ELECTRIC DOOR AND TAILGATE LOCKS AND ELECTRIC WINDOWS

PLYMOUTH · DODGE · CHRYSLER · IMPERIAL · DODGE TRUCK

CHRYSLER MOTORS CORPORATION
This month's session deals with three options offered on Chrysler Corporation cars that not only are a convenience to drivers but contribute to their safety as well. Featured in this month's session will be power door locks, the power "Auto-Lock" tailgate, and power windows.

All of these options are electrically operated. However, the circuits and components have been designed and improved so that service is seldom required. However, if you are called on to service any of these systems, this month's session will be a big help to you.

For easy reference, each system is covered individually in this reference book. A brief review of the basic fundamentals for each system is given first. The more you understand about the operation of a system, the easier it will be for you to diagnose and service it. Following the fundamentals are diagnosis and service tips to correct the more common problems encountered by each system. If you read this reference book thoroughly and use it in conjunction with your service manuals, you shouldn't have any problems with electric door locks, the "Auto-Lock" power tailgate, or electric windows.

Remember, your customers ordered and paid for these options to provide more convenience and to some degree, more safety. And it's your responsibility as a Master Technician to keep them working properly so the customer gets what he paid for.

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Power door locks are a convenience and safety option for some Chrysler models. They permit locking or unlocking of all doors simultaneously from either front door. On all but Imperial models, this is accomplished with the regular door lock button. On Imperial models, it is accomplished by means of a switch located in the armrest portion of the front door trim panel.

**ALL DOORS LOCK AUTOMATICALLY**
On all but Imperial models equipped with electric door locks, all doors can be locked automatically at either front door. This is accomplished by pushing the lock button down to lock and pulling up to unlock in the same manner as locking them manually.

![Figure 1](image1.jpg)

**Fig. 1—Action same as with manual locks**

this will become evident later when the linkage and circuitry are explained in detail.

**RIGHT FRONT DOOR**
In the event of a power failure, the right front door can be locked or unlocked mechanically with the door lock push button. This is accomplished by means of an override device on the linkage. The right front door cannot be unlocked mechanically

![Figure 2](image2.jpg)

**Fig. 2—Will unlock door in event of power failure**

**LEFT FRONT DOOR**
The left front door cannot be locked or unlocked mechanically by the door lock button when equipped with electric locks. In the event of a power failure, the left front door can be unlocked manually with the inside remote handle. This action is the same as on models not equipped with electric door locks and is independent of the electric door lock system. It must be locked mechanically from the outside with the ignition key. The reasons for

![Figure 3](image3.jpg)

**Fig. 3—Rear doors lock or unlock by either button**
with the inside remote handle but can be locked mechanically with the key from the outside.

REAR DOORS
On four-door models, the rear doors can be locked or unlocked electrically by either front door locking button. They can also be mechanically locked or unlocked individually by their respective door lock button.

LINKAGE AND CIRCUITRY
Starting with the left front door on all but Imperial models, the following is a description of the mechanical and electrical circuitry for electric door locks. The door lock button is connected by a link to a spring-loaded toggle switch. The door lock button is not connected to the door latch in any way, therefore is not able to lock or unlock the door mechanically.

TOGGLE SWITCH COMPLETES CIRCUIT
When the door lock button is pushed down, it activates the toggle switch. The closed contacts of the toggle switch complete a circuit between the circuit breaker located on the fuse block and the door locking relay located behind the right front cowl trim panel. The circuit is energized as long as the switch contacts are held closed by holding the button down.

RELAY TO SOLENOID
The energized door locking relay completes the circuit to the lock windings of the solenoids in both front doors and the rear doors on four-door models. Each solenoid is grounded independently to its respective door inner panel.

SOLENOID TO LATCH
The solenoid is connected to the door latch mechanism by a link. When the locking winding in the solenoid is energized, the plunger moves into the winding. This extends the plunger shaft connected to the latch to lock the door.

BUTTON RELEASED, CIRCUIT BROKEN
When the door lock button is released, the spring on the switch returns the switch contacts to a neutral position and the circuit is no longer energized. Because the button is attached to the switch on the left front door, it also returns to a neutral position. Since the other buttons are connected to the latch mechanism, they remain in the down, or lock, position.
UNLOCKING
Pulling up on either front door lock button will electrically unlock all doors. The action is the same as the locking sequence only it is reversed. The toggle switch is activated in the opposite direction by the button. The closed contacts of the switch complete the circuit to the circuit breaker.

DIFFERENT RELAY IS ENERGIZED
In the unlocking sequence, the circuit is completed from the circuit breaker to the door unlocking relay which is energized. The door locking and unlocking relays are separate units contained in one component. The relay energizes the unlocking winding of the solenoid.

SOLENOID PLUNGER RETRACTS
The energized unlock winding attracts the solenoid plunger. As the plunger moves into the unlock winding, the plunger shaft connected to the latch retracts to unlock the door. When the button is released, the switch contacts return to a neutral position along with the button and the circuit is no longer energized.

SOLENOID ADJUSTMENT
If you can hear the solenoid operating, but the door will not lock or unlock electrically, it’s almost a sure bet that the solenoid is not properly adjusted. To adjust the solenoid, first disconnect the battery. Remove the trim panel and loosen the two solenoid mounting screws. Push the solenoid all the way down, then carefully pull upward on the solenoid link until the door locks. Hold the solenoid in this position and tighten the mounting screws.

Fig. 8—Solenoid adjustment is most common service

IMPORTANT! LIFT BY LINK
There’s one very important thing to remember when adjusting the door lock solenoid. Do not hold the solenoid down while pulling up on the link. The proper way is to lift the solenoid by the link alone. This will position the solenoid properly with the link extended the proper distance.

Fig. 9—Very important when adjusting solenoid

SERVICING ELECTRIC DOOR LOCKS
Service problems with the electric door locks are limited. The service procedures to correct them are relatively simple to perform. The most common service performed on the electric door locks is adjustment of the solenoid for correct positioning. This is usually required when you have a condition where all but one door will lock electrically.
DOOR LOCK SWITCH
The door locking switch connecting the door lock button in either front door is basically a simple, two-position toggle switch. One set of contacts completes the circuit to the door locking relay. The other set of contacts completes the circuit to the door unlocking relay. Since the solenoids can only be momentarily energized, the toggle is returned to neutral position by a double-action spring after the door lock button is released.

MINOR PROBLEMS CAN EASILY BE CORRECTED

Fig. 10—Spring returns toggle to neutral position

BUTTON DOES THE SAME
The left front door lock button is connected only to the door locking switch and is not connected to the door latch. When the button is released after locking or unlocking the doors, it will also return to a neutral position. The button is returned to the neutral position by the same spring action employed in the switch.

SWITCH LUBE IMPORTANT
Whenever the trim panel is removed for any reason, make sure that the toggle of the switch is lubricated at the point where the leaves of the spring contact the toggle. If not lubricated, corrosion could result from moisture. If this happens, the toggle may hang up and the solenoid will be energized longer than necessary.

Fig. 12—If not lubricated, corrosion could result

BURNED UP SOLENOIDS COULD RESULT
If the corrosive condition of the spring is allowed to become extreme, there's the possibility that the toggle will stick permanently and the switch contacts will remain closed.

In this case, the relay will remain energized and all solenoids will have constant current to the winding that was energized. If this occurs, there's a very likely chance that the result will be burned up solenoids.

ELECTRICAL TESTS MAY BE NEEDED
If a complete failure of the electric door locks occurs, electrical tests will have to be made to determine the cause of the failure. A standard voltmeter will be needed to test the circuit components. In addition, the battery voltage must be checked to make sure that it is fully charged, before conducting the tests.

DOOR LOCKING RELAY TEST
The door locking relay should be tested first. It is
located behind the right front cowl trim panel. To test the relay, connect the positive lead from the voltmeter to the buss bar on the relay assembly. Connect the negative lead to a good ground.

VOLTAGE READINGS
With no load on the relay, the voltmeter should read full battery voltage. When the door locks are activated, the voltage drop should read approximately one and one-half volts. The door locks should be activated in both the lock and unlock condition. If no reading is obtained, the circuit breaker should be tested next.

CIRCUIT BREAKER TEST
To test the circuit breaker, connect the positive lead from the voltmeter to the light green terminal of the circuit breaker. Connect the other lead to any good ground. A reading on the voltmeter of full battery voltage indicates that the circuit breaker is good.

If a reading of full battery voltage is not obtained, connect the voltmeter to the battery terminal of the circuit breaker. If a reading of full battery voltage is obtained in this manner, the circuit breaker is probably defective and should be replaced.

In some instances, a full battery voltage reading on the meter will not be obtained with the meter connected to either terminal of the circuit breaker. In this case, inspect the wiring for a break or a loose connection at any point.
Solenoid Replacement
If all solenoids have been properly adjusted, and the switches, circuit breaker and relay are not at fault, but the door will not lock or unlock electrically, the solenoid must be replaced. If it is necessary to replace a solenoid, follow the procedures outlined in the Body Service Manual. Whenever replacing a solenoid, it is especially important to properly adjust the solenoid for correct positioning.

Fig. 17—Follow Body Service Manual procedures

Power "Auto-Lock" Tailgate

The power Auto-Lock tailgate now is optional on most Chrysler Corporation station wagons. It provides increased protection for rear compartment passengers by locking the tailgate automatically when the ignition is on.

Fig. 18—Increased protection for passengers

Tailgate Unlocks from Instrument Panel
The tailgate may be unlocked electrically when the ignition switch is on. This is accomplished by actuating the tailgate unlock switch located on the instrument panel. The switch must be held in the engaged position until the tailgate is opened.

Fig. 19—Switch located on instrument panel

Tailgate Re-Locks Automatically
When the spring-loaded switch has been released, the tailgate latch will return to the lock position automatically if the ignition switch is on. When the
tailgate is closed, it will be locked. With the ignition off, the tailgate can be unlocked automatically by activating the tailgate unlock switch. However, the tailgate remains unlocked until the ignition is turned back on.

**MANUAL OPERATION**
The tailgate can be unlocked manually with the ignition off by using the tailgate key or pulling up on the push button on the inner tailgate panel. It can be relocked manually by key or push button or electrically by turning the ignition on.

**"B" BODY SOLENOID OPERATION**
The following paragraphs will explain the operation of the "B" body solenoid. With this explanation it will be easier for you to understand why the solenoid adjustment is much more important for the tailgate than the doors.

**SWITCH FOR EACH COIL**
To begin with, the "B" body solenoid is different because it retracts to lock and extends to unlock. This is just the opposite of the door solenoids. In addition, the operation of the tailgate solenoid is a bit more complicated than the door lock solenoid. The main reason for this is that the tailgate solenoid has a switch with contacts for each coil winding which is an integral part of the solenoid.

**SWITCH PLAYS IMPORTANT ROLE**
The switch in the tailgate solenoid plays a very important role in the proper operation and service life of the solenoid. One important thing to remember is that the coils are energized through the closed switch contacts. A snap ring installed on the shaft opens the switch contacts. The switch is designed so that when one set of contacts is open the other is closed.

**HERE'S A STARTING POINT**
To explain exactly what happens inside the solenoid, let's take a situation where the tailgate has been unlocked by the switch with the ignition off. If you remember, the tailgate will remain unlocked in this situation until the ignition is turned back on. In the unlock position with the ignition off, the lock switch contacts are closed. However, neither coil at this point is energized.

**IGNITION ENERGIZES LOCK COIL**
When the ignition is turned on, the lock coil is
energized. The plunger moves into the coil and the shaft retracts to lock the tailgate latch.

**PLUNGER OPENS CONTACTS**
The plunger moving into the lock coil opens the lock switch contacts which are physically held open by the latch. With the contacts open, the lock coil is no longer energized although the ignition remains on. The unlock switch contacts at this point are closed but are not energized.

**SWITCH ENERGIZES UNLOCK COIL**
When the tailgate switch is activated, the unlock coil is energized through the closed unlock switch contacts. The plunger moves into the energized coil and the shaft extends to unlock the tailgate latch. It remains in this position until the switch is released and the coil de-energized.

**IGNITION TAKES OVER AGAIN**
Because the ignition is still on and the lock contacts of the switch are closed, the lock coil will be energized again. The plunger will again move into the lock coil and the shaft will retract to lock the tailgate latch.

**WHY ADJUSTMENT IS IMPORTANT**
If the solenoid is not properly adjusted to the correct position, the travel of the shaft may be restricted. In this case, either set of switch contacts may be unable to open by the plunger moving into the coil. If the switch contacts remain closed, the coil will be continuously energized and will result in a burned-up solenoid.
INCLUDE LOCKING CONTROL ASSEMBLY
Since the action of the locking control assembly can affect operation of the solenoid, it must be adjusted along with the solenoid. In the event of improper tailgate “Auto-Lock” operation, or removal of the locking control assembly or solenoid for any reason, both the solenoid and locking control assembly must be adjusted to ensure proper operation. Failure to adjust them will result in inability to lock or unlock the tailgate electrically. Under extreme conditions, the result could be a burned-up solenoid.

START ADJUSTMENT PROCEDURE
To adjust the tailgate solenoid, open the tailgate door in the tailgate fashion and remove the tailgate trim panel. Disconnect the solenoid from the wiring harness and the solenoid link from the locking control assembly. Then loosen the locking control assembly mounting screws and push the button to the lock position.

POSITION FOR CLEARANCE
Position the locking control assembly so that there is approximately one-sixteenth of an inch clearance between the locking lever and the mounting plate of the locking control assembly. Hold the assembly in this position and tighten the mounting screws.

SOLENOID ADJUSTMENT
To adjust the solenoid, the mounting screws must be loosened. Then re-attach the link from the solenoid shaft to the locking control assembly. Push the solenoid toward the locking control assembly.
Hold the solenoid gently but firmly with the left hand. While holding the solenoid, push the lock button until the locking control assembly bottoms out in the lock position.

Allow the solenoid to move only the distance that the locking action of the push button requires. The solenoid will then be properly located in the correct position. Hold the solenoid in this position and tighten the mounting screws.

**CLEARANCE IN LOCK POSITION**

With the locking control and solenoid properly adjusted, there should be about one-sixteenth of an inch between the locking lever and the locking control assembly mounting plate when the assembly is in the lock position. Figure 30 illustrates the proper clearance.

**CLEARANCE IN UNLOCK POSITION**

In the unlock position, there must be clearance between the locking lever and the tab on the mounting plate. This clearance should also be approximately the same as between the lever and the mounting plate in the lock position. In some cases, the clearances may be more or less than one-sixteenth of an inch, however, the object is to adjust the locking control assembly and solenoid so that the clearances in the lock and unlock positions are close to being equal. Check the clearance by using the lock button to position the control assembly in both the lock and unlock position. If they are not close to being the same, the locking control assembly and solenoid will have to be readjusted.

**CONNECT SOLENOID AND TEST**

To test the system, connect the solenoid to the wiring harness. Turn on the ignition and operate the tailgate unlock switch. The tailgate should unlock. When the unlock switch is released, the tailgate should lock. Turn off the ignition and operate the unlock switch. The tailgate should unlock and remain unlocked until the ignition is turned on.

**COMPLETE TEST AT PUSH BUTTON**

Leave the ignition on and perform the last test at the tailgate door. With the ignition on, pull the door lock push button lightly toward the unlock position and try to open the door by the handle. If a slight vibration is felt and the door will not open, the solenoid is correctly positioned. If the push button resists efforts to unlock but no vibration is felt, the solenoid is incorrectly positioned.
felt, the locking control assembly and solenoid should be readjusted.

FIGHT-BACK FEATURE
By pulling up on the lock button, the lock contacts of the solenoid switch are brought together and the plunger moves out of the lock coil manually. As soon as the switch contacts meet, the lock coil is energized and the plunger moves back into the lock coil electrically. The force that the plunger exerts as it moves back into the lock coil is sufficient to overcome the pull force applied to the push button if a child attempts to unlock the tailgate while the ignition is on.

“C” BODY OPPOSITE OF “B” BODY
The operation of the “C” body solenoid is the same as the “B” body except that it extends to lock and retracts to unlock the tailgate. It, too, is equipped with a switch with contacts for both coils. However, because the movement of the plunger is opposite of the “B” body, the switch contacts and coils for lock and unlock operations are reversed in the “C” body solenoid.

“C” BODY SOLENOID ADJUSTMENT
To adjust the “C” body solenoid, first loosen the mounting screws. Push the solenoid toward the bottom of the tailgate and hold it lightly. At the same time, push the button to the lock position to locate the solenoid. Allow the solenoid to move only the distance that pushing the lock button requires. Hold in this position and tighten the mounting screws.

CHECKING SOLENOID ADJUSTMENT
Checking the operation and adjustment of the “C” body solenoid is done the same as for the “B” body solenoid. However, if the push button does not resist your efforts to unlock the tailgate while the ignition is on, check for one of the following as a possible cause. Check for a disconnected wire or short in the circuit and check connections at the tailgate unlock switch to make sure they are right. If the wiring continuity is okay, the solenoid is defective and should be replaced.

POWER WINDOWS

Power windows have been improved to the point that they are almost trouble-free. However, I’m sure that most mechanics at one time or another are faced with servicing them. Servicing power windows is pretty much limited to three basic conditions. Slow or partial operation, an individual window not operating and, of course, total system failure where none of the windows will operate.

SLOW OPERATION MOST COMMON
You’ll find that a majority of the service problems concerning power windows will involve slow operation of a window or a window that will not travel to the full down position. It is very important that you always check the window for freedom of movement in the glass run channels. Most problems of this nature can usually be traced to a mechanical rather than an electrical problem.

DOME LIGHT TEST
In the case of a window that will not operate, a simple test can be made using the dome light to
**HOW TO CHECK ALIGNMENT**
Lower the window about half-way down. This is the best position to check for alignment problems since the window is not being held steady by either the down stop or the up stop. The best method to check the window for any binding condition is to grab it and wiggle it in all directions. You have to determine by feel if the window is free to travel in the channels.

**MOTOR TEST IN MANUAL**
If you are convinced that the glass run channels are not at fault, the motor should be tested and may have to be replaced. The Service Manual has the complete procedure to properly test the motor and to remove and replace it if necessary.

**REMOVE MOTOR WITH REGULATOR**
If the motor has to be replaced, the entire regulator assembly should be removed from the door to remove and replace the motor.

**IS VOLTAGE SUFFICIENT?**
The dome light test only tells you that the motor is getting voltage. You still don’t know if the voltage is sufficient. This condition could exist in a window that is operating but goes up or down slowly. However, before making a voltage test on the motor, it is again advisable to eliminate first the possibility of an alignment problem in the glass run channels.

**CLAMP REGULATOR IN VISE**
The proper way to remove the motor from the regulator assembly is to clamp the geared sector and plate securely together in a vise. The assist spring must be removed and then the motor can be removed from the regulator assembly.
WHY RISK INJURY?
The motor controls the travel of the geared sector and the lift arm of the regulator. The assist spring is a strong, high-tension spring that is used to help the motor raise the window. If the assist spring is removed first, the motor can be removed and the regulator assembly will remain static. If the motor is removed with the assist spring in place, there is nothing to prevent the regulator from performing its normal function. Aided by the strength of the spring, the lift action will be accelerated. The lift arm moving at this velocity presents a threat to injury should it contact any part of the body.

TAKE ADVANTAGE AND TEST
If the motor and regulator assembly are removed, take advantage of the convenience to perform a couple more quick tests on the motor. These tests may indicate that the motor is not at fault and need not be replaced. You’ll need a fully charged battery to apply voltage to the motor and a standard volt-ammeter.

TEST WITH REGULATOR
Set the motor and regulator on the bench and apply full battery voltage to the motor. If the motor and regulator appear to be functioning properly, chances are that there is still an alignment condition in the glass run channels. As long as the regulator is removed, why not run the glass up and down in the channels by hand and check closely for any binding that may have caused improper motor operation.

ENOUGH FRICTION STALLS MOTOR
I’m sure you know that friction from a binding condition will slow motor operation. However, if the friction is sufficient, it will create a stall condition. If held in the stall condition long enough, the current draw will become great enough to open the circuit breaker inside the motor and stop operation. The circuit breaker will reset after a short period of time and motor operation will resume. Depending on the amount of friction caused by binding, the motor may function intermittently, or not at all. This is why it is important to check all other possibilities and not be quick to decide the motor is faulty and must be replaced.

REMOVE MOTOR AND TEST
Remove the motor from the regulator assembly by the proper method and test the motor independently. Apply full battery voltage to the motor and check the no-load running current with the ammeter. With couplings and seals still attached to the motor, the current draw should be about four amps. If the current draw exceeds four amps, the motor should be replaced.

REGULATOR MAY BE AT FAULT
If the motor is drawing the correct no-load current, but was operating slowly when attached to the regulator, check for a binding condition within the regulator assembly itself.

BLAME THE MOTOR LAST
As mentioned earlier, most power window problems can be attributed to a mechanical, rather than an electrical cause. If the motor is replaced to remedy the situation without first making the mechanical checks that have just been outlined, the problem will not be corrected. If power window service is done properly, it can be done without difficulty and you’ll also eliminate the possibility of embarrassing comebacks.

A WORD ABOUT SWITCHES
In a total failure of the power windows, it’s pretty safe to assume that the problem is in the switch or the wiring circuitry. If total lack of operation exists in only one window and alignment of the glass run channels, the regulator and the motor have been eliminated as the possible cause, check the switch for the individual window and the terminal for that window on the master switch. The Service Manual has the procedures for checking switches. If the switches are not at fault, check for a short, break or loose connection in the wiring continuity.