

# FOREWORD

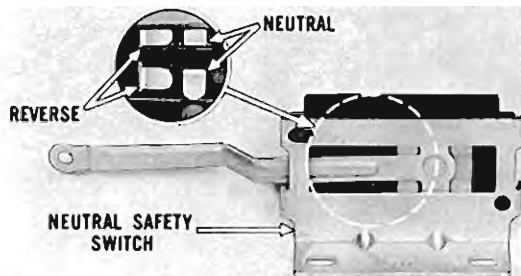
This booklet contains a complete review of the discus-sional slidefilm, **Servicing the Corvair Powerglide Transmission** (Part II, Trouble Shooting and On-the-Car Adjustments). Keep at least one copy of this booklet in the Service Department file of Technical Infor-mation.

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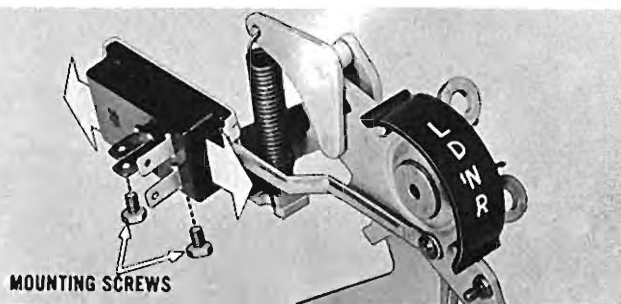
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This film, **PART II**, is designed to give you logical and practical trouble shooting procedures.

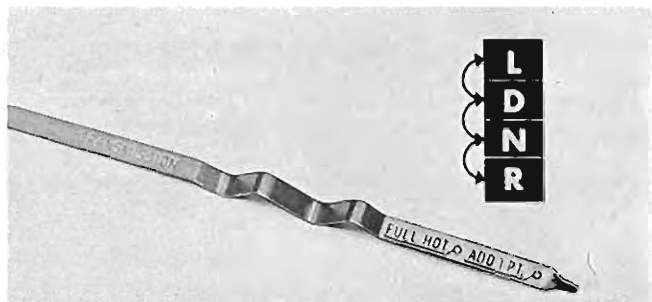
It is set up in the most convenient working order for speed and ease of service. Regardless of the trans-mission difficulty, perform **STEPS 1** through 4, beginning with a check of the neutral safety switch.



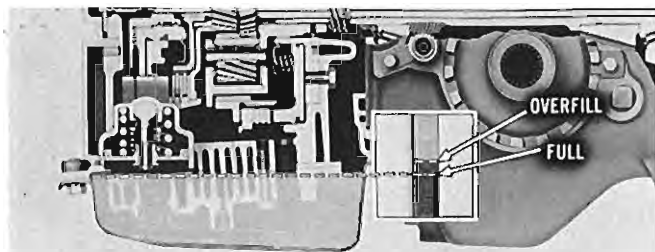
**STEP 1. CHECK NEUTRAL SAFETY SWITCH:** This switch performs two functions. The starter solenoid contacts are wired to prevent the starter from cranking the engine in all ranges except Neutral. The back-up lights (if installed) are wired to a separate set of contacts which close the electrical circuit when in Reverse.



If the starter cranks the engine in "L," "D" or "R" positions, loosen the mounting screws and move the switch housing forward or rearward until the starter operates in "N" position only. Tighten the screws and recheck. Make sure the back-up lights operate (if installed).



**STEP 2. OIL LEVEL:** With transmission warm and engine at normal idle speed, set hand brake and momentarily place the selector lever in all drive ranges. Return to Neutral. Check oil level on transmission dipstick.  
**NOTE:** LOW to FULL mark requires one pint.



If the oil level is more than  $\frac{1}{8}$ " above the FULL mark, drain the amount required to correct the overfill condition. Too high an oil level can cause serious transmission difficulties, due to oil foaming, particularly during hot weather or when driving steep grades.



**OIL LEAKAGE:** If the dipstick reading is below the FULL mark, check for signs of leakage at the pan to case gasket, filler tube connections, modulator to case gasket and pressure test ports. The transmission oil is dyed red to help locate the exact source of leakage.



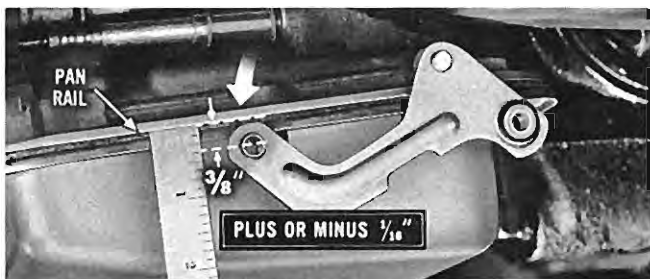
Check for oil leakage at the control cable attachment to the case. Early production models have a threaded nut which tightens and seals the cable sheath to the case. The sheath nut must not be torqued over 10 foot-pounds. Overtightening can crack the case at this point. If the cable nut does not seal at 10 foot-pounds, use a sealer on the threads.



Late production control cables use an "O" ring to provide the seal. If leakage occurs at this point, correction can be made without dropping the oil pan. Place transmission in "D." Remove bracket attaching screw and carefully work cable out of case counterbore. Discard "O" ring.

Install a new "O" ring against the bracket face. Disconnect both rods at throttle lever. Rotate lever fully counterclockwise to place opening in slotted inner lever fully forward. Insert cable into case bore and install bracket attaching screw. Check installation as follows:

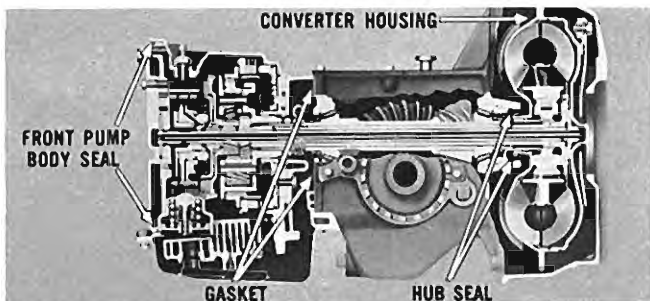




Make sure selector lever is in "D" position. Rotate throttle lever counterclockwise. The hole in the large arm must be below the oil pan rail within the limits shown. If the hole is above the pan rail it indicates the cable ball end did not enter the slotted lever and must be reinstalled correctly. Attach throttle rods with retaining clips.

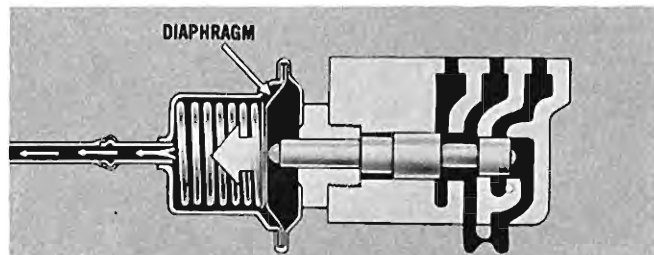
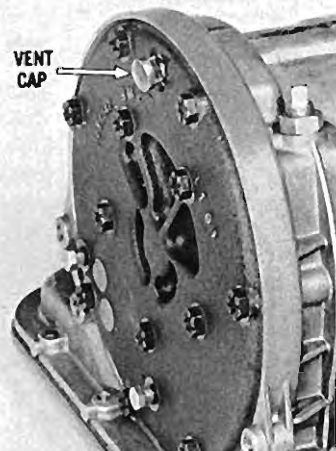


Check for signs of oil leakage at the throttle lever shaft and at the governor. Loss of oil at these two points can be corrected "on-the-car." Follow the service procedures which are shown later.

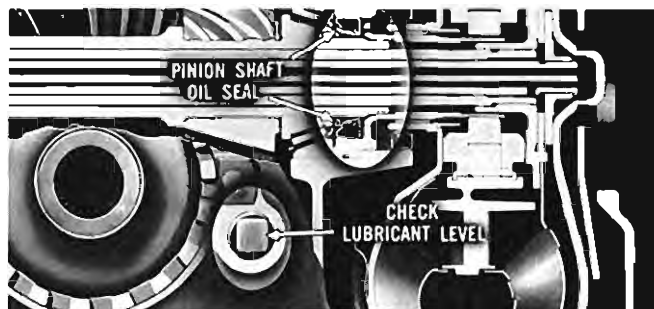


Oil leakage from the front pump body to case seal, the case to rear axle housing gasket, the torque converter housing or the converter hub seal indicates "on-the-bench" service is required. To correct these leakage points, see Part III, OVERHAULING THE CORVAIR POWERGLIDE.

Leakage at gaskets or seals may be caused or "magnified" by a plugged transmission air vent which prevents escape of normal internal air build-up. Rotate the vent cap to dislodge any foreign material which may tend to close the passages.



Loss of oil without finding a leakage point may be caused by a ruptured vacuum modulator diaphragm. This condition allows transmission oil to be drawn into the intake manifolds causing excessive engine exhaust smoke. If this condition is noted, replace the vacuum modulator as covered later on when we test the system. If engine exhaust appears normal —



— check rear axle lubricant level. Transmission oil may enter into the differential case if the pinion shaft oil seal becomes excessively worn or damaged. Service procedures and corrections are covered in the overhaul film, PART III. This completes leakage checking procedures.

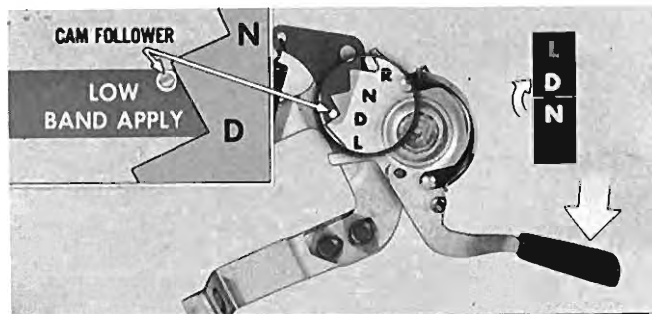
### STEP 3.

**CHECK MANUAL VALVE POSITION:** A manual valve incorrectly positioned may restrict or block mainline pressure from entering the servo apply and release passages and the vacuum modulator and throttle valve circuits.

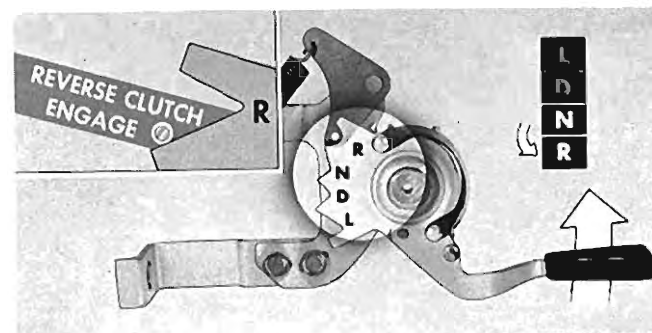
A restriction in mainline pressure may result in clutch and band slippage, excessive heat and wear and eventual "no drive" condition.

Blocked passages may prevent car movement or cause "lock-up" in a drive range.

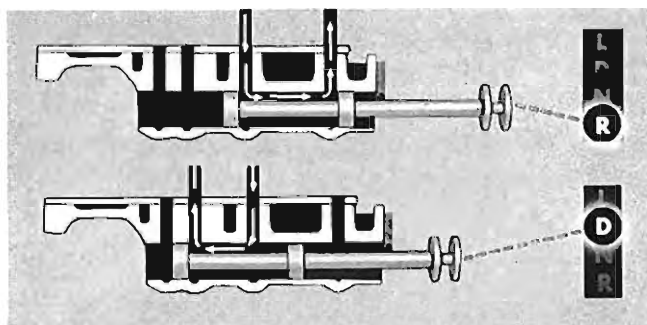
Check the manual valve as follows:



With the wheels blocked, hand brake firmly applied and engine at idle rpm, slowly move the selector lever from "N" toward "D" range. The transmission low band should not apply until the cam follower begins to ride down the peak of the DRIVE detent and enters the area shown.



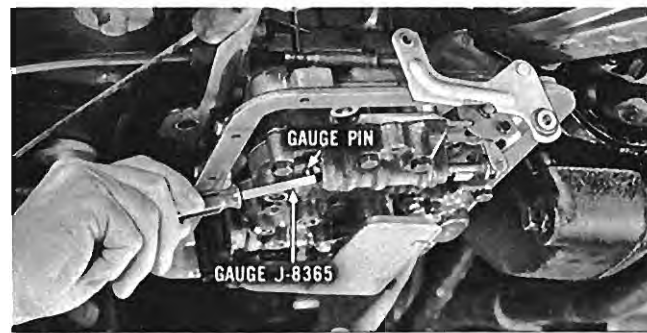
Return the selector lever to "N" and slowly move the lever toward the "R" range. The reverse clutch should not engage until the cam follower begins to ride down the peak of the REVERSE detent and enters the area shown.



When the cam follower drops into full detent for "R" or "D" range, the manual valve should be correctly positioned in the valve body bore with the pressure ports fully open. Neutral and low ranges are then automatically correct.

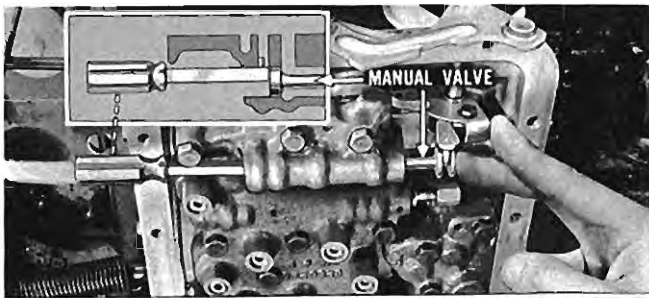
### ADJUST MANUAL VALVE POSITION:

If low band apply or reverse clutch engagement occurs out of the detent areas indicated previously, the manual valve must be re-positioned in the valve body bore. Correct this condition before making a road test. Turn ignition off and place the transmission in "D."

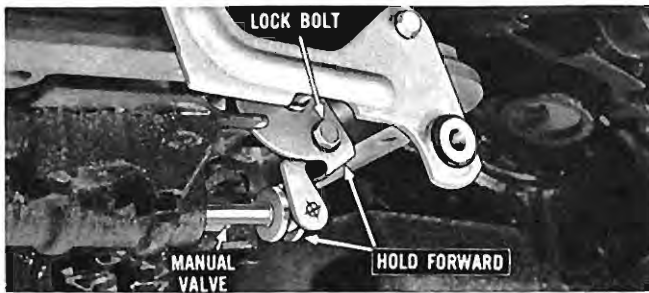


Slowly remove the filler tube gland nut and drain transmission oil into a clean container. Remove pan bolts and pan. Place Gauge J-8365 in the manual valve bore with the gauge pin upward.

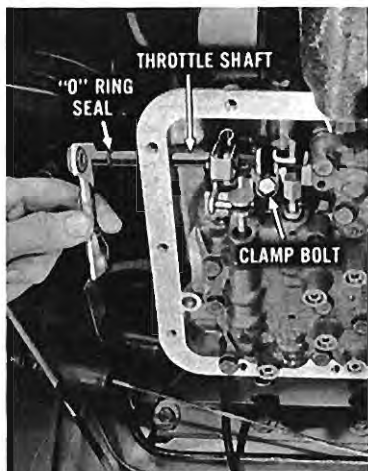




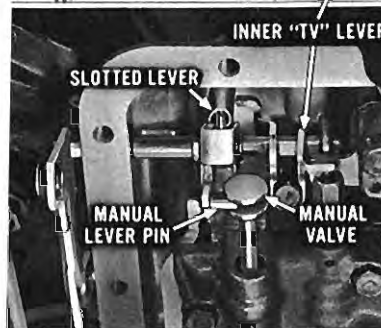
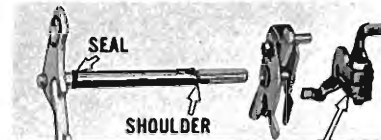
Holding the gauge in position, lightly push both the manual valve and the lower end of the slotted lever toward the front of the transmission. A correctly positioned manual valve should contact the end of the gauge and hold it in place without requiring support.



Adjust the manual valve if it interferes with the gauge and prevents it from entering gauging position, or if the valve face does not contact the gauge. Loosen the lock bolt and locate the valve correctly. While holding the valve and lever in a forward position, tighten the lock bolt securely.



**THROTTLE SHAFT SEAL:** If there are signs of oil leakage at the transmission case to shaft "O" ring seal, correction can be made as follows: Loosen the clamp bolt and carefully pull the shaft out of the case to prevent damage to inner levers.



Position a new seal on the shaft. During installation, make sure the slotted inner lever is connected to the cable ball end and the manual valve indexes with the pin. When the shoulder contacts the inner "TV" lever, tighten the clamp bolt.



When the pan is dropped for any reason, remove the oil screen and "O" ring seal. Clean the screen and oil pan thoroughly. Discard old seal. Install new seal in the valve body intake port. Install the screen and attaching screw.



Remove old gasket material from case with a clean solvent. Scraping may score the aluminum and cause an oil leakage path. Install pan with a new gasket. It is important that pan bolts are not torqued over 3 to 4 foot-pounds. Install 2 quarts of transmission oil and check level as described earlier. Normal refill, 3 quarts if pan is dropped.

**STEP 4. ROAD TEST:** Check transmission operation in all selector ranges, car speeds and accelerator pedal positions.

### SHIFT POINT — MPH CHART

#### UPSHIFTS

Minimum Throttle . . . . .	10 — 12
Part Throttle (to detent) . . . . .	34 — 41
Full Throttle . . . . .	41 — 47

NOTE: Normal minimum throttle upshift will be about 16 mph. However, a 10 to 12 mph upshift is possible if the accelerator pedal is released slightly when this road speed is reached.

### SHIFT POINT — MPH CHART

#### DOWNSHIFTS

Closed Throttle . . . . .	8 — 12
Part Throttle . . . . . below	23 — 30
Full Throttle (through detent) below	38 — 44
Manual Low (will not downshift) above	41 — 46

During the road test, check the engine for correct operating condition. Proper

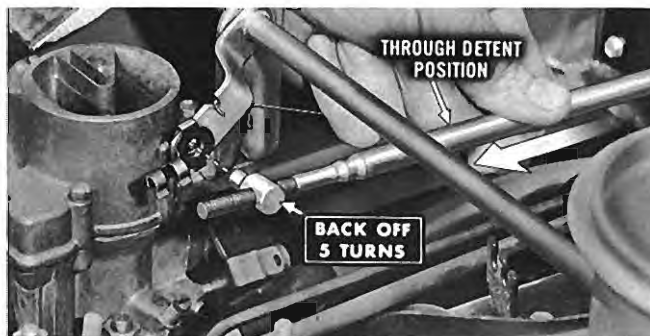
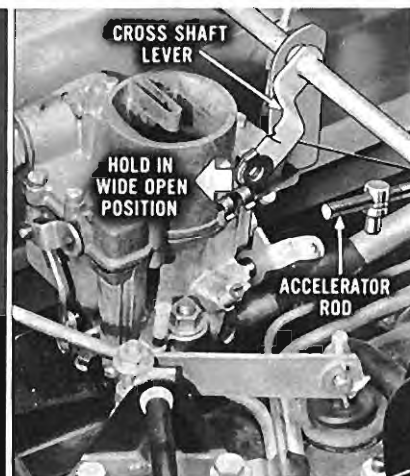


transmission operation depends to a great extent on the engine being "in tune." The carburetors and all connecting linkage must be set to the latest factory specifications and in accordance with the latest service procedures.



**THROTTLE CONTROL LINKAGE:** Shift points which are not within the normal operating range or no full throttle downshift may be caused by improperly adjusted transmission linkage. To check linkage, remove the mud guard and disconnect the accelerator pedal rod swivel joint.

Disconnect the accelerator rod from the carburetor cross shaft lever. Hold the lever so that the carburetor throttle valves are in the wide open position.



Pull the accelerator rod toward rear of car through detent and hold in this position. Rotate swivel joint to align with attachment hole in lever, then back off swivel (lengthen) 5 complete turns. Attach swivel to lever with clip.



**CHECK ACCELERATOR PEDAL TRAVEL:** Place a 1/4" wood block between floor mat and tip of pedal. A 2" block is required if mat is not in place. With the accelerator pedal to throttle lever rod disconnected at the transmission, firmly hold the pedal down to the block. A pedal jack can also be used.



Rotate the throttle lever at the transmission through detent. Firmly hold the lever in this position and check swivel to lever hole alignment. If necessary, turn swivel to align with hole in lever as shown. Attach swivel to lever with clip. Install mud guard and remove wood block.



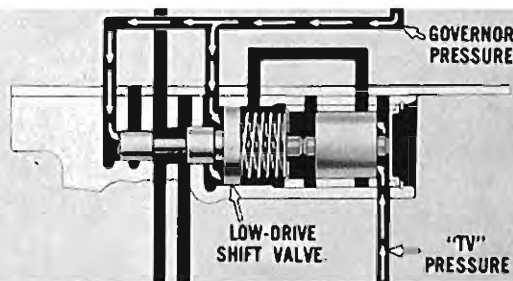
**LOW BAND ADJUSTMENT:** If engine rpm seems to "run away" when starting out in "D" or "L" or during part throttle or full throttle downshifts, it may indicate the low band is slipping. Remove the parcel compartment panel screws. Remove the rubber plug located directly over the adjustment screw.

Adjusting the low band requires a short handled, inch-pound torque wrench such as J-5853. An extra deep 3/4" socket (4 1/2" to 6" long) must also be used to hold the locknut and prevent incorrect torque reading.

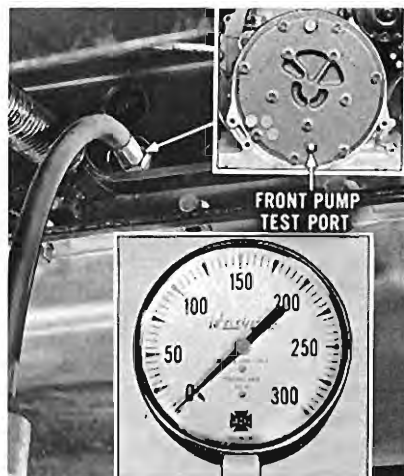
See page 6E-5 in the Corvair Shop Manual for details on how to improvise the socket and the procedures of band adjustment.



1. Loosen locknut. Torque adjusting screw—40 inch-pounds.
2. Back off adjusting screw—exactly 4 turns. Tighten locknut while holding adjusting screw stationary.



**TEST FRONT PUMP PRESSURES:** If a linkage adjustment does not correct the cause of improper shifting, the difficulty may be incorrect "TV" or governor pressure to the low-drive shift valve. Perform a front and rear pump pressure test before taking a "TV" pressure reading. Proceed as follows:



Remove the front pump test port plug located at the 6 o'clock position on the pump cover. Install an oil pressure gauge. The gauge hose should be long enough to allow pressure readings to be made at the side of the car.

**GENERAL NOTE:**

For **SAFETY** reasons, it is suggested that during any oil pressure, or vacuum tests, the gauge should be located away from underneath the car.

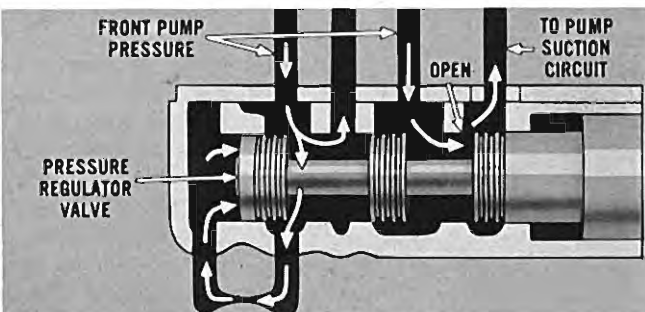
If it is necessary to place the transmission in a drive range during the tests, the rear wheels should be raised off the floor (3" to 5") with the car resting solidly on jack stands.

Test front pump oil pressures with the engine at idle speed, the transmission oil level at the FULL mark and at normal operating temperature. Pressures should be checked in all selector ranges, as shown.

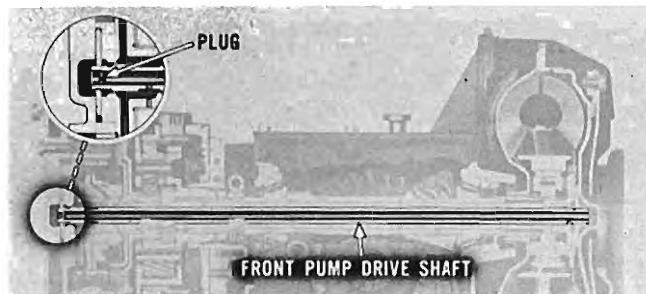
RANGE	VACUUM MODULATOR HOSE CONNECTED	VACUUM MODULATOR HOSE DISCONNECTED
REVERSE	81-98 PSI	140-157 PSI
NEUTRAL	47-57 PSI	71-82 PSI
DRIVE	47-57 PSI	71-82 PSI
LOW	71-82 PSI	71-82 PSI

Front pump oil pressures which are above limits with the vacuum modulator hose connected cause:

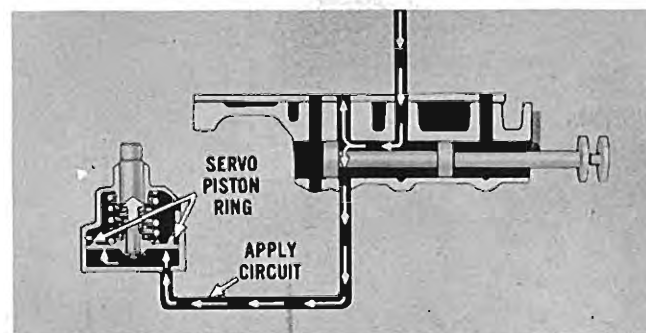
- HARSH GARAGE SHIFTS and
- SEVERE CLOSED THROTTLE "COAST" DOWNSHIFTS



Low oil pressure in all ranges with the modulator hose connected or disconnected indicates the pressure regulator valve may be stuck partially open, by-passing part of front pump pressure to the pump suction circuit. Remove valve body as described in the valve body removal section.



Absence of oil pressure indicates a broken front pump drive shaft, or the shaft disengaged from the front pump drive hub. Very low oil pressure would be caused by a dislodged plug from the front of the hollow front pump drive shaft. See Part III for necessary overhaul procedures.



If pressures are below limits in "D" and "L" range but within the limits in "R" and "N," it indicates a leakage condition in the low servo apply circuit or possible servo piston ring breakage.



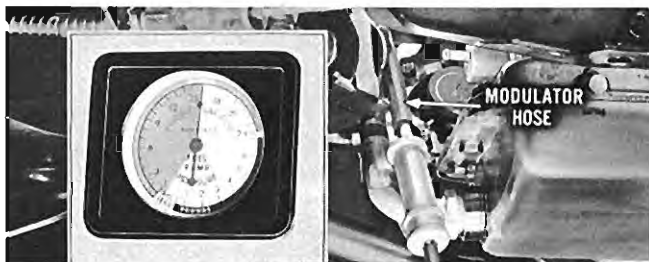
If pressures are within limits in "L," "D" and "N" but very low in "R" range, it indicates oil leakage at the reverse piston seals or in the reverse hydraulic circuit. Overhaul the transmission as described in Part III, **SERVICING THE CORVAIR POWERGLIDE.**



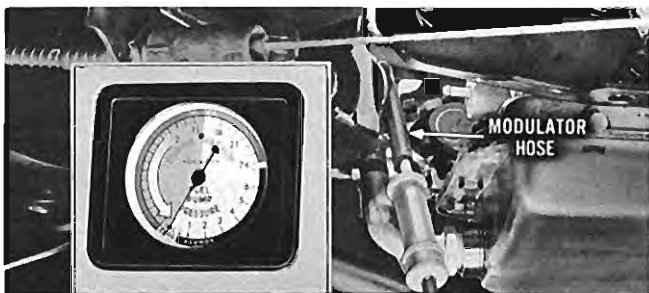
Front pump pressures that are maximum or above limits at all times, and do not change when the vacuum modulator hose is connected, may be due to improper modulator valve action. Test the modulator system for:

- AIR LEAKAGE IN THE MODULATOR VACUUM LINE
- INTERNALLY RESTRICTED OR BLOCKED MODULATOR VACUUM HOSE
- DEFECTIVE VACUUM MODULATOR DIAPHRAGM
- VACUUM MODULATOR VALVE STICKING

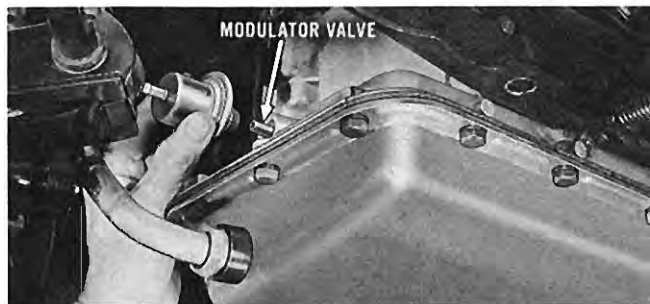
Proceed as follows:



**TEST MODULATOR SYSTEM:** Attach a vacuum gauge to the lower end of the modulator hose and note reading from side of car. At idle speed the gauge should read the same "inches of vacuum" (within 1") as at the upper modulator hose connection. A wide difference in vacuum indicates the hose or tubing is blocked. Correct as necessary.



Quickly open the throttle and check for a prompt drop in vacuum. If vacuum does not drop or there is any delay, it indicates an internal restriction in the vacuum line which must be corrected. If both vacuum tests are normal, proceed as follows:

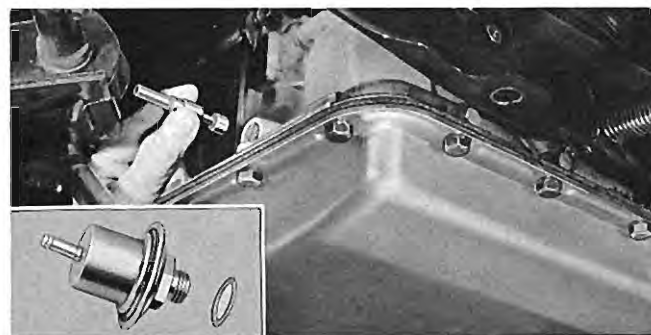


Remove the modulator. If the valve sticks or binds in the bore, remove and inspect carefully. Use a fine slip-stone to polish out the roughness. Clean thoroughly and insert valve in the bore. Check to make sure it moves freely.

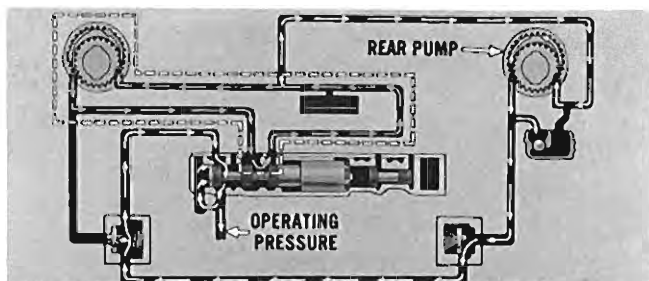


**SPECIAL NOTE:** When it is necessary to remove a small burr or imperfection from the modulator valve (or any valve in the hydraulic circuit), follow these important details:

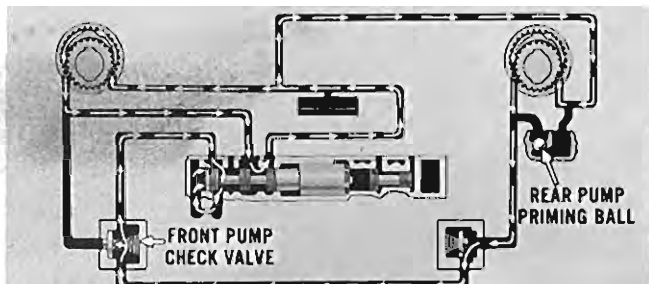
1. All valve lands must remain sharp and square (never attempt to chamfer).
2. When using a slip-stone, place the stone on the bench and rub the valve on the stone.
3. Rotate the valve as it is moved across the stone surface.



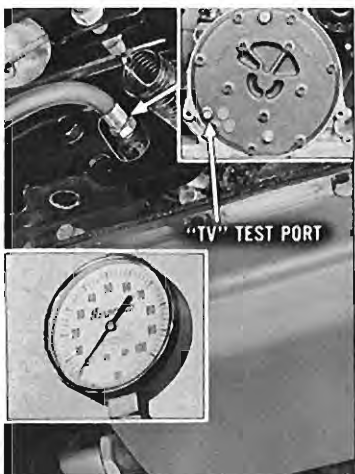
If the modulator valve does not bind, try a new modulator. Install with the gasket centered over the threads. Water pump pliers may be used on the hex flats. Improper use of pliers may distort the cover and cause a vacuum leak.



**TEST REAR PUMP OPERATION:** With the rear wheels 3" to 5" off the floor and free to rotate, move the selector lever to "D." Slowly increase engine rpm. Front pump pressure should drop to 0 to 5 psi between 15 to 20 mph. At this speed, the rear pump provides the hydraulic operating pressure and the front pump automatically bypasses to suction.



If the pressure does not drop, it indicates the front pump check valve or rear pump priming ball is not seating. A rear pump disengaged from the drive lugs will also prevent a pressure drop. The transmission will not upshift under these conditions.

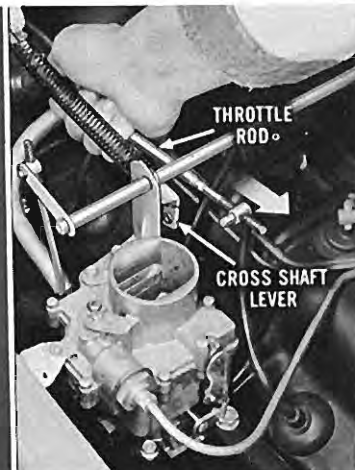


**TEST THROTTLE VALVE (TV) PRESSURES:** Shift points which are rough or not within limits and cannot be corrected with a linkage adjustment may be caused by improper "TV" pressure. Install low reading (0-100 psi) oil pressure gauge in the test port located at the 8 o'clock position on the front pump cover. Take readings from the side of car.



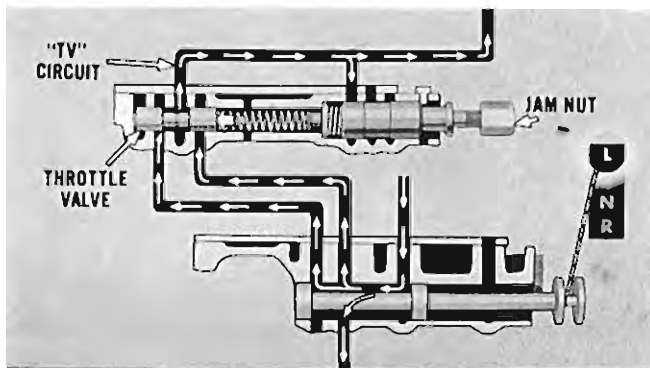
Disconnect the accelerator rod from the transmission throttle lever. This will eliminate the possibility of accelerator pedal interference with throttle lever movement. During the test the rear wheels should be 3" to 5" off the floor.

With engine idling, place transmission in "D" range. Disconnect the throttle rod from the cross shaft lever and the modulator hose from balance tube. Slowly pull rod toward rear of car. Pressure should gradually increase to 40 psi to detent and reach 52 to 54 psi through detent.

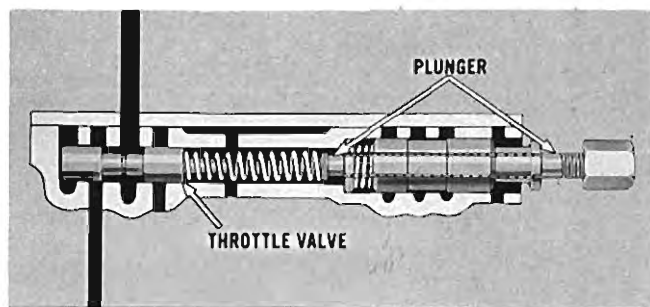


"TV" pressure below 52 psi indicates pressure to the shift valve will be lower at all degrees of throttle lever movement, causing shift points to occur early (low mph).

"TV" pressure above 54 psi indicates pressure to the shift valve will be higher at all degrees of throttle lever movement, causing shift points to occur late (high mph).



"TV" pressure in manual "L" range should remain constant between 66 to 77 psi, regardless of throttle lever movement.



Turning the jam nut in or out varies the length of the throttle valve plunger. This changes the amount of spring force applied to the throttle valve at a given point in throttle plunger movement. Therefore "TV" pressure will change accordingly.

If "TV" pressure in "D" range is not within limits as shown in the chart, it may be raised or lowered.

#### THROTTLE VALVE (TV) PRESSURES (PSI)

CONDITION	R	N	D	L
Disconnect throttle rod at carburetor cross shaft lever and modulator vacuum hose at balance tube. Take pressure reading with throttle rod <u>through detent</u> .	0	0	52-54	66-77

**NOTE:** By disconnecting "TV" rod at carburetor, engine remains at idle speed throughout test.

If necessary, adjust "TV" pressure as follows:

#### ADJUST "TV" PRESSURE:

Remove the oil pan following the procedures given earlier. Insert an Allen socket wrench in the end of the throttle valve plunger and hold in a fixed position.

Turn the jam nut counterclockwise 1 full turn to raise "TV" pressure 3 psi. One full turn clockwise lowers "TV" pressure 3 psi. To change pressure 1 psi, turn jam nut 2 "flats" of the hex.

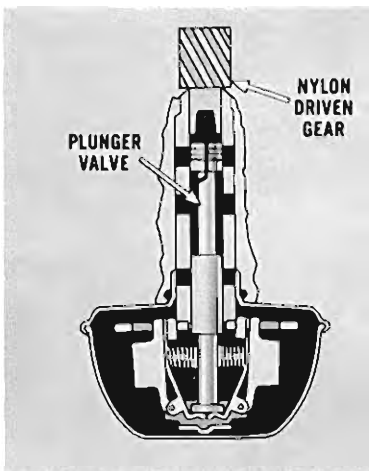


When throttle valve pressure is adjusted, install the pan and refill with oil as described earlier. Re-check "TV" pressure. If now correct, remove both oil pressure gauges and install the test port plugs. Check adjustment of the throttle control linkage as described earlier.

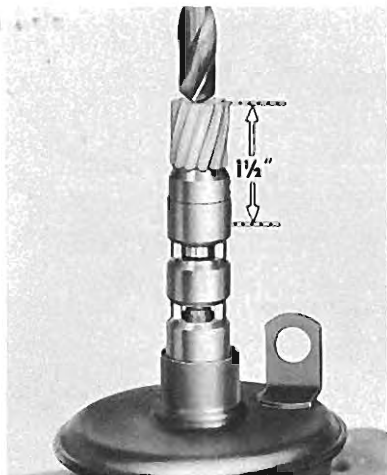
**Install all linkage with retaining clips.**



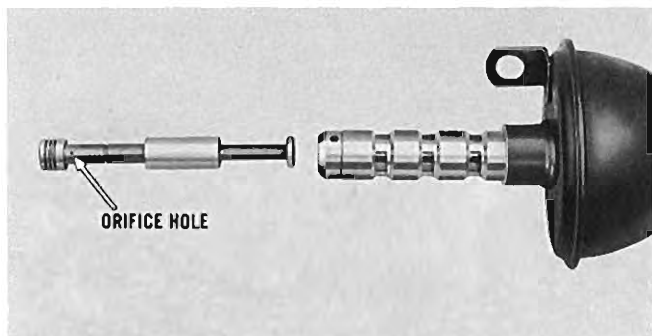
**GOVERNOR:** If there is no upshift or shift points are not correct after checking linkage and oil pressures, the difficulty may be improper, or absence of, governor pressure to the low-drive shift valve. Remove governor and inspect. Check governor seal.



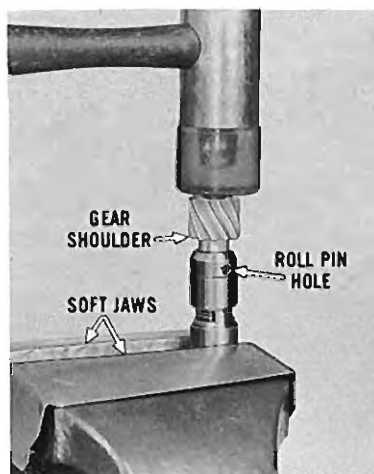
Check for free movement of the plunger valve. If the valve is stuck or there is damage to the nylon driven gear, proceed as follows:



Remove the roll pin. If gear will not pull out of shaft, drill a  $\frac{1}{32}$ " hole directly in the center to a depth of  $1\frac{1}{2}$ ". Collapse the nylon shank and remove from bore of shaft.



Tap end of governor shaft on wood block to remove plunger valve. Never pry on valve lands. Make sure orifice hole is open. Clean up any roughness on polished surfaces of valve or shaft, as described earlier. Install valve.

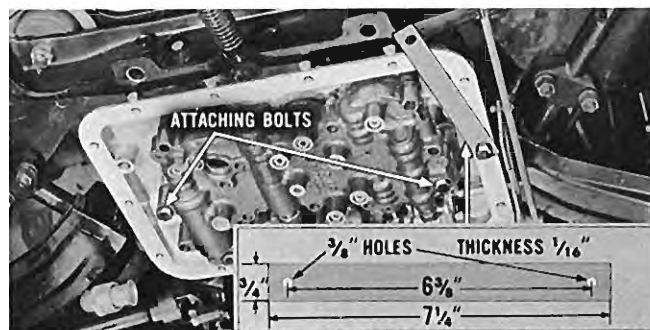


Place governor shaft in a soft jaw vise. Carefully tap new gear into position until the gear shoulder is flush to the shaft end. Drill a hole through the nylon slightly smaller than the roll pin hole diameter and install the roll pin. Position governor seal in case. Install governor and attaching bolt.

Trouble shooting various transmission complaints may indicate improper operation of the hydraulic valves in the main valve body.

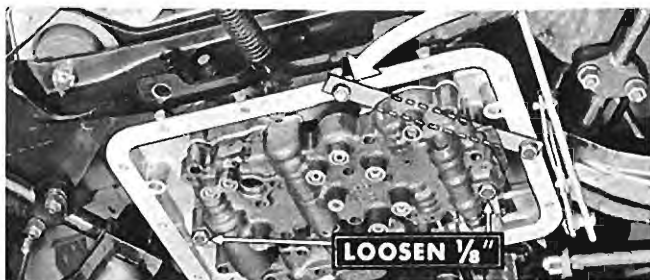
The Corvair Powerglide valve body can be separated from the case for cleaning, inspection and overhaul without removing the transmission from the car.

**IMPORTANT:** Each step in valve body removal and installation must be followed carefully.



**VALVE BODY REMOVAL:** Drain the oil and remove the pan and screen as described earlier. Remove all but 2 valve body attaching bolts. Before removing these 2 bolts, improvise a sheet metal strap and loosely attach to the case as shown.

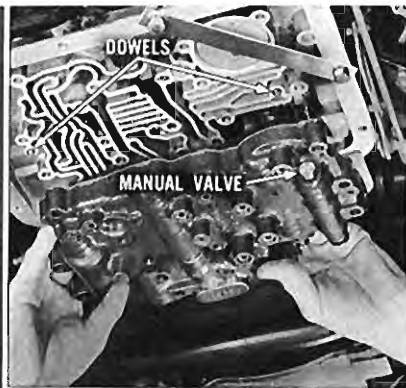




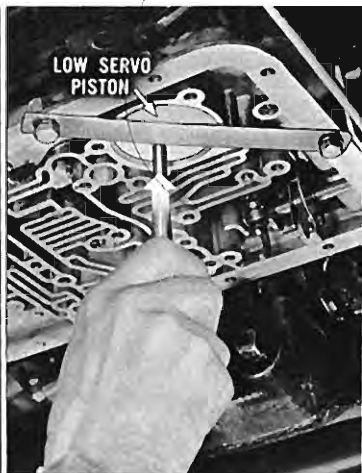
Loosen the 2 valve body bolts about  $\frac{1}{8}$ " so that the strap can be rotated under the stem of the low servo piston. This eliminates the danger of having the low servo piston drop out of its bore and prevents low band internal linkage disengaging when the valve is removed.

With the strap in place, remove remaining bolts. Tap valve body lightly to separate from dowels. Tilt the unit forward during removal to prevent the manual valve from sliding out of its bore.

Place the valve body on a clean surface and overhaul as described in Part III, OVERHAULING THE CORVAIR POWERGLIDE TRANSMISSION.



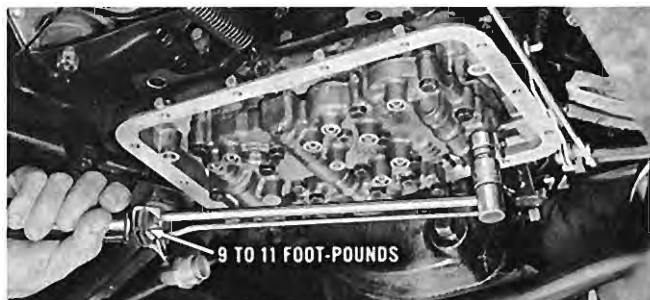
**CHECK LOW SERVO PISTON:** Push upward on the servo piston face as shown. The piston should move about  $\frac{1}{8}$ " to  $\frac{3}{16}$ ". Release pressure. The piston should return to the release position promptly which indicates it is not sticking or binding.



If the servo piston binds or appears damaged, it can be removed and installed on the car. However, two men are required for this service procedure.

**IMPORTANT:** Follow the step-by-step details given in the Corvaire Shop Manual, pages 6E-8 to 6E-11.

**VALVE BODY INSTALLATION:** Install a new valve body to case gasket on the transfer plate. Use petroleum jelly to hold gasket in position. Loosely install the assembly with 2 attaching bolts. Make sure the manual valve indexes with the pin and the throttle plunger is forward of the inner throttle lever. Finger-tighten bolts and remove strap.



Install and torque valve body attaching bolts 9 to 11 foot-pounds. Stagger the tightening sequence. Over-torquing the bolts can distort the valve body and cause the hydraulic valves to bind. Install "O" ring, oil screen and pan. Refill with oil as described earlier.

## NOTES

Good trouble shooting will pinpoint the transmission area which should receive concentrated inspection during service. It eliminates extra work and permits you to determine if minor service or major overhaul is necessary. To do this, follow Steps 1 through 4 as described earlier.

- Step 1. Neutral Safety Switch**
- Step 2. Oil Level (oil leakage)**
- Step 3. Manual Valve Position**
- Step 4. Road Test (linkage or oil pressure tests as indicated)**

**NOTE:** Always perform an oil pressure test if band or clutch slippage is indicated.

## NOTES

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