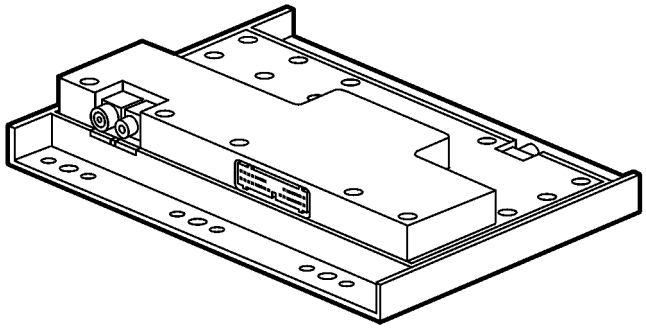
VOLVO
Volvo Trucks North America, Inc.
Greensboro, NC USA

Service Bulletin Trucks

Date	Group	No.	Page
3.2002	**397**	**001**	1(32)

Volvo Link System
Design and Troubleshooting

Satellite Communication System



W3004840

Volvo Link ECU

The Volvo Link System provides satellite communications between a driver and fleet. It includes the Volvo Link ECU, GPS antenna, cable, and wiring harnesses. Some vehicles also include a dash switch. This system allows communications between Volvo's Web based (fleet) software and the vehicle.

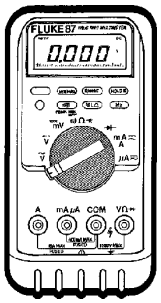
This information includes design and troubleshooting of the vehicle portion of the system. For repair procedures, see service procedures in group 397. For fleet software troubleshooting, see the software help file.

This information contains:

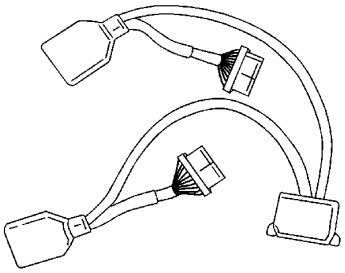
Tools

Special Tools

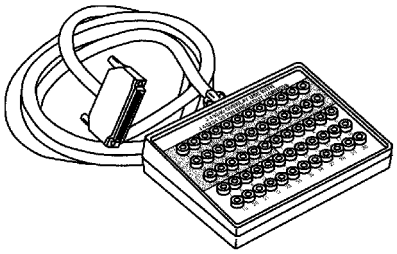
See the special tool information in group 08 for ordering instructions.



J-39200
Fluke Multimeter



J-43234
30-pin Breakout Harness



9998551 with J-43340
60-pin Breakout Box with Overlay

Design and Function

System Operation

The Volvo Link System provides satellite communications between the driver and his fleet home base. The hardware/software that is installed on the vehicle is discussed in this bulletin. In order for the fleet home base to utilize the system, it must subscribe to a web based service through Volvo. For information on the web based application and subscription service, see the Volvo web site at

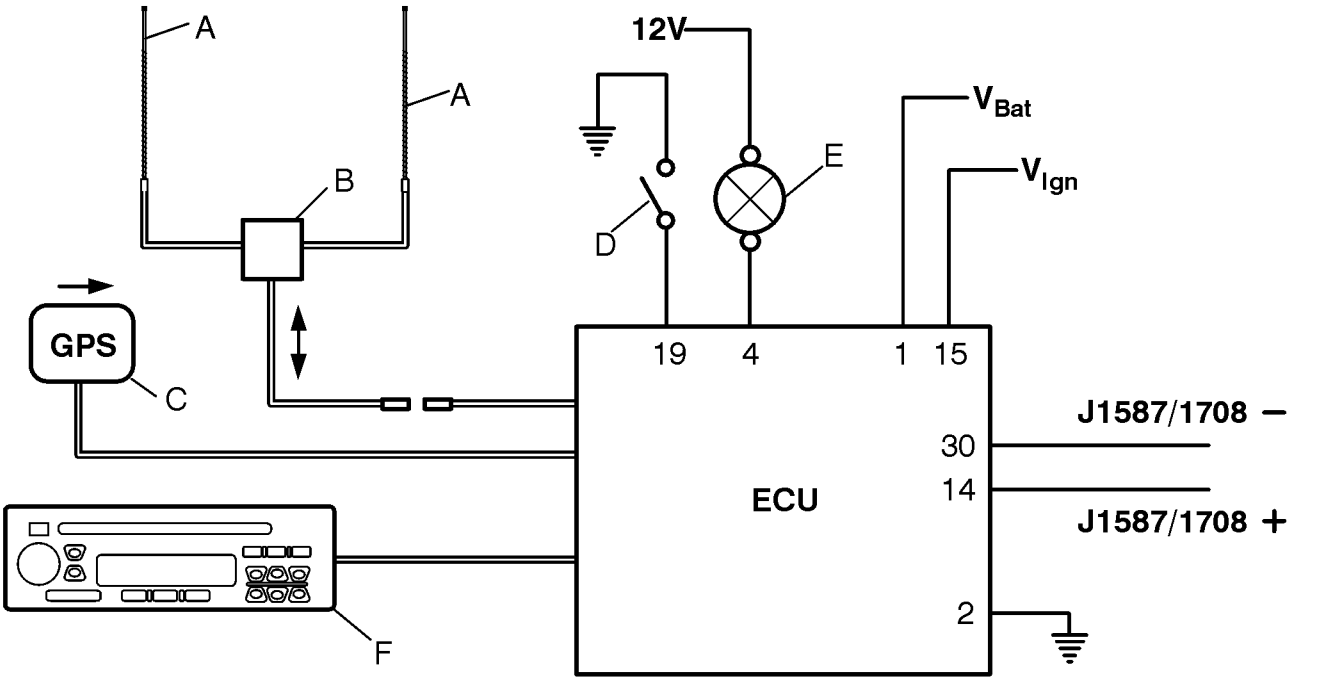
www.volvotrucks.us.com and look under the “Services” category.

The Volvo Link ECU is programmed differently for Cummins and Volvo engines. At the time of the original installation in the vehicle, the Volvo Link ECU acquires the Vehicle Identification Number (VIN) of the vehicle in which it is installed. Replacement of the ECU with one from another vehicle will not work. System checks within the ECU software will recognize that the ECU is not in the proper vehicle and generate a notification message. The Volvo Link ECU is connected to the J1587/1708 Information Data Link.

Incoming and outgoing messages are read on the instrument cluster graphic display screen. Messages are sent and received through the vehicle’s radio antenna system. The vehicle location is identified through a Global Positioning System (GPS) antenna located in the passenger side mirror head. The ORBCOMM network of Low-Earth Orbit satellites relays information between the vehicle and fleet.

Some vehicles may be equipped with a “Volvo Action Service” switch that, when activated, will send a message to Volvo requesting assistance and providing the vehicle location.

System Diagram



W3004841

Volvo Link System

A Multiplex Whip Antennas

B RAMI Antenna Multiplexer box

C GPS Antenna

D* Volvo Action Service Dash Switch

E* Switch Illumination

F Radio

*Switch is not available in all vehicles.

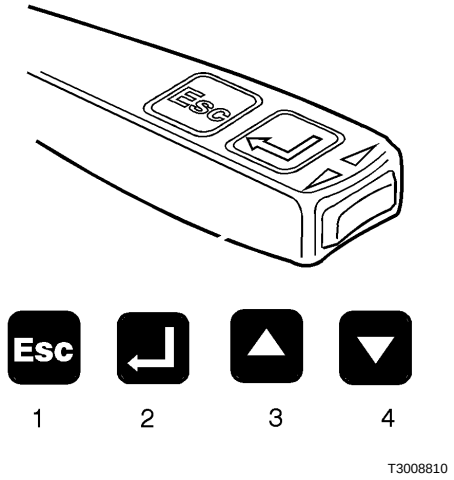
Sending and Receiving Messages

The system has the ability to send brief text messages to and from the vehicle, similar to an e-mail system. It uses the vehicle's graphic display in the instrument cluster for viewing and entering the messages.

The controls for the graphic display are the 4 buttons in the stalk switch on the right side of the steering column.

1 "Esc" (Escape) is used to return to the previous menu and cancel a setting/operation.
2 "↵"or "SELECT" confirms a highlighted selection of a menu or character.
3 "Up arrow" moves the cursor up and is used when setting alpha-numeric values.
4 "Down arrow" moves the cursor down and is used when setting alpha-numeric values.

For more information on using the graphic display controls, see the Operator's Manual, or service information on "Instrumentation" in group 38.



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Using the Graphic Display

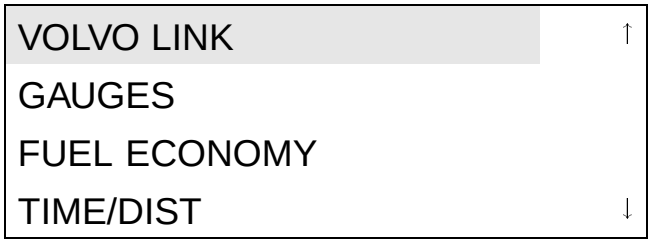
1 The Volvo Link menu should be the first item shown in the graphic display. Use the up/down buttons to highlight it.

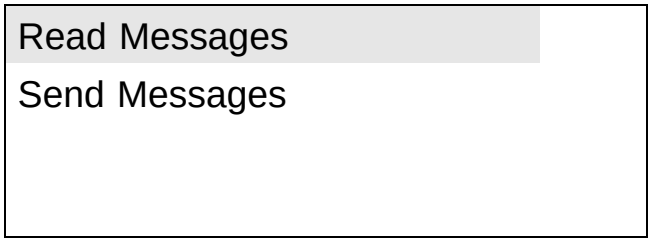
2 Press ↵ to select Volvo Link.

3 After selecting Volvo Link, another screen will pop up, offering the choice to send or read messages.

4 For instructions on sending and receiving messages, see the following:

- "Sending Messages from the Vehicle" page 8
- "Incoming Message Notification from Fleet" page 6
- "Quick Response to Incoming Messages" page 7
- "Viewing Messages" page 7.





Incoming Message Notification from Fleet

Messages are received at the vehicle from the fleet operator. When a message is received by the Volvo Link ECU, the driver will be notified with the INFO lamp and a message in the instrument cluster's graphic display. The message will appear one of the two following ways:

New Message in Volvo Link
or
Priority Message in Volvo Link

If in a driving situation where it is safe to do so, the driver can press the Esc button when he/she sees the message.

Pressing the Esc button turns off the INFO lamp.

The driver can read the "New Message" the next time he stops the vehicle. Or the driver can read a "Priority Message" while driving, provided the vehicle speed is below 55 mph.

Viewing Messages

To view all stored messages, select “Volvo Link,” then “Read Messages” in the cluster’s graphic display.

The messages will display, one at a time, with the most recent message shown first.

Once the newest message is displayed, the driver can use the Up/Down buttons to scroll through the other messages.

Up goes to the next (newer) message. If the newest message is being displayed, the Up button wraps back to the oldest message.

Down goes to the previous (older) message. If the oldest message is being displayed, the Down button wraps back to the newest message.

The message buffer will hold 5 messages. If the buffer is full and a new message is received, the oldest message will be deleted.

While the vehicle is moving, the last message received is the only one that can be displayed, and only if it is a “Priority Message.”

If the driver has access or priority to see the message while driving, the message is displayed. If not, the driver will see a message directing him to:

Stop Vehicle to Read Message

Quick Response to Incoming Messages

The driver has the option of a Quick Response to the most recent message in the queue.

The quick response can be sent while driving.

From the message display screen, press ↵ to access the Quick Response menu.

The Quick Response uses pre-defined text:

Yes/OK
No
Respond @ Next Stop

Sending Messages from the Vehicle

The driver of the vehicle can send messages from the vehicle to the fleet. Messages can be sent when the vehicle is stopped, but not while it is moving. If you attempt to send a message when the vehicle is moving, an error message will display, and the message will not be sent.

The driver can send 3 types of messages, as shown below. These options are selectable from the graphic display.

- Defined Text
- Breakdown
- Free Text

The Defined and Breakdown message lists have approximately 10 message options within each menu.

Defined Text messages:

Load picked up
Load delivered
Late: less than 1 h
Late: more than 1 h
Company defined 1
Company defined 2
Company defined 3
Company defined 4
Company defined 5

Breakdown messages:

This allows the driver to send breakdown messages along with the vehicle's GPS location back to his fleet, which can then help the driver by sending a service vehicle to his location.

Towing needed
Tractor tire
Tractor electrical
Tractor air supply
Tractor drive train
Tractor others
Trailer tire
Trailer electrical
Trailer air supply
Trailer axles
Trailer others

Free Text:

Free text messages are sent as follows:

Select Free Text in the graphic display.

From the blank screen with a cursor, use the up/down arrows to scroll through the numbers 0–9 and the alphabet to create your message, one character at a time.

Note: using the up arrow, you will scroll through 0–9, then A-Z. Using the down arrow, the order is reversed, and you will see Z-A, then 9–0.

For the first character, scroll up or down until you reach the letter/number desired, then press the ↵ button. Repeat for each character.

When finished with the message, press the ↵ button and hold for 3 seconds to send.

Note: if you make a mistake, press Esc to go back to the previous character. To cancel sending a typed message, press Esc until the message is cleared from the screen.

After a Message is Sent

After a message is sent, one of the following confirmations will appear on screen:

Message Sent
Sending Not Allowed
No Subscription

Message Sent confirms that the message was sent by the ECU.

If **Sending Not Allowed** shows on screen, the message was not sent. The reason for this failure may be that the system is busy. Wait briefly and try sending the message again. It may also be an indication that the Volvo Link ECU has been placed in the wrong vehicle (see “Cannot Send or Receive Messages, but No Fault Code” page 31 for more information).

No Subscription indicates that messaging capabilities have been disabled by the fleet.

If **Operation Failed** appears on screen during an attempt to send a message, this is either an indication of network congestion, or a system failure. See “MID 142 Satellite Communication” page 14 for more information.

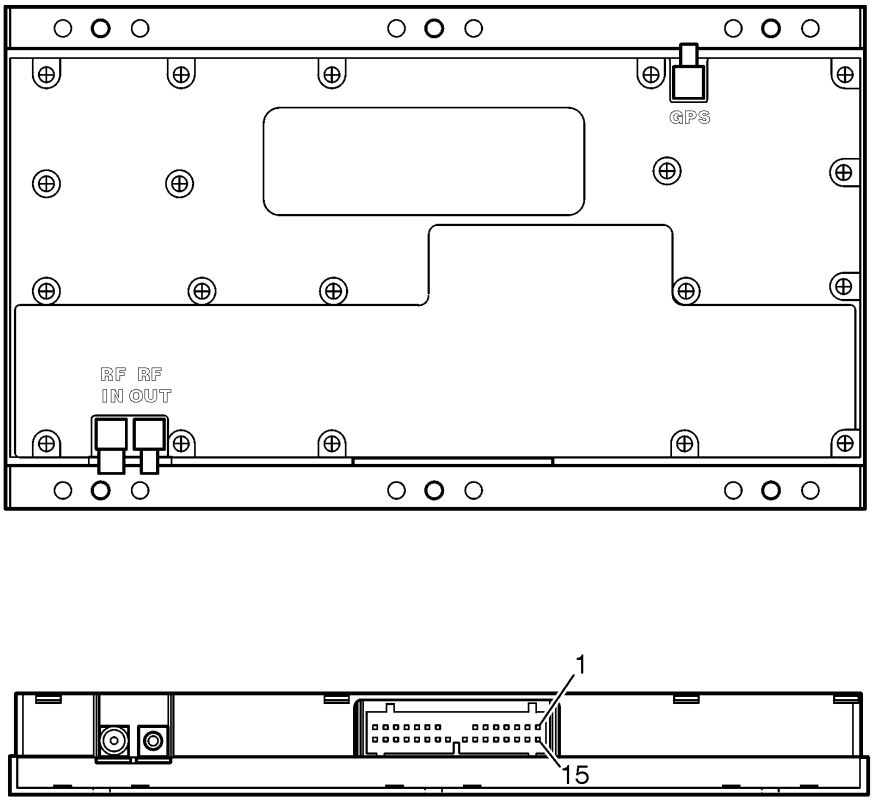
Vehicle Log Data

Total miles, Total Idle Fuel used, Total Fuel used, Total Engine Idle hours, Total Engine hours, Vehicle Location (GPS).

This data can be requested by the Web or can be set up in the Volvo Link ECU to be sent at predetermined time intervals.

Data is recorded using the J1587/1708 data link on the vehicle.

ECU Pinout

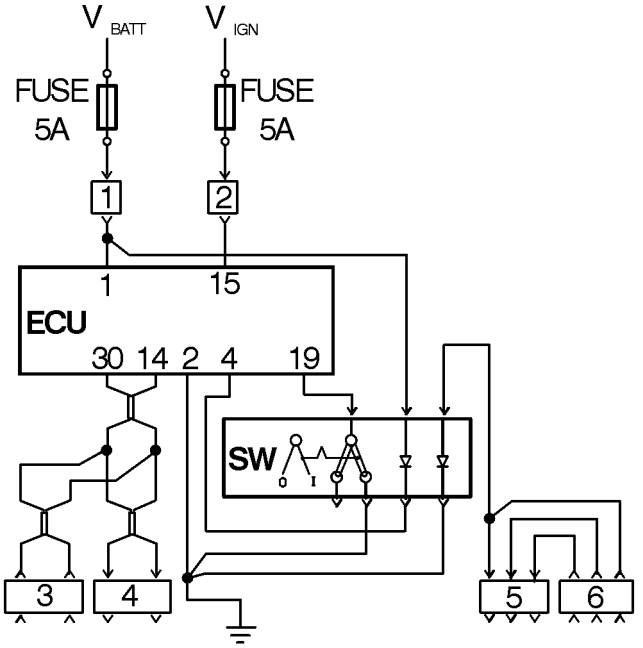


Volvo Link ECU

Pin	Name	Description
1	BATT+	Battery Supply (+)
2	BATT-	Battery Supply (-)
4	OUTPUT1	Volvo Action Service Dash Switch Illumination (not available in all vehicles)
14	J1587/1708+	J1587/1708 Data Link +
15	INPUT1 (PWR)	Ignition Supply (+)
19	INPUT5 (GND)	Volvo Action Service Dash Switch (not available in all vehicles)
30	J1587/1708-	J1587/1708 Data Link -

NOTE: Pins 3, 5–13, 16–18 and 20–29 are not used.

Simplified Schematic



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Volvo Link ECU, Simplified Electrical Schematic

1 Powerpoint connector in TEC center (B2–1)
2 Powerpoint connector in TEC center (B1–1)
3 Diagnostic option connector 2, behind TEC center
4 Diagnostic option connector 1, behind TEC center
5 *Switch illumination connector 1
6 *Switch illumination connector 2

"ECU" is the Volvo Link ECU
* "SW" is the Volvo Action Service dash switch, which is not available in all vehicles.

Note: This simplified schematic should be used only to clarify the design features of the Volvo Link system. For detailed, vehicle-specific schematics, see the "VN/VHD Electrical Schematics" in Group 37.

System Definitions

Data link — An electrical connection for communication with other microprocessor-based devices (such as powertrain control, trip recorders and maintenance systems) that are compatible with the ATA and SAE standard.

GPS — Global Positioning System: a system that uses satellites to provide users with GPS location anywhere in the world.

ORBCOMM — Satellite communications provider used for Volvo Link system. Part of the Volvo Link ECU may be referred to as the ORBCOMM module, because it is the module containing the satellite communications circuitry.

PSID — PSID is a Volvo Proprietary SID, or System Identifier. Note that PSID's will only show a numeric value in the graphic display – no text description.

Volvo Link — Volvo Link System. A satellite communciation system integrated into Volvo vehicles. It includes the Volvo Link ECU, GPS antenna and wiring harnesses. This system allows communications between the fleet (via Volvo's Web based software) and the vehicle.

Web — World Wide Web or Internet.

Web Application — General definition is software on the Internet, but in this case, it refers to the Volvo Link software, usually administered at a fleet's home base.

Troubleshooting

MID 142 Satellite Communication

For **Fault Based** troubleshooting, see:

- “Fault Code Troubleshooting” page 15

For **Symptom Based** troubleshooting, see:

- “Troubleshooting the Messages Shown in the Graphic Display” page 29
- “Cannot Send or Receive Messages, but No Fault Code” page 31
- “No Response from Vehicle” page 31
- “Antenna Checks” page 32

Fault Code Troubleshooting

The system has several failure conditions that can be detected by the ECU. Some of these conditions could be loss of data link and signals, output failures and GPS failures.

The fault codes can be read by using the instrument cluster graphic display or VCADS Pro.

NOTE: About Inactive Faults: Low Counts - If the count of an inactive fault is low or only one, then this may indicate a possible system glitch that may not need any corrective action.

High Counts - If the count of an inactive fault is high, this may indicate a problem in concerned or related components and wiring/connectors.

Do not automatically replace any component until it has been verified to be bad. Clear the fault and do the recommended checks as if the fault was active. Also, if possible, try to recreate the fault by placing the vehicle or component in similar conditions that may have originally caused the fault. This will help in determining why the fault was initially logged and also in finding a solution.

NOTE: The descriptions in the table below are the FMI descriptions according to SAE standards. The text actually shown in the graphic display or in VCADS Pro may vary slightly.

Fault Code: PIDs	Function	FMI	Check
MID 142 - PID 84	Road Speed	9=data not received/abnormal update rate	Speed sensor or data link failure. See “Engine Faults” page 18.
MID 142 - PID 89	PTO Status	9=data not received/abnormal update rate	Indicates a problem in the engine system. See “Engine Faults” page 18.
MID 142 - PID 155	Output 1-4	3=voltage shorted high	See “MID 142 PID 154 or 155 Auxiliary Input and Output Status” page 20.
		4=voltage shorted low	
		5=current low or open circuit	
MID 142 - PID 155	Input 1-4	12=bad component	See “MID 142 PID 154 or 155 Auxiliary Input and Output Status” page 20.
MID 142 - PID 154	Input 5-8	12=bad component	See “MID 142 PID 154 or 155 Auxiliary Input and Output Status” page 20.
MID 142 - PID 183	Fuel Rate	9=data not received/abnormal update rate	Indicates a problem in the engine system. See “Engine Faults” page 18.
MID 142 - PID 190	Engine Speed	9=data not received/abnormal update rate	Indicates a problem in the engine system. See “Engine Faults” page 18.
MID 142 - PID 235	Idle Engine Hours	9=data not received/abnormal update rate	Indicates a problem in the engine system. See “Engine Faults” page 18.
MID 142 - PID 236	Idle Fuel Used	9=data not received/abnormal update rate	Indicates a problem in the engine system. See “Engine Faults” page 18.
MID 142 - PID 237	External VIN Missing	9=data not received/abnormal update rate	See “MID 142 PID 237 FMI 9 External VIN Missing” page 21.

Fault Code: PIDs	Function	FMI	Check
MID 142 - PID 245	Odometer	9=data not received/abnormal update rate	See “MID 142 PID 245 FMI 9 Total Vehicle Distance (Odometer)” page 22
MID 142 - PID 247	Engine Hours	9=data not received/abnormal update rate	Indicates a problem in the engine system. See “Engine Faults” page 18.
MID 142 - PID 248	PTO Hours	9=data not received/abnormal update rate	Indicates a problem in the engine system. See “Engine Faults” page 18.
MID 142 - PID 250	Fuel Used	9=data not received/abnormal update rate	Indicates a problem in the engine system. See “Engine Faults” page 18.

Fault Code: SIDs	Function	FMI	Check
MID 142 - SID 240	Memory Flash/RAM	12=bad component	This indicates a power-up hardware failure in the ECU. See “MID 142 SID 240 FMI 12 Memory Flash/RAM” page 23
MID 142 - SID 250	J1708/1587 Data Link	9=data not received/abnormal update rate	Indicates a data link fault. See “Composite Fault Codes” page 19.
MID 142 - SID 253	Memory ROM	12=bad component	This indicates a power-up hardware failure in the ECU “MID 142 SID 253 Memory ROM” page 24.
MID 142 - SID 254	ECU Hardware failure	12=bad component	Indicates an ECU fault. See “Composite Fault Codes” page 19.

Fault Code: PSIDs	Function	FMI	Check
MID 142 - PSID 003	Sending Message Failure	11=unknown failure,12=bad component (see also PSID 5,6)	For future use.
MID 142 - PSID 004	GPS module/interface	2=bad GPS antenna, 12=bad ECU	Power and ground to Volvo Link ECU. See “MID 142 PSID 004 FMI 2 GPS Antenna/Interface” page 25 and “MID 142 PSID 004 FMI 12 GPS Module/Interface” page 26.
MID 142 - PSID 005	DSP module/interface	12=bad device or antenna	For future use.

Fault Code: PSIDs	Function	FMI	Check
MID 142 - PSID 006	ORBCOMM Satellite module/interface	2=bad antenna, 12=bad ECU	See "MID 142 PSID 006 FMI 2 Orbcomm Satellite Communications Module/Interface" page 27 and "MID 142 PSID 006 FMI 12 Orbcomm Satellite Communications Module/Interface" page 28.
MID 142 - PSID 009	J1708/1587 Data Link Missing	9=data not received/abnormal update rate	Check data link wiring. See "MID 142 PSID 009 FMI 9 J1587/1708 Data Link Missing" page 28.

NOTE: PSID is a Volvo Proprietary SID. Note that PSID's will only show a numeric value in the graphic display – no text description.

Engine Faults

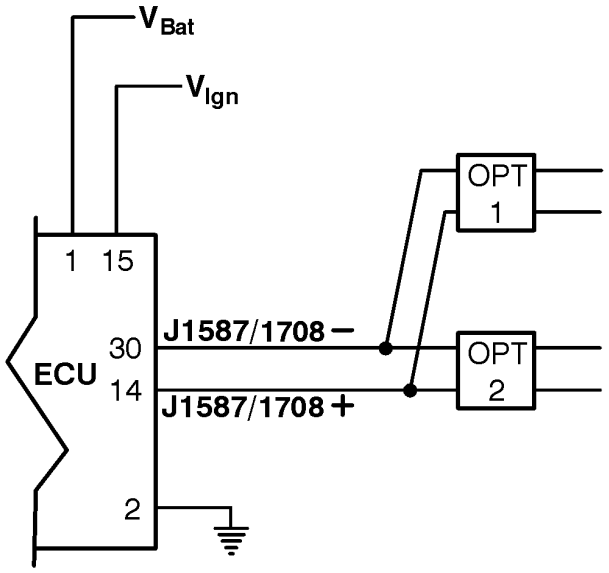
These “engine faults” may be an indication of a fault in the engine, or in the data link information coming from the engine ECU or vehicle ECU.

Check for related faults on MID 128. If a related fault exists for MID 128, the problem is most likely in the engine system. For more information about engine fault code troubleshooting, see service information in group 28.

If there are no related faults on MID 128, the problem is most likely in the data link wiring or connections between the engine system and the Volvo Link ECU.

Begin checking at the Volvo Link ECU, and the wiring connecting it to the data link. See the simplified schematic.

For in-depth troubleshooting of the data link system, see service information in group 371.

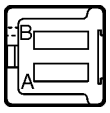


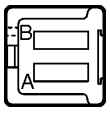
W3005011

Volvo Link ECU

OPT 1 Two-pin Data Link Connector

OPT 2 Two-pin Data Link Connector. See following tables for details.

OPT 1 Data Link Connector			
	Pin	Circuit	Description
	A	401-B	J1587/1708-
	B	400-B	J1587/1708+
Location: rear of TEC center			

OPT 2 Data Link Connector			
	Pin	Circuit	Description
	A	401-A	J1587/1708-
	B	400-A	J1587/1708+
Location: rear of TEC center			

Composite Fault Codes

If you receive a fault containing SID 250 or 254, you must first check for other faults using VCADS Pro.

The reason is that a composite fault code, SID 250 or 254, is generated when one or more of a group of related fault codes exists. If a composite fault code is seen, it is an indication that a related, more specific fault exists.

For example, data link fault codes are grouped under SID 250. But SID 250 only indicates in a general way that there is a data link fault. To view the more specific faults, you must request faults using VCADS Pro or the instrument cluster.

When faults have been requested, the composite fault will display, along with the other fault(s). For example, using VCADS Pro, the following faults may be shown:

MID 142–SID 250–FMI 9
MID 142–SID 245–FMI 9

In this example the problem lies in SID 245, the output from the odometer, and not in SID 250. SID 250 is only shown because SID 245 is a related fault – under the “umbrella” of SID 250.

To summarize,

- **SID 250** = composite fault for other missing J1587/1708 data link items, e.g. VIN, odometer, engine hours, etc.
- **SID 254** = composite fault for physical hardware problems, e.g. Inputs and outputs, GPS/Orbcomm antennas, memory, etc.

Display for SID 250:

MID142
SAE J1708 Data Link
Communication Error
Active

Display for SID 254:

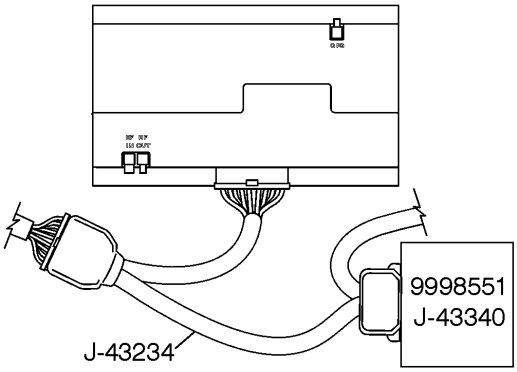
MID142
Controller #1
Component Failure
Active

Note: Actual text may vary slightly.

MID 142 PID 154 or 155 Auxiliary Input and Output Status

General Information

Hardware failure.



Fault code

FMI 3: Voltage shorted high

FMI 4: Voltage shorted low

FMI 5: Voltage low or open circuit

FMI 12: Bad component

- Conditions - ECU did not receive correct input or generate correct output.
- Cause - Defective wiring, switch or internal ECU problem.
- Reaction from control unit - Set Active Fault.
- Noticeable external symptoms - Cluster displays fault message when queried for faults.
- Checks - Input and Output hardware, per Table. If hardware OK, replace ECU.

  Special tools: *J-39200, J-43340, J-43234, 9998551*

  - Key switch position: ON
  - Measuring: Voltage measurement at Truck Electrical Center (TEC) or Volvo Link ECU
  - Adapter J-43234 to be connected to the blue JAE connector on the ECU when applicable. Use the 30–pin side of Overlay J-43340.

Fault Code	Description	Type of Fault	Check	Expected Value
PID 155, FMI 3/4/5	ECU Output 1	Electrical Fault, internal ECU or hardware	VAS Dash Switch Illumination (not available in all vehicles)	
	ECU Output 2		Not used	
	ECU Output 3		Not used	
	ECU Output 4		Not used	
PID 155, FMI 12	ECU Input 1	Component Failure, internal ECU or hardware	Pin 15 - 2 (Ign+)	Battery voltage
	ECU Input 2		Not used	
	ECU Input 3		Not used	
	ECU Input 4		Not used	
PID 154, FMI 12	ECU Input 5	Component Failure, internal ECU or hardware	VAS Dash Switch (not available in all vehicles)	
	ECU Input 6		Not used	
	ECU Input 7		Not used	
	ECU Input 8		Not used	

MID 142 PID 237 FMI 9 External VIN Missing

General Information

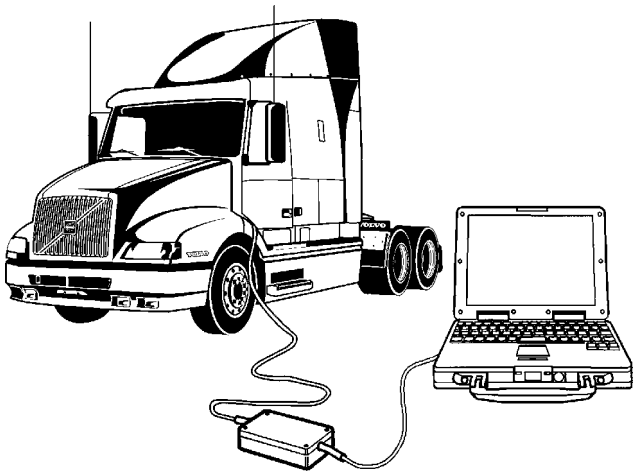
Indicates missing/incorrect VIN information on the data link.

Fault code

FMI 9 Abnormal Update Rate

- Conditions - Volvo Link requested VIN information from both the Cluster (MID 234) and Engine(MID 128).
- Cause - Volvo Link requested VIN information and did not receive it due to missing/incorrect data in the ECUs.
- Reaction from control unit - Set Active Fault.
- Noticeable external symptoms - Cluster displays fault message when queried for faults.
- Checks - Perform 1700-08-02-04 Vehicle Information test in VCADS Pro and correct any mismatched VIN's at this time by reprogramming the ECU(s) that contain incorrect VIN(s).

  NOTE: VCADS Pro will automatically make aware to the user that one or more ECUs have incorrect VINs. Tests and calibrations are restricted, but programming can be performed.



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MID 142 PID 245 FMI 9 Total Vehicle Distance (Odometer)

General Information

Indicates a problem in the data link input from the instrument cluster.

This data is received from the J1587/1708 datalink as well as being calculated internally. The internally calculated data is the total accumulated distance the vehicle has been driven since the installation of the Volvo Link system.

Fault code

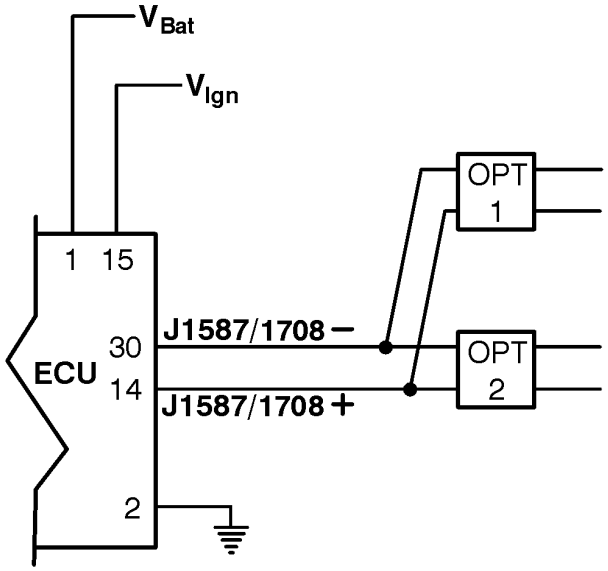
FMI 9: Abnormal Update Rate

This displays in the instrument cluster as
“MID 142, Total Vehicle Dist, Communication Error”

- Conditions - Volvo Link requested odometer data, but did not receive it.
- Cause - If the data is not received this fault code is set.
- Reaction from control unit - Set Active Fault.
- Noticeable external symptoms - Cluster displays fault message when queried for faults.
- Checks - Check to see if MID 140 responds to 1700–08–02–04 Vehicle Information Test in VCADS Pro. If MID 140 is present, the data link may have experienced congestion problems, which caused this fault to appear.

  If the number of fault instances is low, the fault was probably caused by data link congestion. No action is needed.
  If the number of fault instances is high, a data link / ECU problem exists between the instrument cluster and the Volvo Link ECU.

For in-depth troubleshooting of the data link system, see service information in group 371.



Volvo Link ECU, Data Link Wiring

OPT 1 Two-pin Data Link Connector

OPT 2 Two-pin Data Link Connector

For complete data link wiring, see “VN Electrical Schematics” in Group 37.

MID 142 SID 240 FMI 12 Memory Flash/RAM

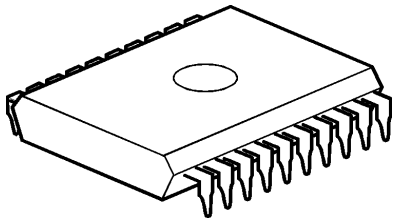
General Information

This fault indicates a power-up failure, which is most likely an internal ECU problem.

Fault code

FMI 12 Bad Component

This displays in the instrument cluster as "MID142, Program Memory, Component Failure"



T2012704

- Conditions - Volvo Link ECU performs certain error checking and memory functions during power up.
- Cause - Volvo Link ECU detects a failure during power up and sets an active fault.
- Reaction from control unit - Set Active Fault, Restrict operations.
- Noticeable external symptoms

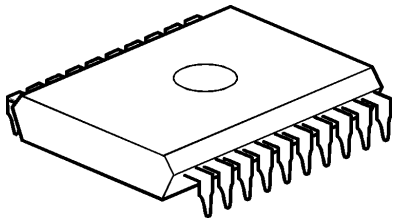
  Cluster displays fault message when queried for faults.

  Volvo Link will disable itself and no internal operations can be performed. Broadcasting fault messages is limited to once every 15 sec. All incoming messages from datalink, ignition, Volvo Action Service switch input, Orbcomm and GPS will be ignored.
- Checks - If this fault code is reported, then the Volvo Link ECU is considered to contain fatal errors and the unit must be replaced.

MID 142 SID 253 Memory ROM

General Information

This fault indicates a power-up failure, which is most likely an internal ECU problem.



T2012704

Fault code

FMI 12 Bad Component

This displays in the instrument cluster as "MID142, Calibration Memory, Component Failure"

- Conditions - Volvo Link ECU performs certain error checking and memory functions during power up.
- Cause - Volvo Link ECU detects a failure during power up and sets an active fault.
- Reaction from control unit - Set Active Fault, Restrict operations.
- Noticeable external symptoms

  Cluster displays fault message when queried for faults.

  Volvo Link will disable itself and no internal operations can be performed. Broadcasting fault messages is limited to once every 15 sec. All incoming messages from data link, ignition, Volvo Action Service switch input, Orbcomm and GPS will be ignored.

- Checks - If this fault code is reported, then the Volvo Link ECU is considered to contain fatal errors and the unit must be replaced.

MID 142 PSID 004 FMI 2 GPS Antenna/Interface

General Information

This fault indicates a failure of the GPS antenna, or a failure of the ECU's GPS receiver circuitry. But it can also occur if there are no satellite communications, i.e. inside a building or tunnel for a long period of time. The fault is logged if:

- there are no satellites in view for 10 minutes while the vehicle is moving
- or if there are no communications with the GPS module portion of the ECU for more than 1 minute.

Check power and ground to Volvo Link ECU. Also check antenna connections at ECU and GPS antenna.

Fault code

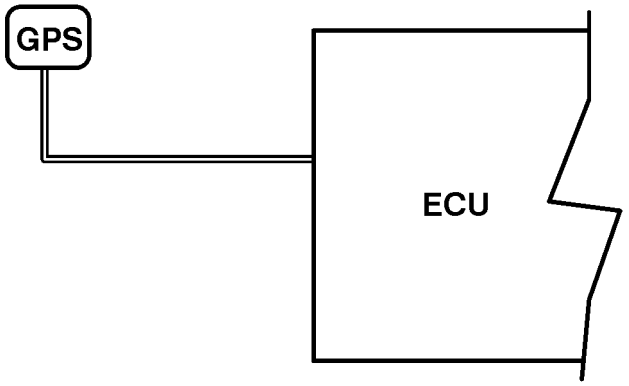
FMI 2 Bad Antenna

This displays in the instrument cluster as "MID142, PSID004, Data Error"

- Conditions - Volvo Link ECU performs certain error checking functions during power up.
- Cause - Volvo Link ECU detects a GPS antenna failure while the vehicle is in operation and sets an active fault.
- Reaction from control unit - Set Active Fault.
- Noticeable external symptoms

  Cluster displays fault message when queried for faults.

- Checks - If this fault code is reported, check the GPS antenna function in an area where there is a clear view of the sky. Does the fault remain active, or become inactive? If inactive and the count of active faults is one, the system is probably OK. If the inactive fault count is high, or if the fault remains active, check the GPS module in the mirror housing and the antenna cable from the mirror to the ECU to make sure that both are functioning correctly. If either is found to be defective replace as required.



W3005015

MID 142 PSID 004 FMI 12 GPS Module/Interface

General Information

This fault indicates a GPS serial communications failure. An internal GPS error has occurred, either on power-up or during operation. The GPS module is part of the Volvo Link ECU.

Fault code

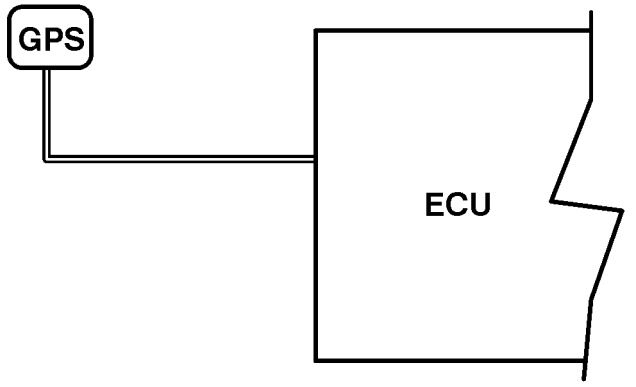
FMI 12 Bad Component

This displays in the instrument cluster as "MID 142, PSID 004, Component Failure"

- Conditions - Volvo Link ECU performs certain error checking functions during power up.
- Cause - Volvo Link ECU detects an internal GPS module/interface failure during power up and sets an active fault.
- Reaction from control unit - Set Active Fault.
- Noticeable external symptoms

  Cluster displays fault message when queried for faults.

  Volvo Link will disable itself and no internal operations can be performed. Broadcasting fault messages is limited to once every 15 sec. Note: if this fault occurs during operation, there will be no messages broadcast. All incoming messages from datalink, ignition, Volvo Action Service switch input, Orbcomm and GPS will be ignored.
- Checks - If this fault code is reported, the Volvo Link ECU is considered to contain fatal errors and should be replaced.



W3005015

MID 142 PSID 006 FMI 2 Orbcomm Satellite Communications Module/Interface

General Information

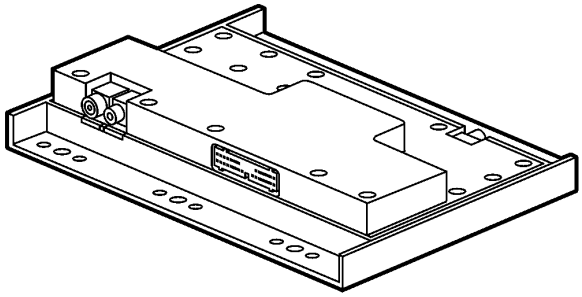
The Volvo Link ECU polls the ORBCOMM network for satellite status. During a specified interval, ongoing communication is expected to be maintained. The ORBCOMM module is part of the Volvo Link ECU.

Fault code

FMI 2 Bad Antenna

This displays in the instrument cluster as "MID142, PSID006, Data Error"

- Conditions - Volvo Link ECU expected satellite communications and did not receive any during a specified period of time.
- Cause - Volvo Link ECU failed to communicate with any satellites, and sets an active fault.
- Reaction from control unit - Set Active Fault.
- Noticeable external symptoms — Cluster displays fault message when queried for faults.
- Checks - See "Antenna Checks" page 32. If the antenna system checks are OK, the ECU should be replaced.



W3004840

Volvo Link ECU

MID 142 PSID 006 FMI 12 Orbcomm Satellite Communications Module/Interface

General Information

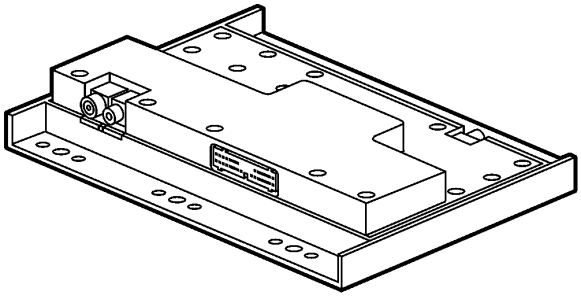
The Volvo Link ECU polls the ORBCOMM network for satellite status. During a specified interval, ongoing communication is expected to be maintained. The ORBCOMM module is part of the Volvo Link ECU.

Fault code

FMI 12 Bad Component

This displays in the instrument cluster as "MID142, PSID006, Component Failure"

- Conditions - Volvo Link ECU expected satellite communications and did not receive any during a specified period of time.
- Cause - Volvo Link ECU failed to communicate with any satellites, and sets an active fault.
- Reaction from control unit - Set Active Fault.
- Noticeable external symptoms — Cluster displays fault message when queried for faults.
- Checks - See antenna checks on "Antenna Checks" page 32. If the antenna system checks are OK, the ECU should be replaced.



W3004840

Volvo Link ECU

MID 142 PSID 009 FMI 9 J1587/1708 Data Link Missing

General Information

Indicates an expected input to the Volvo Link ECU from the data link is missing. This indicates the Volvo Link ECU has detected "ignition on" with no data link activity. The data link connection to the Volvo Link ECU should be checked.

For more information see data link troubleshooting information in group 37.

Troubleshooting the Messages Shown in the Graphic Display

Operation Failed

This message is displayed during a failure to Send or Read messages from the ECU.

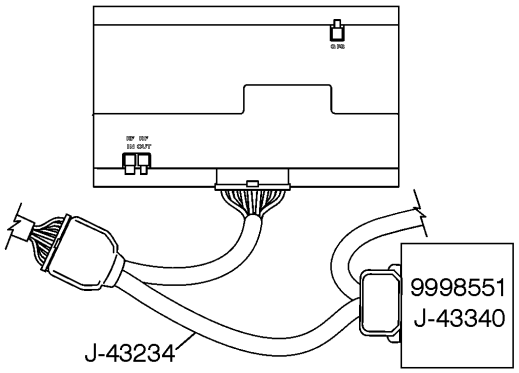
NOTE: This message can be displayed without any problems in the system, due to data link congestion.

1 Attempt to Read Messages again. If you do not get the Operation Failed Screen again, then the problem was data link congestion. Try this 2–3 times just to make sure that there is a problem.

2 Check fault codes. Try to read faults 2–3 times. If a related fault is shown, see "Fault Code Troubleshooting" page 15. Even if a fault is not shown, a hardware failure may exist. Go to the next step.

3 If the problem still occurs and the instrument cluster is working with other data link devices, there may be a hardware failure in the wiring or connections. Make the following checks.

Special tools: *J-39200, J-43340, J-43234, 9998551*



W3005016

- Key switch position: ON
- Measuring: Voltage measurement at Truck Electrical Center (TEC) or Volvo Link ECU
- Adapter J-43234 to be connected to the blue JAE connector on the Volvo Link ECU when applicable. Use the 30–pin side of overlay J-43340.

Function	Check	Expected Value	Possible Cause	Note
Power connections at TEC	Check both power point connectors to the expansion block positions of the TEC.	Battery Voltage	Harness connector not connected. Fuse blown/missing.	
Data link connection at TEC	Check connection at data link connector at rear of TEC.	0-5 VDC	Harness connector not connected. Data link wiring broken/damaged.	To read the fluctuation in voltage on the data link set the range on the DMM to zero decimal places. This should stabilize the measurement.
Power connections at ECU	Measure voltage at ECU: pins 1-2 (Batt+), pin 15-2 (Ign+)	Battery Voltage	If voltage Ok at TEC, then check continuity on wiring in question from TEC to the ECU.	
Data Link connections at ECU	Measure voltage at ECU: pin 14 -30 (J1587+ to J1587-) pin 14 -2 (J1587+ to gnd) pin 30-2 (J1587- to gnd)	0-5 VDC	If voltage Ok at TEC, then check continuity on wiring in question from TEC to the ECU.	To read the fluctuation in voltage on the data link set the range on the DMM to zero decimal places. This should stabilize the measurement.

No Subscription
This message is displayed in the cluster when there are no subscriptions programmed in ECU.

The ECU is working properly, but has not been properly configured by the Web site to allow the type of action requested.

Stop Vehicle to Read Message
This message is displayed when the road speed is over 5 mph for low priority messages, and over 55 mph for high priority messages. Or, it may be displayed when scrolling through the messages when road speed is above 5 mph.

Sending Not Allowed
This message is displayed in the following conditions:

- when trying a “quick response” to an old message (quick response is only possible with the most recent message)
- in other cases where the system will not allow a response

If you see this message, try to send your message again later. If you continue to receive this message, see “Cannot Send or Receive Messages, but No Fault Code” page 31.

No Messages Available
This message is displayed when the Volvo Link ECU’s incoming message queue is empty.

Message Sent
This message is displayed when the Volvo Link ECU has received a message to be sent to the web site. The message has been queued and will be sent during next available satellite transmission.

Stop Vehicle to Send Msg
This message is displayed when the cluster detects the vehicle speed is above 5 mph. Vehicle speed must be below 5 mph before the cluster will allow you to send a message.

Cannot Send or Receive Messages, but No Fault Code

Symptom:

1 The driver consistently sees the **Sending Not Allowed** when he tries to send a message (but the "quick response" still functions). There is no further indication of a problem to the driver.

2 The ECU will not log data.

3 The ECU will still respond to VCADS Pro tests.

4 Use VCADS Pro to check VIN of Volvo Link ECU and if it matches the VIN programmed in the other ECUs on vehicle.

Reason:

- If the VINs do not match, the Volvo Link ECU has been placed in the wrong vehicle. This means the ECU has been tampered with: i.e. stolen or improperly moved from one vehicle to another. On key-on, the Volvo Link ECU checks the vehicle VIN number by polling the VIN information in two other ECUs on the data link.
- If there is a VIN mismatch in the Volvo Link ECU, place that ECU back in the vehicle it was programmed for. If the mismatch is in another ECU, such as the instrument cluster or engine ECU, reprogram that ECU.

No Response from Vehicle

If the vehicle has stopped responding to the Web's request, automatic schedules or never sent the INI message, there is a problem with the hardware in the vehicle.

1 Use the VCADS Pro tool. Go to the Volvo Link section and run the Satellite Communications Test. If there is no response using VCADS then go to Step 2. If the Volvo Link responds then check the following.

- Related fault codes?
- Satellite Test: check the message queue in the Volvo Link ECU. If the queue shows messages and you have good GPS, then the problem is with the antennas. Check the satellite number and strength levels.

  NOTE: This could take approx. 15 minutes in some cases before a satellite is in view.

- If no satellites come into view after the 15 minutes, check the following (see "Antenna Checks" page 32 for more on antenna checking):

  Is the truck inside a building with no satellite reception?
  Antenna whips (make sure they are there and connected)
  Rami multiplexer box to Volvo Link cable
  Antenna to Rami multiplexer box

2 Check the Power, Ignition, Ground and fuses in the TEC center for proper voltage levels. Note: see table page 29 for instructions.

3 Check the Power, Ignition and Ground at the Volvo Link ECU's 30 way JAE connector for proper voltage levels. Note: see table page 29 for instructions.

4 Data link connection: Check the data link pins at the Volvo Link ECU to make sure they are in the correct locations. Note: see table page 29 for instructions.

Antenna Checks

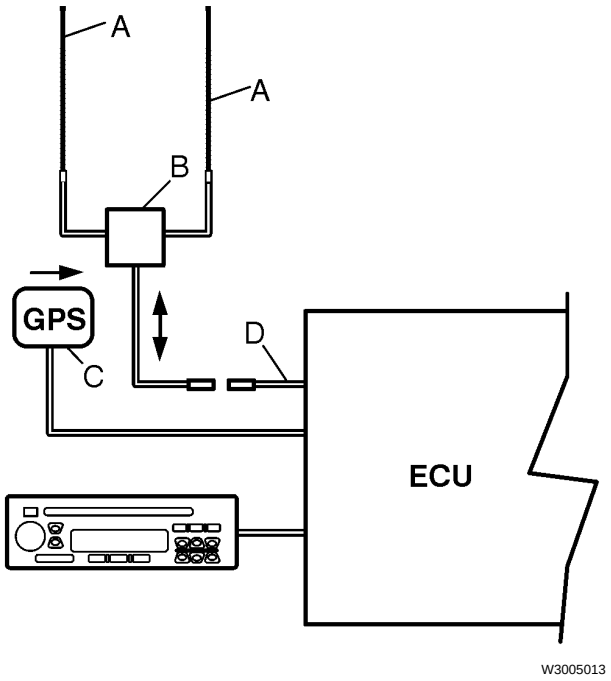
Preliminary Checks

Physically verify that the Rami antennas are attached to the vehicle and are connected to the cables in the mirror housings properly. Also verify that there is no damage to the antenna system. Replace all defective or missing components before continuing with the fault tracing below.

Do not attempt to troubleshoot radio/antenna reception problems in the following conditions:

- Inside buildings
- In areas with a high rate of reflected signal activity (reflected signals are weaker than direct signals & cause problems with cancellation of the direct signals), which ultimately affects radio reception clarity.
- In areas of electrical interference (such as high tension electrical lines)
- When there are electrical storms nearby

The following checks should be performed if a communication problem exists with the Volvo Link system, and the antennas are suspected as being the problem. If a problem is suspected with the radio see Service Information on the Audio System in group 39.



Volvo Link ECU and Antenna System

A Multiplex Whip Antennas
B RAMI Antenna Multiplexer Box
C GPS Antenna
D Antenna Jumper Cable

Basic Reception Test

Perform the following checks of the radio signals (AM/FM and Weatherband). Stations should come in clear with no static.

If the radio plays well, the antenna system is OK. If the radio does not play well, then it is reasonable to say that a problem exists in one of the following:

- Radio
- Volvo Link ECU
- Antenna system

Check	Expected Result	Possible Cause
Reception with antenna connected directly to the radio	OK	Radio and antenna system are OK. Fault may be in the Volvo Link ECU or cables. Check fault codes and test with VCADS Pro.
	Not OK	Fault may be in the antenna system. See Service Information on antenna troubleshooting in group 39, "Audio System."
Reception with antenna disconnected from radio	Not OK	A difference in reception should be noticed. Use this difference (connected vs disconnected) as a baseline to judge reception clarity.
Antenna disconnected from Volvo Link ECU and each end reconnected to each other (RF In connected to RF Out)	OK	Radio and Antenna system are OK. Fault is in Volvo Link ECU.
	Not OK	The RF IN / RF OUT jumper cables may be defective.