




PINPOINT TEST G: THE TRANSMIS...**PINPOINT TEST G: THE TRANSMISSION CONTROL MODULE (TCM) DOES NOT RESPOND TO THE SCAN TOOL (MODULE COMMUNICATIONS NETWORK)**

418-00 Module Communications Network
DIAGNOSIS AND TESTING

2008 F-Super Duty 250-550
Procedure revision date: 03/13/2012

Communications Network**Special Tool(s)**

	73III Automotive Meter 105-R0057 or equivalent
	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool
	Flex Probe Kit 105-R025C or equivalent

Principles of Operation

NOTE:The smart junction box (SJB) is also known as the generic electronic module (GEM).

Vehicle communication utilizes both International Standards Organization (ISO) 9141 and controller area network (CAN) communications. ISO 9141 is for diagnostic use only, and CAN is a method for transferring data among distributed electronic modules via a serial data bus.

The vehicle is equipped with 3 module communication networks:

- ISO 9141
- Medium speed (MS) CAN
- High speed (HS) CAN

ISO 9141 Communications Network

The ISO 9141 communications network is a single wire network. The ISO communications network does not permit intermodule communication and is used for the parking aid module (PAM) and 4X4 control module. When the scan tool communicates with the PAM, the scan tool must request all information since the module cannot initiate communications.

The ISO network operates at a maximum data transfer speed of 10 Kbps for bus messages and is designed for scan tool to module diagnostic use only.

The following fault chart describes the specific ISO 9141 network failures and their resulting symptom:

ISO 9141 Network Communication Fault Chart

Failure Description	Symptom
ISO circuit open	No communication
ISO circuit short to voltage	No communication
ISO circuit short to ground	No communication
Module loss of voltage or ground	No communication
Module internal failure	No communication

MS-CAN

The MS-CAN uses an unshielded twisted pair cable of data (+) and data (-) circuits. The data (+) and the data (-) circuits are each regulated to approximately 2.5 volts during neutral or rested network traffic. As bus messages are sent on the data (+) circuit, voltage is increased by approximately 1.0 volt. Inversely, the data (-) circuit is reduced by approximately 1.0 volt when a bus message is sent. Multiple bus messages can be sent over the network CAN circuits allowing multiple modules to communicate with each other. The MS-CAN is used for the IC and the smart junction box (SJB) communications, and designed for general information transfer.

The MS-CAN will not communicate while certain faults are present, but will operate with diminished performance with other faults present. The MS-CAN bus may remain operational when 1 of the 2 termination resistors are not present. The MS-CAN operates at a maximum data transfer speed of 125 Kbps for bus messages and designed for general information transfer.

In the event that one of the 2 network circuits (MS-CAN + or MS-CAN -) becomes open to a module on the network, unreliable network communication to all modules on the network may result. The module to which the network circuit is open may repeatedly send network messages indicating there has been partial data received. This type of message is referred to as a negative-acknowledge (NACK) message. Repeated NACK messages may "load" the network with too much activity causing intermittent no communication to other network modules and/or the scan tool.

The following fault chart describes the specific MS-CAN failures and their resulting symptom:

MS-CAN Communication Fault Chart

Failure Description	Symptom
MS-CAN (+) shorted to MS-CAN (-)	No communication
MS-CAN (+) short to voltage	No communication
MS-CAN (-) short to voltage	No communication
MS-CAN (+) short to ground	No communication
MS-CAN (-) short to ground	Unreliable communication possible in all network modules.
MS-CAN (+) open	Unreliable communication possible in all network modules.
MS-CAN (-) open	Unreliable communication possible in all network modules.
Module loss of voltage or ground	No communication
Module internal failure	No communication

HS-CAN

The HS-CAN uses an unshielded twisted pair cable of data (+) and data (-) circuits. The data (+) and the data (-) circuits are each regulated to approximately 2.5 volts during neutral or rested network traffic. As bus messages are sent on the data (+) circuit, voltage is increased by approximately 1.0 volt. Inversely, the data (-) circuit is reduced by approximately 1.0 volt when a bus message is sent. Multiple bus messages can be sent over the network CAN circuits allowing multiple modules to communicate with each other. The HS-CAN is a high speed communication network used for the ABS module, IC, the PCM, restraints control module (RCM), auxiliary heater control module (AHCM) (diesel engine only, if equipped), trailer brake control (TBC) module (if equipped), transmission control module (TCM) (diesel engine only, if equipped) and variable geometry turbocharger (VGT) actuator (diesel engine only). The HS-CAN is designed for real time information transfer and control.

The HS-CAN will not communicate while certain faults are present, but will operate with diminished performance with other faults present. The HS-CAN bus may remain operational when 1 of the 2 termination resistors are not present. The HS-CAN operates at a maximum data transfer speed of 500 Kbps and is designed for real time information transfer and control.

In the event that one of the 2 network circuits (HS-CAN + or HS-CAN -) becomes open to a module on the network, unreliable network communication to all modules on the network may result. The module to which the network circuit is open may repeatedly send network messages indicating there has been partial data received. This type of message is referred to as a negative-acknowledge (NACK) message. Repeated NACK messages may "load" the network with too much activity causing intermittent no communication to other network modules and/or the scan tool.

The following fault chart describes the specific HS-CAN failures and their resulting symptom:

HS-CAN Communication Fault Chart

Failure Description	Symptom
HS-CAN (+) shorted to HS-CAN (-)	No communication
HS-CAN (+) short to voltage	No communication
HS-CAN (-) short to voltage	No communication
HS-CAN (+) short to ground	No communication
HS-CAN (-) short to ground	Unreliable communication possible in all network modules
HS-CAN (+) open	Unreliable communication possible in all network modules

Failure Description	Symptom
HS-CAN (-) open	Unreliable communication possible in all network modules
Module loss of voltage or ground	No communication
Module internal failure	No communication

The following chart describes the specific CAN messages broadcast by each module, and the module(s) that receive the message:

CAN Module Communication Message Chart

Broadcast Message	Originating Module	Network Type	Receiving Module(s)
ABS event in progress	ABS module	HS-CAN	<ul style="list-style-type: none"> PCM RCM TBC module
ABS system status	ABS module	HS-CAN	<ul style="list-style-type: none"> TBC module
A/C clutch inhibit request	TCM (diesel engine only, if equipped)	HS-CAN	<ul style="list-style-type: none"> PCM
A/C clutch request	Heating ventilation air conditioning (HVAC) module	MS-CAN	<ul style="list-style-type: none"> IC
A/C clutch request (gateway)	IC	HS-CAN	<ul style="list-style-type: none"> PCM
A/C clutch status	PCM	HS-CAN	<ul style="list-style-type: none"> IC TCM (diesel engine only)
Accessory delay status	SJB	MS-CAN	<ul style="list-style-type: none"> ACM Rear entertainment module (RETM) IC
Accelerator pedal position	PCM	HS-CAN	<ul style="list-style-type: none"> ABS module IC RCM TCM (diesel engine only)
Accelerator pedal position (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module
Airbag malfunction indicator lamp status	RCM	HS-CAN	<ul style="list-style-type: none"> IC
Airbag malfunction indicator request	RCM	HS-CAN	<ul style="list-style-type: none"> IC
Alternator failure status	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> AHCM (diesel engine only, if equipped) IC
Ambient temperature	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> TCM (diesel engine only)

Broadcast Message	Originating Module	Network Type	Receiving Module(s)
Autolamp delay time	IC	MS-CAN	<ul style="list-style-type: none"> SJB
Autolamp delay status	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Autolock command	IC	MS-CAN	<ul style="list-style-type: none"> SJB
Autolock status	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Auto-unlock command	IC	MS-CAN	<ul style="list-style-type: none"> SJB
Auto-unlock status	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Axle ratio	PCM	HS-CAN	<ul style="list-style-type: none"> IC TCM (diesel engine only)
Axle ratio (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module
Barometric pressure	PCM	HS-CAN	<ul style="list-style-type: none"> ABS module IC TCM (diesel engine only)
Barometric pressure (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module SJB
Brake fluid level status	IC	HS-CAN	<ul style="list-style-type: none"> ABS module PCM
Brake lamp switch status	PCM	HS-CAN	<ul style="list-style-type: none"> ABS module RCM TCM (diesel engine only) TBC module
Brake lamp switch status	SJB	MS-CAN	<ul style="list-style-type: none"> CDIM
Brake (red) warning indicator request	ABS module	HS-CAN	<ul style="list-style-type: none"> IC
Brake (red) warning indicator request	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Charging system warning indicator request	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Daytime running lamps (DRL) status	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Door ajar status	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Electronic throttle control (ETC) mode	PCM	HS-CAN	<ul style="list-style-type: none"> TCM (diesel engine only)

Broadcast Message	Originating Module	Network Type	Receiving Module(s)
English /Metric display mode	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module
Engine coolant temperature	PCM	HS-CAN	<ul style="list-style-type: none"> IC AHCM (diesel engine only, if equipped) TCM (diesel engine only, if equipped)
Engine coolant temperature (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module
Engine fuel type	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Engine fuel consumption data	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Engine load %	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> TCM (diesel engine only) VGT actuator (diesel engine only)
Engine RPM	PCM	HS-CAN	<ul style="list-style-type: none"> IC TCM (diesel engine only) AHCM (diesel engine only, if equipped) VGT actuator (diesel engine only)
Engine RPM (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> CDIM (diesel engine only, if equipped) HVAC module
Engine torque data	TCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> PCM
Engine torque data	PCM	HS-CAN	<ul style="list-style-type: none"> TCM (diesel engine only)
Engine turbo boost	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> IC
Engine turbo vane position command	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> VGT actuator (diesel engine only)
Engine turbo vane position status	VGT actuator (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> PCM (diesel engine only)
Engine malfunction indicator lamp (MIL) request	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Engine off timer	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Engine off timer (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module
Exhaust gas temperature	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> IC

Broadcast Message	Originating Module	Network Type	Receiving Module(s)
Fail-safe cooling mode status	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Four-wheel drive (4X4) mode status	IC	HS-CAN	<ul style="list-style-type: none"> ABS module PCM TCM (diesel engine only)
Fuel cap off indicator request	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Fuel level input status (instant)	IC	MS-CAN	<ul style="list-style-type: none"> PCM
Gas/diesel engine configuration	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module
Headlamp high beam indicator request	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Headlamps on warning chime request	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Idle engine shutdown	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Idle engine shutdown (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> CDIM (diesel engine only, if equipped)
Ignition switch position	SJB	MS-CAN	<ul style="list-style-type: none"> ACM CDIM (diesel engine only) DSM RETM
Ignition switch position	IC	HS-CAN	<ul style="list-style-type: none"> ABS module PCM TCM (diesel engine only) TBC module
Illumination dimmer level	SJB	MS-CAN	<ul style="list-style-type: none"> ACM RETM HVAC module
Illumination dimmer level	IC	HS-CAN	<ul style="list-style-type: none"> TBC module
Key-in-ignition chime request	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Key-in-ignition status	SJB	MS-CAN	<ul style="list-style-type: none"> ACM CDIM (diesel engine only, if equipped) DSM IC
Key fob button status	SJB	MS-CAN	<ul style="list-style-type: none"> DSM
Keypad button status	SJB	MS-CAN	<ul style="list-style-type: none"> DSM

Broadcast Message	Originating Module	Network Type	Receiving Module(s)
Low brake fluid indicator request	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Navigation radio rolling wheel count	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Navigation radio rolling wheel count (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> ACM
Odometer count	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Parking brake status	IC	HS-CAN	<ul style="list-style-type: none"> ABS module PCM
Parking brake status/chime request	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Passive anti-theft system (PATS) OK to start	IC	HS-CAN	<ul style="list-style-type: none"> PCM
PATS security data	PCM	HS-CAN	<ul style="list-style-type: none"> IC
PATS theft condition	PCM	HS-CAN	<ul style="list-style-type: none"> IC
Power take-off (PTO) engaged/disengaged status	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> TCM (diesel engine only)
Safety belt indicator request	RCM	HS-CAN	<ul style="list-style-type: none"> IC
Safety belt indicator status	IC	HS-CAN	<ul style="list-style-type: none"> RCM
Belt-Minder® chime request	RCM	HS-CAN	<ul style="list-style-type: none"> IC
Speed control status	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> RCM TCM (diesel engine only)
Speed control deactivate switch status	PCM	HS-CAN	<ul style="list-style-type: none"> ABS module TCM (diesel engine only) TBC module
Supplemental heater request	HVAC module	MS-CAN	<ul style="list-style-type: none"> IC
Supplemental heater status	AHCM (diesel engine only, if equipped)	HS-CAN	<ul style="list-style-type: none"> IC
Supplemental heater status (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module
Supplemental heater current draw	AHCM (diesel engine only, if equipped)	HS-CAN	<ul style="list-style-type: none"> HVAC module
Supplemental heater current draw (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> HVAC module

Broadcast Message	Originating Module	Network Type	Receiving Module(s)
Tire revolutions per mile	PCM	HS-CAN	<ul style="list-style-type: none"> • IC • TCM (diesel engine only)
Tire revolutions per mile (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> • HVAC module
Tow/haul mode status	PCM (gasoline engine only)	HS-CAN	<ul style="list-style-type: none"> • IC
Tow/haul mode status	TCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> • IC
Tire pressure monitoring system (TPMS) status	SJB (late build vehicles)	MS-CAN	<ul style="list-style-type: none"> • IC
TPMS sensor status (LF, RF, LR, RR, spare)	SJB (late build vehicles)	MS-CAN	<ul style="list-style-type: none"> • IC
Trailer brake lamp request	IC	MS-CAN	<ul style="list-style-type: none"> • SJB
Trailer brake malfunction indicator lamp request	TBC module	HS-CAN	<ul style="list-style-type: none"> • IC
Trailer brake status lamp request	TBC module	HS-CAN	<ul style="list-style-type: none"> • IC
Trailer brake active	TBC module	HS-CAN	<ul style="list-style-type: none"> • IC
Transmission fluid temperature	PCM (gasoline engine only)	HS-CAN	<ul style="list-style-type: none"> • IC
Transmission fluid temperature	TCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> • IC
Transmission malfunction indicator lamp request	PCM (gasoline engine only)	HS-CAN	<ul style="list-style-type: none"> • IC
Transmission malfunction indicator lamp request	TCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> • IC
Transmission shift in progress	PCM (gasoline engine only)	HS-CAN	<ul style="list-style-type: none"> • ABS module
Transmission shift in progress	TCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> • ABS module
Transmission type	PCM	HS-CAN	<ul style="list-style-type: none"> • IC
Transmission output shaft speed	TCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> • PCM
Transmission turbine shaft speed	TCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> • PCM
Trailer brake status	IC	HS-CAN	<ul style="list-style-type: none"> • TBC module
Transmission selector (PRNDL) range	PCM (gasoline engine only)	HS-CAN	<ul style="list-style-type: none"> • IC

Broadcast Message	Originating Module	Network Type	Receiving Module(s)
Transmission selector (PRNDL) range	TCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> IC
Transmission selector (PRNDL) range (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> ACM CDIM (diesel engine only, if equipped) DSM SJB
Turn signal indicator request	SJB	MS-CAN	<ul style="list-style-type: none"> IC
Vehicle speed	PCM	HS-CAN	<ul style="list-style-type: none"> IC RCM TBC module
Vehicle speed (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> ACM CDIM (diesel engine only, if equipped) HVAC module SJB VGT actuator (diesel engine only)
Vehicle identification number (VIN) information	PCM	HS-CAN	<ul style="list-style-type: none"> ABS module IC RCM TCM (diesel engine only) TBC module
VIN information (gateway)	IC	MS-CAN	<ul style="list-style-type: none"> ACM HVAC module SDARS module SJB
Wait to start indicator command	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> IC
Water in fuel indicator request	PCM (diesel engine only)	HS-CAN	<ul style="list-style-type: none"> IC
Wheel speed sensor input (LF, RF, LR, RR)	ABS module	HS-CAN	<ul style="list-style-type: none"> PCM TCM (diesel engine only) TBC module

Pinpoint Tests

Pinpoint Test G: The Transmission Control Module (TCM) Does Not Respond To The Scan Tool

Refer to Wiring Diagrams Cell 14, Module Communications Network for schematic and connector information.

Normal Operation

The transmission control module (TCM) is used on automatic transmission equipped diesel engine vehicles only. The TCM communicates with the scan tool through the high speed controller area network (HS-CAN), circuits VDB04 (WH/BU) (HS-CAN +) and VDB05 (WH) (HS-CAN -) provide the HS-CAN connection to the TCM. The TCM shares the HS-CAN with the PCM, the ABS module, the trailer brake control (TBC) module (if equipped), the variable geometry turbocharger (VGT) actuator, the instrument

cluster (IC), the auxiliary heater control module (AHCM) (if equipped) and the restraints control module (RCM). Voltage for the TCM is provided by circuits CBB72 (GN/VT) and SBB37 (GY/RD). Circuit GD120 (BK/GN) provides ground.

This pinpoint test is intended to diagnose the following:

- Fuse
- Wiring, terminals or connectors
- TCM

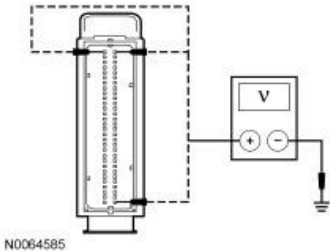
PINPOINT TEST G : THE TRANSMISSION CONTROL MODULE (TCM) DOES NOT RESPOND TO THE SCAN TOOL

NOTICE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

G1 CHECK THE TRANSMISSION CONTROL MODULE (TCM) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

- Disconnect: TCM C1750.
- Ignition ON.
- Measure the voltage between the TCM harness side and ground as follows:

TCM Connector-Pin	Circuit
C1750-1	CBB72 (GN/VT)
C1750-31	CBB72 (GN/VT)
C1750-60	SBB37 (GY/RD)



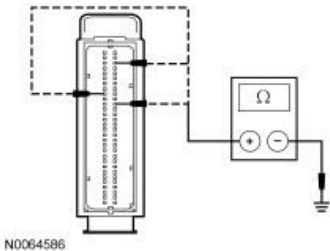
Are the voltages greater than 10 volts?

Yes	GO to G2 .
No	VERIFY the smart junction box (SJB) fuse 37 (10A) and battery junction box (BJB) fuse 72 (15A) is OK. If OK, REPAIR the circuit in question. CLEAR the DTCs. REPEAT the network test with the scan tool.

G2 CHECK THE TCM GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Measure the resistance between the TCM harness side and ground as follows:

TCM Connector-Pin	Circuit
C1750-9	GD120 (BK/GN)
C1750-33	GD120 (BK/GN)
C1750-41	GD120 (BK/GN)

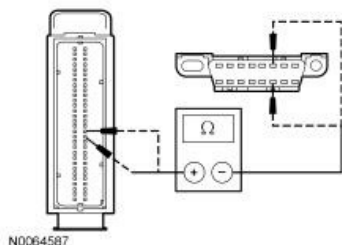


Are the resistances less than 5 ohms?

Yes	GO to G3 .
No	REPAIR the circuit. CLEAR the DTCs. REPEAT the network test with the scan tool.

G3 CHECK THE HS-CAN CIRCUITS BETWEEN THE TCM AND THE DATA LINK CONNECTOR (DLC) FOR AN OPEN

- Measure the resistance between the TCM C1750-47, circuit VDB04 (WH/BU), harness side and the DLC C251-6, circuit VDB04 (WH/BU), harness side; and between the TCM C1750-48, circuit VDB05 (WH), harness side and the DLC C251-14, circuit VDB05 (WH), harness side.

**Are the resistances less than 5 ohms?**

Yes	GO to G4 .
No	REPAIR the circuit in question. CLEAR the DTCs. REPEAT the network test with the scan tool.

G4 CHECK FOR CORRECT TCM OPERATION

- Disconnect the TCM connector.
- Check for:
 - corrosion
 - damaged pins
 - pushed-out pins
- Connect the TCM connector and make sure it seats correctly.
- Operate the system and verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new TCM. REFER to Section 307-01 . CLEAR the DTCs. REPEAT the network test with the scan tool.
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the network test with the scan tool.

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