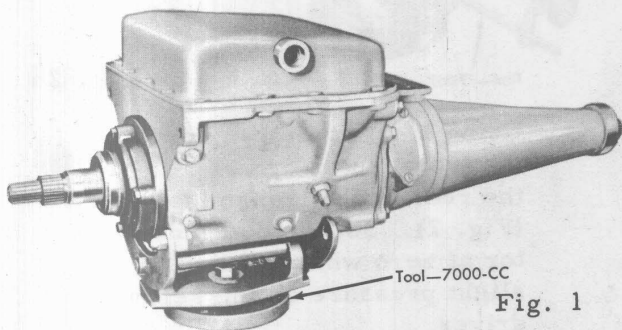


# CRUISE-O-MATIC TRANSMISSION TRANSMISSION OVERHAUL

## REMOVAL OF SUB ASSEMBLIES

### Hydraulic Control System Parts Removal

- ⊗ Thoroughly clean the outside of the transmission case before removing any of the transmission sub-assemblies. Do not allow dirt to get inside the mechanism.
- ⊗ Place the transmission assembly in the transmission holder, if available (Fig. 1).



- ⊗ Remove the transmission oil pan and gasket. Remove the screen clip. Raise the screen off the forward tube, then raise the screen off the rear tube.
- ⊗ Remove the spring seat from the pressure regulator.

**Caution:** Maintain constant pressure on the seat. Release slowly to prevent distortion of the spring seat and avoid personal injury.

- ⊗ Remove the pressure regulator springs and pilots.

**Note:** Do not remove the valves at this time.

- ⊗ Loosen, but do not remove, the pressure regulator body attaching bolts. Remove the lubrication tube from the pressure regulator and rear pump.

**Note:** If necessary, tap the tube with a mallet.

**Caution:** Do not bend or distort the tube.

- ⊗ Slip the pump intake tube from the bore in the transmission case.

**Caution:** Do not bend the tube.

- ⊗ Remove the small compensator pressure tube. Remove the large control pressure tube from the pressure regulator and the control valve body.

**Note:** If necessary, tap the tubes with a mallet. Do not distort the tubes.

- ⊗ Loosen the front and the rear servo band adjusting screws five complete turns. Loosen the front servo attaching bolts three complete turns.

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- ⊗ Remove the control valve body attaching bolts. Align the levers to allow removal of the valve body. Lift the valve body from the transmission case. Pull the valve body from the servo tubes. Remove the valve body from the case.

- ⊗ Remove the regulator body from the case.

**Note:** Keep the control pressure and converter pressure regulator valves in the pressure regulator body. This will avoid damage to the valves.

- ⊗ Remove the front servo apply, accumulator, and release tubes.

**Note:** Twist and pull at the same time.

Remove the front servo attaching bolts. Hold the front servo strut with the fingers. Remove the servo assembly from the case.

- ⊗ Remove the rear servo attaching bolts. Hold the actuating and anchor struts with the fingers. Lift the servo from the case.

### Transmission End Play Check

- ⊗ Remove one front pump attaching bolt. Screw the dial indicator support tool in the front pump bolt hole. Mount a dial indicator on the support. The contact must rest on the end of the turbine shaft (Fig. 2).
- ⊗ Install the extension housing seal replacer on the output shaft to provide support for the shaft.

PRY FRONT CLUTCH CYLINDER TOWARD REAR OF TRANSMISSION

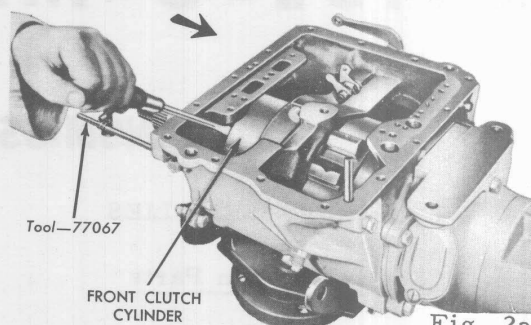


Fig. 2a

PRY GEAR TRAIN TOWARD FRONT OF TRANSMISSION

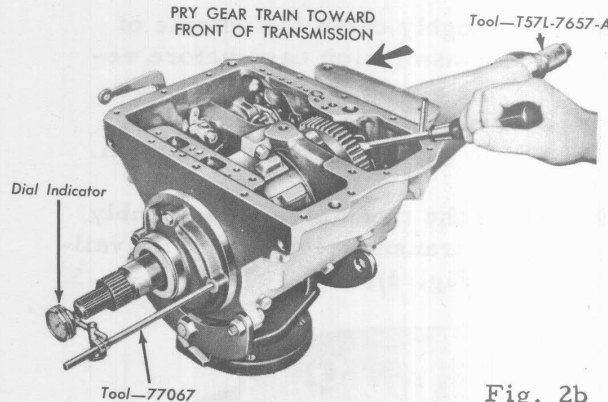


Fig. 2b

- ⊗ Using a screw driver, pry the front clutch cylinder to the rear of the transmission. (Fig. 2). Set the dial indicator at zero while holding a slight pressure on the screw driver.
- ⊗ Remove the screw driver. Insert the screw driver between the large internal gear and the transmission case (Fig. 2). Pry the unit toward the front of the transmission.
- ⊗ Note the indicator reading for use during assembly of the transmission.

**Note:** End play should be .010" to .029".

# Automatic Transmission

## SERVICE GUIDE

**CRUISE-O-MATIC  
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- ☒ Remove the indicator support. Remove the seal replacer from the output shaft.

### Case and Extension Housing Parts-Removal

- ☒ Remove the three remaining front pump attaching bolts. Remove the front pump assembly.

**Note:** If necessary tap the cap screw bosses with a mallet to loosen the pump from the transmission case.

- ☒ Remove the five transmission to extension housing bolts.

**Note:** These bolts also attach the rear pump to the case.

While holding the rear pump in position, remove the extension housing.

- ☒ Using a snap ring pliers, remove the speedometer drive gear snap ring from the output shaft (Fig. 3). Place one hand under the output shaft below the drive gear. Remove the speedometer drive gear. If the drive gear drive ball does not drop out, remove the ball from the seat in the output shaft.

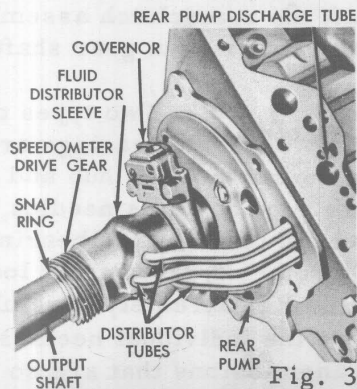


Fig. 3

- ☒ Remove the distributor sleeve and tubes from the transmission.
- ☒ Remove the four seal rings from the output shaft.

### **Note:**

Use your fingers to prevent breaking the rings.

- ☒ Using snap ring pliers, remove the governor snap ring from the output shaft. Slide the governor assembly off the output shaft. Remove the governor drive ball.
- ☒ Insert the tube extractor tool in the rear pump discharge tube (Fig. 4). Remove the tube.

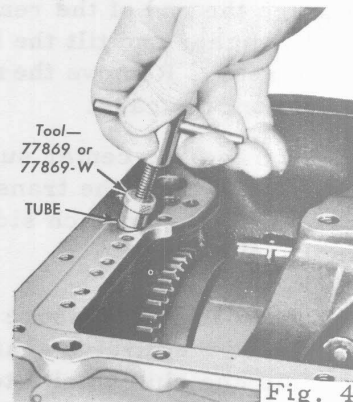


Fig. 4

- ☒ Remove the rear pump from the case. Remove the extension housing and pump gaskets.
- ☒ Remove the rear pump drive key. Remove the bronze thrust washer from the output shaft.
- ☒ Hold the pinion carrier forward while removing the output shaft.
- ☒ Remove the selective thrust washer from the rear of the pinion carrier.

# Automatic Transmission

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- ⊗ Remove the two seal rings from the primary sun gear shaft. Remove the pinion carrier.
- ⊗ Remove the thrust bearing from the primary sun gear shaft. Remove the thrust bearing race from inside the pinion carrier.
- ⊗ Mark the rear band position for reference in assembly.

**Note:** The end of the band next to the adjusting screw has a depression (dimple) in the center of the boss.

- ⊗ Squeeze the end of the rear band together and tilt the band to the rear. Remove the rear band from the case.
- ⊗ Remove the two center support outer bolts from the transmission case (one on each side of the case).
- ⊗ Exert sufficient pressure on the end of the turbine shaft to hold the clutch units together. Remove the center support and the front and rear clutch assemblies as one unit (Fig. 5).

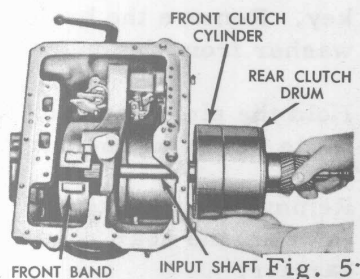


Fig. 5

- ⊗ Install the clutch assemblies in the bench fixture. (Fig. 6).

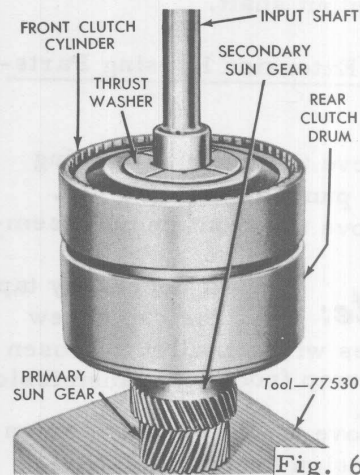


Fig. 6

- ⊗ Remove the thrust washer from the front of the turbine shaft. Lift the front clutch assembly from the primary sun gear shaft. Remove the front band from the case.
- ⊗ Remove the bronze and steel thrust washers from the rear clutch return spring retainer.

**Note:** Wire these thrust washers together to insure correct installation.

- ⊗ Remove the front clutch seal rings from the primary sun gear shaft.
- ⊗ Lift the rear clutch assembly from the primary sun gear shaft.

**Caution:** Two types of needle bearings are used in the rear clutch hub and drum. One type contains needles that are held in place by the bearing race. The other type contains loose needles. Be extremely careful not to lose the individual needles on the transmissions that are so equipped.

### SERVICE GUIDE

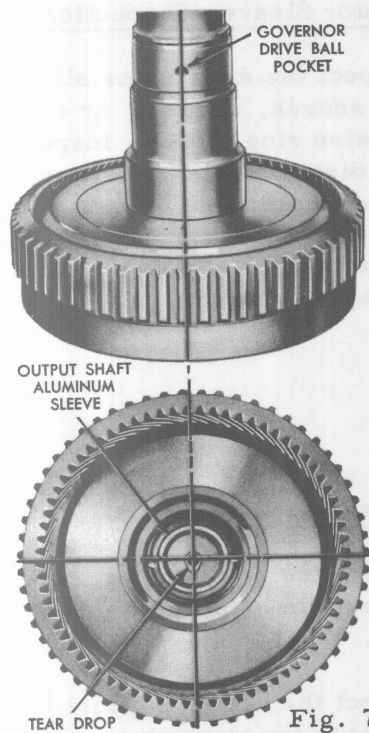


Fig. 7

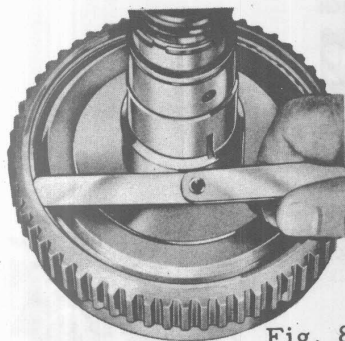


Fig. 8

- ☒ Remove the rear clutch seal rings from the primary sun gear shaft. Do not break the seal rings. Remove the primary sun gear front thrust washer.

#### GENERAL INSPECTION

#### Output Shaft and Primary Sun Gear Shaft - Inspection

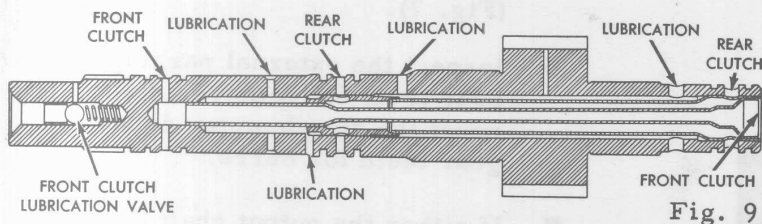
- ☒ Inspect all thrust surfaces and journals for scores. Inspect the internal gear for broken, damaged, or worn teeth.
- ☒ Inspect the aluminum sleeve for scores, burrs, damage, or leakage. Inspect the ring grooves for burrs or damage.
- ☒ Inspect the key-way and drive ball pocket for wear. Inspect the splines for burrs or wear.
- ☒ Carefully inspect the output shaft sleeve for alignment with the governor drive ball (Fig. 7).
- ☒ Inspect the external parking gear teeth for damage. Inspect the speedometer drive gear teeth for burrs.
- ☒ If either the output shaft or ring gear has been replaced, place the assembled unit with the gear face down on the bench. Press the shaft downward. Check the clearance between the top of the snap ring and its groove (Fig. 8). Replace the snap ring with a thicker ring to reduce the clearance to less than .002" if this clearance exceeds .002".

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**Note:** Selective snap rings are available in several thicknesses for this purpose.

- ☒ Inspect the rubber seal and stop ring at the front of the output shaft spline. Replace the seal if wear or damage is evident.
- ☒ Inspect the primary sun gear for broken, damaged, or worn teeth. Inspect all thrust surfaces and journals for scores and damage. Check all fluid passages for obstructions and leakage (Fig. 9). Inspect the seal ring grooves for burrs or damage.
- ☒ Inspect the sun gear shaft splines for burrs and wear. Check for free movement of the front clutch lubrication valve.

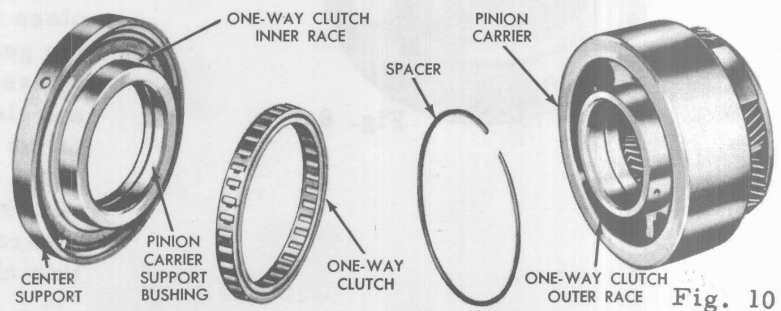


### Distributor Sleeve - Inspection

- ☒ Inspect the distributor sleeve for scores, damage, or excessive ring wear. Inspect the distributor sleeve passage for obstructions.
- ☒ Check the fit of the fluid tubes in the distributor.

### Pinion Carrier - Inspection

- ☒ Inspect the clutch outer race surface for wear or roughness (Fig. 10).
- ☒ Inspect the center support inner race for wear or roughness.
- ☒ Inspect the sprag ends or flat spots for damage.



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### Extension Housing - Inspection

- ☒ Inspect the housing for cracks or damage. Inspect the gasket surface for burrs or warpage. Check for leakage around the governor inspection cover and gasket. Install a new gasket if leakage is evident.
- ☒ Inspect the bushing for scores, damage, or wear. If necessary replace the bushing.
- ☒ Inspect the rear seal for hardness, cracks, damage, or wear. If the seal is not serviceable, replace the seal as follows:
- ☒ Install the extension housing on the transmission case. Install the seal puller and remove the extension housing seal.
- ☒ Inspect the seal counterbore. Remove all burrs and scores with crocus cloth.
- ☒ Coat the outer diameter of a new seal with sealing compound #3. Position the seal in the extension housing counterbore.

**Note:**

The felt side of the seal must be toward the rear.

- ☒ Drive the seal into place with the seal driver until it is firmly seated in the counterbore.

### REPAIR AND ASSEMBLY OF COMPONENT PARTS

- ☒ When repairing the sub-assemblies, certain general instructions which apply to all units

of the transmission must be followed. The following instructions are given at this time to avoid repetition.

- ☒ Handle all transmission parts carefully. Avoid nicking or burring the bearing or mating surfaces.
- ☒ Lubricate all internal parts of the transmission before assembly with transmission fluid.

**Note:**

The use of other lubricants is not recommended by the manufacturer.

- ☒ Gaskets and thrust washers may be coated with petroleum jelly to facilitate assembly.
- ☒ Always install new gaskets when assembling parts of the transmission.
- ☒ Tighten all bolts and screws to the recommended torque.

### Primary Sun Gear Shaft - Disassembly and Assembly

- ☒ Place the primary sun gear shaft in the clutch bench fixture.
- ☒ Check the fit of the seal rings in the grooves of the shaft. The rings should be free to rotate in the ring grooves without binding.
- ☒ Check the fit of the seal rings in their respective bores.

**Note:**

A clearance of .002" to .009" should exist between the ends of the rings.

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- ☒ Install the seal rings on the shaft. Check for free movement of the rings in the grooves.
- ☒ If the front clutch lubrication valve is not operating properly, replace it by installing a new kit.

### Rear Clutch - Disassembly and Assembly

- ☒ Remove the clutch pressure plate snap ring. Remove the pressure plate from the drum. Remove the bronze and steel plates.
- ☒ Compress the spring in an arbor press (Fig. 11). Remove the snap ring.

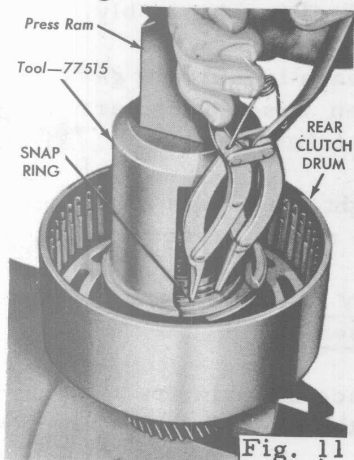


Fig. 11

- ☒ Guide the spring retainer while releasing the press to prevent the retainer from locking in the snap ring groove.
- ☒ Position the primary sun gear shaft in the rear clutch. Position an air hose nozzle at one of the holes in the shaft. Place one finger over the other hole. Force the clutch piston out of the clutch drum with air pressure.

**Caution:** Hold one hand over the piston to prevent damage.

- ☒ Remove the clutch piston inner seal from the clutch drum. Remove the clutch piston outer seal ring from the groove in the piston.
- ☒ Inspect the drum band surface, the bushing, and thrust surfaces for scores.

**Note:** Minor scores can be removed with crocus cloth. Heavily scored parts must be replaced.

- ☒ Inspect the needle bearing for worn rollers. Check the clutch piston bore and the piston inner and outer bearing surfaces for scores.

Check the air bleed ball valve and the clutch piston for free movement. Check the orifice to make sure it is not plugged.

- ☒ Check the fluid passages for obstruction. All fluid passages must be clean and free of obstruction.
- ☒ Inspect the clutch plates for scores. Check the plates for fit on the clutch hub serrations. Replace all plates that are badly scored or do not fit freely in the hub serrations.

**Note:** Front clutch plates differ in friction characteristics from rear clutch plates and are not interchangeable.

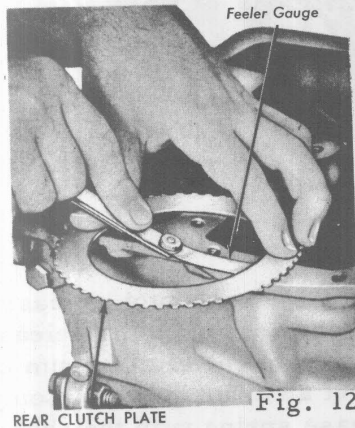


# Automatic Transmission

## SERVICE GUIDE

CRUISE-O-MATIC  
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- ☒ Position the steel plates on a flat surface. Check the "dish" with a feeler gauge. The plates are "dished" to .010" clearance. (Fig. 12).



- ☒ Inspect the clutch pressure plate for scores on the clutch bearing surface. Check the clutch release spring for distortion.
- ☒ Lubricate all parts to facilitate assembly. Install the clutch piston inner seal ring in the groove in the drum. Install a new outer seal ring on the piston. Install the piston in the drum.
- ☒ Install the clutch release spring. Position the retainer on the spring.
- ☒ Place the clutch assembly in an arbor press. Position the tool on the spring retainer (Fig. 11) Compress the clutch spring, and install the snap ring.

**Note:** While compressing the spring, guide the retainer to avoid interference of the retainer with the snap ring groove.

**Caution:** Make certain the snap ring is fully seated in the groove.

- ☒ Install the steel and bronze clutch plates alternately. Start with the steel plate.

**Note:** Because of the "dish" all steel plates must face the same direction with either all concave or all convex sides up.

- ☒ Install the clutch pressure plate with the bearing surface down. Install the clutch pressure plate snap ring.

**Caution:** Make sure the snap ring is fully seated in the groove.

- ☒ Install the bronze thrust washer on the primary sun gear shaft.

**Note:** Lubricate all parts to facilitate assembly.

- ☒ Install the rear clutch on the primary sun gear shaft.

**Caution:** Center the seal rings on the primary sun gear shaft to prevent breakage.

**Note:** If the rear clutch hub is equipped with a needle bearing that contains loose needles, be certain all needles are in place before assembling the clutch assembly on the sun gear shaft.

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**Note:** Needles may be held in place with a light film of petroleum jelly.

- ☒ Install the steel and bronze thrust washers on the secondary sun gear. If the outer edge of the steel washer is chamfered on one side, install it with the chamfered side down.
- ☒ Install the two seal rings in the groove of the primary sun gear shaft. Check the seal rings for free movement in the groove and in their respective bores. Install new rings if they bind.

### Front Clutch - Disassembly and Assembly

- ☒ Remove the clutch cover snap ring with a screw driver.
- ☒ Remove the turbine shaft from the clutch drum.
- ☒ Remove the thrust washer from the thrust surface of the clutch hub. Insert a finger in the clutch hub, then lift the hub straight up to remove the hub from the clutch drum.
- ☒ Remove the four bronze and three steel clutch plates. Remove the pressure plates from the clutch drum.

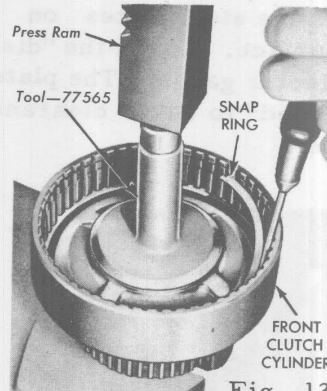


Fig. 13

- ☒ Position the front clutch release spring compressor on the release spring. Place the clutch drum on the bed of an arbor press. Compress the release spring with the arbor press until the release spring snap ring can be removed (Fig. 13).

Remove the clutch release spring from the clutch drum.

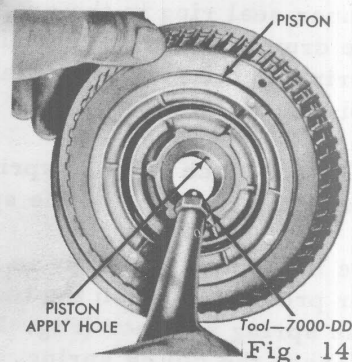


Fig. 14

- ☒ Install the special nozzle on the air hose (Fig. 14). Place the nozzle against the clutch apply hole in the front clutch housing. Blow the piston out of the housing.

## SERVICE GUIDE

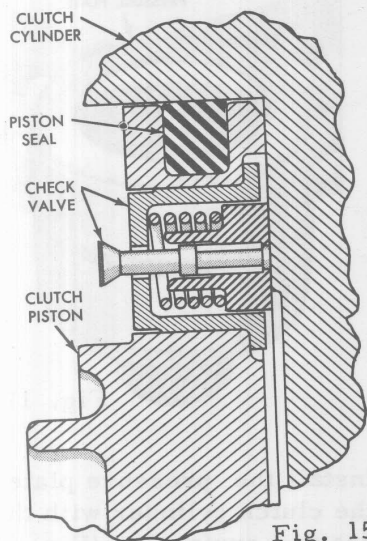


Fig. 15

- ☒ Remove the piston inner seal from the clutch housing (Fig. 15). Remove the piston outer seal from the groove in the piston (Fig. 15).
- ☒ Inspect the clutch cylinder thrust surfaces, piston bore, and clutch plate serrations for scores, burrs, or damage.

### Note:

Minor scores or burrs may be removed with crocus cloth.

Replace the clutch cylinder if it is badly scored or damaged.

- ☒ Check the fluid passages and clutch cylinder for obstructions. Blow out all passages. Inspect the clutch piston for scores. Replace if necessary.

Inspect the piston check valve for freedom of movement and correct seating (Fig. 15).

- ☒ Check the clutch release spring for distortion and cracks. Replace the spring if it is unserviceable.
- ☒ Inspect the bronze and steel clutch plates and the clutch pressure plate for scored bearing surfaces. Replace all parts that are deeply scored.
- ☒ Check the clutch plates for flatness and fit on the clutch hub serrations. Discard any plate that does not slide freely on the serrations or that is not flat.

**Caution:** Front clutch plates differ in friction characteristics from the rear clutch plates and are not interchangeable.

- ☒ Check the clutch hub thrust surfaces for scores. Inspect the clutch hub splines for wear.
- ☒ Inspect the turbine shaft bearing surfaces for scores. If excessive clearance or scores are noted, discard the unit.
- ☒ Check the splines on the turbine shaft for wear. Replace them if they are excessively worn. Check the bushing and the turbine shaft for scores or damage.
- ☒ Lubricate all parts with transmission fluid. Install a new piston inner seal ring in the clutch cylinder. Install a new piston outer seal in the groove in the piston. (Fig. 15).

# Automatic Transmission

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- ☒ Install the piston in the clutch housing.

**Caution:** Make sure the steel bearing ring is in place on the piston.

- ☒ Position the release spring in the clutch cylinder with the concave side up. Position the release spring compressor on the spring. Compress the spring with an arbor press. Install the snap ring (Fig. 13).

**Caution:** Make certain the snap ring is fully seated in the groove.

- ☒ Install the front clutch housing on the primary sun gear shaft by rotating the clutch units to mesh the rear clutch plates with the serrations on the clutch hub.

**Caution:** Use care not to break the seal rings.

- ☒ Install the clutch hub in the front clutch cylinder with the deep counterbore down. (Fig. 16). Install the thrust washer on the clutch hub.

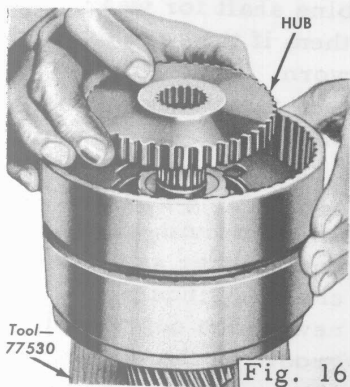


Fig. 16

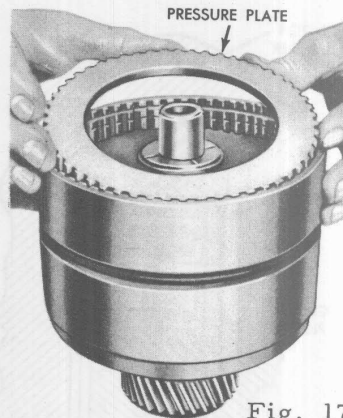


Fig. 17

- ☒ Install the pressure plate in the clutch cylinder with the bearing surface up (Fig. 17). Install the four bronze and three steel clutch plates alternately. Start with a bronze plate (Fig. 18).

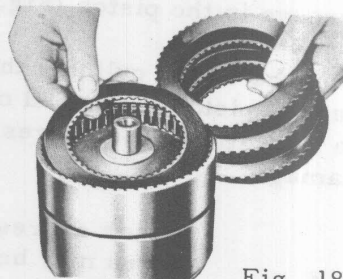


Fig. 18

**Note:** Lubricate the plates as they are installed.

- ☒ Install the turbine shaft in the clutch cylinder. Install the snap ring.

**Caution:** Make certain the snap ring is fully seated in the groove.

- ☒ Install the thrust washer on the turbine shaft.

# Automatic Transmission SERVICE GUIDE

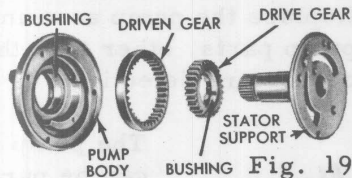
**CRUISE-O-MATIC  
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## Front Pump - Disassembly and Assembly

- ☒ Remove the stator support attaching screws. Remove the stator support. Mark the top surface of the pump drive gear with marking blue to assure correct assembly.

**Caution:** Do not scratch the pump gears.

- ☒ Remove the drive and driven gears from the pump body.
- ☒ Inspect the pump body housing, drive gear bushing, gear pockets, and crescent for scores or wear (Fig. 19).



- ☒ Inspect the mating surfaces of the pump body and cover for burrs and scores.
- ☒ Inspect the drive and driven gear bearing surface for scores. Check the gear teeth for burrs. Inspect the stator support splines for burrs and wear.
- ☒ Check the fluid passages for obstructions.
- ☒ Replace the pump as a unit if any parts other than the stator support are found to be defective.

**Note:** Minor burrs and scores can be removed with crocus cloth.

**Note:**

The stator support is serviced separately.

- ☒ Bolt the front pump to the transmission case with cap screws. Install the oil seal remover (Fig. 20). Pull the front seal from the pump body.

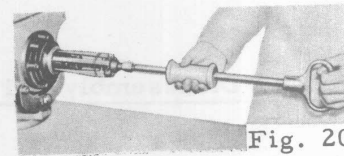


Fig. 20

**Note:**

The front seal is 1/2" thick.

- ☒ Clean the pump body counterbore. Inspect the bore for rough spots. Smooth up the counterbore with crocus cloth.
- ☒ Remove the pump body from the transmission case. Coat the outer diameter of a new seal with sealing compound #3. Position the seal in the pump body. Drive the seal into the pump body until the seal is firmly seated in the body (Fig. 21).

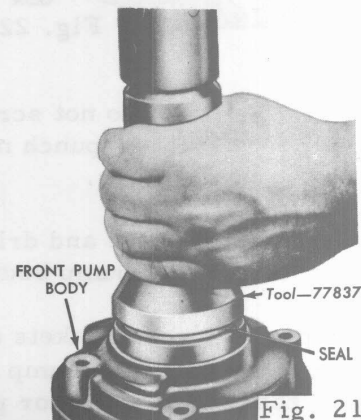


Fig. 21

# Automatic Transmission

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- ☒ Position the pump drive gear in the pump body with the mark on the gear facing upward. Install the drive gear in the pump body.
- ☒ Install the stator support attaching screws and lock washers. Check the pump for free rotation of the gears.

### Rear Pump - Disassembly and Assembly

- ☒ Remove the screws and lock washers which secure the pump cover to the pump body. Remove the cover. Mark the top face of the pump drive and driven gear with marking blue to assure correct installation of gears at assembly (Fig. 22).

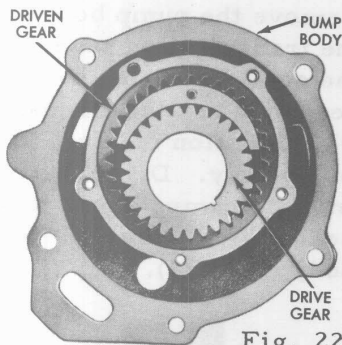


Fig. 22

**Caution:** Do not scratch or punch marks on the pump gears.

- ☒ Remove the drive and driven gears from the pump body.
- ☒ Inspect the gear pockets and the crescent of the pump body for scores, damage, or pitting.

- ☒ Check the inner bushings and the drive and driven gear bearing surfaces for scores and damage.
- ☒ Check all fluid passages for obstructions. Inspect the mating surfaces and gasket surfaces of the pump body and cover for burrs.
- ☒ Check the pump cover bearing surface for scores.

**Note:** Minor burrs or scores can be removed with crocus cloth.

- ☒ Replace the pump as a unit if any pump parts, other than the pump cover are defective.

**Note:** The pump cover can be purchased separately.

- ☒ Place the pump driven gear in the pump body with the mark facing upward.

**Note:** The mark was placed on the gear at disassembly.

- ☒ Install the drive gear in the pump body with the mark facing upward. Install the pump cover, attaching screws, and lock washers. Torque the  $\frac{1}{4}$ " screws to 80 to 90 in. lbs. Torque the 10-24 screws to 25 to 35 in. lbs.

- ☒ Check the pump for free rotation of the gears.

# Automatic Transmission SERVICE GUIDE

## CRUISE-O-MATIC OVERHAUL

### Pressure Regulator - Disassembly and Assembly

- ☒ Remove the valves from the regulator body.
- ☒ Remove the regulator body cover attaching screws. Remove the cover.
- ☒ Remove the separator plate. Remove the front pump check valve and spring from the regulator cover.
- ☒ Wash all parts thoroughly. Blow dry with compressed air.
- ☒ Check the regulator body and cover mating surfaces for burrs. Check all fluid passages for obstructions.
- ☒ Check the control pressure and converter pressure valves and bores for burrs and scores.

**Note:** Remove all burrs carefully with crocus cloth.

- ☒ Check for free movement of the valves in their respective bores.

### **Note:**

Each valve should fall freely into its bore when both the valve and bore are dry.

- ☒ Inspect the valve springs for distortion and collapsed coils.
- ☒ Place the check valve spring and valve in the regulator cover.
- ☒ Position the separator plate on the regulator cover.
- ☒ Position the regulator cover and separator plate on the regulator body. Install the attaching screws. Torque the screws to 20 to 30 in. lbs.
- ☒ Install the valves in the pressure regulator body (Fig. 23).

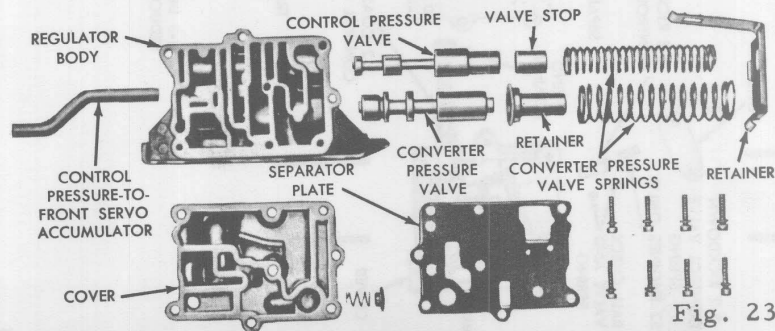
### Control Valve Body

### **Note:**

When disassembling the control valve assembly, avoid damage to valve parts. Keep the valve parts clean. Place the valve assembly on a clean shop cloth while performing the disassembly operation.

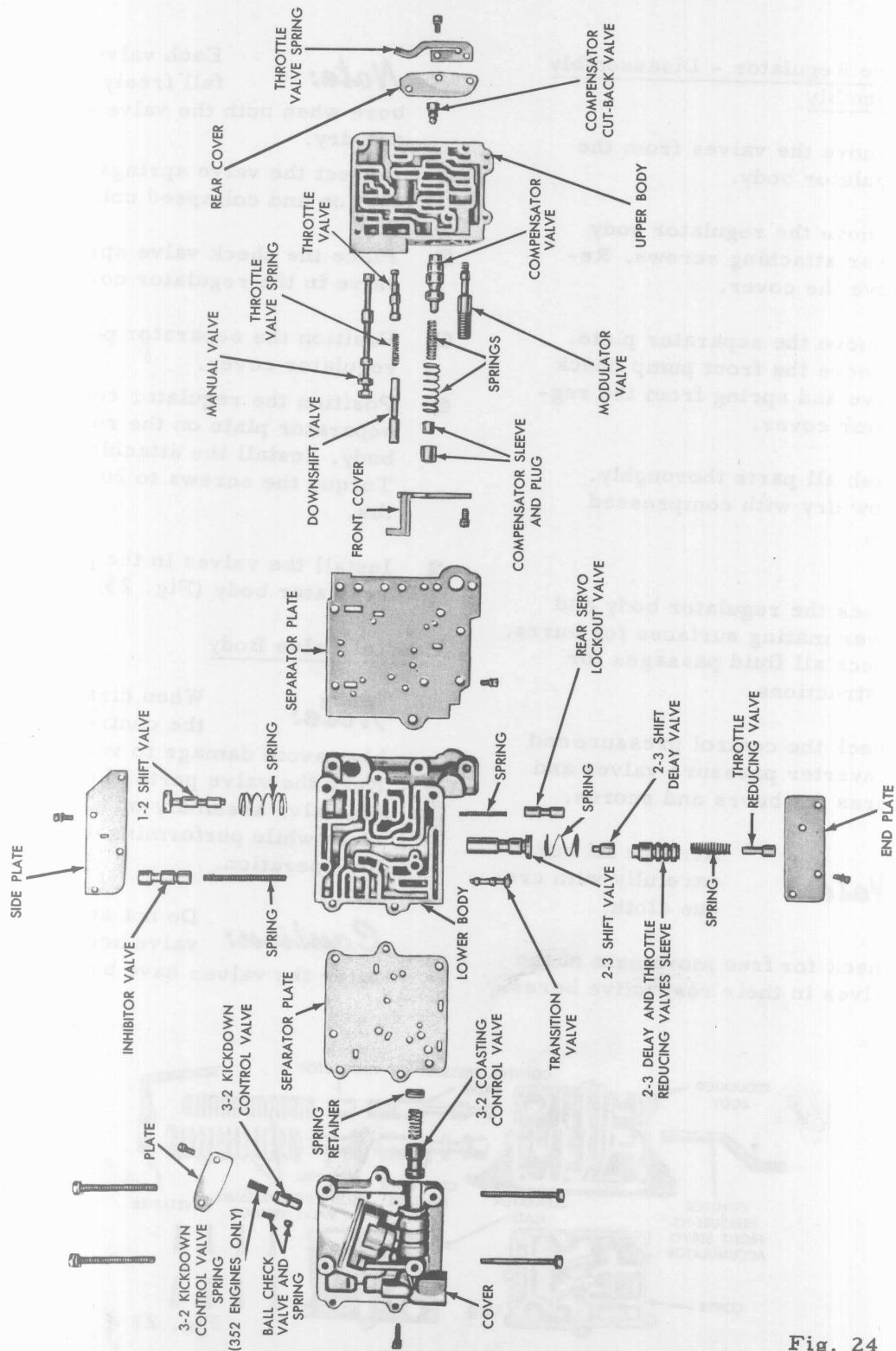
### **Caution:**

Do not separate the valve bodies until after the valves have been removed.



# Automatic Transmission

## SERVICE GUIDE



16-E

Fig. 24



# Automatic Transmission

## SERVICE GUIDE

CRUISE-O-MATIC  
OVERHAUL

### Disassembly

- ☒ Remove the manual valve. Remove the one screw that attaches the separator plate to the lower valve body. Remove the upper body front plate (Fig. 24).

**Caution:** The plate is spring loaded. Apply pressure to the plate while removing the attaching screws.

- ☒ Remove the compensator sleeve and plugs. Remove the compensator valve springs. Remove the compensator valve.
- ☒ Remove the modulator valve assembly. Remove the down-shift valve and throttle valve spring.
- ☒ Remove the two screws that attach the throttle valve return spring to the upper body. Remove the spring. Remove the remaining screw that attaches the upper valve body rear plate to the body. Remove the plate.
- ☒ Remove the throttle valve and the compensator cut back valve.
- ☒ Remove the lower body side plate (Fig. 24).

**Caution:** The plate is spring loaded. Apply pressure to the plate while removing the attaching screws.

- ☒ Remove the 1 - 2 shift valve spring and valve. Remove the inhibitor valve and spring.
- ☒ Remove the lower body end plate.

**Note:** The end plate is spring loaded. Apply pressure to the plate while removing the attaching screws.

- ☒ Remove the rear servo lockout valve and spring.
- ☒ Remove the 2 - 3 throttle reducing valve and spring, the 2 - 3 shift valve sleeve and the 2 - 3 delay shift valve.
- ☒ Remove the 2 - 3 shift valve spring and valve. Remove the transition valve.
- ☒ Remove the 3 - 2 kickdown control valve and check valve cover located on the valve body cover. (Fig. 24).
- ☒ Remove the check ball spring and check ball. Remove the kickdown control valve spring and valve.
- ☒ Remove the 3 - 2 coasting control valve spring retainer from the cover. Remove the valve and spring.
- ☒ Remove the through bolts and screws. Separate the bodies.
- ☒ Inspect the rear pump check valve which is installed in the lower body.

**Note:** The valve seat is staked for a firm fit in the lower body and should not be removed unless a new one is to be installed.

# Automatic Transmission

## SERVICE GUIDE

### Inspection

- ⊗ Clean all parts thoroughly in solvent. Blow dry with compressed air.
- ⊗ Check all valve and plug bores for scores. Inspect all fluid passages for obstructions. Inspect the check valve for free movement. Check all mating surfaces for burrs or distortion. Inspect all plugs and valves for burrs and scores.

**Caution:** Crocus cloth can be used to polish valves and plugs if care is exercised to avoid rounding the sharp edges of the valves and plugs.

- ⊗ Inspect all springs for distortion and collapsed coils. Check all valves and plugs for free movement in their respective bores.

**Note:** Valves and plugs, when dry, must fall of their own weight in their respective bores.

- ⊗ Roll the manual valve on a flat surface to check if it is bent.

### Assembly

- ⊗ Place all parts in their correct position.

**Note:** Rotate the valves and plugs when inserting them in their bores to avoid shearing of the soft body casting.

- ⊗ Install the separator plate on the upper body.

### **Note:**

Do not tighten the screws.

- ⊗ Install the check valve spring, valve, and seat in the lower body. Place the lower body on the upper body. Start, but do not tighten the attaching screws.
- ⊗ Place the cover and separator plate on the lower body. Start the four through bolts.
- ⊗ Align the valve body attaching bolt holes in the separator plate and the lower body. Torque the four valve body bolts equally to 4 to 6 ft. lbs.

### **Caution:**

Excessive tightening of these bolts can distort the valve bodies, causing valves or plugs to "hang up".

- ⊗ Install the three cover to lower body screws. Torque the cover and body screws to 20 to 30 in. lbs. Tighten the other screws.
- ⊗ Install the 3 - 2 kickdown control valve and spring and the ball check valve and spring in the cover. Install the plate.
- ⊗ Install the 3 - 2 coasting control valve, spring, and spring retainer in the cover.
- ⊗ Install the transition valve in the lower body. Install the 2 - 3 shift valve, spring, sleeve, shift delay valve, inner spring, and throttle reducing valve.

# Automatic Transmission

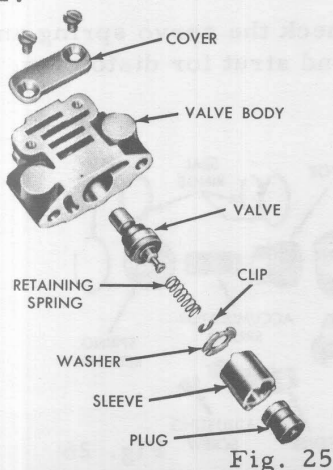
## SERVICE GUIDE

**CRUISE-O-MATIC  
OVERHAUL**

- ☒ Install the rear servo lockout valve spring and valve. Install the lower body end plate.
- ☒ Install the inhibitor valve spring and valve in the lower body.
- ☒ Install the 1 - 2 shift valve spring and valve. Install the lower body side plate.
- ☒ Install the throttle valve and compensator cut back valve in the upper body. Install the upper body rear plate and throttle valve return spring.
- ☒ Install the throttle valve spring and downshift valve. Install the modulator valve assembly.
- ☒ Install the compensator valve, inner and outer compensator springs, and the compensator sleeve and plug. Install the upper body front plate.
- ☒ Install the manual valve.

### Governor - Disassembly and Assembly

- ☒ Remove the governor valve body cover.



- ☒ Remove the valve body from the counterweight (Fig. 25).
- ☒ Remove the plug, sleeve, washer, and valve from the body (Fig. 25).
- ☒ Inspect the governor valve and bore for scores or burrs.

**Note:** Minor scores and burrs may be removed with crocus cloth.

Replace the governor if the valve or body is deeply scored.

- ☒ Check for free movement of the valve in the bore. Inspect fluid passages in the valve body and counterweight for obstructions.

**Note:** Fluid passages must be clean and free of obstruction.

- ☒ Inspect the mating surfaces of the valve body and counterweight for burrs and distortion.

**Note:** Mating surfaces must be smooth and flat.

- ☒ Install the governor valve and spring assembly in the bore of the valve body. Install the washer, sleeve, and plug.

**Note:** Make sure the three points on the end of the sleeve seat in the slots in the washer.

- ☒ Install the body on the counterweight.

# Automatic Transmission

## SERVICE GUIDE

**Caution:** Make certain the fluid passages in the body and the counterweight are aligned.

- ☒ Position the cover on the body. Install the screws.

### Front Servo - Disassembly and Assembly

- ☒ Remove the servo piston retainer snap ring (Fig. 26).

**Caution:** The servo piston is spring loaded. Apply pressure to the piston when removing the snap ring.

- ☒ Remove the servo piston retainer, servo piston and the return piston from the servo body.

**Note:** It may be necessary to tap the piston stem lightly with a soft mallet to separate the piston retainer from the servo body.

- ☒ On the 352 V-8 engines, remove the screw and washer from the end of the piston stem. Separate the piston retainer, return piston, and servo piston.
- ☒ Remove all seal rings. Remove the spring from the servo body.

- ☒ Apply pressure against the accumulator spring and retainer. Remove the retainer snap ring from the servo body. Separate the accumulator piston and spring retainer.
- ☒ Remove the seal rings from the accumulator piston and the retainer.
- ☒ Inspect the servo body for cracks. Check the piston bore and the servo piston stem for scores (Fig. 26). Check fluid passages for obstruction.
- ☒ Check the actuating lever for free movement. Inspect the actuating lever for wear. If necessary to replace the actuating lever or shaft, remove the retaining pin then push the shaft out of the bracket.

**Note:** If the shaft is not retained by a pin, it is retained in the body by serrations on one end of the shaft. These serrations cause a press fit at that end. To remove the shaft, press on the end opposite the serrations.

- ☒ Inspect the adjusting screw threads and the threads in the lever.
- ☒ Check the servo spring and servo band strut for distortion.

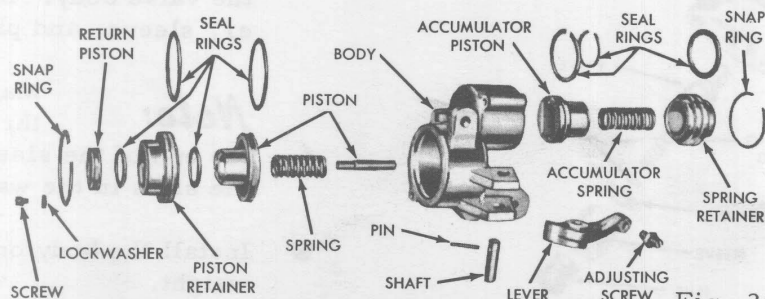


Fig. 26

# Automatic Transmission

## SERVICE GUIDE

### CRUISE-O-MATIC OVERHAUL

- ☒ Inspect the servo band lining for excessive wear and bonding to the metal.

**Note:** The band should be replaced if worn to a point where grooves are not clearly visible.

- ☒ Check the band ends for cracks. Inspect the band for distortion.
- ☒ Assemble the servo.

**Note:** The assembly procedure is exactly the reverse of the disassembly procedure.

#### Rear Servo - Disassembly and Assembly

- ☒ Using a 1/8" punch, remove the servo actuating lever shaft retaining pin. Remove the shaft and actuating lever needle bearings and thrust washers.
- ☒ Press down on the servo spring retainer. Remove the snap ring.

**Caution:** Release the pressure on the retainer slowly to prevent the spring from flying out.

- ☒ Remove the retainer and servo spring.

- ☒ Force the piston out of the servo body with air pressure.

**Caution:** Hold one hand over the piston to prevent damage or injury.

- ☒ Remove the piston seal ring. Remove the accumulator piston from the servo piston.
- ☒ Inspect the servo body for cracks and the piston bore for scores (Fig. 27). Check the servo body to transmission case mating surface for burrs.
- ☒ Inspect the fluid passages for obstructions. Check the fluid passage plugs for tightness in the body. Check the orifice in the servo piston for foreign particles. Inspect the check valve in the servo piston for free movement and proper seating.
- ☒ Inspect the accumulator piston stem for scores. Inspect the actuating lever socket for wear. Check the actuating lever and shaft for wear.
- ☒ Inspect the band and the strut for distortion. Check the band ends for cracks.
- ☒ Check the servo spring for distortion and collapsed coils.

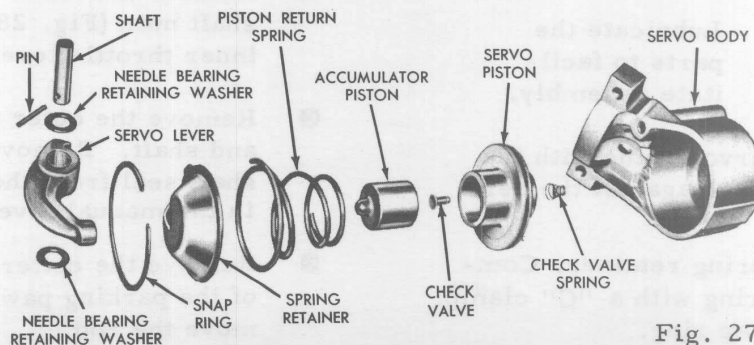


Fig. 27

# Automatic Transmission

## SERVICE GUIDE

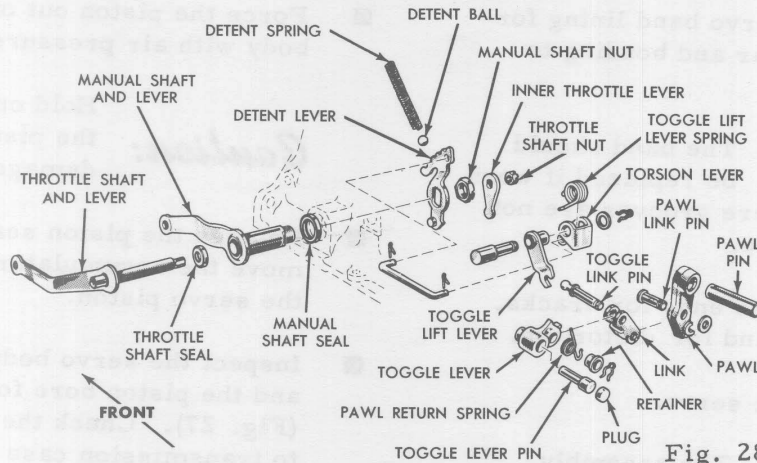


Fig. 28

- ☒ Inspect the servo band lining for excessive wear and bonding to the metal band.

**Note:** The band should be replaced if worn to a point where grooves are not clearly visible.

- ☒ Check the accumulator piston and bore for scores. Be certain that the piston slides freely in the bore.
- ☒ Install the accumulator piston in the servo piston.
- ☒ Install a new seal ring on the servo piston.
- ☒ Install the piston in the servo body.

**Note:** Lubricate the parts to facilitate assembly.

Install the servo spring with the small coiled end against the servo piston.

- ☒ Install the spring retainer. Compress the spring with a "C" clamp. Install the snap ring.

**Caution:**

The snap ring must be fully seated in the groove.

- ☒ Install the needle bearing in the actuating lever. Install the actuating lever and thrust washers with the socket in the lever bearings on the piston stem. Install the actuating lever shaft, aligning the retaining pin holes. Install the pin.
- ☒ Check the actuating lever for free movement.

### TRANSMISSION CASE AND LINKAGE

#### Disassembly

- ☒ Remove the inner throttle lever shaft nut. (Fig. 28). Remove the inner throttle lever.
- ☒ Remove the outer throttle lever and shaft. Remove the throttle shaft seal from the counterbore in the manual lever shaft.
- ☒ Remove the cotter pin from each end of the parking pawl torsion rod. Remove the rod.

# Automatic Transmission

## SERVICE GUIDE

CRUISE-O-MATIC  
OVERHAUL

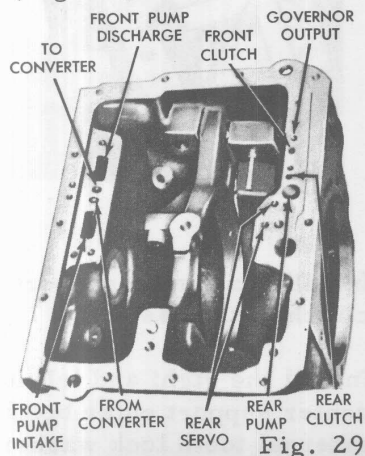
- ⊗ Rotate the manual shaft until the detent lever clears the detent plunger. Remove the detent plunger and spring.

**Caution:** Do not allow the detent plunger to fly out of the case.

- ⊗ Remove the manual lever shaft nut. Remove the detent lever. Remove the outer manual lever and shaft from the transmission case.
- ⊗ Remove the clip retaining the torsion lever assembly. Disassemble the torsion lever assembly.
- ⊗ Tap the toggle lever sharply toward the rear of the case to remove the plug and pin.
- ⊗ Remove the pawl pin by working the pawl back and forth. Remove the pawl and toggle lever assembly. Disassemble the pawl and toggle lever assembly.
- ⊗ Remove the manual shaft seal. Remove the case vent.

### Inspection

- ⊗ Clean the case thoroughly. Blow out all passages with compressed air (Fig. 29).



- ⊗ Inspect the case for cracks and stripped threads. Check the gasket and mating surfaces for burrs. Check the vent for obstructions. Check all fluid passages for obstructions and leakage.
- ⊗ Check the case bushing and center support bushing for scores. Inspect the torsion lever pin for wear.
- ⊗ Check all parking linkage parts for wear or damage (Fig. 28).

### Assembly

- ⊗ Assemble the toggle lever and pawl assembly. Install in the case. ✓
- ⊗ Install the torsion lever assembly. Use two screw drivers to position the spring on the lever. ✓
- ⊗ Coat the outer diameter of the new manual shaft seal with gasket sealer. Install the seal in the case. ✓
- ⊗ Install the manual lever shaft in the case. ✓
- ⊗ Install the detent lever and the attaching nut. Torque the nut to 35 to 40 ft. lbs. ✓
- ⊗ Install the detent spring and plunger. ✓

### Note:

Use a tube to depress the plunger and spring while rotating the lever. ✓

- ⊗ Complete the lever installation using a new throttle lever shaft seal. ✓
- ⊗ Check the linkage for free operation. ✓

# Automatic Transmission

## SERVICE GUIDE

### INSTALLATION OF COMPONENT ASSEMBLIES

**Caution:** Do not use force to assemble mating parts. If parts do not assemble freely, examine them for the cause of difficulty. ✓

**Note:** Always use new gaskets during the assembly operation. ✓



Fig. 30

#### Clutch Assemblies - Installation

- ☒ Install the front band in the transmission case with the anchor end aligned with the anchor in the case.
- ☒ Lift the clutch assemblies out of the holding fixture.

**Caution:** Do not allow the clutches to separate.

- ☒ Install the sub-assemblies in the transmission case while positioning the servo band on the drum.

**Caution:** Hold the units together while installing in the case (Fig. 5).

#### Center Support, One-Way Clutch, Pinion Carrier, and Output Shaft - Installation

- ☒ On the work bench, install the one-way clutch on the center support.

**Note:** The flange side of the cage rings must be up (Fig. 30).

- ☒ Carefully compress each drag spring as it is started on the inner race. After all the drag springs are started on the race, rotate the clutch to tilt the sprags. Push the clutch all the way down on the center support. Position a strong rubber band around the sprag outer end (Fig. 31).

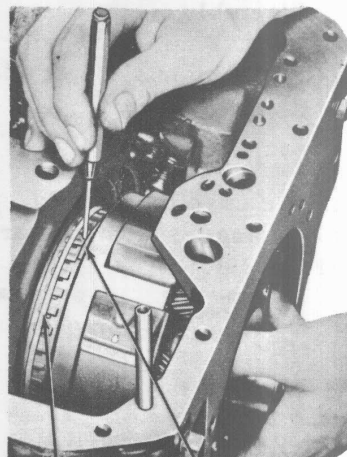


Fig. 31

- ☒ Install the center support and clutch in the case.
- ☒ Install the right and left hand center support outer bolts and external tooth lock washers.



# Automatic Transmission SERVICE GUIDE

CRUISE-O-MATIC  
OVERHAUL

**Note:** The lock washers must be installed with the rolled edge toward the transmission case to insure a tight seal.

Torque the bolts to 20 to 25 ft. lbs.

- ☒ Place the rear band in the transmission case (Fig. 31).
- ☒ Install the primary sun gear rear thrust bearing race and bearing on the thrust face inside the pinion carrier (Fig. 32). Be certain the one-way clutch spacer is inside the pinion carrier (Fig. 10).

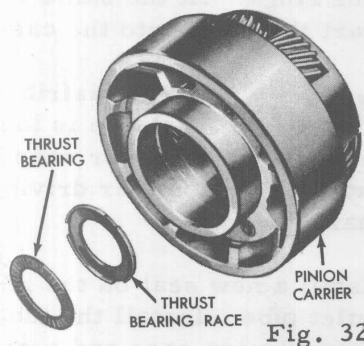
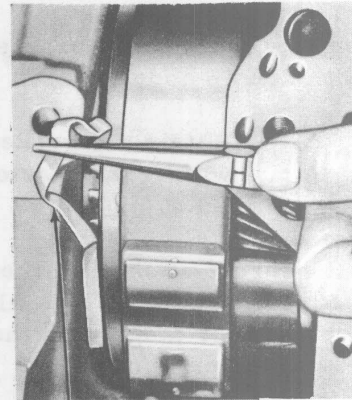


Fig. 32

- ☒ Install the pinion carrier in the case. Start the pinion carrier front pilot in the center support bushing. Depress the T-bar and work the pinion carrier forward until the sprags are started on the clutch outer race.
- ☒ Remove the rubber band (Fig.33).
- ☒ Move the pinion carrier forward to the point where the one-way clutch is barely visible. Rotate the pinion carrier counter-clockwise (from the rear). Note whether the clutch rotates with

the pinion carrier or remains stationary with the center support.



Rubber Band

Fig. 33

**Note:** Clutch T-bar frictional grip on the clutch outer race is stronger than the drag spring friction grip on the inner race. The clutch should rotate with the pinion carrier. Replace the clutch if it does not rotate with the pinion carrier.

- ☒ Install the selective thrust washer on the pinion carrier rear pilot.

**Note:** If the end play was not within specifications when checked prior to disassembly, replace the washer with one of the proper thickness.

**Note:** Selective washers are available in thicknesses of .061" - .063", .067" - .069", .074" - .076" and .081" - .083".

- ☒ Install the output shaft, carefully meshing the internal gear with the pinions.

# Automatic Transmission

## SERVICE GUIDE

### Rear Pump - Installation

- ☒ Install the rear pump drive key in the key-way on the output shaft.
- ☒ Position new front and rear gaskets on the pump body.

#### *Note:*

Retain the gaskets with transmission fluid.

- ☒ Install the thrust washer on the pump body, bronze side up. Align the thrust washer tangs with the bosses on the pump body.

#### *Caution:*

Make certain the drive key is aligned with the key-way in the pump drive gear.

### Governor - Installation

- ☒ Install the governor drive ball in the pocket in the output shaft.

#### *Note:*

Retain the ball with transmission fluid.

- ☒ Install the governor assembly, aligning the groove with the ball in the output shaft.
- ☒ Install the governor with the governor body plate toward the rear of the transmission. Install the governor snap ring.

### Distributor - Installation

- ☒ Position the four seal rings in the distributor sleeve. Check the ring gap. ✓

- ☒ Check the fit of the seal rings in the groove of the output shaft.

#### *Note:*

The rings should rotate freely.

Install the rings in the grooves of the output shaft.

- ☒ Install the three tubes in the distributor sleeve (Fig. 3).
- ☒ Install the distributor sleeve on the output shaft, chamfer forward.

#### *Note:*

Lubricate parts to facilitate assembly.

Slide the sleeve forward over the four rings. At the same time, start the tubes into the case.

#### *Note:*

The distributor sleeve is located between the governor snap ring and the speedometer driving gear.

- ☒ Install a new seal on the rear pump outlet tube. Install the tube in the transmission case and rear pump body.

### Extension Housing - Installation

- ☒ Install the speedometer drive gear ball in the pocket of the output shaft.

#### *Note:*

Retain the ball with transmission fluid.

Install the speedometer drive gear. Install the speedometer drive gear snap ring.

# Automatic Transmission

## SERVICE GUIDE

CRUISE-O-MATIC  
OVERHAUL

- ☒ Insert the extension housing oil seal replacer and pilot in the housing. Install the extension housing on the transmission case. Install the extension housing attaching bolts and external tooth lock washers.

**Note:** The lock washers must be installed with the rolled edge toward the transmission case to insure a tight seal.

- ☒ Torque the extension housing attaching bolts to 28 to 38 ft. lbs. Install the governor inspection cover with the new gasket on the housing.

### Front Pump - Installation

- ☒ Install a new front pump gasket in the counterbore of the transmission case.
- ☒ Install the front pump. Align the pump bolt holes with the holes in the case. Install three of the front pump attaching bolts. Torque the bolts to 17 to 20 ft. lbs.

### Transmission End Play Check

- ☒ Position the dial indicator support in a front pump bolt hole. Mount a dial indicator on the support to allow the contact to rest on the end of the turbine shaft (Fig. 2).
- ☒ Pry the front of the clutch drum toward the rear of the transmission with a large screw driver (Fig. 2). Set the dial indicator to zero.
- ☒ Remove the screw driver. Pry the units toward the front of the transmission by inserting the screw driver between the large internal

gear and the transmission case (Fig. 2). Note the indicator reading. End Play should be .010" - .029".

- ☒ Remove the dial indicator. Remove the support tool from the extension housing.
- ☒ Install the one remaining front pump attaching bolt. Torque the bolt to 17 to 22 ft. lbs.

### Front Servo - Installation

- ☒ Position the front band forward in the case with the ends of the band up.
- ☒ Install the servo strut with the slotted end aligned with the servo actuating lever, and with the small end aligned with the band end. Rotate the band, strut, and servo into position engaging the anchor end of the band with the anchor pin in the case.
- ☒ Locate the servo on the case. Install the attaching bolts.

**Note:**

Tighten the attaching bolts only two or three threads.

- ☒ Install the servo tubes.

### Rear Servo - Installation

- ☒ Position the servo anchor strut. Rotate the rear band to engage the strut.
- ☒ Position the servo actuating lever strut with a finger. Install the servo and attaching bolts. Torque the bolts to 40 to 50 ft. lbs.

# Automatic Transmission

## SERVICE GUIDE

- ☒ Install the control and converter valve guides and springs. Install the spring retainer.
- ☒ Install a new seal ring on the rear pump intake tube. Install the tube in the transmission case.

### Control Valve Body - Installation

- ☒ Install the control valve assembly, carefully aligning the servo tubes with the control valve. Align the inner throttle lever between the throttle lever stop and the downshift valve. At the same time, push the throttle valve in to clear the transmission case. Shift the manual lever to the Low position. Align the manual valve with the actuating pin in the manual detent lever.

**Note:** Do not tighten the attaching bolts.

- ☒ Install the large control pressure tubes in the valve body and regulator.
- ☒ Install the small control pressure compensator tube in the valve body and regulator.
- ☒ Move the control valve body toward the center of the case as far as the attaching bolts will permit.

**Note:** This movement is made to take up clearance between the manual valve and the actuating pin on the manual detent lever.

- ☒ Torque the attaching bolts to 8 to 10 ft. lbs.
- ☒ Turn the manual valve one full turn in each manual detent position. If

the manual valve binds against the actuating pin in any detent position, loosen the valve body attaching bolts and move the body away from the center of the case.

### **Note:**

Move the body only enough to relieve the binding.

- ☒ Torque the attaching bolts. Recheck the manual valve for binding.
- ☒ Install the lubrication tube in the rear pump and the regulator body.
- ☒ Torque the front servo attaching bolt to 30 to 35 ft. lbs.

### Front Servo Adjustment

- ☒ Loosen the front servo adjusting screw lock nut. Back off the nut three complete turns.
- ☒ Loosen the adjusting screw five complete turns.
- ☒ Using the front band adjusting wrench, insert a  $\frac{1}{4}$ " spacer between the lever and the stem (Fig. 34). Tighten the screw until the ratchet overruns.

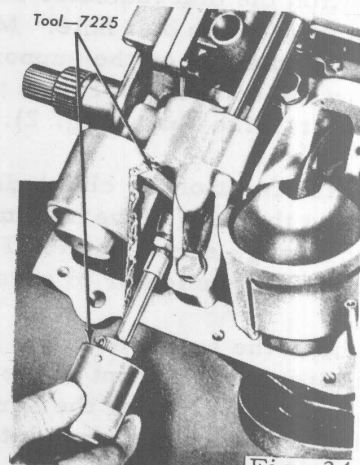


Fig. 34

# Automatic Transmission SERVICE GUIDE

**CRUISE-O-MATIC  
OVERHAUL**

- ☒ Back off the adjusting screw one complete turn. Tighten the lock nut.

## Rear Servo Adjustment

- ☒ Loosen the adjusting screw lock nut three complete turns with the  $\frac{3}{4}$ " socket of the rear band adjusting wrench.
- ☒ Back off the adjusting screw until free travel is obtained.
- ☒ Use the special adjusting tool and tighten the adjusting screw until the ratchet overruns (Fig. 35). Back off the adjusting screw 1-1/2 turns.

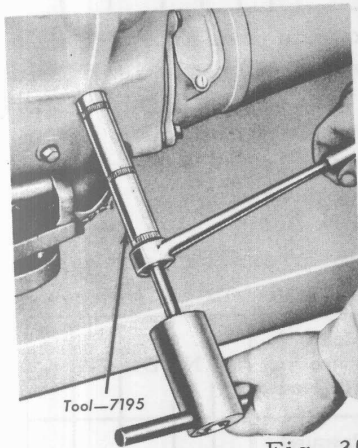


Fig. 35

- ☒ Hold the rear servo adjusting screw stationary. Tighten the lock nut.

## Fluid Screen and Bottom Pan - Installation

- ☒ Install the fluid screen over the rear pump and front pump inlet tubes. Press the screen down firmly. Install the screen retaining clip.

- ☒ Position a new gasket on the transmission case. Install the pan. Install the attaching bolts and lock washers. Tighten the bolts to 10 to 13 ft. lbs.

## HYDRAULIC SYSTEM BENCH TESTS

- ☒ When the transmission assembly procedure has been completed and the transmission is ready for installation in a car, check the hydraulic system to make sure that it is operating correctly. The hydraulic test can be made on the bench so that many malfunctions of the system can be corrected before the transmission is installed.

### Testing Tool Installation

- ☒ Install a plug in the filler tube hole in the oil pan. Pour four quarts of transmission fluid into the transmission through the speedometer gear opening.
- ☒ Install the bench testing tool on the transmission (Fig. 36).

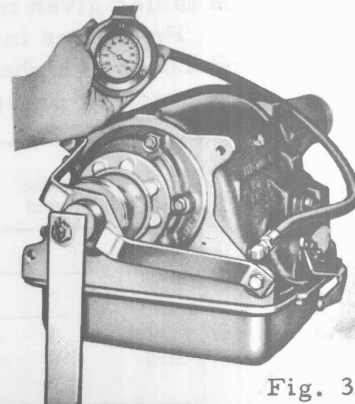


Fig. 36

# Automatic Transmission

## SERVICE GUIDE

- ☒ Remove the 1/8" pipe plug at the transmission case rear face or at the left hand side of the case. Rotate the front pump in a clockwise direction at approximately 75 to 100 rpm until a regular flow of transmission fluid comes through the test hole in the transmission case.

**Note:** This operation "bleeds" the air from the pump.

- ☒ Install the pressure gauge (Fig. 36).

### Pressure Tests

- ☒ Rotate the front pump at 75 to 100 rpm. Note the gauge readings. The pressure readings on the bench test must be within the limits set for a transmission in the car. As an example, on the bench test, the transmission must develop at closed throttle, 56 to 72 psi in all manual valve positions. While maintaining 56 - 72 psi, push the throttle lever down slowly and note that a pressure rise is obtained.

- ☒ Maximum pressures must be within the tables given in Fig. 37. Pressures in Reverse and Low are higher because compensator pressure

is not present with advanced throttle in Reverse and Low.

- ☒ Think of the hydraulic control system as a main line pressure system with feeder lines running from it. When the manual valve is shifted, these feeder lines are "cut in" and "cut out" of the system. By noting the positions in which pressure is low, it is possible to locate a leak. For example, pressure readings might be:

Manual Valve Position	P	R	N	D2	D1	L
Pressure At Closed Throttle (Psi)	60	20	60	60	60	60

- ☒ Since the pressure is low in Reverse only, the leak is in the passage that is in the system only in Reverse. That passage is the rear clutch apply passage.
- ☒ Again, pressure readings on a bench test might be:

Manual Valve Position	P	R	N	D2	D1	L
Pressure At Closed Throttle (Psi)	60	60	60	20	20	20

Engine Speed	Selector Lever Position	Pressure Range psi
Idle	All	56-72
1000 rpm	D1 or D2	80-85
Stall	D1 or D2	150-170
	L and R	196-216

Fig. 37

# Automatic Transmission

## SERVICE GUIDE

### CRUISE-O-MATIC OVERHAUL

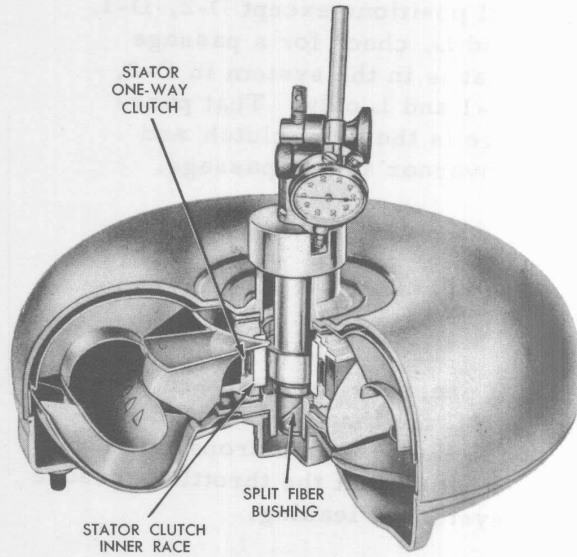
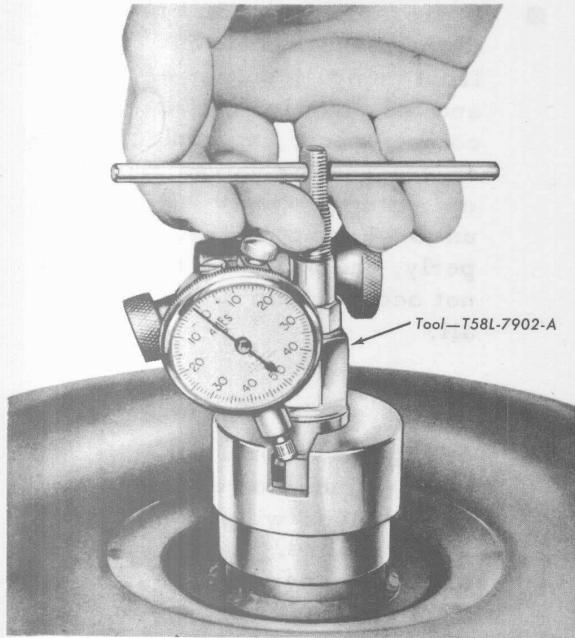
- ☒ Since pressure is normal in all positions except D-2, D-1, and L, check for a passage that is in the system in D-2, D-1 and L only. That passage is the front clutch and governor supply passage.
- ☒ If pressure is normal in any of the manual positions, the front pump, throttle valve bore and the throttle, modulator, compensator, and control pressure regulator valves are all operating properly. If these units were not operating properly, the pressure rise would not occur within limits or at all.
- ☒ If pressure readings are normal until the throttle is advanced, the the pressure drops, it is indication that the throttle pressure system is leaking.
- ☒ Sticking 2 - 1 or 2 - 3 shift valves, inhibitor or transition valves will not cause low pressure. If these valves are stuck open, a "pressure tight" passage has been opened. When the 2 - 3 shift valve sticks in the open position, the transmission will start in high instead of in intermediate. A pressure gauge installed on a transmission with this condition will give a normal reading. All "on" and "off" valves in the control valve body are manufactured so that their exhaust ports close before their inlet ports open.

**Note:** Throttle pressure is in the system only when the throttle lever is advanced.

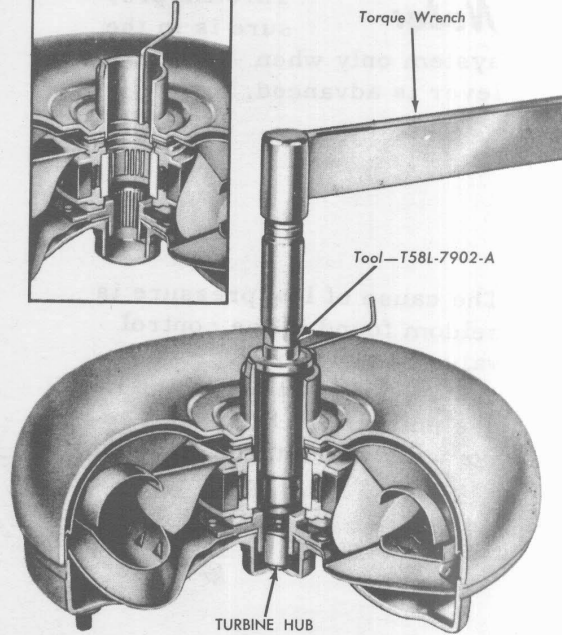
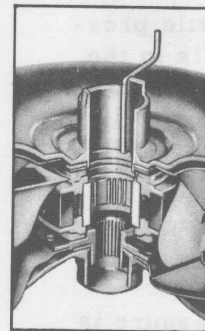
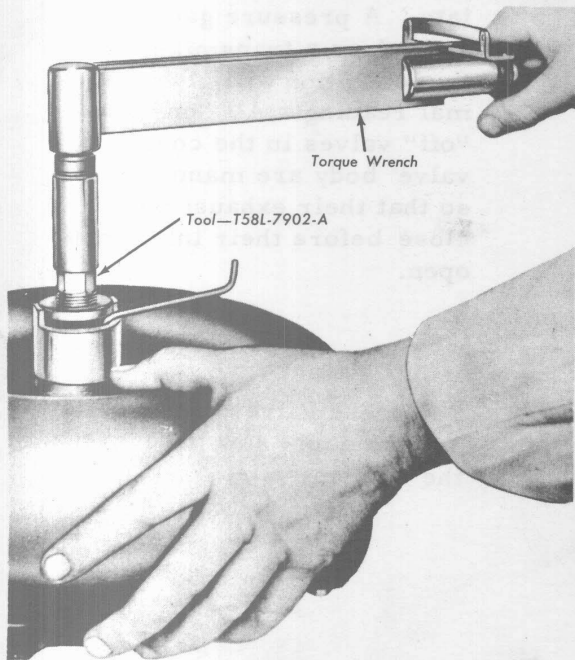
- ☒ The cause of low pressure is seldom found in the control valve body. However, the control valve body on high mileage units may have excessive wear and internal leakage.
- ☒ Scratched valves or valve bores seldom cause low pressure in the transmission.

# Automatic Transmission

## SERVICE GUIDE



END PLAY CHECK



STATOR CLUTCH CHECK

Fig. 38



## SERVICE GUIDE

### TORQUE CONVERTER CHECK

The Cruise-o-matic and Fordomatic torque converters are totally enclosed in a welded housing. They are serviced as an assembly only. Special tools are available to check the end play in the stator and the operation of the one-way stator clutches.

- ☒ Identical service checks are made on the Fordomatic and Cruise-o-matic converters. Procedures and limits on the two converters are also the same. Because of dimensional differences in the two converters, however, two tools are required to check end play and operation of the stator clutch (Fig. 38). Stator interference checks on the Fordomatic must be made with a Fordomatic front pump, Fordomatic stator support, and Fordomatic input shaft.

### Turbine and Stator End Play Check

- ☒ Insert the end play checking tool into the converter pump drive hub until it is bottomed.
- ☒ Install the guide over the converter pump drive hub.
- ☒ Tighten the adjusting nut to expand the split fiber bushing in the turbine spline until the tool is securely locked.
- ☒ Install a dial indicator to the end play checking tool (Fig. 38 or 39). Position the indicator button on a converter pump drive hub lug. Set the dial face to zero.

- ☒ Raise the tool upward as far as possible. Note the indicator reading. This reading is the total end play which the turbine and stator share. If the total end play exceeds .060", the converter unit should be replaced.

### Stator One-Way Clutch Check

- ☒ Loosen the adjusting nut to free the split bushing. Remove the tool from the converter.
- ☒ Install the stator outer race holding tool in one of the four holes in the stator (Fig. 38).
- ☒ Insert the tool in the converter pump drive hub. When the tool enters the converter, the pins will engage the stator clutch inner race spline.
- ☒ Position a torque wrench on the tool (Fig. 38). The tool and stator inner race should turn freely in a clockwise direction (from the pump drive hub side of the converter). The stator inner race should lock up and hold a ten foot pound pull when the wrench is rotated in a counter-clockwise direction.

**Note:** Try the clutch for lock-up and hold in at least five different locations.

- ☒ Replace the converter unit if the clutch fails to lock-up and hold a ten foot pound pull.

# Automatic Transmission

## SERVICE GUIDE

### Stator to Impeller Interference Check

- ☒ Place the front pump assembly on a bench with the spline end of the stator shaft up (Fig. 40).

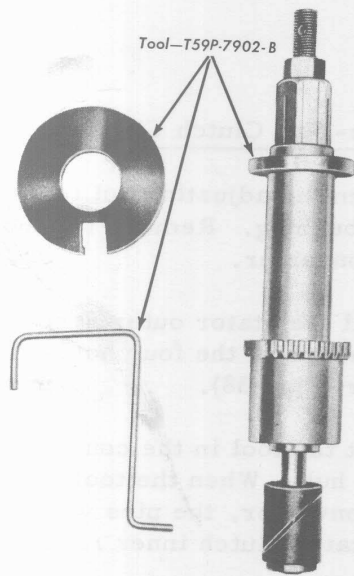


Fig. 39

- ☒ Install the converter on the pump. The splines on the one-way clutch inner race must engage the mating splines of the stator support while the converter hub engages with the pump drive gear.
- ☒ Try to rotate the converter counter-clockwise while holding the pump stationary. The converter should rotate freely. There should be no sign of interference or scraping within the converter assembly.
- ☒ If there is any indication of scraping, the trailing edges of the stator blades may be interfering with the leading edges of the impeller blades. In such instances, the converter must be replaced.

### Stator to Turbine Interference Check

- ☒ Position the converter on the bench with the front side down.
- ☒ Install the front pump assembly to engage the mating splines of the stator support and stator, and the pump drive gear lugs.
- ☒ Install the input shaft, engaging the splines with the turbine hub.



Fig. 40

- ☒ Attempt to rotate the turbine with the input shaft while holding the pump stationary. The turbine should rotate freely in both directions without any sign of interference or scraping noise.
- ☒ If interference exists, the stator front thrust washer may be worn. This will allow the stator to hit the turbine. In such instances replacement of the converter is necessary.

### Converter Flushing

- ☒ The torque converter cannot be disassembled for cleaning. The following cleaning procedure can be used if there is reason to believe that the converter has foreign particles in it.

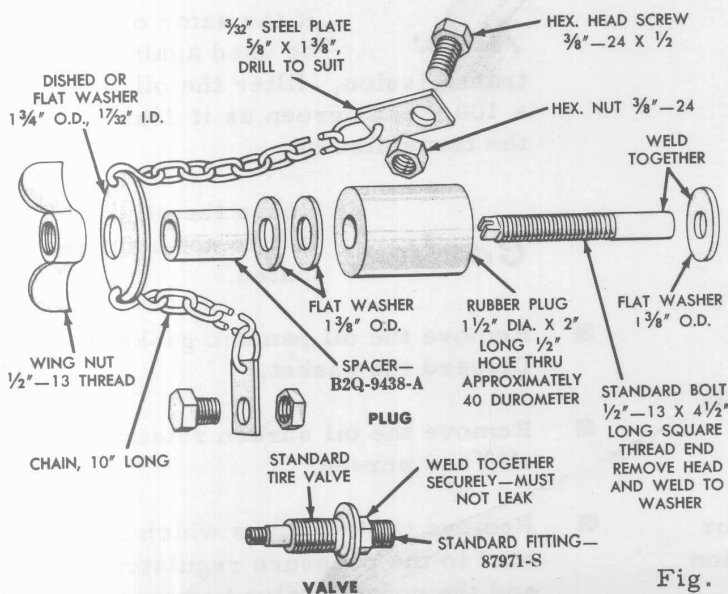
# Automatic Transmission SERVICE GUIDE

## CRUISE-O-MATIC OVERHAUL

- ☒ Place the converter on the work bench. Remove both drain plugs. Tilt the converter in all directions to drain as much oil as possible.
- ☒ Install the drain plugs. Fill the converter through the pump drive hub with a light body oil (kerosene) or a good cleaning solvent.
- ☒ Install the special tool shown in Fig. 38 in the converter. Expand the bushing in the turbine spline. Rotate the tool to circulate the solvent in the converter.
- ☒ Remove both drain plugs. Thoroughly drain the torque converter.
- ☒ Repeat the procedure until all foreign particles are removed.

### Leakage Check

- ☒ The following check should be made before the unit is installed if there are indications that the welds on the torque converter housing are leaking.



- ☒ A checking tool can be made from standard parts (Fig. 41).

### Note:

This tool can be used to check both Cruise-o-matic and Fordomatic converters.

- ☒ Install the plug in the converter (Fig. 42 and 43). Expand the tool by tightening the wing nut. Attach the safety chains.
- ☒ Install the air valve in one of the drain plugs.
- ☒ Introduce approximately 20 lbs. of air pressure into the converter housing.

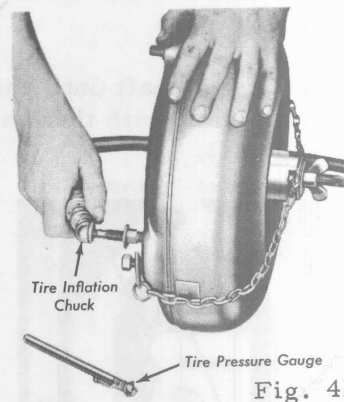


Fig. 42



Fig. 43

Fig. 41

# Automatic Transmission

## SERVICE GUIDE

### Note:

This pressure may be checked with a tire gauge.

- ☒ Place the converter in a water tank. Carefully check the welded areas for bubbles. If no bubbles are observed, the converter does not leak.

### REMOVAL AND REPLACEMENT OF SUB-ASSEMBLIES -- TRANSMISSION IN CAR

#### Governor - Removal and Replacement

- ☒ Place the car on a lift so that the extension housing is accessible.
- ☒ Remove the governor inspection cover from the transmission extension housing.
- ☒ Turn the drive shaft until the governor is aligned with the inspection hole (Fig. 44).

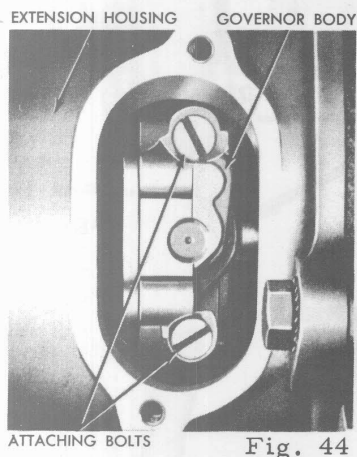


Fig. 44

- ☒ Remove the governor valve body from the counterweight.

**Caution:** Do not drop the attaching bolts or the valve parts into the extension housing.

- ☒ Lubricate the new governor valve parts with transmission oil.

**Caution:** The valve must be free to move in the valve body bore.

- ☒ Install the governor valve body on the counterweight.

**Note:** The valve body cover must face rearward. Securely tighten the two attaching bolts.

- ☒ Install the governor inspection cover with a new gasket on the extension housing. Tighten the attaching screws to 50 to 60 in. lbs. torque.

#### Oil Pan and Control Valve Body - Removal and Replacement

- ☒ Place the car on a lift so that the transmission oil pan is accessible.
- ☒ Disconnect the oil filler tube from the oil pan. Drain the oil from the transmission.

**Note:** If the same oil is to be used again in the transmission, filter the oil through a 100 mesh screen as it drains from the transmission.

**Caution:** Reuse the oil only if it is not contaminated.

- ☒ Remove the oil pan and gasket. Discard the gasket.
- ☒ Remove the oil screen retaining clip and screen.
- ☒ Remove the two tubes which connect to the pressure regulator and the control valve body.

# Automatic Transmission SERVICE GUIDE

## CRUISE-O-MATIC MINOR SERVICE

**Note:** The regulator lubrication tube does not have to be removed (Fig. 45).

- ⊗ Loosen the servo attaching bolts three complete turns.
- ⊗ Remove the three control valve body attaching bolts. Lower the valve body while pulling it off the front servo oil tubes (Fig. 45).

**Caution:** Use care not to damage the valve body or the tubes.

- ⊗ Check for a bent manual valve before installing the control valve body.

**Note:** This is done by rolling the valve on a surface plate or a flat surface.

- ⊗ Install the control valve body by aligning the front servo oil tubes with the holes in the valve body. Move the manual lever to the low detent. Position the inner throttle lever between the throttle lever stop and the downshift valve.

**Note:** The manual valve must engage the actuating pin in the manual detent lever.

- ⊗ Install the control valve body attaching bolts. Do not tighten.

- ⊗ Install the two tubes to the pressure regulator and the control valve body.

- ⊗ Move the control valve body to the center of the case as far as the attaching bolts will allow.

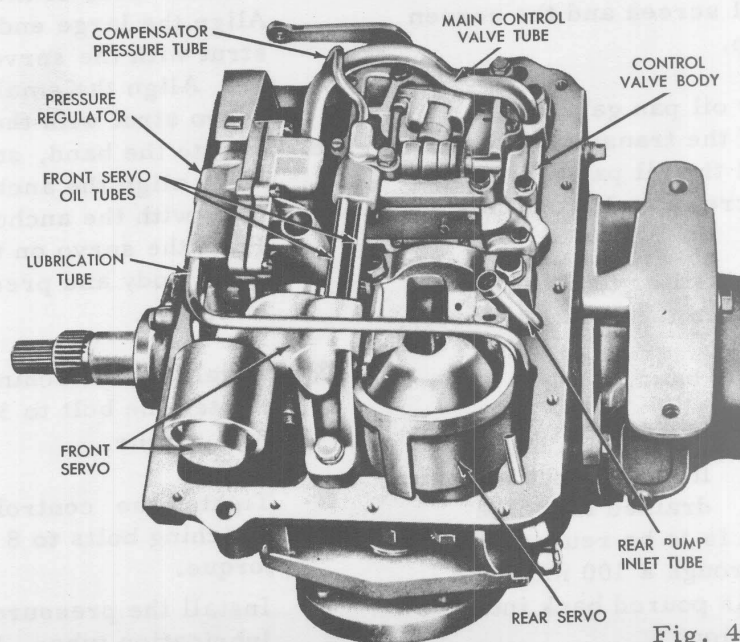


Fig. 45

# Automatic Transmission

## SERVICE GUIDE

**Note:** This movement is made to take up the clearance between the manual valve and the actuating pin on the manual detent lever.

- ⊗ Tighten the attaching bolts to 8 to 10 ft. lbs. torque.
- ⊗ Rotate the manual valve one full turn in each manual detent position. If the manual valve binds against the actuating pin in any particular detent position, loosen the valve body attaching bolts. Lift the body away from the center of the case. Move the body only enough to relieve the bind. Tighten the attaching bolts. Recheck the manual valve for binding.
- ⊗ Tighten the front servo attaching bolts to 30 to 35 ft. lbs. torque.
- ⊗ Adjust the front band.
- ⊗ Install the oil screen and the screen retaining clip.
- ⊗ Secure a new oil pan gasket to the bottom of the transmission case. Install the oil pan. Tighten the oil pan screws to 10 to 13 lbs. torque.
- ⊗ Connect the oil filler tube to the oil pan. Tighten the fitting securely.
- ⊗ Adjust the rear band.
- ⊗ Fill the transmission with oil.

**Note:** It the oil that was drained from the transmission is to be reused, filter the oil through a 100 mesh screen as it is poured back into the transmission.

**Caution:** Reuse the fluid only if it is not contaminated.

- ⊗ If the control valve body was replaced, adjust the transmission throttle and manual control linkage.

### Front Servo - Removal and Replacement

- ⊗ Drain the oil from the transmission. Remove the oil pan and oil screen.
- ⊗ Remove the pressure regulator lubrication tube (Fig. 45).
- ⊗ Loosen the three control valve body attaching bolts.
- ⊗ Remove the attaching bolts from the front servo (Fig. 45). Hold the strut with the fingers, then remove the servo.
- ⊗ To install the front servo, position the front band forward in the case with the ends of the band downward. Align the large end of the servo strut with the servo actuating lever. Align the small end of the servo strut with the band end.
- ⊗ Rotate the band, strut, and servo to align the anchor end of the band with the anchor in the case. Push the servo on the control valve body and pressure regulator tubes.
- ⊗ Install the attaching bolt and tighten the bolt to 30 to 35 ft. lbs. torque.
- ⊗ Tighten the control valve body attaching bolts to 8 to 10 ft. lbs. torque.
- ⊗ Install the pressure regulator lubrication tube.

# Automatic Transmission SERVICE GUIDE

## CRUISE-O-MATIC MINOR SERVICE

- ☒ Adjust the front band.
- ☒ Install the oil screen and oil pan. Fill the transmission with 'Type A' oil.
- ☒ Adjust the throttle and manual linkage.

### Rear Servo - Removal and Replacement

- ☒ Drain the oil from the transmission. Remove the oil pan and oil screen.
- ☒ Remove the pressure regulator lubrication tube (Fig. 45).
- ☒ Remove the control valve body and the two front servo oil tubes.
- ☒ Remove the attaching bolts from the rear servo. Hold the actuating and anchor struts with the fingers. Remove the servo.
- ☒ To install the rear servo, position the servo anchor strut on the servo band. Rotate the band to engage the strut.
- ☒ Hold the servo anchor strut in position with the fingers. Position the actuating strut, then install the servo.
- ☒ Install the servo attaching bolts and tighten them to 40 to 50 ft. lbs. torque.

**Caution:** The longer bolt must be installed in the inner bolt hole.

- ☒ Install the two front servo oil tubes and the control valve body.

- ☒ Install the pressure regulator lubrication tube.
- ☒ Adjust the rear band.
- ☒ Install the oil screen and oil pan. Fill the transmission with 'Type A' oil.
- ☒ Adjust the throttle and manual linkage.

### Pressure Regulator - Removal and Replacement

- ☒ Drain the oil from the transmission. Remove the oil pan and oil screen.
- ☒ Remove the pressure regulator lubrication tube (Fig. 45).
- ☒ Remove the small compensator pressure tube and the large control pressure tube from the control valve body and the pressure regulator.
- ☒ Remove the pressure regulator spring retainer, springs, and spacer.

**Caution:** Maintain steady pressure on the retainer to prevent the springs from flying out.

- ☒ Remove the pressure regulator attaching bolts and washers. Remove the regulator.

**Note:** Leave the pressure regulator to front servo tube in the regulator body.

# Automatic Transmission

## SERVICE GUIDE

- ☒ Position the replacement regulator body on the transmission case and onto the front servo tube. Install the attaching bolts. Tighten the bolts to 17 to 22 ft. lbs. torque.
- ☒ Check the converter pressure and control pressure valves to be certain that the valves operate freely in their respective bores.
- ☒ Install the valve springs, spacer, and retainer.
- ☒ Install the large control pressure tube, small compensator pressure tube, and the pressure regulator lubrication tube.
- ☒ Install the oil screen and the oil pan. Fill the transmission with Type A Oil.

### Extension Housing Bushing and Rear Seal - Removal and Replacement

- ☒ Remove the drive shaft from the transmission.
- ☒ Remove the bushings and the rear seal together when the bushing requires replacement (Fig. 46).

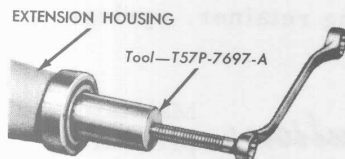


Fig. 46

**Caution:** Use extreme care when the bushing remover tool is installed so that the spline seal is not damaged.

When only the rear seal needs replacement, remove the rear seal from the extension housing with a special seal puller.

- ☒ When installing a new bushing use a bushing installer (Fig. 47).

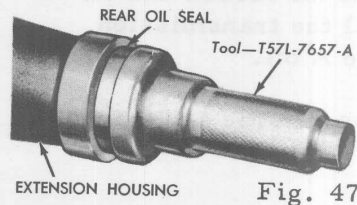


Fig. 47

- ☒ Before installing a new seal, inspect the sealing surface of the universal joint for scores. If scores are found, replace the universal joint yoke.
- ☒ Inspect the counterbore of the housing for burrs. Polish off all burrs with crocus cloth.
- ☒ Coat the outer diameter of the new seal with #3 sealing compound or its equivalent. Position the seal in the bore of the extension housing with the felt side of the seal to the rear.
- ☒ Drive the seal into the housing with the seal installer. The seal should be firmly seated in the bore. Install the drive shaft.

### Oil Cooler Flushing Procedure

- ☒ When a clutch or band fails, or other internal trouble has occurred in the transmission, any metal particles, or clutch plate, or band material that may have been carried into the cooler should be removed from the system by flushing the cooler before the transmission is put back into service.
- ☒ Disconnect the oil return line from the rear of the transmission.



# Automatic Transmission SERVICE GUIDE

## CRUISE-O-MATIC MINOR SERVICE

- ☒ Start the engine. Drain approximately two quarts of oil from the cooler into the pan. Discard the drained oil. If there is no oil flow or the oil does not flow freely from the return line, shut off engine. Disconnect both lines at the cooler and transmission.
- ☒ Use compressed air with not more than 100 psi pressure to reverse flush the lines and the cooler.
- ☒ Connect both lines at the cooler and the pressure line at the transmission.
- ☒ Start the engine and check the oil flow. If the oil flows freely, connect the return line at the transmission and fill the transmission with new oil to the specified level. If there is no oil flow or if the flow is restricted, replace the radiator.

**Caution:** Do not attempt to correct cooler or cooling line leaks by closing off the lines.

### Oil Cooler - Replacement

- ☒ When oil leakage is found at the oil cooler, the entire radiator must be replaced.

**Note:** The oil cooler cannot be removed from the radiator for replacement.

### Oil Cooler Tube - Replacement

- ☒ When one or more of the oil cooler steel tubes must be replaced, the replacement tube must be fabricated from exactly the same size and grade of tubing as the original line.

- ☒ Using the oil tube as a guide, bend the new tube as required. Add the necessary fittings and install the tube.
- ☒ After the fittings have been tightened, add oil as required. Check for oil leaks.

### TRANSMISSION - REMOVAL AND REPLACEMENT

#### Transmission and Converter Removed and Replaced as an Assembly

##### Removal

- ☒ Position the car on a lift. Do not raise the car at this time.
- ☒ Remove the two upper bolts and lock washers which attach the converter housing to the engine.
- ☒ Raise the car. Remove the cover from the lower front side of the torque converter housing.
- ☒ Remove one of the torque converter drain plugs. Rotate the torque converter 180° and remove the other plug.

**Caution:** Do not attempt to turn the converter with a wrench on the converter stud nuts.

**Note:** If desired, the converter may be drained after the transmission unit has been removed from the vehicle.

- ☒ Disconnect the oil filler tube from the transmission oil pan.

# Automatic Transmission

## SERVICE GUIDE

- ⊗ Remove the fly-wheel to converter nuts and flat washers when the oil has stopped draining from the transmission and converter. Install the torque converter housing front plate to hold the converter in place when the transmission is removed.
- ⊗ Disconnect the cable from the starter motor. Remove the starter.
- ⊗ Disconnect the oil cooler lines at the transmission. Remove the transmission vent tube.
- ⊗ Disconnect the throttle and manual linkage at the transmission.
- ⊗ Disconnect the speedometer cable from the transmission extension housing. Remove the drive shaft.
- ⊗ On vehicles with a single exhaust system, loosen then drop the exhaust system to permit the torque converter to clear the muffler inlet pipe.
- ⊗ Remove the two engine rear support to transmission bolts. Raise the transmission slightly to take the transmission weight off the cross member. Remove the transmission cross member.

### *Note:*

Support the rear part of the engine.

- ⊗ Remove the remaining converter housing to engine attaching bolts.
- ⊗ If additional clearance is required to remove the transmission and converter assembly

from the vehicle, tilt the rear of the assembly upward slightly and to the rear of the car (enough to allow the removal of the six fly-wheel to crank shaft bolts). Move the transmission assembly to the rear. Remove the transmission.

### Installation

- ⊗ If the torque converter has been removed from the converter housing, install the converter in the housing. Install the housing lower front cover plate to prevent the converter from slipping out of the housing. Install the transmission vent tube.
- ⊗ Rotate the torque converter until the studs are in a vertical position. Position the fly-wheel on the crank shaft flange. Install six attaching bolts.
- ⊗ Move the converter and transmission assemblies forward into position.

**Caution:** Use extreme care not to damage the fly-wheel and converter pilot.

- ⊗ Install the lower converter housing to engine bolts. Tighten the bolts to 45 to 50 ft. lbs. torque.
- ⊗ Install the cross member.
- ⊗ Lower the transmission until the extension housing rests on the cross member. Install the extension housing to cross member bolts.

# Automatic Transmission

## SERVICE GUIDE

### CRUISE-O-MATIC MINOR SERVICE

**Caution:** The converter must rest squarely against the fly-wheel. This indicates that the converter pilot is not binding in the engine crank shaft.

- ☒ Install the attaching nuts and flat washers.
- ☒ Install the converter drain plugs and the access plates.
- ☒ Connect the oil cooler inlet and outlet lines at the transmission case.
- ☒ Coat the front universal joint yoke spline with lubricant. Install the drive shaft.
- ☒ Connect the speedometer cable at the transmission.
- ☒ Connect the manual and throttle linkage at the transmission.
- ☒ Install the starting motor.
- ☒ Connect the oil filler tubes to the oil pan.
- ☒ Lower the lift. Install the upper two converter housing to engine bolts. Tighten to 45 to 50 ft. lbs. torque.
- ☒ Fill the transmission with 'Type A' oil.
- ☒ Check the transmission, converter assembly, and oil cooler lines for oil leaks. Adjust the manual and throttle linkages.

### TRANSMISSION REMOVAL AND REPLACEMENT -- WITHOUT THE TORQUE CONVERTER

**Note:** The frame construction of the 'Sunliner' will not allow the transmission to be moved rearward sufficiently to clear the turbine shaft from the converter. For this reason, the converter and transmission must be removed as a complete assembly from this model.

#### Removal

- ☒ Raise the car on a lift. Disconnect the oil filler tubes from the oil pan. Drain the oil.
- ☒ Disconnect the drive shaft from the rear axle. Remove the drive shaft.
- ☒ Disconnect the oil cooler lines from the transmission. Remove the vent tube.
- ☒ Disconnect the manual linkage at the transmission throttle lever.
- ☒ Disconnect the speedometer cable at the extension housing.
- ☒ Remove the two engine rear support to transmission bolts.
- ☒ Place a transmission jack under the transmission. Raise the jack slightly to take the weight off the cross member. Remove the cross member bolts, then the cross member. With the transmission jack in position, remove the four transmission to converter housing bolts.

# Automatic Transmission

## SERVICE GUIDE

- ⊗ Support the engine. Tilt the rear of the transmission assembly slightly upward and with the jack move the assembly toward the rear until clear of the turbine shaft. Lower the transmission and remove it from underneath the car.

### Installation

- ⊗ Install guide pins in the two top transmission to converter housing attaching bolts.
  - ⊗ Mount the transmission on the transmission jack.
- Caution:** Be certain to align the turbine shaft splines with the turbine splines and the converter impeller lugs with the slots in the front pump drive gear.
- ⊗ Raise the transmission and move it toward the front of the car, then position it on the converter housing.
  - ⊗ Install the transmission to converter housing lower attaching bolts. Remove the two guide pins, then install the two upper attaching bolts. Tighten all four bolts to 35 to 45 ft. lbs. torque.
  - ⊗ Install the frame cross member and bolts.
  - ⊗ Lower the transmission on to the cross member. Install the engine rear support to transmission bolts.
  - ⊗ Connect the oil cooler to transmission oil inlet and outlet lines to the transmission. Tighten the fittings securely. Install the vent tube.
  - ⊗ If a new transmission is being installed, position a new rubber extension housing shield over the end of the housing.
  - ⊗ Lubricate the front universal slip yoke. Slide the universal joint yoke on to the output shaft. Connect the drive shaft at the rear axle.
  - ⊗ Connect the speedometer cable to the extension housing. Connect the manual linkage to the transmission manual lever. Connect the throttle linkage to the transmission throttle lever. Adjust the linkage.
  - ⊗ Check the operation of the Neutral - Park switch. Adjust if necessary.
  - ⊗ Connect the oil filler tube to the oil pan. Tighten the fittings securely.
  - ⊗ Lower the car to the floor. Fill the transmission with oil, then check the oil level with the transmission at normal operating temperature.

# Automatic Transmission

## SERVICE GUIDE

**CRUISE-O-MATIC  
OPERATION**

### TRANSMISSION OPERATION

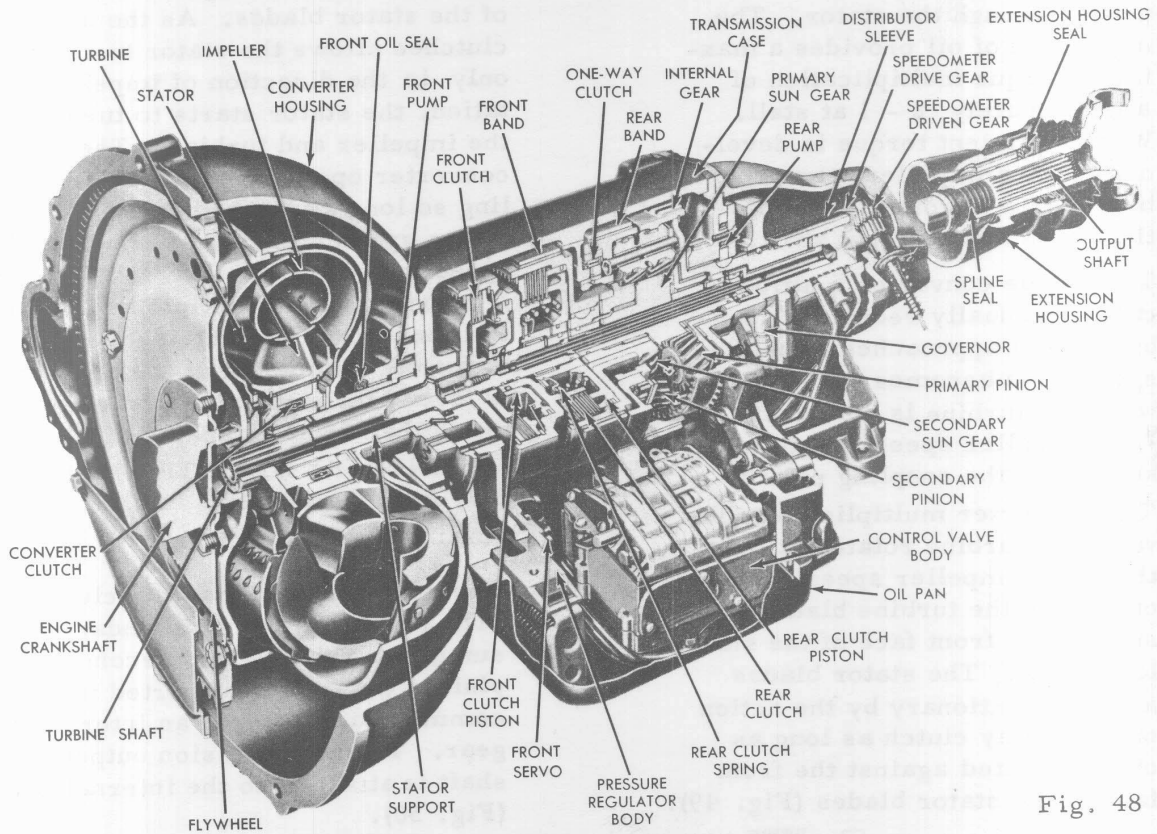


Fig. 48

Cruise-O-Matic transmission includes a hydraulic torque converter used in conjunction with a planetary gear train to provide three forward speeds and one reverse speed (Fig. 48).

#### THE TORQUE CONVERTER

- ⊠ The hydraulic torque converter includes an impeller (pump), a turbine, and a stator. (Fig. 49). These components are enclosed and operate in an oil filled housing.

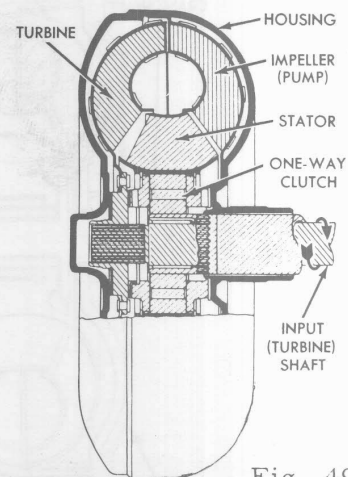


Fig. 49

# Automatic Transmission

## SERVICE GUIDE

- ⊗ With the engine running, the oil in the torque converter moves from the impeller to the turbine and then back to the impeller through the stator. The movement of oil provides a maximum torque multiplication of approximately 2 - 1 at stall. When sufficient torque is developed by the impeller, the turbine starts to rotate, turning the transmission input shaft.
- ⊗ The torque converter multiplication gradually reduces as turbine speed approaches impeller speed, and becomes a 1 - 1 ratio when the turbine is driven at  $\frac{9}{10}$  impeller speed. This is known as "the coupling point".
- ⊗ The converter multiplies torque when the turbine rotates at less than  $\frac{9}{10}$  impeller speed. The oil leaves the turbine blades and strikes the front face of the stator blades. The stator blades are held stationary by the action of a one-way clutch as long as oil is directed against the front face of the stator blades (Fig. 49).

- ⊗ When the turbine speed is greater than  $\frac{9}{10}$  impeller speed, the converter no longer multiplies torque. The oil is directed against the back of the stator blades. As the one-way clutches allows the stator to rotate only in the direction of impeller rotation, the stator starts to turn with the impeller and turbine. The torque converter operates as a fluid coupling so long as the turbine speed remains greater than  $\frac{9}{10}$  impeller speed.
- ⊗ A constant flow of oil into and out of the converter is maintained. Some of the oil coming out of the converter is forced through an oil cooler located in the radiator tank.

### THE PLANETARY GEAR TRAIN, SERVOS, BANDS, AND CLUTCHES

#### The Planetary Gear Train

- ⊗ The planetary gear train includes a primary sun gear, a secondary sun gear, primary and secondary pinions which are supported in a common carrier, and an internal gear. The transmission output shaft is attached to the internal gear (Fig. 50).

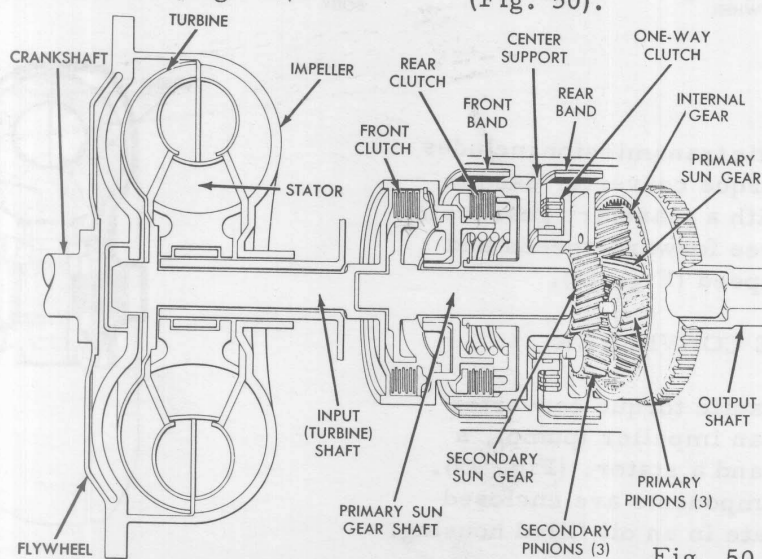


Fig. 50

# Automatic Transmission

## SERVICE GUIDE

CRUISE-O-MATIC  
OPERATION

### The Front Clutch

- ⊗ The front clutch drive plates are connected to the turbine shaft through the front clutch drum (Fig. 51). The driven plates are connected to the primary sun gear shaft.

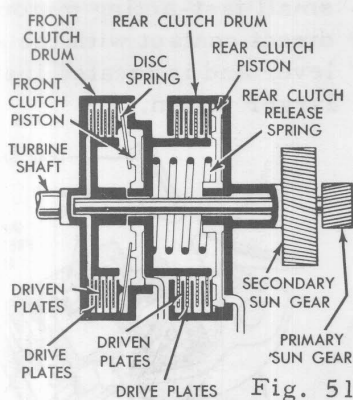


Fig. 51

- ⊗ The front clutch is applied by oil pressure against the clutch piston. The piston moves against a disc spring which acts as a lever to firmly lock the drive and driven plates together.
- ⊗ The primary sun gear is locked to and driven by the input shaft when the clutch is applied. The piston is returned to the release position by the disc spring when oil pressure is not applied (Fig. 51). A check valve is located in the front clutch piston to allow the remaining oil to exhaust when the piston is in the release position.
- ⊗ In Neutral position, the front clutch drum and steel plates are driven, the bronze plates are stationary. In Reverse position, the clutch is not applied, since the steel and bronze plates must turn in opposite directions.

### The Rear Clutch

- ⊗ The rear clutch is applied by oil pressure against the clutch piston (Fig. 51). Movement of the piston compresses the release spring and locks the drive and driven clutch plates together. The rear clutch drive plates are splined to the front clutch drum. The driven plates are splined to the rear clutch drum and secondary sun gear. When the rear clutch is applied in Reverse and third speeds, the secondary sun gear is driven. When hydraulic pressure is released, the piston is moved to the release position by the release spring.
- ⊗ In Neutral, the rear clutch bronze plates are driven while the steel plates are free. In second speed, the bronze plates are driven, the steel plates are held stationary. In first speed, the bronze plates are driven clockwise at engine speed, the steel plates are driven counter-clockwise.

### The Front Band and Servo

- ⊗ One end of the front band which encircles the rear clutch drum, is anchored to the transmission case. The other end is connected by an actuating lever to the front servo piston.
- ⊗ Oil pressure forces the front servo piston outward against the inner end of the front servo actuating lever. Force is transmitted through a strut located between the outer end of the lever and the end of the band. This action tightens the band around the rear clutch.

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drum. Under certain conditions, the servo is released by routing fluid pressure to the opposite side of the piston, assisted by release spring force.

- ☒ To cushion band application, an accumulator piston in the front servo operates with the apply piston. Oil pressure is exerted against both the apply piston and the accumulator piston simultaneously; however, the apply piston offers less resistance to the pressure than the accumulator piston, and rapidly moves out to start application of the band (Fig. 52).

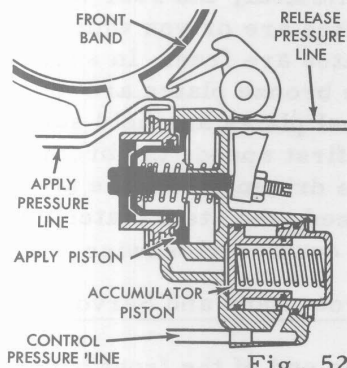


Fig. 52

- ☒ When the oil pressure overcomes the resistance of the accumulator piston, the piston is forced to move out. At this time both pistons offer equal resistance to the pressure, and continue to move out together more slowly to cushion the final application of the band.

### The Rear Band and Servo

- ☒ The rear band encircles the planetary gear train drum. One end of the band is adjacent to

the end of the band adjusting screw. The opposite end of the band connects to the rear servo.

- ☒ Two rear servo pistons apply the rear band (Fig. 53). The small fast-acting piston is in direct contact with the servo lever and is located inside the larger piston.

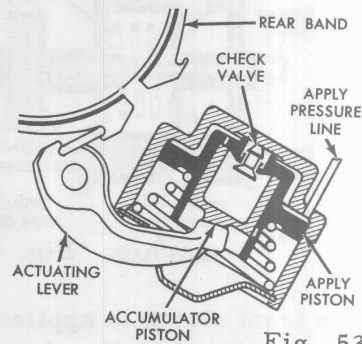


Fig. 53

- ☒ Oil pressure against the large piston moves through a check valve to work against the small piston. This piston has low pressure resistance from the spring force of the rear band and whatever friction is in the servo lever and band struts. At a very low apply pressure and small volume of fluid flow, the small piston moves out and tightens the rear band around the pinion carrier.
- ☒ When the apply pressure increases to approximately 10 psi, the larger piston moves out against its return spring, permitting the check valve to close. When the check valve closes, the fluid in the small piston is trapped. The apply force of the large piston is therefore added to that of the small piston.



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**CRUISE-O-MATIC  
OPERATION**

- ⊗ With band application completed, the trapped oil can bleed out through an orifice. This allows the small piston to bottom on the larger piston.

### POWERFLOW

#### Power Flow in Neutral

- ⊗ When the transmission is in Neutral, none of the gears are held or driven (Fig. 54). No power is transmitted to the output shaft of the transmission.

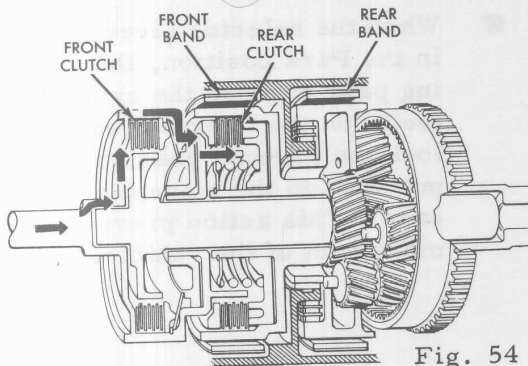


Fig. 54

#### Power Flow in First Speed and Low

- ⊗ In first speed with the selector lever in Low position, the primary sun gear is driven and the pinion carrier is held stationary by the rear band (Fig. 55). Power is transmitted to the primary pinions, the secondary pinions, and the internal gear. The internal gear is thereby driven in the same direction as the primary sun gear. The secondary sun gear rotates freely in the reverse direction and has no effect on the gear train.

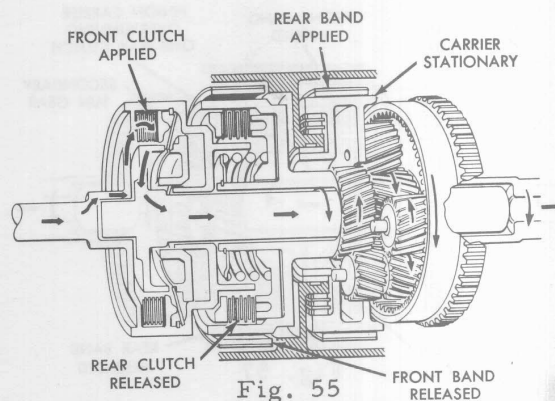


Fig. 55

#### Power Flow in First Gear, Drive 1

- ⊗ In first speed when in the Drive 1 selector lever position, the pinion carrier is held against rotation by the one-way clutch instead of the rear band (Fig. 56). First speed in Drive 1 is the only speed that uses the one-way clutch.

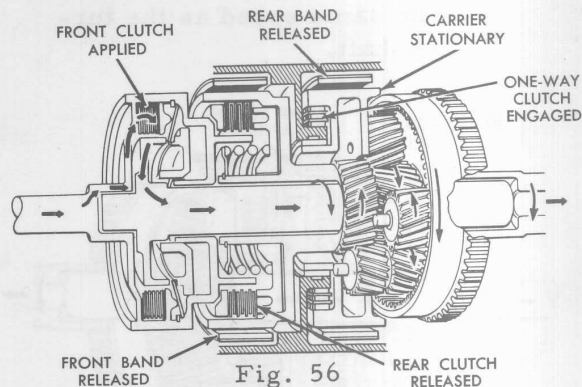


Fig. 56

#### Power Flow in Second Speed

- ⊗ Second speed is provided by driving the primary sun gear and holding the secondary sun gear stationary (Fig. 57). The primary pinions drive the secondary pinions which caused them to "walk" around the secondary sun gear and rotate the internal gear and output shaft around with them.

# Automatic Transmission

## SERVICE GUIDE

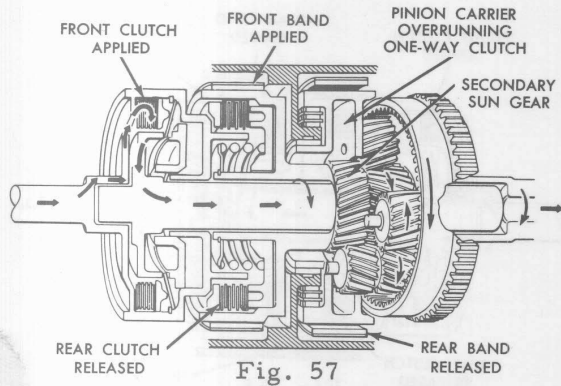


Fig. 57

### Power Flow in Third Speed

- ⊗ In third speed, the primary and secondary sun gears are locked together and driven as one unit (Fig. 58). The pinions therefore, cannot rotate and the entire planetary gear train revolves as a unit. This causes the output shaft to turn at the same speed as the turbine shaft.

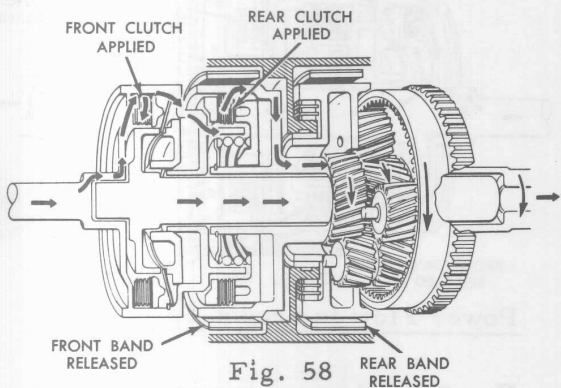


Fig. 58

### Power Flow in Reverse

- ⊗ Reverse is obtained by driving the secondary sun gear while holding the pinion carrier (Fig. 59). The secondary pinions force the internal gear in the reverse direction. The

primary sun gear and primary pinions rotate freely and have no effect on the gear train.

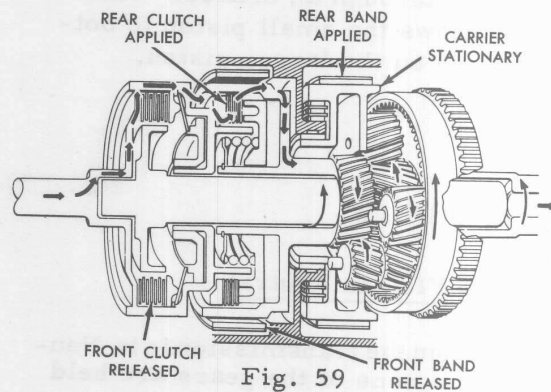


Fig. 59

### Power Flow in Park

- ⊗ When the selector lever is in the Park position, the parking pawl engages the external teeth on the internal gear and output shaft to the transmission case. This action prevents movement of the vehicle.

## OPERATION OF THE HYDRAULIC CONTROL SYSTEM

### Pumps

- ⊗ The front pump is driven by the converter impeller and delivers hydraulic pressure to the control system whenever the engine is operating. The rear pump is driven by the transmission output shaft and delivers hydraulic pressure to the control system when the car moves forward.

# Automatic Transmission

## SERVICE GUIDE

### CRUISE-O-MATIC OPERATION

- Both front and rear pumps deliver hydraulic pressure to the control pressure regulator and control valve body. A regulated control pressure is provided at the control valve body when the engine is running or the car is moving forward above approximately 15 mph.

#### Throttle Pressure

- Throttle pressure adjusts transmission operation to engine torque requirements. Throttle pressure is derived from control pressure by the throttle valve and is controlled by the pressure on the throttle valve

spring when the accelerator pedal is depressed.

- Throttle pressure varies from zero at a closed throttle to the same pressure as maximum control pressure at wide open throttle.

#### Modulator Throttle Pressure

- When in Drive 1 and Drive 2 ranges, modulated throttle pressure is directed to one face of the compensator valve (Fig. 60). This adjusts compensator pressure to accelerator pedal movement or engine torque.

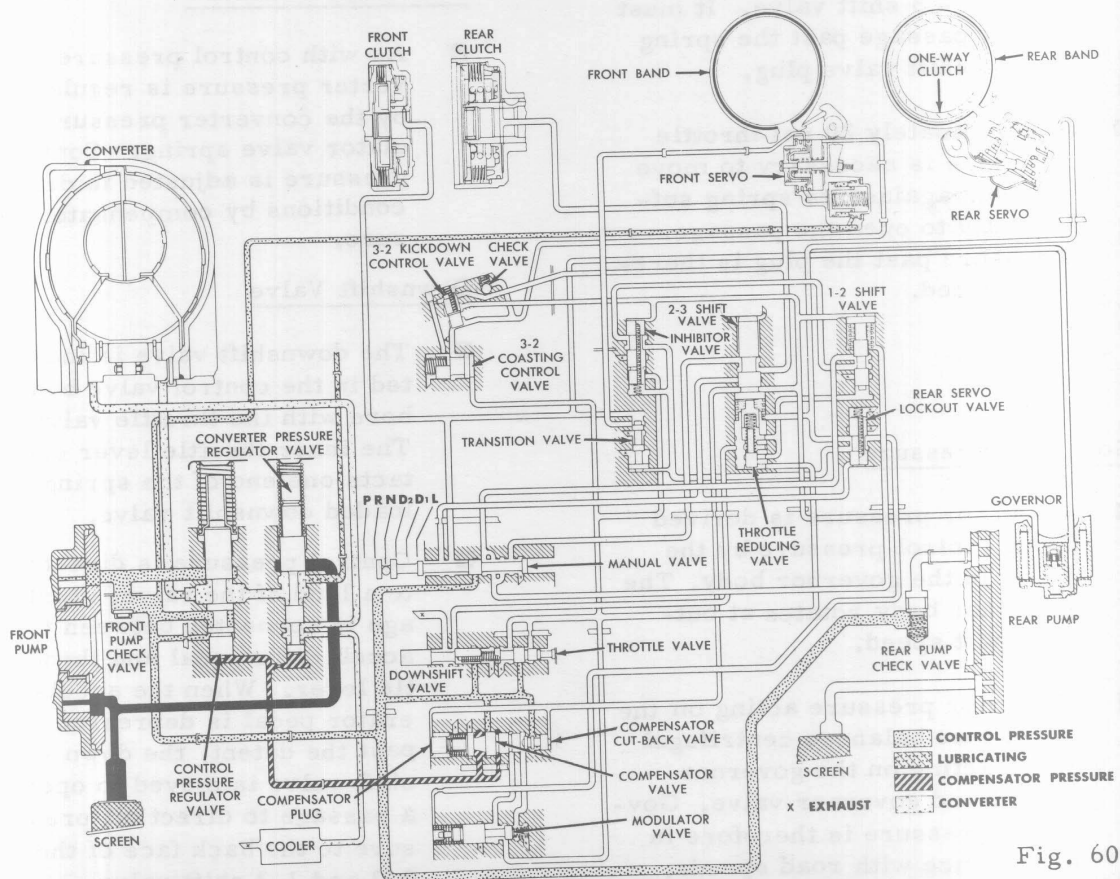


Fig. 60

# Automatic Transmission

## SERVICE GUIDE

- ⊗ In Low and Reverse ranges, the modulator valve is positioned by control pressure so that full throttle pressure is routed to two faces of the compensator valve. This causes a greater decrease in compensator pressure with throttle opening. Therefore, a greater increase in control pressure is obtainable.

### Shift Valve Plug Pressure

- ⊗ Before throttle pressure is admitted to the front face of the 2 - 3 shift valve. It must open a passage past the spring loaded shift valve plug.
- ⊗ Approximately 20 psi throttle pressure is necessary to move the plug against its spring sufficiently to open the passage. Pressure past the plug is thereby reduced.

### Governor Pressure

- ⊗ Governor pressure is derived from control pressure by the valve in the governor body. The governor body rotates at output shaft speed.
- ⊗ Governor pressure acting on the valve face balances centrifugal force acting on the governor weight and governor valve. Governor pressure is therefore in accordance with road speeds.

### Control and Compensator Pressure

- ⊗ Control pressure is regulated by the spring loaded control pressure regulator valve (Fig. 60). Control pressure is adjusted to engine torque, road speed, and selector lever position.
- ⊗ To accomplish this, compensator pressure under various conditions is adjusted by throttle pressure (engine torque), governor pressure (road speed), or selector lever position. Compensator pressure, in turn, adjusts control pressure.

### Converter Pressure

- ⊗ As with control pressure, converter pressure is regulated by the converter pressure regulator valve spring. Converter pressure is adjusted to driving conditions by compensator pressure.

### Downshift Valve

- ⊗ The downshift valve is located in the control valve body bore with the throttle valve. The inner throttle lever contacts one end of the spring loaded downshift valve.
- ⊗ Control pressure is directed to a land of the valve. Linkage is connected between the accelerator pedal and throttle lever. When the accelerator pedal is depressed past the detent, the downshift valve is moved to open a passage to direct oil pressure to the back face of the 2-3 and 1-2 shift valve.

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**CRUISE-O-MATIC  
OPERATION**

### Transition Valve

- ⊗ The transition valve provides a 3 - 1 closed throttle downshift in Drive 1 operation. The transition valve admits or blocks control pressure to the front servo apply piston. It is opened by control pressure to the front servo, and is closed by control pressure through the 1-2 valves.

### Low Inhibitor Valve

- ⊗ The low inhibitor valve prevents the transmission from going into first speed when the selector lever is shifted into Low above approximately 28 mph. This is accomplished by blocking control pressure to the rear servo. The valve is closed by governor pressure and is opened by spring force and throttle pressure.

### Rear Servo Lockout Valve

- ⊗ The rear servo lockout valve blocks control pressure flow to the rear servo in Drive 1 and Drive 2 ranges.

### 1 - 2 Shift Valve

- ⊗ The 1-2 shift valve controls the 1-2 shift, the closed throttle 3-1 shift, and the partial to full throttle 2-1 shift. The valve is held in its closed position by a spring and throttle pressure. Governor pressure opens the 1-2 shift valve.

### 3 - 2 Coasting Control Valve

- ⊗ The 3-2 coasting control valve operates in the front servo release passage.

- ⊗ The valve is positioned by a spring so that the front servo release pressure must exhaust slowly through an orifice during the 3-2 closed throttle downshift in Drive 2 range. The slow exhaust of release pressure provides a slow front band application.

- ⊗ During a partial to full throttle 3-2 downshift, the 3-2 coasting control valve is moved by throttle pressure so that the front servo release pressure can be exhausted rapidly. This provides a rapid front band application.

### 3 - 2 Kickdown Control Valve

- ⊗ The 3-2 kickdown control valve operates in the front servo release pressure passage between the 2-3 valve and the front servo. A check valve is installed parallel with the kickdown valve in the same passage so that release pressure flow to the servo by-passes it.

- ⊗ The kickdown valve controls the rate of front servo release pressure exhaust (flow from the servo), and thereby the rate of front band application.

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- ⊗ At low car speeds (about 25 mph) the 3-2 kickdown control valve eliminates the possibility of a run-away condition in the transmission during the 3-2 kick-down. It also eliminates the possibility of a tie-up during the same shift at higher speed (50 mph and more).

### Hydraulic Control System in Neutral

- ⊗ The manual valve in Neutral position blocks the oil flow to both clutches and both bands (Fig. 60). The clutches and bands are released by spring pressure with no fluid pressure in the clutches or servos, preventing power from being transmitted to the transmission output shaft.
- ⊗ Neutral operation of the transmission keeps control pressure at the correct value, keeps the torque converter full, lubricates the transmission, and maintains oil flow through the cooling system.

### Hydraulic Control System in Drive 1, First Speed

- ⊗ The manual valve opens three passages to control pressure when the selector lever is moved from Neutral to Drive 1. From left to right, the first passage routes control pressure to supply the 2-3 valve and close the rear servo lockout valve. The second passage routes control

pressure to apply the front clutch, supply the governor and transition valve. The third passage routes control pressure flow through the 1-2 and inhibitor valve and close the transition valve.

- ⊗ The primary sun gear attempts to drive the pinion carrier in a counter-clockwise direction with the front clutch applied. Counter-clockwise rotation at the pinion carrier is prevented by the one-way clutch. With the front clutch applied, and the pinion carrier held stationary, the transmission is in first speed.

### Hydraulic Control System in Drive 1, Second Speed

- ⊗ The 1-2 shift takes place when governor pressure on the 1-2 shift valve overcomes shift plug pressure and spring forces. The 1-2 valve moves inward, exhausting the fluid which holds the transition valve closed. The transition valve opens and admits control pressure to apply the front band.
- ⊗ The front clutch stays on, and the front band applies to put the transmission in second speed.

### Hydraulic Control System in Drive 1, Third Speed

- ⊗ The 2-3 shift takes place when governor pressure overcomes spring and shift plug pressure force at the 2-3 shift valve. When the shift valve opens, control pressure flows through it to apply the rear clutch and

# Automatic Transmission

## SERVICE GUIDE

### CRUISE-O-MATIC OPERATION

release the front band. With both clutches applied, the transmission in in third speed.

#### Hydraulic Control System in Drive 2, Second Speed

- ☒ Control pressure to the 1-2 shift valve is cut off when the manual valve is at the Drive 2 selector lever position. This allows control pressure to flow through the transition valve to apply the front band.
- ☒ With the front clutch and front band applied, the transmission operates in second speed.

#### Hydraulic Control System in Drive 2, Third Speed

- ☒ Operation in Drive 2 range, third speed is the same as in Drive 1 range, third speed except that the closed throttle downshift is from third to second in Drive 2 instead of third to first as in Drive 1.

#### Hydraulic Control System in Drive 1 and Drive 2 Ranges, 3-2 Kickdown

- ☒ The downshift valve opens a passage that admits control pressure behind the 2-3 shift plug to oppose governor pressure when the accelerator pedal is depressed through the detent. If the transmission

is in Direct Drive and road speed is below 55 - 66 mph, the 2-3 valve will be forced closed against governor pressure. When the 2-3 valve closes, control pressure which has been applying the rear clutch and releasing the front band is exhausted. The apply pressure that was in the front servo in third speed is now free to apply the front band. As soon as the front band applies, the transmission is in second speed.

#### Hydraulic Control System in Low, First Speed

- ☒ In Low range, first speed, control pressure is routed by the manual valve to apply the front clutch and rear band. Control pressure is also routed by the manual valve to lock the 1-2 and 2-3 shift valves in their closed position. The transmission will remain in first speed regardless of throttle position or road speed since neither shift valve can move.

#### Hydraulic Control System in Reverse

- ☒ Control pressure is directed to apply the rear clutch and rear band when the manual valve is moved into Reverse. Governor supply pressure is cut off by the manual valve, therefore the transmission cannot shift automatically.

# Automatic Transmission

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### LUBRICATION AND ADJUSTMENTS

**Note:** Oil soluble red dye can be added to the oil without harmful effects to the transmission. This dye is useful for pin-pointing transmission oil leaks.

#### Transmission Oil Level Check

- ⊗ Park the car on a level spot. Firmly apply the parking brake.
- ⊗ Operate the engine at normal idle speed.

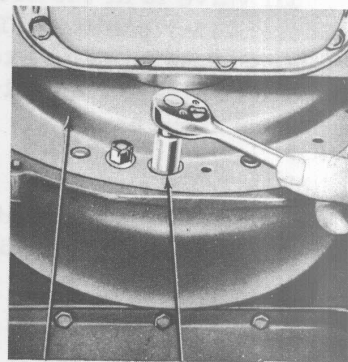
**Note:** If the transmission oil is cold, operate the engine at fast idle speed (approximately 1200 rpm) until the oil reaches normal operating temperature. When the oil is warm, set the idle speed.

- ⊗ Move the selector lever through all positions. Move the lever to Park position. Allow the engine to idle during the oil level check.
- ⊗ Before removing the dip-stick from the filler tube, clean away all dirt that may enter the transmission.
- ⊗ Remove the dip-stick from the tube and wipe it clean. Insert the dip-stick all the way down into the tube.
- ⊗ Remove the dip-stick again and check the oil level. If necessary add sufficient oil to the transmission to raise the oil level to the "Full" mark on the dip-stick.

**Caution:** Do not overfill the transmission.

#### Transmission Oil Change

- ⊗ Remove the cover from the lower front side of the torque converter housing. Remove one of the torque converter drain plugs (Fig. 61).



FLYWHEEL DRAIN PLUG HOLE Fig. 61

- ⊗ Turn the converter 180° then remove the other drain plug.

**Caution:** Do not attempt to rotate the converter with a wrench on the converter stud nuts.

- ⊗ Disconnect the oil filler tube at the transmission oil pan. Remove and thoroughly clean the oil pan and screen when the fluid has drained from the transmission and converter. Discard the oil pan gasket.
- ⊗ Position a new gasket on the oil pan. Install the screen and pan on the transmission. Connect the filler tube to the oil pan. Tighten the fittings securely.



# Automatic Transmission

## SERVICE GUIDE

## CRUISE-O-MATIC ADJUSTMENTS

- ☒ Install both drain plugs in the converter cover. Tighten to 15 to 18 ft. lbs. torque. Install the converter housing cover.
- ☒ Add five quarts of oil to the transmission. Operate the engine at idle speed for approximately two minutes, then add five additional quarts of oil. Operate the engine at fast idle speed (approximately 1200 rpm) until it reaches normal operating temperature.

**Caution:** Do not race the engine.

- ☒ Move the selector lever through all the positions. Place it in Park, then check the oil level. If necessary, add enough oil to the transmission to raise the level to the "Full" mark on the dip-stick.

**Caution:** Do not overfill the transmission.

### CONTROL LINKAGE ADJUSTMENTS

**Caution:** The transmission control linkage adjustments should be made in the sequence in which they are herein listed.

#### Throttle Linkage Adjustment - Preliminary Adjustment

- ☒ Set the parking brake firmly. Position the selector lever in Neutral.
- ☒ Operate the engine at normal idle speed.

**Note:** If the engine is cold, operate the engine at fast idle speed (approximately 1200 rpm) until the engine reaches normal operating temperature. When the engine is thoroughly warmed up, set it at normal idle speed.

- ☒ Connect an electrical tachometer to the engine. Set the engine idle speed at 450 to 475 rpm with the transmission selector in Drive 1 or Drive 2 position.

**Note:** The carburetor throttle lever must be against the idle adjusting screw at 450 to 475 rpm in Drive 1 or Drive 2 (Fig: 62).

- ☒ To make certain that the carburetor throttle lever is against the adjusting screw, make the following checks:
  - ☒ Inspect for clearance between the bottomed dashpot plunger and the carburetor lever.
  - ☒ Check the position of the fast idle cam. It must be in the hot idle position.
  - ☒ Stop the engine and adjust the anti-stall dashpot clearance after the engine idle speed has been correctly adjusted. Check the clearance between the dashpot plunger and the throttle lever. Bottom the dashpot plunger against the spring. Adjust the clearance between the bottomed plunger and the throttle lever to .060" to .090".

# Automatic Transmission

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- ⊗ Disconnect the throttle control rod clevis from the accelerator assembly.
- ⊗ Disconnect the carburetor connecting link from the accelerator assembly.
- ⊗ Insert a gauge pin ( $1/4$ " drill rod) through the gauging holes (Fig. 62).
- ⊗ Raise the carburetor connecting link to its normal operating position. Maintain forward pressure on the connecting link so that the carburetor connecting lever is held firmly against the idle adjusting screw. While maintaining forward pressure on the link, adjust the link so that the trunnion will slide freely into the accelerator assembly lever. From this free-fit position lengthen the link by turning the trunnion one full turn counter-clockwise. Remove the gauge pin. Connect the link to the accelerator assembly lever.
- ⊗ Check the alignment of the gauge pin holes. Open the throttle and allow the throttle linkage retracting spring to return the linkage to its normal hot idle position. The pin must enter the holes freely. If necessary readjust the carburetor connecting links to permit a free entry of the gauge pin.
- ⊗ Remove the gauge pin. Adjust the throttle control rod. Pull upward gently, but firmly on the rod to hold the transmission lever against the internal stop.
- ⊗ Turn the clevis until the clevis pin freely enters the accelerator assembly lever. Lengthen the throttle control rod by turning the clevis three turns counter-clockwise to attain an approximate setting. Connect the throttle control rod to the accelerator assembly lever.

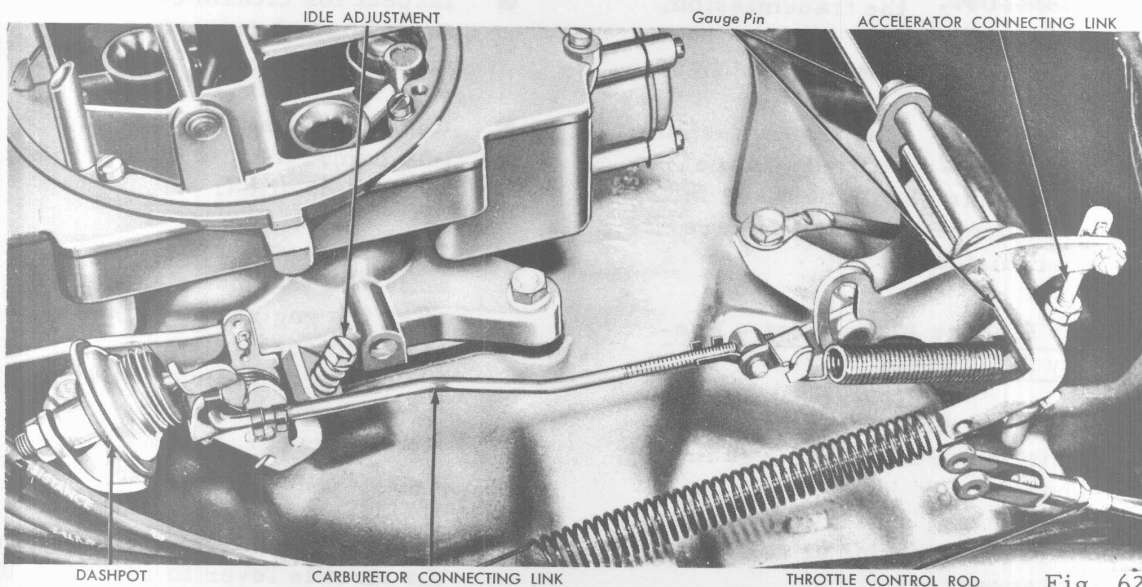


Fig. 62

# Automatic Transmission

## SERVICE GUIDE

### CRUISE-O-MATIC ADJUSTMENTS

- ⊗ Adjust the accelerator connecting link to attain a pedal height of 3 1/2".

**Note:**

This measurement is taken from the top corner of the pedal to the floor.

- ⊗ Final adjustment of the throttle control rod must now be made by the pressure method of linkage adjustment that follows.

#### Throttle Linkage Adjustment - Final Adjustment (Pressure Method)

- ⊗ Apply the parking brake to prevent operation of the rear pump. Raise the car on a lift. Remove the 1/8" pipe plug that is located on the transmission case rear face.
- ⊗ Install a pressure gauge. Lower the car to the floor. Position the gauge so it can be read from the driver's seat. Connect an electrical tachometer.

- ⊗ Start the engine and apply the foot brakes. Shift the selector lever to Drive 2 or Drive 1.

- ⊗ Increase the engine speed to 1000 rpm. Note the gauge reading. The throttle rod clevis must be rotated to lengthen the rod if the pressure reading is below 80 psi. The clevis must be rotated to shorten the rod if the pressure reading is more than 85 psi.

**Note:**

To obtain a consistent gauge reading, advance the engine throttle so that 1000 rpm is not exceeded. If 1000 rpm is exceeded, reduce engine speed to idle, then increase it to 1000 rpm.

- ⊗ Attach the throttle control rod clevis to the linkage. Tighten the locknut securely.
- ⊗ Check the pressure adjustments at idle and stall speeds. Pressure limits for idle and stall speed conditions are shown in the table below:

Engine Speed	Selector Lever Position	Pressure Range psi
Idle	All	56-72
1000 rpm	D1 or D2	80-85
Stall	D1 or D2	150-170
	L and R	196-216

# Automatic Transmission

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- ⊗ If idle pressure is higher than specifications and the linkage cannot be further shortened, the throttle lever internal stop must be bent away from the valve body. If the idle pressure is below specifications, or is unsteady, trouble may exist in the transmission, and normal diagnosis procedures must be followed. If stall speed is not within specifications, normal diagnosis procedures must be followed.

**Caution:** Do not operate the car for lengthy periods under stall or partial stall conditions. Obtain pressure readings quickly and decrease engine speed to idle.

### Manual Linkage Adjustments

- ⊗ With the engine not operating, loosen the clamp at the shift lever so that the shift rod is free to slide in the clamp (Fig. 63).
- ⊗ Move the selector lever to the Drive 1 position.
- ⊗ Move the manual lever at the transmission into the Drive detent position.

**Note:**

This is the second position from the rear.

- ⊗ Tighten the clamp on the shift rod. Check the pointer alignment for all selector lever detent positions.

### Starter Neutral Switch Adjustment

- ⊗ Check the starter circuit in all selector lever positions.

**Note:** The circuit must be closed in Neutral and Park and opened in all other positions.

- ⊗ Loosen the neutral switch to steering column attaching screws to adjust the switch. Move the selector lever to the Neutral detent position. Position the switch in the elongated mounting holes so that a .060" gauge pin can be installed to the switch housing and into the switch plate (Fig. 63). Tighten the attaching screws with a gauge pin in place. Remove the gauge pin.
- ⊗ Recheck the starter circuit in all selector lever positions. The circuit must be open in all positions except Neutral and Park.

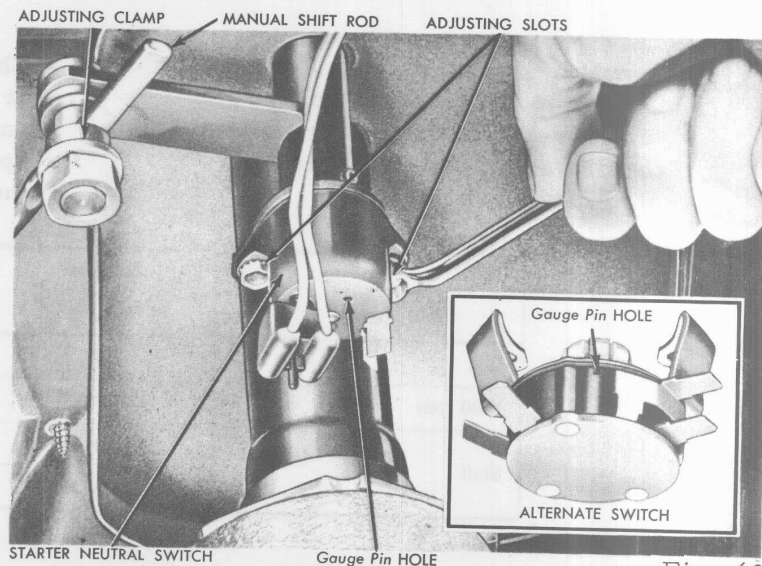


Fig. 63

# Automatic Transmission SERVICE GUIDE

## CRUISE-O-MATIC ADJUSTMENTS

### CRUISE-O-MATIC BAND ADJUSTMENTS

#### Front Band Adjustment

- ☒ Disconnect the oil filler tube from the oil pan. Drain the oil from the transmission.

**Note:** If the same oil is to be reused after the band adjustment, filter the oil through a 100 mesh screen as it drains from the transmission.

**Caution:** Reuse the oil only if it is not contaminated.

- ☒ Remove and thoroughly clean the oil pan and screen. Discard the oil pan gasket.
- ☒ Using a 9/16" wrench, loosen the front servo adjusting screw locknut two full turns. Check the adjusting screw threads for free movement in the actuating lever.
- ☒ Pull the adjusting screw end of the actuating lever away from the servo body. Insert the adjusting tool gauge block between the servo piston stem and the adjusting screw
- ☒ Tighten the adjusting screw with the adjusting tool until the tool overruns the screw. Back off the screw exactly one full turn.

**Caution:** Severe damage may result if the adjusting screw is not backed off exactly one full turn.

- ☒ Hold the adjusting screw stationary. Securely tighten the locknut.
- ☒ Remove the gauge block from the transmission front servo.
- ☒ Position a new gasket on the oil pan. Install the screen and pan on the transmission.
- ☒ Connect the filler tube to the oil pan. Securely tighten the fitting.
- ☒ Fill the transmission with oil.

**Note:** If the oil that was drained from the transmission is to be used again, filter the oil through a 100 mesh screen as it is poured back into the transmission.

**Caution:** Reuse the oil only if it is not contaminated.

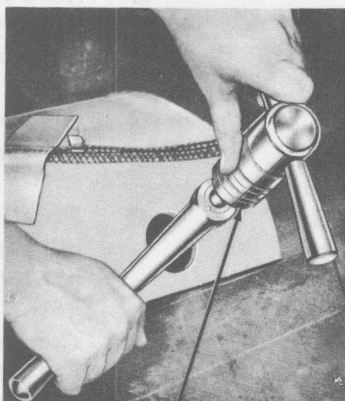
#### Rear Band Adjustment

- ☒ Fold back the floor mat to expose the removable cover near the right center of the floor pan.
- ☒ Remove the access cover from the floor pan.
- ☒ Wipe all dirt away from the rear band adjusting screw threads. Lubricate the threads.

# Automatic Transmission

## SERVICE GUIDE

- ⊗ Loosen the adjusting screw lock-nut with the adjusting tool (Fig. 64).



Tool-7195 Fig. 64

- ⊗ Using the T handle of the adjusting tool, tighten the adjusting screw until the tool overruns.

**Caution:** If the screw has been tightened beyond the capacity (10 ft. lbs. torque) of the tool, loosen the screw several turns and tighten it again until the tool overruns.

- ⊗ Back off the adjusting screw exactly  $1\frac{1}{2}$  turns.

**Caution:** Severe damage may result if the adjusting screw is not backed off exactly  $1\frac{1}{2}$  complete turns.

- ⊗ Hold the adjusting screw stationary. Securely tighten the lock-nut.

# Automatic Transmission

## SERVICE GUIDE

CRUISE-O-MATIC  
DIAGNOSIS

### TROUBLE SHOOTING

#### PRELIMINARY CHECKS

- ☒ The following preliminary checks should be made on a Cruise -O-Matic transmission prior to making a diagnosis of a transmission complaint.

#### Transmission Oil Level Check

- ☒ Check the oil level. Low oil level can cause faulty operation of the transmission, it may also indicate oil leakage that might cause transmission damage.
- ☒ Oil level that is too high will cause the oil to become aerated. Aerated oil will cause a low control pressure. Aerated oil may be forced out of the transmission breather.

#### Transmission Oil Leakage Checks

- ☒ Inspect the speedometer cable connection at the transmission. If necessary, replace the rubber seal.
- ☒ Check the governor inspection plate for leakage. If necessary, install a new gasket.
- ☒ Leakage at the oil pan can frequently be eliminated by tightening the attaching bolts to the proper torque. Replace the gasket if necessary.
- ☒ Check the oil filler tube connection at the transmission oil pan. Tighten the fitting if leakage is evident at this point.

- ☒ Check the oil lines and fittings between the transmission and the cooler in the radiator tank for looseness, wear, or damage. Replace the defective parts if the leak cannot be stopped by tightening the fittings.

- ☒ Inspect the engine coolant in the radiator. If transmission oil is present in the coolant, the cooler in the radiator tank is probably leaking.

- ☒ The cooler can be further checked for leaks by disconnecting the lines at the cooler fittings and applying 5 psi air pressure to the fittings. If the cooler leaks and will not hold the pressure, the radiator must be replaced.

#### *Note:*

The cooler cannot be replaced separately.

- ☒ If leakage is evident at either the throttle lever shaft or the manual lever shaft, replace one or both seals.
- ☒ Check the pipe plug on the left side of the transmission case at the front. If the plug shows leakage, torque the plug to 7 to 15 ft. lbs. Replace the plug if tightening does not stop the leak.
- ☒ If leakage is evident at the drain plug, remove the two drain plugs with a 6 point socket. Coat the threads with #3 sealer or its equivalent. Install the plugs and tighten to 15 to 28 ft. lbs. torque.

# Automatic Transmission

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**Caution:** Fluid leakage from the converter housing may be caused by engine oil leaking past the rear main bearing or from the oil gallery plugs. Be sure to determine the exact cause of the leak.

**Note:** Oil soluble aniline or fluorescent dyes (premixed at the rate of 1/2 teaspoon of dry power to 1/2 pint of transmission fluid) have proved helpful in locating the source of oil leaks. These dyes have been used to determine whether an engine oil or transmission oil leak is present, or if the oil in the cooler leaks into the engine coolant system. A black light, however, must be used with the fluorescent dye solution.

### Engine Idle Speed Check

- ☒ Check and adjust the engine idle speed if necessary. If the idle speed is too low the engine will roll or stall. An idle speed that is too high will cause the car to creep when the transmission selector is in any drive position.

### Anti-Stall Dashpot Clearance Check

- ☒ Check the anti-stall dashpot clearance after the engine speed has been properly set.

### Throttle Linkage Check

- ☒ With the engine tuned and the idle speed and anti-stall dashpot clearance adjustment set, check the throttle linkage.

### Manual Linkage Check

- ☒ Proper manual linkage adjustment is required to position the manual valve for proper oil pressure routing to the various transmission components. Improperly adjusted manual linkage may cause cross-leakage and subsequent transmission failure.

### Stall Test

- ☒ The stall test is made at full throttle in Drive 2, Drive 1, Low, or Reverse to determine if the band and clutches are holding properly.

**Caution:** Do not hold the throttle open for more than 5 seconds at a time when making this test.

- ☒ Connect an electrical tachometer. Start the engine to allow it to reach normal operating temperature. Apply both the parking and service brakes.



# Automatic Transmission SERVICE GUIDE

## CRUISE-O-MATIC DIAGNOSIS

Selector Lever Position	Clutch Applied	Band Applied	Engine Speed (rpm)		
			292 V-8	352 V-8 (Dual Carburetor)	352 V-8 (4-Barrel Carburetor)
D2	Front	Front	1510-1710	1610-1810	1690-1890
D1	Front	One-Way Clutch			
L	Front	Rear			
R	Rear	Rear			

- ☒ Position the selector lever at Drive 2. Floor the accelerator pedal to the floor. Note the engine speed. Stall speeds are given in the table above:

**Note:** The Cruise-O-Matic will not downshift in either Drive 1 or Drive 2 when the car is stationary and the accelerator pedal is pressed to the detent.

- ☒ In Drive 1 (car stationary), the front clutch and the one-way clutch are applied at all accelerator pedal positions.
- ☒ In Drive 2 (car stationary), the front clutch and front band are applied at all accelerator pedal positions.
- ☒ In Low the front clutch and rear band are engaged.
- ☒ In Reverse, the rear clutch and rear band are engaged.
- ☒ If the engine speed is below the limits given in the above table and the engine is tuned, probable trouble is in the stator clutch. Remove the converter and check the stator clutch.

- ☒ If the engine rpm exceeds the maximum limits on the above table, release the accelerator pedal immediately. Clutch or band slippage is indicated.

- ☒ The band or clutch that is causing the slippage can be found by testing in another selector lever position. As an example, should the transmission slip in Drive 2 but not in Drive 1 the probable cause is the front band.

### PERFORMANCE CHECKS

- ☒ Performance checks are normally made only after the preliminary checks have been completed and if the trouble has not been found. If an unsatisfactory operating condition is discovered during the checks, stop the check and proceed to final diagnosis and the correction of the trouble.

**Caution:** Do not race the engine at speed greater than 2500 rpm with the transmission in Neutral. Serious damage to the transmission may result.

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## SERVICE GUIDE

Rear Axle Ratio	Automatic Shift Speeds (mph)								Manual Shift Speeds (mph)
	D1		D1 or D2		D1	D1 or D2	D1	D2	L
	1-2 Minimum Throttle	1-2 Maximum Throttle	2-3 Minimum Throttle	2-3 Maximum Throttle	3-1 Minimum Throttle	3-2 Maximum Throttle	2-1 Maximum Throttle	3-2 Minimum Throttle	2-1
3.56:1	7-11	32-42	11-20	52-64	4-8	46-60	20-27	4-8	15-23
3.10:1	8-13	37-48	12-24	59-74	5-9	53-69	23-31	5-9	17-26
2.91:1	9-14	40-51	13-25	64-78	5-10	58-73	25-33	5-10	19-28

### Initial Engagement Checks

- ☒ Initial engagement checks are performed to establish whether initial band and clutch engagements are smooth.
- ☒ Operate the engine until the normal operating temperature is reached. Move the selector lever from Neutral to Drive 2 and from Neutral to Drive 1 with the engine at the proper idle speed. Carefully observe the initial band and clutch engagements.
- ☒ Repeat this procedure in Low and Reverse. Band and clutch engagements should be smooth in all selector lever positions. Rough initial engagements are caused by the following conditions: high engine idle speed, high throttle pressure, high control pressure, faulty operation of the pressure regulator valve or of the main control valve.

### Shift Point Checks

- ☒ Check the light throttle upshifts in Drive 1 position. The transmission should start in first speed and shift to second at

approximately 10 mph, then shift to third at approximately 22 mph (see the table above).

- ☒ Depress the accelerator to the detent while the transmission is in third speed. If the vehicle speed is in excess of 36 mph, the transmission should shift from third to second speed. The transmission should shift from third to first if vehicle speed is below 24 mph.
- ☒ Check the closed throttle downshift from third to first by coasting down from about 30 mph in third speed. The shift should occur at approximately 8 mph.
- ☒ Partial throttle downshift in Drive 1 position may be checked by using the foot brakes as a load. Depress and hold the accelerator at half throttle position with the transmission in third speed. At the same time, apply the service brake to the point that road speed is slowly reduced. The third to second and then second to first shift should occur as road speed decreases.
- ☒ When the selector lever is in Drive 2 position, the transmission can operate only in second and third speeds. Shift points from

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DIAGNOSIS

second to third and third to second are the same in both Drive 2 and Drive 1 positions.

- ☒ The transmission should shift to second speed when the selector lever is moved from Drive 2 to Drive 1 to Low, if the transmission is in third speed and road speed is higher than approximately 28 mph. The transmission will shift from second or third to first when the same manual shift is made below approximately 20 mph.

### Operational Checks

- ☒ Operational checks are performed to supplement the stall test data.
- ☒ Converter stator clutch problems are indicated when the stall test speeds are low and the engine is properly tuned. A road test must be performed to pin-point the exact cause of the condition.
- ☒ The stator clutch is slipping if the stall test speeds are 300 - 400 rpm below the figure shown in the table on page 65-E and the car cruises properly but has very poor acceleration.
- ☒ Remove the converter and check the stator clutch.
- ☒ The stator clutch is installed backwards if the stall test speeds are 300 - 400 rpm below the table shown on page 65-E and the car drags at cruising speeds and acceleration is poor.
- ☒ When the stall test shows normal speeds, acceleration is normal, but the car drags at

cruising speeds, the difficulty is due to a seized stator assembly.

### Control Pressure Checks

- ☒ Control pressure checks are performed to determine if the control pressures are within the limits shown in Figure 37.
- ☒ Install the pressure gauge at the transmission case rear face. Connect an electrical tachometer to the engine to check and set engine idle speed if necessary.
- ☒ Apply the parking brake. With the gauge and tachometer installed, allow the engine and transmission to reach normal operating temperature.
- ☒ Move the selector lever to Drive 1 or Drive 2 position. Check the idle pressure. This pressure should be within the limits shown in Figure 37.
- ☒ Speed up the engine to 1000 rpm. Note the control pressure reading on the gauge (should be 80 - 85 psi). Adjust the throttle control rod to obtain the required pressure if the control pressure does not come within the pressure limits at 1000 rpm. Recheck the idle pressure.
- ☒ Increase engine speed to a stall condition with the selector lever still in Drive 1 or Drive 2 position. Note the gauge reading and check the engine speed. Stall pressure should be within the limits specified.

# Automatic Transmission

## SERVICE GUIDE

- ⊗ The main control throttle lever stop must be bent away from the valve body if idle pressure is above normal. If idle pressure is lower than normal or is unsteady, follow normal diagnosis procedures to locate the cause of the condition (pressure regulator or main control assembly malfunction).
- ⊗ If pressures at 1000 rpm and at stall cannot be obtained or are not steady, check the pressure regulating parts as outlined for idle speed pressure problems.
- ⊗ Move the selector lever to Reverse position. Repeat the pressure checks at idle, 1000 rpm and stall.
- ⊗ Idle pressure should be the same in Reverse as it was in Drive 1 or Drive 2 positions. Control pressure in Reverse and Low positions at 1000 rpm and at stall should be above that obtained in Drive 1 or Drive 2 position Figure 37.

### Air Pressure Checks

- ⊗ Because of inoperative clutches or bands a "No Drive" complaint can occur even with correct transmission fluid pressure. The inoperative components can be determined through a series of checks by substituting air pressure for the oil pressure to determine the location of the faulty unit.
- ⊗ With the selector lever in Drive 2 position a "No Drive" condition can be caused by an inoperative front clutch or front band. A

"No Drive" condition in Drive 1 position can be caused by an inoperative front clutch or one-way clutch. When there is "No Drive" in Low position, the trouble can be caused by improper operation of the front clutch, the rear band or the one-way clutch. Failure to move in Reverse can be caused by a faulty rear clutch or rear band. Erratic shifts can be caused by a faulty governor.

- ⊗ To perform the air pressure tests, drain the transmission oil, then remove the oil pan and the control valve assembly.
- ⊗ The inoperative components can be located by admitting air pressure into the transmission oil passages leading to the clutches, rear servo, and governor, and into the front servo apply release and accumulator tubes.

### Front Clutch Air Check

- ⊗ Direct air pressure to the transmission case front clutch passage (Fig. 65). A dull thud should be heard when the clutch piston is applied. If noise is not heard,

FRONT CLUTCH GOVERNOR INPUT PASSAGE

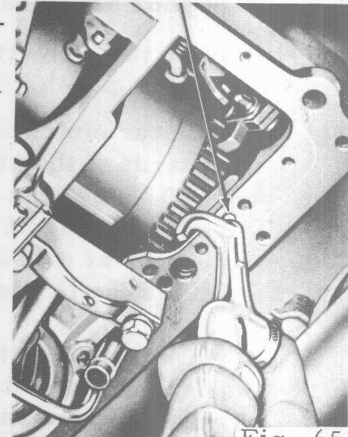


Fig. 65

# Automatic Transmission

## SERVICE GUIDE

## CRUISE-O-MATIC DIAGNOSIS

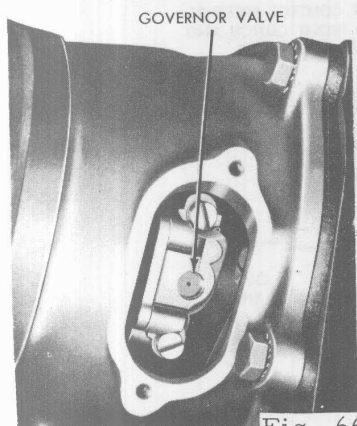
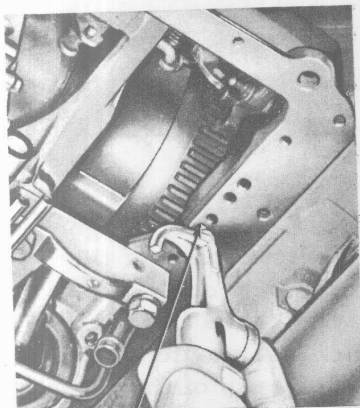
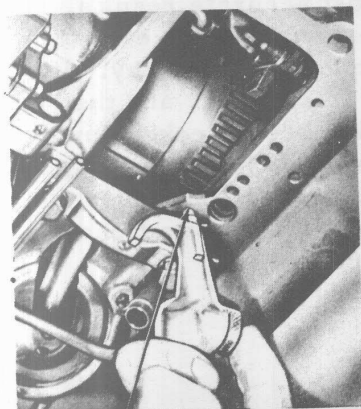


Fig. 66



REAR CLUTCH INPUT PASSAGE Fig. 67



REAR SERVO APPLY PASSAGE Fig. 68

### Governor Air Checks

- ☒ Remove the governor inspection cover from the extension housing. Direct air pressure to front clutch passage. Listen for sharp 'click'. Watch to see if the governor weight snaps inward (Fig. 66). Inward weight movement indicates proper governor valve action.

### Rear Clutch Air Checks

- ☒ Direct air pressure to the rear clutch passage (Fig. 67). A dull thud indicates that the rear clutch piston has moved outward to the applied position. If noise is not heard, place the finger-tips on the rear drum. Again apply air pressure to determine if there is movement of the piston.

### Front Servo Air Checks

- ☒ Position the air hose in the front servo apply tube. Operation of the front servo can be determined by a tightening of the front band around the drum. Continue to apply air pressure to the front servo apply tube, then introduce air pressure into the front servo release tube.

**Caution:** Hold a cloth over the release tube while applying the servo to catch the spray from the release tube.

The front servo should release the band against the apply pressure.

### Rear Servo Air Check

- ☒ Direct air pressure to the rear servo apply passage (Fig. 68). The rear band should tighten around the drum if the rear servo is operating correctly.

# Automatic Transmission

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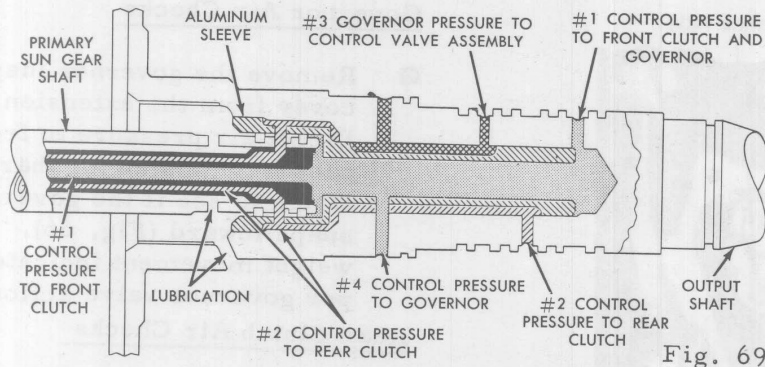


Fig. 69

- ⊗ If either servo is inoperative, remove the inoperative servo unit and apply air pressure directly to the oil passages. Correct operation of the servos indicate the trouble is not in the servo but in the case passages. If the servo does not operate, disassemble, clean, and inspect it to locate the malfunction.
- ⊗ If air pressure when applied to either of the clutch passages fails to cause the clutch to operate or operates both clutches at once, remove and with air pressure, check the fluid passages at the output shaft aluminum sleeve for correct indexing with the holes in the output shaft. Check the primary sun gear shaft assembly passages with air pressure to detect obstructions (Fig. 69).
- ⊗ If the output shaft and primary sun gear shaft passages are

clear, remove the clutch assembly. Clean and inspect the faulty clutch to locate the trouble.

### CRUISE-O-MATIC DIAGNOSIS GUIDE

- ⊗ The Cruise-O-Matic Diagnosis Guide lists many of the most common trouble symptoms that may be found and suggests the items that should be checked to find the cause of the trouble.
- ⊗ The items to be checked are arranged in logical sequence which should be followed for fastest and most accurate results. The number symbols for each item are explained in the key. If items 1, 2, 3, 11, and the stall test have been checked during preliminary checks and adjustments, there is no necessity to repeat these operations.

# Automatic Transmission

## SERVICE GUIDE

### CRUISE-O-MATIC DIAGNOSIS

CONDITION	Items to Check	
	Transmission in Car	Transmission out of Car
Harsh Initial Engagement	11-2-8-23-6-5	
1 to 2 or 2 to 3 Shift Points Not Correct	1-2-3-4-23-5- 12	
Harsh 2 to 3 Shift	2-7-6-5-10	38
Engine Speeds up on 2 to 3 Shift	2-7-5	38
No 1 to 2 or 2 to 3 Shift	4-5	26-27-30
No 3 to 1 Shift	11-2-5	
No Forced Downshifts	2-23-5-12	
Engine Speeds Up on Forced Downshift	7-6-5-10	27
Harsh 3 to 2 or 3 to 1 Shift--Closed Throttle	11-2-5	
Excessive Creeping in D-1 or D-2 Range	11	
Chatters or Slips in First Speed	1-2-8-23-6-5- 12	25-27-30-33
Chatters or Slips in Second Speed	1-2-7-23-6-5- 10	25-27
Chatters or Slips in Reverse Range	1-2-8-23-6-5- 9	26-27-30
No Drive in D-1 Range	3-5	33
No Drive in D-2 Range	7-5-18	25-27-30
No Drive in Low Range	3-8-9-5-18	27-30
No Drive in Reverse Range	8-9-5-18	26-27-30
No Drive in Any Drive Range	1-3-23-6-5-18	27
Locks Up in D-1 Range	3-9-10	26-31-27
Locks Up in D-2 Range	3-8-9-10	26-31-27-33
Locks Up in Low Range	7-10-5	26-31-27-33
Locks Up in Reverse Range	7-10	25-31-27
Parking Lock Binds or Does not Hold	3	31
Engine Will not Start When Car is Pushed	1-3-6-5	29-27
Transmission Overheats	15-6	36
Poor Acceleration--Maximum Speed Too Low		36
Transmission Noisy In Neutral Range	6	25-28
Transmission Noisy In All Speeds	6	30-25-26-28
Transmission Noisy In Park Range	6	28
Transmission Noisy In Neutral With Engine Stopped at 30 - 20 MPH.		29
Oil Leak at Converter Housing	13	34-35-37
Oil Leak at Transmission Oil Pan	14	

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CONDITION	Items to Check	
	Transmission in Car	Transmission out of Car
Oil Leak at Left Side of Case	16-17-20	
Oil Leak at Right Side of Case	17-20-15	
Oil Leak at Front of Extension Housing	19-22	
Oil Leak at Rear of Extension Housing	21	
Oil Leak at Speedometer Driven Gear Adapter	24	

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- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Oil Level</li> <li>2. Throttle Linkage</li> <li>3. Manual Linkage</li> <li>4. Governor</li> <li>5. Valve Control Body</li> <li>6. Pressure Regulator</li> <li>7. Front Band</li> <li>8. Rear Band</li> <li>9. Rear Servo</li> <li>10. Front Servo</li> <li>11. Engine Idle Speed</li> <li>12. Inner and Outer Throttle Levers</li> <li>13. Converter Drain Plugs</li> <li>14. Oil Pan Gasket Drain Plug or Tube</li> <li>15. Oil Cooler and Connections</li> <li>16. Manual or Throttle Lever Shaft Seal</li> <li>17. 1/8" Pipe Plug on Side of Case</li> <li>18. Perform Air Pressure Test</li> <li>19. Extension Housing to Case Gaskets and Lockwashers</li> </ol> | <ol style="list-style-type: none"> <li>20. Center Support Bolt Lockwashers</li> <li>21. Extension Housing Rear Oil Seal</li> <li>22. Governor Inspection Cover Gasket</li> <li>23. Perform Control Pressure Check</li> <li>24. Speedometer Driven Gear Adapter Seal</li> <li>25. Front Clutch</li> <li>26. Rear Clutch</li> <li>27. Hydraulic System Leakage</li> <li>28. Front Pump</li> <li>29. Rear Pump</li> <li>30. Fluid Distributor Sleeve in Output Shaft</li> <li>31. Parking Linkage</li> <li>32. Planetary Assembly</li> <li>33. Planetary One-Way Clutch</li> <li>34. Engine Rear Oil Seal</li> <li>35. Front Pump Oil Seal</li> <li>36. Converter One-Way Clutch</li> <li>37. Front Pump to Case Gasket</li> <li>38. Rear Clutch Piston Air Bleed Valve</li> </ol> |
|---|---|