Bolted-On Exterior Panels - Part 2 (EXT04e)

Textbook

I-CAR®

Version: 5.2

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EXT04e-INMAN1-E

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Contents

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Introduction

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Obligations To The Customer And Liability

The collision repair industry has an obligation to correctly repair the customer's vehicle. Collision repairs must be performed using:

- recommended or tested procedures from vehicle makers, I-CAR, and other research and testing organizations.
- quality replacement parts and materials.
- repair processes and parts as written and agreed upon in the repair order. If items on the repair agreement are not consistent with the repair order, it can be considered fraud.

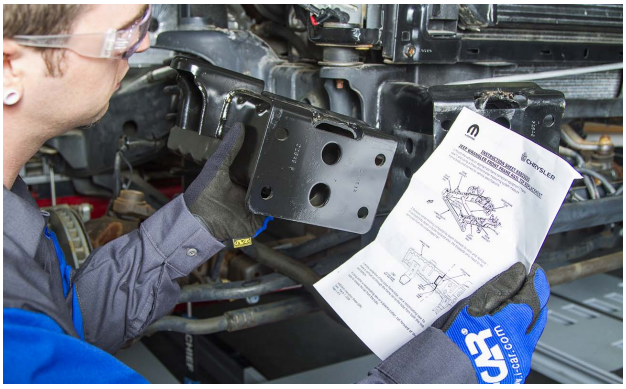
Performing proper collision repairs requires using parts and procedures that keep remaining warranties intact.

Collision repairs must restore:

- safety.
- structural integrity.
- durability.
- performance.
- fit.
- finish.

Throughout the damage analysis and repair process the repairer and insurer must:

- communicate with each other.
- maintain constant communication with the customer.
- be in agreement with each other and the customer on how repairs will be performed.
- inform the customer of any changes in the repair plan from the original repair agreement, and explain the changes and why they have to be made.



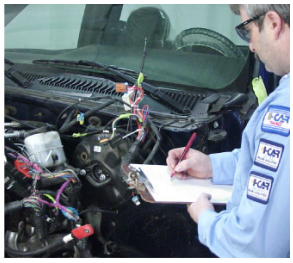
To reduce liability:

- make sure that all repairs are performed thoroughly, correctly and as listed in the damage report.
- follow proper procedures.
- have documentation of required repairs with detailed record keeping available for customers.

Technicians are considered the experts and are expected to be knowledgeable on how to perform a quality repair.

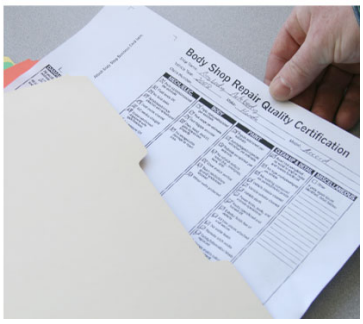
Liability insurance that covers the repair facility may not always cover all damages. For example:

- the policy may not cover faulty repairs, leaving liability responsibility completely on the facility.
- a shop owner may find that repair facility liability coverage may not cover the full amount awarded in a lawsuit. The shop owner would have to pay the difference.



It is difficult to reduce the risk of liability exposure. The part that the repairer can control is the chance of being found at fault. Chances can be minimized by:

- using recommended or tested procedures from the vehicle makers, I-CAR, or other research and testing organizations.
- using quality replacement parts and materials that restore fit, finish, durability, and perform at least as well as the original.
- keeping thorough records.



Keeping thorough records includes more than recording the date, mileage, and pre-existing damage. Record keeping also includes:

- making sure all notes are legible.
- verifying the repairs that were made or not made.
- having the customer sign a waiver for repairs that they do not want performed. Repairers must determine their liability on not repairing safety systems such as restraint and anti-lock brake systems.
- keeping computer printouts or worksheets on file showing wheel alignment readings or vehicle dimensions before and after repairs.
- keeping scan tool printouts and records of computer codes for airbag, anti-lock brake, emission, and powertrain control module (PCM) systems.

- attaching the OEM or other tested procedure printout to the vehicle repair order.
- keeping receipts for all sublet work performed.

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Module 1 - Front Body Panels

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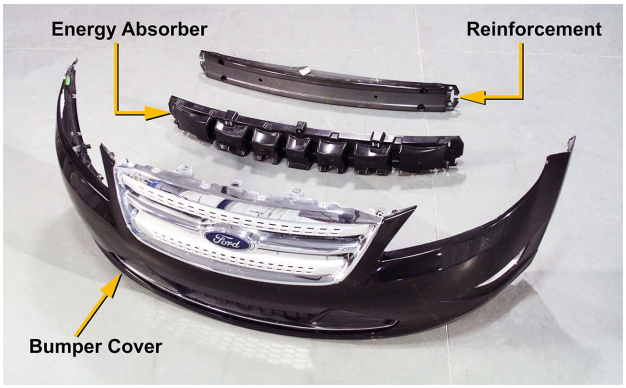
Bumper Assemblies

Learning objectives for this module include:

- identifying bumper systems.
- replacing steel bumpers.
- replacing plastic bumper covers / fascias.
- replacing energy absorbers.
- replacing bumper reinforcements.
- replacing grilles.
- replacing steel fenders.
- aligning fenders.
- replacing hoods.
- aligning hoods.



These are the various parts of a bumper assembly.

Many of today's bumper assemblies are designed to withstand very minor collisions with limited damage to the vehicle. In a moderate to severe collision, bumper assemblies assist in collision energy management through the use of energy absorbers and bumper reinforcements. It may be difficult to make a complete damage analysis of a bumper assembly during initial inspection due to damage that may be hidden behind the fascia or bumper cover.

Some bumper assemblies include a plastic bumper cover.

The bumper assembly on this vehicle is a combination of steel and plastic.

Bumper assemblies, like those found on unibody and some body-over-frame vehicles, are typically made up of:

- a plastic bumper cover or fascia.
- one or two energy absorbers.
- a bumper reinforcement.

Some bumper covers and grilles are one assembly.

Bumper assembly types include:

- a combination of steel and plastic. This may include a painted steel

bumper with a plastic fascia attached below it.
- plastic bumper covers or fascias. These have a plastic bumper cover over an energy absorber and bumper reinforcement. Bumper reinforcements may be made of ultra-high-strength steel (UHSS), aluminum, or a reinforced composite.

This bumper has a plastic air dam attached to it.

When replacing a complete or partial bumper assembly, it may be necessary to remove some adjacent parts. These may include, but are not limited to:

- grilles or grille inserts.
- headlamps and driving lamps. Headlamps may have to be removed to access fasteners. If a driving lamp is installed on a bumper assembly, it may not require removal, but will have to be disconnected for bumper removal.
- air dams.
- the fender. Complete removal may not be required, but partial removal may be necessary to access hidden fasteners.

Replacement plastic bumper covers will require refinishing before installation.

Bumper covers:

- are usually made of some type of plastic. Some are refinished by the vehicle maker, and some are color-impregnated.
- are cosmetic. Although bumper covers may have some energy absorbing qualities, they are typically a cosmetic panel.
- are designed to allow for airflow into the engine compartment.
- may have lamps attached.
- will usually require removal for a two-sided repair. Even if the backside has limited access, it may be beneficial to remove the bumper cover for repairs and refinishing.
- may also be called a bumper fascia.

A rear bumper cover may have attachments such as lamps.

Similar to front bumper covers, rear bumper covers will have energy absorbers and a bumper reinforcement. Other considerations for rear bumper covers include:

- the license plate mounting area and lighting associated with it.
- the condition of the step pad when applicable.
- verifying attachment locations and that the part is correct for the vehicle on which it will be installed.

Attachments to a front bumper cover may include an air dam, and lamps.

Depending on the vehicle, some bumper or fascia attachments may include:

- impact strips. Impact strips may be designed into a bumper cover to reduce damage caused by bumping into an object. Impact strips are the 25-50 mm (1"-2") wide strips around the bumper cover or fascia. Inspect the damaged bumper cover to determine if the replacement part impact strips will require refinishing.
- driving or fog lamps.
- grille inserts. Some grilles are separate from the bumper cover, some are molded into the bumper cover, and some are mechanically attached to the bumper cover.
- an air dam or air deflector underneath the bumper cover.

After removing this bumper cover, any hidden damage to the foam energy absorber will be revealed.

To remove a front or rear bumper cover or fascia:

- disconnect any wiring that is attached to the bumper cover.
- remove any required attachments for access to fasteners.
- remove the fasteners that attach the bumper cover to the bumper reinforcement. To avoid damaging plastic retaining clips, specialty tools may be required. Undamaged fasteners should be labeled and stored for reinstallation.

Due to the extent of damage, this bumper cover will be replaced.

When the fasteners have been removed, the bumper cover can be removed from the vehicle. If repairs are to be made, the type of plastic can be identified to help identify the recommended repair materials. If damaged beyond repair, the bumper cover can be discarded. Before discarding, make sure that all parts have been removed such as license plates, clips, etc.

This energy absorber will fit inside of the bumper cover.

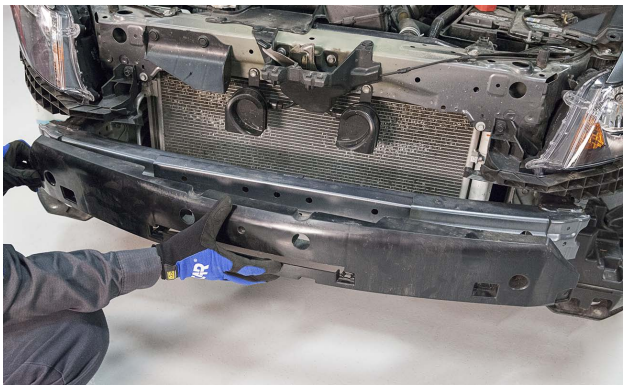
With the bumper cover removed, the energy absorber will be visible. Energy absorbers are commonly foam or plastic. Foam energy absorbers are often made of polypropylene. Some vehicle makers have repair recommendations for minor damage to these types of energy absorbers.

Because a bumper cover may return to its original shape following a collision, damage to the energy absorber may not be evident during initial damage analysis.

After removing this energy absorber, damage to the reinforcement is revealed.

To remove an energy absorber, it should be unbolted or unclipped from the

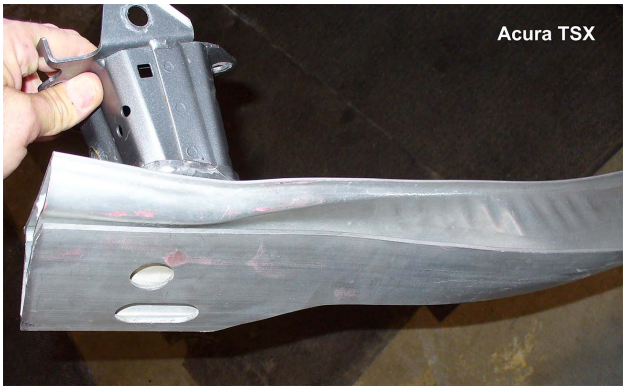
bumper reinforcement. If the energy absorber is unrepairable, it should be discarded.



The bumper reinforcement prevented damage to this air conditioning condenser.

With the energy absorber removed, the bumper reinforcement, or impact bar, is visible. The bumper reinforcement is attached to the lower rails on a unibody vehicle. The bumper cover and energy absorber are attached to the bumper reinforcement. Bumper reinforcements are very strong and assist in collision energy management. Bumper reinforcements may be made of:

- UHSS.
- reinforced composite material.
- aluminum.



Bumper reinforcements are usually not repairable. This one will require replacement.

There may be hidden damage to the bumper reinforcement that is not visible with the bumper cover installed. Most bumper reinforcements are removed by unbolting it from the mounting area on the lower rail. Damaged bumper reinforcements should not be repaired.

The bumper reinforcement on this vehicle is being replaced.

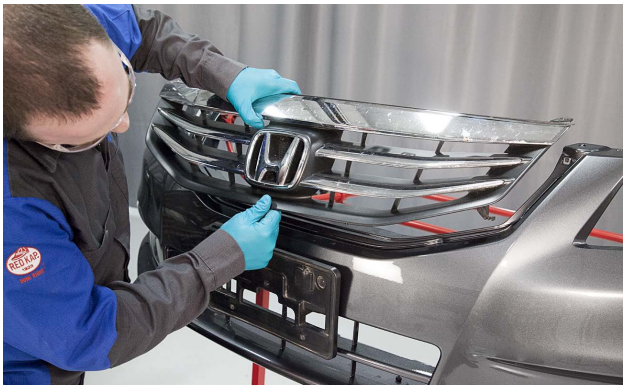
To install a bolted bumper reinforcement:

- refinish first if required. Bumper reinforcements that are visible through the bumper cover or fascia may require refinishing. To determine if the replacement bumper reinforcement should be

refinished, inspect the damaged reinforcement.
- install the reinforcement in place and temporarily install the absorber and bumper cover.
- align the bumper reinforcement, if adjustable.
- tighten the fasteners to the recommended torque specification.

Some trim may need to be re-attached to the bumper cover.

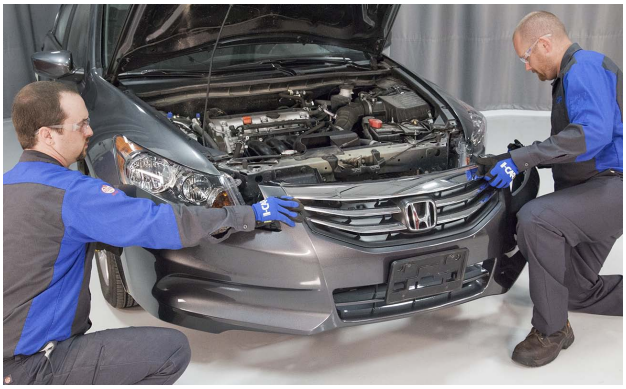
License plate mounting brackets may need to be re-attached.



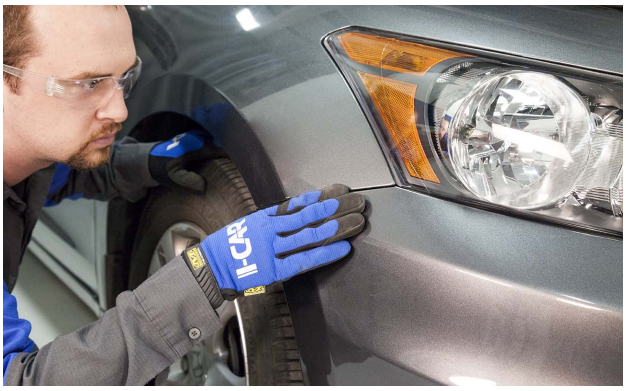
The grille may need to be re-attached on some bumper covers.

After installing the bumper reinforcement and energy absorber, the bumper cover can be installed. Tape may be used to hold a foam absorber in position while the bumper cover is installed. Steps for installing a bumper cover include, but are not limited to:

- refinishing the replacement part. This should be done off of the vehicle to ensure complete coverage on areas that may be covered when the bumper is installed.
- installing any moldings, brackets, or lamps that have fasteners that cannot be accessed following installation of the bumper cover.
- installing the bumper cover or fascia and inspecting the alignment. Typically, there will be limited adjustment available.



Install any required fasteners for bumper cover attachment.



After the bumper cover is installed, verify the panel alignment.

Complete the bumper cover installation by:

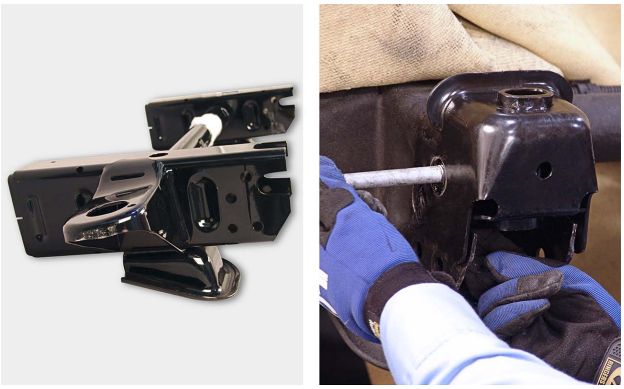
- reconnecting any electrical connectors and verifying that they operate properly.
- installing the required fasteners. These will usually be some design of plastic push pin, but may also include screws or bolts. Torque to specification whenever a specification exists.
- installing any additional trim as required such as moldings, license plate mounting brackets, and step plates.

Refer to "Video: Bumper Cover Replacement" in the presentation. This video discusses how to replace a plastic bumper cover.

Steel Bumpers

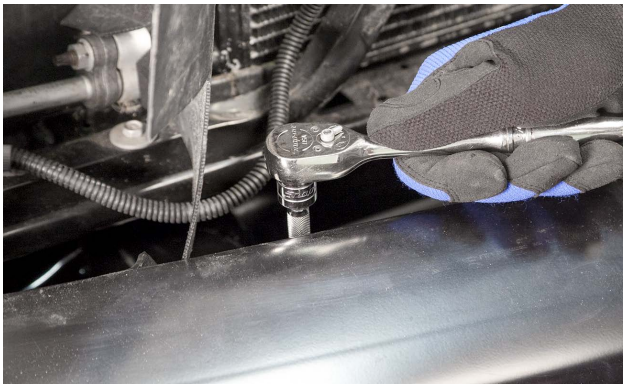
Trucks commonly use a steel bumper which may include plastic covers.

Steel bumpers are most often found on body-over-frame vehicles such as trucks and SUVs. Some steel bumpers may also have a plastic bumper cover or air dam attached to it. Some rear bumpers have a trailer hitch attached to it. These should be inspected for damage to the mounting area.



This bracket attaches the steel bumper to the frame (left). Brackets may be bolted to the frame assembly (right).

Bumper brackets are used to attach the bumper to the frame. Adjustable bumpers are usually attached to the frame with bolts and U-clips. Bumper brackets are often collapsible and may be responsible for collision energy management and may affect airbag timing.



Some fasteners may be hidden behind trim.

To remove a steel bumper:

- protect adjacent panels to prevent damage.
- disconnect any attached lighting or accessories such as driving lamps. It may be necessary to remove the air dam for bumper removal.
- it may be necessary to remove some trim pieces or other attachments to gain access to hidden fasteners. If there are no hidden fasteners, trim may be removed following bumper removal.

Bumper removal may require the help of an assistant.

This bracket is being inspected for damage.

Continue the steel bumper removal by:

- removing the fasteners that attach the bumper to the vehicle. Depending on access, determine if the bumper will be removed from the bumper bracket or if the bumper bracket will be removed

from the frame. When removing the bumper fasteners, note the location of mounting hardware. This will be beneficial when installing the replacement bumper.
- having an assistant help remove the bumper, if required.

After removing a steel bumper, closely inspect the bumper brackets and determine if the brackets and fasteners will require replacement.

An assistant may be required when installing a bumper.

To install a steel bumper:

- install any trim that will not be accessible after bumper installation.
- protect adjacent panels. Since the bumper will usually be installed following repairs and refinishing, it is important to not damage the fenders. Masking tape or protective blankets may be used.
- use an assistant to help with installation to avoid damaging the bumper or adjacent panels, if required.
- temporarily install the fasteners based on the original location. Look for signs of where the fasteners were previously installed, such as missing paint.
- verify lamp operation, if applicable, before permanently installing the fasteners.
- adjust the bumper as required.

This bumper will have to be adjusted so that the gaps between the lamps and the bumper are consistent from side-to-side.

The gaps will need to be adjusted on this side of the bumper also.

When adjusting a steel bumper:

- inspect the gaps from the bumper to the fenders, headlamps, and

grille. The gaps should be uniform from side-to-side.
- filler or closeout panels should be installed to ensure proper fit.
- it may be necessary to adjust a bolted radiator core support for proper bumper alignment.
- an assistant may be helpful for raising and lowering the bumper while tightening.

After the bumper is aligned, any remaining trim can be reinstalled. Torque the steel bumper to specification when available.

On this body-over-frame vehicle, adjustments are in the form of slotted holes.

Depending on the bumper, bumper brackets, and frame construction, steel bumper adjustments may:

- be limited.
- include height.
- include forward and rearward movement.
- include side-to-side movement.

Refer to "Video: Steel Bumper Replacement" in the presentation. This video discusses how to replace a bolted-on steel bumper.

Grilles

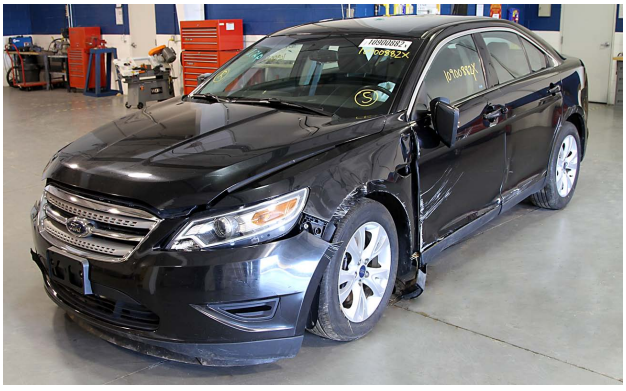
Grilles allow airflow into the engine compartment.

The grille on some trucks and SUVs is attached to the radiator core support.

This grille is attached to the bumper cover.

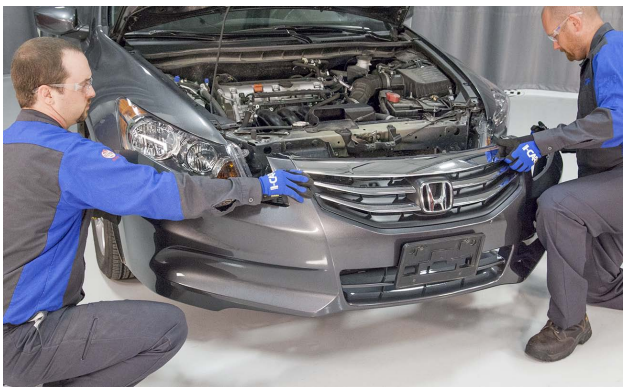
Grilles allow for airflow into the engine compartment and may be:

- a part of, or attached to, the bumper cover. Some grilles are molded into the bumper cover and some are mechanically fastened to the bumper cover.
- attached to the hood. This type will have a frame that is attached to the hood.
- attached to the radiator core support. This is common on some trucks and SUVs and typically have openings for the headlamps.



The plastic grille on this vehicle will require replacement.

Most grilles are made of plastic. Those that are attached to a hood have a steel mounting frame around them. Grilles come in a variety of designs and may have a mounting area for emblem attachment.



The bumper cover may require removal to allow for grille removal.

To remove a damaged grille, it may be necessary to first remove the bumper cover or fascia. Some may be accessible by opening the hood and will not require bumper cover removal. Depending on the attachment method, grilles are removed by unbolting, unclipping, or unscrewing the fasteners and removing the grille.

This grille, which is attached to the bumper assembly, has been replaced and the bumper assembly is being reinstalled.

To install a grille:

- verify the correct replacement part upon delivery.
- refinish the grille as required. Although a grille may be ordered by color, it may require refinishing in order to achieve the proper color match.

This headlamp mounting panel is attached to the radiator core support.

Some vehicles have a headlamp mounting panel that attach the grille, headlamps, and side lamps to the radiator core support. These are generally constructed of a composite plastic material. Some headlamp mounting panels have alignment pins to ensure correct fit between the grille and front lamps to the front body panels.

Fenders

This vehicle has steel fenders.

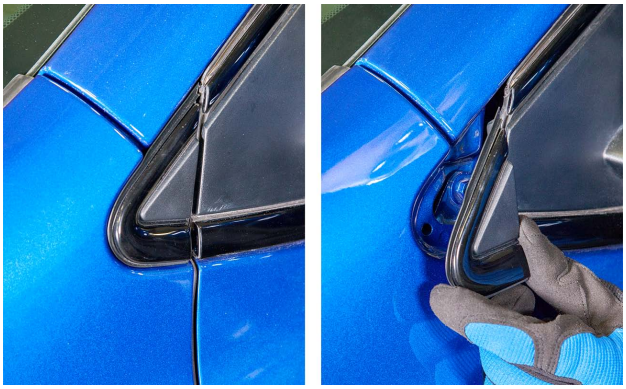
The types of fenders that are included in this course are bolted:

- steel fenders.
- plastic fenders.

Fenders are usually flush with the hood and door. Some fenders may have slight positive flush with the front door to reduce wind noise. Positive flushness from the fender to the door means that the fender is positioned slightly outward from the vehicle when compared to the door. Another way of saying it is that the door has slight negative flush with the fender.

This vehicle has a one-piece fender.

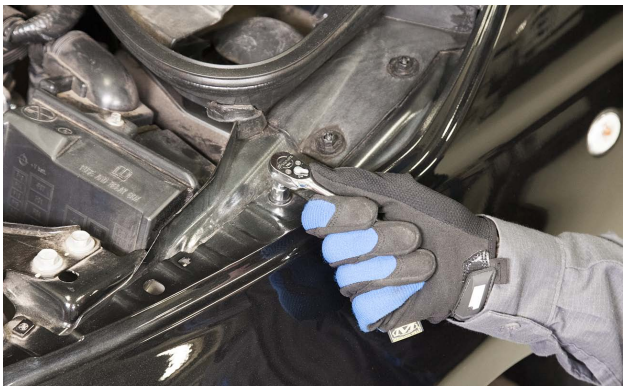
Although most fenders are of one-piece construction, there are some two-piece fenders available that have an inner fender that is welded to the outer fender. These will typically be found on trucks and SUVs.



Fender attachments may include molding, such as on this vehicle.

There may be a number of different parts attached to a fender including, but not limited to:

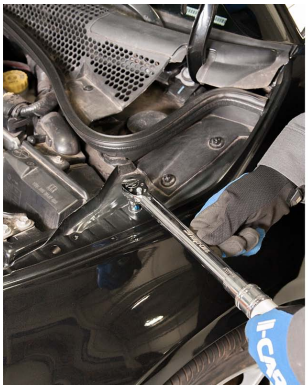
- a splash shield. Splash shields protect the engine compartment from road contaminants that are propelled by a rotating tire. Mud flaps are also often attached to the fender.
- moldings, emblems, and flares.
- side-marker lamps and reflectors.
- the radio antenna.
- underhood mechanical attachments and electrical grounds. Although not as common on unibody vehicles, many trucks and SUVs have mechanical parts attached to the inner fender.
- hood cushions. Hood cushions are used to support the center section on each side of the hood and protect the fender and hood finish.

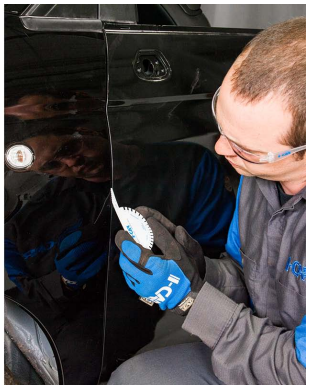


This damaged fender is being removed from this vehicle.

To remove a bolted fender from the vehicle structure:

- remove the splash shield from the wheelhouse area. The splash shield will require removal to access any hidden fasteners.
- remove any other required parts for access to hidden fasteners or parts that will inhibit fender removal, such as rocker moldings, cladding, underhood mechanical parts, etc.
- unbolt and remove the fender.
- remove any moldings, emblems, or other attachments that will be transferred onto the replacement part.





This fender bolt is being tightened to the recommended torque specification (left). The panel gaps are being verified (right).

Before installing a fender on a vehicle, the inside edge or jamb should be refinished. Continue installation by:

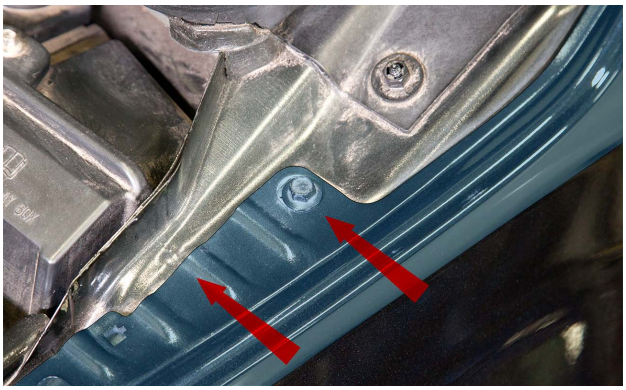
- installing any attachments that have fasteners that will not be accessible once the fender is installed.
- temporarily installing the fender and attachment hardware, usually bolts.
- adjusting the fender as required to the front door and hood.
- tightening the fasteners to the recommended torque specification.
- installing any remaining attachments.

After refinishing, duplicate the appearance and application of any necessary corrosion protection materials that were originally applied to the backside of the part.

The U-clip in the slotted hole of an upper rail allows some adjustment in the fender.

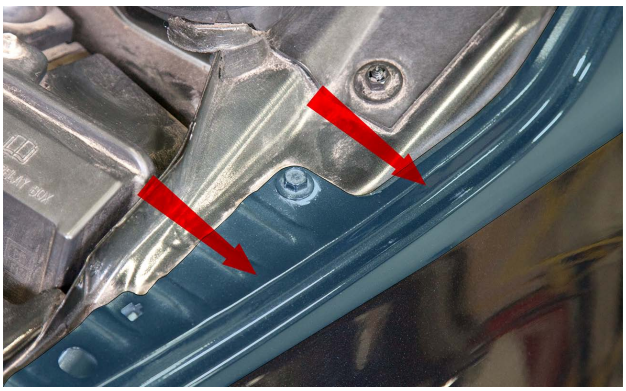
Fenders may use slotted or elongated holes in the fender for adjustment, or they may be adjustable using U-clips in the upper rail. Fender adjustments include:

- forward or rearward. This allows for alignment to the front door and bumper.
- inward or outward from the engine compartment.
- upward using shims. Because the upper rail cannot be adjusted, the fender can only be raised by using shims.



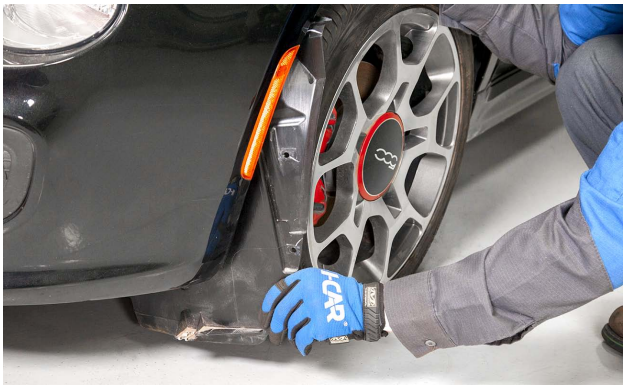
This fender is being adjusted inward, indicated by the finish from under the bolt head.

To move the front of the fender inward or outward, loosen the front fasteners, adjust the fender, and tighten the fasteners. To move the rear of the fender inward or outward, loosen the rear fasteners, adjust the fender, and tighten the fasteners.



This fender is being adjusted outward, indicated by the finish from under the bolt head.

To move the fender forward or rearward, loosen the fasteners, adjust the fender, and tighten the fasteners. Determine if the hood needs to be adjusted to meet the flushness with the fender. If the hood is in alignment and the fender needs to be raised, shims may be used to raise the fender upward. Shims should not be used to compensate for structural misalignment.

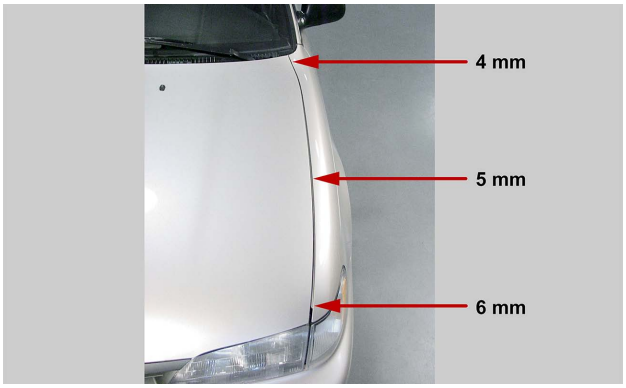


This splash shield is being reinstalled following fender replacement.

When installing fender attachments:

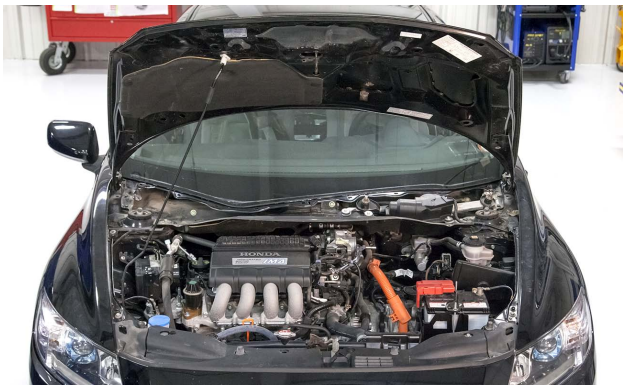
- replace damaged fasteners with the same type.
- two-sided tape or emblem adhesive can be used to install trim after refinishing.
- verify that underhood parts and ground connections are installed in the correct location. It may be necessary to remove paint coatings from ground attachment locations if the fender has been edged.
- it may be necessary to touch up the antenna nut following antenna installation. This is because many antenna nuts are painted and the finish may become damaged during removal and installation.

Activity: Fender Adjustment



Refer to Module 1, "Activity: Fender Adjustment" in the presentation. This activity presents one example of adjusting fenders.

Hoods



Some hoods have safety catches on the hinges to prevent intrusion into the windshield during a front collision.

Hoods have safety features built in such as collapse zones and safety stops. Collapse zones and safety stops minimize the potential for the hood to intrude into the passenger compartment during a front collision. Hoods are equipped with hinges, latches, and props and usually have multiple vehicle information labels.

Most hoods have rear-mounted hinges.

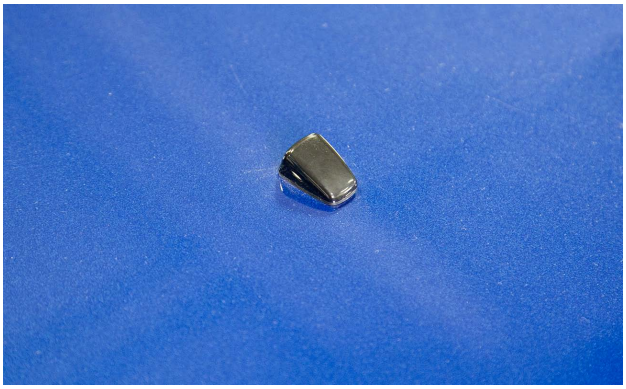
Although some hoods have front-mounted hinges, where the hood opens from the back, most have rear-mounted hinges. Hoods may be made of:

- steel.
- a composite material such as sheet-molded compound (SMC).
- aluminum.

This hood has several parts that will have to be removed and reinstalled on a replacement hood.

Common hood attachments include, but are not limited to:

- emblems. These are usually located in the front or middle of the hood.
- hinges. There are a number of different styles of hinges.
- prop rods. Prop rods are used to keep the hood open.
- latches. The latch secures the hood to the vehicle structure.
- lighting. When the hood is open, underhood lamps light to illuminate the engine compartment.
- a hood insulation pad.



A windshield washer nozzle is attached to this hood.

Other hood attachments include:

- grilles.
- windshield washer spray nozzles.
- hood scoops and hood scoop screens.
- adjustable stops. Adjustable stops are used to align the hood height to the fenders.
- aftermarket parts such as bug shields and cowl covers.

This hood insulation blanket is fastened to the hood with plastic retainers.

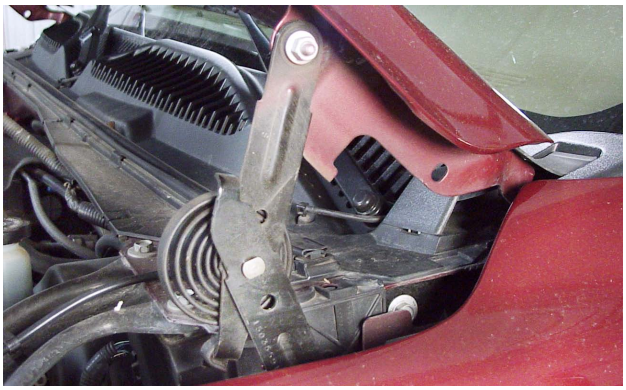
Some considerations for transferring hood attachments include determining when to transfer the parts. Should the parts be installed before hood installation or after? This may depend on personal preference and access. If the hood is large, such as a truck hood, it may be difficult to transfer some parts after the hood is installed. Other considerations include:

- removal and installation of the hood insulation pad. The fasteners that attach the hood insulation pad may be difficult to remove without damage. Extra fasteners should be available.
- ordering and installing replacement identification labels. It will not be possible to transfer the labels from the damaged hood to the replacement hood. Timely and accurate ordering of the labels will reduce the chance of the customer having to return at a later date.
- routing of the wiring harness. Note the routing of the underhood lamp and the location of any wire harness routing clips and fasteners.

This hinge is mounted on the firewall of the vehicle and will require removal of the cowl vent panel for access.

Hood hinges may be mounted:

- at the rear of the hood on the upper rail, cowl, or fender.
- at the front of the hood on the radiator core support. Front-mounted hinges are not as common as rear-mounted hinges.
- vertically on the hood underside or the hood flange.



This hinge uses a coil spring to keep the hood open.

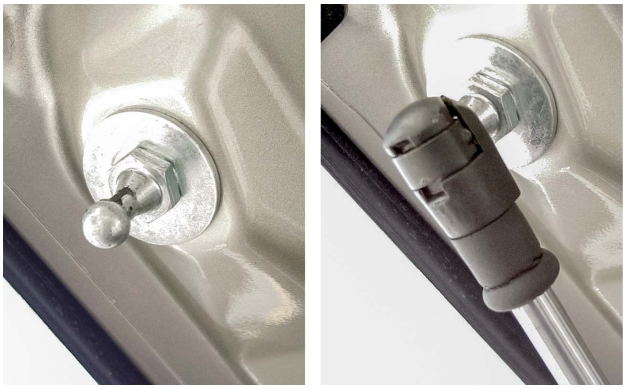
There are a variety of different hinges, but most are constructed one of three ways. Hood hinges may have:

- a single pin at the hinging point.
- multiple, usually two, pins at the hinging point.
- a coiled spring as one pivot point. Excluding the spring, there may be up to three additional pivot points.

A conventional prop rod is attached to the front of this vehicle.

Hood props hold the hood in the open position. Ways to prop the hood open include:

- using a piston. Piston-type props require no manual operation. They extend automatically once the hood is released from the secondary latch.
- tension on a coiled spring hood hinge.
- a conventional hood prop located on the radiator core support, upper rail, or apron. This type requires unhooking and swinging the hood prop into position and inserting it into the hood underside.

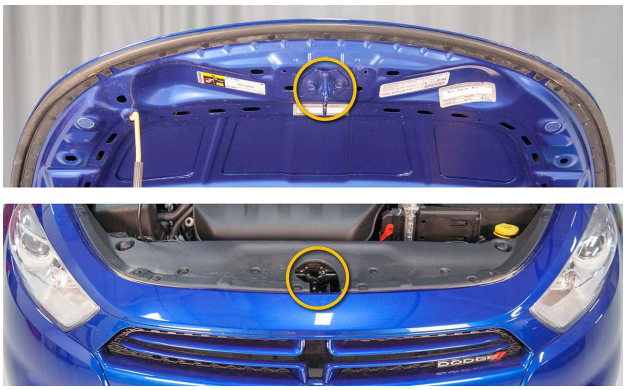


Piston-type prop rods may use a ball stud and a socket with a retainer clip to attach them to the hood.

To replace a piston-type prop rod:

- slightly pry the retaining spring clip outward. Try not to completely remove the spring clip.
- apply upward pressure on the hood to relieve pressure from the prop rod.
- remove the rod from the ball stud from either the hood or the fender.

To install a piston-type prop rod, reverse the removal procedure.



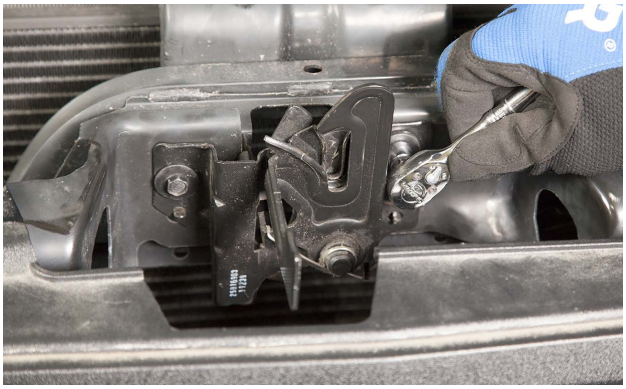
This hood latching system has a striker (top) and a primary and secondary latch (bottom).

The hood latching system is responsible for keeping the hood closed. On most vehicles, the hood latch area is located in the middle of the hood on the radiator core support. A typical hood latch area consists of:

- a striker. The striker is usually located on the hood and is secured by the hood latch.
- the primary latch and a release cable. The primary latch is responsible for holding the hood in the closed position. The release cable is routed from the radiator core support into the passenger compartment. When the cable is pulled, the primary latch releases.
- a secondary latch. In the event of a primary latch failure, the secondary latch retains the hood and prevents it from opening.

There are other types of hood latch systems including a:

- spring striker and latch assembly.
- dual latch and striker system. With this system, there are two strikers and two latches located to the left and right of the hood center.



Shoulder bolts attach this latch to the radiator core support.

To remove a hood latch:

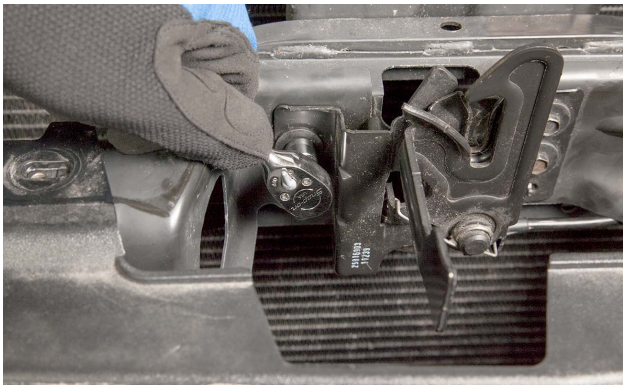
- mark the location of the latch for installation.
- remove the fasteners, usually shoulder bolts that are threaded into the radiator core support.
- remove the release cable and secure it to the radiator core support. If the cable is being replaced, make note of the routing.

This cable is used to pull the release lever on this latch.

To replace a worn or damaged release cable:

- remove the release cable from the latch mechanism. It may be necessary to remove the latch to remove the release cable.
- note the routing of the cable and remove the cable from the engine compartment.
- remove the release mechanism from the vehicle interior. This will usually be located beneath the instrument panel and fastened with shoulder bolts or screws.

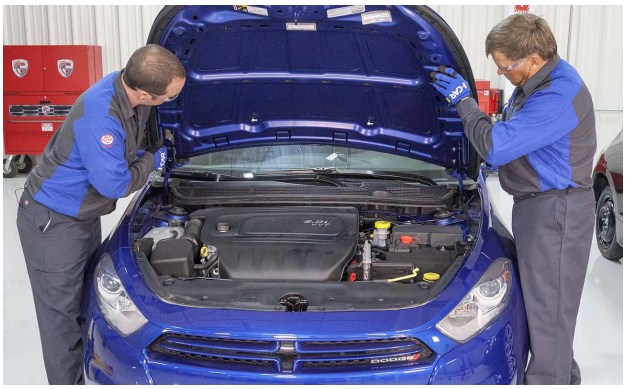
To install a hood release cable, reverse the removal procedure.



This hood latch is installed on the radiator core support.

To install a hood latch:

- install the release cable into the latch.
- position the latch according to the marks on the radiator core support.
- temporarily install the fasteners.
- align the latch and torque the fasteners following the vehicle maker's recommendation.

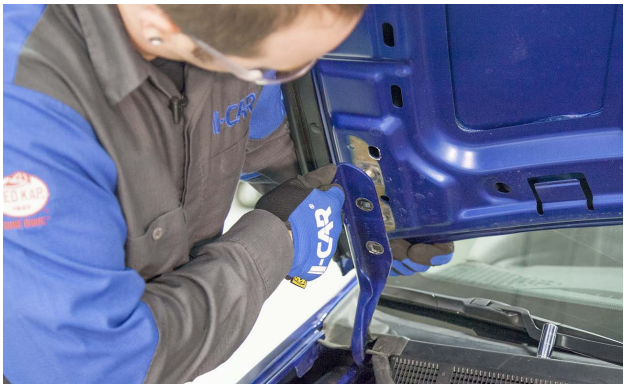


Most hoods will require help from an assistant for removal.

To remove a hood:

- an assistant will be required.
- begin by removing the prop rod, if it is a piston-type prop rod.
- determine which fasteners will be removed. Depending on access and damage, either the hood fasteners or the fender or upper rail fasteners can be removed.

After removing the fasteners, the hood can be removed and stored. Damaged hoods can be discarded after all repairs are complete.

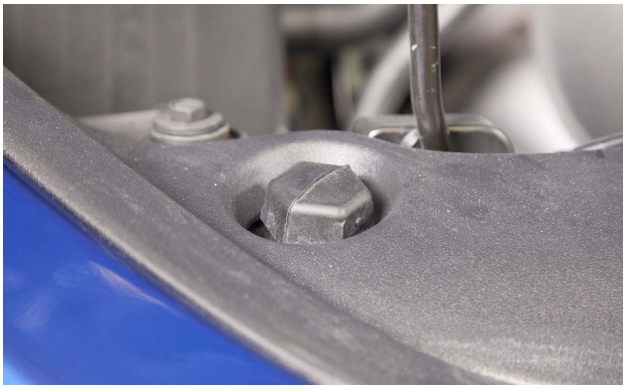


This hood is installed with the attachments already installed.

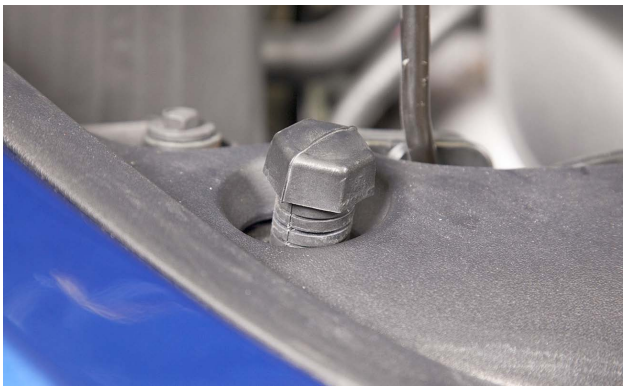
To install a replacement hood:

- have an assistant help position the hood in place. Depending on the removal procedure, this may include positioning the hood on the hinges or the hinges on the fender or upper rail.
- temporarily install the required fasteners.
- align the hood and tighten the fasteners. Note that additional adjustment may be required.
- transfer any undamaged hood attachments to the replacement hood and install all required replacement labels.

Hoods can be adjusted on the hinges or the hood stops.



This hood stop is adjusted fully down.



This hood stop is adjusted partially up.

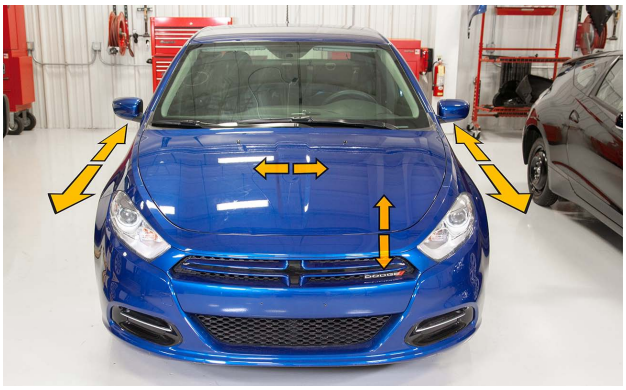
Depending on the design of the hood, alignment may be done by adjusting the:

- hood hinges.
- adjustable stops.
- striker and latch area.

To properly align a hood, it may be necessary to make adjustments to any combination of these.

There is a special tool available that can be used to release the primary hood latch. This eliminates the need for the technician to pull the hood release mechanism in the passenger compartment during alignment.

When aligning hoods, verify that there are adequate gaps before closing to prevent damage to adjacent panels.



Most hoods can be adjusted forward or backward on both sides, from side-to-side, and for flushness with the fenders.

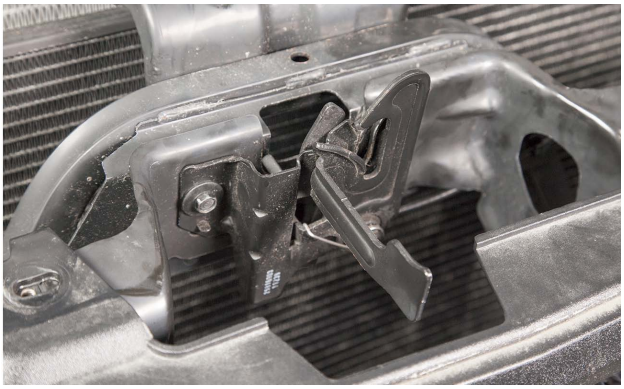
Depending on the mounting position of the hinges, it may be possible to adjust the hood:

- frontward or rearward. This is a gap adjustment between the cowl and bumper assembly. This adjustment is common on most hoods.
- towards the driver or passenger side. This is a gap adjustment and is common on most hoods.
- for flushness either up or down. This can only be to the rear of the hood on those with hinges that are mounted vertically.

Adjusting the stops will change the flushness at the front of the hood.

Adjustable stops:

- are used to raise and lower the front portion of the hood in order to accomplish zero flushness with the fenders.
- may be mounted on the hood.
- may be mounted on the fender or structure, either the upper rail or radiator core support.

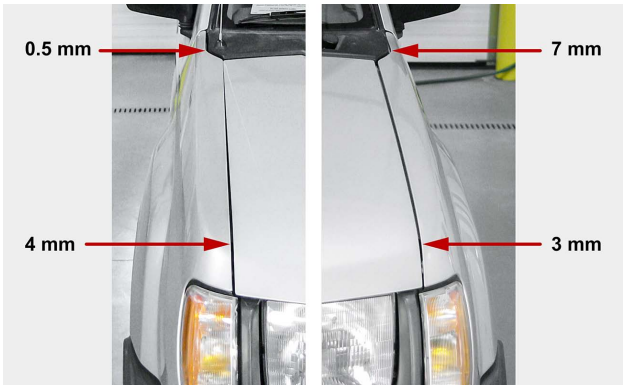


This latch can be adjusted up and down and to the left and right.

The hood and fender gaps should be adjusted with the latch removed. When the proper gaps are obtained, the latch can be installed so that the striker and latch operate smoothly and the hood is not "pulled" to either side. The latch may be adjusted in combination with the hood bumpers to align the flushness with the fenders. Installing the latch to "pull" the hood to obtain proper fender-to-hood gaps may result in the hood and striker binding and could cause the latch to be inoperative.

Refer to "Video: Bolted Hood Replacement" in the presentation. This video shows a bolted-on hood being removed and reinstalled.

Activity: Hood Adjustment



Refer to Module 1, "Activity: Hood Adjustment" in the presentation. This activity presents one example of adjusting hoods.

Module Wrap-Up

Topics discussed in this module included:

- bumper system identification.
- steel bumper replacement.
- plastic bumper cover / fascia replacement.
- energy absorber replacement.
- bumper reinforcement replacement.
- grille replacement.
- steel fender replacement.
- fender alignment.
- hood replacement.
- hood alignment.

Module 2 - Rear Body Panels

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Truck Box

Learning objectives for this module include:

- replacing truck boxes.
- replacing deck lids.
- replacing liftgates and hatchbacks.
- replacing tailgates.

This truck box is constructed of steel.

Types of materials used for truck boxes include:

- steel.
- composite.
- steel with composite box sides.

The fuel filler neck is being disconnected for box removal on this truck.

Use a cart or dolly to aid in moving the truck box.

Steps included in truck box removal may include, but are not limited to:

- removing the fuel filler neck from the fuel door opening. Be sure to disconnect the wire that provides a ground for the filler neck to the frame.
- raising the truck to access fasteners, if required.
- removing the trailer hitch, if equipped. Access to the fasteners may require the hitch to be removed.
- removing the fasteners that attach the box to the frame.
- lowering the vehicle.

- determining how to lift the box. There are box lifters available that can be used with an engine hoist. Assistants can be used, or a two-post lift with planks and chains.
- removing the box and placing it on a cart or dolly.

This tail lamp is being transferred to the reinstalled truck box.

To install a truck box:

- position the box over the frame.
- lower the box onto the frame.
- install and torque the mounting fasteners.
- transfer any accessories including the tail lamps and any aftermarket accessories.

This truck has a plastic bedliner.

Some common aftermarket attachments that may require transfer or installation include:

- tonneau covers. These may either be constructed of vinyl or a composite material. Composite tonneau covers may offer some repairability if damaged.
- truck caps. Fiberglass or SMC truck caps may offer some repairability if damaged.
- bedliners. Bedliners may be spray-on or plastic. Damaged boxes that have a spray-on bedliner may require the bedliner replacement to be sublet.

Deck Lid

This deck lid has hinges mounted in the package tray area.

Deck lids are the rear closure panels that cover the trunk area. Deck lids:

- most often open from the rear. This means that the hinges are mounted in front of the deck lid, either on top of the quarter panel or under the rear package tray.
- may be dual opening. Some automatic convertibles open the deck lid from the front to lower the convertible top and can be opened from the rear for access to the trunk.
- may be made of steel.
- may be made of a composite material.

Deck lid hinges are designed to hold a deck lid in the open postion.

The deck lid hinges are responsible for the swinging open effect of the deck lid, and keep the deck lid in the open position. Different types of deck lid hinges include a:

- spring type.
- piston type. These are similar to hood piston prop rods. These may also have a hinge attached to the prop rod.
- torsion bar type. The torsion bars are mounted under the rear package tray and may have adjustments to accommodate for wear. The torsion bars attach the hinges and the hinges are attached to the deck lid.

This deck lid has several attachments.

Attachments that may require removal or transfer when replacing a deck lid include:

- vehicle lighting and associated wiring. Some tail lamps are part of the deck lid.
- emblems. These are found on most deck lids and are typically the vehicle model emblem.
- a rear spoiler. If a spoiler is an aftermarket attachment that is being transferred, holes may have to be drilled into the replacement deck lid. Any holes should be drilled before refinishing.
- information labels.
- emergency release levers.
- the lock cylinder.
- the latch. The latch is installed on most deck lids, but some deck lids may have the striker installed. The striker and latch assemblies are similar to the type used on hoods and some doors.

This hinge has elongated holes for adjustments.

To remove a deck lid for replacement:

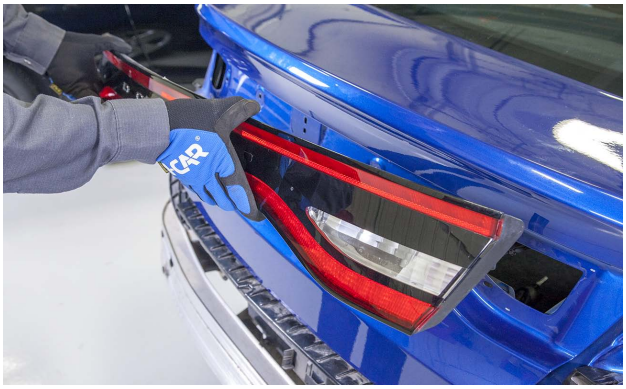
- open and support the deck lid.
- disconnect and label any wiring that is attached to the deck lid.
- disconnect and remove the latch.
- unfasten and remove the deck lid.

This deck lid latch is being reinstalled.

This deck lid latch striker is being adjusted.

To install a deck lid:

- support the deck lid and temporarily install the mounting fasteners.
- check the alignment and correct as necessary.
- torque the fasteners and recheck the alignment. If the latch was removed, install so that the striker is centered in the latch. This will prevent the latch from pulling the deck lid to either side. Flushness with the quarter panels may be adjusted by moving the latch either up or down.



The deck lid attachments are being reinstalled.

The electrical connections are being reattached on this deck lid.

Complete the deck lid installation by:

- installing the lock cylinder and verifying its proper operation.
- transferring any undamaged emblems and reattaching the deck lid accessories.

Adjustments on this deck lid include forward and rearward, up and down, and from side-to-side.

Depending on the mounting position of the deck lid on the hinges, adjustments may include:

- up and down. This may be done by moving either the deck lid

up or down on the hinge or by moving the latch mechanism up or down. If the front of the deck lid has to be raised or lowered, adjust the hinge area. If the rear of the deck lid has to be raised or lowered, adjust the latch mechanism.

- forward or rearward. To move the entire deck lid forward, the deck lid has to be moved forward on the hinges in the horizontal position. The opposite applies to move the deck lid rearward. To move one side forward and one side rearward, slide the appropriate side forward or rearward.
- side-to-side. Depending on the mounting position of the deck lid on the hinge, adjustments may be available to move the deck lid from side-to-side. The latch should also be moved so that the striker and latch are in alignment.

Liftgates And Hatches


On this vehicle, the glass will open independently from the liftgate, or the liftgate and glass will open as an assembly.

Liftgates and hatches are of similar construction. Liftgates and hatches may:

- have stationary glass contained in the hatch. Stationary glass found in liftgates and hatches usually contain defrost grids.
- have movable glass. Movable glass may either lift up alone or lift up with the liftgate.
- be made of steel.
- be made of a composite material.
- be made of aluminum.


Shown are the liftgate striker (left) and hinge (right).

Liftgates and hatches are equipped with:

- hinges, latches, and strikers that are similar to doors.
- prop rods to hold the liftgate or hatch open. Most of these are similar to the piston-type hood props.
- rear wipers on many vehicles. Some may also have washer fluid spray nozzles.

The electrical connections on a liftgate should be inspected during liftgate replacement.

Liftgate and hatch wiring that require disconnection before liftgate or hatch removal may include:

- the rear wiper wiring.
- heated glass wiring.
- tail lamp wiring when the tail lamp is located on the liftgate or hatch.
- the license plate lighting wiring.
- automatic latch release wiring.

An assistant may be required to remove a liftgate.

Steps included in liftgate or hatch removal include, but are not limited to:

- protecting or removing and storing the glass, as required.
- raising and supporting the liftgate or hatch.
- disconnecting and labeling the wiring after removing the trim panel.
- using an assistant to help in the removal procedure.
- removing the prop rods, which is similar to the procedure used for piston-type hood props.

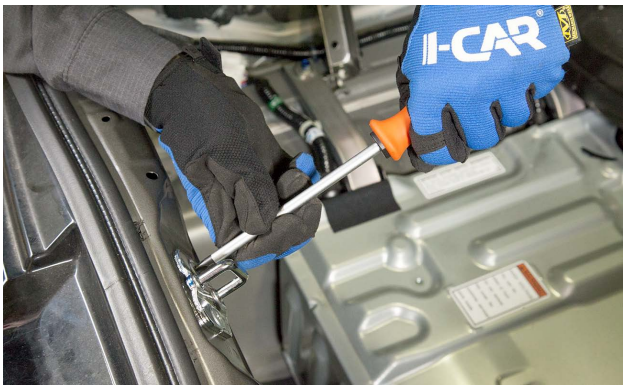
These hinge-to-liftgate fasteners are removed with a socket and ratchet.

Complete the liftgate or hatch removal by removing the retaining fasteners. Store the liftgate or hatch if it will be reused.

This piston-type prop is installed on the ball stud.

To install a liftgate or hatch:

- support the part with the help of an assistant.
- temporarily install the fasteners.
- align and correct as required. Depending on the mounting position of the liftgate, adjustments may be made for up and down, side-to-side, and flushness.
- torque the fasteners to the recommended specification.
- install the prop rods. The prop rods can be installed earlier to assist in supporting the liftgate or hatch if preferred.



After the liftgate has the correct gaps, the striker is installed.

Complete the liftgate or hatch installation by:

- installing the striker or latch, if removed.
- installing the glass, if required.
- transferring undamaged accessories or installing replacement accessories and rerouting and connecting the wiring.
- verifying the proper operation of accessories.
- rechecking the alignment and correcting as required.

Tailgates

Most truck tailgates fold down to allow access to the box.

This tailgate is hinged at the bottom and the hinges are attached to the box structure.

Tailgates are most common on pickup trucks. Tailgates on trucks fold down to gain entry to the truck box. Some SUVs are equipped with a tailgate and may contain movable glass. Tailgates may be made of steel, a composite material, or aluminum.

The strikers are mounted to the inner box structure. The latch assemblies are installed in the tailgate shell.

Tailgate operation accessories may include the:

- handle and the linkage.
- latching mechanisms. Most tailgates have dual latches on either side of the tailgate. The latches are connected to the handle by linkages.
- hinging mechanism. Some tailgates have cups that make a pivot point that the tailgate hinges on. Other tailgates use welded hinges that have pins and bushings that the tailgate pivots on. Adjustments on a tailgate are limited to aligning the flushness by moving the strikers either in or out.
- cables to prevent the tailgate from opening too far.
- torsion springs. Torsion springs are used mainly on SUV tailgates due to the added weight of accessories. The torsion spring aids in the opening and closing effort. Support straps or cables prevent the gate from opening too far.

This retainer strap has a metal retainer clip to prevent it from falling off of the stud.

When installing a tailgate, reverse the removal process.

To replace a tailgate:

- lower the tailgate to access the straps and hinging mechanism.
- slightly lift upward on the tailgate and remove the retainer straps.
- lift the slotted side of the tailgate and slide the tailgate off of the vehicle or remove the hinges by unbolting.

To install a tailgate, reverse the removal procedure.

Module Wrap-Up

Topics discussed in this module included:

- truck box replacement.
- deck lid replacement.
- liftgate and hatchback replacement.
- tailgate replacement.