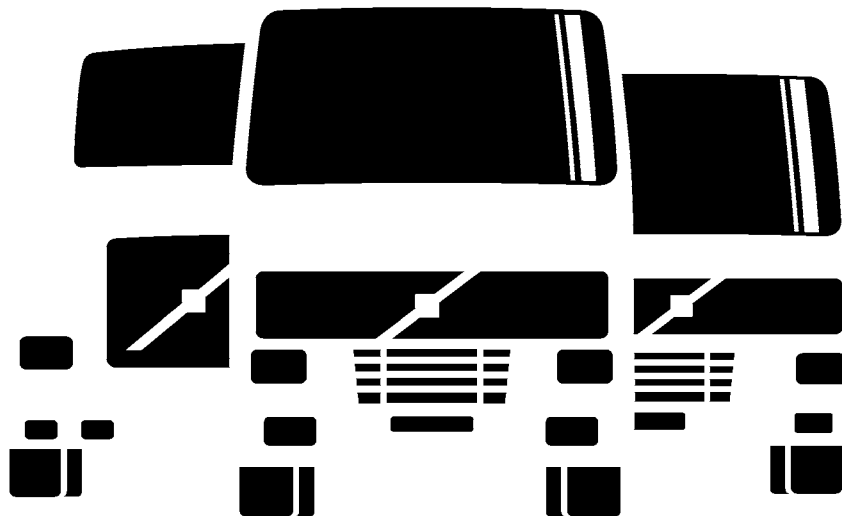


Service Manual Trucks

Group **363–500**

Windshield Wiper System

VN, VHD



Foreword

The descriptions and service procedures contained in this manual are based on designs and methods studies carried out up to August 2000.

The products are under continuous development. Vehicles and components produced after the above date may therefore have different specifications and repair methods. When this is believed to have a significant bearing on this manual, supplementary service bulletins will be issued to cover the changes.

The new edition of this manual will update the changes.

In service procedures where the title incorporates an operation number, this is a reference to an S.R.T. (Standard Repair Time).

Service procedures which do not include an operation number in the title are for general information and no reference is made to an S.R.T.

The following levels of observations, cautions and warnings are used in this Service Documentation:

Note: Indicates a procedure, practice, or condition that must be followed in order to have the vehicle or component function in the manner intended.

Caution: Indicates an unsafe practice where damage to the product could occur.

Warning: Indicates an unsafe practice where personal injury or severe damage to the product could occur.

Danger: Indicates an unsafe practice where serious personal injury or death could occur.

Volvo Trucks North America, Inc.
Greensboro, NC USA

Order number: PV776-TSP143133

© 2000 Volvo Trucks North America, Inc., Greensboro, NC USA

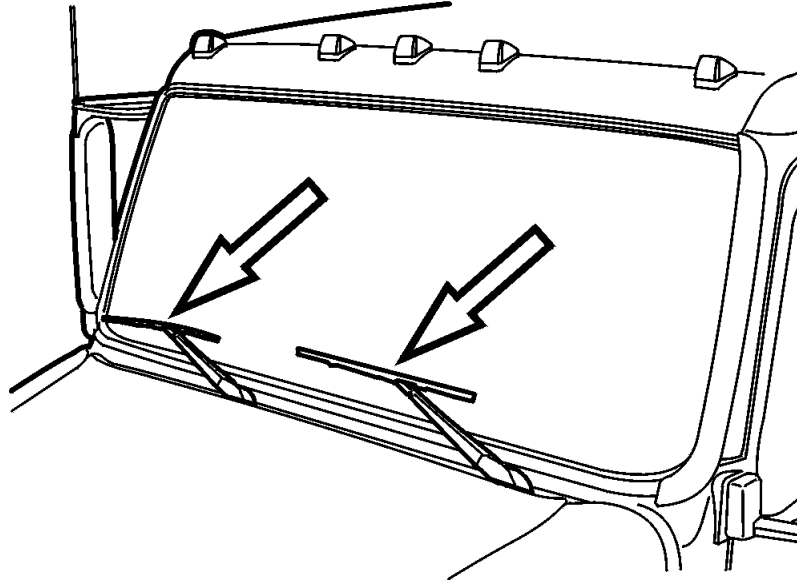
All rights reserved. No part of this publication may be reproduced, stored in retrieval system, or transmitted in any forms by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of Volvo Trucks North America, Inc..

Contents

General	3
Windshield Wiper System	3
Tools	5
Special Tools	5
Design and Function	7
Windshield Wiper System Components	7
The Windshield Washer System	8
Graphic Display Control Buttons	10
Troubleshooting	13
Work Practices	13
Using the VCADS Pro Tool	13
Windshield Washer Pump, Troubleshooting	14
Windshield Wiper Stalk Switch, Troubleshooting	16
Windshield Wiper Motor, Troubleshooting	19
Intermittent Windshield Wipers, Troubleshooting	21
Models with Volvo Engines	21
Intermittent Windshield Wipers, Troubleshooting	24
Models with Non-Volvo Engines	24
Windshield Wiper Stalk/ Graphic Display Control Buttons, Trou- bleshooting	26
Service Procedures	29
Windshield Wiper Blade, Replacement	29
Windshield Wiper Arm, Replacement	29
Windshield Wiper Module, Replacement	30
Windshield Wiper Switch, Replacement	31
Windshield Wiper Motor, Replacement	33
Windshield Wiper Motor and Linkage Assembly, Replacement	34
Windshield Washer Pump, Replacement	40
Windshield Washer Fluid Fill Bottle, Replacement	41
Windshield Washer Fluid Filter, Replacement	42
Windshield Washer Check Valve, Replacement	42
Windshield Washer Fluid Reservoir, Replacement (Battery Box Mount)	42
Windshield Washer Fluid Reservoir, Replacement (Frame Rail Mount)	43
Feedback	
Foldout A Windshield Wiper System	
Foldout B Windshield Wiper System	
Foldout C Windshield Wiper Stalk/ Graphic Display Control Buttons	
Operation Numbers	

General

Windshield Wiper System



W3004393

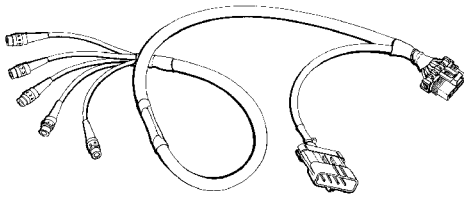
This service information contains design, service and troubleshooting information on the windshield wipers. It covers VN and VHD models. There are some differences in the design of the wipers depending on engine model. For vehicles with Volvo engines, the wiper electronics are in the Vehicle ECU. For vehicles with other engines, the wiper electronics are in a Wiper Control Module. Both of these modules are located in the TEC center in the center dash.

Tools

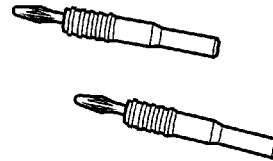
Special Tools

The following special tools may be needed when troubleshooting the Windshield Wiper System. When ordering these tools from Kent-Moore (800)-328-6657 or Volvo, quote the specified number.

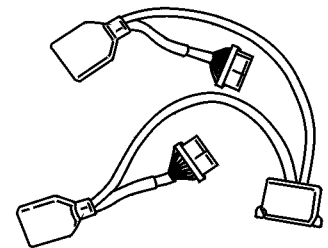
Note: For VCADS Pro tooling see most current VCADS Pro user manual.



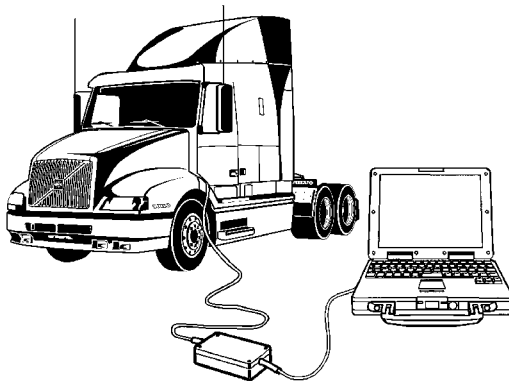
J-41133



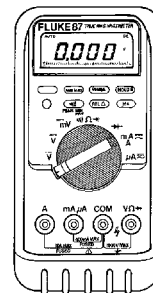
J-44567



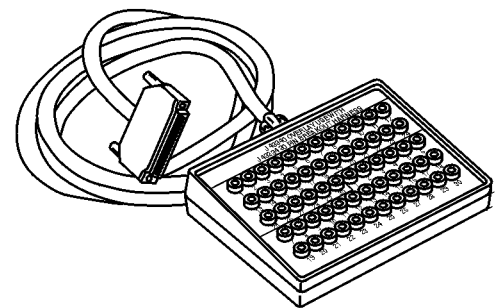
J-43234



VCADS Pro



J-39200



999 8551/J-43340

J-411335-pin breakout har-
ness (Kent-Moore)**J-44567**Probe Adapter (Kent
Moore)**J-43234**

Adapter (Kent-Moore)

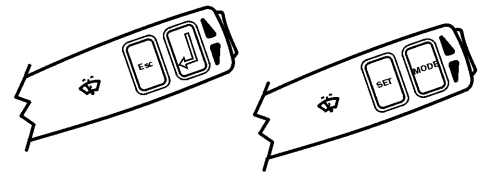
J-39200Digital Multimeter
(Kent-Moore)**9998551**60-Pin breakout box
(Volvo)**J-43340**Overlay for 60-pin
breakout box (Kent-
Moore)

Design and Function

Windshield Wiper System Components

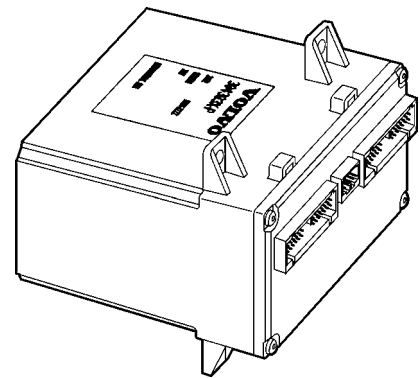
A windshield wiper stalk switch controls the windshield wiper system used on VN/VHD series vehicles. Control buttons for the instrument cluster graphic display are integrated into this switch.

Intermittent windshield wipers are pre-set to make a single sweep every 10 seconds. The interval can be set to between 1 and 10 seconds by moving the windshield wiper stalk to the intermittent position, then to off, then to intermittent again when another sweep is desired.



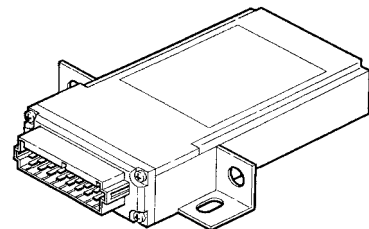
W3004341

The intermittent windshield wiper function is controlled in one of two ways, depending on the engine. On vehicles with Volvo engines, the Vehicle Electronic Control Unit (VECU) and intermittent windshield wiper relay are used.



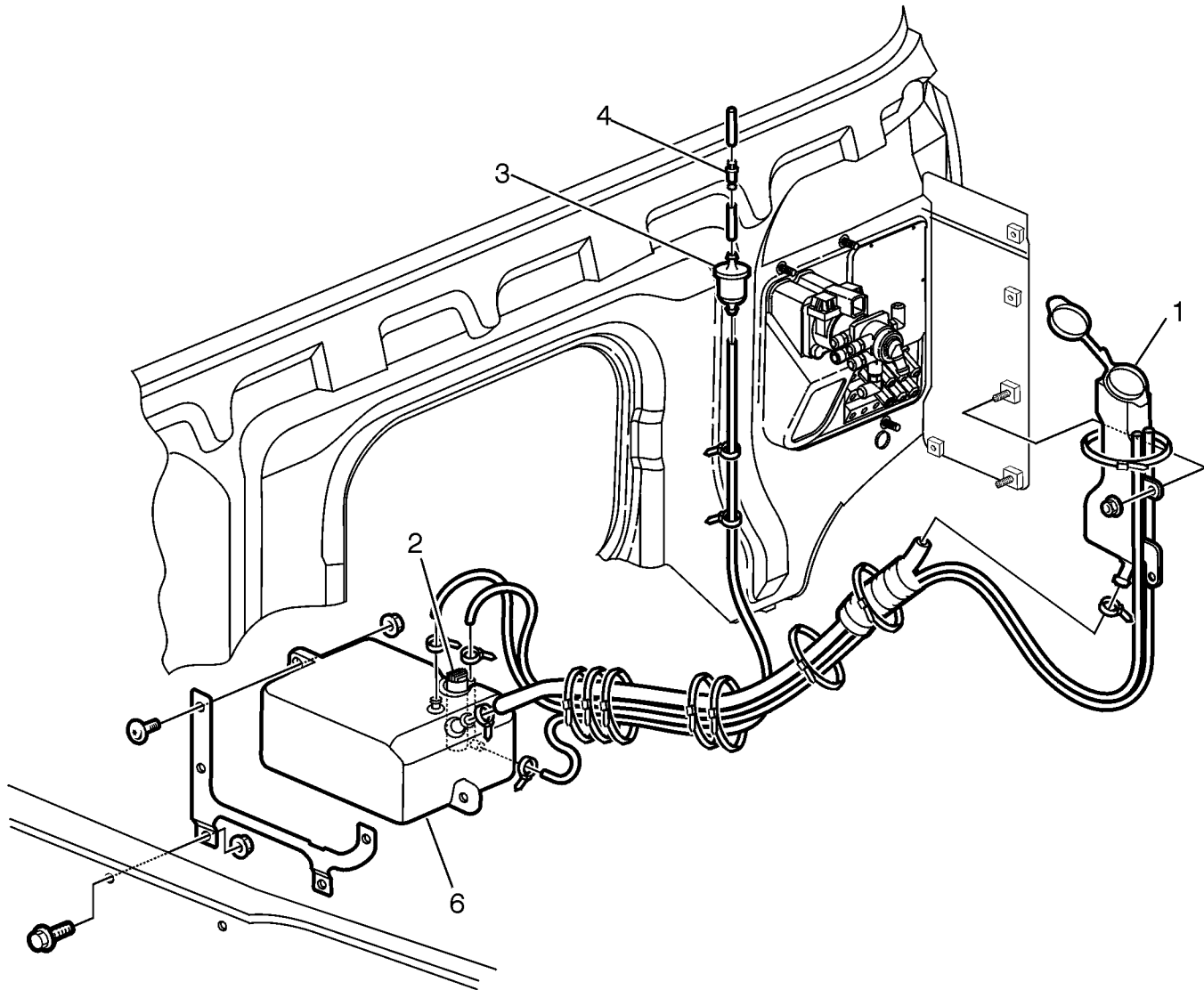
W2002673

On vehicles with Cummins or Detroit engines, a windshield wiper control module is used.



W3003803

The Windshield Washer System



W3004333

Fig. 1: Frame Rail Mount

- 1 Windshield Washer Fluid Fill Bottle
- 2 Windshield Washer Pump
- 3 Windshield Washer Fluid Filter
- 4 Windshield Washer Check Valve
- 5 Windshield Washer Fluid Reservoir (Battery Box Mount)

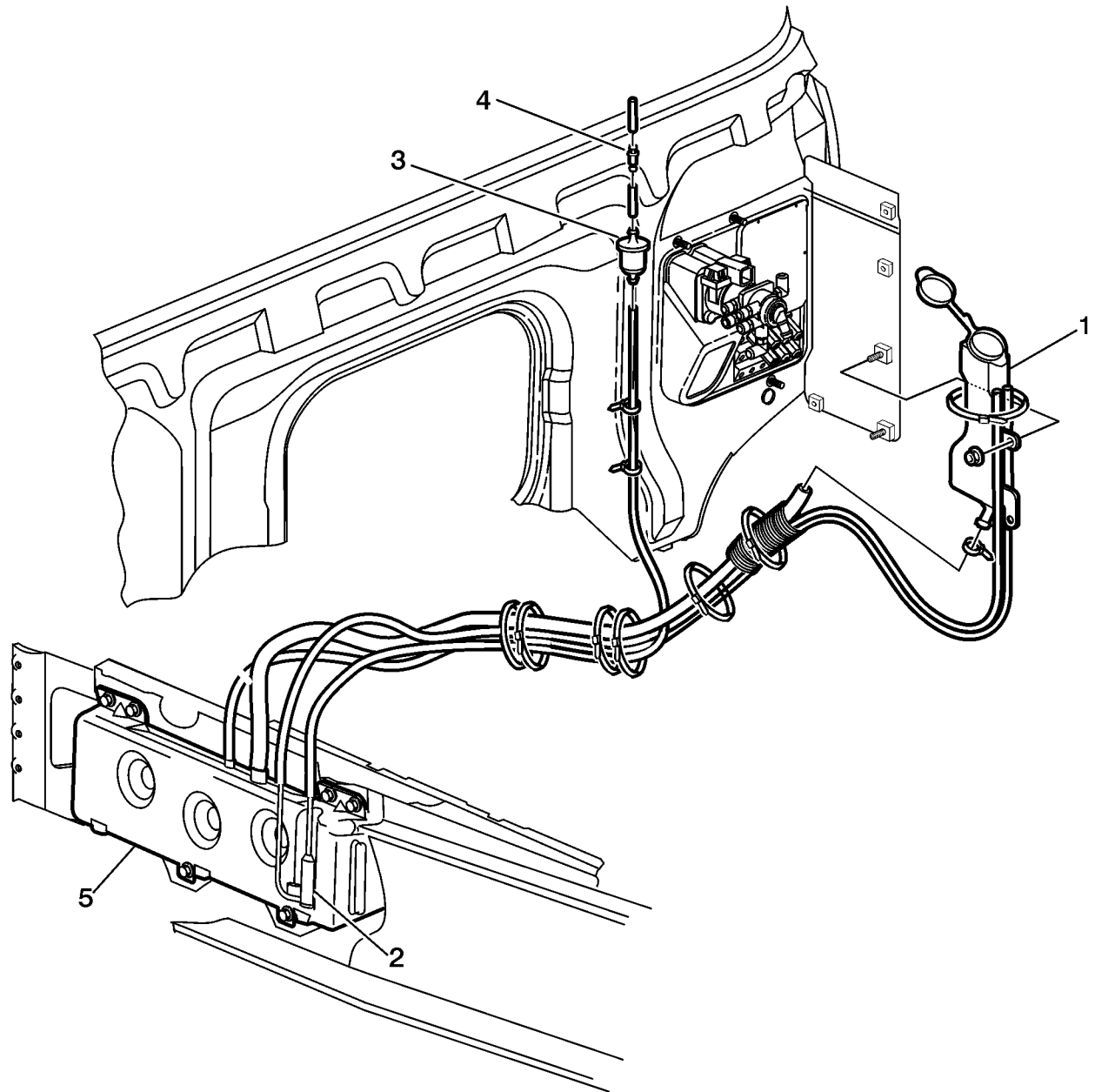


Fig. 2: Battery Box Mount

W3004334

- 1 Windshield Washer Fluid Fill Bottle
- 2 Windshield Washer Pump
- 3 Windshield Washer Fluid Filter
- 4 Windshield Washer Check Valve
- 5 Windshield Washer Fluid Reservoir (Frame Rail Mount)

The windshield washer fluid is added to the system at the fill bottle located on the left side cowl (1). Fill and vent hoses run from the fill bottle to the fluid reservoir. The “battery box mount” fluid reservoir (5) is most commonly used. This is the mounting location on all VN series. The location is the same on the VHD series when the battery location is the same as VN. On the VHD series with alternate battery locations, the “frame rail mount” fluid reservoir (6) is located on the top of the left frame rail.

The windshield washer pump (2) is mounted to the fluid reservoir with the tip submerged in windshield washer fluid. Whenever windshield “wash” is requested, the pump delivers windshield washer fluid via hoses first to an in-line filter (3) and then through a one way check valve (4) to the spray nozzles in the windshield wiper arm assembly.

The “battery box mount” fluid reservoir has a capacity in excess of 3 gallons, while the “frame rail mount” fluid reservoir capacity is considerably less. If the fluid level becomes low, an indicator will appear on the instrument cluster graphic display and the yellow INFO telltale light will illuminate. There is a 10-second activation delay to allow for windshield washer fluid slosh.

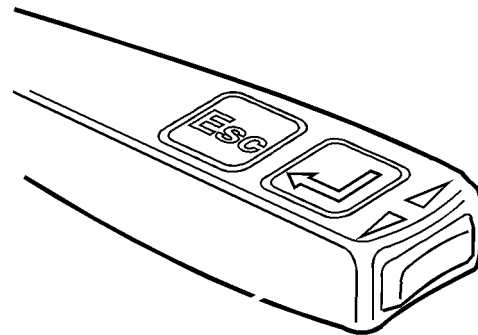


Low Washer Fluid Level Icon

Graphic Display Control Buttons

Control buttons for the instrument cluster graphic display are integrated into the windshield wiper stalk. The following commands are available:

- 1 “Esc” (Escape) is used to return to the previous menu and cancel a setting/operation.
Note: Some models may have “Set” instead of “Esc.”
- 2 “↵” or “SELECT” confirms a highlighted selection of a menu or character.
Note: Some models may have “Mode” option instead of “↵.”
- 3 “Up arrow” moves the cursor up and is used when setting numerical values.
- 4 “Down arrow” moves the cursor down and is used when setting numerical values.



1 2 3 4

T3008810

This service information focuses on the function and troubleshooting of the control buttons only. If the instrument cluster graphic display does not respond to the control buttons after it is determined that the control buttons are working properly, see service information "Instrumentation VN, VHD".

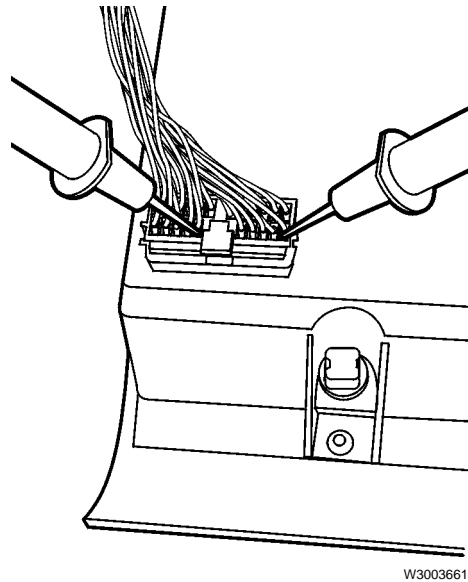
Troubleshooting

Work Practices

Back-probing connectors

The tests in this service information suggest taking measurements with digital multimeter J-39200 or equivalent tool by back-probing the connector pins. The following precautions should be observed when back-probing the connectors:

- Use the pin-out charts in the “VN/VHD Series Electrical Schematics” or this bulletin to determine the exact location of measuring points. Note that all drawings, unless noted, show the pins from the wire insertion side of the connector.
- Use the digital multimeter test probes to contact the metal portion of the connector pins. Do not puncture the wire insulation when probing. To avoid false readings and/or damage to the wiring connectors component do not allow the test probes to contact each other.
- Do not directly front-probe connector pins or cavities. Front-probing connector cavities with these large probes may spread and damage the cavity/pin connectors, resulting in intermittent faults.



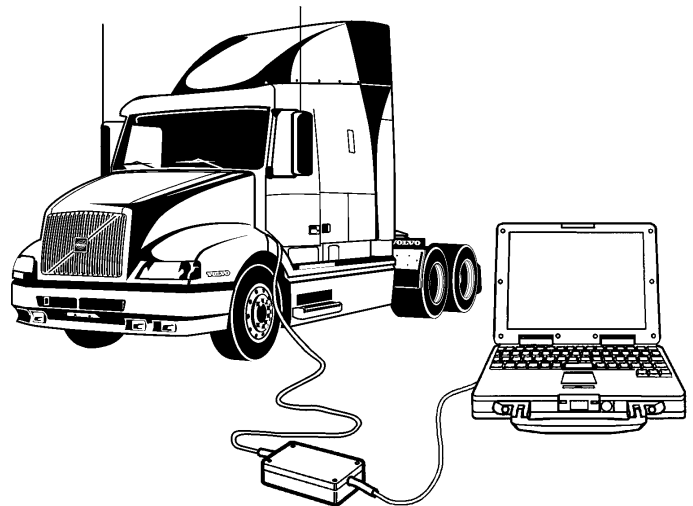
Using the VCADS Pro Tool

The VCADS Pro is a Windows 95® based tool that can be used to perform various intermittent windshield wiper tests. The following is a brief description of tests that are available:

- **Intermittent Windshield Wiper, Test**
The indicators on the VCADS Pro tool will illuminate green when various windshield wiper functions are selected by the windshield wiper stalk switch or when various functions are active.
- **Instrument Cluster, Test**
This test confirms that the graphic display control buttons on the windshield wiper stalk are delivering a signal. The indicator on the VCADS Pro tool will illuminate green when the buttons “Esc”, “Select”, “Up Arrow” and “Down Arrow” are pressed.

For detailed information about VCADS Pro tool see the most current VCADS Pro user manual or the “Help” menu in the VCADS Pro tool.

Note: VCADS Pro is designed to access the electronic architecture of vehicles equipped with Volvo engines. Therefore, some tests are not available on vehicles equipped with Cummins, Caterpillar or Detroit engines.



W0001632

Windshield Washer Pump, Troubleshooting

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

CAUTION

Possible damage to electrical components. Turn the vehicle ignition switch OFF before disconnecting or connecting electrical components. Failure to de-energize circuits may result in electronic equipment damage.

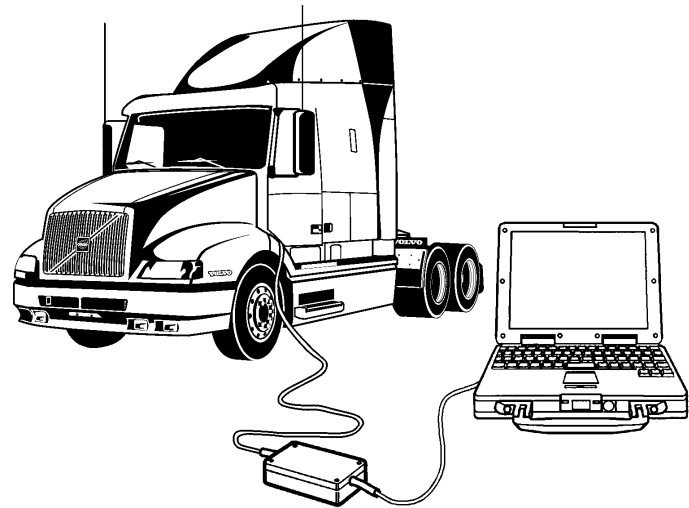
General

Power to operate the windshield washer pump is sent via a wire from the windshield wiper stalk switch. The windshield washer pump also contains a switch that activates the windshield washer fluid level icon on the instrument cluster graphic display.

Troubleshooting

If the windshield washer pump indicator illuminates properly in the “Intermittent Windshield Wiper, Test” (see page 13), the windshield wiper stalk switch is delivering a signal that is recognized by the vehicle’s electronic system.

Note: VCADS Pro test is not available on vehicles equipped with Cummins, Caterpillar, or Detroit engines. See [“Using the VCADS Pro Tool” page 13](#)



W0001632

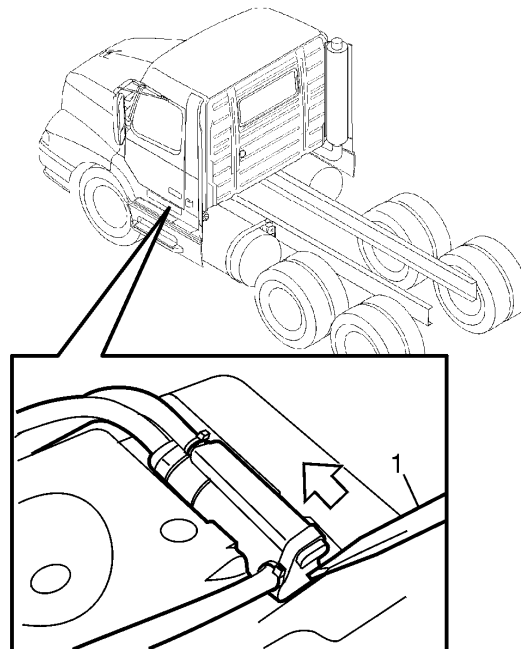
Due to its mounting location, the windshield washer pump must be removed to access the wiring harness connector.

To remove the windshield washer pump:

- 1 Place a drain pan under the windshield washer fluid reservoir.
- 2 Use a screwdriver to pry the windshield washer pump assembly up and out of the windshield washer fluid reservoir.

Note: Windshield washer fluid will drain out of the reservoir when the windshield washer pump assembly is removed.

- 3 Disconnect the wiring harness connector.



1. Screwdriver blade

W3003797

Note: The windshield washer pump connector uses weather resistant type connectors that **should not be back-probed**. In order to avoid damage to the terminals do not insert the test probes into the terminal connectors. Perform the following tests by carefully contacting the terminal pins with multimeter J-39200 (or equivalent tool) :

Windshield Washer Pump, Troubleshooting

Function	Key Position	Measuring Point	Expected Value	Note	Possible Cause (if expected value not correct)
Power Supply from Wiper Stalk Switch	On	C to alternate ground with meter	12V	Washer position active	Fuse, connectors, or wiring fault in power supply circuit from wiper stalk switch
Ground	Off	A to alternate ground with meter	<1 Ω		Connectors or wiring fault in ground circuit
Washer fluid level signal to instrument cluster	On	B / jumper wire connection to alternate ground	Washer fluid level icon on graphic display active		Connectors or wiring fault in circuit to instrument cluster or instrument cluster fault.

- If the measurements are outside the expected values, refer to appropriate electrical schematics, group 37.
- Before replacing the windshield washer pump check for possible mechanical causes for failure such as obstructed windshield washer fluid hoses, filters, check valves or nozzles.
- If all measurements are correct, probable windshield washer pump failure.

Windshield Wiper Stalk Switch, Troubleshooting

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

CAUTION

Possible damage to electrical components. Turn the vehicle ignition switch OFF before disconnecting or connecting electrical components. Failure to de-energize circuits may result in electronic equipment damage.

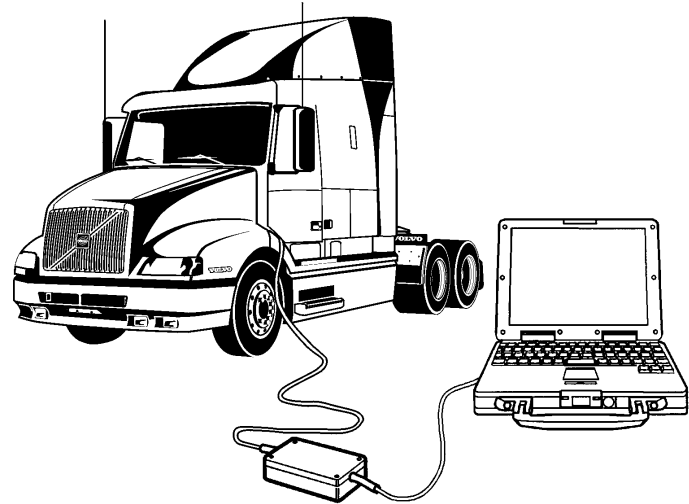
General

The windshield wiper stalk switch delivers direct output signals for wash, low, and high speed windshield wipers. It also delivers an intermittent wipe request to the VECU (Volvo engine) or windshield wiper control module (Cummins, Caterpillar or Detroit engines). When the windshield wipers are switched off or stop in the intermittent position, a latching circuit in the windshield wiper motor keeps the windshield wipers in motion until they reach the "park" position on the windshield.

Troubleshooting using the VCADS Pro Tool

If the indicators illuminate properly in the ["Intermittent Windshield Wiper, Test"](#) (see [page 13](#)), the windshield wiper stalk switch is delivering a signal that is recognized by the vehicle's electronic system.

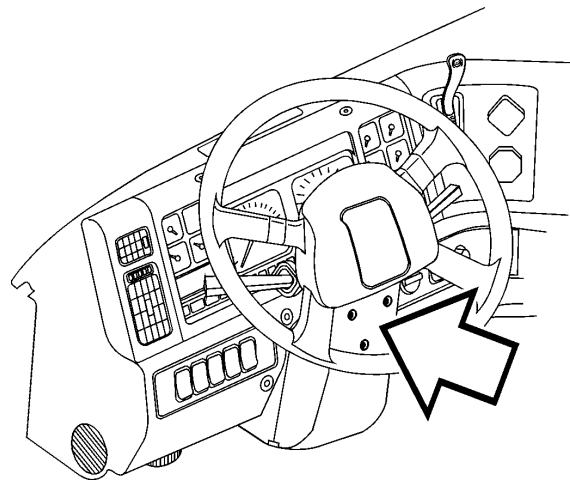
Note: This VCADS Pro test is not available on vehicles equipped with Cummins, Caterpillar or Detroit engines. See ["Using the VCADS Pro Tool"](#) [page 13](#)



W0001632

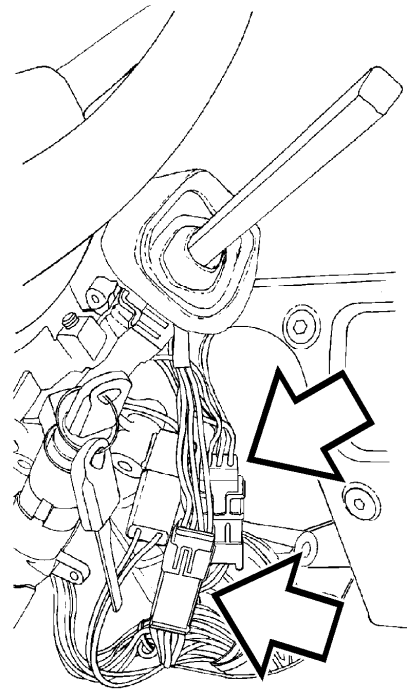
Troubleshooting without using the VCADS Pro Tool

1. Gain access to the windshield wiper stalk switch connectors by removing the steering column cover.



W8002165

2. Locate the 2 windshield wiper stalk switch connectors (6-pin connector is for windshield wiper operation).



W3003799

The tests that follow should be performed by back-probing the windshield wiper switch connector pins with multimeter J-39200 (or equivalent tool). Before performing the tests, see ["Back-probing Connectors" page 13](#).

Windshield Wiper Stalk Switch, Troubleshooting

Function	Key Position	Measuring Point	Expected Value	Note	Possible Cause (if expected value not correct)
Power Supply	On	From C to alternate ground with meter	12 V		Fuse, Connectors or wiring fault in power supply circuit to wiper stalk switch.
Wash	On	From B to alternate ground with meter	12 V	Wash position active	If "Power Supply" correct, probable wiper stalk switch failure.
Low Speed Wipe	On	From D to alternate ground with meter	12 V	Low speed position active	If "Power Supply" correct, probable wiper stalk switch failure.
High Speed Wipe	On	From A to alternate ground with meter	12 V	High speed position active	If "Power Supply" correct, probable wiper stalk switch failure.

Park/Hold	On	From E to alternate ground with meter	12 V	Wiper sweeping	1 Fuse, connectors, or wiring through wiper motor. 2 Wiper motor.
			0 V	Wiper at park position	
Intermittent Wipe	On	From F to alternate ground with meter	12 V	Intermittent position active	If "Power Supply" correct, probable wiper stalk switch failure.

- If the measurements are outside the expected values, refer to appropriate electrical schematics, group 37.
- If the windshield wiper stalk switch requires replacement, see the "Service Procedures" section.

Windshield Wiper Motor, Troubleshooting



DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.



CAUTION

Possible damage to electrical components. Turn the vehicle ignition switch OFF before disconnecting or connecting electrical components. Failure to de-energize circuits may result in electronic equipment damage.

General

The windshield wiper motor receives operating signals for low and high speed operation directly from the windshield wiper stalk switch. Intermittent windshield wiper signals are received from the VECU, in vehicles equipped with Volvo engines, or from the windshield wiper control module, in vehicles equipped with Cummins, Caterpillar or Detroit engines.

Vehicles equipped with Volvo engines also use an intermittent windshield wiper relay to deliver signals. See "Schematics, Windshield Wiper System" Foldout B.

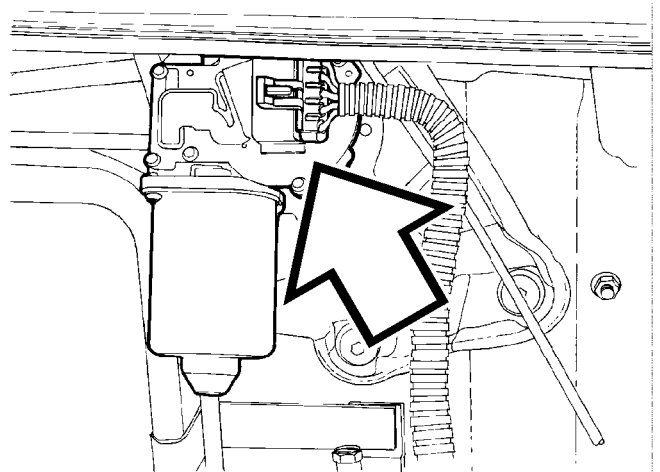
When the windshield wipers are switched off or stop in the intermittent position, a latching circuit in the windshield wiper motor keeps the windshield wipers in motion until they reach the "park" position on the windshield.

Troubleshooting

The windshield wiper motor is located on the left side bulkhead. The connector can be accessed with breakout harness J-41133.

Note: The windshield wiper motor connector uses weather resistant type connectors that **should not be back-probed**. Back-probing these connectors will destroy the weather resistant seal. If the breakout harness tooling is not available, the following test should be performed by carefully contacting the terminal pins with multimeter J-39200 (or equivalent tool) after the connector is disconnected. In order to avoid damage to the terminals do not insert the test probes into the terminal connectors.

- 1 Install breakout harness J-41133 in series between the windshield wiper motor connector and harness connector.
- 2 Use multimeter J-39200 (or equivalent tool) to perform the following test.



W3003800

Windshield Wiper Motor, Troubleshooting

Function	Key Position	Measuring Point	Expected Value	Note	Possible Cause (if expected value not correct)
Power Supply	On	From E to alternate ground with meter	12 V		Fuse, Connectors or wiring fault in power supply circuit to wiper motor.
Ground	Off	From C to alternate ground with meter	<1 Ω		Connectors or wiring fault in ground circuit.
Low Speed Wipe	On	From A to alternate ground with meter	12 V	Wiper Switch low speed position active	<ol style="list-style-type: none"> 1 Wiper Stalk Switch. 2 Connectors or wiring fault in low speed circuit from wiper stalk switch. 3 Intermittent wiper relay (Volvo engine only).
High Speed Wipe	On	From B to alternate ground with meter	12 V	Wiper switch high speed position active	<ol style="list-style-type: none"> 1 Wiper Stalk Switch. 2 Connectors or wiring fault in low speed circuit from wiper stalk switch.
Park/Hold	On	From D to alternate ground with meter	12 V	Wiper switch off	If power supply correct, probable wiper motor failure.
			0 V	Wiper at park position	

- If the measurements are outside the expected values, refer to appropriate electrical schematics, group 37.
- Before replacing the windshield wiper motor, check for possible mechanical causes for failure such as a damaged or binding windshield wiper linkage assembly.
- If the windshield wiper motor requires replacement, see the "Service Procedures".

Intermittent Windshield Wipers, Troubleshooting

Models with Volvo Engines

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

CAUTION

Possible damage to electrical components. Turn the vehicle ignition switch OFF before disconnecting or connecting electrical components. Failure to de-energize circuits may result in electronic equipment damage.

General

The Vehicle Electronic Control Unit (VECU) controls the intermittent windshield wipers on vehicles equipped with Volvo engines.

When the intermittent windshield wiper request is received from the windshield wiper stalk switch, the VECU supplies a ground to the Intermittent Windshield Wiper Relay. A latching circuit from the windshield wiper motor goes through the VECU, and only allows the windshield wipers to “park” in the proper position on the windshield. If windshield “wash” is requested, the VECU will initiate a minimum wipe time. See “Windshield Wiper System with Volvo Engine”, Foldout A.

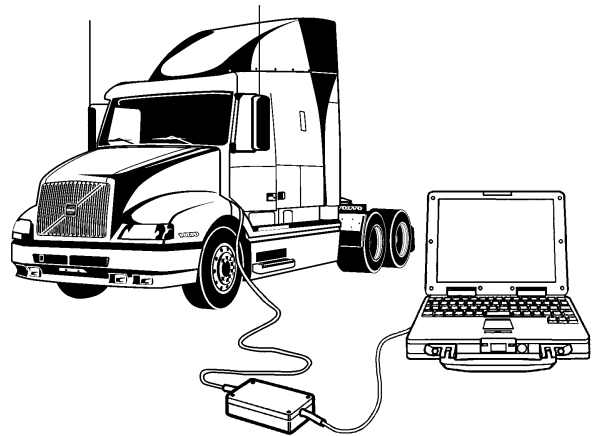
Troubleshooting with VCADS Pro

If the indicators illuminate properly in the “[Intermittent Windshield Wiper, Test](#)” (see [page 13](#)), the VECU is receiving and delivering signals that are recognized by the vehicle’s electronic system.

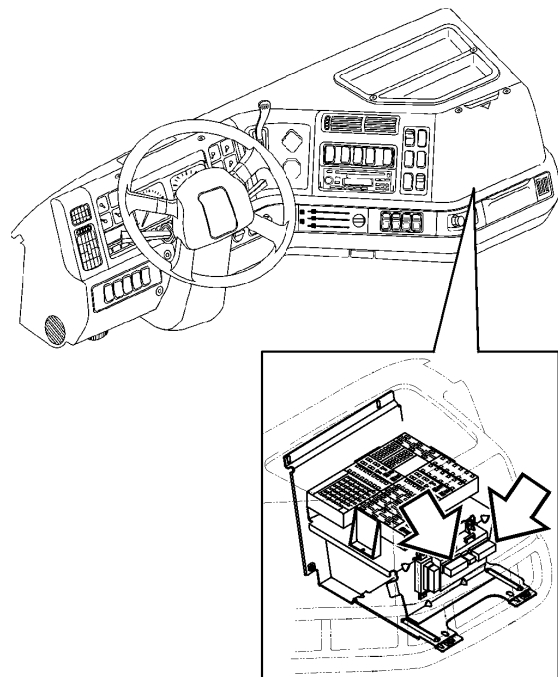
Note: This VCADS Pro test is not available on vehicles equipped with Cummins, Caterpillar, or Detroit engines. See “[Using the VCADS Pro Tool](#)” [page 13](#).

Troubleshooting without using the VCADS Pro Tool

- 1 Remove the front dash panel to be able to access the VECU connectors.



W0001632



W3003798

Note: If breakout harness tooling is not available, the tests should be performed by back-probing the VECU connector pins with multimeter J-39200 (or equivalent tool). See [“Back-probing Connectors” page 13](#)

- 2 Connect Breakout Box 9998551 with adapter J-43234 in series between VECU wiring harness connector PA/PB and VECU connector PA/PB.
- 3 Install overlay J-43340 with the “30 PIN BREAKOUT HARNESS” side up. The overlay is color coded green for the PA connector pins/measuring points and blue for the PB connector pins/measuring points.
- 4 Use multimeter J-39200 (or equivalent tool) and perform the following test:

Intermittent Windshield Wipers, Volvo Engines, Troubleshooting

Function	Key Position	Measuring Point	Expected Value	Note	Possible Cause (if expected value not correct)
Intermittent Wiper Request	On	From PA 10 (green) to alternate ground with meter	12 V	Wiper switch in intermittent position	Fuse, connectors or wiring fault in power supply circuit from wiper stalk switch.
Ground for Intermittent Wipe Relay	On	From PB 16 (blue) to alternate ground with meter	0 - 2 V	Intermittent wipers in motion	<ol style="list-style-type: none"> 1 Connectors or wiring fault in circuit through intermittent wiper relay. 2 Intermittent wiper relay. 3 VECU.
				Intermittent wipers at hold.	
Intermittent Wiper/ Hold/Park	On	From PA 9 (green) to alternate ground with meter	12 V	Intermittent wipers in motion	
			0 V	Intermittent wipers at hold	
Windshield Washer Position	On	From PA 11 (green) to alternate ground with meter	12V	Wiper switch wash position active	<ol style="list-style-type: none"> 1 Wiper stalk switch. 2 Fuse, connectors or wiring fault in wash circuit from wiper stalk switch.

- If the measurements are outside the expected values, refer to appropriate electrical schematics, group 37.
- If a problem with the VECU is suspected, refer to “Vehicle Electronic Control Unit, MID144” service information, Volvo Service Publication PV776–300–610.

Intermittent Windshield Wipers, Troubleshooting

Models with Non-Volvo Engines

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

CAUTION

Possible damage to electrical components. Turn the vehicle ignition switch OFF before disconnecting or connecting electrical components. Failure to de-energize circuits may result in electronic equipment damage.

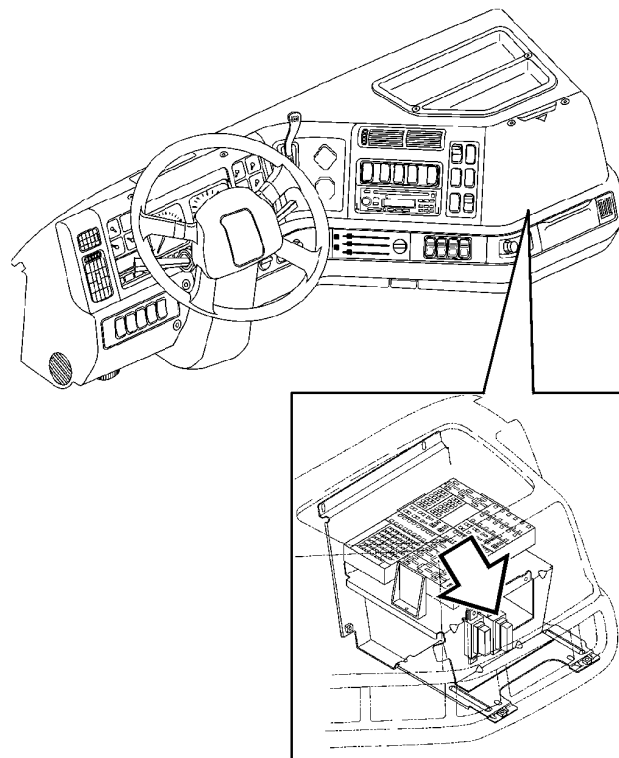
General

The Windshield Wiper Control Module controls the intermittent windshield wipers on vehicles equipped with Cummins, Caterpillar or Detroit engines.

When the intermittent windshield wiper request is received from the windshield wiper stalk switch, the windshield wiper control module supplies power to the windshield wiper motor back through the windshield wiper stalk switch. A latching circuit from the windshield wiper motor, which only allows the windshield wipers to “park” in the proper position on the windshield, goes through the windshield wiper control module. If windshield “Wash” is requested, the windshield wiper control module will initiate a minimum wipe time. See “Windshield Wiper System with Cummins, Caterpillar and Detroit Engine Schematic” Foldout A.

Troubleshooting

- 1 Remove the front dash panel and ash tray assembly to access the windshield wiper control module.



W3003806

2. Use multimeter J-39200 (or equivalent tool) and perform the test below by back-probing the windshield wiper control module connector pins. Before performing the tests, see “[Back-probing Connectors](#)” page 13.

Intermittent Windshield Wipers, Cummins, Caterpillar and Detroit Engines, Troubleshooting

Function	Key Position	Measuring Point	Expected Value	Note	Possible Cause (if expected value not correct)
Power Supply for Wiper Control Module	On	From Pin-9 to alternate ground with meter	12 V		Fuse, connectors or wiring fault in power supply circuit to wiper control circuit.
Ground	Off	From Pin-1 to alternate ground with meter	<1 Ω		1. Connectors or wiring fault in ground circuit.
Power Supply for Intermittent Wipers (input)	On	From Pin-15 to alternate ground with meter	12 V		1. Fuse, connectors or wiring fault in power supply circuit to wiper control module. 2. Wiper control module.
Power Supply for Intermittent Wipers (output)	On	From Pin-13 to alternate ground with meter	12 V	Intermittent wipers in motion	1. Fuse, connectors or wiring fault in power supply circuit to wiper control module. 2. Wiper control module.
Intermittent Wiper Request	On	From Pin-6 to alternate ground with meter	12 V	Wiper switch in intermittent position	Fuse, connectors or wiring fault in power supply circuit from wiper stalk switch.
Intermittent Wiper - Hold/Park	On	From Pin-16 to alternate ground with meter	12 V	Intermittent wipers in motion	1. Fuse, connectors or wiring fault in circuit from wiper motor. 2. Wiper motor.
			0 V	Intermittent wipers at Hold/Park	
Windshield Washer Position	On	From Pin-8 to alternate ground with meter	12 V	Wiper switch wash position active	1. Wiper stalk switch. 2. Fuse, connectors or wiring fault in wash circuit from wiper stalk switch.

- If the measurements are outside the expected values, refer to appropriate electrical schematics, group 37.
- If the windshield wiper control module requires replacement, see the “Service Procedures” section.

Windshield Wiper Stalk/ Graphic Display Control Buttons, Troubleshooting

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

CAUTION

Possible damage to electric components. Turn the vehicle ignition switch OFF before disconnecting or connecting electrical components. Failure to de-energize circuits may result in electronic equipment damage.

General

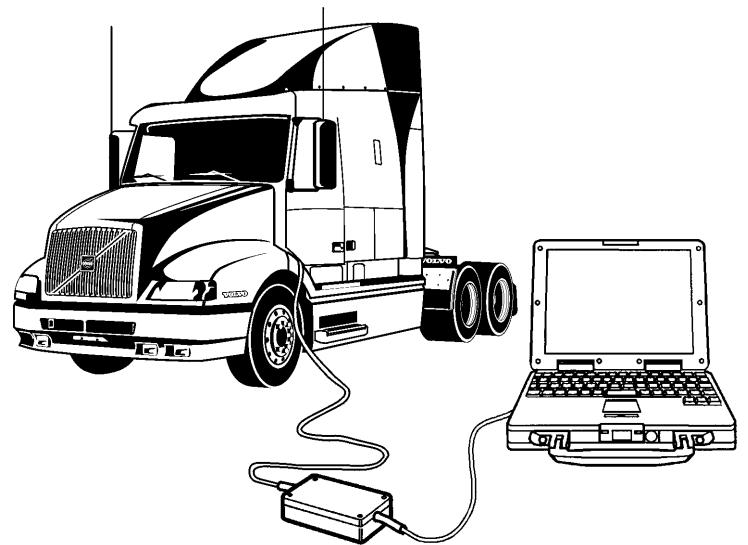
The windshield wiper stalk control buttons are used to manually communicate with and manipulate the instrument cluster graphic display menus.

The instrument cluster delivers 12 volts to the windshield wiper stalk control buttons' "common" terminal. When buttons "Escape", "Select", "Up Arrow" or "Down Arrow" are pressed, 12 volt signals are sent back to the instrument cluster via individual wires.

Troubleshooting Using the VCADS Pro Tool

If the windshield wiper stalk control buttons function properly in the "[Instrument Cluster, Test](#)" (see page 13) and graphic display functions can be accessed, the windshield wiper stalk control buttons are working properly.

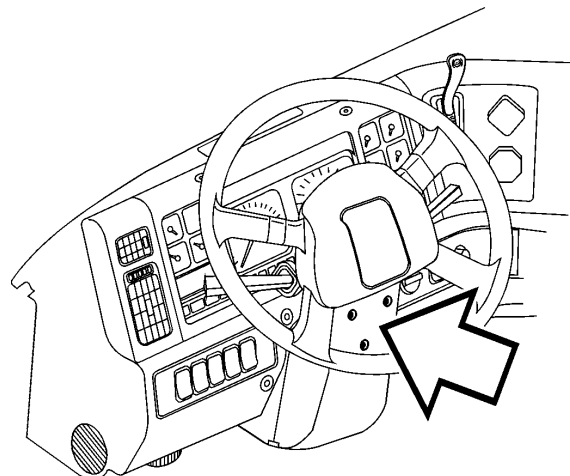
If the windshield wiper stalk control buttons **do not** function properly in the "Instrument Cluster, Test" or graphic display functions can not be accessed, perform the test below.



W0001632

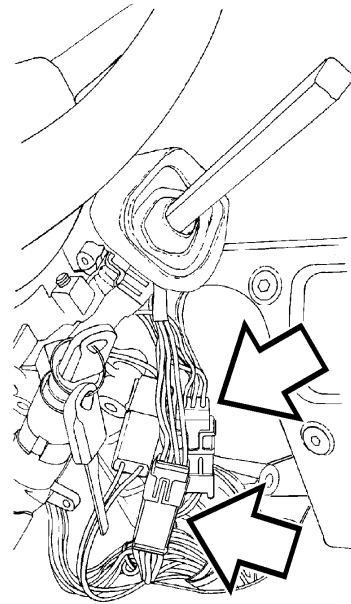
Troubleshooting without using the VCADS Pro Tool

1. Remove the 3 torx bolt that holds the steering column cover to access the windshield wiper stalk switch.



W8002165

2. Locate the two windshield wiper stalk switch connectors (8-pin connector is for the windshield wiper stalk control buttons).



W3003799

3. Do the following tests by carefully back-probing the windshield wiper stalk control button connector pins. Use multimeter J-39200 (or equivalent tool). Before performing the tests, see ["Back-probing Connectors" page 13.](#)

Windshield Wiper Stalk/ Graphic Display Control Buttons, Troubleshooting

Function	Key Position	Measuring Point	Expected Value	Note	Possible Cause (if expected value not correct)
Power Supply from instrument cluster	On/Off	From A to alternate ground with meter	12 V		Fuse, connectors or wiring fault in power supply circuit from instrument cluster.
Esc Button signal to instrument cluster	On/Off	From C to alternate ground with meter	12 V	"Esc" Button active	If "Power Supply from instrument cluster" correct, probable wiper stalk switch failure.
Select Button signal to instrument cluster	On/Off	From E to alternate ground with meter	12 V	"Select" Button active	If "Power Supply from instrument cluster" correct, probable wiper stalk switch failure.
Up Arrow Button signal to instrument cluster	On/Off	From G to alternate ground with meter	12 V	"Up Arrow" Button active	If "Power Supply from instrument cluster" correct, probable wiper stalk switch failure.
Down Arrow Button signal to instrument cluster	On/Off	From H to alternate ground with meter	12 V	"Down Arrow" Button active	If "Power Supply from instrument cluster" correct, probable wiper stalk switch failure.

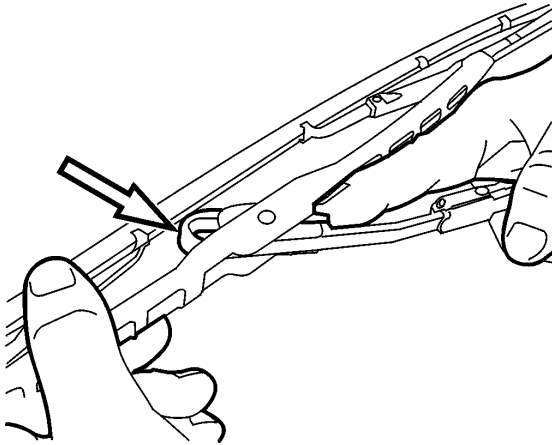
- If the measurements are outside the expected values, refer to appropriate electrical schematics, group 37.
- If the windshield wiper stalk control buttons operate correctly but the instrument cluster graphic display does not function properly, refer to “Instrumentation – VN/VHD”.
- If the windshield wiper stalk assembly requires replacement, see the service procedure section.

Service Procedures

3636-03-02-01 Windshield Wiper Blade, Re- placement

1
Pull the windshield wiper arm away from the windshield and angle the windshield wiper blade to the arm as necessary.

2



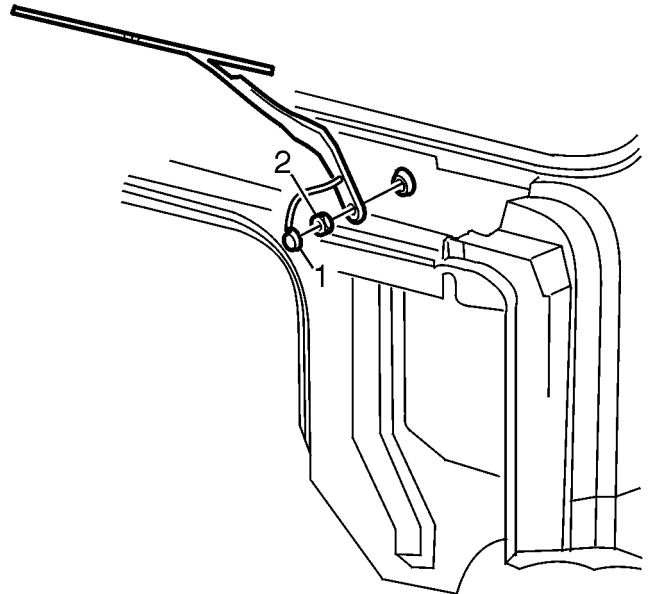
W3004323

Press the windshield wiper blade lock down toward the windshield wiper arm to release. Slide the windshield wiper blade out of the windshield wiper arm.

3
Position the replacement windshield wiper blade into the arm and slide up until it locks into position.

3637-03-02-01 Windshield Wiper Arm, Re- placement

Removal



W3004332

1



Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

Carefully disconnect the windshield washer fluid line connector at the windshield wiper (1).

2
Remove the windshield wiper arm mounting nut (2).

3
Pull the windshield wiper arm away from the windshield to relieve the spring tension, then remove the windshield wiper arm assembly from the shaft.

Installation

1
Install the replacement windshield wiper arm assembly onto the shaft. Be sure to position the windshield wiper blade in the "park" position on the windshield.

2
Install the windshield wiper arm mounting nut. Torque to 23 ± 3 Nm (17 ± 2 ft-lb).

3
Snap the windshield washer fluid line connector on the base.

3645-03-02-06 Windshield Wiper Module, Replacement

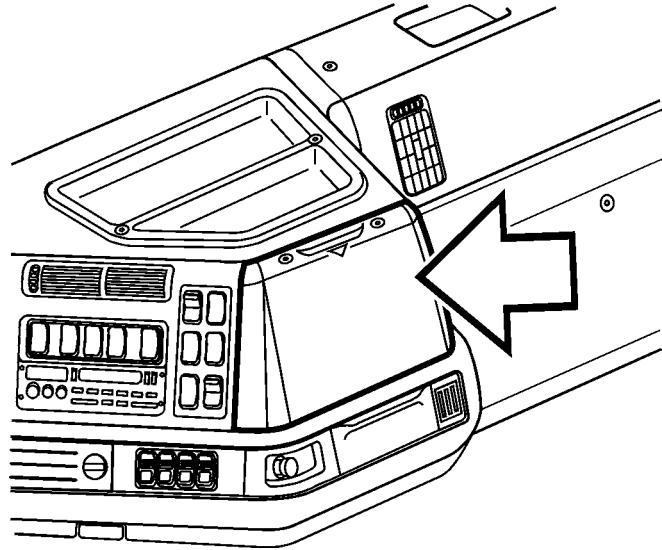
CAUTION

Possible damage to electric components. Turn the vehicle ignition switch OFF before disconnecting or connecting electrical components. Failure to de-energize circuits may result in electronic equipment damage.

Removal

1
Turn the ignition key OFF.

2



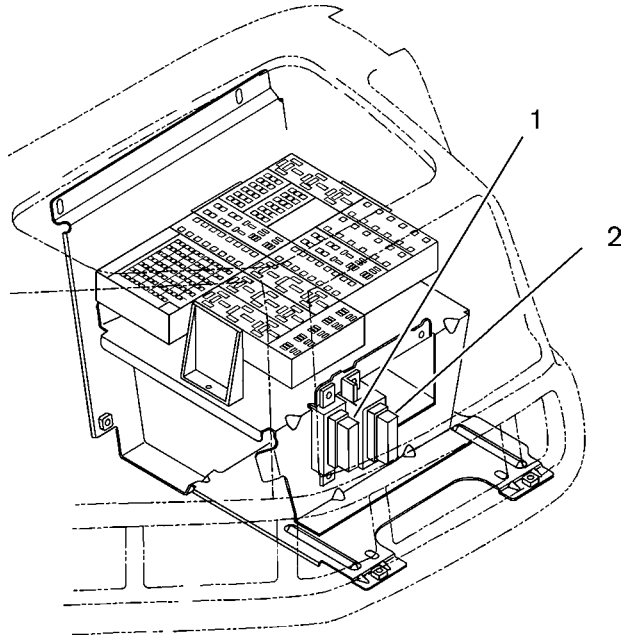
W3002701

Remove the two bolts just above the ashtray that attach the front cover of the TEC. Remove the front cover to access the module.

3

Remove the ashtray from the ashtray housing. Remove the two screws from the ashtray housing, and remove the housing.

4



- 1 Central Door Lock Module
2 Windshield Wiper Module

W3002524

Disconnect the module connector, remove the mounting screws and remove the module.

Installation

- 1
Install the new module in the location where the old module was installed. Bolt the module in place with 2 torx bolts. Torque to 4.0 ± 0.5 Nm (35 ± 4 in-lb). Connect the module electrical connector.
- 2
Check the new module to verify that the system is operating correctly.
- 3
Install the ashtray housing, using the two mounting screws. Torque the screws to 1.5 ± 0.25 Nm (13.28 ± 2.21 in-lb). Install the ashtray.
- 4
Install the front TEC cover. Torque the bolts to 2.5 ± 0.5 Nm (22.13 ± 4.43 in-lb).

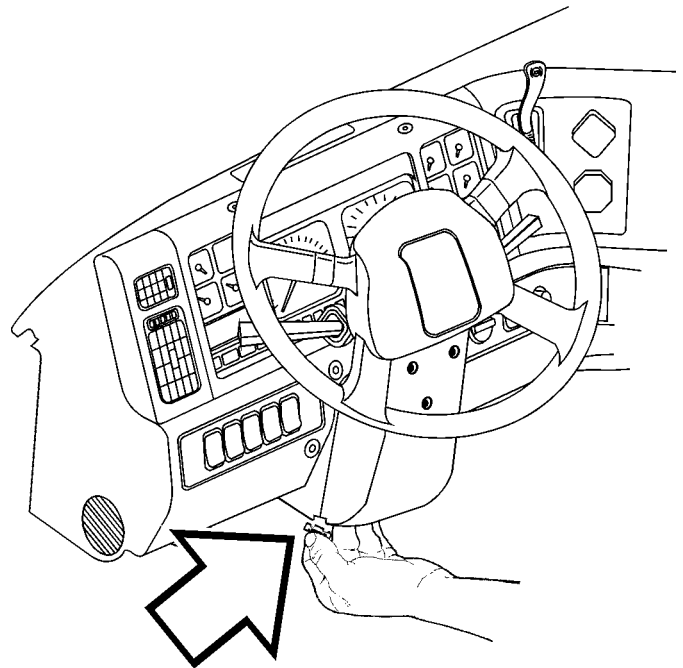
3638-03-02-01 Windshield Wiper Switch, Replacement



CAUTION
Possible damage to electronic components. Turn the vehicle ignition switch **OFF** before disconnecting or connecting any electrical components. Failure to de-energize circuits may result in electronic equipment damage.

Removal

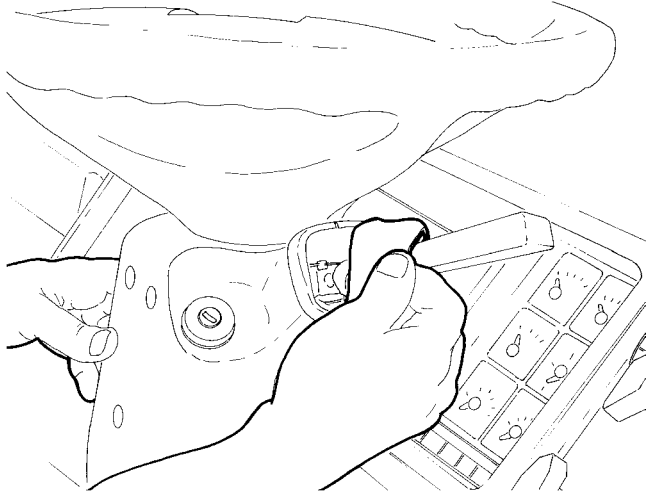
- 1
Turn the ignition key **OFF** and disconnect the negative and positive battery cables.
- 2



W8002166

Remove the two clips at the bottom of the steering column cover.

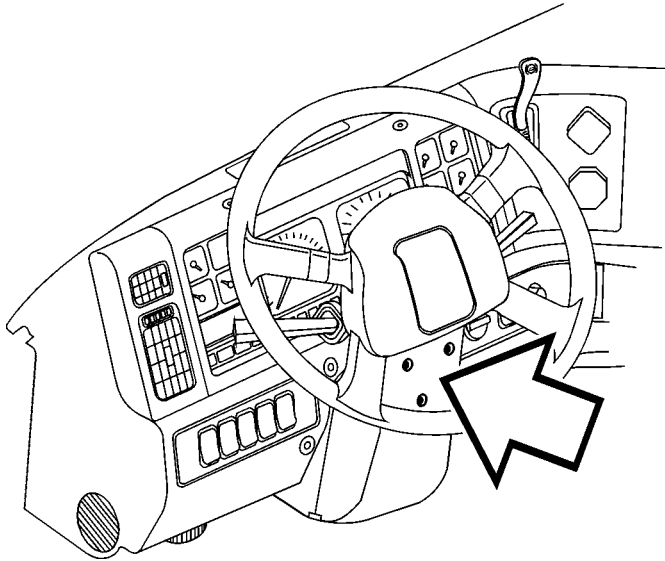
3



W3002652

If possible, adjust the steering column up toward you. Remove the front steering column cover by removing the three torx bolts from the cover and sliding the rubber grommets off of the cover.

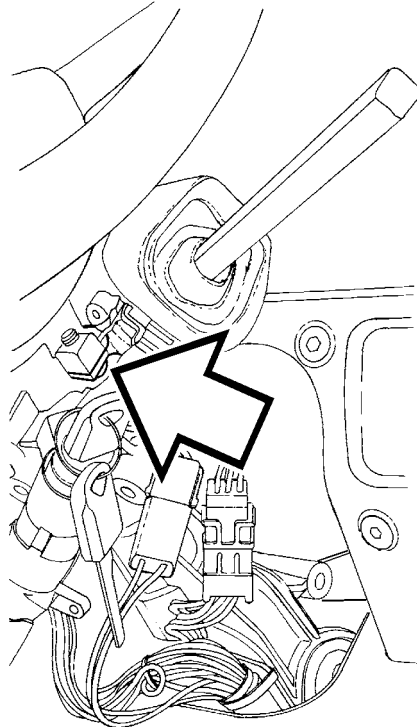
4



W8002165

If possible, adjust the steering column forward and up. Remove the bolts from the rear column cover and remove cover.

5

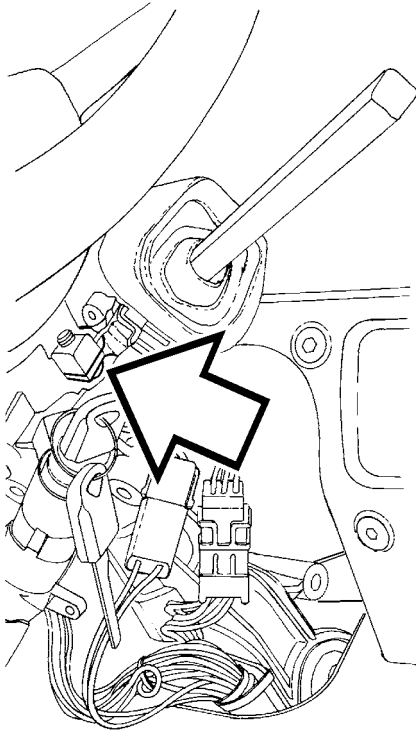


W3000652

Disconnect both electrical connectors. Remove the torx bolts on each side of the windshield wiper switch and remove the switch.

Installation

1



Mount the windshield wiper switch to the column with bolts on each side. Torque to 5 ± 0.8 Nm (44 ± 7 in-lb). Connect the electrical connectors.

W3000652

5 ± 0.8 Nm
(44 ± 7 in-lb)

2

If possible, pull steering column back and up. Install front cover by installing torx bolts. Torque to 5 ± 0.8 Nm (44 ± 7 in-lb).

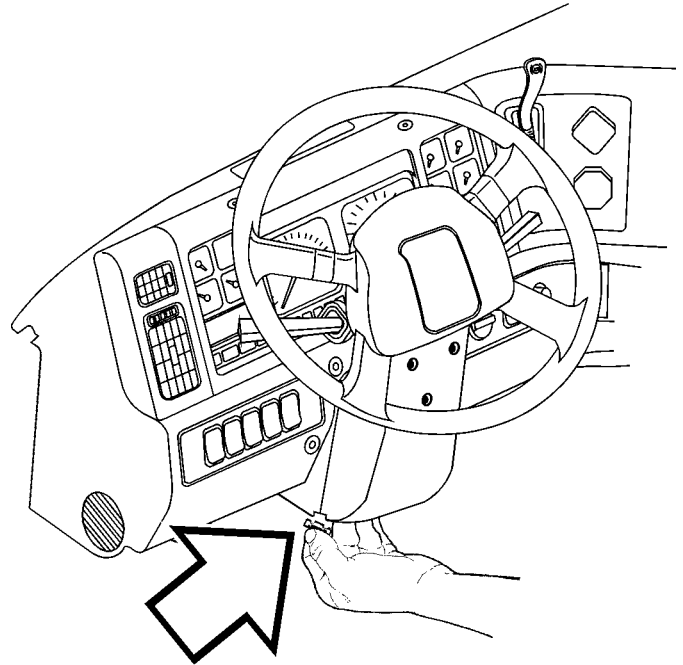
5 ± 0.8 Nm
(44 ± 7 in-lb)

3

If possible, pull steering column forward and up. Install rear cover of steering column by installing torx bolts and attaching rubber grommets at stalk switches. Torque to 5 ± 0.8 Nm (44 ± 7 in-lb).

5 ± 0.8 Nm
(44 ± 7 in-lb)

4



W8002166

Install the two clips on the bottom of the steering column cover.

3631-03-02-01 Windshield Wiper Motor, Replacement

Removal

1

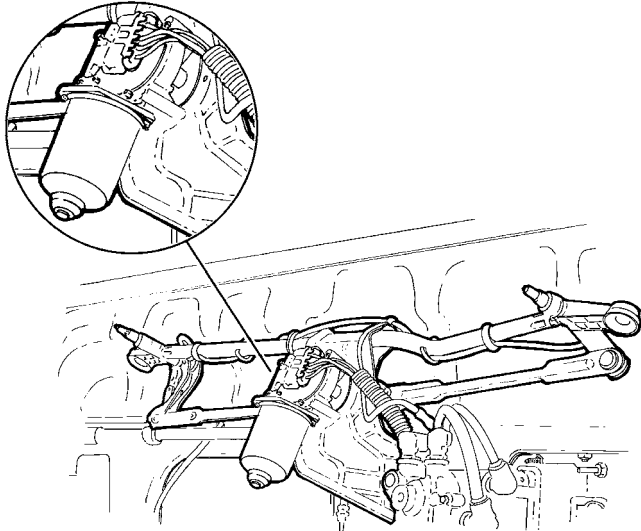


DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

Make certain the vehicle ignition is **OFF** before beginning this procedure.

2



Disconnect the electrical connector from the windshield wiper motor.

W3000669

3

Remove the nut from the linkage arm, and push the arm from the shaft.

4

Push the linkage arm from the area where the windshield wiper motor is mounted to the housing for access to the bolts. Remove the three bolts to remove motor.

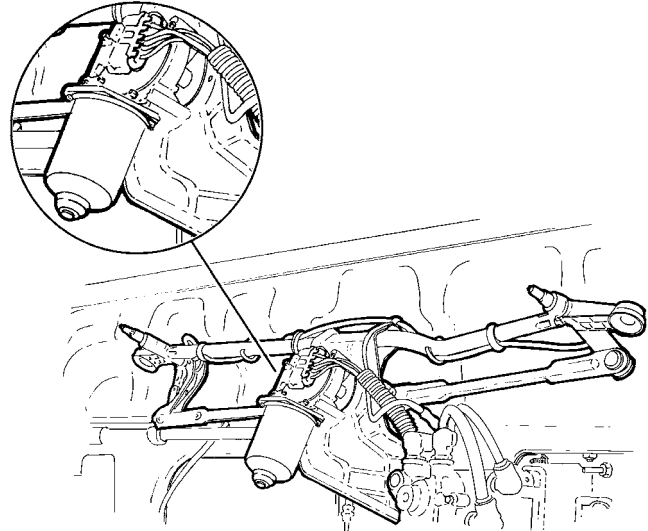
Installation

1

Mount the motor to the housing with three bolts. **START** all bolts before tightening. Torque to 40–49 Nm (29–36 ft-lb).

40–49 Nm
(29–36 ft-lb)

2



Align the arm from the linkage to the motor. Replace the nut on the shaft and connect the electrical connector. Torque to 10–13 Nm (89–115 in-lb).

W3000669

10–13 Nm
(89–115 in-lb)

3

Test the windshield wiper system to ensure proper operation.

3631-03-02-05

Windshield Wiper Motor and Linkage Assembly, Replacement

Removal

1

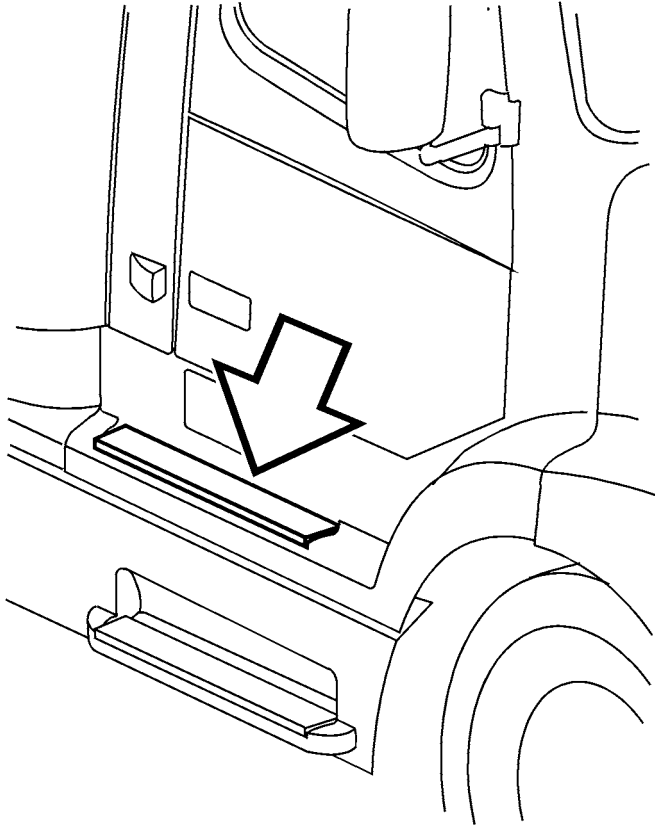


DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

Make certain the vehicle ignition is **OFF** before beginning this procedure.

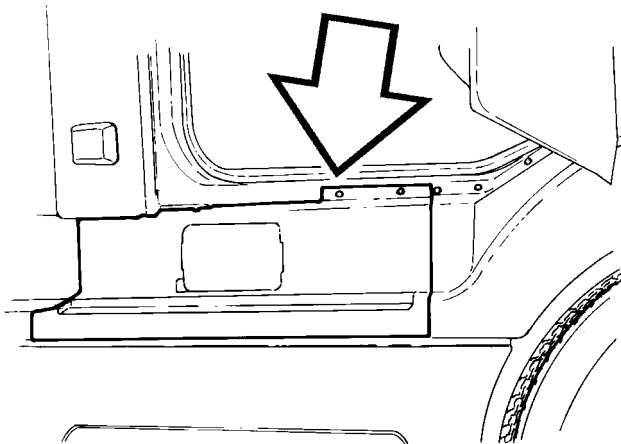
2



W3000667

Remove four torx bolts from the step on the right side of the cab, and remove the step.

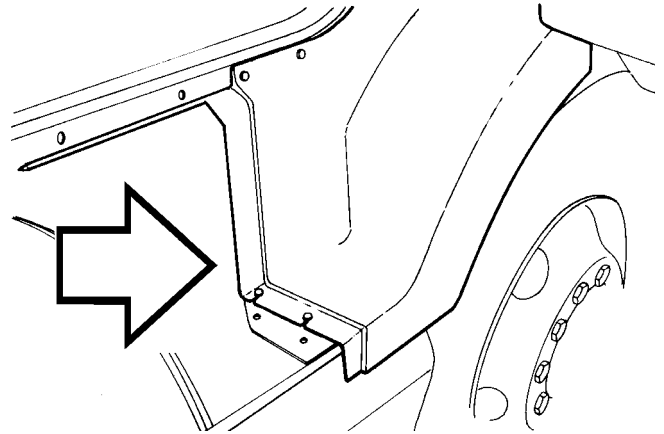
3



W3000662

Remove the upper tank fairing by removing four torx bolts.

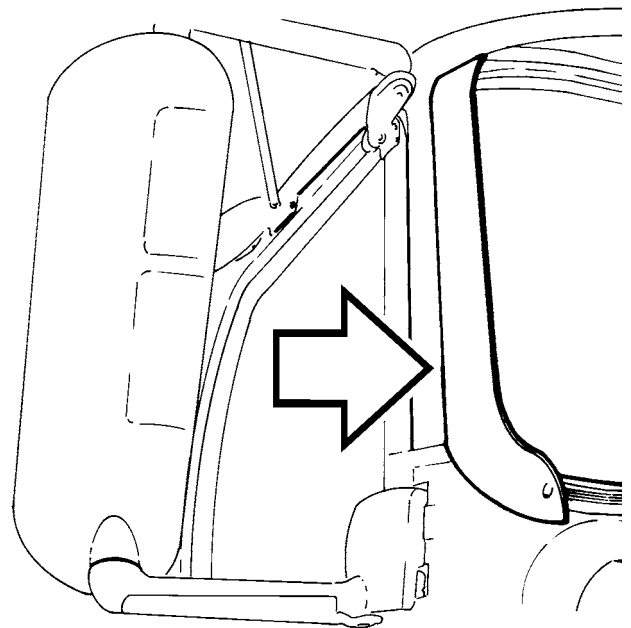
4



W3000661

Remove five torx bolts from the top side of the right quarter fender section in the lower door frame and two bolts from the step bracket. Remove the quarter fender fairing section.

5



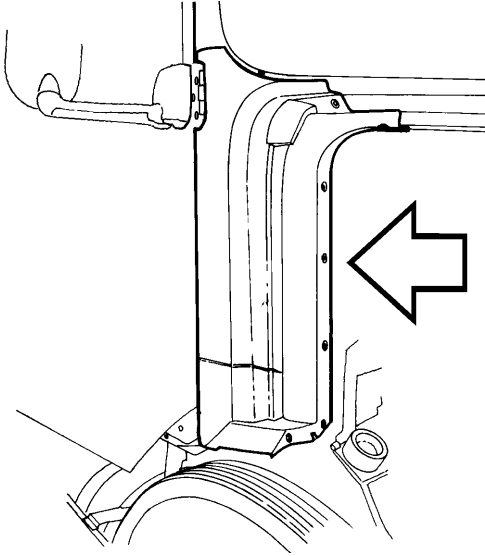
W3000663

Remove three screws from the right side drip molding and remove the molding.

6

Remove three torx bolts from the bottom of the right side mirror mounting arm.

7



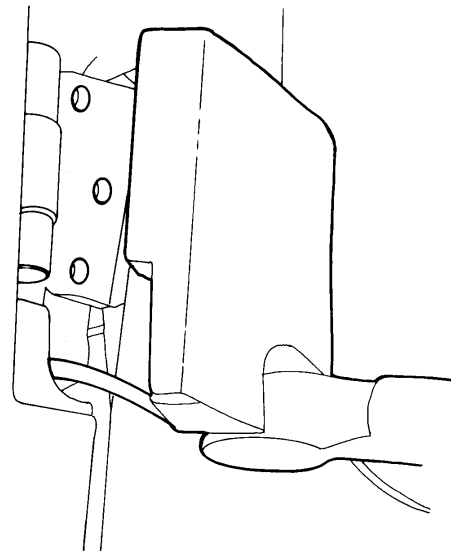
W3000670

Remove the right side cowl panel by removing bolts inside the door jamb and around the cowl panel.

8

Remove three screws from the drip molding on the left side of the cab and remove the drip molding.

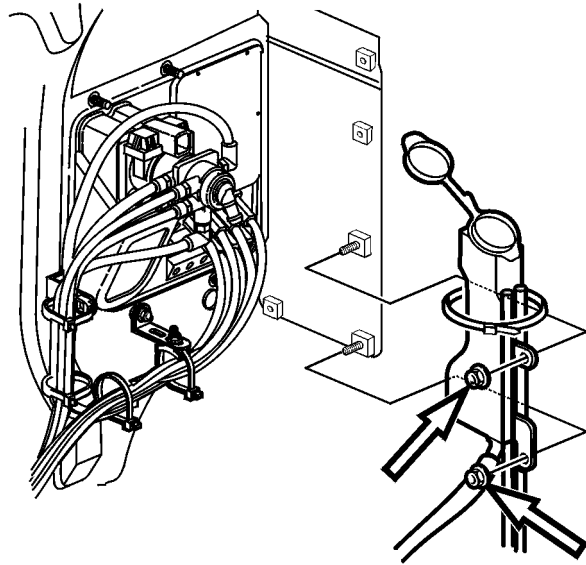
9



W3000665

Remove three torx bolts from bottom of the left side mirror mounting arm.

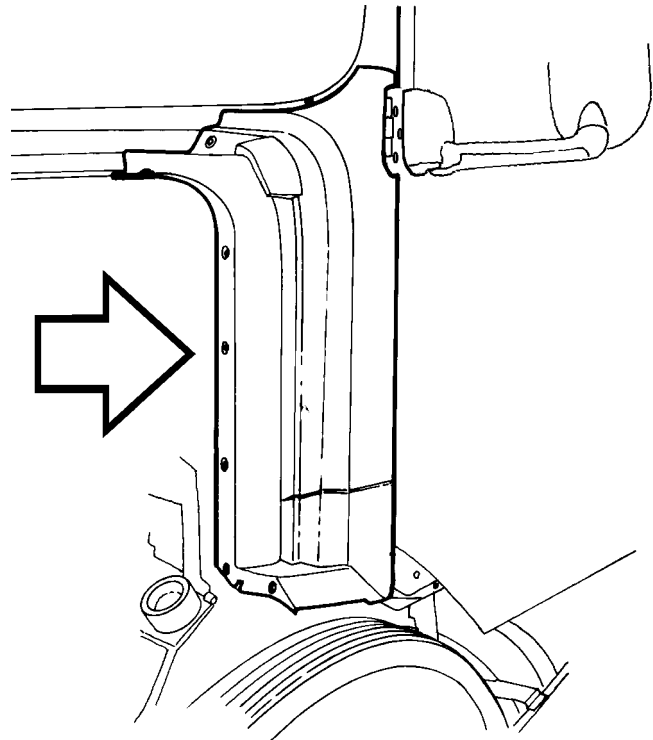
10



W3004328

Remove the two nuts shown to remove the windshield washer fluid fill bottle.

11



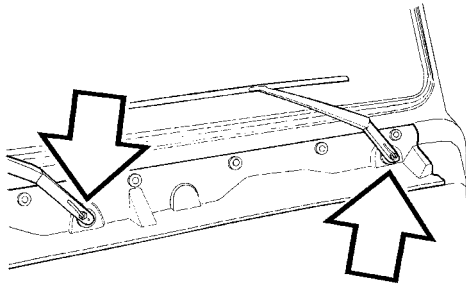
W3000671

Remove the left side cowl panel by removing the remaining bolts around the cowl section and inside the door jamb.

12

Remove the windshield washer hose.

13



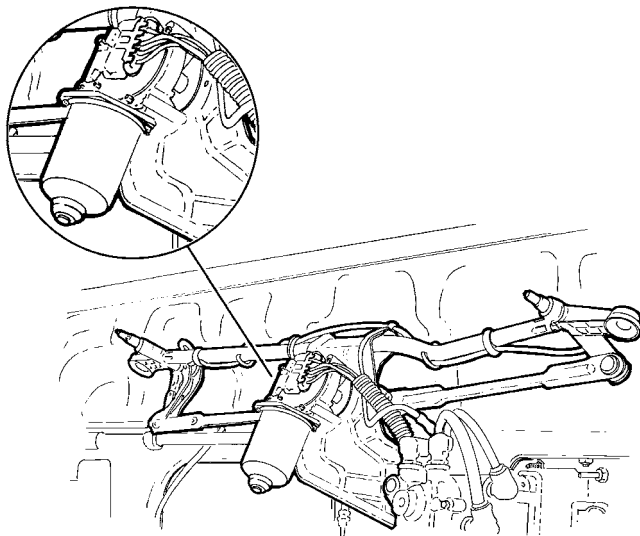
W3000997

Remove the windshield wiper arm nut from both arms and remove the windshield wiper arms.

14

Remove the cowl panel under the windshield by removing the linkage shaft caps and 11 torx bolts from the panel.

15



W3000669

Disconnect the electrical connector from the windshield wiper motor and disconnect the hose to the windshield washer.

16

Remove the windshield wiper motor and linkage assembly by removing the five torx bolts from assembly.

Removal of windshield wiper motor from linkage assembly (if needed)

17

Remove the nut from the motor linkage arm and push the arm from the shaft.

18

Push the linkage arm away from the area where the motor is bolted to the housing. Remove three bolts from the motor, then remove motor.

Installation

1

If the motor was not removed from the linkage assembly, skip to step four. If the motor was removed, mount motor on linkage housing with three mounting bolts. **START** all bolts before tightening. Torque to 40–49 Nm (29–36 ft-lb).

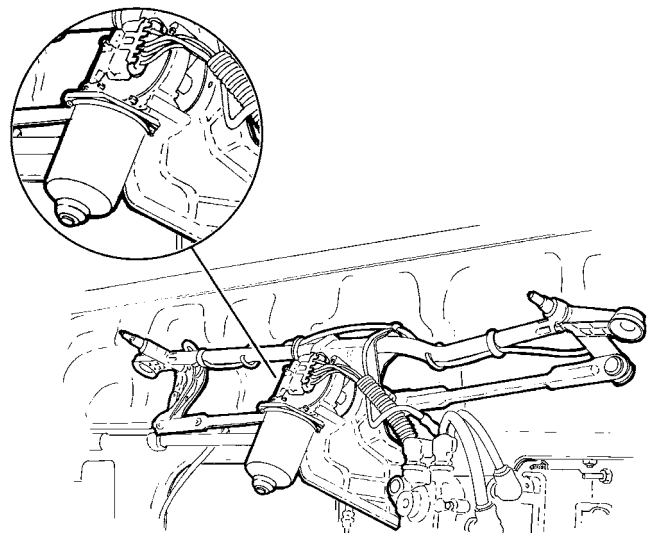
40–49 Nm
(29–36 ft-lb)

2

Install the shaft nut to the linkage arm. Make sure the shaft and transmission arm are aligned so that the timing and placement of the windshield wipers will be properly aligned when the windshield wipers are in the **OFF** position. Torque to 10–13 Nm (90–115 in-lb).

10–13 Nm
(88.5–115 in-lb)

3

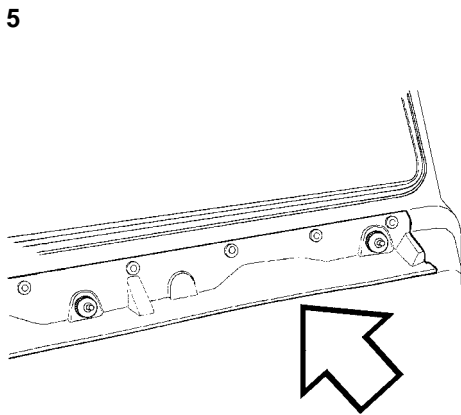


W3000669

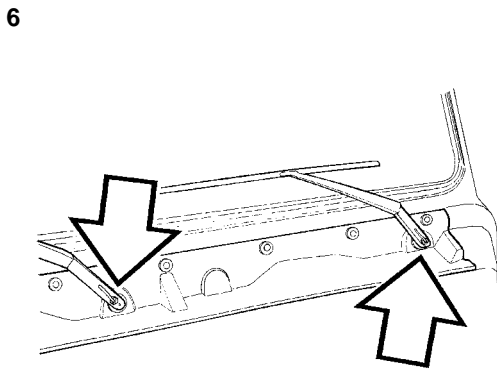
Align the windshield wiper assembly to the cowl, and install it with the five torx bolts. Torque to 23 ± 2.5 Nm (199 ± 22 in-lb). Connect the electrical connector and windshield washer hose.

23 ± 2.5 Nm
(199 ± 22 in-lb)

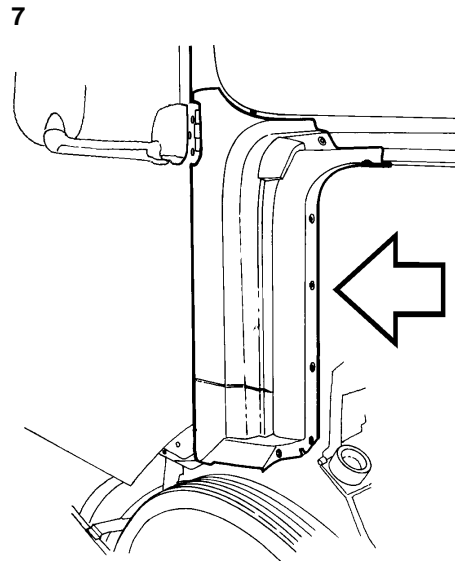
4
Test the windshield wiper system before installing the body panels to ensure proper operation of the system.



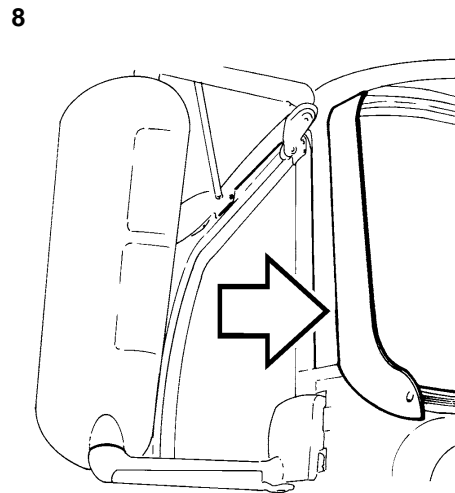
W3000673
Install the cowl panel with 11 torx bolts. Torque to 24 ± 4 Nm (212 ± 35 in-lb).



W3000997
Install the windshield wiper arms and connect windshield washer hoses. Torque the arm nut to 23 ± 3 Nm (203 ± 26 in-lb).



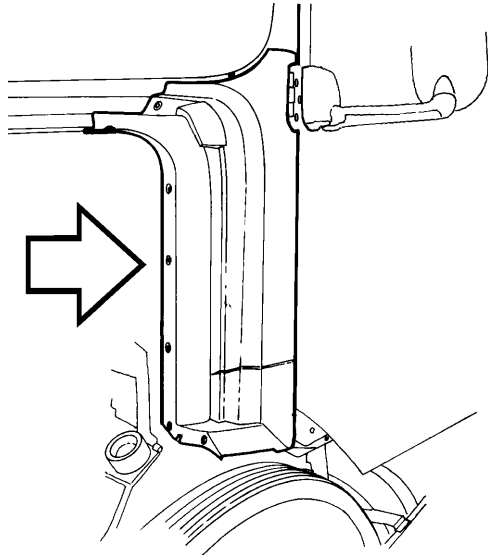
W3000670
Install the right side cowl panel using bolts on the outside and inside of the door jamb. START all bolts and align the cowl before tightening. Torque to 24 ± 4 Nm (212 ± 35 in-lb).



W3000663
Install the right side drip molding with three screws. Torque the top two screws to 1.2 ± 0.2 Nm (11 ± 2 in-lb), and the bottom to 3 ± 0.5 Nm (26 ± 5 in-lb).

9
Install three bolts in the lower right side mirror arm. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

10

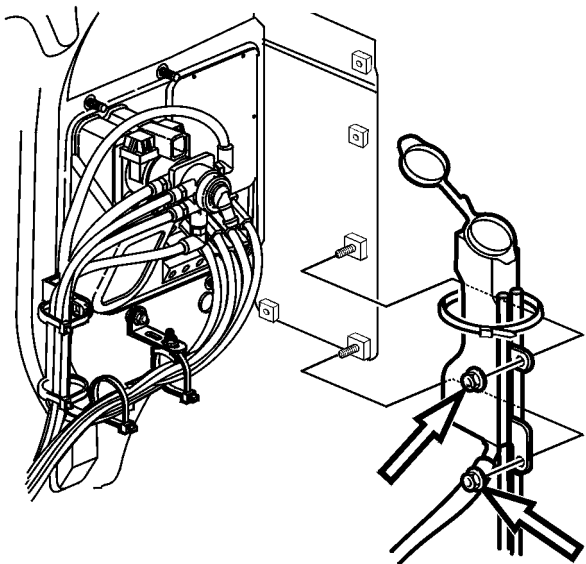


Install the left side cowl panel using bolts on the outside and inside of the door jamb. START all bolts and align the cowl before tightening. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

W3000671

24 ± 4 Nm
(18 ± 3 ft-lb)

11

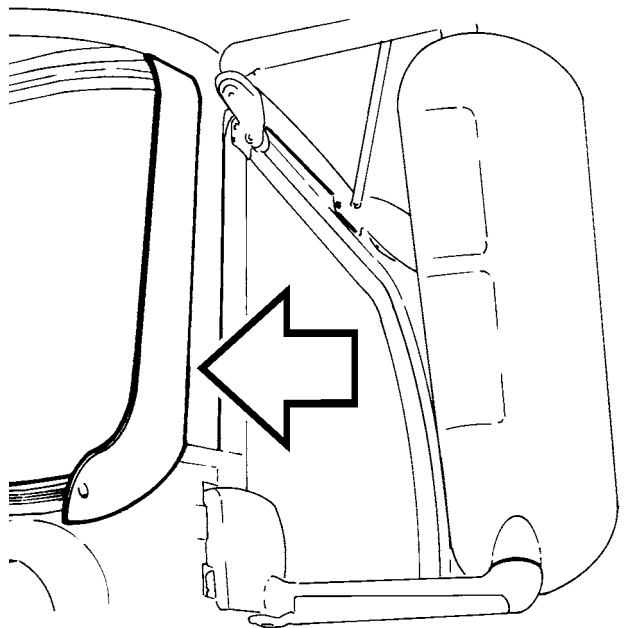


Install the windshield washer fluid fill bottle. START all bolts, then tighten nuts. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

W3004328

24 ± 4 Nm
(18 ± 3 ft-lb)

12



Install the left side drip molding with three screws. Torque the top two screws to 1.2 ± 0.2 Nm (11 ± 2 in-lb), and the bottom to 3 ± 0.5 Nm (26 ± 5 in-lb).

W3000664

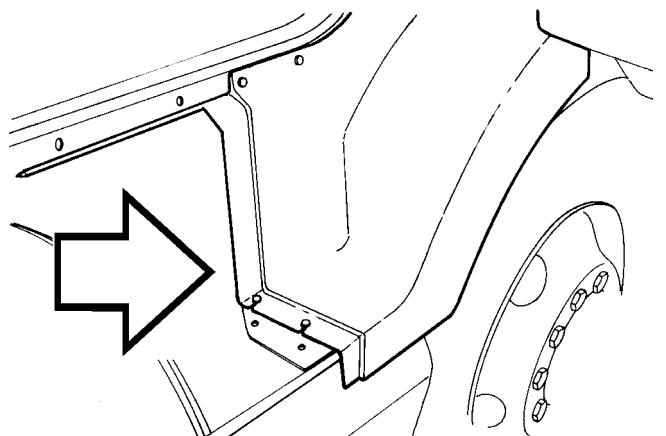
1.2 ± 0.2 Nm
(11 ± 2 in-lb)
 3 ± 0.5 Nm
(26 ± 5 in-lb)

13

Install three bolts in the lower left side mirror arm. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

24.4 ± 4 Nm
(18 ± 3 ft-lb)

14

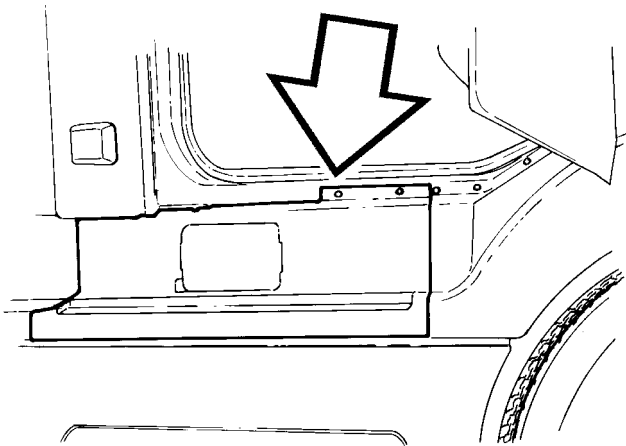


Install the right side quarter fender section. START bolts, but do not tighten until after aligning. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

W3000661

24 ± 4 Nm
(18 ± 3 ft-lb)

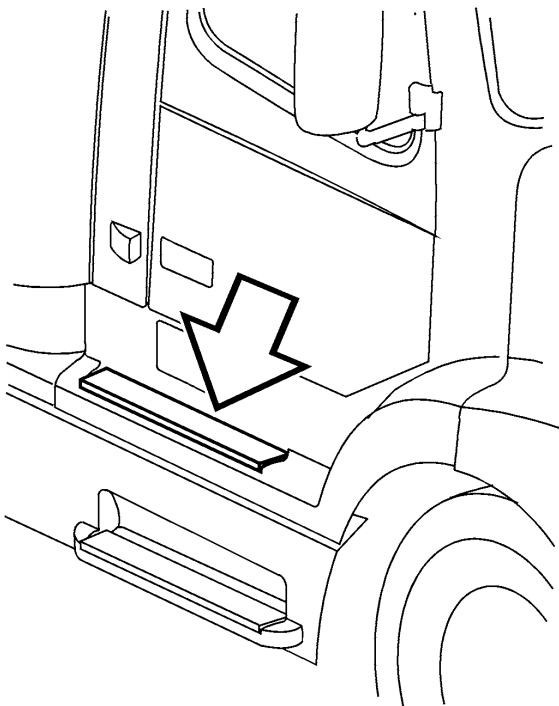
15



W3000662

Install the tank fairing. START all bolts, then tighten after aligning fairing. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

16



W3000667

Install the step. START all four bolts, then tighten after aligning the step. Torque to 12 ± 1 Nm (106 ± 9 in-lb).

3635-03-02-01 Windshield Washer Pump, Re- placement

Removal

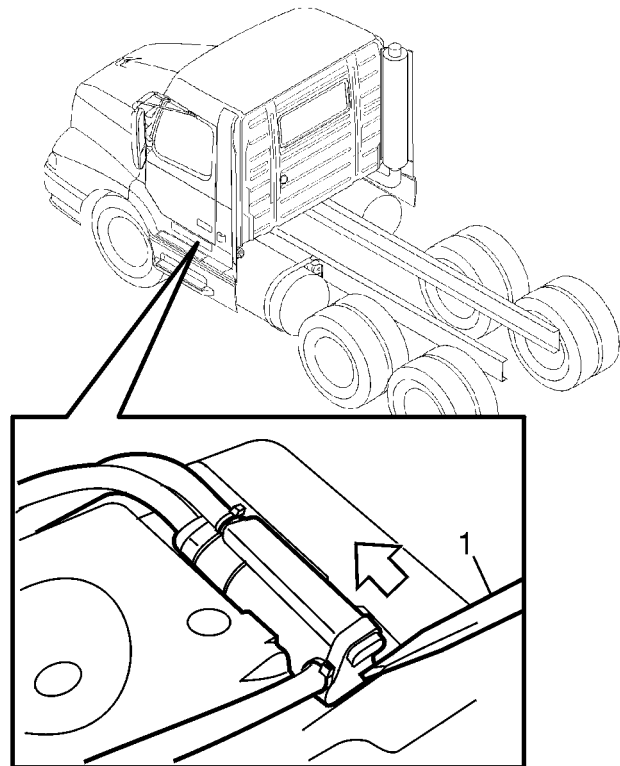
1



DANGER
Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

Place a drain pan under the windshield washer fluid reservoir.

2



W3003797

Use a screwdriver to pry the windshield washer pump assembly up and out of the windshield washer fluid reservoir.

Note: Windshield washer fluid will drain out of the reservoir when the windshield washer pump assembly is removed.

3
Disconnect the wiring harness connector.

4
Cut the cable ties securing the hoses to the pump and remove hoses.

Installation

1
Install the hoses onto the replacement windshield washer pump and secure with cable ties.

2
Connect the wiring harness connector.

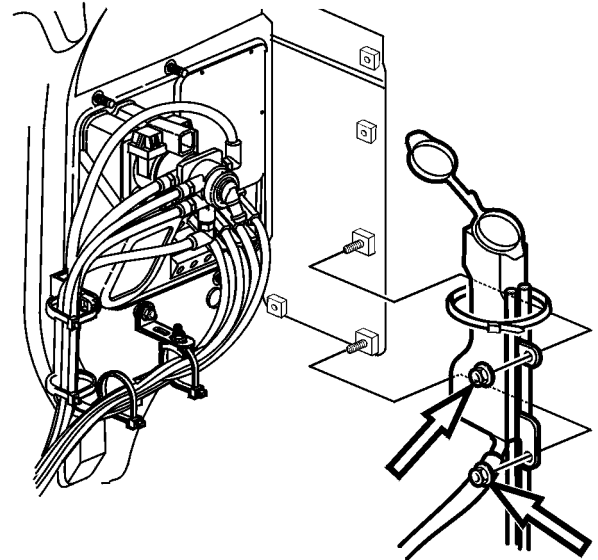
3
Press the windshield washer pump down into the reservoir until it is properly seated.

4
Fill the reservoir with new windshield washer fluid. Test for proper operation and leaks.

3634-03-02-11 Windshield Washer Fluid Fill Bottle, Replacement

Removal

1



W3004328

Cut any cable ties that may secure vent hoses to the windshield washer fluid fill bottle. Remove the two mounting nuts.

2

Remove the fill bottle from its mounting location. If necessary, pour out any windshield washer fluid and dispose of properly.

3

Disconnect the reservoir fill hose at the bottom of the windshield washer fluid fill bottle.

Installation

1

Connect the reservoir fill hose to the replacement windshield washer fluid fill bottle.

2

Position the fill bottle in its mounting location and secure with mounting nuts. Secure any vent hoses that may have been removed with cable ties.

3634-03-02-12 Windshield Washer Fluid Filter, Replacement

Removal

1
Cut cable ties as needed to free the windshield washer fluid filter

2
Remove the inlet and outlet hoses from the filter.

Installation

1
Install the inlet and outlet hoses onto the replacement filter.

2
Secure with cable ties as needed.

3634-03-02-13 Windshield Washer Check Valve, Replacement

Removal

1
Cut cable ties as needed to free the windshield washer fluid check valve.

2
Remove the inlet and outlet hoses from the check valve.

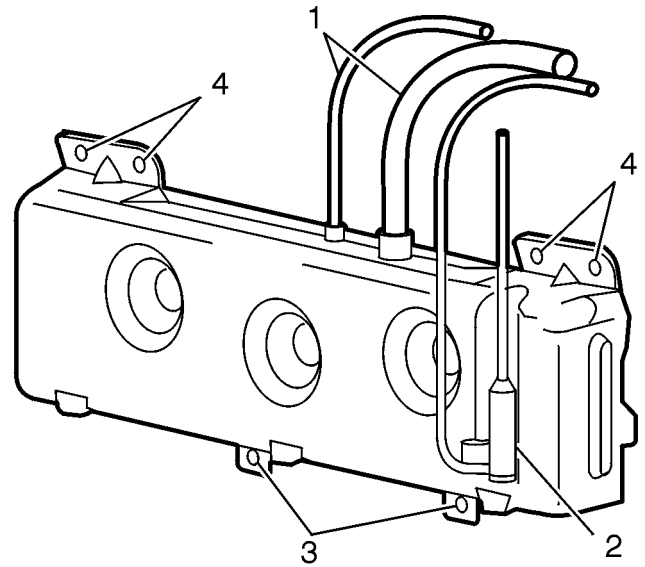
Installation

1
Install the inlet and outlet hoses onto the replacement check valve.

2
Secure with cable ties as needed.

3634-03-02-09 Windshield Washer Fluid Reservoir, Replacement (Bat- tery Box Mount)

Note: It may be necessary to remove various cab components such as cab fairings or inner fenders to gain full access and remove the windshield washer fluid reservoir.



W3004329

- 1 Top Hoses
- 2 Windshield Washer Pump
- 3 Lower Mounts
- 4 Upper Mounts

Removal

1

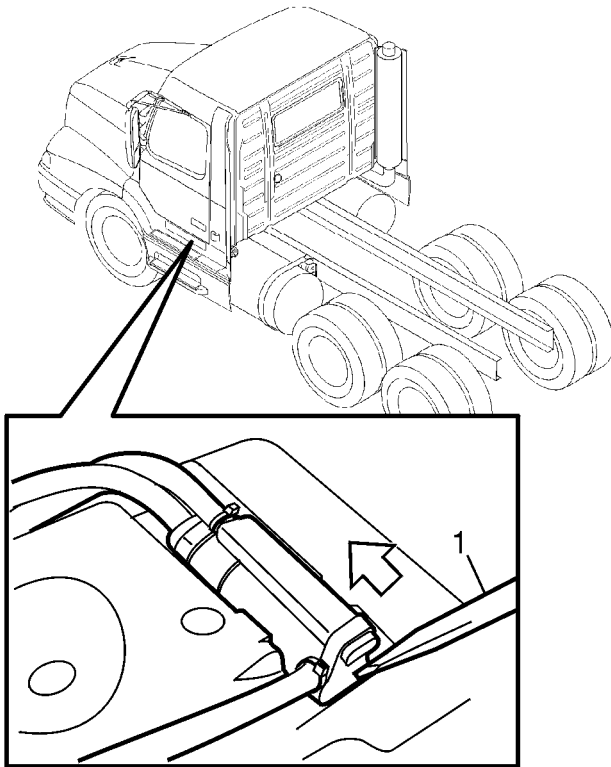


DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so may result in unexpected vehicle movement and can cause serious personal injury or death.

Disconnect the hoses on the top of the reservoir (1).

2



Place a drain pan under the windshield washer fluid reservoir. Use a screwdriver to pry the windshield washer pump (2) up and out of the windshield washer fluid reservoir. Do not remove the hoses and electrical connector.

Note: Windshield washer fluid will drain out of the reservoir when the windshield washer pump assembly is removed.

3

Remove the lower mounting bolts (3). Remove the upper mounting bolts (4) including the upper battery box retainers and battery cable supports. Move the battery cable assembly to the side to allow removal of the windshield washer fluid reservoir.

Installation

1

Position the replacement windshield washer fluid reservoir in its mounting location. Install and secure the mounting bolts with the upper battery box retainers and battery cable supports.

2

Press the windshield washer pump down into the reservoir until it is properly seated.

3

Connect the hoses on the top of the reservoir.

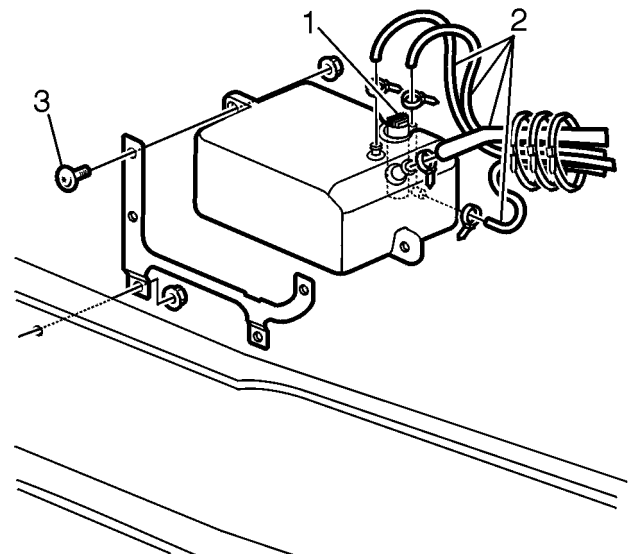
4

Fill the reservoir with new windshield washer fluid. Test for proper operation and leaks.

3634-03-02-10 Windshield Washer Fluid Reservoir, Replacement (Frame Rail Mount)

Note: It may be necessary to remove various cab components such as cab fairings or inner fenders to gain full access and remove the windshield washer fluid reservoir.

W3003797

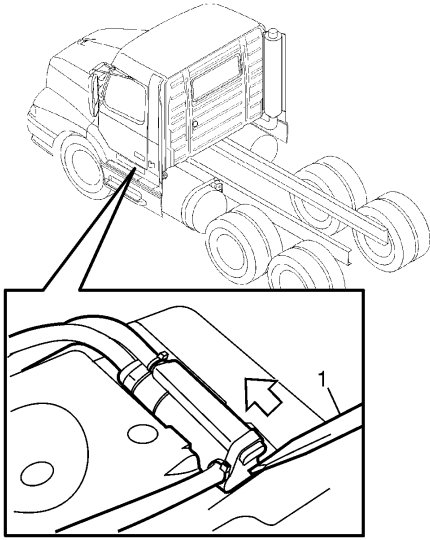


W3004330

- 1 Washer Pump Assembly
- 2 Top Hoses
- 3 Reservoir Mounting Bolts

Removal

1



W3003797

1 Screwdriver blade

Place a drain pan under the windshield washer fluid reservoir. Use a screwdriver to pry the windshield washer pump assembly up (1) and out of the windshield washer fluid reservoir. Do not remove the hoses and electrical connector.

Note: Windshield washer fluid will drain out of the reservoir when the windshield washer pump assembly is removed.

2

Disconnect the hoses on the top of the reservoir (2).

3

Remove the reservoir mounting bolts (3) and remove the windshield washer fluid reservoir from the vehicle.

Installation

1

Position the replacement windshield washer fluid reservoir in its mounting location. Install and secure the mounting bolts.

2

Press the windshield washer pump down into the reservoir until it is properly seated.

3

Connect the hoses on the top of the reservoir.

4

Fill the reservoir with new windshield washer fluid. Test for proper operation and leaks.

Feedback

One of our objectives is that workshop personnel should have access to correct and appropriate service manuals where it concerns fault tracing, repairs and maintenance of Volvo trucks.
In order to maintain the high standards of our literature, your opinions and experience when using this manual would be greatly appreciated.
If you have any comments or suggestions, make a copy of this page, write down your comments and send them to us, either via telefax or mailing directly to the address listed below.

To

Volvo Trucks North America, Inc.

Dept. 516 Service Publications

7825 National Service Road

P.O. Box 26115

Greensboro, NC 27402-6115

USA

Fax (336) 393-3170

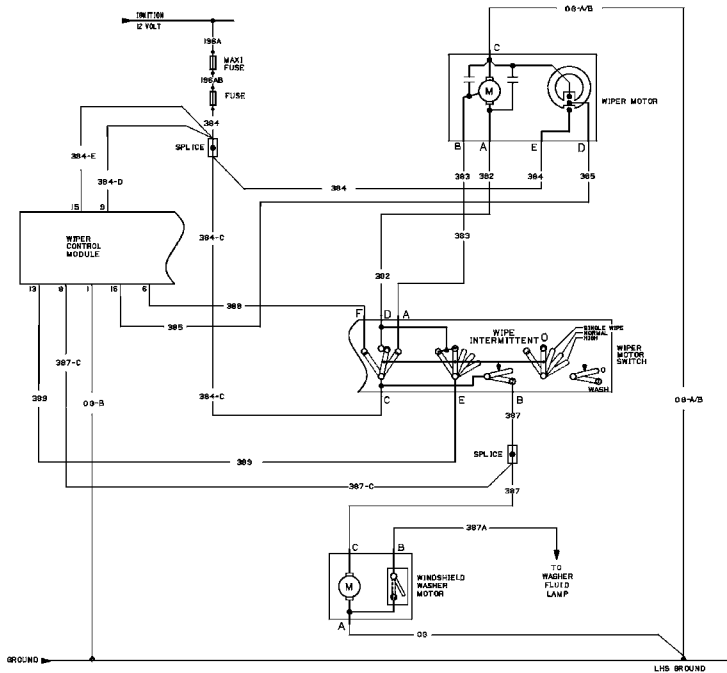
From

.....
.....
.....
.....
.....
.....

Comments/proposals

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Concerns Service Manual:



W3003804

Cummins, Caterpillar and Detroit Diesel Engines

	<p>WIPER SWITCH</p> <table border="1"> <thead> <tr> <th colspan="3">TABLE OF CONTENTS</th> </tr> <tr> <th>CAVITY</th> <th>CIRCUIT</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>383</td> <td>HIGH SPEED WIPER</td> </tr> <tr> <td>B</td> <td>387</td> <td>12 VOLT SUPPLY</td> </tr> <tr> <td>C</td> <td>384-C</td> <td>12 VOLT SUPPLY</td> </tr> <tr> <td>D</td> <td>382</td> <td>LOW SPEED WIPER</td> </tr> <tr> <td>E</td> <td>389</td> <td>TO WIPER CONTROL MODULE</td> </tr> <tr> <td>F</td> <td>388</td> <td>TO WIPER CONTROL MODULE</td> </tr> </tbody> </table>	TABLE OF CONTENTS			CAVITY	CIRCUIT	FUNCTION	A	383	HIGH SPEED WIPER	B	387	12 VOLT SUPPLY	C	384-C	12 VOLT SUPPLY	D	382	LOW SPEED WIPER	E	389	TO WIPER CONTROL MODULE	F	388	TO WIPER CONTROL MODULE	<p>WIPER MOTOR</p> <table border="1"> <thead> <tr> <th colspan="3">TABLE OF CONTENTS</th> </tr> <tr> <th>CAVITY</th> <th>CIRCUIT</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>382-A</td> <td>LOW SPEED WIPER</td> </tr> <tr> <td>B</td> <td>383</td> <td>HIGH SPEED WIPER</td> </tr> <tr> <td>C</td> <td>0G-A/B</td> <td>GROUND</td> </tr> <tr> <td>D</td> <td>385</td> <td>PARK CONTROL WIPER MOTOR</td> </tr> <tr> <td>E</td> <td>384</td> <td>12 VOLT SUPPLY</td> </tr> </tbody> </table>	TABLE OF CONTENTS			CAVITY	CIRCUIT	FUNCTION	A	382-A	LOW SPEED WIPER	B	383	HIGH SPEED WIPER	C	0G-A/B	GROUND	D	385	PARK CONTROL WIPER MOTOR	E	384	12 VOLT SUPPLY
TABLE OF CONTENTS																																															
CAVITY	CIRCUIT	FUNCTION																																													
A	383	HIGH SPEED WIPER																																													
B	387	12 VOLT SUPPLY																																													
C	384-C	12 VOLT SUPPLY																																													
D	382	LOW SPEED WIPER																																													
E	389	TO WIPER CONTROL MODULE																																													
F	388	TO WIPER CONTROL MODULE																																													
TABLE OF CONTENTS																																															
CAVITY	CIRCUIT	FUNCTION																																													
A	382-A	LOW SPEED WIPER																																													
B	383	HIGH SPEED WIPER																																													
C	0G-A/B	GROUND																																													
D	385	PARK CONTROL WIPER MOTOR																																													
E	384	12 VOLT SUPPLY																																													
<p>WASHER MOTOR</p> <table border="1"> <thead> <tr> <th colspan="3">TABLE OF CONTENTS</th> </tr> <tr> <th>CAVITY</th> <th>CIRCUIT</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0G-A/B</td> <td>GROUND</td> </tr> <tr> <td>B</td> <td>387A</td> <td>LOW FLUID LEVEL</td> </tr> <tr> <td>C</td> <td>387</td> <td>12 VOLT SUPPLY</td> </tr> </tbody> </table>	TABLE OF CONTENTS			CAVITY	CIRCUIT	FUNCTION	A	0G-A/B	GROUND	B	387A	LOW FLUID LEVEL	C	387	12 VOLT SUPPLY	<p>WIPER CONTROL MODULE</p> <table border="1"> <thead> <tr> <th colspan="3">TABLE OF CONTENTS</th> </tr> <tr> <th>CAVITY</th> <th>CIRCUIT</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0G-B</td> <td>GROUND</td> </tr> <tr> <td>6</td> <td>388</td> <td>SWITCH/INTERVAL WIPER</td> </tr> <tr> <td>8</td> <td>387-C</td> <td>SWITCH TO WASH MOTOR</td> </tr> <tr> <td>9</td> <td>384-D</td> <td>12 VOLT SUPPLY</td> </tr> <tr> <td>13</td> <td>389</td> <td>12 VOLT SUPPLY</td> </tr> <tr> <td>15</td> <td>384-E</td> <td>WIPER MOTOR SUPPLY</td> </tr> <tr> <td>16</td> <td>385</td> <td>PARK CONTROL WIPER MOTOR</td> </tr> </tbody> </table>	TABLE OF CONTENTS			CAVITY	CIRCUIT	FUNCTION	1	0G-B	GROUND	6	388	SWITCH/INTERVAL WIPER	8	387-C	SWITCH TO WASH MOTOR	9	384-D	12 VOLT SUPPLY	13	389	12 VOLT SUPPLY	15	384-E	WIPER MOTOR SUPPLY	16	385	PARK CONTROL WIPER MOTOR				
TABLE OF CONTENTS																																															
CAVITY	CIRCUIT	FUNCTION																																													
A	0G-A/B	GROUND																																													
B	387A	LOW FLUID LEVEL																																													
C	387	12 VOLT SUPPLY																																													
TABLE OF CONTENTS																																															
CAVITY	CIRCUIT	FUNCTION																																													
1	0G-B	GROUND																																													
6	388	SWITCH/INTERVAL WIPER																																													
8	387-C	SWITCH TO WASH MOTOR																																													
9	384-D	12 VOLT SUPPLY																																													
13	389	12 VOLT SUPPLY																																													
15	384-E	WIPER MOTOR SUPPLY																																													
16	385	PARK CONTROL WIPER MOTOR																																													

W3003805

Foldout A
Windshield Wiper System

WIPER SWITCH




TABLE OF CONTENTS		
CAVITY	CIRCUIT	FUNCTION
A	383	HIGH SPEED WIPER
B	387	12 VOLT SUPPLY
C	384-C	12 VOLT SUPPLY
D	382	LOW SPEED WIPER
E	385-B	TO VECU
F	388	TO VECU

WIPER MOTOR

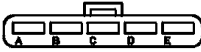


TABLE OF CONTENTS		
CAVITY	CIRCUIT	FUNCTION
A	382A	LOW SPEED WIPER
B	383	HIGH SPEED WIPER
C	0H	GROUND
D	385	PARK CONTROL WIPER MOTOR
E	384-B	12 VOLT SUPPLY

WASHER MOTOR




TABLE OF CONTENTS		
CAVITY	CIRCUIT	FUNCTION
A	0G	GROUND
B	387A	LOW FLUID LEVEL
C	387B	12 VOLT SUPPLY

INTERMITTENT WIPER RELAY

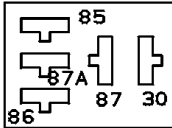
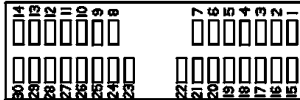


TABLE OF CONTENTS		
CAVITY	CIRCUIT	FUNCTION
86	196W	12 VOLT SUPPLY
87A	382	12 VOLT SUPPLY
85	389B	POWER CONTROL F
87	389A	12 VOLT SUPPLY
30	382A	GROUND

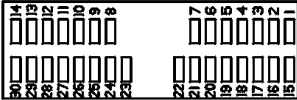
VEHICLE ECU CONNECTOR PA

TABLE OF CONTENTS		
CAVITY	CIRCUIT	FUNCTION
9	385-A	PARK CONTROL WIPER
10	388	SWITCH/INTERVAL WIPER
11	387-C	WASHER MOTOR CONTROL

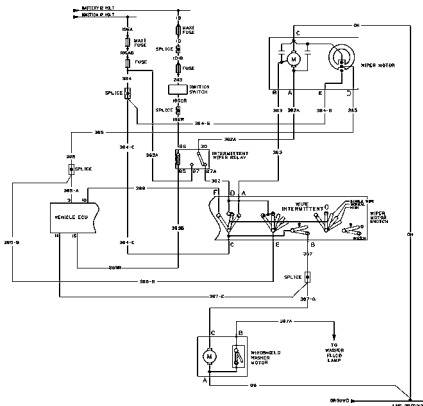


VEHICLE ECU CONNECTOR PB

TABLE OF CONTENTS		
CAVITY	CIRCUIT	FUNCTION
16	389B	INTERMITTENT WIPER



Volvo Engines



W3003796

The simplified schematic and pin out charts should only be used to clarify the design features and troubleshooting procedures for this manual. For detailed, vehicle specific, schematics see "VN/VHD Series Electrical Schematics, Group 37"

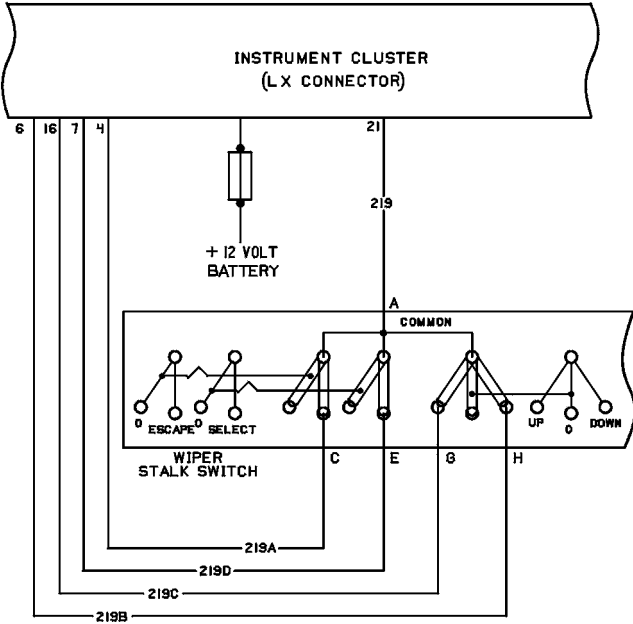
Foldout B
Windshield Wiper System

WIPER STALK SWITCH CONN



TABLE OF CONTENTS		
CAVITY	CIRCUIT	FUNCT I
A	219	CLUSTER DISP
C	219A	CLUSTER DISP
E	219D	CLUSTER DISP
G	219C	CLUSTER DIS
H	219B	CLUSTER DIS

The simplified schematic and pin out charts should only be used to clarify the design features and troubleshooting procedures for this manual. For detailed, vehicle specific, schematics see "VN/VHD Series Electrical Schematics, Group 37"



Foldout C
Windshield Wiper Stalk/ Graphic Display Control Buttons

Operation Numbers

3631-03-02-01	Windshield Wiper Motor, Replacement	33
3631-03-02-05	Windshield Wiper Motor and Linkage Assembly, Replacement	34
3634-03-02-09	Windshield Washer Fluid Reservoir, Replacement (Battery Box Mount)	42
3634-03-02-10	Windshield Washer Fluid Reservoir, Replacement (Frame Rail Mount)	43
3634-03-02-11	Windshield Washer Fluid Fill Bottle, Replacement	41
3634-03-02-12	Windshield Washer Fluid Filter, Replacement	42
3634-03-02-13	Windshield Washer Check Valve, Replacement	42
3635-03-02-01	Windshield Washer Pump, Replacement	40
3636-03-02-01	Windshield Wiper Blade, Replacement	29
3637-03-02-01	Windshield Wiper Arm, Replacement	29
3638-03-02-01	Windshield Wiper Switch, Replacement	31
3645-03-02-06	Windshield Wiper Module, Replacement	30

VOLVO

Volvo Trucks North America, Inc.

P.O. Box 26115, Greensboro, NC 27402-6115

Volvo Trucks Canada, Ltd.

6490 Vipond Drive, Mississauga, Ontario L5T 1W8

<http://www.volvotrucks.volvo.com>