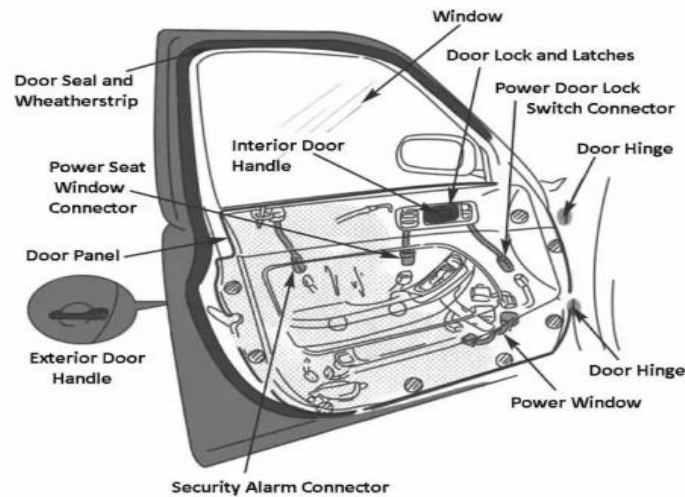


Automotive Body Repair and Paint Work LEVEL-III

Based On October , 2023, Curriculum Version I,



Module Title: Repairing Mechanical Door Lock and Window Mechanisms

Module code: EIS BRP3 M05 1023

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Acronyms

LAP

DC

LED

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Introduction to the Module

This unit describes the skills and knowledge required to repairing mechanical door lock and window mechanisms. This unit involves prepare to repair door lock and window regulator mechanisms, Carry out door and window regulator repairs, and Complete work processes.

Doors are the most used and abused parts of a vehicle. They are opened and closed thousands upon thousands of times during the life of a car or truck. They must also remain strong enough to stay closed and protect the driver and passengers from injury during a collision. In addition, doors must seal out water and wind noise to keep the vehicle interior dry and quiet. Doors are frequently damaged in collisions.

A door lock assembly usually consists of the outside door handle, linkage rods, the door lock mechanism, and the door latch. Various types of exterior door handles are available. The button or outer handle contacts the lock lever on the latch to open the door. However, most exterior door handles operate through one or more metal rods.

This module covers the units:

- vehicle door and window mechanism
- repairing vehicle door and window mechanism

Learning Objective of the Module

- Describe vehicle door and window mechanism
- Repairing vehicle door and window mechanism

Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” giver at the end of each unit and

Unit One: Vehicle Door and Window Mechanism

This unit is developed to provide you the necessary information regarding the following content coverage and topics

- Purpose of vehicle door and window mechanism
- Types and construction of door latches, locks and window regulators.

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Understand the Purpose of vehicle door and window mechanism
- Identify Types and construction of door latches, locks and window regulators.

1.1. Purpose of Vehicle Door and Window Mechanism

Door

Doors are the most used and abused parts of a vehicle. They are opened and closed thousands upon thousands of times during the life of a car or truck. They must also remain strong enough to stay closed and protect the driver and passengers from injury during a collision. In addition, doors must seal out water and wind noise to keep the vehicle interior dry and quiet. Doors are frequently damaged in collisions

Door Lock and Latch

Car doors have latches and locks to keep the door in place and prevent unauthorized entry into the vehicle. The latching mechanism consists of both a latch and an electric motor that controls the central locking. The latch opens or closes the doors, while the door lock locks or unlocks the vehicle. These are available as manual and power door locks depending on the vehicle type. A switch usually operates the power door locks. These can also be operated via a key fob in some models. In addition, most vehicles have a child safety lock feature that prevents rear seat occupants from opening the doors.

A door lock assembly usually consists of the outside door handle, linkage rods, the door lock mechanism, and the door latch. Various types of exterior door handles are available. The button or outer handle contacts the lock lever on the latch to open the door. However, most exterior door handles operate through one or more metal rods (*Figure 0.1*).

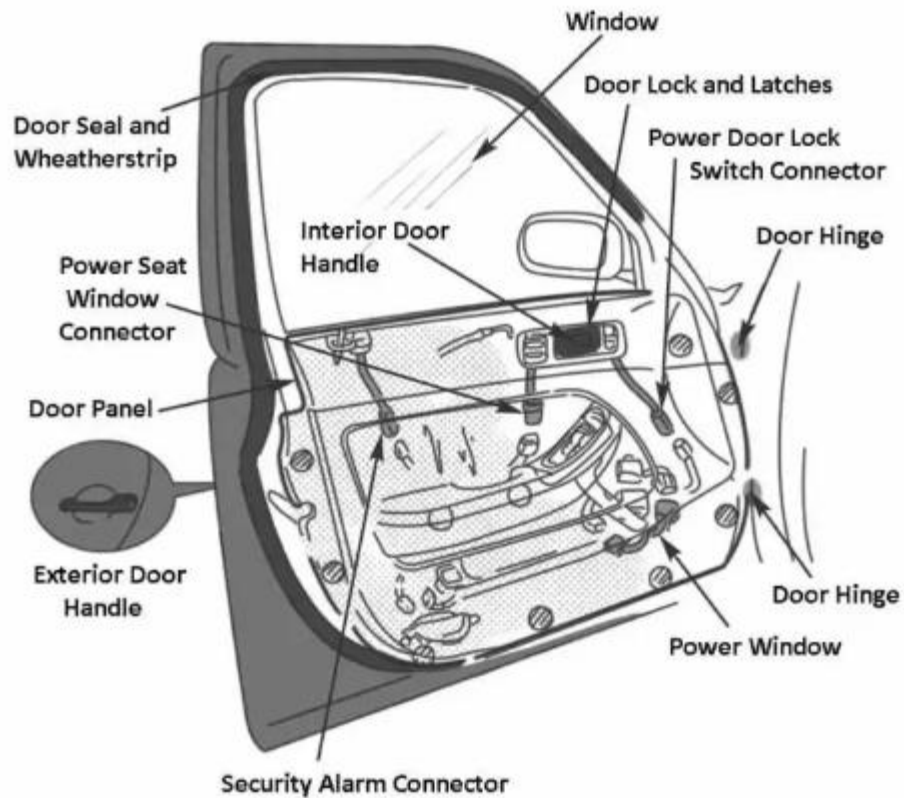


Figure 1-0-1: Note how small metal rods extend from the inner door handle to the door latch.

Door Window Regulator

A window regulator is a mechanism for raising and lowering the door glass. It consists of a set of gears, a window crank or electric motor, and sash channels. The sash channels guide the glass as it slides up and down (Figure 0.2).

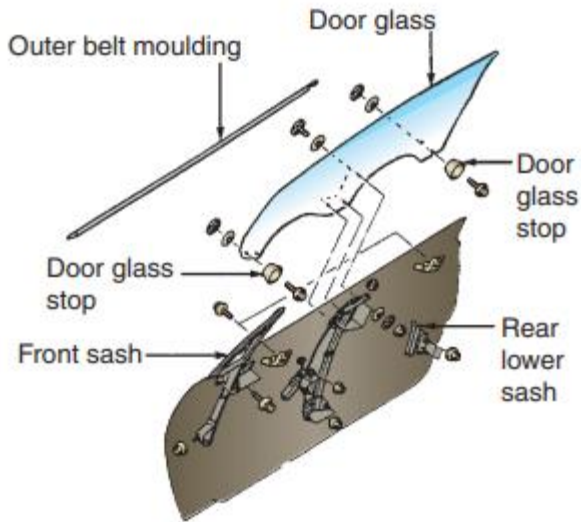


Figure 1-0-2: Note how glass is secured to the window regulator.

1.2. Construction and Types of Door Latches, Locks and Window Regulators.

1.2.1. Door Construction

There are **two basic door designs**:

1. Framed Doors
2. Hardtop Doors

Framed doors surround the sides and top of the door glass with a metal frame. This helps keep the window glass in alignment. The door frame seals against the door opening. Hardtop doors have the glass extending up out of the door without a frame around it. The glass itself must seal against the weather stripping in the door opening. Illustrated in Figure 0.3, the basic parts of a door include:

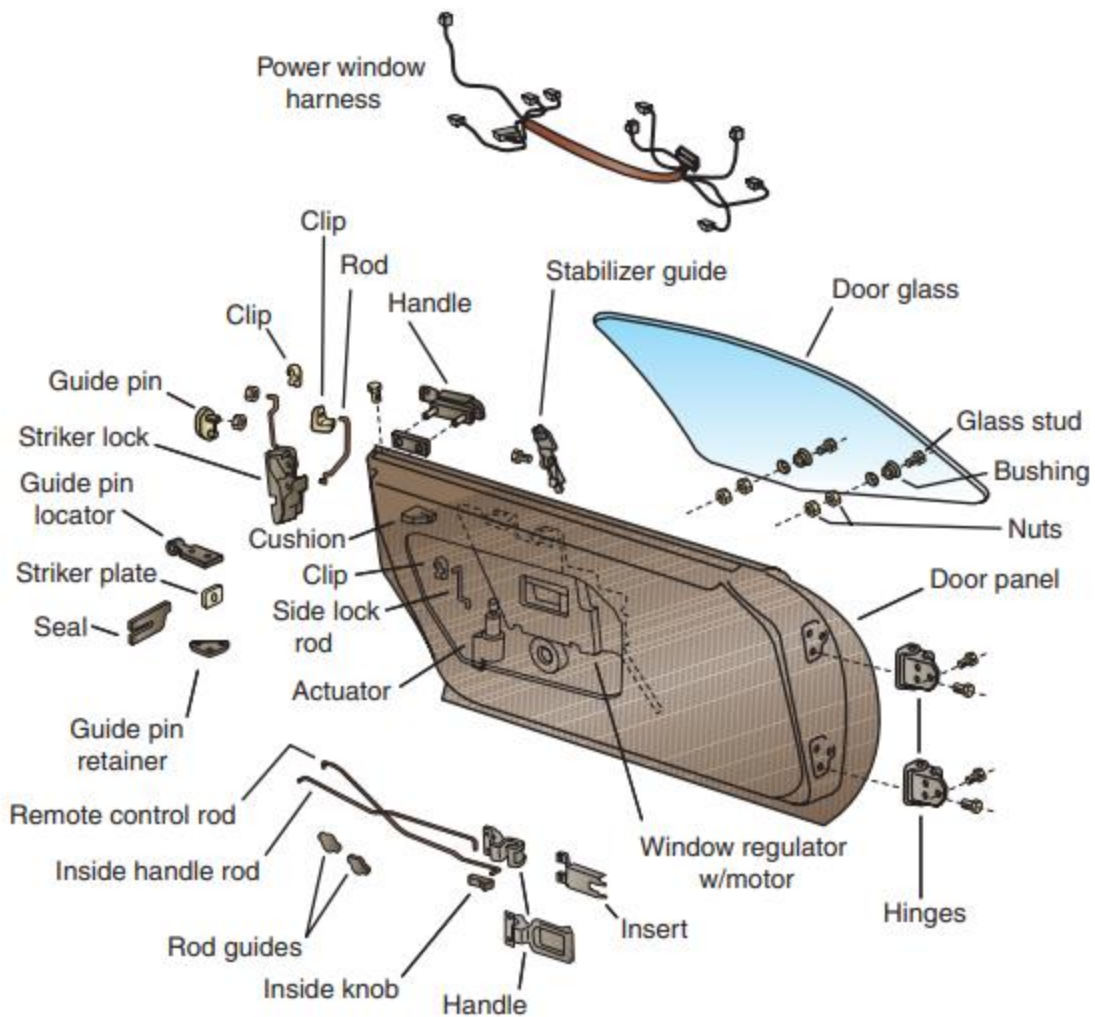


Figure 1-0-3: Study how the typical parts of a door are assembled.

1.2.2. The Basic Parts of a Door

- 1) The **door frame** is the main steel frame of the door. Other parts (hinges, glass, handle, and so on) mount on the door frame.
- 2) The **door skin** is the outer panel over the door frame. It can be made of steel, aluminum, fiberglass, or plastic.
- 3) The **door glass** must allow good visibility out the door. The door glass channel serves as a guide for the glass to move up and down. It is a U-shaped channel lined with a low friction material, felt, for example.

- 4) The **window regulator** is a gear and arm mechanism for moving the glass. When you turn the window handle or press the window button, the regulator moves the glass up or down.
- 5) The **door latch** engages the door striker on the vehicle body to hold the door closed.
- 6) Inner and outer **door handles** use linkage rods to transfer motion to the door latch. This allows you to activate the latch to open the door.
- 7) The **door trim panel** is an attractive cover over the inner door frame. Various parts (inner handle, window buttons, and speakers) can mount inside the inner trim panel.
- 8) A plastic or paper **door dust cover** fits between the inner trim panel and door frame to keep out wind noise.
- 9) **Door weather stripping** fits around the door or door opening to seal the door-to-body joint. When the door is closed, the weather stripping is partially compressed to prevent air and water leaks. A rearview mirror is often mounted on the outside of the door frame. A remote mirror knob on the inner trim panel allows for mirror adjustment.

1.2.3. Manual and Power window Regulators

Window regulators can be manually or electrically powered. Both types of regulators are very similar, the only difference being the handle crank mechanism on manual regulators and the electric motor-driven gear mechanism on powered regulators. The lift arms or mechanisms are the same for both types. One or two lift arms can be used, depending on the make of the vehicle. If two lift arms are used in the window regulator, it is usually referred to as an X-type regulator. The X-design uses an auxiliary arm that is mounted into a cam or stabilizer channel that is adjustable. The cam adjustments allow the glass to be tilted or rocked so that it can be raised in a parallel position.

Self-check-1

PART ONE: CHOOSE

Choose the correct answer from the given alternative and write the answer on the space provided.

_____ 1. It is a part of door fits around the door or door opening to seal the door-to-body joint.

- A.** Door handles **B.** Door trim panel **C.** Door dust cover **D.** Door weather stripping

_____ 2. _____ is a gear and arm mechanism for moving the glass

- A.** The window regulator **B.** door frame **C.** Door skin **D.** Door glass

_____ 3. A door lock assembly usually consists of the

- A.** Outside door handle **B.** linkage rod **C.** the door lock mechanism, **D.** ALL

PART TWO: SHORT ANSWER

Write the short answer on the space provided

1. _____ is the main steel frame of the door
2. _____ is the outer panel over the door frame
3. _____ is a mechanism for raising and lowering the door glass.
4. _____ is an attractive cover over the inner door frame.
5. _____ fits between the inner trim panel and door frame to keep out wind noise.

Unit Two: Repairing Vehicle Door and Window Mechanism

This unit to provide you the necessary information regarding the following content coverage and topics:

- Check Operation Of Door Latch, Door Lock And Window Regulator
- Defects For Door Latch, Lock And Window Regulator
- Procedures for Repairing Door Latches. Locks And Window Regulators

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Check operation of door latch, door lock and window regulator
- Identify possible defects for door latch, lock and window regulator
- Apply Procedures for repairing door latches. Locks and window regulators

2.1. Operation of Door Latch, Door Lock and Window Regulator

- **Checking Door Operation**

Before door removal, check that the door and its related parts operate normally. Inspect the door assembly, its hinges, and the door opening in the body. Look for uneven or nonparallel gaps all the way around the door edge. **Non-parallel body gaps** indicate panel misalignment from structural damage, shifted panel fasteners, or worn mechanical parts (hinges or latches). Look between the fender and door, rocker panel and door, quarter panel or rear door and front door, and between the roof rail and top of door. If you find gap misalignment, it may give you a clue about what needs to be done to repair the door, hinges, and door opening in the body. You might find a front fender pushed back into the door by checking gaps. The fender might have to be adjusted back to allow the door to open. An even gap might be due to the A-pillars or rocker panel being deformed from the collision. This would tell you to measure the door opening to check for body damage. These kinds of problems must be found before door removal so that they can be corrected during door service.

Door sagging results when the rear of the door is lower than the front. This is a common problem that is often due to badly worn hinge pins. Without periodic lubrication the hinge pins can wear, producing play in the hinges. This play allows the door to sag or drop on its unhinged end.

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A **door hinge** check involves trying to move the door assembly up and down on its hinges. On lighter doors, you can try to raise and lower the door by hand. On larger doors, use a floor jack to move the door upward while watching the hinges.

Worn door hinges show up when the two halves of the hinge body shift, allowing up and down door movement. Good door hinges are evident when there is little or no play between the pin and hinge body. Worn door hinges should be replaced before reinstalling the door assembly.

A *door operational* check involves slowly opening and closing the door to check its latch, lock, hinge action, and other parameters (rattles from loose parts, squeaks from unlubricated parts, or binding from misaligned panels). Roll the windows up and down to check for binding or other troubles. With power windows, turn the ignition key on and activate all power window buttons. If a power window is inoperative, you want to find out now so it can be repaired while the door is apart.

2.2. Defected Door Latch, Lock and Window Regulator Parts

Problems with Car Door & Their Remedies

Symptoms:

Door(s) fail to respond normally to lock/unlock signals. In several cases, sending a lock signal via remote locks all but one door. Subsequently sending a un-lock and second lock signal then locks the problematic door. Also, when the door in question is the driver's side front door with an aftermarket window controller, the controller usually fails to operate as usual.

Problem:

The door locking mechanism - responsible for coordinating the activities of the handles, key, and alarm - is having an electronic malfunction, most likely a cracked solder joint from repeated door opening/closing. This is combined with a poor design layout that stresses internal solder joints if the locking mechanism screws loosen and allows movement of the entire unit in the door. This, of course, is assuming that the door locks and unlocks mechanically without problem (through the interior handle, exterior handle, and key insertion). Replacing the part with a new one will be a definite fix, but you may also want to consider popping the unit open and look for any obvious problems - despite appearances the internal parts susceptible to failure are simple to troubleshoot and repair. Also, considering that you'll be removing the inner door panel to access the locking mechanism, now would be

a goodtime to add some noise dampening material to the metal door skin if you desire. There is a damping panel in place from the factory, and it would be interesting to hear if adding additional material would have a noticeable effect

Some causes of exterior door handle problems are:

- Worn bushings
- Bent or incorrectly adjusted lock cylinder rods
- No lubrication on handle, linkage, or latch

2.3. Procedures for repairing door latches. Locks and window regulators

2.3.1. Remove door latches, locks and window regulators from the vehicle.

Door removal is necessary for replacement and many repairs, such as door skin replacement or frame straightening. To remove a typical door, you must remove the two door hinge bolts or drive out the welded hinge pins (Figure 2.1).

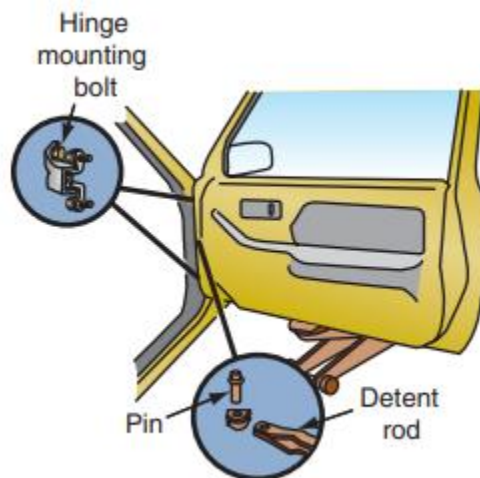


Figure 2.1. A floor jack covered with a shop towel or holding fixture

Disconnect wiring going into the door frame and disconnect the door hinges. Some wiring is easy to disconnect on the outside of the door; other wiring requires complete door disassembly. Open the door about halfway. Place a floor jack under the door. Place a fender cover, rag, notched block of wood (a short piece of 2 × 4 works well), or door holding tool on the jack saddle to protect the painted edge of the door. A door holding tool

is a rubber jack saddle insert that has a long groove to engage the bottom of the door flange
(*Figure 2.2A & B*).



Figure 2.2A special door holding fixture has been placed on the floor jack



Figure 2.2B. Note how two technicians are working together to install a freshly painted door without damage.

With the saddle near the center of the door, raise the jack just enough to take most of the weight off the hinges. Be careful not to raise the jack too much, because it is easy to damage the door with the power of a hydraulic jack. You want the weight of the door balanced on the jack so the hinge bolts unscrew easily (Figure 2.3).

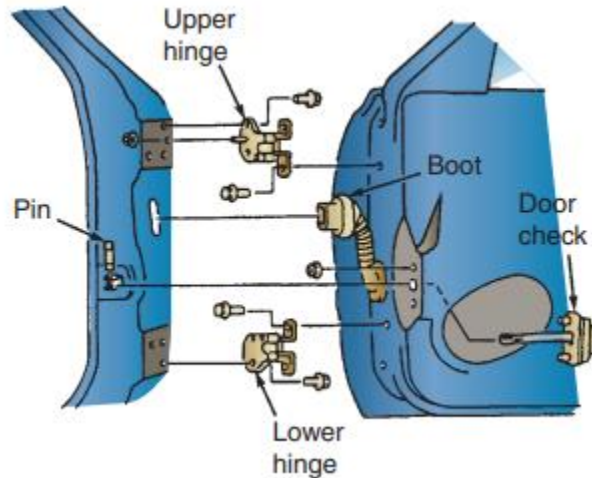


Figure 2.4. Note how hinges fasten to the door and vehicle body.

Before removing the last bolt, ask a coworker to help hold the door and keep it from falling off the jack (Figure 2.5). The two of you can then move the door to a workbench or out of the way. Normally, place the door skin or outer panel down on the work surface. If the door does not have to be repainted, make sure you place a clean shop blanket on the work surface to prevent scratches in the finish.



Figure 2.5. When loosening door hinge bolts, make sure the door is held so it does not fall off the jack.

Door Window Regulator Service

A manual window regulator uses a hand crank to turn the gears in the regulator. A power window regulator uses a small electric DC motor to spin the regulator gears. A station wagon tailgate window regulator is very similar to door window regulators.

Small nuts and bolts secure the window regulator and glass guides or tracks in position. Usually, the glass bolts to the upper arms of the regulator. Rivets can also be used to secure the glass to its regulator. On a few older vehicles, the glass may be held with a special adhesive or epoxy.

To remove the glass, unbolt it from the regulator. You must then remove any parts that prevent you from sliding the glass out of the door. This can vary so refer to the manual if needed. If the glass was broken, use a vacuum cleaner to remove all broken glass from inside the door. Install the new glass and bolt it to the regulator. Make sure you use all rubber, plastic, and metal washers.

OPERATION SHEET 2.1:-

Operation Title: Removing the door trim panel:

Instruction: Choose the Right tools & follow critical step

Purpose: the purpose of this Operation Sheet is how to remove the door trim panel:

Required tools and equipment:

- Socket wrench
- 10mm socket
- Torx drivers/bits: T10*, T20, T25
- 12 point star driver/bit (aka triple-square or spline bit): M8
- De-soldering braid
- Millimeter

Precautions:

- Be sure the car is properly parked.
- Take proper precautions to prevent damage.
- Wear eye protection at all times.
- Weld only in a fire safe area.

Procedure

Step-1.Begin by lowering the door window glass completely.

Step-2.There are two black Torx T25 screws at the bottom of the door - remove them.

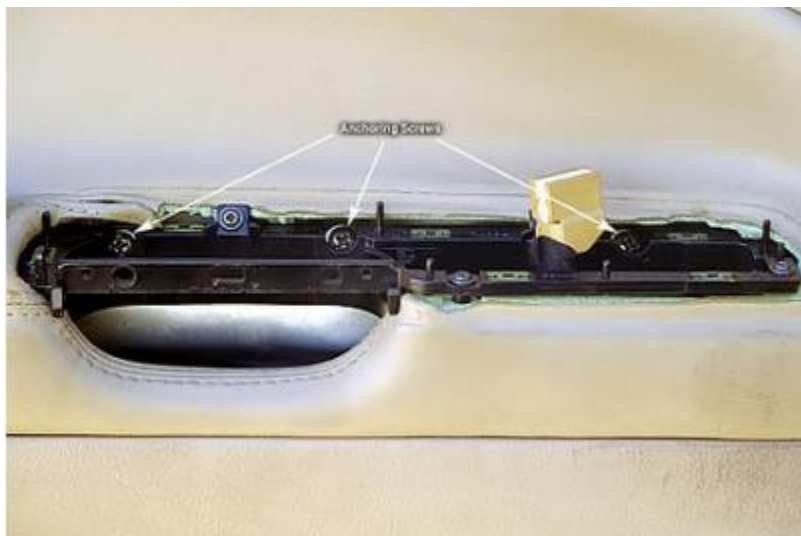


Step-3. Use a thin-bladed flathead screwdriver to pry off the inner door handle cover (not the door release handle).



Step-4. For the driver side door, you can now pull up on the entire handle/switch assembly as a unit - use moderate force to unclasp the clips holding it in place. Remove the brown wire harness from the handle/switch assembly and set the assembly aside.

Step-5. For the driver's side door, there are three bronze color screws anchoring the door trim panel to the rest of the door. The passenger's side door has two of these screws. Use a large Philips-head screwdriver to remove these.



Step-6. The rest of the door trim panel is now held in place by snap-in anchors and can be loosened by pulling the trim panel away from the door. Begin with the bottom of the door and give it a good tug to pop out the connectors. Take care not to pull the trim panel far away from the door, as there are several wire/cable connections still in place between the trim panel and door. After the lower portion of the trim panel is separated, pull the entire panel upward to unhinge the panel from the window sill. The trim panel should now be free from the door, with several wires and cables still in place.



Step-7. Disconnect the following from the trim panel: Wire harness plugged into the door release handle. Door release cable. To remove this, pull the cable insulation away from the hooked end and slide the exposed cable out of the slotted retainer. Release the hooked end. Security alarm LED wire connector. Bottom door sill lamp - it's easier to pull out the entire wire harness + lamp assembly than to disconnect the wire harness.

Step-8. Pull the door trim panel away and set aside

Step-9. Use a Torx T20 driver to unscrew the set screw. Unscrew it as far as it will go, then reinsert a few threads to keep the screw from falling out of its mounting.

Step-10. Pull on the exterior door handle - with the door handle in this position, pull on the lock cylinder. It should slide out without much trouble. Set the lock cylinder aside.



2.3.2. Remove and install glasses from door

Door and door glass adjustments

If there are undamaged panels next to the door, cover their painted edges with masking tape. This will help prevent them from being accidentally scratched and kicked if bumped by the door during installation.

Door installation procedure involves reversing the removal procedure. Have someone help hold the door on the floor jack. Raise the jack until the door hinges are the same height as their bolt holes in the body. Make sure you are holding the door level .

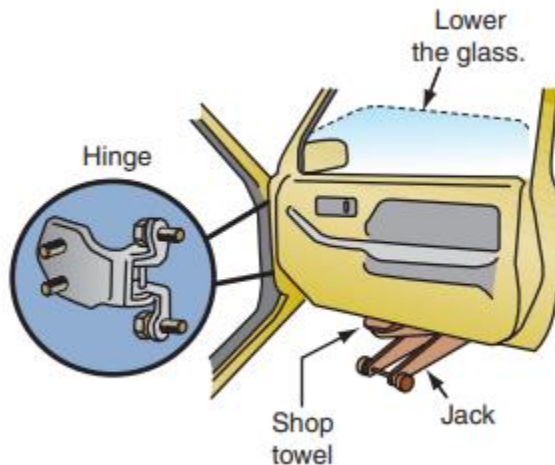


Figure 2.6. Use a floor jack to raise a door to the correct height for starting hinge bolts. The door should be level on the jack. Have someone help you hold the door on the jack.

Slowly slide the door hinges against their bolt holes. Wiggle and shift the door until you can start the bolts with your fingers. Align the hinges to their original positions. Snug the bolts down but do not tighten them yet.

Door frame adjustment is needed to ensure that the door will close easily and not rattle or leak water and dust. This section will describe various door adjustments and door glass adjustments. Door glass adjustment is also needed to prevent air and water leakage into the passenger compartment.

Worn door hinges will have play that allows up and down movement of the rear of the door. If the hinge pins are worn out, you should replace the hinges. Some hinges use bushings around the hinge pins. When these bushings are worn out, replace them. This will retighten the pin in

the hinges and also readjust the door to a certain extent. Make sure replacement hinge bushings are available. If the hinges are to be removed, scribe a line around the hinge to mark its position on the body and door. This will simplify reinstallation and positioning of the new hinge. You might have to loosen the fender at the rear bottom edge to reach the hinge bolts.

Servicing Welded Door Hinges

Obviously, service methods are different for welded hinges. The large pin must be driven in and out of a welded hinge to service the door assembly. The bolted hinge can be easily adjusted forward, rearward, up, and down. The use of shims behind the hinge also allows the hinge to be moved as desired.

A specially designed pry bar can be used to adjust a door. The end of the bar hooks over the striker bar and a U-shaped bracket engages the latch.

As mentioned, some vehicles use a welded-on door hinge that has no adjustment provisions. A pin is provided to remove the door for servicing the hinges. The half of the hinge that is to be installed on the door is predrilled to permit a bolt-on installation with tapped caged plates and bolts. The half of the hinge on the hinge pillar must be re-welded on the pillar when it is replaced.

When removing the door hinge pins, use a special spring compressing tool. The spring must be seated properly in the tool before compressing it. Otherwise, the spring can slip and cause damage or personal injury. After the pin in each hinge is removed, the door can then be removed from the vehicle.

To replace the welded door side hinge, first scribe the outline of the hinge on the door. Center punch the spot welds and drill an 1/8-inch (3.2 mm) pilot hole completely through the welds . The weld is then drilled out with a larger bit (about 1/2 inch, or 12 mm), but only deep enough to penetrate the hinge base to release the hinge from the panel. Next, a chisel is driven between the hinge and the base to break it free from the panel.

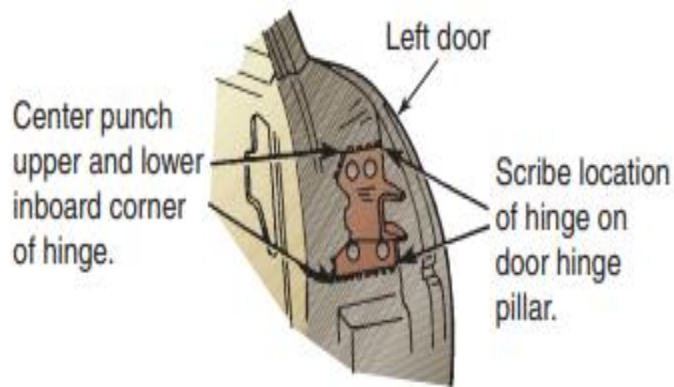


FIGURE 2.7 scribing the hinge location can help rough adjust a door when you are reinstalling it.

The new part is installed on the door by drilling the recommended size holes into the attaching holes. The holes will allow for slight adjustment on the door assembly, because the bolts are often smaller than the holes.

To remove the body side hinge, scribe the hinge position. Then use a cutting torch to cut the tabs holding the hinge together. The door sill plate and carpet should be removed or covered with an asbestos sheet to protect them from the hot slag of the cutting operation.

Using a suitable tool, such as grip-type pliers, the welds holding the separated hinge tabs are twisted or rotated to break them. Once the tabs are removed, the pillar is ground smooth and prepared to receive the new part.

To install the new hinge strap, manufacturer measurements, as shown in Figure 2.8, must be transferred to the new part. First, tack weld the hinges carefully in place and then hang the door to check its fit in the door opening and with surrounding panels.

If it fits properly, the door is removed and the hinge is welded completely around the upper and lower hinge tabs. The area is cleaned properly and a paintable sealer is applied around the perimeter of the hinge. The area is then refinished to the proper color before the door is reinstalled.

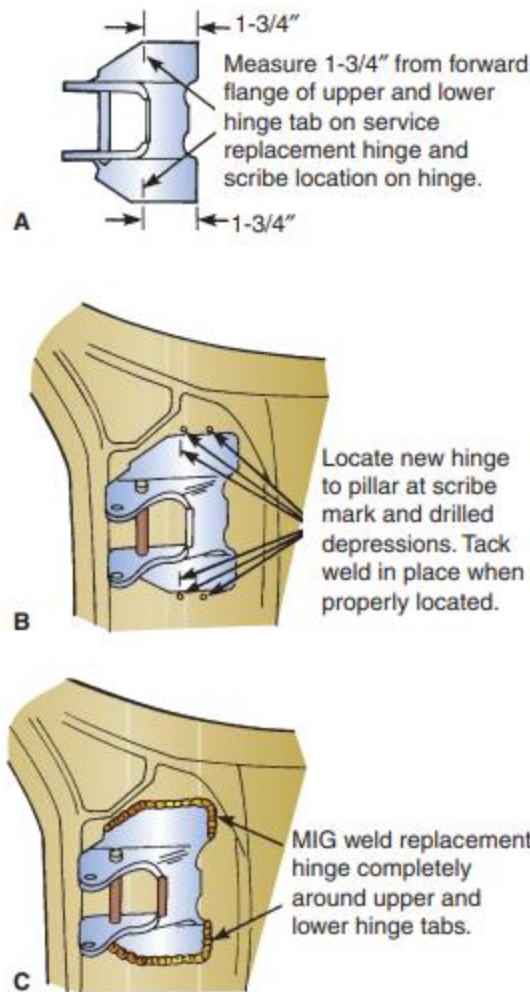


FIGURE 2.8 (A) Measure the hinge location, (B) transfer these measurements to the new hinge, and (C) weld the hinge tabs

2.3.3. Adjust, repair and install door latches, Locks and window regulators.

Bolted Door Hinge Adjustment

Doors must be accurately adjusted so that they close easily and do not rattle or leak. Basically, the door hinges must be adjusted to hold the door in the center of its opening when closed. The door striker must be adjusted to engage the latch smoothly. This section will describe various door adjustments.

Doors must fit their openings and align with the adjacent body panels. When the doors on a sedan need adjusting, start at the rear door. Because the quarter panel cannot be moved, the

rear door must be adjusted to fit these body lines and the opening. Once the rear door is adjusted, the front door can be adjusted to fit the rear door.

Next, the front fender can be adjusted to fit the door. On hardtop models, the windows can then be adjusted to fit the weather stripping. The windows are usually adjusted starting at the front and working toward the back. The front is adjusted to fit the front door pillar, and the front window is then adjusted to it. The rear door window is adjusted to the front window rear edge and the opening for the rear door assembly.

Some vehicles have rubber door stops that can be turned to adjust the closed door in or out. They are similar to hood stops. You can rotate the door stops to screw them in or out so that the door panel is flush with the adjacent panels

OPERATION SHEET 2.2:

Operation Title: To adjust a door in its opening

Instruction: Choose the Right tools & follow critical step

Purpose: the purpose of this Operation Sheet is how to adjust the door opening:

Required tools and equipment:

- Socket wrench
- 10mm socket
- 12 point star driver/bit (aka triple-square or spline bit): M8

Precautions:

- Be sure the car is properly parked.
- Take proper precautions to prevent damage.
- Wear eye protection at all times.
- Weld only in a fire safe area.

Procedure

Step-1. Remove the striker bolt so it will not interfere with the alignment process.

Step-2. Determine which hinge bolts must be loosened to move the door in the desired direction. First, establish door height.

Step-3. Loosen the hinge bolts just enough to permit movement of the door with a padded pry bar or jack and wooden block. On some vehicles, a special wrench must be used to loosen and tighten the bolts.

Step-4. Move the door as needed. Tighten the hinge bolts. Then, check the door fit to be sure there is no bind or interference with the adjacent panel.

Step-5. Repeat the operation until the desired fit is obtained.

Step-6. Install the striker bolt and adjust it so that the door closes smoothly and is flush with the rear door or quarter panel. Check that the door is in the full latched position, not the safety latch position (Figure 15–51).

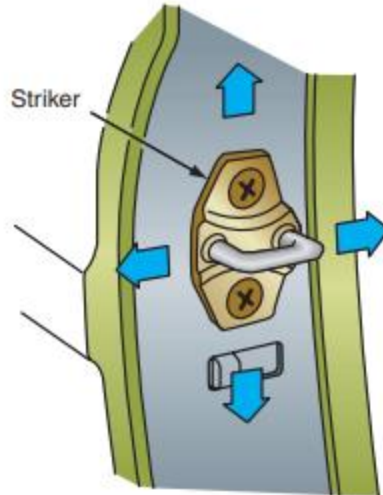


FIGURE 2.9 after the door hinges are adjusted, you may have to adjust the striker.

Step-7. On all hardtop models, the door and quarter glass must be checked to ensure proper alignment with the roof rail and weather strip.

In-and-out adjustments are also very important. The door must fit the opening and be aligned in and out to fit the body panels. The door must also provide a good seal between the weather stripping and the body opening. The weather strip must be compressed sufficiently in the opening to prevent water, dust, drafts, and wind noises from entering the automobile.

Care must be taken when adjusting the in-and-out movement of the door. Moving a door out on the top hinge will not only affect the top of the door but also move the opposite bottom corner in. If the bottom of the door is moved in on the hinge, it will move the top opposite corner out. If the door is moved in or out equally on both hinges, however, it will only affect the front of the door because the amount of adjustment decreases toward the back of the door.

The center door post, striker bolt, and lock determine the position of the door. The front leading edge of the door should always be slightly in on the front edge from the rear of the other panel (usually the front fender). This will help to stop wind noises at the leading edge of the door panel. If the front edge is sticking out, wind noise will annoy the car owner and passengers. Another common fastener that allows for door striker adjustments is the caged plate (Figure 2.9).

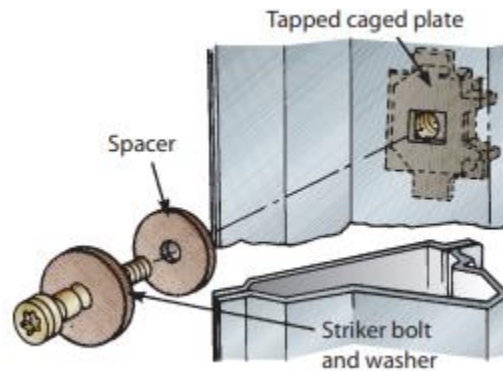


FIGURE 2.10 A caged plate allows for striker adjustments and provides a strong mounting point

A caged plate is a thick, heavy, steel plate with threaded holes to accept large bolts. The threaded plate is often housed in a “cage,” or box of thin sheet metal spot welded to the body panel. The cage is larger than the plate so that the plate can be moved around, but the cage prevents the plate from falling away from or down into the panel. Oversized holes in the panel allow the plate and bolts for the hinge or latch to be adjusted in any direction. Caged plates are often used in doors and door pillars. In this application, the cluster of oversized bolt holes would weaken the panel without the reinforcement of the steel backing plate. See Figure 2.14



FIGURE 2.14 The first time you close the door after installation, close it slowly and softly while watching how the door fits.



FIGURE 2.15 here the technician is using a ratchet and torx socket to install and tighten the door striker.

Self-Check -2

PART ONE: CHOOSE

Choose the correct answer from the given alternative and write the answer on the space provided.

_____ 1. Indicate panel misalignment from structural damage, shifted panel fasteners, or worn Mechanical parts (hinges or latches).

- A. Non-parallel body gaps B. Parallel body gaps C. A & B D. none

_____ 2. Door sagging results when

- A. the rear of the door is lower than the front
 B. the rear of the door is greater than the front
 C. the rear of the door is equal to the front
 D. All

_____ 3. A door hinge check involves trying to move the door assembly _____

- A. up and down on its hinges B. back and forth on its hinges C. circular D. all

PART TWO: TRUE OR FALSE

Say true if the statement is correct and say false if the statement is incorrect

_____ 1).A caged plate is a thick, heavy, steel plate with threaded holes to accept large bolts

_____ 2).Moving a door out on the top hinge will not only affect the top of the door but also move the opposite bottom corner in.

_____ 3).Doors must fit their openings and align with the adjacent body panels.

_____ 4).The rear door window is adjusted to the front window rear edge and the opening for the rear door assembly.

_____ 5).Doors must be accurately adjusted so that they close easily and do not rattle or leak.

_____ 6).To replace the welded door side hinge, first scribe the outline of the hinge on the door.

_____ 7).When removing the door hinge pins, use a special spring compressing tool.

LAP Test

Practical Demonstration

Name: _____

Date: _____

Time started: _____

Time finished: _____

Instruction: Perform the following tasks

Task 1: remove door and identify components

Task 2: Remove door latches, locks and window regulators from the vehicle.

Task 3: Remove and install glasses from door

Task 4: Adjust, repair and install door latches, Locks and window regulators.

Task 5: check the repaired door latches, locks and window regulator

Reference/Text Book

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3. Kohli P. L, “Automotive Chassis & Body”, Papyrus Publishing House, New Delhi, 2010.
4. Wolf-Heinrich Hucho, “Aerodynamics of Road Vehicles” SAE International, USA, 1998.
5. Robinson A., Livesey W. A, “The Repair of Vehicle Bodies”, Butterworth - Heinemann Ltd, 1989
6. Sumantran V. and Gino Sovram, “Vehicle Aerodynamics”, SAE International, USA, 1994.
7. John Fenton, “Vehicle Body Layout & Analysis”, Hutchinson, London, 1998

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