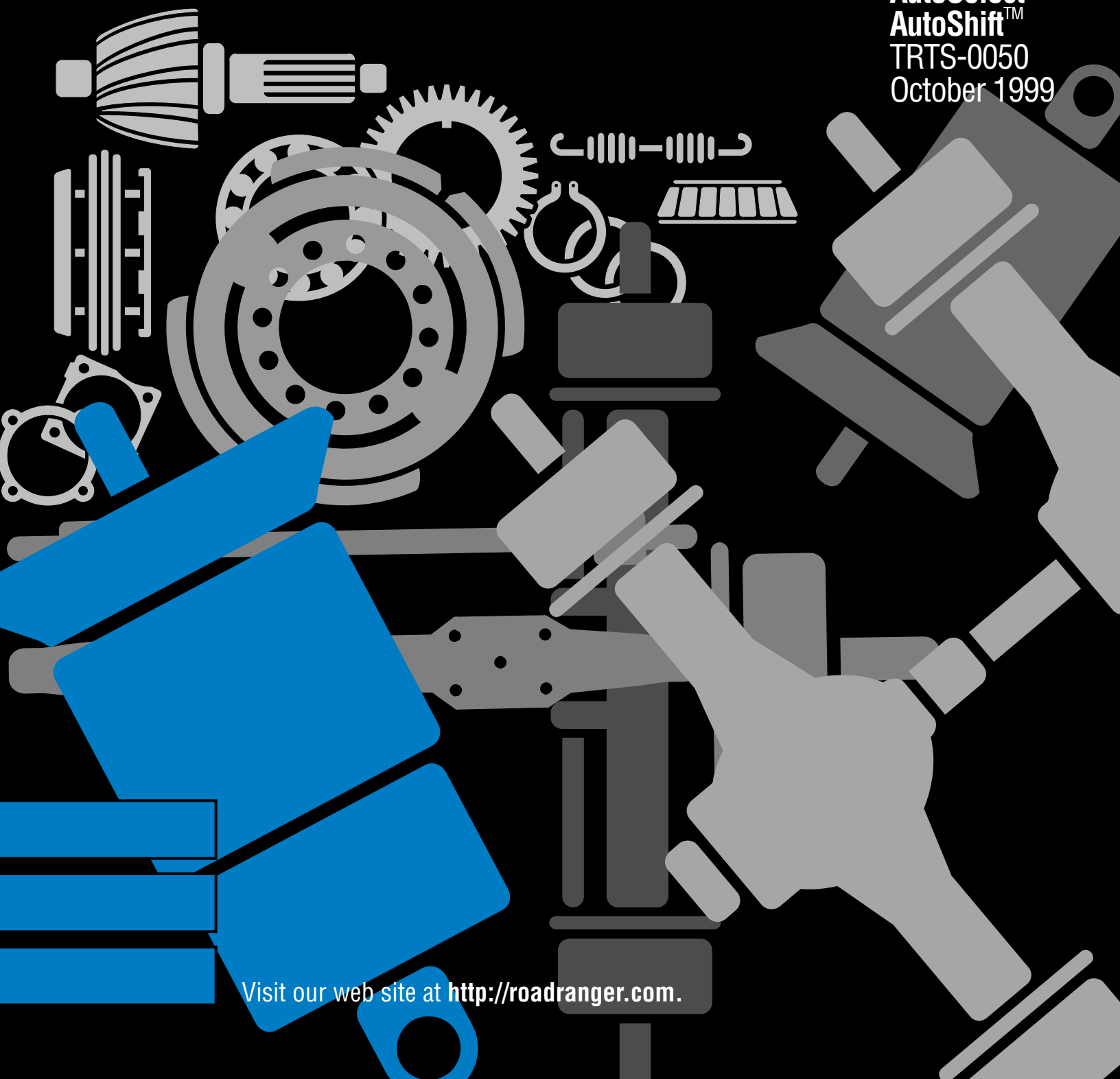
BACK / RETOUR

Eaton® Fuller®
Automated Transmissions

Troubleshooting Guide

AutoSelect™
AutoShift™
TRTS-0050
October 1999



Visit our web site at **http://roadranger.com.**

General Warnings:

Before starting a vehicle:

- Sit in the driver's seat
- Place shift lever in neutral
- Set the parking brake

Before working on a vehicle or leaving the cab with engine running:

- Place shift lever in neutral
- Set the parking brake
- Block the wheels

Do not release the parking brake or attempt to select a gear until the air pressure is at the correct level.

When parking the vehicle or leaving the cab:

- Place shift lever in neutral
- Set the parking brake

To avoid damage to the transmission during towing:

- Place shift lever in neutral
- Lift the drive wheels off of the ground or disconnect the driveline

Do not operate vehicle if alternator lamp is lit or if gauges indicate low voltage.

Suggested Tools:

Pressure Gauges:

- 0-100 PSI Air gauge
- Data Link Tester K-3378

O.E. Tool & Equipment Group/Kent-Moore SPX Corporation

Kent-Moore Part No.	Description
5505027	Volt/Ohm Meter (Standard commercially available VOM)
J-38500-1	Pro-link Main Unit
J-38500-1500C	Multi-Protocol Cartridge (MPC)
J-38500-1300B	MPC Eaton Systems Software v2.0
J-38500-560	J-1939/EPL Software Cartridge
J-38500-60A	6-Pin Deutsch Diagnostic Adapter
J-43318	Eaton Test Adapter Kit

To place orders, contact Kent-Moore at 1-800-328-6657 or fax 1-800-578-7375.

Related Publications

AutoSelect/AutoShift

Installation Guide	Eaton TRIG-0050
Service Manual	Eaton TRSM-0050

AutoSelect

Driver Instructions	Eaton TRDR-0040
Illustrated Parts List	Eaton TRIP-0040 (11710)
	Eaton TRIP-0041 (12710)
	Eaton TRIP-0042 (13710)
	Eaton TRIP-0043 (14710)
	Eaton TRIP-0044 (15710)
	Eaton TRIP-0045 (16710)
	Eaton TRIP-0064 (14710)

AutoShift

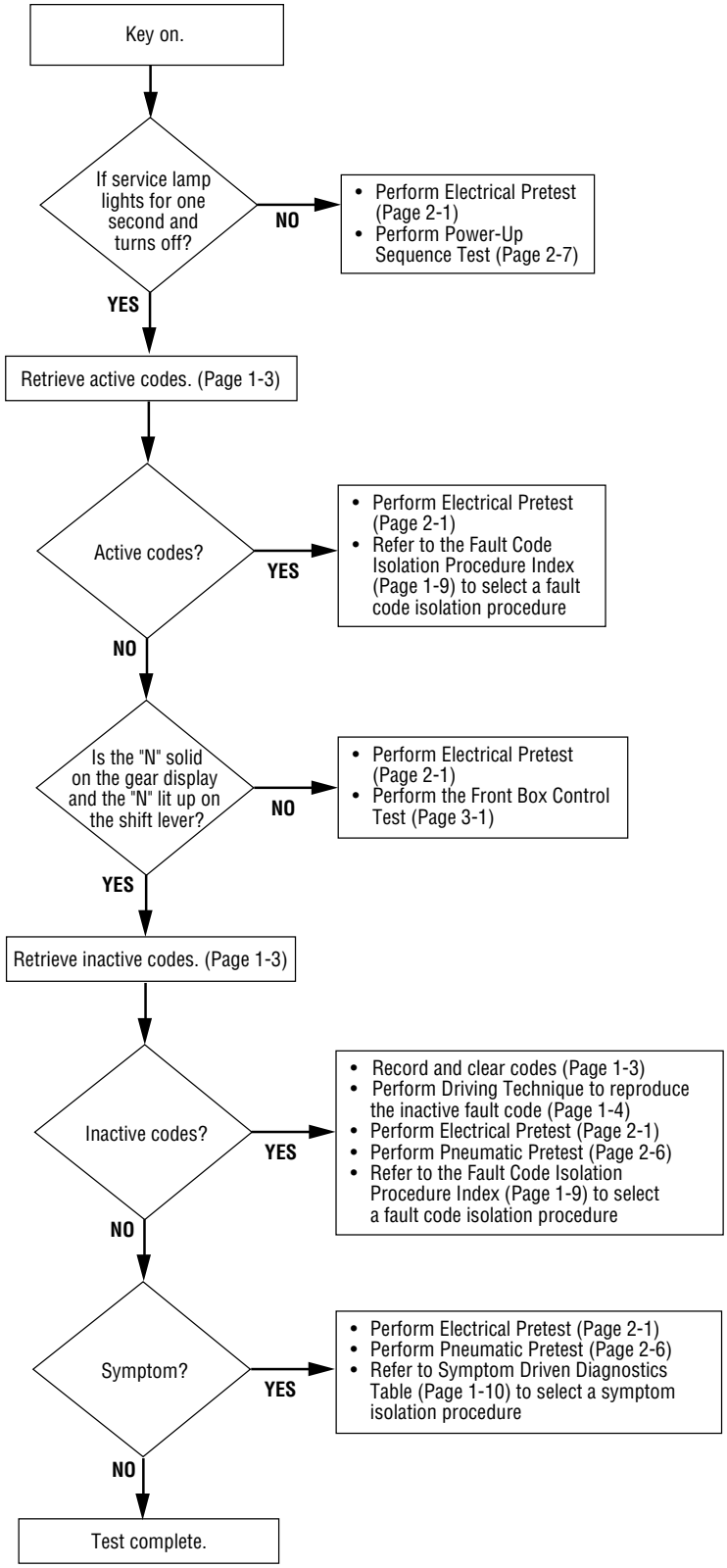
Driver Instructions	Eaton TRDR-0060
Illustrated Parts List	Eaton TRIP-0064 (14710)

For more information call 1-800-826-HELP (826-4357).

Table of Contents

Diagnostics Procedure

Follow the flowchart below for all AutoSelect/AutoShift transmission failures. Perform tests and procedures as directed by the flowchart.



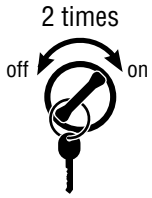
Fault Codes Retrieval/Clearing

Retrieving Fault Codes

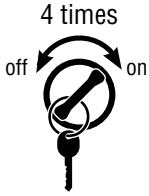
Retrieve AutoSelect/AutoShift fault codes by enabling the AutoSelect/AutoShift system's self-diagnostic mode.

Note: You can also use a diagnostic scan tool, such as the MPSI Pro Link Main, to retrieve AutoSelect/AutoShift fault codes. Refer to the OEM's documentation for more information.

1. Place the shift lever in neutral.
2. Set the parking brakes.
3. Turn the ignition key on but do *not* start the engine.
4. **To Retrieve Active Codes**: Start with the key in the on position. Turn the key off and on two times within five seconds ending with the key in the on position.



To Retrieve Inactive (Intermittent) Codes: Start with the key in the on position. Turn the key off and on four times within five seconds ending with the key in the on position.



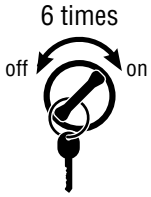
After a brief pause, the service transmission indicator lamp begins flashing two-digit fault codes.

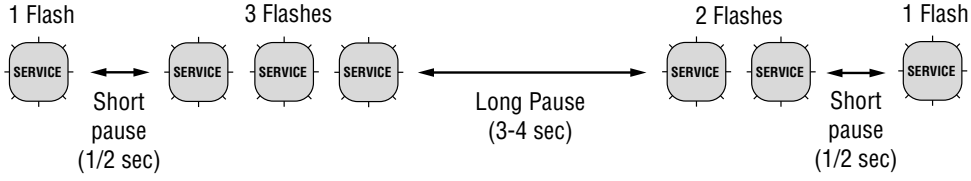
5. Observe the sequence of flashes on the indicator lamp and record the codes. A one to two second pause separates each stored code, and the sequence automatically repeats after all codes have been flashed.

Clearing Fault Codes

The following procedure clears all inactive (intermittent) fault codes from the ECU's memory. (Active fault codes are automatically cleared when the fault has been corrected.)

1. Place the shift lever in neutral.
2. Set the parking brakes.
3. Turn the ignition key on but do *not* start the engine.
4. Start with the key in the on position. Turn the key off and on six times within five seconds ending with the key in the on position.





Code 13 **Code 21**

Driving Techniques

Fault Codes	Hand-Held Code PID	SID	FMI	Description	Type of Code	Driving Technique
11		254	2,12	System Controller	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
12		233	12	Transmission Controller	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
13		236	4,5	Power Connect Relay Coil	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
14		18	12	Shift Lever	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat, vibration and selecting different shift lever positions.
15		57	2	Shift Lever Data Link	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
16		248	2	Eaton Proprietary Link (EPL)	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.

Driving Techniques, continued

Fault Codes	Hand-Held Code PID	SID	FMI	Description	Type of Code	Driving Technique
17		237	4	Start Enable Relay Coil	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
31	62		3,4,5	Engine Brake Relay Coil	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
33	168		4	Battery Voltage Supply	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
35		231	2,7	Engine Control Failure	System	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat, vibration and varying levels of throttle demand.
41		56	7	Range Failed to Engage	System	Operate the vehicle and perform several range upshifts and downshifts. The failure is detected after 5 consecutive attempts to complete the same type of range shift. Several shifts (ten or more) may be necessary before the ECU confirms the failure.
42		61	7	Splitter Failed to Engage	System	Operate the vehicle and perform several splitter upshifts and downshifts. The failure is detected after 5 consecutive attempts to complete the same type of splitter shift. Several shifts (ten or more) may be necessary before the ECU confirms the failure.

Driving Techniques, continued

Fault Codes	Hand-Held Code PID	SID	FMI	Description	Type of Code	Driving Technique
43		35 or 36	3,4,5	Range Solenoid Valve	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
44	54		3,4,5	Inertia Brake Solenoid Coil	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
46		37 or 38	4,5	Splitter Solenoid Valve	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
51	60		2	Rail Select Sensor	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
52	59		2	Gear Select Sensor	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
53		34	2	Reverse Ball Switch	Component	Select a reverse gear (repeatedly).
56	161		2	Input Shaft Speed Sensor	Component	Select a forward gear and drive at a steady speed no slower than 10 mph. It may be necessary to operate the vehicle for a prolonged period of time if the cause of failure is related to heat and vibration.

Driving Techniques, continued

Fault Codes	Hand-Held Code PID	SID	FMI	Description	Type of Code	Driving Technique
57	160		2	Main Shaft Speed Sensor	Component	Select a forward gear and drive at a steady speed no slower than 10 mph. It may be necessary to operate the vehicle for a prolonged period of time if the cause of failure is related to heat and vibration.
58	191		2	Output Shaft Speed Sensor	Component	Select a forward gear and drive at a steady speed no slower than 10 mph. It may be necessary to operate the vehicle for a prolonged period of time if the cause of failure is related to heat and vibration.
61		39	5,6	Rail Select Motor	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
63		40	5,6	Gear Select Motor	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
65		251	4	Low Motor Voltage	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.
71		60	7	Stuck Engaged	System	Engage LO gear and allow the vehicle to slowly move forward. While the vehicle is in motion, move the shift lever to Reverse LO and slowly bring the vehicle to a stop. The vehicle will shift into Reverse LO. Several shifts (ten or more) may be required before ECU confirms the failure.
72		59	7	Failed to Select Rail	System	Complete several shifts while the vehicle is in motion, including selections from neutral. Also allow the transmission to complete several automatic shifts.
73		58	7	Failed to Engage Gear	System	Complete several shifts while the vehicle is in motion, including selections from neutral. Also allow the transmission to complete several automatic shifts.

Driving Techniques, continued

Fault Codes	Hand-Held Code PID	SID	FMI	Description	Type of Code	Driving Technique
74		54	7	Failed to Sync Initial Engagement	System	With vehicle stopped, select a drive gear and fully depress clutch pedal. Return transmission to neutral. Repeat several times.
83		18	14	Shift Lever Missing	Component	Key on. If the fault is present, the system should automatically detect the problem and set the code. If the fault is not present at key on, operate the vehicle and attempt to duplicate the driving conditions that triggered the fault code. Possible triggers include heat and vibration.

Fault Code Isolation Procedure Index

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13		236	4,5	Power Connect Relay Coil	Component	2-14
14		18	12	Shift Lever	Component	2-16
15		57	2	Shift Lever Data Link	Component	2-18
16		248	2	Eaton Proprietary Link (EPL)	Component	2-22
17		237	4	Start Enable Relay Coil	Component	2-28
31	62		3,4,5	Engine Brake Relay Coil	Component	2-30
33	168		4	Battery Voltage Supply	Component	2-32
35		231	2,7	Engine Control Failure	System	2-34
41		56	7	Range Failed to Engage	System	2-38
42		61	7	Splitter Failed to Engage	System	2-42
43		35 or 36	3,4,5	Range Solenoid Valve	Component	2-46
44	54		3,4,5	Inertia Brake Solenoid Coil	Component	2-50
46		37 or 38	4,5	Splitter Solenoid Valve	Component	2-54
51	60		2	Rail Select Sensor	Component	2-58
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Symptom Driven Diagnostics

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Engine does not start with shift lever in neutral	Start Enable Relay Contact Test	3-16
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Starting and reverse gears only	J-1939 Data Link Test	3-22
Only HI or LO range gears available	Auxiliary Box Test	3-24
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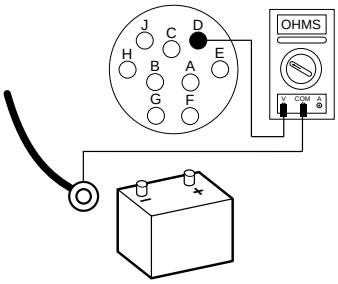
Shift complaint	Shift Complaint Test	3-32

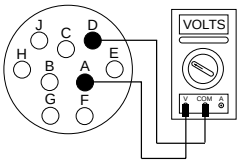
Electrical Pretest

Step A	Procedure	Condition	Action
	1. Key off. 2. Measure voltage across battery.	If voltage is 11 to 13 volts	Go to **Step B**.
		If voltage is outside of range	Repair of replace batteries and/or charging system as required. Repeat this step.

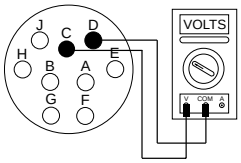
Step B	Procedure	Condition	Action
	1. Locate service port. 2. Key off. 3. Disconnect negative (–) battery cable. 4. Measure resistance between service port pin D and negative battery cable.	If resistance is 0 to .3 ohms	Go to **Step C**.
		If resistance is outside of range	Repair ground path for transmission. Repeat this step. **Note:** See Appendix pages A-2 through A-9 for typical ground path diagram.



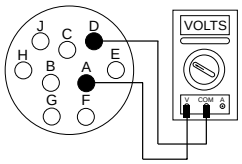
Step C	Procedure	Condition	Action
	1. Key off. 2. Reconnect negative (–) battery cable 3. Measure voltage across service port pins A and D.	If voltage is less than 1 volt	Go to **Step D**.
		If voltage is outside of range	Constant ignition power, repair ignition supply to transmission. Repeat this step.

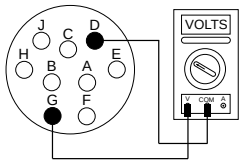


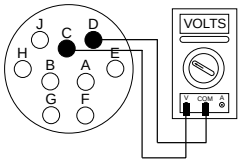
Step D	Procedure	Condition	Action
	1. Key off. 2. Measure voltage across service port pins D and C.	If voltage is less than 1 volt	Go to **Step E**.
		If voltage is outside of range	Go to **Step H**.

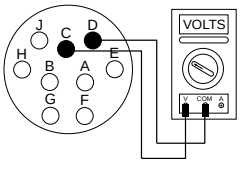


Electrical Pretest, continued

Step E	Procedure	Condition	Action
	1. Key on. 2. Measure voltage across service port pins A and D. 	If voltage is within 1 volt of battery voltage	Go to **Step F**.
		If voltage is outside of range	No ignition power, repair ignition power supply to transmission. Repeat this step.

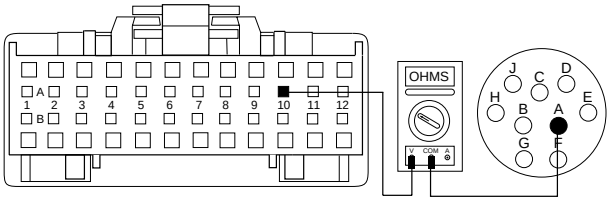
Step F	Procedure	Condition	Action
	1. Key on. 2. Measure voltage across service port pins G and D. 	If voltage is within 2 volts of battery voltage	Go to **Step G**.
		If voltage is outside of range	Go to **Step I**.

Step G	Procedure	Condition	Action
	1. Key on. 2. Measure voltage across service port pins C and D. 	If voltage is within 1 volt of battery voltage	Test complete.
		If voltage is outside of range	Go to **Step K**.

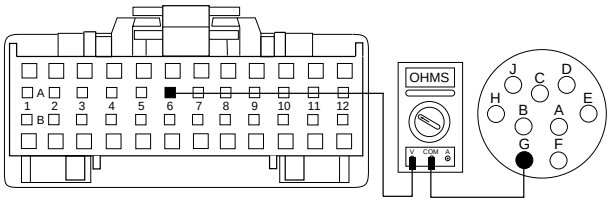
Step H	Procedure	Condition	Action
	1. Key off. 1. Remove power connect relay. 2. Measure voltage across service port pins D and C. 	If voltage is within 1 volt of battery voltage	Constant battery power, repair battery supply to transmission. Go to **Step D**.
		If voltage is outside of range	Replace power connect relay. Go to **Step D**.

Electrical Pretest, continued

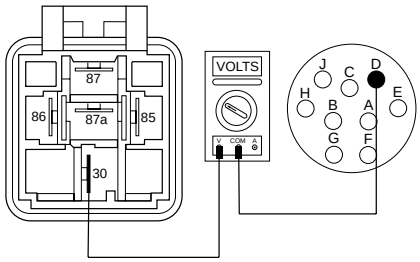
Step I	Procedure	Condition	Action
	1. Disconnect system manager 24-way connector. 2. Measure resistance between system manager 24-way connector pin A10 and service port pin A.	If resistance is 0 to .3 ohms	Go to **Step J**.
		If resistance is outside of range	Repair or replace tower harness as required. Repeat this step.



Step J	Procedure	Condition	Action
	1. Measure resistance between system manager 24-way connector pin A6 and service port pin G.	If resistance is 0 to .3 ohms	Replace system manager ECU. Go to **Step D**.
		If resistance is outside of range	Repair or replace tower harness as required. Go to **Step D**.

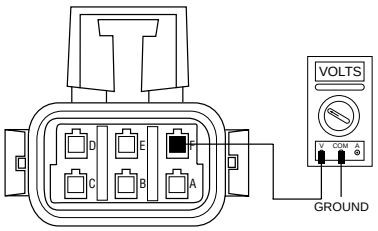


Step K	Procedure	Condition	Action
	1. Disconnect power connect relay connector. 2. Measure voltage between power connect relay connector pin 30 and service port pin D.	If voltage is within 1 volt of battery voltage	Replace power connect relay. Repeat this step.
		If voltage is outside of range	Go to **Step L**.

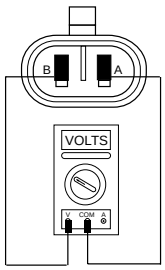


Electrical Pretest, continued

Step L	Procedure	Condition	Action
	1. Reconnect power connect relay connector. 2. Disconnect transmission harness from transmission interface harness. 3. Measure voltage between transmission harness pin F and ground.	If voltage is within 1 volt of battery voltage	Repair vehicle interface harness as required. Go to **Step D**.
		If voltage is outside of range	Go to **Step M**.



Step M	Procedure	Condition	Action
	1. Disconnect power interface module connector at transmission harness. 2. Measure voltage between power interface module connector pins.	If voltage is within 1 volt of battery voltage	Repair or replace transmission harness as required. Go to **Step D**.
		If voltage is outside of range	Go to **Step N**.



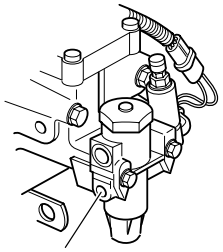
Electrical Pretest, continued

Step N	Procedure	Condition	Action
	1. Check battery and ground supply to power module →	If battery and ground connections are okay →	Replace power module. Go to **Step V**.
		If battery and ground connections are not okay →	Repair connections and retest.

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Attempt to reproduce symptom. 6. Check symptom. →	If no symptom →	Test complete.
		If symptom appears →	Return to **Step A** to find error in testing.
		If other code or symptom appears →	Go to Diagnostics Procedure (page 1-2).

Pneumatic Pretest

Step A	Procedure	Condition	Action
	1. Key off. 2. Install a 0 to 100 PSI air gauge in the regulated test port of the air filter/regulator. 3. Start engine and allow air pressure to build to governor cut-off. →	If air pressure cuts off at 90 to 120 PSI →	Go to **Step B**.
		If air pressure is outside of range →	Repair vehicle air system as required. Repeat this step.



Step B	Procedure	Condition	Action
	1. Key off. 2. Monitor air pressure. →	If vehicle maintains air pressure →	Go to **Step C**.
		If vehicle loses air pressure →	Repair vehicle air system as required. Repeat this step.

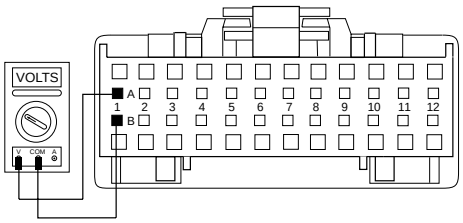
Step C	Procedure	Condition	Action
	1. Read air pressure guage installed at the regulated port. →	If air pressure is 55 to 65 PSI →	Test complete.
		If air pressure is outside of range →	Go to **Step D**.

Step D	Procedure	Condition	Action
	1. Remove air supply line to the air filter/regulator and check air flow. →	If air flows from the supply line →	Replace air filter/regulator. Go to **Step C**.
		If air does not flow from the supply line →	Repair vehicle air supply to the regulator. Go to **Step C**.

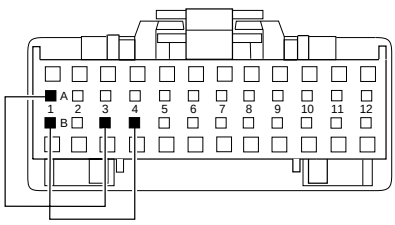
Power-Up Sequence Test

Step A	Procedure	Condition	Action
	1. Key on. 2. Observe service lamp.	If service lamp lights for one second and goes off	Test complete.
		If service lamp never comes on	Go to **Step B**.
		If service lamp is on steady	Replace Eaton supplied shift tower. If vehicle has the System Manager ECU mounted in a separate location from the Shift Lever, go to **Step C.**

Step B	Procedure	Condition	Action
	1. Key off. 2. Disconnect shift lever 24-way connector. 3. Key on. 4. Measure voltage between shift lever 24-way connector pins A1 and B1.	If voltage is within 1 volt of battery voltage	Replace shift lever Go to **Step A**.
		If voltage is outside of range	Repair or replace tower harness. Go to **Step A**.

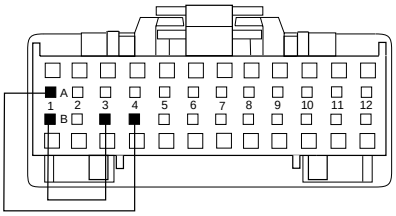


Step C	Procedure	Condition	Action
	1. Connect hand-held diagnostic tool to transmission diagnostic port. 2. Select monitor data and view "TRANS_RNG_SEL". 3. Disconnect shift lever 24-way connector. 4. Place a jumper between shift lever 24-way connector pins: • A1 and B3 • B1 and B4	If TRANS_RNG_SEL reads "HI"	Go to **Step D**.
		If hand-held diagnostic tool does not read as described above	Go to **Step E**.



Power-Up Sequence Test, continued

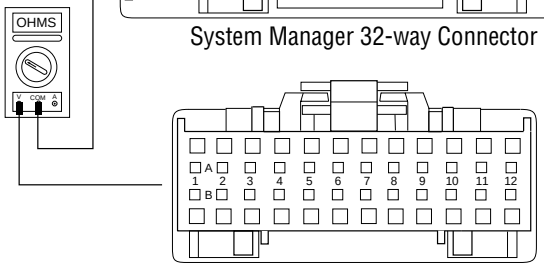
Step D	Procedure	Condition	Action
	1. Remove jumpers. 2. Place a jumper between shift lever 24-way connector pins: • B1 and B3 • A1 and B4	If TRANS_RNG SEL reads "LO" →	Replace shift lever. Go to **Step A**.
		If hand-held diagnostic tool does not read as described above →	Go to **Step E**.



Step E	Procedure	Condition	Action
	1. Remove system manager 32-way connector. 2. Measure resistance between system manager 32-way connector pins and shift lever 24-way connector pins:	If resistance for each measurement is 0 to .3 ohms →	Replace system manager ECU. Go to **Step A**.
		If any measurement is outside of range →	Repair or replace tower harness as required. Go to **Step A**.

32-way		24-way
D8	and	B8
C8	and	B7
D9	and	B6
C9	and	B5
C13	and	B4
C13	and	B3

System Manager 32-way Connector



Shift Lever 24-way Connector

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Component Code 11 (Hand-Held Code 254) System Controller

Fault Description

This code indicates an internal failure of the system manager ECU.

Required Tools

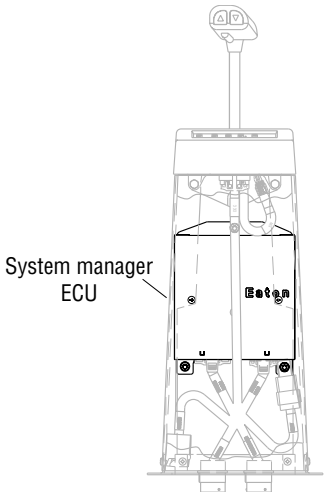
- Basic Hand Tools
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Improper configuration software
- Faulty system manager ECU

Likely Failed Components



Code 11 (Hand-Held Code 254), System Controller Test

Step A	Procedure	Condition	Action
	1. Key on. 2. Retrieve codes (see page 1-3). →	If code 11 is active →	Replace system manager ECU.
		If code 11 is inactive →	Test complete.

Component Code 12 (Hand-Held Code 233) Transmission ECU

Fault Description

This code indicates an internal failure of the transmission ECU.

Required Tools

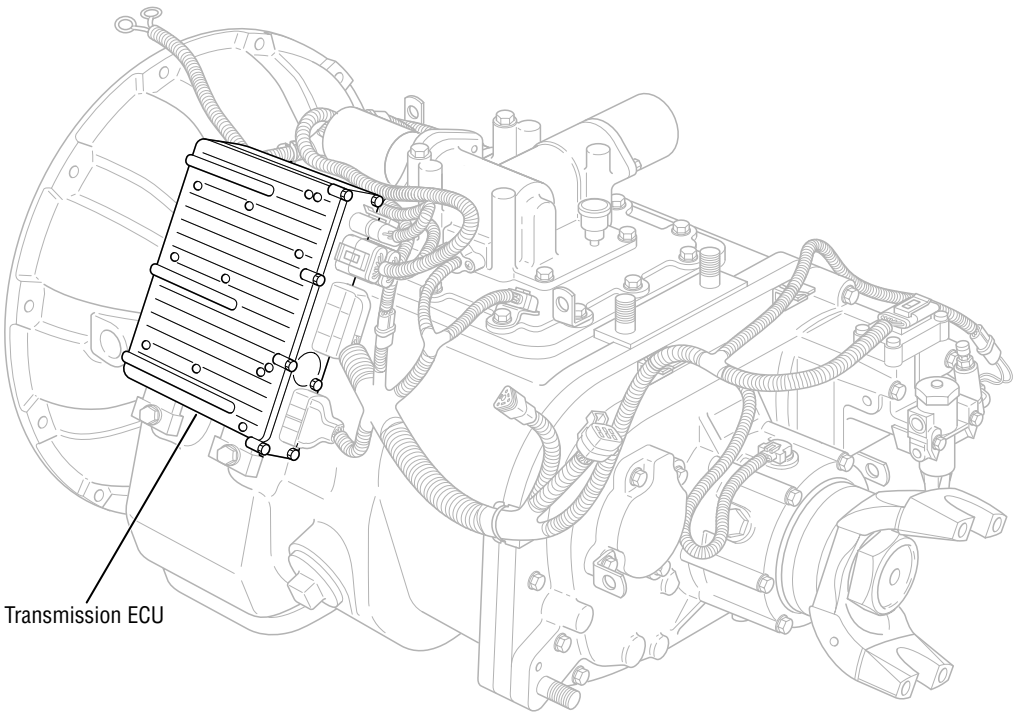
- Basic Hand Tools
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Improper configuration software
- Faulty transmission ECU

Likely Failed Components



Code 12 (Hand-Held Code 233), Transmission ECU Test

Step A	Procedure	Condition	Action
	1. Key on. 2. Retrieve codes (see page 1-3). →	If code 12 is active →	Replace transmission ECU.
		If code 12 is inactive →	Test complete.

Component Code 13 (Hand-Held Code 236) Power Connect Relay Coil

Fault Description

This code indicates an electrical failure of the relay used to distribute power throughout the transmission system.

Required Tools

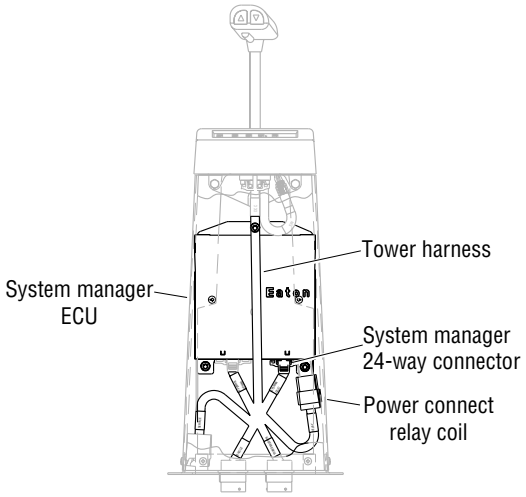
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

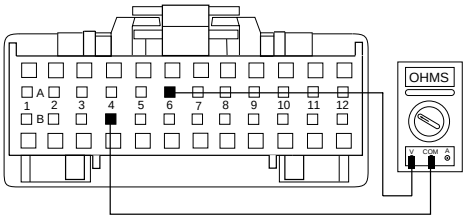
- System manager ECU
- Tower harness
- Power connect relay

Likely Failed Components

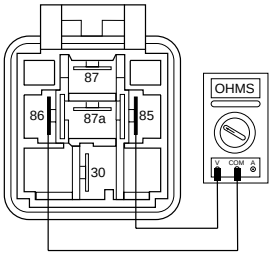


Code 13 (Hand-Held Code 236), Power Connect Relay Coil Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect system manager 24-way connector. 3. Measure resistance between system manager 24-way connector pins A6 and B4.	If resistance is 40 to 90 ohms	Replace system manager ECU. Go to **Step V**.
		If resistance is outside of range	Go to **Step B**.



Step B	Procedure	Condition	Action
	1. Remove power connect relay connector from tower harness. 2. Measure resistance between power connect relay pins 85 and 86.	If resistance is 40 to 90 ohms	Repair or replace tower harness. Go to **Step V**.
		If resistance is outside of range	Replace power connect relay. Go to **Step V**.



Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3).	If no codes	Test complete.
		If code 13 appears	Return to **Step A** to find error in testing.
		If code other than 13 appears	Go to Fault Isolation Procedure Index (page 1-9).

Component Code 14 (Hand-Held Code 18) Shift Lever

Fault Description

This code indicates an internal failure of the shift lever.

Required Tools

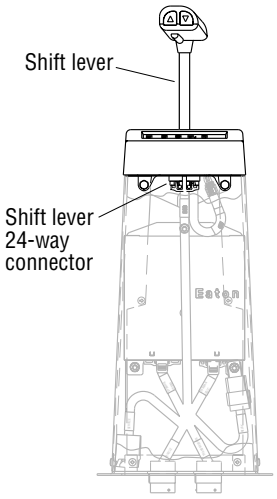
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

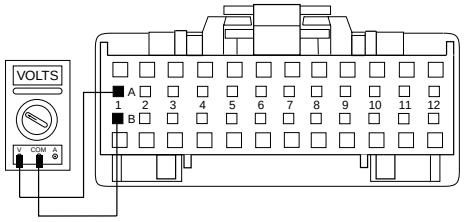
- Malfunctioning shift lever

Likely Failed Components



Code 14 (Hand-Held Code 18), Shift Lever Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect shift lever 24-way connector. 3. Key on. 4. Measure voltage across shift lever 24-way connector pins A1 and B1. →	If voltage is within 1 volt of battery voltage →	Replace shift lever. Go to **Step V**.
		If voltage is outside of range →	Repair ignition supply to shift lever. Go to **Step V**.



Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 14 appears →	Return to **Step A** to find error in testing.
		If code other than 14 appears →	Go to Fault Isolation Procedure Index (page 1-9).

Component Code 15 (Hand-Held Code 57) Shift Lever Data Link

Fault Description

This code indicates that the system manager ECU and the shift lever are unable to communicate.

Required Tools

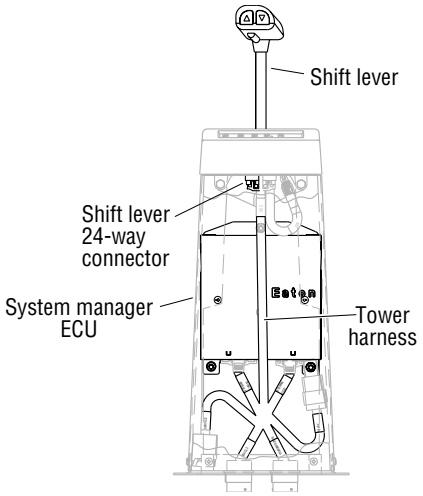
- Basic Hand Tools
- Hand-Held Diagnostic Tool
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Damaged shift lever data link
- Malfunctioning shift lever
- Malfunctioning system manager ECU

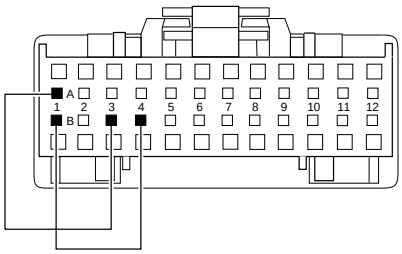
Likely Failed Components



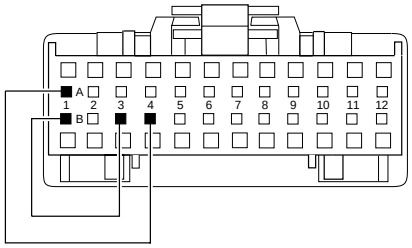
Code 15 (Hand-Held 57), Shift Lever Data Link Test

Step A	Procedure	Condition	Action
	1. Key on. 2. Check for codes (see Retrieving Fault Codes, page 1-3)	If code 15 is active	Replace Eaton supplied shift tower. If vehicle has the system manager ECU mounted in a separate location from the shift lever, go to **Step B.**
		If code 15 is inactive	Test complete.

Step B	Procedure	Condition	Action
	1. Key off. 2. Connect hand-held diagnostic tool to transmission diagnostic port. 3. Select monitor data and view "TRANS_RNG_SEL". 4. Disconnect shift lever 24-way connector. 5. Place a jumper between shift lever 24-way connector pins: • A1 and B3 • B1 and B4	If TRANS_RNG_SEL reads "HI"	Go to **Step C.**
		If hand-held diagnostic tool does not read as described above	Go to **Step D.**



Step C	Procedure	Condition	Action
	1. Remove jumpers. 2. Place a jumper between shift lever 24-way connector pins: • B1 and B3 • A1 and B4	If TRANS_RNG SEL reads "LO"	Replace shift lever. Go to **Step V**.
		If hand-held diagnostic tool does not read as described above	Go to **Step D.**



Code 15 (Hand-Held Code 57), Shift Lever Data Link Test, continued

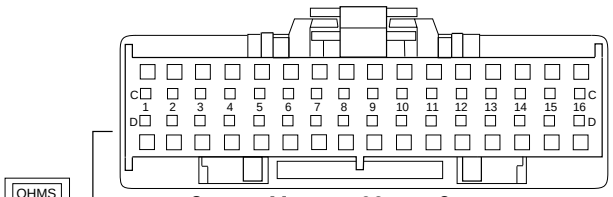
Step D	Procedure	Condition	Action

1. Disconnect system manager 32-way connector.
2. Measure resistance between system manager 32-way connector pins and shift lever 24-way connector pins:

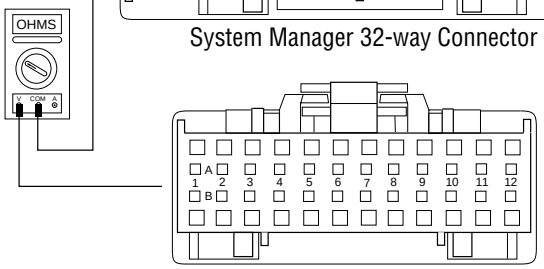
32-way		24-way
D8	and	B8
C8	and	B7
D9	and	B6
C9	and	B5
C13	and	B4
C13	and	B3

→ If resistance for each measurement is 0 to .3 ohms → Replace system manager ECU. Go to **Step V**.

If any measurement is outside of range → Repair or replace tower harness as required. Go to **Step V**.



System Manager 32-way Connector



Shift Lever 24-way Connector

Step V	Procedure	Condition	Action

1. Key off.
2. Reconnect all connectors.
3. Key on.
4. Clear codes (see Clearing Fault Codes, page 1-3).
5. Use Driving Technique to attempt to reset the code (page 1-4).
6. Check for codes (see Retrieving Fault Codes, page 1-3). →

If no codes → Test complete.

If code 15 appears → Return to **Step B** to find error in testing.

If code other than 15 appears → Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 16 (Hand-Held Code 248) Eaton Proprietary Link (EPL)

Fault Description

This code indicates that the system manager ECU and the transmission ECU are unable to communicate.

Required Tools

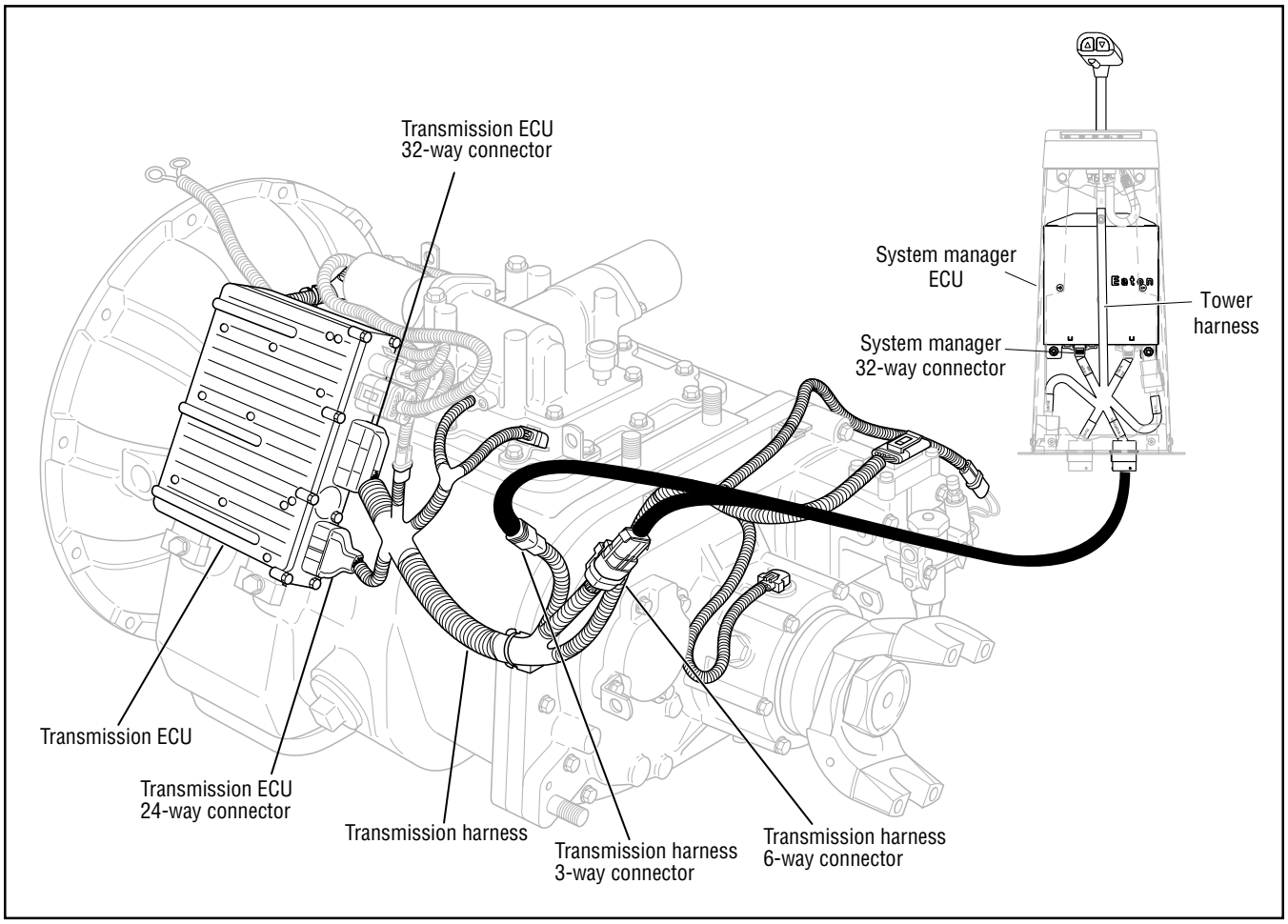
- Basic Hand Tools
- Hand-Held Diagnostic Tool
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide
- Data Link Tester

Possible Causes

This code can be caused by any of the following conditions:

- Damaged transmission interface harness
- Damaged transmission harness
- Damaged tower or OEM harness
- Malfunctioning transmission ECU
- Malfunctioning system manager ECU

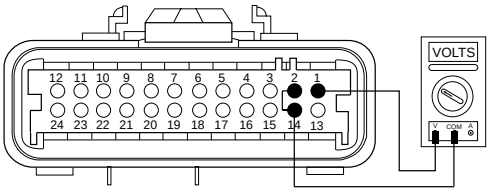
Likely Failed Components



Code 16 (Hand-Held Code 248), Eaton Proprietary Link Test

Step A	Procedure	Condition	Action

1. Key off.
2. Disconnect transmission ECU 24-way connector.
3. Place a jumper between transmission ECU 24-way connector pins 2 and 14.
4. Key on.
5. Measure voltage across transmission ECU 24-way connector pins 1 and 14.

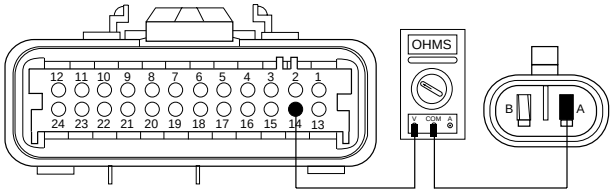


→ If voltage is within 1 volt of battery voltage → Go to **Step C**.

If voltage is outside of range → Go to **Step B**.

Step B	Procedure	Condition	Action

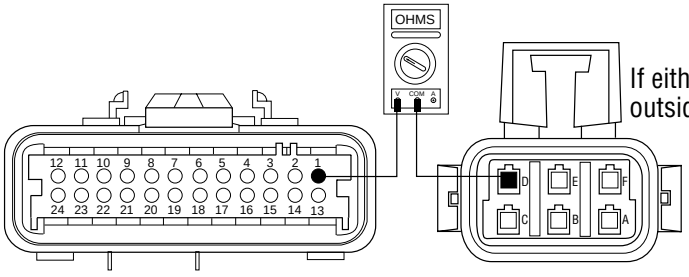
1. Remove jumper.
2. Disconnect transmission harness from transmission interface harness.
3. Disconnect power interface module from transmission harness.
4. Measure resistance between transmission ECU 24-way connector pin 14 and power interface module connector pin A on transmission harness.



5. Measure resistance between transmission harness 6-way connector pin D and transmission ECU 24-way connector pin 1.

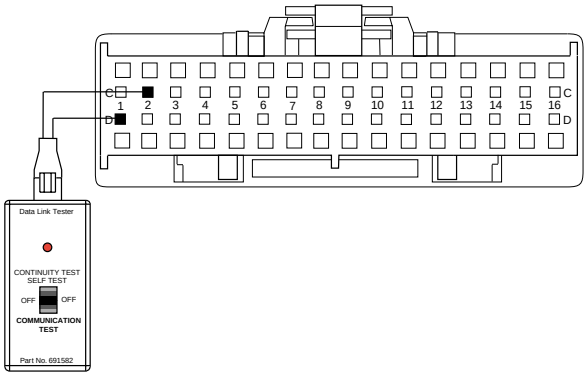
→ If both measurements are 0 to .3 ohms → Repair or replace vehicle interface harness or tower harness. Go to **Step V**.

If either measurement is outside of range. → Repair of replace transmission harness as required. Go to **Step V**.

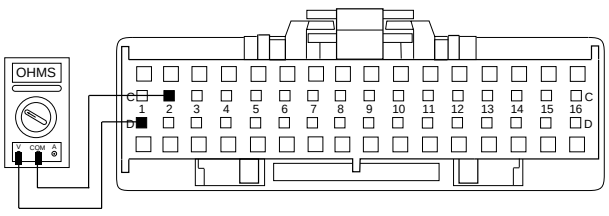


Code 16 (Hand-Held Code 248), Eaton Proprietary Link Test, continued

Step C	Procedure	Condition	Action
	1. Reconnect transmission ECU 24-way connector. 2. Key off. Allow transmission to power down. 3. Disconnect system manager 32-way connector. 4. Connect data link tester to system manager 32-way connector pins C2 and D1. 5. Key on. 6. Start EPL Communication Test.	→ If test passes	→ Replace system manager ECU. Go to **Step V**.
		If test fails	→ Go to **Step D**.

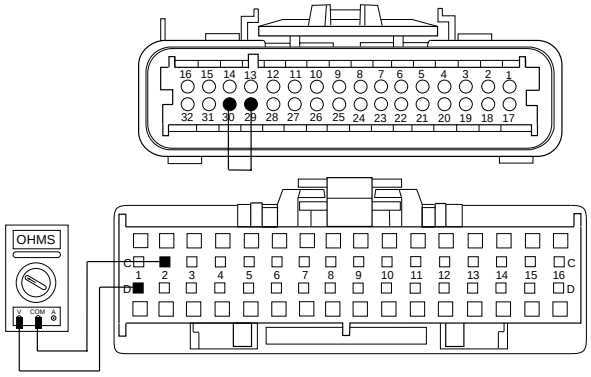


Step D	Procedure	Condition	Action
	1. Key off. Allow transmission to power down. 2. Disconnect transmission ECU 32-way connector. 3. Remove EPL tester from system manager 32-way connector. 4. Measure resistance between system manager 32-way connector pins C2 and D1 and from each pin to ground.	→ If resistance for each measurement is more than 10K ohms or open circuit [OL]	→ Go to **Step E**.
		If resistance of any measurement is less than 10K ohms	→ Go to **Step F**.

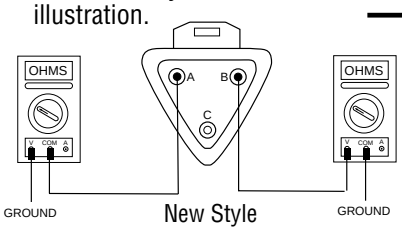


Code 16 (Hand-Held Code 248), Eaton Proprietary Link Test, continued

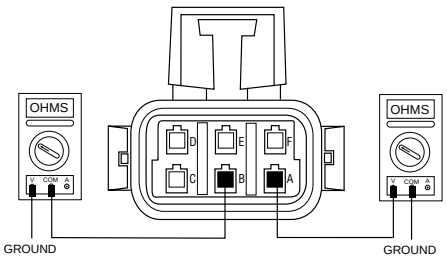
Step E	Procedure	Condition	Action
	1. Place a jumper across transmission ECU 32-way connector pins 29 and 30. 2. Measure resistance between system manager 32-way connector pins C2 and D1.	If resistance is 0 to .3 ohms	Replace transmission ECU. Go to **Step V**.
		If resistance is outside of range	Go to **Step F**.



Step F	Procedure	Condition	Action
	1. Reconnect system manager 32-way connector. 2. Disconnect transmission harness 3-way connector from transmission interface harness. 3. Remove any jumper wires currently in place. 4. Measure resistance between transmission harness 3-way connector pins A and B and from each pin to ground. **Note**: Depending on which connector you have, refer to either the old style or the new style connector illustration.	If resistance for each measurement is more than 10K ohms or open circuit [OL]	Go to **Step G**.
		If resistance of any measurement is less than 10K ohms	Repair or replace transmission harness. Go to **Step V**.



New Style



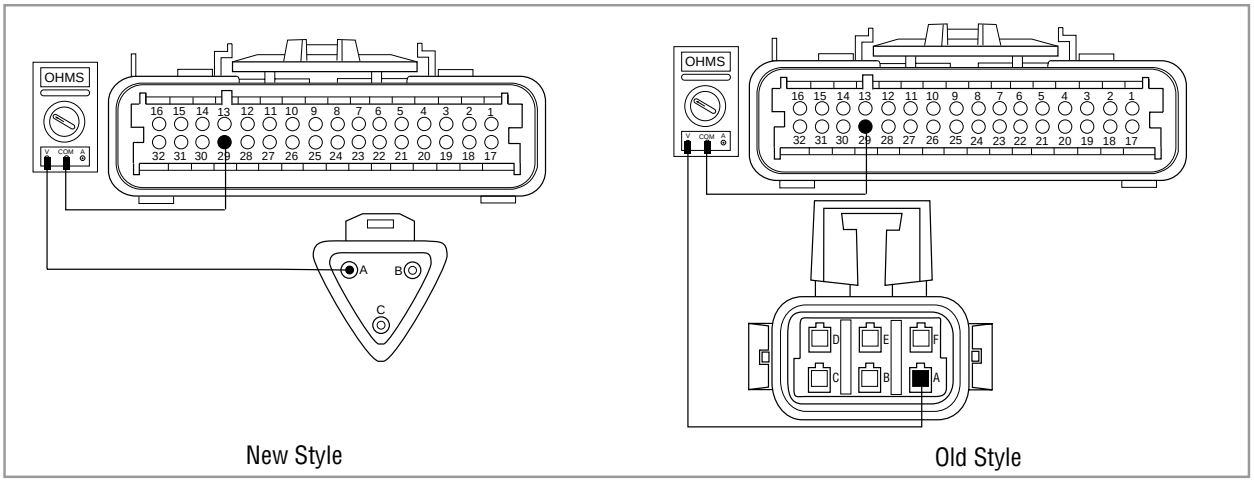
Old Style

Code 16 (Hand-Held Code 248), Eaton Proprietary Link Test, continued

Step G	Procedure	Condition	Action

1. Measure resistance between transmission ECU 32-way connector pin 29 and transmission harness 3-way connector pin A.

Note: Depending on which connector you have, refer to either the old style or the new style connector illustration.

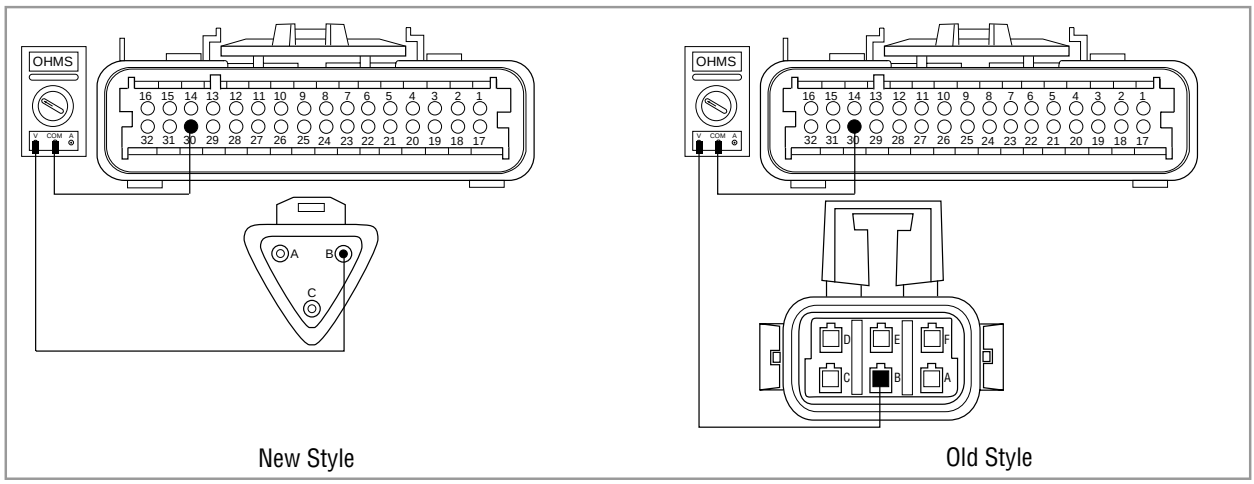


New Style — Old Style

2. Measure resistance between transmission ECU 32-way connector pin 30 and transmission harness 3-way connector pin B.

→ If both measurements are 0 to .3 ohms → Repair OEM wiring from system manager ECU to transmission. Go to **Step V**.

If either measurement is outside of range → Repair or replace transmission harness. Go to **Step V**.



New Style — Old Style

Code 16 (Hand-Held Code 248), Eaton Proprietary Link Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 16 appears →	Return to **Step A** to find error in testing.
		If code other than 16 appears →	Go to Fault Isolation Procedure Index (page 1-9).

Component Code 17 (Hand-Held Code 237) Start Enable Relay Coil

Fault Description

This code indicates an electrical failure of the relay used to allow the engine to start.

Required Tools

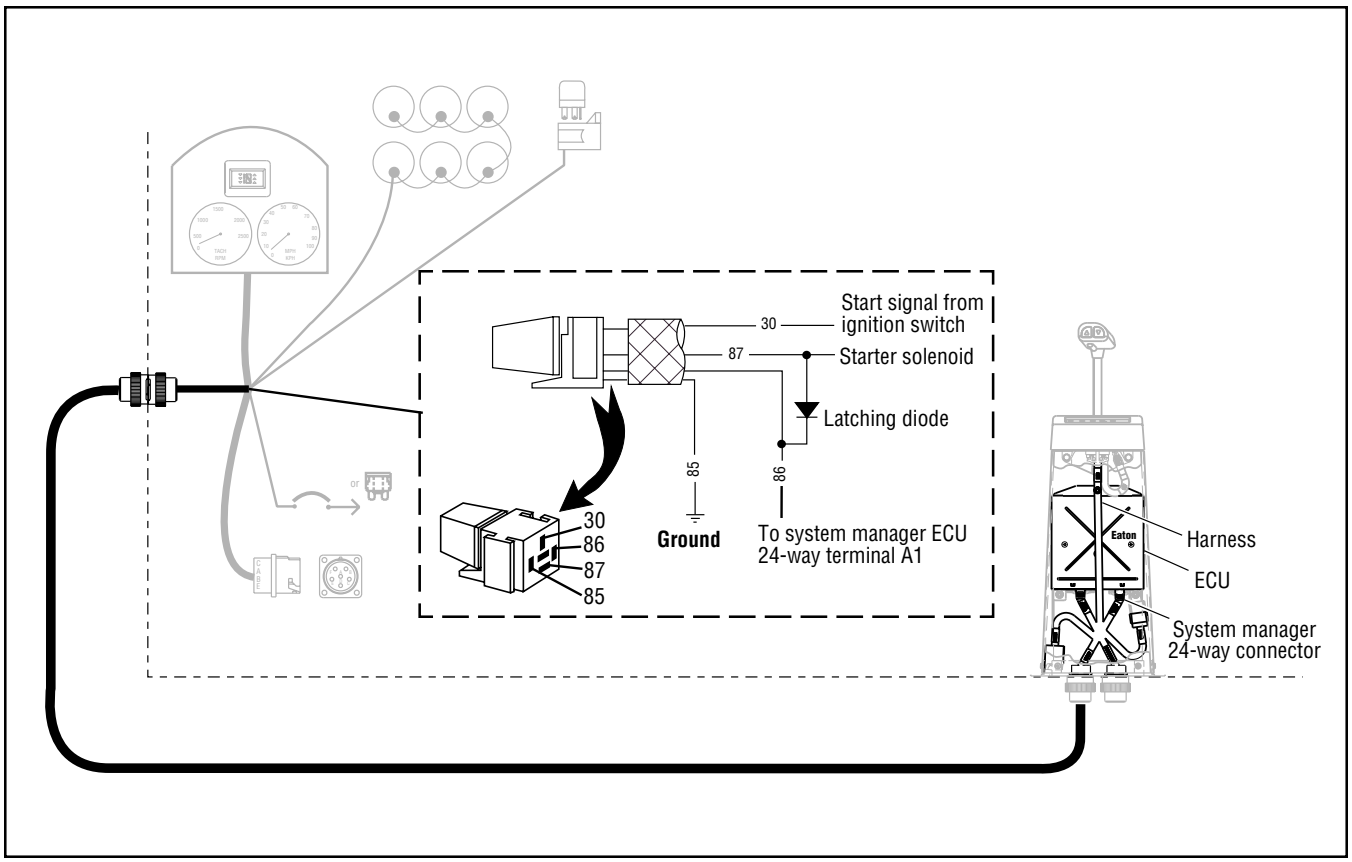
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

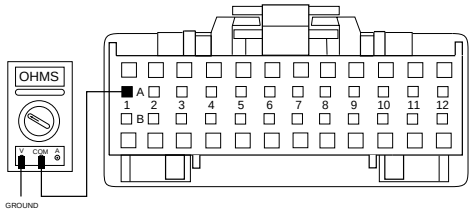
- Relay coil open or shorted
- Damaged tower or OEM harness
- Malfunctioning system manager ECU

Likely Failed Components

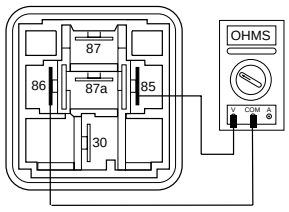


Code 17 (Hand-Held Code 237), Start Enable Relay Coil Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect system manager 24-way connector. 3. Measure resistance between system manager 24-way connector pin A1 and ground.	→ If resistance is 40 to 120 ohms	→ Replace system manager ECU. Go to **Step V**.
		If resistance is outside of range	→ Go to **Step B**.



Step B	Procedure	Condition	Action
	1. Remove start enable relay from OEM dash harness. 2. Measure resistance between start enable relay pins 85 and 86.	→ If resistance is 40 to 120 ohms	→ Repair OEM wiring from system manager ECU to start enable relay. Go to **Step V**.
		If resistance is outside of range	→ Replace start enable relay. Go to **Step V**.



Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3).	→ If no codes	→ Test complete.
		If code 17 appears	→ Return to **Step A** to find error in testing.
		If code other than 17 appears	→ Go to Fault Isolation Procedure Index (page 1-9).

Component Code 31 (Hand-Held Code 62) Engine Brake Relay Coil

Fault Description

This code indicates an electrical failure of the relay used to inhibit the engine brake during shifts.

Required Tools

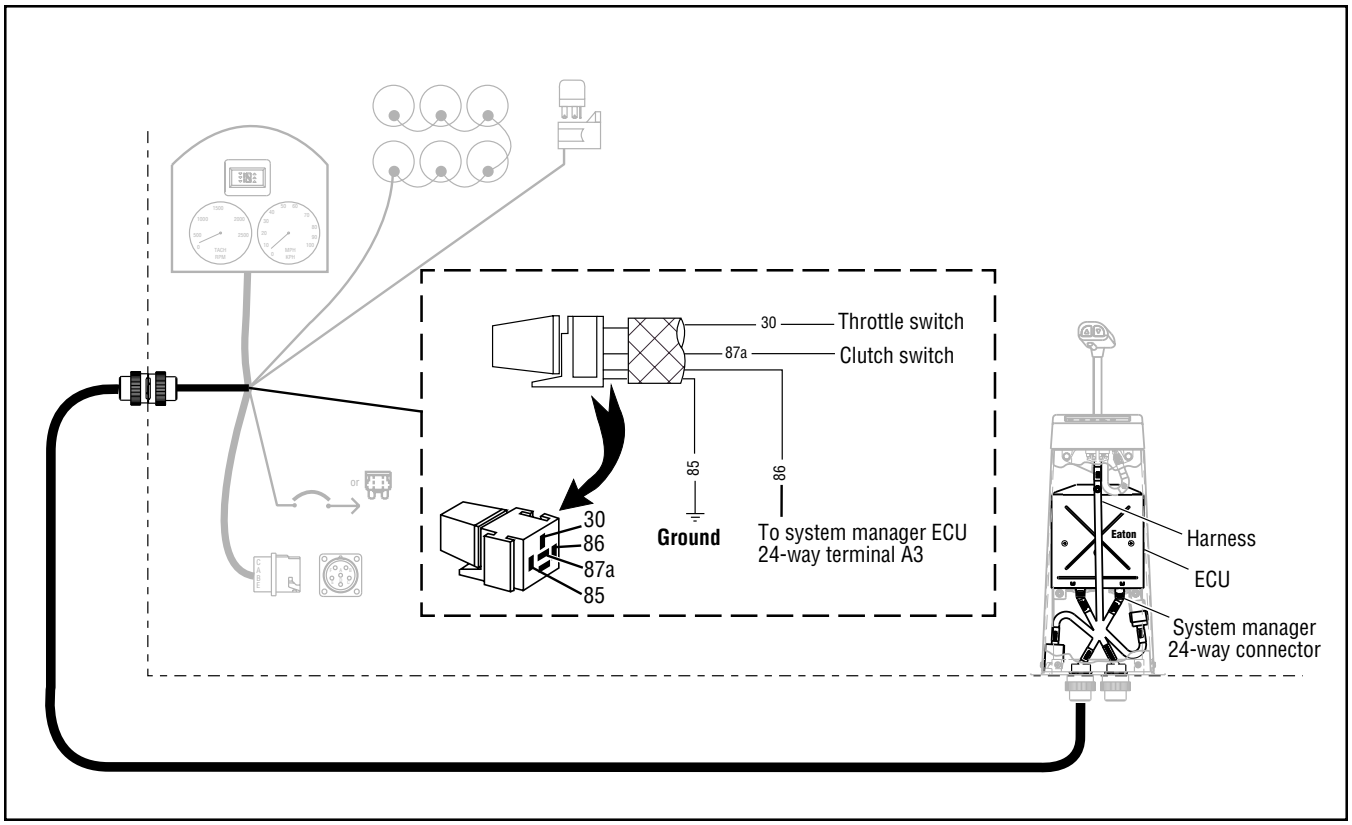
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

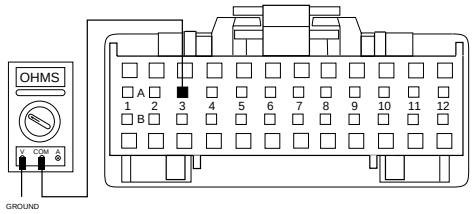
- Relay coil open or shorted
- Damaged tower or OEM harness
- Malfunctioning system manager ECU

Likely Failed Components

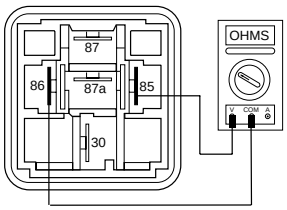


Code 31 (Hand-Held Code 62), Engine Brake Relay Coil Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect system manager 24-way connector. 3. Measure resistance between system manager 24-way connector pin A3 and ground.	If resistance is 40 to 90 ohms	Replace system manager ECU. Go to **Step V**.
		If resistance is outside of range	Go to **Step B**.



Step B	Procedure	Condition	Action
	1. Remove engine brake inhibit relay from OEM dash harness. 2. Measure resistance between engine brake inhibit relay pins 85 and 86.	If resistance is 40 to 90 ohms	Repair OEM wiring from system manager ECU to engine brake inhibit relay. Go to **Step V**.
		If resistance is outside of range	Replace engine brake inhibit relay. Go to **Step V**.



Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3).	If no codes	Test complete.
		If code 31 appears	Return to **Step A** to find error in testing.
		If code other than 31 appears	Go to Fault Isolation Procedure Index (page 1-9).

Component Code 33 (Hand-Held Code 168) Battery Voltage Supply

Fault Description

This code indicates the system manager has detected that the battery power supply is low.

Required Tools

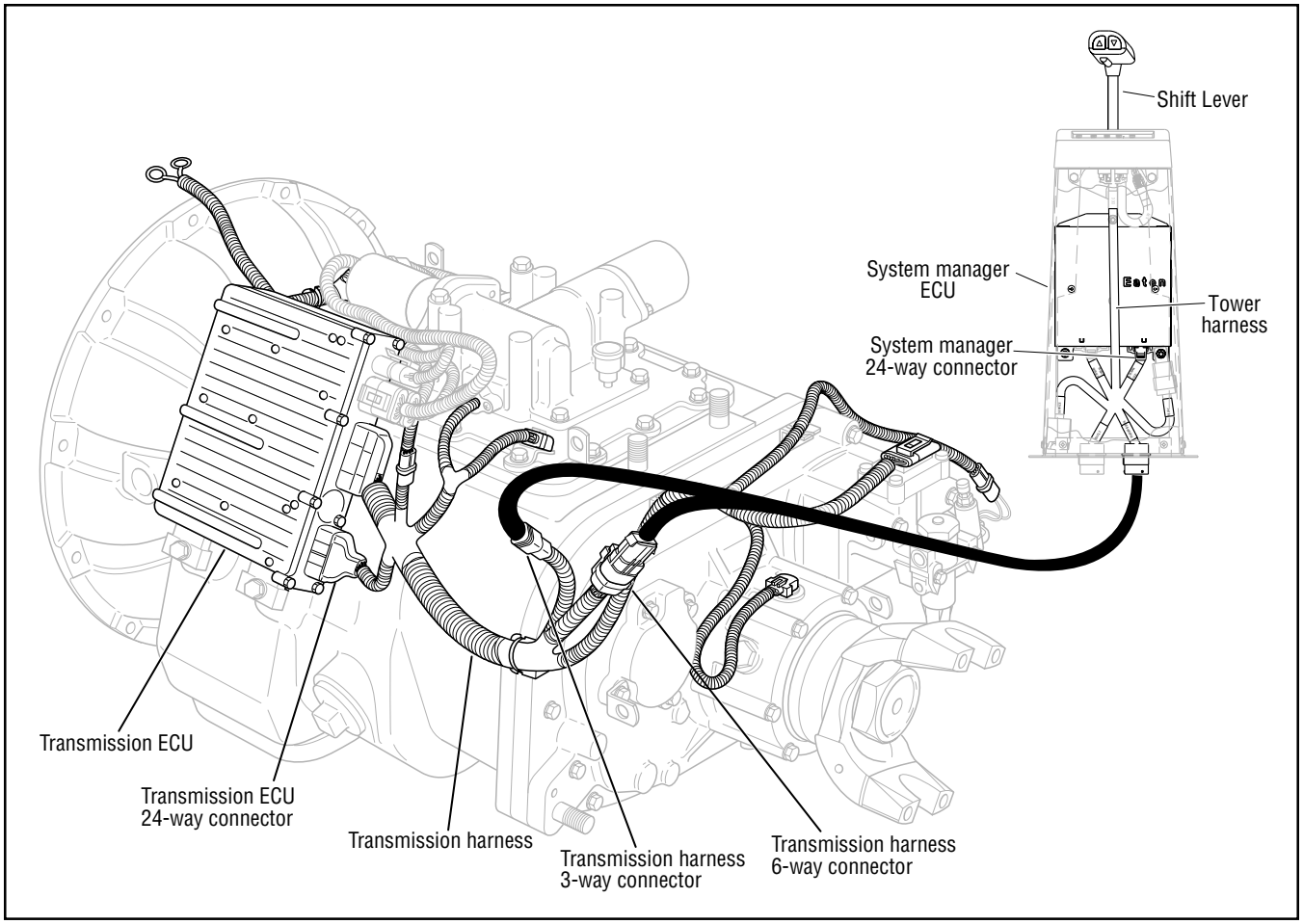
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Battery bus fuse/circuit breaker is open
- Low batteries
- Damaged tower or OEM harness
- Damaged transmission harness
- Malfunctioning power connect relay
- Malfunctioning system manager ECU

Likely Failed Components



Code 33 (Hand-Held Code 168), Battery Voltage Supply Test

Step A	Procedure	Condition	Action
	1. Key on. 2. Retrieve codes (page 1-3).	If code 33 is active	Perform Electrical Pretest on page 2-1.
		If code 33 is inactive	Test complete.

System Code 35 (Hand-Held Code 231) Engine Control Failure

Fault Description

This code indicates the AutoShift failed to receive information from the engine or the engine failed to properly respond to throttle control during a shift as commanded by the engine J-1939 data link.

Required Tools

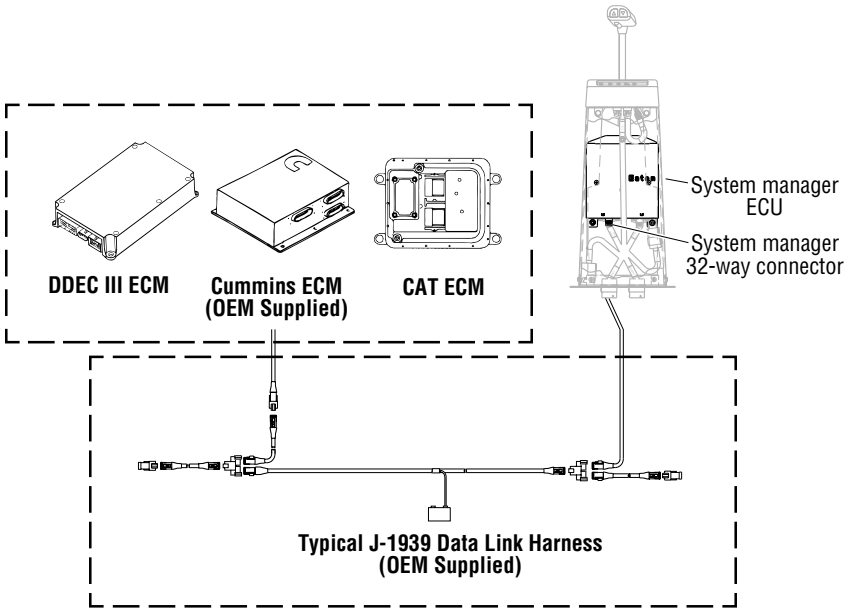
- Basic Hand Tools
- Hand-Held Diagnostic Tool
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide
- Data Link Tester

Possible Causes

This code can be caused by any of the following conditions:

- Faulty J-1939 data link
- Faulty vehicle interface harness or connections
- Faulty engine harness or connections
- Excessive radio interference
- Faulty engine ECM
- Faulty engine fuel pump
- Faulty system manager ECU

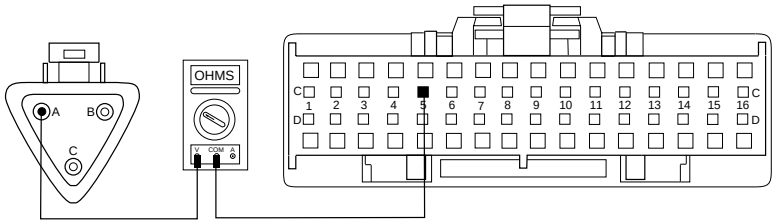
Likely Failed Components



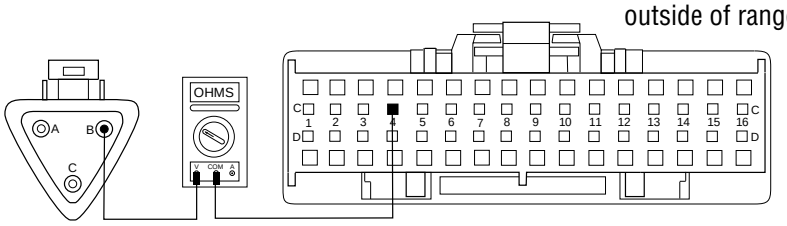
Code 35 (Hand-Held Code 231), Engine Control Failure Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect J-1939 data link connector. (Located near system manager on older vehicles. Located on the J-1939 data link harness on newer vehicles.) 3. Key on. 4. Connect data link tester to connector leading to system manager. 5. Start Communication Test.	→ If test passes	→ Failure has occurred in J-1939 harness or engine ECM, contact OEM for repair. Go to **Step V**.
		If test fails	→ Go to **Step B**.

Step B	Procedure	Condition	Action
	1. Key off. 2. Disconnect system manager 32-way connector. 3. Measure resistance between system manager 32-way connector pin C5 and J-1939 connector pin A.		



	4. Measure resistance between system manager 32-way connector pin C4 and J-1939 connector pin B.	→ If both measurements are 0 to .3 ohms	→ Replace system manager ECU. Go to **Step V**.
		If either measurement is outside of range	→ Repair or replace tower harness as required. Go to **Step V**.



Code 35 (Hand-Held Code 231), Engine Control Failure Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 35 appears →	Return to **Step A** to find error in testing.
		If code other than 35 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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System Code 41
(Hand-Held Code 56)
Range Failed to Engage

Fault Description

This code indicates the transmission is unable to complete a shift across the range. The range is either stuck in HI or LO, or cannot complete engagement in HI or LO.

Required Tools

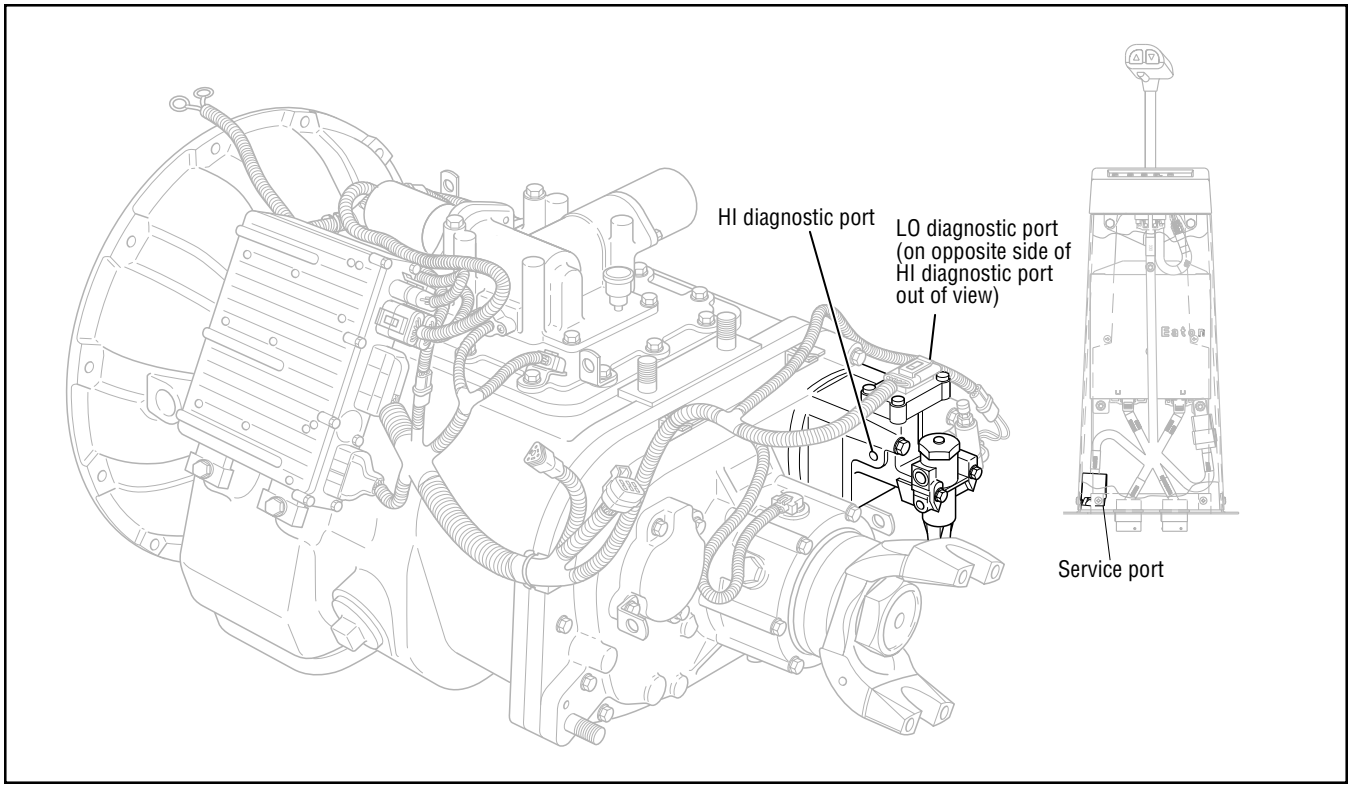
- Basic Hand Tools
- 0-100 PSI Air Pressure Gauges
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Low air pressure
- Contaminated air supply
- Air leak
- Range solenoid stuck
- Failed range synchronizer
- Failed range actuator/cylinder/piston/yoke

Likely Failed Components



Code 41 (Hand-Held Code 56), Range Failed to Engage Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Install 0-100 PSI gauges into the range valve diagnostic ports. 3. Start vehicle and allow air pressure to reach governor cut-off. 4. Release clutch to register input speed in transmission. 5. Turn off engine, but leave key in "ON" position. 6. With the shift control, select reverse and back to neutral. →	If LO range gauge = 55 to 65 PSI and If HI range gauge = 0 PSI →	Go to **Step B**.
		Note: 5 minutes is allowed for checking the pressure after moving the shift lever to neutral. If air gauges do not read as shown above →	Repair or replace range valve and range cylinder cover as required. Retest.

Step B	Procedure	Condition	Action
	1. Move shift lever to reverse, press upshift button, and move lever back to neutral. **Note:** If shift lever DOES NOT have upshift buttons, move shift lever to reverse and place a jumper between service port connector pins B and D. Remove jumper and place shift lever in neutral. →	If HI range gauge = 55 to 65 PSI and If LO range gauge = 0 PSI →	Repair or replace mechanical range system as required. Go to **Step V**.
		Note: 5 minutes is allowed for checking the pressure after moving the shift lever to neutral. If air gauges do not read as shown above →	Repair or replace range valve and range cylinder cover as required. Go to **Step V**.

Code 41 (Hand-Held Code 56), Range Failed to Engage Test, continued

Step V	Procedure	Condition	Action
	1. Disconnect gauges. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset code (page 1-4). 6. Check codes (see retreiving fault codes, page 1-3).	→ If no codes	→ Test complete.
		If code 41 appears	→ Return to **Step A** to find error in testing.
		If code other than 41 appears	→ Go to Fault Isolation Procedure Index (page 1-9).

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System Code 42
(Hand-Held Code 61)
Splitter Failed to Engage

Fault Description

This code indicates the transmission is unable to complete a shift across the splitter. The splitter is either stuck in HI or LO, or cannot complete engagement in HI or LO.

Required Tools

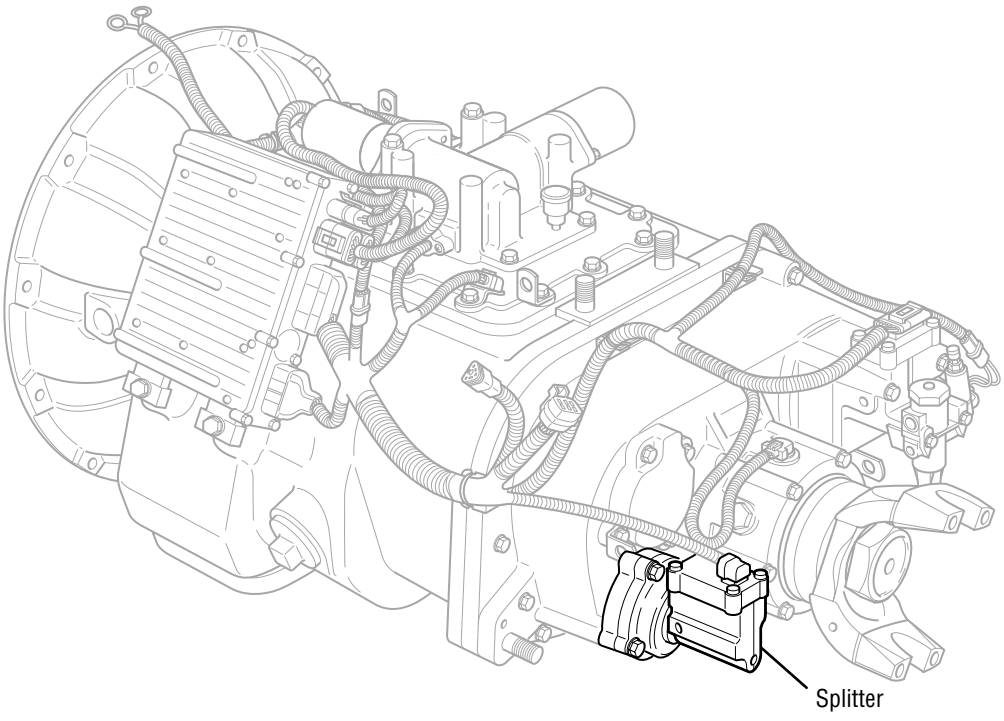
- Basic Hand Tools
- 0-100 PSI Air Pressure Gauges
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Low air pressure
- Contaminated air supply
- Air leak
- Splitter solenoid stuck
- Failed splitter actuator/cylinder/piston/yoke

Likely Failed Components



Code 42 (Hand-Held Code 61), Splitter Failed to Engage Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Install 0-100 PSI gauges into the splitter valve diagnostic ports. 3. Start vehicle and allow air pressure to reach governor cut-off. 4. Release clutch to register input speed in transmission. 5. Turn off engine, but leave key in "ON" position. 6. With the shift control, select reverse and back to neutral. →	If HI split gauge = 55 to 65 PSI and If LO split gauge = 0 PSI →	Go to **Step B**.
		Note: 5 minutes is allowed for checking the pressure after moving the shift lever to neutral.	
		If gauges do not read as shown above →	Repair or replace splitter valve and splitter cylinder cover as required. Repeat this step.

Step B	Procedure	Condition	Action
	1. Key on. 2. With shift control select reverse, press upshift button and select neutral. →	If LO split gauge = 55 to 65 PSI and If HI split gauge = 0 PSI →	Repair or replace mechanical splitter system as required. Go to **Step V**.
		If gauges do not read as shown above →	Repair or replace splitter valve and splitter cylinder cover as required. Go to **Step V**.

Code 42 (Hand-Held Code 61), Splitter Failed to Engage Test, continued

Step V	Procedure	Condition	Action
	1. Disconnect gauges. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset code (page 1-4). 6. Check codes (see retreiving fault codes, page 1-3).	→ If no codes	→ Test complete.
		If code 42 appears	→ Return to **Step A** to find error in testing.
		If code other than 42 appears	→ Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 43 (Hand-Held Code 35 or 36) Range Solenoid Valve

Fault Description

This code indicates an electrical failure of the solenoids that control the pneumatic range valve.

Required Tools

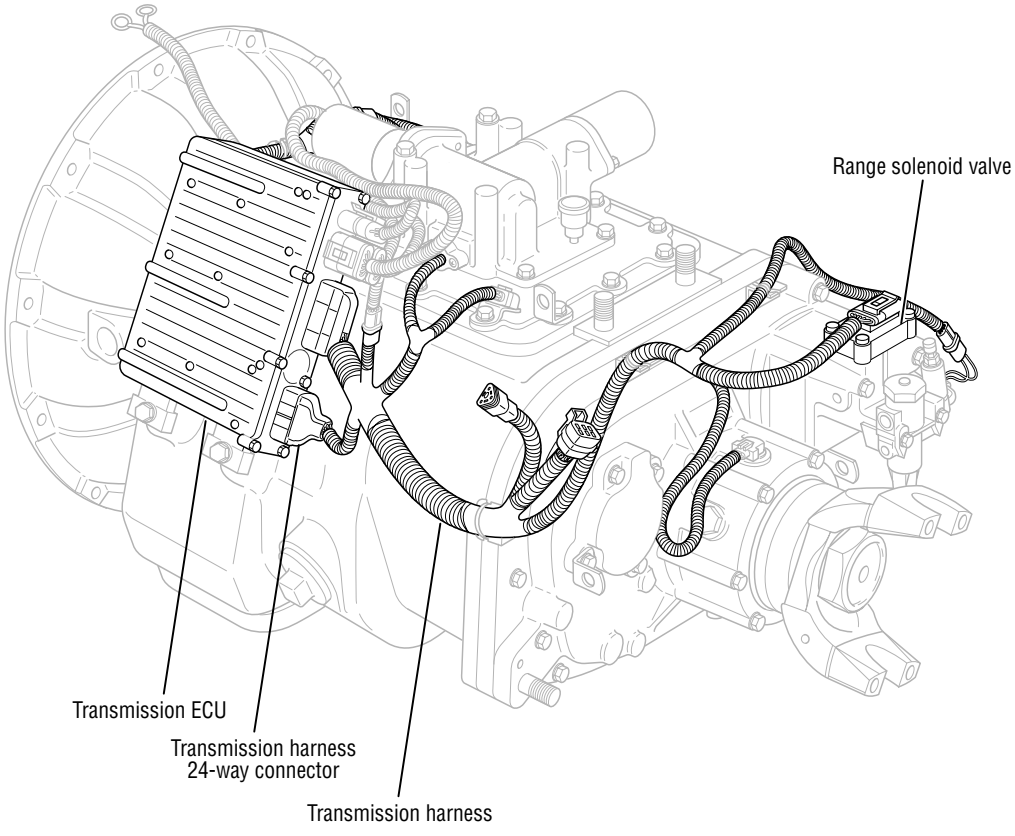
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

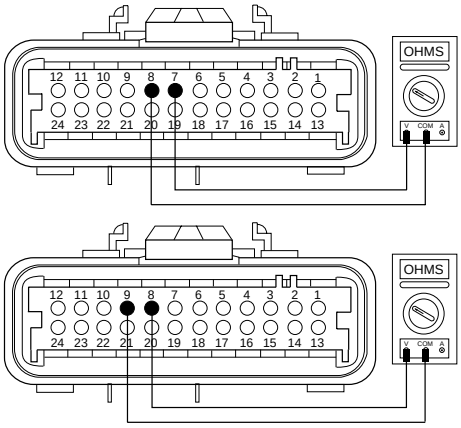
- Range solenoid coil open or shorted
- Damaged transmission harness
- Malfunctioning transmission ECU

Likely Failed Components

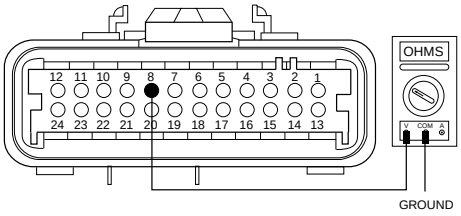


Code 43 (Hand-Held 35 or 36), Range Solenoid Valve Test

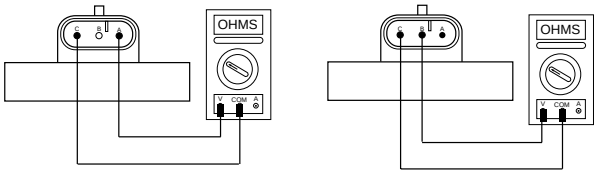
Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect transmission ECU24-way connector. 3. Measure resistance between transmission ECU 24-way connector pins: • 7 and 8 • 8 and 9	If resistance is 9 to 16 ohms	Go to **Step B**.
		If resistance is outside of range	Go to **Step C**.

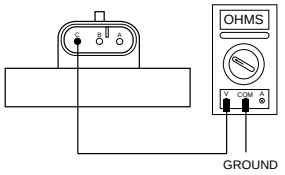


Step B	Procedure	Condition	Action
	1. Measure resistance between transmission ECU 24-way connector pin 8 and ground.	If resistance is more than 10K ohms or open circuit [OL]	Replace transmission ECU. Go to **Step V**.
		If resistance is less than 10K ohms	Go to **Step C**.



Code 43 (Hand-Held Code 35 or 36), Range Solenoid Valve Test, continued

Step C	Procedure	Condition	Action
	1. Disconnect transmission harness from range valve. 2. Measure resistance between range valve pins: • A and C • B and C	→ If resistance is 9 to 16 ohms	→ Go to **Step D**.
		If resistance is outside of range	→ Replace range valve. Go to **Step V**.

Step D	Procedure	Condition	Action
	1. Measure resistance between range valve pin C and ground.	→ If resistance is more than 10K ohms or open circuit [OL]	→ Repair or replace transmission harness. Go to **Step V**.
		If resistance is less than 10K ohms	→ Replace range valve. Go to **Step V**.

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3).	→ If no codes	→ Test complete.
		If code 43 appears	→ Return to **Step A** to find error in testing.
		If code other than 43 appears	→ Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 44 (Hand-Held Code 54) Inertia Brake Solenoid Coil

Fault Description

This code indicates an electrical problem in the inertia brake.

Required Tools

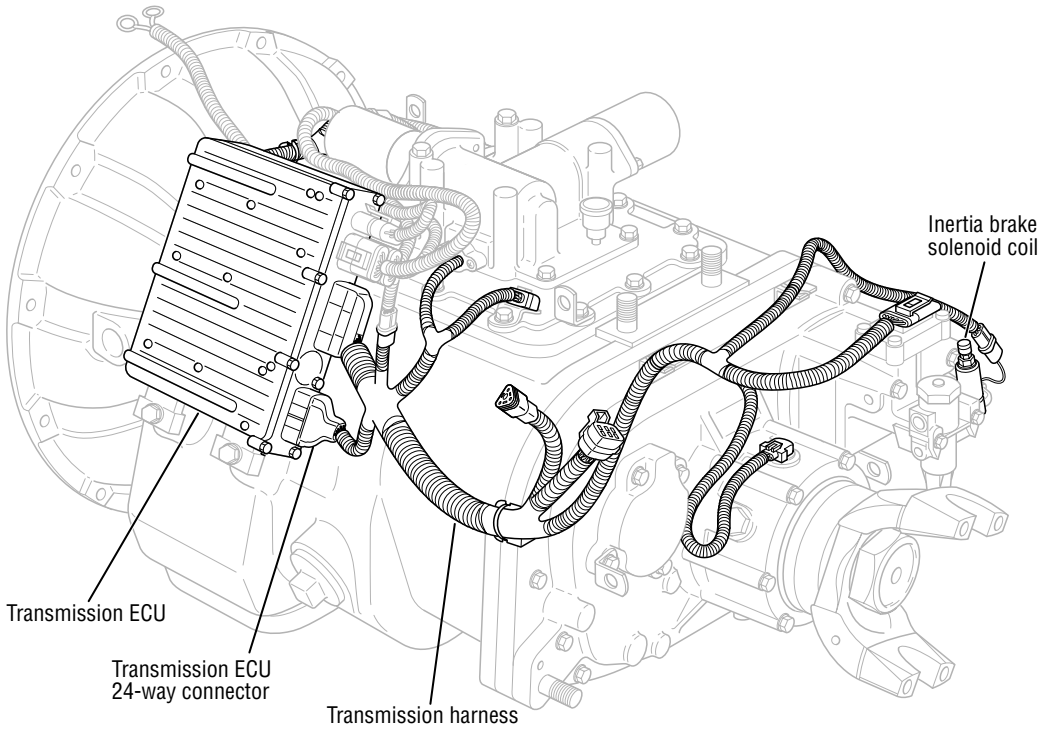
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

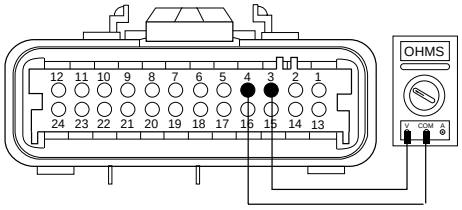
- Relay coil open or shorted
- Damaged transmission harness
- Malfunctioning transmission ECU

Likely Failed Components

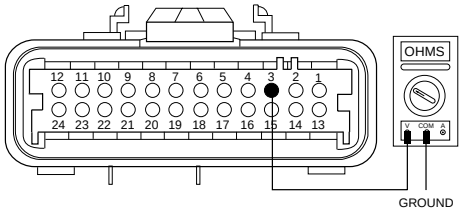


Code 44 (Hand-Held Code 54), Inertia Brake Solenoid Coil Test

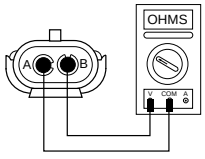
Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect 24-way transmission ECU connector. 3. Measure resistance between 24-way transmission ECU connector pins 3 and 4.	If resistance is 13 to 18 ohms	Go to **Step B**.
		If resistance is outside of range	Go to **Step C**.



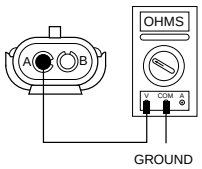
Step B	Procedure	Condition	Action
	1. Measure resistance between 24-way transmission ECU connector pin 3 and ground.	If resistance is more than 10K ohms or open circuit [OL]	Replace transmission ECU. Go to **Step V**.
		If resistance is less than 10K ohms	Go to **Step C**.



Step C	Procedure	Condition	Action
	1. Disconnect transmission harness from inertia brake solenoid coil. 2. Measure resistance between between inertia brake solenoid coil pins A and B.	If resistance is 13 to 18 ohms	Go to **Step D**.
		If resistance is outside of range	Replace inertia brake solenoid. Go to **Step V**.



Code 44 (Hand-Held Code 54), Inertia Brake Solenoid Coil Test, continued

Step D	Procedure	Condition	Action
	1. Measure resistance between inertia brake solenoid coil pin A and ground. 	If resistance is more than 10K ohms or open circuit [OL]	Repair or replace transmission harness. Go to **Step V**.
		If resistance is less than 10K ohms	Replace inertia brake solenoid. Go to **Step V.**

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3).	If no codes	Test complete.
		If code 44 appears	Return to **Step A** to find error in testing.
		If code other than 44 appears	Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 46 (Hand-Held Code 37 or 38) Splitter Solenoid Valve

Fault Description

This code indicates an electrical failure of the solenoids that control the range.

Required Tools

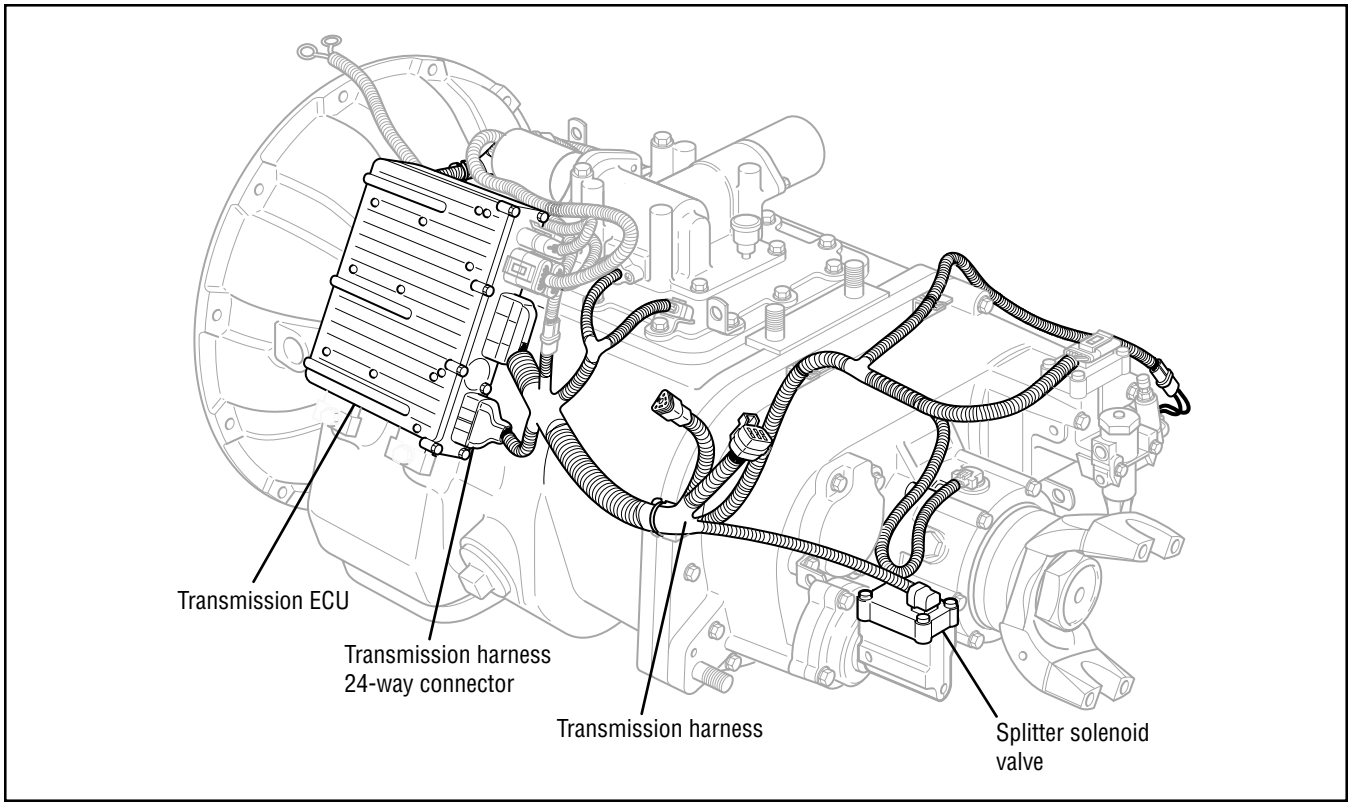
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

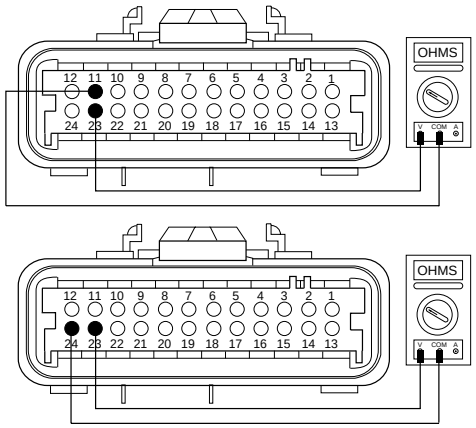
- Solenoid coil open or shorted
- Damaged transmission harness
- Malfunctioning transmission ECU

Likely Failed Components

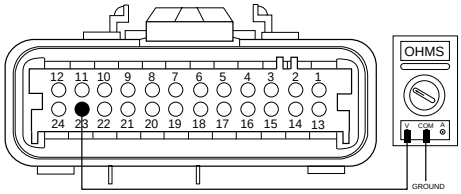


Code 46 (Hand-Held 37 or 38), Splitter Solenoid Valve Test

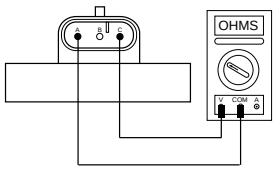
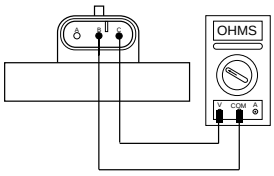
Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect transmission ECU 24-way connector. 3. Measure resistance between transmission ECU 24-way connector pins: • 11 and 23 • 24 and 23	→ If resistance is 9 to 16 ohms	→ Go to **Step B**.
		If resistance is outside of range	→ Go to **Step C**.

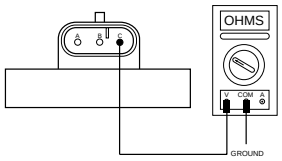


Step B	Procedure	Condition	Action
	1. Measure resistance between transmission ECU 24-way connector pin 23 and ground.	→ If resistance is more than 10K ohms or open circuit [OL]	→ Replace transmission ECU. Go to **Step V**.
		If resistance is less than 10K ohms	→ Go to **Step C**.



Code 46 (Hand-Held Code 37 or 38), Splitter Solenoid Valve Test, continued

Step C	Procedure	Condition	Action
	1. Disconnect transmission harness from splitter valve. 2. Measure resistance between splitter valve pins: • A and C • B and C	If resistance is 9 to 16 ohms	Go to **Step D**.
	 	If resistance is outside of range	Replace splitter valve. Go to **Step V**.

Step D	Procedure	Condition	Action
	1. Measure resistance between splitter valve pin C and ground.	If resistance is more than 10K ohms or open circuit [OL]	Repair or replace transmission harness. Go to **Step V**.
		If resistance is less than 10K ohms	Replace splitter valve. Go to **Step V**.

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3).	If no codes	Test complete.
		If code 46 appears	Return to **Step A** to find error in testing.
		If code other than 46 appears	Go to Fault Isolation Procedure Index (page 1-8).

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Component Code 51 (Hand-Held Code 60) Rail Select Sensor

Fault Description

This code indicates an electrical failure of the rail select sensors on the electric shifter.

Required Tools

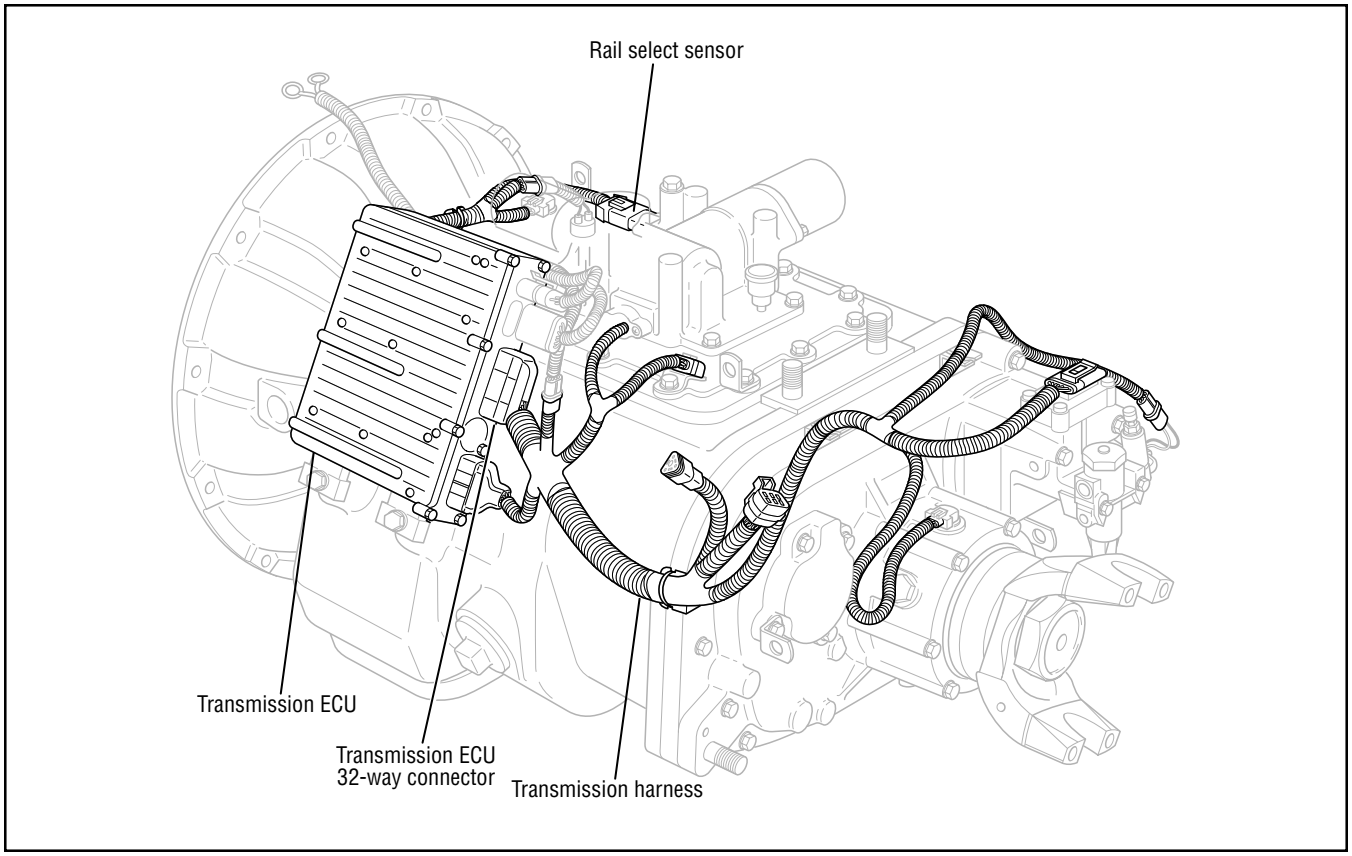
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

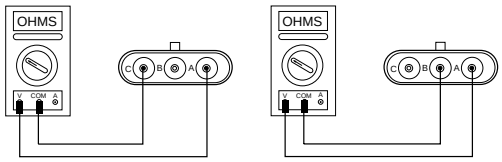
This code can be caused by any of the following conditions:

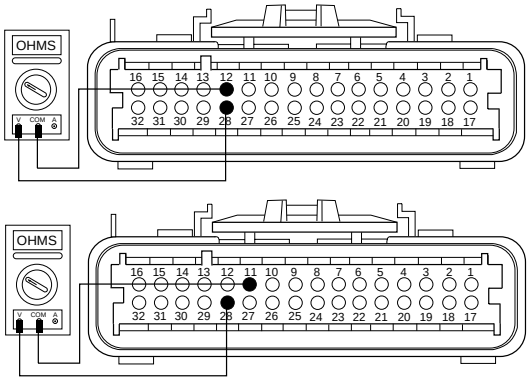
- Damaged transmission harness
- Mechanical connection failure in electric shifter
- Malfunctioning rail select sensor
- Malfunctioning transmission ECU

Likely Failed Components



Code 51 (Hand-Held Code 60), Rail Select Sensor Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect transmission harness from rail select sensor. 3. Remove rail select sensor from electric shifter. 4. Measure resistance between rail select sensor pins: • A and C • A and B	→ If pin A and C resistance is 750 to 1250 ohms and	
		Pin A and B resistance changes smoothly through sensor rotation →	Go to **Step B**.
		If any of the above conditions are not met →	Replace rail select sensor. Go to **Step V**.

Step B	Procedure	Condition	Action
	1. Reconnect transmission harness to rail select sensor. 2. Disconnect transmission ECU 32-way connector. 3. Measure resistance between transmission ECU 32-way connector pins: • 28 and 12 • 28 and 11	→ If pin 28 and 12 resistance is 750 to 1250 ohms and	
		Pin 28 and 11 resistance changes smoothly through sensor rotation →	Replace transmission ECU. Go to **Step V**.
		If any of the above conditions are not met →	Repair or replace transmission harness as required. Go to **Step V**.

Code 51 (Hand-Held Code 60), Rail Select Sensor Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reinstall rail select sensor to electric shifter. 3. Reconnect all connectors. 4. Key on. 5. Clear codes (see Clearing Fault Codes, page 1-3). 6. Use Driving Technique to attempt to reset the code (page 1-4). 7. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 51 appears →	Return to **Step A** to find error in testing.
		If code other than 51 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 52 (Hand-Held Code 59) Gear Select Sensor

Fault Description

This code indicates an electrical failure of the gear select sensors on the electric shifter.

Required Tools

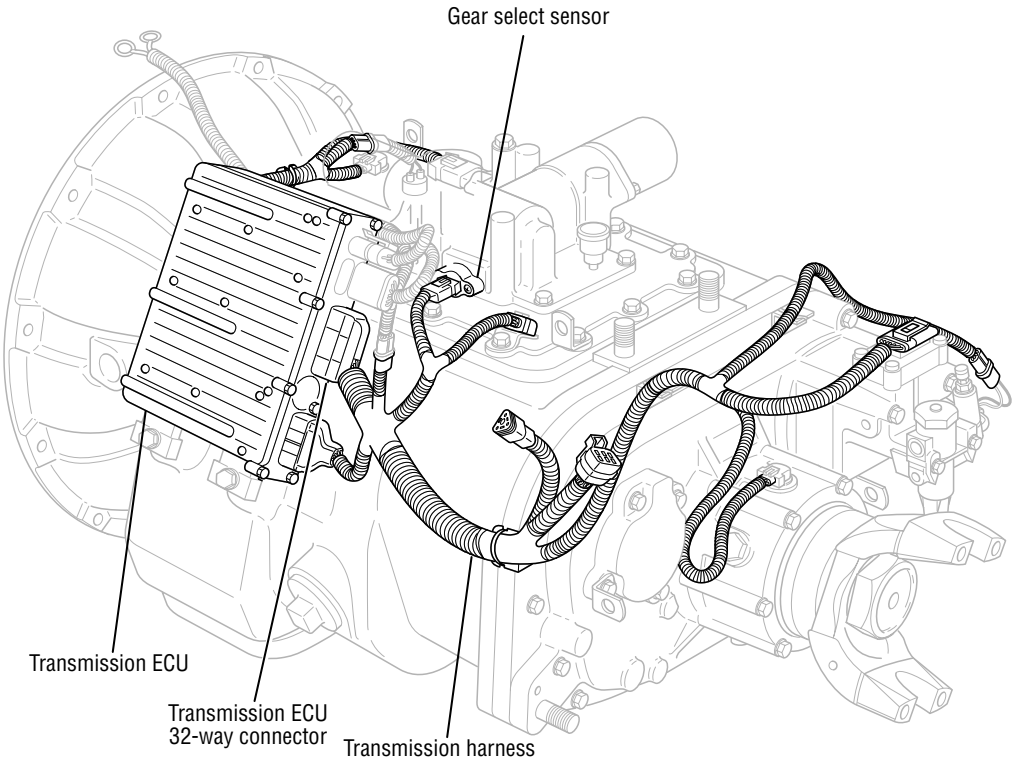
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

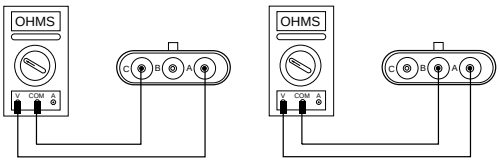
- Damaged transmission harness
- Mechanical connection failure in electric shifter
- Malfunctioning gear select sensor
- Malfunctioning transmission ECU

Likely Failed Components

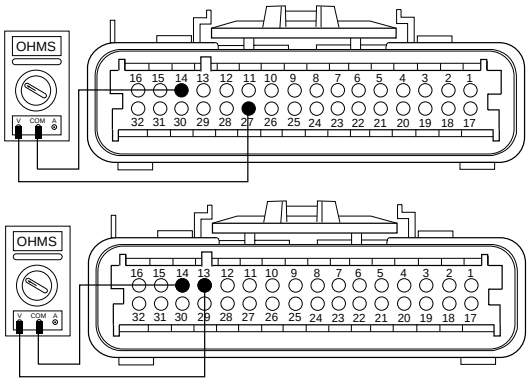


Code 52 (Hand-Held Code 59), Gear Select Sensor Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect transmission harness from gear select sensor. 3. Remove gear select sensor from electric shifter. 4. Measure resistance between rail select sensor pins: • A and C • A and B	If pin A and C resistance is 750 to 1250 ohms and	
		Pin A and B resistance changes smoothly through sensor rotation	Go to **Step B**.
		If any of the above conditions are not met	Replace gear select sensor. Go to **Step V**.



Step B	Procedure	Condition	Action
	1. Reconnect transmission harness to gear select sensor. 2. Disconnect transmission ECU 32-way connector. 3. Measure resistance between transmission ECU 32-way connector pins: • 14 and 27 • 14 and 13	If pin 14 and 27 resistance is 750 to 1250 ohms and	
		Pin 14 and 13 resistance changes smoothly through sensor rotation	Replace transmission ECU. Go to **Step V**.
		If any of the above conditions are not met	Repair or replace transmission harness as required. Go to **Step V**.



Code 52 (Hand-Held 59), Gear Select Sensor Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reinstall gear select sensor to electric shifter. 3. Reconnect all connectors. 4. Key on. 5. Clear codes (see Clearing Fault Codes, page 1-3). 6. Use Driving Technique to attempt to reset the code (page 1-4). 7. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 52 appears →	Return to **Step A** to find error in testing.
		If code other than 52 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 53 (Hand-Held Code 34) Reverse Ball Switch

Fault Description

This code indicates a mechanical or electrical failure of the ball switch that reports engagement in the reverse gear position.

Required Tools

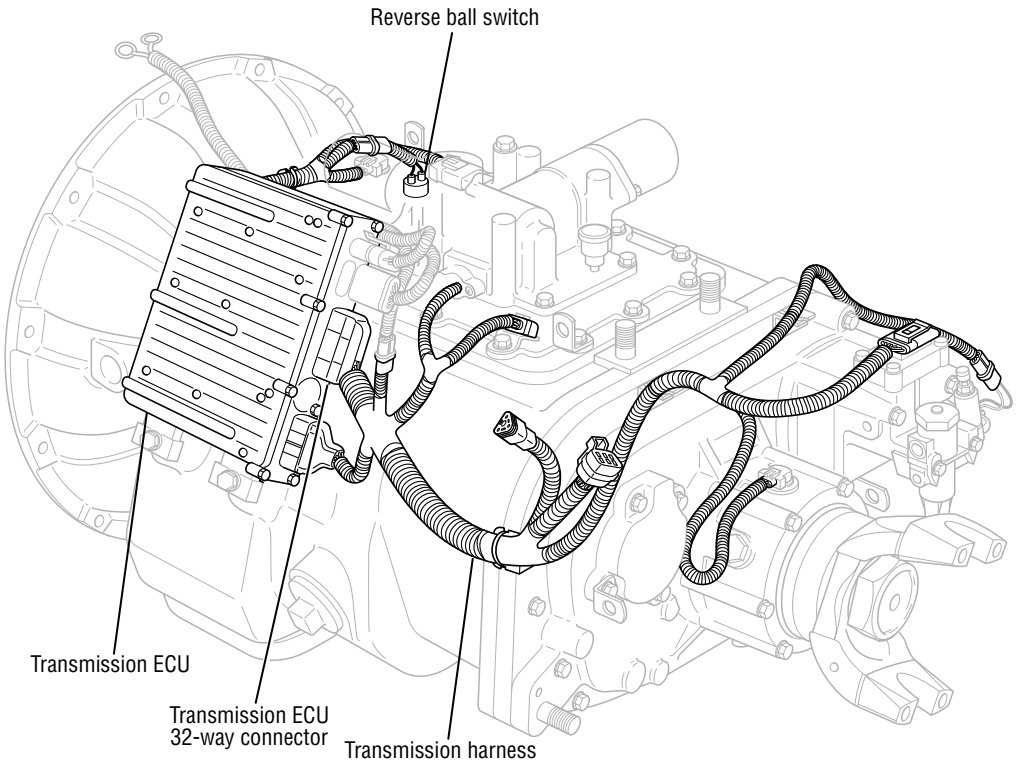
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

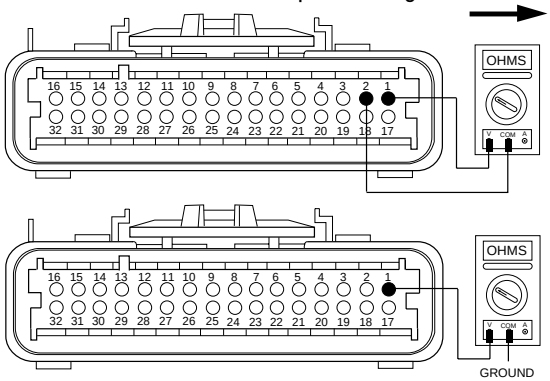
- Failed reverse ball switch
- Damaged transmission harness
- Gear select sensor in electric shifter
- Mechanical failure in electric shifter
- Worn yoke
- Failed shift block
- Malfunctioning transmission ECU

Likely Failed Components

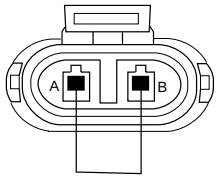


Code 53 (Hand-Held Code 34), Reverse Ball Switch Test

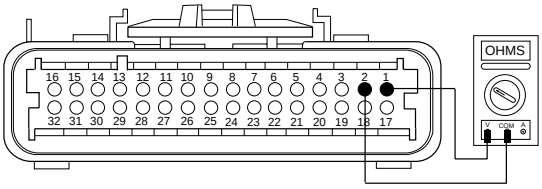
Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect transmission ECU 32-way connector. 3. Measure resistance between transmission pins 1 and 2. 4. Measure resistance between transmission pin 1 and ground.	If resistance for each measurement is more than 10K ohms or open circuit [OL]	Go to Step B.
		If resistance of any measurement is less than 10K ohms	Go to Step C.



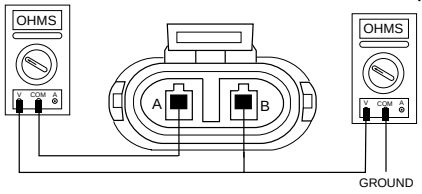
Step B	Procedure	Condition	Action
	1. Locate reverse switch on shift bar housing and disconnect transmission harness from reverse switch. 2. Place jumper wire across reverse switch harness.		



	3. Measure resistance between transmission ECU 32-way connector pins 1 and 2.	If resistance is 0 to .3 ohms	Replace reverse switch. Go to **Step D**.
		If resistance is outside of range	Replace transmission harness. Go to **Step V**.



Code 53 (Hand-Held Code 34), Reverse Ball Switch Test, continued

Step C	Procedure	Condition	Action
	1. Locate reverse switch on shift bar housing and disconnect transmission harness from reverse switch. 2. Measure resistance between reverse switch connector pins. 	If resistance is more than 10K ohms or open circuit [OL]	Repair of replace transmission harness. Go to **Step V**.
		If resistance is less than 10K ohms	Replace reverse switch. Go to **Step D**.

Step D	Procedure	Condition	Action
	1. Reverse switch has been replaced. Retest transmission function using Driving Technique on page 1-4.	If function is OK	Test complete.
		If function is not correct	Replace shift bar housing. Go to **Step E**.

Step E	Procedure	Condition	Action
	1. Reverse switch and shift bar housing have been replaced. Retest transmission function using Driving Technique on page 1-4.	If function is OK	Test complete.
		If function is not correct	Replace transmission ECU. Go to **Step V**.

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3).	If no codes	Test complete.
		If code 53 appears	Return to **Step A** to find error in testing.
		If code other than 53 appears	Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 56 (Hand-Held Code 161) Input Shaft Speed Sensor

Fault Description

This code indicates an electrical problem in the input shaft speed sensor circuit. The signal from the sensor did not match the current operating conditions.

Required Tools

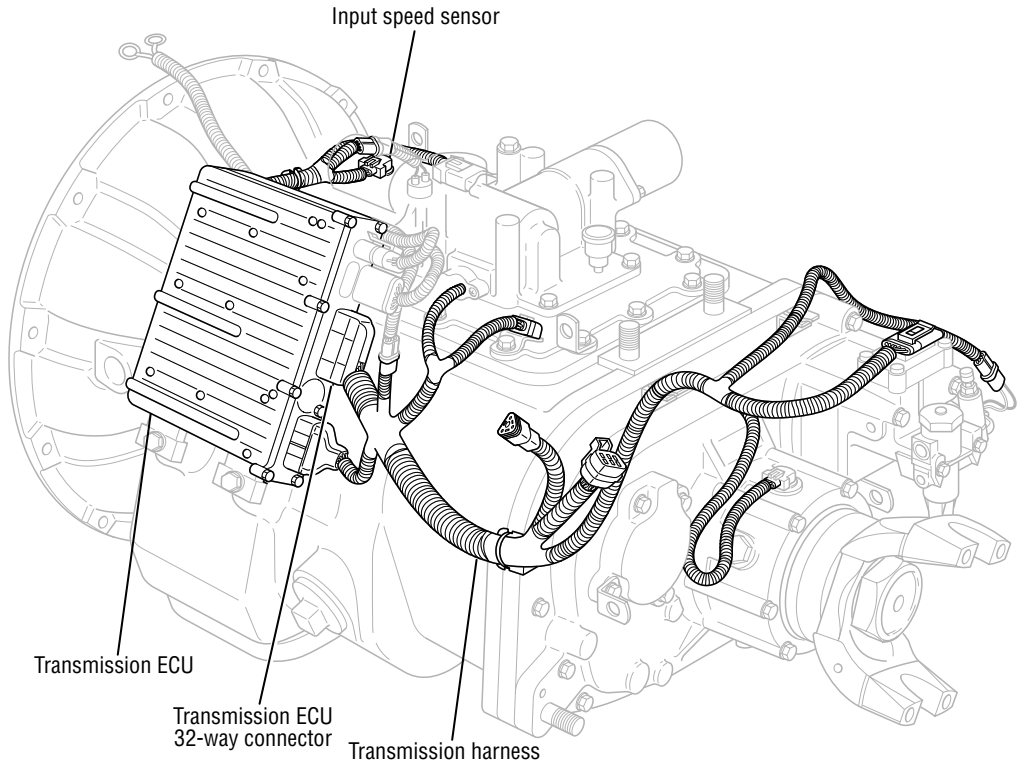
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Loose speed sensor
- Contaminated sensor end
- Damaged transmission harness
- Malfunctioning input shaft speed sensor
- Failed main drive gear
- Malfunctioning transmission ECU

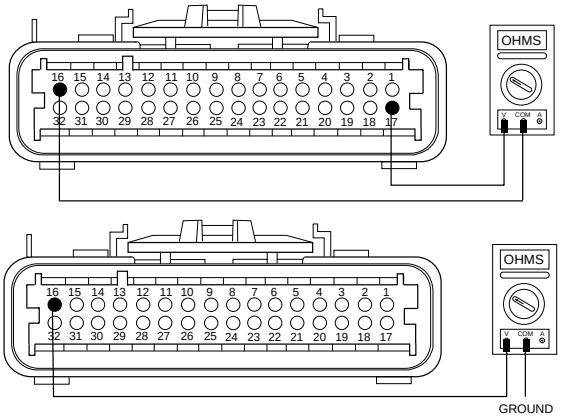
Likely Failed Components



Code 56 (Hand-Held Code 161), Input Shaft Speed Sensor Test

Step A	Procedure	Condition	Action

1. Key off.
2. Disconnect transmission controller 32-way connector.
3. Measure resistance across transmission ECU 32-way connector pins 16 and 17 and between pin 16 and ground. →



If pin 16 and 17 resistance is 2K to 4K ohms and

Pin 16 and ground resistance is 10K ohms or open circuit [OL] → Go to **Step B**.

If any of the above conditions are not met → Go to **Step C**.

Step B	Procedure	Condition	Action

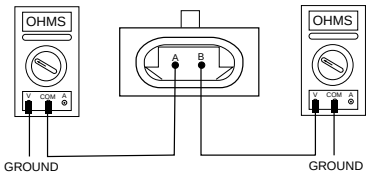
1. Inspect input shaft speed sensor for proper installation or contamination. →

If no problem found → Replace transmission ECU. Go to **Step V**.

If problem found → Repair as required. Go to **Step V**.

Step C	Procedure	Condition	Action

1. Disconnect transmission harness from input shaft speed sensor.
2. Measure resistance between input shaft speed sensor pins and each pin and ground. →



If input shaft speed sensor pins resistance is 2K to 4K ohms and

If input shaft speed sensor pins to ground is 10K ohms or open circuit [OL] → Repair or replace transmission harness. Go to **Step V**.

If any of the above conditions are not met → Replace input speed sensor. Go to **Step V**.

Code 56 (Hand-Held Code 161), Input Shaft Speed Sensor Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 56 appears →	Return to **Step A** to find error in testing.
		If code other than 56 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 57 (Hand-Held Code 160) Main Shaft Speed Sensor

Fault Description

This code indicates an electrical problem in the main shaft speed sensor circuit. The signal from the sensor did not match the current operating conditions.

Required Tools

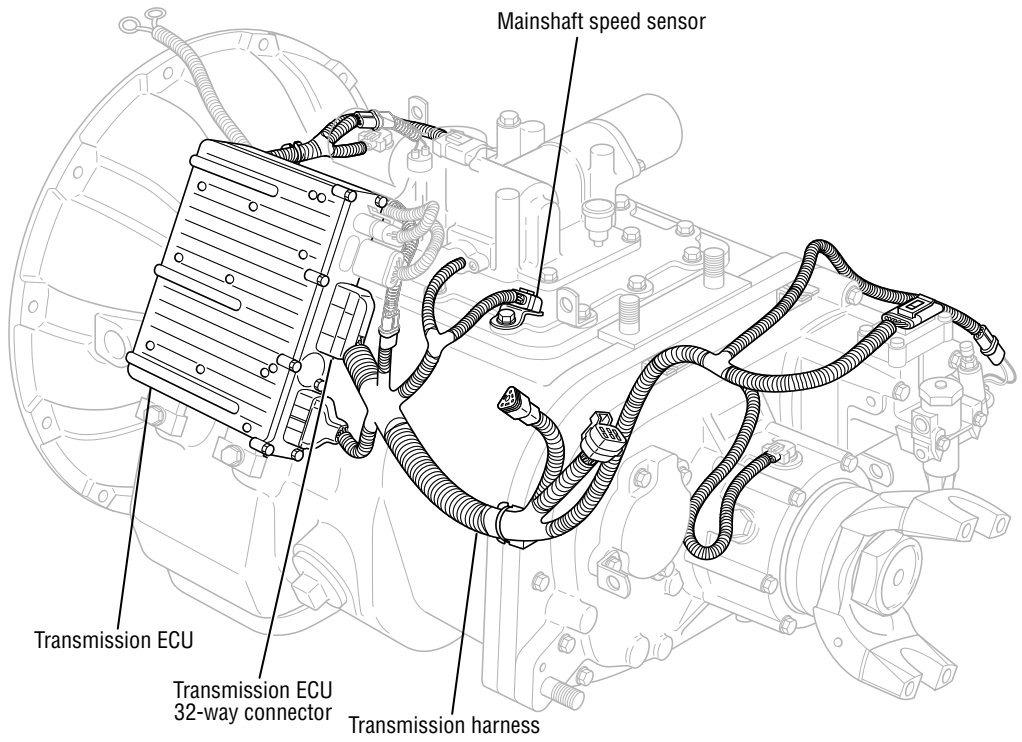
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Loose speed sensor
- Contaminated sensor end
- Damaged transmission harness
- Malfunctioning main shaft speed sensor
- Malfunctioning transmission ECU

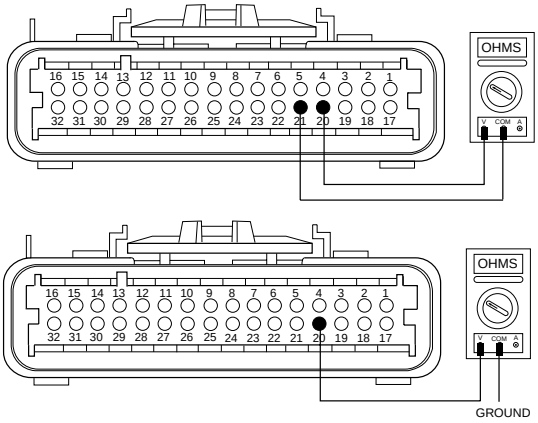
Likely Failed Components



Code 57 (Hand-Held Code 160), Main Shaft Speed Sensor Test

Step A	Procedure	Condition	Action

1. Key off.
2. Disconnect transmission ECU 32-way connector.
3. Measure resistance across transmission controller 32-way connector pins 20 and 21 and between pin 20 and ground. → If pin 20 and 21 resistance is 2K to 4K ohms and



Pin 20 and ground resistance is 10K ohms or open circuit [OL] → Go to **Step B**.

If any of the above conditions are not met → Go to **Step C**.

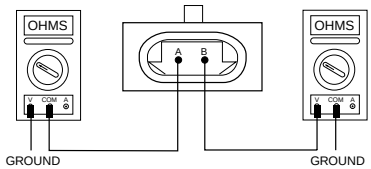
Step B	Procedure	Condition	Action

1. Inspect main shaft speed sensor for proper installation or contamination. → If no problem found → Replace transmission ECU. Go to **Step V**.

If problem found → Repair as required. Go to **Step V**.

Step C	Procedure	Condition	Action

1. Disconnect transmission harness from main shaft speed sensor.
2. Measure resistance between main shaft speed sensor pins and each pin and ground. → If main shaft speed sensor pins resistance is 2K to 4K ohms and



If main shaft speed sensor pins to ground is 10K ohms or open circuit [OL] → Repair or replace transmission harness. Go to **Step V**.

If any of the above conditions are not met → Replace main speed sensor. Go to **Step V**.

Code 57 (Hand-Held Code 160), Main Shaft Speed Sensor Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 57 appears →	Return to **Step A** to find error in testing.
		If code other than 57 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 58 (Hand-Held Code 191) Output Shaft Speed Sensor

Fault Description

This code indicates an electrical problem in the output shaft speed sensor circuit. The signal from the sensor did not match the current operating conditions.

Required Tools

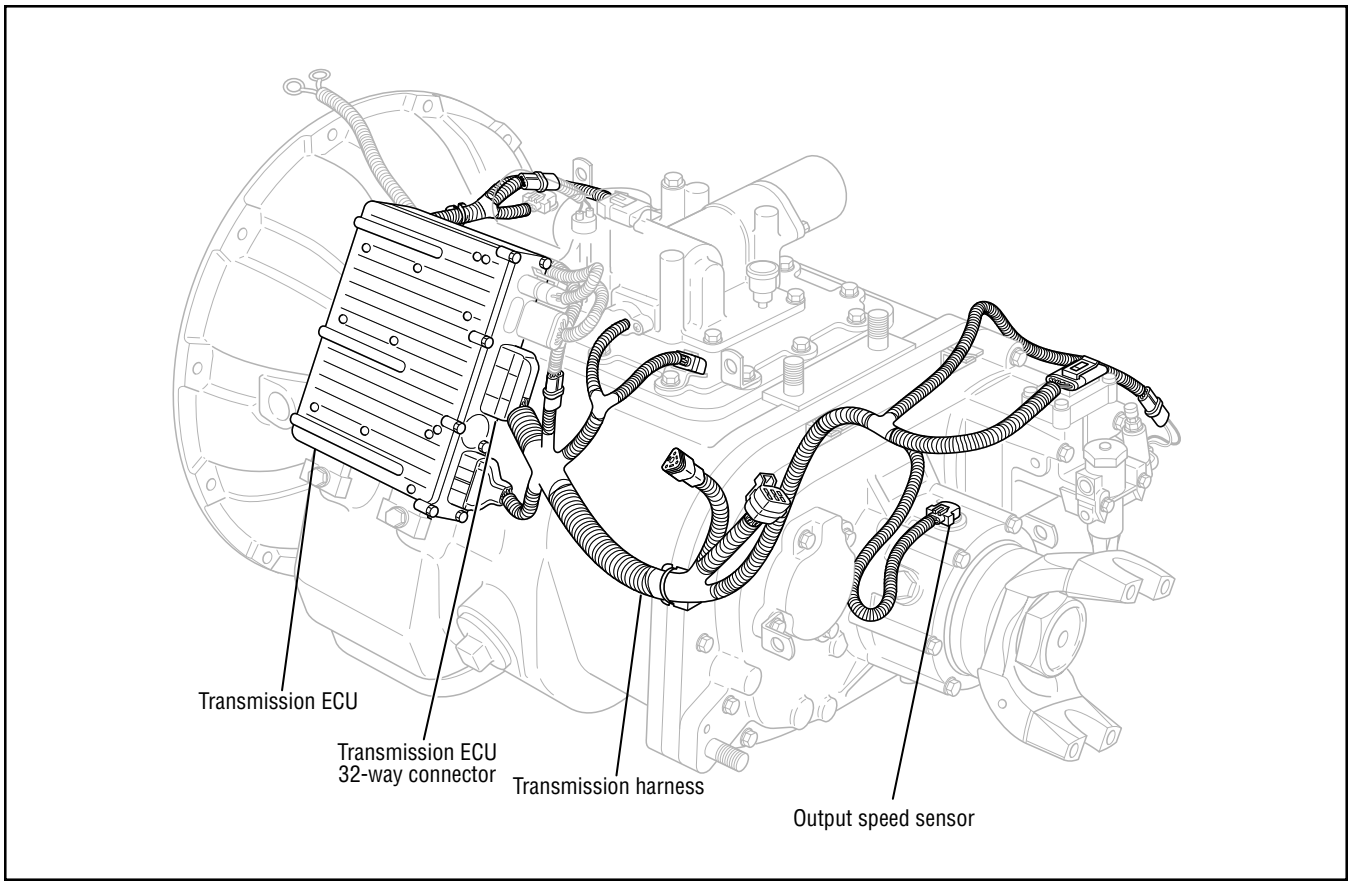
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Loose speed sensor
- Contaminated sensor end
- Damaged transmission harness
- Malfunctioning output shaft speed sensor
- Failed or loose tone wheel
- Malfunctioning transmission ECU

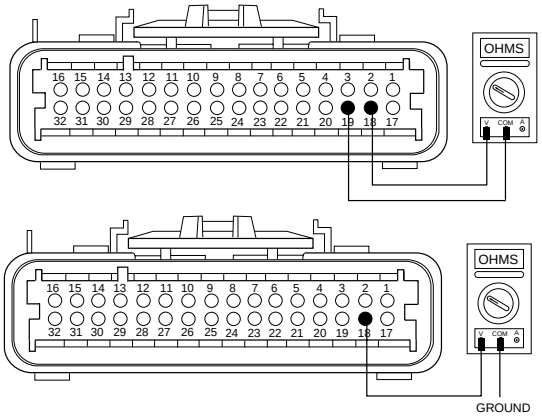
Likely Failed Components



Code 58 (Hand-Held Code 191), Output Shaft Speed Sensor Test

Step A	Procedure	Condition	Action

1. Key off.
2. Disconnect transmission ECU 32-way connector.
3. Measure resistance across transmission ECU 32-way connector pins 18 and 19 and between pin 18 and ground. →



If pin 18 and 19 resistance is 2K to 4K ohms and

Pin 18 and ground resistance is 10K ohms or open circuit [OL] → Go to **Step B**.

If any of the above conditions are not met → Go to **Step C**.

Step B	Procedure	Condition	Action

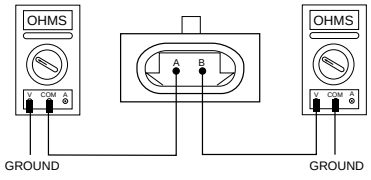
1. Inspect output shaft speed sensor for proper installation or contamination. →

If no problem found → Replace transmission ECU. Go to **Step V**.

If problem found → Repair as required. Go to **Step V**.

Step C	Procedure	Condition	Action

1. Disconnect transmission harness from output shaft speed sensor.
2. Measure resistance between output shaft speed sensor pins and each pin and ground. →



If output shaft speed sensor pins resistance is 2K to 4K ohms and

If output shaft speed sensor pins to ground is 10K ohms or open circuit [OL] → Repair or replace transmission harness. Go to **Step V**.

If any of the above conditions are not met → Replace output speed sensor. Go to **Step V**.

Code 58 (Hand-Held Code 191), Output Shaft Speed Sensor Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 58 appears →	Return to **Step A** to find error in testing.
		If code other than 58 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 61 (Hand-Held Code 39) Rail Select Motor

Fault Description

This code indicates an electrical failure of the rail select motor that drives the electric shifter.

Required Tools

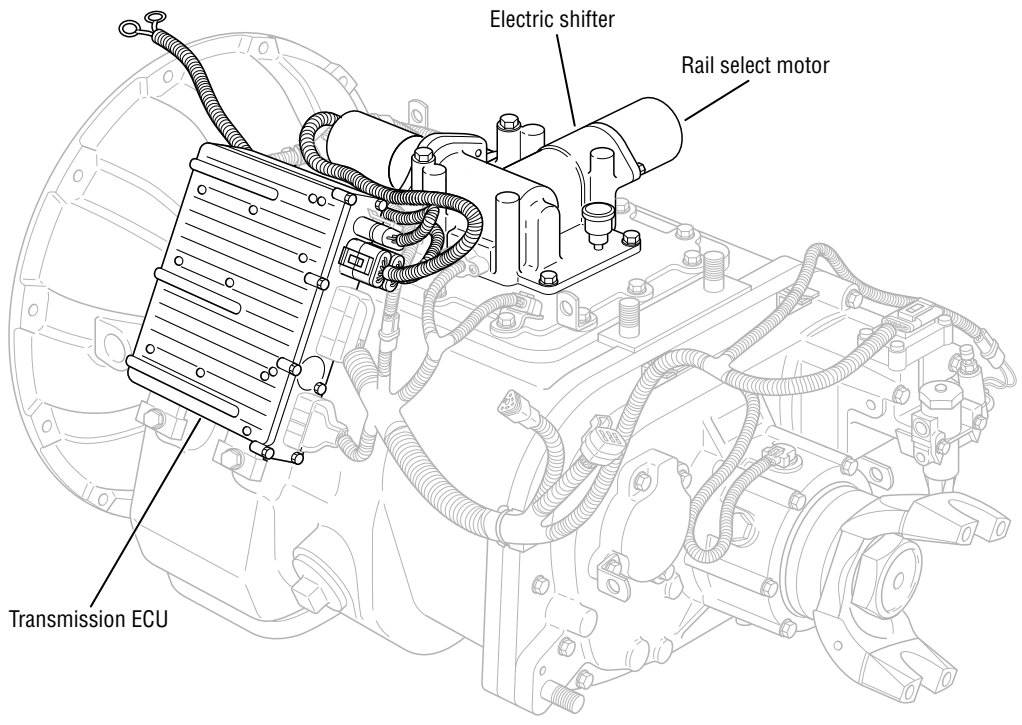
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

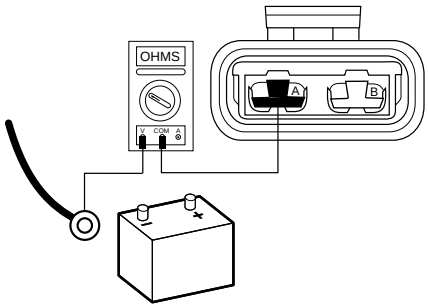
- Failed rail select motor
- Malfunctioning transmission ECU
- Power Interface Module

Likely Failed Components

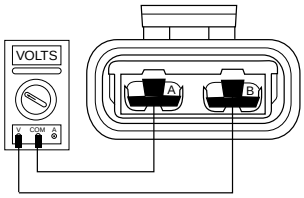


Code 61 (Hand-Held Code 39), Rail Select Motor Test

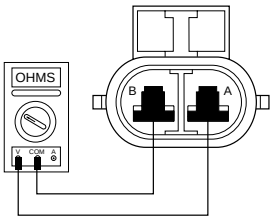
Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect power interface module 2-way connector from transmission controller. 3. Disconnect negative (–) battery cable. 4. Measure resistance between power interface module 2-way connector pin A and negative battery cable.	If resistance is 0 to .3 ohms	Go to **Step B**.
		If resistance is outside of range	Check battery and ground supply to power interface module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.



Step B	Procedure	Condition	Action
	1. Reconnect negative battery cable. 2. Measure voltage across power interface module 2-way connector pins.	If voltage is within 1 volt of battery voltage	Go to **Step C**.
		If voltage is outside of range	Check battery and ground supply to power interface module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.

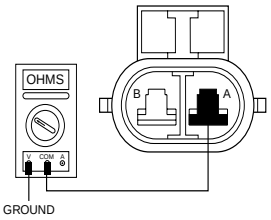


Step C	Procedure	Condition	Action
	1. Disconnect rail select motor 2-way (black) connector from transmission controller. 2. Measure the resistance across rail select 2-way connector pins.	If resistance is .5 to 150 ohms	Go to **Step D**.
		If resistance is outside of range	Replace electric shifter. Go to **Step V**.

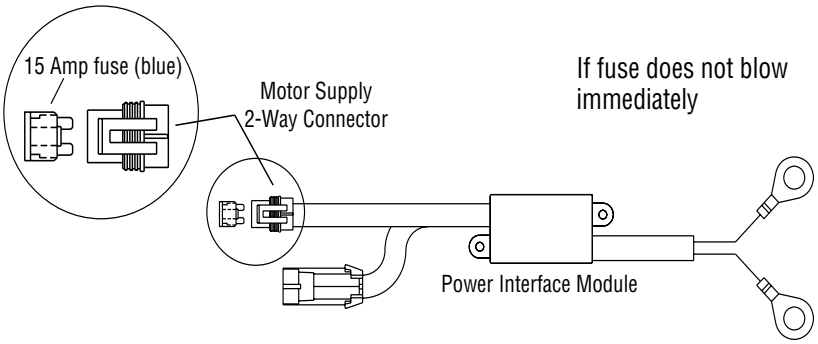


Code 61 (Hand-Held Code 39), Rail Select Motor Test, continued

Step D	Procedure	Condition	Action
	1. Measure resistance between rail select motor 2-way connector pin A and ground.	If resistance is 10K ohms or open circuit [OL]	Go to **Step E**.
		If resistance is outside of range	Replace electric shifter. Go to **Step V**.



Step E	Procedure	Condition	Action
	1. Key off. 2. Insert 15-amp fuse into Motor Supply 2-way connector.	If fuse blows immediately	Replace electric shifter. **⚠CAUTION** Disconnect the battery negative cable before reconnecting the motor supply 2-way connector. Failure to disconnect the battery negative cable can cause the failure of the power interface module. Go to **Step F**.
		If fuse does not blow immediately	Replace electric shifter and power interface module. **⚠CAUTION** Disconnect the battery negative cable before reconnecting the motor supply 2-way connector. Failure to disconnect the battery negative cable can cause the failure of the power interface module. Go to **Step F**.



Step F	Procedure	Condition	Action
	1. Key off. 2. Disconnect negative (–) battery cable. 3. Reconnect Motor Supply 2-way connector to transmission ECU. 4. Reconnect negative (–) battery cable. 5. Drive the vehicle to determine whether shift complint has been repaired.	If shift complaint was repaired	Go to **Step V**.
		If fault code 61 appears	Go to **Step G**.

Code 61 (Hand-Held Code 39), Rail Select Motor Test, continued

Step G	Procedure	Condition	Action
	1. Key off. 2. Verify all connectors are seated correctly at the transmission ECU. →	If all connectors are seated correctly →	Replace transmission ECU. Go to **Step V**.
		If connectors are not seated correctly →	Seat all connectors. Go to **Step V**.

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 61 appears →	Return to **Step A** to find error in testing.
		If code other than 61 appears →	Go to Fault Isolation Procedure Index (page 1-9).

Component Code 63 (Hand-Held Code 40) Gear Select Motor

Fault Description

This code indicates an electrical failure of the gear select motor that drives the electric shifter.

Required Tools

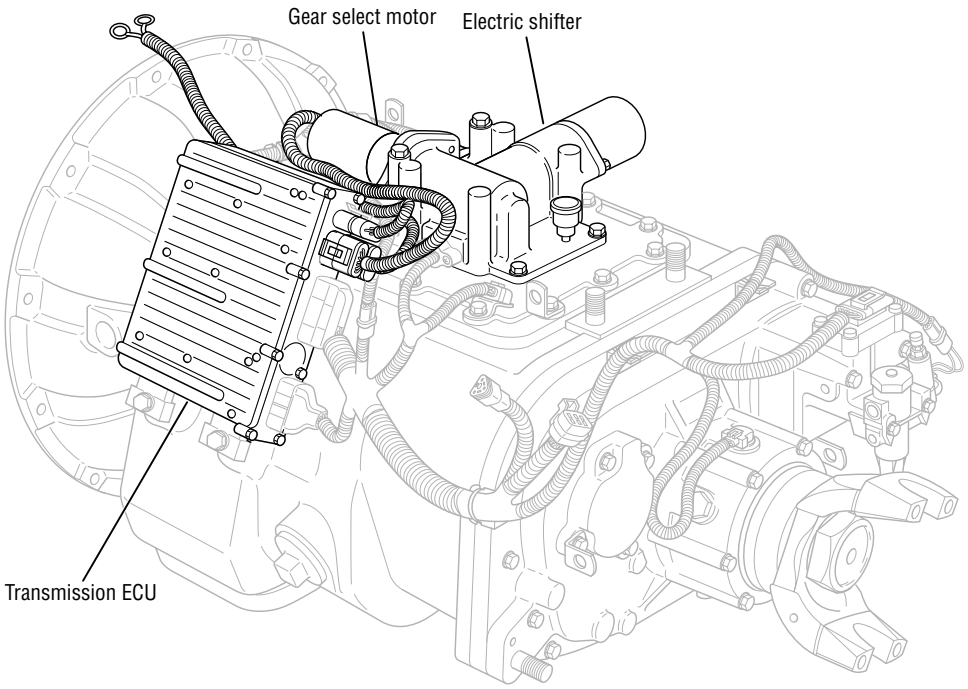
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

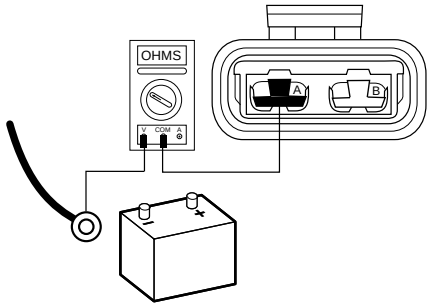
- Failed gear select motor
- Malfunctioning transmission ECU
- Power Interface Module

Likely Failed Components

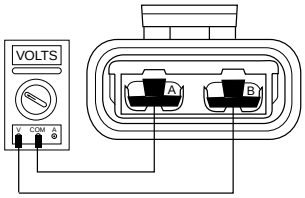


Code 63 (Hand-Held Code 40), Gear Select Motor Test

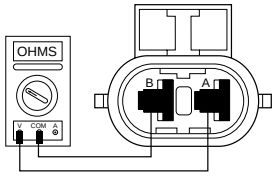
Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect power module 2-way connector from transmission controller. 3. Disconnect negative (–) battery cable. 4. Measure resistance between power module 2-way connector pin A and negative battery cable.	If resistance is 0 to .3 ohms	Go to **Step B**.
		If resistance is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.



Step B	Procedure	Condition	Action
	1. Reconnect negative battery cable. 2. Measure voltage across power module 2-way connector pins.	If voltage is within 1 volt of battery voltage	Go to **Step C**.
		If voltage is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.

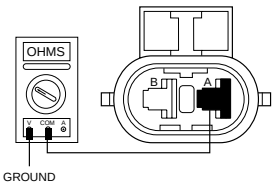


Step C	Procedure	Condition	Action
	1. Disconnect gear select motor 2-way (blue) connector from transmission controller. 2. Measure the resistance across gear select 2-way connector pins.	If resistance is .5 to 150 ohms	Go to **Step D**.
		If resistance is outside of range	Replace electric shifter. Go to **Step V**.

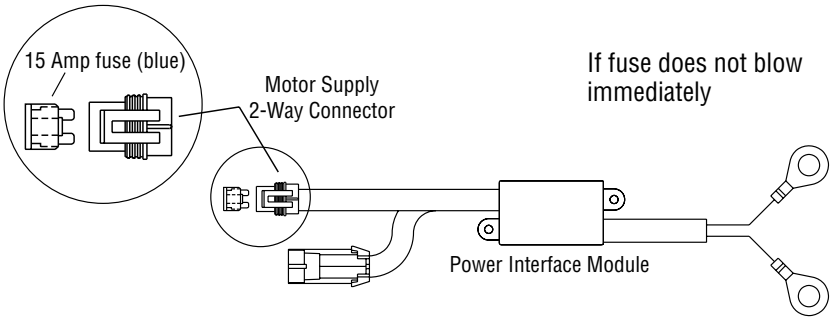


Code 63 (Hand-Held Code 40), Gear Select Motor Test, continued

Step D	Procedure	Condition	Action
	1. Measure resistance between gear select motor 2-way connector pin A and ground.	If resistance is 10K ohms or open circuit [OL]	Go to **Step E**.
		If resistance is outside of range	Replace electric shifter. Go to **Step V**.



Step E	Procedure	Condition	Action
	1. Key off. 2. Insert 15-amp fuse into Motor Supply 2-way connector.	If fuse blows immediately	Replace electric shifter. **⚠CAUTION** Disconnect the battery negative cable before reconnecting the motor supply 2-way connector. Failure to disconnect the battery negative cable can cause the failure of the power interface module. Go to **Step F**.
		If fuse does not blow immediately	Replace electric shifter and power interface module. **⚠CAUTION** Disconnect the battery negative cable before reconnecting the motor supply 2-way connector. Failure to disconnect the battery negative cable can cause the failure of the power interface module. Go to **Step F**.



Step F	Procedure	Condition	Action
	1. Key off. 2. Disconnect negative (–) battery cable. 3. Reconnect Motor Supply 2-way connector to transmission ECU. 4. Reconnect negative (–) battery cable. 5. Drive the vehicle to determine whether shift complint has been repaired.	If shift complaint was repaired	Test complete.
		If fault code 63 appears	Go to **Step G**.

Code 63 (Hand-Held Code 40), Gear Select Motor Test, continued

Step G	Procedure	Condition	Action
	1. Key off. 2. Verify all connectors are seated correctly at the transmission ECU. →	If all connectors are seated correctly →	Replace transmission ECU. Go to **Step V**.
		If connectors are not seated correctly →	Seat all connectors. Go to **Step V**.

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 63 appears →	Return to **Step A** to find error in testing.
		If code other than 63 appears →	Go to Fault Isolation Procedure Index (page 1-9).

Component Code 65 (Hand-Held Code 251) Low Motor Voltage

Fault Description

This code indicates the transmission ECU has detected low battery power supply to the electric shifter motors.

Required Tools

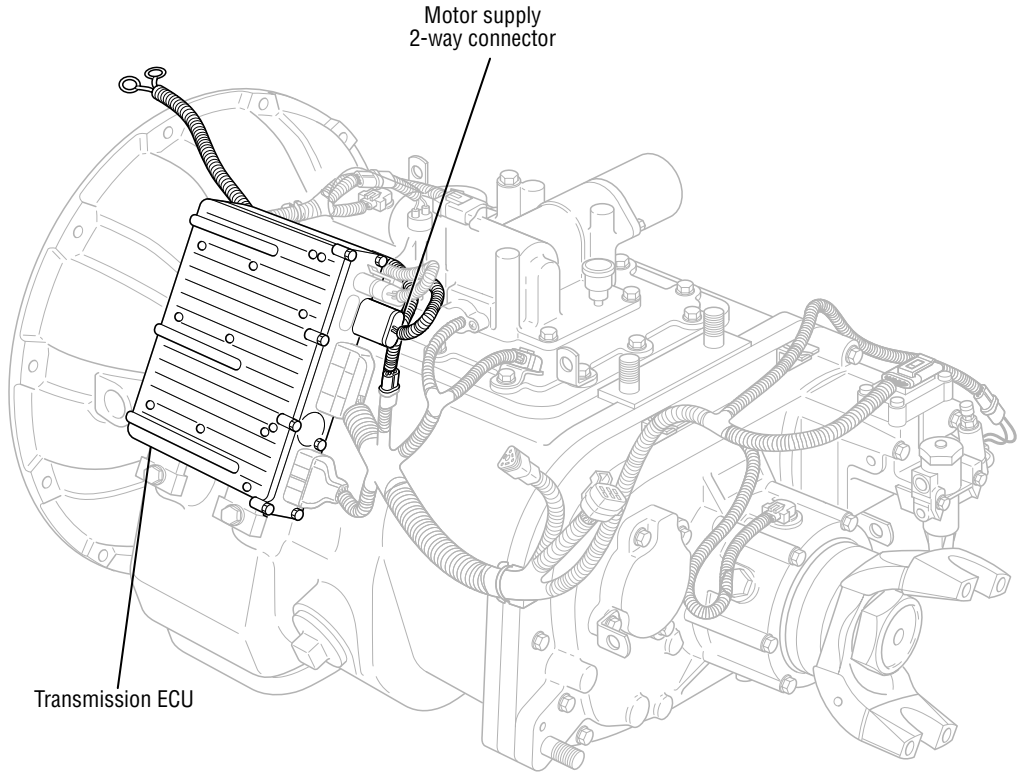
- Basic Hand Tools
- Digital Volt/Ohm Meter
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

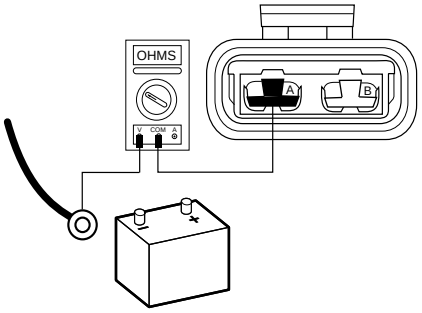
- Battery bus fuse/circuit breaker is open
- Low batteries
- Corroded or loose contacts
- Failed power interface module
- Malfunctioning transmission ECU

Likely Failed Components

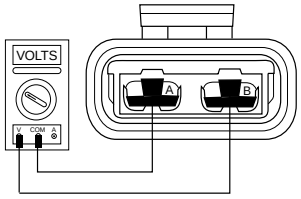


Code 65 (Hand-Held Code 251), Low Motor Voltage Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect power module 2-way connector from transmission ECU. 3. Disconnect negative (–) battery cable. 4. Measure resistance between power module 2-way connector pin A and negative battery cable.	If resistance is 0 to .3 ohms	Go to **Step B**.
		If resistance is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.

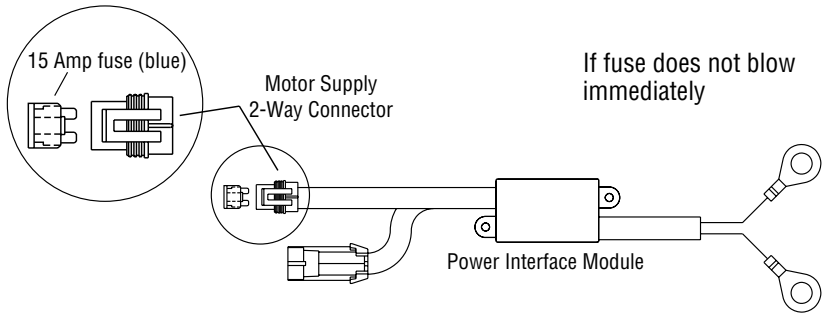


Step B	Procedure	Condition	Action
	1. Measure voltage across power module 2-way connector pins.	If voltage is within 1 volt of battery voltage	Go to **Step C**.
		If voltage is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.



Code 65 (Hand-Held Code 251), Low Motor Voltage Test, continued

Step C	Procedure	Condition	Action
	1. Key off. 2. Insert 15-amp fuse into Motor Supply 2-way connector.	If fuse blows immediately	Replace electric shifter. **⚠CAUTION** Disconnect the battery negative cable before reconnecting the motor supply 2-way connector. Failure to disconnect the battery negative cable can cause the failure of the power interface module. Go to **Step D**.
		If fuse does not blow immediately	Replace electric shifter and power interface module. **⚠CAUTION** Disconnect the battery negative cable before reconnecting the motor supply 2-way connector. Failure to disconnect the battery negative cable can cause the failure of the power interface module. Go to **Step D**.



Step D	Procedure	Condition	Action
	1. Key off. 2. Disconnect negative (–) battery cable. 3. Reconnect Motor Supply 2-way connector to transmission ECU. 4. Reconnect negative (–) battery cable. 5. Drive the vehicle to determine whether shift complint has been repaired.	If shift complaint was repaired	Go to **Step V**.
		If fault code 65 appears	Go to **Step E**.

Step E	Procedure	Condition	Action
	1. Key off. 2. Verify all connectors are seated correctly at the transmission ECU.	If all connectors are seated correctly	Replace transmission ECU. Go to **Step V**.
		If connectors are not seated correctly	Seat all connectors.t. Go to **Step V**.

Code 65 (Hand-Held Code 251), Low Motor Voltage Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 65 appears →	Return to **Step A** to find error in testing.
		If code other than 65 appears →	Go to Fault Isolation Procedure Index (page 1-9).

System Code 71 (Hand-Held Code 60) Stuck Engaged

Fault Description

This code indicates the transmission was unable to move the front box to neutral, during a shift request.

Required Tools

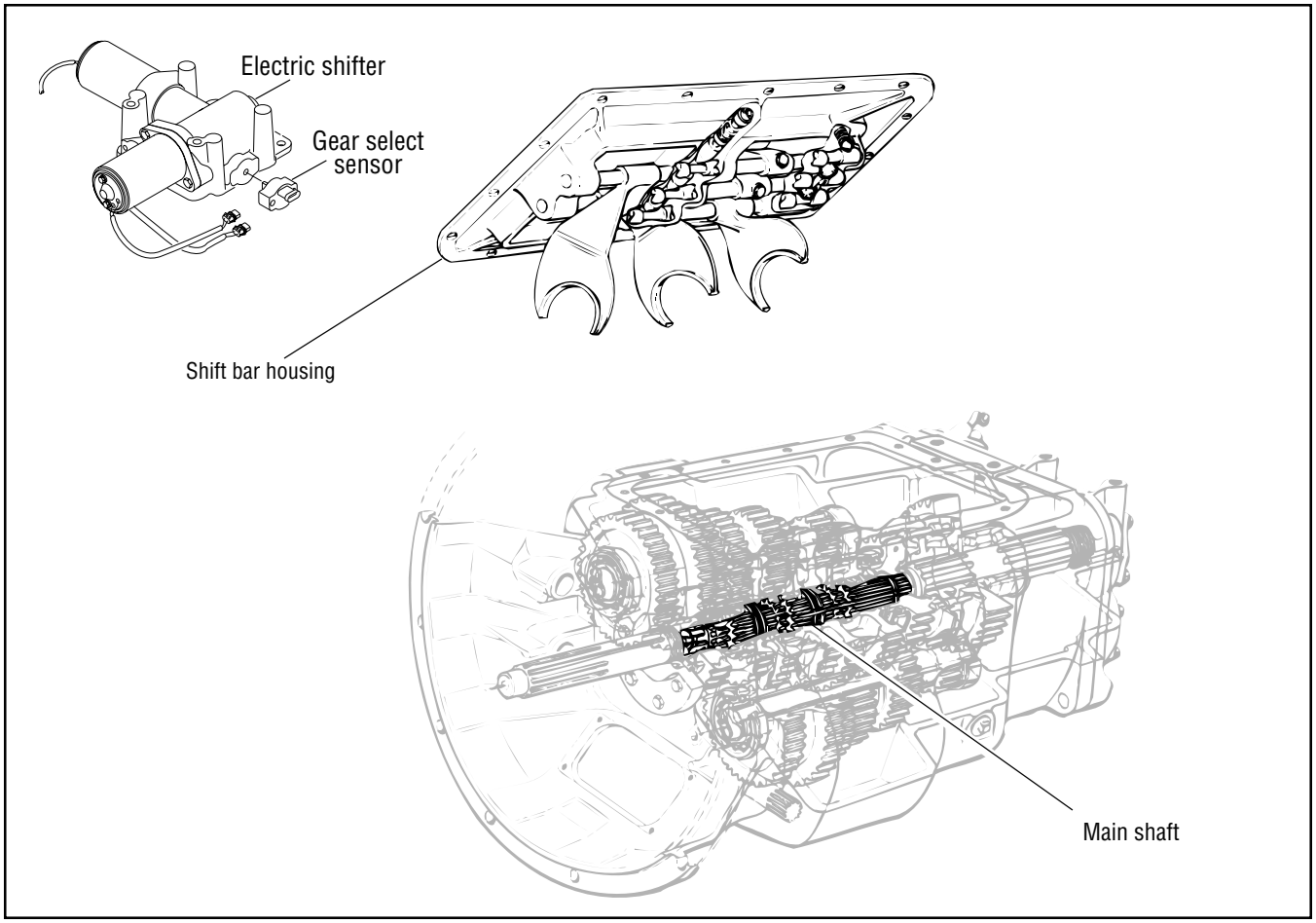
- Basic Hand Tools
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

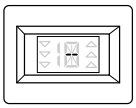
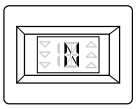
This code can be caused by any of the following conditions:

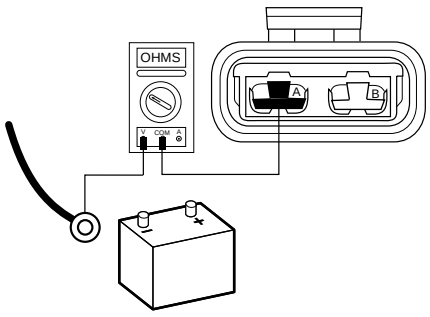
- Low power to gear select motor
- Failed gear select sensor
- Malfunctioning electric shifter
- Malfunctioning yoke/clutch/main shaft
- Failed shift block
- Failed or misaligned shift block
- Electric shifter calibration
- Dragging clutch
- Torque locked in gear

Likely Failed Components

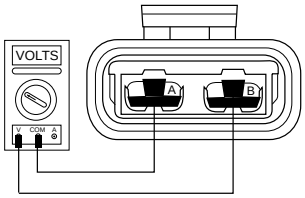


Code 71 (Hand-Held Code 60), Stuck Engaged Test

Step A	Procedure	Condition	Action
	1. Place shift lever in neutral 2. Depress the clutch pedal 3. Key on. 4. Observe service lamp.	→ If wait light is on constantly **or**	
		Gear display shows: 	→ Go to **Step B**.
		If no lights or tones turn on	→ Perform Electrical Pretest (page 2-1).
		If "N" is highlighted on shift lever and	
		Gear display shows: 	→ Test complete.

Step B	Procedure	Condition	Action
	1. Key off. 2. Disconnect power module 2-way connector from transmission controller. 3. Disconnect negative (–) battery cable. 4. Measure resistance between power module 2-way connector pin A and negative battery cable.	→ If resistance is 0 to .3 ohms	→ Go to **Step C**.
		If resistance is outside of range	→ Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Go to **Step V**.

Code 71 (Hand-Held Code 60), Stuck Engaged Test, continued

Step C	Procedure	Condition	Action
	1. Measure voltage across power module 2-way connector pins. 	If voltage is within 1 volt of battery voltage	Go to **Step D**.
		If voltage is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Go to **Step V**.

Step D	Procedure	Condition	Action
	1. Remove electric shifter from shift bar housing. 2. Inspect electric shifter and shift bar housing. • Shift blocks • Roll pins • Finger movement • Mechanical linkages	If no problem found	Replace electric shifter. Go to **Step V**.
		If problem found	Repair as required. Go to **Step V**.

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3).	If no codes	Test complete.
		If code 71 appears	Return to **Step A** to find error in testing.
		If code other than 71 appears	Go to Fault Isolation Procedure Index (page 1-9).

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System Code 72 (Hand-Held Code 59) Failed to Select Rail

Fault Description

This code indicates the transmission is unable to select the required rail during a shift.

Required Tools

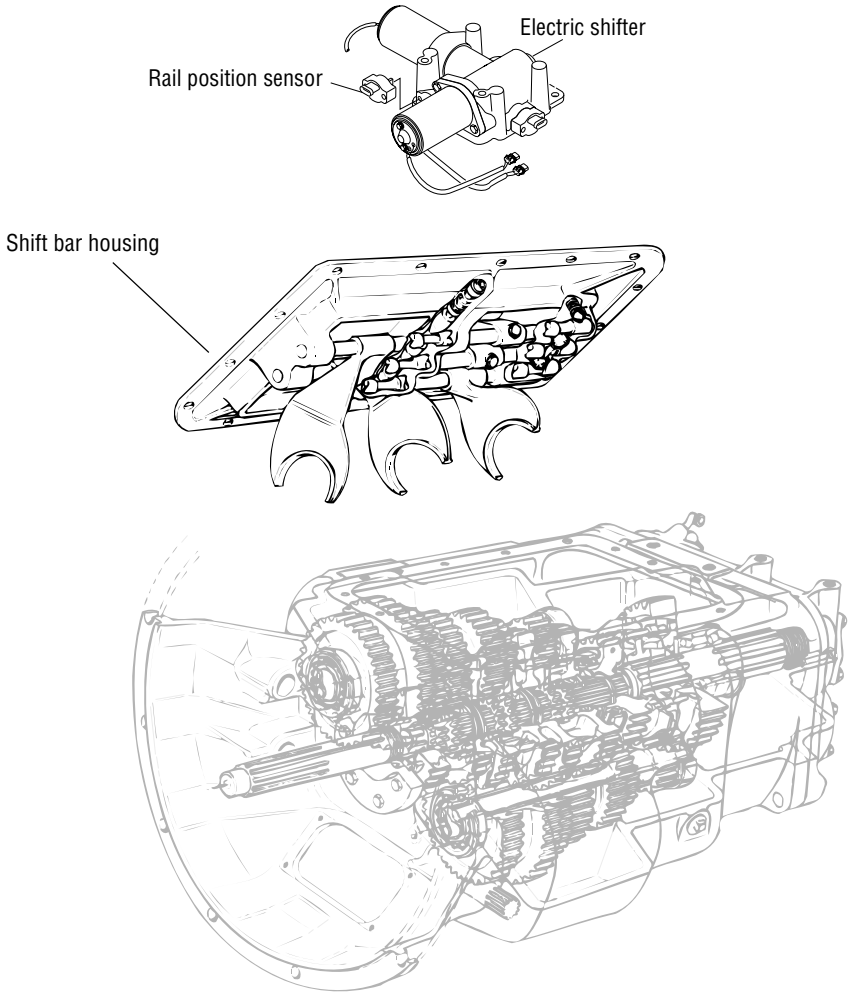
- Basic Hand Tools
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

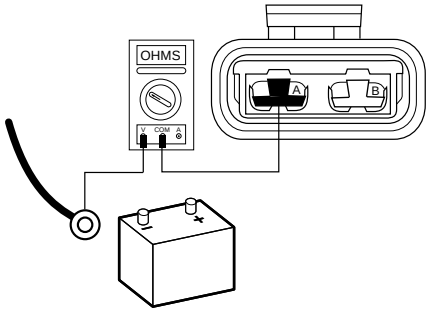
- Low power to rail motor
- Failed rail select motor
- Failed rail select sensor
- Failed or misaligned shift block
- Malfunctioning transmission ECU

Likely Failed Components

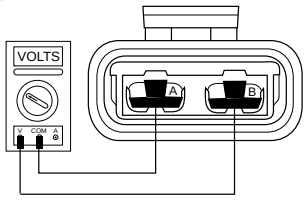


Code 72 (Hand-Held Code 59), Failed to Select Rail Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect power module 2-way connector from transmission controller. 3. Disconnect negative (–) battery cable. 4. Measure resistance between power module 2-way connector pin A and negative battery cable.	If resistance is 0 to .3 ohms	Go to **Step B**.
		If resistance is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.



Step B	Procedure	Condition	Action
	1. Measure voltage across power module 2-way connector pins.	If voltage is within 1 volt of battery voltage	Go to **Step C**.
		If voltage is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Go to **Step V**.



Step C	Procedure	Condition	Action
	1. Remove electric shifter from shift bar housing. 2. Inspect electric shifter and shift bar housing. • Shift blocks • Roll pins • Finger movement • Mechanical linkages	If no problem found	Replace electric shifter. Go to **Step V**.
		If problem found	Repair as required. Go to **Step V**.

Code 72 (Hand-Held Code 59), Failed to Select Rail Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 72 appears →	Return to **Step A** to find error in testing.
		If code other than 72 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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System Code 73
(Hand-Held Code 58)
Failed to Engage Gear

Fault Description

This code indicates the transmission is unable to engage the desired gear in the front box during a shift.

Required Tools

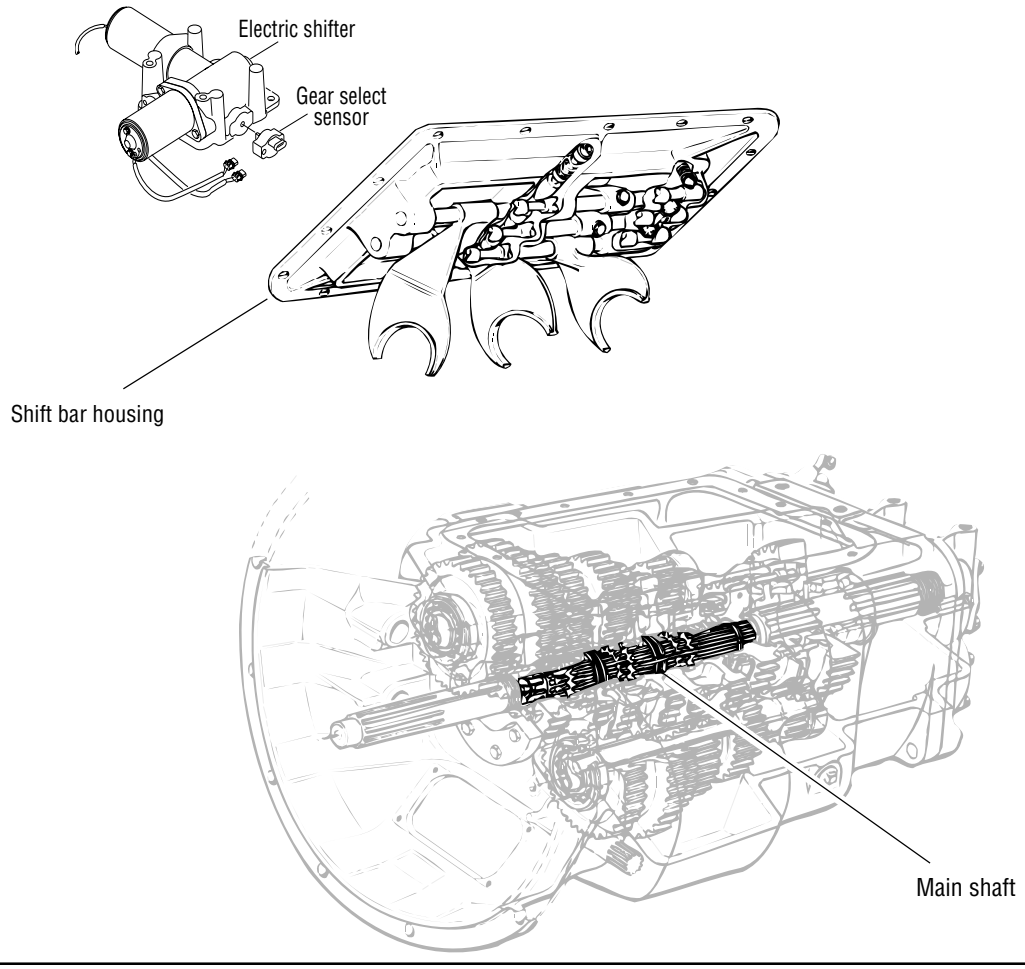
- Basic Hand Tools
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

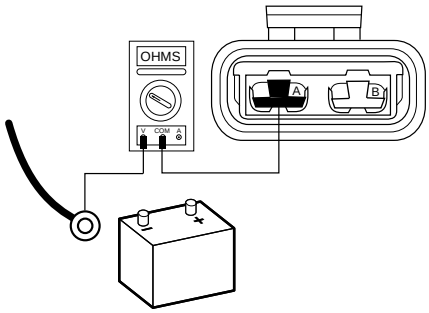
- Malfunctioning electric shifter
- Malfunctioning yoke/clutch/main shaft
- Failed shift block
- Failed or misaligned shift block
- Electric shifter calibration
- Failed gear select sensor

Likely Failed Components

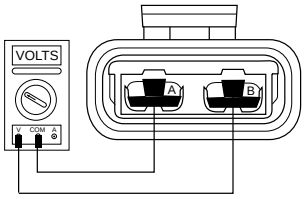


Code 73 (Hand-Held Code 58), Failed to Engage Gear Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect power module 2-way connector from transmission controller. 3. Disconnect negative (–) battery cable. 4. Measure resistance between power module 2-way connector pin A and negative battery cable.	If resistance is 0 to .3 ohms	Go to **Step B**.
		If resistance is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Go to **Step V**.



Step B	Procedure	Condition	Action
	1. Measure voltage across power module 2-way connector pins.	If voltage is within 1 volt of battery voltage	Go to **Step C**.
		If voltage is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Go to **Step V**.



Step C	Procedure	Condition	Action
	1. Remove electric shifter from shift bar housing. 2. Inspect electric shifter and shift bar housing. • Shift blocks • Roll pins • Finger movement • Mechanical linkages	If no problem found	Replace electric shifter. Go to **Step V**.
		If problem found	Repair as required. Go to **Step V**.

Code 73 (Hand-Held Code 58), Failed to Engage Gear Test, continued

Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 73 appears →	Return to **Step A** to find error in testing.
		If code other than 73 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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System Code 74
(Hand-Held Code 54)
Failed to Sync Initial Engagement

Fault Description

This code indicates the system was unable to bring input shaft to a stop using the inertia brake.

Required Tools

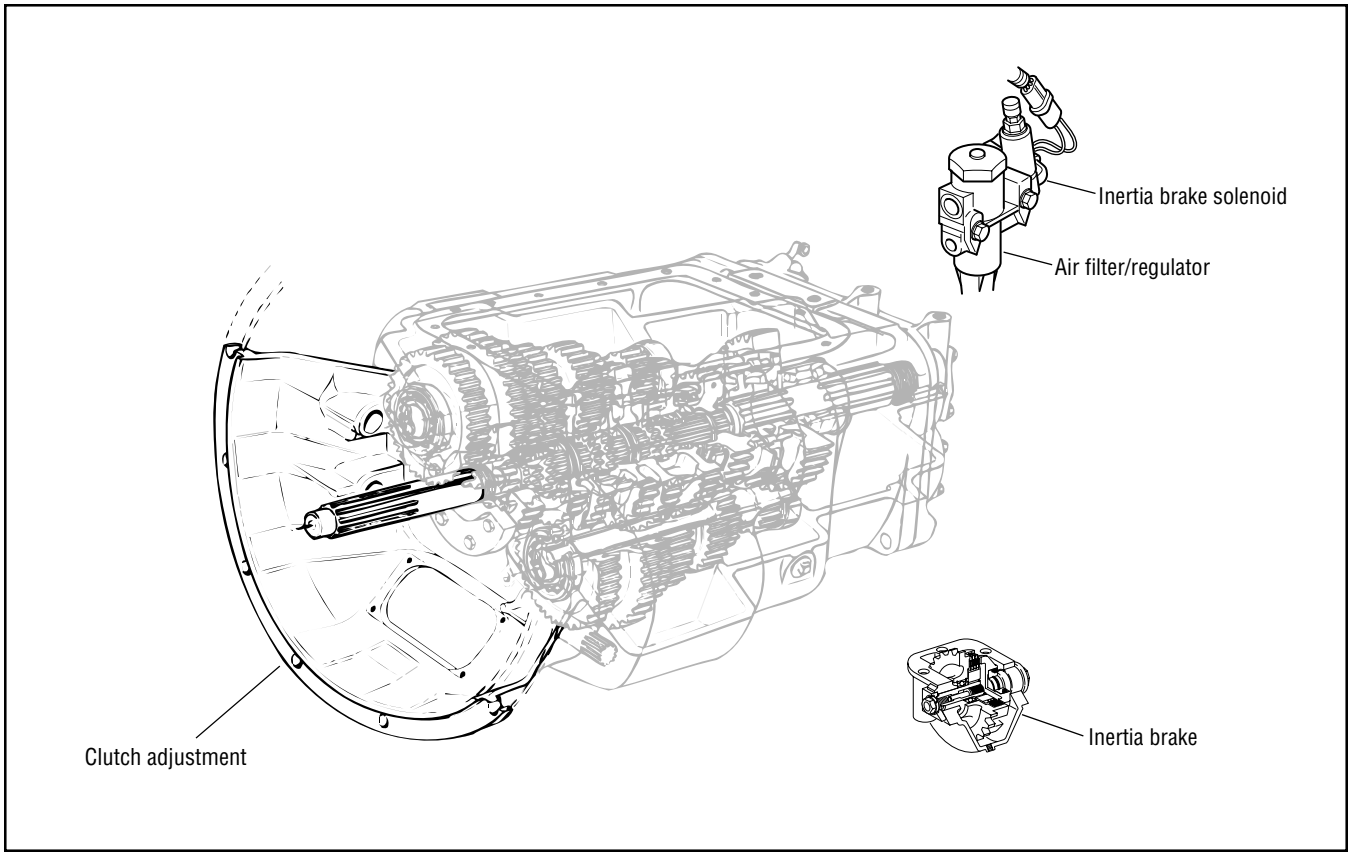
- Basic Hand Tools
- Hand-Held Diagnostic Tool
- 0-100 PSI Air Pressure Gauges
- AutoSelect/AutoShift Troubleshooting Guide

Possible Causes

This code can be caused by any of the following conditions:

- Low air pressure
- Contaminated air supply
- Clutch out of adjustment
- Damaged input shaft brake
- Malfunctioning inertia brake
- Damaged internal transmission gearing

Likely Failed Components



Code 74 (Hand-Held Code 54), Failed to Sync Initial Engagement Test, continued

Step A	Procedure	Condition	Action
	1. Key on. 2. Connect hand-held diagnostic tool and monitor input shaft speed. 3. Fully depress the clutch pedal all the way to engage the input shaft brake. →	If the input shaft speed rapidly drops to 0 RPM →	Go to **Step B**.
		If the input shaft does not rapidly drop to 0 RPM →	The clutch is out of adjustment or the input shaft brake needs to be replaced. Repair or replace as required. Repeat this step.

Step B	Procedure	Condition	Action
	1. Key off. 2. Tee a 0 to 100 PSI air gauge in the supply between the inertia brake solenoid and the air filter/regulator. 3. Key on. 4. Observe the gauge. →	If pressure is 58 to 63 PSI →	Go to **Step C**.
		If pressure is outside of range →	Replace the air filter/regulator. Go to **Step V**.

Code 74 (Hand-Held Code 54), Failed to Sync Initial Engagement Test, continued

Step C	Procedure	Condition	Action
	1. Key off. 2. Locate the air line from the inertia brake solenoid to the inertia brake. 3. Tee a 0 to 100 PSI air pressure gauge in the inertia brake line. 4. Key on. Allow air system to reach governor cut-off. 5. Place the transmission in "D". 6. Monitor the input shaft speed with the hand-held diagnostic tool. 7. Slowly depress the clutch pedal and keep the input shaft between 250 to 350 RPM for more than 10 seconds. (The transmission will nor engage starting gear until input shaft speed drops below 150 RPM.). 8. Observe the gauge. →	If pressure is 58 to 63 PSI →	Replace the inertia brake. Go to **Step V**.
		If pressure is outside of range →	Replace the inertia brake solenoid. Go to **Step V**.

Step V	Procedure	Condition	Action
	1. Key off. 2. Remove air gauges. 3. Reconnect connectors. 4. Key on. 5. Clear codes (see Clearing Fault Codes, page 1-3). 6. Use Driving Technique to attempt to reset the code (page 1-4). 7. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 74 appears →	Return to **Step A** to find error in testing.
		If code other than 74 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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Component Code 83 (Hand-Held Code 18) Shift Lever Missing

Fault Description

This code indicates the shift lever is not sensing any lever positions.

Possible Causes

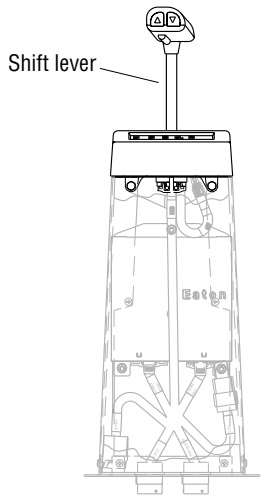
This code is caused by any of the following conditions:

- Lever placed between positions

Required Tools

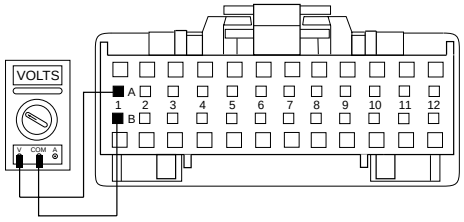
- Basic Hand Tools
- AutoSelect/AutoShift Troubleshooting Guide

Likely Failed Components



Code 83 (Hand-Held Code 18), Shift Lever Missing Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect shift lever 24-way connector. 3. Key on. 4. Measure voltage across shift lever 24-way connector pins A1 and B1. →	If voltage is within 1 volt of battery voltage →	Replace shift lever. Go to **Step V**.
		If voltage is outside of range →	Repair ignition supply to shift lever. Go to **Step V**.



Step V	Procedure	Condition	Action
	1. Key off. 2. Reconnect all connectors. 3. Key on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Use Driving Technique to attempt to reset the code (page 1-4). 6. Check for codes (see Retrieving Fault Codes, page 1-3). →	If no codes →	Test complete.
		If code 83 appears →	Return to **Step A** to find error in testing.
		If code other than 83 appears →	Go to Fault Isolation Procedure Index (page 1-9).

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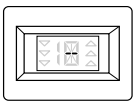
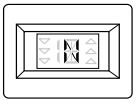
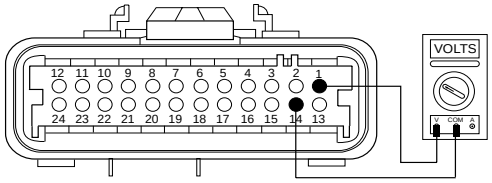
Front Box Control Test

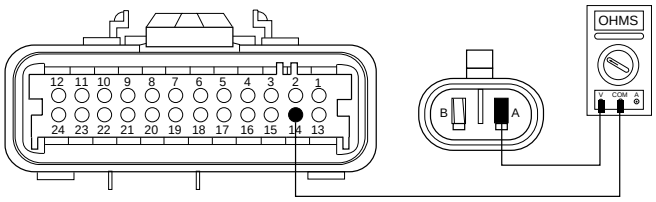
Step A	Procedure	Condition	Action
	1. Place shift lever in neutral 2. Depress the clutch pedal 3. Key on. 4. Observe service lamp. →	If service lamp and wait light are on constantly →	Test EPL Link. Go to **Step B**.
		If wait light is on constantly **or**	
		Gear display shows: → 	Test front box control. Go to **Step I**.
		If no lights or tones turn on →	Perform Electrical Pretest (page 2-1).
		If "N" is highlighted on shift lever and	
		Gear display shows: → 	Test complete.

Step B	Procedure	Condition	Action
	1. Remove transmission ECU 24-way connector. 2. Key on. 3. Measure voltage across transmission ECU 24-way connector pins 1 and 14. → 	If voltage is within 1 volt of battery voltage →	Go to **Step D**.
		If voltage is outside of range →	Go to **Step C**.

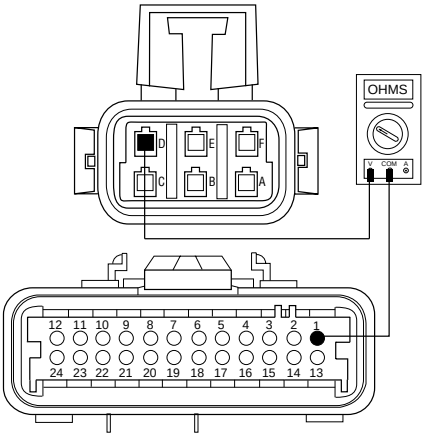
Front Box Control Test, continued

Step C	Procedure	Condition	Action

1. Disconnect transmission harness 6-way connector from transmission interface harness.
2. Disconnect power module from transmission harness.
3. Measure resistance between transmission ECU 24-way connector pin 14 and power module connector pin A on the transmission harness.



4. Measure resistance between transmission harness 6-way connector pin D and transmission ECU 24-way connector pin 1. → If resistance is 0 to .3 ohms → Repair or replace vehicle interface harness or tower harness. Go to **Step A**.



If resistance is outside of range → Repair or replace transmission harness as required. Go to **Step A**.

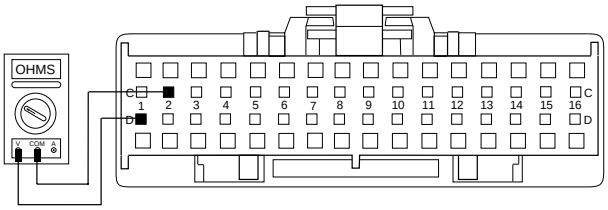
Step D	Procedure	Condition	Action

1. Reconnect transmission ECU 24-way connector.
2. Key off. Allow transmission to power down.
3. Disconnect system manager 32-way connector.
4. Connect EPL tester to tower harness.
5. Key on. Start Communication Test. → If test passes → Replace system manager ECU. Go to **Step A**.

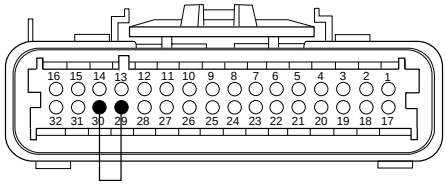
If test fails → Go to **Step E**.

Front Box Control Test, continued

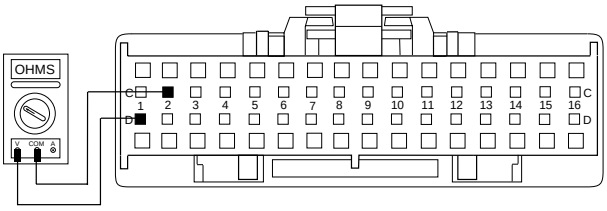
Step E	Procedure	Condition	Action
	1. Key off. Allow transmission to power down. 2. Disconnect transmission ECU 32-way connector. 3. Remove EPL tester from system manager 32-way connector. 4. Measure resistance between system manager 32-way connector pins C2 and D1 and from each pin to ground.	If resistance for each measurement is more than 10K ohms or open circuit [OL]	Go to **Step F**.
		If resistance of any measurement is less than 10K ohms	Go to **Step G**.



Step F	Procedure	Condition	Action
	1. Place a jumper across transmission ECU 32-way connector pins 29 and 30.		

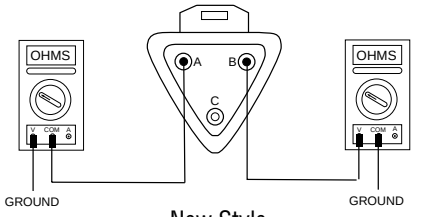


	2. Measure resistance between system manager 32-way connector pins C2 and D1.	If resistance is 0 to .3 ohms	Replace transmission ECU. Repeat this step.
		If resistance is outside of range	Go to **Step G**.

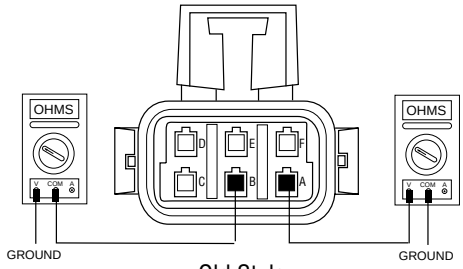


Front Box Control Test, continued

Step G	Procedure	Condition	Action
	1. Reconnect system manager 32-way connector. 2. Disconnect transmission harness 3-way connector from transmission interface harness. 3. Remove any jumper wires currently in place. 4. Measure resistance between the transmission harness 3-way connector pins A and B and from each pin to ground. **Note**: Depending on which connector you have, refer to either the old style or the new style connector illustration.	If resistance for each measurement is more than 10K ohms or open circuit [OL]	Go to **Step H**.
		If resistance of any measurement is less than 10K ohms	Repair or replace transmission harness. Go to **Step A**.



New Style



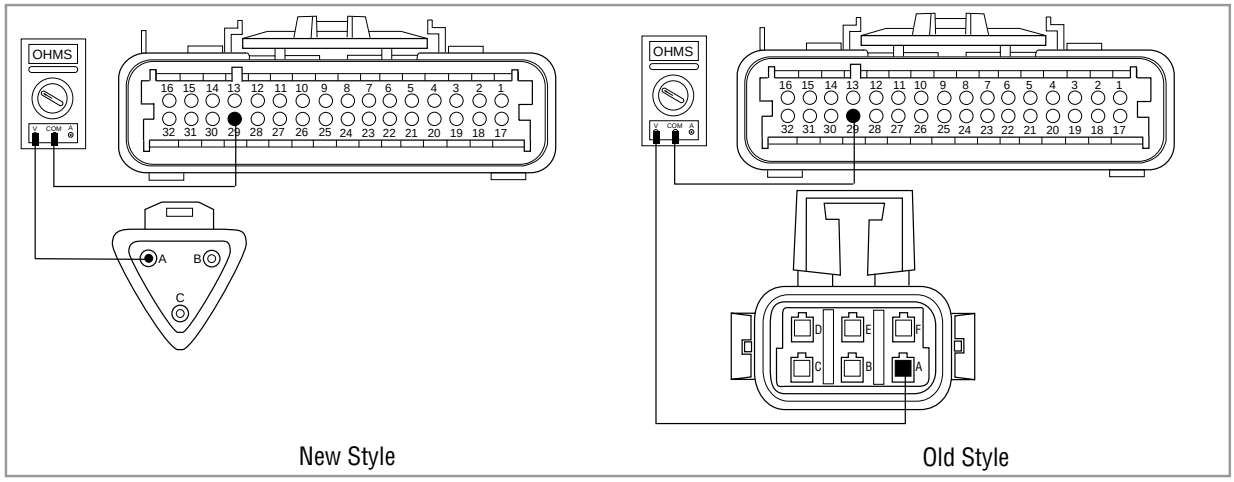
Old Style

Front Box Control Test, continued

Step H	Procedure	Condition	Action

1. Measure resistance between transmission ECU 32-way connector pin 29 and transmission harness 3-way connector pin A.

Note: Depending on which connector you have, refer to either the old style or the new style connector illustration.

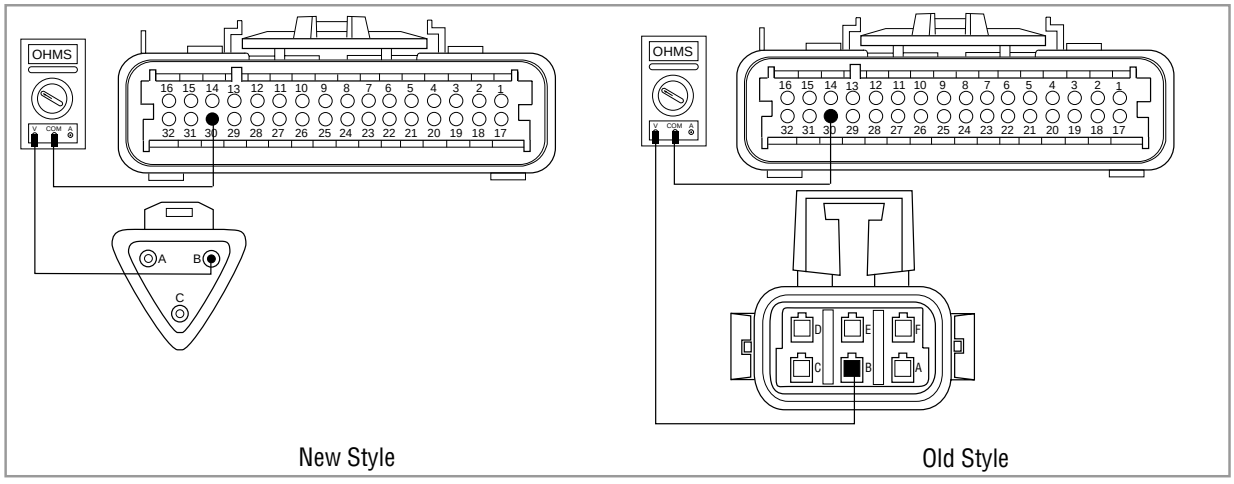


New Style Old Style

2. Measure resistance between transmission ECU 32-way connector pin 30 and transmission harness 3-way connector pin B.

→ If both measurements are 0 to .3 ohms → Repair OEM wiring from system manager to transmission harness. Go to **Step A**.

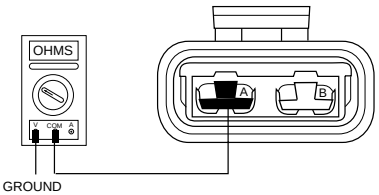
If resistance of either measurement is outside of range → Repair or replace transmission harness. Go to **Step A**.



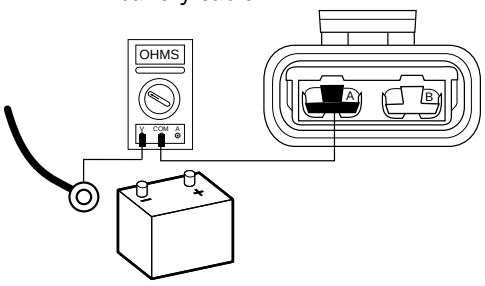
New Style Old Style

Front Box Control Test, continued

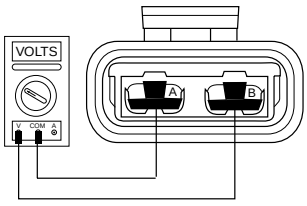
Step I	Procedure	Condition	Action
	1. Key off. 2. Disconnect power module 2-way connector from transmission controller. 3. Disconnect negative (–) battery cable.		



4. Measure resistance between power module 2-way connector pin A and negative battery cable.	→	If resistance is 0 to .3 ohms	→ Go to **Step J**.
		If resistance is outside of range	→ Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Repeat this step.



Step J	Procedure	Condition	Action
	1. Reconnect negative battery cable. 2. Measure voltage across power module 2-way connector pins.		



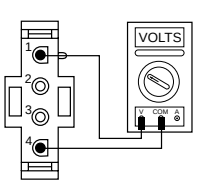
	→	If voltage is within 1 volt of battery voltage	→ Go to **Step K**.
		If voltage is outside of range	→ Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Go to **Step A**.

Front Box Control Test, continued

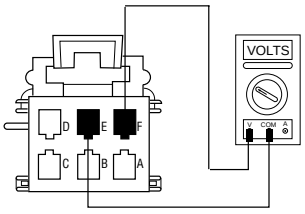
Step K	Procedure	Condition	Action
	1. Remove electric shifter from shift bar housing. 2. Inspect electric shifter and shift bar housing. • Shift blocks • Roll pins • Finger movement • Mechanical linkages	→ If no problem found	→ Replace electric shifter. Go to **Step A**.
		If problem found	→ Repair as required. Go to **Step A**.

Gear Display Power Supply Test

Step A	Procedure	Condition	Action
	1. Key off. **Note:** If the vehicle is equipped with a 12/25V converter at the gear display, the converter and gear display are viewed as one part. Replacement of the gear display includes the converter. 2. Remove the dash panel and unplug the gear display from the dash harness. 3. Key on. 4. Measure voltage across dash harness pins E or 4 and F or 1. **Note**: Depending on which connector you have, refer to the old style or the new style connector illustration. →	If voltage is within 1 volt of battery voltage →	Go to **Step D**.
		If voltage is outside of range →	Go to **Step B**.

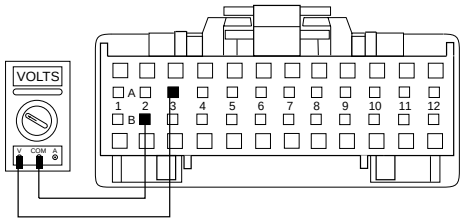


New Style



Old Style

Step B	Procedure	Condition	Action
	1. Disconnect shift lever 24-way connector. 2. Measure voltage across shift lever 24-way connector pins A3 and B2. →	If voltage is within 1 volt of battery voltage →	Go to **Step C**.
		If voltage is outside of range →	Repair ignition and/or ground supply to shift lever. Go to **Step A**.

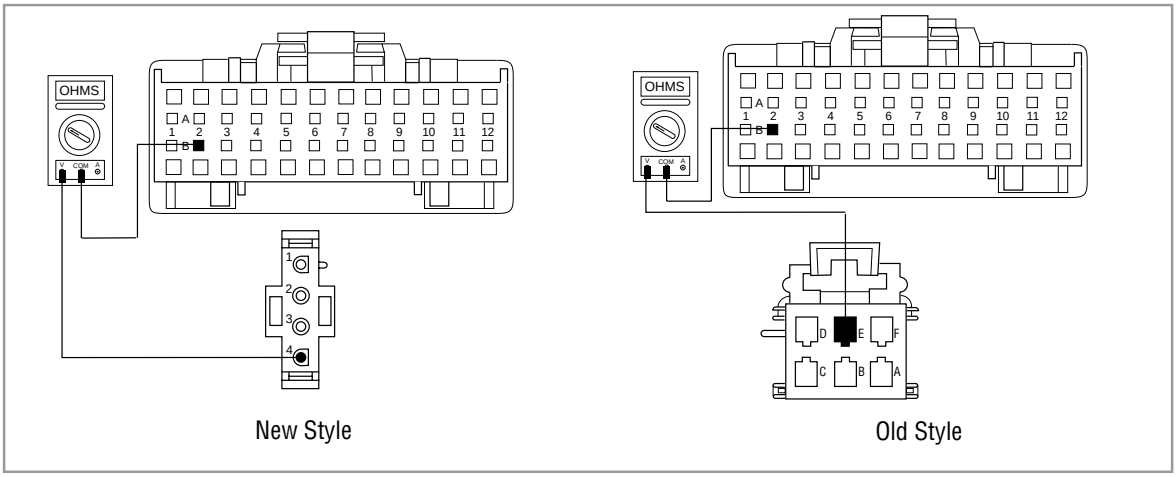


Gear Display Power Supply Test, continued

Step C	Procedure	Condition	Action

1. Measure resistance between dash harness connector at gear display pin E or 4 and shift lever 24-way connector pin B2.

Note: Depending on which connector you have, refer to the old style or the new style connector illustration.

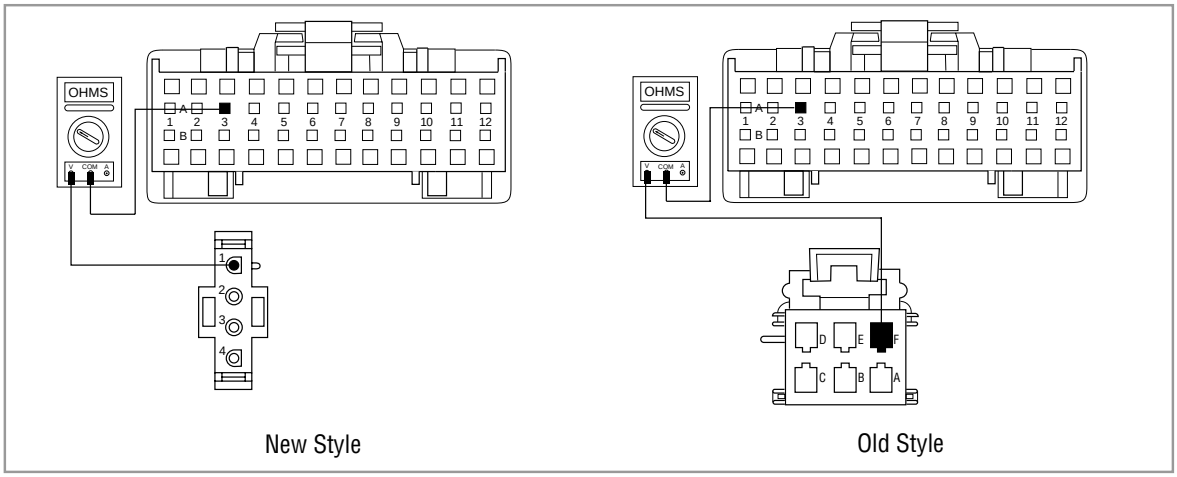


New Style Old Style

2. Measure resistance between dash harness connector at gear display pin F or 1 and shift lever 24-way connector pin A3.

→ If both measurements are 0 to .3 ohms → Replace shift lever. Go to **Step V**.

If either measurement is outside of range → Repair harness between gear display and shift lever as required. Go to **Step V**.



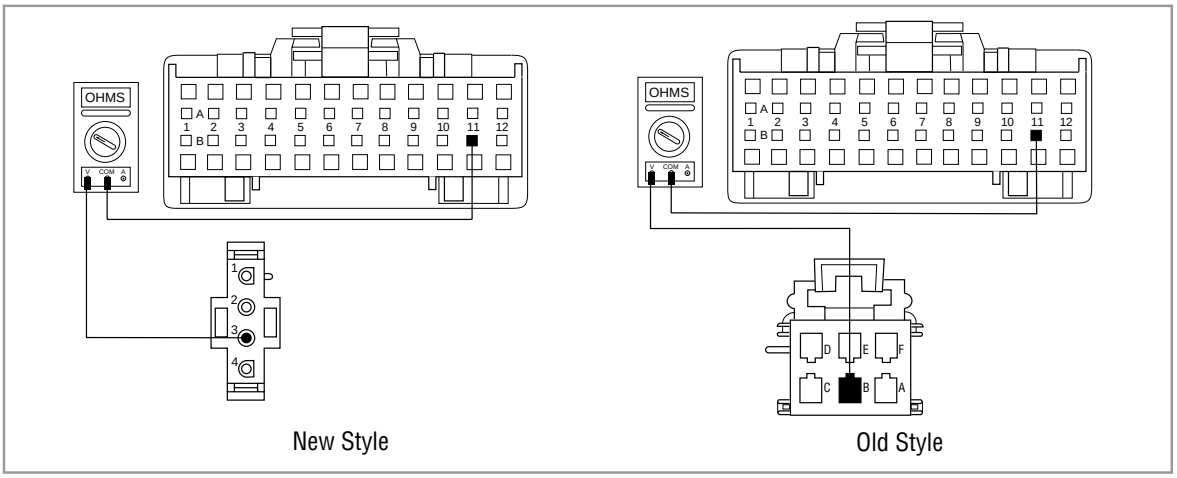
New Style Old Style

Gear Display Power Supply Test, continued

Step D	Procedure	Condition	Action

1. Disconnect shift lever 24-way connector.
2. Measure resistance between dash harness connector at gear display pin B or 3 and shift lever 24-way connector pin B11.

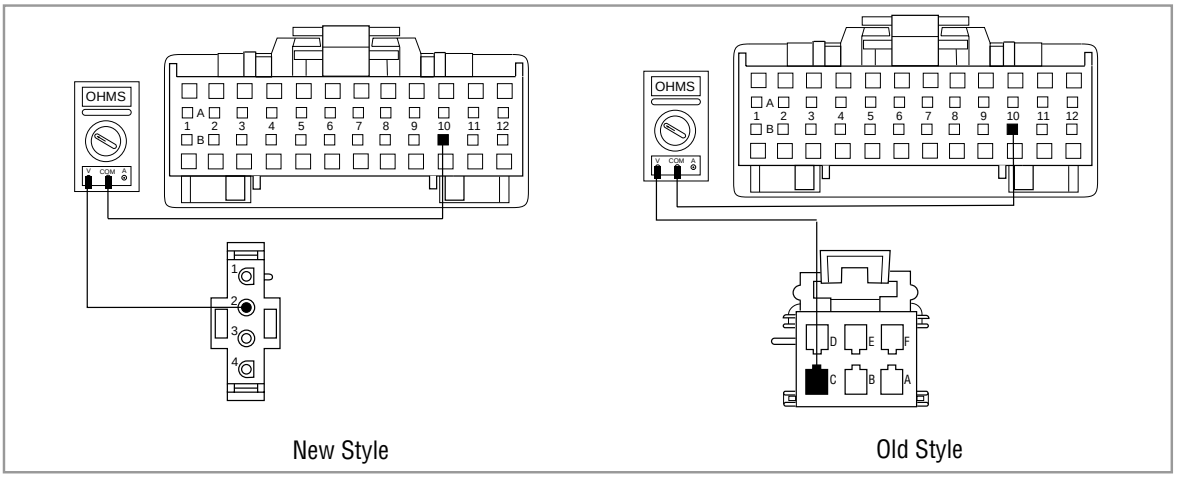
Note: Depending on which connector you have, refer to the old style or the new style connector illustration.



New Style Old Style

3. Measure resistance between dash harness connector at gear display pin C or 2 and shift lever 24-way connector pin B10.

If both measurements are 0 to .3 ohms	→	Go to **Step E**.
If either measurement is outside of range	→	Repair harness between gear display and shift lever as required. Repeat this step.



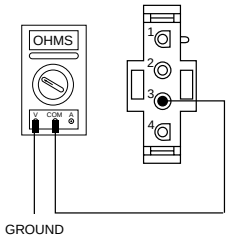
New Style Old Style

Gear Display Power Supply Test, continued

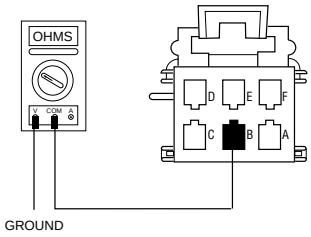
Step E	Procedure	Condition	Action

1. Measure resistance between dash harness connector at gear display pin B or 3 and ground.

Note: Depending on which connector you have, refer to the old style or the new style connector illustration.

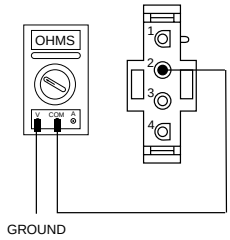


New Style

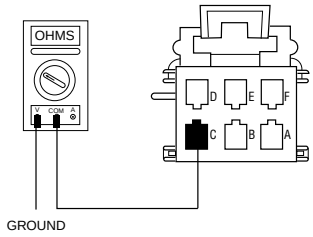


Old Style

2. Measure resistance between dash harness connector at gear display pin C or 2 and ground.



New Style



Old Style

→	If both measurements are more than 10K ohms or open circuit [OL]	→ Replace gear display. Retest. If problem continues, replace shift lever. Go to **Step V**.
	If both measurements are less than 10K ohms	→ Repair harness between gear display and shift lever as required. Go to **Step V**.

Step V	Procedure	Condition	Action

1. Key off.
2. Reconnect all connectors.
3. Key on.
4. Observe gear display.

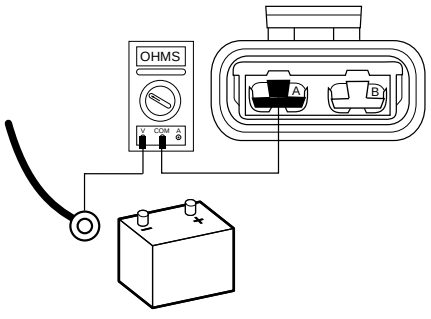
→	If after power up, gear display comes on	→ Test complete.
	If problem continues	→ Go to **Step A** to find error in testing.
	If other code or symptom appears	→ Go to Diagnostics Procedure (page 1-2).

Electric Shifter Test

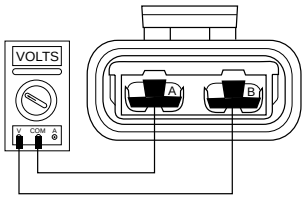
Step A	Procedure	Condition	Action
	1. Key on. 2. Connect hand-held diagnostic tool and monitor input shaft speed. 3. Fully depress the clutch pedal all the way to engage the input shaft brake.	If the input shaft speed rapidly drops to 0 RPM	Go to **Step B**.
		If the input shaft does not rapidly drop to 0 RPM	The clutch is out of adjustment or the input shaft brake needs to be replaced. Repair or replace as required. Repeat this step.

Step B	Procedure	Condition	Action
	1. Press clutch, move shift lever to drive, and select 4th gear start with buttons. 2. Monitor input shaft, main shaft and output shaft speeds on the hand-held diagnostic tool while slowly releasing the clutch.	If input shaft speed increases but main shaft and output shaft speed remain stopped	Go to **Step C**.
		If input shaft and main shaft speed increase but output shaft speed remains stopped	Go to **Step F**.

Step C	Procedure	Condition	Action
	1. Disconnect power module 2-way connector from transmission controller. 2. Disconnect negative (–) battery cable. 3. Measure resistance between power module 2-way connector pin A and negative battery cable.	If resistance is 0 to .3 ohms	Go to **Step D**.
		If resistance is outside of range	Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Repeat this step.



Electric Shifter Test, continued

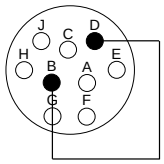
Step D	Procedure	Condition	Action
	1. Measure voltage across power module 2-way connector pins. 	→ If voltage is within 1 volt of battery voltage	→ Go to **Step E**.
		If voltage is outside of range →	Check battery and ground supply to power module and repeat this step. If problem continues, replace power module. Repeat this step.

Step E	Procedure	Condition	Action
	1. Remove electric shifter from shift bar housing. 2. Inspect electric shifter and shift bar housing. • Shift blocks • Roll pins • Finger movement • Mechanical linkages	→ If no problem found	→ Replace electric shifter. Go to **Step V**.
		If problem found →	Repair as required. Go to **Step V**.

Electric Shifter Test, continued

Step F	Procedure	Condition	Action
	1. Install a 0 to 100 PSI air gauge into the range valve diagnostic ports. 2. Start engine and allow air pressure to build to governor cut-off. 3. Attempt engeagement into reverse LO. 4. Release clutch to register input speed in transmission. 5. Turn off engine, but leave key in "ON" position. 6. Move shift lever to reverse and back to neutral. →	If LO range gauge = 55 to 65 PSI and If HI range gauge = 0 PSI →	Go to **Step G.**
		Note: 5 minutes is allowed for checking the pressure after moving the shift lever to neutral. If air gauges do not read as shown above →	Repair or replace range valve and range cylinder cover as required. Repeat this step.

Electric Shifter Test, continued

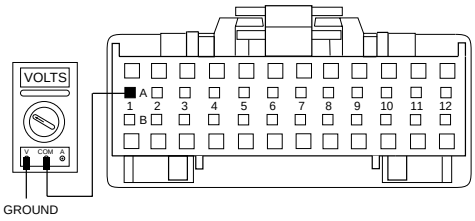
Step G	Procedure	Condition	Action
	1. Move shift lever to reverse, press upshift button, and move lever back to neutral. **Note:** If shift lever DOES NOT have upshift buttons, move shift lever to reverse and place a jumper between service port connector pins B and D. Remove jumper and place shift lever in neutral. →	If HI range gauge = 55 to 65 PSI and If LO range gauge = 0 PSI →	Repair or replace mechanical range system as required. Go to **Step V**.
		**Note:** 5 minutes is allowed for checking the pressure after moving the shift lever to neutral. If air gauges do not read as shown above →	Repair or replace range valve and range cylinder cover as required. Go to **Step V**.

Step V	Procedure	Condition	Action
	1 Key off. 2. Reconnect all connectors. 3. Key on. 4. Drive the vehicle to determine whether electric shifter complaint has been repaired. →	If the electric shifter complaint was repaired →	Test complete.
		If the electric shifter complaint was not repaired →	Return to **Step A** to find error in testing.
		If other code or symptom appears →	Go to Diagnostics Procedure (page 1-2).

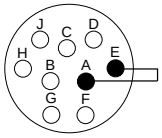
Start Enable Relay Contact Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect system manager 24-way connector. 3. Key on. 4. Engage starter.	If engine cranks	Go to **Step B**.
		If engine does not crank	Go to **Step C**.

Step B	Procedure	Condition	Action
	1. Key off. 2. Measure voltage between system manager 24-way connector pin A1 and ground.	If voltage is less than 1 volt	Replace start enable relay. Go to **Step V**.
		If voltage is outside of range	Start enable supply is short battery. Repair as required. Go to **Step V**.



Step C	Procedure	Condition	Action
	1. Place a jumper across service port pins A and E. 2. Engage starter.	If engine cranks	Go to **Step D**.
		If engine does not crank	Go to **Step E**.

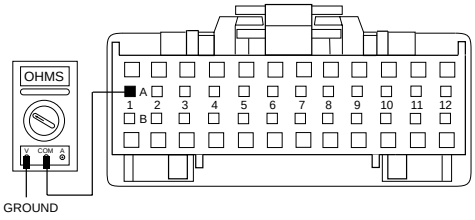


Step D	Procedure	Condition	Action
	1. While engaging starter, remove jumper wire.	If engine continues to crank	Test complete.
		If engine stops cranking when jumper is removed	Replace start enable latching diode. Repeat this step.

Start Enable Relay Contact Test, continued

Step E	Procedure	Condition	Action
	1. Replace start enable relay. 2. Engage starter.	→ If engine cranks	→ Test complete.
		If engine does not crank	→ Go to **Step F**.

Step F	Procedure	Condition	Action
	1. Measure resistance between system manager 24-way connector pin A1 and ground.	→ If resistance is 40 to 90 ohms	→ Check vehicle starting system. If no problem found, replace system manager. Go to **Step V**.
		If resistance is outside of range	→ Repair harness between start enable relay and system manager. Go to **Step V**.

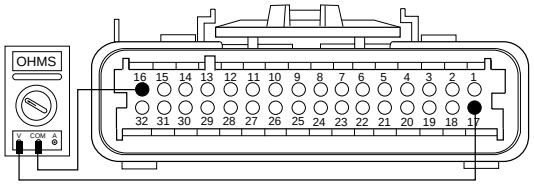


Step V	Procedure	Condition	Action
	1 Key off. 2. Reconnect all connectors. 3. Key on. 4. Start the engine to determine whether the start enable relay contact complaint has been repaired.	→ If engine starts	→ Test complete.
		If engine does not start	→ Return to **Step A** to find error in testing.
		If other code or symptom appears	→ Go to Diagnostics Procedure (page 1-2).

Starting Gear Engagement Test with Constant "N"

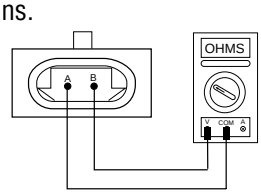
Step A	Procedure	Condition	Action
	1. Key off. 2. Connect hand-held diagnostic tool. 3. Start engine and view input shaft speed with clutch pedal released.	If input shaft speed exists	Go to **Step E**.
		If input shaft speed does not exist	Go to **Step B**.

Step B	Procedure	Condition	Action
	1. Disconnect transmission ECU 32-way connector. 2. Measure resistance across transmission ECU 32-way connector pins 16 and 17.	If resistance is 2K to 4K ohms	Go to **Step C**.
		If resistance is outside of range	Go to **Step D**.



Step C	Procedure	Condition	Action
	1. Inspect input shaft speed sensor for proper installation or contamination.	If no problem found	Replace transmission ECU. Go to **Step V**.
		If problem found	Repair as required. Go to **Step V**.

Step D	Procedure	Condition	Action
	1. Disconnect transmission harness from input shaft speed sensor. 2. Measure resistance between input shaft speed sensor pins.	If resistance is 2K to 4K ohms	Repair or replace transmission harness. Go to **Step V**.
		If resistance is outside of range	Replace input shaft speed sensor. Go to **Step V**.

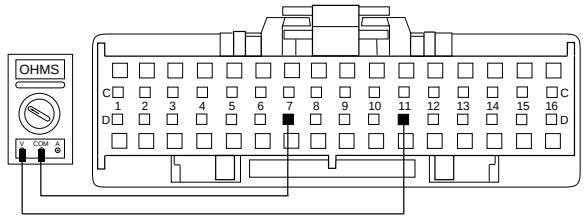


Starting Gear Engagement Test with Constant "N", continued

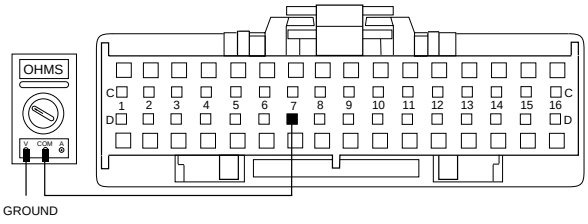
Step E	Procedure	Condition	Action
	1. Is vehicle equipped with a wheelchair lift?	If yes	Go to **Step F**.
		If no	Test complete.

Step F	Procedure	Condition	Action
	1. Is wheelchair lift switch normally open or normally closed?	If normally closed	Go to **Step G**.
		If normally open	Go to **Step J**.

Step G	Procedure	Condition	Action
	1. Assure the lift is off and at rest position. 2. Disconnect system manager 32-way connector. 3. Measure resistance between system manager 32-way connector pins D7 and D11.	If resistance is 0 to .3 ohms	Go to **Step H**.
		If resistance is outside of range	Pin D7 requires connection to pin D11. Repair harness. Repeat this step.

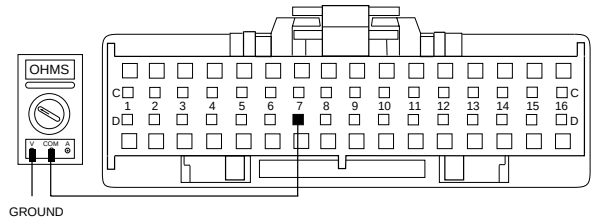


Step H	Procedure	Condition	Action
	1. Measure resistance between system manager 32-way connector pin D7 and ground.	If resistance is 0 to .3 ohms	Go to **Step I**.
		If resistance is outside of range	Normally closed type systems require pin D7 be grounded for normal transmission operation. Repair harness or switch as required. Repeat this step.

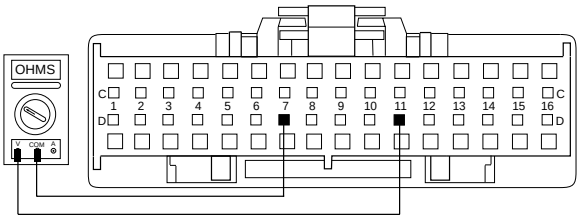


Starting Gear Engagement Test with Constant "N", continued

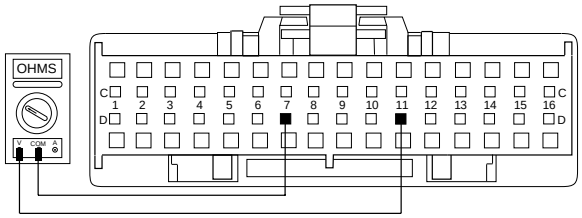
Step I	Procedure	Condition	Action
	1. Activate wheelchair lift. 2. Measure resistance between system manager 32-way connector pin D7 and ground.	If resistance is more than 10K ohms or open circuit [OL]	Replace system manager ECU. Go to **Step V**.
		If resistance is less than 10K ohms	Normally closed type systems require pin D7 open to ground to inhibit gear selection. Repair harness or switch as required. Go to **Step V**.



Step J	Procedure	Condition	Action
	1. Assure the lift is off and at rest position. 2. Disconnect system manager 32-way connector. 3. Measure resistance between system manager 32-way connector pins D7 and D11.	If resistance is more than 10K ohms or open circuit [OL]	Go to **Step K**.
		If resistance is less than 10K ohms	Normally open type systems require pins D7 and D11 be open for normal transmission operation. Repair harness or switch as required. Repeat this step.



Step K	Procedure	Condition	Action
	1. Activate wheelchair lift. 2. Measure resistance between system manager 32-way connector pins D7 and D11.	If resistance is 0 to .3 ohms	Replace system manager ECU. Go to **Step V**.
		If resistance is outside of range	Normally open type systems require pins D7 and D11 be connected to inhibit gear selection. Go to **Step V**.



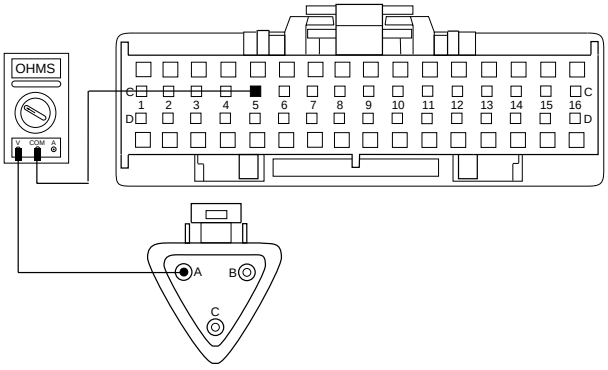
Starting Gear Engagement Test with Constant "N", continued

Step V	Procedure	Condition	Action
	1 Key off. 2. Reconnect all connectors. 3. Key on. 4. Drive the vehicle to determine whether the complaint has been repaired. →	If the complaint was repaired →	Test complete.
		If the complaint was not repaired →	Return to **Step A** to find error in testing.
		If other code or symptom appears	Go to Diagnostics Procedure (page 1-2).

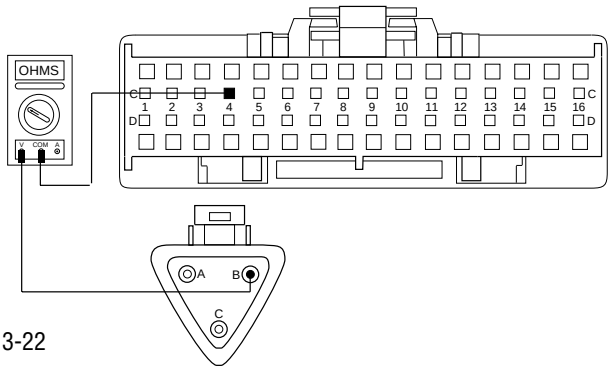
J-1939 Data Link Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Locate J-1939 link connector near system manager and disconnect from the vehicle interface harness. 3. Key on. 4. Connect J-1939 link tester to connector leading to system manager. 5. Start J-1939 Communication Test.	If test passes	Failure has occurred in J-1939 harness or engine ECM, contact OEM for repair. Go to **Step V**.
		If test fails	Go to **Step B**.

Step B	Procedure	Condition	Action
	1. Key off. 2. Disconnect system manager 32-way connector. 3. Measure resistance between system manager 32-way connector pin C5 and J-1939 connector pin A.		



	4. Measure resistance between system manager 32-way connector pin C4 and J-1939 connector pin B.	If both measurements are 0 to .3 ohms	Replace system manager ECU. Go to **Step V**.
		If either measurement is outside of range	Repair or replace tower harness as required. Go to **Step V**.

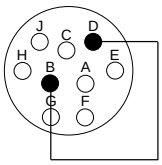


J-1939 Data Link Test, continued

Step V	Procedure	Condition	Action
	1 Key off. 2. Reconnect all connectors. 3. Key on. 4. Drive the vehicle to determine whether the J-1939 data link complaint has been repaired. →	If the J-1939 data link complaint was repaired →	Test complete.
		If the J-1939 data link complaint was not repaired →	Return to **Step A** to find error in testing. Refer to wiring diagrams in Appendix (pages A-6 through A-9).
		If other code or symptom appears →	Go to Diagnostics Procedure (page 1-2).

Auxiliary Box Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Install 0 to 100 PSI gauges into the range valve diagnostic ports. 3. Start vehicle and allow air pressure to reach governor cut-off. 4. Release clutch to register input speed in transmission. 5. Turn off engine, but leave key in "ON" position. 6. Move shift lever to reverse and back to neutral. →	If LO range gauge = 55 to 65 PSI and If HI range gauge = 0 PSI →	Go to **Step B**.
		Note: 5 minutes is allowed for checking the pressure after moving the shift lever to neutral. If air gauges do not read as shown above →	Repair or replace range valve and range cylinder cover as required. Retest.

Step B	Procedure	Condition	Action
	1. Move shift lever to reverse, press upshift button, and move lever back to neutral. **Note:** If shift lever DOES NOT have upshift buttons, move shift lever to reverse and place a jumper between service port connector pins B and D. Remove jumper and place shift lever in neutral. →	If HI range gauge = 55 to 65 PSI and If LO range gauge = 0 PSI →	Repair or replace mechanical range system as required. Go to **Step V**.
		**Note:** 5 minutes is allowed for checking the pressure after moving the shift lever to neutral. If air gauges do not read as shown above →	Repair or replace range valve and range cylinder cover as required. Go to **Step V**.

Auxiliary Box Test, continued

Step V	Procedure	Condition	Action
	1. Disconnect gauges. 2. Reconnect all connectors. 3. Key-on. 4. Clear codes (see Clearing Fault Codes, page 1-3). 5. Attempt to reproduce symptom. 6. Check symptom. →	If no symptom →	Test complete.
		If symptom appears →	Return to **Step A** to find error in testing.
		If other code or symptom appears →	Go to Diagnostics Procedure (page 1-2).

Up/Down Button Test

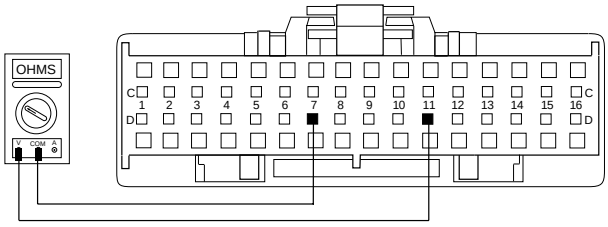
Step A	Procedure	Condition	Action
	1. Verify 3-way button connector is properly connected to the tower harness side of the shift lever 24-way connector. →	If properly connected →	Replace shift lever. Go to **Step V**.
		If problem found →	Repair as required. Go to **Step V**.

Step V	Procedure	Condition	Action
	1. Reconnect all connectors. 2. Key-on. 3. Clear codes (see Clearing Codes, page 1-3). 4. Attempt to reproduce symptom. 5. Check symptom. →	If no symptom →	Test complete.
		If symptom appears →	Return to **Step A** to find error in testing.
		If other code or symptom appears →	Go to Diagnostics Procedure (1-2).

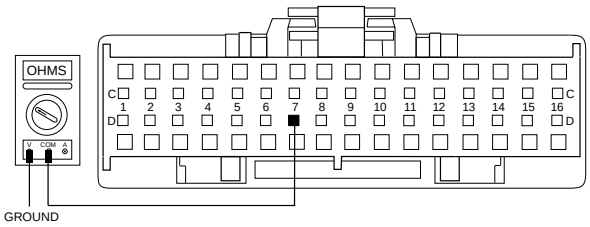
Neutral Lock Input Test

Step A	Procedure	Condition	Action
	1. Is wheelchair lift switch normally open or normally closed?	If normally closed	Go to **Step B**.
		If normally open	Go to **Step E**.

Step B	Procedure	Condition	Action
	1. Assure the lift is off and at rest position. 2. Disconnect system manager 32-way connector. 3. Measure resistance between system manager 32-way connector pins D7 and D11.	If resistance is 0 to .3 ohms	Go to **Step C**.
		If resistance is outside of range	Pin D7 requires connection to pin D11. Repair harness. Repeat this step.

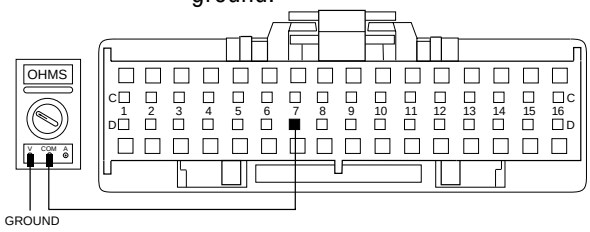


Step C	Procedure	Condition	Action
	1. Measure resistance between system manager 32-way connector pin D7 and ground.	If resistance is 0 to .3 ohms	Go to **Step D**.
		If resistance is outside of range	Normally closed type systems require pin D7 be grounded for normal transmission operation. Repair harness or switch as required. Repeat this step.

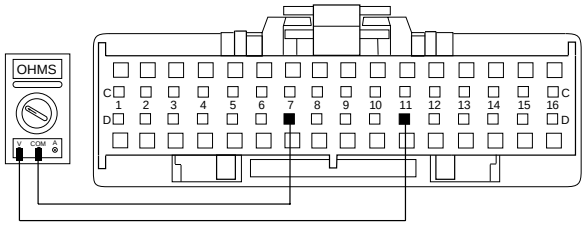


Neutral Lock Input Test, continued

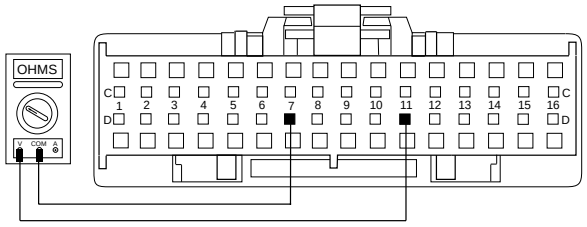
Step D	Procedure	Condition	Action
	1. Activate wheelchair lift. 2. Measure resistance between system manager 32-way connector pin D7 and ground.	If resistance is more than 10K ohms or open circuit [OL]	Replace system manager ECU. Go to **Step V**.
		If resistance is less than 10K ohms	Normally closed type systems require pin D7 open to ground to inhibit gear selection. Repair harness or switch as required. Go to **Step V**.



Step E	Procedure	Condition	Action
	1. Assure the lift is off and at rest position. 2. Disconnect system manager 32-way connector. 3. Measure resistance between system manager 32-way connector pins D7 and D11.	If resistance is more than 10K ohms or open circuit [OL]	Go to **Step F**.
		If resistance is less than 10K ohms	Normally open type systems require pins D7 and D11 be open for normal transmission operation. Repair harness or switch as required. Repeat this step.



Step F	Procedure	Condition	Action
	1. Activate wheelchair lift. 2. Measure resistance between system manager 32-way connector pins D7 and D11.	If resistance is 0 to .3 ohms	Replace system manager ECU. Go to **Step V**.
		If resistance is outside of range	Normally open type systems require pins D7 and D11 be connected to inhibit gear selection. Repair harness or switch as required. Go to **Step V**.



Neutral Lock Input Test, continued

Step V	Procedure	Condition	Action
	1 Key off. 2. Reconnect all connectors. 3. Key on. 4. Drive the vehicle to determine whether the complaint has been repaired.	If the complaint was repaired	Test complete.
		If the complaint was not repaired	Return to **Step A** to find error in testing.
		If other code or symptom appears	Go to Diagnostics Procedure (page 1-2).

Splitter Test

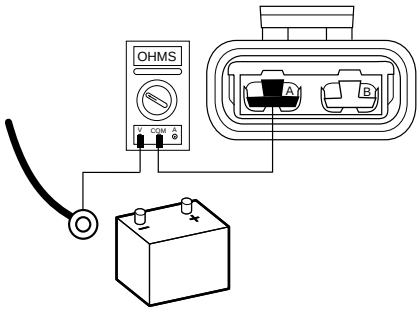
Step A	Procedure	Condition	Action
	1. Key off. 2. Install 0-100 PSI gauges into the splitter valve diagnostic ports. 3. Start vehicle and allow air pressure to reach governor cut-off. 4. Release clutch to register input speed in transmission. 5. Turn off engine, but leave key in "ON" position. 6. With the shift control, select reverse and back to neutral. →	If HI split gauge = 55 to 65 PSI and If LO split gauge = 0 PSI →	Go to **Step B**.
		Note: 5 minutes is allowed for checking the pressure after moving the shift lever to neutral.	
		If gauges do not read as shown above →	Repair or replace splitter valve and splitter cylinder cover as required. Repeat this step.

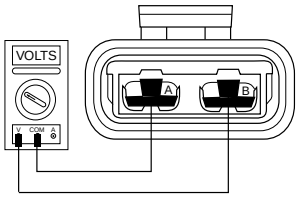
Step B	Procedure	Condition	Action
	1. Key on. 2. With shift control select reverse, press upshift button and select neutral. →	If LO split gauge = 55 to 65 PSI and If HI split gauge = 0 PSI →	Repair or replace mechanical splitter system as required. Go to **Step V**.
		If gauges do not read as shown above →	Repair or replace splitter valve and splitter cylinder cover as required. Go to **Step V**.

Splitter Test, continued

Step V	Procedure	Condition	Action
	1. Disconnect gauges. 2. Reconnect all connectors. 3. Key-on. 4. Clear codes (see Clearing Codes, page 1-3). 5. Attempt to reproduce symptom. 6. Check symptom. →	If no symptom →	Test complete.
		If symptom appears →	Return to **Step A** to find error in testing.
		If other code or symptom appears →	Go to Diagnostics Procedure (1-2).

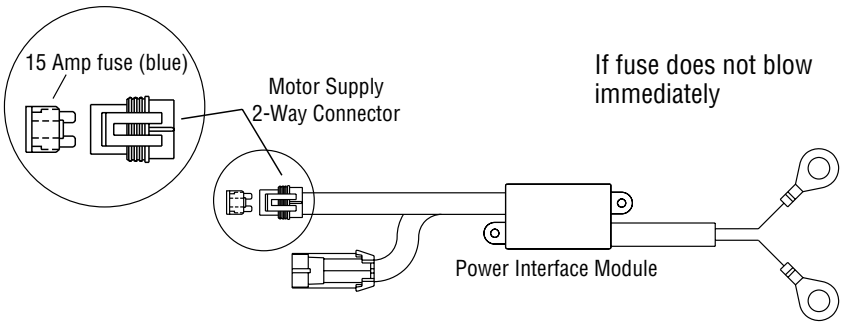
Shift Complaint Test

Step A	Procedure	Condition	Action
	1. Key off. 2. Disconnect Motor Supply 2-way. 3. Disconnect negative (–) battery cable. 4. Measure resistance between Motor Supply 2-way connector pin A and negative battery cable.	If resistance is 0 to .3 ohms	Go to **Step B**
		If resistance is outside of range	Check battery and ground supply to power intereface module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.

Step B	Procedure	Condition	Action
	1. Key off. 2. Reconnect battery negative cable. 3. Measure voltage across Motor Supply 2-way connector pins.	If voltage is within 1 volt of battery voltage	Go to **Step C**.
		If voltage is outside of range	Check battery and ground supply to power intereface module and repeat this step. If problem continues, replace power interface module. Go to **Step V**.

Shift Complaint Test, continued

Step C	Procedure	Condition	Action
	1. Key off. 2. Insert 15-amp fuse into Motor Supply 2-way connector.	If fuse blows immediately	Replace electric shifter. **⚠CAUTION** Disconnect the battery negative cable before reconnecting the motor supply 2-way connector. Failure to disconnect the battery negative cable can cause the failure of the power interface module. Go to **Step D**.
		If fuse does not blow immediately	Replace electric shifter and power interface module. **⚠CAUTION** Disconnect the battery negative cable before reconnecting the motor supply 2-way connector. Failure to disconnect the battery negative cable can cause the failure of the power interface module. Go to **Step D**.



Step D	Procedure	Condition	Action
	1. Key off. 2. Disconnect negative (–) battery cable. 3. Reconnect Motor Supply 2-way connector to transmission ECU. 4. Reconnect negative (–) battery cable. 5. Drive the vehicle to determine whether shift complint has been repaired.	If shift complaint was repaired	Test complete.
		If fault code 61, 63, or 65 appear	Go to **Step E**.

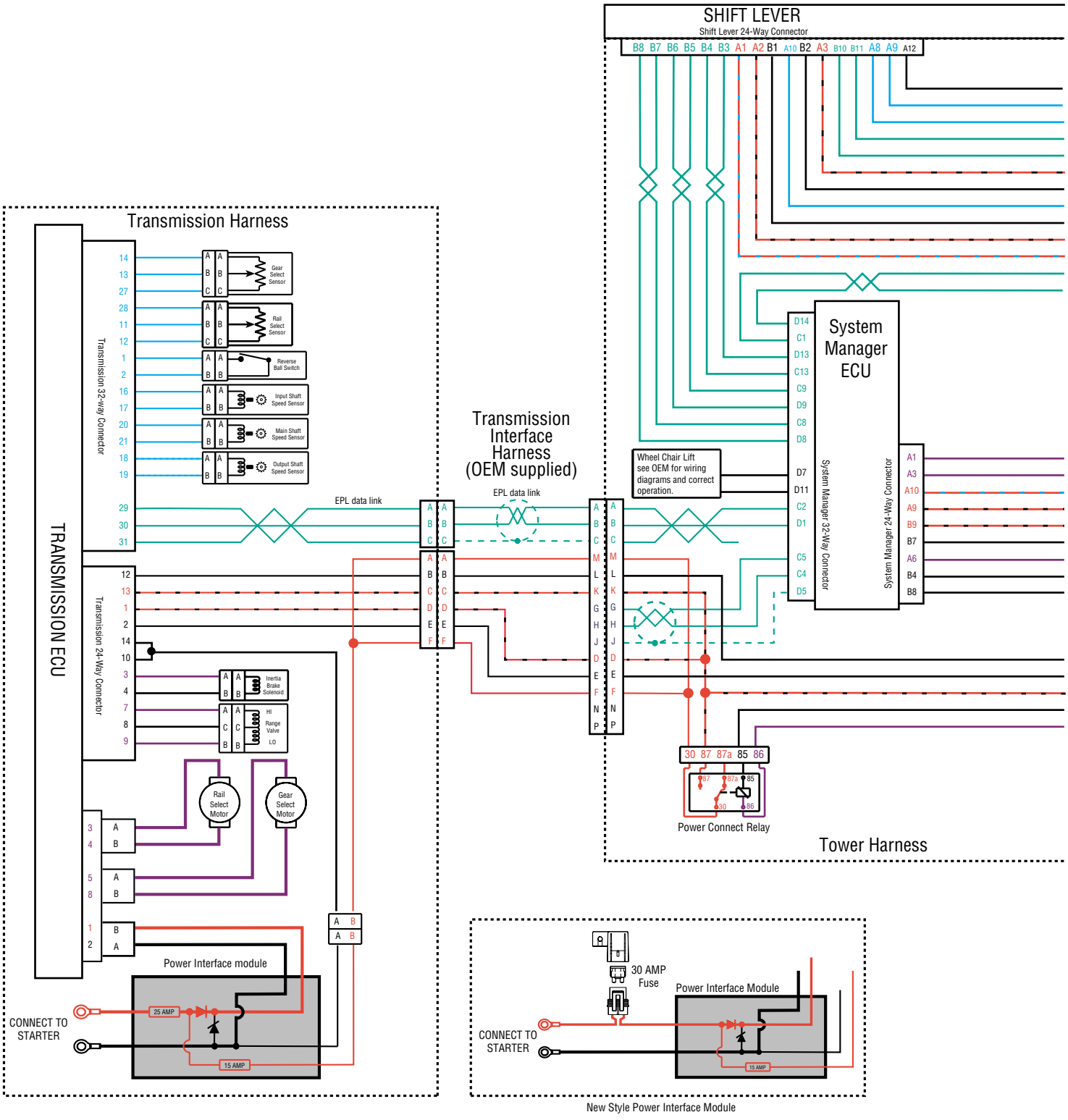
Step E	Procedure	Condition	Action
	1. Key off. 2. Verify all connectors are seated correctly at the transmission ECU.	If all connectors are seated correctly	Replace transmission ECU. Retest.
		If connectors are not seated correctly	Seat all connectors and retest.

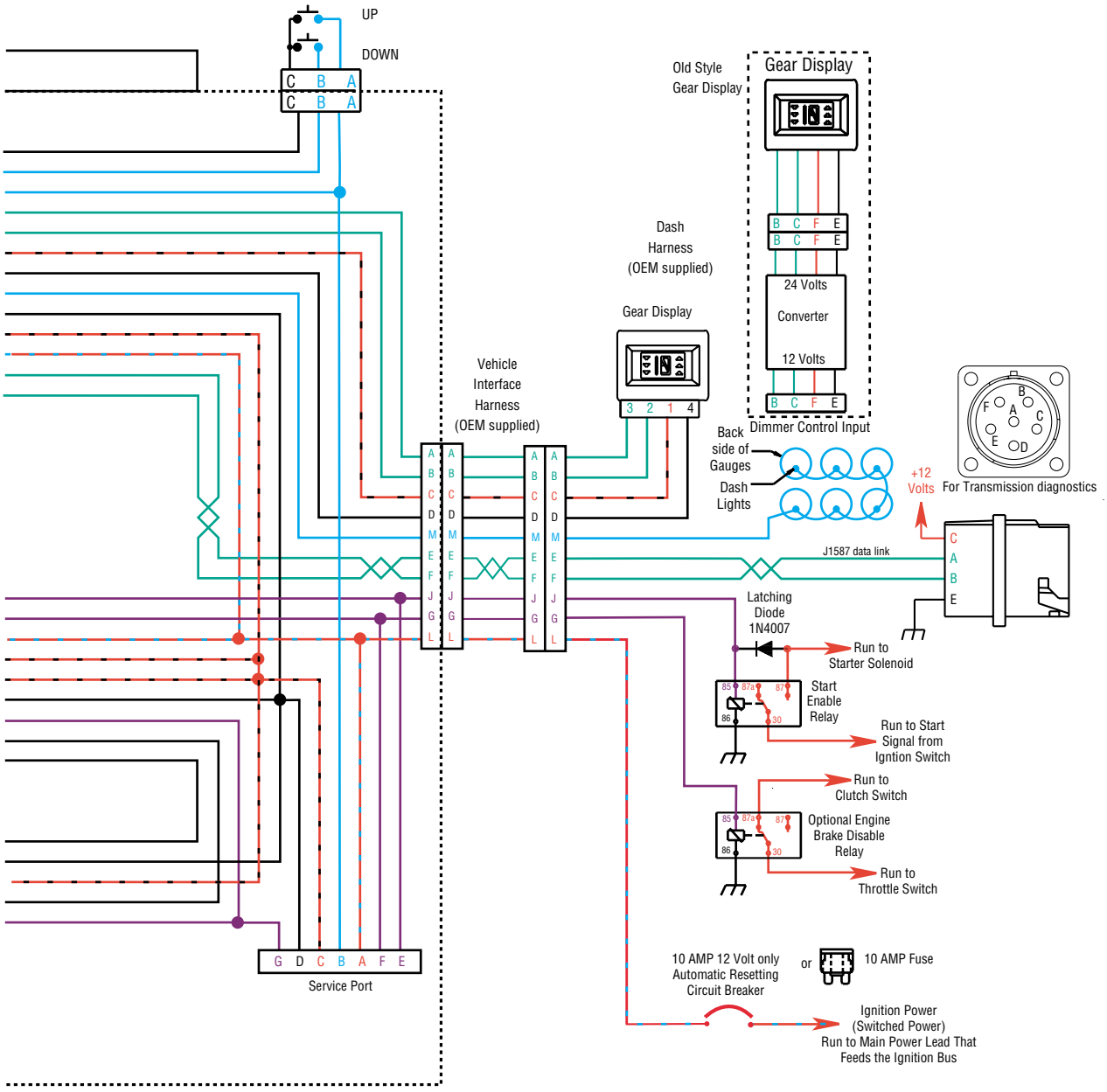
Shift Complaint Test, continued

Step V	Procedure	Condition	Action
	1. Reconnect all connectors. 2. Key on. 3. Drive vehicle to determine whether the complaint has been repaired. →	If the shift complaint has been repaired →	Test complete.
		If the shift complaint has not been repaired →	Contact your Eaton service representative.

Appendix

AutoSelect Wiring Diagram

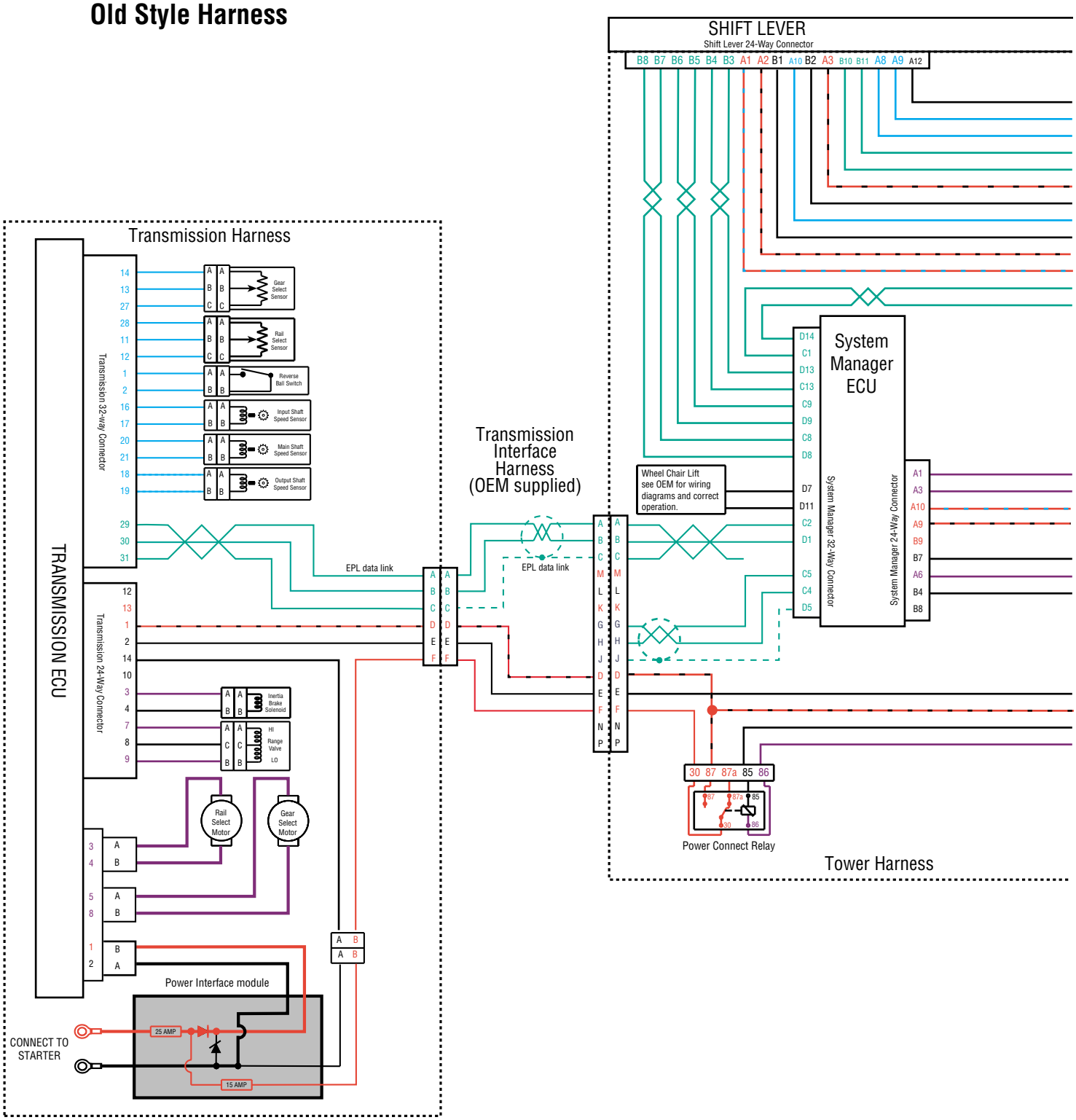


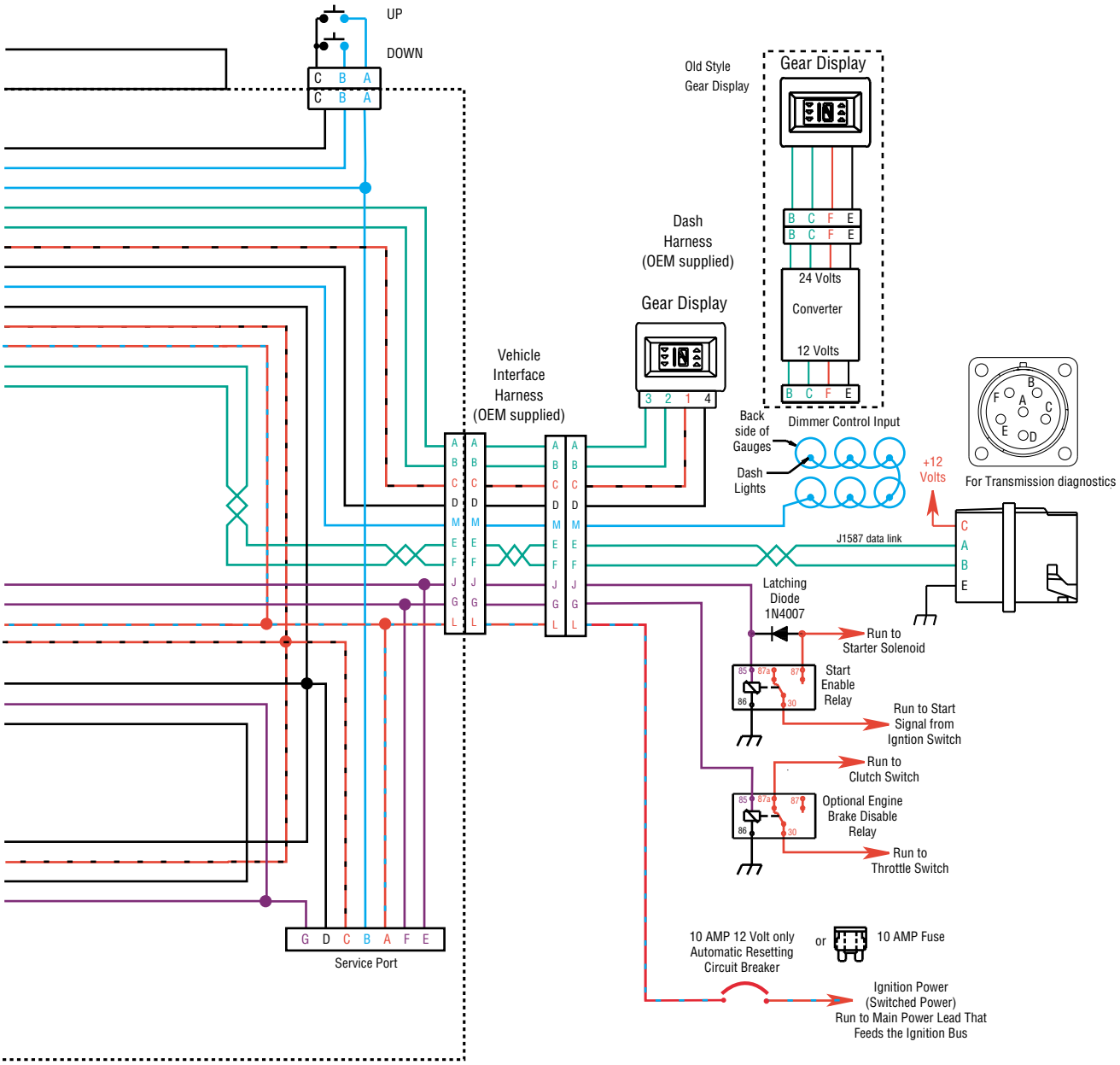


All OEM responsible wiring shown is "typical". Consult specific application.
+12 volt non-switched from battery
+12 volt switched from Power Connect Relay
+12 volt switched from Ignition Switch
Signals into the ECU
Communication from and to the ECU
Signal returns, Grounds, and general OEM wiring
+12 volt solenoid source

AutoSelect Wiring Diagram

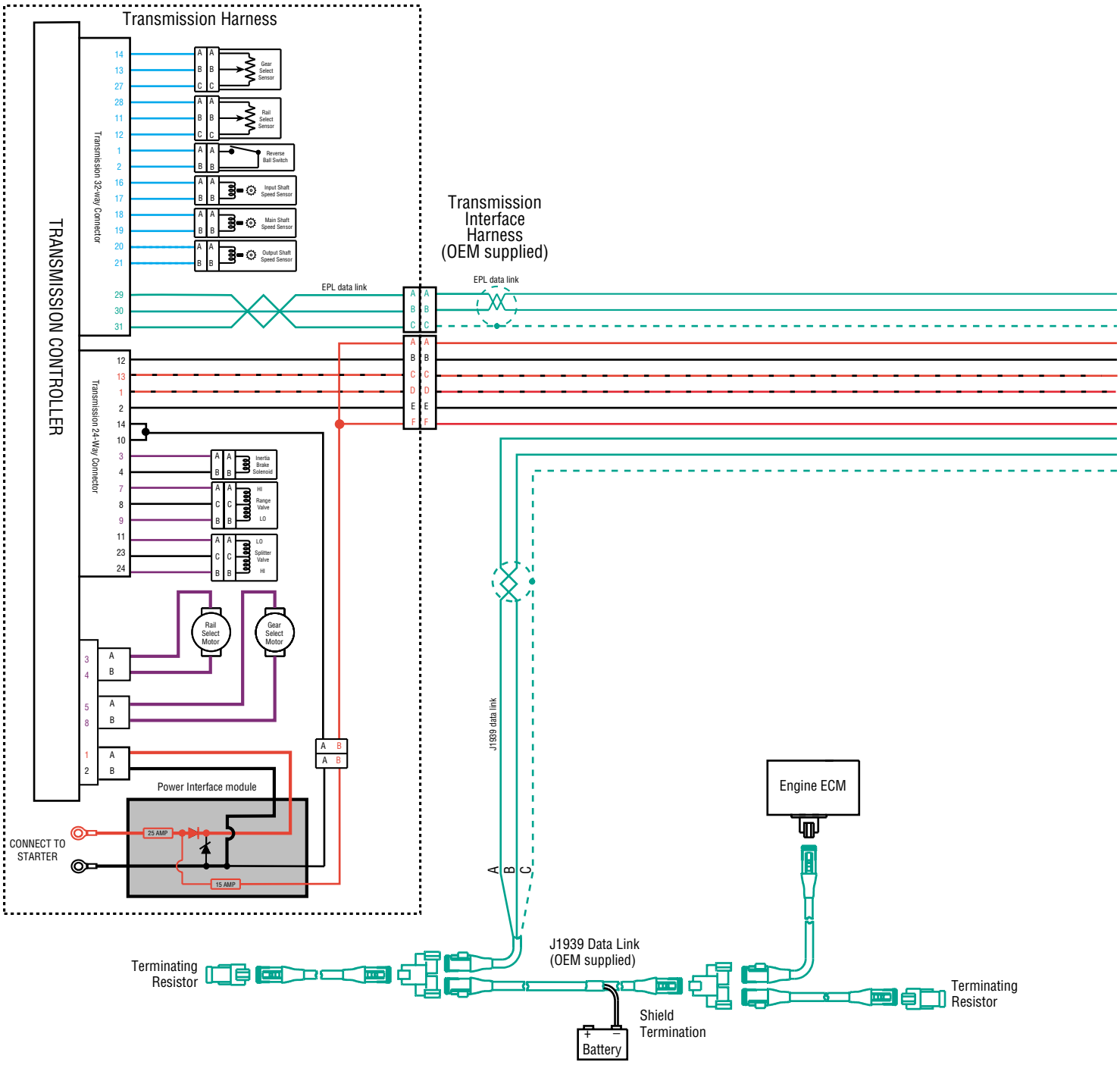
Old Style Harness

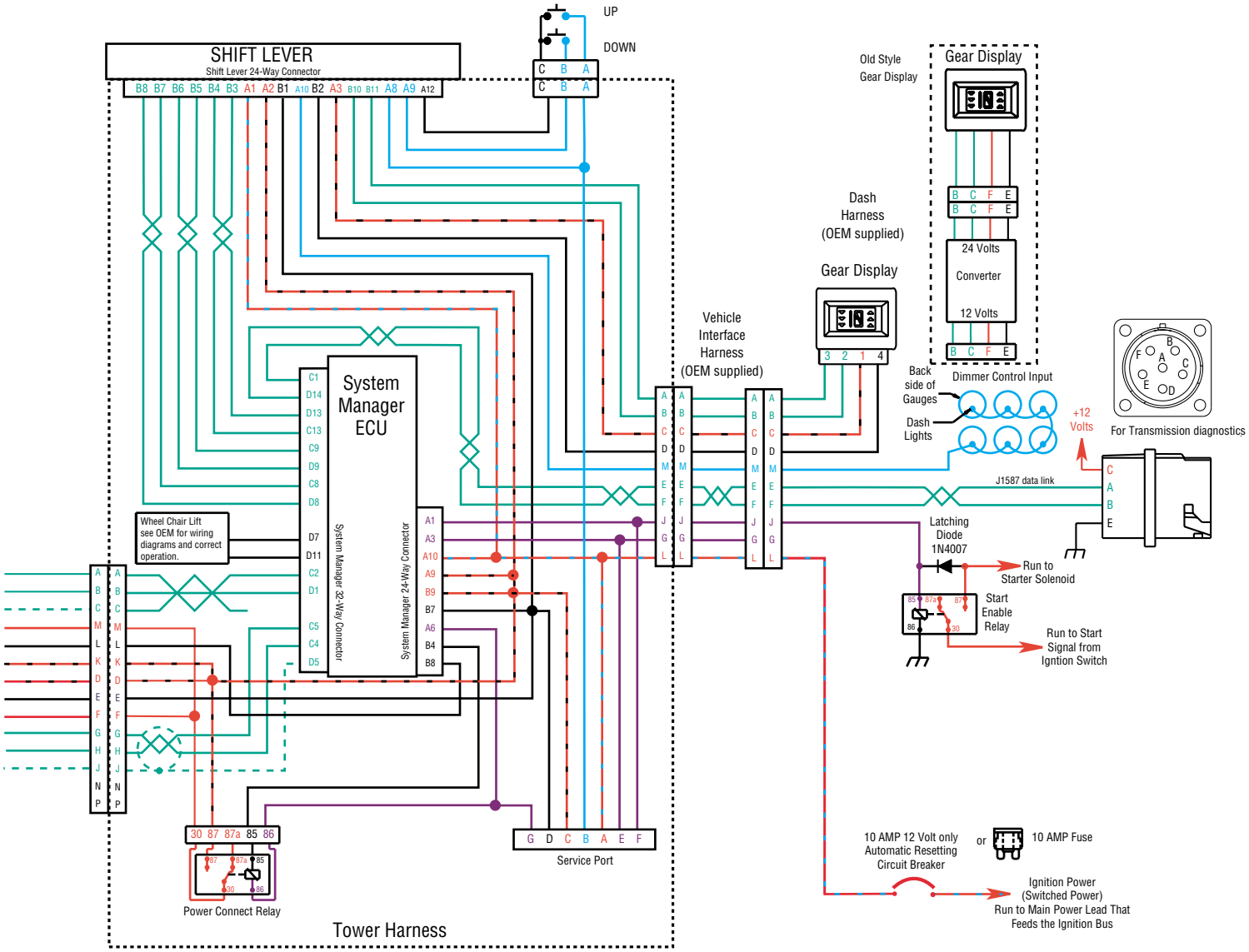




All OEM responsible wiring shown is "typical". Consult specific application.
+12 volt non-switched from battery
+12 volt switched from Power Connect Relay
+12 volt switched from Ignition Switch
Signals into the ECU
Communication from and to the ECU
Signal returns, Grounds, and general OEM wiring
+12 volt solenoid source

AutoShift Wiring Diagram

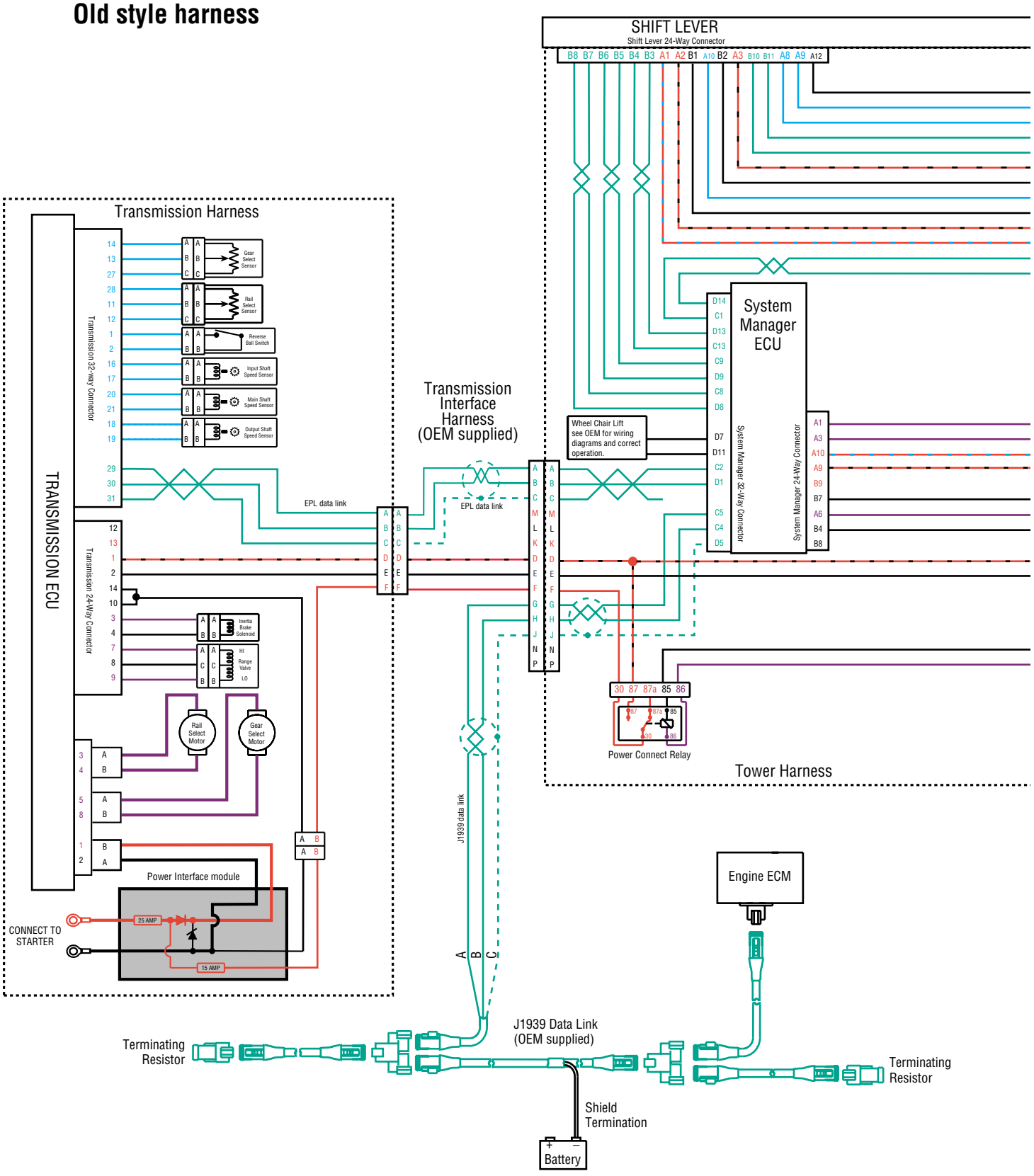


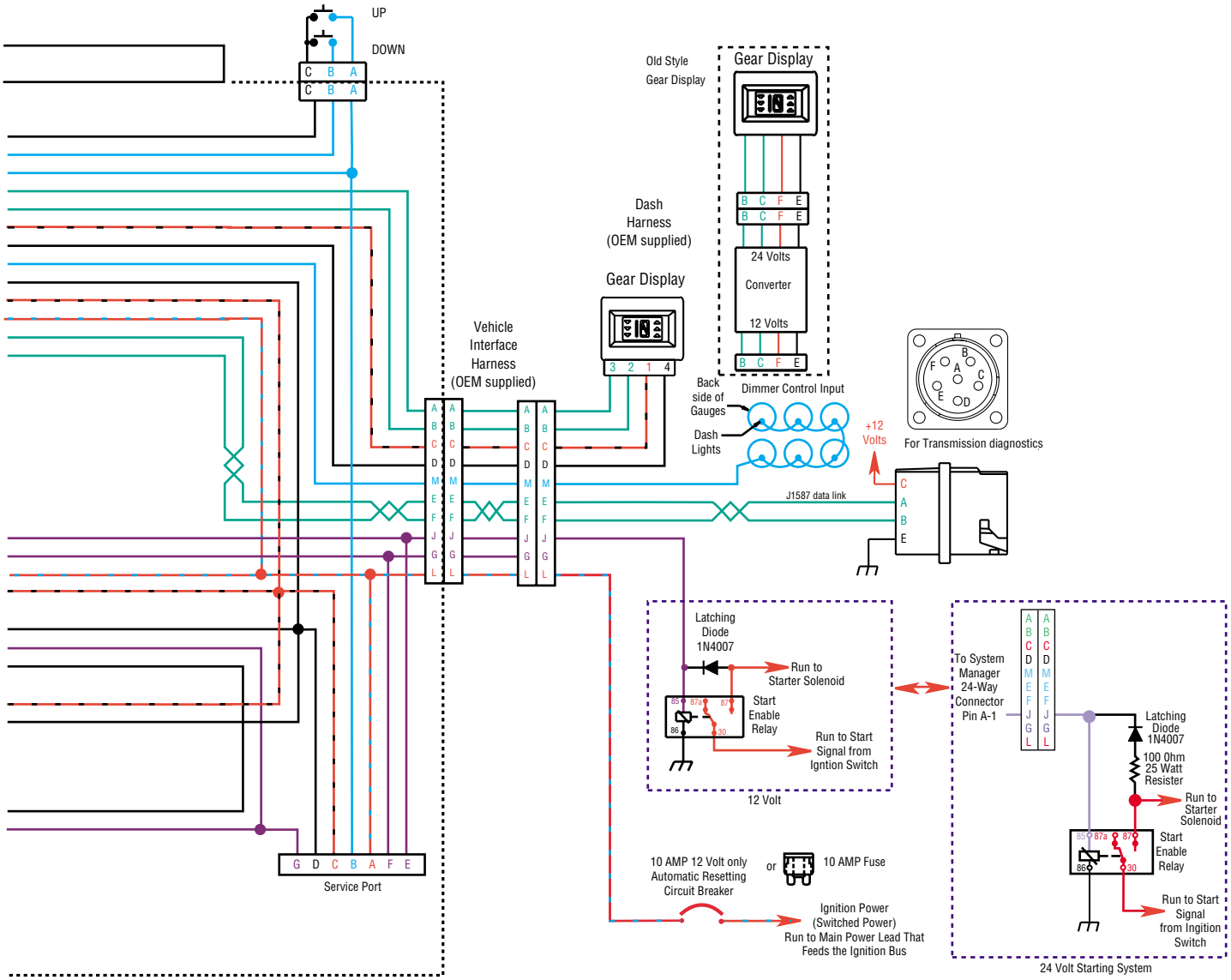


All OEM responsible wiring shown is "typical". Consult specific application.
+12 volt non-switched from battery
+12 volt switched from Power Connect Relay
+12 volt switched from Ignition Switch
Signals into the ECU
Communication from and to the ECU
Signal returns, Grounds, and general OEM wiring
+12 volt solenoid source

AutoShift Wiring Diagram

Old style harness





All OEM responsible wiring shown is "typical". Consult specific application.
+12 volt non-switched from battery
+12 volt switched from Power Connect Relay
+12 volt switched from Ignition Switch
Signals into the ECU
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When performing the test for proper clutch operation, the vehicle should be in same condition as when the problem occurred. For instance, if the problem only occurs when the vehicle is hot, drive the vehicle to warm it up before conducting the test.

When the operator depresses the clutch pedal and shifts from neutral to drive or reverse, the ECU waits for the transmission input shaft speed to decrease to less than 150 rpm before shifting the transmission into gear. If the clutch is not disengaging completely or the clutch brake is not functioning properly, the input shaft will not slow down and the transmission will not shift into gear.

Check For Proper Clutch Operation

With Hand-held

1. Connect hand-held tool.
2. Make sure the transmission is in neutral.
3. Start engine.
4. Set hand-held to monitor input shaft speed.
5. With clutch pedal up (clutch engaged) compare input speed and engine speed (rpm). They should be the same.
6. If not:
   a. Perform Input Shaft Speed Sensor test on page 2-66
   b. Confirm proper clutch adjustment, adjust as needed.
   c. Check clutch for slippage, repair or replace as necessary.
7. Depress clutch pedal to activate clutch brake. Within 2 seconds, input shaft speed should be less than 25 rpm (0 rpm is desired).

If input shaft does not stop turning, this indicates that the clutch is not disengaging completely or the clutch brake is not functioning properly.

a. Check for proper clutch adjustment, adjust as necessary.
b. Inspect clutch brake for excessive friction material wear or internal damage. Replace as necessary.

Note: The clutch brake may have to be removed to inspect properly.

c. If clutch adjustment is correct and clutch brake appears satisfactory, the problem may be a defective clutch. The clutch may require repair or replacement. Refer to the clutch manufacturer's service information to verify a "dragging" clutch.

Without Hand-held

1. Place transmission in neutral.
2. Start Engine.
3. Let up on the clutch pedal (clutch engaged).
4. Depress clutch pedal fully to activate clutch brake and hold for 2 seconds.
5. Place transmission in starting gear.
6. Gear display shows flashing gear not yet engaged or solid gear for engaged. If flashing gear is displayed, slowly release clutch pedal.
7. If flashing gear does not become solid or gear does not engage, check clutch brake for proper function and check clutch adjustment.
8. If gear does not engage and clutch is adjusted properly, troubleshoot for dragging clutch according to clutch manufacturer.

Procedure To Confirm Proper Clutch Adjustment and Clutch Brake Contact

Confirm release bearing travel gap

Use a 1/2" gauge to verify the release bearing travel gap. This gap (distance between the rear of the release bearing and the clutch brake) must be between 1/2" and 9/16".

If this dimension is incorrect, adjust the clutch per the clutch manufacture's instructions.

Confirm the free-play gap*

*For mechanical clutch release systems with free-play.

Use a 1/8" gauge to verify proper free-play gap. This gap should be 1/8".

If this dimension is incorrect, adjust the clutch per the clutch manufacturer's instructions.

Confirm proper clutch brake contact

Insert a .010" feeler gauge between the release bearing and the clutch brake. Have an assistant fully depress the clutch pedal. The .010" feeler gauge should be squeezed between the release bearing rear and the clutch brake. Have the assistant slowly let up on the clutch pedal. The .010" feeler gauge should slide out when the clutch pedal is 1/2" to 1" above the cab floor or lower pedal stop.

If the .010" feeler gauge is not adequately squeezed to prevent removal or can be removed with the pedal less than 1/2" or greater than 1", check and adjust the clutch pedal height and travel per the chassis manufacturer's instructions. In addition, check the external clutch linkage for excessive wear or obstruction preventing complete travel.