2015 Harley-Davidson Touring Models
Electrical Diagnostic Manual

99497-15

IMPORTANT NOTICE

Harley-Davidson motorcycles conform to all applicable U.S.A. Federal Motor Vehicle Safety Standards and U.S.A. Environmental Protection Agency regulations effective on the date of manufacture.

To maintain the safety, dependability, and emission and noise control performance, it is essential that the procedures, specifications and service instructions in this manual are followed.

Any substitution, alteration or adjustment of emission system and noise control components outside of factory specifications may be prohibited by law.

Harley-Davidson Motor Company

2015 Harley-Davidson Touring Models Electrical Diagnostic Manual

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Printed in the U.S.A.

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http://www.harley-davidson.com

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2015 Harley-Davidson Touring Models Electrical Diagnostic Manual (99497-15)

Please clip out and mail to:
Service Communications Department
Harley-Davidson Motor Company
P.O. Box 653
Milwaukee, WI USA 53201

NOTES

ABOUT THIS MANUAL

GENERAL

⚠WARNING

The rider's safety depends upon proper motorcycle service and maintenance. If a procedure in this manual is not within your capabilities or you do not have the correct tools, have a Harley-Davidson dealer perform the procedure. Improper service or maintenance could result in death or serious injury. (00627b)

This electrical diagnostic manual has been prepared with two purposes in mind. First, it will acquaint the user with the construction of the Harley-Davidson product and assist in the performance of repair. Secondly, it will introduce to the professional Harley-Davidson Technician the latest field-tested and factory-approved diagnostic methods. We sincerely believe that this manual will make your association with Harley-Davidson products more pleasant and profitable.

HOW TO USE YOUR MANUAL

Refer to the table below for the content layout of this manual.

NO.	CHAPTER
1	Initial Diagnostics
2	Serial Data
3	Starting and Charging
4	Instruments
5	Accessories, Horn, Lighting and Security
6	Engine Management
7	ABS
8	Audio System
A	Appendix A Connector Repair
B	Appendix B Wiring
C	Appendix C Reference

Use the TABLE OF CONTENTS (which follows this FOREWORD) and the INDEX (at the back of this manual) to quickly locate subjects. Chapters and topics in this manual are sequentially numbered for easy navigation.

For example, a cross-reference shown as **2.2 SPECIFICATIONS** refers to chapter 2 CHASSIS, heading 2.2 SPECIFICATIONS.

For quick and easy reference, all pages contain a chapter number followed by a page number. For example, **page 3-5** refers to page 5 in Chapter 3.

A number of acronyms and abbreviations are used in this document. See the C.4 GLOSSARY for a list of acronyms, abbreviations and definitions.

PREPARATION FOR SERVICE

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

⚠WARNING

Stop the engine when refueling or servicing the fuel system. Do not smoke or allow open flame or sparks near gasoline. Gasoline is extremely flammable and highly explosive, which could result in death or serious injury. (00002a)

Good preparation is very important for efficient service work. Start each job with a clean work area. This will allow the repair to proceed as smoothly as possible. It will also reduce the incidence of misplaced tools and parts.

Clean a motorcycle that is excessively dirty before work starts. Cleaning will occasionally uncover sources of trouble. Gather any tools, instruments and any parts needed for the job before work begins. Interrupting a job to locate tools or parts is a distraction and causes needless delay.

NOTES

- *To avoid unnecessary disassembly, carefully read all related service information before repair work begins.*
- *In figure legends, the number which follows the name of a part indicates the quantity necessary for one complete assembly.*
- *When servicing a vehicle equipped with the Harley-Davidson Smart Security System (H-DSSS), first disarm the system. Keep the fob close to the vehicle or use DIGITAL TECHNICIAN II (Part No. HD-48650) to disable the system. Activate the system after service is completed.*

SERVICE BULLETINS

In addition to the information presented in this manual, Harley-Davidson Motor Company will periodically issue service bulletins to Harley-Davidson dealers. Service bulletins cover interim engineering changes and supplementary information. Consult the service bulletins to keep your product knowledge current and complete.

USE GENUINE REPLACEMENT PARTS

⚠WARNING

Harley-Davidson parts and accessories are designed for Harley-Davidson motorcycles. Using non-Harley-Davidson parts or accessories can adversely affect performance, stability or handling, which could result in death or serious injury. (00001b)

To achieve satisfactory and lasting repairs, carefully follow the service manual instructions and use only genuine Harley-Davidson replacement parts. Behind the emblem bearing the words GENUINE HARLEY-DAVIDSON stand more than 100 years of design, research, manufacturing, testing and inspecting experience. This is your assurance that the parts you are using will fit right, operate properly and last longer.

WARNINGS AND CAUTIONS

Statements in this manual preceded by the following words are of special significance.

⚠WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. (00119a)

⚠CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. (00139a)

NOTICE

NOTICE indicates a potentially hazardous situation which, if not avoided, may result in property damage. (00140b)

NOTE

Refers to important information. It is recommended that you take special notice of these items.

Proper service and repair are important for the safe, reliable operation of all mechanical products. The service procedures recommended and described in this manual are effective methods for performing service operations.

⚠WARNING

Always wear proper eye protection when using hammers, arbor or hydraulic presses, gear pullers, spring compressors, slide hammers and similar tools. Flying parts could result in death or serious injury. (00496b)

Some of these service operations require the use of tools specially designed for the purpose. These special tools should be used when and as recommended. It is important to note that some warnings against the use of specific service methods, which could damage the motorcycle or render it unsafe, are stated in this manual. However, remember that these warnings are not all-inclusive. Inadequate safety precautions could result in death or serious injury.

Since Harley-Davidson could not possibly know, evaluate or advise the service trade of all possible ways in which service might be performed, or of the possible hazardous consequences of each method, we have not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by Harley-Davidson must first thoroughly satisfy himself that neither his nor the operator's safety will be jeopardized as a result. Failure to do so could result in death or serious injury.

PRODUCT REFERENCES

⚠WARNING

Read and follow warnings and directions on all products. Failure to follow warnings and directions can result in death or serious injury. (00470b)

When reference is made in this manual to a specific brand name product, tool or instrument, an equivalent product, tool or instrument may be substituted.

Special Tools

All tools mentioned in this manual with a part number beginning with "HD", "J" or "B" must be ordered through your local Harley-Davidson dealer. Special tools may only be purchased, serviced or warrantied through a Harley-Davidson dealer.

LOCTITE Sealing and THREADLOCKING Products

Some procedures in this manual call for the use of LOCTITE products. If you have any questions regarding LOCTITE product usage or retailer/wholesaler locations, contact Loctite Corp. at www.loctite.com.

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CONTENTS

All photographs, illustrations and procedures may not necessarily depict the most current model or component, but are based on the latest production information available at the time of publication.

Since product improvement is our continual goal, Harley-Davidson reserves the right to change specifications, equipment or designs at any time without notice and without incurring obligation.

INITIAL DIAGNOSTICS

1.1 SPECIFICATIONS

1.2 INITIAL DIAGNOSTICS

1.3 DIAGNOSTIC TOOLS

1.4 DIAGNOSTICS AND TROUBLESHOOTING

SERIAL DATA

2.1 CAN COMMUNICATION

2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274

TABLE OF CONTENTS

3.3 STARTER OUTPUT DTCS

3.4 TESTING STARTER ON MOTORCYCLE

3.5 TESTING STARTER ON BENCH

3.6 CHARGING SYSTEM

3.7 ABS VOLTAGE DIAGNOSTICS

3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS

TABLE OF CONTENTS

4.5 INDICATOR LAMPS

4.6 GAUGES

ACCESSORIES, HORN, LIGHTING AND SECURITY

5.1 ACC CIRCUIT DIAGNOSTICS

5.2 HEATED HANDGRIPS

5.3 CRUISE CONTROL

5.9 STOP LAMP DIAGNOSTICS

5.10 BRAKE SWITCH DIAGNOSTICS

5.11 SWITCH DIAGNOSTICS

5.12 RUNNING LAMP DIAGNOSTICS

5.13 SECURITY SYSTEM

TABLE OF CONTENTS

5.14 KEY FOB

5.15 SIREN

5.16 SERVICE AND EMERGENCY FUNCTIONS AND CONFIGURATIONS

5.17 ALARM DIAGNOSTICS

5.18 SECURITY ANTENNA DIAGNOSTICS

5.19 NEUTRAL SWITCH DIAGNOSTICS

5.20 ADDITIONAL OUTPUT DIAGNOSTICS

ENGINE MANAGEMENT

6.1 EFI SYSTEM

6.2 ELECTRONIC CONTROL MODULE

6.3 SENSORS AND DRIVERS

6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS

6.5 FUEL PUMP DIAGNOSTICS

6.6 AAT SENSOR DIAGNOSTICS

6.7 TMAP SENSOR DIAGNOSTICS

6.8 ET SENSOR DIAGNOSTICS

TABLE OF CONTENTS

6.12 CKP SENSOR DIAGNOSTICS

6.13 PURGE SOLENOID DIAGNOSTICS

6.14 VSS DIAGNOSTICS

6.15 IDLE SPEED CONTROL DIAGNOSTICS

6.16 ECM INTERNAL DIAGNOSTICS

6.17 5V REFERENCE DIAGNOSTICS

6.18 COOLING RELAY DIAGNOSTICS

6.19 DTC P1009

6.20 DTC P1017

TABLE OF CONTENTS

6.21 ECT SENSOR DIAGNOSTICS

6.22 DTC P1270

6.23 COMBUSTION EFFICIENCY DIAGNOSTICS

6.24 EXHAUST ACTUATOR DIAGNOSTICS

6.25 JSS DIAGNOSTICS

6.26 ETC MANAGMENT DIAGNOSTICS

6.27 ETC ERROR DIAGNOSTICS

6.28 ACR DIAGNOSTICS

6.29 COOLING FAN DIAGNOSTICS

6.30 ETC ACTUATOR DIAGNOSTICS

6.31 DTC P2105, P2107

6.32 DTC P2119

6.33 TGS DIAGNOSTICS

6.34 CORRELATION ERROR DIAGNOSTICS

7.4 INVALID VIN DIAGNOSTICS

7.5 ABS INDICATOR ALWAYS ON, FLASHING OR INOPERATIVE

AUDIO SYSTEM

8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS

8.2 AUDIO VOLTAGE DIAGNOSTICS

8.3 FACEPLATE BUTTON DIAGNOSTICS

8.4 FRONT HAND CONTROLS DIAGNOSTICS

8.5 REAR AUDIO CONTROL DIAGNOSTICS

8.6 FRONT SPEAKER DIAGNOSTICS

8.7 REAR SPEAKER DIAGNOSTICS

8.8 DTC B1353

8.9 ANTENNA DTCS

8.10 HEADSET DTCS

8.11 DTC B1366

8.12 AUDIO SYSTEM SYMPTOMS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

8.13 AMPLIFIER 1 DTCS

8.14 AMPLIFIER 2 DTCS

TABLE OF CONTENTS

TABLE OF CONTENTS

NOTES

SPECIFICATIONS 1.1

SPECIFICATIONS

Table 1-1. Fuel System Specifications

FUEL SYSTEM	TYPE
Intake	Side draft throttle body
Recommended fuel	91 Octane

Table 1-2. Idle Speed Specifications

ADJUSTMENT	RPM
Normal idle speed	950-1050 Nominal, non-adjustable

Table 1-3. Battery Specifications

BATTERY	SPECIFICATIONS
Size	12V/28 AH/405CCA
Type	Sealed, AGM

Table 1-4. Spark Plug Specifications

SPARK PLUG	SPECIFICATIONS	
Gap	0.038-0.043 in.	0.97-1.09 mm
Torque with anti-seize applied to threads	12-18 ft-lbs	16.3-24.4 Nm
Type	Harley-Davidson No. 6R12	

Table 1-5. Spark Plug Cables

SPECIFICATION	FRONT	REAR
Length in.	34.5-35	16.5-17
Length mm	876-889	419-431
Resistance-ohms	8625-23,334	4125-11,334

Table 1-6. Ignition Coil Specifications

WINDING	RESISTANCE
Primary resistance	0.3-1.5 Ohm
Secondary resistance	5500-7500 Ohms

Table 1-7. Starter Specifications

STARTER	SPECIFICATIONS
Cranking current	200A
Free speed	3000 rpm (min)
Free current	90A
Stall torque	8.0 ft-lbs (10.8 Nm)

Table 1-8. Fuel Pump Pressure Specifications

RANGE	VALUE
Normal	55-62 psi (380-425 kPA)

Table 1-9. Alternator Specifications

MEASUREMENT	VALUE
AC voltage output	16-23 VAC per 1000 rpm
Stator coil resistance	0.1-0.2 Ohm

Table 1-10. Regulator Specifications

MEASUREMENT	VALUE
Amperes @ 3000 rpm	35-50A
Voltage @ 3600 rpm	14.3-14.7V @ 75 °F (24 °C)

Table 1-11. Fuse Specifications

ITEM	RATING (AMPERES)
Battery fuse	5
System power fuse	7.5
Radio fuse	20
Spare fuse	5
Cooling fuse	10
P&A fuse	20
Spare fuse	7.5
Spare fuse	20
Amp fuse (if equipped)	30
Main fuse	50

INITIAL DIAGNOSTICS 1.2

DESCRIPTION AND OPERATION

Use initial diagnostics as a starting point to efficiently troubleshoot concerns. A basic understanding of electronics and a general knowledge of the vehicle are necessary to effectively use this manual.

NOTE

Certain diagnostic procedures require part removal. See the service manual for details.

Before diagnosing a concern, perform a general functional test of the vehicle to verify the concern. This will also identify any other issues that may affect diagnostics. Use the procedures in this chapter for initial diagnostics.

NOTE

When working through a diagnostic procedure follow the steps in the order instructed. Never jump to a test in another procedure. All "Go to test" statements refer to a test in that procedure.

INITIAL DIAGNOSTICS

1. Fuse Test

1. Verify all fuses are good.
2. Are all fuses good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace fuse. If fuse opens again, repair short to ground in that circuit.

2. Current DTC Test

1. Check for current DTCs. See 1.2 INITIAL DIAGNOSTICS, Odometer Self-Diagnostics.

NOTE

Historic DTCs are not to be diagnosed unless the condition is reoccurring and intermittent.

2. Are current DTCs present?
   a. **Yes.** Refer to Table 1-12.
   b. **No.** Go to Test 3.

3. Odometer Function Test

1. Enter odometer self-diagnostics.
2. Did odometer self-diagnostics mode function properly?
   a. **Yes.** Refer to Table 1-13.
   b. **No.** Go to Test 4.

4. Odometer Inoperative Test

1. Turn IGN ON.
2. Does the odometer display illuminate?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 5.

5. Battery Power Test

1. Turn IGN/engine stop switch ON.
2. Does headlamp and/or tail lamp illuminate?
   a. **Yes.** Go to Test 6.
   b. **No.** Verify battery condition and connections. If all are good, see 2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, No Vehicle Power: DTC U0140.

6. Starter Test

1. Attempt to start vehicle.
2. Does starter crank?
   a. **Yes.** See 4.1 INSTRUMENTS.
   b. **No.** See 2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274.

7. LHCM Test

1. With IGN ON, operate all left hand control functions.
2. Do any left hand controls function properly?
   a. **Yes.** All controls are operational except the trip switch. See 4.3 TRIP ODOMETER SWITCH DIAGNOSTICS.
   b. **No.** All left hand control functions are inoperative. See 2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, Left Hand Controls Inoperative: DTC U0141.

DIAGNOSTICS

Diagnostic Tips

- The trip odometer reset switch is located in the left hand control module. The switch signal is sent to the speedometer over the CAN bus. Therefore, if there is a problem with the CAN bus, the odometer self-diagnostic mode may not function.
- For a quick check of instrument function, perform a "WOW" test by entering odometer self-diagnostics. Background lighting will illuminate, gauge needles will sweep their full range of motion and all indicator lamps controlled by the CAN circuit will illuminate.
- If the instrument fails "WOW" test, check for battery power and ground to the instrument. If any feature in the speedometer is non-functional, see 4.1 INSTRUMENTS.

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
B1103	30	LHCM internal error	5.11 SWITCH DIAGNOSTICS
B1153	29	RHCM internal error	5.11 SWITCH DIAGNOSTICS
B1200	19	IM internal fault	4.4 NO INSTRUMENT POWER DIAGNOSTICS
B1212	145	Fuel signal low	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS
B1213	146	Fuel signal high	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS
B1300	285	Radio voltage high	8.2 AUDIO VOLTAGE DIAGNOSTICS
B1301	286	Radio voltage low	8.2 AUDIO VOLTAGE DIAGNOSTICS
B1302	287	Faceplate home button stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1303	288	Faceplate favorite button stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1304	289	Faceplate navigation button stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1305	290	Faceplate power/mute button stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1306	344	Rear hand controls shorted high	8.5 REAR AUDIO CONTROL DIAGNOSTICS
B1307	345	Rear hand controls shorted low	8.5 REAR AUDIO CONTROL DIAGNOSTICS
B1308	346	Rear volume up button stuck	8.5 REAR AUDIO CONTROL DIAGNOSTICS
B1309	347	Rear volume down button stuck	8.5 REAR AUDIO CONTROL DIAGNOSTICS
B1310	348	Rear mode button stuck	8.5 REAR AUDIO CONTROL DIAGNOSTICS
B1311	349	Rear PTT button stuck	8.5 REAR AUDIO CONTROL DIAGNOSTICS
B1312	350	Rear tune up button stuck	8.5 REAR AUDIO CONTROL DIAGNOSTICS
B1313	351	Rear tune down button stuck	8.5 REAR AUDIO CONTROL DIAGNOSTICS
B1314	291	LHCM VR button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1315	292	LHCM up button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1316	293	LHCM left button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1317	294	LHCM center button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1318	295	LHCM right button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1319	296	LHCM down button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1320	297	RHCM info button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1321	298	RHCM up button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1322	299	RHCM left button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1323	300	RHCM center button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1324	301	RHCM right button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1325	302	RHCM down button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1326	303	RHCM CB squelch up button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1327	304	RHCM CB PTT button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1328	305	RHCM CB squelch down button stuck	8.4 FRONT HAND CONTROLS DIAGNOSTICS
B1329	306	Faceplate preset button 1 stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1330	307	Faceplate preset button 2 stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1331	308	Faceplate preset button 3 stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1332	309	Faceplate preset button 4 stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1333	310	Faceplate preset button 5 stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
B1334	311	Faceplate preset button 6 stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1335	312	Faceplate preset button 7 stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1336	313	Faceplate preset button 8 stuck	8.3 FACEPLATE BUTTON DIAGNOSTICS
B1337	314	Front left speaker shorted together	8.6 FRONT SPEAKER DIAGNOSTICS
B1338	315	Front left speaker open	8.6 FRONT SPEAKER DIAGNOSTICS
B1339	316	Front left speaker shorted low	8.6 FRONT SPEAKER DIAGNOSTICS
B1340	317	Front left speaker shorted high	8.6 FRONT SPEAKER DIAGNOSTICS
B1341	318	Rear left speaker shorted together	8.7 REAR SPEAKER DIAGNOSTICS
B1342	319	Rear left speaker open	8.7 REAR SPEAKER DIAGNOSTICS
B1343	320	Rear left speaker shorted low	8.7 REAR SPEAKER DIAGNOSTICS
B1344	321	Rear left speaker shorted high	8.7 REAR SPEAKER DIAGNOSTICS
B1345	322	Front right speaker shorted together	8.6 FRONT SPEAKER DIAGNOSTICS
B1346	323	Front right speaker open	8.6 FRONT SPEAKER DIAGNOSTICS
B1347	324	Front right speaker shorted low	8.6 FRONT SPEAKER DIAGNOSTICS
B1348	325	Front right speaker shorted high	8.6 FRONT SPEAKER DIAGNOSTICS
B1349	326	Rear right speaker shorted together	8.7 REAR SPEAKER DIAGNOSTICS
B1350	327	Rear right speaker open	8.7 REAR SPEAKER DIAGNOSTICS
B1351	328	Rear right speaker shorted low	8.7 REAR SPEAKER DIAGNOSTICS
B1352	329	Rear right speaker shorted high	8.7 REAR SPEAKER DIAGNOSTICS
B1353	330	Speaker output DC offset	8.8 DTC B1353
B1354	331	GPS antenna open	8.9 ANTENNA DTCS
B1355	332	GPS antenna shorted low	8.9 ANTENNA DTCS
B1356	333	SDARS antenna open	8.9 ANTENNA DTCS
B1357	334	SDARS antenna shorted	8.9 ANTENNA DTCS
B1358	335	Front left headset shorted high	8.10 HEADSET DTCS
B1359	336	Front right headset shorted high	8.10 HEADSET DTCS
B1360	337	Front left headset shorted low	8.10 HEADSET DTCS
B1361	338	Front right headset shorted low	8.10 HEADSET DTCS
B1362	339	Rear left headset shorted high	8.10 HEADSET DTCS
B1363	340	Rear right headset shorted high	8.10 HEADSET DTCS
B1364	341	Rear left headset shorted low	8.10 HEADSET DTCS
B1365	342	Rear right headset shorted low	8.10 HEADSET DTCS
B1366	343	Internal thermal shutdown error	8.11 DTC B1366
B1401	352	Amp voltage low	8.2 AUDIO VOLTAGE DIAGNOSTICS
B1402	353	Amp voltage high	8.2 AUDIO VOLTAGE DIAGNOSTICS
B1403	354	Speaker output DC offset	8.13 AMPLIFIER 1 DTCS
B1404	355	Internal thermal shutdown error	8.13 AMPLIFIER 1 DTCS
B1405	370	EQ correlation error	8.12 AUDIO SYSTEM SYMPTOMS
B1406	373	Invalid or missing EQ	8.12 AUDIO SYSTEM SYMPTOMS
B1410	356	Channel 1 speaker open	8.13 AMPLIFIER 1 DTCS

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
B1411	357	Channel 1 speaker shorted low	8.13 AMPLIFIER 1 DTCS
B1412	358	Channel 1 speaker shorted high	8.13 AMPLIFIER 1 DTCS
B1413	359	Channel 1 speaker shorted together	8.13 AMPLIFIER 1 DTCS
B1420	360	Channel 2 speaker open	8.13 AMPLIFIER 1 DTCS
B1421	361	Channel 2 speaker shorted low	8.13 AMPLIFIER 1 DTCS
B1422	362	Channel 2 speaker shorted high	8.13 AMPLIFIER 1 DTCS
B1423	363	Channel 2 speaker shorted together	8.13 AMPLIFIER 1 DTCS
B1430	364	Channel 3 speaker open	8.13 AMPLIFIER 1 DTCS
B1431	365	Channel 3 speaker shorted low	8.13 AMPLIFIER 1 DTCS
B1432	366	Channel 3 speaker shorted high	8.13 AMPLIFIER 1 DTCS
B1433	367	Channel 3 speaker shorted together	8.13 AMPLIFIER 1 DTCS
B1440	368	Channel 4 speaker open	8.13 AMPLIFIER 1 DTCS
B1441	369	Channel 4 speaker shorted low	8.13 AMPLIFIER 1 DTCS
B1442	370	Channel 4 speaker shorted high	8.13 AMPLIFIER 1 DTCS
B1443	371	Channel 4 speaker shorted together	8.13 AMPLIFIER 1 DTCS
B2102	31	System power output shorted high	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS
B2103	32	System power output shorted low	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS
B2104	39	System power output over-loaded	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS
B2106	225	L4 output open	5.8 HEADLAMP DIAGNOSTICS
B2107	193	L4 output shorted high	5.8 HEADLAMP DIAGNOSTICS
B2108	194	L4 output shorted low	5.8 HEADLAMP DIAGNOSTICS
B2109	195	L4 output overloaded	5.8 HEADLAMP DIAGNOSTICS
B2112	109	ACC output shorted high	5.1 ACC CIRCUIT DIAGNOSTICS
B2113	111	ACC output shorted low	5.1 ACC CIRCUIT DIAGNOSTICS
B2114	113	ACC output overloaded	5.1 ACC CIRCUIT DIAGNOSTICS
B2116	78	Fuel pump output open	6.5 FUEL PUMP DIAGNOSTICS
B2117	79	Fuel pump output shorted high	6.5 FUEL PUMP DIAGNOSTICS
B2118	80	Fuel pump output shorted low	6.5 FUEL PUMP DIAGNOSTICS
B2119	81	Fuel pump output overloaded	6.5 FUEL PUMP DIAGNOSTICS
B2121	43	Starter output open	3.3 STARTER OUTPUT DTCS
B2122	44	Starter output shorted high	3.3 STARTER OUTPUT DTCS
B2123	45	Starter output shorted low	3.3 STARTER OUTPUT DTCS
B2124	46	Starter output overloaded	3.3 STARTER OUTPUT DTCS
B2127	211	E4 output shorted high	5.4 HORN DIAGNOSTICS
B2128	212	E4 output shorted low	5.4 HORN DIAGNOSTICS
B2129	213	E4 output overloaded	5.4 HORN DIAGNOSTICS
B2132	202	High beam output shorted high	5.8 HEADLAMP DIAGNOSTICS
B2133	203	High beam output shorted low	5.8 HEADLAMP DIAGNOSTICS

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
B2134	204	High beam output overloaded	5.8 HEADLAMP DIAGNOSTICS
B2137	198	Low beam output shorted high	5.8 HEADLAMP DIAGNOSTICS
B2138	199	Low beam output shorted low	5.8 HEADLAMP DIAGNOSTICS
B2139	200	Low beam output overloaded	5.8 HEADLAMP DIAGNOSTICS
B2141	175	Left front turn signal output open	5.6 FRONT TURN SIGNAL DIAGNOSTICS
B2143	182	Left front turn signal output shorted low	5.6 FRONT TURN SIGNAL DIAGNOSTICS
B2144	183	Left front turn signal output overloaded	5.6 FRONT TURN SIGNAL DIAGNOSTICS
B2146	184	Right front turn signal output open	5.6 FRONT TURN SIGNAL DIAGNOSTICS
B2148	185	Right front turn signal output shorted low	5.6 FRONT TURN SIGNAL DIAGNOSTICS
B2149	186	Right front turn signal output overloaded	5.6 FRONT TURN SIGNAL DIAGNOSTICS
B2151	187	Left rear turn signal output open	5.7 REAR TURN SIGNAL DIAGNOSTICS
B2153	188	Left rear turn signal output shorted low	5.7 REAR TURN SIGNAL DIAGNOSTICS
B2154	189	Left rear turn signal output overloaded	5.7 REAR TURN SIGNAL DIAGNOSTICS
B2156	190	Right rear turn signal output open	5.7 REAR TURN SIGNAL DIAGNOSTICS
B2158	191	Right rear turn signal output shorted low	5.7 REAR TURN SIGNAL DIAGNOSTICS
B2159	192	Right rear turn signal output overloaded	5.7 REAR TURN SIGNAL DIAGNOSTICS
B2161	166	Brake lamp output open	5.9 STOP LAMP DIAGNOSTICS
B2163	167	Brake lamp output shorted low	5.9 STOP LAMP DIAGNOSTICS
B2164	168	Brake lamp output overloaded	5.9 STOP LAMP DIAGNOSTICS
B2168	142	Running lights output shorted low	5.12 RUNNING LAMP DIAGNOSTICS
B2169	143	Running lights output over-loaded	5.12 RUNNING LAMP DIAGNOSTICS
B2172	205	H2 output shorted high	5.17 ALARM DIAGNOSTICS
B2173	206	H2 output shorted low	5.17 ALARM DIAGNOSTICS
B2176	207	Security antenna output open	5.18 SECURITY ANTENNA DIAGNOSTICS
B2177	208	Security antenna output shorted high	5.18 SECURITY ANTENNA DIAGNOSTICS
B2178	209	Security antenna output shorted low	5.18 SECURITY ANTENNA DIAGNOSTICS
B2183	219	G2 output shorted low	5.20 ADDITIONAL OUTPUT DIAGNOSTICS
B2188	222	G3 output shorted low	5.20 ADDITIONAL OUTPUT DIAGNOSTICS
B2193	224	H4 output shorted low	5.20 ADDITIONAL OUTPUT DIAGNOSTICS
B2198	227	H3 output shorted low	5.20 ADDITIONAL OUTPUT DIAGNOSTICS
B2201	37	IGN switch off w/VSS	3.9 IGN SWITCH DIAGNOSTICS
B2203	35	Ignition switch input shorted low	3.9 IGN SWITCH DIAGNOSTICS

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
B2206	36	Run/stop switch input open/shorted high	3.10 ENGINE STOP SWITCH DIAGNOSTICS
B2208	38	Run/stop switch input shorted low	3.10 ENGINE STOP SWITCH DIAGNOSTICS
B2210	40	Run/stop switch inputs both open	5.11 SWITCH DIAGNOSTICS
B2212	41	Run/stop switch inputs both closed	5.11 SWITCH DIAGNOSTICS
B2218	108	Neutral switch shorted low	5.19 NEUTRAL SWITCH DIAGNOSTICS
B2223	165	Rear brake switch shorted low (light on)	5.9 STOP LAMP DIAGNOSTICS
B2226	215	BAS input open	BCM not configured properly.
B2228	218	BAS input shorted low	BCM not configured properly.
B2231	268	Fork locked w/VSS	BCM not configured properly. This DTC should only apply to CVO models.
B2232	269	Fork lock shorted high	BCM not configured properly. This DTC should only apply to CVO models.
B2233	270	Fork lock shorted low	BCM not configured properly. This DTC should only apply to CVO models.
B2234	271	Fork lock detected w/option disabled	BCM not configured properly. This DTC should only apply to CVO models.
B2235	272	Fork lock configuration invalid	BCM not configured properly. This DTC should only apply to CVO models.
B2250	107	Clutch switch stuck	5.11 SWITCH DIAGNOSTICS
B2251	210	Horn switch stuck	5.11 SWITCH DIAGNOSTICS
B2253	196	FTP switch stuck	5.11 SWITCH DIAGNOSTICS
B2254	171	Left turn switch stuck	5.11 SWITCH DIAGNOSTICS
B2255	214	Trip switch stuck	4.3 TRIP ODOMETER SWITCH DIAGNOSTICS
B2256	176	LHCM police siren power stuck	BCM not configured properly. This DTC should only apply to Police models.
B2257	177	LHCM police siren wail power stuck	BCM not configured properly. This DTC should only apply to Police models.
B2258	178	LHCM police siren yelp stuck	BCM not configured properly. This DTC should only apply to Police models.
B2260	42	Start switch stuck	5.11 SWITCH DIAGNOSTICS
B2261	172	Right turn switch stuck	5.11 SWITCH DIAGNOSTICS
B2262	164	Front brake switch stuck	5.11 SWITCH DIAGNOSTICS
B2263	170	Hazard switch stuck	5.11 SWITCH DIAGNOSTICS
B2264	179	RHCM police lights power switch stuck	BCM not configured properly. This DTC should only apply to Police models.
B2265	180	RHCM police lights front switch stuck	BCM not configured properly. This DTC should only apply to Police models.
B2266	181	RHCM police lights rear switch stuck	BCM not configured properly. This DTC should only apply to Police models.
B2267	392	RHCM police ICR switch stuck	BCM not configured properly. This DTC should only apply to Police models.
B2270	12	BCM internal error	5.11 SWITCH DIAGNOSTICS
B2271	11	BCM voltage low	3.11 BCM VOLTAGE DIAGNOSTICS

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
B2272	16	BCM/IM voltage high	3.11 BCM VOLTAGE DIAGNOSTICS
B2274	34	Constant battery line error	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274
C0562	20	ABS voltage low	3.7 ABS VOLTAGE DIAGNOSTICS
C0563	22	ABS voltage high	3.7 ABS VOLTAGE DIAGNOSTICS
C1014	151	ABS ECU relay error	7.2 INTERNAL FAULT DIAGNOSTICS
C1021	159	ABS front WSS always zero	7.3 WSS DIAGNOSTICS
C1023	160	ABS rear WSS always zero	7.3 WSS DIAGNOSTICS
C1025	162	ABS front wheel speed intermittent	7.3 WSS DIAGNOSTICS
C1027	163	ABS rear wheel speed intermittent	7.3 WSS DIAGNOSTICS
C1029	161	ABS wheel speed difference too high	7.3 WSS DIAGNOSTICS
C1032	157	ABS front wheel speed circuit open/shorted	7.3 WSS DIAGNOSTICS
C1034	158	ABS rear wheel speed circuit open/shorted	7.3 WSS DIAGNOSTICS
C1040	152	ABS pump/motor error	7.2 INTERNAL FAULT DIAGNOSTICS
C1055	21	ABS ECU internal error	7.2 INTERNAL FAULT DIAGNOSTICS
C1061	153	ABS front apply solenoid circuit open/high resistance	7.2 INTERNAL FAULT DIAGNOSTICS
C1062	155	ABS front release solenoid circuit open/high resistance	7.2 INTERNAL FAULT DIAGNOSTICS
C1065	154	ABS rear apply solenoid circuit open/high resistance	7.2 INTERNAL FAULT DIAGNOSTICS
C1066	156	ABS rear release solenoid circuit open/high resistance	7.2 INTERNAL FAULT DIAGNOSTICS
C1071	253	Rear prime valve error	7.2 INTERNAL FAULT DIAGNOSTICS
C1072	254	Rear isolation valve error	7.2 INTERNAL FAULT DIAGNOSTICS
C1073	255	Front isolation valve error	7.2 INTERNAL FAULT DIAGNOSTICS
C1074	256	Front prime valve error	7.2 INTERNAL FAULT DIAGNOSTICS
C1075	257	Front linked inlet valve error	7.2 INTERNAL FAULT DIAGNOSTICS
C1076	258	Front linked outlet valve error	7.2 INTERNAL FAULT DIAGNOSTICS
C1077	259	Front circuit pressure sensor error	7.2 INTERNAL FAULT DIAGNOSTICS
C1078	260	Rear circuit pressure sensor error	7.2 INTERNAL FAULT DIAGNOSTICS
C1081	261	Front master pressure sensor error	7.2 INTERNAL FAULT DIAGNOSTICS
C1082	262	Front master pressure sensor offset error	7.2 INTERNAL FAULT DIAGNOSTICS
C1083	263	Front wheel pressure sensor error	7.2 INTERNAL FAULT DIAGNOSTICS
C1084	264	Front wheel pressure sensor offset error	7.2 INTERNAL FAULT DIAGNOSTICS
C1085	265	Rear master pressure sensor error	7.2 INTERNAL FAULT DIAGNOSTICS

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
C1086	266	Rear master pressure sensor offset error	7.2 INTERNAL FAULT DIAGNOSTICS
C1087	267	Rear wheel pressure sensor error	7.2 INTERNAL FAULT DIAGNOSTICS
C1088	268	Rear wheel pressure sensor offset error	7.2 INTERNAL FAULT DIAGNOSTICS
C1089	269	Pressure sensor external supply error	7.2 INTERNAL FAULT DIAGNOSTICS
C1159	27	ABS invalid stored VIN	7.4 INVALID VIN DIAGNOSTICS
C1178	25	ABS no VIN received from ECM	7.4 INVALID VIN DIAGNOSTICS
C1184	26	ABS invalid VIN from ECM	7.4 INVALID VIN DIAGNOSTICS
C1195	234	Wake up error	7.2 INTERNAL FAULT DIAGNOSTICS
P0031	124	Front HO2S low/open	6.10 HO2S DIAGNOSTICS
P0032	127	Front HO2S shorted/high	6.10 HO2S DIAGNOSTICS
P0051	125	Rear HO2S low/open	6.10 HO2S DIAGNOSTICS
P0052	126	Rear HO2S shorted/high	6.10 HO2S DIAGNOSTICS
P0072	93	AAT sensor low	6.6 AAT SENSOR DIAGNOSTICS
P0073	94	AAT sensor high/open	6.6 AAT SENSOR DIAGNOSTICS
P0107	86	MAP sensor failed low/open	6.7 TMAP SENSOR DIAGNOSTICS
P0108	87	MAP sensor failed high/open port	6.7 TMAP SENSOR DIAGNOSTICS
P0112	102	IAT sensor shorted low	6.7 TMAP SENSOR DIAGNOSTICS
P0113	104	IAT sensor high/open	6.7 TMAP SENSOR DIAGNOSTICS
P0117	88	ET sensor shorted low	6.8 ET SENSOR DIAGNOSTICS
P0118	91	ET sensor high/open	6.8 ET SENSOR DIAGNOSTICS
P0120	59	TPS 1 range error	6.9 TCA DIAGNOSTICS
P0122	60	TPS 1 low	6.9 TCA DIAGNOSTICS
P0123	61	TPS 1 high/open	6.9 TCA DIAGNOSTICS
P0131	128	O2 sensor low/engine lean (front)	6.10 HO2S DIAGNOSTICS
P0132	130	Engine running rich (front)	6.10 HO2S DIAGNOSTICS
P0134	132	Oxygen sensor high/open (front)	6.10 HO2S DIAGNOSTICS
P0151	129	O2 sensor low/engine lean (rear)	6.10 HO2S DIAGNOSTICS
P0152	131	Engine running rich (rear)	6.10 HO2S DIAGNOSTICS
P0154	133	O2 sensor high/open (rear)	6.10 HO2S DIAGNOSTICS
P0220	64	TPS 2 range error	6.9 TCA DIAGNOSTICS
P0222	62	TPS 2 low/open	6.9 TCA DIAGNOSTICS
P0223	63	TPS 2 high	6.9 TCA DIAGNOSTICS
P0261	82	Fuel injector low/open (front)	6.11 FUEL INJECTOR DIAGNOSTICS
P0262	83	Fuel injector shorted high (front)	6.11 FUEL INJECTOR DIAGNOSTICS
P0264	84	Fuel injector low/open (rear)	6.11 FUEL INJECTOR DIAGNOSTICS
P0265	85	Fuel injector shorted high (rear)	6.11 FUEL INJECTOR DIAGNOSTICS

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
P0371	50	CKP sensor wrong number of pulses	6.12 CKP SENSOR DIAGNOSTICS
P0374	49	CKP sensor no pulses	6.12 CKP SENSOR DIAGNOSTICS
P0444	118	Purge solenoid low/open	6.13 PURGE SOLENOID DIAGNOSTICS
P0445	119	Purge solenoid shorted high	6.13 PURGE SOLENOID DIAGNOSTICS
P0502	114	VSS failed low	6.14 VSS DIAGNOSTICS
P0503	115	VSS failed high	6.14 VSS DIAGNOSTICS
P0505	120	Idle speed control - unstable	6.15 IDLE SPEED CONTROL DIAGNOSTICS
P0562	106	ECM voltage low	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS
P0572	169	Brake switch low	5.10 BRAKE SWITCH DIAGNOSTICS
P0577	137	Cruise control input error	5.3 CRUISE CONTROL
P0603	14	ECM EEPROM memory error	6.16 ECM INTERNAL DIAGNOSTICS
P0605	13	ECM FLASH memory error	6.16 ECM INTERNAL DIAGNOSTICS
P0641	47	5 Volt reference out of range	6.17 5V REFERENCE DIAGNOSTICS
P0651	48	5 Volt reference 2 out of range	6.17 5V REFERENCE DIAGNOSTICS
P0691	92	Fan/cooling relay output low/open	6.18 COOLING RELAY DIAGNOSTICS
P0692	95	Fan/cooling relay output high	6.18 COOLING RELAY DIAGNOSTICS
P1009	15	VTD disabled fuel due to bad password	6.19 DTC P1009
P1017	89	ET indicates overheating	6.20 DTC P1017
P1019	90	ECT difference (high temp)	6.21 ECT SENSOR DIAGNOSTICS
P1270	52	TGS 2 A/D validation error	6.22 DTC P1270
P1353	116	No combustion detected (front)	6.23 COMBUSTION EFFICIENCY DIAGNOSTICS
P1356	117	No combustion detected (rear)	6.23 COMBUSTION EFFICIENCY DIAGNOSTICS
P1475	121	Exhaust position actuation error	6.24 EXHAUST ACTUATOR DIAGNOSTICS
P1477	122	Exhaust valve actuator low/open	6.24 EXHAUST ACTUATOR DIAGNOSTICS
P1478	123	Exhaust valve actuator shorted high	6.24 EXHAUST ACTUATOR DIAGNOSTICS
P1501	140	JSS low	6.25 JSS DIAGNOSTICS
P1502	141	JSS high/open	6.25 JSS DIAGNOSTICS
P1510	134	ETC limited performance mode	6.26 ETC MANAGMENT DIAGNOSTICS
P1511	135	ETC power management mode	6.26 ETC MANAGMENT DIAGNOSTICS
P1512	136	ETC forced idle mode	6.26 ETC MANAGMENT DIAGNOSTICS
P1514	72	ETC airflow error	6.27 ETC ERROR DIAGNOSTICS
P1600	51	ETC watchdog error	6.27 ETC ERROR DIAGNOSTICS
P1655	138	ACR solenoid low/open	6.28 ACR DIAGNOSTICS
P1656	139	ACR solenoid shorted high	6.28 ACR DIAGNOSTICS
P1691	96	Cooling fan left low/open	6.29 COOLING FAN DIAGNOSTICS
P1692	97	Cooling fan left shorted high	6.29 COOLING FAN DIAGNOSTICS
P1693	98	Cooling fan right low/open	6.29 COOLING FAN DIAGNOSTICS
P1694	99	Cooling fan right shorted high	6.29 COOLING FAN DIAGNOSTICS
P2100	67	ETC driver open circuit	6.30 ETC ACTUATOR DIAGNOSTICS

Table 1-12. Diagnostic Trouble Codes (DTCs) and Fault Conditions Priority Table

DTC	PRIORITY ORDER	FAULT CONDITION	SOLUTION
P2101	68	ETC actuation error	6.30 ETC ACTUATOR DIAGNOSTICS
P2102	69	ETC driver shorted low	6.30 ETC ACTUATOR DIAGNOSTICS
P2103	70	ETC driver shorted high	6.30 ETC ACTUATOR DIAGNOSTICS
P2105	73	ETC forced shutdown mode	6.31 DTC P2105, P2107
P2107	53	ETC driver internal error	6.31 DTC P2105, P2107
P2119	66	ETC actuator return error	6.32 DTC P2119
P2122	54	TGS 1 low/open	6.33 TGS DIAGNOSTICS
P2123	55	TGS 1 high	6.33 TGS DIAGNOSTICS
P2127	56	TGS 2 low/open	6.33 TGS DIAGNOSTICS
P2128	57	TGS 2 high	6.33 TGS DIAGNOSTICS
P2135	65	TPS correlation error	6.34 CORRELATION ERROR DIAGNOSTICS
P2138	58	TGS correlation error	6.34 CORRELATION ERROR DIAGNOSTICS
P2176	71	ETC zero position learning error	6.35 DTC P2176
P2184	100	ECT sensor low	6.21 ECT SENSOR DIAGNOSTICS
P2185	101	ECT sensor high	6.21 ECT SENSOR DIAGNOSTICS
P2300	74	Ignition coil driver low/open (front)	6.36 IGN COIL DRIVER DIAGNOSTICS
P2301	75	Ignition coil driver shorted high (front)	6.36 IGN COIL DRIVER DIAGNOSTICS
P2303	76	Ignition coil driver low/open (rear)	6.36 IGN COIL DRIVER DIAGNOSTICS
P2304	77	Ignition coil driver shorted high (rear)	6.36 IGN COIL DRIVER DIAGNOSTICS
U0001	1	CAN BUS error	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274
U0002	10	CAN comm bus perf error	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274
U0003	8	Network management monitoring	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
U0100	3	Lost comm w/ECM	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
U0121	7	Lost comm w/ABS	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
U0140	2	Lost comm w/BCM	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
U0141	5	Lost comm w/LHCM	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
U0142	4	Lost comm w/RHCM	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
U0156	6	Lost comm w/speedo	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
U0158	148	Lost comm w/fuel gauge	2.4 SECONDARY COMMUNICATION DIAGNOSTICS
U0159	149	Lost comm w/volt gauge	2.4 SECONDARY COMMUNICATION DIAGNOSTICS
U0160	147	Lost comm w/fuel and volt gauges	2.4 SECONDARY COMMUNICATION DIAGNOSTICS
U0184	278	Lost comm w/radio	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
U0185	280	Lost comm w/AMP 1	2.5 AMP COMMUNICATION DIAGNOSTICS
U0186	281	Lost comm w/AMP 2	2.5 AMP COMMUNICATION DIAGNOSTICS
U1302	279	ACC bus perf error	2.4 SECONDARY COMMUNICATION DIAGNOSTICS
U1401	284	Lost comm w/CB	2.4 SECONDARY COMMUNICATION DIAGNOSTICS

RETRIEVING TROUBLE CODES

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

There are two levels of diagnostics.

- The most sophisticated mode uses a computer-based diagnostic package called DIGITAL TECHNICIAN II (Part No. HD-48650).
- The second mode requires using odometer self-diagnostics. Speedometer, BCM, ECM, tachometer and ABS (if equipped) DTCs can be accessed and cleared.

ODOMETER SELF-DIAGNOSTICS

Diagnostic Mode

1. To enter diagnostic mode, press and hold the trip odometer reset switch located on the left handlebar controls, while turning the IGN ON.

NOTE

The trip odometer reset switch is located in the left hand control module. The switch signal is sent to the speedometer over the CAN bus. Therefore, if there is a problem with the CAN bus, the odometer self-diagnostic mode may not function.

2. Release the trip odometer reset switch. "diag" will appear on odometer display.
3. Press and release trip odometer reset switch. ECM will appear on odometer display. It will have either a "Y" or an "N" after it, depending if there are any ECM codes or not.
4. Quickly press and release trip odometer reset switch to cycle through the modules. Modules include the BCM, SPDO, ABS and RAD.
5. Once the desired module is displayed, press and hold trip odometer reset switch.
6. If any DTCs are stored in the module, the odometer will display the DTC. Quickly pressing and releasing trip odometer reset switch will cycle through stored DTCs.
7. When all DTCs have been cycled the odometer will display "end".
8. To clear all DTCs in that module press and hold trip odometer reset switch, while a DTC is displayed. If DTCs are not to be cleared, quickly press and release trip odometer reset switch. The part number of the module will be displayed.
9. Press and release trip odometer reset switch again to continue to next module.
10. Make note of all DTCs. Clear all DTCs and operate vehicle to verify DTCs set and are current. Historic DTCs are not to be diagnosed unless the condition is reoccurring and intermittent.
11. Turn IGN OFF to exit diagnostic mode. If IGN is not turned off, vehicle will exit diagnostics mode when vehicle starts moving.

CODE TYPES

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

There are two types of DTCs: current and historic. If a DTC is stored, it can be read using a computer-based diagnostic package called DIGITAL TECHNICIAN II (Part No. HD-48650) or odometer self-diagnostics.

NOTES

- *Odometer self-diagnostics will display both current and historic DTCs. To differentiate between current and historic DTCs, use a computer-based diagnostic package called DIGITAL TECHNICIAN II (Part No. HD-48650).*
- *Current DTCs reside in the memory of the ECM, BCM, instruments, radio or ABS module (if equipped) until the DTC is resolved.*
- *DTCs are designated by a P, C, B or U depending on the type of code and what module sets them. The ECM sets "P" codes to indicate issues monitored by the ECM. The ABS module sets "C" codes indicating an issue with ABS on the vehicle. Instruments, radio or BCM can all set "B" codes. All modules set "U" codes when there is an issue causing the modules not to communicate properly.*
- *A historic DTC can be cleared by use of odometer self-diagnostics or after a total of 20 error free ignition cycles (start and run cycle) have elapsed.*

Current

Current DTCs are those which presently disrupt motorcycle operation and are set during the current ignition cycle. To determine current DTCs are present, clear the DTCs and operate the vehicle within the parameters for setting the DTC. See the appropriate diagnostic procedures for solutions.

Historic

If a particular problem happens to resolve itself, the active status problem is dropped and it becomes a historic DTC rather than a current DTC. DTCs will also lose current status when ignition is turned off. If the problem still exists when ignition is turned on, the code will show as current.

Historic DTCs are stored for 20 ignition cycles to assist in diagnosis of intermittent faults. On the 20th error free cycle, the DTC will clear itself.

It is important to note that historic DTCs will exist whenever the system indicates existence of a current fault. See 1.2 INITIAL DIAGNOSTICS, Multiple Trouble Codes if multiple DTCs are found.

Diagnostic procedures are designed for use with current DTCs. As a result, they frequently suggest part replacement. When diagnosing a historic DTC, the procedures can be helpful but should not lead to part replacement without verification that the part is faulty.

MULTIPLE TROUBLE CODES

All DTCs are assigned a priority number to determine the order in which they should be diagnosed. In the event there are multiple DTCs present, always diagnose the highest priority first. Refer to Table 1-12.

After a repair is completed, restore connections, clear DTCs and start vehicle. Perform odometer self-diagnostics test to verify repair and that all DTCs have been cleared. If any DTCs are still present, refer to Table 1-12.

CLEARING DTCS

Clear DTCs after any diagnostic or repair procedure. The odometer is capable of displaying and clearing ECM, BCM, instruments, radio and ABS DTCs. Once DTCs are cleared perform a road test to verify DTCs do not return. It is important to perform a road test and not simply start the motorcycle since some DTCs may require vehicle speed or other inputs in order to validate repair.

SECURITY LAMP

The security lamp functions in the same manner as the check engine lamp, except that it is controlled by the BCM. The security lamp will be turned on when current codes are present in the BCM.

CHECK ENGINE LAMP

To diagnose ECM system problems, start by observing behavior of check engine lamp.

NOTES

- *"IGN ON" means engine stop switch is set to RUN (although engine is **not** running).*
- *When IGN is turned ON, check engine lamp will illuminate for approximately four seconds and then turn off.*
- *If check engine lamp is not illuminated at IGN ON or if it fails to turn off after the initial four-second period, refer to Table 1-12.*

1. See Figure 1-1. After check engine lamp turns off following the first four second illumination period, one of two events may occur.
   a. Lamp remains off. This indicates the ECM did not detect any current fault conditions or stored DTCs.
   b. If lamp illuminates again and remains illuminated, a current DTC exists.
2. See 1.2 INITIAL DIAGNOSTICS, Code Types for a complete description of DTC formats.

NOTE

Some DTCs can only be fully diagnosed during actuation. For example, a problem with the ignition coil will be considered a current fault even after the problem is corrected. The ECM will not know of its resolution until after the coil is exercised by the vehicle start sequence. In this manner, there may sometimes be a false indication of the current DTC.

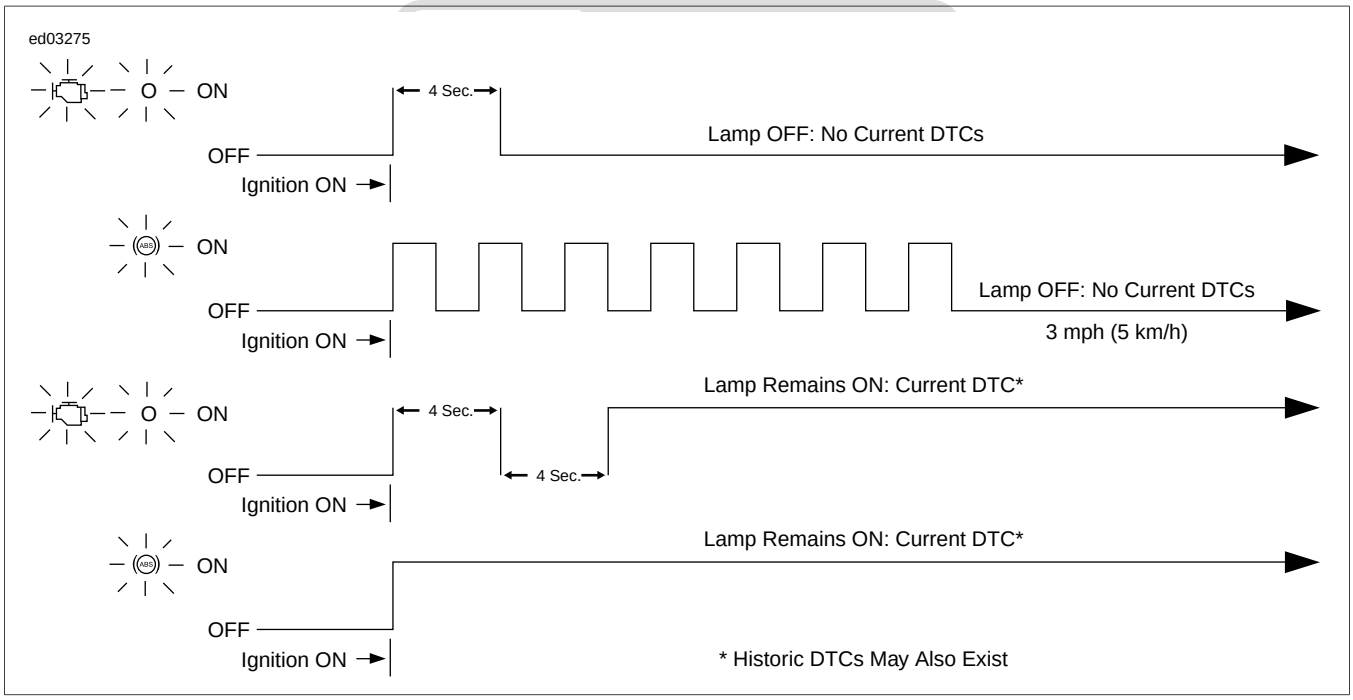


Figure 1-1. Check Engine Lamp and Security Lamp Operation

SYMPTOMS

If no DTCs are present, address any symptoms indicating a malfunction. Refer to Table 1-13 and Table 1-14.

Table 1-13. Symptom Table

CHAPTER	SYMPTOM	DIAGNOSTIC PROCEDURE
Serial Data	Left hand controls inoperative	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
	Odometer self-diagnostics inoperative	1.2 INITIAL DIAGNOSTICS
	Trip switch functions will not enter self-diagnostics	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
	Vehicle power inoperative	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS
Starting and Charging	Battery runs down during use	3.6 CHARGING SYSTEM
	Charging system inoperative	3.6 CHARGING SYSTEM
	Low battery after extended IGN OFF	3.6 CHARGING SYSTEM
	Low or no charging	3.6 CHARGING SYSTEM
	Overcharging	3.6 CHARGING SYSTEM
	Starter does not spin	3.2 STARTING SYSTEM
	Starter solenoid clicks	3.2 STARTING SYSTEM
	Starter spins, but does not engage	3.2 STARTING SYSTEM
	Starter stalls or spins too slowly	3.2 STARTING SYSTEM
Instruments	Fuel gauge inaccurate, no DTCs	4.6 GAUGES
	High beam indicator inoperative	4.5 INDICATOR LAMPS
	Low fuel lamp always on	4.5 INDICATOR LAMPS
	Low fuel lamp flashes at steady rate	Fuel sender DTC set. See 1.2 INITIAL DIAGNOSTICS.
	Low fuel lamp inoperative	4.5 INDICATOR LAMPS
	Neutral lamp always on	4.5 INDICATOR LAMPS
	Neutral lamp inoperative	4.5 INDICATOR LAMPS
	Odometer displays "DIAG" at IGN ON	4.3 TRIP ODOMETER SWITCH DIAGNOSTICS
	Oil pressure lamp always on	4.5 INDICATOR LAMPS
	Oil pressure lamp inoperative	4.5 INDICATOR LAMPS
	Speedometer inoperative	4.1 INSTRUMENTS
	Tachometer does not function	4.1 INSTRUMENTS
	Trip odometer reset switch inoperative	4.3 TRIP ODOMETER SWITCH DIAGNOSTICS
	Turn signal indicator inoperative	4.5 INDICATOR LAMPS
	Voltmeter gauge inoperative	4.6 GAUGES
Accessories, Horn, Lighting and Security	Any hand control switch inoperative	5.11 SWITCH DIAGNOSTICS
	Hand control switch inoperative	5.11 SWITCH DIAGNOSTICS
	P&A battery power inoperative	5.1 ACC CIRCUIT DIAGNOSTICS
	Running lamps inoperative	5.12 RUNNING LAMP DIAGNOSTICS
	Security lamp inoperative	5.13 SECURITY SYSTEM
Engine Management	Engine cranks, but will not start	6.37 ENGINE CRANKS, BUT WILL NOT START
	Hesitation, loss of power	6.38 HESITATION OR LOSS OF POWER
	Misfire at idle or under load	6.40 MISFIRE AT IDLE OR UNDER LOAD
	Starts, then stalls	6.39 STARTS, THEN STALLS

Table 1-13. Symptom Table

CHAPTER	SYMPTOM	DIAGNOSTIC PROCEDURE
ABS	ABS indicator continuously flashing, no DTCs	7.5 ABS INDICATOR ALWAYS ON, FLASHING OR INOPERATIVE
	ABS lamp always on or inoperative, no DTCs	7.5 ABS INDICATOR ALWAYS ON, FLASHING OR INOPERATIVE

Table 1-14. Audio Symptom Table

SYMPTOM	DIAGNOSTIC PROCEDURE
Both left speakers inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
Both left speakers inoperative w/amplifier 2	8.12 AUDIO SYSTEM SYMPTOMS
Both right speakers inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
Both right speakers inoperative w/amplifier 2	8.12 AUDIO SYSTEM SYMPTOMS
CB receiver inoperative	8.12 AUDIO SYSTEM SYMPTOMS
CB transmitter inoperative	8.12 AUDIO SYSTEM SYMPTOMS
Front headset malfunction	8.12 AUDIO SYSTEM SYMPTOMS
PTT inoperative	8.12 AUDIO SYSTEM SYMPTOMS
Handlebar audio/PTT and mode switch malfunction	8.12 AUDIO SYSTEM SYMPTOMS
Left front speaker inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
Left rear speaker pod inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
Left rear speaker pod inoperative w/amplifier 2	8.12 AUDIO SYSTEM SYMPTOMS
Lower left speaker inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
Lower right speaker inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
No or intermittent reception on XM module	8.12 AUDIO SYSTEM SYMPTOMS
No or low audio with high output amplifier	8.12 AUDIO SYSTEM SYMPTOMS
No or low audio from XM or XM inoperative	8.12 AUDIO SYSTEM SYMPTOMS
Passenger's audio/PTT and mode switch malfunction	8.12 AUDIO SYSTEM SYMPTOMS
Poor or no reception	8.12 AUDIO SYSTEM SYMPTOMS
Radio inoperative	8.12 AUDIO SYSTEM SYMPTOMS
Radio soft keys malfunction	8.12 AUDIO SYSTEM SYMPTOMS
Radio turns ON and OFF	8.12 AUDIO SYSTEM SYMPTOMS
Rear audio switch malfunction	8.12 AUDIO SYSTEM SYMPTOMS
Rear headset malfunction	8.12 AUDIO SYSTEM SYMPTOMS
Right front speaker inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
Right rear speaker pod inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS

Table 1-14. Audio Symptom Table

SYMPTOM	DIAGNOSTIC PROCEDURE
Right rear speaker pod inoperative w/amplifier 2	8.12 AUDIO SYSTEM SYMPTOMS
Saddlebag left speaker inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
Saddlebag left speaker inoperative w/amplifier 2	8.12 AUDIO SYSTEM SYMPTOMS
Saddlebag right speaker inoperative w/amplifier 1	8.12 AUDIO SYSTEM SYMPTOMS
Saddlebag right speaker inoperative w/amplifier 2	8.12 AUDIO SYSTEM SYMPTOMS
Static present with engine running	8.12 AUDIO SYSTEM SYMPTOMS

DIAGNOSTIC TOOLS 1.3

HOW TO USE DIAGNOSTIC TOOLS

PART NUMBER	TOOL NAME
GRX-3110 HD	BATTERY DIAGNOSTIC STATION
HD-26792	SPARK TESTER
HD-39617	FLUKE AC/DC CURRENT PROBE
HD-39978	DIGITAL MULTIMETER (FLUKE 78)
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS
HD-47918	BREAKOUT BOX
HD-48650	DIGITAL TECHNICIAN II
HD-50341	WHEEL SPEED SENSOR TEST LEAD
HD-50390-1	BREAKOUT BOX
HD-50390-1-P1	ABS OVERLAY
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY
HD-50390-7	ABS CABLE

GRX-3110 HD Battery Diagnostic Station

See Figure 1-2. Read the BATTERY DIAGNOSTIC STATION (Part No. GRX-3110 HD) instruction manual to perform a battery test. The test results include a decision on the battery condition.

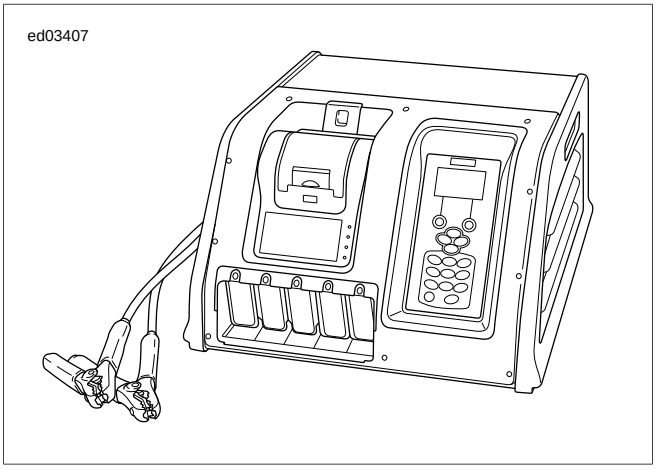


Figure 1-2. Advanced Battery Conductance and Electrical System Analyzer Kit

HD-26792 Spark Tester

See Figure 1-3. SPARK TESTER (Part No. HD-26792) is used to verify adequate spark at spark plug. Attach tester to the spark plug wire and to ground. While cranking engine, a spark should jump across the gap on tester.

NOTE

The coil will not produce spark voltage with both spark plugs removed. When checking for spark, use SPARK TESTER (Part No. HD-26792) with both plugs installed.

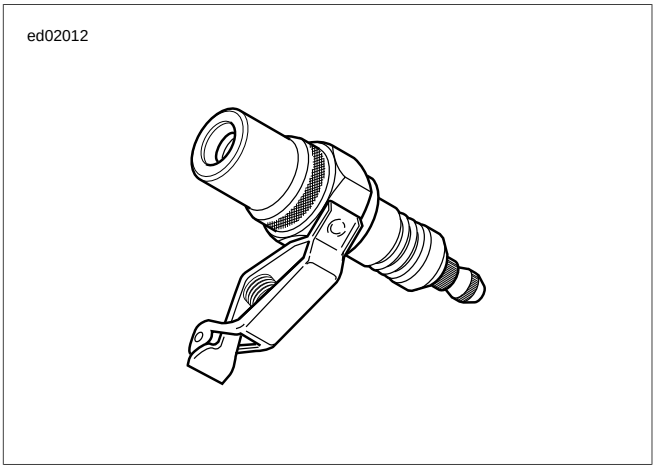


Figure 1-3. Spark Tester

HD-39978 Digital Multimeter (Fluke 78)

See Figure 1-4. DIGITAL MULTIMETER (FLUKE 78) (Part No. HD-39978) is used for various tests throughout this manual.

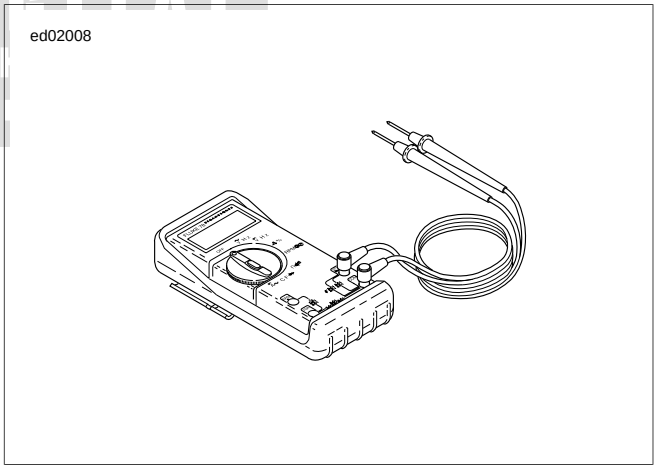


Figure 1-4. Digital Multimeter (Fluke 78)

HD-39617 Fluke AC/DC Current Probe

See Figure 1-5. FLUKE AC/DC CURRENT PROBE (Part No. HD-39617) is used to measure current draw. Use in conjunction with DIGITAL MULTIMETER (FLUKE 78) (Part No. HD-39978).

1. Connect current probe to positive (+) and negative (-) input terminals on the multimeter.
2. Position rotary switch to mV dc (millivolt direct current).
3. Push ON/OFF button and ON indicator will illuminate.
4. With inductive jaws empty, turn the zero adjust so that multimeter reads 0.000 mV.

5. Clamp inductive jaws around the conductor that is being tested.
6. With circuit activated read multimeter display, 1 mV = 1 A.

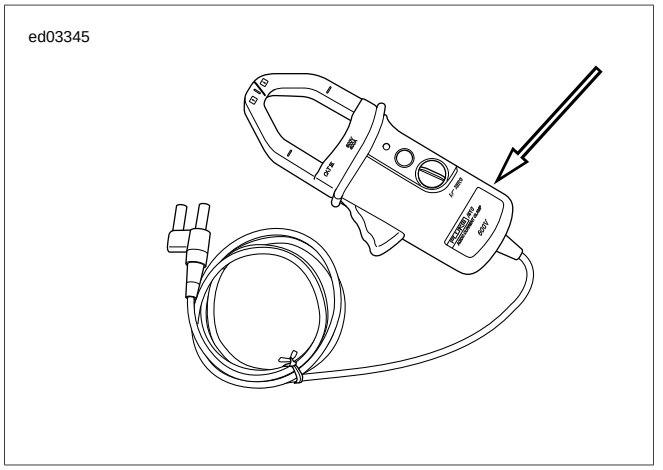


Figure 1-5. Fluke AC/DC Current Probe

HD-41404 Harness Connector Test Kit

HARNESS CONNECTOR TEST KIT (Part No. HD-41404) contains pin and socket terminals and stackable banana jack patch cords used to test circuits. Pin and socket terminals are used to connect to various connectors. See tool instruction sheet for specific terminal usage.

NOTES

- *Insert probe tip straight into the terminal cavity.*
- *Do not wiggle or move the probe tip once it is inserted into the terminal.*
- *Do not use more than one probe per terminal or cavity at one time.*

HD-50341 Wheel Speed Sensor Test Lead

See Figure 1-6. WHEEL SPEED SENSOR TEST LEAD (Part No. HD-50341) is a stackable banana jack patch cord with a built in resistor to test the wheels speed sensor circuit. Used in conjunction with HARNESS CONNECTOR TEST KIT (Part No. HD-41404), connect test lead in place of WSS when required during diagnostics.

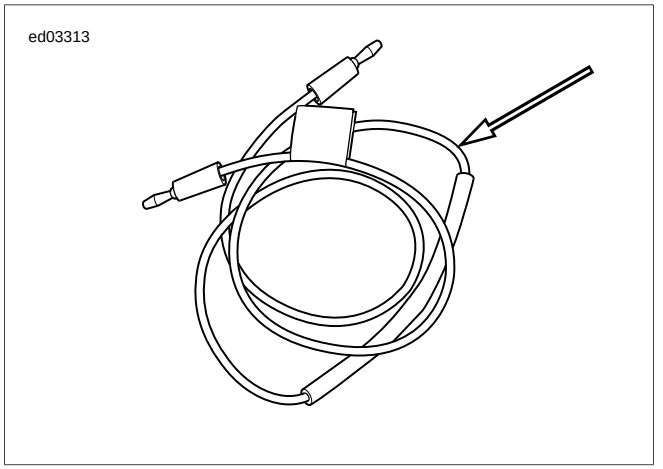
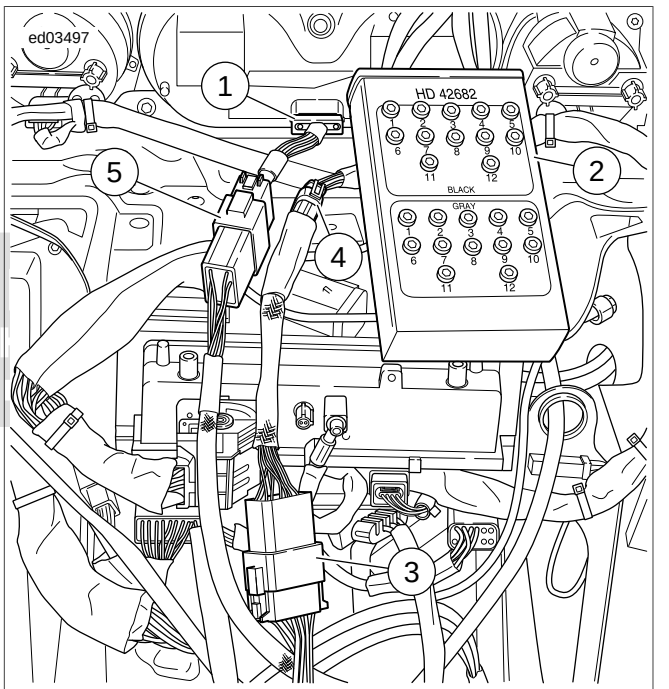


Figure 1-6. Wheel Speed Sensor Test Lead

HD-42682 Breakout Box (Instruments)

BREAKOUT BOX (Part No. HD-42682) and BREAKOUT BOX ADAPTERS (Part No. HD-46601) connect to the IM [39]. Used in conjunction with a multimeter, it allows circuit diagnosis of wiring harness and connections without having to probe with sharp objects. Install BOB in series using black connectors as follows:

1. Access IM [39].
2. See Figure 1-7. Press latch and disconnect [39B].
3. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39A] and [39B].
4. Attach black connectors from BREAKOUT BOX (Part No. HD-42682) to BREAKOUT BOX ADAPTERS (Part No. HD-46601). All tests will be performed using black side of BOB.
5. When testing is complete, remove BOB and jumper harness and restore connections.



1. **IM [39]**
2. **Breakout box HD-42682**
3. **Breakout box harness connector**
4. **Breakout box adapter to harness connector**
5. **Breakout box adapter HD-46601 to IM [39]**

Figure 1-7. Breakout Box Connection

HD-50390-1 Breakout Box (ECM)

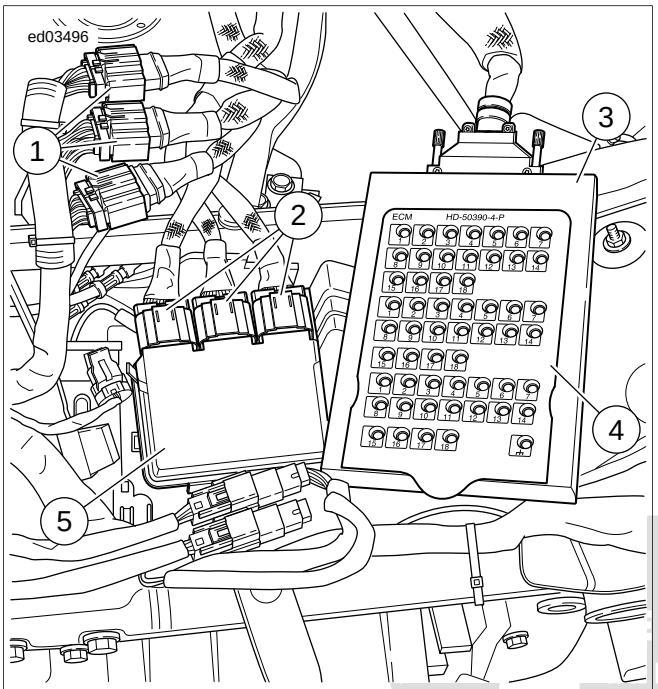
BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) splice into the main harness. Used in conjunction with a multimeter, it allows circuit diagnosis of wiring harness and connections without having to probe with sharp objects. Install BOB in series as follows:

NOTE

See wiring diagrams for ECM terminal functions. ECM is located under left side cover.

1. Access ECM.

2. Press latch and disconnect ECM connectors [78B-1], [78B-2] and [78B-3].
3. See Figure 1-8. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to connectors.
4. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
5. When testing is complete, remove BOB and restore connections.



1. **Wiring harness [78-B]**
2. **ECM [78-A]**
3. **Breakout box**
4. **ECM overlay**
5. **ECM**

Figure 1-8. ECM Breakout Box Connection

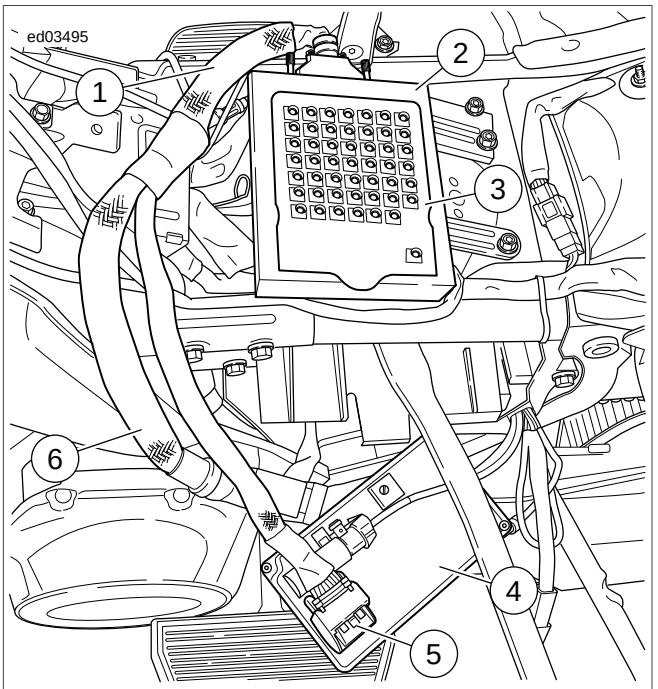
HD-50390-1 Breakout Box (BCM)

BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) splice into the main harness. Used in conjunction with a multimeter, it allows circuit diagnosis of wiring harness and connections without having to probe with sharp objects. Install BOB in series as follows:

NOTE

See wiring diagrams for BCM terminal functions. BCM is located under left side cover.

1. Access BCM.
2. Press latch and disconnect BCM [242B].
3. See Figure 1-9. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to connectors.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. When testing is complete, remove BOB and restore connections.



1. **BCM cable**
2. **Breakout box**
3. **BCM overlay**
4. **BCM**
5. **BCM [242A]**
6. **Wiring harness [242B]**

Figure 1-9. BCM Breakout Box Connection

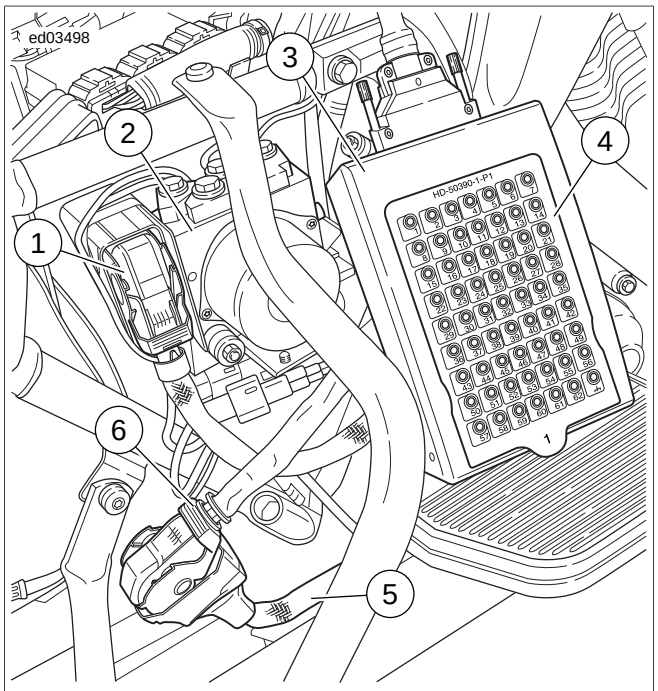
HD-50390-1 Breakout Box (ABS)

See Figure 1-10. BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) splice to the ABS harness. Used in conjunction with a multimeter, it allows circuit diagnosis of wiring harness and connections without having to probe with sharp objects. Install BOB in series as follows:

NOTE

See wiring diagrams for ABS module terminal functions. ABS module is located under right side cover.

1. Access ABS module.
2. Press latch and disconnect ABS module [166B].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) to [166].
4. Verify ABS OVERLAY (Part No. HD-50390-1-P1) is in position on BOB.
5. In some cases it is necessary to leave ABS module disconnected.
6. When testing is complete remove BOB and restore connections.



1. **ABS module [166A]**
2. **ABS module**
3. **Breakout box**
4. **ABS overlay**
5. **Breakout box cable**
6. **Wiring harness [166B]**

Figure 1-10. ABS Breakout Box Connection

HD-48650 Digital Technician II

NOTE

If DIGITAL TECHNICIAN II (Part No. HD-48650) is connected to DLC [91] and communicating with the vehicle, then odometer self-diagnostics will not function properly. Disconnect DIGITAL TECHNICIAN II (Part No. HD-48650) before entering odometer self-diagnostics.

DIGITAL TECHNICIAN II (Part No. HD-48650) is a computer based diagnostic device used to communicate/diagnose and program systems/modules.

Diagnostics in this manual are developed under the assumption that DTII is not available.

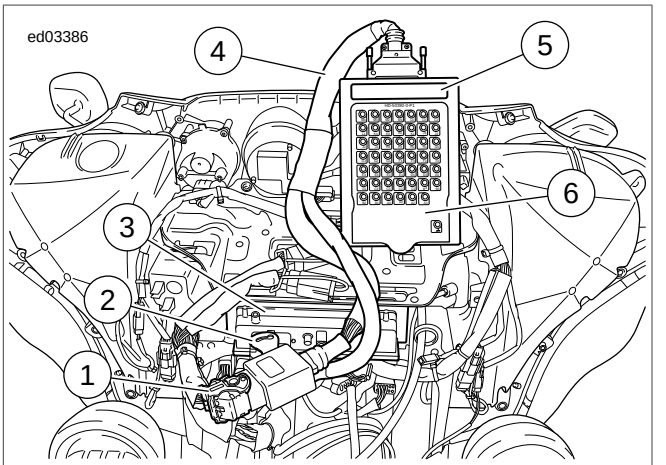
HD-50390-1 Breakout Box (Radio)

BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) splice into the main harness. Used in conjunction with a multimeter, it allows circuit diagnosis of wiring harness and connections without having to probe with sharp objects. Install BOB in series as follows:

NOTE

See wiring diagrams for radio terminal functions. Radio is located under fairing.

1. Access the radio.
2. Press latch and disconnect radio [27B].
3. See Figure 1-11. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to connectors.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. When testing is completed, remove the BOB and restore connections.



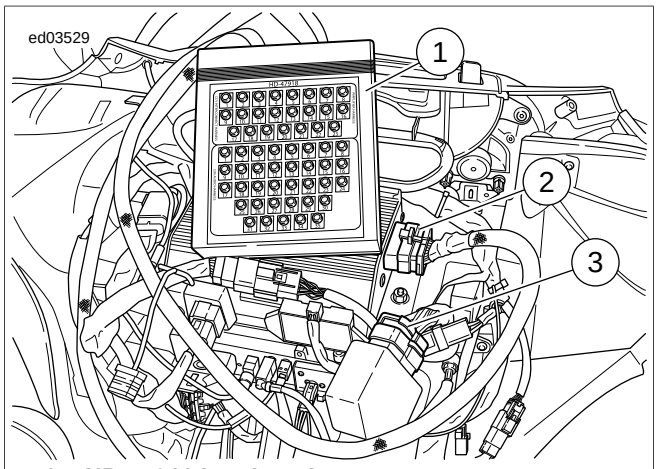
1. **Wire harness [27B]**
2. **Radio [27A]**
3. **Radio**
4. **Breakout box cable**
5. **Breakout box**
6. **Overlay**

Figure 1-11. Radio Breakout Box Connection

HD-47918 Advanced Audio System Breakout Box

The BREAKOUT BOX (Part No. HD-47918) connects to amplifier at [149]. Used in conjunction with a multimeter, it allows circuit diagnosis of wiring harness and connections without having to probe with sharp objects. Install BOB in series as follows:

1. Locate amplifier:
   a. Amplifier 1: Remove upper fairing and windshield.
   b. Amplifier 2: Remove left saddlebag amplifier cover.
2. Press latch and disconnect amplifier [149].
3. See Figure 1-12. Connect BREAKOUT BOX (Part No. HD-47918) to connectors.
4. When testing is complete remove BOB and restore connections.
5. Install upper fairing and windshield.



1. HD-47918 breakout box
2. Breakout box to amplifier connection
3. Breakout box to harness connection

Figure 1-12. Advanced Audio System Breakout Box

VOLTAGE DROP

Voltage drop test:

- Helps locate poor connections or components with excessive voltage drops.
- Measures the difference in potential or actual voltage dropped between source and destination.
- Checks integrity of the wiring, switches, fuses, connectors and contacts between source and destination.
- Identifies poor grounds.

A voltage drop test measures the difference in voltage between two points in a circuit. The amount of voltage dropped over any part of a circuit is directly related to the amount of resistance in that part of the circuit and the current flowing through it.

Components such as wires, switches and connectors are designed to have very little resistance and very little voltage drop. A voltage drop greater than 1.0V across these components indicates a high resistance and possible fault.

The benefits of doing it this way are:

- Readings are not as sensitive to real battery voltage.
- Readings show the actual voltage dropped not just the presence of voltage.
- System is tested as it is actually being used.
- Testing is more accurate and displays hard-to-find poor connections.
- Starting circuits, lighting circuits or ignition circuits can be tested with this approach. (Start from the most positive and go to the most negative destination or component.)

When testing a typical power circuit, place positive (red) meter lead on most positive part of circuit (or positive battery post). Remember, there is nothing more positive than the positive post of the battery.

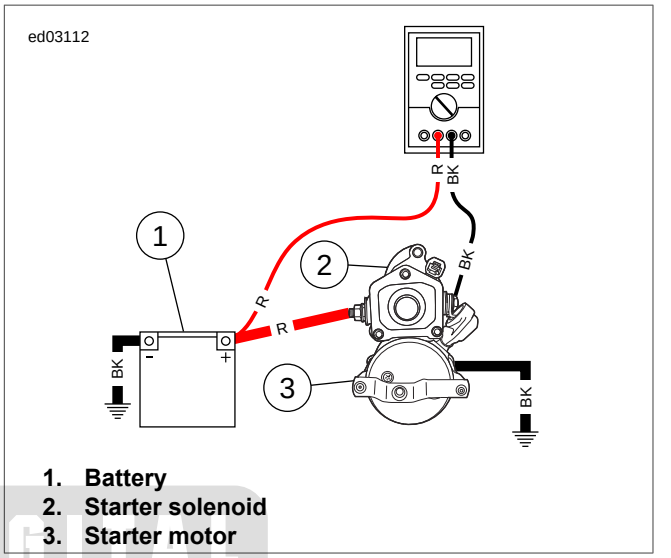
Place negative (black) meter lead at positive side of connector in question. Activate circuit. Move negative meter lead through the circuit until high voltage drop is found.

When testing a typical ground circuit, place negative lead on most negative part of circuit (or negative battery post). Remember, there is nothing more negative than the negative post of the battery.

Place positive meter lead at negative side of connector in question. Activate circuit. Move positive meter lead through the circuit until high voltage drop is found.

The following steps demonstrate a typical starter circuit voltage drop test:

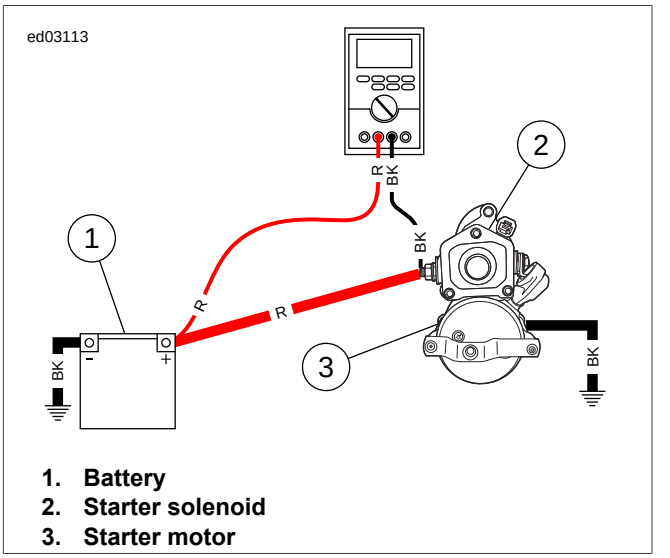
1. Disconnect CKP [79] to prevent engine from starting.
   a. See Figure 1-13. Connect red meter lead to positive battery post.
   b. Connect black meter lead to starter side post of starter solenoid. Observe meter reading.
   c. Crank starter and observe meter reading. The difference in the voltage is the voltage drop.



1. **Battery**
2. **Starter solenoid**
3. **Starter motor**

Figure 1-13. To Starter Solenoid Starter Terminal

2. See Figure 1-14. Move black meter lead to battery side post on starter solenoid. Crank starter. Observe voltage drop.



1. **Battery**
2. **Starter solenoid**
3. **Starter motor**

Figure 1-14. To Starter Solenoid Battery Terminal

3. See Figure 1-15. Finally move black meter lead to negative battery post and red meter lead to starter case. Crank starter. Observe voltage drop.

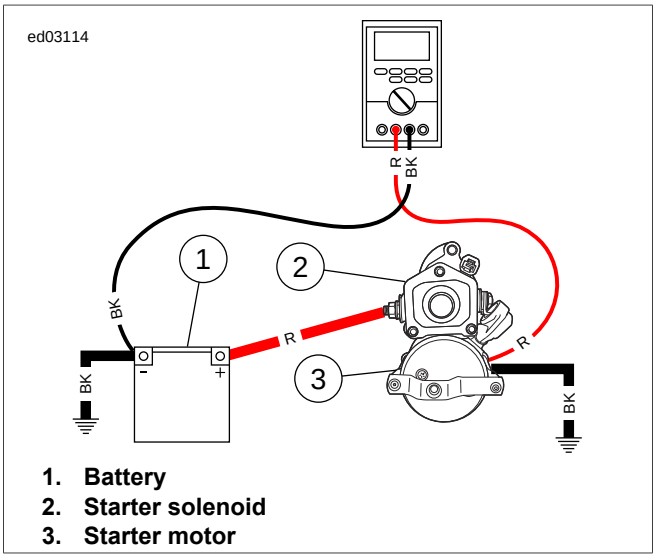


Figure 1-15. Starter Ground Circuit

WIGGLE TEST

PART NUMBER	TOOL NAME
HD-39978	DIGITAL MULTIMETER (FLUKE 78)
HD-48650	DIGITAL TECHNICIAN II
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Wiggle test checks for the presence of intermittents in a wiring harness. If available, use DIGITAL TECHNICIAN II (Part No. HD-48650) to perform wiggle test.

1. See Figure 1-16. Connect DIGITAL MULTIMETER (FLUKE 78) (Part No. HD-39978) to wiring harness between suspect connections. When diagnosing ECM connections, use BREAKOUT BOX (Part No. HD-50390-1), ECM CABLE (Part No. HD-50390-4) and ECM OVERLAY (Part No. HD-50390-4-P) to simplify the procedure. See 1.3 DIAGNOSTIC TOOLS.
2. Set the multimeter to read voltage changes.
3. Start motorcycle engine and run at idle.
4. Shake or wiggle harness to detect intermittents. If intermittents are present, radical voltage changes register on multimeter.

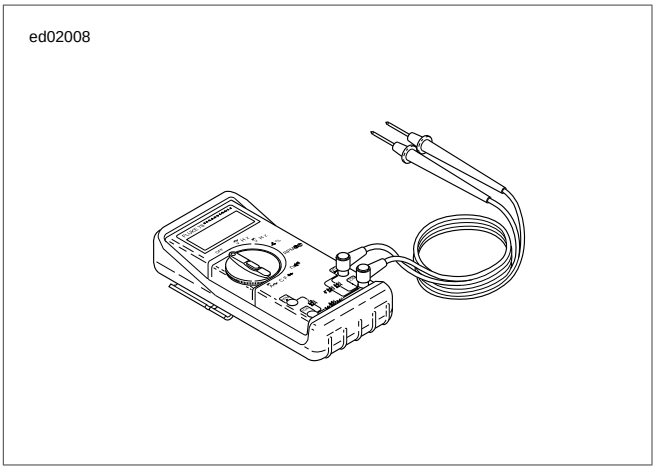


Figure 1-16. Digital Multimeter (Fluke 78)

RELAY DIAGNOSTICS

Relay Variation

See Figure 1-17. Relays normally have four or five terminals. Circuitry inside relays are very similar with the exception of normally closed contact being eliminated in four terminal relay. Some relays have five terminals at the base, even though internally 4 or 87A are not connected.

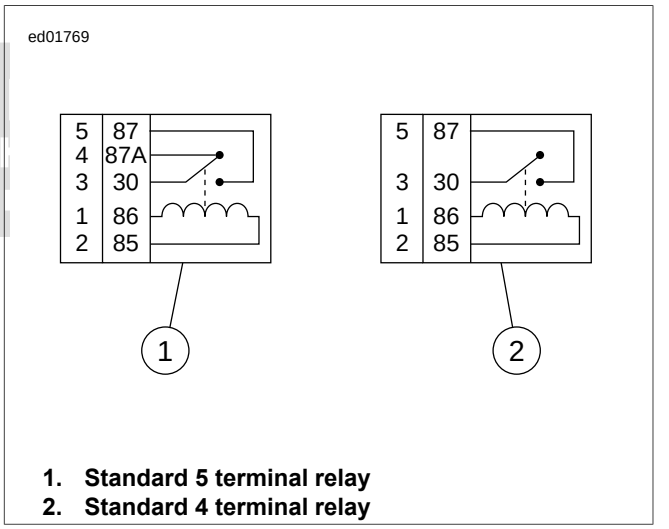


Figure 1-17. Standard Relays

Relay Test

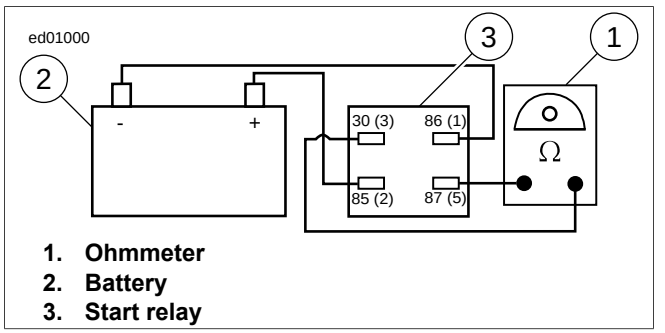
A relay can be tested using the motorcycle's 12V battery and a multimeter.

1. Unplug relay from relay block.
2. See Figure 1-18 and Figure 1-19 to energize the relay. Connect relay terminal 85 to negative battery terminal and relay terminal 86 to positive battery terminal.

NOTE

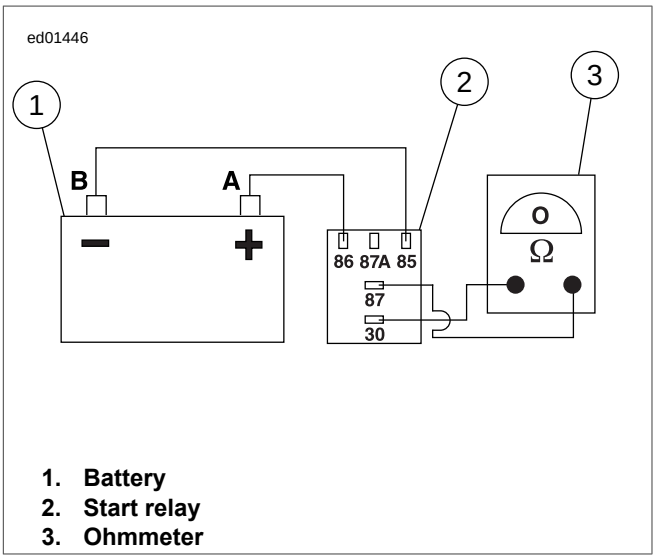
Some relays contain internal diodes. If the applied voltage is not the correct polarity, the diode could be damaged.

3. Test for continuity between terminals 30 and 87.
   a. A good relay shows continuity (continuity tester lamp on or a zero Ohm reading on the ohmmeter).
   b. A malfunctioning relay will not show continuity and must be replaced.



1. **Ohmmeter**
2. **Battery**
3. **Start relay**

Figure 1-18. Four Terminal Relay Test



1. **Battery**
2. **Start relay**
3. **Ohmmeter**

Figure 1-19. Five Terminal Relay Test

JOB/TIME CODES VALUES

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

Dealership technicians filing warranty claims should use job/time code values printed in bold text at the end of the appropriate repair. When using DIGITAL TECHNICIAN II (Part No. HD-48650), dealership technicians filling out warranty claims should use job/time code given by the computer.

TABLE OF CONTENTS

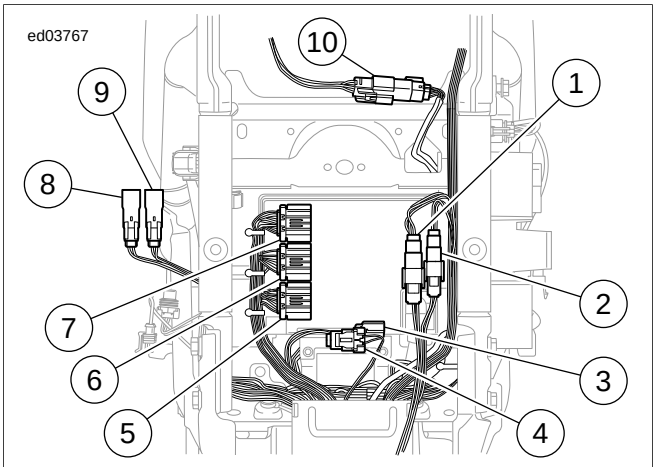
NOTES

CAN COMMUNICATION 2.1

DESCRIPTION AND OPERATION

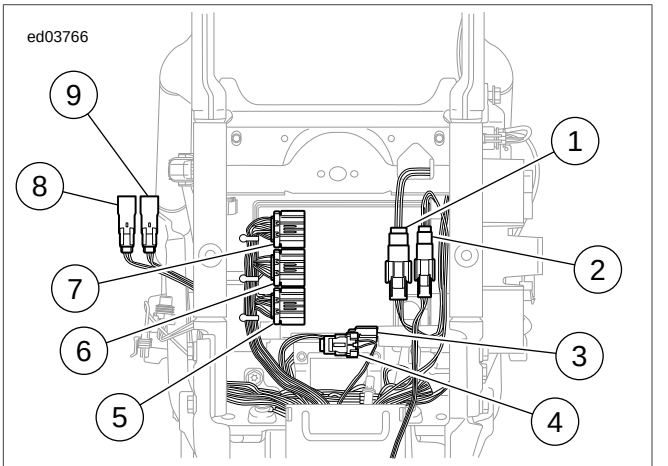
PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

See Figure 2-1, Figure 2-2 and Figure 2-3. CAN bus circuits are used by modules and diagnostic tools to share information.



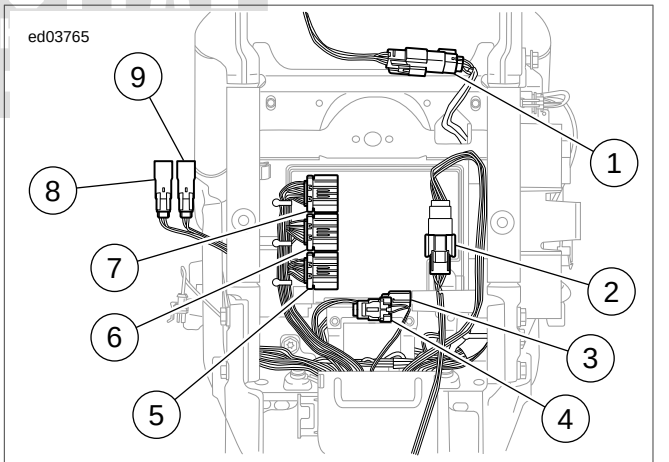
1. Fuel tank harness [13]
2. Rider headset [53]
3. Security antenna [209]
4. Purge solenoid [95]
5. ECM [78-1]
6. ECM [78-2]
7. ECM [78-3]
8. Rear HO2S [138]
9. Front HO2S [137]
10. Rear harness [7]

Figure 2-1. Under Seat: FLHT



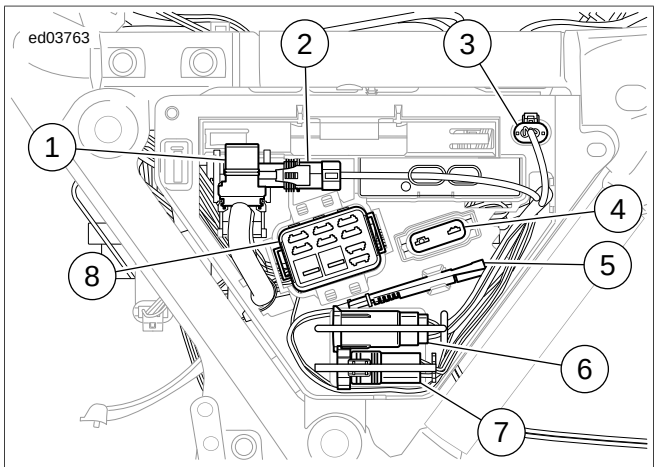
1. Rear lighting [7]
2. Fuel tank harness [13]
3. Security antenna [209]
4. Purge solenoid [95]
5. ECM [78-1]
6. ECM [78-2]
7. ECM [78-3]
8. Rear HO2S [138]
9. Front HO2S [137]

Figure 2-2. Under Seat: FLHX, FLT



1. Rear lighting [7]
2. Console harness [20]
3. Security antenna [209]
4. Purge solenoid [95]
5. ECM [78-1]
6. ECM [78-2]
7. ECM [78-3]
8. Rear HO2S [138]
9. Front HO2S [137]

Figure 2-3. Under Seat: FLHR



1. **BCM [242]**
2. **BCM power [259]**
3. **Security siren [142]**
4. **Main fuse [5]**
5. **Battery tender [281]**
6. **Auxiliary devices [4]**
7. **DLC [91]**
8. **Fuse block [64]**

Figure 2-4. Under Left Side Cover

The instruments, ECM, BCM, hand controls, ABS (if equipped), radio and amplifier(s) all communicate on the CAN bus. CAN communication uses a (W/BK) and (W/R) wire in a twisted pair that runs to all the modules. It is used to transfer data from one module to the other. It also runs to the DLC [91] and is used to communicate with the modules using DIGITAL TECHNICIAN II (Part No. HD-48650).

COMPONENTS

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

Electronic Control Module (ECM)

See Figure 2-1, Figure 2-2 and Figure 2-3. The ECM is located under the seat. The ECM monitors the engine sensors to enhance performance and driveability. This is done by adjusting the fuel and spark delivery based on the information provided by the sensors.

Instruments

The instruments contain some indicator and warning lamps for the motorcycle. It uses CAN communication to receive information from the other modules to know which lamps to illuminate at any given time. Vehicle speed is also sent to the instruments over the CAN bus.

On non-fairing models, LEDs in the indicator bar are directly wired to the speedometer. The speedometer turns the indicators on and off based off commands from the BCM over the CAN bus.

On fairing models, fuel and voltmeter gauges get their information from the IM using a proprietary data link called HD-Link. HD-Link uses one (V/W) wire to communicate. These gauges also contain turn signal, battery and low fuel indicators.

BCM

See Figure 2-4. The BCM is located under the left side cover. The BCM supplies ignition and accessory power to most of the vehicle and controls the power mode of the electrical system. It controls lighting and other outputs by using switches as inputs. The BCM is also connected to the CAN bus and shares information with the other modules.

ABS Module (If Equipped)

The ABS ECU is located under the right side cover. The ECU receives input from front and rear WSS, and controls the HCU accordingly. The ABS ECU communicates over the CAN bus to the speedometer to control the ABS indicator.

Hand Control Modules

Left and right hand control modules control all switches and controls on the handlebars. The engine stop switch has a redundant wire directly to the BCM. In the event of a communication malfunction, this redundant circuit is used to keep the engine from shutting off until the switch is turned off.

Radio (If Equipped)

The radio is located under the fairing and is connected to the CAN bus. It shares information with the other modules. It also functions as a display for information such as the ambient air temperature and receives information from the ECM over the CAN bus.

Amplifier(s)

There can be up to two amplifiers on a vehicle. AMP 1 is located under the fairing. AMP 2 is located in the left saddlebag. The amplifier(s) are connected to the CAN bus to communicate with the radio. An issue with the amp(s) may affect the performance of the CAN bus.

Data Link Connector (DLC)

The DLC is located under the left side cover. The DLC is used to connect DIGITAL TECHNICIAN II (Part No. HD-48650) to the motorcycle.

COMMUNICATION DTCS AND ERROR MESSAGES

Lost BUS Communication

There are several DTCs that may set due to an issue with CAN bus communication. Different DTCs are set by different modules. If a module loses communication with the rest of the system it will set DTC U0001, but the DTC can not be retrieved until the CAN lines to that module are restored. If a module goes OFF line due to loss of PWR or GND, a loss of communication to that module, the module will not set a code, but the other modules will set DTCs indicating they are not able to communicate with it. When the speedometer or IM recognizes a problem on the CAN bus, it may display "BUS Err" on the odometer.

VIN Errors

"VINERR" may also be displayed in the odometer if the instruments and ECM are not seeing the same VIN in both modules. This will usually occur after replacing one of the two modules. The two modules must have the VINs match before they can share odometer mileage. Both the ECM and instru-

ments retain the odometer value. If the speedometer or IM is replaced, it will display the odometer value stored in the ECM. The replacement instrument will become locked to the ECM after 31.1 miles (50 km) have been accumulated. The trip B odometer will display the countdown mileage. Once the countdown reaches zero, the instrument is locked to the ECM. If installed on another vehicle, the odometer will display "VINERR". If the speedometer or IM is removed from the vehicle before the countdown reaches zero, it has not been locked to the ECM. This mileage countdown allows for a road test to verify that speedometer or IM replacement was the proper repair.

Diagnostic Tips

Modules must have power and be grounded in order to communicate. When checking any communication DTC be sure to check the power and ground connections on the suspect module. Bus Err may show on the odometer if the following are present:

- CAN wires shorted together.
- CAN wire shorted to PWR or GND.
- CAN transceiver on some module failed shorted.
- Non-compliant module connected to the CAN bus.

ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274 2.2

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

CAN communication uses a set of wires in a twisted pair. These two wires are designated as CAN low and CAN high circuits. Both circuits are connected to the ECM, BCM, instruments, both hand control modules, the ABS module (if equipped), radio and amplifiers (if equipped). The ECM and right hand control module contain 120 Ohm terminating resistors. Typical resistance between the two circuits is approximately 60 Ohms.

- DTC U0001 indicates there is a fault on the CAN bus circuits. This code can be set by the ECM, BCM, instruments, ABS module (if equipped) and radio. This code is usually accompanied by other "U" codes, due to it causing a loss of communication between the modules on the CAN bus.
- DTC B2274 indicates a fault with the battery fuse or (R/O) wire.

NOTE

Always start from 1.2 INITIAL DIAGNOSTICS before proceeding with this test.

Table 2-1. Code Description

DTC	DESCRIPTION
U0001	CAN BUS error
U0002	CAN comm bus perf error
B2274	Constant battery line error

Diagnostic Tips

The instruments do not have an ignition input. They receive a message over the CAN bus, indicating the IGN is ON. Also, the trip odometer reset switch is a CAN communication to the instruments. Therefore, CAN bus errors can cause odometer self-diagnostics to be completely inoperative or to only partially function. The instruments backlighting may not function along with hand control switches and indicators. The odometer may read "BUS Err" in this condition, prior to becoming inoperative.

NOTE

If DIGITAL TECHNICIAN II (Part No. HD-48650) is connected to the DLC [91] and communicating with the vehicle, the odometer self-diagnostics will not function properly. Disconnect DIGITAL TECHNICIAN II (Part No. HD-48650) before entering odometer self-diagnostics.

The BCM supplies power to several systems. When testing for a short to voltage, perform all tests before disconnecting the BCM to keep from powering down systems on the vehicle. If the short to voltage goes away when the BCM is disconnected, test for continuity between the circuit in question and BCM [242B] terminals F4, J3, L3, L4 and M2 to verify the tested circuit is not shorted to one of these circuits. If continuity is present, repair short to circuit instead of replacing the BCM.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

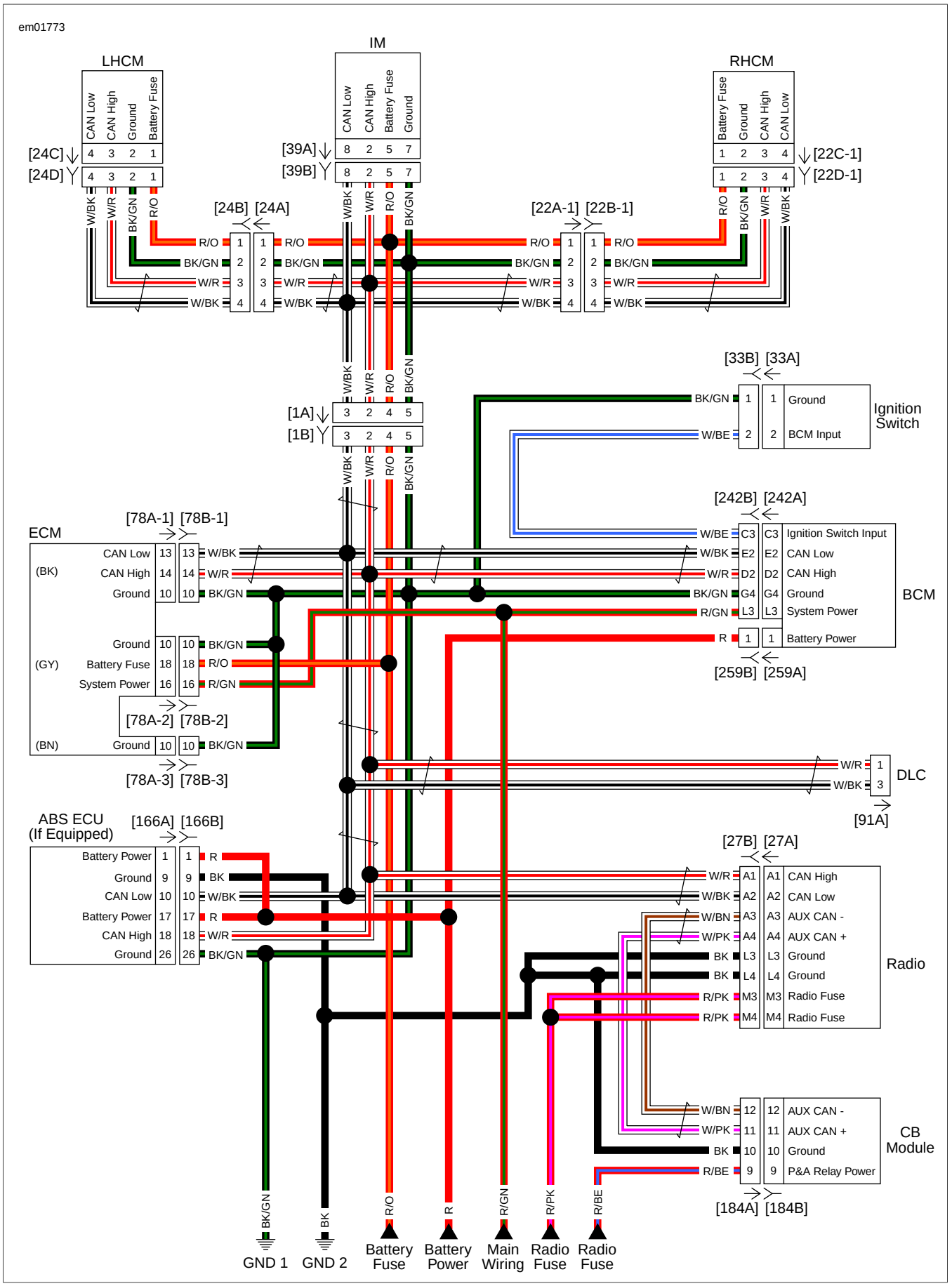


Figure 2-5. CAN Bus Circuit: FLH With Fairing

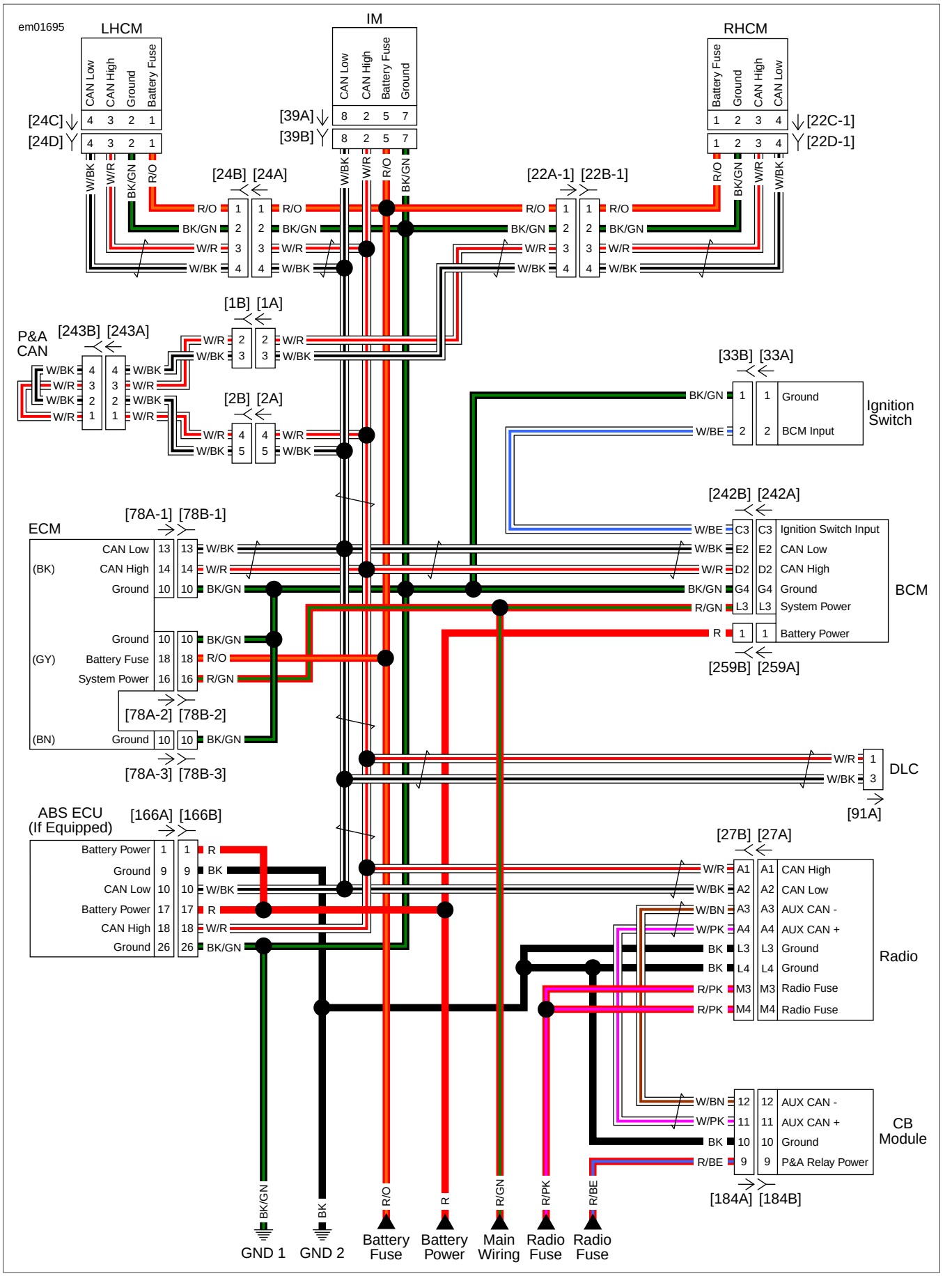


Figure 2-6. CAN Bus Circuit: FLT

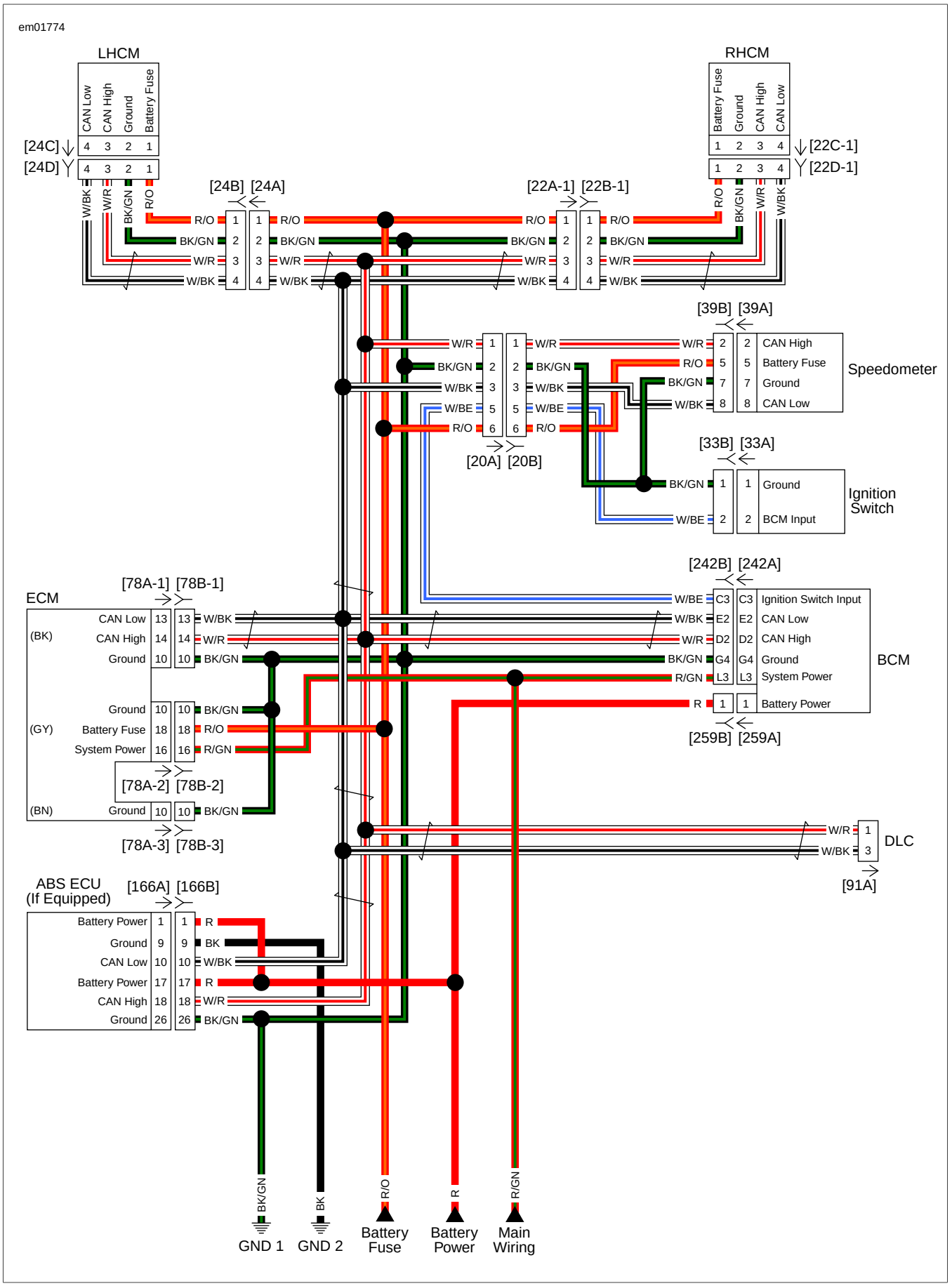


Figure 2-7. CAN Bus Circuit: FLHR

ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY
HD-50390-7	ABS CABLE

Table 2-2. Odometer Self-Diagnostic Inoperative Diagnostic Faults: DTC U0001, U0002, B2274

POSSIBLE CAUSES
Short between CAN low and high circuits
Open in CAN high circuit
Open in CAN low circuit
Short to ground on CAN high circuit
Short to ground on CAN low circuit
Short to voltage on CAN high circuit
Short to voltage on CAN low circuit

NOTE

When measuring resistance (Ohms), compensate for test lead resistance before performing the measurement. Select the Ohms position and touch the test leads together. Refer to the multimeter user's manual to either zero the display or manually subtract the test lead resistance from the measured circuit's value.

1. Battery Fuse

1. Turn IGN OFF.
2. Check battery fuse in fuse block [64].
3. Is fuse good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery fuse.

2. Speedometer System Voltage Test

1. Disconnect instrument [39].
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters, leaving [39A] disconnected.
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 5 and ground.
5. Is battery voltage present?
   a. **Yes.** Connect [39]. Go to Test 3.
   b. **No.** Repair open in (R/O) wire.

3. CAN Bus Test

1. Turn IGN OFF.
2. Remove main fuse.
3. Test resistance between DLC [91A] terminals 1 and 3.
4. Is resistance between 50-70 Ohms?
   a. **Yes.** Go to Test 18.
   b. **No. Resistance less than 50 Ohms.** Go to Test 4.
   c. **No. Resistance more than 70 Ohms.** Go to Test 13.

4. Speedometer Test

1. Disconnect instrument [39A].
2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes. Non-fairing models.** Replace speedometer.
   b. **Yes. Fairing models.** Replace IM.
   c. **No.** Go to Test 5.

5. BCM Test

1. Disconnect BCM [242].
2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes.** Replace BCM.
   b. **No, with ABS.** Go to Test 6.
   c. **No, without ABS.** Go to Test 7.

6. ABS Test

1. Disconnect ABS module [166].
2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes.** Replace ABS module.
   b. **No.** Go to Test 7.

7. LHCM Test

1. Disconnect LHCM [24].
2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes.** Replace LHCM.
   b. **No. With fairing.** Go to Test 8.
   c. **No. Without fairing.** Go to Test 9.

8. Radio Test

1. Disconnect radio [27].

2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes.** Replace radio.
   b. **No. With 2 amplifiers.** Go to Test 9.
   c. **No. With 1 amplifier.** Go to Test 10.
   d. **No. Without amplifier.** Go to Test 11.

9. Amplifier 2 Test

1. Disconnect amplifier 2 [149-2].
2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes.** Replace amplifier 2.
   b. **No.** Go to Test 10.

10. Amplifier 1 Test

1. Disconnect amplifier 1 [149].
2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes.** Replace amplifier 1.
   b. **No.** Go to Test 11.

11. ECM Test

1. Disconnect ECM [78B-1].
2. Is resistance between [91A] terminals 1 and 3 between 100-130 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Go to Test 12.

12. RHCM Test

1. Disconnect RHCM [22-1].
2. Is resistance between [91A] terminals 1 and 3 greater than 500 Ohms?
   a. **Yes.** Replace RHCM.
   b. **No.** Repair short between (W/R) and (W/BK) wires.

13. CAN Circuit Open Test

1. While watching resistance between DLC [91A] terminals 1 and 3, disconnect ECM [78-1].
2. Did resistance change?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 16.

14. CAN High Circuit Resistance to RHCM Test

1. Disconnect RHCM [22-1].
2. Test resistance between [91A] terminal 1 (W/R) wire and [22A-1] terminal 3.
3. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair (W/R) wire.
   b. **No.** Go to Test 15.

15. CAN Low Circuit Resistance to RHCM Test

1. Test resistance between [91A] terminal 3 (W/BK) wire and [22A-1] terminal 4.
2. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair (W/BK) wire.
   b. **No.** Replace RHCM.

16. CAN Low Circuit Resistance to ECM Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving [78A-1], [78A-2] and [78A-3] disconnected.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Test resistance between [91A] terminal 3 (W/BK) wire and BOB [78-1] terminal 13.
4. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair (W/BK) wire.
   b. **No.** Go to Test 17.

17. CAN High Circuit Resistance to ECM Test

1. Test resistance between [91A] terminal 1 (W/R) wire and BOB [78-1] terminal 14.
2. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair (W/R) wire.
   b. **No.** Replace ECM.

18. CAN High Circuit Short to Ground Test

1. Turn IGN OFF.
2. Test resistance between [91A] terminal 1 and ground.
3. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 19.
   b. **No.** Go to Test 29.

19. Speedometer Test

1. Disconnect instrument [39].
2. Is resistance between [91A] terminal 1 and ground less than 1000 Ohms?
   a. **Yes.** Go to Test 20.
   b. **No. Non-fairing models.** Replace speedometer.
   c. **No. Fairing models.** Replace IM.

20. ECM Test

1. Disconnect ECM [78B-1], [78B-2] and [78B-3].
2. Is resistance between [91A] terminal 1 and ground less than 1000 Ohms?
   a. **Yes.** Go to Test 21.
   b. **No.** Replace ECM.

21. LHCM Test

1. Disconnect LHCM [24].
2. Is resistance between [91A] terminal 1 and ground less than 1000 Ohms?
   a. **Yes. With fairing.** Go to Test 22.
   b. **Yes. Without fairing.** Go to Test 25.
   c. **No.** Replace LHCM.

22. Radio Test

1. Disconnect radio [27].
2. Is resistance between [91A] terminal 1 and ground less than 1000 Ohms?
   a. **Yes. With 2 amplifiers.** Go to Test 23.
   b. **Yes. With 1 amplifiers.** Go to Test 24.
   c. **No.** Replace radio.

23. Amplifier 2 Test

1. Disconnect amplifier 2 [149-2].
2. Is resistance between [91A] terminals 1 and ground less than 1000 Ohms?
   a. **Yes.** Go to Test 24.
   b. **No.** Replace amplifier 2.

24. Amplifier 1 Test

1. Disconnect amplifier 1 [149].
2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes.** Go to Test 25.
   b. **No.** Replace amplifier 1.

25. BCM Test

1. Disconnect BCM [242].
2. Is resistance between [91A] terminal 1 and ground less than 1000 Ohms?
   a. **Yes, with ABS.** Go to Test 26.
   b. **Yes, without ABS.** Go to Test 27.
   c. **No.** Replace BCM.

26. ABS Test

1. Disconnect ABS module [166].
2. Is resistance between [91A] terminal 1 and ground less than 1000 Ohms?
   a. **Yes.** Go to Test 27.
   b. **No.** Replace ABS module.

27. RHCM Test

1. Disconnect RHCM [22-1].
2. Is resistance between [91A] terminal 1 and ground less than 1000 Ohms?
   a. **Yes.** Repair short to ground in (W/R) wire.
   b. **No.** Go to Test 28.

28. CAN Low Circuit Short to Ground Test

1. Test resistance between [91A] terminal 3 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Repair short to ground in (W/BK) wire.
   b. **No.** Replace RHCM.

29. CAN High Circuit Short to Voltage Test

1. Install main fuse.
2. Turn IGN ON.
3. Test voltage between [91A] terminal 1 and ground.
4. Is voltage greater than 4V?
   a. **Yes.** Go to Test 30.
   b. **No.** Go to Test 40.

30. Speedometer Test

1. Turn IGN OFF.
2. Disconnect instrument [39].
3. Turn IGN ON.
4. Is voltage between [91A] terminal 1 and ground greater than 4V?
   a. **Yes.** Go to Test 31.
   b. **No. Non-fairing models.** Replace speedometer.
   c. **No. Fairing models.** Replace IM.

31. ECM Test

1. Turn IGN OFF.
2. Disconnect ECM [78B-1].
3. Turn IGN ON.
4. Is voltage between [91A] terminal 1 and ground greater than 4V?
   a. **Yes. With fairing.** Go to Test 32.
   b. **Yes. Without fairing.** Go to Test 35.
   c. **No.** Replace ECM.

32. Radio Test

1. Turn IGN OFF.
2. Disconnect radio [27].
3. Turn IGN ON.
4. Is voltage between [91A] terminal 1 and ground greater than 4V?
   a. **Yes. With 2 amplifiers.** Go to Test 33.
   b. **Yes. With 1 amplifiers.** Go to Test 34.
   c. **No.** Replace radio.

33. Amplifier 2 Test

1. Disconnect amplifier 2 [149-2].
2. Is resistance between [91A] terminals 1 and ground less than 1000 Ohms?
   a. **Yes.** Go to Test 34.
   b. **No.** Replace amplifier 2.

34. Amplifier 1 Test

1. Disconnect amplifier 1 [149].
2. Is resistance between [91A] terminals 1 and 3 between 50-70 Ohms?
   a. **Yes.** Go to Test 35.
   b. **No.** Replace amplifier 1.

35. LHCM Test

1. Turn IGN OFF.
2. Disconnect LHCM [24].
3. Turn IGN ON.
4. Is voltage between [91A] terminal 1 and ground greater than 4V?
   a. **Yes, with ABS.** Go to Test 36.
   b. **Yes, without ABS.** Go to Test 37.
   c. **No.** Replace LHCM.

36. ABS Test

1. Turn IGN OFF.
2. Disconnect ABS module [166].
3. Turn IGN ON.
4. Is voltage between [91A] terminal 1 and ground greater than 4V?
   a. **Yes.** Go to Test 37.
   b. **No.** Replace ABS module.

37. BCM Test

1. Turn IGN OFF.
2. Disconnect BCM [242].
3. Turn IGN ON.
4. Is voltage between [91A] terminal 1 and ground greater than 4V?
   a. **Yes.** Go to Test 38.
   b. **No.** Replace BCM. See diagnostic tips.

38. RHCM Test

1. Turn IGN OFF.
2. Disconnect RHCM [22-1].
3. Turn IGN ON.
4. Is voltage between [91A] terminal 1 and ground greater than 4V?
   a. **Yes.** Repair short to voltage in (W/R) wire.
   b. **No.** Go to Test 39.

39. CAN Low Circuit Short to Voltage Test

1. Test voltage between [91A] terminal 3 and ground.
2. Is voltage present?
   a. **Yes.** Repair short to voltage in (W/BK) wire.
   b. **No.** Replace RHCM.

40. CAN Low Circuit Resistance to BCM Test

1. Turn IGN OFF.
2. Disconnect BCM [242].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wiring harness [242B], leaving [242A] disconnected.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Test resistance between [91A] terminal 3 (W/BK) wire and BOB terminal E2.
6. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/BK) wire between [91A] terminal 3 and [242B] terminal E2.
   b. **No.** Go to Test 41.

41. CAN High Circuit Resistance to BCM Test

1. Test resistance between [91A] terminal 1 (W/R) wire and BOB terminal D2.
2. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/R) wire between [91A] terminal 1 and [242B] terminal D2.
   b. **No, with ABS.** Go to Test 42.
   c. **No, without ABS.** Go to Test 44.

42. CAN Low Circuit Resistance to ABS Module Test

1. Remove cables and BCM BOB. Connect BCM [242].
2. Disconnect ABS [166].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) to wiring harness connector [166B]. Leaving [166A] disconnected, test resistance between [91A] terminal 3 (W/BK) wire and BOB terminal 10.
4. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/BK) wire between [91A] terminal 3 and [166B] terminal 10.
   b. **No.** Go to Test 43.

43. CAN High Circuit Resistance to ABS Module Test

1. Test resistance between [91A] terminal 1 (W/R) wire and BOB terminal 18.
2. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/R) wire between [91A] terminal 1 and [166B] terminal 18.
   b. **No.** Go to Test 44.

44. CAN Low Circuit Resistance to Speedometer Test

1. Remove cables and ABS BOB, connect ABS module [166].
2. Disconnect instrument [39].
3. Connect BREAKOUT BOX (Part No. HD-42682) and BREAKOUT BOX ADAPTERS (Part No. HD-46601) to wiring harness connectors [39B]. Leave [39A] disconnected.
4. Test resistance between [91A] terminal 3 (W/BK) wire and BOB terminal 8.
5. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/BK) wire between [91A] terminal 3 and [39B] terminal 8.
   b. **No.** Go to Test 45.

45. CAN High Circuit Resistance to Speedometer Test

1. Test resistance between [91A] terminal 1 (W/R) wire and BOB terminal 2.
2. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/R) wire between [91A] terminal 1 and [39B] terminal 2.
   b. **No. With fairing.** Go to Test 46.
   c. **No. Without fairing.** Concern is intermittent. Perform wiggle test and verify all connectors are properly connected. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

46. CAN Low Circuit Resistance to Radio Test

1. Remove cables and BOB, connect instrument [39].
2. Disconnect radio [27].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [27B], leaving [27A] disconnected.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Test resistance between [91A] terminal 3 (W/BK) wire and BOB terminal A2.
6. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/BK) wire between [91A] terminal 3 and [27B] terminal A2.
   b. **No.** Go to Test 47.

47. CAN High Circuit Resistance to Radio Test

1. Test resistance between [91A] terminal 1 (W/R) wire and BOB terminal A1.
2. Is resistance greater than 0.5 Ohm?
   a. **Yes. With 2 amplifiers.** Go to Test 48.
   b. **Yes. With 1 amplifiers.** Go to Test 50.
   c. **No.** Concern is intermittent. Perform wiggle test and verify all connectors are properly connected. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

48. CAN Low Circuit Resistance to Amplifier 2 Test

1. Remove cables and BOB, connect radio [27].
2. Disconnect amplifier 2 [149B-2].
3. Connect BREAKOUT BOX (Part No. HD-47918), leaving [149A-2] disconnected.
4. Test resistance between [91A] terminal 3 (W/BK) wire and BOB terminal 18.
5. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/BK) wire between [91A] terminal 3 and [149B-1] terminal 18.
   b. **No.** Go to Test 49.

49. CAN High Circuit Resistance Amplifier 2 Test

1. Test resistance between [91A] terminal 1 (W/R) wire and BOB terminal 11.
2. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/R) wire between [91A] terminal 1 and [149B-2] terminal 11.
   b. **No.** Go to Test 50.

50. CAN Low Circuit Resistance to Amplifier 1 Test

1. Remove cables and BOB.
2. Disconnect amplifier 1 [149].
3. Connect BREAKOUT BOX (Part No. HD-47918), leaving [149A] disconnected.
4. Test resistance between [91A] terminal 3 (W/BK) wire and BOB terminal 18.

5. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/BK) wire between [91A] terminal 3 and [27B] terminal 18.
   b. **No.** Go to Test 51.

51. CAN High Circuit Resistance to Amplifier 1 Test

1. Test resistance between [91A] terminal 1 (W/R) wire and BOB terminal 11.
2. Is resistance greater than 0.5 Ohm?
   a. **Yes.** Repair (W/R) wire between [91A] terminal 1 and [149] terminal 11.
   b. **No.** Concern is intermittent. Perform wiggle test and verify all connectors are properly connected. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

NO VEHICLE POWER OR LOST COMMUNICATION DTCS 2.3

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The CAN bus circuit provides a means for the ECM, instruments, BCM, hand control modules, the ABS module (if equipped), radio and amps (if equipped) to communicate their current status. When all operating parameters on the CAN bus are within specification, a state of health message is sent between the components.

The CAN bus is made up of two circuits. The (W/R) is the CAN bus high circuit and the (W/BK) is the CAN bus low circuit. Both of these circuits show around 2.5V when measured between each of the circuits and ground with the IGN ON. These circuits are connected to each module on the CAN bus network. A fault on either one of these circuits will cause several modules to set "U" codes and may cause a complete loss of communication between all modules.

Table 2-3. Code Description

DTC	DESCRIPTION
U0003	Network management monitoring
U0100	Lost comm w/ECM
U0121	Lost comm w/ABS
U0140	Lost comm w/BCM
U0141	Lost comm w/LHCM
U0142	Lost comm w/RHCM
U0156	Lost comm w/speedometer
U0184	Lost comm w/radio

Diagnostic Tips

Modules must have power in order to communicate on the CAN bus. It is important to check for battery power and ground on any module that is not communicating on the CAN bus network.

At least two modules will set a lost communication DTC when one module has lost the ability to communicate on the CAN bus.

- When two or more modules are setting the same U-code, this indicates a problem with the device the code is set against.
- If two or more modules are intermittently setting the same U-code, it indicates an intermittent problem with the device the code is set against or intermittent CAN, power or ground wires to the device.

See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test to test wiring to the component.

The BCM supplies power to several systems. When testing for a short to voltage, perform all tests before disconnecting the BCM to keep from powering down systems on the vehicle. If the short to voltage goes away when the BCM is disconnected, test for continuity between the circuit in question and BCM [242B] terminals F4, J3, L3, L4 and M2 to verify the tested circuit is not shorted to one of these circuits. If continuity is present, repair shorted circuit instead of replacing the BCM.

Historic U-codes may be found if battery power has been lost for any reason or if the main or battery fuse have been disconnected and reconnected. This may also happen during diagnostics using DIGITAL TECHNICIAN II (Part No. HD-48650) if the diagnostics connector has been disconnected before vehicle has been powered down. This is not an indication of a problem and does not cause any loss of functionality.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

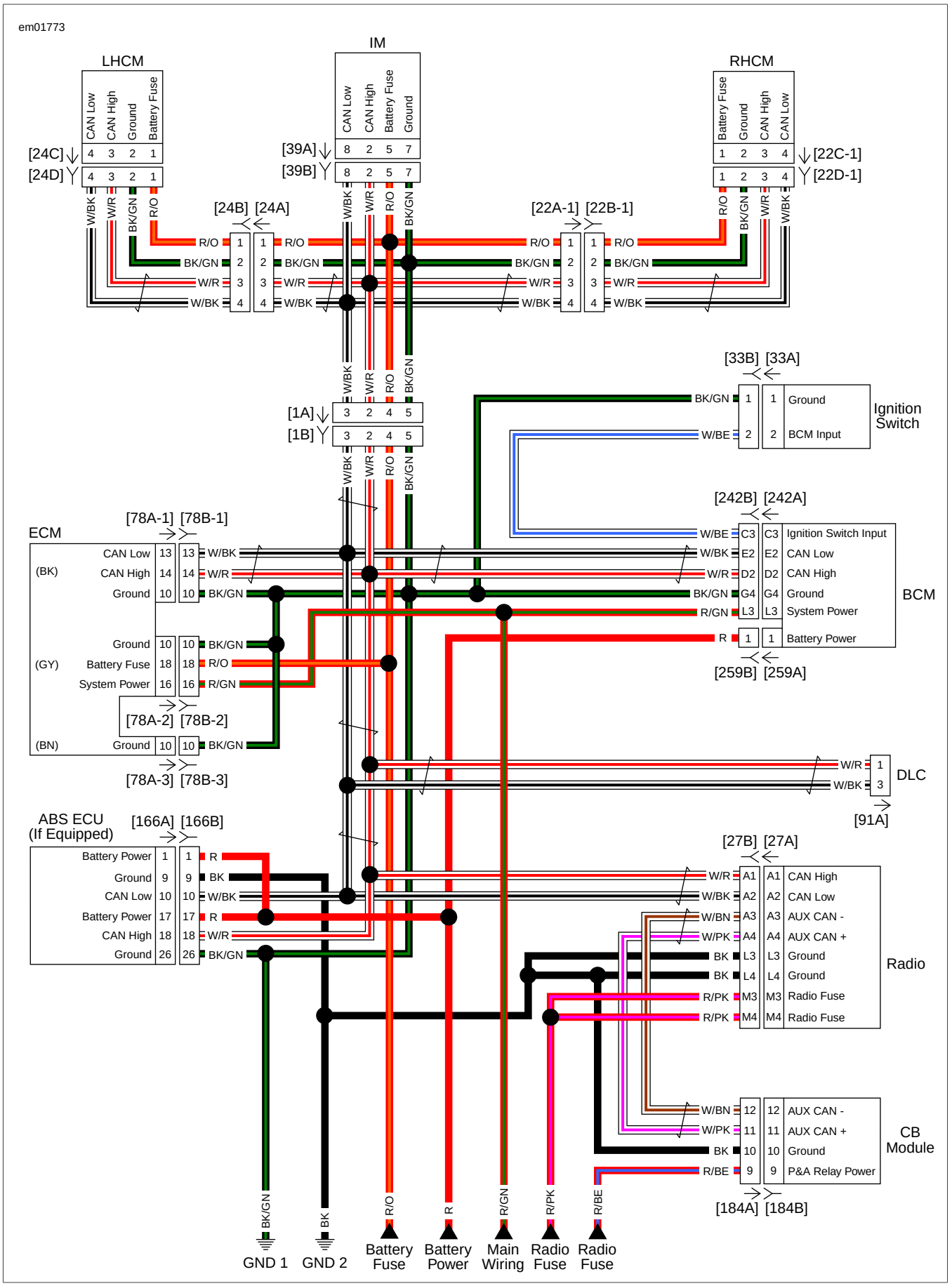


Figure 2-8. CAN Bus Circuit: FLH With Fairing

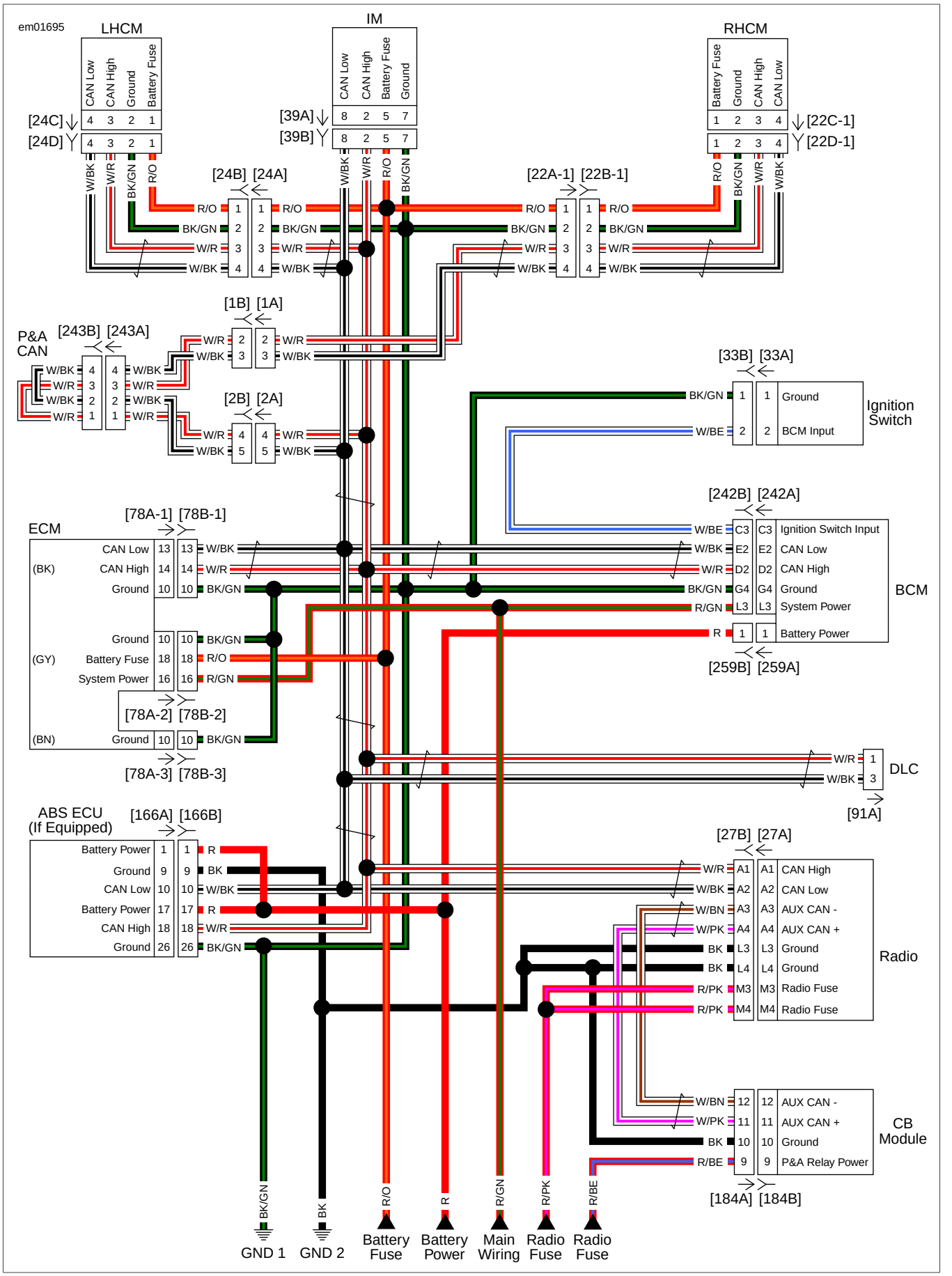


Figure 2-9. CAN Bus Circuit: FLT

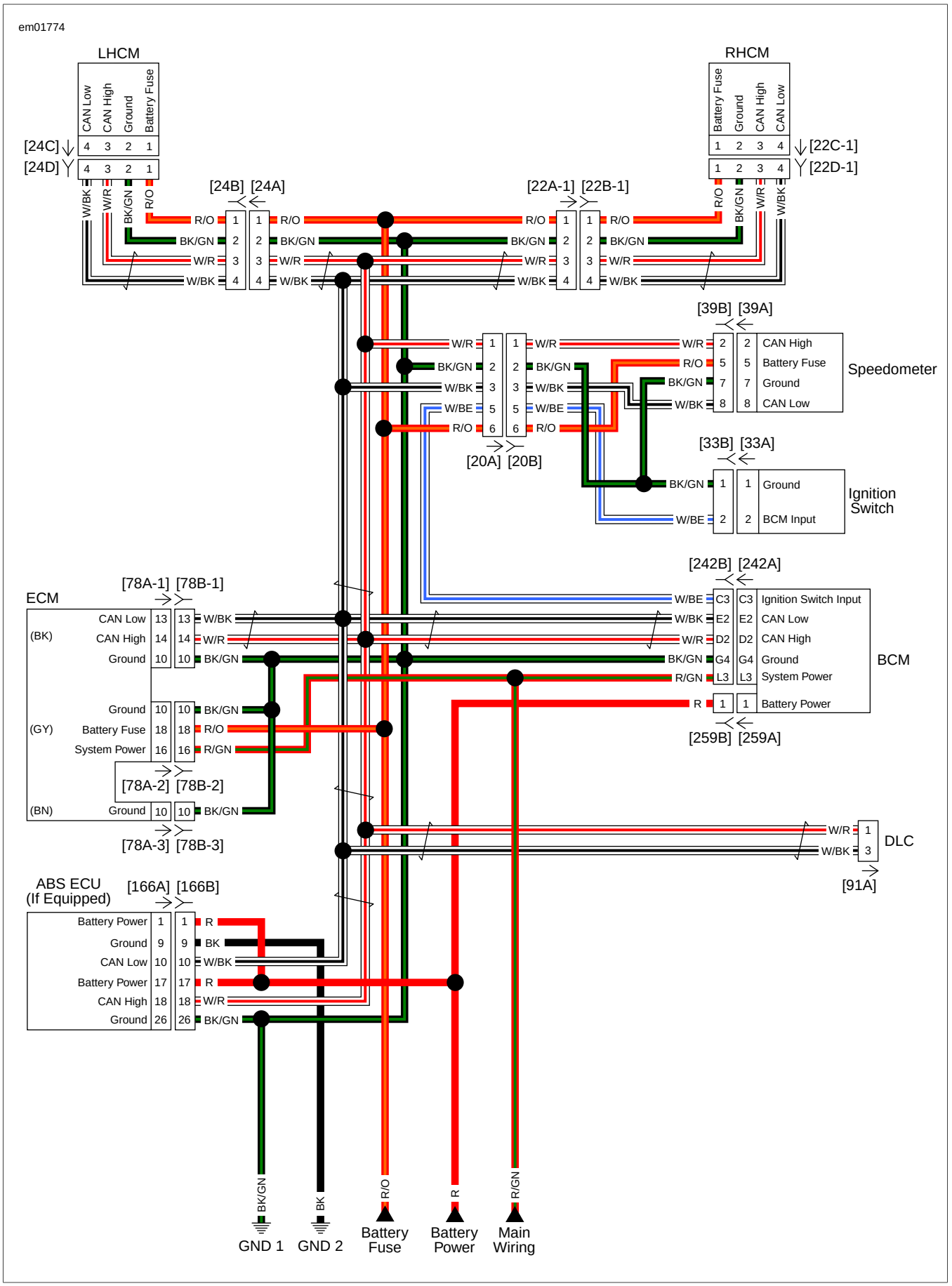


Figure 2-10. CAN Bus Circuit: FLHR

DTC U0003

Table 2-4. DTC U0003 Diagnostic Faults

POSSIBLE CAUSES
ABS ECU fault or malfunction

1. ABS ECU DTC Test

1. Clear DTCs.
2. Turn IGN OFF.
3. Check for DTCs.
4. Did DTC U0003 reset?
   a. **Yes.** Replace ABS module.
   b. **No.** ABS system working properly.

DTC U0100

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 2-5. DTC U0100 Diagnostic Faults

POSSIBLE CAUSES
Open in CAN high circuit to the ECM
Open in CAN low circuit to the ECM
Open in ECM system power circuit
Open in ECM ground circuit

1. Module Test

1. View odometer.
2. Is only BCM setting DTC?
   a. **Yes.** Go to Test 9.
   b. **No, ABS module only.** Go to Test 7.
   c. **No, instruments only.** Go to Test 8.
   d. **No, multiple modules.** Go to Test 2.

2. System Power Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness connectors [78B-1], [78B-2] and [78B-3], leaving [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminal 16 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (R/GN) wire.

3. ECM [78-1] Ground Test

1. Turn IGN OFF.
2. Test continuity between BOB [78-1] terminal 10 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK/GN) wire.

4. ECM [78-2] Ground Test

1. Test continuity between BOB [78-2] terminal 10 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (BK/GN) wire.

5. CAN High Circuit Continuity Test

1. Test continuity between BOB [78-1] terminal 14 and DLC [91A] terminal 1.
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (W/R) wire.

6. CAN Low Circuit Continuity Test

1. Test continuity between BOB [78-1] terminal 13 and [91A] terminal 3.
2. Is continuity present?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (W/BK) wire.

7. Verify ABS Module Test

1. Turn IGN OFF.
2. Replace ABS module with a known good ABS module.
3. Turn IGN ON.
4. Attempt to start vehicle.
5. Check DTC.
6. Is DTC U0100 present?
   a. **Yes.** Check vehicle for any accessories connected to the CAN bus.
   b. **No.** Replace ABS module.

8. Verify Speedometer/IM Test

1. Turn IGN OFF.

2. **Non-fairing models:** Replace speedometer with known good speedometer.

   Fairing models: Replace IM with known good IM.

3. Turn IGN ON.
4. Attempt to start vehicle.
5. Check DTC.
6. Is DTC U0100 present?
   a. **Yes.** Check vehicle for any accessories connected to the CAN bus.
   b. **No. Non-fairing models.** Replace speedometer.
   c. **No. Fairing models.** Replace IM.

9. Verify BCM Test

1. Replace BCM with a known good BCM.
2. Turn IGN ON.
3. Attempt to start vehicle.
4. Check DTC.
5. Is DTC U0100 present?
   a. **Yes.** Check vehicle for any accessories connected to the CAN bus.
   b. **No.** Replace BCM.

DTC U0121

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-1-P1	ABS OVERLAY
HD-50390-7	ABS CABLE

Table 2-6. DTC U0121 Diagnostic Faults

POSSIBLE CAUSES
Open in CAN high circuit to the ABS module
Open in CAN low circuit to the ABS module
Open in ABS system power circuit
Open in ABS ground circuit

1. ABS Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) to wiring harness [166B], leaving [166A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ABS OVERLAY (Part No. HD-50390-1-P1) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 1 and ground.
5. Test voltage between BOB terminal 17 and ground.
6. Is battery voltage present on both?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R) wire.

2. ABS Ground Test

1. Test voltage between BOB terminals 1 and 9.
2. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK) wire.

3. CAN High Circuit Continuity Test

1. Turn IGN OFF.
2. Test continuity between BOB terminal 18 and DLC [91A] terminal 1.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (W/R) wire.

4. CAN Low Circuit Continuity Test

1. Turn IGN OFF.
2. Test continuity between BOB terminal 10 and DLC [91A] terminal 3.
3. Is continuity present?
   a. **Yes.** Replace ABS module.
   b. **No.** Repair open in (W/BK) wire.

NO VEHICLE POWER: DTC U0140

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 2-7. No Vehicle Power Diagnostic Faults: DTC U0140

POSSIBLE CAUSES
Open in CAN high circuit to the BCM
Open in CAN low circuit to the BCM
Open in ignition switch circuit
Short to ground in ignition switch circuit
Short to voltage in ignition switch circuit
Ignition switch malfunction
Open in BCM battery power circuit
Open in BCM ground circuit

1. Ignition Switch Ground Test

1. Turn IGN OFF.

2. Disconnect ignition switch [33].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [33B] terminal 1 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (BK/GN) ground wire.

2. Ignition Switch Test

1. Turn IGN ON.
2. Test resistance between [33A] terminals 1 and 2.
3. Is resistance between 50-500 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace the ignition switch.

3. Ignition Switch Accessory Test

1. Turn IGN to ACC.
2. Test resistance between [33A] terminals 1 and 2.
3. Is resistance between 400-1900 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace ignition switch.

4. Ignition Switch Signal Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between [33B] terminal 2 (W/BE) wire and BOB terminal C3.
5. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (W/BE) wire.

5. Switch Signal Short to Ground Test

1. Test continuity between [33B] terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (W/BE) wire.
   b. **No.** Go to Test 6.

6. Ignition Switch Signal Short to Voltage Test

1. Disconnect [242B].
2. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal C3 from [242B].
3. Connect [242B] to BOB.
4. Test voltage between [33B] terminal 2 (W/BE) wire and ground.
5. Is voltage present?
   a. **Yes.** Repair short to voltage in (W/BE) wire.
   b. **No.** Go to Test 7.

7. BCM Ground Test

1. Turn IGN OFF.
2. Connect [33].
3. Test continuity between BOB terminal G4 (BK/GN) wire and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair open in (BK/GN) wire.

8. CAN High Circuit Continuity Test

1. Test continuity between BOB terminal D2 and DLC [91A] terminal 1 (W/R) wire.
2. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair open in (W/R) wire.

9. CAN Low Circuit Continuity Test

1. Test continuity between BOB terminal E2 and [91A] terminal 3 (W/BK) wire.
2. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Repair open in (W/BK) wire.

10. BCM Voltage Test

1. Disconnect BCM power [259B].
2. Test voltage between [259B] terminal 1 and ground.
3. Is battery voltage present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in (R) wire.

LEFT HAND CONTROLS INOPERATIVE: DTC U0141

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 2-8. Left Hand Controls Inoperative, DTC U0141 Diagnostic Faults

POSSIBLE CAUSES
Open in CAN high circuit to the LHCM
Open in CAN low circuit to the LHCM
Open in LHCM battery power circuit
Open in LHCM ground circuit

1. LHCM Voltage Test

1. Turn IGN OFF.
2. Disconnect LHCM [24D].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between LHCM [24D] terminal 1 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/O) wire.

2. LHCM Test

1. Test voltage between [24D] terminals 1 and 2.
2. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK/GN) wire.

3. CAN High Circuit Continuity Test

1. Test continuity between [24D] terminal 3 and DLC [91A] terminal 1.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (W/R) wire.

4. CAN Low Circuit Continuity Test

1. Test continuity between [24D] terminal 4 and [91A] terminal 3.
2. Is continuity present?
   a. **Yes.** Replace LHCM.
   b. **No.** Repair open in (W/BK) wire.

DTC U0142

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 2-9. DTC U0142 Diagnostic Faults

POSSIBLE CAUSES
Open in CAN high circuit to the RHCM
Open in CAN low circuit to the RHCM
Open in RHCM battery power circuit
Open in RHCM ground circuit

1. RHCM Voltage Test

1. Turn IGN OFF.
2. Disconnect RHCM [22D-1].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between RHCM [22D-1] terminal 1 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/O) wire.

2. RHCM Test

1. Test voltage between [22D-1] terminals 1 and 2.
2. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK/GN) wire.

3. CAN High Circuit Continuity Test

1. Test continuity between [22D-1] terminal 3 and DLC [91A] terminal 1.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (W/R) wire.

4. CAN Low Circuit Continuity Test

1. Test continuity between [22D-1] terminal 4 and [91A] terminal 3.
2. Is continuity present?
   a. **Yes.** Replace RHCM.
   b. **No.** Repair open in (W/BK) wire.

SPEEDOMETER INOPERATIVE: DTC U0156

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 2-10. Speedometer Inoperative: DTC U0156 Diagnostic Faults

POSSIBLE CAUSES
Open in CAN high circuit to the speedometer
Open in CAN low circuit to the speedometer
Open in speedometer battery power circuit
Open in speedometer ground circuit

1. Speedometer Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-42682) and BREAKOUT BOX ADAPTERS (Part No. HD-46601) to wiring harness [39B], leaving [39A] disconnected.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 5 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/O) wire.

2. Speedometer Ground Test

1. Test voltage between BOB terminals 5 and 7.
2. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK/GN) wire.

3. CAN High Circuit Continuity Test

1. Test continuity between BOB terminal 2 and DLC [91A] terminal 1.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (W/R) wire.

4. CAN Low Circuit Continuity Test

1. Test continuity between BOB terminal 8 and [91A] terminal 3.
2. Is continuity present?
   a. **Yes. Non-fairing models.** Replace speedometer.
   b. **Yes. Fairing models.** Replace IM.
   c. **No.** Repair open in (W/BK) wire.

DTC U0184

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 2-11. DTC U0184 Diagnostic Faults

POSSIBLE CAUSES
Open in CAN high circuit to the radio
Open in CAN low circuit to the radio
Open in radio system power circuit
Open in radio ground circuit

1. Radio Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [27B], leaving [27A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal M3 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/PK) wire.

2. Radio Ground Test

1. Test voltage between BOB terminals L3 and M3.
2. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK) wire.

3. CAN High Circuit Continuity Test

1. Test continuity between BOB terminal A1 and DLC [91A] terminal 1.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (W/R) wire.

4. CAN Low Circuit Continuity Test

1. Test continuity between BOB terminal A2 and DLC [91A] terminal 3.
2. Is continuity present?
   a. **Yes.** Replace radio.
   b. **No.** Repair open in (W/BK) wire.

SECONDARY COMMUNICATION DIAGNOSTICS 2.4

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The fuel and voltmeter gauges send their information to the IM using a proprietary data link called HD-Link. HD-Link uses one (V/W) wire.

The CB module uses a proprietary AUX CAN bus. The AUX CAN bus is only for the CB module and radio to communicate. The AUX CAN bus is made up of two circuits. The (W/PK) is the AUX CAN bus high circuit and the (W/BN) is the AUX CAN bus low circuit.

Table 2-12. Code Description

DTC	DESCRIPTION
U0158	Lost comm w/fuel gauge
U0159	Lost comm w/volt gauge
U0160	Lost comm w/fuel and volt gauges
U1302	ACC bus perf error
U1401	Lost comm w/CB

Diagnostic Tips

Modules must have power in order to communicate on HD-Link or AUX CAN bus. It is important to check for battery power and ground on any module that is not communicating on HD-Link or AUX CAN bus network.

The BCM supplies power to several systems. When testing for a short to voltage, perform all tests before disconnecting the BCM to keep from powering down systems on the vehicle. If the short to voltage goes away when the BCM is disconnected, test for continuity between the circuit in question and BCM [242B] terminals F4, J3, L3, L4 and M2 to verify the tested circuit is not shorted to one of these circuits. If continuity is present, repair shorted circuit instead of replacing the BCM.

Historic U-codes may be found if battery power has been lost for any reason or if the main or battery fuses have been disconnected and reconnected. This may also happen during diagnostics using DIGITAL TECHNICIAN II (Part No. HD-48650) if the diagnostics connector has been disconnected before vehicle has been powered down. This is not an indication of a problem and does not cause any loss of functionality.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

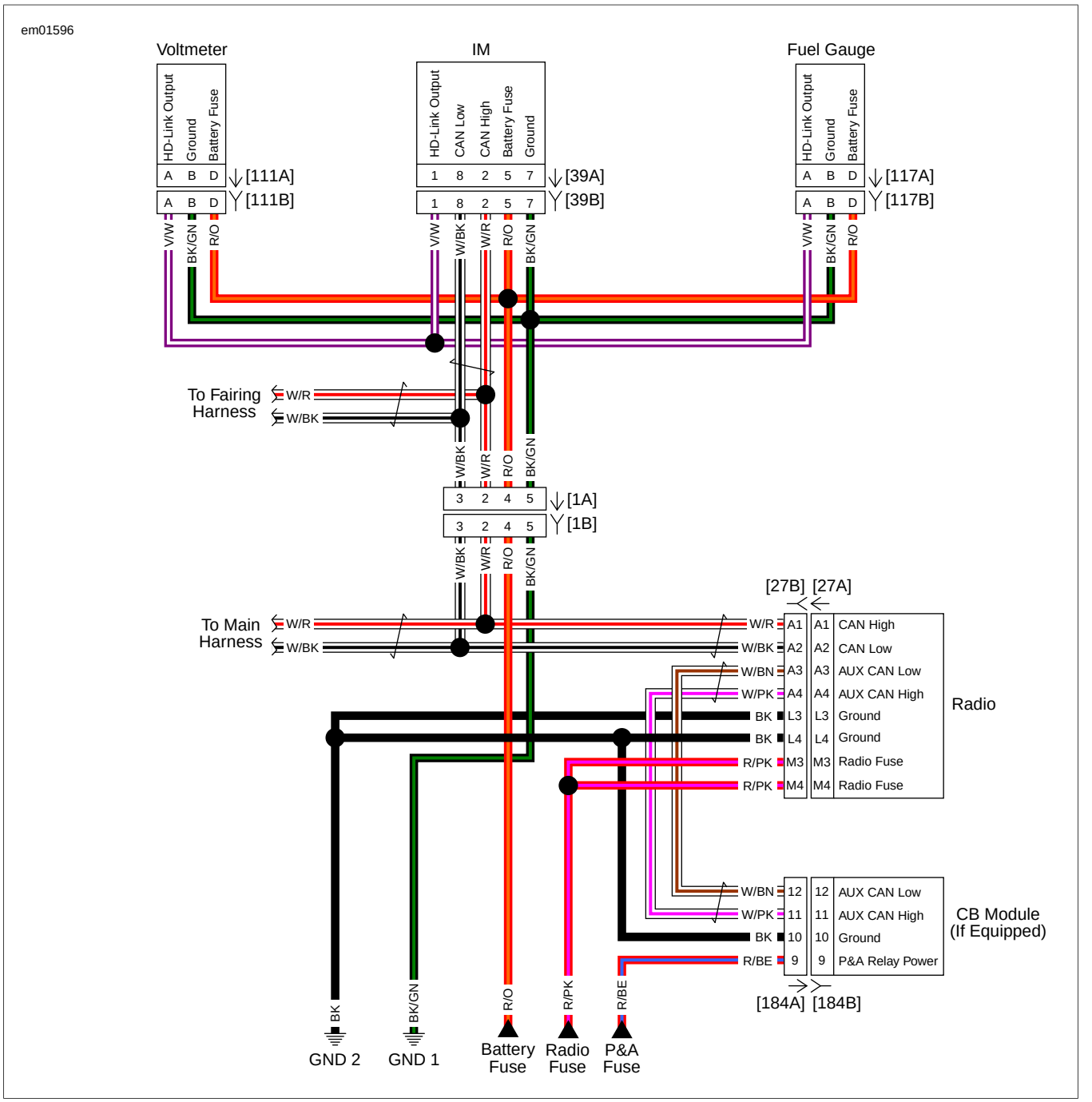


Figure 2-11. HD-Link and AUX CAN Bus: FLH with Fairing

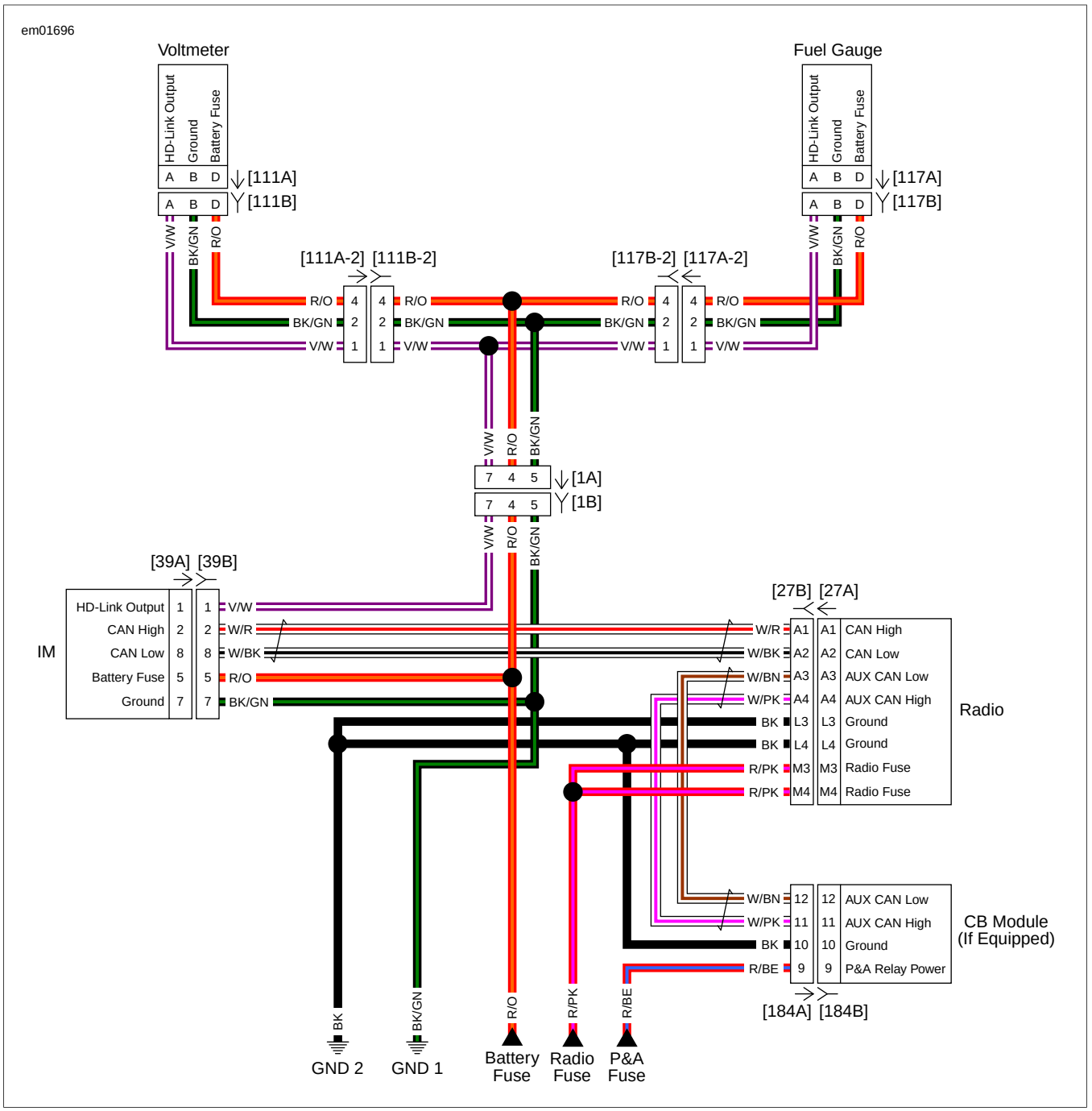


Figure 2-12. HD-Link and AUX CAN Bus: FLT

DTC U0158

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 2-13. DTC U0158 Diagnostic Faults

POSSIBLE CAUSES
Open in HD-Link circuit to the fuel gauge
Open in fuel gauge battery power circuit
Open in fuel gauge ground circuit

1. Fuel Gauge Voltage Test

1. Turn IGN OFF.
2. Disconnect fuel gauge [117].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between fuel gauge [117B] terminal D and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/O) wire.

2. Ground Circuit Continuity Test

1. Test continuity between [117B] terminal B and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK/GN) wire.

3. HD-Link Circuit Continuity Test

1. Disconnect IM [39].
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters, leaving [39A] disconnected.
3. Test continuity between [117B] terminal A and BOB terminal 1.
4. Is continuity present?
   a. **Yes.** Replace fuel gauge.
   b. **No.** Repair open in (V/W) wire.

DTC U0159

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 2-14. DTC U0159 Diagnostic Faults

POSSIBLE CAUSES
Open in HD-Link circuit to the voltmeter
Open in voltmeter battery power circuit
Open in voltmeter ground circuit

1. Voltmeter Voltage Test

1. Turn IGN OFF.
2. Disconnect voltmeter [111].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between voltmeter [111B] terminal D and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/O) wire.

2. Ground Circuit Continuity Test

1. Test continuity between [111B] terminal B and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK/GN) wire.

3. HD-Link Circuit Continuity Test

1. Disconnect IM [39].
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters, leaving [39A] disconnected.
3. Test continuity between [111B] terminal A and BOB terminal 1.
4. Is continuity present?
   a. **Yes.** Replace voltmeter.
   b. **No.** Repair open in (V/W) wire.

DTC U0160

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 2-15. DTC U0160 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in HD-Link circuit
Open in HD-Link circuit
Short to ground in HD-Link circuit

1. HD-Link Circuit Continuity Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters, leaving [39A] disconnected.
3. Disconnect voltmeter [111].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [111B] terminal A and BOB terminal 1.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (V/W) wire.

2. HD-Link Circuit Short to Ground Test

1. Test continuity between BOB terminal 1 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. Fuel Gauge Shorted Test

1. Disconnect fuel gauge [117].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (V/W) wire.
   b. **No.** Replace fuel gauge.

4. HD-Link Circuit Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB terminal 1 and ground.
3. Is voltage present?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 6.

5. Fuel Gauge Test

1. Turn IGN OFF.
2. Disconnect fuel gauge [117].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is voltage present?
   a. **Yes.** Repair short to voltage in (V/W) wire.
   b. **No.** Replace fuel gauge.

6. Voltmeter Short to Ground Test

1. Connect voltmeter [111].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Replace voltmeter.
   b. **No.** Go to Test 7.

7. Voltmeter Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB terminal 1 and ground.
3. Is voltage present?
   a. **Yes.** Replace voltmeter.
   b. **No.** Replace IM.

DTC U1302

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 2-16. DTC U1302 Diagnostic Faults

POSSIBLE CAUSES
Module shorted to ground or voltage

1. Accessory Bus Shorted to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to radio wire harness [27B], leaving [27A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal A3 and ground.
5. Test continuity between BOB terminal A4 and ground.

6. Is continuity present on either circuit?
   a. **Yes, with CB.** Go to Test 2.
   b. **Yes, without CB.** Repair short to ground in (W/PK) or (W/BN) wire. **(5041)**
   c. **No.** Go to Test 3.

2. CB Module Test

1. Disconnect CB module [184].
2. Test continuity between BOB terminal A3 and ground.
3. Test continuity between BOB terminal A4 and ground.
4. Is continuity present on either circuit?
   a. **Yes.** Repair short to ground in (W/PK) or (W/BN) wires. **(5041)**
   b. **No.** Replace CB module. **(6625)**

3. Accessory Bus Shorted to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB terminal A3 and ground.
3. Test voltage between BOB terminal A4 and ground.
4. Is voltage present on either circuit?
   a. **Yes, with CB.** Go to Test 4.
   b. **Yes, without CB.** Repair short to voltage in (W/PK) or (W/BN) wire. **(5041)**
   c. **No.** Go to Test 5.

4. CB Accessory BUS Test

1. Disconnect CB module [184].
2. Test voltage between BOB terminal A3 and ground.
3. Test voltage between BOB terminal A4 and ground.
4. Is voltage present?
   a. **Yes.** Repair short to voltage in (W/PK) or (W/BN) wire. **(5041)**
   b. **No.** Replace CB module. **(6625)**

5. Accessory BUS Shorted Together Test

1. Disconnect CB module [184].
2. Test continuity between BOB terminal A3 and A4.
3. Is continuity present?
   a. **Yes.** Repair short between (W/PK) or (W/BN) wires. **(5041)**
   b. **No.** Replace radio. **(6101)**

DTC U1401

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 2-17. DTC U1401 Diagnostic Faults

POSSIBLE CAUSES
Open in both Aux CAN high and low circuit to CB module

1. Aux CAN High Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to radio wire harness [27B], leaving [27A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal A3 and [184A] terminal 12.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open aux CAN high circuit (W/BN) wire. **(5041)**

2. Aux CAN Low Open Test

1. Test continuity between BOB terminal A4 and [184A] terminal 11.
2. Is continuity present?
   a. **Yes.** Test for intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No.** Repair open aux CAN low circuit (W/PK) wire. **(5041)**

AMP COMMUNICATION DIAGNOSTICS 2.5

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The amplifiers use the CAN bus to communicate their current status. The CAN bus circuit also provides a means for the ECM, instruments, BCM, hand control modules, ABS module (if equipped) and radio to communicate their current status. When all operating parameters on the CAN bus are within specification, a state of health message is sent between components.

The CAN bus is made up of two circuits. The (W/R) is the CAN bus high circuit and the (W/BK) is the CAN bus low circuit. Both circuits show around 2.5V when measured between each of the circuits and ground with the IGN ON. These circuits are connected to each module on the CAN bus network. A fault on either one of these circuits will cause several modules to set "U" codes and may cause a complete loss of communication between all modules.

Table 2-18. Code Description

DTC	DESCRIPTION
U0185	Lost comm w/AMP 1
U0186	Lost comm w/AMP 2

Diagnostic Tips

Modules must have power in order to communicate on the CAN bus. It is important to check for battery power and ground on any module that is not communicating on the CAN bus network. Only the radio is capable of setting these codes. If the radio is intermittently setting the same U-code, it indicates an intermittent problem with the device the code is set against or intermittent CAN, power or ground wires to the device. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test to test wiring to the component.

The BCM supplies power to several systems. When testing for a short to voltage, perform all tests before disconnecting the BCM to keep from powering down systems on the vehicle. If the short to voltage goes away when the BCM is disconnected, test for continuity between the circuit in question and BCM [242B] terminals F4, J3, L3, L4 and M2 to verify the tested circuit is not shorted to one of these circuits. If continuity is present, repair shorted circuit instead of replacing the BCM. Historic U-codes may be found if battery power has been lost for any reason or if the main or battery fuses have been disconnected and reconnected. This may also happen if during diagnostics using DIGITAL TECHNICIAN II (Part No. HD-48650). The diagnostics connector has been disconnected before vehicle has been powered down. This is not an indication of a problem and does not cause any loss of functionality.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

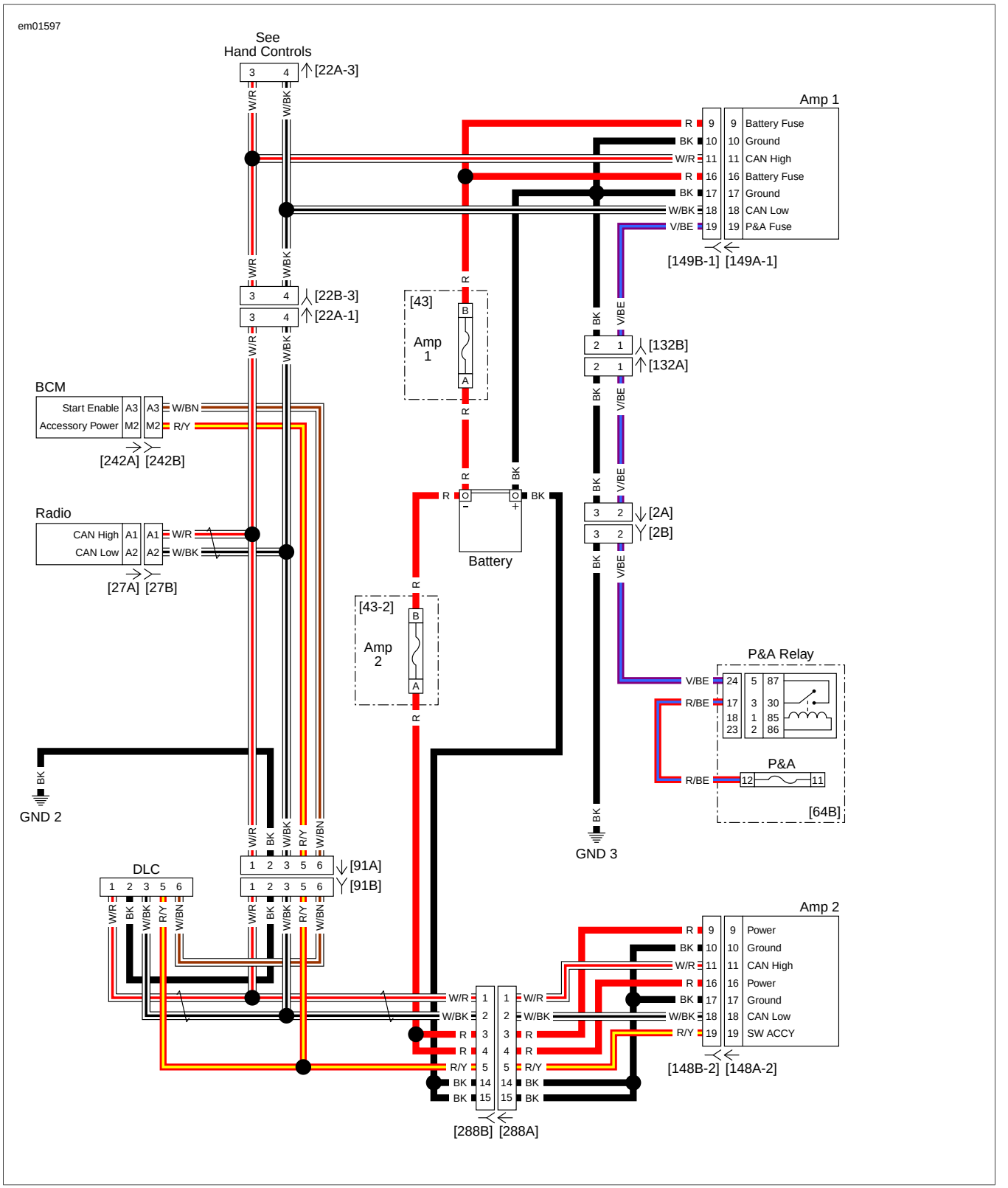


Figure 2-13. AMP 1 & AMP 2 CAN Bus

DTC U0185

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 2-19. DTC U0185 Diagnostic Faults

POSSIBLE CAUSES
Open in CAN high circuit to the AMP 1
Open in CAN low circuit to the AMP 1
Open in AMP 1 switched power circuit
Open in AMP 1 ground circuit
Open in AMP 1 battery power circuit

1. Fuse Test

1. Check AMP 1 fuse.
2. Is fuse good?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair as needed, replace fuse.

2. AMP 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect AMP 1 [149-1].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [149B-1] terminal 9 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (R) wire.

3. AMP 1 Ground Test

1. Test voltage between [149B-1] terminals 9 and 10.
2. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK) wire.

4. Switched Power Test

1. Turn IGN ON.
2. Test voltage between [149B-1] terminal 19 and ground.
3. Is battery voltage present?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 7.

5. CAN High Circuit Continuity Test

1. Test continuity between [149B-1] terminal 11 and DLC [91A] terminal 1.
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (W/R) wire.

6. CAN Low Circuit Continuity Test

1. Test continuity between [149B-1] terminal 18 and DLC [91A] terminal 3.
2. Is continuity present?
   a. **Yes.** Replace AMP 1.
   b. **No.** Repair open in (W/BK) wire.

7. Switched Power Ground Test

1. Turn IGN OFF.
2. Test continuity between [149B-1] terminal 19 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground on [149B-1] terminal 19 (V/BE) wire.
   b. **No.** Go to Test 8.

8. BCM Test

1. Connect [149-1].
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Test voltage between BOB terminal M2 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 9.
   b. **No.** Replace BCM.

9. P&A Relay Test

1. Disconnect [149-1].
2. Remove P&A relay.
3. Test continuity between [149B-1] terminal 19 and fuse block [64] terminal 24.
4. Is continuity present?
   a. **Yes.** Replace P&A relay.
   b. **No.** Repair open in (V/BE) wire.

DTC U0186

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 2-20. DTC U0186 Diagnostic Faults

POSSIBLE CAUSES
Open in CAN high circuit to the AMP 2
Open in CAN low circuit to the AMP 2
Open in AMP 1 switched power circuit
Open in AMP 1 ground circuit
Open in AMP 2 battery power circuit

1. Fuse Test

1. Check AMP 2 fuse.
2. Is fuse good?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair as needed, replace fuse.

2. AMP 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect AMP 2 [149-2].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [149B-2] terminal 9 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (R) wire.

3. AMP 2 Ground Test

1. Test voltage between [149B-2] terminals 9 and 10.
2. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK) wire.

4. Switched Power Test

1. Turn IGN ON.
2. Test voltage between [149B-2] terminal 19 and ground.
3. Is battery voltage present?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 7.

5. CAN High Circuit Continuity Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between [149B-2] terminal 11 and BOB terminal D2.
4. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (W/R) wire.

6. CAN Low Circuit Continuity Test

1. Test continuity between [149B-2] terminal 18 and BOB terminal E2.
2. Is continuity present?
   a. **Yes.** Replace AMP 2.
   b. **No.** Repair open in (W/BK) wire.

7. Switched Power Ground Test

1. Turn IGN OFF.
2. Test continuity between [149B-2] terminal 19 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (R/Y) wire.
   b. **No.** Go to Test 8.

8. BCM Test

1. Connect [149-2].
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Test voltage between BOB terminal M2 and ground.
6. Is battery voltage present?
   a. **Yes.** Repair open in (R/Y) wire.
   b. **No.** Replace BCM.

TABLE OF CONTENTS

NOTES

BATTERY TESTING 3.1

GENERAL

Test battery condition by using a voltage, charging or load test.

Always fully charge battery prior to load testing.

NOTE

An automatic, constant monitoring battery charger/tender with a charging rate of 5 Amps or less at less than 14.6V is recommended. The use of constant current chargers (including trickle chargers) to charge sealed AGM batteries is not recommended. Any overcharge will cause dry-out and premature battery failure.

VOLTMETER TEST

The voltmeter test provides a general indication of battery state of charge or condition. Check the voltage of the battery to verify that it is in a 100% fully charged condition. Refer to Table 3-1.

If the open circuit (disconnected) voltage reading is below 12.6V, charge battery and then recheck voltage after battery has set for one to two hours. If voltage reading is 12.7V or above, perform a load test. See 3.1 BATTERY TESTING, Load Test.

Table 3-1. Voltmeter Test For Battery Charge Conditions

VOLTAGE	STATE OF CHARGE
12.7	100%
12.6	75%
12.3	50%
12.0	25%
11.8	0%

BATTERY DIAGNOSTIC TEST

PART NUMBER	TOOL NAME
GRX-3110 HD	BATTERY DIAGNOSTIC STATION

Test battery using the BATTERY DIAGNOSTIC STATION (Part No. GRX-3110 HD).

WARNING

Disconnect negative (-) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00049a)

1. Disconnect and remove battery.
2. Read GRX instruction manual before performing a battery test.
3. Connect BATTERY DIAGNOSTIC STATION (Part No. GRX-3110 HD) leads to the battery terminals.

Test results will include a decision on battery condition and measured state of charge. See Figure 3-1. The GRX printer will provide a printout including test results:

- GOOD BATTERY - Return battery to service.
- REPLACE BATTERY - Replace battery.

Figure 3-1. Battery Test Results Printout (Typical)

LOAD TEST

WARNING

Disconnect negative (-) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00049a)

1. With vehicle battery on a bench, charge battery using an automatic, constant monitoring battery charger approved for AGM batteries.

NOTE

Always fully charge battery before testing or test readings will be incorrect. Load testing a discharged battery can also result in permanent battery damage.

WARNING

Turn battery load tester OFF before connecting tester cables to battery terminals. Connecting tester cables with load tester ON can cause a spark and battery explosion, which could result in death or serious injury. (00252a)

2. See Figure 3-2. Connect tester leads to battery posts and place induction pickup over negative (black) cable.

NOTE

To avoid load tester and/or battery damage, do not leave load tester switch turned ON for more than 20 seconds.

3. Load battery at 50% of CCA rating using load tester. Voltage reading after 15 seconds should be 9.6V or more at 70 °F (21 °C). Refer to Table 3-2.

⚠WARNING

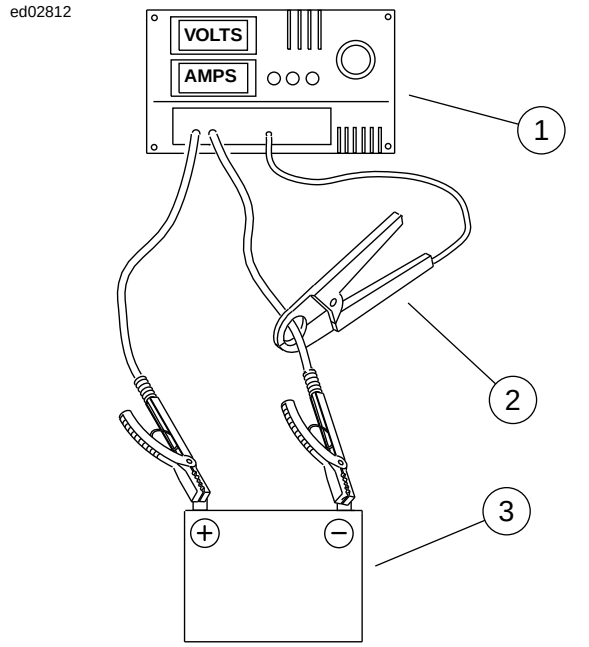
Turn battery load tester OFF before disconnecting tester cables to battery terminals. Disconnecting tester cables with load tester ON can cause a spark and battery explosion, which could result in death or serious injury. (00253a)

⚠WARNING

Connect positive (+) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00068a)

NOTICE

Do not over-tighten bolts on battery terminals. Use recommended torque values. Over-tightening battery terminal bolts could result in damage to battery terminals. (00216a)



1. **Load tester**
2. **Induction pickup**
3. **Battery**

Figure 3-2. Load Test Battery

Table 3-2. Battery Load Test

COLD CRANKING AMPERAGE (CCA)	100%	50%
Touring models	405	200

STARTING SYSTEM 3.2

DESCRIPTION AND OPERATION

Battery voltage is supplied to the BCM at all times through the main fuse. The BCM provides and monitors a voltage signal to the ignition switch. This signal changes depending on the position of the IGN switch.

When the engine stop switch is in the RUN position, a CAN message is sent, signaling the BCM that the switch is in the RUN position. If CAN communication is interrupted while the engine is running, the BCM checks for the signal from the redundant engine stop switch circuit.

When the start switch is pressed, a CAN message is sent to the BCM. The BCM provides power to the starter solenoid. This energizes the solenoid and full battery power is sent to the starter. The BCM disables the starter solenoid if the start switch is pressed for more than 10 seconds.

COMPONENTS

Starter

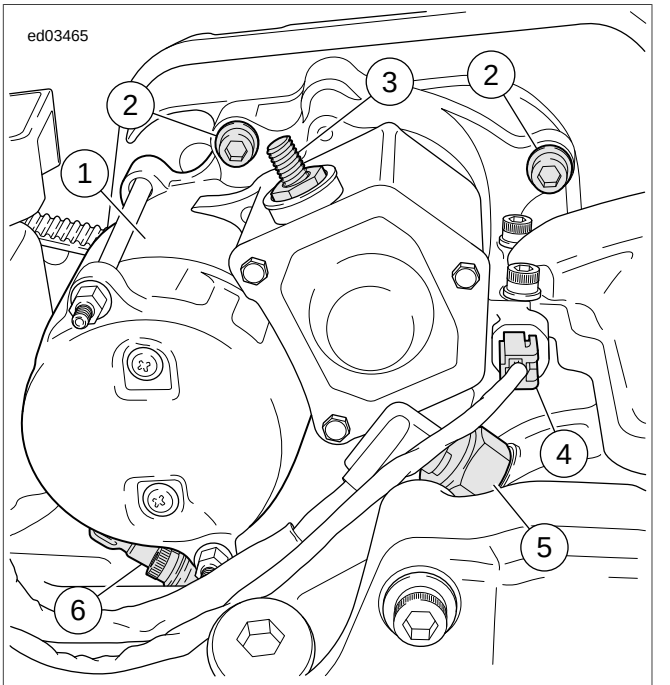
The starter receives power from the battery through the starter solenoid and is grounded through the starter case. When the starter solenoid is energized, two events happen:

- The plunger pulls inward which allows current to flow to the starter motor.
- The pinion gear engages with the ring gear on the clutch shell.

With the starter motor turning, the rotation is transferred:

- The starter armature gear transfers rotation to the idler gear.
- The idler gear transfers rotation to the starter clutch.
- The starter clutch transfers rotation through a spline gear to the starter drive shaft which also drives the pinion gear.
- The pinion gear transfers its rotation to the ring gear on the clutch shell.
- The primary chain drives the alternator rotor sprocket on the end of the crankshaft.

The starter clutch has a one-way clutch. When the engine starts, it allows the clutch shell and sprocket to spin freely without causing any damage to the starter motor. After the engine starts and the start switch is released, the plunger returns to its normal position, disengaging the pinion gear from the clutch shell and sprocket.



1. **Starter**
2. **Starter mounting fasteners**
3. **Positive battery cable post**
4. **Solenoid wire**
5. **Neutral switch**
6. **VSS**

Figure 3-3. Starter Components

Starter Solenoid

See Figure 3-3. The starter solenoid provides power to the starter. The solenoid is a means of controlling a high amperage device with a low amperage switch. The low amperage switch in this circuit is the BCM. The BCM sends voltage to the starter solenoid making a magnetic field that pulls a larger circuit closed, allowing voltage to the starter.

Engine Stop Switch

The engine stop switch is located on the right hand controls. With the engine stop switch in the RUN position, a CAN message is sent, signaling the BCM that the switch is in the RUN position. If CAN communication is interrupted while engine is running, a redundant engine stop switch circuit allows communication to the BCM.

Start Switch

The start switch is a push button switch located in the right hand controls. When the start switch is pressed, a CAN message is sent to the BCM.

BCM

The BCM supplies ignition and accessory power to most of the vehicle. It controls the lighting along with other functions by using the switches as inputs and the power circuits for the lights and other electrical loads as outputs.

Ignition Switch

The BCM provides and monitors a voltage signal to the ignition switch, which is an open circuit in the OFF position. The ignition switch routes the signal through a 200 Ohm resistor to ground in the IGN position or through a 800 Ohm resistor to ground in the ACC position. The difference in resistance in the ignition switch informs the BCM of the switch position.

Battery

⚠WARNING

Batteries contain sulfuric acid, which could cause severe burns to eyes and skin. Wear a protective face shield, rubberized gloves and protective clothing when working with batteries. KEEP BATTERIES AWAY FROM CHILDREN. (00063a)

⚠WARNING

Never remove warning label attached to top of battery. Failure to read and understand all precautions contained in warning, could result in death or serious injury. (00064a)

⚠WARNING

Explosive hydrogen gas, which escapes during charging, could cause death or serious injury. Charge battery in a well-ventilated area. Keep open flames, electrical sparks and smoking materials away from battery at all times. KEEP BATTERIES AWAY FROM CHILDREN. (00065a)

⚠WARNING

If battery becomes hot, gassing or spewing of electrolyte can occur, which could cause death or serious injury. Unplug or turn OFF the charger until battery cools. (00412b)

⚠WARNING

Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer, and birth defects or other reproductive harm. Wash hands after handling. (00019e)

NOTICE

If battery releases an excessive amount of gas during charging, decrease the charging rate. Overheating can result in plate distortion, internal shorting, drying out or damage. (00413b)

The AGM batteries are permanently sealed, maintenance-free, valve-regulated, lead/calcium and sulfuric acid batteries.

The battery is recharged by the alternator and kept from overcharging by the regulator during use.

Battery condition can be determined by a voltage test, a charging and a load test. See 3.1 BATTERY TESTING.

The battery must be fully charged to perform a conductance test or a load test.

Grinding Noise or Erratic Starting

1. Remove starter.
2. Inspect starter mounting surface and mating area on inner primary for arcing and pitting. This condition is caused by insufficient ground and or clamp load.
3. Clean mating surfaces.
4. Inspect starter pinion gear. Replace starter clutch assemblies with cracked or missing teeth. Rounding of pinion gear teeth is considered normal. If replacing pinion gear, inspect ring gear on clutch. Replace clutch ring gear if damaged.
5. Install starter.

Job/Time Code Values

Dealership Technicians filing warranty claims should use the job/time code values printed in (bold text) beside the appropriate repair.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

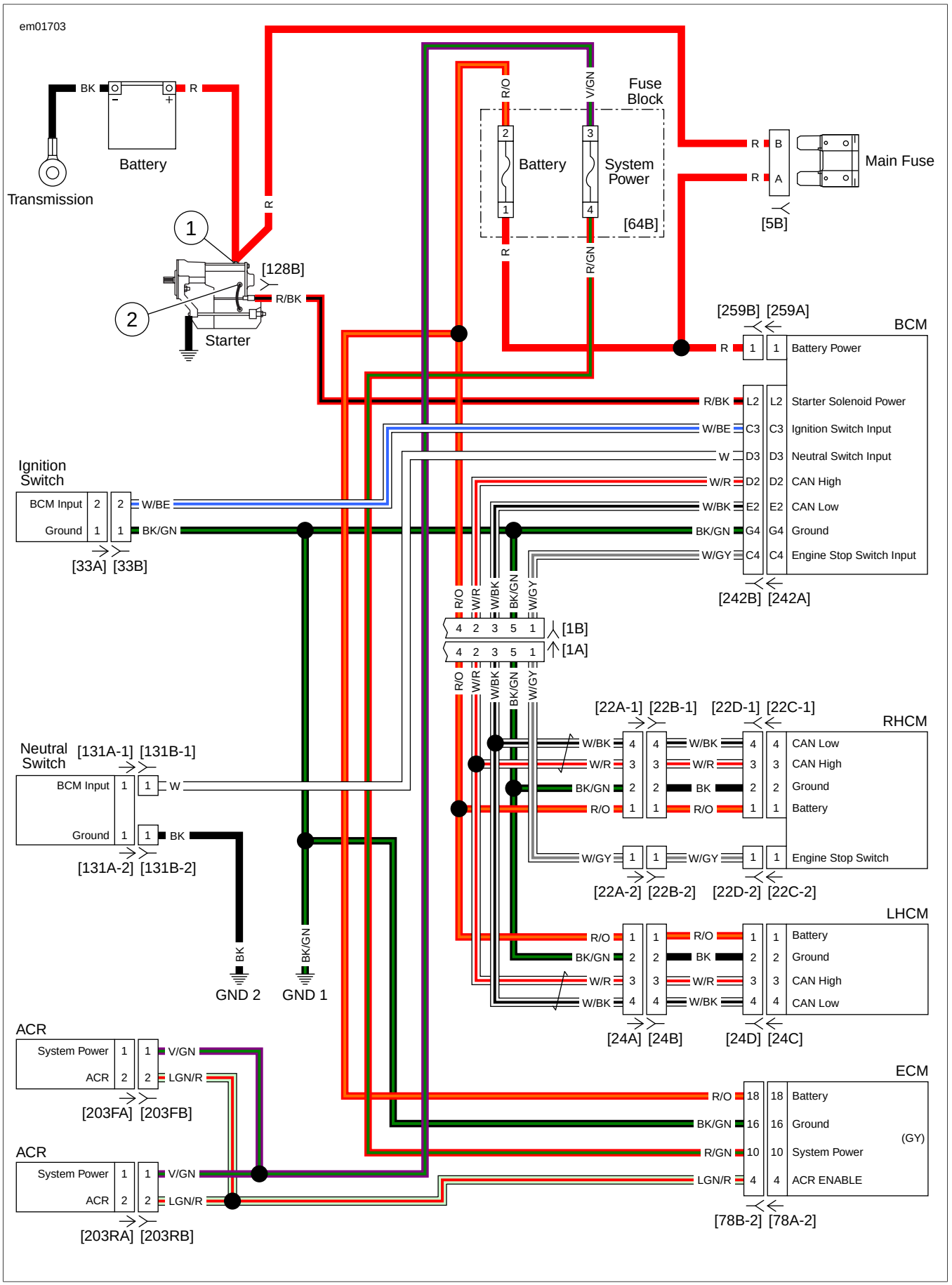


Figure 3-4. Starting Circuit: FLH With Fairing

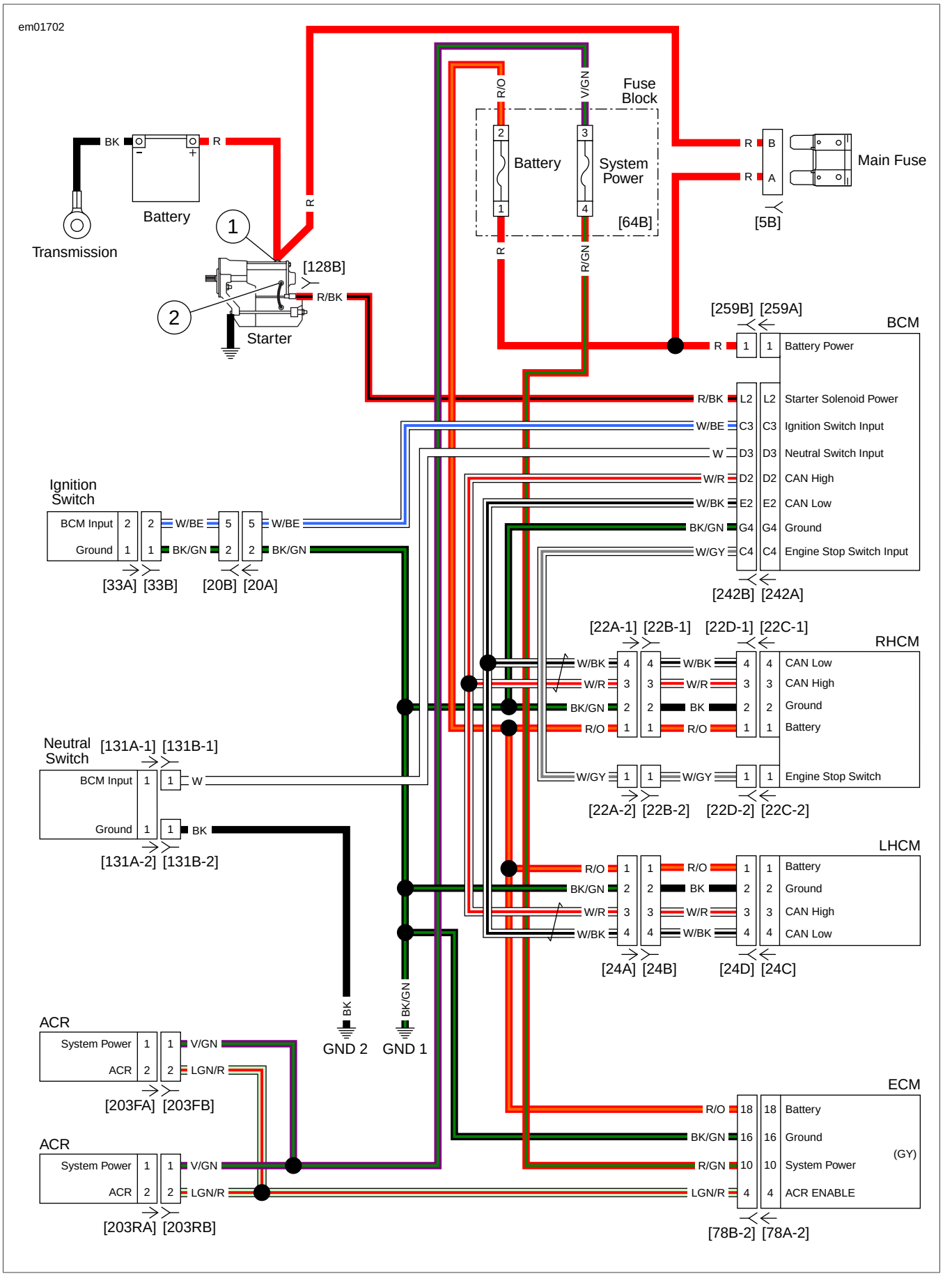


Figure 3-5. Starting Circuit: FLH Without Fairing

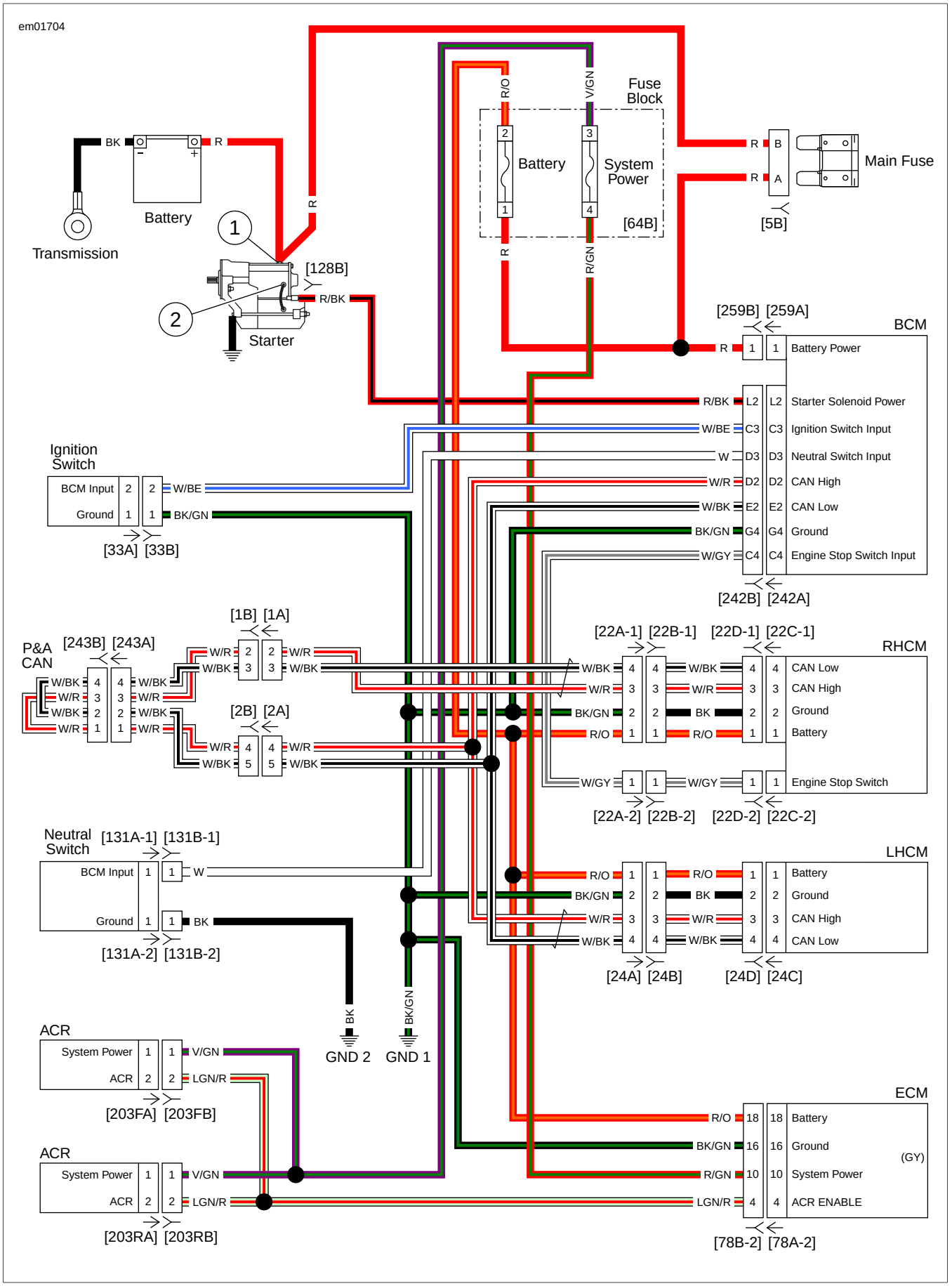


Figure 3-6. Starting Circuit: FLT

STARTER TROUBLESHOOTING

Troubleshooting tables contain detailed procedures to solve and correct problems. Follow 3.2 STARTING SYSTEM to diagnose starting system problems. The 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Voltage Drop procedure will help you to locate poor connections or components with excessive voltage drops.

STARTER TESTING

Table 3-3. Starter Testing Diagnostic Faults

POSSIBLE CAUSES
Short to voltage at starter solenoid
Start switch malfunction
Short to voltage on BCM supply circuit

1. Starting System Operational Test

1. Turn IGN ON.
2. With transmission in neutral and engine stop switch in RUN position, press start switch.
3. Does starter spin?
   a. **Yes, starter spins but does not engage.** See 3.2 STARTING SYSTEM, Starter Spins But Does Not Engage.
   b. **Yes, starter stalls or spins too slowly.** See 3.2 STARTING SYSTEM, Starter Stalls or Spins Too Slowly.
   c. **Yes, starter runs on.** Go to Test 3.
   d. **No.** Go to Test 2.

2. Audible Noise Test

1. While listening for audible clicking noise from starter solenoid, press start switch.
2. Is there a click?
   a. **Yes, starter solenoid clicks.** See 3.2 STARTING SYSTEM, Starter Solenoid Clicks.
   b. **No.** See 3.2 STARTING SYSTEM, Nothing Clicks.

3. Starter Solenoid Test

1. Disconnect starter solenoid [128].
2. Does starter stop?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace starter solenoid assembly. **(5845)**

4. Checking DTCs Test

1. Check DTCs.
2. Is DTC B2122 present?
   a. **Yes.** See 3.3 STARTER OUTPUT DTCS.
   b. **No.** Replace BCM. **(5838)**

NOTHING CLICKS

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-4. Nothing Clicks Diagnostic Faults

POSSIBLE CAUSES
Low battery
Open fuse
Neutral switch malfunction
Open neutral circuit
Ignition switch malfunction
Open ignition circuit

NOTE

Verify that vehicle is in neutral. Check that key fob is present and in working order (if security equipped). Verify the engine stop switch is in RUN position.

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery. **(5705)**

2. Ignition Circuit Test

1. Turn IGN ON.
2. Do odometer, headlamp and tail lamps illuminate?
   a. **Yes.** Go to Test 3.
   b. **No. Odometer is inoperative, but headlamp and tail lamps illuminate.** See 2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274.
   c. **No. Odometer, headlamp and tail lamps inoperative.** See 2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, No Vehicle Power: DTC U0140.

3. Starter Solenoid Circuit Test

1. Turn IGN OFF.
2. Disconnect starter solenoid [128].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), during the first 4-5 seconds, while start button is pressed, test voltage between [128B] (R/BK) wire and ground.

5. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 5.

4. Starter Ground Test

1. Remove starter attaching bolts.
2. Clean bolts and starter base, install starter bolts.
3. Does engine crank?
   a. **Yes. Engine cranks at normal speed.** Repair complete. **(5817)**
   b. **Yes. Engine cranks, but at a slower speed.** See 3.4 TESTING STARTER ON MOTORCYCLE, Starter Current Draw Test.
   c. **No.** Replace starter solenoid. **(5845)**

5. Neutral Switch Test

1. With IGN ON and the transmission in neutral, observe the neutral lamp.
2. Is the neutral lamp illuminated?
   a. **Yes.** Go to Test 6.
   b. **No.** See 4.5 INDICATOR LAMPS, Neutral Lamp Inoperative.

6. Starter Solenoid Circuit Test

1. Turn IGN OFF.
2. Connect the BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and BCM [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal L2 and [128B].
5. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (R/BK) wire. **(5041)**

7. BCM Test

1. Turn IGN OFF.
2. Remove main fuse [5].
3. Disconnect BCM and replace with known good BCM.
4. Install main fuse.
5. Turn IGN ON.
6. Attempt to start vehicle.
7. Does engine crank?
   a. **Yes.** Replace BCM. **(5838)**
   b. **No.** Replace RHCM. **(6166)**

STARTER SOLENOID CLICKS

Table 3-5. Starter Solenoid Clicks Diagnostic Faults

POSSIBLE CAUSES
Low battery
Starter malfunction
Starter solenoid malfunction
Open battery cable
Open starter cable
Mechanical binding

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery. **(5705)**

2. Starter Voltage Drop Test

1. Perform voltage drop tests from battery (+) to starter stud on starter (BK) wire. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Voltage Drop.
2. Is voltage drop greater than 1.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 5.

3. Starter Solenoid Voltage Drop Starter Side Test

1. Perform voltage drop test from battery (+) terminal to starter solenoid terminal 2 (BK) wire.
2. Is voltage drop greater than 1.0V?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace starter solenoid assembly. **(5845)**

4. Starter Solenoid Battery Side Voltage Drop Test

1. Perform voltage drop test from battery (+) terminal to starter solenoid terminal 1 (BK) wire.
2. Is voltage drop greater than 1.0V?
   a. **Yes.** Repair or replace (BK) wire from starter solenoid terminal 1 to battery (+) terminal. **(5041)**
   b. **No.** Replace starter solenoid assembly. **(5845)**

5. Starter Ground Circuit Voltage Drop Test

1. Perform voltage drop test from battery (-) terminal to ground.
2. Is voltage drop greater than 1.0V?
   a. **Yes.** Inspect (BK) wire for damage from battery (-) terminal to chassis ground, repair or replace if necessary. Go to Test 6.
   b. **No.** Go to Test 7.

6. Starter Ground Test

1. Remove starter attaching bolts.
2. Clean bolts and starter base, install starter bolts.
3. Does engine crank?
   a. **Yes. Engine cranks at normal speed.** Repair complete. **(5817)**
   b. **Yes. Engine cranks, but at a slower speed.** See 3.4 TESTING STARTER ON MOTORCYCLE, Starter Current Draw Test.
   c. **No.** Replace starter. **(5817)**

7. Starter Draw Test

1. Perform Starter Current Draw Test on motorcycle. See 3.4 TESTING STARTER ON MOTORCYCLE, Starter Current Draw Test.
2. Perform Starter Motor Free Running Current Draw Test on bench. See 3.5 TESTING STARTER ON BENCH, Free Running Current Draw Test.
3. Are test results within range?
   a. **Yes.** Go to Test 8.
   b. **No.** Replace starter. **(5817)**

8. Mechanical Binding Test

1. Remove spark plugs and place transmission in 5th gear.
2. Raise vehicle.
3. Rotate rear wheel.
4. Check for engine binding in the primary and/or crankshaft or starter clutch.
5. Is engine binding?
   a. **Yes.** Repair as needed. (Use appropriate code).
   b. **No.** Replace starter solenoid assembly. **(5845)**

STARTER SPINS BUT DOES NOT ENGAGE

Table 3-6. Starter Spins But Does Not Engage Diagnostic Faults

POSSIBLE CAUSES
Clutch assembly
Clutch shell and sprocket

1. Pinion Gear and Clutch Shell Test

1. Remove primary cover.
2. Inspect for damage to starter pinion gear and clutch shell and sprocket.

NOTE

*Inspect ACR operation (if equipped) before installation of **new** starter clutch assembly.*

3. Is damage present?
   a. **Yes.** Replace clutch assembly or clutch shell and sprocket. **(5825)**
   b. **No.** Replace clutch assembly. **(5837)**

STARTER STALLS OR SPINS TOO SLOWLY

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 3-7. Starter Stalls or Spins Too Slowly Diagnostic Faults

POSSIBLE CAUSES
Low battery
Starter malfunction
Starter solenoid malfunction
Poor connections at starter ground
Open battery cable
Open starter cable

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery. **(5705)**

2. Starter Stud Voltage Drop Test

1. Perform voltage drop test from battery (+) terminal to starter stud on starter (BK) wire. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Voltage Drop.
2. Is voltage drop greater than 1.0V?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 3.

3. Starter Ground Circuit Voltage Drop Test

1. Perform voltage drop test between battery (-) terminal and starter attaching bolts.
2. Is voltage drop greater than 1.0V?
   a. **Yes.** Clean ground connections. **(5041)**
   b. **No.** Go to Test 4.

4. ACR Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wire harness [78B-1], [78B-2], [78B-3] and [78A-1], [78A-2], [78A-3]. See 1.3 DIAGNOSTIC TOOLS.

3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper between BOB [78-2] terminal 16 and terminal 18.
6. Jumper between BOB [78-2] terminal 4 and terminal 10.
7. Do ACRs click?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace front and rear ACR solenoids. **(7078)**

5. Starter Draw Test

1. Perform Starter Current Draw Test on motorcycle. See 3.4 TESTING STARTER ON MOTORCYCLE, Starter Current Draw Test.
2. Perform Starter Motor Free Running Current Draw Test (on bench). See 3.5 TESTING STARTER ON BENCH, Free Running Current Draw Test.
3. Are test results within range?
   a. **Yes.** With the spark plugs removed and transmission in 5th gear, rotate rear wheel. Check for engine, primary and/or crankshaft bind. (Use appropriate code)
   b. **No.** Replace starter. **(5817)**

6. Starter Solenoid Voltage Drop Starter Side Test

1. Perform voltage drop test between battery (+) terminal to starter solenoid terminal 2.
2. Is voltage drop greater than 1.0V?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair connection or (BK) wire between starter solenoid and starter. **(5041)**

7. Starter Solenoid Battery Side Voltage Drop Test

1. Perform voltage drop test between battery (+) terminal and starter solenoid terminal 1 (R) wire.
2. Is voltage drop greater than 1.0V?
   a. **Yes.** Repair or replace connection between battery (+) terminal and starter solenoid terminal 1 (R) wire. **(5041)**
   b. **No.** Repair or replace starter solenoid assembly. **(5845)**

STARTER OUTPUT DTCS 3.3

DESCRIPTION AND OPERATION

The starter solenoid circuit is controlled and monitored by the BCM. The BCM receives a CAN message from the start switch in the RHCM to engage the starter. Voltage is sent from the BCM to the starter solenoid [128] (R/BK) wire. The BCM disables the starter solenoid if the start switch is pressed for more than 10 seconds.

Table 3-8. Code Description

DTC	DESCRIPTION
B2206	Engine stop switch input open/shorted high
B2208	Engine stop switch input shorted low

Conditions for Setting

- DTC B2121 will set if starter solenoid circuit draws less than 600 milliamps.
- DTC B2124 will set if starter solenoid circuit draws more than 12 Amps.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

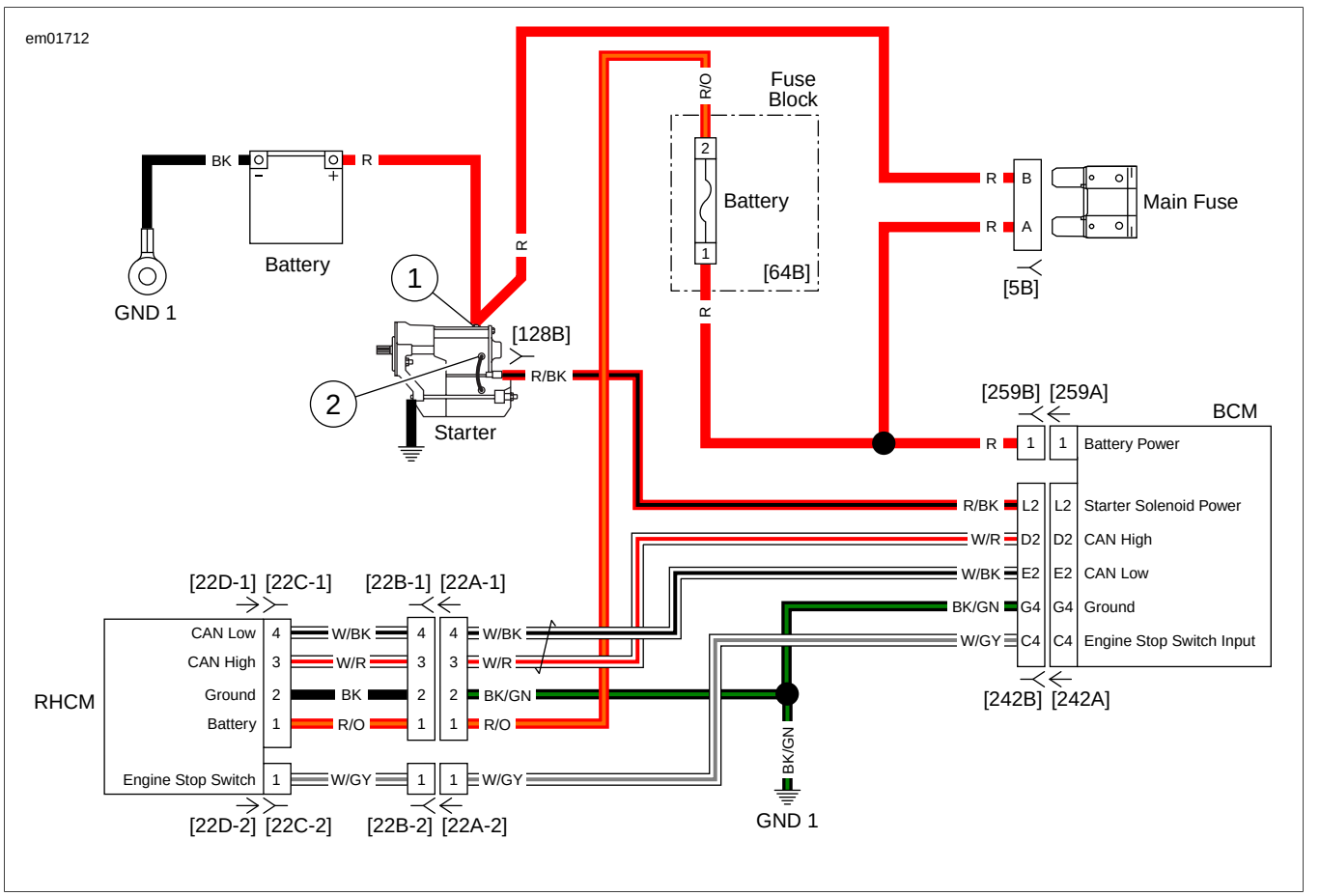


Figure 3-7. Starter: FLH Without Fairing

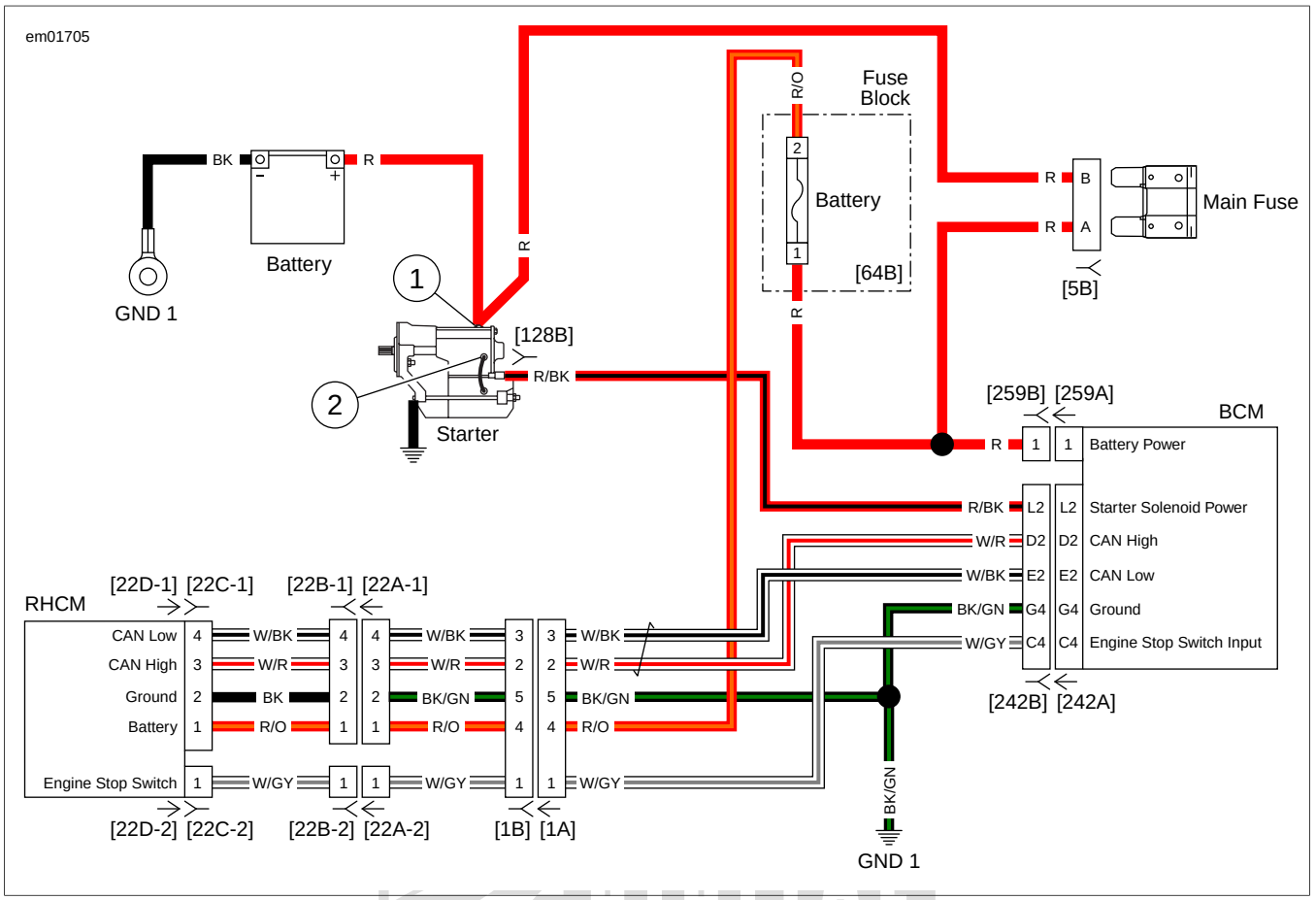


Figure 3-8. Starter: FLH With Fairing

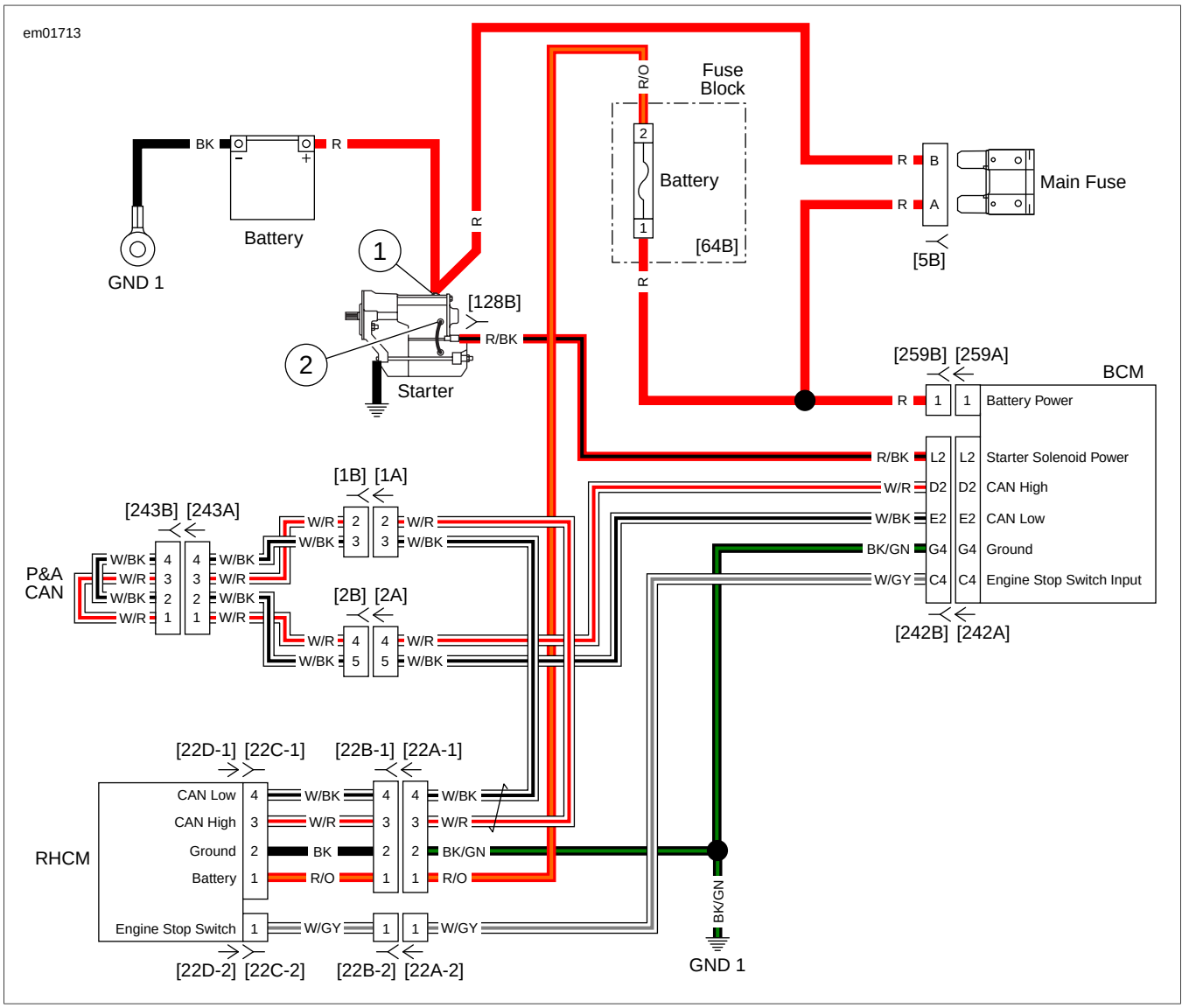


Figure 3-9. Starter: FLT

DTC B2121

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-9. DTC B2121 Diagnostic Faults

POSSIBLE CAUSES
Open in starter circuit
Open in starter solenoid

1. Starter Solenoid Circuit Test

1. Turn IGN OFF.
2. Disconnect starter solenoid [128].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), during first 4-5 seconds, while start button is pressed, test battery voltage between [128B] (R/BK) and ground.
5. Is battery voltage present?
   a. **Yes.** Replace starter solenoid assembly. **(5845)**
   b. **No.** Go to Test 2.

2. Starter Solenoid Supply Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. During first 4-5 seconds, while start button is pressed, test voltage between BOB terminal L2 and ground.

5. Is voltage present?
   a. **Yes.** Repair open in (R/BK) wire between [242B] terminal L2 and [128B]. **(5041)**
   b. **No.** Replace BCM. **(6791)**

DTC B2122

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-10. DTC B2122 Diagnostic Faults

POSSIBLE CAUSES
Short in starter circuit
Short in starter solenoid

1. Starter Solenoid Circuit Test

1. Turn IGN OFF.
2. Disconnect starter solenoid [128].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [128B] (R/BK) and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace starter solenoid assembly. **(5845)**

2. Starter Solenoid Supply Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Without pressing start bottom, test voltage between BOB terminal L2 and ground.
6. Is voltage present?
   a. **Yes.** Repair short to voltage in (R/BK) wire between [242B] terminal L2 and [128B]. **(5041)**
   b. **No.** Replace BCM. **(6773)**

DTC B2123

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-11. DTC B2123 Diagnostic Faults

POSSIBLE CAUSES
Short in starter circuit
Short in starter solenoid

1. Starter Solenoid Supply Continuity Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal L2 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground in (R/BK) wire between [242B] terminal L2 and [128B]. **(5041)**
   b. **No.** Replace BCM. **(6791)**

DTC B2124

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-12. DTC B2124 Diagnostic Faults

POSSIBLE CAUSES
Short in starter circuit
Starter solenoid malfunction
Corrosion at connector

1. Starter Solenoid [128] Test

1. Turn IGN OFF.
2. Disconnect starter solenoid [128].
3. Inspect [128] and (R/BK) wire for damage or corrosion.

4. Is any present?
   a. **Yes.** Repair or replace [128] and (R/BK) wire. **(5041)**
   b. **No.** Go to Test 2.

2. Starter Solenoid Circuit Test

1. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [128B] (R/BK) wire and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace starter solenoid assembly. **(5845)**

3. Starter Solenoid Supply Continuity Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal L2 and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground in (R/BK) wire between [242B] terminal L2 and [128B]. **(5041)**
   b. **No.** Replace BCM. **(6791)**

TESTING STARTER ON MOTORCYCLE 3.4

STARTER CURRENT DRAW TEST

PART NUMBER	TOOL NAME
HD-39617	FLUKE AC/DC CURRENT PROBE

NOTES

- *Engine temperature should be stable and at room temperature.*
- *Battery should be fully charged.*

Check starter current draw with FLUKE AC/DC CURRENT PROBE (Part No. HD-39617). See 1.3 DIAGNOSTIC TOOLS.

1. Verify that transmission is in neutral.
2. Disconnect CKP sensor [79].
3. Clamp FLUKE AC/DC CURRENT PROBE (Part No. HD-39617) around positive starter cable to starter solenoid.

NOTE

After seeing the start button pressed for 10 seconds, the BCM will stop voltage to the starter solenoid automatically.

4. With IGN ON, press start button and read ammeter. Disregard initial high current reading which is normal when engine is first turned over.
5. Did starter current draw exceed 250A?
   a. **Yes.** Perform a bench test. See 3.5 TESTING STARTER ON BENCH, Free Running Current Draw Test.
   b. **No.** Starter current is within specification.

TESTING STARTER ON BENCH 3.5

FREE RUNNING CURRENT DRAW TEST

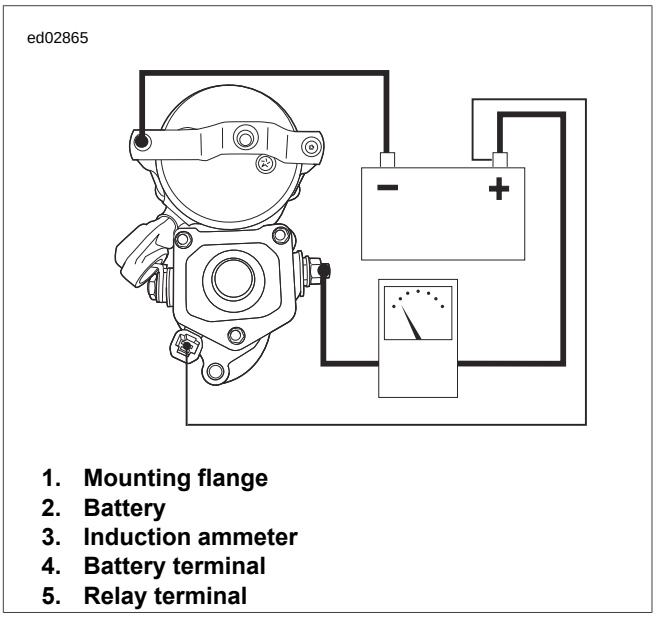
PART NUMBER	TOOL NAME
HD-39617	FLUKE AC/DC CURRENT PROBE

1. Place starter in vise. Use a clean shop towel to prevent scratches or other damage.
2. See Figure 3-10. Attach one heavy jumper cable (6 gauge minimum).
   a. Connect one end to starter mounting flange.
   b. Connect the other end to battery (-) terminal of a fully charged battery.
3. Connect a second heavy jumper cable (6 gauge minimum).
   a. Connect one end to battery (+) terminal of battery.
   b. Connect other end to battery terminal on starter. Clamp FLUKE AC/DC CURRENT PROBE (Part No. HD-39617) around cable.

⚠CAUTION

Keep fingers and clothing away from starter gear to prevent personal injury. (00613b)

4. Connect a smaller jumper cable (14 gauge minimum).
   a. Connect one end to positive (+) terminal of battery.
   b. Connect other end to solenoid relay terminal.
5. Check ammeter reading.
   a. Ammeter should show 90A maximum.
   b. If reading is higher, replace starter.
   c. If starter current draw on vehicle was over 250A and this test was within specification, possible causes may be ACR malfunction, engine modifications, or powertrain binding.



1. **Mounting flange**
2. **Battery**
3. **Induction ammeter**
4. **Battery terminal**
5. **Relay terminal**

Figure 3-10. Free Running Current Draw Test

STARTER SOLENOID

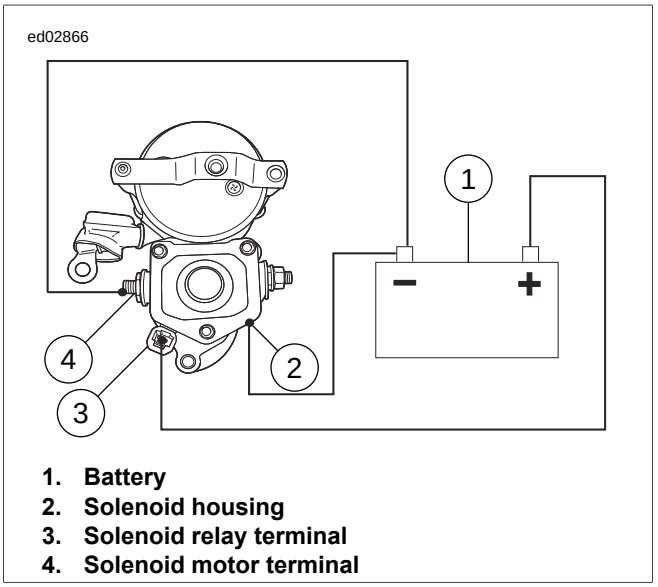
Do not disassemble solenoid. Before testing, disconnect field wire from solenoid motor terminal as shown in Figure 3-11.

Perform each test for only 3-5 seconds to prevent damage to solenoid.

Perform the solenoid Pull-in, Hold-in and Return tests together in one continuous operation. Conduct all three tests one after the other in the sequence given without interruption.

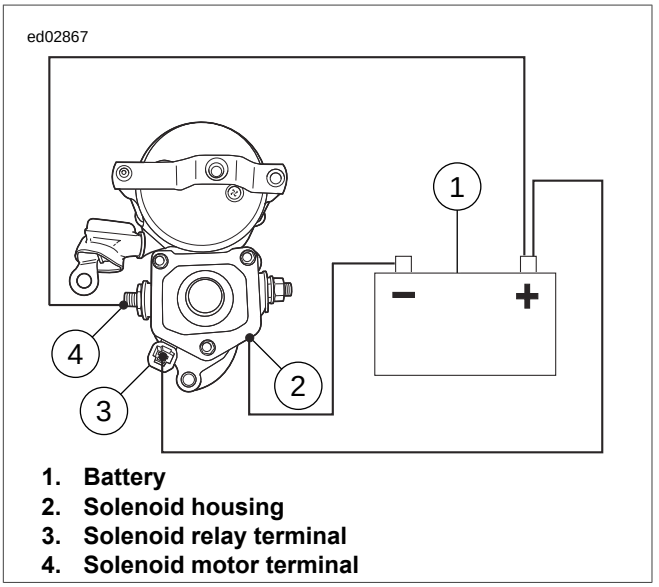
SOLENOID PULL-IN TEST

1. See Figure 3-11. Using a 12V battery, connect three separate test leads as follows:
   a. Solenoid housing to negative battery post.
   b. Solenoid motor terminal to negative battery post.
   c. Solenoid relay terminal to positive battery post.
2. Observe starter shaft.
   a. If starter shaft extends strongly, solenoid is working properly.
   b. If starter shaft does not extend strongly, replace solenoid assembly.



1. **Battery**
2. **Solenoid housing**
3. **Solenoid relay terminal**
4. **Solenoid motor terminal**

Figure 3-11. Pull-In Test



1. **Battery**
2. **Solenoid housing**
3. **Solenoid relay terminal**
4. **Solenoid motor terminal**

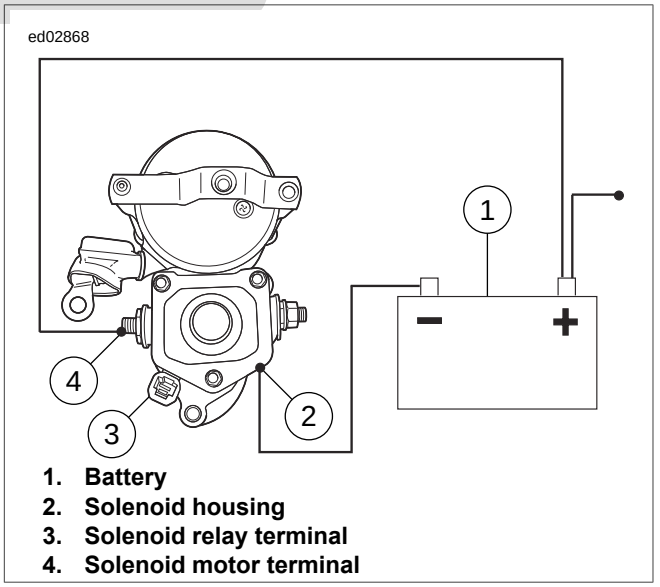
Figure 3-12. Hold-In Test

SOLENOID HOLD-IN TEST

1. See Figure 3-12. With test leads still connected in the manner specified in the previous 3.5 TESTING STARTER ON BENCH, Solenoid Pull-In Test, disconnect solenoid motor terminal/battery negative test lead at negative battery post only. Reconnect loose end of this test lead to positive battery post instead.
2. Observe starter shaft.
   a. If starter shaft remains extended, solenoid is working properly.
   b. If starter shaft retracts, replace solenoid assembly.

SOLENOID RETURN TEST

1. See Figure 3-13. With test leads still connected in the manner specified at the end of 3.5 TESTING STARTER ON BENCH, Solenoid Hold-In Test, disconnect solenoid relay terminal/positive battery post test lead at either end.
2. Observe starter pinion.
   a. If starter shaft retracts, solenoid is working properly.
   b. If starter shaft does not retract, replace solenoid assembly.



1. **Battery**
2. **Solenoid housing**
3. **Solenoid relay terminal**
4. **Solenoid motor terminal**

Figure 3-13. Return Test

CHARGING SYSTEM 3.6

DESCRIPTION AND OPERATION

The charging system is the source of electric current that supplies power to run the ignition, lights, accessories and charge the battery.

- AC voltage is generated by an alternator assembly driven by the crankshaft.
- A rotor supplied with a magnetic field spins around a stator.
- A rectifier (located in the regulator) converts the voltage from AC to DC.
- A regulator ensures that the output voltage is properly matched to the battery voltage as engine speed varies.

Even though the alternator provides additional voltage at all engine speeds, it is not recommended to idle the vehicle for long periods of time.

Alternator

The alternator consists of two main components:

- The rotor which mounts to the primary side of the crankshaft.
- The stator which is attached to the crankcase half.

Voltage Regulator

See Figure 3-14. The voltage regulator is a series regulator. The circuit combines the functions of rectifying and regulating.

TROUBLESHOOTING

Battery

Test for a weak or dead battery. Battery must be fully charged in order to perform a battery diagnostic test, load test or starting or charging tests. See 3.1 BATTERY TESTING.

Wiring

The stator connections must be clean and tight.

Check for corroded or loose connections in the charging system circuit.

Voltage Regulator Inspection

The voltage regulator must be clean and tight. Verify both AC and DC connectors are fully inserted and locked with the regulator latch.

Job/Time Code Values

Dealership Technicians filing warranty claims should use the job/time code values printed in **bold text** next to the appropriate repair.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

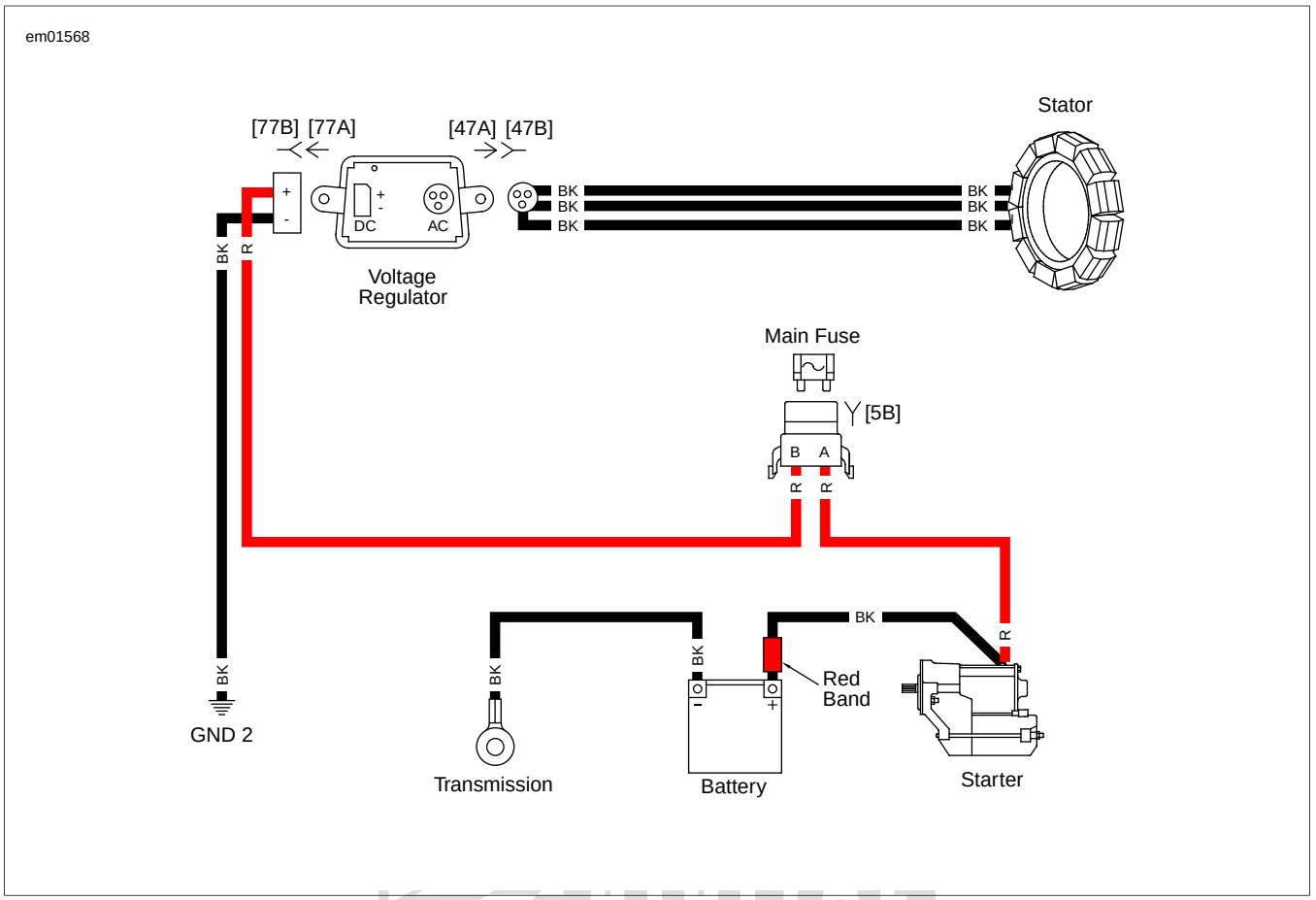


Figure 3-14. Charging System Circuit

LOW OR NO CHARGING

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 3-13. Low or No Charging Diagnostic Faults

POSSIBLE CAUSES
Low battery
Stator malfunction
Rotor malfunction
Voltage regulator malfunction
Open voltage regulator circuit
Stator shorted to ground
AC wire shorted to ground

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery. **(5705)**

NOTE

A discharged battery may show a reading under 13V even though the charging system is working properly.

2. Off Idle Voltage Test

1. With vehicle in neutral, start engine and run at 3000 rpm.
2. Test battery voltage.
3. Is voltage above 13V?
   a. **Yes.** Charging system working properly.
   b. **No.** Go to Test 3.

3. AC Output Test

1. Perform AC output test. See 3.6 CHARGING SYSTEM, Battery Charging Tests.
2. Did output test pass?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 4.

4. Stator Test

1. Perform stator test. See 3.6 CHARGING SYSTEM, Battery Charging Tests.

2. Is the stator good?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace stator. **(5309)**

5. Rotor Inspection Test

1. Turn IGN OFF.
2. Inspect rotor for damage.
3. Remove center bolt and inspect for signs of center hole becoming oval.
4. Verify stator bolts have not backed out and contacted rotor.
5. Is rotor in good condition?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace rotor. **(5319)**

6. Voltage Regulator Power Circuit Test

1. Disconnect voltage regulator [77].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [77B] terminal (+) and battery.
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open wire between voltage regulator [77B] terminal (+) and battery. **(5041)**

7. Voltage Regulator Ground Circuit Test

NOTE

Voltage regulator ground must have a clean, tight connection for proper grounding.

1. Test resistance between [77B] terminal (-) and ground.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace voltage regulator. **(5316)**
   b. **No.** Repair open wire between voltage regulator [77B] terminal - and ground (BK) wire. **(5041)**

OVERCHARGING

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 3-14. Overcharging Diagnostic Faults

POSSIBLE CAUSES
Voltage regulator malfunction
Open in ground circuit

1. Battery Voltage Test

1. With vehicle in neutral, start engine and run at 3000 rpm, test battery voltage.
2. Is voltage above 15.5V?
   a. **Yes.** Go to Test 2.
   b. **No.** Charging system working properly.

2. Voltage Regulator Ground Circuit Test

NOTE

Voltage regulator ground must have a clean, tight connection for proper grounding.

1. Turn IGN OFF.
2. Disconnect voltage regulator [77].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [77B] terminal (-) and ground.
4. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace voltage regulator. **(5316)**
   b. **No.** Repair open wire between [77B] terminal (-) and ground (BK) wire. **(5041)**

LOW BATTERY AFTER EXTENDED IGN OFF

Table 3-15. Low Battery After Extended IGN OFF Diagnostic Faults

POSSIBLE CAUSES
Battery
Accessories improperly wired to stay on at all times
Excessive draw from electrical component with IGN OFF
Battery self-discharge and/or component draw because motorcycle was not operated for a long period

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery. **(5705)**

2. Amp Draw Test

1. Perform milliampere draw test. See 3.6 CHARGING SYSTEM, Battery Charging Tests.
2. Did test exceed maximum draw?
   a. **Yes.** Repair excessive draw and run test again. **(5308)**
   b. **No.** System is working properly.

BATTERY RUNS DOWN DURING USE

Table 3-16. Battery Runs Down During Use Diagnostic Faults

POSSIBLE CAUSES
Low battery
Excessive accessory draw
Accessories on when idling or low rpm riding for extended period

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.

2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery.

2. Total Current Draw Test

1. Perform Total Current Draw and Output Test. See 3.6 CHARGING SYSTEM, Battery Charging Tests.
2. Does charging system exceed current draw by 3.5A?
   a. **Yes.** System is working properly.
   b. **No.** System accessory power requirements exceed charging system capability.

BATTERY CHARGING TESTS

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Milliampere Draw Test

NOTE

Be sure accessories are not wired so they stay on at all times. This condition could drain battery completely if vehicle is parked for a long time.

1. If vehicle is equipped with security, enable service mode before performing test.
2. Disconnect the security siren (if equipped).
3. Remove main fuse.

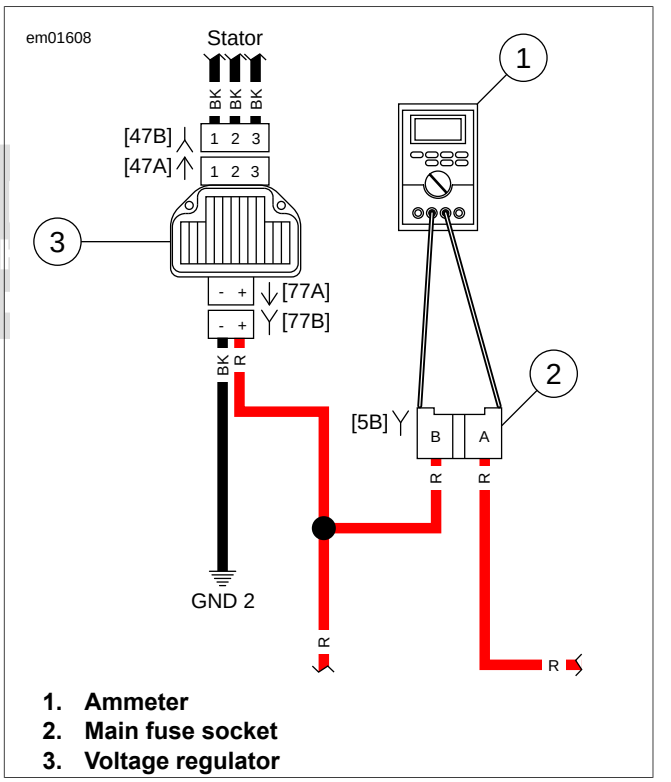
NOTE

With IGN OFF, an initial current draw will occur directly after connecting meter. This should drop to the values shown in Table 3-17 in less than 30 seconds.

4. See Figure 3-15. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), connect ammeter to main fuse socket terminals. With this arrangement, you will also pick up any regulator drain.
5. With IGN OFF and all lights and accessories off, observe current reading.
   a. Add voltage regulator draw to appropriate value for BCM and ECM. If observed ammeter reading is less than listed in Table 3-17.
   b. A higher reading indicates excessive current draw. Verify each accessory's current draw.

Table 3-17. Milliampere Draw Test

ITEM	MAXIMUM DRAW IN MILLI-AMPERES
LHCM	0.5
RHCM	0.5
Speedometer/IM	0.5
Regulator	1.0
ABS (if equipped)	1.0
BCM	1.0
ECM	1.0
Security siren (optional)	20.0*
Radio	0.5
Amplifier	0.5
CB module	0.5
* Siren will draw for 2-24 hours from time motorcycle battery is connected and 0.05 mA once siren battery is charged. Disconnect siren during milliampere draw test.	



1. **Ammeter**
2. **Main fuse socket**
3. **Voltage regulator**

Figure 3-15. Milliampere Draw Test (Ignition Turned to OFF)

Total Current Draw and Output Test

If battery runs down during use, the current draw of the motorcycle components and accessories may exceed output of the charging system.

NOTE

If a load tester is unavailable, use an ammeter with current probe.

⚠WARNING

Turn battery load tester OFF before connecting tester cables to battery terminals. Connecting tester cables with load tester ON can cause a spark and battery explosion, which could result in death or serious injury. (00252a)

1. See Figure 3-16. Connect load tester.
   a. Connect negative and positive leads to battery terminals.
   b. Place load tester induction pickup over battery negative cable.
2. With IGN OFF, disconnect voltage regulator [77].
3. Start engine.
4. Turn all continuously running lights and accessories ON (headlamp on high beam).
5. Run engine at 3000 rpm and make note of the current draw.
6. Turn engine OFF.
7. With IGN OFF, connect voltage regulator [77].
8. Remove the induction pickup from the battery negative cable.
9. Place induction pickup over positive regulator cable.
10. Start engine and run at 3000 rpm.

NOTE

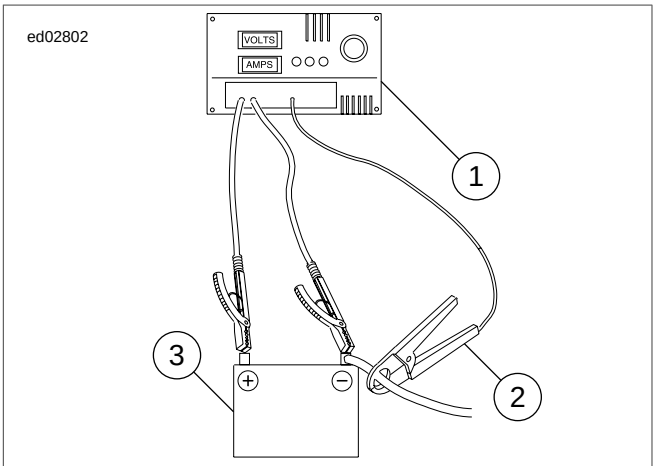
Do not leave any load switch turned on for more than 20 seconds or overheating and tester damage are possible.

11. Increase the load as required to obtain a constant 13.0V.
12. Current output should be 35-50A. Make note of current output.

NOTE

Rider's habits may require output test at lower rpm.

13. Compare both of these readings.
    a. The current output should exceed current draw by 3.5A minimum.
    b. If output does not meet specifications, there may be too many accessories for the charging system to handle.



1. **Load tester**
2. **Induction pickup**
3. **Battery**

Figure 3-16. Check Current Draw (Ignition Switch On)

Stator Test

1. Turn IGN OFF.
2. See Figure 3-17. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), connect an ohmmeter.
   a. Disconnect voltage regulator [47] from alternator stator wiring.
   b. Insert one ohmmeter lead into a stator connector socket.
   c. Attach the other lead to a suitable ground.
3. Test for continuity.
   a. A good stator will show no continuity (open circuit) between all stator sockets and ground.
   b. Any other reading indicates a grounded stator which must be replaced.
4. See Figure 3-18. Remove ground lead. Measure resistance across stator [47B] terminals 1-2, 2-3 and 3-1.
   a. Resistance across all the stator terminals should be 0.1-0.3 Ohm.
   b. If resistance is out of range, replace stator.

NOTE

When measuring resistance (Ohms), compensate for test lead resistance before performing the measurement. Select the Ohms position and touch the test leads together. See the multimeter user's manual to either zero the display or manually subtract the test lead resistance from the measured circuit's value.

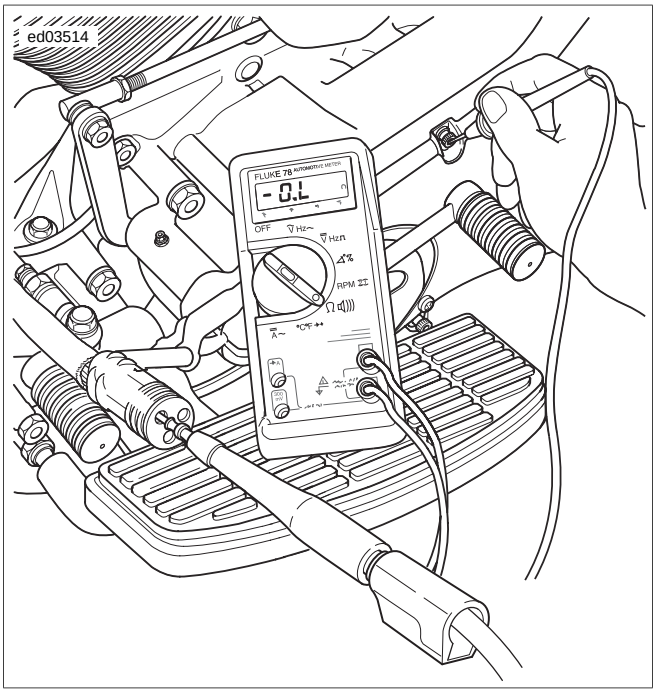


Figure 3-17. Test for Grounded Stator (Typical)

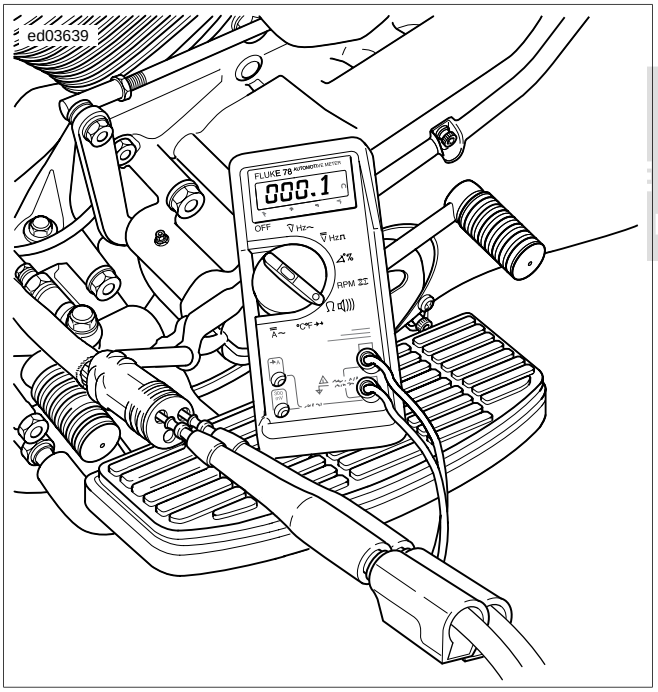


Figure 3-18. Check for Stator Resistance (Typical)

AC Output Test

1. See Figure 3-19. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test AC output.
   a. Disconnect voltage regulator [47] from alternator stator wiring.
   b. Test for VAC across stator [47B] terminals 1 to 2.
   c. Run the engine at 2000 rpm. The VAC output should be 32-46 VAC (approximately 16-22 per 1000 rpm).
   d. Repeat test using terminals 2 to 3 and 1 to 3.
2. Compare test results to specifications.
   a. If the output is below specifications, charging problem could be a faulty rotor or stator.
   b. If output is within specifications, charging problem might be faulty voltage regulator. Replace as required.
3. Check output again as previously described under Total Current Draw and Output Test.

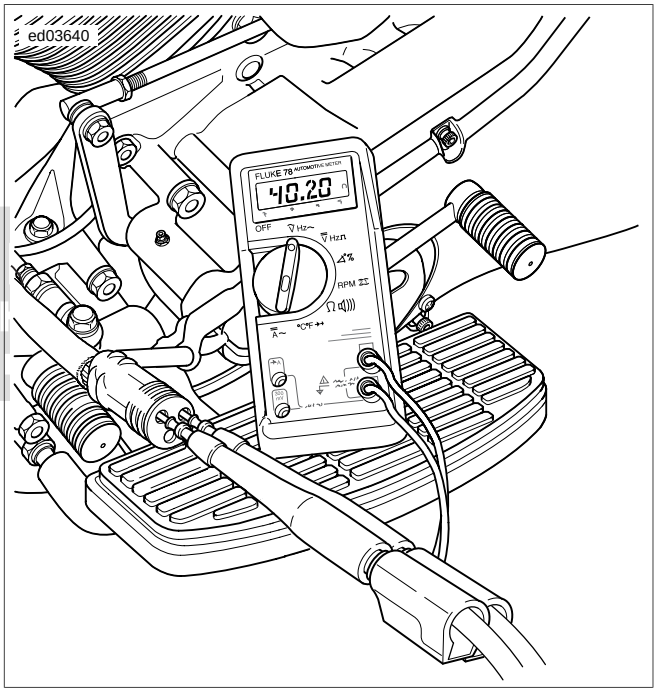


Figure 3-19. Check Stator AC Voltage Output (Typical)

ABS VOLTAGE DIAGNOSTICS 3.7

DESCRIPTION AND OPERATION

Battery voltage is monitored by the ABS module.

- If the battery voltage fails to meet normal operating parameters, the ABS indicator is illuminated.
- If the voltage remains out of normal operating parameters and the vehicle speed is above 4 mph (6 km/h), a DTC is set.

DTC C0562 and C0563

Battery voltage is monitored by the ABS module on both terminals 9 and 18.

- DTC C0562 is displayed when the ABS ECU falls below 9.4V during a non-ABS event or the ABS ECU falls below 9.2V during an ABS event.
- DTC C0563 is displayed when the ABS ECU exceeds 16.8V during a non-ABS event.

Table 3-18. Code Description

DTC	DESCRIPTION
C0562	ABS voltage low
C0563	ABS voltage high

DIAGNOSTICS

Diagnostic Tips

Any of the following conditions could cause these DTCs to set:

- The charging system is malfunctioning.
- There is excessive battery draw and/or extended idling in heavy traffic.
- A faulty system ground is present.
- Shorted ABS actuator circuit.

Low voltage generally indicates a loose wire, corroded connections, battery and/or a charging system problem.

High voltage DTC may set when the vehicle is placed on an unapproved constant current battery charger for a long period of time.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

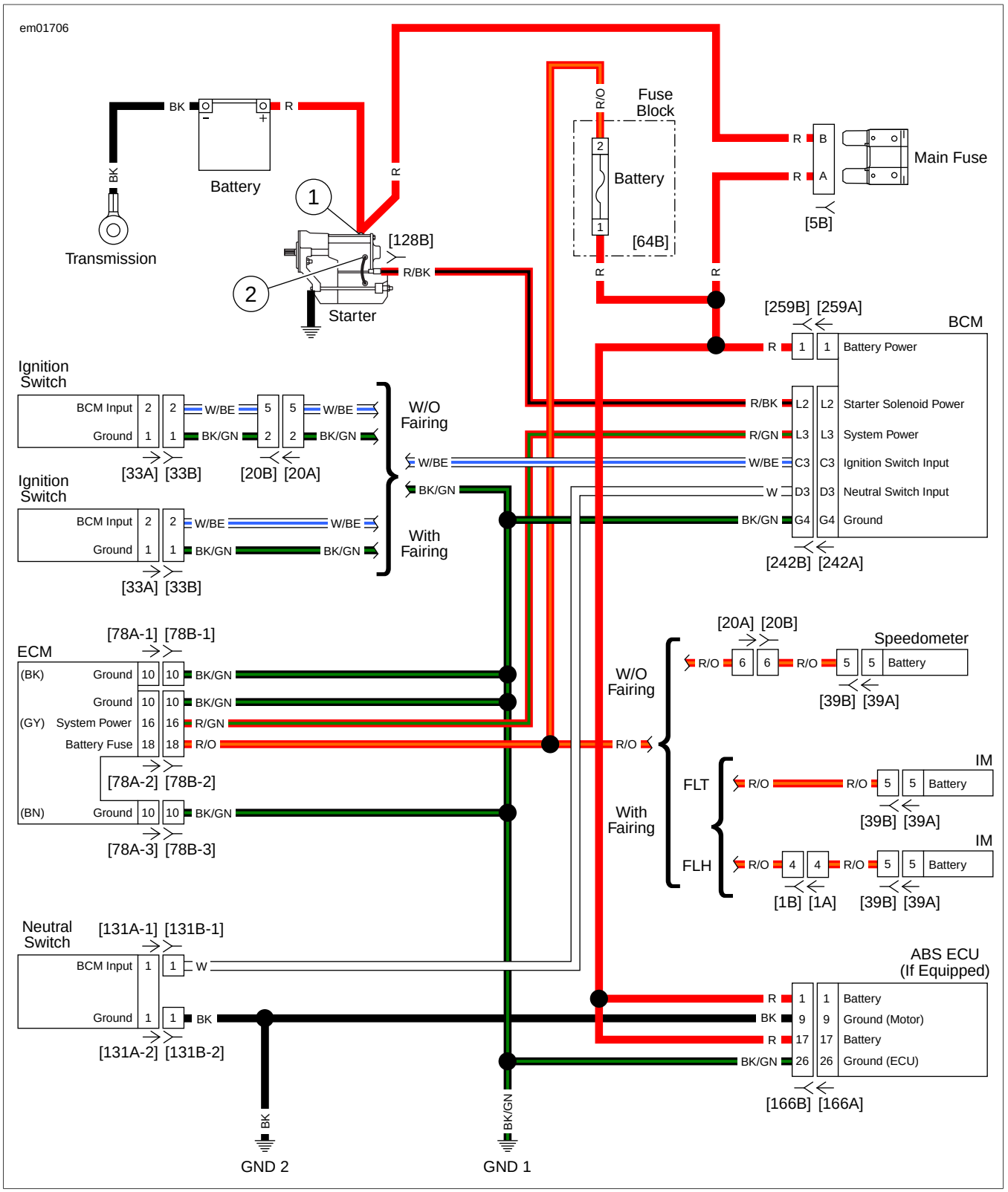


Figure 3-20. High and Low Voltage Modules

DTC C0562

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-1-P1	ABS OVERLAY
HD-50390-7	ABS CABLE

Table 3-19. DTC C0562 Diagnostic Faults

POSSIBLE CAUSES
Low battery
Open ABS module ground circuit
Open ABS module battery circuit

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery.

2. Charging System Test

1. Perform charging system test. See 3.6 CHARGING SYSTEM, Low or No Charging.
2. Is charging system working properly?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair charging system.

3. ABS ECU Battery Voltage Terminal 1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) to wiring harness [166B], leaving [166A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ABS OVERLAY (Part No. HD-50390-1-P1) is in position on BOB.
4. With engine stop switch in RUN position and transmission in neutral, turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminals 1 and 26.
6. Is battery voltage present?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 4.

4. ABS ECU Battery Voltage Terminal 17 Test

1. Test voltage between BOB terminals 17 and 26.
2. Is battery voltage present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open between terminal 1 of [166B] and terminal A of main fuse [5B] (R wire).

5. Repair Validation Test

1. Clear DTCs.
2. Start vehicle.
3. Run at 3000 rpm for 5 seconds.
4. Does DTC set?
   a. **Yes.** Replace ABS module.
   b. **No.** System working properly.

DTC C0563

Table 3-20. DTC C0563 Diagnostic Faults

POSSIBLE CAUSES
Charging system malfunction

1. Charging System Test

1. Perform charging system tests. See 3.6 CHARGING SYSTEM.
2. Is charging system good?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair charging system.

2. Repair Validation Test

1. Clear DTCs.
2. Start vehicle.
3. Run at 3000 rpm for 5 seconds.
4. Does DTC C0563 set?
   a. **Yes.** Replace ABS module.
   b. **No.** System working properly.

BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS 3.8

DESCRIPTION AND OPERATION

Battery voltage is monitored by the ECM on the system power terminal 16 of [78-2]. The system power is supplied to the ECM from the BCM system power terminal L3.

- DTC P0562 is displayed when system power is less than 12.2V at idle and voltage does not increase when engine speed is greater than 2000 rpm.
- DTC P1608 is displayed when battery voltage is less than 12.2V at idle and voltage does not increase when engine speed is greater than 2000 rpm.

Table 3-21. Code Description

DTC	DESCRIPTION
P0562	ECM voltage low
P1608	Loss of continuous battery

Diagnostic Tips

Any of the following conditions could cause these DTCs to set:

- The charging system is malfunctioning.
- There is excessive battery draw and/or extended idling in heavy traffic.
- A faulty system ground is present. Low voltage generally indicates a loose wire, corroded connections, battery and/or a charging system problem.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

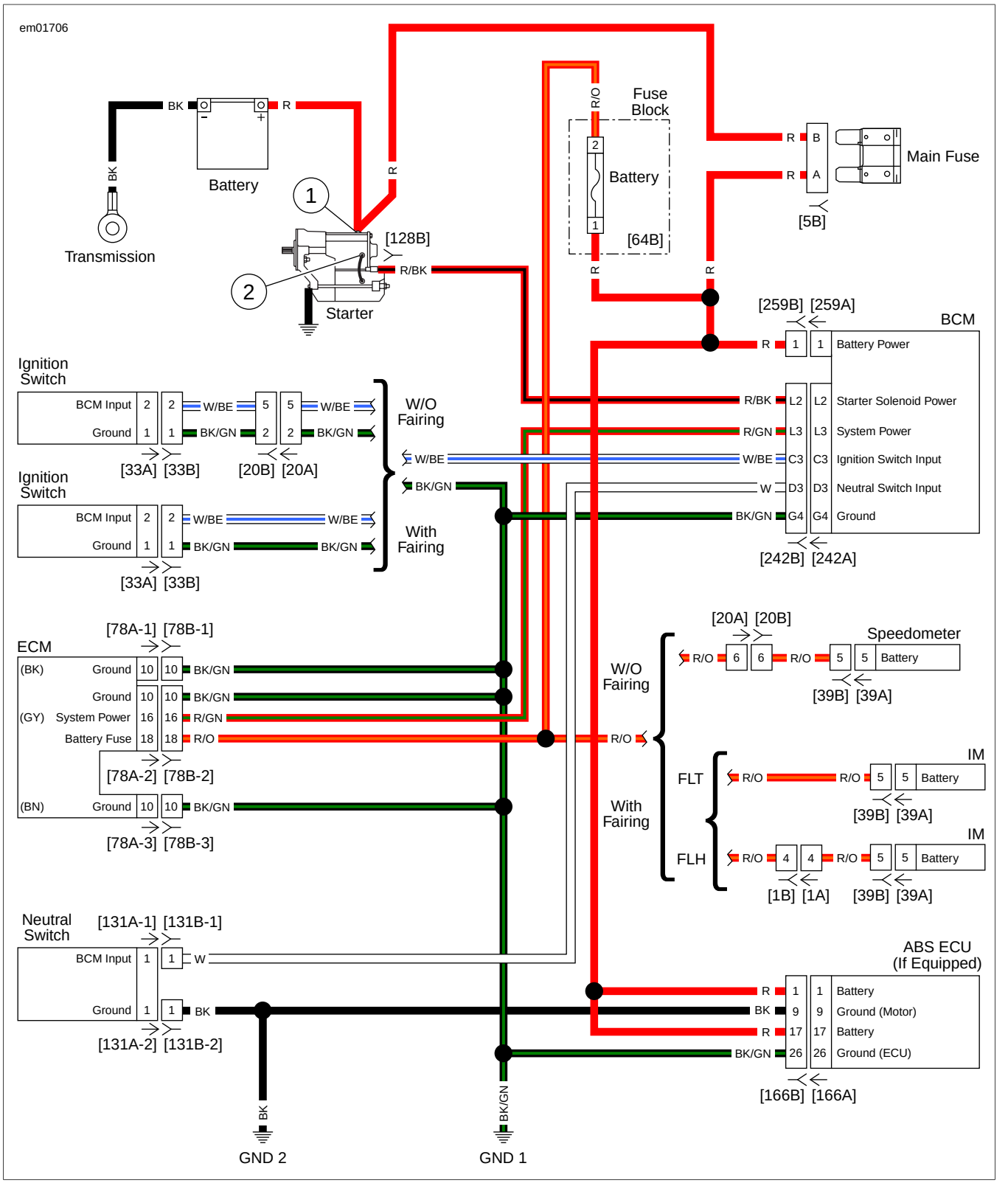


Figure 3-21. High and Low Voltage Modules

DTC P0562

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 3-22. DTC P0562 Diagnostic Faults

POSSIBLE CAUSES
Low battery
Open ECM ground circuit
Open ECM system power circuit

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery.

2. Charging System Test

1. Perform charging system test. See 3.6 CHARGING SYSTEM, Low or No Charging.
2. Is charging system working properly?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair charging system.

3. ECM Switched Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness connectors [78B-1], [78B-2] and [78B-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Start vehicle.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminals 16 and 10.
6. Is voltage greater than 12.2V?
   a. **Yes.** Go to Test 13.
   b. **No.** Go to Test 4.

4. ECM System Power Test

1. Test voltage between BOB [78-2] terminal 16 and ground.
2. Is voltage greater than 12.2V?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 8.

5. ECM Ground [78-1] Circuit Test

1. Turn IGN OFF.
2. Test resistance between BOB [78-1] terminal 10 and ground.
3. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair wiring between ECM [78B-1] terminal 10 and ground.
   b. **No.** Go to Test 6.

6. ECM Ground [78-2] Circuit Test

1. Test resistance between BOB [78-2] terminal 10 and ground.
2. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair wiring between ECM [78B-2] terminal 10 and ground.
   b. **No.** Go to Test 7.

7. ECM Ground [78-3] Circuit Test

1. Test resistance between BOB [78-3] terminal 10 and ground.
2. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair wiring between ECM [78B-3] terminal 10 and ground.
   b. **No.** Problem may be intermittent. Locate and repair bad connection. Perform 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Voltage Drop. If no problem is found, then continue with tests. Go to Test 13.

8. BCM System Power Test

1. Turn IGN OFF.
2. Remove BOB from ECM.
3. Connect [78A] to [78B].
4. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
5. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
6. Start vehicle.
7. Test voltage between BOB terminal L3 and ground.
8. Is voltage greater than 12.2V?
   a. **Yes.** Repair (R/GN) wire between [242B] terminal L3 and [78B-2] terminal 16. **(5041)**
   b. **No.** Go to Test 9.

9. BCM Power Test

1. Turn IGN OFF.
2. Disconnect BCM power [259].

3. Test voltage at [259B].
4. Is battery voltage present?
   a. **Yes.** Replace BCM.
   b. **No.** Go to Test 10.

10. Main Fuse Voltage Test

1. Connect [259].
2. Turn IGN ON.
3. Leaving main fuse in place, perform a voltage drop test between main fuse [5B] socket terminal B and battery (+).
4. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 11.
   b. **No.** Repair or replace (R) wire between main fuse [5B] terminal B and [259B].

11. Main Fuse Voltage Drop Test

1. Leaving main fuse in place, perform a voltage drop test between [5B] socket terminal A and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 12.
   b. **No.** Repair or replace [5B] socket terminals A and B.

12. Main Fuse Supply Voltage Drop Test

1. Perform a voltage drop test between starter terminal 1 and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Repair or replace (R) wire between starter terminal 1 and battery (+).
   b. **No.** Repair or replace (R) wire between starter terminal 1 and main fuse [5B] socket terminal A.

13. Repair Validation Test

1. Clear DTCs.
2. Start vehicle.
3. Run at 3000 rpm for 5 seconds.
4. Does code set?
   a. **Yes.** Replace ECM.
   b. **No.** System working properly.

DTC P1608

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 3-23. DTC P1608 Diagnostic Faults

POSSIBLE CAUSES
Low battery
Open ECM ground circuit
Open ECM system power circuit

1. Battery Fuse Test

1. Turn IGN OFF.
2. Remove any diagnostic equipment that may be connected to DLC [91].
3. Verify battery connections are in good condition.
4. Check main fuse in [5].
5. Is fuse good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace main fuse.

2. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace battery.

3. Charging System Test

1. Perform charging system test. See 3.6 CHARGING SYSTEM, Low or No Charging.
2. Is charging system working properly?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair charging system.

4. ECM Battery Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness connectors [78B-1], [78-B-2] and [78B-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Start vehicle.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminals 18 and 10 of [78-2].

6. Is voltage greater than 12.2V?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 5.

5. ECM Battery Test

1. Test voltage between BOB terminal 16 of [78-2] and ground.
2. Is voltage greater than 12.2V?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 9.

6. ECM Ground [78-1] Circuit Test

1. Turn IGN OFF.
2. Test resistance between BOB terminal 10 of [78-1] and ground.
3. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair wiring between ECM [78B-1] terminal 10 and ground.
   b. **No.** Go to Test 7.

7. ECM Ground [78-2] Circuit Test

1. Test resistance between BOB terminal 10 of [78-2] and ground.
2. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair wiring between ECM [78B-2] terminal 10 and ground.
   b. **No.** Go to Test 8.

8. ECM Ground [78-3] Circuit Test

1. Test resistance between BOB terminal 10 of [78-3] and ground.
2. Is resistance greater than 1 Ohm?
   a. **Yes.** Repair wiring between ECM [78B-3] terminal 10 and ground.
   b. **No.** Problem may be intermittent. Locate and repair bad connection. Perform 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Voltage Drop. If no problem is found, then continue with tests.

9. Main Fuse Voltage Drop Test

1. Leaving main fuse in place, perform a voltage drop test between main fuse [5B] socket terminal A and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 10.
   b. **No.** Repair or replace main fuse [5B] socket terminals A and B.

10. Fuse Block Supply Voltage Drop Test

1. Perform a voltage drop test between starter terminal 1 and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Repair or replace (R) wire between starter terminal 1 and battery (+).
   b. **No.** Repair or replace (R) wire between starter terminal 1 and main fuse [5B] socket terminal A.

11. Repair Validation Test

1. Clear DTCs.
2. Start vehicle.
3. Run at 3000 rpm for 5 seconds.
4. Does code set?
   a. **Yes.** Replace ECM.
   b. **No.** System working properly.

IGN SWITCH DIAGNOSTICS 3.9

DESCRIPTION AND OPERATION

The ignition switch turns on the BCM and the BCM then turns on all the other components. The ignition switch has three positions: OFF, IGN and ACC. However, there are only two wires coming from the ignition switch. There is a ground wire and a signal wire that runs to the BCM.

There are two resistors built into the ignition switch:

- 200 Ohms for the IGN position.
- 800 Ohms for the ACC position.

The BCM will see a different voltage depending on which position the ignition switch is in.

DTC B2201 is set when the BCM detects vehicles speed and indicates an open circuit between [242B] and [33B] in the (W/BE) wire.

DTC B2203 is set when the BCM indicates a short to ground between [242B] and [33B] in the (W/BE) wire.

Table 3-24. Code Description

DTC	DESCRIPTION
B2201	IGN switch off w/VSS
B2203	Ignition switch input shorted low

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

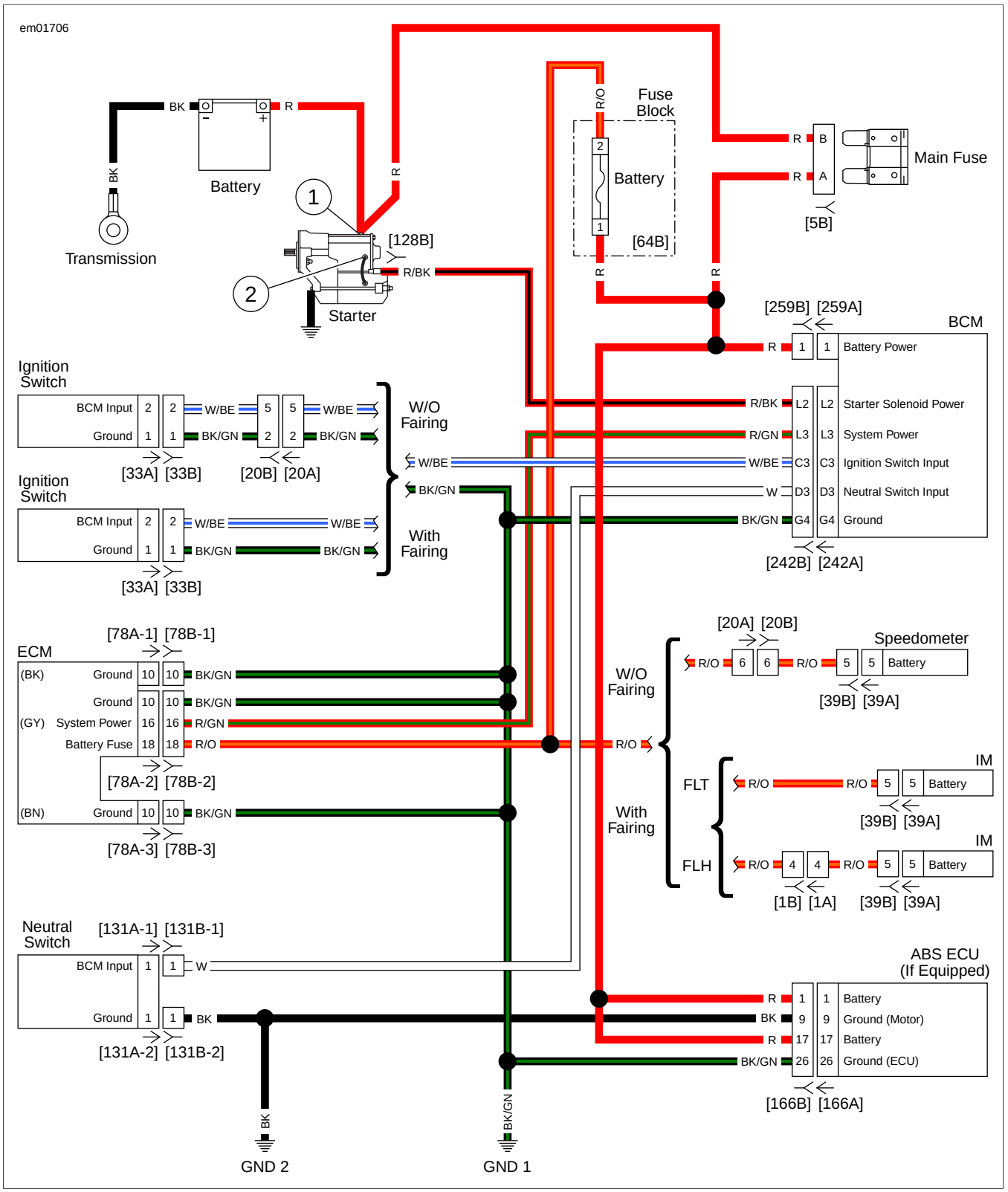


Figure 3-22. High and Low Voltage Modules

DTC B2201

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-25. DTC B2201 Diagnostic Faults

POSSIBLE CAUSES
Open ignition switch feed circuit
Ignition switch malfunction
Open ignition circuit

NOTE

Verify the vehicle is in neutral, the key fob is present and in working order (if security equipped), and the engine stop switch is in RUN position.

1. Ignition Circuit Test

1. Turn IGN ON.
2. Does headlamp illuminate?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 2.

2. Ignition Switch Ground Test

1. Turn IGN OFF.
2. Disconnect ignition switch [33].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [33B] terminal 1 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [33B] terminal 1 and ground (BK/GN) wire. **(5041)**

3. Ignition Switch to BCM Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B], leaving BCM [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal C3 and [33B] terminal 2.
4. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (W/BE) wire between [242B] terminal C3 and [33B] terminals 2.

4. Ignition Switch Test

1. Perform wiggle test. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
2. Check DTCs.
3. Did DTC B2201 return?
   a. **Yes.** Replace ignition switch. **(7287)**
   b. **No.** System operating properly.

DTC B2203

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-26. DTC B2203 Diagnostic Faults

POSSIBLE CAUSES
Short in ignition switch
Ignition switch malfunction

1. Ignition Continuity [242B] Test

1. Turn IGN OFF.
2. Disconnect ignition switch [33].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving BCM [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal C3 and ground.
6. Is continuity present?
   a. **Yes.** Repair short to ground in (W/BE) wire. **(5041)**
   b. **No.** Go to Test 2.

2. Ignition Switch Run Test

1. Turn IGN ON.
2. Test resistance between [33A] terminals 1 (BK/GN) wire and 2 (W/BE) wire.
3. Is resistance between 50-400 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace ignition switch. **(7287)**

3. Ignition Switch ACC Test

1. Turn IGN ACC.
2. Test resistance between [33A] terminals 1 (BK/GN) wire and 2 (W/BE) wire.

3. Is resistance between 500-1900 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace ignition switch. **(7287)**

4. Ignition Switch OFF Test

1. Turn IGN OFF.
2. Test continuity between [33A] terminals 1 (BK/GN) wire and 2 (W/BE) wire.
3. Is continuity present?
   a. **Yes.** Replace ignition switch. **(7287)**
   b. **No.** Replace BCM.

ENGINE STOP SWITCH DIAGNOSTICS 3.10

DESCRIPTION AND OPERATION

The RHCM is monitored by the BCM. Any communication failures between both modules sets a DTC.

These DTCs only refer to the redundant engine stop switch (W/GY) wire from the RHCM.

- DTC B2206 is set when the BCM indicates an open between [242B] terminal C4 and the engine stop switch.
- DTC B2208 is set when the BCM indicates a short to ground between [242B] terminal C4 and the engine stop switch.

Table 3-27. Code Description

DTC	DESCRIPTION
B2206	Engine stop switch input open/shorted high
B2208	Engine stop switch input shorted low

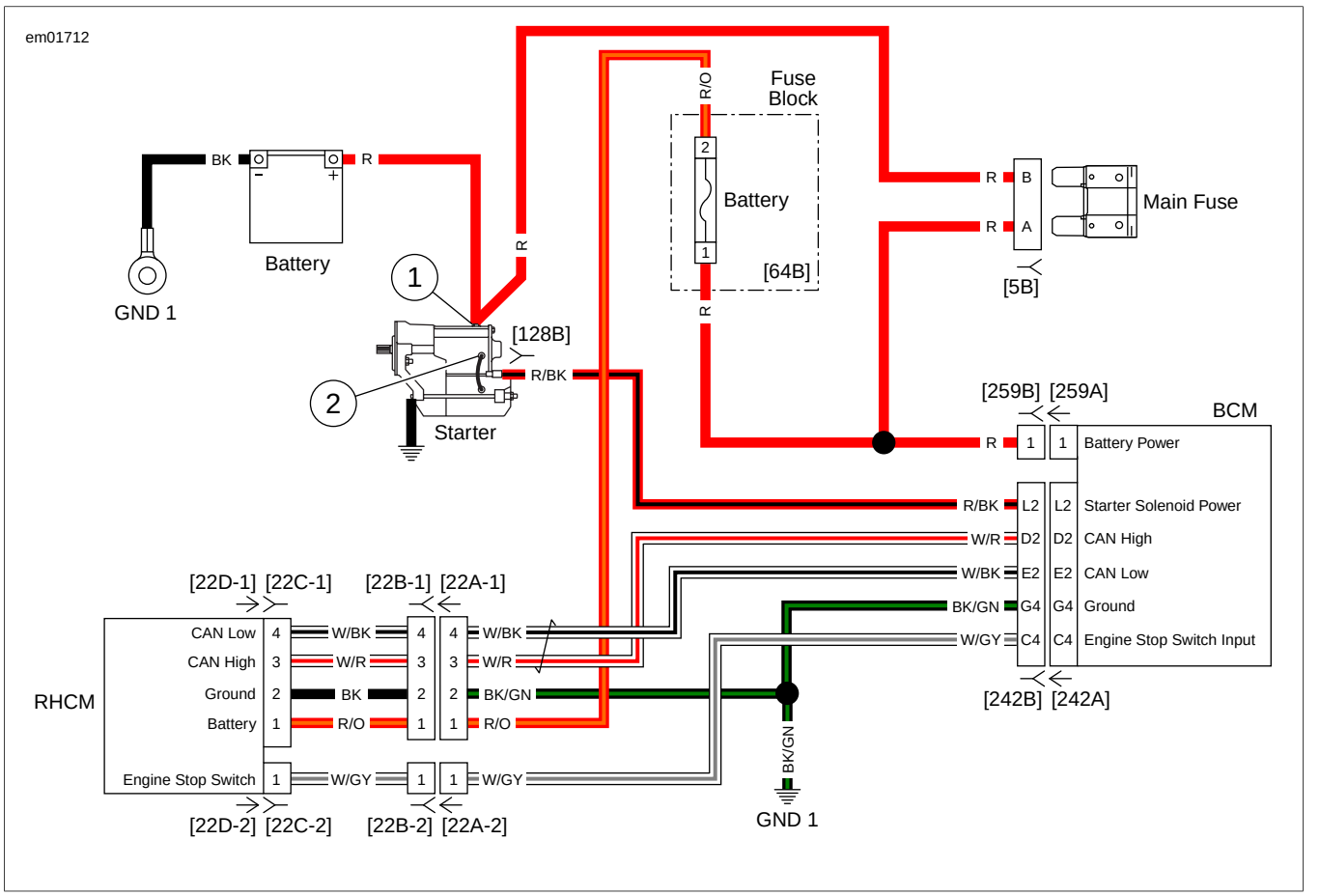


Figure 3-23. Starter: FLH Without Fairing

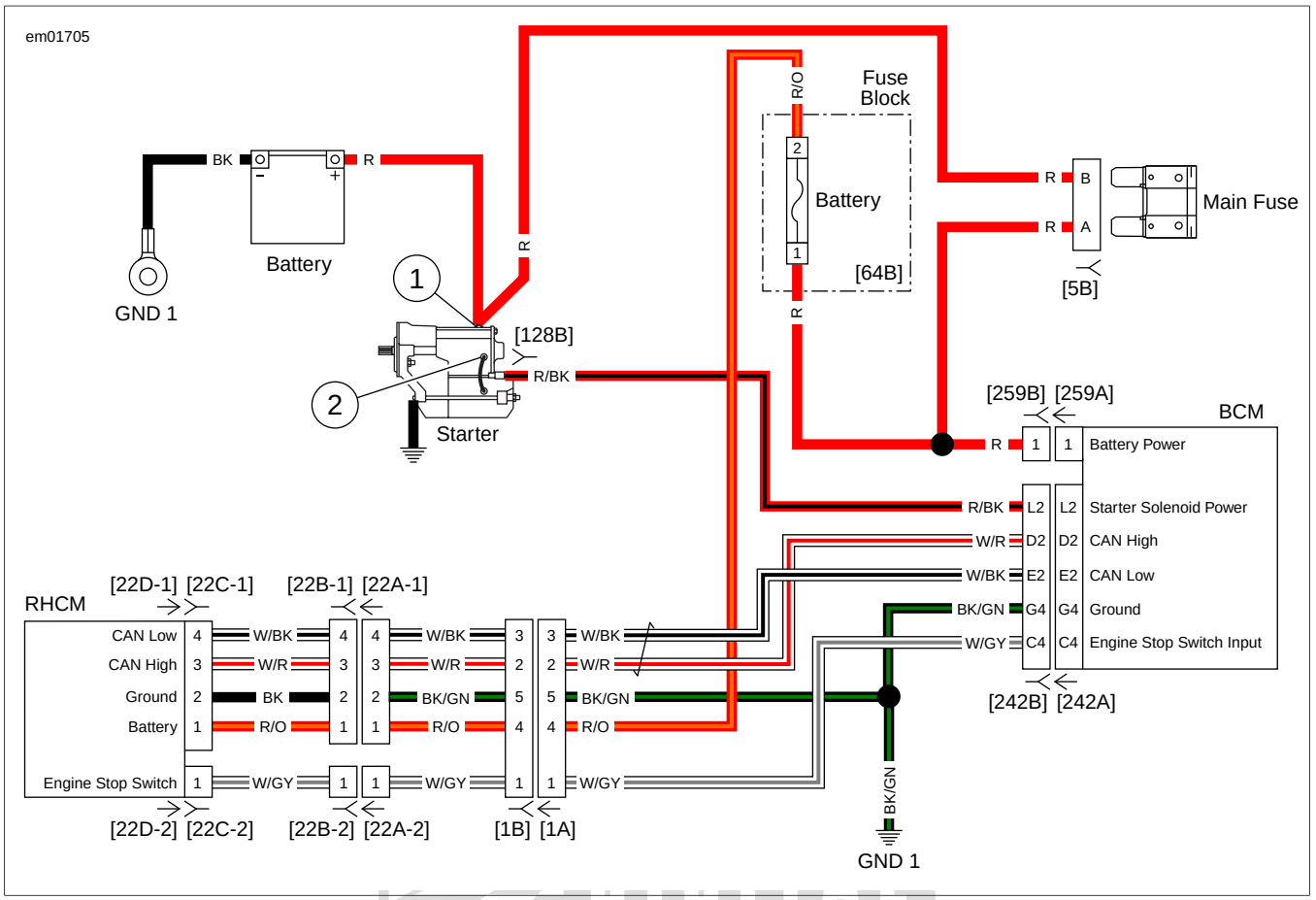


Figure 3-24. Starter: FLH With Fairing

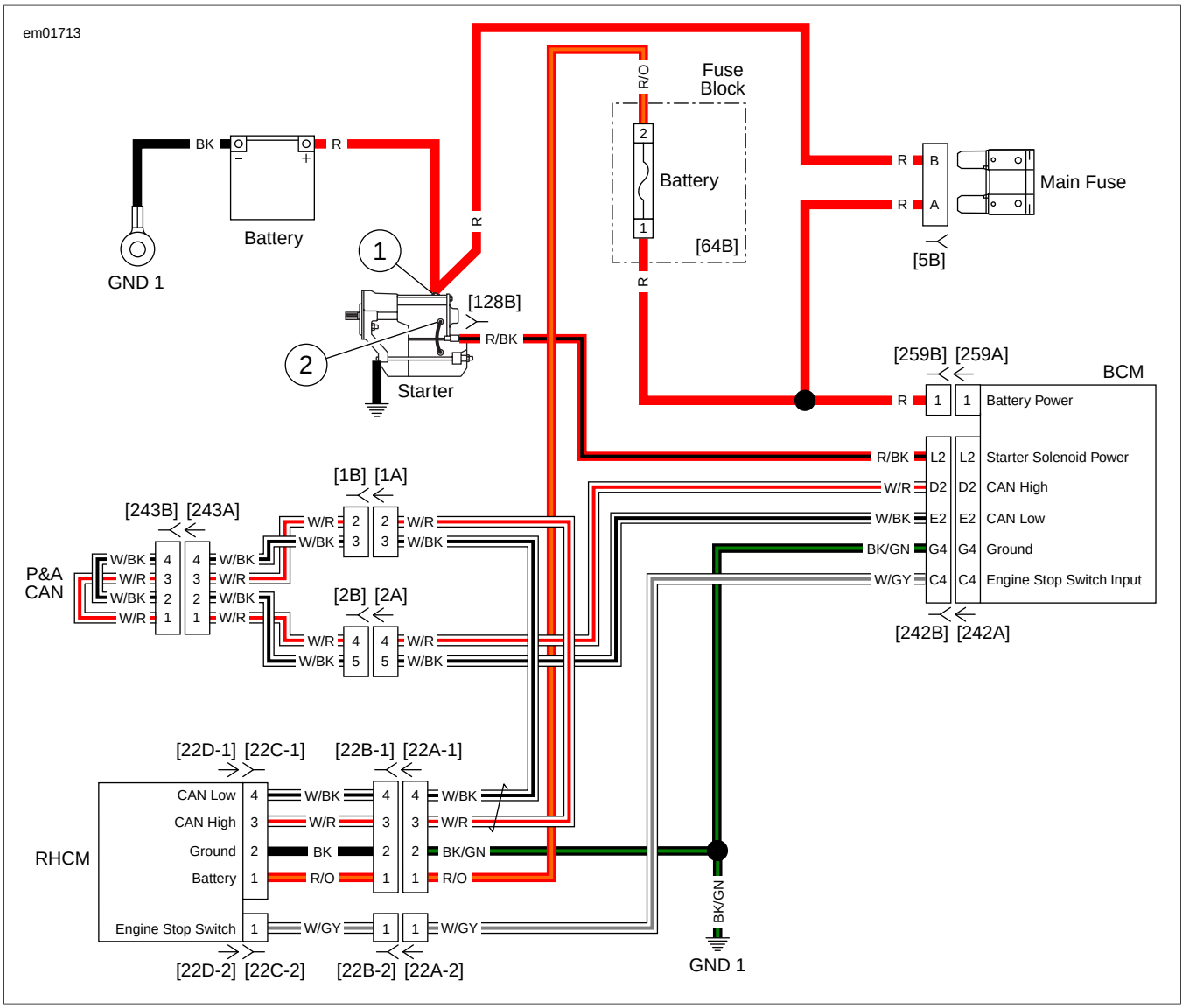


Figure 3-25. Starter: FLT

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

DTC B2206

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-28. DTC B2206 Diagnostic Faults

POSSIBLE CAUSES
Open in engine stop circuit

1. BCM Supply Voltage Test

1. Turn IGN OFF.
2. Disconnect RHCM [22C-2].

3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), during the first 4-5 seconds after IGN ON, test voltage between [22D-2] (W/GY) wire and ground.
4. Turn IGN ON.
5. Is voltage present?
   a. **Yes.** Replace RHCM.
   b. **No.** Go to Test 2.

2. BCM Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. During the first 4-5 seconds after IGN ON, test voltage between BOB terminal C4 and ground.
5. Turn IGN ON.
6. Is voltage present?
   a. **Yes.** Repair open between [242B] terminal C4 and [22D-2] (W/GY) wire.
   b. **No.** Replace BCM.

DTC B2208

PART NUMBER	TOOL NAME
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 3-29. DTC B2208 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in engine stop circuit

1. BCM to Ground Continuity Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal C4 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace BCM.

2. RHCM to Ground Continuity Test

1. Disconnect RHCM [22D-2].
2. Test continuity between [242B] terminal C4 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [242B] terminal C4 and [22D-2] (W/GY) wire. **(5041)**
   b. **No.** Replace RHCM.

BCM VOLTAGE DIAGNOSTICS 3.11

DESCRIPTION AND OPERATION

Battery voltage is constantly monitored by the BCM and speedometer/IM. Any voltage readings outside of normal parameters set a DTC.

DTC B2271

The BCM monitors [259] terminal 1 for battery power.

DTC B2271 is displayed when battery voltage is less than 9.0V.

DTC B2272

The BCM monitors [259] terminal 1 and the speedometer/IM monitors terminal 5 for battery power.

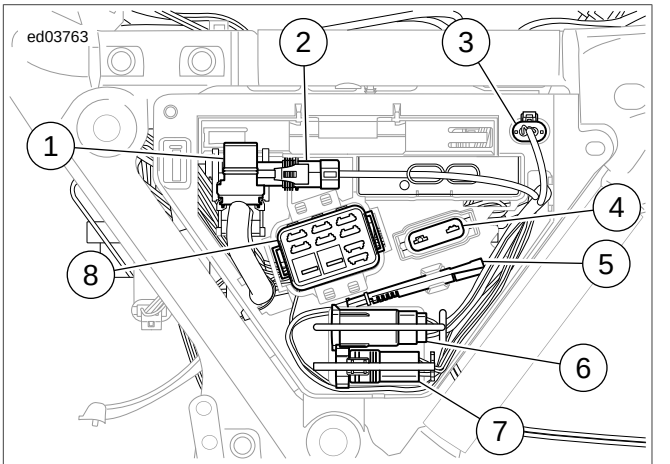
- DTC B2272 (BCM) is displayed when battery voltage is greater than 16.1V for longer than 5 seconds.
- DTC B2272 (Speedometer/IM) is displayed when battery voltage is greater than 16.0V for longer than 5 seconds.

NOTE

ECM, ABS, ECU and/or BCM may also set a battery voltage DTC.

Table 3-30. Code Description

DTC	DESCRIPTION
B2271	BCM voltage low
B2272	BCM voltage high
B2272	Speedometer/IM voltage high



1. **BCM [242]**
2. **BCM power [259]**
3. **Security siren [142]**
4. **Main fuse [5]**
5. **Battery tender [281]**
6. **Auxiliary devices [4]**
7. **DLC [91]**
8. **Fuse block [64]**

Figure 3-26. Under Left Side Cover

Diagnostic Tips

High voltage DTC may set when the vehicle is placed on an unapproved constant current battery charger, on fast charge, for a long period of time.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

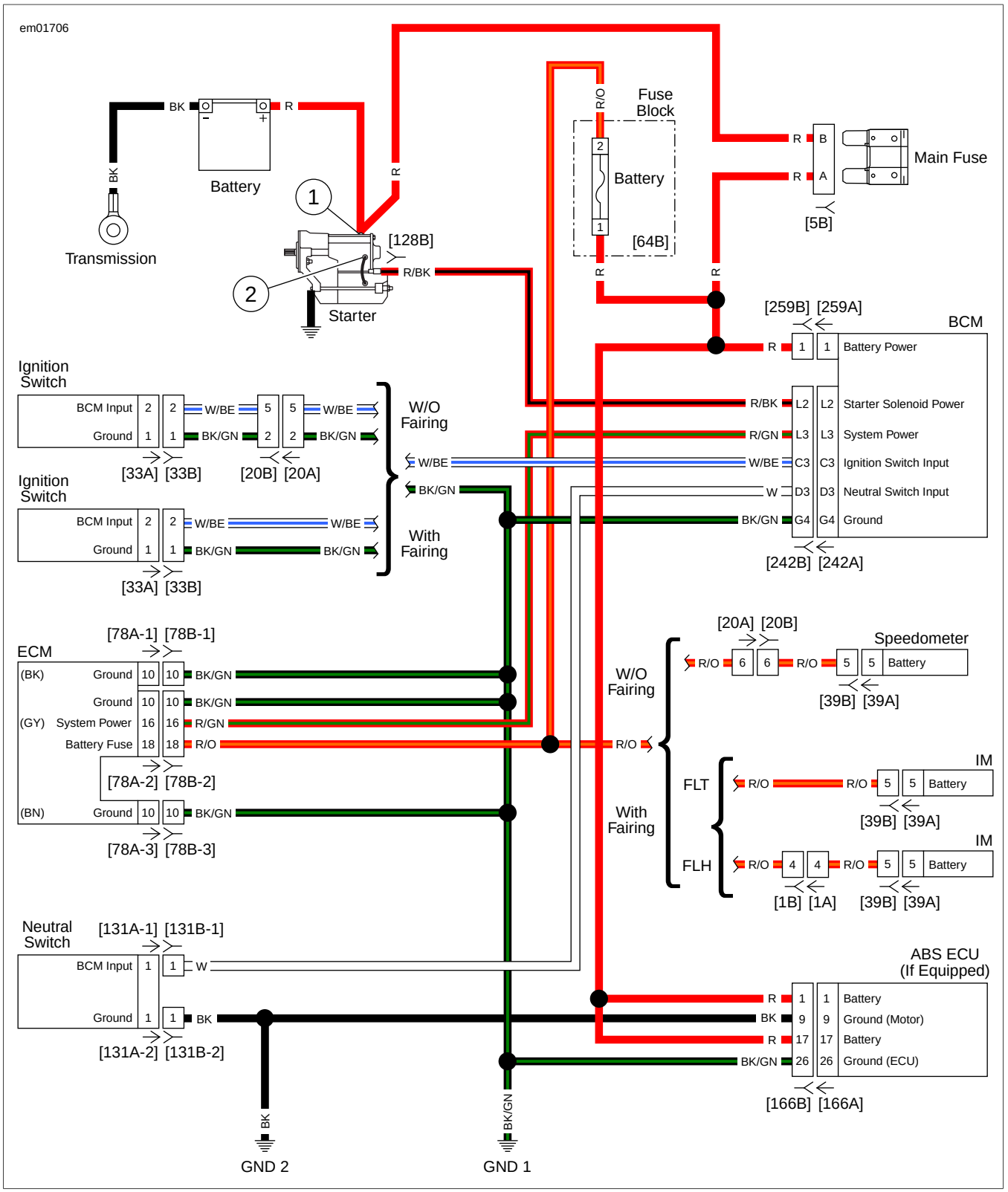


Figure 3-27. High and Low Voltage Modules

DTC B2271

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 3-31. DTC B2271 Diagnostic Faults

POSSIBLE CAUSES
Charging system malfunction
BCM power circuit
Open in battery power circuit

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Charge or replace battery as needed. Verify repair.

2. Charging System Test

1. Perform charging system test. See 3.6 CHARGING SYSTEM, Low or No Charging.
2. Is charging system working properly?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair charging system. Go to Test 7.

3. BCM Power Test

1. Turn IGN OFF.
2. Disconnect BCM power [259].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [259B] and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 4.

4. Main Fuse Voltage Test

1. Perform a voltage drop test between main fuse [5B] socket terminal B and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair or replace (R) wire between main fuse [5B] socket terminal B and [259B].

5. Fuse Block Voltage Test

1. Perform a voltage drop test between fuse block [64B] socket terminal A and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair or replace main fuse [5B] socket terminals A and B.

6. Fuse Block Supply Voltage Test

1. Perform a voltage drop test between starter terminal 1 and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Repair or replace (R) wire between starter terminal 1 and battery (+).
   b. **No.** Repair or replace (R) wire between starter terminal 1 and main fuse [5B] socket terminal A.

7. Repair Validation Test

1. Clear DTCs.
2. Start vehicle.
3. Run at 3000 rpm for 5 seconds.
4. Does code set?
   a. **Yes.** Replace BCM.
   b. **No.** System working properly.

DTC B2272

Table 3-32. DTC B2272 Diagnostic Faults

POSSIBLE CAUSES
Charging system malfunction

1. Charging System Test

1. Perform charging system tests. See 3.6 CHARGING SYSTEM.
2. Is charging system good?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair charging system.

2. Repair Validation Test

1. Clear DTCs.
2. Start vehicle.
3. Run at 3000 rpm for 5 seconds.
4. Does DTC reset?
   a. **Yes. DTC set by speedometer.** Replace speedometer.
   b. **Yes. DTC set by BCM.** Replace BCM.
   c. **No.** System working properly.

TABLE OF CONTENTS

NOTES

INSTRUMENTS 4.1

DESCRIPTION AND OPERATION

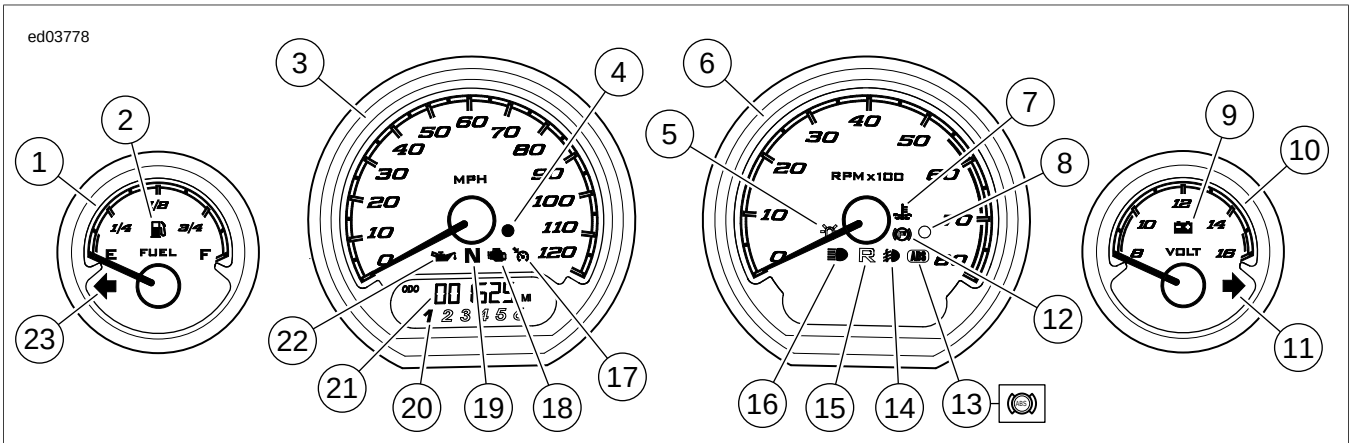
See Figure 4-1. In all fairing models, the IM contains several indicators. These indicators include the security, cruise control, check engine, oil pressure, ABS, auxiliary/fog lamp, headlamp high beam, neutral and engine coolant temperature depending on vehicle configuration. The low fuel and left turn indicators are located in the fuel gauge. The battery discharge lamp and right turn indicators are located in the voltmeter.

See Figure 4-2. For non-fairing models, the speedometer contains several indicators. These indicators include the check engine, security, battery discharge and cruise control indicators. Oil pressure, neutral, headlamp high beam and right/left turn signal indicators are located in an indicator bar.

Trip Odometer Reset Switch Operation

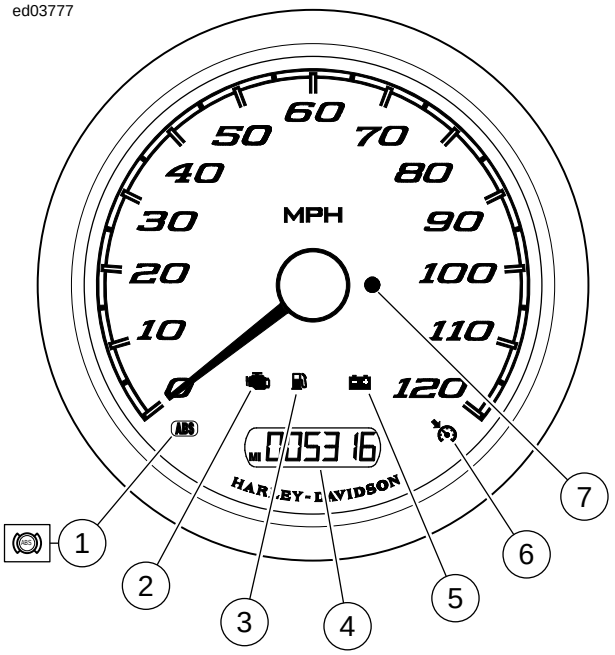
Pressing the trip odometer reset switch, located on the left hand controls, provides the following functions:

- Change the odometer display between total mileage, trip odometer A and trip B, fuel range values, 12/24 hour clock and tachometer with gear indication.
- Reset the trip odometer (press and hold 2-3 seconds).
- Gain access to self-diagnostic mode and clear diagnostic codes. See 1.2 INITIAL DIAGNOSTICS, Odometer Self-Diagnostics.



1. **Fuel gauge**
2. **Low fuel lamp**
3. **Speedometer**
4. **Security lamp**
5. **Not used for these models**
6. **Tachometer**
7. **Engine coolant temperature lamp**
8. **Light sensor (not an indicator)**
9. **Battery discharge lamp**
10. **Voltmeter**
11. **Right turn signal indicator lamp**
12. **Not used for these models**
13. **ABS icon lamp (km/h ABS icon lamp also shown)**
14. **Auxiliary/fog lamp indicator lamp**
15. **Not used for these models**
16. **Headlamp high beam lamp**
17. **Cruise control lamp**
18. **Check engine lamp**
19. **Neutral lamp**
20. **Gear indicator**
21. **Odometer window**
22. **Oil pressure lamp**
23. **Left turn signal indicator lamp**

Figure 4-1. Indicator Lamps: Typical (Fairing Models)



1. **ABS icon lamp (km/h ABS icon lamp also shown)**
2. **Check engine lamp**
3. **Low fuel lamp**
4. **Odometer window**
5. **Battery discharge lamp**
6. **Cruise control lamp**
7. **Security lamp**

Figure 4-2. Indicator Lamps: Non-Fairing Models

The odometer mileage is permanently stored and will not be lost when electrical power is turned off or disconnected. The trip odometer reset switch allows switching between the odometer, trip odometer and fuel range displays.

To zero the trip odometer, have the odometer display visible, press and keep the trip odometer reset switch depressed. The trip odometer mileage will be displayed for 2-3 seconds and then the trip mileage will return to zero.

SPEEDOMETER THEORY OF OPERATION

The speed sensor is mounted at the back of the transmission case. The sensor circuitry is a Hall-Effect sensor that is triggered by the gear teeth of 5th gear on the transmission mainshaft.

The output from the sensor is a series of pulses that are interpreted by ECM circuitry, converted into CAN bus data and then sent to the speedometer/IM. The speedometer converts the data to control the position of the speedometer needle. It also provides input to the BCM for turn signal cancellation.

TACHOMETER THEORY OF OPERATION

The CKP sensor, located on the left front of the lower crankcase half, is a variable reluctance device that generates AC voltage as the teeth on the crankshaft pass by the sensor. The signal is routed to the ECM where it is used to determine crankshaft position, engine speed (rpm) and engine phase (TDC compression). The ECM converts CKP signal to CAN data where it is sent to the IM.

INSTRUMENT DIAGNOSTICS

The speedometer/IM monitors direct inputs from sensors and switches, along with receiving information from the other modules over the CAN bus lines. It sets codes when the parameters for the inputs are out of range.

Table 4-1. Code Description

DTC	DESCRIPTION
B1200	Internal fault
B1210	Fuel level sender shorted low/open
B1211	Fuel level sender shorted high
B1212	Fuel signal low
B1213	Fuel signal high
B2255	Trip switch stuck

FUEL GAUGE AND SENDER DIAGNOSTICS 4.2

DESCRIPTION AND OPERATION

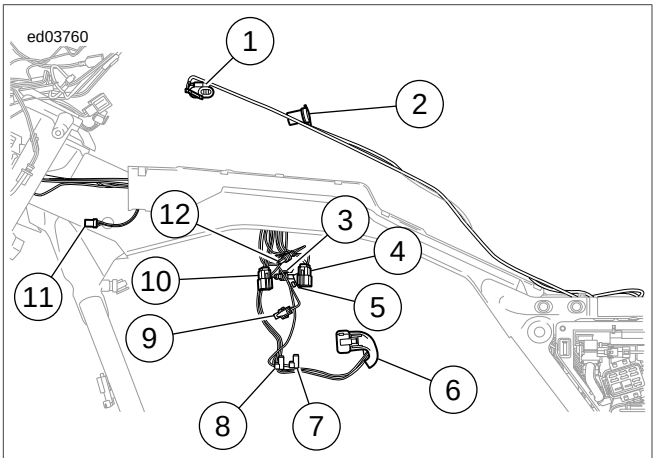
See Figure 4-3. The fuel level is monitored by the speedometer/IM [39] at terminal 9 (W/Y) wire. The low fuel warning lamp serves two functions. It is used to indicate a low fuel condition and to communicate a circuit problem with the fuel sender circuit. The low fuel warning lamp will flash on and off at a steady rate when a current fuel level sender DTC is set.

- If the voltage on terminal 9 exceeds the lower limit for greater than or equal to 15 seconds, a DTC B1210 or B1212 will be set. The low fuel warning lamp will flash on and off at a steady rate.
- If the voltage on terminal 9 exceeds the upper limit (or is open) for greater than or equal to 15 seconds, a DTC B1211 or B1213 will set. The low fuel warning lamp will flash on and off at a steady rate.

Voltage is supplied to the fuel level sender on the (W/Y) wire from the fuel gauge on non-fairing models and from the IM on fairing models. As the fuel level changes the resistance of the sender changes. The fuel gauge and the low fuel lamp are controlled through the (W/Y) wire based off the change in the resistance of the fuel level sender.

Table 4-2. Code Description

DTC	DESCRIPTION
B1210	Fuel level sender shorted low/open
B1211	Fuel level sender shorted high
B1212	Fuel signal low
B1213	Fuel signal high



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 4-3. Engine

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

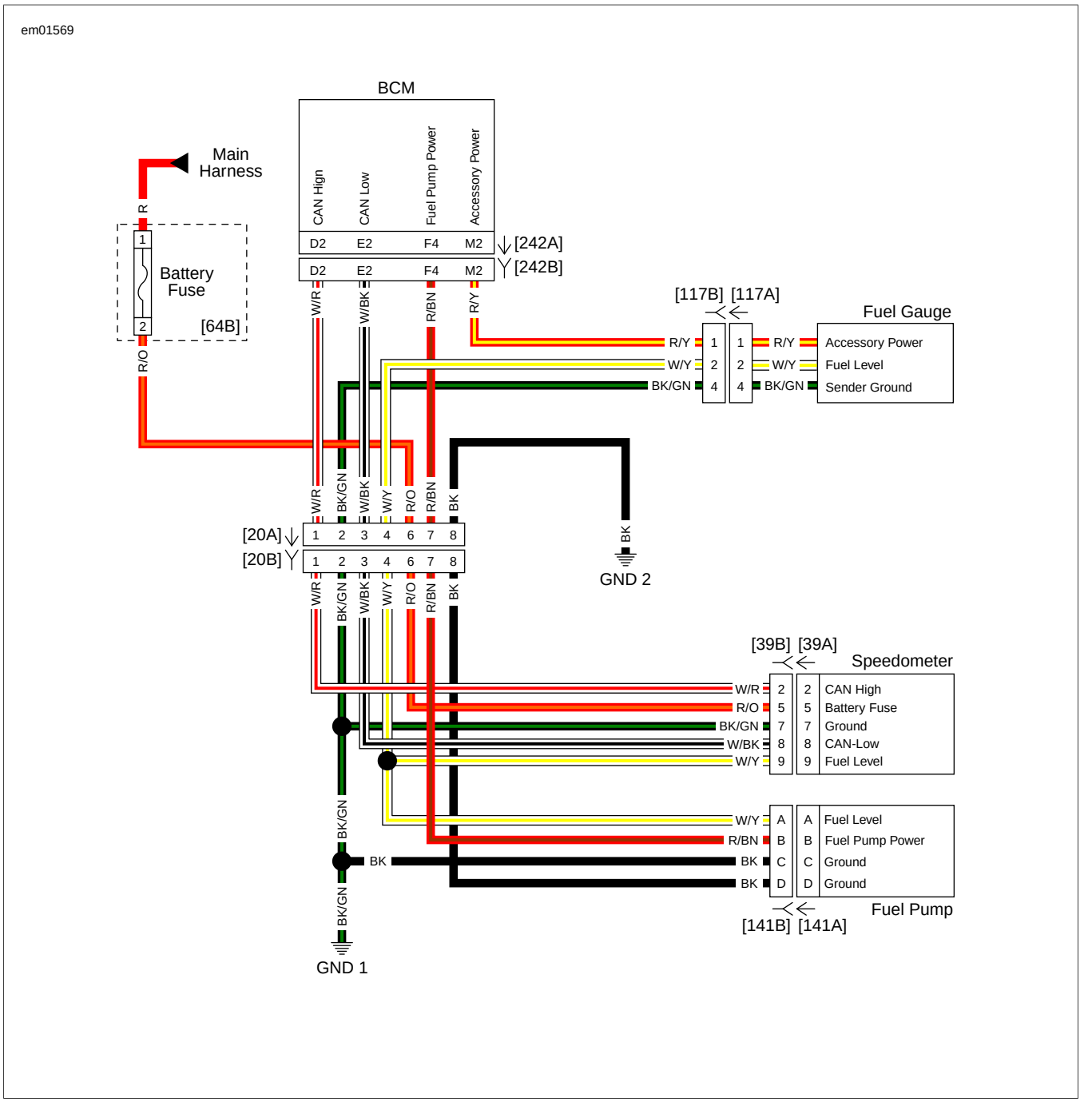


Figure 4-4. Fuel Sensor Circuit: Without Fairing

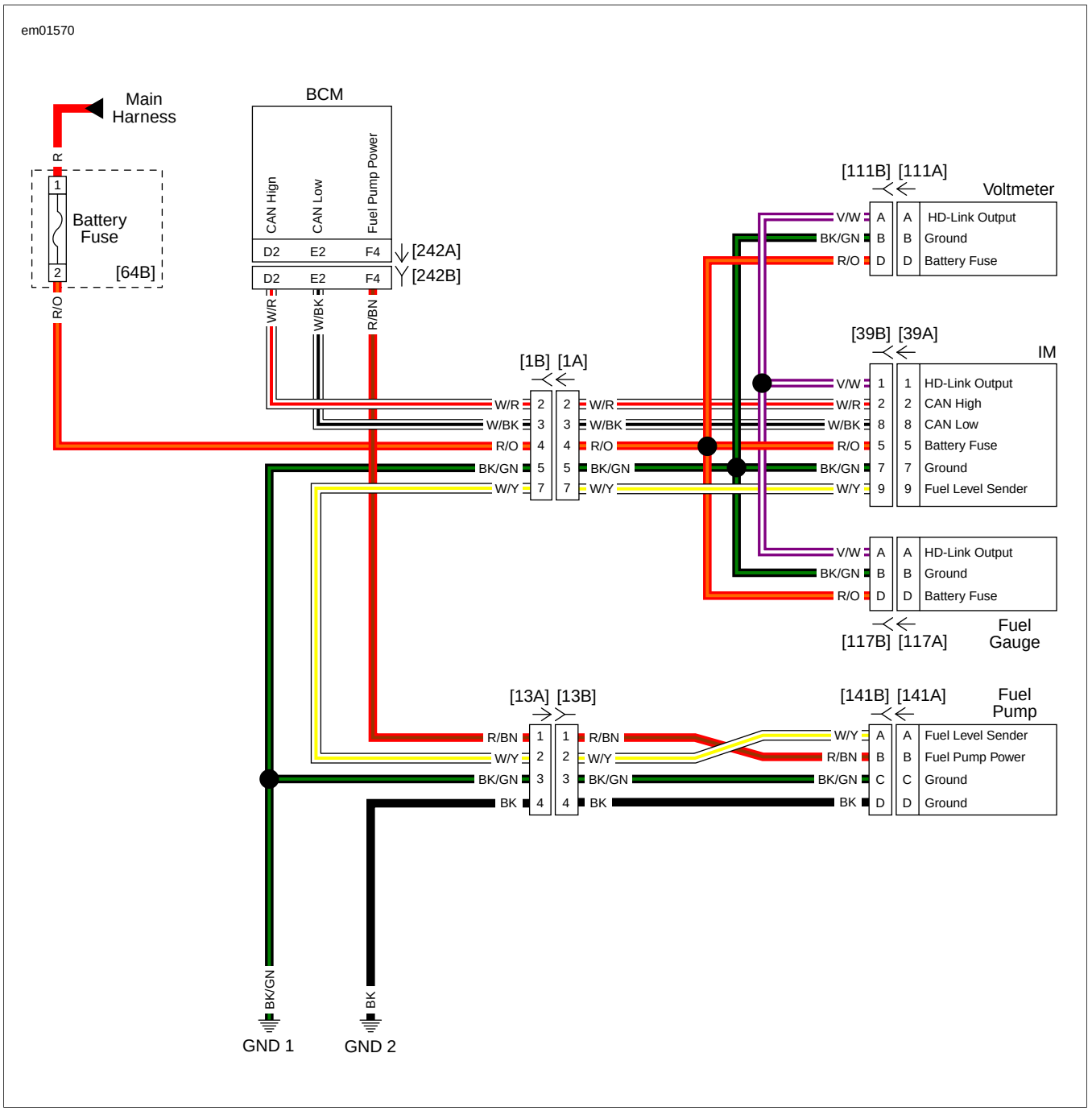


Figure 4-5. Fuel Sensor Circuit: FLH With Fairing

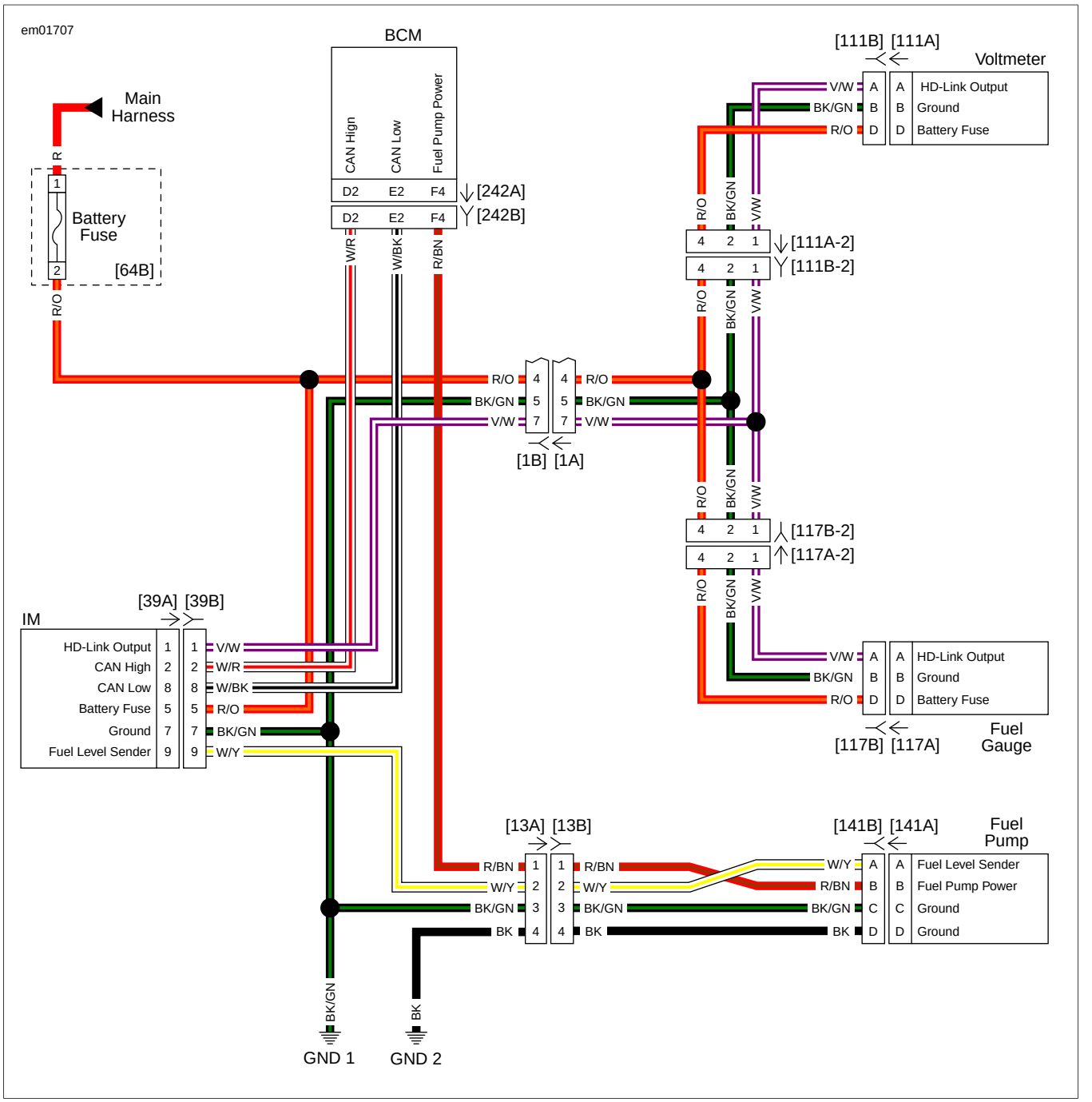


Figure 4-6. Fuel Sensor Circuit: FLT

DTC B1210

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 4-3. DTC B1210 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in fuel level sender circuit
Fuel level sender assembly malfunction
Open fuel gauge circuit
Fuel gauge malfunction

1. BCM Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Test voltage between BOB terminal M2 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace BCM.

2. Fuel Gauge Power Test

1. Turn IGN OFF.
2. Disconnect fuel gauge [117].
3. Test continuity between BOB terminal M2 and [117B] terminal 1 (R/Y) wire.
4. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [117B] terminal 1 and [242] terminal M2 (R/Y) wire.

3. Fuel Level Sender Voltage Test

1. Connect the fuel gauge [117].
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters leaving [39A] disconnected.
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 9 and ground.
5. Is voltage greater than 2.0V?
   a. **Yes.** Replace speedometer.
   b. **No.** Go to Test 4.

4. Fuel Pump and Sender Test

1. Turn IGN OFF.
2. Disconnect fuel pump and sender assembly [141].
3. Turn IGN ON.
4. Test voltage between BOB terminal 9 and ground.
5. Is voltage greater than 2.0V?
   a. **Yes.** Replace fuel pump and sender assembly.
   b. **No.** Go to Test 5.

5. Fuel Gauge Circuit Test

1. Turn IGN OFF.
2. Disconnect fuel gauge [117].
3. Test continuity between [117B] terminal 2 and BOB terminal 9.
4. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (W/Y) wire between fuel gauge and speedometer.

6. Fuel Gauge Circuit Short to Ground Test

1. Test continuity between [117B] terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (W/Y) wire.
   b. **No.** Replace fuel gauge.

DTC B1211

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 4-4. DTC B1211 Diagnostic Faults

POSSIBLE CAUSES
Open ground circuit
Short to voltage in fuel level sensor circuit
Fuel gauge malfunction
Fuel level sender malfunction
Open fuel level sender circuit

1. Fuel Level Sender Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX

(Part No. HD-42682) to harness adapters leaving [39A] disconnected.

3. Turn IGN ON.
4. Test voltage between BOB terminal 9 and ground.
5. Is voltage greater than 8.0V?
   a. **Yes.** Go to Test 2.
   b. **No, voltage between 2-8V.** Replace speedometer.
   c. **No, voltage below 2V.** Go to Test 8.

2. Fuel Pump and Sender Test

1. Turn IGN OFF.
2. Disconnect fuel gauge [117].
3. Turn IGN ON.
4. Test voltage between BOB terminal 9 and ground.
5. Is voltage greater than 8.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. Fuel Level Sender Circuit Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect fuel level sender [141].
3. Test voltage between BOB terminal 9 and ground.
4. Is voltage greater than 8.0V?
   a. **Yes.** Repair short to voltage on (W/Y) wire.
   b. **No.** Replace fuel pump and sender assembly.

4. Fuel Level Sender Circuit Open Test

1. Turn IGN OFF.
2. Disconnect fuel level sender [141].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [117B] terminal 2 and [141B] terminal A.
4. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (W/Y) wire between fuel gauge and fuel level sendor.

5. Fuel Level Sender Ground Circuit Test

1. Test continuity between [141B] terminal C and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (BK/GN) wire.

6. Fuel Gauge Ground Circuit Test

1. Test continuity between [117B] terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open between [117] terminal 4 (BK/GN) wire and ground.

7. Fuel Sender Resistance Test

1. Test resistance between [141A] terminals B and terminal C.
2. Is resistance greater than 260 Ohms?
   a. **Yes.** Replace fuel level sender.
   b. **No.** Replace fuel gauge.

8. Fuel Gauge Voltage Test

1. Turn IGN OFF.
2. Disconnect fuel gauge [117].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [117B] terminal 1 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair open in (R/Y) wire between fuel gauge terminal 1 and BCM.

9. Fuel Gauge Test

1. Test continuity between [117B] terminal 2 and BOB terminal 9.
2. Is continuity present?
   a. **Yes.** Replace fuel gauge.
   b. **No.** Repair open in (W/Y) wire between fuel gauge and speedometer.

DTC B1212

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 4-5. DTC B1212 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in fuel level sender circuit
Fuel level sender assembly malfunction

1. Fuel Level Sender Voltage Test

1. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters.
2. Turn IGN ON.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 9 and ground.

4. Is voltage greater than 2.0V?
   a. **Yes.** Replace IM.
   b. **No.** Go to Test 2.

2. Fuel Pump and Sender Test

1. Disconnect fuel pump and sender assembly [141].
2. Test voltage between BOB terminal 9 and ground.
3. Is voltage greater than 2.0V?
   a. **Yes.** Replace fuel pump and sender assembly.
   b. **No.** Repair short to ground in (W/Y) wire.

DTC B1213

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 4-6. DTC B1213 Diagnostic Faults

POSSIBLE CAUSES
Open ground circuit
Short to voltage in fuel level sensor circuit
Fuel level sender malfunction
Open fuel level sender circuit

1. Fuel Level Sender Circuit Short to Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters.
3. Test voltage between BOB terminal 9 and ground.
4. Is voltage greater than 7.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace IM.

2. Fuel Level Sender Ground Circuit Test

1. Disconnect fuel level sender [141].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [141B] terminal C and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK/GN) wire.

3. Fuel Level Sender Circuit Test

1. Test continuity between BOB terminal 9 and [141B] terminal A.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (W/Y) wire.

4. Fuel Sender Resistance Test

1. Test resistance between [141A] terminals A and C.
2. Is resistance greater than 260 Ohms?
   a. **Yes.** Replace fuel level sender.
   b. **No.** Go to Test 5.

5. Fuel Gauge Voltage Test

1. Disconntect IM [39A].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [141B] terminal A and BOB terminal 9.
3. Is battery voltage present?
   a. **Yes.** Repair short to voltage in (W/Y) wire.
   b. **No.** Replace fuel level sender.

TRIP ODOMETER SWITCH DIAGNOSTICS 4.3

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

Trip Odometer Reset Switch Closed

DTC B2255 sets if the trip odometer reset switch is closed for more than two minutes. This code can be set by the speedometer or the BCM. It will normally be set by both if there is a concern with the trip odometer reset switch.

Odometer self-diagnostics will not function if the switch is stuck. It will not be possible to toggle the switch to navigate through the different diagnostic steps in the odometer.

- A stuck trip odometer reset switch disables odometer self-diagnostics.
- If DIGITAL TECHNICIAN II (Part No. HD-48650) is connected to the DLC [91] and communicating with the vehicle then the odometer self-diagnostics will not function properly.
- Disconnect DIGITAL TECHNICIAN II (Part No. HD-48650) before entering odometer self-diagnostics.

Table 4-7. Code Description

DTC	DESCRIPTION
B2255	Trip switch stuck

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

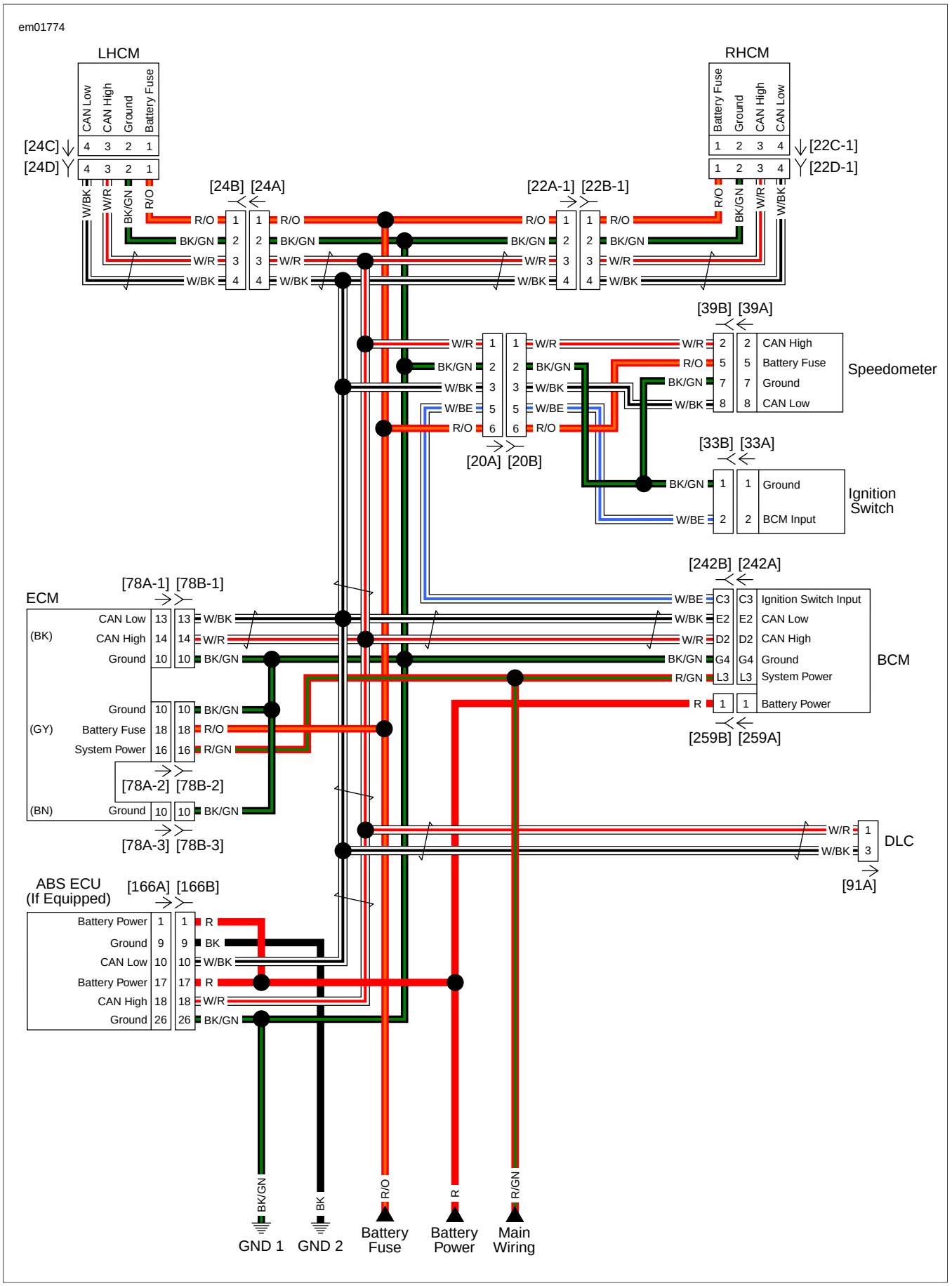


Figure 4-7. CAN Bus Circuit: FLHR

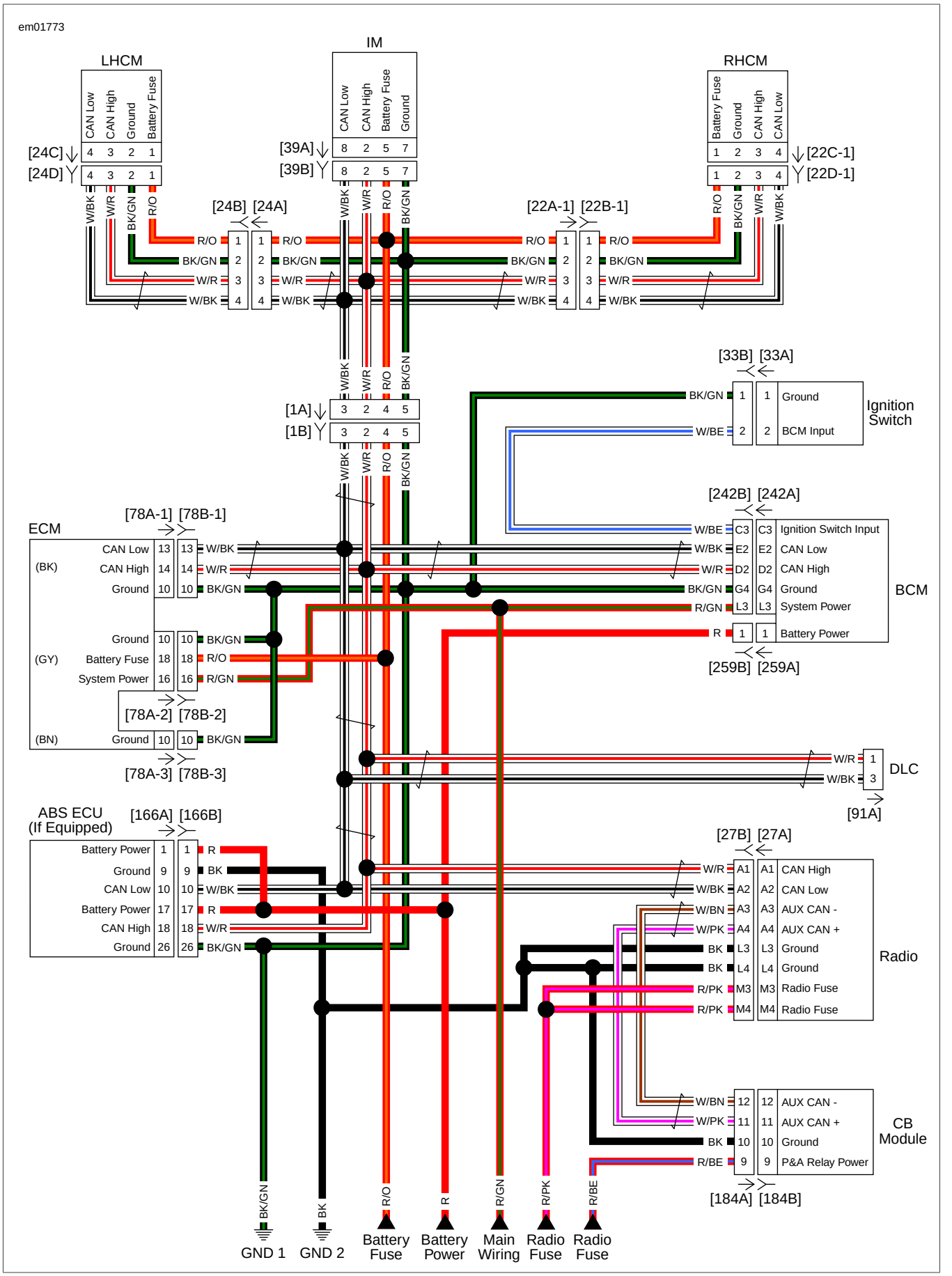


Figure 4-8. CAN Bus Circuit: FLH With Fairing

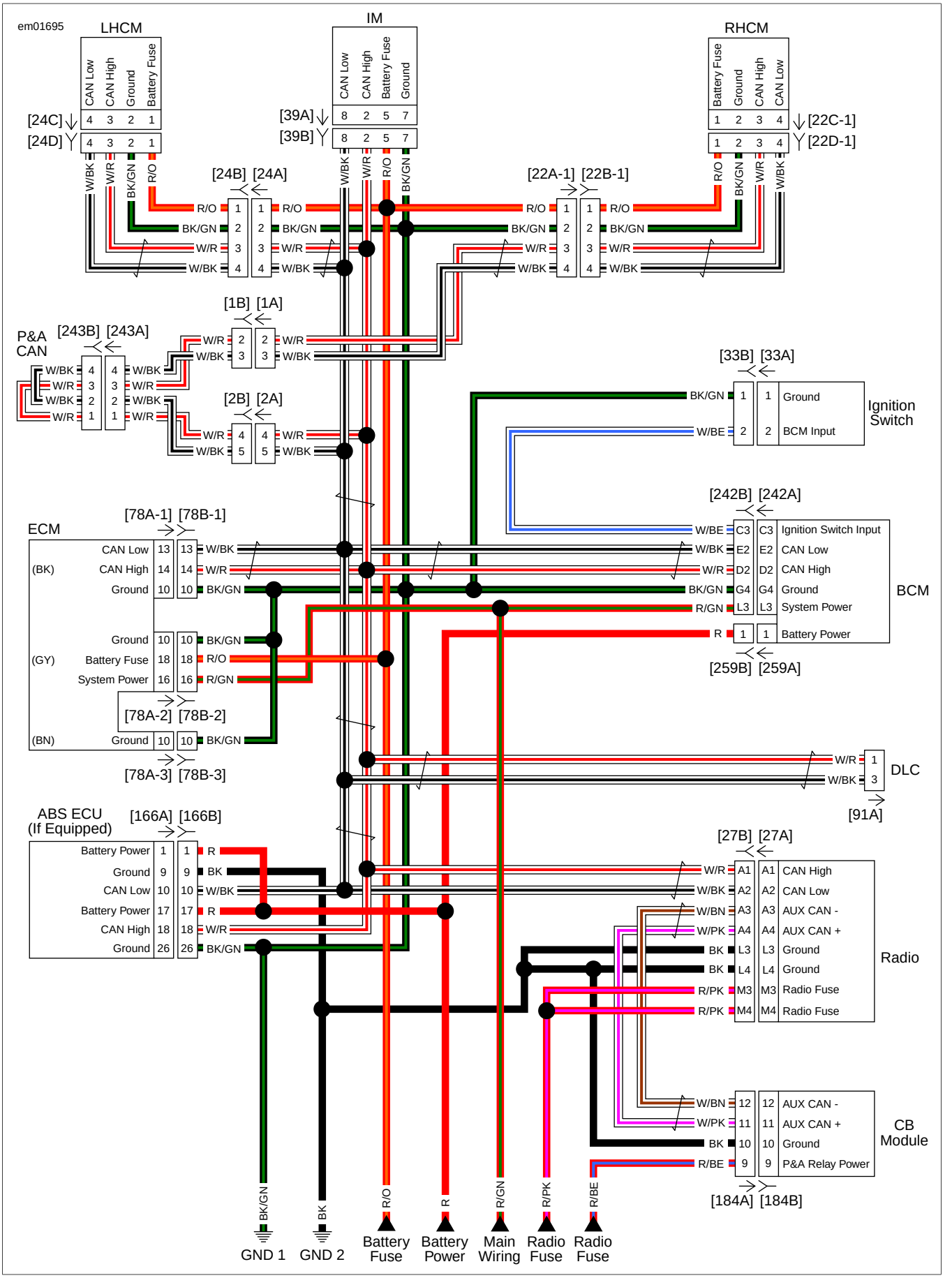


Figure 4-9. CAN Bus Circuit: FLT

TRIP ODOMETER FUNCTIONS INOPERATIVE, DTC B2255

Table 4-8. Trip Odometer Functions Inoperative Diagnostic Faults: DTC B2255

POSSIBLE CAUSES
Instrument malfunction
Trip odometer reset switch malfunction

1. Trip Switch Test

1. Check trip switch for damage or obstruction.
2. Is switch moving freely?
   a. **Yes.** Go to Test 2.
   b. **No.** Remove obstruction. If switch will not move freely, replace LHCM.

2. Odometer Test

1. Press and release the trip odometer reset switch.
2. Does odometer cycle through different odometer counters?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. Speedometer "WOW" Test

1. Turn IGN OFF.
2. Turn IGN ON, while pressing trip odometer reset switch.
3. Does speedometer needle sweep its full range of motion?
   a. **Yes.** System functioning properly. Test for intermittent condition. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No.** Replace speedometer/IM.

4. LHCM Test

1. Operate other switches on LHCM.
2. Do any switches operate?
   a. **Yes.** Replace LHCM.
   b. **No.** See 2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, Left Hand Controls Inoperative: DTC U0141.

NO INSTRUMENT POWER DIAGNOSTICS 4.4

DESCRIPTION AND OPERATION

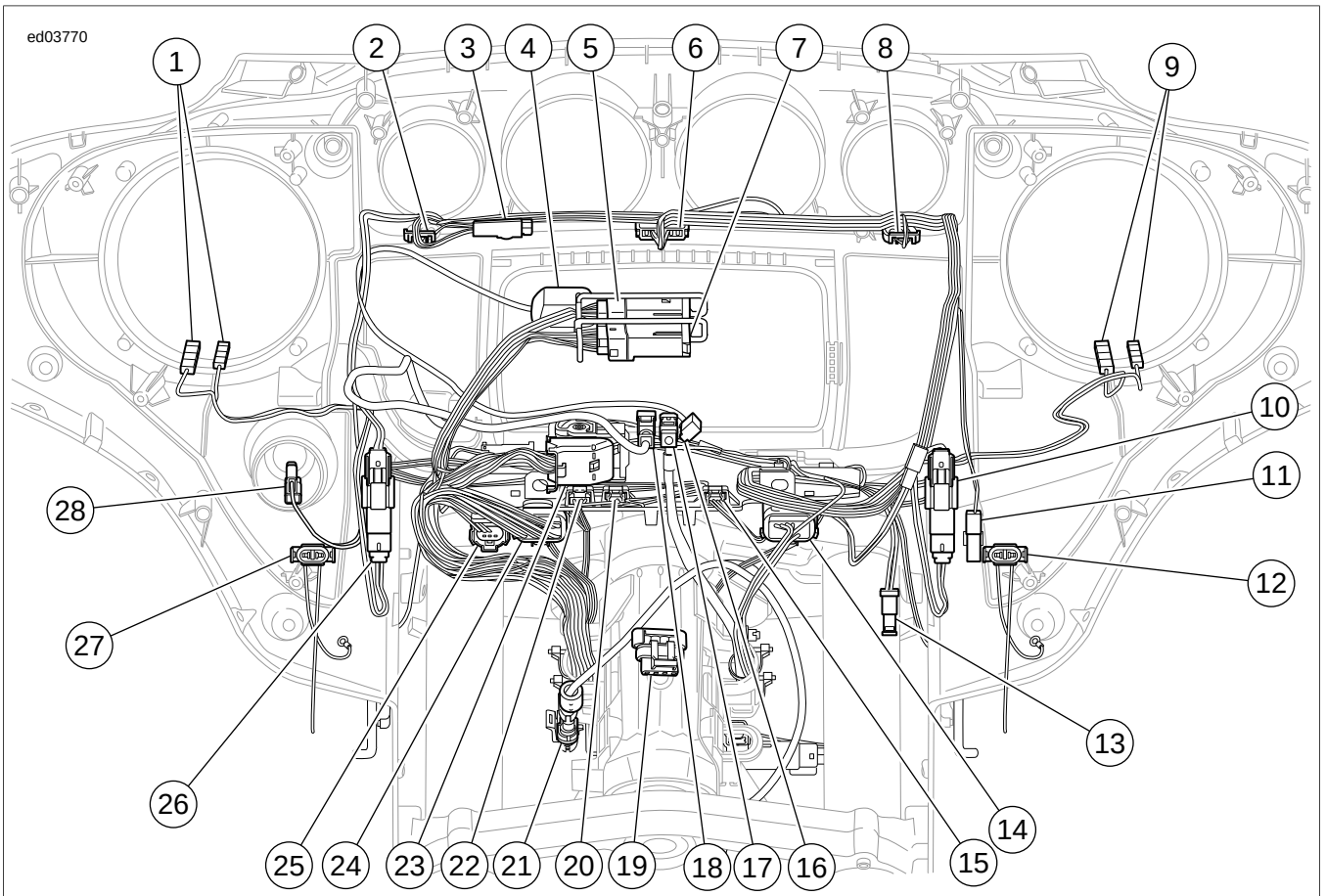
See Figure 4-10. The speedometer/IM receives battery power at terminal 5. This is supplied through the battery fuse located in fuse block [64]. The speedometer/IM receives a message from the BCM over the CAN bus to know if the ignition switch is in the IGN or ACC position. When the ignition switch is in the ACC position, the speedometer/IM illuminates the backlighting, the odometer and the security lamp.

When the ignition switch is in the IGN position, the speedometer/IM illuminates the check engine, low fuel level, security and ABS lamp (if equipped). The backlighting, odometer, neutral lamp and low oil lamp also illuminate with the IGN ON.

The speedometer/IM uses DTC B1200 as an internal fault code. The speedometer/IM will set this code if it detects a malfunction inside the speedometer.

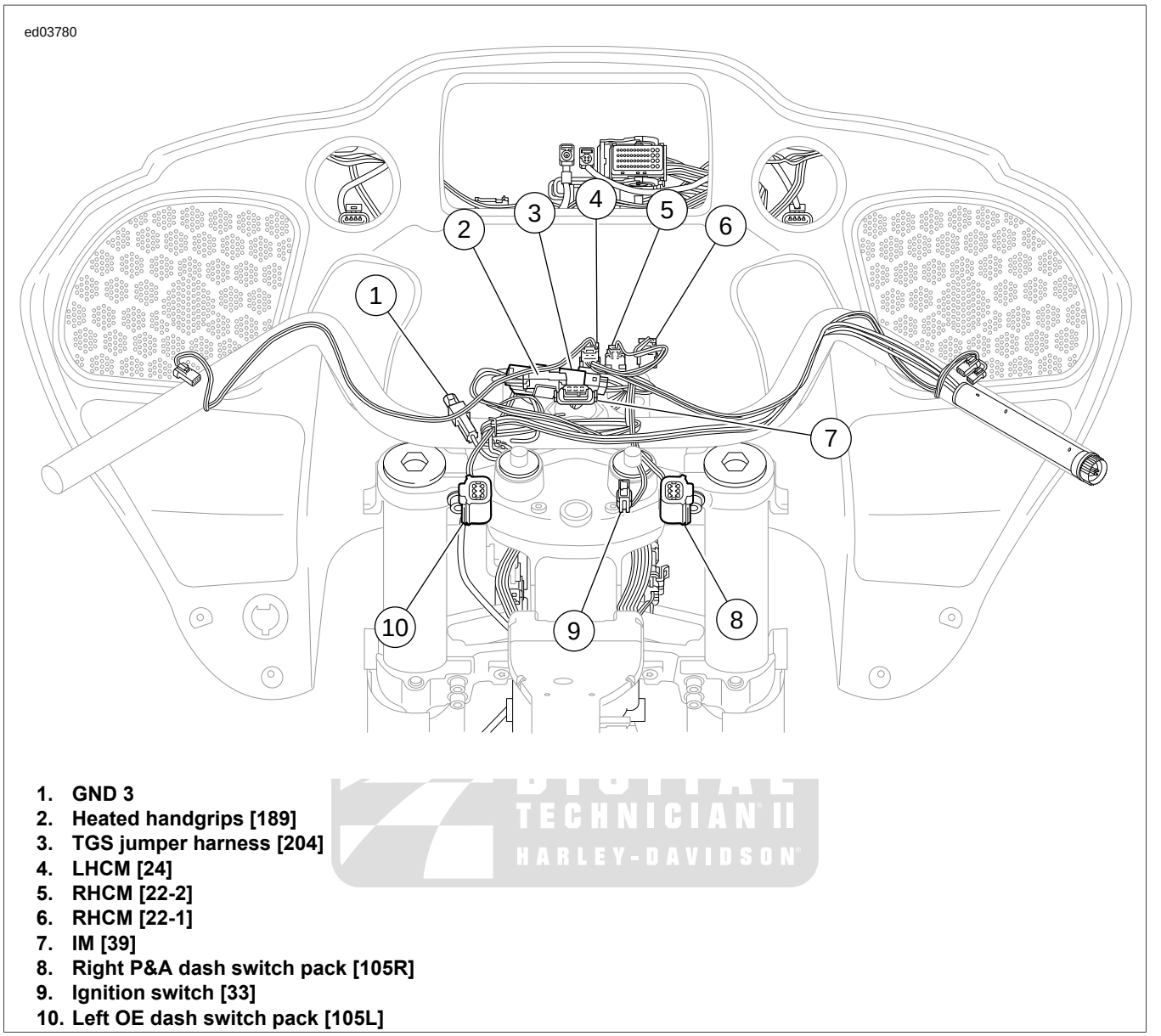
Table 4-9. Code Description

DTC	DESCRIPTION
B1200	Internal fault



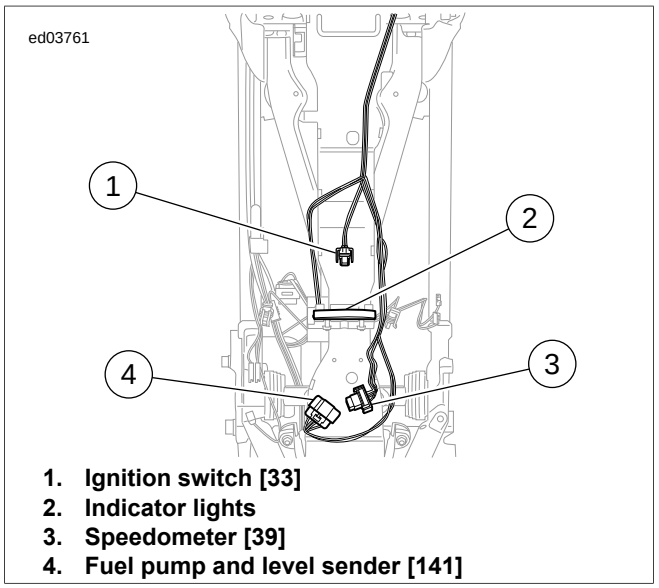
1. Right front speaker [34-2]
2. Voltmeter [111]
3. P&A power [299]
4. GPS antenna
5. P&A audio [280]
6. IM [39]
7. CB module [184]
8. Fuel gauge [117]
9. Left front speaker [35-2]
10. Left front speaker [35-1]
11. Front fender tip lamp [32]
12. Left auxiliary lamp [73L]
13. Heated handgrips [189]
14. Main to fairing harness [2]
15. LHCM [24]
16. GPS antenna [193]
17. Antenna [51]
18. USB
19. Headlamp [38]
20. RHCM [22-2]
21. Front WSS [167]
22. RHCM [22-1]
23. Radio [27]
24. Main to fairing harness [1]
25. TGS jumper harness [204]
26. Right front speaker [34-1]
27. Right auxiliary lamp [73R]
28. Power outlet [132]

Figure 4-10. Under FLH Fairing



1. GND 3
2. Heated handgrips [189]
3. TGS jumper harness [204]
4. LHCM [24]
5. RHCM [22-2]
6. RHCM [22-1]
7. IM [39]
8. Right P&A dash switch pack [105R]
9. Ignition switch [33]
10. Left OE dash switch pack [105L]

Figure 4-11. Handlebars: FLT Models



1. Ignition switch [33]
2. Indicator lights
3. Speedometer [39]
4. Fuel pump and level sender [141]

Figure 4-12. Console: Without Fairing

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

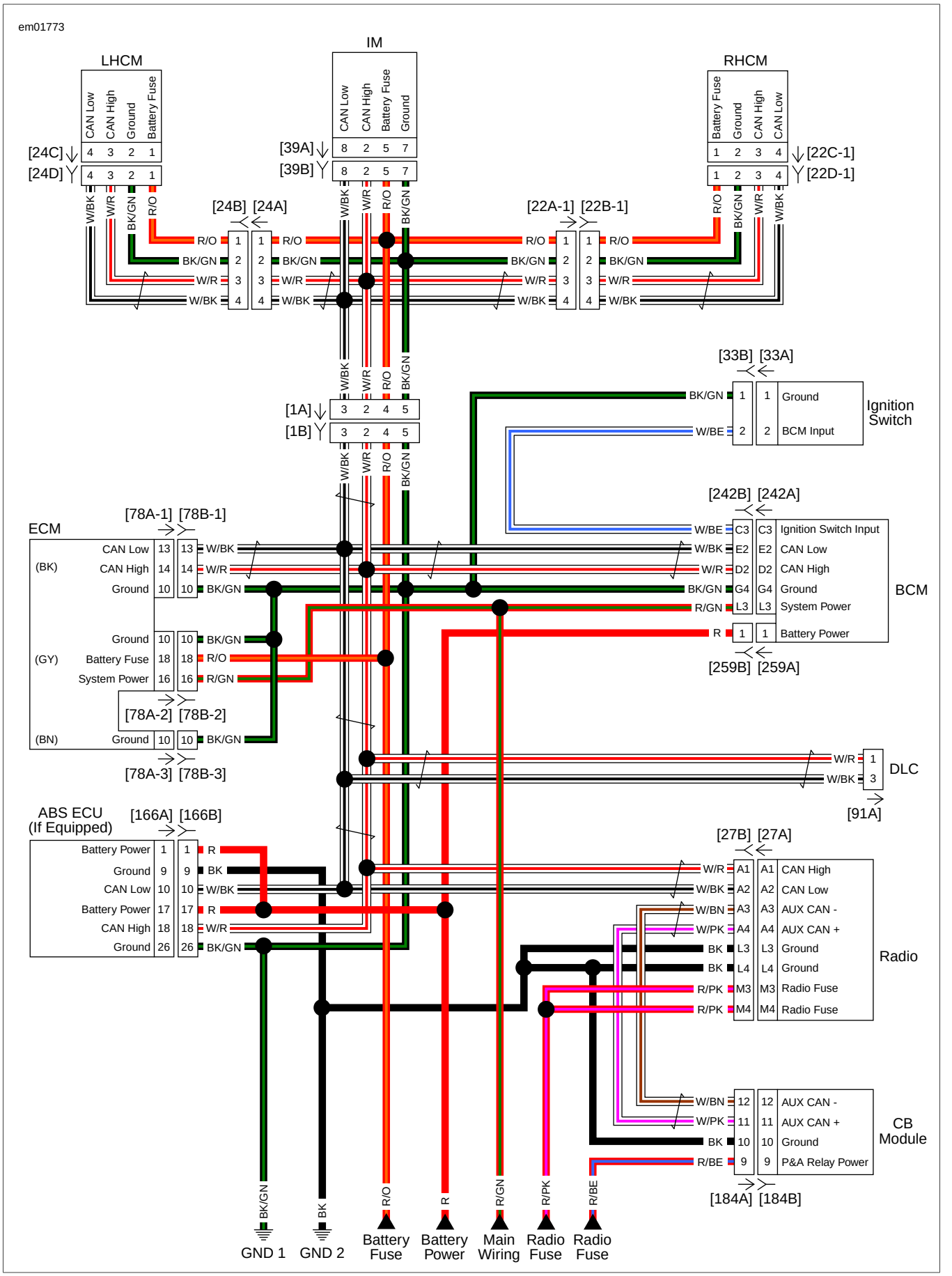


Figure 4-13. CAN Bus Circuit: FLH With Fairing

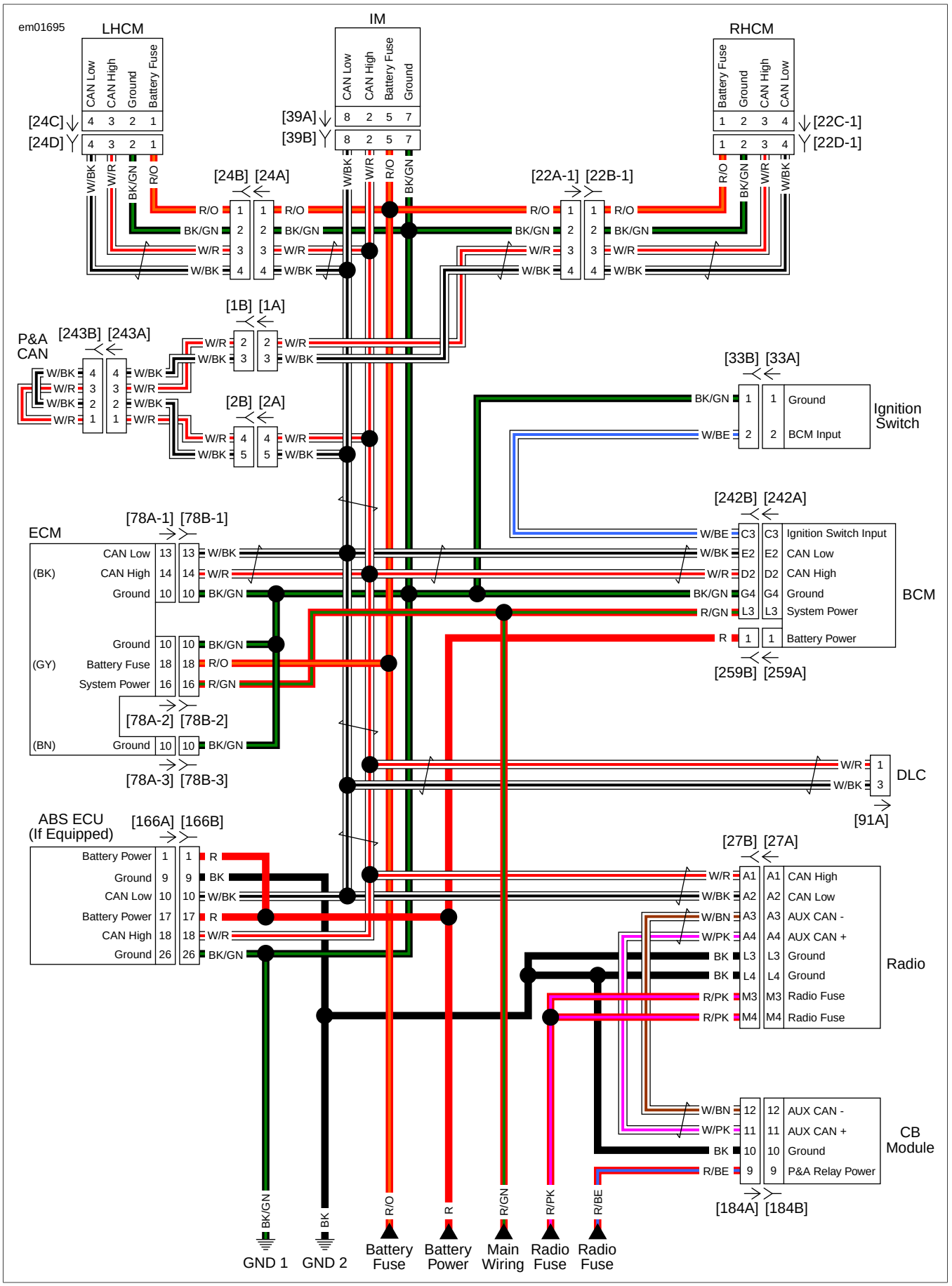


Figure 4-14. CAN Bus Circuit: FLT

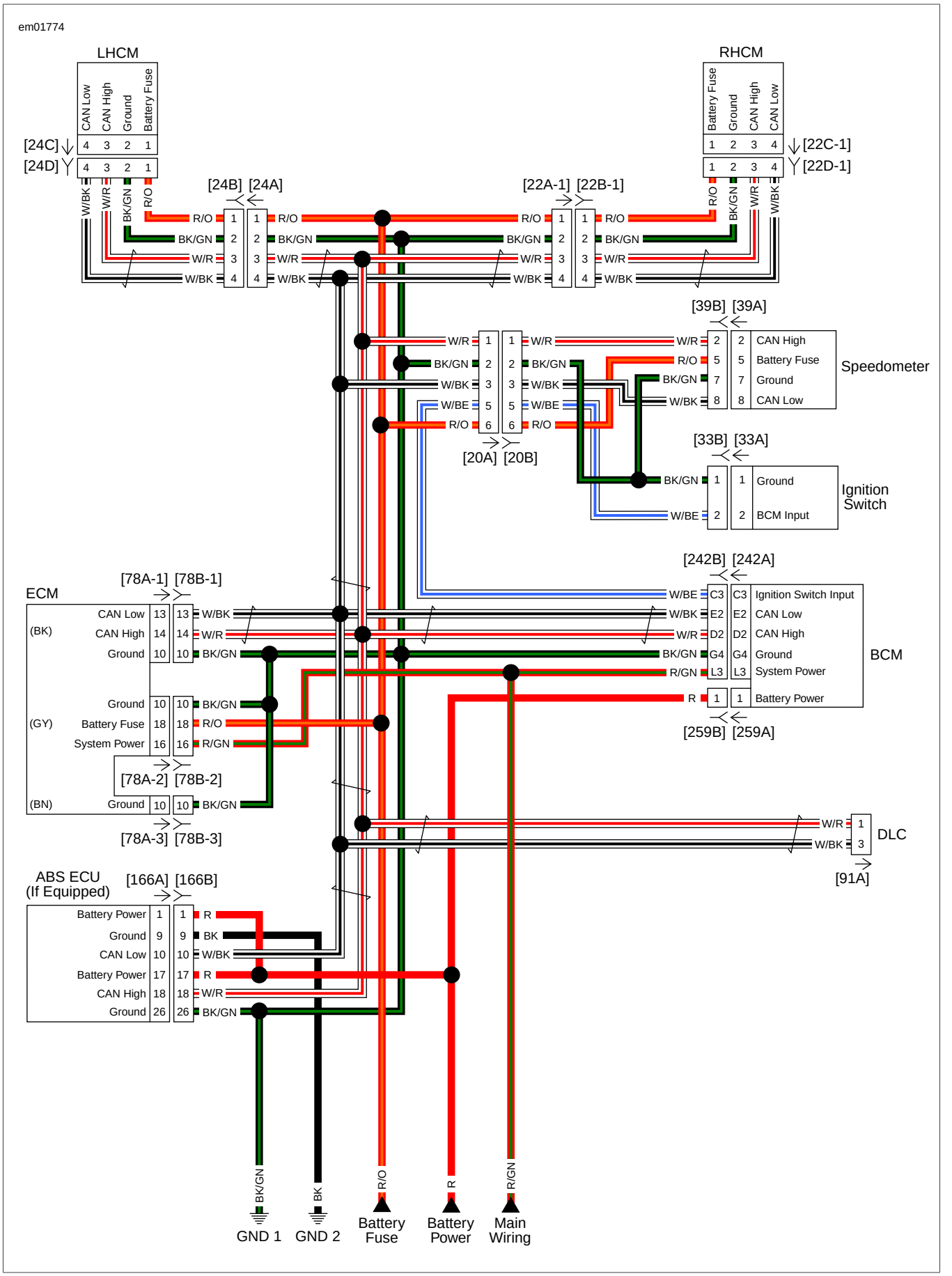


Figure 4-15. CAN Bus Circuit: FLHR

NO INSTRUMENT POWER

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 4-10. No Instrument Power Diagnostic Faults

POSSIBLE CAUSES
Open battery circuit
Open ground circuit
Open in CAN bus circuit to speedometer

1. Battery Circuit Test

1. Turn IGN ON.
2. Does headlamp or tail lamp illuminate?
   a. **Yes.** Go to Test 2.
   b. **No.** See 2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, No Vehicle Power: DTC U0140.

2. Accessory Function Test

1. Attempt to start vehicle.
2. Does engine crank?
   a. **Yes.** Go to Test 3.
   b. **No.** See 2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274.

3. Battery Circuit to Speedometer Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters leaving [39A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 5 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (R/O) wire. **(5041)**

4. Ground Circuit Test

1. Test continuity between BOB terminal 7 and ground.
2. Is continuity present?
   a. **Yes.** Replace speedometer. **(6020)**
   b. **No.** Repair open in (BK/GN) wire. **(5041)**

DTC B1200

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 4-11. DTC B1200 Diagnostic Faults

POSSIBLE CAUSES
Open in speedometer battery power circuit
Open in speedometer ground circuit

1. Speedometer Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-42682) and BREAKOUT BOX ADAPTERS (Part No. HD-46601) to wiring harness [39B], leaving [39A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 5 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/O) wire.

2. Speedometer Ground Test

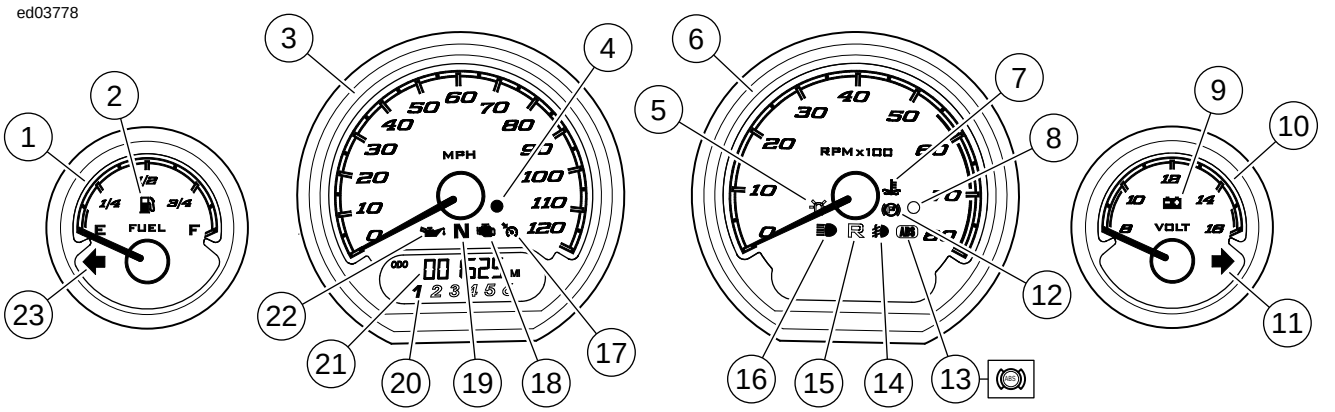
1. Test voltage between BOB terminals 5 and 7.
2. Is battery voltage present?
   a. **Yes.** Replace speedometer.
   b. **No.** Repair open in ground circuit.

INDICATOR LAMPS 4.5

DESCRIPTION AND OPERATION

See Figure 4-16 and Figure 4-17. The instruments are significantly different between a fairing and non-fairing model. Models with fairings have several gauges with indicators in each gauge. These are integral to the gauges and are controlled through messages over the CAN bus and the HD-Link communication systems.

The non-fairing models have some of the indicators in the speedometer which are controlled by the speedometer based on messages or inputs it receives. The rest of the indicators are located in the indicator bar and are controlled by the speedometer by supplying a ground path for the indicators.



1. **Fuel gauge**
2. **Low fuel lamp**
3. **Speedometer**
4. **Security lamp**
5. **Not used for these models**
6. **Tachometer**
7. **Engine coolant temperature lamp**
8. **Light sensor (not an indicator)**
9. **Battery discharge lamp**
10. **Voltmeter**
11. **Right turn signal indicator lamp**
12. **Not used for these models**
13. **ABS icon lamp (km/h ABS icon lamp also shown)**
14. **Auxiliary/fog lamp indicator lamp**
15. **Not used for these models**
16. **Headlamp high beam lamp**
17. **Cruise control lamp**
18. **Check engine lamp**
19. **Neutral lamp**
20. **Gear indicator**
21. **Odometer window**
22. **Oil pressure lamp**
23. **Left turn signal indicator lamp**

Figure 4-16. Indicator Lamps: Typical (Fairing Models)

ABS Indicator

The instruments illuminate the ABS indicator when:

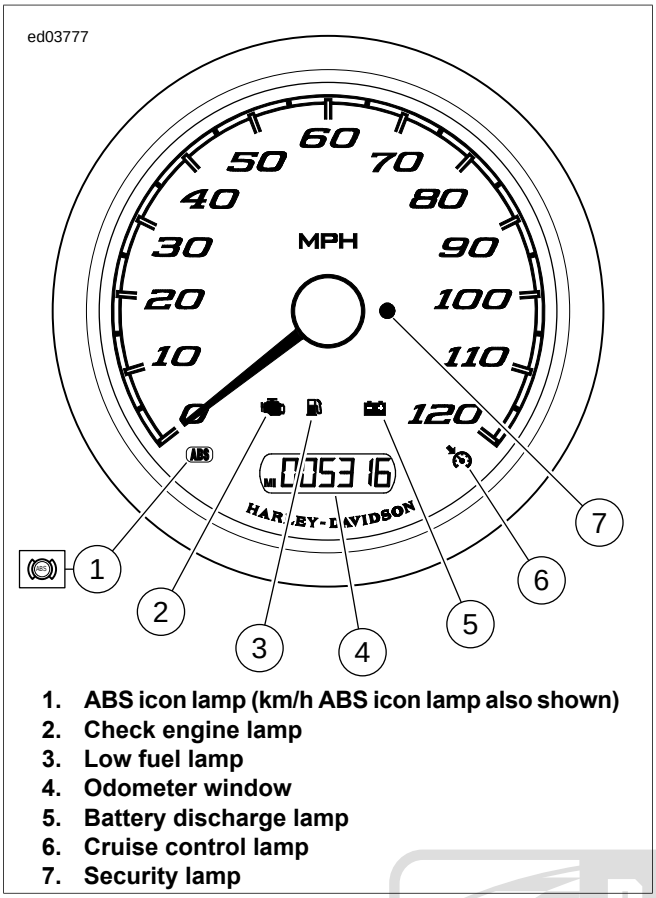
- The ECU detects an ABS disabling malfunction. The ECU sends a serial data message to the instrument requesting illumination.
- The speedometer performs a bulb check.
- The speedometer detects a loss of communication with the ECU.
- The ABS light may flash when the IGN is turned on. This will continue until the vehicle is driven to verify WSS operation.

The ECU sends a message to the instruments when a malfunction that disables ABS operation is detected. Depending on the fault, the ABS indicator may stay on even after the malfunction is corrected. The indicator will not go off until the vehicle is operated at speeds greater than 10 mph (16 km/h). It is important to verify that this is not the cause of an ABS indicator, which is illuminated when no DTCs are set, before attempting to diagnose other possible causes.

Security Lamp

When the IGN is turned ON, the security lamp will illuminate for approximately four seconds and then turn off. The BCM controls the security lamp by sending a CAN message to the instruments. After the security lamp turns off following the first four second illumination period, one of two events may occur.

- The lamp remains off. This indicates there are no current fault conditions or stored DTCs currently detected by the BCM.
- If the lamp illuminates again and remains lit, a current DTC exists.



1. **ABS icon lamp (km/h ABS icon lamp also shown)**
2. **Check engine lamp**
3. **Low fuel lamp**
4. **Odometer window**
5. **Battery discharge lamp**
6. **Cruise control lamp**
7. **Security lamp**

Figure 4-17. Indicator Lamps: Non-Fairing Models

Check Engine Lamp

When the IGN is ON, the check engine lamp will illuminate for approximately four seconds and then turn off. The ECM controls the check engine lamp by sending a CAN message to the instruments. After the check engine lamp turns off following the first four second illumination period, one of two events may occur.

- The lamp remains off. This indicates there are no current fault conditions or stored DTCs currently detected by the ECM.
- If the lamp illuminates again and remains illuminated, a current DTC exists.

The check engine lamp may not illuminate for less than 4 seconds under the following conditions:

- IGN OFF/ON within 5 seconds.
- Trip switch activated, then IGN ON within 5 seconds.
- Run/stop switch cycled, then IGN ON within 5 seconds.
- Security armed vehicles that are moved, then IGN ON, or IGN ON and FOB response is not immediately received (interference).

Low Battery Lamp

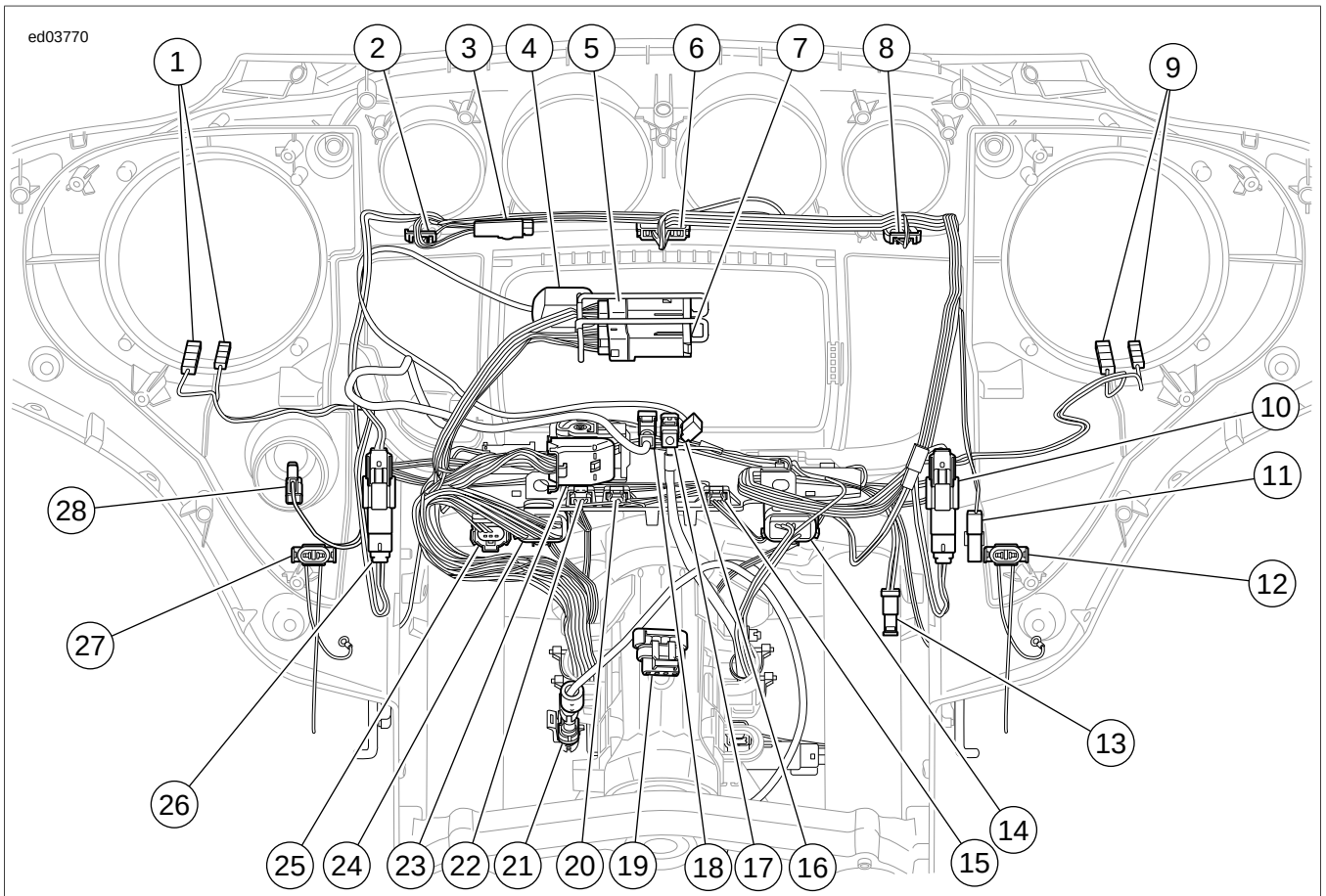
Non-fairing models: The BCM sends a message to the speedometer to control the low battery lamp. The speedometer will turn the lamp on if the BCM identifies a low voltage condition on [259] terminal 1.

Fairing models: The BCM sends a message to the IM. The IM sends a message to the voltmeter to control the low battery lamp. The voltmeter will turn the lamp on if the BCM identifies a low voltage condition on [259] terminal 1.

Low Fuel Indicator

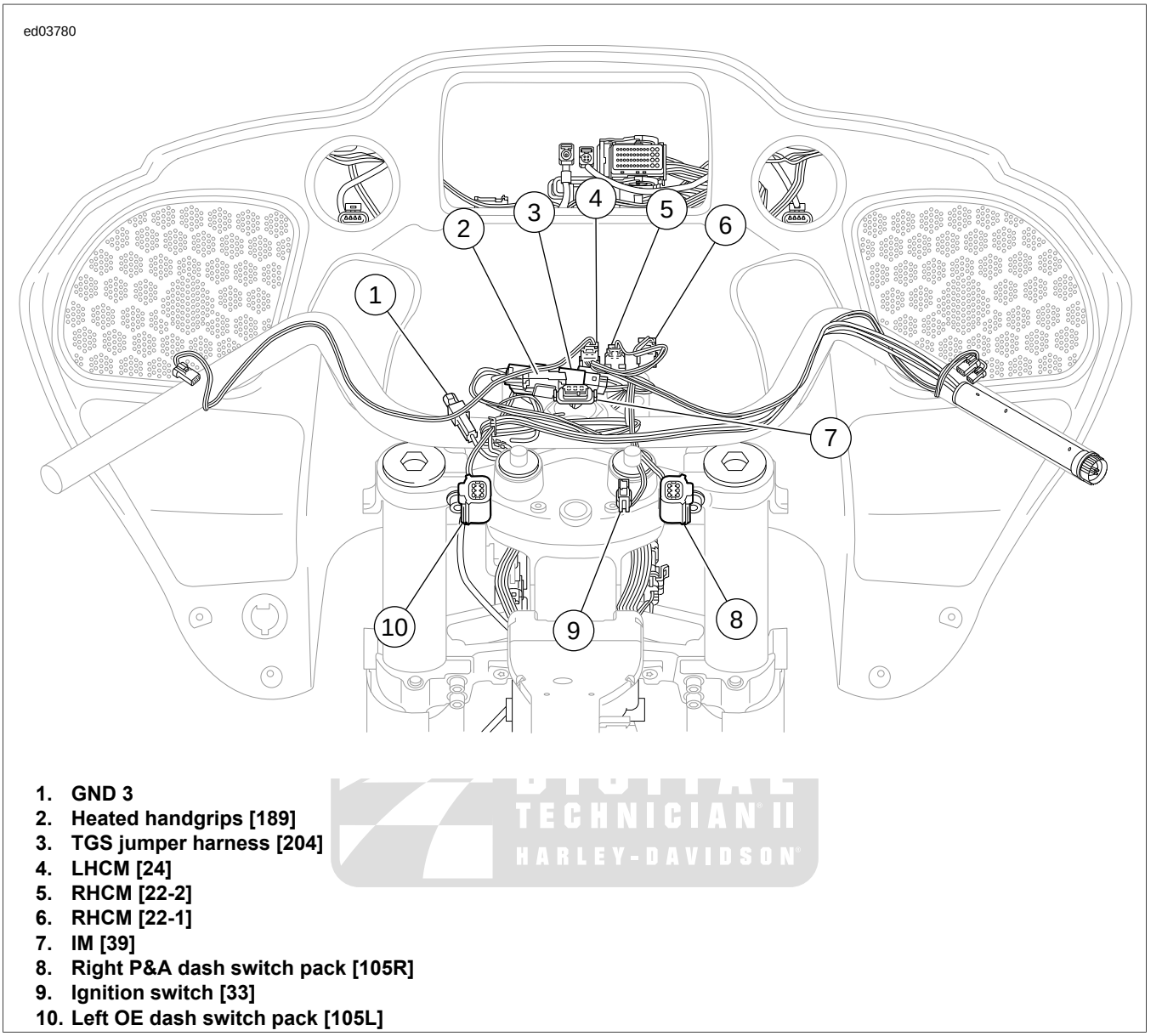
Non-fairing models: See Figure 4-17. The low fuel indicator is controlled at terminal 9 (W/Y) of the speedometer. The fuel gauge sends voltage on the (W/Y) wire to the low fuel lamp and fuel level sender. When the fuel drops below 1.0 gal (3.8 L), the resistance in the fuel level sender reaches a point that causes enough of a change in the voltage on the (W/Y) wire and it signals the speedometer to activate the low fuel lamp.

Fairing models: See Figure 4-16. The low fuel indicator is controlled by the IM. The IM sends voltage on terminal 9 (W/Y) wire to the fuel level sender. When the fuel drops below 1.0 gal (3.8 L), the resistance in the fuel level sender reaches a point that causes enough of a change in the voltage on the (W/Y) wire and it signals the IM to send a message to the fuel gauge to activate the low fuel lamp.



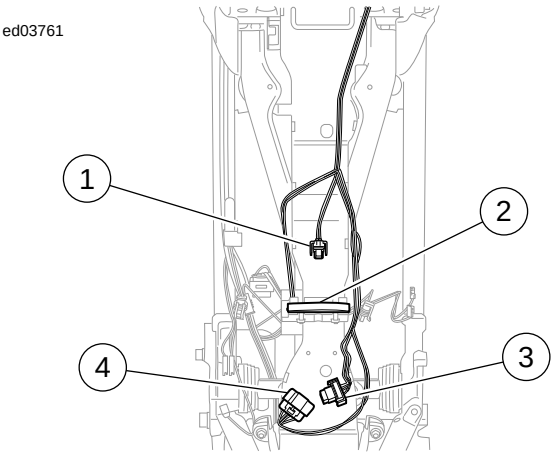
1. Right front speaker [34-2]
2. Voltmeter [111]
3. P&A power [299]
4. GPS antenna
5. P&A audio [280]
6. IM [39]
7. CB module [184]
8. Fuel gauge [117]
9. Left front speaker [35-2]
10. Left front speaker [35-1]
11. Front fender tip lamp [32]
12. Left auxiliary lamp [73L]
13. Heated handgrips [189]
14. Main to fairing harness [2]
15. LHCM [24]
16. GPS antenna [193]
17. Antenna [51]
18. USB
19. Headlamp [38]
20. RHCM [22-2]
21. Front WSS [167]
22. RHCM [22-1]
23. Radio [27]
24. Main to fairing harness [1]
25. TGS jumper harness [204]
26. Right front speaker [34-1]
27. Right auxiliary lamp [73R]
28. Power outlet [132]

Figure 4-18. Under FLH Fairing



1. GND 3
2. Heated handgrips [189]
3. TGS jumper harness [204]
4. LHCM [24]
5. RHCM [22-2]
6. RHCM [22-1]
7. IM [39]
8. Right P&A dash switch pack [105R]
9. Ignition switch [33]
10. Left OE dash switch pack [105L]

Figure 4-19. Handlebars: FLT Models

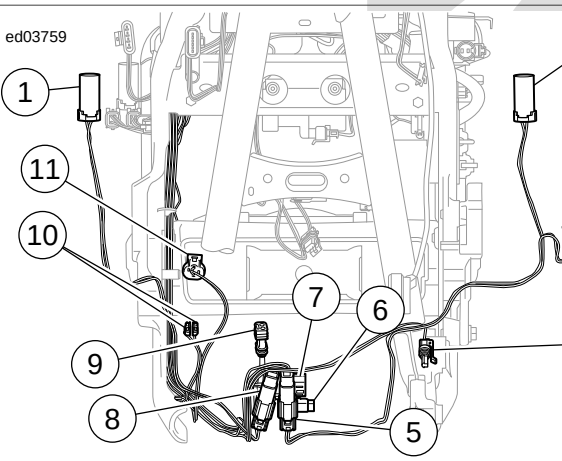


1. **Ignition switch [33]**
2. **Indicator lights**
3. **Speedometer [39]**
4. **Fuel pump and level sender [141]**

Figure 4-20. Console: Without Fairing

Neutral Indicator

See Figure 4-21. The neutral indicator is controlled through the (W) wire connected to the speedometer/IM. When the transmission is in neutral, the neutral switch closes and supplies a ground to the BCM on terminal D3. The BCM then sends a message to the speedometer/IM over the CAN bus indicating the transmission is in neutral. The speedometer/IM supplies ground to the neutral indicator causing it to illuminate.



1. **Right cooling fan [97] (if equipped)**
2. **Left cooling fan [215] (if equipped)**
3. **ECT sensor [236] (if equipped)**
4. **Cooling pump [235] (if equipped)**
5. **Left cooling jumper [232L] (if equipped)**
6. **CKP [79]**
7. **JSS [133]**
8. **Right cooling jumper [232R] (if equipped)**
9. **Voltage regulator [77]**
10. **Rear brake switch [212]**
11. **Oil pressure switch [120] (w/o fairing) and oil pressure sender [139] (with fairing)**

Figure 4-21. Front of Engine

Oil Pressure Indicator

See Figure 4-21. The oil pressure indicator is connected to the speedometer. The switch closes when oil pressure is low and supplies ground to the BCM at terminal E3. The BCM then sends a message to the speedometer over the CAN bus indicating the oil pressure is low. The speedometer supplies ground to the oil pressure indicator. This ground causes the indicator to illuminate with the IGN ON and the engine OFF.

Turn Signal Indicators

Non-fairing models: The turn signal indicators are controlled by the speedometer. When the BCM receives a CAN bus message from the left or right turn signal switch, it flashes the correct turn signals. At the same time, the BCM sends a message to the speedometer over the CAN bus indicating which turn signal to operate. The speedometer supplies ground to the corresponding turn signal indicator causing it to illuminate.

Fairing models: The turn signal indicators are controlled by the IM. When the BCM receives a CAN bus message from the left or right turn signal switch, it flashes the correct turn signals. At the same time, the BCM sends a message to the IM over the CAN bus, indicating which turn signal to operate. The IM sends a message to either the fuel gauge (left turn signal) or voltmeter (right turn signal), causing the corresponding turn signal to illuminate.

High Beam Indicator

This circuit is controlled by the speedometer/IM. When the BCM receives a CAN bus message that the headlamp switch is placed in the high beam position, a message is sent over the CAN bus to the speedometer/IM and the BCM. The speedometer/IM controls the indicator and the BCM controls the headlamp.

Diagnostic Tips

After replacing a component in the fuel circuit, verify the tank is full of fuel and that the main fuse is removed for 2 minutes and reinstalled to turn low fuel lamp off.

Some aftermarket fuel gauges not made by Harley-Davidson may cause the fuel circuit to report inaccurate readings.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

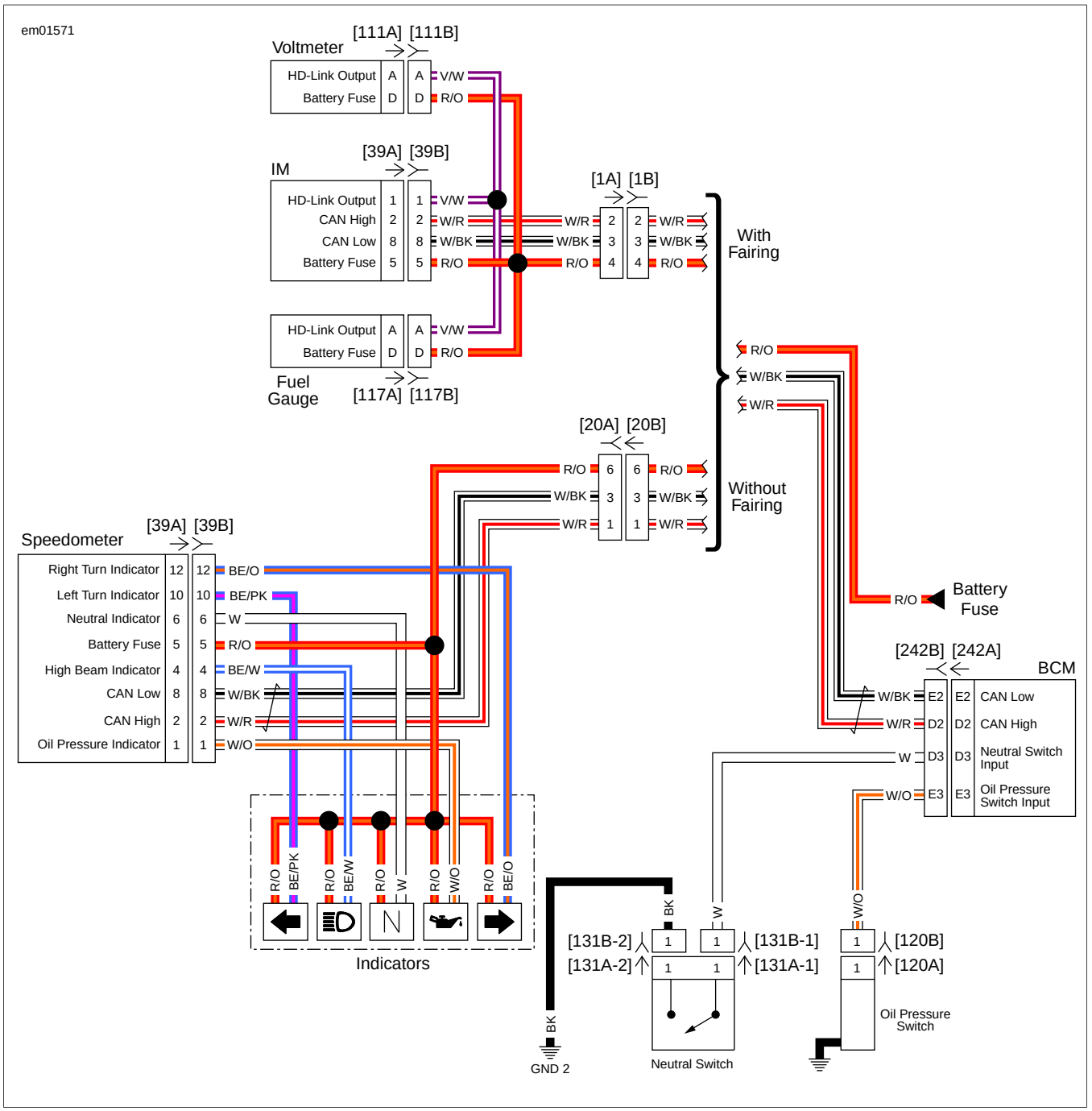


Figure 4-22. FLH Indicator Lamps

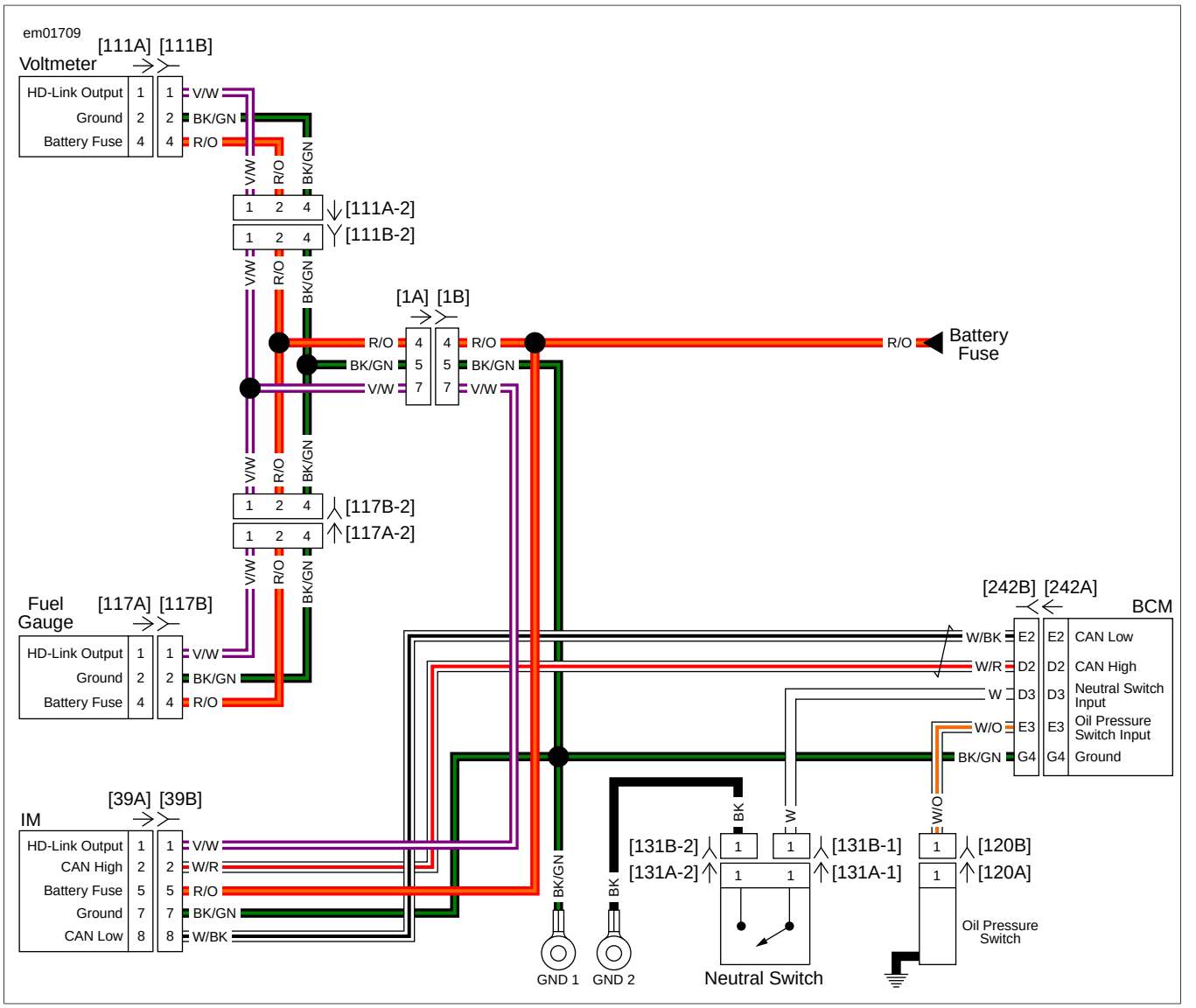


Figure 4-23. FLT Indicator Lamps

OIL PRESSURE LAMP ALWAYS ON

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY
HD-96921-52D	OIL PRESSURE GAUGE SET

Table 4-12. Oil Pressure Lamp Always On Diagnostic Faults

POSSIBLE CAUSES
Short to ground in oil pressure circuit
Indicator malfunction
Mechanical issue
Oil pressure switch malfunction

1. Oil Pressure Lamp Function Test

1. Turn IGN ON.
2. Does oil pressure lamp illuminate?
   a. **Yes.** Go to Test 2.
   b. **No.** See 4.5 INDICATOR LAMPS, Oil Pressure Lamp Inoperative.

2. Engine Running Test

1. Start engine.
2. Does oil pressure lamp turn OFF and stay off?
   a. **Yes.** Oil pressure lamp is operating properly. Test for intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No.** Go to Test 3.

3. Oil Pressure Sensor Test

1. Disconnect oil pressure switch [120] or oil pressure sender [139].
2. Does oil pressure lamp turn OFF while engine is running?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 4.

4. Oil Pressure Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal E3 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace BCM. **(5863)**

5. Mechanical Test

1. Inspect engine for any issues that impact oil pressure.
2. Using OIL PRESSURE GAUGE SET (Part No. HD-96921-52D), verify engine oil pressure.
3. Is oil pressure within specification?
   a. **Yes.** Replace oil pressure switch. **(5161)**
   b. **No.** Repair as needed.

6. Oil Pressure Switch Circuit Test

1. Disconnect [242A].
2. Test continuity between BOB terminal E3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground. **(5041)**
   b. **No. Without fairing.** Go to Test 7.
   c. **No. With fairing.** Replace IM.

7. Speedometer Test

1. Turn IGN OFF.
2. Remove BCM BOB.
3. Connect [242].
4. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters, leaving [39A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
5. Test continuity between BOB terminal 1 and ground.
6. Is continuity present?
   a. **Yes.** Repair short to ground in (W/O) wire. **(5041)**
   b. **No.** Replace speedometer. **(6020)**

OIL PRESSURE LAMP INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 4-13. Oil Pressure Lamp Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open oil pressure circuit
Indicator malfunction

1. Oil Pressure Lamp Function Test

1. Turn IGN ON.
2. Does oil pressure lamp illuminate?
   a. **Yes.** Test for intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No. Without fairing.** Go to Test 2.
   c. **No. With fairing.** Replace IM.

2. Speedometer Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters leaving [39A] disconnected.
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper BOB terminal 1 to ground.
5. Does oil pressure lamp turn ON?
   a. **Yes.** Replace speedometer. **(6020)**
   b. **No.** Repair or replace console harness. **(5191)**

NEUTRAL LAMP ALWAYS ON

Table 4-14. Neutral Lamp Always On Diagnostic Faults

POSSIBLE CAUSES
Short to ground in neutral switch circuit
Short to ground in neutral indicator circuit

1. Neutral Lamp Function Test

1. With vehicle in neutral, turn IGN ON.
2. Does neutral lamp illuminate?
   a. **Yes. Without fairing.** Go to Test 2.
   b. **Yes. With fairing.** Go to Test 3.
   c. **No.** See 4.5 INDICATOR LAMPS, Neutral Lamp Inoperative.

2. Indicator Harness Test

1. Disconnect speedometer [39].
2. Did neutral lamp turn OFF?
   a. **Yes.** Replace speedometer. **(6020)**
   b. **No.** Repair short to ground in (W) wire between neutral indicator and speedometer. **(5041)**

3. Neutral Switch Harness Test

1. Shift transmission out of neutral.
2. Did neutral lamp turn OFF?
   a. **Yes.** Test for intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No.** Replace IM. **(6020)**

NEUTRAL LAMP INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 4-15. Neutral Lamp Inoperative Diagnostic Faults

POSSIBLE CAUSES
Neutral switch malfunction
Open ground circuit
Open neutral switch circuit
Indicator malfunction

1. Neutral Lamp Function Test

1. With vehicle in neutral, turn IGN ON.
2. Does neutral lamp illuminate?
   a. **Yes.** Test for intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No.** Go to Test 2.

2. BCM Message Test

1. Verify transmission is in neutral.
2. With clutch lever released, start engine.
3. Does engine start?
   a. **Yes. Without fairing.** Go to Test 6.
   b. **Yes. With fairing.** Replace IM.
   c. **No.** Go to Test 3.

3. Neutral Switch Test

1. Turn IGN OFF.
2. Disconnect neutral switch [131].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper between [131B-1] (W) wire and [131B-2] (BK) wire.
4. Turn IGN ON.
5. Does neutral lamp turn ON?
   a. **Yes.** Replace neutral switch. **(5157)**
   b. **No.** Go to Test 4.

4. Ground Wire Test

1. Jumper between [131B-1] (W) wire and ground.
2. Does neutral lamp turn on?
   a. **Yes.** Repair open in (BK) ground wire. **(5041)**
   b. **No.** Go to Test 5.

5. Neutral Switch Power Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Test continuity between BOB terminal D3 and [131B-1] (W) wire.
6. Is continuity present?
   a. **Yes.** Replace BCM. **(5863)**
   b. **No.** Repair open in (W) wire between indicators and neutral switch. **(5041)**

6. Speedometer Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters, leaving [39A] disconnected.
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper BOB terminal 6 to ground.
5. Does neutral lamp illuminate?
   a. **Yes.** Replace speedometer. **(6020)**
   b. **No.** Repair or replace console harness. **(5191)**

HIGH BEAM INDICATOR LAMP ALWAYS ON

Table 4-16. High Beam Indicator Lamp Always On Diagnostic Faults

POSSIBLE CAUSES
Indicator malfunction
Short to ground in high beam indicator circuit

1. High Beam Indicator Function Test

1. Operate headlamp switch.
2. Do high and low beam headlamps function correctly?
   a. **Yes. Without fairing.** Go to Test 2.
   b. **Yes. With fairing.** Replace IM. **(6020)**
   c. **No.** See 5.8 HEADLAMP DIAGNOSTICS.

2. High Beam Indicator Circuit Test

1. Turn IGN OFF.
2. Disconnect speedometer [39].
3. Turn IGN ON.
4. Does high beam indicator illuminate?
   a. **Yes.** Repair or replace console harness. **(5191)**
   b. **No.** Replace speedometer. **(6020)**

HIGH BEAM INDICATOR LAMP INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 4-17. High Beam Indicator Lamp Inoperative Diagnostic Faults

POSSIBLE CAUSES
Indicator malfunction
Open high beam indicator circuit

1. High Beam Indicator Function Test

1. Operate headlamp switch.
2. Do high and low beam headlamps function correctly?
   a. **Yes. Without fairing.** Go to Test 2.
   b. **Yes. With fairing.** Replace IM. **(6020)**
   c. **No.** See 5.8 HEADLAMP DIAGNOSTICS.

2. High Beam Indicator Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters, leaving [39A] disconnected.
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper BOB terminal 4 to ground.
5. Does high beam indicator illuminate?
   a. **Yes.** Replace speedometer. **(6020)**
   b. **No.** Repair or replace console harness. **(5191)**

TURN SIGNAL INDICATOR LAMP ALWAYS ON

Table 4-18. Turn Signal Indicator Lamp Always On Diagnostic Faults

POSSIBLE CAUSES
Indicator malfunction
Short to ground turn signal circuit

1. Turn Signal Function Test

1. Operate turn signals.

2. Do turn signals operate?
   a. **Yes.** Go to Test 2.
   b. **No.** See 5.5 TURN SIGNALS.

2. Turn Signal Indicator Circuit Test

1. Turn IGN OFF.
2. Disconnect speedometer [39].
3. Turn IGN ON.
4. Does turn signal indicator illuminate?
   a. **Yes. Without fairing.** Repair or replace console harness. **(5191)**
   b. **Yes. With fairing.** Replace voltmeter or fuel gauge depending on which turn signal is always on.
   c. **No.** Replace speedometer/IM. **(6020)**

TURN SIGNAL INDICATOR INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-42682	BREAKOUT BOX
HD-46601	BREAKOUT BOX ADAPTERS

Table 4-19. Turn Signal Indicator Inoperative Diagnostic Faults

POSSIBLE CAUSES
Indicator malfunction
Open turn signal circuit

1. Turn Signal Function Test

1. Operate turn signals.
2. Do turn signals operate?
   a. **Yes. Without fairing.** Go to Test 2.
   b. **Yes. With fairing.** Replace gauge with inoperative indicator.
   c. **No.** See 5.5 TURN SIGNALS.

2. Turn Signal Indicator Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX ADAPTERS (Part No. HD-46601) to [39]. Attach connectors from BREAKOUT BOX (Part No. HD-42682) to harness adapters, leaving [39A] disconnected.
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper BOB terminal 10 (left) or terminal 12 (right) to ground.
5. Does turn signal indicator illuminate?
   a. **Yes.** Replace speedometer. **(6020)**
   b. **No.** Repair or replace console harness. **(5191)**

LOW FUEL LAMP ALWAYS ON

Table 4-20. Low Fuel Lamp Always On Diagnostic Faults

POSSIBLE CAUSES
Fuel level sensor malfunction
Fuel gauge malfunction

1. Fuel Level Sensor Test

NOTE

Test must be performed with a full fuel tank.

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON.
5. View low fuel lamp and fuel gauge.
6. Is fuel gauge accurate?
   a. **Yes. Without fairing.** Replace speedometer.
   b. **Yes. With fairing.** Replace fuel gauge.
   c. **No.** See 4.6 GAUGES, Fuel Gauge Inoperative: Non-Fairing Models.

LOW FUEL LAMP INOPERATIVE

Table 4-21. Low Fuel Lamp Inoperative Diagnostic Faults

POSSIBLE CAUSES
Fuel level sensor malfunction
Fuel gauge malfunction

1. Speedometer Test

NOTE

Test must be performed with fuel level in tank less than 1.0 gal (3.8L).

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON.
5. View low fuel lamp and fuel gauge.
6. Is the fuel gauge inoperative?
   a. **Yes.** See 4.6 GAUGES, Fuel Gauge Inoperative: Non-Fairing Models.
   b. **No. Without fairing.** Replace speedometer.
   c. **No. With fairing.** Replace fuel gauge.

GAUGES 4.6

THEORY OF OPERATION

See Figure 4-24 and Figure 4-25. With IGN ON, the fuel gauge receives 12V through the accessory power circuit. Current flows through the gauge and variable resistor in the fuel gauge sending unit to ground. The sending unit float controls the amount of resistance in the variable resistor.

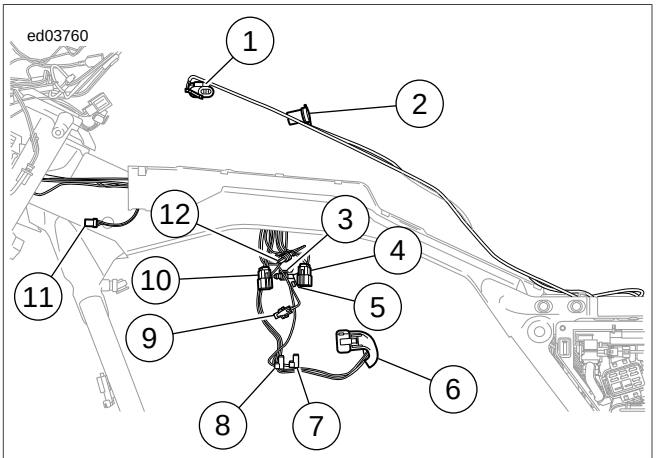
Inoperative gauges occur if:

- Sender or fuel gauge not grounded.
- Malfunction in sender or fuel gauge.
- Inoperative or disconnected wire to fuel gauge.
- Corroded connections at fuel gauge.

The voltmeter and tachometer gauges are controlled through the IM over the vehicle communication bus. If either of the instruments are inoperative and no DTCs are set, then replace the instrument.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 4-24. Engine

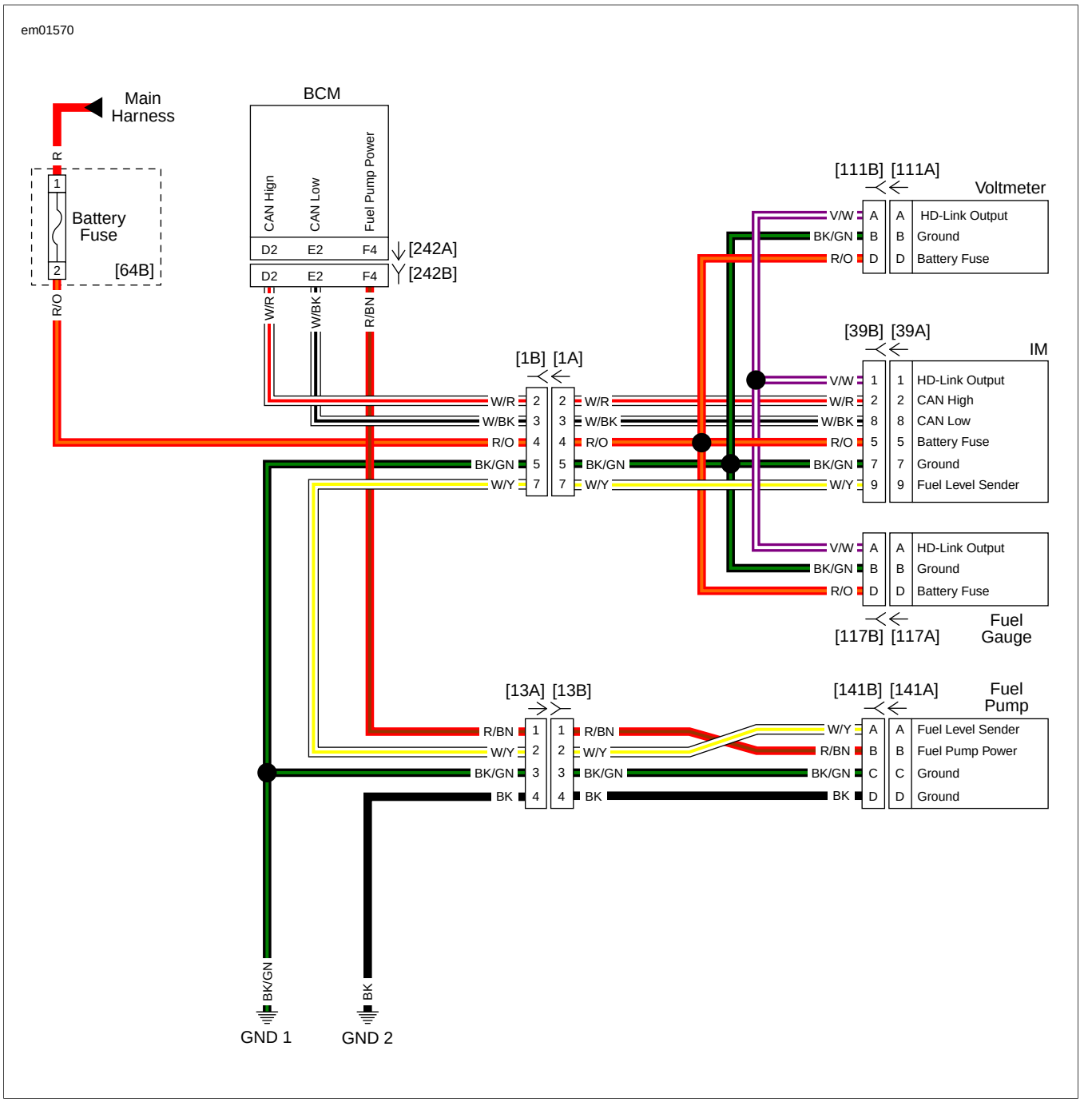


Figure 4-25. Fuel Sensor Circuit: FLH With Fairing

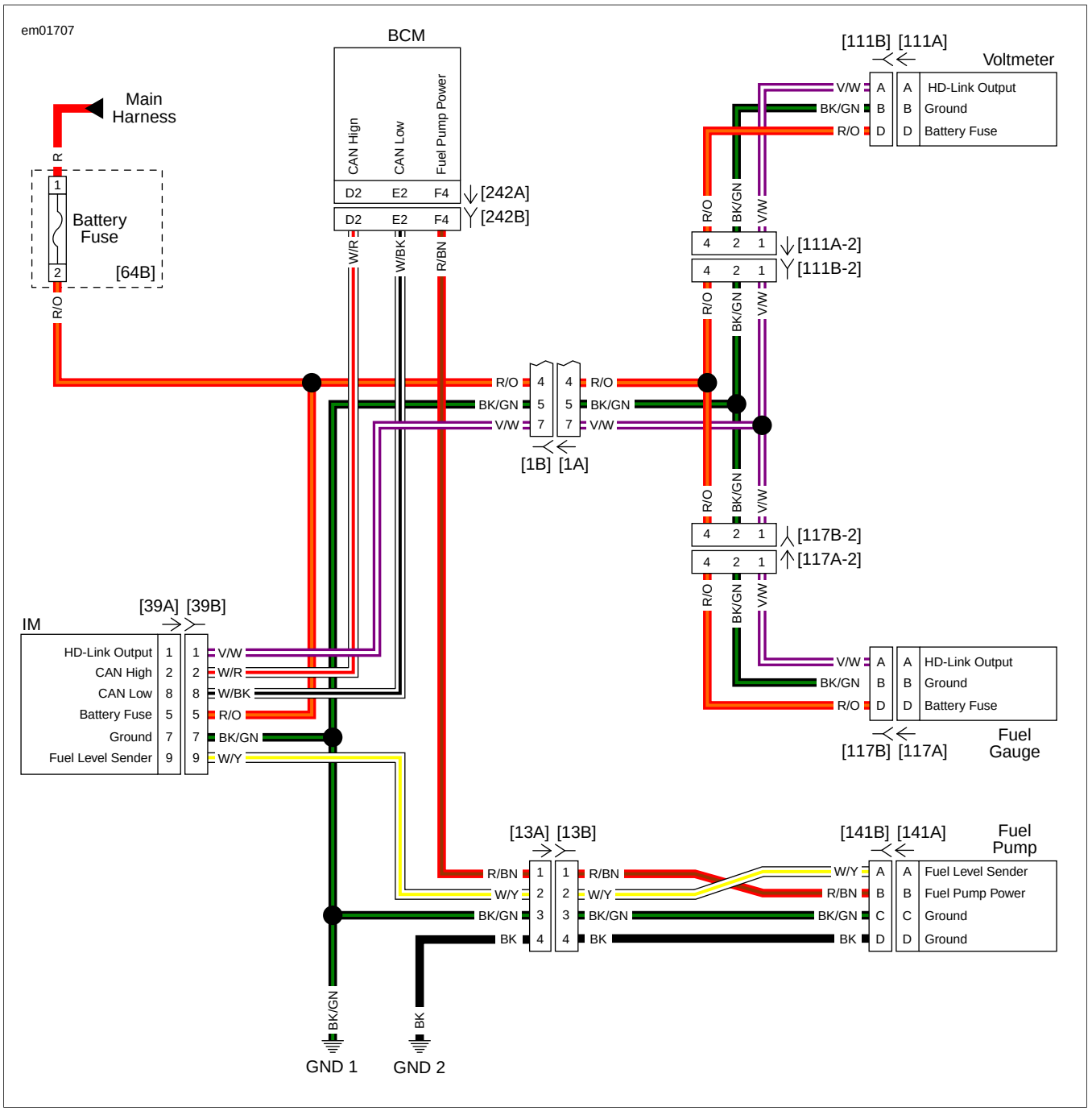


Figure 4-26. Fuel Sensor Circuit: FLT

FUEL GAUGE INACCURATE, NO DTCS

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 4-22. Fuel Gauge Inaccurate, No DTCs Diagnostic Faults

POSSIBLE CAUSES
Open in fuel gauge power circuit
Open in fuel gauge ground circuit
Fuel sender malfunction
Fuel gauge malfunction

1. Fuel Gauge Test

1. Turn IGN OFF.
2. Disconnect fuel pump and sender [141].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper [141B] terminal A to ground.
4. Turn IGN ON.
5. Does fuel gauge indicate full?
   a. **Yes.** Go to Test 2.
   b. **No. Without fairing.** Go to Test 3.
   c. **No. With fairing.** Replace fuel gauge.

2. Sending Unit Test

1. Test resistance between [141A] terminals A and C.
2. Is resistance within specified range? Refer to Table 4-23.
   a. **Yes.** System operating properly.
   b. **No.** Replace fuel sender.

Table 4-23. Fuel Sender Resistance Values

FUEL LEVEL	RESISTANCE
Full	27-40 Ohms
Half-full	97-118 Ohms
Empty	240-264 Ohms

3. Fuel Gauge Circuit Test

1. Turn IGN OFF.
2. Disconnect fuel gauge [117].
3. Turn IGN ON.
4. Test voltage between [117B] terminals 1 and 4.
5. Is battery voltage present?
   a. **Yes.** Replace fuel gauge.
   b. **No.** Repair open in (R/Y) or (BK/GN) wire.

FUEL GAUGE INOPERATIVE: NON-FAIRING MODELS

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 4-24. Fuel Gauge Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open in power circuit
Open in ground circuit
Fuel gauge malfunction

NOTE

The diagnostic applies to the non-fairing models. Models with fairings should replace the fuel gauge if it is inoperative.

1. Ignition Voltage Test

1. Turn IGN OFF.
2. Disconnect fuel gauge [117].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [117B] terminals 1 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/Y) wire. **(5041)**

2. Ground Circuit Test

1. Test voltage between [117B] terminals 1 and 4.
2. Is battery voltage present?
   a. **Yes.** Replace fuel gauge. **(6047)**
   b. **No.** Repair open in ground circuit. **(5041)**

TABLE OF CONTENTS

NOTES

ACC CIRCUIT DIAGNOSTICS 5.1

DESCRIPTION AND OPERATION

See Figure 5-1. The accessory power circuit from the BCM terminal M2 runs to the rear lighting, DLC connector and the P&A relay. This circuit is energized by the BCM when the IGN is in the ACC or ON position.

With IGN in the ACC or ON position the BCM terminal M2 is energized. This supplies power to the coil side of the P&A relay. When the P&A relay is energized by the BCM, it supplies power to the P&A circuit through the P&A fuse.

Table 5-1. Code Description

DTC	DESCRIPTION
B2112	ACC output shorted high
B2113	ACC output shorted low
B2114	ACC output overloaded

Conditions for Setting

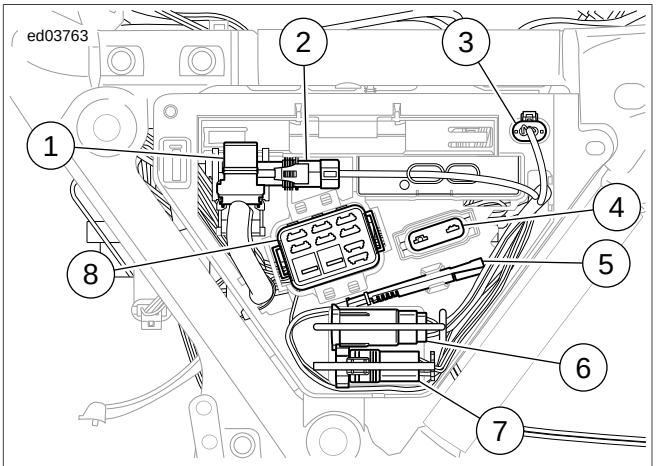
The accessory circuit normally has power when the IGN is ON or in the ACC positions. If the accessory circuit has power when the IGN is OFF, then DTC B2112 will set.

DTC B2114 will set if the accessory circuit draws more than 20 Amps.

The other accessory circuit DTCs will set if the BCM identifies them with the IGN ON or in the ACC position.

Diagnostic Tips

This circuit may be used for aftermarket accessories or systems. If a code is set and cannot be duplicated, check for aftermarket devices.



1. **BCM [242]**
2. **BCM power [259]**
3. **Security siren [142]**
4. **Main fuse [5]**
5. **Battery tender [281]**
6. **Auxiliary devices [4]**
7. **DLC [91]**
8. **Fuse block [64]**

Figure 5-1. Under Left Side Cover

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

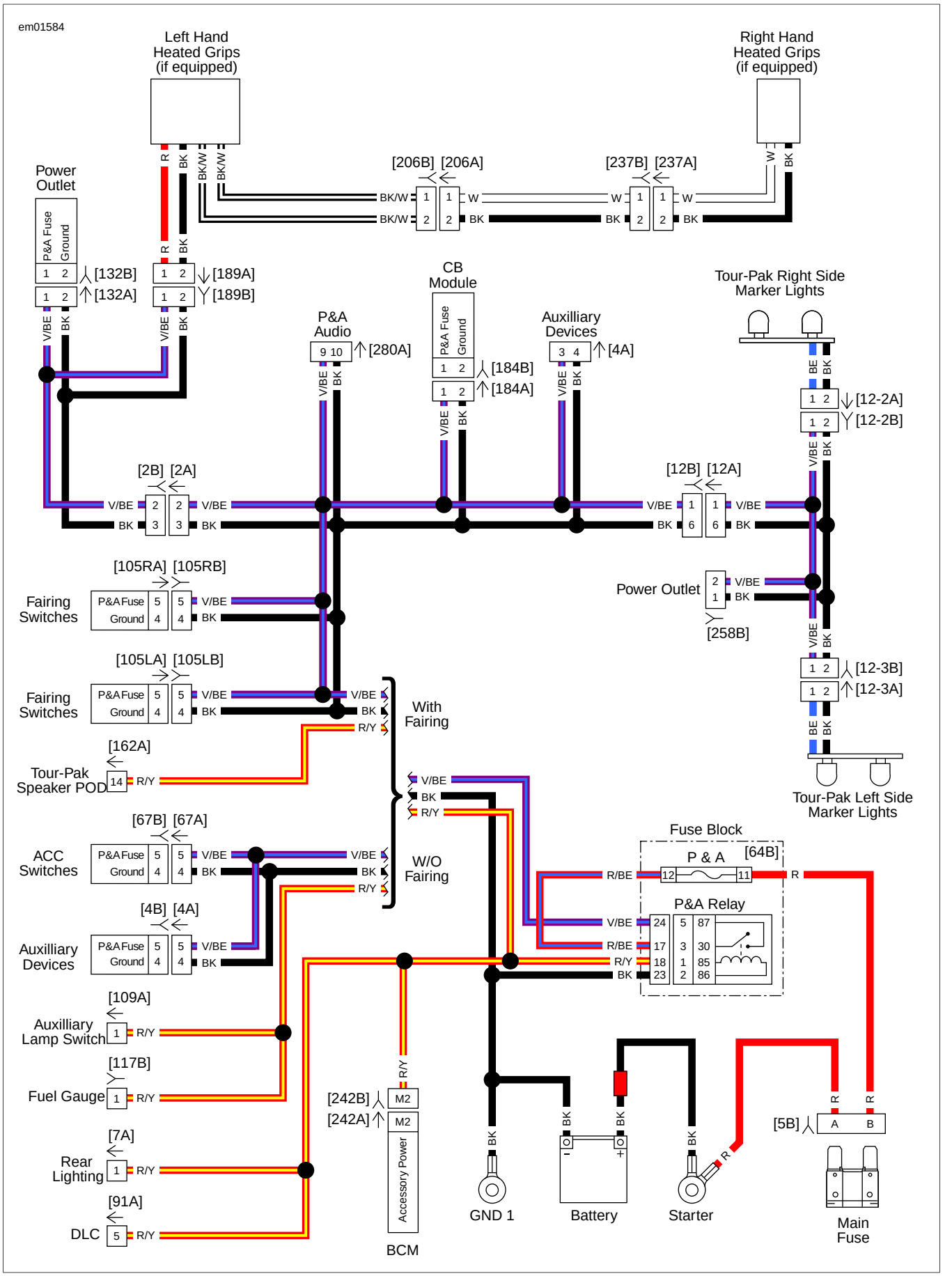


Figure 5-2. FLH P&A Power

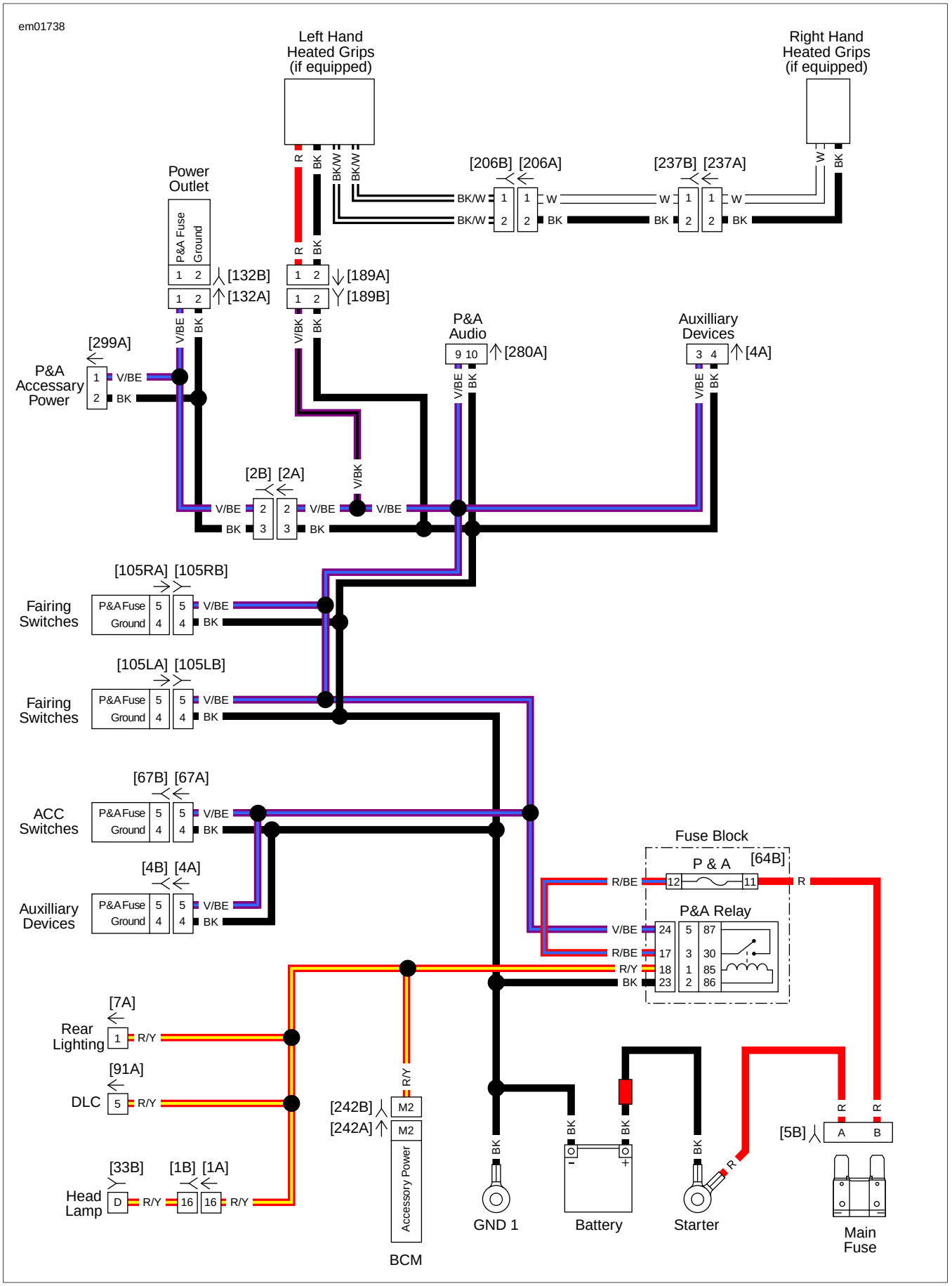


Figure 5-3. FLT P&A Power

DTC B2112

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 5-2. DTC B2112 Diagnostic Faults

POSSIBLE CAUSES
Short to battery in the accessory power circuit

1. Accessory Power Circuit Short to Voltage Test

1. Turn IGN OFF.
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between DLC [91A] terminal 5 and ground.
3. Is battery voltage present?
   a. **Yes.** Repair short to voltage on (R/Y) wire.
   b. **No.** Go to Test 2.

2. BCM Test

1. Clear DTC.
2. Turn IGN ON-OFF.
3. Check for DTCs.
4. Did DTC return?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent. Accessory devices may have caused DTC to set. Inspect and repair as needed.

DTC B2113, B2114

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-3. DTC B2113, B2114 Diagnostic Faults

POSSIBLE CAUSES
Excessive current draw in accessory power circuit
Short to ground in the accessory power circuit

1. Accessory Power Circuit Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B] leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminal M2 and ground.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

2. Accessory Circuit Test

1. Inspect for any accessories connected to the accessory circuit.
2. Disconnect any accessories on the circuit.
3. Test resistance between BOB terminal M2 and ground.
4. Is resistance less than 2 Ohms?
   a. **Yes.** Repair short to ground in (R/Y) wire.
   b. **No.** Go to Test 3.

3. BCM Test

1. Leave all aftermarket accessories disconnected.
2. Connect BCM [242A].
3. Clear DTC.
4. Turn IGN ON.
5. Did DTC return?
   a. **Yes.** Replace BCM.
   b. **No.** Accessory devices may have caused DTC to set. Inspect and repair as needed.

REAR AUXILIARY POWER OUTLET INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 5-4. Rear Auxiliary Power Outlet Inoperative Diagnostic Faults

POSSIBLE CAUSES
Power outlet malfunction
Open in the ground circuit
Open in the power circuit
Short to ground in the power circuit
Malfunction in the device attached to the power outlet

1. Power Outlet Test

1. Turn IGN OFF.
2. Disconnect power outlet [258].
3. Turn IGN ON.

4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [258B] terminals 1 and 2.
5. Is battery voltage present?
   a. **Yes.** Replace auxiliary power outlet. **(5116)**
   b. **No.** Go to Test 2.

2. Power Outlet Ground Circuit Test

1. Test voltage between [258B] terminal 1 and ground.
2. Is battery voltage present?
   a. **Yes.** Repair open in (BK) wire. **(5041)**
   b. **No.** Repair open in (V/BE) wire. **(5041)**

FRONT POWER OUTLET INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 5-5. Front Power Outlet Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open in the ground circuit
Open in the power circuit
Short to ground in the power circuit

1. Front Power Outlet Test

1. Disconnect front power outlet [132].
2. Turn IGN ON.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [132B] terminals 1 and 2.
4. Is battery voltage present?
   a. **Yes.** Replace defective part of front power outlet. **(6077)**
   b. **No.** Go to Test 2.

2. Cigar Lighter Ground Circuit Test

1. Test voltage between [132B] terminal 1 and ground.
2. Is battery voltage present?
   a. **Yes.** Repair open in (BK) wire. **(5041)**
   b. **No.** Repair open in (V/BE) wire. **(5041)**

HEATED HANDGRIPS 5.2

DESCRIPTION AND OPERATION

See Figure 5-4. The heated handgrips are controlled by the rotating switch located at the end of the left handgrip. The switch can be turned from an OFF position through 6 increasingly warm settings.

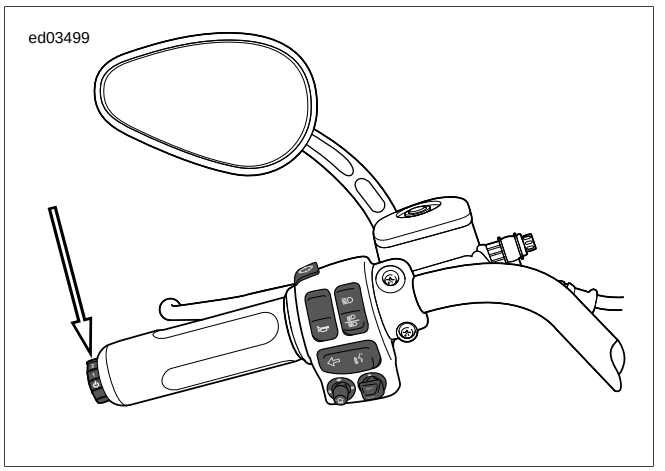


Figure 5-4. Heated Handgrip Control Switch

Diagnostic Tips

If the heating element controller, located in the left grip, detects an open or short between the left and right grip circuit, the system is disabled. To enable the heating element control circuit, cycle the ignition switch after the problem is resolved.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

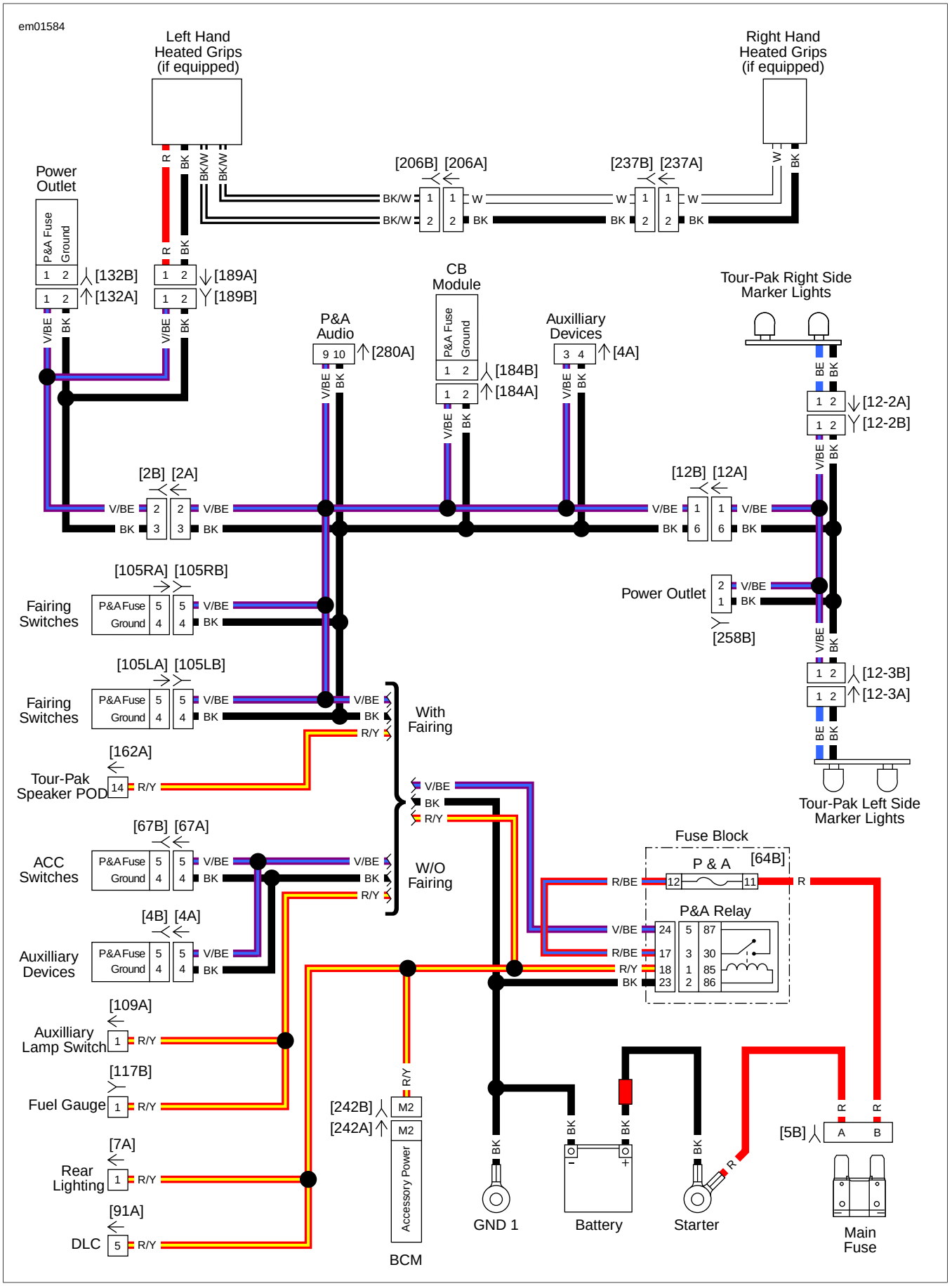


Figure 5-5. FLH P&A Power

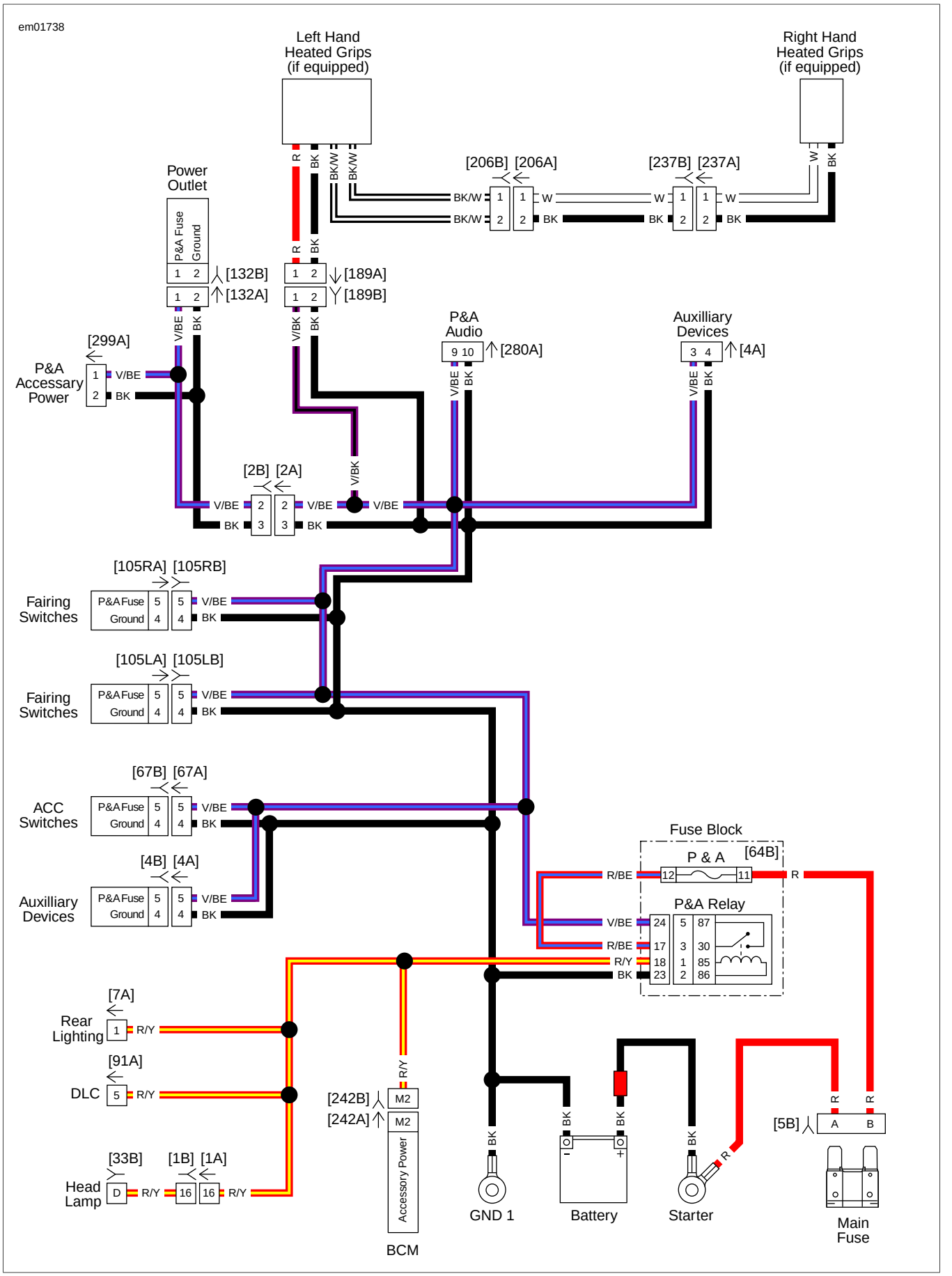


Figure 5-6. FLT P&A Power

HEATED HANDGRIPS INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 5-6. Heated Handgrips Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open in the ground circuit
Open in the power circuit
Short to ground in the power circuit
Right heated grip malfunction
Left heated grip malfunction

1. Current Draw Test

1. Turn IGN OFF.
2. Remove P&A fuse.
3. Turn IGN ON.
4. With heated handgrips off, using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test current draw across fuse block [64B] socket terminals 11 and 12.
5. Turn heated handgrips control to maximum setting while watching current draw.
6. Does current draw increase to approximately 3.5 Amps above original reading?
   a. **Yes.** System functioning normally.
   b. **No.** Go to Test 2.

2. Power Supply Test

1. Turn IGN OFF.
2. Install P&A fuse.
3. Disconnect heated grips [189].
4. Turn IGN ON.
5. Test voltage between [189B] terminals 1 and 2.
6. Is battery voltage present?
   a. **Yes.** Go to Test 8.
   b. **No.** Go to Test 3.

3. Heated Grips Power Circuit Test

1. Test voltage between [189B] terminal 1 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (V/BK) wire. **(5041)**

4. Heated Grips Ground Circuit Test

1. Test continuity between [189B] terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (BK) wire. **(5041)**

5. Heated Grips Test

1. Disconnect right heated handgrip [237].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [237B] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace right heated grip. **(6553)**

6. Heated Grips Short to Ground Test

1. Disconnect heated handgrip interconnect [206].
2. Test continuity between [206B] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short to ground between [237B] terminal 1 and [206A] terminal 1. **(5041)**

7. Heated Grip Power Circuit Short to Ground Test

1. Disconnect heated handgrip to main harness [189].
2. Test continuity between [189B] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (V/BE) wire. **(5041)**
   b. **No.** Replace left handgrip.

8. Heated Grips Resistance Test

1. Disconnect right heated handgrip [237].
2. Test resistance between [237A] terminals 1 and 2.
3. Is resistance between 7-12 Ohms?
   a. **Yes.** Replace left heated grip. **(6553)**
   b. **No.** Replace right heated grip. **(6554)**

CRUISE CONTROL 5.3

DESCRIPTION AND OPERATION

The ECM controls and monitors the operation of the vehicle cruise control. The cruise switch allows the control circuit to be enabled or disabled and, when enabled, the lamp in the switch illuminates.

The CRUISE/SET/RESUME switch automatically regulates the speed of the vehicle. It is located on the LHCM and is a three position momentary switch, spring loaded to the center position.

- **CRUISE:** Press the CRUISE switch to enable cruise control. The cruise control indicator lights orange. Pressing the CRUISE switch again turns off cruise control.
- **SET/-:** With cruise control enabled, press SET/- to set cruise to current vehicle speed. The cruise control indicator lights green. While at cruising speed, press SET/- to reduce speed.
- **RESUME/+:** While at cruising speed, press RESUME/+ to increase speed. If cruise control is disengaged (such as a braking event), press RESUME/+ to resume the previous cruising speed.

Table 5-7. Code Description

DTC	DESCRIPTION
P0577	Cruise control input error

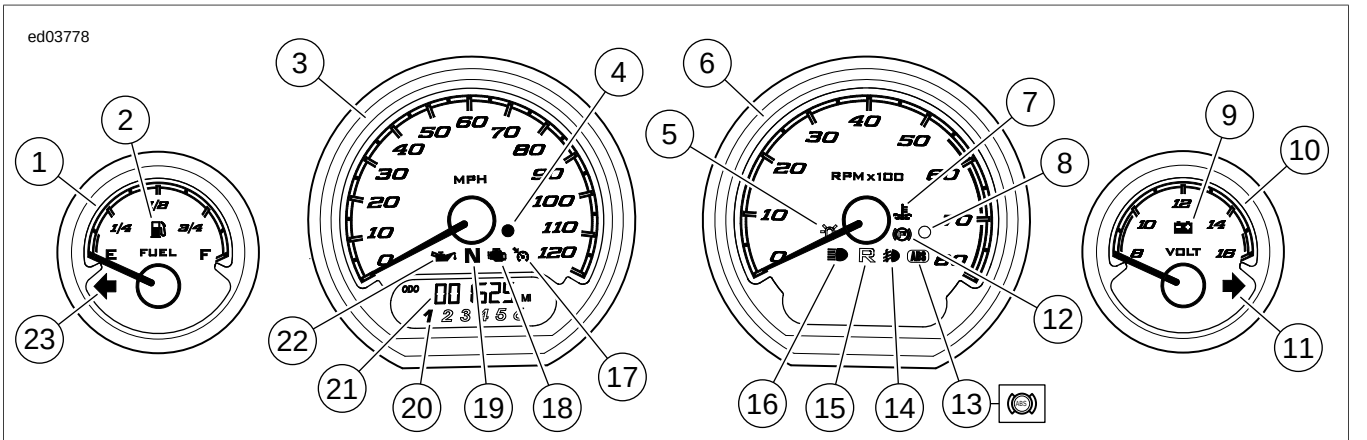
SYSTEM OPERATION

To engage and disengage the cruise control system, proceed as follows:

1. While riding in fourth, fifth or sixth gear, press straight in on the CRUISE/SET/RESUME switch to turn the cruise ON. The cruise enabled/engaged lamp in the instrument turns orange to indicate the system is activated.
2. With the motorcycle traveling at the desired cruise speed, 30-90 mph (48-145 km/h) and cruise control enabled, press SET/- to set the cruising speed.
3. The ECM monitors the VSS to establish the desired vehicle speed. The ECM then modulates the throttle control actuator to maintain vehicle speed. The cruise enabled/engaged lamp in the instrument turns from orange to green to indicate the cruising speed is locked in.
4. The ECM monitors both the engine rpm and the VSS output speed signal. The ECM signals the throttle control actuator to open or close the throttle to keep the speedometer output speed signal constant. The engine rpm is monitored to detect engine overspeed, a condition which automatically causes cruise disengagement.
5. The ECM automatically disengages cruise mode whenever the ECM receives one of the following inputs:
   a. Front or rear brake is applied.
   b. Throttle is "rolled forward" past closed, thereby actuating throttle roll off (disengage) command.
   c. Motorcycle clutch is engaged or wheel slip detected. (ECM senses too great an increase in rpm).
   d. Pressing the CRUISE switch again turns off cruise control. The cruise enabled/engaged lamp in the instrument turns off to indicate the system is not activated.
   e. Handlebar-mounted engine stop switch placed in the off position.
   f. The SET/- switch is pressed and held in that position until vehicle speed drops below 30 mph (48 km/h) or press the RESUME/+ switch until vehicle speed exceeds 93 mph (150 km/h).

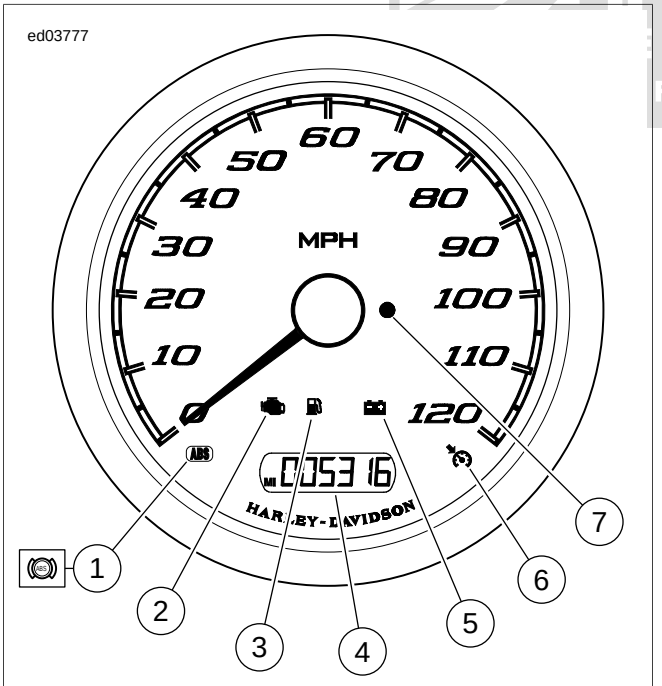
NOTE

If the vehicle speed is above 30 mph (48 km/h) when the cruise RESUME/+ switch is released, then the cruise system automatically re-engages.



1. **Fuel gauge**
2. **Low fuel lamp**
3. **Speedometer**
4. **Security lamp**
5. **Not used for these models**
6. **Tachometer**
7. **Engine coolant temperature lamp**
8. **Light sensor (not an indicator)**
9. **Battery discharge lamp**
10. **Voltmeter**
11. **Right turn signal indicator lamp**
12. **Not used for these models**
13. **ABS icon lamp (km/h ABS icon lamp also shown)**
14. **Auxiliary/fog lamp indicator lamp**
15. **Not used for these models**
16. **Headlamp high beam lamp**
17. **Cruise control lamp**
18. **Check engine lamp**
19. **Neutral lamp**
20. **Gear indicator**
21. **Odometer window**
22. **Oil pressure lamp**
23. **Left turn signal indicator lamp**

Figure 5-7. Indicator Lamps: Typical (Fairing Models)



1. **ABS icon lamp (km/h ABS icon lamp also shown)**
2. **Check engine lamp**
3. **Low fuel lamp**
4. **Odometer window**
5. **Battery discharge lamp**
6. **Cruise control lamp**
7. **Security lamp**

Figure 5-8. Indicator Lamps: Non-Fairing Models

TROUBLESHOOTING

Cruise control switch interactive diagnostics are provided to allow testing of the cruise control inputs without the use of a service tool. Note that the diagnostic mode is only available if cruise control has been selected. The cruise engaged lamp is used to verify that each switch is activating properly.

Diagnostic Mode Entry

To enter diagnostic mode:

1. Turn IGN ON.
2. Press cruise enable to turn on the orange cruise enable lamp.
3. Turn IGN OFF.
4. Hold the cruise SET switch ON while switching IGN ON.

Switch Verification

In the diagnostic test mode, the green cruise engaged lamp is illuminated whenever any of these inputs are actuated:

- SET switch.
- RES switch.
- Front brake.
- Rear brake.
- Twist grip in "Cruise Rolloff" position.
- Clutch lever is pulled in.

NOTE

The cruise enable switch is automatically tested with the cruise power indicator light. No special test mode is needed.

Diagnostic Mode Exit

The diagnostic mode is exited for any of these conditions:

- Turn IGN OFF.
- The cruise enable switch is turned off.
- The engine is turning.

Diagnostic Tips

- An intermittent may be caused by poor connection, rubbed through wire insulation or an inoperative wire inside the insulation.
- **Poor connection:** Inspect component and harness connectors for backed out terminals, improper mating, inoperative locks, improperly formed or damaged terminals, poor terminal-to-wire connection and damaged harnesses.

CRUISE CONTROL INOPERATIVE CONDITIONS

The cruise control will become inoperative under the following conditions:

- Engine stop switch is off.
- Loss of ignition voltage.
- Throttle position faults P0120 and P0220.
- VSS faults P0501 and P0502.
- Cruise control switch or brake switch failure P0577.
- TPS correlation error P2135.
- Flash memory error P0605.
- Brake switch fault.
- ETC limited performance mode P1510.
- Cruise control set speed is too low.
- Cruise control set speed is too high.
- Vehicle cannot increase to cruise control set speed (uphill).
- Vehicle cannot decrease to cruise control set speed (downhill).
- Brake is applied.
- Twist grip roll-off.
- Engine has not been running long enough.
- Clutch lever is pulled in.
- Vehicle acceleration rate is too high.
- Vehicle deceleration rate is too high.
- Vehicle speed is too high.
- Vehicle speed is too low.
- Engine rpm is too high.
- Engine rpm is too low.
- Engine rpm acceleration is too high.
- Transmission is in too low of a gear or in neutral.

CRUISE CONTROL

The cruise control system is monitored and controlled through the ECM. The CRUISE/SET/RESUME switch send signals from the LHCM to the ECM. If the ECM sees the same signal with no interruptions for more than two minutes, DTC P0577 will set.

Table 5-8. Code Description

DTC	DESCRIPTION
P0577	Cruise control input error

Conditions for Setting

If the switch is held or stuck for over two minutes with the engine stop switch ON, the stuck switch code will set for that switch.

Diagnostic Tips

Pressing the switch for an extended period of time can set the stuck switch DTCs. These codes should be cleared and operate the vehicle to see if they return. Stuck switch codes will take over two minutes to set.

DTC P0577

Table 5-9. DTC P0577 Diagnostic Faults

POSSIBLE CAUSES
LHCM malfunction

1. Switch Test

1. Clear DTC.
2. Turn engine stop switch ON, wait three minutes.
3. Operate vehicle to meet conditions for setting DTC.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace LHCM.
   b. **No.** Concern is intermittent. Switch may have been pressed for an extended period of time.

HORN DIAGNOSTICS 5.4

DESCRIPTION AND OPERATION

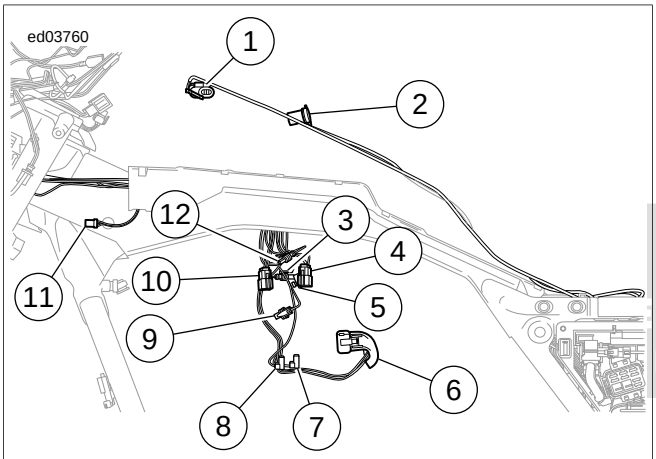
The horn is powered by the BCM from terminal E4 and grounded through GND 2. When the horn switch is pressed, a CAN signal is sent to the BCM. The BCM then supplies power to the horn over the (R/V) wire.

The LHCM sends a signal to the BCM over the CAN bus when the horn switch is pressed. The horn switch is diagnosed with the other switches in the hand controls. See 5.11 SWITCH DIAGNOSTICS.

NOTE

If the horn button is pressed for more than 10 seconds, the BCM deactivates the horn to protect it from damage. Checking horn output from the BCM has to be done within 10 seconds of pressing the horn button.

See Figure 5-9. The horn is located on the left side of the vehicle between the cylinders.



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 5-9. Engine

Table 5-10. Code Description

DTC	DESCRIPTION
B2127	E4 output shorted high
B2128	E4 output shorted low
B2129	E4 output overloaded

Conditions for Setting

The horn switch may have to be pressed attempting to activate the horn in order to set these DTCs.

- DTC B2127 will set if the horn button is pressed for more than 10 seconds.
- DTC B2129 will set if the horn circuit draws more than 5 Amps.

Diagnostic Tips

There will not be a code set if the horn switch is always open. If the horn will not function when the switch is pressed but the other switches on the LHCM work normally, see 5.11 SWITCH DIAGNOSTICS.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

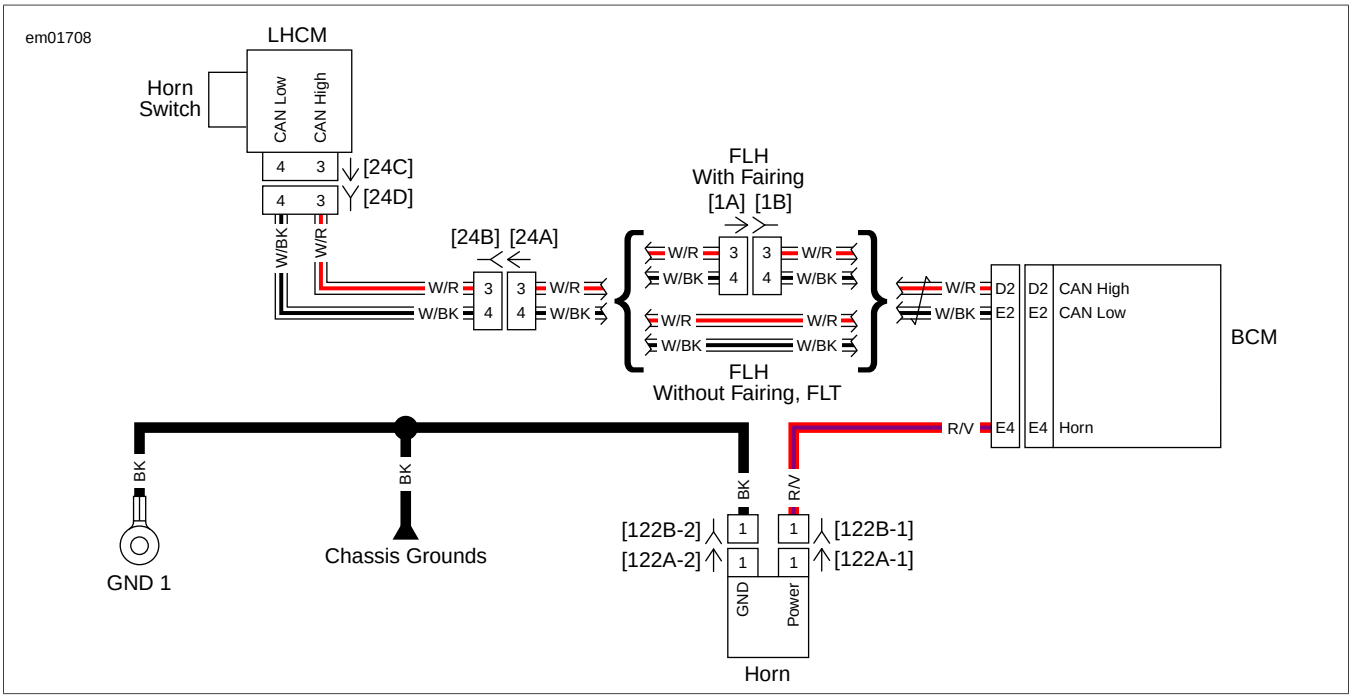


Figure 5-10. Horn

DTC B2126

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-11. DTC B2126 Diagnostic Faults

POSSIBLE CAUSES
Open in horn ground circuit
Open in horn power circuit
Horn malfunction

1. Horn Test

1. Turn IGN OFF.
2. Disconnect horn [122-1] and [122-2].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [122B-1] and [122B-2] while pressing horn switch.
5. Is battery voltage present?
   a. **Yes.** Replace horn.
   b. **No.** Go to Test 2.

2. Ground Circuit Open Test

1. While pressing horn switch, test voltage between [122B-1] terminal 1 and ground.

NOTE

If the horn button is pressed for more than 10 seconds, the BCM deactivates the horn to protect it from damage. Checking horn output from the BCM has to be done within 10 seconds of pressing the horn button.

2. Is battery voltage present?
   a. **Yes.** Repair open in (BK) ground circuit.
   b. **No.** Go to Test 3.

3. Power Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. While pressing horn switch, test voltage between BOB terminal E4 and ground.
5. Is battery voltage present?
   a. **Yes.** Repair open in (R/V) wire.
   b. **No.** Replace BCM.

DTC B2127

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 5-12. DTC B2127 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in horn power circuit

1. Horn Power Circuit Short to Voltage Test

1. Turn IGN OFF.
2. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal E4 (R/V) wire from BCM harness connector [242B].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Turn IGN ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between extracted terminal E4 and ground.
7. Is voltage present?
   a. **Yes.** Repair short to voltage in horn power circuit (R/V) wire.
   b. **No.** Go to Test 2.

2. DTC Test

1. Clear DTCs.
2. Turn IGN ON.
3. Check DTCs.
4. Did DTC B2127 set?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

DTC B2128, B2129

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 5-13. DTC B2128, B2129 Diagnostic Faults

POSSIBLE CAUSES
Accessory horn overloading circuit
Short to ground in horn power circuit
Horn malfunction

1. Horn Circuit Test

1. Turn IGN OFF.
2. Disconnect horn [122].
3. Disconnect BCM [242].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [122B-1] terminal 1 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground in (R/V) wire.
   b. **No.** Go to Test 2.

2. DTC Test

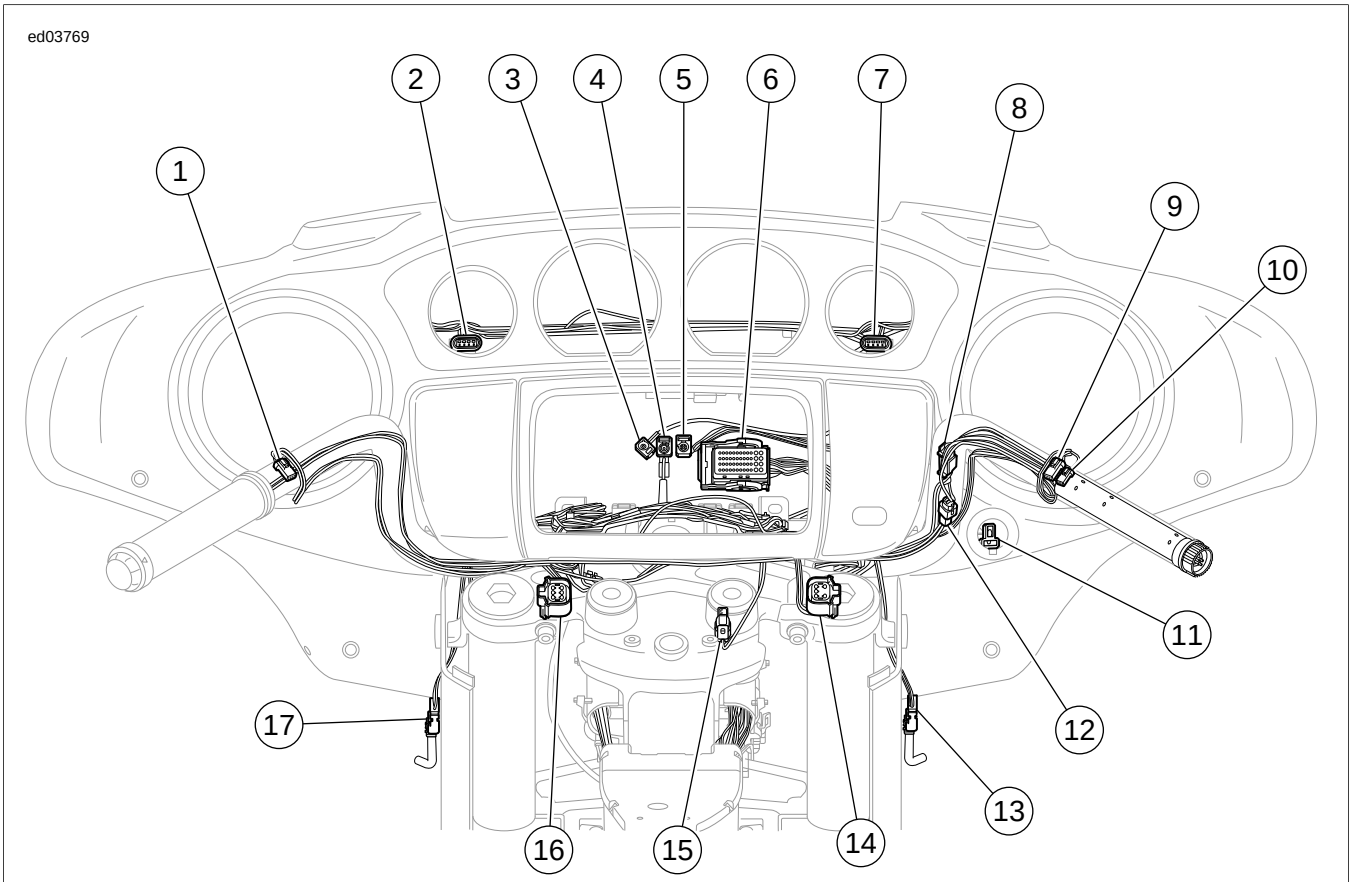
1. Connect [242].
2. Clear DTC.
3. Turn IGN ON.
4. Press horn switch.
5. Check DTCs.
6. Did the DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Replace horn.

TURN SIGNALS 5.5

DESCRIPTION AND OPERATION

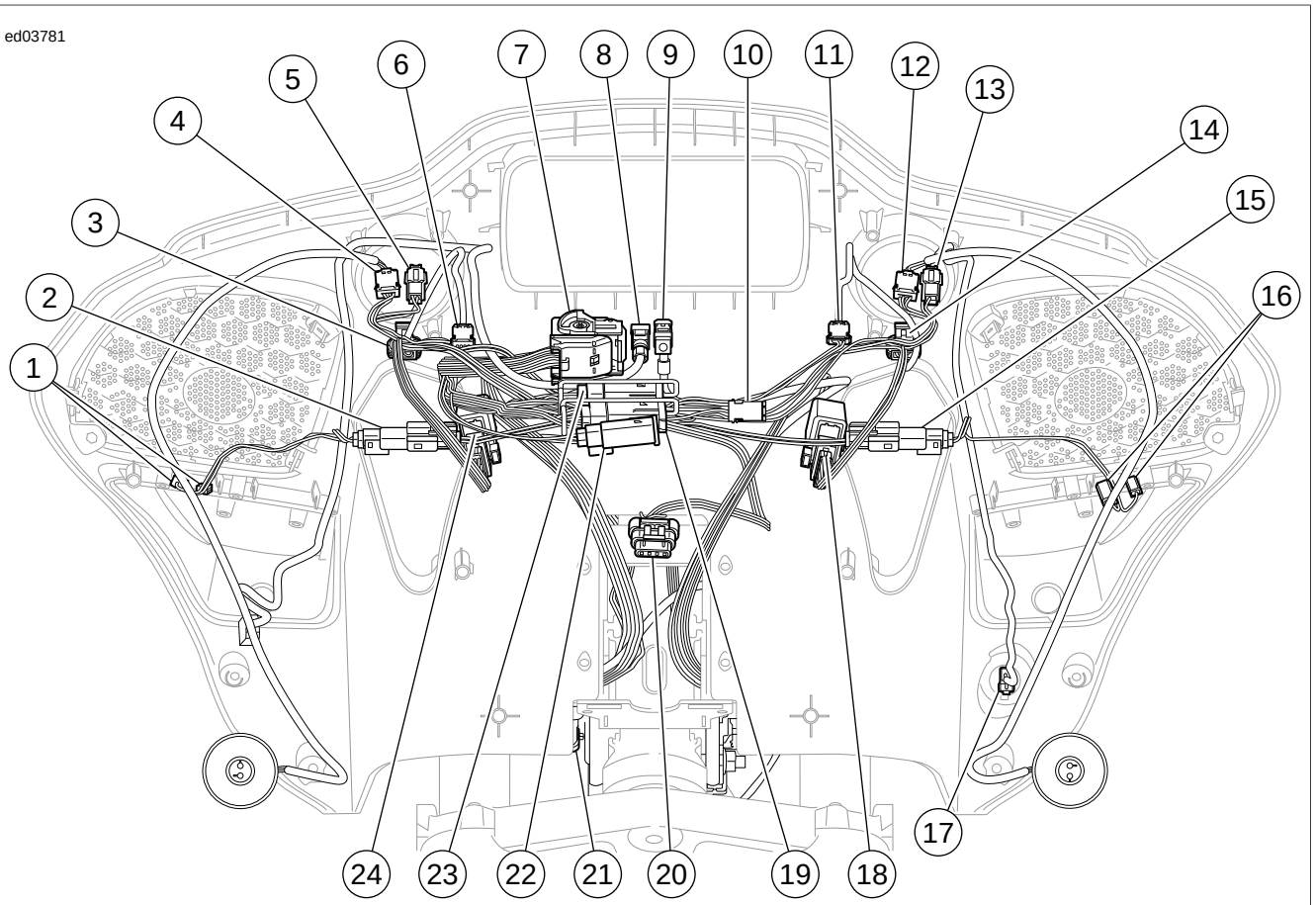
The BCM controls the turn signal functions, including the hazard lamps and turn signal cancellation feature. The BCM has separate controls for each of the turn signals. This allows the BCM to set DTCs for each turn signal individually.

See Figure 5-11 and Figure 5-13. The BCM controls the front turn signals, as well as the rear turn signals. The BCM sends power to the turn signals directly over the specific wire for each signal.



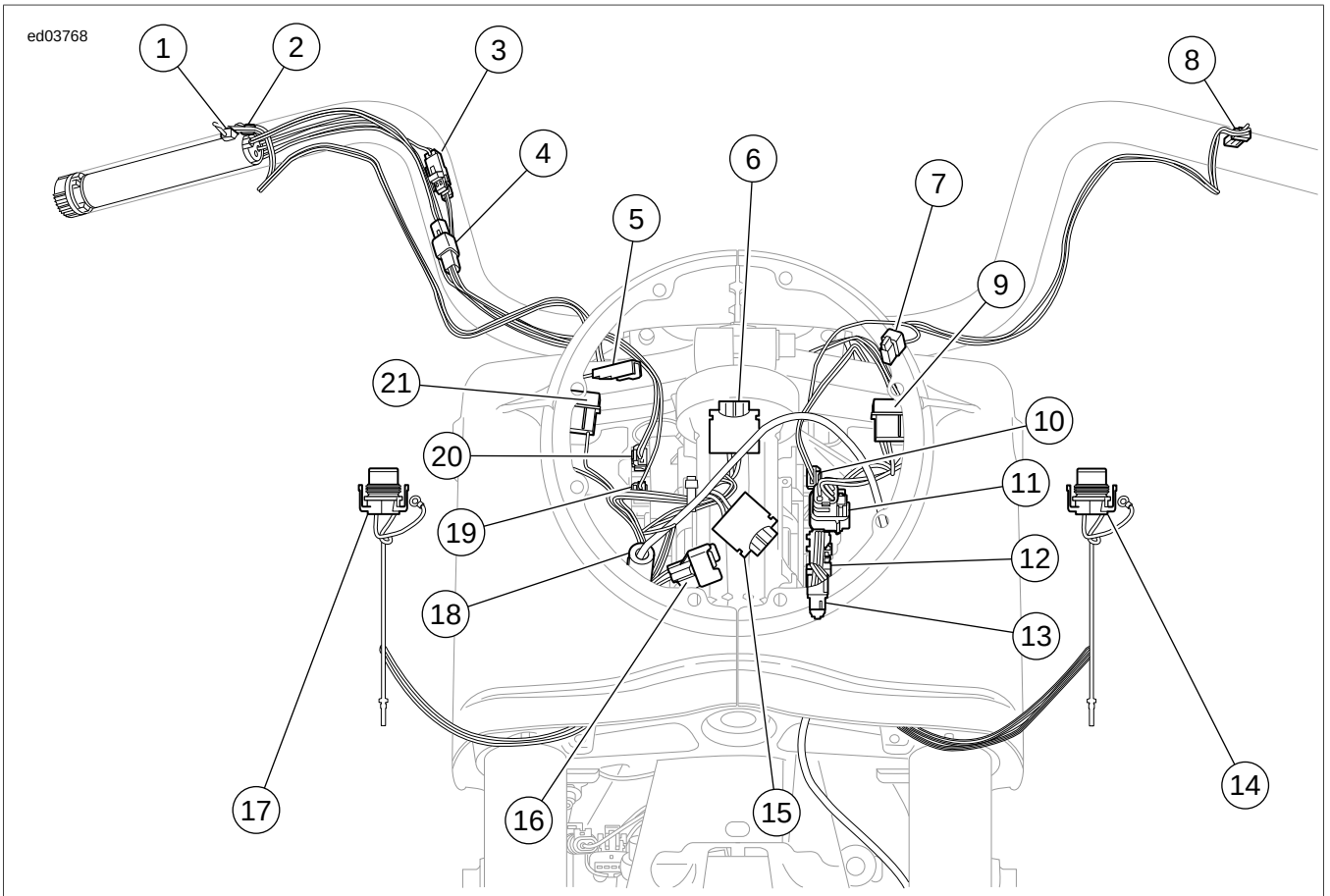
1. LHCM inside LHCM housing [24]
2. Fuel gauge [117]
3. GPS antenna [193]
4. Antenna [51]
5. USB
6. Radio [27]
7. Voltmeter [111]
8. Heated handgrips [237]
9. RHCM inside RHCM housing [22-1]
10. RHCM inside RHCM housing [22-2]
11. Power outlet [132]
12. TGS [224]
13. Right front turn/auxiliary lamps [31R]
14. Right P&A dash switch pack [105R]
15. Ignition switch [33]
16. Left OE dash switch pack [105L]
17. Left front turn/auxiliary lamps [31L]

Figure 5-11. Handlebars: FLH Fairing Models



1. Right front speaker [34-2]
2. Right front speaker [34-1]
3. Voltmeter [111]
4. Right front turn [31R]
5. P&A power [299]
6. Voltmeter jumper [111-2]
7. Radio [27]
8. USB
9. Antenna [51]
10. P&A CAN jumper [243]
11. Fuel gauge jumper [117-2]
12. Left front turn [31L]
13. Power outlet [132]
14. Fuel gauge [117]
15. Left front speaker [35-1]
16. Left front speaker [35-2]
17. Power outlet [132C]
18. Main to fairing harness [2]
19. CB module [184]
20. Headlamp [38]
21. Front WSS [167]
22. Rear speakers [162]
23. P&A audio [280]
24. Main to fairing harness [1]

Figure 5-12. Under FLT Fairing



1. **RHCM inside RHCM housing [22-1]**
2. **RHCM inside RHCM housing [22-2]**
3. **Heated handgrips [237]**
4. **TGS [224]**
5. **Heated handgrip interconnect [206]**
6. **Headlamp low beam [38LO]**
7. **GND 3**
8. **LHCM inside LHCM housing [24]**
9. **Auxiliary lamp switch [109]**
10. **LHCM [24]**
11. **TGS jumper harness [204]**
12. **Right front turn signal/auxiliary lamps [31R]**
13. **Left front turn signal/auxiliary lamp [31L]**
14. **Left auxiliary lamp [73L]**
15. **Headlamp high beam [38HI]**
16. **Position lamp [29]**
17. **Right auxiliary lamp [73R]**
18. **Front WSS [167]**
19. **RHCM [22-1]**
20. **RHCM [22-2]**
21. **Accessory switch [67]**

Figure 5-13. Headlamp Nacelle: Without Fairing

The LHCM and RHCM send messages to the BCM over the CAN bus when either of the turn signal switches or hazard warning switch are pressed. The BCM will also set codes if it determines a switch is stuck in the pressed position for longer than two minutes. The switch DTCs are diagnosed with the other hand control module switches. See 5.11 SWITCH DIAGNOSTICS.

Manual Cancellation

To stop the turn signals from flashing, briefly press the turn signal switch a second time.

If signaling to turn in one direction, pressing the switch for the opposite turn signal will cause the first signal to cancel and the opposite side to begin.

Automatic Cancellation

Press the left or right turn switch to activate automatic turn signal cancellation. There is no need to hold the turn switch in when approaching the turn. The BCM will not cancel the signal before the turn is actually completed.

- When the turn signal switch is released, the system starts a 20 count. As long as the vehicle is traveling above 8 mph (13 km/h), the directional will always cancel after 20 flashes if the system does not recognize any other input.
- If the vehicle speed drops to 8 mph (13 km/h) or less, including stopped, the directionals will continue to flash. Counting will resume when vehicle speed reaches 8 mph (13 km/h) and will automatically cancel when the count total equals 20 as stated above.
- The turn signals may cancel within two seconds upon turn completion depending on vehicle lean angle during turn. An accelerometer inside the BCM cancels the signal after the vehicle has been returned to an upright position.

NOTE

The bank angle cancellation function has an automatic calibration feature. Ride the vehicle for 0.25 mile (0.4 km) at steady speeds (upright) to calibrate the system. This calibration process optimizes the performance of the bank angle function. This automatic calibration is performed automatically every time the vehicle is started and ridden.

Four-Way Flashing

Use the following method to activate the four-way flashers:

1. With the ignition switch ON or in ACC, press the hazard warning switch.

NOTE

To activate or deactivate hazards on vehicle equipped with security system, the fob must be within range of the vehicle.

2. Turn the ignition switch OFF (the security system will arm if equipped). The four-way flashers will continue for two hours.
3. To cancel four-way flashing, disarm the security system if equipped, turn the ignition switch ON or to ACC and press the hazard warning switch.

NOTE

To activate or deactivate hazards on vehicle equipped with security system, the fob must be within range of the vehicle.

This system allows a stranded vehicle to be left in the four-way flashing mode and secured until help is found.

If the security system is disarmed while the four-way flashers are active, the lights will flash as follows:

1. BCM stops four-way flashing mode. Vehicle sits for one second with turn signals off.
2. BCM performs disarming confirmation (one flash).
3. Vehicle sits for one second with turn signals off.
4. Vehicle restarts four-way flashing mode.

Tip Over Detection Operation

The BCM uses an internal accelerometer to monitor vehicle position. Under normal driving conditions, the BCM uses the accelerometer along with speed input provided from the ECM to know when to automatically cancel the turn signals after a turn. The BCM will disable turn signal lamps, accessory power and starter activation and will shut down the ignition and the fuel pump if the vehicle is tipped over. The odometer will display "TIP" when a tip-over condition is present.

Tip Over Reset

1. Return the vehicle to an upright position.
2. Cycle the IGN OFF-ON before restarting the vehicle.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

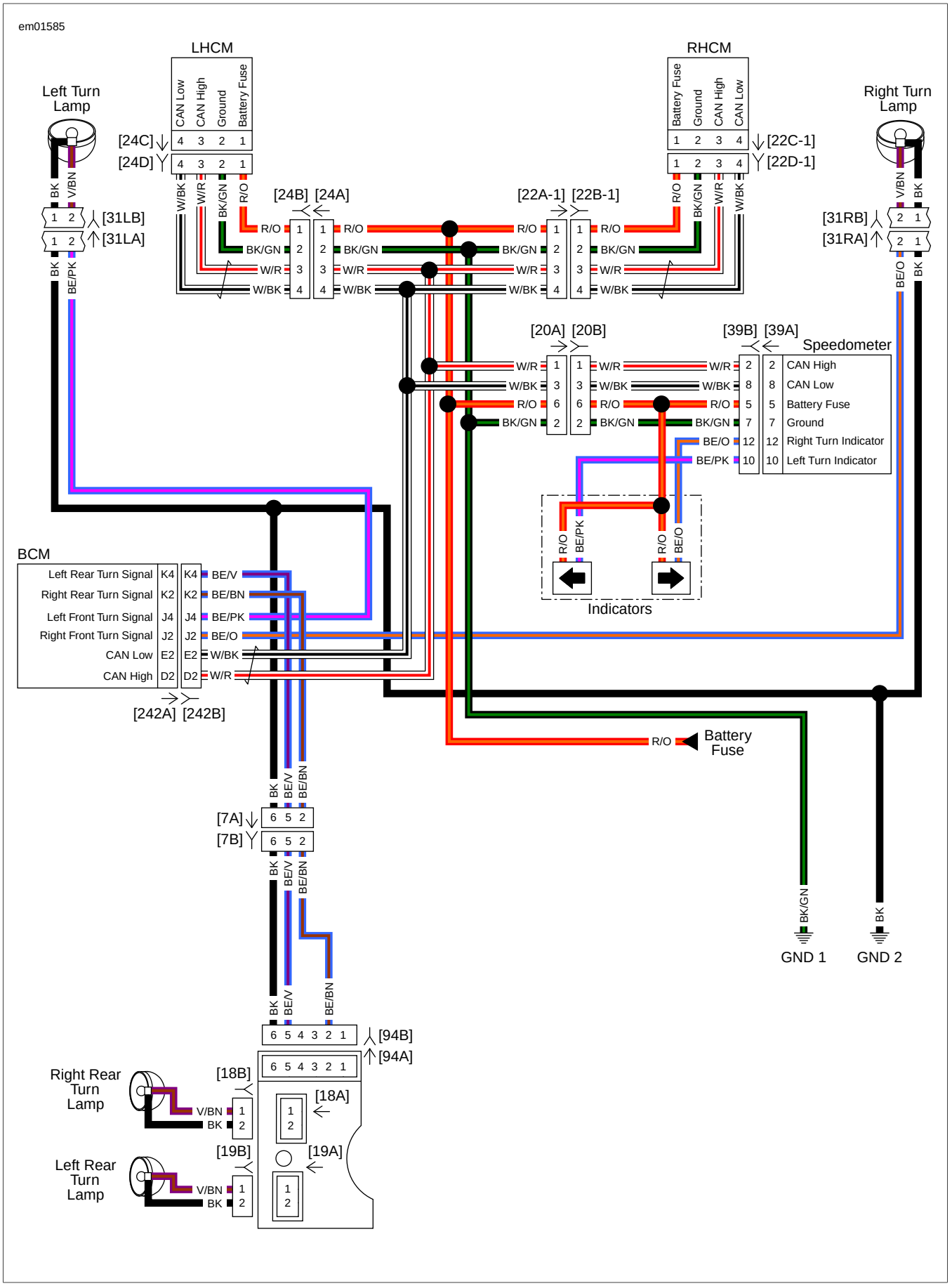


Figure 5-14. Turn Signals: Without Fairing

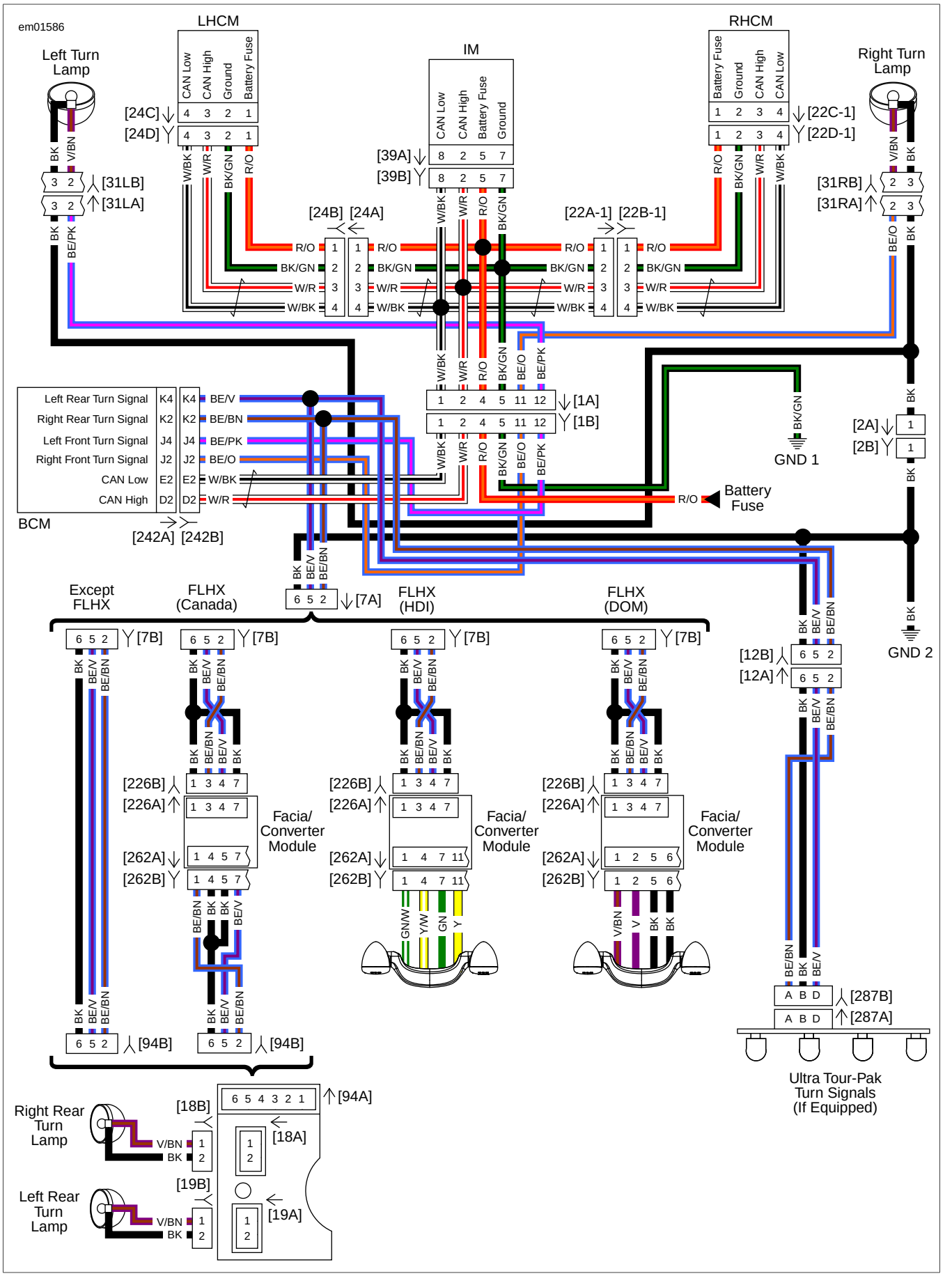


Figure 5-15. Turn Signals: FLH With Fairing

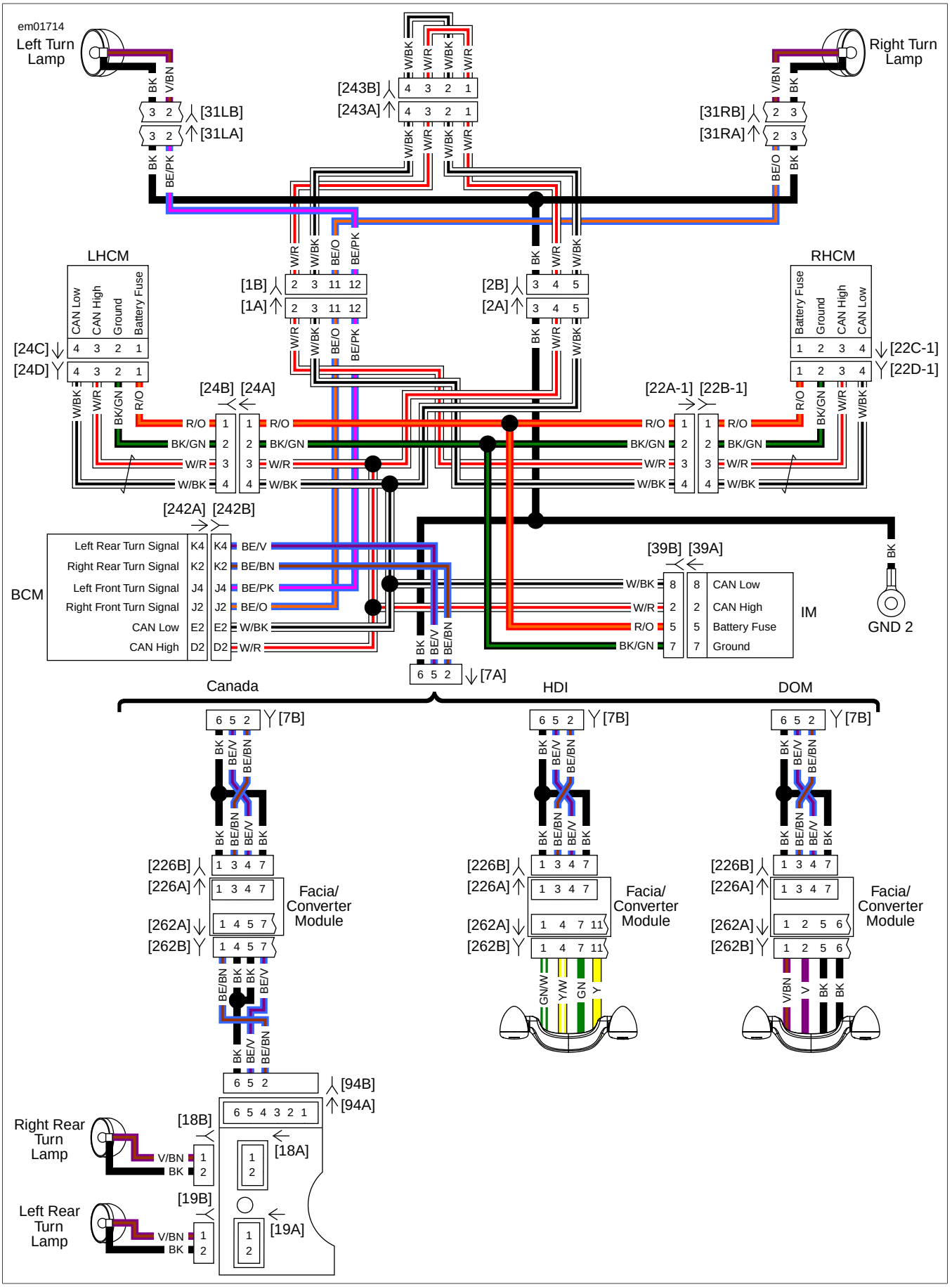


Figure 5-16. Turn Signals: FLT With Fairing

WILL NOT CANCEL UPON TURN COMPLETION, NO DTCS

Table 5-14. Will Not Cancel Upon Turn Completion, No DTCs Diagnostic Faults

POSSIBLE CAUSES
Conditions to self cancel not met
Improper configuration

1. BCM Mounting Test

1. Verify BCM is mounted correctly.
2. Is BCM mounted correctly?
   a. **Yes.** Go to Test 2.
   b. **No.** Mount correctly.

2. Correct Configuration Test

1. Check if BCM is configured correctly. See 5.16 SERVICE AND EMERGENCY FUNCTIONS AND CONFIGURATIONS.
2. Is BCM configured correctly?
   a. **Yes.** Go to Test 3.
   b. **No.** Select proper vehicle configuration.

3. Turn Signals Cancel Test

1. Operate vehicle at a speed greater than 8 mph (13 km/h) in a straight line.
2. Activate either turn signal.
3. Turn signals should cancel after 20 flashes.
4. Do turn signals cancel?
   a. **Yes.** System operating properly.
   b. **No.** Go to Test 4.

4. Speedometer Test

1. Does speedometer register vehicle speed?
   a. **Yes.** Replace BCM. **(6773)**
   b. **No.** See 1.2 INITIAL DIAGNOSTICS.

FRONT TURN SIGNAL DIAGNOSTICS 5.6

DESCRIPTION AND OPERATION

See Figure 5-17, Figure 5-18 and Figure 5-19. The turn signals are controlled by the BCM. The BCM supplies power to the turn signals and controls the flash rate of the turn signals through the turn signals individual power circuit.

When the turn signal or hazard warning lamp switch is pressed, the hand control module sends a message over the CAN bus to the BCM. The BCM then controls the power to the turn signal. The turn signals have a constant ground.

Before troubleshooting errors after relocating front turn signals, perform following steps:

1. Turn IGN ON.
2. Activate hazard lights for 10 flashes.
3. Deactivate hazards.
4. Activate hazard lights for 10 flashes.
5. Deactivate hazards.
6. Clear DTCs.
7. Turn IGN OFF, ON, activate hazard lights.
8. Verify DTCs.

NOTE

This is necessary for the BCM to validate the proper front lighting configuration and which module is actually controlling them.

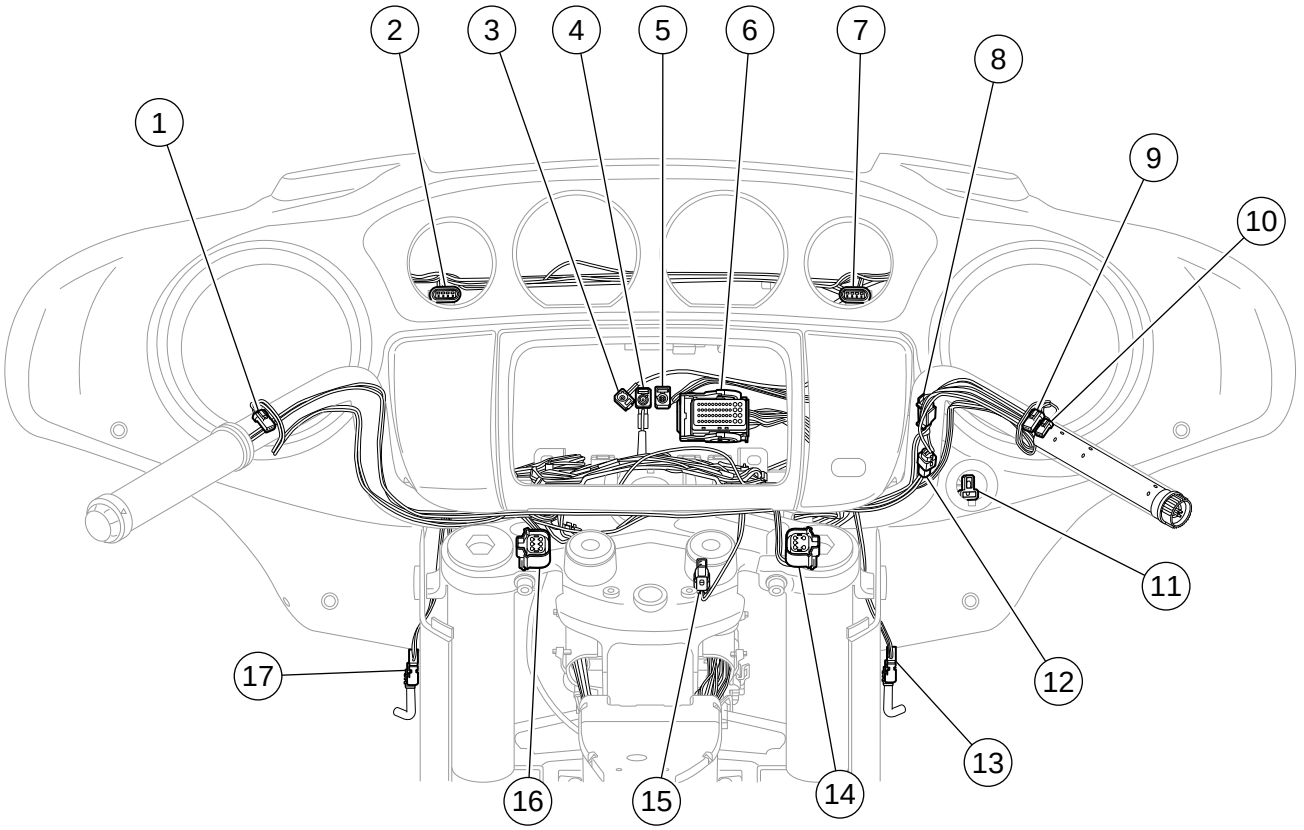
Table 5-15. Code Description

DTC	DESCRIPTION
B2141	Left front turn signal output open
B2143	Left front turn signal output shorted low
B2144	Left front turn signal output overloaded
B2146	Right front turn signal output open
B2148	Right front turn signal output shorted low
B2149	Right front turn signal output overloaded

Conditions for Setting

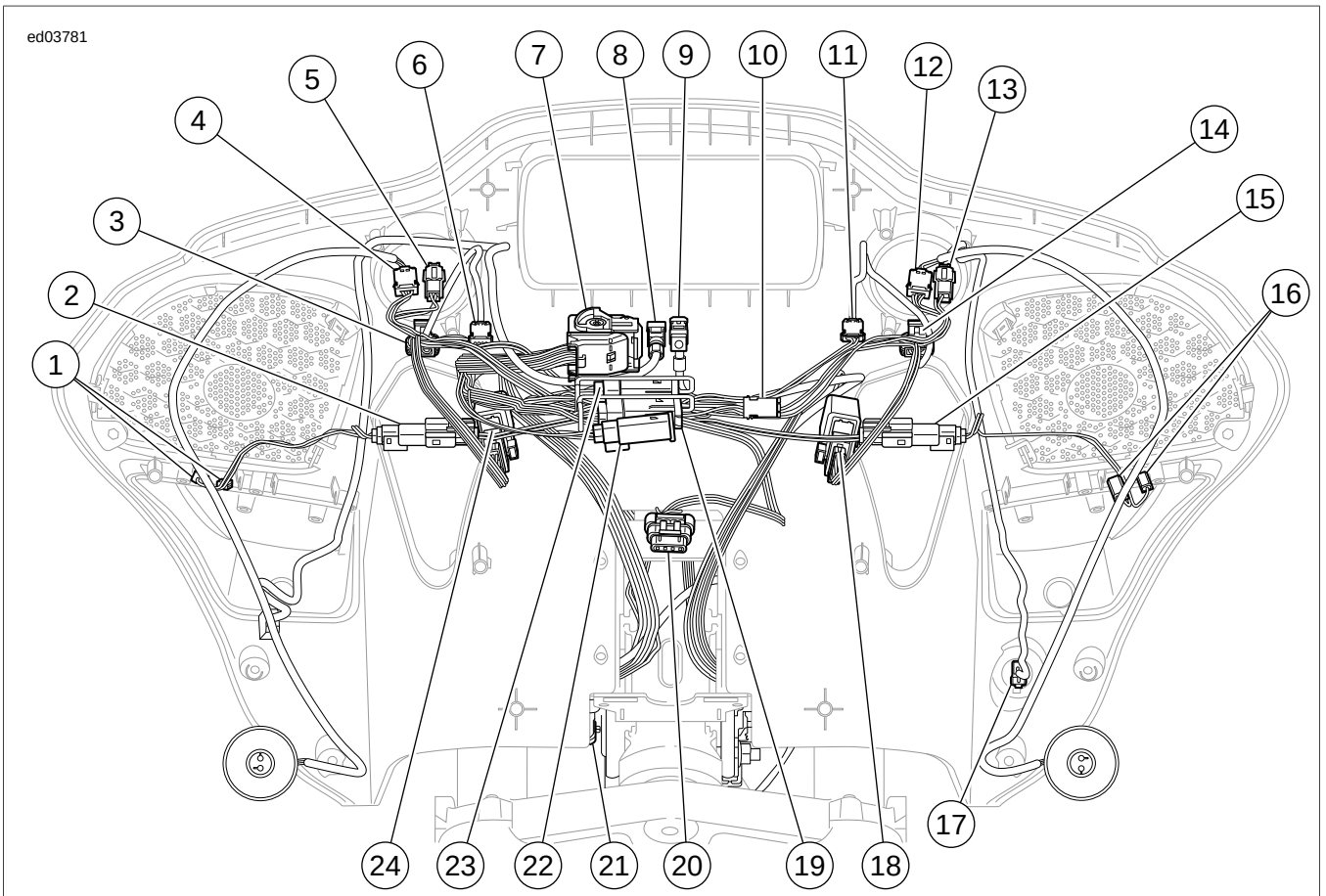
After clearing DTCs, test inoperative turn signal. Verify DTC does not return.

- DTC B2141 or B2146 sets if the corresponding front turn signal circuit draws less than 120 milliamps.
- DTC B2144 or B2149 sets if the corresponding front turn signal circuit draws more than 3 Amps.



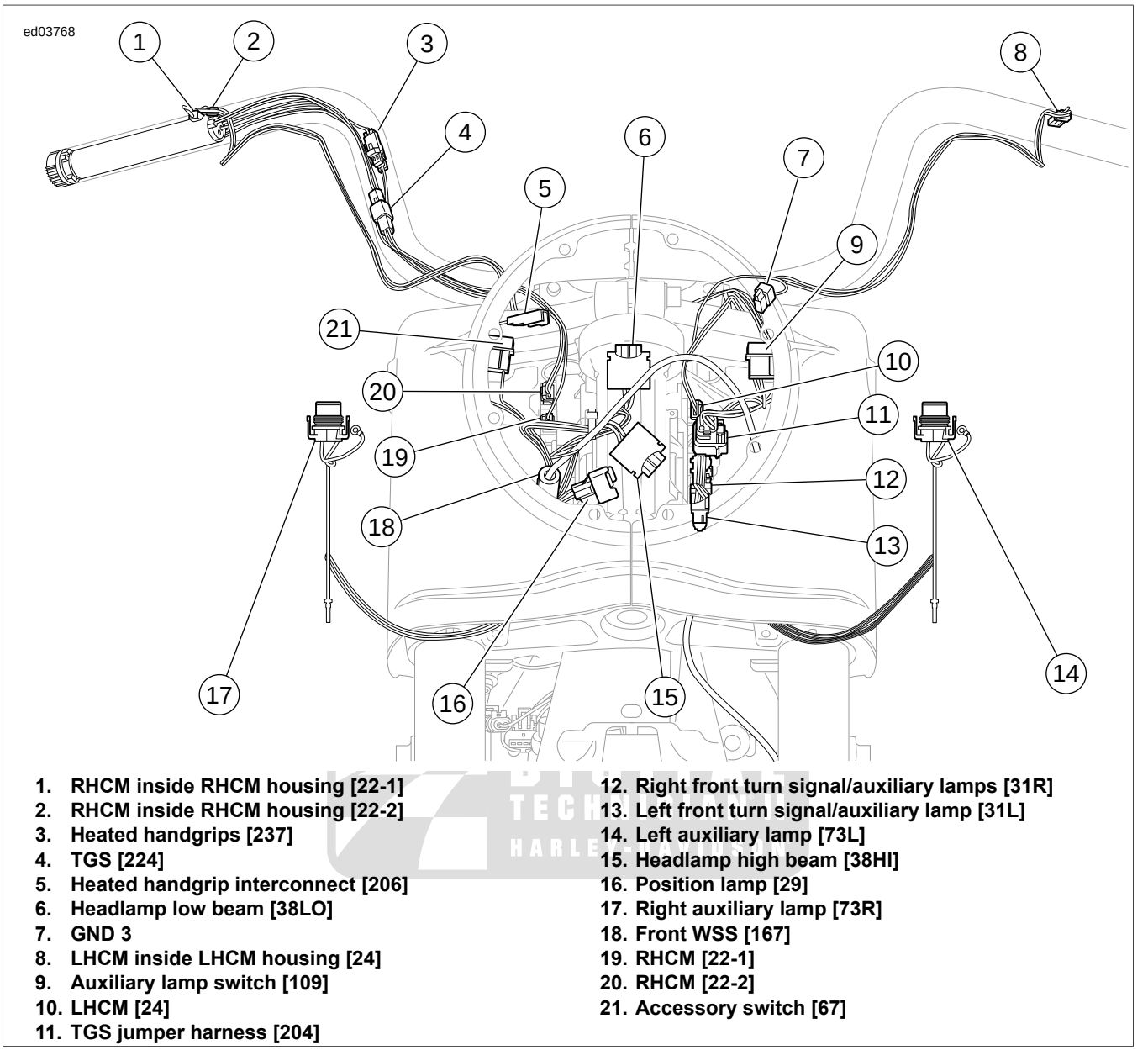
1. LHCM inside LHCM housing [24]
2. Fuel gauge [117]
3. GPS antenna [193]
4. Antenna [51]
5. USB
6. Radio [27]
7. Voltmeter [111]
8. Heated handgrips [237]
9. RHCM inside RHCM housing [22-1]
10. RHCM inside RHCM housing [22-2]
11. Power outlet [132]
12. TGS [224]
13. Right front turn/auxiliary lamps [31R]
14. Right P&A dash switch pack [105R]
15. Ignition switch [33]
16. Left OE dash switch pack [105L]
17. Left front turn/auxiliary lamps [31L]

Figure 5-17. Handlebars: FLH Fairing Models



1. Right front speaker [34-2]
2. Right front speaker [34-1]
3. Voltmeter [111]
4. Right front turn [31R]
5. P&A power [299]
6. Voltmeter jumper [111-2]
7. Radio [27]
8. USB
9. Antenna [51]
10. P&A CAN jumper [243]
11. Fuel gauge jumper [117-2]
12. Left front turn [31L]
13. Power outlet [132]
14. Fuel gauge [117]
15. Left front speaker [35-1]
16. Left front speaker [35-2]
17. Power outlet [132C]
18. Main to fairing harness [2]
19. CB module [184]
20. Headlamp [38]
21. Front WSS [167]
22. Rear speakers [162]
23. P&A audio [280]
24. Main to fairing harness [1]

Figure 5-18. Under FLT Fairing



1. RHCM inside RHCM housing [22-1]
2. RHCM inside RHCM housing [22-2]
3. Heated handgrips [237]
4. TGS [224]
5. Heated handgrip interconnect [206]
6. Headlamp low beam [38LO]
7. GND 3
8. LHCM inside LHCM housing [24]
9. Auxiliary lamp switch [109]
10. LHCM [24]
11. TGS jumper harness [204]
12. Right front turn signal/auxiliary lamps [31R]
13. Left front turn signal/auxiliary lamp [31L]
14. Left auxiliary lamp [73L]
15. Headlamp high beam [38HI]
16. Position lamp [29]
17. Right auxiliary lamp [73R]
18. Front WSS [167]
19. RHCM [22-1]
20. RHCM [22-2]
21. Accessory switch [67]

Figure 5-19. Headlamp Nacelle: Without Fairing

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

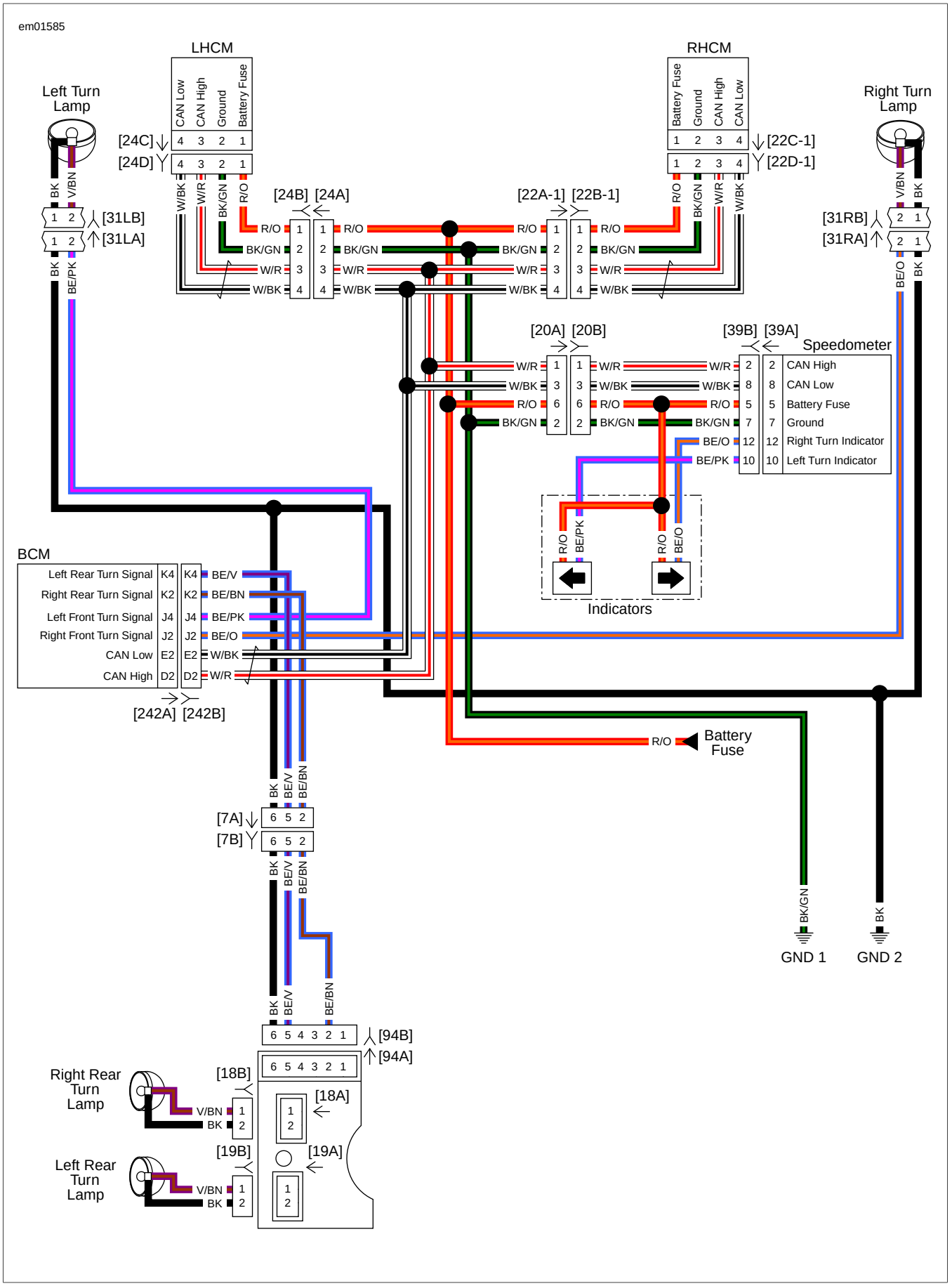


Figure 5-20. Turn Signals: Without Fairing

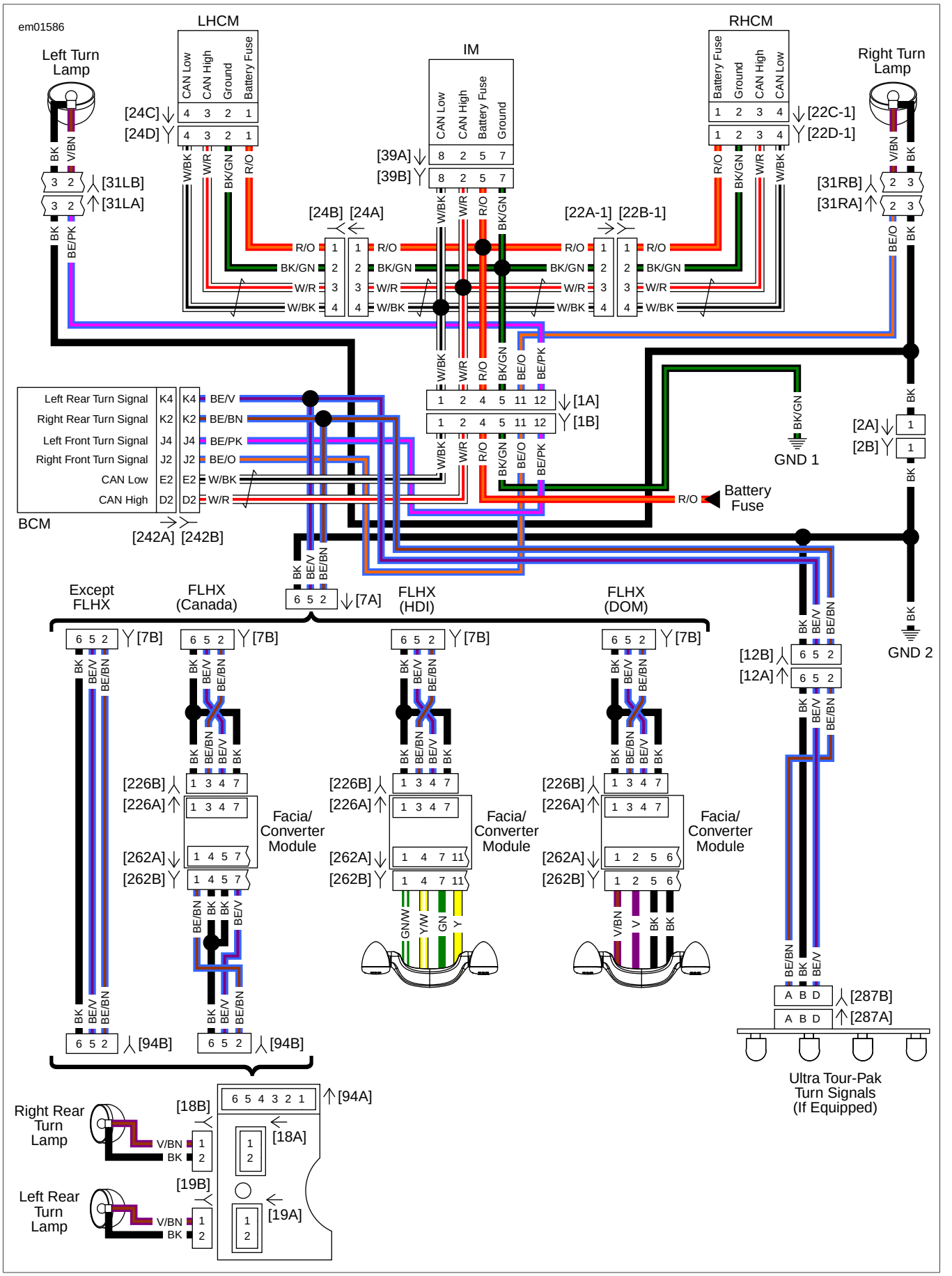


Figure 5-21. Turn Signals: FLH With Fairing

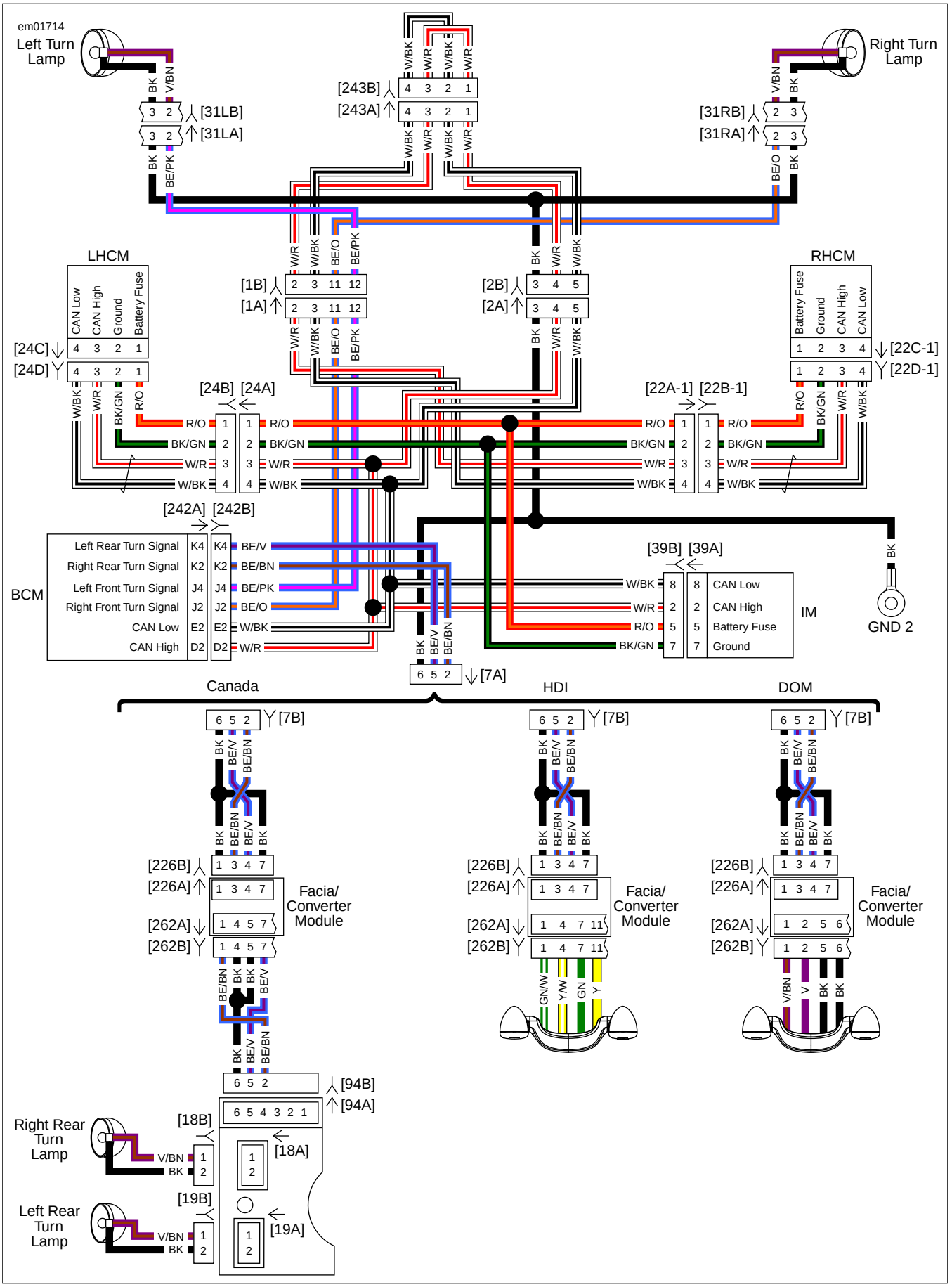


Figure 5-22. Turn Signals: FLT With Fairing

DTC B2141

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-16. DTC B2141 Diagnostic Faults

POSSIBLE CAUSES
Open in left front turn signal ground circuit
Open in left front turn signal power circuit
Short to voltage in left front turn signal power circuit
Bulb malfunction

1. Bulb Test

1. Turn IGN OFF.
2. Inspect left front turn signal bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace bulb.

2. Ground Circuit Open Test

1. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between bulb socket ground and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK) wire.

3. Power Circuit Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test resistance between BOB terminal J4 and left front turn signal bulb socket terminal.
4. Is resistance less than 1 Ohm?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in left front turn signal power circuit (BE/PK) wire.

DTC B2143, B2144

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-17. DTC B2143, B2144 Diagnostic Faults

POSSIBLE CAUSES
Left front turn signal bulb current exceeds 3.0A
Accessory lighting overloading circuit
Short to ground in left front turn signal power circuit

1. Bulb Test

1. Turn IGN OFF.
2. Inspect left front turn signal bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace bulb.

2. Power Circuit Short to Ground Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.2 INITIAL DIAGNOSTICS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), with bulb out, test continuity between BOB terminal J4 and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground in left front turn signal power circuit (BE/PK) wire.
   b. **No.** Go to Test 3.

3. DTC Test

1. Connect [242A].
2. Clear DTC.
3. Turn IGN ON.
4. Turn on left turn signal.
5. With bulb out, check DTCs.
6. Did the DTC B2143 or B2144 reset?
   a. **Yes.** Replace BCM.
   b. **No.** Replace turn signal bulb.

DTC B2146

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-18. DTC B2146 Diagnostic Faults

POSSIBLE CAUSES
Open in right front turn signal ground circuit
Open in right front turn signal power circuit
Short to voltage in right front turn signal power circuit
Bulb malfunction

1. Bulb Test

1. Turn IGN OFF.
2. Inspect right front turn signal bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace bulb.

2. Ground Circuit Open Test

1. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between bulb socket ground and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK) wire.

3. Power Circuit Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal J2 and right front turn signal bulb socket terminal.
4. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in right front turn signal power circuit (BE/O) wire.

DTC B2148, B2149

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-19. DTC B2148, B2149 Diagnostic Faults

POSSIBLE CAUSES
Right front turn signal bulb current exceeds 3.0A
Accessory lighting overloading circuit
Short to ground in right front turn signal power circuit

1. Bulb Test

1. Turn IGN OFF.
2. Inspect right front turn signal bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace bulb.

2. Power Circuit Short to Ground Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), with bulb out, test continuity between BOB terminal J2 and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground in right front turn signal power circuit (BE/O) wire.
   b. **No.** Go to Test 3.

3. DTC Test

1. Connect [242A].
2. Clear DTC.
3. Turn IGN ON.
4. Turn on right turn signal.
5. With bulb removed, check DTCs.
6. Did DTC B2148 or B2149 reset?
   a. **Yes.** Replace BCM.
   b. **No.** Replace turn signal bulb.

REAR TURN SIGNAL DIAGNOSTICS 5.7

DESCRIPTION AND OPERATION

See Figure 5-23, Figure 5-24 and Figure 5-25. The rear turn signals are controlled by the BCM. The BCM supplies power to the rear turn signals and controls the flash rate of the turn signals through the power circuit.

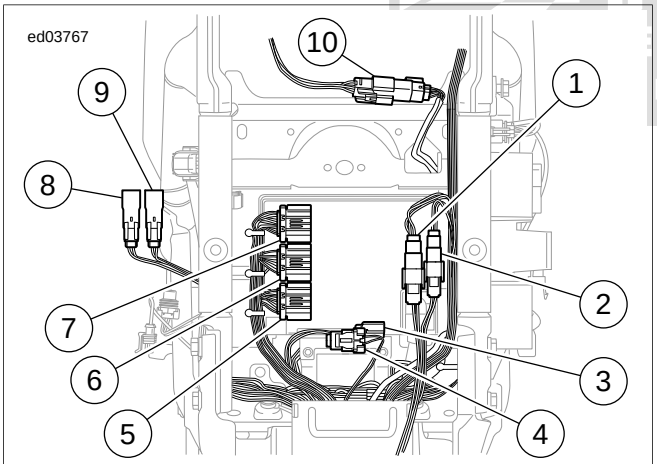
Table 5-20. Code Description

DTC	DESCRIPTION
B2151	Left rear turn signal output open
B2153	Left rear turn signal output shorted low
B2154	Left rear turn signal output overloaded
B2156	Right rear turn signal output open
B2158	Right rear turn signal output shorted low
B2159	Right rear turn signal output overloaded

Conditions for Setting

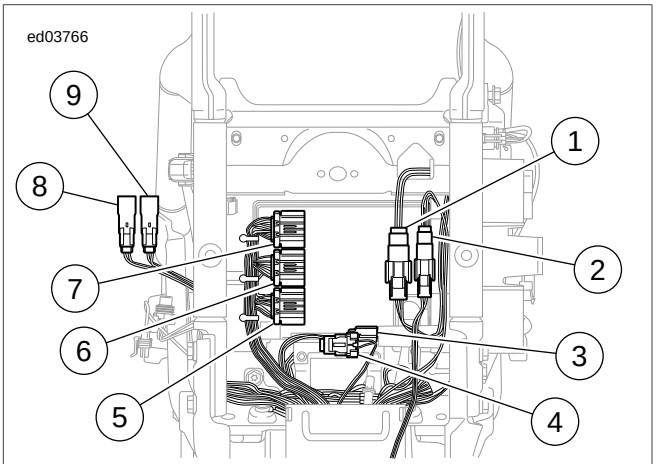
After clearing the DTCs, operate the inoperative turn signal to verify if the DTC has returned.

- DTC B2151 or B2156 will set if the corresponding rear turn signal circuit draws less than 120 milliamps.
- DTC B2154 or B2159 will set if the corresponding rear turn signal circuit draws more than 3 Amps.



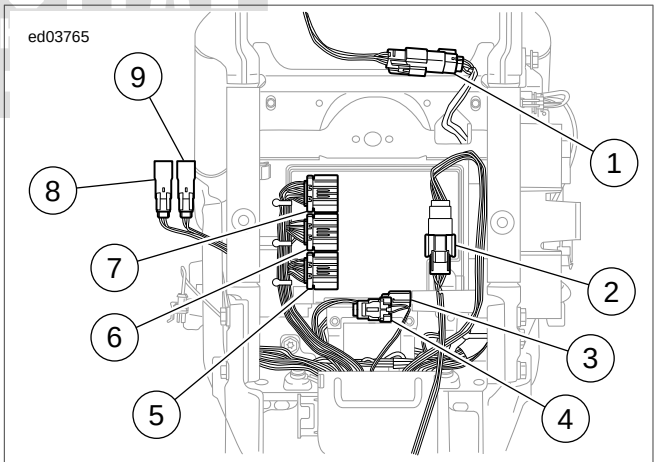
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 5-23. Under Seat: FLHT



1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 5-24. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 5-25. Under Seat: FLHR

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

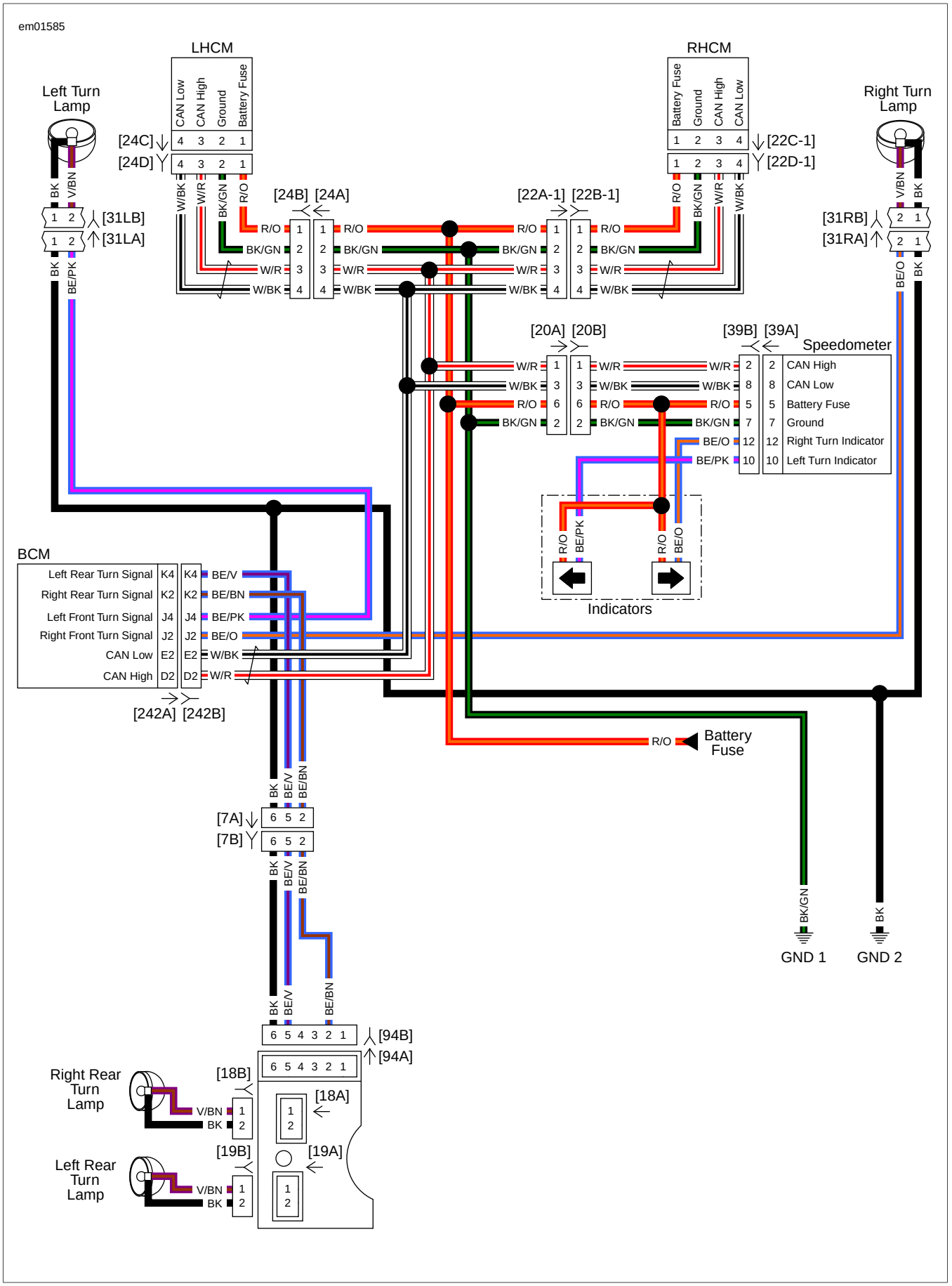


Figure 5-26. Turn Signals: Without Fairing

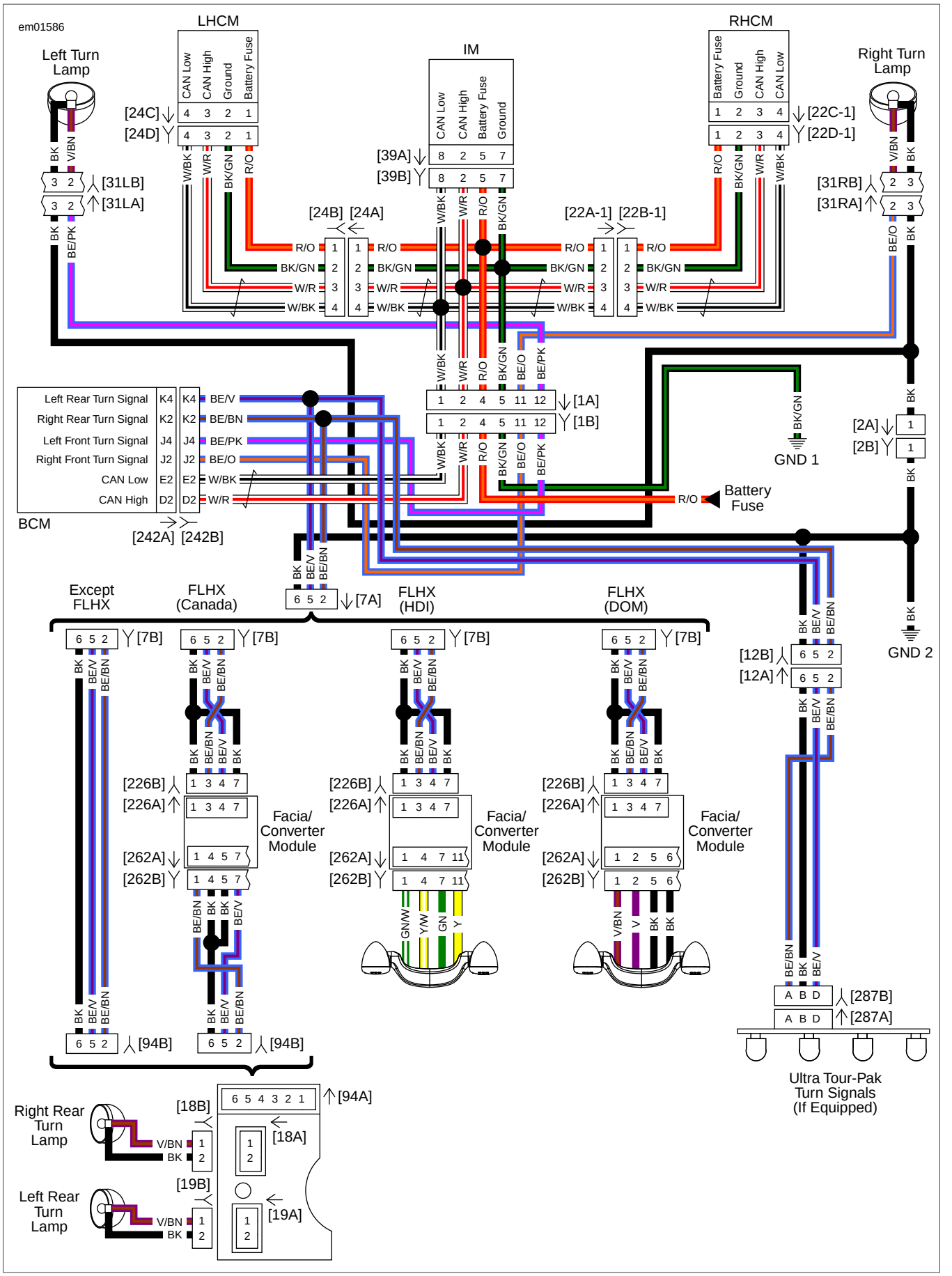


Figure 5-27. Turn Signals: FLH With Fairing

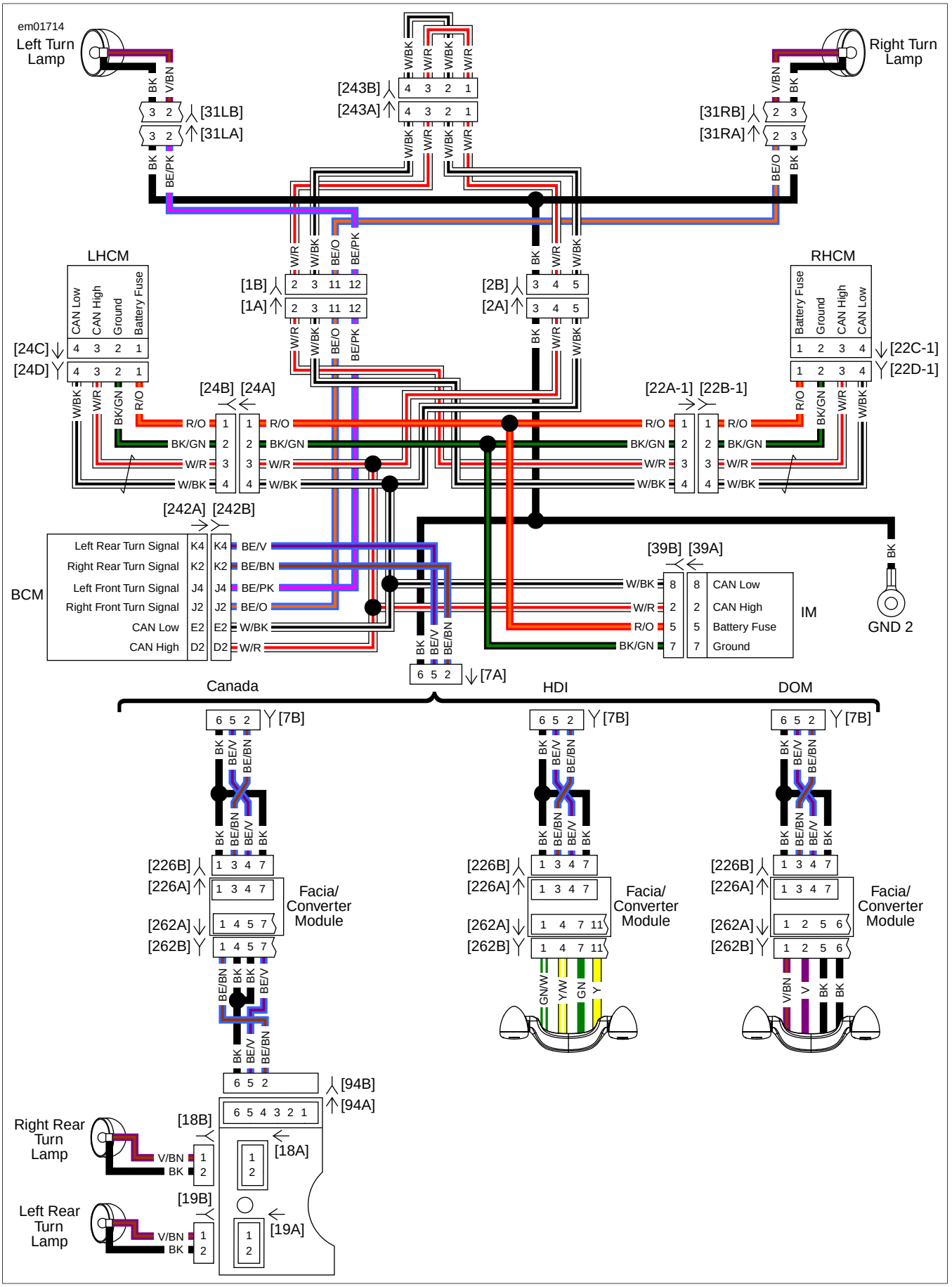


Figure 5-28. Turn Signals: FLT With Fairing

DTC B2151

PART NUMBER	TOOL NAME
HD-34730-2E	FUEL INJECTOR TEST LIGHT
HD-41404	HARNESS CONNECTOR TEST KIT
HD-44687	IGNITION COIL CIRCUIT TEST ADAPTER
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-21. DTC B2151 Diagnostic Faults

POSSIBLE CAUSES
Open in left rear turn signal ground circuit
Open in left rear turn signal power circuit
Short to voltage in left rear turn signal power circuit
Bulb malfunction

1. Left Rear Turn Signal Bulb Test

1. Remove left rear turn signal bulb.
2. Inspect bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No. Lamp is LED in Tour-Pak.** Go to Test 6.
   c. **No. Bulb does not work.** Replace bulb. **(6820)**

2. Left Rear Turn Signal Circuit Test: Except LED Lights

1. Disconnect left rear turn signal [19] (except FLHX/S) or rear lighting jumper harness [262] (FLHX/S).
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), connect test light to:
   a. [19A] terminals 1 and 2 (except FLHX/S).
   b. [262A] terminals 5 and 7 (except FLHX/S Canada).
   c. [262A] terminals 7 and 11 (FLHX/S HDI).
   d. [262A] terminals 2 and 5 (FLHX/S DOM).
3. Press left turn signal switch.
4. Does test light flash?
   a. **Yes.** Lamp is bulb. Replace left rear turn signal. **(6823)**
   b. **Yes.** Lamp is LED. Replace lightbar. **(6823)**
   c. **No.** Go to Test 3.

3. Left Rear Turn Signal Component Test

1. Connect test light to [94B] (except FLHX/S) terminals 5 and 6 or [226B] (FLHX/S) terminals 1 and 4.
2. Press left turn signal switch.
3. Does test light flash?
   a. **Yes. FLHX/S.** Replace facia/converter module. **(6809)**
   b. **Yes. Except FLHX/S.** Replace circuit board. **(5215)**
   c. **No.** Go to Test 4.

4. Left Rear Turn Signal Ground Circuit Test

1. Connect test light to [94B] terminal 5 or [226B] terminal 4 and ground.
2. Press left turn signal switch.
3. Does test light flash?
   a. **Yes.** Repair open in (BK) wire. **(5041)**
   b. **No.** Go to Test 5.

5. Power Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal K4 and [94B] terminal 5 or [226B] terminal 4.
5. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in (BE/V) wire. **(5041)**

6. Ground Circuit Open LED Test

1. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [278B] terminal B and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (BK) wire.

7. Power Circuit Open LED Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal K4 and [278B] terminal D.
5. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair open in left rear turn signal power circuit (BE/V).

8. Left Turn Signal LED Test

1. Using IGNITION COIL CIRCUIT TEST ADAPTER (Part No. HD-44687) connect FUEL INJECTOR TEST LIGHT (Part No. HD-34730-2E) to BOB terminals G4 and K4.
2. Turn IGN ON.
3. Turn on left turn signals.
4. Does light flash?
   a. **Yes.** Replace ultra Tour-Pak rear marker/stop lights/turn signals. **(6823)**
   b. **No.** Replace BCM.

DTC B2153, B2154

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-22. DTC B2153, B2154 Diagnostic Faults

POSSIBLE CAUSES
Left rear turn signal bulb current too high
Accessory lighting overloading circuit
Short to ground in left rear turn signal power circuit

1. Left Rear Turn Signal Bulb Test

1. Remove left rear turn signal bulb.
2. Inspect bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No. Lamp is LED in Tour-Pak.** Go to Test 4.
   c. **No. Bulb does not work.** Replace bulb. **(6820)**

2. Left Rear Turn Power Circuit Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal K4 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace BCM.

3. Power Circuit Short to Ground Test

1. Disconnect [94] or [226].
2. Test continuity between BOB terminal K4 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in left rear turn signal power circuit (BE/V) wire.
   b. **No. FLHX/S.** Replace facia/converter module. **(6809)**
   c. **No. Except FLHX/S.** Replace circuit board. **(5215)**

4. LED Test

1. Turn IGN OFF.
2. Clear DTCs.
3. Disconnect [278].
4. Activate left turn signal.
5. Did DTC B2153 or B2154 return?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace Ultra Tour-Pak rear marker/stop lights/turn signals. **(6823)**

5. Power Circuit Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal K4 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground in Left rear turn signal power circuit (BE/V) wire.
   b. **No.** Replace BCM.

DTC B2156

PART NUMBER	TOOL NAME
HD-34730-2E	FUEL INJECTOR TEST LIGHT
HD-41404	HARNESS CONNECTOR TEST KIT
HD-44687	IGNITION COIL CIRCUIT TEST ADAPTER
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-23. DTC B2156 Diagnostic Faults

POSSIBLE CAUSES
Open in right rear turn signal ground circuit
Open in right rear turn signal power circuit
Short to voltage in right rear turn signal power circuit
Bulb malfunction

1. Right Rear Turn Signal Bulb Test

1. Remove right rear turn signal bulb.
2. Inspect bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No. Lamp is LED in Tour-Pak.** Go to Test 6.
   c. **No. Bulb does not work.** Replace bulb. **(6820)**

2. Right Rear Turn Signal Circuit Test

1. Disconnect right rear turn signal [18] (except FLHX/S) or rear lighting jumper harness [262] (FLHX/S).
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), connect test light to:
   a. [18A] terminals 1 and 2 (except FLHX/S).
   b. [262A] terminals 1 and 5 (except FLHX/S Canada).
   c. [262A] terminals 1 and 4 (FLHX/S HDI).
   d. [262A] terminals 1 and 6 (FLHX/S DOM).
3. Press right turn signal switch.
4. Does test light flash?
   a. **Yes. Lamp is bulb.** Replace right rear turn signal. **(6823)**
   b. **Yes. Lamp is LED.** Replace lightbar. **(6823)**
   c. **No.** Go to Test 3.

3. Right Rear Turn Signal Component Test

1. Connect test light to [94B] (except FLHX/S) terminals 2 and 6 or [226B] (FLHX/S) terminals 1 and 3.
2. Press right turn signal switch.
3. Does test light flash?
   a. **Yes. FLHX/S.** Replace facia/converter module. **(6809)**
   b. **Yes. Except FLHX/S.** Replace circuit board. **(5215)**
   c. **No.** Go to Test 4.

4. Right Rear Turn Signal Ground Circuit Test

1. Connect test light to [94B] terminal 2 or [226B] terminal 3 and ground.
2. Press right turn signal switch.
3. Does test light flash?
   a. **Yes.** Repair open in (BK) wire. (5041)
   b. **No.** Go to Test 5.

5. Power Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal K2 and [94B] terminal 2 or [226B] terminal 3.
5. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in (BE/BN) wire. (5041)

6. Ground Circuit Open Test

1. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [278B] terminal B and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (BK) wire.

7. Power Circuit Open LED Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal K2 and [278B] terminal A.
5. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair open in right rear turn signal power circuit (BE/BN).

8. Right Turn Signal LED Test

1. Using IGNITION COIL CIRCUIT TEST ADAPTER (Part No. HD-44687) connect FUEL INJECTOR TEST LIGHT (Part No. HD-34730-2E) to BOB terminals G4 and K2.
2. Turn IGN ON.
3. Turn on right turn signals.
4. Does light flash?
   a. **Yes.** Replace Ultra Tour-Pak rear marker/stop lights/turn signals.
   b. **No.** Replace BCM.

DTC B2158, B2159

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-24. DTC B2158, B2159 Diagnostic Faults

POSSIBLE CAUSES
Right rear turn signal bulb current too high
Accessory lighting overloading circuit
Short to ground in right rear turn signal power circuit

1. Right Rear Turn Signal Bulb Test

1. Remove right rear turn signal bulb.
2. Inspect bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No. Lamp is LED in Tour-Pak.** Go to Test 4.
   c. **No. Bulb does not work.** Replace bulb. **(6820)**

2. Right Rear Turn Power Circuit Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal K2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace BCM.

3. Power Circuit Short to Ground Test

1. Disconnect [94] or [226].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in right rear turn signal power circuit (BE/BN) wire.
   b. **No. FLHX/S.** Replace facia/converter module. **(6809)**
   c. **No. Except FLHX/S.** Replace circuit board. **(5215)**

4. LED Test

1. Turn IGN OFF.
2. Clear DTCs.
3. Disconnect [278].
4. Activate right turn signal.
5. Did DTC B2158 or B2159 return?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace Ultra Tour-Pak rear marker/stop lights/turn signals. **(6823)**

5. Power Circuit Short to Ground Test

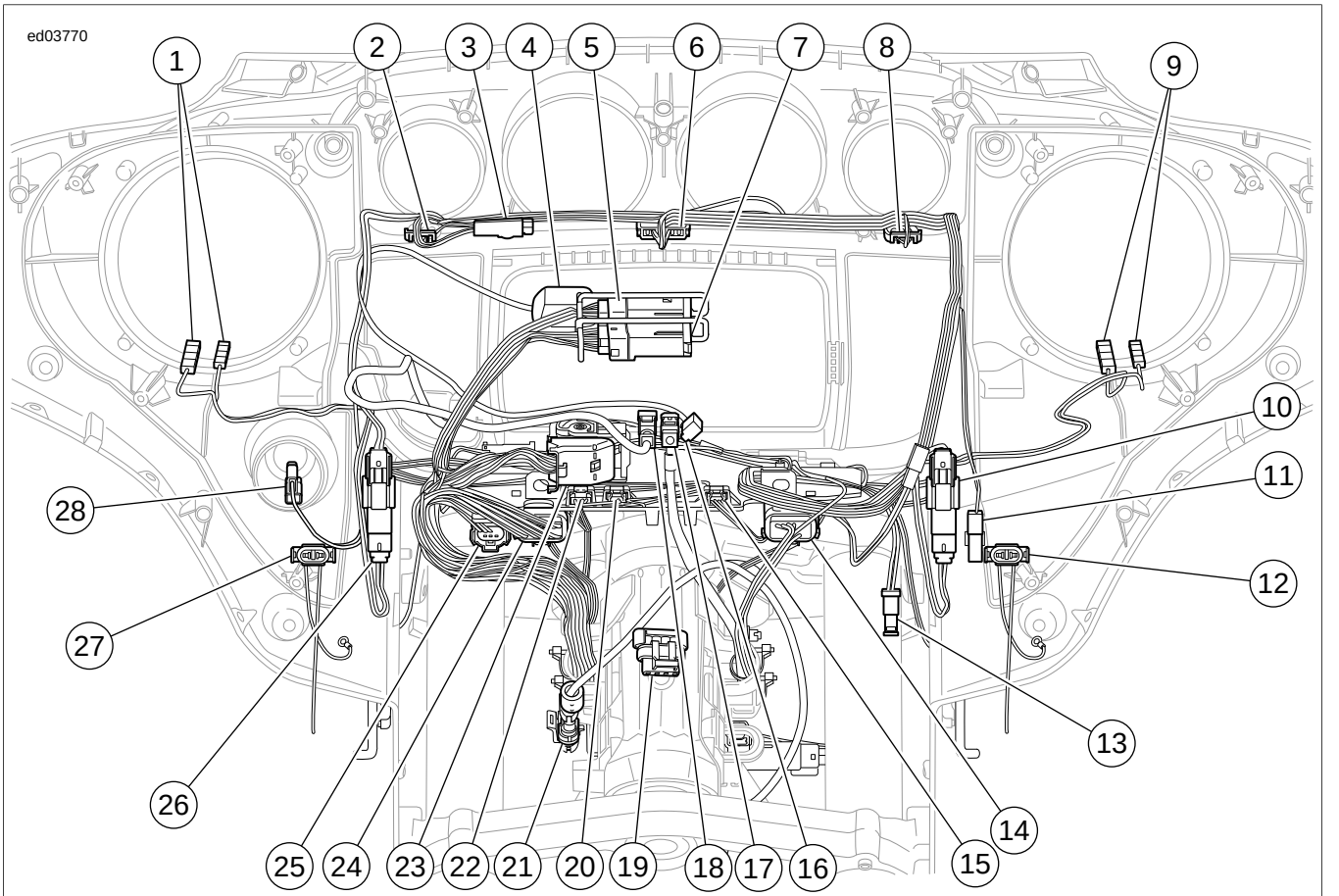
1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal K2 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground in right rear turn signal power circuit (BE/BN) wire.
   b. **No.** Replace BCM.

HEADLAMP DIAGNOSTICS 5.8

DESCRIPTION AND OPERATION

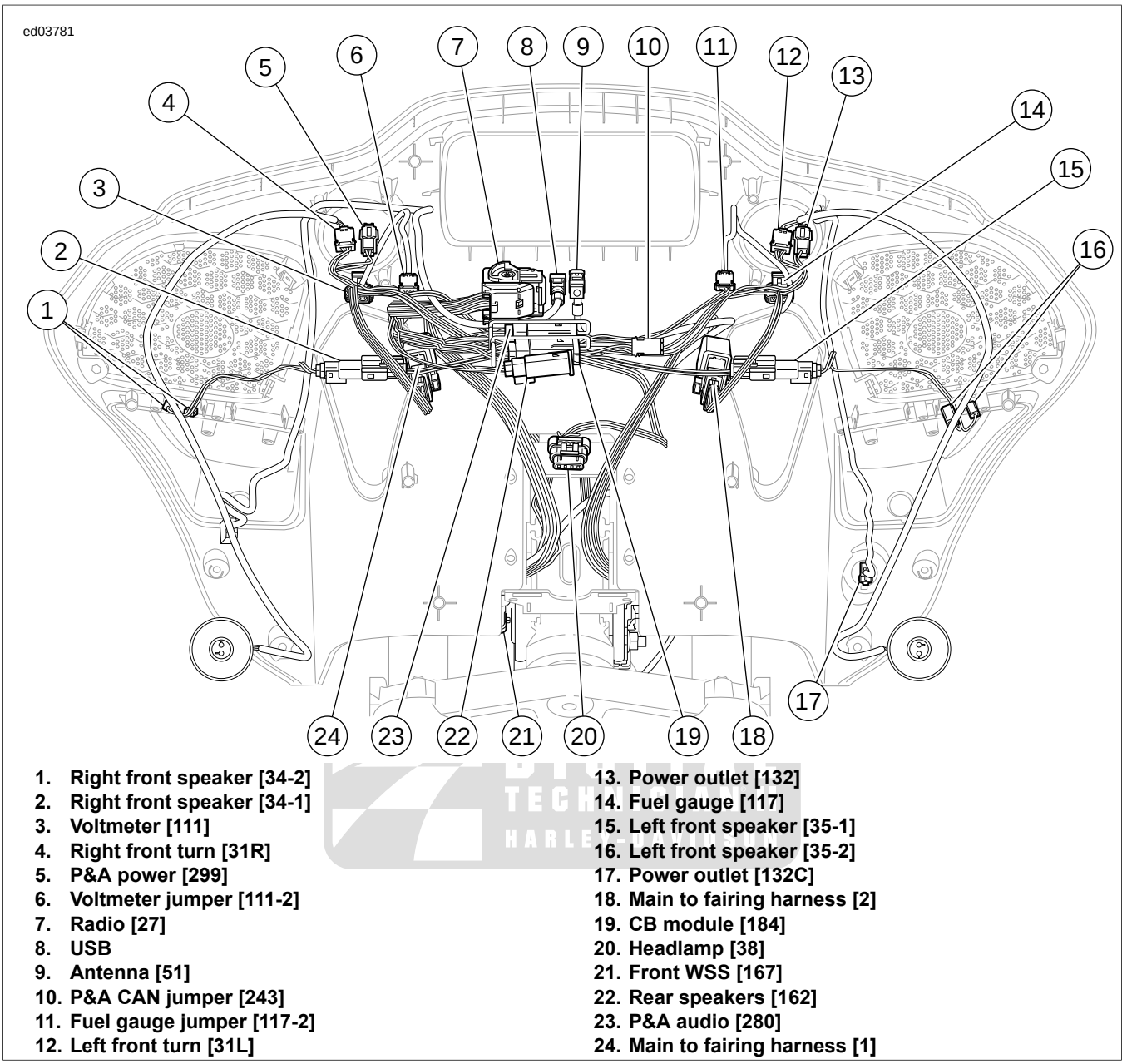
See Figure 5-29 and Figure 5-31. The headlamp switch activates either the high beam or the low beam headlamps. When the ignition is turned ON, the BCM defaults to the low beam position. Pressing the upper part of the switch toggles to the high beam headlamp and the lower part of the switch toggles to the low beam headlamp.

- In the low position, the BCM supplies power to illuminate the low beam headlamp.
- Push the low position again, the BCM supplies power to the high beam headlamp to provided a flash to pass feature.
- In the high position, BCM supplies power to the high beam headlamp and sends a message to the speedometer over the CAN bus to illuminate the high beam indicator.



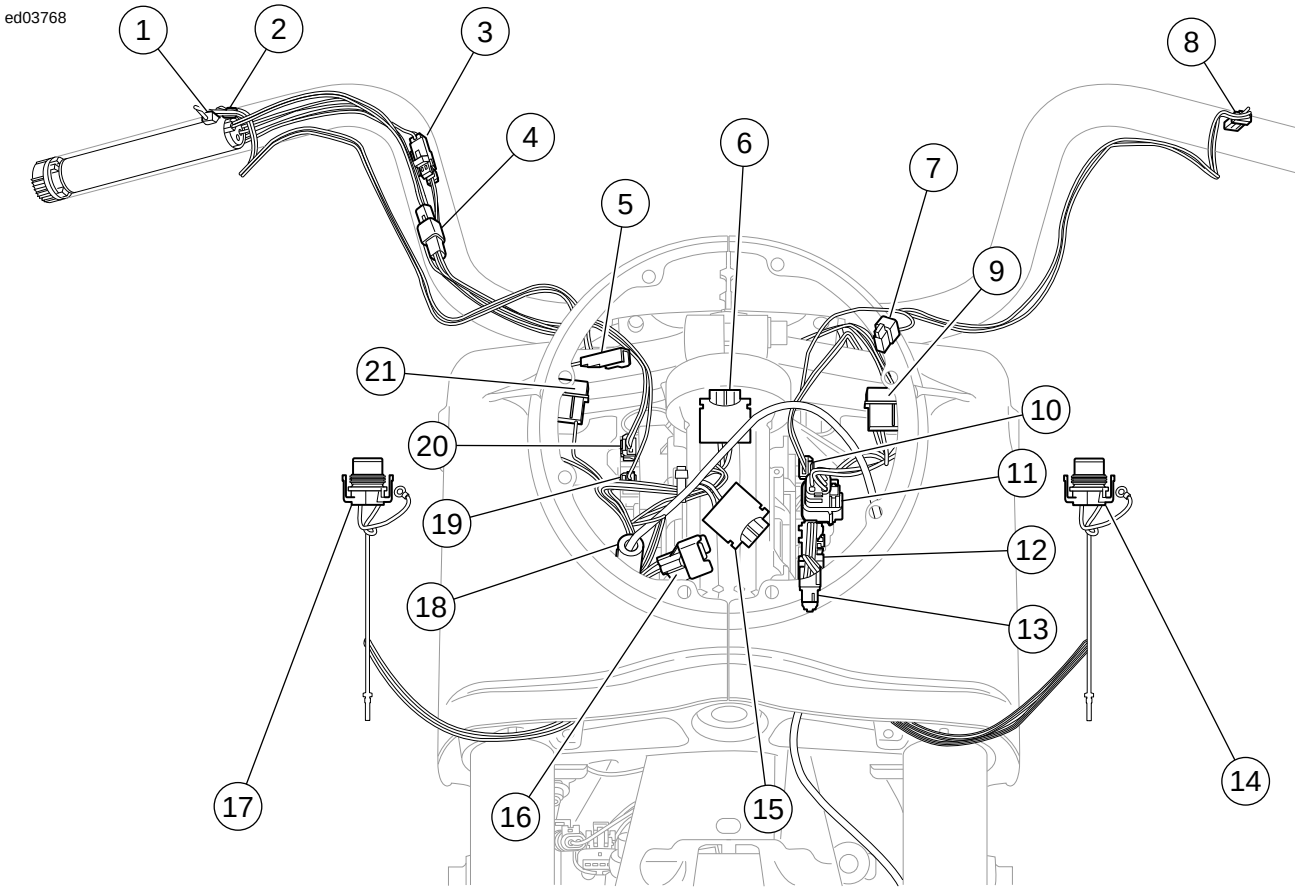
1. Right front speaker [34-2]
2. Voltmeter [111]
3. P&A power [299]
4. GPS antenna
5. P&A audio [280]
6. IM [39]
7. CB module [184]
8. Fuel gauge [117]
9. Left front speaker [35-2]
10. Left front speaker [35-1]
11. Front fender tip lamp [32]
12. Left auxiliary lamp [73L]
13. Heated handgrips [189]
14. Main to fairing harness [2]
15. LHCM [24]
16. GPS antenna [193]
17. Antenna [51]
18. USB
19. Headlamp [38]
20. RHCM [22-2]
21. Front WSS [167]
22. RHCM [22-1]
23. Radio [27]
24. Main to fairing harness [1]
25. TGS jumper harness [204]
26. Right front speaker [34-1]
27. Right auxiliary lamp [73R]
28. Power outlet [132]

Figure 5-29. Under FLH Fairing



1. Right front speaker [34-2]
2. Right front speaker [34-1]
3. Voltmeter [111]
4. Right front turn [31R]
5. P&A power [299]
6. Voltmeter jumper [111-2]
7. Radio [27]
8. USB
9. Antenna [51]
10. P&A CAN jumper [243]
11. Fuel gauge jumper [117-2]
12. Left front turn [31L]
13. Power outlet [132]
14. Fuel gauge [117]
15. Left front speaker [35-1]
16. Left front speaker [35-2]
17. Power outlet [132C]
18. Main to fairing harness [2]
19. CB module [184]
20. Headlamp [38]
21. Front WSS [167]
22. Rear speakers [162]
23. P&A audio [280]
24. Main to fairing harness [1]

Figure 5-30. Under FLT Fairing



1. RHCM inside RHCM housing [22-1]
2. RHCM inside RHCM housing [22-2]
3. Heated handgrips [237]
4. TGS [224]
5. Heated handgrip interconnect [206]
6. Headlamp low beam [38LO]
7. GND 3
8. LHCM inside LHCM housing [24]
9. Auxiliary lamp switch [109]
10. LHCM [24]
11. TGS jumper harness [204]
12. Right front turn signal/auxiliary lamps [31R]
13. Left front turn signal/auxiliary lamp [31L]
14. Left auxiliary lamp [73L]
15. Headlamp high beam [38HI]
16. Position lamp [29]
17. Right auxiliary lamp [73R]
18. Front WSS [167]
19. RHCM [22-1]
20. RHCM [22-2]
21. Accessory switch [67]

Figure 5-31. Headlamp Nacelle: Without Fairing

Table 5-25. Code Description

DTC	DESCRIPTION
B2106	L4 output open
B2107	L4 output shorted high
B2108	L4 output shorted low
B2109	L4 output overloaded
B2131	High beam output open
B2132	High beam output shorted high
B2133	High beam output shorted low
B2134	High beam output overloaded
B2136	Low beam output open
B2137	Low beam output shorted high
B2138	Low beam output shorted low
B2139	Low beam output overloaded

Conditions for Setting

The headlamp DTCs may require either the high or low beam headlamp be activated in order to set the DTC. Toggle back and forth between the high and low beam headlamp positions to check DTCs on both circuits.

- DTC B2131 or B2136 will set if the corresponding headlamp circuit draws less than 1.2 Amps.
- DTC B2134 or B2139 will set if the corresponding headlamp circuit draws more than 12 Amps.

Diagnostic Tips

If the headlamp cannot be switched from one position to the other with no codes it could be an open switch causing the problem. See 5.11 SWITCH DIAGNOSTICS.

Turn IGN to ACC.

- If low beam illuminates, this circuit is shorted to voltage.
- If high beam illuminates, this circuit is shorted to voltage.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

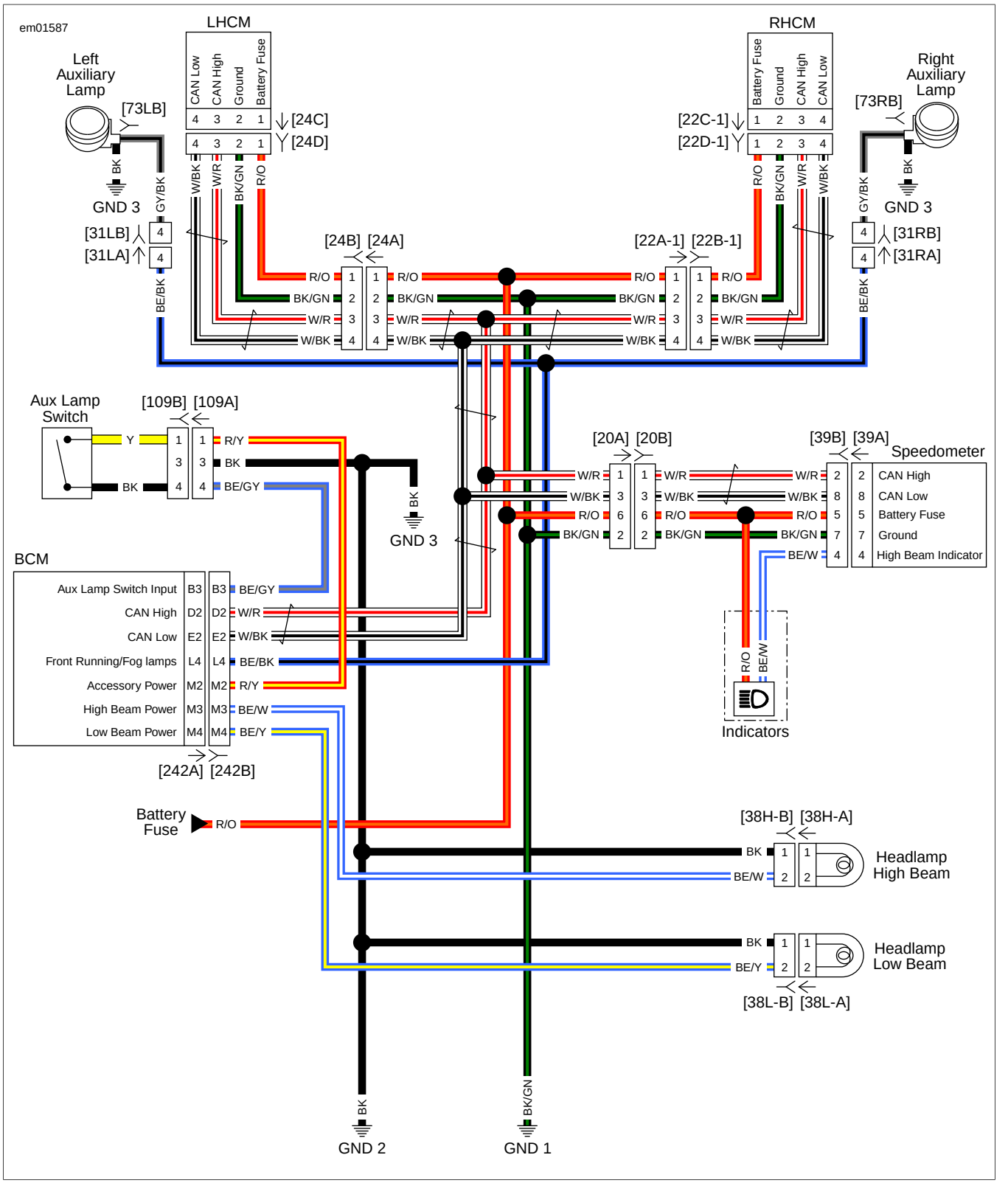


Figure 5-32. Headlamp: Without Fairing

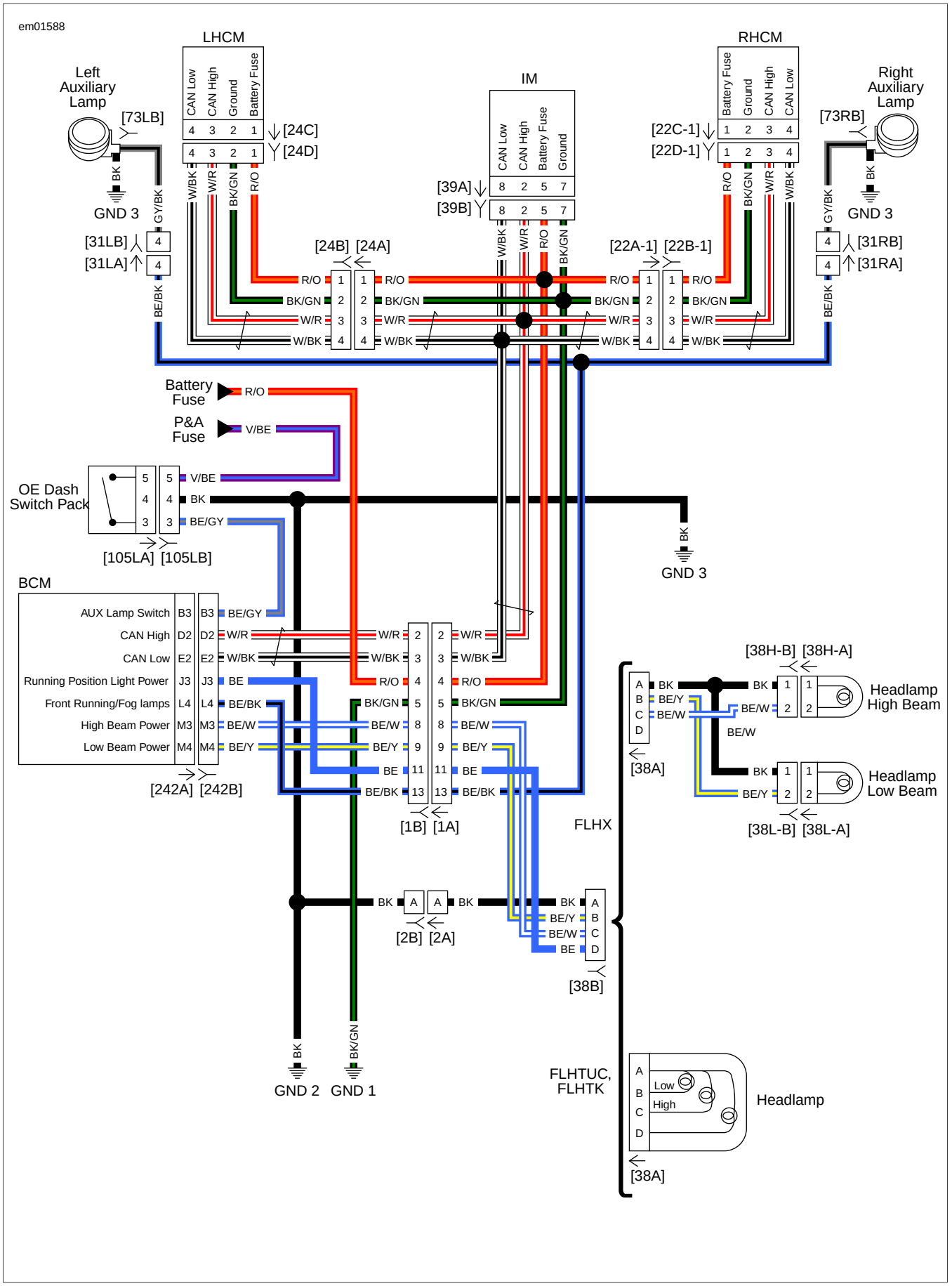


Figure 5-33. Headlamp: FLH With Fairing

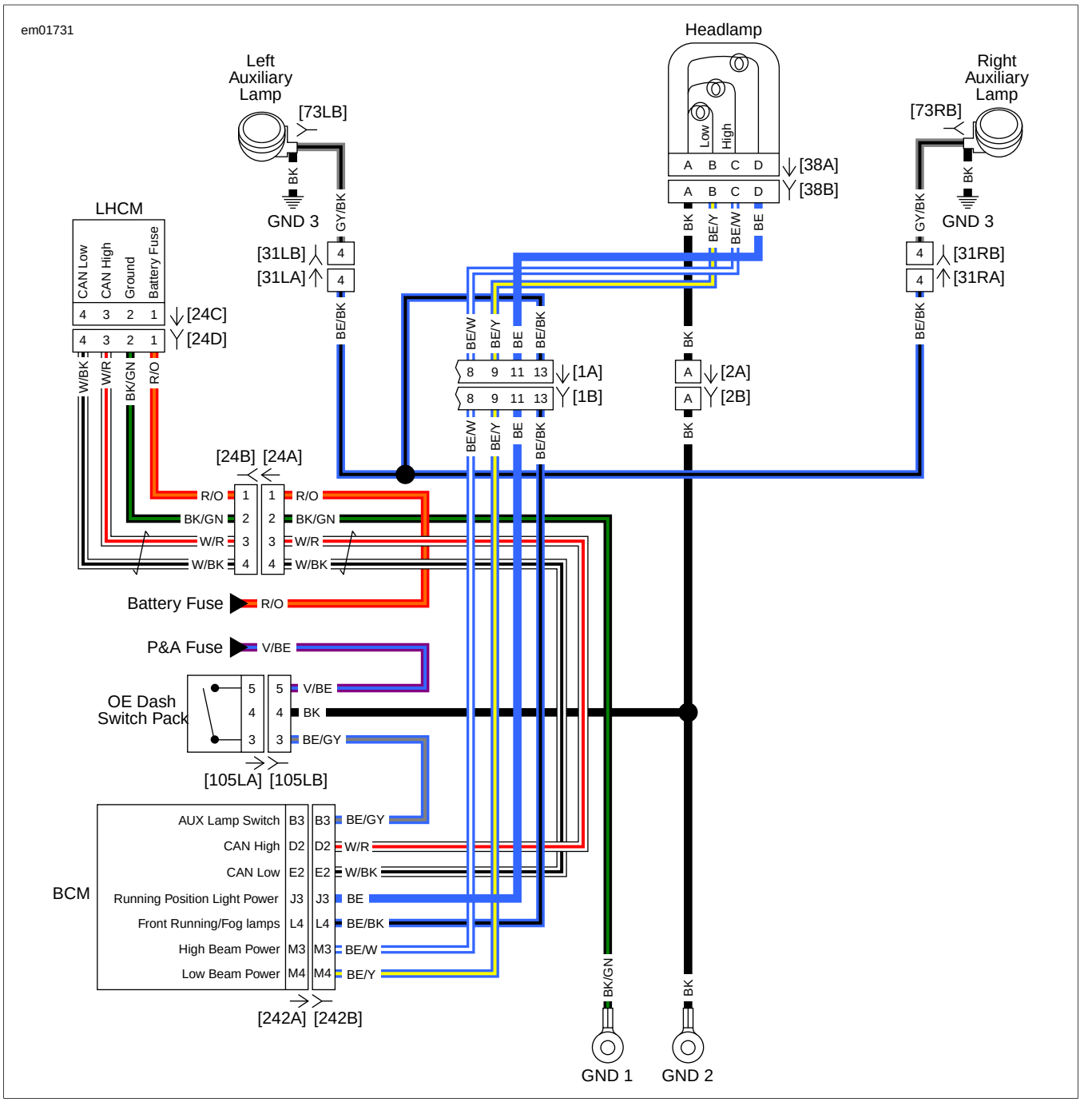


Figure 5-34. Headlamp: FLT With Fairing

AUXILIARY LAMPS INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-26. Auxiliary Lamps Inoperative Diagnostic Faults

POSSIBLE CAUSES
Auxiliary lamp malfunction
Auxiliary lamp switch malfunction
Open in auxiliary power circuit
Open in auxiliary ground circuit

NOTE

The auxiliary lamps can be configured with Digital Technician II one of three ways. They will either be on only when the low beam headlamp is on, only when the high beam headlamp is on or when both are on. Verify operation before diagnosing.

1. Auxiliary Lamps Operation Test

1. Turn on auxiliary lamps.
2. Do auxiliary lamps illuminate?
   a. **Yes.** System operating properly. Intermittent perform wiggle test. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No. Only one auxiliary lamp is operative.** Go to Test 2.
   c. **No. Both auxiliary lamps are inoperative.** Go to Test 5.

2. Auxiliary Bulb Test

1. Inspect bulb.
2. Is bulb good?
   a. **Yes.** Go to Test 3.
   b. **No. Auxiliary lamp is LED.** Go to Test 3.
   c. **No. Auxiliary lamp is a bulb.** Replace bulb. **(5227)**

3. Auxiliary Lamp Circuit Test

1. Disconnect auxiliary lamps [73].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [73B] terminal B and ground.
3. Turn IGN ON.
4. Turn on auxiliary lamps.
5. Is battery voltage present?
   a. **Yes.** Replace inoperative auxiliary lamp. **(5227)**
   b. **No.** Go to Test 4.

4. Auxiliary Lamp Ground Circuit Test

1. Turn IGN OFF.
2. Test resistance between inoperative circuit at [73B] terminal A and ground.
3. Is resistance less that 0.5 Ohms?
   a. **Yes.** Repair open in (GY/BK) wire. **(5041)**
   b. **No.** Repair open in (BK) wire. **(5041)**

5. Auxiliary Lamp Switch Test

1. Turn IGN OFF.
2. Disconnect auxiliary lamp switch [109] (non-fairing models) or [105L] (fairing models).
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper [109A] terminals 1 and 4 (non-fairing models) or [105LB] terminals 3 and 5 (fairing models) together.
4. Turn IGN ON.
5. Do auxiliary lamps illuminate?
   a. **Yes.** Replace auxiliary lamp toggle switch. **(5167)**
   b. **No.** Go to Test 6.

6. Auxiliary Lamp Switch Power Test

1. Test voltage between [109A] terminal 1 (non-fairing models) or [105LB] terminal 5 (fairing models) and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (R/Y) wire (non-fairing models) or (V/BE) wire (fairing models).

7. Auxiliary Lamp Input Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test voltage between BOB terminal B3 and ground.
5. Reconnect [109A] (non-fairing models) or [105LB] (fairing models).
6. Turn IGN ON.
7. Turn on auxiliary lamps.
8. Is battery voltage present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair open in (BE/GY) wire.

8. Auxiliary Lamp BCM Test

1. Test voltage between BOB terminal L4 and ground.

2. Is battery voltage present?
   a. **Yes.** Go to Test 9.
   b. **No.** Replace BCM.

9. Auxiliary Lamp Power Circuit Test

1. Turn IGN OFF.
2. Disconnect auxiliary lamps [73].
3. Turn IGN ON.
4. Test voltage between [73LB] or [73RB] terminal B and ground.
5. Is battery voltage present?
   a. **Yes.** Repair open in GND 3 connections. **(5041)**
   b. **No.** Repair open in (BE/BK) wire. **(5041)**

DTC B2106, B2107

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY
HD-50424	1.5 MM TERMINAL EXTRACTOR TOOL

Table 5-27. DTC B2106, B2107 Diagnostic Faults

POSSIBLE CAUSES
Short to power in auxiliary lamp circuit
Open in auxiliary lamp power circuit

1. Auxiliary Lamp Bulb Test

1. Inspect auxiliary lamp.
2. Are both bulbs good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace bulb. **(6796)**

2. Auxiliary Lamp Open Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Disconnect auxiliary lamps [73].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminal L4 and [73B] terminal B.
6. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in the auxiliary lamp circuit (BE/BK) wire.

3. Auxiliary Lamp Circuit Short to Voltage Test

1. Disconnect [242B].
2. Using 1.5 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50424), remove terminal L4 from [242B].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Turn IGN ON.
6. Test voltage between extracted terminal L4 and ground.
7. Is voltage present?
   a. **Yes.** Repair short to voltage in auxiliary lamp circuit (BE/BK) wire.
   b. **No.** Go to Test 4.

4. DTC Test

1. Connect [242].
2. Clear DTC.
3. Turn IGN ON.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Condition not currently present.

DTC B2108, B2109

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-28. DTC B2108, B2109 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in auxiliary lamp circuit
High current in auxiliary lamp circuit
Auxiliary lamp circuit overloading circuit

1. Auxiliary Lamp Circuit Short to Ground Test

1. Turn IGN OFF.
2. Disconnect both auxiliary lamps [73].

3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminal L4 and ground.
6. Is resistance less than 500 Ohms?
   a. **Yes.** Repair short to ground in (BE/BK) wire.
   b. **No.** Go to Test 2.

2. DTC Test

1. Connect [242].
2. Clear DTC.
3. Turn IGN ON.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Condition not currently present.

HIGH BEAM INOPERATIVE, DTC B2131

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-29. DTC B2131 Diagnostic Faults

POSSIBLE CAUSES
Open in high beam ground circuit
Open in high beam power circuit
Headlamp malfunction

1. Headlamp Inspection Test

1. Visually inspect headlamp.
2. Does headlamp have a separate connector for high and low beam?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. Bulb Test

1. Turn IGN OFF.
2. Inspect high beam headlamp.
3. Is bulb good?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace high beam headlamp.

3. Ground Circuit Open Test

1. Disconnect headlamp [38H].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [38H-B] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK) ground wire.

4. Power Circuit Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal M3 and [38HB] high beam terminal 2 (BE/W) wire.
4. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (BE/W) wire between BCM and headlamp.

5. BCM Test

1. Connect [38H-B].
2. Turn IGN ON.
3. Jumper BOB terminal M2 to M3.
4. Does high beam headlamp illuminate?
   a. **Yes.** Replace BCM.
   b. **No.** Replace high beam headlamp.

6. Ground Circuit Open Test

1. Turn IGN OFF.
2. Disconnect headlamp [38].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [38B] terminal A and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (BK) ground wire.

7. Power Circuit Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal M3 and [38B] high beam terminal C (BE/W) wire.

4. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair open in (BE/W) wire between BCM and headlamp.

8. BCM Test

1. Connect [38B].
2. Turn IGN ON.
3. Jumper BOB terminal M2 to M3.
4. Does high beam headlamp illuminate?
   a. **Yes.** Replace BCM.
   b. **No.** Replace headlamp.

DTC B2132

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50424	1.5 MM TERMINAL EXTRACTOR TOOL

Table 5-30. DTC B2132 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in headlamp high beam circuit

1. Headlamp Test

1. Turn IGN OFF.
2. Disconnect BCM [242].
3. Using 1.5 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50424), remove terminal M3 from [242B].
4. Connect [242].
5. Turn IGN ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between extracted terminal M3 and ground.
7. Is voltage present?
   a. **Yes.** Repair short to voltage in (BE/W) wire.
   b. **No.** Go to Test 2.

2. DTC Test

1. Install terminal M3 from [242B].
2. Connect [242].
3. Clear DTCs.
4. Turn IGN ON.
5. Observe headlamp in high and low beam positions.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Condition is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

DTC B2133, B2134

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-31. DTC B2133, B2134 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in high beam headlamp circuit
Accessory lighting overloading circuit
Headlamp malfunction

1. High Beam Circuit Test

1. Turn IGN OFF.
2. Disconnect headlamp [38H] (dual connector headlamp) or [38] (single connector headlamp).
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal M3 and ground.
6. Is continuity present?
   a. **Yes.** Repair short to ground in (BE/W) wire.
   b. **No.** Go to Test 2.

2. DTC Test

1. Connect [242].
2. Clear DTCs.
3. Turn IGN ON.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Replace high beam headlamp.

LOW BEAM INOPERATIVE, DTC B2136

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-32. DTC B2136 Diagnostic Faults

POSSIBLE CAUSES
Open in low beam ground circuit
Open in low beam power circuit
Headlamp malfunction

1. Headlamp Inspection Test

1. Visually inspect headlamp.
2. Does headlamp have separate connectors for high and low beam?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. Bulb Test

1. Turn IGN OFF.
2. Inspect low beam headlamp.
3. Is bulb good?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace low beam headlamp.

3. Ground Circuit Open Test

1. Disconnect headlamp [38L].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [38L-B] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK) ground wire.

4. Power Circuit Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal M4 and [38L-B] low beam terminal 2 (BE/Y) wire.
4. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (BE/Y) wire between BCM and headlamp.

5. BCM Test

1. Connect headlamp [38L-B].
2. Turn IGN ON.
3. Jumper BOB terminal M2 to M4.
4. Does low beam headlamp illuminate?
   a. **Yes.** Replace BCM.
   b. **No.** Replace low beam headlamp.

6. Ground Circuit Open Test

1. Turn IGN OFF.
2. Disconnect headlamp [38].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [38B] terminal B and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (BK) ground wire.

7. Power Circuit Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal M4 and [38B] low beam terminal B (BE/Y) wire.
4. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair open in (BE/Y) wire between BCM and headlamp.

8. BCM Test

1. Connect [38B].
2. Turn IGN ON.
3. Jumper BOB terminal M2 to M4.
4. Does low beam headlamp illuminate?
   a. **Yes.** Replace BCM.
   b. **No.** Replace headlamp.

DTC B2137

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50424	1.5 MM TERMINAL EXTRACTOR TOOL

Table 5-33. DTC B2137 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in headlamp low beam circuit

1. Headlamp Test

1. Turn IGN OFF.
2. Disconnect BCM [242].
3. Using 1.5 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50424), remove terminal (M4) from [242B].
4. Connect BCM [242].
5. Turn IGN ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between removed terminal (M4) and ground.
7. Is voltage present?
   a. **Yes.** Repair short to voltage in (BE/Y) wire.
   b. **No.** Go to Test 2.

2. DTC Test

1. Install terminal M4 from [242B].
2. Connect [242].
3. Clear DTCs.
4. Turn IGN ON.
5. Observe headlamp in high and low beam positions.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Condition is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

DTC B2138, B2139

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-34. DTC B2138, B2139 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in low beam headlamp circuit
Accessory lighting overloading circuit
Headlamp malfunction

1. Low Beam Circuit Test

1. Turn IGN OFF.
2. Disconnect headlamp [38L] (dual connector headlamp) or [38] (single connector headlamp).
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal (M4) and ground.
6. Is continuity present?
   a. **Yes.** Repair short to ground in (BE/Y) wire.
   b. **No.**

2. DTC Test

1. Connect [242].
2. Clear DTCs.
3. Turn IGN ON.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Replace low beam headlamp.

STOP LAMP DIAGNOSTICS 5.9

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

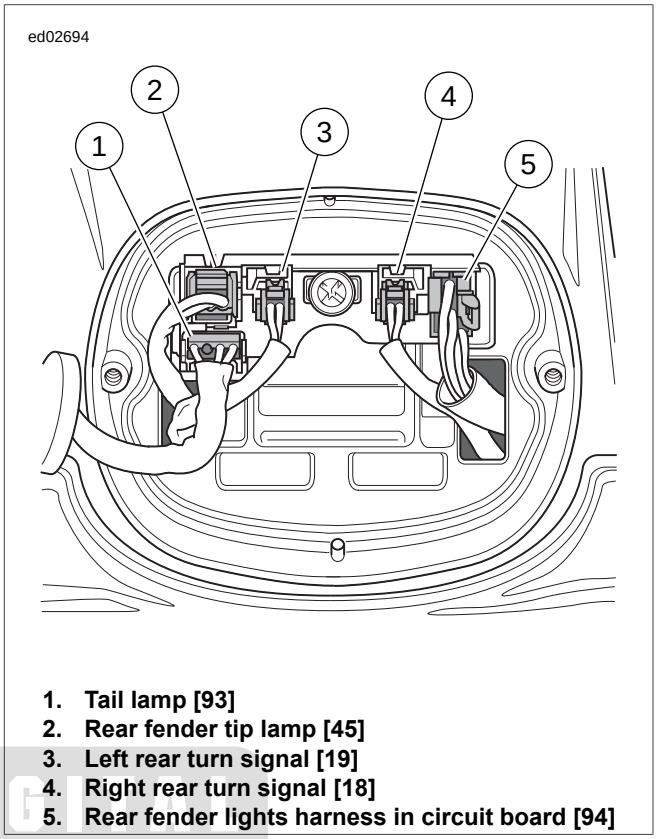
See Figure 5-35 and Figure 5-36. The BCM controls the stop lamp based off inputs from the front and rear stop lamp switches. The front stop lamp switch is a mechanical switch. When the front brake lever is applied, the lever presses a mechanical switch and closes the contacts on the switch. The front stop lamp switch is part of the RHCM. When the switch is pressed, the RHCM sends a message to the BCM over the CAN bus and the BCM supplies power to the stop lamp.

The rear stop lamp switch is a pressure switch. When the rear brake is applied, it generates pressure in the brake fluid. This pressure in the fluid closes the contacts for the rear stop lamp switch. The BCM supplies power to the rear stop lamp switch. When the rear stop lamp switch is closed, it grounds the circuit from the BCM. This signals the BCM to supply power to the stop lamp.

Some models have no center stop lamp. Instead the turn signals are used for stop, turn and tail lamp functions. If DTCs B2161, B2163, B2164 set on a model with no center stop lamp, it means the vehicle is improperly configured. Use DIGITAL TECHNICIAN II (Part No. HD-48650) to configure properly.

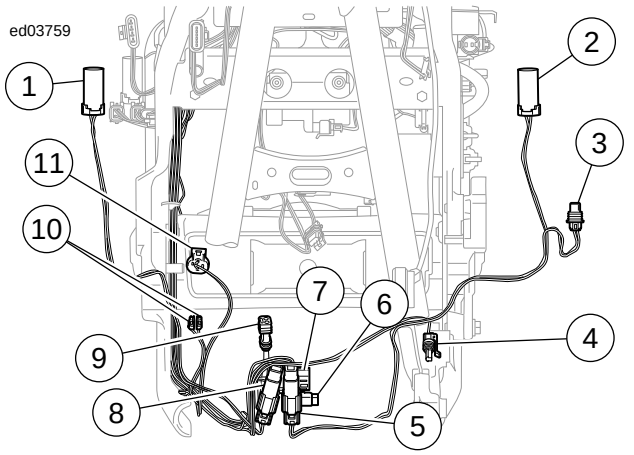
Table 5-35. Code Description

DTC	DESCRIPTION
B2161	Brake lamp output open
B2163	Brake lamp output shorted low
B2164	Brake lamp output overloaded
B2223	Rear brake switch shorted low (light on)



1. **Tail lamp [93]**
2. **Rear fender tip lamp [45]**
3. **Left rear turn signal [19]**
4. **Right rear turn signal [18]**
5. **Rear fender lights harness in circuit board [94]**

Figure 5-35. Rear Fender Lights Assembly



1. **Right cooling fan [97] (if equipped)**
2. **Left cooling fan [215] (if equipped)**
3. **ECT sensor [236] (if equipped)**
4. **Cooling pump [235] (if equipped)**
5. **Left cooling jumper [232L] (if equipped)**
6. **CKP [79]**
7. **JSS [133]**
8. **Right cooling jumper [232R] (if equipped)**
9. **Voltage regulator [77]**
10. **Rear brake switch [212]**
11. **Oil pressure switch [120] (w/o fairing) and oil pressure sender [139] (with fairing)**

Figure 5-36. Front of Engine

Conditions for Setting

The stop lamp circuit needs to see activation to set DTCs. Apply the front and rear brakes to verify stop lamp DTCs do not return.

- DTC B2161 is set when the stop lamp circuit current draw is less than 120 milliamps.
- DTC B2164 is set when the stop lamp circuit current draw is above 4 Amps.
- DTC B2223 is set when the brake switch input circuit is grounded for 120 seconds and the vehicle speed is above 45 mph (72 km/h).

The brake switch is normally open and supplies a path to ground when closed. In order to set a shorted brake switch code, the vehicle needs to be operated over 30 mph (48 km/h) for at least two minutes. DTC B2161 will only set when all loads on the circuit are inoperable.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

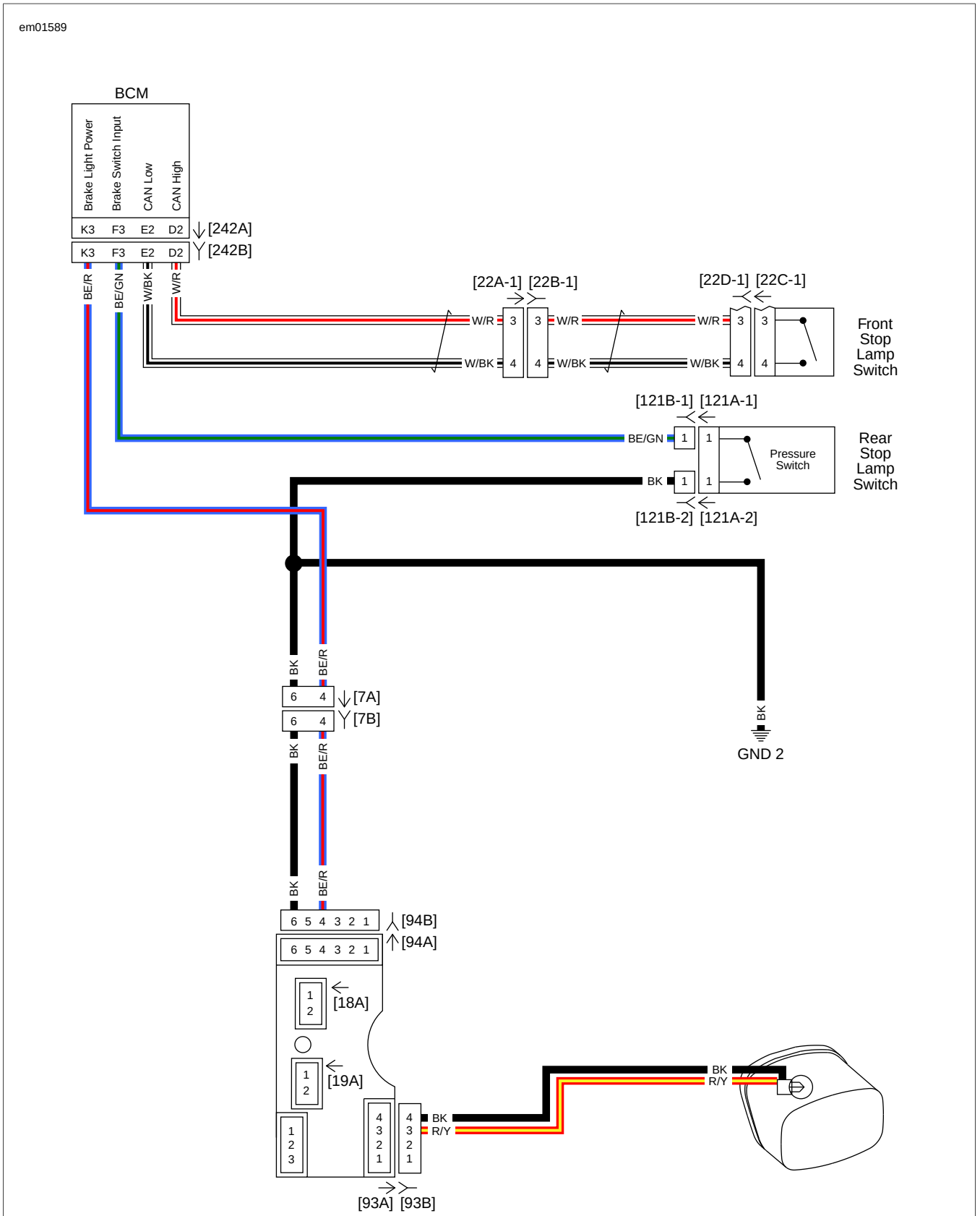


Figure 5-37. Stop/Tail Lamps: Without Fairing

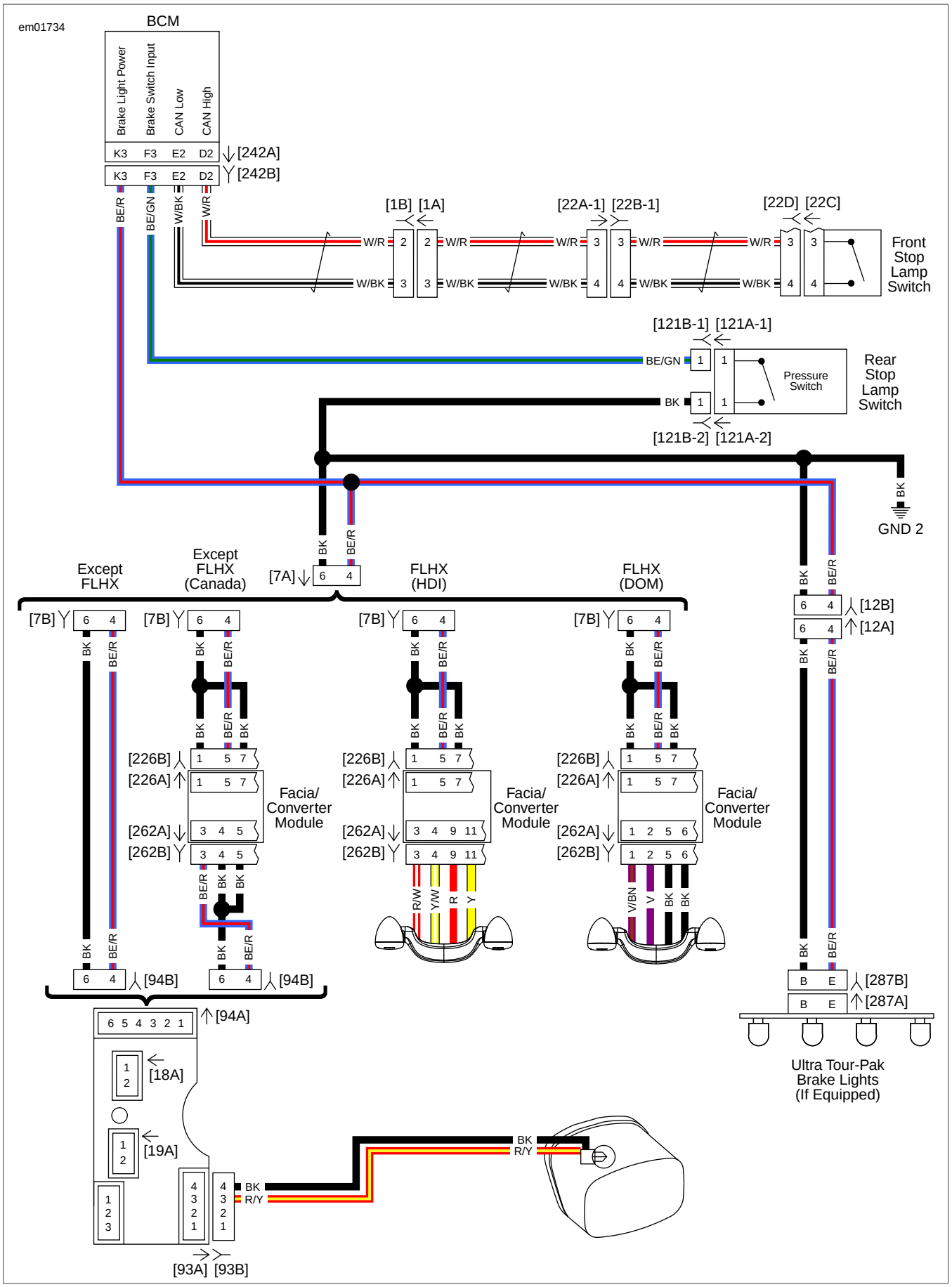


Figure 5-38. Stop Lamps: FLH With Fairing

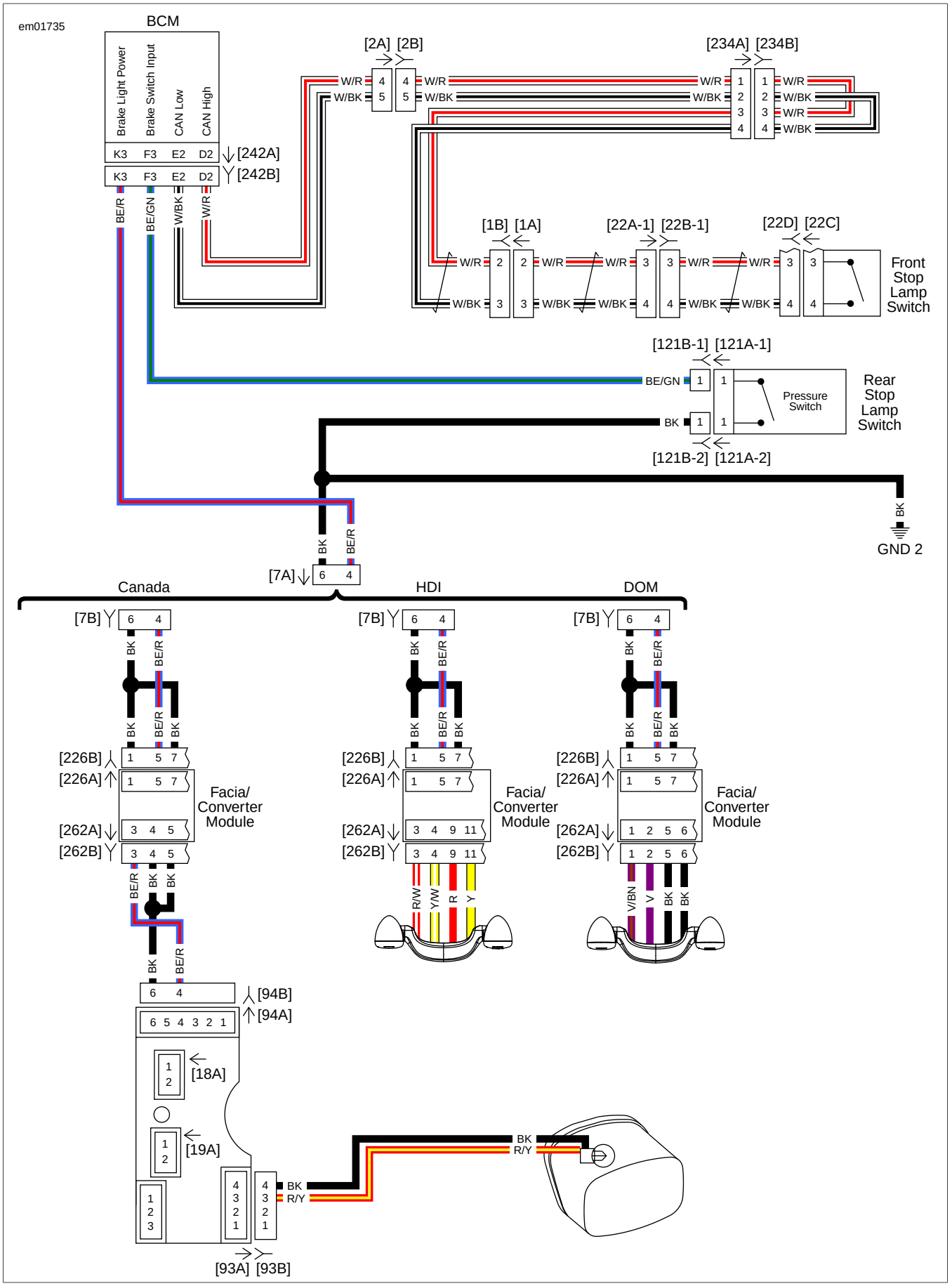


Figure 5-39. Stop Lamps: FLT With Fairing

STOP LAMP INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-36. Stop Lamp Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open fuse
Open power to switch circuit
Open ground circuit
Open stop lamp circuit
Stop lamp malfunction
Rear stop lamp switch malfunction
RHCM malfunction

1. Stop Lamp Switch Test

1. Apply front brake while observing stop lamp.
2. Apply rear brake while observing stop lamp.
3. Does stop lamp illuminate?
   a. **Yes. Stop lamp illuminates only with front brake applied.** Go to Test 2.
   b. **Yes. Stop lamp illuminates only with rear brake applied.** Go to Test 5.
   c. **No.** Go to Test 2.

2. Brake Switch Test

1. Turn IGN OFF.
2. Disconnect rear stop lamp switch [121-1] and [121-2].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper between [121B-1] and [121B-2].
4. Turn IGN ON.
5. Is stop lamp on?
   a. **Yes.** Replace stop lamp switch.
   b. **No.** Go to Test 3.

3. Brake Switch Ground Test

1. Jumper between [121B-1] (BE/GN) wire and ground.
2. Is stop lamp on?
   a. **Yes.** Repair open between [121B-2] (BK) wire and ground.
   b. **No.** Go to Test 4.

4. Brake Switch Input Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal F3 and rear brake switch [121B-1] (BE/GN) wire.
5. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open between [242B] terminal F3 and [121B-1] (BE/GN) wire.

5. RHCM Test

1. Turn IGN OFF.
2. Connect known good RHCM to vehicle.
3. Turn IGN ON.
4. Apply front brake lever.
5. Does stop lamp illuminate?
   a. **Yes.** Replace RHCM.
   b. **No.** Replace BCM.

STOP LAMP ALWAYS ON, DTC B2223

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 5-37. Stop Lamp Always On, DTC B2223 Diagnostic Faults

POSSIBLE CAUSES
Brake switch malfunction
Short to voltage on stop lamp output circuit

1. Brake Switch Test

1. Turn IGN OFF.
2. Disconnect rear brake switch [121-1] (BE/GN) wire.
3. Turn IGN ON.
4. Does stop lamp go out?
   a. **Yes.** Replace rear brake switch.
   b. **No.** Go to Test 2.

2. Brake Switch Input Test

1. Turn IGN OFF.

2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal F3 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground between [242B] and [121B-1] (BE/GN) wire.
   b. **No.** Go to Test 3.

3. Stop Lamp Power Test

1. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal K3 from [242B] (BE/R) wire.
2. Connect [242A].
3. Turn IGN ON.
4. Is stop lamp on?
   a. **Yes.** Repair short to voltage on stop lamp power circuit. **(5041)**
   b. **No.** Go to Test 4.

4. DTC Test

1. Remove BOB.
2. Insert terminal K3 into [242B] (BE/R) wire.
3. Connect [242].
4. Clear DTCs.
5. Operate system in the conditions for setting DTCs.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

DTC B2161

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-38. DTC B2161 Diagnostic Faults

POSSIBLE CAUSES
Short in stop lamp circuit
Open ground circuit
Open stop lamp circuit
Stop lamp malfunction

1. Stop Lamp Bulb Test

1. Remove stop lamp bulb.
2. Inspect bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No. Lamp is LED.** Go to Test 6.
   c. **No. Lamp is LED in Tour-Pak.** Go to Test 10.
   d. **No. Bulb does not work.** Replace bulb. **(6820)**

2. Stop Lamp Test

1. Turn IGN OFF.
2. Disconnect tail lamp [93].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), with brake applied, test voltage between [93A] terminals 3 and 4.
5. Is battery voltage present?
   a. **Yes.** Replace stop lamp assembly. **(5215)**
   b. **No.** Go to Test 3.

3. Circuit Board Test

1. Turn IGN OFF.
2. Disconnect rear fender lights [94].
3. Turn IGN ON.
4. With brake applied, test voltage between [94B] terminals 4 and 6.
5. Is battery voltage present?
   a. **Yes.** Replace circuit board. **(5215)**
   b. **No.** Go to Test 4.

4. Stop Lamp Circuit Test

1. With brake applied, test voltage between [94B] terminal 4 and ground.

2. Is battery voltage present?
   a. **Yes.** Repair open in (BK) wire. **(5041)**
   b. **No.** Go to Test 5.

5. Power Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Connect [93] and [94].
5. Install stop lamp bulb.
6. Jumper BOB terminals M2 and K3.
7. Turn IGN ON.
8. Does stop lamp illuminate?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in in (BE/R) wire. **(5041)**

6. Light Bar Circuit Test

NOTE

Only follow this test if the turn signals in the light bar also function as the stop lamps.

1. Disconnect rear lighting jumper harness [226].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), with brake applied, test voltage between [226B] terminals 5 and 7.
3. Is battery voltage present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 7.

7. Stop Lamp Circuit Test

1. With brake applied, test voltage between [226B] terminal 5 and ground.
2. Is battery voltage present?
   a. **Yes.** Repair open in (BK) wire. **(5041)**
   b. **No.** Go to Test 8.

8. Power Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB K3 and [226] terminal 5.
5. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in in (BE/R) wire. **(5041)**

9. Facia/Converter Module Test

1. Connect rear lighting [226].
2. Disconnect rear lighting [262].
3. Test voltage between:
   a. [262A] terminals 3 and 4 right and terminals 5 and 9 left. (FLHX/S HDI)
   b. [262A] terminals 1 and 6 right. And terminals 2 and 5 left. (FLHX/S U.S.)
4. Apply brakes.
5. Is battery voltage present?
   a. **Yes.** Replace lightbar. **(6823)**
   b. **No.** Replace facia/converter module. **(6809)**

10. Ground Circuit Open LED Test

1. Turn IGN OFF.
2. Disconnect Tour-Pak Lighting [287].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [287B] terminal B and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Repair open in (BK) wire.

11. Power Circuit Open LED Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal K3 and [278B] terminal E.
4. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Repair open (BE/R) wire.

12. Stop Lamp Signal LED Test

1. Turn IGN ON.
2. Apply brakes.
3. Test voltage between [278B] terminal E and ground.
4. Is battery voltage present?
   a. **Yes.** Replace ultra Tour-Pak rear marker/stop lights/turn signals. **(6823)**
   b. **No.** Replace BCM.

DTC B2163, B2164

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-39. DTC B2163, B2164 Diagnostic Faults

POSSIBLE CAUSES
Accessory tail lamp overloading circuit
Short to ground in stop lamp power circuit
Bulb malfunction

1. Bulb Test

1. Turn IGN OFF.
2. Inspect bulb.
3. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace bulb.

2. Stop Lamp Power Circuit Short to Ground Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal K3 and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground in (BE/R) wire.
   b. **No.** Replace BCM.

BRAKE SWITCH DIAGNOSTICS 5.10

DESCRIPTION AND OPERATION

There are two stop lamp switches.

- The front stop lamp switch is a mechanical switch located on the right hand controls.
- The rear stop lamp switch is a pressure switch located in the brake line under the exhaust pipes.

During an ignition cycle, the ECM must receive a valid brake switch input. During the same ignition cycle the vehicle has to reach 31 mph (50 km/h) in third gear or higher and return to a stop three times without any brake switch signals in order to set DTC P0572.

Table 5-40. Code Description

DTC	DESCRIPTION
P0572	Brake switch low

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

em01589

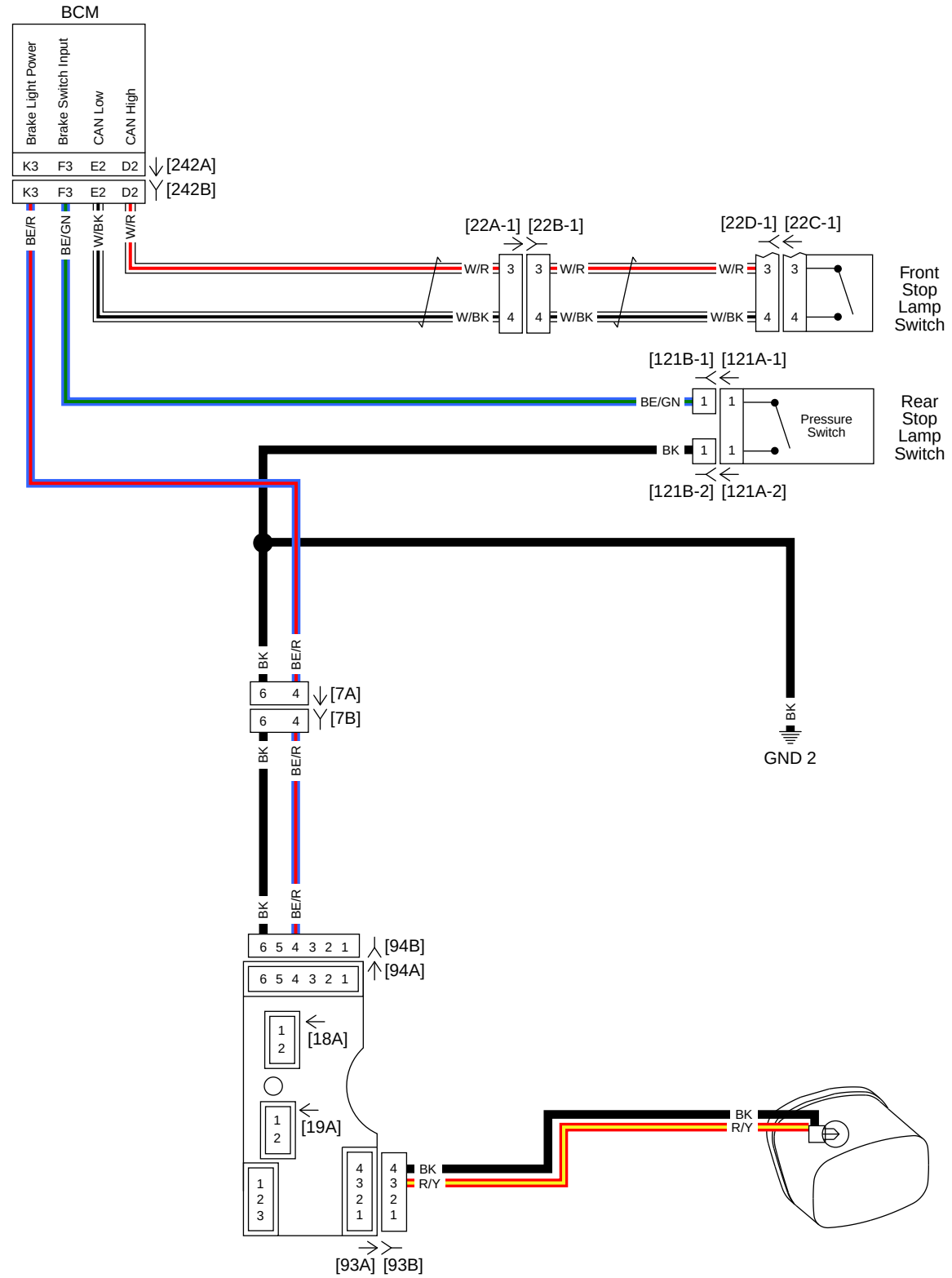


Figure 5-40. Stop/Tail Lamps: Without Fairing

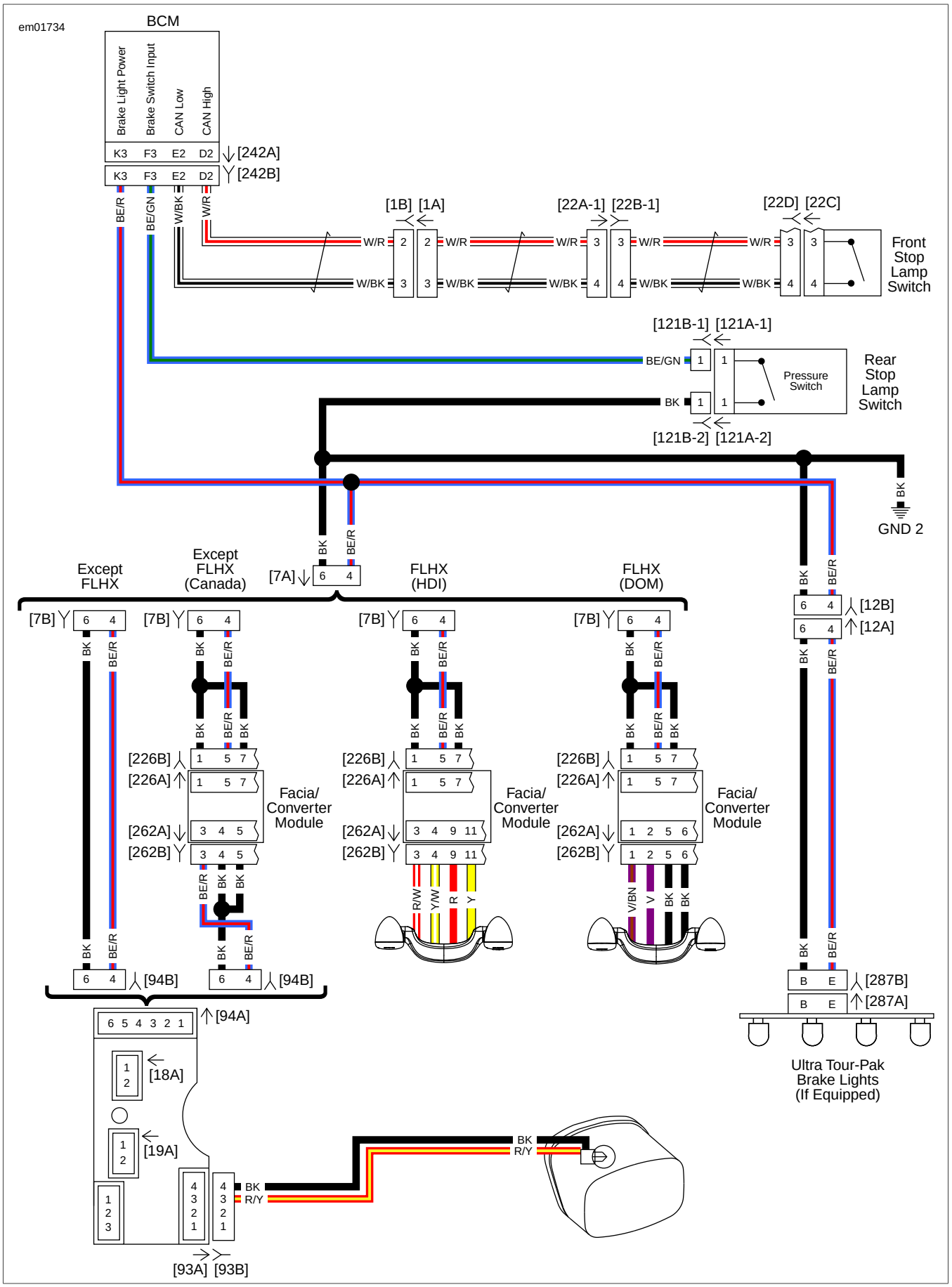


Figure 5-41. Stop Lamps: FLH With Fairing

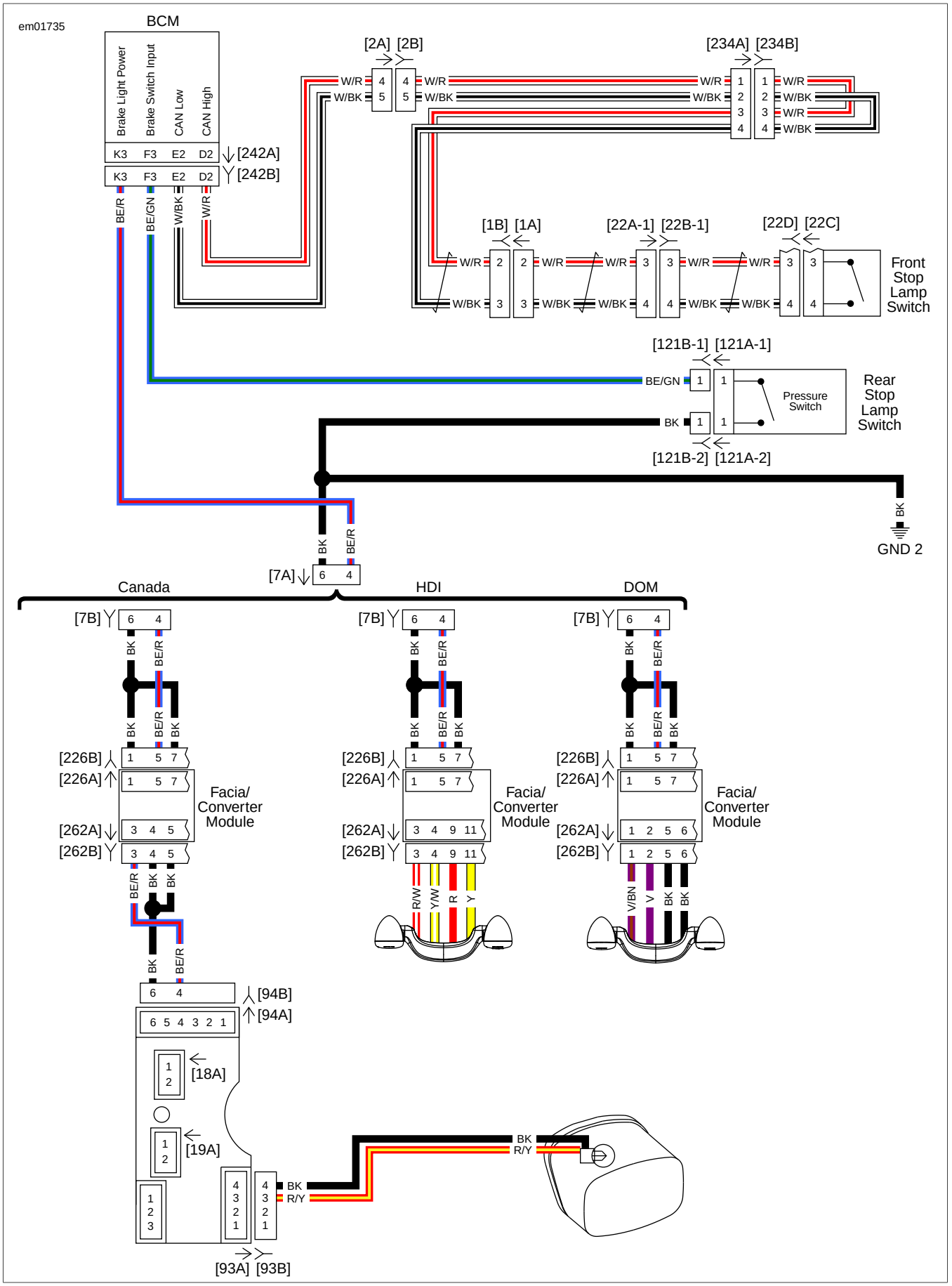


Figure 5-42. Stop Lamps: FLT With Fairing

DTC P0572

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-41. DTC P0572 Diagnostic Faults

POSSIBLE CAUSES
RHCM malfunction
Rear brake switch malfunction
Short to ground in rear brake circuit

1. Stop Lamp Test

1. Verify stop lamp is illuminated.
2. Is stop lamp illuminated?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 2.

2. Rear Brake Switch Test

1. Activate rear brake.
2. Does stop lamp illuminate?
   a. **Yes.** Replace RHCM.
   b. **No.** Go to Test 3.

3. Brake Switch Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Disconnect rear stop lamp switch [121B-1].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal F3 and [121B-1] (BE/GN) wire.
6. Is continuity present?
   a. **Yes.** Replace rear brake switch.
   b. **No.** Repair open in (BE/GN) wire. **(5041)**

4. Brake Switch Circuit Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal F3 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace RHCM.

5. Brake Switch Short to Ground Test

1. Disconnect rear stop lamp switch [121B-1].
2. Test continuity between BOB terminal F3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in [242B] terminal F3 (BE/GN) wire. **(5041)**
   b. **No.** Replace rear brake switch.

SWITCH DIAGNOSTICS 5.11

DESCRIPTION AND OPERATION

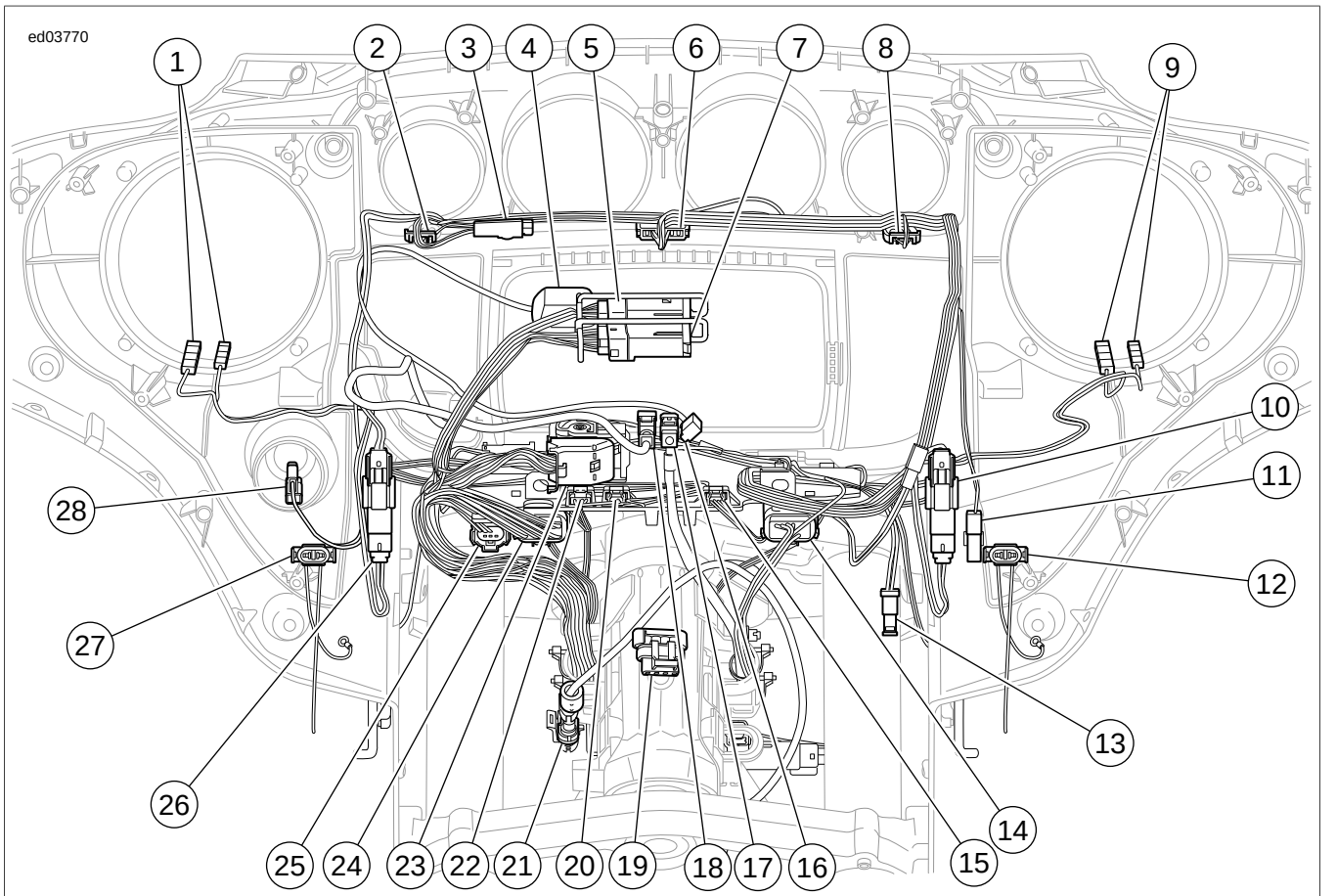
See Figure 5-43 and Figure 5-45. All of these DTCs pertain to stuck switches or an internal fault in the LHCM, RHCM or BCM. If the switches are open they will not set DTCs. In most cases, there will be symptoms depending on which switch is malfunctioning.

Table 5-42. Switch Symptoms

OPEN SWITCH	SYMPTOM
High beam	Headlamp will not toggle to high beam
Low beam	Headlamp will not toggle to low beam
Left turn signal	Left turn signals will not function/PIN cannot be entered
Right turn signal	Right turn signals will not function/PIN cannot be entered
Trip	Odometer will not cycle through different settings
Front brake	Stop lamp will not function with brake lever pulled in
Clutch	Vehicle will not start unless in neutral
Horn	Horn will not sound
Hazard	Hazard lamps will not function
Start switch	Vehicle will not start (nothing clicks)
Engine stop switch	Vehicle will not start (nothing clicks)

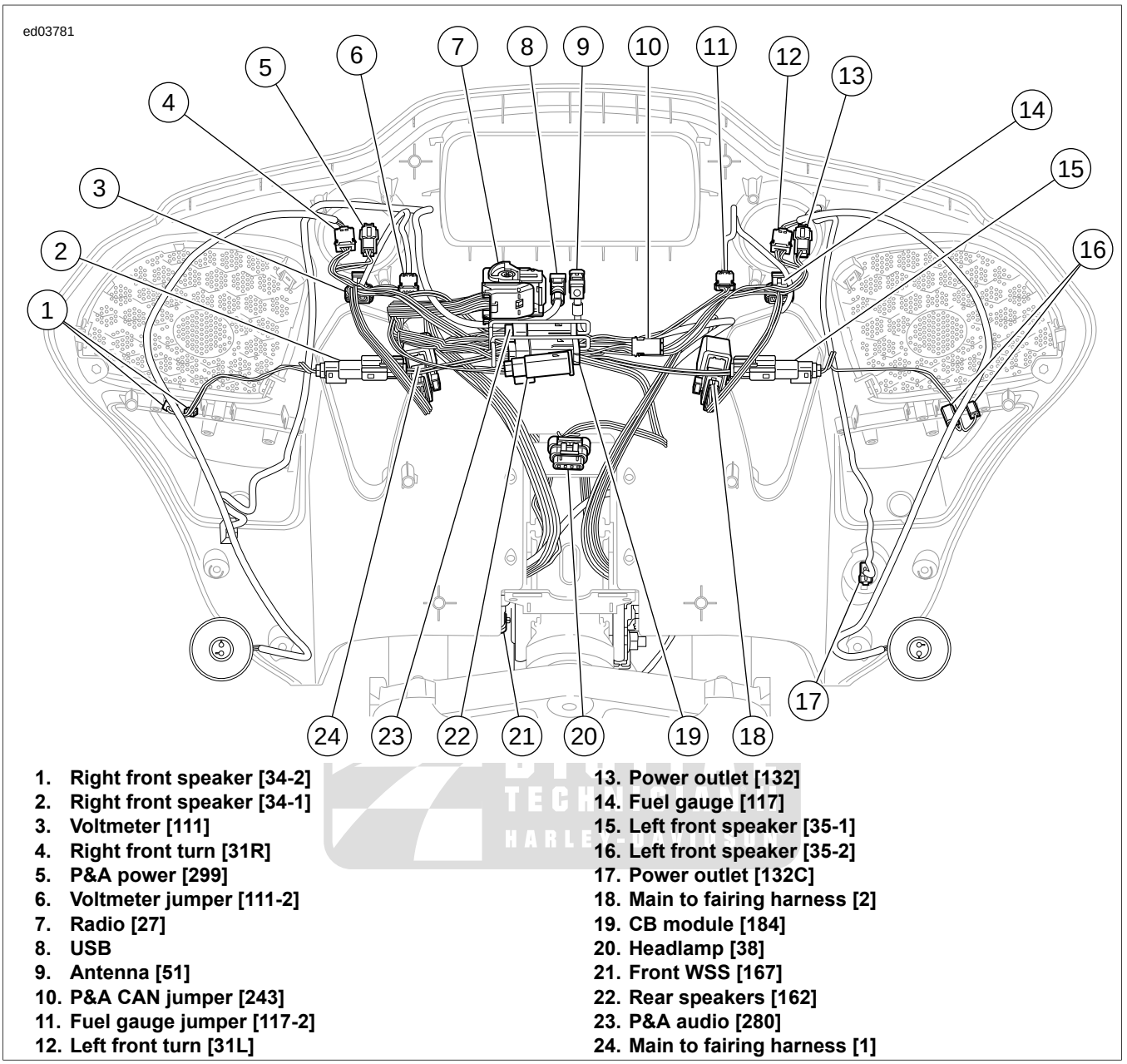
Table 5-43. Code Description

DTC	DESCRIPTION
B1103	LHCM internal error
B1153	RHCM internal error
B2210	Engine stop switch inputs both open
B2212	Engine stop switch inputs both closed
B2250	Clutch switch stuck
B2251	Horn switch stuck
B2253	FTP switch stuck
B2254	Left turn switch stuck
B2260	Start switch stuck
B2261	Right turn switch stuck
B2262	Front brake switch stuck
B2263	Hazard switch stuck
B2270	BCM internal error



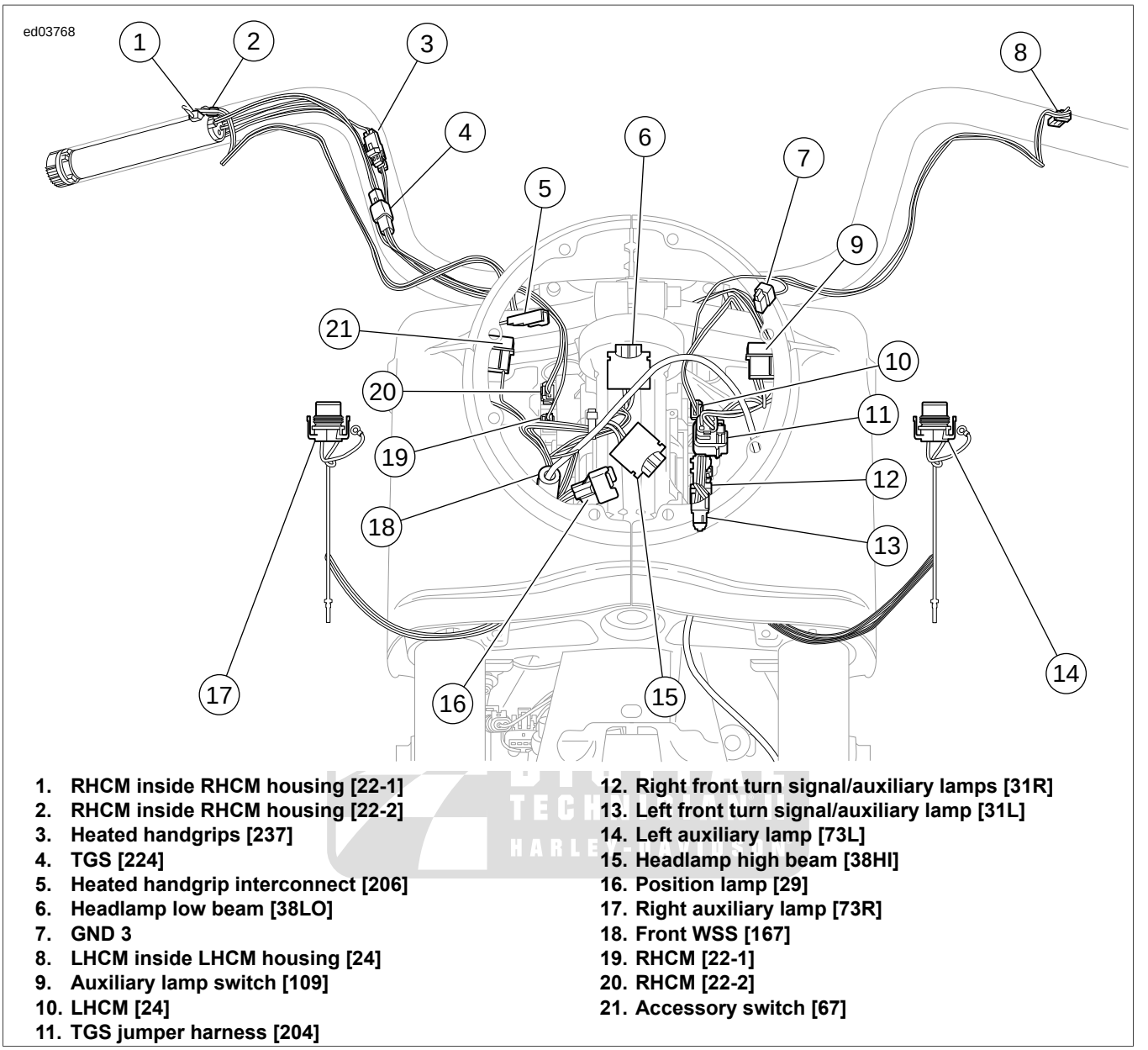
1. Right front speaker [34-2]
2. Voltmeter [111]
3. P&A power [299]
4. GPS antenna
5. P&A audio [280]
6. IM [39]
7. CB module [184]
8. Fuel gauge [117]
9. Left front speaker [35-2]
10. Left front speaker [35-1]
11. Front fender tip lamp [32]
12. Left auxiliary lamp [73L]
13. Heated handgrips [189]
14. Main to fairing harness [2]
15. LHCM [24]
16. GPS antenna [193]
17. Antenna [51]
18. USB
19. Headlamp [38]
20. RHCM [22-2]
21. Front WSS [167]
22. RHCM [22-1]
23. Radio [27]
24. Main to fairing harness [1]
25. TGS jumper harness [204]
26. Right front speaker [34-1]
27. Right auxiliary lamp [73R]
28. Power outlet [132]

Figure 5-43. Under FLH Fairing



1. Right front speaker [34-2]
2. Right front speaker [34-1]
3. Voltmeter [111]
4. Right front turn [31R]
5. P&A power [299]
6. Voltmeter jumper [111-2]
7. Radio [27]
8. USB
9. Antenna [51]
10. P&A CAN jumper [243]
11. Fuel gauge jumper [117-2]
12. Left front turn [31L]
13. Power outlet [132]
14. Fuel gauge [117]
15. Left front speaker [35-1]
16. Left front speaker [35-2]
17. Power outlet [132C]
18. Main to fairing harness [2]
19. CB module [184]
20. Headlamp [38]
21. Front WSS [167]
22. Rear speakers [162]
23. P&A audio [280]
24. Main to fairing harness [1]

Figure 5-44. Under FLT Fairing



1. **RHCM inside RHCM housing [22-1]**
2. **RHCM inside RHCM housing [22-2]**
3. **Heated handgrips [237]**
4. **TGS [224]**
5. **Heated handgrip interconnect [206]**
6. **Headlamp low beam [38LO]**
7. **GND 3**
8. **LHCM inside LHCM housing [24]**
9. **Auxiliary lamp switch [109]**
10. **LHCM [24]**
11. **TGS jumper harness [204]**
12. **Right front turn signal/auxiliary lamps [31R]**
13. **Left front turn signal/auxiliary lamp [31L]**
14. **Left auxiliary lamp [73L]**
15. **Headlamp high beam [38HI]**
16. **Position lamp [29]**
17. **Right auxiliary lamp [73R]**
18. **Front WSS [167]**
19. **RHCM [22-1]**
20. **RHCM [22-2]**
21. **Accessory switch [67]**

Figure 5-45. Headlamp Nacelle: Without Fairing

Conditions for Setting

If any of the switches are held or stuck for over two minutes with the IGN ON, the stuck switch code will set for that switch. The engine stop is either in the run or the stop position. If the RHCM does not see either input or both inputs at the same time, DTC B2210 or B2212 will set.

For DTC B2262 and B2250 to be set, the vehicle has to be in operation for more than two minutes at speed above 30 mph (48 km/h). Historic codes may indicate the rider continually applies the brake or clutch. For example, coasting downhill with the clutch lever pulled in for more than two minutes will set codes.

Diagnostic Tips

Clear the DTCs and operate the vehicle to verify the DTCs are current. Stuck switch codes will take over two minutes to set.

DTC B1103, B1153

Table 5-44. DTC B1103, B1153 Diagnostic Faults

POSSIBLE CAUSES
Open in hand control module ground circuit
Open in hand control module power circuit

1. Switch Test

1. Clear DTC.
2. Turn IGN ON and wait three minutes.
3. Check DTCs.
4. Did DTC reset?
   a. **Yes.** Replace LHCM or RHCM.
   b. **No.** Condition not currently present.

DTC B2210, B2212, B2250, B2251, B2253, B2254, B2260, B2261, B2262, B2263

Table 5-45. DTC B2210, B2212, B2250, B2251, B2253, B2254, B2260, B2261, B2262, B2263 Diagnostic Faults

POSSIBLE CAUSES
Damaged switch cap

1. Switch Test

1. Clear DTC.
2. Turn IGN ON and wait three minutes.
3. Operate vehicle to meet conditions for setting DTC.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes, except DTC B2250 or B2262.** Replace LHCM or RHCM.
   b. **Yes, DTC B2250 or B2262.** Replace clutch or brake switch.
   c. **Yes, DTC B2210 or B2212.** Replace run/stop key cap.
   d. **No.** Concern is intermittent. Switch may have been pressed for an extended period of time.

DTC B2270

Table 5-46. DTC B2270 Diagnostic Faults

POSSIBLE CAUSES
Open in BCM battery circuit
Open in BCM ground circuit

1. DTC Test

1. Clear DTC.
2. Turn IGN ON.
3. Check for DTCs.
4. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Condition not currently present.

ANY HAND CONTROL SWITCH INOPERATIVE

Table 5-47. Any Hand Control Switch Inoperative Diagnostic Faults

POSSIBLE CAUSES
Clutch switch malfunction
Brake switch malfunction

1. Switch Operation Test

1. Operate inoperative switch.
2. Does switch operate correctly?
   a. **Yes.** Condition not currently present.
   b. **No.** Replace LHCM or RHCM.

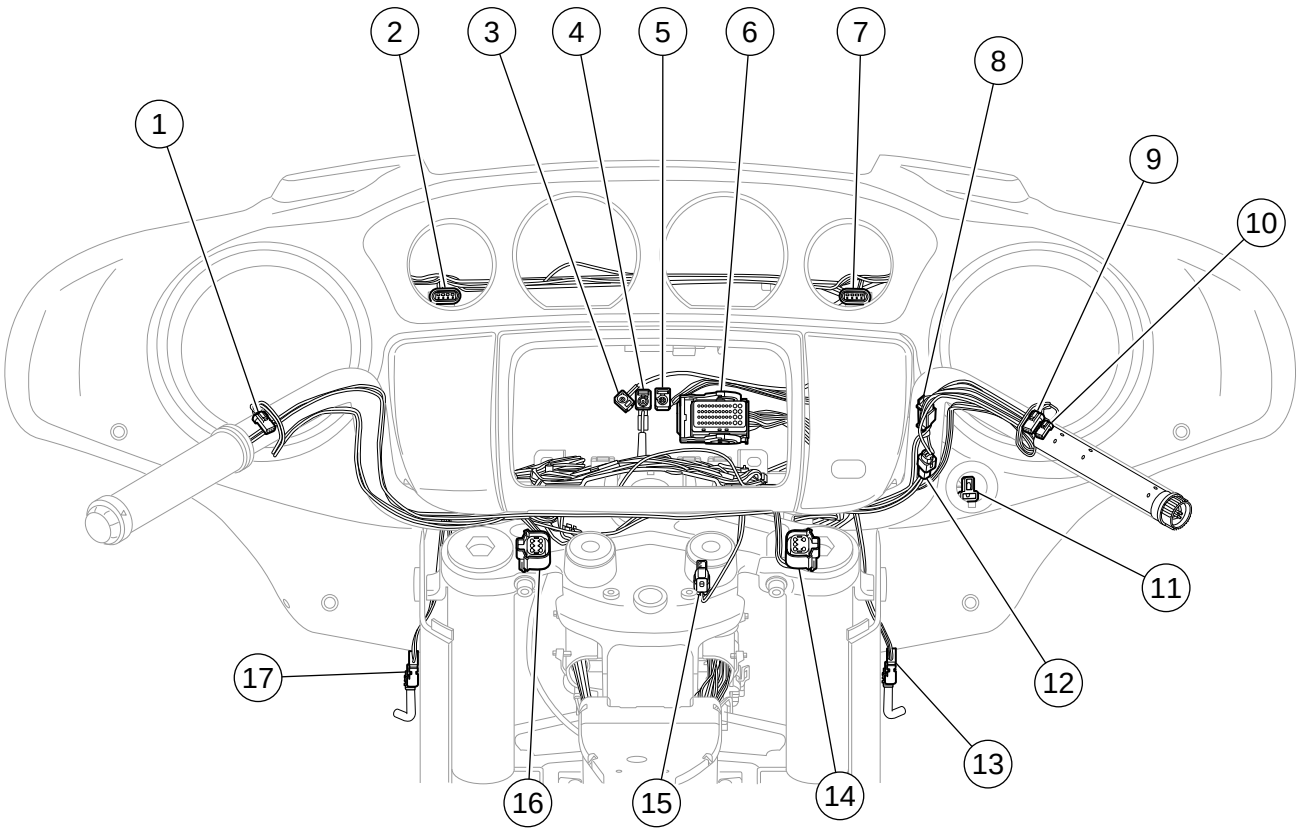
RUNNING LAMP DIAGNOSTICS 5.12

DESCRIPTION AND OPERATION

See Figure 5-46, Figure 5-47, Figure 5-48 and Figure 5-49. The running lamps consist of the front position lamp (HDI), located in the headlamp housing, the front running lamps, the license plate lamp and the tail lamp. The running lamps are powered by the BCM through terminal J3 and L4 (if equipped).

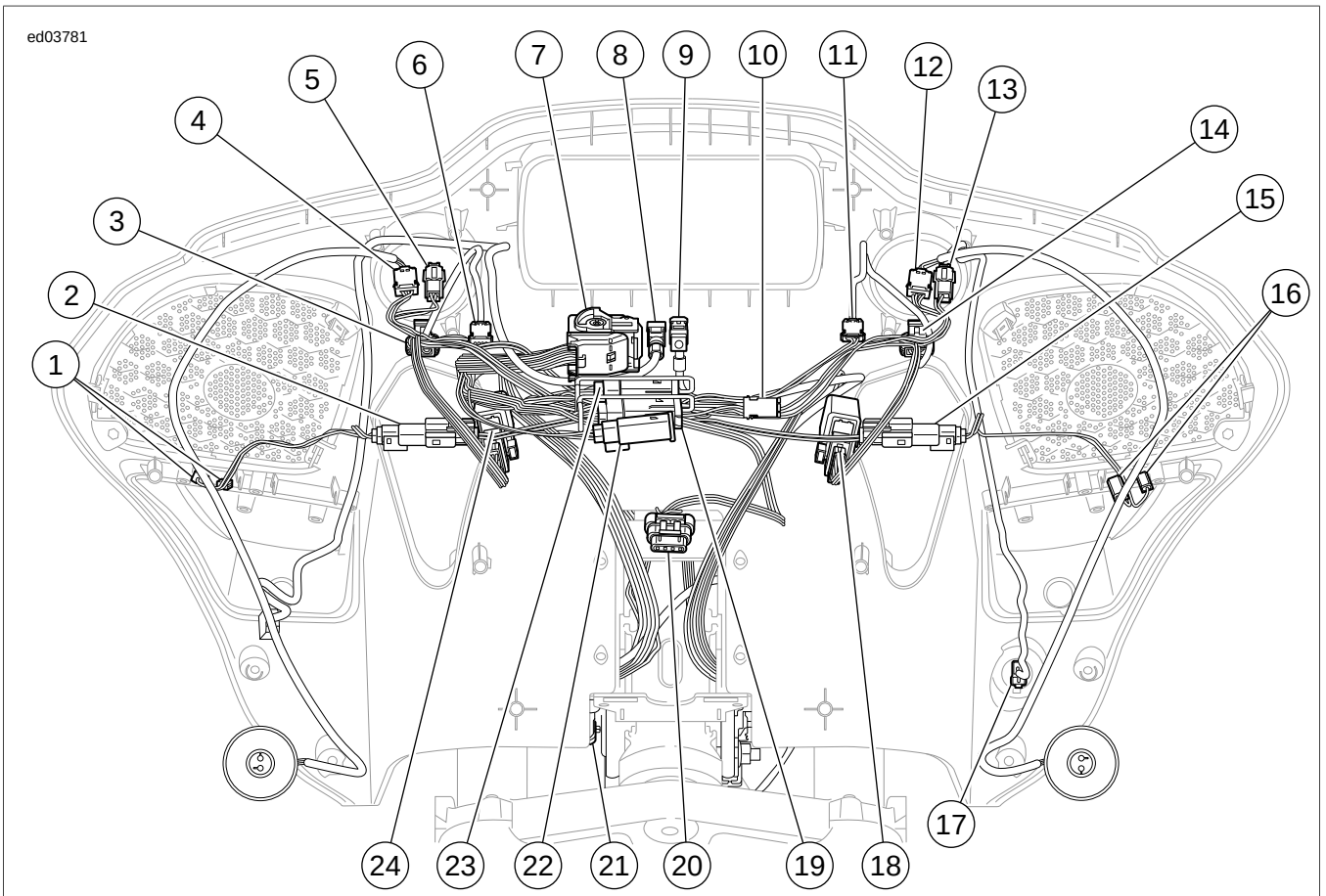
Table 5-48. Code Description

DTC	DESCRIPTION
B2168	Running lights output shorted low
B2169	Running lights output overloaded



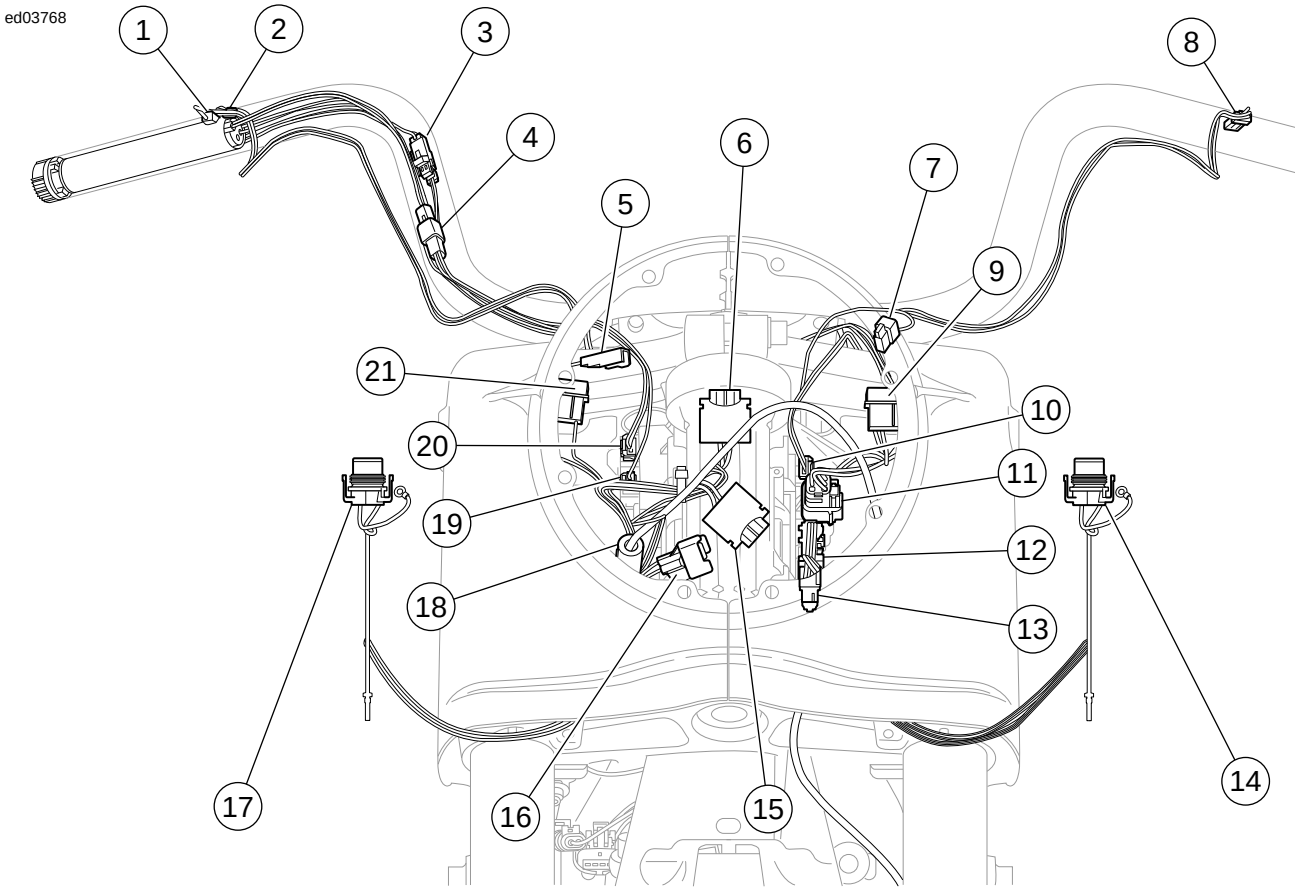
1. LHCM inside LHCM housing [24]
2. Fuel gauge [117]
3. GPS antenna [193]
4. Antenna [51]
5. USB
6. Radio [27]
7. Voltmeter [111]
8. Heated handgrips [237]
9. RHCM inside RHCM housing [22-1]
10. RHCM inside RHCM housing [22-2]
11. Power outlet [132]
12. TGS [224]
13. Right front turn/auxiliary lamps [31R]
14. Right P&A dash switch pack [105R]
15. Ignition switch [33]
16. Left OE dash switch pack [105L]
17. Left front turn/auxiliary lamps [31L]

Figure 5-46. Handlebars: FLH Fairing Models



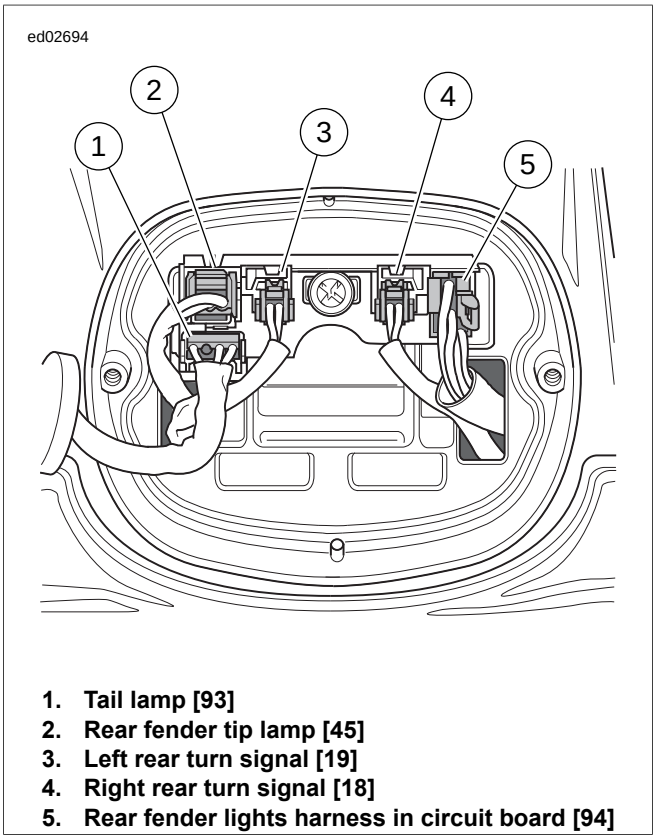
1. Right front speaker [34-2]
2. Right front speaker [34-1]
3. Voltmeter [111]
4. Right front turn [31R]
5. P&A power [299]
6. Voltmeter jumper [111-2]
7. Radio [27]
8. USB
9. Antenna [51]
10. P&A CAN jumper [243]
11. Fuel gauge jumper [117-2]
12. Left front turn [31L]
13. Power outlet [132]
14. Fuel gauge [117]
15. Left front speaker [35-1]
16. Left front speaker [35-2]
17. Power outlet [132C]
18. Main to fairing harness [2]
19. CB module [184]
20. Headlamp [38]
21. Front WSS [167]
22. Rear speakers [162]
23. P&A audio [280]
24. Main to fairing harness [1]

Figure 5-47. Under FLT Fairing



1. RHCM inside RHCM housing [22-1]
2. RHCM inside RHCM housing [22-2]
3. Heated handgrips [237]
4. TGS [224]
5. Heated handgrip interconnect [206]
6. Headlamp low beam [38LO]
7. GND 3
8. LHCM inside LHCM housing [24]
9. Auxiliary lamp switch [109]
10. LHCM [24]
11. TGS jumper harness [204]
12. Right front turn signal/auxiliary lamps [31R]
13. Left front turn signal/auxiliary lamp [31L]
14. Left auxiliary lamp [73L]
15. Headlamp high beam [38HI]
16. Position lamp [29]
17. Right auxiliary lamp [73R]
18. Front WSS [167]
19. RHCM [22-1]
20. RHCM [22-2]
21. Accessory switch [67]

Figure 5-48. Headlamp Nacelle: Without Fairing



1. **Tail lamp [93]**
2. **Rear fender tip lamp [45]**
3. **Left rear turn signal [19]**
4. **Right rear turn signal [18]**
5. **Rear fender lights harness in circuit board [94]**

Figure 5-49. Rear Fender Lights Assembly

Conditions for Setting

The running lamps circuit powers up when the ignition is turned on. On HDI models, the running lamp circuit is also powered in the ACC position. Any running lamp related DTCs will set shortly after the ignition is turned on.

- DTC B2106 will set if the running lights circuit is below 120 milliamps.
- DTC B2169 will set if the running lights circuit is above 3 Amps.
- DTC B2109 will set if the switched power output circuit is above 10 Amps.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

em01593

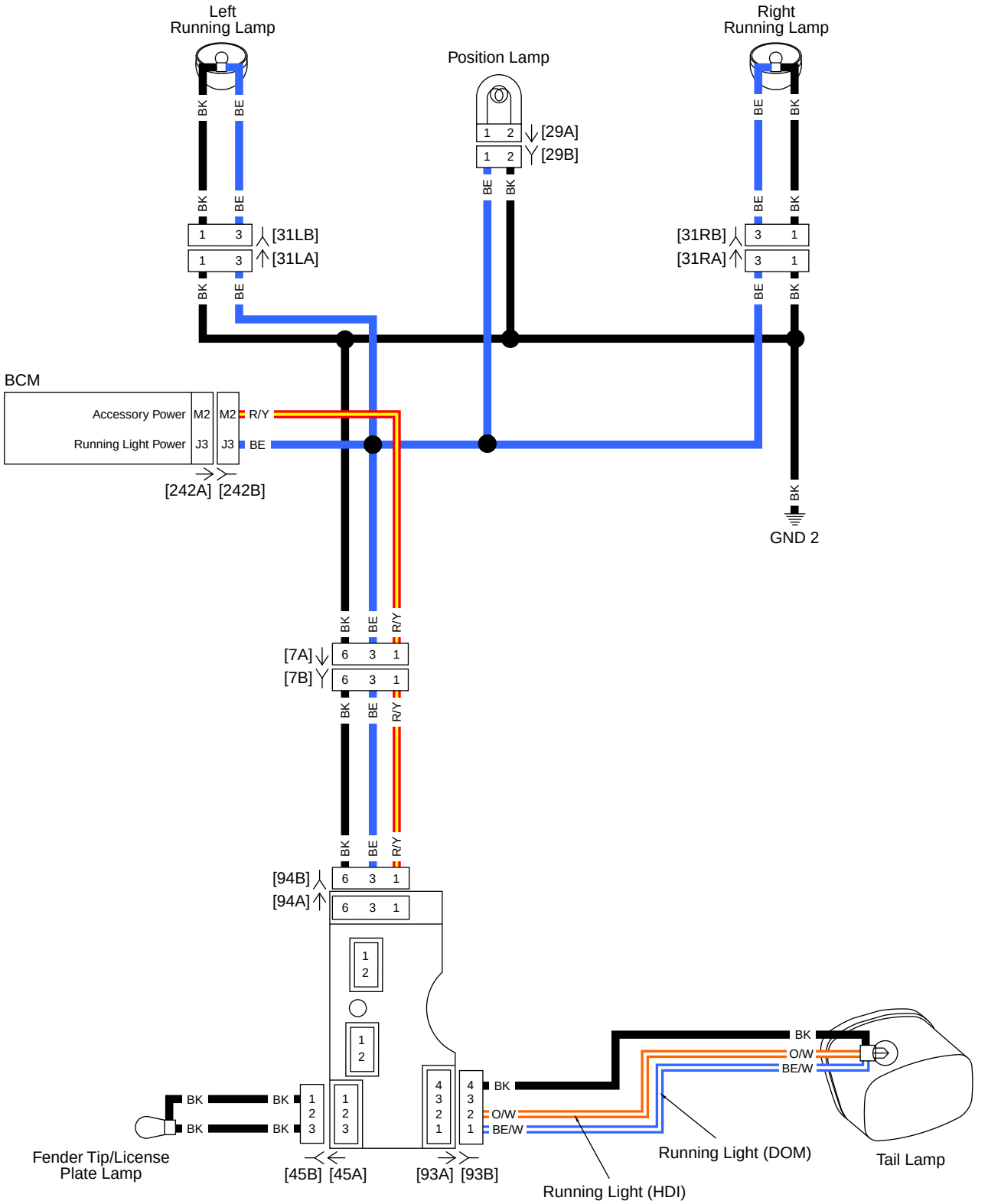


Figure 5-50. Running Lamps: Non-Fairing Models

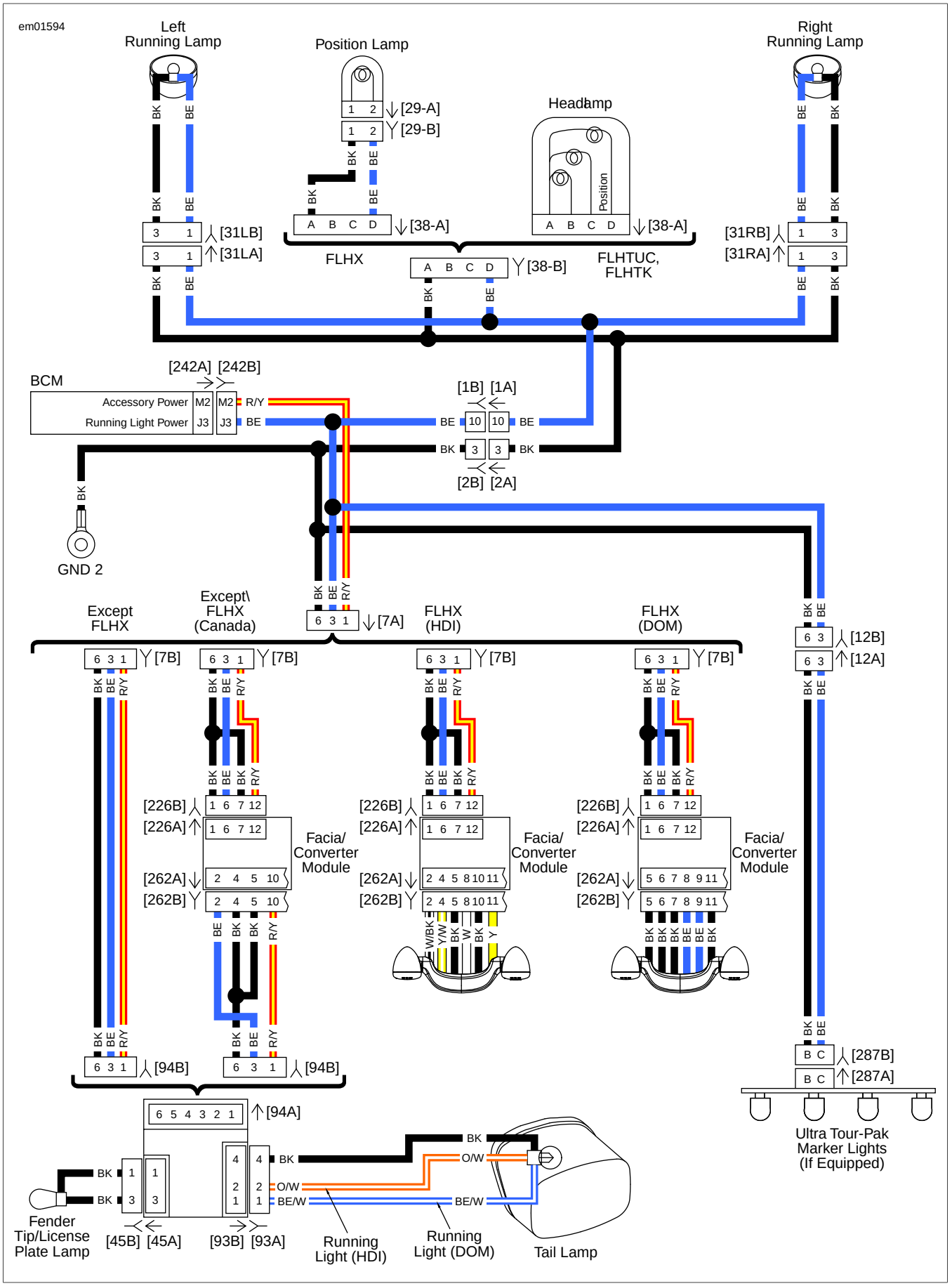


Figure 5-51. Running Lamps: FLH Fairing Models

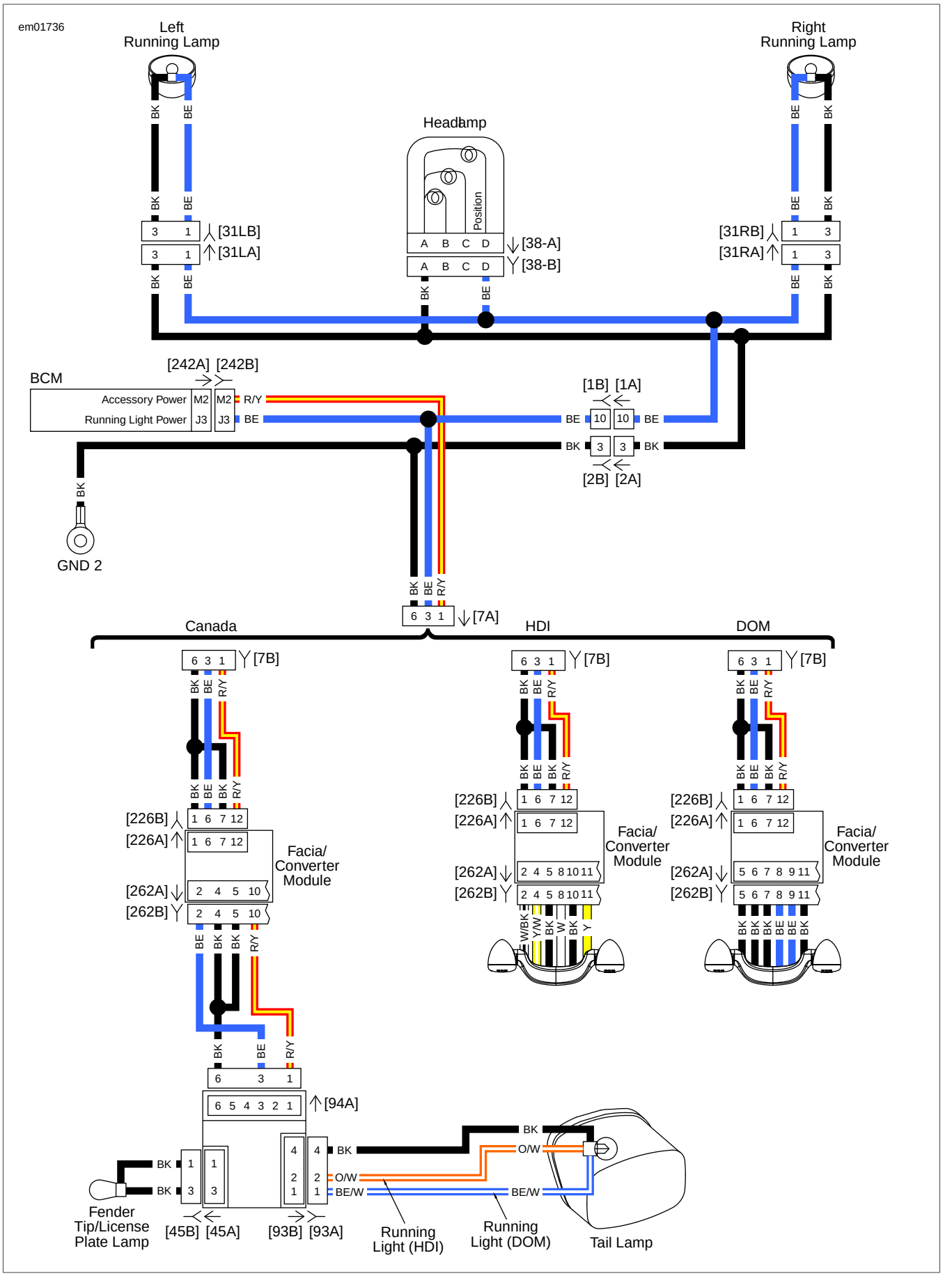


Figure 5-52. Running Lamps: FLT Fairing Models

POSITION LAMP INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 5-49. Position Lamp Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open accessory circuit
Lamp malfunction
Open ground circuit

1. Headlamp Inspection Test

1. Visually inspect headlamp.
2. Does headlamp have a separate connector for position lamp?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. Position Lamp Test

1. Turn IGN OFF.
2. Disconnect position lamp [29].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [29B] terminals 1 and 2.
5. Is battery voltage present?
   a. **Yes.** Replace position lamp. **(5143)**
   b. **No.** Go to Test 3.

3. Ground Circuit Test

1. Test voltage between [29B] terminal 1 and ground.
2. Is battery voltage present?
   a. **Yes.** Repair open in (BK) ground wire. **(5041)**
   b. **No.** Repair open in (BE) wire. **(5043)**

4. Position Headlamp Test

1. Turn IGN OFF.
2. Disconnect headlamp [38].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [38B] terminals A and D.
5. Is battery voltage present?
   a. **Yes.** Replace headlamp. **(5143)**
   b. **No.** Go to Test 5.

5. Ground Circuit Test

1. Test voltage between [38B] terminal D and ground.
2. Is battery voltage present?
   a. **Yes.** Repair open in (BK) ground wire. **(5041)**
   b. **No.** Repair open in (BE) wire. **(5043)**

RUNNING LAMPS INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-50. Running Lamps Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open lights circuit
Lamp malfunction
Open ground circuit

1. Running Lamp Test

1. Visually inspect all running lamps.
2. Do any running lamps work?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 7.

2. Running Lamp ID Test

1. Visually inspect running lamps that are not working.
2. Are they located in Tour-Pak?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 3.

3. General Lamp Test

1. Inspect inoperative lamp and repair any issues.
2. Disconnect inoperative lamp connector.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between inoperative lamp power and ground terminals.
4. Is battery voltage present?
   a. **Yes.** Replace inoperative lamp.
   b. **No.** Go to Test 4.

4. Single Lamp Power Test

1. Test voltage between inoperative lamp power terminal and ground.
2. Is battery voltage present?
   a. **Yes.** Repair open in ground circuit. **(5041)**
   b. **No.** Repair open in power circuit. **(5041)**

5. General LED Test

1. Turn IGN OFF.

2. Disconnect Tour-Pak [278B].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [278B] terminals B and C.
4. Turn IGN ON.
5. Is battery voltage present?
   a. **Yes.** Replace Ultra Tour-Pak rear marker lights.
   b. **No.** Go to Test 6.

6. LED Power Test

1. Test voltage between [278B] terminals C and ground.
2. Is battery voltage present?
   a. **Yes.** Repair open in ground (BK) wire. **(5041)**
   b. **No.** Repair open in power circuit (BE) wire. **(5041)**

7. Running Lamp Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Disconnect rear lighting [7].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal J3 and [7A] terminal 3.
6. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in (BE) wire.

DTC B2168, B2169

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-51. DTC B2168, B2169 Diagnostic Faults

POSSIBLE CAUSES
Running lights circuit resistance too low
Short to ground in running lights power circuit
Accessory lighting overloading circuit

1. Rear Running Lamps Circuit Test

1. Turn IGN OFF.
2. Disconnect rear running lamps [7].
3. Clear DTC.
4. Cycle IGN OFF-ON.
5. Did DTC return?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair short to ground or high current draw in the running lamp circuit of the rear lighting harness or components.

2. Front Running Lamp Circuit Test

1. Turn IGN OFF.
2. Disconnect front turn signal [31L] and [31R].
3. Clear DTC.
4. Turn IGN ON.
5. Did DTC return?
   a. **Yes. FLHR/C and FLHX/S.** Go to Test 4.
   b. **Yes. FLHTCU, FLHTK and FLT.** Go to Test 3.
   c. **No.** Repair short to ground in front running lamps.

3. Tour-Pak Running Lamps Circuit Test

1. Turn IGN OFF.
2. Disconnect Tour-Pak running lamps [12].
3. Clear DTC.
4. Cycle IGN OFF-ON.
5. Did DTC return?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to ground or high current draw in Tour-Pak harness in the running lamp power circuits.

4. BCM Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal (J3) and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground in (BE) wire.
   b. **No.** Replace BCM.

LP LAMP INOPERATIVE (WITHOUT CENTER STOP LAMP)

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-52. LP Lamp Inoperative (Without Center Stop Lamp) Diagnostic Faults

POSSIBLE CAUSES
Open accessory circuit
Lamp malfunction
Open ground circuit

1. LP Lamp Bulb Test

1. Turn IGN OFF.
2. Remove LP lamp bulb.
3. Inspect bulb.
4. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No. Lamp is LED.** Go to Test 2.
   c. **No. Bulb does not work.** Replace bulb. **(6820)**

2. LP Lamp Circuit Test

1. Disconnect rear lighting [262] (FLHX/S, FLT).
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage at:
   a. **FLHX/S except U.S.** [262A] terminals 5 and 10.
   b. **FLHX/S U.S.** [262A] terminals 7 and 11.
   c. **FLT except U.S.** [262A] terminals 5 and 10.
   d. **FLT U.S.** [262A] terminals 7 and 11.
3. Turn IGN ON.
4. Is voltage present?
   a. **Yes.** Replace light bar. **(6823)**
   b. **No.** Go to Test 3.

3. LP Lamp Component Test

1. Turn IGN OFF.
2. Disconnect facia/converter module [226].
3. Turn IGN ON.
4. Test voltage between [226B] terminals 1 and 12.
5. Is voltage present?
   a. **Yes.** Replace facia/converter module. **(6809)**
   b. **No.** Go to Test 4.

4. LP Lamp Ground Circuit Test

1. Test voltage between [226] terminal 12 and ground.
2. Is voltage present?
   a. **Yes.** Repair open in (BK) wire. **(5041)**
   b. **No.** Go to Test 5.

5. LP Lamp Power Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal M2 and [226] terminal 12.
5. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in (R/Y) wire. **(5041)**

LP LAMP INOPERATIVE (WITH CENTER STOP LAMP)

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-53. LP Lamp Inoperative (With Center Stop Lamp) Diagnostic Faults

POSSIBLE CAUSES
Open accessory circuit
Lamp malfunction
Open ground circuit

1. LP Lamp Bulb Test

1. Turn IGN OFF.
2. Remove LP lamp bulb.
3. Inspect bulb.
4. Is bulb good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace bulb. **(6820)**

2. LP Lamp Circuit Test

1. Disconnect tail lamp [93].
2. Turn IGN ON.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [93A] terminals 1 and 4 (U.S.) or terminals 2 and 4 (except U.S.).

4. Is voltage present?
   a. **Yes.** Replace tail lamp assembly. **(6823)**
   b. **No.** Go to Test 3.

3. LP Lamp Component Test

1. Disconnect [94].
2. Test voltage between [94B] terminals 3 and 6 (U.S.) or terminals 1 and 6 (except U.S.).
3. Is voltage present?
   a. **Yes.** Replace circuit board. **(5215)**
   b. **No.** Go to Test 4.

4. LP Lamp Ground Circuit Test

1. Test voltage between [94B] terminal 3 (U.S.) or terminal 1 (except U.S.) and ground.
2. Is voltage present?
   a. **Yes.** Repair open in (BK) wire. **(5041)**
   b. **No.** Go to Test 5.

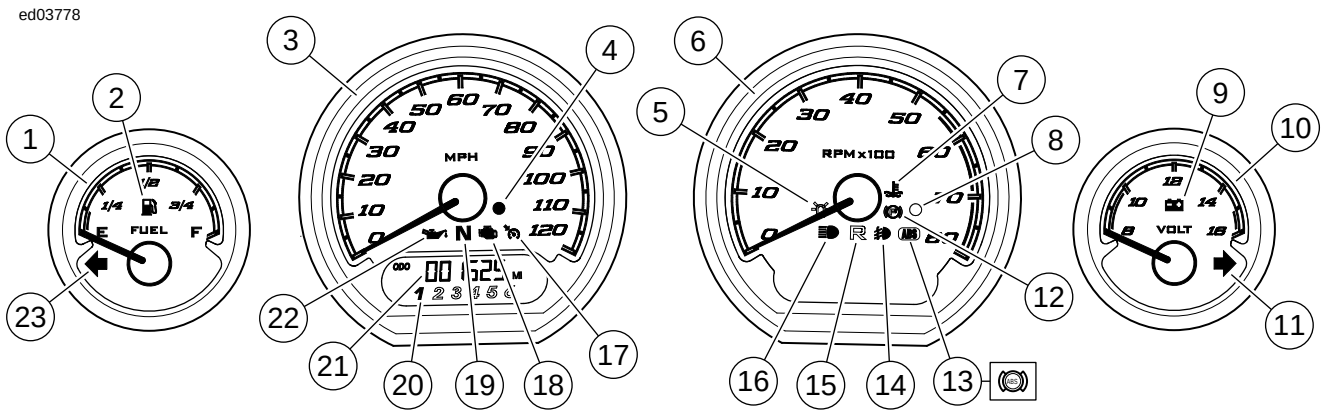
5. LP Lamp Power Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal J3 and [94B] terminal 3 (U.S.) or BOB terminal M2 and [94B] terminal 1 (except U.S.).
5. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in (BE) or (R/Y) wire. **(5041)**

SECURITY SYSTEM 5.13

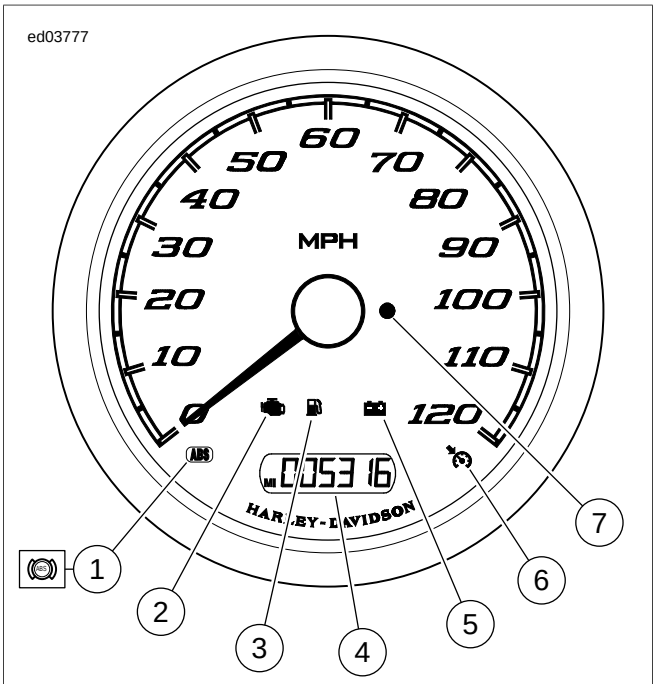
SECURITY LAMP

See Figure 5-53 and Figure 5-54. The security lamp indicates system status. Refer to Table 5-54.



1. Fuel gauge
2. Low fuel lamp
3. Speedometer
4. Security lamp
5. Not used for these models
6. Tachometer
7. Engine coolant temperature lamp
8. Light sensor (not an indicator)
9. Battery discharge lamp
10. Voltmeter
11. Right turn signal indicator lamp
12. Not used for these models
13. ABS icon lamp (km/h ABS icon lamp also shown)
14. Auxiliary/fog lamp indicator lamp
15. Not used for these models
16. Headlamp high beam lamp
17. Cruise control lamp
18. Check engine lamp
19. Neutral lamp
20. Gear indicator
21. Odometer window
22. Oil pressure lamp
23. Left turn signal indicator lamp

Figure 5-53. Indicator Lamps: Typical (Fairing Models)



1. **ABS icon lamp (km/h ABS icon lamp also shown)**
2. **Check engine lamp**
3. **Low fuel lamp**
4. **Odometer window**
5. **Battery discharge lamp**
6. **Cruise control lamp**
7. **Security lamp**

Figure 5-54. Indicator Lamps: Non-Fairing Models

Table 5-54. Security Lamp Status

LAMP	MODE
Does not flash.	Security system not armed.
Flashes every second.	Two minute timeout after failed PIN entry attempt or a battery reconnect has occurred while armed.
Flashes every 2.5 seconds.	Security system armed.
Flashes 4 times a second.	PIN entry mode.
Stays on solid with IGN OFF.	Arming is starting up. You have five seconds before system is armed.
Stays on solid with IGN ON.	If solid for more than four seconds after IGN ON, a current DTC is present.

SECURITY IMMOBILIZATION

NOTE

Always disarm the vehicle by turning the IGN ON with the fob present before removing or disconnecting the battery. This prevents the siren (if installed) from activating.

If the vehicle is equipped with the security system, the functionality is provided by a security BCM. The BCM will disable the starter and ignition system. Additional functions include the ability to alternately flash the left and right turn signals and sound a siren (if equipped) if a theft attempt is detected.

NOTE

The siren must be in the chirp mode for the siren to chirp on arming or disarming. See 5.15 SIREN, Siren Chirp Mode Confirmation.

Conditions that trigger a security event when system is armed include:

- **Detecting tampering of the ignition circuit:** Turn signals flash three times, optional siren chirps once and then turns off. If the tampering continues, a second warning will activate after four seconds. Continued tampering will cause the alarm to activate for 30 seconds and then turn off. The two warnings/alarm cycle is repeated for each tampering incident. The system will remain armed and the vehicle will be immobilized.
- **Detecting vehicle movement:** Turn signals flash three times, optional siren chirps once and then turns off. If the vehicle is not returned to its original position, a second warning will activate after four seconds. If the vehicle is not returned to its original position, the alarm activates for 30 seconds then turns off. The two warnings/alarm cycle may repeat a maximum of 10 times with a 10 second pause between cycles.
- **Detecting that a battery or ground disconnect has occurred while armed:** The optional siren activates its self-alarm mode. Turn signals will not flash.

SECURITY SYSTEM FEATURES

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The following information applies only to vehicles equipped with the security.

- **Personal code disarming:** If the fob is not available or inoperative, the BCM allows the rider to disable the security alarm and immobilization functions with a five-digit personal code.
- **Arming confirmation:** When the security system is armed, the system provides visual feedback (confirmation) to the rider by flashing the turn signals and an audible "chirp" if equipped with the optional smart siren and chirp mode is enabled.
- **Disarming confirmation:** When the security system is disarmed, the system provides an audible "chirp" (confirmation) if equipped with the optional smart siren and chirp mode is enabled.
- **Transport mode:** It is possible to arm the security system without enabling the motion detector for one ignition cycle. This allows the vehicle to be moved in an immobilized state.
- **Starter/ignition disable:** When armed the starter and ignition system are disabled.
- **Security system alarm:** See 5.15 SIREN. The system will alternately flash the left and right turn signals and sound an optional Smart Siren if a vehicle security condition is detected while the system is armed.
- **Dealer service mode:** This mode allows the dealer to disable security system via DIGITAL TECHNICIAN II (Part

No. HD-48650). Dealer service mode is exited when the IGN is turned ON with the assigned fob in range.

SECURITY SYSTEM WARNINGS

A warning consists of three alternate flashes of the turn signals and chirp from the optional smart siren. Warnings are issued from an armed security system in the following order:

1. **First Warning:** A warning is issued whenever a person without a fob present or with the system armed attempts to move the vehicle or turns the ignition switch to **IGN.**
2. **Second Warning:** If the motion continues or the ignition switch is not turned back to **OFF**, a second warning is issued within four seconds of the first.
3. **Alarm:** If the motion continues or the ignition switch is not turned to **OFF** past the second warning, the smart security system will go into full alarm.

ARMING

The H-DSSS automatically arms within five seconds when the vehicle is parked and the ignition switch is turned to **OFF** or **ACC** and motion is not detected.

On arming, the turn signals flash twice and the smart siren will "chirp" twice if chirp function is activated. While armed, the security lamp will flash once every 2.5 seconds. Refer to Table 5-54.

DISARMING

There are two ways to disarm the H-DSSS:

- Automatic disarming.
- Using the PIN.

Automatic Disarming

Always have the fob present when riding, loading, fueling, moving, parking or servicing the vehicle. Carry the fob in a convenient pocket. The vehicle can be moved in an armed state with the fob present without triggering the alarm. The H-DSSS disarms automatically when the ignition switch is turned to ON.

On disarming, the smart siren will chirp once (if chirp function is activated) and the security lamp will turn ON solid for four seconds then go out. Refer to Table 5-54.

Disarming with a PIN

See 5.16 SERVICE AND EMERGENCY FUNCTIONS AND CONFIGURATIONS to enter an initial PIN to enable the system.

If you make an error while disarming the security system using the PIN, the alarm will activate for 30 seconds after the last digit is entered. After a failed attempt, the security lamp will flash once every second for two minutes. **During this time, the vehicle will not accept any attempt to enter a PIN.** Refer to Table 5-55.

Table 5-55. Entering a PIN to Disarm Harley-Davidson Smart Security System

STEP NO.	ACTION	WAIT FOR CONFIRMATION	NOTES
1	If necessary, verify the current 5-digit PIN.		Should be recorded on wallet card.
2	Turn ignition to **IGN**.	If armed, the odometer window display will read: ENTER PIN and the security lamp will be flashing at a fast rate. The headlight will not be on.	
3	Press and release the left turn signal switch.	In the odometer window, a flashing 1 will appear.	
4	Increment the digit by tapping the left turn signal until the odometer window displays the first digit of the PIN.	The first digit in the odometer will be the first digit in the PIN.	
5	Press **right** turn switch **1 time.**	The first digit is stored and the next digit will flash.	Serves as enter key.
6	Increment the second digit using the left turn switch until the digit reaches the second digit of the PIN.	The second digit in the odometer will be the second digit in the PIN.	
7	Press right turn switch 1 time.	The second digit is stored and the next dash will flash.	Serves as enter key.
8	Increment the third digit using the left turn switch until it reaches the third digit of the PIN.	The third digit in the odometer will be the third digit in the PIN.	
9	Press **right** turn switch **1 time**.	The third digit is stored and the next dash will flash.	Serves as enter key.
10	Increment the fourth digit using the left turn switch until it reaches the fourth digit of the PIN.	The fourth digit in the odometer will be the fourth digit in the PIN.	

Table 5-55. Entering a PIN to Disarm Harley-Davidson Smart Security System

STEP NO.	ACTION	WAIT FOR CONFIRMATION	NOTES
11	Press **right** turn switch **1 time.**	The fourth digit is stored and the next dash will flash.	Serves as enter key.
12	Increment the fifth digit using the left turn switch until it reaches the fifth digit of the PIN.	The fifth digit in the odometer will be the fifth digit in the PIN.	
13	Press **right** turn switch **1 time**.	The fifth digit is stored. The security system indicator lamp stops blinking.	Smart Security System is disarmed.

ALARM

Activation

When the alarm system is activated:

- Turn signals alternately flash.
- Smart siren, if equipped, sounds.

After 30 seconds of alarm, if no further vehicle motion is detected, the alarm will stop.

NOTE

*Vehicle must be returned to original parked position with ignition switch turned to **OFF**.*

If vehicle motion continues, the alarm will start again and continue for another 30 seconds.

The security system will repeat the alarm cycles 10 times for a total of five minutes, with a 10-second pause between alarm cycles.

During warnings and alarms, the starter motor and the ignition remain disabled.

Deactivation

Stop the alarm at any time by moving an assigned fob to the vehicle. The presence of the fob will terminate the alarm.

KEY FOB 5.14

DESCRIPTION AND OPERATION

See Figure 5-55. The fob's reception range for the signal depends on a specific receiver pattern. The typical range will be an arm's length.

NOTES

- *Environmental and geographic conditions impact signal range.*
- *Always have the fob present whenever the vehicle is operated.*
- *Do not place fob in metal enclosure. Do not place it closer than 3.0 in. (80.0 mm) to cellular phones, the handsfree antenna, PDAs, displays and other electronic devices while operating the vehicle. That may prevent the fob from disarming the security system.*
- *Replace the fob battery every year.*

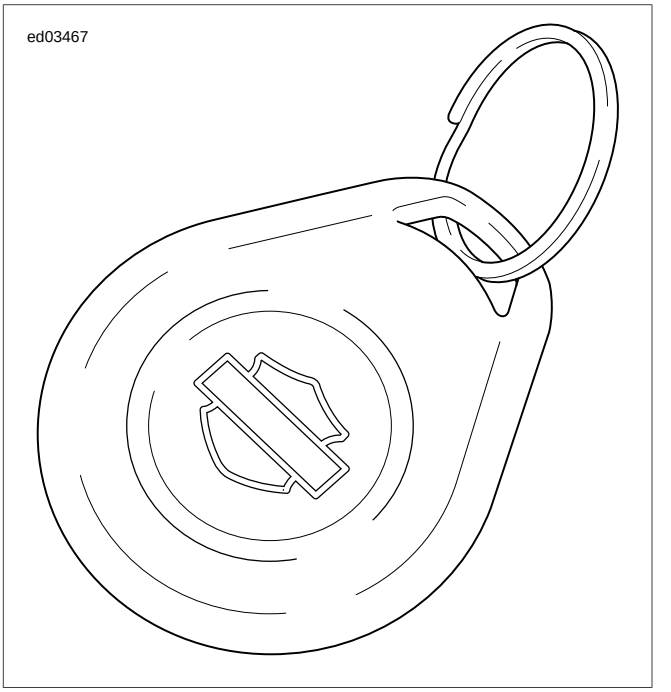


Figure 5-55. Hands-Free Fob

FOB ASSIGNMENT

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

Use DIGITAL TECHNICIAN II (Part No. HD-48650) to assign both fobs to the H-DSSS. Follow the menu prompts in the DIGITAL TECHNICIAN II (Part No. HD-48650) display and scan the fob serial number with the bar code reader, or key-in the number from the keyboard.

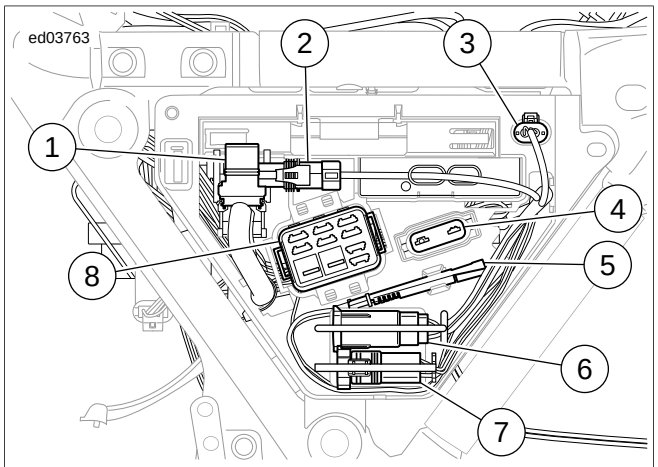
NOTE

Each fob has a unique serial number. Attach fob label to a blank NOTES page in the owner's manual for reference.

SIREN 5.15

DESCRIPTION AND OPERATION

See Figure 5-56. If equipped, the siren is attached at [142] off the BCM. Through this connector it shares the battery circuit, the ground circuit and the alarm signal circuit with the BCM. The siren adds an audible warning to the visual warnings that are a standard function of the security system.



1. **BCM [242]**
2. **BCM power [259]**
3. **Security siren [142]**
4. **Main fuse [5]**
5. **Battery tender [281]**
6. **Auxiliary devices [4]**
7. **DLC [91]**
8. **Fuse block [64]**

Figure 5-56. Under Left Side Cover

SIREN CHIRP MODE CONFIRMATION

Chirpless Mode

In the chirpless mode, the siren does not chirp on arming or disarming.

NOTE

Even when armed in the chirpless mode, the siren still chirps warnings on movement and will activate the alarm through the normal cycles.

Chirp Mode

On arming in the chirp mode, the siren responds with two chirps. When disarming, the siren responds with a single chirp.

Switching Modes

Cycling quickly through three armings and disarmings will switch chirp mode.

1. With the fob present, the IGN ON and the system disarmed, turn the IGN OFF.
2. When the security lamp turns off, immediately turn the IGN ON. If the turn signals flash twice before the IGN is turned ON, the system will drop out of the switching mode sequence and will have to be started over from the beginning.
3. Wait until the security lamp goes out, then immediately turn the IGN OFF.
4. When the security lamp turns off, immediately turn the IGN ON. If the turn signals flash twice before the IGN is turned ON, the system will drop out of the switching mode sequence and will have to be started over from the beginning.
5. Wait until the security lamp goes out, then immediately turn the IGN OFF.
6. When the security lamp turns off, immediately turn the IGN ON. If the turn signals flash twice before the IGN is turned ON, the system will drop out of the switching mode sequence and will have to be started over from the beginning.

SERVICE AND EMERGENCY FUNCTIONS AND CONFIGURATIONS 5.16

GENERAL

Setting up a vehicle's security requires a BCM that is security equipped.

ACTUATION

Actuation consists of assigning two fobs to the system and entering an initial PIN. The PIN can be changed by the rider at any time.

1. Configure vehicles by assigning **both** fobs to the vehicle.
2. Configure vehicles by entering a PIN picked by the owner. The personal code allows the owner to operate the system if the fob is lost or inoperable. Record the PIN in the owner's manual wallet card. Instruct the customer to always carry this card when riding the motorcycle.

Once the system has been activated, it will always arm within five seconds of turning the ignition switch to **OFF** or **ACC** and no vehicle motion.

SELECTING A PIN

The PIN consists of five digits. Each digit can be any number from 1-9. There can be no zeros (0) in the PIN. The PIN **must** be used to disarm the security system in case the fob becomes unavailable.

INITIAL PIN ENTRY

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The initial PIN entry should be performed using DIGITAL TECHNICIAN II (Part No. HD-48650) in conjunction with fob assignment.

CHANGING THE PIN

To change a PIN, refer to Table 5-56.

If a PIN was previously entered, the odometer will display the equivalent digit. To increment the digits, press the left turn signal switch. The first press selects the same value and then each additional press of the left turn signal switch will increment the digit by one.

Examples:

- To advance from 5 to 6, press and release the left turn switch twice.
- To advance from 8 to 2, press and release the left turn switch four times.

Table 5-56. Changing the PIN

STEP NO.	ACTION	WAIT FOR CONFIRMATION	NOTES
1	Select a 5-digit (1 thru 9) PIN and record on the wallet card from owner's manual.		
2	With an assigned fob present, turn the OFF/RUN switch to **OFF**.		
3	Turn the ignition switch to **IGN**.		
4	Cycle the OFF/RUN switch twice: **RUN - OFF - RUN - OFF - RUN**.		
5	Press **left** turn signal switch **2 times**.	ENTER PIN will scroll through the odometer window.	
6	Press **right** turn signal switch **1 time** and release.	Turn signals will flash 3 times. Current PIN will appear in odometer. The first digit will be flashing.	
7	Enter first digit of new PIN by pressing and releasing the **left** turn signal switch until the selected digit appears.		
8	Press **right** turn signal switch **1 time** and release.	The new digit will replace the current in odometer window.	
9	Enter second digit of selected PIN by pressing and releasing the **left** turn signal switch until the selected digit is present.		
10	Press **right** turn signal switch **1 time** and release.	The new digit will replace the current in odometer window.	

Table 5-56. Changing the PIN

STEP NO.	ACTION	WAIT FOR CONFIRMATION	NOTES
11	Enter third digit of the selected PIN by pressing and releasing the **left** turn signal switch until the selected digit is present.		
12	Press **right** turn switch **1 time** and release.	The new digit will replace the current in odometer window.	
13	Enter fourth digit of new PIN by pressing and releasing the **left** turn signal switch until the selected digit is present.		
14	Press **right** turn switch **1 time** and release.	The new digit will replace the current in odometer window.	
15	Enter fifth digit of the new PIN by pressing and releasing the **left** turn signal switch until the selected digit is present.		
16	Press **right** turn switch **1 time** and release.	The new digit will replace the current in odometer window.	
17	Turn the OFF/RUN switch **OFF**, then turn the ignition switch to **OFF**.		Pushing the OFF/RUN switch to **OFF** stores the new PIN in the module.

TRANSPORT MODE

When transporting the motorcycle, place the system in the transport mode. Otherwise, the alarm activated by motion detection can discharge the battery.

In the transport mode, the security system is armed without enabling the motion detector for one ignition cycle. This allows the vehicle to be picked up and moved in an armed state. Any attempt to start the engine when the fob is not within range will trigger the alarm.

To Enter Transport Mode

1. With an assigned fob within range, turn the ignition switch to IGN.
2. Before the security system lamp goes out, turn the ignition switch to OFF.
3. Within three seconds, simultaneously press both the left and the right turn signal switches.
4. After the turn signals flash once, the system enters the transport mode. With the fob removed, the motorcycle can be moved without setting off the alarm.

To Exit Transport Mode

With the fob present, turn the ignition switch to IGN to disarm the system.

SERVICE MODE

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

With a fob present, the security system can be configured for service by disabling the security system with DIGITAL TECHNICIAN II (Part No. HD-48650).

Once disabled, the vehicle can be operated without an assigned fob present. To maintain the service mode, the assigned fobs must be kept out of range. If the fob appears in range, the service mode is cancelled.

FOUR-WAY FLASHING

To Arm the Security System with the Hazard Warning Flashers ON

If it is necessary to leave a vehicle parked along side the road, the hazard warning four-way flashers can be turned ON with the smart security system armed.

1. Turn IGN ON or ACC.
2. Press the hazard warning switch. The four-way flashers will continue for two hours.
3. Turn IGN OFF to arm the smart security system.

To Disarm the Security System and Turn the Hazard Warning Flashers OFF

1. With a fob present, turn IGN to ON or ACC.
2. Press the hazard warning switch.

ALARM DIAGNOSTICS 5.17

DESCRIPTION AND OPERATION

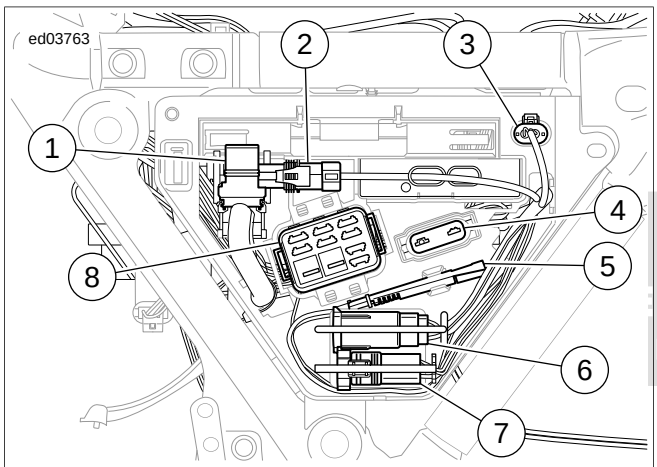
NOTE

This section applies only to those vehicles equipped with the optional security system.

See Figure 5-57. An alarm cycle is activated when the BCM is connected, the siren has been armed by the BCM and a security event occurs. See 5.13 SECURITY SYSTEM. Under normal armed operation, the siren input (terminal 2) is driven low by the BCM to trigger the audible alarm. When the siren input is driven high by the BCM the audible alarm stops.

Table 5-57. Code Description

DTC	DESCRIPTION
B2172	H2 output shorted high
B2173	H2 output shorted low



1. **BCM [242]**
2. **BCM power [259]**
3. **Security siren [142]**
4. **Main fuse [5]**
5. **Battery tender [281]**
6. **Auxiliary devices [4]**
7. **DLC [91]**
8. **Fuse block [64]**

Figure 5-57. Under Left Side Cover

Diagnostic Tips

- If the siren is armed and the internal siren battery is dead, shorted, disconnected or has been charging for a period longer than 24 hours, the siren will respond with three chirps on arming instead of two.
- The internal siren battery may not charge if the vehicle's battery is less than 12.5V.
- If the siren does not chirp two or three times on a valid arming command from the BCM, the chirp function has been disabled, the siren is either not connected, not working or the siren wiring was opened or shorted while the siren was disarmed.
- If the siren enters the self-driven mode where it is powered from the siren internal 9V battery, the turn-signal lamps will not alternately flash. If the BCM activates the siren, the turn-signal lamps will flash. If the siren has been armed and a security event occurs, and the siren is in self-driven mode, the siren will alarm for 20-30 seconds and then turn off for 5-10 seconds. This alarm cycle will be repeated ten times if the siren is in the self-driven mode.
- If the siren does not stop alarming after it has been armed, then either the BCM output or siren input may be shorted to ground, the siren vehicle battery connection is open or the siren vehicle ground connection is open or a security event has occurred. See 5.13 SECURITY SYSTEM for a description of alarm functions.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

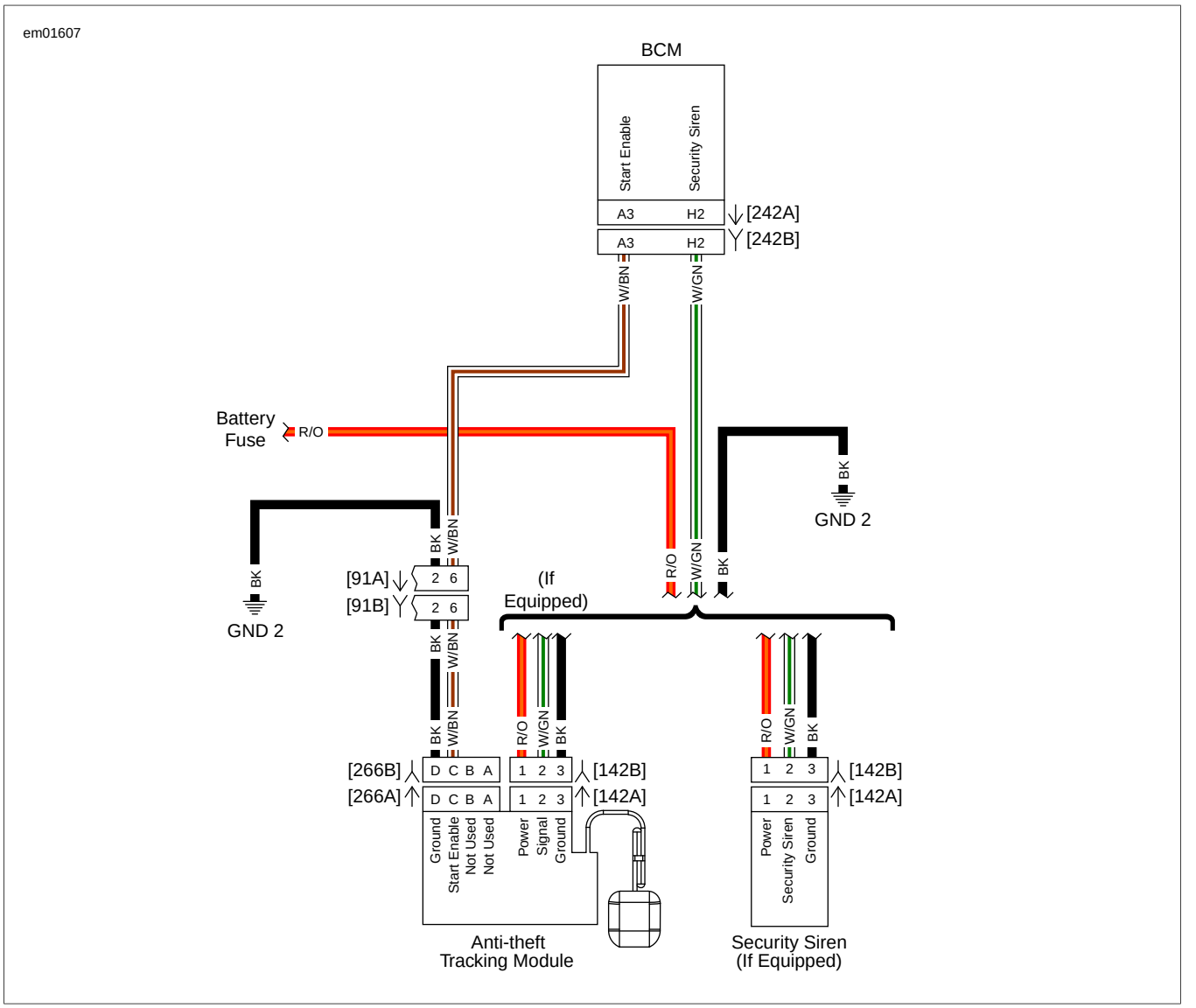


Figure 5-58. Smart Siren Circuit

DTC B2172

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 5-58. DTC B2172 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in alarm signal
Siren malfunction

1. Siren Circuit Short to Voltage Test

1. Disconnect siren [142] (if equipped).
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [142B] terminal 2 and ground.
3. Is battery voltage present?
   a. **Yes.** Repair short to voltage in (W/GN) wire.
   b. **No.** Go to Test 2.

2. DTC Test

1. Clear DTCs.
2. Turn IGN OFF. Verify security activates.
3. Check DTCs.
4. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Replace siren.

DTC B2173

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-59. DTC B2173 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in alarm signal
Open ground circuit
Open alarm signal
Siren malfunction

1. Siren Signal Short to Ground Test

1. Disconnect security siren [142] (if equipped).
2. Turn IGN OFF.
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal H2 and ground.
6. Is continuity present?
   a. **Yes.** Repair short to ground in (W/GN) wire between [142B] and [242B].
   b. **No.** Go to Test 2.

2. DTC Test

1. Connect [242].
2. Clear DTCs.
3. Turn IGN ON.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Replace security siren.

SECURITY ANTENNA DIAGNOSTICS 5.18

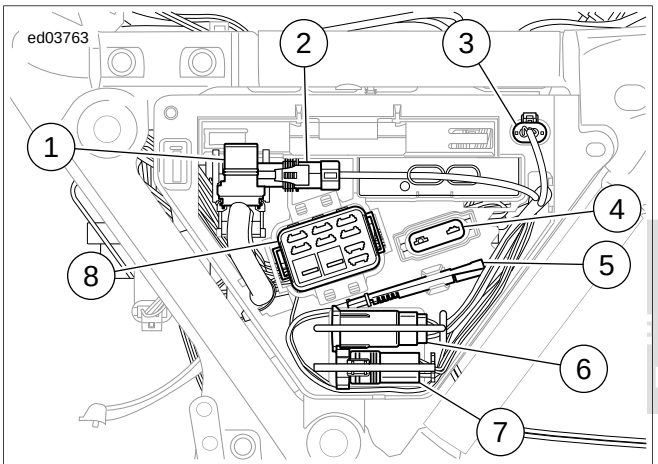
DESCRIPTION AND OPERATION

See Figure 5-59, Figure 5-60, Figure 5-61, Figure 5-62 and Figure 5-63. DTC B2176, B2177 or B2178 will set when a fault occurs to the security antenna circuit used to transmit to the fob. Refer to Table 5-60.

If the security system does not respond, responds with limited range or will not consistently disarm with fob within normal range, follow the fails to disarm diagnostic procedure.

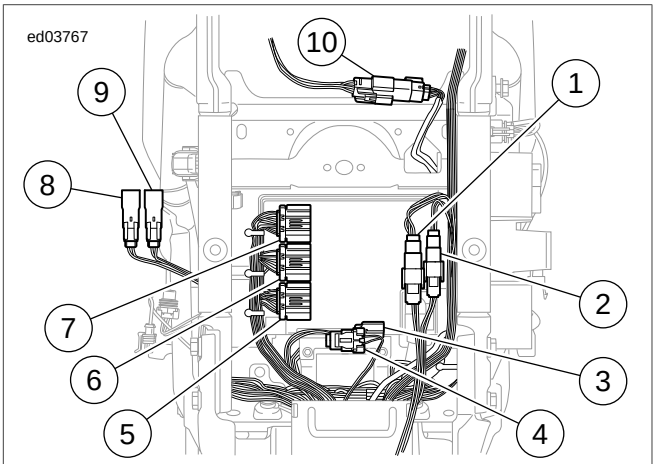
Table 5-60. Code Description

DTC	DESCRIPTION
B2176	Security antenna output open
B2177	Security antenna output shorted high
B2178	Security antenna output shorted low



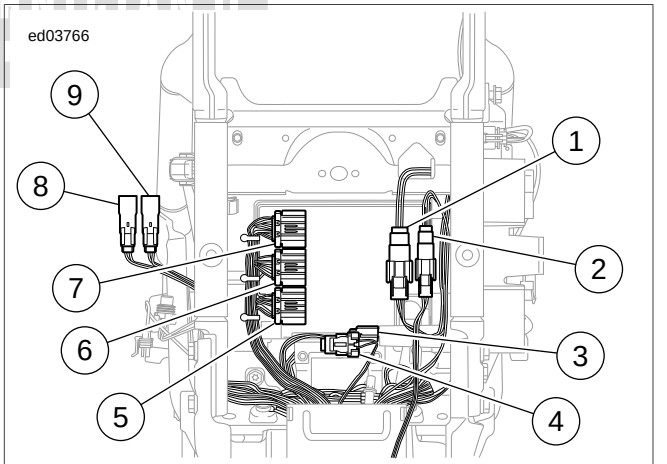
1. **BCM [242]**
2. **BCM power [259]**
3. **Security siren [142]**
4. **Main fuse [5]**
5. **Battery tender [281]**
6. **Auxiliary devices [4]**
7. **DLC [91]**
8. **Fuse block [64]**

Figure 5-59. Under Left Side Cover



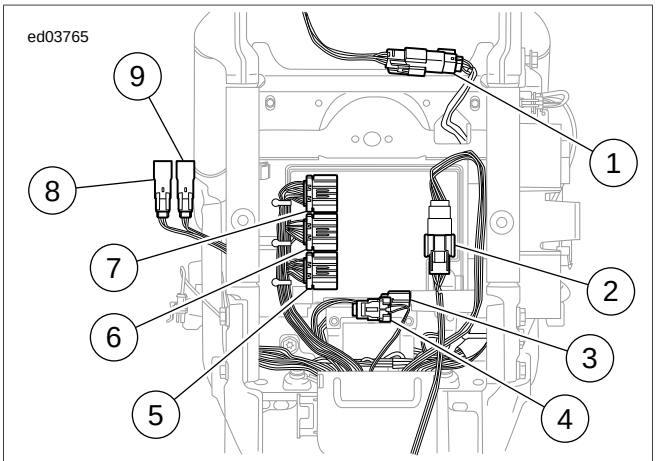
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 5-60. Under Seat: FLHT



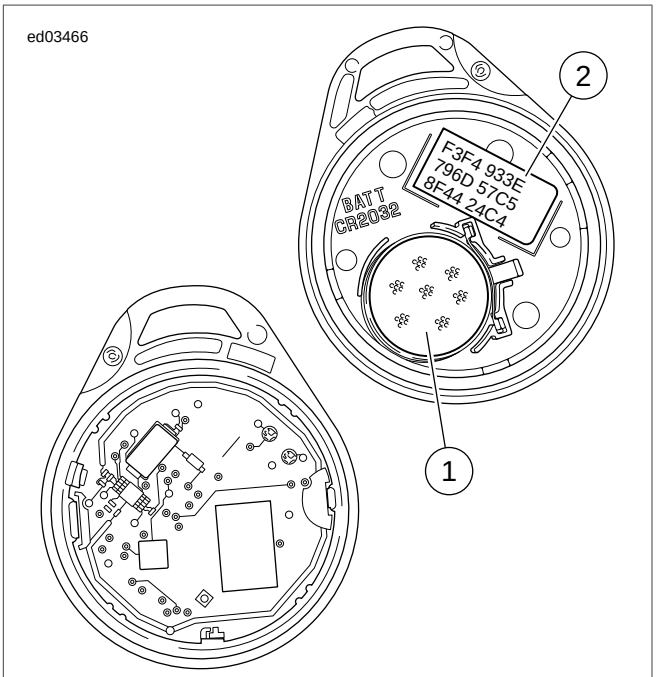
1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 5-61. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 5-62. Under Seat: FLHR



1. **Battery**
2. **Fob serial number**

Figure 5-63. Open Fob

Conditions for Setting

The BCM will recognize the faults with IGN ON.

Diagnostic Tips

- Verify that cell phone is not within 3.0 in (80.0 mm) of key fob.
- Interference from physical surroundings impacts RF transmission. Place fob next to vehicle or move vehicle to a new location and retest.
- Verify that antenna is in OE location. Make sure that seat has not been replaced with a metal base seat.
- Check for damage to antenna wire.
- Verify fob battery voltage is at least 2.9V.
- Fob serial number is located inside fob. Twist thin blade in thumbnail slot to open.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

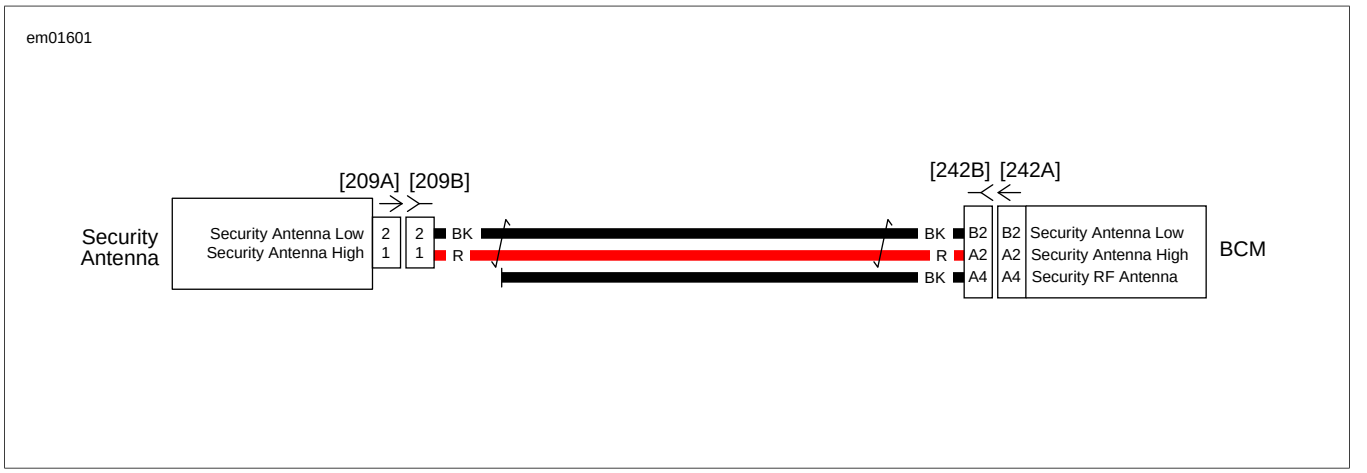


Figure 5-64. Antenna Circuit

DTC B2176

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-61. DTC B2176 Diagnostic Faults

POSSIBLE CAUSES
Security antenna malfunction
Open antenna circuit

1. Fob Test

1. Turn IGN OFF.
2. With fob present, turn IGN ON.
3. Does odometer read ENTER PIN?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. Security Antenna Visual Test

1. Inspect security antenna for damage.
2. Is security antenna damaged?
   a. **Yes.** Repair or replace security antenna as needed.
   b. **No.** Go to Test 3.

3. Security Antenna Resistance Test

1. Turn IGN OFF.
2. Disconnect antenna [209].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [209A] terminals 1 and 2.
4. Is resistance greater than 5700 Ohms?
   a. **Yes.** Replace security antenna.
   b. **No.** Go to Test 4.

4. Antenna B Circuit Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal B2 and [209B] terminal 2.
4. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (BK) wire.

5. Antenna A Circuit Open Test

1. Test continuity between BOB terminal A2 and [209B] terminal 1.
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (R) wire.

6. DTC Test

1. Connect [242] and [209] (if needed).
2. Clear DTCs.
3. Turn IGN ON.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

DTC B2177

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-62. DTC B2177 Diagnostic Faults

POSSIBLE CAUSES
Security antenna malfunction
Short to voltage in antenna circuit

1. Security Antenna Visual Test

1. Inspect security antenna for damage.
2. Is security antenna damaged?
   a. **Yes.** Repair or replace security antenna as needed.
   b. **No.** Go to Test 2.

2. Security Antenna High Circuit Short to Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B] and [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal A2 and ground.
6. Is voltage greater than 0.6V?
   a. **Yes.** Repair short to voltage in (R) wire.
   b. **No.** Go to Test 3.

3. Security Antenna Low Circuit Short to Voltage Test

1. Test voltage between BOB terminal B2 and ground.
2. Is voltage greater than 0.6V?
   a. **Yes.** Repair short to voltage on (BK) wire.
   b. **No.** Go to Test 4.

4. DTC Test

1. Clear DTCs.
2. Turn IGN ON.
3. Check DTCs.
4. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

DTC B2178

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 5-63. DTC B2178 Diagnostic Faults

POSSIBLE CAUSES
Security antenna malfunction
Open antenna circuit

1. Security Antenna Visual Test

1. Inspect security antenna for damage.
2. Is security antenna damaged?
   a. **Yes.** Repair or replace security antenna as needed.
   b. **No.** Go to Test 2.

2. Security Antenna High Circuit Short to Ground Test

1. Disconnect security antenna [209].
2. Turn IGN OFF.
3. Disconnect BCM [242].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [209B] terminal 1 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground in (R) wire.
   b. **No.** Go to Test 3.

3. Security Antenna Low Circuit Short to Ground Test

1. Test continuity between [209B] terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (BK) wire.
   b. **No.** Go to Test 4.

4. DTC Test

1. Connect BCM [242] and [209].
2. Clear DTC.
3. Turn IGN ON.
4. Did the DTC return?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

FAILS TO DISARM

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-64. Fails to Disarm Diagnostic Faults

POSSIBLE CAUSES
Open antenna circuit
Short to ground in antenna circuit
RF interference
Antenna malfunction
Fob malfunction/dead battery

1. Non-Functional Fob Test

1. Check battery on non-functional fob.
2. Is battery voltage greater than 2.9V?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery. **(6755)**

2. Interference Test

1. Move vehicle away from any possible interference sources.
2. Place fob on seat.
3. Will security system disarm?
   a. **Yes.** Inspect for electrical accessories or an after-market seat that may be causing interference.
   b. **No.** Go to Test 3.

3. Antenna Connection Test

1. Inspect antenna location and connection.
2. Is antenna properly located and connected?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair connection.

4. Antenna Circuit Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving BCM [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal A4 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground. **(5041)**
   b. **No.** Go to Test 5.

5. Antenna Circuits Shorted Together Test

1. Disconnect security antenna [209].
2. Test continuity between BOB terminals A2 and B2.
3. Is continuity present?
   a. **Yes.** Repair short between antenna circuits. **(5041)**
   b. **No.** Go to Test 6.

6. Antenna Circuit Open Test

1. Test continuity between BOB terminal A4 and end of (BK) wire. Pull back conduit to expose unterminated end of wire.
2. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open on (BK) wire. **(5041)**

7. Security System Antenna Test

1. Replace security antenna with a known good security antenna.
2. Does security system now disarm?
   a. **Yes.** Replace security antenna. **(6878)**
   b. **No.** Replace BCM. **(6757)**

NEUTRAL SWITCH DIAGNOSTICS 5.19

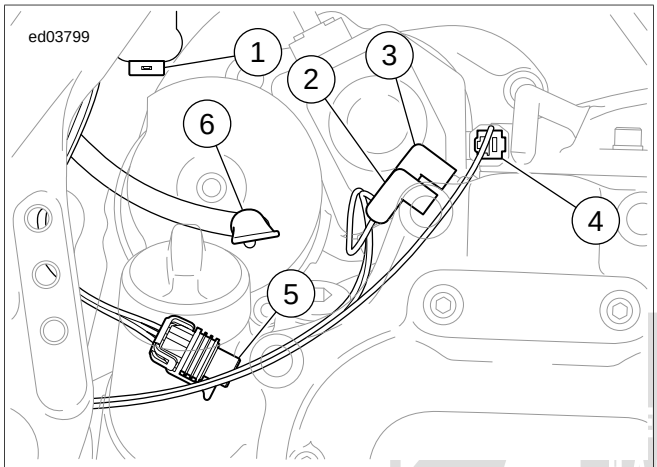
DESCRIPTION AND OPERATION

See Figure 5-65. The BCM monitors the clutch and neutral switch circuits to determine whether or not to let the vehicle start. No power will be supplied to the starter solenoid unless either:

- Clutch switch is closed (lever pulled in).
- Neutral switch is closed (shifted to neutral).

Table 5-65. Code Description

DTC	DESCRIPTION
B2218	Neutral switch shorted low



1. **Ignition coil [83]**
2. **Neutral switch [131-1]**
3. **Neutral switch [131-2]**
4. **Starter solenoid [128]**
5. **VSS [65]**
6. **Battery + connections to starter**

Figure 5-65. Starter

Conditions for Setting

DTC B2218 will set when the neutral switch circuit is shorted low at speeds greater than 5 mph (8 km/h) for more than 60 seconds.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

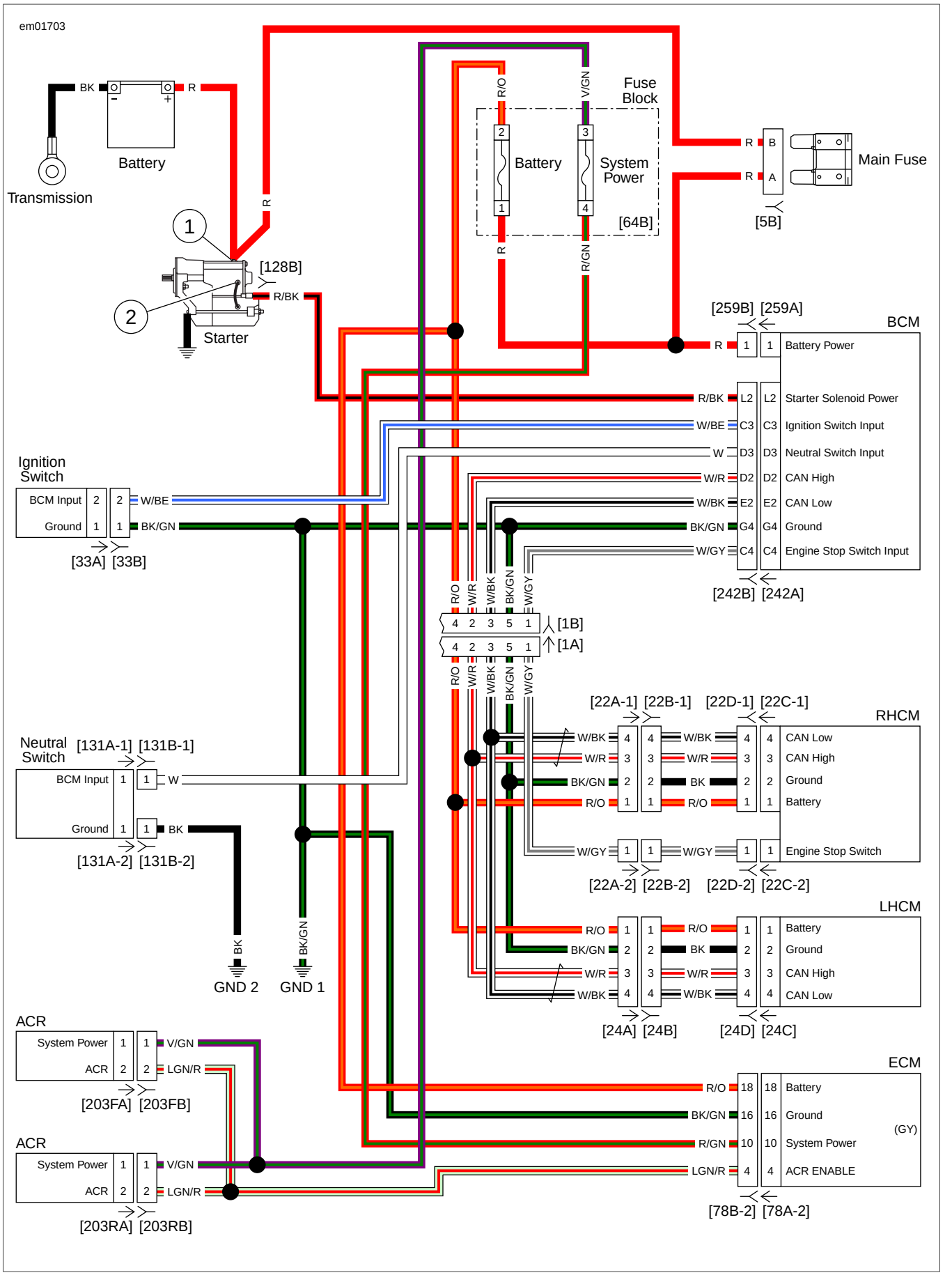


Figure 5-66. Starting Circuit: FLH With Fairing

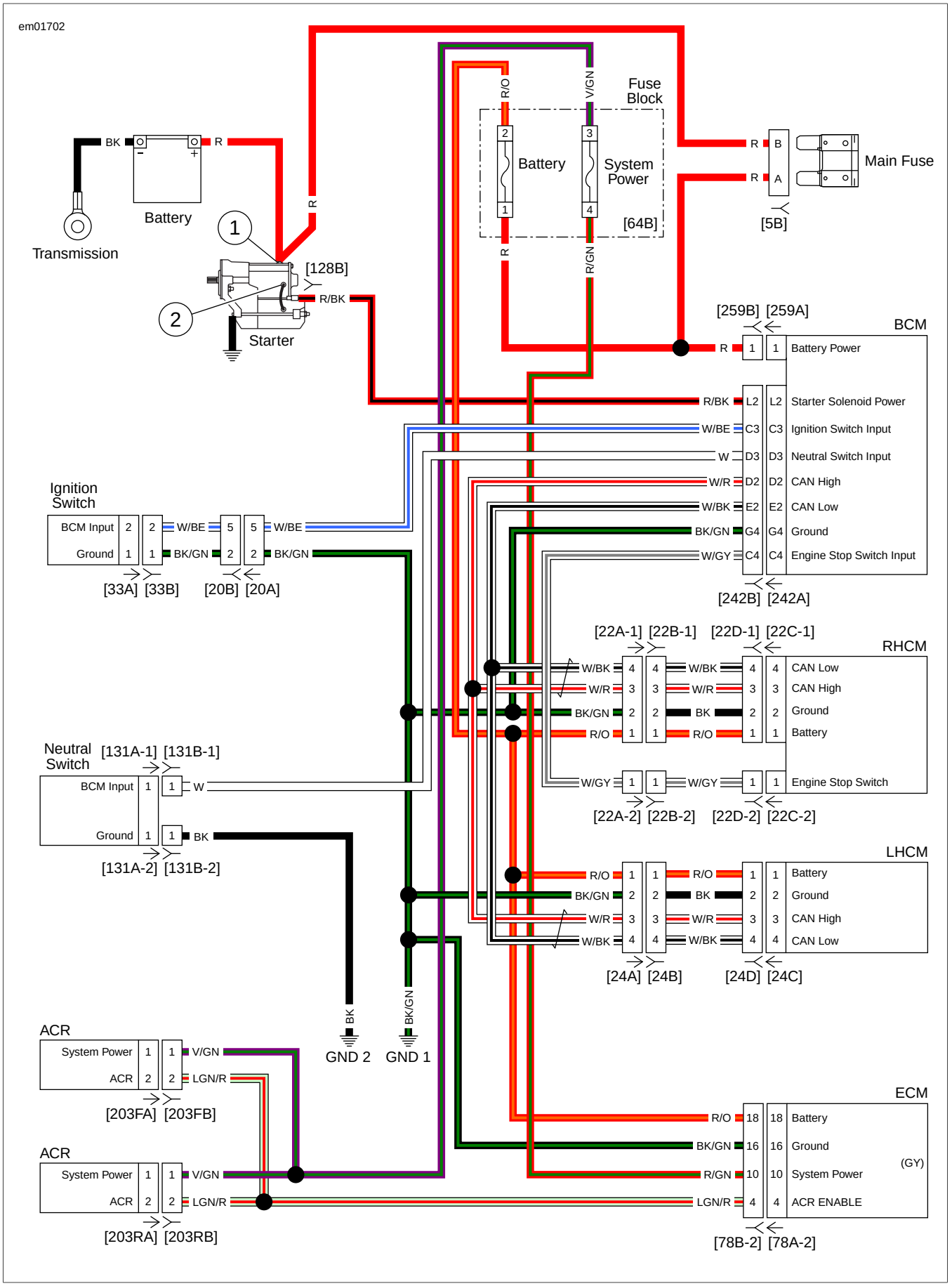


Figure 5-67. Starting Circuit: FLH Without Fairing

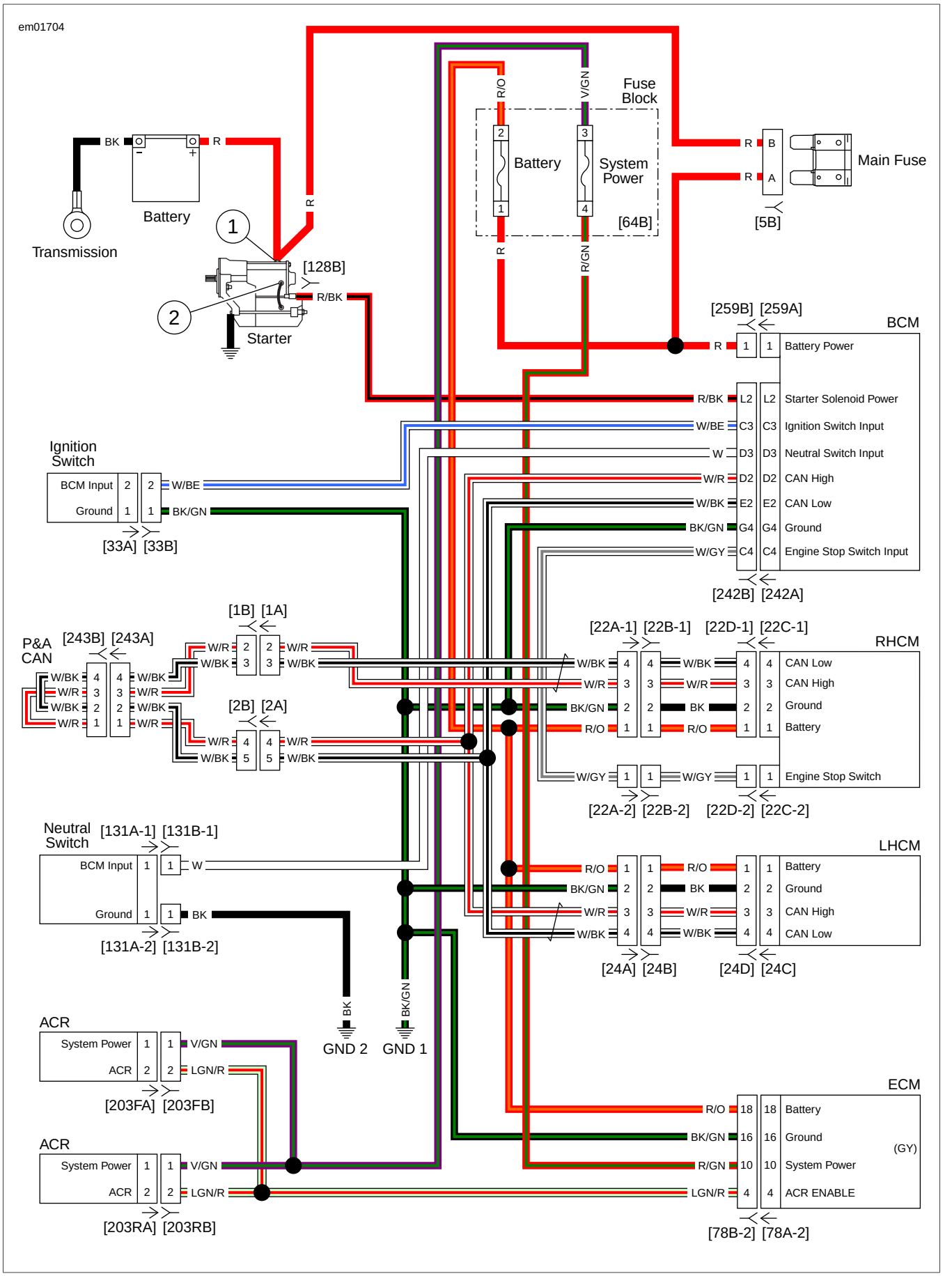


Figure 5-68. Starting Circuit: FLT

DTC B2218

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 5-66. DTC B2218 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in neutral circuit
Neutral switch malfunction

NOTE

This DTC may occur if the vehicle is ridden in neutral at speeds greater than 5 mph (8 km/h) for more than 60 seconds. For example, if coasting down a long mountain road with the transmission in neutral.

1. Neutral Circuit Short to Ground Test

1. Shift transmission into 1st or 2nd gear.
2. Turn IGN ON.
3. Is neutral indicator illuminated?
   a. **Yes.** Go to Test 2.
   b. **No.** Verify neutral switch torque.

2. Neutral Switch Test

1. Disconnect neutral switch [131-1].
2. Is neutral lamp illuminated?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace neutral switch.

3. Neutral Switch Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminal D3 and ground.
5. Is resistance less than 10 Ohms?
   a. **Yes.** Repair short to ground on (W) wire.
   b. **No.** Go to Test 4.

4. DTC Test

1. Connect BCM [242] and neutral switch.
2. Clear DTC.
3. Turn IGN ON.
4. Operate vehicle above 5 mph (8 km/h) for at least two minutes.
5. Did DTC return?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

ADDITIONAL OUTPUT DIAGNOSTICS 5.20

DESCRIPTION AND OPERATION

These outputs are intended for future applications and are not used for this model.

Table 5-67. Code Description

DTC	DESCRIPTION
B2183	High side drive output #1 shorted low
B2188	High side drive output #2 shorted low
B2193	High side drive output #3 shorted low
B2198	High side drive output #4 shorted low

Conditions for Setting

This output is shorted to ground in one of three areas:

- Wire harness.
- Device the output is connected to.
- BCM.

Diagnostic Tips

This circuit may be used for aftermarket accessories or systems. If a code is set and cannot be duplicated, check for aftermarket devices.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

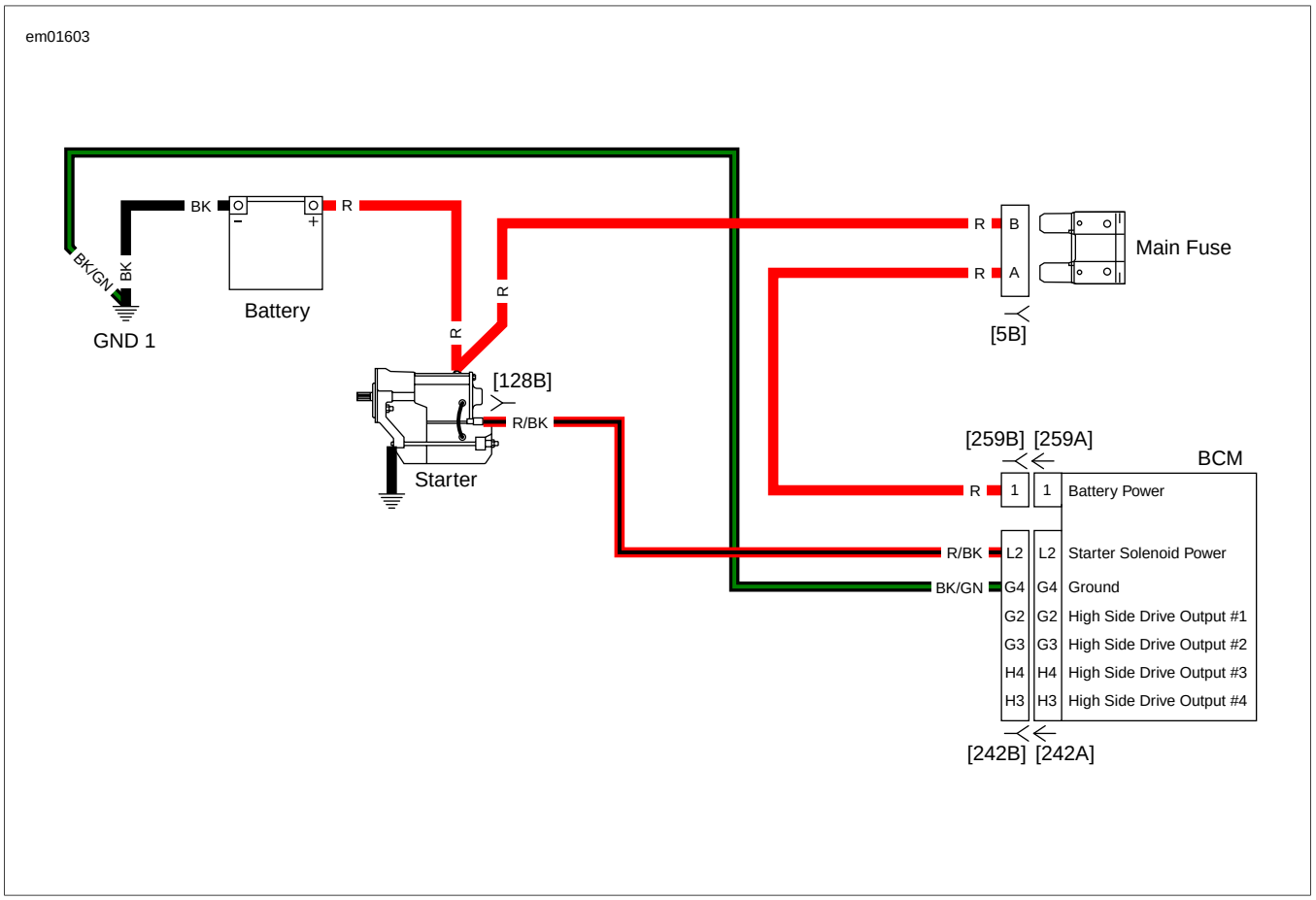


Figure 5-69. Spare Outputs

DTC B2183, B2188, B2193, B2198

Table 5-68. DTC B2183, B2188, B2193, B2198 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in spare output circuit

1. Circuit Inspection Test

1. Visually inspect BCM harness [242].
2. Are there wires plugged into any of the spare output terminals?
   a. **Yes.** Problem may be caused by aftermarket devices. See aftermarket manufacturer for repair.
   b. **No.** Go to Test 2.

2. DTC Test

1. Clear DTCs.
2. Turn IGN ON.
3. Check DTCs.
4. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent.

NOTES

TABLE OF CONTENTS

NOTES

EFI SYSTEM 6.1

GENERAL

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

See Figure 6-1. The engine management system consists of the following components:

- ECM
- CKP sensor
- TMAP sensor
- ET sensor
- TGS
- TCA
- VSS
- HO2S
- Active exhaust actuator (HDI)
- Ignition coil
- Fuel pump
- Fuel injector
- Purge solenoid (if equipped)

The ECM is a solid state device mounted under the seat and sealed to prevent contamination from dust/dirt, water and oil. The ECM controls engine performance based upon input supplied to the ECM from the ET, CKP, TMAP, TGS, HO2S and the VSS sensors and other additional low-voltage circuits and components between the battery and ignition coil.

- The ECM controls the dwell time for the ignition coil, providing optimum ignition circuit performance for all engine speeds/load conditions. Optimizing the ignition system allows the ECM to control/vary engine timing (as needed) from 0-50 degrees BTDC.
- The ECM also has built-in protection against transient voltages, continuous reverse voltages and inadvertent damage resulting from jump starts. The ECM is a non-repairable item and must be replaced when it fails.

The CKP sensor is located in the front left side of the crankcase. The CKP generates an AC signal that is sent to the ECM where it is used to reference engine position (TDC) and speed. It functions by taking readings off the 30 teeth on the left side flywheel (two teeth are missing to establish a reference point).

The TMAP sensor is a dual-purpose sensor, mounted in the top of the intake manifold. One portion is used to measure temperature and the other portion is used to measure the air pressure inside the intake manifold. The temperature part of the TMAP contains a thermistor element, used to measure the temperature of the air entering the intake manifold. The MAP portion of this sensor is used to measure the difference between atmospheric pressure and vacuum pressure, within the intake manifold. The ECM processes information from the TMAP (and other sensors) to adjust ignition timing and fuel to achieve optimum engine performance.

The ET sensor contains a thermistor element that varies the sensor's internal electrical resistance. As the engine temperature changes the resistance in the ET sensor changes. The ECM monitors this resistance to compensate for various operating conditions.

The TGS, mounted on the right hand side of the handlebar, houses two internal (opposing) Hall-effect sensors for operator control of the engine's throttle. The opposing operation of the sensors ensures that repositioning of the throttle twist grip, forward and/or back, is accurately reported to the ECM. As the throttle is operated, position changes are reported to the ECM which controls the corresponding movement of the throttle plate by the TCA.

The TCA, mounted to the intake manifold, operates the throttle plate internal to the induction module on the engine. Two corresponding TP sensors receive input from the ECM, corresponding to the position of the TGS, to adjust the position of the throttle plate, accordingly. The ECM incorporates an H-Bridge and WatchDog microprocessor, used to control inadvertent or unexpected operations/conditions of the TCA and TGS.

The VSS is mounted in the transmission, beneath the starter motor. The VSS is a Hall-effect sensor, used to monitor and report vehicle speed based upon a reference point on the 5th gear of the transmission. A 5V reference signal and common ground circuitry are provided to the VSS, from the ECM. The VSS communicates electrical pulses to the ECM, where vehicle speed is calculated and sent to the speedometer as a serial data message.

The HO2S diagnostic codes may be seen during the vehicle break-in period. The sensor diagnostic codes will not illuminate the check engine lamp for current or historic codes and will only be indicated by DIGITAL TECHNICIAN II (Part No. HD-48650) or speedometer self-diagnostics. If the diagnostic codes are reported during the break-in period, clear or ignore the code(s) until the break-in period is complete.

There are two HO2S, one mounted in each of the two exhaust pipes, to monitor the exhaust gas air/fuel mixture ratio. Each HO2S samples the exhaust oxygen content and provides specific voltage to the ECM. The ECM continuously adjusts the air/fuel mixture to maintain an optimal air/fuel mixture. When properly mixed, the HO2S voltage(s) will measure approximately 0.45V, each when measuring across the sensor.

The active exhaust system (certain International configurations) uses an actuator valve located in the rear of the exhaust pipe that is connected via a cable. The valve position automatically adjusts to enhance engine performance.

The ignition coils, mounted rearward on the chassis behind the engine, provide high voltage output to the spark plugs. Each ignition coil is made up of a primary winding where low voltage input creates a high voltage spike in the collapsible field of the secondary winding. The front and rear coils are fired independently (one cylinder at a time). The ignition coil contains an extra terminal where the ECM monitors the current of the secondary winding for knock detection and combustion diagnostics.

The fuel pump, mounted inside the fuel tank, is a submersible pump used to provide fuel to the fuel injectors. The fuel pump is powered by the BCM.

- When the ignition switch is in the IGNITION position and the engine stop switch is in the RUN position, the BCM supplies voltage to the fuel pump.
- The fuel pump continues running during cranking and normal running operation, as long as the ECM is receiving input from the CKP sensor. If no CKP pulses are received, the ECM sends a message to the BCM to turn off the fuel pump within 2 seconds after the ignition is turned on, the engine has stalled or immediately after the engine is shut off.
- The fuel pump contains a pressure regulator which maintains consistent fuel pressure to each of the fuel injectors. Excess fuel flow is bypassed into the fuel tank by the pressure regulator.

There are two fuel injectors mounted to the intake manifold. The ECM controls the injectors by actuating the injector solenoid enabling fuel to be metered through the injector and atomized into the intake manifold.

- The injectors are timed to the combustion cycle and are triggered sequentially. When the ECM determines that fuel is required, the ECM supplies a short duration ground to the fuel injector, which opens and releases fuel into the air intake manifold.
- The BCM supplies voltage to the fuel injectors. Each injector is protected and grounded by the ECM, through a common point ground within the ECM.

The purge solenoid (working with the charcoal canister only used in certain destinations) allows the vapors to escape back into the throttle body. The purge solenoid is timed to the throttle position but is disabled at startup, low engine temperature, low engine speed or low vehicle speed. The power for the purge solenoid comes from the BCM. The ECM provides the path to ground to trigger the purge solenoid.

Engine Idle Temperature Management System

To improve rider comfort on all stock Touring model motorcycles, an optional heat management system (EITMS) may be enabled. After being enabled, the heat management system improves rider comfort by turning off the rear cylinder fuel injector when all of the following conditions exist:

- High engine temperature.
- Engine at idle speed.
- Low or no vehicle speed.
- Clutch lever pulled in or transmission in neutral.

There is a four minute delay after startup before EITMS will engage. As the engine maintains idle speed, the rear cylinder functions as an "air pump," helping to cool the engine. This continues until one of the above listed conditions is no longer met, then the rear cylinder fires normally again.

NOTE

When the engine is in heat management mode, a noticeable difference in idle may be accompanied by a unique exhaust odor. While these conditions are normal, a rider or technician unaware of the heat management system may incorrectly assume an idle problem is present.

Enable/Disable EITMS

1. Turn the ignition ON. Push the engine OFF/RUN switch on the right handlebar to the RUN position (the motorcycle may be running or not running).
2. Verify cruise control is OFF.
3. Push the throttle to roll-off position and hold.
4. After approximately 3 seconds, the cruise indicator will flash either amber (disabled) or green (enabled).
5. Repeat the procedure as necessary to enable or disable.

NOTE

On radio equipped models, the status of EITMS can be viewed on the information display.

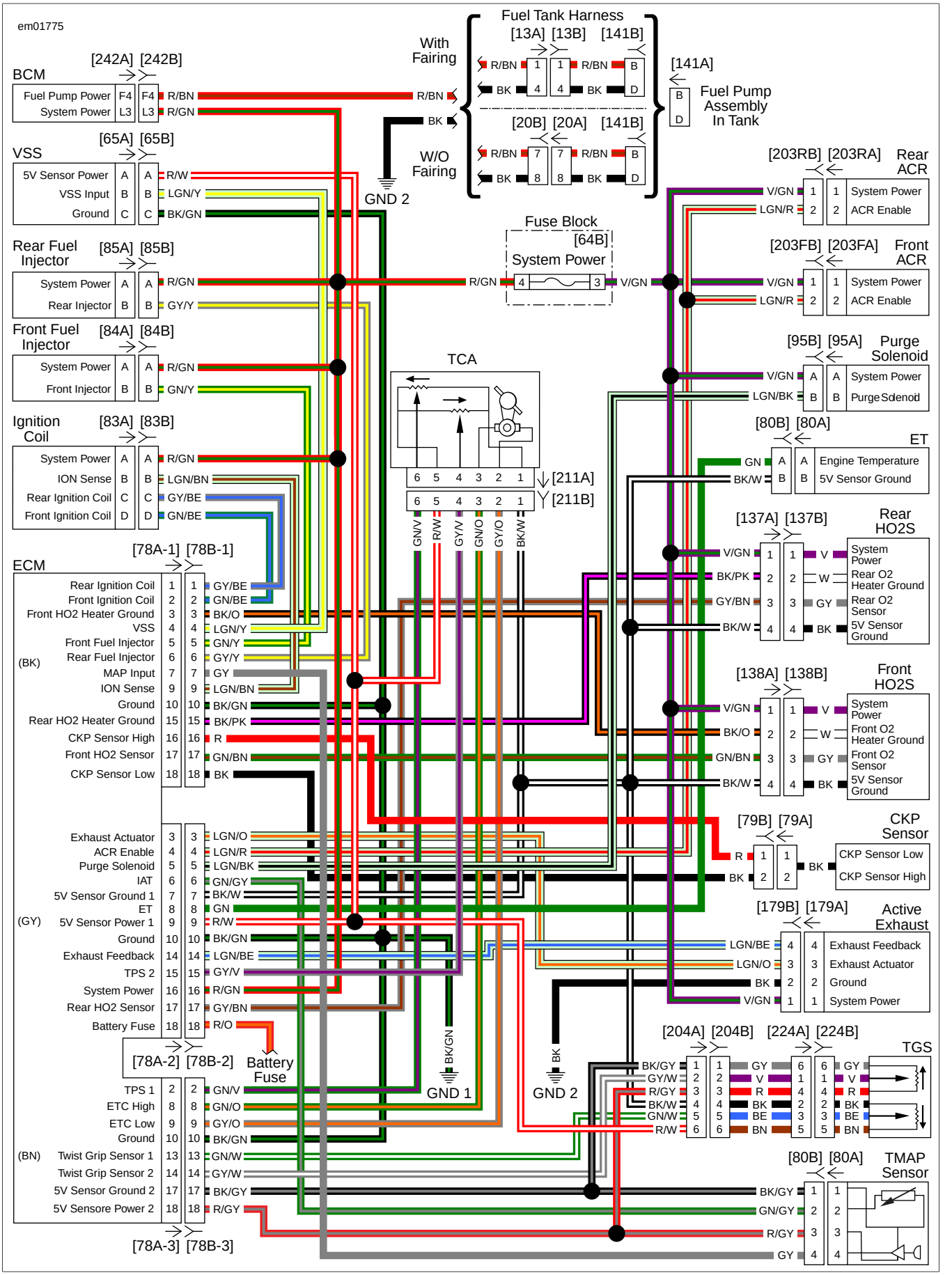
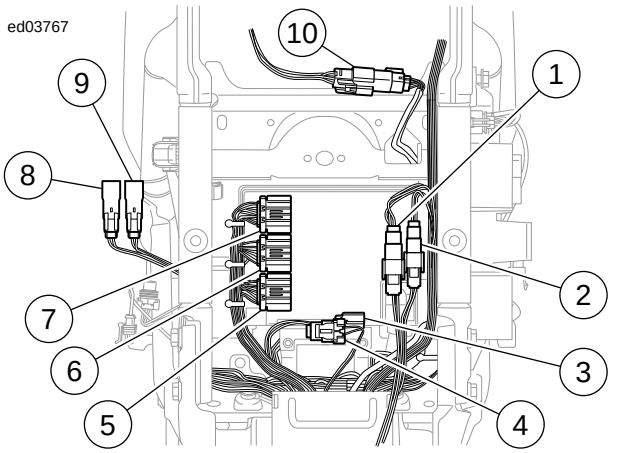


Figure 6-1. EFI Simplified Schematic

ELECTRONIC CONTROL MODULE 6.2

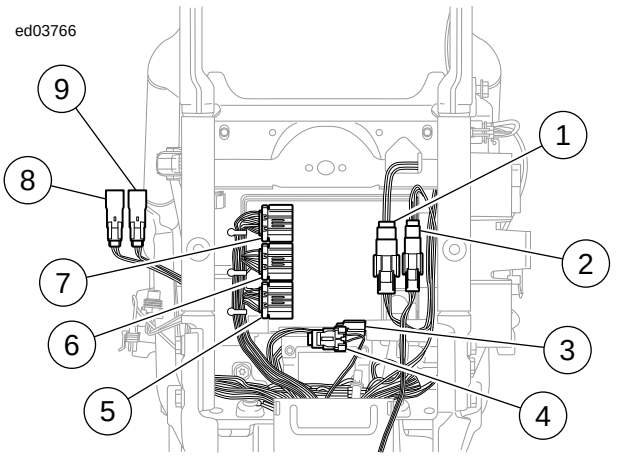
GENERAL

See Figure 6-2, Figure 6-3 and Figure 6-4. The ECM receives and processes signals from the sensors and applies output signals to the drivers to start, idle and run the engine. This section describes the configuration of the ECM.



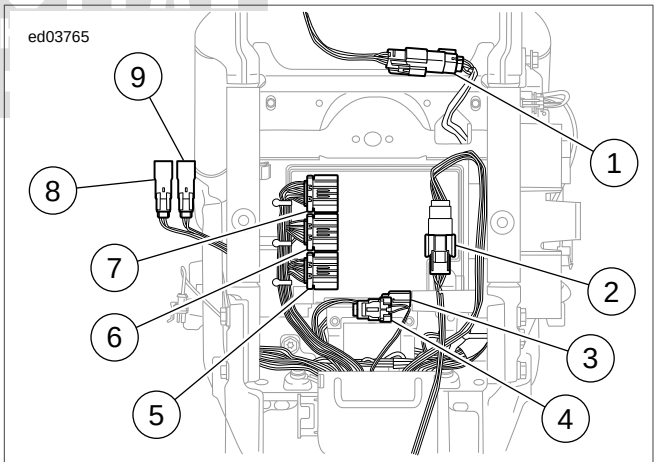
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 6-2. Under Seat: FLHT



1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-3. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-4. Under Seat: FLHR

ECM

The ECM is mounted under the seat. It computes the spark advance for proper ignition timing and fuel control based on sensor inputs (from ET, CKP, TMAP, TGS, HO2S and VSS

sensors) and controls the low-voltage circuits for the ignition coils and injectors.

The ECM contains all of the components used in the ignition system. The dwell time for the ignition coil is also calculated in the microprocessor and is dependent upon battery voltage. The programmed dwell is an added feature to give adequate spark at all speeds. (The ECM has added protection against transient voltages, continuous reverse voltage protection and damage due to jump starts.) The ECM is fully enclosed to protect it from vibration, dust, water or oil. This unit is a non-repairable item. If it fails, it must be replaced.

32-2 Flywheel

The left flywheel has positions for 32 teeth evenly spaced around its circumference with 30 teeth present and two consecutive teeth missing (sync gap). In this configuration, the ECM determines engine position, engine phase and engine speed from the CKP sensor input. Phase (TDC compression) is determined by the ECM during startup and, when necessary, while running. No engine ignition events can occur until the ECM determines the relationship of piston position to crankshaft position. The following paragraphs in this section describe synchronization and phasing by the ECM to provide smooth operation of the engine at all speeds.

Crank Position Signal Synchronization

In the 32-2 crank configuration, crankshaft position is determined by the ECM finding the two-tooth (sync gap) in the CKP sensor signal. This is usually accomplished the first time the sync gap is encountered. The ECM monitors the CKP signal status every engine revolution. If the ECM determines synchronization is lost, it immediately terminates ignition events and synchronizes on the next occurrence of the sync gap.

Engine Phase

Phasing is accomplished by the ECM identifying a widening in the CKP signal caused by the deceleration of the crankshaft, as a piston approaches TDC on its compression stroke. Since the rear cylinder approaches TDC earlier than the front cylinder, engine phase can be readily discriminated. Phasing is normally accomplished on the first TDC cycle after engine synchronization. Once phased, the ECM can begin normal ignition events. If the ECM experiences a system reset or loss of synchronization while the engine is running it also loses phase.

When phase is lost one of the following occurs:

- If an engine-not-running (Crank Mode) rpm is detected, the ECM executes the normal start-up phasing process.
- If Engine Run Mode is detected, the ECM executes a running re-phase sequence.

The front cylinder is fired every engine revolution. The ECM monitors the power stroke after the fire event to determine if sufficient acceleration occurred to indicate the ECM fired on the compression stroke. When two valid power strokes are detected, the ECM locks phase and resumes normal ignition events.

Engine Run Mode

Many functions of the EFI system require an engine run mode determination. Engine run is determined by the level of engine rpm. Generally, the engine is considered to be running when engine rpm exceeds a minimum of 750 rpm.

SENSORS AND DRIVERS 6.3

DESCRIPTION AND OPERATION

Sensors and drivers play an important part in the ECM's ability to provide the proper operational parameters for engine efficiency, emissions control and fuel economy. When a failure occurs, a DTC is generated by, and stored in, the ECM. These codes help the technician diagnose engine trouble to the proper sensor or driver. See 1.2 INITIAL DIAGNOSTICS.

SENSORS

Not all sensor problems cause an engine shutdown, but sensor failure can seriously degrade overall engine performance. A notable exception is the CKP sensor, which if faulty, completely disables engine operation. The following are brief explanations of sensor types and their functions within the EFI system.

Crank Position (CKP) Sensor

The CKP sensor, located on the left front of the lower crankcase half, is a variable reluctance sensor that generates AC voltage as the teeth on the flywheel pass by the sensor. The signal is routed to the ECM where it is used to determine crankshaft position, engine speed (rpm) and engine phase (TDC compression). Without the presence of the CKP signal, the ECM will not allow the ignition and fuel injection drivers to operate, and thus the engine will not run. The ECM uses crankshaft compression slow down events to determine engine phase. Therefore, the spark plugs must be installed when checking for spark.

Twist Grip Sensor (TGS)

The TGS, mounted on the right hand side of the handlebar, houses two internal (opposing) Hall-effect sensors for operator control of the engine's throttle. The opposing operation of the sensors ensures that repositioning of the throttle twist grip, forward and/or back, is accurately reported to the ECM. As the throttle is operated, position changes are reported to the ECM that controls the corresponding movement of the throttle plate by the TCA.

Throttle Control Actuator (TCA)

The TCA, mounted to the intake manifold, operates the throttle plate internal to the induction module on the engine. Two corresponding TP sensors provide input to the ECM, so the ECM may verify that plate position corresponds to TGS input (rider desired position of the plate) and to adjust the position of the throttle plate, accordingly.

Jiffy Stand Sensor (JSS): If Equipped

The JSS uses a Hall-effect device to monitor jiffy stand position. When the jiffy stand is fully retracted, the sensor picks up the presence of a metal tab mounted to the jiffy stand. When extended, the engine only starts and runs if the ECM receives a signal from the neutral switch indicating the transmission is in neutral, or a signal from the clutch switch indicating the clutch is engaged. Otherwise, the engine stalls as the clutch is released with the transmission in gear.

Accelerometer

The accelerometer is within the BCM. The BCM will shut the engine down if the vehicle is tipped over and the odometer will display tip. Once the sensor is tripped, the motorcycle must be righted, the ignition turned off and then on again before the engine can be restarted. This is communicated across the CAN communication.

Clutch Switch

The clutch switch is part of the LHCM. There are two types of clutch switches, one type for mechanical (cable) operated clutches and one for hydraulic operated clutches. The switches function differently and are not interchangeable. The LHCM communicates the position of the clutch switch to the ECM and BCM over the CAN communication circuits.

NOTE

The clutch switches are not interchangeable. If swapped, it could cause DTCs or improper vehicle operation.

Neutral Switch

The BCM provides voltage to the neutral switch, which is open when the transmission is in gear. With the transmission in neutral, the switch is closed, allowing current flow to ground. The BCM will not allow the engine to start unless the transmission is in neutral or the clutch is pulled in.

Engine Temperature (ET) Sensor

The ET sensor is a thermistor device, which means that at a specific temperature it has a specific resistance across its terminals. As this resistance varies, so does the voltage.

- At high temperatures, the resistance of the sensor is very low, which effectively lowers the signal voltage on ECM [78-2] terminal 8.
- At low temperatures, the resistance is very high, allowing the voltage to rise close to 5V. This information is used to display the temperature on the radio information tab.

Temperature Manifold Absolute Pressure (TMAP) Sensor

The TMAP sensor combines the MAP and IAT in a single component. The functions of each are described in the following paragraphs. During diagnostics the two parts of the TMAP are tested as separate units.

Manifold Absolute Pressure (MAP) Sensor

The MAP sensor is supplied 5V from the ECM and sends a signal back to ECM. This signal varies in accordance with engine vacuum, intake air temperature and atmospheric barometric pressure. The MAP sensor monitors the intake manifold pressure (vacuum) and sends the information to the ECM. The ECM then adjusts the spark and fuel timing advance curves for optimum performance. The output of the sensor can also be used to determine if the engine is rotating when a fault with the CKP sensor is present.

Intake Air Temperature (IAT) Sensor

The IAT sensor is a thermistor device. As such, it will have a specific resistance across its terminals at a specific temper-

ature. As the temperature varies, the thermistor resistance varies, and so does the voltage on ECM [78-2] terminal 6.

- At high temperatures, the resistance of the sensor is very low, which effectively lowers the signal voltage on ECM [78-2] terminal 6.
- At low temperatures, the resistance is very high, allowing the voltage to rise close to 5V. The ECM monitors this voltage to compensate for various operating conditions.

Engine Coolant Temperature (ECT) Sensor (If Equipped)

The ECT sensor is a thermistor device, which means that at a specific temperature it has a specific resistance across its terminals. As this resistance varies, so does the voltage.

- At high temperatures, the resistance of the sensor is very low, which effectively lowers the signal voltage to the ECM.
- At low temperatures, the resistance is very high, allowing the voltage to rise close to 5V. The ECM monitors this voltage to determine when to start the cooling fans.

Ambient Air Temperature (AAT) Sensor (If Equipped)

The AAT sensor is a thermistor device, which means that at a specific temperature it has a specific resistance across its terminals. As this resistance varies, so does the voltage.

- At high temperatures, the resistance of the sensor is very low, which effectively lowers the signal voltage to the ECM.
- At low temperatures, the resistance is very high, allowing the voltage to rise. This information is used to display the temperature on the radio information tab.

Vehicle Speed Sensor (VSS)

The VSS is a Hall-effect device mounted close to the teeth of the 5th gear in the transmission. The output signal frequency varies with vehicle speed. The ECM processes the vehicle speed signal and transmits it via the serial data circuit to the speedometer to indicate vehicle speed.

HO2S: Front and Rear

The HO2S detects unburned oxygen in the engine exhaust. The output of the sensor is a voltage having a range of about 0-1.0V.

- The normal output is 0.5V which represents a balance between a lean (not enough fuel) and rich (too much fuel) air/fuel mixture.
- An output less than 0.5V represents a lean mixture; greater than 0.5V represents a rich mixture.
- The change in output level signals the ECM to modify the air/fuel ratio. The HO2S does not operate efficiently until the engine is at operating temperature. Always warm-up the vehicle prior to troubleshooting the HO2S. The heater elements on the HO2S helps bring the HO2S up to operating temperature quicker. Leaks in the exhaust system, leaky exhaust valves, misfires or any engine problem allowing unburned oxygen into the exhaust stream could create a DTC indicating a bad sensor. Look for problems related to an improper air/fuel mixture before replacing the sensor.

DRIVERS

The ECM drivers are the output devices or system outputs of the EFI system. Drivers are provided ground by the ECM to pump, inject and ignite the air/fuel mixture in the engine and to activate relays.

Fuel Pump

The BCM provides battery voltage to the fuel pump which is inside the fuel tank.

Ignition Coils and Spark Plugs

The ignition coils create the energy to fire the spark plugs and ignite the air/fuel mixture in the cylinders. Advancing or retarding the spark is controlled by the ECM to suit load and speed conditions of the engine.

The BCM powers a separate ignition coil for each cylinder.

Fuel Injectors

The BCM provides battery power to the fuel injectors. The ECM provides the path to ground to trigger the injectors. The fuel injectors are pulse-width modulated solenoids for metering fuel into the intake tract. The pulse-width of the ground path to the injectors is varied by the ECM in response to inputs from the various sensors, thus varying the length of time the injector is open.

Active Exhaust Actuator: HDI Only

The active exhaust system utilizes an actuator valve located in the rear exhaust pipe. This valve is connected to a servo motor via a cable. The valve position automatically adjusts to enhance engine performance.

Cooling System (If Equipped)

The electronic part of the cooling system consists of the fans, pump and ECT. The ECM controls both cooling fans and the relay that supplies power to the pump. Once the engine starts, the ECM grounds the coil side of the cooling relay, causing the relay to energize, sending power to the pump. The ECM monitors engine coolant temperature to determine when to turn on the fans. The ECM offsets the start up of the two fans slightly to minimize current draw in the system.

SYSTEM POWER CIRCUIT DIAGNOSTICS 6.4

DESCRIPTION AND OPERATION

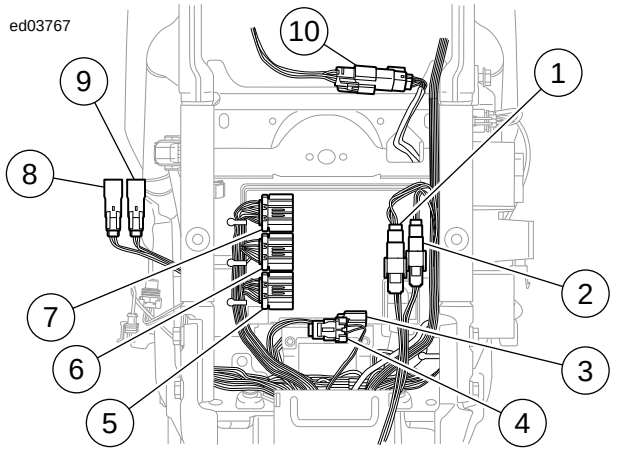
See Figure 6-5, Figure 6-6 and Figure 6-7. The BCM supplies and monitors the 12V system power circuit from terminal L3 of the BCM to the following components:

- Ignition coil
- Active exhaust
- Front fuel injector
- Rear fuel injector
- Purge solenoid
- ECM
- Front HO2S
- Rear HO2S
- Front ACR
- Rear ACR

The system power circuit is energized when the ignition is turned on.

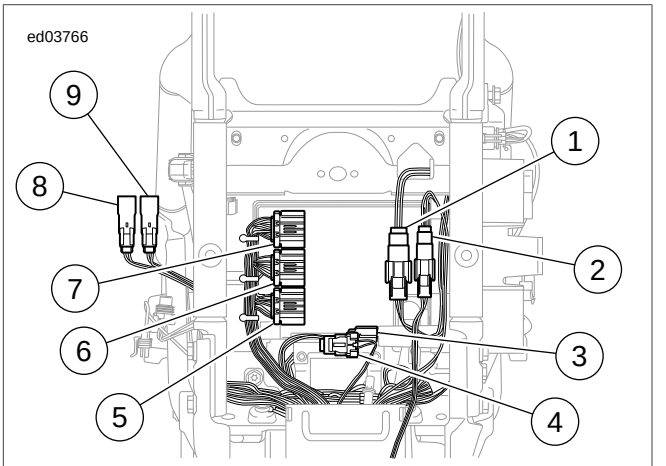
Table 6-1. Code Description

DTC	DESCRIPTION
B2102	System power output shorted high
B2103	System power output shorted low
B2104	System power output overloaded



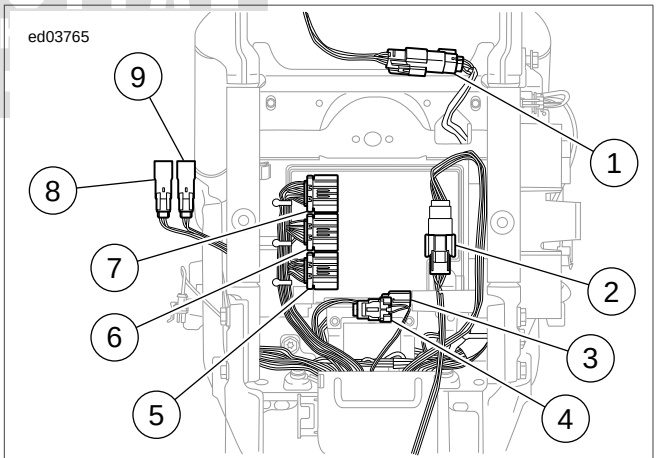
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 6-5. Under Seat: FLHT



1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-6. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-7. Under Seat: FLHR

Conditions for Setting

DTC B2104 will set if the system power circuit draws more than 10 Amps.

Diagnostic Tips

Since the system power circuit normally has ignition voltage with IGN ON, the short to voltage will have to be present with the vehicle turned off in order to set DTC B2102.

When disconnecting connectors, always inspect connector for corrosion or backed out terminals and repair as required.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

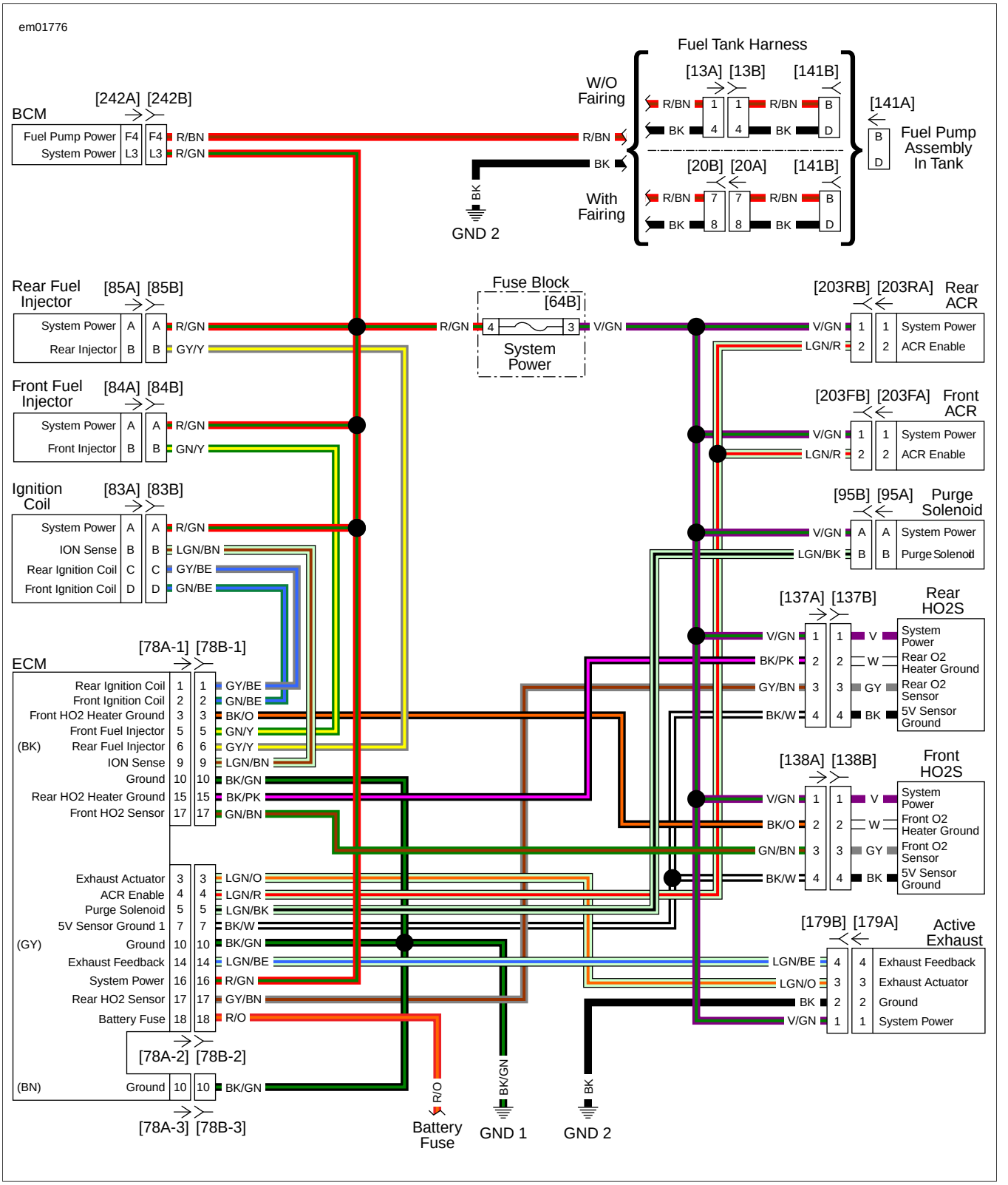


Figure 6-8. System Power Circuit

DTC B2102

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-2. DTC B2102 Diagnostic Faults

POSSIBLE CAUSES
Short to battery in the system power circuit

1. System Power Circuit Short to Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to [78B-1], 78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminal 16 and ground.
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage in (R/GN) wire.
   b. **No.** Replace BCM.

DTC B2103, B2104

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 6-3. DTC B2103, B2104 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in the system power circuit
Ignition coil resistance too low
Front coil shorted low
Rear coil shorted low
Active intake resistance too low
Active exhaust resistance too low
Front HO2S resistance too low
Rear HO2S resistance too low
Front fuel injector resistance too low
Rear fuel injector resistance too low
ACR resistance too low
Purge solenoid resistance too low

1. Fuse Test

1. Inspect the system fuse.
2. Is the fuse good?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 15.

2. Ignition Coil Test

1. Turn IGN OFF.
2. Disconnect ignition coil [83].
3. Clear DTCs.
4. Turn IGN ON.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace ignition coil.

3. Rear Coil Shorted to Ground Test

1. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [83B] terminal C and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground on (GY/BE) wire.
   b. **No.** Go to Test 4.

4. Front Coil Shorted to Ground Test

1. Test continuity between [83B] terminal D and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground on (GN/BE) wire.
   b. **No.** Go to Test 5.

5. Rear Fuel Injector Test

1. Turn IGN OFF.
2. Connect [83].
3. Disconnect rear fuel injector [85].
4. Clear DTCs.
5. Turn IGN ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace rear fuel injector.

6. Front Fuel Injector Test

1. Turn IGN OFF.
2. Connect [85].
3. Disconnect front fuel injector [84].
4. Clear DTCs.
5. Turn IGN ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 7.
   b. **No.** Replace front fuel injector.

7. Purge Solenoid Test

1. Turn IGN OFF.
2. Disconnect purge solenoid [95].
3. Clear DTCs.
4. Turn IGN ON.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 8.
   b. **No.** Replace purge solenoid.

8. Exhaust Actuator Test

1. Turn IGN OFF.
2. Connect [95].
3. Disconnect exhaust actuator [179].
4. Clear DTCs.
5. Turn IGN ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 9.
   b. **No.** Replace exhaust actuator.

9. Front HO2S Test

1. Turn IGN OFF.
2. Connect [178].
3. Disconnect front HO2S [138].
4. Clear DTCs.
5. Turn IGN ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 10.
   b. **No.** Replace front HO2S.

10. Rear HO2S Test

1. Turn IGN OFF.
2. Connect [138].
3. Disconnect rear HO2S [137].
4. Clear DTCs.
5. Turn IGN ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 11.
   b. **No.** Replace rear HO2S.

11. Front ACR Test

1. Turn IGN OFF.
2. Connect [137].
3. Disconnect front ACR [203F].
4. Clear DTCs.
5. Turn IGN ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 12.
   b. **No.** Replace front ACR.

12. Rear ACR Test

1. Turn IGN OFF.
2. Connect [203F].
3. Disconnect rear ACR [203R].
4. Clear DTCs.
5. Turn IGN ON.
6. Check DTCs.

7. Did DTC reset?
   a. **Yes.** Go to Test 13.
   b. **No.** Replace rear ACR.

13. ECM Test

1. Turn IGN OFF.
2. Connect [85].
3. Disconnect ECM [78-2].
4. Clear DTCs.
5. Turn IGN ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 14.
   b. **No.** Replace ECM.

14. BCM Test

1. Turn IGN OFF.
2. Connect [78].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B] leaving BCM [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
5. Test continuity between BOB terminal L3 and ground.
6. Is continuity present?
   a. **Yes.** Repair short to ground in (R/GN) wire.
   b. **No.** Replace BCM.

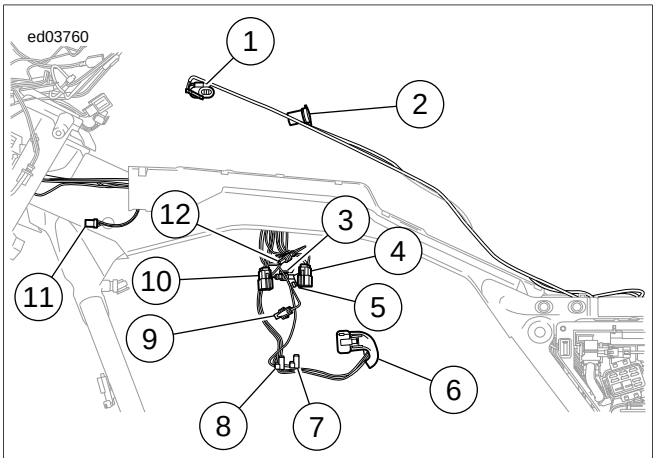
15. System Power Short to Ground Test

1. Test continuity between fuse block [64B] terminal 3 and ground.
2. Disconnect the front and rear HO2S, the front and rear ACRs, the purge solenoid and active exhaust (if equipped).
3. Was continuity lost as the components were removed?
   a. **Yes.** Replace last component removed when continuity was lost.
   b. **No.** Repair short to ground in (V/GN) wire.

FUEL PUMP DIAGNOSTICS 6.5

DESCRIPTION AND OPERATION

See Figure 6-9. The BCM supplies and monitors the 12V system power circuit from terminal F4 of the BCM to the fuel pump. The fuel pump is constantly grounded. The BCM controls the fuel pump by turning on and off the power to the pump on the (R/BN) wire.



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-9. Engine

Table 6-4. Code Description

DTC	DESCRIPTION
B2116	Fuel pump output open
B2117	Fuel pump output shorted high
B2118	Fuel pump output shorted low
B2119	Fuel pump output overloaded

Conditions for Setting

DTC B2116 will set if the fuel pump circuit draws less than 600 milliamps.

DTC B2119 will set if the fuel pump circuit draws more than 6 Amps.

Diagnostic Tips

DTC B2119 can set if the BCM sees an excessive load on the fuel pump circuit. This could be caused by a fuel pump being run dry. If the fuel pump was replaced or the vehicle was run out of gas, prime the pump and clear the code. Start the vehicle and check DTCs to see if the code returns.

Any circuit that is powered up continually with IGN ON could cause DTC B2117 or B2119 to set if shorted to the fuel pump circuit. If a short to voltage or overload conditon is found, test continuity between fuel pump circuit and the other power circuits from the BCM.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

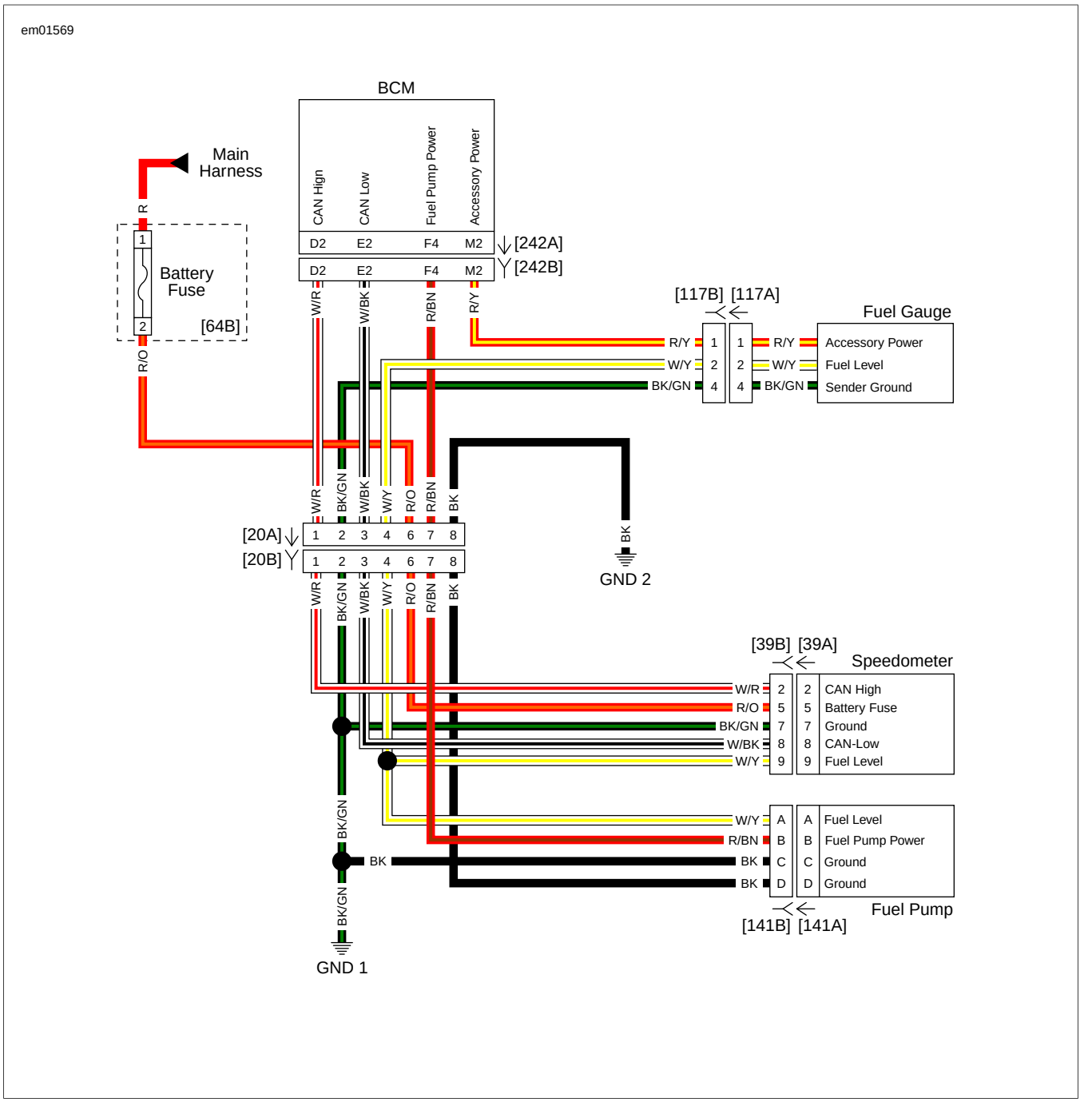


Figure 6-10. Fuel Sensor Circuit: Without Fairing

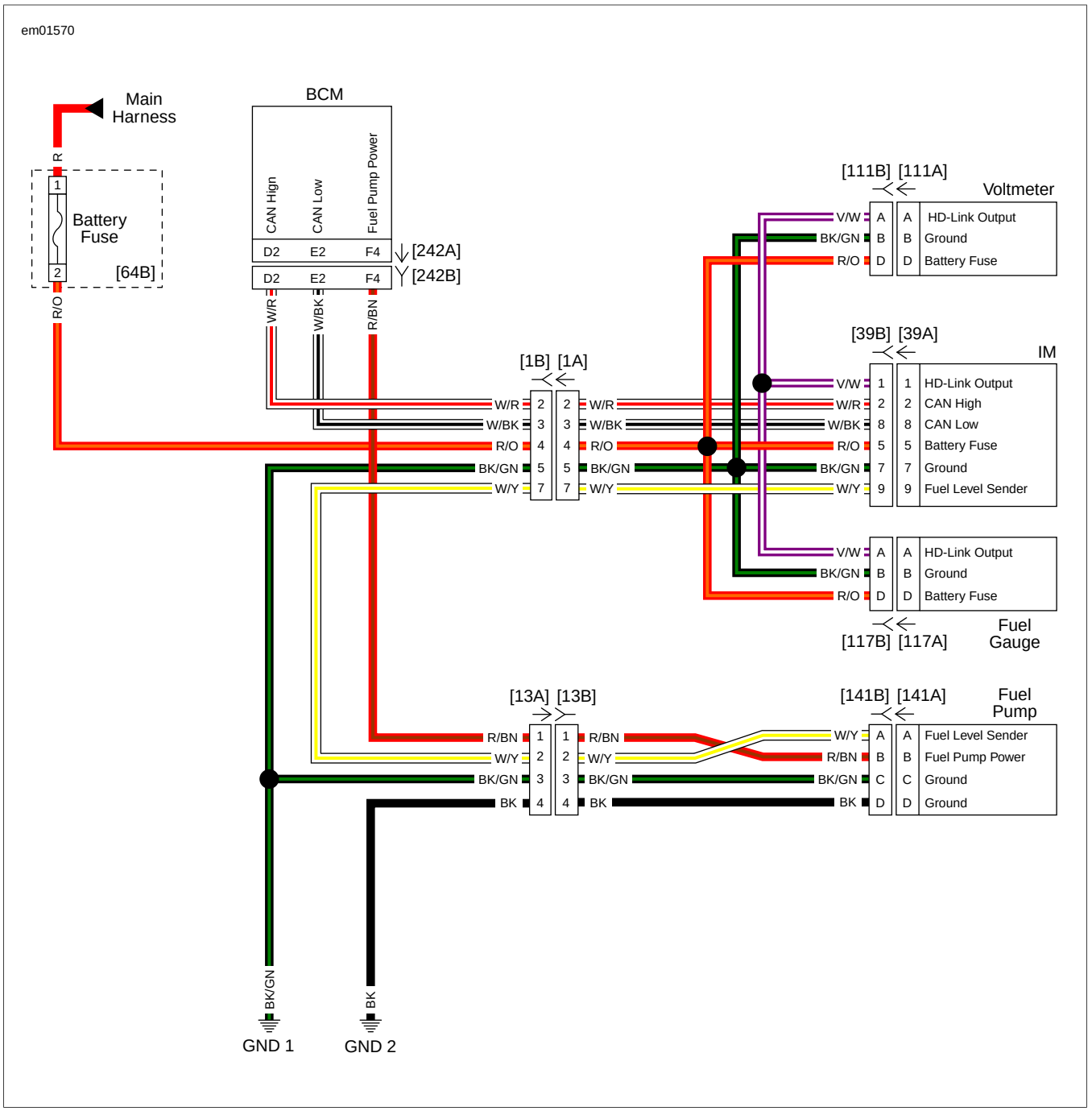


Figure 6-11. Fuel Sensor Circuit: FLH With Fairing

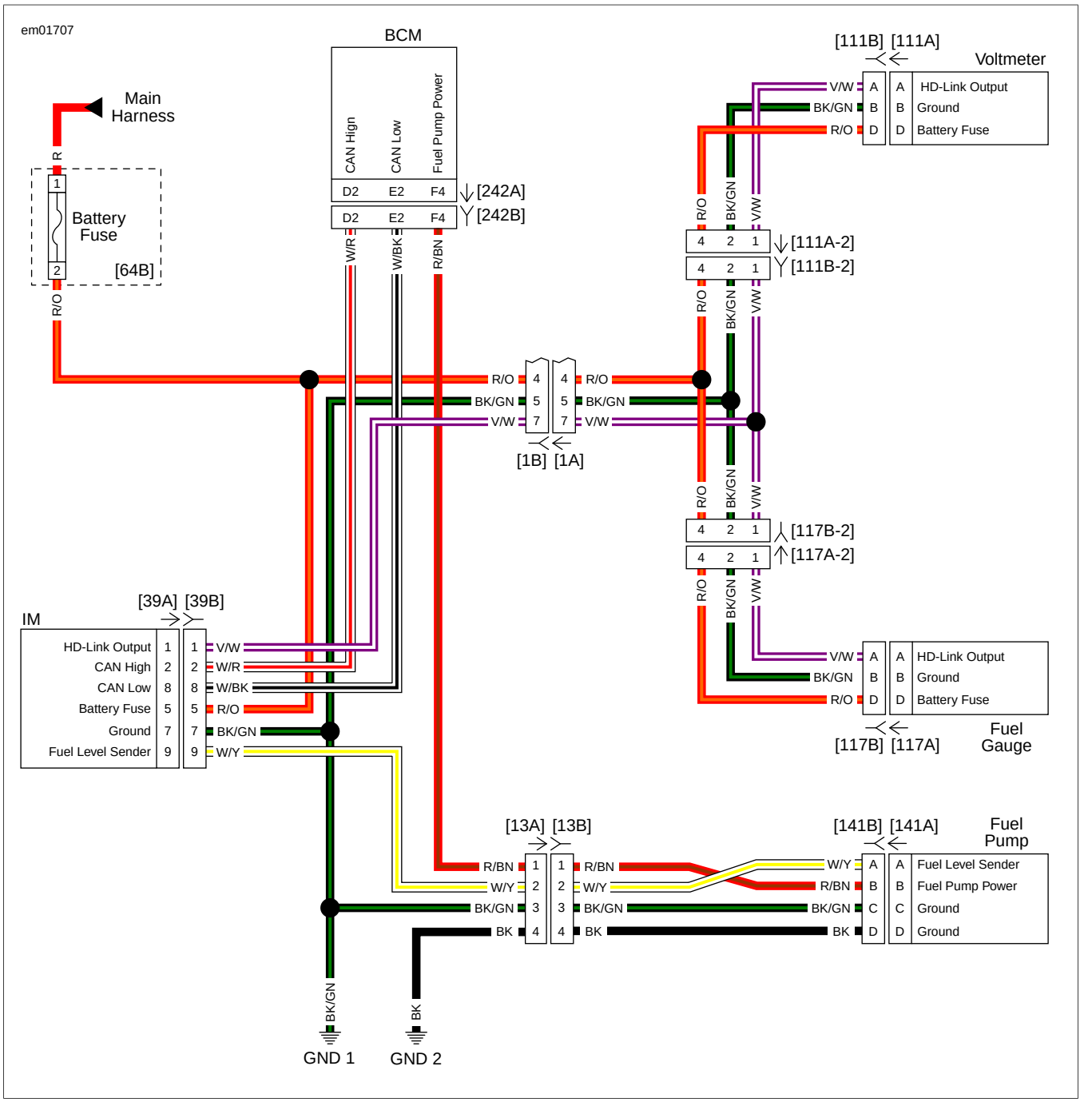


Figure 6-12. Fuel Sensor Circuit: FLT

DTC B2116

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 6-5. DTC B2116 Diagnostic Faults

POSSIBLE CAUSES
Open in the fuel pump power circuit
Fuel pump fault or malfunction

1. Fuel Pump Circuit Test

1. Turn IGN OFF.
2. Disconnect fuel pump [141].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [141B] terminals B and D.
4. Turn IGN ON.
5. Was battery voltage displayed for a short time?
   a. **Yes.** Replace fuel pump.
   b. **No.** Go to Test 2.

2. Ground Circuit Open Test

1. Turn IGN OFF.
2. Test resistance between [141B] terminal D and ground.
3. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK) ground wire.

3. Power Circuit Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) to wire harness [242B], leaving BCM [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between BOB terminal F4 and [141B] terminal A.
4. Is continuity present?
   a. **Yes.** Replace BCM.
   b. **No.** Repair open in (R/BN) wire.

DTC B2117

Table 6-6. DTC B2117 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in the fuel pump power circuit

1. Fuel Pump Power Circuit Short to Voltage Test

1. Turn IGN ON.
2. Does fuel pump continue to run after the initial 2 second start up?
   a. **Yes.** Repair short to voltage in (R/BN) wire. See diagnostic tips. If no source of short is found, replace BCM.
   b. **No.** Go to Test 2.

2. Code Verification Test

1. Clear DTC.
2. Start engine.
3. Check DTCs.
4. Did DTC reset?
   a. **Yes.** Replace BCM.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

DTC B2118, B2119

Table 6-7. DTC B2118, B2119 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in the fuel pump power circuit
Fuel pump malfunction

1. Fuel Test

1. Verify there is fuel in fuel tank.
2. Is fuel present in tank?
   a. **Yes.** Go to Test 2.
   b. **No.** Fill tank with fuel and clear DTCs. If the DTC returned, then continue with tests. Go to Test 2.

2. Fuel Pump Test

1. Turn IGN OFF.
2. Disconnect fuel pump [141].
3. Clear DTC.
4. Turn IGN ON.
5. Check DTCs.
6. Did DTC B2118 or B2119 reset?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace fuel pump.

3. Power Circuit Short to Ground Test

1. Turn IGN OFF.
2. Disconnect BCM [242].
3. Test continuity between [141B] terminal 1 (R/BN) wire and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground on (R/BN) wire.
   b. **No.** See diagnostic tips. If problem not found, replace BCM.

AAT SENSOR DIAGNOSTICS 6.6

DESCRIPTION AND OPERATION

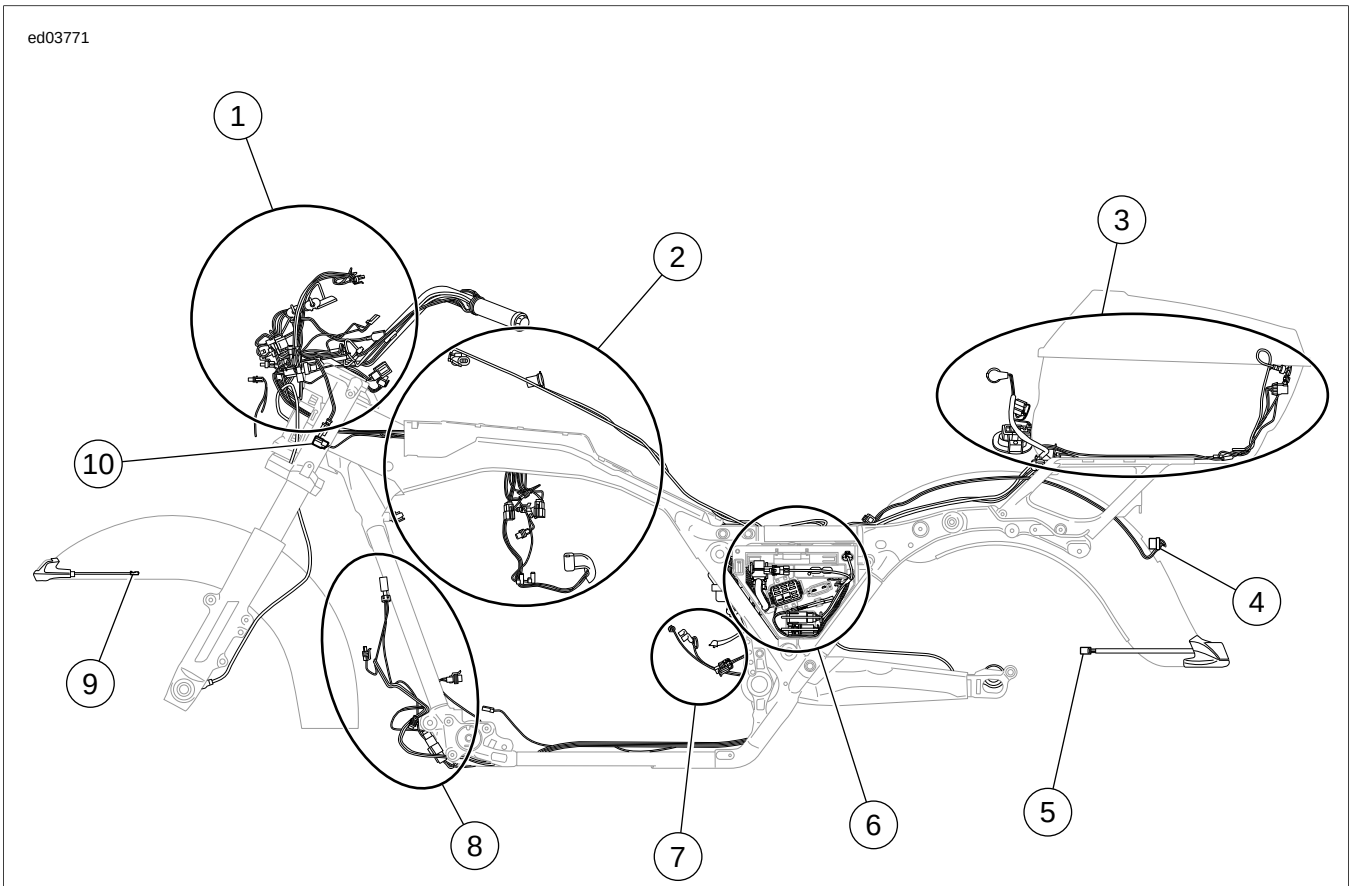
See Figure 6-13. The ECM supplies and monitors a voltage signal from [78-3] terminal 3 to one side of the AAT sensor. The other side of the AAT sensor is connected to a common sensor ground. The ground is also connected to the ECM [78-2] terminal 7.

The AAT sensor is a thermistor device. At a specific temperature it will have a specific resistance across its terminals. As this resistance varies, so does the voltage on ECM [78-3] terminal 3.

- At high temperatures, the resistance of the sensor is very low. This lowers the signal voltage on ECM [78-3] terminal 3.
- At low temperatures, the resistance is very high. This allows the voltage to rise close to 5V. The ECM monitors this voltage to update the ambient temperature on the radio display.
- Temperature reading will update when vehicle is moving over 3 mph (5 kph) for at least one minute.

Table 6-8. Code Description

DTC	DESCRIPTION
P0072	AAT sensor low
P0073	AAT sensor high/open



1. **Under fairing**
2. **Engine**
3. **Tour-Pak**
4. **Tail lamp [93]**
5. **Rear fender tip lamp [45]**
6. **Left side cover**
7. **Starter**
8. **Front of engine**
9. **Front fender tip lamp [32]**
10. **AAT sensor [107]**

Figure 6-13. Left Side

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

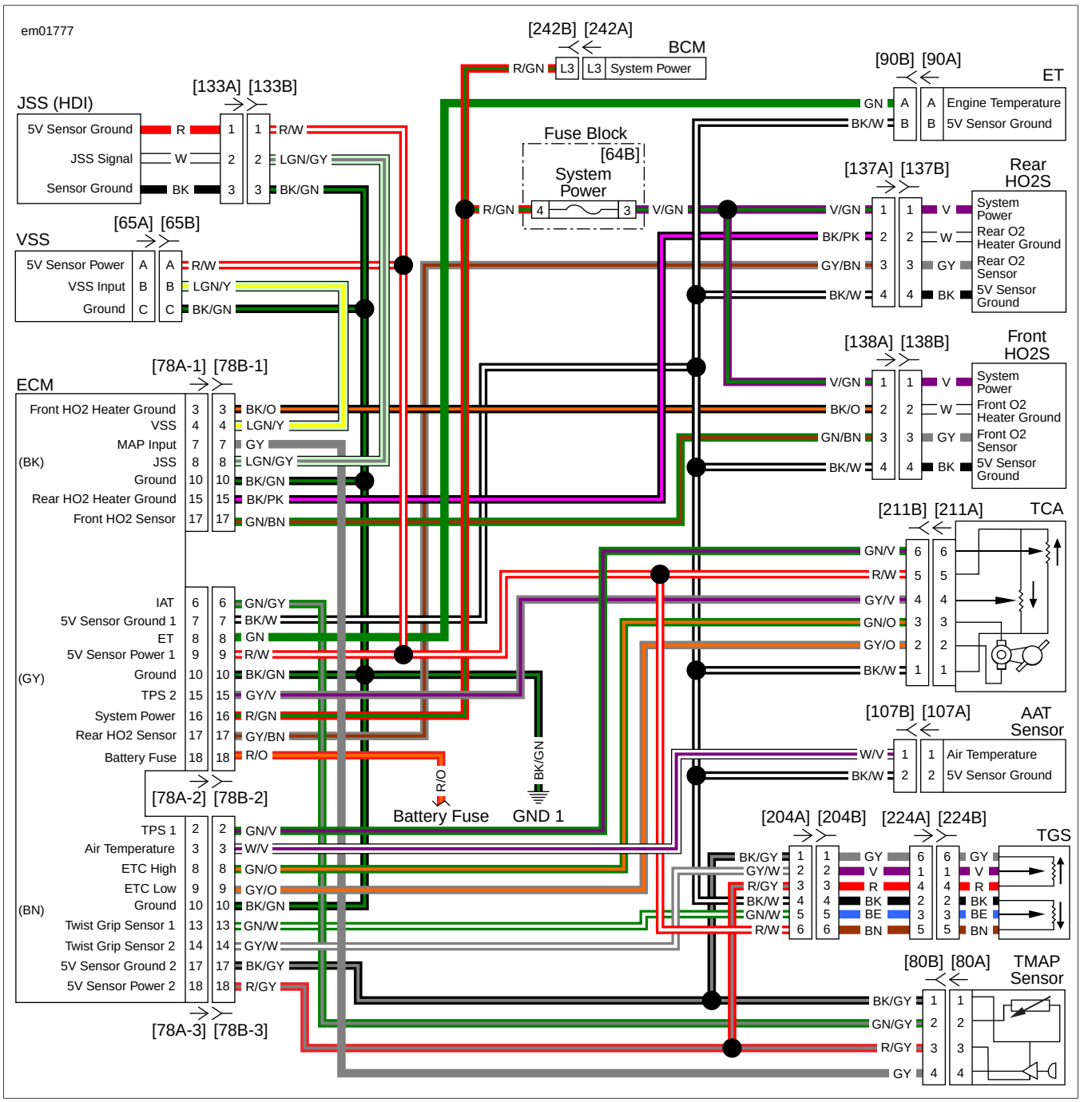


Figure 6-14. Sensor Circuit

DTC P0072

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-9. DTC P0072 Diagnostic Faults

POSSIBLE CAUSES
AAT sensor malfunction
Short to ground in 5V reference circuit

1. AAT Sensor Test

NOTE

Vehicle and sensor must be at ambient room temperature before starting diagnostic test.

1. Turn IGN OFF.
2. Disconnect AAT sensor [107].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404) test resistance between [107A] terminals 1 and 2.
4. Is resistance between 11,000-12,000 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace AAT sensor.

2. AAT Sensor Signal Wire Shorted to Ground Test

1. Test resistance between [107B] terminal 1 (W/V) wire and ground.
2. Is resistance less than 1 Ohm?
   a. **Yes.** Repair short to ground in (W/V) wire.
   b. **No.** Go to Test 3.

3. AAT Sensor Signal Wire Shorted to Sensor Ground Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Test continuity between BOB [78-2] terminal 7 and [78-3] terminal 3.
4. Is continuity present?
   a. **Yes.** Repair short between [107B] terminals 1 (W/V) wire and 2 (BK/W) wire.
   b. **No.** Replace ECM.

DTC P0073

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-10. DTC P0073 Diagnostic Faults

POSSIBLE CAUSES
ET sensor malfunction
Open or short to voltage in 5V reference circuit

1. AAT Signal Voltage Test

1. Turn IGN OFF.
2. Disconnect AAT sensor [107].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [107B] terminal 1 (W/V) wire and ground.
4. Turn IGN ON.
5. Is voltage greater than 6V?
   a. **Yes.** Repair short to voltage on (W/V) wire.
   b. **No.** Go to Test 2.

2. AAT Sensor Signal Wire Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between [107B] terminal 1 (W/V) wire and BOB [78-3] terminal 3.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (W/V) wire.

3. AAT Sensor Open Ground Wire Test

1. Test resistance between [107B] terminal 2 (BK/W) wire and BOB [78-2] terminal 7.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK/W) wire.

4. AAT Sensor Signal Wire Shorted to Sensor Power Test

1. Test continuity between BOB [78-2] terminal 9 and [78-3] terminal 3.

2. Is continuity present?
   a. **Yes.** Repair short between (W/V) and (R/W) wires.
   b. **No.** Go to Test 5.

5. AAT Sensor Test

1. Connect [107].
2. Test continuity between BOB [78-2] terminal 7 and [78-3] terminal 3.
3. Is continuity present?
   a. **Yes.** Replace ECM.
   b. **No.** Replace AAT sensor.

TMAP SENSOR DIAGNOSTICS 6.7

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-23738	VACUUM PUMP

See Figure 6-15. The TMAP sensor provides the functions of both an IAT sensor and a MAP sensor in one unit. The TMAP sensor is supplied 5V from ECM [78-3] terminal 18. It sends MAP and IAT signals back to ECM [78-1] terminal 7 and [78-2] terminal 6, respectively. Refer to Table 6-11.

Table 6-11. Code Description

DTC	DESCRIPTION
P0107	MAP sensor open/low
P0108	MAP sensor high
P0112	IAT sensor voltage low
P0113	IAT sensor open/high

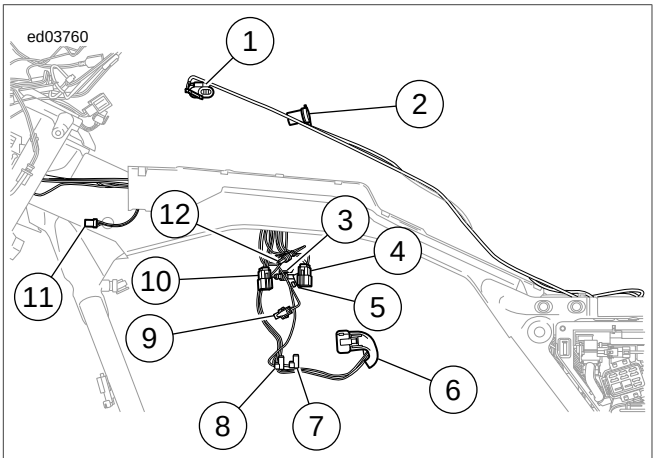
TMAP: MAP Signal

The MAP signal varies in accordance with engine vacuum and atmospheric pressure. Changes in atmospheric pressure are influenced by weather and altitude.

TMAP: IAT Signal

The IAT portion of the TMAP sensor is a thermistor device. At a specific temperature, it will have a specific resistance across its terminals. As this resistance varies, so does the voltage on [78-2] terminal 6 of the ECM.

- At high temperatures, the resistance of the IAT sensor is very low, which effectively lowers the signal voltage on [78-2] terminal 6.
- At low temperatures, the resistance is very high, allowing the voltage to rise close to 5V. The ECM monitors this voltage to compensate for various operating conditions.



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-15. Engine

Diagnostic Tips: MAP Portion of TMAP Sensor

- DTCs P0107 or P0108 will set if the MAP sensor signal is out of range. DTC P0108 can only be detected with the engine running.
- Using the VACUUM PUMP (Part No. HD-23738), apply a vacuum to the pressure port of the TMAP sensor. The MAP signal voltage should lower as the vacuum is applied.
- The TMAP and TGS are connected to the same reference line (+5V Vref). If the reference line goes to ground or open, multiple codes will be set (DTCs P0107, P0108, P0122, P0123, P1501 and P1502).

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

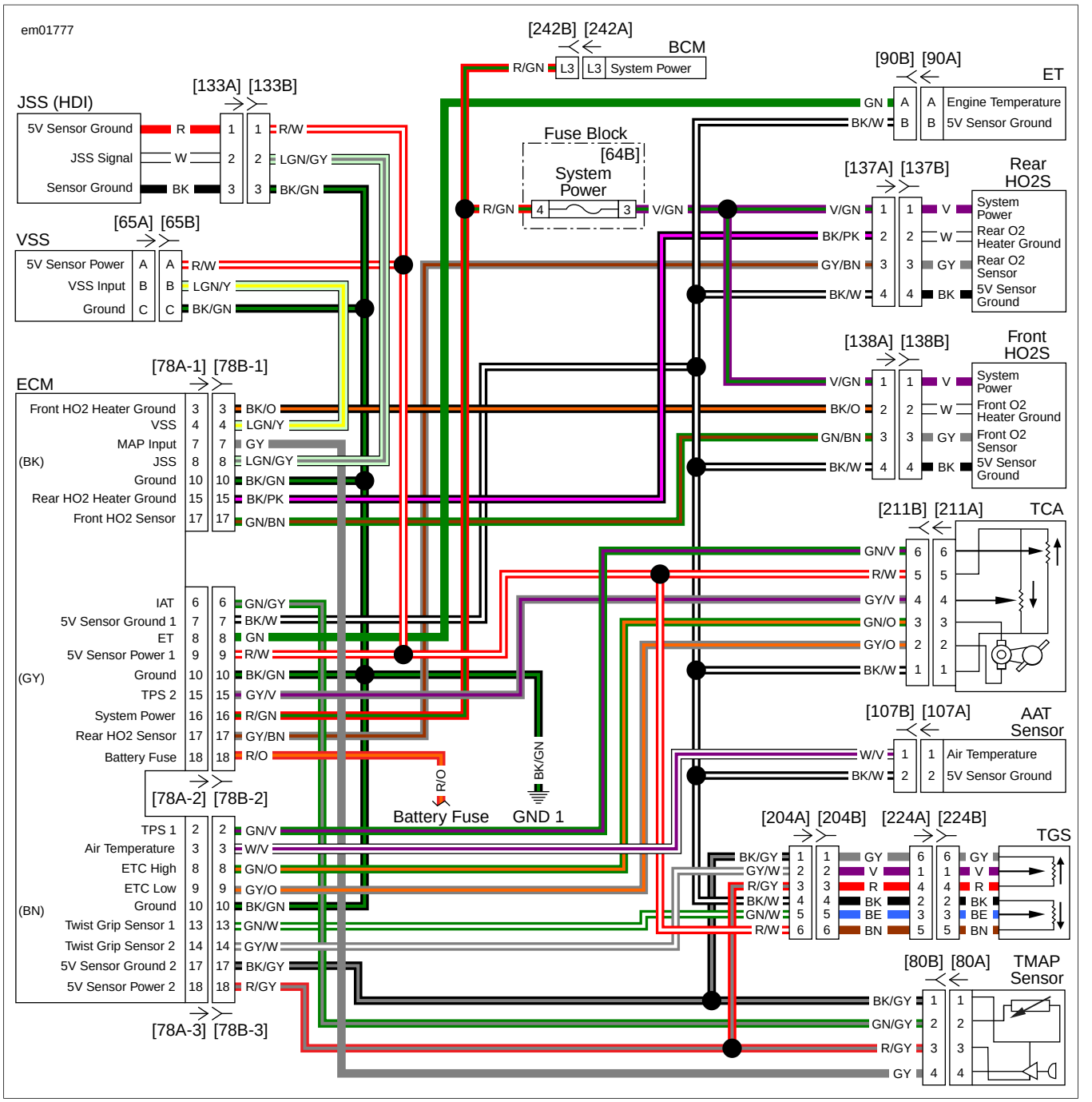


Figure 6-16. Sensor Circuit

DTC P0107

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-12. DTC P0107 Diagnostic Faults

POSSIBLE CAUSES
MAP sensor malfunction
Open or shorted to ground signal wire
Open or shorted to ground 5V reference circuit

1. MAP Sensor Test

1. Turn IGN OFF.
2. Disconnect TMAP sensor [80].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper between [80B] terminals 4 (GY) wire and 3 (R/GY) wire.
4. Clear DTCs.
5. Start engine.
6. Turn IGN ON.
7. Check DTCs.
8. Did DTC reset?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace TMAP sensor.

2. MAP Sensor Signal Voltage Test

1. Turn IGN OFF.
2. Remove jumper.
3. Turn IGN ON.
4. Test voltage between [80B] terminal 3 (R/GY) wire and ground.
5. Is voltage approximately 5V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 6.

3. MAP Sensor Signal Wire Continuity Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between [80B] terminal 4 (GY) wire and BOB [78-1] terminal 7.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (GY) wire.

4. MAP Sensor Signal Wire Shorted to Ground Test

1. Test continuity between BOB [78-1] terminal 7 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (GY) wire.
   b. **No.** Go to Test 5.

5. MAP Sensor Signal Wire Shorted to Sensor Ground Test

1. Test continuity between BOB [78-1] terminal 7 and [78-3] terminal 17.
2. Is continuity present?
   a. **Yes.** Repair short between (GY) and (BK/GY) wires.
   b. **No.** Replace ECM.

6. MAP Sensor 5V Reference Wire Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between [80B] terminal 3 (R/GY) wire and BOB [78-3] terminal 18.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (R/GY) wire.

7. MAP Sensor 5V Reference Shorted to Signal Ground Test

1. Test continuity between BOB [78-3] terminals 17 and 18.
2. Is continuity present?
   a. **Yes.** Repair short between the (R/GY) and (BK/GY) wires.
   b. **No.** See diagnostic tips before replacement. Replace ECM.

DTC P0108

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-13. DTC P0108 Diagnostic Faults

POSSIBLE CAUSES
MAP sensor malfunction
Short to voltage

1. MAP Sensor Test

1. Turn IGN OFF.
2. Disconnect TMAP sensor [80].
3. Clear DTC.
4. Start engine.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace MAP sensor.

2. MAP Sensor Signal Wire Short to 5V Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wire harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB [78-1] terminal 7 and [78-3] terminal 18.
5. Is continuity present?
   a. **Yes.** Repair short between (R/GY) and (GY) wires.
   b. **No.** Go to Test 3.

3. MAP Sensor Signal Wire Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB [78-1] terminal 7 and ground.
3. Is voltage present?
   a. **Yes.** Repair short to voltage in (GY) wire.
   b. **No.** Go to Test 4.

4. MAP Sensor 5V Reference Shorted to Battery Voltage Test

1. Test voltage between BOB [78-3] terminal 18 and ground.
2. Is voltage greater than 5.25V?
   a. **Yes.** Repair short to voltage in (R/GY) wire.
   b. **No.** Go to Test 5.

5. MAP Sensor Ground Wire Open Test

1. Test resistance between [80B] terminal 1 and BOB [78-3] terminal 17.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace TMAP sensor.
   b. **No.** Repair open in (BK/GY) wire.

DTC P0112

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-14. DTC P0112 Diagnostic Faults

POSSIBLE CAUSES
IAT sensor malfunction
Short to ground in 5V reference circuit

NOTE

Vehicle and sensor must be at ambient room temperature before starting diagnostic test.

1. IAT Sensor Test

1. Turn IGN OFF.
2. Disconnect TMAP sensor [80].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [80A] terminals 1 and 2.
4. Is resistance between 500-5000 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace TMAP sensor.

2. IAT Sensor Signal Wire Shorted to Ground Test

1. Test resistance between [80B] terminal 2 (GN/GY) and ground.
2. Is resistance reading less than 1 Ohm?
   a. **Yes.** Repair short to ground on (GN/GY) wire.
   b. **No.** Go to Test 3.

3. IAT Sensor Signal Voltage High Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wire harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Test continuity between BOB [78-2] terminals 6 and 10.
4. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to ground on (GN/GY) wire.

4. IAT Sensor Signal Wire Shorted to Sensor Ground Test

1. Test continuity between BOB [78-2] terminal 6 and [78-3] terminal 17.
2. Is continuity present?
   a. **Yes.** Repair short between [80B] terminals 1 and 2 (GN/GY and BK/GY) wires.
   b. **No.** Replace ECM.

DTC P0113

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-15. DTC P0113 Diagnostic Faults

POSSIBLE CAUSES
IAT sensor malfunction
Open or short to voltage in 5V reference circuit

1. IAT Sensor Test

1. Turn IGN OFF.
2. Disconnect TMAP sensor [80].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [80B] terminal 2 (GN/GY) and ground.
5. Is voltage greater than 6V?
   a. **Yes.** Repair short to voltage on (GN/GY) wire.
   b. **No.** Go to Test 2.

2. IAT Sensor Signal Wire Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between [80B] terminal 2 (GN/GY) and BOB [78-2] terminal 6.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open circuit in (GN/GY) wire.

3. IAT Sensor Open Ground Wire Test

1. Test resistance between BOB [78-3] terminal 17 and [80B] terminal 1 (BK/GY).
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK/GY) wire.

4. IAT Sensor Signal Wire Shorted to Sensor Power Test

1. Test continuity between BOB [78-2] terminal 6 and [78-3] terminal 18.
2. Is continuity present?
   a. **Yes.** Repair short between (GN/GY) and (R/GY) wires. Verify IAT sensor resistance value and if incorrect replace TMAP sensor.
   b. **No.** Replace ECM.

ET SENSOR DIAGNOSTICS 6.8

DESCRIPTION AND OPERATION

See Figure 6-17. The ECM supplies and monitors a voltage signal from [78-2] terminal 8 to one side of the ET sensor. The other side of the ET sensor is connected to a common sensor ground. The ground is also connected to the ECM [78-2] terminal 7.

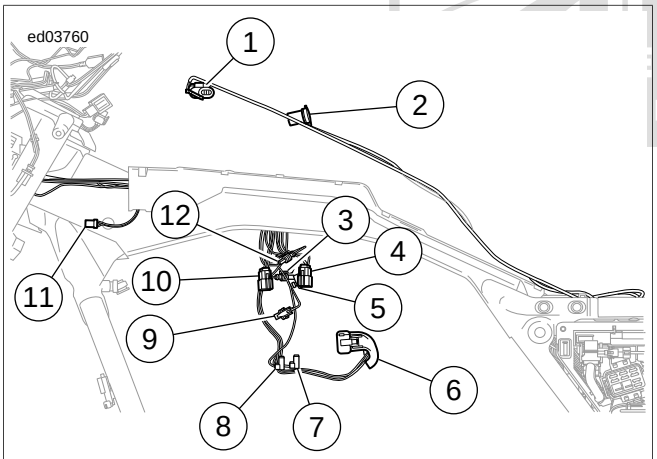
The ET sensor is a thermistor device. At a specific temperature it will have a specific resistance across its terminals. As this resistance varies, so does the voltage on ECM [78-2] terminal 8.

- At high temperatures, the resistance of the sensor is very low. This lowers the signal voltage on ECM [78-2] terminal 8.
- At low temperatures, the resistance is very high. This allows the voltage to rise close to 5V.

The ECM monitors this voltage to compensate for various operating conditions.

Table 6-16. Code Description

DTC	DESCRIPTION
P0117	ET sensor shorted low
P0118	ET sensor high/open



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-17. Engine

Diagnostic Tips

Once the engine is started, the temperature should rise steadily to operating temperature.

An intermittent may be caused by a poor connection, rubbed through wire insulation or an inoperative wire inside the insulation.

Check the following conditions:

- **Poor connection:** Inspect ECM harness connector [78-1], [78-2] and [78-3] for backed out terminals, improper mating, inoperative locks, improperly formed or damaged terminals, poor terminal-to-wire connection and damaged harness.
- **Perform** 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test **to locate intermittents:** If connections and harness check out OK, use a multimeter to check the engine temperature reading while moving related connectors and wiring harness. If the failure is induced, the engine temperature display will change.
- **Shifted sensor resistance value:** Measure ET and IAT sensor temperatures with a cool engine. The sensor temperatures should be within 10 °F (5.6 °C) of each other. If the two sensors are not within the specified range replace the inaccurate sensor.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

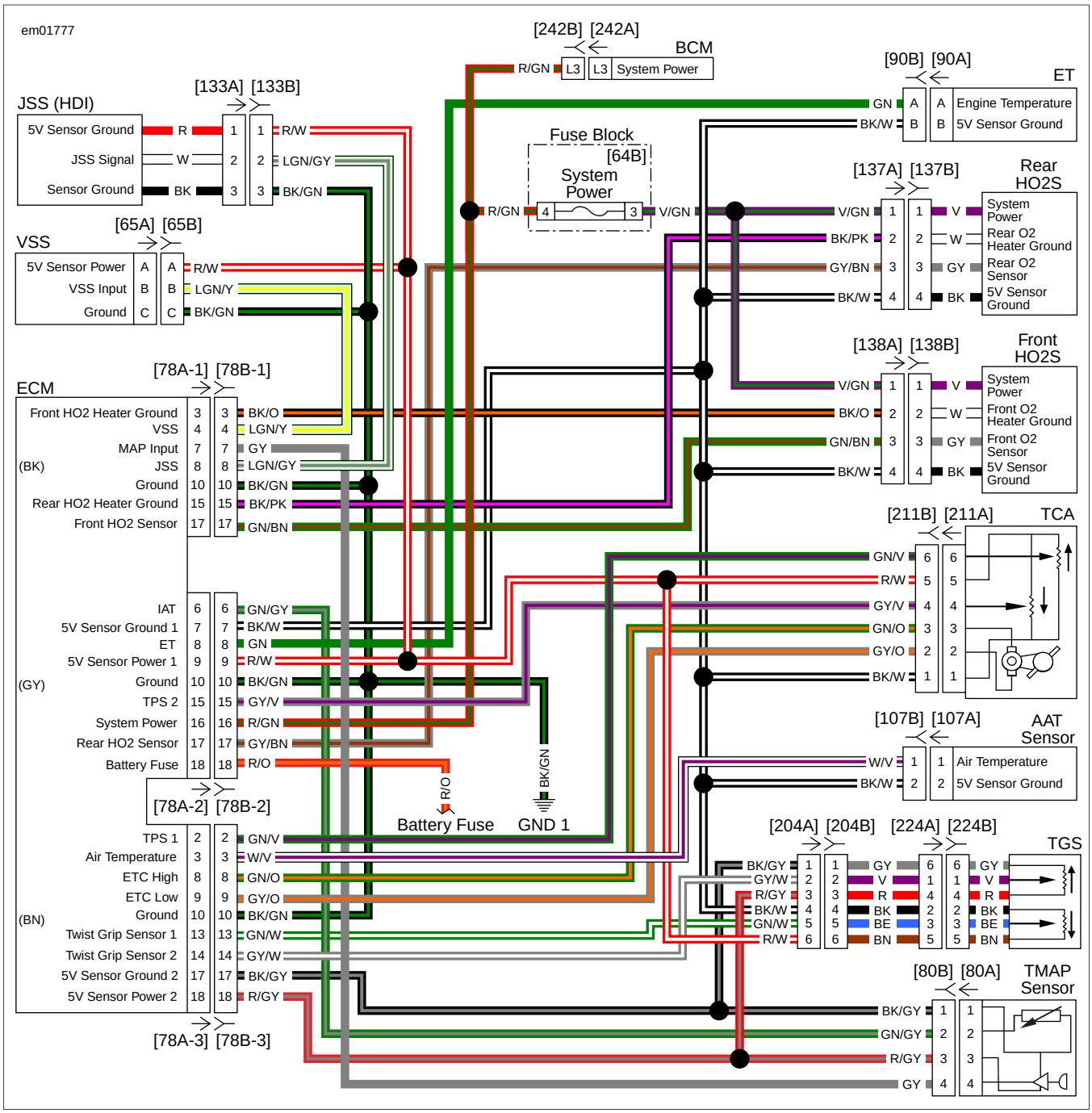


Figure 6-18. Sensor Circuit

DTC P0117

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-17. DTC P0117 Diagnostic Faults

POSSIBLE CAUSES
ET sensor malfunction
Short to ground in 5V reference circuit

1. ET Sensor Test

NOTE

Vehicle and sensor must be at ambient room temperature before starting diagnostic test.

1. Turn IGN OFF.
2. Disconnect ET sensor [90].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [90A] terminals 1 and 2.
4. Is resistance between 900-10,000 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace ET sensor.

2. ET Sensor Signal Wire Shorted to Ground Test

1. Test resistance between [90B] terminal A (GN) wire and ground.
2. Is resistance less than 1 Ohm?
   a. **Yes.** Repair short to ground in (GN) wire.
   b. **No.** Go to Test 3.

3. ET Sensor Signal Wire Shorted to Sensor Ground Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Test continuity between BOB [78-2] terminals 8 and 7.
4. Is continuity present?
   a. **Yes.** Repair short between [90B] terminals A (GN) wire and B (BK/W) wire.
   b. **No.** Replace ECM.

DTC P0118

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-18. DTC P0118 Diagnostic Faults

POSSIBLE CAUSES
ET sensor malfunction
Open or short to voltage in 5V reference circuit

1. ET Signal Voltage Test

1. Turn IGN OFF.
2. Disconnect ET sensor [90].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [90B] terminal A (GN) wire and ground.
4. Turn IGN ON.
5. Is voltage greater than 6V?
   a. **Yes.** Repair short to voltage on (GN) wire.
   b. **No.** Go to Test 2.

2. ET Sensor Signal Wire Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between [90B] terminal A (GN) wire and BOB [78-2] terminal 8.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (GN) wire.

3. ET Sensor Open Ground Wire Test

1. Test resistance between [90B] terminal B (BK/W) wire and BOB [78-2] terminal 7.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK/W) wire.

4. ET Sensor Signal Wire Shorted to Sensor Power Test

1. Test continuity between BOB [78-2] terminals 8 and 9.

2. Is continuity present?
   a. **Yes.** Repair short between (GN) and (R/W) wires.
   b. **No.** Go to Test 5.

5. ET Sensor Test

1. Connect [90].
2. Test continuity between BOB [78-2] terminals 8 and 7.
3. Is continuity present?
   a. **Yes.** Replace ECM.
   b. **No.** Replace ET sensor.

TCA DIAGNOSTICS 6.9

DESCRIPTION AND OPERATION

See Figure 6-19. A dual TPS is integrated into the TCA, mounted to the induction module.

Within the TCA, a set of potentiometers are designated as TPS (TPS1 and TPS2). The ECM drives the motor in the TCA to open and close the throttle plate based on the signals from the twist grip sensor. The TPS (TPS1 and TPS2) send signals back to the ECM based on throttle plate position to verify the throttle plate movement.

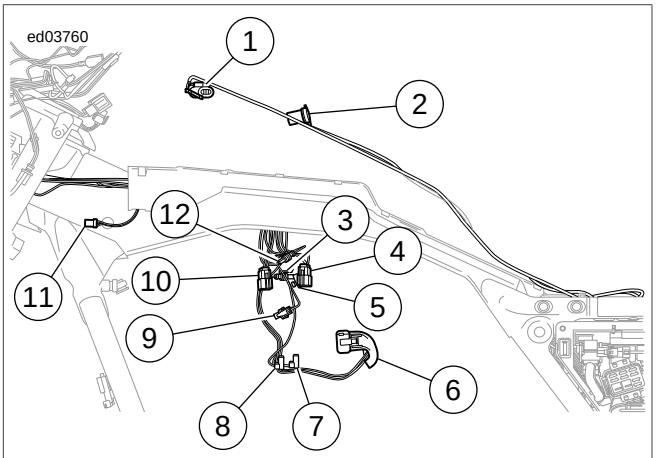
The ECM supplies a 5.0V signal from terminal [78-2] terminal 9 to TPS1 and [78-3] terminal 18 to TPS2. The signals from TPS1 and TPS2 are sent back to the ECM [78-3] terminals 13 and 14 and vary in voltage according to actual throttle plate position.

The two TP sensors work opposite each other. When one sensor reads high, the other reads low. The sum of TPS1 and TPS2 signals should measure around 5.0V.

See Figure 6-1 for TCA (TPS1 and TPS2) circuitry diagram. Refer to Table 6-19 for DTCs associated with TPS1 and TPS2 of the TCA.

Table 6-19. Code Description

DTC	DESCRIPTION
P0120	TPS1 range error
P0122	TPS1 low/open
P0123	TPS1 high
P0220	TPS2 range error
P0222	TPS2 low/open
P0223	TPS2 high



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-19. Engine

NOTE

The TGS, JSS, TCA and VSS sensors are connected to the same reference line (+5V REF). If the reference line goes to ground or open, multiple codes will be set (DTC P0122, P0123, P0502, P0503, P1501, P1502, P2101, P2102, P2103, 2122, 2123, P2127, P2128). Start with the trouble code having the highest priority DTC. Refer to Table 1-12.

Check for the following conditions:

- **Poor connection:** Inspect ECM harness connector [78B-1], [78B-2] and [78-B-3] for backed out terminals, improper mating, inoperative locks, improperly formed or damaged terminals, poor terminal-to-wire connection and damaged harness.
- **Perform 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test to locate intermittents:** If connections and harness check out OK, monitor TPS voltage using a multimeter while moving related connectors and wiring harness. If the failure is induced, the TPS voltage will change.
- An intermittent may be caused by poor connection, rubbed through wire insulation or an inoperative wire within the wire insulation.

Diagnostic Tips

A faulty sensor can negatively affect the signal voltage of the other sensors sharing the same 5V reference. If the wiring passes the following tests, disconnect one sensor at a time on the 5V reference and verify the DTC is still present. Additional

DTCs will be set as each sensor is disconnected, clear DTCs after this test. Be sure to perform this test before replacing a component.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

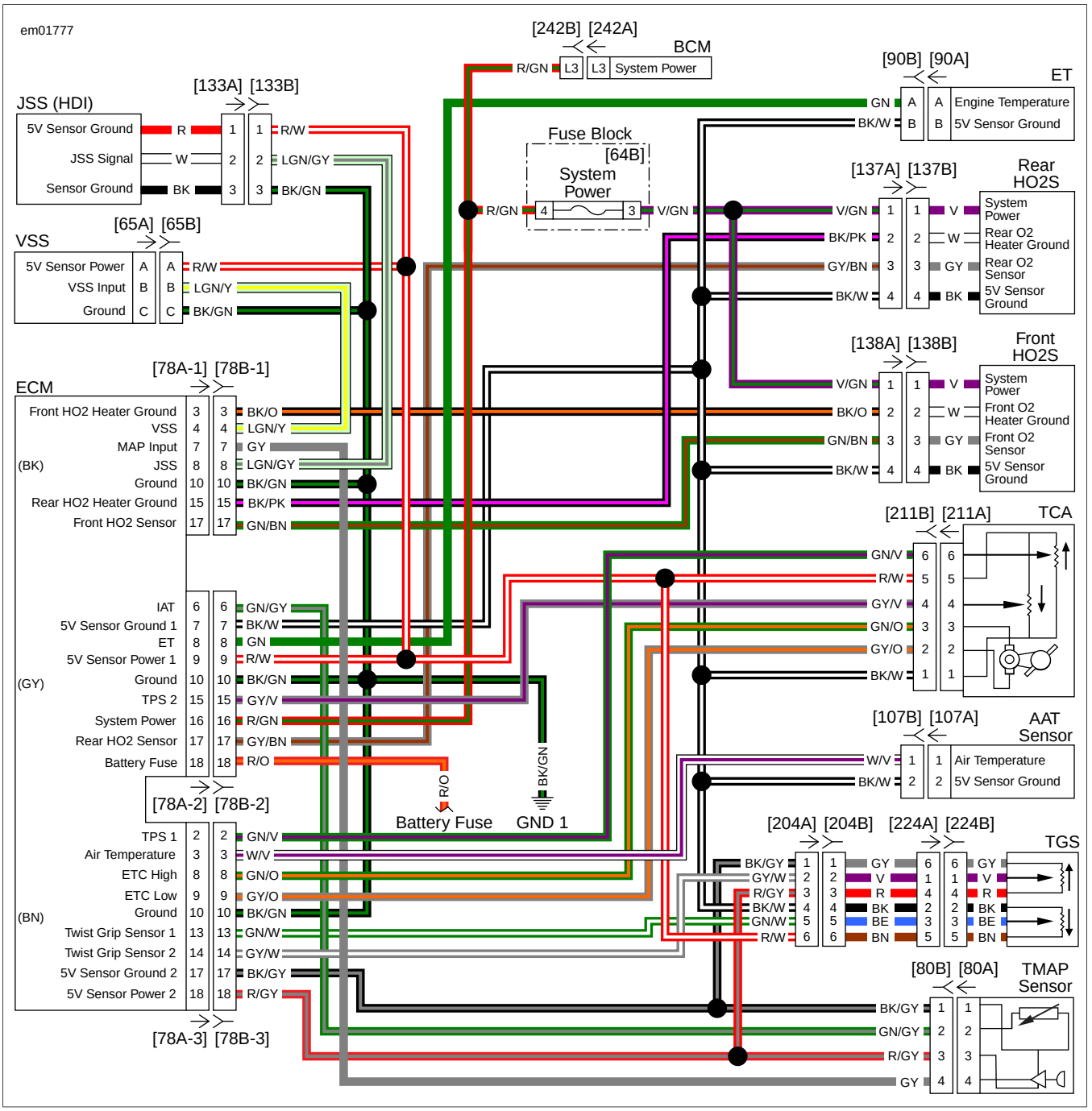


Figure 6-20. Sensor Circuit

DTC P0120

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-20. DTC P0120 Diagnostic Faults

POSSIBLE CAUSES
Open in sensor power circuit
Short to voltage in TPS-1 circuit
Open in TPS-1 circuit
Short to ground in TPS-1 circuit
Open sensor ground circuit

1. Sensor Power-1 Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Disconnect TCA [211].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-2] terminal 9 and [211B] terminal 5.
6. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/W) wire.

2. TPS-1 Circuit Shorted Test

1. Test continuity between BOB [78-2] terminal 9 and [78-3] terminal 2.
2. Is continuity present?
   a. **Yes.** Repair short between (GN/V) and (R/W) wires.
   b. **No.** Go to Test 3.

3. TPS-1 Circuit Continuity Test

1. Test resistance between BOB [78-3] terminal 2 and [211B] terminal 6.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (GN/V) wire.

4. TPS-1 Circuit Short to Ground Test

1. Test continuity between BOB [78-3] terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground on (GN/V) wire.
   b. **No.** Go to Test 5.

5. TPS-1 Circuit Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB [78-3] terminal 2 and ground.
3. Is voltage present?
   a. **Yes.** Repair short to voltage on (GN/V) wire.
   b. **No.** Go to Test 6.

6. Sensor Ground Continuity Test

1. Test resistance between BOB [78-2] terminal 7 and [211B] terminal 1.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (BK/W) wire.

7. TCA Test

1. Turn IGN OFF.
2. Connect [78A-1], [78A-2] and [78A-3] to BOB.
3. Connect [211].
4. Turn IGN ON.
5. Test voltage between BOB [78-2] terminal 7 and [78-3] terminal 2.
6. Is voltage between 0.4-4.8V?
   a. **Yes.** Replace ECM.
   b. **No.** Replace TCA.

DTC P0122

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-21. DTC P0122 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in TPS-1 Circuit
Open in sensor power circuit

1. TCA Sensor-1 Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3] and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.

3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-3] terminal 2 and [78-2] terminal 7.
6. Is voltage greater than 0.2V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. TCA Sensor-1 Circuit Short to Ground Test

1. Turn IGN OFF.
2. Disconnect ECM [78A-1], [78A-2] and [78A-3] from BOB.
3. Disconnect TCA [211].
4. Test continuity between BOB [78-3] terminal 2 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground in (GN/V) wire.
   b. **No.** Go to Test 3.

3. TCA Power-1 Circuit Open Test

1. Test resistance between BOB [78-2] terminal 9 and [211] terminal 5.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace TCA.
   b. **No.** Repair open in (R/W) wire.

4. TCA Sensor Test

1. Turn IGN OFF.
2. Disconnect TCA [211].
3. Test voltage between BOB [78-2] terminal 9 and ground.
4. Is voltage greater than 4V?
   a. **Yes.** Replace TCA.
   b. **No.** Go to Test 5.

5. ECM Test

1. Disconnect ECM [78A-1], [78A-2] and [78A-3] from BOB.
2. Test continuity between BOB [78-3] terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (GN/V) wire.
   b. **No.** Replace ECM.

DTC P0123

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-22. DTC P0123 Diagnostic Faults

POSSIBLE CAUSES
Open in TPS-1 circuit
Short to voltage in TPS-1 circuit
Short to voltage in sensor power circuit
Open in sensor ground circuit

1. TPS-1 Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-3] terminal 2 and [78-2] terminal 7.
6. Is voltage less than 4.8V?
   a. **Yes.** Go to Test 8.
   b. **No.** Go to Test 2.

2. TPS-1 Circuit Test

1. Turn IGN OFF.
2. Disconnect TCA [211].
3. Turn IGN ON.
4. Test voltage between [211B] terminal 6 and ground.
5. Is voltage between 4-5.25V?
   a. **Yes.** Go to Test 3.
   b. **No. Less than 4V.** Repair open in (GN/V) wire.
   c. **No. Greater than 5.25V.** Repair short to voltage in (GN/V) wire.

3. Sensor Power Circuit Test

1. Test voltage between [211B] terminal 5 and ground.
2. Is voltage less than 5.25V?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to voltage in (R/W) wire.

4. TCA Test

1. Jumper [211B] terminals 6 and 1.
2. Test voltage between BOB [78-3] terminal 2 and [78-2] terminal 7.
3. Is voltage greater than 1.0V?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace TCA.

5. Sensor Ground Test

1. Turn IGN OFF.
2. Test resistance between [211B] terminal 1 and ground.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 7.

6. Sensor Ground Circuit Shorted Test

1. Test continuity between [211B] terminals 5 and 6.
2. Is continuity present?
   a. **Yes.** Repair short between (GN/V) and (R/W) wires.
   b. **No.** Replace ECM.

7. Sensor Ground Circuit Test

1. Disconnect ECM [78A-1], [78A-2] and [78A-3].
2. Test resistance between [211B] terminal 1 and BOB [78-2] terminal 7.
3. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (BK/W) wire.

8. TPS-1 Circuit Function Test

1. Disconnect TCA [211].
2. Test voltage between [211B] terminal 6 and ground.
3. Is voltage between 2-5.25V?
   a. **Yes.** Go to Test 9.
   b. **No. Less than 2V.** Repair open in (GN/V) wire.
   c. **No. Greater than 5.25V.** Repair short to voltage on (GN/V) wire.

9. Sensor Power Short to Voltage Test

1. Test voltage between [211B] terminal 5 and ground.
2. Is voltage less than 5.25V?
   a. **Yes.** Go to Test 10.
   b. **No.** Repair short to voltage on (R/W) wire.

10. Ground Circuit Open Test

1. Turn IGN OFF.
2. Disconnect ECM [78A-1], [78A-2] and [78A-3].
3. Test resistance between [211B] terminal 1 and BOB [78-2] terminal 7.
4. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 11.
   b. **No.** Repair open in (BK/W) wire.

11. TPS-1 Continuity Test

1. Test resistance between [211B] terminal 6 and BOB [78-3] terminal 2.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace TCA.
   b. **No.** Repair open in (GN/V) wire.

DTC P0220

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-23. DTC P0220 Diagnostic Faults

POSSIBLE CAUSES
Open in sensor power circuit
Short to voltage in sensor power circuit
Open in TPS-2 circuit
Short to voltage in TPS-2 circuit
Short to ground in TPS-2 circuit
Open in sensor ground circuit

1. Sensor Power-1 Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Disconnect TCA [211].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-2] terminal 9 and [211] terminal 5.
6. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (R/W) wire.

2. Sensor Power-1 Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB [78-2] terminal 9 and ground.

3. Is battery voltage present?
   a. **Yes.** Repair short to voltage (R/W) wire.
   b. **No.** Go to Test 3.

3. TPS-2 Circuit Shorted Test

1. Turn IGN OFF.
2. Test continuity between BOB [78-2] terminals 9 and 15.
3. Is continuity present?
   a. **Yes.** Repair short between (R/W) and (GY/V) wires.
   b. **No.** Go to Test 4.

4. TPS-2 Circuit Resistance Test

1. Test resistance between BOB [78-2] terminal 15 and [211B] terminal 4.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (GY/V) wire.

5. TPS-1 Circuit Short to Ground Test

1. Test continuity between BOB [78-2] terminal 15 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground on (GY/V) wire.
   b. **No.** Go to Test 6.

6. TPS-1 Circuit Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB [78-2] terminal 15 and ground.
3. Is voltage present?
   a. **Yes.** Repair short to voltage on (GY/V) wire.
   b. **No.** Go to Test 7.

7. Sensor Ground Resistance Test

1. Turn IGN OFF.
2. Test resistance between BOB [78-2] terminal 7 and [211B] terminal 1.
3. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair open in (BK/W) wire.

8. TCA Test

1. Connect [78A-1], [78A-2] and [78A-3] to BOB.
2. Connect [211].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminals 15 and 7.
5. Is voltage between 0.4-4.8V?
   a. **Yes.** Replace ECM.
   b. **No.** Replace TCA.

DTC P0222

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-24. DTC P0222 Diagnostic Faults

POSSIBLE CAUSES
Open in sensor power circuit
Short to ground in TPS-2 circuit

1. TCA Sensor-2 Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminals 15 and 7.
6. Is voltage greater than 0.2V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. TCA Sensor-2 Circuit Short to Ground Test

1. Turn IGN OFF.
2. Disconnect [78A-1], [78A-2] and [78A-3] from BOB.
3. Disconnect TCA [211].
4. Test continuity between BOB [78-2] terminal 15 and ground.
5. Is continuity present?
   a. **Yes.** Repair short to ground in (GY/V) wire.
   b. **No.** Go to Test 3.

3. TCA Power-1 Circuit Open Test

1. Test resistance between BOB [78-2] terminal 9 and [211] terminal 5.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace TCA.
   b. **No.** Repair open in (R/W) wire.

4. TCA 5V Ref Circuit Short to Ground Test

1. Turn IGN OFF.

2. Disconnect [211].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminal 9 and ground.
5. Is voltage greater than 4V?
   a. **Yes.** Replace TCA.
   b. **No.** Go to Test 5.

5. ECM Test

1. Turn IGN OFF.
2. Disconnect [78A] from BOB.
3. Test resistance between BOB [78-2] terminal 15 and ground.
4. Is resistance greater than 0.5 Ohms?
   a. **Yes.** Repair short to ground in (GY/V) wire.
   b. **No.** Replace ECM.

DTC P0223

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-25. DTC P0223 Diagnostic Faults

POSSIBLE CAUSES
Open in sensor power circuit
Short to voltage in sensor power circuit
Open in TPS-2 circuit
Short to voltage in TPS-2 circuit
Short to ground in TPS-2 circuit
Open in sensor ground circuit

1. TPS-2 Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminals 15 and 7.
6. Is voltage less than 4.8V?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 2.

2. TPS-2 Circuit Test

1. Disconnect TCA [211].
2. Test voltage between [211B] terminal 4 and ground.
3. Is voltage less than 0.2V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 5.

3. Sensor Power Circuit Test

1. Test voltage between [211B] terminal 5 and ground.
2. Is voltage less than 5.25V?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to voltage in (R/W) wire.

4. Sensor Ground Test

1. Turn IGN OFF.
2. Test resistance between [211B] terminal 1 and ground.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace TCA.
   b. **No.** Go to Test 6.

5. Shorted 5V Circuit Test

1. Disconnect [78A-1], [78A-2] and [78A-3].
2. Test continuity between [211B] terminals 4 and 5.
3. Is continuity present?
   a. **Yes.** Repair short between (GY/V) and (R/W) wires.
   b. **No.** Replace ECM.

6. Sensor Ground Circuit Test

1. Test resistance between [211B] terminal 1 and BOB [78-2] terminal 7.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (BK/W) wire.

7. TPS-2 Circuit Test

1. Disconnect [78A-1], [78A-2] and [78A-3].
2. Disconnect TCA [211].
3. Turn IGN ON.
4. Test voltage between [211B] terminal 4 and ground.
5. Is voltage less than 1.0V?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to voltage on (GY/V) wire.

8. Sensor Short to Voltage Test

1. Test voltage between [211B] terminal 5 and ground.

2. Is voltage less than 5.25V?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair short to voltage on (R/W) wire.

9. Ground Circuit Open Test

1. Turn IGN OFF.
2. Disconnect [78A-1], [78A-2] and [78A-3].
3. Test resistance between [211B] terminal 1 and BOB [78-2] terminal 7.
4. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace TCA.
   b. **No.** Repair open in (BK/W) wire.

HO2S DIAGNOSTICS 6.10

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The HO2S provides a signal to the ECM which indicates whether the engine is running rich or lean.

- A P0131 (front) or P0151 (rear) is set when the ECM detects an excessively lean condition for a specified length of time. DTCs may also set if HO2S fails.
- A P0132 (front) or P0152 (rear) is set when the ECM detects an excessively rich condition for a specified length of time. This can be caused by oil contamination or fuel injector malfunctions. DTCs may also set if HO2S fails.
- A P0134 (front) or a P0154 (rear) is set when the sensor circuit is open or too cold to respond.
- When the air/fuel mixture is ideal, approximately 14.6 parts air to 1 part fuel, the voltage will be approximately 0.45V when measuring across the sensor.

Table 6-26. Code Description

DTC	DESCRIPTION
P0031	Front HO2S low/open
P0032	Front HO2S shorted high
P0051	Rear HO2S low/open
P0052	Rear HO2S shorted high
P0131	O2 sensor low/engine lean (front)
P0132	Engine running rich (front)
P0134	O2 sensor high/open (front)
P0151	O2 sensor low/engine lean (rear)
P0152	Engine running rich (rear)
P0154	O2 sensor high/open (rear)

The heater portion of the HO2S is powered by the BCM. The front and rear HO2S heaters have separate control circuits monitored by the ECM.

Diagnostic Tips

The heater circuits in the HO2S are powered from the system power circuit. This circuit voltage is supplied by the BCM through the system power fuse. Any short causing the fuse to open will cause the ECM to set DTC P0031 and P0051. If these codes are present with an open fuse, the fault is a short to ground somewhere in the circuit or the components.

Some HO2S DTCs will not illuminate the check engine lamp for current or historic codes and will only be indicated by DIGITAL TECHNICIAN II (Part No. HD-48650) or odometer self-diagnostics. All historic HO2S DTCs are to be ignored and cleared.

The multimeter displays the signal from the HO2S in Volts. This voltage will have an average value tending towards lean, rich or ideal value depending on operating temperature of the engine, engine speed and throttle position. An open/short to voltage or short to ground in the (GN/BN) wire (front) and (GY/BN) wire (rear) will cause the engine to run rich (short to ground) or lean (short to voltage) until the fault is detected. Once fault is detected, vehicle will run in open loop.

Check for the following conditions:

- **Poor connection:** Inspect the ECM [78-1], [78-2] and [78-3], fuel injector [84, 85] and HO2S [137, 138] connectors for backed out terminals, improper mating, inoperative locks, improperly formed or damaged terminals, poor terminal-to-wire connection and damaged harnesses.
- **Dirty/stuck open injectors:** The vehicle may run lean (dirty/clogged injectors) or rich (stuck open injectors) if there are injector problems. This could also cause poor fuel economy and performance.
- **Leaking injectors:** This causes fuel imbalance and poor idle quality due to different air/fuel ratios in each cylinder. To check for leaky injectors, first remove the air box and air filter. Then, with the throttle wide open, turn IGN ON for 2 seconds and then OFF for 2 seconds five consecutive times. Replace the fuel injector if there is any evidence of raw fuel in the bores. See Fuel Injectors in the service manual.
- **Loose HO2S:** If an HO2S is loose, engine performance may be affected. This could also show up as a slow changing HO2S voltage.
- **Loose/leaking exhaust:** This can cause a poor ground connection for the sensor or allow fresh air into the exhaust system. If fresh air enters exhaust system, the HO2S will read a lean condition, causing the system to go rich.
- **Engine misfire:** See 6.40 MISFIRE AT IDLE OR UNDER LOAD.
- **Intake leaks:** See the service manual.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

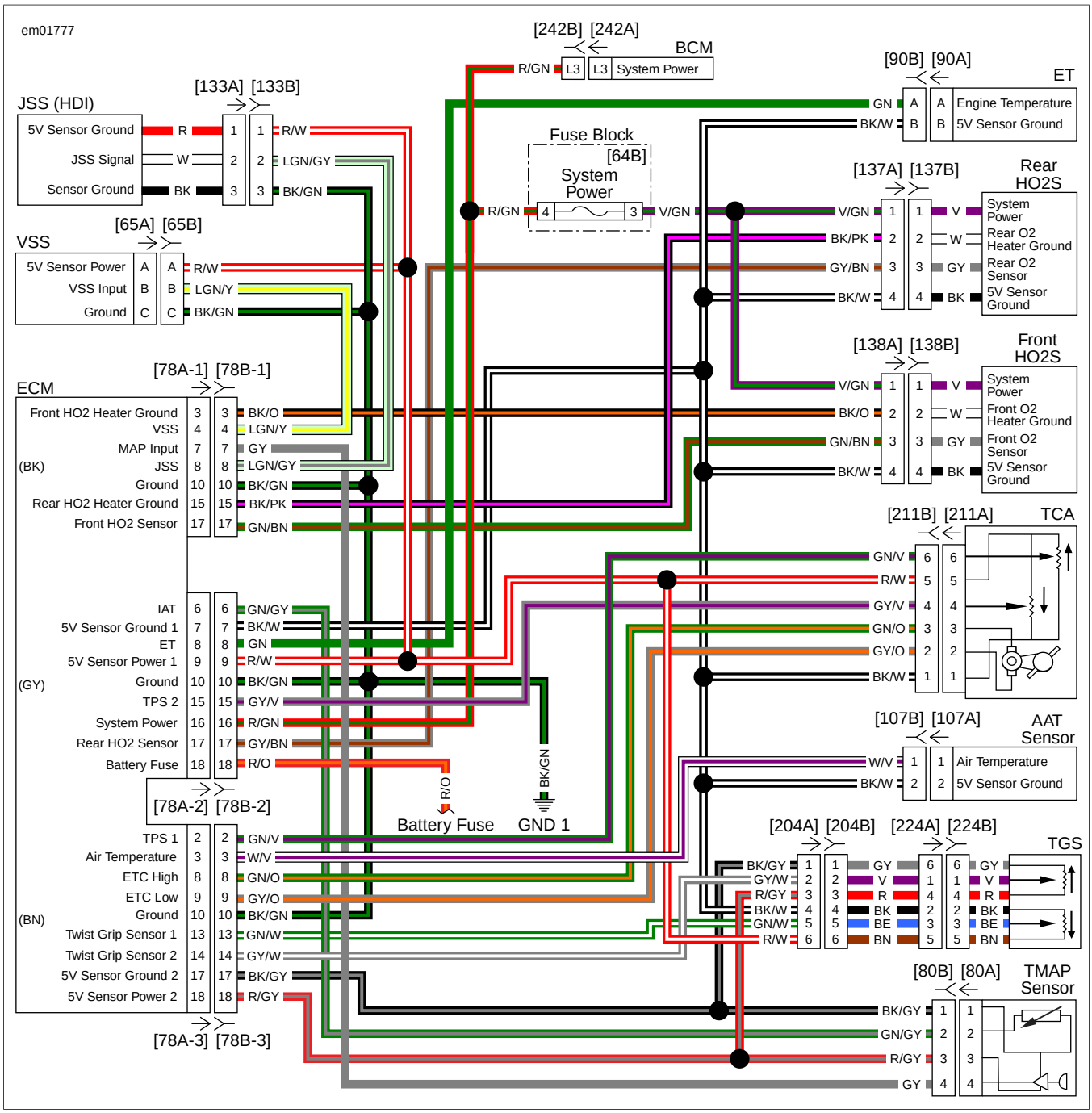


Figure 6-21. Sensor Circuit

DTC P0031

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-27. DTC P0031 Diagnostic Faults

POSSIBLE CAUSES
Open or short to ground on front HO2S circuit
HO2S malfunction
Open in sensor power circuit

1. Front HO2S Voltage Test

1. Turn IGN OFF.
2. Disconnect front HO2S [138].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [138A] terminal 1 (V/GN) wire and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (V/GN) wire.

2. Open Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between BOB [78-1] terminal 3 and [138A] terminal 2 (BK/O) wire.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK/O) wire.

3. Short to Ground Test

1. Test continuity between BOB [78-1] terminal 3 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (BK/O) wire.
   b. **No.** Go to Test 4.

4. Resistance Test

1. Test resistance between [138B] terminals 1 (V) wire and 2 (W) wire.
2. Is resistance between 13.5-35 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace front HO2S.

DTC P0032

PART NUMBER	TOOL NAME
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-28. DTC P0032 Diagnostic Faults

POSSIBLE CAUSES
Front HO2S circuit shorted to 12V
HO2S malfunction

1. Front HO2S Shorted to Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Test voltage between BOB [78-1] terminal 3 and ground.
6. Is voltage present?
   a. **Yes.** Repair short to voltage on (BK/O) wire.
   b. **No.** Go to Test 2.

2. Resistance Test

1. Turn IGN OFF.
2. Disconnect front HO2S [138].
3. Test resistance between [138B] terminals 1 (V) wire and 2 (W) wire.
4. Is resistance between 13.5-35 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace front HO2S.

DTC P0051

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-29. DTC P0051 Diagnostic Faults

POSSIBLE CAUSES
Open or short to ground on rear HO2S circuit
HO2S malfunction
Open in sensor power circuit

1. Rear HO2S Voltage Test

1. Turn IGN OFF.
2. Disconnect rear HO2S [137].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [137A] terminal 1 (V/GN) wire and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (V/GN) wire.

2. Open Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between BOB [78-1] terminal 15 and [137A] terminal 2 (BK/PK) wire.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BK/PK) wire.

3. Short to Ground Test

1. Test continuity between BOB [78-1] terminal 15 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (BK/PK) wire.
   b. **No.** Go to Test 4.

4. Resistance Test

1. Test resistance between [137B] terminals 1 (V) wire and 2 (W) wire.
2. Is resistance between 13.5-35 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace rear HO2S.

DTC P0052

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-30. DTC P0052 Diagnostic Faults

POSSIBLE CAUSES
Rear HO2S circuit shorted to voltage
Rear HO2S malfunction

1. Rear HO2S Shorted to Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-1] terminal 15 and ground.
6. Is voltage present?
   a. **Yes.** Repair short to voltage on (BK/PK) wire.
   b. **No.** Go to Test 2.

2. Resistance Test

1. Turn IGN OFF.
2. Test resistance between [137B] terminals 1 (V) wire and 2 (W) wire.
3. Is resistance between 13.5-35 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace front HO2S.

DTC P0131

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-31. DTC P0131 Diagnostic Faults

POSSIBLE CAUSES
Front HO2S malfunction
Short to ground in signal circuit
Fuel system malfunction

NOTE

Vehicle and sensor must be at ambient room temperature before starting diagnostic test.

1. Front HO2S Voltage Test

1. Turn IGN OFF.
2. Disconnect front HO2S [138].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [138A] terminal 3 (GN/BN) wire and ground.
5. Is voltage approximately 5V?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 2.

2. HO2S Test

1. Test continuity between [138B] terminal 3 (GY) wire and ground.
2. Is continuity present?
   a. **Yes.** Replace HO2S.
   b. **No.** Go to Test 3.

3. Signal Wire Shorted to Sensor Ground Test

1. Turn IGN OFF.
2. Disconnect ECM [78-1], [78-2] and [78-3].
3. Test continuity between [138A] terminals 3 (GN/BN) wire and 4 (BK/W) wire.
4. Is continuity present?
   a. **Yes.** Repair short between (GN/BN) and (BK/W) wires.
   b. **No.** Go to Test 4.

4. Signal Wire Shorted to Ground Test

1. Test continuity between [138A] terminal 3 (GN/BN) wire and ground.
2. Is continuity present?
   a. **Yes.** Repair short between (GN/BN) wire and ground.
   b. **No.** Replace ECM.

5. Operation Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Connect [138].
4. Start engine and allow it to reach operating temperature.
5. With engine speed at a steady rpm, test voltage between BOB [78-1] terminal 17 and [78-2] terminal 7.
6. Is voltage approximately 0.45V?
   a. **Yes.** Replace ECM.
   b. **No.** (0.0-0.4V). Perform fuel pressure test. Look for incorrect ECM calibration, low fuel pressure, air leaks and dirty injectors. If no issues are found, replace HO2S.

DTC P0132

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-32. DTC P0132 Diagnostic Faults

POSSIBLE CAUSES
Front HO2S malfunction
Fuel system malfunction

1. Front HO2S Operation Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Start engine and allow it to reach operating temperature.
5. With engine speed at a steady rpm, using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-1] terminal 17 and [78-2] terminal 7.

6. Is voltage approximately 0.45V?
   a. **Yes.** Replace ECM.
   b. **No.** (0.6-1.0V) Perform fuel pressure test. Look for incorrect ECM calibration, high fuel pressure, stuck open or leaking injectors. If no issues are found, replace HO2S.

DTC P0134

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-33. DTC P0134 Diagnostic Faults

POSSIBLE CAUSES
Front HO2S malfunction
Open or short to voltage in signal circuit
Open sensor ground

1. Front HO2S Signal Wire Short Circuit Voltage Test

1. Turn IGN OFF.
2. Disconnect front HO2S [138].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [138A] terminal 3 (GN/BN) wire to ground.
5. Is voltage greater than 5V?
   a. **Yes.** Repair short to voltage on (GN/BN) wire.
   b. **No. Greater than 4V.** Go to Test 2.
   c. **No. Less than 4V.** Go to Test 3.

2. Open Sensor Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between [138A] terminal 4 (BK/W) wire and BOB [78-2] terminal 7.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace front O2 sensor.
   b. **No.** Repair open on (BK/W) wire.

3. Signal Wire Open Test

1. Test resistance between [138A] terminal 3 (GN/BN) wire and BOB [78-1] terminal 17.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (GN/BN) wire.

DTC P0151

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-34. DTC P0151 Diagnostic Faults

POSSIBLE CAUSES
Rear HO2S malfunction
Short to ground in signal circuit
Fuel system malfunction

NOTE

Vehicle and sensor must be at ambient room temperature before starting diagnostic test.

1. Rear HO2S Test

1. Turn IGN OFF.
2. Disconnect rear HO2S [137].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [137A] terminal 3 (GY/BN) wire to ground.
5. Is voltage approximately 5V?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 2.

2. HO2S Test

1. Test continuity between [137B] terminal 3 (GY) wire and ground.
2. Is continuity present?
   a. **Yes.** Replace HO2S.
   b. **No.** Go to Test 3.

3. Signal Wire Shorted to Sensor Ground Test

1. Turn IGN OFF.
2. Disconnect ECM [78-1], [78-2] and [78-3].
3. Test continuity between [137A] terminals 3 (GY/BN) wire and 4 (BK/W) wire.

4. Is continuity present?
   a. **Yes.** Repair short between (GY/BN) and (BK/W) wires.
   b. **No.** Go to Test 4.

4. Signal Wire Shorted to Ground Test

1. Test continuity between [137A] terminal 3 (GY/BN) wire and ground.
2. Is continuity present?
   a. **Yes.** Repair short between (GY/BN) wire and ground.
   b. **No.** Replace ECM.

5. Operation Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Start engine and allow it to reach operating temperature.
4. With engine speed at a steady rpm, test voltage between BOB [78-2] terminal 17 and [78-2] terminal 7.
5. Is voltage approximately 0.45V?
   a. **Yes.** Replace ECM.
   b. **No.** (0.0-0.4V). Perform fuel pressure test. Look for incorrect ECM calibration, low fuel pressure, air leaks and dirty injectors. If no issues are found, replace HO2S.

DTC P0152

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-35. DTC P0152 Diagnostic Faults

POSSIBLE CAUSES
Rear HO2S malfunction
Fuel system malfunction

1. Rear HO2S Operation Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Start engine and allow it to reach operating temperature.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), with engine speed at a steady rpm, test voltage between BOB [78-2] terminal 17 and [78-2] terminal 7.
6. Is voltage approximately 0.45V?
   a. **Yes.** Replace ECM.
   b. **No.** (0.6-1.0V). Perform fuel pressure test. Look for incorrect ECM calibration, high fuel pressure, stuck open or leaking injectors. If no issues are found, replace HO2S.

DTC P0154

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-36. DTC P0154 Diagnostic Faults

POSSIBLE CAUSES
Rear HO2S malfunction
Open or short voltage in signal circuit
Open sensor ground

1. Rear HO2S Signal Wire Short Circuit Voltage Test

1. Turn IGN OFF.
2. Disconnect rear HO2S [137].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [137A] terminal 3 (GY/BN) wire to ground.
5. Is voltage greater than 5V?
   a. **Yes.** Repair short to voltage on (GY/BN) wire.
   b. **No. Greater than 4V.** Go to Test 2.
   c. **No. Less than 4V.** Go to Test 3.

2. Open Sensor Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1] and [78B-2], leaving ECM [78A-1] and [78A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between [137A] terminal 4 (BK/W) wire and BOB [78-2] terminal 7.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace rear HO2S.
   b. **No.** Repair open on (BK/W) wire.

3. Signal Wire Open Test

1. Test resistance between [137A] terminal 3 (GY/BN) wire and BOB [78-2] terminal 17.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (GY/BN) wire.

FUEL INJECTOR DIAGNOSTICS 6.11

DESCRIPTION AND OPERATION

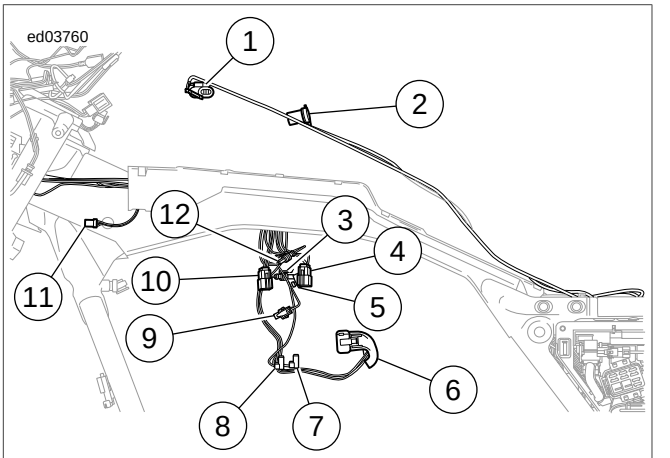
See Figure 6-22. The fuel injectors are solenoids that allow pressurized fuel into the intake tract. The injectors are timed to the engine cycle and triggered sequentially. The power for the injectors comes from the BCM. The ECM provides the path to ground to trigger the injectors.

NOTE

System power failures or wiring harness problems will cause 12V power to be lost to both injectors and the ignition coils.

Table 6-37. Code Description

DTC	DESCRIPTION
P0261	Fuel injector low/open (front)
P0262	Fuel injector shorted high (front)
P0264	Fuel injector low/open (rear)
P0265	Fuel injector shorted high (rear)



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-22. Engine

Diagnostic Tips

When disconnecting any connectors always inspect connector for corrosion or backed out terminals and repair as required.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

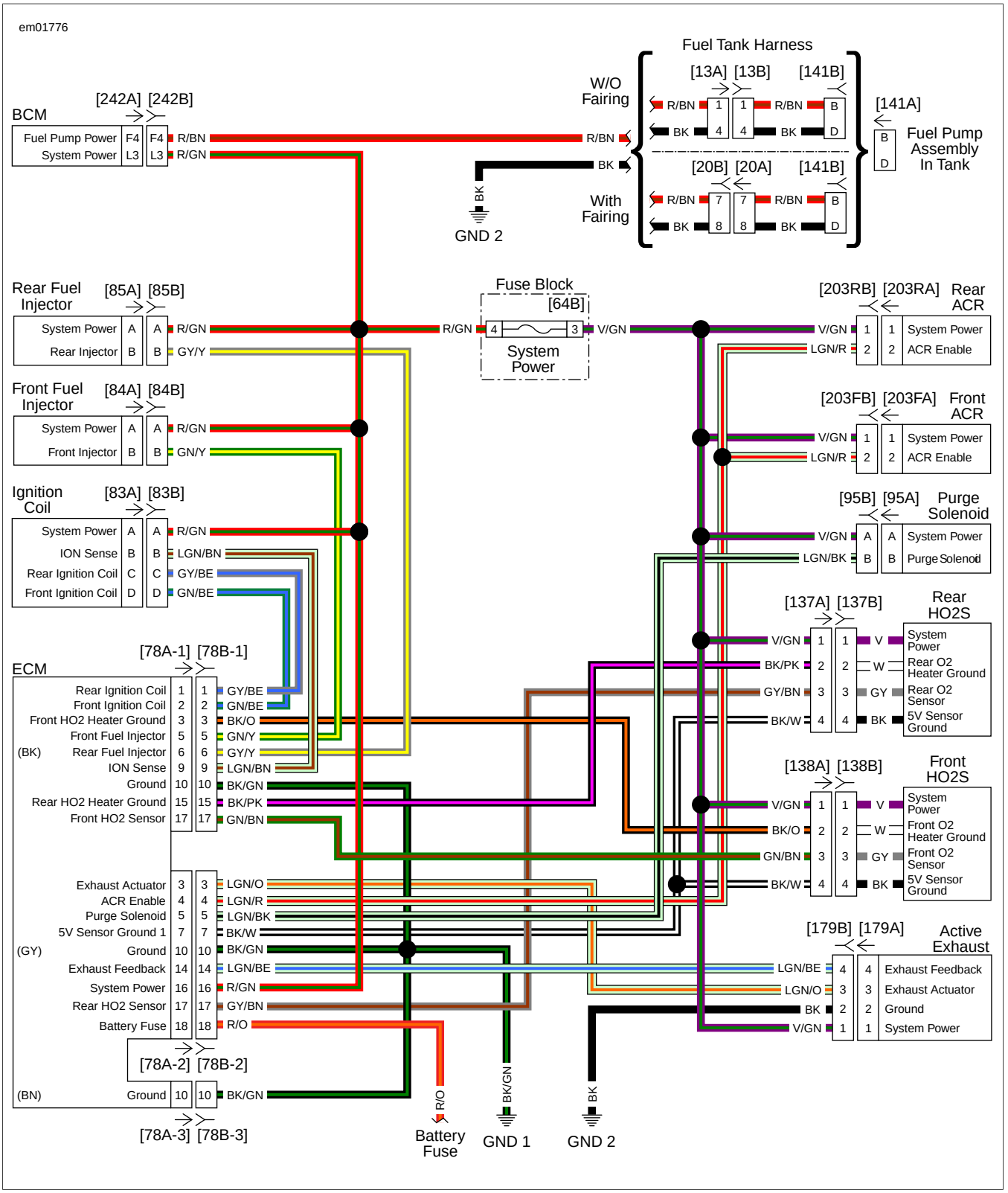


Figure 6-23. System Power Circuit

DTC P0261

PART NUMBER	TOOL NAME
HD-34730-2E	FUEL INJECTOR TEST LIGHT
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-38. DTC P0261 Diagnostic Faults

POSSIBLE CAUSES
Front fuel injector malfunction
Open signal circuit
Open power circuit

1. Front Fuel Injector Test

1. Turn IGN OFF.
2. Disconnect front fuel injector [84].
3. Connect FUEL INJECTOR TEST LIGHT (Part No. HD-34730-2E) to [84B].
4. Crank engine.
5. Does light flash when engine is cranking (or running)?
   a. **Yes.** Go to Test 4.
   b. **No, lamp does not illuminate.** Go to Test 2.
   c. **No, lamp is on steady.** Go to Test 5.

2. Power Circuit Open Test

1. Turn IGN OFF.
2. Remove fuel injector test light.
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-2] terminal 16 and [84B] terminal A (R/GN) wire.
6. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (R/GN) wire.

3. Control Circuit Open Test

1. Test resistance between BOB [78-1] terminal 5 and [84B] terminal B (GN/Y) wire.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (GN/Y) wire.

4. Injector Resistance Test

1. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [84A] terminals A and B.
2. Is resistance between 10-20 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace front injector.

5. Driver Short to Ground Test

1. Remove fuel injector test light.
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [84A] terminal B and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground on (GN/Y) wire.
   b. **No.** Replace ECM.

DTC P0262

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-39. DTC P0262 Diagnostic Faults

POSSIBLE CAUSES
Front fuel injector malfunction
Short to ground in signal circuit

1. Front Fuel Injector Control Circuit Shorted to Voltage Test

1. Turn IGN OFF.
2. Disconnect front injector [84].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [84B] terminal B (GN/Y) wire and ground.
5. Is voltage less than 5.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 2.

2. Control Circuit Shorted to System Test

1. Turn IGN OFF.
2. Test continuity between [84B] terminals A (R/GN) wire and B (GN/Y) wire.
3. Is continuity present?
   a. **Yes.** Repair short between (R/GN) and (GN/Y) wires.
   b. **No.** Repair short to voltage on (GN/Y) wire.

3. Injector Resistance Test

1. Test resistance between [84A] terminals A and B of injector [84A].

2. Is resistance between 10-20 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace front injector.

DTC P0264

PART NUMBER	TOOL NAME
HD-34730-2E	FUEL INJECTOR TEST LIGHT
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-40. DTC P0264 Diagnostic Faults

POSSIBLE CAUSES
Rear fuel injector malfunction
Open signal circuit
Open power circuit

1. Rear Fuel Injector Test

1. Turn IGN OFF.
2. Disconnect rear fuel injector [85].
3. Connect FUEL INJECTOR TEST LIGHT (Part No. HD-34730-2E) to [85B].
4. Crank engine.
5. Does lamp flash when engine is cranking (or running)?
   a. **Yes.** Go to Test 4.
   b. **No, lamp does not illuminate.** Go to Test 2.
   c. **No, lamp is on steady.** Go to Test 5.

2. Power Circuit Open Test

1. Turn IGN OFF.
2. Remove fuel injector test light.
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-2] terminal 16 and [85B] terminal A (R/GN) wire.
6. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (R/GN) wire.

3. Control Circuit Open Test

1. Test resistance between BOB [78-1] terminal 6 and [85B] terminal B (GY/Y) wire.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (GY/Y) wire.

4. Injector Resistance Test

1. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [85A] terminal A and B of injector [85A].
2. Is resistance between 10-20 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace rear injector.

5. Driver Short to Ground Test

1. Remove fuel injector test light.
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [85B] terminal B and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground on (GY/Y) wire.
   b. **No.** Replace ECM.

DTC P0265

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-41. DTC P0265 Diagnostic Faults

POSSIBLE CAUSES
Rear fuel injector malfunction
Short to ground in signal circuit

1. Rear Fuel Injector Control Circuit Shorted to Voltage Test

1. Turn IGN OFF.
2. Disconnect rear injector [85].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [85B] terminal B (GY/Y) wire and ground.
5. Is voltage less than 5.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 2.

2. Control Circuit Shorted to System Test

1. Turn IGN OFF.
2. Test continuity between [85B] terminals A (R/GN) wire and B (GY/Y) wire.
3. Is continuity present?
   a. **Yes.** Repair short between (R/GN) and (GY/Y) wires.
   b. **No.** Repair short to voltage on (GY/Y) wire.

3. Injector Resistance Test

1. Test resistance between [85A] terminals A and B of injector [85A].
2. Is resistance between 10-20 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace rear injector.

CKP SENSOR DIAGNOSTICS 6.12

DESCRIPTION AND OPERATION

See Figure 6-24. If the CKP sensor signal is weak or absent, DTC P0371 or P0374 sets. DTC P0371 usually sets when several attempts to crank the engine have failed.

NOTE

If signal is not detected or cannot synchronize (DTC P0374), engine will not start.

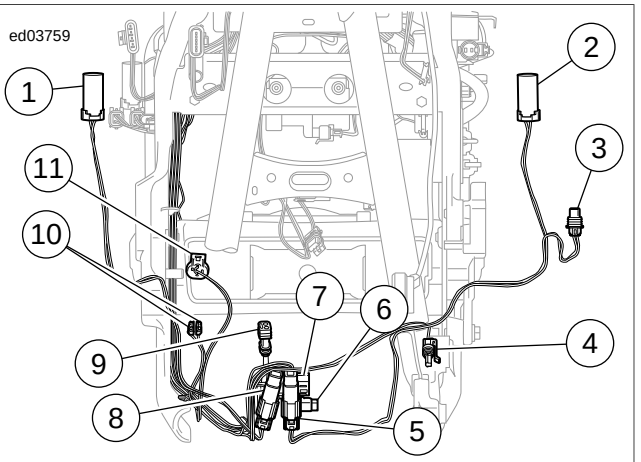
Table 6-42. Code Description

DTC	DESCRIPTION
P0371	CKP sensor wrong number of pulses
P0374	CKP sensor no pulses

Diagnostic Tips

Engine must be cranked for more than five seconds without CKP signal to set P0374 code. Intermittent TMAP wiring or sensor issues may cause these codes to set prior to setting TMAP codes. Verify TMAP wiring and sensor prior to replacing the ECM.

When disconnecting any connectors always inspect connector for corrosion or backed out terminals and repair as required.



1. **Right cooling fan [97] (if equipped)**
2. **Left cooling fan [215] (if equipped)**
3. **ECT sensor [236] (if equipped)**
4. **Cooling pump [235] (if equipped)**
5. **Left cooling jumper [232L] (if equipped)**
6. **CKP [79]**
7. **JSS [133]**
8. **Right cooling jumper [232R] (if equipped)**
9. **Voltage regulator [77]**
10. **Rear brake switch [212]**
11. **Oil pressure switch [120] (w/o fairing) and oil pressure sender [139] (with fairing)**

Figure 6-24. Front of Engine

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

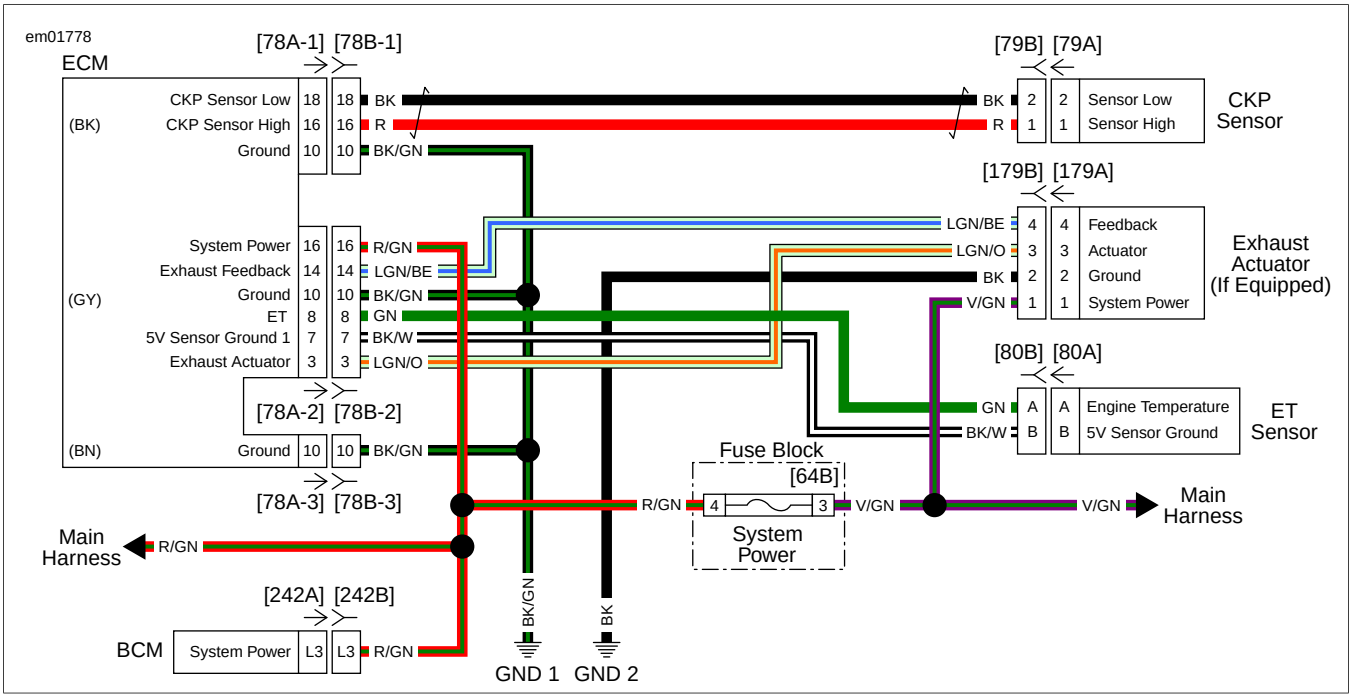


Figure 6-25. Active Exhaust Actuator and CKP Circuit

DTC P0371, P0374

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-43. DTC P0371, P0374 Diagnostic Faults

POSSIBLE CAUSES
CKP sensor malfunction
Open or short to ground in signal circuit
May be set if there are incorrect fluctuations from TMAP that does not set TMAP codes (examples - intermittent sensor or wiring issue)

1. CKP Sensor Connections Test

1. Turn IGN OFF.
2. Disconnect ECM [78-1], [78-2] and [78-3].
3. Inspect connection for corrosion or backed out terminals.
4. Are terminal problems present?
   a. **Yes.** Repair terminals as required.
   b. **No.** Go to Test 2.

2. Signal Wire Continuity Test

1. Disconnect CKP sensor [79].
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-1] terminal 16 to [79B] terminal 1 (R) wire.
5. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open on (R) wire.

3. Ground Wire Continuity Test

1. Test resistance between BOB [78-1] terminal 18 to [79B] terminal 2 (BK) wire.
2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open on (BK) wire.

4. Signal Wire Shorted to CKP Ground Wire Test

1. Test continuity between BOB [78-1] terminals 16 and 18.
2. Is continuity present?
   a. **Yes.** Repair short between [79B] terminals 1 (R) and 2 (BK).
   b. **No.** Go to Test 5.

5. Output Test

1. Connect CKP sensor [79].
2. Test AC voltage between BOB [78-1] terminals 16 and 18.
3. Crank engine for 5 seconds while observing multimeter.
4. Is AC voltage greater than 2V?
   a. **Yes.** See diagnostic tips. If TMAP sensor is good, replace ECM.
   b. **No.** Replace CKP sensor.

PURGE SOLENOID DIAGNOSTICS 6.13

DESCRIPTION AND OPERATION

Purge Solenoid (CA and Select International Market Models Only)

See Figure 6-26, Figure 6-27 and Figure 6-28. The purge solenoid is mounted under the seat in front of the ECM. The solenoid connects to a fuel tank vent line and a vent canister.

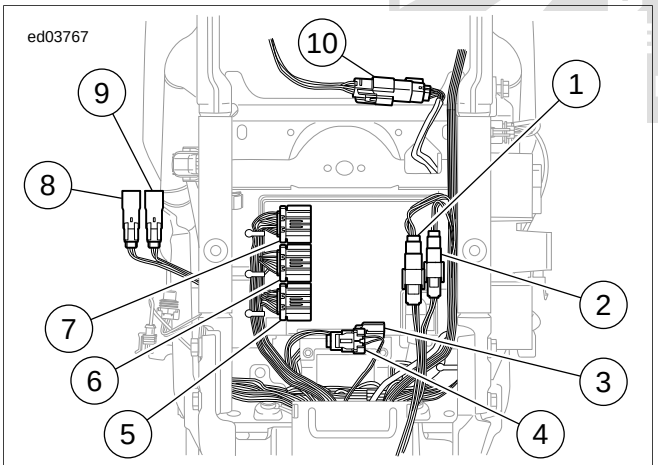
A return line from the canister reconnects to the air intake manifold allowing vented fumes to be recirculated, for emission efficiency. The purge solenoid is timed to the throttle position and is disabled during startup, low engine temperature, low engine speed or low vehicle speed.

Power for the purge solenoid is supplied by the BCM. The BCM also provides power for the VSS, fuel injectors, active exhaust, active intake, ECM and the ignition coil.

The ECM provides a path to ground to trigger the purge solenoid.

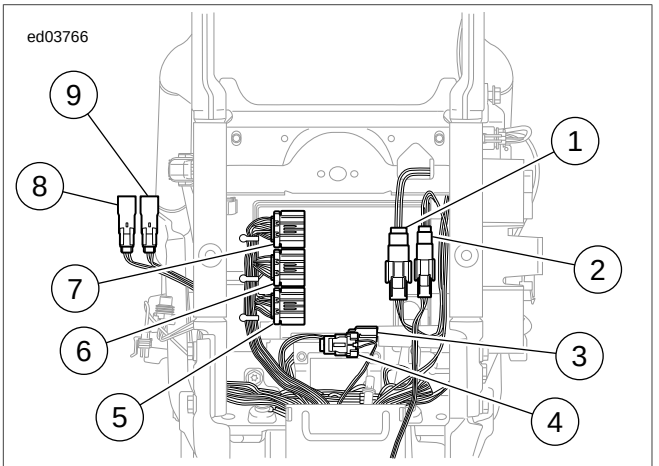
NOTES

- *BCM or wiring harness problems will cause 12V power to be lost to the VSS, fuel injectors, active exhaust, active intake, ECM, ignition coil and purge solenoid.*
- *Purge solenoid is not installed on non-emission vehicles and DTCs P0444 and P0445 are not available. If these DTCs appear, the ECM should be reprogrammed.*



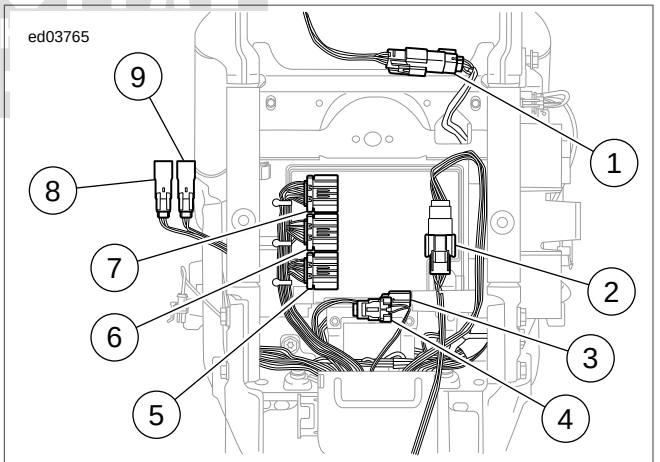
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 6-26. Under Seat: FLHT



1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-27. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-28. Under Seat: FLHR

Table 6-44. Code Description

DTC	DESCRIPTION
P0444	Purge solenoid low/open
P0445	Purge solenoid shorted high

Diagnostic Tips

The purge solenoid is powered from the system power circuit. This circuit voltage is supplied by the BCM through the system power fuse. Any short causing the fuse to open will cause the ECM to set DTC P0444. If this code is present with an open fuse, the fault is a short to ground somewhere in the circuit or the components.

When disconnecting any connectors always inspect connector for corrosion or backed out terminals and repair as required.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

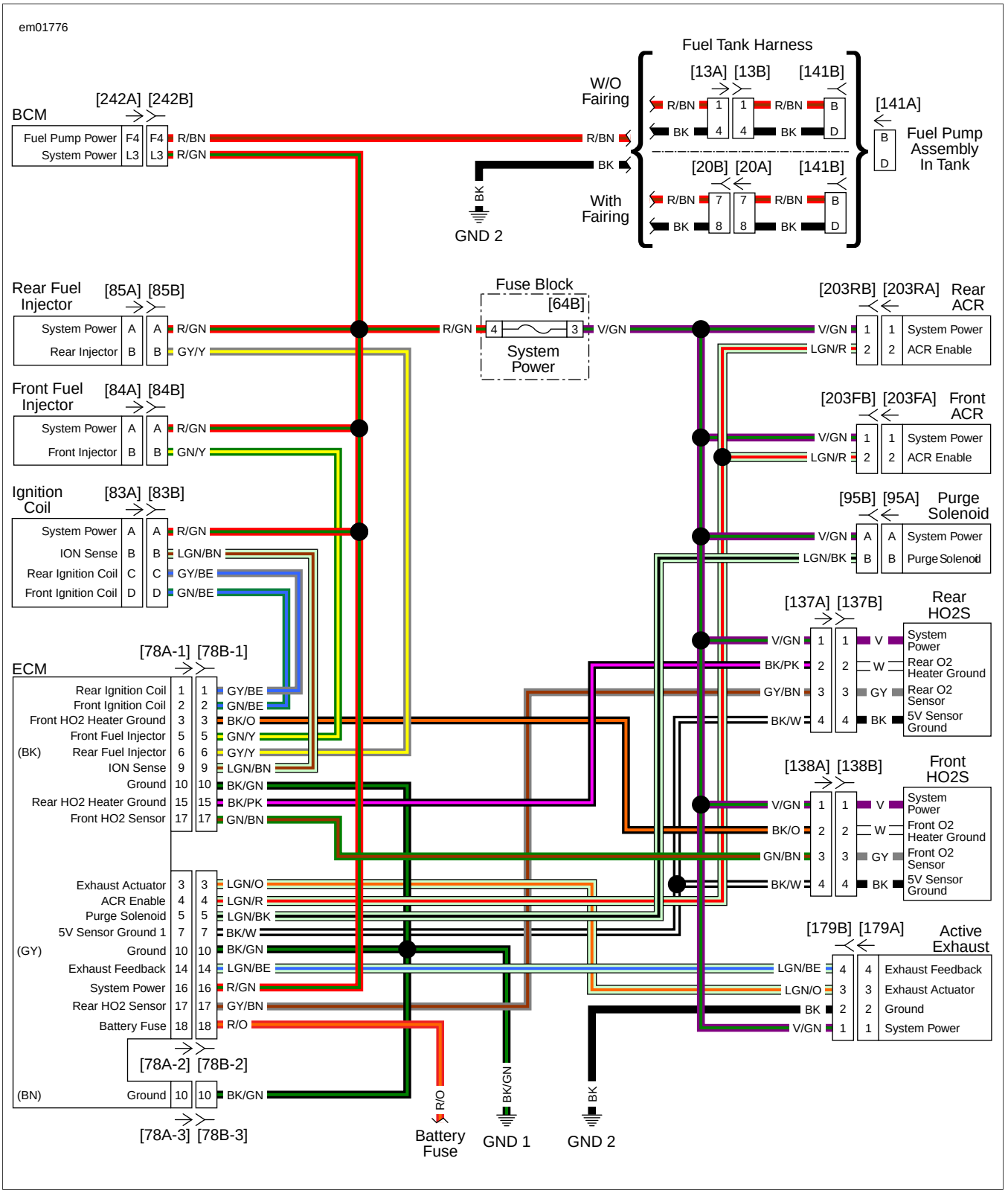


Figure 6-29. System Power Circuit

DTC P0444

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2-P	BCM OVERLAY
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-45. DTC P0444 Diagnostic Faults

POSSIBLE CAUSES
Purge solenoid malfunction
Short to ground in signal circuit

1. Purge Solenoid Test

1. Turn IGN OFF.
2. Disconnect purge solenoid [95].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [95A] terminals A and B of the purge solenoid.
4. Is resistance between 4-21 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace purge solenoid.

2. Purge Solenoid Voltage Test

1. Test voltage between [95B] terminal A (V/GN) wire and ground.
2. Turn IGN ON.
3. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 5.

3. Control Wire Shorted to Ground Test

1. Turn IGN OFF.
2. Disconnect ECM [78-1], [78-2] and [78-3].
3. Test continuity between [95B] terminal B (LGN/BK) wire and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground on (LGN/BK) wire.
   b. **No.** Go to Test 4.

4. Control Wire Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Test resistance between [95B] terminal B (LGN/BK) wire and BOB [78-2] terminal 5.
4. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (LGN/BK) wire.

5. Power Wire Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test resistance between [95B] terminal A (V/GN) wire and BOB [78-2] terminal 16.
4. Is resistance less than 0.5 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (V/GN) wire.

DTC P0445

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-46. DTC P0445 Diagnostic Faults

POSSIBLE CAUSES
Purge solenoid malfunction
Short to voltage in signal circuit

1. Purge Solenoid Test

1. Turn IGN OFF.
2. Disconnect purge solenoid [95].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [95A] terminals A and B of purge solenoid.
4. Is resistance between 4-21 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace purge solenoid.

2. Purge Solenoid Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between [95B] terminal B (LGN/BK) wire and ground.
3. Is voltage greater than 5.0V?
   a. **Yes.** Repair short to voltage on (LGN/BK) wire.
   b. **No.** Replace ECM.

VSS DIAGNOSTICS 6.14

DESCRIPTION AND OPERATION

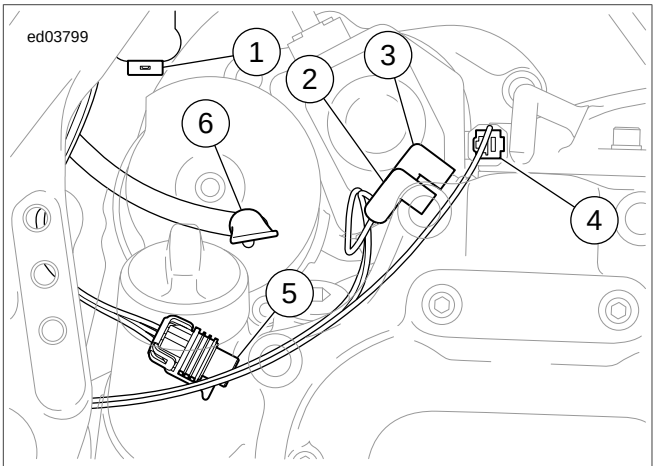
See Figure 6-30. The VSS is powered and monitored by the ECM. The ECM processes the vehicle speed signal and transmits this signal to the BCM and the speedometer/IM through the CAN bus circuit.

NOTES

- *The ECM uses VSS input to calculate idle air control position. Therefore problems with the vehicle speed signal can lead to improper operation of the idle air control.*
- *The TGS, JSS, TCA and VSS sensors are connected to the same reference line (+5V REF). If the reference line goes to ground or open, multiple codes will be set (DTC P0122, P0123, P0502, P0503, P1501, P1502, P2101, P2102, P2103, P2122, P2123, P2127, P2128). Start with the trouble code having the lowest ranking value.*
- *A faulty sensor can negatively affect the signal voltage of the other sensors sharing the same 5V reference. If the wiring passes the following tests, disconnect one sensor at a time on the 5V reference and verify the DTC is still present. Additional DTCs will be set as each sensor is disconnected, clear DTCs after this test. Be sure to perform this test before replacing a component.*

Table 6-47. Code Description

DTC	DESCRIPTION
P0502	VSS failed low
P0503	VSS failed high



1. **Ignition coil [83]**
2. **Neutral switch [131-1]**
3. **Neutral switch [131-2]**
4. **Starter solenoid [128]**
5. **VSS [65]**
6. **Battery + connections to starter**

Figure 6-30. Starter

Diagnostic Tips

When disconnecting any connectors always inspect connector for corrosion or backed out terminals and repair as required.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

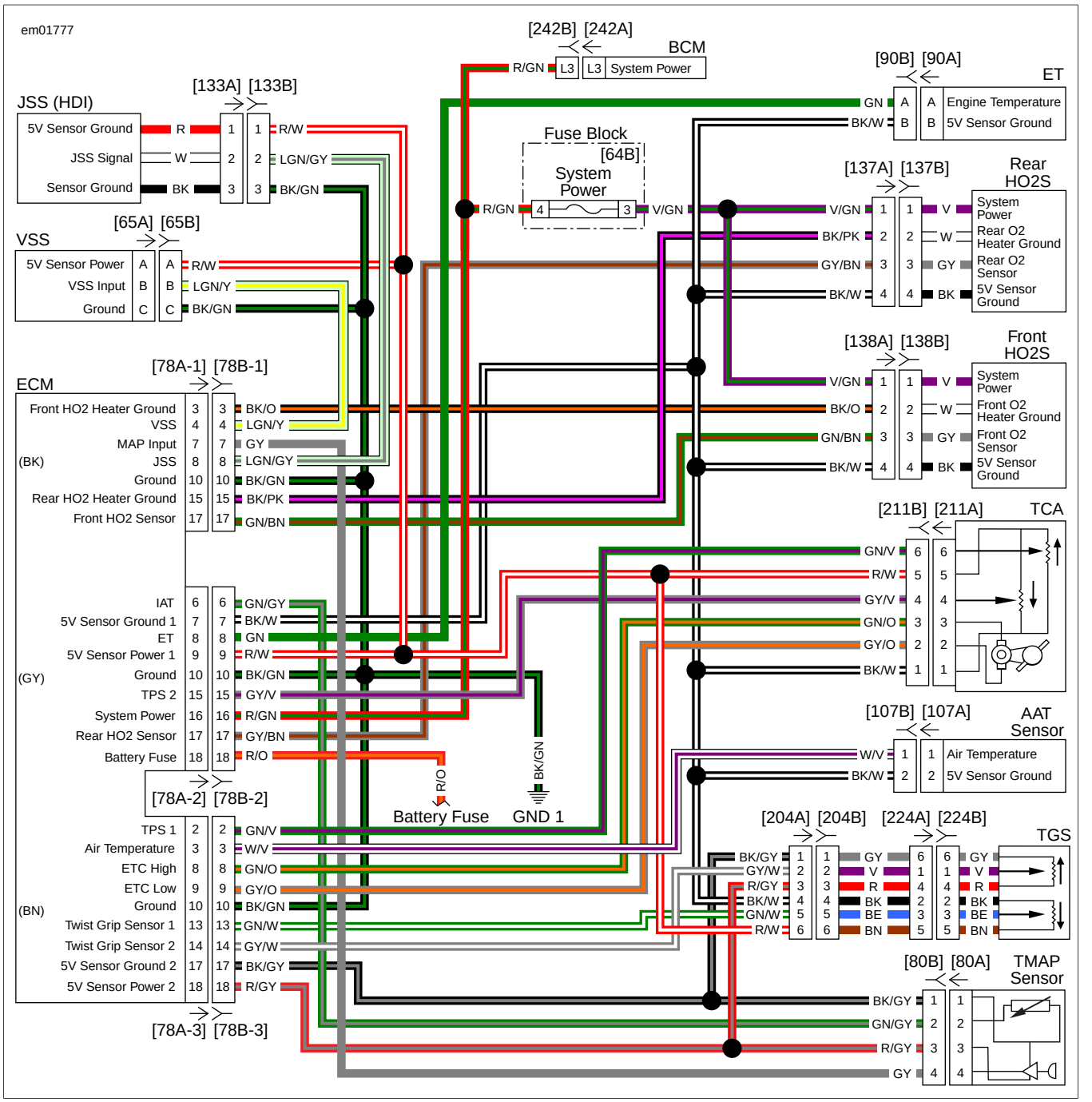


Figure 6-31. Sensor Circuit

DTC P0502

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-48. DTC P0502 Diagnostic Faults

POSSIBLE CAUSES
VSS malfunction
Open or short to ground in signal circuit
Open or short to ground in 5V reference circuit

1. VSS Connections Test

1. Turn IGN OFF.
2. Disconnect VSS [65].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [65B] terminal A (R/W) wire and ground.
5. Is voltage approximately 5.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open on (R/W) wire.

2. Signal Wire Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test continuity between BOB [78-1] terminals 4 and 10.
5. Is continuity present?
   a. **Yes.** Repair short to ground on (LGN/Y) wire.
   b. **No.** Go to Test 3.

3. Signal Wire Open Test

1. Test resistance between BOB [78-1] terminal 4 and [65B] terminal B (LGN/Y) wire.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open on (LGN/Y) wire.

4. Dirty or Damaged Test

1. Remove VSS.
2. Check for debris on sensor tip.
3. Is debris present?
   a. **Yes.** Clean debris from VSS and install.
   b. **No.** Replace VSS.

DTC P0503

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-49. DTC P0503 Diagnostic Faults

POSSIBLE CAUSES
VSS malfunction
Short to voltage in signal circuit
Open ground
5V reference shorted to battery voltage

1. VSS Sensor Power Shorted to Voltage Test

1. Turn IGN OFF.
2. Disconnect VSS [65].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [65B] terminals A (R/W) wire and C (BK/GN) wire.
5. Is voltage greater than 6.0V?
   a. **Yes.** Repair short to voltage on (R/W) wire.
   b. **No.** Go to Test 2.

2. Signal Wire Short to Voltage Test

1. Test voltage between [65B] terminal B (LGN/Y) wire and ground.
2. Is voltage above 6.0V?
   a. **Yes.** Repair short to voltage on (LGN/Y) wire.
   b. **No.** Go to Test 3.

3. VSS Ground Wire Open Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Test resistance between BOB [78-1] terminal 10 and [65B] terminal C (BK/GN) wire.

4. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open on (BK/GN) wire.

4. Signal Wire Shorted to Sensor Power Test

1. Test continuity between BOB [78-1] terminal 4 and [78-2] terminal 9.
2. Is continuity present?
   a. **Yes.** Repair short between (LGN/Y) and (R/W) wires.
   b. **No.** Go to Test 5.

5. VSS Test

1. Connect [78A-1], [78A-2] and [78A-3] to BOB.
2. Clear DTC.
3. Did DTC reset?
   a. **Yes.** Replace ECM.
   b. **No.** Replace VSS.

IDLE SPEED CONTROL DIAGNOSTICS 6.15

LOSS OF IDLE SPEED CONTROL

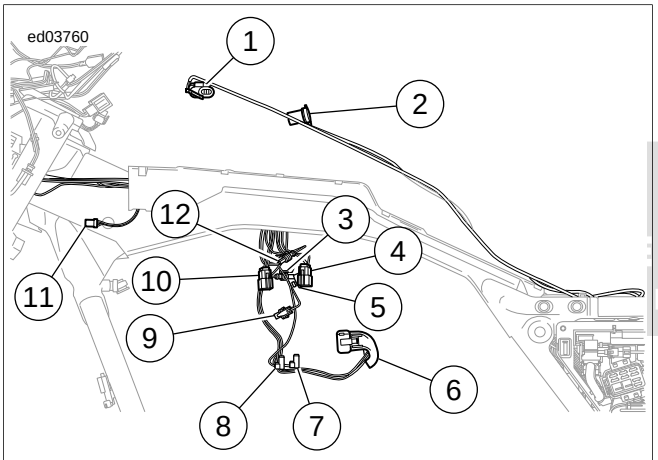
See Figure 6-32. The throttle control actuator uses a two wire DC motor to move the throttle plate from the spring loaded off-idle detent. The ECM supplies a pulse width modulated voltage signal through [78-3] terminals 8 and 9. The ECM monitors throttle position through the dual position sensors (TPS1 and TPS2). This code will set if the idle speed becomes unstable. This can be caused by a fuel or ignition related issue, throttle actuator friction or an intermittent air leak.

NOTE

Although the ECM monitors [78-3] terminals 8 and 9, faults on these terminals will not cause this DTC. Faults on these terminals will be higher priority DTCs, address them first.

Table 6-50. Code Description

DTC	DESCRIPTION
P0505	Idle speed control - unstable



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-32. Engine

Diagnostic Tips

Before replacing the TCA, cycle the ignition four times when idle is high.

1. Start engine.
2. Increase rpm to 2500 rpm and bring engine back to idle.
3. Turn IGN OFF.
4. Repeat previous steps a total of four times.

This process will help the controller learn throttle plate position.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

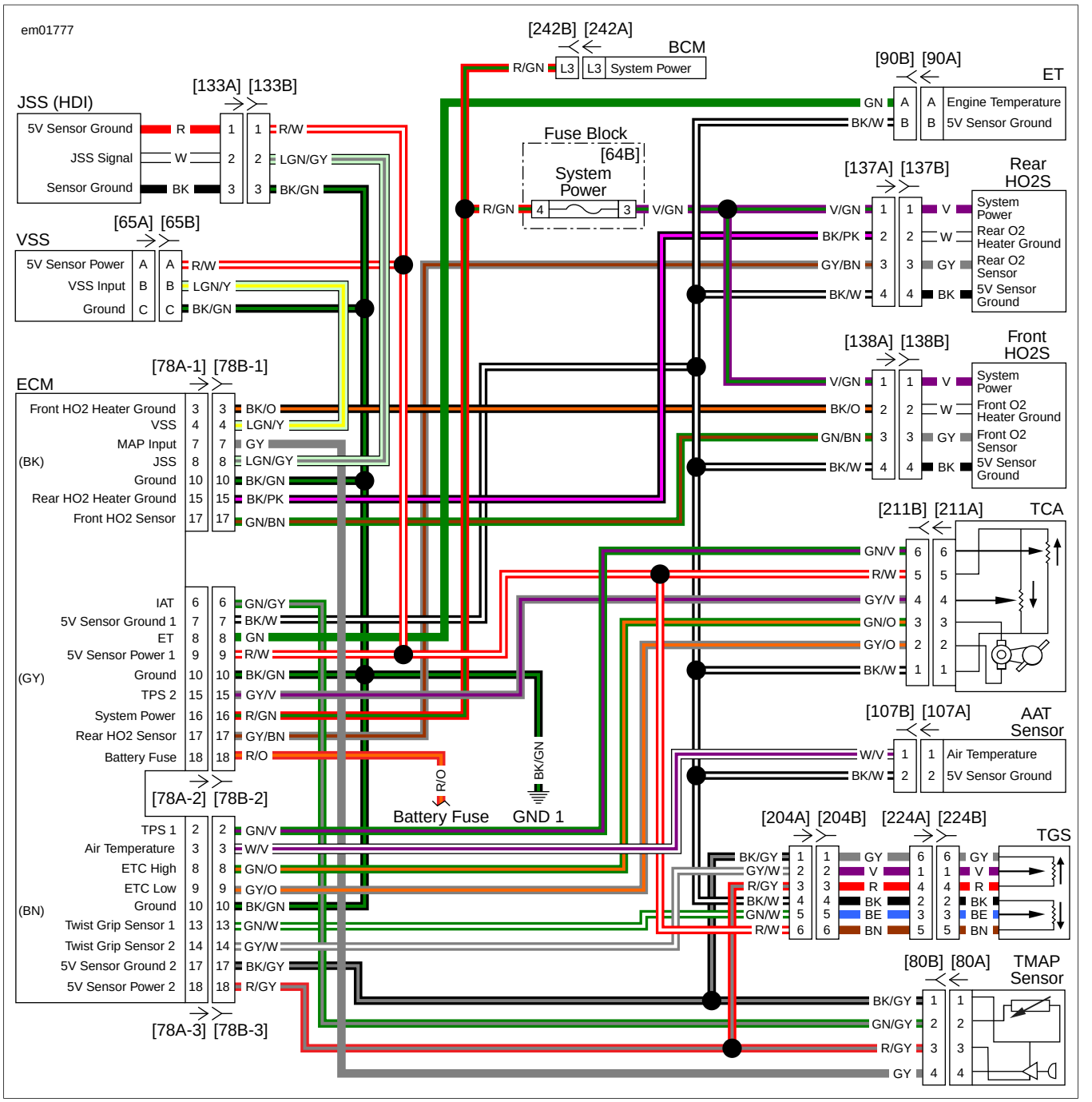


Figure 6-33. Sensor Circuit

DTC P0505

PART NUMBER	TOOL NAME
HD-26792	SPARK TESTER

Table 6-51. DTC P0505 Diagnostic Faults

POSSIBLE CAUSES
Vacuum/air leaks
Fuel system problems
Ignition system problems
Loss of engine compression

1. Preliminary Engine Tests

1. Verify battery connections are in good condition.
2. Verify fuel in the tank is fresh and not contaminated.
3. Verify spark plug wires are firmly connected to the coil and plugs.
4. Verify fuel injectors are not clogged.
5. Verify battery condition. See 3.1 BATTERY TESTING.
6. Does battery pass tests?
   a. **Yes.** Go to Test 2.
   b. **No.** Charge or replace battery.

2. Vacuum Leak Test

1. Start the motorcycle and check for vacuum leaks.
2. Were any leaks found?
   a. **Yes.** Repair the vacuum leak.
   b. **No.** Go to Test 3.

3. Spark Present Test

1. Check spark plug condition. Replace if fouled.
2. Using SPARK TESTER (Part No. HD-26792), check spark at both plugs while cranking engine.
3. Is spark present?
   a. **Yes.** Go to Test 4.
   b. **No.** The spark plugs will not spark if there is low or no compression. If spark is not present, test compression before troubleshooting ignition circuit. Once good compression is confirmed, check condition of ignition coils, coil primary wiring and spark plug boots. See 6.12 CKP SENSOR DIAGNOSTICS.

4. Compression Test

1. Perform compression test.
2. Does engine pass compression test?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair engine loss of compression.

5. Fuel System Test

1. Check fuel system and perform fuel pressure test.
2. Does fuel pressure meet specification?
   a. **Yes.** Replace TCA.
   b. **No.** Inspect fuel inlet sock and fuel filter for obstruction. Inspect internal fuel hose for leaks. If no issues are found, replace fuel pump assembly.

ECM INTERNAL DIAGNOSTICS 6.16

DESCRIPTION AND OPERATION

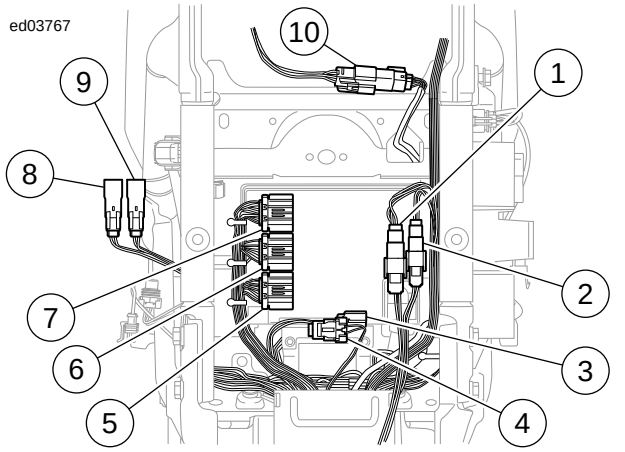
See Figure 6-34, Figure 6-35 and Figure 6-36. The DTCs listed indicate a failure which requires replacement of the ECM. Refer to Table 6-52.

NOTE

After replacing ECM, perform password learning procedure and clear DTCs using odometer self-diagnostics. See 1.2 INITIAL DIAGNOSTICS, Odometer Self-Diagnostics.

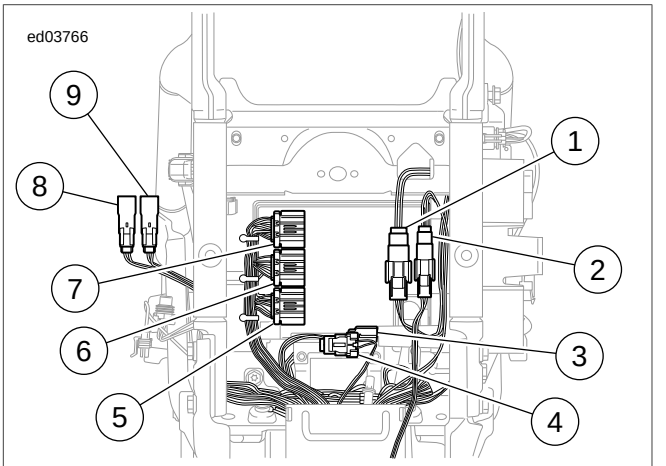
Table 6-52. Code Description

DTC	DESCRIPTION
P0603	ECM EEPROM memory error
P0605	ECM flash memory error



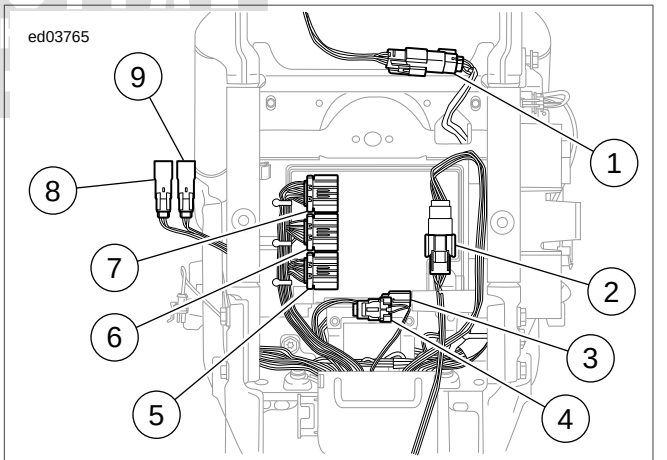
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 6-34. Under Seat: FLHT



1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-35. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-36. Under Seat: FLHR

DTC P0603 Test

1. Clear DTCs.
2. Turn IGN ON.

3. Check DTCs.
4. Did DTC reset?
   a. **Yes.** Replace ECM.
   b. **No.** System operating properly.

DTC P0605 Test

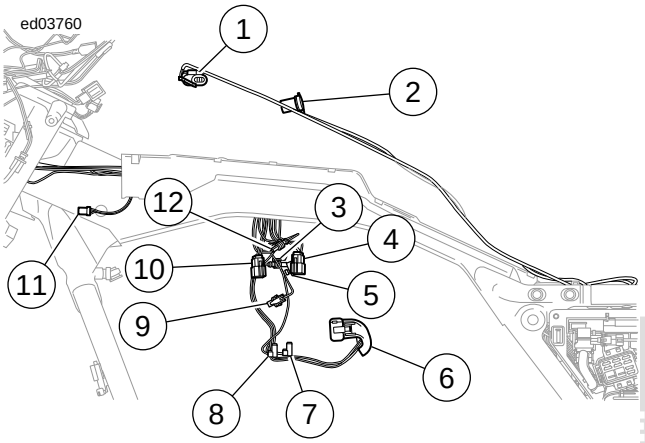
1. Clear DTCs.
2. Attempt to program ECM using correct calibration.
3. Start engine.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace ECM.
   b. **No.** System operating properly.

5V REFERENCE DIAGNOSTICS 6.17

DESCRIPTION AND OPERATION

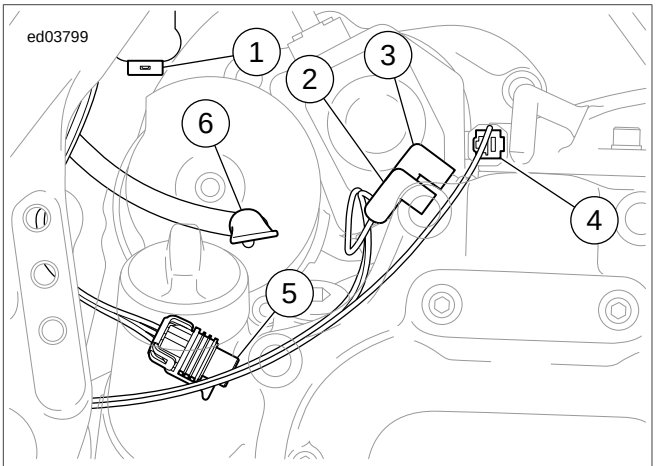
See Figure 6-37, Figure 6-38 and Figure 6-39. The ECM supplies 5V to the TGS, JSS, TCA and VSS from [78-2] terminal 9. These sensors may have individual codes along with this code since they all share the 5V ref circuit.

- DTC P0641 is displayed when sensor power-1 is out of range. The 5V sensor power-1 circuit supplies the TCA, VSS, JSS and sensor 2 of the TGS with a 5V reference signal.
- DTC P0651 is displayed when sensor power-2 is out of range. The 5V sensor power-2 circuit supplies the TMAP sensor and sensor 1 of the TGS with a 5V reference signal.



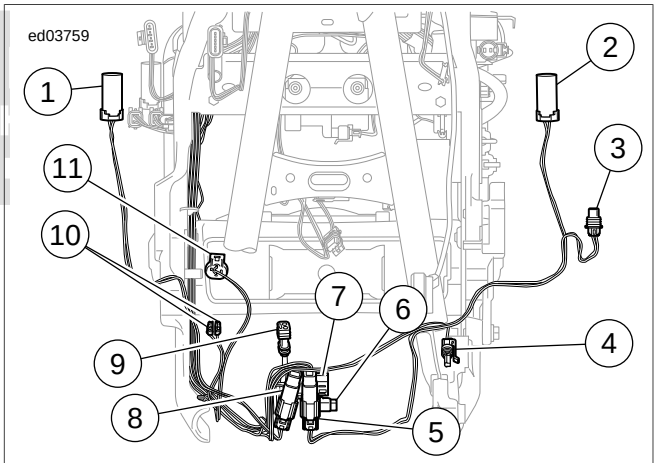
1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-37. Engine



1. **Ignition coil [83]**
2. **Neutral switch [131-1]**
3. **Neutral switch [131-2]**
4. **Starter solenoid [128]**
5. **VSS [65]**
6. **Battery + connections to starter**

Figure 6-38. Starter



1. **Right cooling fan [97] (if equipped)**
2. **Left cooling fan [215] (if equipped)**
3. **ECT sensor [236] (if equipped)**
4. **Cooling pump [235] (if equipped)**
5. **Left cooling jumper [232L] (if equipped)**
6. **CKP [79]**
7. **JSS [133]**
8. **Right cooling jumper [232R] (if equipped)**
9. **Voltage regulator [77]**
10. **Rear brake switch [212]**
11. **Oil pressure switch [120] (w/o fairing) and oil pressure sender [139] (with fairing)**

Figure 6-39. Front of Engine

Table 6-53. Code Description

DTC	DESCRIPTION
P0641	5V reference out of range
P0651	5V reference 2 out of range

Any of these conditions will set these DTCs:

- Short to ground on the 5V sensor power circuit.
- Short to voltage on the 5V sensor power circuit.
- VSS fault or malfunction.
- TMAP sensor fault or malfunction.
- TCA fault or malfunction.
- JSS (HDI) fault or malfunction.
- TGS fault or malfunction.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

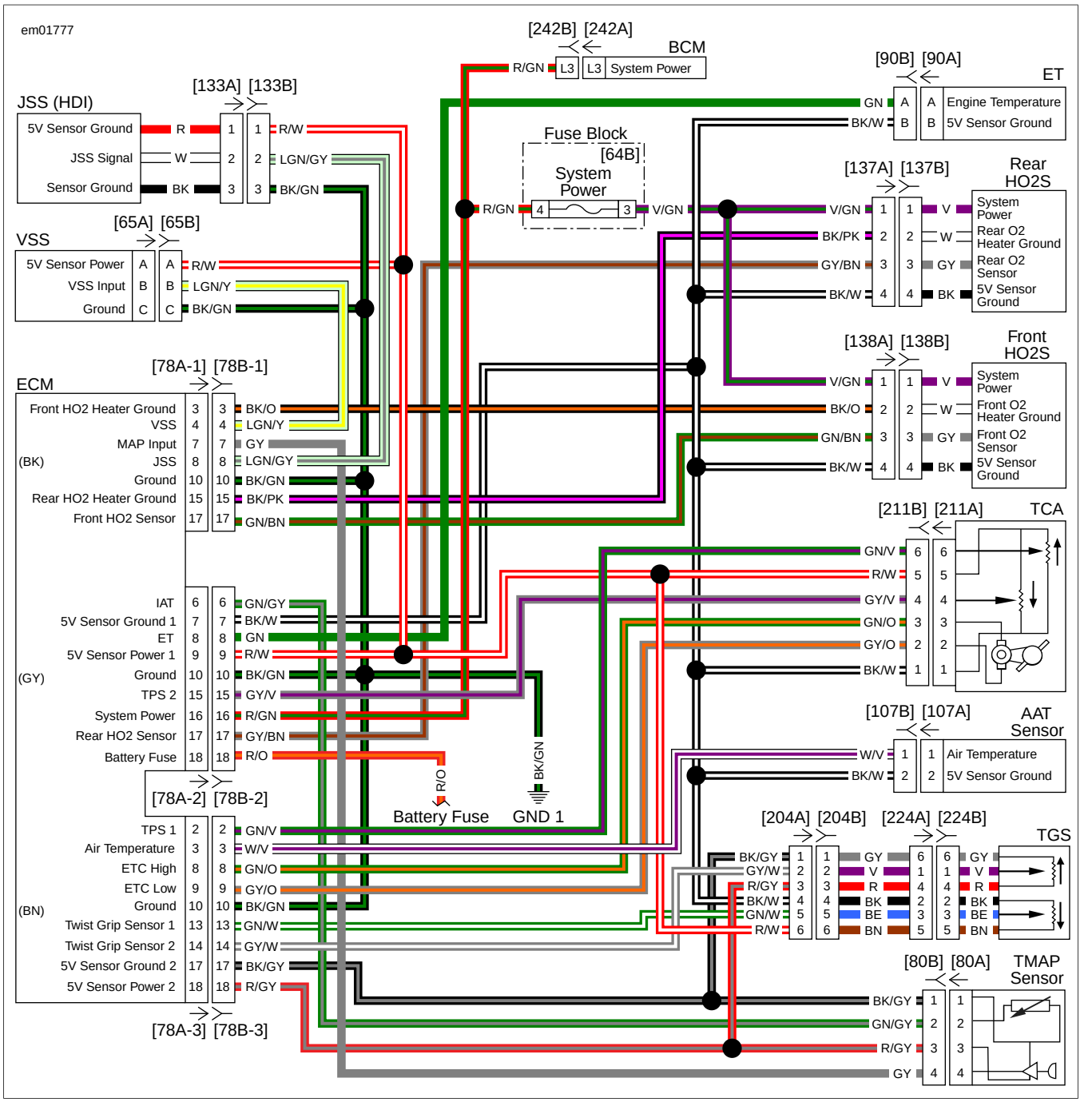


Figure 6-40. Sensor Circuit

DTC P0641

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-54. DTC P0641 Diagnostic Faults

POSSIBLE CAUSES
Short to ground on the 5V sensor power circuit
Short to voltage on the 5V sensor power circuit
VSS fault or malfunction
TGS fault or malfunction
TCA fault or malfunction
JSS (HDI) fault or malfunction

1. 5V Sensor Short to Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminal 9 and ground.
6. Is voltage between 4-6V?
   a. **Yes.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No. Greater than 6V.** Repair short to voltage on (R/W) wire.
   c. **No. Less than 4V.** Go to Test 2.

2. TCA Test

1. Turn IGN OFF.
2. Disconnect TCA [211].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminal 9 and terminal 7.
5. Is voltage less than 4V?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace TCA.

3. TGS Power Circuit Below Range Test

1. Turn IGN OFF.
2. Disconnect TGS [204].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminals 9 and 10.
5. Is voltage less than 4V?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace TGS.

4. VSS Circuit Below Range Test

1. Turn IGN OFF.
2. Disconnect VSS [65].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminals 9 and 10.
5. Is voltage less than 4V?
   a. **Yes, with JSS.** Go to Test 5.
   b. **Yes, without JSS.** Go to Test 6.
   c. **No.** Replace VSS.

5. JSS Circuit Below Range Test

1. Turn IGN OFF.
2. Disconnect JSS [133].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminals 9 and 10.
5. Is voltage less than 4V?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace JSS.

6. Circuit Short to Ground Test

1. Disconnect ECM from BOB.
2. Test continuity between BOB [78-2] terminal 9 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (R/W) wire.
   b. **No.** Go to Test 7.

7. Circuit Shorted to Sensor Ground Circuit Test

1. Test continuity between BOB [78-2] terminals 9 and 7.
2. Is continuity present?
   a. **Yes.** Repair short between (R/W) and (BK/W) wires.
   b. **No.** Replace ECM.

DTC P0651

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-55. DTC P0651 Diagnostic Faults

POSSIBLE CAUSES
Short to ground on the 5V sensor power circuit
Short to voltage on the 5V sensor power circuit
TMAP sensor fault or malfunction
TGS fault or malfunction

1. 5V Sensor Short to Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1] and [78B-2] and ECM [78A-1] and [78A-2]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-3] terminal 18 and ground.
6. Is voltage between 4-6V?
   a. **Yes.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
   b. **No. Greater than 6V.** Repair short to voltage on (R/GY) wire.
   c. **No. Less than 4V.** Go to Test 2.

2. TGS Circuit Below Range Test

1. Turn IGN OFF.
2. Disconnect TGS [204].
3. Turn IGN ON.
4. Test voltage between BOB [78-3] terminals 18 and 10.
5. Is voltage less than 4V?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace TGS.

3. TMAP Power Circuit Below Range Test

1. Turn IGN OFF.
2. Disconnect TMAP sensor [80].
3. Turn IGN ON.
4. Test voltage between BOB [78-3] terminals 18 and 10.
5. Is voltage less than 4V?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace TMAP sensor.

4. Circuit Short to Ground Test

1. Disconnect ECM from BOB.
2. Test continuity between BOB [78-3] terminal 18 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (R/GY) wire.
   b. **No.** Go to Test 5.

5. Circuit Shorted to Sensor Ground Circuit Test

1. Test continuity between BOB [78-3] terminals 17 and 18.
2. Is continuity present?
   a. **Yes.** Repair short between (R/GY) and (BK/GY) wires.
   b. **No.** Replace ECM.

COOLING RELAY DIAGNOSTICS 6.18

DESCRIPTION AND OPERATION

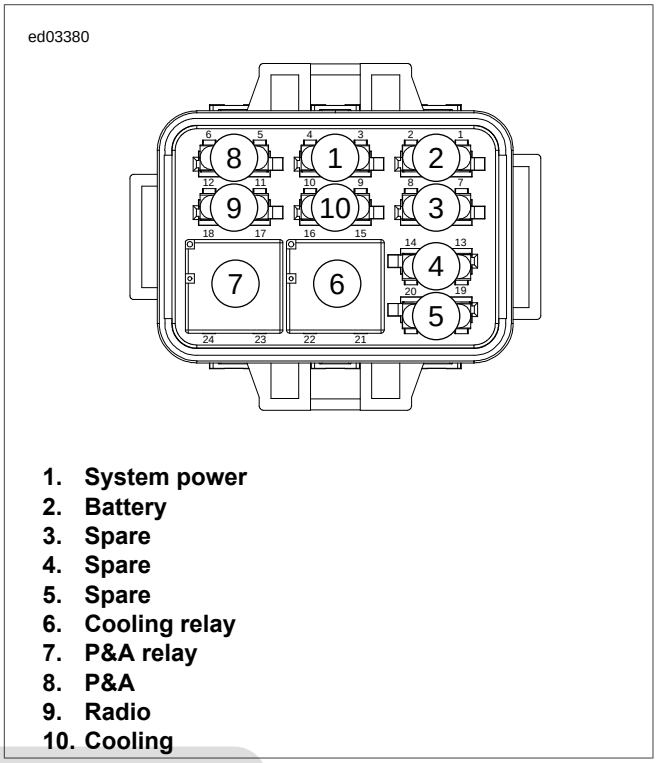
See Figure 6-41. The ECM supplies the ground circuit to the cooling relay, which turns the cooling relay ON. The cooling relay then supplies battery voltage to the cooling system components, left cooling fan, right cooling fan and cooling pump.

The cooling system uses a thermistor device to monitor coolant temperature. At a specific temperature it will have a specific resistance across its terminals. As this resistance varies, so does the voltage on ECM [78-3] terminal 15.

- At high temperatures, the resistance of the sensor is very low. This lowers the signal voltage on ECM [78-3] terminal 15.
- At low temperatures, the resistance is very high. This allows the voltage to rise. The ECM monitors this voltage to compensate for various operating conditions.

Table 6-56. Code Description

DTC	DESCRIPTION
P0691	Fan/cooling relay output low/open
P0692	Fan/cooling relay output high



1. **System power**
2. **Battery**
3. **Spare**
4. **Spare**
5. **Spare**
6. **Cooling relay**
7. **P&A relay**
8. **P&A**
9. **Radio**
10. **Cooling**

Figure 6-41. Fuse Block [64B]

Diagnostic Tips

Once the engine is started and the thermostat opens, the temperature should rise steadily to operating temperature. An intermittent may be caused by a poor connection, rubbed through wire insulation or an inoperative wire inside the insulation. Check the following conditions:

- **Poor connection:** Inspect ECM harness connector [78-1], [78-2] and [78-3] for backed out terminals, improper mating, inoperative locks, improperly formed or damaged terminals, poor terminal-to-wire connection and damaged harness.
- **Perform** 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test **to locate intermittents:** If connections and harness check out OK, use a multimeter to check.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

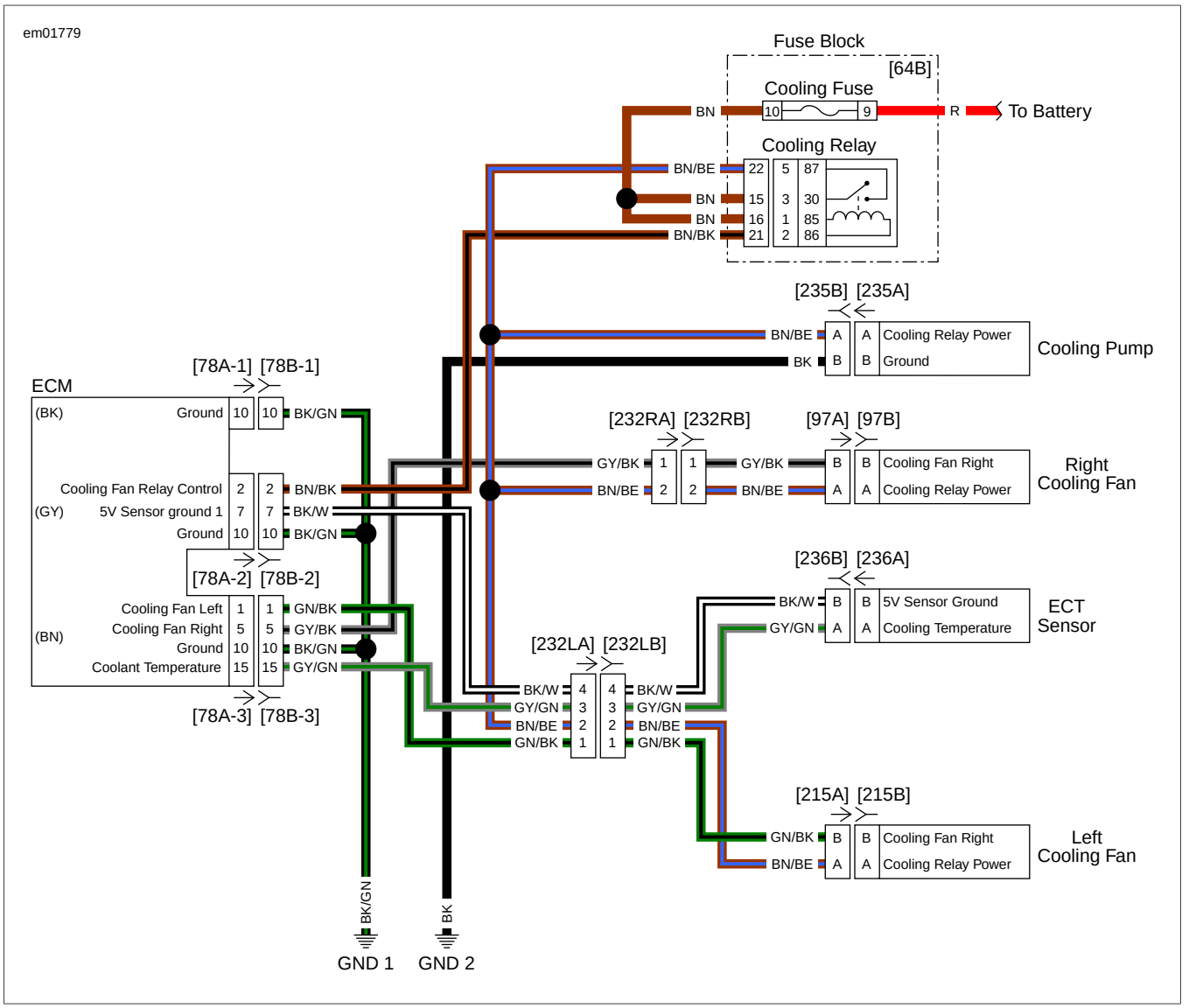


Figure 6-42. Cooling System Schematic

DTC P0691

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-57. DTC P0691 Diagnostic Faults

POSSIBLE CAUSES
Cooling relay malfunction
Open in cooling relay control circuit
Open in cooling relay power circuit
Short to ground in cooling relay control circuit

1. Relay Test

1. Disconnect cooling relay.
2. Perform relay diagnostics. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Relay Diagnostics.
3. Is the relay good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace cooling relay.

2. Relay Voltage Test

1. Test voltage between fuse block [64B] terminals 15, 16 and ground.
2. Is battery voltage present at both terminals?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (BN) or (R) wire.

3. Cooling Relay Control Circuit Continuity Test

1. Turn IGN OFF.

2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-2] terminal 2 and fuse block [64] terminal 21.
5. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BN/BK) wire.

4. Cooling Relay Control Circuit Short to Ground Test

1. Test continuity between [64] terminal 21 (BN/BK) wire and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (BN/BK) wire.
   b. **No.** Replace ECM.

DTC P0692

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-58. DTC P0692 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in cooling relay control circuit
Cooling relay malfunction

1. Relay Test

1. Disconnect cooling relay.
2. Perform relay diagnostics. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.
3. Is the relay good?
   a. **Yes.** Replace ECM.
   b. **No.** Go to Test 2.

2. Cooling Relay Control Circuit Short to Battery Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Remove cooling relay.
5. Turn IGN ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminal 2 and ground.
7. Is voltage present?
   a. **Yes.** Repair short to voltage in (BN/BK) wire.
   b. **No.** Replace ECM.

DTC P1009 6.19

GENERAL

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

Password Problem

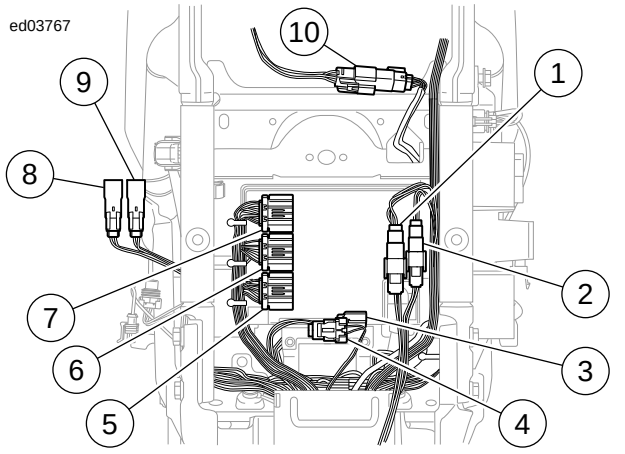
See Figure 6-43, Figure 6-44 and Figure 6-45. The ECM and BCM exchange passwords during operation. An incorrect password sets a DTC. If any U-codes exist, troubleshoot the higher priority codes prior to performing the tests in this section. Refer to Table 1-12.

NOTE

Vehicle will not start if BCM is disconnected.

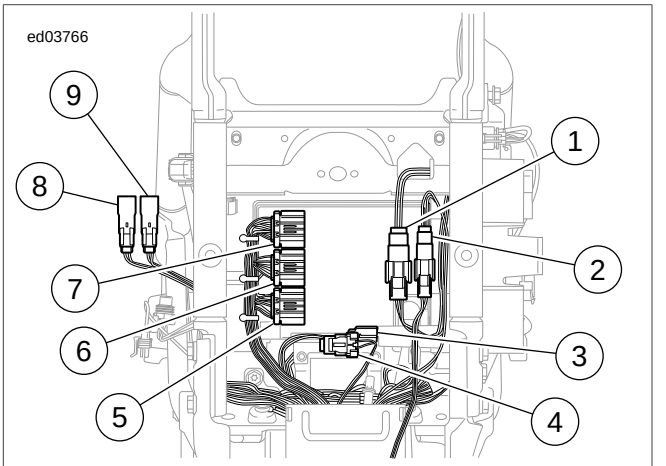
Table 6-59. Code Description

DTC	DESCRIPTION
P1009	VTD disabled fuel due to bad password



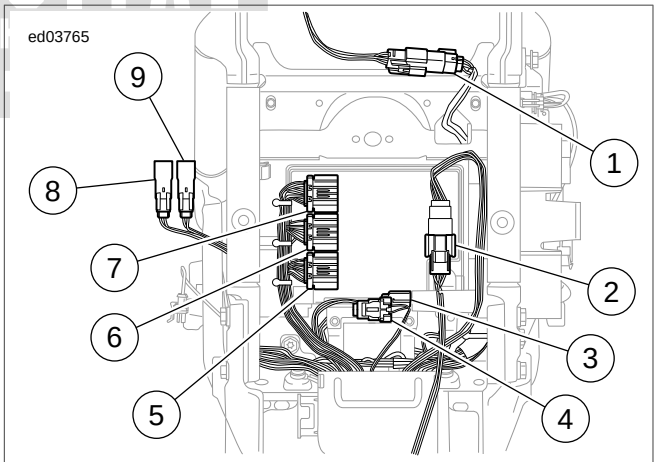
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 6-43. Under Seat: FLHT



1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-44. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-45. Under Seat: FLHR

Diagnostic Tips

This code will usually appear after replacing the ECM or BCM. **New** modules must be programmed using DIGITAL TECHNI-

CIAN II (Part No. HD-48650). After parts are programmed and matched correctly for specific vehicle, clear codes.

DTC P1009

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

Table 6-60. DTC P1009 Diagnostic Faults

POSSIBLE CAUSES
ECM malfunction
BCM malfunction

1. Incorrect Password Test

1. Using DIGITAL TECHNICIAN II (Part No. HD-48650), attempt to calibrate the ECM using the module replace feature found in vehicle set up.
2. Clear DTCs.
3. Turn IGN OFF.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Go to Test 2.
   b. **No.** System operating properly.

2. BCM Replacement Test

1. Turn IGN OFF.
2. Replace BCM.
3. Attempt to calibrate the BCM using the module replace feature found in vehicle set-up.
4. Clear DTCs.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Install original BCM and replace ECM.
   b. **No.** System operating properly.

DTC P1017 6.20

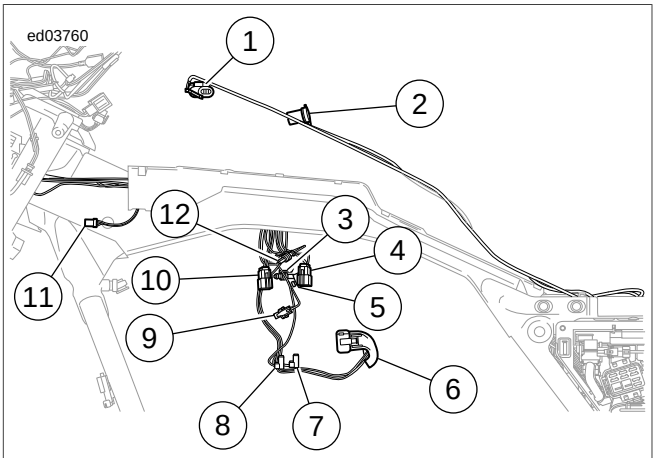
DESCRIPTION AND OPERATION

See Figure 6-46. The ECM monitors the ET sensor to determine engine temperature. The ECT monitors the coolant temperature but does not indicate an actual engine overheating condition without the ET sensor input as well. The ECM uses the ET sensor to indicate overheating. When the ET sensor indicates an overheating condition, the ECM sets DTC P1017 and illuminates the temperature indicator.

Table 6-61. Code Description

DTC	DESCRIPTION
P1017	ET indicates overheating

See 6.1 EFI SYSTEM. The heat management system also engages based off ET sensor input to the ECM.



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-46. Engine

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

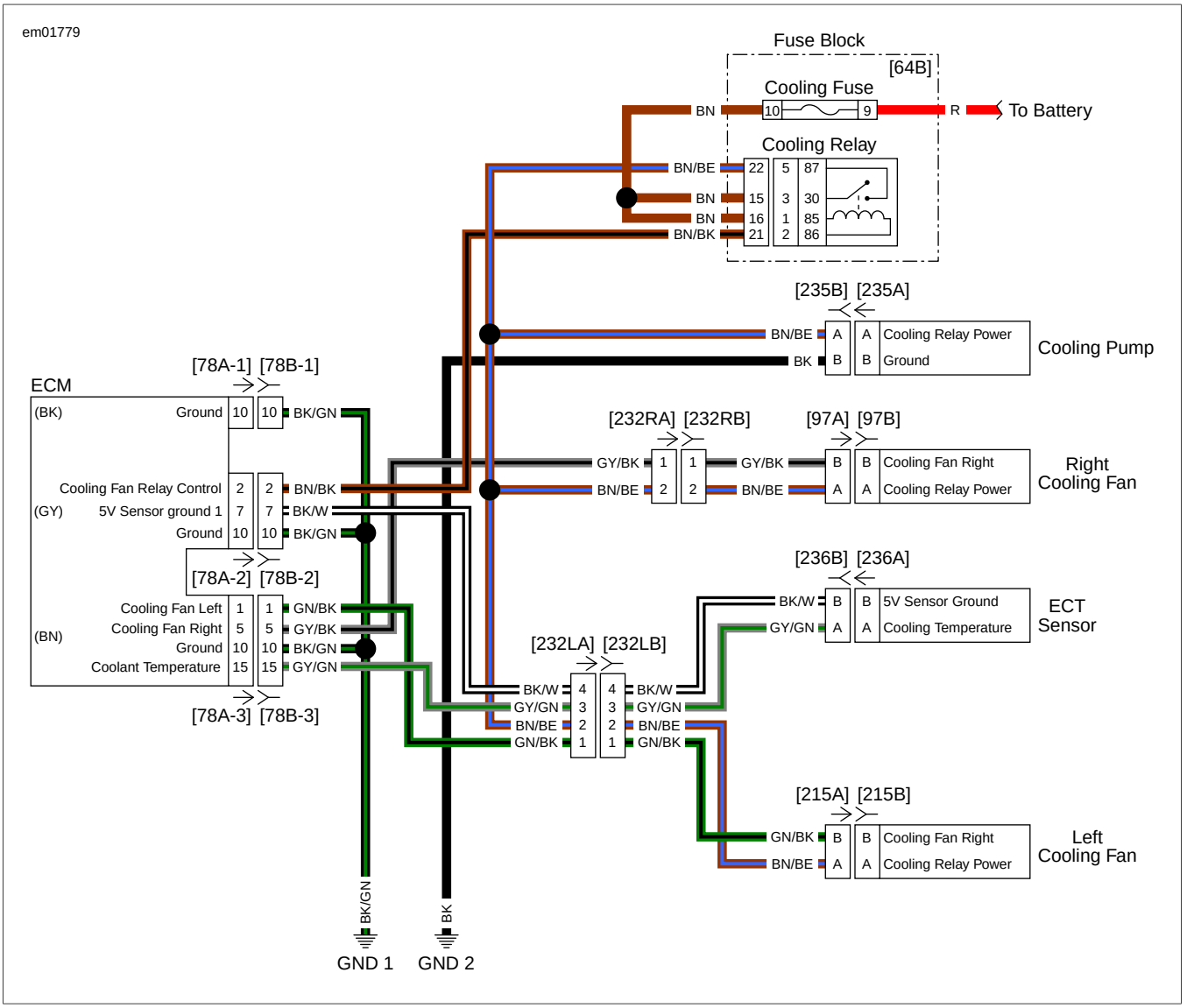


Figure 6-47. Cooling System Schematic

DTC P1017

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-62. DTC P1017 Diagnostic Faults

POSSIBLE CAUSES
ET sensor malfunction
Short to ground in ET signal circuit
No air flow over engine

1. Engine Inspection Test

1. Verify engine area is clean and free from debris.
2. Verify engine oil is clean and at the proper level.
3. Is the engine area clear of debris and oil at proper level?
   a. **Yes.** Go to Test 2.
   b. **No.** Correct issue.

2. ET Sensor Test

NOTE

Vehicle and sensor must be at ambient room temperature before starting diagnostic test.

1. Turn IGN OFF.
2. Disconnect ET sensor [90].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [90A] terminals A (GN) wire and B (BK/W) wire.
4. Is resistance between 900-10,000 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace ET sensor.

3. Cooling Pump Test

1. Turn IGN ON.
2. Hold throttle fully open for a few seconds (the cooling pump and fans should turn on).
3. Verify cooling pump is operating. (Should be able to feel the pump when running).
4. Is pump operating?
   a. **Yes.** Inspect for mechanical issues that may cause engine overheating.
   b. **No.** Go to Test 4.

4. Cooling Pump Voltage Test

1. Turn IGN OFF.
2. Disconnect cooling pump [235B].
3. Test voltage between [235B] terminals A and B.
4. Turn IGN ON.
5. Open throttle fully.
6. Is voltage present?
   a. **Yes.** Replace cooling pump.
   b. **No.** Go to Test 5.

5. Cooling Pump Ground Test

1. Turn IGN OFF.
2. Test resistance between [235B] terminal B and ground.
3. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (BK) wire.

6. Open Relay Power Test

1. Remove cooling relay.
2. Test resistance between [235B] terminal A and fuse block [64] terminal 22.
3. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (BN/BE) wire.

7. Relay Power Short to Ground Test

1. Test continuity between [235B] terminal A and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (BN/BE) wire.
   b. **No.** Replace ECM.

ECT SENSOR DIAGNOSTICS 6.21

DESCRIPTION AND OPERATION

See Figure 6-48. The ECM supplies and monitors a voltage signal from [78-3] terminal 15 to one side of the ECT sensor. The other side of the ECT sensor is connected to a common sensor ground. The ground is also connected to the ECM [78-2] terminal 7.

The ECT sensor is a thermistor device. At a specific temperature it will have a specific resistance across its terminals. As this resistance varies, so does the voltage on ECM [78-3] terminal 15.

- At high temperatures, the resistance of the sensor is very low. This lowers the signal voltage on ECM [78-3] terminal 15.
- At low temperatures, the resistance is very high. This allows the voltage to rise. The ECM monitors this voltage to compensate for various operating conditions.

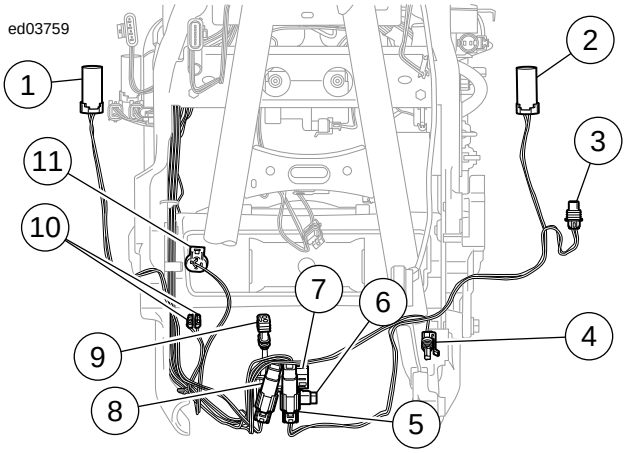
Table 6-63. Code Description

DTC	DESCRIPTION
P1019	ECT difference (high temp)
P2184	ECT sensor low
P2185	ECT sensor high

Diagnostic Tips

Once the engine is started and the thermostat opens, the temperature should rise steadily to operating temperature. An intermittent may be caused by a poor connection, rubbed through wire insulation or an inoperative wire inside the insulation. Check the following conditions:

Poor connection: Inspect ECM harness connector [78- 1], [78-2] and [78-3] for backed out terminals, improper mating, inoperative locks, improperly formed or damaged terminals, poor terminal-to-wire connection and damaged harness.



1. **Right cooling fan [97] (if equipped)**
2. **Left cooling fan [215] (if equipped)**
3. **ECT sensor [236] (if equipped)**
4. **Cooling pump [235] (if equipped)**
5. **Left cooling jumper [232L] (if equipped)**
6. **CKP [79]**
7. **JSS [133]**
8. **Right cooling jumper [232R] (if equipped)**
9. **Voltage regulator [77]**
10. **Rear brake switch [212]**
11. **Oil pressure switch [120] (w/o fairing) and oil pressure sender [139] (with fairing)**

Figure 6-48. Front of Engine

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

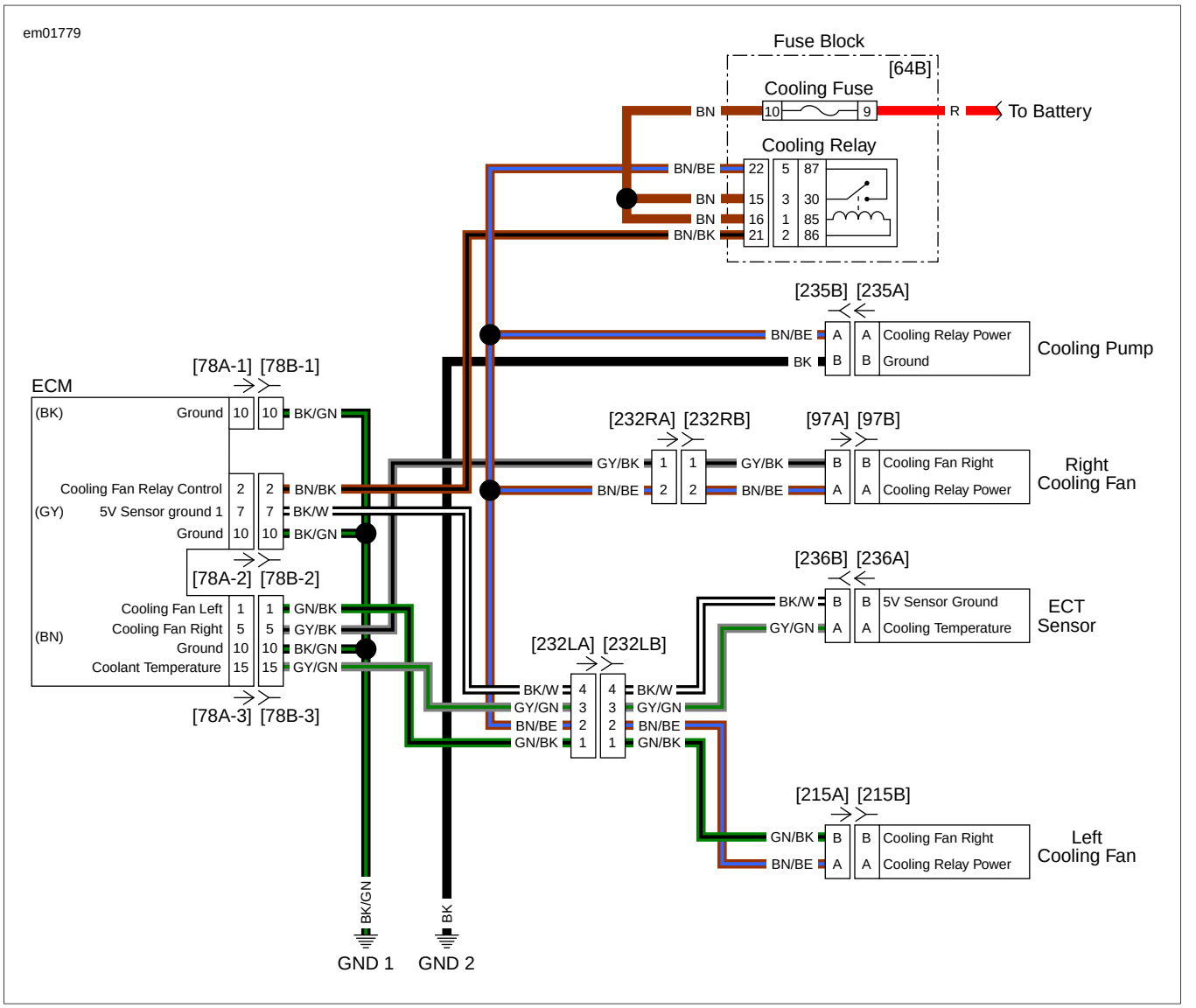


Figure 6-49. Cooling System Schematic

DTC P1019

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-64. DTC P1019 Diagnostic Faults

POSSIBLE CAUSES
ECT sensor malfunction
Short to ground in ECT signal circuit
No air flow through radiators
Low or no coolant in system

1. Engine Inspection Test

1. Turn IGN OFF.
2. Verify both radiators are clean and free from debris.
3. Verify coolant is at the proper level.
4. Is radiator clear of debris and coolant at proper level?
   a. **Yes.** Go to Test 2.
   b. **No.** Correct issue.

2. Cooling Pump Test

1. Turn IGN ON.
2. Open throttle fully.
3. Verify cooling pump is operating. (Should be able to feel the pump when running).
4. Is the pump and both fans operating?
   a. **Yes.** Replace ECT.
   b. **No.** Go to Test 3.

3. Cooling Pump Voltage Test

1. Turn IGN OFF.
2. Disconnect cooling pump [235B].

3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [235B] terminals A and B.
4. Turn IGN ON.
5. Open throttle fully.
6. Is voltage present?
   a. **Yes.** Replace cooling pump.
   b. **No.** Go to Test 4.

4. Cooling Pump Ground Test

1. Turn IGN OFF.
2. Disconnect cooling pump [235B].
3. Test resistance between [235B] terminal B and ground.
4. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (BK) wire.

5. Open Relay Power Test

1. Remove cooling relay.
2. Test resistance between [235B] terminal A and fuse block [64] terminal 22.
3. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (BN/BE) wire.

6. Relay Power Short to Ground Test

1. Test continuity between [235B] terminal A and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (BN/BE) wire.
   b. **No.** Replace ECM.

DTC P2184

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-65. DTC P2184 Diagnostic Faults

POSSIBLE CAUSES
ECT sensor malfunction
Short to ground in 5V reference circuit

1. ECT Sensor Test

NOTE

Vehicle and sensor must be at ambient room temperature before starting diagnostic test.

1. Turn IGN OFF.
2. Disconnect ECT sensor [236B].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [236A] terminals A and B.
4. Is resistance between 3500-4700 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace ECT sensor.

2. ECT Sensor Signal Wire Shorted to Ground Test

1. Test resistance between [236B] terminal A (GY/GN) wire and ground.
2. Is resistance less than 1 Ohm?
   a. **Yes.** Repair short to ground in (GY/GN) wire.
   b. **No.** Go to Test 3.

3. ECT Sensor Signal Wire Shorted to Sensor Ground Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Test continuity between BOB [78-2] terminal 7 and [78-3] terminal 15.
4. Is continuity present?
   a. **Yes.** Repair short between [236B] terminals A (GY/GN) wire and B (BK/W) wire.
   b. **No.** Replace ECM.

DTC P2185

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-66. DTC P2185 Diagnostic Faults

POSSIBLE CAUSES
ET sensor malfunction
Open or short to voltage in 5V reference circuit

1. ECT Signal Voltage Test

1. Turn IGN OFF.
2. Disconnect ECT sensor [236B].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [236B] terminal A (GY/GN) wire and ground.

4. Turn IGN ON.
5. Is voltage greater than 6V?
   a. **Yes.** Repair short to voltage on (GY/GN) wire.
   b. **No.** Go to Test 2.

2. ECT Sensor Signal Wire Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between [236B] terminal A (GY/GN) wire and BOB [78-3] terminal 15.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (GY/GN) wire.

3. ECT Sensor Open Ground Wire Test

1. Test resistance between [236B] terminal B (BK/W) wire and BOB [78-2] terminal 7.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (BK/W) wire.

4. ECT Sensor Signal Wire Shorted to Sensor Power Test

1. Test continuity between BOB [78-2] terminal 9 and [78-3] terminal 15.
2. Is continuity present?
   a. **Yes.** Repair short between (GY/GN) and (R/W) wires.
   b. **No.** Go to Test 5.

5. ECT Sensor Test

1. Connect [236B].
2. Test continuity between BOB [78-2] terminal 7 and [78-3] terminal 15.
3. Is continuity present?
   a. **Yes.** Replace ECM.
   b. **No.** Replace ECT sensor.

DTC P1270 6.22

DESCRIPTION AND OPERATION

TGS2 Validation

Within the ECM, there are two independent Analog/Digital (A/D) converter modules used to validate the input of Twist Grip Sensor 2 (TGS2). TGS2 inputs are sent into both converter modules and if the output of the two readings are not within the designated value of each other for a specified time, then DTC P1270 fault is initiated.

Unless the ECM has a poor or intermittent connection, DTC P1270 indicates the ECM is defective and requires replacement.

NOTE

After replacing the ECM, perform password learning procedure and clear codes.

Table 6-67. Code Description

DTC	DESCRIPTION
P1270	TGS 2 A/D validation error

DTC P1270

Table 6-68. DTC P1270 Diagnostic Faults

POSSIBLE CAUSES
ECM internal fault

1. DTC P1270 Test

1. Clear DTCs.
2. Turn IGN ON.
3. Check DTCs.
4. Did DTC reset?
   a. **Yes.** Replace ECM.
   b. **No.** System operating properly.

COMBUSTION EFFICIENCY DIAGNOSTICS 6.23

DESCRIPTION AND OPERATION

See Figure 6-50. A feedback voltage signal in the secondary ignition circuit (terminal B) detects the presence of combustion each time a cylinder fires on ECM [78-1] terminal 9. For diagnostic purposes, this signal is only analyzed at high speed and load conditions where it may be easily measured. Failure to detect combustion at high speed and load means one of following conditions is true:

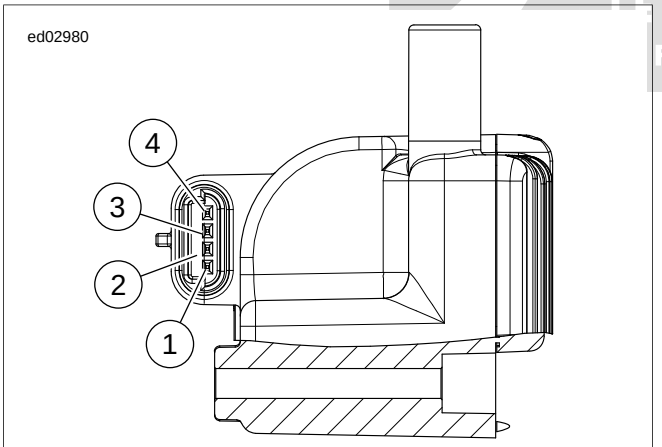
- Cylinder is truly misfiring.
- There is a lack of continuity in the ignition coil secondary circuit.

NOTES

- *Check for non-OE spark plugs and cables before testing. The incorrect resistance values of non-original equipment components will set these DTCs.*
- *Make sure vehicle is running properly before performing the tests in this section. Perform fuel pressure tests if required.*

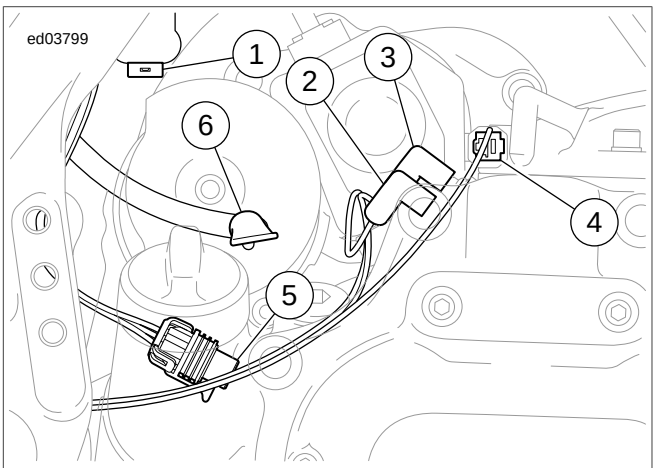
Table 6-69. Code Description

DTC	DESCRIPTION
P1353	No combustion detected (front)
P1356	No combustion detected (rear)



1. **Terminal A: power**
2. **Terminal B: ion sense**
3. **Terminal C: rear coil**
4. **Terminal D: front coil**

Figure 6-50. Ignition Coil: Typical



1. **Ignition coil [83]**
2. **Neutral switch [131-1]**
3. **Neutral switch [131-2]**
4. **Starter solenoid [128]**
5. **VSS [65]**
6. **Battery + connections to starter**

Figure 6-51. Starter

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

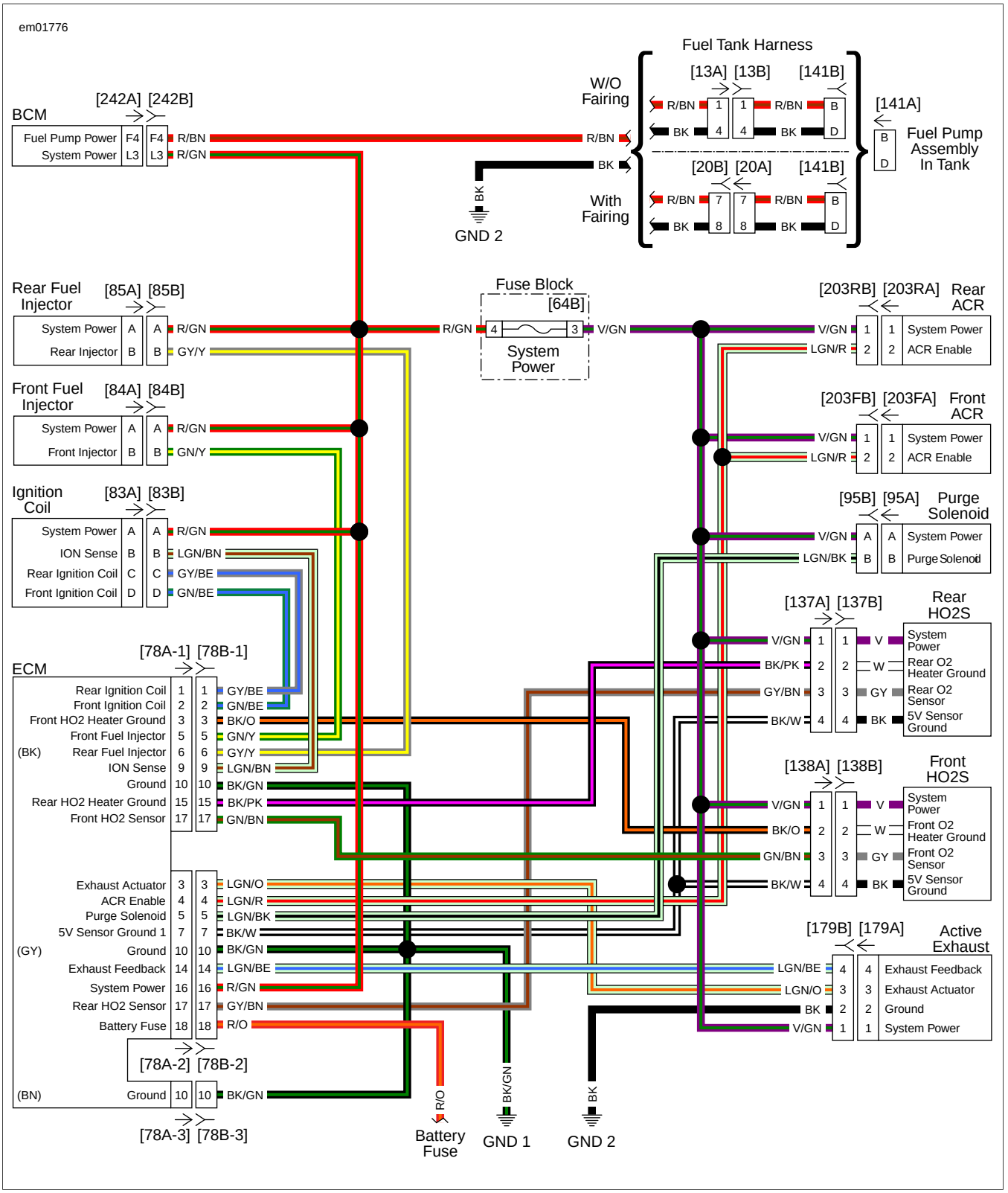


Figure 6-52. System Power Circuit

DTC P1353, P1356

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-70. DTC P1353, P1356 Diagnostic Faults

POSSIBLE CAUSES
Ignition coil malfunction
Fuel system problems
Open or short to voltage in signal circuit
Spark plug wire connections faulty
Spark plug cables
Spark plug

1. Absence of Fuel Test

1. Verify vehicle has fuel.
2. Has vehicle run out of fuel recently?
   a. **Yes.** Clear DTCs. Fill with fresh fuel and restart. If code returns, then continue with tests. Go to Test 2.
   b. **No.** Go to Test 2.

2. Ion Sense Continuity Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Disconnect ignition coil [83].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [83B] terminal B (LGN/BN) wire and BOB [78-1] terminal 9.
6. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (LGN/BN) wire.

3. Ion Sense Short to Voltage Test

1. Connect [78A-1], [78A-2] and [78A-3].
2. Turn IGN ON.
3. Test voltage between [83B] terminal B (LGN/BN) wire and BOB [78-1] terminal 10.
4. Is voltage present?
   a. **Yes.** Repair short to voltage on (LGN/BN) wire.
   b. **No.** Go to Test 4.

4. Spark Plug Cable Test

1. Disconnect spark plug cables.
2. Inspect spark plug cables for carbon tracking or loose connections.
3. Test resistance of spark plug cables.
4. Is front and rear spark plug cable resistance within the specified range? Refer to Table 1-5.
   a. **Yes.** Go to Test 5.
   b. **No.** Replace out of range spark plug cable.

5. Ignition Rear Coil Primary Resistance Test

1. Test resistance between [83A] terminals A and C.
2. Is resistance 0.3-1.5 Ohms?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace ignition coil.

6. Ignition Front Coil Primary Resistance Test

1. Test resistance between [83A] terminals A and D.
2. Is resistance 0.3-1.5 Ohms?
   a. **Yes.** Go to Test 7.
   b. **No.** Replace ignition coil.

7. Ion Sense Coil Resistance Test

1. Test resistance between [83A] terminal B to front coil secondary output tower. Repeat test for rear output tower.
2. Is resistance 2500-3500 Ohms?
   a. **Yes.** Go to Test 8.
   b. **No.** Replace ignition coil.

8. Ignition Coil Secondary Resistance Test

1. Test resistance across ignition coil front and rear secondary output towers.
2. Is resistance within specifications? Refer to Table 1-6.
   a. **Yes.** Go to Test 9.
   b. **No.** Replace ignition coil.

9. Coil Internal Short Test

1. Test continuity between [83A] terminals A and B.
2. Is continuity present?
   a. **Yes.** Replace ignition coil.
   b. **No.** Replace spark plugs and spark plug cables.

EXHAUST ACTUATOR DIAGNOSTICS 6.24

DESCRIPTION AND OPERATION

See Figure 6-53 and Figure 6-54. The active exhaust actuator is included on HDI models only.

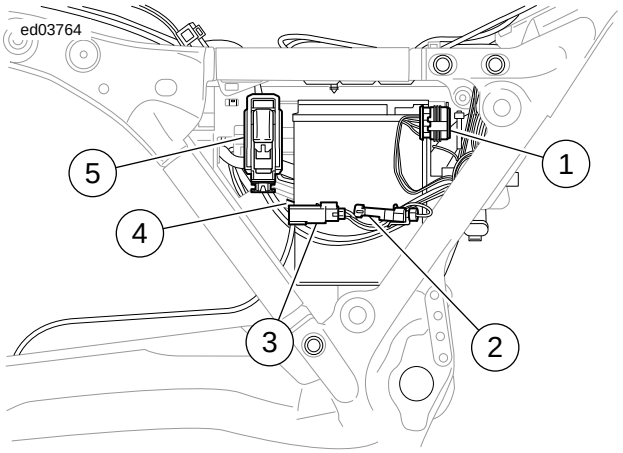
The active exhaust actuator system utilizes an actuator valve located in the rear exhaust pipe which is connected to a servo motor via a cable. The valve position automatically adjusts to enhance engine performance.

Table 6-71. Code Description

DTC	DESCRIPTION
P1475	Exhaust actuator position error
P1477	Exhaust valve actuator low/open
P1478	Exhaust actuator shorted high

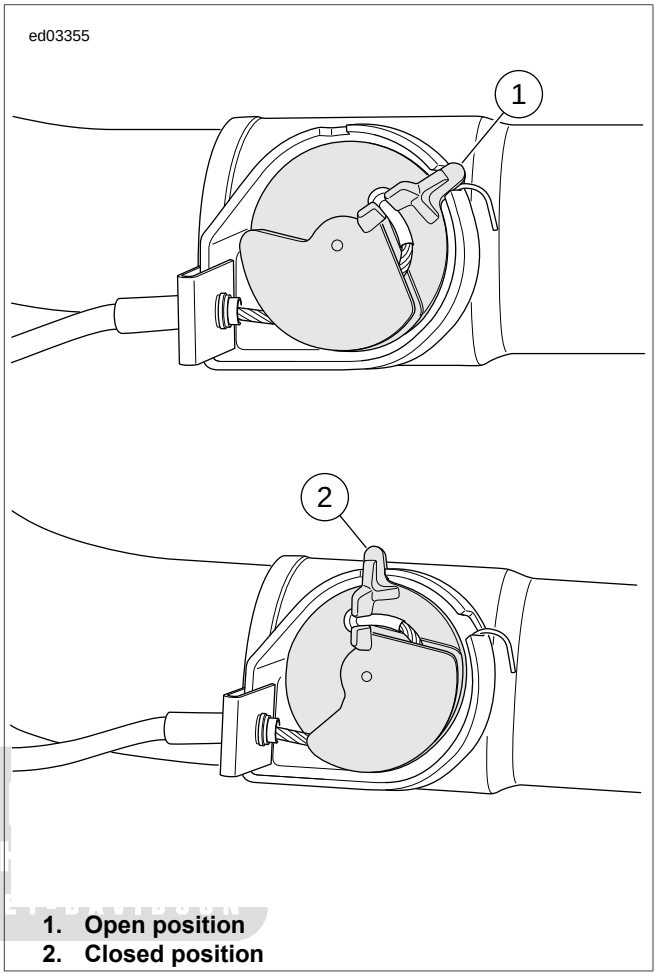
NOTE

The AIS and active exhaust actuator share the same power source and function simultaneously.



1. **Active exhaust actuator [179]**
2. **Rear WSS [168]**
3. **Rear HO2S [138]**
4. **Front HO2S [137] (behind [138])**
5. **ABS ECU [166]**

Figure 6-53. Behind Right Side Cover



1. **Open position**
2. **Closed position**

Figure 6-54. Bellcrank

Diagnostic Tips

The active exhaust actuator is powered from the system power circuit. This circuit voltage is supplied by the BCM through the system power fuse. Any short causing the fuse to open will cause the ECM to set DTC P1477. If this code is present with an open fuse, the fault is a short to ground somewhere in the circuit or the components.

Before replacing the exhaust actuator, check the cable and bellcrank assembly from exhaust actuator to exhaust valve for proper operation.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

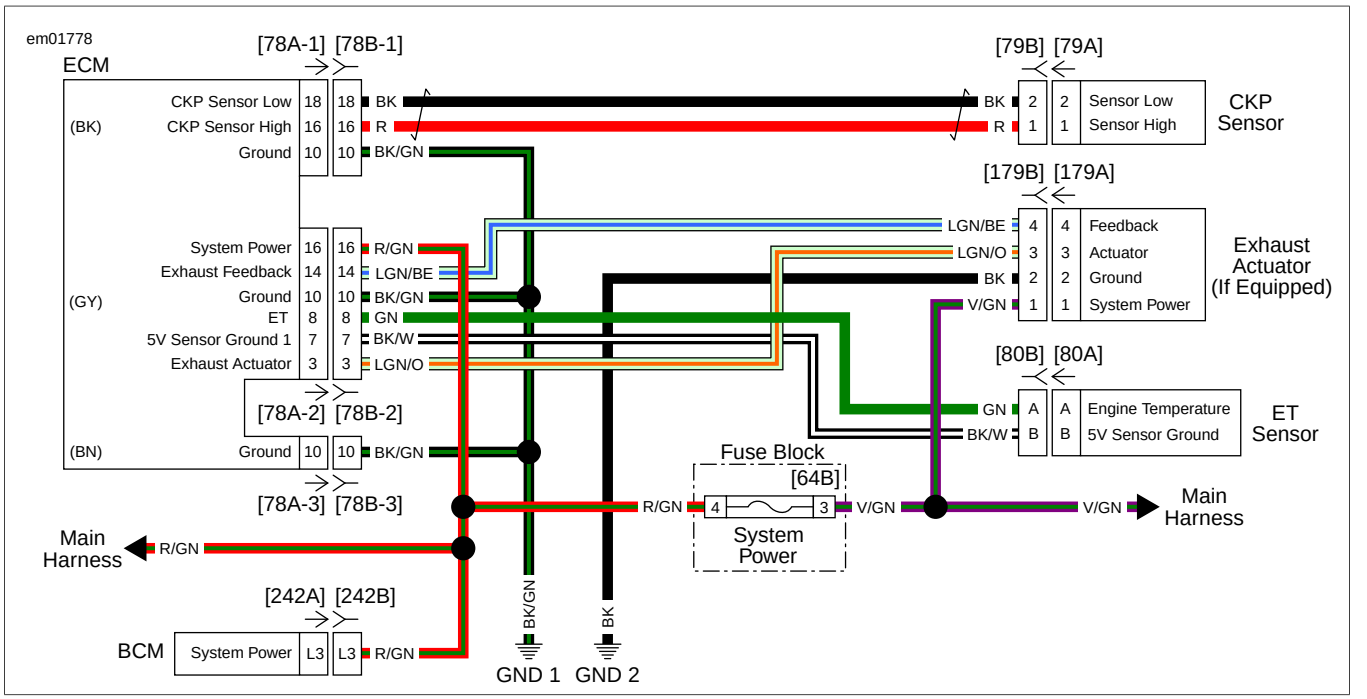


Figure 6-55. Active Exhaust Actuator and CKP Circuit

DTC P1475

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-72. DTC P1475 Diagnostic Faults

POSSIBLE CAUSES
Cable and bellcrank malfunction
Open in ground circuit
Open in power circuit
Open in active exhaust feedback circuit
Exhaust actuator malfunction
Short to voltage in active exhaust feedback circuit
Short to ground in active exhaust feedback circuit

1. Exhaust Actuator Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper BOB [78-2] terminals 3 to 10.
5. Turn IGN ON.
6. Does actuator activate immediately?
   a. **Yes.** Replace ECM.
   b. **No.** Go to Test 2.

2. Voltage Test

1. Turn IGN OFF.
2. Disconnect exhaust actuator [179].
3. Turn IGN ON.
4. Test voltage between [179B] terminals 1 (V/GN) wire and 2 (BK) wire.
5. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. Motor Ground Wire Continuity Test

1. Turn IGN OFF.
2. Test continuity between [179B] terminal 2 (BK) wire and ground.
3. Is continuity present?
   a. **Yes.** Repair open in (V/GN) wire.
   b. **No.** Repair open on (BK) wire.

4. Feedback Voltage Test

1. Connect [78A-1], [78A-2] and [78A-3].
2. Turn IGN ON.
3. Test voltage between BOB [78-2] terminals 10 and 14.

4. Is voltage between 4.5-5.5V?
   a. **Yes.** Go to Test 5.
   b. **No. Battery voltage.** Go to Test 8.
   c. **No. 0V.** Go to Test 9.

5. Feedback Continuity Test

1. Turn IGN OFF.
2. Test resistance between [179B] terminal 4 (LGN/BE) wire and BOB [78-2] terminal 14.
3. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (LGN/BE) wire.

6. Feedback Control Test

1. Connect [179].
2. Turn IGN ON.
3. Test voltage between BOB [78-2] terminals 10 and 14.
4. Jump between BOB [78-2] terminals 3 and 10 several times.
5. Does voltage change to less than 1.0V and exhaust actuator valve open each time?
   a. **Yes.** Go to Test 7.
   b. **No.** Replace exhaust actuator.

7. Feedback Run Test

1. Turn IGN OFF.
2. Clear codes.
3. Start engine.
4. Run engine between 1500-2500 rpm.
5. Does exhaust valve open at 1600 rpm or less and close at 1800 rpm or more?
   a. **Yes.** System operating properly.
   b. **No.** Replace ECM.

8. Feedback Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect [78A-1], [78A-2] and [78A-3].
3. Test voltage between BOB [78-2] terminal 14 and ground.
4. Is voltage present?
   a. **Yes.** Repair short to voltage on (LGN/BE) wire.
   b. **No.** Replace ECM.

9. Feedback Short to Ground Test

1. Disconnect [78A-1], [78A-2] and [78A-3].
2. Test continuity between [179B] terminal 4 (LGN/BE) wire and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground on (LGN/BE) wire.
   b. **No.** Replace ECM.

DTC P1477

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE

Table 6-73. DTC P1477 Diagnostic Faults

POSSIBLE CAUSES
Exhaust actuator malfunction
Open in exhaust actuator circuit
Short to ground in exhaust actuator circuit

1. Exhaust Actuator Motor Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect exhaust actuator [179].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-2] terminal 3 to [179B] terminal 3.
5. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open (LGN/O) wire.

2. Exhaust Actuator Motor Shorted to Ground Test

1. Turn IGN OFF.
2. Connect [78A-1], [78A-2] and [78A-3] to BOB.
3. Test continuity between BOB [78-2] terminal 3 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace ECM.

3. Exhaust Actuator Feedback Shorted to Ground Test

1. Disconnect [78A-2] from BOB.
2. Test continuity between BOB [78-2] terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground on (LGN/O) wire.
   b. **No.** Replace active exhaust actuator.

DTC P1478

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-74. DTC P1478 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in active exhaust circuit
Exhaust actuator malfunction

1. Exhaust Actuator Motor High Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminal 3 and ground.
6. Is voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace ECM.

2. Motor Shorted to Voltage Test

1. Turn IGN OFF.
2. Disconnect exhaust actuator [179].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminal 3 and ground.
5. Is voltage present?
   a. **Yes.** Repair short to voltage on (LGN/O) wire.
   b. **No.** Replace active exhaust control actuator.

JSS DIAGNOSTICS 6.25

DESCRIPTION AND OPERATION

See Figure 6-56. The jiffy stand sensor (JSS) uses a Hall-effect sensor to monitor jiffy stand position.

- When the jiffy stand is fully retracted the sensor picks up the presence of the metal tab mounted to the jiffy stand. The metal tab is moved away from the sensor as the jiffy stand is extended.
- When the jiffy stand is extended the engine will only start and run if the BCM determines the transmission is in neutral. This is done by monitoring the neutral switch input to the BCM and communicating that input over the CAN bus circuit to the ECM.

The JSS is powered and monitored by the ECM. The ECM supplies the 5V reference to the JSS. The JSS sends a signal back to the ECM. This signal is used by the ECM to determine when the jiffy stand is retracted or extended. The JSS is grounded through the ECM.

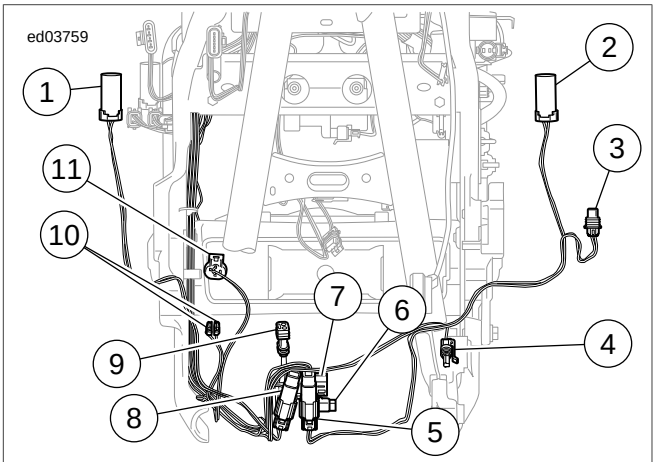
The JSS also has a Fail Enable Mode. This mode allows the engine to start and run if the system recognizes a problem with the JSS circuit. When a problem exists or if the transmission is put in gear with the jiffy stand extended the odometer will display "SIdE Stand." DTC P1501 or P1502 will set if the JSS circuits are out of range.

NOTE

The ECM supplies 5V reference voltage to the VSS, TCA and TGS in addition to the JSS. Problems on the 5V reference will cause other DTCs.

Table 6-75. Code Description

DTC	DESCRIPTION
P1501	JSS low
P1502	JSS high/open



1. **Right cooling fan [97] (if equipped)**
2. **Left cooling fan [215] (if equipped)**
3. **ECT sensor [236] (if equipped)**
4. **Cooling pump [235] (if equipped)**
5. **Left cooling jumper [232L] (if equipped)**
6. **CKP [79]**
7. **JSS [133]**
8. **Right cooling jumper [232R] (if equipped)**
9. **Voltage regulator [77]**
10. **Rear brake switch [212]**
11. **Oil pressure switch [120] (w/o fairing) and oil pressure sender [139] (with fairing)**

Figure 6-56. Front of Engine

Diagnostic Tips

When disconnecting any connectors always inspect connector for corrosion or backed out terminals and repair as required.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

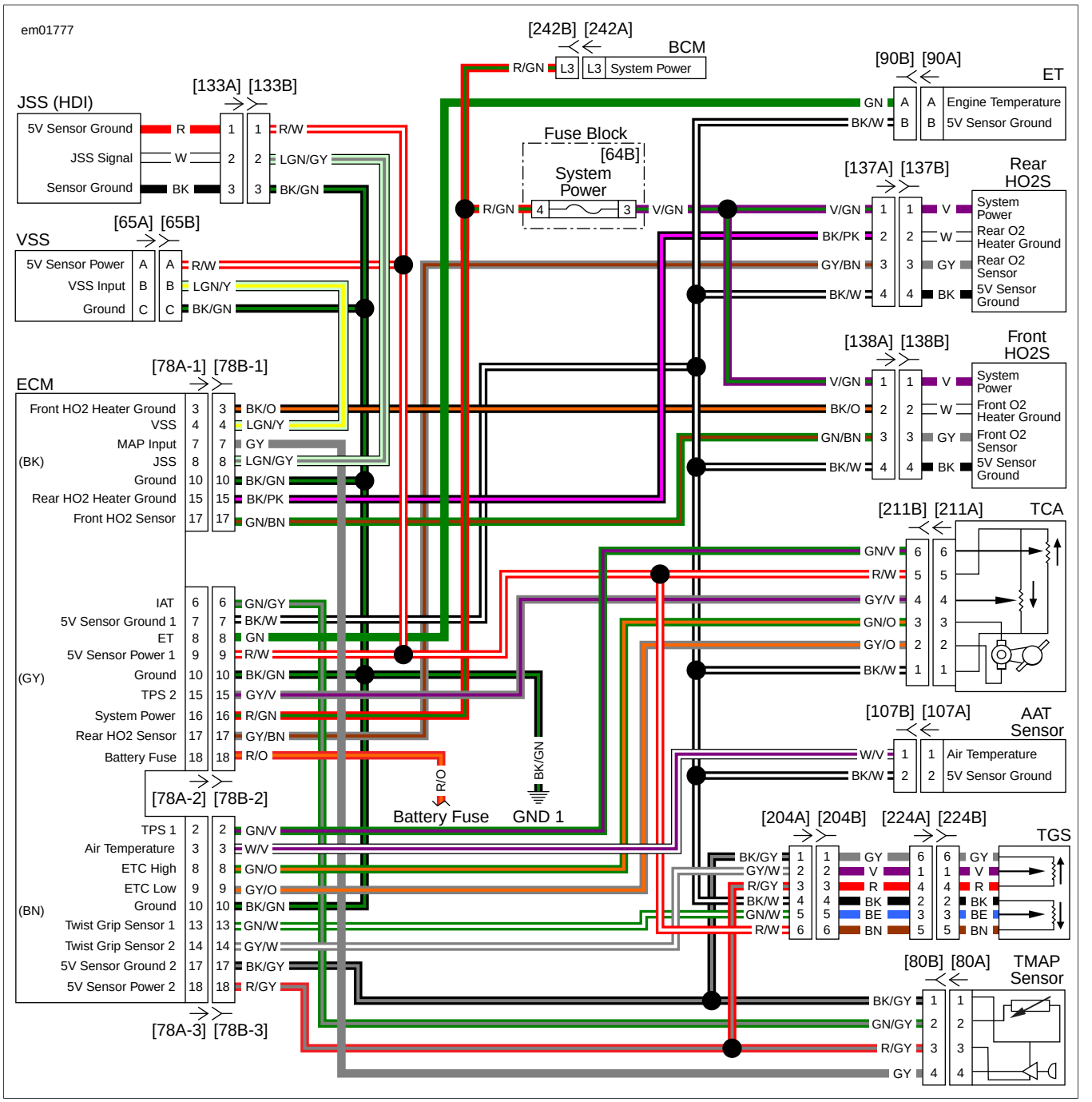


Figure 6-57. Sensor Circuit

DTC P1501

Table 6-76. DTC P1501 Diagnostic Faults

POSSIBLE CAUSES
JSS malfunction
Short to ground in signal circuit

1. Signal Wire Shorted to Ground Test

1. Turn IGN OFF.
2. Disconnect JSS [133].
3. Test continuity between [133B] terminal 2 (LGN/GY) wire and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground on (LGN/GY) wire.
   b. **No.** Replace JSS.

DTC P1502

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-77. DTC P1502 Diagnostic Faults

POSSIBLE CAUSES
JSS malfunction
Short to voltage in signal circuit
Open ground
Short between 5V reference circuit and signal circuit
Open in signal circuit

1. JSS Ground Wire Test

1. Turn IGN OFF.
2. Disconnect JSS [133].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [133B] terminal 3 and ground.
4. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (BK/GN) wire.

2. JSS Signal Wire Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between [133B] terminal 2 (LGN/GY) wire and ground.
3. Is voltage greater than 5V?
   a. **Yes.** Repair short to voltage on (LGN/GY) wire.
   b. **No.** Go to Test 3.

3. 5V Reference and Signal Shorted Together Test

1. Turn IGN OFF.
2. Disconnect ECM [78-1], [78-2] and [78-3].
3. Test continuity between [133B] terminals 1 (R/W) wire and 2 (LGN/GY) wire.
4. Is continuity present?
   a. **Yes.** Repair short between (R/W) and (LGN/GY) wires.
   b. **No.** Go to Test 4.

4. Signal Wire Open Circuit Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Test resistance between BOB [78-1] terminal 8 and [133B] terminal 2 (LGN/GY) wire.
4. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace JSS.
   b. **No.** Repair open on (LGN/GY) wire.

SIDE STAND DISPLAYED ON SPEEDOMETER

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-78. Side Stand Displayed on Speedometer Diagnostic Faults

POSSIBLE CAUSES
Jiffy stand is down
Jiffy stand out of adjustment
Open 5V sensor power wire

1. Starts, Then Stalls Test

1. Start engine.
2. Does engine start and stall?
   a. **Yes.** See 6.39 STARTS, THEN STALLS.
   b. **No.** Go to Test 2.

2. Neutral Test

1. Verify transmission is in neutral.
2. Is neutral indicator illuminated?
   a. **Yes.** Go to Test 3.
   b. **No.** See 4.5 INDICATOR LAMPS.

3. JSS Clearance Test

1. Inspect JSS and jiffy stand for correct mounting and clearance to jiffy stand tab.
2. Is clearance less than 0.18 in (4.5 mm)?
   a. **Yes.** Go to Test 4.
   b. **No.** Install JSS and jiffy stand correctly.

4. 5V Reference Open Circuit Test

1. Turn IGN OFF.
2. Disconnect JSS [133].

3. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-2] terminal 9 and [133B] terminal 1 (R/W) wire.
6. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace JSS.
   b. **No.** Repair open on (R/W) wire.

ETC MANAGMENT DIAGNOSTICS 6.26

DESCRIPTION AND OPERATION

Throttle Control Actuator Management

The ECM constantly monitors throttle actuation and throttle plate positioning. Several features are programmed into the ECM to limit performance when an error or fault in throttle actuation is detected. These DTCs always accompany another code. Refer to Table 6-79.

Table 6-79. Code Description

DTC	DESCRIPTION
P1510	ETC limited performance mode
P1511	ETC power management mode
P1512	ETC forced idle mode

Performance limitations are identified by code, as follows:

- **P1510 Limited Performance:** Enables near normal operation of the vehicle, guarding against inadvertent wide open throttle conditions. Typically this code is the result if one of the TGS or TP sensors, or one of each, has failed.
- **P1511 Power Management:** Provides more limitation on driveability, due to failure of the TCA, without a TGS, TMAP or airflow faults. The TCA is de-energized and the throttle plate returns to its idle detent position. The ECM monitors the operation of the TGS and adjusts the spark advance and cylinder shutoff/rev limiting, allowing the vehicle to reach traffic speeds (limp-home).
- **P1512 Forced Idle Mode:** Provides extreme limitation of driveability, due to a failure of both TGS, TGS validation error or failure of one TGS and the brake switch. The TCA is de-energized and the throttle plate is forced to a fast idle position providing enough torque to operate at a high idle speed.

DTC P1510, P1511, P1512

Table 6-80. DTC P1510, P1511, P1512 Diagnostic Faults

POSSIBLE CAUSES
Other DTCs set

1. DTC Verification Test

1. Clear DTCs.
2. Start and run engine for a few seconds.
3. Cycle the engine on and off, for a few seconds each time a total of three times.
4. Did DTC P1510, P1511 or P1512 set with no other DTCs?
   a. **Yes.** Replace ECM.
   b. **No. Other DTCs set.** Refer to Table 1-12.
   c. **No. No DTCs set.** DTC was properly cleared.

ETC ERROR DIAGNOSTICS 6.27

DESCRIPTION AND OPERATION

Air Flow Fault

The ECM uses the TMAP sensor to monitor air flow past the throttle plate. This ensures proper throttle plate positioning when the throttle is released and allowed to return to the unpowered position. The unpowered position is typically 7% of throttle plate range.

In order to avoid inconsistent readings at low rpm (or at idle), testing air flow is only performed at engine speeds above normal idle (10% of throttle plate range or approximately 1300 rpm).

The ECM compares the intake manifold pressure value from the TMAP to the throttle plate position value from the TPS. DTC 1514 sets if the manifold pressure is higher than it should be for that given throttle plate position for three consecutive ignition cycles. If a TMAP sensor error is present, then the ECM does not check P1514 parameters and instead P2105 (forced shutdown mode) is initiated, shutting down the fuel pump and fuel injectors. See 6.31 DTC P2105, P2107. The ECM only checks for DTC P1514 if power management mode (DTC P1511) is present.

The ECM uses a main microprocessor and a monitoring microcontroller to communicate with the throttle actuation control system.

The microcontroller monitors the main microprocessor of the ECM. When a communication failure is identified, the microcontroller shuts down the TCA and fuel injectors.

An internal ignition delay timer monitors when the ignition circuit is energized. The microcontroller issues DTC P1600 if no communication is established between the main microprocessor or if a monitoring failure occurs within three consecutive ignition cycles.

Table 6-81. Code Description

DTC	DESCRIPTION
P1514	TCA airflow error
P1600	TCA internal fault

DTC P1514

Table 6-82. DTC P1514 Diagnostic Faults

POSSIBLE CAUSES
Other DTCs set

1. DTC Verification Test

1. Clear DTCs.
2. Start and run the engine for a few seconds.
3. Cycle engine on and off, for a few seconds each time a total of three times.
4. Did DTC P1514 set with no other DTCs?
   a. **Yes.** Replace ECM.
   b. **No. Other DTCs set.** Refer to Table 1-12.
   c. **No. No DTCs set.** DTC was properly cleared.

DTC P1600

Table 6-83. DTC P1600 Diagnostic Faults

POSSIBLE CAUSES
Other DTCs set

1. DTC Verification Test

1. Clear DTCs.
2. Start and run the engine for a few seconds.
3. Cycle engine on and off, for a few seconds each time a total of three times.
4. Did DTC P1600 set with no other DTCs?
   a. **Yes.** Replace ECM.
   b. **No. Other DTCs set.** Refer to Table 1-12.
   c. **No. No DTCs set.** DTC was properly cleared.

ACR DIAGNOSTICS 6.28

DESCRIPTION AND OPERATION

See Figure 6-58. When open, compressed gases are released through the exhaust port.

See Figure 6-59. The automatic compression release (ACR) is opened and closed by the ECM to assist starting.

Table 6-84. Code Description

DTC	DESCRIPTION
P1655	ACR solenoid low/open
P1656	ACR solenoid shorted high

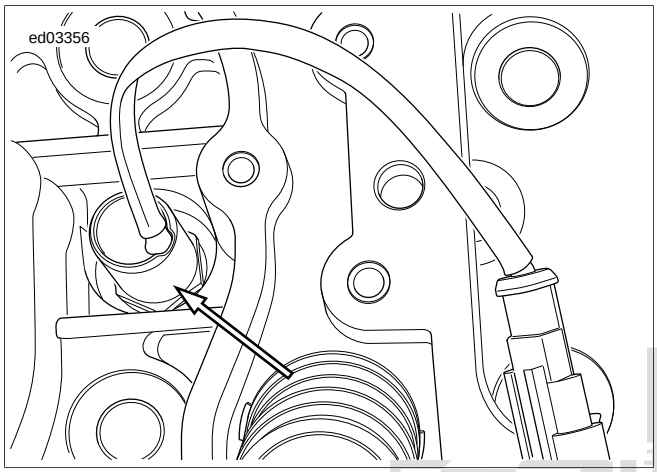
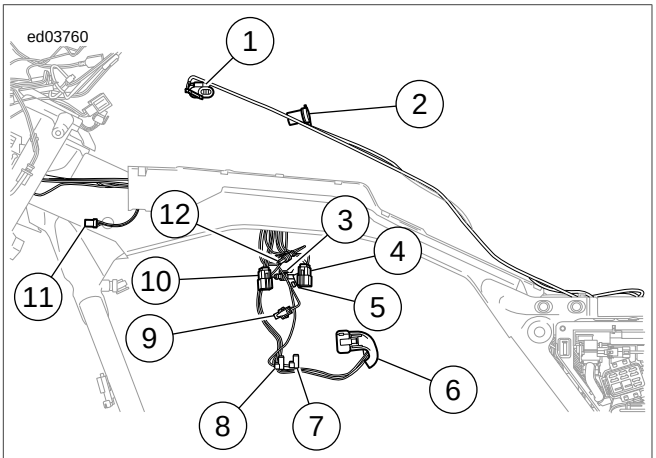


Figure 6-58. ACR in Head



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-59. Engine

Diagnostic Tips

The ACR circuits are powered from the system power circuit. This circuit voltage is supplied by the BCM through the system power fuse. Any short causing the fuse to open will cause the ECM to set DTC P1655. If this code is present with an open fuse the fault is a short to ground somewhere in the circuit or the components.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

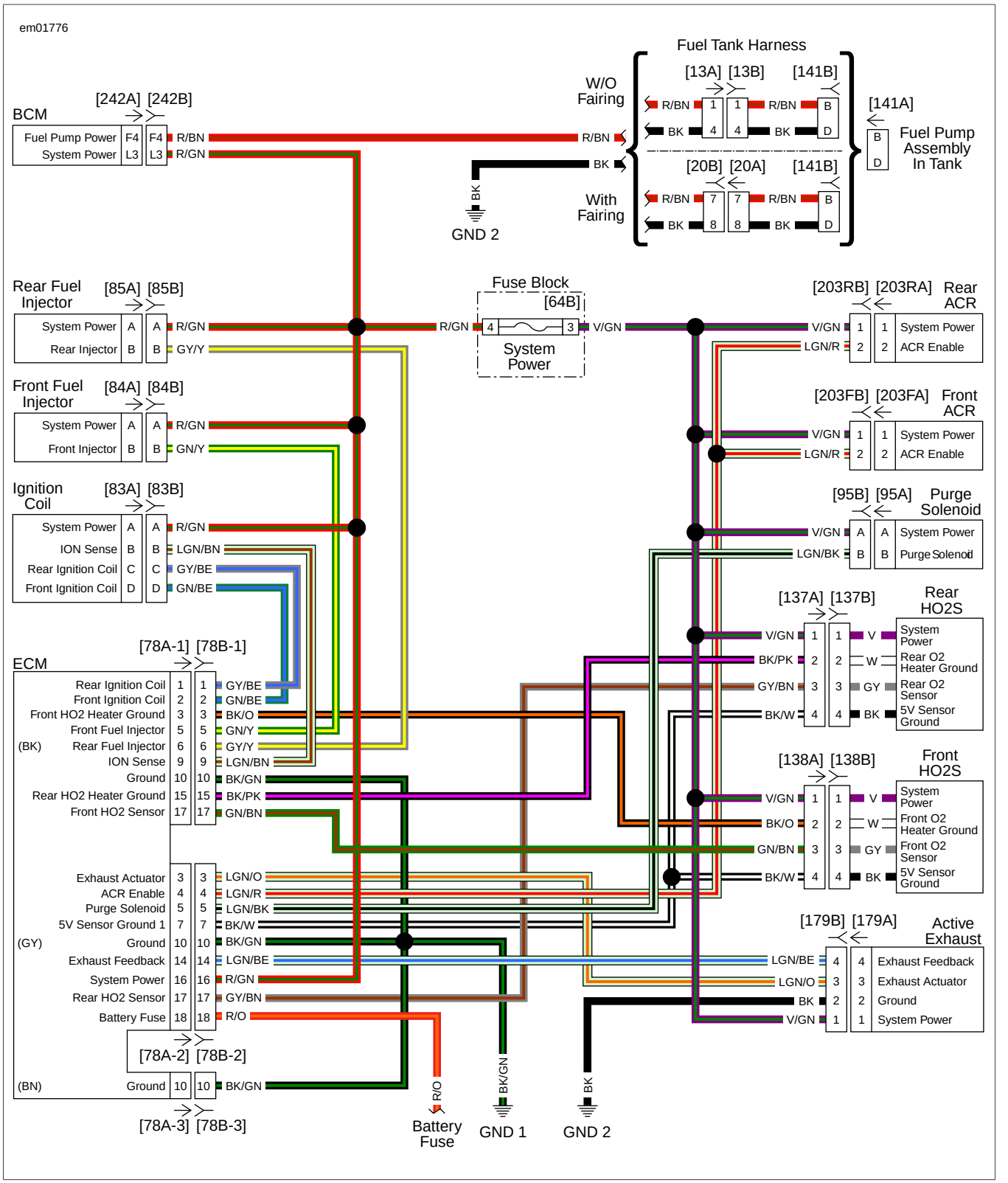


Figure 6-60. System Power Circuit

DTC P1655

PART NUMBER	TOOL NAME
HD-34730-2E	FUEL INJECTOR TEST LIGHT
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-85. DTC P1655 Diagnostic Faults

POSSIBLE CAUSES
ACR solenoid malfunction
Open in ACR control circuit
Open in system power circuit
Short to ground in ACR control circuit

1. Front ACR Test

1. Turn IGN OFF.
2. Disconnect front ACR [203F].
3. Connect FUEL INJECTOR TEST LIGHT (Part No. HD-34730-2E).
4. Crank engine for 5 seconds.
5. Does the test light flash on and off?
   a. **Yes.** Go to Test 2.
   b. **No, test light stays on steady.** Go to Test 4.
   c. **No, did not stay on steady.** Go to Test 6.

2. Rear ACR Test

1. Turn IGN OFF.
2. Disconnect rear ACR [203R].
3. Connect FUEL INJECTOR TEST LIGHT (Part No. HD-34730-2E).
4. Crank engine for 5 seconds.
5. Does the test light flash on and off?
   a. **Yes.** Replace front and rear ACR solenoids.
   b. **No.** Go to Test 3.

3. Rear ACR Control Circuit Test

1. Turn IGN OFF.
2. Disconnect test light.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [203FB] terminal 1 (V/GN) wire and [203RB] terminal 1 (V/GN) wire.
4. Is continuity present?
   a. **Yes.** Repair open in (LGN/R)wire.
   b. **No.** Repair open in (V/GN) wire.

4. Front ACR Control Circuit Short to Ground Test

1. Turn IGN OFF.
2. Disconnect ECM [78-2].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [203FB] terminal 2 (LGN/R) wire and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace ECM.

5. Rear ACR Control Circuit Short to Ground Test

1. Disconnect rear ACR [203RB].
2. Test continuity between [203FB] terminal 2 (LGN/R) wire and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (LGN/R) wire.
   b. **No.** Replace front and rear ACR solenoids.

6. Shorted ACR Test

1. Turn IGN OFF.
2. Disconnect rear ACR [203RB].
3. Crank engine for 5 seconds.
4. Does the test light flash on and off?
   a. **Yes.** Replace front and rear ACR solenoids.
   b. **No.** Go to Test 7.

7. ACR Control Circuit Continuity Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-2] terminal 4 and [203FB] terminal 2 (LGN/R) wire.
5. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair open in (LGN/R) wire.

8. Power Circuit Continuity Test

1. Test resistance between BOB [78-2] terminal 16 and [203B] terminal 1 (V/GN) wire.

2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (V/GN) wire.

DTC P1656

PART NUMBER	TOOL NAME
HD-34730-2E	FUEL INJECTOR TEST LIGHT
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-86. DTC P1656 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in ACR control circuit
ACR solenoid malfunction

1. Front ACR Test

1. Turn IGN OFF.
2. Disconnect front ACR [203F].
3. Connect FUEL INJECTOR TEST LIGHT (Part No. HD-34730-2E).
4. Crank engine for 5 seconds.
5. Does test light flash on and off?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. Rear ACR Test

1. Turn IGN OFF.
2. Disconnect rear ACR [203R].
3. Disconnect test light from [203F].
4. Connect test light to [203R].
5. Crank engine for 5 seconds.
6. Does test light flash on and off?
   a. **Yes.** Replace front and rear ACR.
   b. **No.** Go to Test 3.

3. Rear ACR Control Circuit Test

1. Disconnect test light.
2. While cranking engine, using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [203RB] terminal 2 (LGN/R) wire and ground.
3. Is voltage greater than 5.0V?
   a. **Yes.** Repair short to voltage on (LGN/R) wire.
   b. **No.** Replace ECM.

4. Front ACR Control Circuit Test

1. Disconnect rear ACR [203R].
2. While cranking engine, using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [203FB] terminal 2 (LGN/R) wire and ground.
3. Is voltage greater than 5.0V?
   a. **Yes.** Repair short to voltage on (LGN/R) wire.
   b. **No.** Replace front and rear ACR.

COOLING FAN DIAGNOSTICS 6.29

DESCRIPTION AND OPERATION

See Figure 6-61. The ECM supplies the ground circuit to the cooling relay, which turns the cooling relay ON. The cooling relay then supplies battery voltage to the cooling system components, left cooling fan, right cooling fan and cooling pumps.

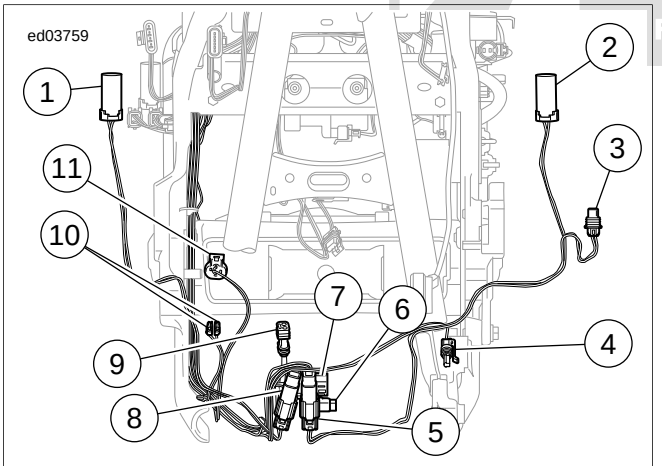
The cooling system uses a thermistor device to monitor coolant temperature. At a specific temperature it will have a specific resistance across its terminals. As this resistance varies, so does the voltage on ECM [78-3] terminal 15.

- At high temperatures, the resistance of the sensor is very low. This lowers the signal voltage on ECM [78-3] terminal 15.
- At low temperatures, the resistance is very high. This allows the voltage to rise. The ECM monitors this voltage to compensate for various operating conditions.

Once the ECT reaches 221 °F (105 °C), the ECM will supply ground to the cooling fans causing the fans to turn on.

Table 6-87. Code Description

DTC	DESCRIPTION
P1691	Cooling fan left low/open
P1692	Cooling fan left shorted high
P1693	Cooling fan right low/open
P1694	Cooling fan right shorted high



1. **Right cooling fan [97] (if equipped)**
2. **Left cooling fan [215] (if equipped)**
3. **ECT sensor [236] (if equipped)**
4. **Cooling pump [235] (if equipped)**
5. **Left cooling jumper [232L] (if equipped)**
6. **CKP [79]**
7. **JSS [133]**
8. **Right cooling jumper [232R] (if equipped)**
9. **Voltage regulator [77]**
10. **Rear brake switch [212]**
11. **Oil pressure switch [120] (w/o fairing) and oil pressure sender [139] (with fairing)**

Figure 6-61. Front of Engine

Diagnostic Tips

Once the engine is started and the thermostat has opened, the temperature should rise steadily to operating temperature.

An intermittent may be caused by a poor connection, rubbed through wire insulation or an inoperative wire inside the insulation. Check the following conditions:

- **Poor connection:** Inspect ECM harness connector [78-1], [78-2] and [78-3] for backed out terminals, improper mating, inoperative locks, improperly formed or damaged terminals, poor terminal-to-wire connection and damaged harness.
- **Perform** 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test **to locate intermittents:** If connections and harness check out OK, use a multimeter to check.

The cooling system is designed for an operational test through the ECM. The following steps will cause the ECM to activate the fans and the pump to verify system operation.

1. Turn IGN ON. Do not start engine.
2. Hold the throttle in the wide open position.
3. After a few seconds the cooling pump and fans will all turn on.

This will verify if any components are not operating.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

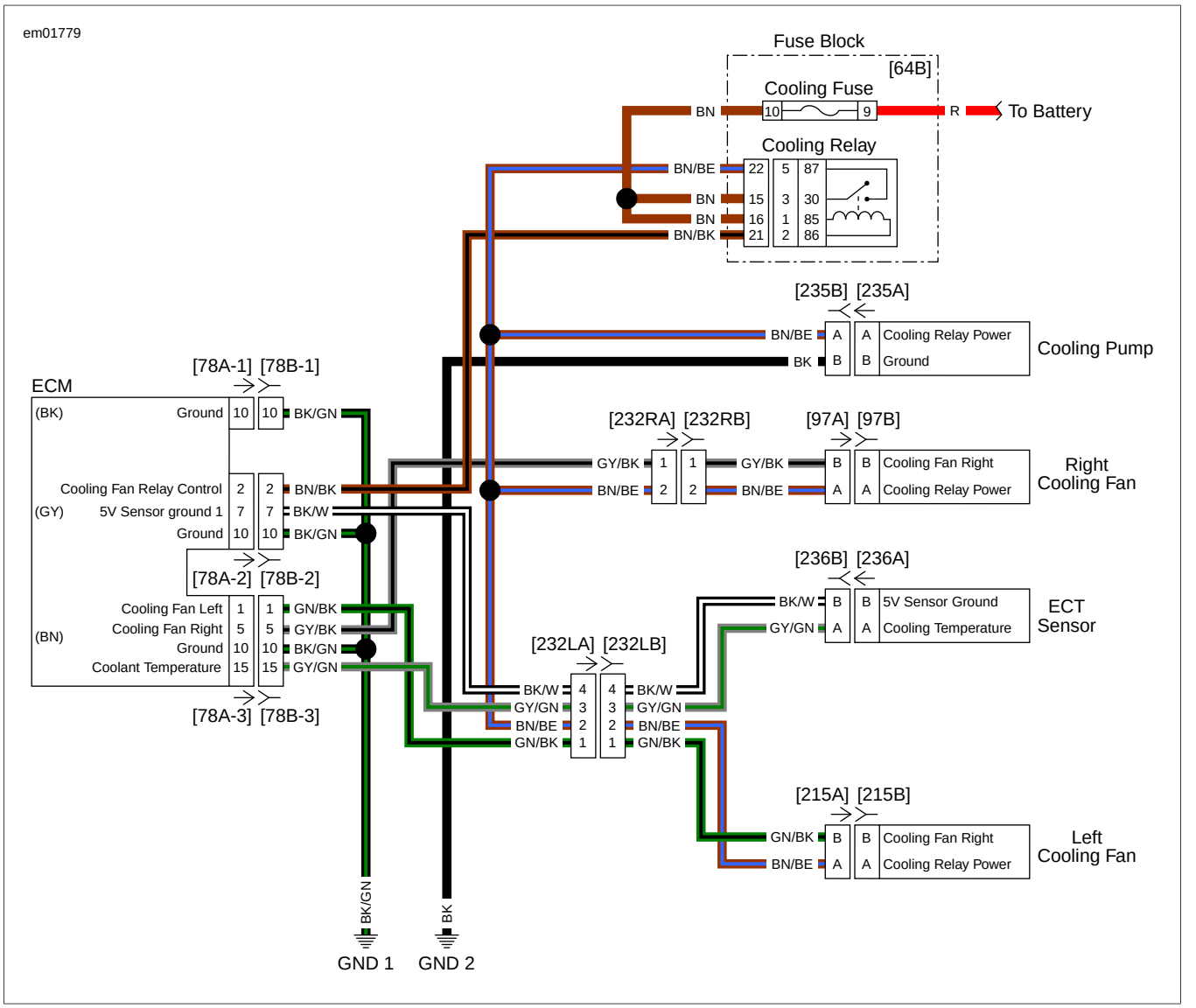


Figure 6-62. Cooling System Schematic

DTC P1691

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-88. DTC P1691 Diagnostic Faults

POSSIBLE CAUSES
Cooling fan left malfunction
Open in left cooling fan control circuit
Open in cooling relay power circuit
Short to ground in left cooling fan control circuit

1. Left Cooling Fan Short To Ground Test

1. Start engine.
2. Does left cooling fan run as soon as engine is started?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. Left Cooling Fan Control Circuit Short to Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB [78-3] terminal 1 and ground.

5. Is continuity present?
   a. **Yes.** Repair short to ground in (GN/BK) wire.
   b. **No.** Replace ECM.

3. Left Cooling Fan Short to Ground Test

1. Turn IGN OFF.
2. Turn IGN ON.
3. Hold throttle at wide open for several seconds.
4. Did left cooling fan turn on?
   a. **Yes.** System operating normally.
   b. **No.** Go to Test 5.

4. Left Cooling Fan Relay Power Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM OVERLAY (Part No. HD-50390-4-P) to [78-1], [78-2] and [78-3], between wire harness and ECM. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Start engine.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper BOB [78-3] terminal 1 to ground.
6. Does left fan operate?
   a. **Yes.** Replace ECM.
   b. **No.** Go to Test 5.

5. Left Cooling Fan Open Relay Power Test

1. Turn IGN OFF.
2. Remove cooling relay.
3. Disconnect left cooling fan [215].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [215A] terminal A and fuse block [64] terminal 22.
5. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (BN/BE) wire.

6. Left Cooling Fan Relay Power Short to Ground Test

1. Test resistance between [215A] terminal B and BOB [78-3] terminal 1.
2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace left cooling fan.
   b. **No.** Repair open in (BK/GN) wire.

DTC P1692

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-89. DTC P1692 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in left cooling fan control circuit
Left cooling fan malfunction

1. Left Cooling Fan Control Circuit Short to Battery Test

1. Turn IGN OFF.
2. Disconnect front left cooling fan [215A].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [215A] terminal B and ground.
5. Is voltage present?
   a. **Yes.** Repair short to voltage in (GN/BK) wire.
   b. **No.** Go to Test 2.

2. Left Cooling Fan Short to Battery Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Connect left cooling fan [215].
5. Turn IGN ON.
6. Test voltage between BOB [78-3] terminal 1 and ground.
7. Is voltage present?
   a. **Yes.** Replace left cooling fan.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

DTC P1693

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-90. DTC P1693 Diagnostic Faults

POSSIBLE CAUSES
Cooling fan right malfunction
Open in right cooling fan control circuit
Open in cooling relay power circuit
Short to ground in right cooling fan control circuit

1. Right Cooling Fan Short To Ground Test

1. Start engine.
2. Does right cooling fan run as soon as engine is started?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. Right Cooling Fan Control Circuit Short to Ground Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB [78-3] terminal 5 and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground in (GY/BK) wire.
   b. **No.** Replace ECM.

3. Right Cooling Fan Short to Ground Test

1. Turn IGN OFF.
2. Turn IGN ON.
3. Hold throttle at wide open for several seconds.
4. Did right cooling fan turn on?
   a. **Yes.** System operating normally.
   b. **No.** Go to Test 4.

4. Right Cooling Fan Relay Power Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM OVERLAY (Part No. HD-50390-4-P) to [78-1], [78-2] and [78-3], between wire harness and ECM. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Start engine.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), jumper BOB [78-3] terminal 5 to ground.
6. Does right fan operate?
   a. **Yes.** Replace ECM.
   b. **No.** Go to Test 5.

5. Right Cooling Fan Open Relay Power Test

1. Turn IGN OFF.
2. Remove cooling relay.
3. Disconnect right cooling fan [97].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between [97A] terminal A and fuse block [64] terminal 22.
5. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (BN/BE) wire.

6. Right Cooling Fan Relay Power Short to Ground Test

1. Test resistance between [97A] terminal B and BOB [78-3] terminal 5.
2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace right cooling fan.
   b. **No.** Repair open in (BK/GN) wire.

DTC P1694

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-91. DTC P1694 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in right cooling fan control circuit
Right cooling fan malfunction

1. Right Cooling Fan Control Circuit Short to Battery Test

1. Turn IGN OFF.
2. Disconnect front right cooling fan [97A].
3. Turn IGN ON.

4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [97A] terminal B and ground.
5. Is voltage present?
   a. **Yes.** Repair short to voltage in (GY/BK) wire.
   b. **No.** Go to Test 2.

2. Right Cooling Fan Short to Battery Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Connect right cooling fan [97].
5. Turn IGN ON.
6. Test voltage between BOB [78-3] terminal 5 and ground.
7. Is voltage present?
   a. **Yes.** Replace right cooling fan.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

ETC ACTUATOR DIAGNOSTICS 6.30

DESCRIPTION AND OPERATION

The TCA contains two potentiometers (designated as TPS1 and TPS2) and an electric DC motor for controlling the actuation of the throttle. TPS1 and TPS2 are mounted in the TCA. They are connected to the keyed shaft for the throttle plate and used to communicate the position of the throttle plate.

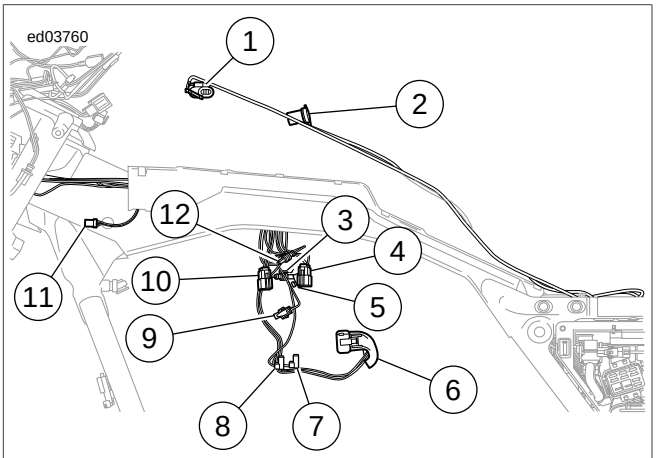
Each TPS supplies input to the ECM in response to the positioning of the throttle plate. The ECM activates the motor in the TCA to move the throttle plate, based on signals from the TGS.

See Figure 6-64. The TCA motor receives input (position data) from the ECM connector [78-3] terminal 8 for electronic throttle control - HI and terminal 9 for electronic throttle control - LOW. The TCA motor drives a series of gears to rotate the position of the throttle plate. Refer to Table 6-92 for DTCs associated with TCA drive motor.

Table 6-92. Code Description

DTC	DESCRIPTION
P2100	ETC driver open circuit
P2101	ETC actuation error
P2102	ETC driver shorted low
P2103	ETC driver shorted high

- **P2100 TCA Motor Circuit Open:** Indicates the ECM identified an open load fault for the TCA motor driver.
- **P2101 TCA Motor Circuit Range/Performance:** Indicates the actual position of the throttle plate is out of range from the commanded throttle plate position.
- **P2102 TCA Motor Control Circuit Shorted Low:** Indicates the ECM identified that the drive motor is shorted to ground within the TCA drive motor circuit.
- **P2103 TCA Motor Control Circuit Shorted High:** Indicates the drive motor is shorted high within the TCA drive motor circuit.



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-63. Engine

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

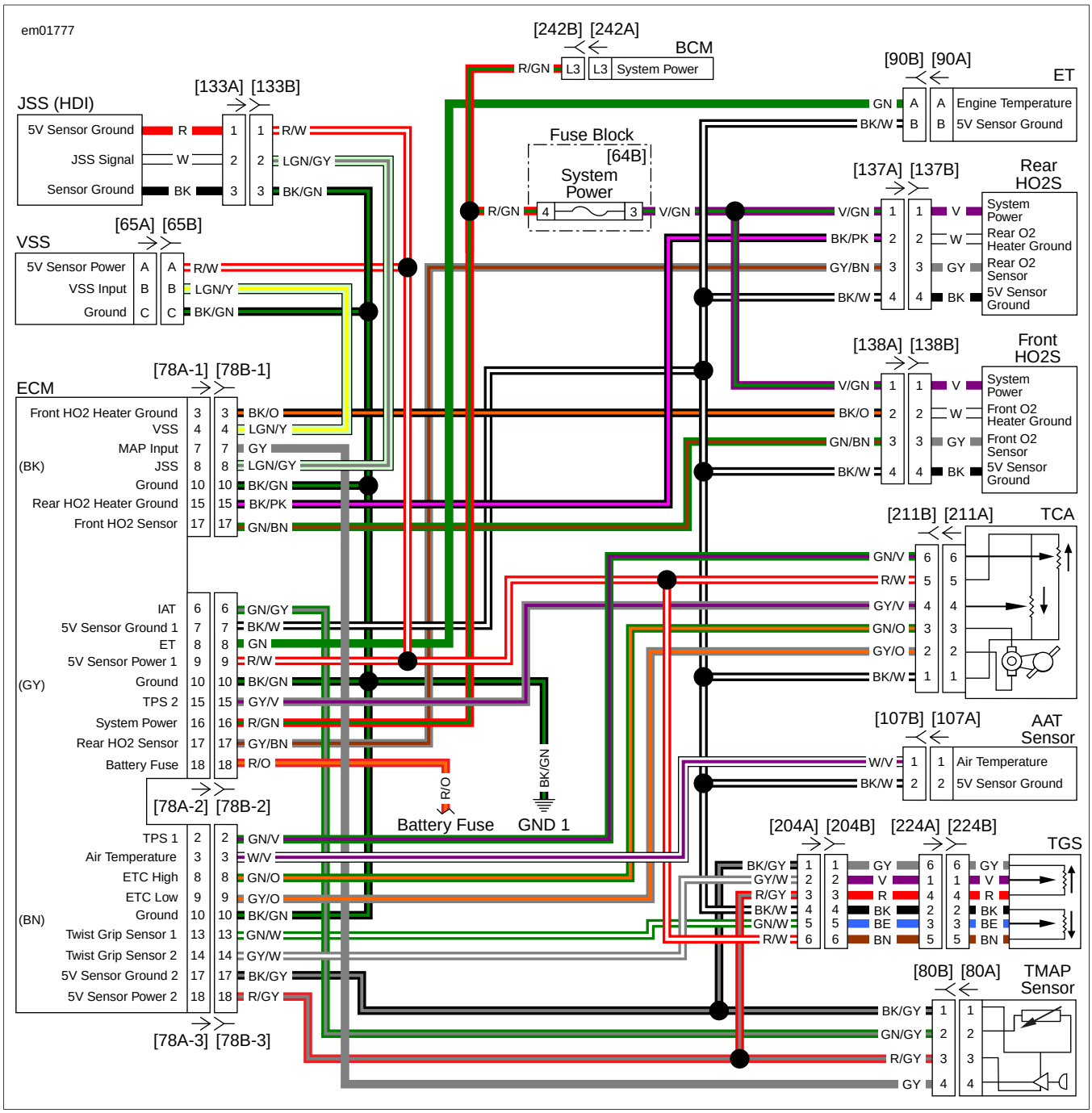


Figure 6-64. Sensor Circuit

DTC P2100

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-93. DTC P2100 Diagnostic Faults

POSSIBLE CAUSES
Open in throttle actuator control circuit high
Open in throttle actuator control circuit low

1. TCA Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-3] terminals 8 and 9.
4. Is resistance greater than 10 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Perform wiggle test. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test. If resistance is below 10 Ohms, replace ECM.

2. TCA High Circuit Test

1. Disconnect TCA [211].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-3] terminal 8 and TCA [211B] terminal 3.
3. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (GN/O) wire.

3. TCA Low Circuit Test

1. Test resistance between BOB [78-3] terminal 9 and TCA [211B] terminal 2.
2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace TCA.
   b. **No.** Repair open in (GY/O) wire.

DTC P2101

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-94. DTC P2101 Diagnostic Faults

POSSIBLE CAUSES
Short between throttle actuator control circuits
Open in throttle actuator control circuit high
Open in throttle actuator control circuit low

1. TCA Circuit Resistance Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-3] terminals 8 and 9.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. TCA Test

1. Disconnect TCA [211].
2. Test resistance between BOB [78-3] terminal 8 and terminal 9.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Repair short between the (GN/O) and (GY/O) wires.
   b. **No.** Replace TCA.

3. TCA High Circuit Test

1. Test resistance between BOB [78-3] terminal 8 and [211B] terminal 3.
2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (GN/O) wire.

4. TCA Low Circuit Test

1. Test resistance between BOB [78-3] terminal 9 and [211B] terminal 2.

2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace ECM.
   b. **No.** Repair open in (GY/O) wire.

DTC P2102

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-95. DTC P2102 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in throttle actuator control circuit low
Short to ground in throttle actuator control circuit high

1. TCA High Circuit Test

1. Turn IGN OFF.
2. Disconnect TCA [211].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [211B] terminal 3 and ground.
4. Is resistance greater than 1000 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair short to ground in (GN/O) wire.

2. TCA Test

1. Test resistance between [211B] terminal 2 and ground.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Repair short to ground in (GY/O) wire.
   b. **No.** Replace TCA.

DTC P2103

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-96. DTC P2103 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in throttle actuator control circuit low
Short to ground in throttle actuator control circuit high

1. TCA High Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Disconnect TCA [211].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB [78-2] terminal 16 and [78-3] terminal 8.
6. Is continuity present?
   a. **Yes.** Repair short between (GN/O) and (R/GN) wires.
   b. **No.** Go to Test 2.

2. TCA Low Circuit Test

1. Test continuity between BOB [78-2] terminal 16 and [78-3] terminal 9.
2. Is continuity present?
   a. **Yes.** Repair short between (GY/O) and (R/GN) wires.
   b. **No.** Replace ECM.

DTC P2105, P2107 6.31

DESCRIPTION AND OPERATION

The ECM sets DTC P2105 and provides a forced shut down of the engine when the performance of the TCA cannot be verified.

Initially, the ECM commands the fuel pump and fuel injectors to be disabled until the actual fault is cleared.

The ECM sets DTC P2107 to identify an internal over-temperature shutdown or a power supply failure. Refer to Table 6-97.

Table 6-97. Code Description

DTC	DESCRIPTION
P2105	ETC forced shutdown mode
P2107	ETC driver internal error

DTC P2105, P2107

Table 6-98. DTC P2105, P2107 Diagnostic Faults

POSSIBLE CAUSES
Internal ECM fault

1. DTC Verification Test

1. Clear DTCs.
2. Start and run the engine for a few seconds.
3. Check DTCs.
4. Did DTC P2105 set with no other DTCs?
   a. **Yes.** Replace ECM.
   b. **No. Other DTCs set.** Refer to Table 1-12.
   c. **No. No DTCs set.** DTC was properly cleared.

DTC P2119 6.32

DESCRIPTION AND OPERATION

The ECM sets DTC P2119 when it determines the throttle plate does not return to the correct de-energized position. This error primarily indicates there may be non-electrical conditions which affect the throttle body range/performance. Refer to Table 6-99.

Table 6-99. Code Description

DTC	DESCRIPTION
P2119	ETC actuator return error

This DTC may have the following conditions:

- Something may be physically interfering with the throttle plate operation such as foreign material, debris, physical obstruction or loosely/improperly mounted throttle plate.
- Damaged or inoperative throttle plate return spring.
- Defective mechanical component(s) internal to the TCA.

DTC P2119

Table 6-100. DTC P2119 Diagnostic Faults

POSSIBLE CAUSES
Mechanical interference

1. Air Inlet Interference Test

1. Inspect air inlet. Check for foreign debris and/or mechanical interference to the throttle plate.
2. Were any issues found?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace induction module.

2. Validation Test

1. Clear inlet. Check throttle plate movement.
2. Clear DTCs.
3. Start the engine and operate the throttle.
4. Check DTCs.
5. Did DTC P2119 set?
   a. **Yes.** Replace induction module.
   b. **No.** Repair complete.

TGS DIAGNOSTICS 6.33

DESCRIPTION AND OPERATION

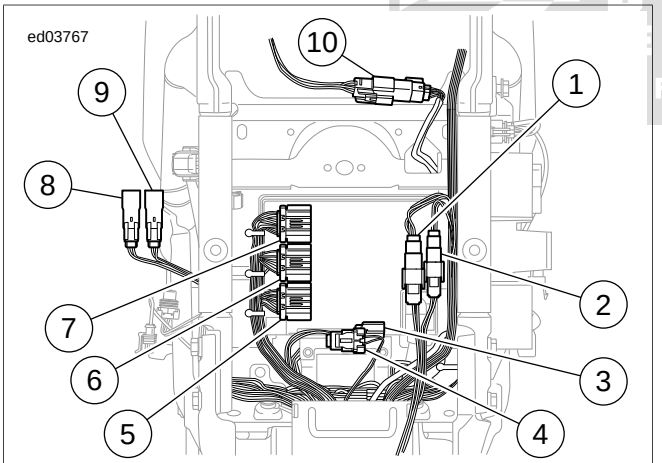
The TGS is an electronic assembly that replaces the conventional cable operated throttle. Two opposing Hall-effect sensors transmit signals to the ECM. The ECM uses these signals to determine the desired throttle plate position. The ECM controls the motor in the TCA to move the throttle plate to the desired position.

The TGS receives a 5V reference signal from the ECM. As the throttle plate is opened the TGS1 signal voltage increases and TGS2 signal voltage decreases. By design, the sum of the voltages when measured for both TGS1 and TGS2 should equal approximately 5.0V. If the sum of these voltages is not 5.0V, then DTCs are set for TGS1 and/or TGS2.

The ECM monitors and controls the TCA system and generates DTCs when errors are reported by the ECM. Refer to Table 6-101.

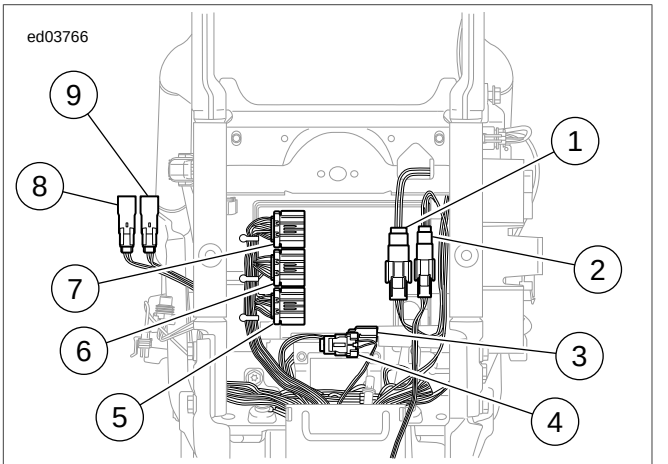
Table 6-101. Code Description

DTC	DESCRIPTION
P2122	TGS1 low/open
P2123	TGS1 high
P2127	TGS2 low/open
P2128	TGS2 high



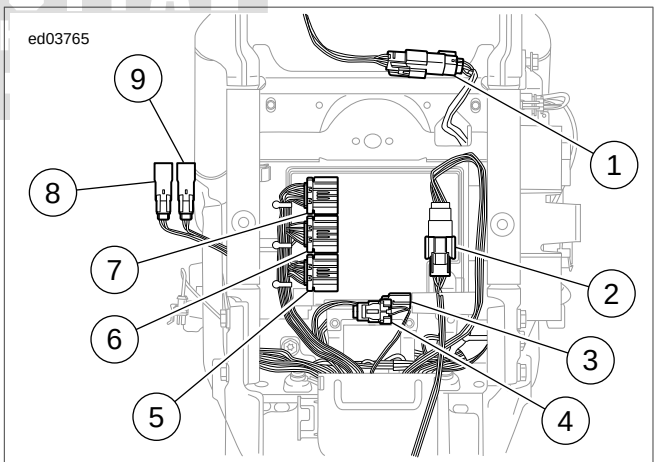
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 6-65. Under Seat: FLHT



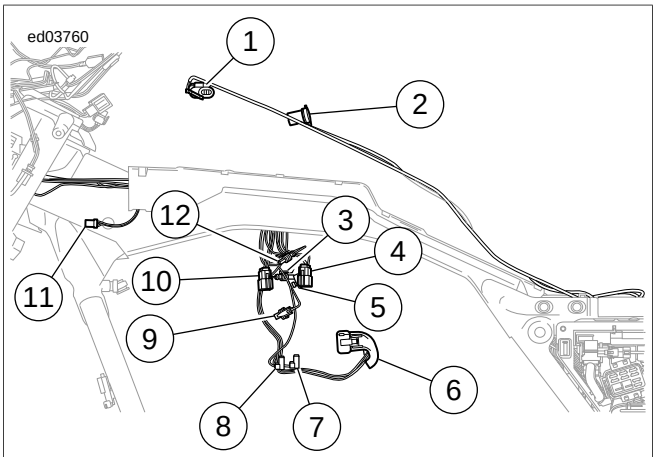
1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-66. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-67. Under Seat: FLHR



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-68. Engine

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

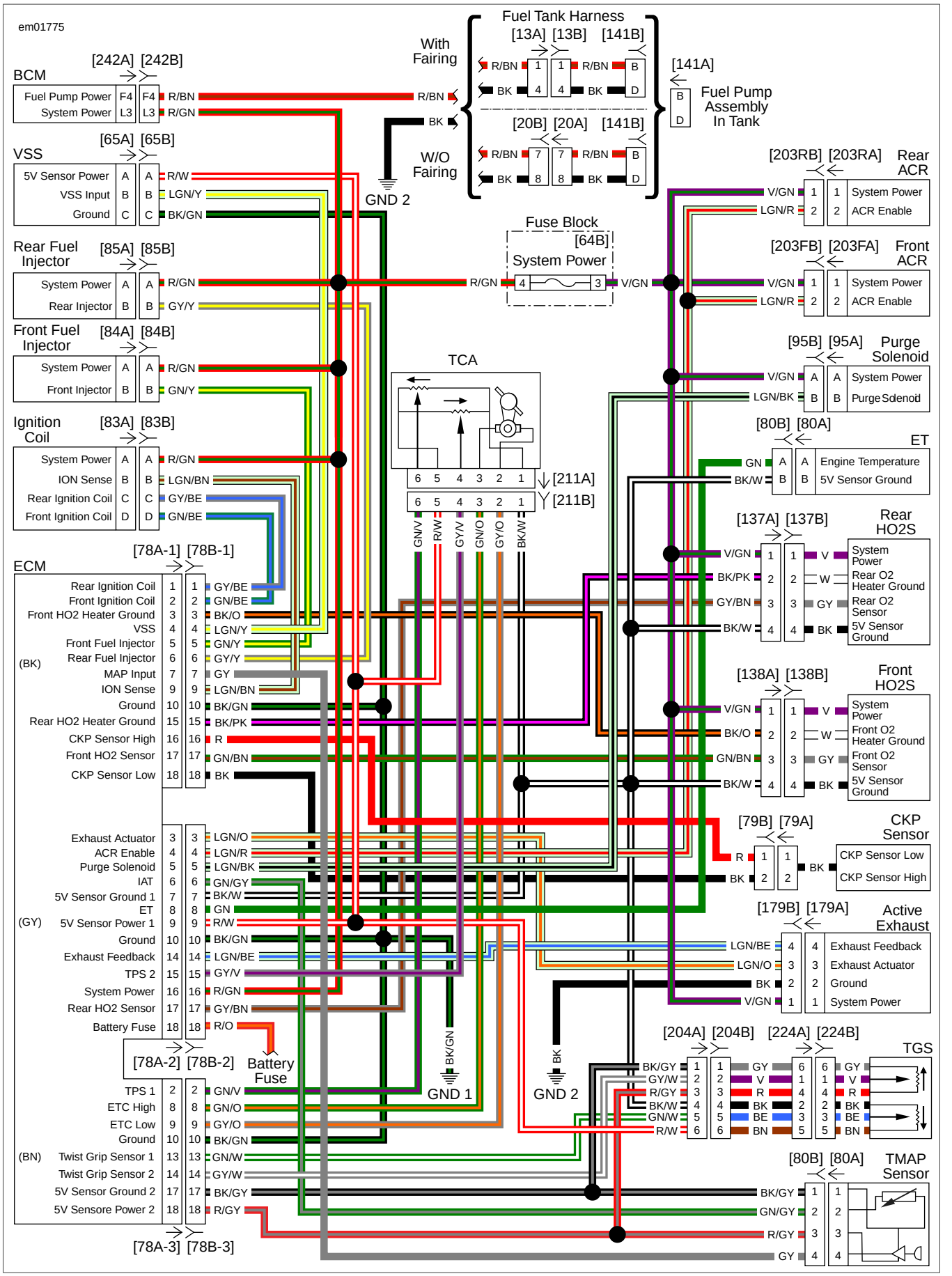


Figure 6-69. EFI Simplified Schematic

DTC P2122

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR TOOL
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-102. DTC P2122 Diagnostic Faults

POSSIBLE CAUSES
Open in TGS-1 circuit
Short to ground in TGS-1 circuit

1. TGS1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3].
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-3] terminal 13 and [78-2] terminal 7.
6. Slowly turn throttle to wide open position and observe voltage.
7. Does voltage steadily increase to greater than 4.6V?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 2.

2. Power Short to Ground Test

1. Turn IGN OFF.
2. Test continuity between BOB [78-2] terminal 9 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 3.

3. Signal Short to Ground Test

1. Test continuity between BOB [78-3] terminal 13 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 6.

4. ECM Signal Short to Ground Test

1. Disconnect [78A-1], [78A-2] and [78A-3].
2. Test continuity between BOB [78-3] terminal 13 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace ECM.

5. TGS1 Signal Short to Ground Test

1. Disconnect TGS [204].
2. Test continuity between BOB [78-3] terminal 13 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (GN/W).
   b. **No.** Replace TGS.

6. Ground Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB [78-2] terminal 7 and ground.
3. Is voltage greater than 1.0V?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 9.

7. ECM Ground Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect [78B-2].
3. Using TERMINAL EXTRACTOR TOOL (Part No. B-50085), remove terminal 7 (BK/W) wire from ECM harness connector [78B-2].
4. Connect [78B-2].
5. Turn IGN ON.
6. Test voltage between extracted terminal 7 and ground.
7. Is voltage greater than 1.0V?
   a. **Yes.** Go to Test 8.
   b. **No.** Replace ECM.

8. TGS1 Ground Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect TGS [204].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminal 7 and ground.
5. Is voltage greater than 1.0V?
   a. **Yes.** Repair short to voltage on (BK/W).
   b. **No.** Replace TGS.

9. Power Open Test

1. Disconnect TGS [204].
2. Test resistance between BOB [78-2] terminal 9 and [204A] terminal 6 (R/W).

3. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 10.
   b. **No.** Repair open in (R/W).

10. Signal Open Test

1. Test resistance between BOB [78-3] terminal 13 and [204A] terminal 5 (GN/W).
2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace TGS.
   b. **No.** Repair open in (GN/W).

11. Sensor Short to Ground Test

1. Disconnect TGS [204].
2. Test continuity between BOB [78-2] terminal 9 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Replace TGS.

12. TCA Short to Ground Test

1. Disconnect TCA [211].
2. Test continuity between BOB [78-2] terminal 9 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Replace TCA.

13. JSS Short to Ground Test

1. Disconnect JSS [131].
2. Test continuity between BOB [78-2] terminal 9 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 14.
   b. **No.** Replace JSS.

14. VSS Short to Ground Test

1. Disconnect VSS [65].
2. Test continuity between BOB [78-2] terminal 9 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Replace VSS.

15. ECM Short to Ground Test

1. Disconnect [78A-1], [78A-2] and [78A-3].
2. Test continuity between BOB [78-2] terminal 9 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (R/W) wire.
   b. **No.** Replace ECM.

16. DTC Test

1. Clear DTCs.
2. Start vehicle and operate throttle.
3. Check DTCs.
4. Did DTC return?
   a. **Yes.** Replace ECM.
   b. **No.** Issue could be intermittent. Perform wiggle test.

DTC P2123

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR TOOL
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-103. DTC P2123 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in sensor signal
Short to voltage in sensor power

1. TGS1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3].
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), voltage between BOB [78-3] terminal 13 and [78-2] terminal 7.
6. Slowly turn throttle to wide open position and observe voltage.
7. Does voltage steadily increase to greater than 4.6V?
   a. **Yes.** Go to Test 8.
   b. **No.** Go to Test 2.

2. Power Short to Voltage Test

1. Test voltage between BOB [78-2] terminal 9 and ground.
2. Is voltage greater than 6.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 5.

3. ECM Power Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect [78B-2].

3. Using TERMINAL EXTRACTOR TOOL (Part No. B-50085), remove terminal 9 (R/W) wire from ECM harness connector [78B-2].
4. Connect [78B-2].
5. Turn IGN ON.
6. Test voltage between extracted terminal 9 and ground.
7. Is voltage greater than 5.0V?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace ECM.

4. TGS1 Power Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect TGS [204].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminal 9 and ground.
5. Is voltage greater than 6.0V?
   a. **Yes.** Repair short to voltage in (R/W).
   b. **No.** Replace TGS.

5. Signal Short to Voltage Test

1. Test voltage between BOB [78-3] terminal 13 and ground.
2. Is voltage greater than 6.0V?
   a. **Yes.** Go to Test 6.
   b. **No.** Issue could be intermittent. Perform wiggle test.

6. ECM Signal Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect [78B-3].
3. Using TERMINAL EXTRACTOR TOOL (Part No. B-50085), remove terminal 13 (GN/W) wire from ECM harness connector [78B-3].
4. Connect [78B-2].
5. Turn IGN ON.
6. Test voltage between extracted terminal 13 and ground.
7. Is voltage greater than 6.0V?
   a. **Yes.** Go to Test 7.
   b. **No.** Replace ECM.

7. TGS1 Signal Short to Voltage Test Test

1. Turn IGN OFF.
2. Disconnect TGS [204].
3. Turn IGN ON.
4. Test voltage between BOB [78-3] terminal 13 and ground.
5. Is voltage greater than 6.0V?
   a. **Yes.** Repair short to voltage in (GN/W).
   b. **No.** Replace TGS.

8. DTC Test

1. Clear DTCs.
2. Start vehicle and operate throttle.
3. Check DTCs.
4. Did DTC return?
   a. **Yes.** Replace ECM.
   b. **No.** Issue could be intermittent. Perform wiggle test.

DTC P2127

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR TOOL
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-104. DTC P2127 Diagnostic Faults

POSSIBLE CAUSES
Open in TGS-2 circuit
Short to ground in TGS-2 circuit

1. TGS2 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3].
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-3] terminals 14 and 17.
6. Slowly turn throttle to wide open position and observe voltage.
7. Does voltage steadily decrease?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 2.

2. Power Short to Ground Test

1. Turn IGN OFF.
2. Test continuity between BOB [78-3] terminal 18 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 3.

3. Signal Short to Ground Test

1. Test continuity between BOB [78-3] terminal 14 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 6.

4. ECM Signal Short to Ground Test

1. Disconnect [78A-1], [78A-2] and [78A-3].
2. Test continuity between BOB [78-3] terminal 14 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Relace ECM.

5. TGS2 Signal Short to Ground Test

1. Disconnect TGS [204].
2. Test continuity between BOB [78-3] terminal 14 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (GY/W).
   b. **No.** Replace TGS.

6. Ground Short to Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB [78-3] terminal 17 and ground.
3. Is voltage greater than 1.0V?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 9.

7. ECM Ground Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect [78B-3].
3. Using TERMINAL EXTRACTOR TOOL (Part No. B-50085), remove terminal 17 (BK/GY) wire from ECM harness connector [78B-3].
4. Connect [78B-3].
5. Turn IGN ON.
6. Test voltage between extracted terminal 7 and ground.
7. Is voltage greater than 1.0V?
   a. **Yes.** Go to Test 8.
   b. **No.** Replace ECM.

8. TGS2 Ground Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect TGS [204].
3. Turn IGN ON.
4. Test voltage between BOB [78-2] terminal 7 and ground.
5. Is voltage greater than 1.0V?
   a. **Yes.** Repair short to voltage on (BK/GY).
   b. **No.** Replace TGS.

9. Power Open Test

1. Disconnect TGS [204].
2. Test resistance between BOB [78-3] terminal 18 and [204A] terminal 3 (R/GY).
3. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 10.
   b. **No.** Repair open in (R/GY).

10. Signal Open Test

1. Test resistance between BOB [78-3] terminal 14 and [204A] terminal 2 (GY/W).
2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Replace TGS.
   b. **No.** Repair open in (GY/W).

11. Sensor Short to Ground Test

1. Disconnect TGS [204].
2. Test continuity between BOB [78-3] terminal 18 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Replace TGS.

12. TMAP Short to Ground Test

1. Disconnect TMAP [80].
2. Test continuity between BOB [78-3] terminal 18 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Replace TMAP.

13. ECM Short to Ground Test

1. Disconnect [78A-1], [78A-2] and [78A-3].
2. Test continuity between BOB [78-3] terminal 18 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (R/GY) wire.
   b. **No.** Replace ECM.

14. DTC Test

1. Clear DTCs.
2. Start vehicle and operate throttle.
3. Check DTCs.

4. Did DTC return?
   a. **Yes.** Replace ECM.
   b. **No.** Issue could be intermittent. Perform wiggle test.

DTC P2128

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR TOOL
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-105. DTC P2128 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in sensor signal
Short to voltage in sensor power

1. TGS2 Test

1. Turn engine stop switch OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3].
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-3] terminals 14 and 17.
6. Slowly turn throttle to wide open position and observe voltage.
7. Does voltage steadily decrease?
   a. **Yes.** Go to Test 8.
   b. **No.** Go to Test 2.

2. Power Short to Voltage Test

1. Test voltage between BOB [78-3] terminal 18 and ground.
2. Is voltage greater than 6.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 5.

3. ECM Power Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect [78B-3].
3. Using TERMINAL EXTRACTOR TOOL (Part No. B-50085), remove terminal 18 (R/GY) wire from ECM harness connector [78B-3].
4. Connect [78B-3].
5. Turn IGN ON.
6. Test voltage between extracted terminal 18 and ground.
7. Is voltage greater than 5.0V?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace ECM.

4. TGS2 Power Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect TGS [204].
3. Turn IGN ON.
4. Test voltage between BOB [78-3] terminal 18 and ground.
5. Is voltage greater than 6.0V?
   a. **Yes.** Repair short to voltage in (R/GY).
   b. **No.** Replace TGS.

5. Signal Short to Voltage Test

1. Test voltage between BOB [78-3] terminal 14 and ground.
2. Is voltage greater than 6.0V?
   a. **Yes.** Go to Test 6.
   b. **No.** Issue could be intermittent. Perform wiggle test.

6. ECM Signal Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect [78B-3].
3. Using TERMINAL EXTRACTOR TOOL (Part No. B-50085), remove terminal 14 (GY/W) wire from ECM harness connector [78B-3].
4. Connect [78B-3].
5. Turn IGN ON.
6. Test voltage between extracted terminal 14 and ground.
7. Is voltage greater than 5.0V?
   a. **Yes.** Go to Test 7.
   b. **No.** Replace ECM.

7. TGS2 Signal Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect TGS [204].
3. Turn IGN ON.
4. Test voltage between BOB [78-3] terminal 14 and ground.
5. Is voltage greater than 6.0V?
   a. **Yes.** Repair short to voltage in (GY/W).
   b. **No.** Replace TGS.

8. DTC Test

1. Clear DTCs.
2. Start vehicle and operate throttle.
3. Check DTCs.

4. Did DTC return?
   a. **Yes.** Replace ECM.
   b. **No.** Issue could be intermittent. Perform wiggle test.

CORRELATION ERROR DIAGNOSTICS 6.34

DESCRIPTION AND OPERATION

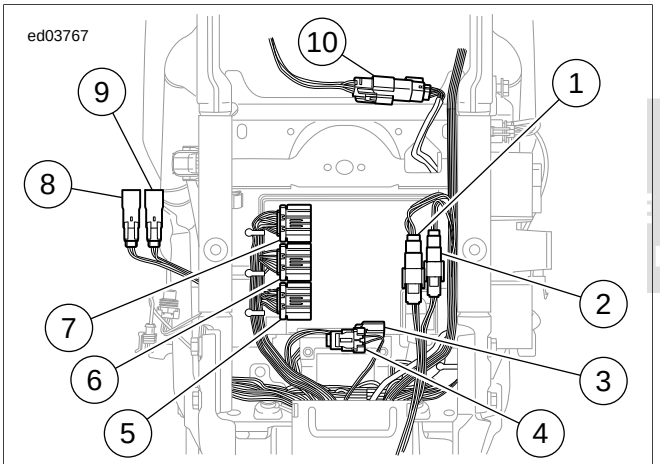
The ECM sets DTCs when it determines that a correlation error exists for either the TP sensor or the TGS.

The two TP sensors work opposite of each other. As the throttle plate opens, TPS1 voltage ranges from 0.0-5.0V, while TPS2 voltage ranges from 5.0-0.0V. The sum of the two TPS voltages should always measure approximately 5.0V.

The two TGSs work the same way. As the TGS is opened, TGS1 voltage increases and TGS2 voltage decreases. The sum of these two voltages should always measure approximately 5.0V. If either component fails to correlate the proper voltage or has out-of-range voltage conditions, the ECM will set a DTC. Refer to Table 6-106.

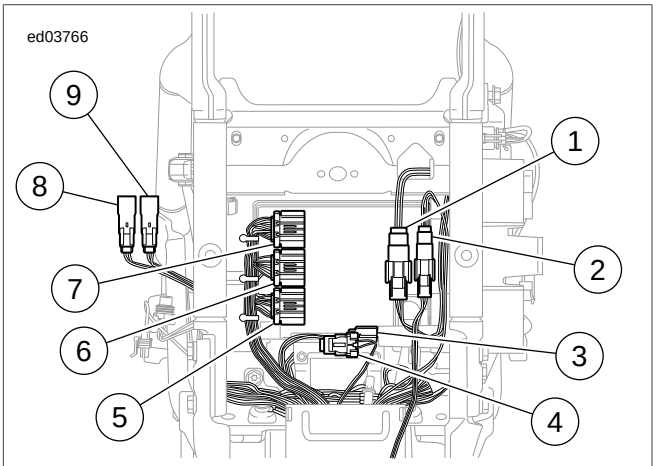
Table 6-106. Code Description

DTC	DESCRIPTION
P2135	TPS correlation error
P2138	TGS correlation error



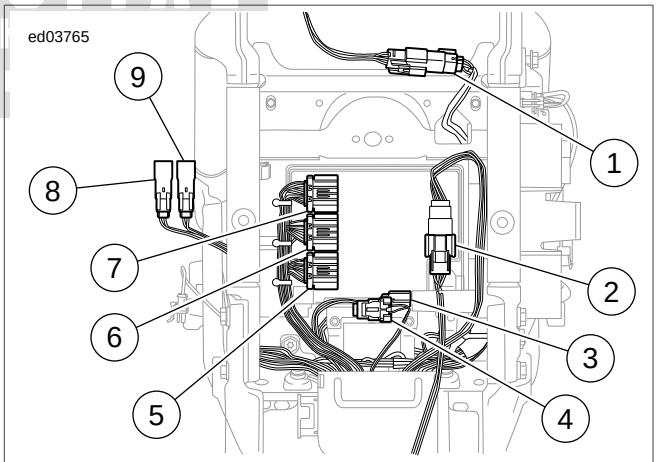
1. **Fuel tank harness [13]**
2. **Rider headset [53]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**
10. **Rear harness [7]**

Figure 6-70. Under Seat: FLHT



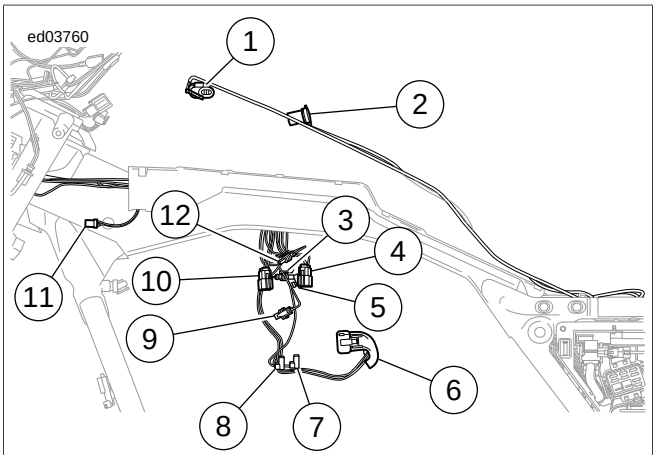
1. **Rear lighting [7]**
2. **Fuel tank harness [13]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-71. Under Seat: FLHX, FLT



1. **Rear lighting [7]**
2. **Console harness [20]**
3. **Security antenna [209]**
4. **Purge solenoid [95]**
5. **ECM [78-1]**
6. **ECM [78-2]**
7. **ECM [78-3]**
8. **Rear HO2S [138]**
9. **Front HO2S [137]**

Figure 6-72. Under Seat: FLHR



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-73. Engine

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

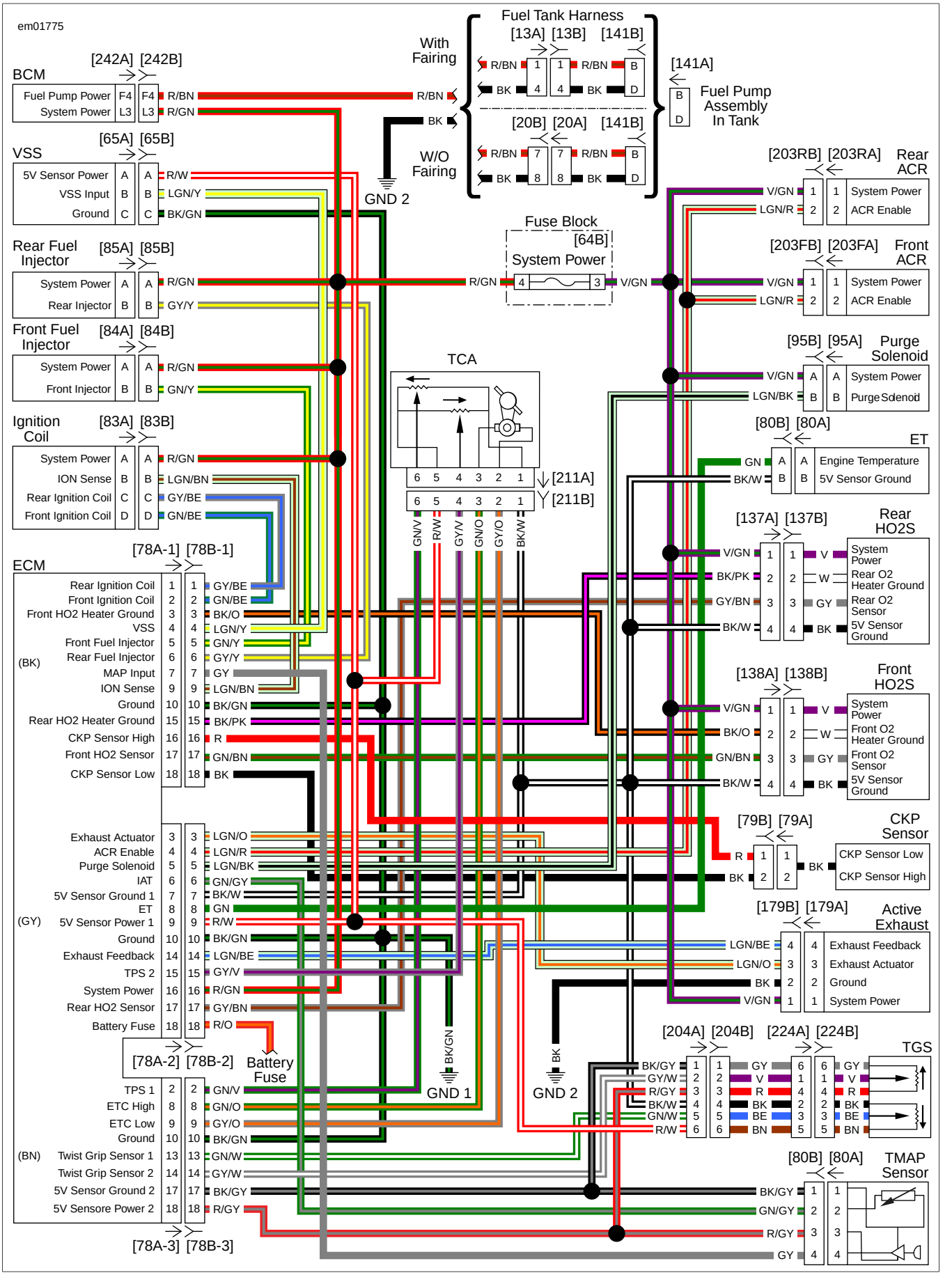


Figure 6-74. EFI Simplified Schematic

DTC P2135

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-107. DTC P2135 Diagnostic Faults

POSSIBLE CAUSES
Open in TPS-1 circuit
Short to ground in TPS-1 circuit
Short to voltage in TPS-1 circuit
Open in TPS-2 circuit
Short to ground in TPS-2 circuit
Short to voltage in TPS-2 circuit
Short to voltage in sensor power circuit

1. TPS-1 Resistance Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Disconnect TCA [211].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-3] terminal 2 and [211B] terminal 6.
6. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open in (GN/V) wire.

2. TPS-1 Short to Ground Test

1. Test continuity between BOB [78-3] terminal 2 and [78-2] terminal 7.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (GN/V) wire.
   b. **No.** Go to Test 3.

3. TPS-1 Short to Voltage Test

1. Test continuity between BOB [78-3] terminal 2 and [78-2] terminal 9.
2. Is continuity present?
   a. **Yes.** Repair short between (GN/V) and (R/W) wires.
   b. **No.** Go to Test 4.

4. TPS-2 Continuity Test

1. Test resistance between BOB [78-2] terminal 15 and [211B] terminal 4.
2. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (GY/V) wire.

5. TPS-2 Short to Ground Test

1. Test continuity between BOB [78-2] terminals 15 and 7.
2. Is continuity present?
   a. **Yes.** Repair short to ground in (GY/V) wire.
   b. **No.** Go to Test 6.

6. TPS-2 Short to Voltage Test

1. Test continuity between BOB [78-2] terminals 15 and 9.
2. Is continuity present?
   a. **Yes.** Repair short between (GY/V) and (R/W) wires.
   b. **No.** Go to Test 7.

7. TPS-2 Circuit Test

1. Connect [78A-1], [78A-2] and [78A-3].
2. Turn IGN ON.
3. Test voltage between BOB [78-2] terminals 15 and 7.
4. Is voltage greater than 5.25V?
   a. **Yes.** Repair short to voltage on (GY/V) wire.
   b. **No.** Go to Test 8.

8. TPS-1 Circuit Test

1. Test voltage between BOB [78-3] terminals 2 and [78-2] terminal 7.
2. Is voltage greater than 5.25V?
   a. **Yes.** Repair short to voltage on (R/W) wire.
   b. **No.** Go to Test 9.

9. Ground Circuit Open Test

1. Connect [211].
2. Clear DTCs.
3. Start vehicle. Operate throttle.
4. Did DTC return?
   a. **Yes.** Replace TCA.
   b. **No.** Operation normal.

DTC P2138

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-108. DTC P2138 Diagnostic Faults

POSSIBLE CAUSES
Open in TGS-1 ground circuit
Open in TGS-2 ground circuit

1. TGS1 Test

1. Turn stop switch OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-3] terminal 13 and [78-2] terminal 7.
6. Slowly turn throttle to wide open position and observe voltage.
7. Does voltage steadily increase to greater than 4.6V?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 2.

2. ECM Ground 1 Open Test

1. Turn IGN OFF.
2. Test resistance between BOB [78-2] terminal 7 and ground.
3. Is resistance less than 1 Ohm?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace ECM.

3. TGS1 Ground Open Test

1. Disconnect TGS [204].
2. Test resistance between BOB [78-2] terminal 7 and [204A] terminal 4 (BK/W).
3. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (BK/W).

4. TGS2 Test

1. Test voltage between BOB [78-3] terminals 13 and 14.
2. Slowly turn throttle to wide open position and observe voltage.
3. Does voltage steadily decrease?
   a. **Yes.** Go to Test 8.
   b. **No.** Go to Test 5.

5. ECM Ground 2 Open Test

1. Turn IGN OFF.
2. Test resistance between BOB [78-3] terminal 14 and ground.
3. Is resistance less than 1 Ohm?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace ECM.

6. TGS2 Ground Open Test

1. Disconnect TGS [204].
2. Test resistance between BOB [78-3] terminal 4 and [204A] terminal 1 (BK/GY).
3. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair open in (BK/GY).

7. DTC Test

1. Connect [204].
2. Clear DTCs.
3. Start vehicle and operate throttle.
4. Check DTCs.
5. Did DTC return?
   a. **Yes.** Replace TGS.
   b. **No.** Operation normal.

8. DTC Test

1. Clear DTCs.
2. Start vehicle and operate throttle.
3. Check DTCs.
4. Did DTC return?
   a. **Yes.** Replace ECM.
   b. **No.** Issue could be intermittent. Perform wiggle test.

DTC P2176 6.35

DESCRIPTION AND OPERATION

The ECM sets DTC P2176 when it determines the zero position of the throttle plate has not been successfully learned.

At power up, the ECM adjusts the throttle plate to the limp-home position, then begins to move the throttle plate closed. The ECM monitors and verifies the amount of movement that occurred. The throttle plate minimum position is held briefly then verified against the expected minimum and maximum range of throttle. If the zero position is found within range, then the position is stored.

If the ECM is not able to learn the minimum position or if the learning fails four consecutive ignition cycles, the ECM sets DTC P2176. Refer to Table 6-109.

Table 6-109. Code Description

DTC	DESCRIPTION
P2176	ETC zero position learning error

DTC P2176

Table 6-110. DTC P2176 Diagnostic Faults

POSSIBLE CAUSES
Induction module malfunction
Mechanical interference

1. Air Inlet Interference Test

1. Inspect the air inlet. Check for foreign debris and/or mechanical interference to the throttle plate.
2. Were any issues found?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace induction module.

2. Validation Test

1. Clear inlet. Check throttle plate movement.
2. Clear DTCs using odometer self-diagnostics. See 1.2 INITIAL DIAGNOSTICS, Odometer Self-Diagnostics.
3. Start the engine and operate the throttle.
4. Check for DTCs. See 1.2 INITIAL DIAGNOSTICS, Odometer Self-Diagnostics.
5. Did DTC P2176 set?
   a. **Yes.** Replace induction module.
   b. **No.** Repair complete.

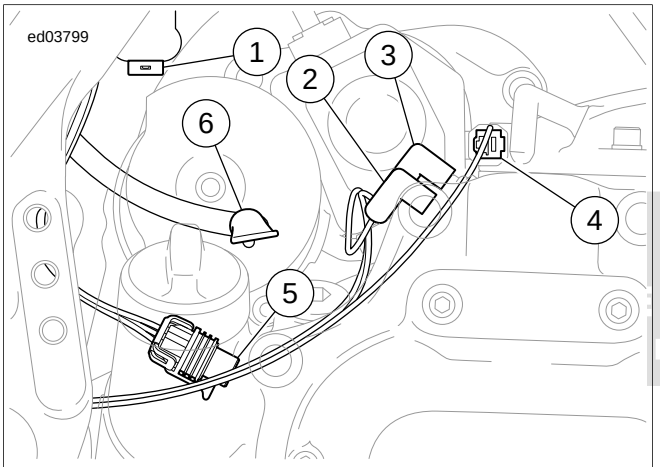
IGN COIL DRIVER DIAGNOSTICS 6.36

DESCRIPTION AND OPERATION

See Figure 6-75 and Figure 6-76. Ignition coil DTCs sets if the ignition coil primary voltage is out of range. This could occur if there is an open coil or loss of power to the coil. If front and rear DTCs are set simultaneously, it is likely a coil power failure or a coil failure. The coil receives power from the BCM at the same time the purge solenoid, active exhaust actuator, active intake solenoid, ECM and injectors are activated.

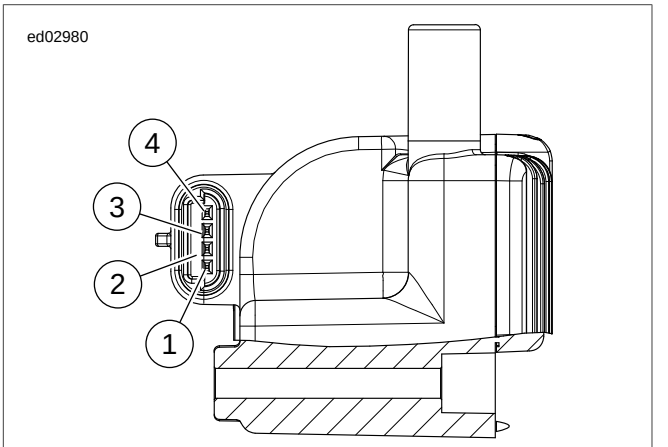
Table 6-111. Code Description

DTC	DESCRIPTION
P2300	Ignition coil driver low/open (front)
P2301	Ignition coil driver shorted high (front)
P2303	Ignition coil driver low/open (rear)
P2304	Ignition coil driver shorted high (rear)



1. **Ignition coil [83]**
2. **Neutral switch [131-1]**
3. **Neutral switch [131-2]**
4. **Starter solenoid [128]**
5. **VSS [65]**
6. **Battery + connections to starter**

Figure 6-75. Starter



1. **Terminal A: power**
2. **Terminal B: ion sense**
3. **Terminal C: rear coil**
4. **Terminal D: front coil**

Figure 6-76. Ignition Coil: Typical

Diagnostic Tips

When disconnecting any connectors always inspect connector for corrosion or backed out terminals and repair as required.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

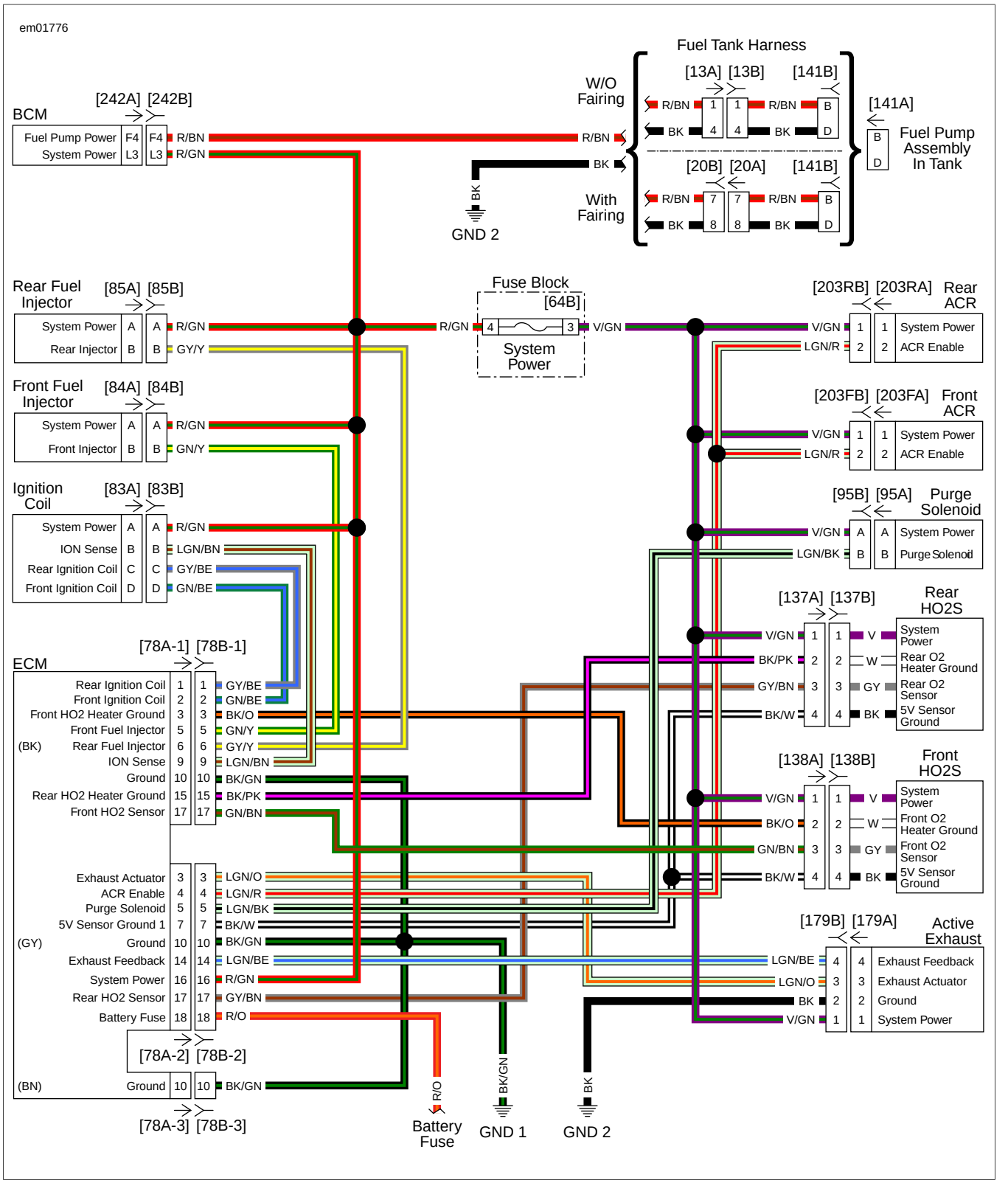


Figure 6-77. System Power Circuit

DTC P2300

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-112. DTC P2300 Diagnostic Faults

POSSIBLE CAUSES
Ignition coil malfunction
Open or short to ground in signal circuit
Open power circuit

1. Ignition Coil Test

1. Turn IGN OFF.
2. Disconnect ignition coil [83].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [83A] terminals A and D.
4. Is resistance greater than 2 Ohms?
   a. **Yes.** Replace ignition coil.
   b. **No.** Go to Test 2.

2. Input Voltage Test

1. Turn IGN ON.
2. Test voltage between [83B] terminal A (R/GN) wire and ground.
3. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open on (R/GN) wire.

3. Control Wire Continuity Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between BOB [78-1] terminal 2 and [83B] terminal D (GN/BE) wire.
5. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (GN/BE) wire.

4. Control Wire Shorted to Ground Test

1. Disconnect [78-1], [78-2] and [78-3].
2. Test continuity between BOB [78-1] terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (GN/BE) wire.
   b. **No.** Replace ECM.

DTC P2301

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-113. DTC P2301 Diagnostic Faults

POSSIBLE CAUSES
Ignition coil malfunction
Short to voltage in signal circuit

1. Ignition Coil Shorted to Voltage Test

1. Turn IGN OFF.
2. Disconnect ignition coil [83].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [83B] terminal D (GN/BE) wire and ground.
5. Is voltage greater than 5.0V?
   a. **Yes.** Repair short to voltage in (GN/BE) wire.
   b. **No.** Go to Test 2.

2. Open Test

1. Test resistance between [83A] terminals A and D.
2. Is resistance greater than 0.4 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace ignition coil.

DTC P2303

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-114. DTC P2303 Diagnostic Faults

POSSIBLE CAUSES
Ignition coil malfunction
Open or short to ground in signal circuit
Open power circuit

1. Ignition Coil Test

1. Turn IGN OFF.
2. Disconnect ignition coil [83].

3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between [83A] terminals A and C.
4. Is resistance greater than 2 Ohms?
   a. **Yes.** Replace ignition coil.
   b. **No.** Go to Test 2.

2. Input Voltage Test

1. Turn IGN ON.
2. Test voltage between [83B] terminal A (R/GN) wire and ground.
3. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open in (R/GN) wire.

3. Control Wire Resistance Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Test resistance between BOB [78-1] terminal 1 and [83B] terminal C (GY/BE) wire.
5. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in (GY/BE) wire.

4. Control Wire Shorted to Ground Test

1. Disconnect [78-1], [78-2] and [78-3].
2. Test continuity between BOB [78-1] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground in (GY/BE) wire.
   b. **No.** Replace ECM.

DTC P2304

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 6-115. DTC P2304 Diagnostic Faults

POSSIBLE CAUSES
Ignition coil malfunction
Short to voltage in signal circuit

1. Ignition Coil Shorted to Voltage Test

1. Turn IGN OFF.
2. Disconnect ignition coil [83].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [83B] terminal C (GY/BE) wire and ground.
5. Is voltage more than 5.0V?
   a. **Yes.** Repair short to voltage in (GY/BE) wire.
   b. **No.** Go to Test 2.

2. Open Test

1. Test resistance between [83A] terminals A and C.
2. Is resistance greater than 0.4 Ohms?
   a. **Yes.** Replace ECM.
   b. **No.** Replace ignition coil.

ENGINE CRANKS, BUT WILL NOT START 6.37

DESCRIPTION AND OPERATION

If the starter will not crank the engine, the problem is not EFI related. See 3.2 STARTING SYSTEM or 5.13 SECURITY SYSTEM.

There may be DTCs associated with this problem. Check for DTCs and clear them before proceeding with this test.

NOTE

To set a CKP DTC, a start attempt must last at least five seconds.

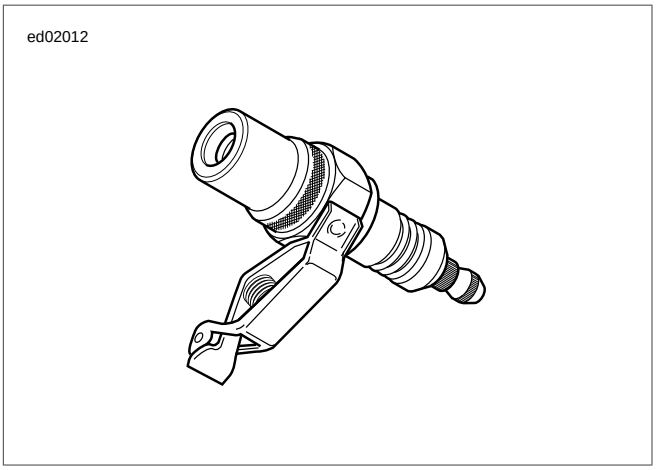


Figure 6-78. Spark Tester

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

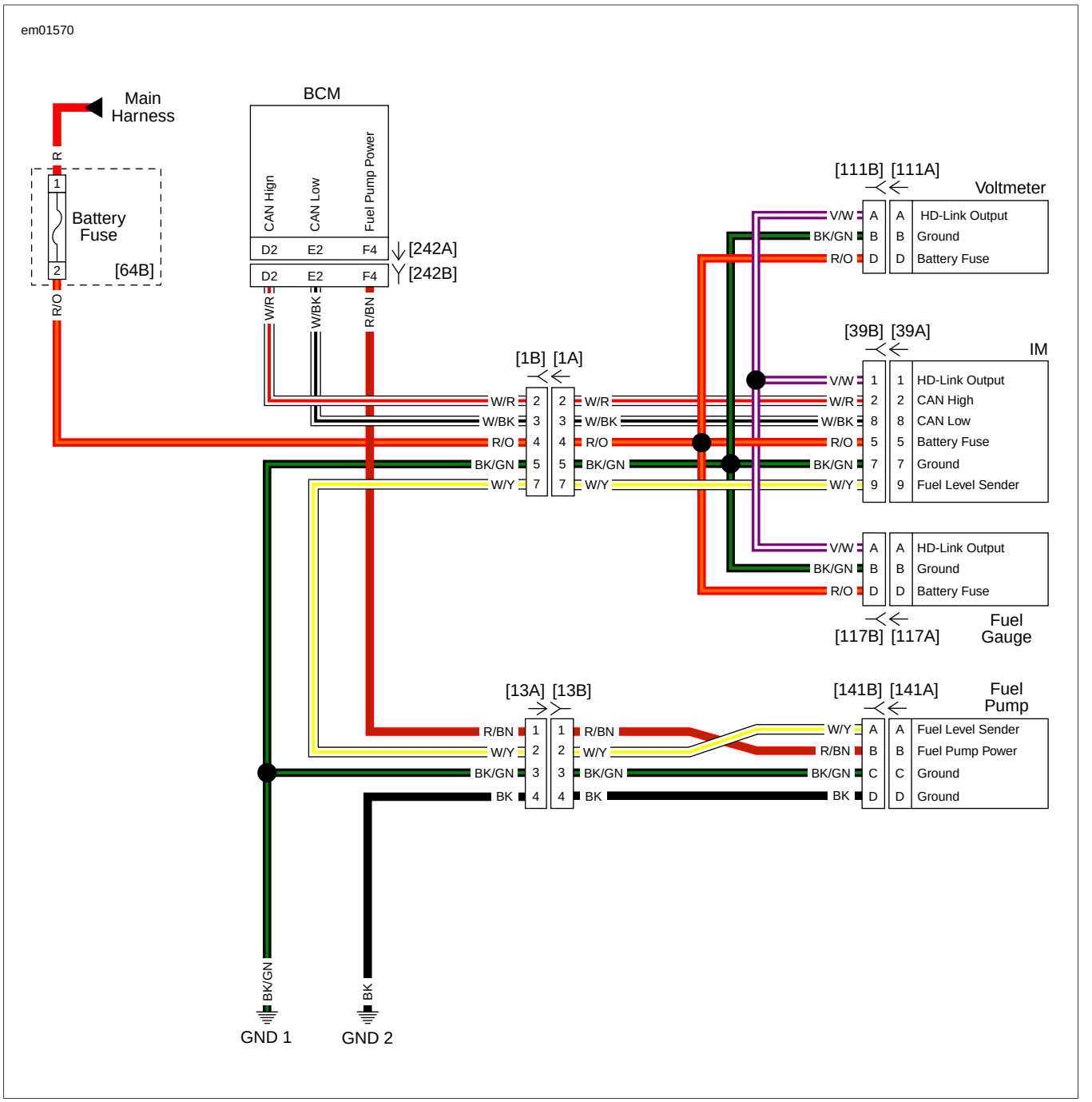


Figure 6-79. Fuel Sensor Circuit: FLH With Fairing

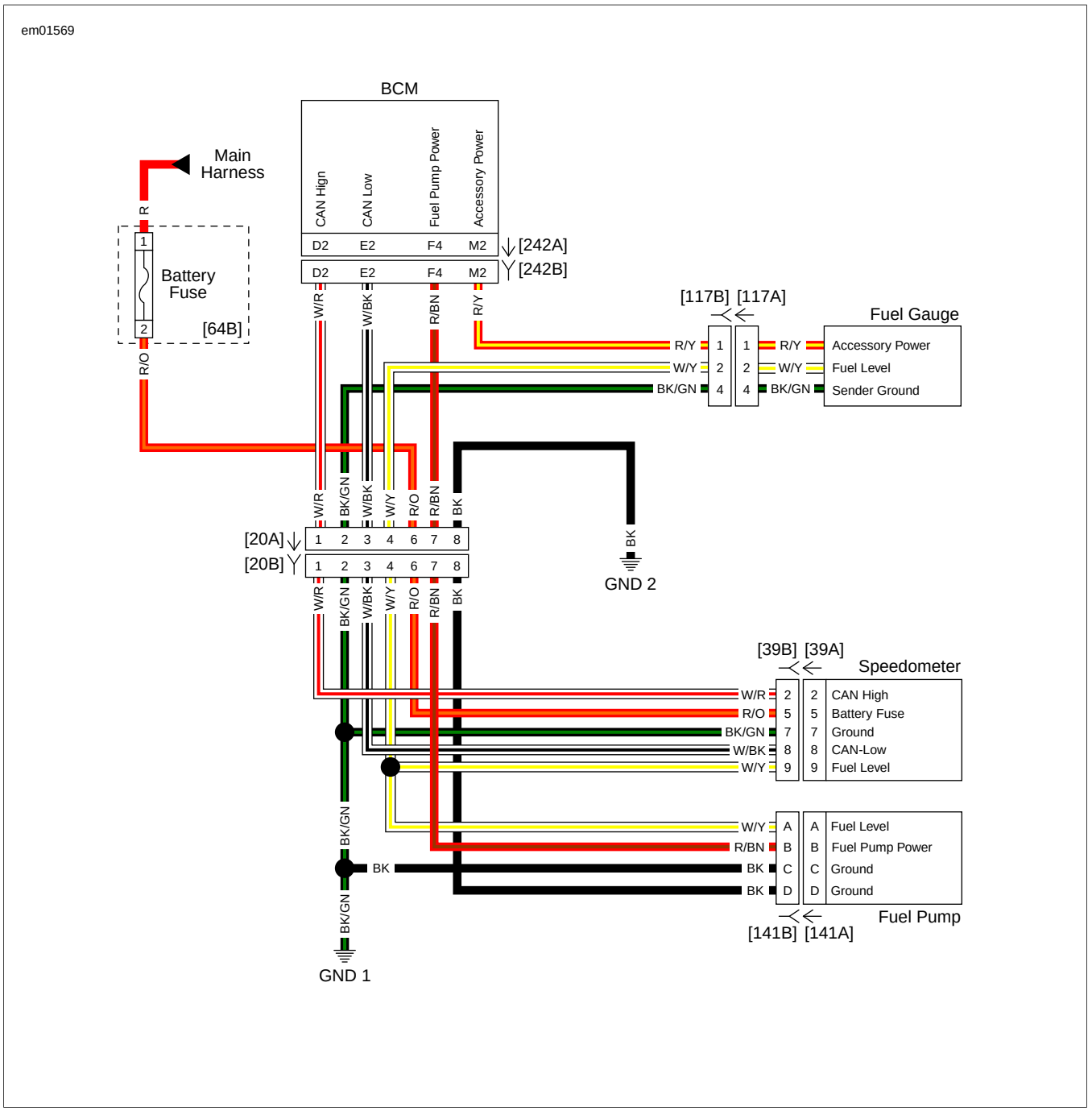


Figure 6-80. Fuel Sensor Circuit: Without Fairing

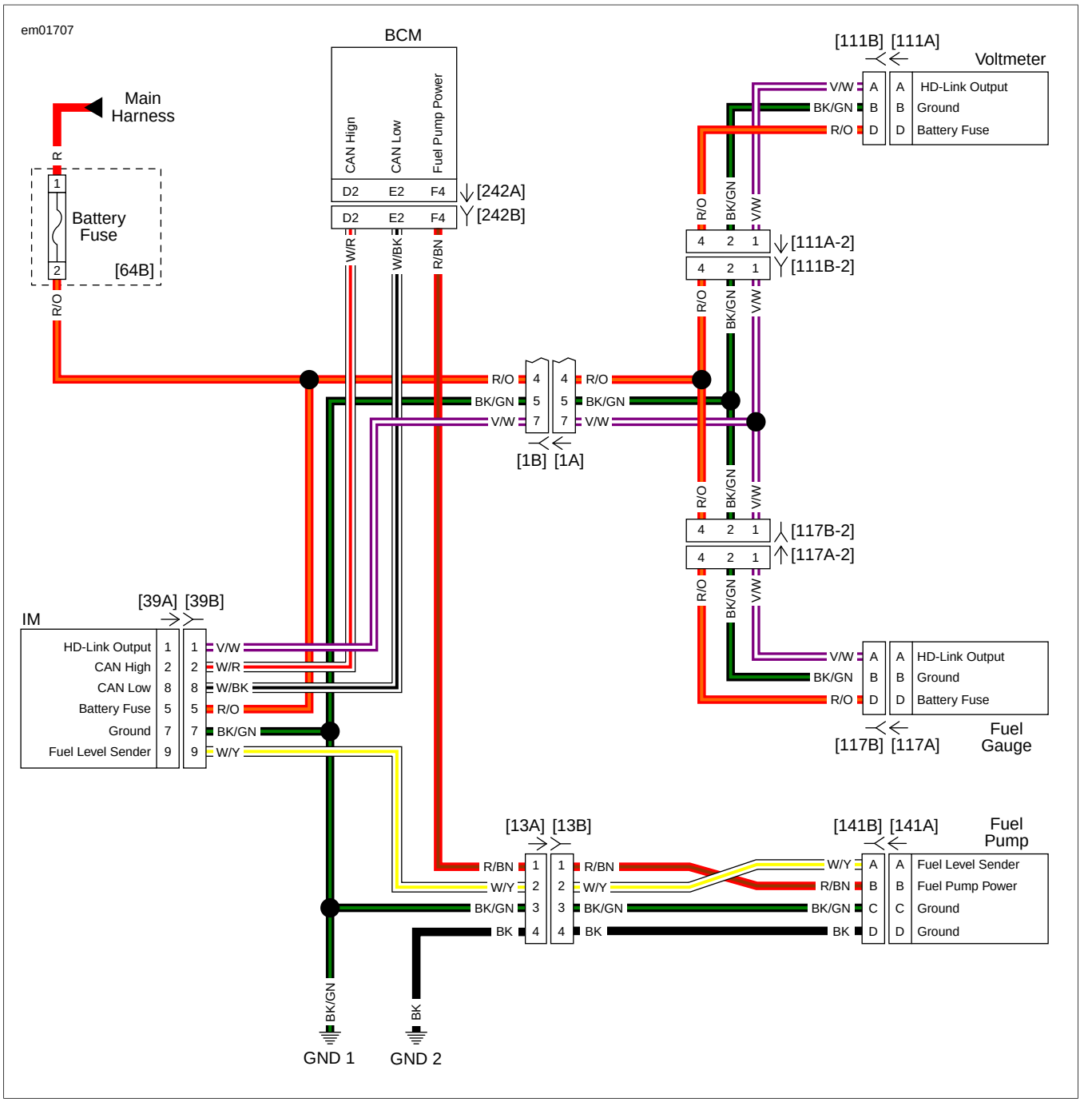


Figure 6-81. Fuel Sensor Circuit: FLT

ENGINE CRANKS BUT WILL NOT START

PART NUMBER	TOOL NAME
HD-26792	SPARK TESTER
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM CABLE
HD-50390-2-P	BCM OVERLAY

Table 6-116. Engine Cranks But Will Not Start Diagnostic Faults

POSSIBLE CAUSES
Battery voltage too low
Ignition system issues
Fuel system issues
Electrical system issues
No or low compression
Open ground circuit

1. Preliminary Engine Tests

1. Verify battery connections are in good condition.
2. Verify fuel in the tank is fresh and not contaminated.
3. Verify spark plug wires are firmly connected to the coil and plugs.
4. Verify fuel injectors are not clogged.
5. Verify battery condition. See 3.1 BATTERY TESTING.
6. Does battery pass tests?
   a. **Yes.** Go to Test 2.
   b. **No.** Charge or replace battery.

2. Check Engine Lamp Test

1. Turn IGN ON. Set engine stop switch to RUN.
2. Does check engine lamp illuminate for 4 seconds immediately after key ON?
   a. **Yes.** Go to Test 3.
   b. **No.** Verify all fuses are good. See 1.2 INITIAL DIAGNOSTICS, Initial Diagnostics.

3. Spark Present Test

1. Check spark plug condition. Replace if fouled.
2. Using SPARK TESTER (Part No. HD-26792), check spark at both plugs while cranking engine.
3. Is spark present?
   a. **Yes.** Go to Test 4.
   b. **No.** The spark plugs will not spark if there is low or no compression. If spark is not present, test compression before troubleshooting ignition circuit. Once good compression is confirmed, check condition of ignition coils, coil primary wiring and spark plug boots. See 6.12 CKP SENSOR DIAGNOSTICS or 6.23 COMBUSTION EFFICIENCY DIAGNOSTICS.

4. Compression Test

1. Perform compression test.
2. Does engine pass compression test?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair engine loss of compression.

5. Fuel Pump Voltage Test

1. Disconnect fuel pump connector [141].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404) and a multimeter, measure voltage between fuel pump [141B] terminals A and D during the first 2-3 seconds after IGN ON.
3. Is battery voltage present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 7.

6. Fuel System Test

1. Check fuel system and perform fuel pressure test.
2. Does fuel pressure meet specification?
   a. **Yes.** Inspect and clean throttle body and repair as needed.
   b. **No.** Inspect fuel inlet sock and fuel filter for obstruction. Inspect internal fuel hose for leaks. If no issues are found, replace fuel pump assembly.

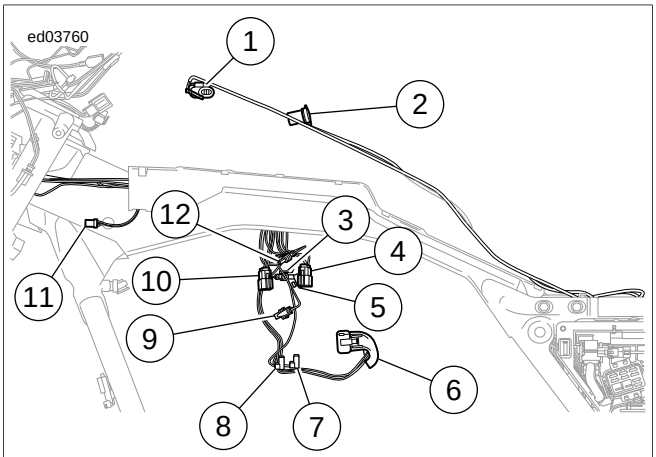
7. Fuel Pump Open Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM CABLE (Part No. HD-50390-2) between wire harness [242B], leaving [242A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test resistance between [141B] terminal A and BOB terminal F4.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Repair open on (BK) wire to ground.
   b. **No.** Repair open (R/BN) wire.

HESITATION OR LOSS OF POWER 6.38

DESCRIPTION AND OPERATION

See Figure 6-82. Improper fuel system pressure may contribute to hesitation or loss of power.



1. **Fuel pump and level sensor [141]**
2. **Rider headset [225] (FLHTK)**
3. **Rear ACR [203R]**
4. **Rear fuel injector [85]**
5. **TMAP [80]**
6. **TCA [211]**
7. **Horn [122-1]**
8. **Horn [122-2]**
9. **ET sensor [90]**
10. **Front fuel injector [84]**
11. **Fuel gauge [117] (w/o fairing)**
12. **Front ACR [203F]**

Figure 6-82. Engine

HESITATION OR LOSS OF POWER TEST

PART NUMBER	TOOL NAME
HD-26792	SPARK TESTER

Table 6-117. Hesitation or Loss of Power Test Diagnostic Faults

POSSIBLE CAUSES
Loss of engine compression
Fuel system issues

1. Preliminary Engine Tests

1. Verify battery connections are in good condition.
2. Verify fuel in the tank is fresh and not contaminated.
3. Verify spark plug wires are firmly connected the coil and plugs.
4. Verify fuel injectors are not clogged.
5. Verify battery condition. See 3.1 BATTERY TESTING.
6. Does battery pass tests?
   a. **Yes.** Go to Test 2.
   b. **No.** Charge or replace battery.

2. Vacuum Leak Test

1. Start engine. Check for vacuum leaks.
2. Were any leaks found?
   a. **Yes.** Repair vacuum leak.
   b. **No.** Go to Test 3.

3. Spark Present Test

1. Check spark plug condition and replace if fouled.
2. Using SPARK TESTER (Part No. HD-26792), check spark at both plugs while cranking engine.
3. Is spark present?
   a. **Yes.** Go to Test 4.
   b. **No.** The spark plugs will not spark if there is low or no compression. If spark is not present, test compression before troubleshooting ignition circuit. Once good compression is confirmed, check condition of ignition coils, coil primary wiring and spark plug boots. See 6.12 CKP SENSOR DIAGNOSTICS or 6.23 COMBUSTION EFFICIENCY DIAGNOSTICS.

4. Compression Test

1. Perform compression test.
2. Does engine pass compression test?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair engine loss of compression.

5. Fuel System Test

1. Check fuel system and perform fuel pressure test.
2. Does fuel pressure meet specification?
   a. **Yes.** Inspect and clean throttle body and repair as needed.
   b. **No.** Inspect fuel inlet sock and fuel filter for obstruction. Inspect internal fuel hose for leaks. If no issues are found, replace fuel pump assembly.

STARTS, THEN STALLS 6.39

DESCRIPTION AND OPERATION

The starts, then stalls condition may be created by the fuel system, the idle air control system or an ECM failure.

There may be DTCs set causing this condition. Solve the problems with the DTCs before performing the tests in this section. The DTCs that may be involved with starts, then stalls are:

- **Fuel injectors:** DTCs P0261, P0262 and P0264
- **Password problem:** DTC P1009
- **TPS1:** DTCs P0122 and P0123
- **ECM errors:** DTCs P0603 and P0605

Diagnostic Tips

- The vehicle will stall if the jiffy stand is extended when the transmission is in gear.
- If this condition is fuel related, perform fuel pressure test.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

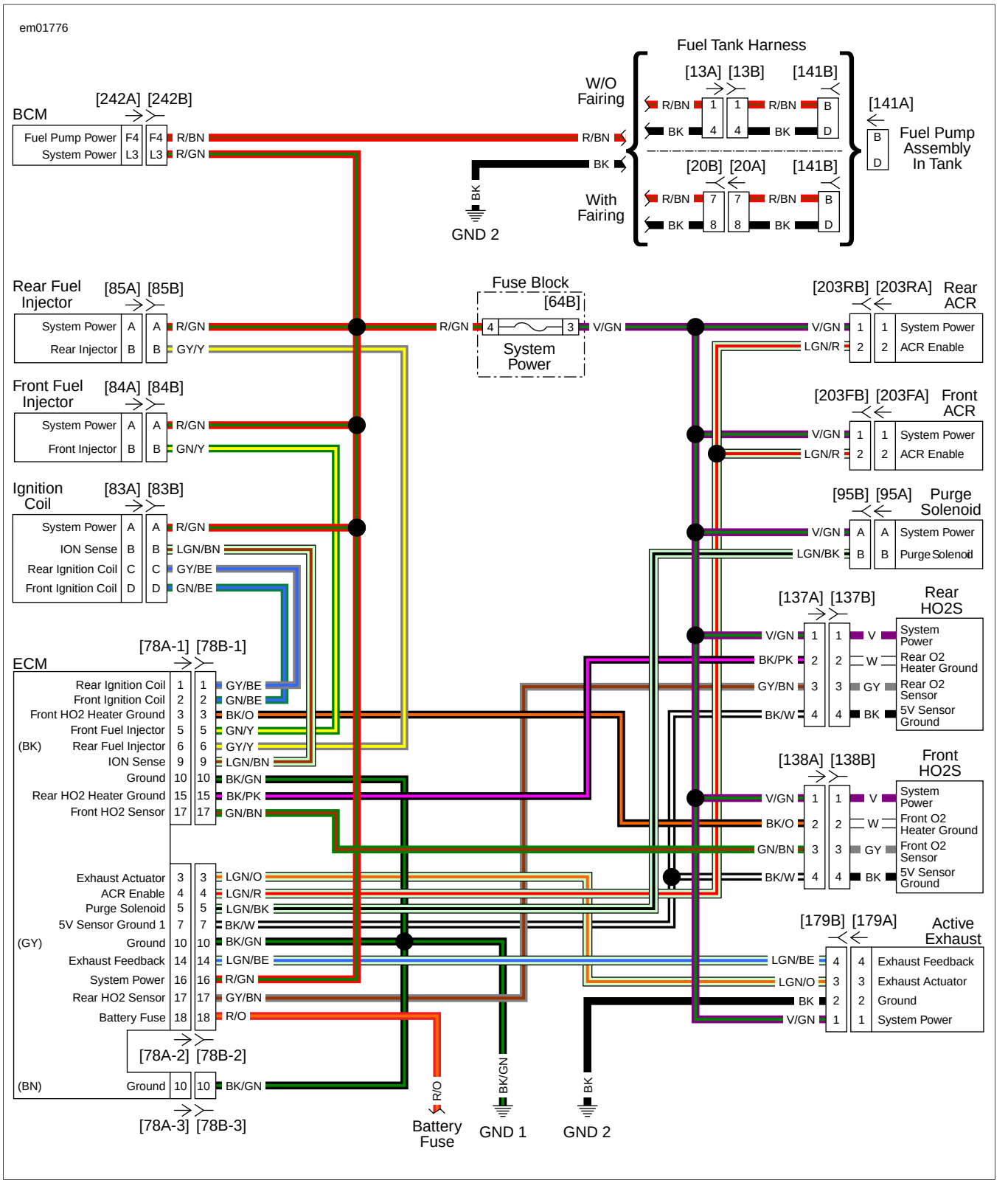


Figure 6-83. System Power Circuit

STARTS, THEN STALLS

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-118. Starts, Then Stalls Diagnostic Faults

POSSIBLE CAUSES
Fuel system malfunction
Idle air control system malfunction

1. Throttle Test

1. Will engine start with throttle partially opened and then stall when closed?
   a. **Yes.** See 6.15 IDLE SPEED CONTROL DIAGNOSTICS.
   b. **No.** Go to Test 2.

2. Fuel System Test

1. Perform fuel pressure test.
2. Is fuel pressure normal?
   a. **Yes.** If fuel injectors are okay, then continue with tests. Go to Test 3.
   b. **No.** Repair fuel pressure problem.

3. System Power Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) to wiring harness [78B-1], [78B-2] and [78B-3], leaving ECM [78A-1], [78A-2] and [78A-3] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB [78-2] terminal 16 and ground.
6. Is voltage present?
   a. **Yes.** Inspect connections at ECM. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test. If connections are good and wiggle test does not find intermittent, replace ECM.
   b. **No.** Repair open in (R/GN) wire.

MISFIRE AT IDLE OR UNDER LOAD 6.40

DESCRIPTION AND OPERATION

Misfire conditions may be caused by:

- Battery condition and connections.
- Fuel system problems. See 6.38 HESITATION OR LOSS OF POWER.
- Ignition system faults.

Diagnostic Tips

⚠WARNING

Wipe up spilled fuel and dispose of rags in a suitable manner. An open spark around gasoline could cause a fire or explosion, resulting in death or serious injury. (00518b)

- When performing the steps in the diagnostic tests, use a known good part to verify whether a suspected part is faulty.
- The ignition coil does not require full installation to be functional.
- Verify faulty ignition coil by performing resistance test. See 6.23 COMBUSTION EFFICIENCY DIAGNOSTICS.

IN-LINE SPARK TESTER

PART NUMBER	TOOL NAME
YA840	SNAP-ON IN-LINE SPARK TESTER

See Figure 6-84. Using a SNAP-ON IN-LINE SPARK TESTER (Part No. YA840) or equivalent can help determine whether a problem exists in the ignition or fuel systems.

- If the test light flashes without interruption on both cylinders during the misfire event, verify spark plug condition and gap and inspect the fuel system for proper operation.
- If the test light does not flash or the flash is interrupted during the misfire event, the problem is ignition related.

1. Turn IGN OFF.
2. Remove front spark plug wire.
3. Install SNAP-ON IN-LINE SPARK TESTER (Part No. YA840) between spark plug wire and spark plug.
4. Start engine and inspect tester light. The light will flash on each spark event if power is transmitted to the plug.
5. Install and repeat procedure on rear cylinder.

NOTE

Use a SNAP-ON IN-LINE SPARK TESTER (Part No. YA840) and a load applying dynamometer to diagnose misfire under load.

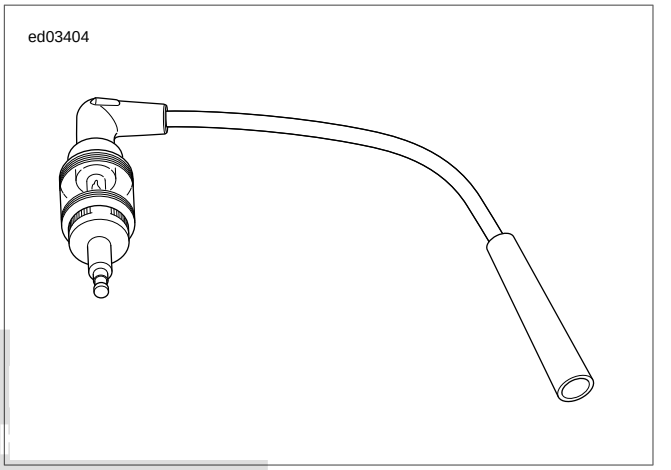


Figure 6-84. In-line Spark Tester

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

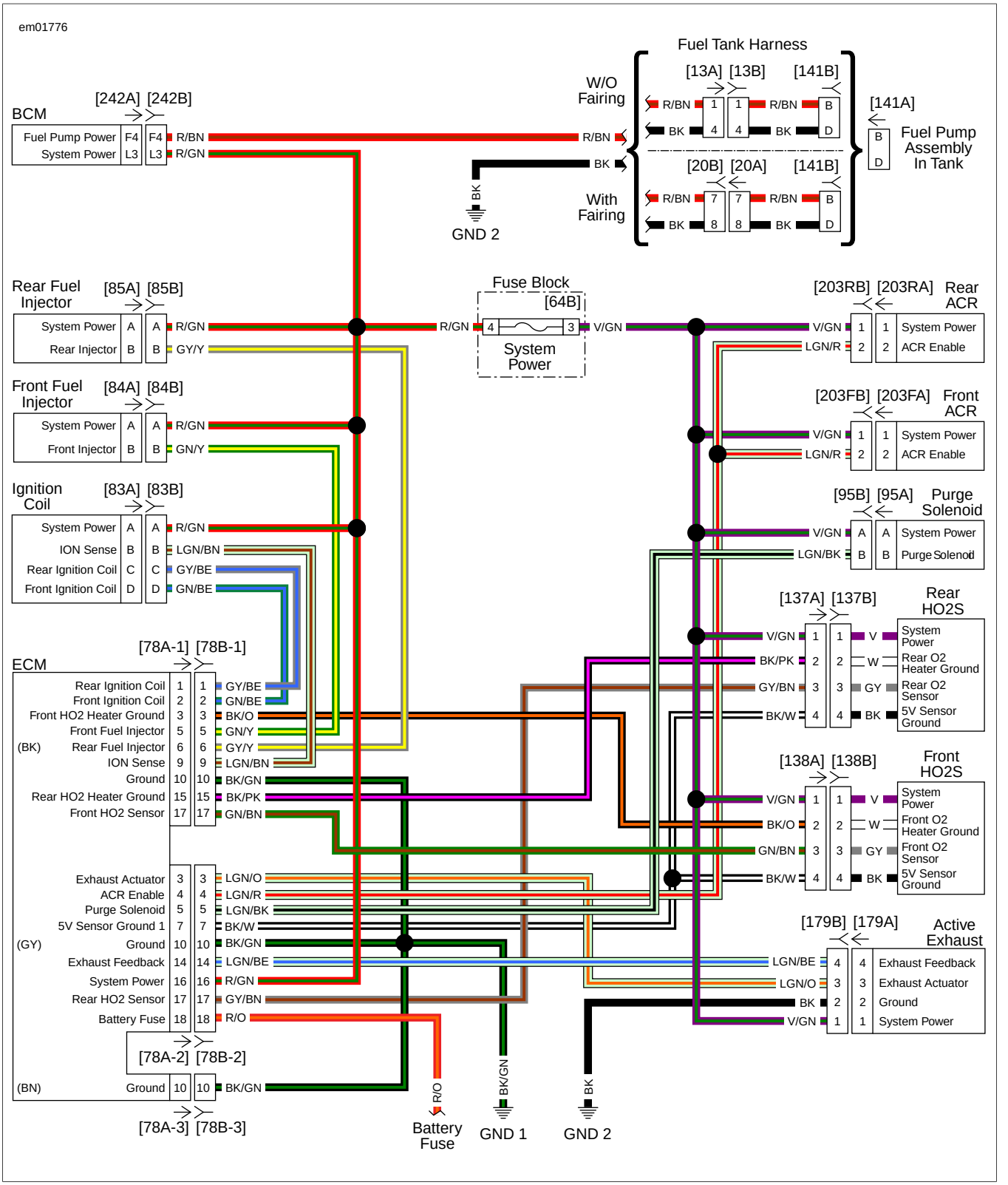


Figure 6-85. System Power Circuit

MISFIRE AT IDLE OR UNDER LOAD

PART NUMBER	TOOL NAME
HD-26792	SPARK TESTER
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-4	ECM CABLE
HD-50390-4-P	ECM OVERLAY

Table 6-119. Misfire At Idle or Under Load Diagnostic Faults

POSSIBLE CAUSES
Ignition system malfunction
Fuel system malfunction
Electrical system malfunction

1. Power Ground Resistance Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ECM CABLE (Part No. HD-50390-4) between wiring harness [78B-1], [78B-2] and [78B-3], and ECM [78A-1], [78A-2] and [78A-3]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify ECM OVERLAY (Part No. HD-50390-4-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB [78-1] terminal 10, [78-2] terminal 10 and then [78-3] terminal 10 to ground.
5. Is resistance less than 0.5 Ohm?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open on (BK/GN) wire.

2. Spark Test

1. Connect SPARK TESTER (Part No. HD-26792) between front spark plug cable and ground. See 1.3 DIAGNOSTIC TOOLS.
2. Crank engine for a few seconds.
3. Remove tester from front spark plug cable. Connect rear spark plug cable and ground.
4. Crank engine for a few seconds.
5. Did spark jump gap on both cables?
   a. **Yes.** Check for faulty, worn or cracked spark plugs, plug fouling due to mechanical problems or faulty connection at plug or coils. Repair as required.
   b. **No.** Go to Test 3.

3. Spark Plug Wire Test

1. Turn IGN OFF.
2. Disconnect spark plug cables.
3. Test resistance of both spark plug cables.
4. Is resistance within specifications? Refer to Table 1-5.
   a. **Yes.** Go to Test 4.
   b. **No.** Replace out of range spark plug cable.

4. Carbon Tracking Inspection Test

1. Inspect top of ignition coils for carbon tracking.
2. Is carbon tracking present?
   a. **Yes.** Replace ignition coil.
   b. **No.** Switch ignition coil with known good unit and perform previous test. If spark jumps gap, replace ignition coil. If not, then continue with tests. Go to Test 5.

5. Ignition Coil Primary Wire Continuity Test

1. Disconnect ignition coil [83].
2. Disconnect BCM [242].
3. Test resistance between [242B] terminal L3 and [83B] terminal A (R/GN) wire. Wiggle connectors while measuring.
4. Is resistance continuously less than 0.5 Ohms?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair intermittent on (R/GN) wire.

6. Battery to Main Fuse Block Voltage Drop Test

1. Start engine.
2. Perform voltage drop test between battery (+) and main fuse [64B] terminal A (R) wire.
3. Is voltage drop more than 1.0V?
   a. **Yes.** Repair (R) wire between terminal A of [64B] and connection at battery including connections at starter.
   b. **No.** Check for corrosion or damage at BCM [259].

ERRACTIC IDLE 6.41

DESCRIPTION AND OPERATION

Erratic idle conditions may be caused by:

- Fouled spark plugs.
- Damaged spark plug cables.
- Fuel system problems.
- Ignition system faults.

Diagnostic Tips

⚠WARNING

Wipe up spilled fuel and dispose of rags in a suitable manner. An open spark around gasoline could cause a fire or explosion, resulting in death or serious injury. (00518b)

When performing the steps in the diagnostic tests, use a known good part to verify whether a suspected part is faulty.

ERRATIC IDLE

PART NUMBER	TOOL NAME
HD-26792	SPARK TESTER

Table 6-120. Erratic Idle Diagnostic Faults

POSSIBLE CAUSES
Bad fuel
Faulty spark plug cables
Malfunctioning fuel system
Fouled spark plugs

1. Preliminary Engine Tests

1. Verify battery connections are in good condition.
2. Verify fuel in the tank is fresh and not contaminated.
3. Verify spark plug wires are firmly connected to the coil and plugs.
4. Verify heat management system is not operating.
5. Verify fuel injectors are not clogged.
6. Verify battery condition. See 3.1 BATTERY TESTING.
7. Does battery pass tests?
   a. **Yes.** Go to Test 2.
   b. **No.** Charge or replace battery.

2. Spark Test

1. Connect SPARK TESTER (Part No. HD-26792) between front spark plug cable and ground. See 1.3 DIAGNOSTIC TOOLS.
2. Crank engine for a few seconds.
3. Remove tester from front spark plug cable. Connect rear spark plug cable and ground.
4. Did spark jump gap on both cables?
   a. **Yes.** Check for faulty, worn or cracked spark plugs, plug fouling due to mechanical problems or faulty connection at plug or coils. Repair as required.
   b. **No.** Go to Test 3.

3. Spark Plug Wire Test

1. Turn IGN OFF.
2. Disconnect spark plug cables.
3. Test resistance of both spark plug cables.
4. Is resistance within specifications? Refer to Table 1-5.
   a. **Yes.** Go to Test 4.
   b. **No.** Replace out of range spark plug cable.

4. Fuel System Test

1. Perform fuel pressure test.
2. Is fuel pressure normal?
   a. **Yes.** If fuel injectors are okay, replace the fuel.
   b. **No.** Repair fuel pressure problem.

NOTES

TABLE OF CONTENTS

NOTES

ANTI-LOCK BRAKE SYSTEM (ABS) GENERAL INFORMATION 7.1

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The ABS module consists of an electro-hydraulic control unit (EHCU) which controls brake application under extreme stopping conditions. The ABS only activates when wheel slip is detected.

The ABS includes the:

- The EHCU.
- Front WSS.
- Rear WSS.

The EHCU responds to WSS inputs. When the EHCU is activated, the solenoid valves decrease, hold or increase hydraulic fluid pressure to control the individual calipers of each wheel to prevent wheel slipping. However, the EHCU cannot increase hydraulic pressure beyond the pressure or force being applied to the brake pedal or lever by the rider.

Linked Braking

Linked braking is a function of the ABS module. It allows the ABS to apply pressure to either the front or rear brakes depending on the situation. The ABS module applies the front and rear brakes together to optimize braking. During an ABS event, linked braking does not affect ABS operation.

Linked braking operates when wheel speed is above 20-25 mph (32-40 kph).

- If the rear brake is applied the ABS module will also apply some pressure to the left front brake.
- If the front brakes are applied the ABS module will apply some pressure to the rear brake.
- If both front and rear brakes are applied the ABS will still activate linked braking as needed to fully optimize braking.

The module monitors wheel speed and fluid pressure to determine not only if the conditions are right to activate linked breaking but also the amount of linked braking to apply. The pump in the ABS module moves fluid throughout the brake system to adjust the pressure as needed to operate linked braking. The system is constantly adjusting for changes in speed and brake inputs. If the operator changes the fluid pressure applied to the brakes, the ABS module will adjust the pressure it is applying to the other brake.

ABS CAN Communication Functionality

The right hand control module (RHCM) has a front brake switch that supplies a signal on the CAN bus. This CAN communication signal is sent to the EHCU to indicate that the front brake is applied. The rear brake switch supplies a ground input to the BCM. The BCM sends a rear brake applied CAN communication signal to the EHCU.

During normal ABS operation:

- A series of rapid solenoid valve pulsations may be felt in either the front brake lever or rear brake pedal but only during initialization and anti-lock braking.
- A ticking or popping noise may be heard as the solenoid valves cycle rapidly.
- During anti-lock braking on dry pavement, intermittent chirping noises may be heard as the tires approach slipping.

When the EHCU is replaced, use DIGITAL TECHNICIAN II (Part No. HD-48650) to program and bleed the EHCU.

Pressure Hold

The EHCU controls the release and apply valves. This holds the same constant pressure on the appropriate caliper. The EHCU will release the pressure hold in the event of wheel slip.

Pressure Decrease

Sometimes the pressure being applied to the caliper is high enough for the EHCU to detect wheel slip. To control the wheel slip, the EHCU closes the apply valve and opens the release valve. This releases pressure on the appropriate caliper until wheel slip is no longer detected. The excess fluid is stored in the accumulator until the pump can return the fluid to the master cylinder or fluid reservoir.

Pressure Increase

After the wheel slip is corrected during an ABS event, a pressure increase occurs. The EHCU closes the release valve and opens the apply valve. This increases the pressure applied to the caliper during deceleration in order to reduce the speed of the wheel. The increased pressure will not exceed the pressure being applied to the master cylinder by the rider.

Initialization Self-Test

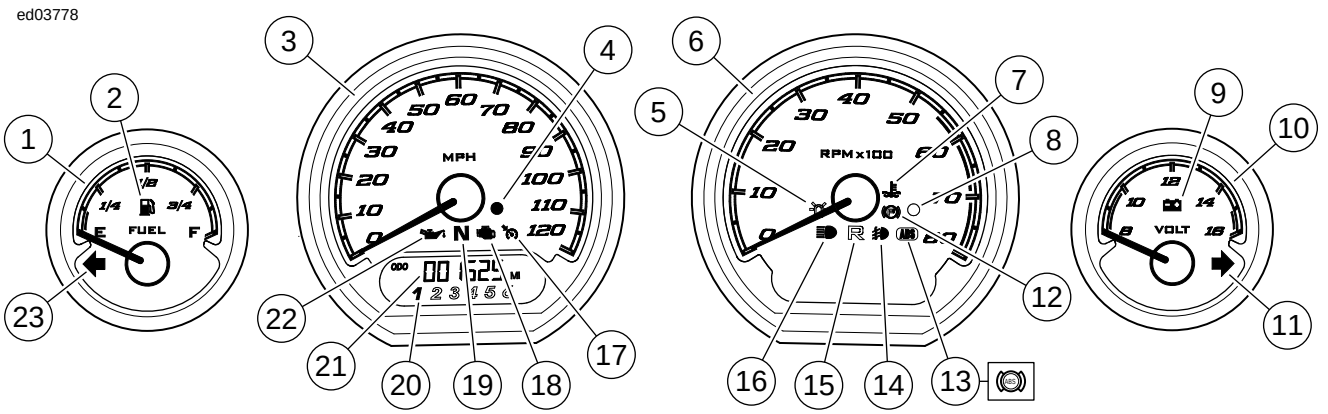
The ABS module performs one initialization test each ignition cycle. As part of the initialization self-test, the ABS module energizes the actuators and commands the motor and solenoids on and off. The ABS ECU will run this test the first time the vehicle speed exceeds 3 mph (5 km/h) in an ignition cycle.

ABS Indicator

See Figure 7-1 and Figure 7-2. The speedometer/IM illuminates the ABS indicator if:

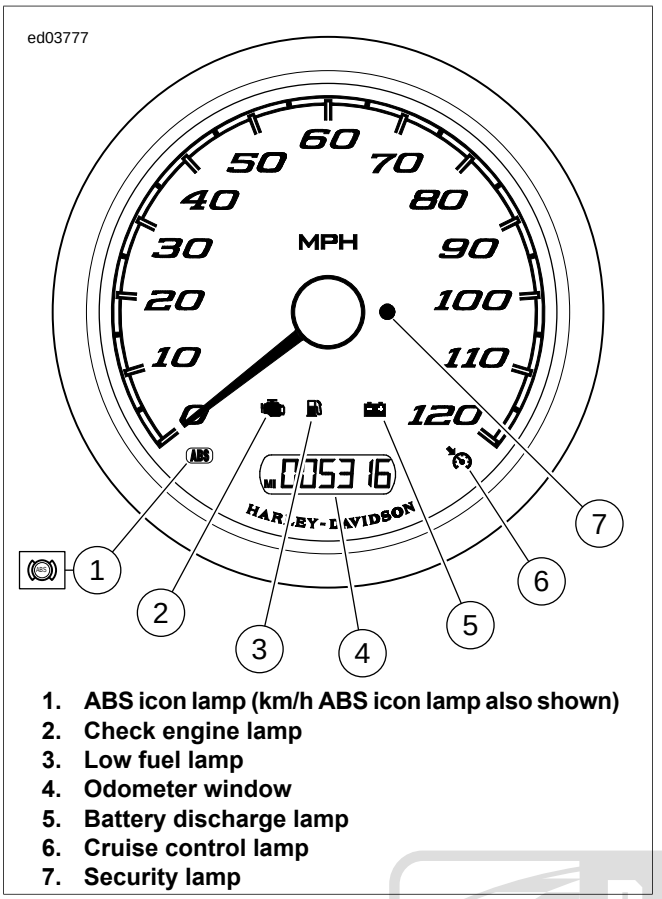
- The EHCU detects an ABS disabling malfunction. The EHCU sends a message to the speedometer/IM requesting illumination.
- The speedometer/IM performs a bulb check.
- The speedometer/IM detects a loss of communication with the EHCU.
- The ABS light may flash when the IGN is turned on. This will continue until the vehicle is driven to verify WSS operation.

The EHCU sends a message to the instrument when a malfunction that disables ABS operation is detected. Depending on the fault, the ABS indicator may stay on even after the malfunction is corrected. The indicator will not go off until the vehicle is operated at speeds greater than 3 mph (5 km/h). It is important to verify that this is not the cause of an ABS indicator, which is illuminated when no DTCs are set, before attempting to diagnose other possible causes.



1. Fuel gauge
2. Low fuel lamp
3. Speedometer
4. Security lamp
5. Not used for these models
6. Tachometer
7. Engine coolant temperature lamp
8. Light sensor (not an indicator)
9. Battery discharge lamp
10. Voltmeter
11. Right turn signal indicator lamp
12. Not used for these models
13. ABS icon lamp (km/h ABS icon lamp also shown)
14. Auxiliary/fog lamp indicator lamp
15. Not used for these models
16. Headlamp high beam lamp
17. Cruise control lamp
18. Check engine lamp
19. Neutral lamp
20. Gear indicator
21. Odometer window
22. Oil pressure lamp
23. Left turn signal indicator lamp

Figure 7-1. Indicator Lamps: Typical (Fairing Models)



1. ABS icon lamp (km/h ABS icon lamp also shown)
2. Check engine lamp
3. Low fuel lamp
4. Odometer window
5. Battery discharge lamp
6. Cruise control lamp
7. Security lamp

Figure 7-2. Indicator Lamps: Non-Fairing Models

INTERNAL FAULT DIAGNOSTICS 7.2

DESCRIPTION AND OPERATION

See Figure 7-3. The EHCU is replaced as a unit. It contains the pump, valves and solenoids along with all the controlling circuitry.

The ABS module monitors the voltage level available for system operation. A low voltage condition prevents the system from operating properly. The ABS module also performs several self-tests for internal problems.

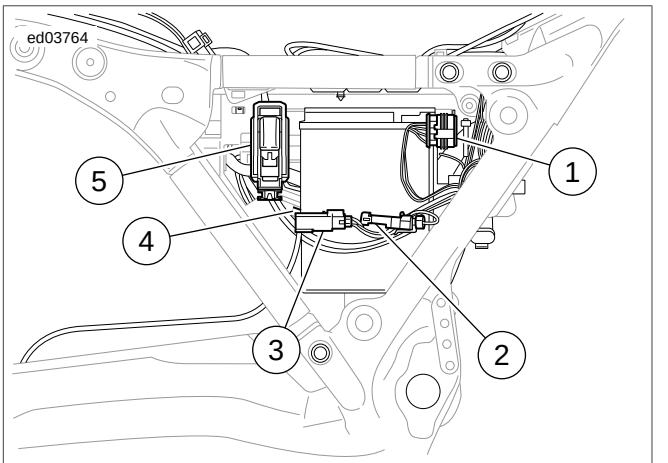
Table 7-1. Code Description

DTC	DESCRIPTION
C1014	ABS ECU relay error
C1040	ABS pump/motor error
C1055	ABS ECU internal error
C1061	ABS front apply solenoid circuit open/high resistance
C1062	ABS front release solenoid circuit open/high resistance
C1065	ABS rear apply solenoid circuit open/high resistance
C1066	ABS rear release solenoid circuit open/high resistance
C1071	Rear prime valve error
C1072	Rear isolation valve error
C1073	Front isolation valve error
C1074	Front prime valve error
C1075	Front linked inlet valve error
C1076	Front linked outlet valve error
C1077	Front circuit pressure sensor error
C1078	Rear circuit pressure sensor error
C1081	Front master pressure sensor error
C1082	Front master pressure sensor offset error
C1083	Front wheel pressure sensor error
C1084	Front wheel pressure sensor offset error
C1085	Rear master pressure sensor error
C1086	Rear master pressure sensor offset error
C1087	Rear wheel pressure sensor error
C1088	Rear wheel pressure sensor offset error
C1089	Pressure sensor external supply error
C1195	Wake up error

Conditions for Setting the DTC

These DTCs can set if one of the following conditions exists in the EHCU:

- Low battery voltage.
- High resistance in the ABS power or ground circuits.
- EHCU fault or malfunction.



1. **Active exhaust actuator [179]**
2. **Rear WSS [168]**
3. **Rear HO2S [138]**
4. **Front HO2S [137] (behind [138])**
5. **ABS ECU [166]**

Figure 7-3. Behind Right Side Cover

Action Taken When the DTC Sets

- ABS is disabled.
- The ABS indicator is illuminated.

Diagnostic Tips

If improper voltage is supplied to the EHCU, these codes may set. Using an improper or high voltage charger may cause these codes to inadvertently set when there is nothing wrong with the ABS system.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

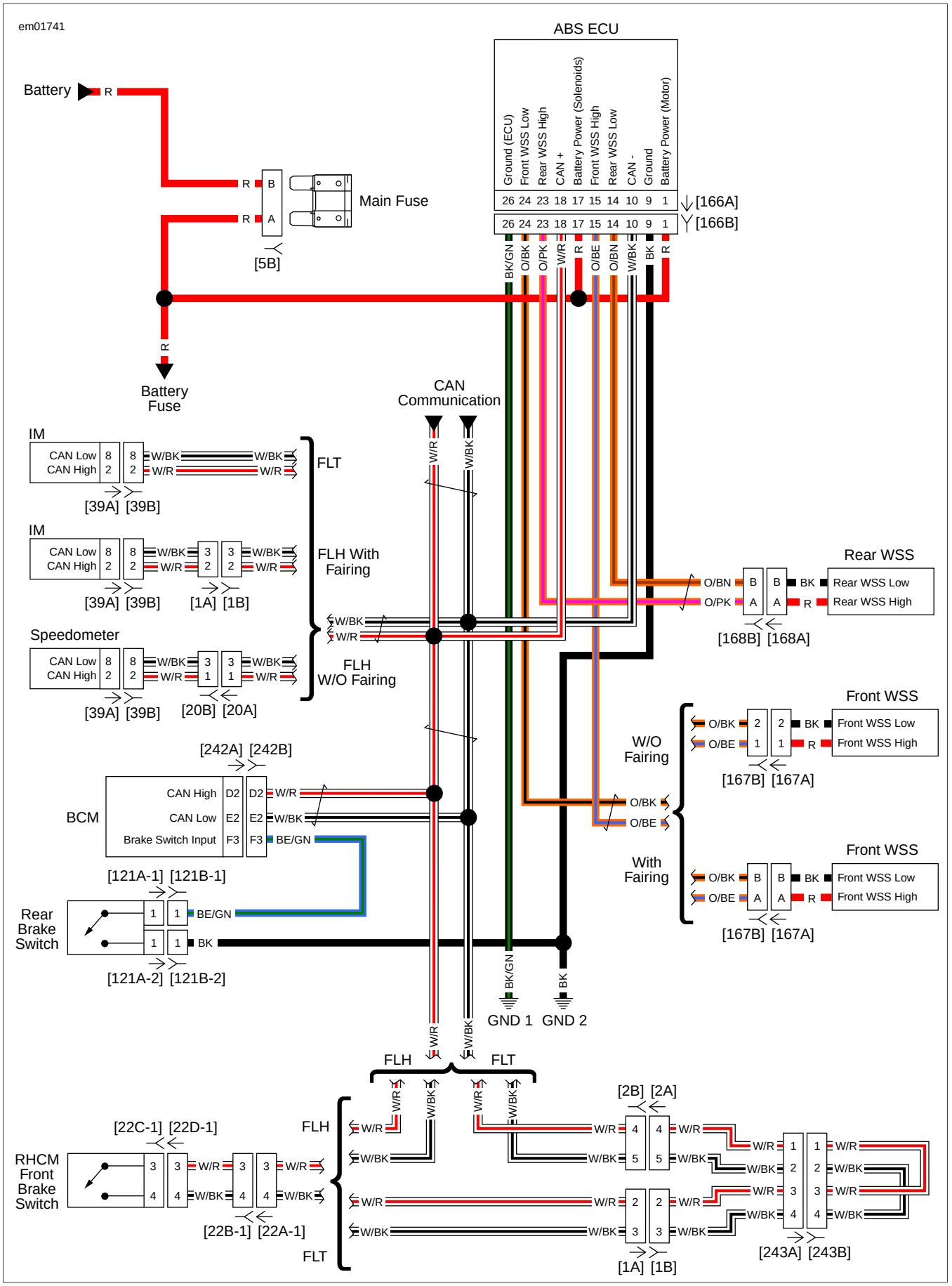


Figure 7-4. ABS Schematic

DTC C1014, C1040, C1055, C1061, C1062, C1065, C1066, C1071-C1078, C1081-C1089, C1195

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-7	ABS CABLE

Table 7-2. DTC C1014, C1040, C1055, C1061, C1062, C1065, C1066, C1071-C1078, C1081-C1089, C1195 Diagnostic Faults

POSSIBLE CAUSES
High resistance in the ABS power or ground circuits
Low battery voltage

1. Battery Voltage Test

1. Turn IGN OFF.
2. Verify battery terminals are properly connected, tightened and clean.
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) to wiring harness [166B], leaving EHCU [166A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 1 and ground.
6. Test voltage between BOB terminal 17 and ground.
7. Is voltage between 10.5-16V on both circuits?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. Ground Circuit Resistance Test

1. Turn IGN OFF.
2. Test resistance between BOB terminal 26 and ground.
3. Test resistance between BOB terminal 9 and ground.
4. Is resistance greater than 0.5 Ohms on either circuit?
   a. **Yes.** Repair high resistance or open condition on ground circuit.
   b. **No.** Go to Test 3.

3. ABS ECU DTC Test

1. Clear DTCs.
2. Turn IGN ON.
3. Check DTCs.
4. Do any of the following DTCs reset? (C1014, C1040, C1055, C1061, C1062, C1065, C1066, C1071, C1072, C1073, C1074, C1075, C1076, C1077, C1078, C1081, C1082, C1083, C1084, C1085, C1086, C1087, C1088, C1089, C1195)
   a. **Yes.** Replace EHCU.
   b. **No.** System working properly.

4. Battery Power Open Test

1. Turn IGN OFF.
2. Remove main fuse [5B].
3. Test resistance between BOB terminal 1 and [5B] socket terminal A (R) wire.
4. Test resistance between BOB terminal 17 and [5B] socket terminal A (R) wire.
5. Is resistance greater than 0.5 Ohms on either circuit?
   a. **Yes.** Inspect battery and charging system. See 3.6 CHARGING SYSTEM.
   b. **No.** Repair open in (R) wire.

WSS DIAGNOSTICS 7.3

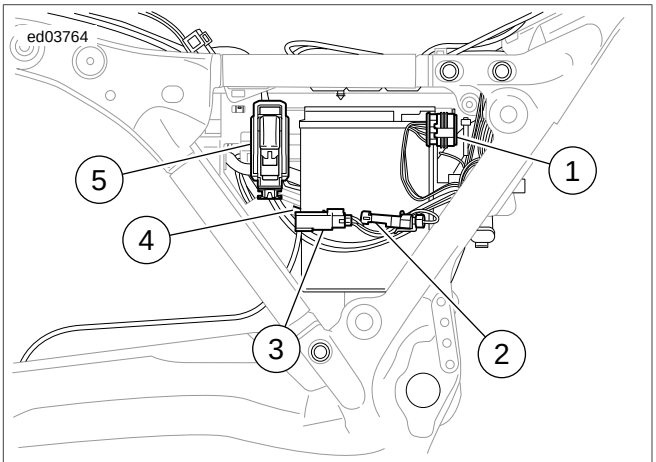
DESCRIPTION AND OPERATION

See Figure 7-6, Figure 7-5, Figure 7-7 and Figure 7-8. The active WSS is supplied system voltage from the EHCU. The sensor then returns a 7 mA or 14 mA signal back to the EHCU.

- **Front WSS high circuit:** The EHCU monitors frequency signal voltage from terminal 15 of the EHCU through the front WSS high circuit of the front WSS.
- **Front WSS low circuit:** The EHCU monitors frequency signal voltage from terminal 24 of the EHCU through the front WSS low circuit of the front WSS.
- **Rear WSS high circuit:** The EHCU monitors frequency signal voltage from terminal 23 of the EHCU through terminal A of the rear WSS.
- **Rear WSS low circuit:** The EHCU monitors the frequency signal from terminal B of the rear WSS through terminal 14 of the EHCU.

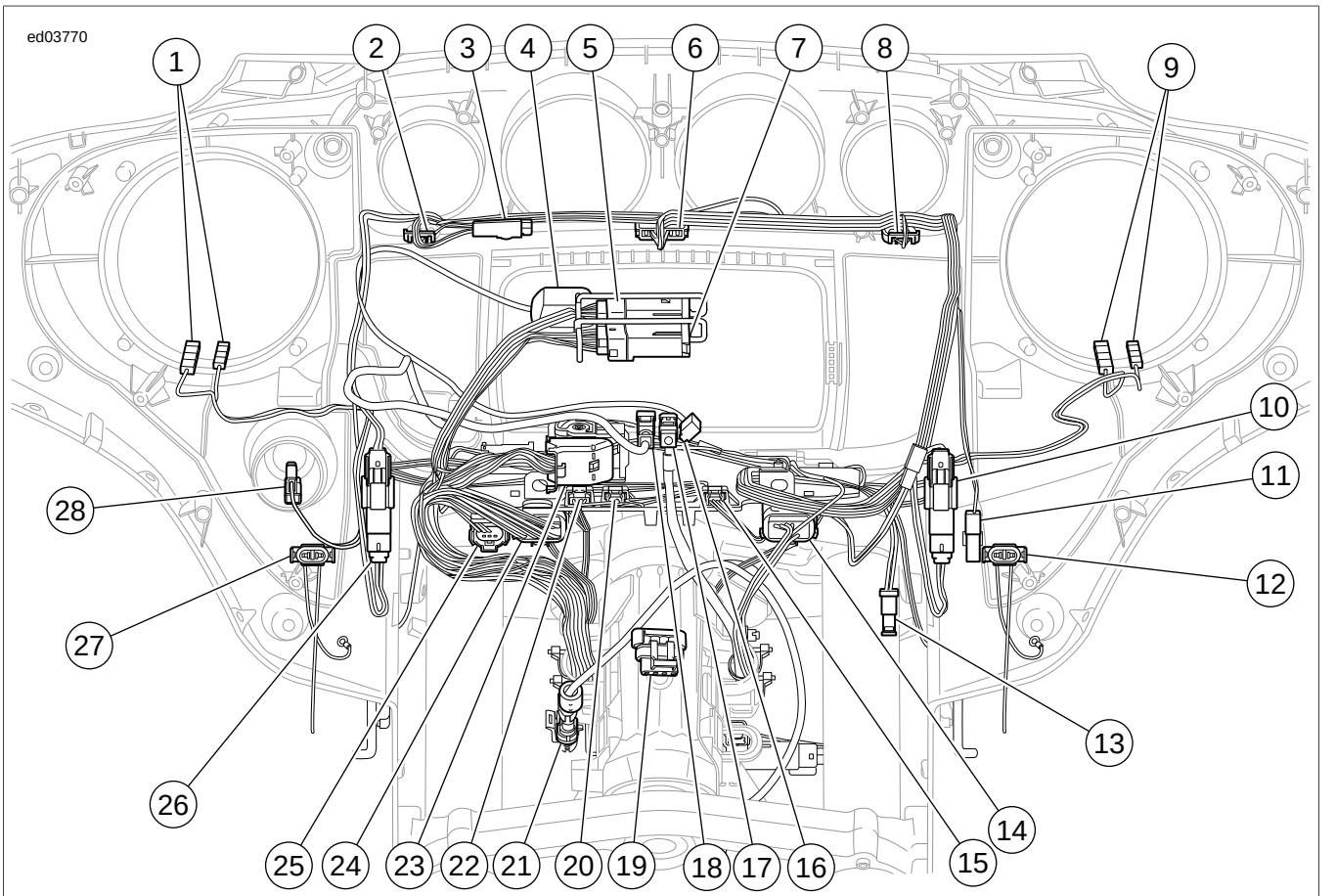
Table 7-3. Code Description

DTC	DESCRIPTION
C1021	ABS front WSS always zero
C1023	ABS rear WSS always zero
C1025	ABS front wheel speed intermittent
C1027	ABS rear wheel speed intermittent
C1029	ABS wheel speed difference too high
C1032	ABS front wheel speed circuit open/shorted
C1034	ABS rear wheel speed circuit open/shorted



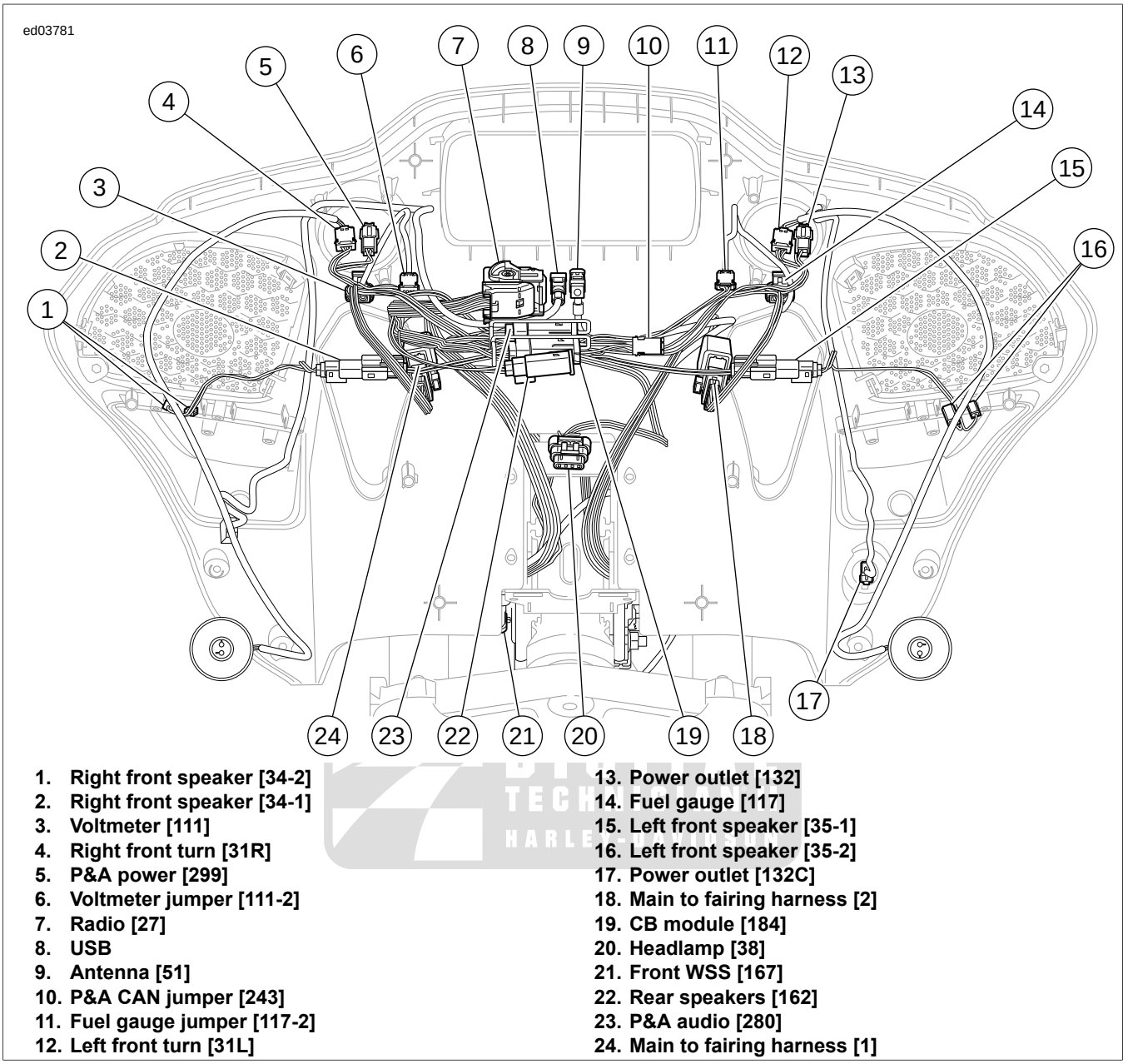
1. **Active exhaust actuator [179]**
2. **Rear WSS [168]**
3. **Rear HO2S [138]**
4. **Front HO2S [137] (behind [138])**
5. **ABS ECU [166]**

Figure 7-5. Behind Right Side Cover



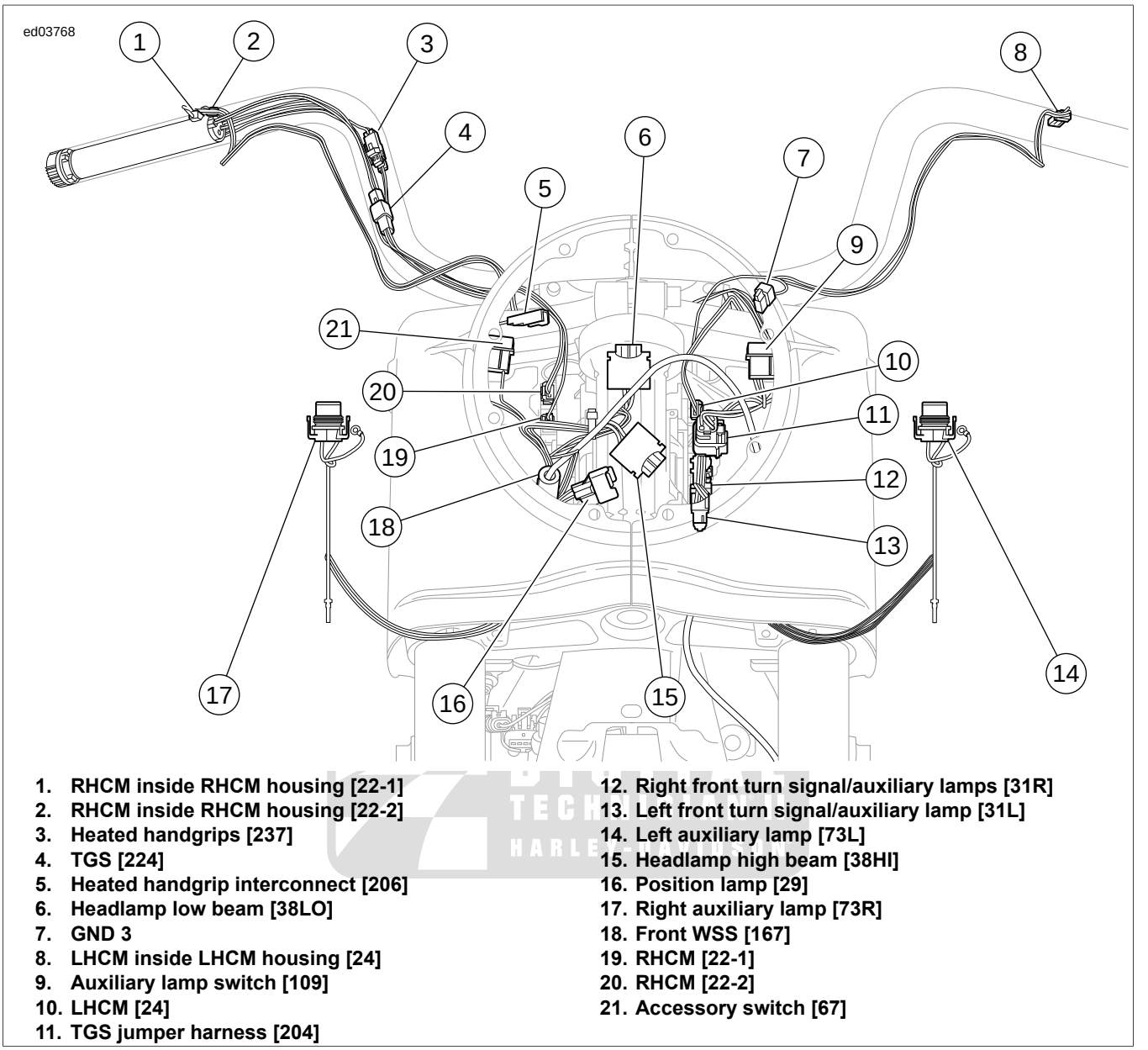
1. Right front speaker [34-2]
2. Voltmeter [111]
3. P&A power [299]
4. GPS antenna
5. P&A audio [280]
6. IM [39]
7. CB module [184]
8. Fuel gauge [117]
9. Left front speaker [35-2]
10. Left front speaker [35-1]
11. Front fender tip lamp [32]
12. Left auxiliary lamp [73L]
13. Heated handgrips [189]
14. Main to fairing harness [2]
15. LHCM [24]
16. GPS antenna [193]
17. Antenna [51]
18. USB
19. Headlamp [38]
20. RHCM [22-2]
21. Front WSS [167]
22. RHCM [22-1]
23. Radio [27]
24. Main to fairing harness [1]
25. TGS jumper harness [204]
26. Right front speaker [34-1]
27. Right auxiliary lamp [73R]
28. Power outlet [132]

Figure 7-6. Under FLH Fairing



1. Right front speaker [34-2]
2. Right front speaker [34-1]
3. Voltmeter [111]
4. Right front turn [31R]
5. P&A power [299]
6. Voltmeter jumper [111-2]
7. Radio [27]
8. USB
9. Antenna [51]
10. P&A CAN jumper [243]
11. Fuel gauge jumper [117-2]
12. Left front turn [31L]
13. Power outlet [132]
14. Fuel gauge [117]
15. Left front speaker [35-1]
16. Left front speaker [35-2]
17. Power outlet [132C]
18. Main to fairing harness [2]
19. CB module [184]
20. Headlamp [38]
21. Front WSS [167]
22. Rear speakers [162]
23. P&A audio [280]
24. Main to fairing harness [1]

Figure 7-7. Under FLT Fairing



1. **RHCM inside RHCM housing [22-1]**
2. **RHCM inside RHCM housing [22-2]**
3. **Heated handgrips [237]**
4. **TGS [224]**
5. **Heated handgrip interconnect [206]**
6. **Headlamp low beam [38LO]**
7. **GND 3**
8. **LHCM inside LHCM housing [24]**
9. **Auxiliary lamp switch [109]**
10. **LHCM [24]**
11. **TGS jumper harness [204]**
12. **Right front turn signal/auxiliary lamps [31R]**
13. **Left front turn signal/auxiliary lamp [31L]**
14. **Left auxiliary lamp [73L]**
15. **Headlamp high beam [38HI]**
16. **Position lamp [29]**
17. **Right auxiliary lamp [73R]**
18. **Front WSS [167]**
19. **RHCM [22-1]**
20. **RHCM [22-2]**
21. **Accessory switch [67]**

Figure 7-8. Headlamp Nacelle: Without Fairing

Conditions for Setting the DTC

DTC C1021, C1023, C1025, C1027 or C1029 can set if the following conditions exist in the WSS circuit:

- Interference on WSS circuit.
- Dynamometer testing.
- WSS fault or malfunction.
- ABS ECU fault or malfunction.
- Incorrect or worn bearing assembly.
- Mismatched or improperly sized tires.
- Worn suspension components.
- Riding over rough terrain.
- External or internal wheel speed circuit intermittent open.
- Electrical noise on WSS wires.

DTC C1032 can set if one of the following conditions exist in the front high or low WSS circuit:

- Short to ground, short to battery, open or high resistance in the front high or low WSS circuits.
- WSS fault or malfunction.
- ABS ECU fault or malfunction.

DTC C1034 can set if one of the following conditions exist in the rear high or low WSS circuit:

- Short to ground, short to battery, open or high resistance in the rear high or low WSS circuits.
- WSS fault or malfunction.
- ABS ECU fault or malfunction.

Action Taken When the DTC Sets

- The ABS module disables the ABS.
- The ABS indicator is illuminated.

Diagnostic Tips

- A correctly installed ABS wheel bearing will have a tan seal facing outward.
- If the red seal is showing, the bearing is installed backward.
- If the seal is black, it is a non-ABS bearing. Replace with the correct bearing.

DTC C1032 and C1034 are related to terminals of the WSS, either internally in the EHCU or WSS, or externally in the wire or connectors. If a DTC is intermittent, it may be a connection problem from terminals of the WSS to the harness wiring.

Check for these issues prior to part replacement:

- Open in WSS circuit.
- WSS circuit short to voltage.
- Short to ground in WSS circuit.
- Short between WSS circuits.
- External or internal wheel speed circuit intermittent open.
- ABS module malfunction.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

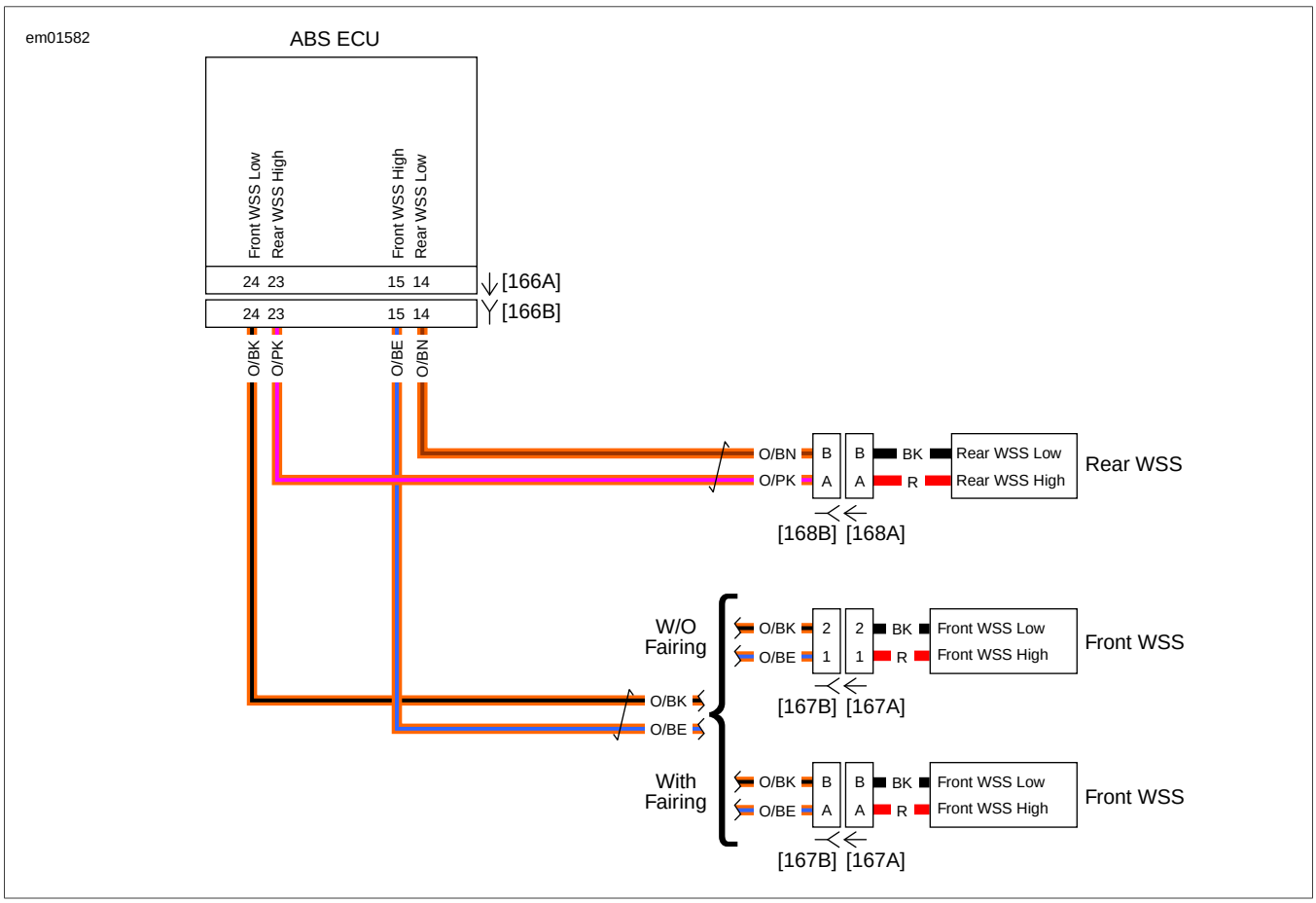


Figure 7-9. Wheel Speed Sensor Circuits

DTC C1021, C1023, C1025, C1027, C1029

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-7	ABS CABLE

Table 7-4. DTC C1021, C1023, C1025, C1027, C1029 Diagnostic Faults

POSSIBLE CAUSES
Electrical interference
Poor connections
Faulty WSS
Worn bearing assembly
Short to battery in the WSS circuits

1. Electrical Interference Test

1. Inspect vehicle for accessories that may cause electrical interference with WSS.
2. Electrical interference present?
   a. **Yes.** Remove or relocate interference.
   b. **No.** Go to Test 2.

2. Validation of Current DTC Test

1. Clear DTC.
2. Operate vehicle above 3 mph (5 km/h) for at least 90 seconds.
3. Check DTCs.
4. Did DTC reset?
   a. **Yes.** Go to Test 3.
   b. **No.** See diagnostic tips.

3. Worn or Damaged Components Test

1. Inspect for worn, damaged or incorrect bearing assembly.

NOTE

A correctly installed ABS wheel bearing will have a tan seal facing outward. If the red seal is showing, the bearing is installed backward. If the seal is black, it is a non-ABS bearing. Replace with the correct bearing.

2. Were worn, damaged or incorrect components found?
   a. **Yes.** Repair as needed.
   b. **No.** Go to Test 4.

4. Circuit Test

1. Inspect WSS connector for proper fit and damage.
2. Is WSS connector secure and in good condition?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace with appropriate bearing assembly and WSS and retest. If code comes back during retest replace ABS module.

5. Front Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect front WSS [167].
3. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) to wiring harness [166B], leaving EHCU [166A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 15 and ground.
6. Is voltage greater than 1.0V?
   a. **Yes.** Repair short to voltage on (O/BE) wire.
   b. **No.** Go to Test 6.

6. Rear Short to Voltage Test

1. Turn IGN OFF.
2. Disconnect rear WSS [168].
3. Turn IGN ON.
4. Test voltage between BOB terminal 23 and ground.
5. Is voltage greater than 1.0V?
   a. **Yes.** Repair short to voltage on (O/PK) wire.
   b. **No.** Repair or replace WSS connector as needed.

DTC C1032

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50341	WHEEL SPEED SENSOR TEST LEAD
HD-50390-1	BREAKOUT BOX
HD-50390-7	ABS CABLE

Table 7-5. DTC C1032 Diagnostic Faults

POSSIBLE CAUSES
WSS fault or malfunction
Intermittent open in the front high or low WSS circuits
Short to ground, short to battery, open or high resistance in the front WSS circuits

1. Electrical Interference Test

1. Inspect vehicle for accessories that may cause electrical interference with WSS.
2. Inspect front wheel bearing.
3. Is electrical interference or wheel bearing malfunction present?
   a. **Yes.** Remove or relocate interference or correct wheel bearing issues.
   b. **No.** Go to Test 2.

2. Loose or Damaged Connections Test

1. Turn IGN OFF.
2. See Figure 7-6. Inspect for loose or damaged connections on WSS circuits.
3. Were poor connections found?
   a. **Yes.** Repair connections and circuits.
   b. **No.** Go to Test 3.

3. Front WSS Test

1. Disconnect front WSS [167].
2. Connect WHEEL SPEED SENSOR TEST LEAD (Part No. HD-50341) between [167B] terminals 1 and 2 (non-fairing models) or A and B (fairing models). See 1.3 DIAGNOSTIC TOOLS.
3. Clear DTCs.
4. Cycle IGN OFF, ON, wait 10 seconds for ABS to complete initialization test.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace front WSS.

4. (O/BK) Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) between wire harness [166B], leaving ABS module [166A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Remove sensor test lead.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminal 24 and [167B] terminal 2 (non-fairing models) or B (fairing models) (O/BK) wire.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (O/BK) wire.

5. (O/BE) Open Test

1. Test resistance between BOB terminal 15 and [167B] terminal 1 (non-fairing models) or A (fairing models) (O/BE) wire.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (O/BE) wire.

6. Shorted Wires Test

1. Test continuity between BOB terminals 24 and 15.
2. Is continuity present?
   a. **Yes.** Repair short between (O/BE) and (O/BK) wires.
   b. **No.** Go to Test 7.

7. (O/BK) Ground Test

1. Test continuity between BOB terminal 24 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground on (O/BK) wire.
   b. **No.** Go to Test 8.

8. (O/BE) Ground Test

1. Test continuity between BOB terminal 15 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground on (O/BE) wire.
   b. **No.** Go to Test 9.

9. (O/BK) Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB terminal 24 and ground.
3. Is voltage present?
   a. **Yes.** Repair short to voltage on (O/BK) wire.
   b. **No.** Replace ABS module.

DTC C1034

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50341	WHEEL SPEED SENSOR TEST LEAD
HD-50390-1	BREAKOUT BOX
HD-50390-7	ABS CABLE

Table 7-6. DTC C1034 Diagnostic Faults

POSSIBLE CAUSES
WSS fault or malfunction
Intermittent open in the rear high or low WSS circuits
Short to ground, short to battery, open or high resistance in the rear WSS circuits

1. Electrical Interference Test

1. Inspect vehicle for accessories that may cause electrical interference with the WSS.
2. Inspect the rear wheel bearing.
3. Is electrical interference or wheel bearing malfunction present?
   a. **Yes.** Remove or relocate interference or correct wheel bearing issues.
   b. **No.** Go to Test 2.

2. Loose or Damaged Connections Test

1. See Figure 7-5. Inspect for loose or damaged connections on WSS circuits.

2. Were poor connections found?
   a. **Yes.** Repair connections and circuits.
   b. **No.** Go to Test 3.

3. Rear WSS Test

1. Turn IGN OFF.
2. Disconnect rear WSS [168].
3. Connect WHEEL SPEED SENSOR TEST LEAD (Part No. HD-50341) between [168A] terminals 1 and 2. See 1.3 DIAGNOSTIC TOOLS.
4. Clear DTCs.
5. Cycle IGN OFF, ON, wait 10 seconds for ABS to complete initialization test.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace rear WSS.

4. (O/BN) Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) between wire harness [166B], leaving ABS module [166A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Remove sensor test lead.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminal 14 and [168A] terminal B (O/BN) wire.
5. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (O/BN) wire.

5. (O/PK) Open Test

1. Test resistance between BOB terminal 23 and [168A] terminal A (O/PK) wire.
2. Is resistance less than 0.5 Ohms?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair open in (O/PK) wire.

6. Shorted Wires Test

1. Test continuity between BOB terminals 14 and 23.
2. Is continuity present?
   a. **Yes.** Repair short between (O/BN) and (O/PK) wires.
   b. **No.** Go to Test 7.

7. (O/BN) Ground Test

1. Test continuity between BOB terminal 14 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground on (O/BN) wire.
   b. **No.** Go to Test 8.

8. (O/PK) Ground Test

1. Test continuity between BOB terminal 23 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground on (O/PK) wire.
   b. **No.** Go to Test 9.

9. (O/BN) Voltage Test

1. Turn IGN ON.
2. Test voltage between BOB terminal 14 and ground.
3. Is voltage present?
   a. **Yes.** Repair short to voltage on (O/BN) wire.
   b. **No.** Replace ABS module.

INVALID VIN DIAGNOSTICS 7.4

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The EHCU is calibrated to maximize ABS performance. If the correct calibration is not in the module the ABS may not perform correctly. The ECM and ABS modules also compare VINs to verify the correct ABS module is installed. These VINs must match before the ABS will operate properly.

Table 7-7. Code Description

DTC	DESCRIPTION
C1159	ABS invalid stored VIN
C1178	ABS no VIN received from ECM
C1184	ABS invalid VIN from ECM

Conditions for Setting the DTC

The ABS module determines final calibration is not completed or that the VIN does not match calibration.

Action Taken When the DTC Sets

- ABS is disabled.
- The ABS indicator is illuminated.

Diagnostic Tips

These codes will usually appear after replacing the ECM or the EHCU. The **new** modules must be programmed using DIGITAL TECHNICIAN II (Part No. HD-48650). After the parts are programmed and matched correctly for the specific vehicle, clear the codes.

DTC C1159, C1178, C1184

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

Table 7-8. DTC C1159, C1178, C1184 Diagnostic Faults

POSSIBLE CAUSES
An EHCU that is not calibrated correctly or has an internal fault
ECM VIN does not match ABS

1. Validation of ECM VIN

1. Using DIGITAL TECHNICIAN II (Part No. HD-48650), verify ECM has the correct VIN for ABS equipped vehicle.
2. Is ECM correct for this vehicle?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace ECM.

2. Validation of Current DTC Test

1. Clear DTC.
2. Start engine. Wait 10 seconds for ABS to complete initialization test.
3. Turn engine off.

NOTE

If more than one DTC resets, make sure to diagnose the DTC with the higher priority first. Refer to Table 1-12.

4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Go to Test 3.
   b. **No.** See diagnostic tips.

3. Successful Calibration Test

1. Using DIGITAL TECHNICIAN II (Part No. HD-48650), attempt to calibrate the EHCU using the ABS service feature found in Vehicle Set Up.
2. Clear DTCs.
3. Turn IGN ON.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Go to Test 4.
   b. **No.** Calibration complete.

4. Speedometer Test

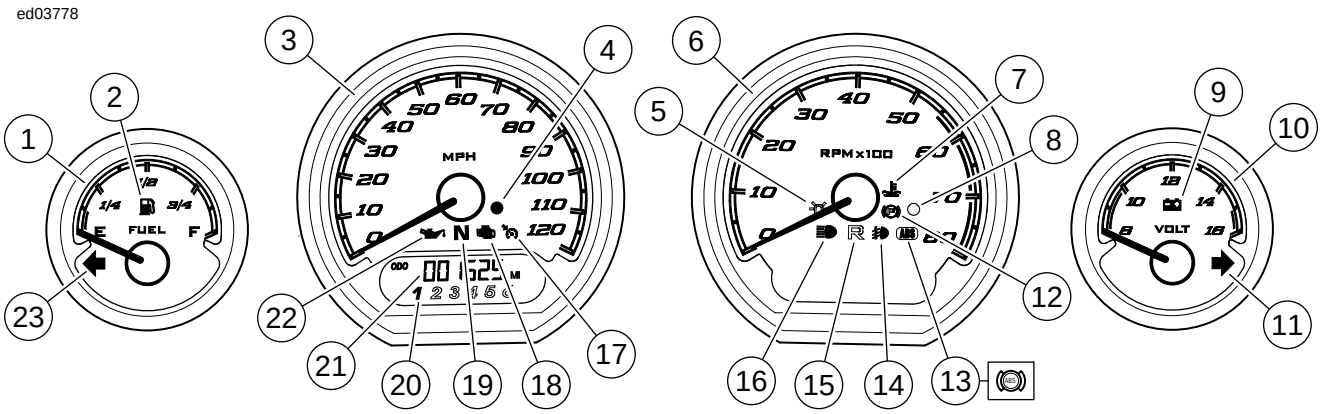
1. Cycle IGN OFF and ON.
2. Does speedometer display VINERR?
   a. **Yes.** Replace ECM.
   b. **No.** Replace EHCU.

ABS INDICATOR ALWAYS ON, FLASHING OR INOPERATIVE 7.5

DESCRIPTION AND OPERATION

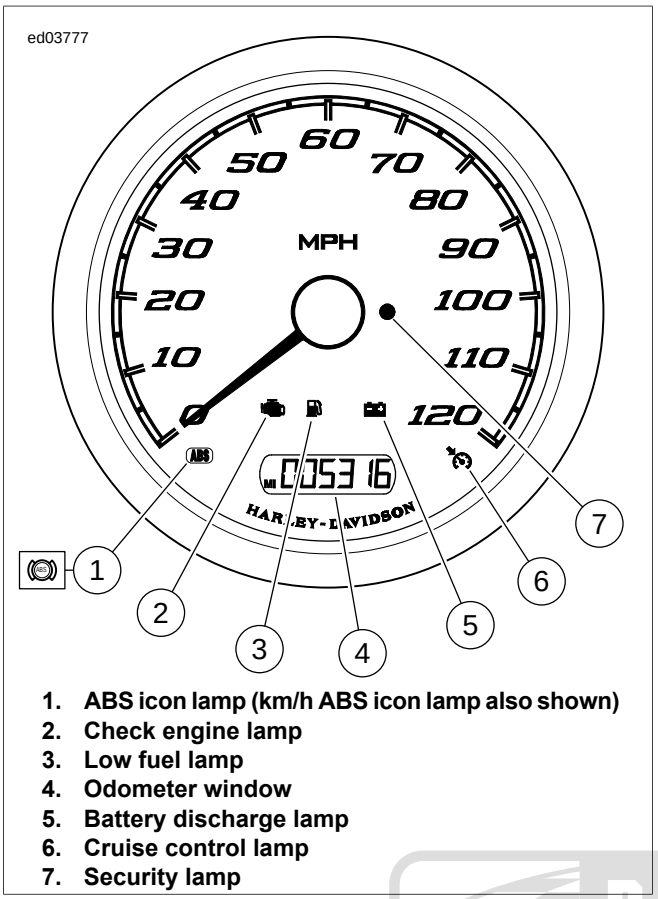
See Figure 7-10 and Figure 7-11. The speedometer/IM illuminates the ABS indicator by supplying ground to the lamp. The ABS module sends a message on the CAN bus to the speedometer/IM in order to command the indicator ON or OFF.

The ABS indicator will normally come on and then begin to flash when the vehicle is turned ON. It will continue to flash until the EHCU sees at least 3 mph (5 km/h) from both WSS to verify proper operation.



1. Fuel gauge
2. Low fuel lamp
3. Speedometer
4. Security lamp
5. Not used for these models
6. Tachometer
7. Engine coolant temperature lamp
8. Light sensor (not an indicator)
9. Battery discharge lamp
10. Voltmeter
11. Right turn signal indicator lamp
12. Not used for these models
13. ABS icon lamp (km/h ABS icon lamp also shown)
14. Auxiliary/fog lamp indicator lamp
15. Not used for these models
16. Headlamp high beam lamp
17. Cruise control lamp
18. Check engine lamp
19. Neutral lamp
20. Gear indicator
21. Odometer window
22. Oil pressure lamp
23. Left turn signal indicator lamp

Figure 7-10. Indicator Lamps: Typical (Fairing Models)



1. **ABS icon lamp (km/h ABS icon lamp also shown)**
2. **Check engine lamp**
3. **Low fuel lamp**
4. **Odometer window**
5. **Battery discharge lamp**
6. **Cruise control lamp**
7. **Security lamp**

Figure 7-11. Indicator Lamps: Non-Fairing Models

Diagnostic Tips

The malfunction must be present during diagnosis in order to prevent unnecessary parts replacement.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

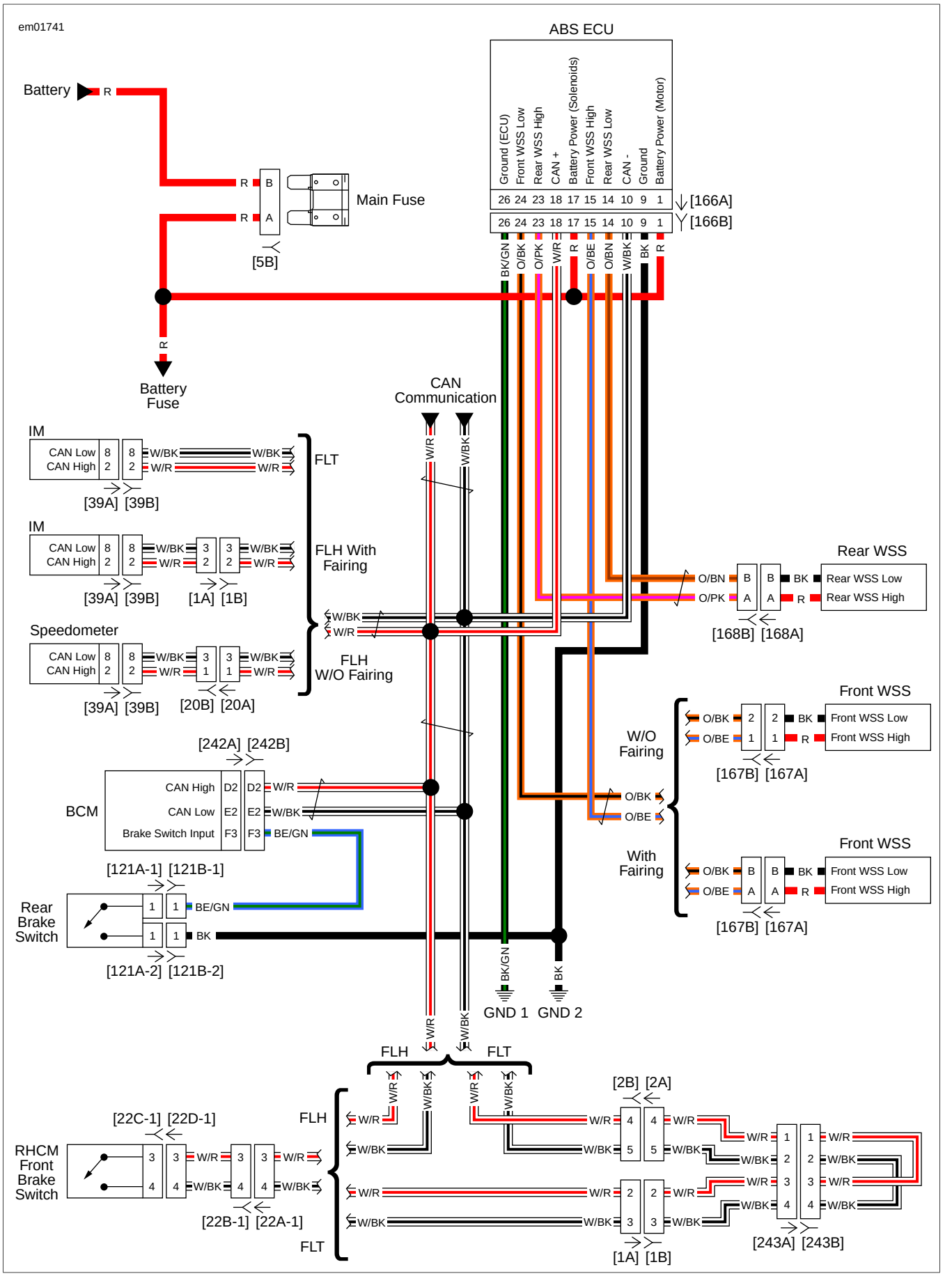


Figure 7-12. ABS Schematic

ABS INDICATOR CONTINUOUSLY FLASHING, NO DTCS

Table 7-9. ABS Indicator Continuously Flashing, No DTCs Diagnostic Faults

POSSIBLE CAUSES
Incorrect wheel bearing
Bearing not properly installed
Damaged wheel bearing

1. DTC Test

1. Verify vehicle is equipped with ABS and has appropriate speedometer/IM.
2. Clear DTCs.
3. Turn IGN OFF.
4. Check DTCs.
5. Did DTCs set?
   a. **Yes.** See appropriate diagnostic procedure.
   b. **No.** Go to Test 2.

2. Wheel Bearing Inspection Test

1. Inspect for worn, damaged or incorrect bearing assembly on the front wheel.

NOTE

A correctly installed ABS wheel bearing will have a tan seal facing outward. If the red seal is showing, the bearing is installed backward. If the seal is black, it is a non-ABS bearing. Replace with the correct bearing.

2. Inspect for worn, damaged or incorrect bearing assembly on the rear wheel.
3. Were worn, damaged or incorrect components found?
   a. **Yes.** Repair the front wheel bearing as needed.
   b. **No.** Repair the rear wheel bearing as needed.

ABS INDICATOR ALWAYS ON OR INOPERATIVE

PART NUMBER	TOOL NAME
HD-42682	BREAKOUT BOX
HD-45325	JUMPER HARNESS
HD-50390-1	BREAKOUT BOX
HD-50390-7	ABS CABLE

Table 7-10. ABS Indicator Always On or Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open battery circuit
Open ground circuit
Short to ground in battery circuit

1. DTC Test

1. Verify vehicle is equipped with ABS and has appropriate speedometer/IM.
2. Clear DTCs.
3. Turn IGN OFF.
4. Check DTCs.
5. Did DTCs set?
   a. **Yes.** See appropriate diagnostic procedure.
   b. **No.** Go to Test 2.

2. ABS Lamp Function Test

1. Perform a "WOW" test. See 1.2 INITIAL DIAGNOSTICS.
2. Does ABS lamp function properly during the "WOW" test?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace speedometer/IM. **(6006)**

3. ABS Power Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and ABS CABLE (Part No. HD-50390-7) to wiring harness [166B], leaving ABS module [166A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Connect BREAKOUT BOX (Part No. HD-42682) and JUMPER HARNESS (Part No. HD-45325) between wire harness [39B] and speedometer/IM [39A]. See 1.3 DIAGNOSTIC TOOLS.
4. Turn IGN ON.
5. Test voltage between ABS BOB terminal 1 and ground.
6. Test voltage between ABS BOB terminal 17 and ground.
7. Is battery voltage present on both circuits?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open in ABS module battery circuit. **(5041)**

4. ABS Ground Circuit Test

1. Turn IGN OFF.
2. Test continuity between ABS BOB terminal 26 and ground.
3. Test continuity between ABS BOB terminal 9 and ground.
4. Is continuity present on both circuits?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open in (BK/GN) or (BK) wire. **(5041)**

5. ABS ECU Test

1. Remove ABS BOB and connect [166].
2. Remove speedometer BOB and connect [39].
3. Clear DTCs.
4. Start the vehicle. Operate in the parameters for initialization self-test.
5. Turn IGN OFF.

6. Check DTCs.

7. Did DTC reset?
   a. **Yes.** Replace EHCU.
   b. **No.** Concern is intermittent. See 1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test.

TABLE OF CONTENTS

NOTES

AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS 8.1

SPECIFICATIONS

There are two different versions:

- Boom! Box 4.3 (4.3" screen)
- Boom! Box 6.5 GT (6.5" touchscreen with GPS Navigation database)

See the Boom! Box Owner's Manual for a list of features, options and operating instructions for the models available in your region.

Table 8-1. Radio Configuration

RADIO	STANDARD RADIO 4.3	PREMIUM RADIO 6.5GT
4.3" non-touch screen	X	N/A
6.5" touch screen	N/A	X
GPS navigation database	N/A	X
25 watt per channel, 1% total harmonic distortion	X	X
5.25" 2 Ohm, two way speakers	X	X
USB 2.0 user port	Supports 480 mbps (high speed) operation	
Supported languages	US English, UK English, FR French, CA French, ES Spanish, MX Spanish, German, Italian and Portuguese	
External amplifier (if equipped)	X	X
Bluetooth	X	X

Audio Interrupts

The different functions of the radio are set up to operate together. This requires the functions to interrupt each other in a logical way. The radio has several modes of operation that will cause an interruption with the speakers.

- Hands Free Mode (HFM): Phone in (PH) with Active Intercom (INTCM)
- Navigation/PND AutoDetect (NAV)
- CB Transmit PTT (CB Tx)
- CB Receive (CB Rx)
- Intercom, Mic Sum (INTCM)
- Radio Data System (RDS) Traffic Announcement (TA): Europe only
- Weather Alert (WA): US only

There are three ways the radio will adjust for an interruption depending on what task the radio is performing and what type of interruption occurs.

- **Mute:** The audio will pause.
- **Attenuation:** The volume will decrease so the interrupt can be heard over it.
- **Mix/Add:** Both sources will play at the same time.

Table 8-2. Interrupts Effect on Media

INTERRUPTS	WA	HFM	NAV	CB Tx	CB Rx	INTCM	TA
Mute	X	X	X	X	X		X
Attenuate						X	

Table 8-3. Interrupts Effect on Weather Alert (WA)

INTERRUPTS	HFM	NAV	CB Tx	CB Rx	INTCM
Mute	X	X	X	X	
Attenuate					X

Table 8-4. Interrupts Effect on Hands Free Mode (HFM)

INTERRUPTS	WA	NAV	CB Tx	CB Rx	TA
Prompt	X				X
Pickup/Hang up			X		
Mix/Add		X			
Blocked				X	

Table 8-5. Interrupts Effect on Navigation Mode (NAV)

INTERRUPTS	WA	HFM	CB Tx	CB Rx	INTCM	TA
Mix/Add	X	X	X	X	X	X

Table 8-6. Interrupts Effect on CB Transmit (Tx) Mode

INTERRUPTS	WA	HFM	NAV	CB Rx	INTCM	TA
Prompt	X					X
Mix/Add		X	X		X	
Blocked				X		

Table 8-7. Interrupts Effect on CB Receive (Rx) Mode

INTERRUPTS	WA	HFM	NAV	CB Tx	INTCM	TA
Mute	X	X		X		X
Mix/Add			X		X	

Table 8-8. Interrupts Effect on Intercom (INTCM) Mode

INTERRUPTS	WA	HFM	NAV	CB Tx	CB Rx	TA
Mix/Add	X	X	X	X	X	X

Table 8-9. Interrupts Effect on Traffic Announcement (TA)

INTERRUPTS	HFM	NAV	CB Tx	CB Rx	INTCM
Mute	X		X	X	
Mix/Add		X			X

GENERAL INFORMATION

Always verify the system has the latest software version available before attempting diagnostics. Software update instructions and the latest software version are available on www.harley-davidson.com.

The audio system has a service menu to aid in identification and diagnosis of most fault conditions. Many faults are stored as diagnostic trouble codes (DTCs). Fault conditions that do not generate DTCs or those for which DTCs cannot be read, can be identified by their symptoms. For troubleshooting and resolving audio system symptoms, see 8.12 AUDIO SYSTEM SYMPTOMS.

SERVICE MENU

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

To enter the service menu:

1. Turn IGN OFF. Wait 15 seconds.
2. Press and hold power/mute button. Turn IGN to ACC.
3. Continue to press power button for 2 seconds after the WARNING screen is displayed.
4. Release power/mute button and accept warning.

The service menu will display the following options:

NOTE

The service menu may display "Diag Service not Available" when a menu option is initially selected. This message will clear once the system has finished performing the "power-on" process.

- DTCs
- Audio
- Display
- Key input
- Component menus
- Version information
- Reset
- Touchscreen

DTCs

This menu item allows the user to view all logged radio DTCs and clear historic DTCs. The DTC status is displayed as either current or historic. The user can toggle between numerical and text descriptions by selecting the information icon between the page up and down buttons. The user can also view additional DTC information by selecting a specific DTC in the list. Additional information includes if an odometer value DTC occurred, a test fail counter and ages since the first and last test failures.

Audio

NOTE

Audio system DTCs can be retrieved through the audio system service menu, odometer self-diagnostic and DIGITAL TECHNICIAN II (Part No. HD-48650).

The audio menu item contains these sub-menu items:

- **EQ:** This menu item was designed for EQ development and has no diagnostic purpose.
- **Speaker test:** This screen displays a representation of the available speaker outputs. The user can perform a manual test of any one of the speaker outputs by pressing the appropriate speaker graphic (or associated faceplate button). The speaker graphic will remain highlighted until the user presses the graphic again (or associated faceplate button). While the selected speaker is tested, a multi-frequency tone is played through the associated speaker.

  The user can also select an auto test that tests each of the speakers in turn for 5 seconds. As each speaker is tested, the associated graphic is highlighted. The auto test can be canceled at any time by pressing auto test a second time.

NOTE

All speaker test functions are turned off when an amplifier is connected to the audio system.

Display

This menu item tests the LCD display brightness and color consistency by displaying a series of screen colors. Pressing the previous/next buttons of the left audio switch will transition the display to white, red, green, blue, and four quadrants of different color (white, green, red, blue) with each press of the switch. The final transition will be back to the service menu.

Key Input

The tests within this menu verify the proper function of the audio switches and buttons. It contains these sub-menu items:

- **Faceplate hardkeys:** The radio screen will display a graphic representation of the faceplate buttons. As the faceplate buttons are pressed, the corresponding button on the radio graphic display will illuminate. For the Boom! Box 4.3, a long press of the "Back" and "Exit" are required for their normal function, since a short press of either of these buttons will result in the corresponding radio graphic button to be illuminated.
- **Handlebars:** The radio screen will display a graphic representation of the handlebar controls. As the audio switches are pressed, the corresponding switch on the radio graphic display will illuminate. This function is limited to testing the handlebar switches used to operate the audio system.
- **Passenger controls:** The radio screen will display a graphic representation of the rear passenger controls (if equipped). As the rear audio switches are pressed, the corresponding switch on the radio graphic display will illuminate.

Component Menus

The component menu contains multiple tabs depending on a standard or premium model: SDARS (Satellite Digital Audio Radio Service) or XM (only available on Boom! Box 6.5 versions). It contains these sub-menu items:

- **Module versions:** Displays the XM module firmware and hardware version information.
- **Subscription info:** Displays XM subscription information, including specialty services.
- **Signal status:** Displays signal status.
- **Antenna state:** Displays the XM module reported signal state. The possible values are: unsupported, detected, not detected, shorted and unknown.
- **Tone generation:** Allows for generating left or right side multi-frequency audio tone generated by the XM module. Volume must not be muted for proper operation.
- **Navigation setting:** The navigation setting menu was designed for developmental purposes and has no diagnostic function.
- **GPS status:** Displays a graphical representation of GPS satellite position and signal strength.
- **Tuner:** Displays the current frequency, signal strength and RDS/RBDS information for each available tuner. If the signal is unavailable or out of range, the display may show dashes instead of a value.
- **Compass:** Indicates current direction.

Version Information

Version information displays a list of software components and their versions. A sub-menu is also displayed that shows the navigation software and database versions. These displays are for developmental purposes and have no diagnostic purpose. To access software and hardware version information for diagnostics, enter the "System Information" sub-menu in the "Set-up" menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS, Software Updates.

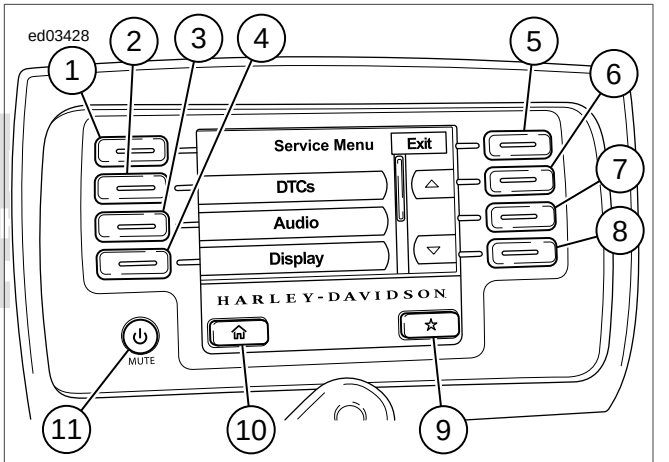
Reset

The reset menu contains these sub-menu items:

- **Pre-calibration reset:** Restores factory default settings. This is recommended when there are radio symptoms and no DTCs.
- **Post calibration save:** Archives customer settings so that they can be restored after a "Post calibration Reset".
- **Post calibration reset:** Resets the radio to factory default settings and restores the last archived data stored during "Post calibration Save".
- **Privacy reset:** Clears private data such as phone pairing, phonebook download, presets and navigation history.

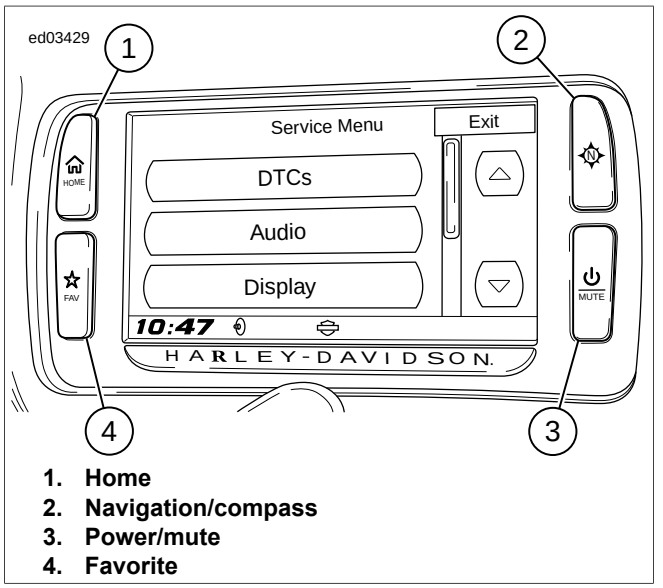
Touchscreen Calibration (Boom! Box 6.5 Models Only)

Calibrate the touchscreen by pressing the center of the displayed target. The target moves to a new location of the screen after each press, for a total of three presses. Press accept for the calibration to update.



1. **Preset 1**
2. **Preset 2**
3. **Preset 3**
4. **Preset 4**
5. **Preset 5**
6. **Preset 6**
7. **Preset 7**
8. **Preset 8**
9. **Favorite**
10. **Home**
11. **Power/mute**

Figure 8-1. Boom! Box 4.3 Radio



1. **Home**
2. **Navigation/compass**
3. **Power/mute**
4. **Favorite**

Figure 8-2. Boom! Box 6.5T/GT Radio

RESETS

Follow these steps when performing a pre-calibration reset:

1. Turn IGN and radio ON.
2. Record all presets on AM and FM.
3. Enter service menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
4. Enter reset tab.
5. Enter pre-calibration reset tab.
6. When prompted with "Restore Factory defaults?", enter "Yes".
7. When prompted with the "Warning" screen, enter "Accept". This completes the reset.
8. Verify the radio reset cleared the observed symptom. If not, see 8.12 AUDIO SYSTEM SYMPTOMS.
9. Set clock and enter all recorded presets.

SOFTWARE UPDATES

Download updates onto an 8 GB or larger USB flash drive. Turn IGN to ACC and radio ON. Install the USB flash drive into the radio USB cable and follow radio display.

When checking for software versions perform the following steps:

1. Turn IGN ON.
   a. **Keyed ignition:** Turn ignition switch to ACC.
   b. **Keyless ignition:** With fob present, press and hold TRIP switch to enter accessory mode.
2. Turn radio ON.
3. Accept warning screen.
4. Press HOME button.
5. Press set-up button.
6. Scroll down to system information and press button.
7. Press software button.
8. Record number under software version.

AUDIO VOLTAGE DIAGNOSTICS 8.2

DESCRIPTION AND OPERATION

Battery voltage is continuously monitored by the radio and amplifier. A DTC is set when battery voltage fails to meet specifications for 15 seconds.

Conditions for Setting

Battery voltage is monitored by the radio on terminals M3 and M4 of [27].

- DTC B1300 is displayed when the system voltage is greater than 16V.
- DTC B1301 is displayed when the system voltage is less than 9V.

Battery voltage is monitored by the amplifier on terminals 9 and 16 of [149-1] or [149-2].

- DTC B1401 is displayed when the system voltage is less than 9V.
- DTC B1402 is displayed when the system voltage is greater than 16V.

NOTE

ECM, ABS, ECU and/or BCM may also set a battery voltage DTC.

Table 8-10. Code Description

DTC	DESCRIPTION
B1300	Radio voltage high
B1301	Radio voltage low
B1401	AMP voltage low
B1402	AMP voltage high

Diagnostic Tips

Any of the following conditions could cause these DTCs to set:

- The charging system is malfunctioning.
- There is excessive battery draw and/or extended idling in heavy traffic.
- A faulty system ground is present. Low voltage generally indicates a loose wire, corroded connections, battery and/or a charging system problem.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

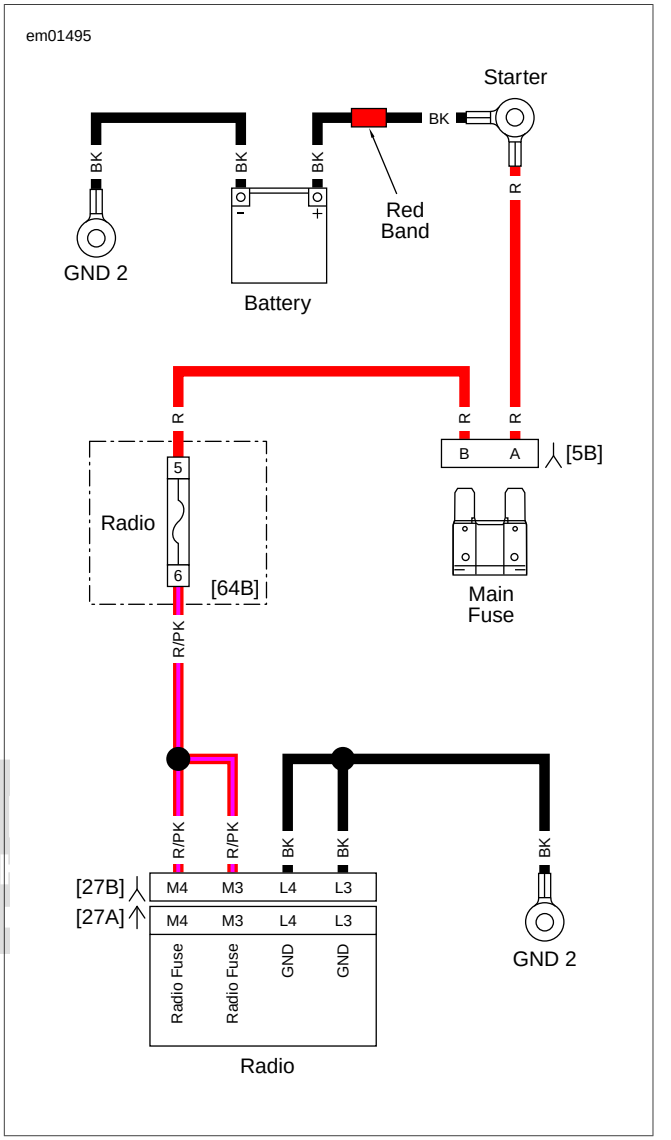


Figure 8-3. Radio Power Circuit

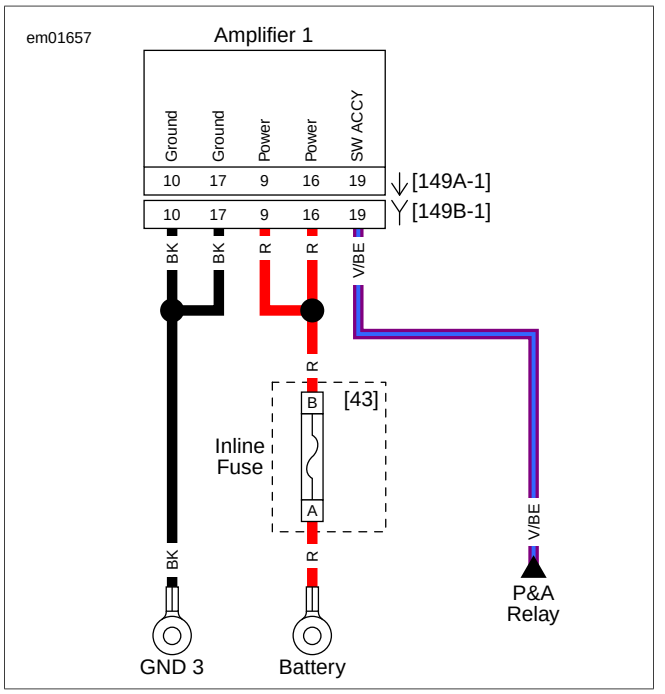


Figure 8-4. Amplifier 1: Power Circuit

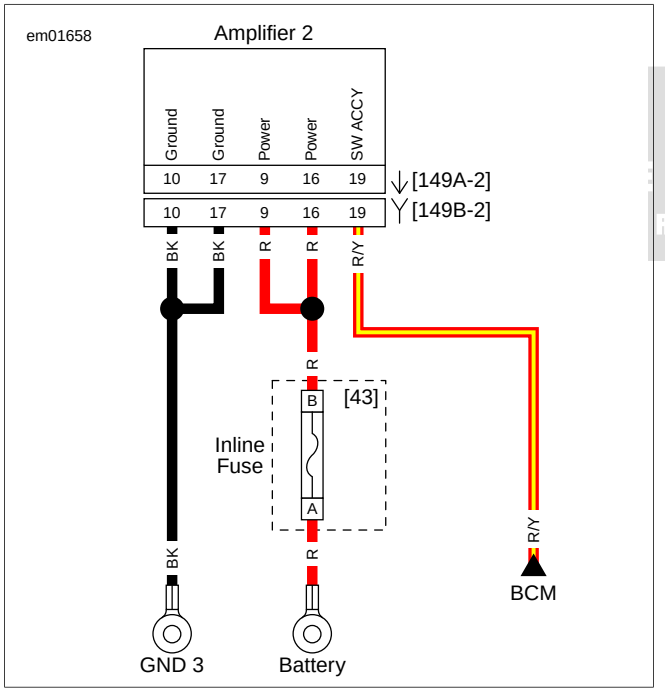


Figure 8-5. Amplifier 2: Power Circuit

DTC B1300

Table 8-11. DTC B1300 Diagnostic Faults

POSSIBLE CAUSES
Charging system malfunction

1. Charging System Test

1. Perform charging system test. See 3.6 CHARGING SYSTEM.
2. Is charging system working properly?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair charging system.

2. Radio DTC Test

1. Turn IGN OFF.
2. Clear DTCs.
3. Start vehicle.
4. Run at 3000 rpm for 5 seconds.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1301

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-12. DTC B1301 Diagnostic Faults

POSSIBLE CAUSES
Low battery
High resistance in radio power circuit
Charging system malfunction

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery.

2. Charging System Test

1. Perform charging system test. See 3.6 CHARGING SYSTEM, Low or No Charging.
2. Is charging system working properly?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair charging system.

3. Radio Battery Voltage M3 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.

4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal M3 and ground.
7. Is voltage less than 9V?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 4.

4. Radio Battery Voltage M4 Test

1. Test voltage between BOB terminal M4 and ground.
2. Is voltage less than 9V?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 8.

5. Radio Battery Voltage Drop M3 Test

1. Perform voltage drop test between BOB terminal M3 and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 7.
   b. **No.** Problem may be intermittent. Go to Test 8.

6. Radio Battery Voltage Drop M4 Test

1. Perform voltage drop test between BOB terminal M4 and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 7.
   b. **No.** Problem may be intermittent. Go to Test 8.

7. Radio Battery Voltage Drop Test

1. Perform voltage drop test between fuse block [64B] socket terminal 6 and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Repair or replace (R) wire between [64B] socket terminal 5 and [5B] terminal B.
   b. **No.** Repair or replace (R/PK) wire between [27B] terminals M3 and M4 and [64B] socket terminal 6.

8. Radio DTC Test

1. Turn IGN OFF.
2. Clear DTCs.
3. Start vehicle.
4. Run at 3000 rpm for 5 seconds.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1401

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-13. DTC B1401 Diagnostic Faults

POSSIBLE CAUSES
Low battery
High resistance in amplifier power circuit
Charging system malfunction

NOTE

Amplifier 1 is referring to [149-1] and amplifier 2 is referring to [149-2]. This diagnostics procedure refers to both as [149].

1. Battery Test

1. Perform battery test. See 3.1 BATTERY TESTING.
2. Did battery pass test?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace battery.

2. Charging System Test

1. Perform charging system test. See 3.6 CHARGING SYSTEM, Low or No Charging.
2. Is charging system working properly?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair charging system.

3. Amplifier Battery Voltage 9 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B] and amplifier [149A]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 9 and ground.
5. Is voltage less than 9V?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 4.

4. Amplifier Battery Voltage 16 Test

1. Test voltage between BOB terminal 16 and ground.
2. Is voltage less than 9V?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 8.

5. Amplifier Battery Voltage Drop 9 Test

1. Perform voltage drop test between BOB terminal 9 and battery (+).

2. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 7.
   b. **No.** Problem may be intermittent. Go to Test 8.

6. Amplifier Battery Voltage Drop 16 Test

1. Perform voltage drop test between BOB terminal 16 and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Go to Test 7.
   b. **No.** Problem may be intermittent. Go to Test 8.

7. Amplifier Battery Voltage Drop Test

1. Perform voltage drop test between in line fuse [43B] terminal A and battery (+).
2. Is voltage drop greater than 0.5V?
   a. **Yes.** Repair or replace (R) wire between [43B] terminal A and battery.
   b. **No.** Repair or replace (R) wire between [149B] terminals 9 and 16 and inline fuse [43B] socket terminal B.

8. Amplifier DTC Test

1. Turn IGN OFF.
2. Clear DTCs.
3. Start vehicle.
4. Run at 3000 rpm for 5 seconds.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace amplifier.
   b. **No.** System working properly.

DTC B1402

Table 8-14. DTC B1402 Diagnostic Faults

POSSIBLE CAUSES
Charging system malfunction

1. Charging System Test

1. Perform charging system tests. See 3.6 CHARGING SYSTEM.
2. Is charging system good?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair charging system.

2. Repair Validation Test

1. Clear DTCs.
2. Start vehicle.
3. Run at 3000 rpm for 5 seconds.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace amplifier.
   b. **No.** System working properly.

FACEPLATE BUTTON DIAGNOSTICS 8.3

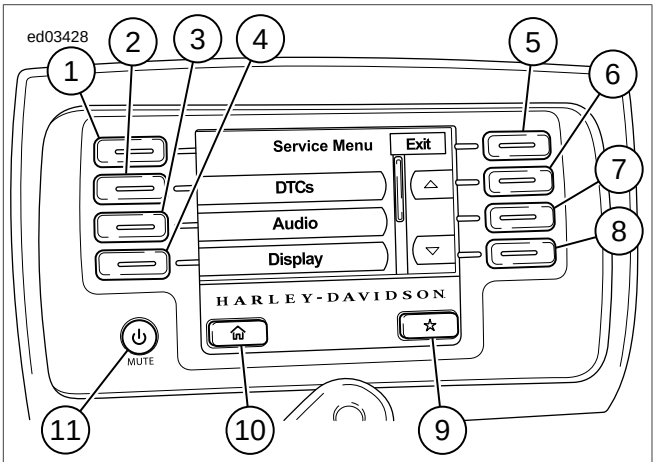
DESCRIPTION AND OPERATION

See Figure 8-6 and Figure 8-7. Faceplate button status is continuously monitored by the radio. A DTC is set if a faceplate button is pushed for more than 30 seconds.

See Figure 8-8. Some faceplate functions can be controlled using the RHCM.

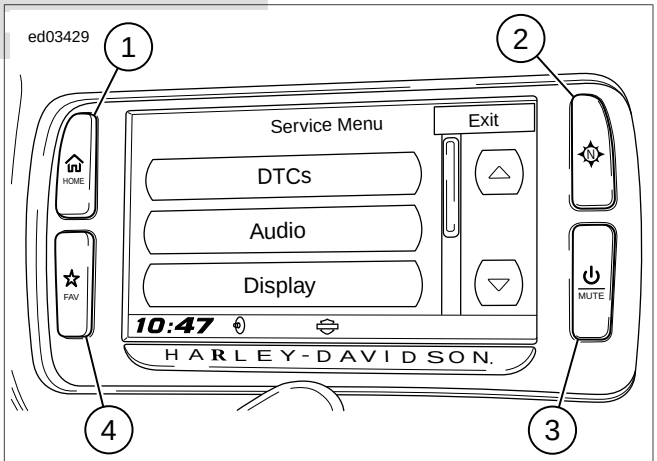
Table 8-15. Code Description

DTC	DESCRIPTION
B1302	Faceplate home button stuck
B1303	Faceplate favorite button stuck
B1304	Faceplate navigation button stuck
B1305	Faceplate power/mute button stuck
B1329	Faceplate preset button 1 stuck
B1330	Faceplate preset button 2 stuck
B1331	Faceplate preset button 3 stuck
B1332	Faceplate preset button 4 stuck
B1333	Faceplate preset button 5 stuck
B1334	Faceplate preset button 6 stuck
B1335	Faceplate preset button 7 stuck
B1336	Faceplate preset button 8 stuck



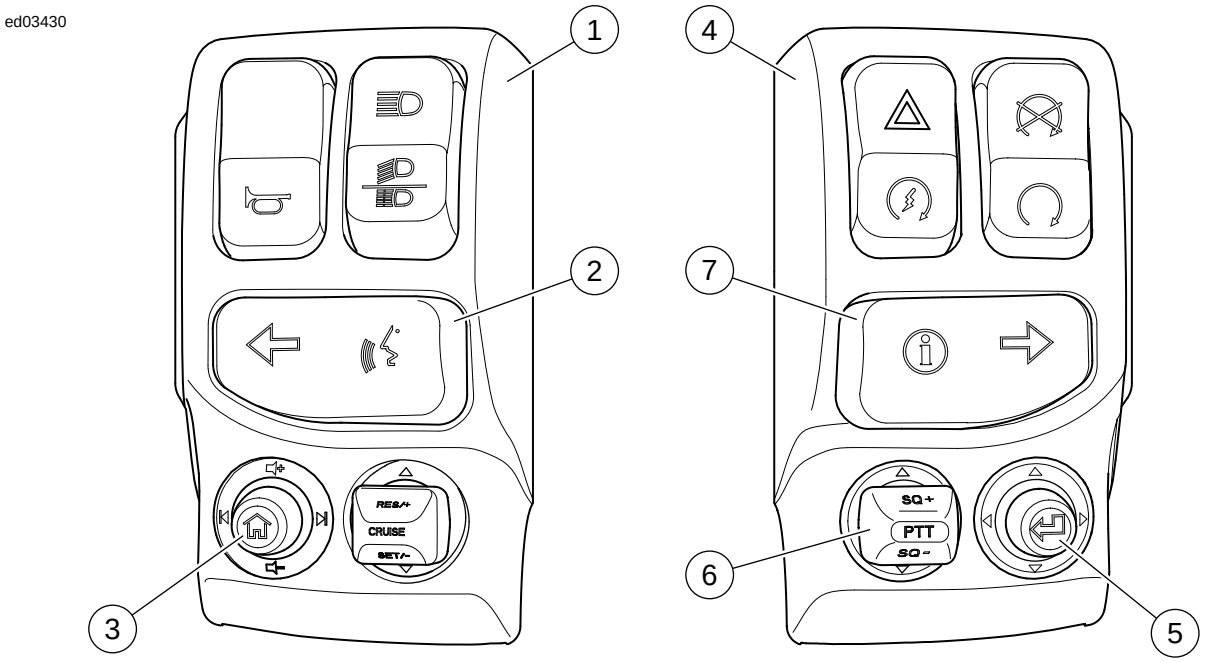
1. **Preset 1**
2. **Preset 2**
3. **Preset 3**
4. **Preset 4**
5. **Preset 5**
6. **Preset 6**
7. **Preset 7**
8. **Preset 8**
9. **Favorite**
10. **Home**
11. **Power/mute**

Figure 8-6. Boom! Box 4.3 Radio



1. **Home**
2. **Navigation/compass**
3. **Power/mute**
4. **Favorite**

Figure 8-7. Boom! Box 6.5T/GT Radio



1. **LHCM**
2. **Voice recognition**
3. **Audio/home**
4. **RHCM**
5. **Select/enter**
6. **PTT/squelch**
7. **Information**

Figure 8-8. Radio Hand Controls

Diagnostic Tips

- When one faceplate button is stuck, all faceplate buttons become inoperative.
- Verify there is no foreign debris on the faceplate holding buttons down.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

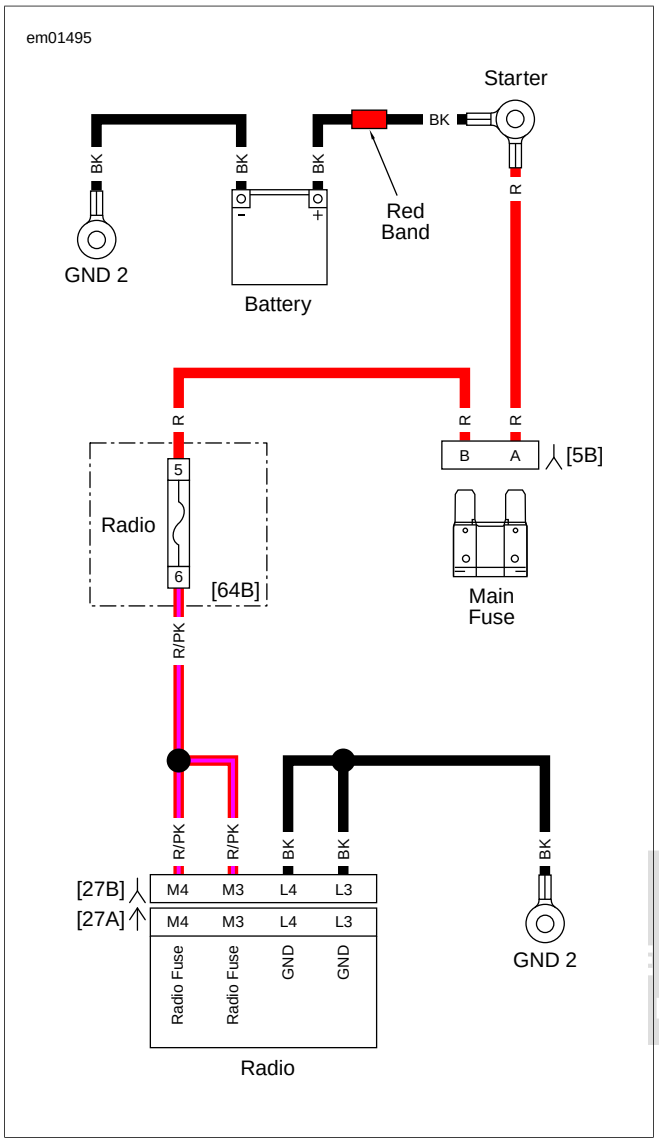


Figure 8-9. Radio Power Circuit

FACEPLATE BUTTON STUCK

Table 8-16. Faceplate Button Stuck Diagnostic Faults

POSSIBLE CAUSES
Damaged faceplate
Reset needed

1. Visual Test

1. Inspect faceplate for damage.
2. Is there damage to the faceplate?
   a. **Yes.** Replace radio.
   b. **No.** Go to Test 2.

NOTE

The select button on the RHCM will be used move through the selections from this point.

2. Switch Test

1. Enter service menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Select key input menu.
3. Select faceplate hardkeys sub-menu.
4. Press suspect faceplate button and verify button illuminates on radio display.
5. Does button illuminate?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. Radio DTC Test

1. Turn IGN OFF.
2. Clear DTCs.
3. Turn IGN OFF
4. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 4.
   b. **No.** System working properly.

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Go to Test 5.
   b. **No.** System working properly.

5. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

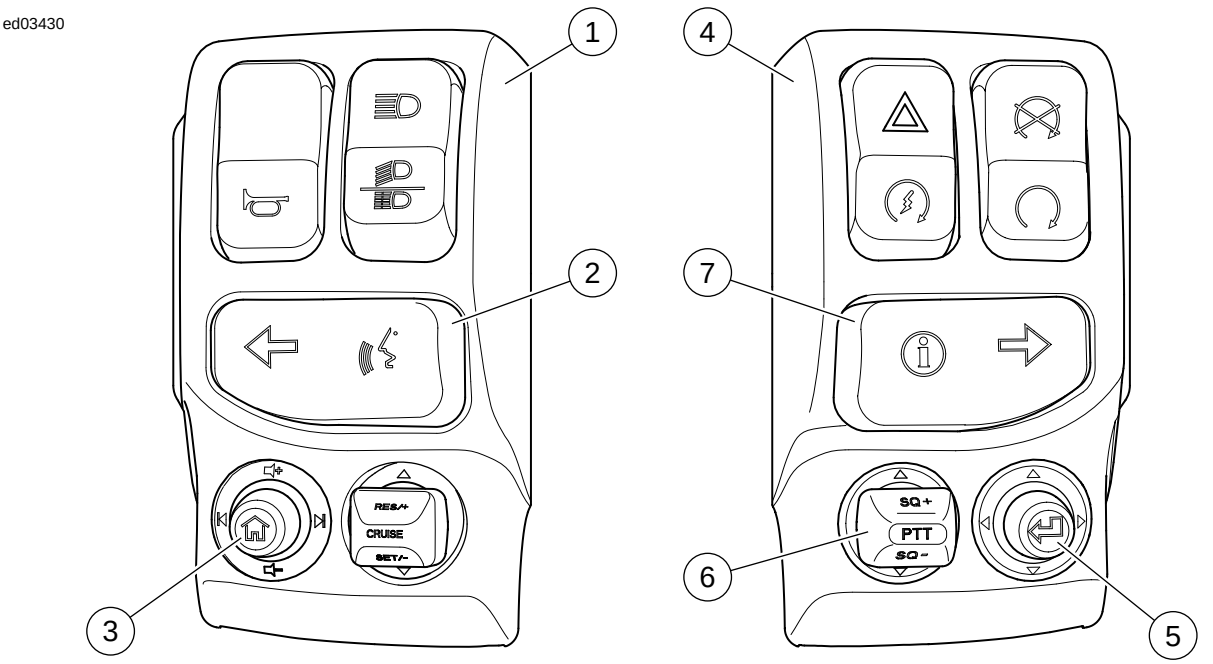
FRONT HAND CONTROLS DIAGNOSTICS 8.4

DESCRIPTION AND OPERATION

See Figure 8-10. Front hand control button status is continuously monitored by the radio through the CAN bus. A DTC is set if a front hand control button is pushed for more than 30 seconds.

Table 8-17. Code Description

DTC	DESCRIPTION
B1314	LHCM VR PTT button stuck
B1315	LHCM volume up button stuck
B1316	LHCM previous/seek down button stuck
B1317	LHCM home button stuck
B1318	LHCM next/seek up button stuck
B1319	LHCM volume down button stuck
B1320	RHCM info button stuck
B1321	RHCM cursor up button stuck
B1322	RHCM cursor left button stuck
B1323	RHCM select/enter button stuck
B1324	RHCM cursor right button stuck
B1325	RHCM cursor down button stuck
B1326	RHCM CB squelch up button stuck
B1327	RHCM CB PTT button stuck
B1328	RHCM CB squelch down button stuck



1. **LHCM**
2. **Voice recognition**
3. **Audio/home**
4. **RHCM**
5. **Select/enter**
6. **PTT/squelch**
7. **Information**

Figure 8-10. Radio Hand Controls

Diagnostic Tips

Verify there is no foreign debris on the hand controls holding buttons down.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

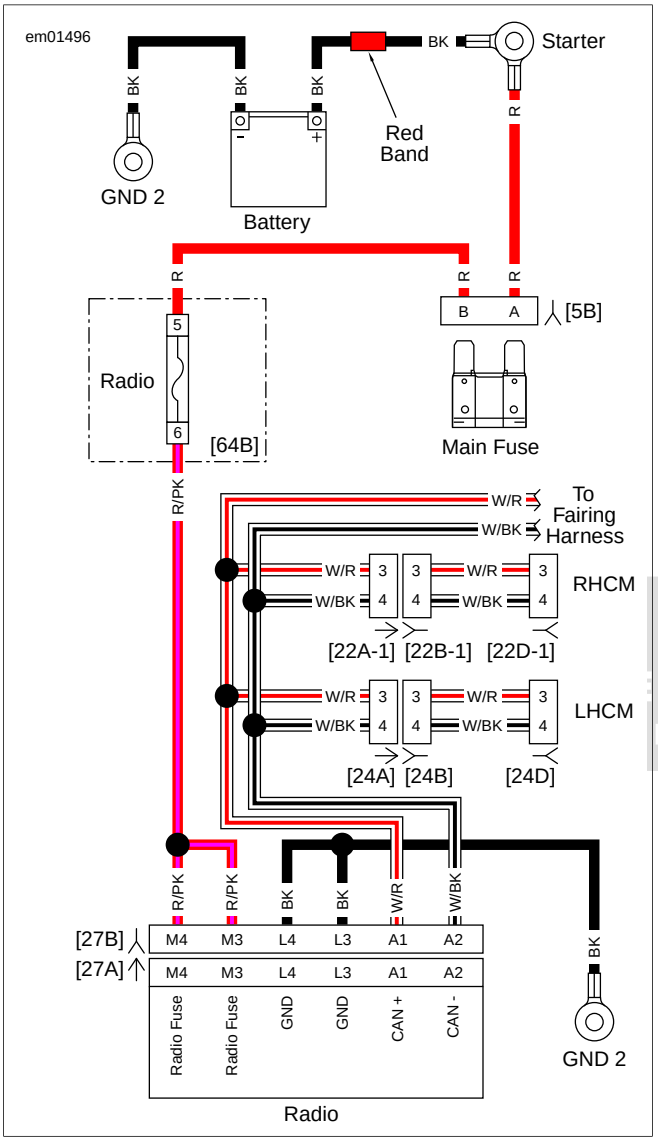


Figure 8-11. FLH Radio Power and CAN Circuit

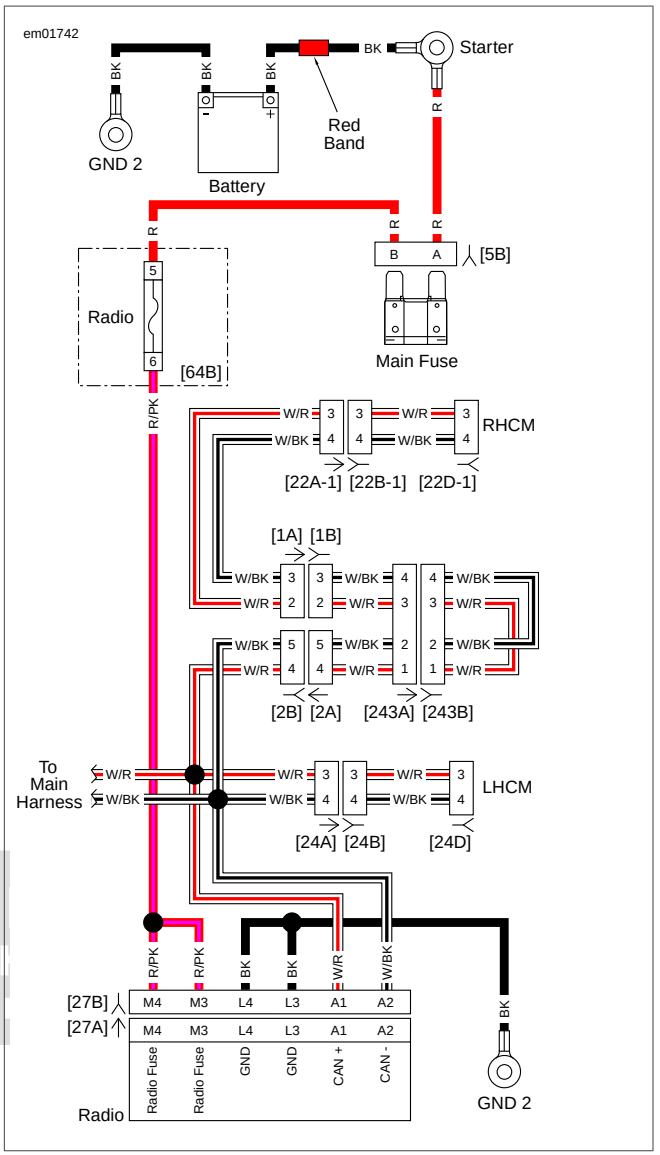


Figure 8-12. FLT Radio Power and CAN Circuit

HAND CONTROL BUTTON STUCK

Table 8-18. Hand Control Button Stuck Diagnostic Faults

POSSIBLE CAUSES
Damaged hand controls
Damaged key caps
Reset needed

1. Visual Test

1. Inspect hand control for damage.
2. Are there damages to the hand control?
   a. **Yes.** Replace hand control.
   b. **No.** Go to Test 2.

2. Switch Test

1. Enter service menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.

2. Select key input menu.
3. Select handlebars sub-menu.
4. Press suspect button and verify button illuminates on radio display.
5. Does button illuminate?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. Radio DTC Test

1. Turn IGN OFF.
2. Clear DTCs.
3. Turn IGN OFF.
4. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 4.
   b. **No.** System working properly.

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Go to Test 5.
   b. **No.** System working properly.

5. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 6.
   b. **No.** System working properly.

6. Hand Control Test

1. Turn IGN OFF.
2. Disconnect affected hand control module, RHCM [22] or LHCM [24].
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** Replace affected hand control module.

REAR AUDIO CONTROL DIAGNOSTICS 8.5

DESCRIPTION AND OPERATION

See Figure 8-13. There are two rear audio switches, an AUDIO/PTT and MODE switch. Both are located on the rear right speaker pod. These buttons are connected to the radio with one signal wire connection.

DTCs B1306 and B1307 are monitored continuously by the radio on B2 of [27]. If the signal wire is shorted high or low, it will immediately set a DTC.

Table 8-19. Code Description

DTC	DESCRIPTION
B1306	Rear hand controls shorted high
B1307	Rear hand controls shorted low
B1308	Rear volume up button stuck
B1309	Rear volume down button stuck
B1310	Rear mode button stuck
B1311	Rear PTT button stuck
B1312	Rear tune up button stuck
B1313	Rear tune down button stuck

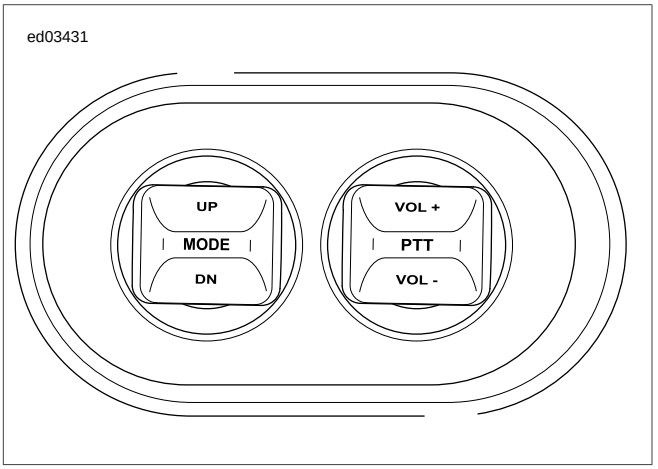


Figure 8-13. Rear Audio Switch

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

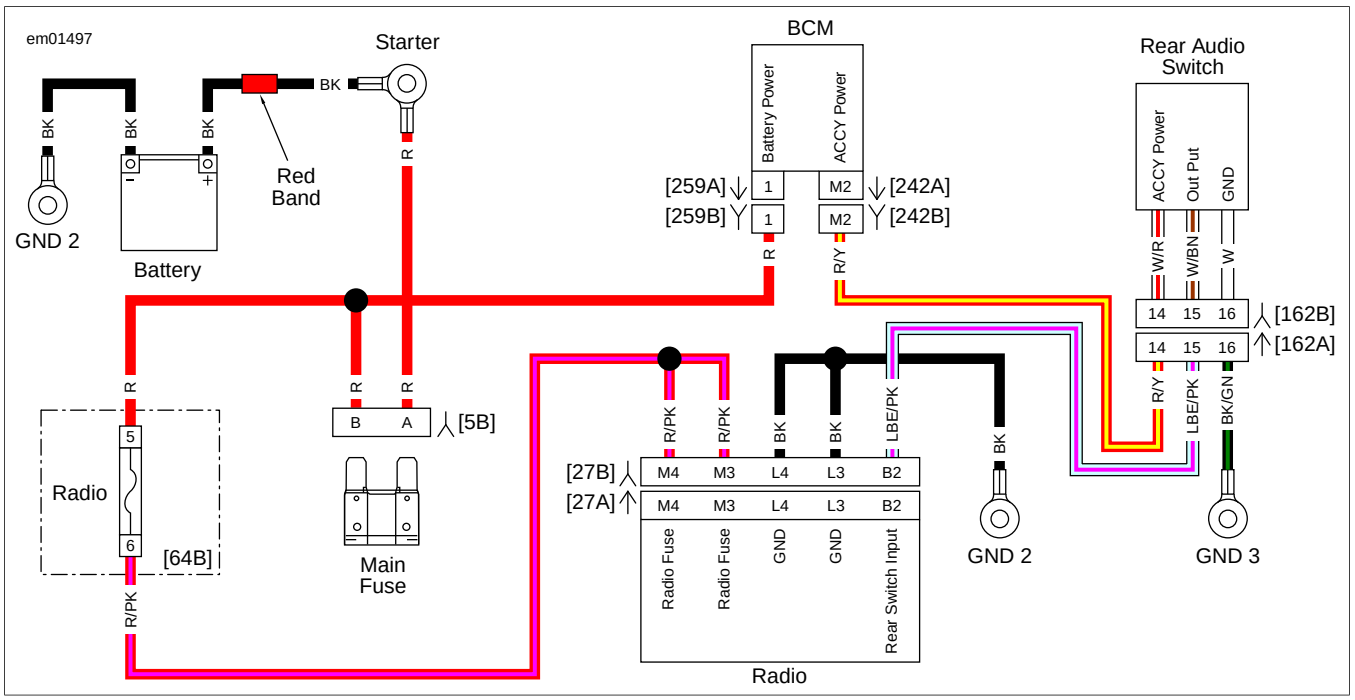


Figure 8-14. Rear Audio Switch Circuit

DTC B1307

PART NUMBER	TOOL NAME
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-20. DTC B1307 Diagnostic Faults

POSSIBLE CAUSES
Signal wire shorted
Signal wire open

1. Ground Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between BOB terminal B2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. Rear Audio Test

1. Disconnect rear audio [162].
2. Test continuity between BOB terminal B2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminal B2 and [162A] terminal 15 (LBE/PK).
   b. **No.** Replace rear audio switch.

3. Open Test

1. Disconnect rear audio [162].
2. Test continuity between BOB terminal B2 and [162A] terminal 15 (LBE/PK).
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open between [27B] terminal B2 and [162A] terminal 15 (LBE/BK).

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1306

PART NUMBER	TOOL NAME
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-21. DTC B1306 Diagnostic Faults

POSSIBLE CAUSES
Damaged rear audio switch
Reset needed

1. Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Test voltage between BOB terminal B2 and ground.
6. Is voltage greater than 5.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. Rear Audio Test

1. Disconnect rear audio [162].
2. Test voltage between BOB terminal B2 and ground.
3. Is voltage greater than 6.0V?
   a. **Yes.** Repair short between [27B] terminal B2 and [162A] terminal 15 (LBE/BK).
   b. **No.** Replace rear audio switch.

3. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

REAR AUDIO BUTTON STUCK

Table 8-22. Rear Audio Button Stuck Diagnostic Faults

POSSIBLE CAUSES
Damaged rear audio switch
Reset needed

1. Visual Test

1. Inspect rear audio switch for damage.
2. Is there damage to the rear audio switch?
   a. **Yes.** Replace rear audio switch.
   b. **No.** Go to Test 2.

2. Verify Button Test

1. Enter service menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS, Service Menu.
2. Select key input menu.
3. Select passenger controls sub-menu.
4. Press suspect button and verify that button illuminates on radio display.
5. Does button illuminate?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. Radio DTC Test

1. Turn IGN OFF.
2. Clear DTCs.
3. Turn IGN OFF.
4. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 4.
   b. **No.** System working properly.

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Go to Test 5.
   b. **No.** System working properly.

5. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 6.
   b. **No.** System working properly.

6. Switch Test

1. Turn IGN OFF.
2. Disconnect rear audio [162].
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Check DTCs.
5. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** Replace rear audio switch.

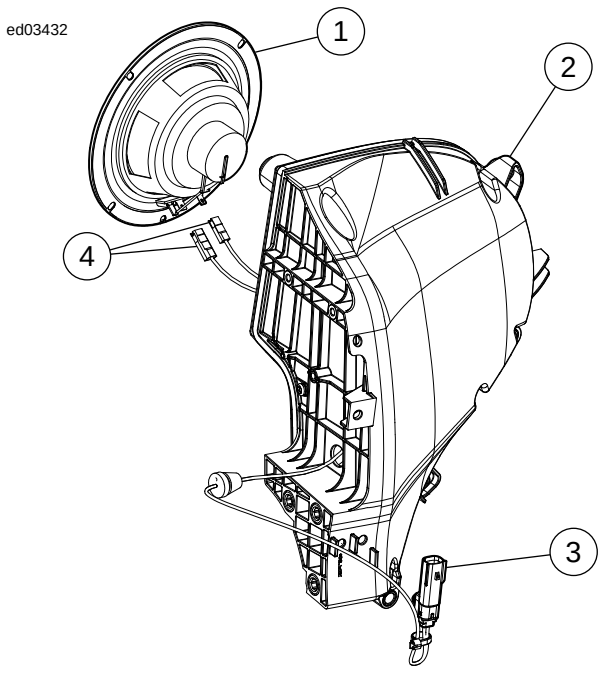
FRONT SPEAKER DIAGNOSTICS 8.6

DESCRIPTION AND OPERATION

See Figure 8-15. The radio and amplifier (if equipped) continuously monitor the status of the front speaker circuits.

Table 8-23. Code Description

DTC	DESCRIPTION
B1337	Front left speaker shorted together
B1338	Front left speaker open
B1339	Front left speaker shorted low
B1340	Front left speaker shorted high
B1345	Front right speaker shorted together
B1346	Front right speaker open
B1347	Front right speaker shorted low
B1348	Front right speaker shorted high



1. **Front LT or RT speaker**
2. **Speaker enclosure**
3. **Speaker harness [35-1] or [34-1]**
4. **Speaker [35-2] or [34-2]**

Figure 8-15. Front Speaker Enclosure: FLH Fairing

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

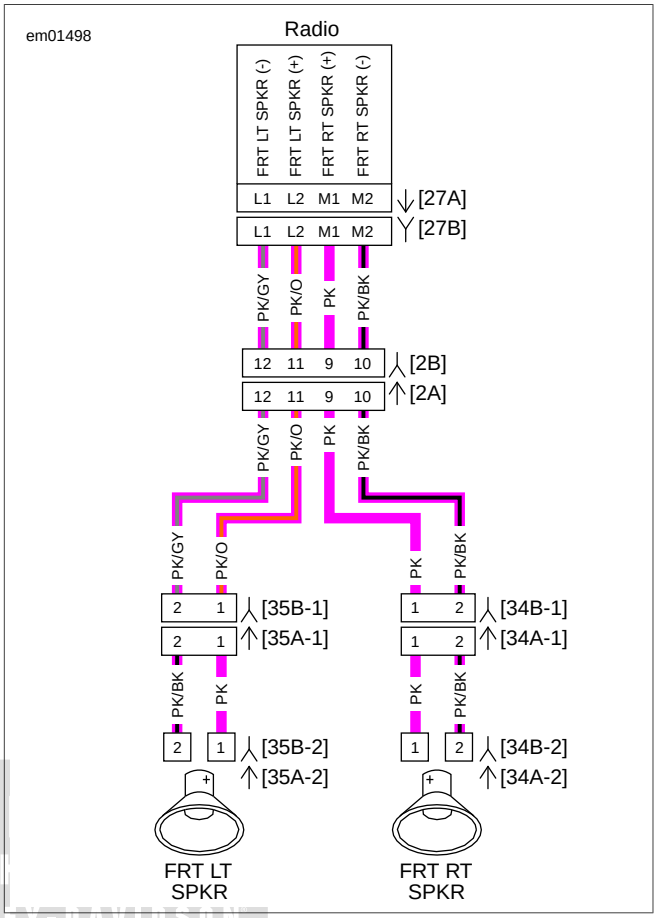


Figure 8-16. Front Speaker Circuit

DTC B1337

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-24. DTC B1337 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Shorted speaker
Reset needed

1. Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.

3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals L1 and L2.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [35A-1] Test

1. Disconnect speaker harness [35-1].
2. Test continuity between BOB terminals L1 and L2.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [2A] Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminals L1 and L2.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminals L1 and L2 and [2B] terminals 12 and 11.
   b. **No.** Repair short between [2A] terminals 11 and 12 and [35B-1] terminals 1 and 2 (PK/GY).

4. Speaker Test

1. Disconnect speaker [35-2].
2. Test resistance between [35A-2] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [35A-1] terminals 1 and 2 and [35B-2] terminals 1 and 2.

5. Reset Test

1. Connect all connectors.
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1338

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-25. DTC B1338 Diagnostic Faults

POSSIBLE CAUSES
Open circuit wires
Open speaker
Reset needed

1. Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals L1 and L2.
5. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Go to Test 2.

2. [35B-1] Terminal 2 Test

1. Disconnect speaker harness [35B-1].
2. Test continuity between BOB terminal L1 and [35B-1] terminal 2 (PK/GY).
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. [2B] Terminal 12 Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal L1 and [2B] terminal 12 (PK/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [2A] terminal 12 and [35B-1] terminal 2 (PK/GY).
   b. **No.** Repair open between [27B] terminal L1 and [2B] terminal 12 (PK/GY).

4. [35B-1] Terminal 1 Test

1. Test continuity between BOB terminal L2 and [35B-1] terminal 1 (PK/O).

2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 5.

5. [2B] Terminal 11 Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal L2 and [2B] terminal 11 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [2A] terminal 11 and [35B-1] terminal 1 (PK/O).
   b. **No.** Repair open between [27B] terminal L2 and [2B] terminal 11 (PK/O).

6. Speaker Test

1. Disconnect speaker [35-2].
2. Test continuity between [35A-2] speaker terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Replace speaker.

7. [35A-1] Terminal 1 Test

1. Test continuity between [35A-1] terminal 1 and [35B-2] terminal 1 and (PK).
2. Is continuity present?
   a. **Yes.** Repair open between [35A-1] terminal 2 and [35B-2] terminal 2 (PK/BK).
   b. **No.** Repair open between [35A-1] terminal 1 and [35B-2] terminal 1 (PK).

8. Reset Test

1. Connect all connectors.
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1339

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-26. DTC B1339 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Reset needed

1. (PK/GY) Circuit Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal L1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. [35B-1] Terminal 2 Test

1. Disconnect speaker harness [35-1].
2. Test continuity between BOB terminal L1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [2B] Terminal 12 Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal L1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal L1 and [2B] terminal 12 (PK/GY).
   b. **No.** Repair short to ground between [2A] terminal 12 and [35B-1] terminal 2 (PK/GY).

4. (PK/O) Circuit Grounded Test

1. Test continuity between BOB terminals L2 and ground.

2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short to ground on speaker harness wires between [35A-1] and [35B-2].

5. [2B] Terminal 11 Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal L2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal L2 and [2B] terminal 12 (PK/O).
   b. **No.** Repair short to ground between [2A] terminal 11 and [35B-1] terminal 1 (PK/O).

6. Reset Test

1. Connect [27A].
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1340

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-27. DTC B1340 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Reset needed

1. (PK/GY) Circuit Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal L1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 8.

2. [35B-1] Terminal 2 Test

1. Turn IGN OFF.
2. Disconnect speaker harness [35-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 5.

3. [2B] Terminal 12 Test

1. Turn IGN OFF.
2. Disconnect fairing [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to voltage between [2A] terminal 12 and [35B-1] terminal 2 (PK/GY).

4. [27A] Terminal L1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal L1 from [27B] (PK/GY).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal L1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 12 and [27B] terminal L1 (PK/GY).

5. (PK/O) Circuit Voltage Test

1. Test voltage between BOB terminal L2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair short to voltage on speaker harness wires between [35A-1] and [35B-2].

6. [2B] Terminal 12 Test

1. Turn IGN OFF.
2. Disconnect fairing [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal L2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short to voltage between [2A] terminal 11 and [35B-1] terminal 1 (PK/O).

7. [27A] Terminal L2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal L2 from [27B] (PK/O).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal L2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 11 and [27B] terminal L2 (PK/O).

8. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1345

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-28. DTC B1345 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Shorted speaker
Reset needed

1. Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals M1 and M2.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [34A-1] Test

1. Disconnect speaker harness [34-1].
2. Test continuity between BOB terminals M1 and M2.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [2A] Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminals M1 and M2.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminals M1 and M2 and [2B] terminals 9 and 10.
   b. **No.** Repair short between [2A] terminals 9 and 10 and [34B-1] terminals 1 and 2.

4. Speaker Test

1. Disconnect speaker [34-2].
2. Test resistance between [34A-2] speaker terminals 1 and 2.

3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [34A-1] terminals 1 and 2 and [34B-2] terminals 1 and 2.

5. Reset Test

1. Connect all connectors.
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1346

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-29. DTC B1346 Diagnostic Faults

POSSIBLE CAUSES
Open circuit wires
Open speaker
Reset needed

1. Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals M1 and M2.
5. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Go to Test 2.

2. [34B-1] Terminal 2 Test

1. Disconnect speaker harness [34-1].
2. Test continuity between BOB terminal M1 and [34B-1] terminal 1 (PK).
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. [2B] Terminal 12 Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal M1 and [2B] terminal 9 (PK).
3. Is continuity present?
   a. **Yes.** Repair open between [2A] terminal 9 and [34B-1] terminal 1 (PK).
   b. **No.** Repair open between [27B] terminal M1 and [2B] terminal 9 (PK).

4. [34B-1] Terminal 1 Test

1. Test continuity between BOB terminal M2 and [34B-1] terminal 2 (PK/BK).
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 5.

5. [2B] Terminal 11 Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal M2 and [2B] terminal 10 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [2A] terminal 10 and [34B-1] terminal 2 (PK/BK).
   b. **No.** Repair open between [27B] terminal M2 and [2B] terminal 10 (PK/BK).

6. Speaker Test

1. Disconnect speaker [34-2].
2. Test continuity between [34A-2] speaker terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Replace speaker.

7. [34A-1] Terminal 1 Test

1. Test continuity between [34A-1] terminal 1 and [34B-2] terminal 1 and (PK).
2. Is continuity present?
   a. **Yes.** Repair open between [34A-1] terminal 2 and [34B-2] terminal 2 (PK/BK).
   b. **No.** Repair open between [34A-1] terminal 1 and [34B-2] terminal 1 (PK).

8. Reset Test

1. Connect all connectors.
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1347

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-30. DTC B1347 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Reset needed

1. (PK/GY) Circuit Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal M1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. [34B-1] Terminal 2 Test

1. Disconnect speaker harness [34-1].
2. Test continuity between BOB terminal M1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [2B] Terminal 12 Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal M1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal M1 and [2B] terminal 9 (PK).
   b. **No.** Repair short to ground between [2A] terminal 9 and [34B-1] terminal 1 (PK).

4. (PK/O) Circuit Grounded Test

1. Test continuity between BOB terminals M2 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short to ground on speaker harness wires between [34A-1] and [34B-2].

5. [2B] Terminal 11 Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal M2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal M2 and [2B] terminal 10 (PK/BK).
   b. **No.** Repair short to ground between [2A] terminal 10 and [34B-1] terminal 2 (PK/BK).

6. Reset Test

1. Connect [27A].
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1348

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-31. DTC B1348 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Reset needed

1. (PK) Circuit Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal M1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 8.

2. [34B-1] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect speaker harness [34-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 5.

3. [2B] Terminal 9 Test

1. Turn IGN OFF.
2. Disconnect fairing [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to voltage between [2A] terminal 9 and [34B-1] terminal 1 (PK).

4. [27A] Terminal M1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal M1 from [27B] (PK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal M1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 9 and [27B] terminal M1 (PK).

5. (PK/BK) Circuit Voltage Test

1. Test voltage between BOB terminal M2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair short to power on speaker harness wires between [34A-1] and [34B-2].

6. [34B-2] Terminal 2 Test

1. Turn IGN OFF.
2. Disconnect fairing [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal M2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short to power between [2A] terminal 10 and [34B-1] terminal 2 (PK/BK).

7. [27A] Terminal M2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal M2 from [27B] (PK/BK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal M2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 10 and [27B] terminal M2 (PK/BK).

8. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

REAR SPEAKER DIAGNOSTICS 8.7

DESCRIPTION AND OPERATION

The radio and amplifier (if equipped) continuously monitor the status of the rear speaker circuits.

Table 8-32. Code Description

DTC	DESCRIPTION
B1341	Rear left speaker shorted together
B1342	Rear left speaker open
B1343	Rear left speaker shorted low
B1344	Rear left speaker shorted high
B1349	Rear right speaker shorted together
B1350	Rear right speaker open
B1351	Rear right speaker shorted low
B1352	Rear right speaker shorted high

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

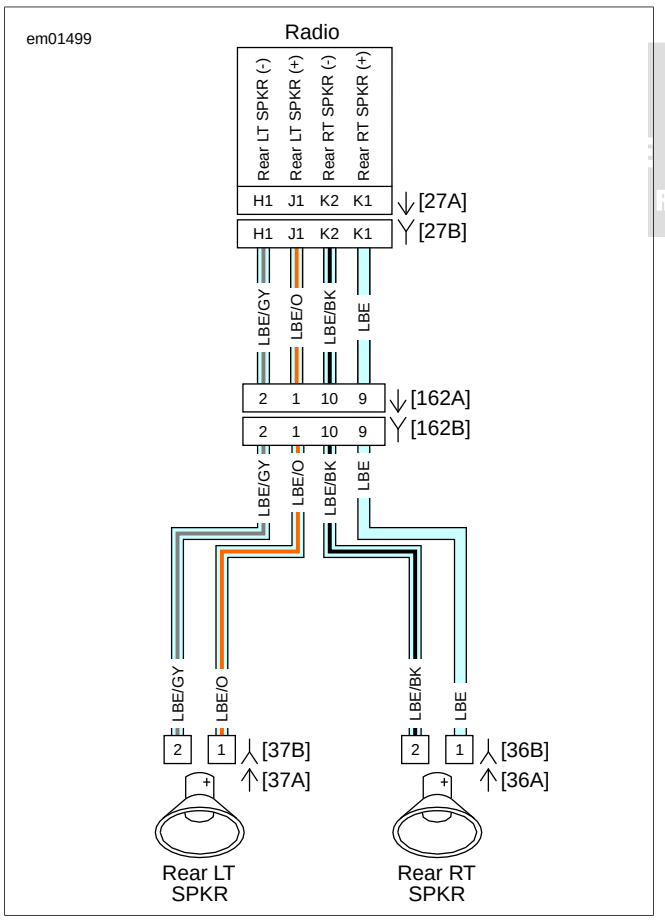


Figure 8-17. Rear Speaker Circuit

DTC B1341

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-33. DTC B1341 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Shorted speaker
Reset needed

1. Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals H1 and J1.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [162B] Test

1. Disconnect rear audio harness [162].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminals H1 and J1 and [162A] terminals 2 and 1.
   b. **No.** Go to Test 3.

3. Speaker Test

1. Disconnect speaker [37].
2. Test resistance between [37A] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [37B] terminals 1 and 2 and [162B] terminals 1 and 2.

4. Reset Test

1. Connect all connectors.
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1342

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-34. DTC B1342 Diagnostic Faults

POSSIBLE CAUSES
Open circuit wires
Open speaker
Reset needed

1. Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals H1 and J1.
5. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 2.

2. [162B] Terminal 2 Test

1. Disconnect rear audio [162].
2. Test continuity between BOB terminal H1 and [162A] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [27B] terminal H1 and [162A] terminal 2 (LBE/GY).

3. [162B] Terminal 1 Test

1. Test continuity between BOB terminal J1 and [162A] terminal 1 (LBE/O).
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open between [27B] terminal J1 and [162A] terminal 1 (LBE/O).

4. Speaker Test

1. Disconnect speaker [37].
2. Test continuity between [37A] speaker terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace speaker.

5. [37B] Terminal 1 Test

1. Test continuity between [37B] terminal 1 and [162B] terminal 1 (LBE/O).
2. Is continuity present?
   a. **Yes.** Repair open between [37B] terminal 2 and [162B] terminal 2 (LBE/GY).
   b. **No.** Repair open between [37B] terminal 1 and [162B] terminal 1 (LBE/O).

6. Reset Test

1. Connect all connectors.
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1343

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-35. DTC B1343 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Reset needed

1. (LBE/GY) Circuit Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal H1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. [27B] Terminal H1 Test

1. Disconnect rear audio [162].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal H1 and [162A] terminal 2 (LBE/GY).
   b. **No.** Go to Test 3.

3. [27B] Terminal J1 Test

1. Test continuity between BOB terminal J1 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal J1 and [162A] terminal 1 (LBE/O).
   b. **No.** Go to Test 4.

4. [162B] Terminal 2 Test

1. Disconnect speaker [37].
2. Test continuity between [162B] terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162B] terminal 2 and [37B] terminal 2 (LBE/GY).
   b. **No.** Go to Test 5.

5. [162B] Terminal 1 Test

1. Test continuity between [162B] terminal 1 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [162B] terminal 1 and [37B] terminal 1 (LBE/O).
   b. **No.** Replace speaker.

6. Reset Test

1. Connect [27A].
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1344

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-36. DTC B1344 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Reset needed

1. (PK/GY) Circuit Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal H1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 7.

2. [162] Terminal H2 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162].
3. Turn IGN ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [27A] Terminal H1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal H1 from [27B] (LBE/GY).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal H1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162A] terminal 1 and [27B] terminal H1 (LBE/GY).

4. [27B] Terminal J1 Test

1. Test voltage between BOB terminal J1 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 6.

5. [27A] Terminal J1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal J1 from [27B] (LBE/O).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal J1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162A] terminal 1 and [27B] terminal J1 (LBE/O).

6. [37A] Terminal 2 Test

1. Turn IGN OFF.
2. Connect [162].
3. Disconnect speaker [37].
4. Turn IGN ON.
5. Test voltage between [37B] terminal 2 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Repair short to voltage between [162B] terminal 2 and [37B] terminal 2 (LBE/GY).
   b. **No.** Repair short to voltage between [162B] terminal 1 and [37B] terminal 1 (LBE/O).

7. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1349

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-37. DTC B1349 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Shorted speaker
Reset needed

1. Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals K2 and K1.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [162B] Test

1. Disconnect rear audio harness [162].
2. Test continuity between BOB terminals K1 and K2.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminals K2 and K1 and [162A] terminals 10 and 9.
   b. **No.** Go to Test 3.

3. Speaker Test

1. Disconnect speaker [36].
2. Test resistance between [36A] speaker terminals 1 and 2.

3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [36B] terminals 1 and 2 and [162B] terminals 9 and 10.

4. Reset Test

1. Connect all connectors.
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1350

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-38. DTC B1350 Diagnostic Faults

POSSIBLE CAUSES
Open circuit wires
Open speaker
Reset needed

1. Circuit Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals K2 and K1.
5. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 2.

2. [162B] Terminal 10 Test

1. Disconnect rear audio [162].
2. Test continuity between BOB terminal K2 and [162A] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [27B] terminal K2 and [162A] terminal 10 (LBE/BK).

3. [162B] Terminal 9 Test

1. Test continuity between BOB terminal K1 and [162A] terminal 9 (LBE).
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open between [27B] terminal K1 and [162A] terminal 9 (LBE).

4. Speaker Test

1. Disconnect speaker [36].
2. Test continuity between [36A] speaker terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace speaker.

5. [36B] Terminal 1 Test

1. Test continuity between [36B] terminal 1 and [162B] terminal 9 (PK).
2. Is continuity present?
   a. **Yes.** Repair open between [36B] terminal 2 and [162B] terminal 10 (LBE/BK).
   b. **No.** Repair open between [36B] terminal 1 and [162B] terminal 9 (LBE).

6. Reset Test

1. Connect all connectors.
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1351

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-39. DTC B1351 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Reset needed

1. (LBE/BK) Circuit Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal K2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. [27B] Terminal K2 Test

1. Disconnect rear audio [162].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal K2 and [162A] terminal 10 (LBE/BK).
   b. **No.** Go to Test 3.

3. [27B] Terminal K1 Test

1. Test continuity between BOB terminal K1 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal K1 and [162B] terminal 9 (LBE).
   b. **No.** Go to Test 4.

4. [162B] Terminal 10 Test

1. Disconnect speaker [36].
2. Test continuity between [162B] terminal 10 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).
   b. **No.** Go to Test 5.

5. [162B] Terminal 9 Test

1. Test continuity between [162B] terminal 9 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [162B] terminal 9 and [36B] terminal 1 (LBE).
   b. **No.** Replace speaker.

6. Reset Test

1. Connect [27A].
2. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
3. Turn IGN OFF and ON.
4. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
5. Turn IGN OFF.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1352

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-40. DTC B1352 Diagnostic Faults

POSSIBLE CAUSES
Shorted circuit wires
Reset needed

1. (PK/GY) Circuit Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal K2 and ground.

7. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [27B] Terminal K2 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162].
3. Turn IGN ON.
4. Test voltage between BOB terminal K2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Repair short to voltage between [27B] terminal K2 and [162A] terminal 10 (LBE/BK).
   b. **No.** Go to Test 3.

3. [27B] Terminal K1 Test

1. Test voltage between BOB terminal K1 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Repair short to voltage between [27B] terminal K1 and [162A] terminal 9 (LBE).
   b. **No.** Go to Test 4.

4. [36A] Terminal 2 Test

1. Turn IGN OFF.
2. Connect [162].
3. Disconnect speaker [36].
4. Turn IGN ON.
5. Test voltage between [36B] terminal 2 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Repair short to voltage between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).
   b. **No.** Repair short to voltage between [162B] terminal 9 and [36B] terminal 1 (LBE).

5. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1353 8.8

DESCRIPTION AND OPERATION

The radio detects that 1.5 Volts or greater is present across internal loads for more than one second.

Table 8-41. Code Description

DTC	DESCRIPTION
B1353	Speaker output DC offset

DTC B1353

Table 8-42. DTC B1353 Diagnostic Faults

POSSIBLE CAUSES
Reset needed

1. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 2.
   b. **No.** System working properly.

2. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON.
5. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

ANTENNA DTCS 8.9

DESCRIPTION AND OPERATION

The radio constantly monitors the supplied voltage to the GPS and XM antennas (if equipped). Refer to Table 8-43 for possible DTCs.

Table 8-43. Code Description

DTC	DESCRIPTION
B1354	GPS antenna open
B1355	GPS antenna shorted low
B1356	SDARS (XM) antenna open
B1357	SDARS (XM) antenna shorted

Diagnostic Tips

Verify that there is no damage to the radio and that all antenna connections on the back of the radio are good.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

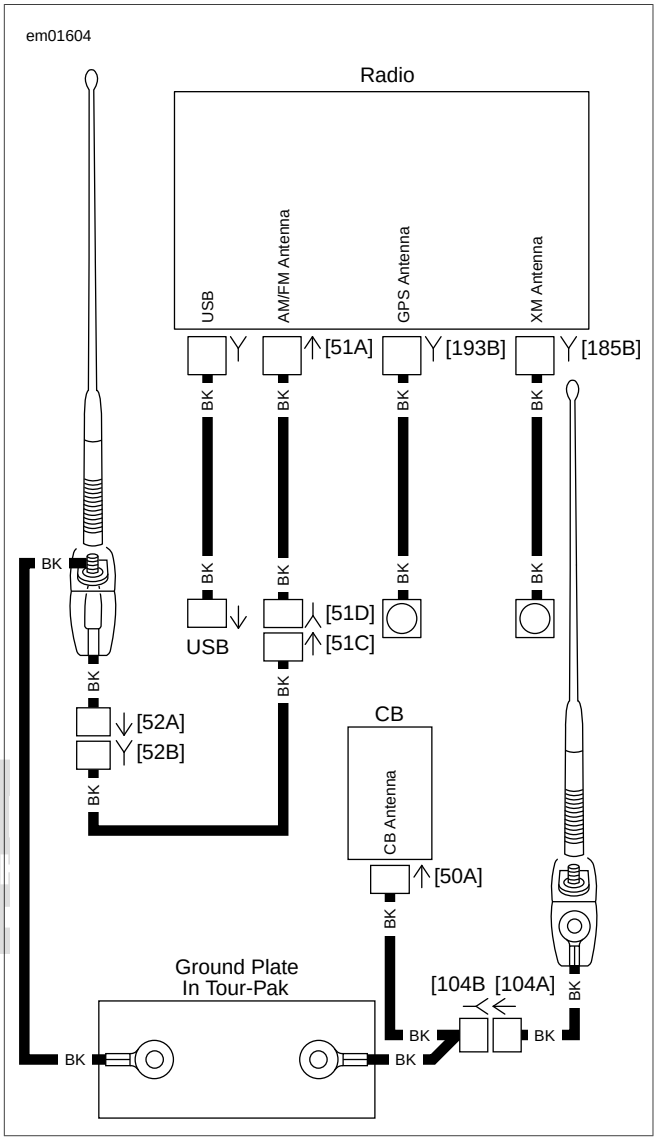


Figure 8-18. Radio Antenna/USB

DTC B1354, B1355

Table 8-44. DTC B1354, B1355 Diagnostic Faults

POSSIBLE CAUSES
Reset needed
GPS antenna circuit

1. GPS Antenna Damage Test

1. Verify that there is no damage to the antenna.
2. Is damage present?
   a. **Yes.** Replace antenna.
   b. **No.** Go to Test 2.

2. GPS Antenna Test

1. Turn IGN OFF.

2. Disconnect GPS [193].
3. Connect a known good GPS antenna to [193].
4. Clear DTC.
5. Turn radio ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace GPS antenna.

3. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust volume to 3 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 4.
   b. **No.** System working properly.

4. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON.
5. Adjust volume to 3 bars and allow radio to play for 30 seconds.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1356, B1357

Table 8-45. DTC B1356, B1357 Diagnostic Faults

POSSIBLE CAUSES
Reset needed
SDARS (XM) antenna circuit

1. SDARS Antenna Damage Test

1. Verify that there is no damage to the antenna.
2. Is damage present?
   a. **Yes.** Replace antenna.
   b. **No.** Go to Test 2.

2. SDARS Antenna Test

1. Turn IGN OFF.
2. Disconnect SDARS [185].
3. Connect a known good SDARS antenna to [185].
4. Clear DTC.
5. Turn radio ON.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace SDARS antenna.

3. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust volume to 3 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 4.
   b. **No.** System working properly.

4. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON.
5. Adjust volume to 3 bars. Allow radio to play for 30 seconds.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

HEADSET DTCS 8.10

DESCRIPTION AND OPERATION

The radio constantly monitors the voltage levels of the front and rear headsets. It can set the following DTCs if out of range. The radio can only detect headset circuit issues at high volume levels.

Table 8-46. Code Description

DTC	DESCRIPTION
B1358	Front left headset shorted high
B1359	Front right headset shorted high
B1360	Front left headset shorted low
B1361	Front right headset shorted low
B1362	Rear left headset shorted high
B1363	Rear right headset shorted high
B1364	Rear left headset shorted low
B1365	Rear right headset shorted low

Diagnostic Tips

All tests must have headsets connected to DINs, headset volume adjusted to 8 bars and headset enabled in all functions. Prior to testing, use a known good pair of headsets and check system. If issue is resolved replace headset.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

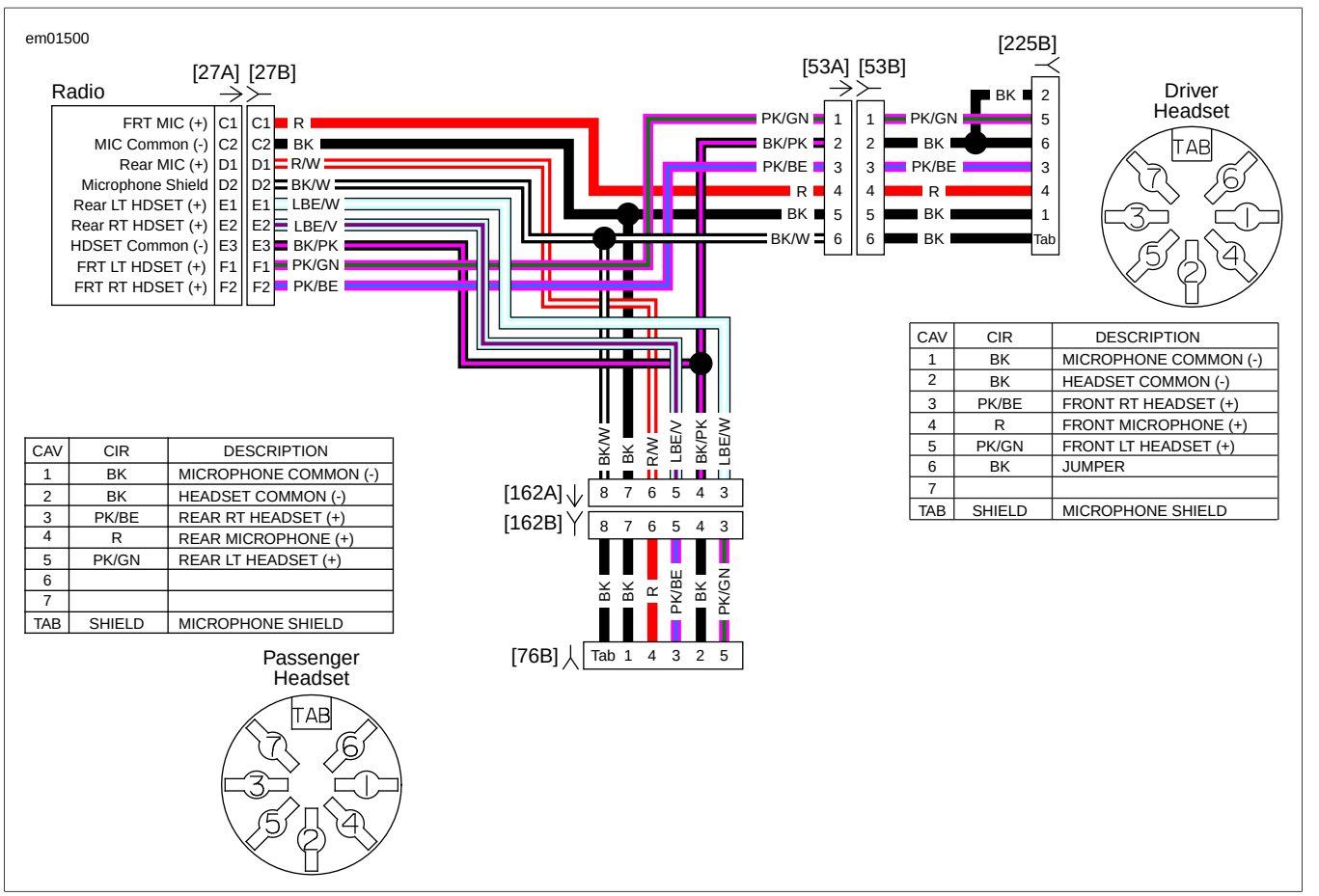


Figure 8-19. Headset and DIN Circuit

DTC B1358

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-47. DTC B1358 Diagnostic Faults

POSSIBLE CAUSES
Front headset circuit shorted
Reset needed

1. [27] Terminal F1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal F1 and ground.
7. Is voltage greater than 2.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [53] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect drivers headset [53].
3. Turn IGN ON.
4. Test voltage between BOB terminal F1 and ground.
5. Is voltage greater than 2.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to voltage between [53B] terminal 1 and drivers DIN [225B] terminal 5 (PK/GN).

3. [27A] Terminal F1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal F1 from [27B] (PK/GN).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal F1 and ground.
7. Is voltage greater than 2.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [27B] terminal F1 and [53A] terminal 1 (PK/GN).

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust headset volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1359

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-48. DTC B1359 Diagnostic Faults

POSSIBLE CAUSES
Front headset circuit shorted
Reset needed

1. [27] Terminal F2 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal F2 and ground.
7. Is voltage greater than 2.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [53] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect drivers headset [53].
3. Turn IGN ON.
4. Test voltage between BOB terminal F2 and ground.
5. Is voltage greater than 2.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to voltage between [53B] terminal 3 and drivers DIN [225B] terminal 3 (PK/BE).

3. [27A] Terminal F2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal F2 from [27B] (PK/BE).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal F2 and ground.
7. Is voltage greater than 2.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [27B] terminal F2 and [53A] terminal 3 (PK/BE).

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust headset volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1360

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-49. DTC B1360 Diagnostic Faults

POSSIBLE CAUSES
Front headset circuit shorted
Reset needed

1. BOB Terminal F1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal F1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. [53] Terminal 1 Test

1. Disconnect drivers headset [53].
2. Test continuity between BOB terminal F1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal F1 and [53A] terminal 1 (PK/GN).
   b. **No.** Repair short to ground between [53B] terminal 1 and drivers DIN [225B] terminal 5 (PK/GN).

3. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust headset volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1361

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-50. DTC B1361 Diagnostic Faults

POSSIBLE CAUSES
Front headset circuit shorted
Reset needed

1. BOB Terminal F2 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal F2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. [53] Terminal 3 Test

1. Disconnect drivers headset [53].
2. Test continuity between BOB terminal F2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal F2 and [53A] terminal 3 (PK/ BE).
   b. **No.** Repair short to ground between [53B] terminal 3 and drivers DIN [225B] terminal 3 (PK/BE).

3. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust headset volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1362

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-51. DTC B1362 Diagnostic Faults

POSSIBLE CAUSES
Rear headset circuit shorted
Reset needed

1. BOB Terminal E1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal E1 and ground.
7. Is voltage greater than 2.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [162] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162].
3. Turn IGN ON.
4. Test voltage between BOB terminal E1 and ground.
5. Is voltage greater than 2.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to voltage between [162B] terminal 3 and passengers DIN [76B] terminal 5 (PK/GN).

3. [27A] Terminal E1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal E1 from [27B] (LBE/W).
4. Connect [27B].
5. Turn IGN ON.

6. Test voltage between BOB terminal E1 and ground.
7. Is voltage greater than 2.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [27B] terminal E1 and [162A] terminal 3 (LBE/W).

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust headset volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1363

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-52. DTC B1363 Diagnostic Faults

POSSIBLE CAUSES
Rear headset circuit shorted
Reset needed

1. [27] Terminal E2 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Turn radio ON.
6. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal E2 and ground.
7. Is voltage greater than 2.0V?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [162] Terminal 5 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162].
3. Turn IGN ON.
4. Test voltage between BOB terminal E2 and ground.
5. Is voltage greater than 2.0V?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to voltage between [162B] terminal 5 and passengers DIN [76B] terminal 3 (PK/BE).

3. [27A] Terminal E2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal E2 from [27B] (LBE/V).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal E2 and ground.
7. Is voltage greater than 2.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [27B] terminal E2 and [162A] terminal 5 (LBE/V).

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust headset volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1364

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-53. DTC B1364 Diagnostic Faults

POSSIBLE CAUSES
Rear headset circuit shorted
Reset needed

1. [27] Terminal E1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal E1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. [162] Terminal 3 Test

1. Disconnect rear audio [162].
2. Test continuity between BOB terminal E1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal E1 and [162A] terminal 3 (LBE/W).
   b. **No.** Repair short to ground between [162B] terminal 3 and passengers DIN [225B] terminal 5 (PK/GN).

3. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS, Service Menu.
2. Turn IGN OFF and ON.
3. Adjust headset volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1365

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-54. DTC B1365 Diagnostic Faults

POSSIBLE CAUSES
Rear headset circuit shorted
Reset needed

1. BOB Terminal E2 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal E2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. [162] Terminal 5 Test

1. Disconnect rear audio [162].
2. Test continuity between BOB terminal E2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal E2 and [162A] terminal 5 (LBE/V).
   b. **No.** Repair short to ground between [162B] terminal 5 and passengers DIN [225B] terminal 3 (PK/BE).

3. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust headset volume to 8 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

DTC B1366 8.11

DESCRIPTION AND OPERATION

The radio monitors three internal thermistors. It sets DTC B1366 when the internal temperature is above 239 °F (115 °C) for 5 seconds. Depending which thermistor is reporting high temperature, the symptom may be loss of navigation location, display turns off or the system turns off.

Table 8-55. Code Description

DTC	DESCRIPTION
B1366	Internal thermal shutdown error

Diagnostic Tips

Extremely high ambient temperature and low air movement around the vehicle may contribute to this condition.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

DTC B1366

Table 8-56. DTC B1366 Diagnostic Faults

POSSIBLE CAUSES
Rear headset circuit shorted
Reset needed

1. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF and ON.
3. Adjust volume to 3 bars. Allow radio to play for 30 seconds.
4. Turn IGN OFF.
5. Check DTCs.
6. Did DTC reset?
   a. **Yes.** Go to Test 2.
   b. **No.** System working properly.

2. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON.
5. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
6. Check DTCs.
7. Did DTC reset?
   a. **Yes.** Replace radio.
   b. **No.** System working properly.

AUDIO SYSTEM SYMPTOMS 8.12

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

Many faults may occur that do not set a DTC. These faults are listed in Table 8-57. Verify no DTCs are present before addressing symptoms.

Table 8-57. Symptoms Description

DESCRIPTION
Front headset malfunction
Rear headset malfunction
Rear audio switch malfunction
Radio inoperative
Static present with engine running
Radio turns ON and OFF
Poor or no reception
CB transmitter inoperative
CB receiver inoperative
All speakers inoperative w/amplifier 1
Left front speaker inoperative w/amplifier 1
Both left speakers inoperative w/amplifier 1
Lower left speaker inoperative w/amplifier 1
Saddlebag left speaker inoperative w/amplifier 1
Left rear speaker pod inoperative w/amplifier 1
Right front speaker inoperative w/amplifier 1
Both right speakers inoperative w/amplifier 1
Lower right speaker inoperative w/amplifier 1
Saddlebag right speaker inoperative w/amplifier 1
Right rear speaker pod inoperative w/amplifier 1
All speakers inoperative w/amplifier 2
Left rear speaker pod inoperative w/amplifier 2
Both left speakers inoperative w/amplifier 2
Saddlebag left speaker inoperative w/amplifier 2
Right rear speaker pod inoperative w/amplifier 2
Both right speakers inoperative w/amplifier 2
Saddlebag right speaker inoperative w/amplifier 2
Bluetooth device will not pair with audio system
No or low audio from XM or XM inoperative

Diagnostic Tips

- Verify that VOX is ON and set to midpoint when testing intercom.
- Check for radio software updates. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
- If radio is beeping with IGN ON and radio ON, then use DIGITAL TECHNICIAN II (Part No. HD-48650) to set regional code.

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

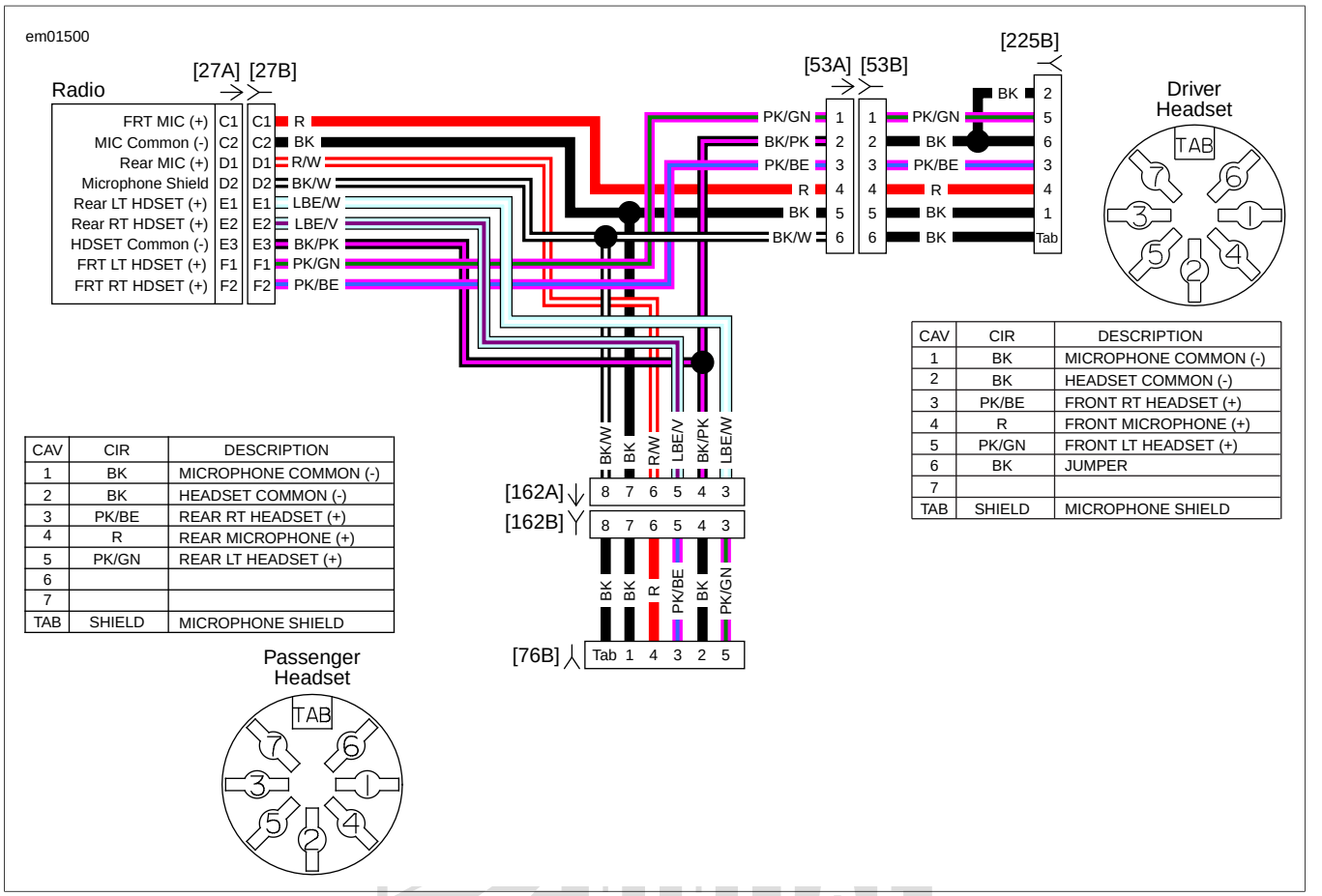


Figure 8-20. Headset and DIN Circuit

FRONT HEADSET MALFUNCTION

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-58. Front Headset Malfunction Diagnostic Faults

POSSIBLE CAUSES
PTT circuit malfunction
Headset malfunction
DIN circuit malfunction

1. Verify Headset Test

1. Replace with known good headset.
2. Does system work properly?
   a. **Yes.** Replace headset.
   b. **No.** Go to Test 2.

2. Visual Test

1. Inspect RHCM for damage.
2. Is there damage to RHCM?
   a. **Yes.** Replace RHCM.
   b. **No.** Go to Test 3.

3. Switch Test

1. Enter service menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Select key input menu.
3. Select handlebars sub-menu.
4. Press PTT button and verify that button illuminates on radio display.
5. Does button illuminate?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 4.

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF.
3. Cycle IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.

4. Turn IGN ON. Check headset operation.
5. Did headset work?
   a. **Yes.** System working properly.
   b. **No.** Go to Test 5.

5. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
5. Turn IGN ON. Check headset operation.
6. Did headset work?
   a. **Yes.** System working properly.
   b. **No.** Go to Test 6.

6. Hand Control Test

1. Turn IGN OFF.
2. Disconnect RHCM [22].
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Turn IGN ON. Check headset operation.
5. Did headset work?
   a. **Yes.** Replace RHCM.
   b. **No.** Replace radio. **(6101)**

7. Headset Power at DIN Test

1. Exit service menu.
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between driver DIN [225B] terminal 4 and ground.
3. Is voltage between 7.5-8.5V?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 8.

8. Headset Power [53] Test

1. Disconnect DIN [53].
2. Test voltage between [53A] terminal 4 and ground.
3. Is voltage between 7.5-8.5V?
   a. **Yes.** Repair open or short between [53B] terminal 4 and [225B] terminal 4 (R). **(5041)**
   b. **No.** Go to Test 9.

9. Headset Power Breakout Box Test

1. Turn IGN OFF.
2. Disconnect [27].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal C1 from [27B].
4. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
5. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
6. Turn IGN ON.
7. Test voltage between BOB terminal C1 and ground.
8. Is voltage between 7.5-8.5V?
   a. **Yes.** Repair open or short between [27B] terminal C1 and [53A] terminal 4 (R). **(5041)**
   b. **No.** Replace radio. **(6101)**

10. Headset Ground at DIN Test

1. Turn IGN OFF.
2. Test continuity between driver DIN [225B] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Go to Test 11.

11. Headset Ground [53] Test

1. Disconnect DIN [53].
2. Test continuity between [53A] terminal 5 (BK) and ground.
3. Is continuity present?
   a. **Yes.** Repair open between [53B] terminal 5 and [225B] terminal 1 (BK). **(5041)**
   b. **No.** Go to Test 12.

12. Headset Ground Breakout Box Test

1. Turn IGN OFF.
2. Disconnect [27].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal C2 from [27B].
4. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
5. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
6. Test for continuity between at BOB terminal C2 and ground.
7. Is continuity present?
   a. **Yes.** Repair open between [28B] terminal C2 and [53A] terminal 5 (BK). **(5041)**
   b. **No.** Replace radio. **(6101)**

13. Common Headset Speaker at DIN Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring

harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.

2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between [225B] terminal 2 and BOB terminal E3.
4. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 14.

14. Common Headset Speaker [53] Test

1. Disconnect DIN [53].
2. Test continuity between [53A] terminal 2 (BK/PK) and BOB terminal E3.
3. Is continuity present?
   a. **Yes.** Repair open between [53B] terminal 2 and [225B] terminal 2 (BK). **(5041)**
   b. **No.** Repair open between [53A] terminal 2 and [27B] terminal E3 (BK/PK). **(5041)**

15. Left Headset Speaker (+) at DIN Test

1. Test continuity between [225B] terminal 5 and BOB terminal F1.
2. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 16.

16. Left Headset Speaker (+) [53] Test

1. Disconnect DIN [53].
2. Test continuity between [53A] terminal 1 (PK/GN) and BOB terminal F1.
3. Is continuity present?
   a. **Yes.** Repair open between [53B] terminal 1 and [225B] terminal 5 (PK/GN). **(5041)**
   b. **No.** Repair open between [53A] terminal 1 and [27B] terminal F1 (PK/GN). **(5041)**

17. Right Headset Speaker (+) at DIN Test

1. Test continuity between [225B] terminal 3 and BOB terminal F2.
2. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Go to Test 18.

18. Right Headset Speaker (+) [53] Test

1. Disconnect DIN [53].
2. Test continuity between [53A] terminal 3 (PK/BE) and BOB terminal F2.
3. Is continuity present?
   a. **Yes.** Repair open between [53B] terminal 3 and [225B] terminal 3 (PK/BE). **(5041)**
   b. **No.** Repair open between [53A] terminal 3 and [27B] terminal F2 (PK/BE). **(5041)**

19. Microphone Open Test

1. Disconnect CB [184].
2. Test continuity between [184A] terminal 1 and BOB terminal C3.
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Repair open between [184A] terminal 1 and [27B] terminal C3 (R). **(5041)**

20. Microphone Low Test

1. Test continuity between [184A] terminal 1 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal C3 and [184A] terminal 1 (R). **(5041)**
   b. **No.** Go to Test 21.

21. Microphone High Test

1. Turn IGN ON.
2. Test voltage between [184A] terminal 1 and ground.
3. Is voltage above 5.0V?
   a. **Yes.** Repair short to power between [27B] terminal C3 and [184A] terminal 1 (R). **(5041)**
   b. **No.** Replace radio. **(6101)**

REAR HEADSET MALFUNCTION

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-59. Rear Headset Malfunction Diagnostic Faults

POSSIBLE CAUSES
PTT circuit malfunction
Headset malfunction
DIN circuit malfunction

1. Verify Headset Test

1. Replace with known good headset.

2. Does system work properly?
   a. **Yes.** Replace headset.
   b. **No.** Go to Test 2.

2. Visual Test

1. Inspect rear audio switch for damage.
2. Is there damage to the rear audio switch?
   a. **Yes.** Replace rear audio switch.
   b. **No.** Go to Test 3.

3. Switch Test

1. Enter service menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Select key input menu.
3. Select handlebars sub-menu.
4. Press PTT button and verify that button illuminates on radio display.
5. Does button illuminate?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 4.

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS, Service Menu.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Turn IGN ON. Check headset operation.
5. Did headset work?
   a. **Yes.** System working properly.
   b. **No.** Go to Test 5.

5. Main Fuse Test

1. Turn IGN OFF.
2. Remove main fuse [5] for 1 minute.
3. Install main fuse.
4. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
5. Turn IGN ON. Check headset operation.
6. Did headset work?
   a. **Yes.** System working properly.
   b. **No.** Go to Test 6.

6. Hand Control Test

1. Turn IGN OFF.
2. Disconnect RHCM [22].
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Turn IGN ON. Check headset operation.
5. Did headset work?
   a. **Yes.** Replace RHCM.
   b. **No.** Replace radio. **(6101)**

7. Headset Power at DIN Test

1. Exit service menu.
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between driver DIN [225B] terminal 4 and ground.
3. Is voltage between 7.5-8.5V?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 8.

8. Headset Power [162] Test

1. Disconnect rear audio [162].
2. Test voltage between [162A] terminal 6 and ground.
3. Is voltage between 7.5-8.5V?
   a. **Yes.** Repair open or short between [162B] terminal 6 and [76B] terminal 4 (R). **(5041)**
   b. **No.** Go to Test 9.

9. Headset Power Breakout Box Test

1. Turn IGN OFF.
2. Disconnect [27].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal D1 from [27B].
4. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
5. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
6. Turn IGN ON.
7. Test voltage between BOB terminal D1 and ground.
8. Is voltage between 7.5-8.5V?
   a. **Yes.** Repair open or short between [27B] terminal D1 and [162A] terminal 6 (R/W). **(5041)**
   b. **No.** Replace radio. **(6101)**

10. Headset Ground at DIN Test

1. Turn IGN OFF.
2. Test continuity between driver DIN [76B] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Go to Test 11.

11. Headset Ground [162] Test

1. Disconnect rear audio [162].

2. Test continuity between [162A] terminal 7 (BK) and ground.
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 7 and [76B] terminal 1 (BK). **(5041)**
   b. **No.** Go to Test 12.

12. Headset Ground Breakout Box Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Test continuity between at BOB terminal C2 and ground.
5. Is continuity present?
   a. **Yes.** Repair open between [27B] terminal C2 and [162A] terminal 7 (BK). **(5041)**
   b. **No.** Replace radio. **(6101)**

13. Common Headset Speaker at DIN Test

1. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
3. Test continuity between [76B] terminal 2 and BOB terminal E3.
4. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 14.

14. Common Headset Speaker [162] Test

1. Disconnect rear audio [162].
2. Test continuity between [162A] terminal 4 (BK/PK) and BOB terminal E3.
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 4 and [76B] terminal 2 (BK).**(5041)**
   b. **No.** Repair open between [162A] terminal 4 and [27B] terminal E3 (BK/PK). **(5041)**

15. Left Headset Speaker (+) at DIN Test

1. Test continuity between [76B] terminal 5 and BOB terminal E1.
2. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 16.

16. Left Headset Speaker (+) [162] Test

1. Disconnect rear audio [162].
2. Test continuity between [162A] terminal 3 (LBE/W) and BOB terminal E1.
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 3 and [76B] terminal 5 (PK/GN). **(5041)**
   b. **No.** Repair open between [162A] terminal 3 and [27B] terminal E1 (LBE/W). **(5041)**

17. Right Headset Speaker (+) at DIN Test

1. Test continuity between [76B] terminal 3 and BOB terminal E2.
2. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Go to Test 18.

18. Right Headset Speaker (+) [53] Test

1. Disconnect DIN [162].
2. Test continuity between [162A] terminal 5 (LBE/V) and BOB terminal E2.
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 5 and [76B] terminal 3 (PK/BE). **(5041)**
   b. **No.** Repair open between [162A] terminal 5 and [27B] terminal E2 (LBE/V). **(5041)**

19. Microphone Open Test

1. Disconnect CB [184].
2. Test continuity between [184A] terminal 1 and BOB terminal C3.
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Repair open between [184A] terminal 1 and [27B] terminal C3 (R). **(5041)**

20. Microphone Low Test

1. Test continuity between [184A] terminal 1 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal C3 and [184A] terminal 1 (R). **(5041)**
   b. **No.** Go to Test 21.

21. Microphone High Test

1. Turn IGN ON.
2. Test voltage between [184A] terminal 1 and ground.
3. Is voltage above 5.0V?
   a. **Yes.** Repair short to power between [27B] terminal C3 and [184A] terminal 1 (R). **(5041)**
   b. **No.** Replace radio. **(6101)**

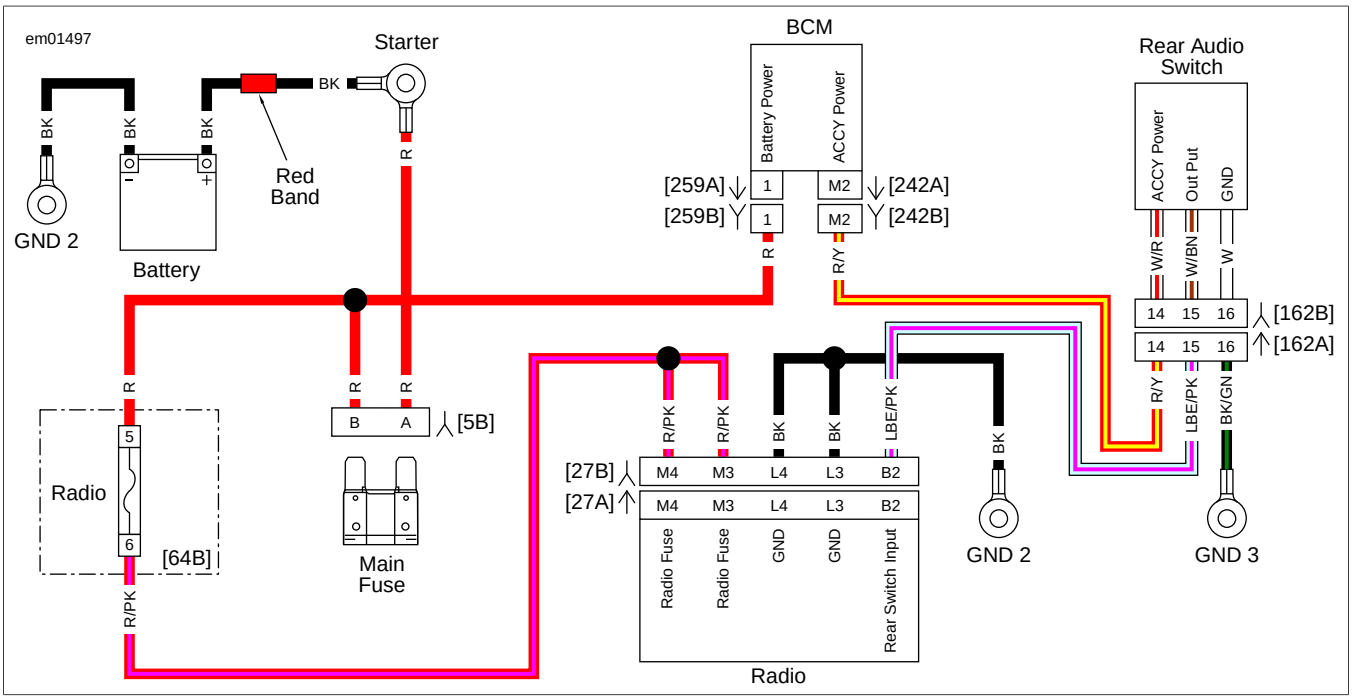


Figure 8-21. Rear Audio Switch Circuit

REAR AUDIO SWITCH MALFUNCTION

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-60. Rear Audio Switch Malfunction Diagnostic Faults

POSSIBLE CAUSES
Rear audio switch malfunction
Open power circuit
Open ground circuit

1. Visual Test

1. Inspect rear audio switch for damage.
2. Is there damage to switch?
   a. **Yes.** Replace switch.
   b. **No.** Go to Test 2.

2. Power Test

1. Turn IGN OFF.
2. Disconnect rear audio [162].
3. Turn IGN and radio ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [162A] terminal 14 (R/Y) and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. Power Circuit Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) between wiring harness [242B] and BCM [242A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Test voltage between BOB terminal M2 and ground.
6. Is battery voltage present?
   a. **Yes.** Repair open between [242B] terminal M2 and [162A] terminal 14 (R/Y).
   b. **No.** Replace BCM.

4. Ground Circuit Test

1. Test continuity between [162A] terminal 16 (BK/GN) and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open between [162A] terminal 16 (BK/GN) and ground.

5. Switch Test

1. Replace rear audio switch with known good switch.
2. Turn IGN OFF.

3. Connect [162].
4. Turn IGN ON.
5. Does system work properly?
   a. **Yes.** Replace rear audio switch.
   b. **No.** Replace radio. **(6101)**

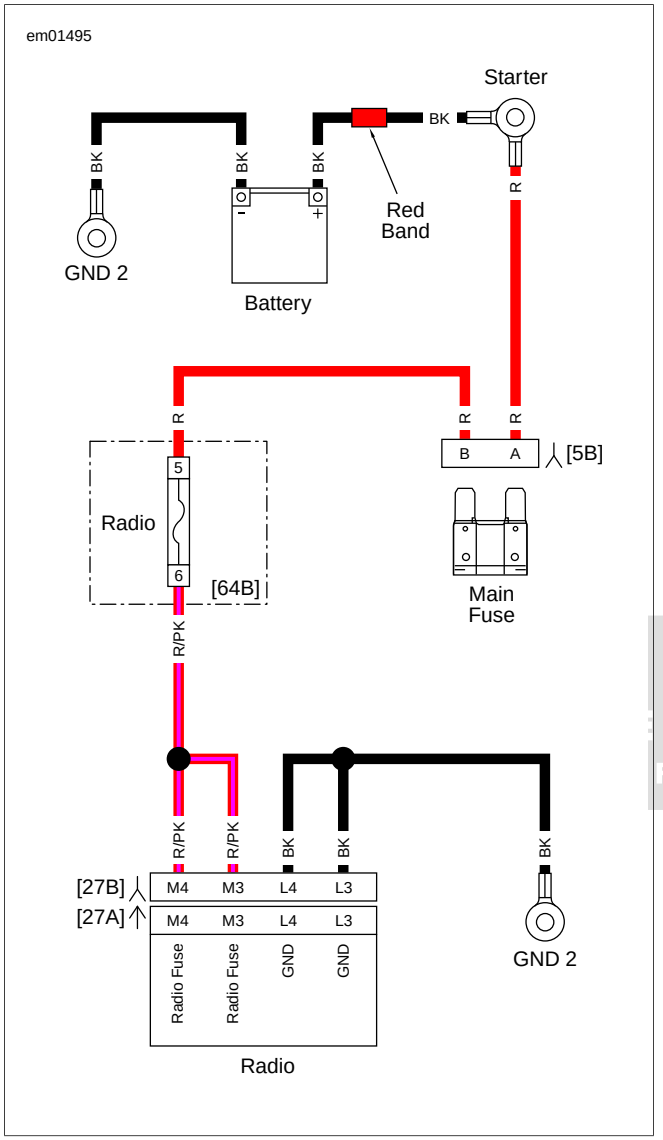


Figure 8-22. Radio Power Circuit

RADIO INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-61. Radio Inoperative Diagnostic Faults

POSSIBLE CAUSES
Open radio fuse
Battery power open
CAN shorted low

1. Radio Fuse Test

1. Inspect radio fuse.
2. Is fuse good?
   a. **Yes.** Go to Test 2.
   b. **No.** Replace radio fuse. If fuse opens again repair short to ground on (R/PK) and test again. **(5041)**

2. Radio Power M3 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to radio [27B], leaving wiring harness [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal M3 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [27B] terminal M3 and fuse block [64B] socket terminal 6 (R/PK). **(5041)**

3. Radio Power M4 Test

1. Test voltage between BOB terminal M4 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open between [27B] terminal M4 and fuse block [64B] socket terminal 6 (R/PK). **(5041)**

4. CAN Test

1. Test continuity between BOB terminal A1 and ground 2.
2. Is continuity present?
   a. **Yes.** Repair short to ground on [27B] terminal A1 (W/R). **(5041)**
   b. **No.** Go to Test 5.

5. Main Fuse Test

1. Remove main fuse [5] for 1 minute.
2. Install main fuse.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Turn IGN ON. Check headset operation.
5. Did headset work?
   a. **Yes.** System working properly.
   b. **No.** Replace radio. **(6101)**

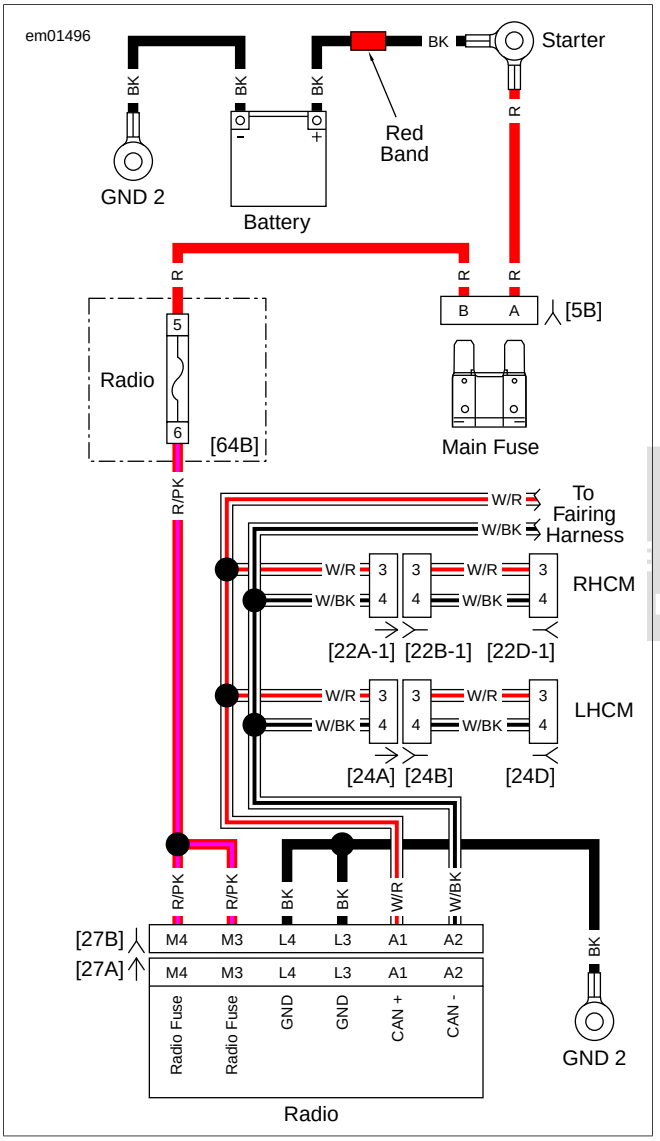


Figure 8-23. FLH Radio Power and CAN Circuit

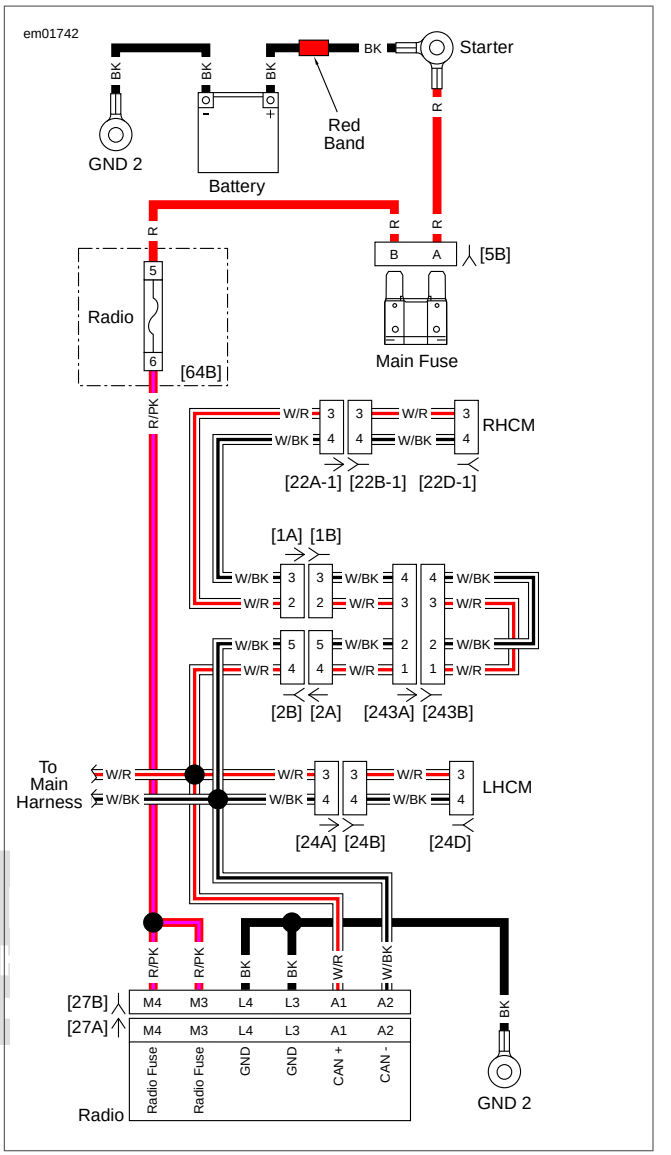


Figure 8-24. FLT Radio Power and CAN Circuit

STATIC PRESENT WITH ENGINE RUNNING

Table 8-62. Static Present with Engine Running Diagnostic Faults

POSSIBLE CAUSES
Alternator malfunction
Regulator malfunction
Loose power connections
Loose antenna connections

1. Static Observation Test

1. Turn IGN ON. Do not start engine.
2. Turn radio ON. Listen for the presence of static.
3. Start engine. Listen for the presence of static.

4. Is static present only when the engine is operating?
   a. **Yes.** Go to Test 2.
   b. **No.** See 8.12 AUDIO SYSTEM SYMPTOMS, Poor or No Reception.

2. Regulator Test

1. Disconnect alternator [47] and start engine.
2. Is static still present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. Regulator Connectors Test

1. Inspect regulator connectors for damaged, pushed out or corroded terminals.
2. Are connector terminations okay and the connectors tight?
   a. **Yes.** Replace voltage regulator. **(6134)**
   b. **No.** Clean and tighten connections. **(5041)**

4. Ignition System Test

1. Test for proper spark plug wire resistance of 4975-11,950 Ohms.
2. Is resistance within specifications?
   a. **Yes.** If spark plug wires are in good condition, replace spark plugs. **(6132)**
   b. **No.** Replace spark plug wires. **(6133)**

RADIO TURNS ON AND OFF

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-63. Radio Turns On and Off Diagnostic Faults

POSSIBLE CAUSES
CAN shorted high or low

1. CAN High Short to Voltage A1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal A1 and ground.
6. Is voltage greater than 4.0V?
   a. **Yes.** Repair short to voltage on [27B] terminal A1 (W/R). **(5041)**
   b. **No.** Go to Test 2.

2. CAN Low Short to Voltage A2 Test

1. Test voltage between BOB terminal A2 and ground.
2. Is voltage greater than 4.0V?
   a. **Yes.** Repair short to voltage on [27B] terminal A2 (W/BK). **(5041)**
   b. **No.** Go to Test 3.

3. CAN Low Short to Ground A2 Test

1. Turn IGN OFF.
2. Test continuity between BOB terminal A2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground on [27B] terminal A2 (W/BK). **(5041)**
   b. **No.** Go to Test 4.

4. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Turn IGN ON.
5. Does radio turn on and stay on?
   a. **Yes.** System working properly.
   b. **No.** Replace radio.

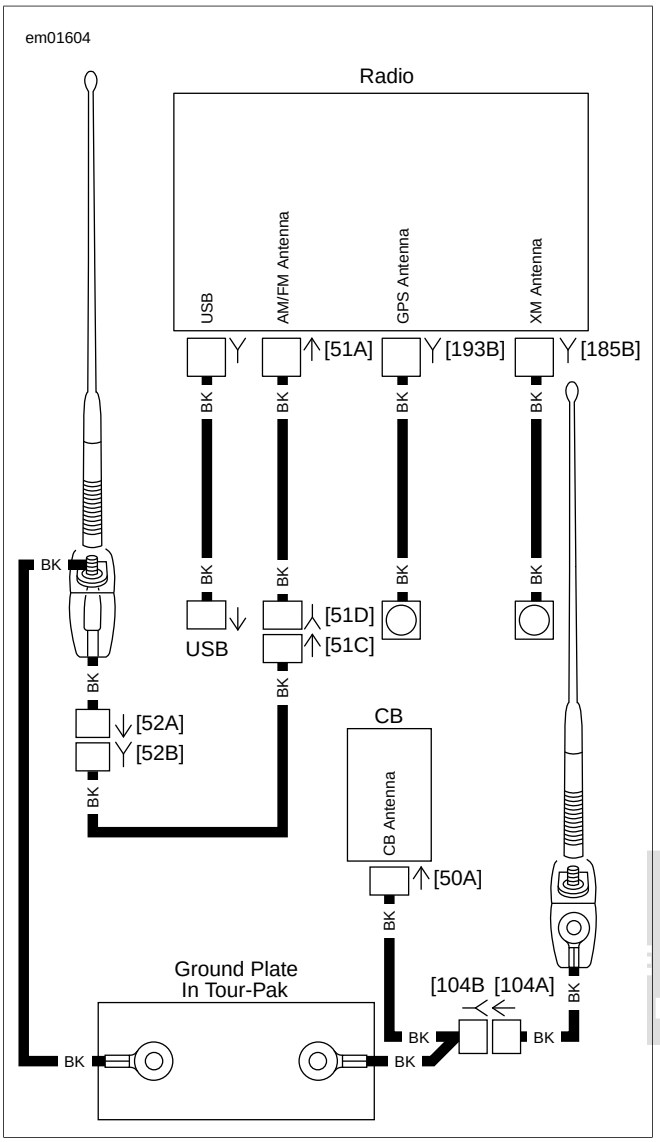


Figure 8-25. Radio Antenna/USB

POOR OR NO RECEPTION

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT

Table 8-64. Poor or No Reception Diagnostic Faults

POSSIBLE CAUSES
Antenna and cable malfunctions
Stations out of range

1. Low-Band Radio Operation Test

1. Switch to AM (or LW/MW/W for HDI) band.
2. Locate a strong station using seek button.
3. Does radio stop seeking on the strong station?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 3.

2. FM-Band Radio Operation Test

1. Switch to FM band.
2. Locate a strong station using the seek button.
3. Does radio stop seeking on the strong station?
   a. **Yes.** Operation normal. Review symptoms.
   b. **No.** Go to Test 3.

3. Antenna Cable Test

1. Verify antenna cable connections to mast and radio.
2. Is antenna cable connected to mast and radio?
   a. **Yes.** Disconnect all antenna cable [51] and [52], check connectors for damaged, pushed out or corroded terminals. Repair as required. If connectors are okay, continue with tests. Go to Test 4.
   b. **No.** Connect antenna cable. **(6609)**

4. Antenna Cable Open Test

1. Connect [51C] and [51D].
2. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity on center conductor between [51A] and [52B].
3. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 5.

5. Antenna Cable Open [52] Test

1. Disconnect [51C] and [51D].
2. Test continuity on center conductor between [51C] and [52B].
3. Is continuity present?
   a. **Yes.** Replace antenna cable between [51D] and [51A]. **(6609)**
   b. **No.** Replace antenna cable between [51C] and [52B]. **(6609)**

6. Antenna Cable Short Test

1. Test continuity between [51A] center conductor to cable shield.
2. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 8.

7. Antenna Cable Open [51] Test

1. Disconnect [51C] and [51D].
2. Test continuity between [51A] center conductor to cable shield.

3. Is continuity present?
   a. **Yes.** Replace antenna cable between [51D] and [51A]. **(6609)**
   b. **No.** Replace antenna cable between [51C] and [52B]. **(6609)**

8. Antenna Base Open to Ground Plate Test

1. Test continuity between [52A] shield (outer conductor) and ground plate inside Tour-Pak.
2. Is continuity present?
   a. **Yes.** Replace radio. **(6101)**
   b. **No.** Repair ground connection or replace antenna base assembly.

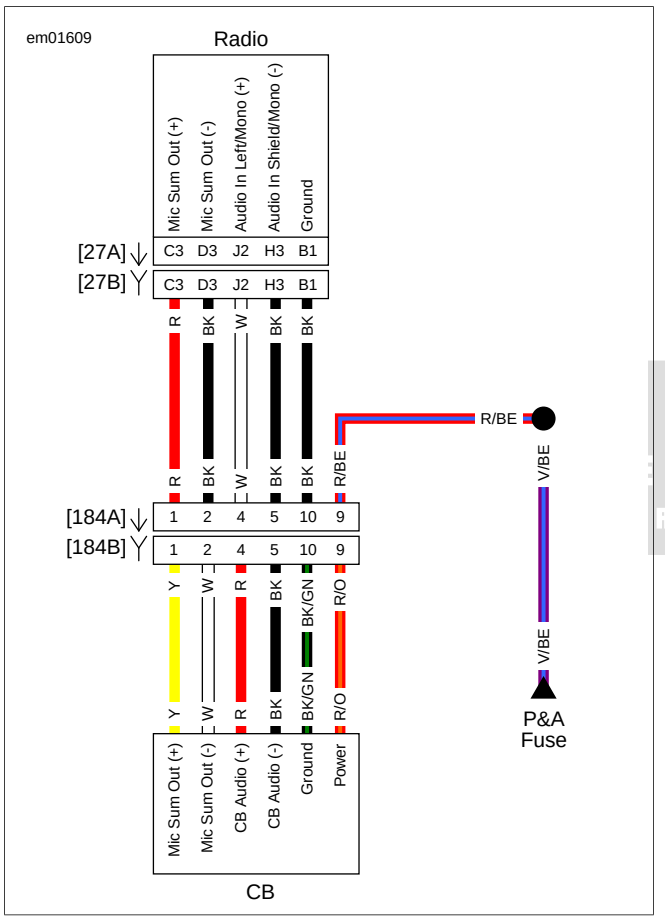


Figure 8-26. CB Circuit

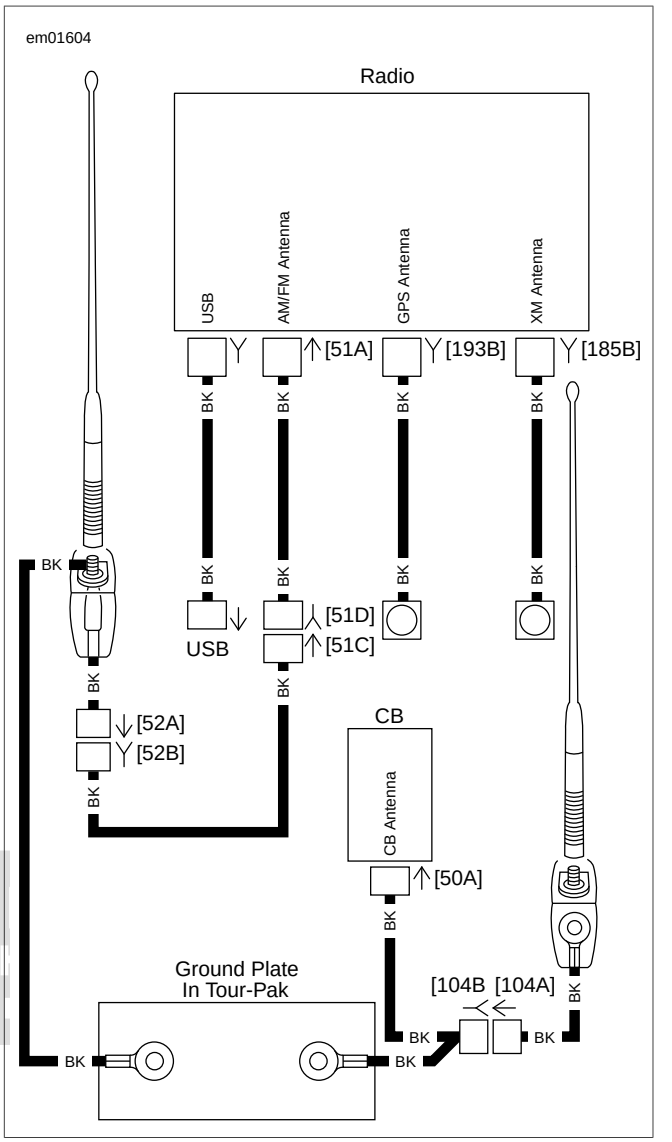


Figure 8-27. Radio Antenna/USB

CB TRANSMITTER INOPERATIVE

PART NUMBER	TOOL NAME
21-534	RADIO SHACK SWR METER
HD-41404	HARNESS CONNECTOR TEST KIT
HD-48037	SWR METER ADAPTERS
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-65. CB Transmitter Inoperative Diagnostic Faults

POSSIBLE CAUSES
P&A fuse
Open power circuit
Open antenna circuit
Shorted antenna circuit
Reset needed

1. Visual Test

1. Inspect RHCM for damage.
2. Are there damages to RHCM?
   a. **Yes.** Replace RHCM.
   b. **No.** Go to Test 2.

2. Switch Test

1. Enter service menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS, Service Menu.
2. Enter key input.
3. Enter handlebars.
4. Press PTT button and verify that button becomes highlighted.
5. Does button highlight?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace RHCM.

3. Fuse Test

1. Check P&A fuse.
2. Is fuse good?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair as needed. Replace fuse.

4. COM Button Test

1. Turn IGN OFF.
2. Perform the following:
   a. Turn IGN ON.
   b. Turn radio ON.
   c. Press accept button.
   d. Press home button.
   e. Press com button.
3. Is CB button present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 5.

5. CB Module Power Test

1. Turn IGN OFF.
2. Disconnect CB [184].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [184A] terminal 9 and ground.
5. Is battery voltage present?
   a. **Yes.** Replace CB module. **(6625)**
   b. **No.** Repair open between [184A] terminal 9 and fuse block [64B] socket terminal 12 (R/BE).

6. CB Button Test

1. Press CB button.
2. Does screen display "CB ON"?
   a. **Yes.** Go to Test 7.
   b. **No.** Turn CB ON and retest.

7. CB Modulation Test

1. Turn IGN OFF.
2. Disconnect antenna [50A & B].
3. Connect RADIO SHACK SWR METER (Part No. 21-534), or equivalent, and SWR METER ADAPTERS (Part No. HD-48037) between [50B] and [50A].
4. Connect known good headset.
5. Turn IGN ON.
6. Wait until CB icon appears on radio screen, press handlebar PTT button, speak into microphone.
7. Does SWR meter fluctuate when transmitting while speaking?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 8.

8. Open MIC (+) Wire Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to radio [27B], leaving wiring harness [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.

3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Disconnect CB [184].
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal C3 and [184B] terminal 1 (R).
6. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair open between [27B] terminal C3 and [184B] terminal 1 (R). **(5041)**

9. Open MIC (-) Wire Test

1. Test continuity between BOB terminal D3 and [184B] terminal 2 (BK).
2. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Repair open between [27B] terminal D3 and [184B] terminal 2 (BK). **(5041)**

10. Continuity MIC Circuit Test

1. Test continuity between BOB terminal D3 and C3.
2. Is continuity present?
   a. **Yes.** Repair short between [27B] terminal D3 (BK) and C3 (R). **(5041)**
   b. **No.** Go to Test 8.

11. CB Antenna Cable Open [50] Test

1. Remove antenna mast from mounting stud.
2. Disconnect CB antenna [50].
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity center conductor between [50A] and mounting stud.
4. Is continuity present?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 12.

12. CB Antenna Cable Open [104] Test

1. Disconnect CB antenna [104].
2. Test continuity center conductor between [50A] to center conductor [104B].
3. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Replace antenna cable between [50A] and [104B]. **(6609)**

13. CB Antenna Cable Open Mast Test

1. Disconnect CB antenna eyelet at base of antenna mast from inside of Tour-Pak.
2. Test continuity center conductor between [104A] and antenna eyelet.
3. Is continuity present?
   a. **Yes.** Replace antenna mast. **(6613)**
   b. **No.** Replace antenna cable between [104B] and antenna mast. **(6609)**

14. CB Antenna Cable Shield Open [50] Test

1. Check continuity outer connector shell between [50A] and ground plate inside Tour-Pak.
2. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 15.

15. CB Antenna Cable Shield Open [104] Test

1. Disconnect CB antenna [104].
2. Test continuity outer connector shell between [50A] to outer connector shell [104B].
3. Is continuity present?
   a. **Yes.** Replace antenna cable between [104B] and antenna mast. **(6609)**
   b. **No.** Replace antenna cable between [50A] and [104B]. **(6609)**

16. CB Antenna Cable Shorted [50] Test

1. Check continuity between center conductor [50A] and ground plate inside Tour-Pak.
2. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 18.

17. CB Antenna Cable Shorted [104] Test

1. Disconnect CB antenna [104].
2. Test continuity center conductor between [50A] to outer connector shell [104B].
3. Is continuity present?
   a. **Yes.** Replace antenna cable between [50A] and [104B] **(6609)**
   b. **No.** Replace antenna cable between [104B] and antenna mast. **(6609)**

18. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Turn IGN ON. Check headset operation.
5. Did headset work?
   a. **Yes.** System working properly.
   b. **No.** Replace radio. **(6101)**

CB RECEIVER INOPERATIVE

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY

Table 8-66. CB Receiver Inoperative Diagnostic Faults

POSSIBLE CAUSES
P&A fuse
Open power circuit
Open antenna circuit
Shorted antenna circuit
Reset needed

1. Visual Test

1. Inspect RHCM for damage.
2. Are there damages to RHCM?
   a. **Yes.** Replace RHCM.
   b. **No.** Go to Test 2.

2. Switch Test

1. Enter service menu. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS.
2. Enter key input.
3. Enter handlebars.
4. Press PTT button. Verify that button becomes highlighted.
5. Does button highlight?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace RHCM.

3. Fuse Test

1. Check P&A fuse.
2. Is fuse good?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace fuse.

4. COM Button Test

1. Turn IGN OFF.
2. Perform the following:
   a. Turn IGN ON.
   b. Turn radio ON.
   c. Press accept button.
   d. Press home button.
   e. Press com button.
3. Is CB button present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 5.

5. CB Module Power Test

1. Turn IGN OFF.
2. Disconnect CB [184].
3. Turn IGN ON.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between [184A] terminal 9 and ground.
5. Is battery voltage present?
   a. **Yes.** Replace CB module. **(6625)**
   b. **No.** Repair open between [184A] terminal 9 and fuse block [64B] socket terminal 12 (R/BE).

6. CB Button Test

1. Press CB button.
2. Does screen display "CB ON"?
   a. **Yes.** Go to Test 7.
   b. **No.** Turn CB ON and retest.

7. Receiver Audio Test

1. Press squelch switch down until bar graph on display moves to the left most position (open).

NOTE

Doing so keeps the squelch open and independent of received signal strength.

2. Is CB audio present? Unless a signal is actually present, audio will be in the form of static hissing.
   a. **Yes.** Go to Test 8.
   b. **No.** Go to Test 9.

8. Squelch Operation Test

1. Press squelch switch up until CB audio cuts out.
2. Transmit a signal from a known good transmitter tuned to the same channel as the receiver under test.
3. Does squelch open and is audio present?
   a. **Yes.** System working properly.
   b. **No.** Go to Test 18.

9. Receiver Operation Test

1. Transmit a signal from a known good transmitter tuned to the same channel as the receiver under test.
2. Is CB receiver audio present?
   a. **Yes.** System working properly.
   b. **No.** Go to Test 10.

10. Receiver Audio Voltage Test

1. Turn IGN OFF.

2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] and radio [27A]. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Turn IGN ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404) and an external transmitter (tuned to same channel as receiver) for test signal, test voltage between BOB terminal J2 and H3
6. Is voltage between 0.0-1.0V?
   a. **Yes.** Replace radio. **(6103)**
   b. **No. Battery voltage present.** Go to Test 14.
   c. **No. 0V present.** Go to Test 12.
   d. **No. Less than battery voltage present.** Go to Test 11.

11. Receiver Audio Open (+) Test

1. Turn IGN OFF.
2. Disconnect [27A].
3. Test continuity between BOB terminal J2 and [184B] terminal 4
4. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Repair open between [27B] terminal J2 and [184B] terminal 4 (W). **(5041)**

12. Receiver Audio Open (-) Test

1. Test continuity between BOB terminal H3 and [184B] terminal 5.
2. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Repair open between [27B] terminal H3 and [184B] terminal 5 (BK). **(5041)**

13. Receiver Audio Short to Ground (+) Test

1. Test continuity between BOB terminal J2 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal J2 and [184B] terminal 4 (W). **(5041)**
   b. **No.** Go to Test 14.

14. Receiver Audio Short to Ground (-) Test

1. Test continuity between BOB terminal H3 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [27B] terminal H3 and [184B] terminal 5 (BK). **(5041)**
   b. **No.** Go to Test 15.

15. Receiver Audio Shorted Together Test

1. Test continuity between BOB terminal J2 and H3.
2. Is continuity present?
   a. **Yes.** Repair short between [27B] terminal J2 and H3 (W) and (BK). **(5041)**
   b. **No.** Go to Test 16.

16. Receiver Audio Harness Shorted to Voltage (+) Test

1. Connect [27A].
2. Turn IGN ON.
3. Test voltage between BOB terminal J2 and ground.
4. Is voltage greater than 4.0V?
   a. **Yes.** Repair short to voltage between [27B] terminal J2 and [184B] terminal 4 (W). **(5041)**
   b. **No.** Go to Test 17.

17. Receiver Audio Harness Shorted to Voltage (-) Test

1. Test voltage between BOB terminal H3 and ground.
2. Is voltage greater than 4.0V?
   a. **Yes.** Repair short to voltage between [27B] terminal H3 and [184B] terminal 5 (BK). **(5041)**
   b. **No.** Replace CB module. **(6625)**

18. CB Antenna Cable Open [50] Test

1. Remove antenna mast from mounting stud.
2. Disconnect CB antenna [50].
3. Test continuity center conductor between [50A] and mounting stud.
4. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Go to Test 21.

19. CB Antenna Cable Open [104] Test

1. Disconnect CB antenna [104].
2. Test continuity center conductor between [50A] to center conductor [104B].
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Replace antenna cable between [50A] and [104B]. **(6609)**

20. CB Antenna Cable Open Mast Test

1. Disconnect CB antenna eyelet at base of antenna mast from inside of Tour-Pak.
2. Test continuity center conductor between [104A] and antenna eyelet.

3. Is continuity present?
   a. **Yes.** Replace antenna mast. **(6613)**
   b. **No.** Replace antenna cable between [104B] and antenna mast. **(6609)**

21. CB Antenna Cable Shield Open [50] Test

1. Check continuity outer connector shell between [50A] and ground plate inside Tour-Pak.
2. Is continuity present?
   a. **Yes.** Go to Test 23.
   b. **No.** Go to Test 22.

22. CB Antenna Cable Shield Open [104] Test

1. Disconnect CB antenna [104].
2. Test continuity between outer connector shell [50A] to outer connector shell [104B].
3. Is continuity present?
   a. **Yes.** Replace antenna cable between [104B] and antenna mast. **(6609)**
   b. **No.** Replace antenna cable between [50A] and [104B]. **(6609)**

23. CB Antenna Cable Shorted [50] Test

1. Check continuity between center conductor [50A] and ground plate inside Tour-Pak.
2. Is continuity present?
   a. **Yes.** Go to Test 24.
   b. **No.** Go to Test 25.

24. CB Antenna Cable Shorted [104] Test

1. Disconnect CB antenna [104].
2. Test continuity center conductor between [50A] to outer connector shell [104B].
3. Is continuity present?
   a. **Yes.** Replace antenna cable between [50A] and [104B]. **(6609)**
   b. **No.** Replace antenna cable between [104B] and antenna mast. **(6609)**

25. Reset Test

1. Perform a pre-calibration reset. See 8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS, Service Menu.
2. Turn IGN OFF.
3. Turn IGN ON. Allow radio to start playing. Wait 30 seconds and turn IGN OFF.
4. Turn IGN ON. Check headset operation.
5. Did headset work?
   a. **Yes.** System working properly.
   b. **No.** Replace radio. **(6101)**

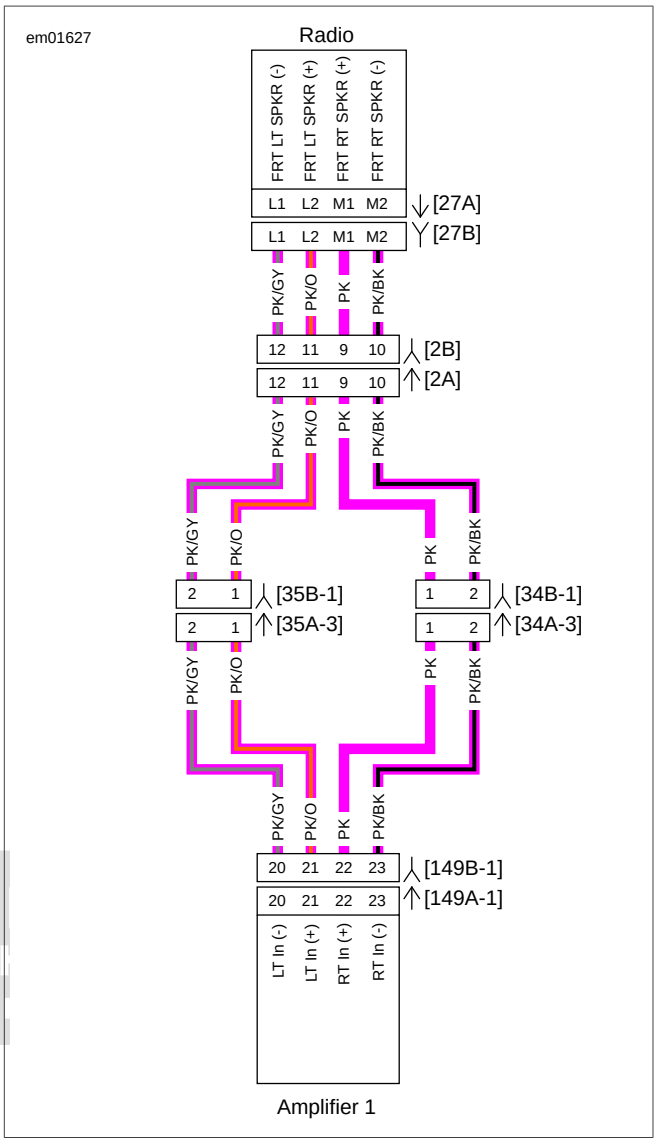


Figure 8-28. Amplifier 1: Radio Front Speaker Circuit

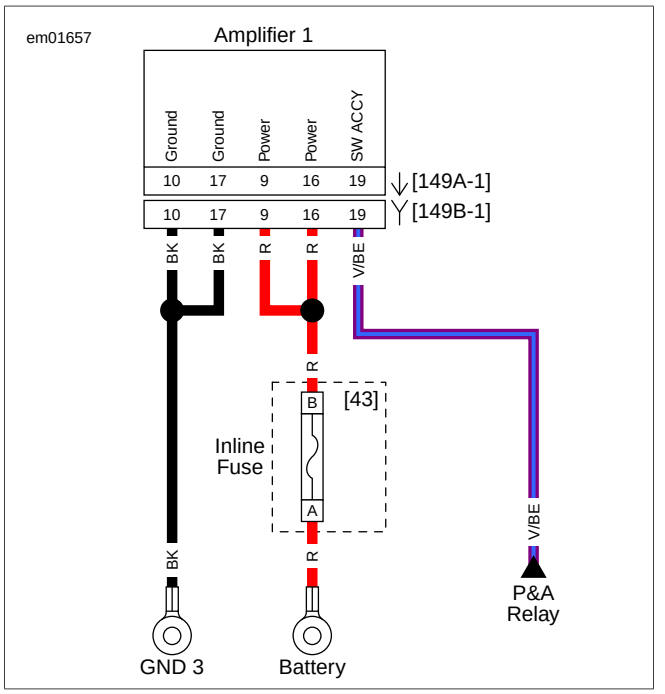


Figure 8-29. Amplifier 1: Power Circuit

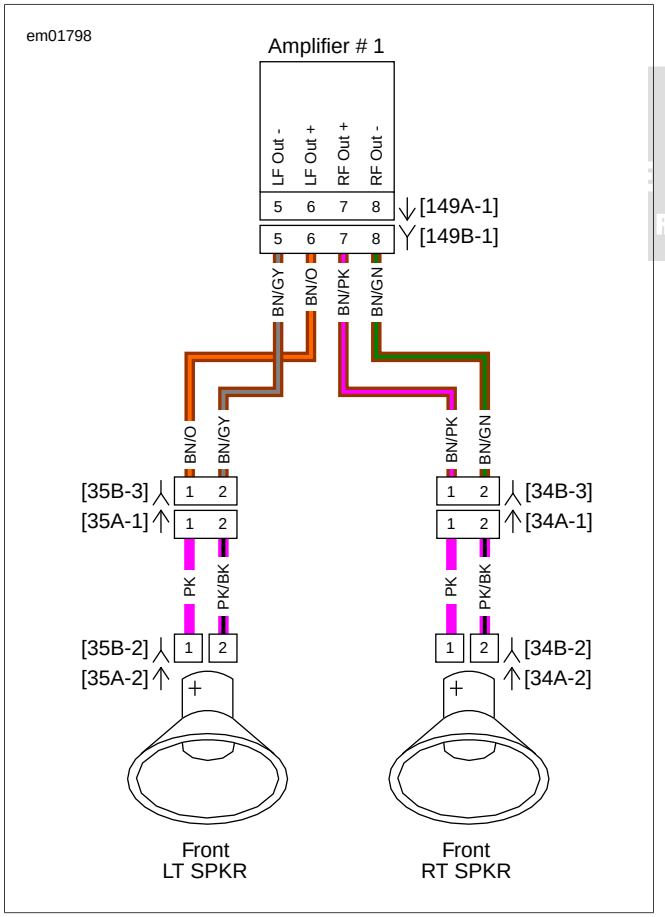


Figure 8-30. Amplifier 1: Front Speakers

ALL SPEAKERS INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-67. All Speakers Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted to ground circuit wires
Open circuit wires

1. Power Terminal 9 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 9 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open between [149-1] terminal 9 and battery (R).

2. Power Terminal 9 Test

1. Test voltage between BOB terminal 16 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [149-1] terminal 16 and battery (R).

3. Ground Terminal 10 Test

1. Test continuity between BOB terminal 10 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open between [149-1] terminal 10 and ground (BK).

4. Ground Terminal 17 Test

1. Test continuity between BOB terminal 17 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open between [149-1] terminal 17 and ground (BK).

5. Switch Power Terminal 19 Test

1. Turn IGN ON.
2. Test voltage between BOB terminal 19 and ground.

3. Is battery voltage present?
   a. **Yes.** Remove BOB. Go to Test 6.
   b. **No.** Repair open between [149-1] terminal 19 and P&A relay (V/BE).

6. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A front speaker jumpers [34-3] and [35-3].
5. Connect OE front speakers [34-1] and [35-1].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Are all speakers inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

LEFT FRONT FAIRING SPEAKER INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-68. Left Front Fairing Speaker Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Configuration Test

1. Verify speakers on amplifier 1.
2. Only speakers on amplifier 1 are front fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 30.

2. Circuit Shorted Together Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B] leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals L1 and L2.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 6.

3. [149-1] Shorted Test

1. Disconnect amplifier [149-1].
2. Test continuity between BOB terminals L1 and L2.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

4. [35A-3] Shorted Test

1. Disconnect speaker harness [35A-3].
2. Test continuity between BOB terminals L1 and L2.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [35A-3] terminals 1 and 2 and [149B-1] terminals 20 and 21.

5. [2A] Shorted Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminals L1 and L2.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminals L1 and L2 and [2B] terminals 12 and 11.
   b. **No.** Repair short between [2A] terminals 11 and 12 and [35B-1] terminals 1 and 2.

6. Circuit Open Test

1. Test continuity between BOB terminals L1 and L2.
2. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Go to Test 7.

7. [149B-1] Terminal 20 Open Test

1. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Test continuity between radio BOB terminal L1 and amplifier BOB terminal 20.

3. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 8.

8. [35A-3] Terminal 2 Open Test

1. Disconnect speaker harness [35A-3].
2. Test continuity between radio BOB terminal L1 and [35B-1] terminal 2 (PK/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [149-1] terminal 20 and [35A-3] terminal 2 (PK/GY).
   b. **No.** Go to Test 9.

9. [2] Terminal 12 Open Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal L1 and [2B] terminal 12 (PK/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [35B-1] terminal 2 and [2A] terminal 12 (PK/GY).
   b. **No.** Repair open between [2B] terminal 12 and [27B] terminal L1 (PK/GY).

10. [149B-1] Terminal 21 Open Test

1. Test continuity between radio BOB terminal L2 and amplifier BOB terminal 21.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Go to Test 11.

11. [35A-3] Terminal 1 Open Test

1. Disconnect speaker harness [35A-3].
2. Test continuity between radio BOB terminal L2 and [35B-1] terminal 1 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [149-1] terminal 21 and [35A-3] terminal 1 (PK/O).
   b. **No.** Go to Test 12.

12. [2] Terminal 11 Open Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal L2 and [2B] terminal 11 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [35B-1] terminal 1 and [2A] terminal 11 (PK/O).
   b. **No.** Repair open between [2B] terminal 11 and [27B] terminal L2 (PK/O).

13. Circuit Grounded L1 Test

1. Test resistance between BOB terminals L1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 17.

14. [149B-1] Terminal 20 Grounded Test

1. Disconnect amplifier [149B-1].
2. Test continuity between BOB terminal L1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Replace amplifier.

15. [35A-3] Terminal 2 Grounded Test

1. Disconnect speaker harness [35A-3].
2. Test continuity between BOB terminal L1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Repair short to ground between [149B-1] terminal 20 and [35A-3] terminal 2 (PK/GY).

16. [2] Terminal 12 Grounded Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal L1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [2B] terminal 12 and [27B] terminal L1 (PK/GY).
   b. **No.** Repair short to ground between [35B-1] terminal 2 and [2A] terminal 12 (PK/GY).

17. Circuit Grounded L2 Test

1. Test resistance between BOB terminal L2 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 18.
   b. **No.** Go to Test 21.

18. [149B-1] Terminal 21 Grounded Test

1. Disconnect amplifier [149-1].
2. Test continuity between BOB terminal L2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Replace amplifier.

19. [35A-3] Terminal 1 Grounded Test

1. Disconnect speaker harness [35B-1].
2. Test continuity between BOB terminal L2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Repair short to ground between [149B-1] terminal 21 and [35A-3] terminal 1 (PK/GY).

20. [2] Terminal 11 Grounded Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminal L2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [2B] terminal 11 and [27B] terminal L2 (PK/O).
   b. **No.** Repair short to ground between [35B-1] terminal 1 and [2A] terminal 11 (PK/O).

21. (PK/GY) Circuit Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 22.
   b. **No.** Go to Test 26.

22. [149-1] Terminal 20 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 23.
   b. **No.** Replace amplifier.

23. [35A-3] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [35A-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to voltage between [149-1] terminal 20 and [35A-3] terminal 2 (PK/GY).

24. [2] Terminal 12 Grounded Test

1. Turn IGN OFF.
2. Disconnect fairing [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 25.
   b. **No.** Repair short to voltage between [35B-1] terminal 2 and [2A] terminal 12 (PK/GY).

25. [27A] Terminal L1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal L1 from [27B] (PK/GY).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal L1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 12 and [27B] terminal L1 (PK/GY).

26. (PK/O) Circuit Voltage Test

1. Test voltage between BOB terminal L2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Go to Test 31.

27. [149-1] Terminal 21 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal L2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 28.
   b. **No.** Replace amplifier.

28. [35A-3] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [35A-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal L2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [149-1] terminal 21 and [35A-3] terminal 1 (PK/O).

29. [2] Terminal 11 Voltage Test

1. Turn IGN OFF.
2. Disconnect fairing [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal L2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [35B-1] terminal 1 and [2A] terminal 11 (PK/O).

30. [27A] Terminal L2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal L2 from [27B] (PK/O).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal L2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 11 and [27B] terminal L2 (PK/O).

31. Left Speaker Circuit Shorted Test

1. Turn IGN OFF.
2. Remove radio BOB and connect [27].
3. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Test resistance between BOB terminals 5 and 6.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 32.
   b. **No.** Go to Test 34.

32. [35B-3] Shorted Test

1. Disconnect speaker harness [35B-3].
2. Test continuity between BOB terminals 5 and 6.
3. Is continuity present?
   a. **Yes.** Repair short between [35B-3] terminals 1 and 2 and [149B-1] terminals 5 and 6.
   b. **No.** Go to Test 33.

33. Speaker Shorted Test

1. Disconnect speaker [35-2].
2. Test resistance between [35A-2] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [35A-1] terminals 1 and 2 and [35B-2] terminals 1 and 2.

34. Left Speaker Circuit Open Test

1. Test continuity between BOB terminals 5 and 6.
2. Is continuity present?
   a. **Yes.** Go to Test 39.
   b. **No.** Go to Test 35.

35. [35B-3] Terminal 1 Open Test

1. Disconnect speaker harness [35B-3].
2. Test continuity between BOB terminal 6 and [35B-3] terminal 1 (BN/O).
3. Is continuity present?
   a. **Yes.** Go to Test 36.
   b. **No.** Repair open between [35B-3] terminal 1 and [149B-1] terminal 6 (BN/O).

36. [35B-3] Terminal 2 Open Test

1. Test continuity between BOB terminal 5 and [35B-3] terminal 2 (BN/GY).
2. Is continuity present?
   a. **Yes.** Go to Test 37.
   b. **No.** Repair open between [35B-3] terminal 2 and [149B-1] terminal 5 (BN/GY).

37. [35B-2] Terminal 1 Open Test

1. Disconnect speaker [35B-2].
2. Test continuity between [35A-1] terminal 1 and [35B-2] terminal 1 (PK).
3. Is continuity present?
   a. **Yes.** Go to Test 38.
   b. **No.** Repair open between [35B-2] terminal 1 and [35A-1] terminal 1 (PK).

38. [35B-2] Terminal 2 Open Test

1. Test continuity between [35A-1] terminal 2 and [35B-2] terminal 2 (PK/BK).
2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Repair open between [35B-2] terminals 2 and [35A-1] terminals 2 (PK/BK).

39. Left Speaker Circuit (+) Grounded Test

1. Test continuity between BOB terminal 6 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 40.
   b. **No.** Go to Test 41.

40. [35B-3] Terminal 1 Grounded Test

1. Disconnect speaker harness [35B-3].
2. Test continuity between BOB terminal 6 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [35B-3] terminal 1 and [149B-1] terminal 6 (BN/O).
   b. **No.** Repair short to ground between [35A-1] terminal 1 and [35B-2] terminal 1 (PK).

41. Left Speaker Circuit (-) Grounded Test

1. Test continuity between BOB terminal 5 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 42.
   b. **No.** Go to Test 43.

42. [35B-3] Terminal 2 Grounded Test

1. Disconnect speaker harness [35B-3].
2. Test continuity between terminal 5 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [35B-3] terminal 2 and [149B-1] terminal 5 (BN/GY).
   b. **No.** Repair short to ground between [35A-1] terminal 2 and [35B-2] terminal 2 (PK/BK).

43. (BN/O) Circuit Voltage Test

1. Connect [149A-1].
2. Turn IGN ON.
3. Test voltage between BOB terminals 6 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 44.
   b. **No.** Go to Test 46.

44. [35B-3] Terminal 1 Voltage Test

1. Disconnect speaker harness [35B-3].
2. Test voltage between terminal 6 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 45.
   b. **No.** Repair short to voltage between [35A-1] terminal 1 and [35B-2] terminal 1 (PK).

45. [149B-1] Terminal 5 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 6 from [149B-1] (BN/O).
4. Connect [149B-2].
5. Turn IGN ON.
6. Test voltage between BOB terminal 6 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [35B-3] terminal 1 and [149B-1] terminal 6 (BN/O).

46. (BN/GY) Circuit Voltage Test

1. Test voltage between BOB terminal 5 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 47.
   b. **No.** Go to Test 49.

47. [35B-3] Terminal 2 Voltage Test

1. Disconnect speaker harness [35B-3].
2. Test voltage between BOB terminal 5 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 48.
   b. **No.** Repair short to voltage between [35A-1] terminal 2 and [35B-2] terminal 2 (PK/BK).

48. [149B-1] Terminal 6 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 5 from [149B-1] (BN/GY).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 5 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [35B-3] terminal 2 and [149B-1] terminal 6 (BN/GY).

49. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A front speaker jumpers [34-3] and [35-3].
5. Connect OE front speakers [34-1] and [35-1].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Is left front speaker inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

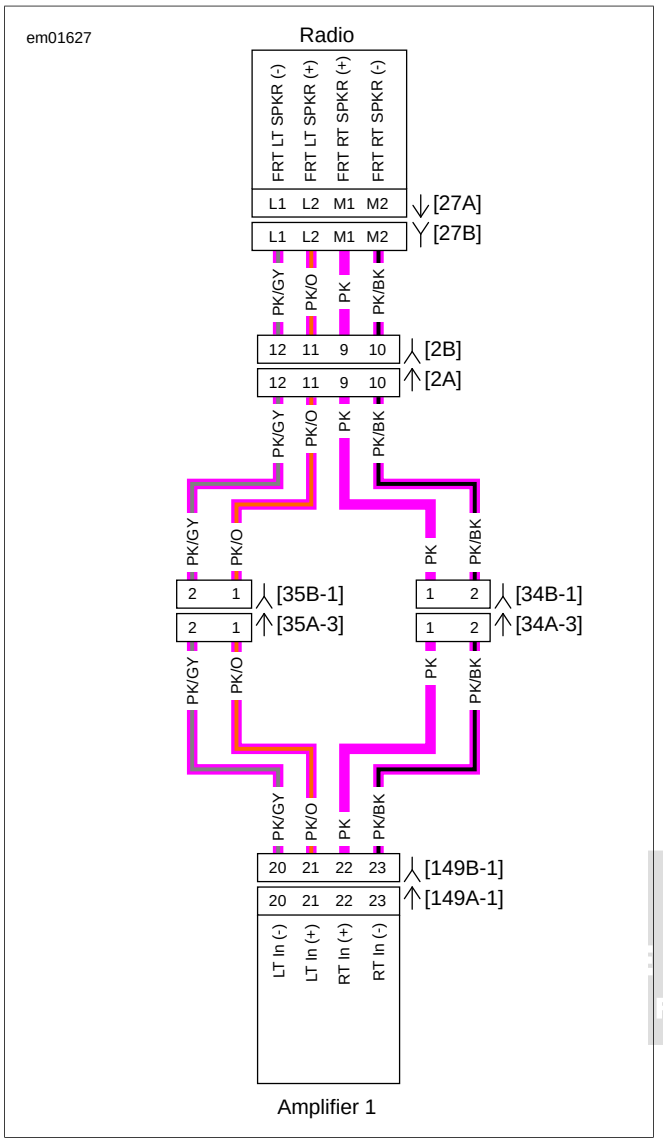


Figure 8-31. Amplifier 1: Radio Front Speaker Circuit

BOTH LEFT SPEAKERS INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-69. Both Left Speakers Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires

1. Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals L1 and L2.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [149-1] Shorted Test

1. Disconnect amplifier [149-1].
2. Test continuity between BOB terminals L1 and L2.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace amplifier.

3. [35A-3] Shorted Test

1. Disconnect speaker harness [35A-3].
2. Test continuity between BOB terminals L1 and L2.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short between [35A-3] terminals 1 and 2 and [149B-1] terminals 20 and 21.

4. [2] Shorted Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminals L1 and L2.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminals L1 and L2 and [2B] terminals 12 and 11.
   b. **No.** Repair short between [2A] terminals 11 and 12 and [35B-1] terminals 1 and 2.

5. Circuit Open Test

1. Test continuity between BOB terminals L1 and L2.
2. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 6.

6. [149B-1] Terminal 20 Open Test

1. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Test continuity between radio BOB terminal L1 and amplifier BOB terminal 20.
3. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 7.

7. [35A-3] Terminal 2 Open Test

1. Disconnect speaker harness [35-1].
2. Test continuity between radio BOB terminal L1 and [35B-1] terminal 2 (PK/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [149-1] terminal 20 and [35A-1] terminal 2 (PK/GY).
   b. **No.** Go to Test 8.

8. [2] Terminal 12 Open Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal L1 and [2B] terminal 12 (PK/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [35B-1] terminal 2 and [2A] terminal 12 (PK/GY).
   b. **No.** Repair open between [2B] terminal 12 and [27B] terminal L1 (PK/GY).

9. [149B-1] Terminal 21 Open Test

1. Test continuity between radio BOB terminal L2 and amplifier BOB terminal 21.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Go to Test 10.

10. [35A-3] Terminal 1 Open Test

1. Disconnect speaker harness [35A-3].
2. Test continuity between radio BOB terminal L2 and [35B-1] terminal 1 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [149-1] terminal 21 and [35A-1] terminal 1 (PK/O).
   b. **No.** Go to Test 11.

11. [2] Terminal 11 Open Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal L2 and [2B] terminal 11 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [35B-1] terminal 1 and [2A] terminal 11 (PK/O).
   b. **No.** Repair open between [2B] terminal 11 and [27B] terminal L2 (PK/O).

12. Circuit Grounded L1 Test

1. Test continuity between BOB terminals L1 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Go to Test 16.

13. [149B-1] Terminal 20 Grounded Test

1. Disconnect amplifier [149B-1].
2. Test continuity between BOB terminal L1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 14.
   b. **No.** Replace amplifier.

14. [35A-3] Terminal 2 Grounded Test

1. Disconnect speaker harness [35A-3].
2. Test continuity between BOB terminal L1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Repair short to ground between [149B-1] terminal 20 and [35A-3] terminal 2 (PK/GY).

15. [2] Terminal 12 Grounded Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal L1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [2B] terminal 12 and [27B] terminal L1 (PK/GY).
   b. **No.** Repair short to ground between [35B-1] terminal 2 and [2A] terminal 12 (PK/GY).

16. Circuit Grounded L2 Test

1. Test resistance between BOB terminal L2 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 20.

17. [149B-1] Terminal 21 Grounded Test

1. Disconnect amplifier [149-1].
2. Test continuity between BOB terminal L2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Replace amplifier.

18. [35A-3] Terminal 1 Grounded Test

1. Disconnect speaker harness [35A-3].
2. Test continuity between BOB terminal L2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to ground between [149B-1] terminal 21 and [35A-3] terminal 1 (PK/GY).

19. [2] Terminal 11 Grounded Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal L2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [2B] terminal 11 and [27B] terminal L2 (PK/GY).
   b. **No.** Repair short to ground between [35B-1] terminal 1 and [2A] terminal 11 (PK/GY).

20. (PK/GY) Circuit Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 21.
   b. **No.** Go to Test 24.

21. [149-1] Terminal 20 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 22.
   b. **No.** Replace amplifier.

22. [35A-3] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [35A-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 23.
   b. **No.** Repair short to voltage between [149-1] terminal 20 and [35A-3] terminal 2 (PK/GY).

23. [2] Terminal 12 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal L1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to voltage between [35B-1] terminal 2 and [2A] terminal 12 (PK/GY).

24. [27A] Terminal L1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal L1 from [27B] (PK/GY).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal L1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 12 and [27B] terminal L1 (PK/GY).

25. (PK/O) Circuit Voltage Test

1. Test voltage between BOB terminal L2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 26.
   b. **No.** Go to Test 30.

26. [149-1] Terminal 21 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal L2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Replace amplifier.

27. [35A-3] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [35A-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal L2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 28.
   b. **No.** Repair short to voltage between [149-1] terminal 21 and [35A-3] terminal 1 (PK/O).

28. [2] Terminal 11 Voltage Test

1. Turn IGN OFF.
2. Disconnect fairing [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal L2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [35B-1] terminal 1 and [2A] terminal 11 (PK/O).

29. [27A] Terminal L2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal L2 from [27B] (PK/O).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal L2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 11 and [27B] terminal L2 (PK/O).

30. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A front speaker jumpers [34-3] and [35-3].
5. Connect OE front speakers [34-1] and [35-1].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Is left front speaker inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

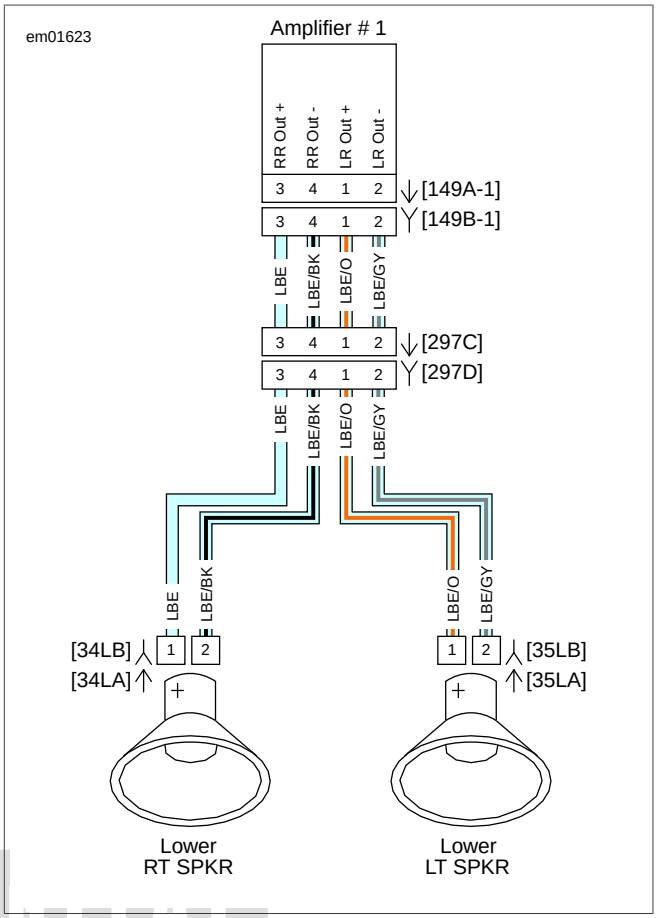


Figure 8-32. Amplifier 1: Lower Speakers

LOWER LEFT SPEAKER INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-70. Lower Left Speaker Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Left Lower Speaker Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.

3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals 1 and 2.
4. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [297C] Shorted Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 1 and 2 and [297C] terminals 1 and 2.
   b. **No.** Go to Test 3.

3. Left Speaker Shorted Test

1. Disconnect speaker [35L].
2. Test resistance between [35LA] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [297D] terminals 1 and 2 and [35LB] terminals 1 and 2.

4. Lower Fairing Speaker Open Test

1. Test continuity between BOB terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 5.

5. Speaker (+) Circuit Open Test

1. Disconnect speaker [35L].
2. Test continuity between BOB terminal 1 and [35LB] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 6.

6. [297C] Terminal 1 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and [297C] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 1 and [35LB] terminal 1 (LBE/O).
   b. **No.** Repair open between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).

7. Speaker (-) Circuit Open Test

1. Test continuity between BOB terminal 2 and [35LB] terminal 2 (LBE/GY).
2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 8.

8. [297C] Terminal 2 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 2 and [35LB] terminal 2 (LBE/GY).
   b. **No.** Repair open between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).

9. Lower Fairing Speaker (+) Grounded Test

1. Test continuity between BOB terminal 1 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 11.

10. [297C] Terminal 1 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).
   b. **No.** Repair short to ground between [297D] terminal 1 and [35LB] terminal 1 (LBE/O).

11. Lower Fairing Speaker (-) Grounded Test

1. Test continuity between BOB terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 13.

12. [297C] Terminal 2 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).
   b. **No.** Repair short to ground between [297D] terminal 2 and [35LB] terminal 2 (LBE/GY).

13. Lower Fairing Speaker (+) Voltage Test

1. Connect [149A-1].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal 1 and ground.

5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 16.

14. [297C] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 15.
   b. **No.** Repair short to voltage between [297D] terminal 1 and [35LB] terminal 1 (LBE/O).

15. [149B-1] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 1 from [149B-1] (LBE/O).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 1 and ground.
7. Is voltage greater than 9.0V
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).

16. Lower Fairing Speaker (-) Voltage Test

1. Test voltage between BOB terminal 2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 19.

17. [297C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 2 and [35LB] terminal 2 (LBE/GY).

18. [149B-1] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), terminal 2 from [149B-1] (LBE/GY).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).

19. Left Speaker Jumper Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Jumper wire from [297C] terminal 3 to [297D] terminal 1.
4. Jumper wire from [297C] terminal 4 to [297D] terminal 2.
5. Turn IGN ON.
6. Turn radio ON.
7. Does lower left speaker work?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

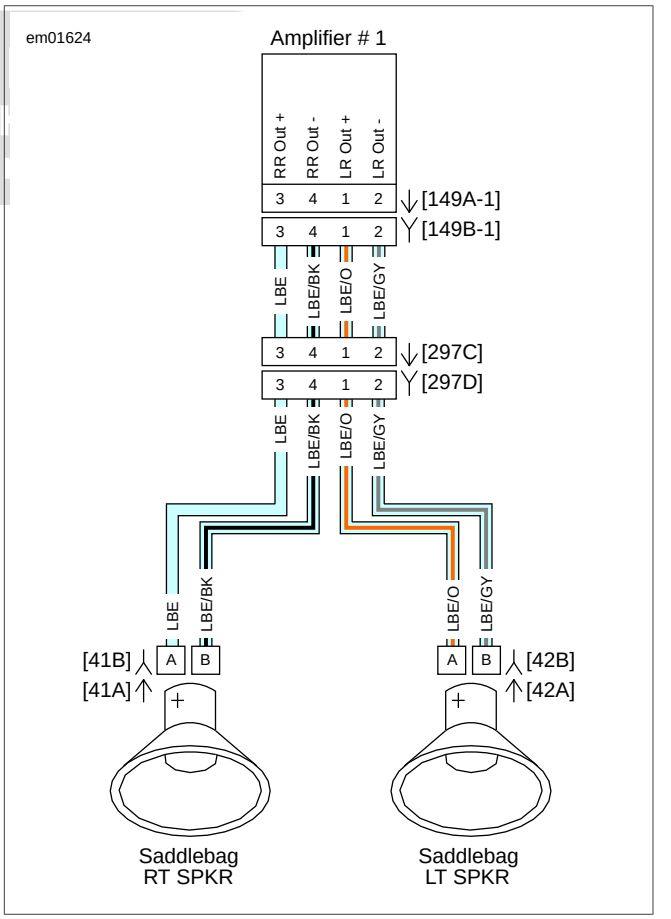


Figure 8-33. Amplifier 1: Saddlebag Speakers

SADDLEBAG LEFT SPEAKER INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-71. Saddlebag Left Speaker Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Left Saddlebag Speaker Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect left saddlebag speakers [42].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminals 1 and 2.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [297C] Shorted Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 1 and 2 and [297C] terminals 1 and 2.
   b. **No.** Go to Test 3.

3. Left Speaker Shorted Test

1. Disconnect speaker [42].
2. Test resistance between [42A] speaker terminals A and B.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [297D] terminals 1 and 2 and [42B] terminal A and B.

4. Lower Fairing Speaker Open Test

1. Test continuity between BOB terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 5.

5. Speaker (+) Circuit Open Test

1. Disconnect speaker [42].
2. Test continuity between BOB terminal 1 and [42B] terminal A (LBE/O).
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 6.

6. [297C] Terminal 1 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and [297C] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 1 and [42B] terminal A (LBE/O).
   b. **No.** Repair open between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).

7. Speaker (-) Circuit Open Test

1. Test continuity between BOB terminal 2 and [42B] terminal B (LBE/GY).
2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 8.

8. [297C] Terminal 2 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 2 and [42B] terminal B (LBE/GY).
   b. **No.** Repair open between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).

9. Saddlebag Speaker (+) Grounded Test

1. Test continuity between BOB terminal 1 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 11.

10. [297C] Terminal 1 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and ground.

3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).
   b. **No.** Repair short to ground between [297D] terminal 1 and [42B] terminal A (LBE/O).

11. Saddlebag Speaker (-) Grounded Test

1. Test continuity between BOB terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 13.

12. [297C] Terminal 2 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).
   b. **No.** Repair short to ground between [297D] terminal 2 and [42B] terminal B (LBE/GY).

13. Saddlebag Speaker (+) Voltage Test

1. Connect [149A-1].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 16.

14. [297C] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 15.
   b. **No.** Repair short to voltage between [297D] terminal 1 and [2B] terminal A (LBE/O).

15. [149B-1] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 1 from [149B-1] (LBE/O).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).

16. Saddlebag Speaker (-) Voltage Test

1. Test voltage between BOB terminal 2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 19.

17. [297C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 2 and [42B] terminal 2 (LBE/GY).

18. [149B-1] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 2 from [149B-1] (LBE/GY).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).

19. Left Speaker Jumper Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Jumper wire from [297C] terminal 3 to [297D] terminal 1.
4. Jumper wire from [297C] terminal 4 to [297D] terminal 2.
5. Turn IGN ON.
6. Turn radio ON.
7. Does saddlebag left speaker work?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

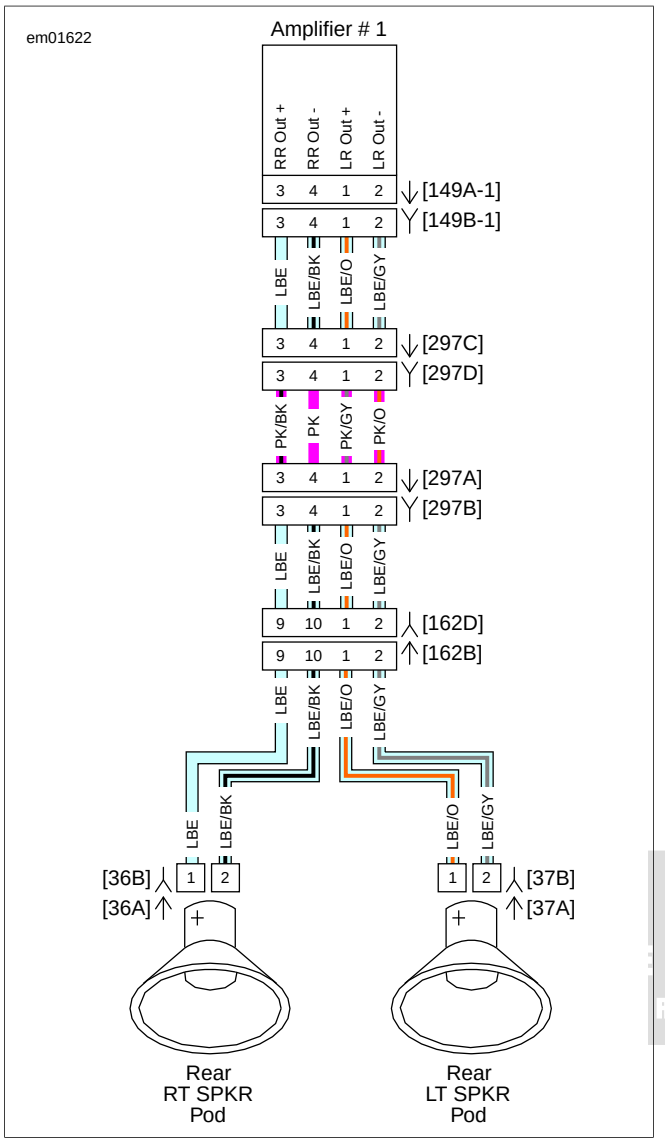


Figure 8-34. Amplifier 1: Rear Speaker Pods

LEFT SPEAKER POD INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-72. Left Speaker Pod Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Left Speaker Pod Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals 1 and 2.
4. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. Speaker Pod Shorted Test

1. Disconnect left speaker [37].
2. Test resistance between [37A] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 3.

3. [162B] Shorted Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short between [162B] terminals 1 and 2 and [37B] terminals 1 and 2.

4. [297B] Shorted Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminals 1 and 2.

3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [162D] terminals 1 and 2 and [297B] terminals 1 and 2.

5. [297C] Shorted Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Repair short between [297C] terminals 1 and 2 and [149B-1] terminals 1 and 2.
   b. **No.** Repair short between [297D] terminals 1 and 2 and [297A] terminals 1 and 2.

6. Left Speaker Pod Circuit Open Test

1. Test continuity between BOB terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 7.

7. Speaker Pod (+) Open Test

1. Test continuity between BOB terminal 1 and [37B] terminal 1 (LBE/O).
2. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 8.

8. [162B] Terminal 1 Open Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 1 and [162D] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 1 and [37B] terminal 1 (LBE/O).
   b. **No.** Go to Test 9.

9. [297B] Terminal 1 Open Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 1 and [297A] terminal 1 (PK/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 1 and [297B] terminal 1 (LBE/O).
   b. **No.** Go to Test 10.

10. [297C] Terminal 1 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and [297C] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 1 and [297A] terminal 1 (PK/GY).
   b. **No.** Repair open between [297C] terminal 1 and [149B-1] terminal 1 (LBE/O).

11. Speaker Pod (-) Open Test

1. Test continuity between BOB terminal 2 and [37B] terminal 2 (LBE/GY).
2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 12.

12. [162B] Terminal 2 Open Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 2 and [162D] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 2 and [37B] terminal 2 (LBE/GY).
   b. **No.** Go to Test 13.

13. [297B] Terminal 2 Open Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 2 and [297A] terminal 2 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).
   b. **No.** Go to Test 14.

14. [297C] Terminal 2 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 2 and [297A] terminal 2 (PK/O).
   b. **No.** Repair open between [297C] terminal 2 and [149B-1] terminal 2 (LBE/GY).

15. Left Speaker Pod (+) Grounded Test

1. Test continuity between BOB terminal 1 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 19.

16. [162B] Terminal 1 Grounded Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 1 and ground.

3. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Repair short to ground between [162B] terminal 1 and [37B] terminal 1 (PK/O).

17. [297B] Terminal 1 Grounded Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to ground between [162D] terminal 1 and [297B] terminal 1 (LBE/O).

18. [297C] Terminal 1 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [297C] terminal 1 and [149B-1] terminal 1 (LBE/O).
   b. **No.** Repair short to ground between [297D] terminal 1 and [297A] terminal 1 (PK/GY).

19. Left Speaker Pod (-) Grounded Test

1. Test continuity between BOB terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Go to Test 23.

20. [162B] Terminal 2 Grounded Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 21.
   b. **No.** Repair short to ground between [162B] terminal 2 and [37B] terminal 2 (PK/GY).

21. [297B] Terminal 2 Grounded Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 22.
   b. **No.** Repair short to ground between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).

22. [297C] Terminal 2 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [297C] terminal 2 and [149B-1] terminal 2 (LBE/GY).
   b. **No.** Repair short to ground between [297D] terminal 2 and [297A] terminal 2 (PK/O).

23. Left Speaker Pod (+) Voltage Test

1. Connect [149A-1].
2. Turn IGN ON.
3. Test voltage between BOB terminal 1 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 24.
   b. **No.** Go to Test 28.

24. [162B] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 25.
   b. **No.** Repair short to voltage between [162B] terminal 1 and [37B] terminal 1 (LBE/O).

25. [297B] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 26.
   b. **No.** Repair short to voltage between [162D] terminal 1 and [297B] terminal 1 (LBE/O).

26. [297C] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Repair short to voltage between [297D] terminal 1 and [297A] terminal 1 (PK/GY).

27. [149B-1] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].

3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 1 from [149B-2] (LBE/O).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [297C] terminal 1 and [149B-1] terminal 1 (LBE/O).

28. Left Speaker Pod (-) Voltage Test

1. Test voltage between BOB terminal 2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 29.
   b. **No.** Go to Test 33.

29. [162B] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [162B] terminal 2 and [37B] terminal 2 (PK/GY).

30. [297B] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 31.
   b. **No.** Repair short to voltage between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).

31. [297C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 32.
   b. **No.** Repair short to voltage between [297D] terminal 2 and [297A] terminal 2 (PK/O).

32. [149B-1] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 2 from [149B-2] (LBE/GY).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [297C] terminal 2 and [149B-1] terminal 2 (LBE/GY).

33. Left Speaker Jumper Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Jumper wire from [297C] terminal 3 to [297D] terminal 1.
4. Jumper wire from [297C] terminal 4 to [297D] terminal 2.
5. Turn IGN ON.
6. Turn radio ON.
7. Does left speaker pod work?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

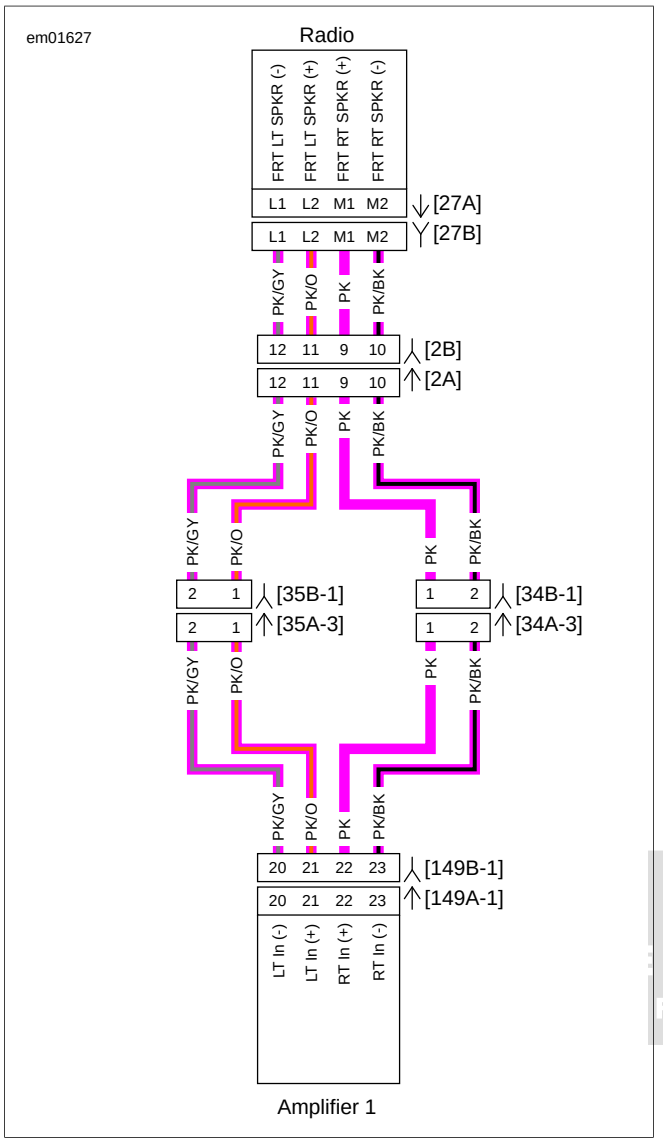


Figure 8-35. Amplifier 1: Radio Front Speaker Circuit

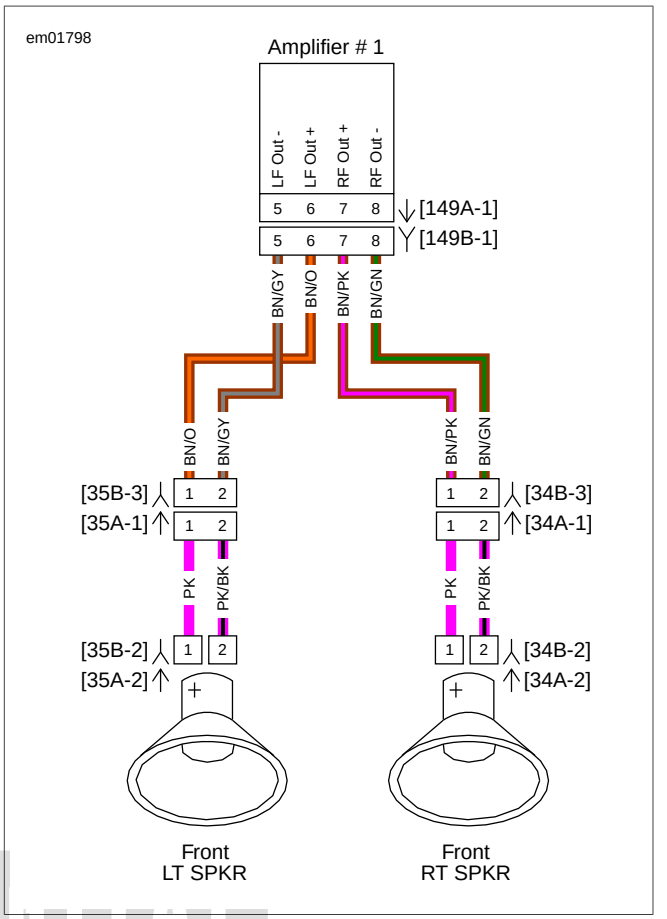


Figure 8-36. Amplifier 1: Front Speakers

RIGHT FRONT FAIRING SPEAKER INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-73. Right Front Fairing Speaker Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Configuration Test

1. Verify speakers on amplifier 1.
2. Only speakers on amplifier 1 are front fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 31.

2. Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals M1 and M2.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 6.

3. [149-1] Shorted Test

1. Disconnect amplifier [149-1].
2. Test continuity between BOB terminals M1 and M2.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

4. [34A-3] Shorted Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between BOB terminals M1 and M2.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [34A-3] terminals 1 and 2 and [149B-1] terminals 22 and 23.

5. [2A] Shorted Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminals M1 and M2.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminals M1 and M2 and [2B] terminals 9 and 10.
   b. **No.** Repair short between [2A] terminals 9 and 10 and [34B-1] terminals 1 and 2.

6. Circuit Open Test

1. Test continuity between BOB terminals M1 and M2.
2. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 13.

7. [149B-1] Terminal 22 Open Test

1. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Test continuity between radio BOB terminal M1 and amplifier BOB terminal 22.
3. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 8.

8. [34A-3] Terminal 1 Open Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between radio BOB terminal M1 and [34B-1] terminal 1 (PK).
3. Is continuity present?
   a. **Yes.** Repair open between [149-1] terminal 22 and [34A-3] terminal 1 (PK).
   b. **No.** Go to Test 9.

9. [2] Terminal 9 Open Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal M1 and [2B] terminal 9 (PK).
3. Is continuity present?
   a. **Yes.** Repair open between [34B-1] terminal 1 and [2A] terminal 9 (PK).
   b. **No.** Repair open between [2B] terminal 9 and [27B] terminal M1 (PK).

10. [149B-1] Terminal 23 Open Test

1. Test continuity between radio BOB terminal M2 and amplifier BOB terminal 23.
2. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Go to Test 11.

11. [34A-3] Terminal 2 Open Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between radio BOB terminal M2 and [34B-1] terminal 2 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [149-1] terminal 23 and [34A-3] terminal 2 (PK/BK).
   b. **No.** Go to Test 12.

12. [2] Terminal 10 Open Test

1. Disconnect fairing [2].

2. Test continuity between radio BOB terminal M2 and [2B] terminal 10 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [34B-1] terminal 1 and [2A] terminal 10 (PK/BK).
   b. **No.** Repair open between [2B] terminal 10 and [27B] terminal M2 (PK/BK).

13. Circuit Grounded M1 Test

1. Test resistance between BOB terminal M1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 17.

14. [149B-1] Terminal 22 Grounded Test

1. Disconnect amplifier [149B-1].
2. Test continuity between BOB terminal M1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Replace amplifier.

15. [34A-3] Terminal 1 Grounded Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between BOB terminal M1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Repair short to ground between [149B-1] terminal 22 and [34A-3] terminal 1 (PK).

16. [2] Terminal 9 Grounded Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal M1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [2B] terminal 9 and [27B] terminal M1 (PK).
   b. **No.** Repair short to ground between [34B-1] terminal 1 and [2A] terminal 9 (PK).

17. Circuit Grounded M2 Test

1. Test resistance between BOB terminal M2 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 18.
   b. **No.** Go to Test 21.

18. [149B-1] Terminal 23 Grounded Test

1. Disconnect amplifier [149-1].
2. Test continuity between BOB terminal M2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Replace amplifier.

19. [34A-3] Terminal 2 Grounded Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between BOB terminal M2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Repair short to ground between [149B-1] terminal 23 and [34A-3] terminal 2 (PK/BK).

20. [2] Terminal 10 Grounded Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal M2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [2B] terminal 10 and [27B] terminal M2 (PK/BK).
   b. **No.** Repair short to ground between [34B-1] terminal 2 and [2A] terminal 10 (PK/BK).

21. (PK) Circuit Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 22.
   b. **No.** Go to Test 26.

22. [149-1] Terminal 22 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 23.
   b. **No.** Replace amplifier.

23. [34A-3] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [34A-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal M1 and ground.

5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to voltage between [149-1] terminal 22 and [34A-3] terminal 1 (PK).

24. [2] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 25.
   b. **No.** Repair short to voltage between [34B-1] terminal 1 and [2A] terminal 9 (PK).

25. [27A] Terminal M1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal M1 from [27B] (PK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal M1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 9 and [27B] terminal M1 (PK).

26. (PK/BK) Circuit Voltage Test

1. Test voltage between BOB terminal M2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Go to Test 31.

27. [149-1] Terminal 23 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal M2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 28.
   b. **No.** Replace amplifier.

28. [34A-3] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [34A-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal M2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [149-1] terminal 23 and [34A-3] terminal 2 (PK/BK).

29. [2] Terminal 10 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal M2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [34B-1] terminal 2 and [2A] terminal 10 (PK/BK).

30. [27A] Terminal M2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal M2 from [27B] (PK/BK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal M2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 10 and [27B] terminal M1 (PK/BK).

31. Right Speaker Circuit Shorted Test

1. Turn IGN OFF.
2. Remove radio BOB and connect [27].
3. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals 7 and 8.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 32.
   b. **No.** Go to Test 34.

32. [34B-3] Shorted Test

1. Disconnect speaker harness [34B-3].
2. Test continuity between BOB terminals 7 and 8.
3. Is continuity present?
   a. **Yes.** Repair short between [34B-3] terminals 1 and 2 and [149B-1] terminals 7 and 8.
   b. **No.** Go to Test 33.

33. Speaker Shorted Test

1. Disconnect speaker [34-2].
2. Test resistance between [34A-2] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [34A-1] terminals 1 and 2 and [34B-2] terminals 1 and 2.

34. Right Speaker Circuit Open Test

1. Test continuity between BOB terminals 7 and 8.
2. Is continuity present?
   a. **Yes.** Go to Test 39.
   b. **No.** Go to Test 35.

35. [34B-3] Terminal 1 Open Test

1. Disconnect speaker harness [34B-3].
2. Test continuity between BOB terminal 7 and [34B-3] terminal 1 (BN/PK).
3. Is continuity present?
   a. **Yes.** Go to Test 36.
   b. **No.** Repair open between [34B-3] terminal 1 and [149B-1] terminal 7 (BN/PK).

36. [34B-3] Terminal 2 Open Test

1. Test continuity between BOB terminal 8 and [34B-3] terminal 2 (BN/GN).
2. Is continuity present?
   a. **Yes.** Go to Test 37.
   b. **No.** Repair open between [34B-3] terminal 2 and [149B-1] terminal 8 (BN/ GN).

37. [34B-2] Terminal 1 Open Test

1. Disconnect speaker [34B-2].
2. Test continuity between [34A-1] terminal 1 and [34B-2] terminal 1 (PK).
3. Is continuity present?
   a. **Yes.** Go to Test 38.
   b. **No.** Repair open between [34B-2] terminal 1 and [34A-1] terminal 1 (PK).

38. [34B-2] Terminal 2 Open Test

1. Test continuity between [34A-1] terminal 2 and [34B-2] terminal 2 (PK/BK).
2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Repair open between [34B-2] terminal 2 and [34A-1] terminal 2 (PK/BK).

39. Right Speaker Circuit (+) Grounded Test

1. Test continuity between BOB terminal 7 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 40.
   b. **No.** Go to Test 41.

40. [34B-3] Terminal 1 Grounded Test

1. Disconnect speaker harness [34B-3].
2. Test continuity between BOB terminal 7 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [34B-3] terminal 1 and [149B-1] terminal 7 (BN/PK).
   b. **No.** Repair short to ground between [34A-1] terminal 1 and [34B-2] terminal 1 (PK).

41. Right Speaker Circuit (-) Grounded Test

1. Test continuity between BOB terminal 8 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 42.
   b. **No.** Go to Test 43.

42. [34B-3] Terminal 2 Test

1. Disconnect speaker harness [34B-3].
2. Test continuity between BOB terminal 8 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [34B-3] terminal 2 and [149B-1] terminal 8 (BN/GN).
   b. **No.** Repair short to ground between [34A-1] terminal 2 and [34B-2] terminal 2 (PK/BK).

43. (BN/PK) Circuit Voltage Test

1. Connect [149A-1].
2. Turn IGN ON.
3. Test voltage between BOB terminal 7 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 44.
   b. **No.** Go to Test 46.

44. [34B-3] Terminal 1 Voltage Test

1. Disconnect speaker harness [34B-3].
2. Test voltage between BOB terminal 7 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 45.
   b. **No.** Repair short to voltage between [34A-1] terminal 1 and [34B-2] terminal 1 (PK).

45. [149B-1] Terminal 7 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].

3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 5 from [149B-1] (BN/PK).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 5 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [34B-3] terminal 1 and [149B-1] terminal 7 (BN/PK).

46. (BN/GN) Circuit Voltage Test

1. Test voltage between BOB terminal 8 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 47.
   b. **No.** Go to Test 49.

47. [34B-3] Terminal 2 Test

1. Disconnect speaker harness [34B-3].
2. Test voltage between BOB terminal 8 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 48.
   b. **No.** Repair short to voltage between [34A-1] terminal 2 and [34B-2] terminal 2 (PK/BK).

48. [149B-1] Terminal 8 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 8 from [149B-1] (BN/GN).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 8 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [34B-3] terminal 2 and [149B-1] terminal 8 (BN/GN).

49. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A front speaker jumpers [34-3] and [35-3].
5. Connect OE front speakers [34-1] and [35-1].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Is right front speaker inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

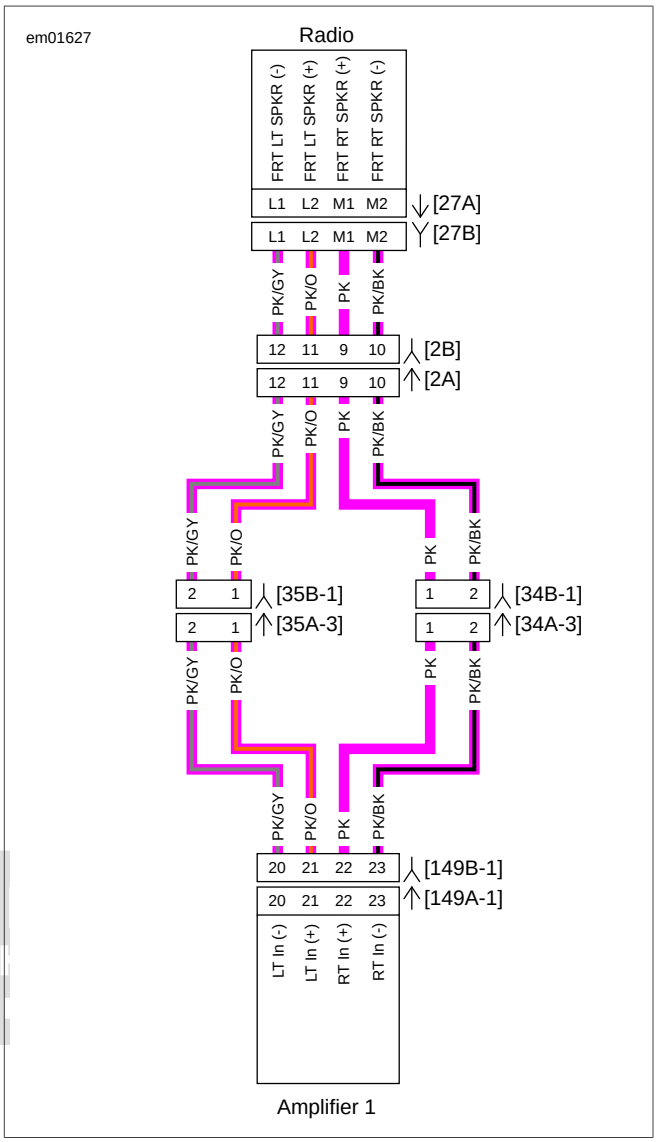


Figure 8-37. Amplifier 1: Radio Front Speaker Circuit

BOTH RIGHT SPEAKERS INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-74. Both Right Speaker Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires

1. Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals M1 and M2.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [149-1] Shorted Test

1. Disconnect amplifier [149-1].
2. Test continuity between BOB terminals M1 and M2.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace amplifier.

3. [34A-3] Shorted Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between BOB terminals M1 and M2.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short between [34A-3] terminals 1 and 2 and [149B-1] terminals 22 and 23.

4. [2A] Shorted Test

1. Disconnect fairing [2].
2. Test continuity between BOB terminals M1 and M2.
3. Is continuity present?
   a. **Yes.** Repair short between [27B] terminals M1 and M2 and [2B] terminals 9 and 10.
   b. **No.** Repair short between [2A] terminals 9 and 10 and [34B-1] terminals 1 and 2.

5. Circuit Open Test

1. Test continuity between BOB terminals M1 and M2.
2. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 6.

6. [149B-1] Terminal 22 Open Test

1. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Test continuity between radio BOB terminal M1 and amplifier BOB terminal 22.
3. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 7.

7. [34A-3] Terminal 1 Open Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between radio BOB terminal M1 and [34B-1] terminal 1 (PK).
3. Is continuity present?
   a. **Yes.** Repair open between [149-1] terminal 22 and [34A-3] terminal 1 (PK).
   b. **No.** Go to Test 8.

8. [2] Terminal 9 Open Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal M1 and [2B] terminal 9 (PK).
3. Is continuity present?
   a. **Yes.** Repair open between [34B-1] terminal 1 and [2A] terminal 9 (PK).
   b. **No.** Repair open between [2B] terminal 9 and [27B] terminal M1 (PK).

9. [149B-1] Terminal 23 Open Test

1. Test continuity between radio BOB terminal M2 and amplifier BOB terminal 23.
2. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 10.

10. [34A-3] Terminal 2 Open Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between radio BOB terminal M2 and [34B-1] terminal 2 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [149-1] terminal 23 and [34A-3] terminal 2 (PK/BK).
   b. **No.** Go to Test 11.

11. [2] Terminal 10 Open Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal M2 and [2B] terminal 10 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [34B-1] terminal 1 and [2A] terminal 10 (PK/BK).
   b. **No.** Repair open between [2B] terminal 10 and [27B] terminal M2 (PK/BK).

12. Circuit Ground M1 Test

1. Test continuity between BOB terminals M1 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Go to Test 16.

13. [149B-1] Terminal 22 Grounded Test

1. Disconnect amplifier [149B-1].
2. Test continuity between BOB terminal M1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 14.
   b. **No.** Replace amplifier.

14. [34A-3] Terminal 1 Grounded Test

1. Disconnect speaker harness [34B-1].
2. Test continuity between BOB terminal M1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Repair short to ground between [149B-1] terminal 22 and [34A-3] terminal 1 (PK).

15. [2] Terminal 9 Grounded Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal M1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [2B] terminal 9 and [27B] terminal M1 (PK).
   b. **No.** Repair short to ground between [34B-1] terminal 1 and [2A] terminal 9 (PK).

16. Circuit Grounded M2 Test

1. Test resistance between BOB terminal M2 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 20.

17. [149B-1] Terminal 23 Grounded Test

1. Disconnect amplifier [149-1].
2. Test continuity between BOB terminal M2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Replace amplifier.

18. [34A-3] Terminal 2 Grounded Test

1. Disconnect speaker harness [34A-3].
2. Test continuity between BOB terminal M2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to ground between [149B-1] terminal 23 and [34A-3] terminal 2 (PK/BK).

19. [2] Terminal 10 Grounded Test

1. Disconnect fairing [2].
2. Test continuity between radio BOB terminal M2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [2B] terminal 10 and [27B] terminal M2 (PK/BK).
   b. **No.** Repair short to ground between [34B-1] terminal 2 and [2A] terminal 10 (PK/BK).

20. (PK) Circuit Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 21.
   b. **No.** Go to Test 25.

21. [149-1] Terminal 22 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 22.
   b. **No.** Replace amplifier.

22. [35A-3] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [34A-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 23.
   b. **No.** Repair short to voltage between [149-1] terminal 22 and [34A-3] terminal 1 (PK).

23. [2] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal M1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to voltage between [34B-1] terminal 1 and [2A] terminal 9 (PK).

24. [27A] Terminal M1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal M1 from [27B] (PK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal M1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 9 and [27B] terminal M1 (PK).

25. (PK/BK) Circuit Voltage Test

1. Test voltage between BOB terminal M2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 26.
   b. **No.** Go to Test 30.

26. [149-1] Terminal 23 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-1].
3. Turn IGN ON.
4. Test voltage between BOB terminal M2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Replace amplifier.

27. [35A-3] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [34A-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal M2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 28.
   b. **No.** Repair short to voltage between [149-1] terminal 23 and [34A-3] terminal 2 (PK/BK).

28. [2] Terminal 10 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker harness [2].
3. Turn IGN ON.
4. Test voltage between BOB terminal M2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [34B-1] terminal 2 and [2A] terminal 10 (PK/BK).

29. [27A] Terminal M2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal M2 from [27B] (PK/BK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal M1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [2B] terminal 10 and [27B] terminal M2 (PK/BK).

30. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A front speaker jumpers [34-3] and [35-3].
5. Connect OE front speakers [34-1] and [35-1].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Are both right front speaker inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

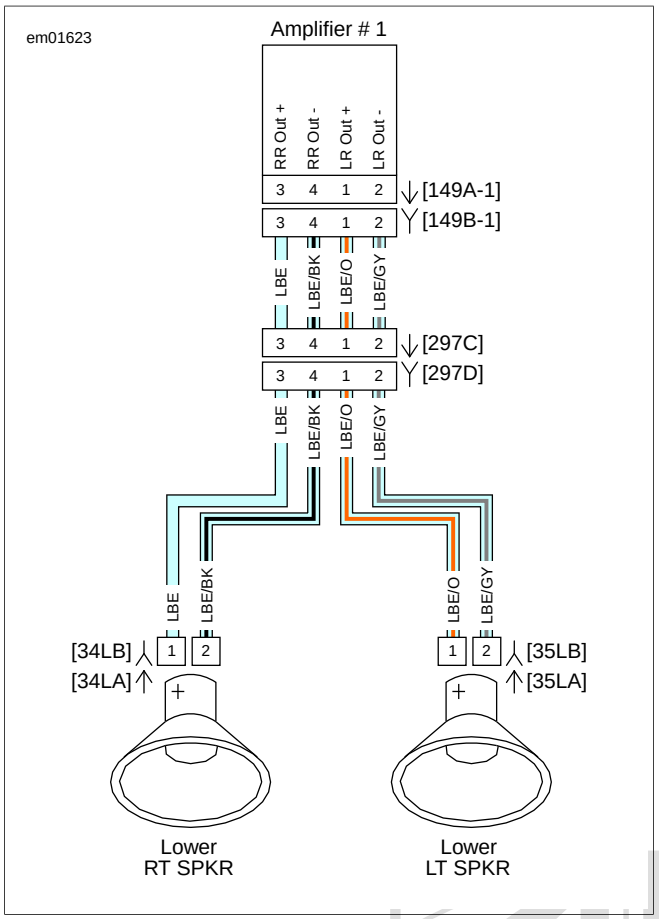


Figure 8-38. Amplifier 1: Lower Speakers

LOWER RIGHT SPEAKER INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-75. Lower Right Speaker Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Right Lower Speaker Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals 3 and 4.
4. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [297C] Shorted Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 3 and 4 and [297C] terminals 3 and 4.
   b. **No.** Go to Test 3.

3. Right Speaker Shorted Test

1. Disconnect speaker [34L].
2. Test resistance between [34LA] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [297D] terminals 3 and 4 and [34LB] terminals 1 and 2.

4. Lower Fairing Speaker Open Test

1. Test continuity between BOB terminals 3 and 4.
2. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 5.

5. Speaker (+) Circuit Open Test

1. Disconnect speaker [34L].
2. Test continuity between BOB terminal 3 and [34LB] terminal 1 (LBE).
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 6.

6. [297C] Terminal 3 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and [297C] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 3 and [34LB] terminal 1 (LBE).
   b. **No.** Repair open between [149B-1] terminal 3 and [297C] terminal 3 (LBE).

7. Speaker (-) Circuit Open Test

1. Test continuity between BOB terminal 4 and [34LB] terminal 2 (LBE/BK).

2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 8.

8. [297C] Terminal 2 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 4 and [34LB] terminal 2 (LBE/BK).
   b. **No.** Repair open between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).

9. Lower Fairing Speaker (+) Grounded Test

1. Test continuity between BOB terminal 3 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 11.

10. [297C] Terminal 3 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 3 and [297C] terminal 3 (LBE).
   b. **No.** Repair short to ground between [297D] terminal 3 and [34LB] terminal 1 (LBE).

11. Lower Fairing Speaker (-) Grounded Test

1. Test continuity between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 13.

12. [297C] Terminal 4 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).
   b. **No.** Repair short to ground between [297D] terminal 4 and [34LB] terminal 2 (LBE/BK).

13. Lower Fairing Speaker (+) Voltage Test

1. Connect [149A-1].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 16.

14. [297C] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 15.
   b. **No.** Repair short to voltage between [297D] terminal 3 and [34LB] terminal 1 (LBE).

15. [149B-1] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 3 from [149B-1] (LBE).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 3 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 3 and [297C] terminal 3 (LBE).

16. Lower Fairing Speaker (-) Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is voltage greater than 9.0V
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 19.

17. [297C] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 4 and [34LB] terminal 2 (LBE/BK).

18. [149B-1] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].

3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 4 from [149B-1] (LBE/BK).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 4 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).

19. Right Speaker Jumper Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Jumper wire from [297C] terminal 1 to [297D] terminal 3.
4. Jumper wire from [297C] terminal 2 to [297D] terminal 4.
5. Turn IGN ON.
6. Turn radio ON.
7. Does lower right speaker work?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

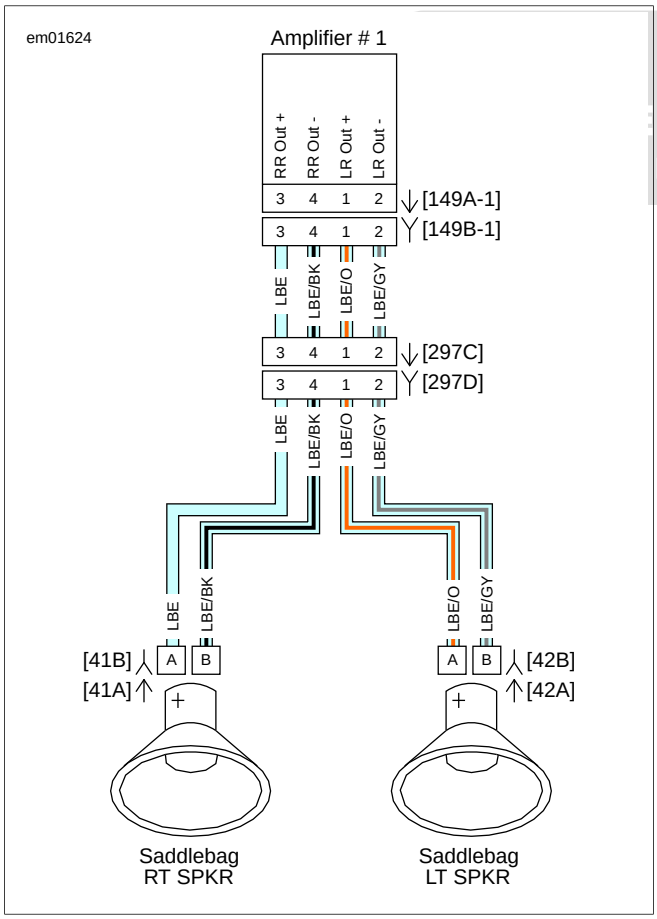


Figure 8-39. Amplifier 1: Saddlebag Speakers

SADDLEBAG RIGHT SPEAKER INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-76. Saddlebag Right Speaker Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Right Saddlebag Speaker Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminals 3 and 4.
4. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [297C] Shorted Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and 4.
3. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminal 3 and 4 and [297C] terminal 3 and 4.
   b. **No.** Go to Test 3.

3. Right Speaker Shorted Test

1. Disconnect speaker [41].
2. Test resistance between [41A] speaker terminals A and B.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Repair short between [297D] terminal 3 and 4 and [41B] terminal A and B.

4. Saddlebag Speaker Open Test

1. Test continuity between BOB terminals 3 and 4.

2. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 5.

5. Speaker (+) Circuit Open Test

1. Disconnect speaker [41].
2. Test continuity between BOB terminal 3 and [41B] terminal A (LBE).
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 6.

6. [297C] Terminal 3 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and [297C] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 3 and [41B] terminal A (LBE).
   b. **No.** Repair open between [149B-1] terminal 3 and [297C] terminal 3 (LBE).

7. Speaker (-) Circuit Open Test

1. Test continuity between BOB terminal 4 and [41B] terminal B (LBE/BK).
2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 8.

8. [297C] Terminal 2 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 4 and [41B] terminal B (LBE/BK).
   b. **No.** Repair open between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).

9. Saddlebag Speaker (+) Grounded Test

1. Test continuity between BOB terminal 3 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 11.

10. [297C] Terminal 3 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 3 and [297C] terminal 3 (LBE).
   b. **No.** Repair short to ground between [297D] terminal 3 and [41B] terminal A (LBE).

11. Saddlebag Speaker (-) Grounded Test

1. Test continuity between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 13.

12. [297C] Terminal 4 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).
   b. **No.** Repair short to ground between [297D] terminal 4 and [41B] terminal B (LBE/BK).

13. Saddlebag Speaker (+) Voltage Test

1. Connect [149A-1].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 14.
   b. **No.** Go to Test 16.

14. [297C] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 15.
   b. **No.** Repair short to voltage between [297D] terminal 3 and [41B] terminal A (LBE).

15. [149B-1] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 3 from [149B-1] (LBE).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 3 and ground.

7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 3 and [297C] terminal 3 (LBE).

16. Saddlebag Speaker (-) Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is voltage greater than 9.0V
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 19.

17. [297C] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 4 and [41B] terminal A (LBE/BK).

18. [149B-1] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 4 from [149B-1] (LBE/BK).
4. Connect [149B-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 4 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).

19. Right Speaker Jumper Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Jumper wire from [297C] terminal 1 to [297D] terminal 3.
4. Jumper wire from [297C] terminal 2 to [297D] terminal 4.
5. Turn IGN ON.
6. Turn radio ON.
7. Does lower right speaker work?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

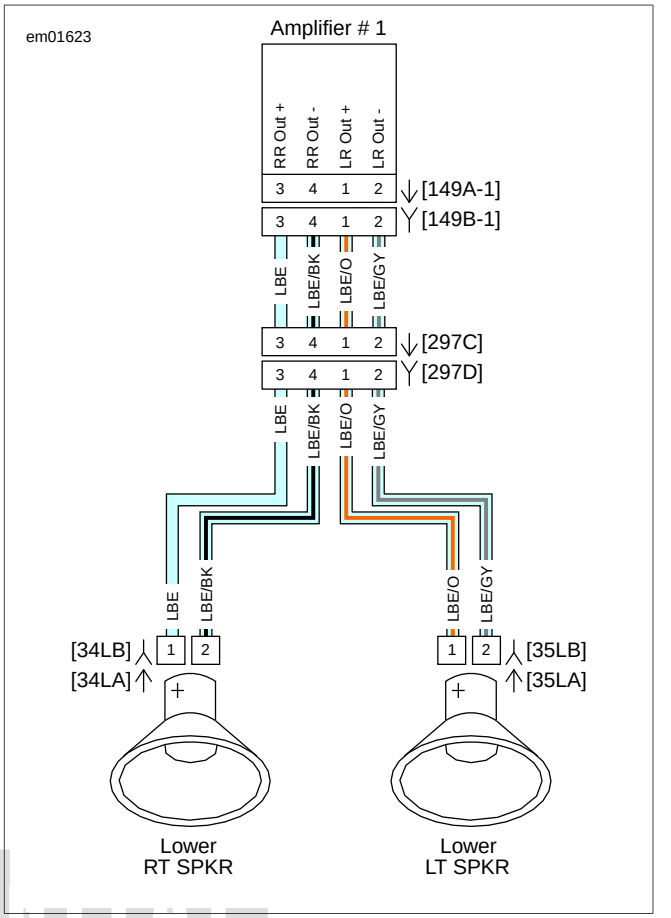


Figure 8-40. Amplifier 1: Lower Speakers

RIGHT SPEAKER POD INOPERATIVE WITH AMPLIFIER 1

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-77. Right Speaker Pod Inoperative With Amplifier 1 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Right Speaker Pod Circuit Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.

3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminals 3 and 4.
4. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. Speaker Pod Shorted Test

1. Disconnect right speaker [36].
2. Test resistance between [36A] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 3.

3. [162B] Shorted Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short between [162B] terminals 9 and 10 and [36B] terminals 1 and 2.

4. [297B] Shorted Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [162D] terminals 9 and 10 and [297B] terminals 3 and 4.

5. [297C] Shorted Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Repair short between [297C] terminals 3 and 4 and [149B-1] terminals 3 and 4.
   b. **No.** Repair short between [297D] terminals 3 and 4 and [297A] terminals 3 and 4.

6. Right Speaker Pod Circuit Open Test

1. Test continuity between BOB terminals 3 and 4.
2. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 7.

7. Speaker Pod (+) Open Test

1. Test continuity between BOB terminal 3 and [36B] terminal 1 (LBE).
2. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 8.

8. [162B] Terminal 1 Open Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 3 and [162D] terminal 9 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 9 and [36B] terminal 1 (LBE).
   b. **No.** Go to Test 9.

9. [297B] Terminal 3 Open Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 3 and [297A] terminal 3 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 9 and [297B] terminal 3 (LBE).
   b. **No.** Go to Test 10.

10. [297C] Terminal 3 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and [297C] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 3 and [297A] terminal 3 (PK/BK).
   b. **No.** Repair open between [297C] terminal 3 and [149B-1] terminal 3 (LBE).

11. Speaker Pod (-) Open Test

1. Test continuity between BOB terminal 4 and [36B] terminal 2 (LBE/BK).
2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 12.

12. [162B] Terminal 10 Open Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 4 and [162D] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).
   b. **No.** Go to Test 13.

13. [297B] Terminal 4 Open Test

1. Disconnect interconnect [297B].

2. Test continuity between BOB terminal 4 and [297A] terminal 4 (PK).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).
   b. **No.** Go to Test 14.

14. [297C] Terminal 4 Open Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 4 and [297A] terminal 4 (PK).
   b. **No.** Repair open between [297C] terminal 4 and [149B-1] terminal 4 (LBE/BK).

15. Right Speaker Pod (+) Grounded Test

1. Test continuity between BOB terminal 3 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 19.

16. [162B] Terminal 9 Grounded Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Repair short to ground between [162B] terminal 9 and [36B] terminal 1 (LBE).

17. [297B] Terminal 3 Grounded Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to ground between [162D] terminal 9 and [297B] terminal 3 (LBE).

18. [297C] Terminal 3 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [297C] terminal 3 and [149B-1] terminal 3 (LBE).
   b. **No.** Repair short to ground between [297D] terminal 3 and [297A] terminal 3 (PK/BK).

19. Right Speaker Pod (-) Grounded Test

1. Test continuity between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Go to Test 23.

20. [162B] Terminal 10 Grounded Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 21.
   b. **No.** Repair short to ground between [162B] terminal 10 and [36B] terminal 2 (PK/BK).

21. [297B] Terminal 4 Grounded Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 22.
   b. **No.** Repair short to ground between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).

22. [297C] Terminal 4 Grounded Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [297C] terminal 4 and [149B-1] terminal 4 (LBE/BK).
   b. **No.** Repair short to ground between [297D] terminal 4 and [297A] terminal 4 (PK).

23. Left Speaker Pod (+) Voltage Test

1. Connect [149A-1].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 24.
   b. **No.** Go to Test 28.

24. [162B] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 25.
   b. **No.** Repair short to voltage between [162B] terminal 9 and [36B] terminal 1 (LBE).

25. [297B] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 26.
   b. **No.** Repair short to voltage between [162D] terminal 9 and [297B] terminal 3 (LBE).

26. [297C] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Repair short to voltage between [297D] terminal 3 and [297A] terminal 3 (PK/BK).

27. [149B-1] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 4 from [149B-1] (LBE/BK).
4. Connect [149-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 3 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [297C] terminal 3 and [149B-1] terminal 3 (LBE).

28. Right Speaker Pod (-) Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 29.
   b. **No.** Go to Test 33.

29. [162B] Terminal 10 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [162B] terminal 10 and [36B] terminal 2 (PK/BK).

30. [297B] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 31.
   b. **No.** Repair short to voltage between [162D] terminal 4 and [297B] terminal 4 (LBE/BK).

31. [297C] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 32.
   b. **No.** Repair short to voltage between [297D] terminal 4 and [297A] terminal 4 (PK).

32. [149B-1] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 4 from [149B-1] (LBE/BK).
4. Connect [149-1].
5. Turn IGN ON.
6. Test voltage between BOB terminal 4 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [297C] terminal 4 and [149B-1] terminal 4 (LBE/BK).

33. Right Speaker Jumper Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Jumper wire from [297C] terminal 1 to [297D] terminal 3.
4. Jumper wire from [297C] terminal 2 to [297D] terminal 4.
5. Turn IGN ON.
6. Turn radio ON.

7. Does right speaker pod work?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

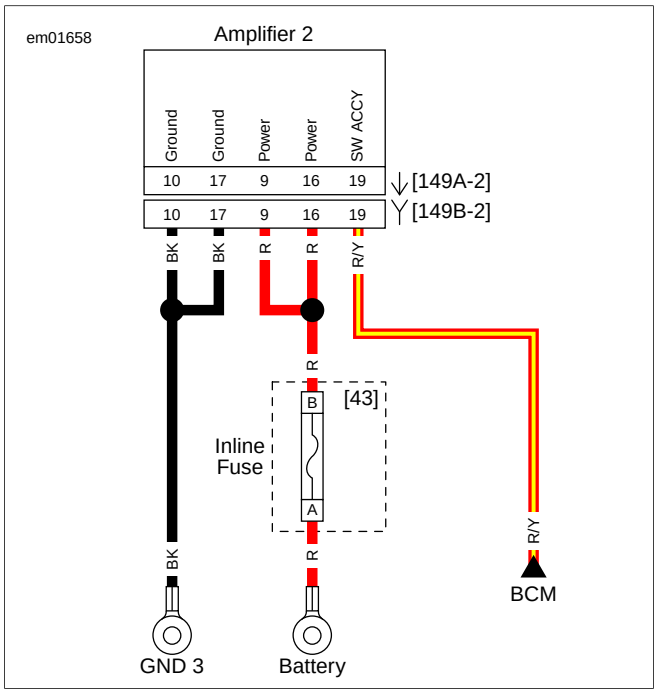


Figure 8-41. Amplifier 2: Power Circuit

ALL SPEAKERS INOPERATIVE WITH AMPLIFIER 2

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-78. All Speakers Inoperative With Amplifier 2 Diagnostic Faults

POSSIBLE CAUSES
Shorted to ground circuit wires
Open circuit wires

1. Power Terminal 9 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2] and amplifier [149A-2]. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 9 and ground.
4. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open between [149-2] terminal 9 and battery (R).

2. Power Terminal 9 Test

1. Test voltage between BOB terminal 16 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [149-2] terminal 16 and battery (R).

3. Ground Terminal 10 Test

1. Test continuity between BOB terminal 10 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open between [149-2] terminal 10 and ground (BK).

4. Ground Terminal 17 Test

1. Test continuity between BOB terminal 17 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open between [149-2] terminal 17 and ground (BK).

5. Switch Power Terminal 19 Test

1. Turn IGN ON.
2. Test voltage between BOB terminal 19 and ground.
3. Is battery voltage present?
   a. **Yes.** Remove BOB. Go to Test 6.
   b. **No.** Repair open between [149-2] terminal 17 and ground (BK) or between [149-2] terminal 19 and BCM [242A] terminal M2 (R/Y).

6. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A rear audio [162C] and [162D].
5. Connect OE rear audio [162A] and [162B].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Are all speakers inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

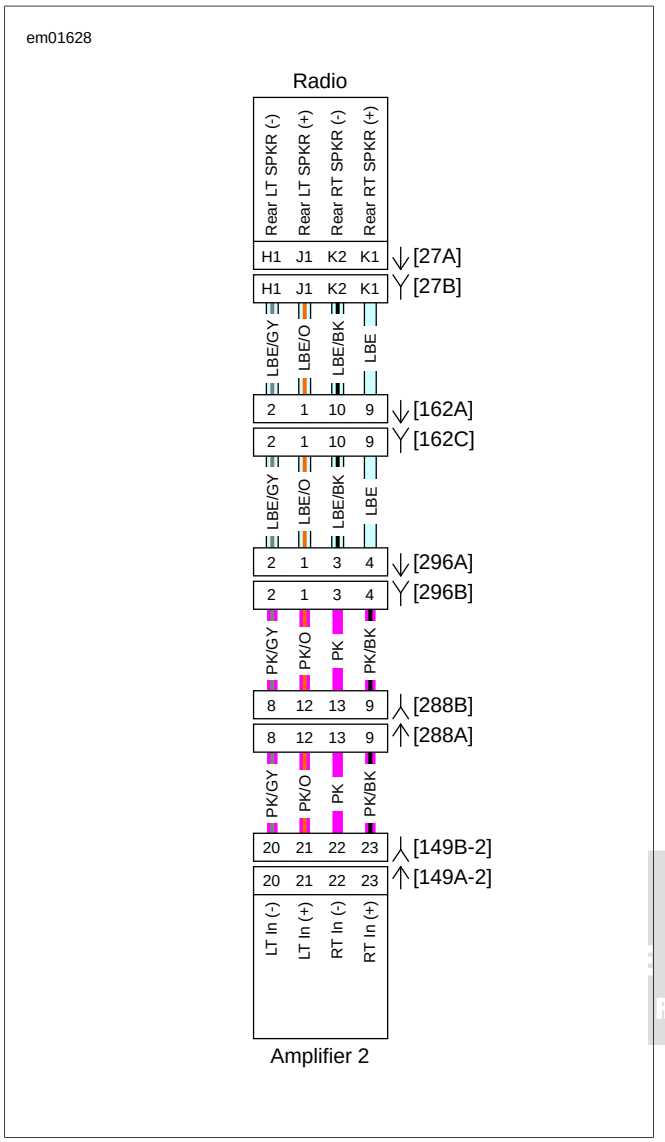


Figure 8-42. Radio and Amplifier 2 Circuit

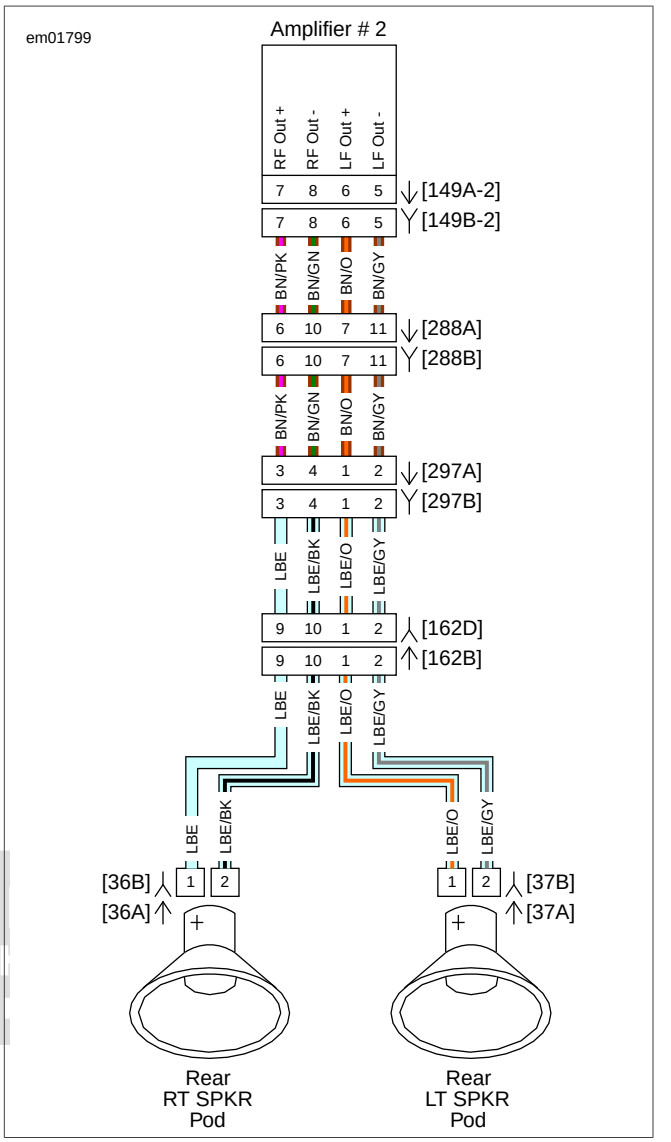


Figure 8-43. Amplifier 2: Rear Speaker Pods

LEFT REAR SPEAKER POD INOPERATIVE WITH AMPLIFIER 2

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-79. Left Rear Speaker Pod Inoperative With Amplifier 2 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Configuration Test

1. Verify speakers on amplifier 2.
2. Only speakers on amplifier 2 are rear speakers pods?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 38.

2. Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals H1 and J1.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 7.

3. [149-2] Shorted Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

4. [288] Shorted Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [149B-2] terminals 20 and 21 and [288A] terminals 8 and 12.

5. [296] Shorted Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair short between [288B] terminals 8 and 12 and [296B] terminals 1 and 2.

6. [162C] Shorted Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Repair short between [296A] terminals 1 and 2 and [27B] terminals H1 and J1.
   b. **No.** Repair short between [162C] terminals 1 and 2 and [296A] terminals 1 and 2.

7. Speaker Pod Open Test

1. Test continuity between BOB terminals H1 and J1.
2. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 8.

8. [149-2] Terminal 20 Open Test

1. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
2. Test continuity between radio BOB terminal H1 and amplifier BOB terminal 20.
3. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 9.

9. [288] Terminal 8 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal H1 and [288B] terminal 8 (PK/GY).

3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminal 8 and [149B-2] terminal 20 (PK/GY).
   b. **No.** Go to Test 10.

10. [296] Terminal 2 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal H1 and [296A] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 2 and [288B] terminal 8 (PK/GY).
   b. **No.** Go to Test 11.

11. [162C] Terminal 2 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal H1 and [162A] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 2 and [162C] terminal 2 (LBE/GY).
   b. **No.** Repair open between [162A] terminal 2 and [27B] terminal H1 (LBE/GY).

12. [149-2] Terminal 21 Open Test

1. Test continuity between BOB terminal J1 and amplifier BOB terminal 21.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Go to Test 13.

13. [288] Terminal 8 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal J1 and [288B] terminal 12 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminal 12 and [149B-2] terminal 21 (PK/O).
   b. **No.** Go to Test 14.

14. [296] Terminal 1 Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal J1 and [296A] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 1 and [288B] terminal 12 (PK/O).
   b. **No.** Go to Test 15.

15. [162C] Terminal 2 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal J1 and [162A] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 1 and [162C] terminal 1 (LBE/O).
   b. **No.** Repair open between [162A] terminal 1 and [27B] terminal J1 (LBE/O).

16. Speaker Pod (-) Grounded Test

1. Test resistance between BOB terminal H1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 21.

17. [149B-2] Terminal 20 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 28.
   b. **No.** Go to Test 22.

18. [288] Terminal 8 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to ground between [288A] terminal 8 and [149B-2] terminal 20 (PK/GY).

19. [296] Terminal 2 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Repair short to ground between [296B] terminal 2 and [288B] terminal 8 (PK/GY).

20. [162C] Terminal 2 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 2 and [27B] terminal H1 (LBE/GY).
   b. **No.** Repair short to ground between [296A] terminal 2 and [162C] terminal 2 (LBE/GY).

21. Speaker Pod (+) Grounded Test

1. Test resistance between BOB terminal J1 and ground.

2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 22.
   b. **No.** Go to Test 26.

22. [149-2] Terminal 21 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 23.
   b. **No.** Replace amplifier.

23. [288] Terminal 12 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to ground between [288A] terminal 12 and [149B-2] terminal 21 (PK/O).

24. [296] Terminal 1 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 25.
   b. **No.** Repair short to ground between [296B] terminal 1 and [288B] terminal 12 (PK/O).

25. [162C] Terminal 1 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal J1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 1 and [27B] terminal J1 (LBE/O).
   b. **No.** Repair short to ground between [296A] terminal 1 and [162C] terminal 1 (LBE/O).

26. Speaker Pod (-) Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Go to Test 32.

27. [149-2] Terminal 20 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 28.
   b. **No.** Go to Test 33.

28. [288] Terminal 8 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminal H1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [288A] terminal 8 and [149B-2] terminal 20 (PK/GY).

29. [296] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal H1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [296B] terminal 2 and [288B] terminal 8 (PK/GY).

30. [162C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 31.
   b. **No.** Repair short to voltage between [162C] terminal 2 and [296A] terminal 2 (LBE/GY).

31. [27A] Terminal H1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal H1 from [27B] (LBE/GY).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal H1 and ground.

7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 2 and [27B] terminal H1 (LBE/GY).

32. Speaker Pod (+) Voltage Test

1. Test voltage between BOB terminal J1 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 33.
   b. **No.** Go to Test 38.

33. [149-2] Terminal 21 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal J1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 34.
   b. **No.** Replace amplifier.

34. [288] Terminal 12 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminals J1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 35.
   b. **No.** Repair short to voltage between [288A] terminal 12 and [149B-2] terminal 21 (PK/O).

35. [296] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal J1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 36.
   b. **No.** Repair short to voltage between [296B] terminal 1 and [288B] terminal 12 (PK/O).

36. [162C] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal J1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 37.
   b. **No.** Repair short to voltage between [162C] terminal 1 and [296A] terminal 1 (LBE/O).

37. [27A] Terminal J1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal J1 from [27B] (LBE/O).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal J1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 1 and [27B] terminal J1 (LBE/O).

38. Left Speaker Pod Circuit Shorted Test

1. Turn IGN OFF.
2. Remove radio BOB.
3. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2], leaving amplifier [149A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals 5 and 6.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 39.
   b. **No.** Go to Test 43.

39. Speaker Pod Shorted Test

1. Disconnect left speaker [37].
2. Test resistance between [37A] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 40.

40. [162B] Shorted Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminals 5 and 6.
3. Is continuity present?
   a. **Yes.** Go to Test 41.
   b. **No.** Repair short between [162B] terminals 1 and 2 and [37B] terminals 1 and 2.

41. [297B] Shorted Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminals 5 and 6.

3. Is continuity present?
   a. **Yes.** Go to Test 42.
   b. **No.** Repair short between [162D] terminals 1 and 2 and [297B] terminals 1 and 2.

42. [288B] Shorted Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminals 5 and 6.
3. Is continuity present?
   a. **Yes.** Repair short between [288A] terminals 7 and 11 and [149B-2] terminals 5 and 6.
   b. **No.** Repair short between [297A] terminals 1 and 2 and [288B] terminals 7 and 11.

43. Left Speaker Pod Circuit Open Test

1. Test continuity between BOB terminals 5 and 6.
2. Is continuity present?
   a. **Yes.** Go to Test 52.
   b. **No.** Go to Test 44.

44. [37B] Terminal 1 Open Test

1. Disconnect left speaker [37B].
2. Test continuity between BOB terminal 6 and [37A] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Go to Test 48.
   b. **No.** Go to Test 45.

45. [162B] Terminal 1 Open Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 6 and [162D] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 1 and [37B] terminal 1 (LBE/O).
   b. **No.** Go to Test 46.

46. [297B] Terminal 1 Open Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 6 and [297A] terminal 1 (BN/O).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 1 and [297B] terminal 1 (LBE/O).
   b. **No.** Go to Test 47.

47. [288B] Terminal 7 Open Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminal 6 and [288A] terminal 7 (BN/O).
3. Is continuity present?
   a. **Yes.** Repair open between [297A] terminal 1 and [288B] terminal 7 (BN/O).
   b. **No.** Repair open between [288A] terminal 7 and [149B-2] terminal 6 (BN/O).

48. [37B] Terminal 2 Open Test

1. Test continuity between BOB terminal 5 and [37A] terminal 2 (LBE/GY).
2. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 49.

49. [162B] Terminal 2 Open Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 5 and [162D] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 1 and [37B] terminal 2 (LBE/GY).
   b. **No.** Go to Test 50.

50. [297B] Terminal 2 Open Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 5 and [297A] terminal 2 (BN/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).
   b. **No.** Go to Test 51.

51. [288B] Terminal 11 Open Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminal 5 and [288A] terminal 11 (BN/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [297A] terminal 2 and [288B] terminal 11 (BN/GY).
   b. **No.** Repair open between [288A] terminal 11 and [149B-2] terminal 5 (BN/GY).

52. Left Speaker Pod Circuit (-) Grounded Test

1. Test continuity between BOB terminal 6 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 53.
   b. **No.** Go to Test 57.

53. [37B] Terminal 1 Grounded Test

1. Disconnect speaker pod [37B].
2. Test continuity between BOB terminal 6 and ground.

3. Is continuity present?
   a. **Yes.** Go to Test 54.
   b. **No.** Go to Test 58.

54. [162B] Terminal 1 Grounded Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 6 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 55.
   b. **No.** Repair short to ground between [162B] terminal 1 and [37B] terminal 1 (LBE/O).

55. [297B] Terminal 1 Grounded Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 6 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 56.
   b. **No.** Repair short to ground between [162D] terminal 1 and [297B] terminal 1 (LBE/O).

56. [288B] Terminal 7 Grounded Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminal 6 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 7 and [149B-2] terminal 6 (BN/O).
   b. **No.** Repair short to ground between [297A] terminal 1 and [288B] terminal 7 (BN/O).

57. Left Speaker Pod Circuit (+) Grounded Test

1. Test continuity between BOB terminal 5 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 58.
   b. **No.** Go to Test 62.

58. [37B] Terminal 2 Grounded Test

1. Disconnect speaker pod [37B].
2. Test continuity between BOB terminal 5 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 59.
   b. **No.** Replace speaker.

59. [162B] Terminal 2 Grounded Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 5 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 60.
   b. **No.** Repair short to ground between [162B] terminal 2 and [37B] terminal 2 (LBE/GY).

60. [297B] Terminal 2 Grounded Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 5 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 62.
   b. **No.** Repair short to ground between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).

61. [288B] Terminal 11 Grounded Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminal 5 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 11 and [149B-2] terminal 5 (BN/GY).
   b. **No.** Repair short to ground between [297A] terminal 2 and [288B] terminal 11 (BN/GY).

62. Left Speaker Pod Circuit (-) Voltage Test

1. Connect [149A-2].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal 6 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 63.
   b. **No.** Go to Test 68.

63. [37B] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker pod [37B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 6 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 64.
   b. **No.** Go to Test 69.

64. [162B] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 6 and ground.

5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 65.
   b. **No.** Repair short to voltage between [162B] terminal 1 and [37B] terminal 1 (LBE/O).

65. [297B] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 6 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 66.
   b. **No.** Repair short to voltage between [162D] terminal 1 and [297B] terminal 1 (LBE/O).

66. [288B] Terminal 7 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 6 and [288A] terminal 7 (BN/O).
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 67.
   b. **No.** Repair short to voltage between [297A] terminal 1 and [288B] terminal 7 (BN/O).

67. [149B-2] Terminal 5 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 6 from [149B-2] (BN/O).
4. Connect [149B-2].
5. Turn IGN ON.
6. Test voltage between BOB terminal 6 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [288A] terminal 7 and [149B-2] terminal 6 (BN/O).

68. Left Speaker Pod Circuit (+) Voltage Test

1. Test voltage between BOB terminal 5 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 69.
   b. **No.** Go to Test 74.

69. [37B] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker pod [37B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 5 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 70.
   b. **No.** Replace speaker.

70. [162B] Terminal 2 Voltage Test

1. Disconnect rear audio [162B].
2. Test voltage between BOB terminal 5 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 71.
   b. **No.** Repair short to voltage between [162B] terminal 2 and [37B] terminal 2 (LBE/GY).

71. [297B] Terminal 2 Voltage Test

1. Disconnect interconnect [297B].
2. Test voltage between BOB terminal 5 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 72.
   b. **No.** Repair short to voltage between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).

72. [288B] Terminal 11 Voltage Test

1. Disconnect left saddlebag [288B].
2. Test voltage between BOB terminal 5 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 73.
   b. **No.** Repair short to voltage between [288A] terminal 11 and [149B-2] terminal 5 (BN/GY).

73. [149B-2] Terminal 6 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 5 from [149B-2] (BN/GY).
4. Connect [149B-2].
5. Turn IGN ON.
6. Test voltage between BOB terminal 5 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [288A] terminal 11 and [149B-2] terminal 5 (BN/GY).

74. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A rear audio [162C] and [162D].

5. Connect OE rear audio [162A] and [162B].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Is left speaker pod inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

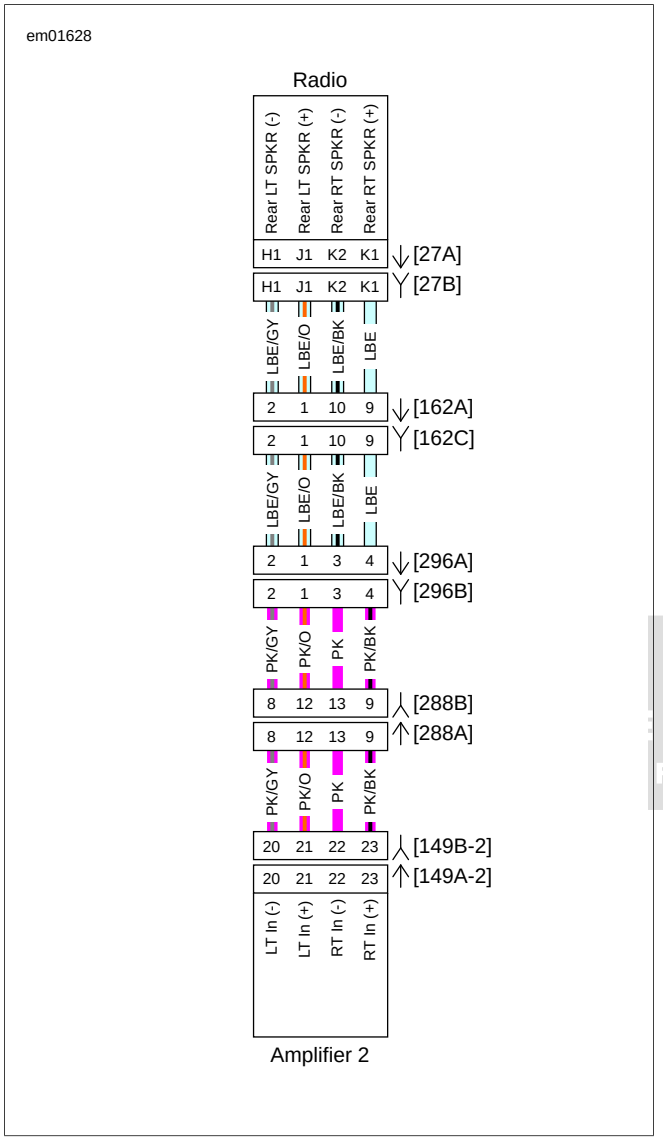


Figure 8-44. Radio and Amplifier 2 Circuit

BOTH LEFT SPEAKERS INOPERATIVE WITH AMPLIFIER 2

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-80. Both Left Speakers Inoperative With Amplifier 2 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires

1. Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals H1 and J1.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. [149-2] Shorted Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace amplifier.

3. [288] Shorted Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short between [149B-2] terminal 20 and 21 and [288A] terminals 8 and 12.

4. [296] Shorted Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [288B] terminal 8 and 12 and [296B] terminals 1 and 2.

5. [162C] Shorted Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Repair short between [296A] terminals 1 and 2 and [27B] terminals H1 and J1.
   b. **No.** Repair short between [162C] terminals 1 and 2 and [296A] terminals 1 and 2.

6. Speaker Pod Open Test

1. Test continuity between radio BOB terminals H1 and J1.
2. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 7.

7. [149-2] Terminal 20 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal H1 and [149B-2] terminal 20 (PK/GY).
3. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 8.

8. [288] Terminal 8 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals H1 and [288B] terminal 8 (PK/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 8 and [149B-2] terminal 20 (PK/GY).
   b. **No.** Go to Test 9.

9. [296] Terminal 2 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal H1 and [296A] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 2 and [288B] terminal 8 (PK/GY).
   b. **No.** Go to Test 10.

10. [162C] Terminal 2 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals H1 and [162A] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 2 and [162C] terminal 2 (LBE/GY).
   b. **No.** Repair open between [162A] terminal 2 and [27B] terminal H1 (LBE/GY).

11. [149-2] Terminal 21 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal J1 and [149B-2] terminal 21 (PK/O).
3. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Go to Test 12.

12. [288] Terminal 12 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals J1 and [288B] terminal 12 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 12 and [149B-2] terminal 21 (PK/O).
   b. **No.** Go to Test 13.

13. [296] Terminal 1 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal J1 and [296A] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 1 and [288B] terminal 12 (PK/O).
   b. **No.** Go to Test 14.

14. [162C] Terminal 1 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals J1 and [162A] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 1 and [162C] terminal 1 (LBE/O).
   b. **No.** Repair open between [162A] terminal 1 and [27B] terminal J1 (LBE/O).

15. Speaker Pod (+) Grounded Test

1. Test resistance between BOB terminals H1 and ground.

2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 20.

16. [149-2] Terminal 20 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 21.

17. [288] Terminal 8 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to ground between [288A] terminals 8 and [149B-2] terminal 20 (PK/GY).

18. [296] Terminal 2 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to ground between [296B] terminal 2 and [288B] terminal 8 (PK/GY).

19. [162C] Terminal 2 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals H1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 2 and [27B] terminal H1 (LBE/GY).
   b. **No.** Repair short to ground between [296A] terminal 2 and [162C] terminal 2 (LBE/GY).

20. Speaker Pod (-) Grounded Test

1. Test resistance between BOB terminals J1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 21.
   b. **No.** Go to Test 25.

21. [149-2] Terminal 21 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 22.
   b. **No.** Replace amplifier.

22. [288] Terminal 12 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 23.
   b. **No.** Repair short to ground between [288A] terminals 12 and [149B-2] terminal 21 (PK/O).

23. [296] Terminal 1 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to ground between [296B] terminal 1 and [288B] terminal 12 (PK/O).

24. [162C] Terminal 1 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals J1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 1 and [27B] terminal J1 (LBE/O).
   b. **No.** Repair short to ground between [296A] terminal 1 and [162C] terminal 1 (LBE/O).

25. Speaker Pod (+) Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Turn radio ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 26.
   b. **No.** Go to Test 31.

26. [149-2] Terminal 20 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Go to Test 32.

27. [288] Terminal 8 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.

4. Test continuity between BOB terminals H1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 28.
   b. **No.** Repair short to voltage between [288A] terminals 8 and [149B-2] terminal 20 (PK/GY).

28. [296] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal H1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [296B] terminal 2 and [288B] terminal 8 (PK/GY).

29. [162C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [162C] terminal 2 and [296A] terminal 2 (LBE/GY).

30. [27A] Terminal H1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal H1 from [242B] (LBE/GY).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal H1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 2 and [27B] terminal H1 (LBE/GY).

31. Speaker Pod (-) Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 32.
   b. **No.** Go to Test 37.

32. [149-2] Terminal 21 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal J1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 33.
   b. **No.** Replace amplifier.

33. [288] Terminal 12 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminals J1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 34.
   b. **No.** Repair short to voltage between [288A] terminals 12 and [149B-2] terminal 21 (PK/O).

34. [296] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal J1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 35.
   b. **No.** Repair short to voltage between [296B] terminal 1 and [288B] terminal 12 (PK/O).

35. [162C] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal J1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 36.
   b. **No.** Repair short to voltage between [162C] terminal 1 and [296A] terminal 1 (LBE/O).

36. [27A] Terminal J1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal J1 from [242B] (LBE/O) wire.
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal J1 and ground.

7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 1 and [27B] terminal H1 (LBE/O)

37. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A rear audio [162C] and [162D].
5. Connect OE rear audio [162A] and [162B].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Is left speaker pod inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

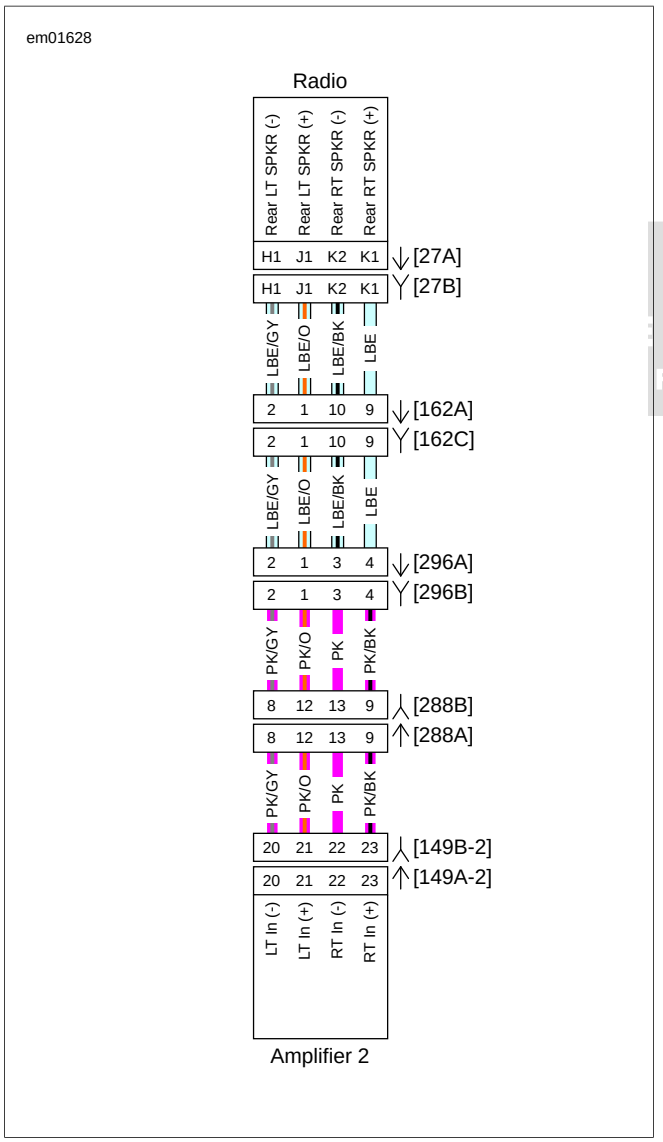


Figure 8-45. Radio and Amplifier 2 Circuit

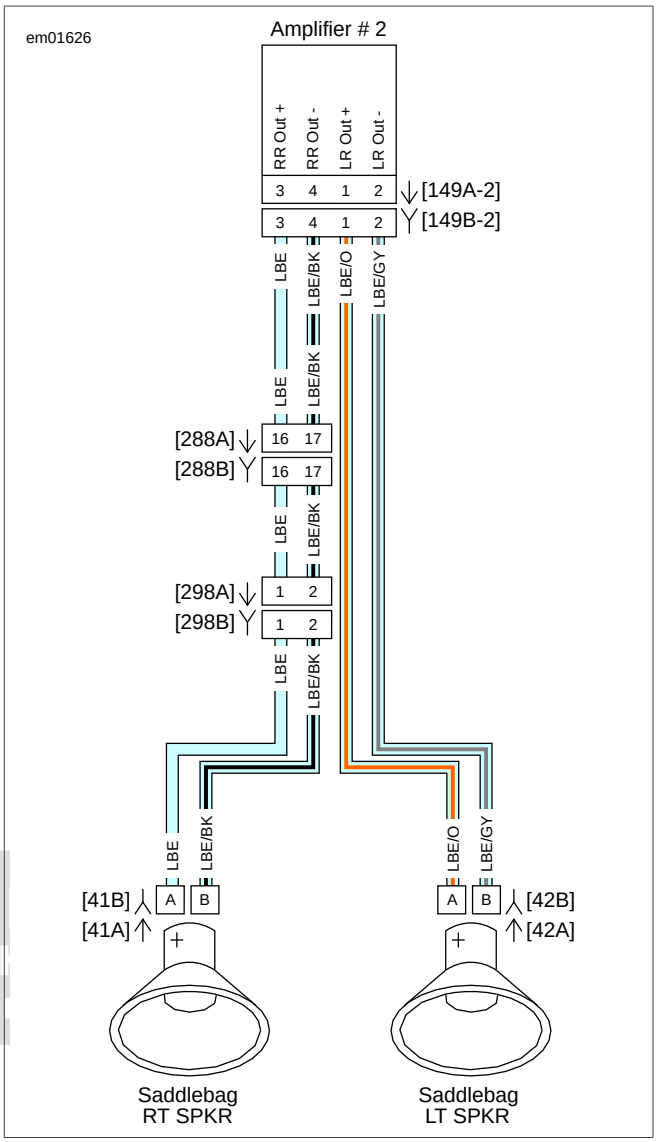


Figure 8-46. Amplifier 2: Saddlebag Speakers

SADDLEBAG LEFT SPEAKER INOPERATIVE WITH AMPLIFIER 2

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-81. Saddlebag Left Speaker Inoperative With Amplifier 2 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Configuration Test

1. Verify speakers on amplifier.
2. Are speakers on amplifier 2 saddlebag speakers?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 38.

2. Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals H1 and J1.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 7.

3. [149-2] Shorted Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

4. [288] Shorted Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [149B-2] terminals 20 and 21 and [288A] terminals 8 and 12.

5. [296] Shorted Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair short between [288B] terminals 8 and 12 and [296B] terminals 1 and 2.

6. [162C] Shorted Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals H1 and J1.
3. Is continuity present?
   a. **Yes.** Repair short between [296A] terminals 1 and 2 and [27B] terminals H1 and J1.
   b. **No.** Repair short between [162C] terminals 1 and 2 and [296A] terminals 1 and 2.

7. Speaker Pod Open Test

1. Test continuity between radio BOB terminals H1 and J1.
2. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 8.

8. [149-2] Terminal 20 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal H1 and [149B-2] terminal 20 (PK/GY).
3. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 9.

9. [288] Terminal 8 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals H1 and [288B] terminal 8 (PK/GY).

3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 8 and [149B-2] terminal 20 (PK/GY).
   b. **No.** Go to Test 10.

10. [296] Terminal 2 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal H1 and [296A] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 2 and [288B] terminal 8 (PK/GY).
   b. **No.** Go to Test 11.

11. [162C] Terminal 2 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals H1 and [162A] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 2 and [162C] terminal 2 (LBE/GY).
   b. **No.** Repair open between [162A] terminal 2 and [27B] terminal H1 (LBE/GY).

12. [149-2] Terminal 21 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal J1 and [149B-2] terminal 21 (PK/GY).
3. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Go to Test 13.

13. [288] Terminal 12 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals J1 and [288B] terminal 12 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 12 and [149B-2] terminal 21 (PK/O).
   b. **No.** Go to Test 14.

14. [296] Terminal 1 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal J1 and [296A] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 1 and [288B] terminal 12 (PK/O).
   b. **No.** Go to Test 15.

15. [162C] Terminal 1 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals J1 and [162A] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 1 and [162C] terminal 1 (LBE/O).
   b. **No.** Repair open between [162A] terminal 1 and [27B] terminal J1 (LBE/O).

16. Speaker Pod (+) Grounded Test

1. Test resistance between BOB terminals H1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 21.

17. [149-2] Terminal 20 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Go to Test 22.

18. [288] Terminal 8 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to ground between [288A] terminals 8 and [149B-2] terminal 20 (PK/GY).

19. [296] Terminal 2 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal H1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Repair short to ground between [296B] terminal 2 and [288B] terminal 8 (PK/GY).

20. [162C] Terminal 2 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals H1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 2 and [27B] terminal H1 (LBE/GY).
   b. **No.** Repair short to ground between [296A] terminal 2 and [162C] terminal 2 (LBE/GY).

21. Speaker Pod (-) Grounded Test

1. Test resistance between BOB terminals J1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 22.
   b. **No.** Go to Test 26.

22. [149-2] Terminal 21 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 23.
   b. **No.** Replace amplifier.

23. [288] Terminal 12 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to ground between [288A] terminals 12 and [149B-2] terminal 21 (PK/O).

24. [296] Terminal 1 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal J1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 25.
   b. **No.** Repair short to ground between [296B] terminal 1 and [288B] terminal 12 (PK/O).

25. [162C] Terminal 1 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals J1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 1 and [27B] terminal J1 (LBE/O).
   b. **No.** Repair short to ground between [296A] terminal 1 and [162C] terminal 1 (LBE/O).

26. Speaker Pod (+) Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Test voltage between BOB terminal H1 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Go to Test 32.

27. [149-2] Terminal 20 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 28.
   b. **No.** Go to Test 33.

28. [288] Terminal 8 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminals H1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [288A] terminals 8 and [149B-2] terminal 20 (PK/GY).

29. [296] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal H1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [296B] terminal 2 and [288B] terminal 8 (PK/GY).

30. [162C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal H1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 31.
   b. **No.** Repair short to voltage between [162C] terminal 2 and [296A] terminal 2 (LBE/GY).

31. [27A] Terminal H1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal H1 from [242B] (LBE/GY).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal H1 and ground.

7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 2 and [27B] terminal H1 (LBE/GY).

32. Speaker Pod (-) Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 33.
   b. **No.** Go to Test 38.

33. [149-2] Terminal 21 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal J1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 34.
   b. **No.** Replace amplifier.

34. [288] Terminal 12 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminals J1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 35.
   b. **No.** Repair short to voltage between [288A] terminals 12 and [149B-2] terminal 21 (PK/O).

35. [296] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal J1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 36.
   b. **No.** Repair short to voltage between [296B] terminal 1 and [288B] terminal 12 (PK/O).

36. [162C] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal J1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 37.
   b. **No.** Repair short to voltage between [162C] terminal 1 and [296A] terminal 1 (LBE/O).

37. [27A] Terminal J1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal J1 from [242B] (LBE/O) wire.
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal J1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 1 and [27B] terminal H1 (LBE/O)

38. Saddlebag Speaker Shorted Test

1. Turn IGN OFF.
2. Disconnect left speaker [42].
3. Test resistance between [42A] speaker terminals A and B.
4. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 39.

39. Saddlebag Speaker Open Test

1. Test continuity between [42A] speaker terminals A and B.
2. Is continuity present?
   a. **Yes.** Go to Test 40.
   b. **No.** Replace speaker.

40. Left Speaker Pod Circuit (-) Shorted Test

1. Remove radio BOB.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2], leaving amplifier [149A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 1 and 2.
4. Is continuity present?
   a. **Yes.** Repair short between [149B-2] terminal 1 and 2 and [42B] terminals A and B.
   b. **No.** Go to Test 41.

41. [149-2] Terminal 1 Open Test

1. Test continuity between BOB terminal 1 and [42B] terminal A (LBE/O).

2. Is continuity present?
   a. **Yes.** Go to Test 42.
   b. **No.** Repair open between [149B-2] terminal 1 and [42B] terminal A (LBE/O).

42. [149-2] Terminal 2 Open Test

1. Test continuity between BOB terminal 2 and [42B] terminal B (LBE/GY).
2. Is continuity present?
   a. **Yes.** Go to Test 43.
   b. **No.** Repair open between [149B-2] terminal 2 and [42B] terminal B (LBE/GY).

43. [149-2] Terminal 1 Grounded Test

1. Test continuity between BOB terminal 1 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-2] terminal 1 and [42B] terminal A (LBE/O).
   b. **No.** Go to Test 44.

44. [149-2] Terminal 2 Grounded Test

1. Test continuity between BOB terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-2] terminal 2 and [42B] terminal B (LBE/GY).
   b. **No.** Go to Test 45.

45. [149-2] Terminal 1 Voltage Test

1. Connect [149A-2].
2. Turn IGN ON.
3. Test voltage between BOB terminal 1 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 46.
   b. **No.** Go to Test 47.

46. [149-2] Terminal 1 Removed Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 1 from [149B-2] (LBE/O).
4. Turn IGN ON.
5. Test voltage between BOB terminal 1 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to ground between [149B-2] terminal 1 and [42B] terminal A (LBE/O).

47. [149-2] Terminal 2 Voltage Test

1. Test voltage between BOB terminal 2 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 48.
   b. **No.** Go to Test 49.

48. [149-2] Terminal 2 Removed Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 2 from [149B-2] (LBE/GY).
4. Turn IGN ON.
5. Test voltage between BOB terminal 2 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to ground between [149B-2] terminal 2 and [42B] terminal B (LBE/O).

49. Jumper Test

1. Turn IGN OFF.
2. Disconnect right saddlebag [41].
3. Jumper BOB terminal 1 to [41A] terminal A.
4. Jumper BOB terminal 2 to [41A] terminal B.
5. Turn IGN ON.
6. Adjust volume to 3 bars. Is right saddlebag speaker inoperative?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

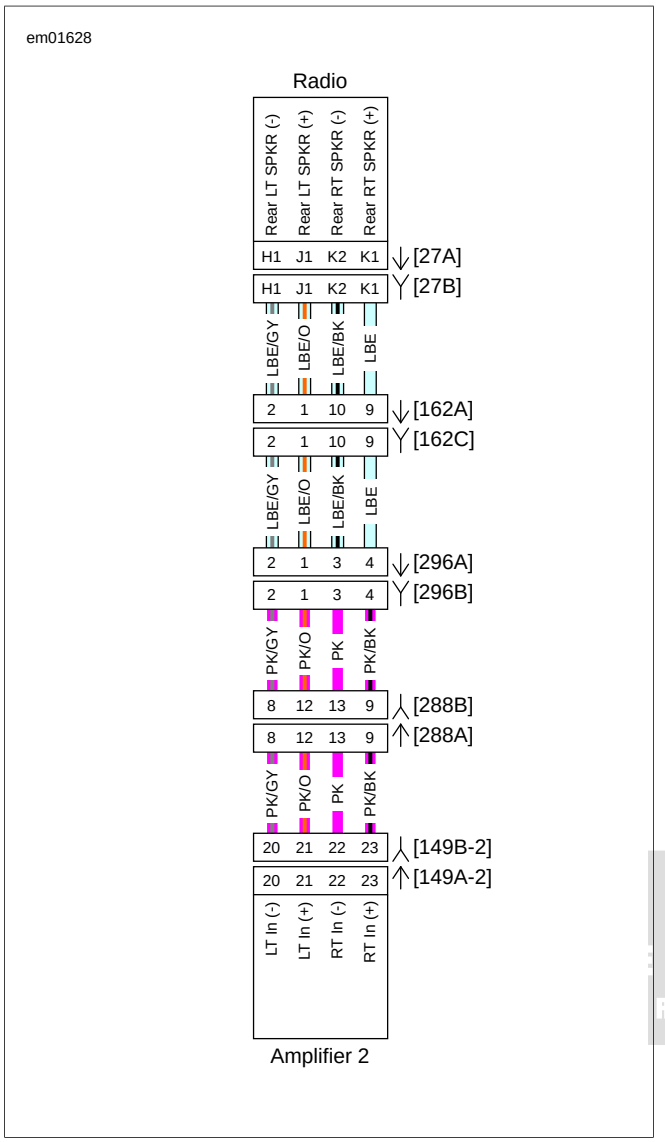


Figure 8-47. Radio and Amplifier 2 Circuit

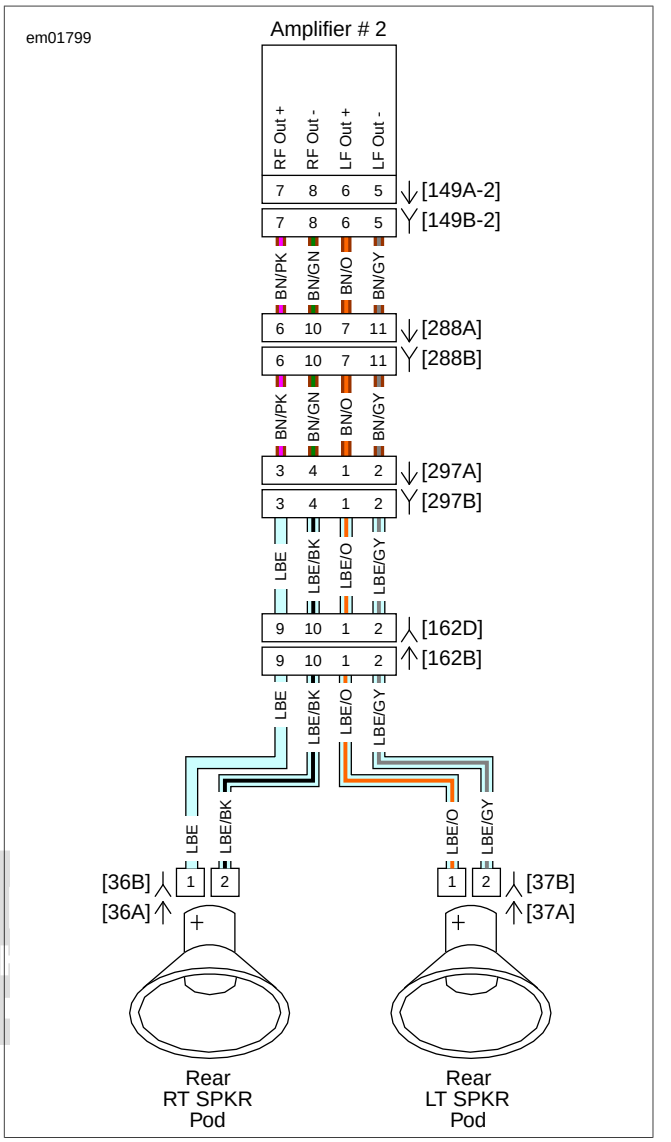


Figure 8-48. Amplifier 2: Rear Speaker Pods

RIGHT REAR SPEAKER POD INOPERATIVE WITH AMPLIFIER 2

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-82. Right Rear Speaker Pod Inoperative With Amplifier 2 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Configuration Test

1. Verify speakers on amplifier 2.
2. Only speakers on amplifier 2 are rear speakers pods?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 38.

2. Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals K2 and K1.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 7.

3. [149-2] Shorted Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

4. [288] Shorted Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [149B-2] terminal 22 and 23 and [288A] terminals 9 and 13.

5. [296] Shorted Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair short between [288B] terminal 9 and 13 and [296B] terminals 3 and 4.

6. [162C] Shorted Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Repair short between [296A] terminals 3 and 4 and [27B] terminals K2 and K1.
   b. **No.** Repair short between [162C] terminals 9 and 10 and [296A] terminals 3 and 4.

7. Speaker Pod Open Test

1. Test continuity between BOB terminals K2 and K1.
2. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 8.

8. [149-2] Terminal 20 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K2 and [149B-2] terminal 22 (PK).
3. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 9.

9. [288] Terminal 13 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal K2 and [288B] terminal 13 (PK).

3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 13 and [149B-2] terminal 22 (PK).
   b. **No.** Go to Test 10.

10. [296] Terminal 3 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K2 and [296A] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 3 and [288B] terminal 13 (PK).
   b. **No.** Go to Test 11.

11. [162C] Terminal 10 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal K2 and [162A] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 3 and [162C] terminal 10 (LBE).
   b. **No.** Repair open between [162A] terminal 10 and [27B] terminal K2 (LBE/BK).

12. [149-2] Terminal 23 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K1 and [149B-2] terminal 23 (PK/BK).
3. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Go to Test 13.

13. [288] Terminal 9 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K1 and [288B] terminal 9 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 9 and [149B-2] terminal 23 (PK/BK).
   b. **No.** Go to Test 14.

14. [296] Terminal 4 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K1 and [296A] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 4 and [288B] terminal 9 (PK/BK).
   b. **No.** Go to Test 15.

15. [162C] Terminal 9 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K1 and [162A] terminal 9 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 4 and [162C] terminal 9 (LBE/BK).
   b. **No.** Repair open between [162A] terminal 9 and [27B] terminal K1 (LBE).

16. Speaker Pod (-) Grounded Test

1. Test resistance between BOB terminals K2 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 21.

17. [149-2] Terminal 22 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Go to Test 22.

18. [288] Terminal 13 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to ground between [288A] terminal 13 and [149B-2] terminal 22 (PK).

19. [296] Terminal 3 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Repair short to ground between [296B] terminal 3 and [288B] terminal 13 (PK).

20. [162C] Terminal 10 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 10 and [27B] terminal K2 (LBE/BK).
   b. **No.** Repair short to ground between [296A] terminal 3 and [162C] terminal 10 (LBE).

21. Speaker Pod (+) Grounded Test

1. Test resistance between BOB terminal K1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 22.
   b. **No.** Go to Test 26.

22. [149-2] Terminal 23 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 23.
   b. **No.** Replace amplifier.

23. [288] Terminal 9 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to ground between [288A] terminal 9 and [149B-2] terminal 23 (PK/BK).

24. [296] Terminal 4 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 25.
   b. **No.** Repair short to ground between [296B] terminal 4 and [288B] terminal 9 (PK/BK).

25. [162C] Terminal 9 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 9 and [27B] terminal K1 (LBE).
   b. **No.** Repair short to ground between [296A] terminal 4 and [162C] terminal 9 (LBE/BK).

26. Speaker Pod (-) Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Test voltage between BOB terminal K2 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Go to Test 32.

27. [149-2] Terminal 22 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal K2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 28.
   b. **No.** Go to Test 33.

28. [288] Terminal 13 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminal K2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [288A] terminal 13 and [149B-2] terminal 22 (PK).

29. [296] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal K2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [296B] terminal 3 and [288B] terminal 13 (PK).

30. [162C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal K2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 31.
   b. **No.** Repair short to voltage between [162C] terminal 10 and [296A] terminal 3 (LBE).

31. [27A] Terminal K2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal K2 from [27B] (LBE/BK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal K2 and ground.

7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 10 and [27B] terminal K2 (LBE/BK).

32. Speaker Pod (+) Voltage Test

1. Test voltage between BOB terminal K1 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 33.
   b. **No.** Go to Test 38.

33. [149-2] Terminal 23 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal K1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 34.
   b. **No.** Replace amplifier.

34. [288] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminals K1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 35.
   b. **No.** Repair short to voltage between [288A] terminals 9 and [149B-2] terminal 23 (PK/BK).

35. [296] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal K1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 36.
   b. **No.** Repair short to voltage between [296B] terminal 4 and [288B] terminal 9 (PK/BK).

36. [162C] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal K1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 37.
   b. **No.** Repair short to voltage between [162C] terminal 9 and [296A] terminal 4 (LBE/BK).

37. [27A] Terminal K1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal K1 from [27B] (LBE/O).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal K1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 9 and [27B] terminal K1 (LBE).

38. Right Speaker Pod Circuit Shorted Test

1. Turn IGN OFF.
2. Remove radio BOB.
3. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2], leaving amplifier [149A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals 7 and 8.
5. Is resistance less than 2 Ohms?
   a. **Yes.** Go to Test 39.
   b. **No.** Go to Test 43.

39. Speaker Pod Shorted Test

1. Disconnect left speaker [37].
2. Test resistance between [37A] speaker terminals 1 and 2.
3. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 40.

40. [162B] Shorted Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 7 and 8.
3. Is continuity present?
   a. **Yes.** Go to Test 41.
   b. **No.** Repair short between [162B] terminals 9 and 10 and [36B] terminals 1 and 2.

41. [297B] Shorted Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 7 and 8.

3. Is continuity present?
   a. **Yes.** Go to Test 42.
   b. **No.** Repair short between [162D] terminal 9 and 10 and [297B] terminals 3 and 4.

42. [288B] Shorted Test

1. Disconnect rear audio [288B].
2. Test continuity between BOB terminals 7 and 8.
3. Is continuity present?
   a. **Yes.** Repair short between [288A] terminals 6 and 10 and [149B-2] terminals 7 and 8.
   b. **No.** Repair short between [297A] terminals 3 and 4 and [288B] terminals 6 and 10.

43. Right Speaker Pod Circuit Open Test

1. Test continuity between BOB terminals 7 and 8.
2. Is continuity present?
   a. **Yes.** Go to Test 52.
   b. **No.** Go to Test 44.

44. [36B] Terminal 1 Open Test

1. Disconnect right speaker pod [36].
2. Test continuity between BOB terminal 7 and [36B] terminal 1 (LBE).
3. Is continuity present?
   a. **Yes.** Go to Test 48.
   b. **No.** Go to Test 49.

45. [162B] Terminal 9 Open Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 7 and [162D] terminal 9 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 9 and [36B] terminal 1 (LBE).
   b. **No.** Go to Test 46.

46. [297B] Terminal 3 Open Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 7 and [297A] terminal 3 (BN/PK).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 9 and [297B] terminal 3 (LBE).
   b. **No.** Go to Test 47.

47. [288B] Terminal 6 Open Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminal 7 and [288A] terminal 6 (BN/PK).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminal 6 and [149B-2] terminal 7 (BN/PK).
   b. **No.** Repair open between [297A] terminal 3 and [288B] terminal 6 (BN/PK).

48. [36B] Terminal 2 Open Test

1. Disconnect rear audio [36B].
2. Test continuity between BOB terminal 8 and [36B] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 49.

49. [162B] Terminal 10 Open Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 8 and [162D] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).
   b. **No.** Go to Test 50.

50. [297B] Terminal 4 Open Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 8 and [297A] terminal 4 (BN/GN).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).
   b. **No.** Go to Test 51.

51. [288B] Terminal 10 Open Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminal 8 and [288A] terminal 10 (BN/GN).
3. Is continuity present?
   a. **Yes.** Repair open between [297A] terminal 4 and [288B] terminal 10 (BN/GN).
   b. **No.** Repair open between [288A] terminal 10 and [149B-2] terminal 8 (BN/GN).

52. Right Speaker Pod Circuit (+) Grounded Test

1. Test continuity between BOB terminal 7 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 53.
   b. **No.** Go to Test 57.

53. [36B] Terminal 1 Grounded Test

1. Disconnect speaker pod [36B].

2. Test continuity between BOB terminal 7 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 54.
   b. **No.** Go to Test 58.

54. [162B] Terminal 9 Grounded Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 7 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 55.
   b. **No.** Repair short to ground between [162B] terminal 3 and [37B] terminal 1 (LBE).

55. [297B] Terminal 3 Grounded Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 7 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 56.
   b. **No.** Repair short to ground between [162D] terminal 9 and [297B] terminal 3 (LBE).

56. [288B] Terminal 6 Grounded Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminal 7 and [288A] terminal 6 (BN/PK).
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 6 and [149B-2] terminal 7 (BN/PK).
   b. **No.** Repair short to ground between [297A] terminal 3 and [288B] terminal 6 (BN/PK).

57. Right Speaker Pod Circuit (-) Grounded Test

1. Test continuity between BOB terminal 8 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 58.
   b. **No.** Go to Test 62.

58. [36B] Terminal 2 Grounded Test

1. Disconnect speaker pod [36B].
2. Test continuity between BOB terminal 8 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 59.
   b. **No.** Replace speaker.

59. [162B] Terminal 10 Grounded Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 8 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 60.
   b. **No.** Repair short to ground between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).

60. [297B] Terminal 4 Grounded Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 8 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 61.
   b. **No.** Repair short to ground between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).

61. [288B] Terminal 10 Grounded Test

1. Disconnect left saddlebag [288B].
2. Test continuity between BOB terminal 8 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [297A] terminal 4 and [288B] terminal 10 (BN/GN).
   b. **No.** Repair short to ground between [288A] terminal 10 and [149B-2] terminal 8 (BN/GN).

62. Right Speaker Pod Circuit (+) Voltage Test

1. Connect [149A-2].
2. Turn IGN ON.
3. Test voltage between BOB terminal 7 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 63.
   b. **No.** Go to Test 68.

63. [36B] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker pod [36B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 7 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 64.
   b. **No.** Go to Test 69.

64. [162B] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 7 and ground.

5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 65.
   b. **No.** Repair short to voltage between [162B] terminal 9 and [36B] terminal 1 (LBE).

65. [297B] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 7 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 66.
   b. **No.** Repair short to voltage between [162D] terminal 9 and [297B] terminal 3 (LBE).

66. [288B] Terminal 6 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 7 and [288A] terminal 6 (BN/PK).
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 67.
   b. **No.** Repair short to voltage between [297A] terminal 3 and [288B] terminal 6 (BN/PK).

67. [149B-2] Terminal 7 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 7 from [149B-2] (BN/PK).
4. Connect [149B-2].
5. Turn IGN ON.
6. Test voltage between BOB terminal 7 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [288A] terminal 6 and [149B-2] terminal 7 (BN/PK).

68. Left Speaker Pod Circuit (-) Voltage Test

1. Test voltage between BOB terminal 8 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 69.
   b. **No.** Go to Test 74.

69. [37B] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect speaker pod [36B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 8 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 70.
   b. **No.** Replace speaker.

70. [162B] Terminal 10 Voltage Test

1. Disconnect rear audio [162B].
2. Test voltage between BOB terminal 8 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 71.
   b. **No.** Repair short to voltage between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).

71. [297B] Terminal 4 Voltage Test

1. Disconnect interconnect [297B].
2. Test voltage between BOB terminal 8 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 72.
   b. **No.** Repair short to voltage between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).

72. [288B] Terminal 10 Voltage Test

1. Disconnect left saddlebag [288B].
2. Test voltage between BOB terminal 8 and ground.
3. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 73.
   b. **No.** Repair short to voltage between [288A] terminal 10 and [149B-2] terminal 8 (BN/GN).

73. [149B-2] Terminal 8 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 8 from [149B-2] (BN/GN).
4. Connect [149B-2].
5. Turn IGN ON.
6. Test voltage between BOB terminal 8 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [288A] terminal 10 and [149B-2] terminal 8 (BN/GN).

74. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A rear audio [162C] and [162D].

5. Connect OE rear audio [162A] and [162B].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Is right speaker pod inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

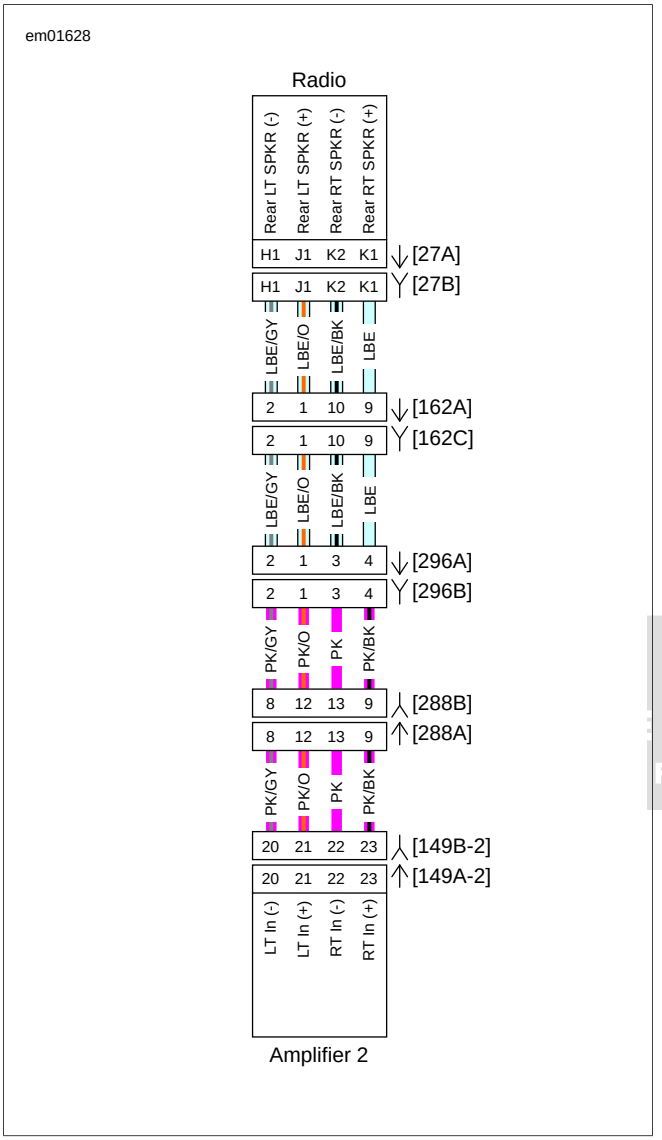


Figure 8-49. Radio and Amplifier 2 Circuit

BOTH RIGHT SPEAKERS INOPERATIVE WITH AMPLIFIER 2

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-83. Both Right Speakers Inoperative With Amplifier 2 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires

1. Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals K2 and K1.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 6.

2. [149-2] Shorted Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace amplifier.

3. [288] Shorted Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short between [149B-2] terminal 22 and 23 and [288A] terminals 9 and 13.

4. [296] Shorted Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [288B] terminal 9 and 13 and [296B] terminals 3 and 4.

5. [162C] Shorted Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Repair short between [296A] terminals 3 and 4 and [27B] terminals K2 and K1.
   b. **No.** Repair short between [162C] terminals 9 and 10 and [296A] terminals 3 and 4.

6. Speaker Pod Open Test

1. Test continuity between radio BOB terminals K2 and K1.
2. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 7.

7. [149-2] Terminal 22 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K2 and [149B-2] terminal 22 (PK).
3. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 8.

8. [288] Terminal 13 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K2 and [288B] terminal 13 (PK).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 13 and [149B-2] terminal 22 (PK).
   b. **No.** Go to Test 9.

9. [296] Terminal 3 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K2 and [296A] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 3 and [288B] terminal 13 (PK).
   b. **No.** Go to Test 10.

10. [162C] Terminal 10 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K2 and [162A] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 3 and [162C] terminal 10 (LBE).
   b. **No.** Repair open between [162A] terminal 10 and [27B] terminal K2 (LBE/BK).

11. [149-2] Terminal 23 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K1 and [149B-2] terminal 23 (PK/BK).
3. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Go to Test 12.

12. [288] Terminal 9 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K1 and [288B] terminal 9 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 9 and [149B-2] terminal 23 (PK/BK).
   b. **No.** Go to Test 13.

13. [296] Terminal 4 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K1 and [296A] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 4 and [288B] terminal 9 (PK/BK).
   b. **No.** Go to Test 14.

14. [162C] Terminal 9 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K1 and [162A] terminal 9 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 4 and [162C] terminal 9 (LBE/BK).
   b. **No.** Repair open between [162A] terminal 9 and [27B] terminal K1 (LBE).

15. Speaker Pod (-) Grounded Test

1. Test resistance between BOB terminals K2 and ground.

2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 20.

16. [149-2] Terminal 22 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 21.

17. [288] Terminal 13 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to ground between [288A] terminal 13 and [149B-2] terminal 22 (PK).

18. [296] Terminal 3 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to ground between [296B] terminal 3 and [288B] terminal 13 (PK).

19. [162C] Terminal 10 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 10 and [27B] terminal K2 (LBE/BK).
   b. **No.** Repair short to ground between [296A] terminal 3 and [162C] terminal 10 (LBE).

20. Speaker Pod (+) Grounded Test

1. Test resistance between BOB terminals K1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 21.
   b. **No.** Go to Test 25.

21. [149-2] Terminal 23 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 22.
   b. **No.** Replace amplifier.

22. [288] Terminal 9 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 23.
   b. **No.** Repair short to ground between [288A] terminal 9 and [149B-2] terminal 23 (PK/BK).

23. [296] Terminal 4 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to ground between [296B] terminal 4 and [288B] terminal 9 (PK/BK).

24. [162C] Terminal 9 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 9 and [27B] terminal K1 (LBE).
   b. **No.** Repair short to ground between [296A] terminal 4 and [162C] terminal 9 (LBE/BK).

25. Speaker Pod (+) Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Test voltage between BOB terminal K2 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 26.
   b. **No.** Go to Test 31.

26. [149-2] Terminal 22 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal K2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Go to Test 32.

27. [288] Terminal 13 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminals K2 and ground.

5. Is continuity present?
   a. **Yes.** Go to Test 28.
   b. **No.** Repair short to voltage between [288A] terminal 13 and [149B-2] terminal 22 (PK).

28. [296] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal K2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [296B] terminal 3 and [288B] terminal 13 (PK).

29. [162C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal K2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [162C] terminal 10 and [296A] terminal 3 (LBE).

30. [27A] Terminal H1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal K2 from [27B] (LBE/BK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal K2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 10 and [27B] terminal K2 (LBE/BK).

31. Speaker Pod (-) Voltage Test

1. Test voltage between BOB terminal K1 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 32.
   b. **No.** Go to Test 37.

32. [149-2] Terminal 23 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal K1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 33.
   b. **No.** Replace amplifier.

33. [288] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminals K1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 34.
   b. **No.** Repair short to voltage between [288A] terminals 9 and [149B-2] terminal 23 (PK/BK).

34. [296] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal K1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 35.
   b. **No.** Repair short to voltage between [296B] terminal 4 and [288B] terminal 9 (PK/BK).

35. [162C] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal K1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 36.
   b. **No.** Repair short to voltage between [162C] terminal 9 and [296A] terminal 4 (LBE/BK).

36. [27A] Terminal K1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal K1 from [27B] (LBE/O).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal K1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 9 and [27B] terminal K1 (LBE).

37. OE Radio Test

1. Turn IGN OFF.
2. Disconnect all P&A CAN jumpers.
3. Connect OE right hand controls [22A-1] and [22B-1].
4. Disconnect P&A rear audio [162C] and [162D].
5. Connect OE rear audio [162A] and [162B].
6. Turn IGN ON.
7. Adjust volume to 3 bars. Are both right speaker pods inoperative?
   a. **Yes.** Replace radio.
   b. **No.** Replace amplifier.

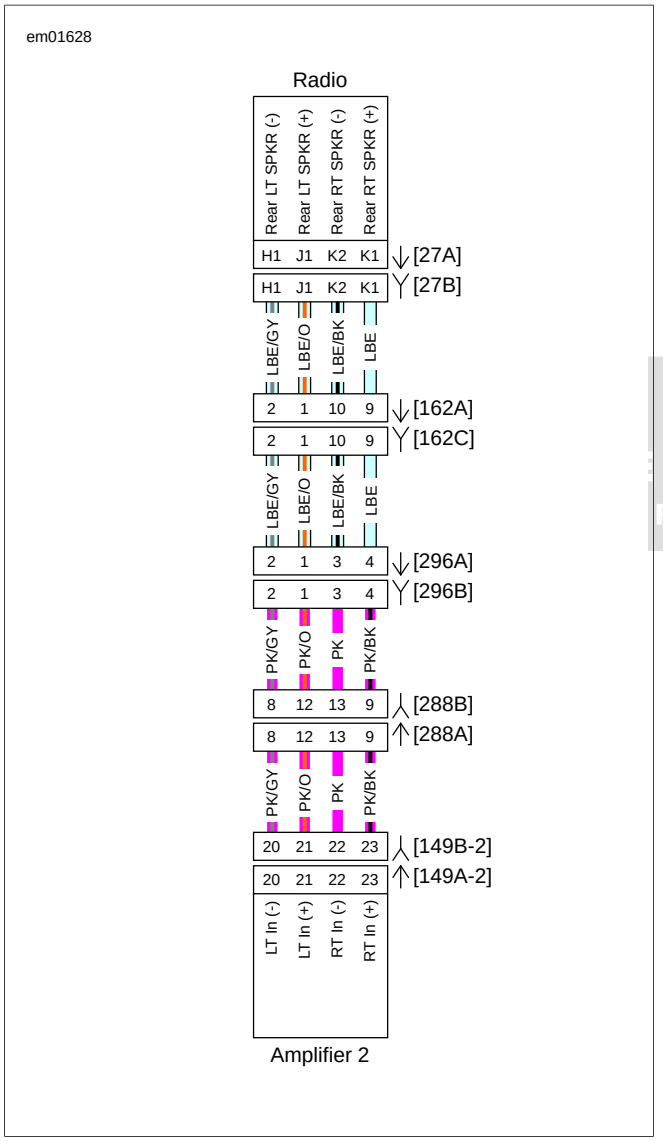


Figure 8-50. Radio and Amplifier 2 Circuit

SADDLEBAG RIGHT SPEAKER INOPERATIVE WITH AMPLIFIER 2

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX
HD-50390-1	BREAKOUT BOX
HD-50390-2	BCM/RADIO CABLE
HD-50390-2-P	BCM OVERLAY
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL

Table 8-84. Saddlebag Right Speaker Inoperative With Amplifier 2 Diagnostic Faults

POSSIBLE CAUSES
Shorted together circuit wires
Shorted to ground circuit wires
Shorted to voltage circuit wires
Open circuit wires
Shorted speaker
Open speaker

1. Configuration Test

1. Verify speakers on amplifier 2.
2. Are speakers on amplifier 2 rear speakers pods?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 38.

2. Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-50390-1) and BCM/RADIO CABLE (Part No. HD-50390-2) to wiring harness [27B], leaving radio [27A] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Verify BCM OVERLAY (Part No. HD-50390-2-P) is in position on BOB.
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test resistance between BOB terminals K2 and K1.
5. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 7.

3. [149-2] Shorted Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

4. [288] Shorted Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair short between [149B-2] terminal 22 and 23 and [288A] terminals 9 and 13.

5. [296] Shorted Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K2 and K1.
3. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair short between [288B] terminal 9 and 13 and [296B] terminals 3 and 4.

6. [162C] Shorted Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K2 and K1.
3. Is continuity present?
   a. **Yes.** Repair short between [296A] terminals 1 and 2 and [27B] terminals K2 and K1.
   b. **No.** Repair short between [162C] terminals 9 and 10 and [296A] terminals 3 and 4.

7. Speaker Pod Open Test

1. Test continuity between BOB terminals K2 and K1.
2. Is continuity present?
   a. **Yes.** Go to Test 16.
   b. **No.** Go to Test 8.

8. [149-2] Terminal 22 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K2 and [149B-2] terminal 22 (PK).
3. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Go to Test 9.

9. [288] Terminal 13 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K2 and [288B] terminal 13 (PK).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 13 and [149B-2] terminal 22 (PK).
   b. **No.** Go to Test 10.

10. [296] Terminal 3 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K2 and [296A] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 3 and [288B] terminal 13 (PK).
   b. **No.** Go to Test 11.

11. [162C] Terminal 10 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K2 and [162A] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 3 and [162C] terminal 10 (LBE).
   b. **No.** Repair open between [162A] terminal 10 and [27B] terminal K2 (LBE/BK).

12. [149-2] Terminal 23 Open Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K1 and [149B-2] terminal 23 (PK/BK).
3. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Go to Test 13.

13. [288] Terminal 9 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals K1 and [288B] terminal 9 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [288A] terminals 9 and [149B-2] terminal 23 (PK/BK).
   b. **No.** Go to Test 14.

14. [296] Terminal 4 Open Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K1 and [296A] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [296B] terminal 4 and [288B] terminal 9 (PK/BK).
   b. **No.** Go to Test 15.

15. [162C] Terminal 9 Open Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminals K1 and [162A] terminal 9 (LBE).

3. Is continuity present?
   a. **Yes.** Repair open between [296A] terminal 4 and [162C] terminal 9 (LBE/BK).
   b. **No.** Repair open between [162A] terminal 9 and [27B] terminal K1 (LBE).

16. Speaker Pod (-) Grounded Test

1. Test resistance between BOB terminal K2 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 17.
   b. **No.** Go to Test 21.

17. [149B-2] Terminal 22 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Go to Test 22.

18. [288] Terminal 13 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to ground between [288A] terminal 13 and [149B-2] terminal 22 (PK).

19. [296] Terminal 3 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Repair short to ground between [296B] terminal 3 and [288B] terminal 13 (PK).

20. [162C] Terminal 10 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal K2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 10 and [27B] terminal K2 (LBE/BK).
   b. **No.** Repair short to ground between [296A] terminal 3 and [162C] terminal 10 (LBE).

21. Speaker Pod (+) Grounded Test

1. Test resistance between BOB terminal K1 and ground.
2. Is resistance less than 1000 Ohms?
   a. **Yes.** Go to Test 22.
   b. **No.** Go to Test 26.

22. [149-2] Terminal 23 Grounded Test

1. Disconnect amplifier [149-2].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 23.
   b. **No.** Replace amplifier.

23. [288] Terminal 9 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 24.
   b. **No.** Repair short to ground between [288A] terminal 9 and [149B-2] terminal 23 (PK/BK).

24. [296] Terminal 4 Grounded Test

1. Disconnect interconnect [296].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 25.
   b. **No.** Repair short to ground between [296B] terminal 4 and [288B] terminal 9 (PK/BK).

25. [162C] Terminal 9 Grounded Test

1. Disconnect rear audio [162C].
2. Test continuity between BOB terminal K1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162A] terminal 9 and [27B] terminal K1 (LBE).
   b. **No.** Repair short to ground between [296A] terminal 4 and [162C] terminal 9 (LBE/BK).

26. Speaker Pod (-) Voltage Test

1. Connect [27A].
2. Turn IGN ON.
3. Test voltage between BOB terminal K2 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 27.
   b. **No.** Go to Test 32.

27. [149-2] Terminal 22 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal K2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 28.
   b. **No.** Go to Test 33.

28. [288] Terminal 13 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminal K2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 29.
   b. **No.** Repair short to voltage between [288A] terminal 13 and [149B-2] terminal 22 (PK).

29. [296] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal K2 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 30.
   b. **No.** Repair short to voltage between [296B] terminal 3 and [288B] terminal 13 (PK).

30. [162C] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal K2 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 31.
   b. **No.** Repair short to voltage between [162C] terminal 10 and [296A] terminal 3 (LBE).

31. [27A] Terminal H1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].
3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal K2 from [27B] (LBE/BK).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal K2 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 10 and [27B] terminal K2 (LBE/BK).

32. Speaker Pod (+) Voltage Test

1. Test voltage between BOB terminal K1 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 33.
   b. **No.** Go to Test 38.

33. [149-2] Terminal 23 Voltage Test

1. Turn IGN OFF.
2. Disconnect amplifier [149-2].
3. Turn IGN ON.
4. Test voltage between BOB terminal K1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 34.
   b. **No.** Replace amplifier.

34. [288] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test continuity between BOB terminals K1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 35.
   b. **No.** Repair short to voltage between [288A] terminals 9 and [149B-2] terminal 23 (PK/BK).

35. [296] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect interconnect [296].
3. Turn IGN ON.
4. Test continuity between BOB terminal K1 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 36.
   b. **No.** Repair short to voltage between [296B] terminal 4 and [288B] terminal 9 (PK/BK).

36. [162C] Terminal 9 Voltage Test

1. Turn IGN OFF.
2. Disconnect rear audio [162C].
3. Turn IGN ON.
4. Test voltage between BOB terminal K1 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 37.
   b. **No.** Repair short to voltage between [162C] terminal 9 and [296A] terminal 4 (LBE/BK).

37. [27A] Terminal K1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [27B].

3. Using 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423), remove terminal K1 from [27B] (LBE/O).
4. Connect [27B].
5. Turn IGN ON.
6. Test voltage between BOB terminal K1 and ground.
7. Is voltage greater than 9.0V?
   a. **Yes.** Replace radio.
   b. **No.** Repair short to voltage between [162B] terminal 9 and [27B] terminal K1 (LBE).

38. Saddlebag Speaker Shorted Test

1. Turn IGN OFF.
2. Disconnect right speaker [41].
3. Test resistance between [41A] speaker terminals A and B.
4. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Go to Test 39.

39. Saddlebag Speaker Open Test

1. Test continuity between [41A] speaker terminals A and B.
2. Is continuity present?
   a. **Yes.** Go to Test 40.
   b. **No.** Replace speaker.

40. Right Saddlebag Speaker Circuit Shorted Test

1. Remove radio BOB.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2], leaving amplifier [149A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 3 and 4.
4. Is continuity present?
   a. **Yes.** Go to Test 41.
   b. **No.** Go to Test 43.

41. [298] Shorted Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Go to Test 42.
   b. **No.** Repair short between [41B] terminals A and B and [298B] terminals 1 and 2.

42. [288] Shorted Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Repair short between [288A] terminals 16 and 17 and [149B-2] terminals 3 and 4.
   b. **No.** Repair short between [298A] terminals 1 and 2 and [288B] terminals 16 and 17.

43. [41B] Terminal A Open Test

1. Test continuity between BOB terminal 3 and [41B] terminal A (LBE).
2. Is continuity present?
   a. **Yes.** Go to Test 46.
   b. **No.** Go to Test 44.

44. [298] Terminal 1 Open Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminal 3 and [298A] terminal 1 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [41B] terminal A and [298B] terminal 1 (LBE).
   b. **No.** Go to Test 45.

45. [288] Terminal 16 Open Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 3 and [288A] terminal 16 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [298A] terminals 1 and [288B] terminal 16 (LBE).
   b. **No.** Repair open between [288A] terminals 16 and [149B-2] terminal 3 (LBE).

46. [41B] Terminal B Open Test

1. Test continuity between BOB terminal 4 and [41B] terminal B (LBE/BK).
2. Is continuity present?
   a. **Yes.** Go to Test 49.
   b. **No.** Go to Test 47.

47. [298] Terminal 2 Open Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminal 4 and [298A] terminal 2 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [41B] terminal B and [298B] terminal 2 (LBE/BK).
   b. **No.** Go to Test 45.

48. [288] Terminal 17 Open Test

1. Disconnect left saddlebag [288].

2. Test continuity between BOB terminal 4 and [288A] terminal 17 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [298A] terminals 2 and [288B] terminal 17 (LBE/BK).
   b. **No.** Repair open between [288A] terminals 17 and [149B-2] terminal 4 (LBE/BK).

49. [41B] Terminal A Grounded Test

1. Test continuity between BOB terminal 3 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 50.
   b. **No.** Go to Test 52.

50. [298] Terminal 1 Grounded Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 51.
   b. **No.** Repair short to ground between [41B] terminal A and [298B] terminal 1 (LBE).

51. [288] Terminal 16 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminals 16 and [149B-2] terminal 3 (LBE).
   b. **No.** Repair short to ground between [298A] terminals 1 and [288B] terminal 16 (LBE).

52. [41B] Terminal B Grounded Test

1. Test continuity between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 53.
   b. **No.** Go to Test 55.

53. [298] Terminal 2 Grounded Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 54.
   b. **No.** Repair short to ground between [41B] terminal B and [298B] terminal 2 (LBE/BK).

54. [288] Terminal 17 Grounded Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminals 17 and [149B-2] terminal 4 (LBE/BK).
   b. **No.** Repair short to ground between [298A] terminals 2 and [288B] terminal 17 (LBE/BK).

55. [41B] Terminal A Voltage Test

1. Connect [149A-2].
2. Turn IGN ON.
3. Test voltage between BOB terminal 3 and ground.
4. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 56.
   b. **No.** Go to Test 58.

56. [298] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect right saddlebag [298].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 57.
   b. **No.** Repair short to voltage between [41B] terminal A and [298B] terminal 1 (LBE).

57. [288] Terminal 16 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Repair short to voltage between [288A] terminals 16 and [149B-2] terminal 3 (LBE).
   b. **No.** Repair short to voltage between [298A] terminals 1 and [288B] terminal 16 (LBE).

58. [41B] Terminal B Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 59.
   b. **No.** Go to Test 61.

59. [298] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect right saddlebag [298].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and ground.

5. Is voltage greater than 9.0V?
   a. **Yes.** Go to Test 60.
   b. **No.** Repair short to voltage between [41B] terminal B and [298B] terminal 2 (LBE/BK).

60. [288] Terminal 17 Voltage Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and ground.
5. Is voltage greater than 9.0V?
   a. **Yes.** Repair short to voltage between [288A] terminals 17 and [149B-2] terminal 4 (LBE/BK).
   b. **No.** Repair short to voltage between [298A] terminals 2 and [288B] terminal 17 (LBE/BK).

61. Jumper Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [42].
3. Jumper BOB terminal 1 to [42A] terminal A.
4. Jumper BOB terminal 2 to [42A] terminal B.
5. Turn IGN ON.
6. Adjust volume to 3 bars. Is right saddlebag speaker inoperative?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

BLUETOOTH DEVICE WILL NOT PAIR WITH AUDIO SYSTEM

Table 8-85. Bluetooth Device Will Not Pair With Audio System Diagnostic Faults

POSSIBLE CAUSES
Device software update
Bluetooth enable
Security settings
Re-boot devices

1. Troubleshooting Test

1. These troubleshooting steps should be done with customer:
   a. Verify device has latest software update.
   b. Verify Bluetooth is enabled on device.
   c. Verify no security setting on device is preventing the pairing process.
   d. Turn device off for 1 minute. Some devices may need battery removed during this time period.
   e. If device is a phone, contact service provider for assistance.

NO OR LOW AUDIO FROM XM OR XM INOPERATIVE

Table 8-86. No or Low Audio from XM or XM Inoperative Diagnostic Faults

POSSIBLE CAUSES
Antenna malfunction
Satellite unavailable

1. XM Radio Operation Test

NOTE

Before proceeding with this test, verify the vehicle is located in an open area with line of sight to the southern sky. Remove all metal objects that could obstruct a properly installed antenna.

1. Turn radio ON.
2. Press home button.
3. Does XM icon appear on radio display?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 2.

2. Module Setting Test

1. Turn IGN OFF.
2. Remove and install XM module.
3. Turn radio ON.
4. Press home button.
5. Does XM icon appear on radio display?
   a. **Yes.** System working normal.
   b. **No.** Go to Test 3.

3. Module Replacement Test

1. Turn IGN OFF.
2. Remove and install a known good XM module.
3. Turn radio ON.
4. Press home button.
5. Does XM icon appear on radio display?
   a. **Yes.** Replace XM module.
   b. **No.** Replace radio.

4. Antenna Signal Test

1. Verify signal bars.
2. Is signal bar strength two or more bars?
   a. **Yes.** Replace XM module.
   b. **No.** Go to Test 5.

5. Antenna Test

1. Remove and install a known good XM antenna.

2. Is signal bar strength two or more bars?
   a. **Yes.** Replace XM antenna.
   b. **No.** Verify that a XM signal is available in the area. If XM signal is present, replace radio.

AMPLIFIER 1 DTCS 8.13

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The amplifier monitors the status of all its speaker circuits.

Table 8-87. Code Description

DTC	DESCRIPTION
B1403	Speaker output DC offset
B1404	Internal thermal shutdown error
B1405	EQ correlation error
B1406	Invalid or missing EQ
B1410	Channel 1 speaker open
B1411	Channel 1 speaker shorted low
B1412	Channel 1 speaker shorted high
B1413	Channel 1 speaker shorted together
B1420	Channel 2 speaker open
B1421	Channel 2 speaker shorted low
B1422	Channel 2 speaker shorted high
B1423	Channel 2 speaker shorted together
B1430	Channel 3 speaker open
B1431	Channel 3 speaker shorted low
B1432	Channel 3 speaker shorted high
B1433	Channel 3 speaker shorted together
B1440	Channel 4 speaker open
B1441	Channel 4 speaker shorted low
B1442	Channel 4 speaker shorted high
B1443	Channel 4 speaker shorted together

Diagnostic Tips

- To retrieve amplifier DTCs, use DIGITAL TECHNICIAN II (Part No. HD-48650).
- Before testing amplifier, remove amplifier fuse for 1 minute, install amplifier fuse and verify issue is still present.
- If B1404 or B1405 is set, the amplifier needs to be reflashed using DIGITAL TECHNICIAN II (Part No. HD-48650).

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

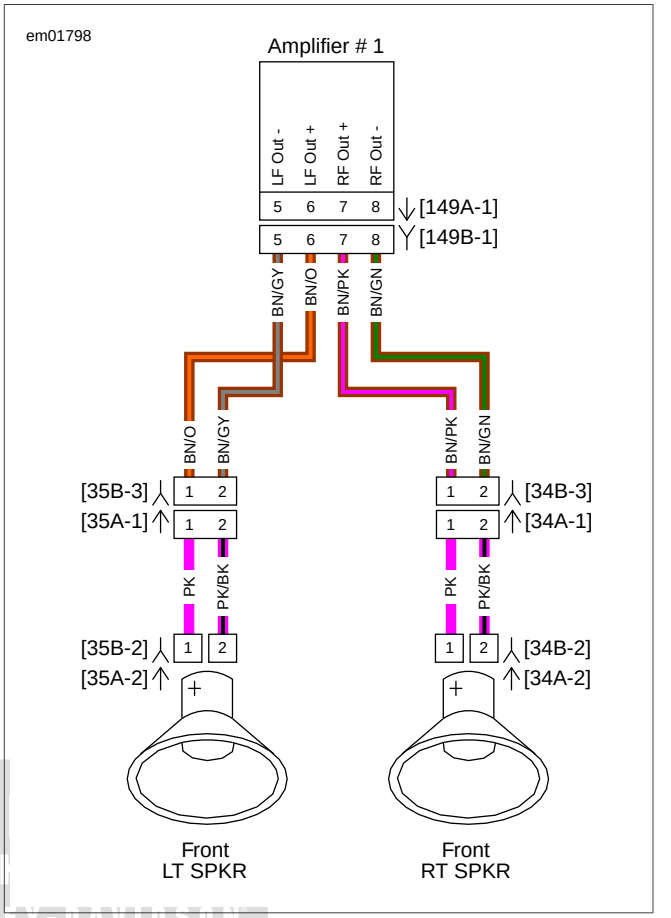


Figure 8-51. Amplifier 1: Front Speakers

DTC B1403, B1404

Table 8-88. DTC B1403, B1404 Diagnostic Faults

POSSIBLE CAUSES
Reset needed

1. Fuse Test

1. Turn IGN OFF.
2. Remove amplifier fuse.
3. After waiting one minute, install amplifier fuse.
4. Turn IGN ON.
5. Clear DTCs.
6. Turn radio ON.
7. Adjust volume to 8 bars. Allow radio to play for 30 seconds.
8. Check DTCs.
9. Did DTC reset?
   a. **Yes.** Replace amplifier.
   b. **No.** System working properly.

DTC B1410

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-89. DTC B1410 Diagnostic Faults

POSSIBLE CAUSES
Open speaker
Open wiring circuit

1. [35-3] Terminal 1 Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect interconnect speaker [35-3].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 6 and [35B-3] terminal 1 (BN/O).
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open between [149B-1] terminal 6 and [35B-3] terminal 1 (BN/O).

2. [35-3] Terminal 2 Test

1. Test continuity between BOB terminal 5 and [35B-3] terminal 2 (BN/GY).
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [149B-1] terminal 5 and [35B-3] terminal 2 (BN/GY).

3. [35-2] Terminal 1 Test

1. Disconnect speaker [35-2].
2. Test continuity between [35A-1] terminal 1 and [35B-2] terminal 1 (PK).
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open between [35A-1] terminal 1 and [35B-2] terminal 1 (PK).

4. [35-2] Terminal 2 Test

1. Test continuity between [35A-1] terminal 2 and [35B-2] terminal 2 (PK/BK).
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open between [35A-1] terminal 2 and [35B-2] terminal 2 (PK/BK).

5. Speaker Test

1. Test continuity between [35A-2] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

DTC B1411

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-90. DTC B1411 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in speaker wires

1. [149B-1] Terminal 6 Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 6 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 2.

2. [149B-1] Terminal 5 Test

1. Test continuity between BOB terminal 5 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

3. [35-3] Terminal 1 Test

1. Disconnect interconnect speaker [35-3].
2. Test continuity between BOB terminal 6 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 6 and [35B-3] terminal 1 (BN/O).
   b. **No.** Repair short to ground between [35A-1] terminal 1 and [35B-2] terminal 1 (PK).

4. [35-3] Terminal 2 Test

1. Disconnect interconnect speaker [35-3].
2. Test continuity between BOB terminals 5 and ground.

3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 5 and [35B-3] terminal 2 (BN/GY).
   b. **No.** Repair short to ground between [35A-1] terminal 2 and [35B-2] terminal 2 (PK/BK).

DTC B1412

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-91. DTC B1412 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in speaker wires

1. [149B-1] Terminal 6 Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 6 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 2.

2. [149B-1] Terminal 5 Test

1. Test voltage between BOB terminal 5 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

3. [35-3] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect interconnect speaker [35-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal 6 and ground.
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [149B-1] terminals 6 and [35B-3] terminal 1 (BN/O).
   b. **No.** Repair short to voltage between [35A-1] terminal 1 and [35B-2] terminal 1 (PK).

4. [35-3] Terminal 6 Test

1. Turn IGN OFF.
2. Disconnect interconnect speaker [35-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal 5 and ground.
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [149B-1] terminals 5 and [35B-3] terminal 2 (BN/GY).
   b. **No.** Repair short to voltage between [35A-1] terminal 2 and [35B-2] terminal 2 (PK/BK).

DTC B1413

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-92. DTC B1413 Diagnostic Faults

POSSIBLE CAUSES
Short in speaker wires

1. [35-3] Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect interconnect speaker [35-3].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 5 and 6.
5. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 5 and 6 and [35B-3] terminals 1 and 2.
   b. **No.** Go to Test 2.

2. [35-2] Test

1. Disconnect speaker [35-2].
2. Test continuity between [35A-1] terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short between [35A-1] terminals 1 and 2 and [35A-2] terminals 1 and 2.

3. Speaker Test

1. Test resistance between [35A-2] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

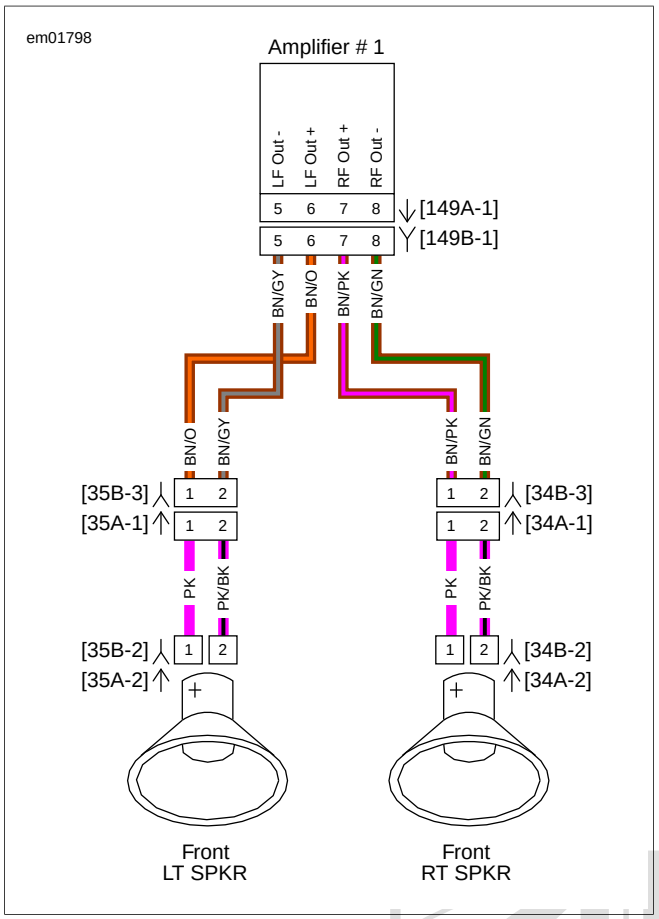


Figure 8-52. Amplifier 1: Front Speakers

DTC B1420

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-93. DTC B1420 Diagnostic Faults

POSSIBLE CAUSES
Open speaker
Open wiring circuit

1. [149-1] Terminal 7 Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect interconnect speaker [34-3].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 7 and [34B-3] terminal 1 (BN/PK).
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open between [149B-1] terminal 7 and [34B-3] terminal 1 (BN/PK).

2. [34-3] Terminal 2 Test

1. Test continuity between BOB terminal 8 and [34B-3] terminal 2 (BN/GN).
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [149B-1] terminal 8 and [34B-3] terminal 2 (BN/GN).

3. [34-2] Terminal 1 Test

1. Test continuity between [34A-1] terminal 1 and [34B-2] terminal 1 (PK).
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair open between [34A-1] terminal 1 and [34B-2] terminal 1 (PK).

4. [34-2] Terminal 2 Test

1. Test continuity between [34A-1] terminal 2 and [34B-2] terminal 2 (PK/BK).
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Repair open between [34A-1] terminal 2 and [34B-2] terminal 2 (PK/BK).

5. Speaker Test

1. Test continuity between [34A-2] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

DTC B1421

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-94. DTC B1421 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in speaker wires

1. [149-1] Terminal 7 Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.

3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 7 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 2.

2. [149-1] Terminal 8 Test

1. Test continuity between BOB terminal 8 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Replace amplifier.

3. [34-3] Terminal 1 Test

1. Disconnect interconnect speaker [34-3].
2. Test continuity between [34A-1] terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminals 7 and [34B-3] terminal 1 (BN/PK).
   b. **No.** Repair short to ground between [34A-1] terminal 1 and [34B-2] terminal 1 (PK).

4. [34-3] Terminal 2 Test

1. Disconnect interconnect speaker [34-3].
2. Test continuity between [34A-1] terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminals 8 and [34B-3] terminal 2 (BN/GN).
   b. **No.** Repair short to ground between [34A-1] terminal 2 and [34B-2] terminal 2 (PK/BK).

DTC B1422

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-95. DTC B1422 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in speaker wires

1. [149-1] Terminal 7 Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 7 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 2.

2. [149-1] Terminal 8 Test

1. Test voltage between BOB terminal 8 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Replace amplifier.

3. [34-3] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect interconnect speaker [34-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal 7 and ground.
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [149B-1] terminals 7 and [34B-3] terminal 1 (BN/PK).
   b. **No.** Repair short to voltage between [34A-1] terminal 1 and [34B-2] terminal 1 (PK).

4. [34-3] (-) Test

1. Turn IGN OFF.
2. Disconnect interconnect speaker [34-3].
3. Turn IGN ON.
4. Test voltage between BOB terminal 8 and ground.
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [149B-1] terminals 8 and [34B-3] terminal 2 (BN/GN).
   b. **No.** Repair short to voltage between [34A-1] terminal 2 and [34B-2] terminal 2 (PK/BK).

DTC B1423

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-96. DTC B1423 Diagnostic Faults

POSSIBLE CAUSES
Short in speaker wires

1. [149-1] Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect interconnect speaker [34-3].

4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 7 and 8.
5. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 7 and 8 and [34B-3] terminals 1 and 2.
   b. **No.** Go to Test 2.

2. [34-2] Test

1. Disconnect speaker [34-2].
2. Test continuity between [34A-1] terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short between [34A-1] terminals 1 and 2 and [34A-2] terminals 1 and 2.

3. Speaker Test

1. Test resistance between [34A-2] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

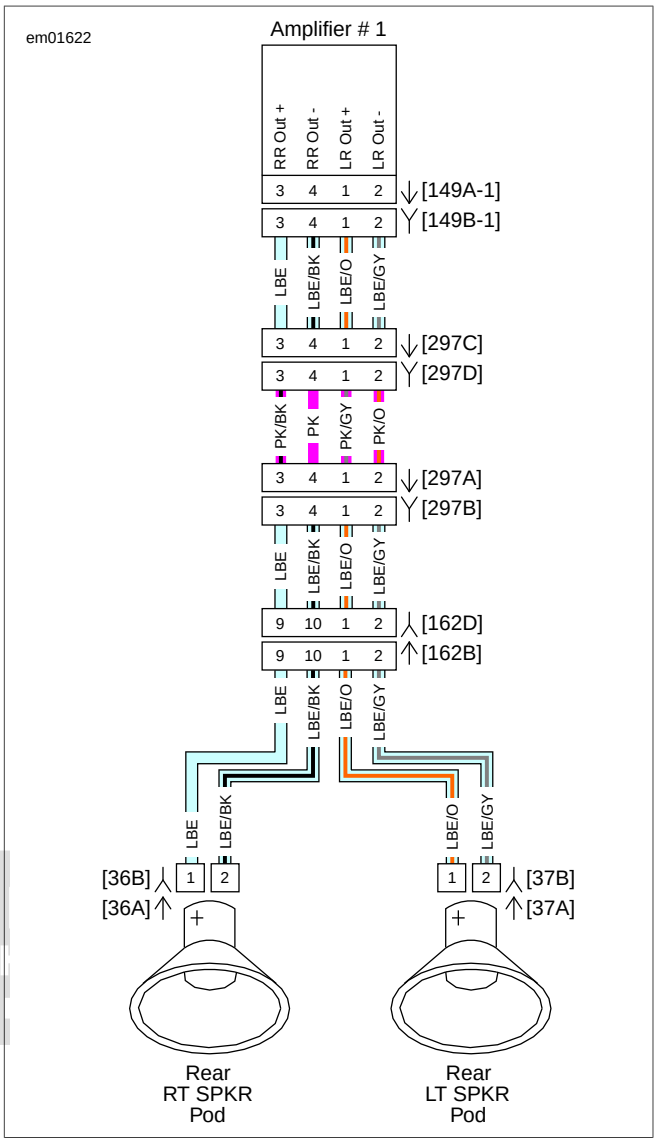


Figure 8-53. Amplifier 1: Rear Speaker Pods

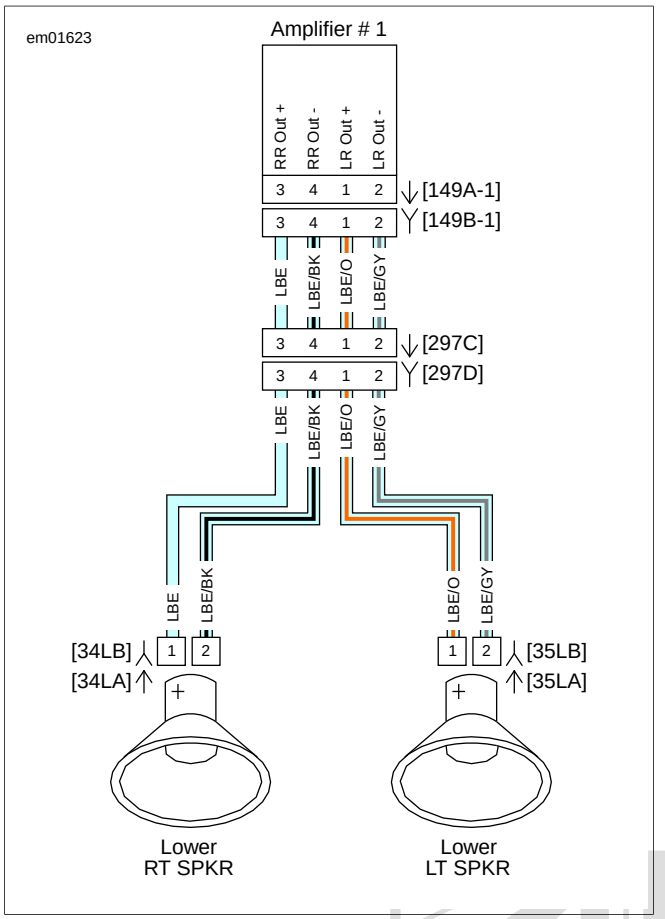


Figure 8-54. Amplifier 1: Lower Speakers

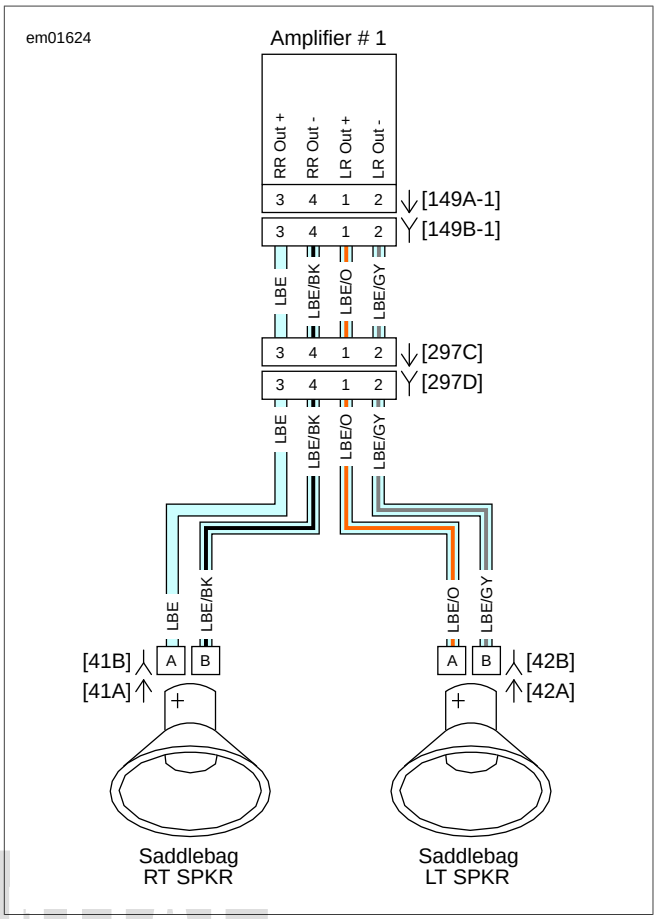


Figure 8-55. Amplifier 1: Saddlebag Speakers

DTC B1430

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-97. DTC B1430 Diagnostic Faults

POSSIBLE CAUSES
Open speaker
Open wiring circuit

1. Set-up Test

1. Verify speaker set-up.
2. Does vehicle have lower fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No. Rear Tour-Pak speaker pods.** Go to Test 7.
   c. **No. Saddlebag speakers.** Go to Test 16.

2. [149-1] Terminal 1 Lower Fairing Open Test

1. Turn IGN OFF.

2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect lower fairing speaker [35].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and [35LB] terminal 1 (LBE/O).
5. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. [297C] Terminal 1 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and [297C] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 1 and [35LB] terminal 1 (LBE/O).
   b. **No.** Repair open between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).

4. [149-1] Terminal 1 Lower Fairing Open Test

1. Test continuity between BOB terminal 2 and [35LB] terminal 2 (LBE/GY).
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 5.

5. [297C] Terminal 2 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 2 and [35LB] terminal 2 (LBE/GY).
   b. **No.** Repair open between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).

6. Left Speaker Lower Fairing Test

1. Test continuity between [35LA] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

7. [149-1] Terminal 1 Speaker Pod Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect Tour-Pak speaker pod [37].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and [37B] terminal 1 (LBE/O).
5. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 8.

8. [162B] Terminal 1 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 1 and [162D] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 1 and [37B] terminal 1 (LBE/O).
   b. **No.** Go to Test 9.

9. [297B] Terminal 1 Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 1 and [297A] terminal 1 (PK/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 1 and [297B] terminal 1 (LBE/O).
   b. **No.** Go to Test 10.

10. [297C] Terminal 1 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and [297C] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 1 and [297A] terminal 1 (PK/GY).
   b. **No.** Repair open between [297C] terminal 1 and [149B-1] terminal 1 (LBE/O).

11. [149-1] Terminal 2 Speaker Pod Open Test

1. Test continuity between BOB terminal 2 and [37B] terminal 2 (LBE/GY).
2. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 12.

12. [162B] Terminal 2 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 2 and [162D] terminal 2 (LBE/GY).

3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 2 and [37B] terminal 2 (LBE/GY).
   b. **No.** Go to Test 13.

13. [297B] Terminal 2 Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 2 and [297A] terminal 2 (PK/O).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).
   b. **No.** Go to Test 14.

14. [297C] Terminal 2 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 2 and [297A] terminal 2 (PK/O).
   b. **No.** Repair open between [297C] terminal 2 and [149B-1] terminal 2 (LBE/GY).

15. Left Speaker Pod Test

1. Test continuity between [37A] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

16. [149-1] Terminal 1 Saddlebag Speaker Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect saddlebag speaker [42].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and [42B] terminal A (LBE/O).
5. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Go to Test 17.

17. [297C] Terminal 1 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and [297C] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 1 and [42B] terminal A (LBE/O).
   b. **No.** Repair open between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).

18. [149-1] Terminal 2 Saddlebag Speaker Open Test

1. Test continuity between BOB terminal 2 and [42B] terminal B (LBE/GY).
2. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Go to Test 19.

19. [297C] Terminal 4 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and [297C] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 2 and [42B] terminal B (LBE/GY).
   b. **No.** Repair open between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).

20. Left Saddlebag Speaker Test

1. Test continuity between [42A] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

DTC B1431

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-98. DTC B1431 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in speaker wires

1. Set-up Test

1. Verify speaker set-up.
2. Does vehicle have lower fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No. Rear Tour-Pak speaker pods.** Go to Test 6.
   c. **No. Saddlebag speakers.** Go to Test 14.

2. [149-1] Terminal 1 Lower Fairing Grounded Test

1. Turn IGN OFF.

2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [297C] Terminal 1 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).
   b. **No.** Repair short to ground between [297D] terminal 1 and [42LB] terminal 1 (LBE/O).

4. [149-1] Terminal 2 Lower Fairing Grounded Test

1. Test continuity between BOB terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace amplifier.

5. [297C] Terminal 2 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).
   b. **No.** Repair short to ground between [297D] terminal 2 and [42LB] terminal 2 (LBE/GY).

6. [149-1] Terminal 1 Speaker Pod Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 10.
   b. **No.** Go to Test 7.

7. [162B] Terminal 1 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to ground between [162B] terminal 1 and [37B] terminal 1 (LBE/O).

8. [297B] Terminal 1 Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair short to ground between [162D] terminal 1 and [297B] terminal 1 (LBE/O).

9. [297C] Terminal 1 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [297C] terminal 1 and [149B-1] terminal 1 (LBE/O).
   b. **No.** Repair short to ground between [297D] terminal 1 and [297A] terminal 1 (PK/GY).

10. [149-1] Terminal 2 Speaker Pod Grounded Test

1. Test continuity between BOB terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Replace amplifier.

11. [162B] Terminal 2 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 12.
   b. **No.** Repair short to ground between [162B] terminal 2 and [37B] terminal 2 (LBE/GY).

12. [297B] Terminal 2 Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 13.
   b. **No.** Repair short to ground between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).

13. [297C] Terminal 2 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and ground.

3. Is continuity present?
   a. **Yes.** Repair short to ground between [297C] terminal 2 and [149B-1] terminal 2 (LBE/GY).
   b. **No.** Repair short to ground between [297D] terminal 2 and [297A] terminal 2 (PK/O).

14. [149-1] Terminal 1 Saddlebag Speaker Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 16.

15. [297C] Terminal 1 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 1 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).
   b. **No.** Repair short to ground between [297D] terminal 1 and [42B] terminal A (LBE/O).

16. [149-1] Terminal 2 Saddlebag Speaker Grounded Test

1. Test continuity between BOB terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Replace amplifier.

17. [297C] Terminal 4 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 2 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).
   b. **No.** Repair short to ground between [297D] terminal 2 and [42B] terminal B (LBE/GY).

DTC B1432

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-99. DTC B1432 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in speaker wires

1. Set-up Test

1. Verify speaker set-up.
2. Does vehicle have lower fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No. Rear Tour-Pak speaker pods.** Go to Test 6.
   c. **No. Saddlebag speakers.** Go to Test 14.

2. [149-1] Terminal 1 Lower Fairing Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [297C] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 1 and [35LB] terminal 1 (LBE/O).

4. [149-1] Terminal 2 Lower Fairing Voltage Test

1. Test voltage between BOB terminal 2 and ground.

2. Is battery voltage present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace amplifier.

5. [297C] Terminal 2 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to voltage between [297D] terminal 2 and [35LB] terminal 2 (LBE/GY).

6. [149-1] Terminal 1 Speaker Pod Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 1 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 10.

7. [162B] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to voltage between [162B] terminal 1 and [37B] terminal 1 (LBE/O).

8. [297B] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair short to voltage between [162D] terminal 1 and [297B] terminal 1 (LBE/O).

9. [297C] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 1 and [297A] terminal 1 (PK/GY).

10. [149-1] Terminal 2 Speaker Pod Voltage Test

1. Test voltage between BOB terminal 2 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 11.
   b. **No.** Replace amplifier.

11. [162B] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 12.
   b. **No.** Repair short to voltage between [162B] terminal 2 and [37B] terminal 2 (PK/GY).

12. [297B] Terminal 2 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 13.
   b. **No.** Repair short to voltage between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).

13. [297C] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to voltage between [297D] terminal 2 and [297A] terminal 2 (PK/O).

14. [149-1] Terminal 1 Saddlebag Speaker Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 1 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 16.

15. [297C] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 1 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 1 and [42B] terminal A (LBE).

16. [149-1] Terminal 2 Saddlebag Speaker Voltage Test

1. Test voltage between BOB terminal 2 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 17.
   b. **No.** Replace amplifier.

17. [297C] Terminal 2 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 2 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to voltage between [297D] terminal 2 and [42B] terminal B (LBE/GY).

18. [149-1] Terminal 1 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 1 from [149B-1] (LBE/O).
4. Turn IGN ON.
5. Test voltage between BOB terminal 1 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to ground between [149B-1] terminal 1 and [297C] terminal 1 (LBE/O).

19. [149-1] Terminal 2 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 2 from [149B-1] (LBE/GY).
4. Turn IGN ON.
5. Test voltage between BOB terminal 2 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to ground between [149B-1] terminal 2 and [297C] terminal 2 (LBE/GY).

DTC B1433

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-100. DTC B1433 Diagnostic Faults

POSSIBLE CAUSES
Shorted speaker wires

1. Set-up Test

1. Verify speaker set-up.
2. Does vehicle have lower fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No. Rear Tour-Pak speaker pods.** Go to Test 5.
   c. **No. Saddlebag speakers.** Go to Test 10.

2. [149-1] Left Lower Fairing Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect left lower speaker [35L].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 1 and 2.
5. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [297C] Lower Fairing Test

1. Disconnect interconnect [297C].

2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 1 and 2 and [297C] terminals 1 and 2.
   b. **No.** Repair short between [297D] terminals 1 and 2 and [35LB] terminals 1 and 2.

4. Left Lower Speaker Test

1. Test resistance between [35LA] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

5. [149-1] Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect left speaker pod [37].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 1 and 2.
5. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 6.

6. [162B] Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short between [162B] terminals 1 and 2 and [37B] terminals 1 and 2.

7. [297B] Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short between [162D] terminals 1 and 2 and [297B] terminals 1 and 2.

8. [297C] Speaker Pod Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Repair short between [297C] terminals 1 and 2 and [149B-1] terminals 1 and 2.
   b. **No.** Repair short between [297D] terminals 1 and 2 and [297A] terminals 1 and 2.

9. Left Speaker Pod Test

1. Test resistance between [37A] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

10. [149-1] Saddlebag Speaker Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect left saddlebag speaker [42].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 1 and 2.
5. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 12.

11. [297C] Saddlebag Speaker Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 1 and 2.
3. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 1 and 2 and [297C] terminals 1 and 2.
   b. **No.** Repair short between [297D] terminals 1 and 2 and [42B] terminals A and B.

12. Left Saddlebag Speaker Test

1. Test resistance between [42A] speaker terminals A and B.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

DTC B1440

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-101. DTC B1440 Diagnostic Faults

POSSIBLE CAUSES
Open speaker
Open wiring circuit

1. Set-up Test

1. Verify speaker set-up.

2. Does vehicle have lower fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No. Rear Tour-Pak speaker pods.** Go to Test 7.
   c. **No. Saddlebag speakers.** Go to Test 16.

2. [149-1] Terminal 3 Lower Fairing Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect lower fairing speaker [34].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and [34LB] terminal 1 (LBE).
5. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 3.

3. [297C] Terminal 3 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and [297C] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 3 and [34LB] terminal 1 (LBE).
   b. **No.** Repair open between [149B-1] terminal 3 and [297C] terminal 3 (LBE).

4. [149-1] Terminal 4 Lower Fairing Open Test

1. Test continuity between BOB terminal 4 and [34LB] terminal 2 (LBE/BK).
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 5.

5. [297C] Terminal 4 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 4 and [34LB] terminal 2 (LBE/BK).
   b. **No.** Repair open between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).

6. Right Speaker Lower Fairing Test

1. Test continuity between [34LA] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

7. [149-1] Terminal 3 Speaker Pod Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect Tour-Pak speaker pod [36].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and [36B] terminal 1 (LBE).
5. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 8.

8. [162B] Terminal 9 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 3 and [162D] terminal 9 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 9 and [36B] terminal 1 (LBE).
   b. **No.** Go to Test 9.

9. [297B] Terminal 3 Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 3 and [297A] terminal 3 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 9 and [297B] terminal 3 (LBE).
   b. **No.** Go to Test 10.

10. [297C] Terminal 3 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and [297C] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 3 and [297A] terminal 3 (PK/BK).
   b. **No.** Repair open between [297C] terminal 3 and [149B-1] terminal 3 (LBE).

11. [149-1] Terminal 4 Speaker Pod Open Test

1. Test continuity between BOB terminal 4 and [36B] terminal 2 (LBE/BK).

2. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 12.

12. [162B] Terminal 10 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 4 and [162D] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).
   b. **No.** Go to Test 13.

13. [297B] Terminal 4 Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 4 and [297A] terminal 4 (PK/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).
   b. **No.** Go to Test 14.

14. [297C] Terminal 4 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 4 and [297A] terminal 4 (PK).
   b. **No.** Repair open between [297C] terminal 4 and [149B-1] terminal 4 (LBE/BK).

15. Right Speaker Pod Test

1. Test continuity between [36A] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

16. [149-1] Terminal 3 Saddlebag Speaker Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect saddlebag speaker [41].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and [41B] terminal A (LBE).
5. Is continuity present?
   a. **Yes.** Go to Test 18.
   b. **No.** Go to Test 17.

17. [297C] Terminal 3 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and [297C] terminal 3 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 3 and [41B] terminal A (LBE).
   b. **No.** Repair open between [149B-1] terminal 3 and [297C] terminal 3 (LBE).

18. [149-1] Terminal 4 Saddlebag Speaker Open Test

1. Test continuity between BOB terminal 4 and [41B] terminal B (LBE/BK).
2. Is continuity present?
   a. **Yes.** Go to Test 20.
   b. **No.** Go to Test 19.

19. [297C] Terminal 4 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [297D] terminal 4 and [41B] terminal B (LBE/BK).
   b. **No.** Repair open between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).

20. Right Saddlebag Speaker Test

1. Test continuity between [41A] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

DTC B1441

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-102. DTC B1441 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in speaker wires

1. Set-up Test

1. Verify speaker set-up.

2. Does vehicle have lower fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No. Rear Tour-Pak speaker pods.** Go to Test 6.
   c. **No. Saddlebag speakers.** Go to Test 14.

2. [149-1] Terminal 3 Lower Fairing Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect lower fairing speaker [34].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [297C] Terminal 3 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 3 and [297C] terminal 3 (LBE).
   b. **No.** Repair short to ground between [297D] terminal 3 and [34LB] terminal 1 (LBE).

4. [149-1] Terminal 4 Lower Fairing Grounded Test

1. Test continuity between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace amplifier.

5. [297C] Terminal 4 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).
   b. **No.** Repair short to ground between [297D] terminal 4 and [34LB] terminal 2 (LBE/BK).

6. [149-1] Terminal 3 Speaker Pod Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 10.

7. [162B] Terminal 9 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to ground between [162B] terminal 9 and [36B] terminal 1 (LBE).

8. [297B] Terminal 3 Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair short to ground between [162D] terminal 9 and [297B] terminal 1 (LBE).

9. [297C] Terminal 3 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [297C] terminal 3 and [149B-1] terminal 3 (LBE).
   b. **No.** Repair short to ground between [297D] terminal 3 and [297A] terminal 3 (PK/BK).

10. [149-1] Terminal 4 Speaker Pod Grounded Test

1. Test continuity between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Replace amplifier.

11. [162B] Terminal 10 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 4 and [162D] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).
   b. **No.** Go to Test 12.

12. [297B] Terminal 4 Test

1. Disconnect interconnect [297B].

2. Test continuity between BOB terminal 4 and [297A] terminal 4 (PK).
3. Is continuity present?
   a. **Yes.** Repair short to ground between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).
   b. **No.** Go to Test 13.

13. [297C] Terminal 4 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair short to ground between [297D] terminal 4 and [297A] terminal 4 (PK).
   b. **No.** Repair short to ground between [297C] terminal 4 and [149B-1] terminal 4 (LBE/BK).

14. [149-1] Terminal 3 Saddlebag Speaker Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 16.

15. [297C] Terminal 3 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 3 and [297C] terminal 3 (LBE).
   b. **No.** Repair short to ground between [297D] terminal 3 and [41B] terminal A (LBE).

16. [149-1] Terminal 4 Saddlebag Speaker Grounded Test

1. Test continuity between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 17.
   b. **No.** Replace amplifier.

17. [297C] Terminal 4 Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).
   b. **No.** Repair short to ground between [297D] terminal 4 and [41B] terminal B (LBE/BK).

DTC B1442

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-103. DTC B1442 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in speaker wires

1. Set-up Test

1. Verify speaker set-up.
2. Does vehicle have lower fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No. Rear Tour-Pak speaker pods.** Go to Test 6.
   c. **No. Saddlebag speakers.** Go to Test 14.

2. [149-1] Terminal 3 Lower Fairing Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 3 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [297C] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 3 and [34LB] terminal 1 (LBE).

4. [149-1] Terminal 4 Lower Fairing Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace amplifier.

5. [297C] Terminal 4 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to voltage between [297D] terminal 4 and [34LB] terminal 2 (LBE/BK).

6. [149-1] Terminal 3 Speaker Pod Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 10.

7. [162B] Terminal 9 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to voltage between [162B] terminal 9 and [36B] terminal 1 (LBE).

8. [297B] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair short to voltage between [162D] terminal 9 and [297B] terminal 1 (LBE).

9. [297C] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 3 and [297A] terminal 3 (PK/BK).

10. [149-1] Terminal 4 Speaker Pod Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 11.
   b. **No.** Replace amplifier.

11. [162B] Terminal 10 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and [162D] terminal 10 (LBE/BK).
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [162B] terminal 10 and [36B] terminal 2 (LBE/BK).
   b. **No.** Go to Test 12.

12. [297B] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and [297A] terminal 4 (PK/BK).
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).
   b. **No.** Go to Test 13.

13. [297C] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.

4. Test voltage between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
5. Is battery voltage present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to voltage between [297D] terminal 4 and [297A] terminal 4 (PK).

14. [149-1] Terminal 3 Saddlebag Speaker Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 15.
   b. **No.** Go to Test 16.

15. [297C] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 18.
   b. **No.** Repair short to voltage between [297D] terminal 3 and [41B] terminal A (LBE).

16. [149-1] Terminal 4 Saddlebag Speaker Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 17.
   b. **No.** Replace amplifier.

17. [297C] Terminal 4 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297C].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and [297C] terminal 4 (LBE/BK).
5. Is battery voltage present?
   a. **Yes.** Go to Test 19.
   b. **No.** Repair short to voltage between [297D] terminal 4 and [41B] terminal B (LBE/BK).

18. [149-1] Terminal 3 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 3 from [149B-1] (LBE).
4. Turn IGN ON.
5. Test voltage between BOB terminal 3 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 3 and [297C] terminal 3 (LBE).

19. [149-1] Terminal 4 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-1].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 4 from [149B-1] (LBE/BK).
4. Turn IGN ON.
5. Test voltage between BOB terminal 4 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-1] terminal 4 and [297C] terminal 4 (LBE/BK).

DTC B1443

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-104. DTC B1443 Diagnostic Faults

POSSIBLE CAUSES
Shorted speaker wires

1. Set-up Test

1. Verify speaker set-up.
2. Does vehicle have lower fairing speakers?
   a. **Yes.** Go to Test 2.
   b. **No. Rear Tour-Pak speaker pods.** Go to Test 5.
   c. **No. Saddlebag speakers.** Go to Test 10.

2. [149-1] Terminal 3 Right Lower Speaker Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right lower speakers [34L].

4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 3 and 4.
5. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

3. [297C] Lower Speaker Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 3 and 4 and [297C] terminals 3 and 4.
   b. **No.** Repair short between [297D] terminals 3 and 4 and [34LB] terminals 1 and 2.

4. Right Speaker Test

1. Test resistance between [34LA] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

5. [149-1] Terminal 4 Right Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right speaker pod [36].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 3 and 4.
5. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Go to Test 9.

6. [162B] Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short between [162B] terminals 9 and 10 and [36B] terminals 1 and 2.

7. [297B] Test

1. Disconnect interconnect [297B].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short between [162D] terminals 9 and 10 and [297B] terminals 1 and 2.

8. [297C] Speaker Pod Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Repair short between [297C] terminals 3 and 4 and [149B-1] terminals 3 and 4.
   b. **No.** Repair short between [297D] terminals 3 and 4 and [297A] terminals 3 and 4.

9. Right Speaker Pod Test

1. Test resistance between [36A] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

10. [149-1] Terminal 3 Saddlebag Speaker Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right saddlebag speaker [41].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 3 and 4.
5. Is continuity present?
   a. **Yes.** Go to Test 11.
   b. **No.** Go to Test 12.

11. [297C] Saddlebag Speaker Test

1. Disconnect interconnect [297C].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 1 and 2 and [297C] terminals 3 and 4.
   b. **No.** Repair short between [297D] terminals 3 and 4 and [41B] terminals A and B.

12. Saddlebag Speaker Test

1. Test resistance between [41A] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

AMPLIFIER 2 DTCS 8.14

DESCRIPTION AND OPERATION

PART NUMBER	TOOL NAME
HD-48650	DIGITAL TECHNICIAN II

The amplifier monitors the status of all its speaker circuits.

Table 8-105. Code Description

DTC	DESCRIPTION
B1403	Speaker output DC offset
B1404	Internal thermal shutdown error
B1405	EQ correlation error
B1406	Invalid or missing EQ
B1410	Channel 1 speaker open
B1411	Channel 1 speaker shorted low
B1412	Channel 1 speaker shorted high
B1413	Channel 1 speaker shorted together
B1420	Channel 2 speaker open
B1421	Channel 2 speaker shorted low
B1422	Channel 2 speaker shorted high
B1423	Channel 2 speaker shorted together
B1430	Channel 3 speaker open
B1431	Channel 3 speaker shorted low
B1432	Channel 3 speaker shorted high
B1433	Channel 3 speaker shorted together
B1440	Channel 4 speaker open
B1441	Channel 4 speaker shorted low
B1442	Channel 4 speaker shorted high
B1443	Channel 4 speaker shorted together

Diagnostic Tips

- To retrieve amplifier DTCs, use DIGITAL TECHNICIAN II (Part No. HD-48650).
- Before testing amplifier, remove amplifier fuse for 1 minute, install amplifier fuse and verify issue is still present.
- If B1404 or B1405 sets, the amplifier needs to be reflashed using DIGITAL TECHNICIAN II (Part No. HD-48650).

Connector Information

For additional information about the connectors in the following diagram(s) and diagnostic procedure(s), including the color of the harness test kit terminal probes, see B.1 CONNECTORS.

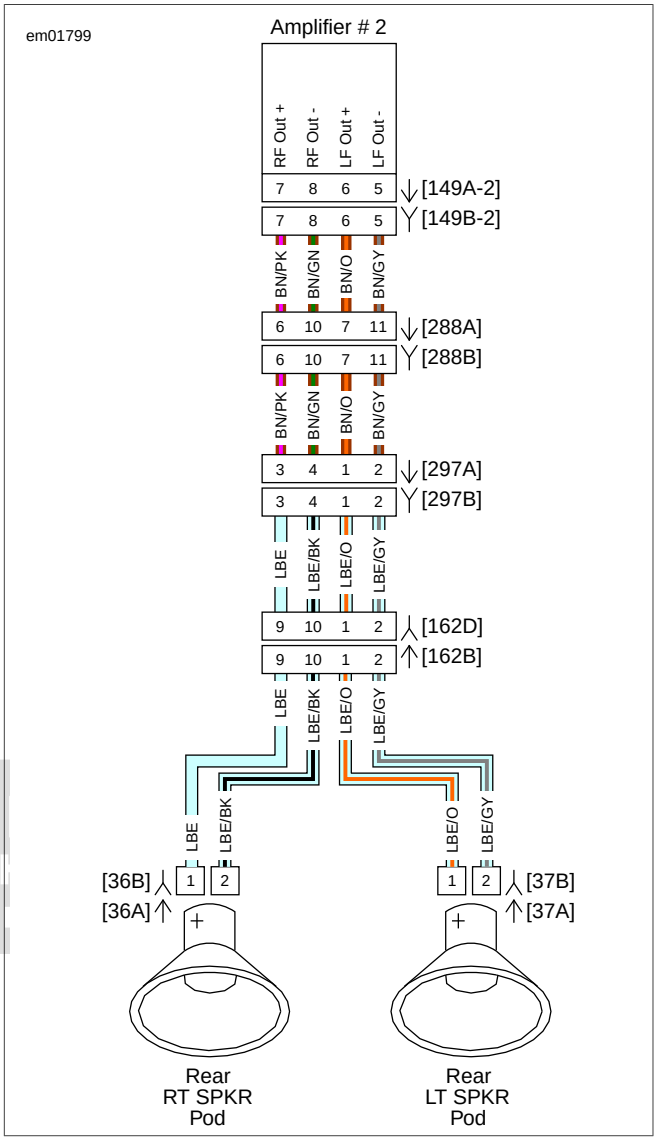


Figure 8-56. Amplifier 2: Rear Speaker Pods

DTC B1403, B1404

Table 8-106. DTC B1403, B1404 Diagnostic Faults

POSSIBLE CAUSES
Reset needed

1. Fuse Test

1. Turn IGN OFF.
2. Remove amplifier fuse.
3. After waiting one minute, install amplifier fuse.
4. Turn IGN ON.
5. Clear DTCs.
6. Turn radio ON.
7. Adjust volume to 8 bars. Allow radio to play for 30 seconds.

8. Check DTCs.
9. Did DTC reset?
   a. **Yes.** Replace amplifier.
   b. **No.** System working properly.

DTC B1410

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-107. DTC B1410 Diagnostic Faults

POSSIBLE CAUSES
Open speaker
Open wiring circuit

1. [149-2] Terminal 6 Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2] and amplifier [149A-2]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect left speaker pod [37].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 6 and [37B] terminal 1 (LBE/O).
5. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 2.

2. [162] Terminal 1 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 6 and [162D] terminal 1 (LBE/O).
3. Is continuity present?
   a. **Yes.** Repair open between [37B] terminal 1 and [162B] terminal 1 (LBE/O).
   b. **No.** Go to Test 3.

3. [297] Terminal 1 Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminal 6 and [297A] terminal 1 (BN/O).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 1 and [297B] terminal 1 (LBE/O).
   b. **No.** Go to Test 4.

4. [288] Terminal 7 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 6 and [288A] terminal 7 (BN/O).
3. Is continuity present?
   a. **Yes.** Repair open between [297A] terminal 1 and [288A] terminal 7 (BN/O).
   b. **No.** Repair open between [288A] terminal 7 and [149B-2] terminal 6 (BN/O).

5. [149-2] Terminal 5 Open Test

1. Test continuity between BOB terminal 5 and [37B] terminal 2 (LBE/GY).
2. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 6.

6. [162] Terminal 2 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 5 and [162D] terminal 2 (LBE/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [37B] terminal 2 and [162B] terminal 2 (LBE/GY).
   b. **No.** Go to Test 7.

7. [297] Terminal 2 Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminal 5 and [297A] terminal 2 (BN/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 2 and [297B] terminal 2 (LBE/GY)
   b. **No.** Go to Test 8.

8. [288] Terminal 11 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 5 and [288A] terminal 11 (BN/GY).
3. Is continuity present?
   a. **Yes.** Repair open between [297A] terminal 2 and [288A] terminal 11 (BN/GY).
   b. **No.** Repair open between [288A] terminal 11 and [149B-2] terminal 5 (BN/GY).

9. Speaker Test

1. Test continuity between [37A] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

DTC B1411

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-108. DTC B1411 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in speaker wires

1. [149-2] Terminal 6 Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2], leaving amplifier [149A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 6 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [162] Terminal 1 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 6 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to ground between [37B] terminal 1 and [162B] terminal 1 (LBE/O).

3. [297] Terminal 1 Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminal 6 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to ground between [162D] terminal 1 and [297B] terminal 1 (LBE/O).

4. [288] Terminal 7 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 6 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 7 and [149B-2] terminal 6 (BN/O).
   b. **No.** Repair short to ground between [297A] terminal 1 and [288A] terminal 7 (BN/O).

5. [149-2] Terminal 5 Grounded Test

1. Test continuity between BOB terminal 5 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace amplifier.

6. [162] Terminal 2 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 5 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short to ground between [37B] terminal 2 and [162B] terminal 2 (LBE/GY).

7. [297] Terminal 2 Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminal 5 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to ground between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).

8. [288] Terminal 11 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 5 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 11 and [149B-2] terminal 5 (BN/GY).
   b. **No.** Repair short to ground between [297A] terminal 2 and [288A] terminal 11 (BN/GY).

DTC B1412

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-109. DTC B1412 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in speaker wires

1. [149-2] Terminal 6 Speaker Pod Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2] and amplifier [149A-2]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.

5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 6 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [162] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 6 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to voltage between [37B] terminal 1 and [162B] terminal 1 (LBE/O).

3. [297] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297].
3. Turn IGN ON.
4. Test voltage between BOB terminal 6 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to voltage between [162D] terminal 1 and [297B] terminal 1 (LBE/O).

4. [288] Terminal 7 Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test voltage between BOB terminal 6 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair short to voltage between [297A] terminal 1 and [288A] terminal 7 (BN/O).

5. [149-2] Terminal 5 Speaker Pod Voltage Test

1. Test voltage between BOB terminal 5 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace amplifier.

6. [162] Terminal 2 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 5 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short to voltage between [37B] terminal 2 and [162B] terminal 2 (LBE/GY).

7. [297] Terminal 2 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297].
3. Turn IGN ON.
4. Test voltage between BOB terminal 5 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to voltage between [162D] terminal 2 and [297B] terminal 2 (LBE/GY).

8. [288] Terminal 11 Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test voltage between BOB terminal 5 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 10.
   b. **No.** Repair short to voltage between [297A] terminal 2 and [288A] terminal 11 (BN/GY).

9. [149A-2] Terminal 6 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 6 from [149B-2] (BN/O).
4. Turn IGN ON.
5. Test voltage between BOB terminal 6 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-2] terminal 6 and [288A] terminal 7 (BN/O).

10. [149A-2] Terminal 5 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 5 from [149B-2] (BN/GY).
4. Turn IGN ON.
5. Test voltage between BOB terminal 5 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to ground between [149B-2] terminal 5 and [288A] terminal 11 (BN/GY).

DTC B1413

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-110. DTC B1413 Diagnostic Faults

POSSIBLE CAUSES
Short in speaker wires

1. [149-2] Terminal 5 Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2], leaving amplifier [149A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right speaker pod [37].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 5 and 6.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [162] Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminals 5 and 6.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short between [162B] terminals 1 and 2 and [37B] terminals 1 and 2.

3. [297] Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminals 5 and 6.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short between [297B] terminals 1 and 2 and [162D] terminals 1 and 2.

4. [288] Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals 5 and 6.
3. Is continuity present?
   a. **Yes.** Repair short between [288A] terminals 7 and 11 and [149B-2] terminals 5 and 6.
   b. **No.** Repair short between [297A] terminals 1 and 2 and [288B] terminals 7 and 11.

5. Speaker Test

1. Test resistance between [37A] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

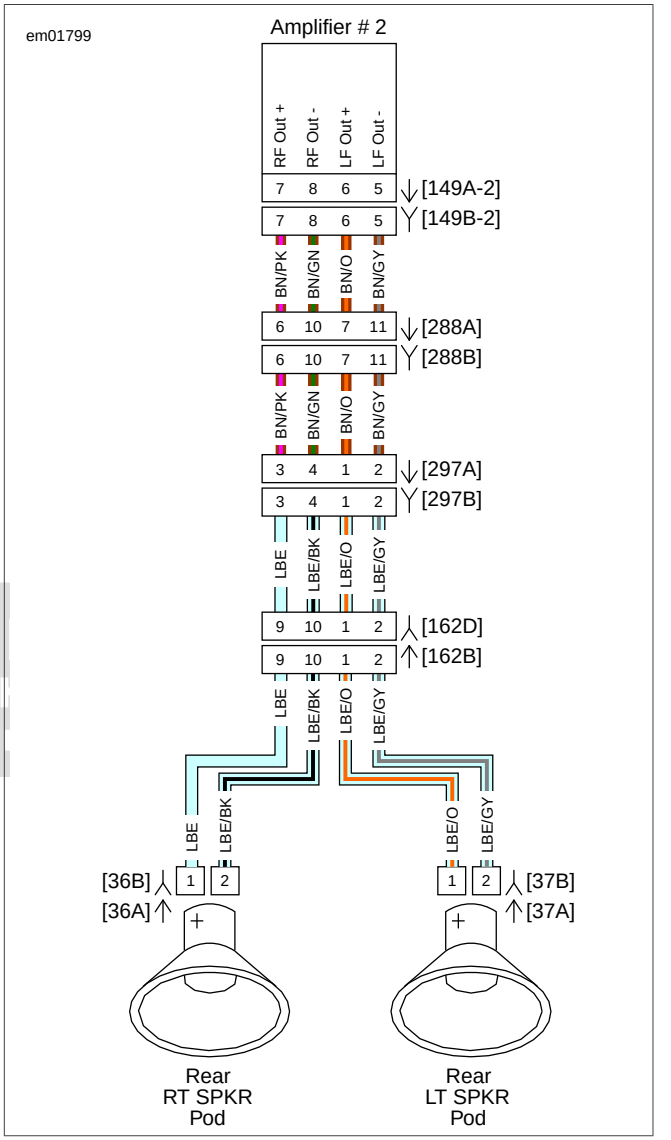


Figure 8-57. Amplifier 2: Rear Speaker Pods

DTC B1420

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-111. DTC B1420 Diagnostic Faults

POSSIBLE CAUSES
Open speaker
Open wiring circuit

1. [149-2] Terminal 7 Speaker Pod Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1] and amplifier [149A-1]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right speaker pod [36].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 7 and [36B] terminal 1 (LBE).
5. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Go to Test 2.

2. [162] Terminal 9 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 7 and [162D] terminal 9 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [36B] terminal 1 and [162B] terminal 9 (LBE).
   b. **No.** Go to Test 3.

3. [297] Terminal 3 Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminal 7 and [297A] terminal 3 (BN/PK).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 9 and [297B] terminal 3 (LBE).
   b. **No.** Go to Test 4.

4. [288] Terminal 6 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 7 and [288A] terminal 6 (BN/PK).
3. Is continuity present?
   a. **Yes.** Repair open between [297A] terminal 3 and [288A] terminal 6 (BN/PK).
   b. **No.** Repair open between [288A] terminal 6 and [149B-2] terminal 7 (BN/PK).

5. [149-2] Terminal 8 Speaker Pod Open Test

1. Test continuity between BOB terminal 8 and [36B] terminal 2 (LBE/BK).
2. Is continuity present?
   a. **Yes.** Go to Test 9.
   b. **No.** Go to Test 6.

6. [162] Terminal 10 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 8 and [162D] terminal 10 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [36B] terminal 2 and [162B] terminal 10 (LBE/BK).
   b. **No.** Go to Test 7.

7. [297] Terminal 4 Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminal 8 and [297A] terminal 4 (BN/GN).
3. Is continuity present?
   a. **Yes.** Repair open between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).
   b. **No.** Go to Test 8.

8. [288] Terminal 10 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 8 and [288A] terminal 10 (BN/GN).
3. Is continuity present?
   a. **Yes.** Repair open between [297A] terminal 4 and [288A] terminal 10 (BN/GN).
   b. **No.** Repair open between [288A] terminal 10 and [149B-2] terminal 8 (BN/GN).

9. Speaker Test

1. Test continuity between [36A] speaker terminals 1 and 2.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

DTC B1421

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-112. DTC B1421 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in speaker wires

1. [149-2] Terminal 7 Speaker Pod Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2], leaving amplifier [149A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 7 and ground.
4. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [162] Terminal 9 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 7 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to ground between [36B] terminal 1 and [162B] terminal 9 (LBE).

3. [297] Terminal 3 Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminal 7 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to ground between [162D] terminal 9 and [297B] terminal 3 (LBE).

4. [288] Terminal 6 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 7 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 6 and [149B-2] terminal 7 (BN/PK).
   b. **No.** Repair short to ground between [297A] terminal 3 and [288A] terminal 6 (BN/PK).

5. [149-2] Terminal 8 Speaker Pod Grounded Test

1. Test continuity between BOB terminal 8 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace amplifier.

6. [162] Terminal 10 Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminal 8 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short to ground between [36B] terminal 2 and [162B] terminal 10 (LBE/BK).

7. [297] Terminal 4 Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminal 8 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to ground between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).

8. [288] Terminal 7 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 8 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 10 and [149B-2] terminal 8 (BN/GN).
   b. **No.** Repair short to ground between [297A] terminal 4 and [288A] terminal 10 (BN/GN).

DTC B1422

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-113. DTC B1422 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in speaker wires

1. [149-2] Terminal 7 Speaker Pod Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2] and amplifier [149A-2]. See 1.3 DIAGNOSTIC TOOLS.

3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 7 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [162] Terminal 9 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 7 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to voltage between [36B] terminal 1 and [162B] terminal 9 (LBE).

3. [297] Terminal 3 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297].
3. Turn IGN ON.
4. Test voltage between BOB terminal 7 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short to voltage between [162D] terminal 9 and [297B] terminal 3 (LBE).

4. [288] Terminal 6 Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test voltage between BOB terminal 7 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 9.
   b. **No.** Repair short to voltage between [297A] terminal 3 and [288A] terminal 6 (BN/PK).

5. [149-2] Terminal 8 Speaker Pod Open Voltage Test

1. Test voltage between BOB terminal 8 and ground.
2. Is battery voltage present?
   a. **Yes.** Go to Test 6.
   b. **No.** Replace amplifier.

6. [162] Terminal 10 Test

1. Turn IGN OFF.
2. Disconnect rear audio [162B].
3. Turn IGN ON.
4. Test voltage between BOB terminal 8 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 7.
   b. **No.** Repair short to voltage between [36B] terminal 2 and [162B] terminal 10 (LBE/BK).

7. [297] Terminal 4 Test

1. Turn IGN OFF.
2. Disconnect interconnect [297].
3. Turn IGN ON.
4. Test voltage between BOB terminal 8 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 8.
   b. **No.** Repair short to voltage between [162D] terminal 10 and [297B] terminal 4 (LBE/BK).

8. [288] Terminal 10 Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test voltage between BOB terminal 8 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 10.
   b. **No.** Repair short to voltage between [297A] terminal 4 and [288A] terminal 10 (BN/GN).

9. [149A-2] Terminal 7 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 7 from [149B-2] (BN/PK).
4. Turn IGN ON.
5. Test voltage between BOB terminal 7 and ground.
6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to voltage between [149B-2] terminal 7 and [288A] terminal 6 (BN/PK).

10. [149A-2] Terminal 8 Voltage Test

1. Turn IGN OFF.
2. Disconnect [149B-2].
3. Using TERMINAL EXTRACTOR (Part No. B-50085), remove terminal 8 from [149B-2] (BN/GN).
4. Turn IGN ON.
5. Test voltage between BOB terminal 8 and ground.

6. Is voltage greater than 9.0V?
   a. **Yes.** Replace amplifier.
   b. **No.** Repair short to ground between [149B-2] terminal 8 and [288A] terminal 10 (BN/GN).

DTC B1423

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-114. DTC B1423 Diagnostic Faults

POSSIBLE CAUSES
Short in speaker wires

1. [149-2] Terminal 7 Speaker Pod Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2], leaving amplifier [149A-2] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right speaker pod [36].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 7 and 8.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 5.

2. [162] Test

1. Disconnect rear audio [162B].
2. Test continuity between BOB terminals 7 and 8.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short between [162B] terminals 9 and 10 and [36B] terminals 1 and 2.

3. [297] Test

1. Disconnect interconnect [297].
2. Test continuity between BOB terminals 7 and 8.
3. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Repair short between [297B] terminals 3 and 4 and [162D] terminals 9 and 10.

4. [288] Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals 7 and 8.
3. Is continuity present?
   a. **Yes.** Repair short between [288A] terminals 6 and 10 and [149B-2] terminals 7 and 8.
   b. **No.** Repair short between [297A] terminals 3 and 4 and [288B] terminals 6 and 10.

5. Speaker Test

1. Test resistance between [36A] speaker terminals 1 and 2.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

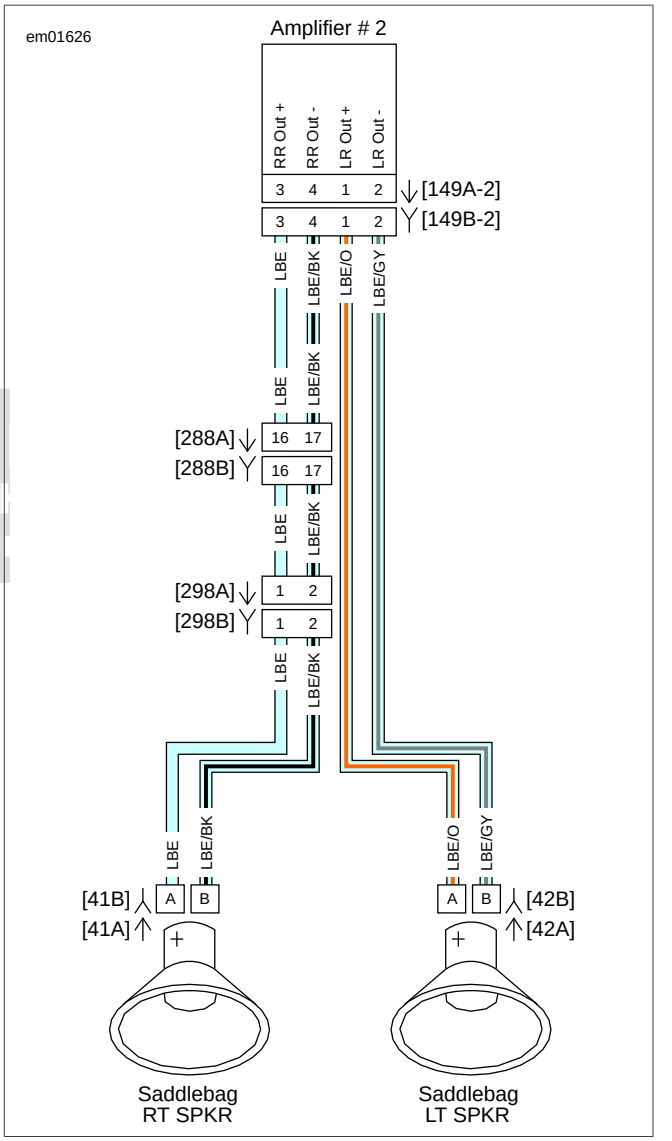


Figure 8-58. Amplifier 2: Saddlebag Speakers

DTC B1430

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-115. DTC B1430 Diagnostic Faults

POSSIBLE CAUSES
Open speaker
Open wiring circuit

1. [149-2] Terminal 1 Saddlebag Speaker Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2] and amplifier [149A-2]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect saddlebag speaker [42].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and [42B] terminal A (LBE/O).
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Repair open between [149B-2] terminal 1 and [42B] terminal A (LBE/O).

2. [149-2] Terminal 2 Saddlebag Speaker Open Test

1. Test continuity between BOB terminal 2 and [42B] terminal B (LBE/GY).
2. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair open between [149B-2] terminal 2 and [42B] terminal B (LBE/ GY).

3. Speaker Test

1. Test continuity between [42A] speaker terminals A and B.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

DTC B1431

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-116. DTC B1431 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in speaker wires

1. [149-2] Terminal 1 Saddlebag Speaker Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 1 and ground.
4. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 1 and [42B] terminal A (LBE/O).
   b. **No.** Go to Test 2.

2. [149-2] Terminal 2 Saddlebag Speaker Open Test

1. Test continuity between BOB terminal 2 and ground.
2. Is continuity present?
   a. **Yes.** Repair short to ground between [149B-1] terminal 2 and [42B] terminal B (LBE/GY).
   b. **No.** Replace amplifier.

DTC B1432

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-117. DTC B1432 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in speaker wires

1. [149-2] Terminal 1 Saddlebag Speaker Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2] and amplifier [149A-2]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.

5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test voltage between BOB terminal 1 and ground.
6. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [149B-2] terminal 1 and [42B] terminal A (LBE/O).
   b. **No.** Go to Test 2.

2. [149-2] Terminal 2 Saddlebag Speaker Voltage Test

1. Test voltage between BOB terminal 2 and ground.
2. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [149B-2] terminal 2 and [42B] terminal B (LBE/GY).
   b. **No.** Replace amplifier.

DTC B1433

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-118. DTC B1433 Diagnostic Faults

POSSIBLE CAUSES
Shorted speaker wires

1. [149-2] Terminal 1 Left Lower Fairing Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect left lower speaker [42].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 1 and 2.
5. Is continuity present?
   a. **Yes.** Repair short between [149B-1] terminals 1 and 2 and [42B] terminals A and B.
   b. **No.** Go to Test 2.

2. Speaker Test

1. Test resistance between [42A] speaker terminals A and B.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

DTC B1440

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-119. DTC B1440 Diagnostic Faults

POSSIBLE CAUSES
Open speaker
Open wiring circuit

1. [149-2] Terminal 3 Saddlebag Speaker Open Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2] and amplifier [149A-2]. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right saddlebag speaker [41].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and [41B] terminal A (LBE).
5. Is continuity present?
   a. **Yes.** Go to Test 4.
   b. **No.** Go to Test 2.

2. [298] Terminal 1 Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminal 3 and [298A] terminal 1 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [298B] terminal 1 and [41B] terminal A (LBE).
   b. **No.** Go to Test 3.

3. [288] Terminal 16 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 3 and [288A] terminal 16 (LBE).
3. Is continuity present?
   a. **Yes.** Repair open between [288B] terminal 16 and [298A] terminal 1 (LBE).
   b. **No.** Repair open between [288A] terminal 16 and [149B-2] terminal 3 (LBE).

4. [149-2] Terminal 4 Saddlebag Speaker Test

1. Test continuity between BOB terminal 4 and [41B] terminal B (LBE/BK).

2. Is continuity present?
   a. **Yes.** Go to Test 7.
   b. **No.** Go to Test 5.

5. [298] Terminal 2 Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminal 4 and [298A] terminal 2 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [298B] terminal 2 and [41B] terminal B (LBE/BK).
   b. **No.** Go to Test 6.

6. [288] Terminal 17 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 3 and [288A] terminal 17 (LBE/BK).
3. Is continuity present?
   a. **Yes.** Repair open between [288B] terminal 17 and [298A] terminal 2 (LBE/BK).
   b. **No.** Repair open between [288A] terminal 17 and [149B-2] terminal 4 (LBE/BK).

7. Speaker Test

1. Test continuity between [41A] speaker terminals A and B.
2. Is continuity present?
   a. **Yes.** Replace amplifier.
   b. **No.** Replace speaker.

DTC B1441

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-120. DTC B1441 Diagnostic Faults

POSSIBLE CAUSES
Short to ground in speaker wires

1. [149-2] Terminal 3 Saddlebag Speaker Grounded Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right saddlebag speaker [41].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [298] Terminal 1 Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to ground between [298B] terminal 1 and [41B] terminal A (LBE).

3. [288] Terminal 16 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 3 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 16 and [149B-2] terminal 3 (LBE).
   b. **No.** Repair short to ground between [288B] terminal 16 and [298A] terminal 1 (LBE).

4. [149-2] Terminal 4 Saddlebag Speaker Test

1. Test continuity between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace amplifier.

5. [298] Terminal 2 Test

1. Disconnect right saddlebag [298].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair short to ground between [298B] terminal 2 and [41B] terminal B (LBE/BK).

6. [288] Terminal 17 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminal 4 and ground.
3. Is continuity present?
   a. **Yes.** Repair short to ground between [288A] terminal 17 and [149B-2] terminal 4 (LBE/BK).
   b. **No.** Repair short to ground between [288B] terminal 17 and [298A] terminal 2 (LBE/BK).

DTC B1442

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-121. DTC B1442 Diagnostic Faults

POSSIBLE CAUSES
Short to voltage in speaker wires

1. [149-2] Terminal 3 Saddlebag Speaker Voltage Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-2] and amplifier [149A-2]. See 1.3 DIAGNOSTIC TOOLS.
3. Turn IGN ON.
4. Turn radio ON.
5. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminal 3 and ground.
6. Is battery voltage present?
   a. **Yes.** Go to Test 2.
   b. **No.** Go to Test 4.

2. [298] Terminal 1 Test

1. Turn IGN OFF.
2. Disconnect right saddlebag [298].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short to voltage between [298B] terminal 1 and [41B] terminal A (LBE).

3. [288] Terminal 16 Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test voltage between BOB terminal 3 and ground.
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [288A] terminal 16 and [149B-2] terminal 3 (LBE).
   b. **No.** Repair short to voltage between [288B] terminal 16 and [298A] terminal 1 (LBE).

4. [149-2] Terminal 4 Saddlebag Speaker Voltage Test

1. Test voltage between BOB terminal 4 and ground.
2. Is continuity present?
   a. **Yes.** Go to Test 5.
   b. **No.** Replace amplifier.

5. [298] Terminal 2 Test

1. Turn IGN OFF.
2. Disconnect right saddlebag [298].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and ground.
5. Is battery voltage present?
   a. **Yes.** Go to Test 6.
   b. **No.** Repair short to voltage between [298B] terminal 2 and [41B] terminal B (LBE/BK).

6. [288] Terminal 17 Test

1. Turn IGN OFF.
2. Disconnect left saddlebag [288].
3. Turn IGN ON.
4. Test voltage between BOB terminal 4 and ground.
5. Is battery voltage present?
   a. **Yes.** Repair short to voltage between [288A] terminal 17 and [149B-2] terminal 4 (LBE/BK).
   b. **No.** Repair short to voltage between [288B] terminal 17 and [298A] terminal 2 (LBE/BK).

DTC B1443

PART NUMBER	TOOL NAME
HD-41404	HARNESS CONNECTOR TEST KIT
HD-47918	BREAKOUT BOX

Table 8-122. DTC B1443 Diagnostic Faults

POSSIBLE CAUSES
Shorted speaker wires

1. [149-2] Saddlebag Speaker Shorted Test

1. Turn IGN OFF.
2. Connect BREAKOUT BOX (Part No. HD-47918) to wiring harness [149B-1], leaving amplifier [149A-1] disconnected. See 1.3 DIAGNOSTIC TOOLS.
3. Disconnect right saddlebag speaker [41].
4. Using HARNESS CONNECTOR TEST KIT (Part No. HD-41404), test continuity between BOB terminals 3 and 4.
5. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Go to Test 4.

2. [298] Terminal 1 Test

1. Disconnect right saddlebag [298].

2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Go to Test 3.
   b. **No.** Repair short between [298B] terminal 1 and 2 and [41B] terminal A and B.

3. [288] Terminal 16 Test

1. Disconnect left saddlebag [288].
2. Test continuity between BOB terminals 3 and 4.
3. Is continuity present?
   a. **Yes.** Repair short between [288A] terminals 16 and 17 and [149B-2] terminals 3 and 4.
   b. **No.** Repair short between [288B] terminal 16 and 17 and [298A] terminal 1 and 2.

4. Speaker Test

1. Test resistance between [41A] speaker terminals A and B.
2. Is resistance less than 2 Ohms?
   a. **Yes.** Replace speaker.
   b. **No.** Replace amplifier.

TABLE OF CONTENTS

NOTES

AUTOFUSE UNSEALED ELECTRICAL CONNECTORS A.1

AUTOFUSE UNSEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
GA500A	SNAP-ON TERMINAL PICK

General

Autofuse Unsealed connector terminals are found in ignition switches and some fuse blocks.

Disassembly

1. See Figure A-1 or Figure A-2. Insert smallest pair of pins on the SNAP-ON TERMINAL PICK (Part No. GA500A) into chamber on mating end of socket housing to press tangs on each side of terminal simultaneously.
2. Gently pull on wire to remove terminal from wire end of socket housing.
3. If necessary, crimp **new** terminals on wires.

Assembly

1. Carefully bend tang on each side of terminal outward away from terminal body. Use the thin flat blade from a hobby knife.
2. With the open side of the terminal facing rib on wire end of socket housing, insert terminal into chamber until it locks in place.

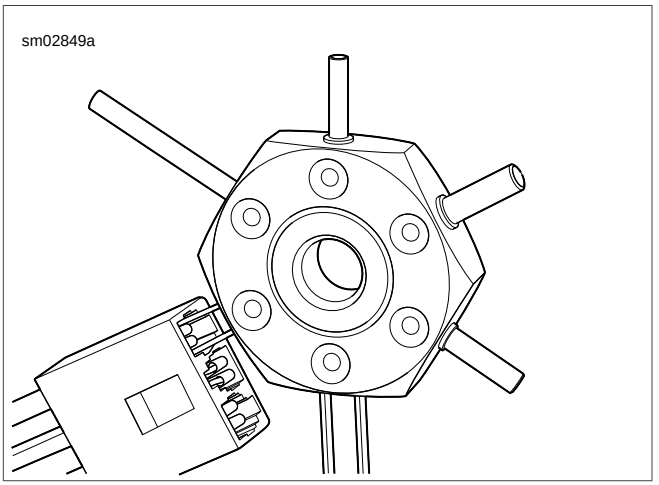


Figure A-1. Removing Autofuse Unsealed Terminal from Ignition Switch

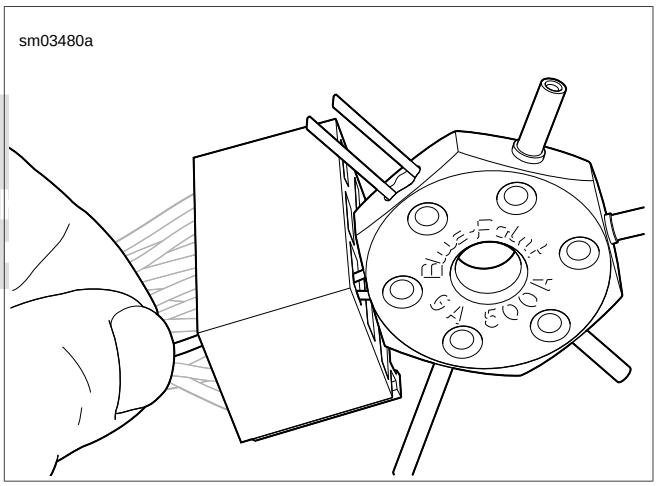


Figure A-2. Removing Autofuse Unsealed Terminal from Fuse Block

BOSCH COMPACT 1.1M CONNECTOR A.2

BOSCH COMPACT 1.1M CONNECTOR

PART NUMBER	TOOL NAME
GA500A	SNAP-ON TERMINAL PICK

General

See Figure A-3. The Bosch Compact 1.1M connector is found on MAP and TMAP sensors.

Housings

Separate: Snap back the secondary lock. Press on the latch while pulling the socket connector from the sensor.

Join: Align the sockets and press the housings together until the latch snaps. Snap in the secondary lock.

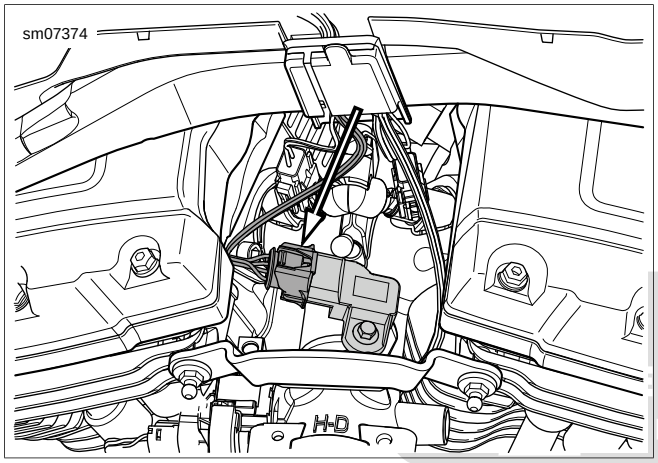


Figure A-3. Bosch Compact 1.1M Connector

Removing Socket Terminal

1. See Figure A-4. Slide the locking bar off the terminal housing.
2. Insert the smallest pins of the SNAP-ON TERMINAL PICK (Part No. GA500A) into the gaps on each side of the socket to compress the tangs on each side of the terminal.
3. Gently pull on the wire to remove the terminal.

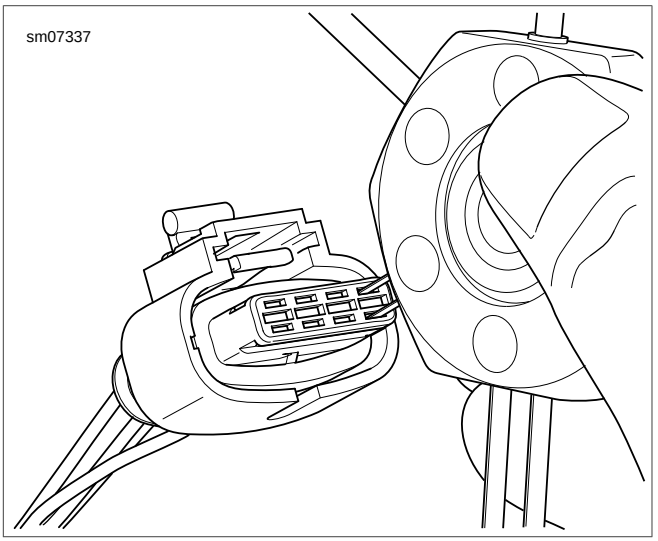


Figure A-4. Terminal Removal: Bosch Compact 1.1M Connector

Installing Socket Terminal

1. See Figure A-5. Use a hobby knife to bend the tangs on each side of the terminal outward.
2. Align terminal to socket housing. Press terminal into housing until it snaps.

NOTE

The teeth on the locking bar face down.

3. Slide the locking bar onto the connector.

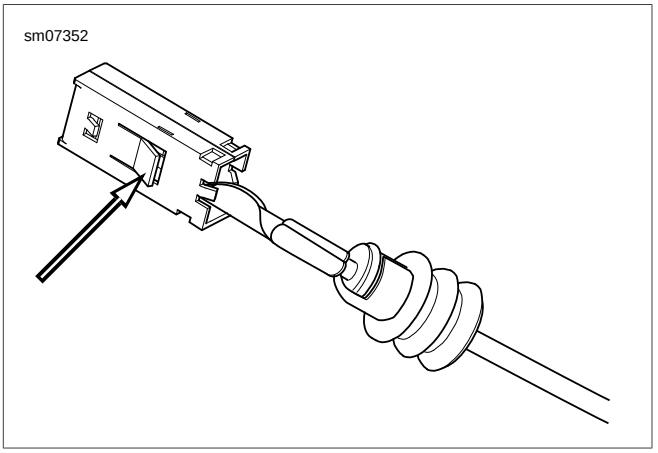


Figure A-5. Tangs: Bosch Compact 1.1M Socket Terminal

BOSCH BTC SEALED CONNECTOR A.3

BOSCH BTC SEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-50120-A	BOSCH TERMINAL REPAIR KIT

The Bosch BTC sealed connector is used to connect the ABS module to the wire harness on Touring models.

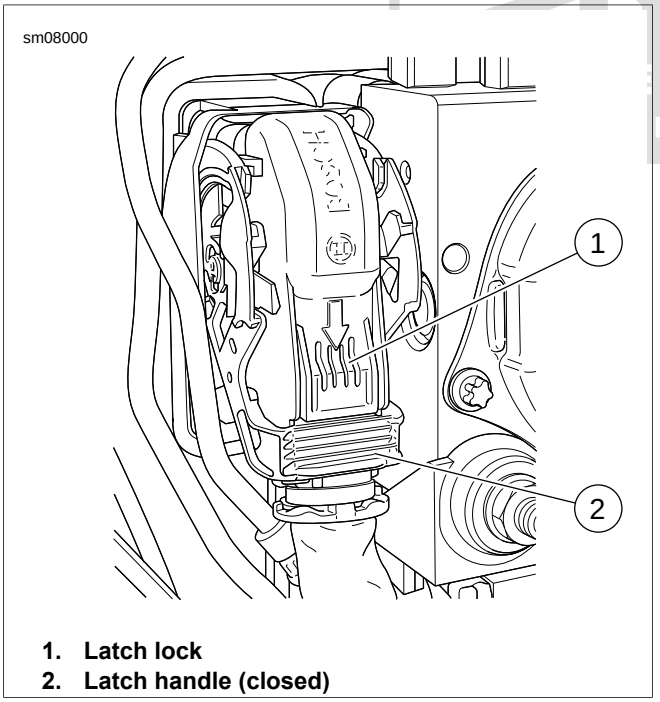
Plugging and Unplugging Connector

1. See Figure A-6. To unplug connector:
   a. While pressing latch lock (1), lift latch handle (2).
   b. See Figure A-7. Raise latch handle into the full upward (open) position (1).
   c. Pull connector straight out of socket.

NOTE

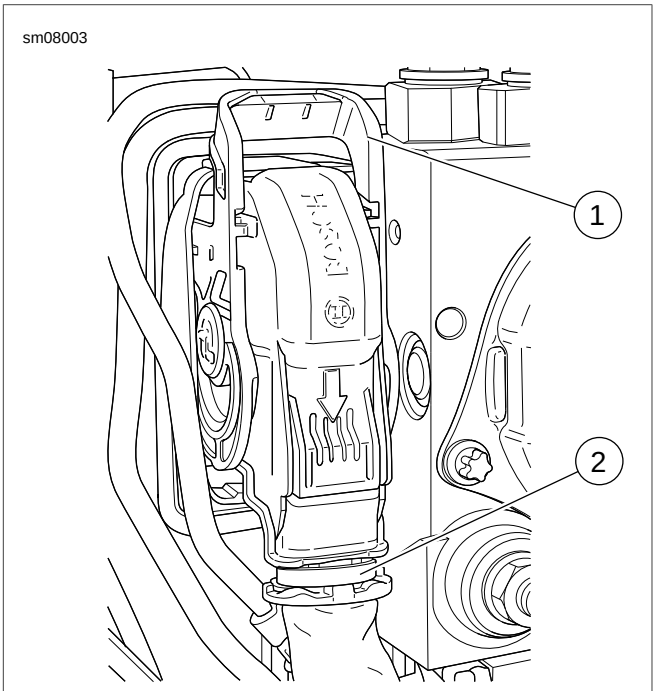
Do not attempt to close latch handle while connector is out of socket. Damage to latch mechanism could result.

2. To plug in connector:
   a. Insert connector. Press gently into socket.
   b. Pull latch handle down (closed) until it clicks.



1. **Latch lock**
2. **Latch handle (closed)**

Figure A-6. Bosch BTC Sealed Connector (Latched)



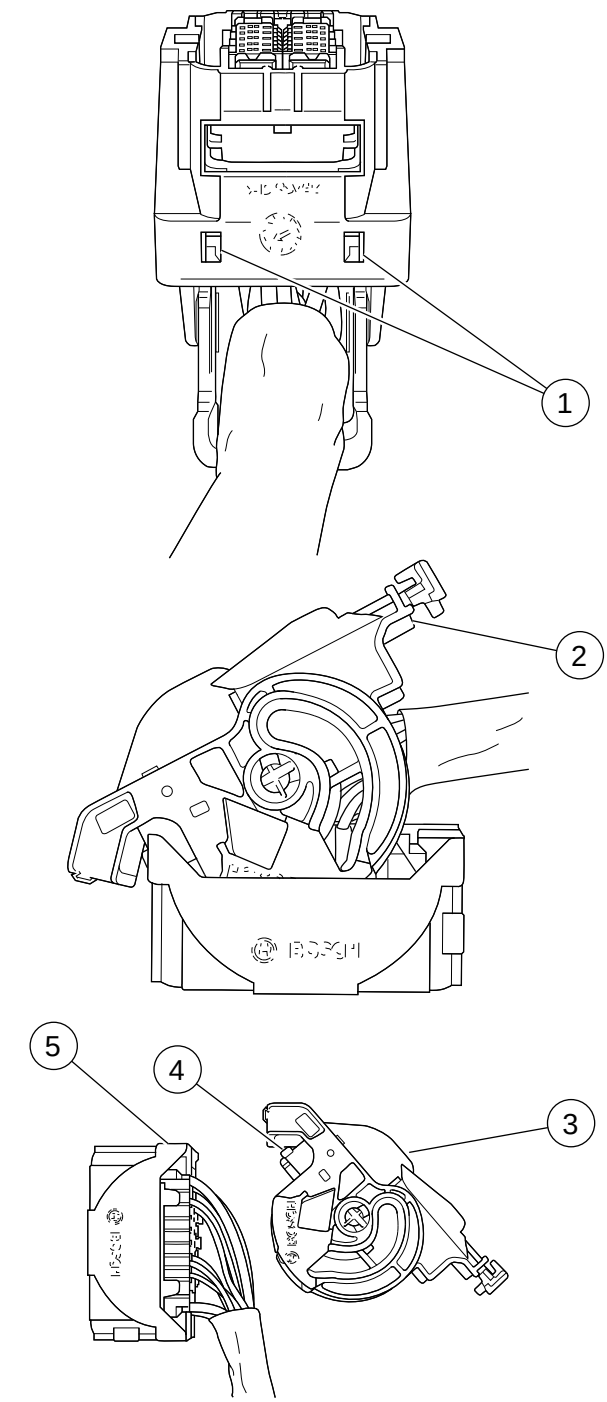
1. **Latch handle (open)**
2. **Cable strap**

Figure A-7. Bosch BTC Sealed Connector (Unlatched)

Removing and Installing Connector Cover

1. To remove connector cover:
   a. See Figure A-7. Remove and discard cable strap (2).
   b. See Figure A-8. Insert the blade of a small screwdriver into cover release latch (1) slot.
   c. Gently pry the cover away from the tab on the body of the connector. Repeat for other release latch slot.
   d. Grasp cover and pivot up (2) and away from connector.

2. To install connector cover:
   a. See Figure A-8. Start cover into connector body at an angle. Engage tabs (4) in slots (5).
   b. Rotate cover down onto body until an audible click is heard, indicating that cover is locked in place.
   c. See Figure A-7. Install **new** cable strap (2).



1. **Cover release latch slot (2)**
2. **Cover pivoted up**
3. **Cover removed**
4. **Tab**
5. **Slot**

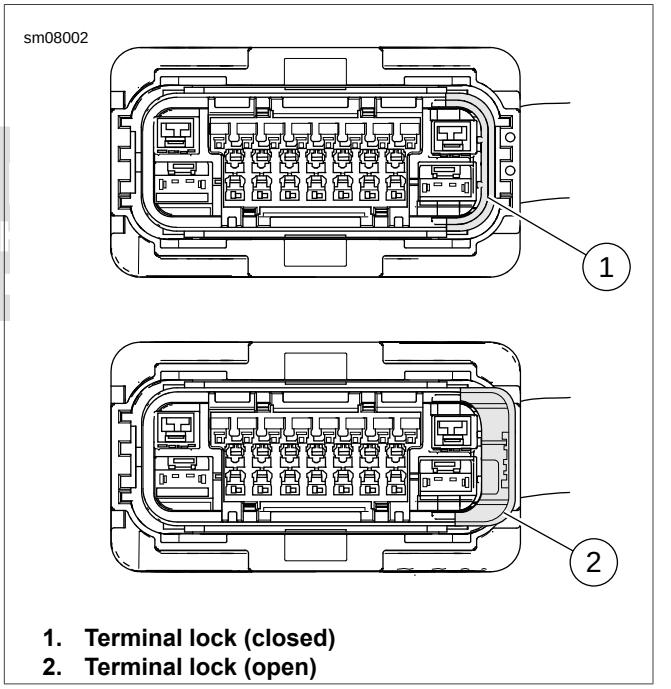
Figure A-8. Removing Bosch BTC Sealed Connector Cover

Removing and Installing Wire Terminals

NOTE

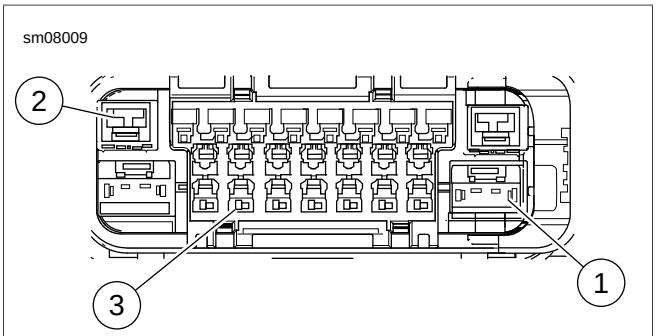
See Figure A-10. The Bosch BTC Sealed connector has three sizes of terminals: 12 gauge, 14 gauge and 20 gauge.

1. To remove terminals from connector:
   a. See Figure A-9. With the blade of a small screwdriver, gently pry the terminal lock (1) open (2).
   b. See Figure A-10. Insert TERMINAL EXTRACTOR (Part No. B-50085) into cavity next to terminal being removed. Carefully pry terminal latch back. Grasp wire and gently pull terminal from terminal cavity.
2. To install terminals in connector:
   a. Carefully insert terminal with wire lead into appropriate terminal cavity.
   b. Gently push terminal into cavity until it clicks, indicating that it is locked in place.
   c. When all terminals are in place, use the blade of a small flat screwdriver to pry the terminal lock closed (1).



1. **Terminal lock (closed)**
2. **Terminal lock (open)**

Figure A-9. Bosch BTC Sealed Connector Terminal Lock



1. **12 ga terminal cavity (2)**
2. **14 ga terminal cavity (2)**
3. **20 ga terminal cavity (22)**

Figure A-10. Bosch BTC Sealed Connector Terminals

Crimping Terminals to Leads

The BOSCH TERMINAL REPAIR KIT (Part No. HD-50120-A) contains the crimper tool, dies and all terminals necessary to repair the Bosch BTC sealed connector. For the correct terminal crimping procedure, refer to the instruction sheet provided with the tool or available through h-dnet.com.

DELPHI 100W MICRO-PACK SEALED CONNECTOR A.4

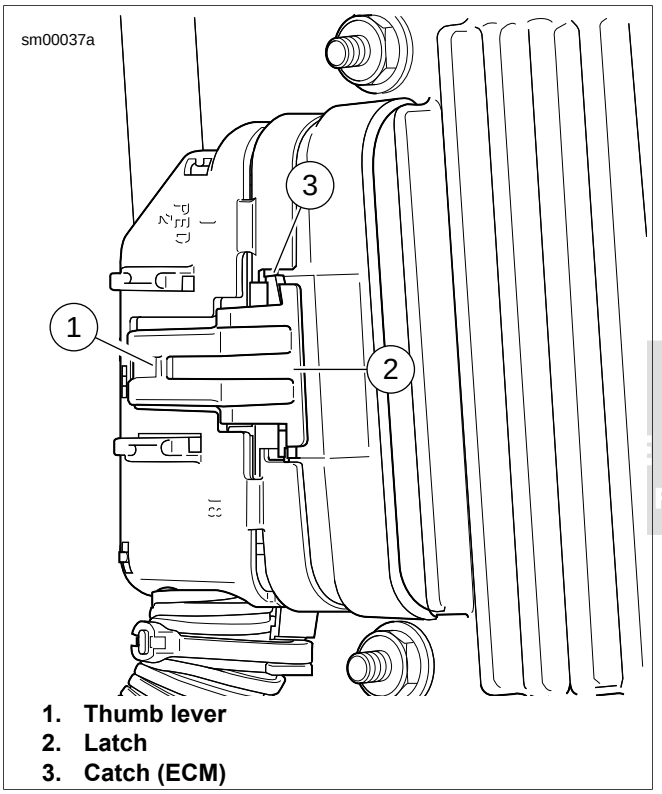
DELPHI 100W MICRO-PACK SEALED CONNECTOR REPAIR

General

A Delphi 100W Micro-Pack Sealed connector connects the electronic control module (ECM) to the main harness.

Separating Socket Housing From ECM

See Figure A-11. While pressing the connector into the ECM, press the thumb lever (1) against the connector until the latch (2) pops out of the catch (3) on the ECM.

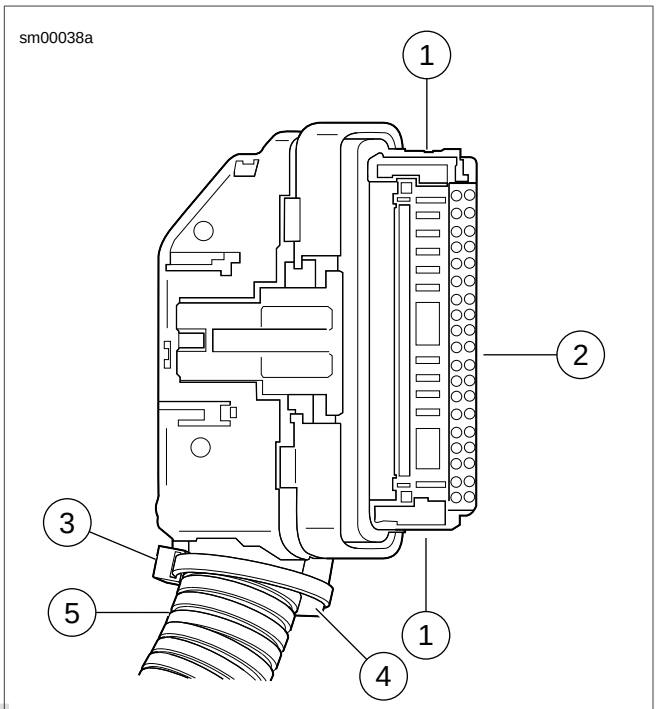


1. Thumb lever
2. Latch
3. Catch (ECM)

Figure A-11. Delphi 100W Micro-Pack Sealed Connector to ECM

Mating Socket Housing To ECM

Push the connector into the ECM until the latch is captured by the catch on the ECM.



1. Latch
2. Secondary lock
3. Cable strap
4. Strain relief collar
5. Conduit

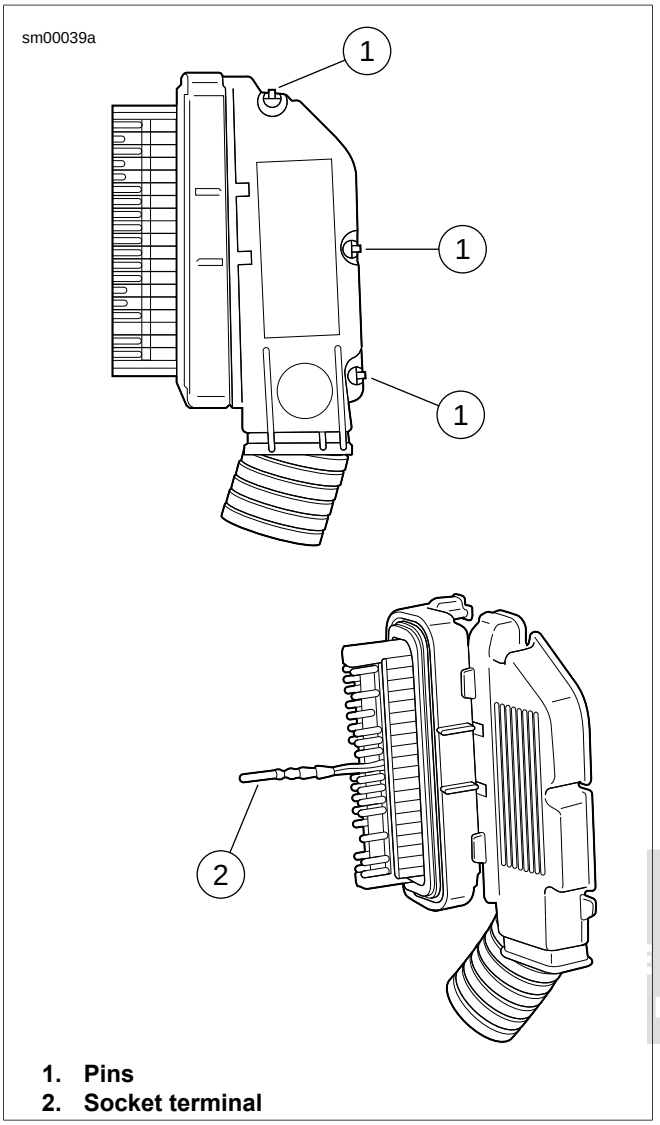
Figure A-12. Delphi 100W Micro-Pack Sealed Connector

Removing Socket Terminal

1. See Figure A-12. To remove, gently press latch (1) on each side of the clear plastic secondary lock (2). For best results, release one side at a time.
2. Carefully cut cable strap (3) to free strain relief collar (4) from conduit (5).
3. See Figure A-13. Using a thin blade, gently pry at seam at back of socket housing to release three plastic pins (1) from slots in housing. Separate and spread halves of socket housing.
4. Push on wire lead to free terminal from chamber.

Installing Socket Terminal

1. From inside socket housing, gently pull on wire to draw terminal into chamber.
2. Exercising caution to avoid pinching wires, press halves of socket housing together until three plastic pins fully engage slots in housing.
3. Install **new** cable strap in groove of strain relief collar capturing cable conduit.
4. With the two ribs on the secondary lock on the same side as the external latch, install over terminals until latches lock in place.



1. **Pins**
2. **Socket terminal**

Figure A-13. Delphi 100W Micro-Pack Sealed Connector: Separate Halves of Socket Housing

CRIMPING TERMINALS

PART NUMBER	TOOL NAME
HD-50120	UNIVERSAL CRIMPER SET
HD-50120-2	HAND CRIMP FRAME
HD-50120-7	TYCO AND DELPHI TERMINAL CRIMP DIE

1. Strip the wire insulation to specification. Refer to Table A-1.
2. Install the TYCO AND DELPHI TERMINAL CRIMP DIE (Part No. HD-50120-7) in the handle of the HAND CRIMP FRAME (Part No. HD-50120-2) of the UNIVERSAL CRIMPER SET (Part No. HD-50120).
3. Place the **new** terminal in the specified nest.
4. Insert the wire to the wire stop. Crimp the terminal.
5. Inspect the crimped terminal.

Table A-1. Delphi 100W Micro-Pack Crimper Die (Part No. HD-50120-7)

TERMINAL	PART NO.	STRIP LENGTH		NEST
		in	mm	
Socket: 18 AWG	72076-00	0.200	5.1	B
Socket: 20-22 AWG	72568-08	0.200	5.1	C

DELPHI 150 METRI-PACK SEALED CONNECTORS A.5

DELPHI 150 METRI-PACK SEALED CONNECTOR REPAIR

General

Delphi 150 Metri-Pack Sealed connectors are embossed with the initials (P.E.D.).

There are two types of connectors in this series:

- Pull-to-Seat
- Push-to-Seat

Separating Pin and Socket Housings

Bend back the external latch slightly and separate the pin and socket halves of the connector.

Mating Pin and Socket Housings

Align the wire colors. Push the pin and socket halves of the connector together.

Removing Socket Terminal

1. See Figure A-14 for pull-to-seat connector or Figure A-15 for push to seat connector. Remove wire lock (1) from wire end of socket housing on push-to-seat type connectors.

NOTE

For best results, free one side of wire lock first and then release the other side.

2. Find the locking tang in the mating end of the connector.

NOTE

The tangs are always positioned in the middle of the chamber. The tangs are on the same side as the external latch.

3. Gently insert a small diameter straight pin into the chamber about 1/8 in (3.2 mm).
   a. **For pull-to-seat:** Stay between the terminal and the chamber wall and pivot the end of the pin toward the terminal body.
   b. **For push-to-seat:** There is a small opening for the pin.
4. When a click is heard, remove the pin and repeat the procedure.

NOTE

The click is the sound of the tang returning to the locked position as it slips from the point of the pin.

5. Pick at the tang until the clicking stops and the pin seems to slide in deeper. This indicates the tang is pressed in.

NOTE

After repeated terminal extractions, the click may not be heard, but pivot the pin as if the click was heard at least three times.

6. Remove the pin.
   a. **For pull-to-seat:** Push on the lead to extract the terminal from the mating end of the connector.
   b. **For push-to-seat:** Pull on the lead to draw the terminal out the wire end.

Inserting Socket Terminal

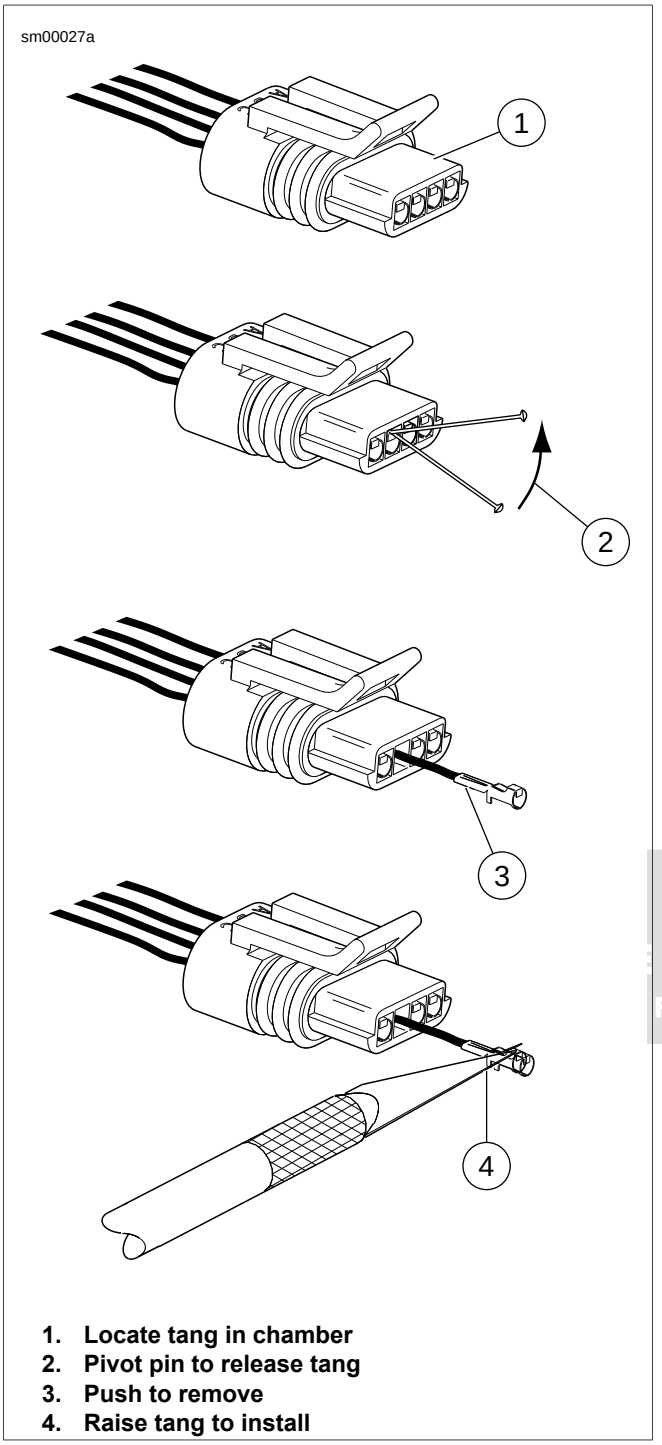
NOTE

For wire location purposes, alpha characters are stamped into the socket housings.

1. See Figure A-14 for pull-to-seat connector or Figure A-15 for push to seat connector. Carefully bend tang on each side of terminal outward away from terminal body. Use the thin flat blade from a hobby knife.
2. Gently pull or push on the lead to install the terminal back into the chamber. A click is heard when the terminal is properly seated.
3. Gently pull or push on the lead to verify that the terminal is locked in place.

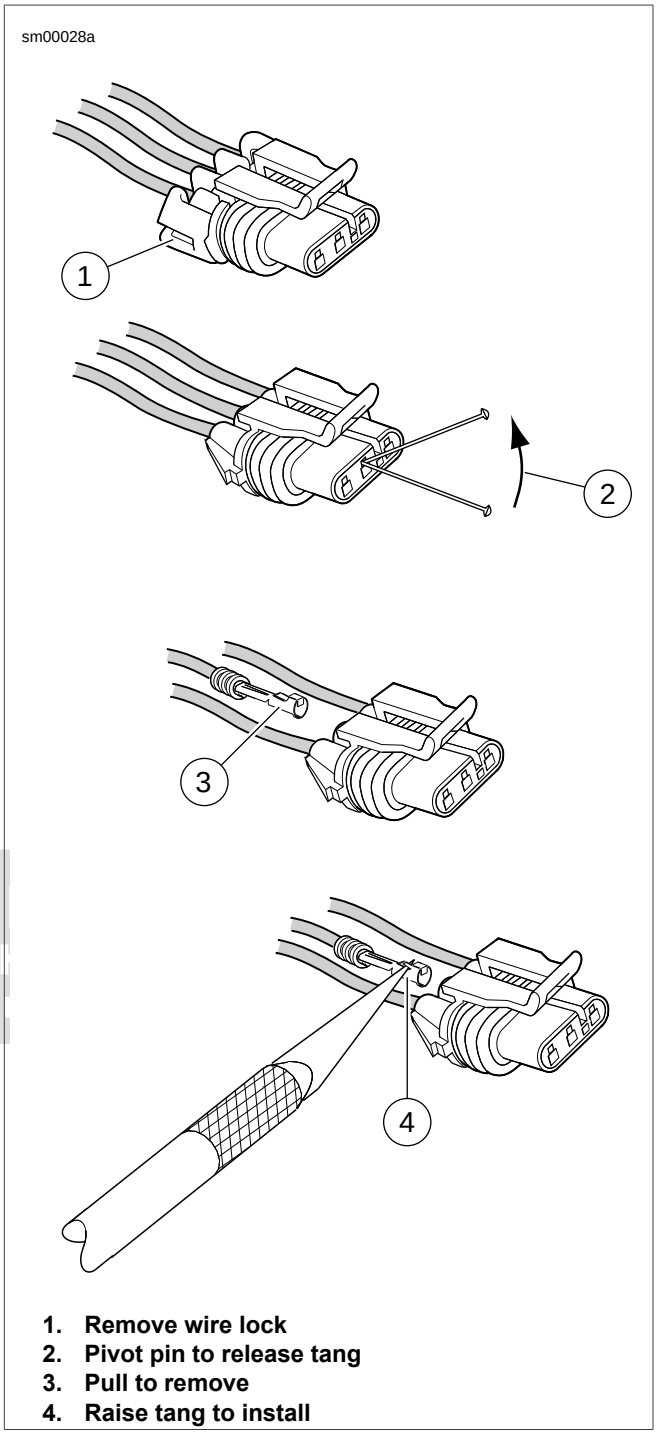
NOTE

For push-to-seat: *See Figure A-15. Seat wires in separate channels of wire lock and then push channels* ***inside*** *chambers at wire end of socket housing. Fully installed, slot on each side of wire lock engages ear on socket housing.*



1. Locate tang in chamber
2. Pivot pin to release tang
3. Push to remove
4. Raise tang to install

Figure A-14. Delphi 150 Metri-Pack Sealed Connector: Pull-to-Seat



1. Remove wire lock
2. Pivot pin to release tang
3. Pull to remove
4. Raise tang to install

Figure A-15. Delphi 150 Metri-Pack Sealed Connector: Push-to-Seat

DELPHI 280 METRI-PACK UNSEALED CONNECTORS A.6

FUSE BLOCK REPAIR

Removing Socket Terminals

1. See Figure A-16. To remove secondary locks, insert end of small flat blade screwdriver (1) under lip of locking wedge (2) and gently pry up secondary lock.

NOTE

For best results, start with locking wedge on outboard side of secondary lock.

2. Looking into chamber at top of fuse block, note the tang next to each socket terminal.
3. Use the thin flat blade from a hobby knife. Gently push tang away from terminal and tug on wire to back terminal out.

Installing Socket Terminals

1. Match the wire lead color to the fuse block terminal cavity.

NOTES

- *Refer to the main harness wiring diagram for wire lead color codes.*
- *See Figure A-17. Alpha (1) and numeric (2) coordinates identify the main fuse block terminal cavity. Refer to the main harness wiring diagram.*

2. With the open side of the socket terminal facing the tang, push lead into chamber at the wire end of the fuse block. A click is heard when the terminal is properly engaged.
3. Gently tug on wire ends to verify that all terminals are locked.
4. Install the secondary locks. With the locking wedges positioned above the tangs in each chamber, slide flat side of secondary lock into slot between rows. Push down until it bottoms.

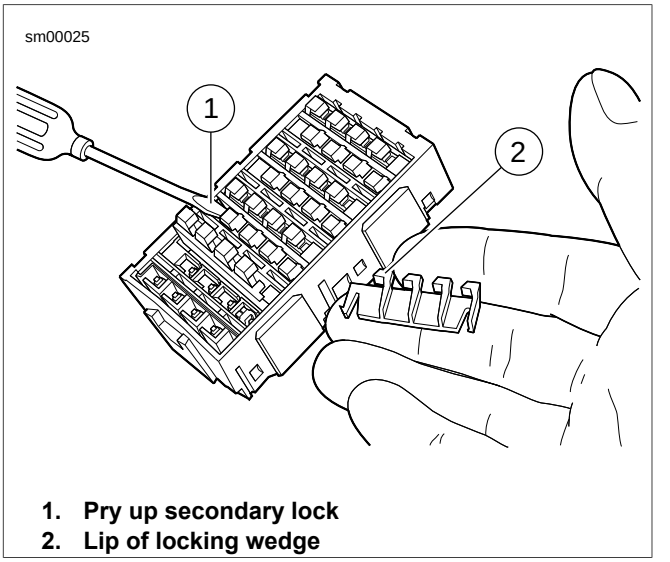
Crimping Terminals

Terminals are crimped twice: once over the wire core and a second time over the insulation/seal.

A correctly crimped terminal can require different crimping dies found on separate crimpers.

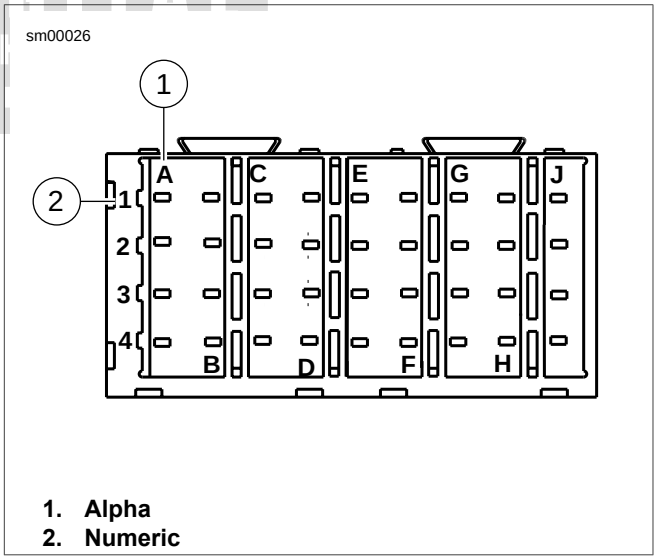
NOTE

The wiring diagram indicates when one socket terminal is being crimped to two wire leads.



1. **Pry up secondary lock**
2. **Lip of locking wedge**

Figure A-16. Fuse Block: Remove Secondary Locks



1. **Alpha**
2. **Numeric**

Figure A-17. Fuse Block: Coordinates (typical)

DELPHI 480 METRI-PACK UNSEALED CONNECTORS A.7

DELPHI 480 METRI-PACK UNSEALED CONNECTOR REPAIR

General

A 480 Metri-Pack connector is frequently used for the B+ (battery voltage) connector to power P&A accessories.

See Figure A-18. An AFL housing (5) is used on many ignition/light switches. The secondary lock (4) must be opened before removing the terminal from the housing.

Separating Pin and Socket Housings

NOTES

- *Record position of cable straps anchoring wire conduits of the pin and socket housing before removing them.*
- *Cut any cable strap anchoring the wire conduits of the pin (accessory connector housing) and the socket (B+) housing.*

See Figure A-18. Using small flat blade screwdriver, press button (1) on pin housing (red wire) side of the connector and pull apart the pin and socket housings.

Mating Pin and Socket Housings

Orient the latch on the socket housing to the button catch on the pin housing and press the housings together.

Removing Socket Terminals

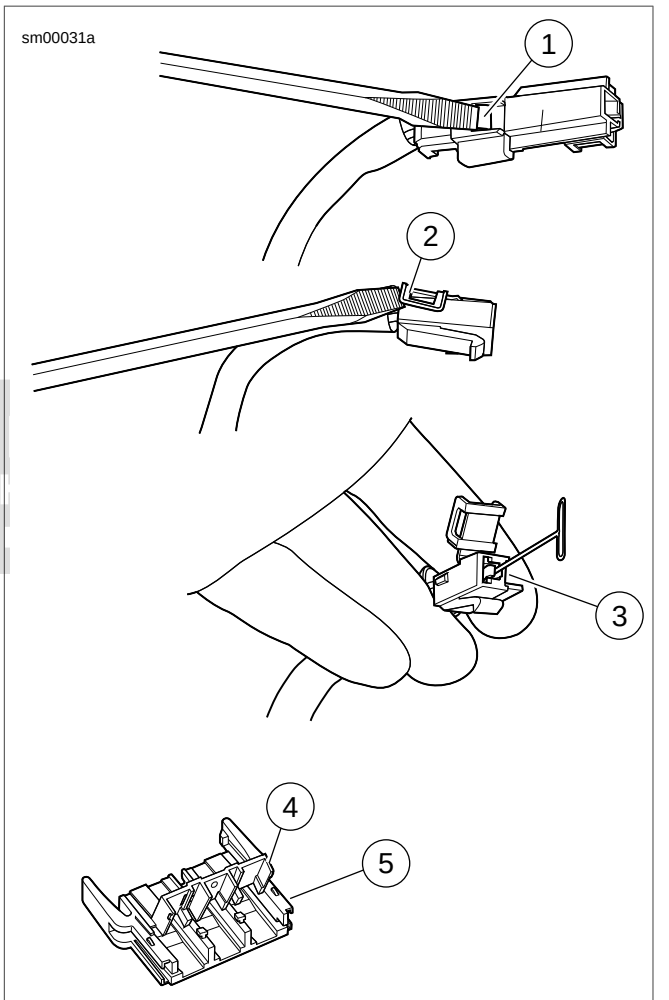
1. See Figure A-18. Bend back the latch (2) slightly and free one side of secondary lock, then repeat to release the opposite side. Rotate the secondary lock outward on hinge to access terminal in chamber of connector housing.
2. On the mating end of the connector, note the tang in the square shaped opening centered next to the terminal. Gently insert the point of a stick pin or large safety pin into the opening (3) between the tang and the chamber wall until it stops.
3. Pivot the end of the pin toward the terminal body to press the tang.
4. Remove the pin and then pull terminal out of the wire end of connector housing.
5. If necessary, crimp **new** terminals on wires. See A.10 DELPHI METRI-PACK TERMINAL REPAIR.

Installing Socket Terminals

1. Carefully bend the tang outward away from the terminal body.
2. With the tang on the same side as the square shaped opening in the mating end of the connector housing, feed terminal into wire end of connector housing until it clicks in place.
3. Verify that terminal will not back out of the chamber. A slight tug on the cable will confirm that it is locked.
4. Rotate the hinged secondary lock inward until latches fully engage tabs on both sides of connector housing.

NOTE

*If removed, install **new** anchored cable strap in original equipment location. Tighten cable strap to capture conduit of both accessory connector and B+ connector approximately 1.0 in (25.4 mm) from housings.*



1. **Button on pin housing**
2. **Secondary lock latch**
3. **Opening between tang and chamber wall**
4. **Secondary lock (shown open)**
5. **AFL housing**

Figure A-18. Delphi 480 Metri-Pack Unsealed Connector: Remove Socket Terminal

DELPHI 630 METRI-PACK UNSEALED CONNECTORS A.8

DELPHI 630 METRI-PACK UNSEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
TT600-3	SNAP-ON PICK

Separating Pin and Socket Housings

NOTE

If necessary, remove connector from barbed anchor or other retaining device.

Bend back the external latch slightly and separate pin and socket halves of the connector.

Mating Pin and Socket Housings

Orient the latch to the catch. Push the pin and socket halves of the connector together until the latch "clicks".

NOTE

If removed, install connector on barbed anchor or other OE retaining device.

Removing Socket Terminal

1. Bend back the latch slightly and free one side of the secondary lock. Repeat the step to unlatch the other side.
2. Rotate the secondary lock outward on hinge to view the terminals in the chambers of the connector housing. The locking tang is on the side opposite the crimp tails. It engages a rib in the chamber wall to lock the terminal in place.
3. Moving to the mating end of the connector, find the small opening on the chamber wall side of each terminal.
4. Insert SNAP-ON PICK (Part No. TT600-3) into opening until it stops. Pivot the end of the pick toward the terminal to press the locking tang.
5. Remove the pick and gently tug on the wire to pull the terminal from the wire end of the connector. Repeat steps if the terminal is still locked in place.
6. If necessary, crimp **new** terminals on wires. See A.10 DELPHI METRI-PACK TERMINAL REPAIR.

Installing Socket Terminal

NOTE

Refer to the wiring diagrams to match wire lead colors to alpha characters molded into the secondary locks of each connector housing.

1. Carefully bend tang on each side of terminal outward away from terminal body. Use the thin flat blade from a hobby knife.
2. With the tang facing the chamber wall, push the lead into the chamber at the wire end of the connector. A click is heard when the terminal is properly seated.
3. Gently tug on wire ends to verify that all terminals are locked.
4. Rotate the hinged secondary lock inward until tabs fully engage latches on both sides of connector.

DELPHI 800 METRI-PACK SEALED MAIN FUSE HOUSING A.9

DELPHI 800 METRI-PACK SEALED MAIN FUSE HOUSING REPAIR

Removing Socket Terminals

⚠WARNING

Disconnect negative (-) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00049a)

1. Disconnect battery.
2. See Figure A-19. Disengage slots (1) on secondary lock (2) from tabs (3) and remove secondary lock.
3. Insert flat blade of pick or small screwdriver into opening (4) until it stops.
4. Tug on cable to pull socket from connector housing. Pivot the pick toward the terminal body to release the latch if necessary.
5. Repeat to remove remaining socket terminal.

NOTE

The battery positive cable and power wire for the main fuse are crimped together at the starter ring terminal. Replace both as an assembly if either requires replacement.

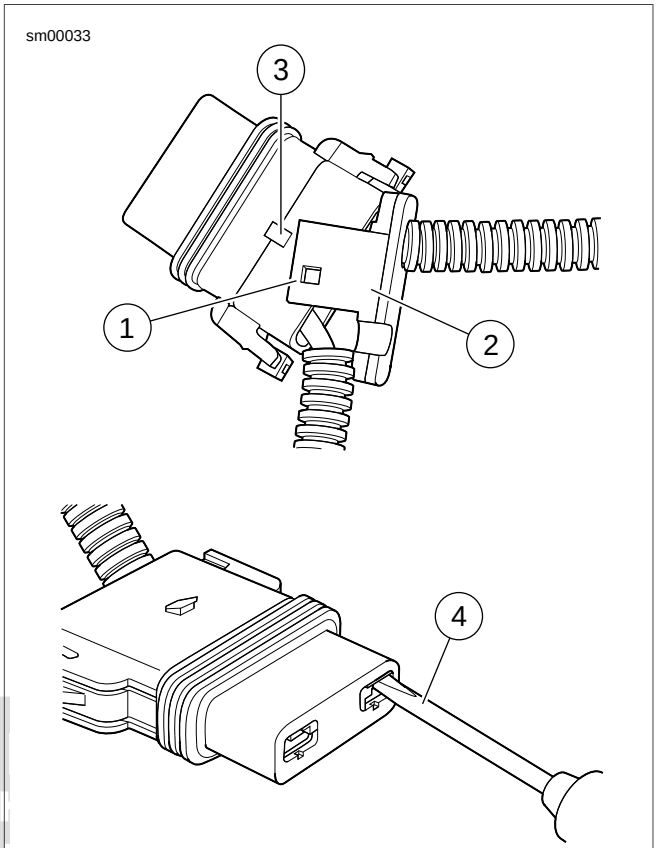
Installing Socket Terminals

1. See Figure A-20. Carefully bend tang outward away from the terminal body.
2. Properly orient terminal to the cavity in the housing. Push terminal into connector housing until it clicks in place. Verify that socket will not back out of chamber.
3. Push rubber seal into connector housing.
4. Repeat to install remaining socket terminal.
5. Install secondary lock onto connector housing. Verify slots engage tabs on sides of connector housing.

⚠WARNING

Connect positive (+) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00068a)

6. Connect battery cables.



1. **Secondary lock slot**
2. **Secondary lock**
3. **Tab**
4. **Insert flat blade into opening**

Figure A-19. Delphi 800 Metri-Pack Sealed Main Fuse Housing: Remove Socket Terminals

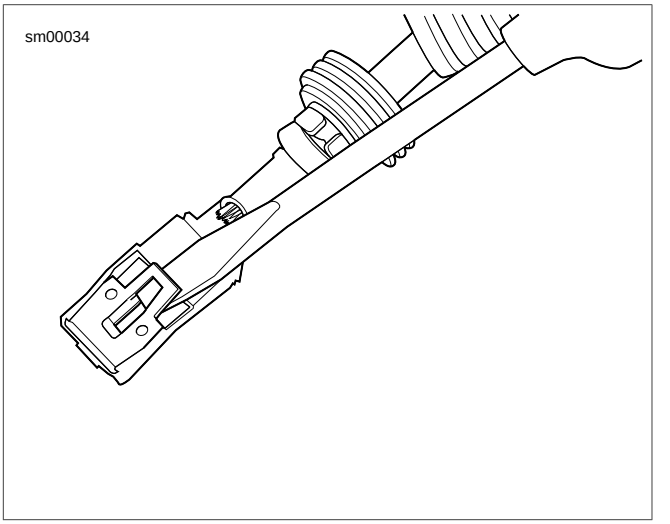


Figure A-20. Delphi 800 Metri-Pack Sealed Main Fuse Housing: Bend Tang

DELPHI METRI-PACK TERMINAL REPAIR A.10

METRI-PACK TERMINAL CRIMPS

PART NUMBER	TOOL NAME
HD-38125-6	PACKARD TERMINAL CRIMPER
HD-38125-7	PACKARD TERMINAL CRIMPER
HD-38125-8	PACKARD TERMINAL CRIMPER

Matching Terminal To Crimper

Metri-Pack connectors embossed with the initials P.E.D. require Packard crimp tools to crimp terminals to wire leads.

Terminals are crimped twice to a wire lead: once over the wire core and a second time over the insulation/seal.

See Figure A-21. A crimp can require two crimping dies. The dies are found on the PACKARD TERMINAL CRIMPER (Part No. HD-38125-6) and the PACKARD TERMINAL CRIMPER (Part No. HD-38125-7). The terminal and the wire gauge determine the core crimp die and the insulator/seal die.

NOTE

The PACKARD TERMINAL CRIMPER (Part No. HD-38125-8) also crimps sealed splice connectors in wire gauge sizes 18-20, 14-16 and 10-12.

Preparing Wire Lead

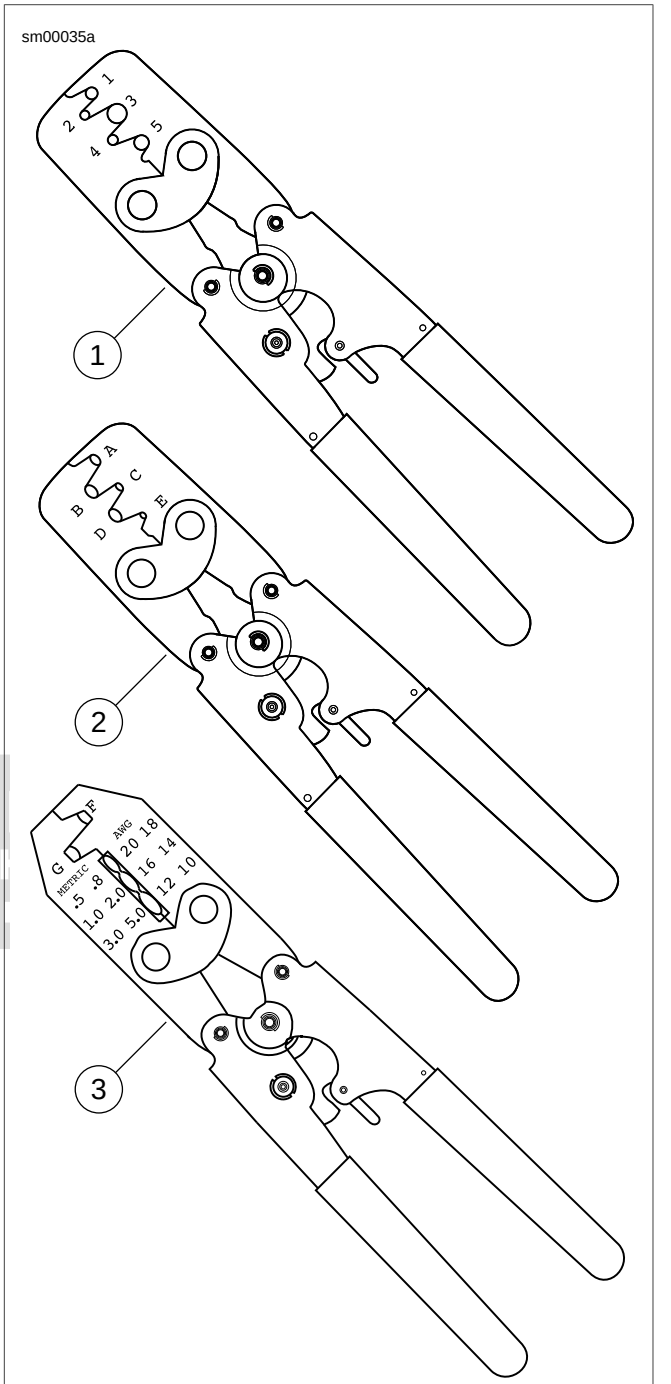
Strip 5/32 in (4.0 mm) of insulation from the wire lead.

Crimping Wire Core

NOTE

Metri-Pack terminal crimps require two steps. Always perform ***Crimping Wire Core*** *before* ***Crimping Insulation/Seal****.*

1. Squeeze and release handles until ratchet automatically opens.
2. Identify the corresponding sized nest for the core crimp.
3. Position the core crimp in the die. Make sure that the core crimp tails are facing the forming jaws.
4. Gently squeeze the handles only until crimpers secure the core crimp tails.
5. Insert stripped wire between crimp tails. Verify that wire is positioned so that short pair of crimp tails squeezes core wire strands, while long pair is positioned over the insulation or seal material.
6. Squeeze handles tightly closed. Release grip and the tool automatically opens.



1. **HD-38125-6 sealed terminals**
2. **HD-38125-7 non-sealed terminals**
3. **HD-38125-8 non-sealed terminals**

Figure A-21. Metri-Pack Terminal Crimp Tools

Crimping Insulation/Seal

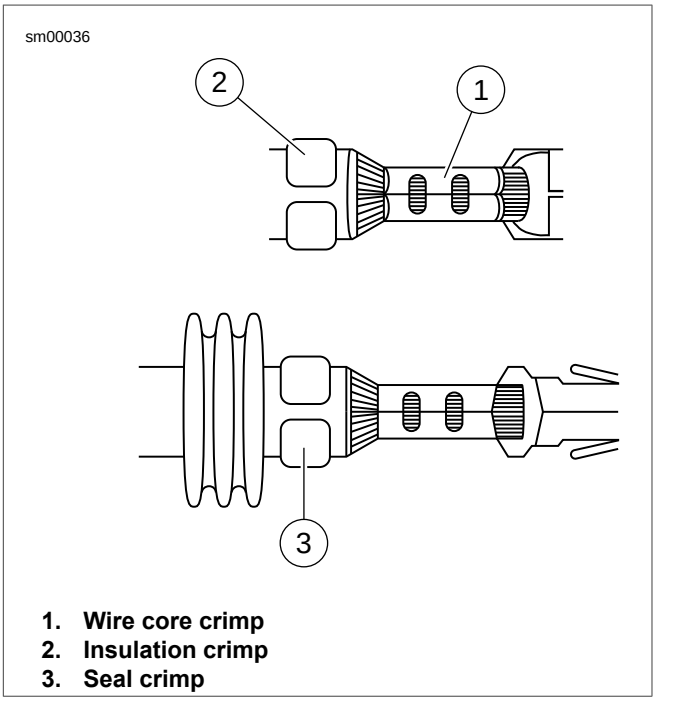
NOTE

Always perform ***Crimping Wire Core*** *before* ***Crimping Insulation/Seal****.*

1. See Figure A-22. Identify the correct die for the insulation/seal crimp (2).
2. Position the insulation/seal crimp in the nest. Make sure that the core crimp tails are facing the forming jaws.
3. Squeeze handle of crimp tool until tightly closed. Tool automatically opens when the crimp is complete.

Inspecting Crimps

1. See Figure A-22. Inspect the wire core crimp (1). Make sure that the tails are folded in on the wire core without any distortion or excess wire strands.
2. Inspect the insulation (2) or seal (3) crimp. Make sure that the tails of the terminal are wrapped around the insulation without distortion.



1. **Wire core crimp**
2. **Insulation crimp**
3. **Seal crimp**

Figure A-22. Metri-Pack Connector: Inspect Core and Insulation/Seal Crimps

DELPHI MICRO 64 SEALED CONNECTORS A.11

DELPHI MICRO 64 SEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
HD-45928	TERMINAL REMOVER
HD-45929	TERMINAL CRIMPER

General

Delphi Micro 64 Sealed connectors are frequently found on speedometers, tachometers and the ECM of Touring Models.

Separating Pin and Socket Housings

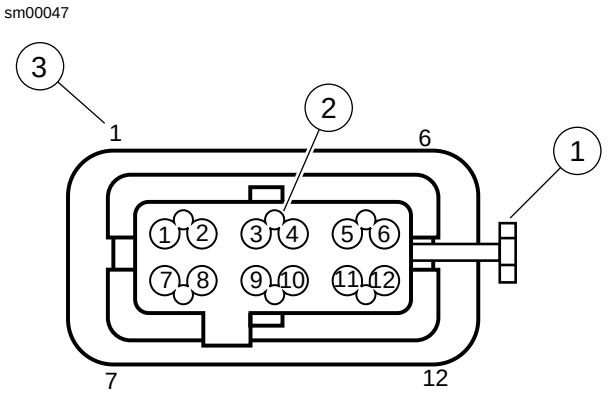
Bend back the external latches slightly and separate the pin and socket housings.

Mating Pin and Socket Housings

Orient the wire lead colors. Align pin and socket housings. Push the pin and socket housings of the connector together until the latches click.

Removing Terminal

1. See Figure A-23. Locate the head of the secondary lock (1) on one side of the connector housing.
2. Insert the blade of a small screwdriver between the center ear of the lock and the connector housing and gently pry out lock. When partially removed, pull lock from connector housing.
3. Locate pin hole (2) between terminals on mating end of connector.



1. **Secondary lock**
2. **Pin hole**
3. **Stamped number**

Figure A-23. Delphi Micro-64 Sealed Connector: Housing

4. See Figure A-24. Obtain the TERMINAL REMOVER (Part No. HD-45928).
5. See Figure A-25. Push the adjacent terminals all the way into the connector housing and then insert tool into hole until it bottoms.
6. Leaving the tool installed, gently tug on wires to pull either one or both terminals from wire end of connector. Remove tool.

Figure A-24. Terminal Remover (HD-45928)

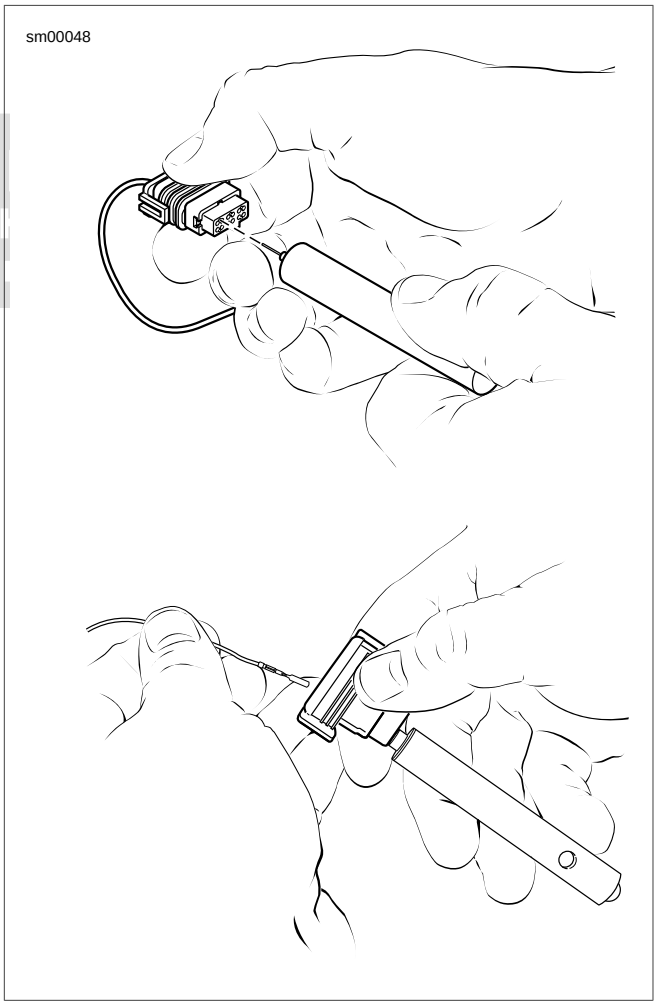


Figure A-25. Delphi Micro-64 Sealed Connector: Insert Tool and Remove Terminal

Installing Terminal

1. Insert terminal into its respective numbered chamber on wire end of connector. No special orientation of the terminal is necessary.

NOTE

See Figure A-23. For wire location purposes, the corners of the socket housing are stamped (3) with the numbers 1, 6, 7 and 12, representing terminals 1-6 on one side, and 7-12 on the other.

2. Bottom the terminal in the chamber and then gently tug on the wire to verify that it is locked in place.

NOTE

Once removed, the terminal may not lock in place when first installed. Until the lock engages, move the terminal back and forth slightly while wiggling the lead.

3. Since the terminal remover tool releases two terminals simultaneously, repeat step 2 on the adjacent terminal even if it was not pulled from the connector housing.

4. With the center ear on the head of the secondary lockpin facing the mating end of the connector, push secondary lock in until head is flush with the connector housing.

Preparing Wire Leads for Crimping

Strip 1/8 in (3.0 mm) of insulation from the wire lead.

Crimping Terminals

1. Inspect **new** socket terminal for bent or deformed contact and crimp tails. Replace as necessary.

2. See Figure A-27. Squeeze the handles of the TERMINAL CRIMPER (Part No. HD-45929) to cycle the tool to the fully open position (1).

3. Raise locking bar and barrel holder by pushing up on bottom tab with index finger (2).

4. With the crimp tails facing upward, insert terminal through locking bar into front hole in barrel holder (20-22 gauge wire) (3).

5. Release locking bar to lock position of contact. When correctly positioned, the locking bar fits snugly in the space at the front of the core crimp tails and the closed side of the terminal rests on the outer nest of the crimp tool.

6. Insert wires between crimp tails until ends make contact with locking bar. Position wire that the wide pair of crimp tails squeeze bare wire strands, while the narrow pair folds over the insulation material.

7. Squeeze handle of crimp tool until tightly closed (4). Tool automatically opens when the crimping sequence is complete.

8. Raise locking bar and barrel holder to remove contact.

Inspecting Crimps

Inspect the quality of the core and insulation crimps. Distortion should be minimal.

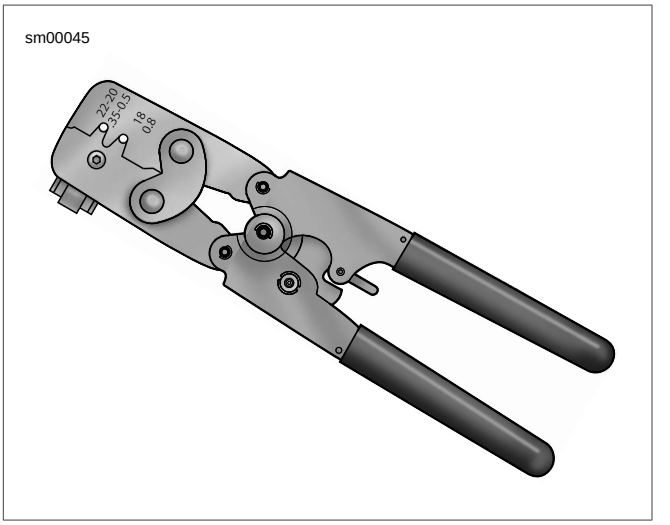
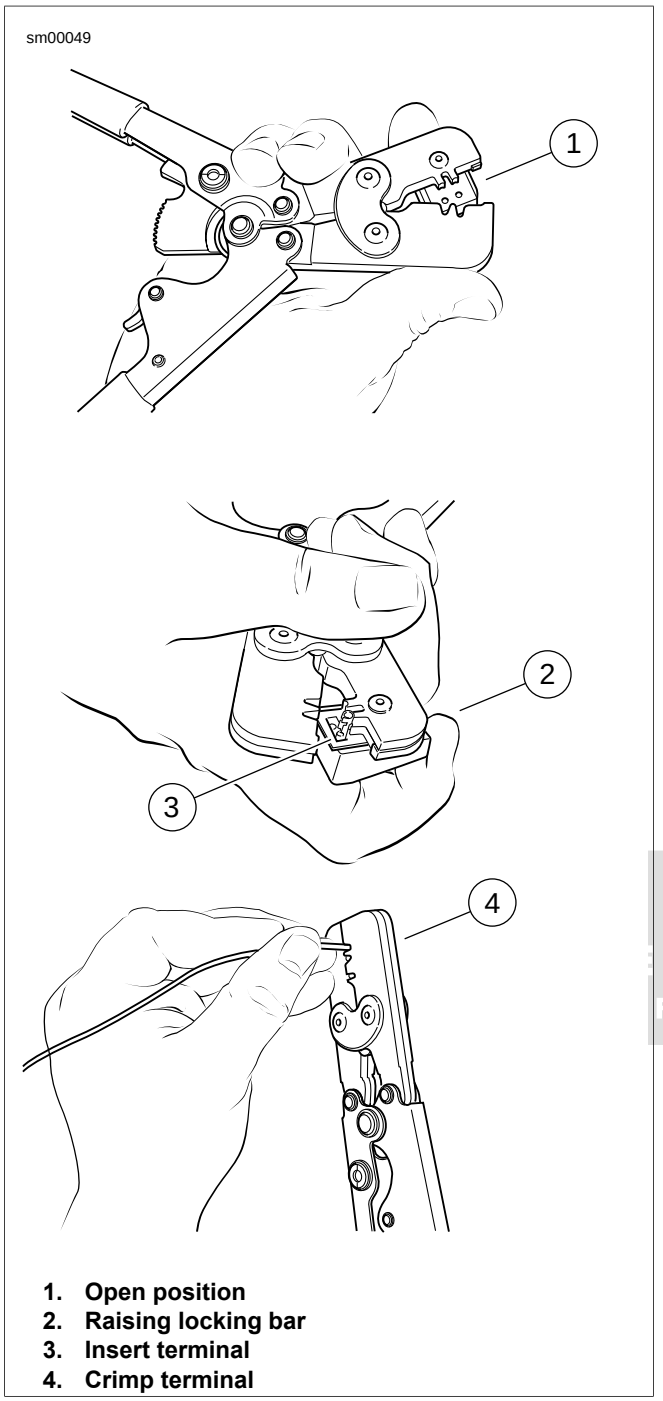


Figure A-26. Terminal Crimper (HD-45929)



1. Open position
2. Raising locking bar
3. Insert terminal
4. Crimp terminal

Figure A-27. Delphi Micro-64 Sealed Connector: Terminal in Crimper

DELPHI GT 150 SEALED CONNECTORS A.12

DELPHI GT 150 SEALED CONNECTOR REPAIR

General

Delphi connectors are embossed with the brand name, Delphi, on the housing latch or terminal block.

Separating Pin and Socket Housings

See Figure A-28. Bend back the external latch(es) slightly and separate pin and socket halves of the connector.

Mating Pin and Socket Housings

Push pin and socket halves of connector together until external latch(es) engage.

Removing Socket Terminals

NOTE

Although the parts of the different Delphi connectors vary in appearance, these instructions are universal.

1. See Figure A-29. If present, free one side of wire lock (1) from ear on wire end of socket housing. Release the other side if necessary. Release wires from channels in wire lock. Remove appropriate terminals from housing.
2. Use a fingernail to pry colored terminal lock (2) loose. Remove from mating end of socket housing.
3. Use the thin flat blade from a hobby knife. Gently pry tang (3) outward away from terminal. Tug on wire to back terminal out wire end of chamber. Do not pull on wire until tang is released or terminal will be difficult to remove.

Installing Socket Terminals

NOTE

For wire location purposes, alpha or numeric characters are stamped into the wire end of each socket housing.

1. Gently push tang on socket housing inward toward chamber. With the open side of the terminal facing the tang, push terminal into chamber at wire end of socket housing.
2. Gently tug on wire to verify that terminal is locked, preventing it from backing out of chamber. If necessary, use fingernail to push tang into engagement with terminal.
3. Install colored terminal lock onto mating end of socket housing.
4. If present, seat wires in separate channels of wire lock and then push channels **inside** chambers at wire end of socket housing. Fully installed, slot on each side of wire lock engages ear on socket housing.

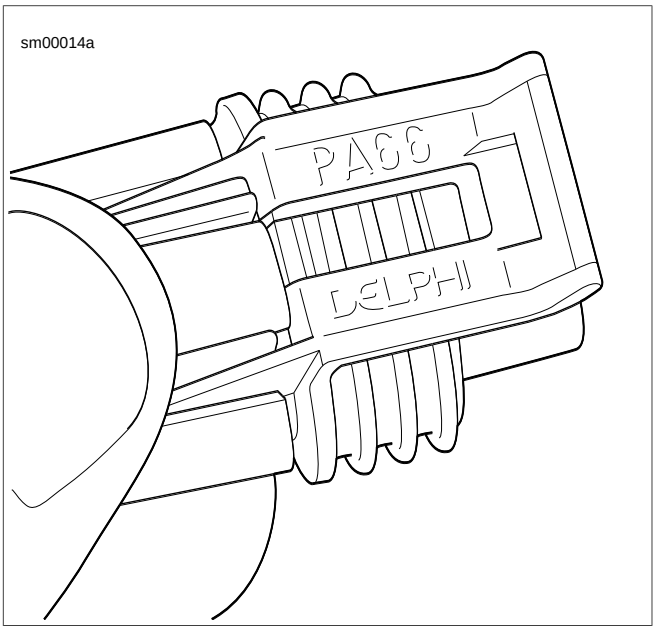
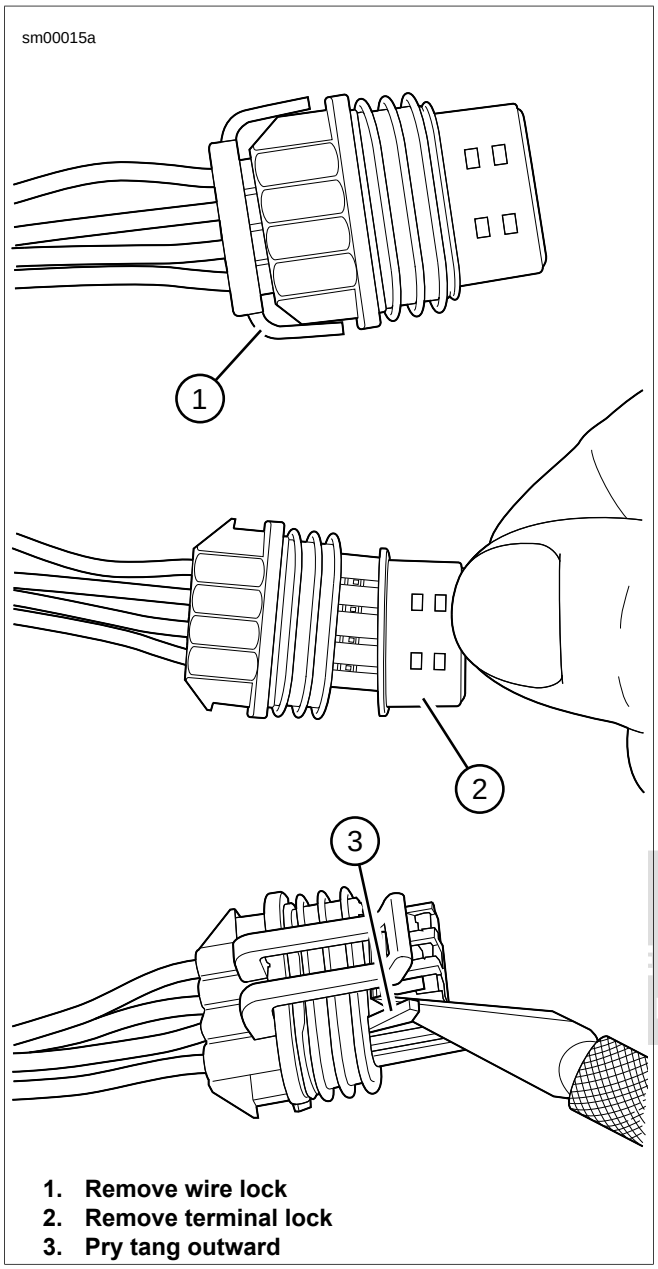


Figure A-28. Delphi GT 150 Sealed Connector: Socket Housing Latch



1. **Remove wire lock**
2. **Remove terminal lock**
3. **Pry tang outward**

Figure A-29. Delphi GT 150 Sealed Connector: Removing Socket Terminals

DEUTSCH DT SEALED CONNECTORS A.13

DEUTSCH DT SEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
HD-41475	DEUTSCH TERMINAL REPAIR KIT
HD-41475-100	FLAT BLADE L-HOOK

General

Deutsch DT sealed connectors are colored coded for location purposes. DT connectors associated with **left** side accessories, such as the front and rear **left** turn signals, are **gray**. All other DT connectors are **black**.

NOTES

- *A DEUTSCH TERMINAL REPAIR KIT (Part No. HD-41475) contains a selection of seals and seal plugs, locking wedges, attachment clips and terminals.*
- *Also included is a FLAT BLADE L-HOOK (Part No. HD-41475-100) used to remove locking wedges, compartmented storage box and carrying case.*

Separating Pin and Socket Housings

See Figure A-30. To separate the connector halves, Press the external latch(es) (1) on the socket housing (2) while rocking the pin (3) and socket housings.

NOTES

- *Generally, the socket housing is found on the accessory side, while the pin housing is attached to the wiring harness.*
- *Six-place and smaller Deutsch connectors have one latch on the connector.*
- *Eight- and twelve-place connectors have a latch on each side. Simultaneously press both latches to separate the connector.*

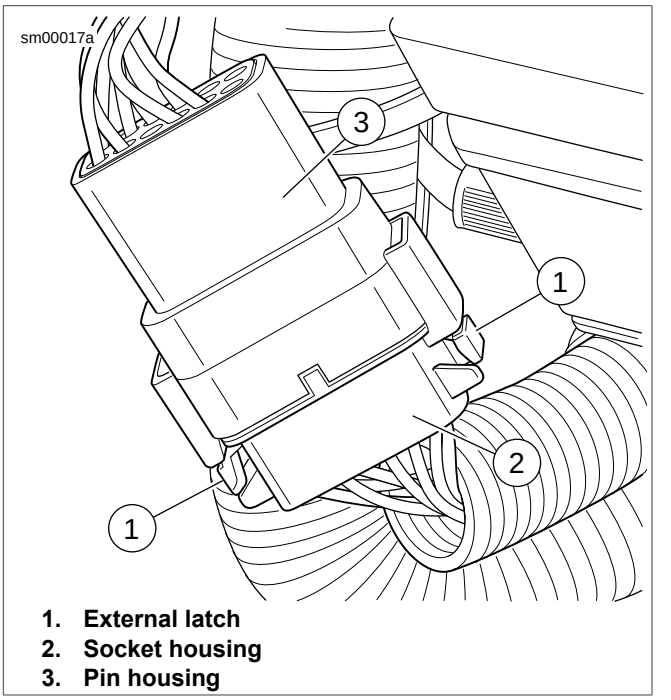
Mating Pin and Socket Housings

1. Align the connectors to match the wire lead colors.
   a. **For One External Latch:** Six-place and smaller Deutsch connectors have one external latch on the socket housing. To join the housings, align the latch on the socket side with the latch cover on the pin side.
   b. **For Two External Latches:** Align the tabs on the socket housing with the grooves on the pin housing.
2. Insert socket housing into pin housing until it snaps or clicks into place.

NOTE

For Two External Latches: *If latches do not click (latch), press on one side of the connector until that latch engages then press on the opposite side to engage the other latch.*

3. If necessary, fit the attachment clip to the pin housing.
4. Place large end of slot on attachment clip over T-stud on frame. Push assembly forward to engage small end of slot.



1. **External latch**
2. **Socket housing**
3. **Pin housing**

Figure A-30. Deutsch DT Sealed Connector

Removing Socket Terminals

1. See Figure A-31. Insert a small screwdriver between the socket housing and locking wedge in-line with the groove (in-line with the pin holes if the groove is absent). Turn the screwdriver 90 degrees to pop the wedge up and remove the secondary locking wedge.
2. See Figure A-34. Use a pick or small screwdriver to press terminal latches inside socket housing and back out sockets through holes in rear wire seal.

NOTE

*If wire leads require **new** terminals, see the instructions for crimping terminals.*

Installing Socket Terminals

1. Match wire lead color to connector cavity.
2. See Figure A-33. Fit rear wire seal (1) into back of socket housing (2), if removed.
3. Grasp wire lead (3) approximately 1.0 in (25.4 mm) behind the socket terminal. Gently push socket through hole in wire seal into its chambers until it clicks in place.
4. A tug on the wire will confirm that it is properly locked in place.

NOTE

Install seal plugs (6) into unused chambers. If removed, seal plugs must be replaced to seal the connector.

5. Install internal seal (4) on lip of socket housing, if removed.
6. Insert tapered end of secondary locking wedge (5) into socket housing and press down until it snaps in place. The

wedge fits into the center groove within the socket housing and holds the terminal latches tightly closed.

NOTES

- *See Figure A-32. While rectangular wedges do not require a special orientation, align arrow (1) on conical secondary locking wedge towards external latch for three-place connectors.*
- *If the secondary locking wedge does not slide into position easily, check the installation of all the terminals. Unseated terminals prevent the locking wedge from proper installation.*

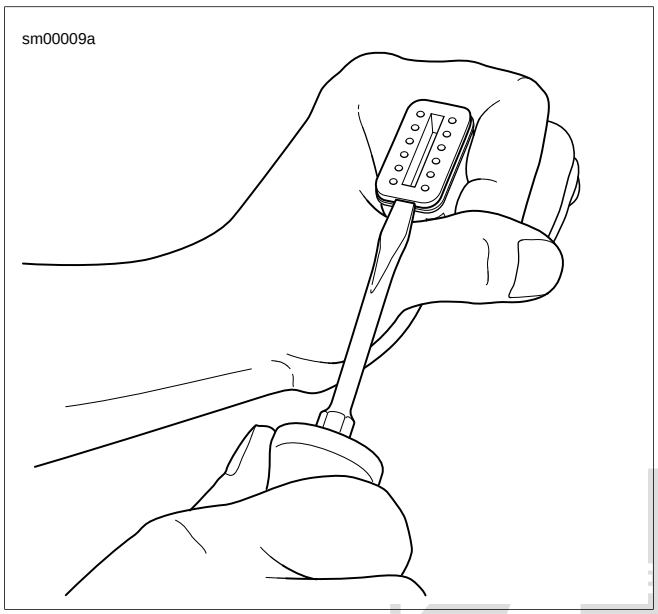
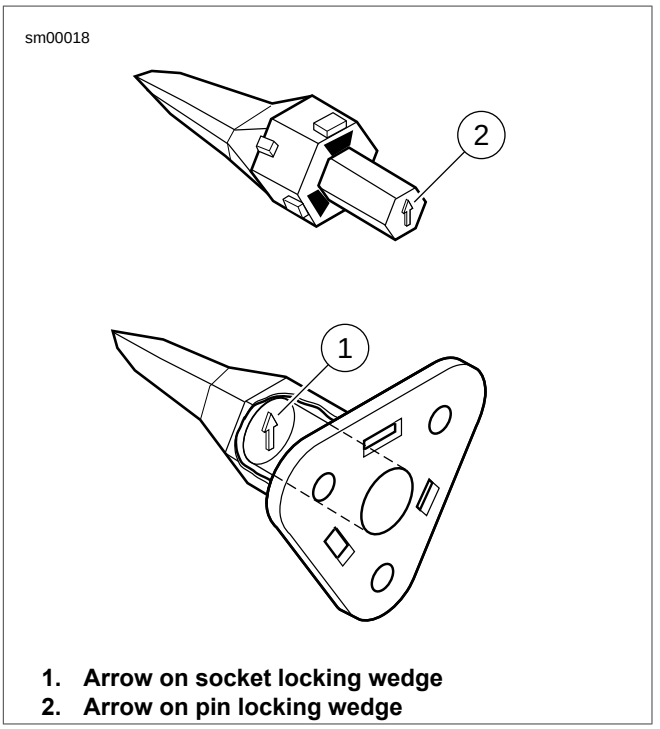
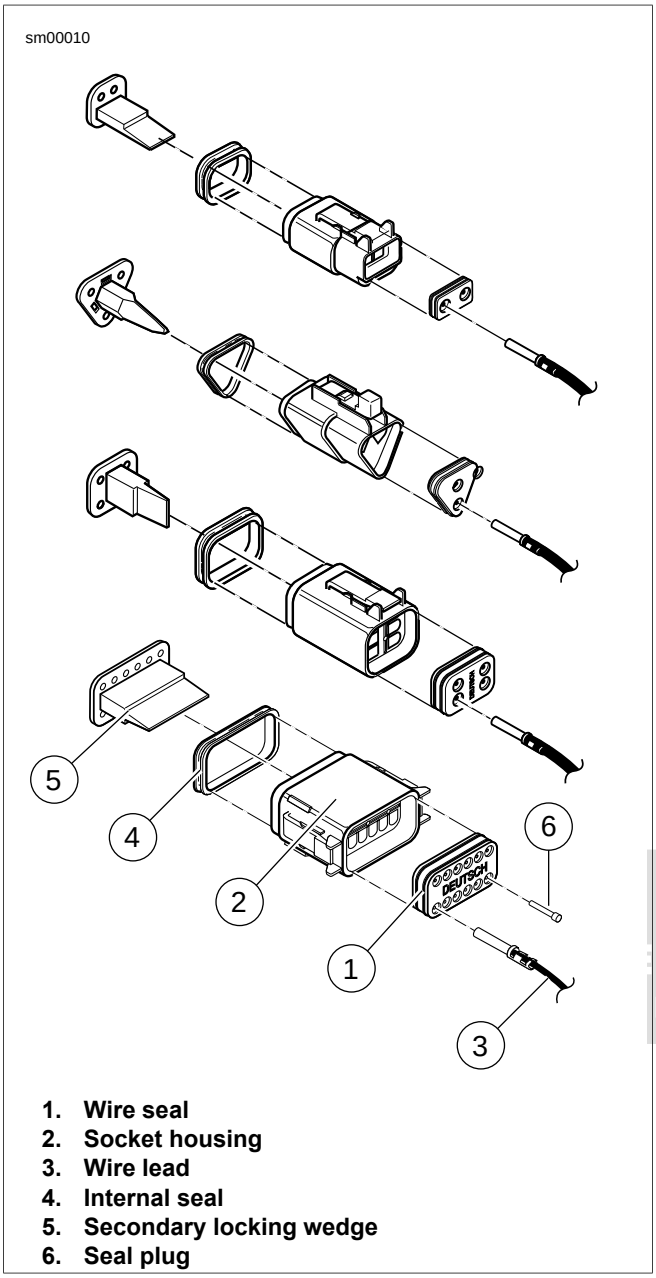


Figure A-31. Deutsch DT Sealed Connector: Remove Secondary Locking Wedge



1. Arrow on socket locking wedge
2. Arrow on pin locking wedge

Figure A-32. Deutsch DT Sealed Connector: 3-Place Locking Wedges



1. **Wire seal**
2. **Socket housing**
3. **Wire lead**
4. **Internal seal**
5. **Secondary locking wedge**
6. **Seal plug**

Figure A-33. Deutsch DT Sealed Connector: 2, 3, 4 and 12-Place Socket Housings

Removing Pin Terminals

1. Use the hooked end of a stiff piece of mechanics wire, a needle nose pliers or the FLAT BLADE L-HOOK (Part No. HD-41475-100) to remove the secondary locking wedge.
2. Gently press terminal latches inside pin housing and back out pins through holes in wire seal.

NOTES

- *If wire leads require **new** terminals, see the instructions for crimping terminals.*
- *The 8-place and 12-place gray and black connectors are not interchangeable. If replacing both the socket and pin housings, the black may be substituted for the gray.*
- *The socket and pin housings of all other connectors are interchangeable. Black may be mated with the gray since the alignment tabs are absent and the orientation of the external latch is the same.*

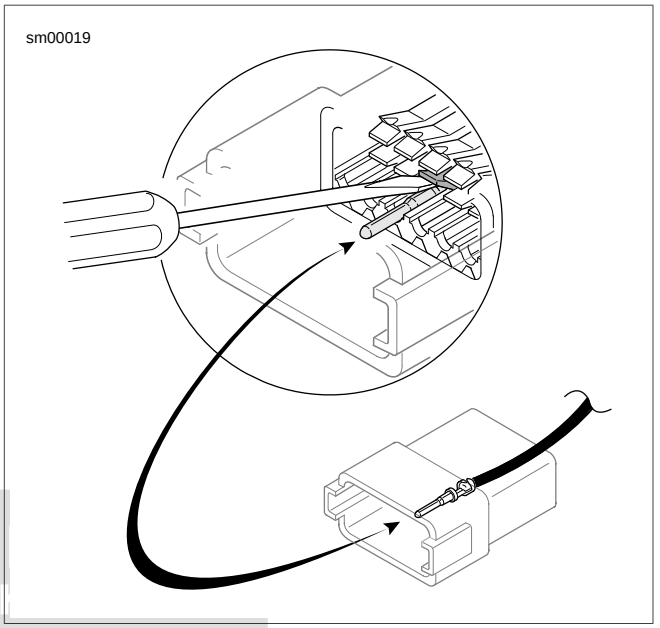


Figure A-34. Deutsch DT Sealed Connector: Press Terminal Latch and Back Out Pin

Installing Pin Terminals

1. See Figure A-35. Fit wire seal (1) into back of pin housing (2).
2. Grasp wire lead approximately 1.0 in (25.4 mm) behind the pin terminal (3). Gently push pin through holes in wire seal into its respective numbered chamber until it "clicks" in place.

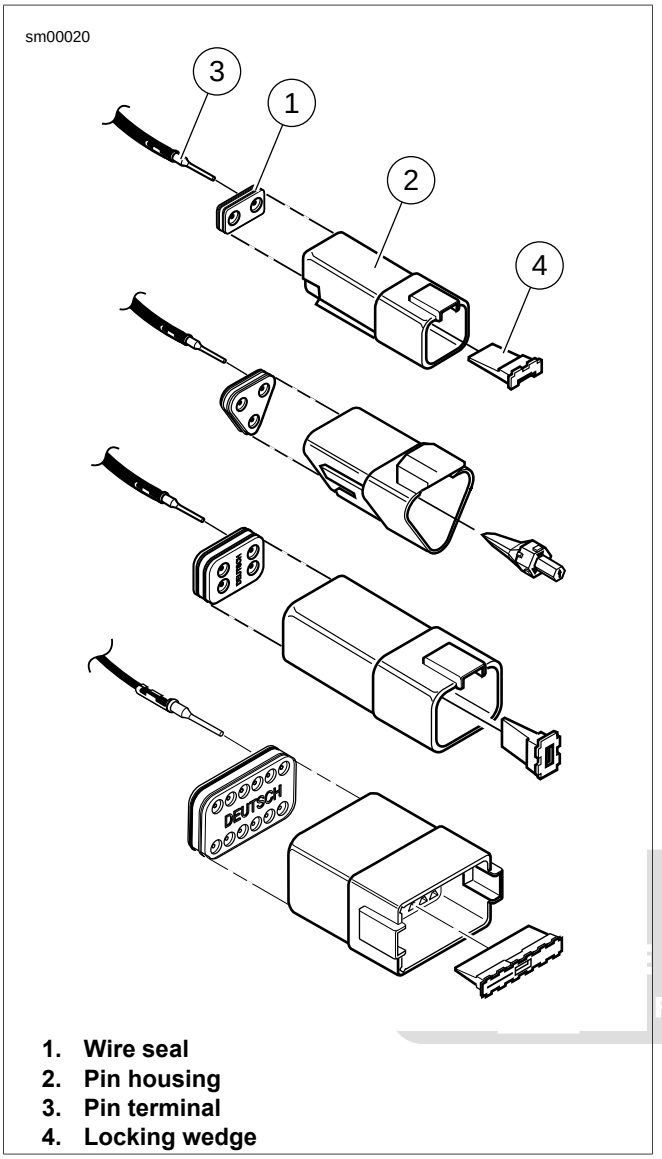
NOTE

A tug on the wire lead will confirm that a pin is locked in place.

3. Insert tapered end of secondary locking wedge (4) into pin housing. Press down until it snaps in place.

NOTES

- *The wedge fits in the center groove of the pin housing and holds the terminal latches tightly closed.*
- *See Figure A-32. While rectangular wedges do not require a special orientation, align arrow (1) on conical secondary locking wedge towards external latch for three-place connectors.*
- *If the secondary locking wedge does not slide into position easily, check the installation of all the terminals. Unseated terminals prevent the locking wedge from proper installation.*



1. **Wire seal**
2. **Pin housing**
3. **Pin terminal**
4. **Locking wedge**

Figure A-35. Deutsch DT Sealed Connector: 2, 3, 4 and 12-Place Pin Housings

Crimping Terminals

Identify which of the types of Deutsch terminals are used with the connector. Follow the corresponding crimping instructions. Refer to Table A-2.

Table A-2. Deutsch Connector: Terminal Crimping Instructions

TYPE	CRIMPING INSTRUCTIONS
DT Sealed (with crimp tails)	A.14 DEUTSCH DT SEALED TERMINAL REPAIR
DTM Mini Sealed Terminal (solid barrel)	A.16 DEUTSCH DTM SEALED SOLID BARREL MINI TERMINAL REPAIR
DTM Mini Sealed Terminal (with crimp tails)	A.15 DEUTSCH DTM SEALED MINI TERMINAL REPAIR

DEUTSCH DT SEALED TERMINAL REPAIR A.14

DEUTSCH DT SEALED TERMINAL CRIMPS

PART NUMBER	TOOL NAME
HD-39965-A	DEUTSCH TERMINAL CRIMP TOOL

Preparing Wire Leads for Crimping

1. Use a shop gauge to determine gauge of wire lead.
2. Strip 5/32 in (4.0 mm) of insulation from the wire lead.

Crimping Terminal to Lead

1. See Figure A-36. Squeeze the handles of the DEUTSCH TERMINAL CRIMP TOOL (Part No. HD-39965-A) to open the jaws. Push the locking bar (1) up.
2. Match the wire gauge to the crimp tool die. Refer to Table A-3.

NOTE

Rest the rounded side of the contact barrel in the nest (concave split level area) with the crimp tails facing up.

3. Insert (2) terminal (socket/pin) through hole of the locking bar.
4. Release locking bar to lock terminal in die.

NOTE

If the crimp tails are slightly out of alignment, the crimp tool rotates the terminal to face the tails upward. When positioned, the locking bar fits snugly in the space between the contact band and the core crimp tails.

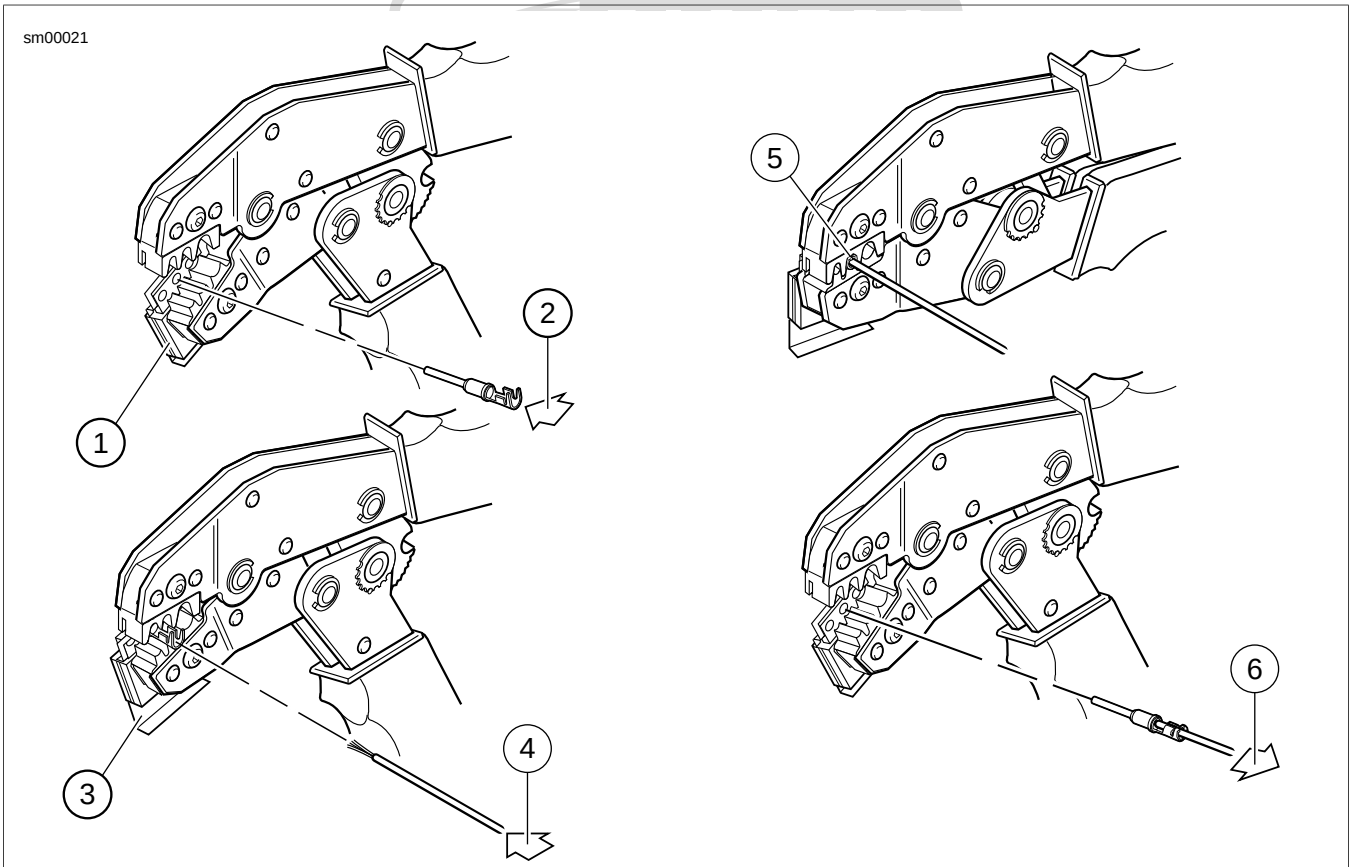
5. Insert stripped wire core between crimp tails until ends make contact with locking bar. Position wire that the wide pair of crimp tails squeeze bare wire strands, while the narrow pair folds over the insulation material.
6. Squeeze handle of crimp tool until tightly closed. Tool automatically opens after the terminal is crimped.
7. Raise locking bar up to remove wire lead and terminal.

Inspecting Crimps

Inspect the wire core and insulation crimps. Distortion should be minimal.

Table A-3. Deutsch DT Sealed Terminal Crimp: Wire Gauge To Die

WIRE GAUGE (AWG)	CRIMP TOOL DIE
20	Front
16-18	Middle



1. **Open jaws and raise locking bar**
2. **Insert terminal in locking bar**
3. **Release locking bar to lock terminal in die**
4. **Insert stripped lead**
5. **Squeeze crimper**
6. **Raise locking bar to remove terminal**

Figure A-36. Crimping a Deutsch DT Sealed Terminal

DEUTSCH DTM SEALED MINI TERMINAL REPAIR A.15

DEUTSCH DTM SEALED MINI TERMINAL CRIMPS

PART NUMBER	TOOL NAME
HD-38125-7	PACKARD TERMINAL CRIMPER

Preparing Wire Leads for Crimping

Strip 5/32 in (4.0 mm) of insulation from the wire lead.

Crimping a Mini Terminal to Wire Lead

1. See Figure A-37. Compress the handles of PACKARD TERMINAL CRIMPER (Part No. HD-38125-7) until the ratchet (2) automatically opens.

NOTE

Always perform core crimp before insulation crimp.

2. Position the core crimp on die E (1) of the crimper. Verify the core crimp tails are facing the forming jaws.
3. Gently apply pressure to handles of tool until crimpers just secure the core crimp tails.
4. Insert stripped wire core stands between crimp tails. Position wire that the short pair of crimp tails squeeze bare wire strands, while long pair squeeze over the insulation.
5. Squeeze handle of crimper until tightly closed. Tool automatically opens when the crimping sequence is complete.

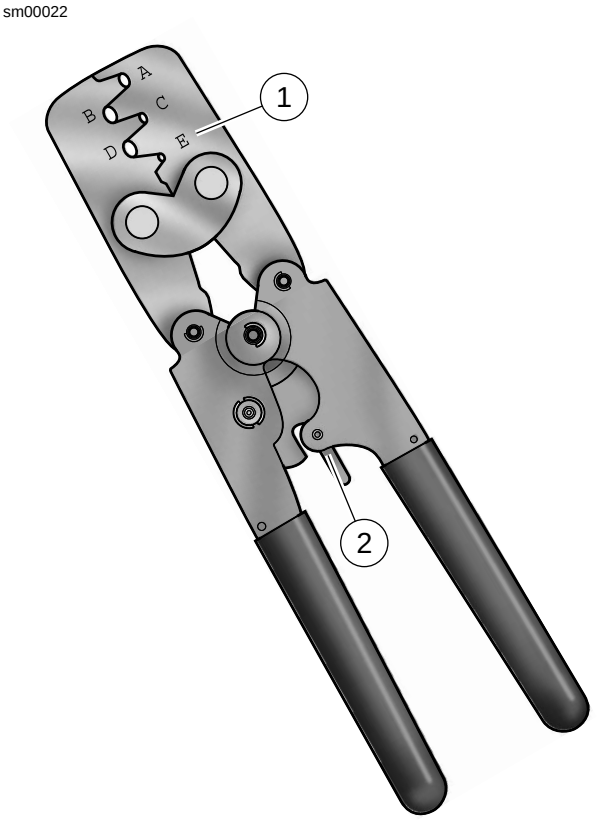
NOTE

If the crimper does not open, squeeze the ratchet trigger (2).

6. Position the insulation crimp on nest C of the crimper. Verify the insulation crimp tails are facing the forming jaws.
7. Squeeze handle of crimp tool until tightly closed. Tool automatically opens when the crimping sequence is complete.

Inspecting Crimps

Inspect the core and insulation crimps. Distortion should be minimal.



1. **E die**
2. **Crimper ratchet trigger**

Figure A-37. Packard Terminal Crimper (HD-38125-7)

DEUTSCH DTM SEALED SOLID BARREL MINI TERMINAL REPAIR A.16

DEUTSCH DTM SEALED SOLID BARREL TERMINAL CRIMPS

PART NUMBER	TOOL NAME
HD-42879	ELECTRICAL CRIMPER TOOL

Preparing Wire Leads For Crimping

For size 20, 16 and 12 contacts, wire ranges 26-12 AWG.

Strip 1/4 in (6.4 mm) of insulation from the wire lead.

Adjusting Crimper Tool

1. See Figure A-38. Squeeze the ELECTRICAL CRIMPER TOOL (Part No. HD-42879) handles to cycle the crimp tool to open.
2. Remove locking pin (1) from selector knob (2).
3. Raise selector knob. Rotate knob until selected wire size stamped on wheel is aligned with "SEL. NO." arrow (3).
4. Loosen knurled locknut (4) and turn adjusting screw (5) clockwise (in) until it stops.

Crimping a Barrel Contact To Wire Lead

1. See Figure A-39. Turn tool over and drop contact barrel (1) into indentor cover (2) hole with the wire end out.
2. Turn adjusting screw counterclockwise (out) until contact is flush with bottom of recess in indentor cover. Tighten knurled locknut.
3. Slowly squeeze handles of crimp tool until contact centers between the four indentor points (3).
4. Insert bare wire core strands of stripped wire lead (4) into contact barrel. Squeeze handle of crimp tool until tightly closed. Tool automatically opens when the crimping sequence is complete.
5. Remove wire lead with crimped contact from indentor.

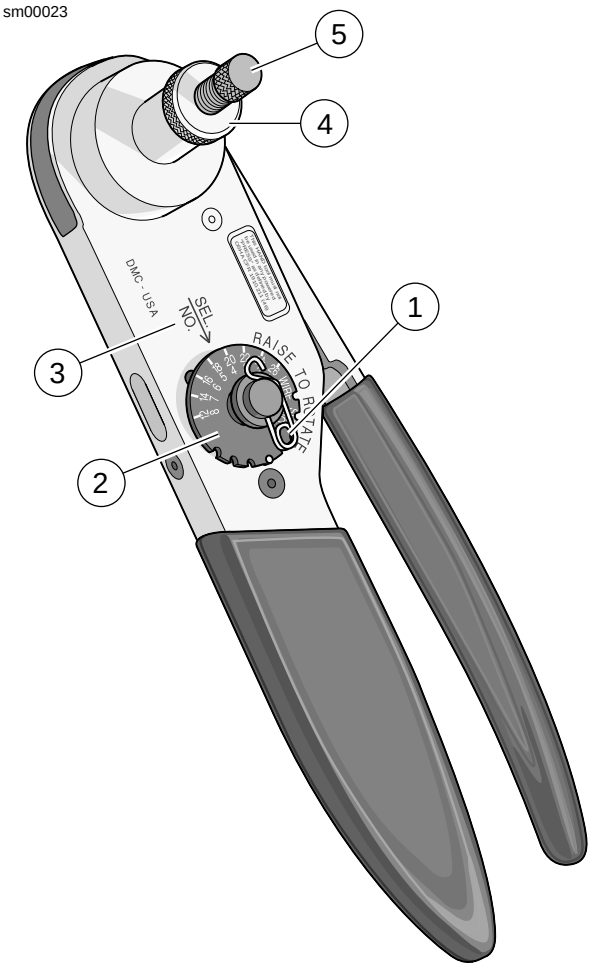
NOTE

Adjust the crimper tool for each contact/wire size.

6. Install pin to lock selector knob.

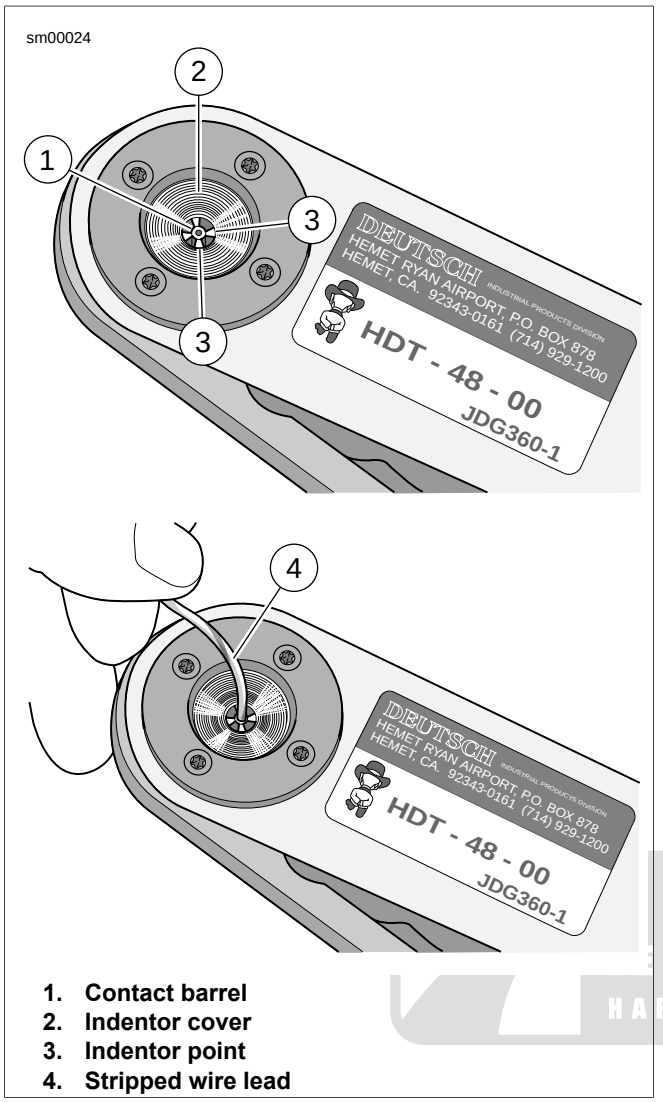
Inspecting Crimps

Inspect the crimp. All core wire strands are to be crimped in the barrel.



1. **Locking pin**
2. **Selector knob**
3. **SEL. NO. arrow**
4. **Knurled locknut**
5. **Adjusting screw**

Figure A-38. Electrical Crimper Tool (HD-42879)



1. **Contact barrel**
2. **Indentor cover**
3. **Indentor point**
4. **Stripped wire lead**

Figure A-39. Deutsch Solid Barrel

JAE MX19 SEALED CONNECTORS A.17

JAE MX19 SEALED CONNECTORS

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR

Connector Housings

Separate Housings: See Figure A-40. Press the two release buttons on each side of the housing to separate the connector.

Connect Housings: Align housings. Press together until the locking tabs click.

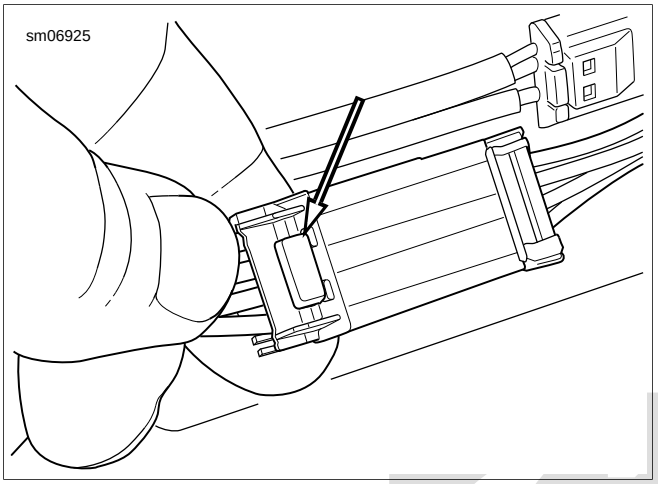


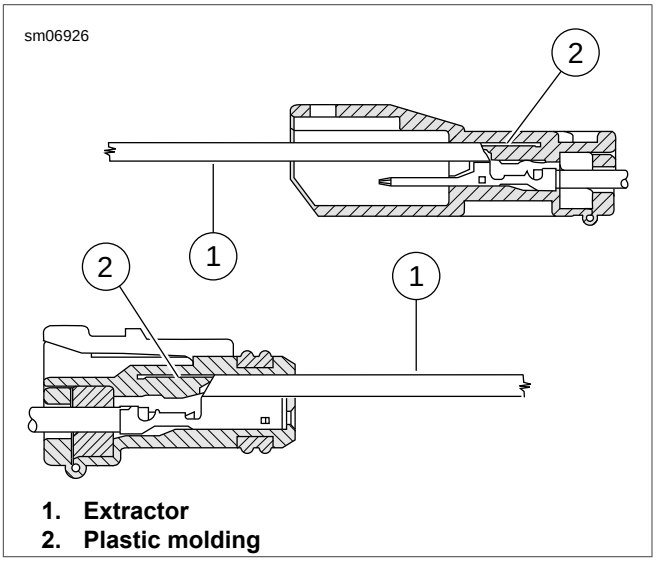
Figure A-40. Release Buttons: JAE MX19 Sealed Connector

Removing Terminals

1. Modify a TERMINAL EXTRACTOR (Part No. B-50085) by filing the front edge to 45 degrees.
2. See Figure A-41. Insert the extractor (1) into the opening above the terminal and press the plastic molding (2) up and out of the way.
3. Pull the wire lead and terminal out of the back of the housing.

Installing Terminals

1. Inspect the plastic molding and replace the connector housing if necessary.
2. Orient the terminal to the housing. Push terminal into housing until it clicks into place.



1. **Extractor**
2. **Plastic molding**

Figure A-41. JAE MX19 Terminal Removal

CRIMPING TERMINALS

PART NUMBER	TOOL NAME
HD-50120	UNIVERSAL CRIMPER SET
HD-50120-2	HAND CRIMP FRAME
HD-50120-6	JAE DIE

1. Strip the wire insulation to specification. Refer to Table A-4.
2. Install the JAE DIE (Part No. HD-50120-6) in the handle of the HAND CRIMP FRAME (Part No. HD-50120-2) of the UNIVERSAL CRIMPER SET (Part No. HD-50120).
3. Place the **new** terminal in the specified nest.
4. Insert the wire to the wire stop. Crimp the terminal.
5. Inspect the crimped terminal.

Table A-4. JAE MX19 Crimper Die (Part No. HD-50120-6)

TERMINAL	PART NO.	STRIP LENGTH		NEST
		in	mm	
Socket	72910-11	0.051-0.098	2.0-2.5	B
Pin	72909-11	0.051-0.098	2.0-2.5	A

MOLEX CMC SEALED CONNECTORS A.18

MOLEX CMC SEALED CONNECTORS

PART NUMBER	TOOL NAME
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL
HD-50424	1.5 MM TERMINAL EXTRACTOR TOOL

Separating the Connector

Release: See Figure A-42. Press the catch and rotate the lever arm down.

Connect: Press on the front guard to release the latch and rotate the lever arm up until the catch clicks in place.

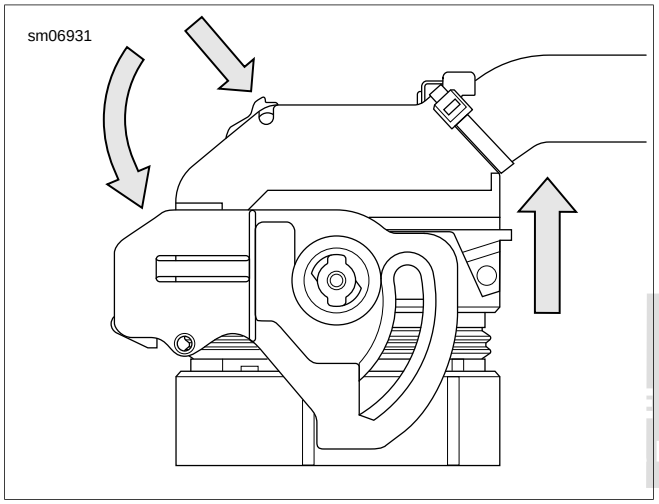


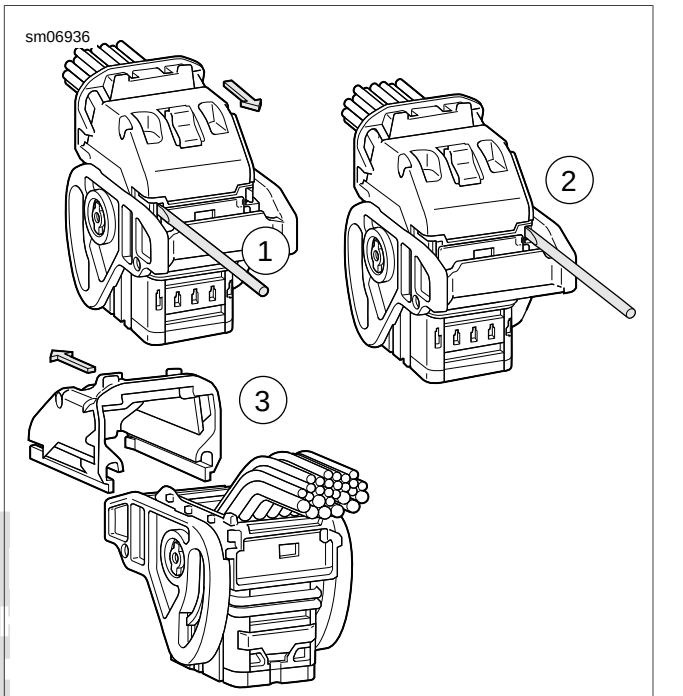
Figure A-42. Release

Removing Terminals

1. With the lever arm open, cut the cable strap around the wire bundle.
2. See Figure A-43. Open a wire cap latch (1) with a small screwdriver.
3. Maintain pressure on the cap and open the opposite latch (2) with the screwdriver.
4. Slide the cap off (3).
5. See Figure A-44. Use the screwdriver to open the secondary lock. Pull the locking bar all the way out.
6. See Figure A-45. Locate the wire lead cavity by the alpha-numeric coordinates.
7. Identify the size of the terminal and select either the CMC extractor 0.6 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50423) or the 1.5 MM TERMINAL EXTRACTOR TOOL (Part No. HD-50424).
8. See Figure A-46. Insert the pins of the CMC extractor tool (1) into the access slots (2) of the terminal cavity and retract the lead and terminal.

Installing Terminals

1. Orient the terminal to the housing cavity. Snap the terminal in place.
2. Slide the cap over the lead bundle. Snap the cap in place.
3. Install a cable strap through the guide and around the lead bundle.



1. **Press latch**
2. **Press cap and latch**
3. **Remove cap**

Figure A-43. Remove the Wire Lead Cap

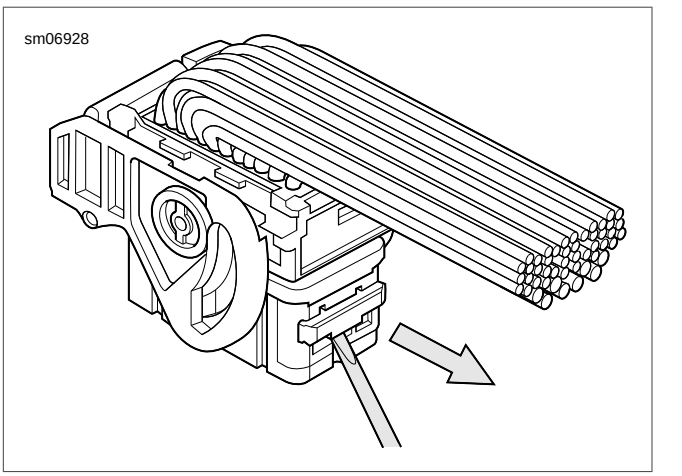
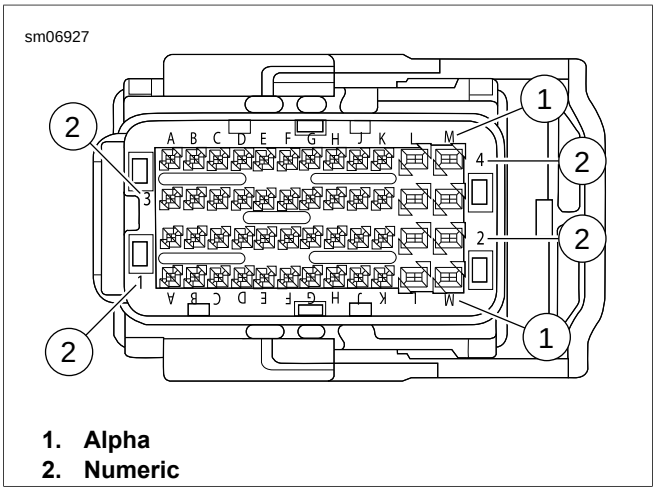
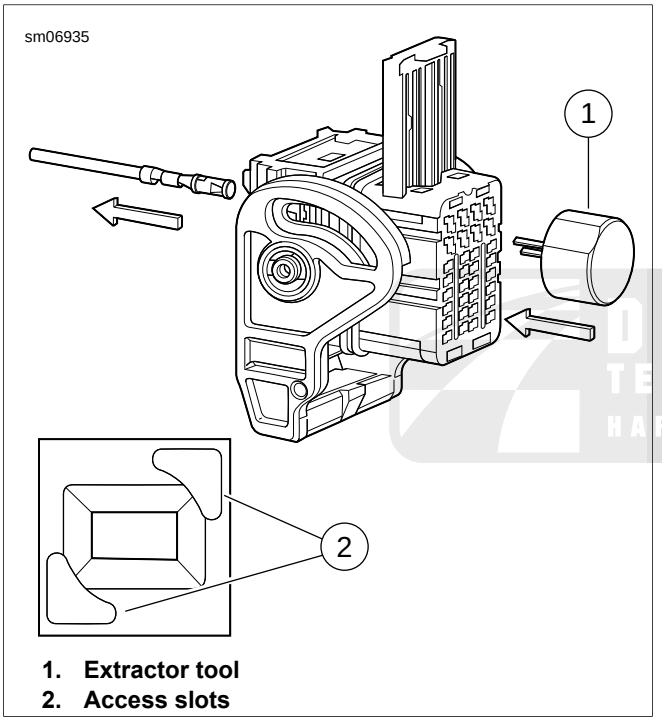


Figure A-44. Molex CMC Sealed Connector Secondary Lock



1. **Alpha**
2. **Numeric**

Figure A-45. Alpha-Numeric Coordinates



1. **Extractor tool**
2. **Access slots**

Figure A-46. Terminal Removal

CRIMPING TERMINALS

PART NUMBER	TOOL NAME
HD-50120	UNIVERSAL CRIMPER SET
HD-50120-2	HAND CRIMP FRAME
HD-50120-3	JAE DIE
HD-50120-4	JAE DIE

1. Select the crimper die according to the terminal part number from the UNIVERSAL CRIMPER SET (Part No. HD-50120).
2. Strip the wire insulation to specification. Refer to Table A-5 or Table A-6.
3. Install the JAE DIE (Part No. HD-50120-3) or JAE DIE (Part No. HD-50120-4) in the handle of the HAND CRIMP FRAME (Part No. HD-50120-2).
4. Place the **new** terminal in the specified nest.
5. Insert the wire to the wire stop. Crimp the terminal.
6. Inspect the crimped terminal.

Table A-5. Molex CMC Sealed Crimper Die (Part No. HD-50120-3)

PART NO.	TERMINAL: WIRE GAUGE	STRIP LENGTH		NEST
		in	mm	
72226-11	Socket: 16 AWG	0.177	4.5	B
72227-11	Socket: 18 AWG	0.177	4.5	A

Table A-6. Molex CMC Sealed Crimper Die (Part No. HD-50120-4)

PART NO.	TERMINAL: WIRE GAUGE	STRIP LENGTH		NEST
		in	mm	
72222-11	Socket: 18 AWG	0.138	3.5	B
72222-11	Socket: 20 AWG	0.138	3.5	A

MOLEX MX 150 SEALED CONNECTORS A.19

MOLEX MX 150 SEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
HD-48114	TERMINAL REMOVER

Separating Pin and Socket Housings

See Figure A-47. Press the latch while pulling the pin and socket housings apart.

Mating Pin and Socket Housings

1. Orient the latch on the pin housing to the latch pocket on the socket housing so the rails on the outside of the pin housings lines up with the tunnels on the socket housing.
2. Press the housings together until the latch clicks.

Removing Terminals

1. Pull the secondary lock up, approximately 3/16 in (4.8 mm), until it stops.
   a. **Socket Housing:** See Figure A-48. Use a small screwdriver in the pry slot. The slot next to the external latch provides a pivot point.
   b. **Pin Housing:** See Figure A-49. Use needle nose pliers to engage the D-holes in the center of the secondary lock.

NOTE

Do not remove the secondary lock from the connector housing.

2. See Figure A-50. Insert TERMINAL REMOVER (Part No. HD-48114) into the pin hole next to the terminal until the tool bottoms.
   a. **Socket Housing:** The pin holes are inside the terminal openings.
   b. **Pin Housing:** The pin holes are outside the pins.
3. Pressing the terminal remover to the bottom of the pin hole, gently pull on the wire to remove wire terminal from its cavity.

Installing Terminals

1. See Figure A-51. From the wiring diagram, match the wire color to its numbered terminal cavity.

NOTE

Cavity numbers (1) are stamped on the housing at the ends of the cavity rows. Determine the cavity number by counting the cavities up or down along the row from each stamped number.

2. Orient the terminal that the tang (2) opposite the open crimp engages the slot (3) in the cavity.
3. Push the terminal into the cavity.
4. Gently tug on wire to verify that the terminal is captured by the secondary lock.
5. With all terminals installed, push the secondary lock into the socket housing to lock the wire terminals into the housing.

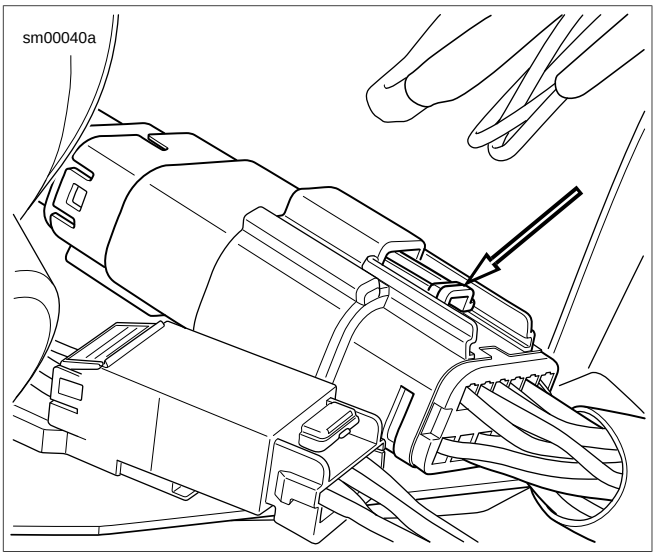


Figure A-47. Molex MX 150 Sealed Connector: Latch

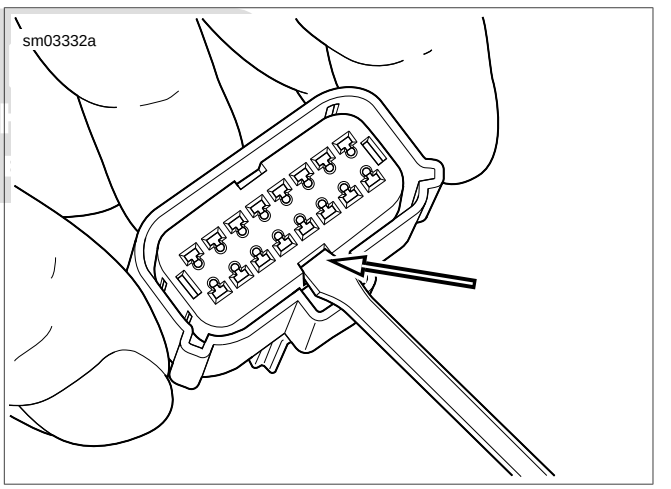


Figure A-48. Secondary Lock Pry Slot (Socket Housing)

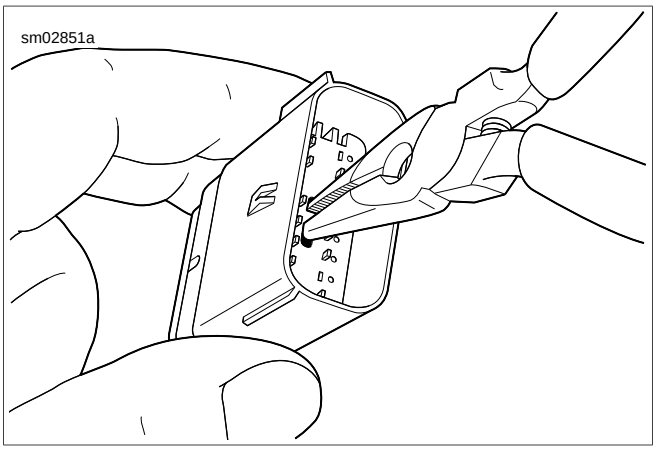


Figure A-49. Pull Up Secondary Lock

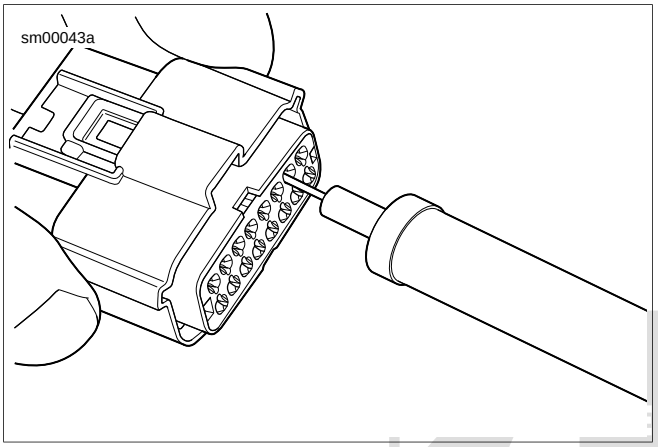
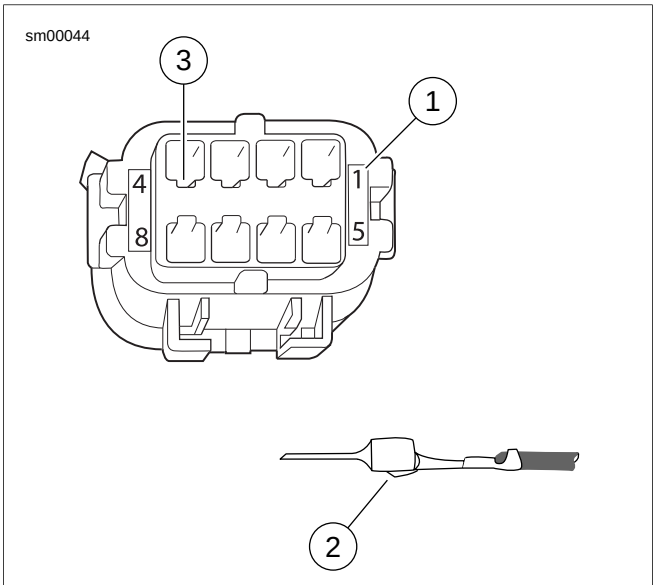


Figure A-50. Molex MX 150 Sealed Connector: Terminal Remover (HD-48114)



1. **Cavity number**
2. **Tang**
3. **Cavity slot**

Figure A-51. Molex MX 150 Sealed Connector: Pin Cavities and Wire Terminal

CRIMP TERMINAL TO LEAD

PART NUMBER	TOOL NAME
HD-48119	TERMINAL CRIMPER

Prepare Lead

1. Cut the damaged terminal close to the back of the terminal to leave as much wire length as possible.
2. Strip wire lead removing 3/16 in (4.70-5.60 mm) of insulation.

NOTE

The strip length is the same for both pin and socket terminals and for wire gauges from 22 to 14.

Prepare Tool

1. Identify the punch/die in the jaws of the TERMINAL CRIMPER (Part No. HD-48119) for the wire gauge. Refer to Table A-7.
2. Squeeze and release the handles to open the tool.

NOTE

The crimp tool automatically opens when the handles are released.

3. See Figure A-52. Hold fully open tool at approximately 45 degrees.

NOTE

Do NOT tighten the locknut holding the locator bars. The bars must float to accommodate the different terminal gauges.

Table A-7. Crimp Tool Wire Gauge Punch/Die

AWG (WIRE GAUGE)	PUNCH/DIE
22	Left
18-20	Middle
14-16*	Right
* Crimp 16 AWG **pin** terminals in the 18-20 middle die.	

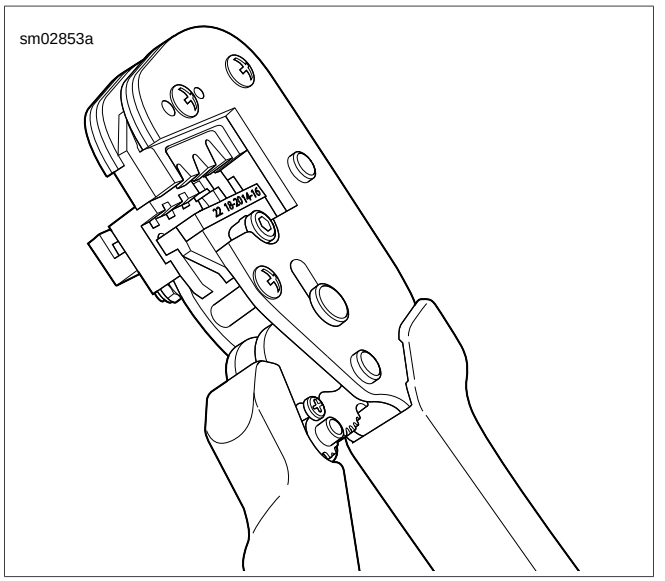
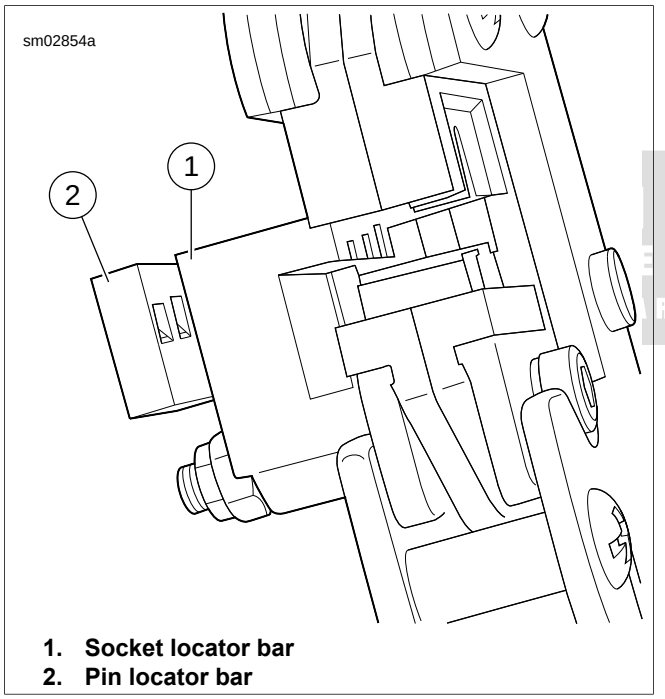


Figure A-52. Open Terminal Crimper (HD-48119) at 45 Degrees



1. **Socket locator bar**
2. **Pin locator bar**

Figure A-53. Terminal Locator Bars

Position Terminal in the Punch/Die

1. See Figure A-54. With the crimp tails up, place the terminal through the punch/die into the square opening in the socket locator bar.
   a. **Socket Terminal:** See Figure A-53. A socket terminal stops against the back face of the socket locator bar (1).
   b. **Pin Terminal:** See Figure A-55. The tip of a pin terminal passes through the socket locator bar and stops in the notch in the face of the pin locator bar.
2. See Figure A-56. Ratchet the handles together until the crimp tails are held in vertical alignment between the punch and the die.

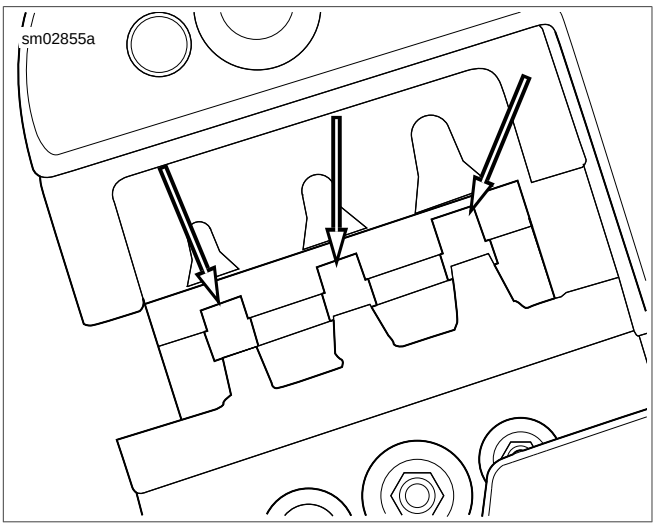


Figure A-54. Square Openings in Socket Locator Bar

Insert Stripped Lead

See Figure A-57. Insert the stripped end (wire core) between the crimp tails at an up angle until the wire core touches the face of the socket locator bar above the square opening.

NOTES

- *The insulation must extend through the insulation crimp tails.*
- *Insert the wire with little or no pressure. Pressing on the lead will bend the wire core.*

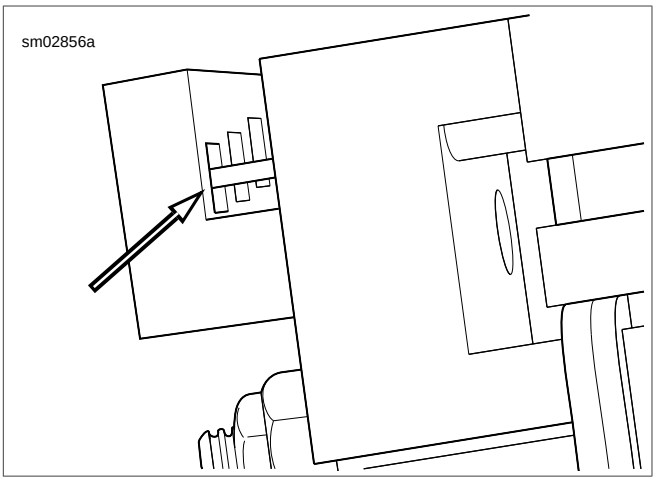


Figure A-55. Pin Terminal against Pin Locator Bar

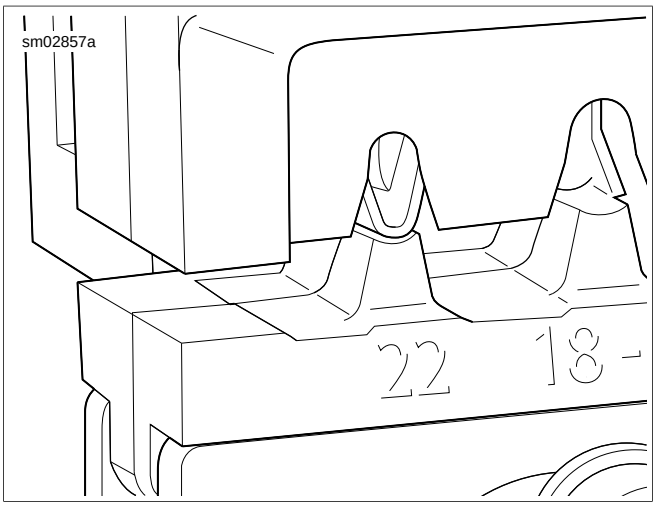


Figure A-56. Crimp Tails in Vertical Alignment between Punch and Die

Crimp Terminal to Lead

1. Holding the wire lead in position touching the locator face at an angle, quickly and smoothly squeeze the crimp tool closed.
2. Final squeeze the handles to open the tool and release the terminal.

NOTE

*Open a stuck or jammed tool by pressing the ratchet release lever found between the handles. Do **not** force the handles open or closed.*

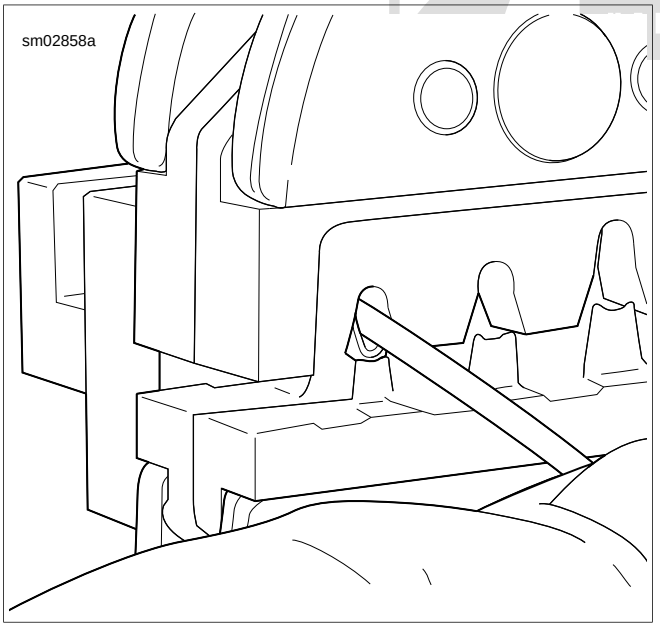
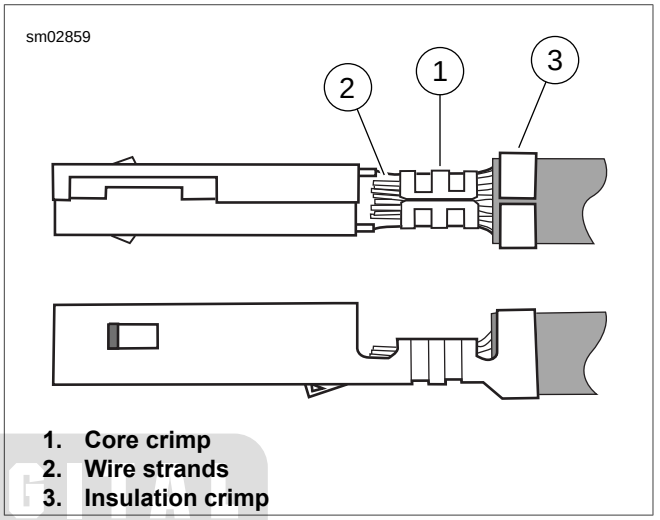


Figure A-57. Stripped Lead at Up Angle

Inspect Crimp

1. **Inspect Crimp:** Inspect the core and insulation crimp.
   a. See Figure A-58. The core tails should be creased into the wire strands at the core crimp (1).
   b. Strands (2) of wire should be visible beyond the core crimp but not forward into the terminal shell.
   c. The insulation tails should be folded into the insulation (3) without piercing or cutting the insulation.
   d. Distortion should be minimal.
2. **Test Crimp:** Hold the terminal. Pull the lead.



1. **Core crimp**
2. **Wire strands**
3. **Insulation crimp**

Figure A-58. Terminal Crimp

TYCO 040 MULTILOCK UNSEALED CONNECTOR A.20

TYCO 040 MULTILOCK UNSEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-44695-A	MULTI-LOCK CRIMPER

General

Tyco 040 Multilock Unsealed connectors are found between wire harnesses and component wiring.

See Figure A-59. To maintain serviceability, always return connectors to OE locations after service.

Obtain the necessary tools to repair the connector and terminals.

NOTE

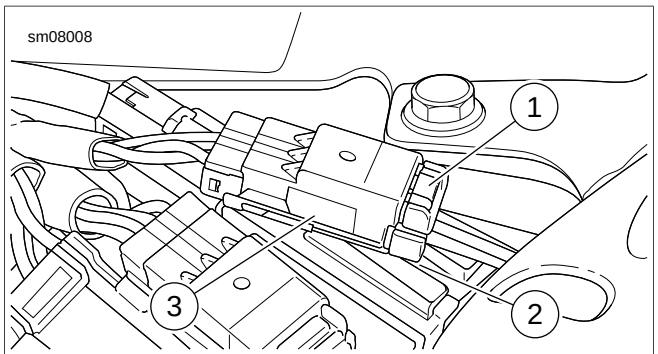
Use the MULTI-LOCK CRIMPER (Part No. HD-44695-A) for terminal crimping.

Separating Pin and Socket Housings

1. See Figure A-59. Press the release button (1) on the socket terminal side of the connector.
2. Pull the socket housing (2) out of the pin housing (3).

Mating Pin and Socket Housings

1. Hold the housings to match wire color to wire color.
2. Insert the socket housing into the pin housing until it clicks in place.



1. Release button
2. Socket housing
3. Pin housing

Figure A-59. Tyco 040 Multilock Unsealed Connector

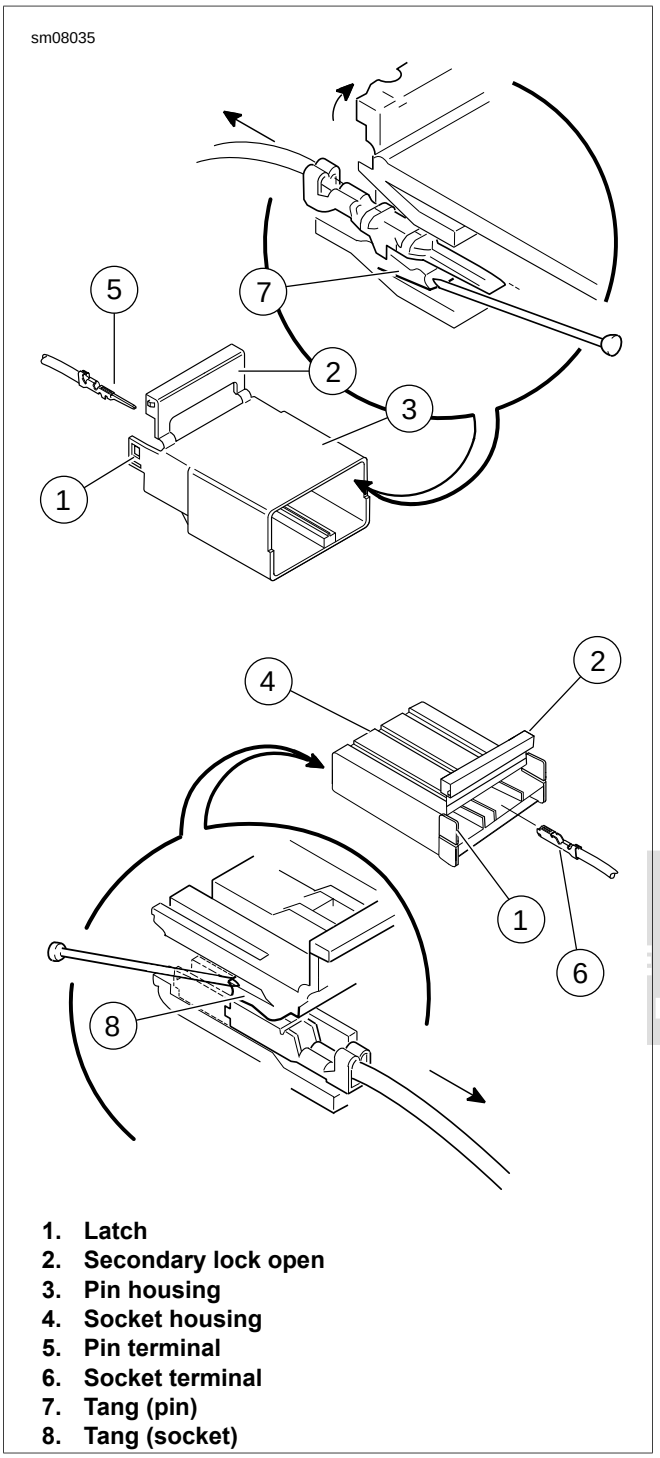
Removing Terminals from Housing

1. See Figure A-60. Bend back the latch (1) to free one end of secondary lock (2) then repeat on the opposite end. Hinge the secondary lock outward.
2. Look in the terminal side of the connector (opposite the secondary lock) and note the cavity next to each terminal.
3. Using TERMINAL EXTRACTOR (Part No. B-50085), press the tang in the housing to release the terminal.
   a. **Socket:** Lift the socket tang (8) up.
   b. **Pin:** Press the pin tang (7) down.

NOTE

If the tang is released, a click is heard.

4. Gently tug on wire to pull wire and terminal from cavity.



1. **Latch**
2. **Secondary lock open**
3. **Pin housing**
4. **Socket housing**
5. **Pin terminal**
6. **Socket terminal**
7. **Tang (pin)**
8. **Tang (socket)**

Figure A-60. Tyco 040 Multilock Unsealed Connector: Socket and Pin Housings

Inserting Terminals into Housing

NOTE

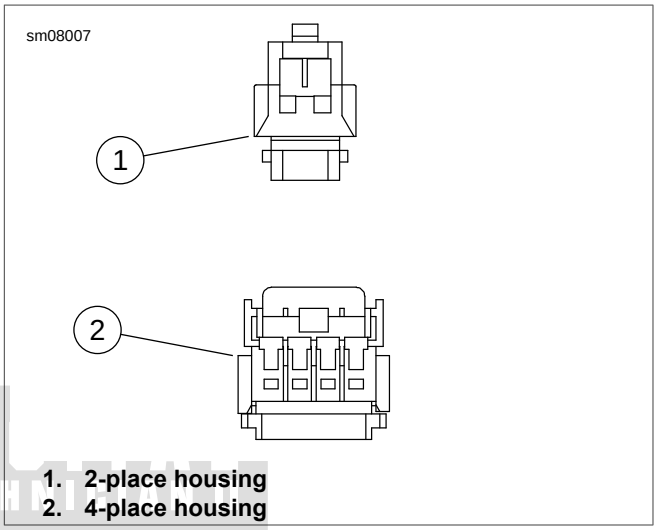
See Figure A-61. Match the wire color to the cavity number found on the wiring diagram.

1. Hold the terminal so the catch faces the tang in the chamber. Insert the terminal into its cavity until it snaps in place.

NOTES

- *The release button is always on the top of the connector.*
- *On the pin side of the connector, tangs are positioned at the bottom of each cavity. Therefore, the slot in the pin terminal (on the side opposite the crimp tails) must face downward.*
- *On the socket side, tangs are at the top of each cavity. Therefore, the socket terminal slot (on the same side as the crimp tails) must face upward.*

2. Gently tug on wire ends to verify that all terminals are locked.
3. Rotate the hinged secondary lock inward until tabs fully engage latches on both sides of connector.



1. **2-place housing**
2. **4-place housing**

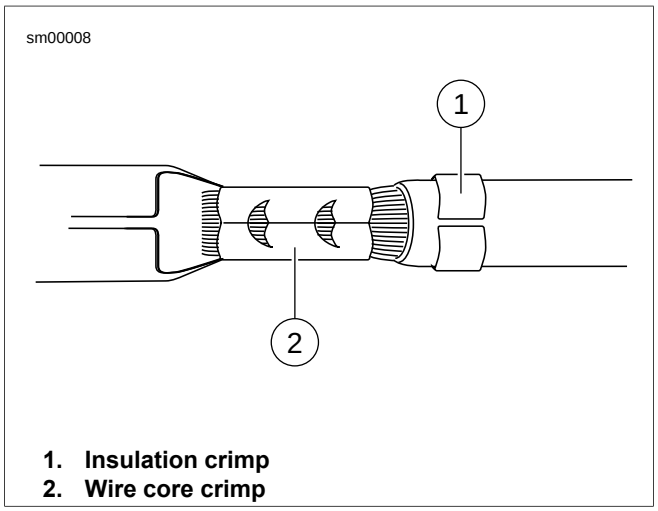
Figure A-61. Tyco 040 Multilock Unsealed Connector (socket housings shown)

Crimping Terminals to Leads

Terminals are crimped twice: once over the wire core and a second time over the insulation tails. For the correct terminal crimping procedure, refer to the instruction sheet provided with the MULTI-LOCK CRIMPER (Part No. HD-44695-A) or available through h-dnet.com.

Inspecting Crimped Terminals

See Figure A-62. Inspect the wire core crimp (2) and insulation crimp (1). Distortion should be minimal.



1. **Insulation crimp**
2. **Wire core crimp**

Figure A-62. Tyco 040 Multilock Unsealed Connector: Terminal Crimp

TYCO 070 MULTILOCK UNSEALED CONNECTOR A.21

TYCO 070 MULTILOCK UNSEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
HD-41609	AMP MULTI-LOCK CRIMPER

General

Tyco 070 Multilock Unsealed connectors are found between wire harnesses and component wiring. They are either floating or anchored to the frame with attachment clips.

See Figure A-63. Attachment clips (1) on the pin housings are fitted to T-studs on motorcycle frame. The T-studs identify OE connector locations. To maintain serviceability, always return connectors to OE locations after service.

Obtain the necessary tools to repair the connector and terminals.

NOTE

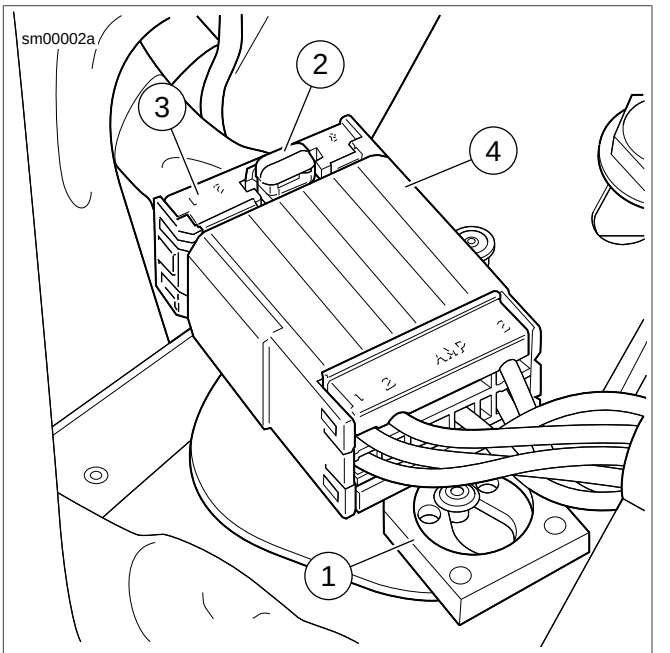
Use the AMP MULTI-LOCK CRIMPER (Part No. HD-41609) for terminal crimping.

Separating Pin and Socket Housings

1. If necessary, slide connector attachment clip so T-stud is in the large end of the clip opening. Remove connector from T-stud.
2. See Figure A-63. Press the release button (2) on the socket terminal side of the connector.
3. Pull the socket housing (3) out of the pin housing (4).

Mating Pin and Socket Housings

1. Hold the housings to match wire color to wire color.
2. Insert the socket housing into the pin housing until it clicks in place.
3. If OE location is a T-stud, fit large opening end of attachment clip over T-stud. Slide connector to engage T-stud to small end of opening in clip.



1. **Attachment clip**
2. **Release button**
3. **Socket housing**
4. **Pin housing**

Figure A-63. Tyco 070 Multilock Unsealed Connector

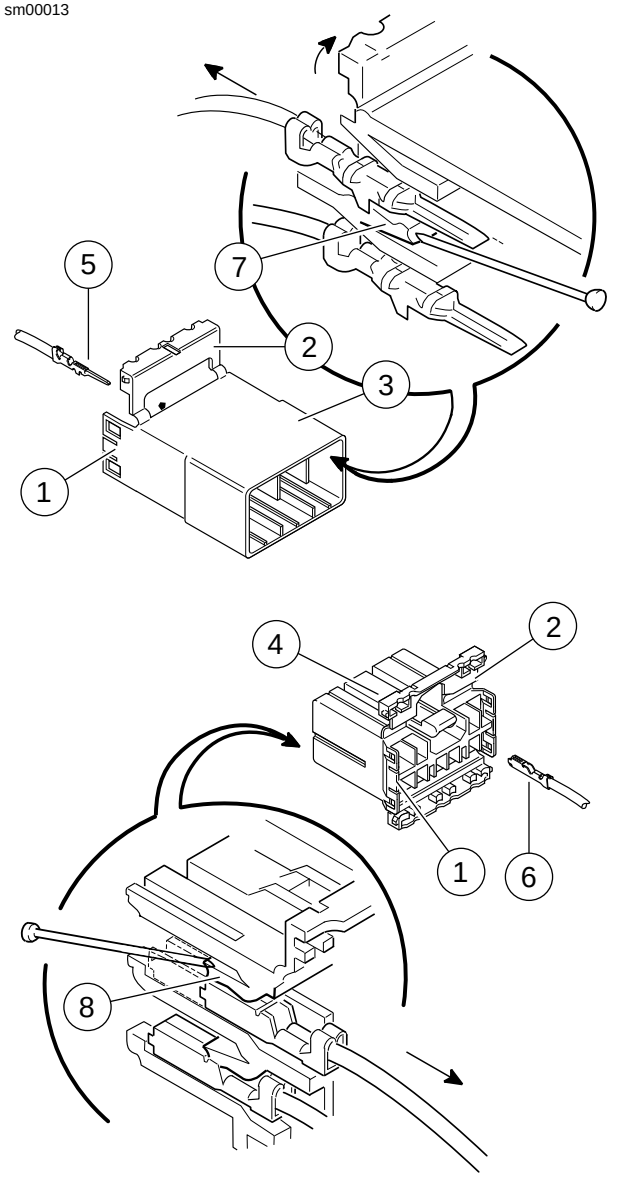
Removing Terminals from Housing

1. See Figure A-64. Bend back the latch (1) to free one end of secondary lock (2) then repeat on the opposite end. Hinge the secondary lock outward.
2. Look in the terminal side of the connector (opposite the secondary lock) and note the cavity next to each terminal.
3. Using TERMINAL EXTRACTOR (Part No. B-50085), press the tang in the housing to release the terminal.
   a. **Socket:** Lift the socket tang (8) up.
   b. **Pin:** Press the pin tang (7) down.

NOTE

If the tang is released, a click is heard.

4. Gently tug on wire to pull wire and terminal from cavity.



1. **Latch**
2. **Secondary lock open**
3. **Pin housing**
4. **Socket housing**
5. **Pin terminal**
6. **Socket terminal**
7. **Tang (pin)**
8. **Tang (socket)**

Figure A-64. Tyco 070 Multilock Unsealed Connector: Socket and Pin Housings

Inserting Terminals into Housing

NOTE

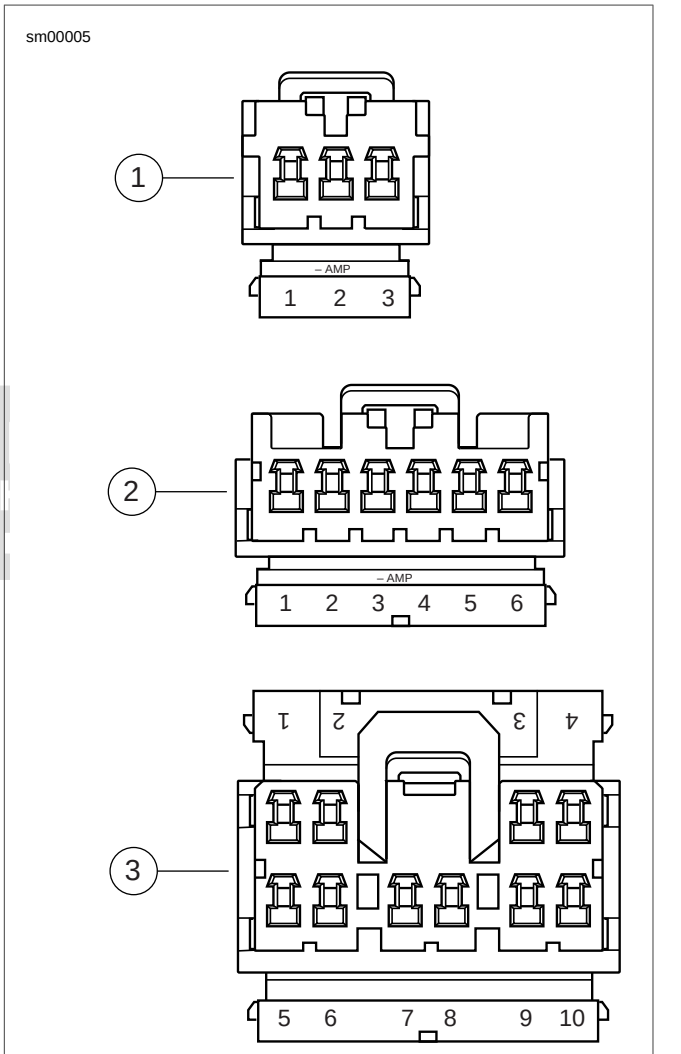
See Figure A-65. Cavity numbers are stamped into the secondary locks of both the socket and pin housings. Match the wire color to the cavity number found on the wiring diagram.

1. Hold the terminal so the catch faces the tang in the chamber. Insert the terminal into its numbered cavity until it snaps in place.

NOTES

- *The release button is always on the top of the connector.*
- *On the pin side of the connector, tangs are positioned at the bottom of each cavity. Therefore, the slot in the pin terminal (on the side opposite the crimp tails) must face downward.*
- *On the socket side, tangs are at the top of each cavity. Therefore, the socket terminal slot (on the same side as the crimp tails) must face upward.*

2. Gently tug on wire ends to verify that all terminals are locked.
3. Rotate the hinged secondary lock inward until tabs fully engage latches on both sides of connector.



1. **3-place housing**
2. **6-place housing**
3. **10-place housing**

Figure A-65. Tyco 070 Multilock Unsealed Connector: Cavity Numbers on Secondary Locks (socket housings shown)

Crimping Terminals to Leads

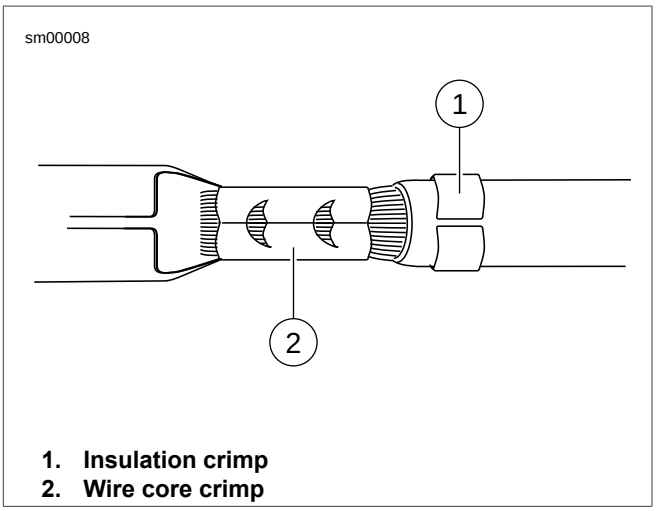
NOTE

Crimping with the AMP Multi-lock Crimper is a one-step operation. One squeeze crimps both the wire core and the insulation tails.

For the correct terminal crimping procedure, refer to the instruction sheet provided with the AMP MULTI-LOCK CRIMPER (Part No. HD-41609) or available through h-dnet.com.

Inspecting Crimped Terminals

See Figure A-66. Inspect the wire core crimp (2) and insulation crimp (1). Distortion should be minimal.



1. **Insulation crimp**
2. **Wire core crimp**

Figure A-66. Tyco 070 Multilock Unsealed Connector: Terminal Crimp

TYCO GET 64 SEALED CONNECTOR A.22

TYCO GET 64 SEALED CONNECTOR REPAIR

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR

General

See Figure A-67. The Tyco GET 64 Sealed connector is found on the ECM of most models.

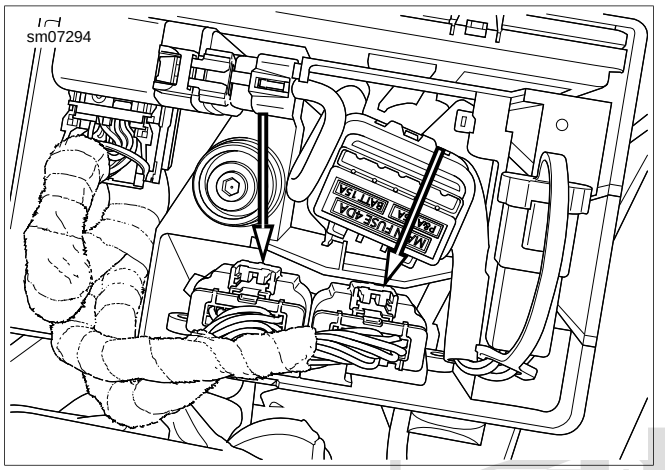
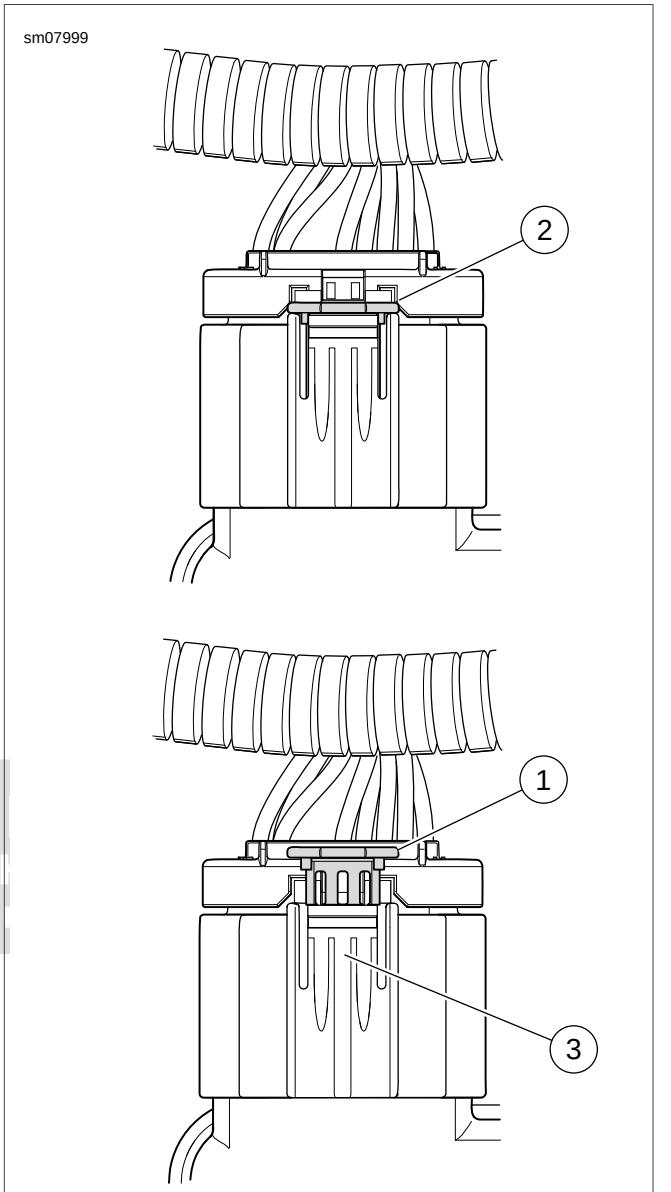


Figure A-67. Tyco GET 64 Sealed Connectors

Housings

See Figure A-68. **Separate:** Lift the latch lock to open (1). Press the latch (3). Pull the socket housing off the ECM.

Join: Align the socket housing latch with the catch on the ECM. Press housing onto ECM. Press down the latch lock to close (2).



1. **Latch lock (open)**
2. **Latch lock (closed)**
3. **Connector latch**

Figure A-68. Tyco GET 64 Sealed Connector Latch and Lock

Removing Socket Terminals

1. Remove the black wrap to access the back of the connector.
2. See Figure A-69. Use needle nose pliers to pull the secondary lock out of the housing.
3. See Figure A-70. Orient the bevel of the TERMINAL EXTRACTOR (Part No. B-50085) (1) to the upper or lower terminal row. Insert the extractor into the slot next to the terminal.

4. Rotate the extractor to release the retention beam and simultaneously pull on the wire lead to remove the terminal.

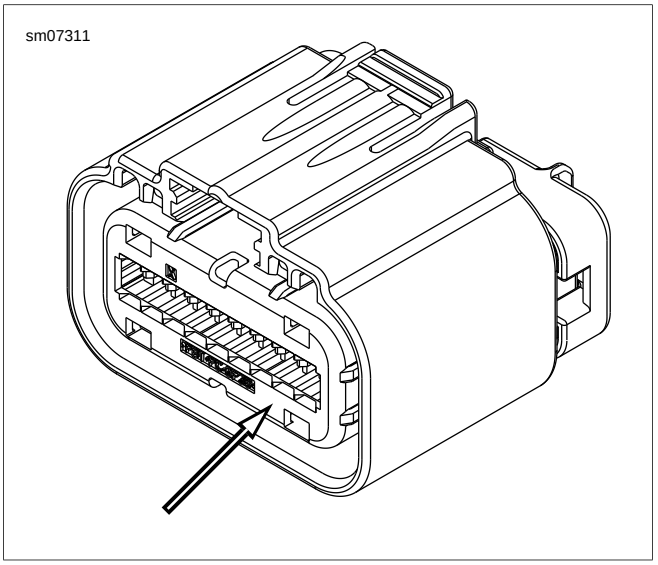
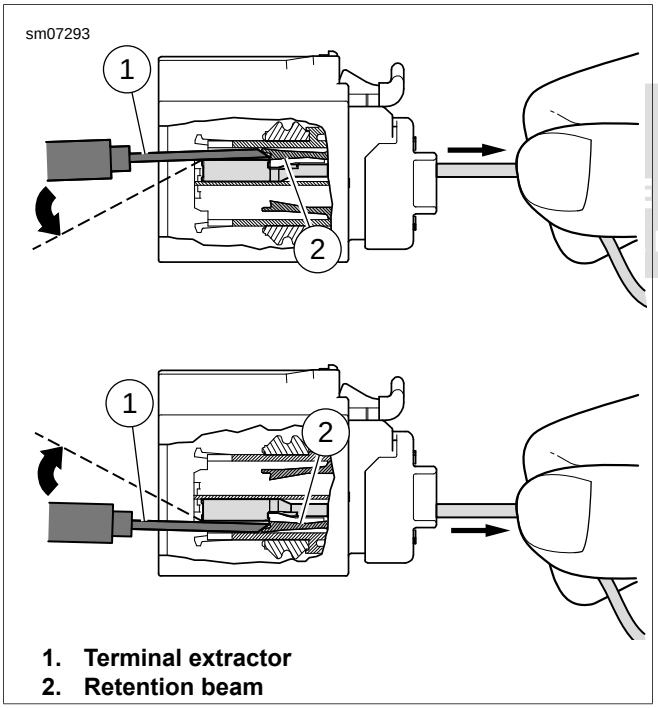


Figure A-69. Tyco GET 64 Secondary Lock



1. **Terminal extractor**
2. **Retention beam**

Figure A-70. Removing Terminals: Tyco GET 64 Sealed Connector

Installing Socket Terminals

1. See Figure A-71. Locate the wire lead cavity by number.
2. See Figure A-72. Orient the open side of the crimp to the lower or the upper terminal row.
3. Press the terminal in through the rear cover and the seal until it clicks.
4. Press the secondary lock into the locked position.
5. Black wrap the wire lead bundle.

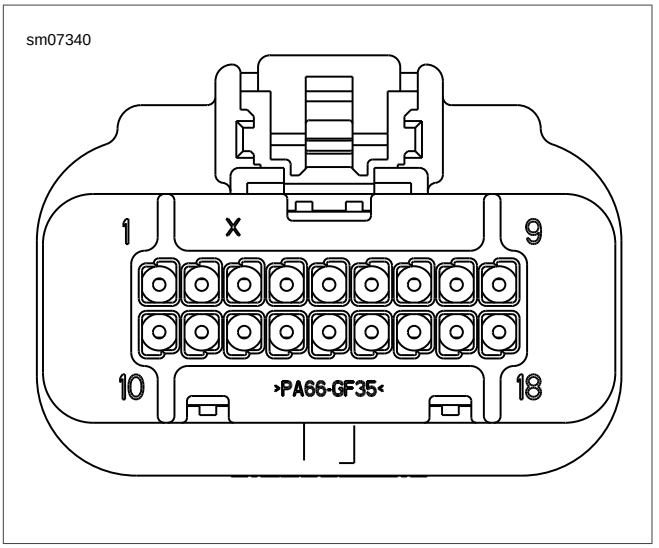


Figure A-71. Cavity Numbers

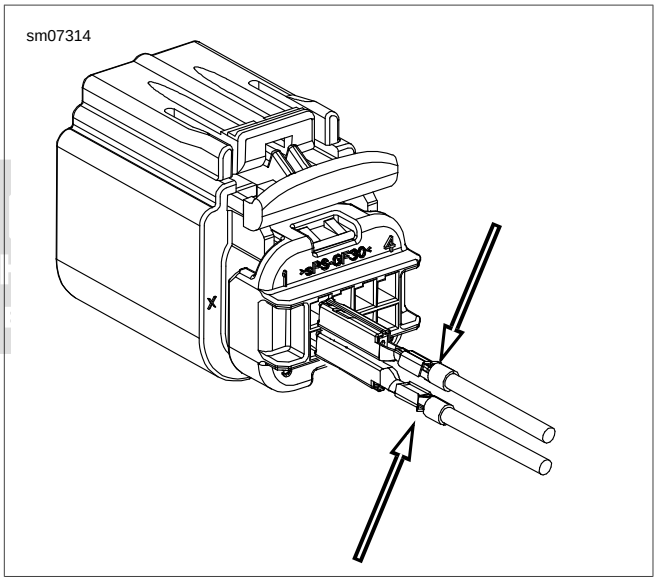


Figure A-72. Socket Terminal Orientation: Crimp Open Side

CRIMPING TERMINALS

PART NUMBER	TOOL NAME
HD-50120	UNIVERSAL CRIMPER SET
HD-50120-2	HAND CRIMP FRAME
HD-50120-7	TYCO AND DELPHI TERMINAL CRIMP DIE

Crimping Tyco GET 64 terminals requires the use of the TYCO AND DELPHI TERMINAL CRIMP DIE (Part No. HD-50120-7) in the HAND CRIMP FRAME (Part No. HD-50120-2). These items are included in the UNIVERSAL CRIMPER SET (Part No. HD-50120).

For the correct terminal crimping procedure, refer to the instruction sheet provided with the tool or available on h-dnet.com.

TYCO MCP SEALED CONNECTOR A.23

TYCO MCP SEALED CONNECTOR

PART NUMBER	TOOL NAME
B-50085	TERMINAL EXTRACTOR
GA500A	SNAP-ON TERMINAL PICK

General

The Tyco MCP sealed connector is used on certain ABS modules.

Housing

Separate: See Figure A-73. Press and hold the lock tab. Pulling on both ends of the lever, open the lever.

Join: Gently mate the pins to the socket. Press and hold the lock tab. Pressing on both ends of the lever, close the lever.

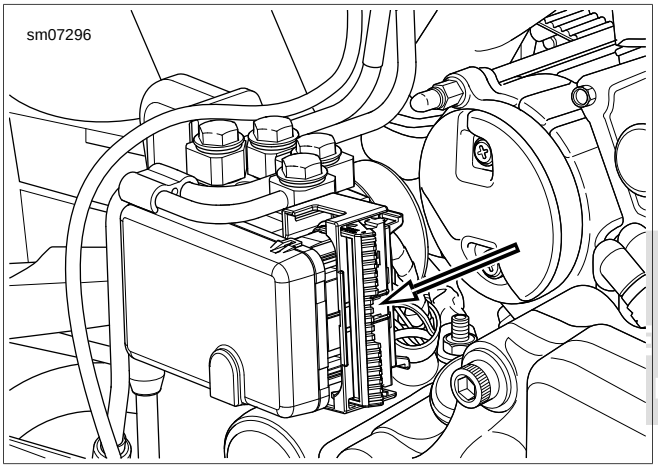


Figure A-73. Tyco MCP Connector Release Bar

Removing the Large Terminals

1. Snap the wire harness cover off of the back of the connector

NOTE

Insert a thin flat bladed screwdriver all the way to the bottom behind the tab of the secondary lock.

2. See Figure A-74. Gently slide the secondary lock out of the connector with a screwdriver.
3. See Figure A-75. Insert the smallest pins of the SNAP-ON TERMINAL PICK (Part No. GA500A) into the gaps on each side of the socket to compress the tangs on each side of the terminal.
4. Gently pull on the wire to remove the terminal.

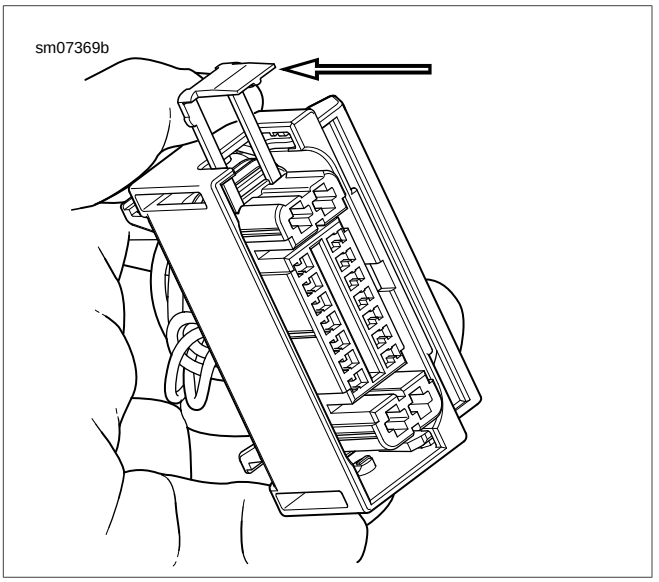


Figure A-74. Tyco MCP Connector Secondary Lock

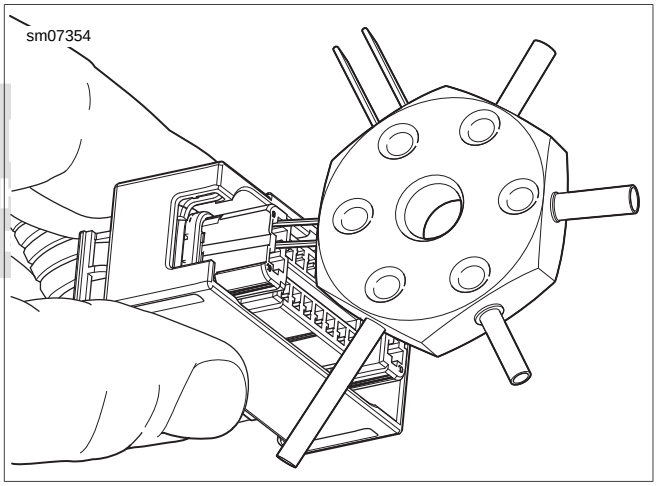


Figure A-75. Removing Large Socket Terminals: Tyco MCP Connector

Removing the Small Terminals

1. Snap the wire harness cover off of the back of the connector

NOTE

Insert a thin flat bladed screwdriver all the way to the bottom behind the tab of the secondary lock.

2. See Figure A-74. Gently slide the secondary lock out of the connector with a screwdriver.
3. See Figure A-76. Insert the TERMINAL EXTRACTOR (Part No. B-50085) into the cavity on the outside of the terminal.
4. Tilt the extractor to lift the molding latch and release the terminal.
5. Gently pull on the wire to remove the terminal.

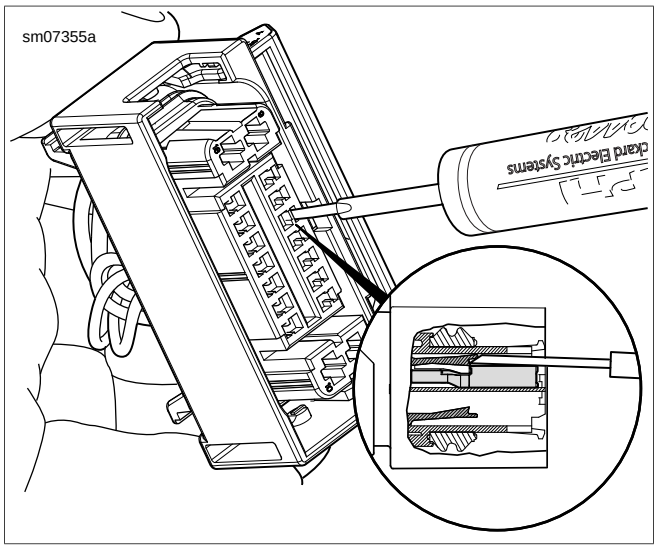


Figure A-76. Removing Small Socket Terminal: Tyco MCP Connector

Installing Terminals

1. See Figure A-77. Locate the wire lead cavity by number.
2. Use a hobby knife to bend the tangs on each side of the terminal outward.
3. Align the socket.
4. Push the socket in until it clicks.
5. Press the secondary lock back into the connector.
6. Snap the wire cover in place.

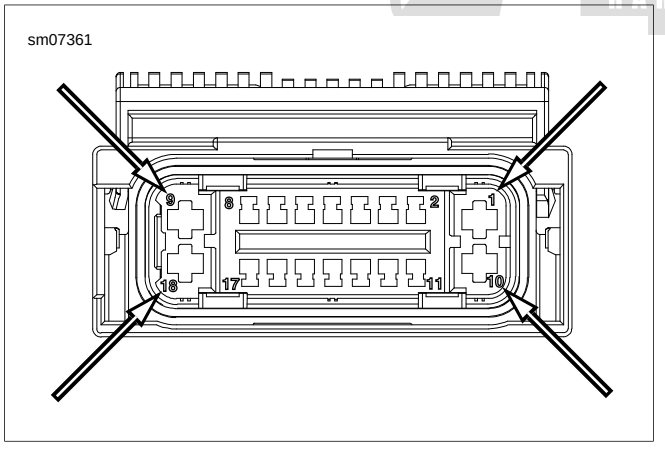


Figure A-77. Tyco MCP Sealed Connector Cavity Numbers

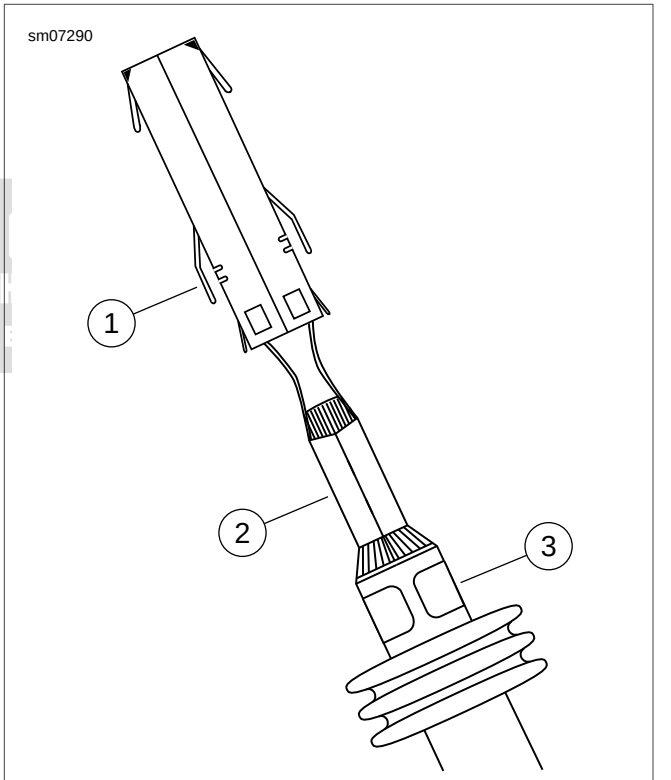
CRIMPING TERMINALS

PART NUMBER	TOOL NAME
HD-50120	UNIVERSAL CRIMPER SET
HD-50120-8	TYCO MCP DIE

1. Strip the wire insulation to specification. Refer to Table A-8.
2. Install the TYCO MCP DIE (Part No. HD-50120-8) in the handle of the UNIVERSAL CRIMPER SET (Part No. HD-50120).
3. Place the **new** terminal in the specified nest.
4. Insert the wire to the wire stop.
5. Crimp the terminal.
6. Inspect the crimped terminal.

Table A-8. Tyco MCP Crimper Die (Part No. HD-50120-8)

TERMINAL	PART NO.	STRIP LENGTH		NEST
		in	mm	
Large socket: 14 AWG	72579-12	0.165-0.189	4.2-4.8	A
Large socket: 16 AWG	72579-12	0.165-0.189	4.2-4.8	B
Small socket: 20 AWG	72580-12	0.130-0.153	3.3-3.9	C



1. **Locking tang**
2. **Lead crimp**
3. **Seal crimp**

Figure A-78. Tyco MCP Socket Terminal Crimp

SEALED SPLICE CONNECTORS A.24

SEALED SPLICE CONNECTOR REPAIR

PART NUMBER	TOOL NAME
HD-25070	ROBINAIR HEAT GUN
HD-38125-8	PACKARD TERMINAL CRIMPER
HD-39969	ULTRA TORCH
HD-41183	HEAT SHIELD ATTACHMENT

General

Splice connectors and several OE ring terminal connectors use heat shrink covering to seal the connection.

Preparing Wire Leads

NOTE

When splicing adjacent wires, stagger the splices that the sealed splice connectors will not touch each other.

1. Using a shop gauge, identify the gauge of the wire.
2. Match the wire gauge to a sealed splice connector by color and part number. Refer to Table A-9.
3. Strip insulation off the wire lead. Refer to Table A-9.

Table A-9. Sealed Splice Connectors

WIRE GAUGE	COLOR	PART NO.	STRIP LENGTH	
			in	mm
18-20 (0.5-0.8 mm)	Red	70585-93	3/8	9.5
14-16 (1.0-2.0 mm)	Blue	70586-93	3/8	9.5
10-12 (3.0-5.0 mm)	Yellow	70587-93	3/8	9.5

NOTE

If any copper wire strands are cut off of the wire core, trim the end and strip the wire again in a larger gauge stripper.

Splicing Wire Leads

NOTE

See Figure A-80. The connector is crimped on one side and then the other.

1. See Figure A-79. Open the PACKARD TERMINAL CRIMPER (Part No. HD-38125-8) ratchet by squeezing the handles closed.
2. Match the connector color to the wire gauge crimp die in the jaws. Insert one end of the sealed connector.
3. Gently squeeze the handles until the connector is held in the jaws.
4. See Figure A-80. Feed the stripped end of a wire into the connector until the wire stops inside the metal insert (1).
5. Squeeze the handles tightly closed to crimp the lead in the insert (2). The tool automatically opens when the crimping is complete.
6. Slide the connector to the other half of the metal insert. Insert the stripped wire lead (1) until it stops. Crimp the lead in the insert (2).

⚠WARNING

Be sure to follow manufacturer's instructions when using the UltraTorch UT-100 or any other radiant heating device. Failure to follow manufacturer's instructions can cause a fire, which could result in death or serious injury. (00335a)

- Avoid directing heat toward any electrical system component that is not being serviced.
- Always keep hands away from tool tip area and heat shrink attachment.

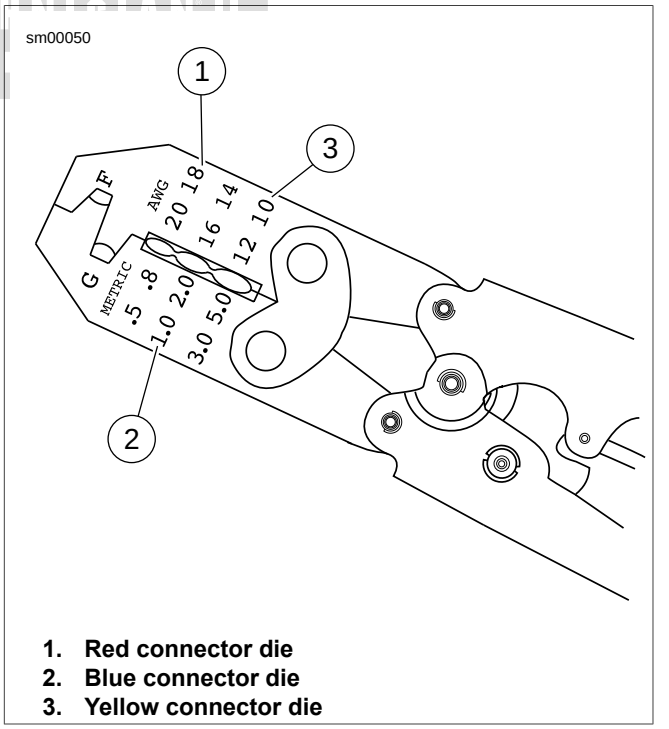
7. Use an ULTRA TORCH (Part No. HD-39969), or a ROBINAIR HEAT GUN (Part No. HD-25070) with a HEAT SHIELD ATTACHMENT (Part No. HD-41183), to heat the connector from the center of the crimp (3) out to each end.

NOTE

It is acceptable for the splice to rest against the heat shrink tool attachment.

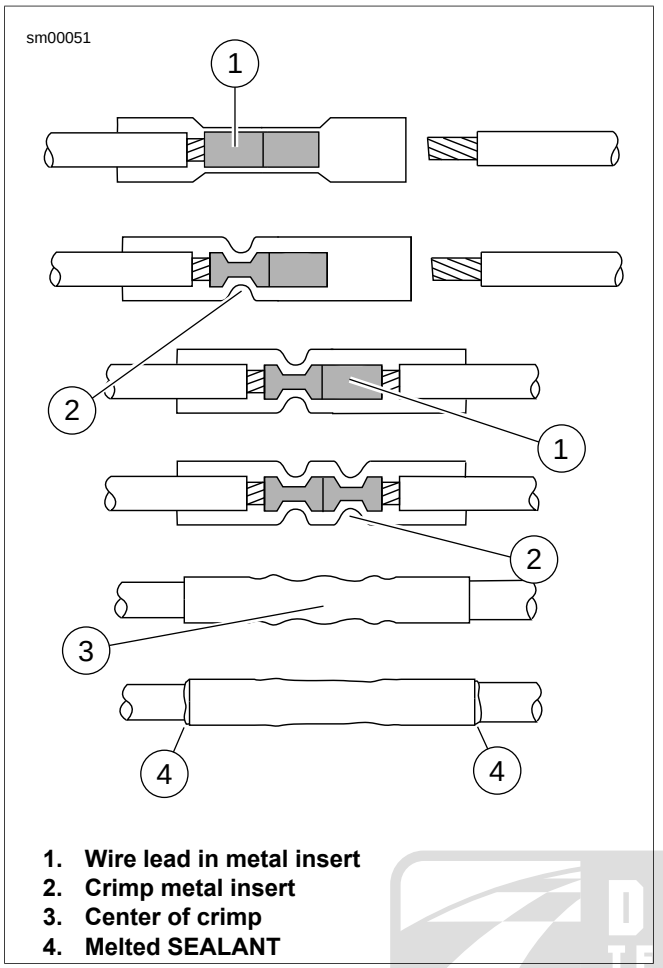
Inspecting Seals

See Figure A-80. Allow the splice to cool and inspect the seal. The insulation should appear smooth and cylindrical. Melted sealant will have extruded out the ends (4) of the insulation.



1. **Red connector die**
2. **Blue connector die**
3. **Yellow connector die**

Figure A-79. Packard Crimping Tool (HD-38125-8)



1. **Wire lead in metal insert**
2. **Crimp metal insert**
3. **Center of crimp**
4. **Melted SEALANT**

Figure A-80. Sealed Splice Connector

TABLE OF CONTENTS

NOTES

CONNECTORS B.1

CONNECTOR LOCATIONS

Function/Location

All vehicle connectors are identified by their function and location. Refer to Table B-1.

Place and Color

The place (number of wire cavities of a connector housing) and color of the connector can also aid identification.

Connector Number

On wiring diagrams and in service/repair instructions, connectors are identified by a number in brackets.

Repair Instructions

The repair instructions in Appendix A are by connector type. Refer to Table B-1.

Table B-1. Connector Locations

NO.	DESCRIPTION	TYPE	TERMINAL PROBE COLOR	LOCATION
[1]	Fairing harness	16-place Molex MX 150 Sealed (BK)	Gray	Inner fairing - right radio support bracket
[2]	Fairing harness	12-place Molex MX 150 Sealed (GY)	Gray	Inner fairing - left radio support bracket
[4]	P&A accessory	8-way Molex MX150 (GY)	Gray	Under left side cover
[5]	Main fuse	2-place Delphi 800 Metri-Pack Sealed (BK)	Red	Under left side cover
[7]	Rear fender lights harness	6-way Molex MX150 Sealed (BK)	Gray	Top of rear fender (under seat)
[12]	Tour-Pak lights	6-way Molex MX150 Sealed (BK)	Gray	Under seat in front of Tour-Pak
[12-2]	Right side marker light	2-way Tyco 070 Multilock Unsealed (BK)	Gray	Inside Tour-Pak
[12-3]	Left side marker light	2-way Tyco 070 Multilock Unsealed (BK)	Gray	Inside Tour-Pak
[13]	Fuel tank harness	4-way Molex MX150 Sealed (GY)	Gray	Behind fuel tank (under seat)
[18]	Right rear turn signal	2-place Tyco 070 Multilock Unsealed (BK)	Gray	Circuit board under tail lamp assembly
[19]	Left rear turn signal	2-place Tyco 070 Multilock Unsealed (BK)	Gray	Circuit board under tail lamp assembly
[20]	Console harness	8-way Molex MX150 Sealed (BK)	Gray	Under seat
[22-1]	RHCM main harness	4-place JAE MX19 Sealed (BK)	Yellow	Inner fairing - under radio right side (with fairing) (except FLT) Instrument nacelle (back of speedometer) (FLT models) Inside headlamp nacelle (without fairing)
	RHCM	4-place JST JWPF Sealed (W)	Light blue	Inside RHCM housing
[22-2]	RHCM main harness	2-place JAE MX19 Sealed (BK)	Yellow	Inner fairing - under radio right side (with fairing) (except FLT) Instrument nacelle (back of speedometer) (FLT models) Inside headlamp nacelle (without fairing)
	RHCM	2-place JST JWPF Sealed (W)	Light blue	Inside RHCM housing

Table B-1. Connector Locations

NO.	DESCRIPTION	TYPE	TERMINAL PROBE COLOR	LOCATION
[24]	LHCM main harness	4-place JAE MX19 Sealed (BK)	Yellow	Inner fairing - under radio left side (with fairing) (except FLT) Instrument nacelle (back of speedo-meter) (FLT models) Inside headlamp nacelle (without fairing)
	LHCM	4-place JST JWPF Sealed (W)	Light blue	Inside LHCM housing
[27]	Radio	48-way Molex CMC Sealed (BK)	Breakout Box	Inner fairing - back of radio (right side)
[29]	Position lamp (if equipped)	2-way EPC (BK)	Gray	Inside headlamp nacelle
[31L]	Left front turn signal/auxiliary lamp	4-way Tyco 070 Multilock Unsealed (BK) (without fairing) 4-way JAE MX19 Sealed (BK) (with fairing)	Gray Yellow	Inside headlamp nacelle (without fairing) Inside left front turn signal/Aux lamp support (with fairing) (except FLT) Inner fairing - lower right side (FLT)
[31R]	Right front turn signal/auxiliary lamp	6-way Tyco 070 Multilock Unsealed (BK) (without fairing) 4-way JAE MX19 Sealed (BK) (with fairing)	Gray Yellow	Inside headlamp nacelle (without fairing) Inside right front turn signal/Aux lamp support (with fairing) (except FLT) Inner fairing - lower right side (FLT)
[32]	Front fender tip lamp jumper harness (if equipped)	2-place Tyco 070 Multilock Unsealed (BK)	Gray	Inner fairing - below upper for bracket (left side) (with fairing) Inside headlamp nacelle (without fairing)
[33]	Ignition switch	2-way Delphi GT 150 3.5mm sealed (GY)	Gray	Bottom of ignition switch (with fairing) Under console (without fairing)
[34-1]	Right front speaker	2-Way Molex MX150 (BK)	Gray	Inner fairing (right speaker enclosure)
[34-2]	Right front speaker	Tyco Insulated Spade terminals (BK)	Gray	Inner fairing (back of right speaker)
[35-1]	Left front speaker	2-Way Molex MX150 (BK)	Gray	Inner fairing (left speaker enclosure)
[35-2]	Left front speaker	Tyco Insulated Spade terminals (BK)	Gray	Inner fairing (back of left speaker)
[36+] [36-]	Left rear speaker	Tyco Insulated Spade terminals (BK)	Gray	Inside left speaker POD (back of left speaker)
[37+] [37-]	Left rear speaker	Tyco Insulated Spade terminals (BK)	Gray	Inside right speaker POD (back of right speaker)
[38]	Headlamp	4-way Delphi 150 Metri-Pack (BK)	Gray	Inner fairing back of headlamp
[38HI]	Headlamp high beam	2-way Tyco (GY)	Gray	Inside headlamp nacelle
[38LO]	Headlamp low beam	2-way Tyco (BK)	Gray	Inside headlamp nacelle
[39]	Speedometer (without fairing) IM (with fairing)	12-place Delphi Micro 64 Sealed (GY)	Breakout Box	Back of speedometer under console (without fairing) (except FLT) Instrument nacelle (back of IM) (FLT models) Inner fairing back of IM (with fairing)
[41+] [41-]	Right saddlebag speaker	Tyco Insulated Spade terminals (BK)	Gray	Inside right saddlebag (back of speaker)
[42+] [42-]	Left saddlebag speaker	Tyco Insulated Spade terminals (BK)	Gray	Inside left saddlebag (back of speaker)
[45]	Rear fender tip lamp (if equipped)	2-way Tyco 070 Unsealed	Gray	Circuit board under tail lamp assembly

Table B-1. Connector Locations

NO.	DESCRIPTION	TYPE	TERMINAL PROBE COLOR	LOCATION
[47]	Stator	3-place Dekko (BK)	Green	Bottom of voltage regulator (left side)
[50]	CB antenna cable			Inner fairing - back of CB module
[51]	Radio antenna cable			Inner fairing - back of radio (left side)
[52]	Radio antenna cable to mast			Inside of Tour-Pak
[53]	Rider headset	6-way Molex MX150 (BK)	Gray	Under seat
[64]	Fuse block	24-way fargo fuse block unsealed (BK)	Gray	Under left side cover
[65]	VSS	3-place Delphi GT 150 Sealed (BK)	Gray	Top of transmission case (under starter)
[67]	Accessory switch	4-place Tyco Mate-N-lok Unsealed (BK)	Gray	Inside headlamp nacelle
[73]	Auxiliary/fog lamps	2-way Delphi 280 Metri-Pack Sealed (BK)	Purple	Inside auxiliary/fog lamps
[76]	Passenger headset	7-place DIN (BK)		Below rear left speaker box
[77]	Voltage regulator	2-place Dekko (BK)	Green	Bottom of voltage regulator (right side)
[78-1]	ECM	18-way Tyco (BK)	Breakout Box	Under seat
[78-2]	ECM	18-way Tyco (GY)	Breakout Box	Under seat
[78-3]	ECM	18-way Tyco (BN)	Breakout Box	Under seat
[79]	CKP sensor	2-place Deutsch DTM Sealed (BK)	Brown	Rear of lower front frame cross-member
[80]	TMAP sensor	4-place Bosch Compact 1.1M Sealed (BK)	Gray	Top of induction module
[83]	Ignition coil	4-place Delphi GT 150 Sealed (BK)	Gray	Bottom front of battery tray
[84]	Front fuel injector	2-place Molex BPT Sealed (BK)	Purple	Below fuel tank (left side)
[85]	Rear fuel injector	2-place Molex BPT Sealed (BK)	Purple	Below fuel tank (left side)
[90]	ET sensor	2-place Delphi GT 150 Sealed (BK)	Gray	Back of front cylinder (left side)
[91]	DLC	4-place Deutsch DT Sealed (GY)	Black	Under left side cover
[91-2]	DLC	6-way Deutsch DT sealed (GY)	Black	Under left side cover
[93]	Tail lamp	4-place Tyco 070 Multilock Unsealed (BK)	Gray	Circuit board under tail lamp assembly
[94]	Rear fender lights harness in circuit board	6-place Tyco 070 Multilock Unsealed (BK)	Gray	Circuit board under tail lamp assembly
[95]	Purge solenoid	2-place Delphi 150 Metri-Pack Sealed (R)	Gray	Under seat
[97]	Right cooling fan	2-way Delphi 150 Metri-Pack Sealed (BK)	Gray	Inside right lower fairing
[105L]	OE dash switch pack	6-way Molex MX150 Sealed (BK)	Gray	Behind switch cover (left side)
[105R]	P&A dash switch pack	6-way Molex MX150 Sealed (BK)	Gray	Behind switch cover (right side)
[107]	AAT sensor	2-way Molex MX64 Unsealed (BK)	Light blue	Steering head, left side

Table B-1. Connector Locations

NO.	DESCRIPTION	TYPE	TERMINAL PROBE COLOR	LOCATION
[109]	Auxiliary lamps switch (without fairing)	4-place Tyco Mate-N-Lok Unsealed (BK)	Gray	Inside headlamp nacelle
[111]	Voltmeter	4-way Delphi GT 150 3.5mm Sealed (BK)	Gray	Inner fairing (back of voltmeter)
[111-2]	Voltmeter jumper	4-place JAEMX19 Sealed (BK)	Yellow	Inner Fairing (marked with yellow spot tape)
[117]	Fuel gauge	4-way Tyco 040 Multilock unsealed (BK) (without fairing) 4-way Delphi GT 150 3.5mm Sealed (BK) (with fairing)	Gray	Inner fairing (back of fuel gauge) (with fairing) Bottom fuel tank left side (without fairing)
[117-2]	Fuel gauge jumper	4-place JAEMX19 Sealed (BK)	Yellow	Inner Fairing (marked with yellow spot tape)
[120]	Oil pressure switch	Push-on Right Angle Molded terminal (BK)	Black	Front right crankcase
[121-1] [121-2]	Rear brake switch	Push-on Molded terminals (BK)	Red	Mid-chassis, lower right side between frame and exhaust pipe)
[122-1] [122-2]	Horn	Flag terminals (BK)	Red	Between cylinders (left side)
[128]	Starter solenoid	Delphi 56 Spade terminal (W)	Red	Top of starter
[131-1] [131-2]	Neutral switch	Push-on Right Angle Molded terminals (BK)		Top of transmission (right side)
[132]	Power outlet	2-way Tyco 070 Multilock Unsealed (BK)	Gray	Inner fairing
[132C]	Power outlet	2-place Delphi Unsealed (GY)	Red	Inner fairing
[133]	JSS	3-place Molex MX 150 Sealed (BK)	Gray	Rear of lower front frame cross-member
[137]	HO2S rear	4-place Molex MX 150 Sealed (BK)	Gray	Under right side cover
[138]	HO2S front	4-place Molex MX 150 Sealed (GY)	Gray	Under right side cover
[139]	Oil pressure sender	4-place Delphi 150 Metri-Pack Sealed (BK)	Gray	Front right crankcase
[141]	Fuel pump and fuel level sender	4-place Delphi GT 280 Sealed (BK)	Gray	Under console on top of fuel tank canopy
[142]	Security siren	3-place Delphi GT 150 Sealed (BK)	Gray	Under left side cover
[143]	Front fender tip lamp (if equipped)	2-place Tyco 070 Multilock Unsealed (BK)	Gray	Under front fender tip lamp bracket
[149-1]	Audio amplifier 1	23-place Tyco AMPSEAL Sealed (BK)	Black	Under fairing above radio
[149-2]	Audio amplifier 2	23-place Tyco AMPSEAL Sealed (BK)	Black	Inside left saddlebag
[162]	Rear audio	6-way Molex MX150 (BK) (without Tour-Pak) 16-way Molex MX150 (BK) (with Tour-Pak)	Gray	Inner fairing - above radio (FLHX/S, FLT) Under seat just in front of Tour-Pak (FLHT)
[166]	ABS module	26-way Bosch BTC Sealed (BK)	Breakout Box	Under right side cover

Table B-1. Connector Locations

NO.	DESCRIPTION	TYPE	TERMINAL PROBE COLOR	LOCATION
[167]	Front WSS	2-way Delphi 150 Metri-Pack Sealed (BK) (with fairing) 2-way Deutsch DTM Sealed (BK) (without fairing)	Gray Brown	Just below upper fork bracket right side (with fairing) Inside headlamp nacelle (without fairing)
[168]	Rear WSS	2-place Delphi 150 Metri-Pack Sealed (BK)	Gray	Under right side cover
[179]	Active exhaust actuator	5-place Tyco Superseal 1.5 Sealed (BK)	Gray	HDI: Under right side cover
[184]	CB module	12-way Molex MX150 Sealed (BK)	Gray	Inner fairing - left side of radio
[189]	Heated handgrip to main harness	2-way Tyco 040 multilock Unsealed (BK)	Gray	Inner fairing - under radio right side (with fairing) (except FLT) Instrument nacelle (back of IM) (FLT models)
[203F]	ACR (front)	2-place Tyco Superseal 1.5 Sealed	Gray	Bracket attached to the throttle body
[203R]	ACR (rear)	2-place Tyco Superseal 1.5 Sealed	Gray	Bracket attached to the throttle body
[204]	TGS jumper harness	6-place Molex MX 150 Sealed (BK)	Gray	Inner fairing - right side below radio (with fairing) (except FLT) Instrument nacelle (back of IM) (FLT models) Inside headlamp nacelle - fork stem nut lock plate (without fairing)
[206]	Heated handgrip interconnect	2-place Tyco 040 Unsealed	Gray	Inside outer fairing, right side
[209]	Security antenna	2-way Molex MX64 Unsealed (BK)	Light blue	Under seat
[211]	TCA	6-place Molex MX 150 Sealed (BK)	Gray	Right side of engine (induction module)
[215]	Left cooling fan	2-way Delphi 150 Metri-Pack Sealed (BK)	Gray	Inside left lower fairing
[224]	TGS	7-place Tyco Mini Multilock (GN)		Handlebar throttle (inside right side handlebar)
[225]	Rider headset	7-place DIN (BK)		Under Console
[226]	Rear lighting jumper harness	12-place Delphi Micro 64 Sealed (GY)	Breakout Box	Rear fender tip fascia module
[232R]	Right cooling fan jumper	2-way Molex MX150 Sealed (BK)	Gray	Under voltage regulator
[232L]	Left cooling fan jumper	4-way Molex MX150 Sealed (BK)	Gray	Under voltage regulator
[235]	Cooling pump	2-way Delphi GT 150 3.5mm Sealed (BK)	Gray	Under voltage regulator
[236]	ECT sensor	2-way Delphi GT 150 3.5mm Sealed (BK)	Gray	Inside left lower fairing
[237]	Right heated grip	2-place Tyco 040 Unsealed		Inside handlebars, right side
[242]	BCM	48-way Molex CMC Sealed (BK)	Breakout Box	Under left side cover
[243]	P&A CAN	4-place JAEMX19 Sealed (BK)	Yellow	Inner fairing next to left speaker enclosure

Table B-1. Connector Locations

NO.	DESCRIPTION	TYPE	TERMINAL PROBE COLOR	LOCATION
[258]	Power outlet	2-place Tyco 070 Multilock Unsealed (BK)	Gray	Inside Tour-Pak
[259]	BCM power	1-way Delphi 800 Metri-Pack Sealed (BK)	Red	Under left side cover
[262]	Rear lighting jumper harness	12-place Delphi Micro 64 Sealed (GY)	Breakout Box	Rear fender tip fascia module
[266]	Anti-theft tracking module	Delphi 150 Metri-Pack Sealed (BK)	Gray	Under left side cover
[280]	P&A audio	12-way Molex MX150 Sealed (GY)	Gray	Inner fairing - above radio
[281]	Battery tender	2-way overmold (BK)		Under left side cover
[287]	Tour-Pak lights	5-way Delphi 150 Metri-Pack	Gray	Inside Tour-Pak
[288]	Left saddlebag	12-place Deutsch DT Sealed (BK)	Black	Inside left saddlebag
[296]	Speaker interconnect	4-way Molex MX150 (BK)	Gray	Under seat just in front of Tour-Pak
[297]	Speaker interconnect	4-way Molex MX150 (BK)	Gray	Under seat just in front of Tour-Pak
[298]	Right saddlebag	2-way Molex MX150 (BK)	Gray	Inside right saddlebag
[299]	P&A accessory power	2-place Tyco 070 Multilock Unsealed (BK)	Gray	Inner fairing
[GND1] [GND2] [GND2A]	Harness grounds	Ring terminals		Under seat
[GND3]	Fork bracket ground	1-way Push On Molded terminal (BK)		Steering head, left side

WIRING DIAGRAMS B.2

WIRING DIAGRAM INFORMATION

Wire Color Codes

Wire traces on wiring diagrams are labeled with alpha codes. Refer to Table B-2.

For Solid Color Wires: See Figure B-1. The alpha code identifies wire color.

For Striped Wires: The code is written with a slash (/) between the solid color code and the stripe code. For example, a trace labeled GN/Y is a green wire with a yellow stripe.

Wiring Diagram Symbols

See Figure B-1. On wiring diagrams and in service/repair instructions, connectors are identified by a number in brackets [ ]. The letter inside the brackets identifies whether the housing is a socket or pin housing.

A=Pin: The letter A and the pin symbol after a connector number identifies the pin side of the terminal connectors.

B=Socket: The letter B and the socket symbol after a connector number identifies the socket side of the terminal connectors. Other symbols found on the wiring diagrams include the following:

Diode: The diode allows current flow in one direction only in a circuit.

Wire break: The wire breaks are used to show option variances or page breaks.

No Connection: Two wires crossing over each other in a wiring diagram that are shown with no splice indicating they are not connected together.

Circuit to/from: This symbol indicates a more complete circuit diagram on another page. The symbol is also identifying the direction of current flow.

Splice: Splices are where two or more wires are connected together along a wiring diagram. The indication of a splice only indicates that wires are spliced to that circuit. It is not the true location of the splice in the wiring harness.

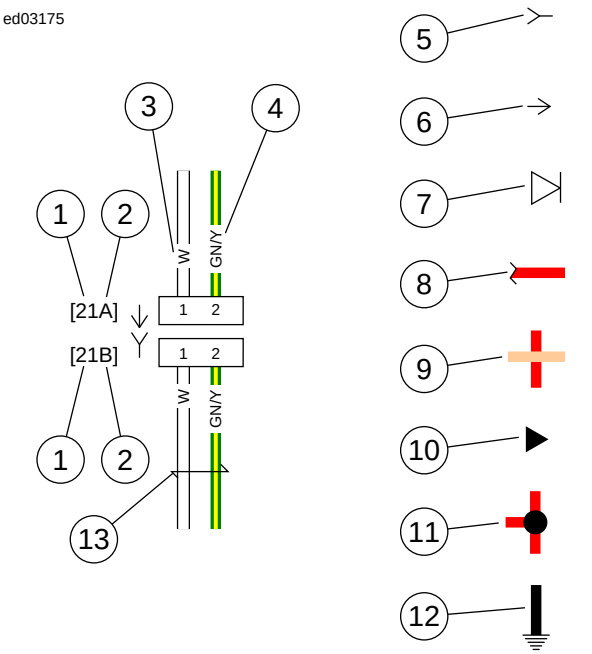
Ground: Grounds can be classified as either clean or dirty grounds. Clean grounds are identified by a (BK/GN) wire and are normally used for sensors or modules.

NOTE

Clean grounds usually do not have electric motors, coils or anything that may cause electrical interference on the ground circuit.

Dirty grounds are identified by a (BK) wire and are used for components that are not as sensitive to electrical interference.

Twisted pair: This symbol indicates the two wires are twisted together in the harness. This minimizes the circuit's electromagnetic interference from external sources. If repairs are necessary to these wires they should remain as twisted wires.



1. **Connector number**
2. **Terminal code (A=pin, B=socket)**
3. **Solid wire color**
4. **Striped wire color**
5. **Socket symbol**
6. **Pin symbol**
7. **Diode**
8. **Wire break**
9. **No connection**
10. **Circuit to/from**
11. **Splice**
12. **Ground**
13. **Twisted pair**

Figure B-1. Connector/Wiring Diagram Symbols

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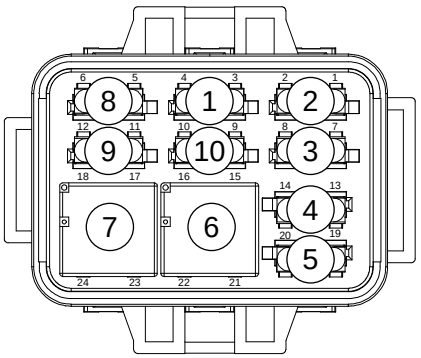

1. **System power**
2. **Battery**
3. **Spare**
4. **Spare**
5. **Spare**
6. **Cooling relay**
7. **P&A relay**
8. **P&A**
9. **Radio**
10. **Cooling**

Figure B-2. Fuse Block [64B]

Table B-2. Wire Color Codes

ALPHA CODE	WIRE COLOR
BE	Blue
BK	Black
BN	Brown
GN	Green
GY	Gray
LBE	Light Blue
LGN	Light Green
O	Orange
PK	Pink
R	Red
TN	Tan
V	Violet
W	White
Y	Yellow

2015 TOURING WIRING DIAGRAMS

Wiring Diagram List

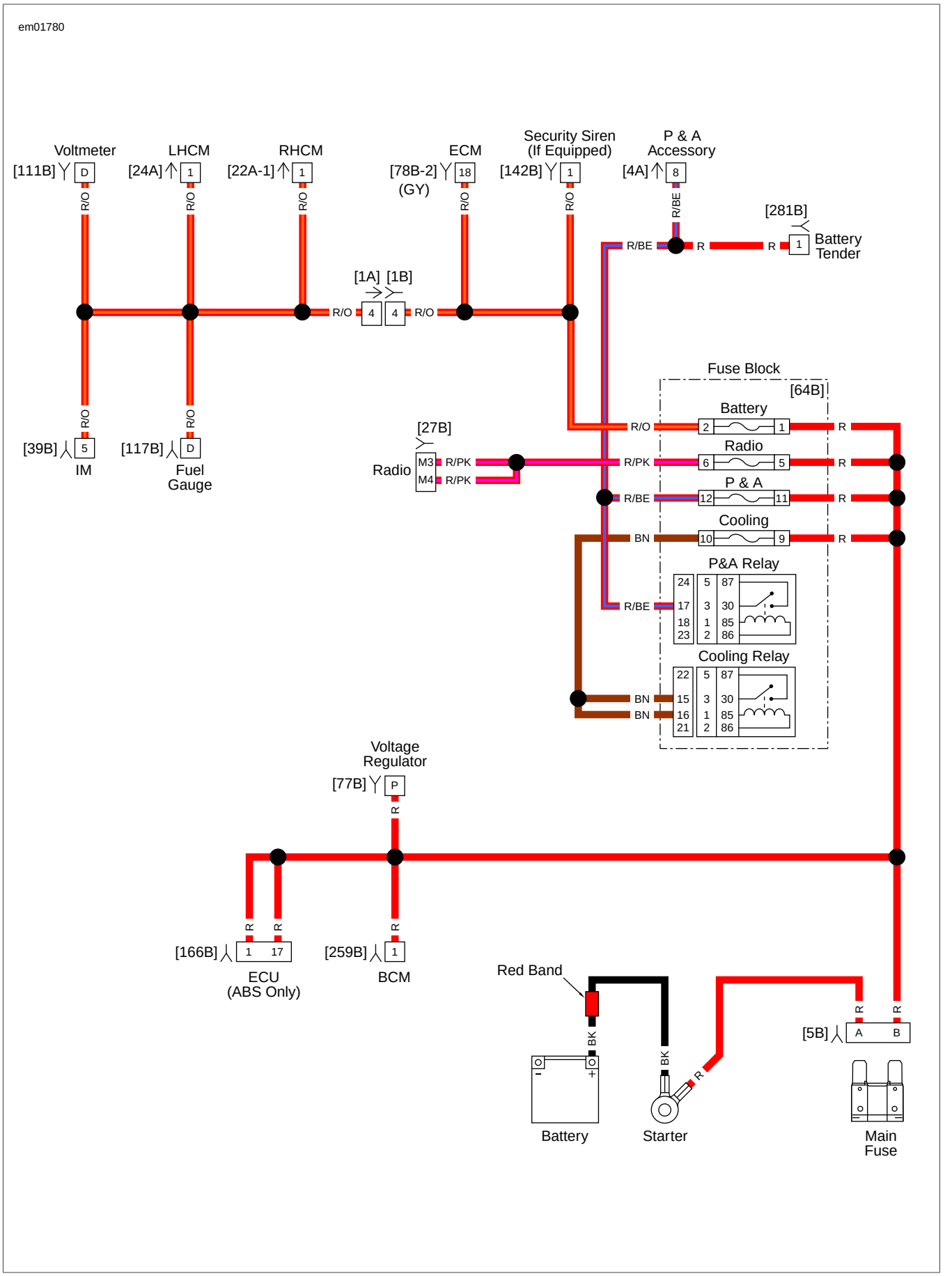

Figure B-3. Battery Power Distribution: FLH With Fairing

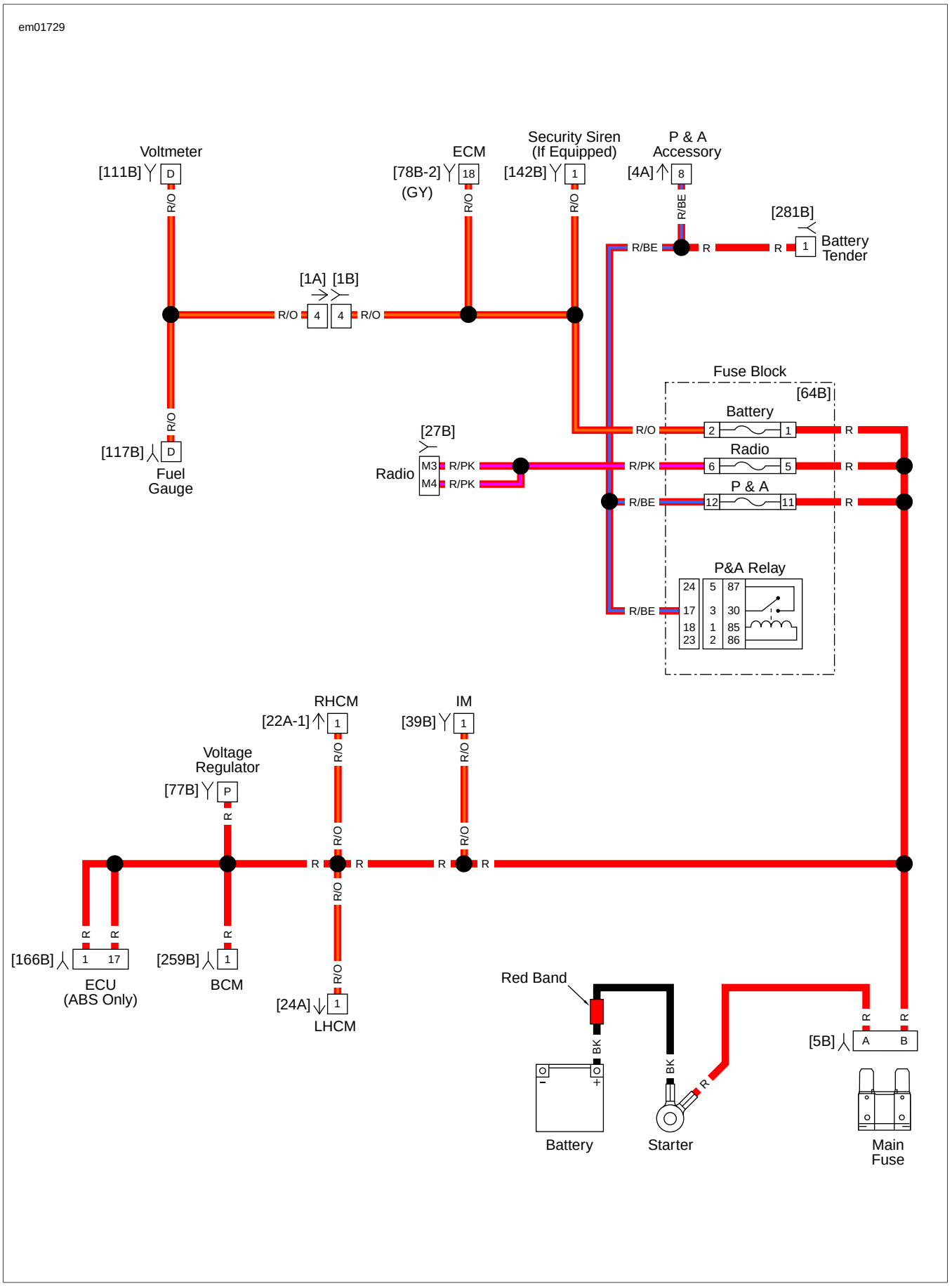

Figure B-4. Battery Power Distribution: FLT

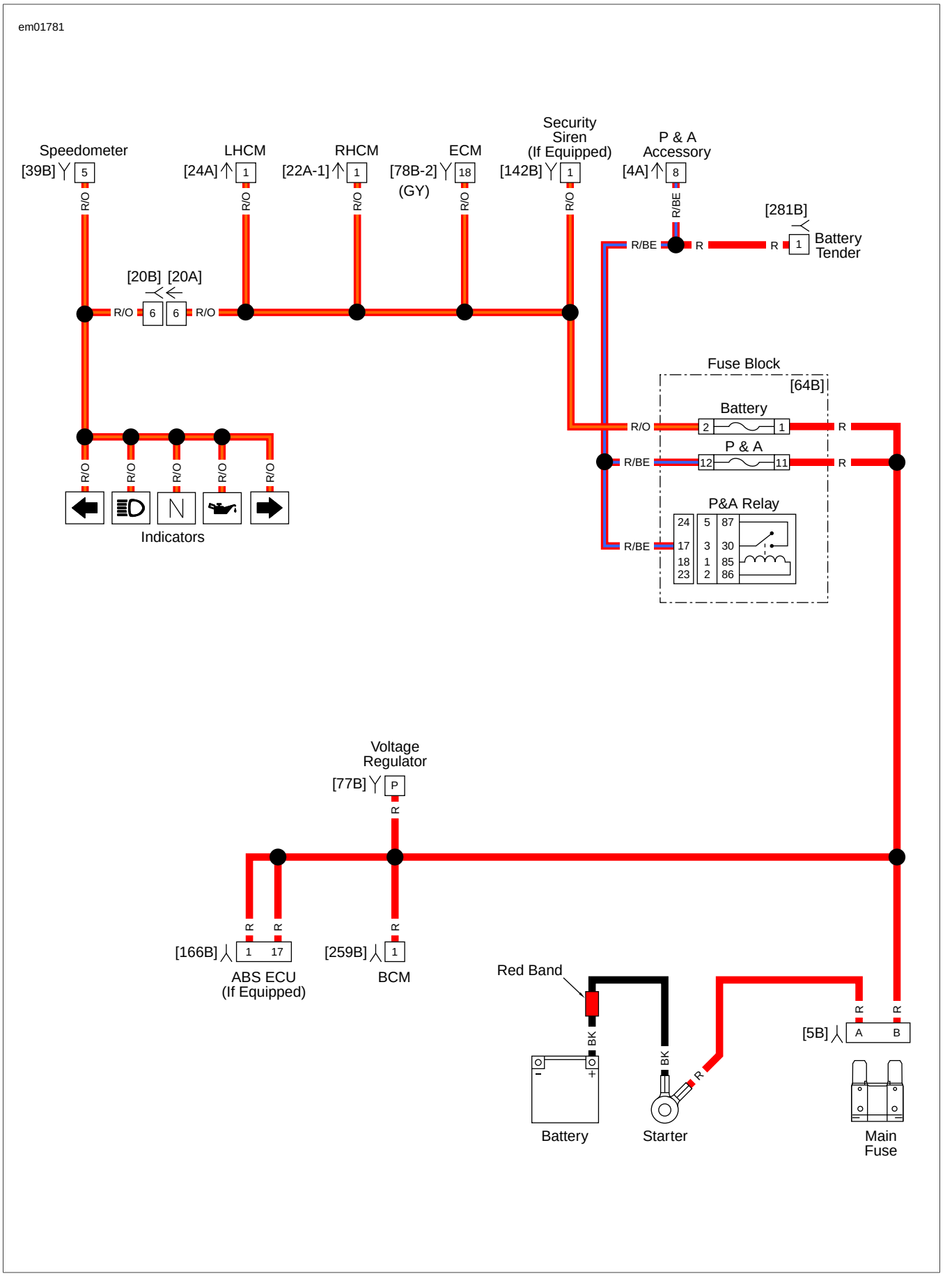

Figure B-5. Battery Power Distribution: Without Fairing

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P&A Accessory Power [299A] 1 V/BE
Front Power Outlet [132A] 1 V/BE
[189B] 1 V/BE
[2A] [2B] 2 2 V/BE
OE Dash Switch Pack [105LB] 5 V/BE
P&A Dash Switch Pack [105RB] 5 V/BE
P&A Accessory [4B] 3 V/BE
CB Module [184A] 9 R/BE V/BE
P&A Audio [280A] 9 V/BE
Accessory Switch [67A] 1 V/BE
P&A Accessory [4B] 3 V/BE
With Fairing
W/O Fairing
Fuel Gauge [162A] 14 R/Y
Auxiliary Lamps Switch [109A] 1 R/Y
[162A] 14 R/Y
W/O Fairing
With Fairing, Except FLHX
Except FLHX
R/Y
FLHX
ECM [78B-2] (GY) 16 R/GN
Rear Fuel Injector [85B] A R/GN
Front Fuel Injector [84B] A R/GN
Ignition Coil [83B] A R/GN
Fuse Block [64B]
7.5A System Power
R/GN 4 3 V/GN
P&A Relay
V/BE 24 5 87 17 3 30 18 1 85 23 2 86
R/Y
DLC [91A] 5 R/Y
Purge Solenoid [95B] A V/GN
ACR Front [203FB] 1 V/GN
HO2S Front [138A] 1 V/GN
[179B] 1 Active Exhaust Actuator (If Equipped)
[203RB] 1 ACR Rear
[137A] 1 HO2S Rear
[1A] [1B] 10 10 13 13
BE
BE/BK
[32A] Front Fender Tip Lamp Jumper Harness
[31LA] Left Front Turn Signal/ Auxiliary Lamps
[31RA] Right Front Turn Signal/ Auxiliary Lamps
[38A] Head Lamp
With Fairing, Except FLHX
[12A] [12B] 3 3 1 1
[258A] Rear Power Outlet
[12-2A] Right Side Marker Light
[12-3A] Left Side Marker Light
[287A] Tour-Pak Lights (If Equipped)
[7A] 3 1 See Rear Lighting
[13B] [13A] 1 1 R/BN
[141B] Fuel Pump And Fuel Level Sender
[139B] A B W/O
Oil Pressure Sender With Fairing
[141B] Oil Pressure Switch W/O Fairing
[242B] [242A] E3 F4 J3 L3 L4 M2
Oil Pressure Input
Fuel Pump Power
Running/Position light Power
System Power
AUX Lamp Power
Accessory Power
BCM
[259B] [259A] R
Red Band
Battery
Starter
[5B] A B
50A Main Fuse

Figure B-6. Ignition and ACC FLH: 2015 Touring

Figure B-6.
Ignition and ACC FLH: 2015 Touring

Figure B-6.
Ignition and ACC FLH: 2015 Touring

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P&A Accessory Power
[299A] 1 V/BE
Front Power Outlet
[132A] 1 V/BE
[2A] [2B]
V/BE 2 2 V/BE
OE Dash Switch Pack
[105LB] 5 V/BE
P&A Dash Switch Pack
[105RB] 5 V/BE
Heated Hand Grips
[189B] 1 V/BK
V/BE
P&A Audio
[280A] 9 V/BE
P&A Accessory
[4B] 3 V/BE

ECM
[78B-2] 16 (GY) R/GN
Rear Fuel Injector
[85B] A R/GN
Front Fuel Injector
[84B] A R/GN
Ignition Coil
[83B] A R/GN

Fuse Block
[64B]
7.5A System Power
R/GN 4 3 V/GN
P&A Relay
V/BE 24 5 87 17 3 30 18 1 85 23 2 86
R/Y

DLC
[91A] 5 R/Y

[1A] [1B]
BE 10 10 BE
BE/BK 13 13 BE/BK
R/Y 16 16 R/Y

BE/BK BE 1 4 [31LA]
Left Front Turn Signal/ Auxiliary Lamps
BE/BK BE 1 4 [31RA]
Right Front Turn Signal/ Auxiliary Lamps
R/Y 1 [38B]
Head Lamp

Purge Solenoid
[95B] A V/GN
ACR Front
[203FB] 1 V/GN
HO2S Front
[138A] 1 V/GN

V/GN 1 [179B]
Active Exhaust Actuator (If Equipped)
V/GN 1 [203RB]
ACR Rear
V/GN 1 [137A]
HO2S Rear

BE R/Y 3 1 [7A]
See Rear Lighting

R/BN 1 [13B] 1 [13A]
1 [141B]
Fuel Pump And Fuel Level Sender

W/O W/O A B [139B]
Oil Pressure Sender

W/O R/BN BE R/GN BE/BK R/Y
[242B] E3 F4 J3 L3 L4 M2
[242A] E3 F4 J3 L3 L4 M2
Oil Pressure Input
Fuel Pump Power
Running/Position light Power
System Power
AUX Lamp Power
Accessory Power
BCM

R 1 [259B] 1 [259A]
Red Band
BK
Battery
BK R
Starter
R R A B [5B]
50A Main Fuse

Figure B-7. Ignition and ACC FLT: 2015 Touring

Figure B-7.
Ignition and ACC FLT: 2015 Touring

Figure B-7.
Ignition and ACC FLT: 2015 Touring

et00711

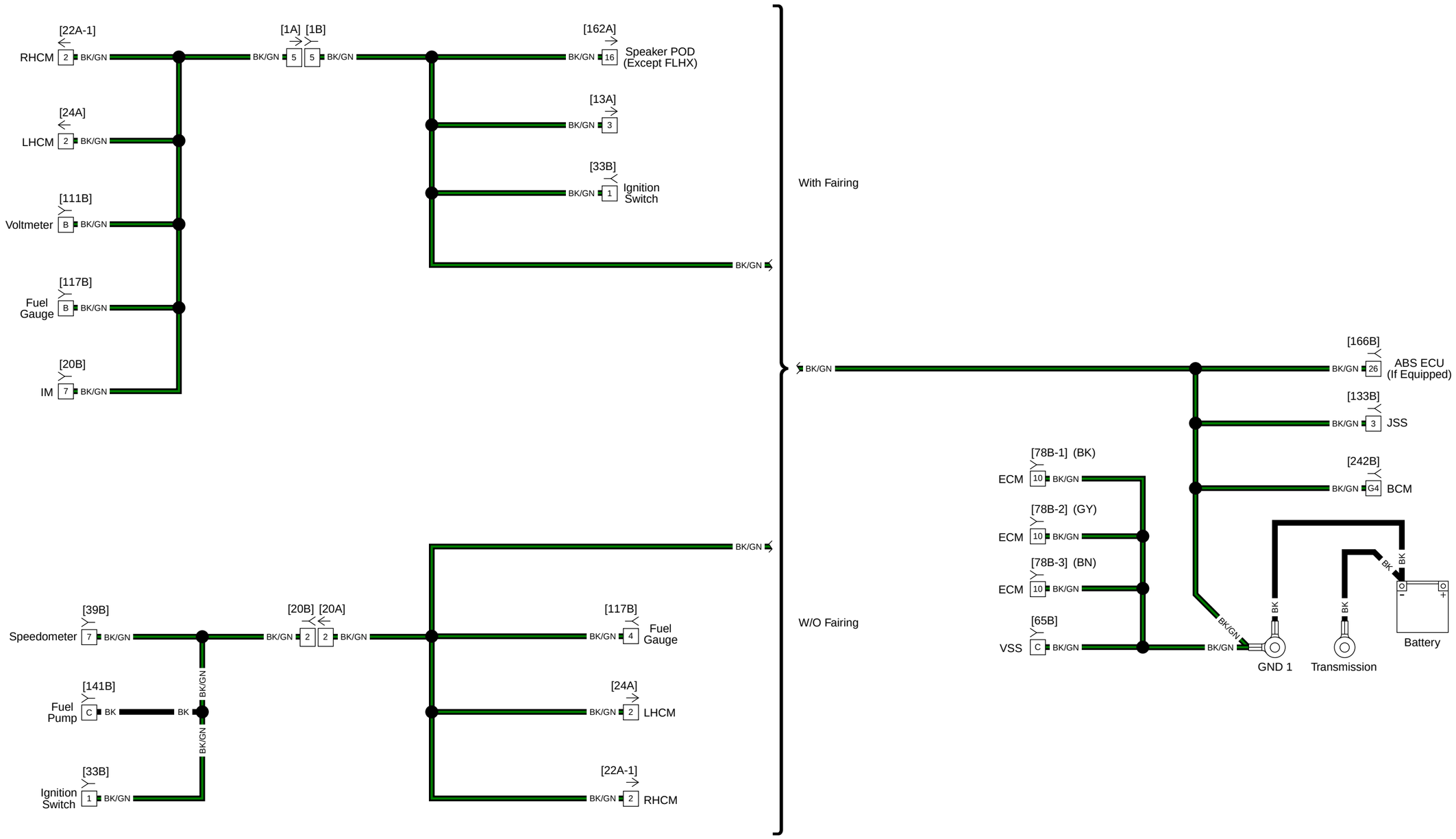

Figure B-8. Sensor Grounds FLH: 2015 Touring

Figure B-8.
Sensor Grounds FLH: 2015 Touring

Figure B-8.
Sensor Grounds FLH: 2015 Touring

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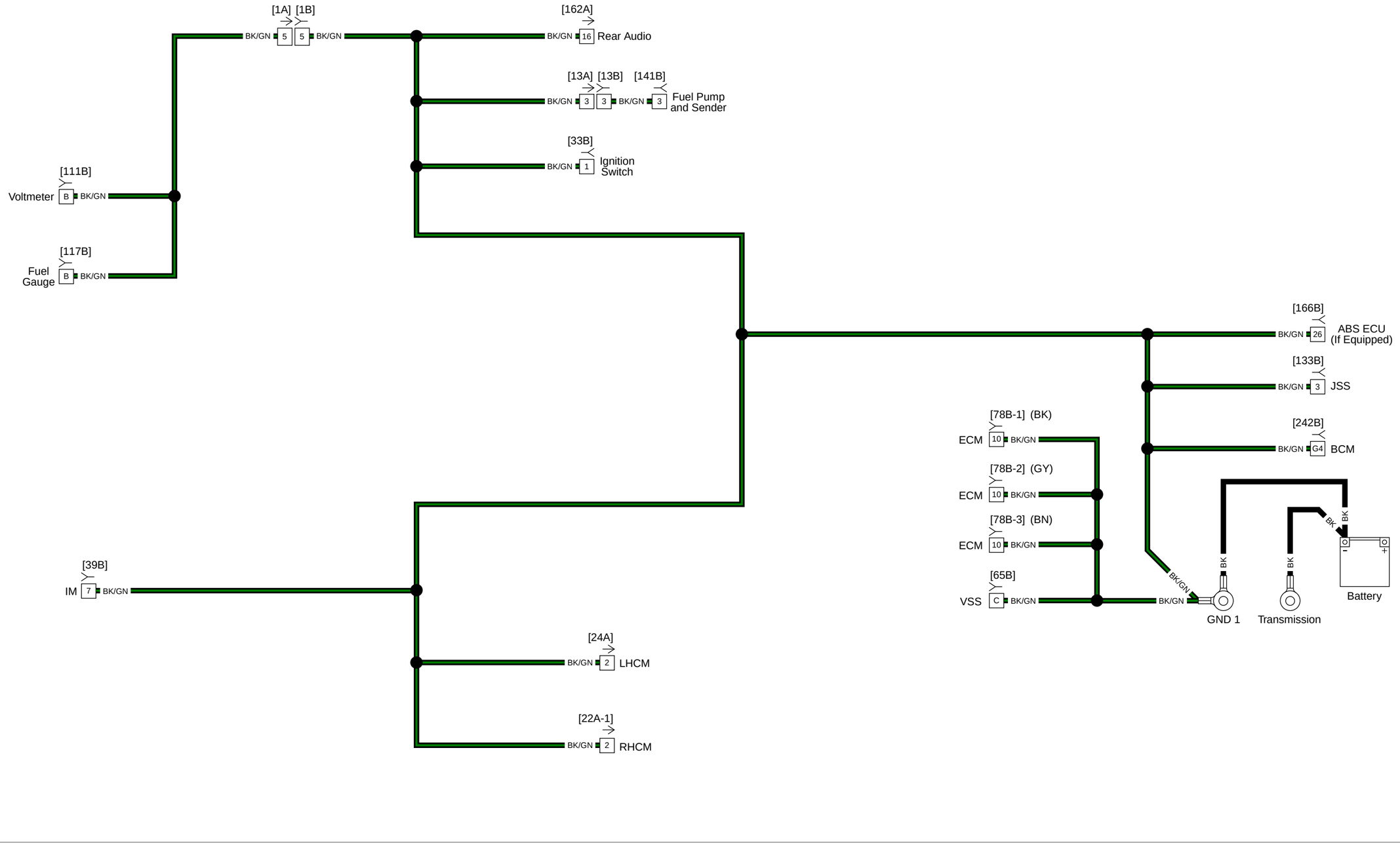

Figure B-9. Sensor Grounds FLT: 2015 Touring

Figure B-9.
Sensor Grounds FLT: 2015 Touring

Figure B-9.
Sensor Grounds FLT: 2015 Touring

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GND3-2
GND3-1
[GND3A] [GND3B]
[29B] Front Position Lamp
[31LA] Left Front Turn/Auxiliary Lamps
[31RA] Right Front Turn/Auxiliary Lamps
[38LB] Headlamp Low Beam
[38HB] Headlamp High Beam
W/O Fairing
With Fairing
[2A] [2B]
[189B] Heated Hand Grips to Main Harness
[132A] Front Power Outlet
[32A] Front Fender Tip Lamp Jumper Harness
[31LA] Left Front Turn/Auxiliary Lamps
[31RA] Right Front Turn/Auxiliary Lamps
[38A] Head Lamp
[299A] P&A Accessory Power
[12A] [12B]
Tour-Pak Lights
With Fairing, Except FLHX
[258A] Rear Power Outlet
[12-2A] Right Side Marker Light
[12-3A] Left Side Marker Light
[287A] Tour-Pak Lights (If Equipped)
[7A]
[7B] Except FLHX
[7B] FLHX (Canada Only)
[7B] FLHX (HDI Only)
[7B] FLHX (DOM Only)
[226B] [226A] [262A] [262B] Facia/Converter Module
[94B]
[18B] [18A] [19B] [19A] [94A] [45B] [45A] [93A] [93B] Circuit Board
Right Rear Turn Lamp
Left Rear Turn Lamp
Fender Tip/License Lamp
Tail Lamp
[20B] [20A] [13B] [13A] [141B]
Fuel Pump and Fuel Level Sender
[27B] Radio
[184A] CB Module
[280A] P&A Audio
[109A] [235B] FLHR/C Auxiliary Lamps Switch
Cooling Pump (If Equipped) With Fairing
[131B-2] Neutral Switch
[4A] P&A Accessory
[166B] ECU (ABS Only)
[91A] DLC
[122B-2] Horn
[179B] Active Exhaust Actuator (If Equipped)
[105RB] P&A Dash Switch Pack
[281B] Battery Tender
Except FLHR/C
[105LB] OE Dash Switch Pack
[142B] Security Siren (If Equipped)
[235B] Left PC Pump
[121B-2] Rear Brake Switch
Fuse Block
[64B] P&A Relay
Voltage Regulator
[77B]
Battery
GND 2
GND 1
Transmission

Figure B-10. Ground Circuit FLH: 2015 Touring

Figure B-10.
Ground Circuit FLH: 2015 Touring

Figure B-10.
Ground Circuit FLH: 2015 Touring

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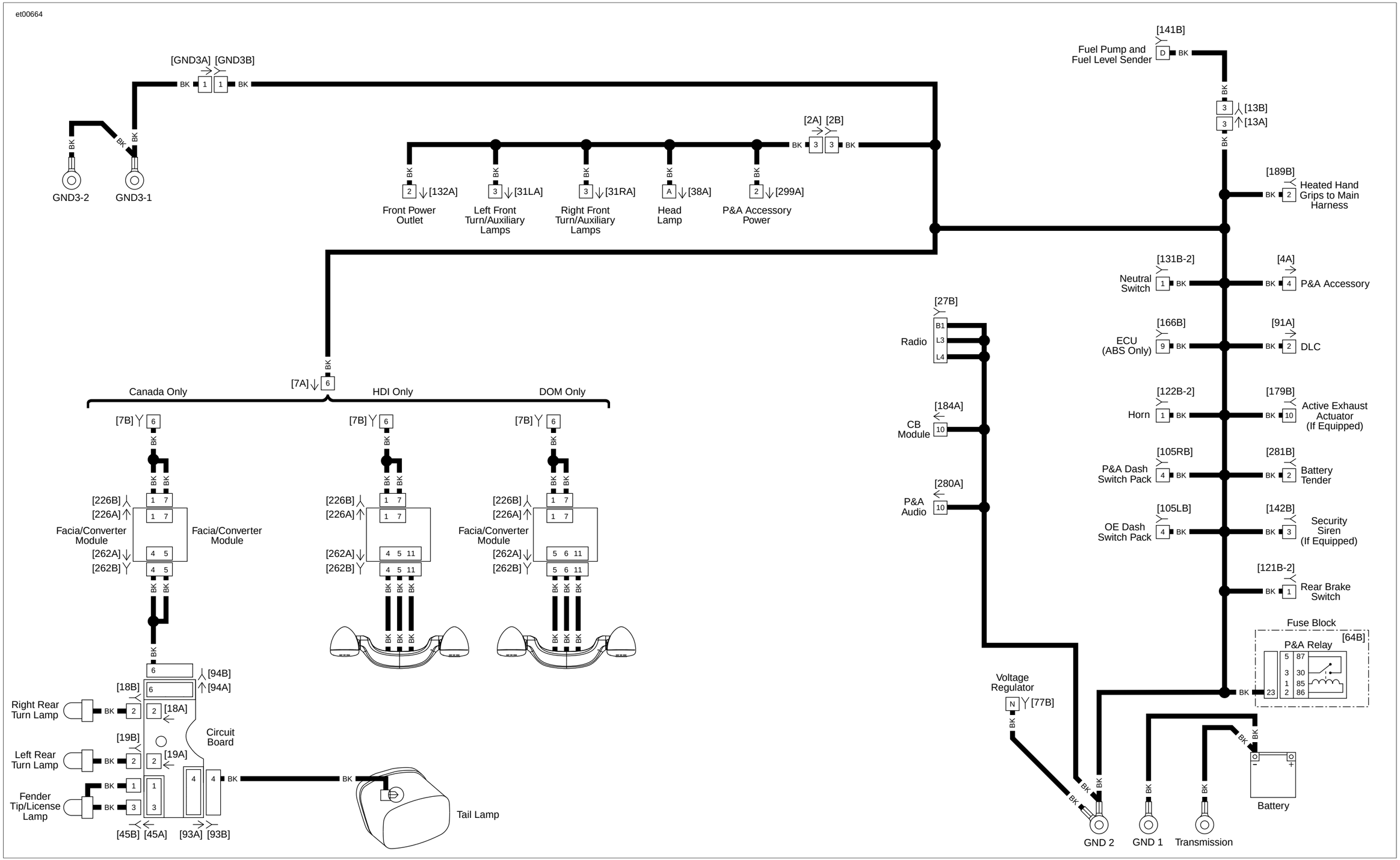

Figure B-11. Ground Circuit FLT: 2015 Touring

Figure B-11.
Ground Circuit FLT: 2015 Touring

Figure B-11.
Ground Circuit FLT: 2015 Touring

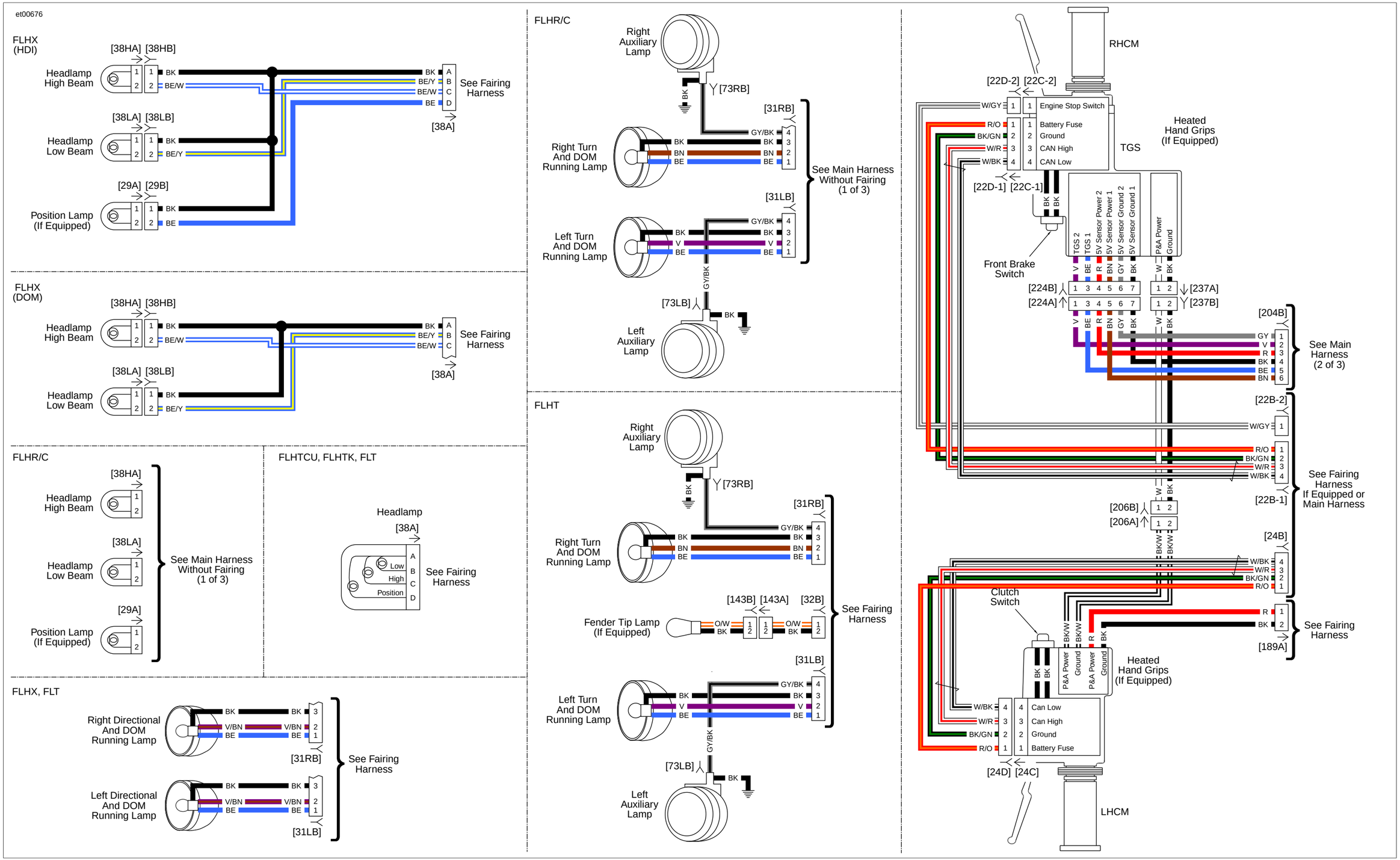

Figure B-12. Front Lighting and Hand Controls: 2015 Touring

Figure B-12.
Front Lighting and Hand Controls: 2015 Touring

Figure B-12.
Front Lighting and Hand Controls: 2015 Touring

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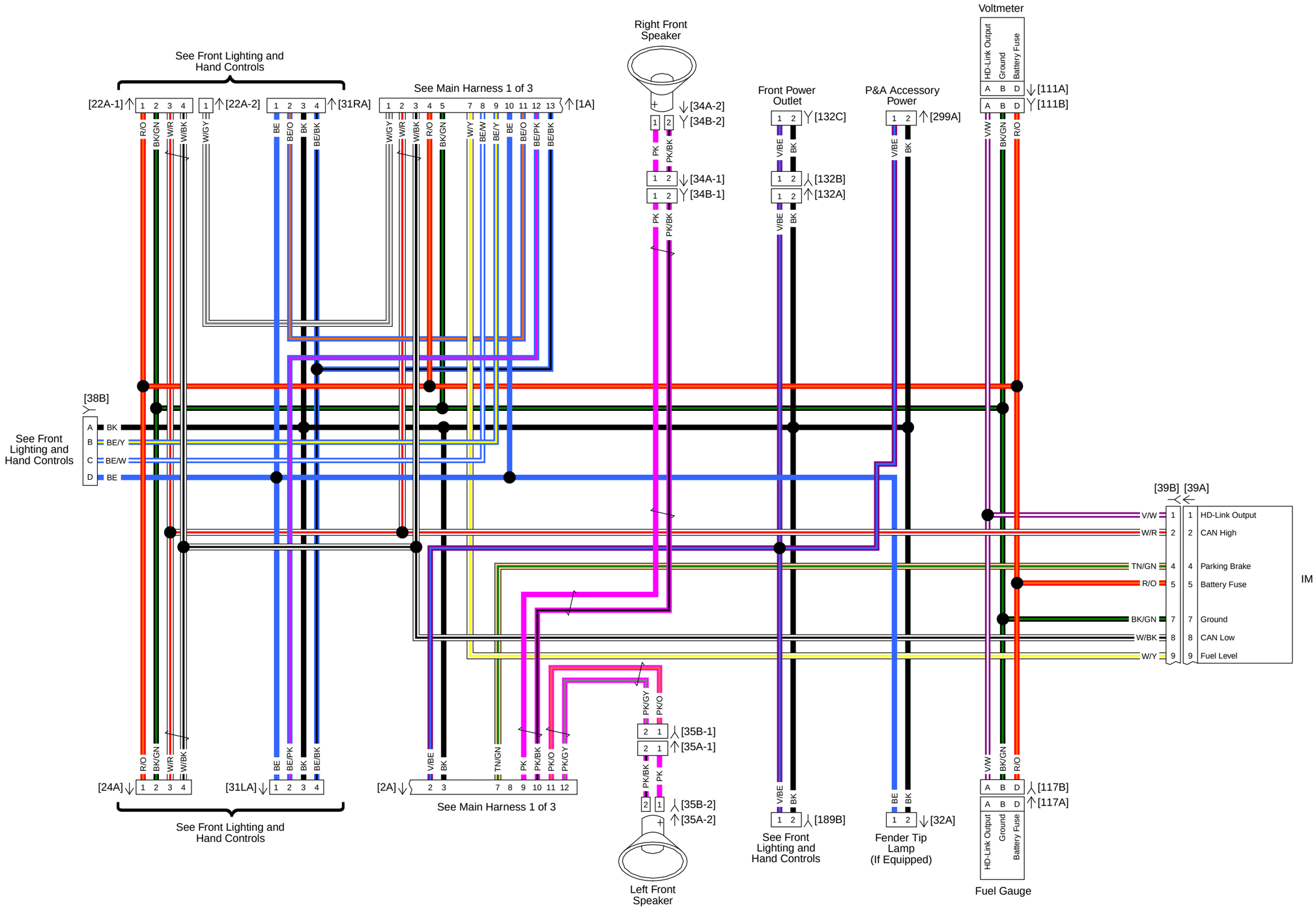


Figure B-13. Fairing Harness FLH: 2015 Touring

Figure B-13.
Fairing Harness FLH: 2015 Touring

Figure B-13.
Fairing Harness FLH: 2015 Touring

et00650

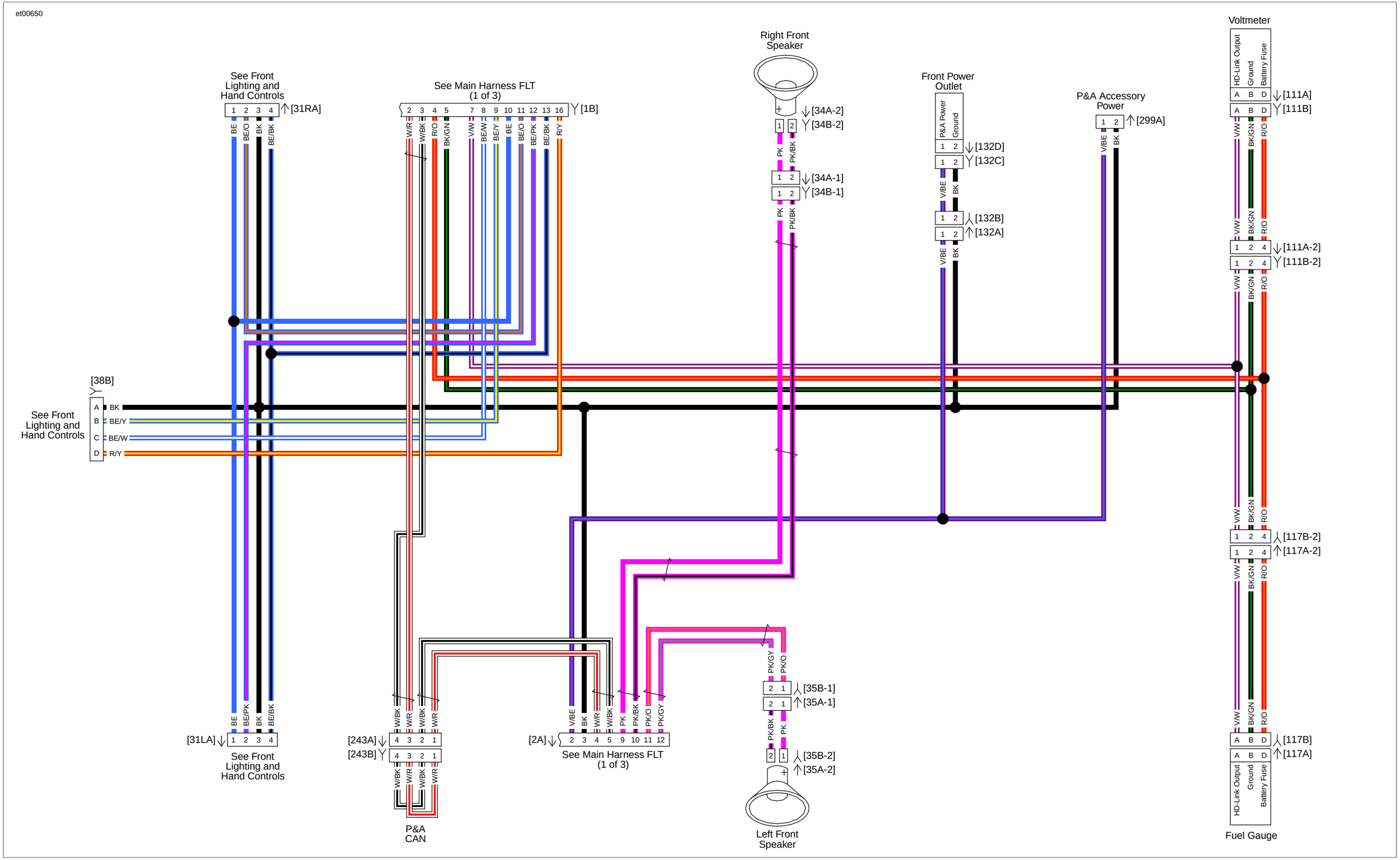


Figure B-14. Fairing Harness FLT: 2015 Touring

Figure B-14.
Fairing Harness FLT: 2015 Touring

Figure B-14.
Fairing Harness FLT: 2015 Touring

et00660

CAV	CIR	DESCRIPTION
1	BK	MICROPHONE, COMMON (-)
2	BK	HEADSET, COMMON (-)
3	PK/BE	HEADSET, RT FRONT (+)
4	R	MICROPHONE, FRONT (+)
5	PK/GN	HEADSET, LT FRONT (+)
6	BK	JUMPER
7		N/C
TAB	SHIELD	MIRCRPHONE, SHIELD

Radio
Antenna
CB Module
C.B. Antenna
Front WSS (If Equipped)
Rider Headset (If Equipped)
P&A Audio
Rear Audio
Horn
ET Sensor
FLHX
Except FLHX
See Main Harness FLH With Fairing Page 2 of 3
See Main Harness FLH With Fairing Page 3 of 3
See Fairing Harness FLH
See Fairing Harness FLH
AAT Sensor
OE Dash Switch Pack
ABS ECU (If Equipped)
Rear WSS (If Equipped)
P&A Dash Switch Pack
Ignition Switch
Ignition Coil
GND 3-1
GND 3-2

Figure B-15. Main Harness FLH (1 of 3): 2015 Touring (With Fairing)

Figure B-15.
Main Harness FLH (1 of 3): 2015 Touring (With Fairing)

Figure B-15.
Main Harness FLH (1 of 3): 2015 Touring (With Fairing)

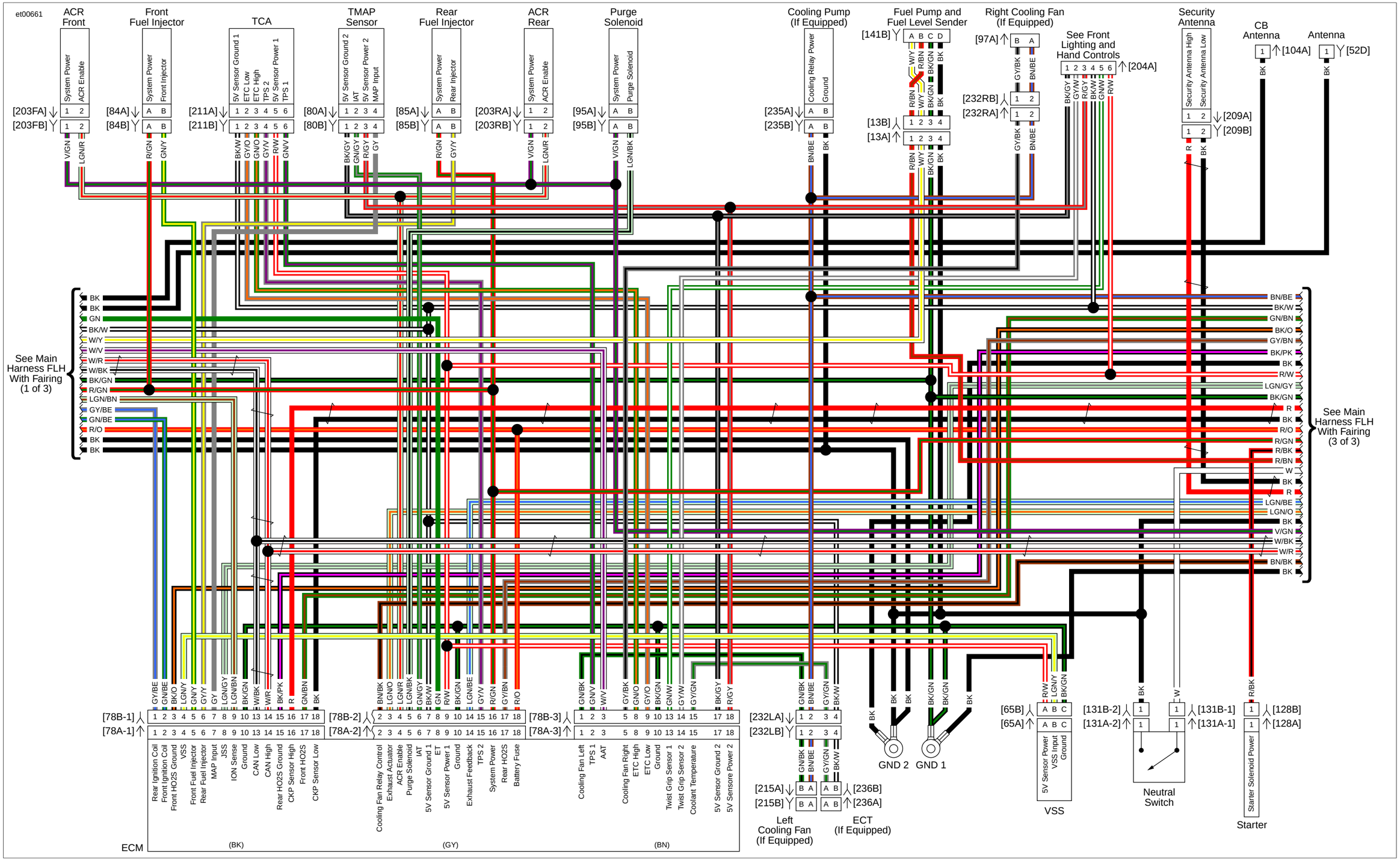


Figure B-16. Main Harness FLH (2 of 3): 2015 Touring (With Fairing)

Figure B-16.
Main Harness FLH (2 of 3): 2015 Touring (With Fairing)

Figure B-16.
Main Harness FLH (2 of 3): 2015 Touring (With Fairing)

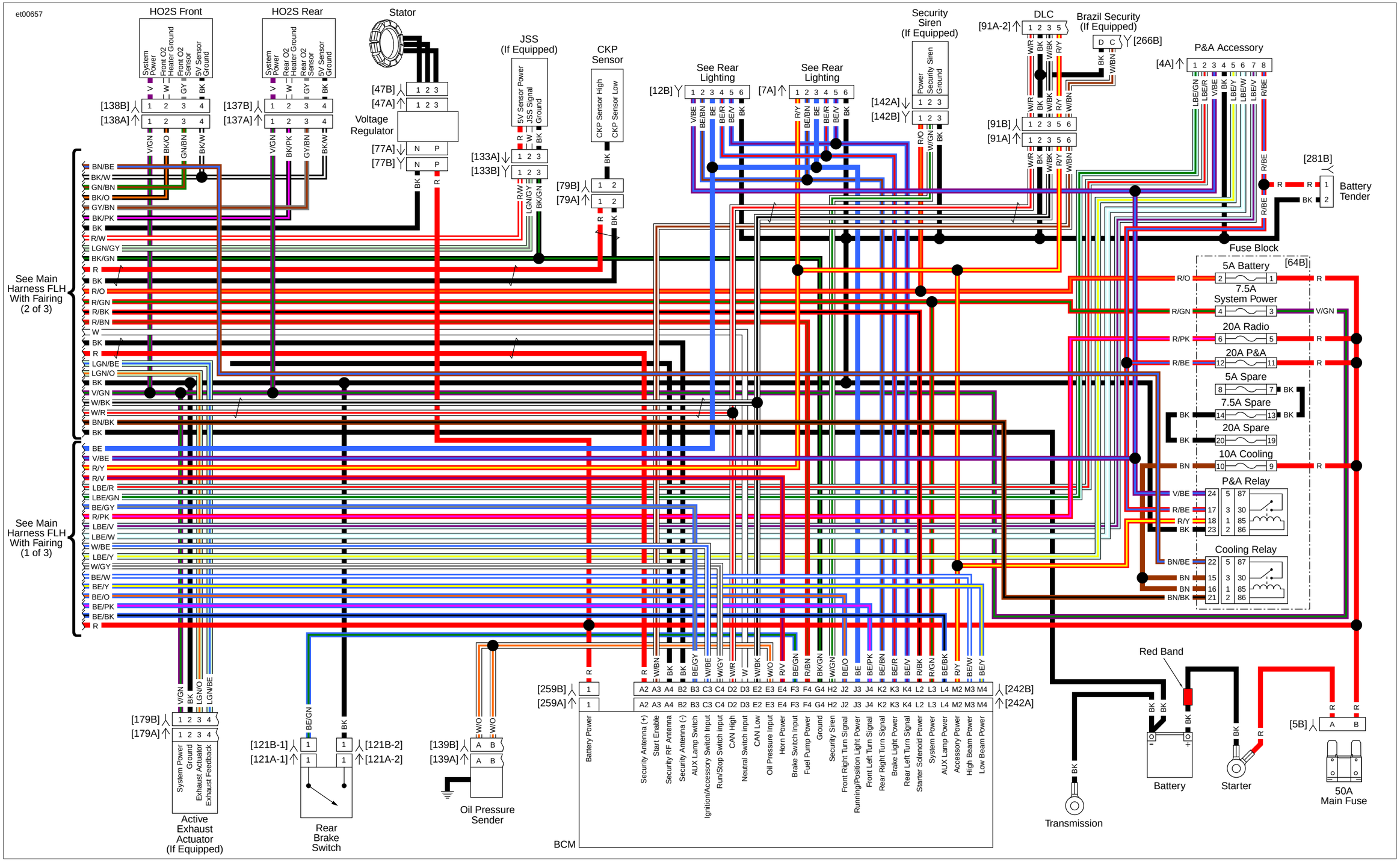


Figure B-17. Main Harness FLH (3 of 3): 2015 Touring (With Fairing)

Figure B-17.
Main Harness FLH (3 of 3): 2015 Touring (With Fairing)

Figure B-17.
Main Harness FLH (3 of 3): 2015 Touring (With Fairing)

et00651

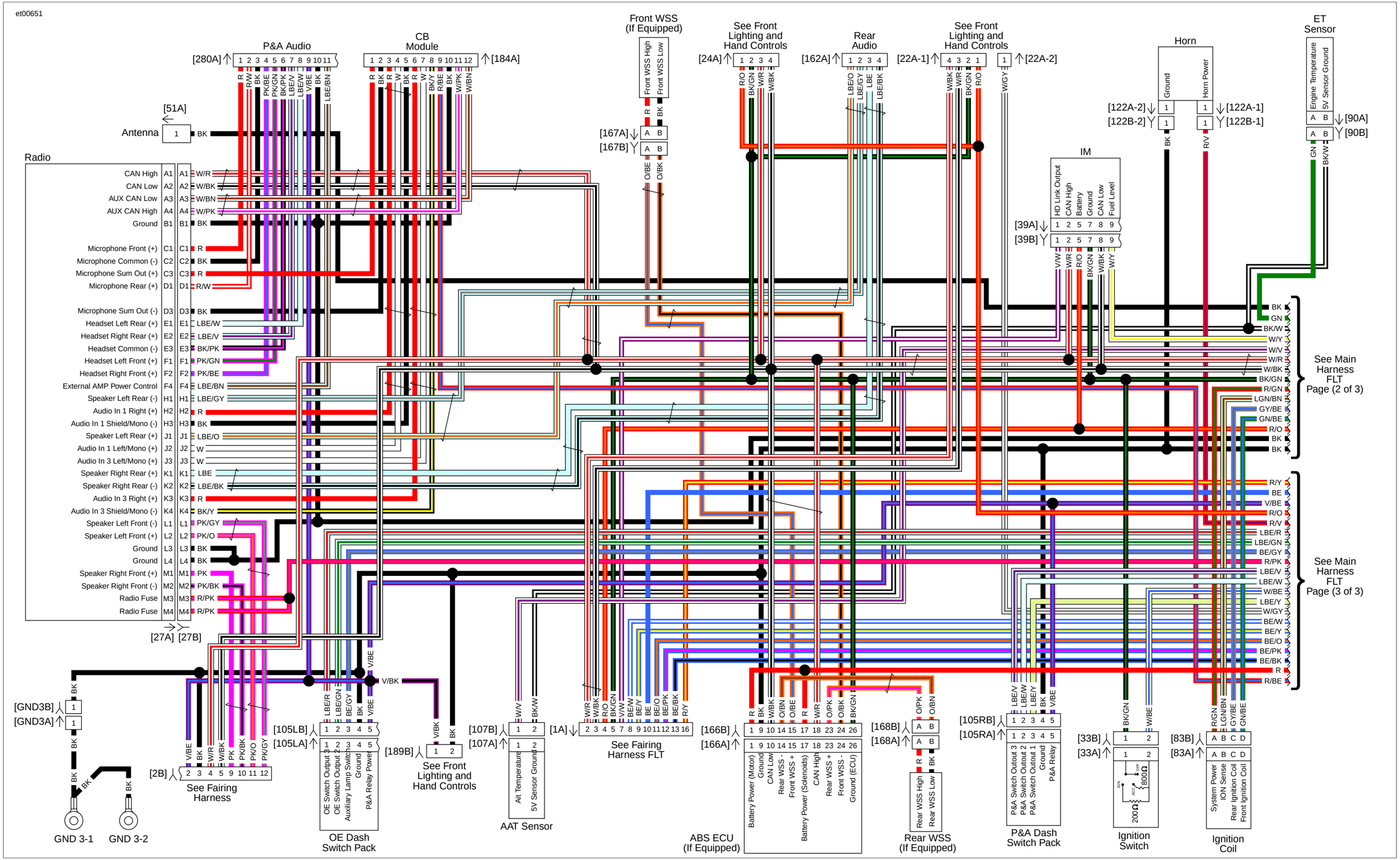


Figure B-18. Main Harness FLT (1 of 3): 2015 Touring

Figure B-18.
Main Harness FLT (1 of 3): 2015 Touring

Figure B-18.
Main Harness FLT (1 of 3): 2015 Touring

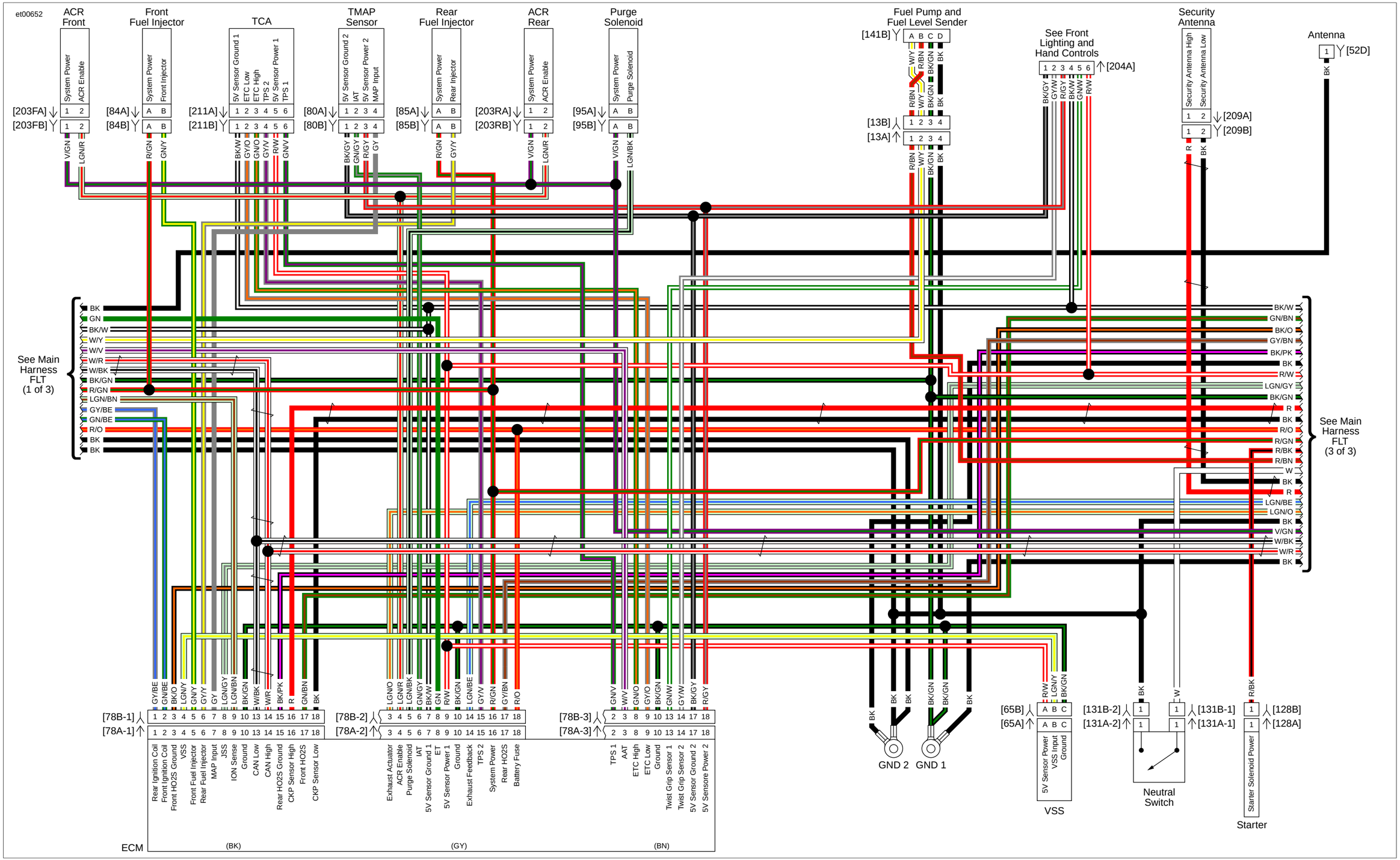


Figure B-19. Main Harness FLT (2 of 3): 2015 Touring

Figure B-19.
Main Harness FLT (2 of 3): 2015 Touring

Figure B-19.
Main Harness FLT (2 of 3): 2015 Touring

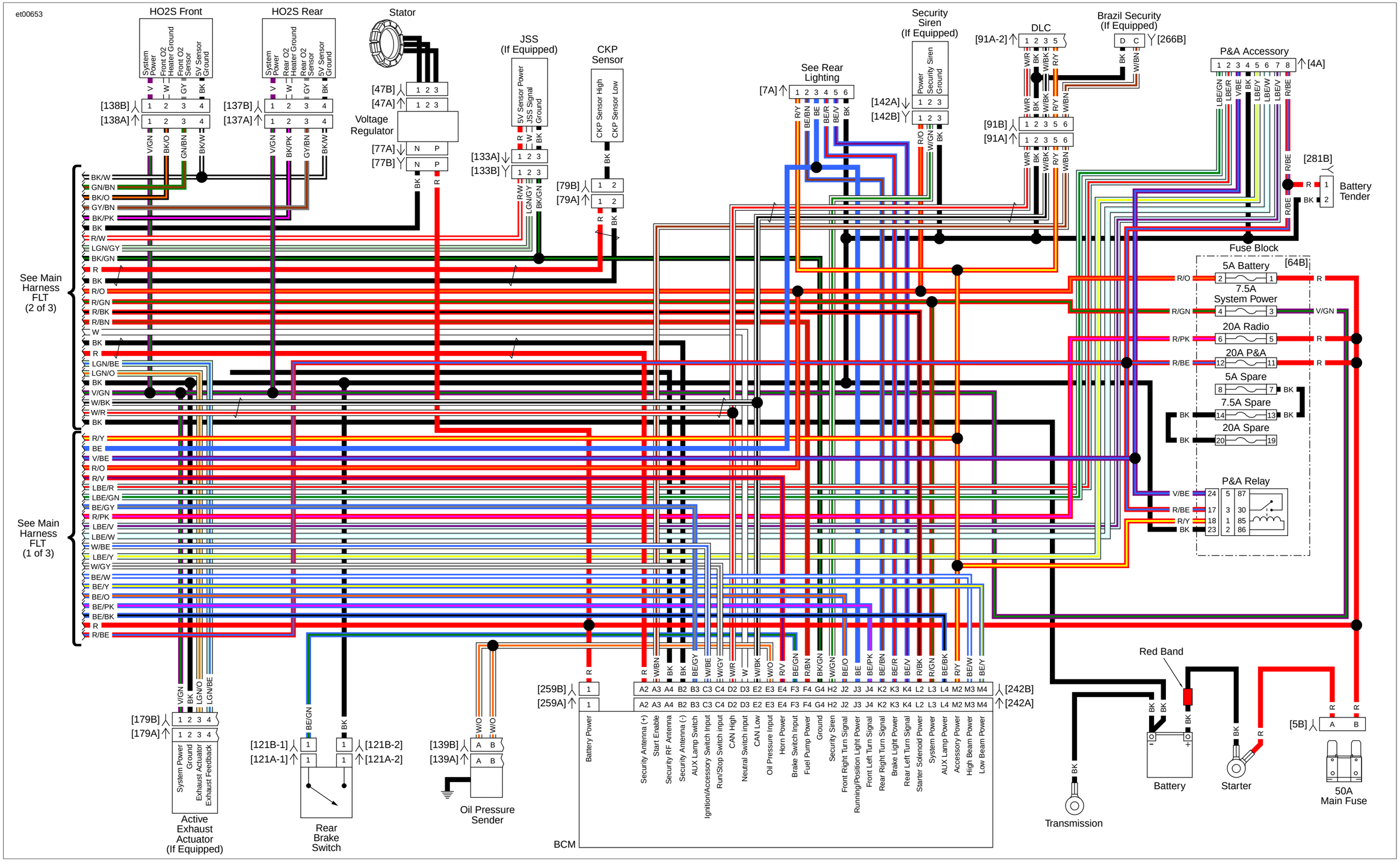


Figure B-20. Main Harness FLT (3 of 3): 2015 Touring

Figure B-20.
Main Harness FLT (3 of 3): 2015 Touring

Figure B-20.
Main Harness FLT (3 of 3): 2015 Touring

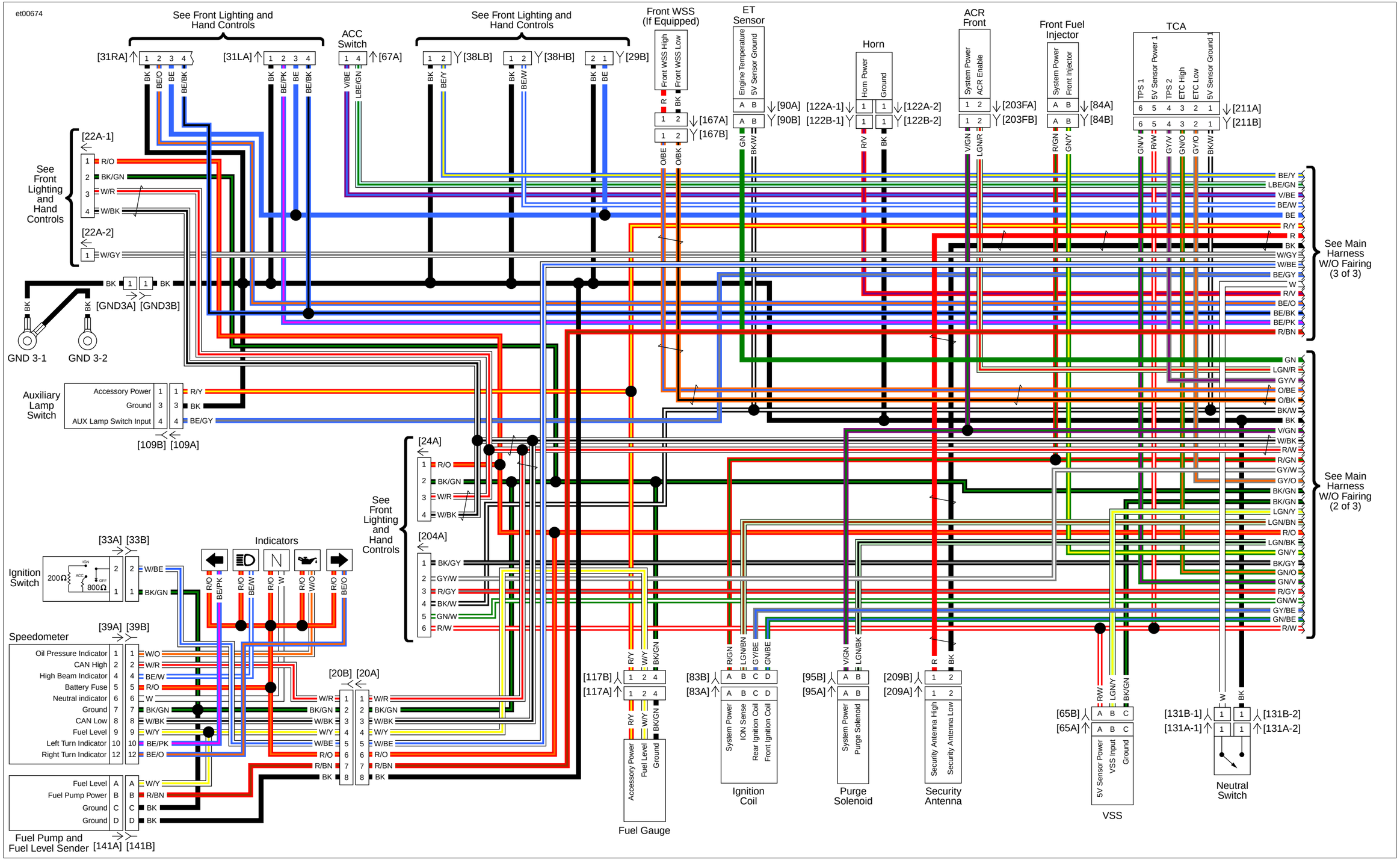


Figure B-21. Main Harness (1 of 3): 2015 Touring (Without Fairing)

Figure B-21.
Main Harness (1 of 3): 2015 Touring (Without Fairing)

Figure B-21.
Main Harness (1 of 3): 2015 Touring (Without Fairing)

et00712

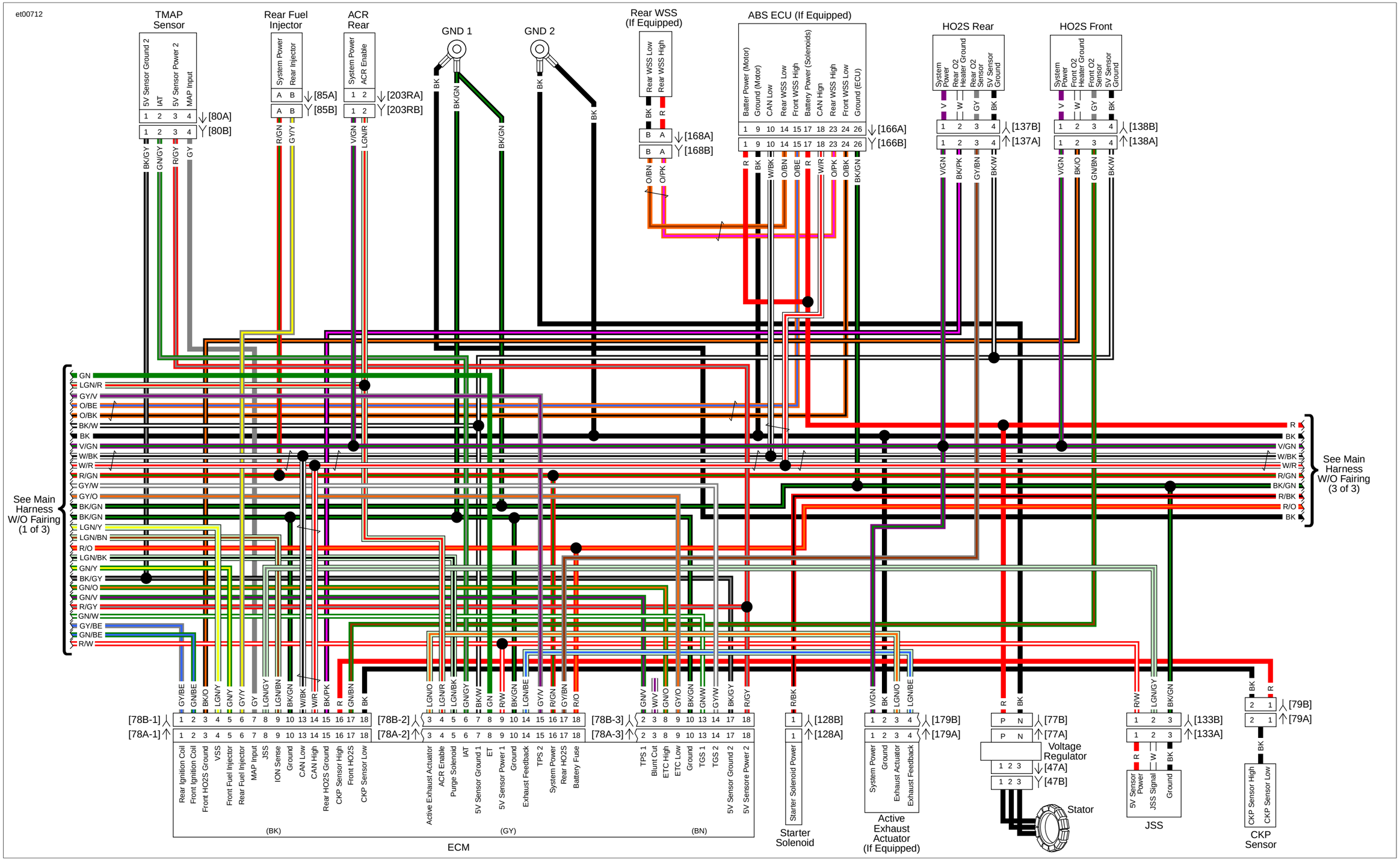


Figure B-22. Main Harness (2 of 3): 2015 Touring (Without Fairing)

Figure B-22.
Main Harness (2 of 3): 2015 Touring (Without Fairing)

Figure B-22.
Main Harness (2 of 3): 2015 Touring (Without Fairing)

et00658

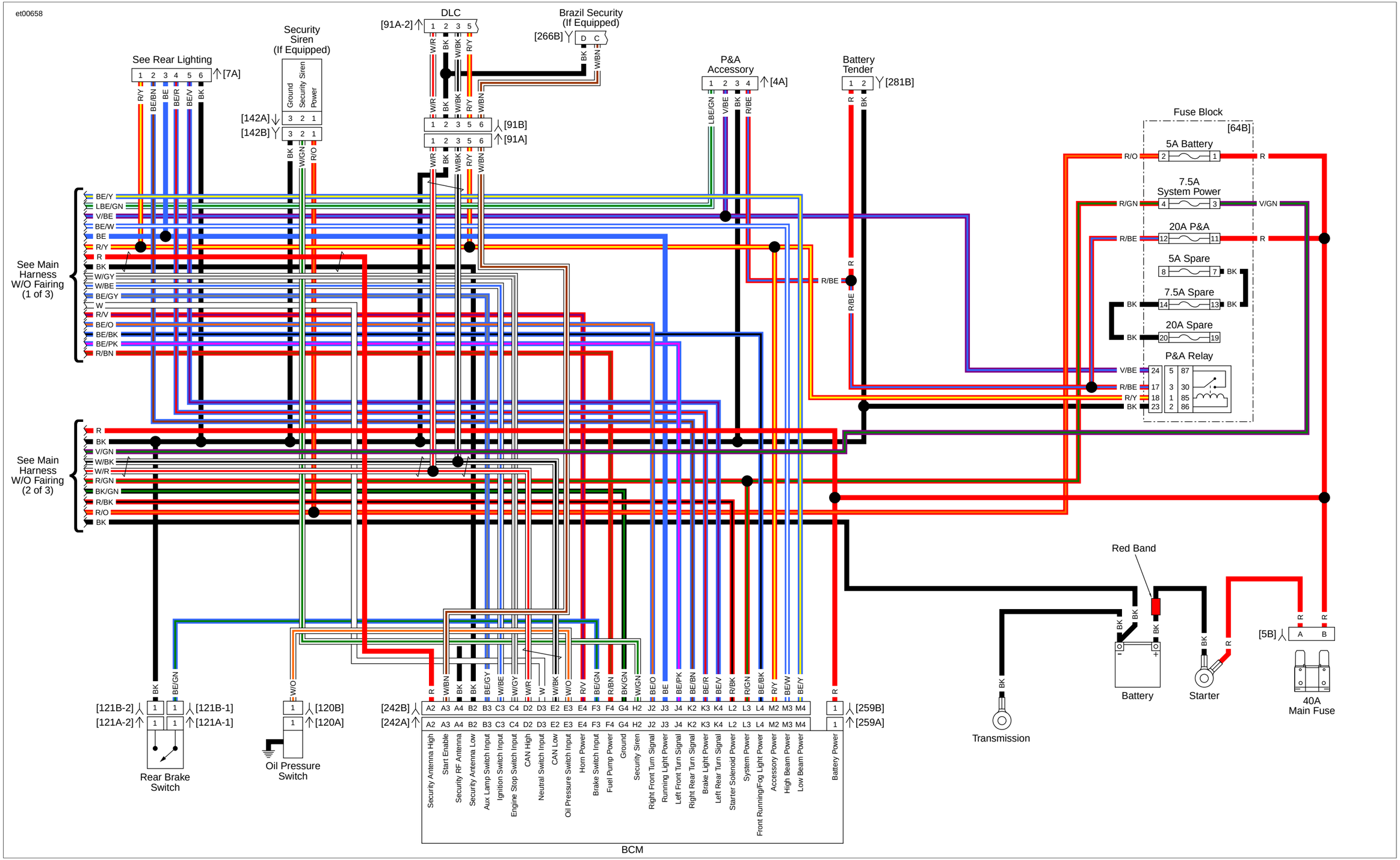


Figure B-23. Main Harness (3 of 3): 2015 Touring (Without Fairing)

Figure B-23.
Main Harness (3 of 3): 2015 Touring (Without Fairing)

Figure B-23.
Main Harness (3 of 3): 2015 Touring (Without Fairing)

et00671

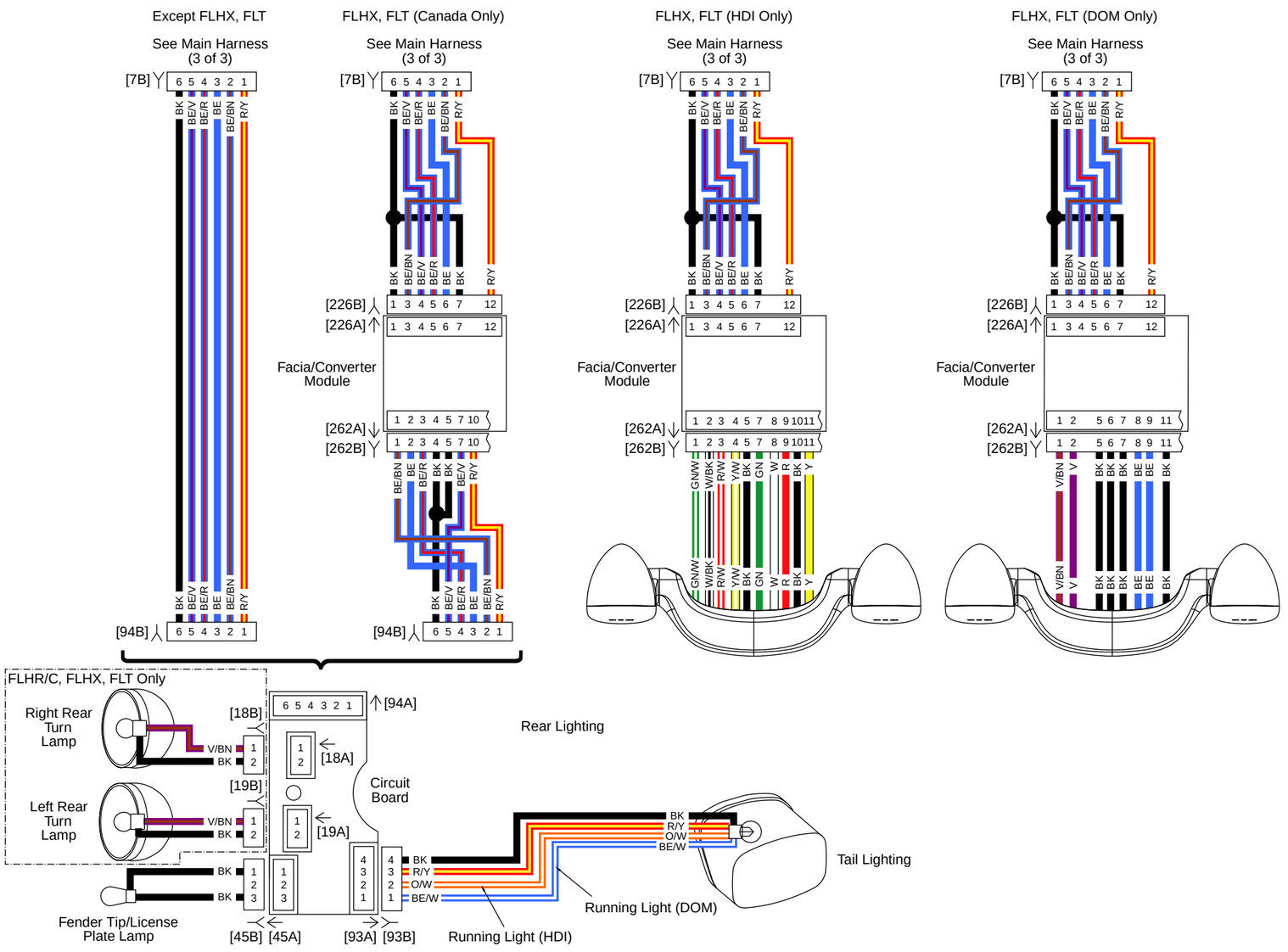


Figure B-24. Rear Lighting: 2015 Touring

Figure B-24.
Rear Lighting: 2015 Touring

Figure B-24.
Rear Lighting: 2015 Touring

et00673

Radio
CAN High A1
CAN Low A2
AUX CAN Low A3
AUX CAN High A4
Ground B1
Rear Switch Input B2
Front Microphone (+) C1
Microphone Common (-) C2
Microphone Sum Out (+) C3
Rear Microphone (+) D1
Microphone Shield D2
Microphone Sum Out (-) D3
Left Rear Headset (+) E1
Right Rear Headset (+) E2
Headset Common (-) E3
Left Front Headset (+) F1
Right Front Headset (+) F2
External AMP Power Control F4
Left Rear Speaker (-) H1
Audio In 1 Right (+) H2
Audio In 1 Shield/Mono (-) H3
Left Rear Speaker (+) J1
Audio In 1 Left/Mono (+) J2
Audio In 3 Left/Mono (+) J3
Right Rear Speaker (+) K1
Right Rear Speaker (-) K2
Audio In 3 Right (+) K3
Audio In 3 Shield/Mono (-) K4
Left Front Speaker (-) L1
Left Front Speaker (+) L2
Ground L3
Ground L4
Right Front Speaker (+) M1
Right Front Speaker (-) M2
Radio Fuse M3
Radio Fuse M4
[27A] [27B]

Antenna [51A]
P&A Audio [280A]
CB Module
Mic Out (+) Y
Mic Out (-) W
CB. Audio (+) R
CB. Audio (-) BK
Power R/O
Ground BK/GN
CAN High Y/O
CAN Low Y/V
[184B] [184A]
CB Antenna [50A]
Rider Headset [225B]
[53B] [53A]
To Main Harness W/BK W/R
[2B] [2A]
GND 2
[105LB] [105LA]
OE Switch Output 3
OE Switch Output 2
Aux/Fog Lamp Switch
GND
P&A Relay Power
OE Dash Switch Pack
[242B] [242A]
Aux/Fog Lamp Switch
Accessory Power
BCM
[105RB]
P&A Dash Switch Pack
[162A] [162B]
CB Antenna [104B]
Antenna [51D]
GND 1
P&A Accessory [4A]
[GND3-B] [GND3-A]
GND 3-2
GND 3-1
[37B] [37A] Left Rear SPKR
[76B]
Passenger Headset
[36B] [36A] Right Rear SPKR
Accessory Power
Ground
Rear Switch Input 1
Speaker POD Switch
Fuse Block
20A Radio
20A P&A
P&A Relay
[64B]
Red Band
GND 1
Battery
Starter
[5B]
50A Main Fuse
Right Front SPKR [34A-2] [34B-2]
[34A-1] [34B-1]
[35B-1] [35A-1]
[35B-2] [35A-2]
Left Front SPKR

CAV	CIR	DESCRIPTION
1	BK	MICROPHONE, COMMON (-)
2	BK	HEADSET, COMMON (-)
3	PK/BE	HEADSET, RT FRONT (+)
4	R	MICROPHONE, FRONT (+)
5	PK/GN	HEADSET, LT FRONT (+)
6	BK	JUMPER
7		N/C
TAB	SHIELD	MICROPHONE, SHIELD

CAV	CIR	DESCRIPTION
1	BK	MICROPHONE, COMMON (-)
2	BK	HEADSET, COMMON (-)
3	PK/BE	REAR RT HEADSET (+)
4	R	REAR MICROPHONE (+)
5	PK/GN	REAR LT HEADSET (+)
6		
7		
TAB	SHIELD	MICROPHONE, SHIELD

Figure B-25. OE Radio: 2015 Touring (Except FLHX/S, FLT)

Figure B-25.
OE Radio: 2015 Touring (Except FLHX/S, FLT)

Figure B-25.
OE Radio: 2015 Touring (Except FLHX/S, FLT)

et00677

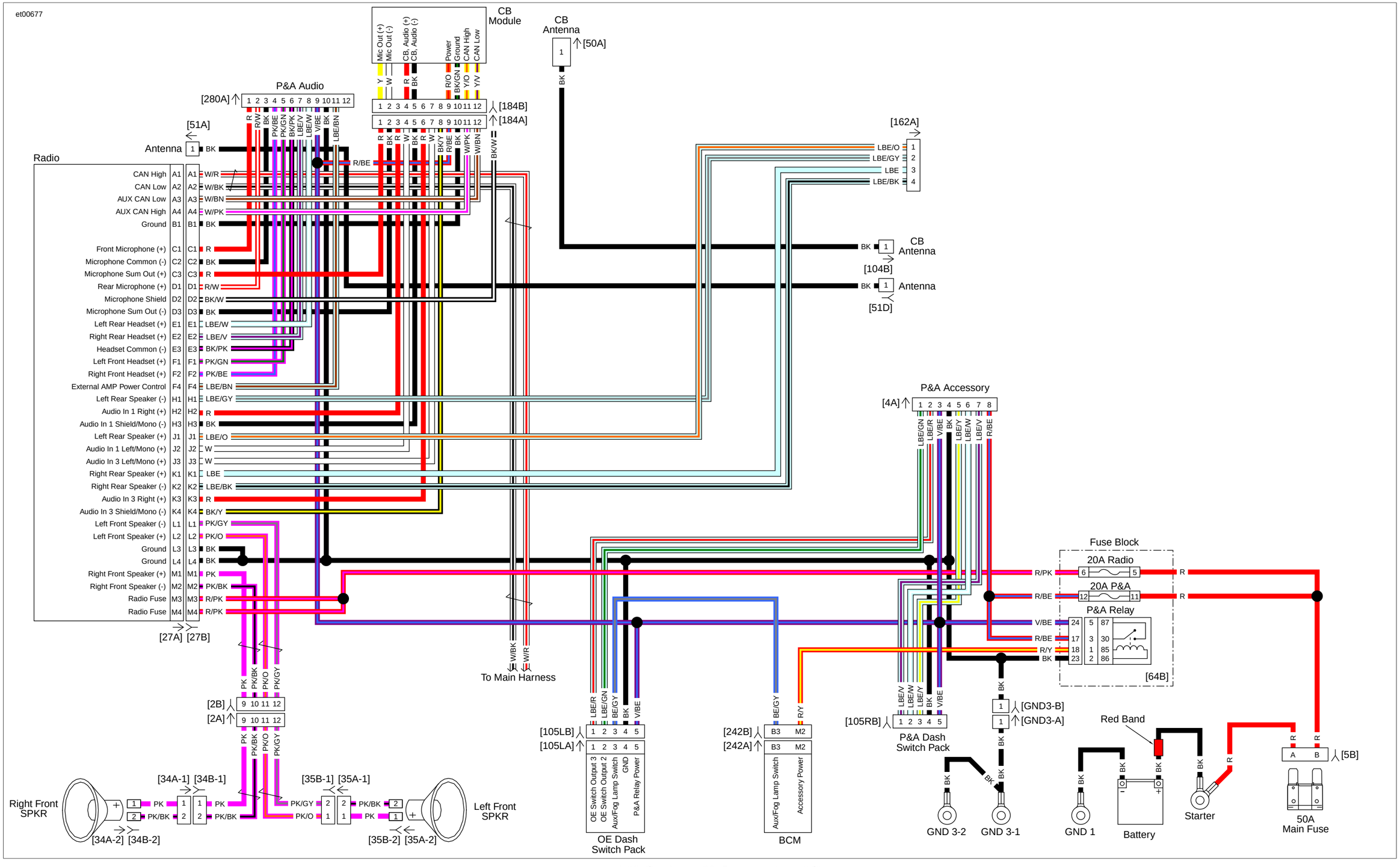


Figure B-26. OE Radio: 2015 Touring (FLHX/S)

Figure B-26.
OE Radio: 2015 Touring (FLHX/S)

Figure B-26.
OE Radio: 2015 Touring (FLHX/S)

et00672

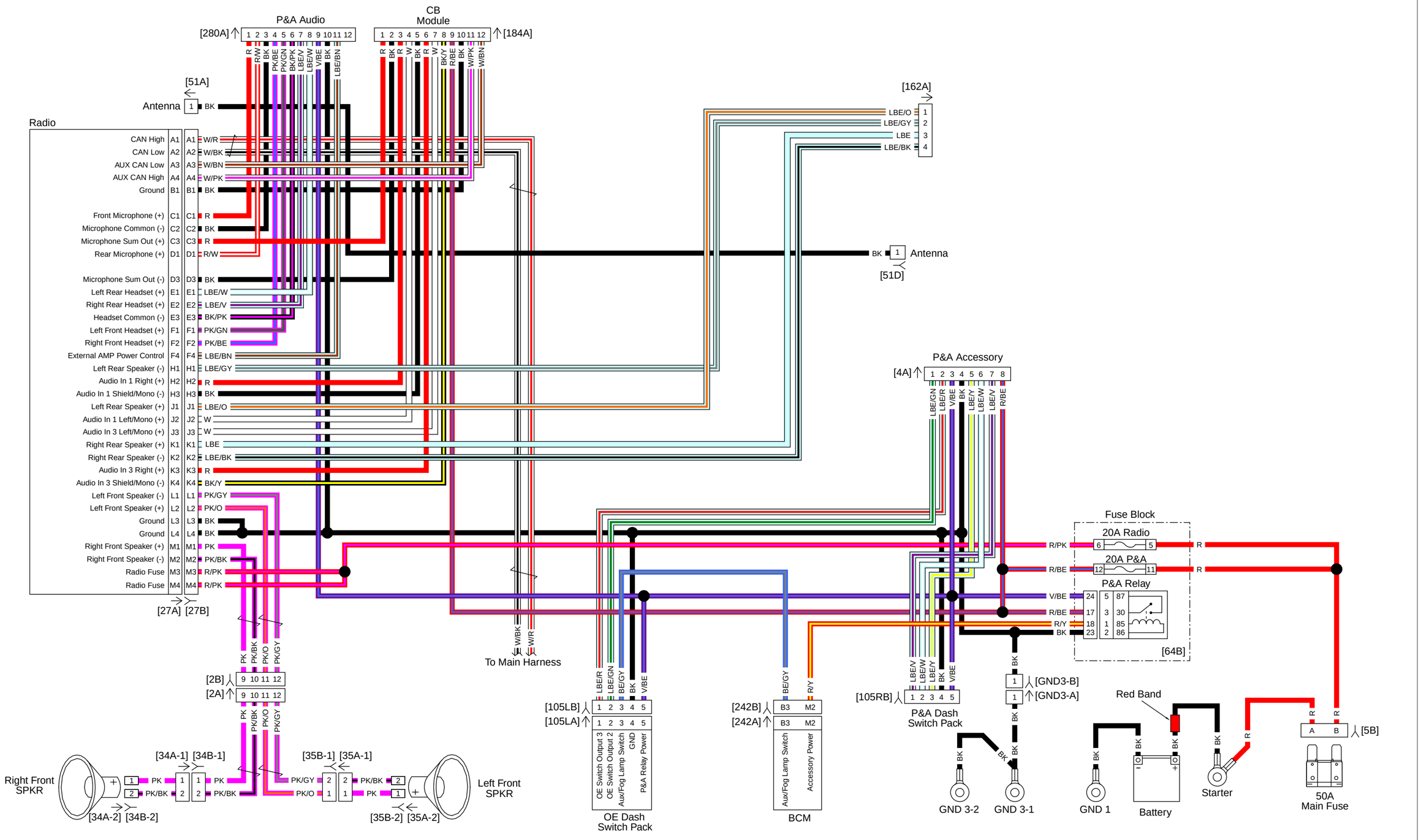


Figure B-27. OE Radio: 2015 Touring (FLT)

Figure B-27.
OE Radio: 2015 Touring (FLT)

Figure B-27.
OE Radio: 2015 Touring (FLT)

et00732

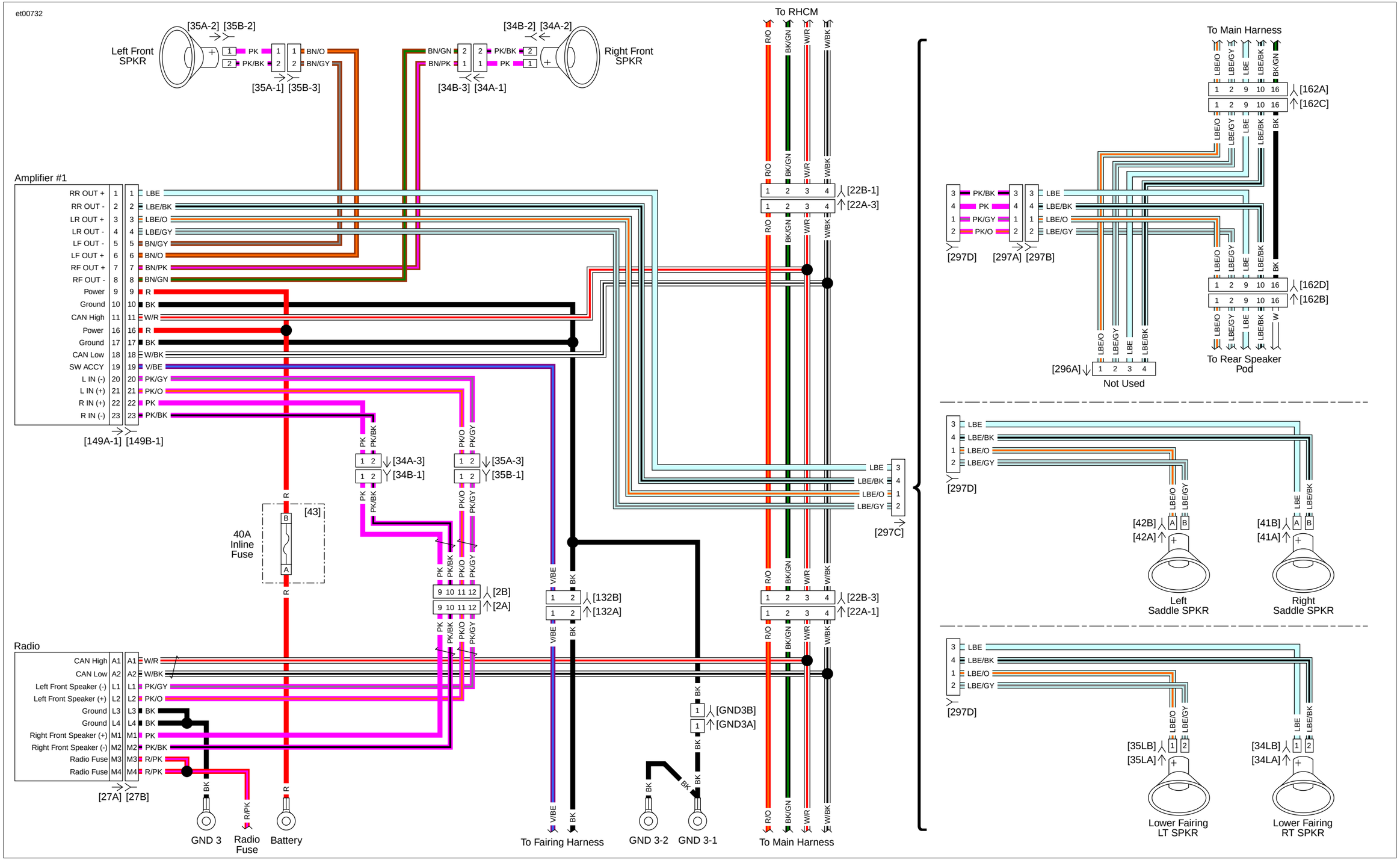


Figure B-28. P&A Radio w/1 Amp: 2015 Touring

Figure B-28.
P&A Radio w/1 Amp: 2015 Touring

Figure B-28.
P&A Radio w/1 Amp: 2015 Touring

et00731

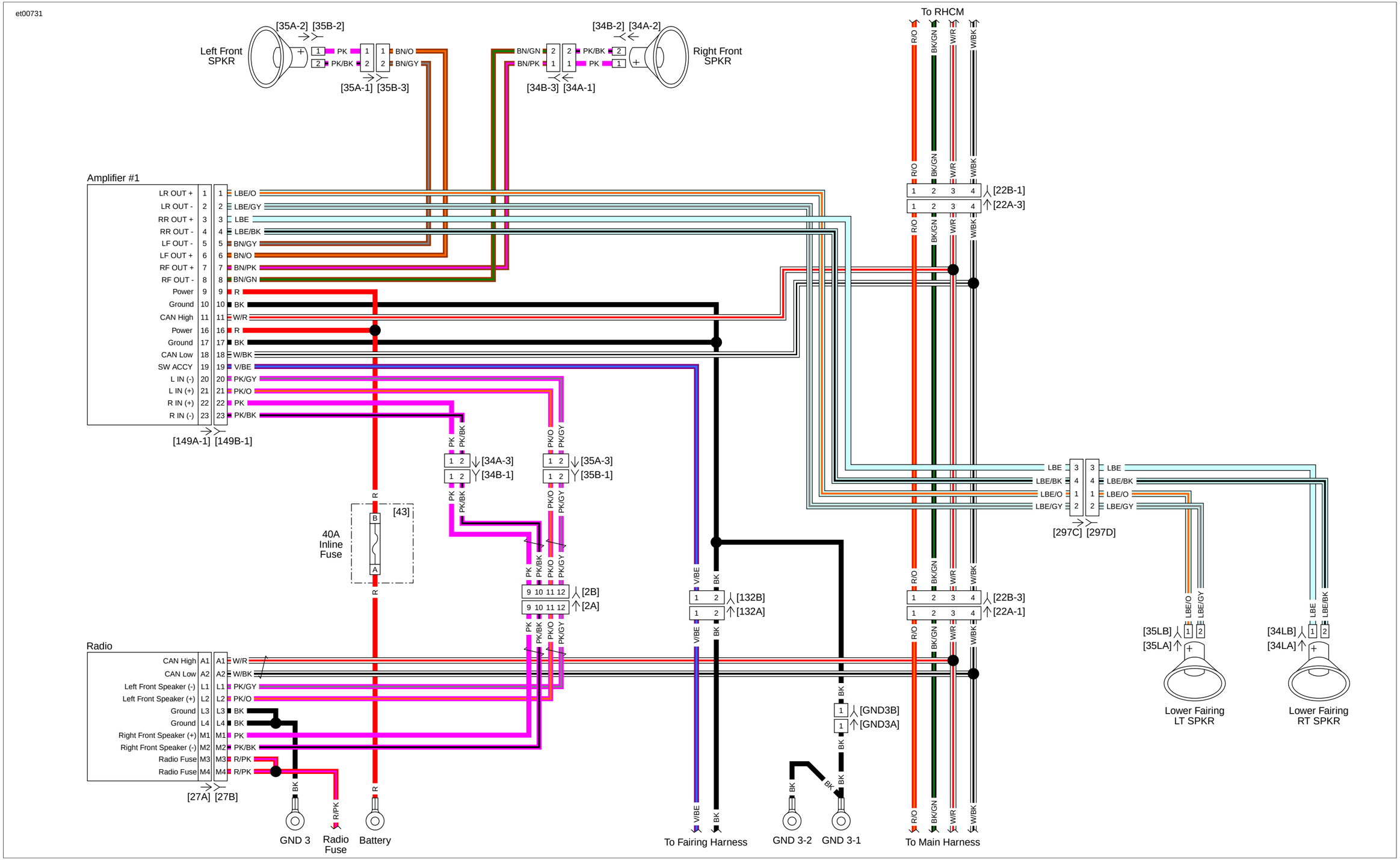


Figure B-29. P&A Radio w/2 Amps (1 of 2): 2015 Touring

Figure B-29.
P&A Radio w/2 Amps (1 of 2): 2015 Touring

Figure B-29.
P&A Radio w/2 Amps (1 of 2): 2015 Touring

et00733

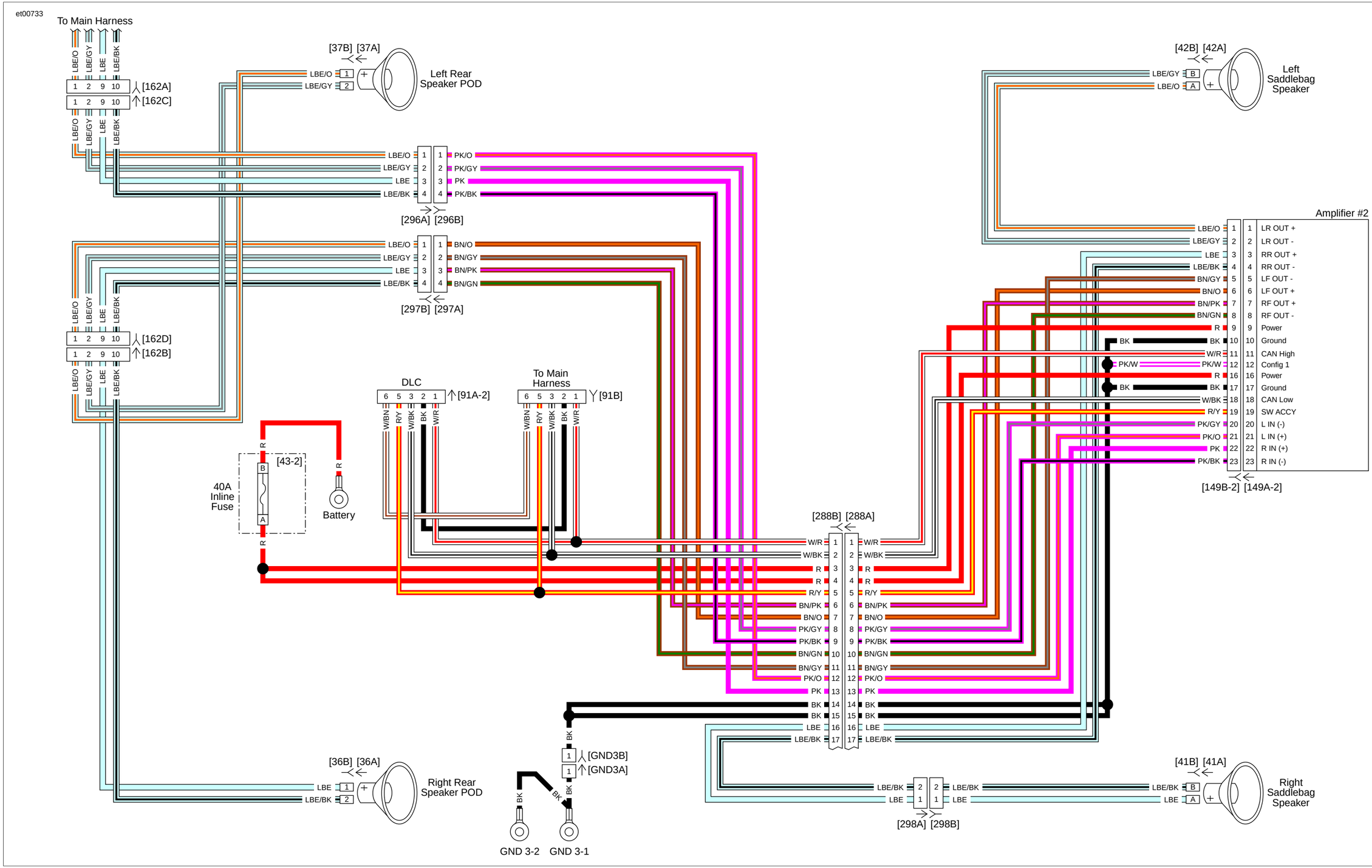


Figure B-30. P&A Radio w/2 Amps (2 of 2): 2015 Touring

Figure B-30.
P&A Radio w/2 Amps (2 of 2): 2015 Touring

Figure B-30.
P&A Radio w/2 Amps (2 of 2): 2015 Touring

CONNECTOR END VIEWS B.3

CONNECTOR END VIEWS

Table B-3. Fairing Harness [1]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/GY	Run/stop switch input (FLH)
2	W/R	CAN high
3	W/BK	CAN low
4	R/O	Battery fuse
5	BK/GN	Ground
6	-	N/C
7	W/Y	Fuel level (FLH)
	V/W	HD-Link output (FLT)
8	BE/W	High beam headlamp
9	BE/Y	Low beam headlamp
10	BE	Running lights power
11	BE/O	Right front turn signal
12	BE/PK	Left front turn signal
13	BE/BK	Running/position light power
14	-	N/C
15	-	N/C
16	R/Y	Accessory power (FLT)

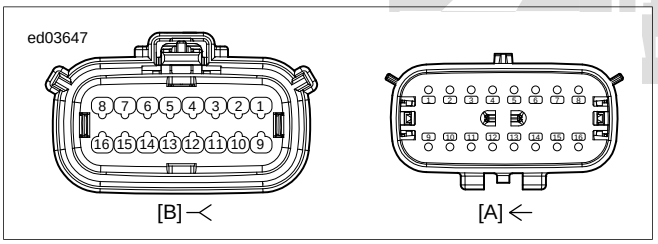


Figure B-31. Fairing Harness [1]

Table B-4. Fairing Harness [2]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	-	N/C
2	V/BE	P&A relay power
3	BK	Ground
4	W/R	CAN high (FLT)
5	W/BK	CAN low (FLT)
6	-	N/C
7	-	N/C
8	-	N/C
9	PK	Speaker right front (+)
10	PK/BK	Speaker right front (-)
11	PK/O	Speaker left front (+)
12	PK/GY	Speaker left front (-)

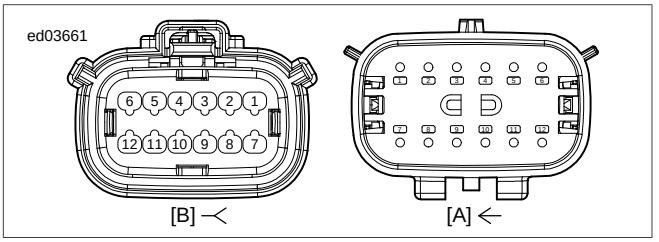


Figure B-32. Fairing Harness [2]

Table B-5. P&A Accessory [4] (without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LGN/GN	ACC switch
2	V/BE	P&A power
3	BK	Ground
4	R/BE	P&A fuse

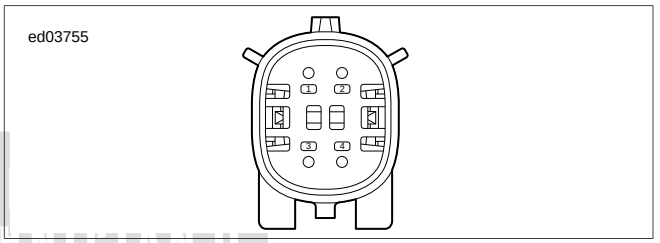


Figure B-33. P&A Accessory [4] (without Fairing)

Table B-6. P&A Accessory [4] (with Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/GN	OE switch output 2
2	LBE/R	OE switch output 1
3	V/BE	P&A relay power
4	BK	Ground
5	LBE/Y	P&A switch output 1
6	LBE/W	P&A switch output 2
7	LBE/V	P&A switch output 3
8	R/BE	P&A fuse power

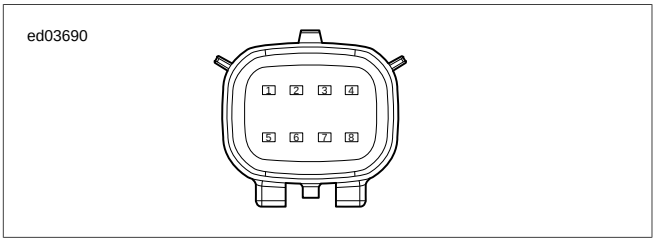


Figure B-34. P&A Accessory [4] (with Fairing)

Table B-7. Main Fuse [5]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	R	Battery
B	R	Main fuse

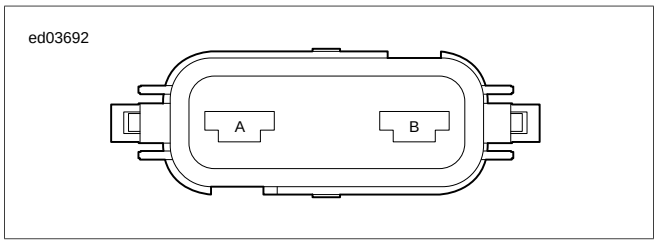


Figure B-35. Main Fuse [5]

Table B-8. Rear Lighting [7]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/Y	Accessory power
2	BE/BN	Right rear turn signal
3	BE	Running/position light power
4	BE/R	Brake light power
5	BE/V	Left rear turn signal
6	BK	Ground

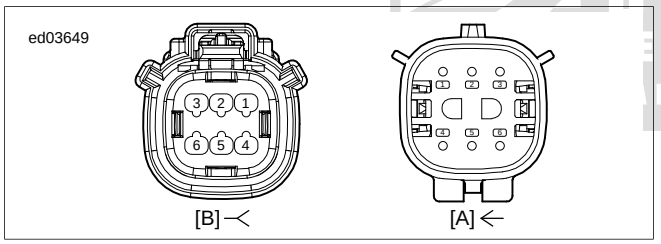


Figure B-36. Rear Lighting [7]

Table B-9. Tour-Pak Lights [12]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BE	P&A relay power
2	BE/BN	Right rear turn signal
3	BE	Running/position light power
4	BE/R	Brake light power
5	BE/V	Left rear turn signal
6	BK	Ground

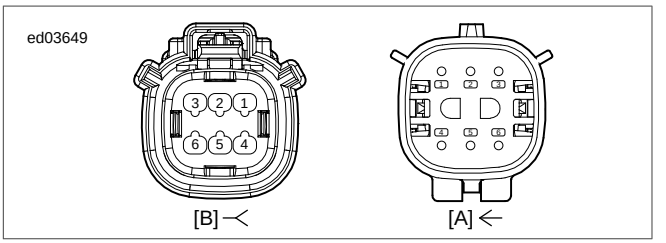


Figure B-37. Tour-Pak Lights [12]

Table B-10. Right Side Marker Lights [12-2B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BE	P&A relay power
2	BK	Ground

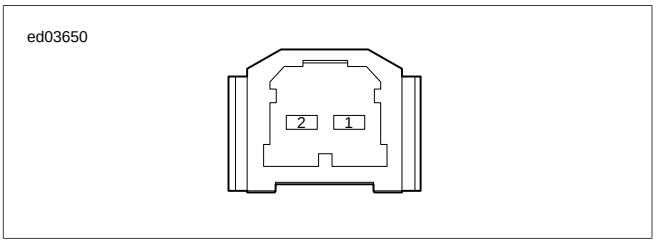


Figure B-38. Right Side Marker Lights [12-2B]

Table B-11. Left Side Marker Lights [12-3B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BE	P&A relay power
2	BK	Ground

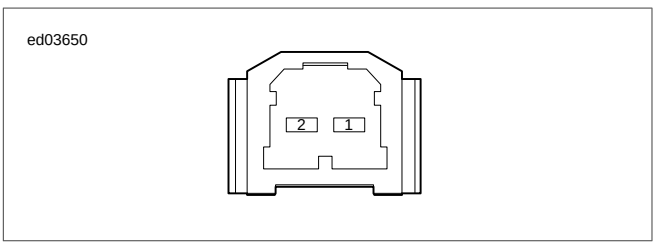


Figure B-39. Left Side Marker Lights [12-3B]

Table B-12. Fuel Tank Harness [13]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/BN	Fuel pump power
2	W/Y	Fuel level sender
3	BK/GN	Sender ground
4	BK	Pump ground

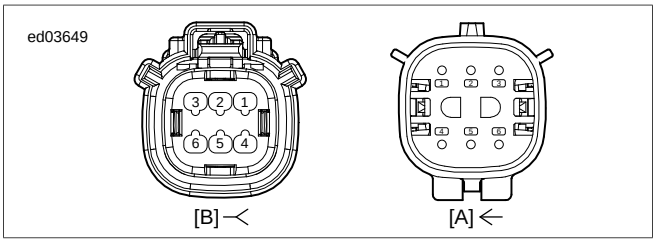


Figure B-40. Fuel Tank Harness [13]

Table B-13. Right Rear Turn Signal [18B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BN	Right rear turn signal
2	BK	Ground

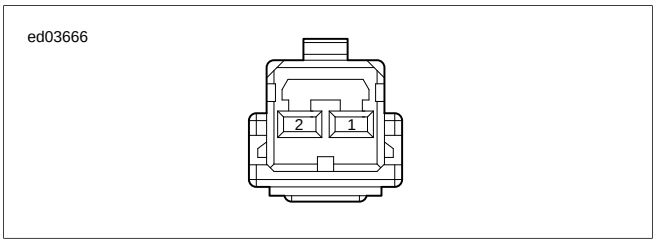


Figure B-41. Right Rear Turn Signal [18B]

Table B-14. Left Rear Turn Signal [19B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BN	Left rear turn signal
2	BK	Ground

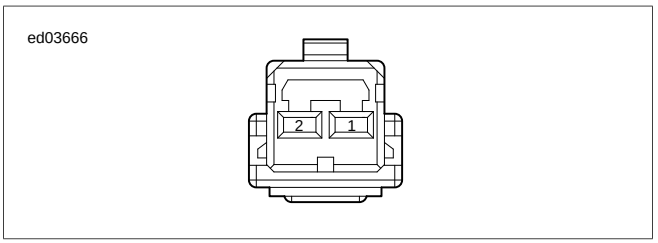


Figure B-42. Left Rear Turn Signal [19B]

Table B-15. Console Harness [20]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/R	CAN high
2	BK/GN	Ground
3	W/BK	CAN low
4	W/Y	Fuel level
5	W/BE	Ignition switch
6	R/O	Battery fuse
7	R/BN	Fuel pump power
8	BK	Ground

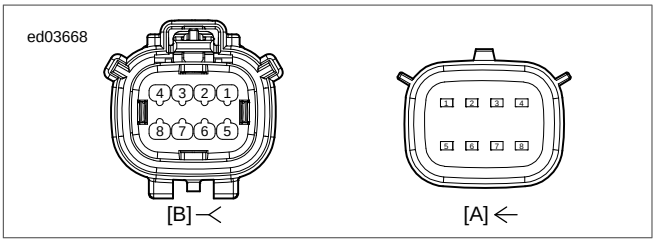


Figure B-43. Console Harness [20]

Table B-16. RHCM [22-1]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/O	Battery fuse
2	BK/GN	Ground
3	W/R	CAN high
4	W/BK	CAN low

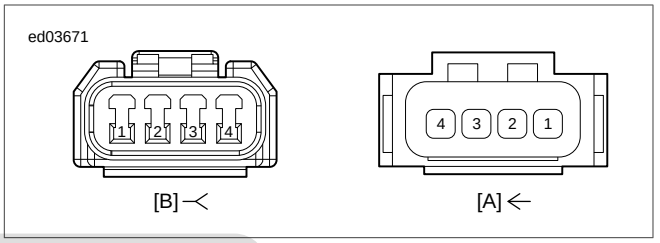


Figure B-44. RHCM [22-1]

Table B-17. RHCM [22D-1] (Inside Hand Controls)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/O	Battery fuse
2	BK/GN	Ground
3	W/R	CAN high
4	W/BK	CAN low

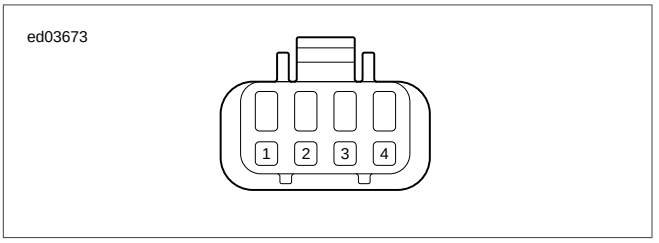


Figure B-45. RHCM [22D-1] (Inside Hand Controls)

Table B-18. RHCM [22-2]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/GY	Engine stop switch
2	-	N/C

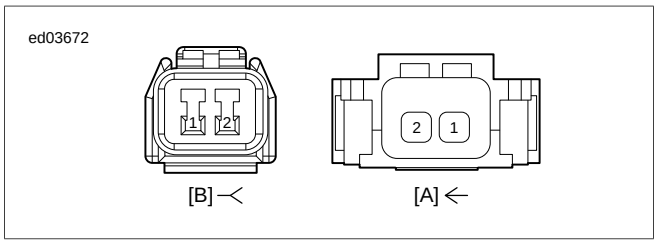


Figure B-46. RHCM [22-2]

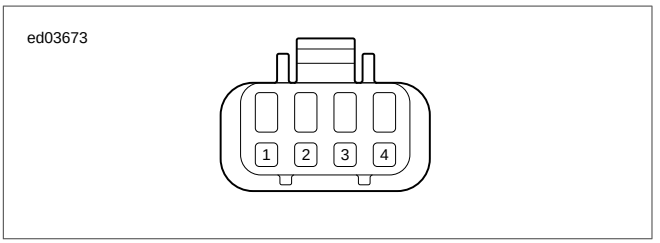


Figure B-49. LHCM [24D] (Inside Hand Controls)

Table B-19. RHCM [22D-2] (Inside Hand Controls)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/GY	Engine stop switch
2	-	N/C

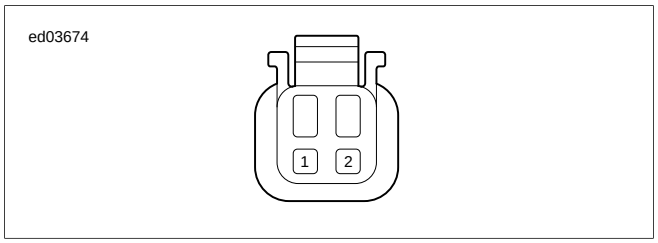


Figure B-47. RHCM [22D-2] (Inside Hand Controls)

Table B-20. LHCM [24]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/O	Battery fuse
2	BK/GN	Ground
3	W/R	CAN high
4	W/BK	CAN low

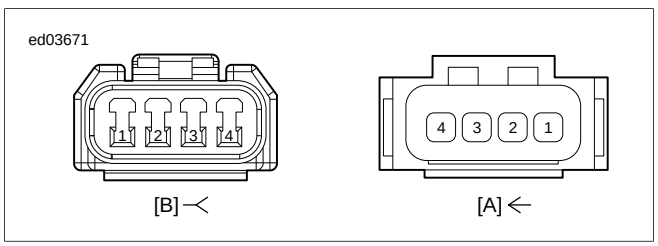


Figure B-48. LHCM [24]

Table B-21. LHCM [24D] (Inside Hand Controls)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/O	Battery fuse
2	BK/GN	Ground
3	W/R	CAN high
4	W/BK	CAN low

Table B-22. Radio [27]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A1	W/R	CAN high
A2	W/BK	CAN low
A3	W/BN	Aux CAN low
A4	W/PK	Aux CAN high
B1	BK	Ground
B2	LBE/PK	Rear switch input (FLH)
B3	-	N/C
B4	-	N/C
C1	R	Microphone front (+)
C2	BK	Microphone common (-)
C3	R	Microphone sum out (+)
C4	-	N/C
D1	R/W	Microphone rear (+) (FLH)
D2	BK/W	Microphone shield (FLH)
D3	BK	Microphone sum out (-)
D4	-	N/C
E1	LBE/W	Headset left rear (+)
E2	LBE/V	Headset right rear (+)
E3	BK/PK	Headset common (-)
E4	-	N/C
F1	PK/GN	Headset front (+)
F2	PK/BE	Headset right front (+)
F3	-	N/C
F4	LNE/BN	Power external AMP power control
G1	-	N/C
G2	-	N/C
G3	-	N/C
G4	-	N/C
H1	LBE/GY	Speaker left rear (-)
H2	R	Audio in 1 right (+)
H3	BK	Audio in 1 shield/mono
H4	-	N/C
J1	LBE/O	Speaker left rear (+)
J2	W	Audio in 1 left mono (+)
J3	W	Audio in 3 left mono (+)
J4	-	N/C
K1	LBE	Speaker right rear (+)
K2	LBE/BK	Speaker right rear (-)
K3	R	Audio in 3 right (+)
K4	BK/Y	Audio in 3 shield/mono (-)
L1	PK/GY	Speaker left front (-)
L2	PK/O	Speaker left front (+)
L3	BK	Ground

Table B-22. Radio [27]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
L4	BK	Ground
M1	PK	Speaker right front (+)
M2	PK/BK	Speaker right front (-)
M3	R/PK	Radio fuse
M4	R/PK	Radio fuse

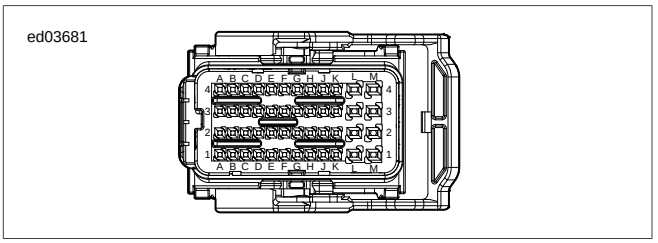


Figure B-50. Radio [27]

Table B-23. HDI Position Lamp [29] (With Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Ground
2	BE	Running lights power

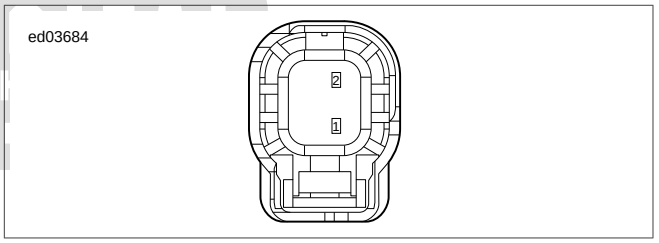


Figure B-51. HDI Position Lamp [29] (With Fairing)

Table B-24. Position Lamp [29] (Without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	BK	Ground

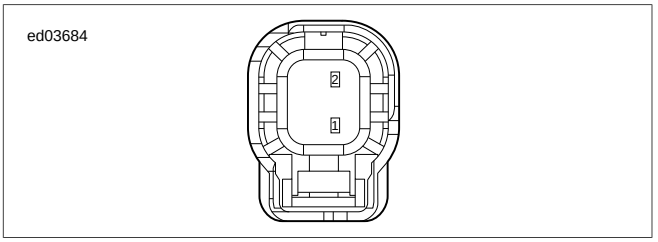


Figure B-52. Position Lamp [29] (Without Fairing)

Table B-25. Left Front Turn Signal [31LA] (Without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Ground

Table B-25. Left Front Turn Signal [31LA] (Without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
2	BE/PK	Left front turn signal
3	BE	Running lights
4	BE/BK	Front running/fog light power

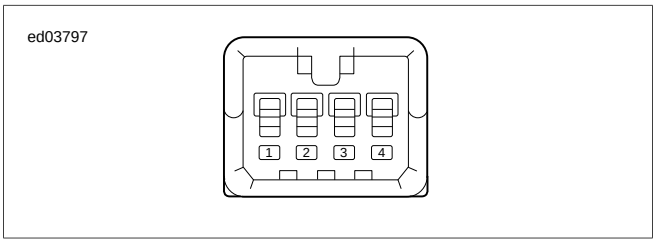


Figure B-53. Left Front Turn Signal [31LA] (without Fairing)

Table B-26. Left Front Turn Signal [31LB] (Without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	V	Left turn signal
3	BK	Ground
4	GY/BK	Front running/fog light power

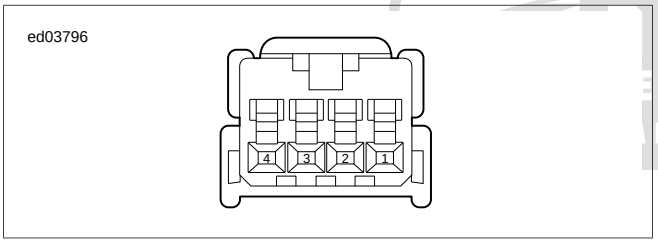


Figure B-54. Left Front Turn Signal [31LB] (Without Fairing)

Table B-27. Left Front Turn Signal [31L] (with Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	BE/PK	Left front turn signal
3	BK	Running lights
4	BE/BK	Front running/fog light power

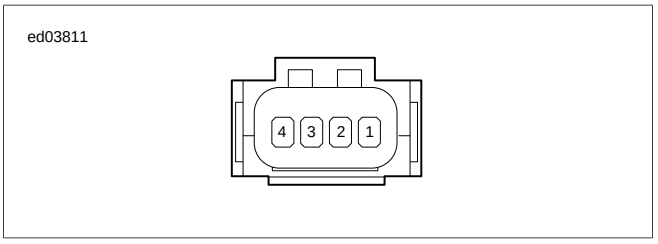


Figure B-55. Left Front Turn Signal [31LA] (with Fairing)

Table B-28. Left Front Turn Signal [31LB] (With Fairing Except FLHX, FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	V	Left turn signal
3	BK	Ground
4	GY/BK	Front running/fog light power

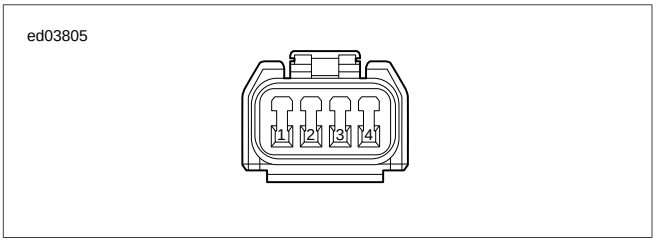


Figure B-56. Left Front Turn Signal [31LB] (With Fairing except FLHX, FLT)

Table B-29. Left Front Turn Signal [31LB] (FLHX, FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	V/BN	Left turn signal
3	BK	Ground
4	-	N/C

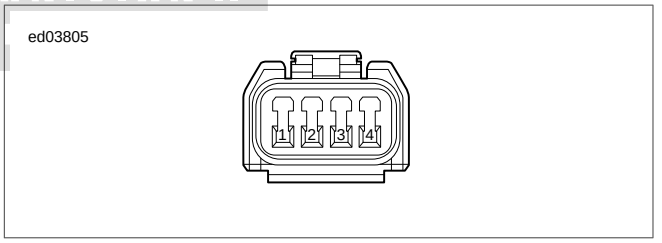


Figure B-57. Left Front Turn Signal [31LB] (FLHX, FLT)

Table B-30. Right Front Turn Signal [31RA] (without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Ground
2	BE/O	Left front turn signal
3	BE	Running lights
4	BE/BK	Front running/fog light power
5	-	N/C
6	-	N/C

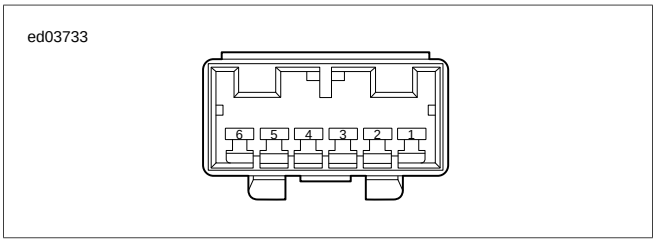


Figure B-58. Right Front Turn Signal [31RA] (without Fairing)

Table B-31. Right Front Turn Signal [31RB] (Without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	BN	Right turn signal
3	BK	Ground
4	GY/BK	Front running/fog light power
5	-	N/C
6	-	N/C

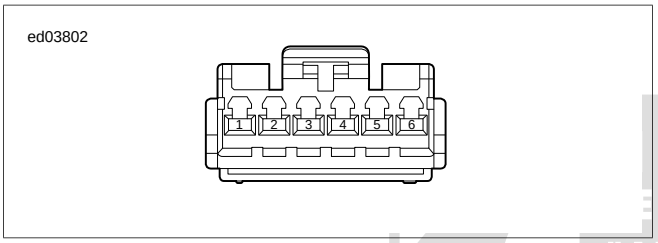


Figure B-59. Right Front Turn Signal [31RB] (Without Fairing)

Table B-32. Right Front Turn Signal [31RA] (With Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	BE/O	Right front turn signal
3	BK	Ground
4	BE/BK	Front running/fog light power

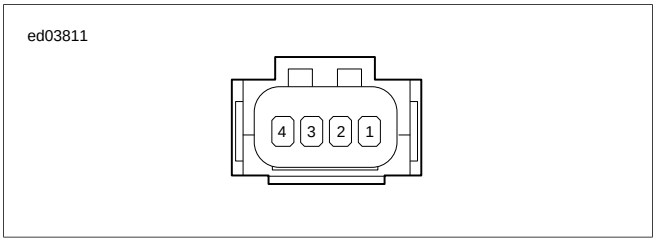


Figure B-60. Right Front Turn Signal [31RA] (with Fairing)

Table B-33. Right Front Turn Signal [31RB] (With Fairing Except FLHX, FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	BN	Right turn signal
3	BK	Ground
4	GY/BK	Front running/fog light power

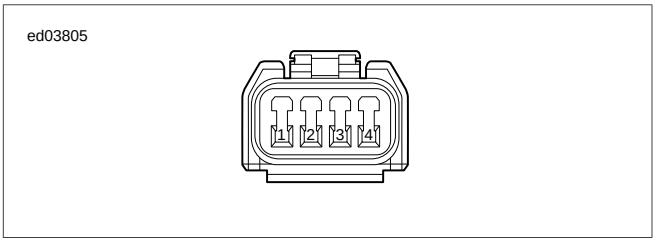


Figure B-61. Right Front Turn Signal [31RB] (With Fairing Except FLHX, FLT)

Table B-34. Right Front Turn Signal [31RB] (FLHX, FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Running lights power
2	V/BN	Right turn signal
3	BK	Ground
4	-	N/C

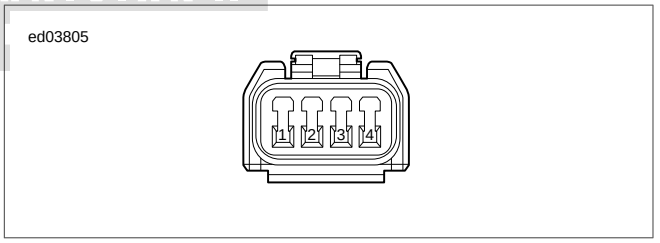


Figure B-62. Right Front Turn Signal [31RB] (FLHX, FLT)

Table B-35. Front Fender Tip Lamp [32A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE	Accessory power
2	BK	Ground

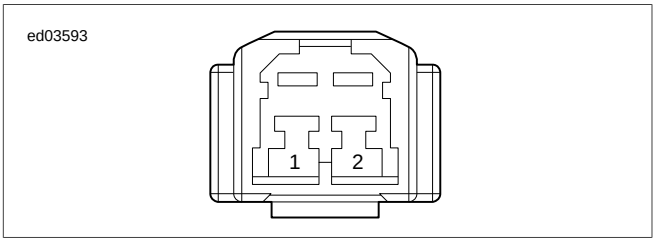


Figure B-63. Front Fender Tip Lamp [32A]

Table B-36. Front Fender Tip Lamp [32B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	O/W	Accessory power
2	BK	Ground

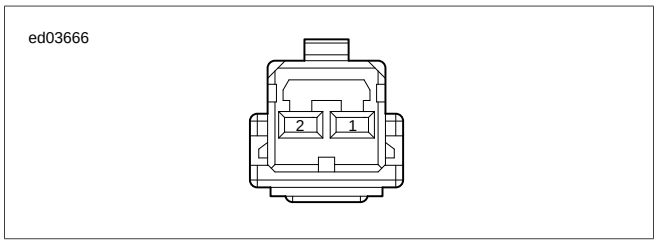


Figure B-64. Front Fender Tip Lamp [32B]

Table B-37. Ignition Switch [33]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK/GN	Ground
2	W/BE	Ignition switch

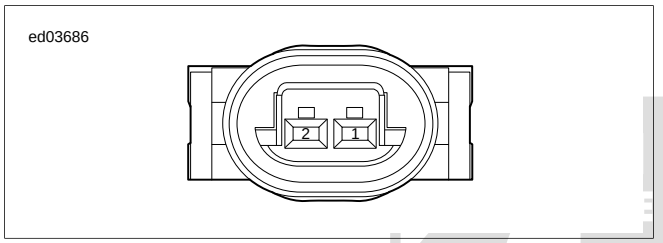


Figure B-65. Ignition Switch [33]

Table B-38. Right Front Speaker [34-1]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	PK	Right front speaker (+)
2	PK/BK	Right front speaker (-)

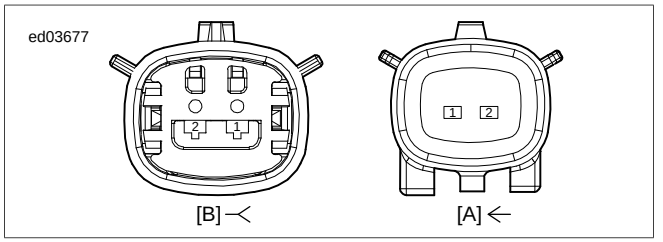


Figure B-66. Right Front Speaker [34-1]

Table B-39. Right Front Speaker [34-2]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	PK	Right front speaker (+)
2	PK/BK	Right front speaker (-)

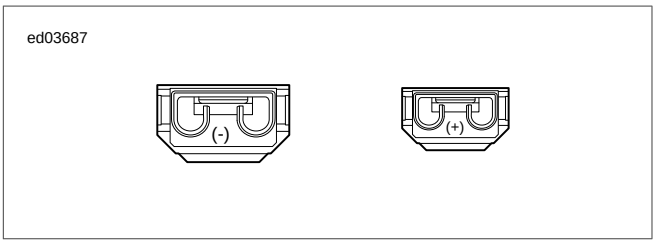


Figure B-67. Right Front Speaker [34-2]

Table B-40. Left Front Speaker [35-1]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	PK/O	Left front speaker (+)
2	PK/BK	Left front speaker (-)

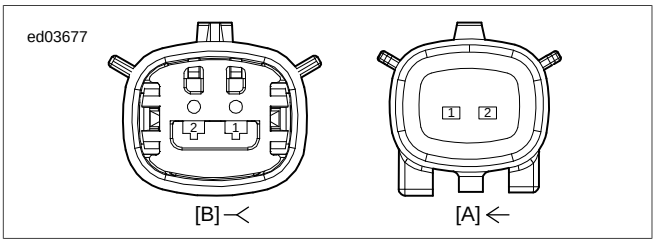


Figure B-68. Left Front Speaker [35-1]

Table B-41. Left Front Speaker [35-2]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	PK	Left front speaker (+)
2	PK/BK	Left front speaker (-)

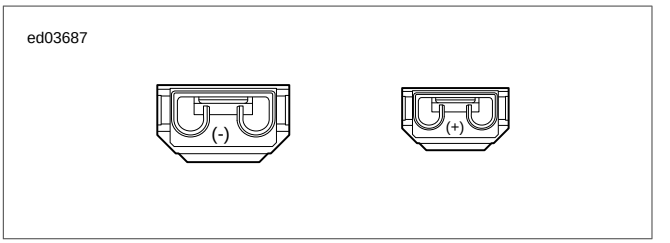


Figure B-69. Left Front Speaker [35-2]

Table B-42. Right Rear Speaker [36]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE	Right rear speaker (+)
2	LBE/BK	Right rear speaker (-)

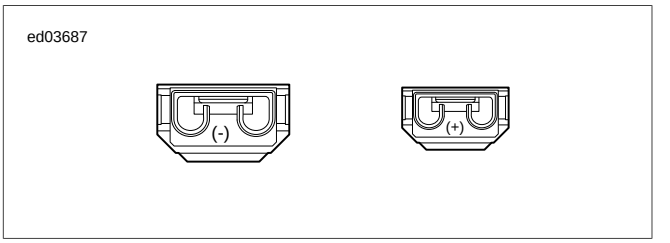


Figure B-70. Right Rear Speaker [36]

Table B-43. Left Rear Speaker [37]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/O	Left rear speaker (+)
2	LBE/GY	Left rear speaker (-)

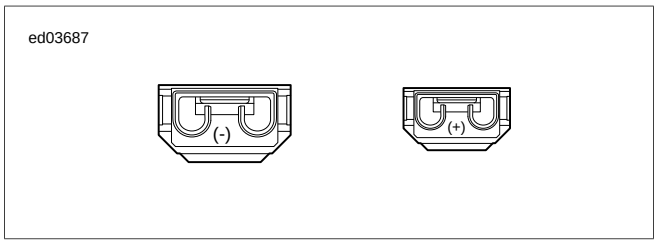


Figure B-71. Left Rear Speaker [37]

Table B-44. Headlamp [38A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	BK	Ground
B	BE/Y	Low beam power
C	BE/W	High beam power
D	BE	Running lights power (HDI)

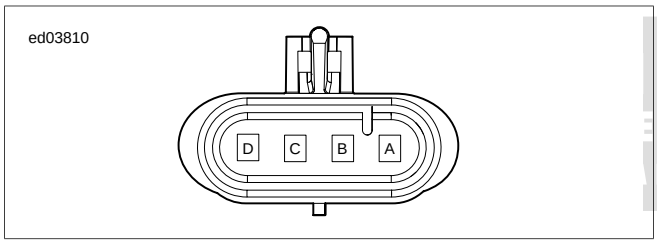


Figure B-72. Headlamp [38A]

Table B-45. Headlamp [38B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	BK	Ground
B	BE/Y	Low beam power
C	BE/W	High beam power
D	BE	Running lights power (FLH)
	R/Y	Accessory power (FLT)

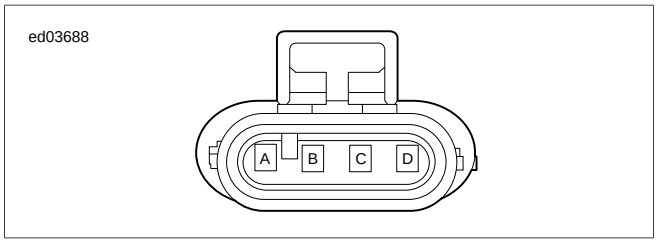


Figure B-73. Headlamp [38B]

Table B-46. Headlamp High Beam [38HI]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Ground
2	BE/W	High beam headlamp

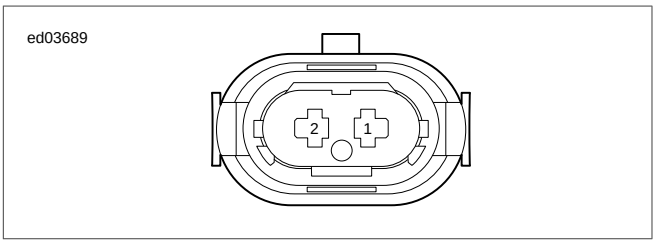


Figure B-74. Headlamp High Beam [38HI]

Table B-47. Headlamp Low Beam [38LO]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Accessory power
2	BE/Y	Low beam headlamp

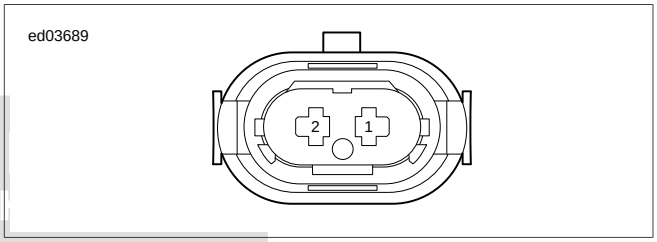


Figure B-75. Headlamp Low Beam [38LO]

Table B-48. IM [39] (with Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/W	HD-Link output
2	W/R	CAN high
3	-	N/C
4	TN/GN	Parking brake (Trike)
5	R/O	Battery fuse
6	-	N/C
7	BK/GN	Ground
8	W/BK	CAN low
9	W/Y	Fuel level
10	-	N/C
11	-	N/C
12	-	N/C

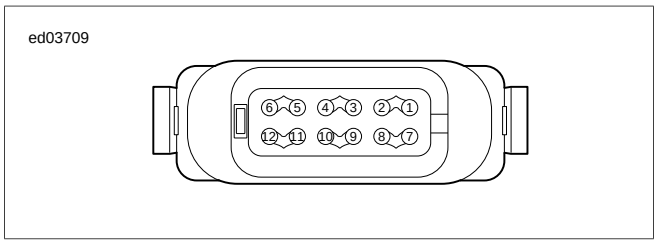


Figure B-76. IM [39] (with Fairing)

Table B-49. Speedometer [39] (without fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/O	Oil pressure indicator
2	W/R	CAN high
3	-	N/C
4	BE/W	High beam indicator
5	R/O	Battery fuse
6	W	Neutral indicator
7	BK/GN	Ground
8	W/BK	CAN low
9	W/Y	Fuel level
10	BE/PK	Left turn indicator
11	-	N/C
12	BE/O	Right turn indictor

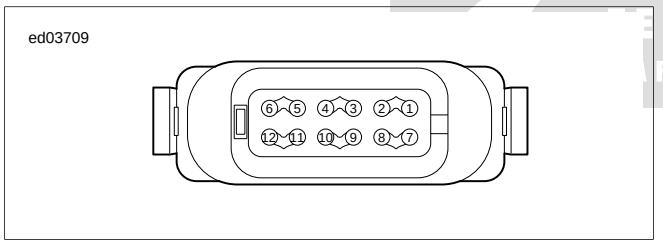


Figure B-77. Speedometer [39] (without Fairing)

Table B-50. Right Saddlebag Speaker [41]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	LBE	Right saddlebag speaker (+)
B	LBE/BK	Right saddlebag speaker (-)

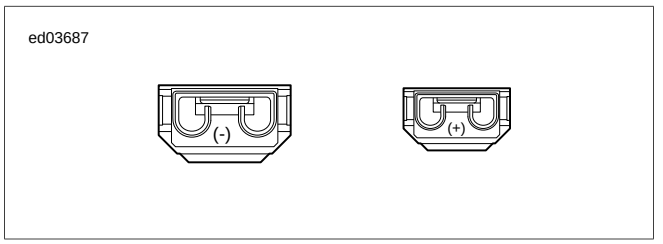


Figure B-78. Right Saddlebag Speaker [41]

Table B-51. Left Saddlebag Speaker [42]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	LBE/O	Left saddlebag speaker (+)
B	LBE/GY	Left saddlebag speaker (-)

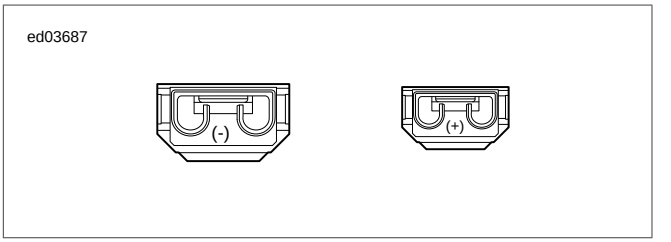


Figure B-79. Left Saddlebag Speaker [42]

Table B-52. Rear Fender Tip Lamp [45]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Running lights
2	-	N/C
3	BK	Ground

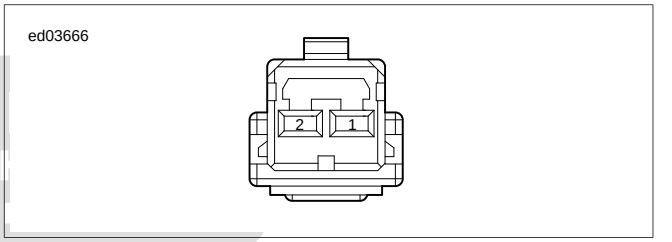


Figure B-80. Rear Fender Tip Lamp [45]

Table B-53. Stator [47]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Stator
1	BK	Stator
1	BK	Stator

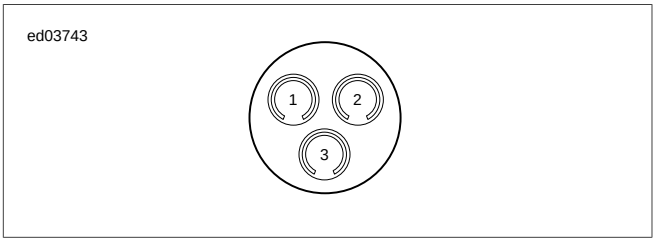


Figure B-81. Stator [47]

Table B-54. Rider Headset [53A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	PK/GN	Headset left front (+)
2	BK/PK	Headset common (-)
3	PK/BE	Headset right front (+)
4	R	Microphone front (+)
5	BK	Microphone common (-)
6	BK/W	Microphone shield (-)

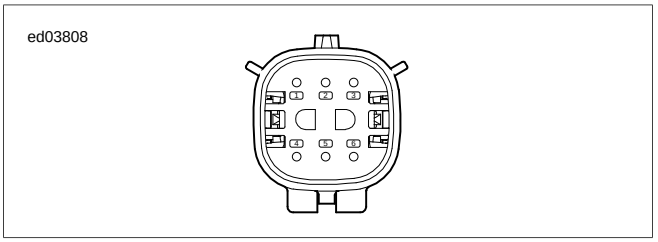


Figure B-82. Rider Headset [53A]

Table B-55. Rider Headset [53B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	PK/GN	Headset left front (+)
2	BK	Headset common (-)
3	PK/BE	Headset right front (+)
4	R	Microphone front (+)
5	BK	Microphone common (-)
6	BK/W	Microphone shield (-)

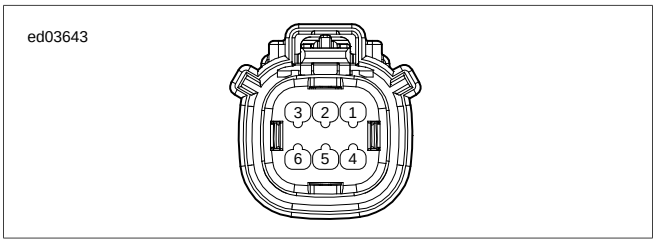


Figure B-83. Rider Headset [53B]

Table B-56. Fuse Block [64]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	Battery
2	R/O	Battery fuse
3	V/GN	System power fuse
4	R/GN	System power
5	R	Battery
6	R/PK	Radio fuse
7	BK	Spare
8	-	N/C
9	R	Battery
10	BN	Cooling fuse
11	R	Battery
12	R/BE	P&A fuse
13	BK	Spare
14	BK	Spare
15	BN	Cooling fuse
16	BN	Cooling fuse
17	R/BE	P&A fuse
18	R/Y	Accessory power
19	-	N/C
20	BK	Spare
21	BN/BK	Cooling fan relay control
22	BN/BE	Left cooling fan
23	BK	Ground
24	V/BE	P&A relay

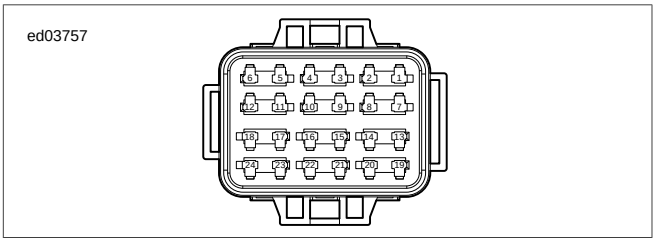


Figure B-84. Fuse Block [64]

Table B-57. VSS [65]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	R/W	5V sensor power
B	LGN/Y	VSS input
C	BK/GN	Sensor ground

ed03695

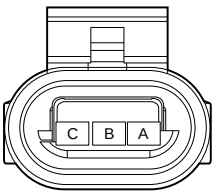


Figure B-85. VSS [65]

Table B-58. Accessory Switch [67]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BE	P&A relay
2	-	N/C
3	-	N/C
4	LBE/GN	P&A accessory

ed03645

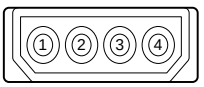


Figure B-86. Accessory Switch [67]

Table B-59. Auxiliary/Fog Lamps [73]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	GY/BK	Front running/fog light power
1	BK	Ground

ed03696

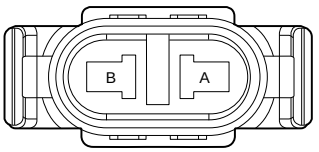


Figure B-87. Auxiliary/Fog Lamps [73]

Table B-60. Passenger Headset [76]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Microphone common (-)
2	BK	Headset common (-)
3	PK/BE	Rear RT headset (+)
4	R	Rear microphone (+)
5	PK/GN	Rear LT headset (+)
6	-	N/C
7	-	N/C
TAB	BK/W	Microphone shield

ed03659

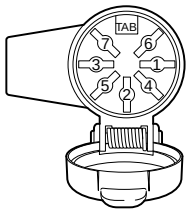


Figure B-88. Passenger Headset [76]

Table B-61. Voltage Regulator [77]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
P	R	Battery
N	BK	Ground

ed03697

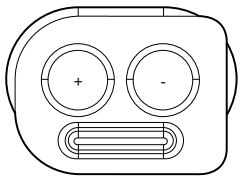


Figure B-89. Voltage Regulator [77]

Table B-62. ECM [78-1] (BK)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	GY/BE	Rear ignition coil
2	GN/BE	Front ignition coil
3	BK/O	Front HO2S heater ground
4	LGN/Y	VSS input
5	GN/Y	Front fuel injector
6	GY/Y	Rear fuel injector
7	GY	MAP input
8	LGN/GY	JSS signal
9	LGN/BN	ION sense
10	BK/GN	Ground
11	-	N/C
12	-	N/C
13	W/BK	CAN low
14	W/R	CAN high
15	BK/PK	Rear HO2S heater ground
16	R	CKP sensor high
17	GN/BN	Front HO2S
18	BK	CKP sensor low

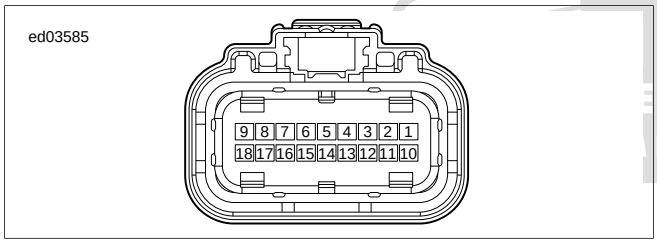


Figure B-90. ECM [78-1]

Table B-63. ECM [78-2] (GY)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	-	N/C
2	BN/BK	Cooling fan relay control
3	LGN/O	Exhaust actuator
4	LGN/R	ACR enable
5	LGN/BK	Purge solenoid
6	GN/GY	IAT
7	BK/W	5V sensor ground
8	GN	ET sensor
9	R/W	5V sensor power
10	BK/GN	Ground
11	-	N/C
12	-	N/C
13	-	N/C
14	LGN/BE	Exhaust feedback
15	GN/V	TPS2
16	R/GN	System power
17	GY/BN	Rear HO2S
18	R/O	Battery fuse

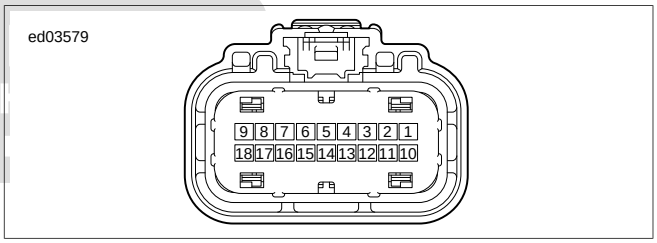


Figure B-91. ECM [78-2]

Table B-64. ECM [78-3] (BN)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	GN/BK	Cooling fan left
2	GN/V	TPS1
3	W/V	AAT
4	-	N/C
5	GY/BK	Cooling fan right
6	-	N/C
7	-	N/C
8	GN/O	TCA high
9	GY/O	TCA low
10	BK/GN	Ground
11	-	N/C
12	-	N/C
13	GN/W	Twist grip sensor 1
14	GY/W	Twist grip sensor 2
15	GY/GN	Coolant temperature
16	-	N/C
17	BK/GY	5V sensor ground 2
18	R/GY	5V sensor power 2

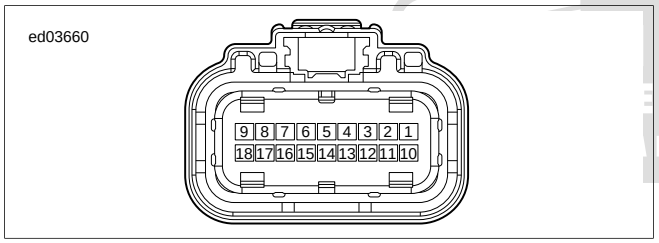


Figure B-92. ECM [78-3]

Table B-65. CKP Sensor [79]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	CKP sensor high
2	BK	CKP sensor low

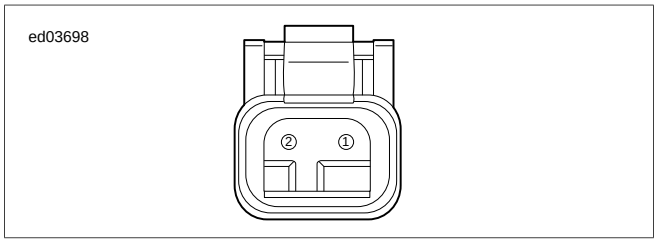


Figure B-93. CKP Sensor [79]

Table B-66. TMAP [80]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK/GY	5V sensor ground 2
2	GN/GY	IAT
3	R/GY	5V sensor power 2
4	GY	MAP input

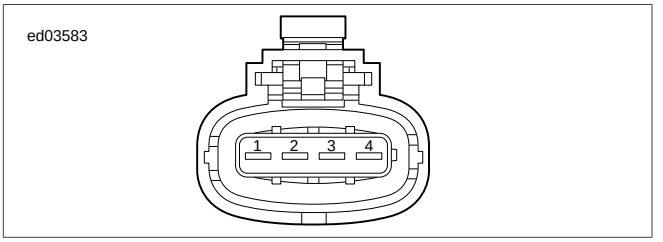


Figure B-94. TMAP [80]

Table B-67. Ignition Coil [83]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	R/GN	System power
B	LGN/BN	ION sense
C	GY/BE	Rear ignition coil
D	GN/BE	Front ignition coil

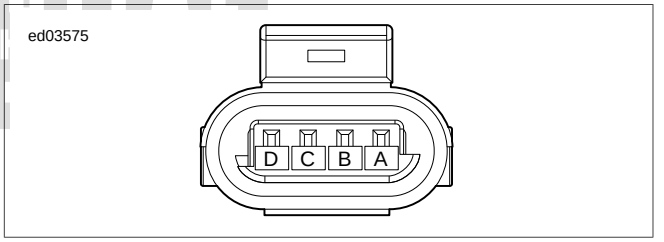


Figure B-95. Ignition Coil [83]

Table B-68. Front Fuel Injector [84]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	R/GN	System power
B	GN/Y	Front fuel injector

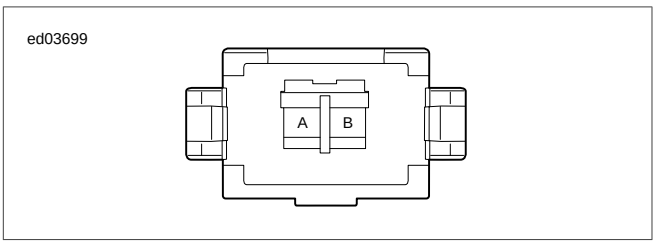


Figure B-96. Front Fuel Injector [84]

Table B-69. Rear Fuel Injector [85]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	R/GN	System power
B	GY/Y	Rear fuel injector

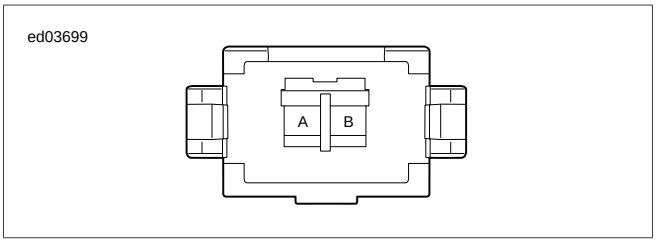


Figure B-97. Rear Fuel Injector [85]

Table B-70. ET Sensor [90]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	GN	ET sensor
B	BK/W	5V sensor ground

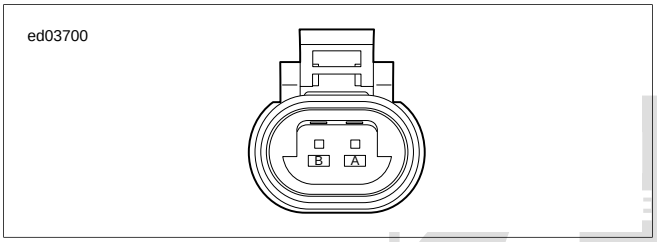


Figure B-98. ET Sensor [90]

Table B-71. DLC [91]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/R	CAN high
2	BK	Ground
3	W/BK	CAN low
4	-	N/C
5	R/Y	Accessory power
6	W/BN	Start enable

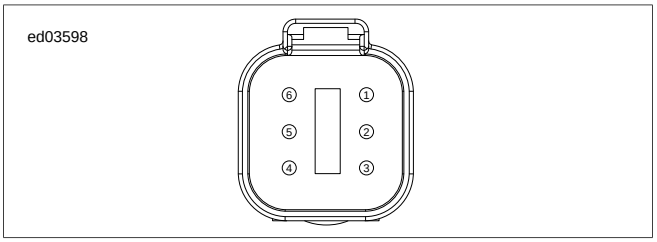


Figure B-99. DLC [91]

Table B-72. DLC [91-2]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/R	CAN high
2	BK	Ground
3	W/BK	CAN low
4	-	N/C
5	R/Y	Accessory power
6	-	N/C

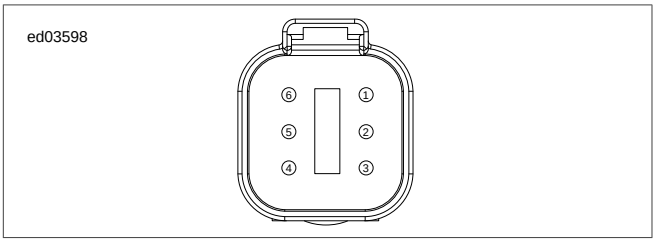


Figure B-100. DLC [91-2]

Table B-73. Tail Lamp [93]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE/W	Running light power (DOM)
2	O/W	Accessory power (HDI)
3	R/Y	Brake lamp power
4	BK	Ground

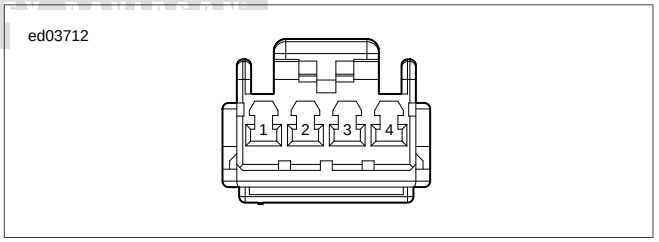


Figure B-101. Tail Lamp [93]

Table B-74. Stop Tail Lamp [94]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/Y	Accessory power
2	BE/BN	Right rear turn signal
3	BE	Running lights power
4	BE/R	Brake lamp power
5	BE/V	Left rear turn signal
6	BK	Ground

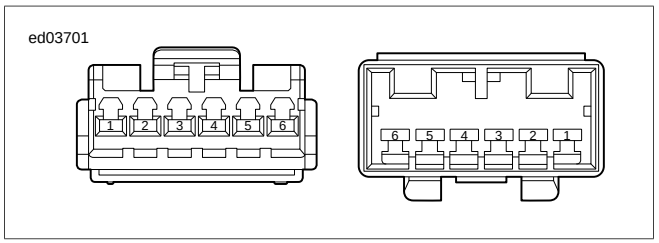


Figure B-102. Stop Tail Lamp [94]

Table B-75. Purge Solenoid [95]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	V/GN	System power
B	LGN/BK	Purge solenoid

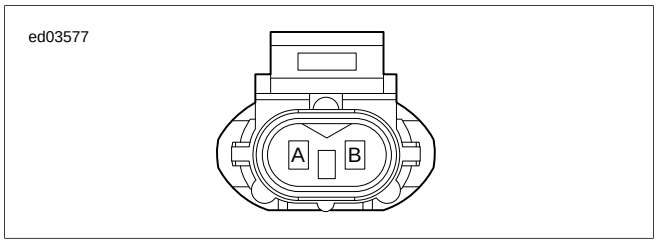


Figure B-103. Purge Solenoid [95]

Table B-76. Right Cooling Fan [97]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	BN/BE	Cooling relay
B	GY/BK	Cooling fan right

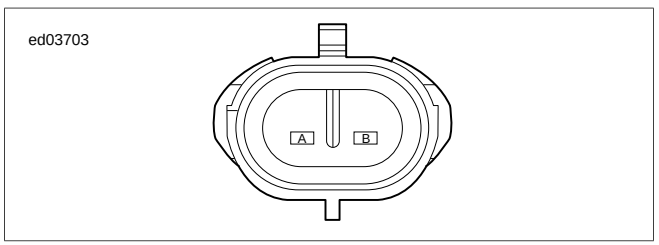


Figure B-104. Right Cooling Fan [97]

Table B-77. CB Antenna [104]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	CB antenna cable

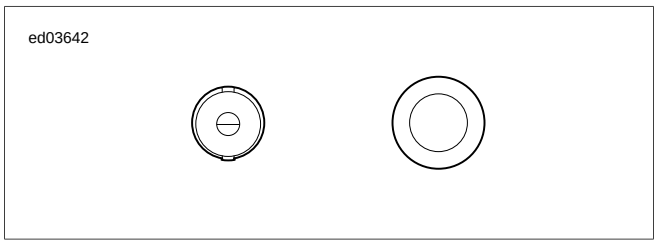


Figure B-105. CB Antenna [104]

Table B-78. OE Dash Switch Pack [105L]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/R	OE switch output 3
2	LBE/GN	OE switch output 2
3	BE/GY	OE switch output 1
4	BK	Ground
5	V/BE	P&A relay power
6	-	N/C

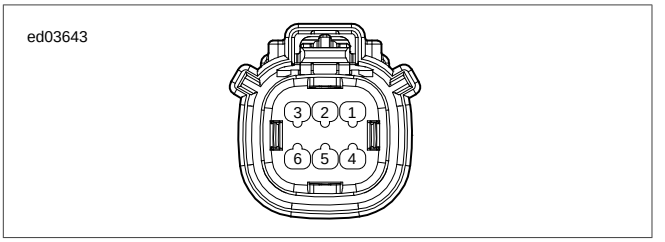


Figure B-106. OE Dash Switch Pack [105L]

Table B-79. P&A Dash Switch Pack [105R]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/V	P&A switch output 3
2	LBE/W	P&A switch output 2
3	LBE/Y	P&A switch output 1
4	BK	Ground
5	V/BE	P&A relay
6	-	N/C

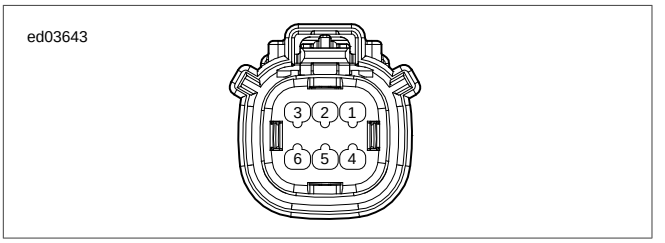


Figure B-107. P&A Dash Switch Pack [105R]

Table B-80. AAT [107]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/V	Air temperature
2	BK/W	5V sensor ground

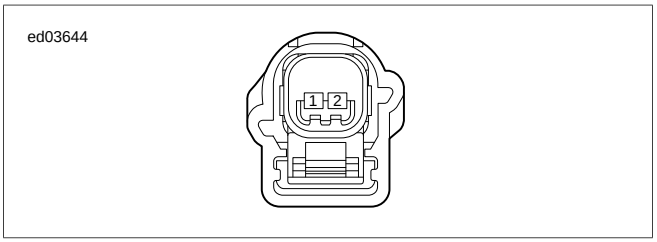


Figure B-108. AAT [107]

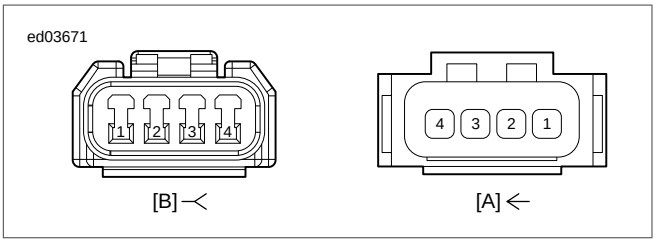


Figure B-111. Voltmeter Jumper [111-2] (FLT)

Table B-81. Auxiliary Lamp Switch [109]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/Y	Accessory power
2	-	N/A
3	BK	Ground
4	BE/GY	AUX lamp switch input

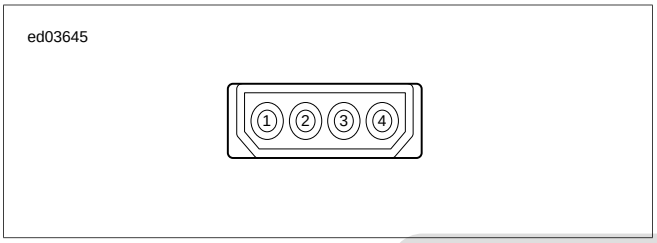


Figure B-109. Auxiliary Lamp Switch [109]

Table B-82. Voltmeter [111]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	V/W	HD-Link output
B	BK/GN	Ground
C	-	N/C
D	R/O	Battery fuse

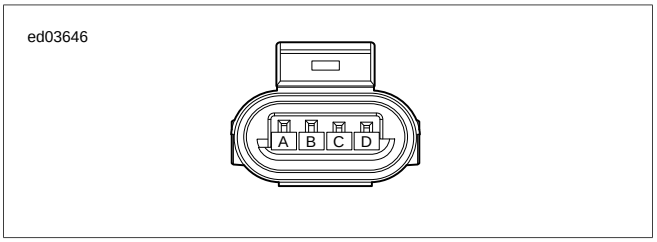


Figure B-110. Voltmeter [111]

Table B-83. Voltmeter Jumper [111-2] (FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/W	HD-Link output
2	BK/GN	Ground
3	-	N/C
4	R/O	Battery fuse

Table B-84. Fuel Gauge [117] (with Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	V/W	HD-Link output
B	BK/GN	Ground
C	-	N/C
D	R/O	Battery fuse

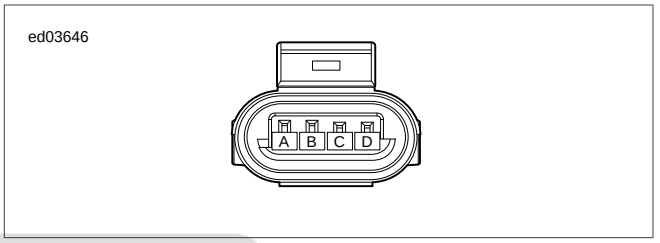


Figure B-112. Fuel Gauge [117] (with Fairing)

Table B-85. Fuel Gauge [117] (without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/Y	Accessory power
2	W/Y	Fuel level
3	-	N/C
4	BK/GN	Ground

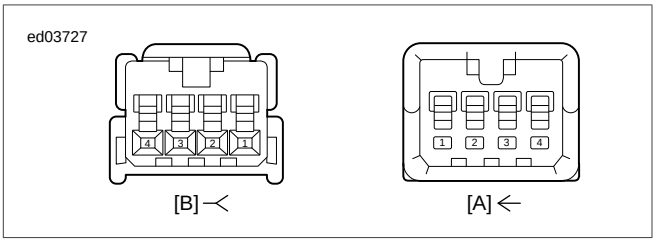


Figure B-113. Fuel Gauge [117] (without Fairing)

Table B-86. Fuel Gauge Jumper [117-2] (FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/W	HD-Link output
2	BK/GN	Ground
3	-	N/C
4	R/O	Battery fuse

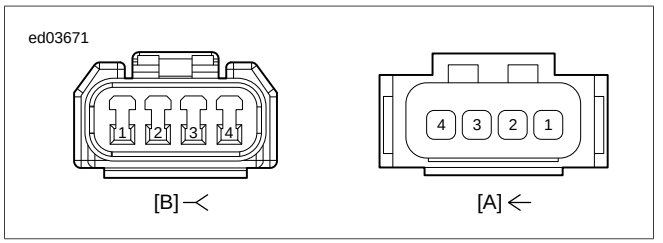


Figure B-114. Fuel Gauge Jumper [117-2] (FLT)

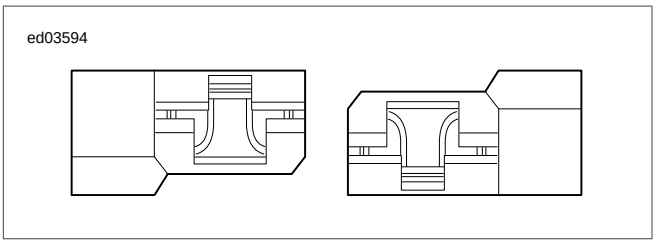


Figure B-117. Horn [122]

Table B-87. Oil Pressure Switch [120]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/O	Oil pressure switch

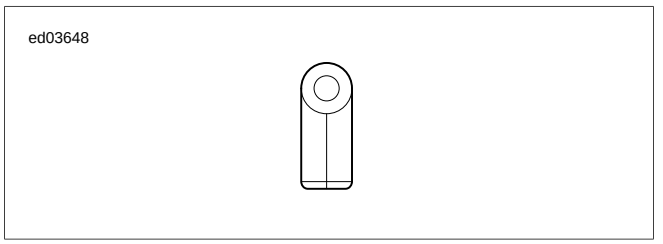


Figure B-115. Oil Pressure Switch [120]

Table B-88. Rear Brake Switch [121]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE/GN	Rear brake switch
1	BK	Ground

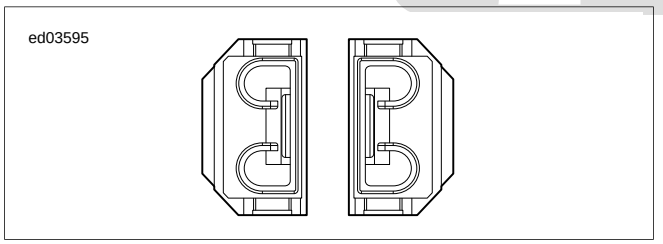


Figure B-116. Rear Brake Switch [121]

Table B-89. Horn [122]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/V	Horn power
1	BK	Ground

Table B-90. Starter Solenoid [128]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/BK	Starter solenoid power

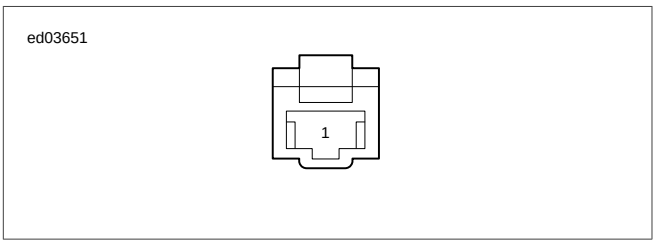


Figure B-118. Starter Solenoid [128]

Table B-91. Neutral Switch [131]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W	Neutral switch input
1	BK	Ground

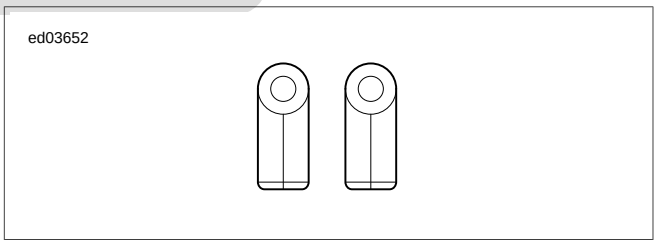


Figure B-119. Neutral Switch [131-1] [131-2]

Table B-92. Power Outlet [132C]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BE	P&A relay power
2	BK	Ground

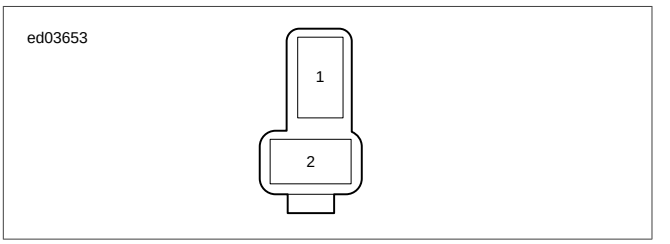


Figure B-120. Power Outlet [132C]

Table B-93. Power Outlet Jumper [132]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BE	P&A relay power
2	BK	Ground

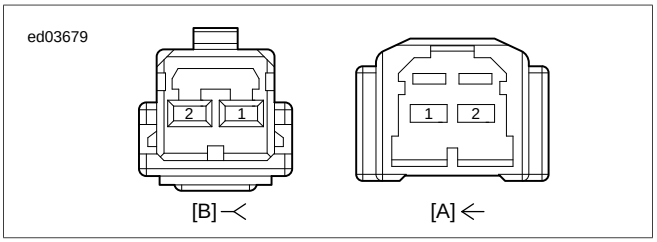


Figure B-121. Power Outlet Jumper [132]

Table B-94. Jiffy Stand [133]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/W	5V sensor power
2	LGN/GY	JSS signal
3	BK/GN	Ground

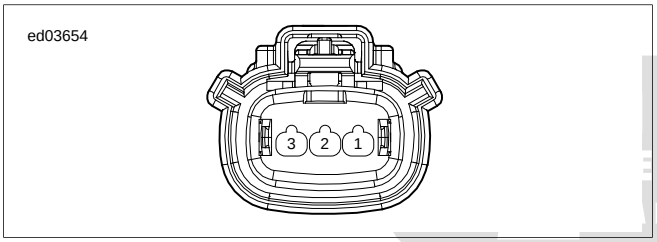


Figure B-122. Jiffy Stand [133]

Table B-95. HO2S Rear [137A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/GN	System power fuse
2	BK/PK	Rear HO2S heater ground
3	GY/BN	Rear HO2S
4	BK/W	5V sensor ground

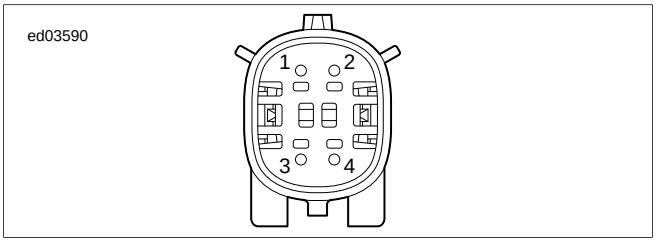


Figure B-123. HO2S Rear [137A]

Table B-96. HO2S Front [137B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V	System power
2	W	HO2S heater ground
3	GY	HO2S
4	BK	5V sensor ground

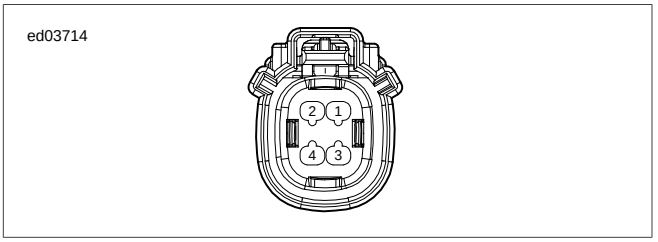


Figure B-124. HO2S Front [137B]

Table B-97. HO2S Front [138A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/GN	System power fuse
2	BK/O	HO2S front heater ground
3	GN/BN	HO2S front
4	BK/W	5V sensor ground

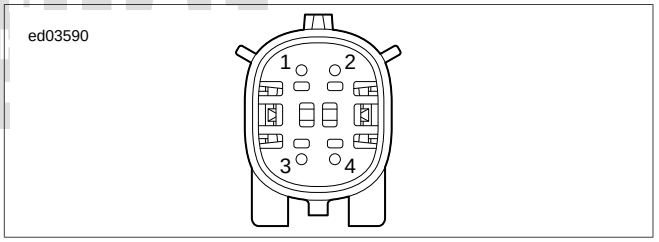


Figure B-125. HO2S Front [138A]

Table B-98. HO2S Rear [138B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V	System power
2	W	HO2S heater ground
3	GY	HO2S
4	BK	5V sensor ground

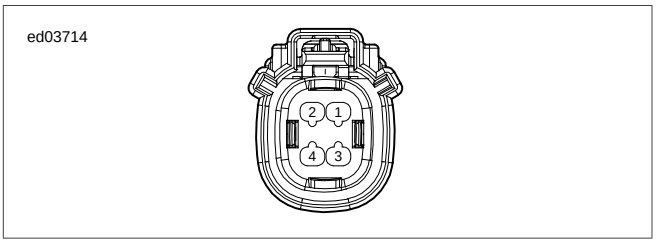


Figure B-126. HO2S Rear [138B]

Table B-99. Oil Pressure Sender [139B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/O	Oil pressure input
2	W/O	Oil pressure input
3	N/C	-
4	N/C	-

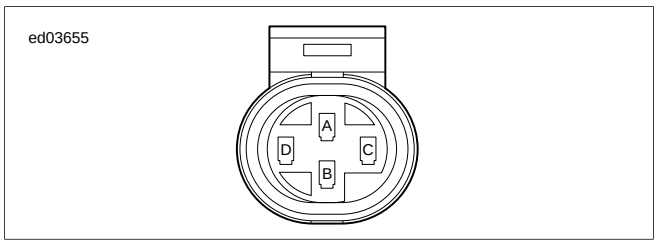


Figure B-127. Oil Pressure Sender [139B]

Table B-100. Fuel Pump [141] (With Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	W/Y	Fuel level
B	R/BN	Fuel pump power
C	BK/GN	Ground
D	BK	Ground

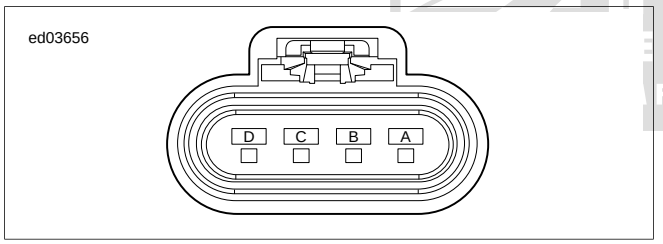


Figure B-128. Fuel Pump [141] (With Fairing)

Table B-101. Fuel Pump [141] (Without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	W/Y	Fuel level
B	R/BN	Fuel pump power
C	BK	Ground
D	BK	Ground

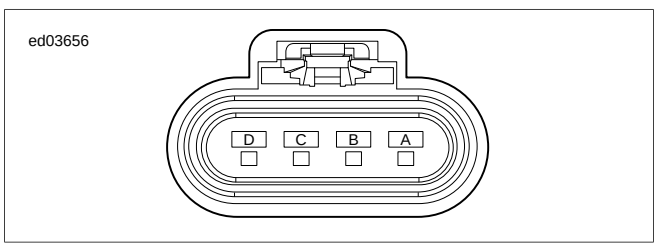


Figure B-129. Fuel Pump [141] (Without Fairing)

Table B-102. Security Siren (Optional) [142]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R/O	Battery power
2	W/GN	Security siren
3	BK	Ground

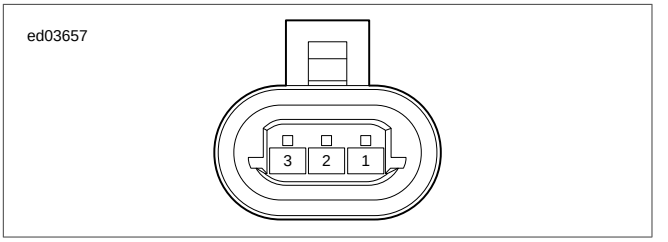


Figure B-130. Security Siren (Optional) [142]

Table B-103. Front Fender Tip Lamp [143]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	O/W	Running lights power
2	BK	Ground

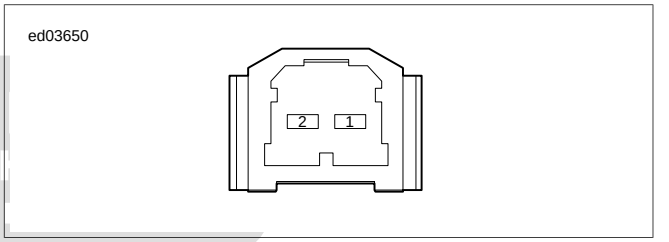


Figure B-131. Front Fender Tip Lamp [143]

Table B-104. Audio Amplifier 1 [149-1]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE	Right rear out +
2	LBE/BK	Right rear out -
3	LBE/O	Left rear out +
4	LBE/GY	Left rear out -
5	BN/O	Left front out -
6	BN/GY	Left front out +
7	BN/PK	Right front out +
8	BN/GN	Right front out -
9	R	Battery fuse
10	BK	Ground
11	W/R	CAN high
12	-	N/C
13	-	N/C
14	-	N/C
15	-	N/C
16	R	Battery fuse
17	BK	Ground
18	W/BK	CAN low
19	V/BE	P&A relay power
20	PK/GY	Left in (-)
21	PK/O	Left in (+)
22	PK	Right in (+)
23	PK/BK	Right in (-)

Table B-105. Audio Amplifier 2 [149-2]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/O	Right rear out +
2	LBE/GY	Right rear out -
3	LBE	Right rear out +
4	LBE/BK	Right rear out -
5	BN/O	Left front out -
6	BN/GY	Left front out +
7	BN/PK	Right front out +
8	BN/GN	Right front out -
9	R	Battery fuse
10	BK	Ground
11	W/R	CAN high
12	PK/W	Config 1 (ground)
13	-	N/C
14	-	N/C
15	-	N/C
16	R	Battery fuse
17	BK	Ground
18	W/BK	CAN low
19	R/Y	Accessory power
20	PK/GY	Left in (-)
21	PK/O	Left in (+)
22	PK	Right in (+)
23	PK/BK	Right in (-)

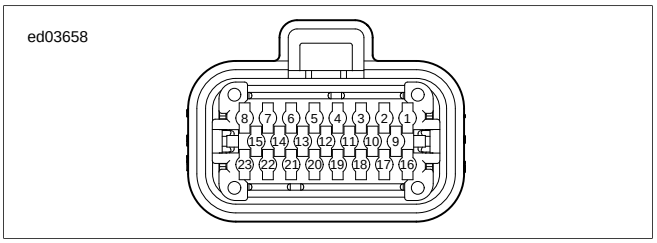


Figure B-132. Audio Amplifier 1 [149-1]

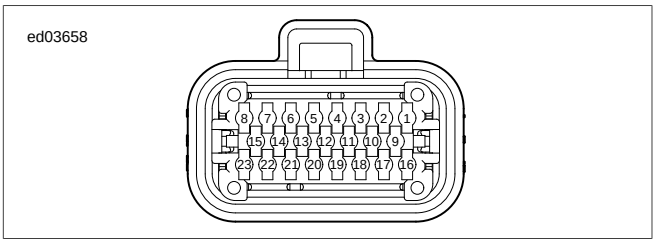


Figure B-133. Audio Amplifier 2 [149-2]

Table B-106. Rear Audio [162A] (Except FLHX and FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/O	Speaker left rear (+)
2	LBE/GY	Speaker left rear (-)
3	LBE/W	Headset left rear (+)
4	BK/PK	Headset common (-)
5	LBE/V	Headset right rear (+)
6	R	Microphone rear (+)
7	BK	Microphone common (-)
8	BK/W	Shield
9	LBE	Speaker right rear (+)
10	LBE/BK	Speaker right rear (-)
11	-	N/C
12	-	N/C
13	-	N/C
14	R/Y	Accessory power
15	LBE/PK	Rear switch input
16	BK/GN	Ground

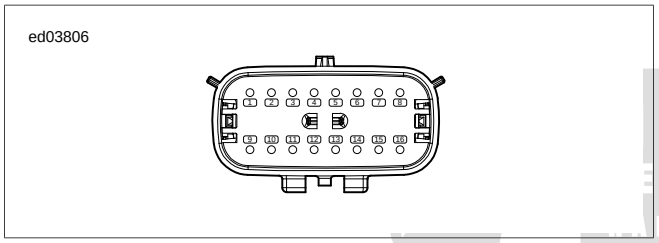


Figure B-134. Rear Audio [162A] (Except FLHX and FLT)

Table B-107. Rear Audio [162B] (Except FLHX and FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/O	Speaker left rear (+)
2	LBE/GY	Speaker left rear (-)
3	PK/GN	Headset left rear (+)
4	BK	Headset common (-)
5	PK/BE	Headset right rear (+)
6	R	Microphone rear (+)
7	BK	Microphone common (-)
8	BK/W	Shield
9	LBE	Speaker right rear (+)
10	LBE/BK	Speaker right rear (-)
11	-	N/C
12	-	N/C
13	-	N/C
14	W/R	Accessory power
15	W/BN	Rear switch input
16	W	Ground

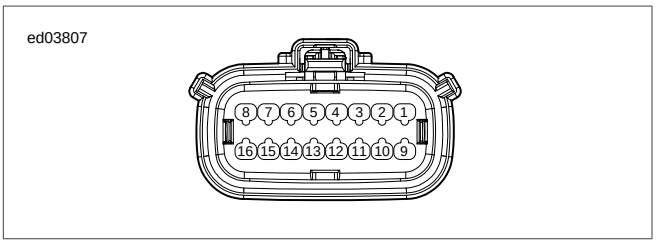


Figure B-135. Rear Audio [162B] (Except FLHX and FLT)

Table B-108. Rear Audio [162] (FLHX, FLT)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/O	Speaker left rear (+)
2	LBE/GY	Speaker left rear (-)
3	LBE	Speaker right rear (+)
4	LBE/BK	Speaker right rear (-)

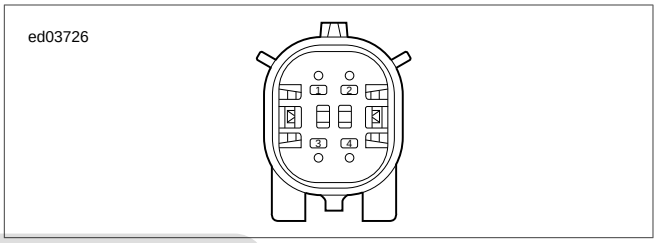


Figure B-136. Rear Audio [162] (FLHX, FLT)

Table B-109. ABS [166]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	Battery power (motor)
2	-	N/C
3	-	N/C
4	-	N/C
5	-	N/C
6	-	N/C
7	-	N/C
8	-	N/C
9	BK	Ground
10	W/BK	CAN low
11	-	N/C
12	-	N/C
13	-	N/C
14	O/BN	Rear WSS -
15	O/BE	Front WSS +
16	-	N/C
17	R	Battery power (solenoids)
18	W/R	CAN high
19	-	N/C
20	-	N/C
21	-	N/C
22	-	N/C
23	O/PK	Rear WSS +
24	O/BK	Front WSS -
25	-	N/C
26	BK/GN	Ground (ECU)

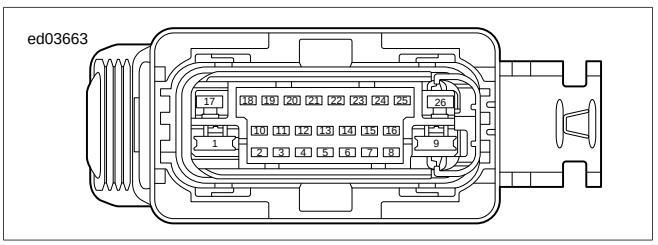


Figure B-137. ABS [166]

Table B-110. Front WSS [167] (with Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	O/BE	Front WSS high
B	O/BK	Front WSS low

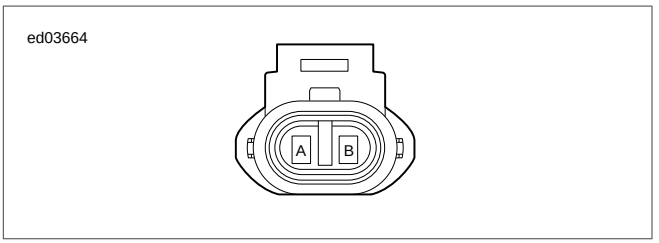


Figure B-138. Front WSS [167] (with Fairing)

Table B-111. Front WSS [167] (without Fairing)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	O/BE	Front WSS high
2	O/BK	Front WSS low

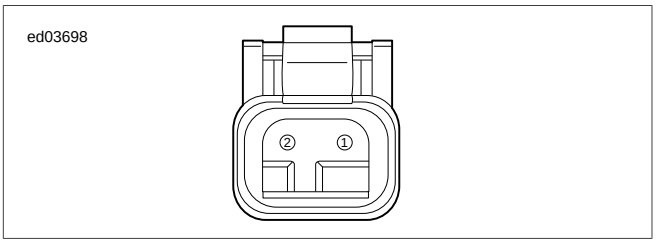


Figure B-139. Front WSS [167] (without Fairing)

Table B-112. Rear WSS [168]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	O/PK	Rear WSS high
B	O/BN	Rear WSS low

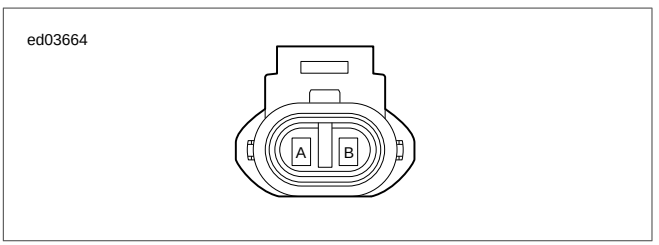


Figure B-140. Rear WSS [168]

Table B-113. Active Exhaust [179]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/GN	System power fuse
2	BK	Ground
3	LGN/O	Exhaust actuator
4	LGN/BE	Exhaust feedback
5	-	N/C

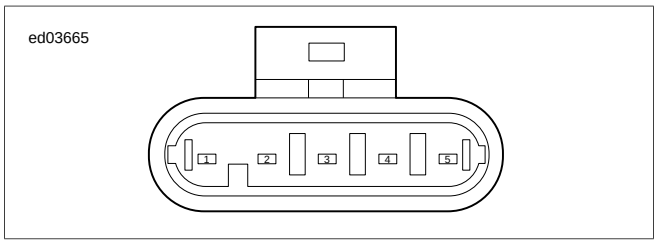


Figure B-141. Active Exhaust [179] (if Equipped)

Table B-114. CB Module [184]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	Microphone sum out (+)
2	BK	Microphone sum out (-)
3	R	Audio in 1 right (+)
4	W	Audio in 1 left/mono (+)
5	BK	Audio in 1 shield/mono (-)
6	R	Audio in 3 shield/mono (-)
7	W	Audio in 3 left/mono (+)
8	BK/Y	Audio in 3 shield/mono (-)
9	R/BE	P&A relay power
10	BK	Ground
11	W/PK	Aux CAN high
12	W/BN	Aux CAN low

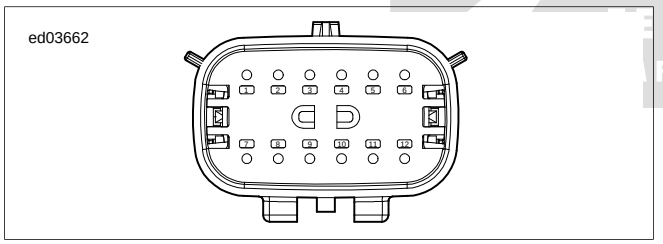


Figure B-142. CB Module [184]

Table B-115. Heated Handgrips [189A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	P&A power
2	BK	Ground

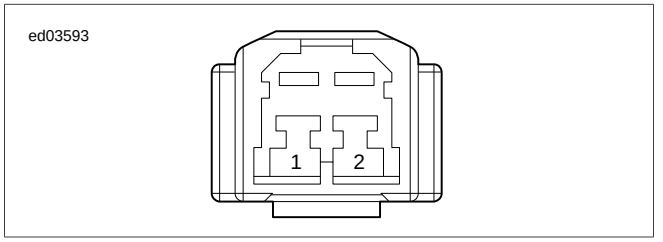


Figure B-143. Heated Handgrips [189A]

Table B-116. Heated Handgrips [189B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BE	P&A power
2	BK	Ground

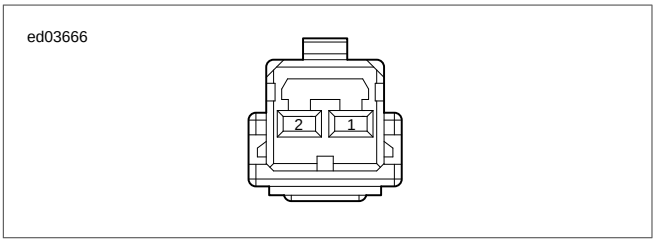


Figure B-144. Heated Handgrips [189B]

Table B-117. GPS Antenna [193]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	Black	GPS antenna cable

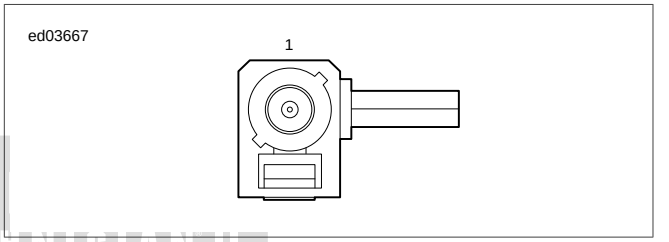


Figure B-145. GPS Antenna [193]

Table B-118. ACR [203]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/GN	System power fuse
2	LGN/R	ACR enable

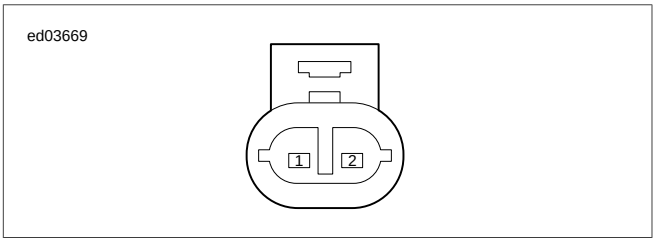


Figure B-146. ACR [203]

Table B-119. TGS [204A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK/GY	5V sensor ground 2
2	GY/W	TGS 2
3	R/GY	5V sensor power 2
4	BK/W	5V sensor ground 1
5	GN/W	TGS 1
6	R/W	5V sensor power 1

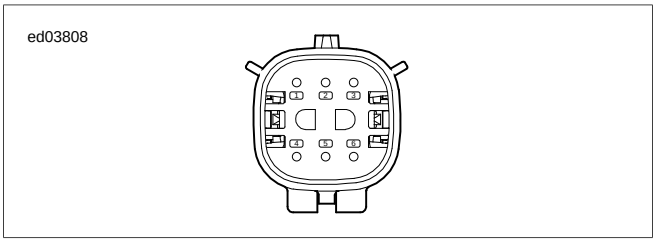


Figure B-147. TGS [204A]

Table B-120. TGS [204B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	GY	5V sensor ground 2
2	V	TGS 2
3	R	5V sensor power 2
4	BK	5V sensor ground 1
5	BE	TGS 1
6	BN	5V sensor power

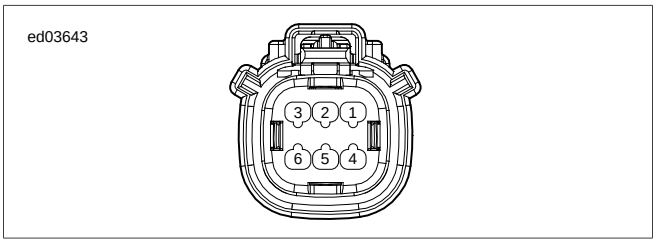


Figure B-148. TGS [204B]

Table B-121. Heated Handgrip Interconnect [206]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W	P&A power
2	BK	Ground

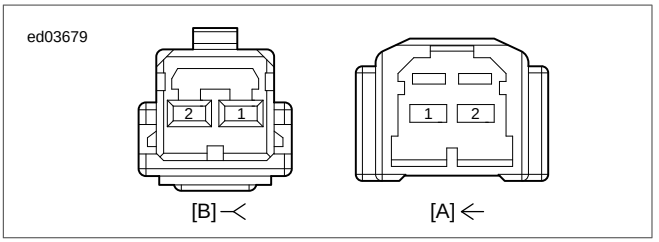


Figure B-149. Heated Handgrip Interconnect [206]

Table B-122. Security Antenna [209]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	Security antenna high
2	BK	Security antenna low

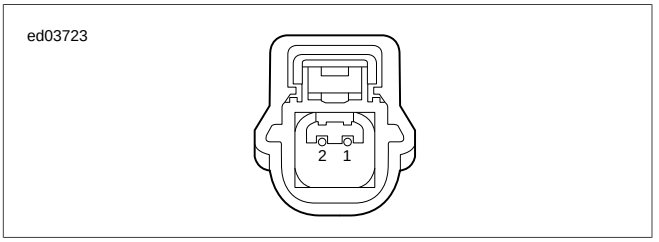


Figure B-150. Security Antenna [209]

Table B-123. TCA [211]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK/W	5V sensor ground 1
2	GY/O	TCA low
3	GN/O	TCA high
4	GY/V	TPS 2
5	R/W	5V sensor power 1
6	GN/V	TPS 1

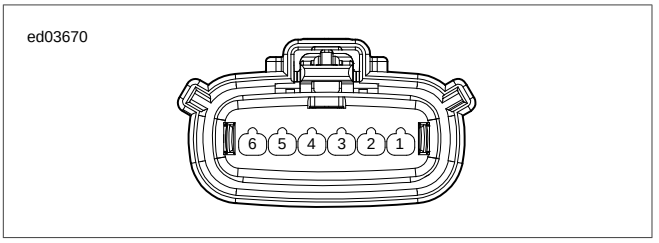


Figure B-151. TCA [211]

Table B-124. Left Cooling Fan [215]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	BN/BE	Cooling fan relay power
B	GN/BK	Cooling fan left

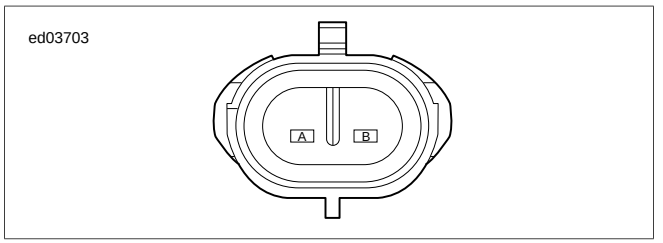


Figure B-152. Left Cooling Fan [215]

Table B-125. TGS [224]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V	TGS 2
2	-	N/C
3	BE	TGS 1
4	R	5V sensor power 2
5	BN	5V sensor power 1
6	GY	5V sensor ground 2
7	BK	5V sensor ground 1

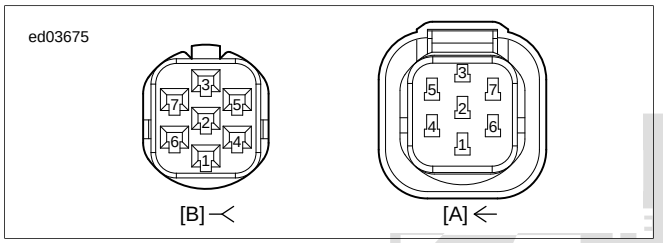


Figure B-153. TGS [224]

Table B-126. Driver Headset [225]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Microphone common (-)
2	BK	Headset common (-)
3	PK/BE	Rear RT headset (+)
4	R	Rear microphone (+)
5	PK/GN	Rear LT headset (+)
6	BK	Jumper
7	-	N/C
TAB	BK/W	Microphone shield

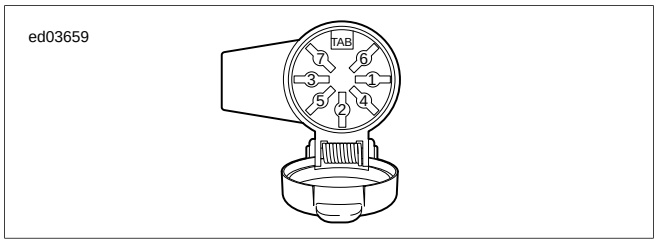


Figure B-154. Driver Headset [225]

Table B-127. Rear Lighting Jumper Harness [226]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Ground
2	-	N/C
3	BE/BN	Right rear turn signal
4	BE/V	Left rear turn signal
5	BE/R	Brake light power
6	BE	Running lights power
7	BK	Ground
8	-	N/C
9	-	N/C
10	-	N/C
11	-	N/C
12	R/Y	Accessory power

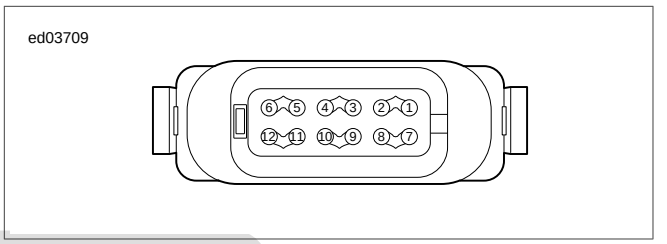


Figure B-155. Rear Lighting Jumper Harness [226]

Table B-128. Left Cooling Fan Jumper [232L]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	GN/BK	Cooling fan left
2	BN/BE	Cooling fan relay power
3	GY/GN	Coolant temperature
4	BK/W	5V sensor ground

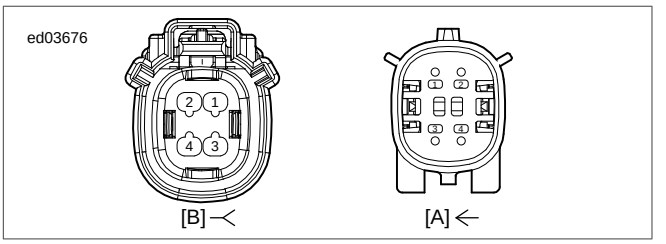


Figure B-156. Left Cooling Fan jumper [232L]

Table B-129. Right Cooling Fan Jumper [232R]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	GY/BK	Cooling fan right
2	BN/BE	Cooling relay power

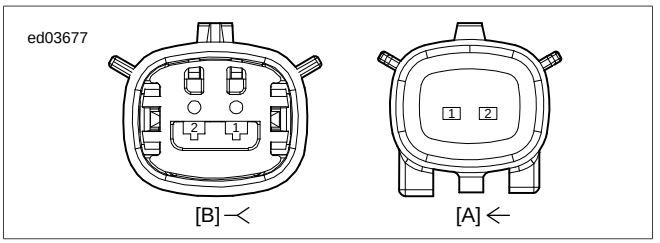


Figure B-157. Right Cooling Fan Jumper [232R]

Table B-130. Cooling Pump [235]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	BN/BE	Cooling relay power
B	BK	Ground

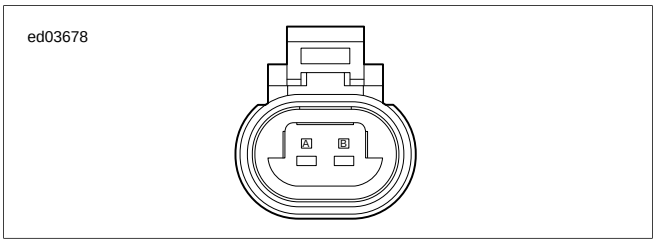


Figure B-158. Cooling Pump [235]

Table B-131. ECT Sensor [236]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	GY/GN	Coolant temperature
B	BK/W	5V sensor ground

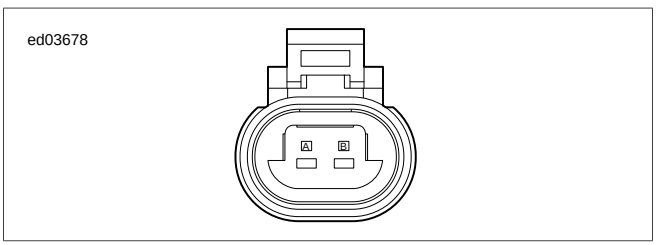


Figure B-159. ECT Sensor [236]

Table B-132. Right Heated Grip [237]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W	P&A power
2	BK	Ground

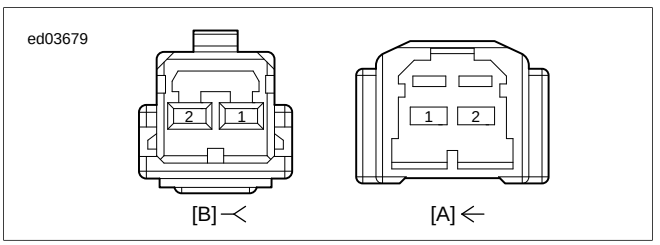


Figure B-160. Right Heated Grip [237]

Table B-133. BCM [242]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A1	-	N/C
A2	R	Security antenna high
A3	W/BN	Start enable
A4	BK	Security RF antenna
B1	-	N/C
B2	BK	Security antenna low
B3	BE/GY	Aux lamp switch
B4	-	N/C
C1	-	N/C
C2	-	N/C
C3	W/BE	Ignition/accessory switch input
C4	W/GY	Engine stop switch input
D1	-	N/C
D2	W/R	CAN high
D3	W	Neutral switch input
D4	-	N/C
E1	-	N/C
E2	W/BK	CAN low
E3	W/O	Oil pressure switch input
E4	R/V	Horn power
F1	-	N/C
F2	-	N/C
F3	BE/GN	Brake switch input
F4	R/BN	Fuel pump power
G1	-	N/C
G2	-	N/C
G3	-	N/C
G4	BK/GN	Ground
H1	-	N/C
H2	W/GN	Security siren
H3	-	N/C
H4	-	N/C
J1	-	N/C
J2	BE/O	Right front turn signal
J3	BE	Running/position lights
J4	BE/PK	Left front turn signal
K1	-	N/C
K2	BE/BN	Right rear turn signal
K3	BE/R	Brake lamp power
K4	BE/V	Left rear turn signal
L1	-	N/C
L2	R/BK	Starter solenoid power
L3	R/GN	System power

Table B-133. BCM [242]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
L4	BE/BK	Front running/fog light power
M1	-	N/C
M2	R/Y	Accessory power
M3	BE/W	High beam power
M4	BE/Y	Low beam power

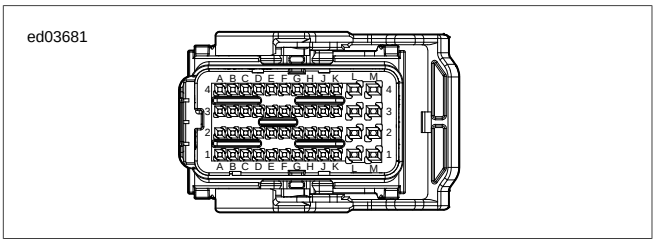


Figure B-161. BCM [242]

Table B-134. P&A CAN [243]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/R	CAN high
2	W/BK	CAN low
3	W/R	CAN high
4	W/BK	CAN low

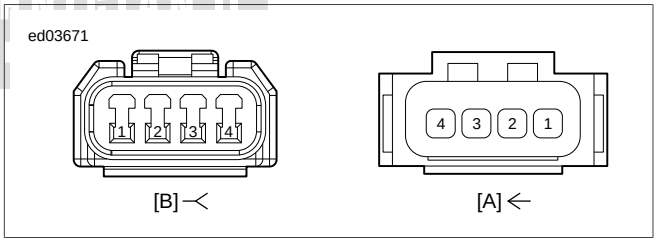


Figure B-162. P&A CAN [243]

Table B-135. Power Outlet [258]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	V/BE	P&A relay power
B	BK	Ground

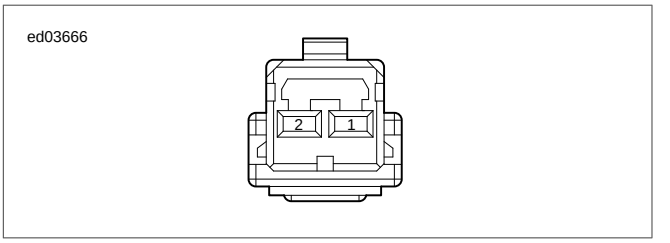


Figure B-163. Power Outlet [258]

Table B-136. BCM Power [259]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	Battery power

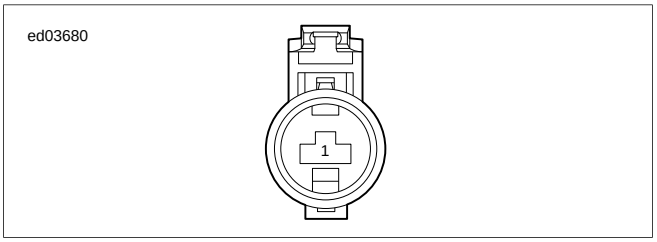


Figure B-164. BCM Power [259]

Table B-137. Rear Lighting Jumper Harness [262] (DOM)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BN	Right rear turn signal
2	V	Left rear turn signal
3	-	N/C
4	-	N/C
5	BK	Ground
6	BK	Ground
7	BK	LP lamp
8	BE	Left tail lamp
9	BE	Right tail lamp
10	-	N/C
11	BK	LP ground
12	-	N/C

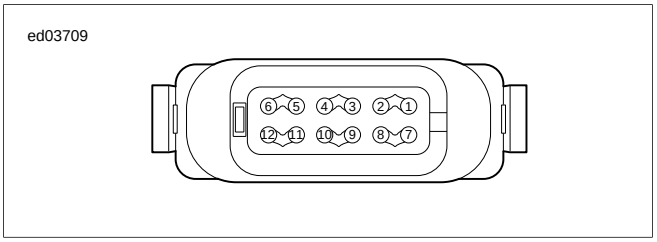


Figure B-165. Rear Lighting Jumper Harness [262] (DOM)

Table B-138. Rear Lighting Jumper Harness [262] (Canada)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BE/BN	Right rear turn signal
2	BE	Running lights power
3	BE/R	Brake light power
4	BK	Ground
5	BK	Ground
6	-	N/C
7	BE/V	Left rear turn signal
8	-	N/C
9	-	N/C
10	R/Y	Accessory power
11	-	N/C
12	-	N/C

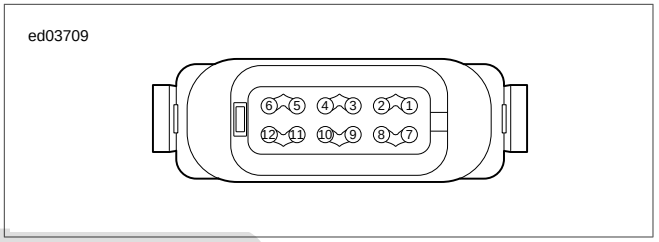


Figure B-166. Rear Lighting Jumper Harness [262] (Canada)

Table B-139. Rear Lighting Jumper Harness [262] (HDI)

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	GN/W	Right rear turn signal
2	W/BK	Right tail lamp
3	R/W	Right stop lamp
4	Y/W	Ground
5	BK	Ground
6	-	N/C
7	GN	Left rear turn signal
8	W	Left tail lamp
9	R	Left stop lamp
10	BK	LP lamp
11	Y	Ground
12	-	N/C

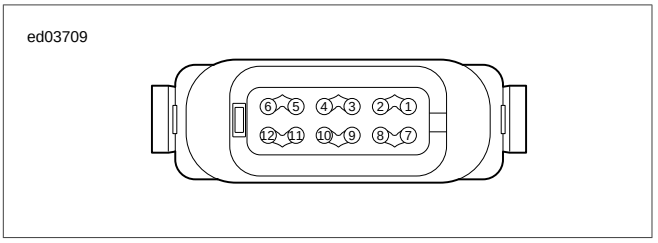


Figure B-167. Rear Lighting Jumper Harness [262] (HDI)

Table B-140. Anti-Theft Tracking Module [266]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	-	N/C
B	-	N/C
C	W/BN	Ground
D	BK	Start enable

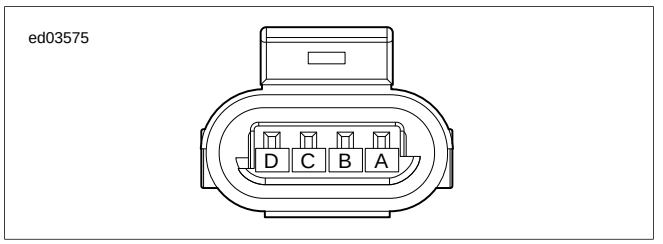


Figure B-168. Anti-Theft Tracking Module [266]

Table B-141. P&A Audio [280]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	Microphone front (+)
2	R/W	Microphone rear (-)
3	BK	Microphone common (-)
4	PK/BE	Headset right front (+)
5	PK/GN	Headset left front (+)
6	BK/PK	Headset common (-)
7	LBE/V	Headset right rear (+)
8	LBE/W	Headset left rear (+)
9	V/BE	P&A relay power
10	BK	Ground
11	LBE/BN	External AMP power control
12	-	N/C

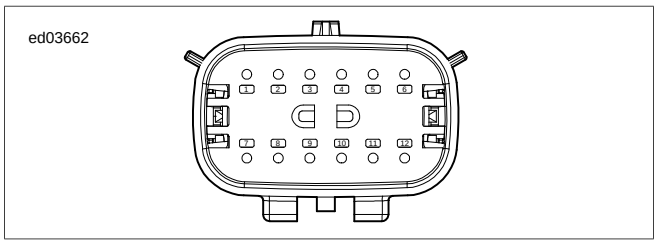


Figure B-169. P&A Audio [280]

Table B-142. Battery Tender [281]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	R	Battery power
2	BK	Ground

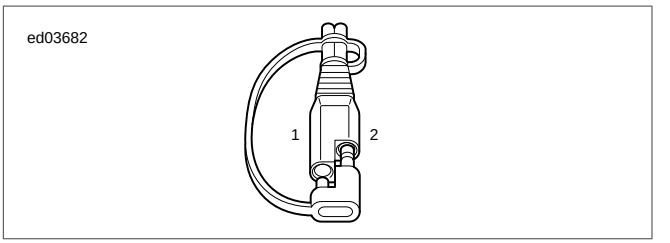


Figure B-170. Battery Tender [281]

Table B-143. Ground [283]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	AM/FM antenna base

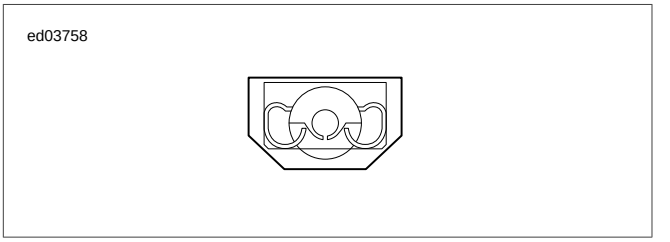


Figure B-171. Ground [283]

Table B-144. Tour-Pak Lights [287]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
A	BE/BN	Right rear turn signal
B	BK	Ground
C	BE	Running lights power
D	BE/V	Left rear turn signal
E	BE/R	Brake light power

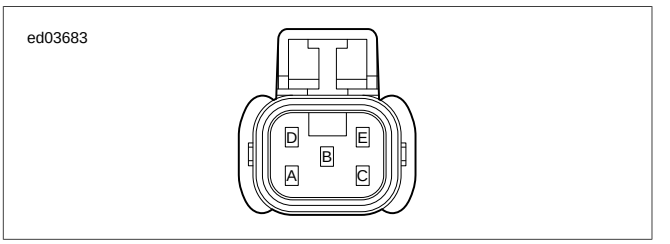


Figure B-172. Tour-Pak Lights [287]

Table B-145. Left Saddlebag [288]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	W/R	CAN high
2	W/BK	CAN low
3	R	Battery fuse
4	R	Battery fuse
5	R/Y	Accessory power
6	BN/PK	Right front out +
7	BN/O	Left front out -
8	PK/GY	Left in (-)
9	PK/BK	Right in (-)
10	BN/GN	Right front out -
11	BN/GY	Left front out +
12	PK/O	Right in (-)
13	PK	Right in (+)
14	BK	Ground
15	BK	Ground
16	LBE	Right rear out +
17	LBE/BK	Right rear out -
18	-	N/C

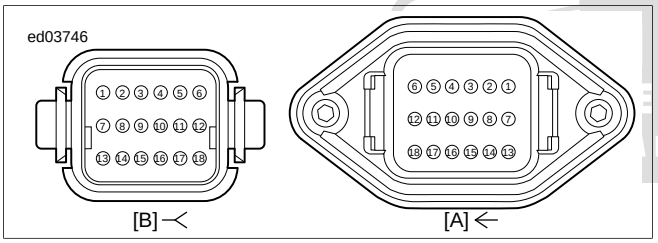


Figure B-173. Left Saddlebag [288]

Table B-146. Speaker POD Interconnect [296A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/O	Speaker left (+)
2	LBE/GY	Speaker left (-)
3	LBE	Speaker right (+)
4	LBE/BK	Speaker right (-)

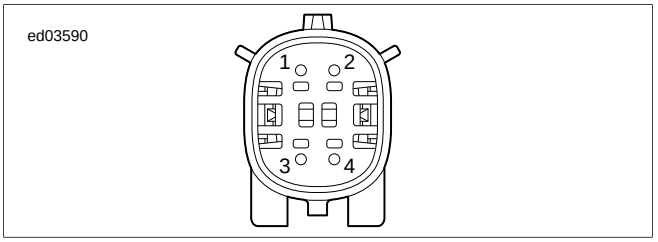


Figure B-174. Speaker POD Interconnect [296A]

Table B-147. Speaker POD Interconnect [296B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	PK/O	Speaker left (+)
2	PK/GY	Speaker left (-)
3	PK	Speaker right (+)
4	PK/BK	Speaker right (-)

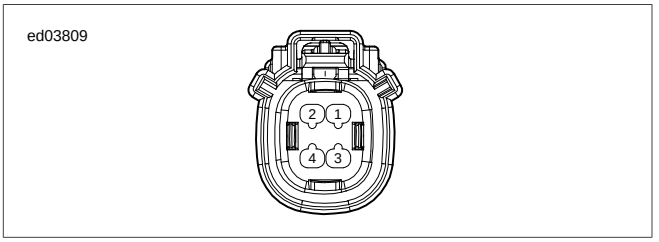


Figure B-175. Speaker POD Interconnect [296B]

Table B-148. Speaker POD Interconnect [297A]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE/O	Speaker left (+)
2	LBE/GY	Speaker left (-)
3	LBE	Speaker right (+)
4	LBE/BK	Speaker right (-)

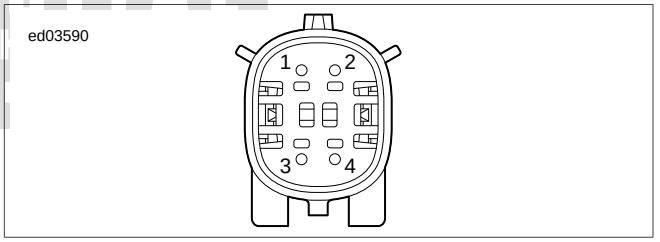


Figure B-176. Speaker POD Interconnect [297A]

Table B-149. Speaker POD Interconnect [297B]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BN/O	Speaker left (+)
2	BN/GY	Speaker left (-)
3	BN/PK	Speaker right (+)
4	BN/GN	Speaker right (-)

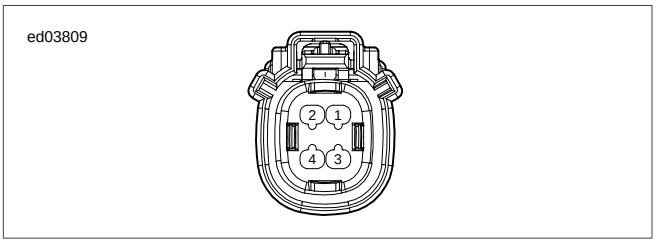


Figure B-177. Speaker POD Interconnect [297B]

Table B-150. Right Saddlebag Speaker [298]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	LBE	Right saddlebag speaker (+)
2	LBE/BK	Right saddlebag speaker (-)

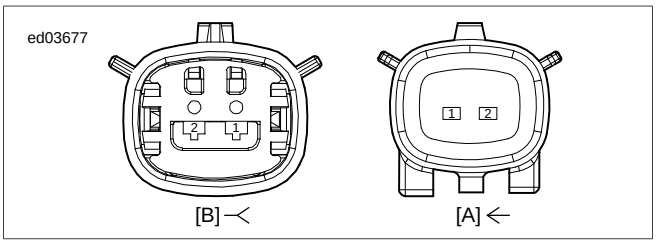


Figure B-178. Right Saddlebag Speaker [298]

Table B-151. P&A Accessory Power [299]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	V/BE	System power fuse
2	BK	Ground

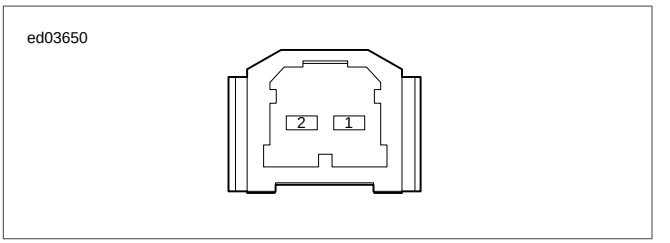


Figure B-179. P&A Accessory Power [299]

Table B-152. Fork Clamp Ground [GND3]

TERMINAL	WIRE COLOR	CIRCUIT DESCRIPTION
1	BK	Ground

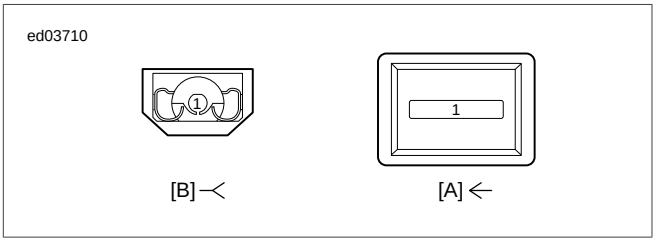
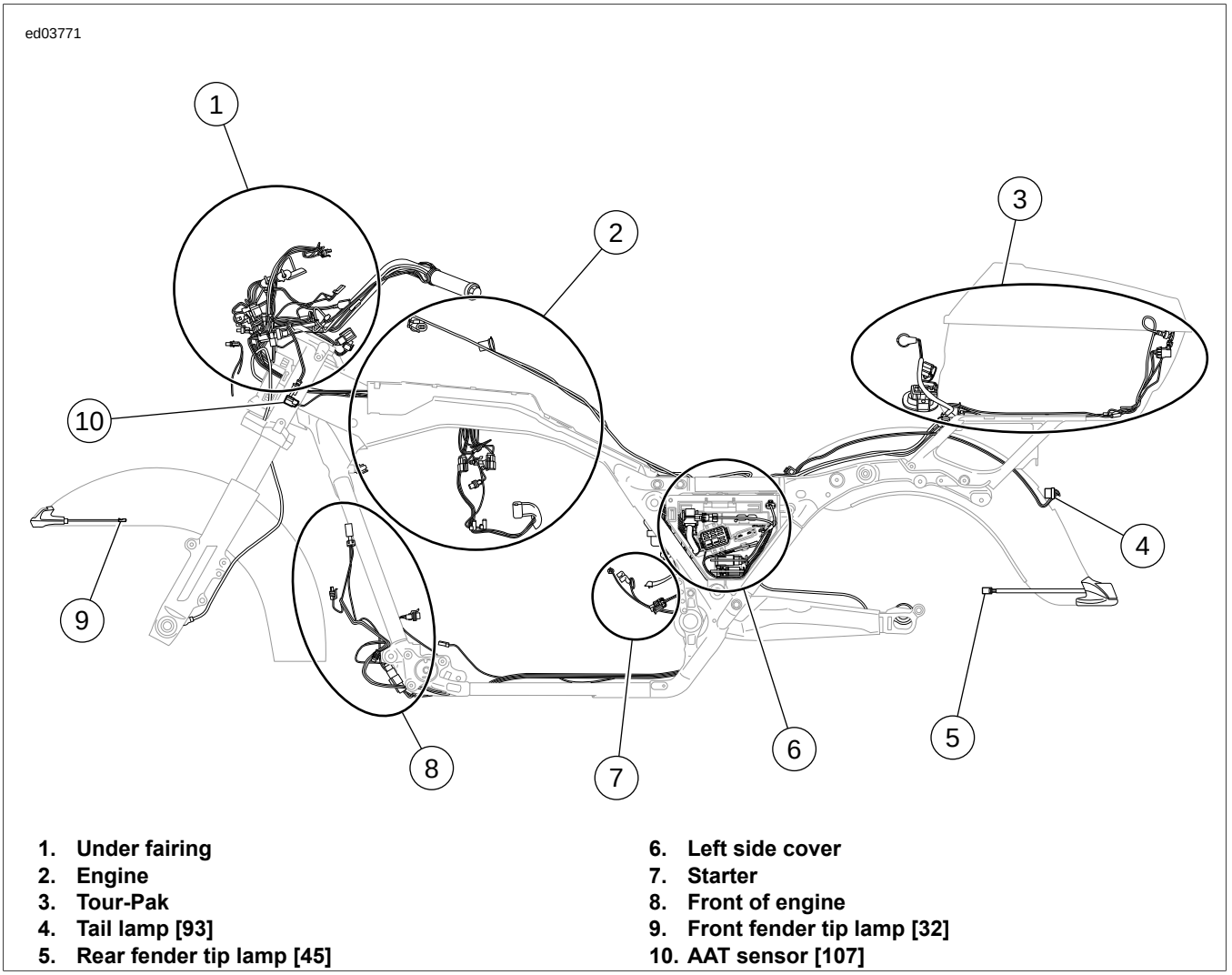


Figure B-180. Fork Clamp Ground [GND3]

COMPONENT LOCATION VIEWS B.4

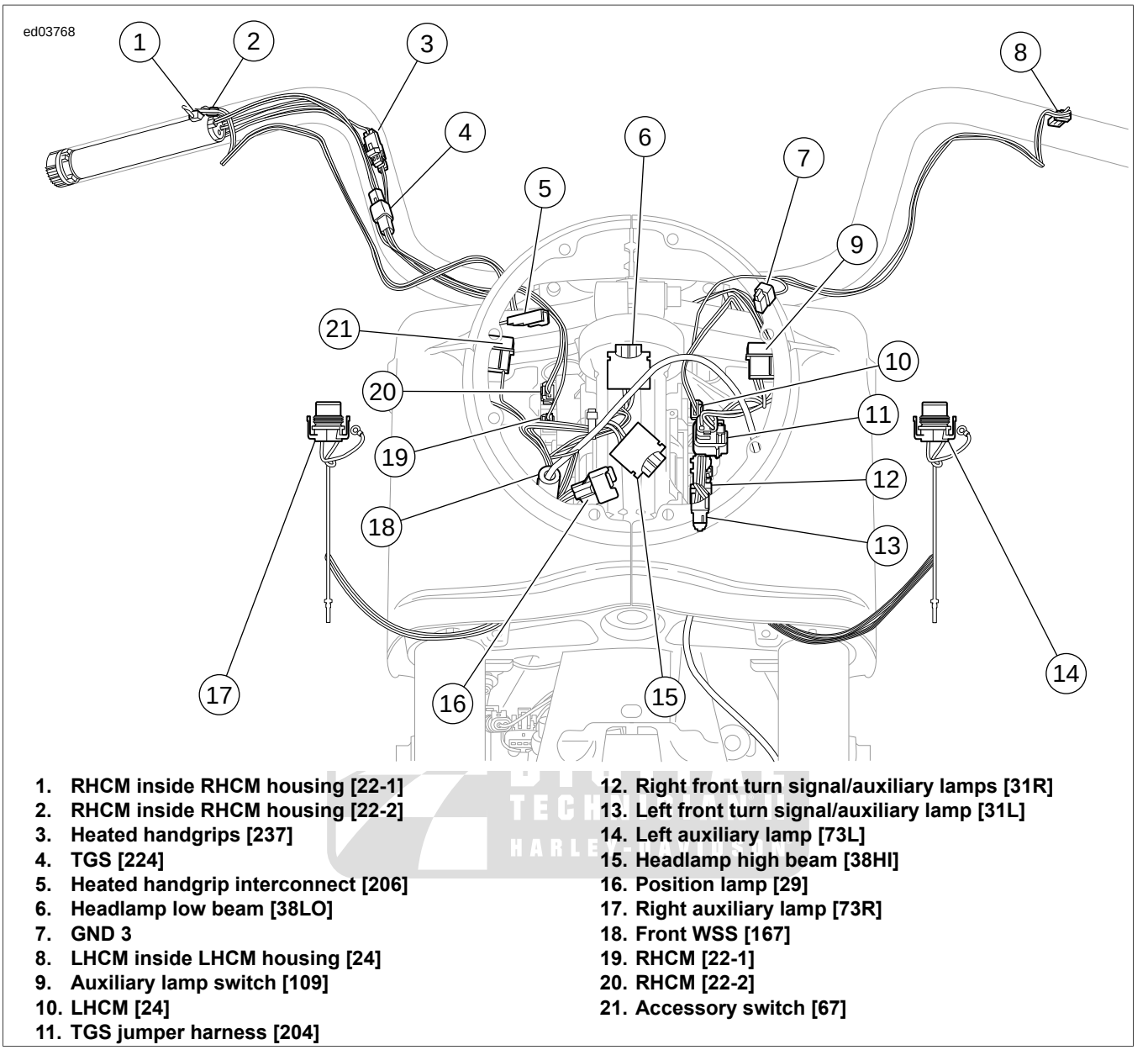
COMPONENT LOCATIONS

Some components and connectors are not easily located on the motorcycle. The following graphics show locations for these components and connectors. The graphics are generally ordered from front to back around the motorcycle.



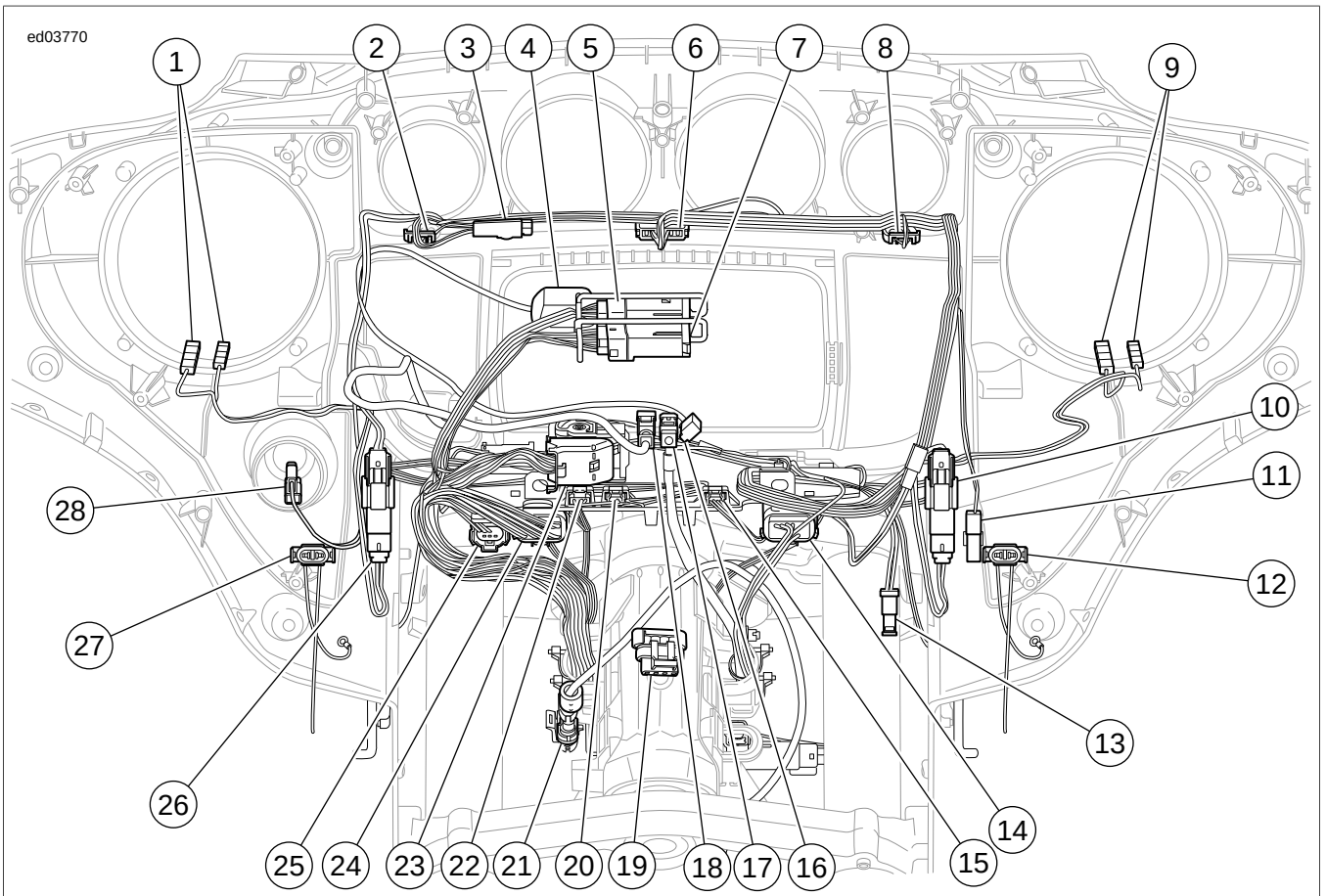
1. **Under fairing**
2. **Engine**
3. **Tour-Pak**
4. **Tail lamp [93]**
5. **Rear fender tip lamp [45]**
6. **Left side cover**
7. **Starter**
8. **Front of engine**
9. **Front fender tip lamp [32]**
10. **AAT sensor [107]**

Figure B-181. Left Side



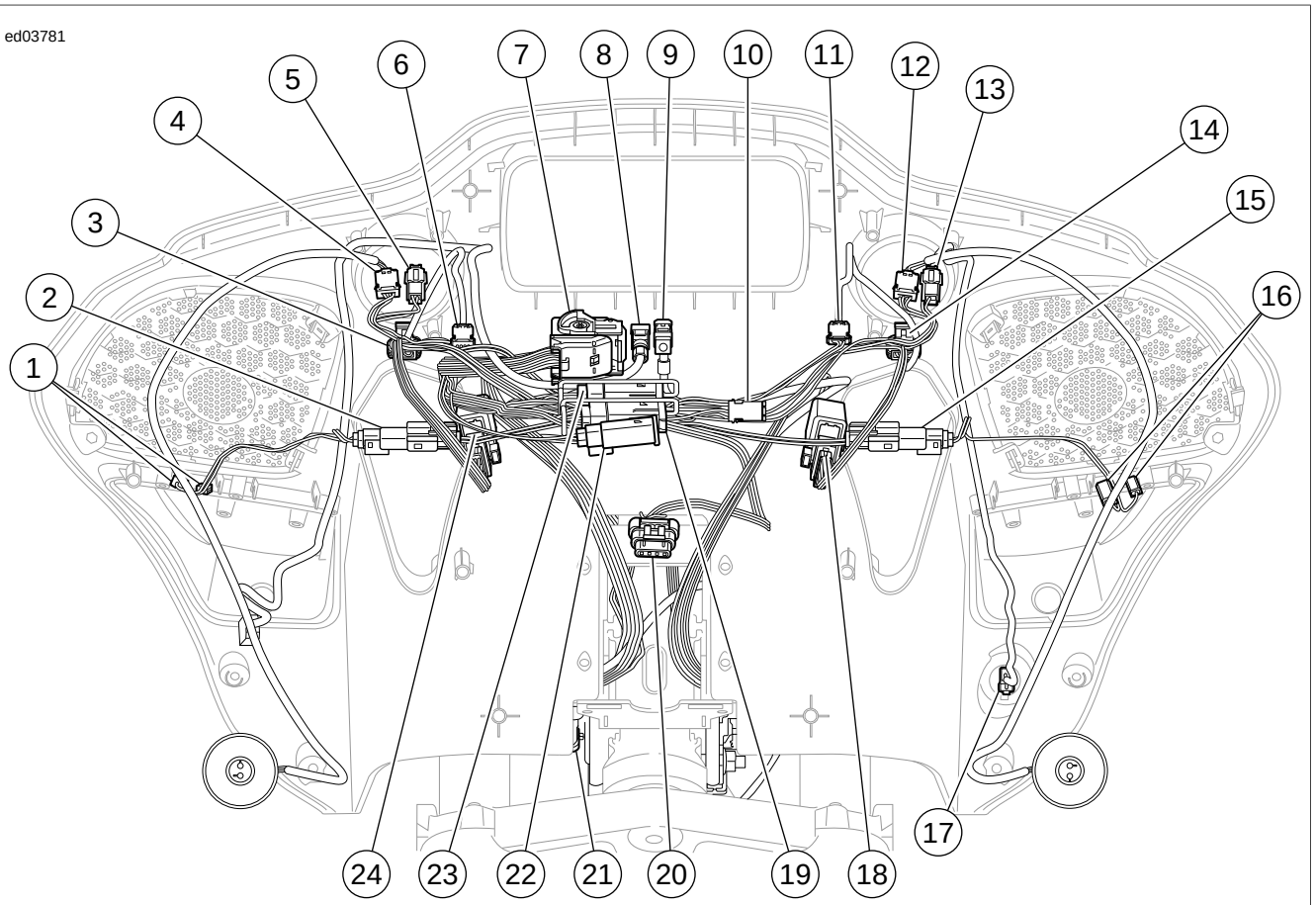
1. RHCM inside RHCM housing [22-1]
2. RHCM inside RHCM housing [22-2]
3. Heated handgrips [237]
4. TGS [224]
5. Heated handgrip interconnect [206]
6. Headlamp low beam [38LO]
7. GND 3
8. LHCM inside LHCM housing [24]
9. Auxiliary lamp switch [109]
10. LHCM [24]
11. TGS jumper harness [204]
12. Right front turn signal/auxiliary lamps [31R]
13. Left front turn signal/auxiliary lamp [31L]
14. Left auxiliary lamp [73L]
15. Headlamp high beam [38HI]
16. Position lamp [29]
17. Right auxiliary lamp [73R]
18. Front WSS [167]
19. RHCM [22-1]
20. RHCM [22-2]
21. Accessory switch [67]

Figure B-182. Headlamp Nacelle: Without Fairing



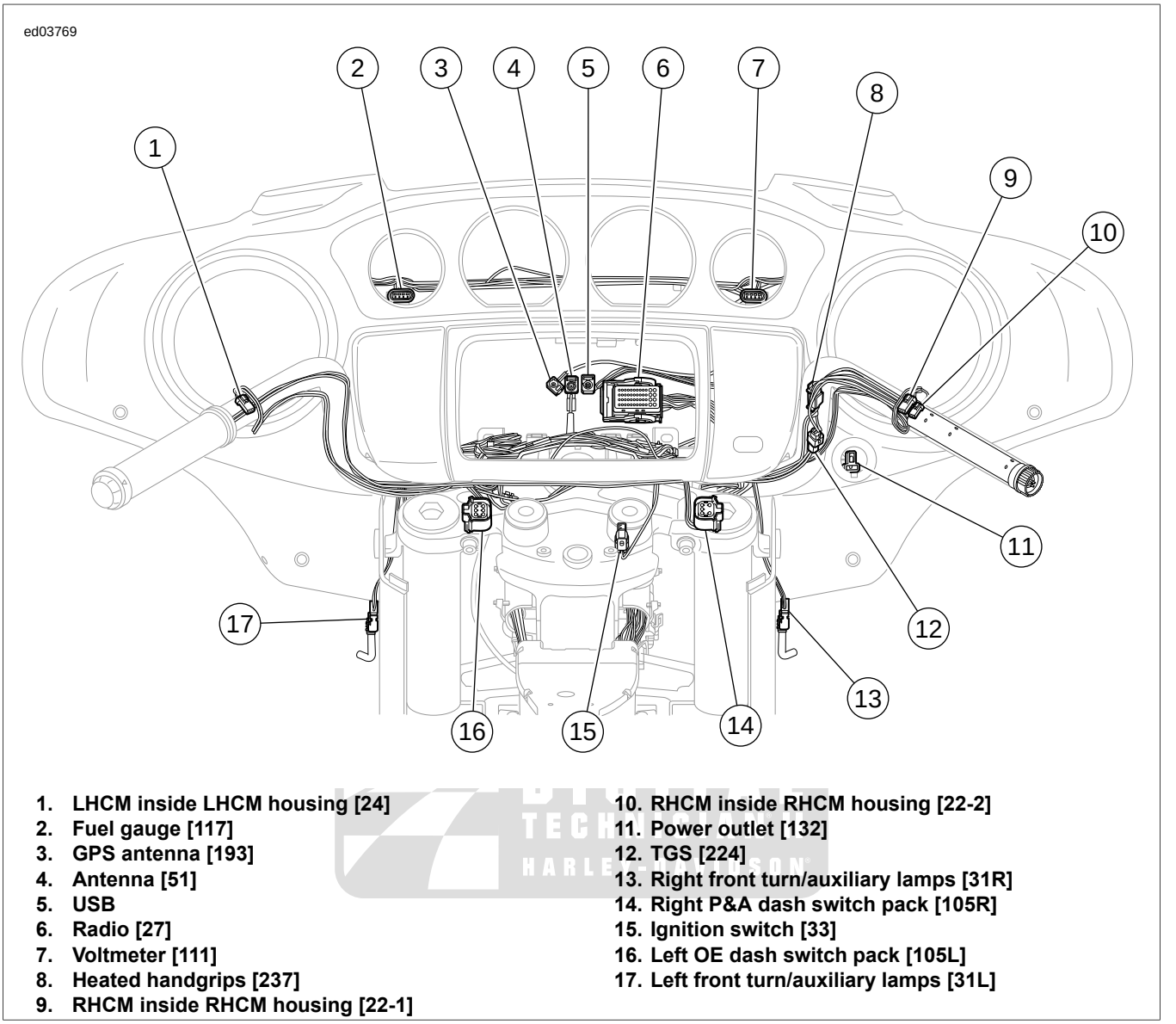
1. Right front speaker [34-2]
2. Voltmeter [111]
3. P&A power [299]
4. GPS antenna
5. P&A audio [280]
6. IM [39]
7. CB module [184]
8. Fuel gauge [117]
9. Left front speaker [35-2]
10. Left front speaker [35-1]
11. Front fender tip lamp [32]
12. Left auxiliary lamp [73L]
13. Heated handgrips [189]
14. Main to fairing harness [2]
15. LHCM [24]
16. GPS antenna [193]
17. Antenna [51]
18. USB
19. Headlamp [38]
20. RHCM [22-2]
21. Front WSS [167]
22. RHCM [22-1]
23. Radio [27]
24. Main to fairing harness [1]
25. TGS jumper harness [204]
26. Right front speaker [34-1]
27. Right auxiliary lamp [73R]
28. Power outlet [132]

Figure B-183. Under FLH Fairing



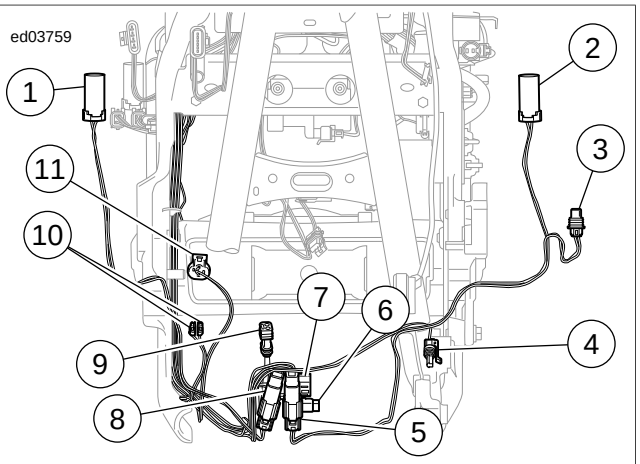
1. Right front speaker [34-2]
2. Right front speaker [34-1]
3. Voltmeter [111]
4. Right front turn [31R]
5. P&A power [299]
6. Voltmeter jumper [111-2]
7. Radio [27]
8. USB
9. Antenna [51]
10. P&A CAN jumper [243]
11. Fuel gauge jumper [117-2]
12. Left front turn [31L]
13. Power outlet [132]
14. Fuel gauge [117]
15. Left front speaker [35-1]
16. Left front speaker [35-2]
17. Power outlet [132C]
18. Main to fairing harness [2]
19. CB module [184]
20. Headlamp [38]
21. Front WSS [167]
22. Rear speakers [162]
23. P&A audio [280]
24. Main to fairing harness [1]

Figure B-184. Under FLT Fairing



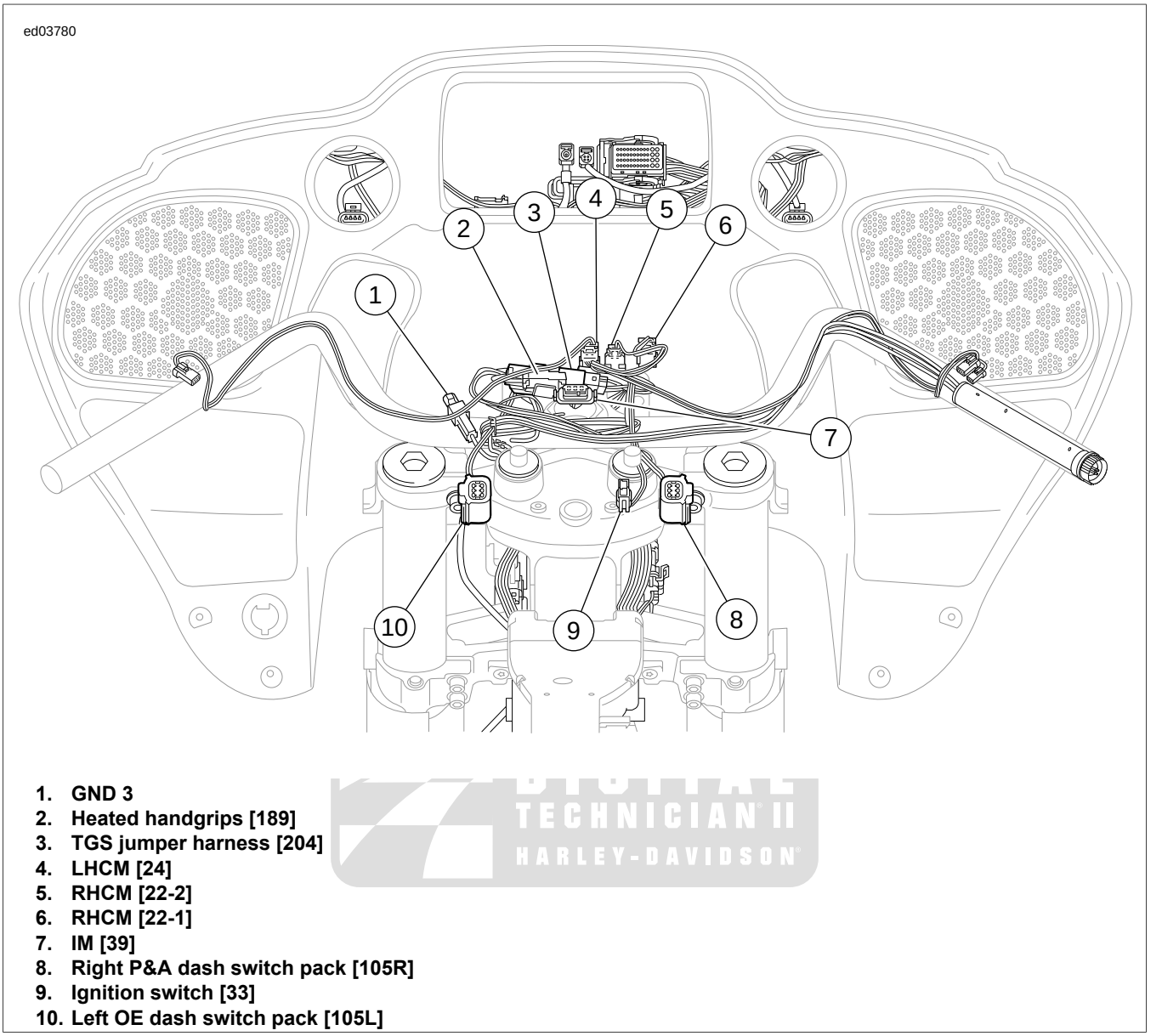
1. LHCM inside LHCM housing [24]
2. Fuel gauge [117]
3. GPS antenna [193]
4. Antenna [51]
5. USB
6. Radio [27]
7. Voltmeter [111]
8. Heated handgrips [237]
9. RHCM inside RHCM housing [22-1]
10. RHCM inside RHCM housing [22-2]
11. Power outlet [132]
12. TGS [224]
13. Right front turn/auxiliary lamps [31R]
14. Right P&A dash switch pack [105R]
15. Ignition switch [33]
16. Left OE dash switch pack [105L]
17. Left front turn/auxiliary lamps [31L]

Figure B-185. Handlebars: FLH Fairing Models



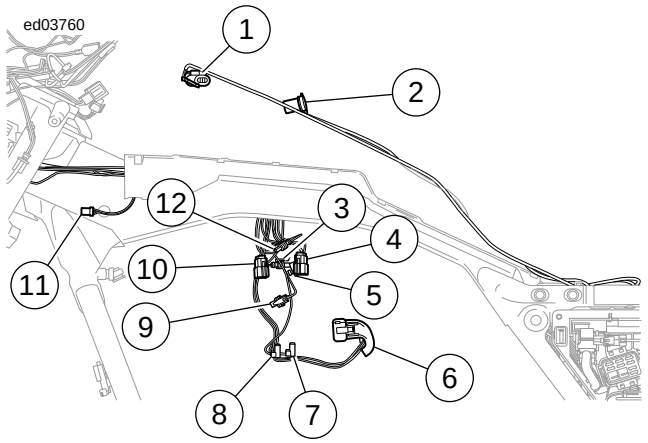
1. Right cooling fan [97] (if equipped)
2. Left cooling fan [215] (if equipped)
3. ECT sensor [236] (if equipped)
4. Cooling pump [235] (if equipped)
5. Left cooling jumper [232L] (if equipped)
6. CKP [79]
7. JSS [133]
8. Right cooling jumper [232R] (if equipped)
9. Voltage regulator [77]
10. Rear brake switch [212]
11. Oil pressure switch [120] (w/o fairing) and oil pressure sender [139] (with fairing)

Figure B-186. Front of Engine



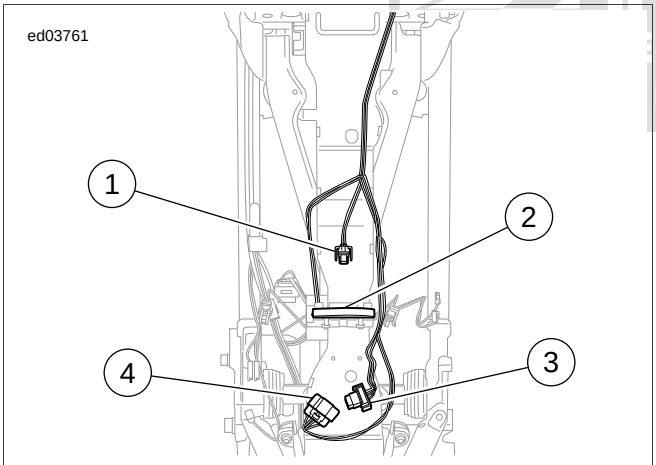
1. GND 3
2. Heated handgrips [189]
3. TGS jumper harness [204]
4. LHCM [24]
5. RHCM [22-2]
6. RHCM [22-1]
7. IM [39]
8. Right P&A dash switch pack [105R]
9. Ignition switch [33]
10. Left OE dash switch pack [105L]

Figure B-187. Handlebars: FLT Models



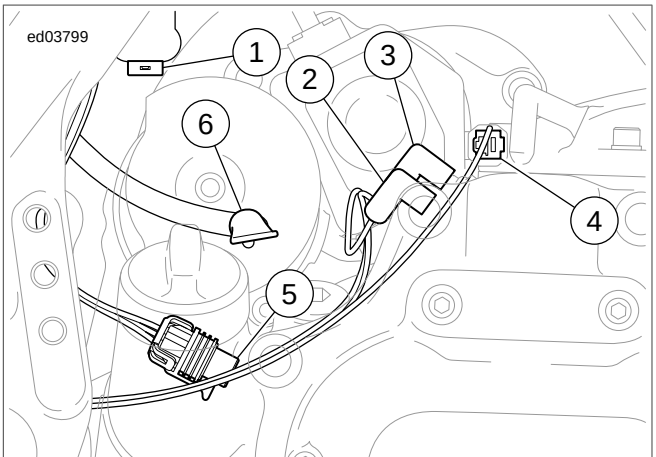
1. Fuel pump and level sensor [141]
2. Rider headset [225] (FLHTK)
3. Rear ACR [203R]
4. Rear fuel injector [85]
5. TMAP [80]
6. TCA [211]
7. Horn [122-1]
8. Horn [122-2]
9. ET sensor [90]
10. Front fuel injector [84]
11. Fuel gauge [117] (w/o fairing)
12. Front ACR [203F]

Figure B-188. Engine



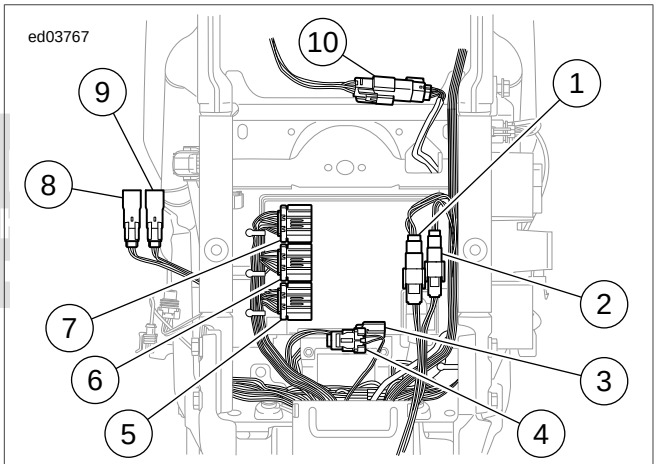
1. Ignition switch [33]
2. Indicator lights
3. Speedometer [39]
4. Fuel pump and level sender [141]

Figure B-189. Console: Without Fairing



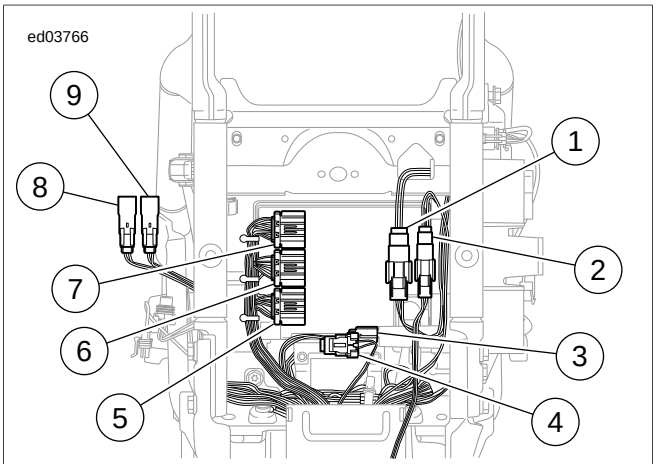
1. Ignition coil [83]
2. Neutral switch [131-1]
3. Neutral switch [131-2]
4. Starter solenoid [128]
5. VSS [65]
6. Battery + connections to starter

Figure B-190. Starter



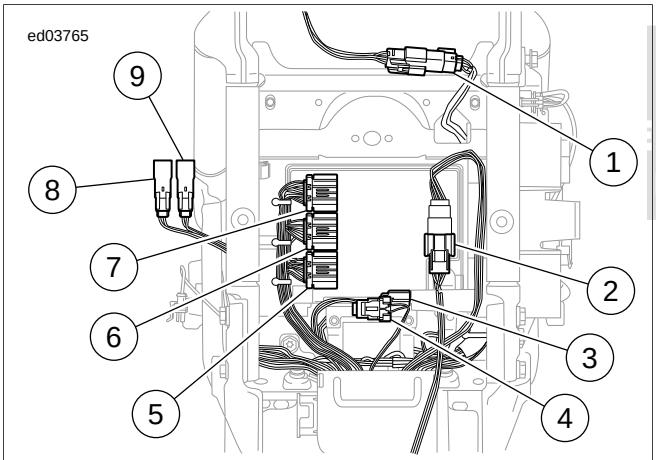
1. Fuel tank harness [13]
2. Rider headset [53]
3. Security antenna [209]
4. Purge solenoid [95]
5. ECM [78-1]
6. ECM [78-2]
7. ECM [78-3]
8. Rear HO2S [138]
9. Front HO2S [137]
10. Rear harness [7]

Figure B-191. Under Seat: FLHT



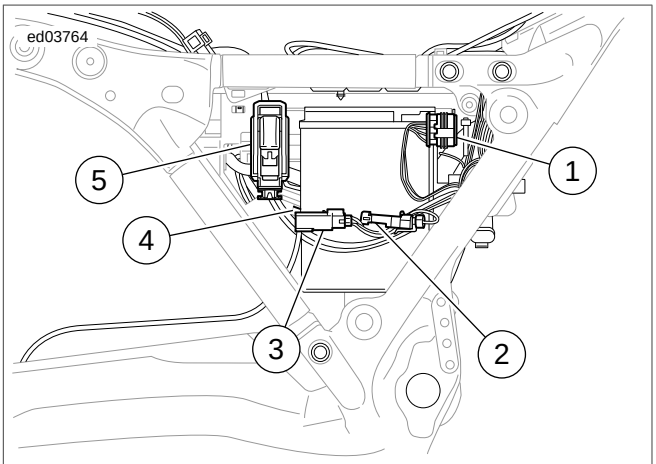
1. Rear lighting [7]
2. Fuel tank harness [13]
3. Security antenna [209]
4. Purge solenoid [95]
5. ECM [78-1]
6. ECM [78-2]
7. ECM [78-3]
8. Rear HO2S [138]
9. Front HO2S [137]

Figure B-192. Under Seat: FLHX, FLT



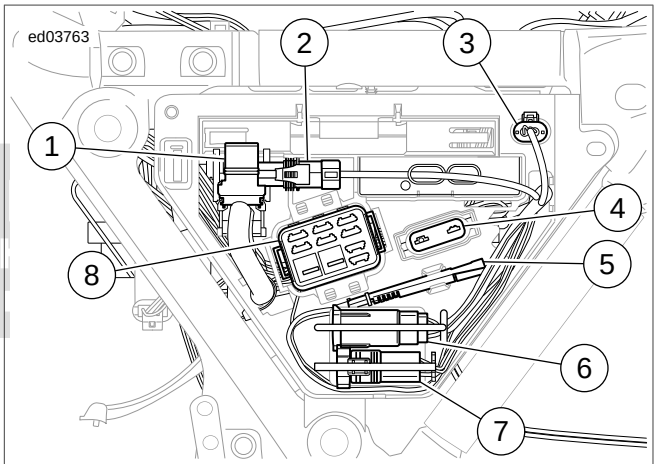
1. Rear lighting [7]
2. Console harness [20]
3. Security antenna [209]
4. Purge solenoid [95]
5. ECM [78-1]
6. ECM [78-2]
7. ECM [78-3]
8. Rear HO2S [138]
9. Front HO2S [137]

Figure B-193. Under Seat: FLHR



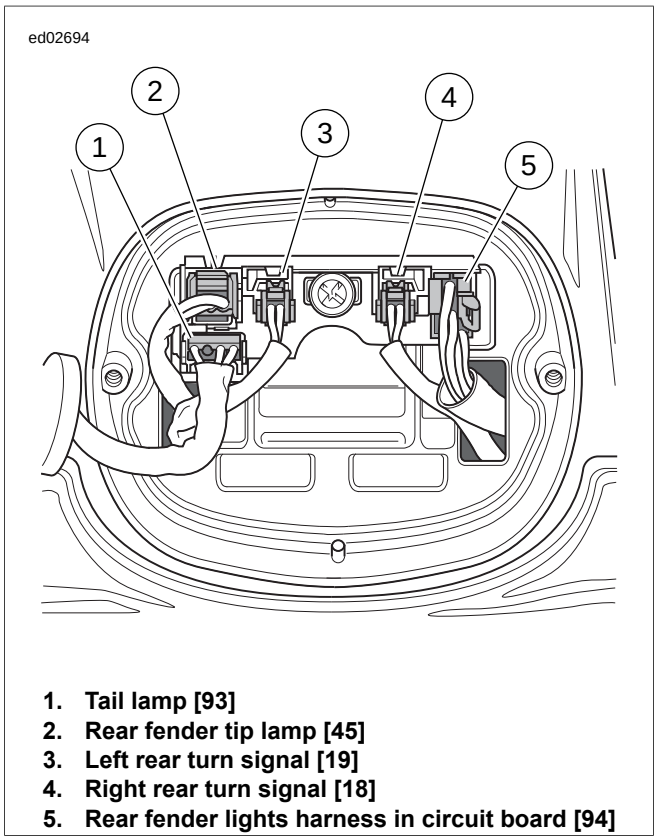
1. Active exhaust actuator [179]
2. Rear WSS [168]
3. Rear HO2S [138]
4. Front HO2S [137] (behind [138])
5. ABS ECU [166]

Figure B-194. Behind Right Side Cover



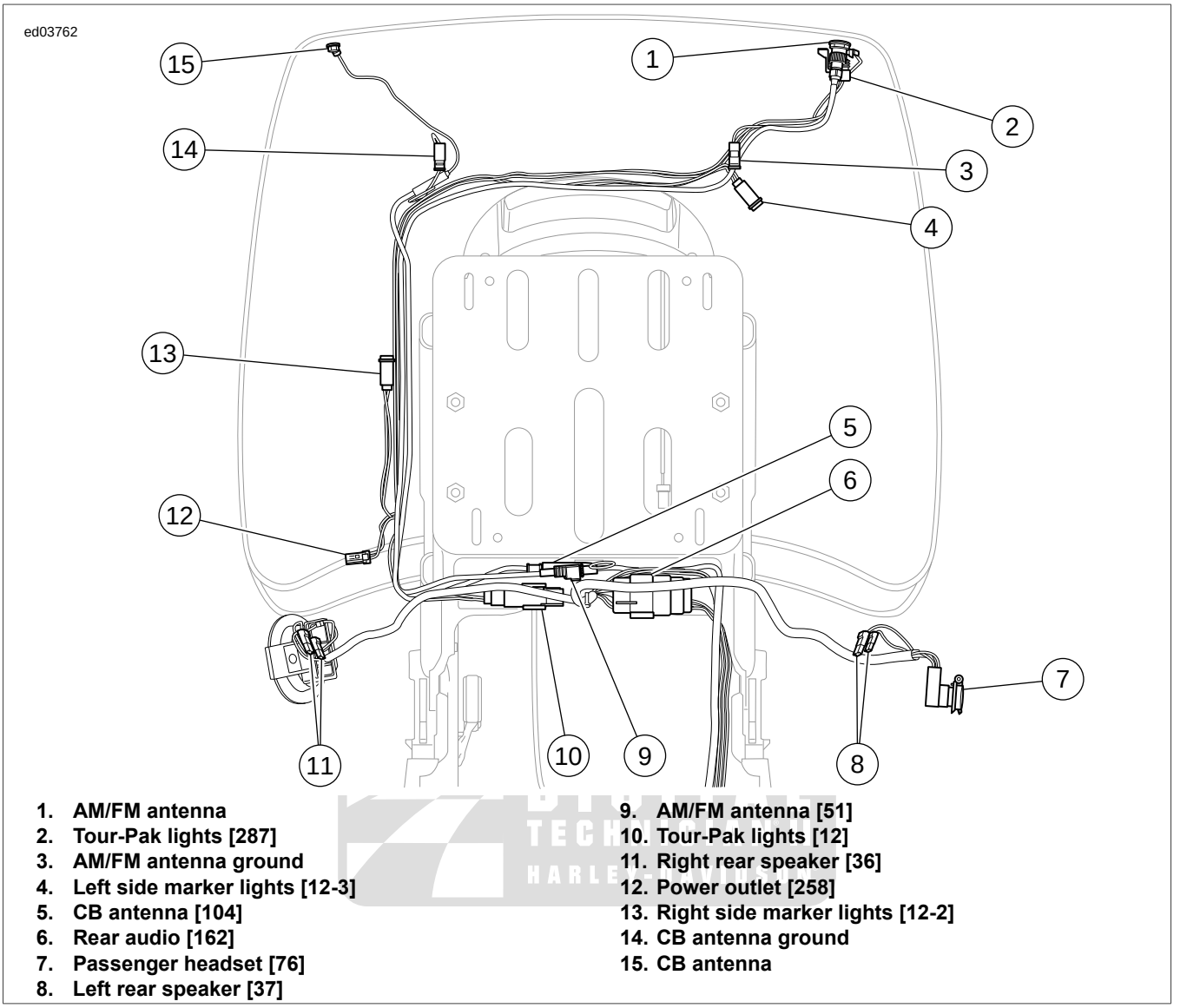
1. BCM [242]
2. BCM power [259]
3. Security siren [142]
4. Main fuse [5]
5. Battery tender [281]
6. Auxiliary devices [4]
7. DLC [91]
8. Fuse block [64]

Figure B-195. Under Left Side Cover



1. **Tail lamp [93]**
2. **Rear fender tip lamp [45]**
3. **Left rear turn signal [19]**
4. **Right rear turn signal [18]**
5. **Rear fender lights harness in circuit board [94]**

Figure B-196. Rear Fender Lights Assembly



1. AM/FM antenna
2. Tour-Pak lights [287]
3. AM/FM antenna ground
4. Left side marker lights [12-3]
5. CB antenna [104]
6. Rear audio [162]
7. Passenger headset [76]
8. Left rear speaker [37]
9. AM/FM antenna [51]
10. Tour-Pak lights [12]
11. Right rear speaker [36]
12. Power outlet [258]
13. Right side marker lights [12-2]
14. CB antenna ground
15. CB antenna

Figure B-197. Tour-Pak

NOTES

TABLE OF CONTENTS

NOTES

LENGTH CONVERSION C.1

CONVERSION TABLE

Table C-1. Metric Conversions

MILLIMETERS to INCHES (MM x 0.03937 = IN)								INCHES to MILLIMETERS (IN x 25.40 = MM)							
mm	in	mm	in	mm	in	mm	in	in	mm	in	mm	in	mm	in	mm
.1	.0039	25	.9842	58	2.283	91	3.582	.001	.025	.6	15.240	1-15/16	49.21	3-5/16	84.14
.2	.0078	26	1.024	59	2.323	92	3.622	.002	.051	5/8	15.875	2	50.80	3-3/8	85.72
.3	.0118	27	1.063	60	2.362	93	3.661	.003	.076	11/16	17.462	2-1/16	52.39	3.4	86.36
.4	.0157	28	1.102	61	2.401	94	3.701	.004	.102	.7	17.780	2.1	53.34	3-7/16	87.31
.5	.0197	29	1.142	62	2.441	95	3.740	.005	.127	3/4	19.050	2-1/8	53.97	3-1/2	88.90
.6	.0236	30	1.181	63	2.480	96	3.779	.006	.152	.8	20.320	2-3/16	55.56	3-9/16	90.49
.7	.0275	31	1.220	64	2.519	97	3.819	.007	.178	13/16	20.638	2.2	55.88	3.6	91.44
.8	.0315	32	1.260	65	2.559	98	3.858	.008	.203	7/8	22.225	2-1/4	57.15	3-5/8	92.07
.9	.0354	33	1.299	66	2.598	99	3.897	.009	.229	.9	22.860	2.3	58.42	3-11/16	93.66
1	.0394	34	1.338	67	2.638	100	3.937	.010	.254	15/16	23.812	2-5/16	58.74	3.7	93.98
2	.0787	35	1.378	68	2.677	101	3.976	1/64	.397	1	25.40	2-3/8	60.32	3-3/4	95.25
3	.1181	36	1.417	69	2.716	102	4.016	.020	.508	1-1/16	26.99	2.4	60.96	3.8	96.52
4	.1575	37	1.456	70	2.756	103	4.055	.030	.762	1.1	27.94	2-7/16	61.91	3-13/16	96.84
5	.1968	38	1.496	71	2.795	104	4.094	1/32	.794	1-1/8	28.57	2-1/2	63.50	3-7/8	98.42
6	.2362	39	1.535	72	2.834	105	4.134	.040	1.016	1-3/16	30.16	2-9/16	65.09	3.9	99.06
7	.2756	40	1.575	73	2.874	106	4.173	.050	1.270	1.2	30.48	2.6	66.04	3-15/16	100.01
8	.3149	41	1.614	74	2.913	107	4.212	.060	1.524	1-1/4	31.75	2-5/8	66.67	4	101.6
9	.3543	42	1.653	75	2.953	108	4.252	1/16	1.588	1.3	33.02	2-11/16	68.26	4-1/16	102.19
10	.3937	43	1.693	76	2.992	109	4.291	.070	1.778	1-5/16	33.34	2.7	68.58	4.1	104.14
11	.4331	44	1.732	77	3.031	110	4.331	.080	2.032	1-3/8	34.92	2-3/4	69.85	4-1/8	104.77
12	.4724	45	1.772	78	3.071	111	4.370	.090	2.286	1.4	35.56	2.8	71.12	4-3/16	106.36
13	.5118	46	1.811	79	3.110	112	4.409	.1	2.540	1-7/16	36.51	2-13/16	71.44	4.2	106.68
14	.5512	47	1.850	80	3.149	113	4.449	1/8	3.175	1-1/2	38.10	2-7/8	73.02	4-1/4	107.95
15	.5905	48	1.890	81	3.189	114	4.488	3/16	4.762	1-9/16	39.69	2.9	73.66	4.3	109.22
16	.6299	49	1.929	82	3.228	115	4.527	.2	5.080	1.6	40.64	2-15/16	74.61	4-5/16	109.54
17	.6693	50	1.968	83	3.268	116	4.567	1/4	6.350	1-5/8	41.27	3	76.20	4-3/8	111.12
18	.7086	51	2.008	84	3.307	117	4.606	.3	7.620	1-11/16	42.86	3-1/16	77.79	4.4	111.76
19	.7480	52	2.047	85	3.346	118	4.645	5/16	7.938	1.7	43.18	3.1	78.74	4-7/16	112.71
20	.7874	53	2.086	86	3.386	119	4.685	3/8	9.525	1-3/4	44.45	3-1/8	79.37	4-1/2	114.30
21	.8268	54	2.126	87	3.425	120	4.724	.4	10.160	1.8	45.72	3-3/16	80.96	4-9/16	115.89
22	.8661	55	2.165	88	3.464	121	4.764	7/16	11.112	1-13/16	46.04	3.2	81.28	4.6	116.84
23	.9055	56	2.205	89	3.504	122	4.803	1/2	12.700	1-7/8	47.62	3-1/4	82.55	4-5/8	117.47
24	.9449	57	2.244	90	3.543	123	4.842	9/16	14.288	1.9	48.26	3.3	83.82	4-11/16	119.06

FLUID CONVERSION C.2

UNITED STATES SYSTEM

Unless otherwise specified, all fluid volume measurements in this manual are expressed in United States (U.S.) units-of-measure. See below:

- 1 pint (U.S.) = 16 fluid ounces (U.S.)
- 1 quart (U.S.) = 2 pints (U.S.) = 32 fl. oz. (U.S.)
- 1 gallon (U.S.) = 4 quarts (U.S.) = 128 fl. oz. (U.S.)

METRIC SYSTEM

Fluid volume measurements in this manual include the metric system equivalents. In the metric system, 1 liter (L) = 1,000 milliliters (mL). To convert between U.S. units-of-measure and metric units-of-measure, refer to the following:

- fluid ounces (U.S.) x 29.574 = milliliters
- pints (U.S.) x 0.473 = liters
- quarts (U.S.) x 0.946 = liters
- gallons (U.S.) x 3.785 = liters
- milliliters x 0.0338 = fluid ounces (U.S.)
- liters x 2.114 = pints (U.S.)
- liters x 1.057 = quarts (U.S.)
- liters x 0.264 = gallons (U.S.)

BRITISH IMPERIAL SYSTEM

Fluid volume measurements in this manual do not include the British Imperial (Imp.) system equivalents. The following conversions exist in the British Imperial system:

- 1 pint (Imp.) = 20 fluid ounces (Imp.)
- 1 quart (Imp.) = 2 pints (Imp.)
- 1 gallon (Imp.) = 4 quarts (Imp.)

Although the same unit-of-measure terminology as the U.S. system is used in the British Imperial (Imp.) system, the actual volume of each British Imperial unit-of-measure differs from its U.S. counterpart. The U.S. fluid ounce is larger than the British Imperial fluid ounce. However, the U.S. pint, quart, and gallon are smaller than the British Imperial pint, quart, and gallon, respectively. To convert between U.S. units and British Imperial units, refer to the following:

- fluid ounces (U.S.) x 1.042 = fluid ounces (Imp.)
- pints (U.S.) x 0.833 = pints (Imp.)
- quarts (U.S.) x 0.833 = quarts (Imp.)
- gallons (U.S.) x 0.833 = gallons (Imp.)
- fluid ounces (Imp.) x 0.960 = fluid ounces (U.S.)
- pints (Imp.) x 1.201 = pints (U.S.)
- quarts (Imp.) x 1.201 = quarts (U.S.)
- gallons (Imp.) x 1.201 = gallons (U.S.)

TORQUE CONVERSION C.3

UNITED STATES SYSTEM

The U.S. units of torque, foot pounds and inch pounds, are used in this manual. To convert units, use the following equations:

- foot pounds (ft-lbs) X 12.00000 = inch pounds (**in-lbs**)
- inch pounds (**in-lbs**) X 0.08333 = foot pounds (ft-lbs)

METRIC SYSTEM

All metric torque specifications are written in Newton-meters (Nm). To convert metric to United States units and United States to metric, use the following equations:

- Newton meters (Nm) X 0.737563 = foot pounds (ft-lbs)
- Newton meters (Nm) X 8.85085 = inch pounds (**in-lbs**)
- foot pounds (ft-lbs) X 1.35582 = Newton meters (Nm)
- inch pounds (**in-lbs**) X 0.112985 = Newton meters (Nm)

GLOSSARY C.4

ACRONYMS AND ABBREVIATIONS

Table C-2. Acronyms and Abbreviations

ACRONYM OR ABBREVIATION	DESCRIPTION
A	Amperes
AAT	Ambient air temperature
ABS	Anti-lock braking system
AC	Alternating current
ACC	Accessory position on ignition switch
ACR	Automatic compression release
AGM	Absorbed glass mat (battery)
Ah	Ampere-hour
AIS	Active intake solenoid
AWG	American wire gauge
B+	Battery voltage
bar	Bar
BAS	Bank angle sensor
BCM	Body control module
BOB	Breakout box
BTDC	Before top dead center
°C	Celsius (Centigrade)
CA	California
CAL	Calibration
CAN	Controller area network
CB Tx	CB send transmission
CB Rx	CB receive transmission
cc	Cubic centimeters
CCA	Cold cranking amps
CCW	Counterclockwise
CKP	Crankshaft position
cm	Centimeters
cm^3	Cubic centimeters
CW	Clockwise
DC	Direct current
DLC	Data link connector
DOM	Domestic
DOT	Department of Transportation
DTC	Diagnostic trouble code
DVOM	Digital volt ohm meter
ECM	Electronic control module
ECT	Engine coolant temperature
ECU	Electronic control unit
EEPROM	Electrically erasable programmable read only memory
EFI	Electronic fuel injection

Table C-2. Acronyms and Abbreviations

ACRONYM OR ABBREVIATION	DESCRIPTION
EHCU	Electro hydraulic control unit
ET	Engine temperature
ETC	Electronic throttle control
EVAP	Evaporative emissions control system
°F	Fahrenheit
fl oz	Fluid ounce
FPS	Fuel pressure sensor
ft	Feet
ft-lbs	Foot pounds
FTP	Flash to pass
g	Gram
gal	Gallon
GAWR	Gross axle weight rating
GND	Ground (electrical)
GPS	Global positioning system
GVWR	Gross vehicle weight rating
HCU	Hydraulic control unit
HDI	Harley-Davidson International
HD-Link	Networking system
H-DSSS	Harley-Davidson smart security system
HFM	Hands-free mode
HFSM	Hands-free security module
Hg	Mercury
H02S	Heated oxygen sensor
hp	Horsepower
hr	Hour
IAC	Idle air control
IAT	Intake air temperature
IC	Instrument cluster
ID	Inside diameter
IGN	Ignition light/key switch position
in	inch
in^3	Cubic inch
INJ PW	Injector pulse width
INTCM	Intercom
in-lbs	Inch pounds
JSS	Jiffy stand sensor
kg	Kilogram
km	Kilometer
km/h	Kilometers per hour
kPa	Kilopascal
kW	Kilowatt
L	Liter

Table C-2. Acronyms and Abbreviations

ACRONYM OR ABBREVIATION	DESCRIPTION
lb	Pounds
LCD	Liquid crystal display
LED	Light emitting diode
LH	Left hand
LHCM	Left hand control module
LP	License plate
LT	Left
mA	Milliampere
MAP	Manifold absolute pressure
max	Maximum
mi	Mile
min	Minimum
mL	Milliliter
mm	Millimeter
mph	Miles per hour
ms	Millisecond
Nm	Newton-meter
NIM	Navigation interface module
NiMH	Nickel metal hydride
N/A	Not applicable
O2	Oxygen
OD	Outside diameter
OEM	Original equipment manufacturer
oz	Ounce
P&A	Parts and Accessories
Part No.	Part number
PIN	Personal identification number
PND	Personal navigation device
psi	Pounds per square inch
PWM signal	Pulse width modulated signal
qt	Quart
RAD	Radio
RCM	Reverse control module
RDS	Radio data system
RES	Reserve mark on fuel supply valve
RH	Right hand
RHCM	Right hand control module
rpm	Revolutions per minute
RT	Right
s	Seconds
SCFH	Cubic feet per hour at standard conditions
SDARS	Satellite digital audio radio service
SPDO	Speedometer

Table C-2. Acronyms and Abbreviations

ACRONYM OR ABBREVIATION	DESCRIPTION
SPKR	Speaker
STT	Stop/tail/turn
TA	Traffic announcement
TCA	Throttle control actuator
TDC	Top dead center
TGS	Twist grip sensor
TPS	Throttle position sensor
TSM	Turn signal module
TSSM	Turn signal/security module
USB	Universal serial bus
V	Volt
VAC	Volts of alternating current
VDC	Volts of direct current
VIN	Vehicle identification number
VR	Voice recognition
VSS	Vehicle speed sensor
W	Watt
WA	Weather alert
WSS	Wheel speed sensor

NOTES

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
21-534	RADIO SHACK SWR METER	8.12 AUDIO SYSTEM SYMPTOMS, CB Transmitter Inoperative
B-50085	TERMINAL EXTRACTOR TOOL	6.33 TGS DIAGNOSTICS, DTC P2122
B-50085	TERMINAL EXTRACTOR TOOL	6.33 TGS DIAGNOSTICS, DTC P2123
B-50085	TERMINAL EXTRACTOR TOOL	6.33 TGS DIAGNOSTICS, DTC P2127
B-50085	TERMINAL EXTRACTOR TOOL	6.33 TGS DIAGNOSTICS, DTC P2128
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Left Front Fairing Speaker Inoperative With Amplifier 1
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Lower Left Speaker Inoperative With Amplifier 1
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 1
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Left Speaker Pod Inoperative With Amplifier 1
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Lower Right Speaker Inoperative With Amplifier 1
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 1
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Right Speaker Pod Inoperative With Amplifier 1
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 2
B-50085	TERMINAL EXTRACTOR	8.12 AUDIO SYSTEM SYMPTOMS, Right Rear Speaker Pod Inoperative With Amplifier 2
B-50085	TERMINAL EXTRACTOR	8.13 AMPLIFIER 1 DTCS, DTC B1432
B-50085	TERMINAL EXTRACTOR	8.13 AMPLIFIER 1 DTCS, DTC B1442
B-50085	TERMINAL EXTRACTOR	8.14 AMPLIFIER 2 DTCS, DTC B1412
B-50085	TERMINAL EXTRACTOR	8.14 AMPLIFIER 2 DTCS, DTC B1422
B-50085	TERMINAL EXTRACTOR	A.3 BOSCH BTC SEALED CONNECTOR, Bosch BTC Sealed Connector Repair
B-50085	TERMINAL EXTRACTOR	A.17 JAE MX19 SEALED CONNECTORS, JAE MX19 Sealed Connectors
B-50085	TERMINAL EXTRACTOR	A.20 TYCO 040 MULTILOCK UNSEALED CONNECTOR, Tyco 040 Multilock Unsealed Connector Repair
B-50085	TERMINAL EXTRACTOR	A.21 TYCO 070 MULTILOCK UNSEALED CONNECTOR, Tyco 070 Multilock Unsealed Connector Repair
B-50085	TERMINAL EXTRACTOR	A.22 TYCO GET 64 SEALED CONNECTOR, Tyco GET 64 Sealed Connector Repair
B-50085	TERMINAL EXTRACTOR	A.23 TYCO MCP SEALED CONNECTOR, Tyco MCP Sealed Connector
GA500A	SNAP-ON TERMINAL PICK	A.1 AUTOFUSE UNSEALED ELECTRICAL CONNECTORS, Autofuse Unsealed Connector Repair
GA500A	SNAP-ON TERMINAL PICK	A.23 TYCO MCP SEALED CONNECTOR, Tyco MCP Sealed Connector
GRX-3110 HD	BATTERY DIAGNOSTIC STATION	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
GRX-3110 HD	BATTERY DIAGNOSTIC STATION	3.1 BATTERY TESTING, Battery Diagnostic Test

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-23738	VACUUM PUMP	6.7 TMAP SENSOR DIAGNOSTICS, Description and Operation
HD-25070	ROBINAIR HEAT GUN	A.24 SEALED SPLICE CONNECTORS, Sealed Splice Connector Repair
HD-26792	SPARK TESTER	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-26792	SPARK TESTER	6.15 IDLE SPEED CONTROL DIAGNOSTICS, DTC P0505
HD-26792	SPARK TESTER	6.37 ENGINE CRANKS, BUT WILL NOT START, Engine Cranks but Will Not Start
HD-26792	SPARK TESTER	6.38 HESITATION OR LOSS OF POWER, Hesitation or Loss of Power Test
HD-26792	SPARK TESTER	6.40 MISFIRE AT IDLE OR UNDER LOAD, Misfire At Idle or Under Load
HD-34730-2E	FUEL INJECTOR TEST LIGHT	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-34730-2E	FUEL INJECTOR TEST LIGHT	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-34730-2E	FUEL INJECTOR TEST LIGHT	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0261
HD-34730-2E	FUEL INJECTOR TEST LIGHT	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0264
HD-34730-2E	FUEL INJECTOR TEST LIGHT	6.28 ACR DIAGNOSTICS, DTC P1655
HD-34730-2E	FUEL INJECTOR TEST LIGHT	6.28 ACR DIAGNOSTICS, DTC P1656
HD-38125-6	PACKARD TERMINAL CRIMPER	A.10 DELPHI METRI-PACK TERMINAL REPAIR, Metri-Pack Terminal Crimps
HD-38125-7	PACKARD TERMINAL CRIMPER	A.10 DELPHI METRI-PACK TERMINAL REPAIR, Metri-Pack Terminal Crimps
HD-38125-7	PACKARD TERMINAL CRIMPER	A.15 DEUTSCH DTM SEALED MINI TERMINAL REPAIR, Deutsch DTM Sealed Mini Terminal Crimps
HD-38125-8	PACKARD TERMINAL CRIMPER	A.10 DELPHI METRI-PACK TERMINAL REPAIR, Metri-Pack Terminal Crimps
HD-38125-8	PACKARD TERMINAL CRIMPER	A.24 SEALED SPLICE CONNECTORS, Sealed Splice Connector Repair
HD-39617	FLUKE AC/DC CURRENT PROBE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-39617	FLUKE AC/DC CURRENT PROBE	3.4 TESTING STARTER ON MOTORCYCLE, Starter Current Draw Test
HD-39965-A	DEUTSCH TERMINAL CRIMP TOOL	A.14 DEUTSCH DT SEALED TERMINAL REPAIR, Deutsch DT Sealed Terminal Crimps
HD-39969	ULTRA TORCH	A.24 SEALED SPLICE CONNECTORS, Sealed Splice Connector Repair
HD-39978	DIGITAL MULTIMETER (FLUKE 78)	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-39978	DIGITAL MULTIMETER (FLUKE 78)	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-39978	DIGITAL MULTIMETER (FLUKE 78)	1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test
HD-41183	HEAT SHIELD ATTACHMENT	A.24 SEALED SPLICE CONNECTORS, Sealed Splice Connector Repair
HD-41404	HARNESS CONNECTOR TEST KIT	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-41404	HARNESS CONNECTOR TEST KIT	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-41404	HARNESS CONNECTOR TEST KIT	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-41404	HARNESS CONNECTOR TEST KIT	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0100
HD-41404	HARNESS CONNECTOR TEST KIT	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0121
HD-41404	HARNESS CONNECTOR TEST KIT	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, Left Hand Controls Inoperative: DTC U0141
HD-41404	HARNESS CONNECTOR TEST KIT	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, Speedometer Inoperative: DTC U0156
HD-41404	HARNESS CONNECTOR TEST KIT	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0184
HD-41404	HARNESS CONNECTOR TEST KIT	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0158
HD-41404	HARNESS CONNECTOR TEST KIT	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0159
HD-41404	HARNESS CONNECTOR TEST KIT	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0160
HD-41404	HARNESS CONNECTOR TEST KIT	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U1302
HD-41404	HARNESS CONNECTOR TEST KIT	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U1401
HD-41404	HARNESS CONNECTOR TEST KIT	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0185
HD-41404	HARNESS CONNECTOR TEST KIT	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0186
HD-41404	HARNESS CONNECTOR TEST KIT	3.2 STARTING SYSTEM, Nothing Clicks
HD-41404	HARNESS CONNECTOR TEST KIT	3.2 STARTING SYSTEM, Starter Stalls or Spins Too Slowly
HD-41404	HARNESS CONNECTOR TEST KIT	3.3 STARTER OUTPUT DTCS, DTC B2122
HD-41404	HARNESS CONNECTOR TEST KIT	3.3 STARTER OUTPUT DTCS, DTC B2123
HD-41404	HARNESS CONNECTOR TEST KIT	3.6 CHARGING SYSTEM, Low or No Charging
HD-41404	HARNESS CONNECTOR TEST KIT	3.7 ABS VOLTAGE DIAGNOSTICS, DTC C0562
HD-41404	HARNESS CONNECTOR TEST KIT	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P0562
HD-41404	HARNESS CONNECTOR TEST KIT	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P1608
HD-41404	HARNESS CONNECTOR TEST KIT	3.9 IGN SWITCH DIAGNOSTICS, DTC B2201
HD-41404	HARNESS CONNECTOR TEST KIT	3.9 IGN SWITCH DIAGNOSTICS, DTC B2203
HD-41404	HARNESS CONNECTOR TEST KIT	3.11 BCM VOLTAGE DIAGNOSTICS, DTC B2271
HD-41404	HARNESS CONNECTOR TEST KIT	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1210
HD-41404	HARNESS CONNECTOR TEST KIT	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1211
HD-41404	HARNESS CONNECTOR TEST KIT	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1212
HD-41404	HARNESS CONNECTOR TEST KIT	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1213
HD-41404	HARNESS CONNECTOR TEST KIT	4.4 NO INSTRUMENT POWER DIAGNOSTICS, No Instrument Power

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-41404	HARNESS CONNECTOR TEST KIT	4.4 NO INSTRUMENT POWER DIAGNOSTICS, DTC B1200
HD-41404	HARNESS CONNECTOR TEST KIT	4.5 INDICATOR LAMPS, Oil Pressure Lamp Always On
HD-41404	HARNESS CONNECTOR TEST KIT	4.5 INDICATOR LAMPS, Oil Pressure Lamp Inoperative
HD-41404	HARNESS CONNECTOR TEST KIT	4.5 INDICATOR LAMPS, Neutral Lamp Inoperative
HD-41404	HARNESS CONNECTOR TEST KIT	4.5 INDICATOR LAMPS, High Beam Indicator Lamp Inoperative
HD-41404	HARNESS CONNECTOR TEST KIT	4.5 INDICATOR LAMPS, Turn Signal Indicator Inoperative
HD-41404	HARNESS CONNECTOR TEST KIT	5.1 ACC CIRCUIT DIAGNOSTICS, DTC B2113, B2114
HD-41404	HARNESS CONNECTOR TEST KIT	5.4 HORN DIAGNOSTICS, DTC B2127
HD-41404	HARNESS CONNECTOR TEST KIT	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2143, B2144
HD-41404	HARNESS CONNECTOR TEST KIT	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2148, B2149
HD-41404	HARNESS CONNECTOR TEST KIT	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-41404	HARNESS CONNECTOR TEST KIT	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2153, B2154
HD-41404	HARNESS CONNECTOR TEST KIT	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2153, B2154
HD-41404	HARNESS CONNECTOR TEST KIT	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-41404	HARNESS CONNECTOR TEST KIT	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2158, B2159
HD-41404	HARNESS CONNECTOR TEST KIT	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2158, B2159
HD-41404	HARNESS CONNECTOR TEST KIT	5.8 HEADLAMP DIAGNOSTICS, DTC B2106, B2107
HD-41404	HARNESS CONNECTOR TEST KIT	5.8 HEADLAMP DIAGNOSTICS, DTC B2108, B2109
HD-41404	HARNESS CONNECTOR TEST KIT	5.8 HEADLAMP DIAGNOSTICS, High Beam Inoperative, DTC B2131
HD-41404	HARNESS CONNECTOR TEST KIT	5.8 HEADLAMP DIAGNOSTICS, DTC B2132
HD-41404	HARNESS CONNECTOR TEST KIT	5.8 HEADLAMP DIAGNOSTICS, DTC B2133, B2134
HD-41404	HARNESS CONNECTOR TEST KIT	5.8 HEADLAMP DIAGNOSTICS, Low Beam Inoperative, DTC B2136
HD-41404	HARNESS CONNECTOR TEST KIT	5.8 HEADLAMP DIAGNOSTICS, DTC B2137
HD-41404	HARNESS CONNECTOR TEST KIT	5.8 HEADLAMP DIAGNOSTICS, DTC B2138, B2139
HD-41404	HARNESS CONNECTOR TEST KIT	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Inoperative
HD-41404	HARNESS CONNECTOR TEST KIT	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Always On, DTC B2223
HD-41404	HARNESS CONNECTOR TEST KIT	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-41404	HARNESS CONNECTOR TEST KIT	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-41404	HARNESS CONNECTOR TEST KIT	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-41404	HARNESS CONNECTOR TEST KIT	5.9 STOP LAMP DIAGNOSTICS, DTC B2163, B2164
HD-41404	HARNESS CONNECTOR TEST KIT	5.10 BRAKE SWITCH DIAGNOSTICS, DTC P0572
HD-41404	HARNESS CONNECTOR TEST KIT	5.10 BRAKE SWITCH DIAGNOSTICS, DTC P0572
HD-41404	HARNESS CONNECTOR TEST KIT	5.12 RUNNING LAMP DIAGNOSTICS, Running Lamps Inoperative

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-41404	HARNESS CONNECTOR TEST KIT	5.12 RUNNING LAMP DIAGNOSTICS, DTC B2168, B2169
HD-41404	HARNESS CONNECTOR TEST KIT	5.12 RUNNING LAMP DIAGNOSTICS, LP Lamp Inoperative (With Center Stop Lamp)
HD-41404	HARNESS CONNECTOR TEST KIT	5.17 ALARM DIAGNOSTICS, DTC B2172
HD-41404	HARNESS CONNECTOR TEST KIT	5.17 ALARM DIAGNOSTICS, DTC B2173
HD-41404	HARNESS CONNECTOR TEST KIT	5.18 SECURITY ANTENNA DIAGNOSTICS, DTC B2177
HD-41404	HARNESS CONNECTOR TEST KIT	5.18 SECURITY ANTENNA DIAGNOSTICS, Fails to Disarm
HD-41404	HARNESS CONNECTOR TEST KIT	5.19 NEUTRAL SWITCH DIAGNOSTICS, DTC B2218
HD-41404	HARNESS CONNECTOR TEST KIT	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS, DTC B2102
HD-41404	HARNESS CONNECTOR TEST KIT	6.5 FUEL PUMP DIAGNOSTICS, DTC B2116
HD-41404	HARNESS CONNECTOR TEST KIT	6.6 AAT SENSOR DIAGNOSTICS, DTC P0072
HD-41404	HARNESS CONNECTOR TEST KIT	6.6 AAT SENSOR DIAGNOSTICS, DTC P0073
HD-41404	HARNESS CONNECTOR TEST KIT	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0107
HD-41404	HARNESS CONNECTOR TEST KIT	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0108
HD-41404	HARNESS CONNECTOR TEST KIT	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0113
HD-41404	HARNESS CONNECTOR TEST KIT	6.8 ET SENSOR DIAGNOSTICS, DTC P0117
HD-41404	HARNESS CONNECTOR TEST KIT	6.8 ET SENSOR DIAGNOSTICS, DTC P0118
HD-41404	HARNESS CONNECTOR TEST KIT	6.9 TCA DIAGNOSTICS, DTC P0120
HD-41404	HARNESS CONNECTOR TEST KIT	6.9 TCA DIAGNOSTICS, DTC P0122
HD-41404	HARNESS CONNECTOR TEST KIT	6.9 TCA DIAGNOSTICS, DTC P0123
HD-41404	HARNESS CONNECTOR TEST KIT	6.9 TCA DIAGNOSTICS, DTC P0220
HD-41404	HARNESS CONNECTOR TEST KIT	6.9 TCA DIAGNOSTICS, DTC P0222
HD-41404	HARNESS CONNECTOR TEST KIT	6.9 TCA DIAGNOSTICS, DTC P0223
HD-41404	HARNESS CONNECTOR TEST KIT	6.10 HO2S DIAGNOSTICS, DTC P0031
HD-41404	HARNESS CONNECTOR TEST KIT	6.10 HO2S DIAGNOSTICS, DTC P0051
HD-41404	HARNESS CONNECTOR TEST KIT	6.10 HO2S DIAGNOSTICS, DTC P0052
HD-41404	HARNESS CONNECTOR TEST KIT	6.10 HO2S DIAGNOSTICS, DTC P0132
HD-41404	HARNESS CONNECTOR TEST KIT	6.10 HO2S DIAGNOSTICS, DTC P0151
HD-41404	HARNESS CONNECTOR TEST KIT	6.10 HO2S DIAGNOSTICS, DTC P0152
HD-41404	HARNESS CONNECTOR TEST KIT	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0261
HD-41404	HARNESS CONNECTOR TEST KIT	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0264
HD-41404	HARNESS CONNECTOR TEST KIT	6.12 CKP SENSOR DIAGNOSTICS, DTC P0371, P0374
HD-41404	HARNESS CONNECTOR TEST KIT	6.13 PURGE SOLENOID DIAGNOSTICS, DTC P0445
HD-41404	HARNESS CONNECTOR TEST KIT	6.14 VSS DIAGNOSTICS, DTC P0503
HD-41404	HARNESS CONNECTOR TEST KIT	6.17 5V REFERENCE DIAGNOSTICS, DTC P0641
HD-41404	HARNESS CONNECTOR TEST KIT	6.17 5V REFERENCE DIAGNOSTICS, DTC P0651
HD-41404	HARNESS CONNECTOR TEST KIT	6.18 COOLING RELAY DIAGNOSTICS, DTC P0691
HD-41404	HARNESS CONNECTOR TEST KIT	6.18 COOLING RELAY DIAGNOSTICS, DTC P0692
HD-41404	HARNESS CONNECTOR TEST KIT	6.20 DTC P1017, DTC P1017
HD-41404	HARNESS CONNECTOR TEST KIT	6.21 ECT SENSOR DIAGNOSTICS, DTC P2185

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-41404	HARNESS CONNECTOR TEST KIT	6.23 COMBUSTION EFFICIENCY DIAGNOSTICS, DTC P1353, P1356
HD-41404	HARNESS CONNECTOR TEST KIT	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1475
HD-41404	HARNESS CONNECTOR TEST KIT	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1477
HD-41404	HARNESS CONNECTOR TEST KIT	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1478
HD-41404	HARNESS CONNECTOR TEST KIT	6.25 JSS DIAGNOSTICS, Side Stand Displayed on Speedometer
HD-41404	HARNESS CONNECTOR TEST KIT	6.28 ACR DIAGNOSTICS, DTC P1655
HD-41404	HARNESS CONNECTOR TEST KIT	6.28 ACR DIAGNOSTICS, DTC P1655
HD-41404	HARNESS CONNECTOR TEST KIT	6.28 ACR DIAGNOSTICS, DTC P1656
HD-41404	HARNESS CONNECTOR TEST KIT	6.29 COOLING FAN DIAGNOSTICS, DTC P1691
HD-41404	HARNESS CONNECTOR TEST KIT	6.29 COOLING FAN DIAGNOSTICS, DTC P1691
HD-41404	HARNESS CONNECTOR TEST KIT	6.29 COOLING FAN DIAGNOSTICS, DTC P1693
HD-41404	HARNESS CONNECTOR TEST KIT	6.29 COOLING FAN DIAGNOSTICS, DTC P1693
HD-41404	HARNESS CONNECTOR TEST KIT	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2100
HD-41404	HARNESS CONNECTOR TEST KIT	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2101
HD-41404	HARNESS CONNECTOR TEST KIT	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2103
HD-41404	HARNESS CONNECTOR TEST KIT	6.33 TGS DIAGNOSTICS, DTC P2122
HD-41404	HARNESS CONNECTOR TEST KIT	6.33 TGS DIAGNOSTICS, DTC P2123
HD-41404	HARNESS CONNECTOR TEST KIT	6.33 TGS DIAGNOSTICS, DTC P2127
HD-41404	HARNESS CONNECTOR TEST KIT	6.33 TGS DIAGNOSTICS, DTC P2128
HD-41404	HARNESS CONNECTOR TEST KIT	6.34 CORRELATION ERROR DIAGNOSTICS, DTC P2135
HD-41404	HARNESS CONNECTOR TEST KIT	6.34 CORRELATION ERROR DIAGNOSTICS, DTC P2138
HD-41404	HARNESS CONNECTOR TEST KIT	6.36 IGN COIL DRIVER DIAGNOSTICS, DTC P2301
HD-41404	HARNESS CONNECTOR TEST KIT	6.36 IGN COIL DRIVER DIAGNOSTICS, DTC P2304
HD-41404	HARNESS CONNECTOR TEST KIT	6.37 ENGINE CRANKS, BUT WILL NOT START, Engine Cranks but Will Not Start
HD-41404	HARNESS CONNECTOR TEST KIT	6.39 STARTS, THEN STALLS, Starts, Then Stalls
HD-41404	HARNESS CONNECTOR TEST KIT	6.40 MISFIRE AT IDLE OR UNDER LOAD, Misfire At Idle or Under Load
HD-41404	HARNESS CONNECTOR TEST KIT	7.2 INTERNAL FAULT DIAGNOSTICS, DTC C1014, C1040, C1055, C1061, C1062, C1065, C1066, C1071-C1078, C1081-C1089, C1195
HD-41404	HARNESS CONNECTOR TEST KIT	7.3 WSS DIAGNOSTICS, DTC C1021, C1023, C1025, C1027, C1029
HD-41404	HARNESS CONNECTOR TEST KIT	7.3 WSS DIAGNOSTICS, DTC C1032
HD-41404	HARNESS CONNECTOR TEST KIT	7.3 WSS DIAGNOSTICS, DTC C1034
HD-41404	HARNESS CONNECTOR TEST KIT	8.2 AUDIO VOLTAGE DIAGNOSTICS, DTC B1301
HD-41404	HARNESS CONNECTOR TEST KIT	8.2 AUDIO VOLTAGE DIAGNOSTICS, DTC B1401
HD-41404	HARNESS CONNECTOR TEST KIT	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1337
HD-41404	HARNESS CONNECTOR TEST KIT	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1338
HD-41404	HARNESS CONNECTOR TEST KIT	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1339
HD-41404	HARNESS CONNECTOR TEST KIT	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1340

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-41404	HARNESS CONNECTOR TEST KIT	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1345
HD-41404	HARNESS CONNECTOR TEST KIT	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1346
HD-41404	HARNESS CONNECTOR TEST KIT	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1347
HD-41404	HARNESS CONNECTOR TEST KIT	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1348
HD-41404	HARNESS CONNECTOR TEST KIT	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1341
HD-41404	HARNESS CONNECTOR TEST KIT	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1342
HD-41404	HARNESS CONNECTOR TEST KIT	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1343
HD-41404	HARNESS CONNECTOR TEST KIT	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1344
HD-41404	HARNESS CONNECTOR TEST KIT	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1349
HD-41404	HARNESS CONNECTOR TEST KIT	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1350
HD-41404	HARNESS CONNECTOR TEST KIT	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1351
HD-41404	HARNESS CONNECTOR TEST KIT	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1352
HD-41404	HARNESS CONNECTOR TEST KIT	8.10 HEADSET DTCS, DTC B1358
HD-41404	HARNESS CONNECTOR TEST KIT	8.10 HEADSET DTCS, DTC B1359
HD-41404	HARNESS CONNECTOR TEST KIT	8.10 HEADSET DTCS, DTC B1360
HD-41404	HARNESS CONNECTOR TEST KIT	8.10 HEADSET DTCS, DTC B1361
HD-41404	HARNESS CONNECTOR TEST KIT	8.10 HEADSET DTCS, DTC B1362
HD-41404	HARNESS CONNECTOR TEST KIT	8.10 HEADSET DTCS, DTC B1363
HD-41404	HARNESS CONNECTOR TEST KIT	8.10 HEADSET DTCS, DTC B1364
HD-41404	HARNESS CONNECTOR TEST KIT	8.10 HEADSET DTCS, DTC B1365
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Rear Audio Switch Malfunction
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Radio Inoperative
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Radio Turns On and Off
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, CB Transmitter Inoperative
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, CB Receiver Inoperative
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, All Speakers Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Left Front Fairing Speaker Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Lower Left Speaker Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Left Speaker Pod Inoperative With Amplifier 1

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Lower Right Speaker Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Right Speaker Pod Inoperative With Amplifier 1
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, All Speakers Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Right Rear Speaker Pod Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Right Rear Speaker Pod Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 2
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1410
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1411
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1412
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1413
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1420
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1421
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1422
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1423
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1430
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1430
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1430
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1431
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1431

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1431
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1432
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1432
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1432
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1433
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1433
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1433
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1440
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1440
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1440
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1441
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1441
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1441
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1442
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1442
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1442
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1443
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1443
HD-41404	HARNESS CONNECTOR TEST KIT	8.13 AMPLIFIER 1 DTCS, DTC B1443
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1410
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1411
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1412
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1413
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1420
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1421
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1422
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1423
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1430
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1431
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1432
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1433
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1440
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1441
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1442
HD-41404	HARNESS CONNECTOR TEST KIT	8.14 AMPLIFIER 2 DTCS, DTC B1443
HD-41475	DEUTSCH TERMINAL REPAIR KIT	A.13 DEUTSCH DT SEALED CONNECTORS, Deutsch DT Sealed Connector Repair
HD-41475-100	FLAT BLADE L-HOOK	A.13 DEUTSCH DT SEALED CONNECTORS, Deutsch DT Sealed Connector Repair
HD-41609	AMP MULTI-LOCK CRIMPER	A.21 TYCO 070 MULTILOCK UNSEALED CONNECTOR, Tyco 070 Multilock Unsealed Connector Repair
HD-41609	AMP MULTI-LOCK CRIMPER	A.21 TYCO 070 MULTILOCK UNSEALED CONNECTOR, Tyco 070 Multilock Unsealed Connector Repair

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-42682	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-42682	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-42682	BREAKOUT BOX	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-42682	BREAKOUT BOX	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-42682	BREAKOUT BOX	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, Speedometer Inoperative: DTC U0156
HD-42682	BREAKOUT BOX	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0158
HD-42682	BREAKOUT BOX	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0159
HD-42682	BREAKOUT BOX	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0160
HD-42682	BREAKOUT BOX	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1210
HD-42682	BREAKOUT BOX	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1211
HD-42682	BREAKOUT BOX	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1212
HD-42682	BREAKOUT BOX	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1213
HD-42682	BREAKOUT BOX	4.4 NO INSTRUMENT POWER DIAGNOSTICS, No Instrument Power
HD-42682	BREAKOUT BOX	4.4 NO INSTRUMENT POWER DIAGNOSTICS, DTC B1200
HD-42682	BREAKOUT BOX	4.5 INDICATOR LAMPS, Oil Pressure Lamp Always On
HD-42682	BREAKOUT BOX	4.5 INDICATOR LAMPS, Oil Pressure Lamp Inoperative
HD-42682	BREAKOUT BOX	4.5 INDICATOR LAMPS, Neutral Lamp Inoperative
HD-42682	BREAKOUT BOX	4.5 INDICATOR LAMPS, High Beam Indicator Lamp Inoperative
HD-42682	BREAKOUT BOX	4.5 INDICATOR LAMPS, Turn Signal Indicator Inoperative
HD-42682	BREAKOUT BOX	7.5 ABS INDICATOR ALWAYS ON, FLASHING OR INOPERATIVE, ABS Indicator Always On or Inoperative
HD-42879	ELECTRICAL CRIMPER TOOL	A.16 DEUTSCH DTM SEALED SOLID BARREL MINI TERMINAL REPAIR, Deutsch DTM Sealed Solid Barrel Terminal Crimps
HD-44687	IGNITION COIL CIRCUIT TEST ADAPTER	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-44687	IGNITION COIL CIRCUIT TEST ADAPTER	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-44695-A	MULTI-LOCK CRIMPER	A.20 TYCO 040 MULTILOCK UNSEALED CONNECTOR, Tyco 040 Multilock Unsealed Connector Repair
HD-44695-A	MULTI-LOCK CRIMPER	A.20 TYCO 040 MULTILOCK UNSEALED CONNECTOR, Tyco 040 Multilock Unsealed Connector Repair
HD-45325	JUMPER HARNESS	7.5 ABS INDICATOR ALWAYS ON, FLASHING OR INOPERATIVE, ABS Indicator Always On or Inoperative

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-45928	TERMINAL REMOVER	A.11 DELPHI MICRO 64 SEALED CONNECTORS, Delphi Micro 64 Sealed Connector Repair
HD-45929	TERMINAL CRIMPER	A.11 DELPHI MICRO 64 SEALED CONNECTORS, Delphi Micro 64 Sealed Connector Repair
HD-46601	BREAKOUT BOX ADAPTERS	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-46601	BREAKOUT BOX ADAPTERS	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-46601	BREAKOUT BOX ADAPTERS	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-46601	BREAKOUT BOX ADAPTERS	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-46601	BREAKOUT BOX ADAPTERS	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, Speedometer Inoperative: DTC U0156
HD-46601	BREAKOUT BOX ADAPTERS	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0158
HD-46601	BREAKOUT BOX ADAPTERS	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0159
HD-46601	BREAKOUT BOX ADAPTERS	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U0160
HD-46601	BREAKOUT BOX ADAPTERS	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1210
HD-46601	BREAKOUT BOX ADAPTERS	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1211
HD-46601	BREAKOUT BOX ADAPTERS	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1212
HD-46601	BREAKOUT BOX ADAPTERS	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1213
HD-46601	BREAKOUT BOX ADAPTERS	4.4 NO INSTRUMENT POWER DIAGNOSTICS, No Instrument Power
HD-46601	BREAKOUT BOX ADAPTERS	4.4 NO INSTRUMENT POWER DIAGNOSTICS, DTC B1200
HD-46601	BREAKOUT BOX ADAPTERS	4.5 INDICATOR LAMPS, Oil Pressure Lamp Always On
HD-46601	BREAKOUT BOX ADAPTERS	4.5 INDICATOR LAMPS, Oil Pressure Lamp Inoperative
HD-46601	BREAKOUT BOX ADAPTERS	4.5 INDICATOR LAMPS, Neutral Lamp Inoperative
HD-46601	BREAKOUT BOX ADAPTERS	4.5 INDICATOR LAMPS, High Beam Indicator Lamp Inoperative
HD-46601	BREAKOUT BOX ADAPTERS	4.5 INDICATOR LAMPS, Turn Signal Indicator Inoperative
HD-47918	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-47918	BREAKOUT BOX	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-47918	BREAKOUT BOX	8.2 AUDIO VOLTAGE DIAGNOSTICS, DTC B1401
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, All Speakers Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Left Front Fairing Speaker Inoperative With Amplifier 1

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Left Front Fairing Speaker Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Lower Left Speaker Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Left Speaker Pod Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Lower Right Speaker Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Right Speaker Pod Inoperative With Amplifier 1
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, All Speakers Inoperative With Amplifier 2
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 2
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Right Rear Speaker Pod Inoperative With Amplifier 2
HD-47918	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 2
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1410
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1411
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1412
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1413
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1420
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1421
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1422
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1423
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1430
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1430
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1430
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1431
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1431

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1431
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1432
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1432
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1432
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1433
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1433
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1433
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1440
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1440
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1440
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1441
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1441
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1441
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1442
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1442
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1442
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1443
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1443
HD-47918	BREAKOUT BOX	8.13 AMPLIFIER 1 DTCS, DTC B1443
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1410
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1411
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1412
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1413
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1420
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1421
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1422
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1423
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1430
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1431
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1432
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1433
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1440
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1441
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1442
HD-47918	BREAKOUT BOX	8.14 AMPLIFIER 2 DTCS, DTC B1443
HD-48037	SWR METER ADAPTERS	8.12 AUDIO SYSTEM SYMPTOMS, CB Transmitter Inoperative
HD-48114	TERMINAL REMOVER	A.19 MOLEX MX 150 SEALED CONNECTORS, Molex MX 150 Sealed Connector Repair
HD-48119	TERMINAL CRIMPER	A.19 MOLEX MX 150 SEALED CONNECTORS, Crimp Terminal to Lead
HD-48650	DIGITAL TECHNICIAN II	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-48650	DIGITAL TECHNICIAN II	1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test
HD-48650	DIGITAL TECHNICIAN II	1.4 DIAGNOSTICS AND TROUBLESHOOTING, Job/Time Codes Values
HD-48650	DIGITAL TECHNICIAN II	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	2.5 AMP COMMUNICATION DIAGNOSTICS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	4.3 TRIP ODOMETER SWITCH DIAGNOSTICS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	5.9 STOP LAMP DIAGNOSTICS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	5.13 SECURITY SYSTEM, Security System Features
HD-48650	DIGITAL TECHNICIAN II	6.1 EFI SYSTEM, General
HD-48650	DIGITAL TECHNICIAN II	6.10 HO2S DIAGNOSTICS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	6.19 DTC P1009, General
HD-48650	DIGITAL TECHNICIAN II	7.1 ANTI-LOCK BRAKE SYSTEM (ABS) GENERAL INFORMATION, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	7.4 INVALID VIN DIAGNOSTICS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	8.1 AUDIO SPECIFICATIONS AND SERVICE FUNCTIONS, Service Menu
HD-48650	DIGITAL TECHNICIAN II	8.12 AUDIO SYSTEM SYMPTOMS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	8.13 AMPLIFIER 1 DTCS, Description and Operation
HD-48650	DIGITAL TECHNICIAN II	8.14 AMPLIFIER 2 DTCS, Description and Operation
HD-50120	UNIVERSAL CRIMPER SET	A.4 DELPHI 100W MICRO-PACK SEALED CONNECTOR, Crimping Terminals
HD-50120	UNIVERSAL CRIMPER SET	A.17 JAE MX19 SEALED CONNECTORS, Crimping Terminals
HD-50120	UNIVERSAL CRIMPER SET	A.18 MOLEX CMC SEALED CONNECTORS, Crimping Terminals
HD-50120	UNIVERSAL CRIMPER SET	A.22 TYCO GET 64 SEALED CONNECTOR, Crimping Terminals
HD-50120	UNIVERSAL CRIMPER SET	A.23 TYCO MCP SEALED CONNECTOR, Crimping Terminals
HD-50120-2	HAND CRIMP FRAME	A.4 DELPHI 100W MICRO-PACK SEALED CONNECTOR, Crimping Terminals
HD-50120-2	HAND CRIMP FRAME	A.17 JAE MX19 SEALED CONNECTORS, Crimping Terminals
HD-50120-2	HAND CRIMP FRAME	A.18 MOLEX CMC SEALED CONNECTORS, Crimping Terminals
HD-50120-2	HAND CRIMP FRAME	A.22 TYCO GET 64 SEALED CONNECTOR, Crimping Terminals
HD-50120-3	JAE DIE	A.18 MOLEX CMC SEALED CONNECTORS, Crimping Terminals

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50120-4	JAE DIE	A.18 MOLEX CMC SEALED CONNECTORS, Crimping Terminals
HD-50120-6	JAE DIE	A.17 JAE MX19 SEALED CONNECTORS, Crimping Terminals
HD-50120-7	TYCO AND DELPHI TERMINAL CRIMP DIE	A.4 DELPHI 100W MICRO-PACK SEALED CONNECTOR, Crimping Terminals
HD-50120-7	TYCO AND DELPHI TERMINAL CRIMP DIE	A.22 TYCO GET 64 SEALED CONNECTOR, Crimping Terminals
HD-50120-8	TYCO MCP DIE	A.23 TYCO MCP SEALED CONNECTOR, Crimping Terminals
HD-50120-A	BOSCH TERMINAL REPAIR KIT	A.3 BOSCH BTC SEALED CONNECTOR, Bosch BTC Sealed Connector Repair
HD-50341	WHEEL SPEED SENSOR TEST LEAD	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50341	WHEEL SPEED SENSOR TEST LEAD	7.3 WSS DIAGNOSTICS, DTC C1032
HD-50341	WHEEL SPEED SENSOR TEST LEAD	7.3 WSS DIAGNOSTICS, DTC C1034
HD-50390-1	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1	BREAKOUT BOX	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1	BREAKOUT BOX	1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test
HD-50390-1	BREAKOUT BOX	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-1	BREAKOUT BOX	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-1	BREAKOUT BOX	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-1	BREAKOUT BOX	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-1	BREAKOUT BOX	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0100
HD-50390-1	BREAKOUT BOX	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0121
HD-50390-1	BREAKOUT BOX	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, No Vehicle Power: DTC U0140
HD-50390-1	BREAKOUT BOX	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0184
HD-50390-1	BREAKOUT BOX	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U1302

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-1	BREAKOUT BOX	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U1401
HD-50390-1	BREAKOUT BOX	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0185
HD-50390-1	BREAKOUT BOX	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0186
HD-50390-1	BREAKOUT BOX	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0186
HD-50390-1	BREAKOUT BOX	3.2 STARTING SYSTEM, Nothing Clicks
HD-50390-1	BREAKOUT BOX	3.2 STARTING SYSTEM, Starter Stalls or Spins Too Slowly
HD-50390-1	BREAKOUT BOX	3.3 STARTER OUTPUT DTCS, DTC B2121
HD-50390-1	BREAKOUT BOX	3.3 STARTER OUTPUT DTCS, DTC B2122
HD-50390-1	BREAKOUT BOX	3.3 STARTER OUTPUT DTCS, DTC B2123
HD-50390-1	BREAKOUT BOX	3.3 STARTER OUTPUT DTCS, DTC B2124
HD-50390-1	BREAKOUT BOX	3.7 ABS VOLTAGE DIAGNOSTICS, DTC C0562
HD-50390-1	BREAKOUT BOX	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P0562
HD-50390-1	BREAKOUT BOX	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P0562
HD-50390-1	BREAKOUT BOX	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P1608
HD-50390-1	BREAKOUT BOX	3.9 IGN SWITCH DIAGNOSTICS, DTC B2201
HD-50390-1	BREAKOUT BOX	3.9 IGN SWITCH DIAGNOSTICS, DTC B2203
HD-50390-1	BREAKOUT BOX	3.10 ENGINE STOP SWITCH DIAGNOSTICS, DTC B2206
HD-50390-1	BREAKOUT BOX	3.10 ENGINE STOP SWITCH DIAGNOSTICS, DTC B2208
HD-50390-1	BREAKOUT BOX	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1210
HD-50390-1	BREAKOUT BOX	4.5 INDICATOR LAMPS, Oil Pressure Lamp Always On
HD-50390-1	BREAKOUT BOX	4.5 INDICATOR LAMPS, Neutral Lamp Inoperative
HD-50390-1	BREAKOUT BOX	5.1 ACC CIRCUIT DIAGNOSTICS, DTC B2113, B2114
HD-50390-1	BREAKOUT BOX	5.4 HORN DIAGNOSTICS, DTC B2126
HD-50390-1	BREAKOUT BOX	5.4 HORN DIAGNOSTICS, DTC B2127
HD-50390-1	BREAKOUT BOX	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2141
HD-50390-1	BREAKOUT BOX	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2143, B2144
HD-50390-1	BREAKOUT BOX	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2146
HD-50390-1	BREAKOUT BOX	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2148, B2149
HD-50390-1	BREAKOUT BOX	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-50390-1	BREAKOUT BOX	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-50390-1	BREAKOUT BOX	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2153, B2154

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-1	BREAKOUT BOX	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2153, B2154
HD-50390-1	BREAKOUT BOX	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-50390-1	BREAKOUT BOX	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-50390-1	BREAKOUT BOX	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2158, B2159
HD-50390-1	BREAKOUT BOX	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2158, B2159
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, Auxiliary Lamps Inoperative
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, DTC B2106, B2107
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, DTC B2106, B2107
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, DTC B2108, B2109
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, High Beam Inoperative, DTC B2131
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, High Beam Inoperative, DTC B2131
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, DTC B2133, B2134
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, Low Beam Inoperative, DTC B2136
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, Low Beam Inoperative, DTC B2136
HD-50390-1	BREAKOUT BOX	5.8 HEADLAMP DIAGNOSTICS, DTC B2138, B2139
HD-50390-1	BREAKOUT BOX	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Inoperative
HD-50390-1	BREAKOUT BOX	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Always On, DTC B2223
HD-50390-1	BREAKOUT BOX	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-1	BREAKOUT BOX	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-1	BREAKOUT BOX	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-1	BREAKOUT BOX	5.9 STOP LAMP DIAGNOSTICS, DTC B2163, B2164
HD-50390-1	BREAKOUT BOX	5.10 BRAKE SWITCH DIAGNOSTICS, DTC P0572
HD-50390-1	BREAKOUT BOX	5.10 BRAKE SWITCH DIAGNOSTICS, DTC P0572
HD-50390-1	BREAKOUT BOX	5.12 RUNNING LAMP DIAGNOSTICS, Running Lamps Inoperative
HD-50390-1	BREAKOUT BOX	5.12 RUNNING LAMP DIAGNOSTICS, DTC B2168, B2169
HD-50390-1	BREAKOUT BOX	5.12 RUNNING LAMP DIAGNOSTICS, LP Lamp Inoperative (Without Center Stop Lamp)
HD-50390-1	BREAKOUT BOX	5.12 RUNNING LAMP DIAGNOSTICS, LP Lamp Inoperative (With Center Stop Lamp)
HD-50390-1	BREAKOUT BOX	5.17 ALARM DIAGNOSTICS, DTC B2173
HD-50390-1	BREAKOUT BOX	5.18 SECURITY ANTENNA DIAGNOSTICS, DTC B2176
HD-50390-1	BREAKOUT BOX	5.18 SECURITY ANTENNA DIAGNOSTICS, DTC B2177
HD-50390-1	BREAKOUT BOX	5.18 SECURITY ANTENNA DIAGNOSTICS, Fails to Disarm
HD-50390-1	BREAKOUT BOX	5.19 NEUTRAL SWITCH DIAGNOSTICS, DTC B2218

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-1	BREAKOUT BOX	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS, DTC B2102
HD-50390-1	BREAKOUT BOX	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS, DTC B2103, B2104
HD-50390-1	BREAKOUT BOX	6.5 FUEL PUMP DIAGNOSTICS, DTC B2116
HD-50390-1	BREAKOUT BOX	6.6 AAT SENSOR DIAGNOSTICS, DTC P0072
HD-50390-1	BREAKOUT BOX	6.6 AAT SENSOR DIAGNOSTICS, DTC P0073
HD-50390-1	BREAKOUT BOX	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0107
HD-50390-1	BREAKOUT BOX	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0107
HD-50390-1	BREAKOUT BOX	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0108
HD-50390-1	BREAKOUT BOX	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0112
HD-50390-1	BREAKOUT BOX	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0113
HD-50390-1	BREAKOUT BOX	6.8 ET SENSOR DIAGNOSTICS, DTC P0117
HD-50390-1	BREAKOUT BOX	6.8 ET SENSOR DIAGNOSTICS, DTC P0118
HD-50390-1	BREAKOUT BOX	6.9 TCA DIAGNOSTICS, DTC P0120
HD-50390-1	BREAKOUT BOX	6.9 TCA DIAGNOSTICS, DTC P0122
HD-50390-1	BREAKOUT BOX	6.9 TCA DIAGNOSTICS, DTC P0123
HD-50390-1	BREAKOUT BOX	6.9 TCA DIAGNOSTICS, DTC P0220
HD-50390-1	BREAKOUT BOX	6.9 TCA DIAGNOSTICS, DTC P0222
HD-50390-1	BREAKOUT BOX	6.9 TCA DIAGNOSTICS, DTC P0223
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0031
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0032
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0051
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0052
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0131
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0132
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0134
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0151
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0152
HD-50390-1	BREAKOUT BOX	6.10 HO2S DIAGNOSTICS, DTC P0154
HD-50390-1	BREAKOUT BOX	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0261
HD-50390-1	BREAKOUT BOX	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0264
HD-50390-1	BREAKOUT BOX	6.12 CKP SENSOR DIAGNOSTICS, DTC P0371, P0374
HD-50390-1	BREAKOUT BOX	6.13 PURGE SOLENOID DIAGNOSTICS, DTC P0444
HD-50390-1	BREAKOUT BOX	6.13 PURGE SOLENOID DIAGNOSTICS, DTC P0444
HD-50390-1	BREAKOUT BOX	6.14 VSS DIAGNOSTICS, DTC P0502
HD-50390-1	BREAKOUT BOX	6.14 VSS DIAGNOSTICS, DTC P0503
HD-50390-1	BREAKOUT BOX	6.17 5V REFERENCE DIAGNOSTICS, DTC P0641
HD-50390-1	BREAKOUT BOX	6.17 5V REFERENCE DIAGNOSTICS, DTC P0651
HD-50390-1	BREAKOUT BOX	6.18 COOLING RELAY DIAGNOSTICS, DTC P0691
HD-50390-1	BREAKOUT BOX	6.18 COOLING RELAY DIAGNOSTICS, DTC P0692
HD-50390-1	BREAKOUT BOX	6.21 ECT SENSOR DIAGNOSTICS, DTC P2184
HD-50390-1	BREAKOUT BOX	6.21 ECT SENSOR DIAGNOSTICS, DTC P2185

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-1	BREAKOUT BOX	6.23 COMBUSTION EFFICIENCY DIAGNOSTICS, DTC P1353, P1356
HD-50390-1	BREAKOUT BOX	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1475
HD-50390-1	BREAKOUT BOX	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1477
HD-50390-1	BREAKOUT BOX	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1478
HD-50390-1	BREAKOUT BOX	6.25 JSS DIAGNOSTICS, DTC P1502
HD-50390-1	BREAKOUT BOX	6.25 JSS DIAGNOSTICS, Side Stand Displayed on Speedometer
HD-50390-1	BREAKOUT BOX	6.28 ACR DIAGNOSTICS, DTC P1655
HD-50390-1	BREAKOUT BOX	6.29 COOLING FAN DIAGNOSTICS, DTC P1691
HD-50390-1	BREAKOUT BOX	6.29 COOLING FAN DIAGNOSTICS, DTC P1691
HD-50390-1	BREAKOUT BOX	6.29 COOLING FAN DIAGNOSTICS, DTC P1692
HD-50390-1	BREAKOUT BOX	6.29 COOLING FAN DIAGNOSTICS, DTC P1693
HD-50390-1	BREAKOUT BOX	6.29 COOLING FAN DIAGNOSTICS, DTC P1693
HD-50390-1	BREAKOUT BOX	6.29 COOLING FAN DIAGNOSTICS, DTC P1694
HD-50390-1	BREAKOUT BOX	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2100
HD-50390-1	BREAKOUT BOX	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2101
HD-50390-1	BREAKOUT BOX	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2103
HD-50390-1	BREAKOUT BOX	6.33 TGS DIAGNOSTICS, DTC P2122
HD-50390-1	BREAKOUT BOX	6.33 TGS DIAGNOSTICS, DTC P2123
HD-50390-1	BREAKOUT BOX	6.33 TGS DIAGNOSTICS, DTC P2127
HD-50390-1	BREAKOUT BOX	6.33 TGS DIAGNOSTICS, DTC P2128
HD-50390-1	BREAKOUT BOX	6.34 CORRELATION ERROR DIAGNOSTICS, DTC P2135
HD-50390-1	BREAKOUT BOX	6.34 CORRELATION ERROR DIAGNOSTICS, DTC P2138
HD-50390-1	BREAKOUT BOX	6.36 IGN COIL DRIVER DIAGNOSTICS, DTC P2300
HD-50390-1	BREAKOUT BOX	6.36 IGN COIL DRIVER DIAGNOSTICS, DTC P2303
HD-50390-1	BREAKOUT BOX	6.37 ENGINE CRANKS, BUT WILL NOT START, Engine Cranks but Will Not Start
HD-50390-1	BREAKOUT BOX	6.39 STARTS, THEN STALLS, Starts, Then Stalls
HD-50390-1	BREAKOUT BOX	6.40 MISFIRE AT IDLE OR UNDER LOAD, Misfire At Idle or Under Load
HD-50390-1	BREAKOUT BOX	7.2 INTERNAL FAULT DIAGNOSTICS, DTC C1014, C1040, C1055, C1061, C1062, C1065, C1066, C1071-C1078, C1081-C1089, C1195
HD-50390-1	BREAKOUT BOX	7.3 WSS DIAGNOSTICS, DTC C1021, C1023, C1025, C1027, C1029
HD-50390-1	BREAKOUT BOX	7.3 WSS DIAGNOSTICS, DTC C1032
HD-50390-1	BREAKOUT BOX	7.3 WSS DIAGNOSTICS, DTC C1034
HD-50390-1	BREAKOUT BOX	7.5 ABS INDICATOR ALWAYS ON, FLASHING OR INOPERATIVE, ABS Indicator Always On or Inoperative
HD-50390-1	BREAKOUT BOX	8.2 AUDIO VOLTAGE DIAGNOSTICS, DTC B1301
HD-50390-1	BREAKOUT BOX	8.5 REAR AUDIO CONTROL DIAGNOSTICS, DTC B1307

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-1	BREAKOUT BOX	8.5 REAR AUDIO CONTROL DIAGNOSTICS, DTC B1306
HD-50390-1	BREAKOUT BOX	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1337
HD-50390-1	BREAKOUT BOX	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1338
HD-50390-1	BREAKOUT BOX	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1339
HD-50390-1	BREAKOUT BOX	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1340
HD-50390-1	BREAKOUT BOX	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1345
HD-50390-1	BREAKOUT BOX	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1346
HD-50390-1	BREAKOUT BOX	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1347
HD-50390-1	BREAKOUT BOX	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1348
HD-50390-1	BREAKOUT BOX	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1341
HD-50390-1	BREAKOUT BOX	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1342
HD-50390-1	BREAKOUT BOX	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1343
HD-50390-1	BREAKOUT BOX	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1344
HD-50390-1	BREAKOUT BOX	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1349
HD-50390-1	BREAKOUT BOX	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1350
HD-50390-1	BREAKOUT BOX	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1351
HD-50390-1	BREAKOUT BOX	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1352
HD-50390-1	BREAKOUT BOX	8.10 HEADSET DTCS, DTC B1358
HD-50390-1	BREAKOUT BOX	8.10 HEADSET DTCS, DTC B1359
HD-50390-1	BREAKOUT BOX	8.10 HEADSET DTCS, DTC B1360
HD-50390-1	BREAKOUT BOX	8.10 HEADSET DTCS, DTC B1361
HD-50390-1	BREAKOUT BOX	8.10 HEADSET DTCS, DTC B1362
HD-50390-1	BREAKOUT BOX	8.10 HEADSET DTCS, DTC B1363
HD-50390-1	BREAKOUT BOX	8.10 HEADSET DTCS, DTC B1364
HD-50390-1	BREAKOUT BOX	8.10 HEADSET DTCS, DTC B1365
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Rear Audio Switch Malfunction
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Radio Inoperative
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Radio Turns On and Off
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, CB Transmitter Inoperative

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, CB Receiver Inoperative
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Left Front Fairing Speaker Inoperative With Amplifier 1
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 1
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 1
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 2
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 2
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Right Rear Speaker Pod Inoperative With Amplifier 2
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 2
HD-50390-1	BREAKOUT BOX	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 2
HD-50390-1-P1	ABS OVERLAY	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-1-P1	ABS OVERLAY	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0121
HD-50390-1-P1	ABS OVERLAY	3.7 ABS VOLTAGE DIAGNOSTICS, DTC C0562
HD-50390-2	BCM CABLE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-2	BCM CABLE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-2	BCM CABLE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-2	BCM CABLE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-2	BCM CABLE	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-2	BCM CABLE	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-2	BCM CABLE	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, No Vehicle Power: DTC U0140
HD-50390-2	BCM CABLE	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0184
HD-50390-2	BCM CABLE	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U1302
HD-50390-2	BCM CABLE	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U1401
HD-50390-2	BCM CABLE	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0185
HD-50390-2	BCM CABLE	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0186

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-2	BCM CABLE	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0186
HD-50390-2	BCM CABLE	3.2 STARTING SYSTEM, Nothing Clicks
HD-50390-2	BCM CABLE	3.3 STARTER OUTPUT DTCS, DTC B2121
HD-50390-2	BCM CABLE	3.3 STARTER OUTPUT DTCS, DTC B2122
HD-50390-2	BCM CABLE	3.3 STARTER OUTPUT DTCS, DTC B2123
HD-50390-2	BCM CABLE	3.3 STARTER OUTPUT DTCS, DTC B2124
HD-50390-2	BCM CABLE	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P0562
HD-50390-2	BCM CABLE	3.9 IGN SWITCH DIAGNOSTICS, DTC B2201
HD-50390-2	BCM CABLE	3.9 IGN SWITCH DIAGNOSTICS, DTC B2203
HD-50390-2	BCM CABLE	3.10 ENGINE STOP SWITCH DIAGNOSTICS, DTC B2206
HD-50390-2	BCM CABLE	3.10 ENGINE STOP SWITCH DIAGNOSTICS, DTC B2208
HD-50390-2	BCM CABLE	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1210
HD-50390-2	BCM CABLE	4.5 INDICATOR LAMPS, Oil Pressure Lamp Always On
HD-50390-2	BCM CABLE	4.5 INDICATOR LAMPS, Neutral Lamp Inoperative
HD-50390-2	BCM CABLE	5.1 ACC CIRCUIT DIAGNOSTICS, DTC B2113, B2114
HD-50390-2	BCM CABLE	5.4 HORN DIAGNOSTICS, DTC B2126
HD-50390-2	BCM CABLE	5.4 HORN DIAGNOSTICS, DTC B2127
HD-50390-2	BCM CABLE	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2141
HD-50390-2	BCM CABLE	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2143, B2144
HD-50390-2	BCM CABLE	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2146
HD-50390-2	BCM CABLE	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2148, B2149
HD-50390-2	BCM CABLE	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-50390-2	BCM CABLE	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-50390-2	BCM CABLE	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2153, B2154
HD-50390-2	BCM CABLE	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2153, B2154
HD-50390-2	BCM CABLE	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-50390-2	BCM CABLE	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-50390-2	BCM CABLE	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2158, B2159
HD-50390-2	BCM CABLE	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2158, B2159
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, Auxiliary Lamps Inoperative
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, DTC B2106, B2107
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, DTC B2106, B2107
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, DTC B2108, B2109

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, High Beam Inoperative, DTC B2131
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, High Beam Inoperative, DTC B2131
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, DTC B2133, B2134
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, Low Beam Inoperative, DTC B2136
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, Low Beam Inoperative, DTC B2136
HD-50390-2	BCM CABLE	5.8 HEADLAMP DIAGNOSTICS, DTC B2138, B2139
HD-50390-2	BCM CABLE	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Inoperative
HD-50390-2	BCM CABLE	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Always On, DTC B2223
HD-50390-2	BCM CABLE	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-2	BCM CABLE	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-2	BCM CABLE	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-2	BCM CABLE	5.9 STOP LAMP DIAGNOSTICS, DTC B2163, B2164
HD-50390-2	BCM CABLE	5.10 BRAKE SWITCH DIAGNOSTICS, DTC P0572
HD-50390-2	BCM CABLE	5.10 BRAKE SWITCH DIAGNOSTICS, DTC P0572
HD-50390-2	BCM CABLE	5.12 RUNNING LAMP DIAGNOSTICS, Running Lamps Inoperative
HD-50390-2	BCM CABLE	5.12 RUNNING LAMP DIAGNOSTICS, DTC B2168, B2169
HD-50390-2	BCM CABLE	5.12 RUNNING LAMP DIAGNOSTICS, LP Lamp Inoperative (Without Center Stop Lamp)
HD-50390-2	BCM CABLE	5.12 RUNNING LAMP DIAGNOSTICS, LP Lamp Inoperative (With Center Stop Lamp)
HD-50390-2	BCM CABLE	5.17 ALARM DIAGNOSTICS, DTC B2173
HD-50390-2	BCM CABLE	5.18 SECURITY ANTENNA DIAGNOSTICS, DTC B2176
HD-50390-2	BCM CABLE	5.18 SECURITY ANTENNA DIAGNOSTICS, DTC B2177
HD-50390-2	BCM CABLE	5.18 SECURITY ANTENNA DIAGNOSTICS, Fails to Disarm
HD-50390-2	BCM CABLE	5.19 NEUTRAL SWITCH DIAGNOSTICS, DTC B2218
HD-50390-2	BCM CABLE	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS, DTC B2103, B2104
HD-50390-2	BCM CABLE	6.5 FUEL PUMP DIAGNOSTICS, DTC B2116
HD-50390-2	BCM CABLE	6.37 ENGINE CRANKS, BUT WILL NOT START, Engine Cranks but Will Not Start
HD-50390-2	BCM/RADIO CABLE	8.2 AUDIO VOLTAGE DIAGNOSTICS, DTC B1301
HD-50390-2	BCM/RADIO CABLE	8.5 REAR AUDIO CONTROL DIAGNOSTICS, DTC B1307
HD-50390-2	BCM/RADIO CABLE	8.5 REAR AUDIO CONTROL DIAGNOSTICS, DTC B1306
HD-50390-2	BCM/RADIO CABLE	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1337
HD-50390-2	BCM/RADIO CABLE	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1338
HD-50390-2	BCM/RADIO CABLE	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1339

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-2	BCM/RADIO CABLE	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1340
HD-50390-2	BCM/RADIO CABLE	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1345
HD-50390-2	BCM/RADIO CABLE	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1346
HD-50390-2	BCM/RADIO CABLE	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1347
HD-50390-2	BCM/RADIO CABLE	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1348
HD-50390-2	BCM/RADIO CABLE	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1341
HD-50390-2	BCM/RADIO CABLE	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1342
HD-50390-2	BCM/RADIO CABLE	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1343
HD-50390-2	BCM/RADIO CABLE	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1344
HD-50390-2	BCM/RADIO CABLE	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1349
HD-50390-2	BCM/RADIO CABLE	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1350
HD-50390-2	BCM/RADIO CABLE	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1351
HD-50390-2	BCM/RADIO CABLE	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1352
HD-50390-2	BCM/RADIO CABLE	8.10 HEADSET DTCS, DTC B1358
HD-50390-2	BCM/RADIO CABLE	8.10 HEADSET DTCS, DTC B1359
HD-50390-2	BCM/RADIO CABLE	8.10 HEADSET DTCS, DTC B1360
HD-50390-2	BCM/RADIO CABLE	8.10 HEADSET DTCS, DTC B1361
HD-50390-2	BCM/RADIO CABLE	8.10 HEADSET DTCS, DTC B1362
HD-50390-2	BCM/RADIO CABLE	8.10 HEADSET DTCS, DTC B1363
HD-50390-2	BCM/RADIO CABLE	8.10 HEADSET DTCS, DTC B1364
HD-50390-2	BCM/RADIO CABLE	8.10 HEADSET DTCS, DTC B1365
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Rear Audio Switch Malfunction
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Radio Inoperative
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Radio Turns On and Off
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, CB Transmitter Inoperative
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, CB Receiver Inoperative
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Left Front Fairing Speaker Inoperative With Amplifier 1

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 1
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 1
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 2
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 2
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Right Rear Speaker Pod Inoperative With Amplifier 2
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 2
HD-50390-2	BCM/RADIO CABLE	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 2
HD-50390-2-P	BCM OVERLAY	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-2-P	BCM OVERLAY	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-2-P	BCM OVERLAY	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-2-P	BCM OVERLAY	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-2-P	BCM OVERLAY	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, No Vehicle Power: DTC U0140
HD-50390-2-P	BCM OVERLAY	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0184
HD-50390-2-P	BCM OVERLAY	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U1302
HD-50390-2-P	BCM OVERLAY	2.4 SECONDARY COMMUNICATION DIAGNOSTICS, DTC U1401
HD-50390-2-P	BCM OVERLAY	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0185
HD-50390-2-P	BCM OVERLAY	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0186
HD-50390-2-P	BCM OVERLAY	2.5 AMP COMMUNICATION DIAGNOSTICS, DTC U0186
HD-50390-2-P	BCM OVERLAY	3.2 STARTING SYSTEM, Nothing Clicks
HD-50390-2-P	BCM OVERLAY	3.3 STARTER OUTPUT DTCS, DTC B2121
HD-50390-2-P	BCM OVERLAY	3.3 STARTER OUTPUT DTCS, DTC B2122
HD-50390-2-P	BCM OVERLAY	3.3 STARTER OUTPUT DTCS, DTC B2123
HD-50390-2-P	BCM OVERLAY	3.3 STARTER OUTPUT DTCS, DTC B2124
HD-50390-2-P	BCM OVERLAY	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P0562
HD-50390-2-P	BCM OVERLAY	3.9 IGN SWITCH DIAGNOSTICS, DTC B2201

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-2-P	BCM OVERLAY	3.9 IGN SWITCH DIAGNOSTICS, DTC B2203
HD-50390-2-P	BCM OVERLAY	3.10 ENGINE STOP SWITCH DIAGNOSTICS, DTC B2206
HD-50390-2-P	BCM OVERLAY	3.10 ENGINE STOP SWITCH DIAGNOSTICS, DTC B2208
HD-50390-2-P	BCM OVERLAY	4.2 FUEL GAUGE AND SENDER DIAGNOSTICS, DTC B1210
HD-50390-2-P	BCM OVERLAY	4.5 INDICATOR LAMPS, Oil Pressure Lamp Always On
HD-50390-2-P	BCM OVERLAY	4.5 INDICATOR LAMPS, Neutral Lamp Inoperative
HD-50390-2-P	BCM OVERLAY	5.1 ACC CIRCUIT DIAGNOSTICS, DTC B2113, B2114
HD-50390-2-P	BCM OVERLAY	5.4 HORN DIAGNOSTICS, DTC B2126
HD-50390-2-P	BCM OVERLAY	5.4 HORN DIAGNOSTICS, DTC B2127
HD-50390-2-P	BCM OVERLAY	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2141
HD-50390-2-P	BCM OVERLAY	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2143, B2144
HD-50390-2-P	BCM OVERLAY	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2146
HD-50390-2-P	BCM OVERLAY	5.6 FRONT TURN SIGNAL DIAGNOSTICS, DTC B2148, B2149
HD-50390-2-P	BCM OVERLAY	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-50390-2-P	BCM OVERLAY	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2151
HD-50390-2-P	BCM OVERLAY	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2153, B2154
HD-50390-2-P	BCM OVERLAY	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2153, B2154
HD-50390-2-P	BCM OVERLAY	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-50390-2-P	BCM OVERLAY	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2156
HD-50390-2-P	BCM OVERLAY	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2158, B2159
HD-50390-2-P	BCM OVERLAY	5.7 REAR TURN SIGNAL DIAGNOSTICS, DTC B2158, B2159
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, Auxiliary Lamps Inoperative
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, DTC B2106, B2107
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, DTC B2106, B2107
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, DTC B2108, B2109
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, High Beam Inoperative, DTC B2131
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, High Beam Inoperative, DTC B2131
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, DTC B2133, B2134
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, Low Beam Inoperative, DTC B2136
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, Low Beam Inoperative, DTC B2136
HD-50390-2-P	BCM OVERLAY	5.8 HEADLAMP DIAGNOSTICS, DTC B2138, B2139
HD-50390-2-P	BCM OVERLAY	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Inoperative

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-2-P	BCM OVERLAY	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Always On, DTC B2223
HD-50390-2-P	BCM OVERLAY	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-2-P	BCM OVERLAY	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-2-P	BCM OVERLAY	5.9 STOP LAMP DIAGNOSTICS, DTC B2161
HD-50390-2-P	BCM OVERLAY	5.9 STOP LAMP DIAGNOSTICS, DTC B2163, B2164
HD-50390-2-P	BCM OVERLAY	5.10 BRAKE SWITCH DIAGNOSTICS, DTC P0572
HD-50390-2-P	BCM OVERLAY	5.10 BRAKE SWITCH DIAGNOSTICS, DTC P0572
HD-50390-2-P	BCM OVERLAY	5.12 RUNNING LAMP DIAGNOSTICS, Running Lamps Inoperative
HD-50390-2-P	BCM OVERLAY	5.12 RUNNING LAMP DIAGNOSTICS, DTC B2168, B2169
HD-50390-2-P	BCM OVERLAY	5.12 RUNNING LAMP DIAGNOSTICS, LP Lamp Inoperative (Without Center Stop Lamp)
HD-50390-2-P	BCM OVERLAY	5.12 RUNNING LAMP DIAGNOSTICS, LP Lamp Inoperative (With Center Stop Lamp)
HD-50390-2-P	BCM OVERLAY	5.17 ALARM DIAGNOSTICS, DTC B2173
HD-50390-2-P	BCM OVERLAY	5.18 SECURITY ANTENNA DIAGNOSTICS, DTC B2176
HD-50390-2-P	BCM OVERLAY	5.18 SECURITY ANTENNA DIAGNOSTICS, DTC B2177
HD-50390-2-P	BCM OVERLAY	5.18 SECURITY ANTENNA DIAGNOSTICS, Fails to Disarm
HD-50390-2-P	BCM OVERLAY	5.19 NEUTRAL SWITCH DIAGNOSTICS, DTC B2218
HD-50390-2-P	BCM OVERLAY	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS, DTC B2103, B2104
HD-50390-2-P	BCM OVERLAY	6.5 FUEL PUMP DIAGNOSTICS, DTC B2116
HD-50390-2-P	BCM OVERLAY	6.13 PURGE SOLENOID DIAGNOSTICS, DTC P0444
HD-50390-2-P	BCM OVERLAY	6.37 ENGINE CRANKS, BUT WILL NOT START, Engine Cranks but Will Not Start
HD-50390-2-P	BCM OVERLAY	8.2 AUDIO VOLTAGE DIAGNOSTICS, DTC B1301
HD-50390-2-P	BCM OVERLAY	8.5 REAR AUDIO CONTROL DIAGNOSTICS, DTC B1307
HD-50390-2-P	BCM OVERLAY	8.5 REAR AUDIO CONTROL DIAGNOSTICS, DTC B1306
HD-50390-2-P	BCM OVERLAY	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1337
HD-50390-2-P	BCM OVERLAY	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1338
HD-50390-2-P	BCM OVERLAY	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1339
HD-50390-2-P	BCM OVERLAY	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1340
HD-50390-2-P	BCM OVERLAY	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1345
HD-50390-2-P	BCM OVERLAY	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1346
HD-50390-2-P	BCM OVERLAY	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1347
HD-50390-2-P	BCM OVERLAY	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1348
HD-50390-2-P	BCM OVERLAY	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1341
HD-50390-2-P	BCM OVERLAY	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1342
HD-50390-2-P	BCM OVERLAY	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1343
HD-50390-2-P	BCM OVERLAY	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1344

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-2-P	BCM OVERLAY	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1349
HD-50390-2-P	BCM OVERLAY	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1350
HD-50390-2-P	BCM OVERLAY	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1351
HD-50390-2-P	BCM OVERLAY	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1352
HD-50390-2-P	BCM OVERLAY	8.10 HEADSET DTCS, DTC B1358
HD-50390-2-P	BCM OVERLAY	8.10 HEADSET DTCS, DTC B1359
HD-50390-2-P	BCM OVERLAY	8.10 HEADSET DTCS, DTC B1360
HD-50390-2-P	BCM OVERLAY	8.10 HEADSET DTCS, DTC B1361
HD-50390-2-P	BCM OVERLAY	8.10 HEADSET DTCS, DTC B1362
HD-50390-2-P	BCM OVERLAY	8.10 HEADSET DTCS, DTC B1363
HD-50390-2-P	BCM OVERLAY	8.10 HEADSET DTCS, DTC B1364
HD-50390-2-P	BCM OVERLAY	8.10 HEADSET DTCS, DTC B1365
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Rear Audio Switch Malfunction
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Radio Inoperative
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Radio Turns On and Off
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, CB Transmitter Inoperative
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, CB Receiver Inoperative
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Left Front Fairing Speaker Inoperative With Amplifier 1
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 1
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 1
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 2
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 2

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Right Rear Speaker Pod Inoperative With Amplifier 2
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 2
HD-50390-2-P	BCM OVERLAY	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 2
HD-50390-4	ECM CABLE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-4	ECM CABLE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-4	ECM CABLE	1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test
HD-50390-4	ECM CABLE	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-4	ECM CABLE	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0100
HD-50390-4	ECM CABLE	3.2 STARTING SYSTEM, Starter Stalls or Spins Too Slowly
HD-50390-4	ECM CABLE	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P0562
HD-50390-4	ECM CABLE	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P1608
HD-50390-4	ECM CABLE	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS, DTC B2102
HD-50390-4	ECM CABLE	6.6 AAT SENSOR DIAGNOSTICS, DTC P0072
HD-50390-4	ECM CABLE	6.6 AAT SENSOR DIAGNOSTICS, DTC P0073
HD-50390-4	ECM CABLE	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0107
HD-50390-4	ECM CABLE	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0107
HD-50390-4	ECM CABLE	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0108
HD-50390-4	ECM CABLE	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0112
HD-50390-4	ECM CABLE	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0113
HD-50390-4	ECM CABLE	6.8 ET SENSOR DIAGNOSTICS, DTC P0117
HD-50390-4	ECM CABLE	6.8 ET SENSOR DIAGNOSTICS, DTC P0118
HD-50390-4	ECM CABLE	6.9 TCA DIAGNOSTICS, DTC P0120
HD-50390-4	ECM CABLE	6.9 TCA DIAGNOSTICS, DTC P0122
HD-50390-4	ECM CABLE	6.9 TCA DIAGNOSTICS, DTC P0123
HD-50390-4	ECM CABLE	6.9 TCA DIAGNOSTICS, DTC P0220
HD-50390-4	ECM CABLE	6.9 TCA DIAGNOSTICS, DTC P0222
HD-50390-4	ECM CABLE	6.9 TCA DIAGNOSTICS, DTC P0223
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0031
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0032
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0051
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0052
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0131
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0132
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0134

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0151
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0152
HD-50390-4	ECM CABLE	6.10 HO2S DIAGNOSTICS, DTC P0154
HD-50390-4	ECM CABLE	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0261
HD-50390-4	ECM CABLE	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0264
HD-50390-4	ECM CABLE	6.12 CKP SENSOR DIAGNOSTICS, DTC P0371, P0374
HD-50390-4	ECM CABLE	6.13 PURGE SOLENOID DIAGNOSTICS, DTC P0444
HD-50390-4	ECM CABLE	6.13 PURGE SOLENOID DIAGNOSTICS, DTC P0444
HD-50390-4	ECM CABLE	6.14 VSS DIAGNOSTICS, DTC P0502
HD-50390-4	ECM CABLE	6.14 VSS DIAGNOSTICS, DTC P0503
HD-50390-4	ECM CABLE	6.17 5V REFERENCE DIAGNOSTICS, DTC P0641
HD-50390-4	ECM CABLE	6.17 5V REFERENCE DIAGNOSTICS, DTC P0651
HD-50390-4	ECM CABLE	6.18 COOLING RELAY DIAGNOSTICS, DTC P0691
HD-50390-4	ECM CABLE	6.18 COOLING RELAY DIAGNOSTICS, DTC P0692
HD-50390-4	ECM CABLE	6.21 ECT SENSOR DIAGNOSTICS, DTC P2184
HD-50390-4	ECM CABLE	6.21 ECT SENSOR DIAGNOSTICS, DTC P2185
HD-50390-4	ECM CABLE	6.23 COMBUSTION EFFICIENCY DIAGNOSTICS, DTC P1353, P1356
HD-50390-4	ECM CABLE	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1475
HD-50390-4	ECM CABLE	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1477
HD-50390-4	ECM CABLE	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1478
HD-50390-4	ECM CABLE	6.25 JSS DIAGNOSTICS, DTC P1502
HD-50390-4	ECM CABLE	6.25 JSS DIAGNOSTICS, Side Stand Displayed on Speedometer
HD-50390-4	ECM CABLE	6.28 ACR DIAGNOSTICS, DTC P1655
HD-50390-4	ECM CABLE	6.29 COOLING FAN DIAGNOSTICS, DTC P1691
HD-50390-4	ECM CABLE	6.29 COOLING FAN DIAGNOSTICS, DTC P1692
HD-50390-4	ECM CABLE	6.29 COOLING FAN DIAGNOSTICS, DTC P1693
HD-50390-4	ECM CABLE	6.29 COOLING FAN DIAGNOSTICS, DTC P1694
HD-50390-4	ECM CABLE	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2100
HD-50390-4	ECM CABLE	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2101
HD-50390-4	ECM CABLE	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2103
HD-50390-4	ECM CABLE	6.33 TGS DIAGNOSTICS, DTC P2122
HD-50390-4	ECM CABLE	6.33 TGS DIAGNOSTICS, DTC P2123
HD-50390-4	ECM CABLE	6.33 TGS DIAGNOSTICS, DTC P2127
HD-50390-4	ECM CABLE	6.33 TGS DIAGNOSTICS, DTC P2128
HD-50390-4	ECM CABLE	6.34 CORRELATION ERROR DIAGNOSTICS, DTC P2135
HD-50390-4	ECM CABLE	6.34 CORRELATION ERROR DIAGNOSTICS, DTC P2138
HD-50390-4	ECM CABLE	6.36 IGN COIL DRIVER DIAGNOSTICS, DTC P2300
HD-50390-4	ECM CABLE	6.36 IGN COIL DRIVER DIAGNOSTICS, DTC P2303
HD-50390-4	ECM CABLE	6.39 STARTS, THEN STALLS, Starts, Then Stalls

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-4	ECM CABLE	6.40 MISFIRE AT IDLE OR UNDER LOAD, Misfire At Idle or Under Load
HD-50390-4-P	ECM OVERLAY	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-4-P	ECM OVERLAY	1.4 DIAGNOSTICS AND TROUBLESHOOTING, Wiggle Test
HD-50390-4-P	ECM OVERLAY	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-4-P	ECM OVERLAY	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0100
HD-50390-4-P	ECM OVERLAY	3.2 STARTING SYSTEM, Starter Stalls or Spins Too Slowly
HD-50390-4-P	ECM OVERLAY	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P0562
HD-50390-4-P	ECM OVERLAY	3.8 BATTERY AND SYSTEM VOLTAGE DIAGNOSTICS, DTC P1608
HD-50390-4-P	ECM OVERLAY	6.4 SYSTEM POWER CIRCUIT DIAGNOSTICS, DTC B2102
HD-50390-4-P	ECM OVERLAY	6.6 AAT SENSOR DIAGNOSTICS, DTC P0072
HD-50390-4-P	ECM OVERLAY	6.6 AAT SENSOR DIAGNOSTICS, DTC P0073
HD-50390-4-P	ECM OVERLAY	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0107
HD-50390-4-P	ECM OVERLAY	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0107
HD-50390-4-P	ECM OVERLAY	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0108
HD-50390-4-P	ECM OVERLAY	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0112
HD-50390-4-P	ECM OVERLAY	6.7 TMAP SENSOR DIAGNOSTICS, DTC P0113
HD-50390-4-P	ECM OVERLAY	6.8 ET SENSOR DIAGNOSTICS, DTC P0117
HD-50390-4-P	ECM OVERLAY	6.8 ET SENSOR DIAGNOSTICS, DTC P0118
HD-50390-4-P	ECM OVERLAY	6.9 TCA DIAGNOSTICS, DTC P0120
HD-50390-4-P	ECM OVERLAY	6.9 TCA DIAGNOSTICS, DTC P0122
HD-50390-4-P	ECM OVERLAY	6.9 TCA DIAGNOSTICS, DTC P0123
HD-50390-4-P	ECM OVERLAY	6.9 TCA DIAGNOSTICS, DTC P0220
HD-50390-4-P	ECM OVERLAY	6.9 TCA DIAGNOSTICS, DTC P0222
HD-50390-4-P	ECM OVERLAY	6.9 TCA DIAGNOSTICS, DTC P0223
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0031
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0032
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0051
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0052
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0131
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0132
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0134
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0151
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0152
HD-50390-4-P	ECM OVERLAY	6.10 HO2S DIAGNOSTICS, DTC P0154
HD-50390-4-P	ECM OVERLAY	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0261
HD-50390-4-P	ECM OVERLAY	6.11 FUEL INJECTOR DIAGNOSTICS, DTC P0264

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-4-P	ECM OVERLAY	6.12 CKP SENSOR DIAGNOSTICS, DTC P0371, P0374
HD-50390-4-P	ECM OVERLAY	6.13 PURGE SOLENOID DIAGNOSTICS, DTC P0444
HD-50390-4-P	ECM OVERLAY	6.14 VSS DIAGNOSTICS, DTC P0502
HD-50390-4-P	ECM OVERLAY	6.14 VSS DIAGNOSTICS, DTC P0503
HD-50390-4-P	ECM OVERLAY	6.17 5V REFERENCE DIAGNOSTICS, DTC P0641
HD-50390-4-P	ECM OVERLAY	6.17 5V REFERENCE DIAGNOSTICS, DTC P0651
HD-50390-4-P	ECM OVERLAY	6.18 COOLING RELAY DIAGNOSTICS, DTC P0691
HD-50390-4-P	ECM OVERLAY	6.18 COOLING RELAY DIAGNOSTICS, DTC P0692
HD-50390-4-P	ECM OVERLAY	6.21 ECT SENSOR DIAGNOSTICS, DTC P2184
HD-50390-4-P	ECM OVERLAY	6.21 ECT SENSOR DIAGNOSTICS, DTC P2185
HD-50390-4-P	ECM OVERLAY	6.23 COMBUSTION EFFICIENCY DIAGNOSTICS, DTC P1353, P1356
HD-50390-4-P	ECM OVERLAY	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1475
HD-50390-4-P	ECM OVERLAY	6.24 EXHAUST ACTUATOR DIAGNOSTICS, DTC P1478
HD-50390-4-P	ECM OVERLAY	6.25 JSS DIAGNOSTICS, DTC P1502
HD-50390-4-P	ECM OVERLAY	6.25 JSS DIAGNOSTICS, Side Stand Displayed on Speedometer
HD-50390-4-P	ECM OVERLAY	6.28 ACR DIAGNOSTICS, DTC P1655
HD-50390-4-P	ECM OVERLAY	6.29 COOLING FAN DIAGNOSTICS, DTC P1691
HD-50390-4-P	ECM OVERLAY	6.29 COOLING FAN DIAGNOSTICS, DTC P1691
HD-50390-4-P	ECM OVERLAY	6.29 COOLING FAN DIAGNOSTICS, DTC P1692
HD-50390-4-P	ECM OVERLAY	6.29 COOLING FAN DIAGNOSTICS, DTC P1693
HD-50390-4-P	ECM OVERLAY	6.29 COOLING FAN DIAGNOSTICS, DTC P1693
HD-50390-4-P	ECM OVERLAY	6.29 COOLING FAN DIAGNOSTICS, DTC P1694
HD-50390-4-P	ECM OVERLAY	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2100
HD-50390-4-P	ECM OVERLAY	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2101
HD-50390-4-P	ECM OVERLAY	6.30 ETC ACTUATOR DIAGNOSTICS, DTC P2103
HD-50390-4-P	ECM OVERLAY	6.33 TGS DIAGNOSTICS, DTC P2122
HD-50390-4-P	ECM OVERLAY	6.33 TGS DIAGNOSTICS, DTC P2123
HD-50390-4-P	ECM OVERLAY	6.33 TGS DIAGNOSTICS, DTC P2127
HD-50390-4-P	ECM OVERLAY	6.33 TGS DIAGNOSTICS, DTC P2128
HD-50390-4-P	ECM OVERLAY	6.34 CORRELATION ERROR DIAGNOSTICS, DTC P2135
HD-50390-4-P	ECM OVERLAY	6.34 CORRELATION ERROR DIAGNOSTICS, DTC P2138
HD-50390-4-P	ECM OVERLAY	6.36 IGN COIL DRIVER DIAGNOSTICS, DTC P2300
HD-50390-4-P	ECM OVERLAY	6.36 IGN COIL DRIVER DIAGNOSTICS, DTC P2303
HD-50390-4-P	ECM OVERLAY	6.39 STARTS, THEN STALLS, Starts, Then Stalls
HD-50390-4-P	ECM OVERLAY	6.40 MISFIRE AT IDLE OR UNDER LOAD, Misfire At Idle or Under Load
HD-50390-7	ABS CABLE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools
HD-50390-7	ABS CABLE	1.3 DIAGNOSTIC TOOLS, How To Use Diagnostic Tools

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50390-7	ABS CABLE	2.2 ODOMETER SELF-DIAGNOSTIC INOPERATIVE: DTC U0001, U0002, B2274, Odometer Self-Diagnostic Inoperative: DTC U0001, U0002, B2274
HD-50390-7	ABS CABLE	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, DTC U0121
HD-50390-7	ABS CABLE	3.7 ABS VOLTAGE DIAGNOSTICS, DTC C0562
HD-50390-7	ABS CABLE	7.2 INTERNAL FAULT DIAGNOSTICS, DTC C1014, C1040, C1055, C1061, C1062, C1065, C1066, C1071-C1078, C1081-C1089, C1195
HD-50390-7	ABS CABLE	7.3 WSS DIAGNOSTICS, DTC C1021, C1023, C1025, C1027, C1029
HD-50390-7	ABS CABLE	7.3 WSS DIAGNOSTICS, DTC C1032
HD-50390-7	ABS CABLE	7.3 WSS DIAGNOSTICS, DTC C1034
HD-50390-7	ABS CABLE	7.5 ABS INDICATOR ALWAYS ON, FLASHING OR INOPERATIVE, ABS Indicator Always On or Inoperative
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	2.3 NO VEHICLE POWER OR LOST COMMUNICATION DTCS, No Vehicle Power: DTC U0140
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	5.4 HORN DIAGNOSTICS, DTC B2127
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	5.9 STOP LAMP DIAGNOSTICS, Stop Lamp Always On, DTC B2223
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1340
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.6 FRONT SPEAKER DIAGNOSTICS, DTC B1348
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.7 REAR SPEAKER DIAGNOSTICS, DTC B1344
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.10 HEADSET DTCS, DTC B1358
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.10 HEADSET DTCS, DTC B1359
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.10 HEADSET DTCS, DTC B1362
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.10 HEADSET DTCS, DTC B1363
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Front Headset Malfunction
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Rear Headset Malfunction
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Left Front Fairing Speaker Inoperative With Amplifier 1
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 1
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Right Front Fairing Speaker Inoperative With Amplifier 1
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 1
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Left Rear Speaker Pod Inoperative With Amplifier 2
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Both Left Speakers Inoperative With Amplifier 2
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Left Speaker Inoperative With Amplifier 2

Tools Used in This Manual

PART NUMBER	TOOL NAME	NOTES
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Right Rear Speaker Pod Inoperative With Amplifier 2
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Both Right Speakers Inoperative With Amplifier 2
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	8.12 AUDIO SYSTEM SYMPTOMS, Saddlebag Right Speaker Inoperative With Amplifier 2
HD-50423	0.6 MM TERMINAL EXTRACTOR TOOL	A.18 MOLEX CMC SEALED CONNECTORS, Molex CMC Sealed Connectors
HD-50424	1.5 MM TERMINAL EXTRACTOR TOOL	5.8 HEADLAMP DIAGNOSTICS, DTC B2106, B2107
HD-50424	1.5 MM TERMINAL EXTRACTOR TOOL	5.8 HEADLAMP DIAGNOSTICS, DTC B2132
HD-50424	1.5 MM TERMINAL EXTRACTOR TOOL	5.8 HEADLAMP DIAGNOSTICS, DTC B2137
HD-50424	1.5 MM TERMINAL EXTRACTOR TOOL	A.18 MOLEX CMC SEALED CONNECTORS, Molex CMC Sealed Connectors
HD-96921-52D	OIL PRESSURE GAUGE SET	4.5 INDICATOR LAMPS, Oil Pressure Lamp Always On
TT600-3	SNAP-ON PICK	A.8 DELPHI 630 METRI-PACK UNSEALED CONNECTORS, Delphi 630 Metri-Pack Unsealed Connector Repair
YA840	SNAP-ON IN-LINE SPARK TESTER	6.40 MISFIRE AT IDLE OR UNDER LOAD, In-line Spark Tester

2015 Harley-Davidson Touring Models Electrical Diagnostic Manual

FASTENER	TORQUE VALUE	NOTES
No torque values were found in this manual.		

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