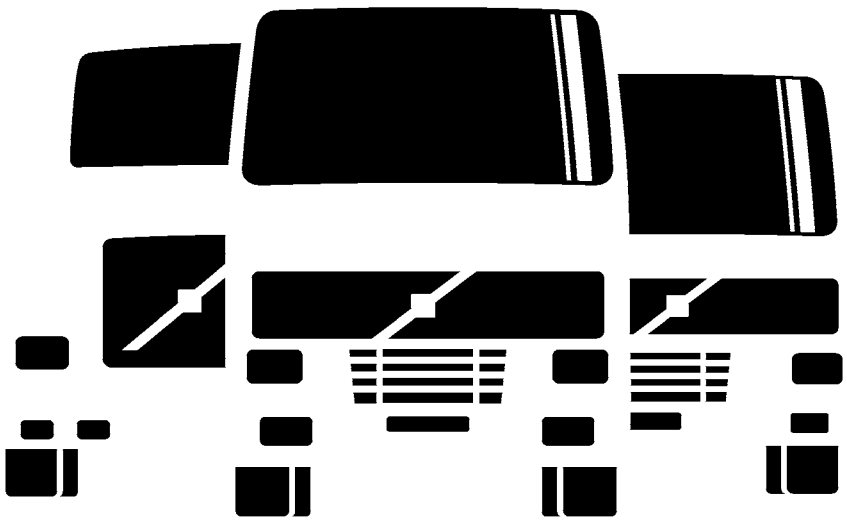
Service Manual
Trucks

Group **39**

Delco Audio System, Troubleshooting
VN



PV776-TSP109859

VOLVO

Foreword

The descriptions and service procedures contained in this manual are based on designs and methods studies carried out up to December 98.

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-TSP109859

Contents

General

Volvo VN Sound System

The stereo systems in the Volvo VN series trucks have been selected and tuned for optimized performance. All VN models are available with a variety of Delco Electronics components including a basic AM/FM stereo radio with weather-band, a basic AM/FM cassette player with weather-band, and Delco Electronics Premium Systems with enhanced features and performance.

All VN models are also available with either basic or premium speaker packages. The VN 770 premium speaker system includes an 8 channel amplifier and a subwoofer. The VN 660 and VN 770 models are available with remote CD changers.

Consult the ”Owner’s Manual” that is supplied with the vehicle for complete operation instructions.

Repair/Replacement

As an alternative to expensive replacement, Delco Electronics Devices may be repaired at approved service centers. Call D&B Auto Radio at 1-800-323-4813 for repair information.

General Cautions

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.

DANGER

PERSONAL INJURY HAZARD! 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.

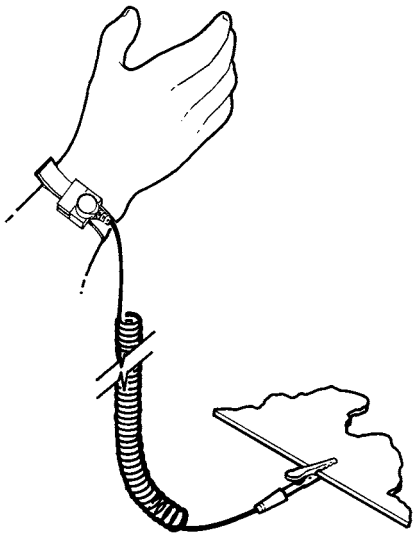
DANGER

On vehicles with SRS (airbags): Before doing any electrical repair work in the steering column, disconnect the negative and positive battery cables in order to disengage the SRS. Failure to do so can cause the SRS to be accidentally deployed, resulting in serious personal injury. Disconnect the ground terminal **first**.

Preventing Electrostatic Discharge

CAUTION

A wrist grounding strap must be worn when working on electronic equipment such as audio components. This is to prevent electrostatic discharge (ESD), which can damage electronic components. To use the wrist strap in a vehicle, attach the alligator clip to the nearest electrical ground such as a metal mounting screw, a ground terminal or preferably a ground stud.



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Additional Cautions

For a complete list of precautions when working with electrical circuits see ”Electrical General” manual, Volvo service publication number PV776–TSP28379/1.

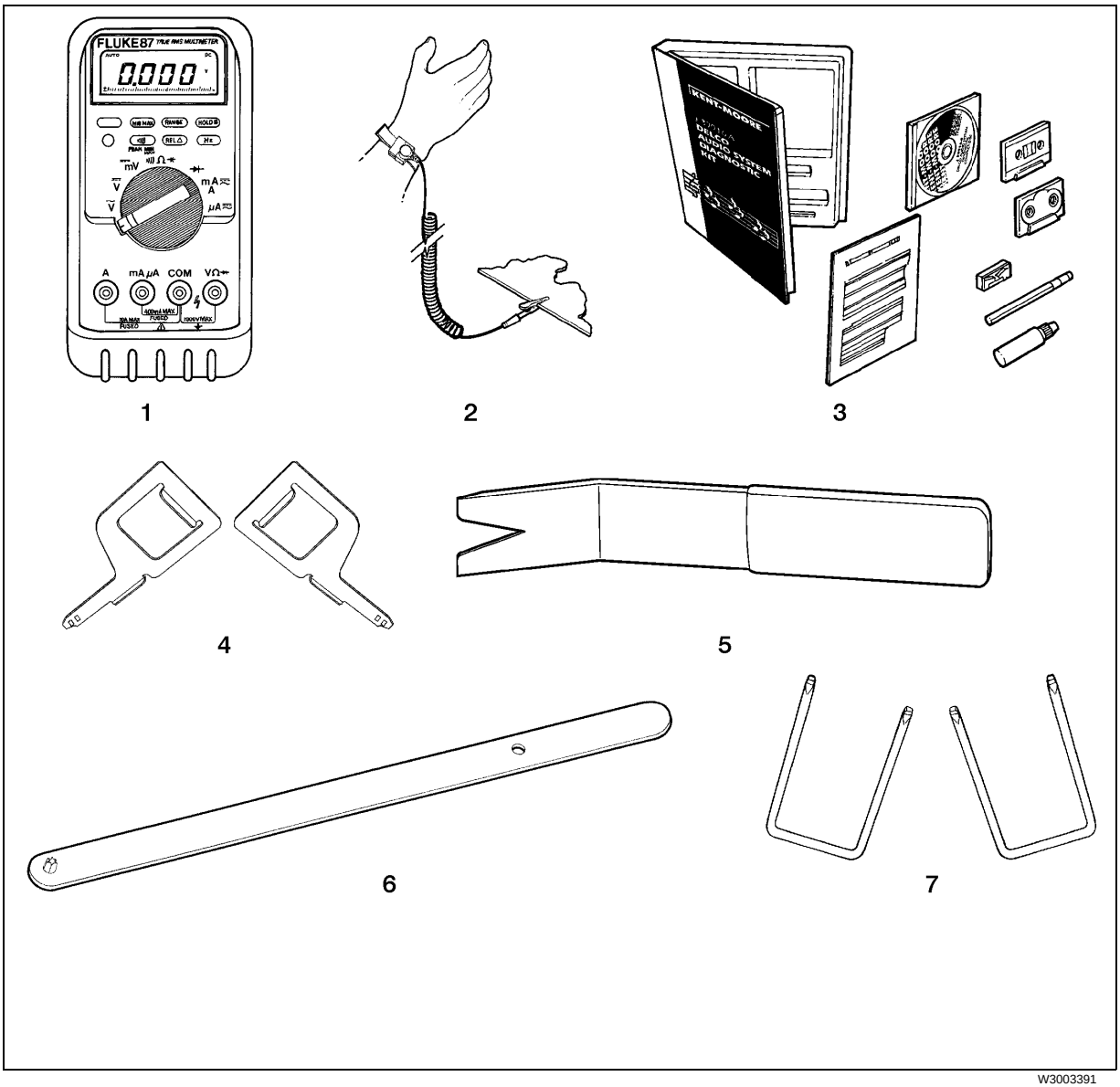
Unauthorized Repair

The warranty may not apply if the product is worked on by an unauthorized person.

Tools

Special Equipment

The following items can be ordered from Kent Moore (1–800–328–6657) or Volvo Parts dealer.



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1 **Kent Moore J39200**, digital multimeter
2 **Kent Moore (several models)**, electro-static discharge strap
3 **Kent Moore J39916A**, diagnostic audio kit
4 **Volvo P/N 3949548 (left), P/N 3949549 (right)**, premium radio removal tools
5 **Kent Moore J38778**, trim pad removal tool
6 **Kent Moore J43144**, torx bit strap tool,
7 **Volvo P/N 176000**, basic radio removal tools

Design and Function

Radio Signals

The radio signal is sent from a broadcast station and this signal is then received by an antenna. The strength of the signal depends on the following:

- The power output (wattage) of the broadcasting station.
- The location of the receiver relative to the broadcast tower.
- Obstacles between the tower and the receiver.
- Atmospheric conditions.
- What band (AM or FM) the station is broadcasting.
- Type of antenna and the grounding bases.

In North America, commercial radio signals are legislated into two bands:

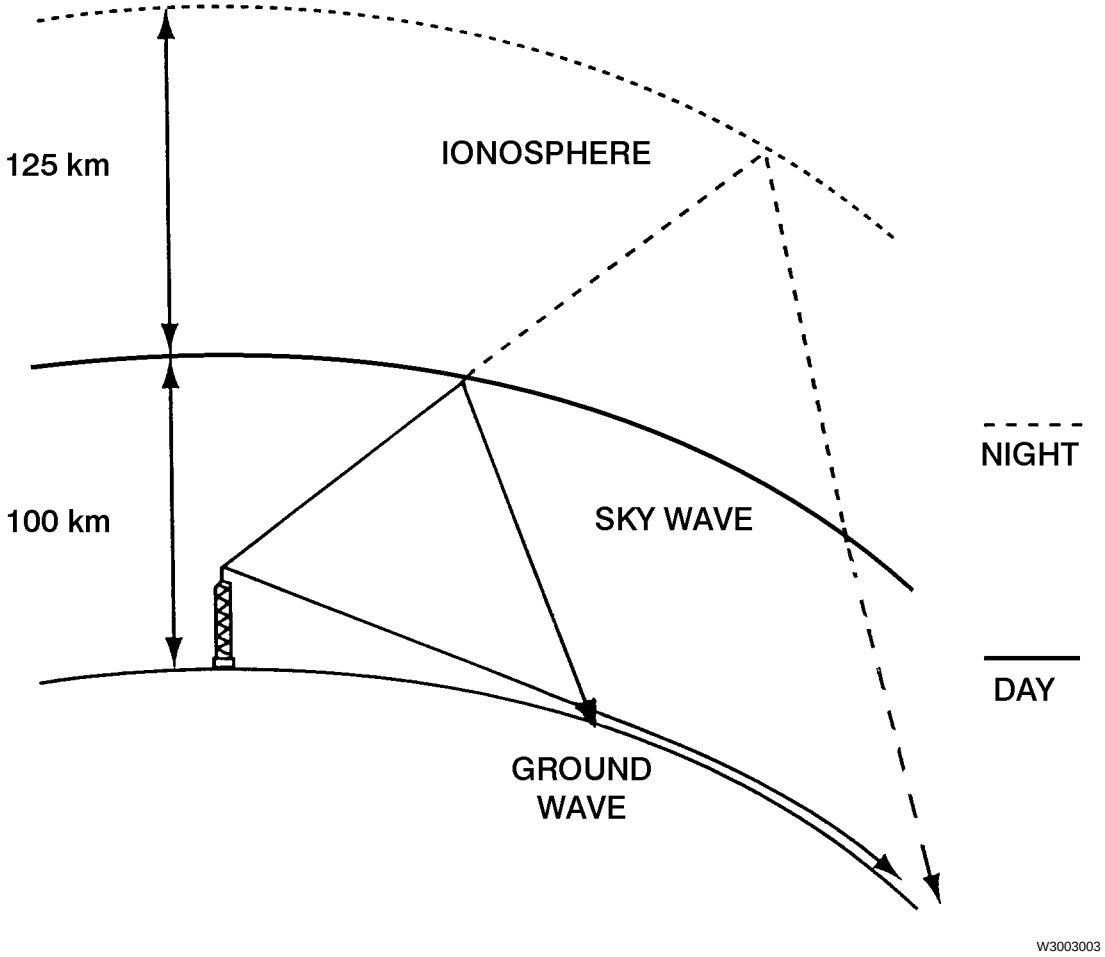
- AM 530-1710 kHz (in 10 kHz steps)
- FM 87.9-107.9 MHz (in 200 kHz steps)

Each frequency range uses a different modulation method. Since a radio wave is really just electromagnetic energy, it must be controlled in a certain way to carry information. The process of adding the information to the radio signals is called modulation. There are two modulation techniques used in radio broadcasts:

- AM = Amplitude Modulation
- FM = Frequency Modulation

The characteristics of the signal depend on both the frequency and the modulation. It is important to understand these characteristics to properly verify a complaint.

AM Band



AM radio signals. (100 km = 62 miles)

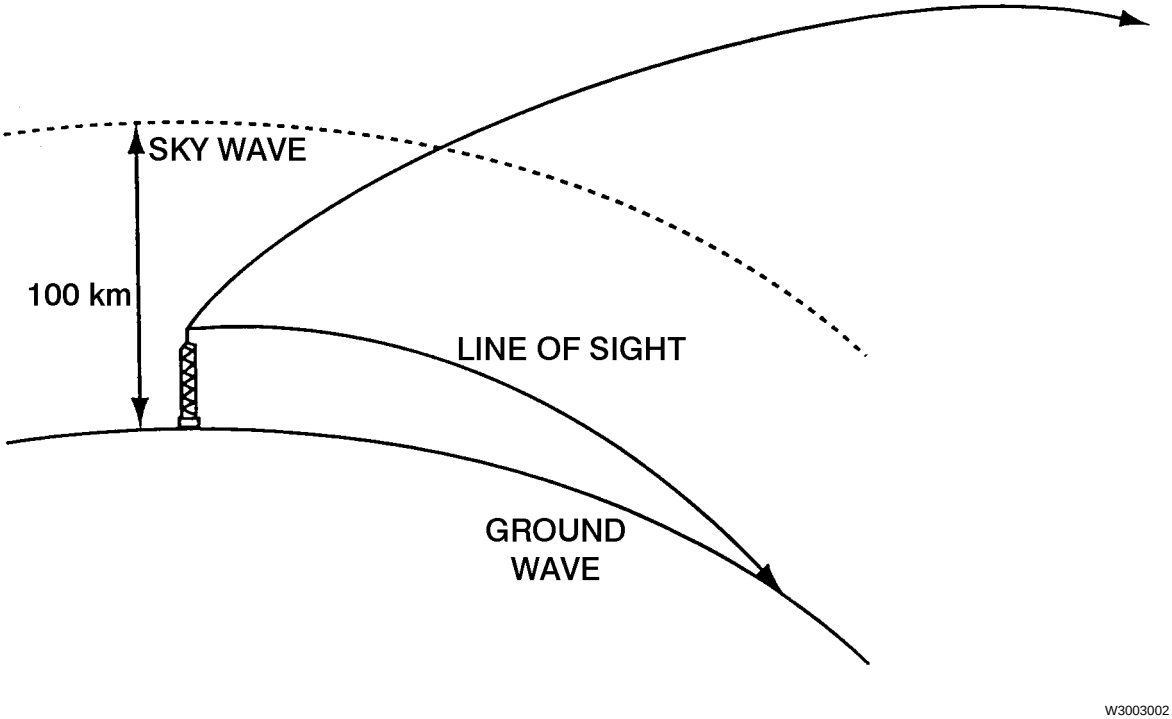
Radio signals in the AM band have lower frequency and longer wavelengths than the FM band. Some characteristics of the AM band include:

- The frequency used is relatively low; therefore, these waves can bend around obstacles and skip along the ground.
- The waves are reflected by the ionosphere layer in the atmosphere.
- Long range reception is sometimes available.
- AM is subject to electrical interferences.
- AM can be blocked by steel and/or concrete structures.

The AM frequencies have longer range due to the ground wave. The ground wave follows the curvature of the earth and is effected by its conductivity. The greater the conductivity, the less the signal loss; so transmission over water is better than over land. The ground wave in this frequency band has a range of 80–320 kilometers (50–200 miles).

The sky wave will pass through the atmosphere and reflect off of the ionosphere to the vehicle's antenna. At night, the ionosphere is actually higher than during the day, so it is possible for AM signals from great distances to be received during nighttime hours. As a result, many AM stations actually reduce transmitting power in the evening hours to maintain the same coverage as during the day.

FM Band



FM band signal. (100 km = 62 miles)

Radio signals in the FM band have higher frequency and shorter wavelengths than the AM band. Some characteristics of the FM band include:

- FM is able to eliminate atmospheric noise mainly due to its method of propagation. Atmospheric noises are generally amplitude related and have little effect on FM signals.
- Reflect off of obstacles.
- Penetrate the ionosphere.

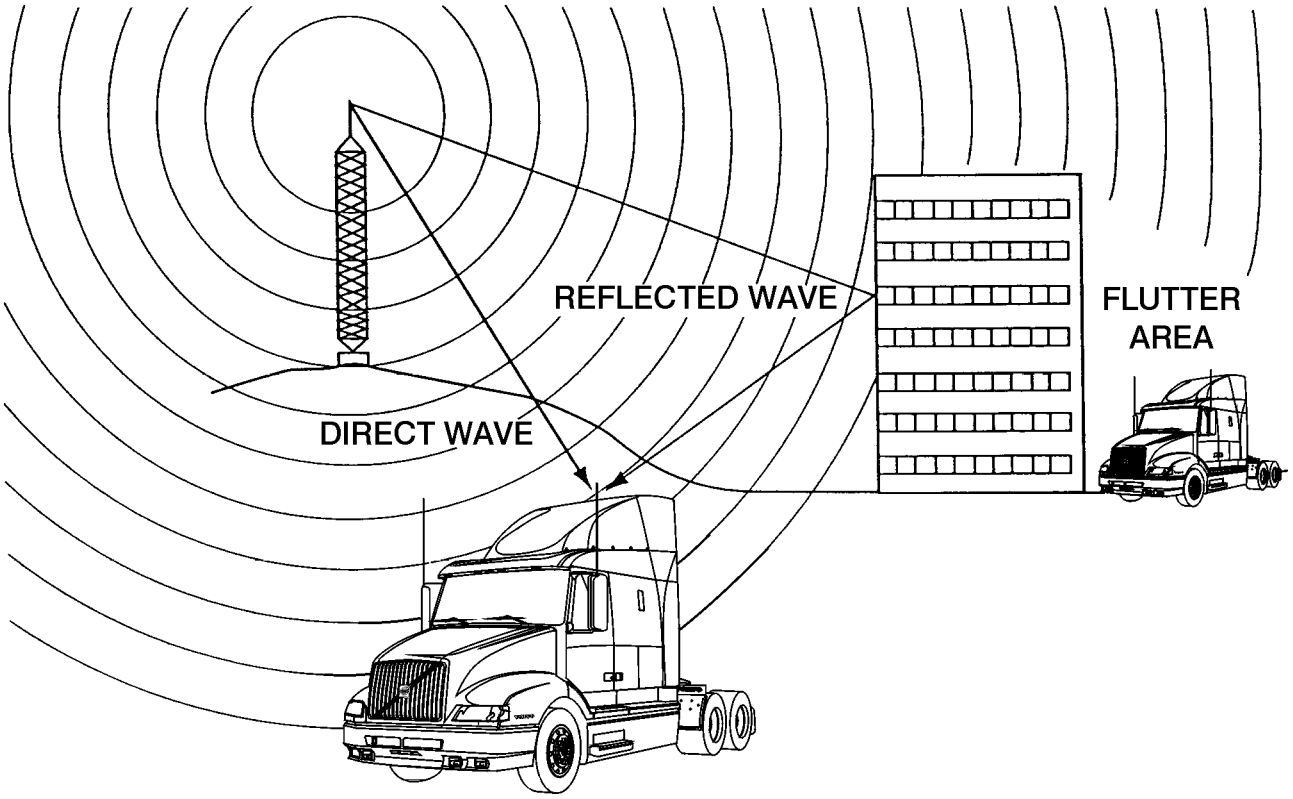
Radio frequencies over 30 MHz are effectively absorbed by the earth, eliminating the ground wave. Even when out of a direct line of sight, the signal may be reflected into areas that would be in a ”shadow” otherwise.

FM signals and light rays respond to atmosphere in a similar manner. The atmosphere bends them both so they will follow the curvature of the earth to a certain extent. This is called refraction and it is similar to a lens which can bend light waves. A good example of this is when you see a sunset. The sunlight is visible with the sun well below the horizon. FM signals characteristically have a shorter range than AM signals.

Factors which affect the line of sight include:

- Height of the broadcast antenna.
- Height of the receiving antenna.
- Terrain and buildings in the broadcast path.

Signal Disruption



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Since the higher frequency signals behave more like light, the signal may be reflected or there may be areas of shadow. When a receiver has more than one signal due to reflection, we call it multipath distortion. When a receiver is located in a signal shadow, we call it flutter.

Multipath

This condition is caused by reflected signals. The reflected signal must travel further than the direct signal, so it takes longer to get to the antenna and it is weaker when it gets there. The receiver then has two signals which are slightly out-of-time with each other. The two signals tend to cancel each other out. This condition is most common in built-up areas which reflect the signals. A multipath area is often only a few inches wide. At home you can locate the antenna to avoid a multipath area, but in your vehicle you may drive in and out of multipath areas.

Flutter

Flutter occurs when the signal strength is too low to allow proper reception. Flutter can occur when in a fringe area of a transmitter. Flutter can occur much closer to the transmitter if the receiver is located in a signal shadow. In a strong signal area, reflection will generally fill in the reception shadows. When there is little to support reflection, an obstacle may cause a signal shadow. Operating in the shadow will cause flutter. This may also be called ”picket fencing”.

Electrical Interference

Electrical interference signal disruptions may come from electrical fields near high tension power lines, vehicle electrical devices or other high power radio signals. Strong FM band signals are usually not affected by electrical interference.

Atmospheric Interference

A loss of sensitivity (especially from stations more than 25 miles away) may be due to atmospheric conditions. An increase in sensitivity for a short period may be due to a complementing atmospheric alignment.

Electrical storms will cause atmospheric interference, especially in the AM band.

Noise

Noise is an undesirable interference in the audio system. Noise can enter the audio system one of two ways, conducted or radiated.

- Conducted noises will have a physical connection to the audio system through one of the audio system circuits.
- Radiated noises have no physical connection to the audio system, but the electrical or magnetic fields reaching the audio system or wiring induce an electrical effect causing noise.

In diagnosing noise complaints, technicians may need to identify noise sources that are physically connected (back-way noise) or sources affected only by radiation. The vehicle contains many ”noisy” components which radiate an electromagnetic signal. As the distance from the radio transmitter station increases, on-board components may begin to compete with desired radio signals. The following pages will help isolate the cause of radio noise and suggest a fix.

EMI / RFI

EMI (Electromagnetic Interference) is the undesirable interference of an electrical system via radiated emissions from another electrical system.

The term ”EMI” includes all disturbances in the electromagnetic spectrum. Within the EMI category is a smaller group known as RFI (Radio Frequency Interference). This is the frequency group of EMI that is the radio frequency band.

RFI characteristics:

- RF (Radio Frequency) waves are radiated when a high-frequency current and proper geometry exist in a circuit.
- Waves travel in all directions and will easily pass through non-conductive materials.
- Waves are reflected by conductive materials unless the geometry is correct for absorption. If so, then the wave is converted into electrical potential.

The energy radiated relates to the amount of energy in the circuit and the geometry.

If conditions are correct, the RF wave will be absorbed into the system and induce stray currents internally within the system. RFI has the capability to cause disturbances over longer distance because of the probability of susceptible devices being highly sensitive. Therefore, RFI can be very difficult to combat in some cases so good diagnostic practices are absolutely required.

Some possible vehicle sources of interference:

- Charging system
- Solenoids
- Motors
- Engine electronics
- 2–way radios
- Citizen band (CB) radios
- Cellular phones
- Satellite Communication systems
- After-market electrical devices

Troubleshooting Consideration

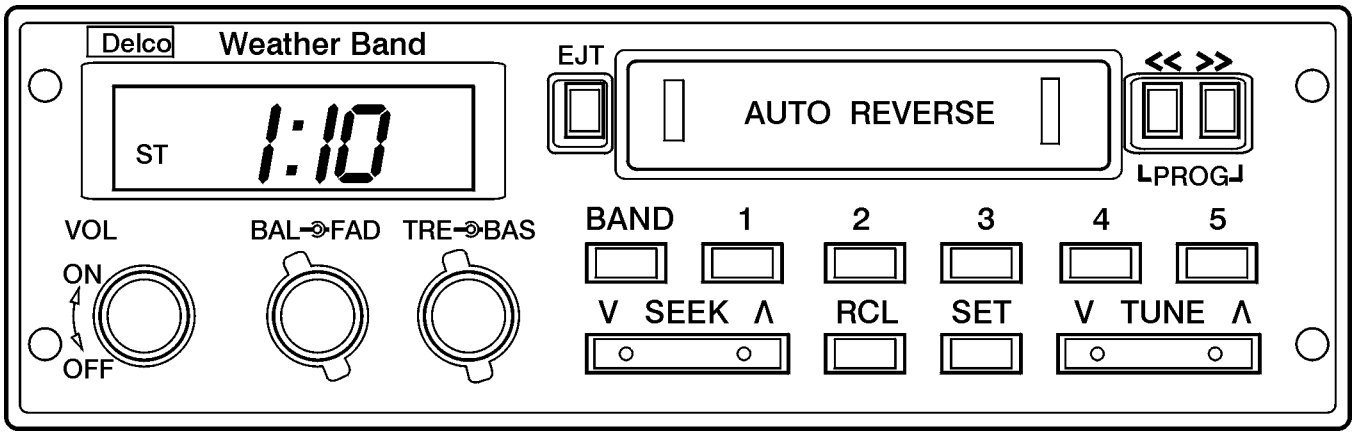
When troubleshooting radio reception problems consider problems associated with radio signals. Do not attempt to troubleshoot radio problems:

- inside buildings (steel and concrete structures are worst).
- in area with reflected signals (see “Multipath” page 9).
- close to areas with known electrical interference such as near high tension power lines.
- with electrical storms in the area.

To minimize flutter, tune to radio stations with a strong signal while troubleshooting. Fore more radio reception troubleshooting see “Noise” page 59.

Stereo Receiver

Basic Sound System



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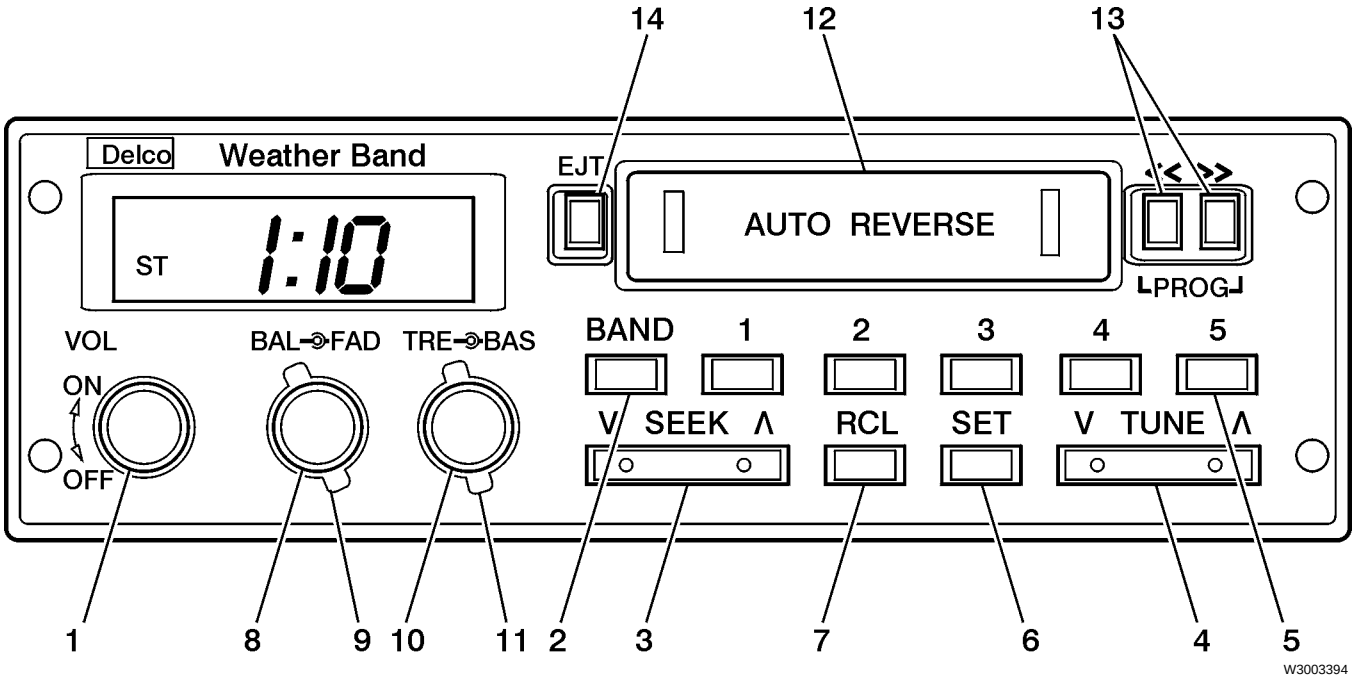
The basic sound system features a Delco Heavy Duty stereo receiver with weather-band. The basic stereo receiver is also available with a cassette tape player. The stereo receiver is installed in the dash and receives constant battery power for its clock and memory functions. The basic stereo receiver does not have ability to detect and display error messages.

Note: NOAA – Weather Radio is a service of the ”Voice of the National Weather Service”. It provides continuous broadcasts of the latest weather information directly from National Weather Service offices. Taped weather messages are repeated every four to six minutes and are routinely revised every one to three hours, or more frequently if needed. Most of the stations operate 24 hours daily.

Operating instructions



1 **Radio Power** – Rotate the ON/OFF **(1)** control clockwise to turn the radio on; rotate CCW to turn radio off.

Volume – Rotate VOL **(1)** control clockwise to increase volume.

2 **AM/FM or WX** – Press BAND **(2)** switch to select desired band. (**AM/FM or WX** will be displayed on band choice.)

Note: The last station heard on each band will be stored in memory. When switching back to that band, it will automatically return.

3 **SEEK** – Press SEEK ∇ **/** Δ **(3)** to automatically search for the next higher or lower listenable station and stay there. It will find another station and stay there. It will find another station each time that you press the button.

4 **Manual Tuning** – Press and hold TUNE Δ **(4)** button to increase frequency. Release as desired frequency is approached. Press TUNE ∇ **(4)** to decrease frequency.

5 **Push-buttons** – Press one of the five push-buttons **(5)** to recall a preset station. (Use the following procedure to setup push-buttons.)

- Locate a favorite station by using SEEK ∇ **/** Δ **(3)** or the TUNE ∇ **/** Δ **(4)** buttons.
- Press SET **(6)** push-button. The station frequency will flash 5 seconds or until set.
- Press the push-button that you want to establish for that station.
- The radio will now return to that frequency each time that button is pressed.

Note: A total of fifteen stations can be preset – 5 AM, 5 FM and 5 WX.

6 **SET** – Press the SET **(6)** button to set a stations frequency.

7 **Clock** – If time-of-day is not on the display, press RCL **(7)**.

- Press and hold SET **(6)** button and at the same time press and hold TUNE Δ **(4)** until correct ***minute*** appears. (Seconds will set to 00 when adjusting minutes.)

Frequency – If radio is turned on and time is being displayed, press RCL **(7)** to display frequency.

Stereo – The radio will automatically switch to stereo when tuned to an FM station broadcasting stereo, and the stereo indicator light **ST** will be displayed.

Note: FADe and **BAL**ance controls have a detent position at the center for a balance of front to rear and left to right.

8 **Balance** – The left-right stereo balance is adjusted by rotating the BAL **(8)** control in the corresponding direction from the detent position.

9 **FADE** – Using the tab behind the BAL control, adjust the FAD **(9)** control to the right to fade toward the rear speakers. Adjust it to the left to fade toward the front speakers.

10 **Treble** – Rotate TRE **(10)** control to the left to decrease treble; rotate TRE control to the right to increase treble.

11 **Bass** – Rotate BAS **(11)** control to the left to decrease bass; rotate BAS control to the right to increase bass.

Note: Both controls, for bass and treble, have a detent position at the center for a balance of treble and bass.

12 **Tape Player** – Insert a tape into the door marked **AUTO REVERSE (12)**. Insert the tape with the raised side to the right.

Note: The arrow, in the display window, points in the of tape play.

13 **Fast Forward** – To activate fast forward press the right hand arrow (>>) button **(13)**. Press the left hand arrow (<<) button lightly to cancel fast forward and return to play mode.

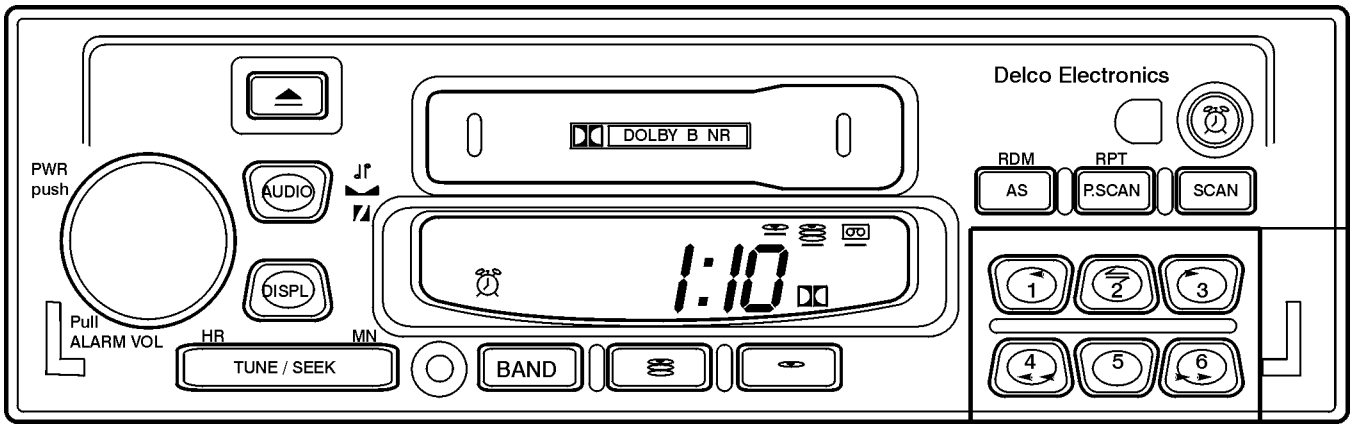
Fast Reverse – To activate fast reverse press the right hand arrow (<<) button **(13)**. Press the right hand arrow (>>) button lightly to cancel fast reverse and return to play mode.

Program – Press both direction buttons **(13)** (<< and >>) simultaneously. The direction arrow will change in the display window and the player will play the other side of the tape.

14 **Eject** – Press EJT **(14)** button firmly to eject a tape.

Note: When a tape is ejected, the radio becomes operative. It is not necessary to eject a tape when leaving the vehicle; a solenoid removes internal pressure automatically.

Premium Sound System



The premium sound system features a Delco Heavy Duty High Performance stereo receiver available with either a cassette or a CD player. The stereo receiver is installed in the dash and receives constant battery power for the clock and the memory functions. The premium stereo has the ability to detect and display some error codes from the cassette or CD player, and from the CD changer (if equipped). Some of the standard features of the premium sound system include:

- THEFTLOCK® theft deterrent feature.
- Sleep Feature.
- Infrared remote control.
- Cassette Tape or CD Player.

The VN 770 and VN 660 are also available with optional:

- Six disc CD Changer.
- Premium speaker system including a 8 channel amplifier and a subwoofer.

Theft Deterrent Feature

THEFTLOCK® is designed to discourage theft of your radio. It works by using a secret code that you select to disable all radio functions whenever the radio is disconnected from the vehicle or battery power is removed.

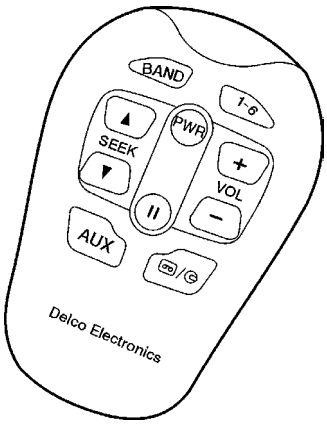
The THEFTLOCK feature of the radio may be used or ignored. If ignored, the audio system plays normally and the radio is not protected by the feature. If THEFTLOCK is activated, your radio will not operate if stolen. Whether THEFTLOCK has been activated or not, a red light on the radio will flash when the ignition is OFF. This light is intended to deter thieves.
For THEFTLOCK operating instructions see “Theftlock” page 37.

Sleep Feature

The premium AM/FM radio receives a battery feed and can be turned on when the ignition is OFF by pushing in the POWER knob. With the ignition OFF, the radio will play for one hour and automatically turn off.

Note: On amplified systems, when the sleep feature is in use, only the two upper bunk speakers can be heard. In order to play the stereo through all speakers, the ignition switch must be turned on. (Applies only the VN 770’s premium speaker package.)

Infrared Remote Control



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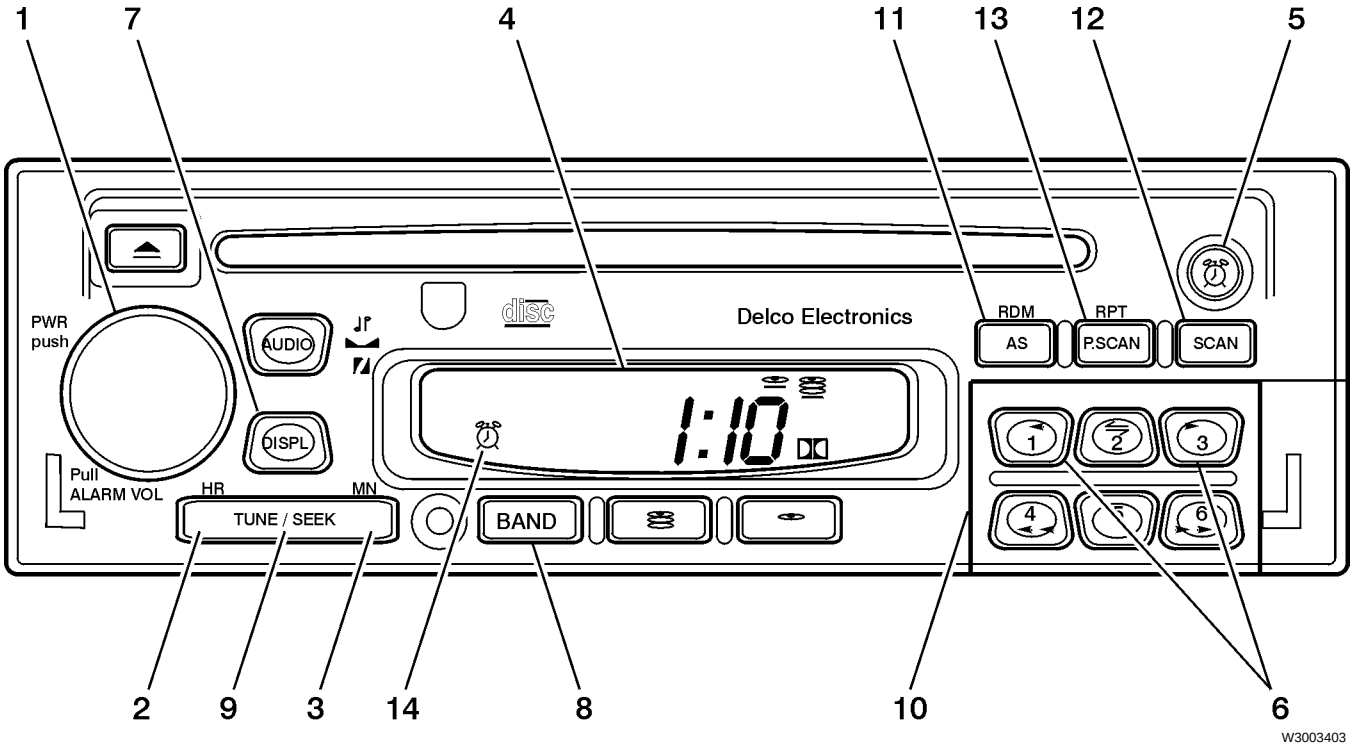
The premium sound system is equipped with an infrared remote control. The remote control will:

- Turn the radio on and off.
- Adjust volume.
- Select a preset station.
- Seek up and down.
- Select band (FM1, FM2 or AM).
- Play a cassette tape.
- Change cassette tape side.
- Play a CD.
- Select the next or previous CD track.
- Select the next CD.

Operating Instructions



Clock

12 or 24 Hour Mode:

1 Turn the ignition ON and the radio off.

2 Press both the HR **(2)** and MN **(3)** buttons at the same time. Hold them for 2 seconds.

3 Press both buttons again and hold to switch modes.

The current mode will appear on the display **(4)**.

To Set the Clock:

1 Turn the ignition ON and the radio off.

2 Press and hold HR **(2)** until the correct hour appears on the display.

3 Press and hold MN **(3)** until the correct minute appears on the display.

The clock is now set.

Alarm

To Set the Alarm:

1 Press the alarm button **(5)** and hold until an alarm icon **(14)** and the time at which the alarm is currently set appear on the display.

2 Press the HR button **(2)** until the desired hour appears on the display.

3 Press MN button **(3)** until the desired minute appears on the display.

When the alarm icon and the time appears on the display, the alarm has been set. If the radio is on the alarm sounds. To turn off the alarm sound activate snooze or turn off the alarm by pressing the alarm button **(5)**.

To check the time for which the alarm is set, momentarily press the alarm button.

To Turn Off the Alarm:

1 Press and hold the alarm button **(5)** until the alarm clock icon on the display disappears.

To Set the Alarm Volume:

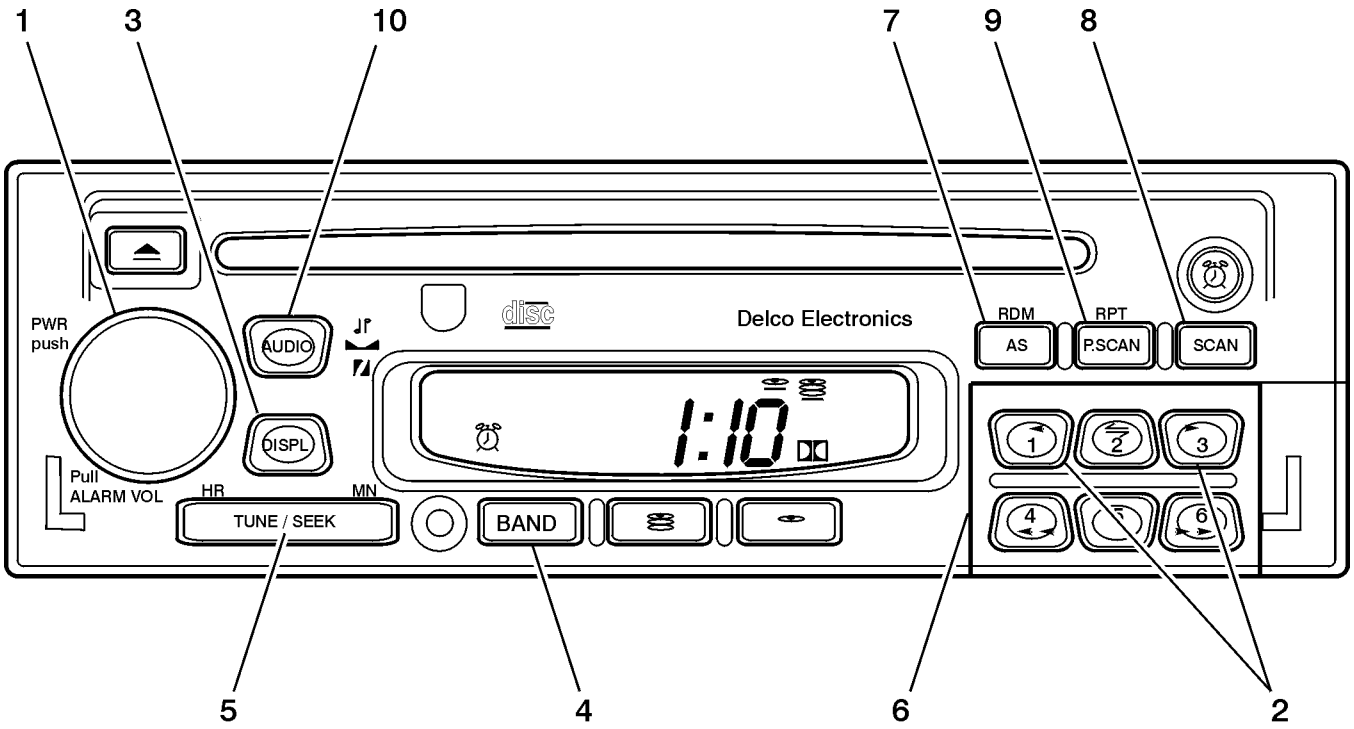
1 Turn the radio on.

2 Pull out the volume knob **(1)** gently, and rotate to set the alarm volume.

3 Push the knob in to set the alarm volume.

The radio will return to the volume level at which the radio was previously playing.

- Press any button or the volume knob when the alarm is sounding. The display will show **SNOOZE** momentarily. The alarm will sound again every 9 minutes until it is turned off.



Radio

Power: The radio can be turned on when the ignition is ON or OFF by pushing the PWR knob **(1)**. If the ignition is OFF the radio will play for one hour and automatically turn off (sleep feature).

IGN OFF – Radio ON/OFF: The radio can be programmed to switch on and off independent of the ignition.

1 Turn the ignition ON and the radio off.

2 Press and hold push-buttons 1 and 3 **(2)** at the same time until it beeps. The radio display will show **IGN OFF=RADIO OFF** or **IGN OFF=RADIO ON**.

3 Repeat this procedure to implement the opposite condition.

If the display reads **IGN OFF=RADIO OFF**, the radio will turn off when the ignition turns OFF. If the display reads **IGN OFF=RADIO ON**, the radio will play, when the ignition is turned OFF, until the radio is turned off or the battery runs down.

Note: The automatic turn off after 1 hour is only valid when the radio is turned on while the ignition is OFF.

Default Display:

1 Press DISPL **(3)** to view either radio frequency or the time. Pressing DISPL more than one time allows to toggle between the two displays.

2 Press DISPL again, hold it until it beeps, to set the display.

To Find a Station:

Band: Press the BAND **(4)** button to switch between AM, FM1 and FM2. The radio display shows the selection.

TUNE: Press the TUNE/SEEK button **(5)** once to tune to the next higher or lower station one frequency at a time. Press and hold TUNE/SEEK until it beep to seek the next station. When a station with a strong enough signal is found, the seek function will stop and the station will play. Press TUNE/SEEK to stop seeking.

Presetting Stations: 6 stations per band can be preset.

1 Turn the radio on.

2 Select the band.

3 Tune in the desired station.

4 Press and hold one of the 6 push-buttons **(6)** until it beeps. Whenever the button is pressed now, the station set will be played.

5 Repeat steps 1 – 4 for each push-button.

AS: Press AS **(7)** (Auto Store) to automatically store the 6 strongest stations onto the preset push-buttons. AS only presets the default band.

SCAN: Press SCAN **(8)** to scan all station on the default band. When a frequency of sufficient strength is found, the radio will play for 5 seconds and then continue scanning for next station. To stop the scanning press SCAN again.

P.SCAN: Press P.SCAN **(9)** to scan the presets on the default band. To stop the scanning press P.SCAN again.

Adjusting the Radio:

AUDIO: To adjust Balance, Fade, Bass, Treble, DIM and SEEK Sensitivity, press the AUDIO button **(10)** until the feature appears on the display.

Balance: Rotate the VOL knob **(1)** to move the sound to the left or right speakers.

Fade: Rotate the VOL knob to move the sound to the front or rear speakers.

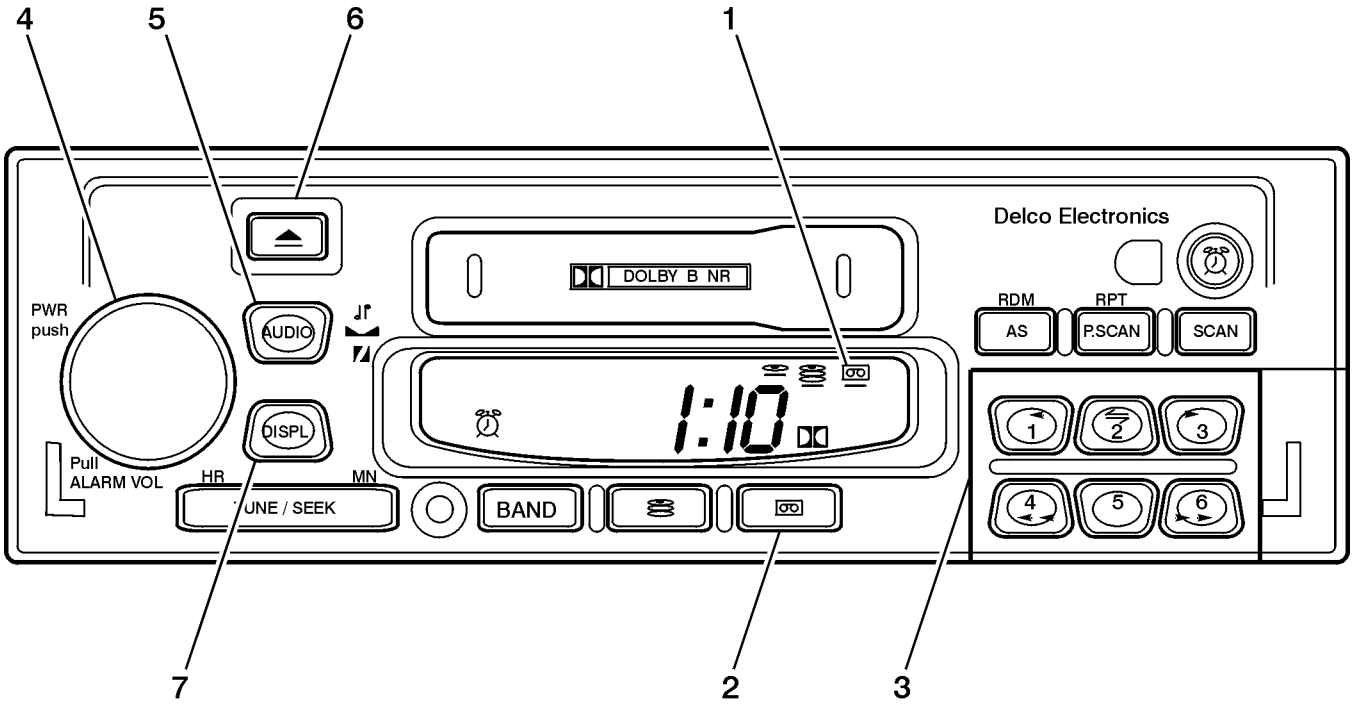
TREBLE: Rotate the VOL knob to adjust treble sound.

BASS: Rotate the VOL knob to adjust the bass sound.

DIM: Rotate the VOL knob to adjust the brightness of the radio display. The brightness can be only be adjusted when the vehicle lights are on.

SEEK: To set the radio to seek and find station with a weak signal, press the AUDIO button until **SEEK+2** appears. To set the radio to seek only strong signals, press the AUDIO button until **SEEK–2** appears.

Press the AUDIO button one more time to set all adjustments and return to the default display.



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Cassette Tape Player

To Play a Cassette Tape:

1 Turn the radio on.

2 Insert a cassette into the cassette slot. The cassette icon **(1)** will appear on the display and the tape will begin to play.

3 If the radio or a CD playing, press the tape button **(2)** to play the cassette. If no tape is loaded into the player, the display will show **NO TAPE**. If a tape is in the player, **SIDE 1** or **SIDE 2** will be displayed.

4 The six numbered push-buttons **(3)** helps to operate the tape player conveniently.

- Press ***1*** (◄) to go to the beginning of the selection being played. If this button is pressed during the first 8 seconds of the selection, the previous selection will be played.
- Press ***2*** to reverse the direction of the tape and play the existing track in that position.
- Press ***3*** (►) to go to the next selection.
- Press ***4*** (◄◄) to rewind.
- Press ***5*** to turn the Dolby background noise reduction on or off.
- Press ***6*** (►►) to fast forward.

5 Use the VOL knob **(4)** and AUDIO button **(5)** to adjust the sound.

EJECT: Press the eject button **(6)** to eject a tape from the tape player.

DISPL: Press the DISPL button **(7)** to view the time, SIDE 1 or SIDE 2. Pressing DISPL more than one time allows to toggle between the displays. Press DISPL and hold it until it beeps, to set the default display.

TAPE: Press the tape button **(2)** and hold for 2 seconds any time the radio is on, to enable or disable ”Radio Monitor”. This feature allows you listen to the radio while a tape is rewinding or fast forwarding. The display will read **RADIO ON** or **RADIO OFF**.

If the radio detects a bad cassette, **BAD TAPE** will appear on the display, and the tape will be ejected. The tape may be damaged or too tight. If it is damaged, try a new tape.

If the tape is too tight, the player can not turn the tape hubs. Remove the tape and hold it with the open end down. Try to turn the right hub counterclockwise with a pencil. Turn the tape over and repeat. If the hubs do not turn easily, the tape may be damaged and should not be used in the player.

Note: When using a CD adapter or a cleaning cassette, the bad tape detector must be turned off.

Bad Tape Detector, ON/OFF:

1 Turn the ignition ON and the radio off.

2 Press and hold the tape button **(2)** for 5 seconds. The display will read **BAD TAPE DETECT OFF**; a beep confirms that the bad tape detector is off until the next ignition cycle.

Cleaning the Tape Player: After 24 hours of cassette play, the display will read **TIME TO...** If then pressing the DISPL button **(7)**, **CLEAN TAPE PLAYER** will appear.

Note: Avoid touching the cassette head with magnetic or hard objects or/and lubricating the player mechanism.

1 Turn off the ”Bad Tape Detect”.

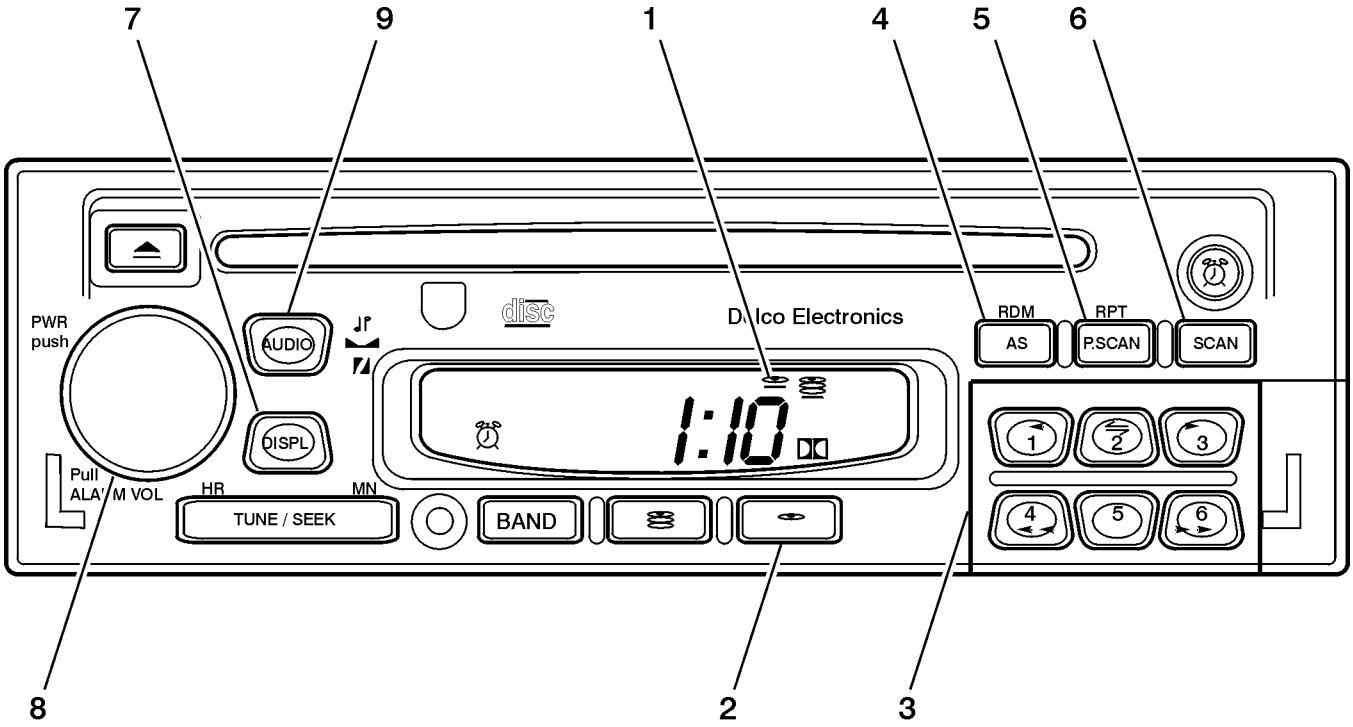
2 Insert a wet-type, nonabrasive, scrubbing cassette cleaner. (See “Diagnostic Test Kit — Cassette Head Cleaning” page 45.)

3 Follow the cleaning instructions provided with the cassette cleaner.

4 Press the AUDIO button until the display reads **CLEAN** ◊.

5 Rotate the VOL knob until **YES** appears.

6 Approximately 5 seconds after YES appears, the cleaning reminder will disappear, and the display will return to the previously set display.



W3003401

Compact Disc Player

To Play a CD:

1 Turn the radio on.

2 Insert a CD part way into the slot, with the label side up. The CD icon **(1)** will appear on the display and the disc will begin to play if the radio is in the CD mode.

Note: The player will automatically pull the disc in once it has been partially inserted.

3 If the radio or a cassette is played, press the CD button **(2)** to play the CD. If no CD has been loaded into the player, the display will show **NO CD**. If a CD has been loaded , the display will show the track number followed by the elapsed time on the track.

4 The numbered push-buttons **(3)** helps to operate the CD player conveniently.

- Press ***1*** (◄) to go to the beginning of the track being played. If this button is pressed during the first 8 seconds of the track, the previous track will be played.
- Press ***3*** (►) to go to the next track.
- Press ***4*** (◄◄) to fast reverse.
- Press ***6*** (►►) to fast forward.

5 Use the VOL knob **(8)** and AUDIO button **(9)** to adjust the sound.

Note: When driving on a very rough road or if it is very hot, the disc may not play and **ERROR** and a number may appear, for 5 seconds, on the display. Error may also appear if a disc is dirty, wet or the air is very humid.

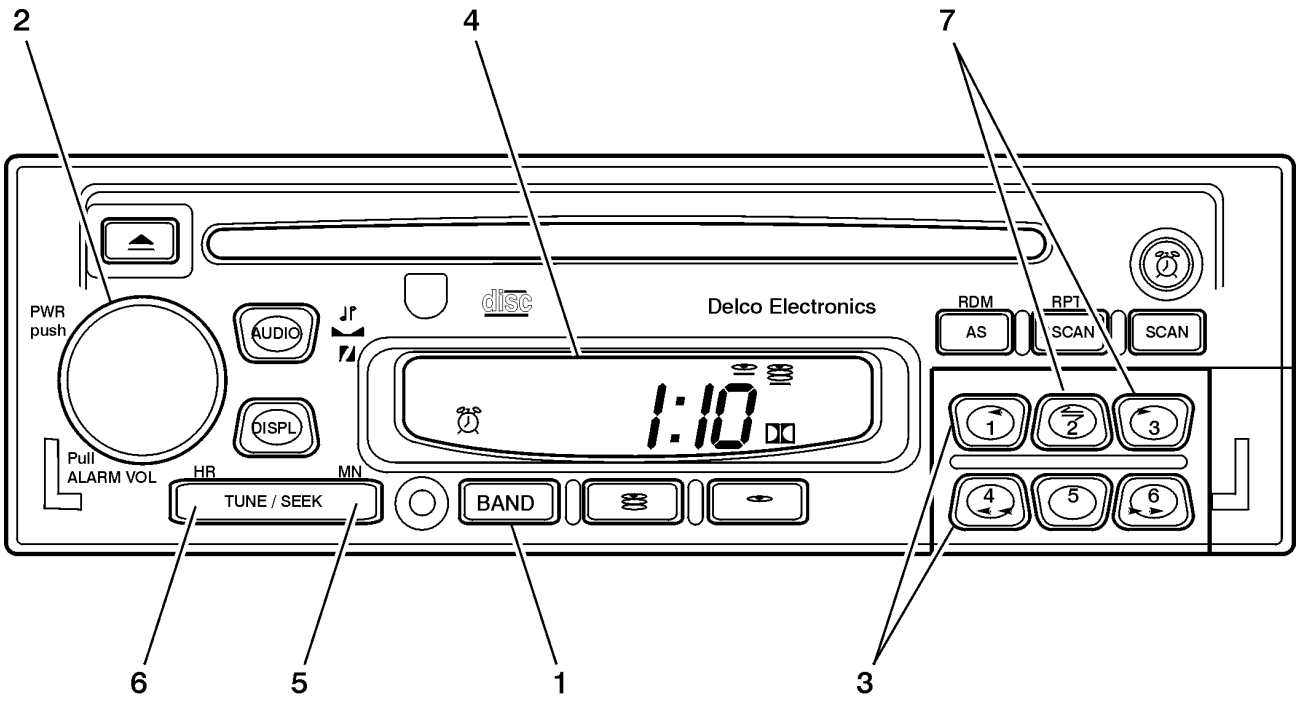
Note: If a CD is inserted upside down, **FOCUS** will appear on the display. Remove the CD and insert it with the label up.

RDM: Press the RDM button **(4)** to activate random track selection. RDM will illuminate. All tracks on the CD will be played in random order. **RDM** on the display indicates ”random play” on. Press this button again to turn off the ”random play” beginning with the next track played.

RPT: Press the RPT button **(5)** to repeat the same track again. **RPT** on the display indicates that this feature is on and the track will be repeated until the RPT button is pressed again. The disc number and track number will also show on the display.

SCAN: Press the SCAN button **(6)** to immediately advance to the next track. **SCAN** will appear on the display and 10 seconds of the track will be played, the CD will advance to the next track, play 10 seconds and continue. To deactivate SCAN, press the SCAN button again.

DISPL: Press the DISPL button **(7)** to view the disc number, elapsed time, track number or the time. Pressing the DISPL button more than one time allows to toggle between the displays. Press the DISPL button and hold it until it beeps to set the default display.



Theftlock

When THEFTLOCK is activated, the radio will display **LOCKED** to indicate a locked condition anytime battery power is removed. If your battery loses power for any reason, you must unlock the radio with the secret code before it will operate. To unlock a locked radio see “Theftlock” page 37.

The instructions that follow explain how to enter your secret code to activate the THEFTLOCK system. It is recommended that you read through all 11 steps before starting the procedure.

Note: If you allow more than 15 seconds to elapse between any of the steps, the radio will automatically revert to time and you must start the procedure over at step 4.

To activate THEFTLOCK:

1 Choose a 4–digit code between 0000 and 9999.

Note: Keep the code in a secure place.

2 Turn the ignition ON.

3 Turn the radio off **(2)**.

4 Press push-buttons 1 and 4 **(3)** at the same time. Hold them until **– – – –** shows on the display **(4)**.

5 Press MN **(5)**, **0000** will appear on the display.

6 Press MN **(5)** as many times as needed to make the last two digits agree with the secret code you have chosen.

7 Press HR **(6)** as many times as needed to make the first two digits agree with the secret code you have chosen.

8 Confirm that the code on the display matches your secret code.

9 Press BAND **(1)**. The display will show **REPEAT** to let you know that you need to confirm your code.

10 Repeat step 5–8 to confirm your code.

11 Press BAND **(1)**. The display will show **SECURE** to let you know that your radio is secure. If THEFTLOCK has not been activated, **– – – –** will show on the display. To activate, repeat steps 4–11.

To disable the THEFTLOCK:

Note: Pause no more than 15 seconds between the steps.

1 Turn the ignition ON.

2 Turn the radio off.

3 Press the push-buttons 1 and 4 **(3)** together until

SECURE shows up on the display.

4 Press MN **(5)**. The display will show **0000**.

5 Press MN **(5)** as many times as needed to make the last digits agree with the secret code.

6 Press HR **(6)** as many times as needed to make the first digits agree with the secret code.

7 Confirm that the code on the display matches the code you have chosen.

8 Press BAND. The display will show **– – – –** indicating that the radio is no longer secure.

Note: If the display shows **SECURE**, the incorrect code was entered. Repeat steps 1–8.

Infrared Remote Control

1 Press the PWR button **(1)** to turn the radio on or off.

2 Press the VOL + button **(2)** to increase the volume.

3 Press the VOL – button **(3)** to decrease the volume.

4 Press the mute button **(4)** to reduce the volume to a minimum. The display will read **MUTE**. To deactivate mute, press this button again.

5 Press this button **(5)** to move to the next (preset) radio station.

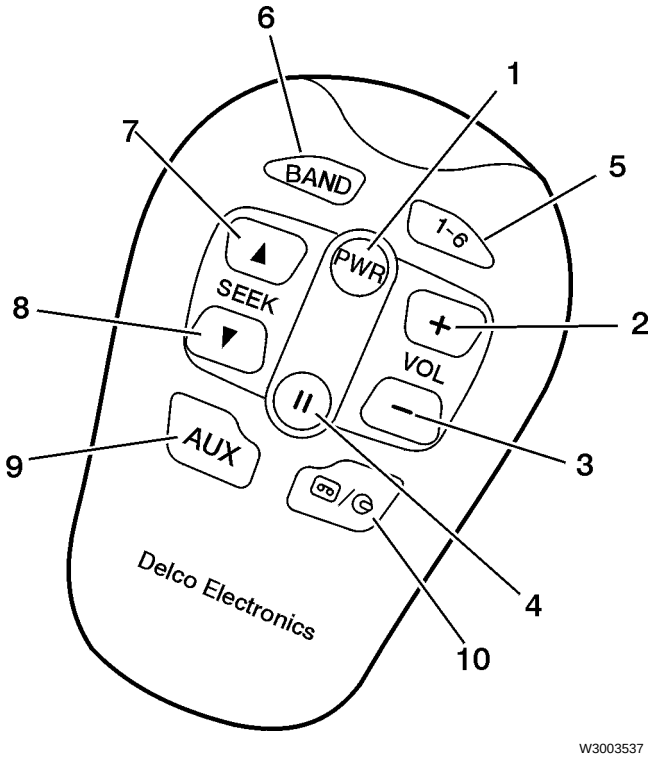
6 Press the BAND button **(6)** to select FM1, FM2 or AM.

7 If in radio mode, press the SEEK ▲ button **(7)** to move to the next strongest radio station up the band. If in cassette or CD mode, press the SEEK ▲ button **(7)** to go to the next track of the cassette or CD.

8 If in radio mode, press the SEEK ▼ button **(8)** to move to the next strongest radio station down the band. If in cassette or CD mode, press the SEEK ▼ button **(8)** to go to the beginning of the cassette or CD track.

9 Press the AUX button **(9)** to play a CD loaded in the CD changer. Press this button again to select the next loaded CD.

10 Press this button **(10)** to turn on integral cassette or CD player. Press this button again to change tape sides or advance to the next CD track.



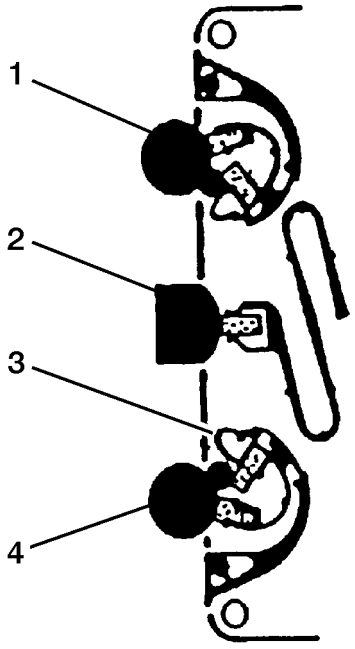
CD Changer

How to operate a CD changer see “To Play CDs Loaded in the CD Changer” page 30.

Cassette Tape Player

Cassette tapes operate on the basis of magnetics. When an unrecorded tape passes through the record head, the oxide particles are magnetized such that the pattern represents electronically the sound information that one wishes to record. Once the information has been recorded, it is played back by the tape passing over the playback head. The magnetically stored information is decoded as electrical voltages. These differences in voltages are amplified through several stages until an audio signal is obtained.

Those parts most important in the playback of a cassette are; the supply reel, take-up reel, capstan, pinch rollers and the tape head. When the cassette is properly loaded, the motor starts. The motor will then rotate the capstan. (The capstan is a rod which comes up, rotates and allows the tape to feed over the head.) One of the pinch rollers comes forward and ”squeezes” the tape between it and the capstan. Simultaneously, the head pulls into place. For the cassette to play, the head can be no more than 0.7–0.8 micros away from the tape head. (A human hair is typically 60–100 micros thick.) The tape then passes over the playback head. The magnetic information stored on the tape is read by the playback head and then converted into an electrical signal. This signal, on the order of 90 mV (millivolts), is sent to a pre-amplifier in the cassette player. The pre-amplifier creates a signal of about 0.58 V. This signal is sent to the receiver where it is amplified and played at the specified level.



W3003392

1 Auto reverse tape drive
2 Tape head
3 Capstan
4 Pinch roller

Cassette Tape Care

Cassette tapes longer than 90 minutes may be too thin to work well with automotive cassette player.

Do not use cassettes that are deformed, dirty or contaminated.

Cassette tapes that are not properly stored in their plastic cases away from contaminant’s, direct sunlight and extreme heat, may not properly operate and could cause premature failure of the tape player.

Cassette tapes are subject to wear and the sound quality may degrade over time. Always verify the cassette tape is in good condition before use.

Compact Disc Player

CD (Compact Disc) players are somewhat similar to conventional record players. The disc is rotated by a motor, just like record is. However, the CD plays inside to outside unlike the record player which plays outside to inside. The speed of a record player does not change, but the rotation speed of a disc does change to maintain the same velocity as the spiral diameter changes. The speed slows down as the laser moves from the inside to the outside of the disc.

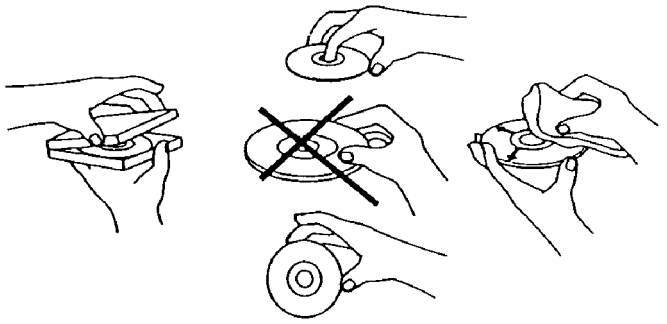
A CD player reads the information as digital electronic signals, whereas a phonograph reads the information as mechanical signals. An optical pickup (laser beam) performs the same function as that of the record player's mechanical stylus. Nothing mechanical ever touches the disc. The light beam emitted from the pickup carries the data. This signal is converted into an analog signal which is filtered to achieve the final audio signal which can be processed by a home stereo or a vehicle system.

Compact Disc

A compact disc contains digitally encoded music which is read by a laser beam. The data is read as a change in laser light intensity. Since no stylus ever touches the disc surface, there is no disc wear from playing. Thus, digital storage, error protection and disc longevity create a high fidelity audio medium.

Compact Disc Care

Particular care and handling should be taken to preserve compact discs.

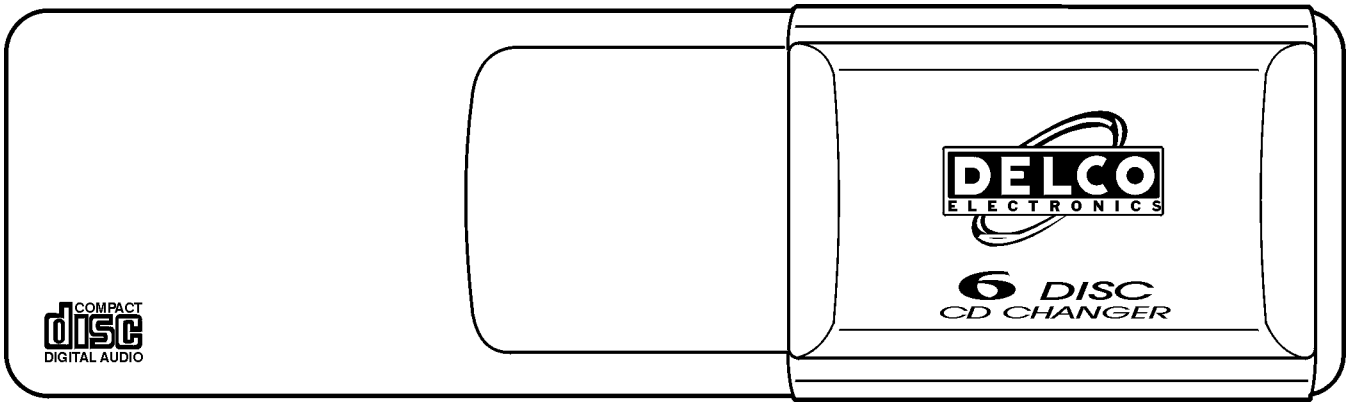


W3002998

- Mini CDs called ”singles” (about 0.1 m (4 in.) in diameter), in most cases, will not eject and should not be used.
- The ability of the compact disc to play is adversely affected by fingerprints, dirt, scratches and sometimes data defects caused during manufacturing of the disc.
  These can decrease the amount of light reflected from the recorded surface, thus affecting sound quality. If the disc becomes soiled, gently wipe any soil from the center of disc to the outer edge.

  Note: Do not use volatile chemicals such as benzine, thinner, record sprays or antistatic agents, which can damage the disc.
  If a cleaner is needed, use a solution of mild neutral detergent.
- Do not attempt to play cracked or warped discs. Should a player exhibit playability problems, substitute another clean/new disc to verify whether the problem in the disc or the player. The disc revolves at a high speed within the player so a defective disc should not be used.
- Be sure never to touch the signal surface when handling discs. Pick up discs by grasping the outer edge.
- Do not affix paper or tape to the disc and avoid scratching the disc.
- As with traditional audio records, compact discs are made of plastic. To avoid warping, keep the discs in their cases, and do not store them in direct sunlight.

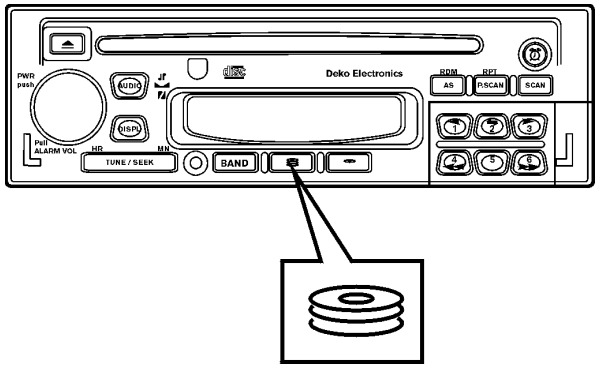
CD Changer



W3002991

The VN 770 and the VN 660 equipped with a Premium Sound System may be equipped with a six disc CD changer, capable of storing and playing up to 6 full size CD's.

All CD functions, except ejecting of the magazine, are controlled by stereo buttons. While the CD changer is loading CDs, the CD changer icon in the radio display will blink. This process will take approximately one minute.



W3003006

CD Changer Magazine

Handling the CD Magazines

Precautions for handling magazines:

- Do not put the magazine in a place where it will be exposed to high temperatures or direct sunlight.
- Do not disassemble the magazine or knock it against anything.
- Never insert anything other than compact discs.
- Do not attach a label or tape to a disc.
- The use of benzine, thinner, insecticide or other volatile chemicals may damage the magazine surface.

Inserting Discs

Load the discs in the magazine. Up to 6 discs can be loaded in the magazine. The discs are numbered 1 to 6 from the bottom disc tray.

Loading and Removing the Magazine

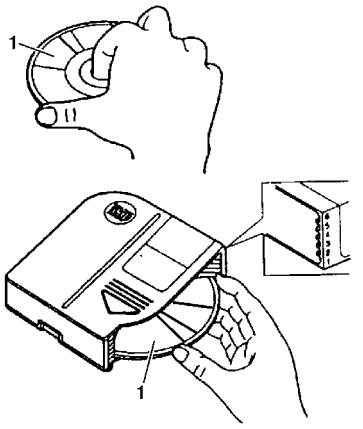
To Insert a Disc

1 Be sure to hold a disc with the label (the side where titles are printed) up as shown.

2 With the disc mark on the magazine up, insert disc, one at a time, straight into slots of the magazine until it is locked with a click.

⚠ CAUTION

Insert each disc straight and level, not tilted, into a slot to avoid trouble.



W3003004

1 Label side

To Remove a Disc

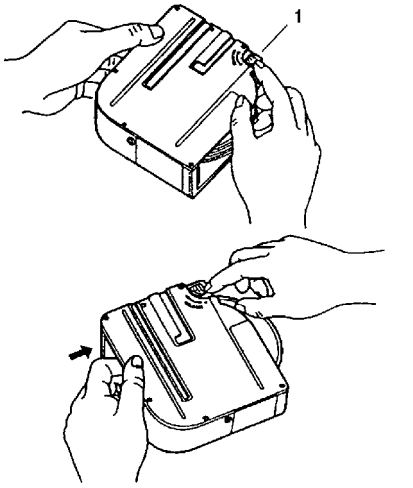
1 Turn the magazine upside down, hold it level and turn the disc release lever in the direction of release to unlock.

2 The disc can now be removed from the magazine by lightly pushing them through the opening. Be careful not to drop the disc.

CAUTION

Be sure to use the magazine supplied with the unit as an accessory, any other magazine can not be used.

Never use protected film or stabilizer, commercially available as a CD accessory, for the unit because it may cause malfunction.



W3002997

1 Disc release lever

How to Use the CD Changer Unit and Disc Magazine

To Load a CD Magazine

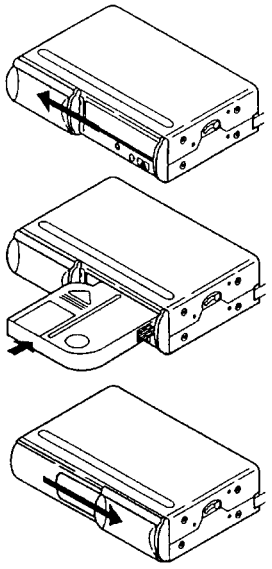
1 Slide the door to the left until it is fully open with a click.

2 Check the unit for its top and magazine inserting direction and carefully push the magazine into it until you hear a click.

3 Close the slid door fully until you hear a click.

CAUTION

Be sure to keep the CD door closed to prevent dirt and dust from getting into the unit and causing possible malfunctions.



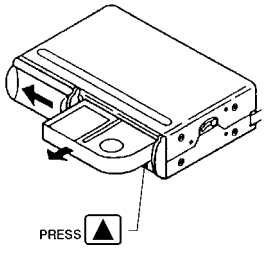
W3002995

To Remove a CD Magazine

1 Open the slide door.

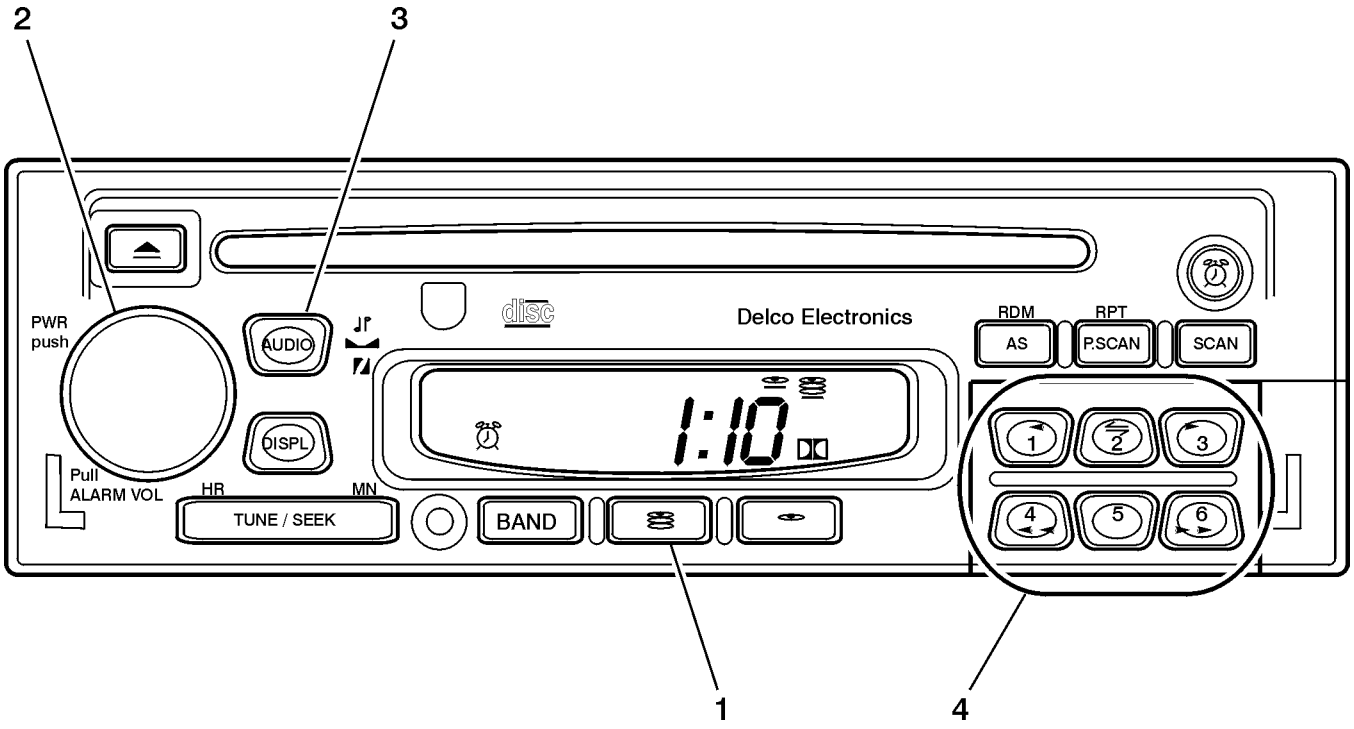
2 Press the eject button. The magazine will eject automatically.

3 Pull the magazine straight in the arrow direction until it comes off the unit.



W3002996

Playing CDs



W3003538

To Play CDs Loaded in the CD Changer

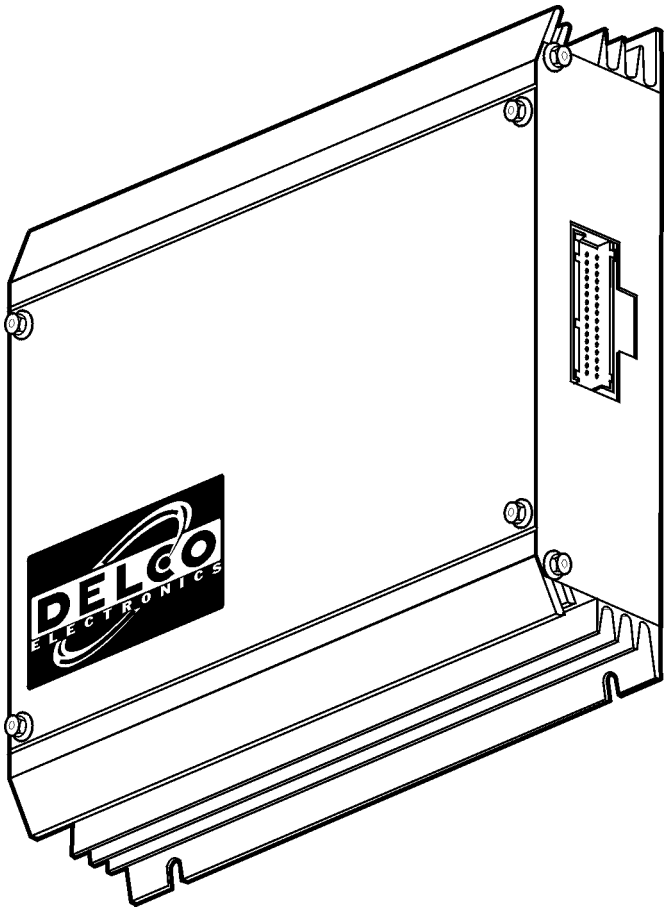
1 Make sure the CD changer is loaded.

2 Turn on the radio.

3 Press the CD changer button **(1)** on the radio. When a CD begins to play, the display will show the disc and track number followed by the elapsed time on the track and then return to the default display you have chosen.

4 While the CD is playing, use the VOL knob **(2)**, AUDIO button **(3)** and the push-button **(4)** just as when playing a CD player (see “Compact Disc Player” page 21).

Amplifier



W3003014

The purpose of an amplifier is to increase the power of a voltage or current signal. The output signal of an amplifier may consist of the same frequencies as the input signal or it may consist of only a portion of the frequencies of the input signal, as in the case of a subwoofer or a mid-range amplifier.

The amplifier provides better sound performance in general and can be played at higher volume levels without noticeable distortion. The Delco Electronics amplifier in the VN 770's premium speaker package has been tuned with special volume levels and filters at specific frequencies on all eight channels to optimize the system components for the vehicle's unique acoustics.

Speakers

All speakers operate on the same basic principle. A basic speaker consists of a cone, voice coil, magnet, magnetic core and two wires which connect the speaker to the receiver.
The speaker's permanent magnet creates a magnetic field that is radiated outward and through the voice coil that is attached to the cone. As the audio signal (alternating current) passes through the voice coil, it creates a varying magnetic field that interacts with the magnetic field from the permanent magnet. This interaction of magnetic fields forces the cone to move back and forth, thus creating sound waves.

The speaker plus (+) and minus (-) (or A and B) signs only define a direction of motion during the conversion from electrical to mechanical energy.

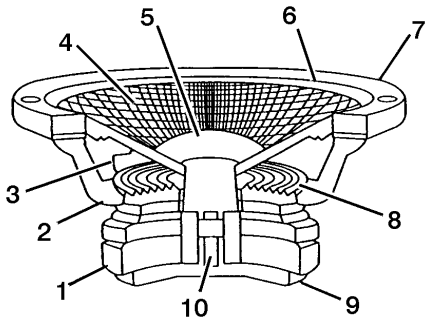
The plus and minus do not directly relate to a voltage level. By convention, if a battery's positive terminal is connected to speaker terminal (+) and battery negative is connected to speaker terminal (-) then the speaker cone will move outward. Speakers should be connected with the correct polarity to the receiver, otherwise the two different speaker cones can be moving in opposite directions during the same input. This will lead to less effective sound reproduction because the speakers are out of phase with each other.

When the speaker is at rest, such as during minimum volume, the voltage applied to each side of the speaker is 1/2 ignition system voltage. This way, the speaker cone can easily be driven in either direction (in or out). To do this, the amplifier will raise the voltage on one side of the speaker and will lower it on the other side; then quickly reverse this polarity to get the speaker cone moving in the opposite direction.

The sound produced by speakers may be different due to speaker construction, mounting location and vehicle acoustics.

It is not practical for one speaker to reproduce the entire musical frequency range well. The range may run from 30 Hz to over 16,000 Hz in just one musical program. Therefore, the frequency extremes are left to their own special speaker types. Large speakers called woofers produce the low frequencies the best, while smaller speakers called tweeters produce the high frequencies best.

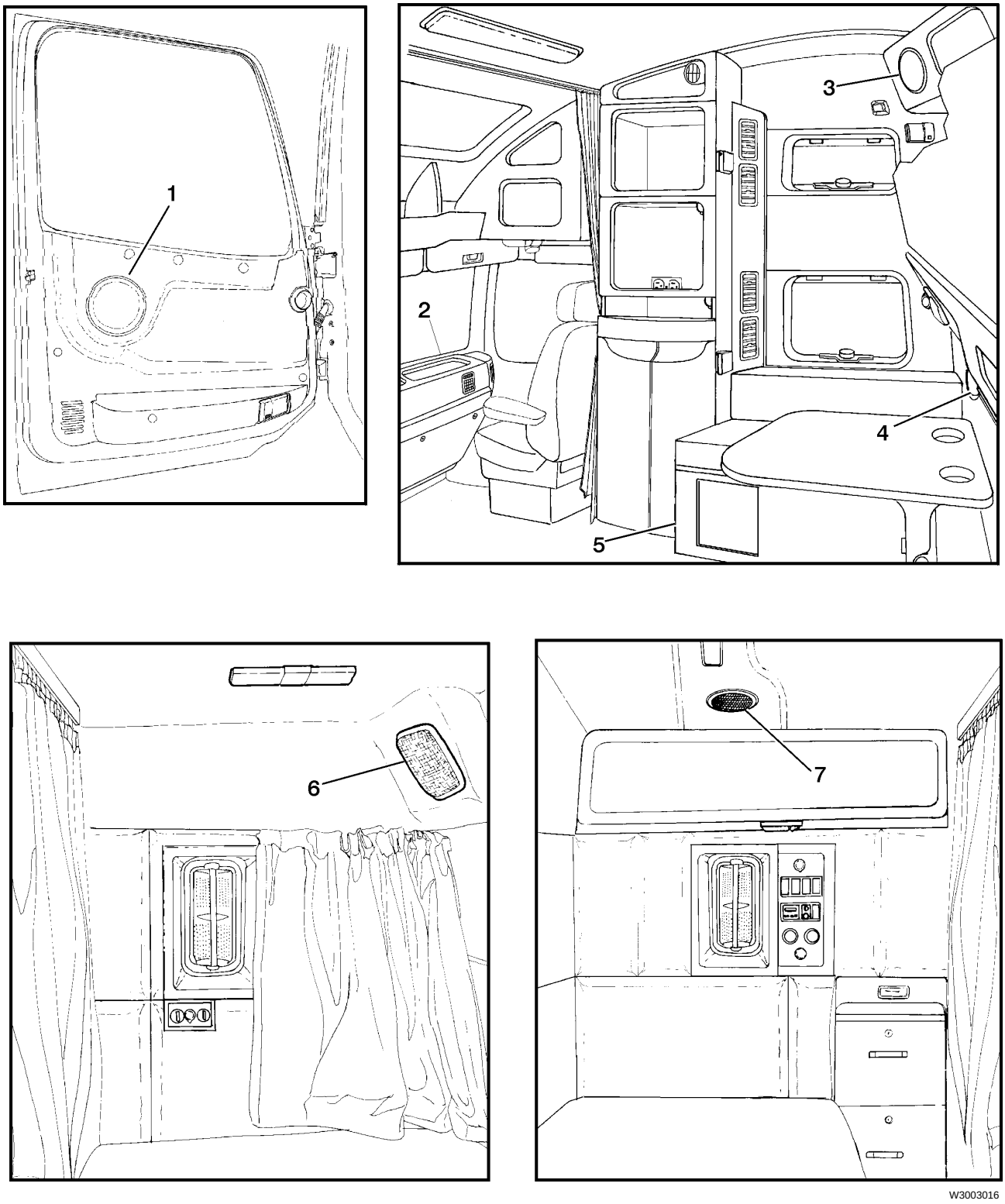
Volvo utilizes several types of speakers, all designed differently, in their vehicle sound systems. If speakers are replaced, always use OEM replacement parts to maintain sound balance and quality.



W3002993

1 Magnet
2 Frame/basket
3 Basket mounted connector
4 Cone
5 Dome
6 Surround
7 Gasket
8 Spider
9 Pole piece
10 Voice coil

Speaker Location



1 Door speaker (all models, both sides)
2 Dash speaker (all models, both sides)
3 Rear speaker (VN 660 / 770, both sides)
4 Rear speaker (VN 770, both sides)
5 Subwoofer (VN 770)
6 Rear speaker (VNL 420, both sides)
7 Rear speaker (VNL 610, both sides)

Note: Rear speakers in the day cab vehicles have the same location as in the VNL 420 (7).

Antenna

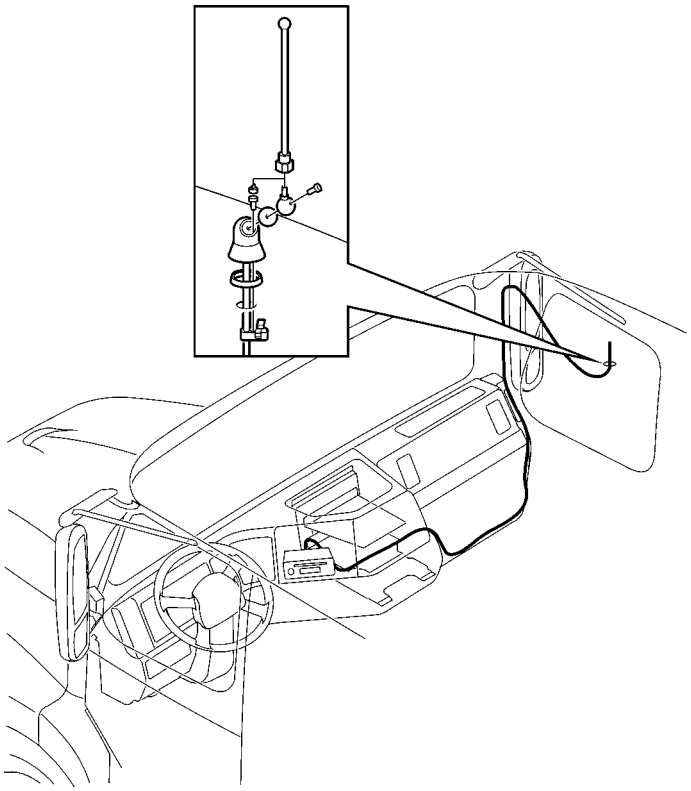
The antenna collects radio frequency signals. Electromagnetic energy (radio waves) from a broadcast antenna induces a very small voltage in the receiving antenna. For best performance, the receiving antenna would be sized to receive the wavelength being broadcast. This is impractical as vehicle radio systems tune in a wide range of frequencies with wavelengths between roughly 3 meters (FM) and 566 meters (AM) (10 ft. and 1856 ft.). A vehicle antenna is a compromise of utility over performance with the receiver carrying the additional burden.

The vehicle antenna system consists of not only the mast but also the ground plane. The antenna cable shield must be properly grounded at the antenna base. Without proper grounding the signal can be weak or even eliminated. Improper grounding can also make the antenna susceptible to noise.

Antenna Types

Three types of antennas are currently used on the Volvo VN series truck.

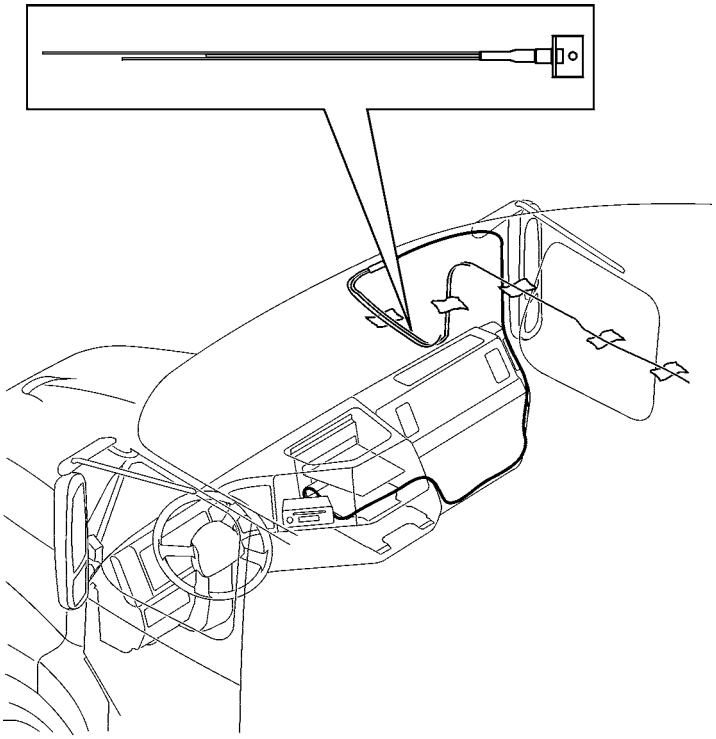
- **Fixed Mast** – Offer, excellent overall performance currently available. The antenna is grounded at the base to the metal roof of the cab by the mounting bracket.



W3003140

The fixed mast antenna is standard on the VNM, VNL and VNL 420. These vehicles can also be equipped with the multiplexer antenna system as an option.

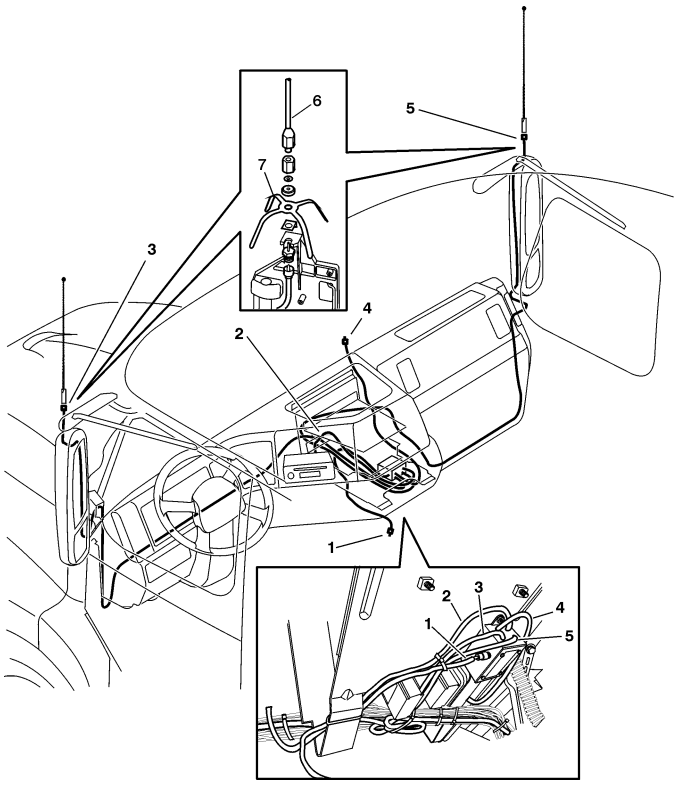
- **Ribbon** – The ribbon antenna is made from a 3 conductor insulated wire with each conductor being precisely tuned to a desired frequency. The shortest conductor is tuned to the Weather-band, the middle length conductor is tuned to the FM band and the longest conductor is tuned to the AM band. The ribbon antenna is located between the headliner and the SMC roof panel in the area immediately above the windshield. The metal antenna base is grounded to the cab with a steel rivet (or screw). The ribbon antenna should be secured with vinyl tape to the SMC roof at least 0.1 m (4 in.) away from any metal objects that may tend to de-tune the antenna.



W3003272

The ribbon antenna is standard on the VNL 610. The VNL 610 can also be equipped with the multiplexed antenna system as an option.

- **Multiplexer** – A modification of the fixed mast design for operation of CB radio, cellular phone and stereo receiver. The multiplexer antenna system used in the Volvo VN series vehicle uses a combination AM/FM and CB radio antenna mast. The windings in the antenna are specific to this system and require no tuning. Always replace the antenna mast with OEM replacement parts. The use of a standard CB antenna mast will give unsatisfactory performance for CB reception and very poor or no reception on AM, FM and cellular phone frequencies. The multiplexer antenna mast used in the VN series can be identified by the clear plastic covering exposing the antenna windings and a top cap with the RAMI® logo.



W3003138

The multiplexer antenna system is standard on the Volvo VN 660, VN 770 and optional on other VN model vehicles.

1 Cellular phone antenna cable (option).
2 Radio antenna cable.
3 Left side antenna mount.
4 CB radio antenna connection.
5 Right side antenna.
6 Multiband antenna mast.
7 Cellular phone antenna ground plane.

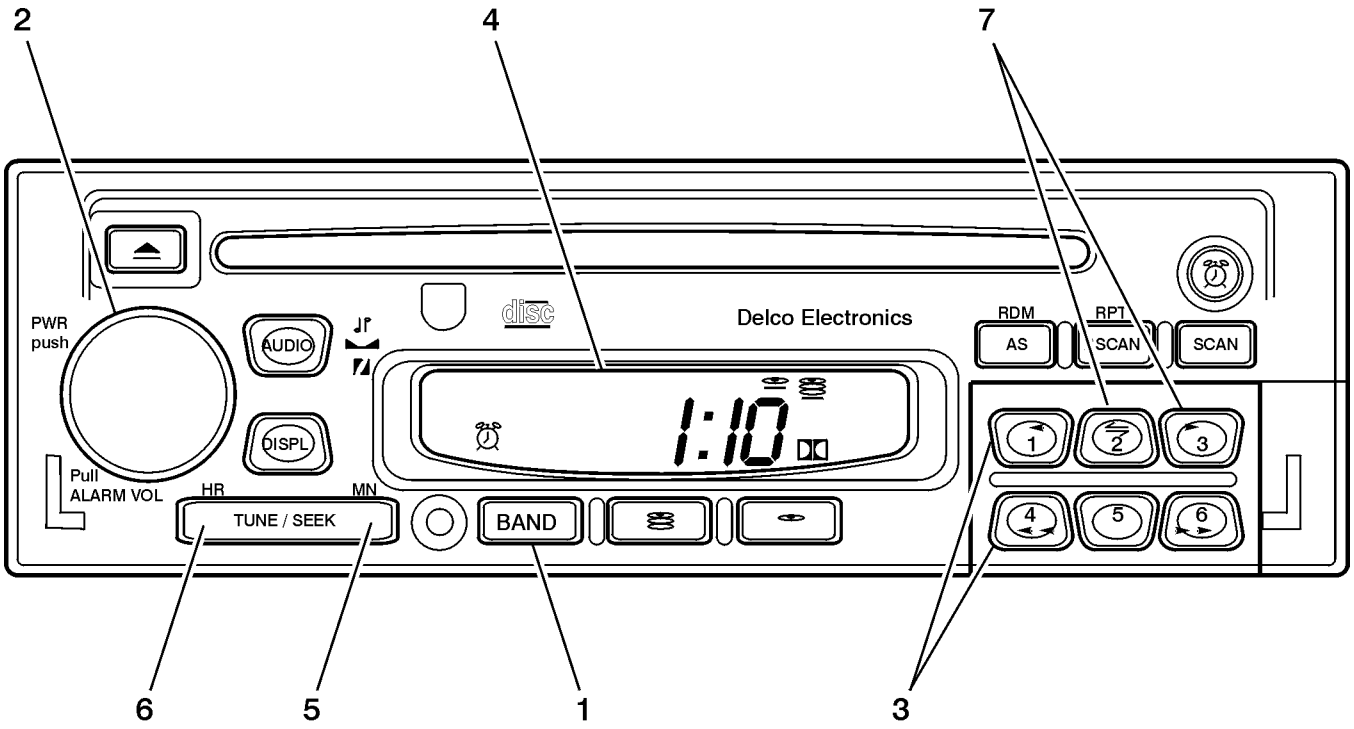
Antenna Lead-In Cable

The antenna lead-in cable carries the RF signal from the antenna to the AM/FM receiver. The lead-in cable consists of a center conductor, insulating material and an outer grounding shield. Some cables have a greater distance between the center conductor and outer shield so the cable acts less like a capacitor and less signal is lost on the lead-in. Receivers are matched or tuned to a specific lead-in type and cable length. Always use OEM replacement cables.

Troubleshooting

Stereo Receiver

Theftlock



If the radio is in the ”Secure” mode and the battery power is lost, the radio will not operate. **LOCKED** will appear on the display when the radio PWR button is pushed or when the ignition is turned on.

To unlock a LOCKED radio:

Note: Pause no more than 15 seconds between the steps.

1 Press MN **(5)**. The display will show 0000.

2 Press MN **(5)** as many times as needed to make the last digits agree with the secret code.

3 Press HR **(6)** as many times as needed to make the first digits agree with the secret code.

4 Confirm that the code on the display matches the code you have chosen.

5 Press BAND **(1)**. The display will show **SECURE** indicating that the radio is operating and the THEFTLOCK is active.

Note: If the display shows **LOCKED**, the incorrect code was entered. Repeat steps 1–5.

If the wrong code is entered 8 times, **InoP** will appear on the display. You will have to wait an hour with the ignition ON before you can try again. When you try again, you will only have three more chances (8 tries per chance) to enter the correct code before **InoP** appears again.

To unlock a LOCKED radio when the code is not available:

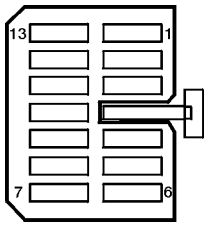
To obtain an unlock code for a LOCKED radio when the entered code is not available contact the local Volvo District Service Manager or call technical support at 1–800–52–VOLVO.

Repair/Replacement

As an alternative to expensive replacement, Delco Electronics Stereo Receivers may be repaired at approved service centers. Call D&B Auto Radio at 1-800-323-4813 for repair information.

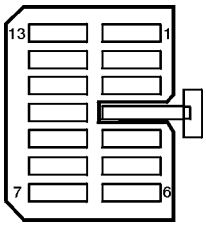
Harness Connectors

4 Speaker System



Cavity	Circuit	Function
1	499RF+	+ RHS Dash Speaker
2	499LF+	+ LHS Dash Speaker
3	490-A	12 V Supply (Accessory)
4	141R	Dimmer Control
5	497R+	+ RHS Door Speaker
6	497L+	+ LHS Door Speaker
7	497L-	- LHS Door Speaker
8	497R -	- RHS Door Speaker
9	0C - F	Ground
10	90A	Light Control
11	492	12 V Supply (Battery)
12	499LF-	- LHS Dash Speaker
13	499RF-	- RHS Dash Speaker

6 Speaker System



Cavity	Circuit	Function
1	499RF+	+ RHS Dash Speaker
2	499LF+	+ LHS Dash Speaker
3	490-A	12 V Supply (Accessory)
4	141R	Dimmer Control
5	498RR+	+ RHS Rear Speakers
6	498LR+	+ LHS Rear Speakers
7	498LR-	- LHS Rear Speakers
8	498RR-	- RHS Rear Speakers
9	0C - F	Ground
10	90A	Light Control
11	492	12 V Supply (Battery)
12	499LF-	- LHS Dash Speaker
13	499RF-	- RHS Dash Speaker

For schematics see “Foldout B 6 Speaker System Schematic” and “Foldout C 4 Speaker System Schematic”.

Note: The following checks are valid for both non-amplified and amplified sound systems. However, always check the amplifier system before replacing the stereo receiver. Refer to “Amplifier” page 52.
Before beginning stereo receiver troubleshooting, see “Troubleshooting Consideration” page 11.

No Stereo Receiver Operation

- Confirm no operation of receiver or playback devices. If the receiver operates but the playback device does not, refer to “Cassette Tape Player” page 44 or “CD Player” page 46.
- Check for power supply. Ignition key must be in ON or ACC position. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[1]	Expected Value
Pin 3 ⇔ Alternate ground	B+

If not correct, check for blown fuse or damage/incorrect truck wiring and take appropriate corrective action.

- Check for proper ground. Ignition must be in OFF position. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[1]	Expected Value
Pin 9 ⇔ Alternate ground	less than 1 Ω

If not correct, check for damage/incorrect truck wiring and take appropriate corrective action.

- Check speaker outputs from the receiver. Ignition must be in ON or ACC position. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[1]	Expected Value
Pin 1 ⇔ Pin 13	AC voltage changing proportionately with volume
Pin 2 ⇔ Pin 12	AC voltage changing proportionately with volume
Pin 8 ⇔ Pin 5	AC voltage changing proportionately with volume
Pin 6 ⇔ Pin 7	AC voltage changing proportionately with volume

If correct, check speakers or wiring harness.

After performing the above tests, if no faults were found, replace the stereo receiver. Test operation after replacement.

[1]See “Harness Connectors” page 39

The Receiver Will Not Maintain Pre-Sets

- The stereo receiver should maintain preset stations and the time even with the ignition key in the OFF position. If the preset stations are not maintained check the constant power source and ground. Ignition key must be in OFF position. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[2]	Expected Value
Pin 11 ⇔ Alternate ground	B+
Pin 9 ⇔ Alternate ground	less than 1 Ω

If not correct, check for blown fuse or damage/incorrect truck wiring and take appropriate corrective action.

After performing the above test, if no faults were found, replace the stereo receiver. Test operation after replacement.

No Sound From Some Speakers

Note: If equipped with an amplifier, only the upper two rear bunk speakers will play in the sleep mode. Also if there is a failure in the power supply or the ground of the amplifier, only the upper two rear bunk speakers will play.

- Check for AC voltage at suspect speakers, see “Speakers” page 58.
- Check speaker outputs from the stereo receiver. Ignition key must be in ON or ACC position. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[2]	Expected Value
Pin 1 ⇔ Pin 13	AC voltage changing proportionately with volume
Pin 2 ⇔ Pin 12	AC voltage changing proportionately with volume
Pin 8 ⇔ Pin 5	AC voltage changing proportionately with volume
Pin 6 ⇔ Pin 7	AC voltage changing proportionately with volume

If correct, check speakers or wiring harness.

After performing the above test, if no faults were found, replace the stereo receiver. Test operation after replacement.

[2]See “Harness Connectors” page 39

No Stereo Receiver Display Illumination

The stereo receiver display should illuminate when the ignition key is in the ON or ACC position. Additionally, the premium stereo receiver display should illuminate in the ”sleep mode”.

- Check for power supply. Ignition key must be in ON or ACC position. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[3]	Expected Value
Pin 3 ⇔ Alternate ground	B+

If not correct, check for blown fuse or damage/incorrect truck wiring and take appropriate corrective action.

- Check for proper ground. Ignition key must be in OFF position. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[3]	Expected Value
Pin 9 ⇔ Alternate ground	less than 1 Ω

If not correct, check damage/incorrect truck wiring and take appropriate corrective action.

After performing the above test, if no faults were found, replace the stereo receiver. There are no field replaceable lamps in the stereo receiver assembly. Test operation after replacement.

No Stereo Receiver Face Illumination

The stereo receiver face should illuminate when the headlight switch is on and also the display background light should automatically dim to reduce glare. The dimmer switch should raise and lower the brightness of the face illumination and the display background light.

- Check for power supply. Headlight switch must be on. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[3]	Expected Value
Pin 4 ⇔ Alternate ground	B+ to 0 volts, variable with dimmer control.

If not correct, check for blown fuse or damage/incorrect truck wiring and take appropriate corrective action.

[3]See “Harness Connectors” page 39

- Check for proper ground. Ignition key must be in OFF position. Back probe the wiring harness connector to the stereo receiver.

Measuring Points[4]	Expected Value
Pin 9 ⇔ Alternate ground	less than 1 Ω

If not correct, check damage/incorrect truck wiring and take appropriate corrective action.

After performing the above test, if no faults were found, replace the stereo receiver. There are no field replaceable lamps in the stereo receiver assembly. Test operation after replacement.

[4]See “Harness Connectors” page 39

Cassette Tape Player

Error Messages

Note: The premium stereo receiver equipped with a cassette player can identify and display the following error codes. The basic stereo receiver does not have the ability to display error codes.

Error Message		Cause	
Display Message	***Code No.***	***Type***	***Description***
BAD TAPE	10	Tight Tape	The player is unable to turn tape spindles and the tape is ejected.
BAD TAPE	11	Broken Tape	The spindles of the tape are not turning proportionally and the tape is ejected.
ERROR 13	13	Communication	There is a communication problem with the tape player.

Dirty Head

For optimal audio performance, the tape heads should be cleaned after every 15 hours of playback. The cleaning should take place every 50 hours to prevent damage to the playback unit. Symptoms of a dirty tape path include:

- Incorrect tape speed.
- Tape won't eject.
- Tape won't play in one direction.
- Muffled sound - no high frequency response.
- Left or right channel dead or plays at a lower volume.
- Tape deck "eats" tape.

Use a cleaning kit to clean the tape head. The Diagnostic Test Kit (Kent More J39916-A) contains a tape head cleaning kit, see "Diagnostic Test Kit — Cassette Head Cleaning" page 45.
A cleaning kit will generally contain:

- Tape head cleaner.
- Cleaning solvent.
- Extra cleaning pads.

Internal Faults

If the radio on the stereo receiver works properly but the cassette tape player does not, there is likely an internal fault in the cassette tape player. There are no field repairs available for the cassette tape player. Replace if necessary.

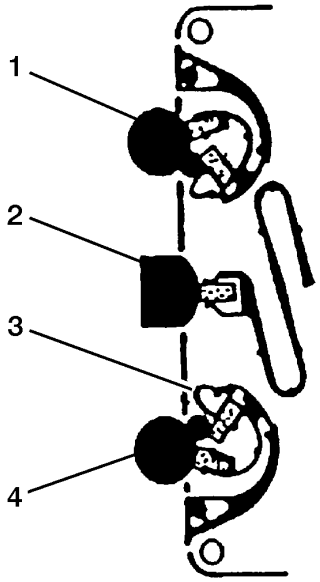
Diagnostic Test Kit

The Delco Audio System Diagnostic Kit (Kent Moore - J39916A) can be used to diagnose cassette player complaints. See "Diagnostic Test Kit" page 72.

Diagnostic Test Kit — Cassette Head Cleaning

Note: The premium sound system is equipped with a ”Bad Tape” detector which must be turned off when cleaning the cassette player. To turn off the ”Bad Tape” detector see “Cassette Tape Player” page 19.
Inspection of the player must take place before using the cleaning and diagnostic cassette. Using a light source, carry out a visual check through the cassette entry flap and ensure that there is no debris inside the player and that the tape is not wrapped around the capstan.

Before proceeding with the diagnostic cassette, the tone head, pinch wheel(s) and capstan(s) must be cleaned. To do this, use the head cleaning cassette as follows:



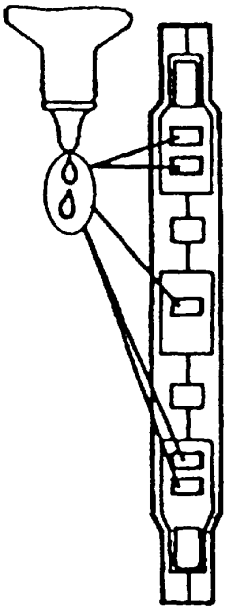
1 Auto reverse tape drive
2 Tape head
3 Capstan
4 Pinch roller

1 Put two drops of the cleaning solution on each felt pad.

2 Insert the cleaning cassette into the tape player and play for 20 seconds, engage the ”auto reverse” feature and clean for another 20 seconds.

3 Remove the cleaning cassette. Now allow 2 - 3 minutes of drying time before proceeding.

Note: It is recommended that the cleaning cassette is used every 15 hours of play time. **Replace cleaning cartridges when the felt pads look dirty.**



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CD Player

Error Messages

Note: The premium stereo receiver equipped with a CD player can identify and display the following error codes.

Error Message		Cause	
Display Message	***Code No.***	***Type***	***Description***
FOCUS	20	CD Focus	Optic focus error - upside down CD, moisture, etc.
ERROR 21	21	CD Tracking	Loss of optic tracking control.
ERROR 22	22	CD Load/Eject	Mechanism unable to complete load/unload within specified time frame.
ERROR 23	23	CD Communication	There is a communication problem with the CD mechanism.

CD Skips or Mutes

- CD Changer Mounts:
  Check for loose Stereo Receiver mounts. Secure as necessary.
- Vibration Skip:
  The CD player has been designed with a shock absorbing suspension, much like that of a car. Only under extreme operating temperatures and severe shock or vibration should the music be temporarily muted. The temporary muting is considered normal and should not cause damage to the player or compact disc. The player will resume normal playing when the vibration or shock subsides.
- Dew Point Operation:
  Under certain cold temperature and humidity conditions, moisture in the air will condense on the surrounding surfaces. This most commonly occurs in the spring and fall when moisture accumulates on the windshield and body of the vehicle if it is left out at night. The heart of the CD player is a laser/lens assembly reading a shiny digital encoded disc. If this lens or disc becomes fogged up with moisture, the mechanism will have difficulty reading the disc and reproducing the music. When this condition exist, the player may intermittently mute.
  This type of reaction is considered normal and will clear as soon as the CD or the player has warmed up enough to evaporate the moisture.
- Hot Operation:
  Additional heat generated from the heater ducts during humid conditions, when combined with that generated from the integral compact disc player, can create temperatures in excess of normal operating conditions.
  If the CD player encounters theses conditions, it may produce distorted audio and temporarily mute. These reactions are normal and if these conditions occur, remove the CD until the operating temperature has returned to normal.

Internal Faults

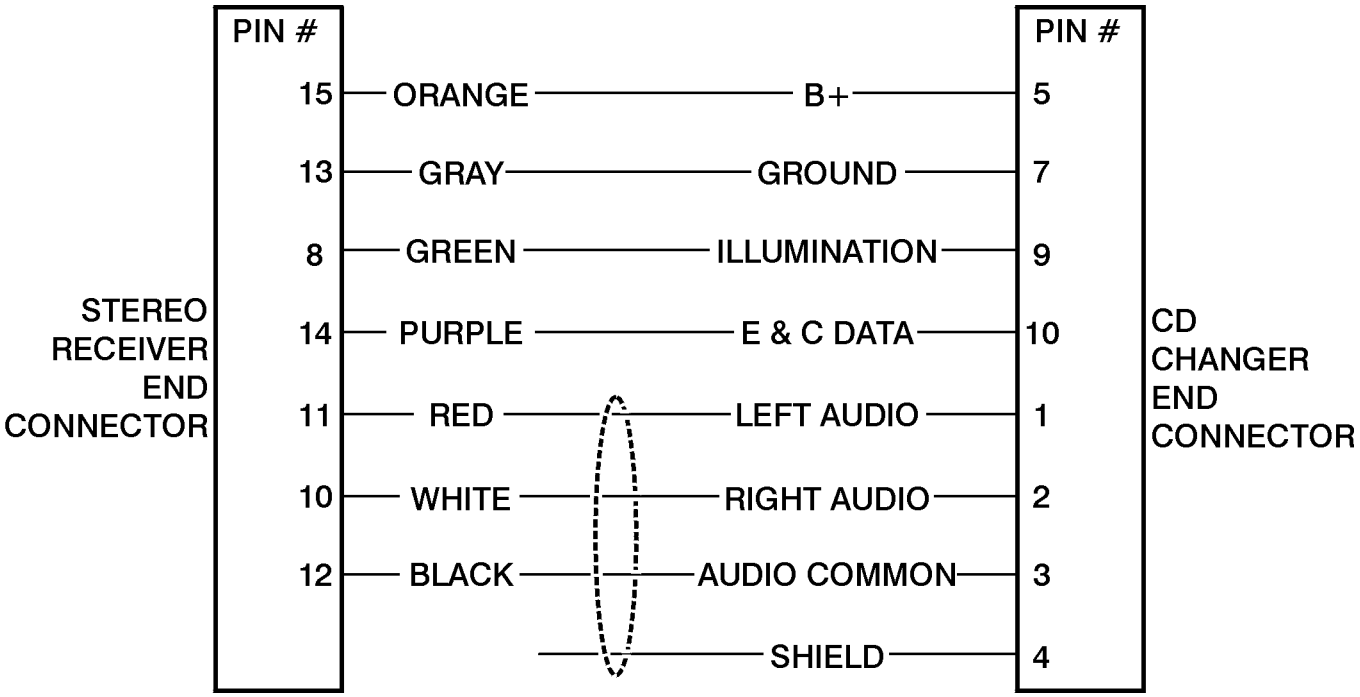
If the radio on the stereo receiver works properly but the CD player does not, there is likely an internal fault in the CD player. There are no field repairs available for the CD player. Replace if necessary.

Diagnostic Kit test

The Delco Audio System Kit (Kent Moore - J39916A) can be used to diagnose CD player complaints. See “Diagnostic Test Kit” page 72.

CD Changer

Harness Connectors

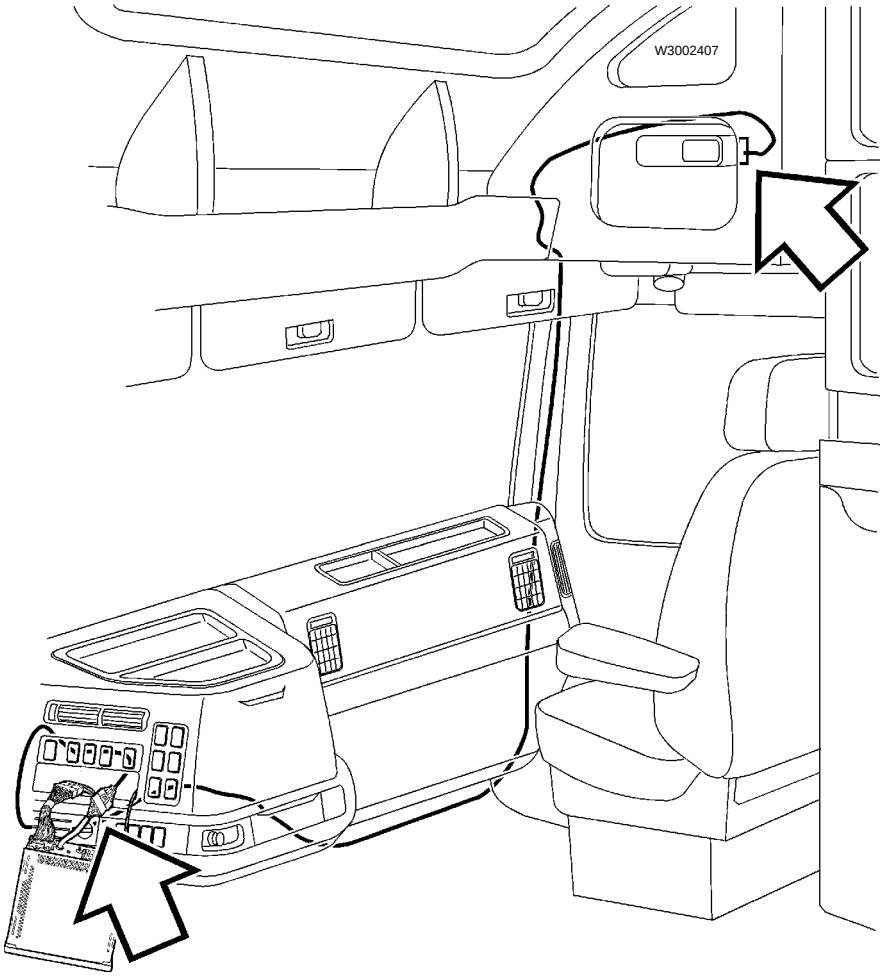


Note: The shield wire is not connected to the stereo receiver end.

CD Changer Harness							
	Stereo Receiver End Connector				CD Changer End Connector		
	Cavity	***Color***	***Function***		***Cavity***	***Color***	***Function***
	7		Not Used		1	Red	Left Audio
	8	Green	Illumination		2	White	Right Audio
	9		Not Used		3	Black	Audio Common
	10	White	Right Audio		4		Shield
	11	Red	Left Audio		5	Or-ange	Battery +12V
	12	Black	Audio Common		6		Not Used
	13	Gray	Ground		7	Gray	Ground
	14	Purple	E & C Data		8		Not Used
	15	Or-ange	Battery +12V		9	Green	Illumination
					10	Purple	E & C Data

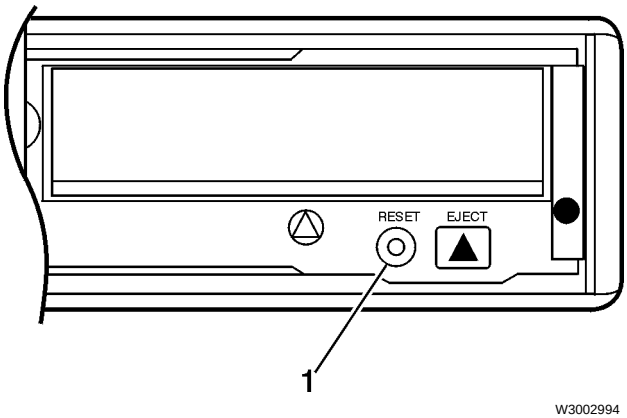
Note: For detailed, vehicle specific, electrical schematics see: VN Series Electrical Schematics – Group 37.

CD Changer Wiring Harness



The CD changer is powered and controlled by the radio and receives a battery feed. Functions for the CD changer are made via a cable connection between the changer and the radio in the dash. A CD changer cable harness is connected to the changer above the passenger seat. The harness is routed through the A-pillar trim and connects to the stereo through the dash.

Reset Switch



1 Reset switch

If the CD changer does not operate, pressing the reset switch with a pointed object may restore normal operation.

Error Messages

Note: The premium stereo receiver equipped with an optional CD changer can identify and display the following error codes.

Error Message		Cause	
Display Message	***Code No.***	***Type***	***Description***
FOCUS	30	CDX Focus	Optic focus error - upside down CD, moisture, etc.
ERROR 31	31	CDX Tracking	Loss of CDX optic tracking control.
ERROR 32	32	CDX Load/Eject	Mechanism unable to complete load/unload within specified time frame.
ERROR 33	33	CDX Communication	There is a communication problem with the CDX mechanism.
MAGAZINE	34	No CDs	No CDs loaded into the CDX magazine.
CD DOOR	35	CDX Door	CDX door open, if the magazine has been previously initialized.
NO CD	TBD	CDX Door	CDX door is open and the magazine has not been initialized.

CD Skips or Mutes

- CD Changer Mounts:
  Check for loose CD changer mounting. Secure as necessary.
- Vibration Skip:
  The CD player has been designed with a shock absorbing suspension, much like that of a car. Only under extreme operating temperatures and server shock or vibration should the music be temporarily muted. The temporary muting is considered normal and should not cause damage to the player or compact disc. The player will resume normal playing when the vibration or shock subsides.
- Dew Point Operation:
  Under certain cold temperature and humidity conditions, moisture in the air will condense on the surrounding surfaces. This most commonly occurs in the spring and fall when moisture accumulates on the windshield and body of the vehicle if it is left out at night. The heart of the CD player is a laser/lens assembly reading a shiny digital encoded disc. If this lens or disc becomes fogged up with moisture, the mechanism will have difficulty reading the disc and reproducing the music. When this condition exist, the player may intermittently mute.
  This type of reaction is considered normal and will clear as soon as the CD or the player has warmed up enough to evaporate the moisture.
- Hot Operation:
  Additional heat generated from the heater ducts during humid conditions, when combined with that generated from the integral compact disc player, can create temperatures in excess of normal operating conditions.
  If the CD player encounters these conditions, it may produce distorted audio and temporarily mute. These reactions are normal and if these conditions occur, remove the CD until the operating temperature has returned to normal.

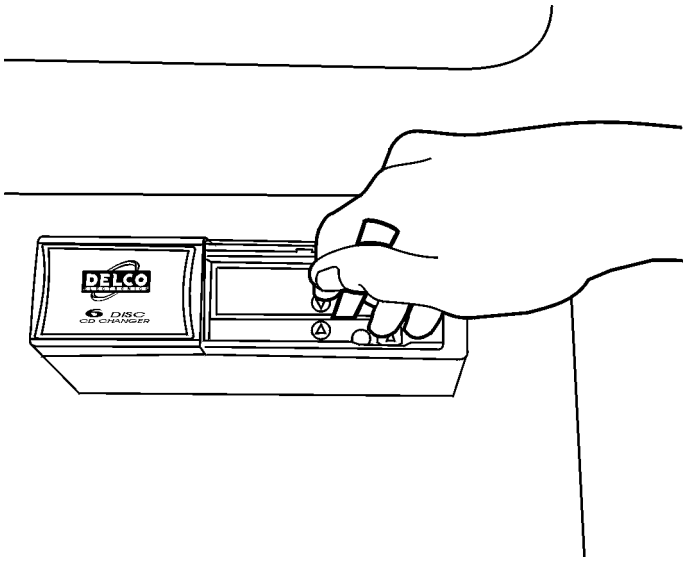
CD Changer Magazine Will Not Eject

Note: The magazine will not eject if a CD is in the optic area (loaded to play) of the changer. Attempting to remove the magazine with a CD loaded will damage the CD and/or the changer.

1 Push the reset switch, see “Reset Switch” page 48.

2 Push the Eject button.

3



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If the magazine does not eject, it may be manually ejected if no CD is in the optic area of the changer. Insert a hack saw blade, or similar tool, approximately 100 mm (3.9 in.) straight into the CD changer to the immediate right of the two alignment arrows on the changer housing and magazine. With the blade inserted, move the blade to the left to manually release the magazine.

Note: Do not force, little pressure should be required.

4 Check the magazine and CD carriers for damage that may prevent proper ejection.

CD Changer Does Nothing (Dead)

- Check all cable connections between the stereo and the CD changer. The CD changer receives power through the radio fuse. When this fuse is blown, a loss of function for the CD changer and the radio will occur. Refer to the fuse chart provided on the fuse panel. Replace this fuse if necessary.
- Set the ignition key in the OFF position. Back probe the CD changer connector with a multimeter (Kent Moore J39200) at the following measuring points.

Measuring points[5]	Expected value
Pin 5 ⇔ Alternate ground	B+
Pin 7 ⇔ Alternate ground	less than 1 Ω

If the above conditions are not correct, check the CD changer harness, stereo receiver outputs and damage/incorrect truck wiring. Refer to the appropriate wiring schematic.

If the above conditions are correct, replace the CD changer.

[5]See “Harness Connectors” page 47.

- Commands from the stereo receiver to the CD changer are communicated digitally over the Entertainment and Comfort Data Link (E & C Data). To check the E & C Data Link, back probe the CD changer connector with a multimeter (Kent Moore J39200) at the following measuring points.

Measuring points[6]	Expected value
Pin 10 ⇔ Pin 7	0 AC Volts (AM/FM radio on)
Pin 10 ⇔ Pin 7	Variable AC Volts (CD changer operation requested)

Note: AC voltages should change each time a track change is requested at the stereo receiver.

If the above conditions are not correct, check the CD changer harness or stereo outputs.

If the above conditions are correct, replace the CD changer.

CD Changer Initializes, But Does Not Produce Sound

- Left and/or right audio output(s) not operating. Back probe the CD changer connector with a multimeter (Kent Moore J39200) while a CD is playing at the following measuring points.

Measuring points[6]	Expected value
Pin 1 ⇔ Pin 3	AC voltage varies with music intensity
Pin 2 ⇔ Pin 3	AC voltage varies with music intensity

If the above conditions are not correct, replace the CD changer.

If the above conditions are correct, check the CD changer harness and inputs to stereo receiver.

If inputs to the stereo receiver are correct, the stereo receiver may be at fault. See “Stereo Receiver” page 37.

Diagnostic Kit test

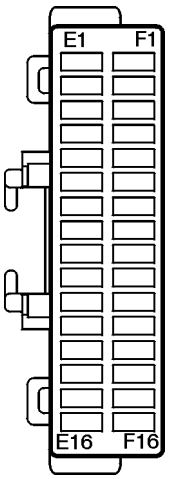
The Delco Audio System Kit (Kent Moore - J39916A) can be used to diagnose CD changer complaints. See “Diagnostic Test Kit” page 72.

[6]See “Harness Connectors” page 47.

Amplifier

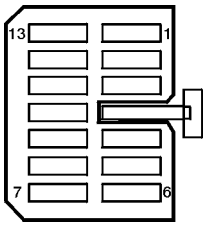
Harness Connectors

Amplifier Harness To Amplifier



Cavity	*Circuit*	*Function*
E1	499RA	+ RHS Front Input
E2	499LA	+ LHS Front Input
E3	499LB	- LHS Front Input
E4	498RB	- RHS Rear Input
E5	498RA	+ RHS Rear Input
E6	498LA	- LHS Rear Input
E7	498LB	+ LHS Rear Input
E8	0C	Ground
E9	0C	Ground
E11	490	12 V Supply
E12	490	12 V Supply
E13	L4 +	+ LHS Dash Speaker
E14	L4 -	- LHS Dash Speaker
E15	L6 +	+ LHS Door Speaker
E16	L6 -	- LHS Door Speaker
F1	499RB	- RHS Front Input
F2	R4 +	+ RHS Dash Speaker
F3	R4 -	- RHS Dash Speaker
F4	S2 -	- Subwoofer (Coil 2)
F5	S2 +	+ Subwoofer (Coil 2)
F6	R6 -	+ RHS Door Speaker
F7	R6 +	- RHS Door Speaker
F10	S1 -	- Subwoofer (Coil 1)
F11	S2 +	+ Subwoofer (Coil 1)
F13	R +	+ RHS Rear Wall Speaker
F14	R -	- RHS Rear Wall Speaker
F15	L +	+ LHS Rear Wall Speaker
F16	L -	- LHS Rear Wall Speaker

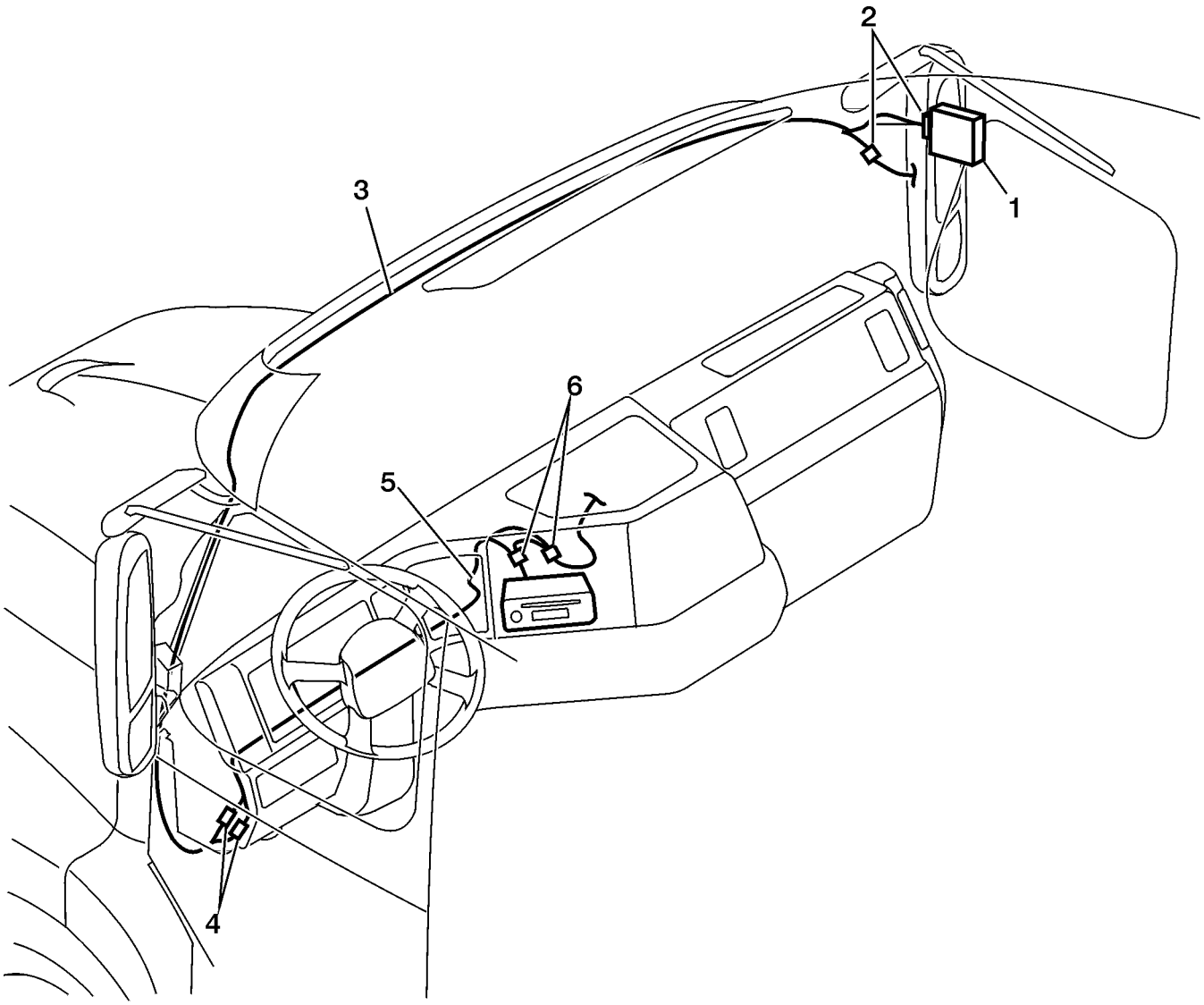
Amplifier Harness To Stereo Receiver



Cavity	*Circuit*	*Function*
1	499RA	+ RHS Dash Speaker
2	499LA	+ LHS Dash Speaker
3	490	12 V Supply
4	141	Dimmer Control
5	498RA	+ RHS Door Speaker
6	498LA	+ LHS Door Speaker
7	498LB	- LHS Door Speaker
8	498RB	- RHS Door Speaker
9	0C	Ground
10	90A	Light Control
11	492	12 V Supply
12	499LB	- LHS Dash Speaker
13	499RB	- RHS Dash Speaker

For schematic see “Foldout A Amplified 8 Speaker (+ Subwoofer) System Schematic”.

Wiring Harness



W3003443

1 Amplifier
2 Connectors
3 Upper harness
4 Connectors
5 Lower harness
6 Connectors

The amplifier harness is a two piece harness. The harness runs from 2 connectors at the stereo receiver to 2 connectors behind the left kick panel. The upper harness runs from the 2 connectors behind the left kick panel, up the left A-pillar, across the cab under the lower headliner to the amplifier and a connector for the rear speakers.

No Amplifier Operation

- Confirm operation of stereo receiver. The two upper rear speakers operate independently of the amplifier. If the upper rear speaker do not operate, check stereo receiver, harness or speakers.
- Ignition key must be in ON or ACC position. Back probe the amplifier connector with a multimeter (Kent Moore J39200) at the following measuring points.

Measuring Points[7]	Expected Value
Pin E11 ⇔ Alternate ground	B+
Pin E12 ⇔ Alternate ground	B+

If not correct, check for blown fuse or damage/incorrect truck wiring and take appropriate corrective action.

- Check for proper ground. Ignition key must be in OFF position. Back probe the amplifier connector with a multimeter (Kent Moore J39200) at the following measuring points.

Measuring Points[7]	Expected Value
Pin E8 ⇔ Alternate ground	less than 1 Ω
Pin E9 ⇔ Alternate ground	less than 1 Ω

If not correct, check damage/incorrect truck wiring and take appropriate corrective action.

- Check speaker inputs from the stereo receiver. Ignition key must be in ON or ACC position. Back probe the amplifier connector with a multimeter (Kent Moore J39200) at the following measuring points.

Measuring Points[7]	Expected Value
Pin E2 ⇔ Pin E3	AC voltage changing proportionately with volume
Pin E1 ⇔ Pin F1	AC voltage changing proportionately with volume
Pin E4 ⇔ Pin E5	AC voltage changing proportionately with volume
Pin E6 ⇔ Pin E7	AC voltage changing proportionately with volume

If not correct, check the stereo receiver outputs or wiring harness.
If all are correct, replace the amplifier.

[7]See “Harness Connectors” page 52.

- Check speaker outputs from the amplifier. Ignition key must be in ON or ACC position. Back probe the amplifier connector with a multimeter (Kent Moore J39200) at the following measuring points.

Measuring Points[8]	**Expected Value**
Pin E13 ⇔ Pin E14	AC voltage changing proportionately with volume
Pin E15 ⇔ Pin E16	AC voltage changing proportionately with volume
Pin F2 ⇔ Pin F3	AC voltage changing proportionately with volume
Pin E2 ⇔ Pin E3	AC voltage changing proportionately with volume
Pin F4 ⇔ Pin F5	AC voltage changing proportionately with volume
Pin F6 ⇔ Pin F7	AC voltage changing proportionately with volume
Pin F10 ⇔ Pin F11	AC voltage changing proportionately with volume
Pin F13 ⇔ Pin F14	AC voltage changing proportionately with volume
Pin F15 ⇔ Pin F16	AC voltage changing proportionately with volume

If not correct, replace the amplifier.

If correct, check the wiring to speakers and check the speakers.

[8]See “Harness Connectors” page 52.

Amplifier Does Not Operate On All Channels

- Check for AC voltage at suspect speakers, see “Speakers” page 58.
- Check speaker inputs from the stereo receiver. Ignition key must be in ON or ACC position. Back probe the amplifier connector with a multimeter (Kent Moore J39200) at the following measuring points.

Measuring Points[9]	Expected Value
Pin E2 ⇔ Pin E3	AC voltage changing proportionately with volume
Pin E1 ⇔ Pin F1	AC voltage changing proportionately with volume
Pin E4 ⇔ Pin E5	AC voltage changing proportionately with volume
Pin E6 ⇔ Pin E7	AC voltage changing proportionately with volume

If not correct, check the stereo receiver or wiring harness.

If correct, check speaker outputs from the amplifier.

[9]See “Harness Connectors” page 52.

- Check speaker outputs from the amplifier. Ignition key must be in ON or ACC position. Back probe the amplifier connector with a multimeter (Kent Moore J39200) at the following measuring points.

Measuring Points[10]	Expected Value
Pin E13 ⇔ E14	AC voltage changing proportionately with volume
Pin E15 ⇔ E16	AC voltage changing proportionately with volume
Pin F2 ⇔ F3	AC voltage changing proportionately with volume
Pin E2 ⇔ E3	AC voltage changing proportionately with volume
Pin F4 ⇔ F5	AC voltage changing proportionately with volume
Pin F6 ⇔ F7	AC voltage changing proportionately with volume
Pin F10 ⇔ F11	AC voltage changing proportionately with volume
Pin F13 ⇔ F14	AC voltage changing proportionately with volume
Pin F15 ⇔ F16	AC voltage changing proportionately with volume

If not correct, replace the amplifier.

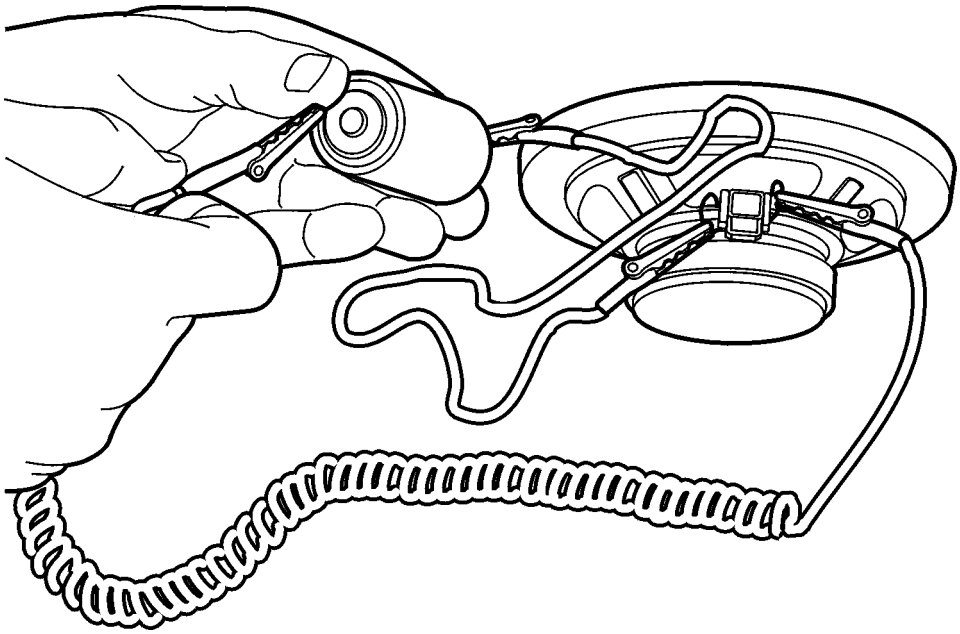
If correct, check the wiring to speakers and the speakers on affected channels.

[10]See “Harness Connectors” page 52.

Speakers

No Sound From Speaker

With the speaker removed from its mounting location and wiring harness disconnected the following checks can be performed:

- Visually inspect for obvious damage such as a torn cone or wiring from the connector to the voice coil broken.
- With a multimeter (Kent More J39200) check the resistance value of the speaker. The specified resistance value should be printed on the speaker (generally 2, 4, 6, 8 or 10 Ω (ohms)).
- 

  The speaker may be tested with a 1.5 volt ”flashlight” battery by connecting one speaker terminal to the battery negative post and momentarily touching the other speaker terminal to the positive post. The speaker should produce a ”pop” when connected. If the speaker contains a capacitor, it will only ”pop” once. Do not leave the battery connected.

With the speaker removed from its mounting location (see page 33) and wiring harness connected the following checks can be performed:

- With a multimeter (Kent Moore J39200) check the AC voltage at the A and B speaker terminals. A small AC voltage should be present with the stereo receiver volume low and increase proportionately with volume increase. If AC voltage is correct, replace the speaker. If no AC voltage is present, check the wiring and the stereo receiver outputs.

Speakers Rattle

- Isolate the problem speaker. Inspect for loose or damaged speaker or grill.
- The Delco Audio System Diagnostic Kit (Kent Moore - J39916-A) can be used to diagnose speaker buzz or rattle. A test CD and cassette tape will provide the technician with test tones for speaker testing. The stereo receiver must be equipped with a CD player or cassette tape player to use this test kit. See “Diagnostic Test Kit” page 72.

Noise

RFI Questionnaire

To begin diagnosing RFI conditions, it is important to understand the nature of the condition and the elements that may be involved. The following questionnaire will help determine vital pieces of information for the diagnostic process.

Question	Yes	No
Is the vehicle equipped with any non-factory installed electronics? (This includes radar detectors, scanners and hand-held communications devices.)		
If the condition occurs with a non-factory installed radio, have the radio installation guidelines been followed?		
If the concern is with the entertainment radio, is the tape or CD affected?		
Identify when the condition occurs:		
• Ignition key in OFF position?		
• Ignition key in ACC position?		
• Ignition key in ON position, engine running?		
• Engine running?		
• AM or FM band?		
• What frequencies are affected?		
• Is the condition on station or between stations?		
• Does condition occur with volume turned down?		
• Does condition vary with volume?		
• Is condition RPM related?		
• Does condition occur when switching an accessory on or off?		
• Check antenna and lead-in cable. Does condition persist?		
• Further test for condition at low volume with antenna disconnected. Does condition persist?		
If the condition is related to a fleet vehicle, answer the following:		
• Who installed the radio(s)?		
• Were the installation guidelines followed?		
• Is this the only vehicle which demonstrates this condition?		
• Do similar vehicles have different antennas?		
• Are the antennas mounted in the same location?		

Front-Way Noise

Front-way noise is any noise that enters the audio system through the antenna system. Some electrical noise is always present in the signals reaching the antenna, but the antenna system cannot be filtered or suppressed. To diagnose front-way noise, test if the antenna system meets specifications or if there is an electrical noise emitter present in the vehicle.

Possible Causes:

- Poor grounding of the following:
  - Antenna
  - Receiver
  - Some electrical components
  - Body panels
- Defective or marginal components (relays, switches, solenoids, motors etc.).
- Antenna lead-in too close to electrical or electronic components.
- Opens, shorts or electrical leaks in the ignition system.

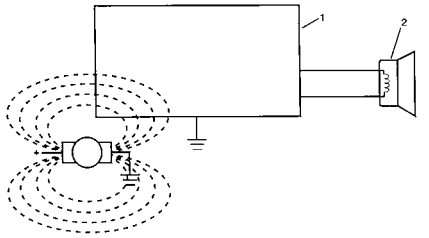
Troubleshooting Hints:

- If noise is present with the radio on but goes away when the CD or cassette tape player is on, it is likely that front-way noise is the problem.
- Confirm that the antenna system is the source of noise with the test antenna. See “Test Antenna” page 71.
- Always verify grounding first. If more than one component interferes, poor grounding probably exists.

  1 Check the antenna system:
    - Antenna lead-in cable must have low resistance.
    - All antenna cable connectors must be in good condition and tight.
    - Antenna base must be well grounded.
    - Lead-in to radio connection must be tight and low resistance.

  2 Check for excess noise reaching the antenna system:
    - Pinpoint the noise source. See “Noise Sniffer” page 64.
    - Route the antenna cable away from electrical/electronic noise circuits.
    - Check for malfunctioning electrical/electronic components on the vehicle.
    - Electrically noisy devices can sometimes be filtered or suppressed.
    - Check for poor grounds or other poor connections in noisy circuits.

Side-Way Noise



W3003059

1 Radio receiver
2 Speaker

Side-way noise is any noise that enters stereo receiver by a radiated field through the stereo receiver case.

Possible Cause:

- Auxiliary electrical components (monitors, cell phones, notebook computers, etc.).
- Noisy wiring or harness too close to the stereo receiver.
- Strong magnetic fields reaching the cassette tape player pickup head.
- High current wiring too close to the stereo receiver.

Troubleshooting Hints:

- If noise is present with the stereo receiver on, but goes away when the receiver is moved out of its mounting location, it is likely that sideway noise is the problem.
- Disconnect any auxiliary electrical components. If noise goes away change the mounting location of the auxiliary electrical components and/or of their wiring harness routing.
- Suppress or shield the noisy harness or wire, or reroute it.

Back-Way Noise

Back-way noise is noise that enters the audio system through its wiring harness.
Back-way noise is most commonly conducted through the power or ground circuits. Some interference or noise is always present in the power and ground circuits.
When the unwanted signals overcome the ability of the audio system to suppress them, they become interference.
These noises are often heard when a particular accessory or system is operated.
Diagnose back-way noise after eliminating front-way or side-way noise.

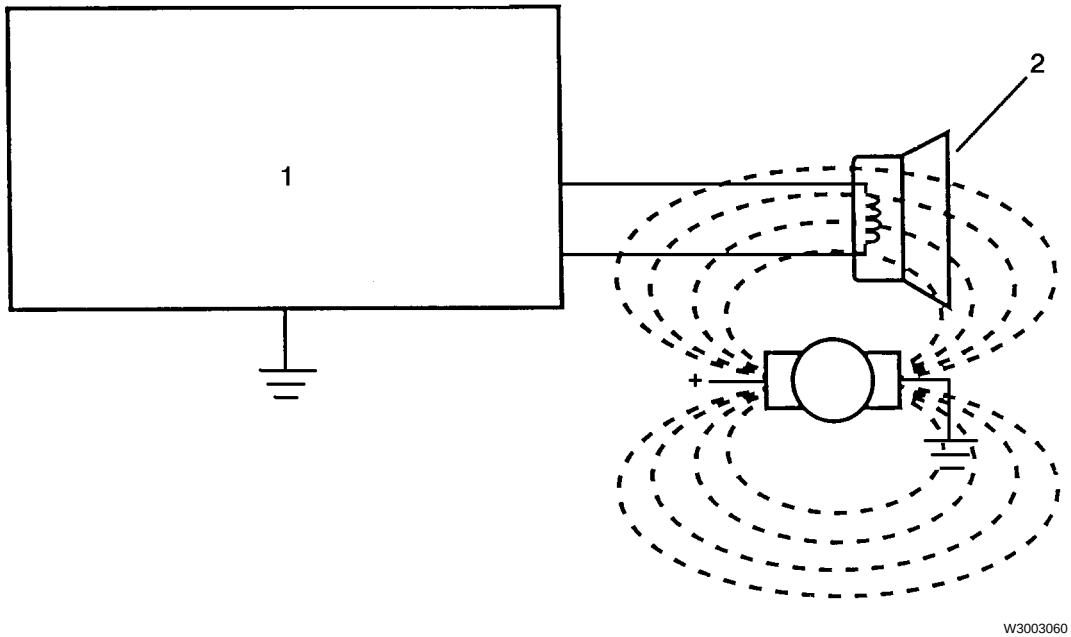
Possible Causes:

- Poor grounding of the receiver (measure with the antenna lead-in disconnected).
- Non-suppressed electrical components.
- Poorly routed wires.
- Defective electrical components or defective suppression components.

Troubleshooting Hints:

- Determine if noise is present only if the engine is running or when certain electrical components are operating. Removing fuses one at a time can help isolate the noise source.
- Grounds shared between electrically noisy components and audio components can be noise sources. Establish new grounds if necessary.
- Switch pops are suppressed using capacitors. See “Switch Pop Suppression” page 69.
- Capacitors or filter packages are most effective when installed at the noise source.
  Whines, squeals or buzzes are best suppressed using filter packages. See “Capacitors” page 67 and “Filters” page 68.

Harness Noise



Speaker harness noise entry.

1 Radio receiver
2 Speaker

Harness noise is any noise induced into speaker wires or any low level audio signal wire used to connect audio components.

Possible Causes:

- Magnetic or electronic fields reaching the low level audio lines.
- Noisy wiring or components too close to the speaker or audio wires.
- Broken, shorted or intermittent audio signal or speaker wires.
- Faulty shield wires.

Troubleshooting Hints:

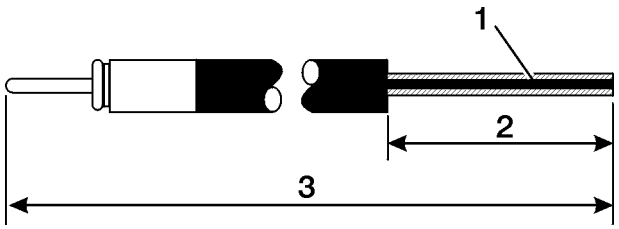
- Noise induced into individual speakers is likely harness noise. However, if the noise is induced into harnesses between audio system components (stereo receiver to amplifier, etc.) all speakers may be affected.
- Temporary speaker wires may be connected between the stereo receiver and noisy speaker to confirm harness noise entry.
- Check for improper component mounting or wire routing.
- Make sure all shield wiring is properly connected in mating connectors.

Noise Sniffer

Sniffer Construction

The noise sniffer can be used along with the vehicle's radio to locate "hot spots" which are generating radio noise interference. These "hot spots" will be found in the harnesses.

The sniffer can be made from an old piece of antenna lead-in from a mast or power antenna. The longer lead-in the better, since it will make the sniffer more flexible as a diagnostic tool.



1 Center conductor wire
2 50 mm (2 in.) of coax shield cut away
3 Antenna lead-in with antenna base connector removed

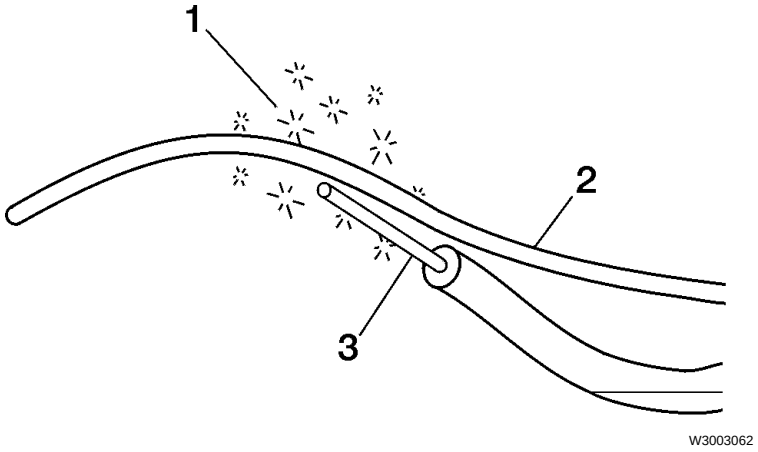
Construct sniffer per above graphic. The 50 mm (2 in.) section with the outer coating and braided shield stripped back becomes the antenna when the sniffer is plugged into the radio's antenna socket. It can then be used to probe and search out "hot spots".

Procedure

1 While listening to the complaint noise, disconnect the antenna and plug the sniffer into the antenna socket.

2 Turn the radio volume up.

3 When searching for the noise source, keep fingers off of the probe, otherwise erroneous results will be received.



1 Noise
2 Wire from harness
3 Sniffer

When checking for noise on a wire, the best results will be achieved when the sniffer is placed parallel to the wire. The sniffer can also be used to determine from what area of the dash the noise is being generated onto the antenna. It must be noted that the sniffer will also locate "normal" hot spots. However, a technician who becomes familiar with the sniffer's capability will find it the most useful diagnostic tool in noise suppression work.

Noise Suppression

The correct application of noise suppression and devices is very important. Connecting a noise suppression device in the wrong place or incorrectly can cause a condition to worsen, circuits to become inoperative or incorrect operation.

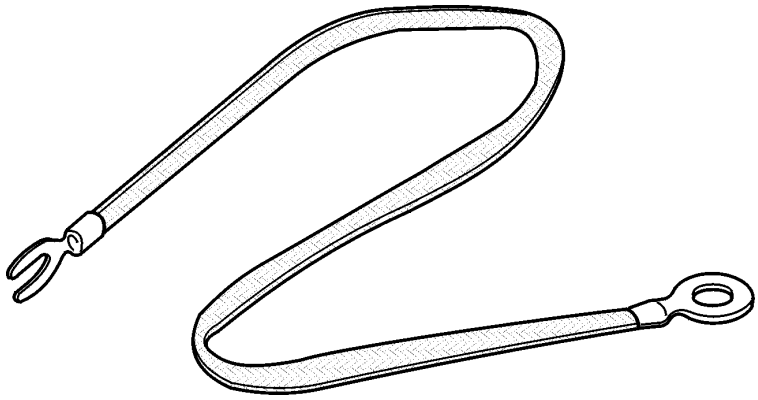
Good Grounds

While a good DC ground is often called for, it is most important to realize just what makes a good ground in an audio system. Diagnostic procedures will often call for testing for a ”good ground”. A good ground in the audio system is one with the following qualities:

- As short as possible.
- Total resistance of 0.2 ohms or less.
- Large surface area.
- Isolated from electrically noisy devices.

One diagnostic procedure calls for installing a braided ground strap from the chassis of the radio to a good grounding point. As important as it is to install the good ground, it is equally important to delete the previous ground at the radio. If two grounds were allowed to remain, it is possible to set up what is called a ”ground loop”. This occurs when there are two paths for ground return but they are not at equal potentials. When this happens, one actually carries a current to the radio chassis and adds it to the normal radio current.

Braided Grounds



W3003063

Braided ground strap.

- Braid 10.5 in. — Volvo P/N 176001
- Braid 19 in. — Volvo P/N 176002
- Braid 21 in. — Volvo P/N 176003
- Braid 8.5 in. — Volvo P/N 176004

The audio system has small AC currents flowing in such places as the antenna system. In a high frequency AC circuit, the current migrates closer to and travels most efficiently near the outside surface of the conductor. This is called the ”skin effect”. Because of the skin effect, the better ground in the audio system is one with a larger conductive surface area. This is why a braided ground strap is used where grounds do not resolve the condition, such as at the base of a power antenna mast. If installing a braided ground does not resolve the condition, reconnect the original ground.

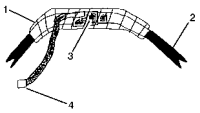
Conductive Shielding Tape

Aluminum Tape (P/N 176005)

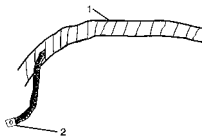
This tape is used in the audio system to create a shield around a wiring harness in the vehicle or a component in the vehicle. This tape will only suppress RFI conditions. The tape must also be grounded using a braided ground strap to obtain optimum results, see “Braided Grounds” page 65.

Nickel Tape (P/N 176006)

The purpose of this tape is to shield or suppress wiring harnesses and components from EMI/RFI disturbances that affect the electrical functions in the vehicle. The nickel tape is better able to shield magnetic interferences than aluminum tape. However, the nickel tape is very expensive compared to the aluminum tape.



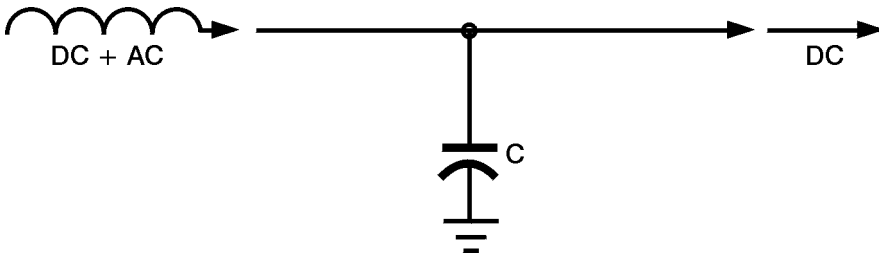
1 Conductive shielding tape
2 Antenna coaxial lead
3 In-line connector
4 Connect ground strap to a good chassis ground



1 Conductive shielding tape
2 Connect braided ground strap to a good chassis ground

Capacitors

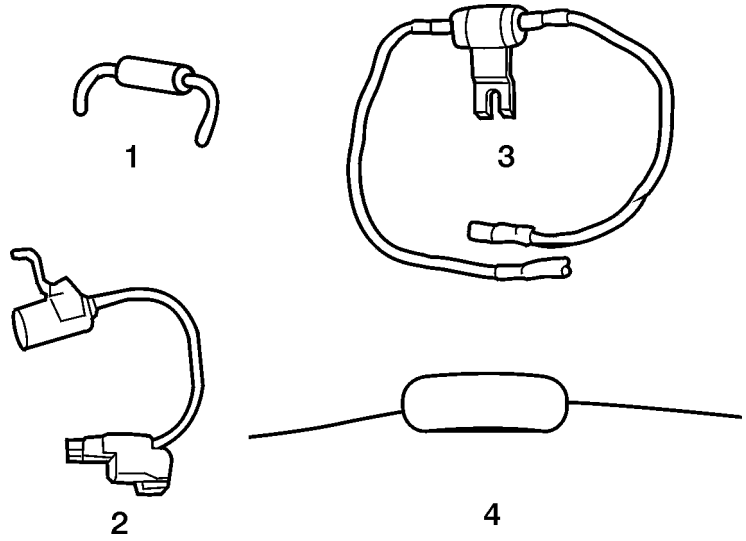
Capacitors are used to shunt AC noise to ground or to slow changes in voltage on a circuit.
Any capacitor that will be installed must be rated for 50 V operating voltage minimum. The capacitor (C) should be placed as close to the noise as possible in order to be most effective.



W3003068

Capacitors are connected in parallel to a DC circuit because the capacitor will act like an open circuit to a DC circuit. Capacitors will act like a resistance to an AC circuit and, therefore, short undesirable alternating currents to ground.

Capacitors may be packaged in several ways. Electrolytic capacitors by themselves will be marked with positive and negative leads and must be installed with the correct polarity.

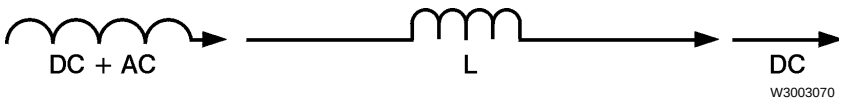


W3003066

1 220 μF 50 V capacitor, P/N 176007
2 Fuse block capacitor, P/N 176008
3 Feed through capacitor, P/N 176009
4 0.47 μF capacitor, P/N 176010

Feed-through type capacitors have already taken care of connecting the capacitor in parallel with the correct polarity. To install the feed through capacitor, open the DC circuit then install the device in series. The feed-through capacitor body must be connected to a good ground for the capacitor to be effective.

Inductors

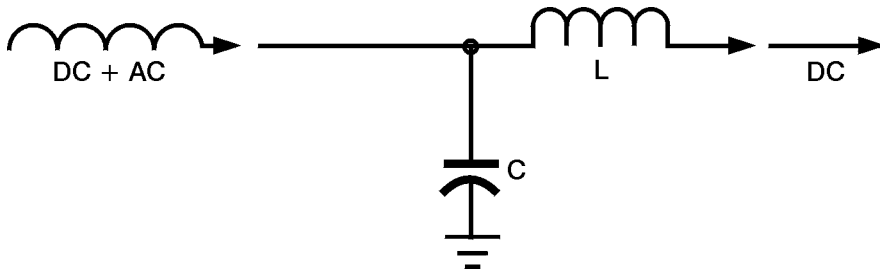


W3003070

L = Inductor

Inductors, sometimes called a ”choke”, are windings of wire. To a DC circuit, this looks like a short; but to an AC circuit, this looks like a high resistance. Thus, AC is effectively blocked while DC passes normally.

Filters

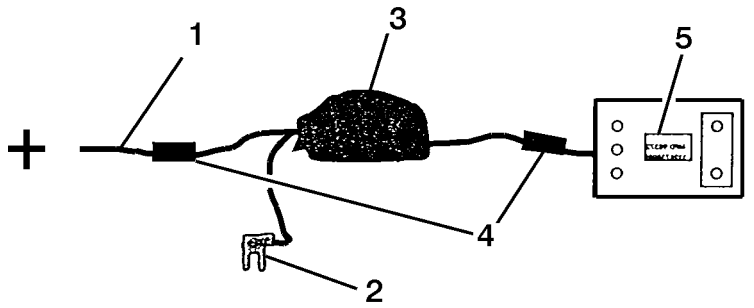


W3003069

Inductors are often used with a capacitor to form a filter. Each end of the inductor (L) is connected in series to the DC circuit and the remaining end of the capacitor (C) to ground.

This forms a double tap for AC that may be traveling the DC circuit. The capacitor will short some AC to ground while the inductor will block any remaining AC.

Filter packages can be especially useful in suppressing noise caused by a constant AC interference. Such interference can be caused by an electric motor.



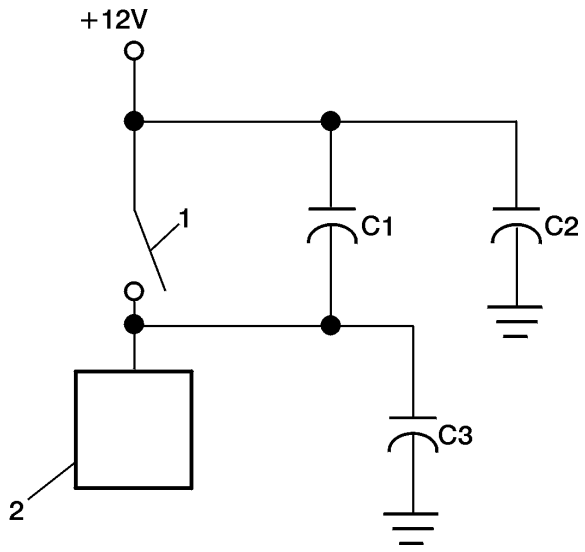
W3003067

1 Component battery or ignition feed
2 Capacitor ground lead (Try grounded and ungrounded)
3 Filter, P/N 176011
4 Splices
5 “Noisy” electrical component

Filter performance is polarity sensitive. Therefore, the effectiveness of the filter is dependent on whether the AC reaches the inductor or the capacitor first. The filter (2) is designed to be most effective when the end with the capacitor ground is connected toward the source of electrical noise. Install the filter in this polarity first. If the noise level is still not satisfactory, try disconnecting the capacitor ground. In some cases, if the first two connections do not eliminate the noise, try reversing the filter polarity and grounding the capacitor lead.

Switch Pop Suppression

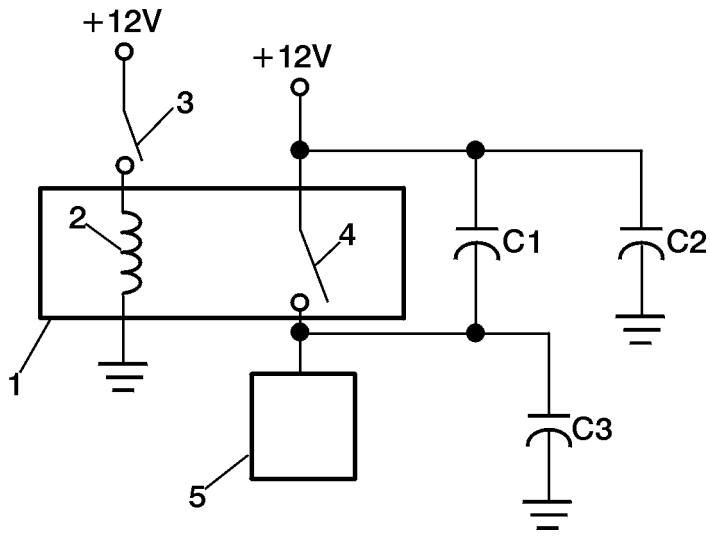
Direct switch activated device



1 Switch
2 Load

C1, C2 and C3 = 0.47 μF capacitor (P/N 176007)

Relay activated device



1 Relay
2 Coil
3 Activator switch
4 Switch
5 Load

1 Determine which switch is causing a ”pop” when activated.

2 Determine if the component being activated is direct switch activated or relay activated.

3 Install a 0.47 μF capacitor (C1) as shown above.

4 Check for switch pop. If pop is still present install a second capacitor (C2) as shown above.

5 Check for switch pop. If pop still present install a third capacitor (C3) as shown above.

6 Check for switch pop. If pop still present install a feed through capacitor (P/N 176009) between the switch and the component.

Diagnostic Test Kit

The Delco Audio System Diagnostic Kit (Kent Moore - J39916A) can be used to diagnose noise complaints. See “Diagnostic Test Kit” page 72.

Antenna

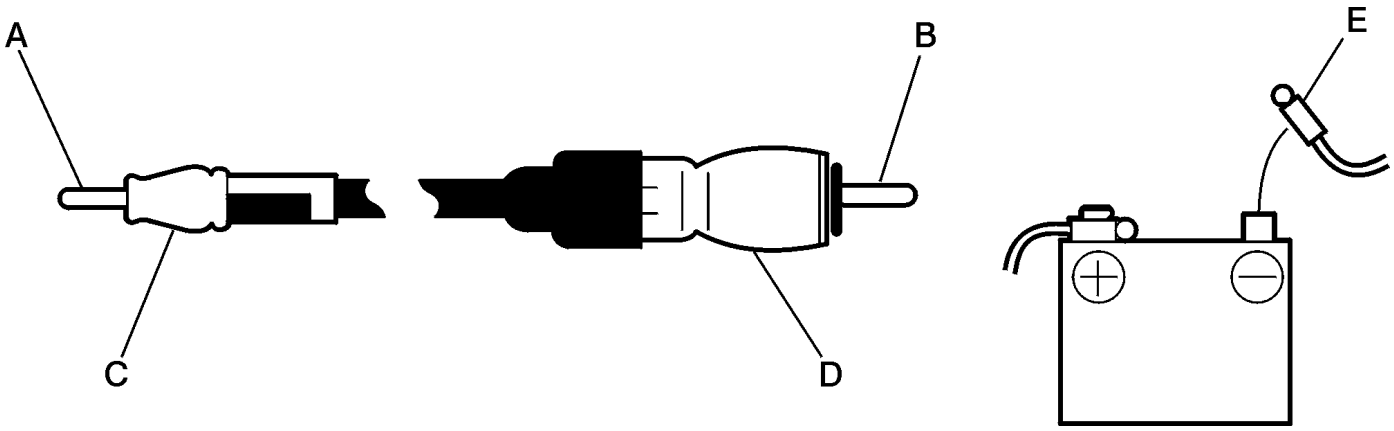
Before beginning antenna/reception troubleshooting, see “Troubleshooting Consideration” page 11.

No AM Signal / Weak FM Signal

Usually symptoms of a broken center conductor of a lead-in cable will result in no AM signal and weak FM signal. Depending on the type antenna system used, the lead in cable may be tested with an ohmmeter. The multiplex antenna system, with its electronic circuitry and no removable connection at the electronic module, cannot be effectively tested. Also, due to the inaccessibility of the antenna end connection, it may not be practical to test the lead in cables on ribbon and mast type systems. As an alternative to lead-in cable testing, a test antenna/lead-in cable may be used, see “Test Antenna” page 71.

If both ends of the lead-in cable can be accessed, the chart below can be used as a guide to determine if the lead-in cable is OK. When checking resistance, cautiously wiggle the lead-in tip and cable and watch for intermittent readings.

Note: “Zero” the meter to avoid a false reading.



A Tip for radio
B Tip for antenna
C Metal case
D Metal case
E Negative battery cable

Measuring Points	Expected Value
A ⇔ B	less than 3.5 Ω
C ⇔ D	less than 1.0 Ω
A ⇔ D	infinite
C ⇔ B	infinite
A ⇔ C	infinite
B ⇔ D	infinite
C ⇔ E	less than 1.0 Ω

⚠ WARNING

When removing battery ground cable, disconnect other ground cables connected to the battery first (such as engine ECU, satellite system, etc.), then remove the battery ground cable. Electronic modules may be damaged when additional grounds are connected/disconnected without the main battery ground connected. Always disconnect the main battery ground **last**.

The antenna and the lead-in must be properly grounded for proper reception. The antenna gets its ground at the mounting bracket. Poor mounting of the antenna can cause poor reception and/or interference. To check the antenna and the lead-in grounding, disconnect the battery negative connector and check from the negative battery cable connector (E) to the lead-in cable shield (C) at the radio.

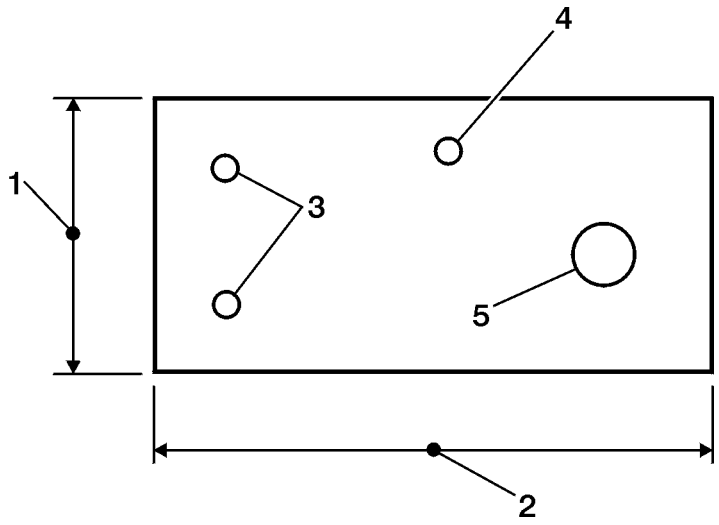
Test Antenna

Generally antenna systems will have very little resistance from the antenna mast to the center conductor tip where it plugs into the radio and very little resistance from the antenna base to ground. However in practice, it is difficult to test antennas in the VN series vehicle due to mounting locations or multiplex antenna circuitry. As an alternative to complex antenna testing, a simple test antenna/lead-in cable can be constructed to help isolate reception or noise problems. To use, the technician must gain access to the antenna input connection at the radio, disconnect the vehicle antenna and connect the test antenna. Connect the test antenna ground wire to a good vehicle ground.
If radio reception improves, it is likely that the antenna mast or lead-in is at fault, see “No AM Signal / Weak FM Signal” page 70. If radio noise improves, the vehicle lead-in cable may need to be moved away from electrically noisy devices, see “Noise Sniffer” page 64.

Note: Do not hold the antenna mast by hand. This will decrease the capability of the antenna to receive a station.

Test Antenna Construction

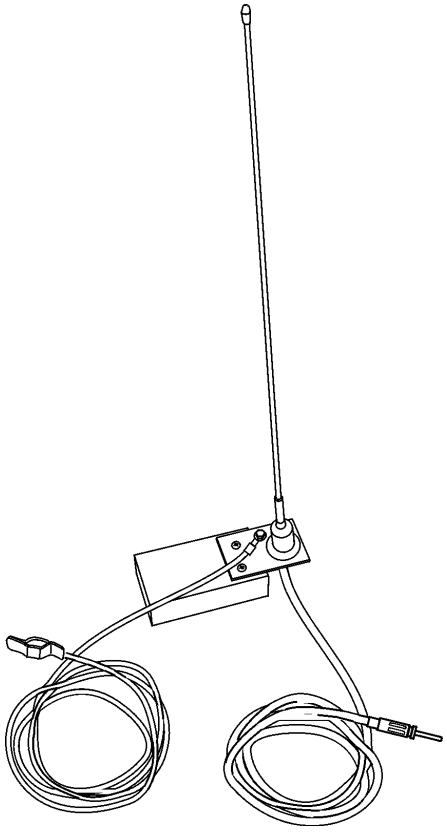
A test antenna can be constructed from any old antenna/lead-in assembly. Volvo antenna P/N 1586621 and lead-in base assembly P/N 1082185 make an excellent test antenna due to convenient size of the antenna and a long lead-in cable.



W3003386

Fabricate a sheet metal plate per the drawing above.
Mount the plate on a 150 x 100 x 50 mm (6 x 4 x 2 in.) piece of wood. Install the ground wire, attach an alligator clip in the other end of the ground wire. Install the antenna assembly.

1 75 mm (3 in.)
2 100 mm (4 in.)
3 Mounting holes: 6.25 mm (1/4 in.)
4 Ground wire hole: 6.25 mm (1/4 in.)
5 Antenna hole: 18.75 mm (3/4 in.)



W3003385

Diagnostic Test Kit

Test CD/Cassette Tape

The Delco Audio Diagnostic Kit (Kent Moore – J39916–A) can be used to diagnose several audio complaints. The test CD/cassette tape will provide the technician with test tones for the following test.

Note: An instruction booklet is included with the kit.

Function

- Bass/subwoofer test
- Mid range speaker tests
- Door tweeter test
- All speaker test
- Speaker buzz and rattle test
- Noise diagnosis
- Coaxial speaker diagnosis
- Motor speed test

⚠ CAUTION

Improper use of this diagnostic CD/cassette tape can result in speaker or amplifier damage. Always begin testing procedures at minimum volume, working up to an appropriate level.

Each signal will be played for five minutes, starting with the low frequency tone. Use the fade and balance controls to evaluate the speakers. For example, when the test signal begins, fade full front and check the speaker response of the right and left speakers with the balance control. Then, fade full rear and check the rear speakers in the same manner. There should be enough time to check all speakers with each signal. If the signal ends, and the test is not completed, simply replay the necessary signal.

Note: Always compare the front speakers to front and rear speakers to rear. Don't compare the front speaker to rear speaker because they could be different speakers or their mounting environment could cause them to sound different.

The three basic tones used to test and evaluate base level speakers, or other complex speaker systems, are a bass (50 Hz sine) tone, a mid (500 Hz warble) tone and a tweeter (9 000 Hz spectral) tone. The combination tone is a blend of the above three tones.

Bass Speaker Test

The 50 Hz tone is used to evaluate the bass response of an audio system. This tone is also helpful in evaluating audio systems witch have separate subwoofer amplifiers and speakers.

Mid-Range Speaker Test

The 500 Hz warble tone is used for the evaluation of range speaker response. This tone is qualified as a warble tone because it has different audio characteristics than a sine tone. This tone produces a warble sound. At these mid-range frequencies, it is better to use a warble tone than a sine wave because the location of warble tone source, such as a speaker, is easier to identify. A normal sine tone can set up a standing wave within a vehicle which can make it difficult to determine its source location.

Tweeter Test

The 9 000 Hz spectral tone is used for tweeter or high frequency evaluation. This tone sounds like a group of crickets chirping. This type of tone is used for two reasons: one, much like the warble tone to locate its source, and two, this type of tone is easier to identify for those people with high-end hearing loss problems.

All Speaker Test

With the combination tone, you will be able to quickly diagnose overall audio performance in a vehicle. This tone can be used for numerous audio problems, such as distorted or no sound from speaker(s). Listening to the combination tone, you should be able to hear three distinct sounds. A low pitch steady tone of 50 Hz, a medium frequency warbling tone of 500 Hz and a high frequency hiss or cricket type of sound about 9 000 Hz. Concentrate on the appropriate element of the test signal; low, medium or high as you listen to the different speaker locations by means of the fade and balance control. **This tone can be an excellent signal to use in the diagnosis of coaxial speakers.** For example, if a coaxial speaker is not functioning properly, a direct comparison of the right to left speaker, or vice versa, can determine if the tweeter or woofer in the speaker assembly is inoperative.

Also, when using the combination tone, comparative AC voltage measurements can be made on the speaker terminals, provided the fade and balance controls are in the detent position. With these voltage measurements, a determination can be made in the diagnosis of speaker or amplifier. If the amplifier system of the vehicle is operating normally, the AC voltages should be very close or the same in value.

Speaker/Grill Rattle Test

This portion of the CD can be used to diagnose speaker and grill rattles. The first test is two variable frequency tones played back to back which can help you find or verify a speaker rattle or buzz. Tone two is also a sweep, but frequency change is at much slower rate. This can be used in the repair of a speaker rattle or buzz. If the problem has already been isolated, the fade and balance controls can be set to the proper location and the test tones can be played in the specific problem area.

Noise Diagnostic

This portion can be used for noise diagnostics such as alternator whine, switch pops etc. This portion of the diagnostic CD/cassette tape may be used in conjunction with the audio diagnostic section in the service manual, provided with the test kit.

Motor Speed

There is a 2 minute time period marked in a section of the diagnostic tape, for the purpose of checking the cassette tape motor speed. This portion of the diagnostic tape can be used to verify or resolve problems when a customer complains that the audio from the cassette tape sounds abnormal. In some cases, improper tape motor speed can cause abnormalities. If the time taken for this test is between 1 minute and 56 seconds to 2 minutes and 1 second, the tape motor speed is within tolerance.

Service Procedures

DANGER

PERSONAL INJURY HAZARD! 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 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.

Basic Radio Replacement

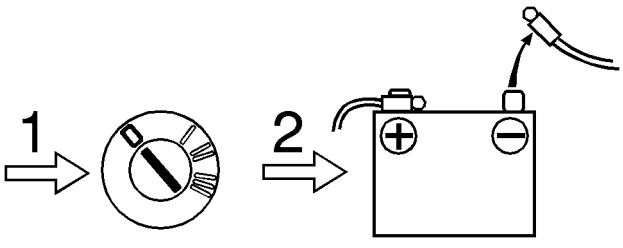
Note: This procedure applies only to the basic in-dash radio. For service information on the premium radio, refer to “Premium Radio Replacement” page 78.

CAUTION

Before beginning this procedure, disconnect any ground cables connected to the battery (such as engine ECU, satellite system, etc.). Disconnect those grounds **first** to avoid damaging electrical components. Then disconnect battery negative and positive terminals to prevent electric shock (disconnect the ground terminal first). Failure to do so could cause personal injury.

Removal

1



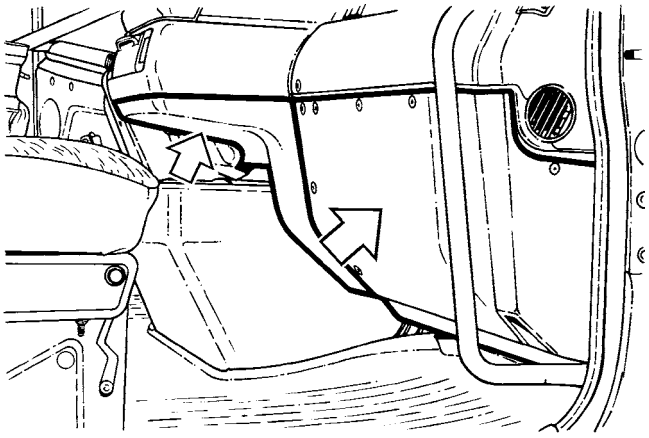
T8006862

Turn the ignition key OFF and disconnect the main negative battery cable.

2

Remove the right front grab handle’s upper bolt cover from the A-pillar trim. Remove the bolt and pull the handle out of the trim.

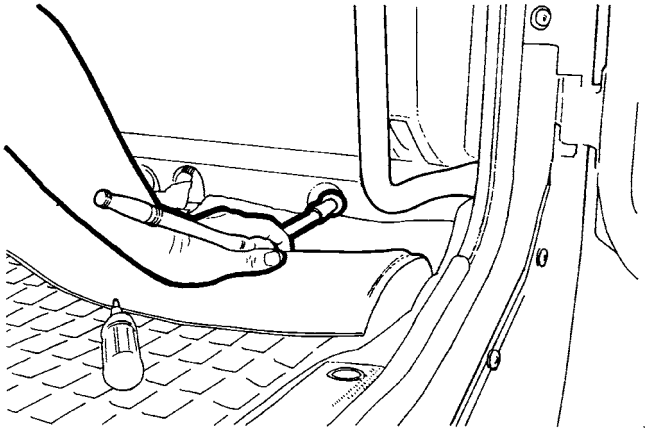
3



W8001131

Remove the 7 torx screws from the lower right dash panel. Remove the 4 screws from the center dash panel.

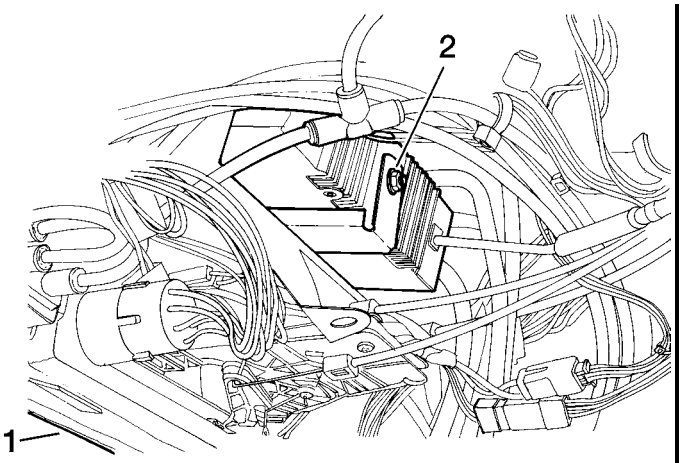
4



W8001165

Pull the floor mat back and remove the plastic nuts. Remove the lower right and center dash panels.

5



W3000675

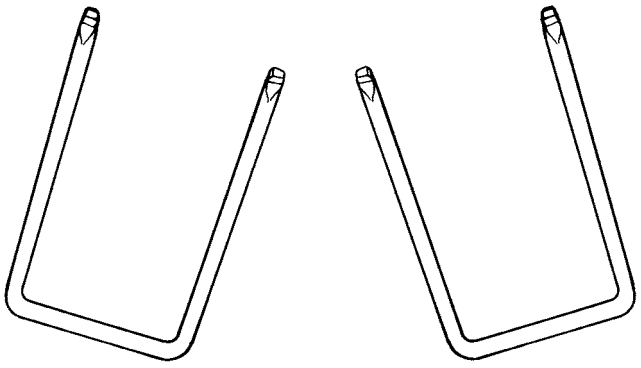
1 Lower edge of dash
2 Nut at radio mounting bracket

CAUTION

To avoid damage to the radio or mounting bracket, remove the nut from the rear of the bracket. Failure to remove the nut may result in bending the bracket and damaging the radio.

Remove the nut from the rear of the radio mounting bracket. This nut is accessible through the opening left when the trim panel was removed.

6

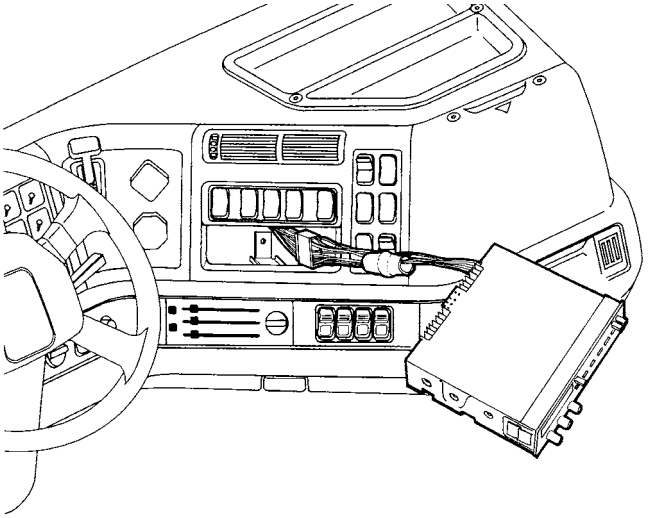


W3000702

Basic radio removal tools, Volvo P/N 176000.

Insert the removal tools into the face of the radio.

7



W3000674

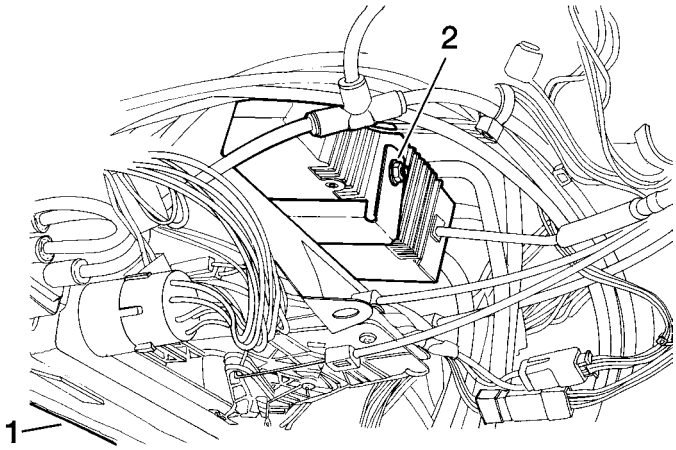
When the tools are inserted, pull slightly apart to unlock the radio from the housing. Pull on the removal tools to slide the radio out of the housing. Disconnect the antenna and the electrical connector.

Installation

1
Make certain the vehicle ignition is OFF before beginning this procedure.

2
Connect the radio electrical connector and the antenna.

3



W3000675

1 Lower edge of dash
2 Nut at radio mounting bracket

Slide the radio into the housing, making sure the stud on the rear of the radio is aligned with the mounting bracket. Install the nut into the bracket to hold the radio in position. Torque to 1.4 ± 0.2 Nm (12 ± 2 in-lb).

1.4 ± 0.2 Nm (12 ± 2 in-lb)

Note: When sliding the radio into position, make certain the antenna cable and electrical connection do not get between the radio and the radio bracket.

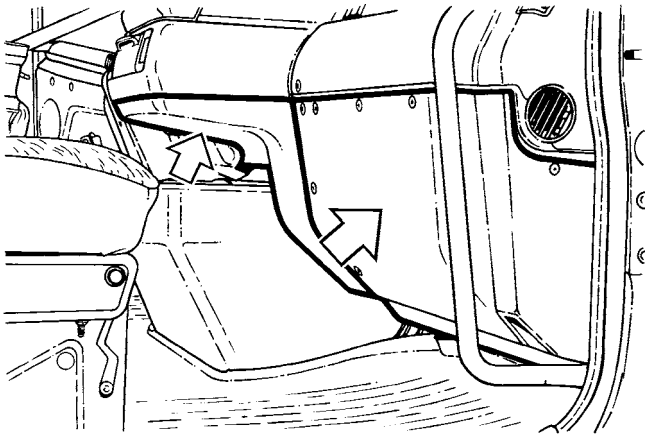
4

⚠ CAUTION

If there are other ground cables connected to the battery (such as engine ECU, satellite system, etc.), connect the battery ground cable **first**, then connect those grounds. Electronic modules may be damaged when additional grounds are connected/disconnected without the main battery ground connected. Always reconnect the main battery ground **first**.

Connect the main negative battery cable. Check operation of the radio. Also check the CD changer and the amplifier if installed.

5

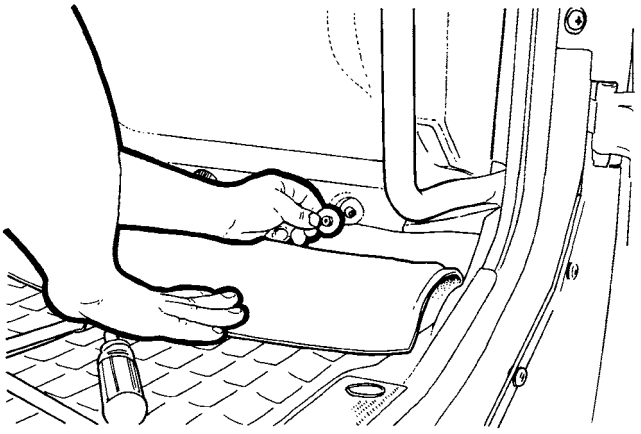


W8001131

Pull the right side floor mat back and insert the lower right dash panel onto the weld studs. Install the 7 torx screws in the top of the panel. Pull the mat back at the accelerator pedal and insert the lower center dash panel onto the weld studs. Install the 4 torx screws in the top of the panel. Torque to 3.5 ± 0.5 Nm (31 ± 4.5 in-lb).

3.5 ± 0.5 Nm (31 ± 4.5 in-lb)

6



W8001166

Pull the floor mat back and install the plastic nuts in the lower right dash panel and the panel under the center of the dash.

7

Install the right front grab handle by starting the mounting bolt in the top of the handle. Then torque to 24 ± 4 Nm (212 ± 30 in-lb). Install the bolt cap in the A-pillar trim panel.

24 ± 4 Nm (212 ± 30 in-lb)

Premium Radio Replacement

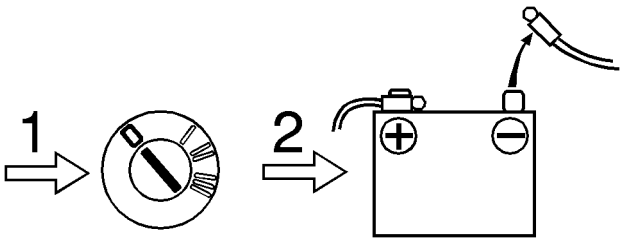
Note: This procedure applies only to replacement of the premium radio option. For more information concerning replacement of the basic radio, see “Basic Radio Replacement” page 75.

CAUTION

Before beginning this procedure, disconnect any ground cables connected to the battery (such as engine ECU, satellite system, etc.). Disconnect those grounds **first** to avoid damaging electrical components. Then disconnect battery negative and positive terminals to prevent electric shock (disconnect the ground terminal first). Failure to do so could cause personal injury.

Removal

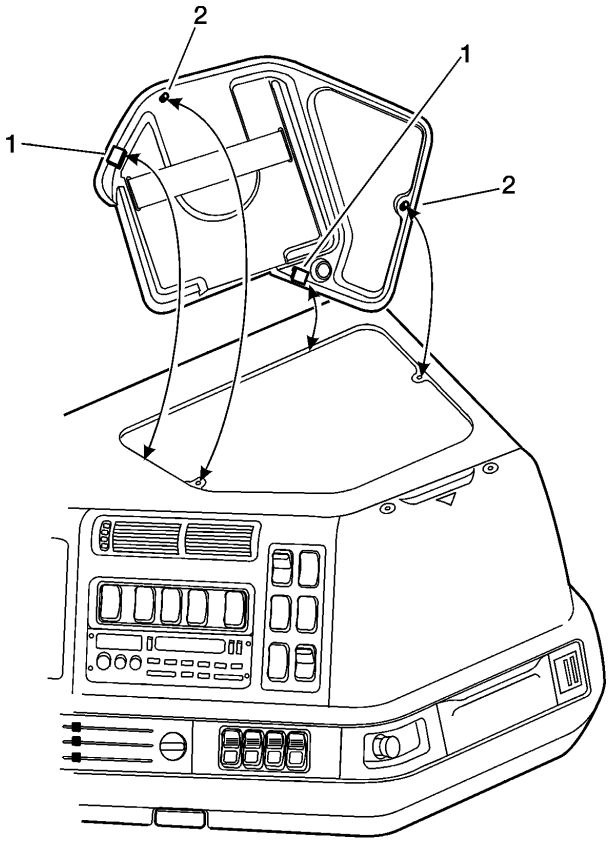
1



T8006862

Turn the ignition key OFF and disconnect the main negative battery cable.

2



W8002059

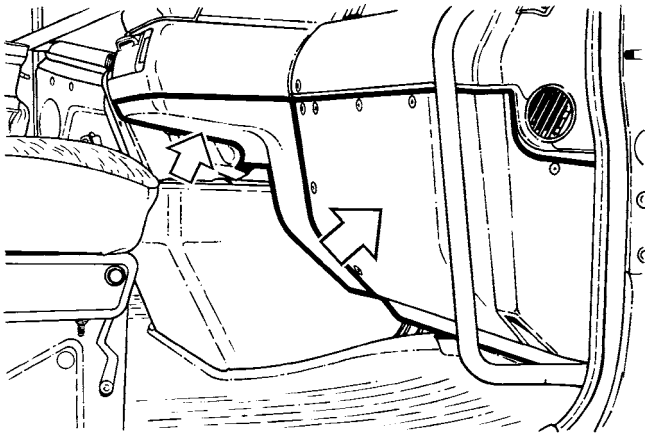
1 Panel tabs
2 Panel torx bolts

Remove the top cover of the TEC center by loosing the 2 bolts and lifting the cover on the right rear corner. Then, pull the cover toward the passenger side and back to clear the tabs on the front and left sides. Remove the CB cable grommet and then the CB cable.

3

Remove the right front grab handle’s upper bolt cover from the A-pillar trim. Remove the bolt and pull the handle out of the trim.

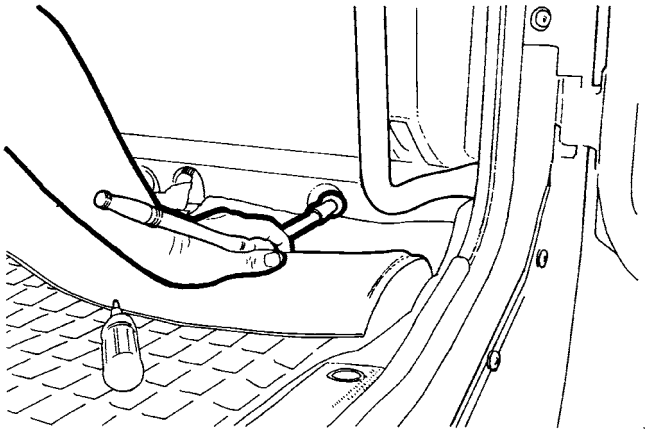
4



W8001131

Remove the 7 torx screws from the lower right dash panel. Remove the 4 screws from the center dash panel.

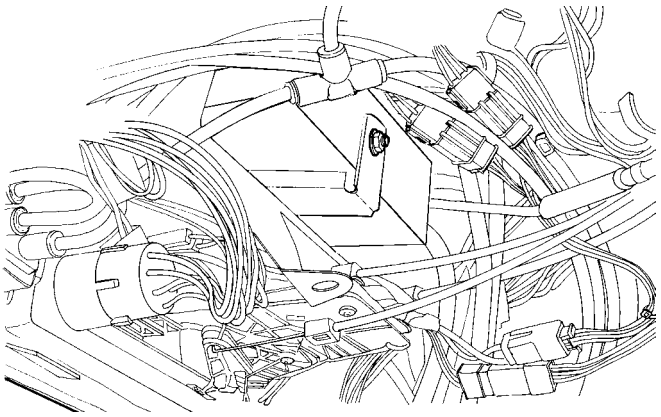
5



W8001165

Pull the floor mat back and remove the plastic nuts. Remove the lower right and center dash panels.

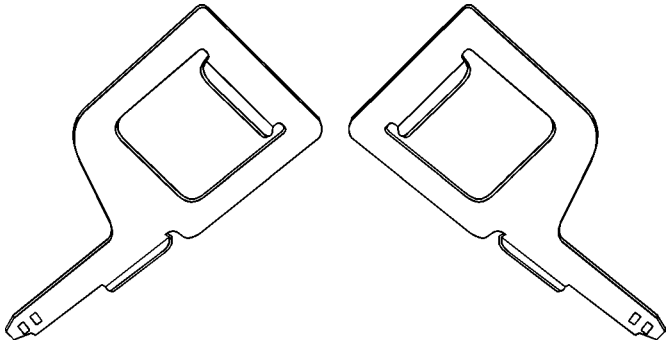
6



W3002404

Remove the nut on the rear of the radio.

7

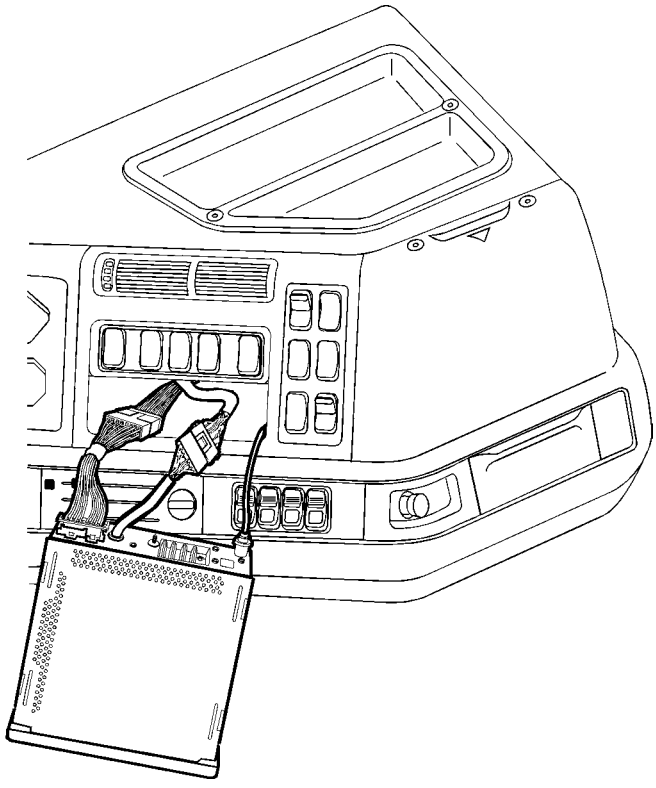


W3002355

Premium radio removal tools, Volvo P/N 3949548 (left), P/N 3949549 (right).

Insert the radio removal tools into the left and right sides of the face of the radio until the tools lock into place. Pull on the tools to remove the radio from the dash.

8



W3002408

Radio shown with optional CD changer cable.

Unplug the antenna and the connector for the radio. If an optional CD changer is equipped, this connector should also be unplugged.

9

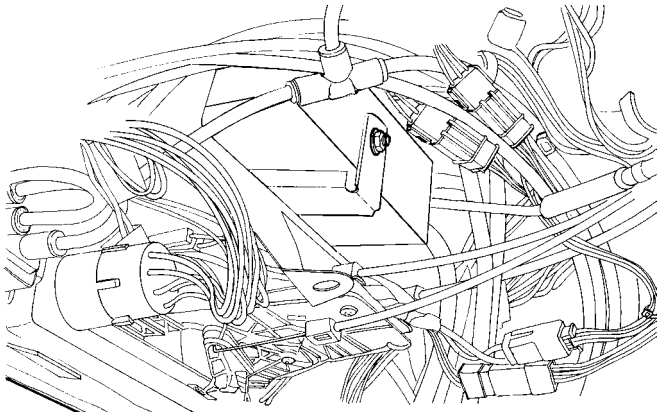
Remove the radio from the dash.

Installation

1
Plug in the electrical connector and the radio antenna. If the CD changer is installed, plug in its connector as well.

2
Slide the radio into the housing, aligning the stud on the rear of the radio with the mounting bracket. Guide the wiring from between the radio and the bracket, making certain that the antenna cable and electrical connection do not get caught in the bracket. Push in the radio until it locks into the security clips.

3



W3002404

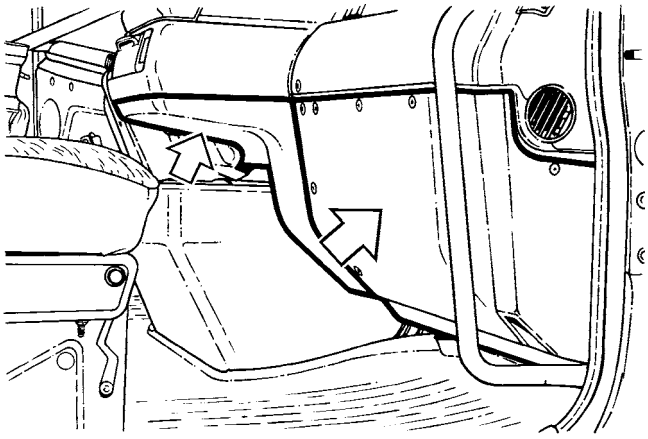
Install the nut on the rear mounting stud of the radio. Torque the nut to 1.4 ± 0.2 Nm (12 ± 2 in-lb).	1.4 ± 0.2 Nm (12 ± 2 in-lb)

4

> **⚠ CAUTION**
>
> If there are other ground cables connected to the battery (such as engine ECU, satellite system, etc.), connect the battery ground cable **first**, then connect those grounds. Electronic modules may be damaged when additional grounds are connected/disconnected without the main battery ground connected. Always reconnect the main battery ground **first**.

Connect the main negative battery cable. Check operation of the radio.

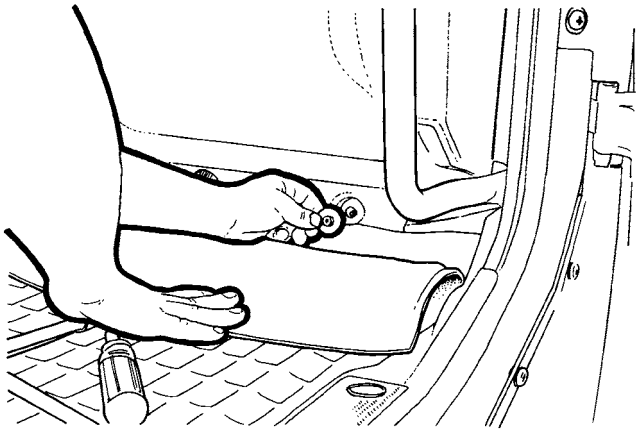
5



W8001131

Pull the right side floor mat back and insert the lower right dash panel onto the weld studs. Install the 7 torx screws in the top of the panel. Pull the mat back at the accelerator pedal and insert the lower center dash panel onto the weld studs. Install the 4 torx screws in the top of the panel. Torque to 3.5 ± 0.5 Nm (31 ± 4.5 in-lb).	3.5 ± 0.5 Nm (31 ± 4.5 in-lb)

6



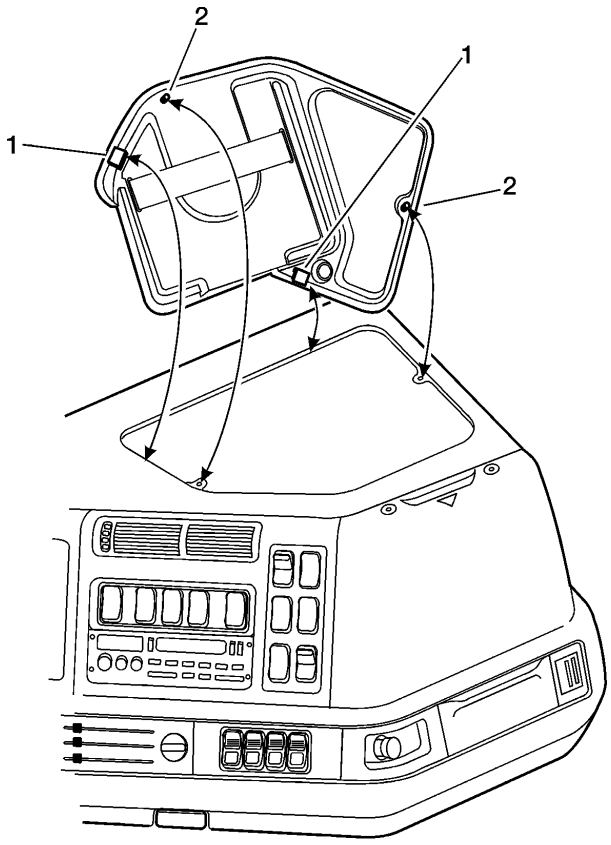
W8001166

Pull the floor mat back and install the plastic nuts in the lower right dash panel and the panel under the center of the dash.

7

Install the right front grab handle by starting the mounting bolt in the top of the handle. Then torque to 24 ± 4 Nm (212 ± 30 in-lb). Install the bolt cap in the A-pillar trim panel.	24 ± 4 Nm (212 ± 30 in-lb)

8



1 Panel tabs
2 Panel torx bolts

Replace the top fuse and relay panel. Insert the tabs of the panel into the front and left sides of the open fuse area. Fit the right rear corner into place. Install the 2 torx bolts 4.5 ± 0.5 Nm (3.3 ± 0.4 ft-lb).

4.5 ± 0.5 Nm (3.3 ± 0.4 ft-lb)

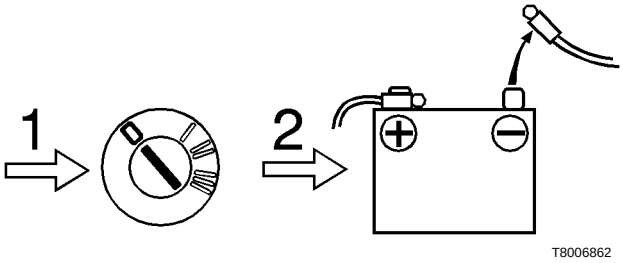
CD Changer Replacement

CAUTION

Before beginning this procedure, disconnect any ground cables connected to the battery (such as engine ECU, satellite system, etc.). Disconnect those grounds ***first*** to avoid damaging electrical components. Then disconnect battery negative and positive terminals to prevent electric shock (disconnect the ground terminal first). Failure to do so could cause personal injury.

Removal

1

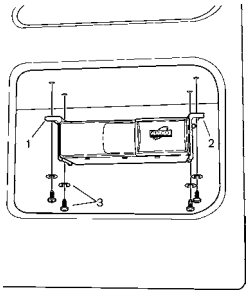


Turn the ignition key OFF and disconnect the main negative battery cable.

2

Check to ensure that the radio sleep timer is inactive.

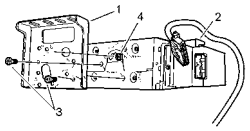
3



1 Left mounting bracket
2 Right mounting bracket
3 Mounting screw and washer

Remove the four screws mounting the CD changer to the shelf.

4



W3002442

1 Right mounting bracket
2 Left mounting bracket
3 M5 torx bolt
4 Positioning screw (do not remove)

Unplug the cable connector from the rear of the CD changer. Remove the 4 mounting bolts from the brackets on the side of the changer. Remove the mounting brackets.

Installation

1

Install the mounting brackets to the CD changer. Using the 4 mounting bolts, fit the mounting brackets to the sides of the player so the brackets face upward. Torque the bolts 3.5 ± 0.5 Nm (31 ± 4 in-lb).

3.5 ± 0.5 Nm (31 ± 4 in-lb)

2

Plug the cable connector into the rear of the CD changer.

3

Mount the CD changer to the bottom side of the upper shelf above the passenger seat. Position the changer and install the 4 screws.

4

⚠ CAUTION

If there are other ground cables to be connected to the battery (such as engine ECU, satellite system, etc.), connect the battery ground cable ***first***, then connect those grounds. Electronic modules may be damaged when additional grounds are connected/disconnected without the main battery ground connected. Always reconnect the main battery ground ***first***.

Reconnect the main negative battery cable.

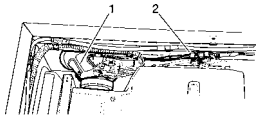
5

Turn the ignition switch ON and the turn on the radio power to test operation of the CD changer.

Subwoofer Replacement

Removal

1

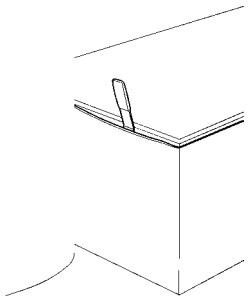


W3002448

1 Subwoofer speaker
2 Subwoofer connection

Turn off the radio and unplug the connector to the subwoofer. Cut any wire ties fastening the wiring.

2

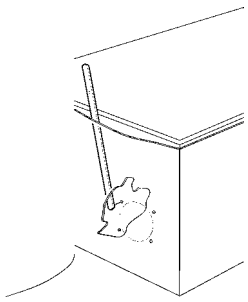


W3002443

To remove the subwoofer from the right side luggage compartment wall, the torx bolts attaching the subwoofer must be removed. To access these bolts, use the trim pad remover (Kent-Moore P/N J-38778) to release the plastic clips holding the carpet trim to the bunk support.

J-38778

3



W3002444

Pull the carpet trim back enough to slide the torx bit strap tool (Kent-Moore P/N J-43144) onto one of the subwoofer's torx bolts. The nut on the bolt may have to be turned to allow alignment of the tool and bolt head.

J-43144

4
Using the torx tool to hold the bolts in place, remove the 4 nuts on the subwoofer. Due to the tight fit of the trim panel, a long screwdriver may be needed to release the tool from the lower bolts.

5
Remove the subwoofer from the luggage compartment.

Installation

1
Install the subwoofer onto the bunk support with the 4 mounting bolts. Using the torx bit strap tool (Kent Moore P/N J-43144), hold each of the 4 mounting bolts in place while tightening the mounting nut. Torque each mounting nut to 3.5 ± 5 Nm (31 ± 4.5 in-lb) . A long screwdriver may be needed to remove the torx bit strap tool from the lower bolt heads.

J-43144
3.5 ± 5 Nm
(31 ± 4.5 in-lb)

2
Reinstall the plastic clips to the carpet trim.

3
Plug in the connector to the subwoofer. Replace wire ties. Check operation of the subwoofer.

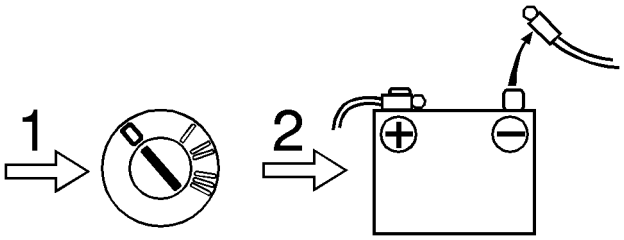
Stereo Amplifier Replacement

CAUTION

Before beginning this procedure, disconnect any ground cables connected to the battery (such as engine ECU, satellite system, etc.). Disconnect those grounds ***first*** to avoid damaging electrical components. Then disconnect battery negative and positive terminals to prevent electric shock (disconnect the ground terminal first). Failure to do so could cause personal injury.

Removal

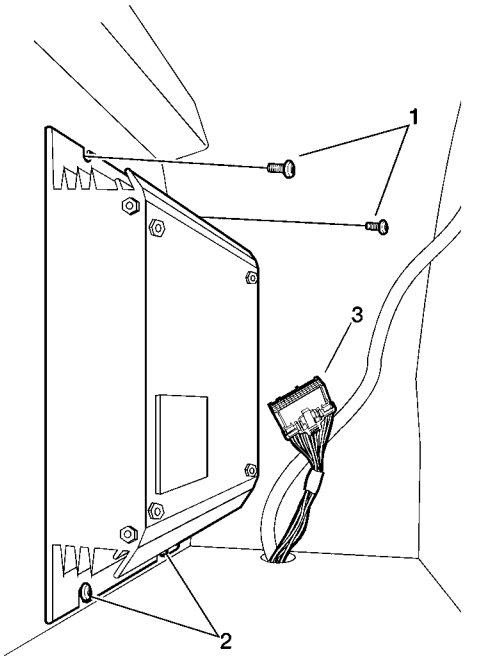
1



T8006862

Turn the ignition key OFF and disconnect the main negative battery cable at the battery.

2

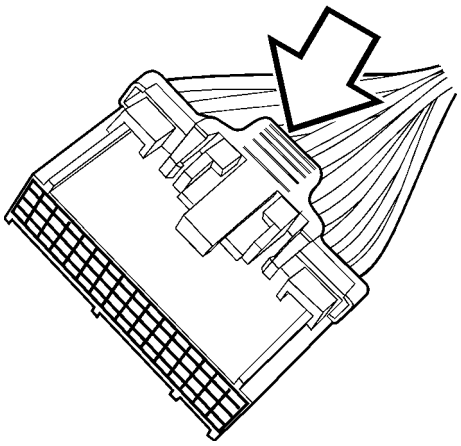


W3002401

1 Upper mounting screws
2 Lower mounting screws
3 Amplifier connector

Remove the 2 mounting screws on the top side of the amplifier. Loosen the 2 lower mounting screws.

3



W3002399

To unplug the connector from the amplifier, slide the amplifier up. Reaching to the back of the amplifier, press the release tab on the center of the connector and disconnect. Remove the amplifier from the truck.

Installation

1
Plug in the connector for the amplifier.

2
Slide the amplifier into the 2 lower screws. Position the 2 upper screws and tighten all 4 screws.

3

CAUTION

If there are other ground cables to be connected to the battery (such as engine ECU, satellite system, etc.), connect the battery ground cable ***first***, then connect those grounds. Electronic modules may be damaged when additional grounds are connected/disconnected without the main battery ground connected. Always reconnect the main battery ground ***first***.

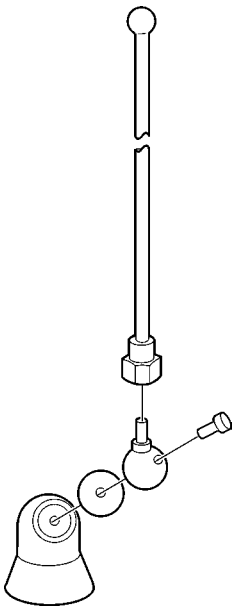
Connect the main negative battery cable and check for operation of the amplifier and stereo system.

Antenna Mast (Fixed Mast Type), Replacement

The fixed mast antenna is standard on the VNM, VNL day cabs and the VNL 420 sleeper cab vehicles. These vehicles may also be equipped with optional multiplexer antenna system. Determine which antenna system is used before beginning repairs.

1
Remove the mast.

2



W3003472

Install the new mast. Torque to 5 ± 0.8 Nm (44 ± 7 in-lb).	5 ± 0.8 Nm (44 ± 7 in-lb)

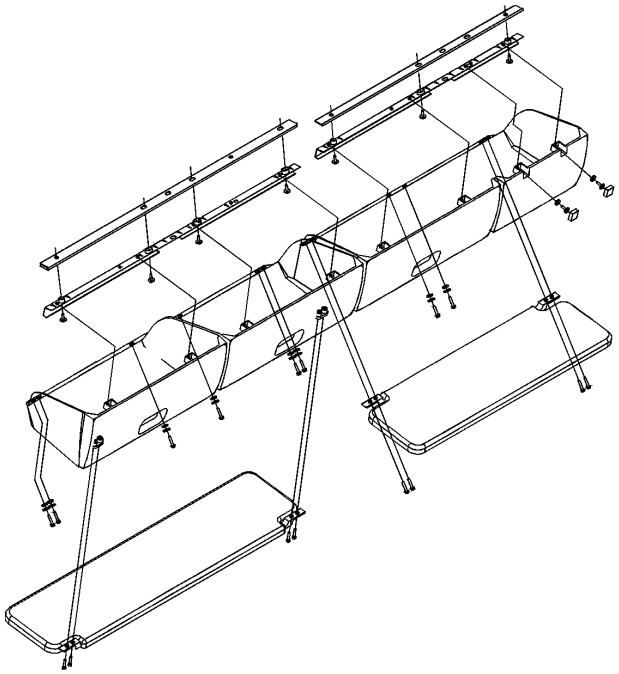
Note: Adjust the swivel base as necessary. Torque to 1.5 ± 0.5 Nm (13 ± 4.4 in-lb).

Antenna Mast (Ribbon Type), Replacement

The ribbon antenna is standard on the VNL 610. It is located between the SMC roof panel and headliner. The VNL 610 may also be equipped with the optional multiplexer antenna system. Determine which antenna system is used on the vehicle before beginning repairs.

Removal

1



Remove the front left overhead storage cabinet together with the sun visor.

2
Remove the right sun visor.

3
If equipped, remove the front right overhead storage cabinet.

Note: Two screw covers, on the far right facing panel, must be removed to gain access to the mounting screws.

4
Remove the cabinet carrier rail assembling screws.

5
Remove driver side window visor assembly:
Pry off the end screw covers. Remove the mounting screws.

Note: On sleeper models without an upper bunk, the step **6** and **7** may be omitted.

6
Remove the sleeper right overhead storage cabinet:
Disconnect the 12 volt power outlet connector. Remove the lamp wiring cover screws. Remove the cabinet mounting bolts. Disconnect the lamp wiring connector. Remove the cabinet from the vehicle.

7
Remove the sleeper left overhead storage cabinet:
Remove the lamp wiring cover screws. Remove the cabinet mounting bolts. Disconnect the lamp wiring connector. Remove the cabinet from the vehicle.

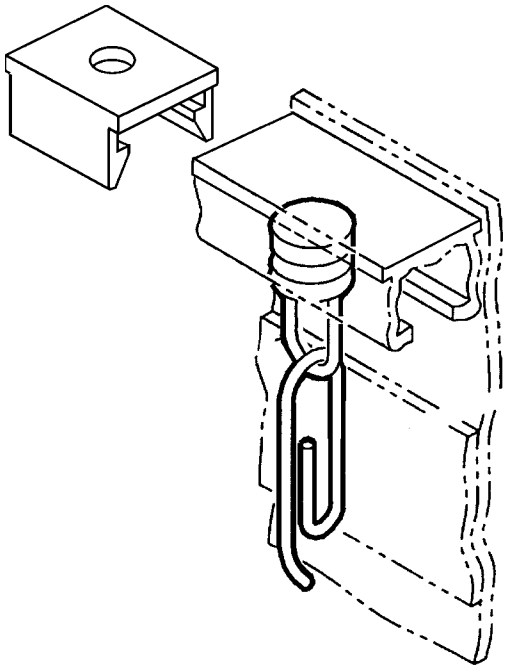
8
Remove the sleeper curtain rail assembly.

Note: The curtains do not need to be removed from the rail.

9
Remove the bezels for the front overhead roof storage pockets.

Note: Use caution not to break the bezel mounting post.

10

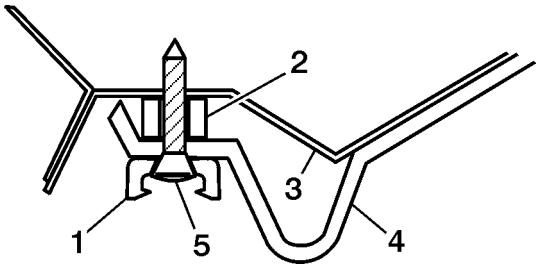


W8001428

Remove the front curtain rail assembly. Use a wide blade screw driver to carefully pry the rail out of one side then the other side on each retaining clip. After all retaining clips are released, remove the front curtain rail assembly from the vehicle.

Note: Use caution not to deform the rail assembly.

11



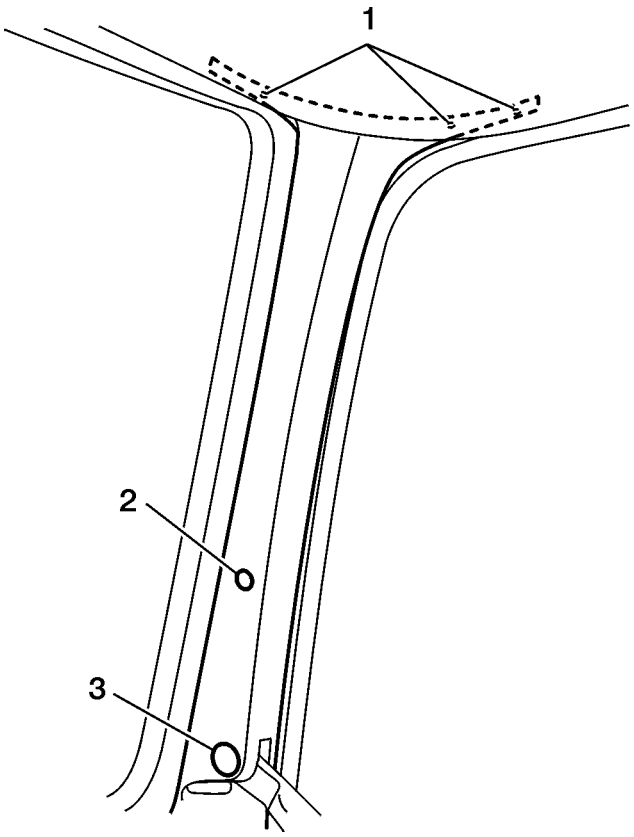
W3003095

1 Curtain rail or trim washer
2 Plastic spacer
3 Cab metal
4 Headliner
5 Screw

Check the retaining clips used to attach the front curtain rail assembly. Remove all that are attached with screws.

Note: Nylon spacers are used between the headliner and cab mounts; note their position for reassembly.

12

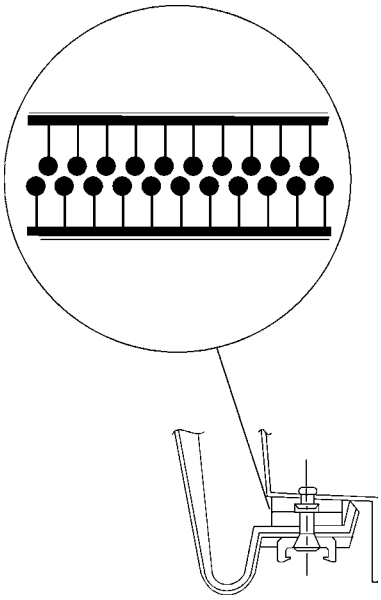


W3003260

1 Plastic rivets (day cab vehicle only)
2 Molding clip
3 Grab handle bolt cover

Remove the upper grab handle bolt cover from the A-pillar trim. Remove the bolt and pull the upper grab handle out of the cover. Repeat on the other side.
Pull the door seal away from the A-pillar trim and the top of the door. Remove the molding clip by pressing in the center button. Remove the A-pillar trim. Repeat on opposite side.

13

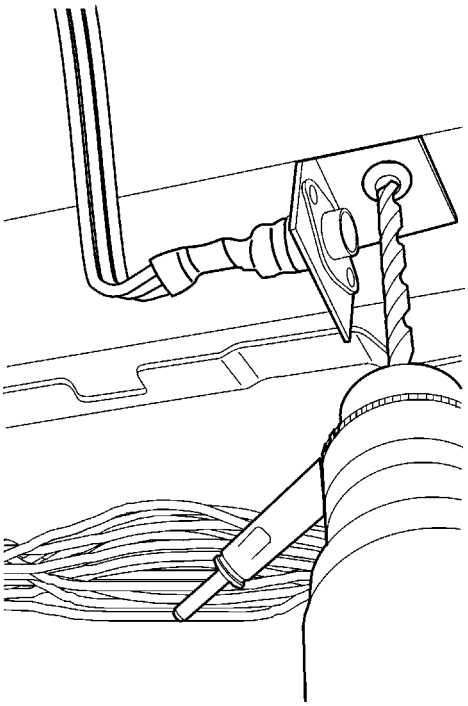


W8001424

The headliner is now held in place by interlocking fasteners. Start at one door and work under the headliner with fingers to pop apart the interlocking fasteners. The fasteners should be at each remaining front curtain rail retaining clip and at various points over the body of the headliner. A long screwdriver, or similar tool, may be used to free the hard to reach interlocking fasteners. After all fasteners are released and the headliner drops, disconnect the lamp assembles and remove the headliner from the vehicle.

Note: Use caution not to bend the headliner to the point at which a permanent crease will show in the material.

14



W3003096

Pull out the antenna lead-in cable at the antenna base connector. Drill out the rivet (or screw) attaching the antenna base bracket to the cab.

15

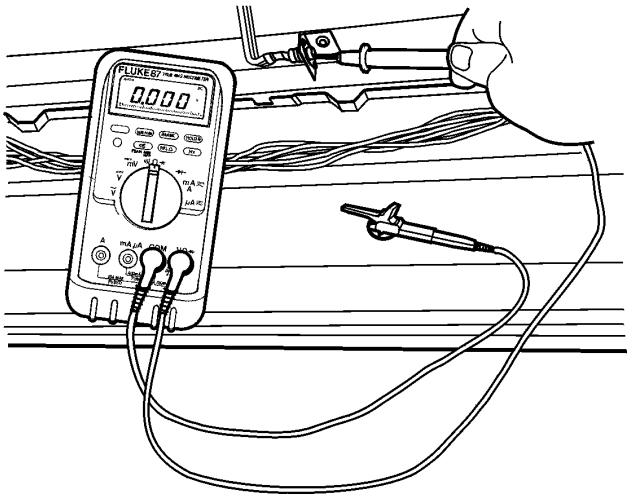
Pull back one side of each piece of vinyl tape securing the antenna mast. Gently pull down the rear headliner as necessary to complete the removal of the antenna mast. Remove the antenna from the vehicle.

Installation

1

Check the antenna base mounting hole. Clean if necessary. Rivet (or screw) the new antenna base to the cab. Use a steel 3/16 rivet.

2



W3003270

Check the continuity using the multimeter J39200 between the antenna base and the cab. The antenna must be properly grounded to operate correctly. The readings should be less than 0.2 ohms.

J39200

Note: “Zero” the meter to avoid a false reading.

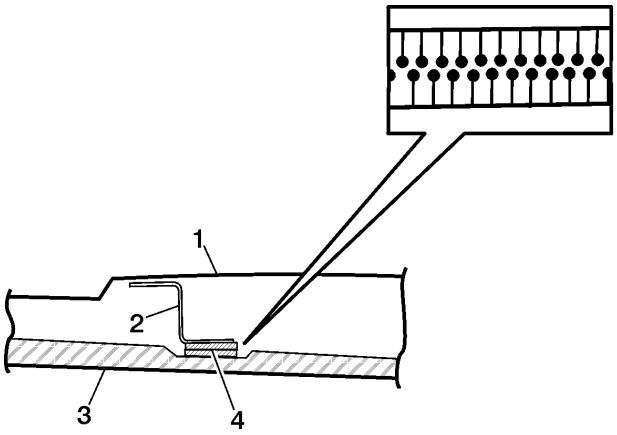
3

Use vinyl tape to secure the antenna to the roof. Gently pull down the rear headliner as necessary to complete the installation of the antenna mast.

4

Connect the antenna lead-in cable to the antenna base connector. Turn on the radio to check antenna reception.

5



W3003110

1 Roof plate
2 Roof panel
3 Headlining
4 Fully engage fasteners – pressing firmly

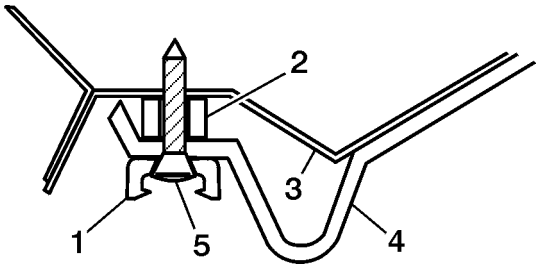
Note the location of all interlocking fasteners on the headliner to aid in installation. Position the headliner in the cab below its mounting location. Connect the overhead light connectors.

Note: Use caution not to bend the headliner to the point at which a permanent crease will show in the material.

6

Lift the headliner assembly into position. Use the front overhead roof storage pockets as a guide to assist in proper positioning. Temporarily secure with a few interlocking fasteners.

7



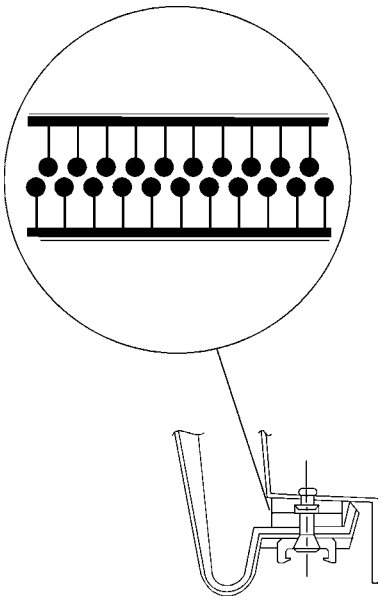
W3003095

1 Curtain rail or trim washer
2 Plastic spacer
3 Cab metal
4 Headliner
5 Screw

Line up the mounting screws for the front curtain rail assembly. Add the nylon spacers between headliner and cab screw holes. Install all screws and retaining clips. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb).

3 ± 0.5 Nm (25 ± 5 in-lb)

8



W8001424

Use a blunt tool to go around the liner and push each remaining press fastener together.

Note: Be careful not to press so hard that the curtain clip is damaged.

9

Install the front overhead storage cabinet assembly carrier rails. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

24 ± 4 Nm (18 ± 3 ft-lb)

10
Use hand pressure to secure the remaining interlocking fasteners.

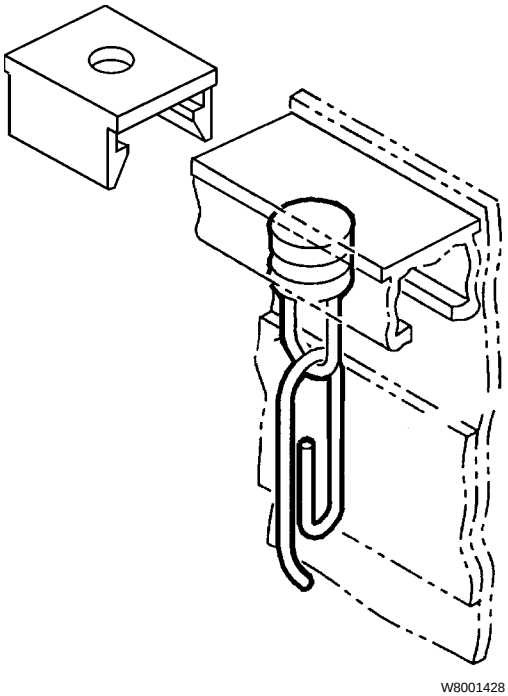
11
Install the A-pillar trim, secure with the molding clip. Repeat on opposite side.

12
Install the grab handles. Tighten the bolts to a torque of 24 ± 4 Nm (18 ± 3 ft-lb). Install cover plugs. — 24 ± 4 Nm (18 ± 3 ft-lb)

13
Install the door seals.

14
Install the bezel for the front overhead roof storage pockets with the “star” fasteners.

15



W8001428

Install the front curtain rail assembly. Use caution not to deform the rail assembly. Position rail and snap into retaining clips.

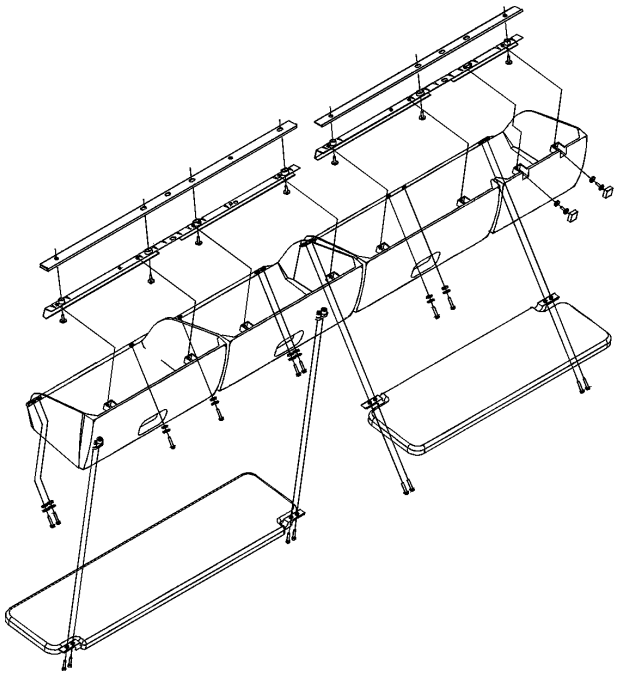
16
Install the sleeper curtain rail assembly. Torque to 5 ± 1 Nm (45 ± 7 in-lb). — 5 ± 1 Nm (45 ± 7 in-lb)

17
If removed, install the sleeper left overhead storage cabinet. Connect the lamp wiring connector. Tight the cabinets mounting bolts and torque to 24 ± 4 Nm (18 ± 3 ft-lb). Install the lamp wiring cover screws. — 24 ± 4 Nm (18 ± 3 ft-lb)

18
If removed, install the sleeper right overhead storage cabinet. Feed the 12 volt power outlet connector through the cabinet access hole. Connect the lamp wiring connector. Install the cabinet mounting bolts and torque to 24 ± 4 Nm (18 ± 3 ft-lb). Install the lamp wiring cover screws. Connect the 12 volt power outlet connector. — 24 ± 4 Nm (18 ± 3 ft-lb)

19
Install the driver side window visor assembly. Torque to 5 ± 0.8 Nm (45 ± 7 in-lb). Install the screw covers. — 5 ± 0.8 Nm (45 ± 7 in-lb)

20



If removed, install the front right overhead storage cabinet. Install the 4 mounting screws, with their rubber washer, to the carrier rail. Torque to 2 ± 0.3 Nm (17 ± 3 in-lb). — 2 ± 0.3 Nm (17 ± 3 in-lb)
Install the 2 screws over the windshield. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb). — 3 ± 0.5 Nm (25 ± 5 in-lb)
Install the mounting screw covers.

21

Install the right sun visor. Torque to 5 ± 0.8 Nm (45 ± 7 in-lb).	5 ± 0.8 Nm (45 ± 7 in-lb)

22

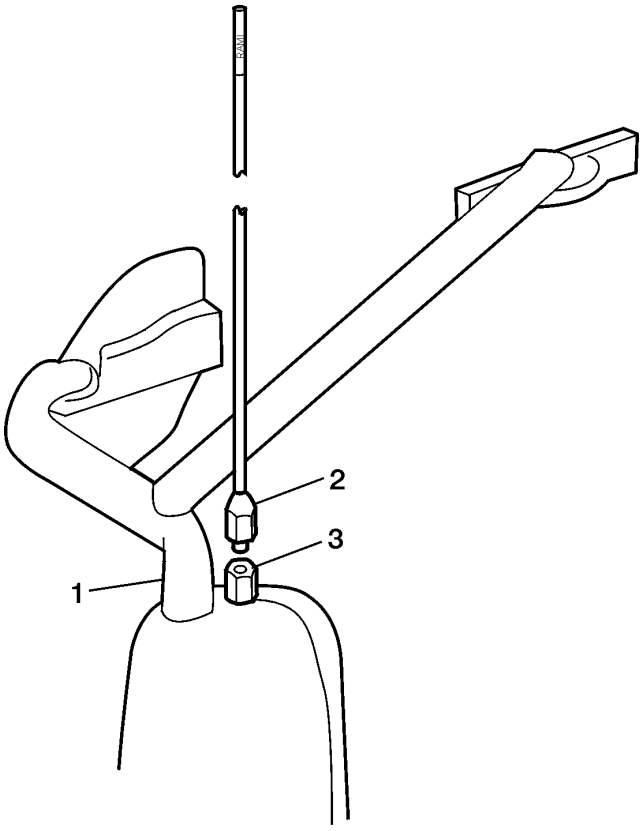
Install the front left overhead storage cabinet together with the sun visor. Install the 4 mounting screws, with their rubber washer, to the carrier rail. Torque to 2 ± 0.3 Nm (17 ± 3 in-lb). Install the 6 screws with their rubber washer over the windshield. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb).	2 ± 0.3 Nm (17 ± 3 in-lb) 3 ± 0.5 Nm (25 ± 5 in-lb)

Antenna Mast (Multiplexer Type), Replacement

The multiplexer mast antenna system is standard on the VNL 660 and the VNL 770, and optional on other VN series vehicles. Determine which antenna system is used before beginning repairs.

Note: Do not confuse a CB antenna mast with a multiplexer antenna mast, see “Antenna Types” page 34.

1



W3003488

1 Mirror assembly
2 Mast
3 Hex adapter

Remove the multiplexer antenna mast by using a wrench to hold the mounting base hex adapter to prevent it from turning.

2

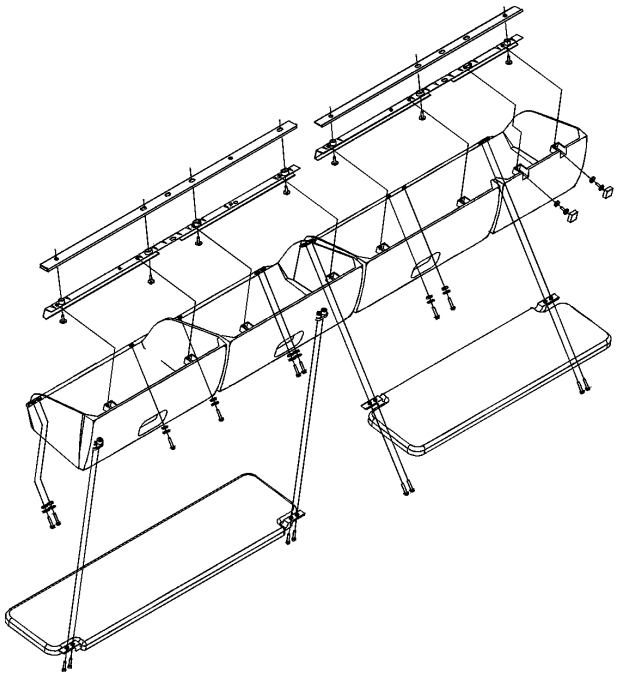
Install the new multiplexer antenna mast by using a wrench to hold the mounting base hex adapter to prevent it from turning. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).	24 ± 4 Nm (18 ± 3 ft-lb)

Antenna Lead-In Cable (Fixed Mast Type, Day Cab), Replacement

The fixed mast antenna is standard on the VNL and VNM day cab vehicles.
For the VNL 420 sleeper cab see “Antenna Lead-In Cable (Fixed Mast Type, Sleeper Cab), Replacement” page 99.
The lead-in cable is attached permanently to the antenna base. These vehicles may also be equipped with optional multiplexer antenna system. Determine which antenna system is used before beginning repairs.

Removal

1



Remove the front left overhead storage cabinet together with the sun visor.

Note: On vehicles that are not equipped with an overhead storage cabinet, remove only the sun visor.

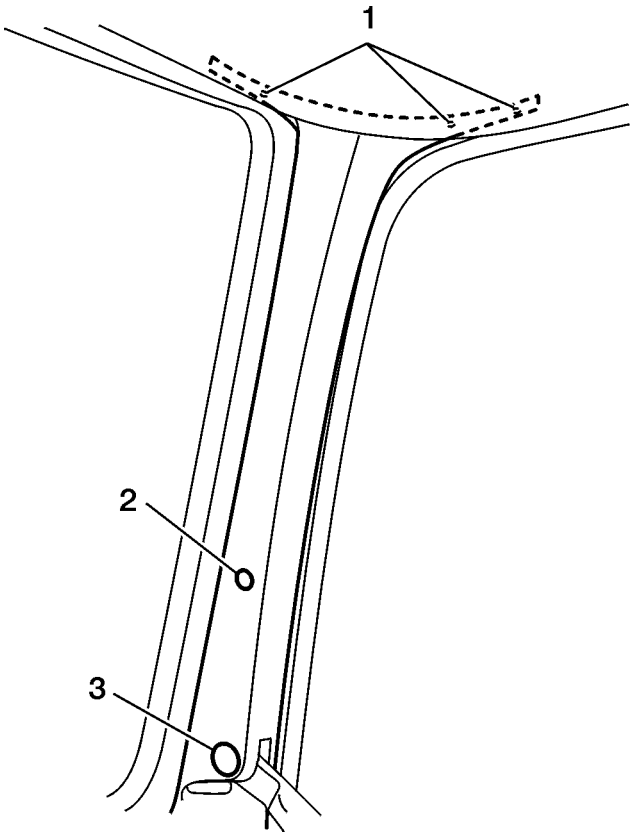
2
Remove the right sun visor.

3
If equipped, remove the front left storage cabinet carrier rail.

4
Remove the coat hooks from the rear of the headliner.

5
If equipped, remove the rear speakers from the headliner.

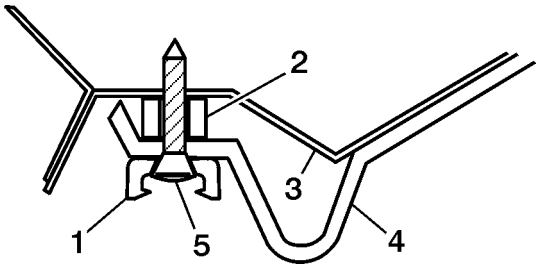
6



1 Plastic rivets (day cab vehicles only)
2 Molding clip
3 Grab handle bolt cover

Remove the upper grab handle bolt cover from the A-pillar trim. Remove the bolt and pull the handle out of the cover.
Pull the door seal away from the A-pillar trim and the top of the door. Remove the molding clip by pressing in the center button. Remove the plastic rivets at the top of the A-pillar trim. Remove the A-pillar trim. Repeat on opposite side.

7



W3003095

1 Curtain rail or trim washer
2 Plastic spacer
3 Cab metal
4 Headliner
5 Screw

Remove the screw securing the front and sides of the headliner.

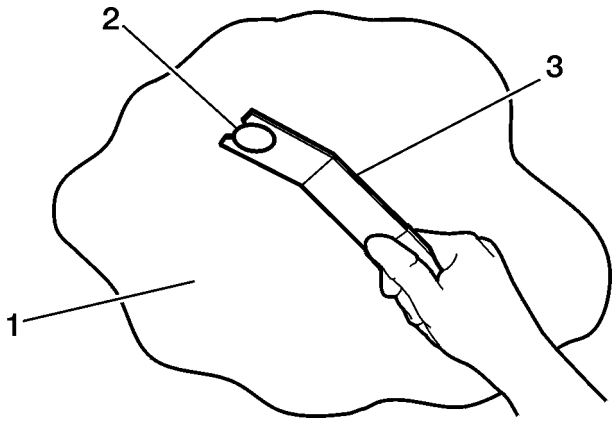
Note: The screws are equipped with plastic spacers between the headliner and the cab sheet metal. Use caution not to lose them during headliner removal.

8

Release the 2 retaining clips in the center of the headliner by pressing in the center button. Remove the retaining clips.

Note: May not apply, depending on interior trim level.

9



W3003261

1 Headliner
2 Xmas tree fastener
3 Removal tool J38778

J38778

Remove the 2 Xmas tree fasteners in the center of the headliner with the removal tool J38778. Use caution not to damage the headliner material.

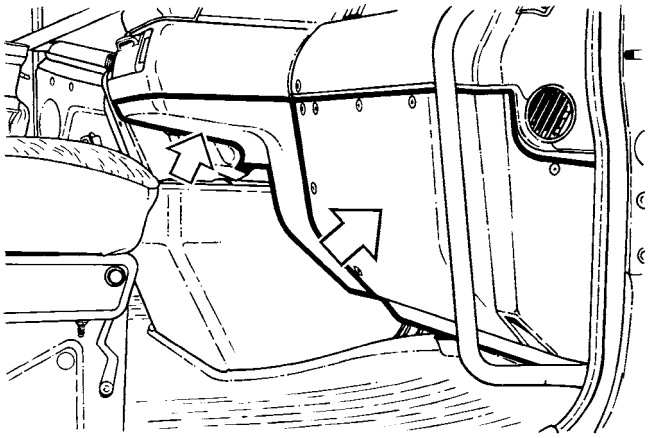
Note: May not apply, depending on the interior trim level.

10

The headliner is now held in place by a few interlocking fasteners and the rear wall B-pillar trim. Pull the door seal away from the top of the B-pillars. Pull the B-pillars trim away at the top to allow removal of the headliner. Pull the front of the headliner down and lift up on the rear to free the rear headliner lip. Disconnect the lamp assembles and remove the headliner from the vehicle.

Note: This step requires 2 technicians. Use caution not to bend the headliner to the point at which a permanent crease will show in the material.

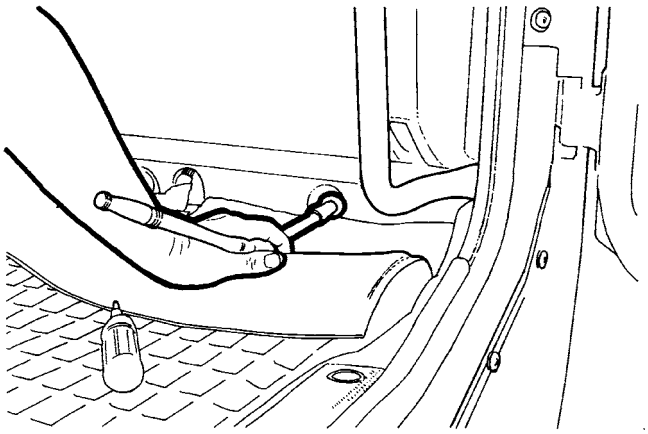
11



W8001131

Remove the 7 torx screws from the lower right dash panel. Remove the 4 screws from the center dash panel.

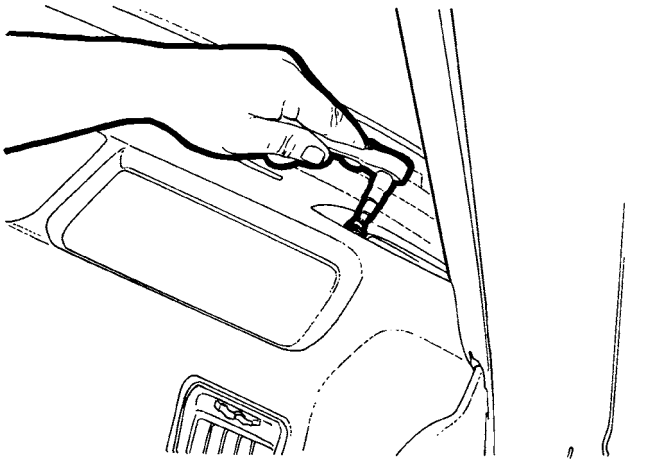
12



W8001165

Pull the floor mat back and remove the plastic nuts. Remove the lower right and center dash panels.

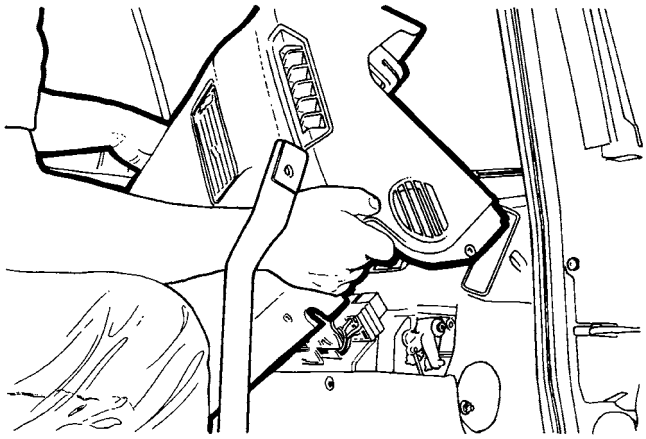
13



W8001178

Remove the right dash speaker grill. Remove the speaker mounting screws. Disconnect the wiring connector and remove the speaker.

14



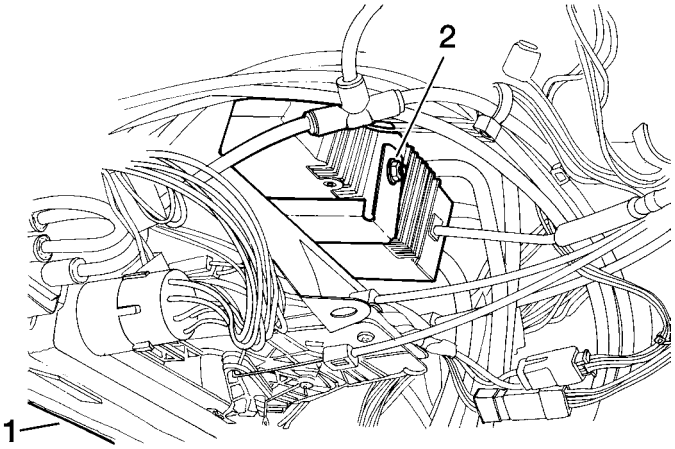
W8001180

Remove, from the right upper dash panel, 3 mounting screws and 1 mounting bolt in the speaker well. Remove the dash panel from the vehicle.

15

Remove the right side right door HVAC duct.

16

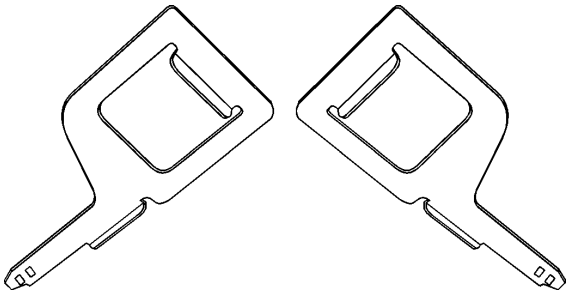


W3000675

1 Lower edge of dash
2 Nut at radio mounting bracket

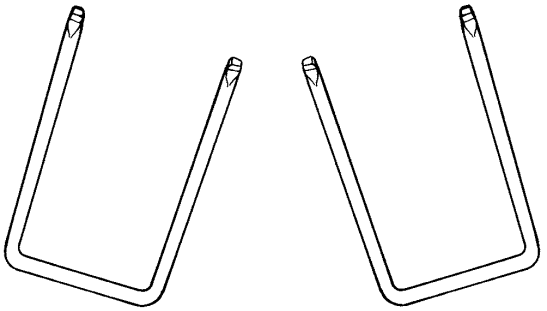
Remove the nut from the rear of the radio mounting bracket. Access the nut from under the dash.

17



W3002355

Premium radio removal tools, Volvo P/N 3949548 (left), 3949549 (right).

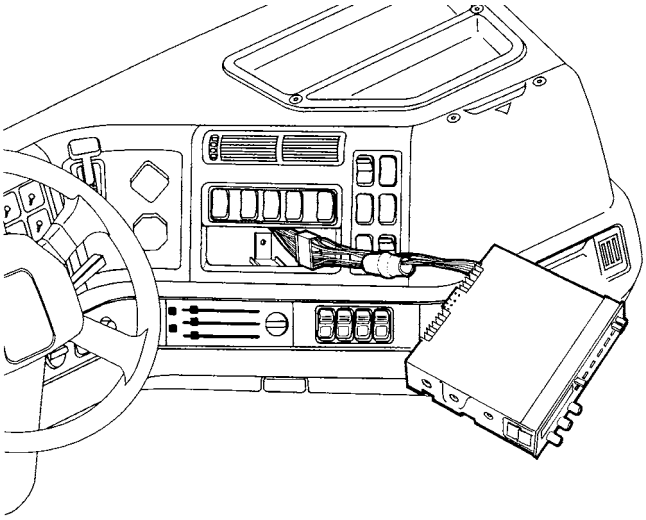


W3000702

Basic radio removal tools, Volvo P/N 176000.

Insert the radio removal tool into the release holes on the radio face until the tools locks in place. With the tools inserted, pull on the tools to slide the radio out of the dash.

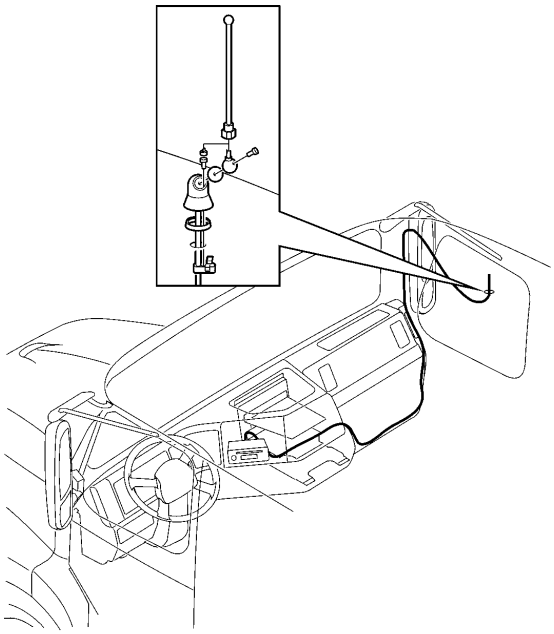
18



W3000674

Disconnect the antenna lead-in cable from the back of the radio.

19



W3003140

Remove the antenna lead-in cable. Begin at the radio, move along the wiring harness and cut cables ties as necessary to free the cable. Note the routing of the cable and location of the cables ties to aid in reinstallation. The lead-in cable should be freed up to the antenna base.

20

Remove the antenna mast swivel and seal.

21

Remove the rubber plug from the antenna base. Remove the antenna base mounting screw. Remove the antenna base and lead-in cable through the cab roof hole and remove from the vehicle.

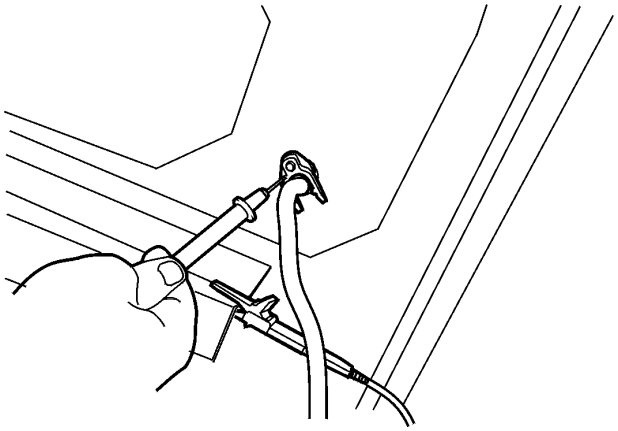
Installation

1

Clean the roof mounting hole if necessary. Install the replacement antenna cable through the roof mounting hole. Properly position the mounting clamp and the antenna base seal. Install the mounting screw. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb).

3 ± 0.5 Nm (25 ± 5 in-lb)

2



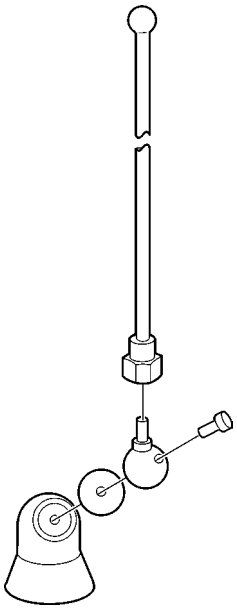
W3003271

Check the continuity between the antenna base and the cab, use the multimeter J39200. The antenna must be properly grounded to operate correctly. The readings should be less than 0.2 ohms.

J39200

Note: ”Zero” the meter to avoid false readings.

3



W3003472

Install the antenna mast swivel with seal. Torque to 1.5 ± 0.5 Nm (12 ± 5 in-lb).

1.5 ± 0.5 Nm (12 ± 5 in-lb)

4

Temporarily connect the lead-in cable to the radio and check for proper reception.

5

Disconnect the lead-in cable from the radio. Install the antenna lead-in cable along the same route as it was removed. Secure as necessary.

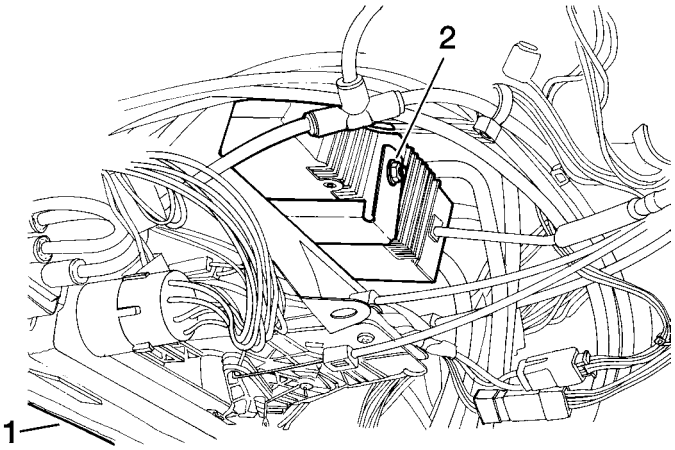
6

Connect the lead-in cable to the radio. Turn on the radio and check for proper reception. Start the vehicle and turn on all accessories. Check for noise entry into radio. If noise is present, reroute the lead-in cable away from electrically noisy components.
See “Noise” page 59.

7

Install the radio. The radio should ”click” into position.

8



W3000675

1 Lower edge of dash
2 Nut at the radio mounting bracket

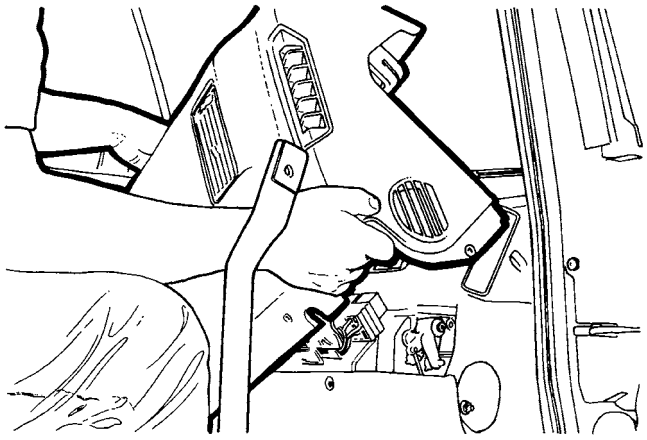
Install the nut on rear of the radio mounting bracket. Access the nut from under the dash. Torque to 1.4 ± 0.2 Nm (12.4 ± 1.8 in-lb).

1.4 ± 0.2 Nm (12.4 ± 1.8 in-lb)

9

Install the right side – right door HVAC duct.

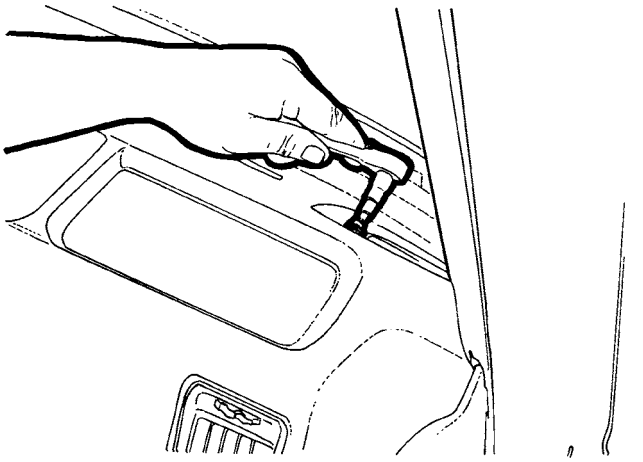
10



W8001180

Install the right upper dash with 3 mounting screws and 1 mounting bolt in the speaker well.

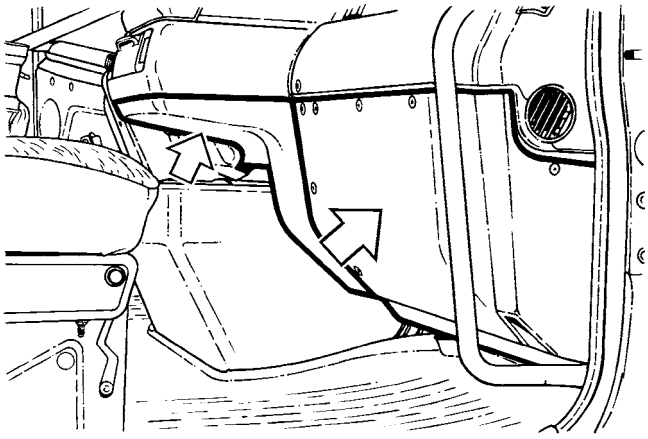
11



W8001178

Connect the wiring connector and install the right dash speaker and the grill.

12

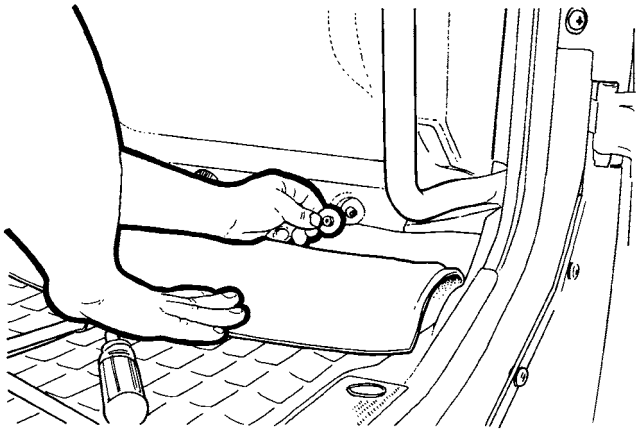


W8001131

Pull the right side floor mat back and insert the lower right dash panel onto the weld studs. Install the 7 torx screws in the top of the panel. Pull the mat back at the accelerator pedal and insert the lower center dash panel onto the weld studs. Install the 4 torx screws in the top of the panel. Torque to 3.5 ± 0.5 Nm (31 ± 4.5 in-lb).

3.5 ± 0.5 Nm (31 ± 4.5 in-lb)

13



W8001166

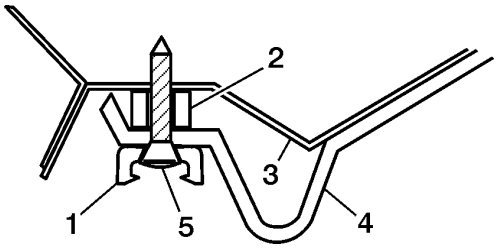
Pull the floor mat back and install the plastic nuts in the lower right dash panel, and the panel under the center of the dash.

14

Install the headliner in the vehicle. Connect the lamp assembles. Note the position of the interlocking fasteners. Start with the front of the headliner down and lift up on the rear to engage the rear headliner lip behind the rear wall trim. At the same time work the side edges behind the B-pillar trim.

Note: Two technicians are required for this step.

15



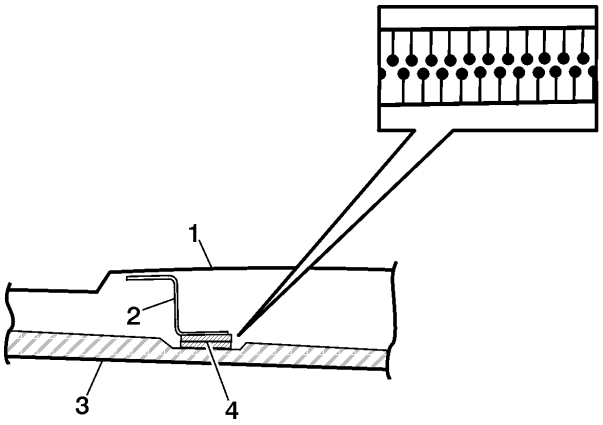
W3003095

1 Curtain rail or trim washer
2 Plastic spacer
3 Cab metal
4 Headliner
5 Screw

With one technician holding the headliner, allow the front of the headliner down enough to install the mounting screws. The mounting screws and the trim should be installed up through the headliner and a spacer installed between each screw and the cab mounting holes. A thin plastic ”lip” on the spacer will hold it in mounting position. After all screws and spacers are in place, carefully lift the headliner up to the roof.

Note: Two technicians are required for this step.

16



W3003110

1 Roof plate
2 Roof panel
3 Headlining
4 Fully engage fasteners – pressing firmly

Install the 2 Xmas tree fasteners in the center of the headliner. Install the 2 remaining clips in the center of the headliner. Press in the center button to secure. Engage the securing interlocking fasteners.

Note: Two technicians are required for this step.

17
Install the screws securing the front and sides of the headliner. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb).

3 ± 0.5 Nm (25 ± 5 in-lb)

18
Install the B-pillar trim.

19
Install the A-pillar trim. Install the molding, press in the center bottom to secure. If equipped, install the plastic rivet fasteners.

20
Install the door seals.

21
Install the grab handles. Torque to 24 ± 4 Nm (18 ± 3 ft-lb). Replace the bolt cover trim.

24 ± 4 Nm (18 ± 3 ft-lb)

22
If equipped, install the rear speakers in the headliner.

23
Install the coat hooks to the rear of the headliner. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb).

3 ± 0.5 Nm (25 ± 5 in-lb)

24
Install the front overhead storage cabinet carrier rail. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

24 ± 4 Nm (18 ± 3 ft-lb)

25
Install the right sun visor. Torque to 5 ± 0.8 Nm (45 ± 7 in-lb).

5 ± 0.8 Nm (45 ± 7 in-lb)

26
Install the front overhead storage cabinet together with the sun visor. Torque to 5 ± 0.8 Nm (45 ± 7 in-lb).

5 ± 0.8 Nm (45 ± 7 in-lb)

Note: Install only the sun visor if the vehicle is not equipped with a front overhead storage cabinet.

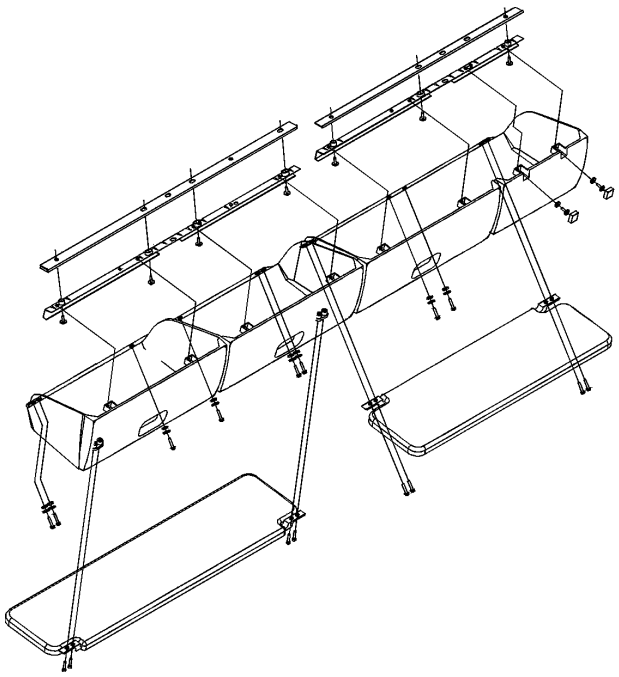
Antenna Lead-In Cable (Fixed Mast Type, Sleeper Cab), Replacement

The fixed mast antenna is standard on the VNL 420 sleeper cab vehicles.
For the VNL and VNM day cab vehicles see “Antenna Lead-In Cable (Fixed Mast Type, Day Cab), Replacement” page 92.

The lead-in cable is attached permanently to the antenna base. The VNL 420 may also be equipped with optional multiplexer antenna system. Determine which antenna system is used before beginning repairs.

Removal

1



Remove the front left overhead storage cabinet together with the sun visor.

2
Remove the right sun visor.

3
If equipped remove the front right overhead storage cabinet.

Note: Two screw covers, on the far right facing panel, must be removed to gain access to the mounting screws.

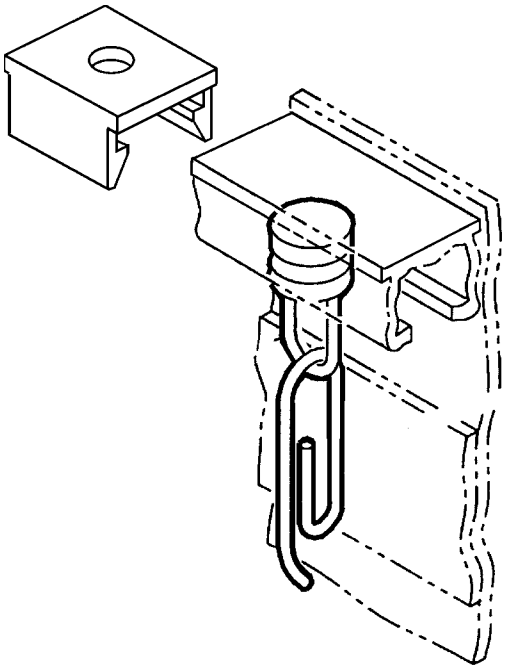
4
Remove the front overhead storage cabinet carrier rail.

5
Remove the driver side window visor assembly. Pry off end screw covers. Remove mounting screws.

6
Remove the sleeper curtain rail assembly.

Note: The curtains do not need to be removed from the rail.

7

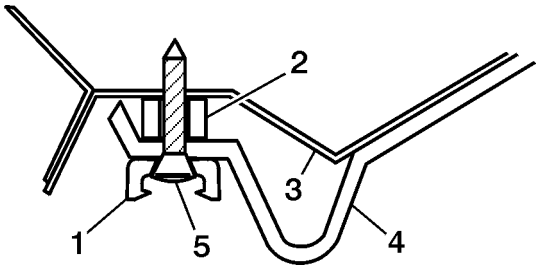


W8001428

Remove the front curtain rail assembly. Use a wide blade screwdriver to carefully pry the rail out of one side then the other side on each retaining clip. After all retaining clips are released, remove the front curtain rail assembly from the vehicle.

Note: Use caution not to deform the rail assembly.

8



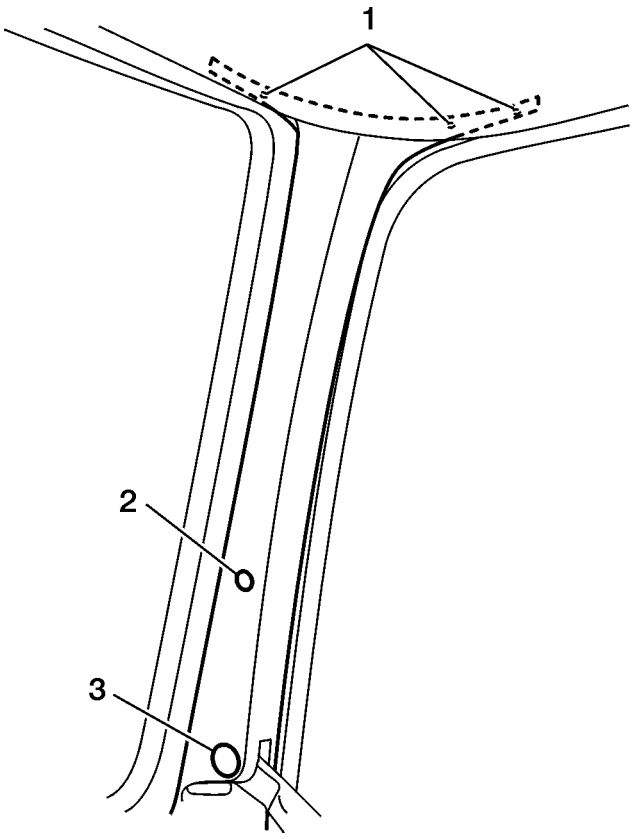
W3003095

1 Curtain rail or trim washer
2 Plastic spacer
3 Cab metal
4 Headliner
5 Screw

Check the retaining clips used to attach the front curtain rail assembly. Remove all that are attached with screws.

Note: Nylon spacers are used between the headliner and the cab mounts. Note their position for reassembly.

9



W3003260

1 Plastic rivets (day cab vehicles only)
2 Molding clip
3 Grab handle bolt cover

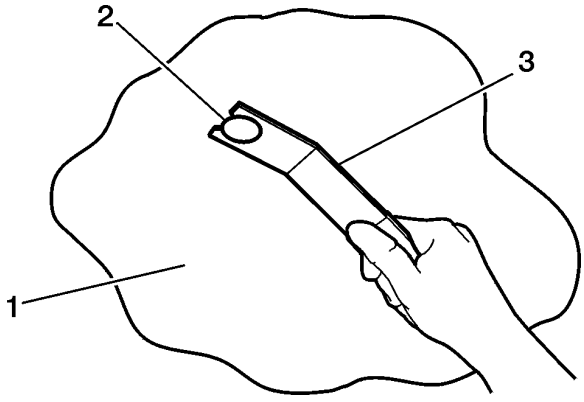
Remove the upper grab handle bolt cover from the A-pillar trim. Remove the bolt and pull the upper grab handle out of the cover. Repeat on the other side.
Pull the door seal away from the A-pillar trim and the top of the door. Remove the molding clip by pressing in the center button. Remove the A-pillar trim. Repeat on opposite side.

10

Release the 2 retaining clips in the center of the headliner by pressing in the center button. Remove the retaining clips.

Note: May not apply, depending on the interior trim level.

11



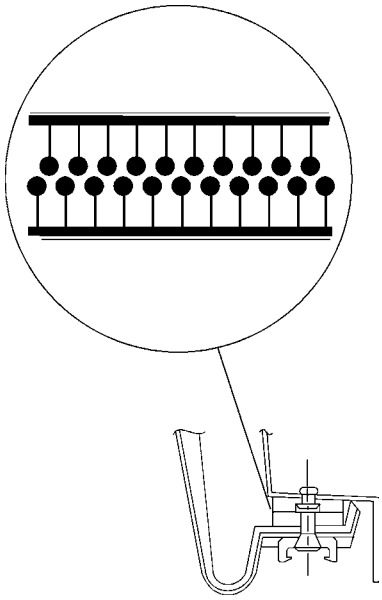
W3003261

1 Headliner
2 Xmas tree fastener
3 Removal tool J38778

Remove the 2 Xmas tree fasteners in the center of the headliner with the removal tool J38778. Use caution not to damage the headliner material. J38778

Note: May not apply, depending on the interior trim level.

12

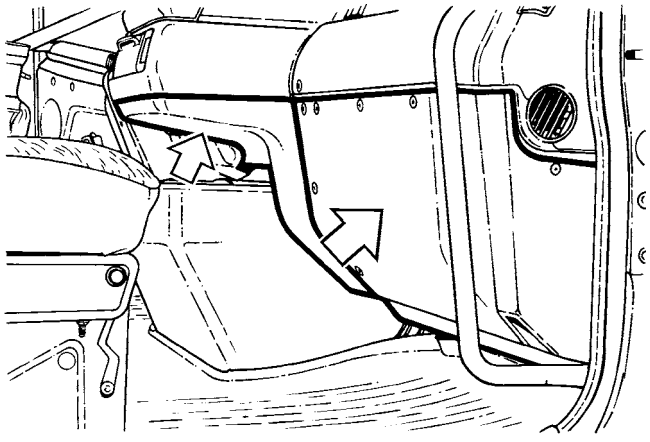


W8001424

The headliner is now held in place by interlocking fasteners. Start at one door and work under the headliner with fingers to pop apart the interlocking fasteners. The fasteners should be at each remaining front curtain rail retaining clip and at various points over the body of the headliner. A long screwdriver, or similar tool, may be used to free the hard to reach interlocking fasteners. After all fasteners are released and the headliner drops, disconnect the lamp assembles and remove the headliner from the vehicle.

Note: Use caution not to bend the headliner to the point at which a permanent crease will show in the material.

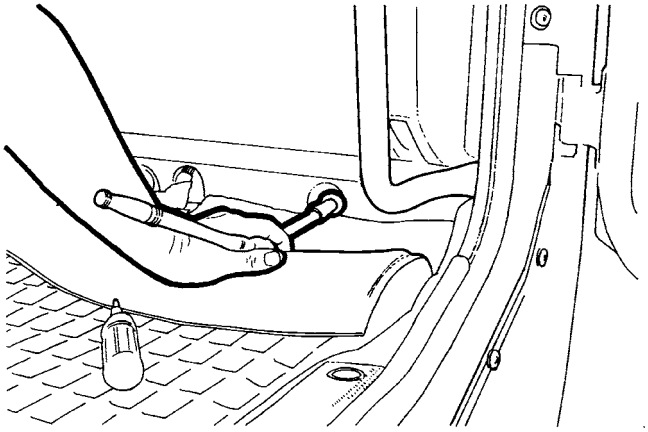
13



W8001131

Remove the 7 torx screws from the lower right dash panel. Remove the 4 screws from the center dash panel.

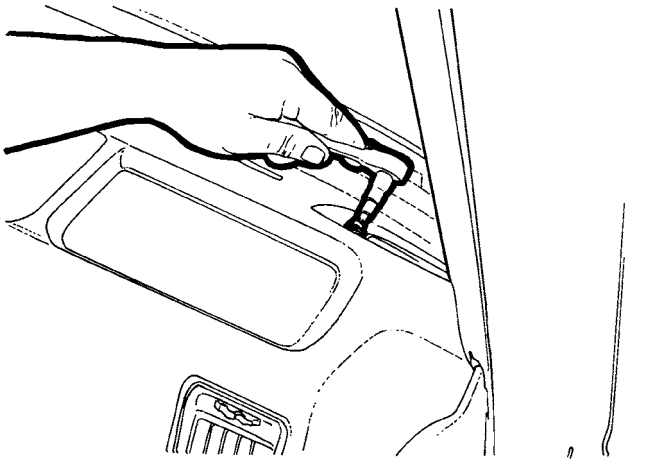
14



W8001165

Pull the floor mat back and remove the plastic nuts. Remove the lower right and center dash panels.

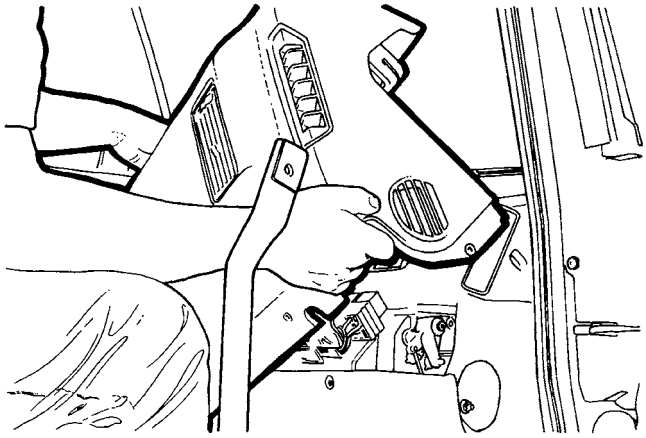
15



W8001178

Remove the right dash speaker grill. Remove the speaker mounting screws. Disconnect the wiring connector and remove the speaker.

16



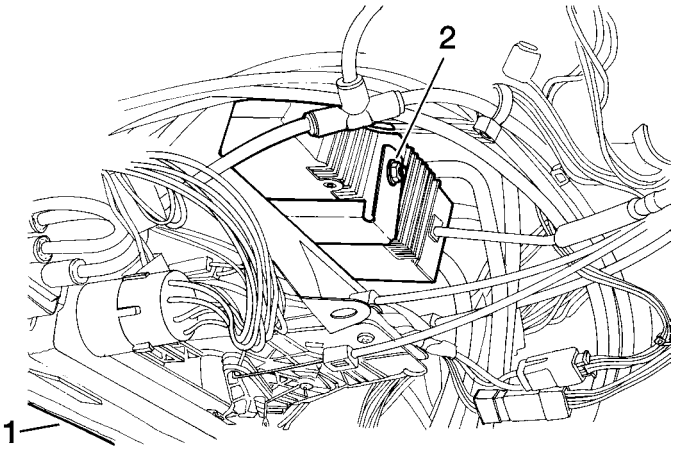
W8001180

Remove 3 mounting screws from the right upper dash panel and 1 mounting bolt in the speaker well. Remove the dash panel from the vehicle.

17

Remove the right side – right door HVAC duct.

18

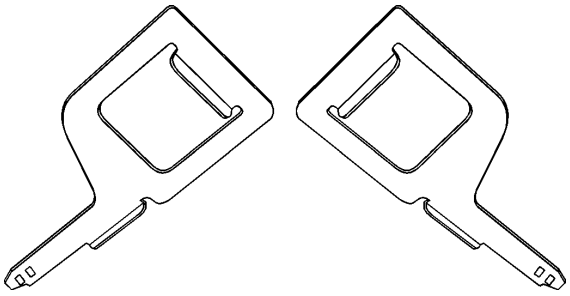


W3000675

1 Lower edge of dash
2 Nut at radio mounting bracket

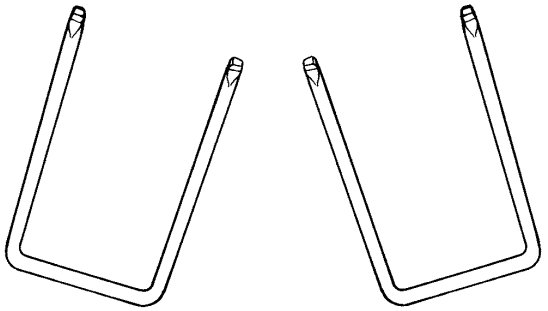
Remove the nut from the rear of the radio mounting bracket. Access the nut from under the dash.

19



W3002355

Premium radio removal tool, Volvo P/N 3949548 (left), 3949549 (right).

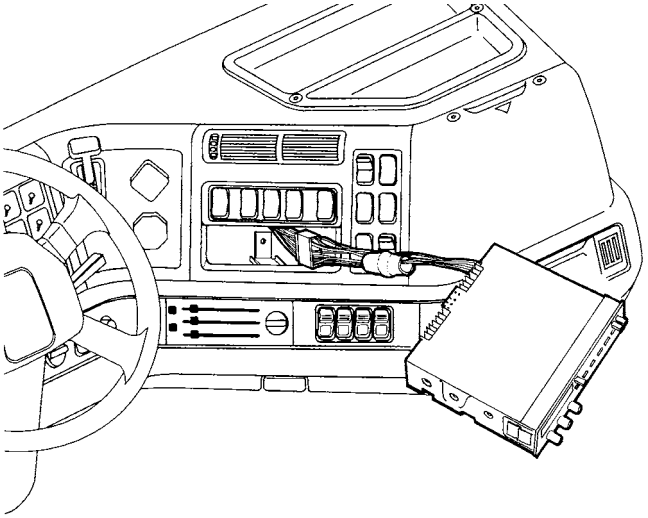


W3000702

Basic radio removal tool, Volvo P/N 176000.

Insert the radio removal tool into the release holes on the radio face until the tools locks in place. With the tools inserted, pull on the tools to slide the radio out of the dash.

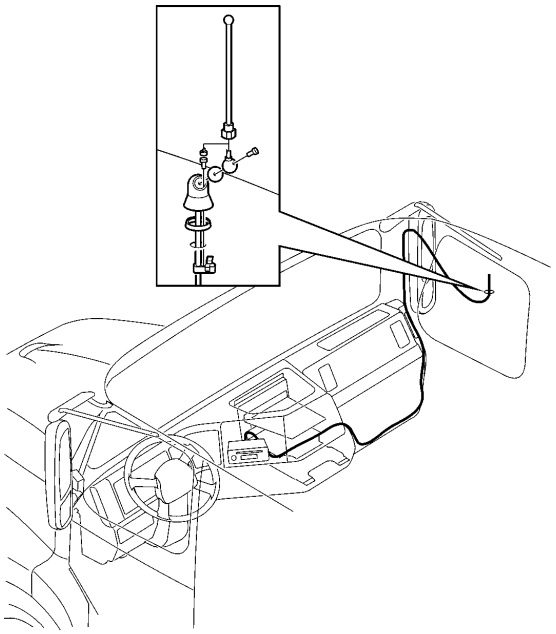
20



W3000674

Disconnect the antenna lead-in cable from the back of the radio.

21



W3003140

Remove the antenna lead-in cable. Begin at the radio, move along the wiring harness and cut cable ties as necessary to free the cable. Note the routing of the cable and location of the cable ties to aid in reinstallation. The lead-in cable should be freed up to the antenna base.

22
Remove the antenna mast swivel and seal.

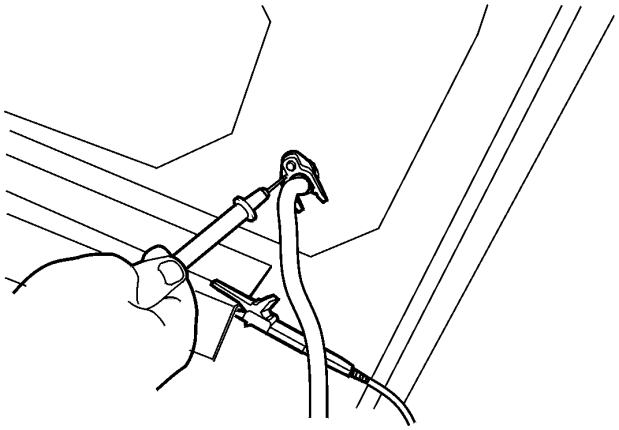
23
Remove the rubber plug from the antenna base. Remove the antenna base mounting screw. Remove the antenna base and lead-in cable through the cab roof hole and remove from the vehicle.

Installation

1
Clean the roof mounting hole if necessary. Install the replacement antenna cable through the roof mounting hole. Properly position the mounting clamp and the antenna base seal. Install the mounting screw. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb).

3 ± 0.5 Nm (25 ± 5 in-lb)

2



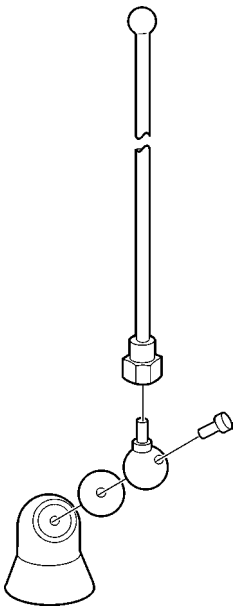
W3003271

Check the continuity between the antenna base and the cab, use the multimeter J39200. The antenna must be properly grounded to operate correctly. The readings should be less than 0.2 ohms.

J39200

Note: “Zero” the meter to avoid false readings.

3



W3003472

Install the antenna mast swivel with seal. Torque to 1.5 ± 0.5 Nm (12 ± 5 in-lb).

1.5 ± 0.5 Nm (12 ± 5 in-lb)

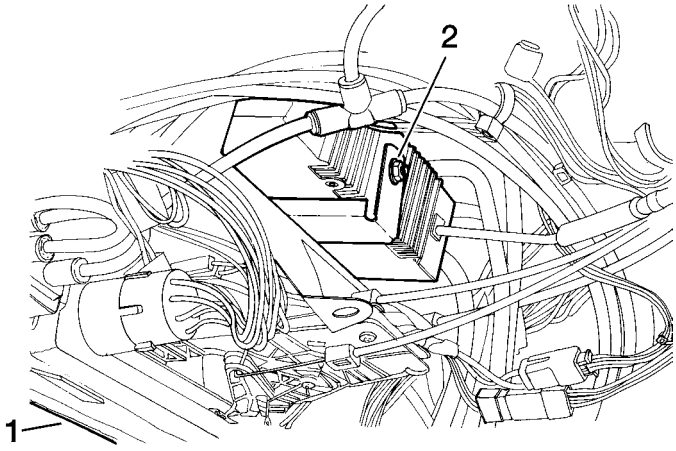
4
Temporarily connect the lead-in cable to the radio and check for proper reception.

5
Disconnect the lead-in cable from the radio. Install the antenna lead-in cable along the same route as it was removed. Secure as necessary.

6
Connect the lead-in cable to the radio. Turn on the radio and check for proper reception. Start the vehicle and turn on all accessories. Check for noise entry into radio. If noise is present, reroute the lead-in cable away from electrically noisy components.
See “Noise” page 59.

7
Install the radio. The radio should ”click” into position.

8



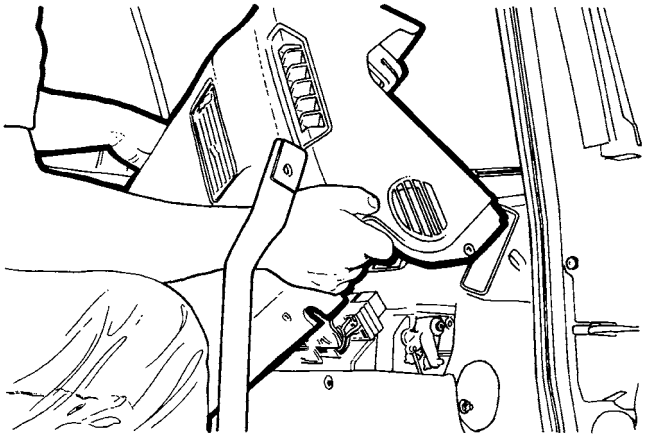
W3000675

1 Lower edge of dash
2 Nut at the radio mounting bracket

Install the nut on rear of the radio mounting bracket. Access the nut from under the dash. Torque to 1.4 ± 0.2 Nm (12.4 ± 1.8 in-lb).	1.4 ± 0.2 Nm (12.4 ± 1.8 in-lb)

9
Install the right side – right door HVAC duct.

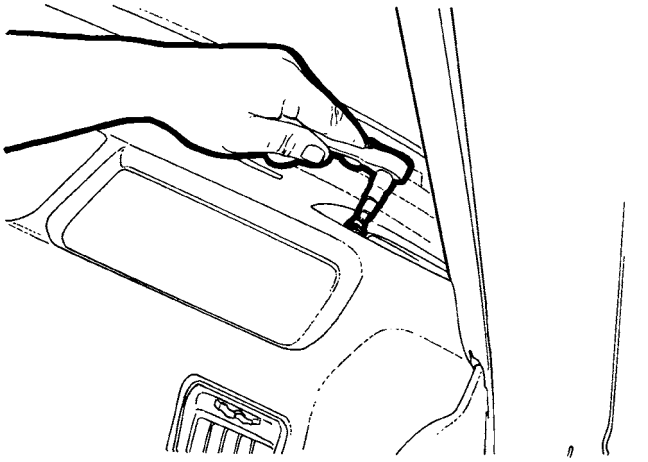
10



W8001180

Install the right upper dash with 3 mounting screws and 1 mounting bolt in the speaker well.

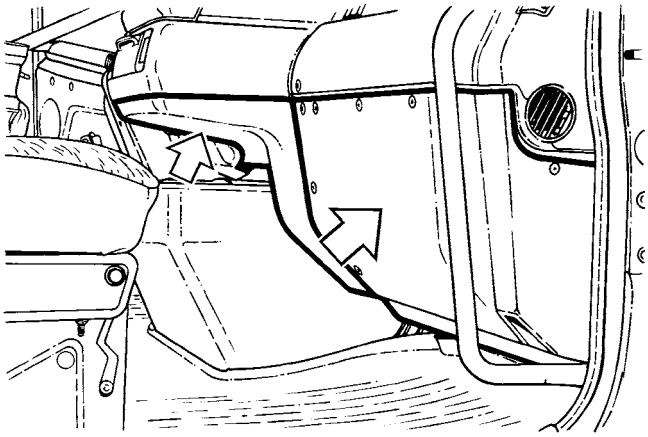
11



W8001178

Connect the wiring connector and install the right dash speaker and the grill.

12

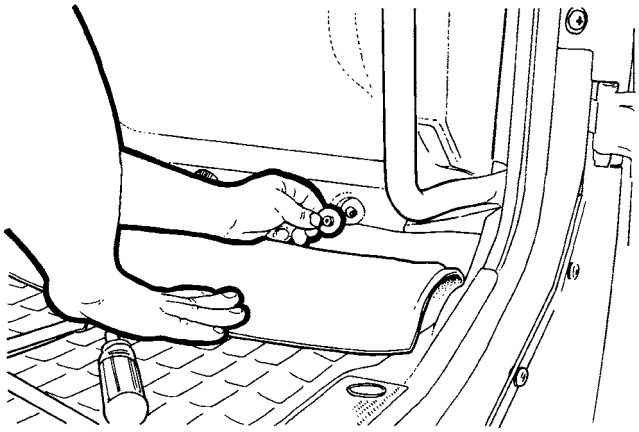


W8001131

Pull the right side floor mat back and insert the lower right dash panel onto the weld studs. Install the 7 torx screws in the top of the panel. Pull the mat back at the accelerator pedal and insert the lower center dash panel onto the weld studs. Install the 4 torx screws in the top of the panel. Torque to 3.5 ± 0.5 Nm (31 ± 4.5 in-lb).

3.5 ± 0.5 Nm (31 ± 4.5 in-lb)

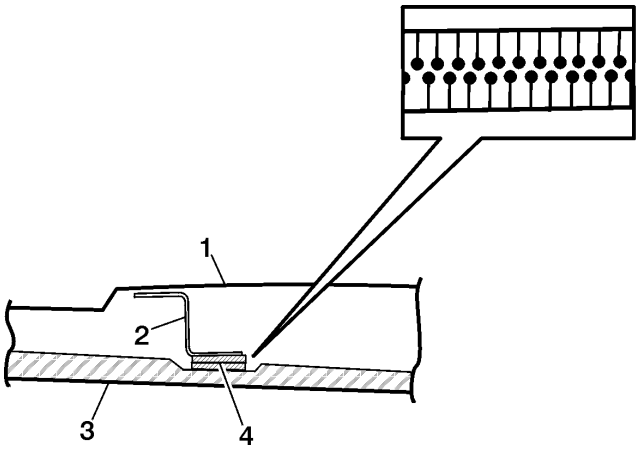
13



W8001166

Pull the floor mat back and install the plastic nuts in the lower right dash panel and the panel under the center of the dash.

14



W3003110

1 Roof plate
2 Roof panel
3 Headlining
4 Fully engage fasteners – pressing firmly

Note the location of all interlocking fasteners on the headliner to aid in installation. Position the headliner in the cab below its mounting location. Connect the lamp assembly connectors.

Note: Use caution not to bend the headliner to the point at which a permanent crease will show in the material.

15

Lift the headliner assembly into position. Temporarily secure with a few interlocking fasteners.

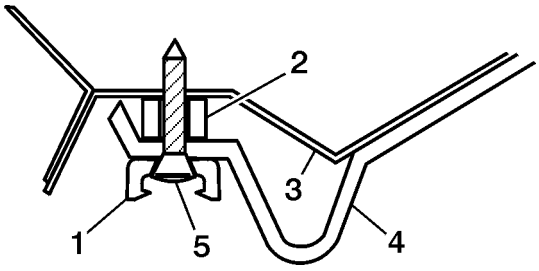
16

If equipped, install the 2 retaining clips in the center of the headliner. Secure by pressing in the center button.

17

If equipped, install the 2 Xmas tree fasteners in the center of the headliner.

18



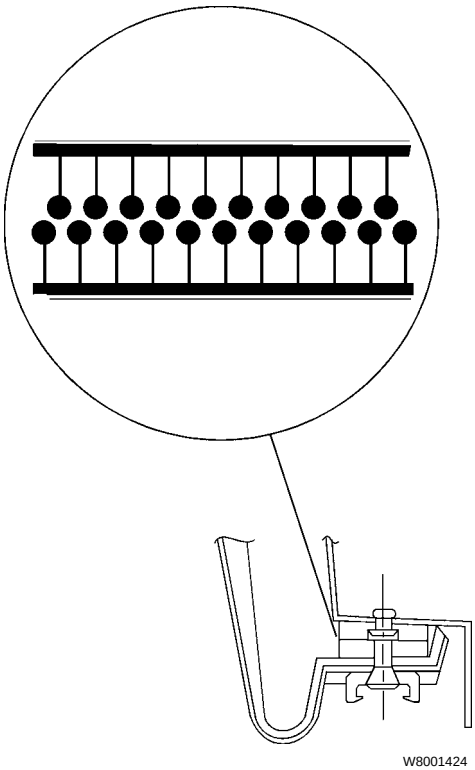
W3003095

1 Curtain rail or trim washer
2 Plastic spacer
3 Cab metal
4 Headliner
5 Screw

Line up the mounting screws for the front curtain rail assembly. Add the nylon spacers between headliner and cab screw holes. Install all screws and retaining clips. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb).

3 ± 0.5 Nm (25 ± 5 in-lb)

19



W8001424

Place a blunt tool, such as a punch, in the center of the remaining retaining clips. Using hand pressure, press the interlocking fasteners under the retaining clips together. Use caution not to damage the retaining clips.

20

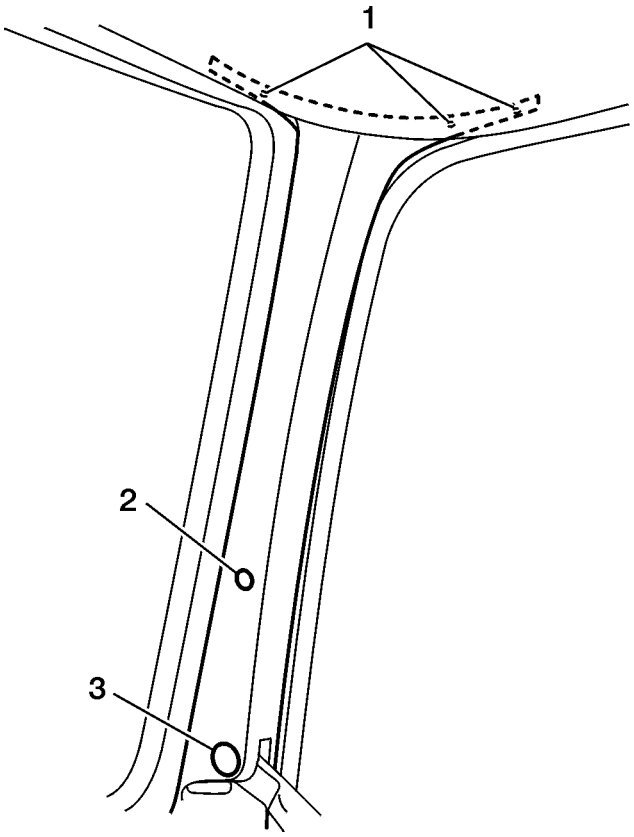
Install the front overhead storage cabinet carrier rail. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

24 ± 4 Nm (18 ± 3 ft-lb)

21

Use hand pressure to secure the remaining interlocking fasteners.

22



W3003260

1 Plastic rivets (day cab vehicles only)
2 Molding clip
3 Grab handle bolt cover

Install the A-pillar trims. Secure with the molding clips.

23

Install the grab handles. Torque to 24 ± 4 Nm (18 ± 3 ft-lb). Replace the bolt cover trim.

24 ± 4 Nm (18 ± 3 ft-lb)

24

Install the door seals.

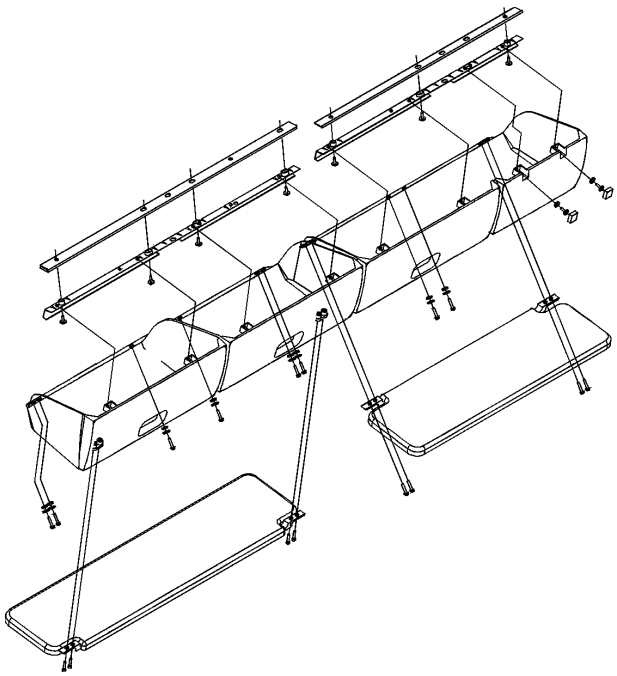
25
Install the front curtain rail assembly. Position the rail and snap into the retaining clips.

Note: Use caution not to deform the rail assembly.

26
Install the sleeper curtain rail assembly. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb). 3 ± 0.5 Nm (25 ± 5 in-lb)

27
Install the driver side window visor assembly. Torque to 5 ± 0.8 Nm (45 ± 7 in-lb). 5 ± 0.8 Nm (45 ± 7 in-lb)

28



Install the front right overhead storage cabinet. Install the 4 mounting screws, with their rubber washer, to the carrier rail. Torque to 2 ± 0.3 Nm (17 ± 3 in-lb). Install the 2 screws over the windshield. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb). Install the mounting screw covers. 2 ± 0.3 Nm (17 ± 3 in-lb) 3 ± 0.5 Nm (25 ± 5 in-lb)

29
Install the right sun visor. Torque to 5 ± 0.8 Nm (45 ± 7 in-lb). 5 ± 0.8 Nm (45 ± 7 in-lb)

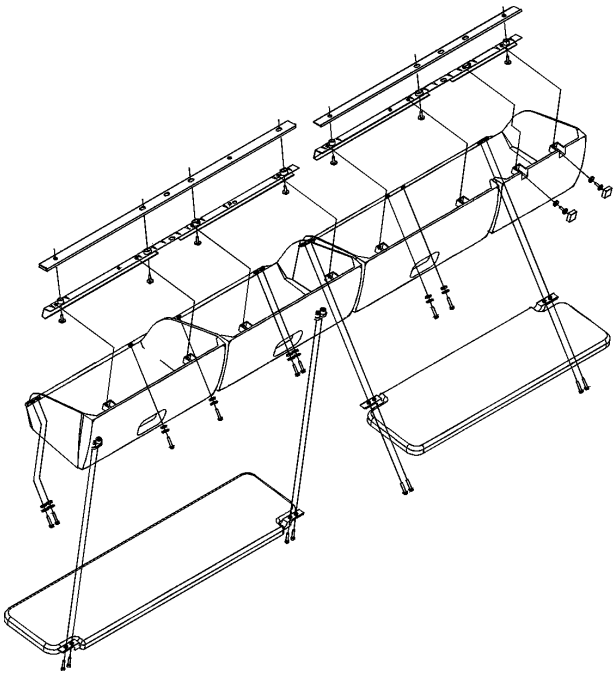
30
Install the front overhead storage cabinet together with the sun visor. Install the 4 mounting screws, with their rubber washer, to the carrier rail. Torque to 2 ± 0.3 Nm (17 ± 3 in-lb). Install the 6 screws, with their rubber washer, over the windshield. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb). 2 ± 0.3 Nm (17 ± 3 in-lb) 3 ± 0.5 Nm (25 ± 5 in-lb)

Antenna Lead-In Cable (Ribbon Type), Replacement

The ribbon antenna is standard on the VNL 610. It is located between the SMC roof panel and the headliner. The VNL 610 may also be equipped with optional multiplexer antenna system. Determine which antenna system is used before beginning repairs.

Removal

1



Remove the front left overhead storage cabinet together with the sun visor.

2
Remove the right sun visor.

3
If equipped remove the front right overhead storage cabinet.

Note: Two screw covers, on the far right facing panel, must be removed to gain access to the mounting screws.

4
Remove the front overhead storage cabinet carrier rail.

5
Remove the driver side window visor assembly. Pry off the end screw covers. Remove mounting screws.

Note: On sleeper models without an upper bunk, steps **6** and **7** may be omitted.

6
Remove the sleeper right overhead storage cabinet:
Disconnect the 12 volt power outlet connector. Remove the lamp wiring cover screws. Remove the cabinet mounting bolts. Disconnect the lamp wiring connector. Remove the cabinet from the vehicle.

7
Remove the sleeper left overhead storage cabinet:
Remove the lamp wiring cover screws. Remove the cabinet mounting bolts. Disconnect the lamp wiring connector. Remove the cabinet from the vehicle.

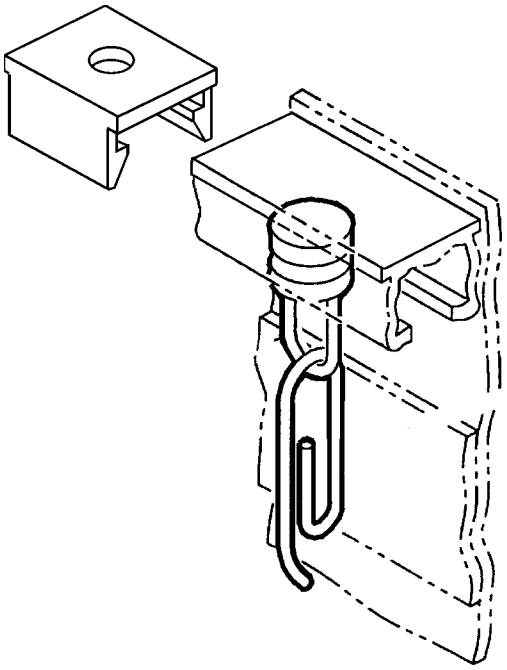
8
Remove the sleeper curtain rail assembly.

Note: The curtains do not need to be removed from the rail.

9
Remove the bezels for the front overhead roof pockets.

Note: Use caution not to break the bezel mounting post.

10

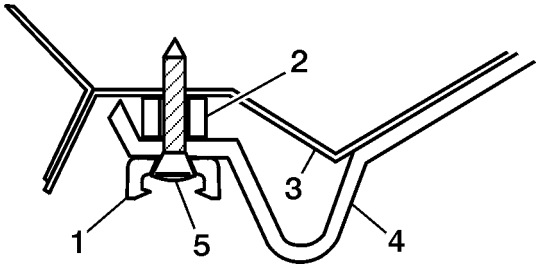


W8001428

Remove the front curtain rail assembly. Use a wide blade screwdriver to carefully pry the rail out of one side then the other side on each retaining clip. After all retaining clips are released, remove the front curtain rail assembly from the vehicle.

Note: Use caution not to deform the rail assembly.

11



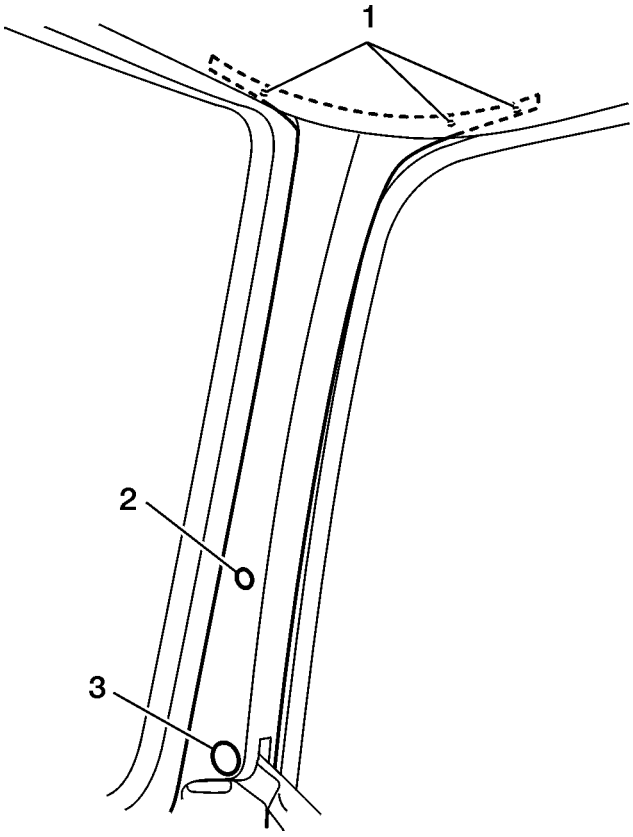
W3003095

1 Curtain rail or trim washer
2 Plastic spacer
3 Cab metal
4 Headliner
5 Screw

Check the retaining clips used to attach the front curtain rail assembly. Remove all that are attached with screws.

Note: Nylon spacers are used between the headliner and the cab mounts. Note their position for reassembly.

12

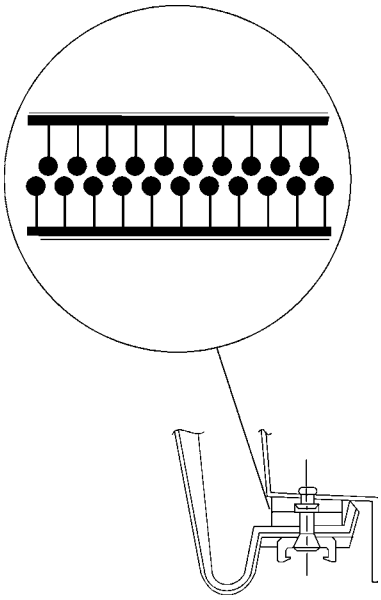


W3003260

1 Plastic rivets (day cab vehicles only)
2 Molding clip
3 Grab handle bolt cover

Remove the upper grab handle bolt cover from the A-pillar trim. Remove the bolt and pull the handle out of the cover.
Pull the door seal away from the A-pillar trim and the top of the door. Remove the molding clip by pressing in the center button. Remove the A-pillar trim. Repeat on the opposite side.

13

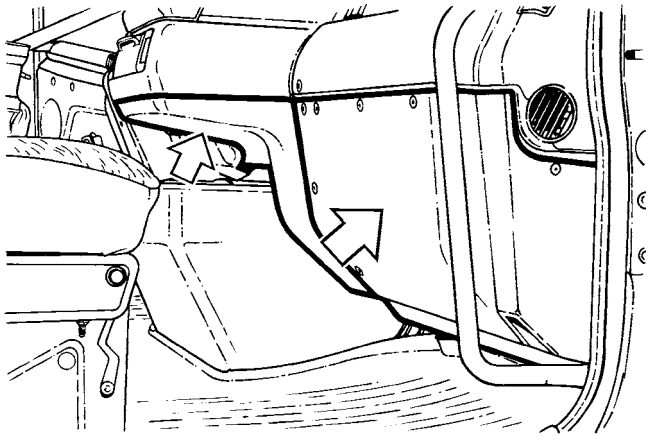


W8001424

The headliner is now held in place by interlocking fasteners. Start at one door and work under the headliner with fingers to pop apart the interlocking fasteners. The fasteners should be at each remaining front curtain rail retaining clip and at various points over the body of the headliner. A long screwdriver, or similar tool, may be used to free the hard to reach interlocking fasteners. After all fasteners are released and the headliner drops, disconnect the lamp assembles and remove the headliner from the vehicle.

Note: Use caution not to bend the headliner to the point at which a permanent crease will show in the material.

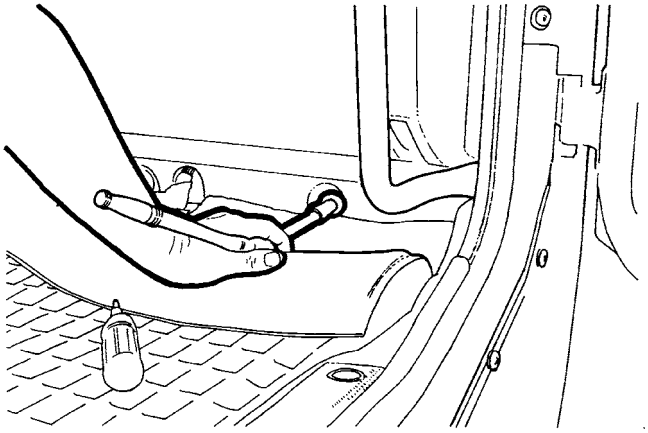
14



W8001131

Remove the 7 torx screws from the lower right dash panel. Remove the 4 screws from the center dash panel.

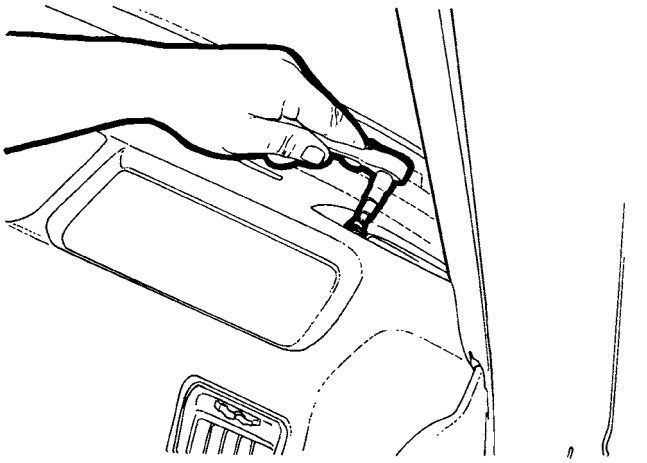
15



W8001165

Pull the floor mat back and remove the plastic nuts. Remove the lower right and center dash panels.

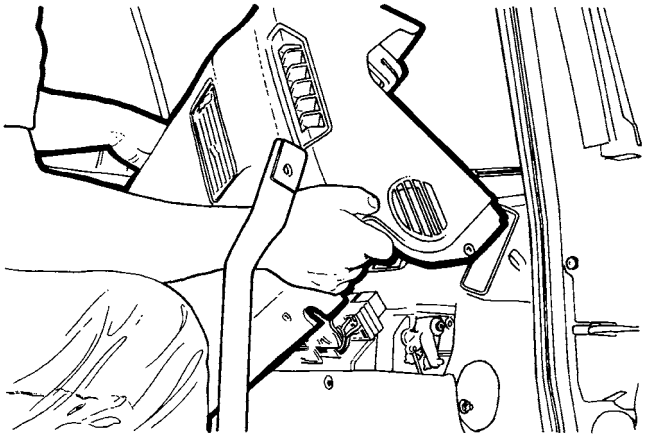
16



W8001178

Remove the right dash speaker grill. Remove the speaker mounting screws. Disconnect the wiring connector and remove the speaker.

17



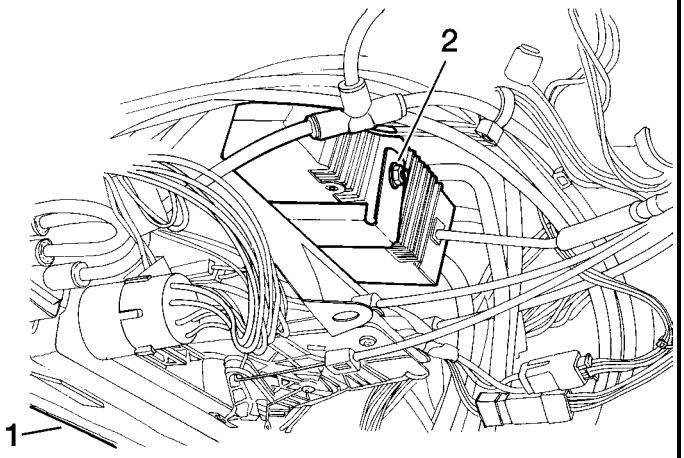
W8001180

Remove 3 mounting screws from the right upper dash panel and 1 mounting bolt in the speaker well. Remove the dash panel from the vehicle.

18

Remove the right side right door HVAC duct.

19

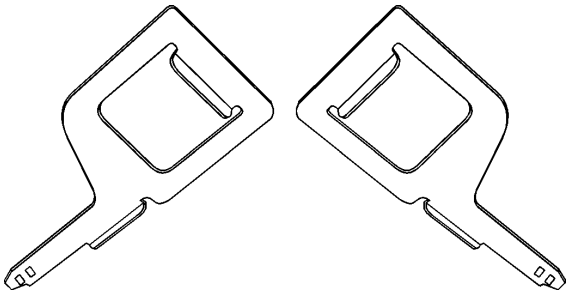


W3000675

1 Lower edge of dash
2 Nut at radio mounting bracket

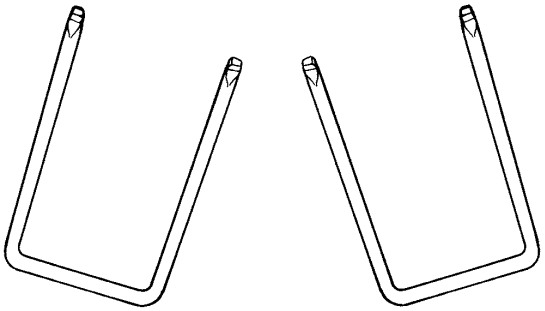
Remove the nut from the rear of the radio mounting bracket. Access the nut from under the dash.

20



W3002355

Premium radio removal tools, Volvo P/N 3949548 (left), 3949548 (right).

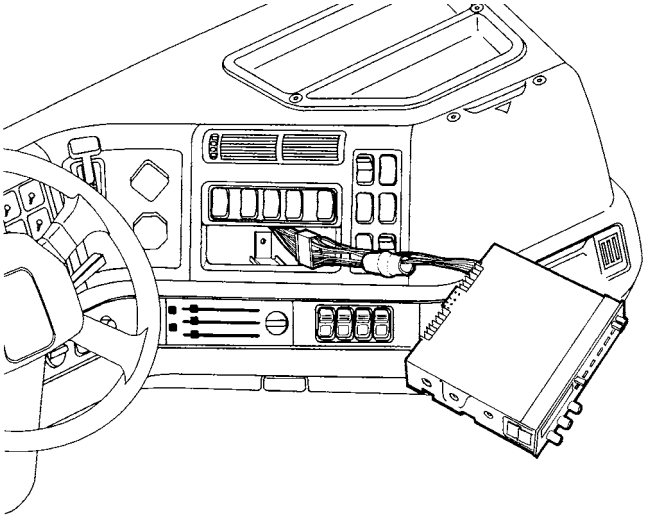


W3000702

Basic radio removal tools, Volvo P/N 176000.

Insert the radio removal tool into the release holes on the radio face until the tools locks in place. With the tools inserted, pull on the tools to slide the radio out of the dash.

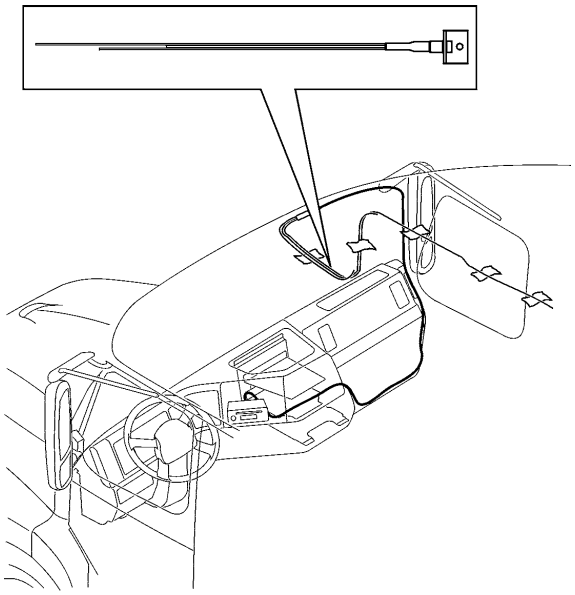
21



W3000674

Disconnect the antenna lead-in cable from the back of the radio.

22



W3003272

Remove the antenna lead-in cable. Begin at the radio, move along the wiring harness and cut cable ties as necessary to free the cable. Note the routing of the cable and location of the cable ties to aid in reinstallation. The lead-in cable should be freed up to the antenna base. Disconnect the connector at the antenna base. Remove the antenna lead-in cable from the vehicle.

Installation

1
Connect the replacement lead-in cable to the antenna.

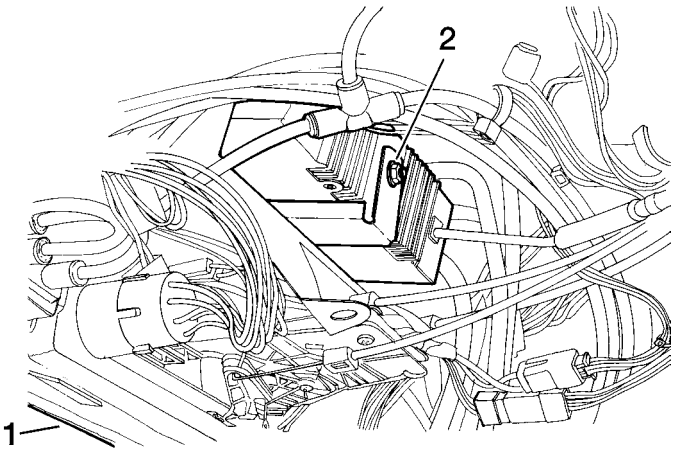
2
Temporarily connect the lead-in cable to the radio and check for proper reception.

3
Disconnect the lead-in cable from the radio. Install the antenna lead-in cable along the same route as it was removed. Secure as necessary.

4
Connect the lead-in cable to the radio. Turn on the radio and check for proper reception. Start the vehicle and turn on all accessories. Check for noise entry into radio. If noise is present, reroute the lead-in cable away from electrically noisy components.
See “Noise” page 59.

5
Install the radio. The radio should ”click” into position.

6



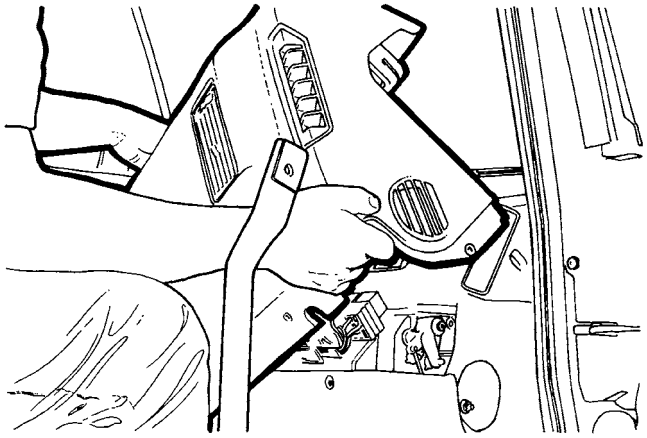
W3000675

1 Lower edge of dash
2 Nut at the radio mounting bracket

Install the nut on rear of the radio mounting bracket. Access the nut from under the dash. Torque to 1.4 ± 0.2 Nm (12.4 ± 1.8 in-lb).	1.4 ± 0.2 Nm (12.4 ± 1.8 in-lb)

7
Install the right side right door HVAC duct.

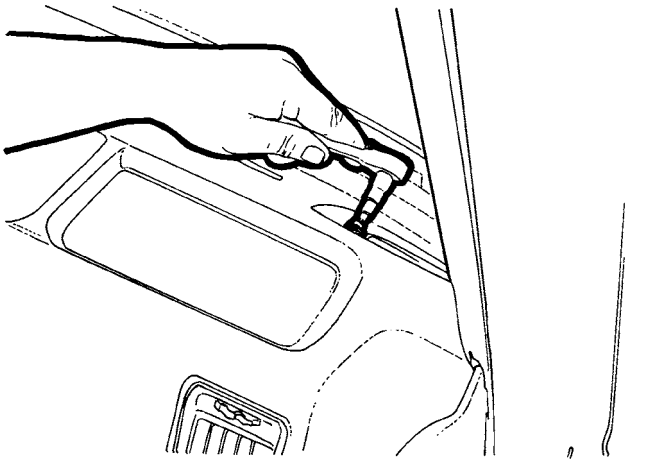
8



W8001180

Install the right upper dash with 3 mounting screws and 1 mounting bolt in the speaker well.

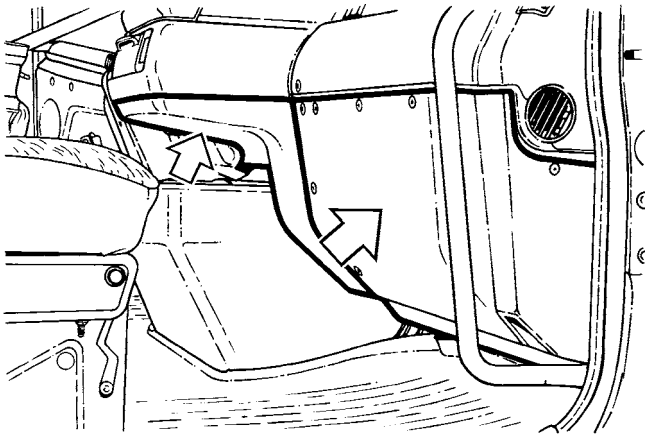
9



W8001178

Connect the wiring connector and install the right dash speaker and the grill.

10

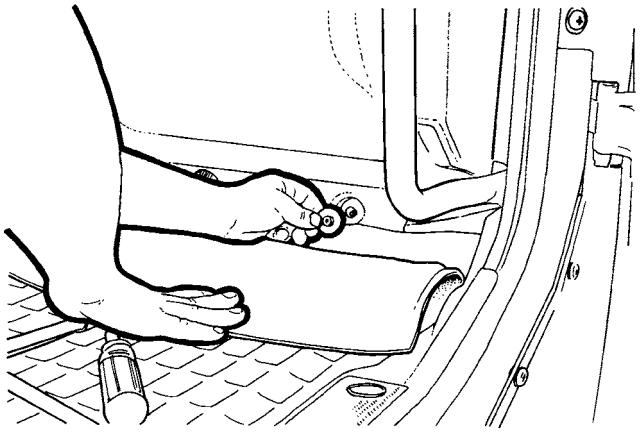


W8001131

Pull the right side floor mat back and insert the lower right dash panel onto the weld studs. Install the 7 torx screws in the top of the panel.
Pull the mat back at the accelerator pedal and insert the lower center dash panel onto the weld studs. Install the 4 torx screws in the top of the panel. Torque to 3.5 ± 0.5 Nm (31 ± 4.5 in-lb).

3.5 ± 0.5 Nm
(31 ± 4.5 in-lb)

11



W8001166

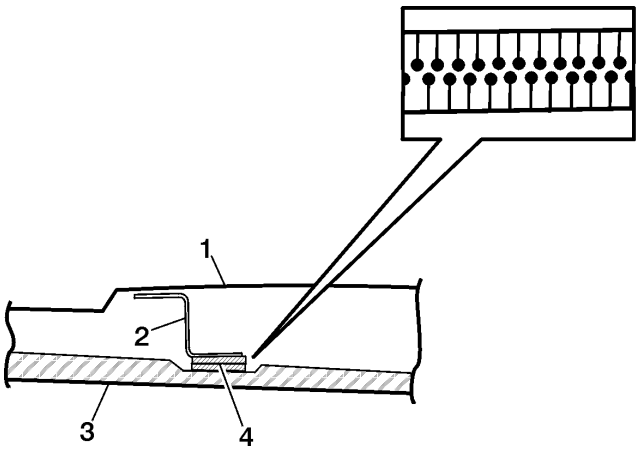
Pull the floor mat back and install the plastic nuts in the lower right dash panel and the panel under the center of the dash.

12

Note the location of all interlocking fasteners on the headliner to aid in installation. Position the headliner in the cab below its mounting location. Connect the lamp assembly connectors.

Note: Use caution not to bend the headliner to the point at which a permanent crease will show in the material.

13

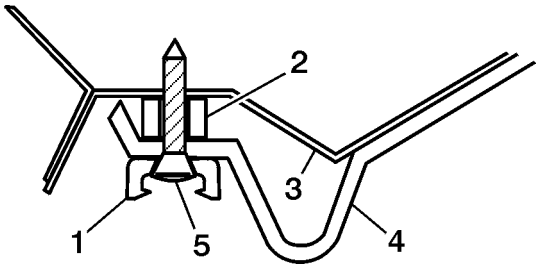


W3003110

1 Roof plate
2 Roof panel
3 Headlining
4 Fully engage fasteners – pressing firmly

Lift the headliner assembly into position. Use the front overhead roof storage pockets as a guide to assist in proper positioning. Temporarily secure with a few interlocking fasteners.

14



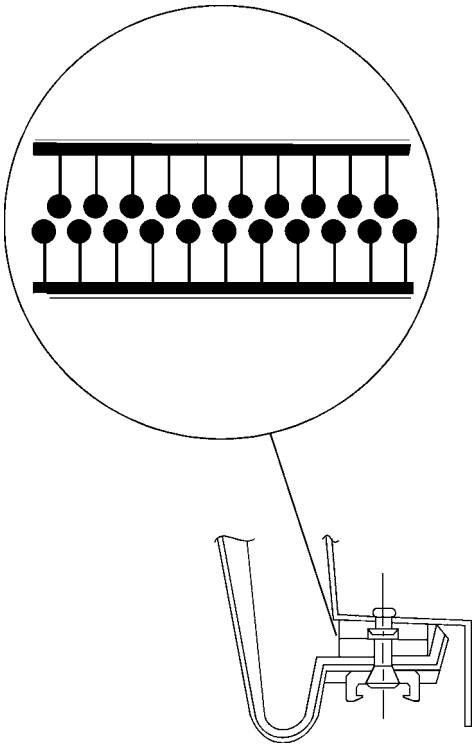
W3003095

1 Curtain rail or trim washer
2 Plastic spacer
3 Cab metal
4 Headliner
5 Screw

Line up the mounting screws for the front curtain rail assembly. Add the nylon spacers between headliner and cab screw holes. Install all retaining clips that are attached with screws. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb).

3 ± 0.5 Nm (25 ± 5 in-lb)

15



W8001424

Place a blunt tool, such as a punch, in the center of the remaining retailing clips. Using hand pressure, press the interlocking fasteners under the retaining clips together. Use caution not to damage the retaining clips.

16

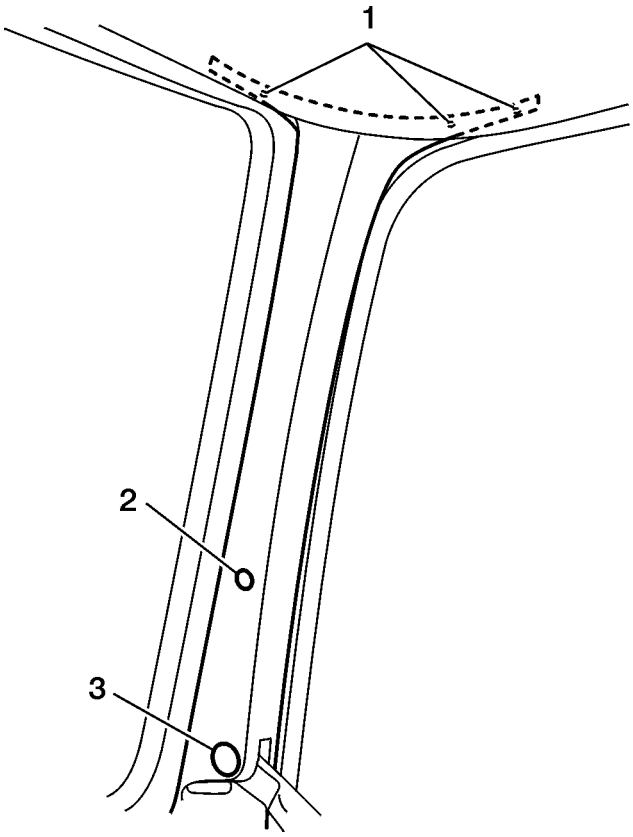
Install the front overhead storage cabinet carrier rail. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).

24 ± 4 Nm (18 ± 3 ft-lb)

17

Use hand pressure to secure the remaining interlocking fasteners.

18



W3003260

1 Plastic rivets (day cab vehicles only)
2 Molding clip
3 Grab handle bolt cover

Install the A-pillar trims. Secure with the molding clips.

19

Install the grab handles. Torque to 24 ± 4 Nm (18 ± 3 ft-lb). Replace the bolt cover trim.

24 ± 4 Nm (18 ± 3 ft-lb)

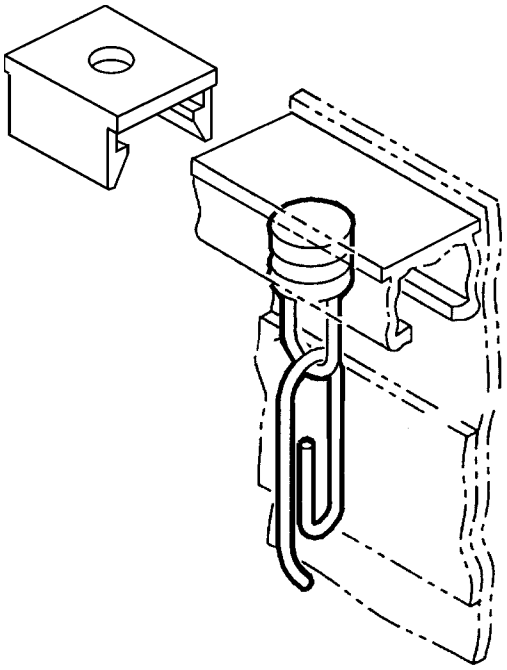
20

Install the door seals.

21

Install the bezels for the front overhead roof storage pockets with the ”star” fasteners.

22



W8001428

Install the front curtain rail assembly. Position the rail and snap into the retaining clips.

Note: Use caution not to deform the rail assembly.

23

Install the sleeper curtain rail assembly. Torque to 5 ± 1 Nm (45 ± 7 in-lb). — 5 ± 1 Nm (45 ± 7 in-lb)

24

If removed, install the sleeper left overhead storage cabinet. Connect the lamp wiring connector. Install the cabinet mounting bolts. Torque to 24 ± 4 Nm (18 ± 3 ft-lb). Install the lamp wiring cover screws. — 24 ± 4 Nm (18 ± 3 ft-lb)

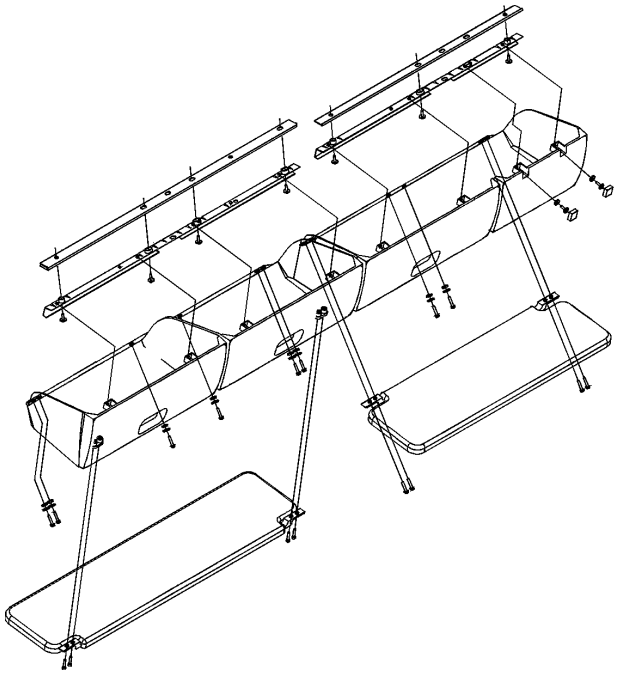
25

If removed, install the sleeper right overhead storage cabinet. Feed the 12 volt power outlet connector through the cabinet access hole. Connect the lamp wiring connector. Install the cabinet mounting bolts. Torque to 24 ± 4 Nm (18 ± 3 ft-lb). Install the lamp wiring cover screws. Connect the 12 V power outlet connector. — 24 ± 4 Nm (18 ± 3 ft-lb)

26

Install the driver side window visor assembly. Torque to 5 ± 0.8 Nm (45 ± 7 in-lb). — 5 ± 0.8 Nm (45 ± 7 in-lb)

27



Install the front right overhead storage cabinet. Install the 4 mounting screws, with their rubber washers, to the carrier rail. Torque to 2 ± 0.3 Nm (17 ± 3 in-lb). Install the 2 screws over the windshield. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb). Install the mounting screw covers. — 2 ± 0.3 Nm (17 ± 3 in-lb) 3 ± 0.5 Nm (25 ± 5 in-lb)

28

Install the right sun visor. Torque to 5 ± 0.8 Nm (45 ± 7 in-lb). — 5 ± 0.8 Nm (45 ± 7 in-lb)

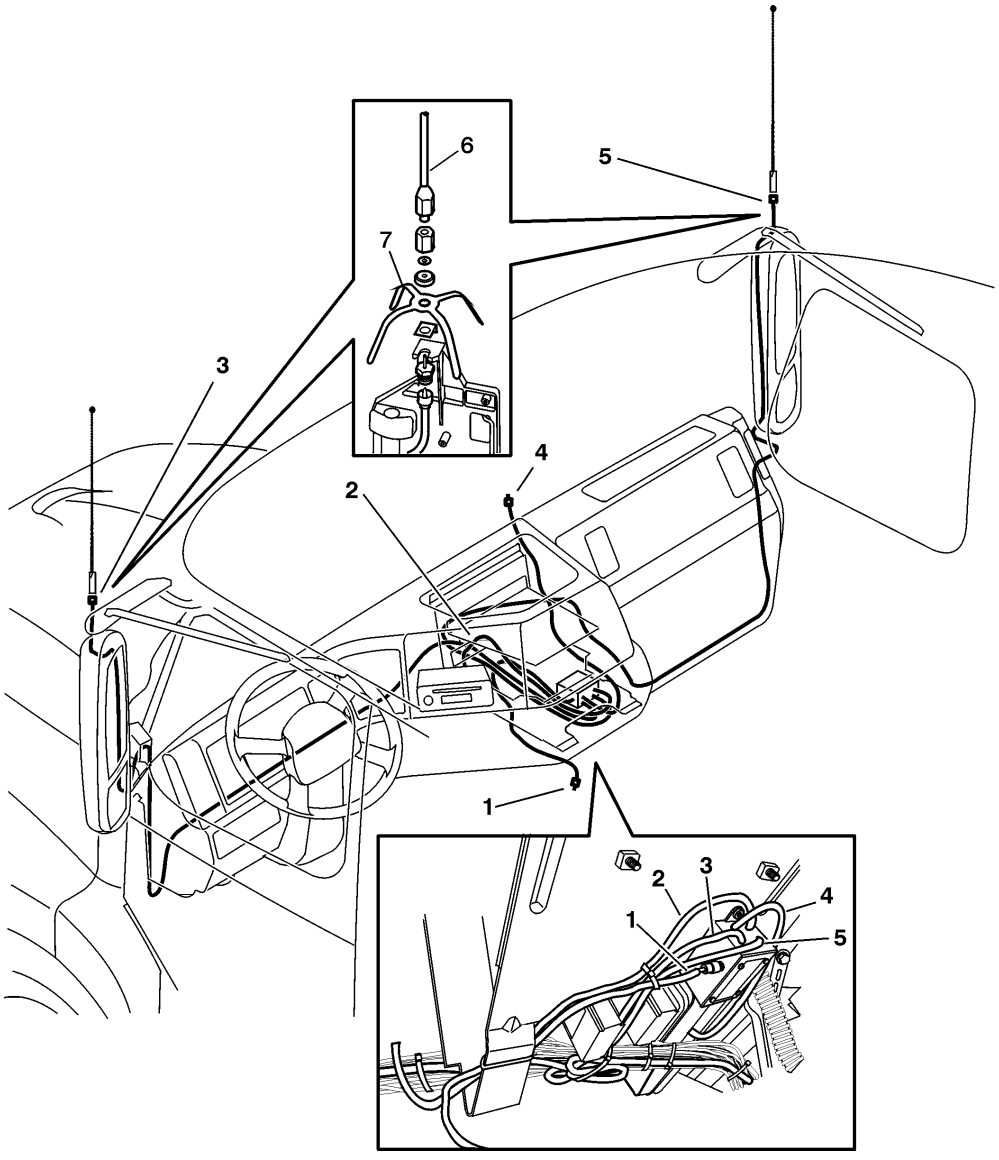
29

Install the front left overhead storage cabinet together with the sun visor. Install the 4 mounting screws, with their rubber washers, to the carrier rail. Torque to 2 ± 0.3 Nm (17 ± 3 in-lb). Install the 6 screws, with their rubber washers, over the windshield. Torque to 3 ± 0.5 Nm (25 ± 5 in-lb). — 2 ± 0.3 Nm (17 ± 3 in-lb) 3 ± 0.5 Nm (25 ± 5 in-lb)

Antenna Lead-In Cable (Multiplexer Type), Replacement

The multiplexer antenna system is standard on the VNL 660 and the VNL 770, and optional on other VN series vehicles. Determine which antenna system is used before beginning repairs.

Note: Do not confuse a CB antenna mast with a multiplexer antenna mast, see “Antenna Types” page 34.



W3003138

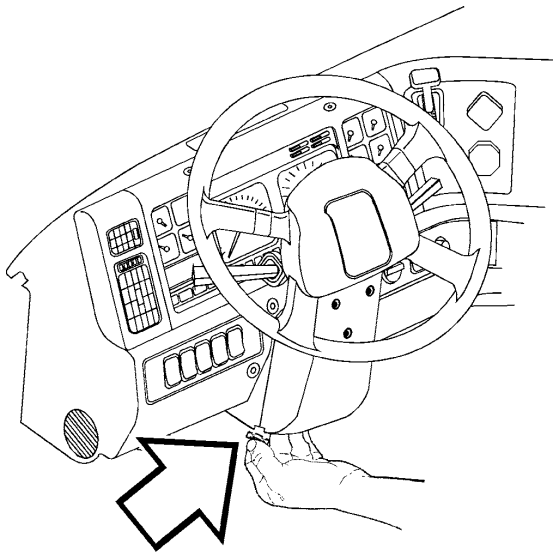
1 Cellular phone antenna cable
2 Radio antenna cable
3 Left side antenna
4 CB radio antenna cable
5 Right side antenna
6 CB/stereo receiver antenna
7 Cellular phone antenna

Removal

1
Make certain the vehicles ignition is OFF before beginning this procedure.

2
Remove the upper grab handle bolt cover from the A-pillar trim. Remove the 2 mounting bolts and remove the grab handle. Repeat on the other side.

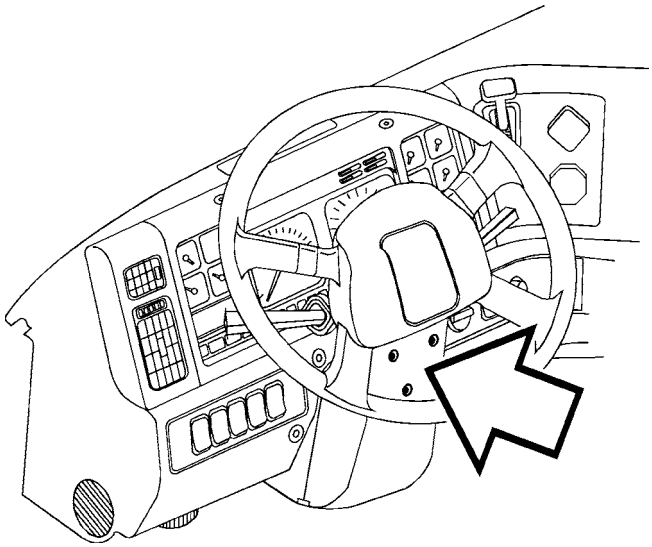
3



Remove the 2 clips at the bottom of the steering column cover.

4
Adjust the steering column up and back, where possible. Remove the front steering cover by removing the 3 torx bolts from the cover and sliding the rubber grommets off of the cover at the stalk switches.

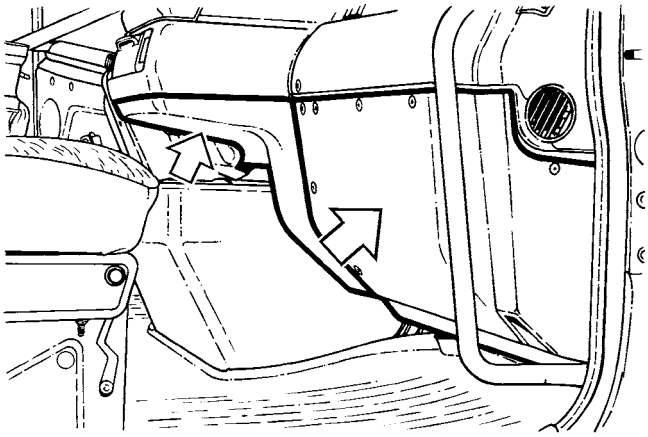
5



W3000648

Adjust the steering column forward and up where possible. Remove the 3 torx bolts from the rear column cover and remove the cover.

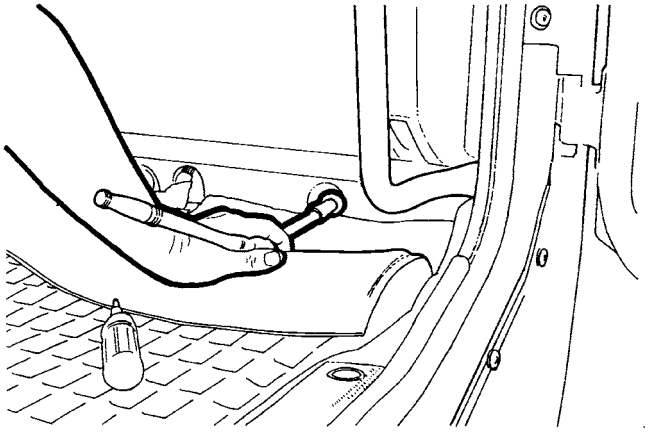
6



W8001131

Remove the 7 torx screws from the lower right dash panel. Remove the 4 screws from the center dash panel.

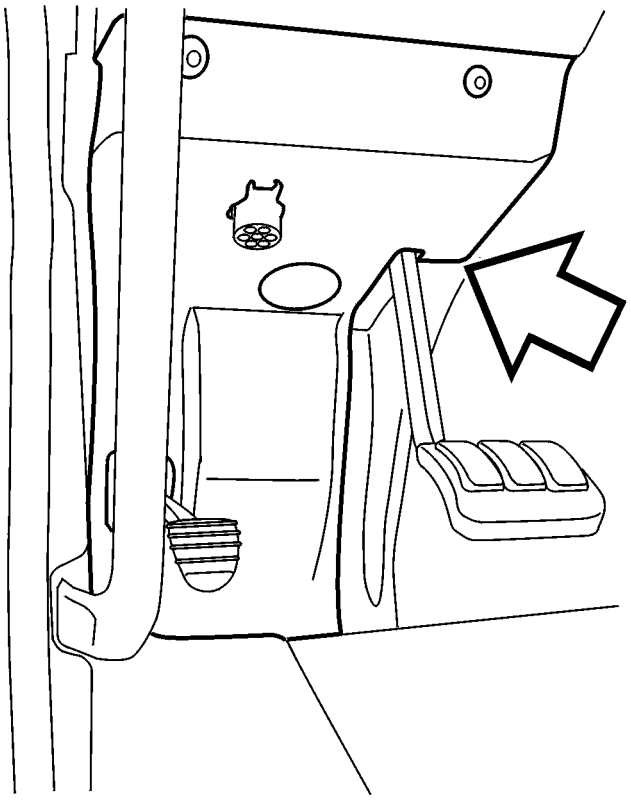
7



W8001165

Pull the floor mat back and remove the plastic nuts. Remove the lower right and center dash panels.

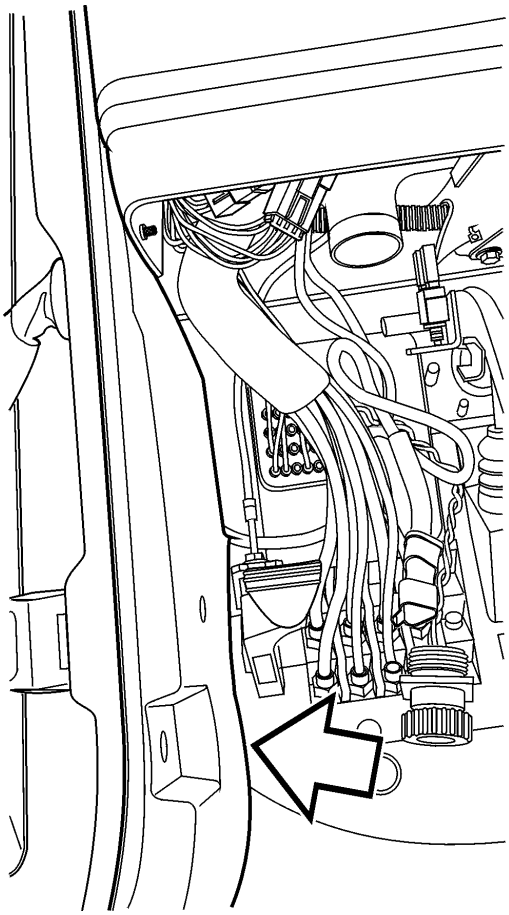
8



W3003368

Remove 3 torx screws from the lower left dash panel. Pull the floor mat back and remove the plastic nut. Remove the panel.

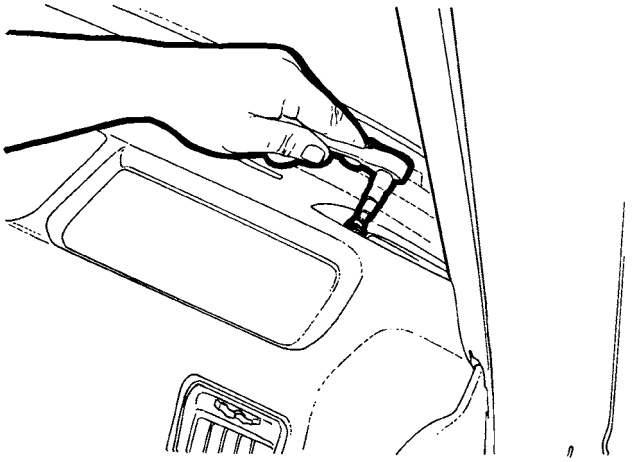
9



W3003367

Remove the lower side panel, below the right A-pillar. Repeat on the other side.

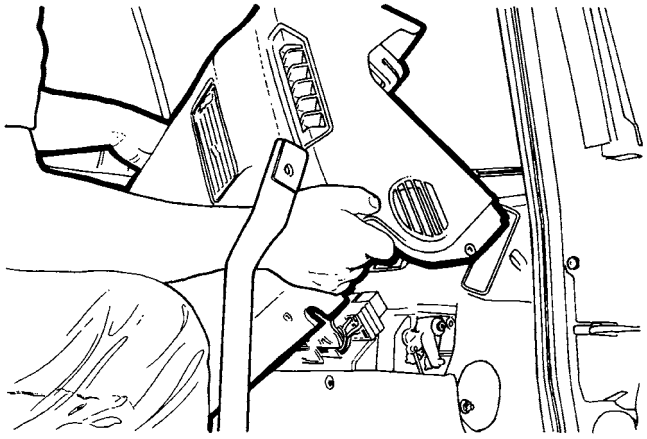
10



W8001178

Remove the right dash speaker grill. Remove the speaker mounting screws. Disconnect the wiring connector and remove the speaker.

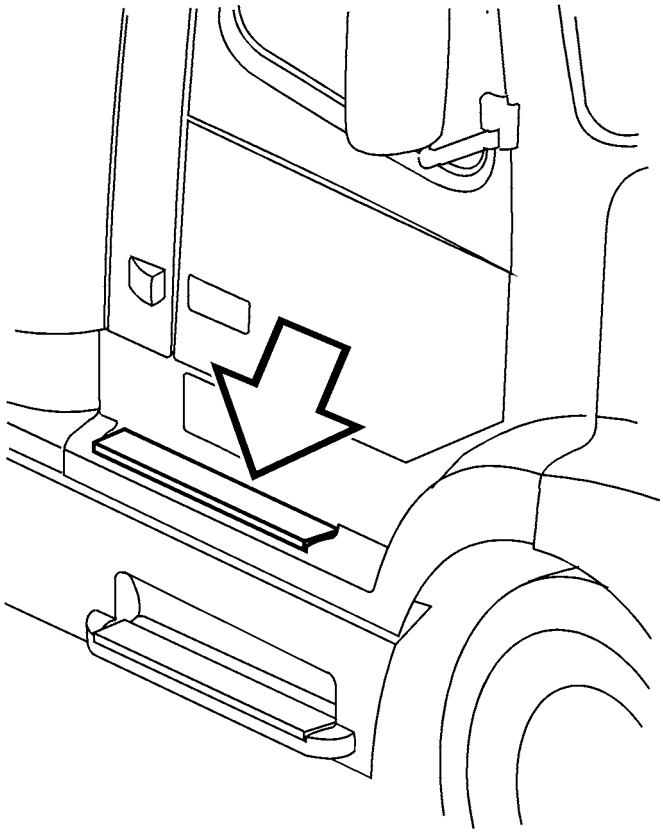
11



W8001180

Remove 3 mounting screws, from the right upper dash panel, and 1 mounting bolt from the speaker well. Remove the dash panel from the vehicle.

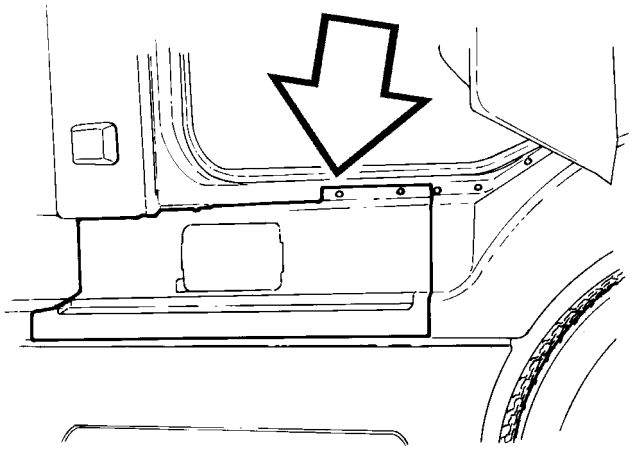
12



W3000667

Remove 4 torx bolts from the step on the right side of the cab, remove the step.

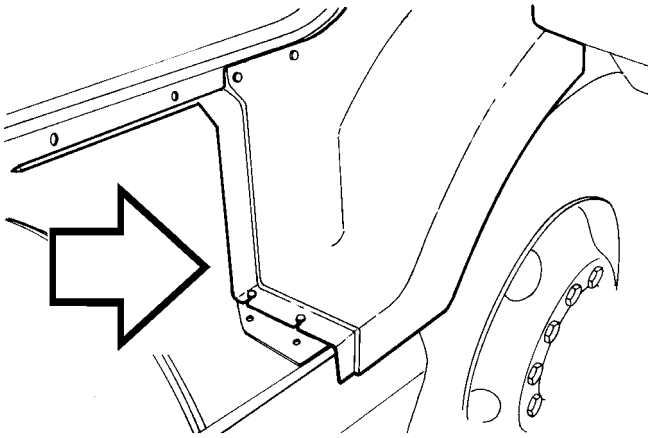
13



W3000662

Remove the upper tank fairing by removing the 4 torx bolts.

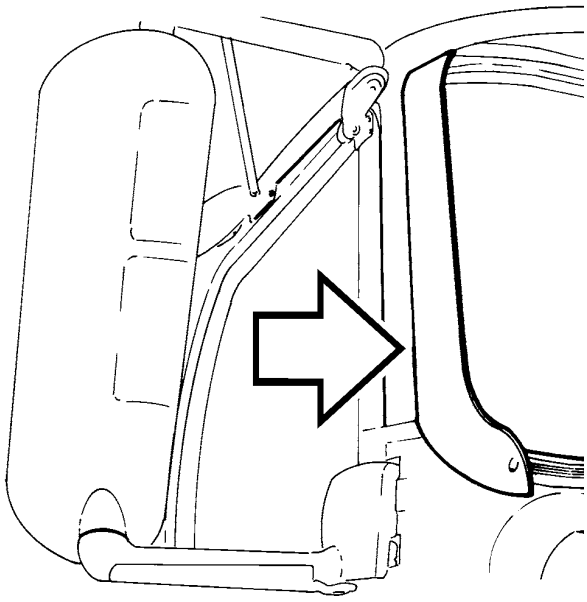
14



W3000661

Remove 5 torx bolts from the step side of the right quarter fender section in the lower door frame and 2 bolts from the step bracket. Remove the quarter fender fairing section.

15

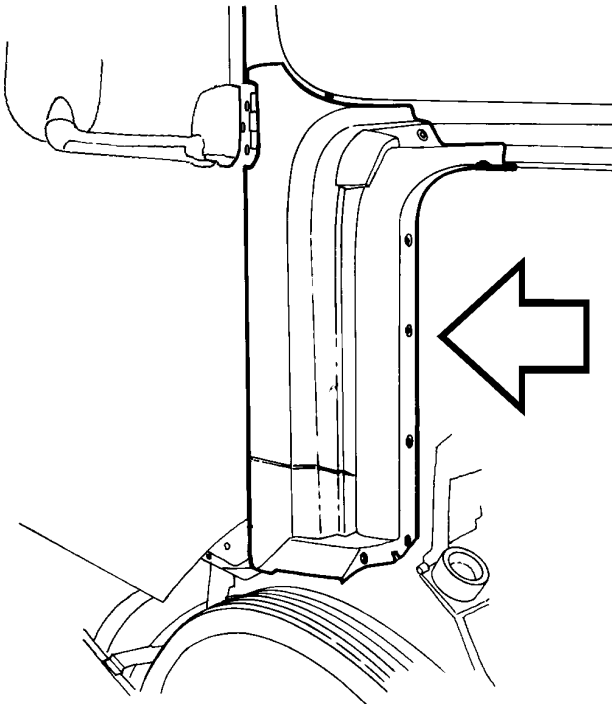


W3000663

Remove 3 screws from the right side drip molding and remove the molding.

16
Remove 3 torx bolts from the bottom of the right side mirror mounting arm.

17



W3000670

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

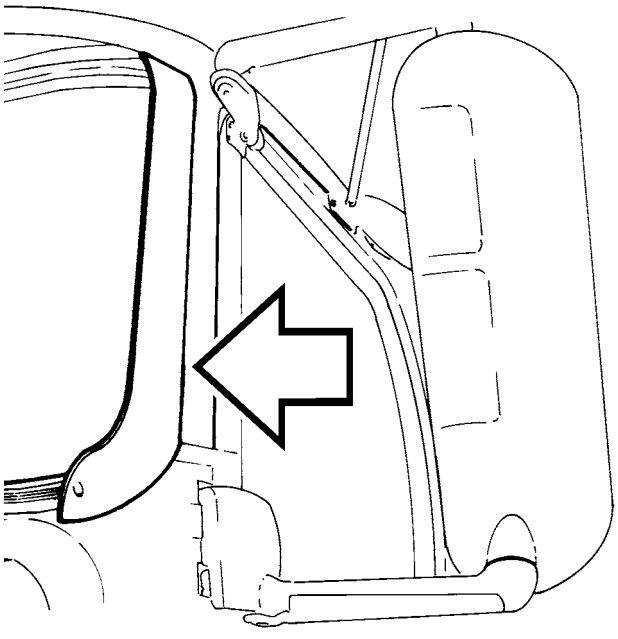
18
Remove the right mirror backing screw covers. Remove the 2 mounting screws, remove the backing and the bottom channel molding.

19
Remove 4 torx bolts from the step on the left side of the cab, remove the step.

20
Remove the upper left fairing by removing the 4 torx bolts.

21
Remove 5 torx bolts from the step side of the left quarter fender section in the lower door frame and 2 bolts from the step bracket. Remove the quarter fender fairing section.

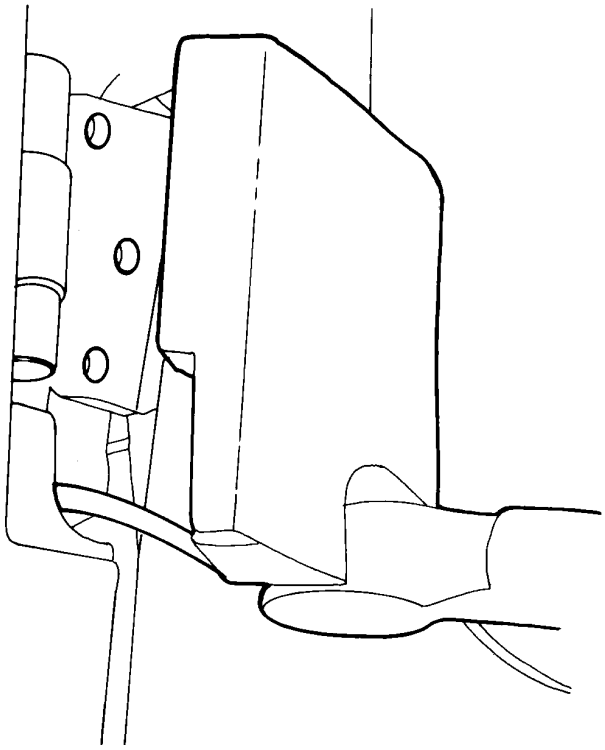
22



W3000664

Remove 3 screws from the left side drip moulding and remove the moulding.

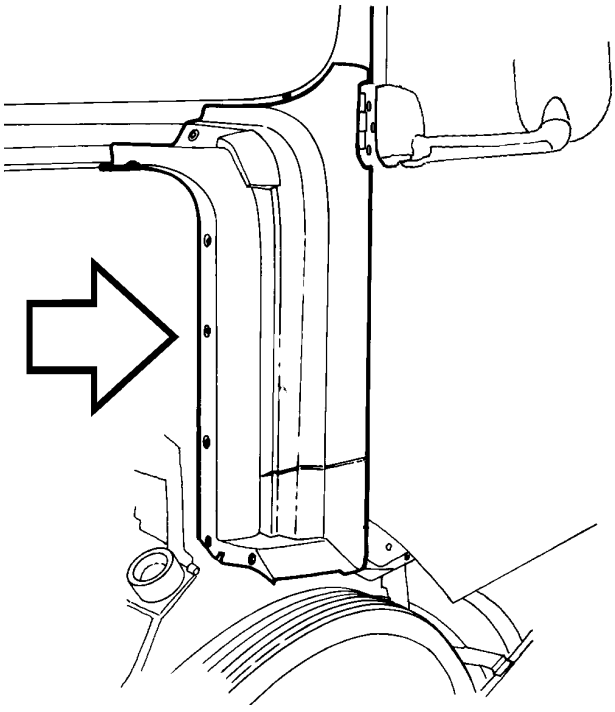
23



W3000665

Remove 3 torx bolts from the bottom of the left side mirror mounting arm.

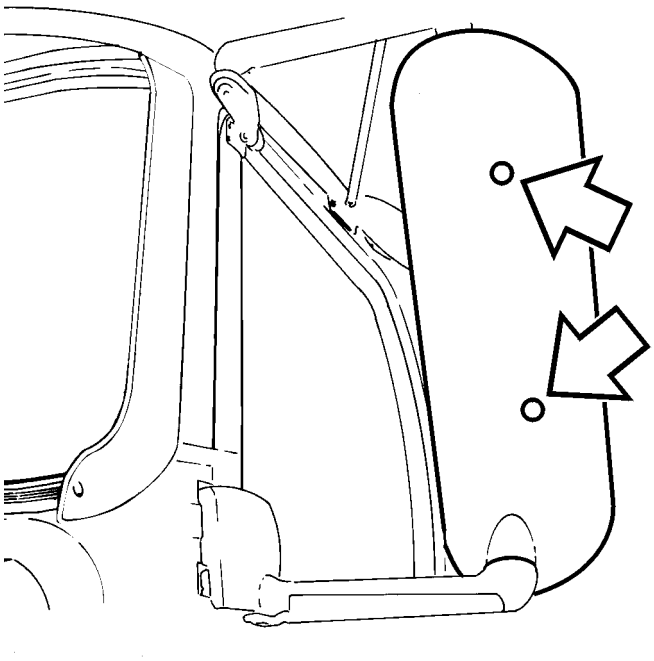
24



W3000671

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

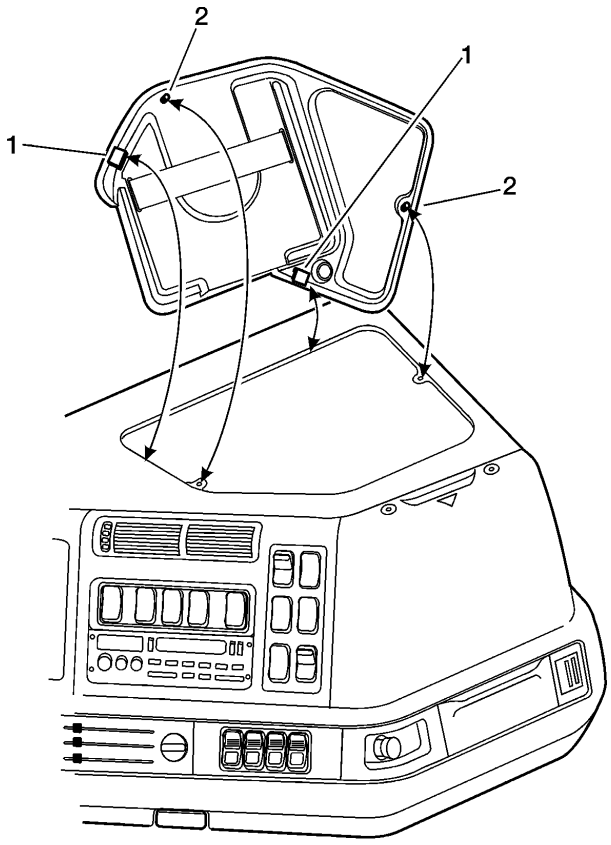
25



W3003376

Remove the left mirror backing screw covers. Remove the 2 mounting screws, remove the backing and the bottom channel molding.

26



W8002059

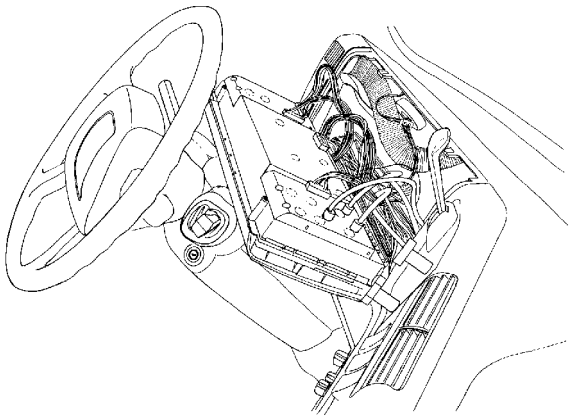
1 Panel tabs
2 Panel torx bolts

Remove the CB tray by loosening the 2 bolts and lifting the cover on the right rear corner. Then, pull the cover toward the passenger side and back to clear the tabs on the front left sides. Remove the CB cable grommet and then remove the CB cable.

27
Disconnect the cellular phone antenna cable from the multiplexer-box.

28
Disconnect the antenna cable from the radio. Cut ties as necessary to free the cable.

29



W3000641

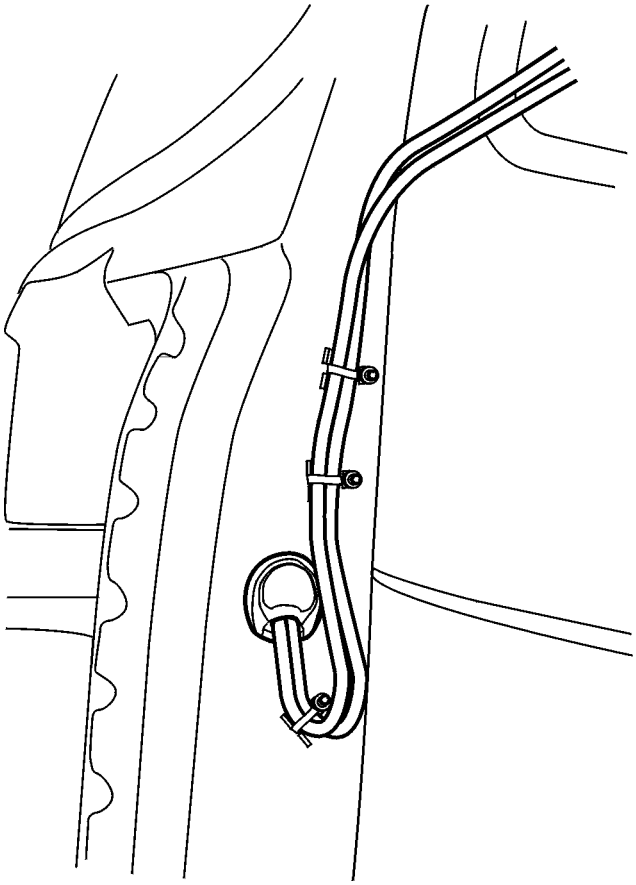
⚠ CAUTION

When servicing or troubleshooting, do not leave the cluster facedown for more than 15 minutes, or damage to the gauges may occur. Gauge oil can run out the front of the gauge faces and make the gauges inaccurate.

Adjust the steering column back where possible. Remove the 2 screws at the top of the instrument cluster and lay the cluster facedown on the steering column.

30
Cut cable ties to free the left antenna lead-in cable from the mirror harness, disconnect the antenna lead-in cable from the antenna. Note the routing of the cable and location of the cables ties to aid in reinstallation.

31



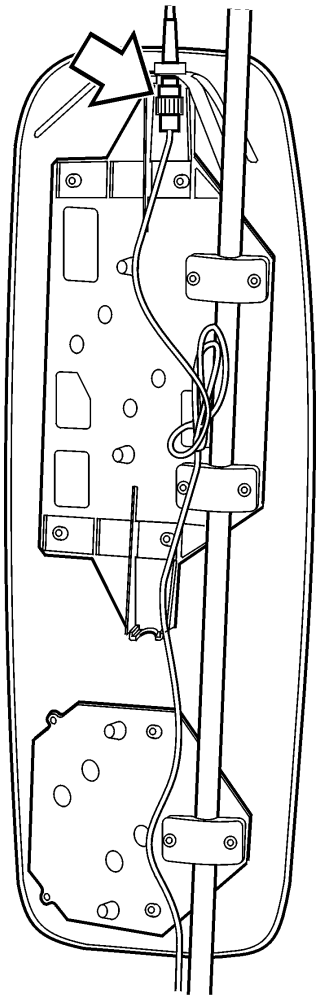
W3003375

Cut the heat shrink and cut cable ties as necessary to free the cable between the mirror and the heat shrink, pull in the lead-in cable into the cab.

32
Disconnect the left mirror harness inside the cab and pull the harness outside the cab.

33
Cut cable ties as necessary to free the cable under the instrument cluster to center of the dash, pull the cable through.

34



W3003366

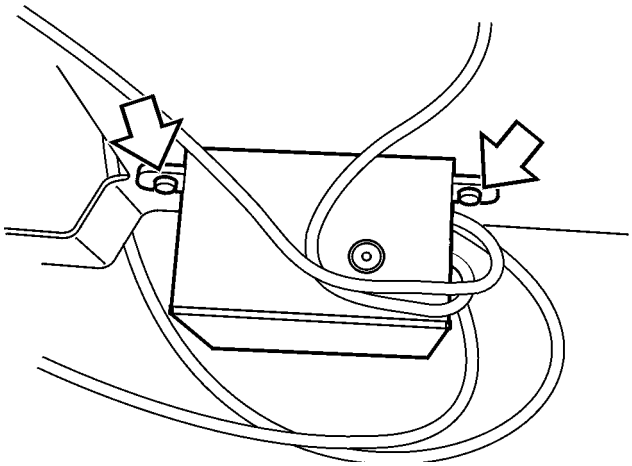
Cut cable ties to free the right antenna lead-in cable from the mirror harness, disconnect the antenna lead-in cable from the antenna. Note the routing of the cable and location of the cables ties to aid in reinstallation.

35
Cut the heat shrink and cut cable ties as necessary to free the cable between the right mirror and the heat shrink, pull in the lead-in cable into the cab.

36
Disconnect the right mirror harness inside the cab and pull the harness outside the cab.

37
Cut cable ties as necessary to free the cable inside the cab. The lead-in cable should be freed up to the multiplexer-box. Note the routing of the cable and location of the cables ties to aid in re-installation.

38



W3003365

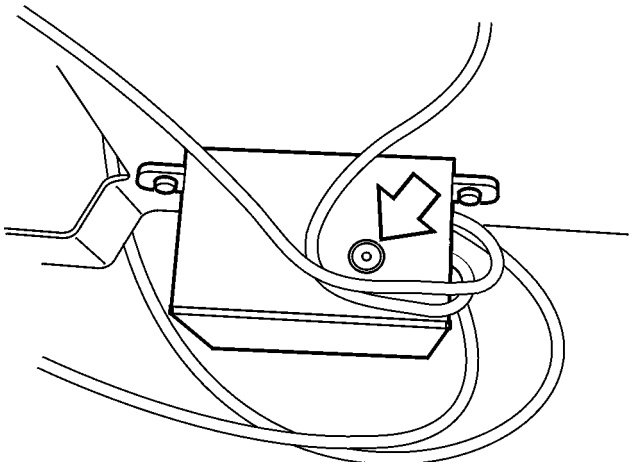
Remove the multiplexer-box together with the harnesses.

Installation

1
Install the new multiplexer-box.

2
Route the antenna cable, as it was removed, to the radio, and secure as necessary. Connect the antenna cable to the radio.

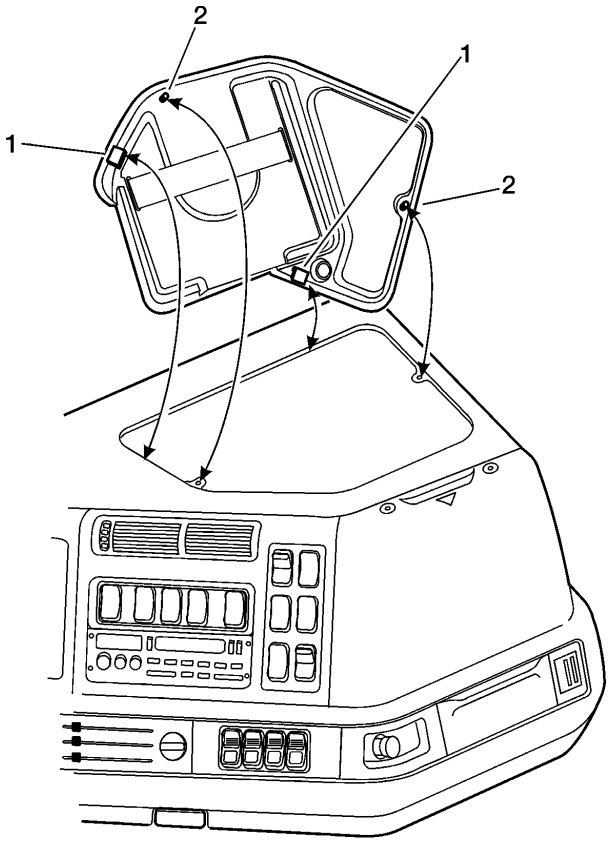
3



W3003369

Install the cell phone antenna cable to the multiplexer-box.

4



W8002059

1 Panel tabs
2 Panel torx bolts

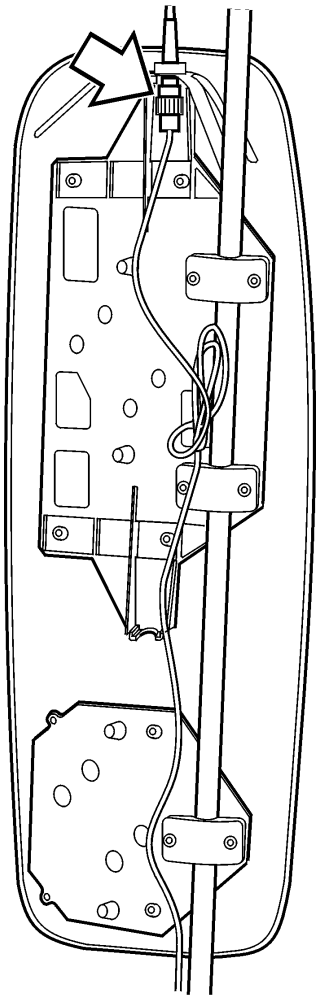
Pull through the CB cable and then install the CB cable grommet to the CB tray. Insert the tabs of the CB tray into the front and left sides of the open fuse area. Fit the right rear corner into place. Install the torx bolts. Torque the mounting bolts 3.5 ± 0.5 Nm (31 ± 4 in-lb).

3.5 ± 0.5 Nm (31 ± 4 in-lb)

5
Route the right antenna lead-cable, through the cab, along the same route as it was removed, secure as necessary. Pull the cable outside the cab. Install a new heat shrink.

6
Pull the right mirror harness inside the cab and connect it.

7



W3003366

Install the antenna lead-in cable to the antenna and tie the cable to the mirror harness.

8

Route the left antenna lead-cable, through the cab, along the same route as it was removed, and secure as necessary. Install a new heat shrink.

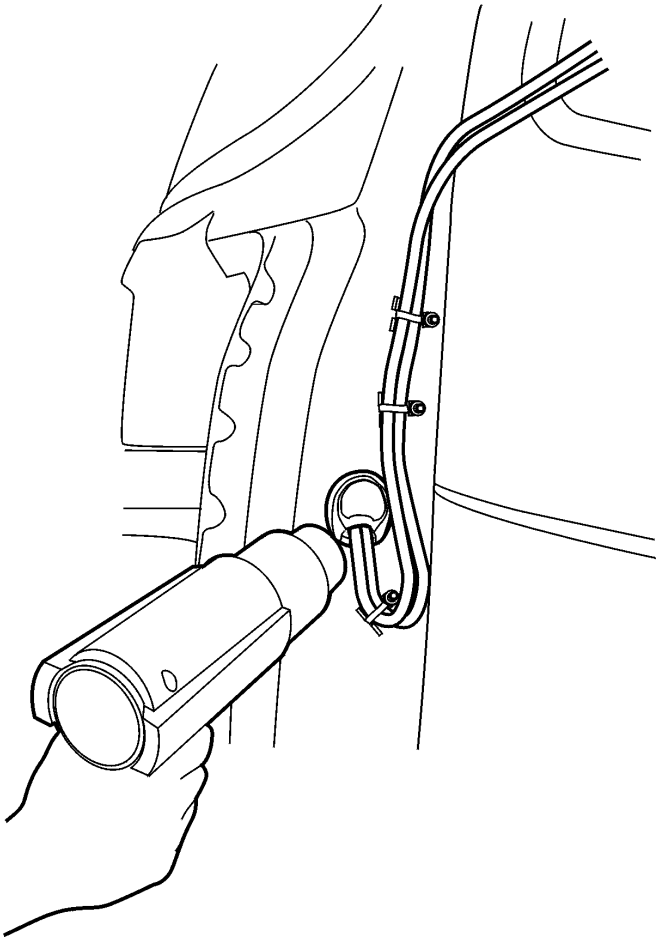
9

Pull the left mirror harness inside the cab and connect it.

10

Install the antenna lead-in cable to the antenna, tie the cable to the mirror harness.

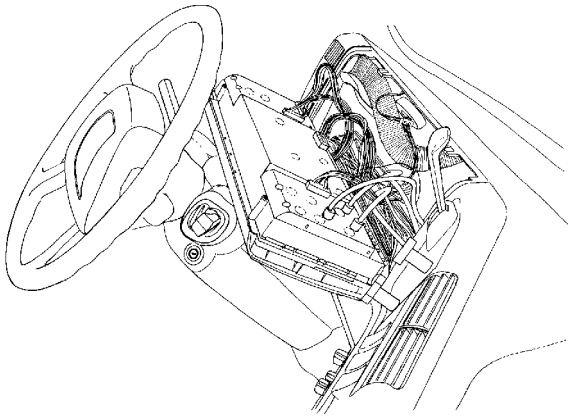
11



W3003374

Using heat gun J-25070, heat the heat shrink until it gets a good moisture seal. Repeat on the other side.	J-25070

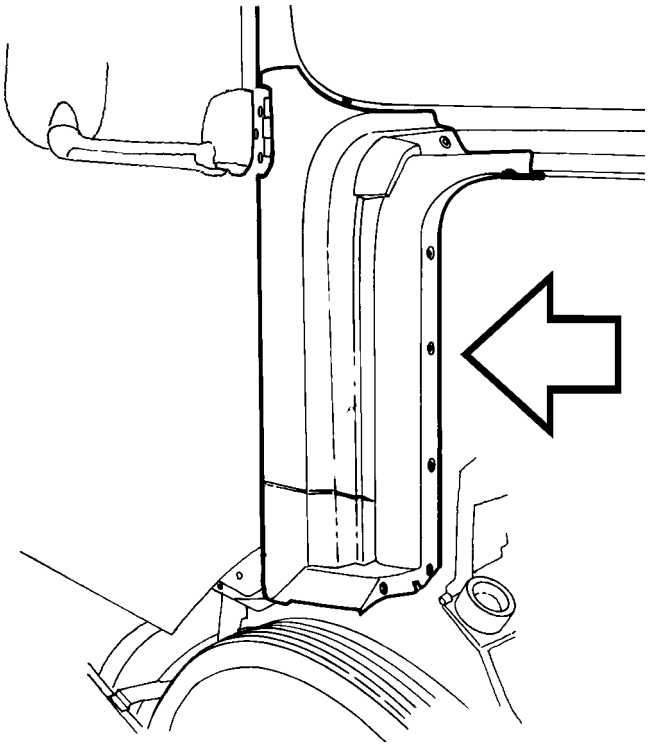
12



W3000641

Install the instrument cluster by tightening the 2 screws at the top of the cluster. Torque to 2 ± 0.3 Nm (17.5 ± 2.5 in-lb).	2 ± 0.3 Nm (17.5 ± 2.5 in-lb)

13



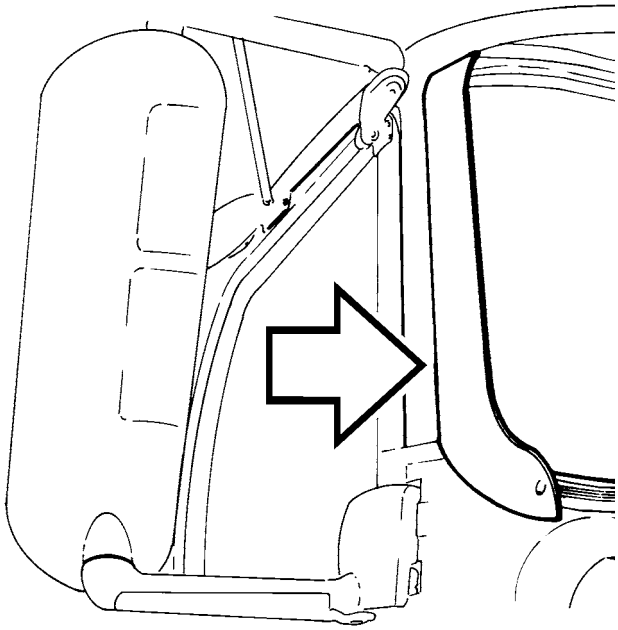
W3000670

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 (18 ± 3 ft-lb).	24 ± 4 Nm (18 ± 3 ft-lb)

14
Install 3 torx bolts in the lower right side mirror mounting arm.

15
Install the right mirror backing together with the bottom channel.

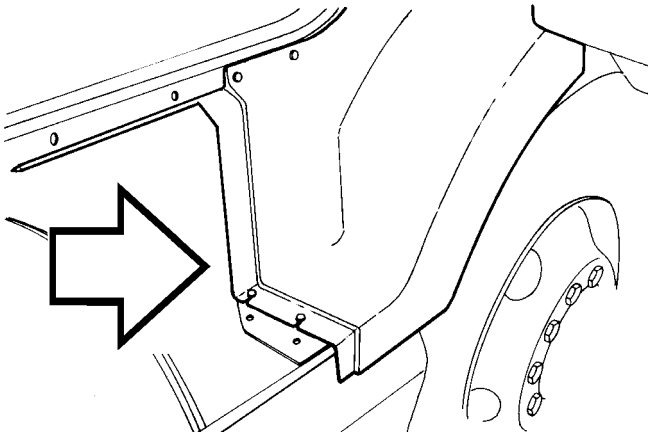
16



W3000663

Install the right side drip molding with 3 screws. Torque the top 2 screws to 1.2 ± 0.2 Nm (10.6 ± 1.8 in-lb), and the bottom screw to 3 ± 0.5 Nm (26 ± 4 in-lb).	1.2 ± 0.2 Nm (10.6 ± 1.8 in-lb) 3 ± 0.5 Nm (26 ± 4 in-lb)

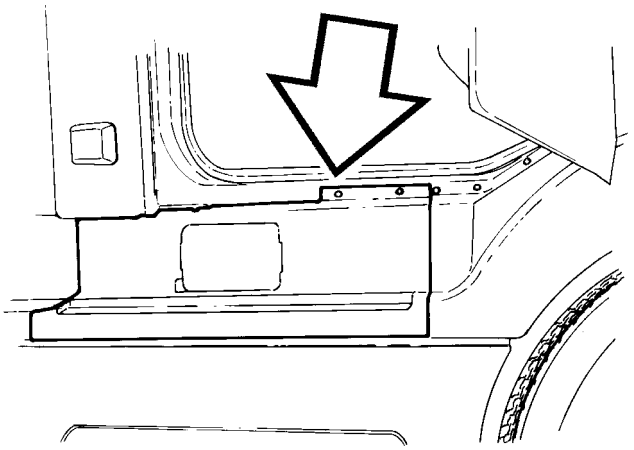
17



W3000661

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

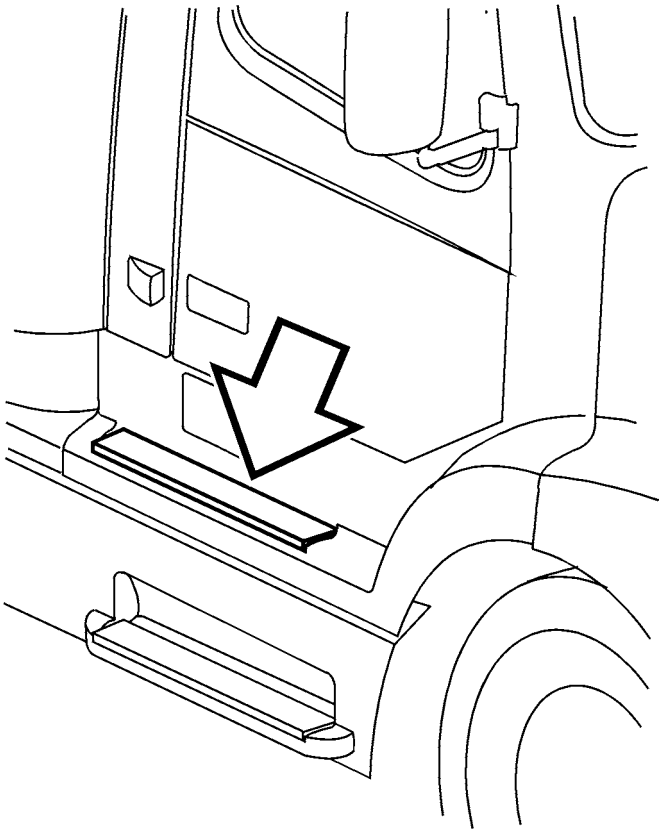
18



W3000662

Install the tank fairing. Start all bolts and align the fairing before tightening. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).	24 ± 4 Nm (18 ± 3 ft-lb)

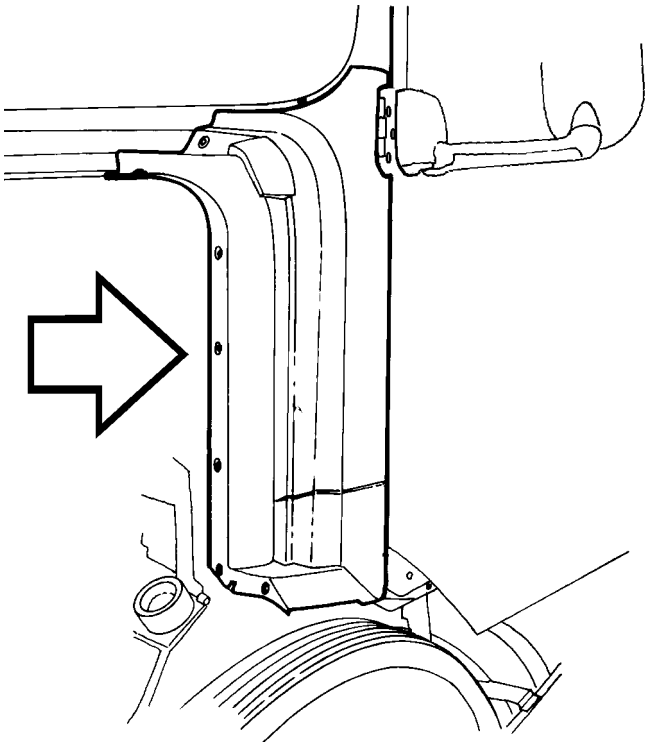
19



W3000667

Install the right step. Start all 4 bolts, and align the step before tightening. Torque to 12 ± 1 Nm (9 ± 0.7 ft-lb).	12 ± 1 Nm (9 ± 0.7 ft-lb)

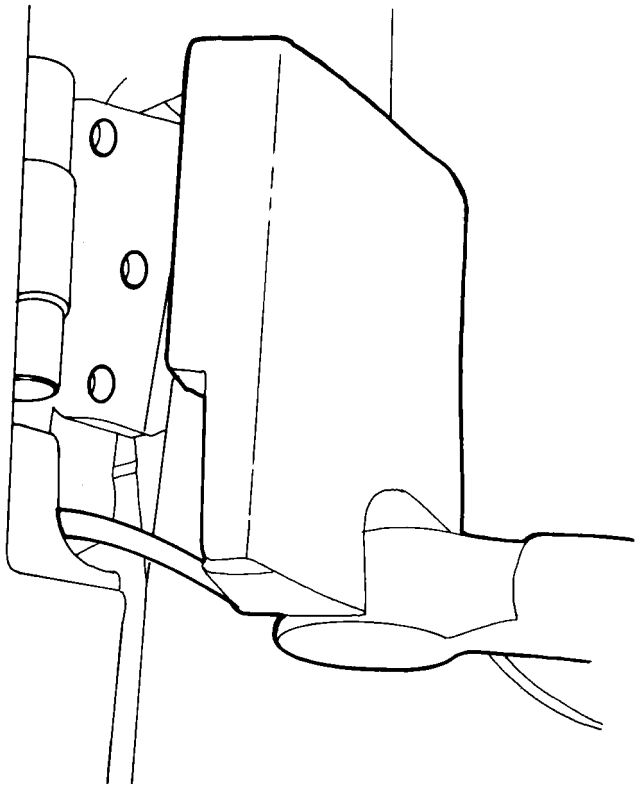
20



W3000671

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).	24 ± 4 Nm (18 ± 3 ft-lb)

21



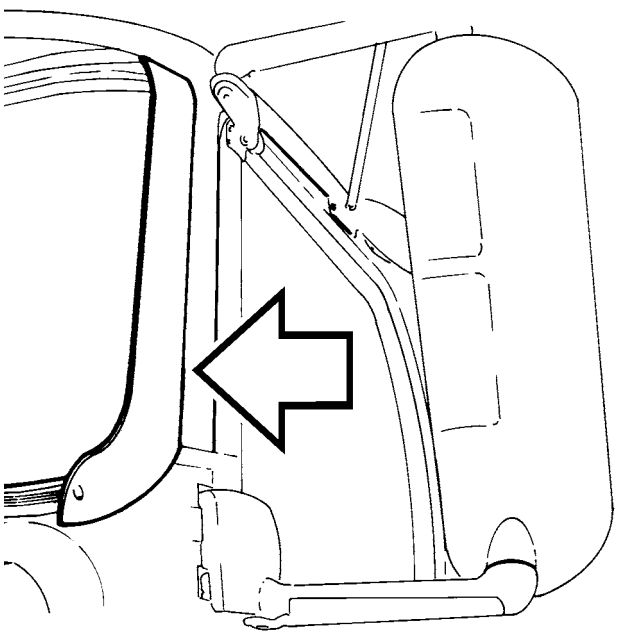
W3000665

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

22

Install the right mirror backing together with the bottom channel.

23



W3000664

Install the left side drip molding with 3 screws. Torque the top 2 screws to 1.2 ± 0.2 Nm (10.6 ± 1.8 in-lb), and the bottom screw to 3 ± 0.5 Nm (26 ± 4 in-lb).	1.2 ± 0.2 Nm (10.6 ± 1.8 in-lb) 3 ± 0.5 Nm (26 ± 4 in-lb)

24

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

25

Install the left fairing. Start all bolts and align the fairing before tightening. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).	24 ± 4 Nm (18 ± 3 ft-lb)

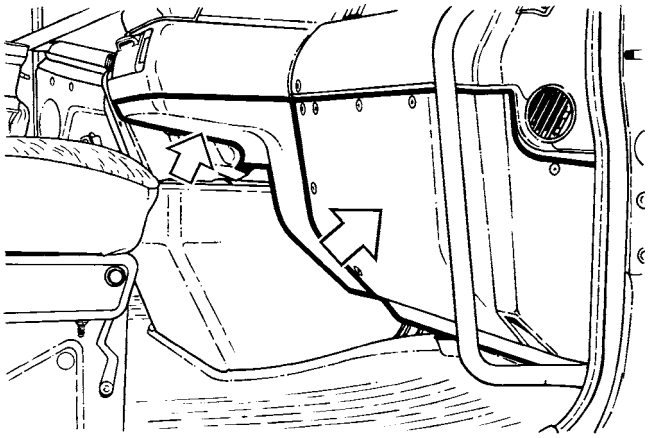
26

Install the left step. Start all 4 bolts, and align the step before tightening. Torque to 12 ± 1 Nm (9 ± 0.7 ft-lb).	12 ± 1 Nm (9 ± 0.7 ft-lb)

27

Install the panel below the right A-pillar.

28

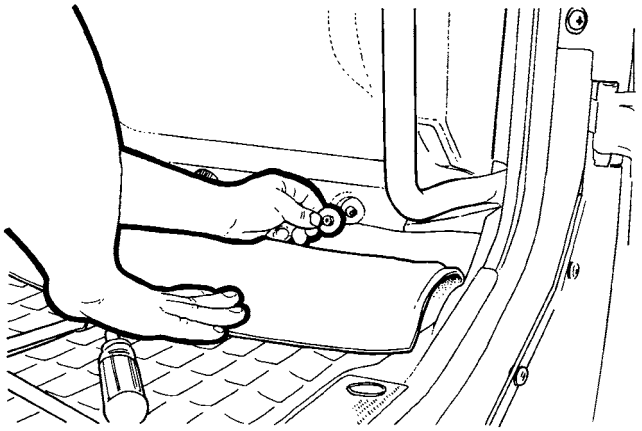


W8001131

Pull the right side floor mat back and insert the lower right dash panel onto the weld studs. Install the 7 torx screws in the top of the panel. Pull the mat back at the accelerator pedal and insert the lower center dash panel onto the weld studs. Install the 4 torx screws in the top of the panel. Torque to 3.5 ± 0.5 Nm (31 ± 4.5 in-lb).

3.5 ± 0.5 Nm (31 ± 4.5 in-lb)

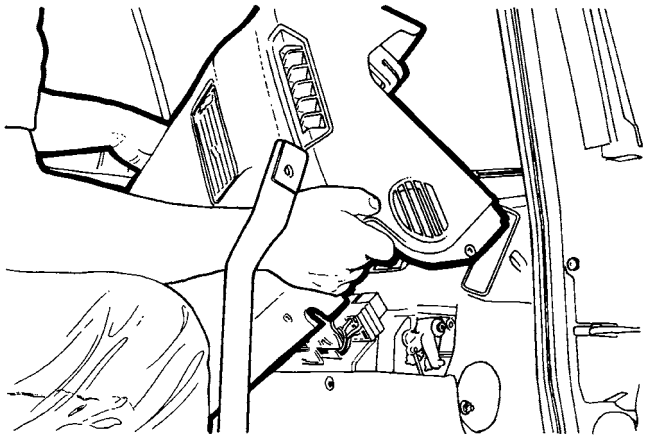
29



W8001166

Pull the floor mat back and install the plastic nuts in the lower right dash panel and the panel under the center of the dash.

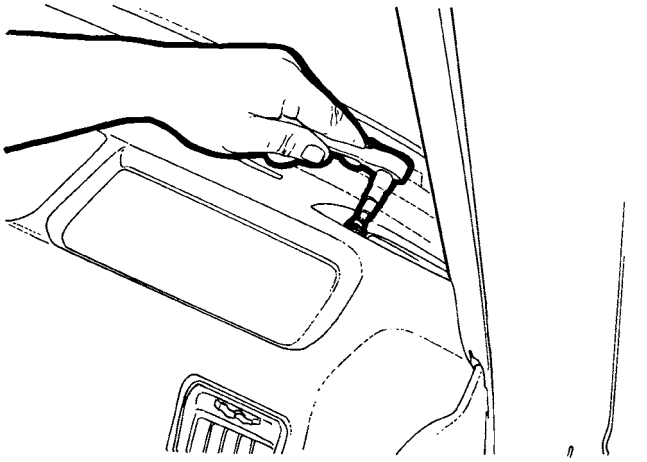
30



W8001180

Install the right upper dash with 3 mounting screws and 1 mounting bolt in the speaker well.

31



W8001178

Connect the wiring connector and install the right dash speaker and the grill.

32

Install the right grab handle. Torque to 24 ± 4 Nm (18 ± 3 ft-lb). Replace the bolt cover trim.

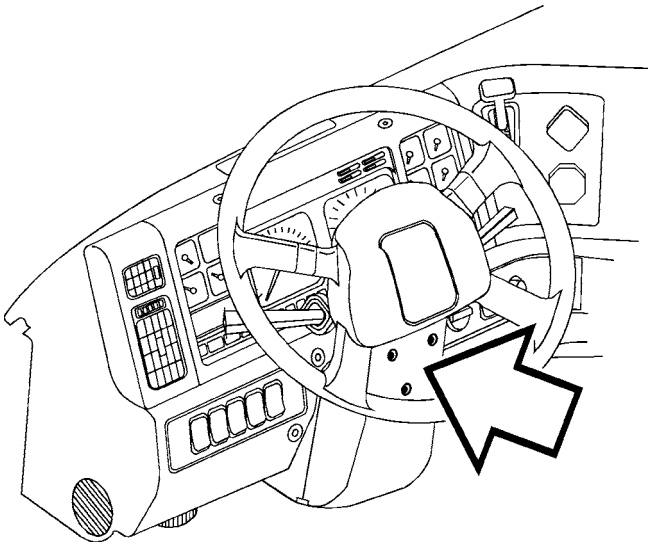
24 ± 4 Nm (18 ± 3 ft-lb)

33

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

5 ± 0.8 Nm (44 ± 7 in-lb)

34

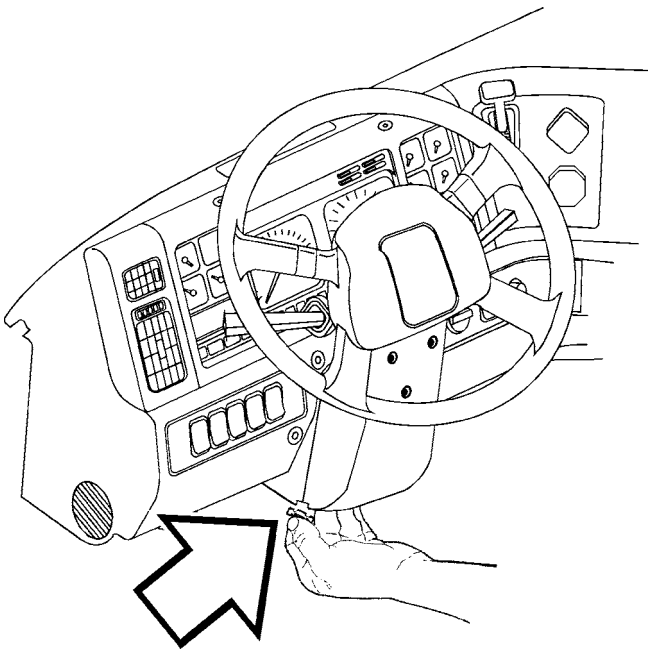


W3000648

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

5 ± 0.8 Nm (44 ± 7 in-lb)

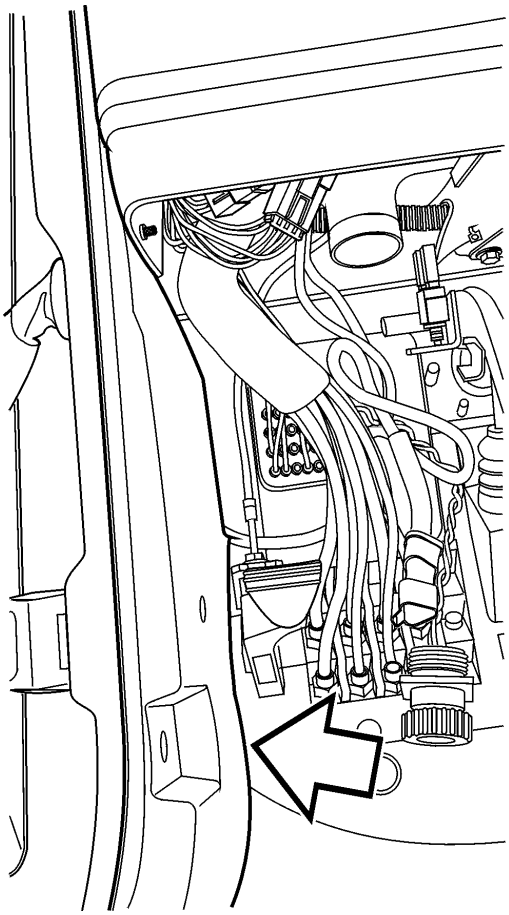
35



W3000655

Replace 2 clips at the bottom of the steering column cover.

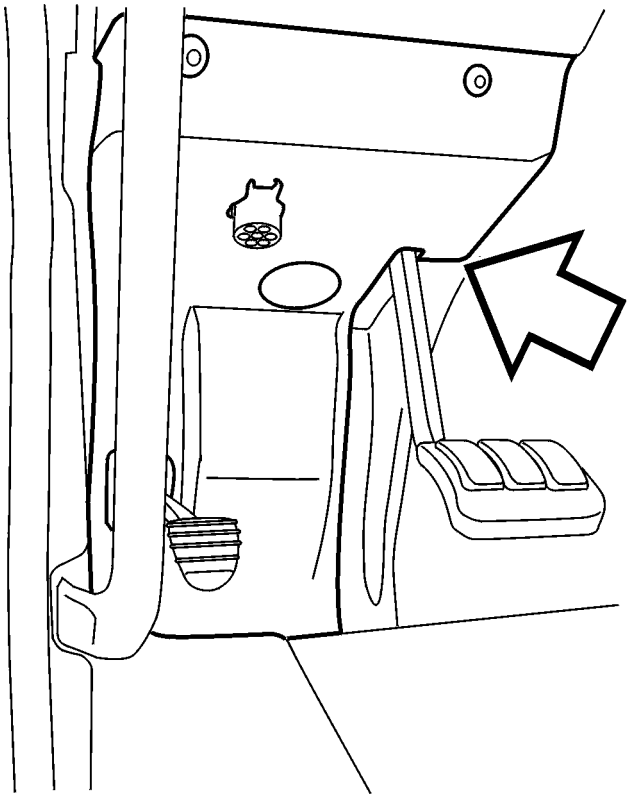
36



W3003367

Install the left panel below the A-pillar.

37



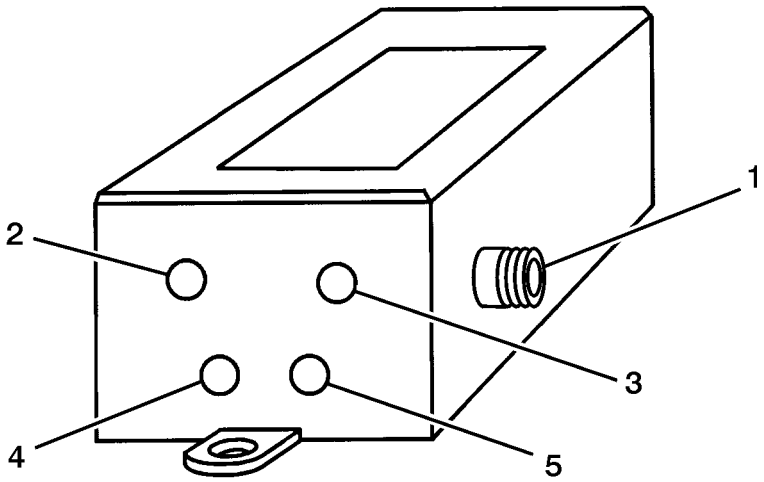
W3003368

Install the lower left dash panel with 3 mounting screws. Torque to 3.5 ± 0.5 Nm (31 ± 4.5 in-lb). Pull the floor mat back and install the plastic nut.	3.5 ± 0.5 Nm (31 ± 4.5 in-lb)

38

Install the left grab handle. Torque to 24 ± 4 Nm (18 ± 3 ft-lb).	24 ± 4 Nm (18 ± 3 ft-lb)

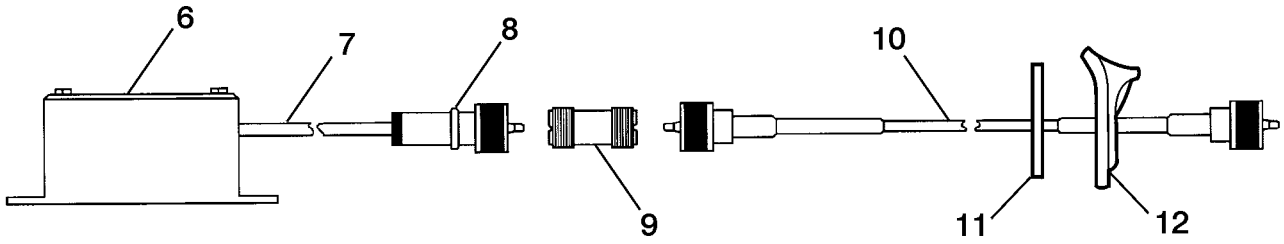
Antenna Lead-In Cable (Multiplexer Type), Repair



W3003360

1 Cell phone antenna
2 Antenna cable
3 Antenna cable
4 AM/FM cable
5 CB cable

A repair kit, P/N 3949871, is available to repair damaged multiplexer antenna lead-in cables without replacing the multiplexer control box. The repair kit contains a connector, splice connector, 3 m (10 foot) cable assembly and door jam sealing parts. When the repair is properly completed, the antenna cable length will be the same as it originally was, so that antenna tuning will remain correct.



W3003359

6 Multiplexer box
7 0.61 m (24 in.) cable
8 CPFI-259–1 Connector
9 CP-AD204 In-line splice connector
10 3 m (10 ft.) cable assembly
11 Sealing washer
12 Heat shrinkable cap

Note: Each kit contains repair parts for one antenna cable. If both antenna cables are damaged, two kits are required.

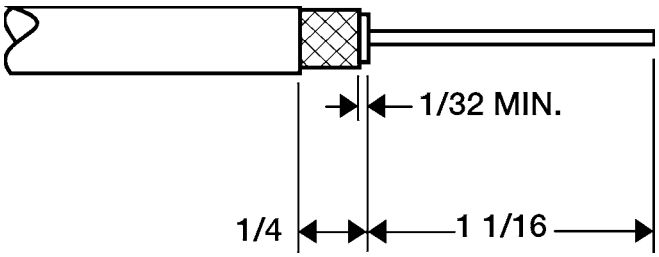
Note: The repair kit P/N 3949871 is designed for Volvo VN series only. Other Volvo vehicles using the multiplexer antenna system have similar kits under different part numbers.

1
See “Antenna Lead-In Cable (Multiplexer Type), Replacement” page 117, for instructions on how to remove the affected cable. Only remove the cable on the side to be repaired.

2
Measure 0.61 m (24 in.) from the multiplexer box and cut the affected antenna cable.

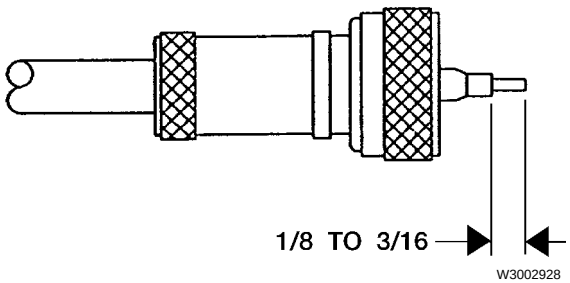
3
Strip the end of the 0.61 m (24 in.) cable remaining on the multiplexer box.

4



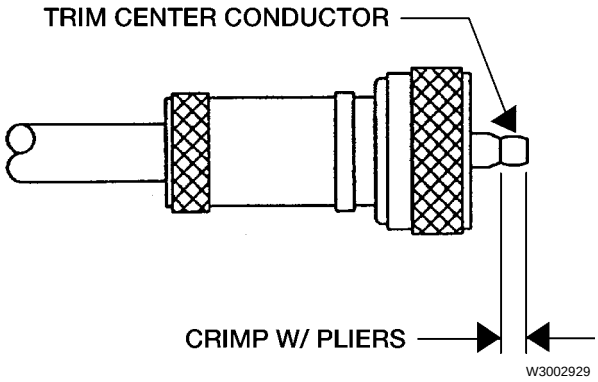
Trim the cable as shown. Avoid nicking the center conductor or the outer braid. Twist the outer braid in a clockwise direction, in such a manner that at least 0.8 mm (1/32 in.) of the inner dielectric is bared (stray or loose braid may cause shorts).

5



Hold the connector by the knurl provided. Twist the connector in a clockwise direction until 3.2 mm (1/8 in.) to 4.8 mm (3/16 in.) of the center conductor protrudes from the center pin contact.

6



Crimp the nose of the center pin contact with a pair of pliers. Then trim away any excess center conductor.

7
Install the in-line splice connector and the new 3 m (10 ft.) cable assembly.

8
Install the repaired cable assembly. See “Antenna Lead-In Cable (Multiplexer Type), Replacement” page 117, for installation instructions.

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

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7825 National Service Road

P.O. Box 26115

Greensboro, NC 27402-6115

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From

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Comments/proposals

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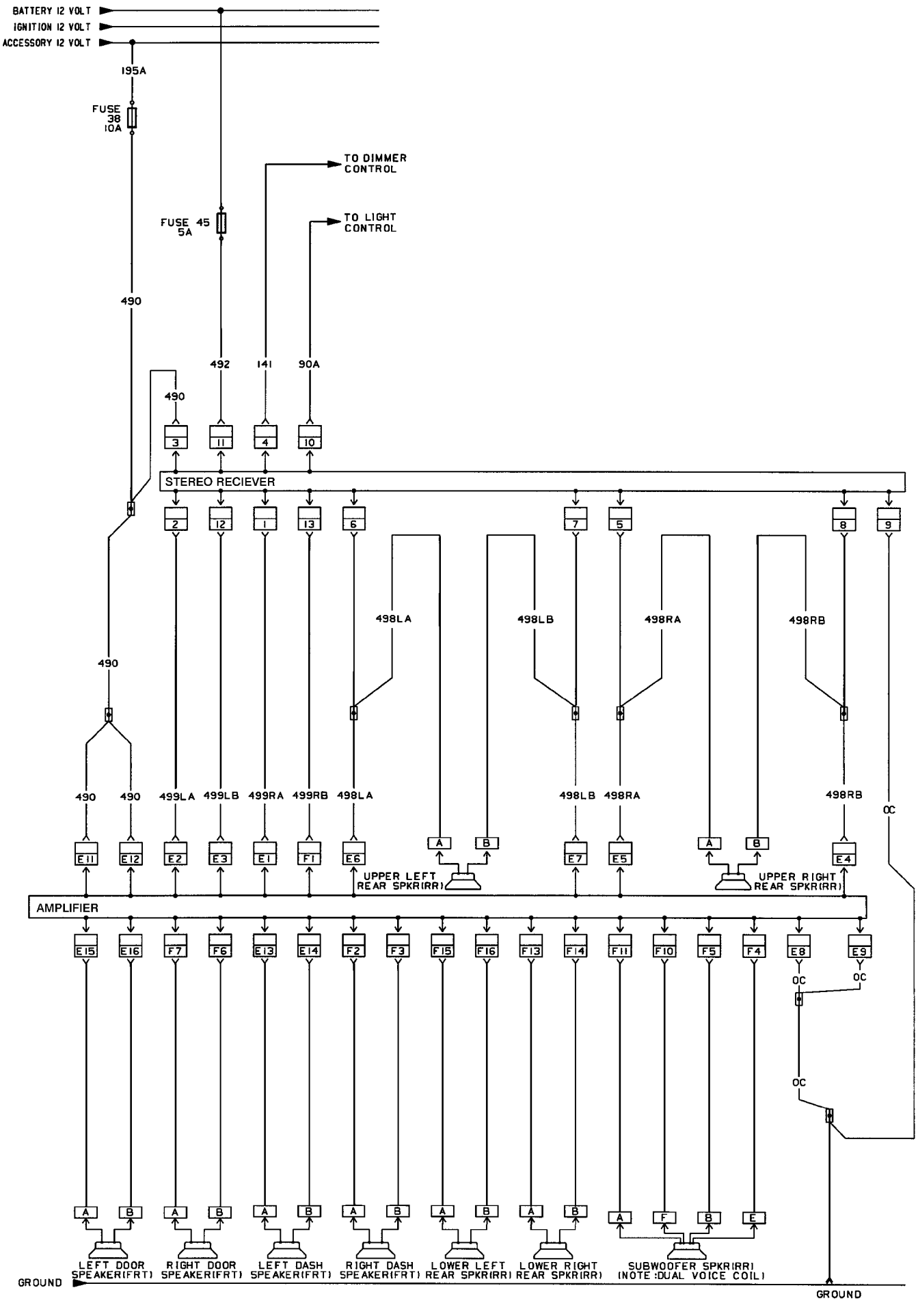
Concerns Service Manual: .....



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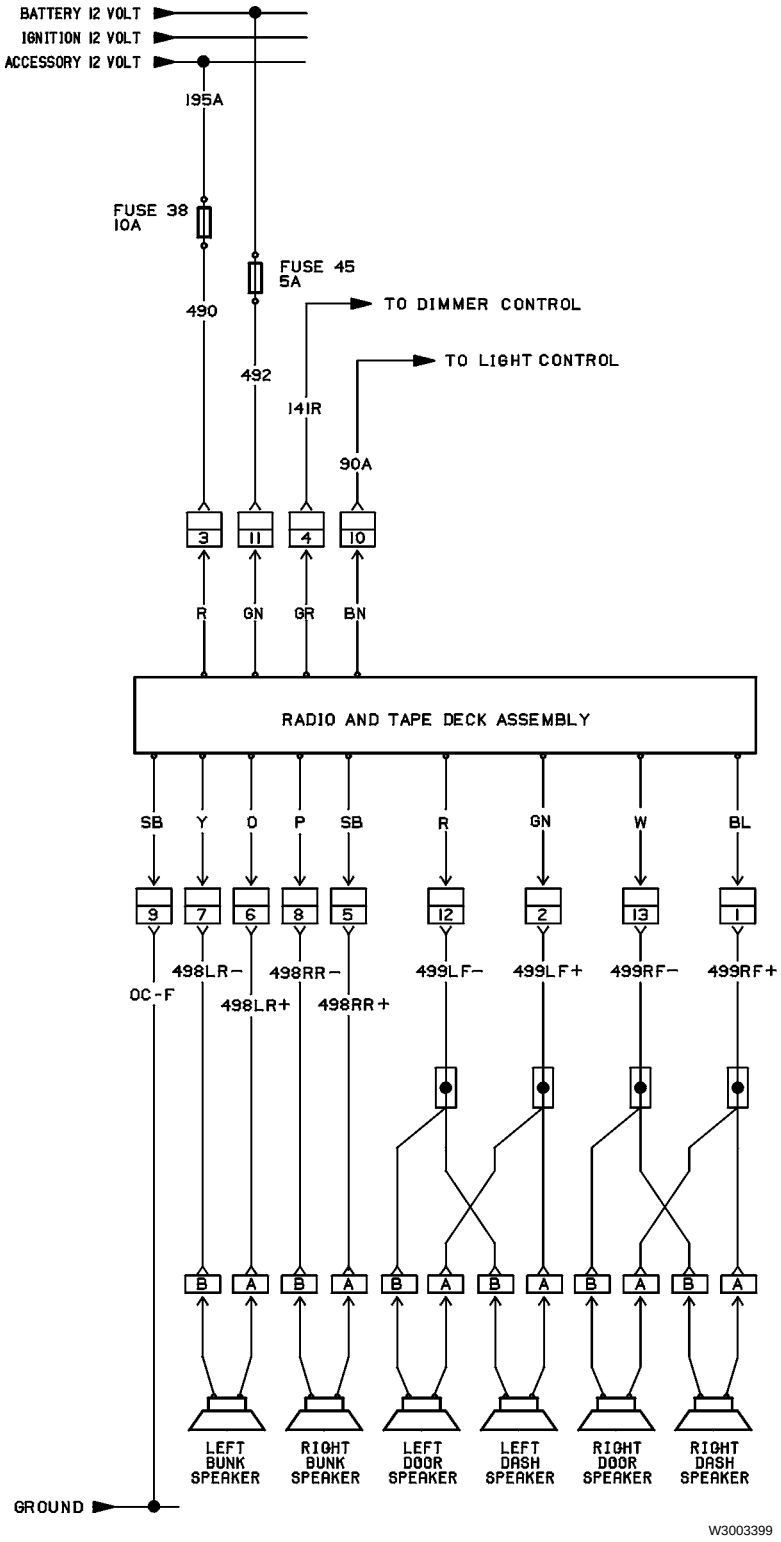
Note: For detailed, vehicle specific, electrical schematics see: VN Series Electrical Schematics – Group 37.

Foldout A

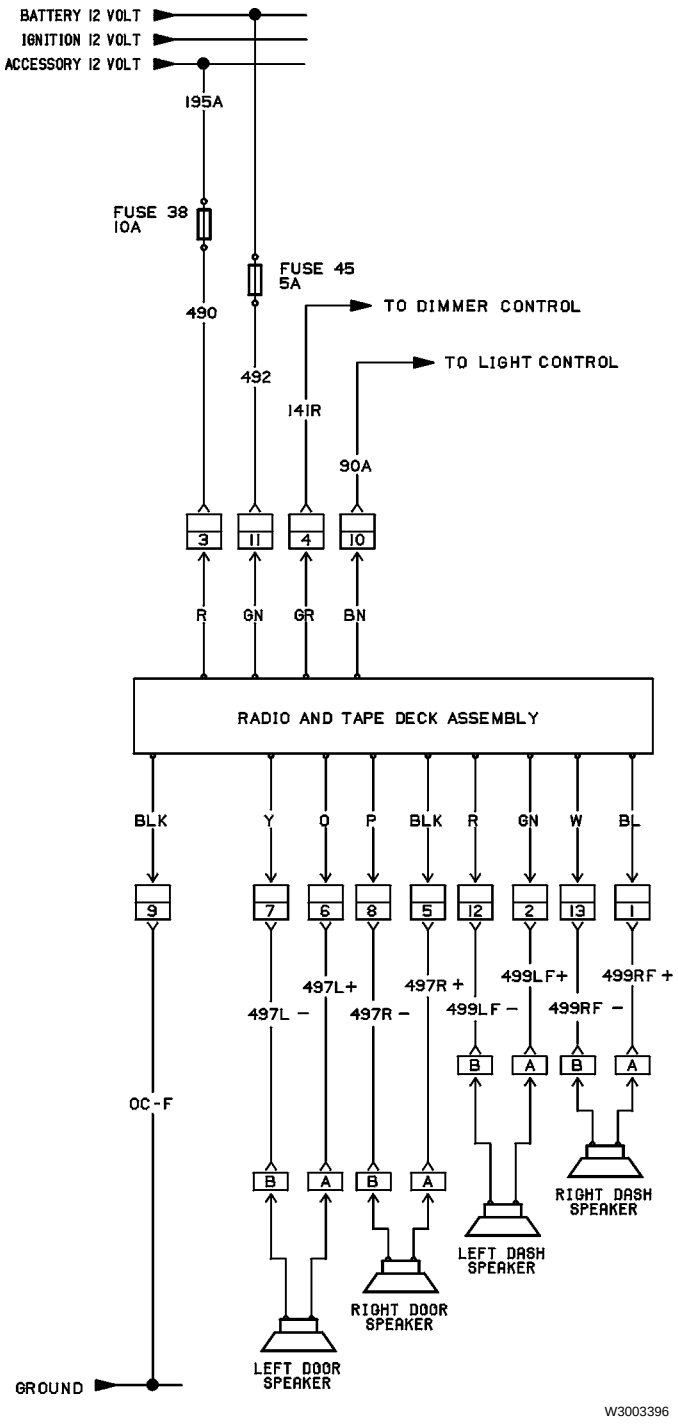
Amplified 8 Speaker (+ Subwoofer) System Schematic



Note: For detailed, vehicle specific, electrical schematics see: VN Series Electrical Schematics – Group 37.

Foldout B

6 Speaker System Schematic



Note: For detailed, vehicle specific, electrical schematics see: VN Series Electrical Schematics – Group 37.

Foldout C

4 Speaker System Schematic

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