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CONTENTS

Servicing The 1964 High Performance 409 Engines

In early production of 1964 model 409 cu.in. V-8 engines, a camshaft change was incorporated in the 400 and the 425 hp. versions of this engine that are furnished for passenger cars in RPO L31 and RPO L80 respectively. The new design camshaft entered production on engines date stamped TO 1118 and suffixed engine type "QA" or "QB".

With use of the new camshaft a coordinated change to new cylinder heads, and valve spring and dampener assemblies was required.

Due to the higher lift and greater valve overlap of the later production camshaft, it is necessary that idle be set at 950-1000 rpm. on the later engines. The ignition timing setting for all 1964 engines of the L31 and L80 options is unchanged —set at 12° BTDC.

For a short period of time after introduction of this new camshaft these engines continued to use Vacuum Advance Control Unit #1116201, however, to improve quality of engine idle vacuum control unit #1116236 was installed on later production engines. If idle problems are experienced on vehicles that incorporate the later production camshaft and have vacuum control unit #1116201 installed; it is suggested that the #1116201 vacuum control unit be replaced with vacuum control unit #1116236.

On engines incorporating the later design valve train components outlined above, it is recommended that a valve lash setting of .018" be used for intake valves, and .030" for exhaust valves.

When necessary to check the 1964 later design valve springs, the spring deflection test should be performed with the dampener removed from the spring then the spring compressed to a height of 1¾". At this height new springs should require loading of 94 to 106 pounds. If a used spring, (with the dampener removed for test), requires a load of less than 74 pounds to compress to 1¾", it should be replaced.

The late 1964 camshaft has the didgets 7736 cast into it just to the rear of the #3 journal. This camshaft assembly is serviced as Part # 3837735.

The late 1964 valve spring and dampener assembly Part # 3858367 has two stripes painted on the coils: one yellow and one aluminum color.

The late 1964 cylinder head can be identified by the number 3852583 which is cast into it, however, this part will be serviced as a Cylinder Head and Stud Assembly under Part #3852582. The spring seats in this head are counterbored below the as-cast surface, to a depth of approx 1/64". The cylinder head used for the earlier production engines (cast 3814690) has spring seats that are raised above the cast surface.

The only late production part involved in the change, that can be used in the early production engines, is the cylinder head. When the 3852582 cylinder head is used on the engines built prior to 11-18-63, the early type valve springs must be used and shimmed as outlined in the Parts Catalog.

Under no circumstances should the 3858367 valve springs be used in the early cylinder head (cast 3814690) as the springs would compress solid and damage the valve train.

Corvair Generator Indicator Light Stays On

On some 1964 Corvairs an abnormal condition can be experienced in which the Generator Indicator Light may stay on, sometimes as long as five minutes after start-up in cold weather operation. On vehicles experiencing this trouble; when the ignition switch is first turned "on," the generator indicator light glows with full intensity in a normal manner, then after the engine is started and the vehicle is in operation, the light remains "on" but with a decreased intensity. However on subsequent restarts of these vehicles (when the engine compartment is warm) the light, in most cases, will go "out" in a normal manner.

The Generator Indicator Light on Corvairs should normally go "off" as soon as the engine is started and operated at speeds above a slow idle.

A slight mis-adjustment of the voltage regulator is the cause of the light remaining on. All regulators coded 4D with a black mark through the code have been readjusted and should not cause this cold weather problem. Any vehicle operating in warm climates will not be affected as much by this minor misadjustment of the regulator.

Since this indicator light is used to warn the operator that the cooling fan is not in operation, the driver may become quite concerned about the light indication.

When the above problem is encountered on vehicles equipped with voltage regulators bearing date codes 3H thru 4C, proper operation of the light can be provided as follows:

1. Remove regulator cover.
2. Lower cut-out relay closing voltage setting by turning adjusting screw one-quarter turn (1/4) in a counter-clockwise direction.
3. Start engine and check cut-out relay operation. When engine is speeded up, the cut-out relay points should be closed. When engine is stopped, cut-out relay points should open.

1964 Truck Emergency Air Brake System (RPO J75)

The Emergency Air Brake System (RPO J75), that is covered from a service standpoint in this article, is available as an option for most air brake equipped 1964 Chevrolet Trucks of the 60 and 80 Series. When this Emergency Air Brake System is installed on a truck, the axles that are to be used for emergency braking and parking hold are equipped with double-diaphragm, three-way air brake chambers; instead of the single-diaphragm type air chambers normally installed. Additional piping plus a low pressure indicator switch, an inversion valve and a push-pull valve complete the emergency system which is shown schematically in Figure 1, along with the basic and trailer air brake options. RPO J75 can be obtained either with, or independent of, the trailer air brake option.

The DD3 Safety Actuator air chambers, that are utilized in this option for application of the service brakes as well as for emergency braking and parking, not only assure extra braking reserve during emergency conditions, but also eliminate the necessity of a separate transmission parking brake and linkage.

To apply parking brake, the handle of the instrument panel mounted push-pull valve is pulled out by the driver. Simultaneously, the inversion valve vents air pressure from the lock piston cavity of the DD3 actuators and full emergency air reservoir pressure is directed thru the parking port of the actuator and against the auxiliary diaphragm. The roller spring in the actuators forces the rollers against the collar, thereby, locking the rollers with the push rod.

In the event an air pressure bleed down occurs when the vehicle has been parked for a prolonged period, the actuator rollers will remain wedged between the collar and shaft, thus preventing the shaft's return to a released position. To release the parking brake, the push-pull valve is pushed in thereby applying reservoir pressure to the actuator lock port and releasing the locking mechanism. At the same time, air pressure also is admitted to the control port of the inversion valve which causes air to be exhausted from the auxiliary diaphragm chamber of the actuators, thereby releasing the brakes.

During vehicle normal running conditions (push-pull handle pushed in), air pressure is delivered from the parking-emergency reservoir to the inversion valve control port. Directed then to the actuator lock port, the air pressure moves the piston forward, contacting the rollers and forcing them up the ramp. The rollers do not contact the push rod, and in normal service brake applications push rod travel is not restricted by the rollers.

If air pressure is lost from the service brake reservoirs, the emergency brakes may be applied by pulling out the push-pull valve handle which applies the brakes as when parking. In the event of air pressure loss at both the emergency and wet service brake reservoirs, a check value protects the dry service brake reservoir, permitting a normal stop with the service brakes. An air leak in the emergency system turns on the low pressure warning light before automatically tripping the push-pull handle at about 40 psi. The inversion valve, likewise, trips at the same pressure and applies the emergency brakes, using the remaining pressure in the emergency reservoir. The

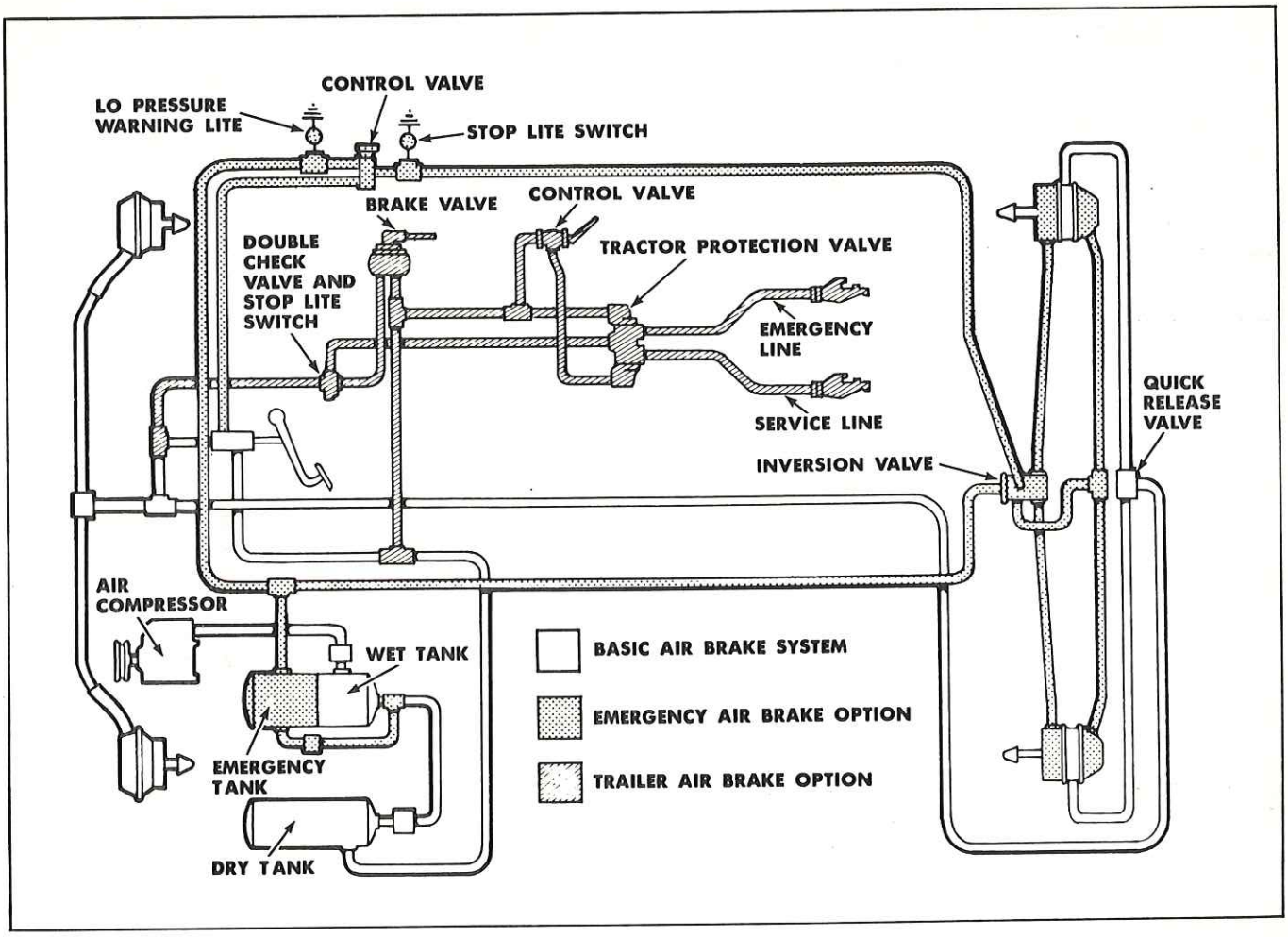


Fig. 1 — 1964 Truck Air Brake Systems—(Schematic)

driver then pushes in the push-pull valve handle and makes a heavy service brake application. This causes air to be exhausted from the auxiliary diaphragm and disengages the actuator lock mechanism. Normal service brake applications may then be made, allowing the vehicle to be driven until the cause of the emergency system leakage is determined. Conversely, the emergency brakes can not be released when the service brake system air pressure falls below safe operating conditions.

Emergency System Release For Towing

In the event that the emergency system has applied and the vehicle must be towed away for repair of the main or emergency air brake systems, the emergency brakes can be released for towing as follows:

1. Attach the truck to tow equipment and/or block wheels of the disabled vehicle.
2. Release all air from emergency air tank then tightly reclose the tank valve.
3. Back-off slack adjusters on wheels attached to emergency air brake system. If slack adjuster back-off does not provide full release of brakes, it will be necessary to remove the pin from the slack adjuster clevis.

CAUTION: *Before placing the vehicle back in service be sure to connect and readjust the slack adjusters and check operation of the emergency and service brake systems.*

TESTING OF INSTALLED COMPONENTS

PUSH-PULL CONTROL VALVE (Refer to Fig. 3)

Operating Test

1. With the air brake system pressure at zero, the actuators should be applied (pull rod fully extended).
2. Build up system pressure and hold control valve plunger "in." The control valve plunger should remain "in" when the systems pressure is above 50 psi. The brake actuators should release (pull rod fully retracted) after making a 100 psi service brake application.
3. With the truck reservoirs charged as above and with the control valve plunger "in", pull

the valve plunger "out". The brake actuators should apply.
4. Push control valve plunger "in". The brake actuators should release with a service brake application.
5. Make a series of brake valve applications to drop system pressure and observe that the spring brake actuators automatically apply when the pressure drops to about 40 psi. Also note that the control valve plunger comes "out".
6. If the push-pull control valve does not function as described above, the valve should be overhauled as described later in this article under "Repair of Components".

LOW PRESSURE INDICATOR SWITCH

Operating Test

Operation of the Low Pressure Indicator may be checked by reducing the reservoir pressure and being sure that the contacts close when the reservoir pressure is between 66 pounds maximum and 54 pounds minimum. The contacts will be closed when the warning light or electrical buzzer operate.

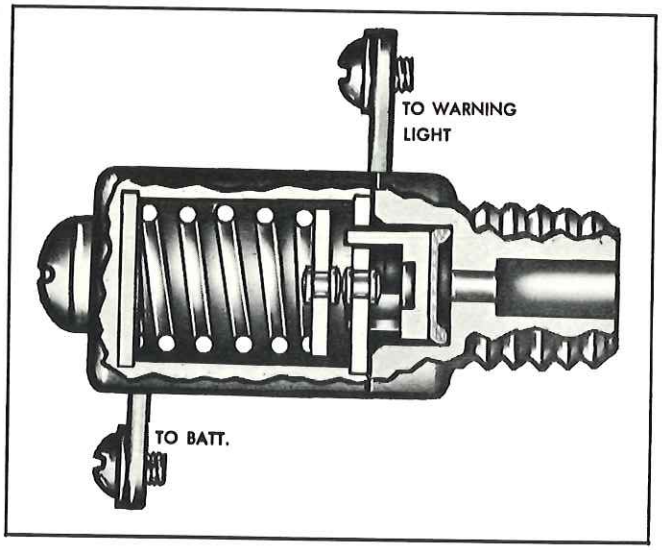


Fig. 2 – Low Pressure Switch–(Cut Away)

Replacement of Switch Assembly

If the low pressure switch is found defective in the operating test, or leakage is evident, repair of the installed switch is not recommended. The switch should be replaced as follows:

1. Block and hold vehicle by means other than air brakes.
2. Drain the air from the system.
3. Disconnect the electrical connections at the low pressure switch.
4. Disconnect the air line at the low pressure switch.
5. Unscrew the switch from its mounting position.
6. Reinstall new switch into the original location and tighten securely.
7. Connect air line and electrical connections to the switch.
8. Build up the air in the system and check to switch for leaks.
9. Check operation of the switch as outlined previously.

INVERSION VALVE (Refer to Fig. 4)

Operating Test

1. With the air brake system built up to governor cut-out pressure and the brakes released, pull out on handle of the push-pull control valve to apply the parking brakes. Note that the brakes apply.
2. Push in on the control valve handle to release the brake application and note that the air from the actuator auxiliary diaphragm chambers is exhausted out the inversion valve exhaust port. The operation of the control valve will not necessarily complete the release of the brakes. A heavy service brake application after the control valve is actuated should complete the release.

Leakage Test

NOTE: *Start leakage checks with system pressure up to governor cut-out and brakes released.*

1. Check the inversion valve exhaust port for possible leakage at (1) the large piston grommet; (2) piston stem grommet or; (3) the inlet valve or its seat. Slight leakage is permissible. While the inversion valve is still in this position, the cap nut should be checked for leakage by the seal ring.
2. Pull out on the parking control valve handle, applying the brakes, then check the inversion valve exhaust port for exhaust valve or seat leakage.
3. If the inversion valve does not function as described or leakage is excessive, it can be repaired by following the procedure outlined later in this article under the heading "Repair of Components".

DD3 SAFETY ACTUATORS (Refer to Fig. 5)

Operating Test

1. With the actuators in the released position, make several service brake applications and note that actuators apply and release properly.
2. Pull out on the push-pull control valve handle and observe that actuators apply. While actuators are in a parking position, drain air supply to auxiliary diaphragm by releasing the air from emergency reservoirs. Note that actuators remain applied.

3. Operate engine to replenish air supply in reservoirs. Push in on the push-pull control valve handle to release parking application, then make a full service application to complete release of actuators. The magnitude of the service brake application to release the brakes may vary on different vehicles due to compressor governor settings. Normally a service application of approximately 70 psi should release the brakes.

Leakage Test

1. With system pressure up and DD3 actuators in the released position, check drain slot and around the push rod boot with a soapy solution to detect possible leakage past the locking piston grommet.
2. Make and hold a service brake application and again check the actuator drain slot for service diaphragm leakage. Continue to hold the service application and coat around the service and auxiliary diaphragm clamping rings with the soapy solution to detect seal leakage. Release service brakes.
3. Pull the push-pull valve handle to parking position and check the exhaust port(s) of the service brake system to detect auxiliary diaphragm leakage. This auxiliary diaphragm leakage detection point could be the exhaust port of the foot brake valve, quick release valve or relay valve depending on system. While still in a parking position, the auxiliary diaphragm clamping ring should be coated with the soap solution to detect seal leakage.
4. Should leakage be detected at the clamping rings in either of the above tests, the clamping ring nuts should be tightened evenly but only enough to stop leakage.
5. If the DD3 safety actuator does not function as described or leakage is excessive, the actuator can be repaired by following the overhaul procedures outlined under "Repair of Components".

REPAIR OF COMPONENTS

PUSH-PULL CONTROL VALVE (Refer to Fig. 3)

Removal

1. Block or hold vehicle by some means other than air brakes.
2. Drain air brake system.
3. Disconnect air lines from control valve.
4. Drive out spiral pin that holds button on control valve plunger.
5. Remove button and warning ring.
6. Remove control valve mounting nut, then control valve.

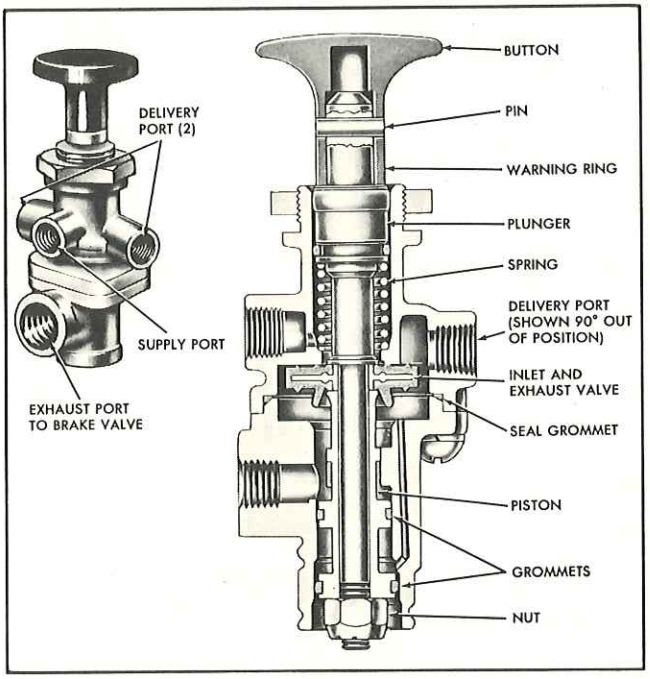


Fig. 3 — Push-Pull Control Valve Assembly

Disassembly

1. Insert a punch or rod in the plunger pin hole to keep the plunger from turning while removing the nut at the bottom of the valve.
2. Remove the plunger and spring.
3. Remove the plunger grommet.
4. Remove the two cover screws and separate the cover from the body.
5. Remove the cover seal grommet and the inlet and exhaust valve.
6. Remove the piston, then the piston grommet.

Cleaning and Inspection

1. Wash all metal parts in a good cleaning solvent and dry. Wipe all reusable rubber parts clean.
2. Inspect all parts for excessive wear or deterioration.
3. Inspect the inside area of the plunger and piston bores for nicks and bores.
4. Check springs for cracks, distortion or corrosion.
5. Inspect the grommets and inlets and exhaust valve for wear and deterioration.
6. Replace all parts not considered serviceable during these inspections.

Assembly

NOTE: *Prior to assembly, lubricate all grommets and bearings surfaces of the body and cover with barium-base grease (Bendix Westinghouse #204M, or equivalent).*

1. Install grommet on plunger.

2. Position spring on plunger.
3. Insert plunger, with spring and grommet installed, in body.
4. Position inlet and exhaust valve over protruding end of the plunger. The double-beaded side of the inlet and exhaust valve should be against the body seat.
5. Attach the cover to the body with two screws.
6. Install the piston, with the grommet installed, over the plunger stem.
7. Depress the plunger, and with a punch or rod hold it from turning while installing the plunger stem nut. Torque on this nut should be between 30 and 40 inch pounds.

Installation

1. Position valve assembly thru dash panel, install escutcheon plate and retaining nut. Torque nut to 10-20 ft. lbs.
2. Install red warning ring over plunger.
3. Install control button on plunger so that spiral pin holes in plunger and button line up. Drive in spiral pin.
4. Connect air lines to their proper ports on the control valve.
5. Perform the valve operating test as outlined earlier in this article.

INVERSION VALVE (Refer to Fig. 4)

Removal

1. Block and hold vehicle by means other than air brakes.
2. Drain service and isolated reservoir supplies.

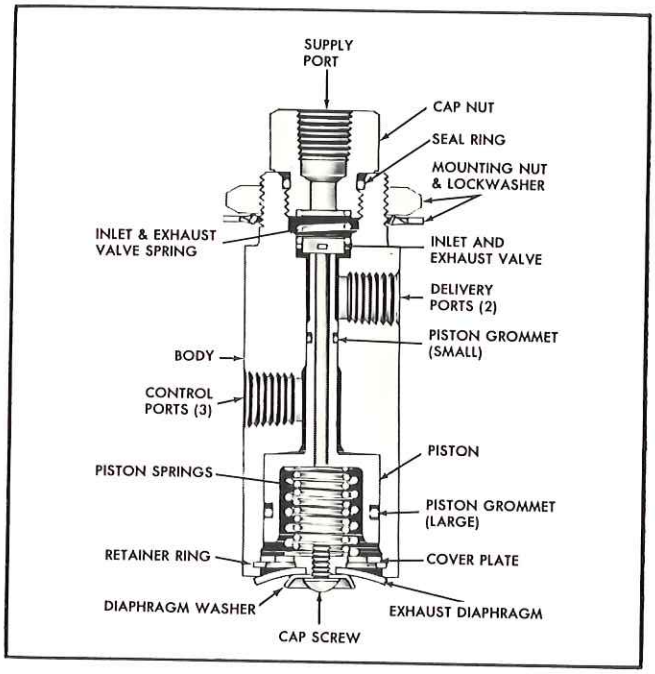


Fig. 4 — Inversion Valve Assembly—(Cross-Section)

3. Disconnect air lines from inversion valve.
4. Loosen valve mounting nut and remove valve.

Disassembly

1. Remove cap nut with sealing ring, remove sealing ring from cap nut.
2. Remove inlet valve spring and inlet valve.
3. Turn valve over and remove exhaust check valve diaphragm cap screw with lockwasher, then diaphragm washer and diaphragm.
4. With a pair of No. 1 Truarc pliers, remove retainer ring.
5. Remove cover plate and two (2) piston springs.
6. Remove piston with grommets.
7. Remove piston grommets.

Cleaning and Inspection

1. Wash all metal parts in a good cleaning solvent. Rubber parts should be wiped clean.
2. Inspect all parts for excessive wear or deterioration.
3. Check springs for cracks, corrosion, or distortion.
4. Inspect piston and its exhaust seat, body bores and inlet valve seat for nicks or burrs.
5. Replace all parts not considered serviceable during these inspections.

Assembly

NOTE: *Before assembling the valves, lubricate the piston, grommets and body bores with barium-base grease. (Bendix-Westinghouse #204M; or equivalent.)*

1. Install piston grommets on piston.
2. Install piston with grommets in valve body.
3. Position piston springs, cover plate and retainer ring in the piston in that order. Press the cover and retainer down and with a pair of Truarc #1 pliers, snap the ring into the body groove.
4. Install the diaphragm and diaphragm washer and secure with cap screw.
5. Turn inversion valve over and position inlet and exhaust valve in its bore.
6. Place spring down over inlet valve.
7. Install sealing ring on cap nut, install cap nut with sealing ring and tighten securely.
8. Mounting nut and lockwasher are installed when valve is mounted on vehicle.

Installation

1. Mount valve securely with mounting nut and lockwasher.
2. Check and clean air lines to valve.

3. Connect air lines to their proper ports on the valve.
4. Perform valve operating and leakage tests as outlined earlier in this article.

DD3 SAFETY ACTUATOR (Refer to Fig. 5)

Removal

1. Block and hold vehicle by some means other than air brakes.
2. With the actuators in the released position, disconnect or completely remove air lines from parking and service ports of the actuator.

   CAUTION: *Air will be exhausted out the line that is connected to the parking port when the control valve is operated. If this line is not removed, it should be disconnected in such a way that it will not whip and cause damage as the air exhausts.*

   NOTE: *After disconnecting only the parking and service port lines, operate the parking control valve. This action will exhaust the isolated air supply and air from the locking port. As a safety precaution, the service system should also be drained.*

3. Disconnect air line at actuator lock port.
4. Remove yoke pin cotter pin and knock out yoke pin.
5. Remove mounting nuts, then actuator.

Disassembly

NOTE: *Clean actuator exterior of all road grime then mark it in such a way so it can be assembled in the same manner.*

1. Remove yoke and yoke lock unts.
2. Remove boot, splash guard and felt breather.
3. Remove auxiliary and service clamping ring nuts and bolts.
4. Spread clamping rings slightly, just enough to slip them off the plates. It may be necessary to use a soft mallet driver to break the clamping rings loose. If the rings are being reused, caution should be taken against bending them out of shape.
5. After clamping rings are removed, auxiliary pressure plate, auxiliary diaphragm, service pressure plate and service diaphragm are removed in that order.
6. Place the remains of actuator on a smooth surface with the push plate down.
7. Connect the air supply (shop air) line to the locking port. By hand press down on the actuator non-pressure plate and at the same time apply air to the locking port. As the shaft is unlocked, ease the non-pressure plate back and remove push plate and shaft assembly with push rod and return spring.
8. Hold lock cap down against roller spring tension and completely remove all four (4) cap screws before releasing and removing cap.
9. Remove roller spring and spring seat washer.
10. Remove all eight (8) rollers.
11. Next cautiously apply air at the locking port to assist in removal of collar and piston, and to remove piston grommet.
12. Inspect bearing in shaft bore of non-pressure and remove it only if it is showing signs of wear and is to be replaced.
13. The push rod should not be removed from the shaft unless it is damaged. If the rod is removed it must be replaced. To remove the rod, place a heavy washer over the rod against the shaft, then position a spacer and second washer over the rod and beneath the yoke lock nut. Turn the lock nut down with a long handled wrench, pulling the push rod from the shaft.
14. The knurled T-bolts in the non-pressure plate can be removed and replaced if damaged.

Cleaning and Inspection

1. Wash all metal parts in a good cleaning solvent and dry. Any reusable rubber parts should be wiped clean.
2. Discard felt breather.
3. Inspect all parts for excessive wear or deterioration.
4. Particular attention should be given to the piston and collar bores in the plate. Also, the air passage from the lock port to piston bore should be clean and not restricted. It may be necessary to remove the inspection plug to thoroughly clean this passage.
5. Rollers should be checked carefully and all replaced if one or more need replacing.
6. Check springs for cracks, distortion or corrosion.
7. Replace all parts not considered serviceable during these inspections, especially rubber parts.

Assembly

NOTE: *On assembly, line up parts as they were marked prior to disassembly. If the bearing in the non-pressure plate was removed it should be re-installed or replaced.*

1. Lubricate piston and collar bores, shaft, piston grommet, piston and roller cavity with barium-base grease (Bendix-Westinghouse #204M; or equivalent).

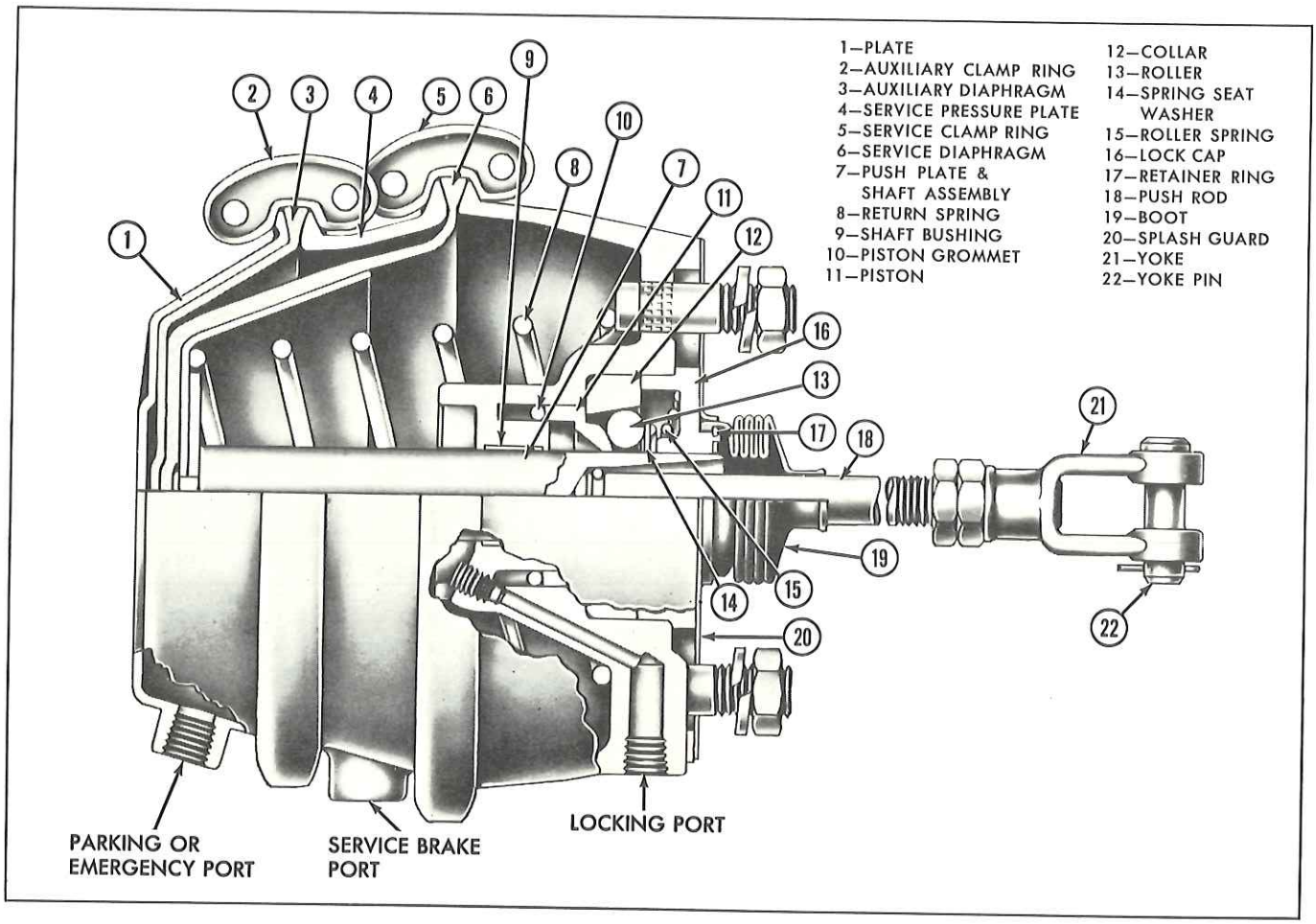


Fig. 5—DD3 Safety Actuator Air Brake Chamber—(Cut Away)

2. Position piston grommet in piston bore, then piston with smooth end down against grommet.
3. Place collar in its bore in plate.
4. Position all eight (8) rollers in groove formed by top of piston and collar ramp.
5. Place roller spring seat washer on top rollers.
6. Position cone shaped roller spring on washer with small end to washer.
7. Position cap on roller spring. Press cap down and hold while installing cap screws evenly and securely.
8. Turn over non-pressure plate with lock mechanism installed and position return spring in plate with large end down.
9. Position push plate and shaft over return spring and press down so shaft moves through lock. The lock should hold shaft position against return spring. If not, check assembly to this point.
10. Install service diaphragm, service pressure plate and clamping ring.
11. Install auxiliary diaphragm, auxiliary pressure plate and clamping ring.
12. Tighten clamping ring bolts in both clamping rings evenly and securely.
13. Install boot and new breather felt, then splash guard down over boot.

Installation

NOTE: *The Safety Actuators must be installed with the drain slot pointing down and towards the center line of the vehicle.*

1. Mount Actuator to mounting bracket and tighten securely.
2. Fasten actuator push rod yoke to slack adjuster with yoke pin. Lock yoke pin with cotter pin.

NOTE: *The angle formed by the push rod and slack adjuster arm should be greater than 90°.*

3. Connect air lines to actuator. Take care that the correct line is installed in the correct port.
4. Adjust brakes.
5. Perform actuator assembly operating and leakage tests as outlined earlier in this article.

Engine Water Pump Pulley Reinforcements

Information provided in Figure 6 is presented to clarify proper usage and installation of engine water pump pulley reinforcements. This illustration covers all 1964 engine applications in which the pulley reinforcement is required.

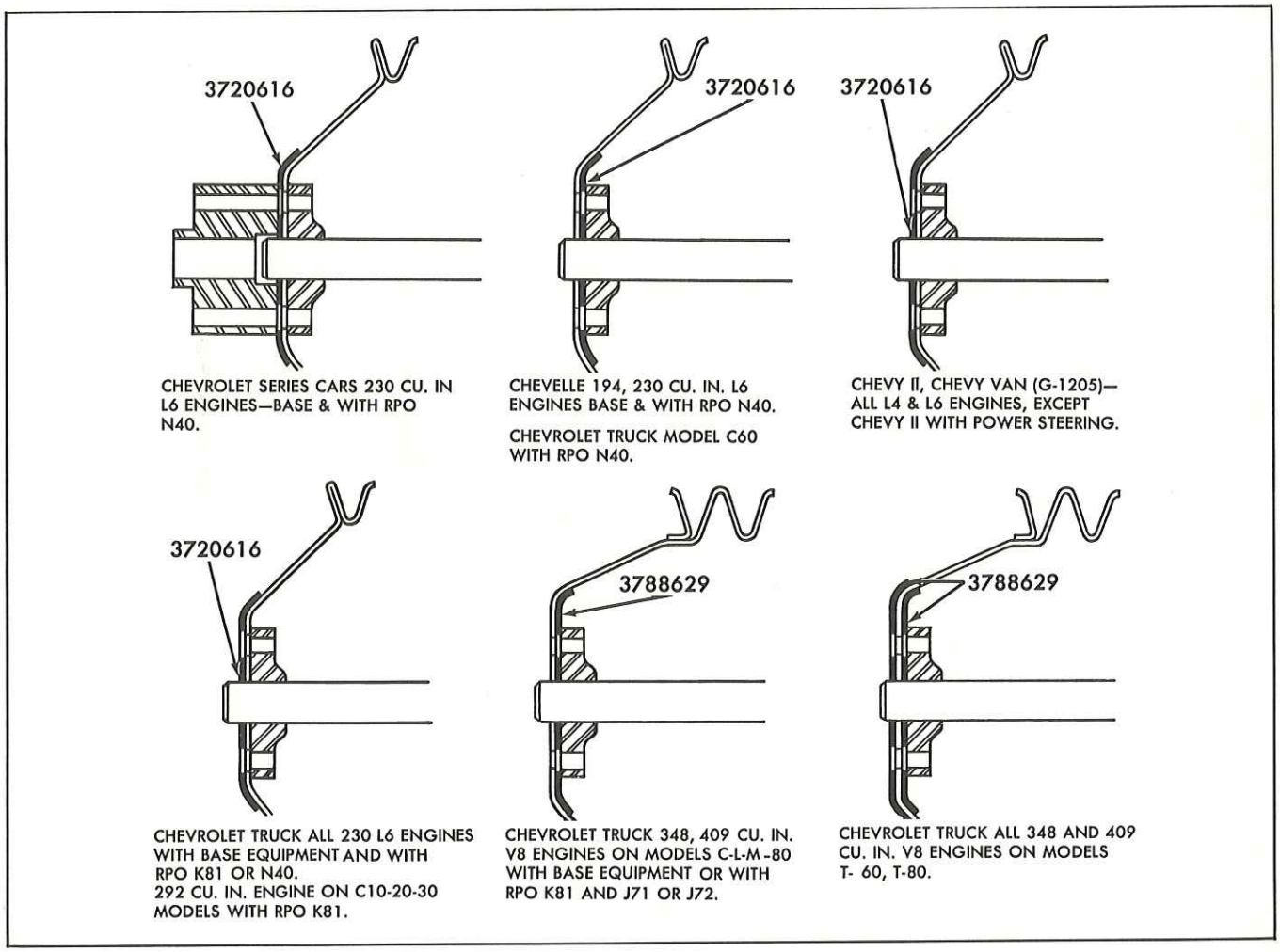


Fig. 6 — 1964 Engine Water Pump Pulley Reinforcement Usage

Elimination of Air Gap at El Camino Tailgate

The design of the tailgate area of Chevelle El Camino vehicles is such that a gap of approximately ¾ of an inch exists between the pickup box and tailgate (Fig. 7).

For the customer who desires a "grain-tight" pickup box, this gap can be eliminated by utilizing the following procedure:

1. Obtain one piece each of part #4406972 - R.H. weatherstrip and part #4406973 - L.H. weatherstrip. These are Service Stock items presently used at the tailgate location of the Chevelle Station Wagon.
2. Cut off the bulbular (solid) end of each weatherstrip. This will leave two pieces of

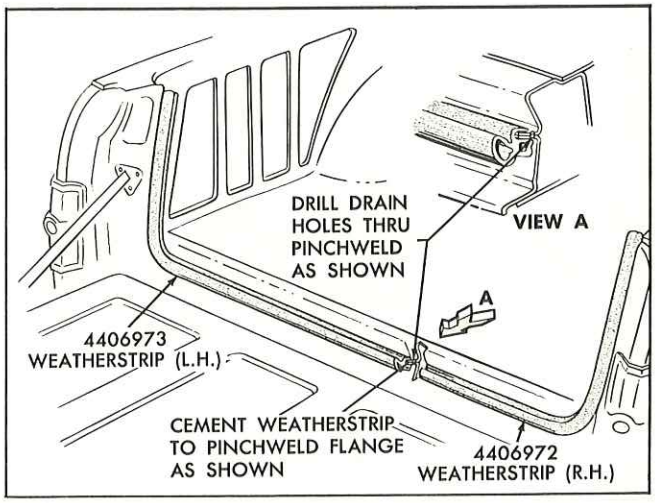


Fig. 7 — Sealing El Camino Tailgate

uniform, extruded section weatherstrip of approximately 44 inch length.

3. Apply a bead of weatherstrip cement to the top rearward edge of the pickup floor pinchweld.
4. Install the two lengths of weatherstrip to the pinchweld as illustrated on the following page.

It should be pointed out that eliminating the gap makes the gate area not only grain tight but also water tight. There are production drain holes incorporated at the front edge of the pickup box floor which will, in most cases, handle the drainage of any water that enters the box. However, if these prove to be inadequate, drain holes can be added at the rear of the box by drilling 1/4 inch holes through the pinchweld immediately in front of the weatherstrip (see the attached illustration).

Chevelle Tail Pipe Interference

On Chevelle vehicles with V-8 engine, the majority of reported axle noise complaints are actually the result of tail pipe interference to the trunk floor compartment and/or the upper spring seat. This condition can exist on either the single or dual exhaust system. Therefore, inspection of the exhaust system should be made before rear axle overhaul is even considered. The change in length of the exhaust system is approximately 7/16 inch when driving at highway speeds above 50 m.p.h. Therefore, the tail pipe clearances shown in Figure 8 must be attained to prevent interference under all operating conditions.

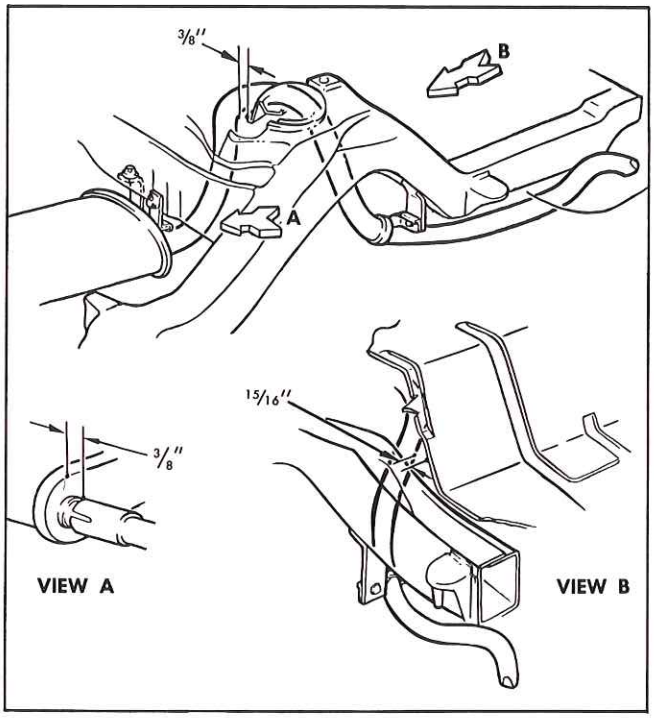


Fig. 8—Chevelle Tail Pipe Clearance with V-8 Engine

To eliminate an existing interference condition slide the tail pipe further onto the muffler, then if necessary, bend the tail pipe to obtain clearances required.

Air Conditioner Compressor Oil Leaks

Some instances of air conditioner compressor shaft seal leaks may be encountered which can not be corrected by the installation of new seals on the shaft. A refrigerant leak in the compressor shaft seal area of the 1962-63-64 model six cylinder compressors can be caused by several items other than a defective shaft seal, seal seat or seal seat O-ring. Before replacing a shaft seal kit because of a refrigerant leak, it is very important that these other items which are explained below be first checked and corrected as necessary to insure that seal leakage will not reoccur after the new seals are installed and the compressor operated a short time.

IMPORTANT: *Oil spotting of the underhood areas does not necessarily indicate an oil leak due to a faulty seal. The design of the six cylinder compressor is such that a small amount of oil is permitted to seep onto the clutch surfaces, which keeps the clutch from squeaking at engagement. Any oil that passes through the clutch is thrown off and may spot the hood and fender skirt slightly. Compressors suspected of having a faulty seal should be checked for refrigerant leakage with leak tester in the regular manner. If no refrigerant leak is indicated, the seal should not be replaced.*

Dislocation of Compressor Shaft in Swash Plate

Due to the design of the six cylinder compressor it is possible, either through the use of improper tools or by a blow on the front of the compressor, to move the shaft in the swash plate. If the shaft has been forced back out of its proper position in the swash plate, the carbon face of the shaft seal may not contact the stationary seal seat and a new shaft seal kit will not stop a refrigerant leak. Also, the rear thrust washers and needle bearing most likely were damaged when the shaft was forced rearward in the compressor.

When checking a compressor that has not been disassembled, if the clutch drive plate appears to have an insufficient air gap relative to the pulley face, dislocation of the compressor shaft in the swash plate should be suspected immediately. With the shaft nut installed to proper torque the air gap between the drive plate and pulley should be as indicated in Figure 9.

Any dislocation of the shaft in the swash plate can be determined positively by measuring the distance between the end of the front head extension and the flat shoulder on the shaft (shaft

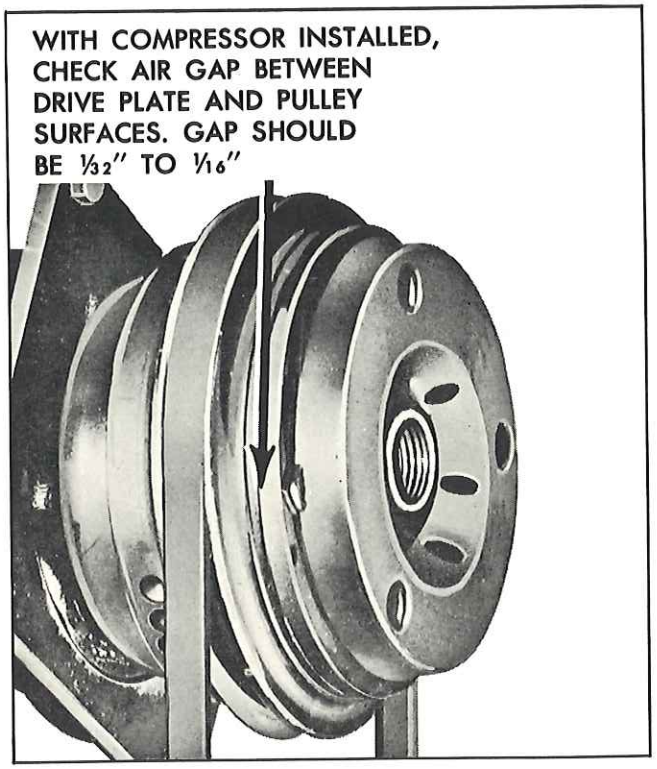


Fig. 9 — Checking Clutch Air Gap

shoulder is the surface which the drive plate hub spacer seats against). See Figure 10. This dimension should be not less than .028" and not more than .073".

To check this dimension, lay a straight edge approximately 2¼ inches long across the end of the front head extension and check gap between straight edge and shaft shoulder. If the shaft has been pushed back in the swash plate (dimension between straight edge and shoulder on shaft more than .073"), disassemble the compressor and replace the shaft and swash plate assembly and the rear thrust washers and needle bearing.

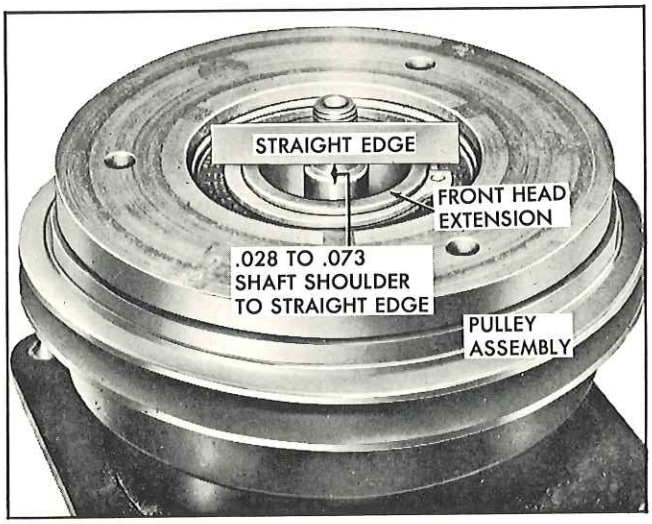


Fig. 10 — Checking Drive Shaft Position

Bent Shaft

Upon removal of the seal seat, examine the inside diameter of seat. If galling has occurred over the entire inner diameter of the seal seat, this indicates that the end of the shaft has been bent. In this case, the shaft and swash plate assembly should be replaced before a new shaft seal assembly is installed.

NOTE: *A bent shaft is very rare, but must be taken into consideration as a possible cause of a seal leak.*

Lack of Concentricity Between the Front Head and the Cylinder Block

Upon the removal of the seal seat, examine its inside diameter. If *one* side only has been galled by contact with the shaft, the front head is not concentric within acceptable limit with the cylinder block. This is a very rare condition; however, it must be taken into consideration as a possible cause of a seal leak.

If there is evidence of lack of concentricity between the front head and the cylinder block, replace the compressor assembly.

Delcotron Magnetic Hum

This is a reminder to technicians to be certain of their diagnosis before condemning a Delcotron bearing as a noise source. There have been many instances where the bearings have been unnecessarily replaced in attempts to eliminate the low speed whistle or whine which is prevalent under certain conditions. This hum or whine is actually a sign of a healthy Delcotron.

The Delcotron is unlike the old DC generator, in that the Delcotron has the capability of putting out substantial power at engine idle. The old DC machine was not capable of cutting-in and supplying the load at idle and speeds just above idle.

When the Delcotron has been setting all night, and has thoroughly stabilized at low temperatures, especially on mornings when the ambient is approximately 15 to 30° and the internal temperature of the battery is high, it is characteristic for the Delcotron to put out current much above its normal rating. This is due to the lower resistance that exists in the windings and fields before the unit warms up.

The hum will be very apparent after cranking because the battery state of charge has been reduced, this causing the Delcotron output to be higher due to the greater charge acceptance of the battery. This condition results in a whistle or whine which may be apparent to the owner as well as the service technician. The first thought is that this must be either the rear needle bearing or

the front ball bearing screaming. This can be diagnosed very quickly by removing the field connector at the back of the Delcotron. The whistle will stop immediately. Any attempt to pin point a noise source during this period, using a stethoscope to probe the Delcotron, will probably result in an incorrect diagnosis as a stethoscope will greatly magnify the signal created by the magnetic lines of flux which are constantly being transmitted between the stator and pole tips.

After a car has been in operation for 10 to 30 minutes, this magnetic hum period will generally taper off to a point where it is not noticeable. The hum, as stated before, is more noticeable in cooler weather. Some models will transmit this noise to the passenger compartment more readily than others, due to placement of body insulation, the general design of the engine compartment, and position of the Delcotron.

Any misplaced fire wall padding, or holes around grommets, or body leaks will also amplify this noise. The phenomena should be explained to the owner fairly, so that he accepts the condition which is actually the result of the high output delivered to keep the battery in a good state of charge. Any attempt to reduce the voltage, to quiet the Delcotron, will reduce the state of charge and cause a rundown battery. Since this is a characteristic of a high output machine, hum or whine must be analyzed correctly or much time will be wasted in trying to eliminate it.

We might caution again to eliminate this noise at checkout, it is necessary to disconnect the field connector only temporarily. If a screaming noise still is present, then a bearing can be suspected.

As a sidelight, we might explain that this is an air-borne noise and can be transmitted by such things as cruise control rods, throttle rods, ducting, and steering gear shafts. Any attempt to isolate this noise will be practically impossible.

Truck Ammeter Damaged by Disconnecting Horn Relay

For the many years Chevrolet has made a general recommendation that the battery be disconnected before performing service work on electrical equipment. However, it is realized that in certain operational checks of components it is advantageous to perform electrical work with the battery connected. For that reason it is felt necessary to warn service technicians that the ammeter used on trucks can be "burned-out" if the ammeter shunt wire is removed from the horn relay while the battery is connected.

Figure 11 shows the normal circuitry of the truck ammeter and also illustrates how current flow through the ammeter is increased if the shunt wire is disconnected from the horn relay terminal block during periods of either charging or discharging.

To avoid ammeter damage on trucks, always disconnect the battery before removing the ammeter shunt wire from the horn relay. The shunt wire is red on 6 cylinder engine equipped trucks and black on V-8 engine equipped trucks. It is spliced to the battery positive post connector and routed beneath the radiator upper support, to the horn relay.

NOTE: *Ammeters installed in passenger cars are not subject to the type of failure described above.*

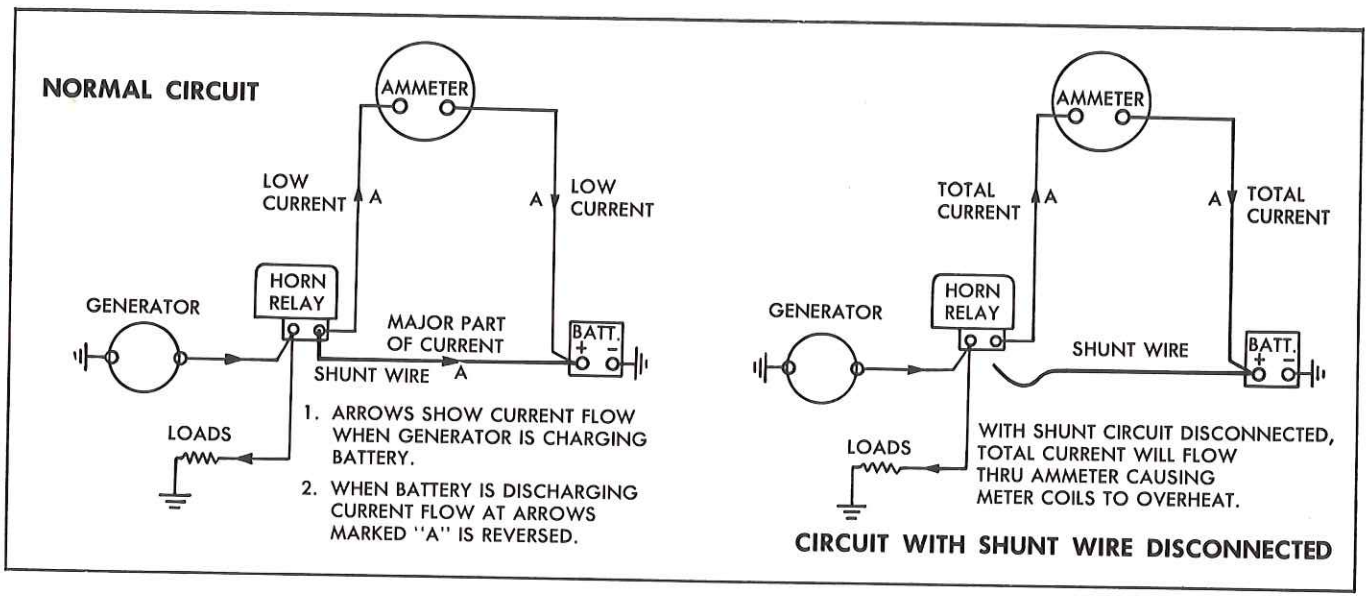


Fig. 11—1964 Truck Ammeter Circuit

3-Speed Transmission Countergear and Thrust Washer Usage

Some uncertainty seems to exist in dealerships as to exactly which service parts should be ordered to replace countergear, countergear thrust washers, and countergear roller bearing thrust washers for each of the slightly different Chevrolet built three-speed manual transmisions that are used in various Series 1964 passenger cars and trucks.

The following chart is presented to clarify service availability of the above mentioned parts and to insure their application in the proper transmissions.

PART NAME	Corvette Chevelle W/V-8 Chevy II W/V-8 Chevrolet W/327 V-8 250 or 300 HP	Chevelle W/L-6 Chevy II W/L-4 or L-6 Chevrolet W/L-6 or V-283 Cu. In. Chevy Van C10 Truck W/Overdrive	CORVAIR "95"	CORVAIR	CKP10-20, Truck (Exc. C10 W/Overdrive)
Countergear	3834208	3834207	3772522	3837983	*3817960
Countergear Thrust Washer	3834209	3834209	Steel (see note)	3834209	Steel (see note)
Countergear Roller Thrust Washer	3737814	3737814	None Installed in Prod. (see note)	3737814	None Installed in Prod. (see note)

NOTE: For each steel thrust washer replaced in servicing truck models noted, procure and use (1) 3740819 Countergear Thrust Washer & (1) 3737814 Countergear Roller Thrust Washer. The roller thrust washer is installed between the countergear rollers and the countergear thrust washer.

A brief description of the above countergears is provided below. This information should be used to establish positive identification of these parts so that binning error will be eliminated.

COUNTERGEAR Part Number	Number of Teeth	Over-all Length	Largest O.D.	Helix Angle At Clutch Gear End
3772522	27—14-22	5.722″	3.993″	31° 36′
3834207	27—14-22	5.842″	3.757″	39° 9′
3837983	28—14-22	5.842″	3.931″	39° 54′
3817960*	27—14-22	5.722″	3.755″	39° 30′
3834208	25—14-22	5.842″	3.571″	39° 9′

*Part number shown covers a service Countergear Unit; containing a countergear, countershaft, and roller bearing.

Truck 6 Cylinder Engine Camshaft Replacement

It is recommended that the following revised service procedure be followed when necessary to replace the camshaft and/or gear in either a 230 or 292 cu. in. 6 cylinder engine installed in 1964 Chevrolet truck models C, K-10-20 and C30.

1. Remove air cleaner and disconnect crankcase ventilation valve at rocker cover

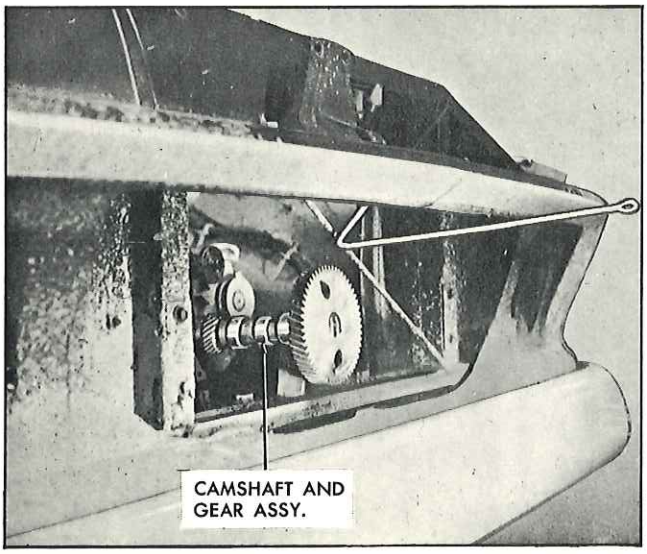


Fig. 12—Removing Camshaft on Light Duty Trucks

2. Remove valve rocker cover and gasket
3. Loosen rocker arms and remove push rods (Note: on the 292 cu. in. engine the #6 intake and exhaust push rods can not be readily removed because of body interference. Simply lift these two push rods enough for camshaft clearance and then tape or otherwise hold them to prevent the rods slipping down into the engine. If necessary to remove the #6 push rods refer to the article in this issue titled, "292 Cu. In. Engine Push Rod Replacement"
4. Raise vehicle and place on jack stands
5. Drain engine oil
6. Remove front mount-to-frame bracket bolts and loosen rear mount bolts
7. Drain radiator and cylinder block
8. Disconnect lower radiator hose from water pump
9. Raise front of engine and place wood blocks between front mounts and frame brackets
10. Remove oil pan bolts, drop pan, disconnect oil pump and remove oil pump and pan together
11. Clean oil pan
12. Disconnect upper radiator hose from radiator

13. Loosen Delcotron and remove fan belt
14. Remove harmonic balancer center bolt and remove harmonic balancer using tool J 6978-1
15. Remove fan, spacer and pulley (as an assembly)
16. Remove upper radiator bolts and remove radiator
17. Remove timing gear cover
18. Remove ignition distributor (Includes — rotate engine for timing)
19. Remove push rod covers and clean
20. Remove hydraulic lifters
21. Remove grille assembly. Includes: disconnect headlight wires
22. Center punch and drill out rivet in lower right end of radiator tie rod. Bend radiator tie rod as shown in Figure 12
23. Raise engine and remove blocks, then lower engine on mounts
24. Remove fuel pump (Note: at time of pump re-installation use Permatex #3 to seal attaching bolts
25. Remove camshaft thrust plate screws. Align timing marks. Slide camshaft and gear assembly from engine
26. Press gear from camshaft
27. Using new camshaft and/or gear, install gear on camshaft. Re-assemble engine using new gaskets and seals where necessary

NOTE: *To provide desired initial lubrication and proper mate-in of new valve train components use molybdenum disulfide grease to coat rubbing contact surfaces between any new rocker arms and rocker arm balls being installed; also use this grease to coat lobes of new camshaft and foot of new valve lifters.*

292 Cu. In. Engine Push Rod Replacement

When necessary to replace the valve push rods in 292 cu. in. engines installed in 1964 Chevrolet truck models C, K-10-20 and C30, it is suggested that the technician follow the service procedure detailed below:

1. Remove air cleaner
2. Remove valve rocker cover and gasket
3. Loosen rocker arms and remove push rods (Note that the 2 push rods for the #6 cylinder can not be removed at this time because of firewall interference
4. Raise #6 intake and exhaust push rods until they hit the firewall and then mark and center punch the firewall at contact points
5. Remove #6 intake push rod after drilling hole in body drip rail and filing to enlarge hole for necessary clearance
6. Remove windshield wiper arms and cowl air intake grille. Disconnect wiper linkage at motor
7. Remove #6 exhaust push rod after drilling hole in plenum chamber from bottom side, then using this hole to punch mark top panel of chamber and then drilling down from above through the top
8. Install push rods, rocker arms and rocker arm balls. Adjust valves

NOTE: *Use molybdenum disulfide grease on the valve rocker arm ball or the ball seat in valve rocker arm at locations where new parts are being installed.*

9. Install suitable plugs in plenum chamber holes drilled for push rod removal
10. Install wiper linkage to motor
11. Install body air intake grille
12. Install windshield wipers and arms
13. Apply body caulking to hole drilled in drip rail.
14. Install new valve rocker cover gasket, install cover and connect crankcase ventilation hose to cover
15. Install air cleaner

Corvair Battery Venting Revised

For late production 1964 model Corvairs, venting of the vehicle battery was changed from the familiar six individual vent plugs to two vent plug adaptors and hoses which vent battery gas or vapors to the outside of the engine compartment, as shown in Figure 13. This new method of battery venting was introduced to minimize the corrosive effect of battery gases on the vehicle components.

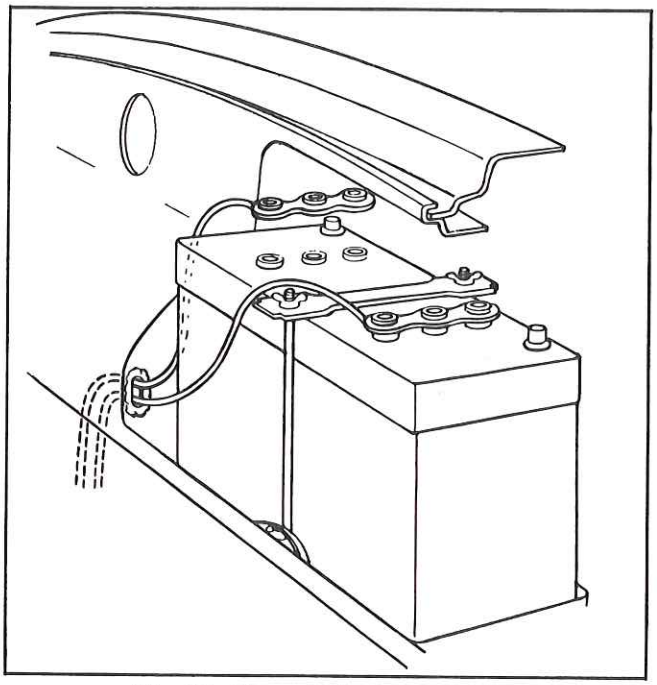


Fig. 13—Corvair Battery Venting

Chevy Van Defroster Outlets

The defroster outlet grilles should be reworked on all Chevy Vans built before March, 1964. A section of each outlet must be blocked off so that air will be patterned higher on the windshield to avert possible heat damage to the glass.

1. Remove the two plastic defroster outlets by using a screwdriver to pry upward on the outlet while depressing the side locking tab.

2. Turn the outlets bottom up and close off the forward section with tape, as shown in Figure 14.

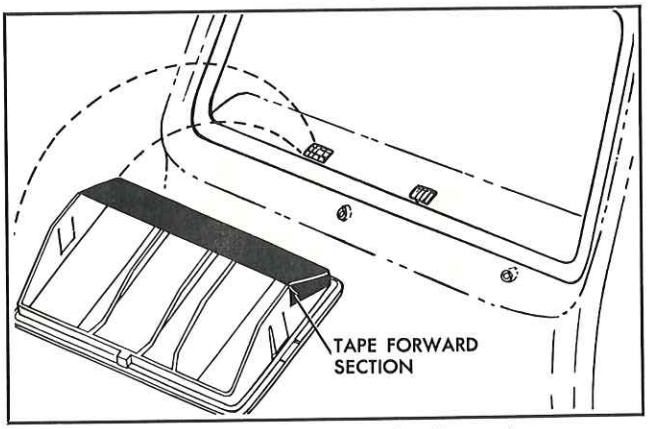


Fig. 14—Defroster Outlet Rework

Rear Axle Oil Leakage

Oil leakage from the rear axle pinion area on some late model passenger cars and light duty trucks can be due to leakage between the pinion shaft and companion flange, rather than past the companion flange seal. If leakage thru the shaft spline is detected, it can be eliminated by removing nut and washer and applying a non-hardening sealer (such as Permatex Type A) to the area shown in Fig. 15. Sealer is applied to this area in production and resealing should be performed if the flange is removed for service work.

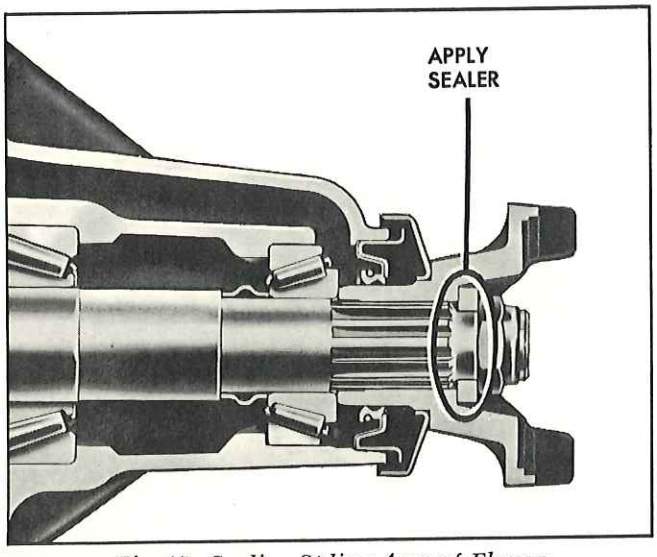


Fig. 15—Sealing Spline Area of Flange

Corvair Pinion Shaft Rear Seal

Figure 16 illustrates a time saving method of replacing the Corvair axle pinion shaft rear seal. Using tool J-8448-1 it is not necessary to press out the stator support shaft and pinion rear bearing cup. NOTE: *J-8448-1 was added to tool line in 1960.*

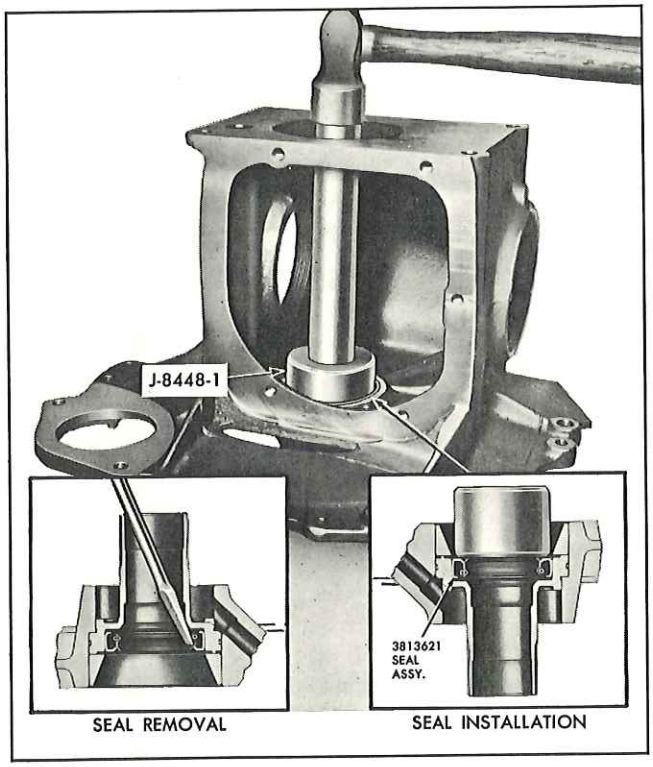


Fig. 16—Pinion Shaft Rear Seal Replacement

Corvair Clutch Housing Seal

Due to the configuration of the metal case on the improved design Corvair engine Clutch Housing Seal now being serviced, the use of new Installer J-21768 is required in order to prevent distortion of this seal during installation (Fig. 17).

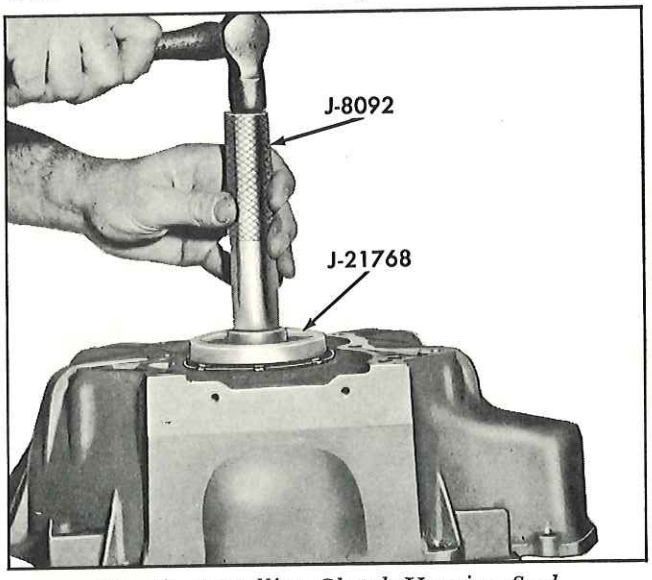


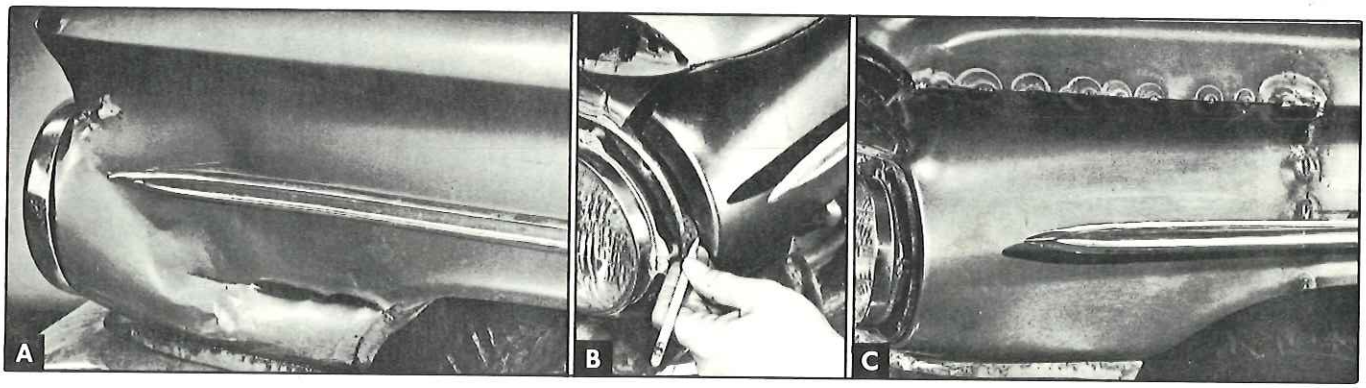
Fig. 17—Installing Clutch Housing Seal

BUILD EXTRA PROFITS WITH CHEVROLET THRIFT REPAIR PANELS

A wide selection of metal replacement panels that are formed to fit high damage areas of the front fenders, rocker and rear quarter panels are available for 1955-60 model Chevrolet Series passenger cars. These partial panels are rightfully named Thrift Repair Panels as they can be used to repair both collision and rust damage simply by installing the replacement panel over the old panel, or by cutting away the old panel before riveting or welding the replacement section in place.

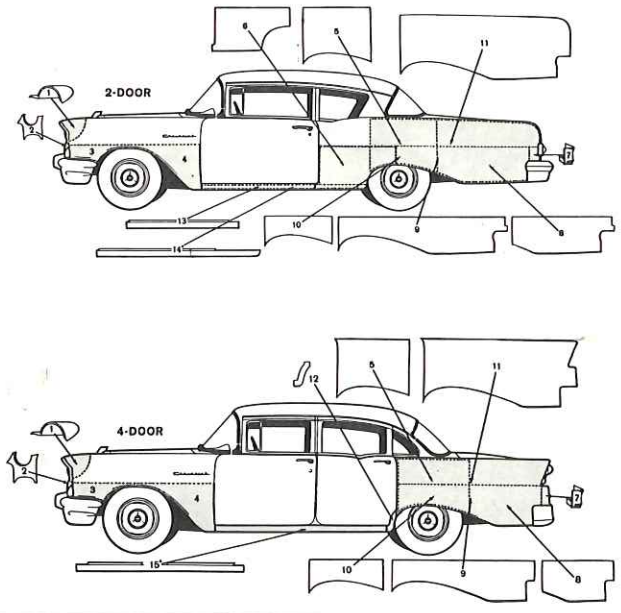
The Thrift panels are stamped from 20 gauge steel then bonderized, prime-coated and packaged in a polyvinyl coating that provides protection during shipping and storage. All panels are designed to nest closely to save space in the storage area.

Thrift Repair Panels duplicate original contours exactly, therefore fitting and metal finishing time is held to a minimum. Because the partial panels cost so much less than full panels and take less time to install, they make it possible to not only sell many more body repair jobs, but also to more economically recondition used cars taken as trade-ins.



View "A" of the above illustration shows typical damage to the fender lower front section of a 1959 Chevrolet. The localized severe collision damage combined with rust makes it economically advisable to cut out the damaged section and install a Thrift Repair Panel. View "B" shows the repairmen marking the front flange of the replacement panel so that it can be trimmed to fit the headlamp body. The portion of the new panel that extended above the fender crease line has already been cut off to locate the joint along the header. The partial panel was then securely clamped in position and the headlamp body screws were installed before the panels were spot brazed as shown in View "C". After brazing, the seam was filled by paddle soldering; thus making the job complete except for metal finishing and painting. Use of a Thrift Panel to repair the damage described above resulted in a total labor and material cost that was approximately only 20% of that which would have been incurred if the full fender panel had been replaced. This repair is typical of savings that are possible with Chevrolet Thrift Repair Panels.

Use these illustrations to determine which panels to order from Chevrolet Parts Catalog Listings



THRIFT REPAIR PANELS FOR CHEVROLET SERIES PASSENGER CARS	Covers Body Area	AVAILABLE FOR MODEL YEARS CHECKED 1955	'56	'57	'58	'59	'60
Headlamp Panel—Upper	1	√	√	√	√	√	√
Headlamp Panel—Lower	2	√	√	√	√		
Front Fender—Lower Front	3	√	√	√	√	√	√
Front Fender—Lower Rear	4	√	√	√	√	√	√
Quarter Panel (Entire) Center Sect.	5	√	√	√			
Quarter Panel—Lower Front (2 Door Only)	6	√	√	√	√	√	√
Quarter Panel Tail Lamp Section	7	√	√				
Quarter Panel—Rear Lower Section (Short)	8	√	√	√	√		
Quarter Panel—Rear Lower Section (Long)	9	√	√	√		√	√
Quarter Panel (Lower) Center Section	10	√	√	√	√		
Quarter Panel Rear Section (Full)	11				√		
Rear Body Lock Pillar	12	√	√	√	√	√	√
Rocker Panel	13	√	√	√	√		
Rocker Panel	14	√	√	√	√		
Rocker Panel	15	√	√	√	√		

THRIFT REPAIR PANELS FOR CHEVROLET TRUCKS	Cab Rear Corner Panels for 1947 thru '59 Models Headlamp Upper Panels for 1955 thru '59 Models