

CHECK ENGINE LAMP

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

NOTES

- See [Figure 2-2](#). “Key ON” means that the ignition key is turned to ON and the engine stop switch is set to RUN (although the engine is **not** running).
 - When the ignition switch is turned ON, the check engine lamp will illuminate for approximately four seconds and then turn off.
 - If the check engine lamp is not illuminated at Key ON. See [Section 2.2 INITIAL DIAGNOSTIC CHECK: SPEEDOMETER](#).
 - If the check engine lamp comes on late (after 20 seconds). See [Section 2.2 INITIAL DIAGNOSTIC CHECK: SPEEDOMETER](#).
 - If the check engine lamp fails to turn OFF after the initial four second period. See [Section 2.2 INITIAL DIAGNOSTIC CHECK: SPEEDOMETER](#).
1. See [Figure 2-3](#). After lamp turns off after being illuminated for the first four second period, one of three situations may occur.
 - a. The lamp remains off. This indicates there are no current fault conditions or stored DTC's currently detected by the ICM or ECM.
 - b. The lamp stays off for only four seconds and then comes back on for an eight second period. This indicates a DTC is stored, but no current DTC exists.
 - c. If the lamp remains on beyond the eight second period, then a current DTC exists.
 2. See [CODE TYPES](#) which follows for a complete description of DTC formats.

NOTES

Some DTC's 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, since the ECM/ICM will not know of its resolution until after the coil is exercised by vehicle start sequence. In this manner, there may sometimes be a false indication of a current DTC.

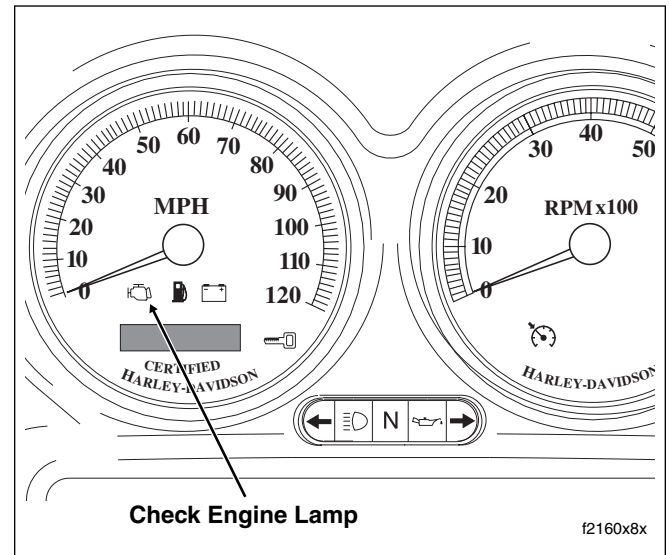


Figure 2-1. Speedometer

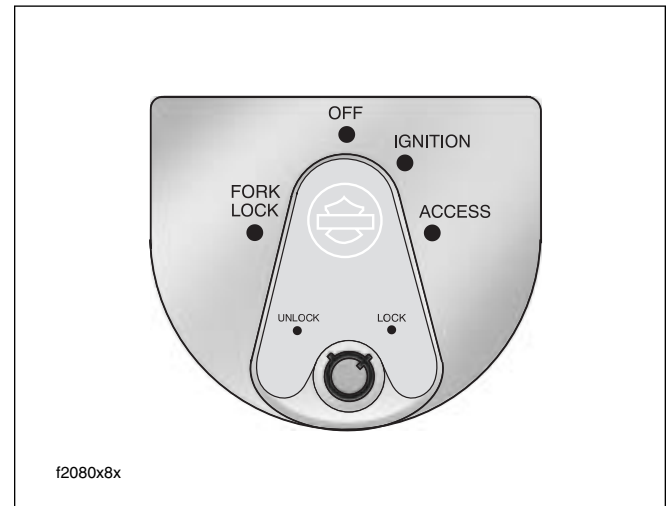


Figure 2-2. Ignition Switch (FLHX, FLHT/C/U, FLTR)

SECURITY LAMP

To diagnose TSM/TSSM system problems, start by observing the behavior of the security lamp.

NOTES

- To provide an indication of TSSM DTC's, the security lamp is enabled on TSSM models.
- See [Figure 2-2](#). "Key ON" means that the ignition key is turned to ON and the engine stop switch is set to RUN (although the engine is **not** running).
- When the ignition switch is turned ON, the check engine lamp will illuminate for approximately four seconds and then turn off.
- If the check engine lamp is not illuminated at Key ON, see [Section 2.2 INITIAL DIAGNOSTIC CHECK: SPEEDOMETER](#).
- If the check engine lamp comes on late (after 20 seconds), see [Section 2.2 INITIAL DIAGNOSTIC CHECK: SPEEDOMETER](#).

- If the check engine lamp fails to turn OFF after the initial four second period, see [Section 2.2 INITIAL DIAGNOSTIC CHECK: SPEEDOMETER](#).

1. See [Figure 2-3](#). After lamp turns off after being illuminated for the first four second period, one of three situations may occur.
 - a. The lamp remains off. This indicates there are no current fault conditions or stored DTC's currently detected by the ICM or ECM.
 - b. The lamp stays off for only four seconds and then comes back on for an eight second period. This indicates a DTC is stored, but no current DTC exists.
 - c. If the lamp remains on beyond the eight second period, then a current DTC exists.
2. See [CODE TYPES](#) which follows for a complete description of DTC formats.

NOTE

Some DTC's can only be fully diagnosed during actuation. For example, a problem with the turn signals will be considered a current fault even after the problem is corrected, since the TSM/TSSM will not know of its resolution until after the turn signals are activated. In this manner, there may sometimes be a false indication of a DTC.

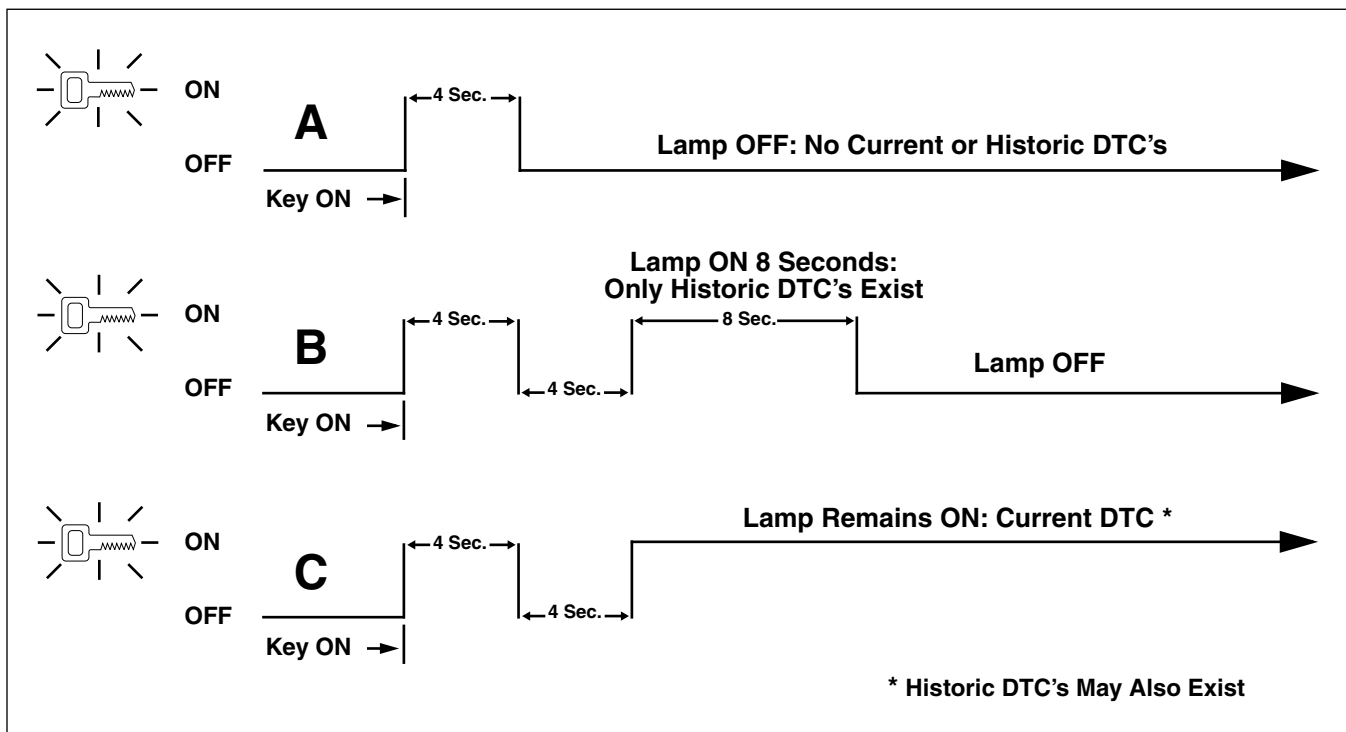


Figure 2-3. Check Engine and Security Lamp Operation

CODE TYPES

There are two types of DTC's: current and historic. If a DTC is stored, it can be read using speedometer self diagnostics. See Section [2.3 SPEEDOMETER SELF DIAGNOSTICS](#).

All DTC's reside in the memory of the ECM/ICM, TSM/TSSM, speedometer or tachometer until the code is cleared by use of the speedometer self diagnostics. See Section [2.3 SPEEDOMETER SELF DIAGNOSTICS](#).

A historic DTC is also cleared after a total of 50 trips has elapsed. A trip consists of a start and run cycle. After the 50 trip retention period, the DTC is automatically erased from memory providing that no subsequent faults of the same type are detected in that period.

Current

Current DTC's are those which presently disrupt motorcycle operation. See the appropriate flow charts for solutions.

Historic

If a particular problem happens to resolve itself, the active status is dropped and it becomes a historic fault rather than a current fault.

Historic trouble codes can only be retrieved using a computer based diagnostic package called DIGITAL TECHNICIAN (Part No. HD-44750).

Historic trouble codes are stored for a length of time to assist in the diagnosis of intermittent faults.

It is important to note that historic trouble codes may also be present whenever the system indicates the existence of a current fault. See [MULTIPLE DIAGNOSTIC TROUBLE CODES](#) if multiple DTC's are found.

Diagnostic charts are designed for use with current trouble codes and as a result they frequently suggest wire repair or part replacement.

RETRIEVING DIAGNOSTIC TROUBLE CODES

The engine management system provides two levels of diagnostics.

- The most sophisticated mode employs a computer based diagnostic package called DIGITAL TECHNICIAN (Part No. HD-44750).
- The second mode requires using the speedometer self diagnostics. Speedometer, tachometer (if equipped), TSM/TSSM and ECM/ICM DTC's can be accessed and cleared. See Section [2.3 SPEEDOMETER SELF DIAGNOSTICS](#).

MULTIPLE DIAGNOSTIC TROUBLE CODES

While it is possible for more than one fault to occur and set more than one DTC, there are several conditions which may result in **one** fault setting **multiple** DTC's:

Serial data DTC's (DTC U1016, U1064, U1097, U1255, U1300 and U1301) may be accompanied by other codes. **Always** correct the serial data DTC's before resolving the other codes.

For proper resolution of multiple DTC's refer to DTC priority chart [page 2-6, Table 2-2](#).

GENERAL

- Constant power is supplied to the speedometer through terminal 5 of connector [39]. The speedometer turns on when power is applied to terminal 1 of connector [39]. The speedometer goes through an initialization sequence every time power is removed and re-applied to terminal 6. The visible part of this sequence is the check engine lamp (in "run" mode), security lamp (models with security only), backlighting, odometer and fuel level (EFI only). Upon key ON, the check engine lamp and security lamp will illuminate for 4 seconds and then (if parameters are normal) go out.
- To locate faulty circuits or other system problems, follow the diagnostic flow charts and tests in this section. For a systematic approach, always begin with [INITIAL DIAGNOSTICS](#) which follows. Read the general information and then work your way through the flow chart box by box.
- Loss of power on any of the four power inputs will change speedometer behavior. Refer to [Table 2-1. Speedometer Function Chart-Loss Of Input.](#)

Diagnostic Notes

If a numbered circle appears adjacent to a flow chart box, then more information is offered in the diagnostic notes. Many diagnostic notes contain supplemental information, descriptions of various diagnostic tools or references to other parts of the manual where information on the location and removal of components may be obtained.

Circuit Diagram/Wire Harness Connector Table

When working through a flow chart, refer to the illustrations, the associated circuit diagram and the wire harness connector table as necessary. The wire harness connector table for each circuit diagram identifies the connector number, description, type and general location.

In order to perform most diagnostic routines, a Breakout Box and a digital volt/ohm meter (DVOM) are required. See [Section 2.5 BREAKOUT BOX: SPEEDOMETER.](#)

To perform the circuit checks with any degree of efficiency, a familiarity with the various wire connectors is also necessary.

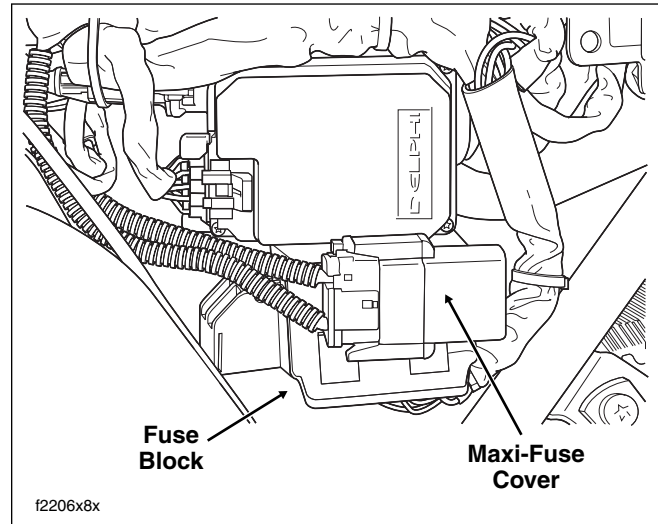


Figure 2-4. Remove Left Side Cover

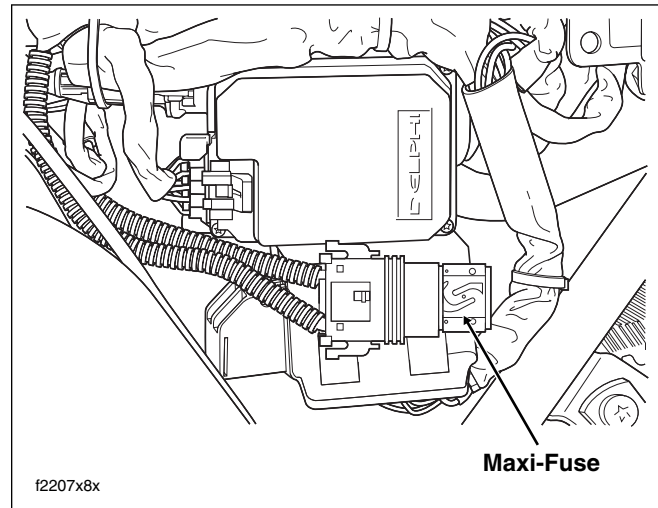


Figure 2-5. Remove Maxi-Fuse Cover

INITIAL DIAGNOSTICS

Diagnostic Tips

- If Speedometer reads “BUS Er” with the ignition key turned ON (engine stop switch at RUN with the engine off), check data link bus for an open or short to ground. between data link connector [91A] terminal 3 and ICM connector [10B] terminal 12 (carbureted models), ECM connector [78B] terminal 5 (EFI models), TSSM connector [30B] terminal 3, Speedometer connector [39B] terminal 2 or tachometer (if equipped) connector [108B] terminal 2.
- Check for an open data test terminal between data link connector [91A] terminal 3 and TSM/TSSM connector [30B] terminal 3. With ignition key turned ON, serial data bus voltage should be typically 0.6-0.8 volts. The range of acceptable voltage is greater than 0 and less than 7.0 volts.
- To identify intermittents, wiggle instrument and/or vehicle harness while performing steps in the Diagnostic Check charts.

Diagnostic Notes

The reference numbers below correlate with the circled numbers on the diagnostic check flow charts. See [page 2-11](#).

1. Connect BREAKOUT BOX (Part No. HD-42682) and INSTRUMENT HARNESS ADAPTERS (Part No. HD-46601) between wire harness and speedometer.

All Speedometer DTC's are listed on [page 2-6](#) in [Table 2-2](#).

Other Codes

See Section [3.9 INITIAL DIAGNOSTIC CHECK: TSM/TSSM](#) for any DTC's related to the turn signal module (TSM) or turn signal security module (TSSM).

See Section [4.4 INITIAL DIAGNOSTIC CHECK: ICM](#) for any DTC's related to the ICM.

See Section [5.5 INITIAL DIAGNOSTIC CHECK: EFI](#) for any DTC's related to the ECM.

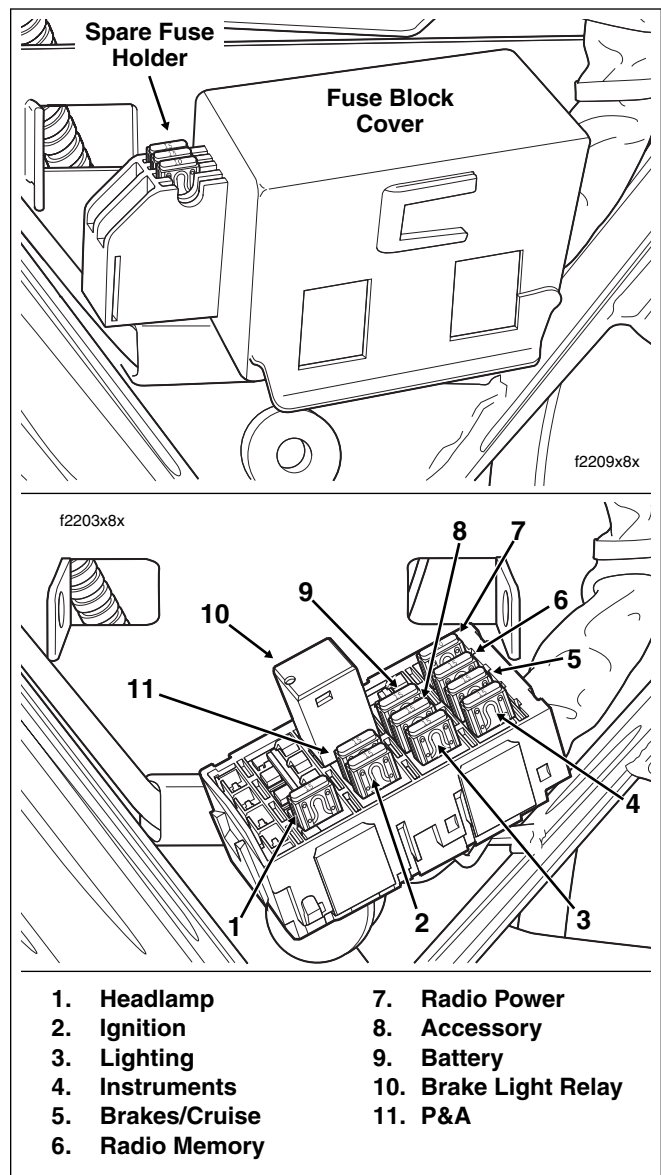


Figure 2-6. Fuse Block (FLHX, FLHTC/U, FLTR)

Table 2-1. Speedometer Function Chart-Loss Of Input

Terminal 5 (Constant)	Terminal 1 (IGN)	Terminal 6 (ACC)	Terminal 7 (GRD)	Terminal 8 and 11 (Reset Switch)
<ul style="list-style-type: none"> ● Security lamp glows dimly during 4-second bulb check 	<ul style="list-style-type: none"> ● Will not “wow” ● Turn signals still functional ● Speedometer will indicate vehicle speed (zero) ● Tachometer unaffected ● Security lamp still functional ● Check engine lamp and battery lamp non-functional ● Diagnostics absent 	<ul style="list-style-type: none"> ● Speedometer will be non-functional in accessory and ignition modes ● Security lamp still performs 4-second bulb check in ignition mode 	<ul style="list-style-type: none"> ● Speedometer completely non-functional ● Diagnostics absent 	<ul style="list-style-type: none"> ● No reset switch function ● Will not “wow”

Table 2-2. Speedometer/Tachometer Diagnostic Trouble Codes (DTC) Priority Chart

DTC	PRIORITY	FAULT CONDITION	SOLUTION	MODULE
“BUS Er”	1	Serial data bus shorted low/open/high	2.15 DTC U1300, U1301 or “BUS ER”	Speedometer/tachometer
U1300	2	Serial data bus shorted low	2.15 DTC U1300, U1301 or “BUS ER”	Speedometer/tachometer
U1301	3	Serial data bus shorted open/high	2.15 DTC U1300, U1301 or “BUS ER”	Speedometer/tachometer
U1016	4	Loss of ECM serial data	2.13 DTC U1016	Speedometer/tachometer
U1064	5	Loss of TSM/TSSM serial data	2.14 DTC U1064, U1255	Speedometer/tachometer
U1255	6	Missing response from other module (TSM/TSSM and/or ICM/ECM) at startup	2.14 DTC U1064, U1255	Speedometer/tachometer
B1007	7	Ignition line overvoltage	2.11 DTC B1006, B1007	Speedometer/tachometer
B1006	8	Accessory line overvoltage	2.11 DTC B1006, B1007	Speedometer/tachometer
B1008	9	Reset switch closed	2.12 DTC B1008	Speedometer
B1004	10	Fuel level sending unit low	2.10 DTC B1004, B1005	Speedometer
B1005	11	Fuel level sending unit high/open	2.10 DTC B1004, B1005	Speedometer

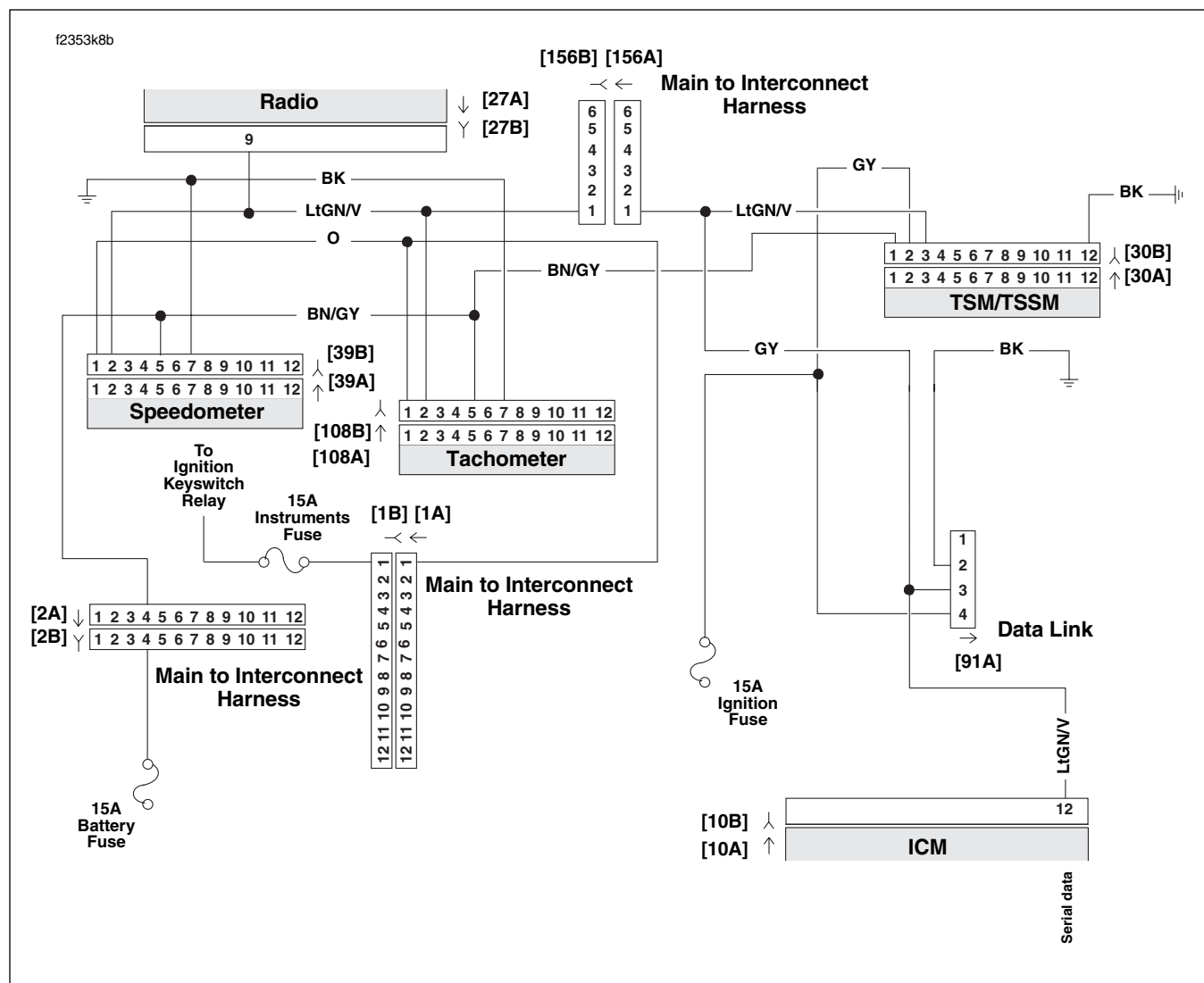


Figure 2-7. Diagnostic Check: FLHX, FLHT/C (Carbureted)

Table 2-3. Wire Harness Connectors in Figure 2-7.

NO.	DESCRIPTION	TYPE	LOCATION
[1]	Main to Interconnect Harness	12-Place Deutsch (Black)	Inner Fairing - Right Radio Support Bracket
[2]	Main to Interconnect Harness	12-Place Deutsch (Gray)	Inner Fairing - Right Fairing Support Brace
[10]	ICM	12-Place Deutsch	Under Right Side Cover
[27]	Radio	23-Place Amp	Inner Fairing - Back of Radio (Right Side)
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Packard	Inner Fairing (Back of Speedometer)
[91]	Data Link	4-Place Deutsch	Under Right Side Cover
[108]	Tachometer	12-Place Packard	Inner Fairing (Back of Tachometer)
[156]	Main to Interconnect Harness	6-Place Deutsch	Inner Fairing - Right Fairing Support Brace

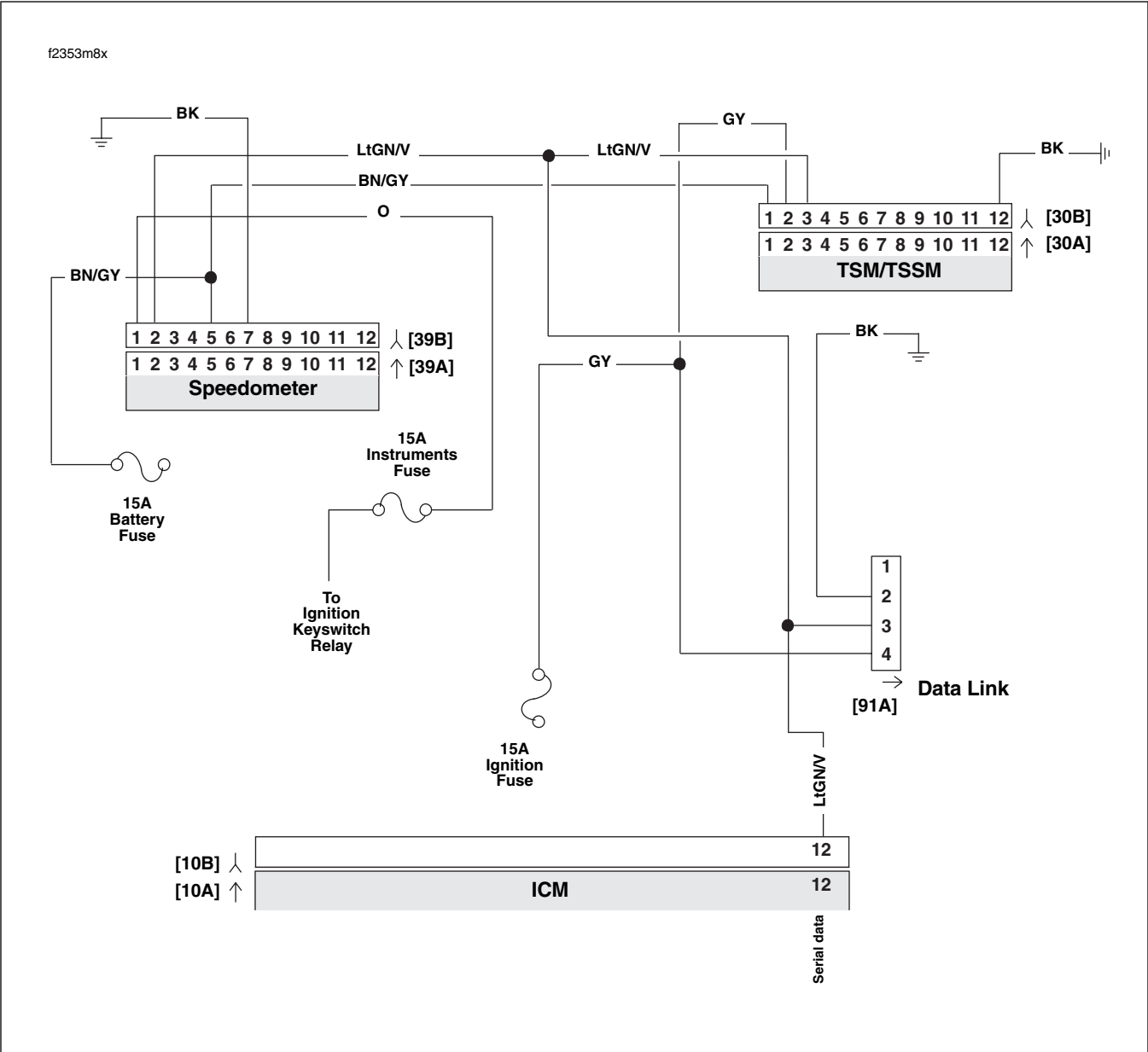


Figure 2-8. Diagnostic Check: FLHR/S (Carbureted)

Table 2-4. Wire Harness Connectors in [Figure 2-8](#).

NO.	DESCRIPTION	TYPE	LOCATION
[10]	ICM	12-Place Deutsch	Under Right Side Cover
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Packard	Under Console (Back of Speedometer)
[91]	Data Link	4-Place Deutsch	Under Right Side Cover

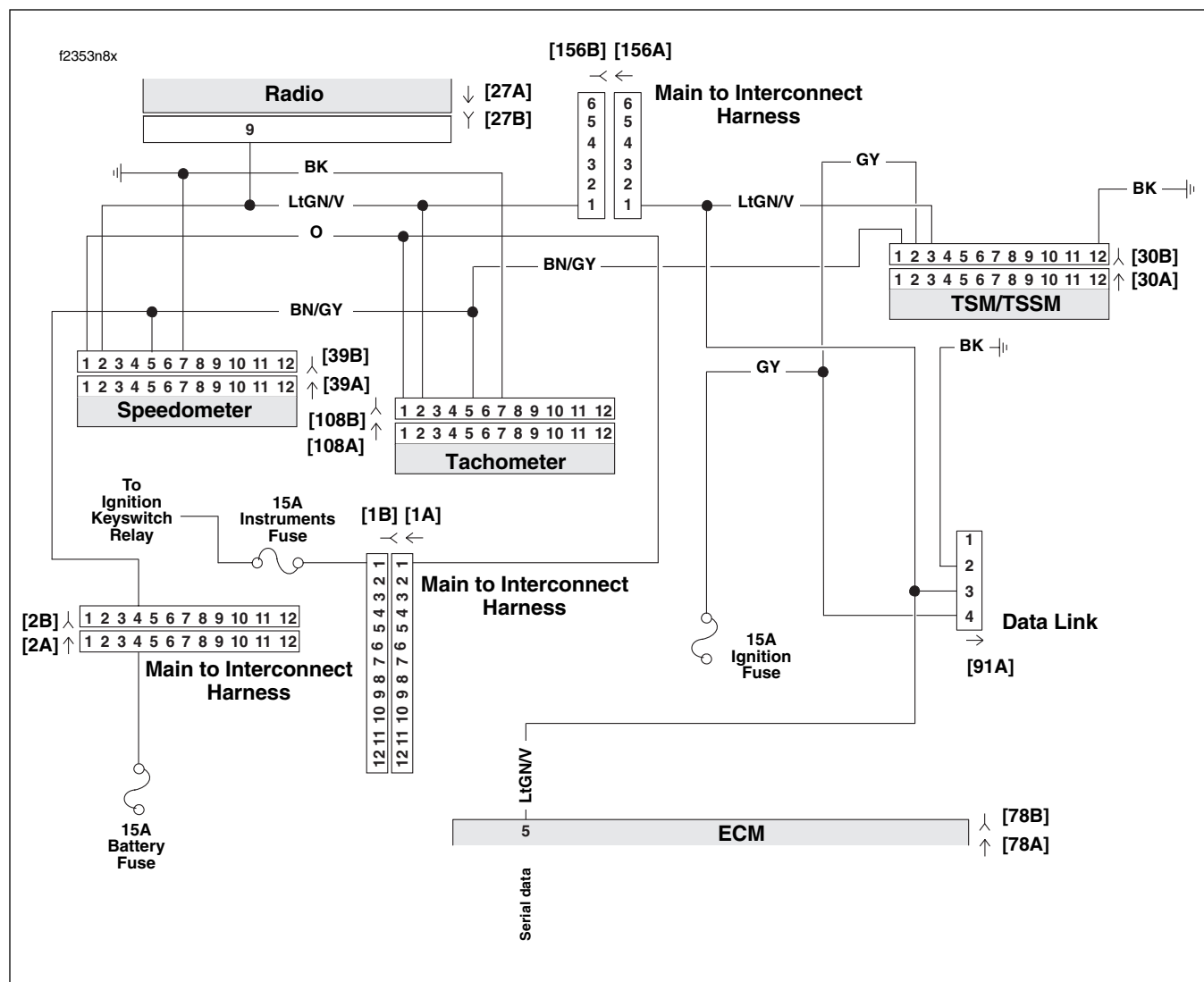


Figure 2-9. Diagnostic Check: FLHX, FLHT/C/U, FLTR (Fuel Injected)

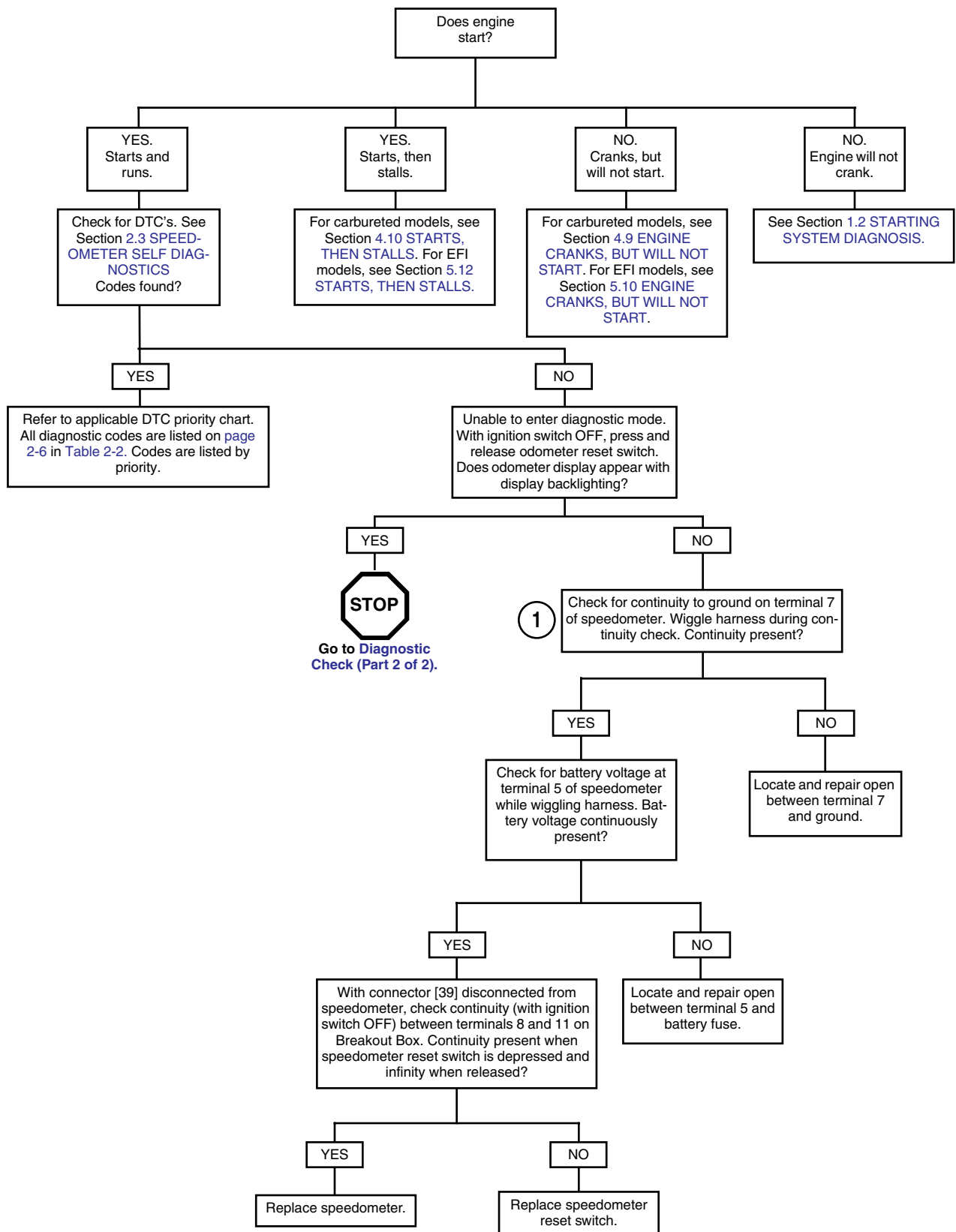
Table 2-5. Wire Harness Connectors in Figure 2-9.

NO.	DESCRIPTION	MODEL	TYPE	LOCATION
[1]	Main to Interconnect Harness	FLHT/C	12-Place Deutsch (Black)	Inner Fairing - Right Radio Support Bracket
		FLTR	12-Place Deutsch (Black)	Inner Fairing - Below Radio (Right Side)
[2]	Main to Interconnect Harness	FLHT/C	12-Place Deutsch (Gray)	Inner Fairing - Right Fairing Support Brace
		FLTR	12-Place Deutsch (Gray)	Inner Fairing - Below Radio (Right Side)
[27]	Radio	All	23-Place Amp	Inner Fairing - Back of Radio (Right Side)
[30]	TSM/TSSM	All	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	FLHT/C	12-Place Packard	Inner Fairing (Back of Speedometer)
		FLTR	12-Place Packard	Under Bezel (Back of Speedometer)
[78]	ECM	All	36-Place Packard	Under Right Side Cover
[91]	Data Link	All	4-Place Deutsch	Under Right Side Cover
[108]	Tachometer	FLHT/C	12-Place Packard	Inner Fairing (Back of Tachometer)
		FLTR	12-Place Packard	Under Bezel (Back of Tachometer)
[156]	Main to Interconnect Harness	FLHT/C	6-Place Deutsch	Inner Fairing - Right Fairing Support Brace
		FLTR	6-Place Deutsch	Inner Fairing - Below Radio (Right Side)

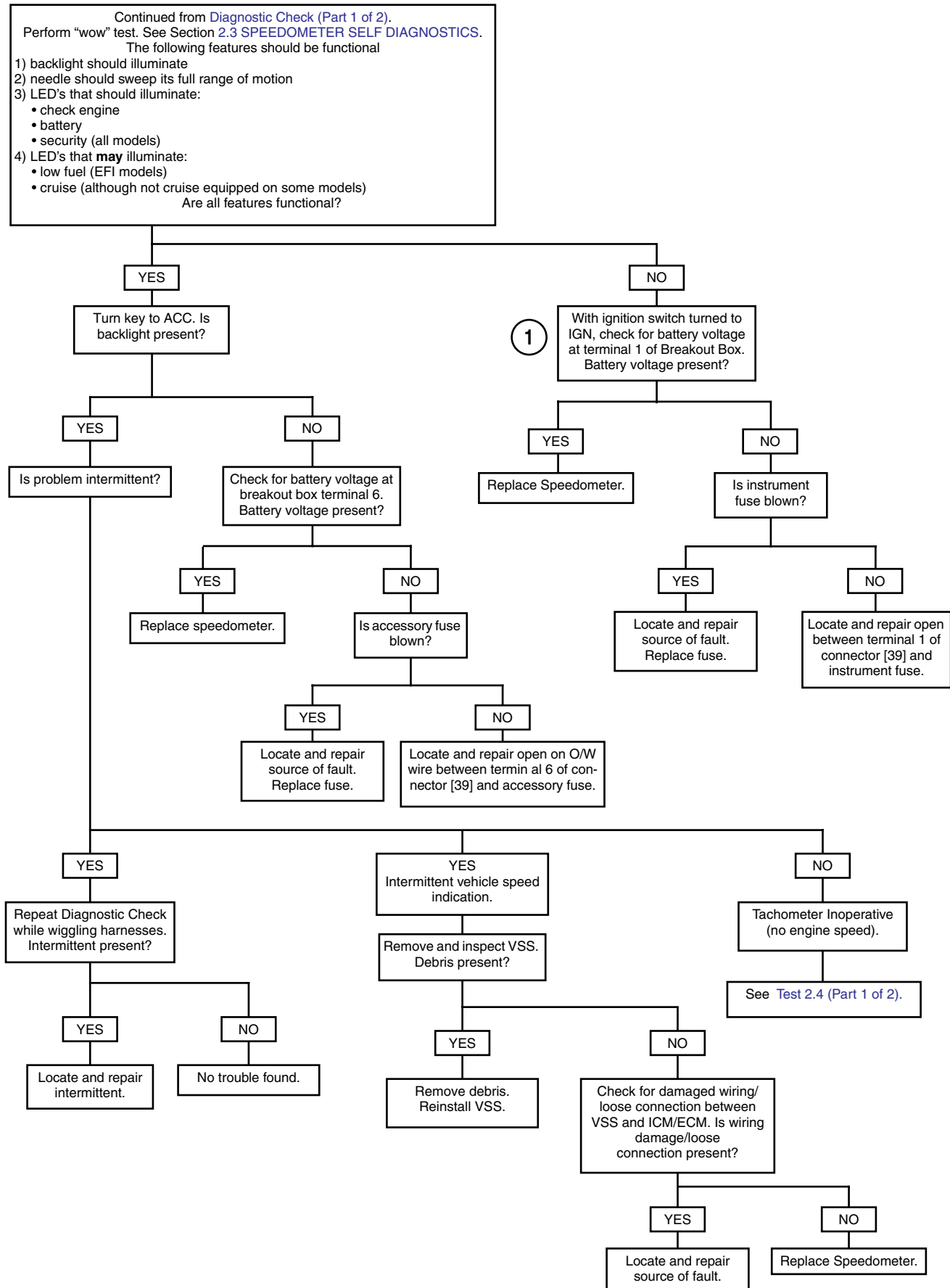
Table 2-6. Wire Harness Connectors in Figure 2-10.

NO.	DESCRIPTION	TYPE	LOCATION
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Mini-Deutsch	Under Console (Back of Speedometer)
[78]	ECM	36-Place Packard	Under Right Side Cover
[91]	Data Link	4-Place Deutsch	Under Right Side Cover

Diagnostic Check (Part 1 of 2)



Diagnostic Check (Part 2 of 2)



GENERAL

The speedometer is capable of displaying and clearing speedometer, tachometer, TSM/TSSM, and ICM/ECM DTC's.

DIAGNOSTICS

Diagnostic Tips

- For a quick check of speedometer function, a “wow” test can be performed. Press and hold odometer reset switch then turn ignition switch ON. Release reset switch. Background lighting should illuminate, speedometer needle should sweep its full range of motion, and indicator lamps [battery, security, low fuel (EFI models) check engine and cruise should illuminate. Some lamps may illuminate even though they do not apply to the vehicle. For example, the cruise lamp may illuminate although this feature does not apply to some models.
- If instrument module fails “wow” test, check for battery, ground, ignition, speedometer reset switch and accessory to speedometer. If any feature in the speedometer is non-functional, see Section [2.2 INITIAL DIAGNOSTIC CHECK: SPEEDOMETER](#).

Diagnostic Notes

Use of speedometer self diagnostics assumes that DIGITAL TECHNICIAN (Part No. HD-44750) is not available.

The reference numbers below correlate with the circled numbers in the [Speedometer Self Diagnostics \(chart\)](#)

1. To exit diagnostic mode, turn ignition switch OFF.
2. To clear DTC's for selected module, press speedometer reset switch for more than 5 seconds when code is displayed.

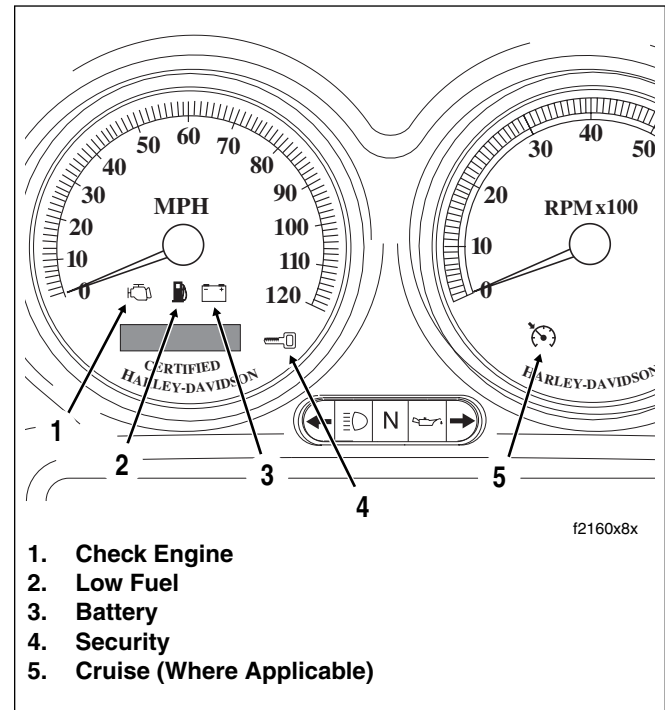


Figure 2-11. Icons

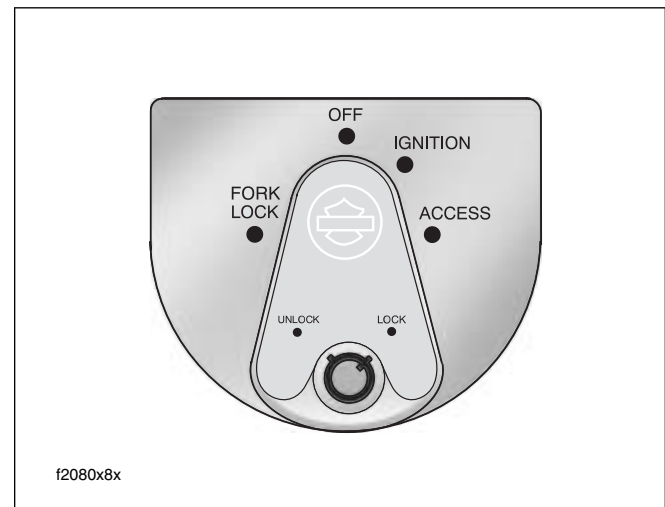


Figure 2-12. Ignition Switch (FLHX, FLHT/C/U, FLTR)

Speedometer Self Diagnostics (chart)

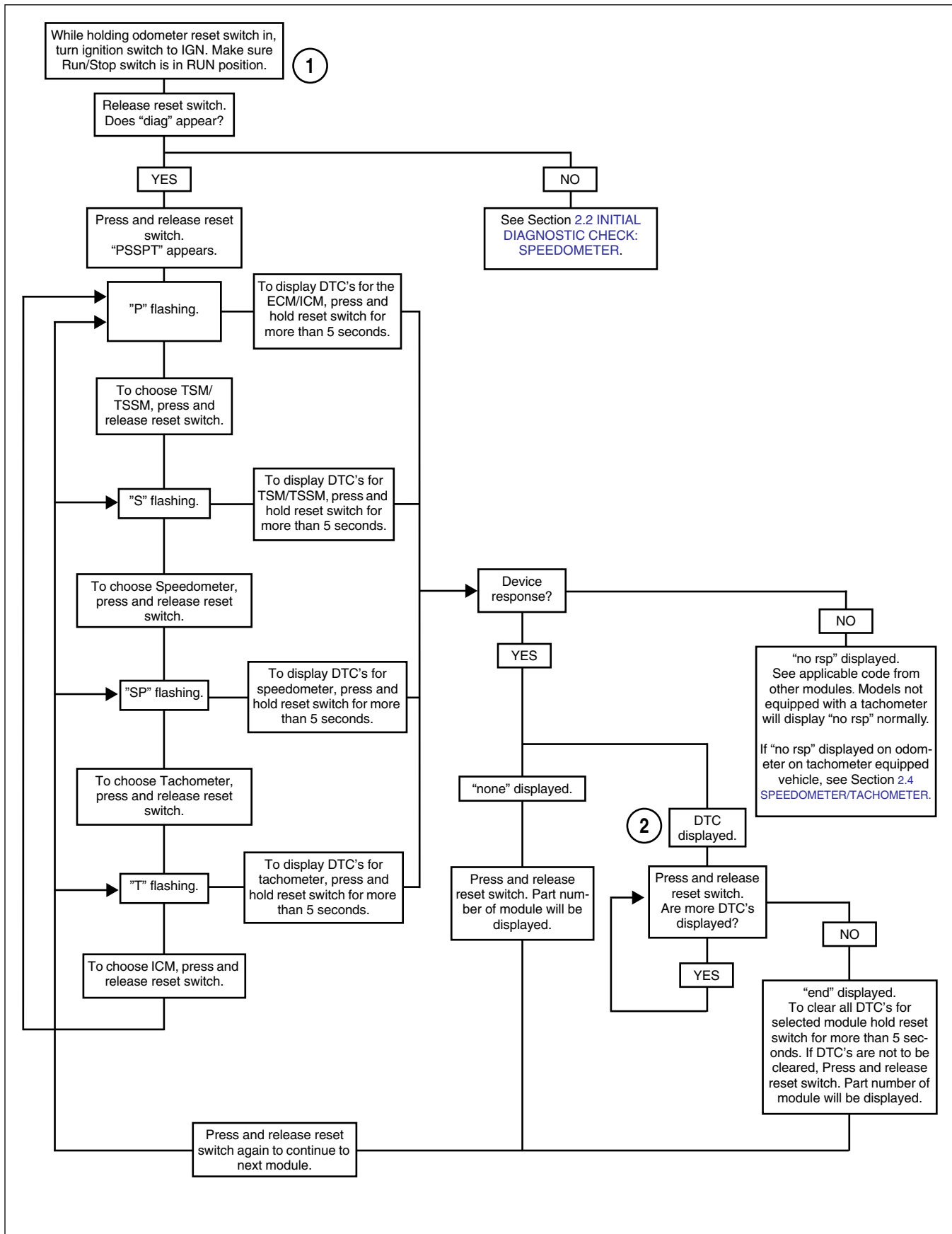


Figure 2-13. Speedometer Self Diagnostics

GENERAL

NOTE

Some icons may illuminate during “wow” test though the icon has no functionality on that vehicle.

The speedometer consists of a speedometer display and several icons. The icons include: check engine, security, battery, and low fuel (EFI only).

Reset Switch

See [Figure 2-14](#). Pressing the odometer reset switch provides the following capabilities:

- Change the odometer display between mileage, trip A and trip B values (press and immediately release).
- Reset an individual trip odometer (press and hold 2-3 seconds).
- Gain access to the diagnostic mode, clear DTC's and exit diagnostic mode. See [Section 2.3 SPEEDOMETER SELF DIAGNOSTICS](#).
- Display odometer while key is OFF. Press and hold reset switch while key is OFF and odometer mileage will be displayed.
- On models with dual scale speedometers, toggle between miles/kilometers on odometer and trip odometer display. To toggle display, turn key ON. Press and hold reset switch while odometer is displayed. Release switch when change is noted. (If reset switch is held while trip odometer is displayed, trip odometer will reset.)

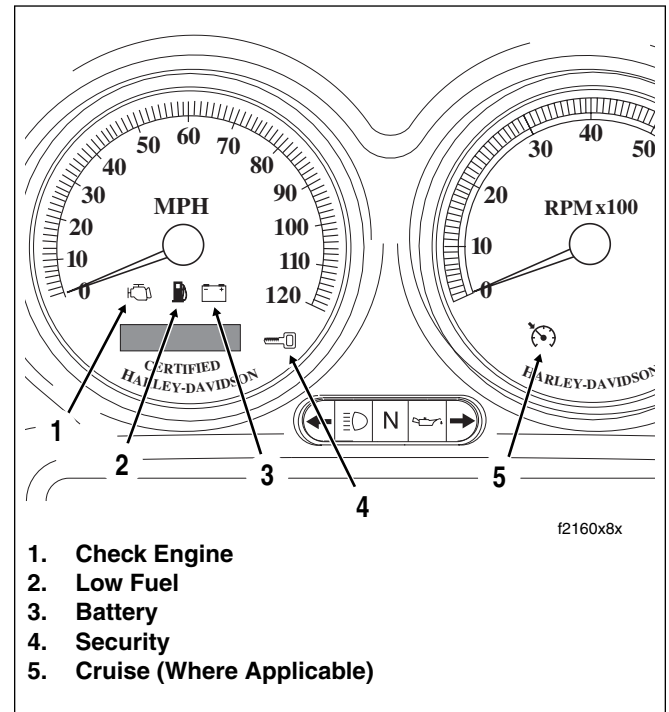


Figure 2-14. Icons (FLHX, FLHT/C/U)

SPEEDOMETER THEORY OF OPERATION

The speedometer consists of a VSS, ICM/ECM, odometer reset switch and the speedometer. The VSS is mounted on the right side of transmission case below the starter. The sensor circuitry is that of a Hall-Effect sensor that is triggered by the gear teeth of 4th gear on the transmission mainshaft.

The output from the sensor is a series of pulses that are interpreted by ICM/ECM circuitry, converted into serial data inside the ICM/ECM then sent to the speedometer to control the position of the speedometer needle and the liquid crystal (LCD) odometer display. The vehicle speed serial data is also transmitted to the TSM/TSSM for turn signal cancellation, sound system for automatic volume control (AVC), and cruise control (for vehicle speed control).

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

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

The odometer can display six numbers to indicate a maximum of 999999 miles/kilometers. The trip odometers can display six numbers with a tenth of a mile accuracy for a maximum of 99999.9 miles/kilometers.

Job/Time Code Values

Dealership technicians filing warranty claims should use the job/time code values in Digital Technician.

TACHOMETER THEORY OF OPERATION

The tachometer receives serial data from the ICM/ECM. The tachometer interprets the serial data and converts it into tachometer needle movement.

DIAGNOSTICS

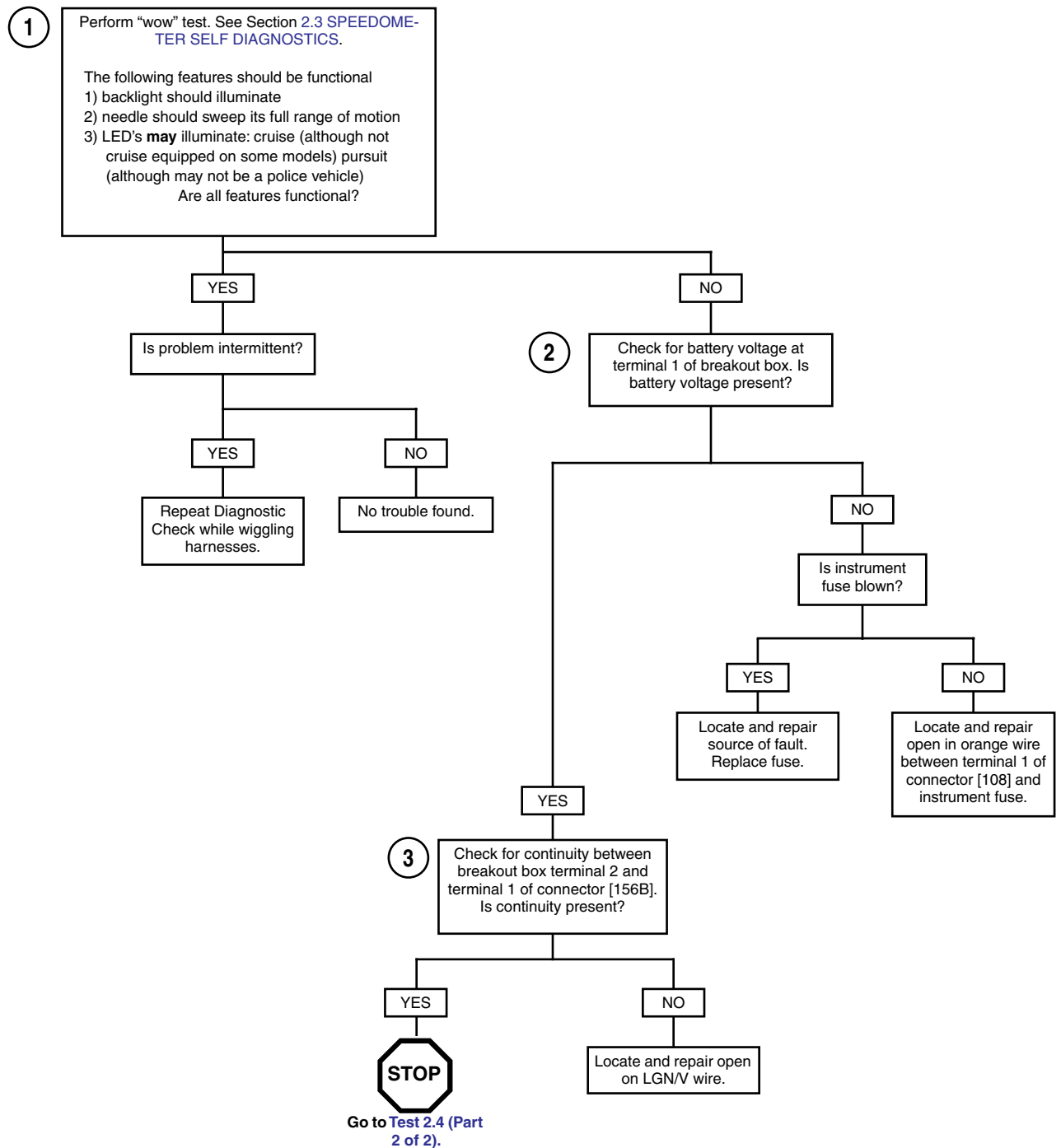
Diagnostic Notes

The reference numbers below correlate with circled numbers on the tachometer diagnostic flow chart.

1. If problems are intermittent, wiggle harness while performing tests.
2. Connect BREAKOUT BOX (Part No. HD-42682) and INSTRUMENT HARNESS ADAPTERS (Part No. HD-46601) between wire harness and tachometer.
3. Use HARNESS CONNECTOR TEST KIT (Part No. HD-41404A), black pin probe and patch cord.

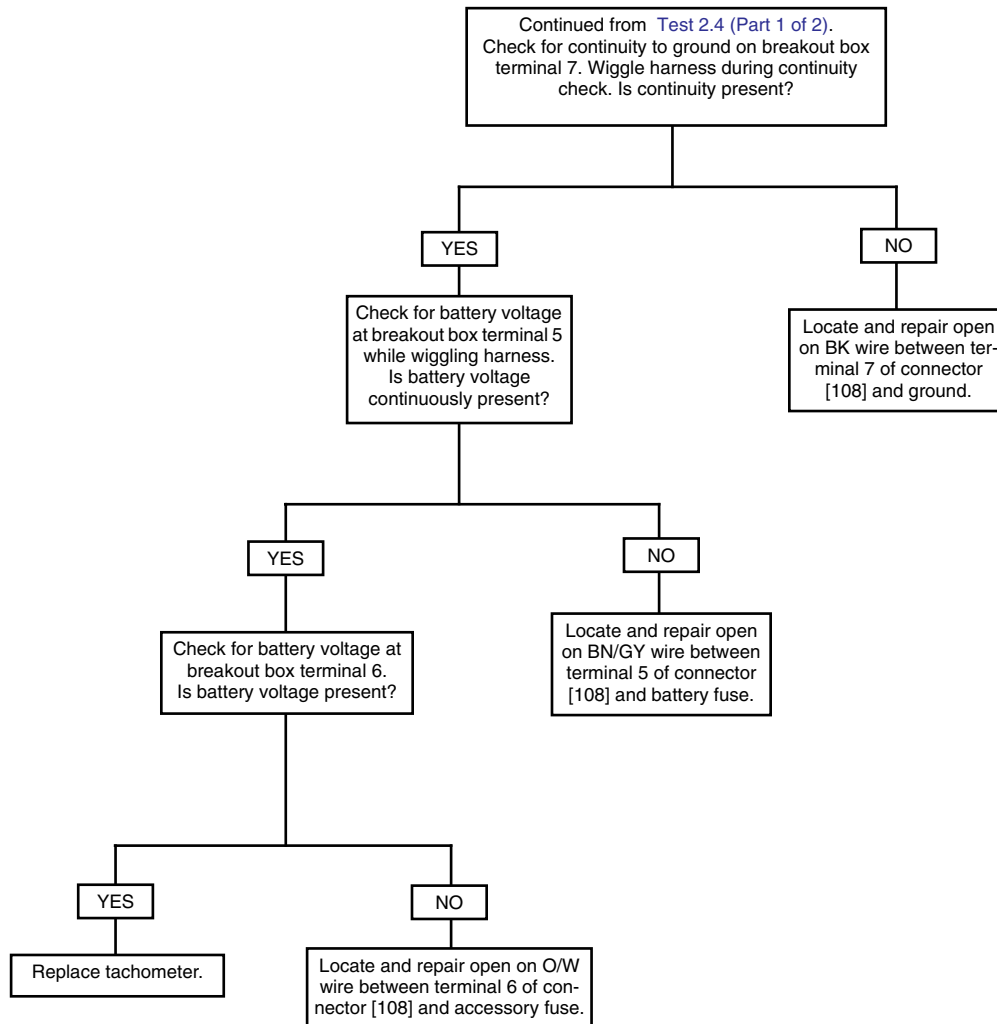
Test 2.4 (Part 1 of 2)

TACHOMETER INOPERATIVE



Test 2.4 (Part 2 of 2)

TACHOMETER INOPERATIVE



GENERAL

The BREAKOUT BOX (Part No. HD-42682) and INSTRUMENT HARNESS ADAPTERS (Part No. HD-46601) connect to speedometer connector [39]. Used in conjunction with a DVOM, it allows circuit diagnosis of wiring harness and connections without having to probe with sharp objects

NOTE

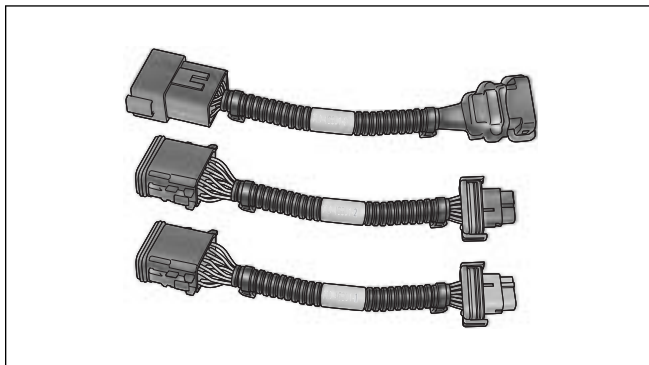
See wiring diagrams for speedometer terminal functions.

INSTALLATION

1. See [Figure 2-16](#). Bend back the external latches slightly and remove connector [39].
2. Connect Instrument Harness Adapters to connectors [39A] and [39B].
3. Attach connectors from Breakout Box to Instrument Harness Adapters.

REMOVAL

1. Detach connectors from Breakout Box to Instrument Harness Adapters.
2. See [Figure 2-15](#). Detach Instrument Harness Adapters from connectors [39A] and [39B].
3. Install connector [39B] to speedometer.



**Figure 2-15. Instrument Harness Adapters
(Part No. HD-46601)**

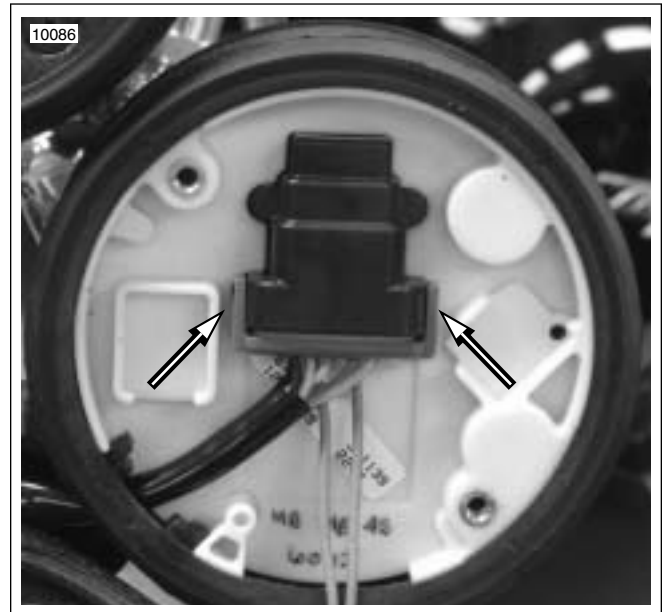


Figure 2-16. Speedometer Connector [39]

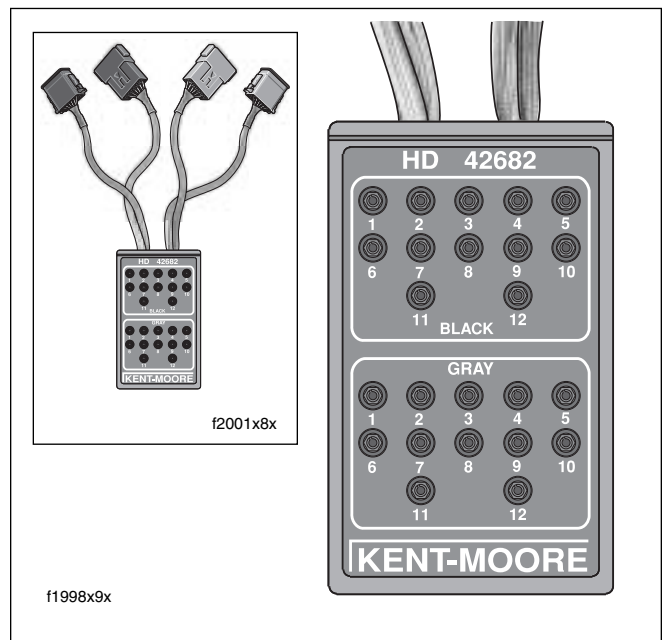


Figure 2-17. Breakout Box (Part No. HD-42682)

THEORY OF OPERATION

With ignition switch ON, the fuel gauge is connected to +12 volts. 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 may be caused by three circumstances.

- Sender or fuel gauge not grounded.
- Malfunction in sender or fuel gauge.
- Broken or disconnected wire from ignition switch to fuel gauge.

Use the [FUEL GAUGE AND SENDER TEST](#) to test suspect components.

FUEL GAUGE AND SENDER TEST

NOTE

Always refer to the applicable wiring diagram (at the rear of this manual) when troubleshooting instruments or gauges.

1. Remove gauge. Ground Y/W wire of fuel gauge sender located at bottom of gauge. Turn ignition switch ON.
 - a. Fuel gauge must indicate FULL. If gauge indicated FULL, gauge is functioning correctly. Proceed to step 2.
 - b. If gauge did not indicate FULL, proceed to step 3.
3. Check voltage to O/W (+) and BK (-) wire of fuel gauge connector [117] if gauge did not indicate FULL.
 - a. Correct reading is equivalent to battery voltage.
 - b. If battery voltage is not present check for broken or disconnected wire. Replace gauge if wiring problem is not found.

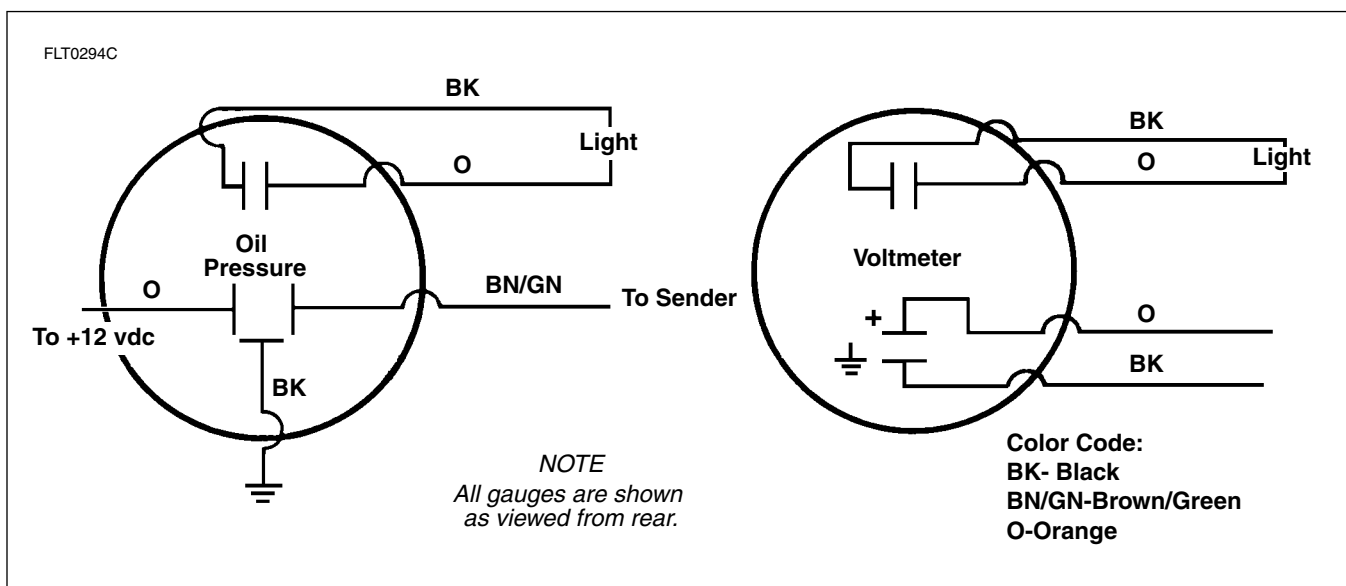


Figure 2-18. Connections for Gauges

OIL PRESSURE GAUGE AND INDICATOR LIGHT

Problem

Low oil pressure light remains on with engine running above idle and/or oil pressure gauge does not work.

Cause	Solution
No oil pressure due to lack of oil or faulty oil pump.	<div style="background-color: black; color: white; text-align: center; padding: 5px;">CAUTION</div> <p>Running engine when OIL pressure light remains on and gauge indicates low pressure will result in engine damage.</p> <ol style="list-style-type: none"> 1. Check oil level. Add oil if low. 2. Restart engine and verify that oil pressure light goes off and gauge indicates pressure. If problem still exists, refer to OIL PUMP in the Touring Service Manual.
Contacts in pressure sending unit not opening to shut off light. Variable resistor in sender is shorted to ground.	<ol style="list-style-type: none"> 1. Locate the oil pressure sending unit on the front right side of the crankcase. 2. Verify that the electrical connector is properly connected to the sending unit. 3. If the oil pressure gauge indicates pressure but the low oil pressure light remains on, proceed as follows: <ol style="list-style-type: none"> a. Remove electrical connector from oil pressure sending unit. Using ohmmeter and Harness Connector Test Kit (HD-41404A), gray socket probe and patch cord, place one probe on indicator lamp terminal (closest to latch on sending unit), place the other probe on the crankcase. Ohmmeter must read less than one ohm. b. Start the engine and run at a fast idle. The ohmmeter must read infinity. c. Replace the sending unit if the above meter readings are not obtained. 4. If the low oil pressure light functions correctly, but the pressure gauge does not, then proceed as follows: <ol style="list-style-type: none"> a. Remove electrical connector from oil pressure sending unit. Turn the Ignition/Light Key Switch to IGNITION. The gauge must read zero. b. Ground BN/GN wire terminal to crankcase. The gauge must read full scale 60 PSI. c. Replace the sending unit if the above gauge readings are obtained. If the gauge readings are not obtained, then replace the pressure gauge.
No power to gauge.	See Voltmeter.

AMBIENT AIR TEMPERATURE GAUGE

Problem

Gauge inoperative.

Cause	Solution
Sensor not grounded or open between sensor and gauge.	Test for continuity between pin 1 and ground and pin 3 and gauge. Repair if open.
Broken or disconnected power or ground wire to gauge.	Check for 12 vdc between pins 1 and 3 at connector [115A]. Replace gauge if voltage is present. Use voltage drop tests and continuity checks to isolate if voltage is not present.
Malfunction in gauge or sensor.	Measure resistance between pins 1 and 3 at 65° to 85° F. Resistance should be 43-31 ohms. Replace sensor if out of range, replace gauge if within range.

VOLTMETER GAUGE

Problem

Meter inoperative.

Cause	Solution
Broken or disconnected leads to meter or open meter winding.	<ol style="list-style-type: none">1. With Ignition/Light Key Switch turned to IGNITION, verify that 12 vdc is present at “±” terminal on voltmeter. With switch turned to OFF, check ground terminal for continuity to ground.2. Replace the voltmeter if 12 vdc is present and ground terminal is grounded.3. If 12 vdc is not present, trace wiring until disconnected or broken wire is found and repair as necessary. If ground terminal is not grounded, refer to wiring diagram and repeat procedure given for 12 vdc lead.

GENERAL

See [Figure 2-19](#). All models except FLHR/C/S are equipped with incandescent indicator lamps which may be replaced individually. See the Touring Models Service Manual for lamp replacement procedure. See [DIAGNOSTICS](#) which follows for troubleshooting procedures.

Table 2-7. Indicator Lamp Connector [21]

TERMINAL	WIRE COLOR	FUNCTION
1	Brown	Right Turn Power
2	Green/Yellow	Oil Pressure Lamp To Switch
3	White	High Beam Power
4	Violet	Left Turn Power
5	Black	Right Turn Ground
6	Orange	Oil Pressure Power
7	Tan	Neutral Lamp To Switch
8	Orange	Neutral Power
9	Black	High Beam Ground
10	Black	Left Turn Ground

Table 2-8. Indicator Lamp Wiring

INDICATOR LAMP	CONNECTION
Oil pressure	Ground Through Switch
Neutral	Ground Through Harness
High beam	12 VDC When Active
Right/left turn	12 VDC When Active

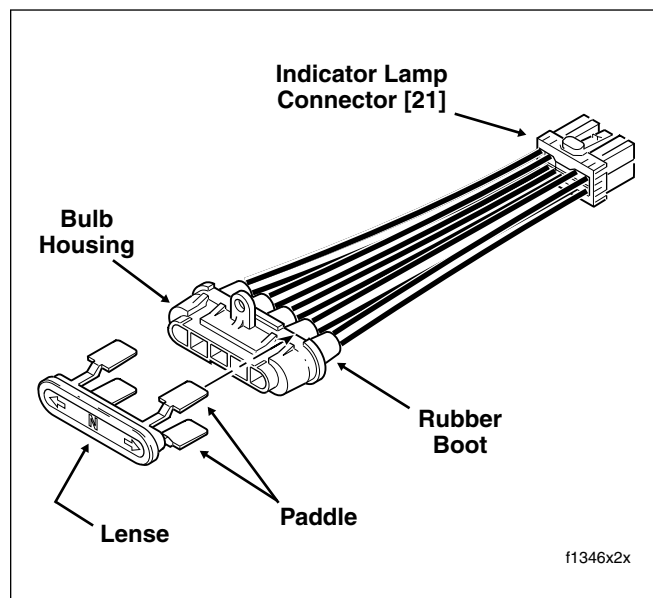


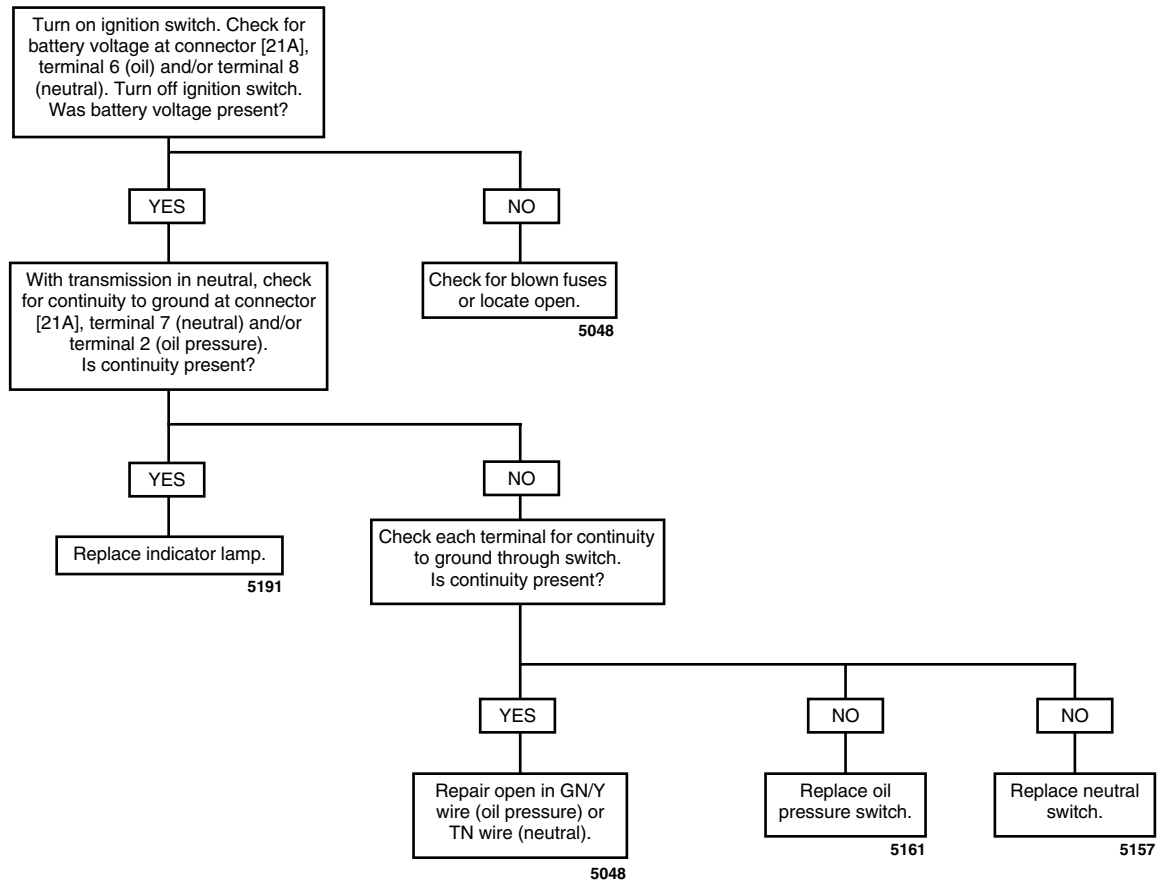
Figure 2-19. Indicator Lamp Assembly (FLHX, FLHT/C/U, FLTR)

Job/Time Code Values

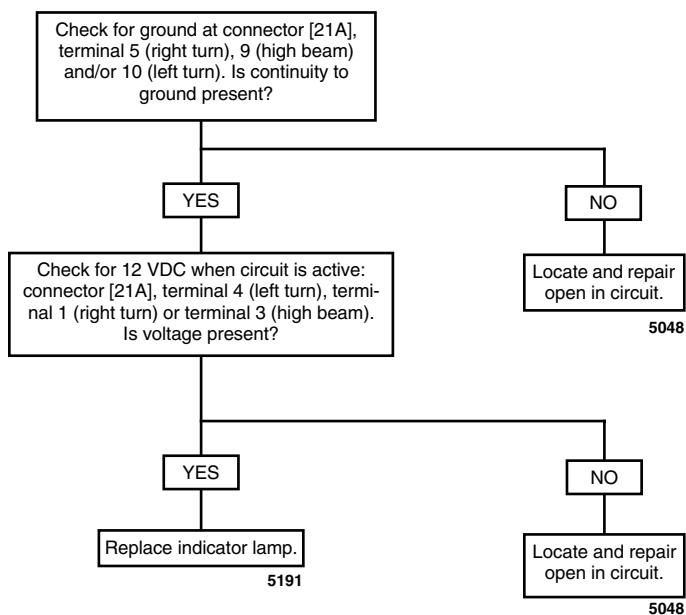
Dealership technicians filing warranty claims should use the job/time code values printed in **bold text** underneath the appropriate repair.

DIAGNOSTICS

Oil Pressure or Neutral Indicator Will Not Function



High Beam or R/L Turn Signal Indicator Will Not Function



GENERAL

FLHR/C/S models are equipped with Light Emitting Diode (LED) indicators. The indicator lamp assembly is not serviceable. If one LED is bad, the entire assembly must be replaced.

See [DIAGNOSTICS](#) which follows for troubleshooting procedures.

Table 2-9. Indicator Lamp Connector [21]

TERMINAL	WIRE COLOR	FUNCTION
1	Violet	Left Turn
2	White	High Beam
3	Green/yellow	Oil Pressure
4	Brown	Right Turn
5	Tan	Neutral
6	Orange	Neutral/Oil Pressure
7	Black	Left Turn/high Beam
8	Not used	N/A

Table 2-10. LED Assembly Wiring

INDICATOR LAMP	CONNECTION
Oil pressure	Ground Through Switch
Neutral	Ground Through Harness
High beam	12 VDC When Active
Right/left turn	12 VDC When Active

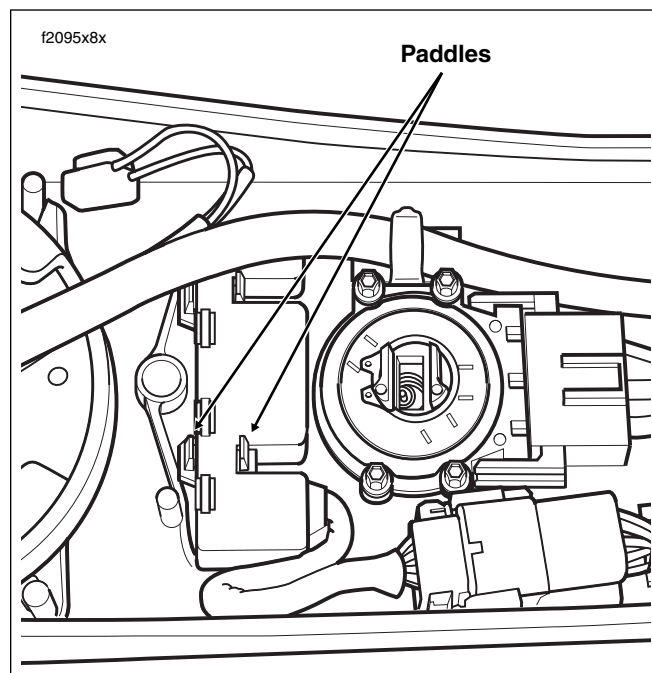


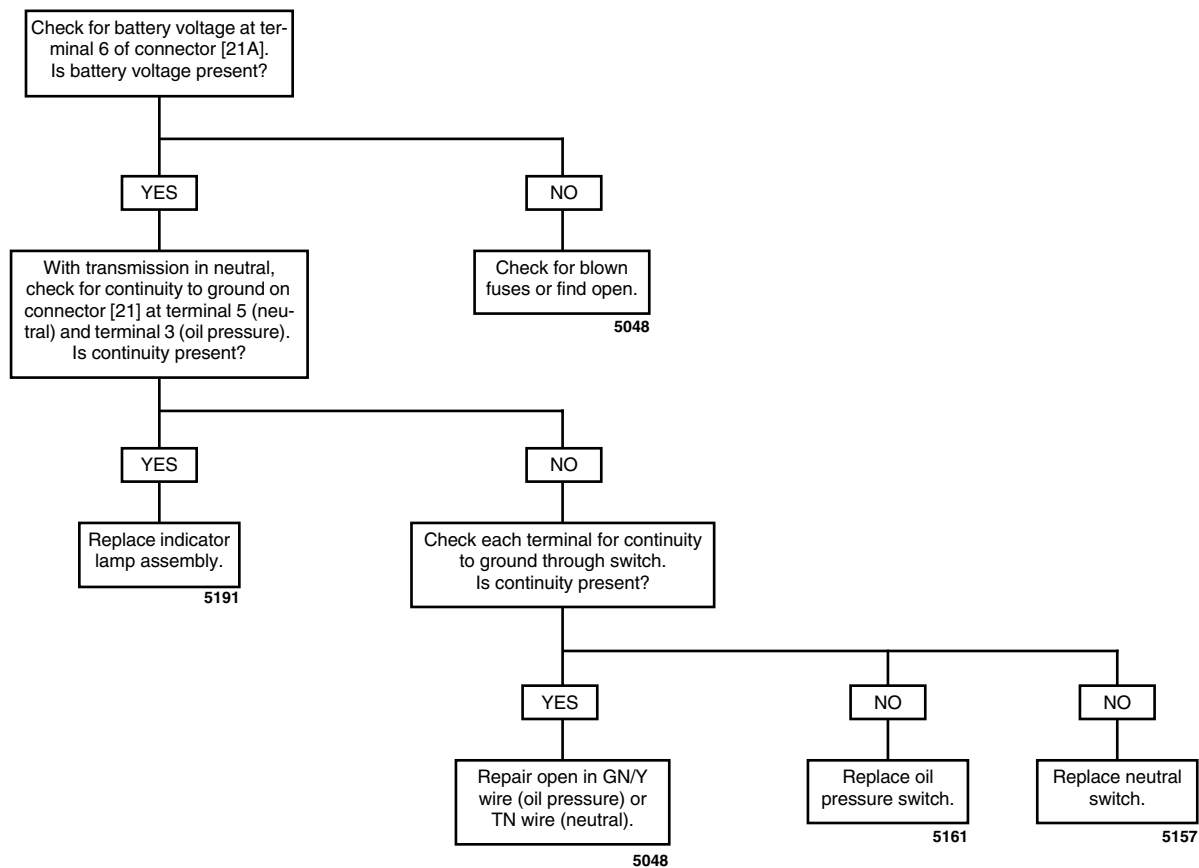
Figure 2-20. Release Paddles to Free Indicator Lights Assembly (FLHR/C/S)

Job/Time Code Values

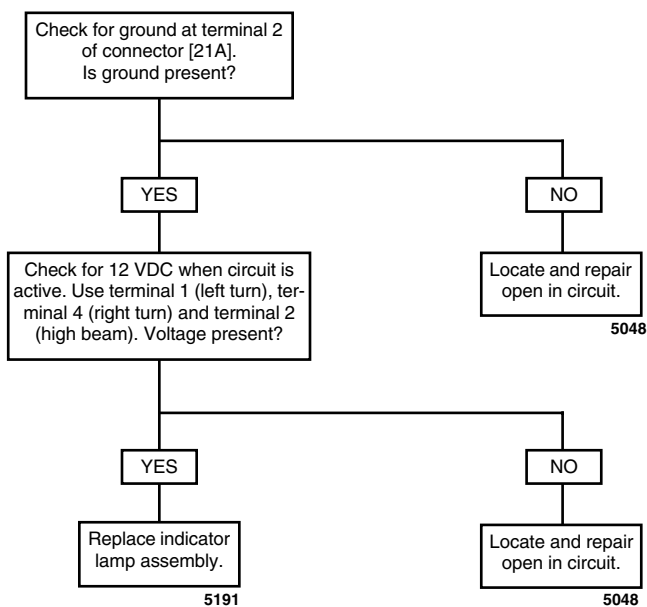
Dealership technicians filing warranty claims should use the job/time code values printed in **bold text** underneath the appropriate repair.

DIAGNOSTICS

Oil Pressure or Neutral Indicator Will Not Function



High Beam or R/L Turn Signal Indicator Will Not Function



GENERAL

The fuel level is monitored by the speedometer pin 9 of connector [39] (Y/W).

- If the voltage on pin 9 of connector [39] exceeds the lower limit for greater than or equal to 15 seconds, DTC B1004 will set.
- If the voltage on pin 9 of connector [39] exceeds the upper limit (or is open) for greater than or equal to 15 seconds a DTC B1005 will set.

Table 2-11. Code Description

DTC	DESCRIPTION
B1004	Fuel level sending unit low.
B1005	Fuel level sending unit high/open.

DIAGNOSTICS

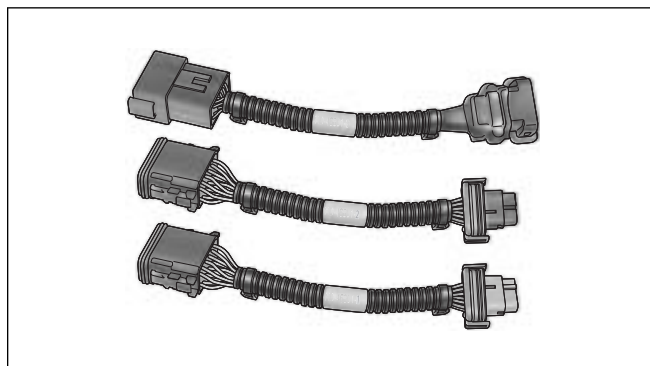
Diagnostic Tips

If fuel gauge is performing erratically (possible false DTC's), inspect for unobstructed movement of sending unit arm. Repair or align as necessary.

Diagnostic Notes

The reference numbers below correlate with the circled numbers on the 2.10 flow chart.

1. Use HARNESS CONNECTOR TEST KIT (Part No. HD-41404A), brown pin probe and patch cord.
2. Connect BREAKOUT BOX (Part No. HD-42682) and INSTRUMENT HARNESS ADAPTERS (Part No. HD-46601) between wire harness and speedometer.



**Figure 2-21. Instrument Harness Adapters
(Part No. HD-46601)**

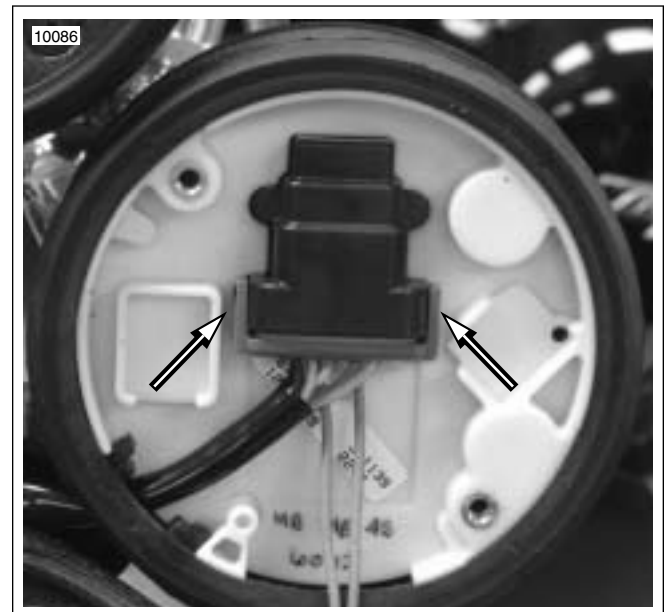


Figure 2-22. Speedometer Connector [39]

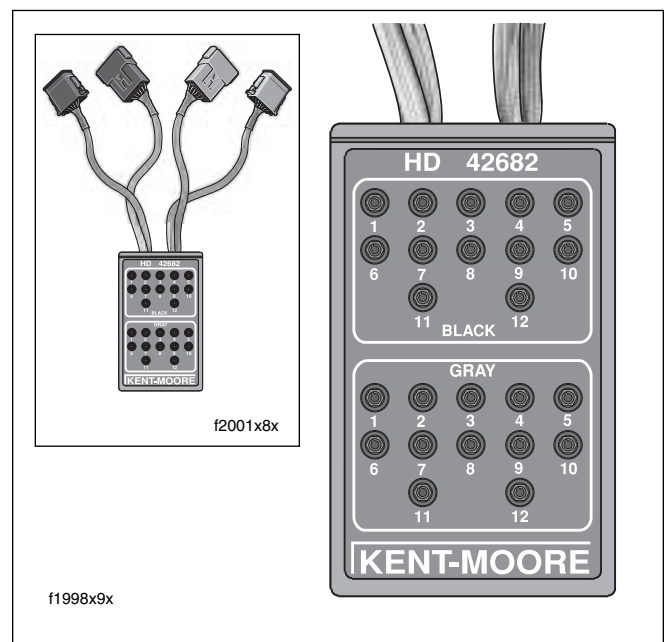


Figure 2-23. Breakout Box (Part No. HD-42682)

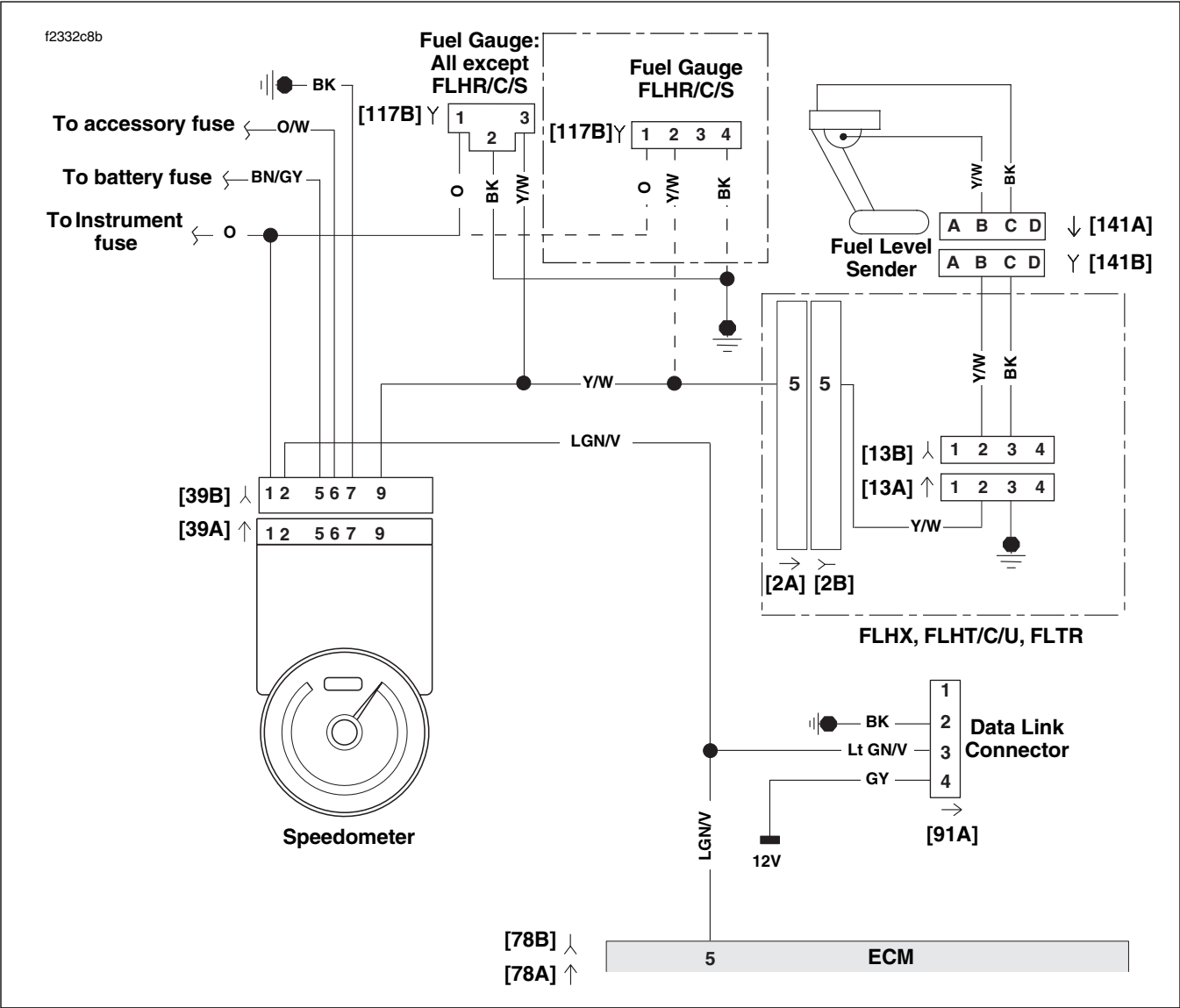
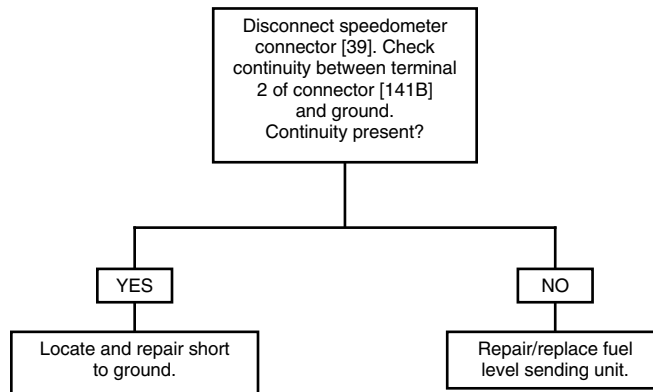


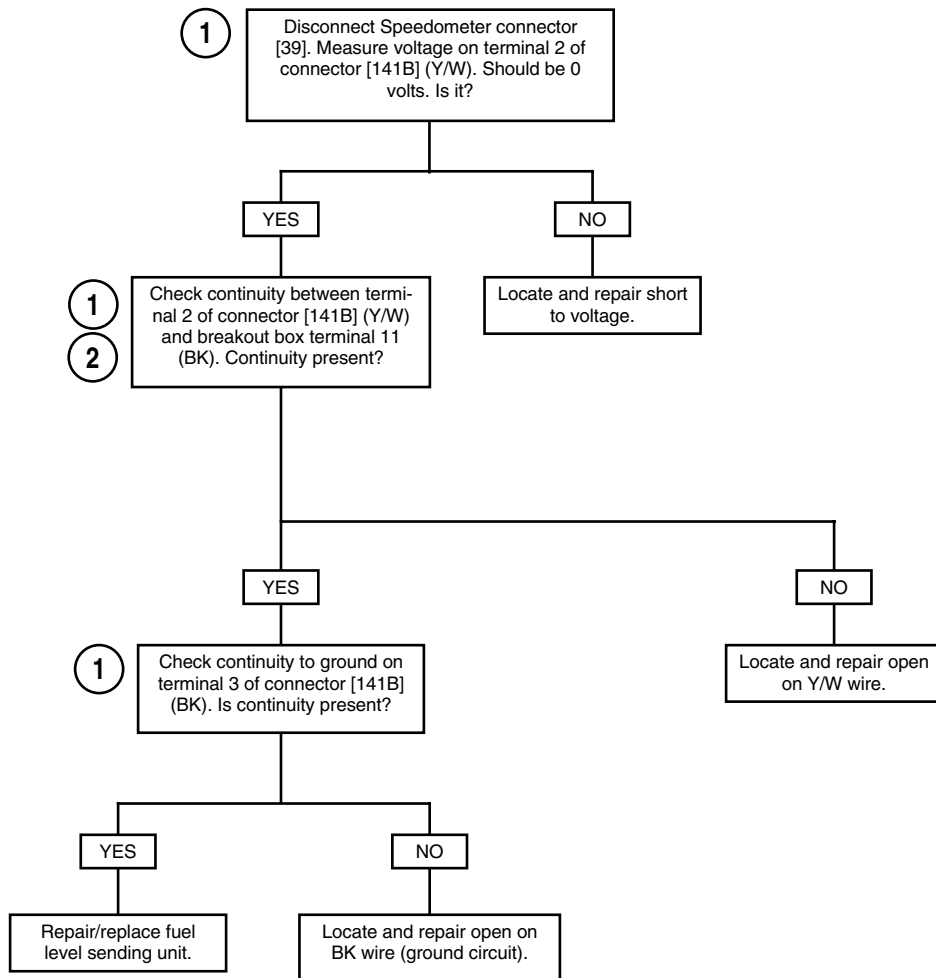
Figure 2-24. Fuel Sender Circuit

Table 2-12. Wire Harness Connectors in Figure 2-24.

NO.	DESCRIPTION	MODEL	TYPE	LOCATION
[2]	Main to Interconnect Harness	FLHT/C	12-Place Deutsch (Gray)	Inner Fairing - Right Fairing Support Brace
		FLTR	12-Place Deutsch (Gray)	Inner Fairing - Below Radio (Right Side)
[13]	Fuel Tank Harness	FLHT/C	4-Place Multilock	Behind Fuel Tank (Under Seat)
		FLTR	4-Place Multilock	Behind Fuel Tank (Under Seat)
[39]	Speedometer	FLHT/C	12-Place Packard	Inner Fairing (Back of Speedometer)
		FLTR	12-Place Packard	Under Bezel (Back of Speedometer)
[78]	ECM	All	36-Place Packard	Under Right Side Cover
[91]	Data Link	All	4-Place Deutsch	Under Right Side Cover
[141]	Fuel Level Sender	FLHT/C	4-Place Packard	Top of Canopy (Under Console)
		FLTR	4-Place Packard	Top of Canopy (Under Console)

Test 2.10: DTC B1004**FUEL LEVEL SENDING UNIT**

Clear codes using speedometer self diagnostics. See Section [2.3 SPEEDOMETER SELF DIAGNOSTICS](#). Confirm proper operation with no check engine lamp.

Test 2.10: DTC B1005**FUEL LEVEL SENDING UNIT**

Clear diagnostic trouble codes using speedometer self diagnostics. See Section 2.3 **SPEEDOMETER SELF DIAGNOSTICS**. Confirm proper operation with no check engine lamp.

GENERAL

Accessory Or Ignition Line Overvoltage

Ignition and accessory voltage is constantly monitored by the speedometer (terminal 1-ignition and terminal 6-accessory). If the battery voltage fails to meet normal operating parameters, a DTC is set.

- DTC B1006 is displayed when accessory line voltage is greater than 16.0 volts for longer than 5 seconds.
- DTC B1007 is displayed when ignition line voltage is greater than 16.0 volts for longer than 5 seconds.

NOTE

ICM/ECM or TSM/TSSM may also set battery voltage DTC's.

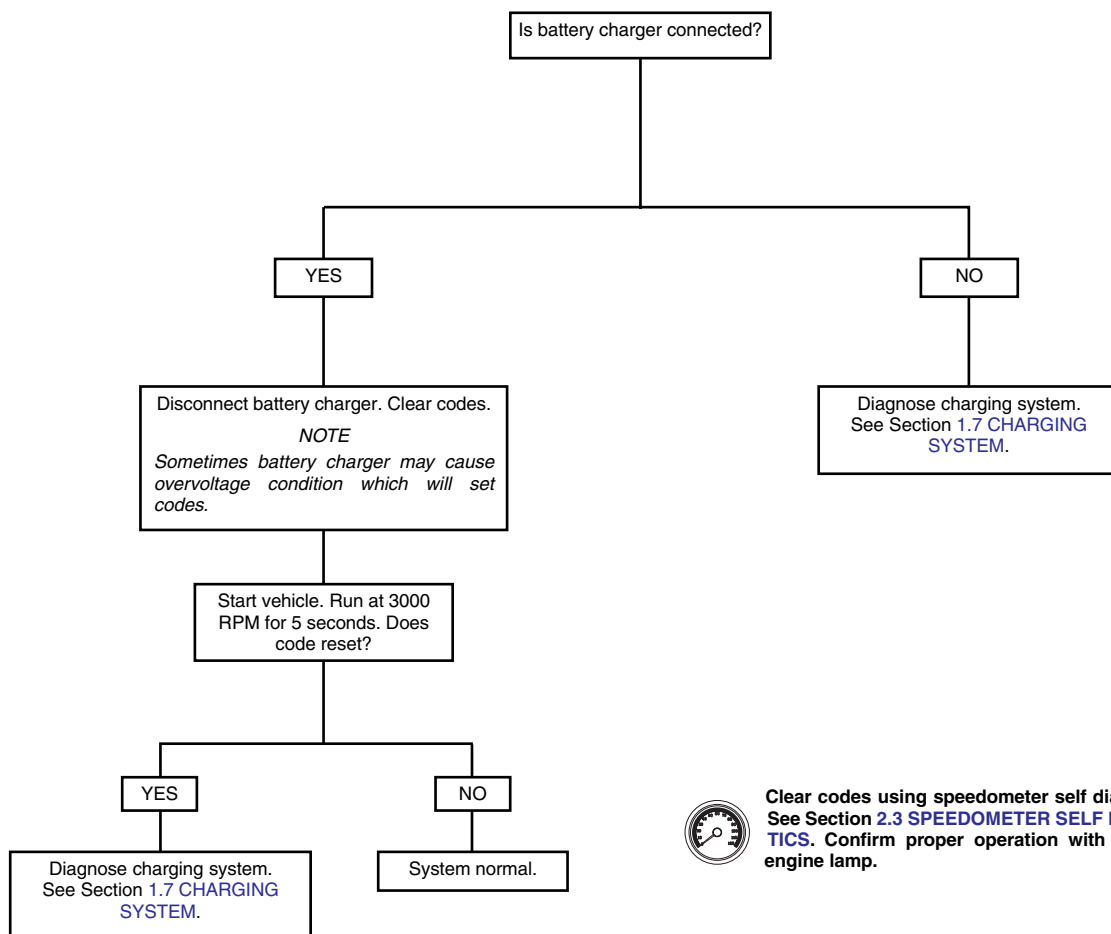
Table 2-13. Code Description

DTC	DESCRIPTION
B1006	Accessory line overvoltage
B1007	Ignition line overvoltage

Test 2.11

ACCESSORY OR IGNITION LINE OVERVOLTAGE:

DTC B1006/B1007



Clear codes using speedometer self diagnostics. See Section 2.3 SPEEDOMETER SELF DIAGNOSTICS. Confirm proper operation with no check engine lamp.

GENERAL

Reset Switch Closed

DTC B1008 will be set if switch terminals are in a constant shorted state.

Table 2-14. Code Description

DTC	DESCRIPTION
B1008	Reset switch closed

DIAGNOSTICS

Diagnostic Notes

The reference numbers below correlate with the circled numbers on the Test 2.12 flow chart.

1. Connect BREAKOUT BOX (Part No. HD-42682) and INSTRUMENT HARNESS ADAPTERS (Part No. HD-46601) between wire harness and speedometer, **leaving speedometer disconnected.**

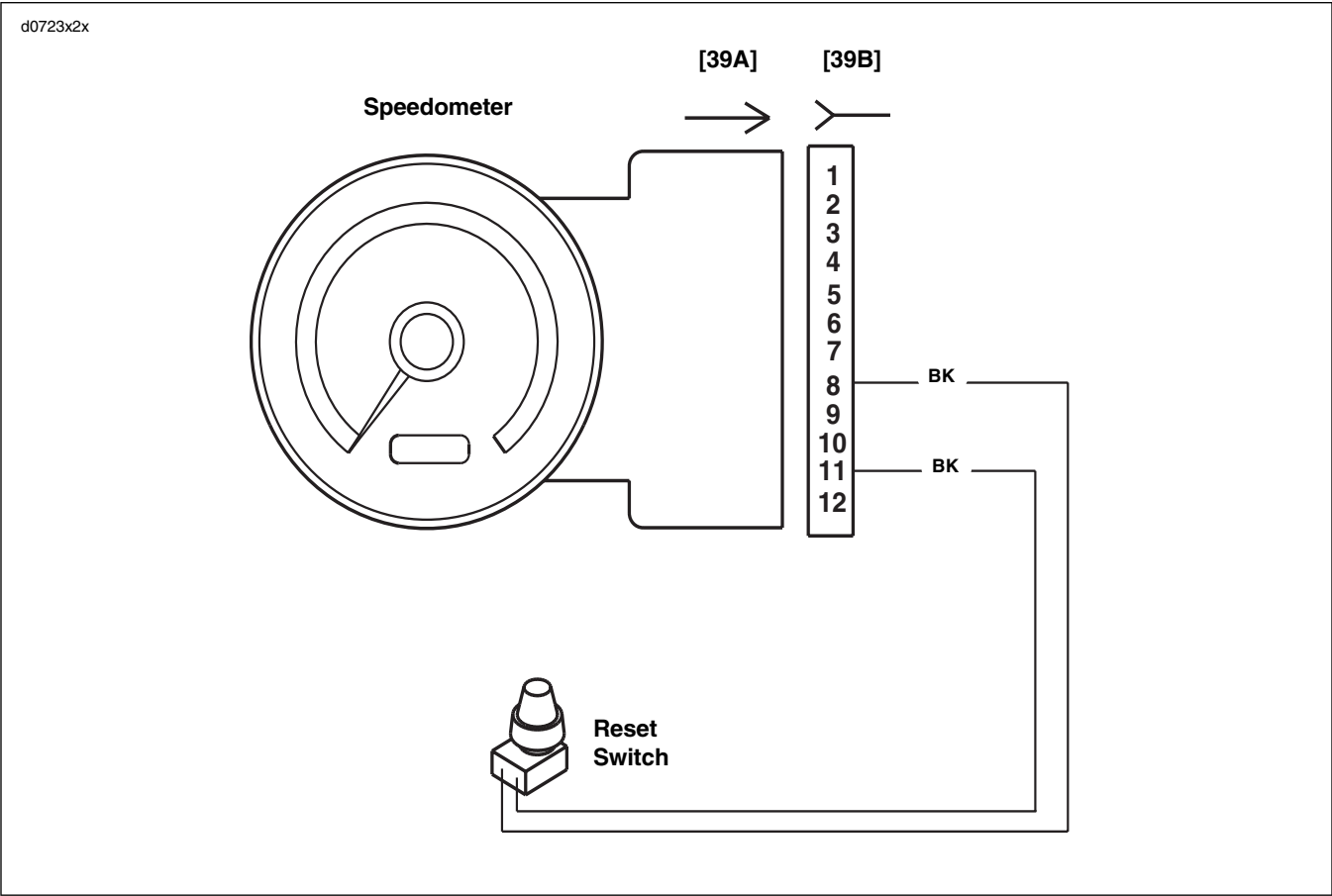


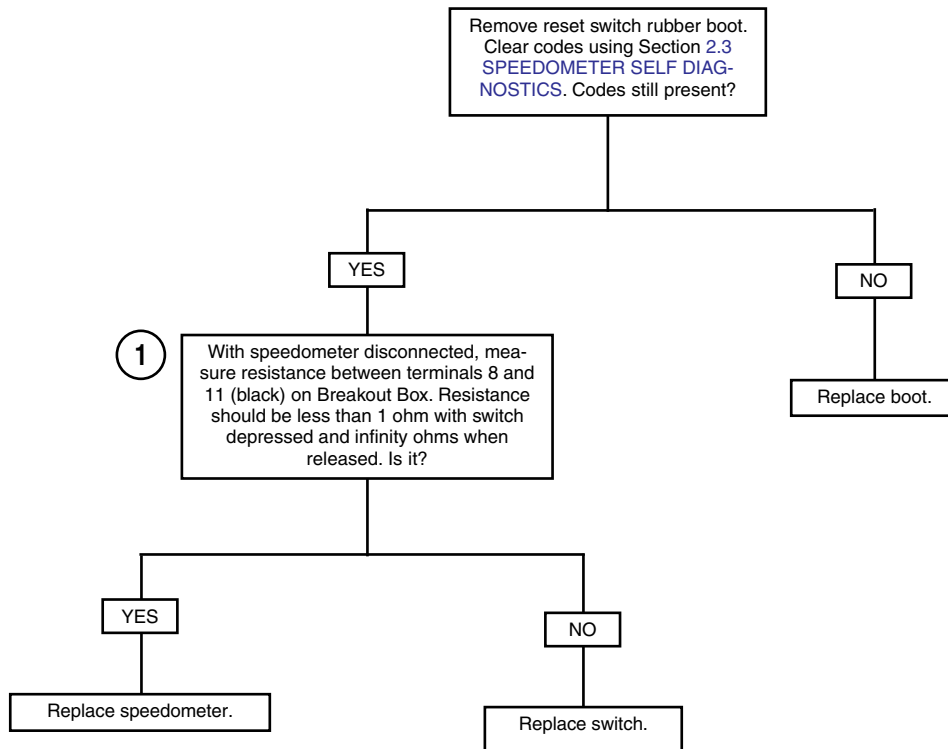
Figure 2-25. Reset Switch Circuit

Table 2-15. Wire Harness Connectors in [Figure 2-25](#).

NO.	DESCRIPTION	MODEL	TYPE	LOCATION
[39]	Speedometer	FLHT/C	12-Place Packard	Inner Fairing (Back of Speedometer)
		FLTR	12-Place Packard	Under Bezel (Back of Speedometer)

Test 2.12

RESET SWITCH CLOSED: DTC B1008



Clear codes using speedometer self diagnostics. See Section 2.3 [SPEEDOMETER SELF DIAGNOSTICS](#). Confirm proper operation with no check engine lamp.

GENERAL

Loss of ICM/ECM Serial Data

The serial data connector provides a means for the ICM or ECM, TSM/TSSM and speedometer to communicate their current status. When all operating parameters on the serial data bus are within specifications, a state of health message is sent between the components. A DTC U1016 indicates that the ICM/ECM is not capable of sending this state of health message.

Table 2-16. Code Description

DTC	DESCRIPTION
U1016	Loss of all ICM/ECM serial data (state of health)
	Loss of vehicle speed
	Loss of vehicle inhibit motion
	Loss of powertrain security status

DIAGNOSTICS

Diagnostic Notes

The reference numbers below correlate with the circled numbers on the Test 2.13 flow chart.

- 1. Connect BREAKOUT BOX (Part No. HD-42682) (gray) between TSM/TSSM connector [30A] and wire harness connector [30B]. See Section 3.11 BREAKOUT BOX: TSM/TSSM.

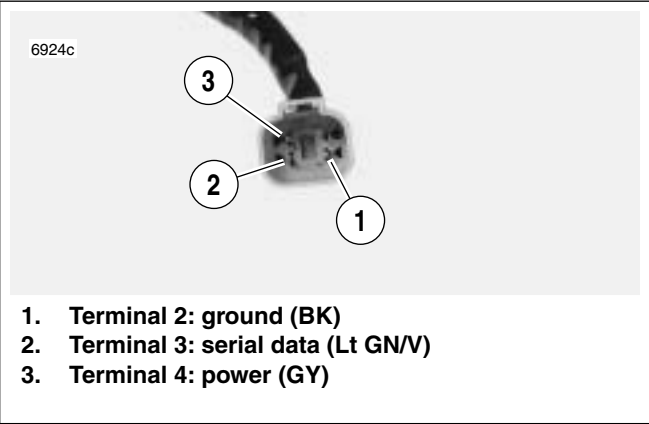


Figure 2-26. Data Link Connector

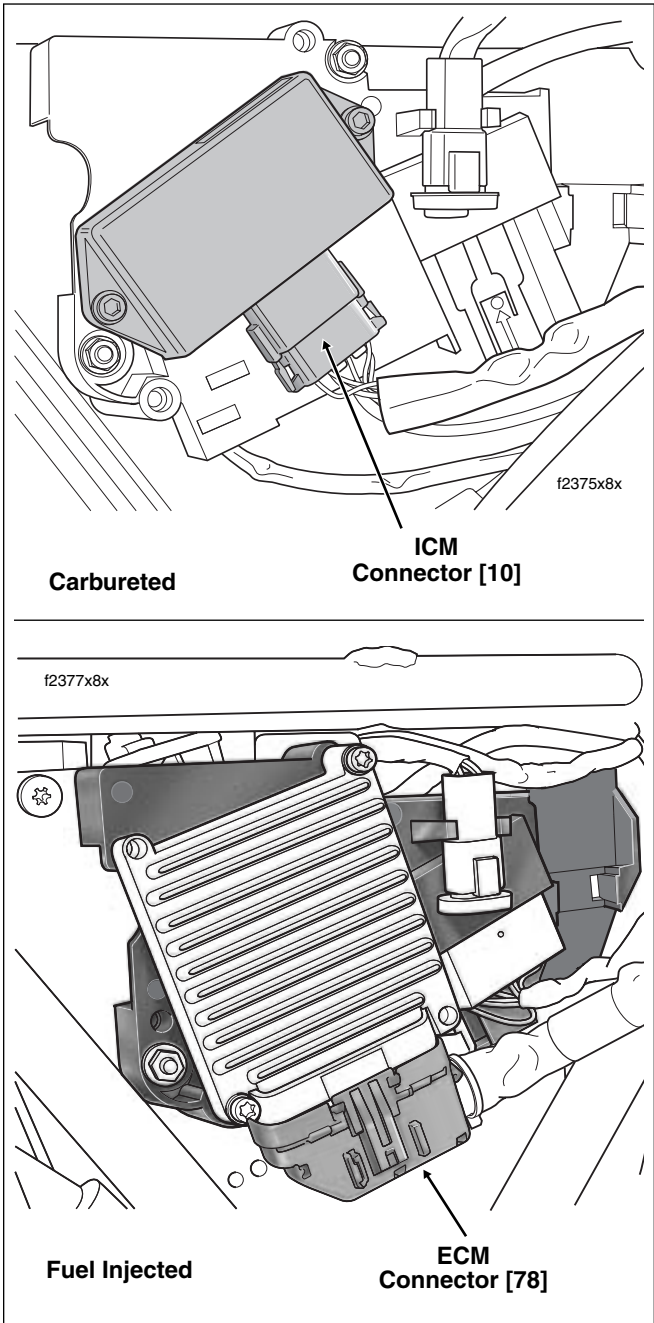


Figure 2-27. Electrical Bracket (Under Right Side Cover)

- 2. Connect BREAKOUT BOX (Part No. HD-42682) (black) between ICM connector [10A] and wiring harness connector [10B]. See Section 4.6 BREAKOUT BOX: ICM
- 3. Connect BREAKOUT BOX (Part No. HD-43876) between wire harness and ICM/ECM. See Section 5.7 BREAKOUT BOX: EFI.

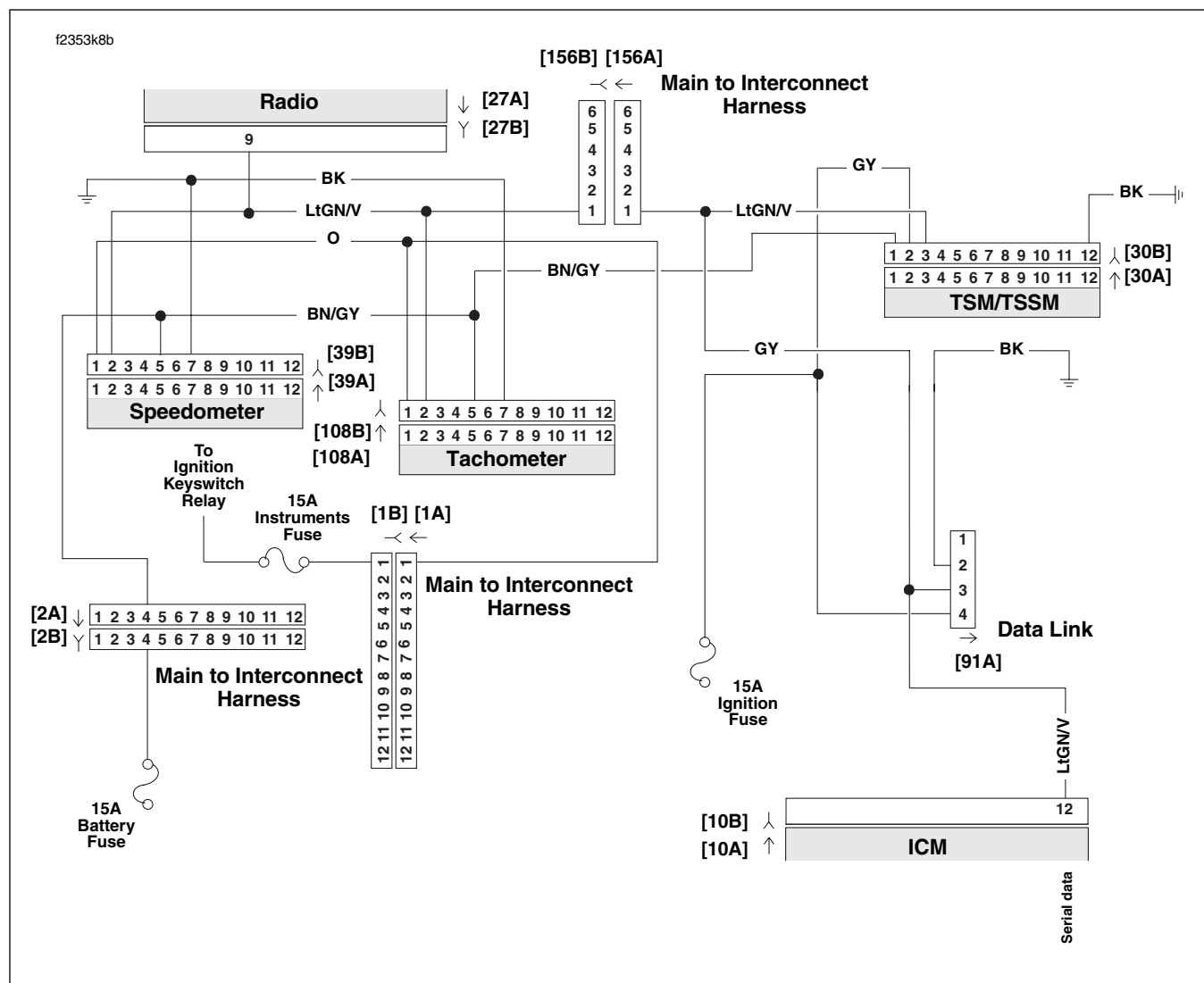


Figure 2-28. Serial Data Circuit: FLHX, FLHT/C (Carbureted)

Table 2-17. Wire Harness Connectors in Figure 2-28.

NO.	DESCRIPTION	TYPE	LOCATION
[1]	Main to Interconnect Harness	12-Place Deutsch (Black)	Inner Fairing - Right Radio Support Bracket
[2]	Main to Interconnect Harness	12-Place Deutsch (Gray)	Inner Fairing - Right Fairing Support Brace
[10]	ICM	12-Place Deutsch	Under Right Side Cover
[27]	Radio	23-Place Amp	Inner Fairing - Back of Radio (Right Side)
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Packard	Inner Fairing (Back of Speedometer)
[91]	Data Link	4-Place Deutsch	Under Right Side Cover
[108]	Tachometer	12-Place Packard	Inner Fairing (Back of Tachometer)
[156]	Main to Interconnect Harness	6-Place Deutsch	Inner Fairing - Right Fairing Support Brace

Table 2-18. Wire Harness Connectors in Figure 2-29.

NO.	DESCRIPTION	TYPE	LOCATION
[10]	ICM	12-Place Deutsch	Under Right Side Cover
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Packard	Under Console (Back of Speedometer)
[91]	Data Link	4-Place Deutsch	Under Right Side Cover

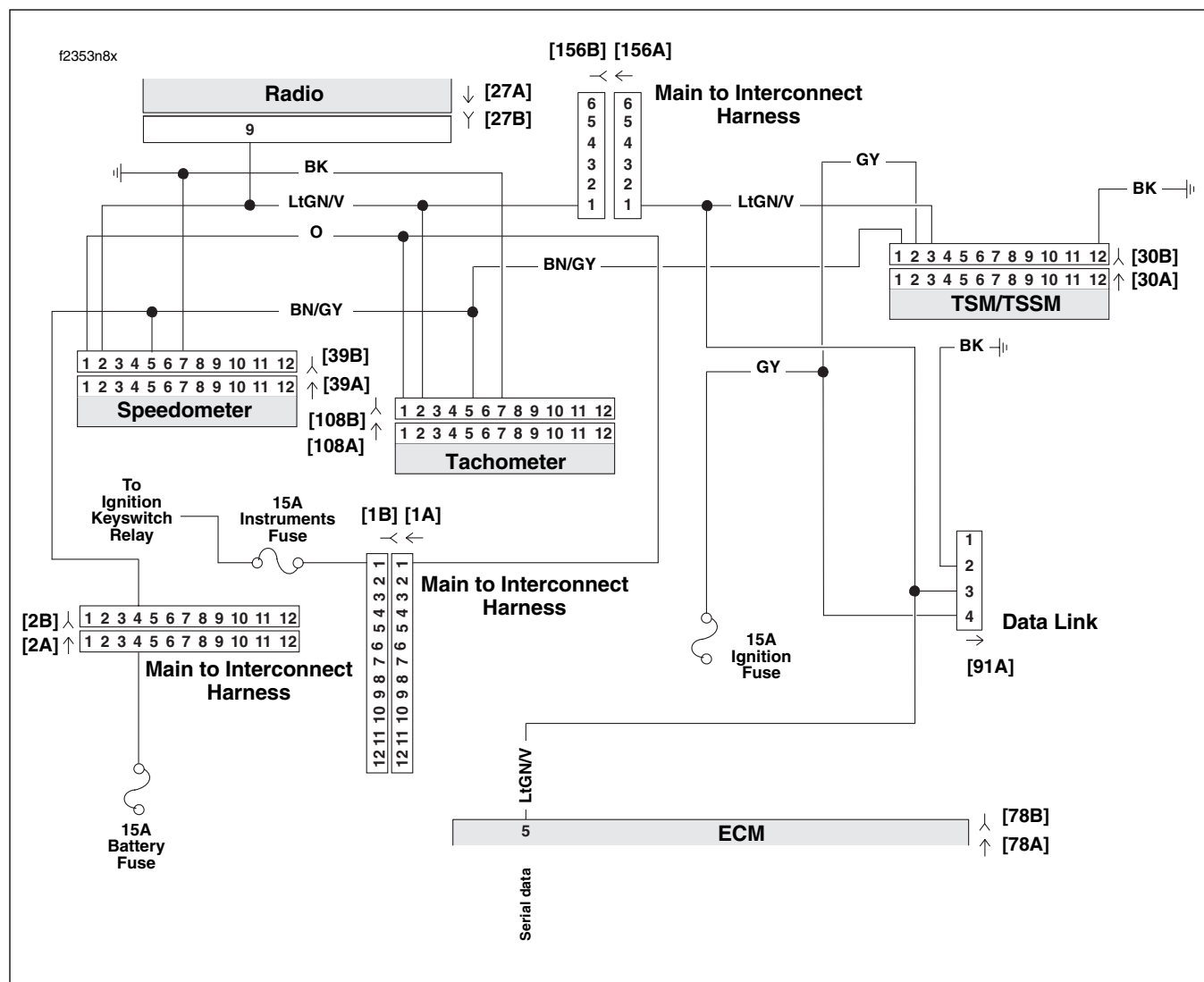


Figure 2-30. Serial Data Circuit: FLHX, FLHT/C/U, FLTR (Fuel Injected)

Table 2-19. Wire Harness Connectors in Figure 2-30.

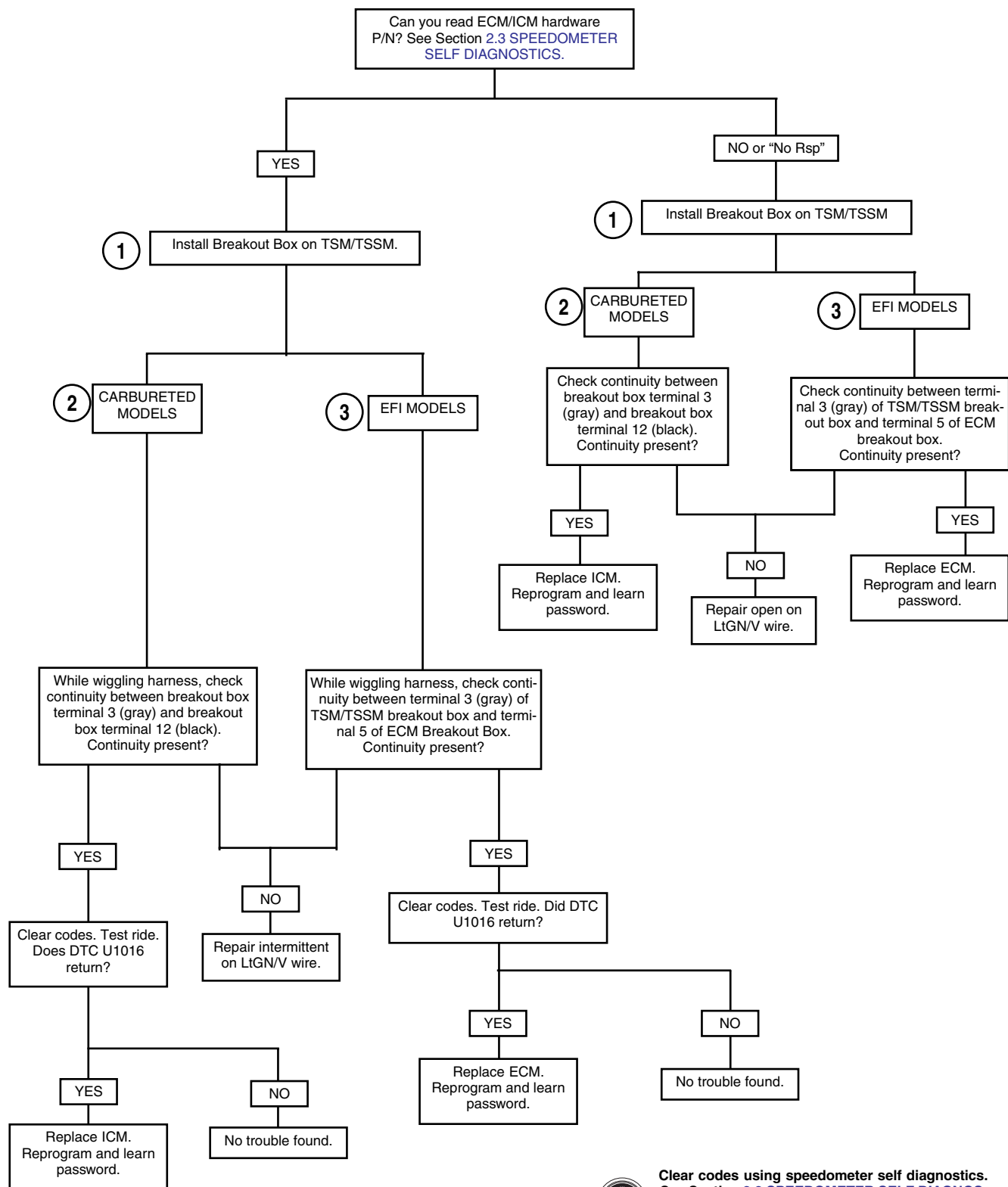
NO.	DESCRIPTION	MODEL	TYPE	LOCATION
[1]	Main to Interconnect Harness	FLHT/C	12-Place Deutsch (Black)	Inner Fairing - Right Radio Support Bracket
		FLTR	12-Place Deutsch (Black)	Inner Fairing - Below Radio (Right Side)
[2]	Main to Interconnect Harness	FLHT/C	12-Place Deutsch (Gray)	Inner Fairing - Right Fairing Support Brace
		FLTR	12-Place Deutsch (Gray)	Inner Fairing - Below Radio (Right Side)
[27]	Radio	All	23-Place Amp	Inner Fairing - Back of Radio (Right Side)
[30]	TSM/TSSM	All	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	FLHT/C	12-Place Packard	Inner Fairing (Back of Speedometer)
		FLTR	12-Place Packard	Under Bezel (Back of Speedometer)
[78]	ECM	All	36-Place Packard	Under Right Side Cover
[91]	Data Link	All	4-Place Deutsch	Under Right Side Cover
[108]	Tachometer	FLHT/C	12-Place Packard	Inner Fairing (Back of Tachometer)
		FLTR	12-Place Packard	Under Bezel (Back of Tachometer)
[156]	Main to Interconnect Harness	FLHT/C	6-Place Deutsch	Inner Fairing - Right Fairing Support Brace
		FLTR	6-Place Deutsch	Inner Fairing - Below Radio (Right Side)

Table 2-20. Wire Harness Connectors in Figure 2-31.

NO.	DESCRIPTION	TYPE	LOCATION
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Mini-Deutsch	Under Console (Back of Speedometer)
[78]	ECM	36-Place Packard	Under Right Side Cover
[91]	Data Link	4-Place Deutsch	Under Right Side Cover

Test 2.13

LOSS OF ICM/ECM SERIAL DATA: DTC U1016



Clear codes using speedometer self diagnostics. See Section 2.3 SPEEDOMETER SELF DIAGNOSTICS. Confirm proper operation with no check engine lamp.

GENERAL

Loss of TSM/TSSM Serial Data

The serial data connector provides a means for the ICM or ECM, TSM/TSSM and speedometer to communicate their current status. When all operating parameters on the serial data bus are within specifications, a state of health message is sent between the components. A DTC U1255 (only reported by the TSM/TSSM or speedometer) indicates that no messages were present during power up of the current key cycle. A DTC U1064 indicates that there was communication on the data bus since power up, but was lost or interrupted during that key cycle.

Table 2-21. Code Description

DTC	DESCRIPTION
U1064	Loss of TSM/TSSM serial data
U1255	Serial data error/missing message

DIAGNOSTICS

Diagnostic Notes

The reference numbers below correlate with the circled numbers on the Test 2.14 flow chart.

1. Connect BREAKOUT BOX (Part No. HD-42682) as follows:
 - a. Mate black socket housing on Breakout Box with speedometer connector [39] using SPEEDOMETER HARNESS ADAPTER (Part No. HD-46601).
 - b. Mate black pin housing on Breakout Box with speedometer harness connector [39B] using SPEEDOMETER HARNESS ADAPTER (Part No. HD-46601).
 - c. Mate gray socket housing on Breakout Box with TSM/TSSM connector [30A].
 - d. Mate gray pin housing on Breakout Box with harness connector [30B].

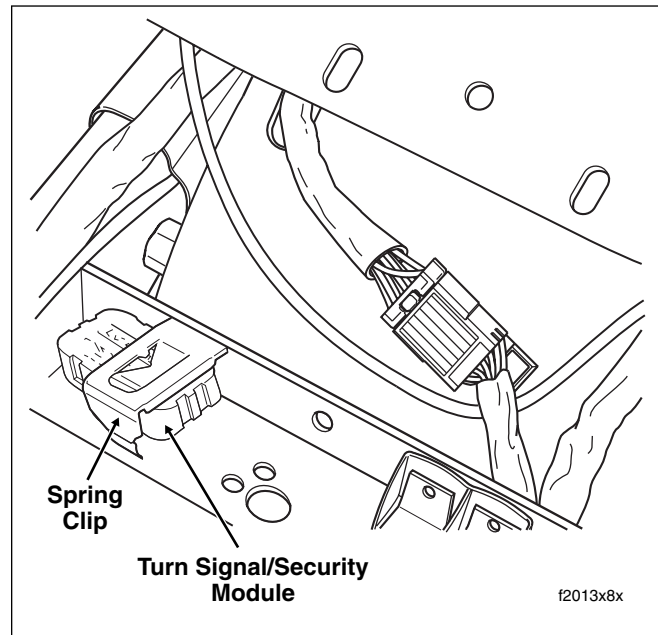


Figure 2-32. Frame Crossmember (Under Seat)

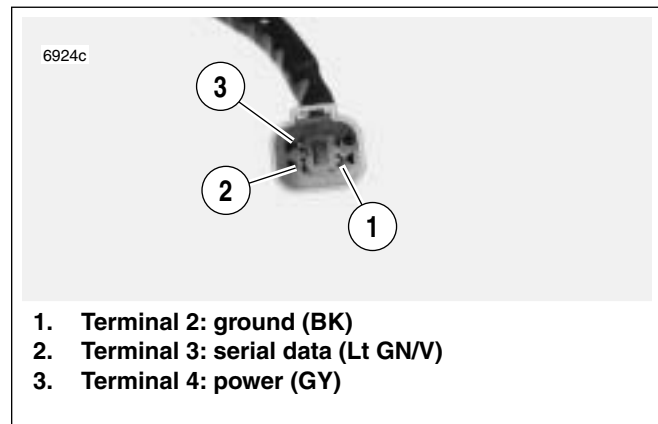


Figure 2-33. Data Link Connector

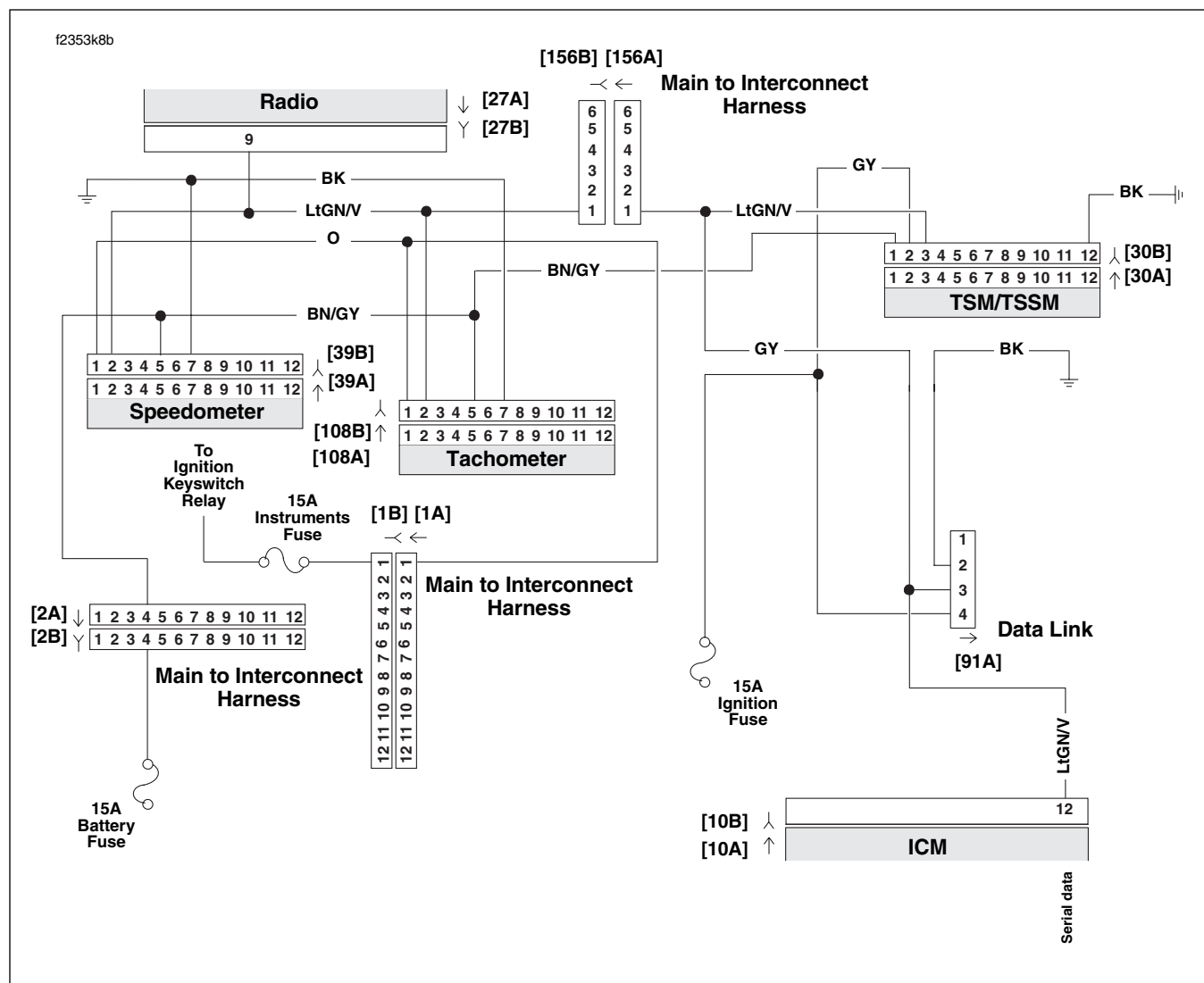


Figure 2-34. Serial Data Circuit: FLHX, FLHT/C (Carbureted)

Table 2-22. Wire Harness Connectors in Figure 2-34.

NO.	DESCRIPTION	TYPE	LOCATION
[1]	Main to Interconnect Harness	12-Place Deutsch (Black)	Inner Fairing - Right Radio Support Bracket
[2]	Main to Interconnect Harness	12-Place Deutsch (Gray)	Inner Fairing - Right Fairing Support Brace
[10]	ICM	12-Place Deutsch	Under Right Side Cover
[27]	Radio	23-Place Amp	Inner Fairing - Back of Radio (Right Side)
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Packard	Inner Fairing (Back of Speedometer)
[91]	Data Link	4-Place Deutsch	Under Right Side Cover
[108]	Tachometer	12-Place Packard	Inner Fairing (Back of Tachometer)
[156]	Main to Interconnect Harness	6-Place Deutsch	Inner Fairing - Right Fairing Support Brace

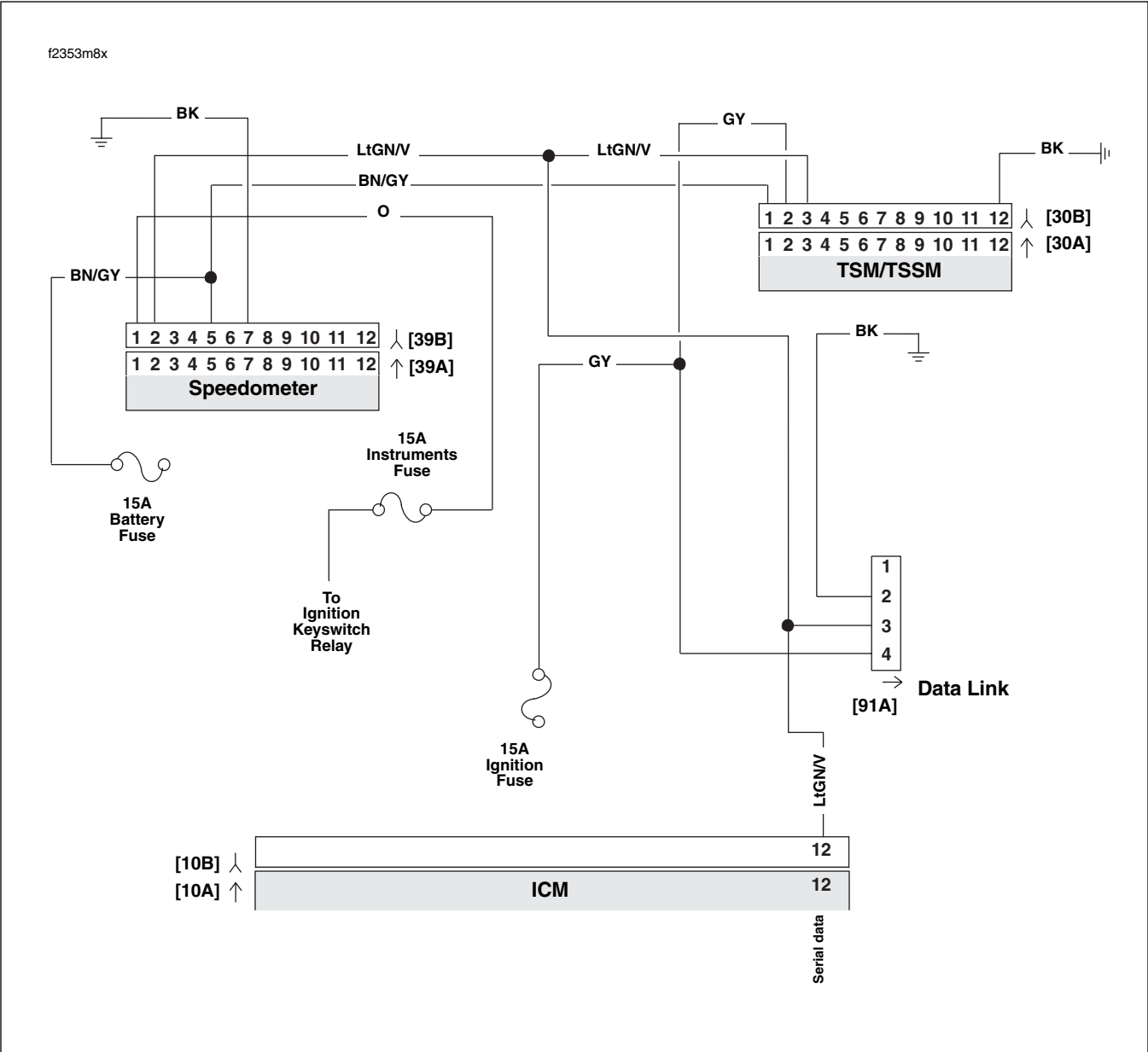


Figure 2-35. Serial Data Circuit: FLHR/S (Carbureted)

Table 2-23. Wire Harness Connectors in [Figure 2-35](#).

NO.	DESCRIPTION	TYPE	LOCATION
[10]	ICM	12-Place Deutsch	Under Right Side Cover
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Packard	Under Console (Back of Speedometer)
[91]	Data Link	4-Place Deutsch	Under Right Side Cover

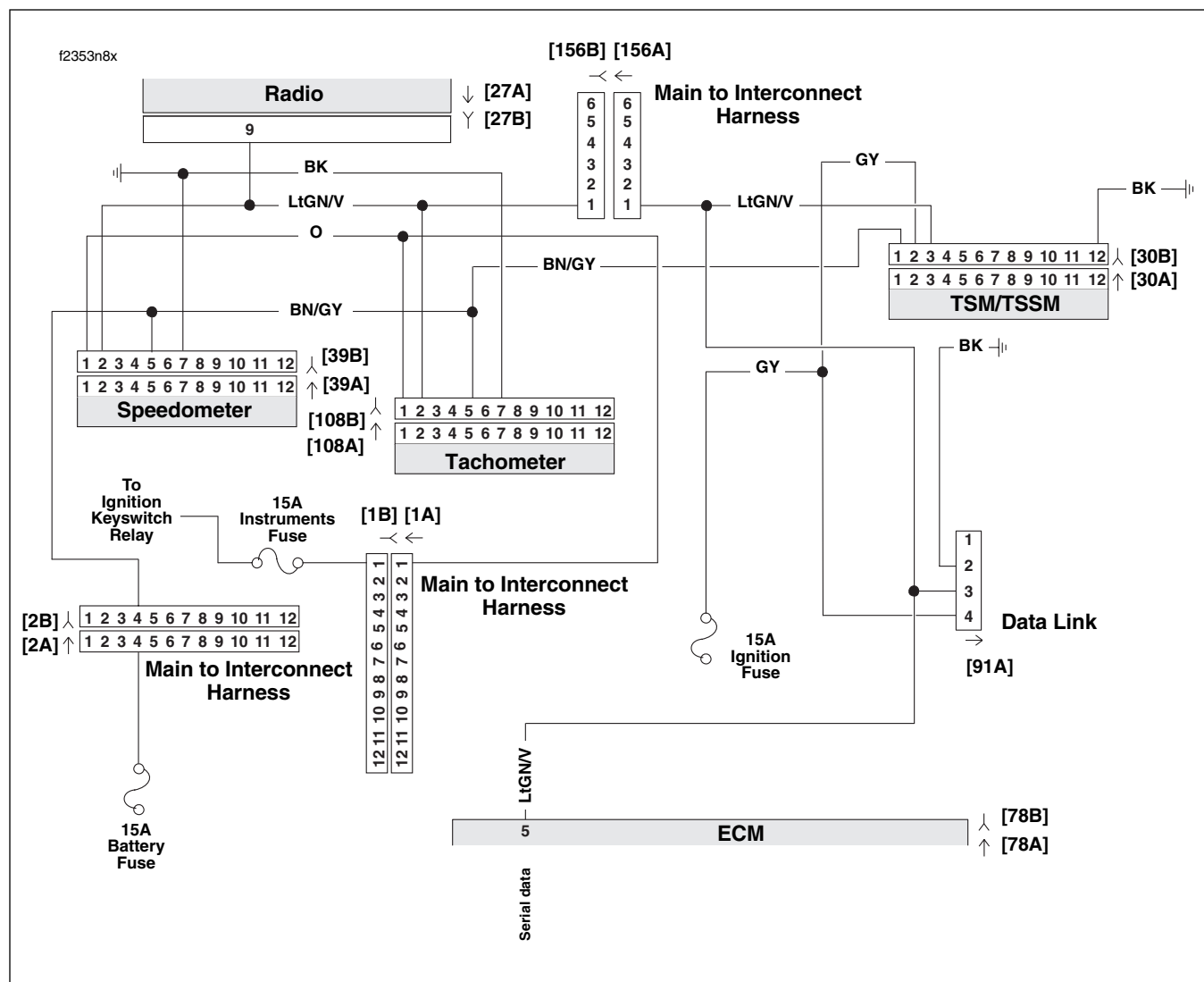


Figure 2-36. Serial Data Circuit: FLHX, FLHT/C/U, FLTR (Fuel Injected)

Table 2-24. Wire Harness Connectors in Figure 2-36.

NO.	DESCRIPTION	MODEL	TYPE	LOCATION
[1]	Main to Interconnect Harness	FLHT/C	12-Place Deutsch (Black)	Inner Fairing - Right Radio Support Bracket
		FLTR	12-Place Deutsch (Black)	Inner Fairing - Below Radio (Right Side)
[2]	Main to Interconnect Harness	FLHT/C	12-Place Deutsch (Gray)	Inner Fairing - Right Fairing Support Brace
		FLTR	12-Place Deutsch (Gray)	Inner Fairing - Below Radio (Right Side)
[27]	Radio	All	23-Place Amp	Inner Fairing - Back of Radio (Right Side)
[30]	TSM/TSSM	All	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	FLHT/C	12-Place Packard	Inner Fairing (Back of Speedometer)
		FLTR	12-Place Packard	Under Bezel (Back of Speedometer)
[78]	ECM	All	36-Place Packard	Under Right Side Cover
[91]	Data Link	All	4-Place Deutsch	Under Right Side Cover
[108]	Tachometer	FLHT/C	12-Place Packard	Inner Fairing (Back of Tachometer)
		FLTR	12-Place Packard	Under Bezel (Back of Tachometer)
[156]	Main to Interconnect Harness	FLHT/C	6-Place Deutsch	Inner Fairing - Right Fairing Support Brace
		FLTR	6-Place Deutsch	Inner Fairing - Below Radio (Right Side)

f2353o8x

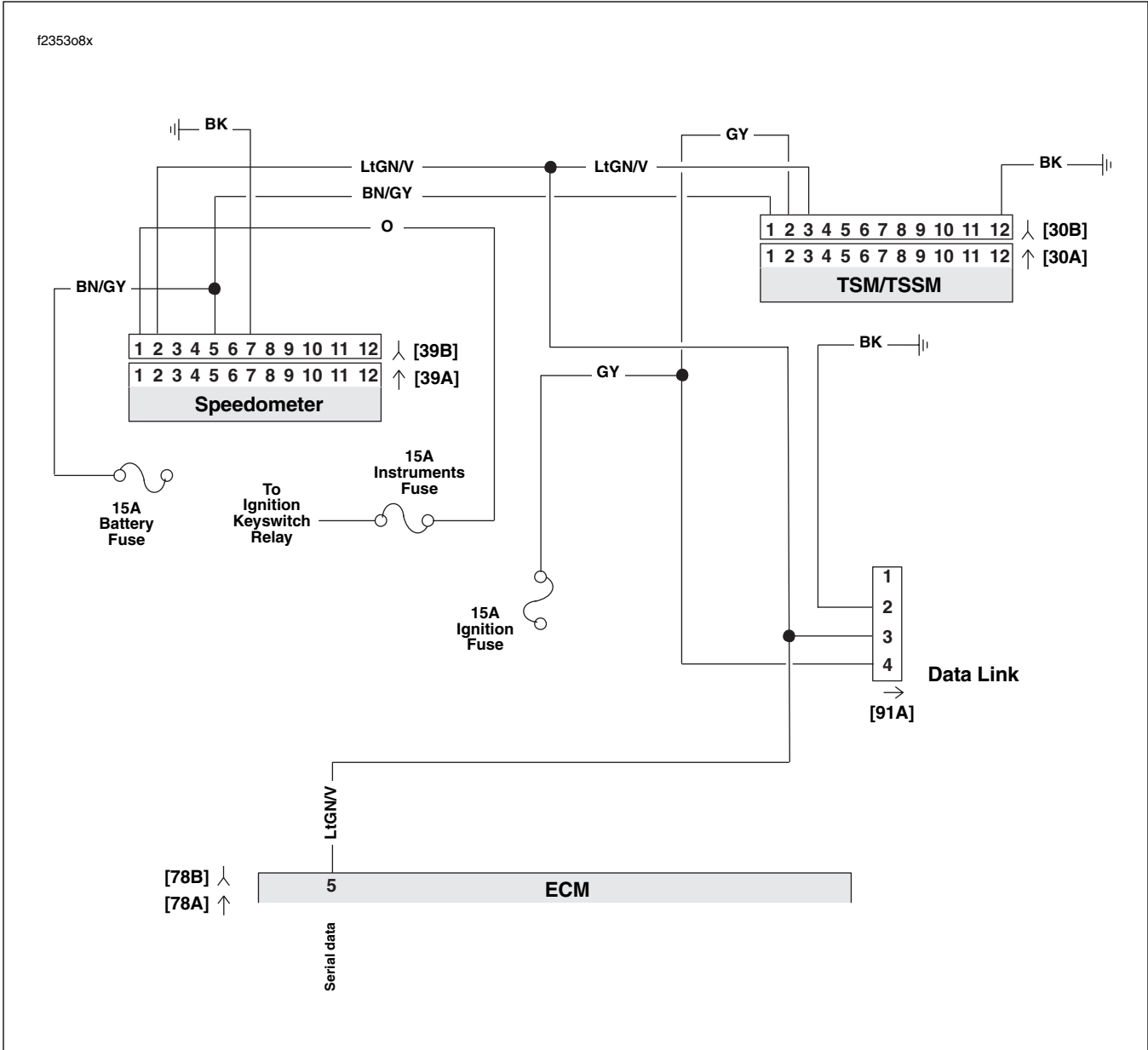
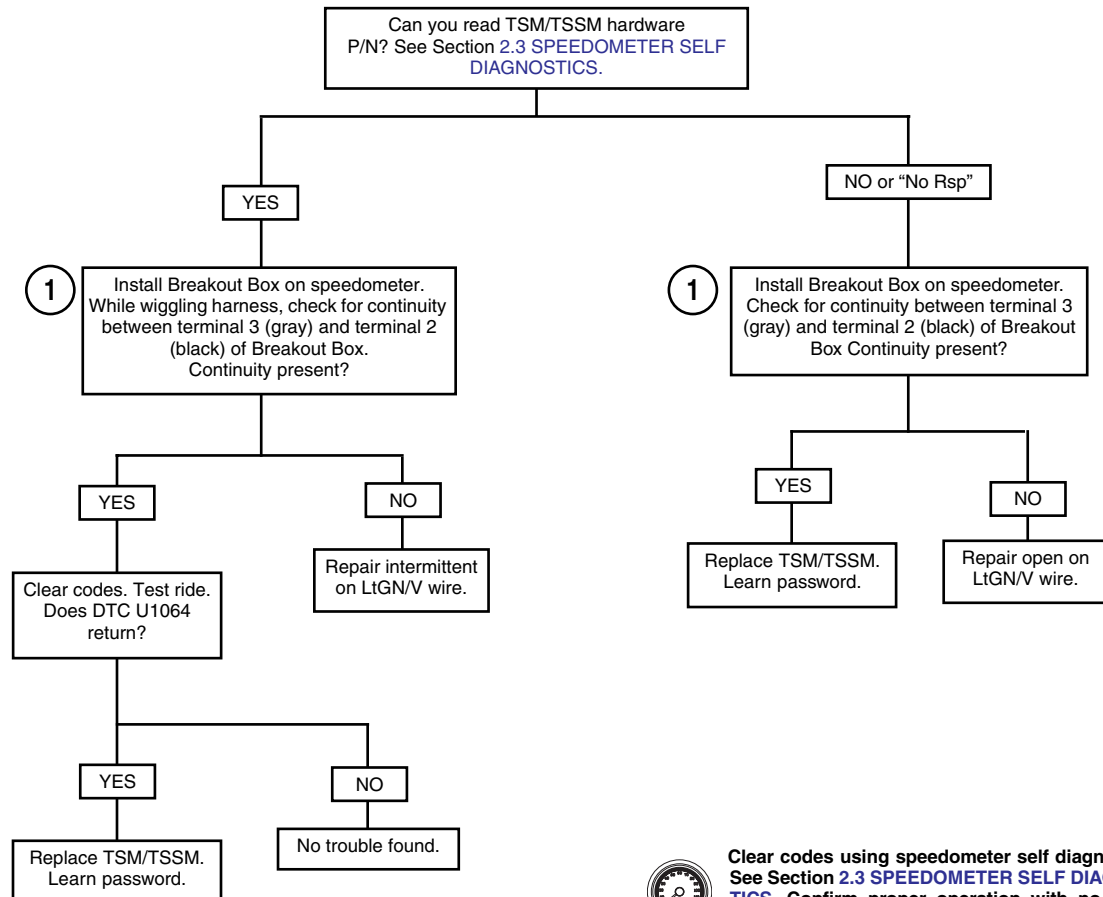


Figure 2-37. Serial Data Circuit: FLHR/C/S (Fuel Injected)

Table 2-25. Wire Harness Connectors in Figure 2-37.

NO.	DESCRIPTION	TYPE	LOCATION
[30]	TSM/TSSM	12-Place Deutsch	Cavity in Crossmember at Rear of Battery Box (Under Seat)
[39]	Speedometer	12-Place Mini-Deutsch	Under Console (Back of Speedometer)
[78]	ECM	36-Place Packard	Under Right Side Cover
[91]	Data Link	4-Place Deutsch	Under Right Side Cover

Test 2.14

LOSS OF TSM/TSSM SERIAL DATA: DTC U1064,
U1255

Clear codes using speedometer self diagnostics. See Section 2.3 SPEEDOMETER SELF DIAGNOSTICS. Confirm proper operation with no check engine lamp.

GENERAL

Serial Data Low or Serial Data Open/High

See [Figure 2-38](#). The typical serial data voltage range is 0 volts (inactive) to 7 volts (active). Due to the short pulse, voltages will be much lower on a DVOM. In analog mode, a DVOM reading serial data will show continuous voltage when active, typically 0.6-0.8 volts. The range for acceptable operations is 0-7.0 volts.

Table 2-26. Code Description

DTC	DESCRIPTION
U1300	Serial data low
U1301	Serial data open/high

DIAGNOSTICS

Diagnostic Tips

- If serial data is shorted, these DTC's will automatically cause the check engine lamp to illuminate. The odometer will read “Bus Er” in this condition.
- DTC's P1009 and P1010 may accompany DTC's U1300 and U1301.
- If a U1300, U1301 or “BUS Er” is present on **carbureted** models, perform diagnostic procedures listed in [Section 4.10 STARTS, THEN STALLS](#).
- If a U1300, U1301 or “BUS Er” is present on **EFI** models, perform diagnostic procedures listed in [Section 5.12 STARTS, THEN STALLS](#).

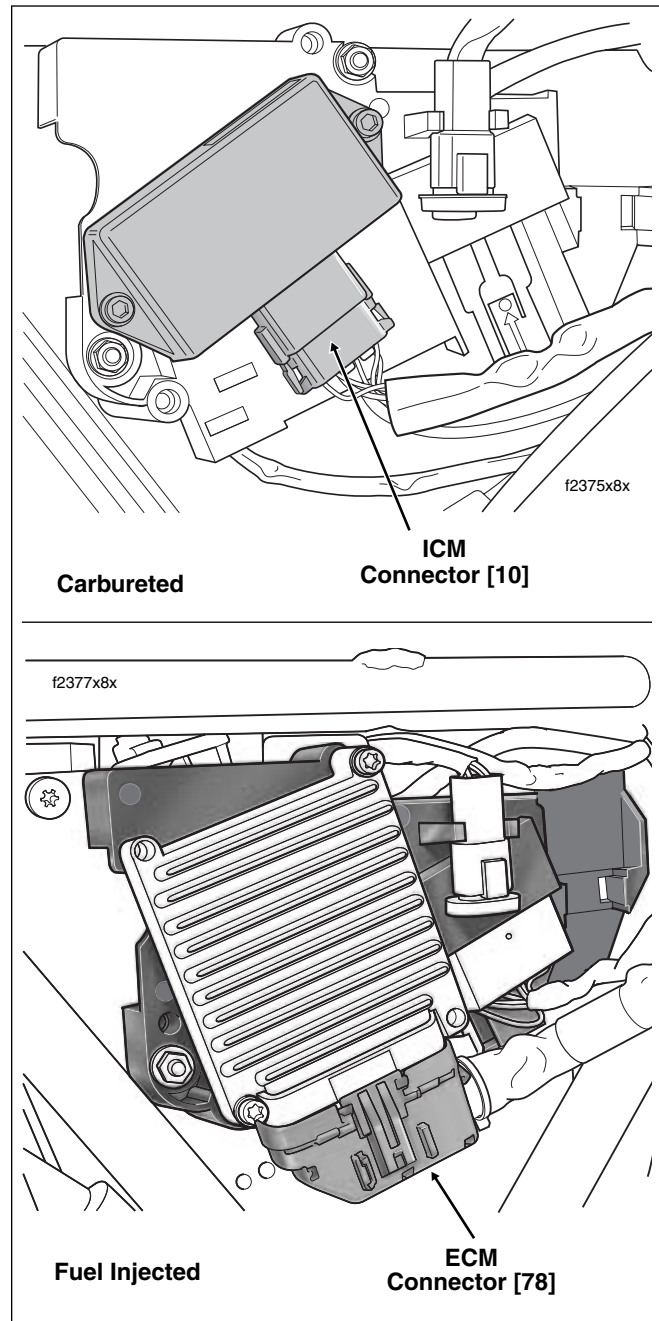


Figure 2-38. Electrical Bracket (Under Right Side Cover)