MAINTENANCE MANUAL

D-15567

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THE NEW
CHRYSLER INDUSTRIAL TORQUE CONVERTER

- **SERVICE PROCEDURES**
- **DIAGNOSIS PROCEDURES**
- **OPERATING PRINCIPLES**
- **LUBRICATION AND MAINTENANCE**

This maintenance manual has been prepared as a reference book to give service men a better understanding of the Chrysler Industrial Torque Converter—its operating principles, maintenance, disassembly and assembly, inspection and adjustment procedures.

The maintenance manual contains diagnosis procedures to help service men maintain the high standard of performance built into the Industrial Torque Converter.

The Industrial Torque Converter as shown in Figures 1, 2 and 3 is made from cast aluminum alloy, has dual cooling, greater coupling efficiency and a built-in speed control.

The tools and equipment referred to in this manual are available from the Miller Mfg. Co., 5979 Tireman Ave., Detroit 4, Michigan, U.S.A.

Price $1.00 Net
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CHRYSLER CORPORATION
INDUSTRIAL ENGINE DIVISION
2000 VAN HORN ROAD, TRENTON, MICHIGAN

Litho in U.S.A.
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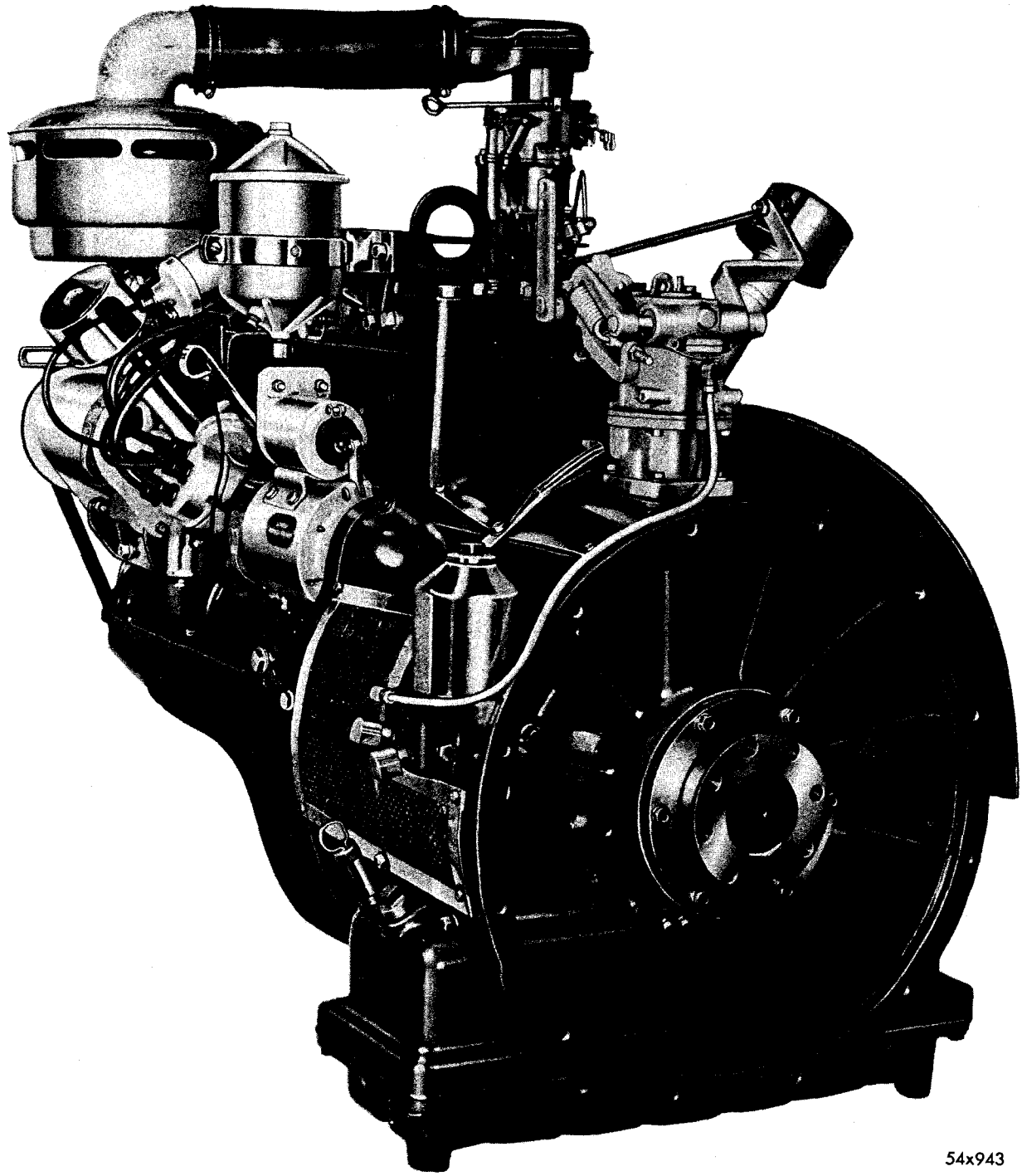

Fig. 1—Torque Converter Installed with Industrial Engine (Left View)

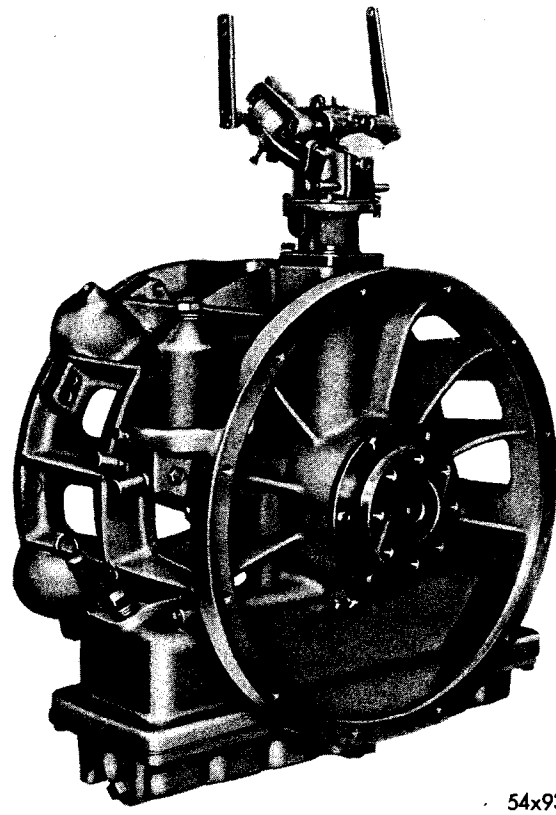

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Fig. 2—Industrial Torque Converter Housing (Front View)

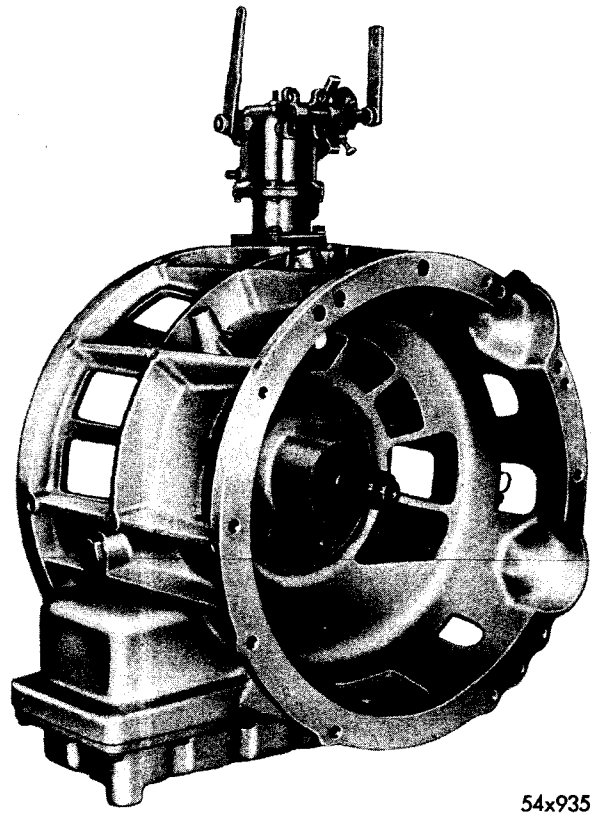

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Fig. 3—Industrial Torque Converter Housing (Rear View)

DATA AND SPECIFICATIONS

Rotation	Right Hand
Input Torque—Maximum	300 Foot Pounds
Torque Multiplication—Maximum	2.6
Efficiency in Coupling Range—Maximum	96.5
Converter Oil—Maximum Operating Temperature	250 Degrees F.
Cooling	Water and Direct Air
Governor—Type	Output Shaft
Converter Oil	Automatic Transmission Fluid Type "A"
Converter Oil —Capacity	12 Quarts
Converter Oil Filter	Full Flow replaceable element
Converter Elements	Three—Impeller, Stator and Turbine
Converter Size—Diameter	12½ inches
Converter Housing	SAE No. 3
Total Weight	Short Housing—164 Pounds Housing with Extension—204 Pounds

TORQUE SPECIFICATIONS

	Foot-Pounds Torque
Oil Pan Drain Plug	50
Torque Converter to Crankshaft Nuts	55
Oil Seal Retainer to Converter Housing Screws	18
Turbine Shaft to Clutch Driving Plate Screws	50
Adapter Plate to Engine Cylinder Block Screws	30
Torque Converter Housing to Adapter Plate Screws	30
Converter to Oil Pump Housing Bolts	18

THE NEW CHRYSLER INDUSTRIAL TORQUE CONVERTER

1. PRINCIPLES OF OPERATION

A Torque Converter as shown in Figure 4, is a hydraulic Coupling which automatically "Multiplies" engine torque when a rising operating load starts to slow down the output shaft speed, relative to the engine speed.

The mechanical difference between a straight Fluid Coupling and a Torque Converter, is that the Torque Converter is fitted with a Stator between the Impeller and the Turbine.

The Stator is stopped while the converter is "Multiplying," and is allowed to "Freewheel" and rotate with the Impeller and the Turbine, when the last two units are running at approximately the same speed, so when this is the case, there is no torque "Multiplication" and the converter is automatically in the coupling range.

2. STATOR OPERATION

In order to determine the Stator operation, it is necessary to analyze a plain Fluid Coupling, as shown in Figure 5. The Impeller and the Turbine are contained in an oil filled unit or "Donut."

The engine turns the impeller. The oil in the impeller is thrown out radially by centrifugal force to the circumference of the impeller as in (2) above.

Since there is always some "slip" between the impeller and the turbine, the centrifugal force on the oil in the turbine, will be less than that in the impeller. Therefore, the oil in the impeller overcomes the oil in the turbine. A resulting flow of oil is then created outwards in the impeller and towards the center in the turbine. The direction of the oil is then from (1) to (2) to (3)

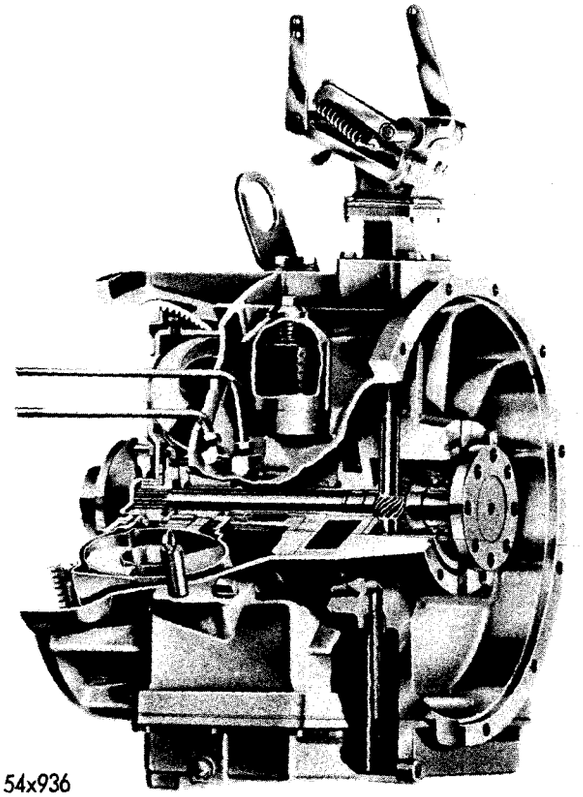

Fig. 4—Torque Converter (Sectional View)

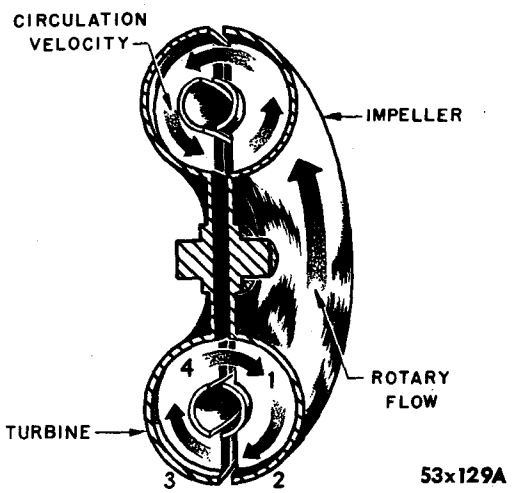

Fig. 5—Rotary Flow and Circulation Velocity

and to (4) and thence back to the eye of the impeller (1).

With the exception of a small degree of "slip," the impeller and the turbine are locked together by a special flow of oil acting in the impeller and the turbine blades. This provides torque transmission, but not torque "Multiplication."

Figure 6 shows a cross section of the Torque Converter, with a Fluid Coupling and an additional third wheel located between the outlet of the turbine, and the inlet of the impeller, which is called the Stator.

The Stator is mounted on a "Freewheel" clutch on the reaction shaft which is fixed to the housing. The Stator is held or "stopped" by the flow of the oil from the turbine so long as the impeller rpm is sufficiently higher than that of the turbine. While the Stator is "stopped," the conversion can take place.

3. CONVERSION RANGE

What happens is in a straight Fluid Coupling, the oil is ejected from the turbine at a speed and direction so that it acts against the impeller blades. A considerable amount of oil velocity is destroyed by the resulting muddle flow.

In the Torque Converter, the Stator redirects the oil flowing from the turbine, so that it reenters the impeller at an angle, where it will meet no resistance from the revolving impeller blades. The remaining velocity therefore, of the oil leaving the turbine is added to the velocity generated in the impeller by centrifugal force. The size of this remaining velocity will depend on the amount of difference in rpm's between the impeller and the turbine. The greater the difference in rpm's, the greater the spiral oil velocity. This means that the velocity of the oil **leaving** the impeller will be greater. This increased oil velocity, leaving the impeller will then be destroyed on impact, with the **slower** moving turbine blades, and so, will be converted into increased **TORQUE** in the turbine or output shaft. **ie.** The higher velocity, low force oil in the impeller, is **CONVERTED** to a lower velocity, high force oil acting on the turbine blades.

NOTE

In relation to the above Paragraph "Conversion Range" the exact term is "Kinetic Energy" some times used instead of "Velocity."

4. COUPLING RANGE

If the operating load is decreased, the turbine will start to run at a speed closer to the speed of the impeller.

With the increased relative speed of the turbine, the oil leaving the turbine no longer is "caught" by the Stator and redirected, as the oil now strikes the **back** of the Stator blades. Since

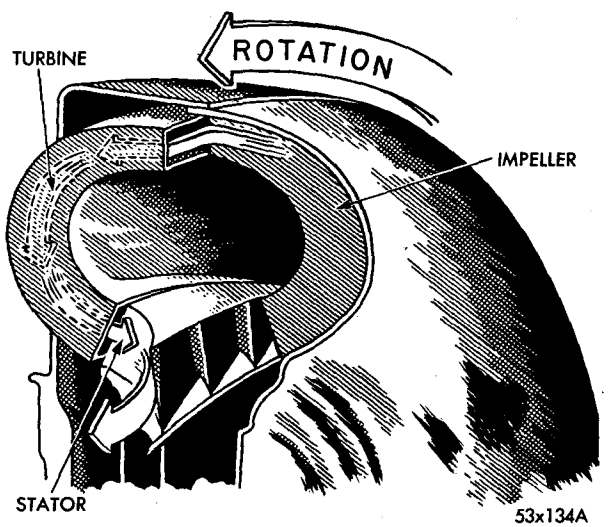

Fig. 6—Giving Oil Flow Initial Forward Motion By Inserting Stator with Curved Blades Between Turbine Outlet and Impeller Inlet

the Stator is mounted on a **"freewheel,"** the Stator, therefore, is free to obey the force of the oil from the turbine, and so starts to rotate with the impeller and the turbine. Nothing is lost motion, however, since the speed of the turbine approaches that of the impeller, no conversion can occur anyway. The free rotation of the Stator under this condition reduces the resistance to the oil flow and allows the converter to approach the efficiency of a normal Fluid Coupling when the Stator is out of the conversion range.

5. CHRYSLER INDUSTRIAL TORQUE CONVERTER BASIC UNITS

The Chrysler Industrial Torque Converter consists of the following:

The Torque Converter Unit or "Donut," the Oil Cooling and Lubrication System, and the Governor, which is optional equipment.

6. TORQUE CONVERTER UNIT

The Torque Converter Unit consists of three basic elements and are the Impeller, Turbine and the Stator.

The Impeller and Turbine are hydrogen brazed assemblies of stamped steel parts, while the Stator is a machined aluminum casting.

The Torque Converter Unit or assembly is completely enclosed in a welded unit, and cannot be serviced except as an assembly.

While many vane angle combinations are possible in this assembly, the vanes of the enclosed Impeller are curved forward and the Turbine vanes are curved backward, so that the turbine may absorb the maximum of force from the circulating oil, while the Stator blades are just curved in an arc. The arc causes the oil leaving the Turbine to change its direction of flow and allows the oil to re-enter the Impeller vanes in the direction of Impeller rotation. Consequently, the Impeller is driven by the compounded action of the engine torque and the flow of oil re-entering the Impeller blades.

The result is a "Multiplication" in the torque transmitted by the Impeller to the Turbine shaft-load.

When the Torque Converter Assembly is installed on an Industrial Engine, it "Multiplies"

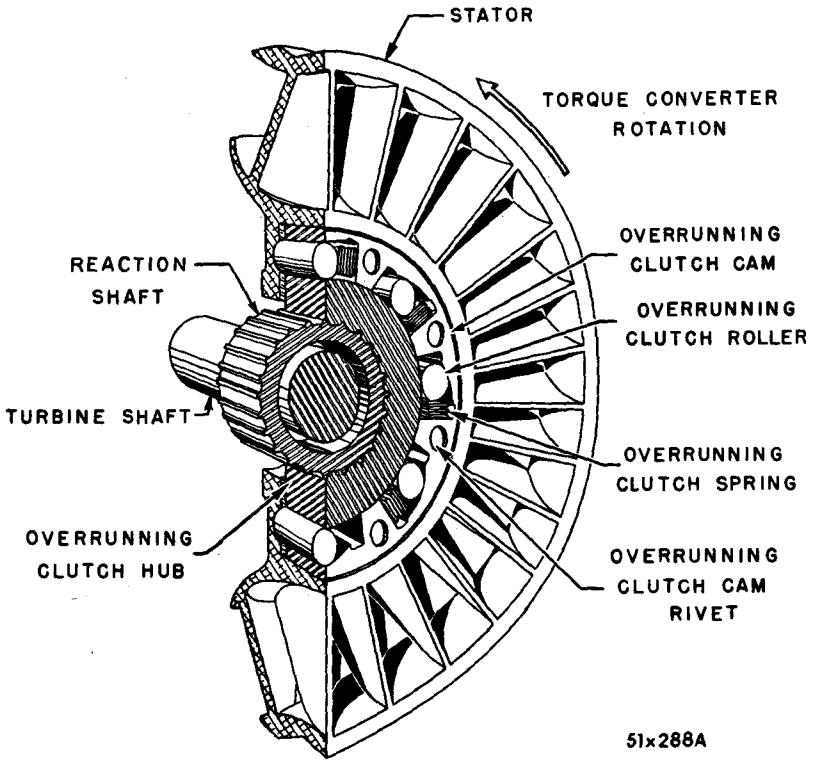

Fig. 7—Torque Converter Overrunning Clutch

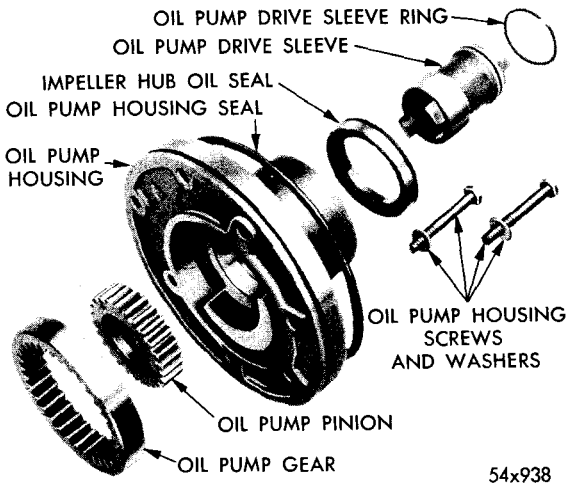

Fig. 9—Oil Pump Housing Assembly (Disassembled View)

NOTE

The Main Regulator Valve is the same Valve, as used in the Chrysler PowerFlite Transmission. The other regulating features designed into the Valve are not utilized in the Chrysler Torque Converter.

After the oil leaves the Regulator Valve Body, it enters a tubulure space, between the oil Pump Drive Quill and the Reaction Shaft, and is pumped along this tubulure space into the Torque Converter.

The oil is circulated within the Torque Converter "Donut" or unit by the hydraulic flow of oil between the Impeller and the Turbine. Oil **leaving** the Torque Converter unit, passes along the space between the Turbine shaft and the Reaction shaft, from where it flows through an oil hole in the Reaction shaft and back into the Regulator Valve Body. Oil leaving the Regulator Valve Body, enters the Auxiliary or Downstream Regulator Valve. The purpose of this valve is twofold; to act as a secondary pressure relief valve and to maintain the oil pressure in the Torque Converter unit at 30 pounds-per-square-inch. The Downstream Regulator Valve does not open to permit oil circulation, until the oil pressure has reached 30 pounds-per-square-inch. This is to ensure a complete filling of the Torque Converter and avoidance of a "cavitation" in the oil. If this "cavitation" were to occur, it would result in a complete loss of the Transmission and cause considerable overheating, of the Torque Converter unit. (See Paragraph 9, "Lubrication and Drain System" that follows.) The Downstream Regulator Valve will remain in the operating position, so long as the oil pressure is between 30 and 80 pounds-per-square-inch. If the pressure should rise above 80 pounds-per-square-inch, the Downstream Regulator Valve will move over further, and allow the oil to flow directly back to the oil pan. It does this, by flowing out of a port in the Regulator Valve Body, down the outside of the valve body and through a 5/8 inch oil hole, which connects the oil Pump recess with the oil pan.

After passing through the Downstream Regulator Valve, the oil leaving the Regulator Valve Body re-enters the Main Torque Converter Housing by an oil hole at 2 o'clock on the back face of the Oil Pump recess, from where the oil travels radially through the Torque Converter Housing, to the oil Filter. There is a relief Valve fitted across the Oil Filter to safeguard the oil system, should the Oil Filter become clogged. The tubes, to and from the oil-water Cooler, at the front of the engine, are connected to adapters on the pad, which support the Oil Filter, with a rearmost tube, being the outlet to the cooler.

9. LUBRICATION AND DRAIN SYSTEM

Lubricating oil to the Oil Pump bushing, drains back through the Oil Pump Housing, spilling into the Oil Pump Recess, and flows through a 5/8 inch drain hole into the oil pan.

Lubrication to the Turbine Shaft Bearing, is by leakage past the piston ring seal on the Turbine Shaft, into the rear Chamber. If a Governor is installed, (as optional equipment), the oil from the Governor, drains into this Chamber as well. Oil to the Governor, is supplied from a connection by the oil Filter.

The rear Chamber is drained through a 3/8 inch oil hole in the bulkhead between the rear Chamber, and the oil Pump recess, then into a passage in the Regulator Valve Body, which is open to the 5/8 inch drain hole, between the Oil Pump recess and the oil pan. The position of the 3/8 inch drain hole, maintains the correct level of oil in the rear chamber to lubricate the Turbine Shaft bearing.

10. OIL FILTER

The Oil Filter, as shown in Figure 10, is of the

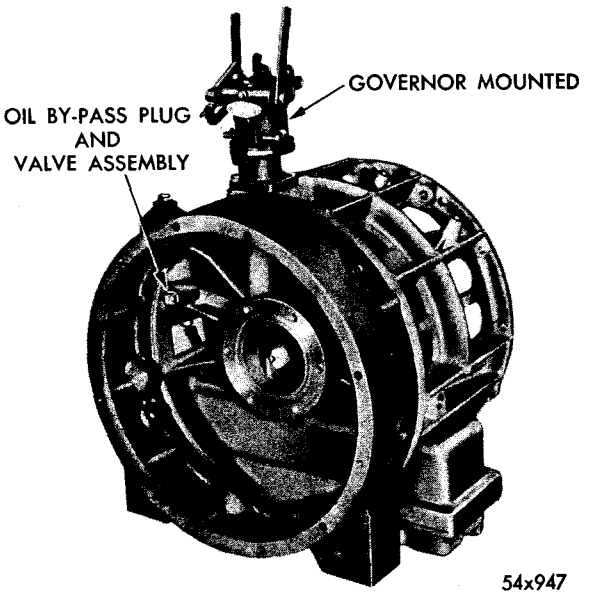

Fig. 13—Governor Attached to Converter Housing

14. OPERATING PROCEDURES

The Governor weights revolving with the mainshaft through centrifugal force, cause the rocker shaft and the operating lever to rotate. The operating lever is connected to the carburetor throttle. A calibrated spring attached to the operating lever, opposes the effort exerted by the Governor weights. The engine speed is governed by the balance of the two forces.

15. ADJUSTING THE GOVERNOR

Make certain that no engine deficiencies exist before attempting to adjust the governor. When installing the carburetor to the governor rod, the lower ball joint is installed in the upper hole of the throttle lever. Screw in the low speed stop screw to hold the throttle lever in its open position, toward the rear of the engine. Hold the carburetor throttle lever against its wide open stop and adjust the length of the rod, so that the upper ball joint will just fit into the tapped hole in the die cast throttle lever. Check the rod installation, and eliminate friction or excessive free play by adjusting the ball joint.

In order to adjust the governor to eliminate surge, select an engine speed at the low point of the range at which the Governor is to operate, and move the speed change lever to obtain this speed. If a no-load surge is encountered at this point, turn the surge adjusting screw in ¼ turns at a time, until the surge is removed. **UNDER NO CIRCUMSTANCES SHOULD THIS SCREW BE TURNED IN FAR ENOUGH TO INCREASE THE NO-LOAD SPEED OF THE ENGINE MORE THAN 25 RPM.**

When adjusting the governed speed of the engine, move the speed change lever in a clockwise direction until an engine speed mid-point in the desired range is obtained. Check the regulation by loading and un-loading the engine. If there is too great a variation in engine rpm's between the no-load and full-load speeds, increase the tension on the governor spring by adjusting the screw eye, and move the speed change lever in a counter-clockwise direction, until the previously selected speed is obtained. Check results again and repeat the process until the desired regulation is obtained. Should the governor surge objectionably when the engine is under load, it will be necessary to decrease the tension on the governor spring with the screw eye, and bring the engine back to the selected speed with the speed change lever. Repeat until the load surge is removed.

To test the speed load, move the speed change lever in a clockwise direction, until the top load is reached. Set the maximum speed adjusting screw to stop the lever travel at this point. Move the speed change lever back until the lowest speed in the range is reached, and set the minimum speed adjusting screw to check the lever travel at this point. Lock all adjustments securely with the check nuts.

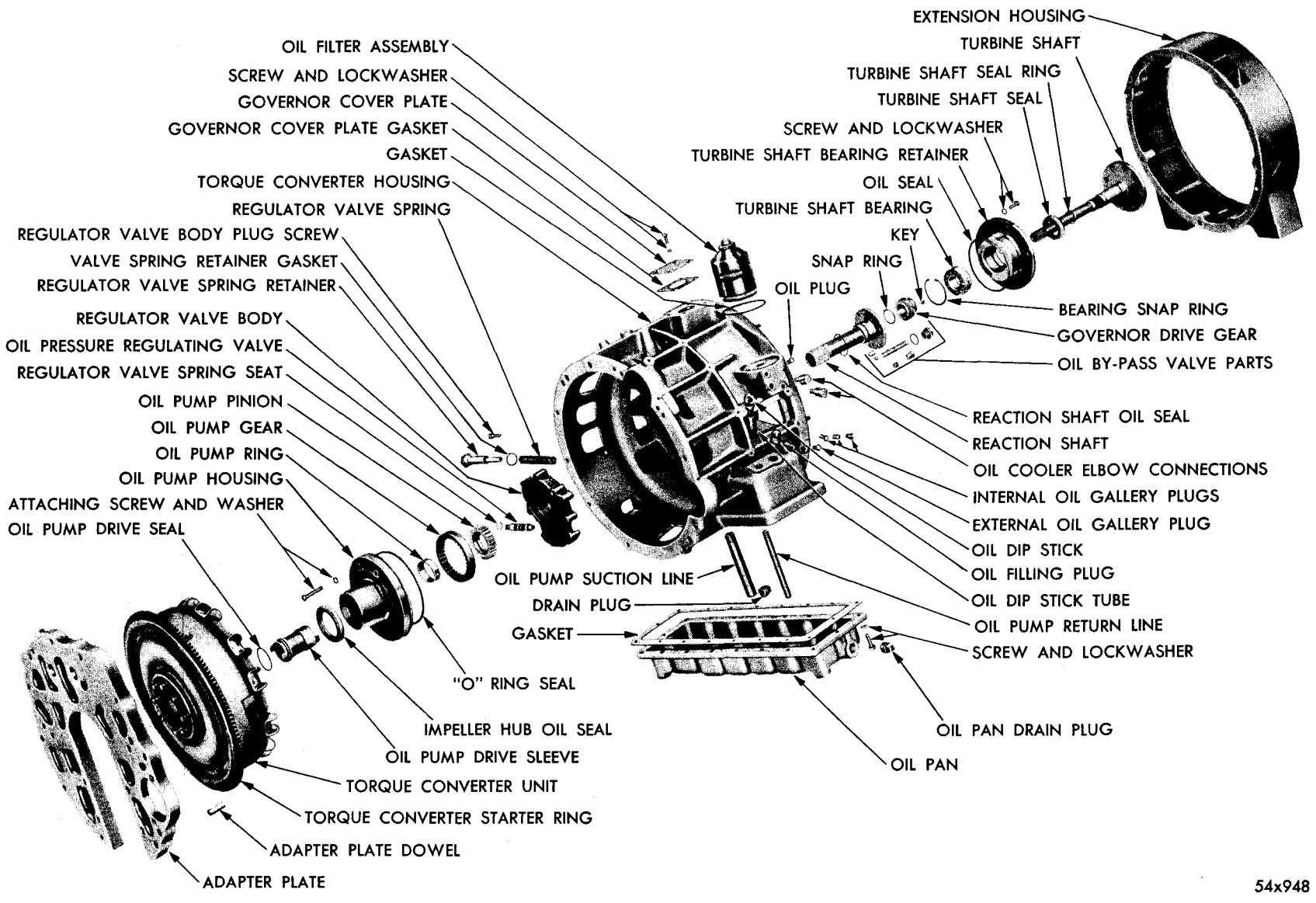

Fig. 14—Torque Converter Housing Assembly (Disassembled View)

TORQUE CONVERTER SERVICE PROCEDURES

16. REMOVAL AND DISASSEMBLY

(1) Drain the oil from the oil pan, on the bottom of the Torque Converter Housing, by removing the two oil pan drain plugs, as shown in Figure 21.

(2) After the oil is drained, remove the rear and external oil gallery plugs, the oil pump filler plug, and the oil level assembly.

(3) Disconnect the oil-water cooler tubes, from the adapters on the side of the Converter Housing, and remove the two brass elbows, as shown in Figure 22.

(4) Install a lifting bracket on the top of the Torque Converter Housing and tighten securely.

(5) Attach a hoist, or chainfall to the lifting bracket and take up the slack.

(6) Remove the bolts attaching the Torque Converter Housing to the adapter plate, and with the chainfall, lift the housing from the engine.

CAUTION

The Torque Converter Housing is doweled to the adapter plate, and care should be exercised when removing the Housing from the adapter. DO NOT HAMMER OR PRY BETWEEN THE HOUSING OR THE ADAPTER, AS THIS WILL DISTORT THE METAL AND RESULT IN MISALIGNMENT. Extreme caution should be exercised also, by moving the Housing straight back from the adapter to avoid damage to the Torque Converter.

(7) Place the Converter Housing on a clean bench with the oil pan side down.

(8) Remove the governor, (if so equipped), shaft and the needle bearing from the Converter Housing, as shown in Figure 24.

(9) Using a drift, push out the rivet and remove the upper drive shaft sleeve, and the shaft bearing from the Governor shaft.

(10) Remove the oil pan, and discard the gasket, as shown in Figure 20.

(11) Remove the oil suction and the oil return pipes from the inside of the Converter Housing, after the oil pan is removed, as shown in Figure 19.

(12) Remove the access to cooler by-pass plug, as shown in Figure 23.

(13) Remove the oil cooler by-pass plug, as shown in Figure 22.

(14) Remove the screws and lockwashers from the Turbine Shaft retainer in the rear of the Torque Converter, and remove the Turbine Shaft.

(15) Disassemble the Turbine shaft by removing the oil ring, lock ring, the Governor drive gear, lock ring, (Woodruff) key, and using an arbor, press out the shaft from the bearing retainer. Remove the bearing from the retainer and the oil seal. (Fig. 38).

(16) Remove the regulator valve spring retainer, the spring gasket, and the regulator valve spring, from the right side of the Converter Housing, (Fig. 28).

(17) Remove the regulator valve body retainer bolt, from the right side of the Converter Housing.

(18) Remove the oil pump drive seal and the oil pump drive sleeve from the oil pump housing.

(19) Remove the screws which bolt the oil pump assembly in the Converter Housing. Number the screws while removing, as they must be assembled in their original location. (Fig. 27).

(20) Remove the pinion and gear from the inside of the oil pump housing.

(21) Remove the reaction shaft oil seal, and remove the screws from the reaction shaft.

(22) Remove the regulator valve body from the Converter Housing. Remove the regulator valve from the body. (Fig. 26).

(23) Remove the oil Filter assembly. Discard the element and the rubber seal. (Fig. 10).

(24) Remove the valve, valve cup and the pressure relief (ball type) valve. Discard the gasket.

(25) Rotate the Torque Converter until the drain plug is accessible. Remove the oil plug and drain the fluid.

(26) Inspect both plug gaskets and install new ones if necessary. Tighten the plugs in the Torque Converter to 50 foot-pounds torque.

(27) Remove the eight Torque Converter stud nuts and lockwashers from the crankshaft flange using wrench, Tool C-811, and remove the Torque Converter.

(28) The Torque Converter and the Housing, are now disassembled and ready for cleaning and inspection.

17. CLEANING AND INSPECTION

(1) Make a thorough inspection of all parts for wear and damage.

(2) To insure proper sealing, new seals and gaskets should always be used when reassembling.

(3) Thoroughly examine the oil passages in the Torque Converter Housing, along the Turbine Shaft and the Reaction shaft for wear or scoring.

(4) The regulator valve body is made of aluminum and requires care in handling to avoid damage. Place the body and valve in a pan containing a clean solvent, wash thoroughly, and dry with compressed air.

(5) Inspect the valve for free movement in the valve body.

(6) Check all fluid passages for obstructions and inspect all mating surfaces for burrs and distortion.

(7) Clean the oil pan with a solvent.

(8) Inspect the mating surfaces of the adapter plate and the Torque Converter Housing. Remove any burrs or rough spots with emery cloth.

(9) Clean the housing mating surface, with a mild solution of cleaning fluid before reassembly.

(10) When cleaning the Torque Converter, cover the hub in front of the Converter so that nothing gets inside, and using a mild solvent, clean the outside thoroughly.

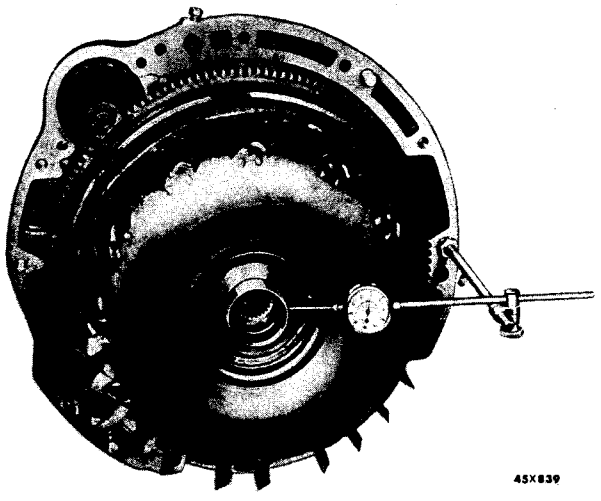

Fig. 15—Checking Converter Hub Runout

18. CHECKING THE CONVERTER HUB RUNOUT

(1) Since the Torque Converter was removed from the crankshaft flange, it will be necessary to take a **RUNOUT,** to determine if the Converter is aligned correctly.

(2) Install the Converter on the crankshaft flange and attach the lockwashers and stud nuts. Using Tool C-811, tighten the nuts to 55 foot-pounds torque.

(3) Attach the clamp, swivel and attaching rod of Tool C-430 to the adapter plate, as shown in Figure 15.

(4) Place the dial indicator, part of Tool C-430 onto the attaching rod. Adjust the plunger of the indicator against the Converter hub. Set the dial indicator to read zero (0).

(5) Rotate the crankshaft to determine the runout. The maximum allowable is .003 inch. If the runout is greater than .003 inch, the Torque Converter should be removed from the crankshaft flange.

(6) Check the Converter mounting face and the crankshaft flange for dirt or burrs. Clean the surface again of both, and reinstall the Converter. Tighten all the nuts evenly, and take another runout. The Converter should now be within the above limits.

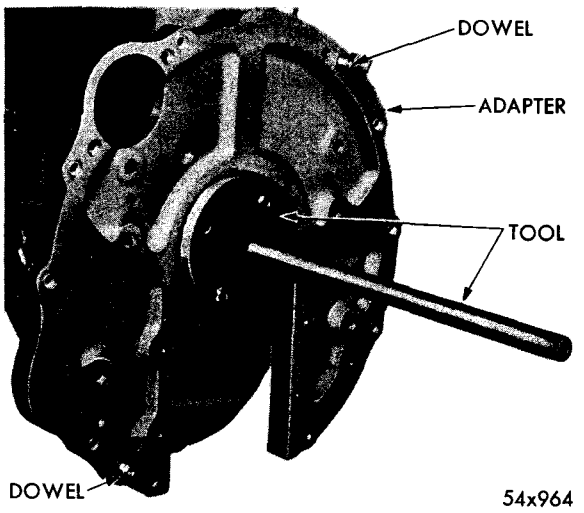

Fig. 16—Fixture Tool C-870 Installed to Crankshaft Flange

19. CHECKING THE TORQUE CONVERTER HOUSING RUNOUT

(1) Before reassembling the Torque Converter Housing with the internal parts, it will be necessary to align the Housing as follows:

(2) Remove the Torque Converter from the crankshaft flange.

(3) Inspect the Housing face where it contacts the rear of the adapter plate for particles of dirt or burrs. Remove all burrs with a file and clean both surfaces.

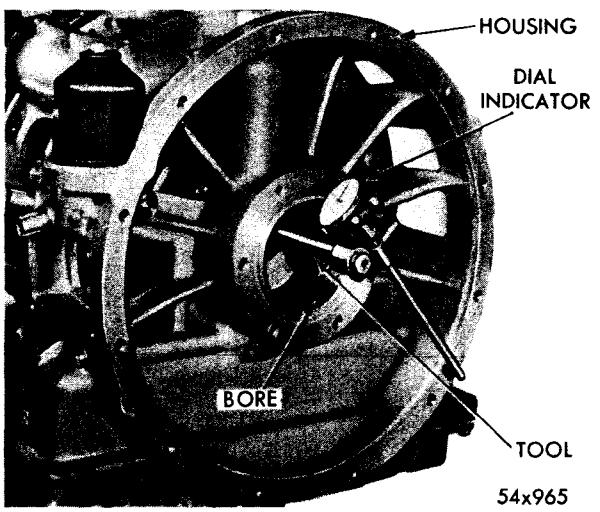

Fig. 17—Checking Runout of Torque Converter Housing Bore with Tool C-870 and Dial Indicator Tool C-430

(4) Using any standard flywheel bolts, install fixture Tool C-870 to the crankshaft flange and tighten securely, as shown in Figure 16.

(5) Install two dowel pins in the adapter plate from the front end so that they will protrude beyond the machined face of the adapter plate.

(6) Using a chainfall or lift, install the Torque Converter Housing to the adapter plate with the cap screws and tighten securely.

(7) Install the dial indicator Tool C-435 or Tool C-430 onto the shaft of the fixture Tool C-870, as shown in Figure 17.

(8) Adjust the plunger of the indicator against the inside diameter of the Housing bore. Set the dial indicator to zero (0).

(9) Rotate the crankshaft and check the inside diameter of the Housing bore, as shown in Figure 17. It should not vary more than .003 to .005 inch **RUNOUT** to one complete revolution of the crankshaft.

(10) If alignment is necessary, install the correct amount of shims between the Converter Housing and the adapter plate until it comes within the specified tolerance.

(11) After obtaining the correct alignment, stamp on the Housing and on the side of the adapter plate, at each screw position, the required number of shims (in thousandths) needed to align the Housing.

(12) Check the **RUNOUT** of the Torque Converter Housing rear face as outlined in the next paragraph.

20. CHECKING THE REAR FACE RUNOUT OF THE TORQUE CONVERTER HOUSING

(1) After checking the bore of the Torque Converter Housing, it will be necessary to take the runout of the Converter Housing rear face.

(2) Proceed as outlined in the Converter Housing Runout, and change the position of the dial indicator Tool C-430. Check the rear face of the Converter Housing, as shown

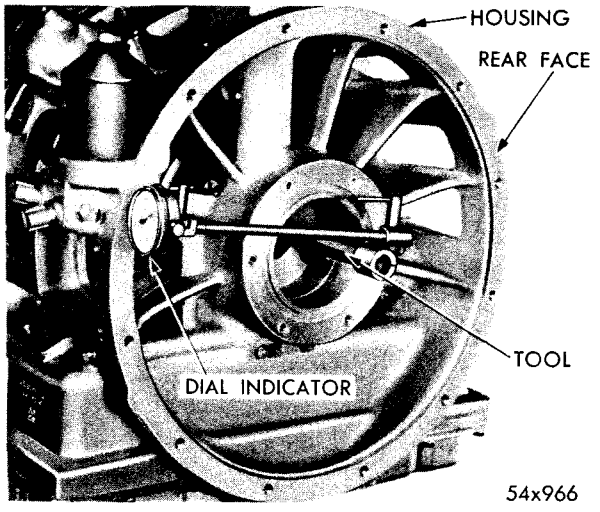

Fig. 18—Checking Runout of Torque Converter Housing Rear Face with Tool C-870 and Dial Indicator Tool C-430

in Figure 18. The maximum allowable is .003 to .005 inch.

(3) If the runout is greater than the above limits, check the Converter Housing rear face for dirt and/or burrs. Remove all burrs with a file and take another runout after the face of the Housing has been cleaned.

(4) The rear face of the Housing should come within the above limits.

21. TORQUE CONVERTER HOUSING ASSEMBLY

(1) Install the oil suction, and the oil return pipes, as shown in Figure 19. Tighten securely.

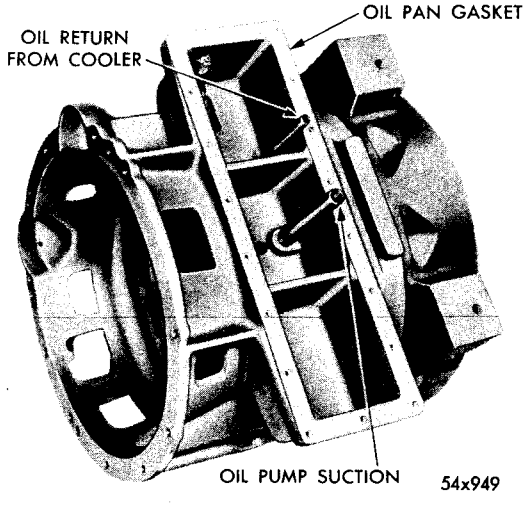

Fig. 19—Removing or Installing the Oil Suction and Return Pipes

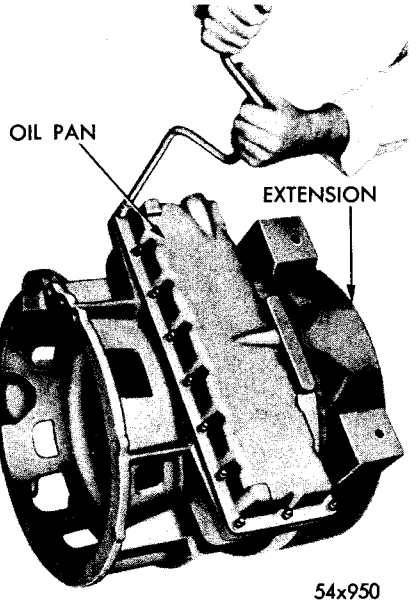

Fig. 20—Removing or Installing the Oil Pan

(2) Install the oil pan so that the center plug hole faces the rear of the Converter Housing, as shown in Figure 20. Using a new gasket, start the bolts all around and tighten them from the middle of the oil pan to each end, 17 foot-pounds torque.

(3) Install the oil pan drain plugs, as shown in Figure 21. Install the rear gallery plugs, the external gallery plug, and the oil pump

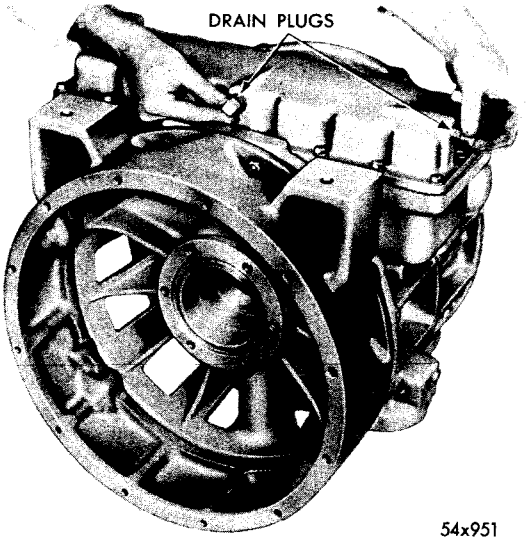

Fig. 21—Removing or Installing the Oil Pan Drain Plugs

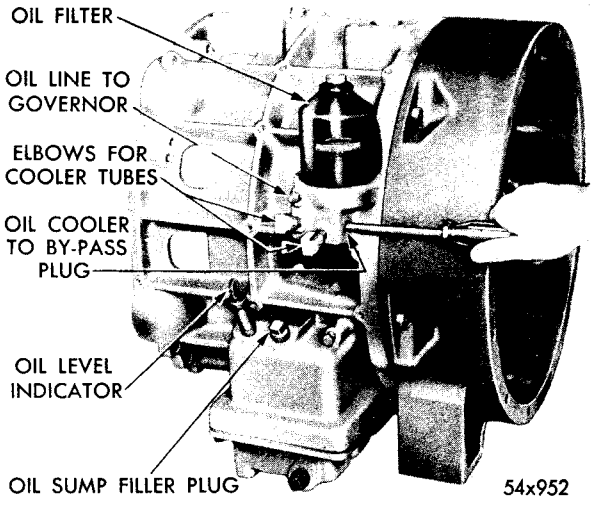

Fig. 22—Removing or Installing the Oil Cooler By-Pass Plug

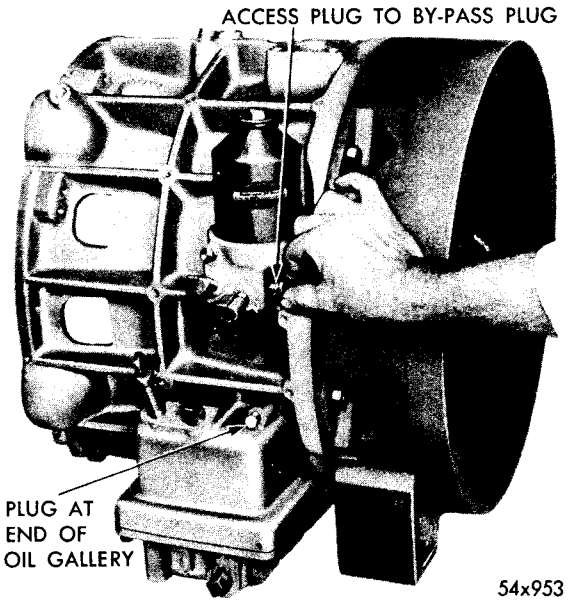

Fig. 23—Removing or Installing the Access Plug to Oil Cooler By-Pass Plug

filler plug and oil level assembly. Tighten all plugs securely.

(4) Install the pressure relief (ball) valve. Using a brass rod, tap the pressure relief valve lightly several times to insure the proper seating.

(5) Install the valve spring, using two gaskets and the valve cap. (See Fig. 13). Tighten securely.

(6) Install the oil filter assembly. (See Fig. 10). Using a new element and rubber seal, install in the recess of the filter seat, and tighten the nut assembly.

(7) Install the oil cooler by-pass plug, as shown in Figure 22, and tighten securely.

(8) Install the access plug to cooler by-pass plug, as shown in Figure 23, and tighten securely.

(9) Install the two brass elbows, for the oil cooler tubes, as shown in Figure 22, and tighten securely.

(10) On the Torque Converter without the Governor, install the Governor gasket and cover plate over the Governor shaft recess and tighten the nuts.

(11) On the Torque Converter with a Governor, fit the upper bearing on the upper drive shaft. Install the drive shaft sleeve to the upper end of the drive shaft and rivet it to the drive shaft. Install the bronze thrust washer on the drive shaft, as shown in Figure 24.

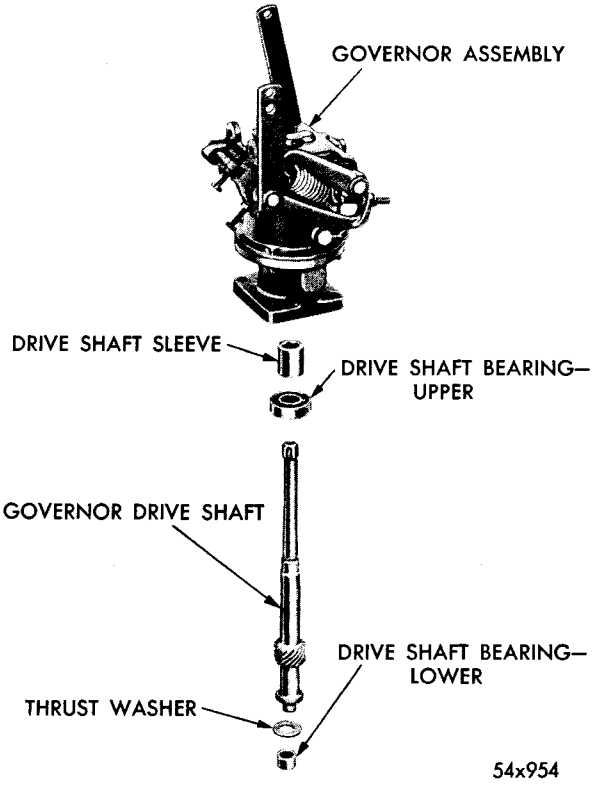

Fig. 24—Governor with Drive Shaft

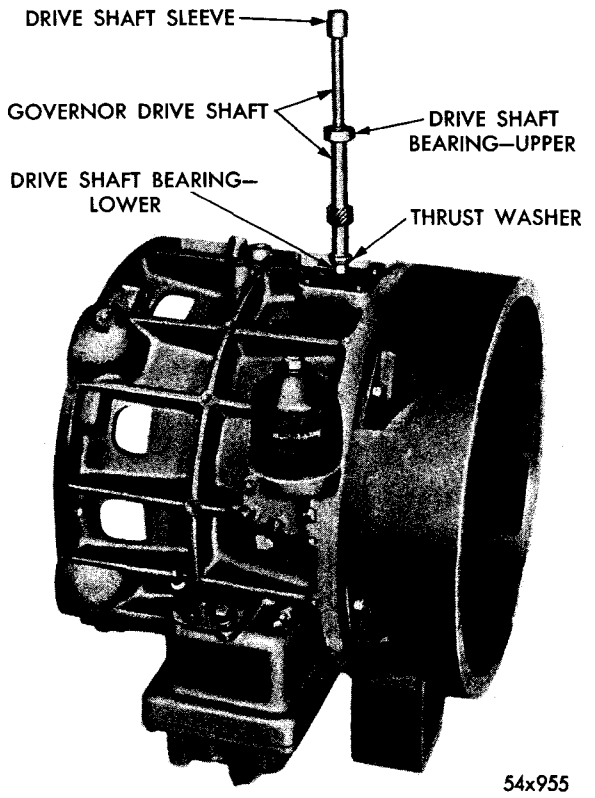

Fig. 25—Installing or Removing the Governor Drive Shaft

(12) Install the lower needle bearing into the main Converter Housing, and install the Governor drive shaft assembly, as shown in Figure 25, seating the upper bearing in the bearing recess.

(13) Rotate the Governor shaft, and see that it operates freely.

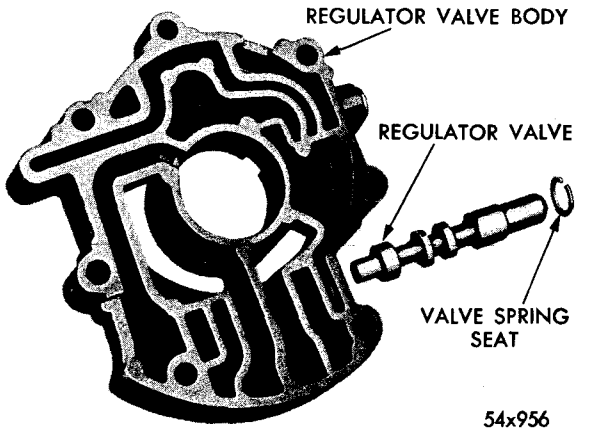

Fig. 26—Torque Converter Regulator Valve Body (Disassembled View)

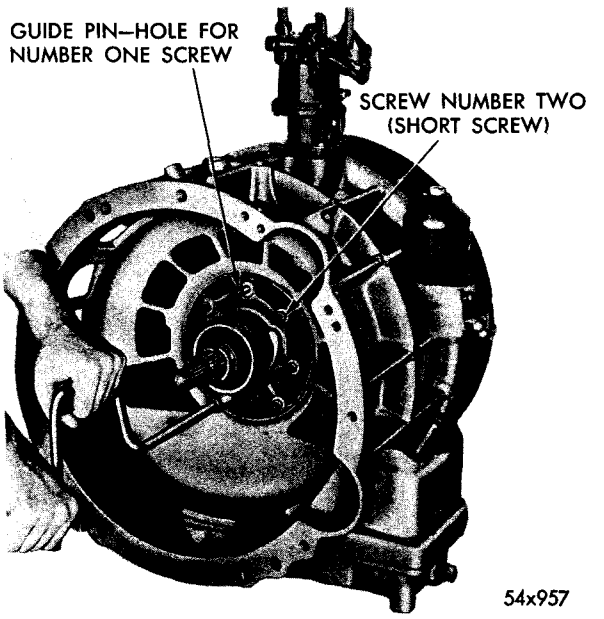

Fig. 27—Installing and Tightening the Oil Pump Housing

(14) Install the reaction shaft thru the rear of the Converter Housing. Line-up the shaft guide hole with the guide pin in the Housing. Install the reaction shaft screws and tighten. Make certain that the oil hole in the reaction shaft flange is in line with the oil hole in the Housing, and that a clear passageway exists. Install the reaction shaft oil seal on the rear of the reaction shaft. Install the dowel pin in the rear face of the reaction shaft.

CAUTION

DO NOT FORCE THE REACTION SHAFT IN THE HOUSING. Use care, when installing the shaft, as any force or jamming can cause extensive damage to the Housing.

(15) Install a guide pin in the front of the Converter Housing to coincide with the oil pump housing screw Number One, as shown in Figure 27.

(16) Install the regulator unit, so that its open end (with all the channeling) is facing into the Converter Housing, (Fig. 26), and that the screw hole Number One of the regulator unit is aligned with the screw hole Number One of the oil pump housing, as shown in Figure 27.

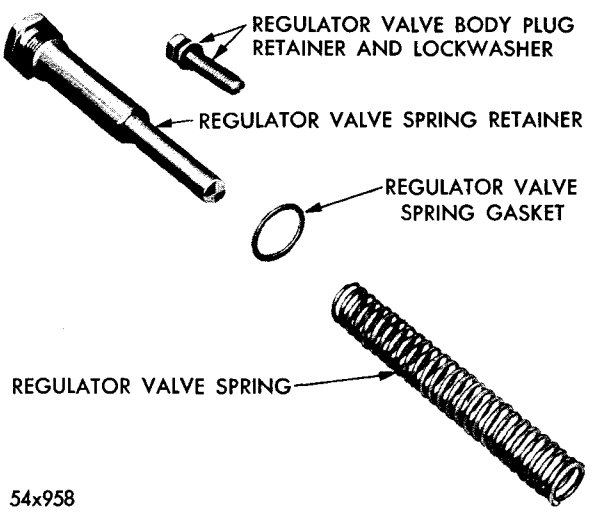

Fig. 28—The Regulator Assembly (Disassembled View)

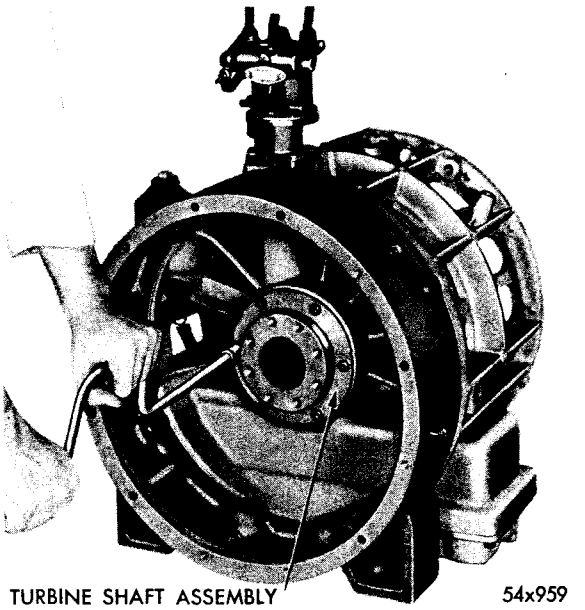

Fig. 29—Tightening the Turbine Shaft Assembly to Converter Housing

(17) Install the regulator valve body retainer into the right side of the Converter Housing and tighten. (See Fig. 28).

(18) Assemble the regulator valve spring gasket, the regulator valve spring and the spring retainer. Install the assembly into the right side of the Converter Housing and tighten.

(19) Install the Oil Pump Assembly, over the reaction shaft into the Converter Housing, using the guide pin in the hole Number One to insure proper assembly.

(20) Using a suitable Tool over the Oil Pump Assembly, press the Assembly, until it is firmly seated in the Converter Housing.

(21) Install and lock the reaction shaft ring seal on the Oil Pump drive sleeve.

(22) Install the Oil Pump drive sleeve over the reaction shaft and engage with the Oil Pump pinion gear. Rotate the assembly for freedom of operation.

(23) Install screws three and seven with washers and tighten to 15 foot-pounds torque, as shown in Figure 27. While tightening the screws, continue to turn the Oil Pump drive sleeve so that it operates freely.

(24) Install screw Number two. This is the short screw and is the only screw that will fit into this hole. Tighten to 18 foot-pounds torque. **DO NOT PLACE A LONGER SCREW INTO THIS HOLE.**

(25) Remove the guide pin. Install screw Number One and tighten to 18 foot-pounds torque. After all the bolts are tightened, see that the Oil Pump drive sleeve operates freely.

(26) Install the bearing retainer flange to the Converter Housing oil seal, in the recess, at the rear of the Converter Housing.

(27) Refer to Figure 38, when re-assembling the Turbine Shaft as follows:

a. Using Tool C-3125, press fit the Turbine Shaft oil seal into the rear of the bearing retainer.

b. Using the above tool, press fit the Turbine Shaft bearing into the front of the Turbine Shaft retainer, and install the Turbine Shaft bearing snap ring into the front retainer recess, over the Turbine Shaft bearing.

c. Install the Governor drive gear (if so equipped) over the Turbine Shaft, with the gear end toward the front of the shaft. Align the Governor drive gear keyway with the key (Woodruff key) in the Turbine Shaft at the same time.

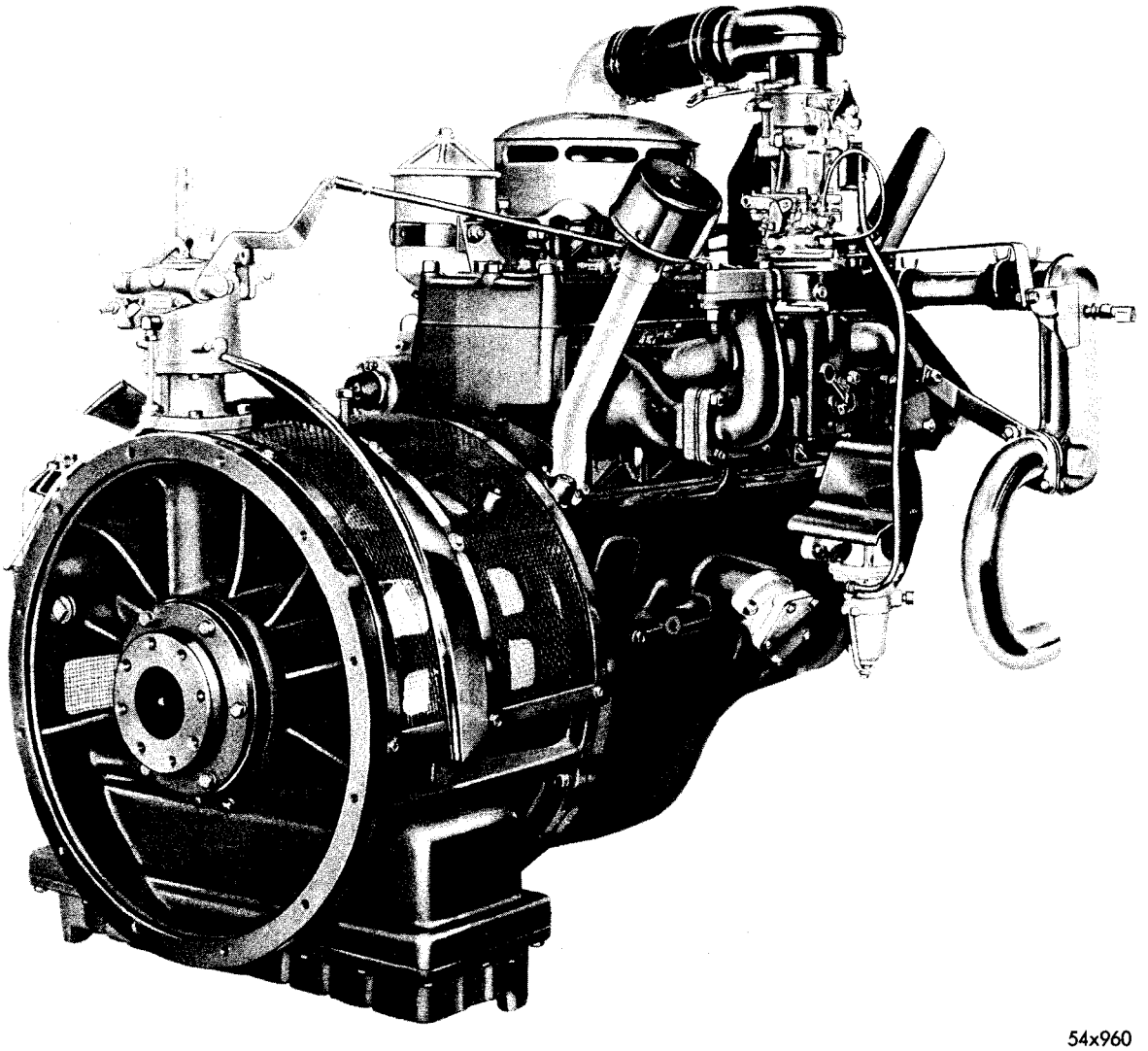

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Fig. 30—Torque Converter Housing Attached to Engine (Left View)

d. Install the snap ring on the Turbine Shaft over the Governor drive gear.

e. Press fit the Turbine Shaft into the Turbine Shaft bearing, until the Turbine Shaft is properly seated against the bearing race.

f. Install and lock the Turbine Shaft oil ring on the Turbine Shaft. The Turbine Shaft assembly is now ready for installation.

(28) Install the Turbine Shaft assembly into the rear of the Converter Housing. Rotate the Turbine Shaft on units equipped with a Governor, to insure mating of the Governor gears. Install the screws and lockwashers and tighten the assembly to the Converter Housing, as shown in Figure 29.

22. INSTALLATION OF TORQUE CONVERTER HOUSING (On Engine) (Fig. 30)

(1) Install a lifting bracket on top of the Torque Converter Housing and tighten securely.

CAUTION

Exercise extreme care when installing the Torque Converter Housing to prevent damage to the Turbine Shaft and the reaction shaft splines, the Impeller hub oil seal and the oil seal ring. Use gentle pressure and DO NOT FORCE THE CONVERTER HOUSING into position.

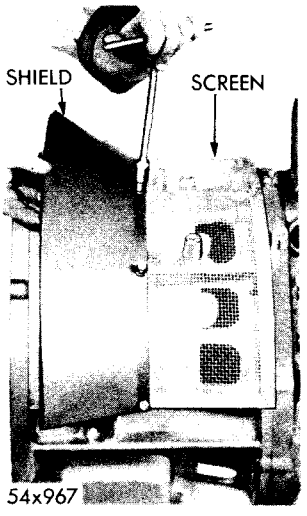

Fig. 31—Attaching the Shield to the Torque Converter Housing

(2) Using a suitable overhead hoist, carefully line-up the Converter Housing with the guide pins in the adapter plate attached to the engine. The correct value of shims must be in the proper location according to the runout as explained earlier, and remove the hoist and the bracket when all the screws are tightened securely. (Refer to Fig. 30).

(3) Install the screen and dust shield after the bracket is removed, as shown in Figure 31.

INDIVIDUAL ASSEMBLIES OF THE CHRYSLER INDUSTRIAL TORQUE CONVERTER

23. INSTALLATION AND SERVICING

When installing or servicing the Chrysler Industrial Torque Converter Assembly, there are four separate assemblies in the complete assembly, which are as follows:

1. The Torque Converter Unit or "Donut" and Adapter Plate
2. The Oil Pump and Regulator Assembly
3. The Turbine Shaft Assembly
4. The Torque Converter Housing Assembly.

24. TORQUE CONVERTER "DONUT" AND ADAPTER PLATE ASSEMBLY

(1) Install the Torque Converter adapter plate on the rear of the engine cylinder block, and tighten to 30 foot-pounds torque, as shown in Figure 32.

(2) Install the adapter plate side brackets on the rear of the adapter plate and the cylin-

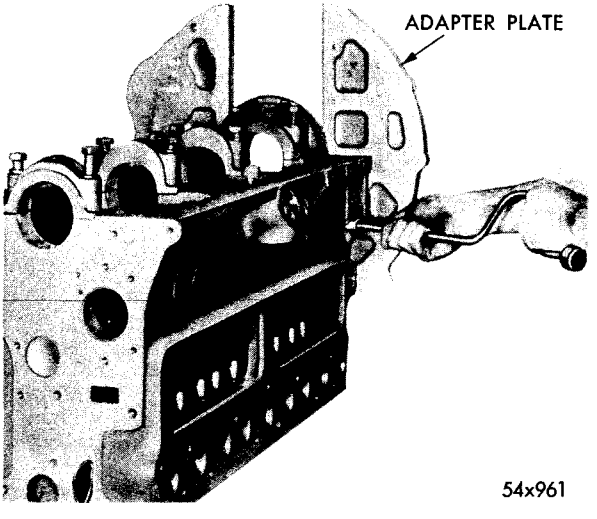

Fig. 32—Installing the Adapter Plate on Engine Cylinder Block

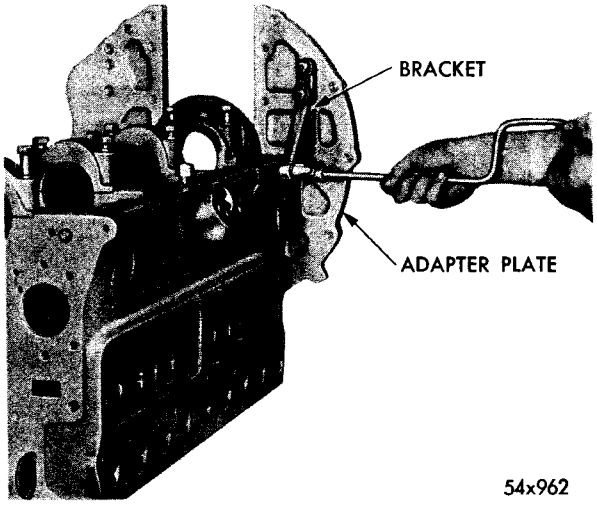

Fig. 33—Installing the Adapter Plate Side Brackets

der block, as shown in Figure 33. Tighten to 30 foot-pounds torque.

(3) Inspect the mating surface on the Torque Converter "Donut" and the crankshaft flange for burrs and/or dirt.

(4) Install the Torque Converter "Donut" on the crankshaft. Using the eight stud nuts and lockwashers, draw down the nuts evenly, using Tool C-811. Tighten to 55 foot-pounds torque, as shown in Figure 34.

NOTE

The Torque Converter "Donut" drive flange recess has two bolts that are unevenly spaced with respect to the rest of the recess bolts. These bolts match-up with the two holes in the crankshaft flange. Tighten the flange nuts securely.

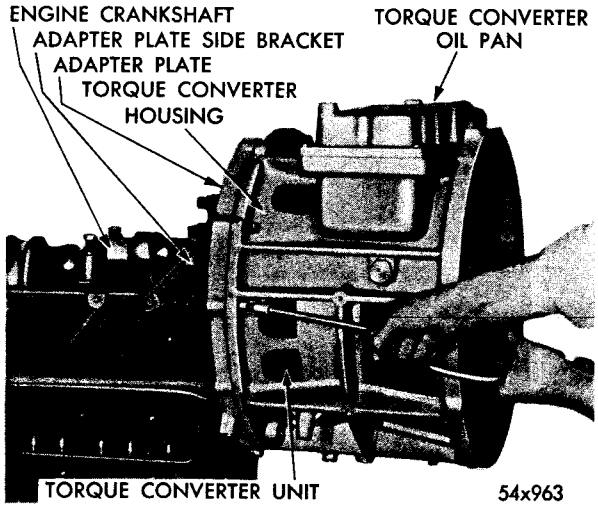

Fig. 34—Installing the Torque Converter Housing on the Adapter Plate

25. TORQUE CONVERTER RUNOUT

NOTE

When the Torque Converter unit or "Donut" is removed from the crankshaft drive flange, for any reason, the Converter run-out should be checked when re-installed. The runout should not exceed .003 inch total indicator reading. Refer to Paragraph 18 for the Runout procedure.

26. OIL PUMP AND REGULATOR DISASSEMBLY AND ASSEMBLY

The oil pump and regulator assembly, as shown in Figures 26 and 27, fits into the front end of the Torque Converter Housing, and consists of the following parts:

The Regulator Assembly

The Oil Pump Assembly

27. REMOVAL

(1) Remove the regulator valve body retainer bolt, the regulator valve spring retainer, the spring gasket and the regulator valve spring, from the right side of the Torque Converter Housing. (See Fig. 28).

(2) Remove the oil pump drive seal and the oil pump drive sleeve from the oil pump housing.

(3) Remove the screws which hold the oil pump assembly in the Converter Housing. Number the screws while removing, as they must be assembled in their original location. (See Fig. 27).

(4) Remove the regulator valve body from the rear of the oil pump housing. (See Fig. 26).

28. CLEANING AND INSPECTION

(1) Clean the oil pump body, pinion and gear, the regulator valve body, and the regulator valve in a solvent solution.

(2) After cleaning the parts, inspect for burrs and any other damage or wear.

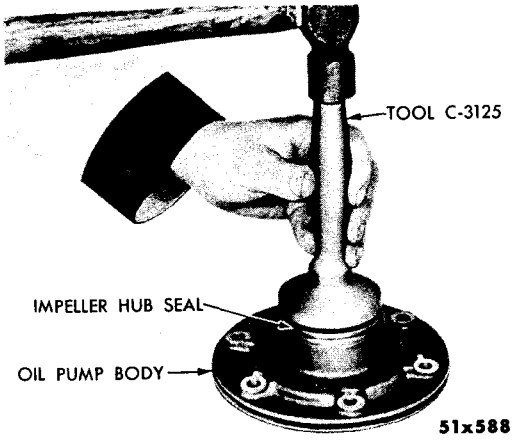

Fig. 35—Installing the Impeller Hub Seal

(3) Inspect the regulator valve spring seat for a tight fit on the regulator valve, before installation.

29. INSTALLATION

(1) Using Tool C-3125, install a new oil seal in the Torque Converter Impeller Hub, as shown in Figure 35.

(2) Install a new oil O-ring seal on the outer diameter of the Oil Pump Housing, as shown in Figure 36.

(3) Assemble the Oil Pump pinion and gear in the Oil Pump Housing.

(4) Install the Oil Pump pinion and gear, with the flange end up, as shown in Figure 36.

(5) Using Tool C-3335 as a surface plate, check the clearance between the Oil Pump Body

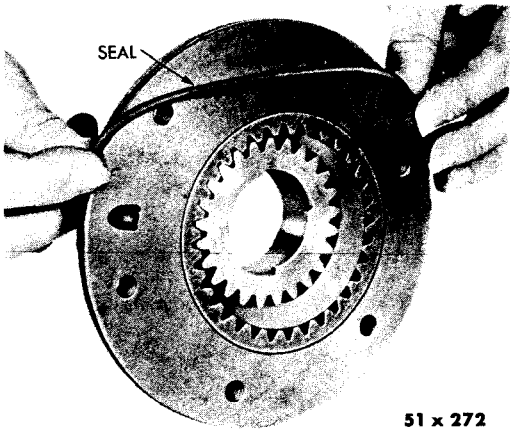

Fig. 36—Installing the Oil Pump Body Seal Ring

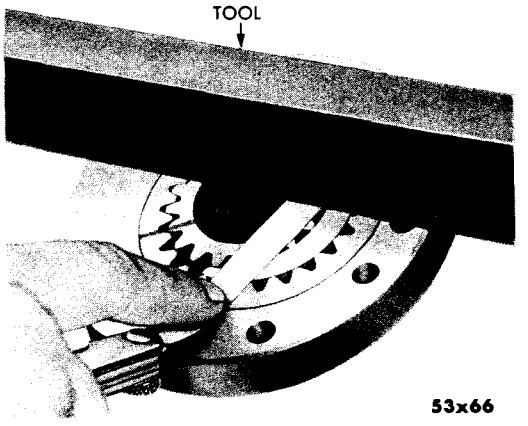

Fig. 37—Checking Clearance Between Pump Body and Gears Using Tool C-3335

face and the face of the gears, as shown in Figure 37. The maximum allowable clearance is .003 inch.

NOTE

In the event that either the pinion or the gear is to be replaced, due to wear or damage, a matched set (pinion and gear) must be installed as a unit. This is necessary in order to maintain the oil pressure and the oil flow in the Torque Converter at the designed values.

(6) Install the regulator valve into the regulator valve body, rotating the valve while installing. This is done to insure a free snug fit. Should the regulator valve snag in the valve passage, remove the valve. Inspect the regulator valve body for burrs, dirt or wear. If there is no damage to the regulator valve body, or the valve, reinstall the valve in the regulator valve body.

(7) **DO NOT USE FORCE WHEN REASSEMBLING THE REGULATOR VALVE INTO THE VALVE BODY.** Damage to the oil passageway in the diecast valve regulator body, will render the unit useless and cause great damage to the Torque Converter, if installed incorrectly.

(8) Install a guide pin or stud in the hole in the front of the Converter Housing, to coincide with the Oil Pump Housing screw Number One, as shown in Figure 27.

(9) Install the regulator assembly, so that its open end (with all the channeling) is fac-

ing into the Converter Housing, and that the unit is aligned with the screw hole Number One of the Oil Pump Housing.

(10) Install the Oil Pump Assembly, over the reaction shaft into the Converter Housing, using the guide pin in Hole Number One to insure proper assembly. Using a suitable tool press the assembly until it is firmly seated in the Housing.

(11) Install and lock the reaction shaft ring seal on the Oil Pump drive sleeve.

(12) Install the Oil Pump drive sleeve over the reaction shaft and engage with the Oil Pump pinion and gear. Rotate the assembly for freedom of operation.

(13) Install screw Number two, the short screw only will fit into this hole. Tighten to 18 foot-pounds torque.

(14) Install the balance of the screws except screw Number one. Tighten them to 18 foot-pounds torque. Remove the guide pin. Install the screw Number one and tighten to 18 foot-pounds torque. Rotate the assembly for freedom of operation.

(15) Install the regulator valve body retainer into the right side of the Converter Housing and tighten.

(16) Assemble the regulator valve spring gasket, the regulator valve spring over the spring retainer. Install the assembly into the right side of the Converter Housing and tighten.

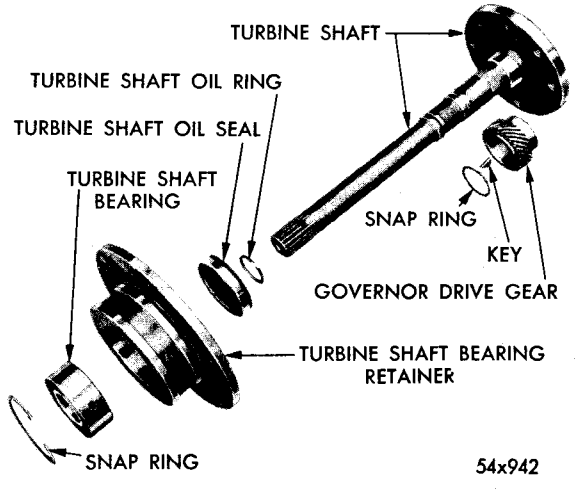

Fig. 38—Turbine Shaft Assembly (Disassembled View)

30. TURBINE SHAFT ASSEMBLY INSTALLATION (Fig. 38)

(1) Using Tool C-3125, press fit the Turbine Shaft oil seal into the rear of the bearing retainer.

(2) Press fit the Turbine Shaft bearing into the front of the retainer, and install the snap ring into the front retainer recess, over the Turbine Shaft bearing.

(3) Install the Governor drive gear over the Turbine Shaft with the gear end toward the front, (if so equipped). Align the gear keyway, with the key (Woodruff key) in the Turbine Shaft at the same time. Install the snap on the Turbine Shaft over the Governor drive gear.

(4) Press fit the Turbine shaft through the Turbine Shaft bearing, until the shaft is properly seated against the bearing race.

(5) Install and lock the Turbine Shaft oil ring on the Turbine Shaft. The Turbine Shaft Assembly, is now ready for installation into the Converter Housing.

31. REMOVING THE STARTER RING GEAR

(1) Remove the Torque Converter Housing from the engine.

(2) Remove the "Donut" from the crankshaft.

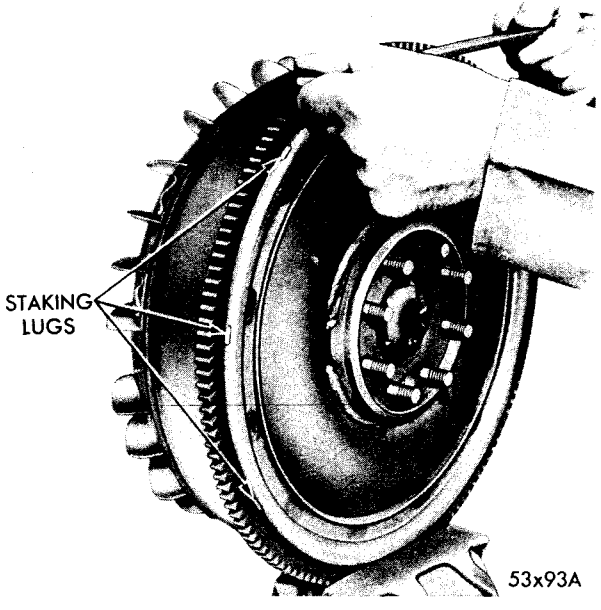

Fig. 39—Removal of Staking Lugs from Torque Converter

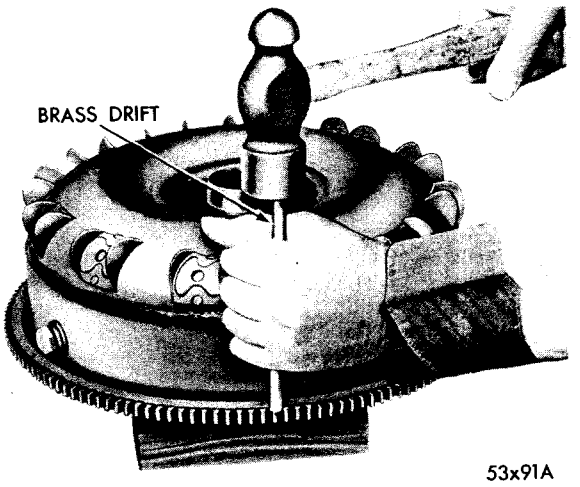

Fig. 40—Removal of Starter Ring Gear

(3) Support the Torque Converter "Donut" in a vise, being careful not to tighten the vise too tightly, as to avoid distortion.

(4) Remove the staking lugs, with a file, as shown in Figure 39.

(5) After filing off the lugs, remove the "donut" from the vise and place it on blocks of wood for support while removing the ring gear.

(6) Using a blunt drift, as shown in Figure 40, tap around the gear until the ring gear comes off the "donut."

(7) Remove the burrs or raised spots on the surface of the "donut" with a file. Do not remove more metal than is required, as the "donut" is a welded unit, and cannot be serviced except as an assembly.

32. INSTALLATION

(1) Heat the starter ring gear for installation to the "donut" as follows:

(2) Using a medium size tip, direct a slow flame around the inner rim of the ring gear. **DO NOT DIRECT THE FLAME ONTO THE TEETH OF THE RING GEAR.** Place a few drops of water on the face of the gear at short intervals during the heating process. When the gear is hot enough to cause the water to boil, installation of the gear can be made on the "donut."

(3) Place the ring gear over the flange of the "donut" so that the rear face of the gear contacts the flange of the "donut" evenly, around the entire diameter.

(4) Three methods are recommended for welding the ring gear to the "donut" which are as follows:

a. Using a welding current of 200 amps.
b. Using a D.C. Welder that is set to a straight polarity or an A.C. Welder.

c. Using a $\frac{5}{32}$ inch diameter, Fleet Weld Number 47, or, a $\frac{5}{32}$ inch diameter General Electric Number W28 or their equivalent.

(5) Reweld the ring gear to the "donut," using extreme care to place as nearly as possible, the same amount of metal in exactly the same location as the original assembly. This is necessary, in order to maintain the proper balance of the assembly. Place the welds alternately on opposite sides of the "donut" to minimize distortion.

CAUTION

To prevent burning through the "donut," the arc should be directed at the intersection of the ring gear and the "donut" from an angle of approximately 45 degrees, from the face of the gear. DO NOT GAS WELD. SUCH A PROCEDURE WOULD RUIN THE ASSEMBLY.

(6) Before installing the "donut" on the crankshaft, inspect all the ring gear teeth, remove all nicks where metal was raised, welding splatter, etc., as they will cause noisy starter operation.

SERVICE DIAGNOSIS

33. OIL LEAKING AT FRONT-END OF TORQUE CONVERTER HOUSING (Engine Side)

Possible Causes

a. Worn or damaged impeller hub seal.

b. Worn oil pump drive sleeve ring seal.

c. Loose oil pump housing screws or washers.

d. Worn oil pump housing bushing.

e. Worn oil pump housing seal.

f. Excessive converter hub runout.

Remedies

a. Inspect impeller hub seal for wear or damage, and replace as necessary.

b. Inspect the oil pump drive sleeve ring seal for wear or damage, and replace as necessary. If the seal is removed from the sleeve, replace with a new one.

c. Check the oil pump housing screws for looseness. If necessary, tighten to 18 foot-pounds torque.

d. Inspect the oil pump housing bushing, for wear or damage. If damaged or worn excessively, replace the oil pump bushing. Check the oil pump gear and pinion for clearance. Replace if necessary.

e. Check the oil pump housing seal for damage. If the oil pump housing is removed from the Converter Housing, replace the O-ring seal.

f. Check the Converter Hub with a dial indicator for the runout. Refer to Paragraph 18 for the service procedure.

34. OIL LEAKAGE AT REAR-END OF TORQUE CONVERTER HOUSING

Possible Causes

a. Worn or damaged Turbine Shaft oil seal.

b. Worn or damaged retainer to housing oil seal. (O-ring).

c. Worn or damaged Turbine Shaft oil ring.

d. Loose retainer screws.

e. Loose rear gallery plugs.

f. Loose oil pan drain plugs.

g. Loose reaction shaft screws.

h. Porosity in the casting.

Remedies

a. Inspect the Turbine Shaft oil seal for wear or damage, and replace as necessary.

NOTE

If the Torque Converter has been in operation for a period of time, a new oil seal must be installed.

b. Inspect the retainer to housing oil seal for wear or damage. Replace as required.

c. Inspect the Turbine Shaft oil ring wear or damage, and replace as necessary. If the seal was removed from the shaft, replace with a new one.

d. Check the retainer flange screws for looseness, and tighten if necessary.

e. Check the rear gallery plugs for looseness, and tighten if necessary.

f. Check the oil pan drain plugs for looseness.

g. Check the reaction shaft screws for looseness, tighten if necessary.

NOTE

This may be done as a check, if the Torque Converter is disassembled, however, it is recommended only as a last resort when the Torque Converter is assembled.

35. RESERVOIR OVERFILLED

Remedies

a. Inspect the oil pressure control valve for proper operation.

b. If the oil pressure control valve is not operating properly, replace the valve. If necessary, the valve body should also be replaced.

c. If the valve spring is weak, it should be replaced.