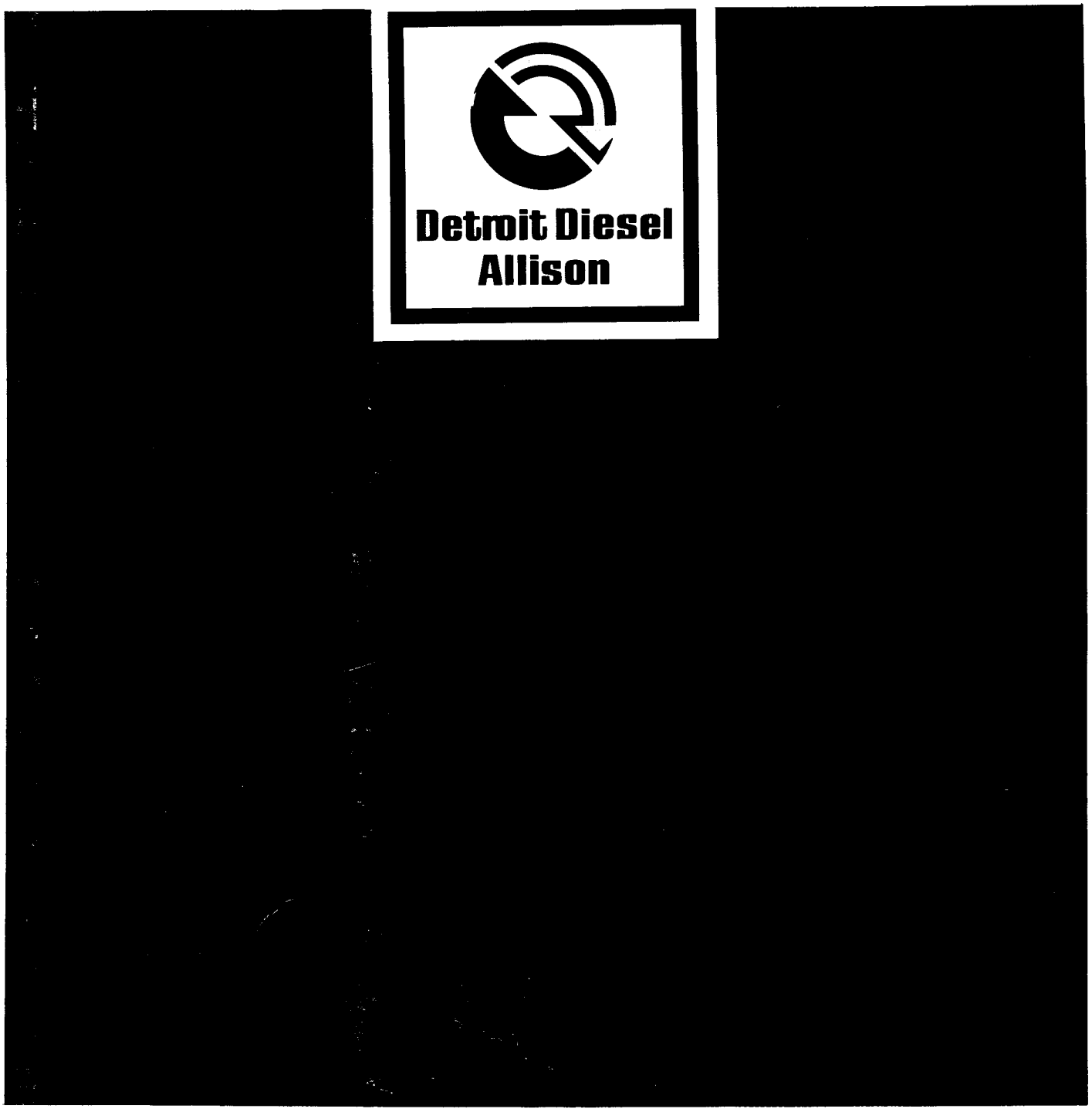
Allison Torqmatic Converters

200, 300 Series Service Manual



IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all motor vehicles. The service procedures recommended by Detroit Diesel Allison and described in this service manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that some warnings against the use of specific service methods that can damage the vehicle or render it unsafe are stated in this service manual. It is also important to understand these warnings are not exhaustive. Detroit Diesel Allison could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Detroit Diesel Allison has not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by Detroit Diesel Allison must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service method he selects.

SA1099D

Service Manual

Allison Torqmatic Converters

MODELS

TC 200, 300; TCO 200, 300
TCA 200, 300: TCOA 200, 300
TCORD 300; TCRD 200, 300

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Detroit Diesel Allison
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FOLDOUTS (back of book)

Cross-Section Views

Exploded Views

Section 1. GENERAL INFORMATION

1-1. SCOPE OF MANUAL

a. Coverage. This service manual covers the TC 200 and TC 300 series Torqmatic converters, figures 1-1 through 1-5. Several options are available with each model, figure 1-6 through 1-8.

b. Arrangement

(1) Eight sections. Eight sections make up the text of the manual. Each paragraph, page and illustration number is prefixed with the applicable section number.

(2) Section content. Section 1 contains general information, and specifications and data. Section 2 describes the transmission components and explains their operation. Section 3 outlines preventive maintenance procedure and contains a troublehooting chart. Section 4 is general information needed for overhaul. Section 5 covers disassembly of the converter into subassemblies. Section 6 covers rebuild of subassemblies. Section 7 covers assembly of converters from subassemblies. Section 8 covers wear limits and spring specifications.

(3) Foldout illustrations. The foldout illustrations at the back of the manual include cross-section views of the converter, and exploded views which show all parts in assembly relation.

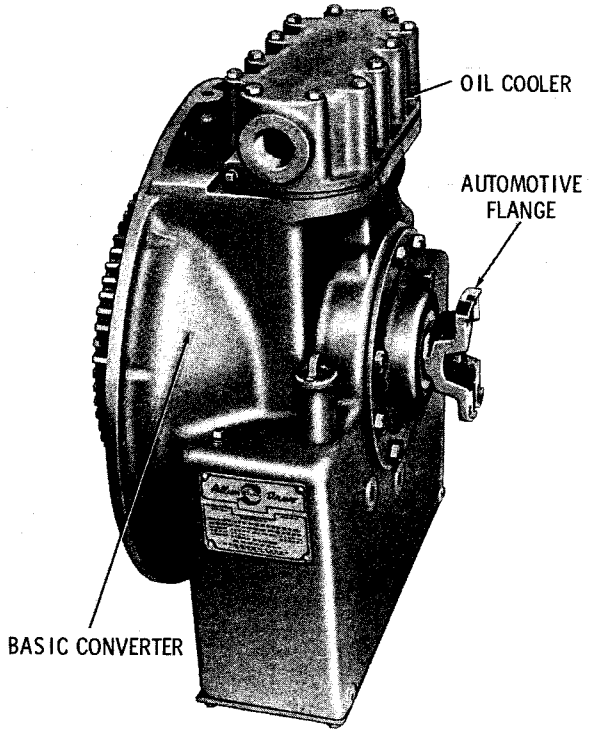

Fig. 1-1. Model TC 244 converter with oil cooler, automotive flange options—left-rear view

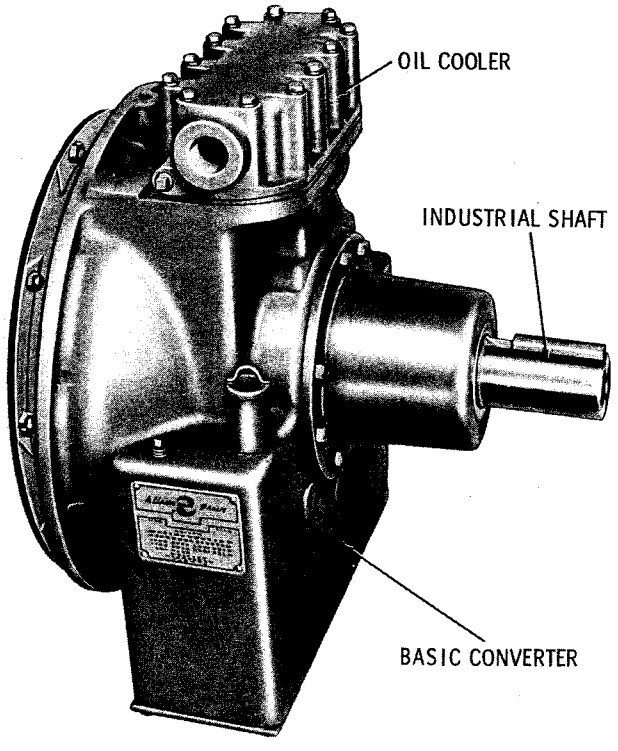

Fig. 1-2. Model TC 375 converter with oil cooler, industrial shaft options—left-rear view

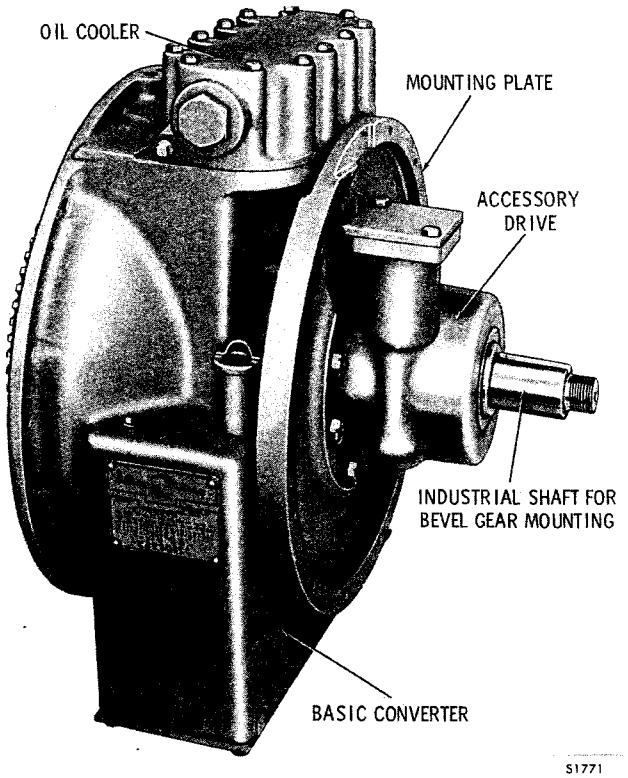

Fig. 1-3. Model TCA 248 converter with oil cooler, accessory drive, industrial shaft, mounting plate options—left-rear view

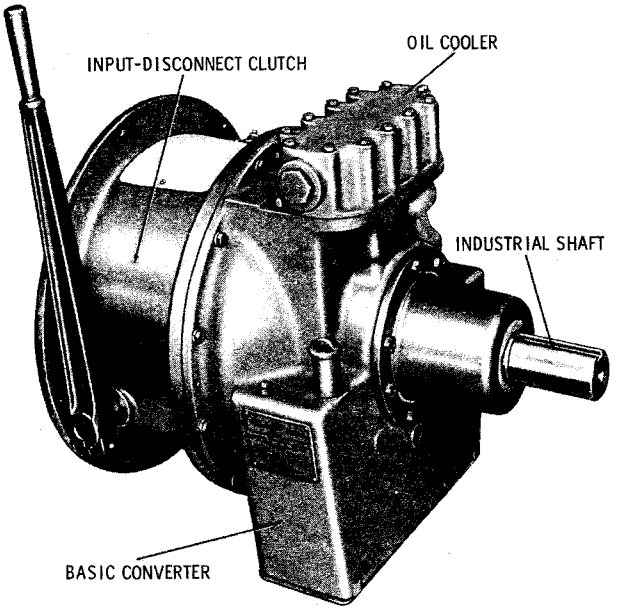

Fig. 1-4. Model TCD 375 converter with oil cooler, industrial shaft, input disconnect clutch options—left-rear view

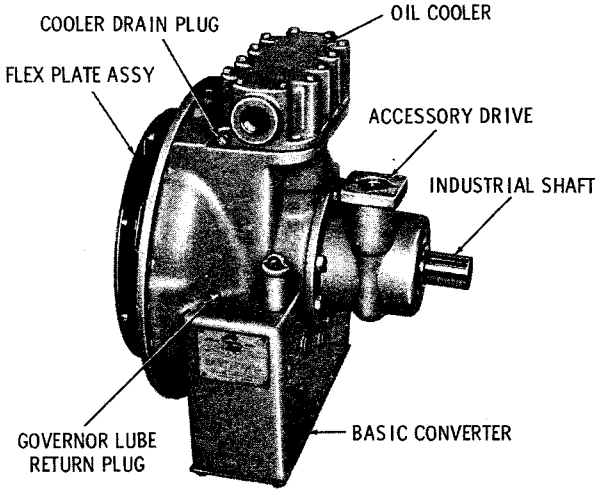

Fig. 1-5. Model TCA 258 converter with oil cooler, industrial shaft, accessory drive options—left-rear view

1-2. SUPPLEMENTARY INFORMATION

When new models and/or assemblies are introduced which have features not covered in this service manual, supplementary information will be issued. Contact your dealer or distributor for the latest service information. Such inquiries should include model number, part number and serial number taken from the nameplate. (Refer to para 1-3 and 1-4, below.)

1-3. MODEL DESIGNATION

a. Nameplate. The converter configuration is identified by letters and figures on the nameplate (fig. 1-9). These consist of a model number, a serial number, and a converter assembly part number, all of which appear on the nameplate. The serial number and the assembly part number indicate the specific converter and the options not covered in the model number.

b. Use Numbers in Correspondence. It is important that the model number, serial number, and assembly part number be referred to when seeking service information or when ordering parts (para 1-4, below).

c. Letters, Numbers Explained. The model designation chart, below, explains the letters and numbers used to identify the TC 200 and TC 300 series Torqmatic converters.

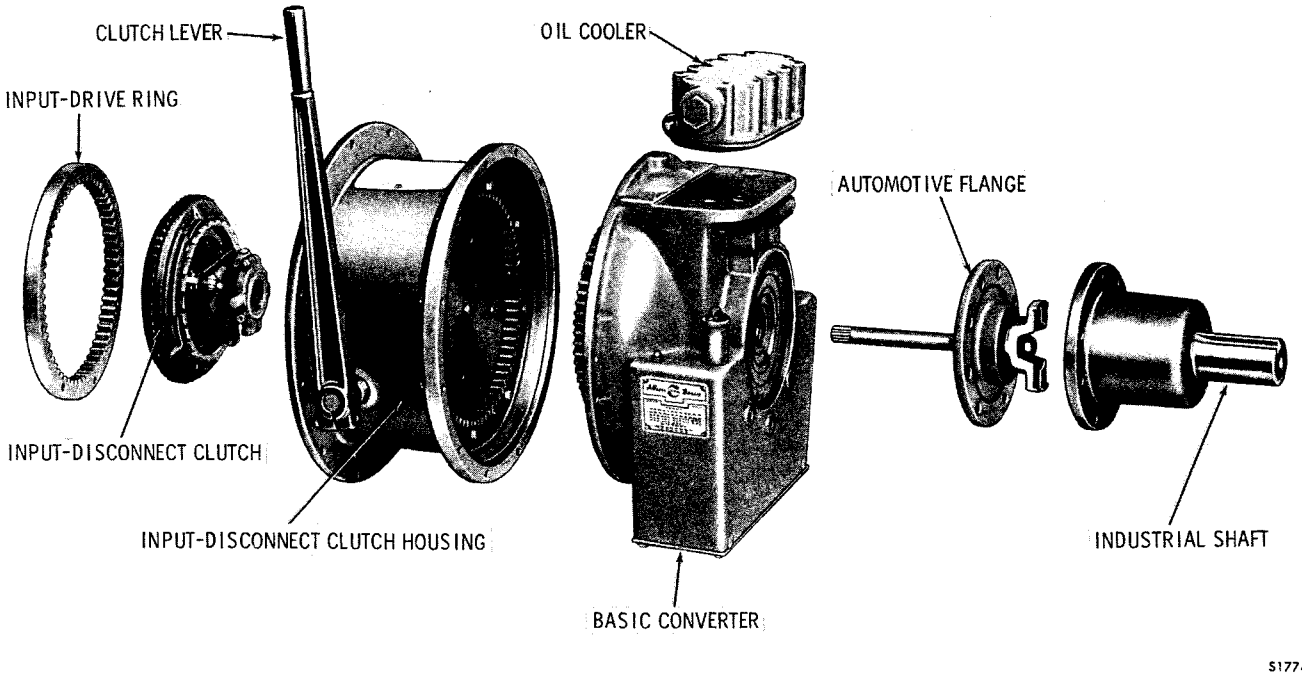

Fig. 1-6. Basic TC 200, 300 converter, with major available options

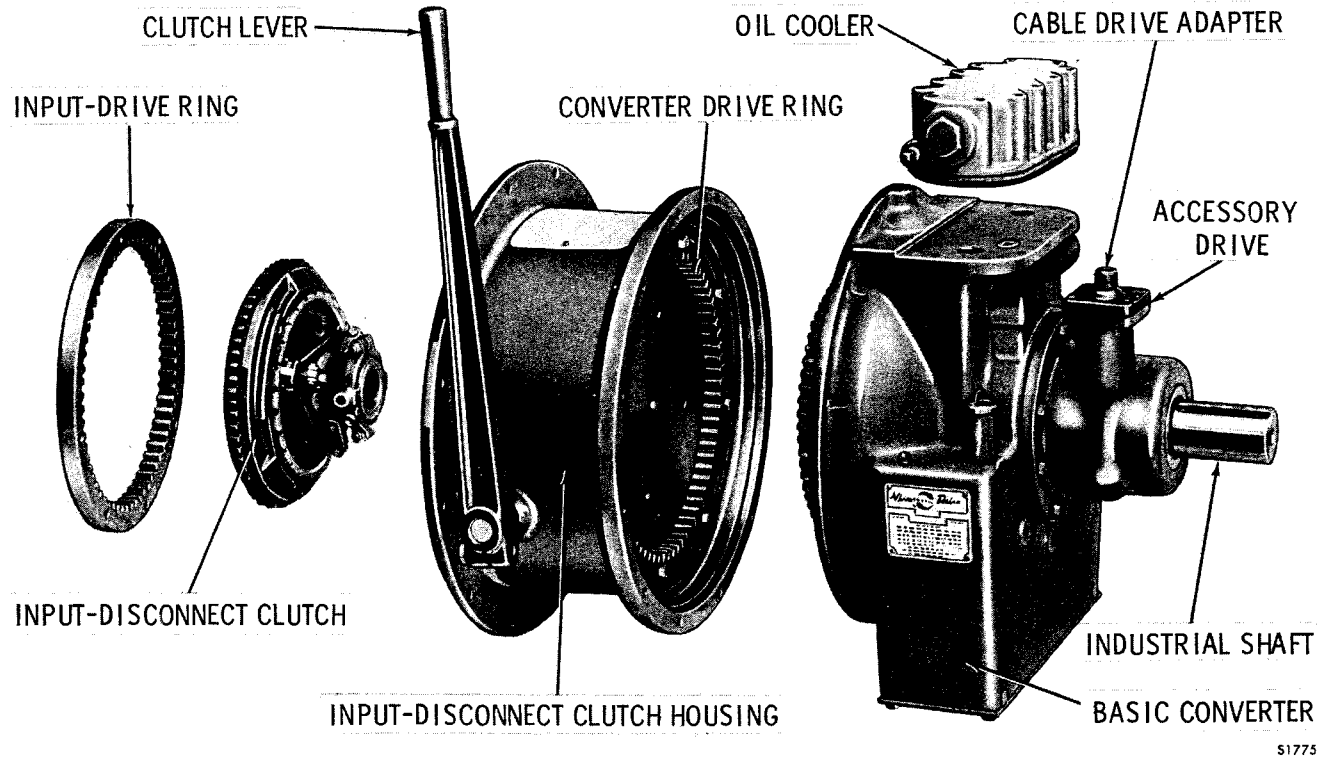

Fig. 1-7. Basic TCA 200, 300 converter, with major available options

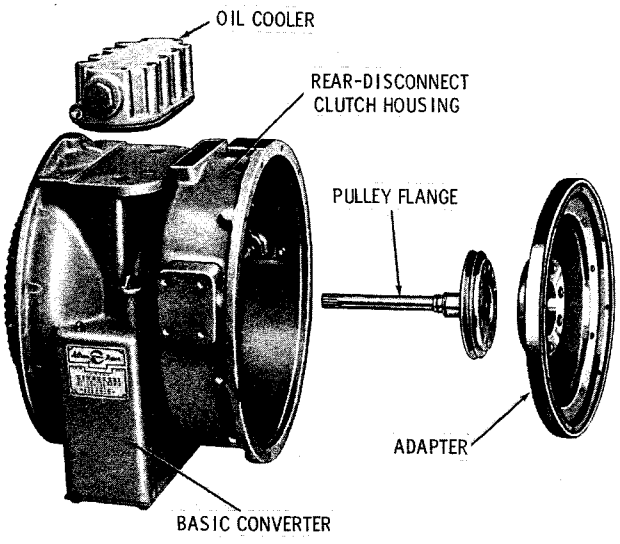

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Fig. 1-8. Basic TCRD 200, 300 converter, with major available options

MODEL DESIGNATION CHART
(TC 200, TC 300 Series)

Letters in Model Number

TC – Torque converter
A – Accessory drive
O – Over-running clutch
RD – Rear disconnect clutch

NOTE

TC is part of the model number for every converter assembly. The remainder of the letters (as applicable) follow TC.

Digits in Model Number

First digit (2 or 3) – TC 200 or TC 300 Series respectively
Second digit (2, 3, 4, 5 or 7) – Torque absorption capacity
Third digit (4 through 9):
- 4 – Automotive output flange
- 5 – Industrial shaft, standard bearings
- 6 – SAE 3, rear disconnect clutch housing
- 7 – Industrial shaft, extra-duty bearings
- 8 – Industrial shaft, bevel pinion mounting
- 9 – SAE 2, rear disconnect clutch housing

Last three digits (preceded by a hyphen, and following the first three digits) – Refer to the current issue of Parts Catalog SA 1039

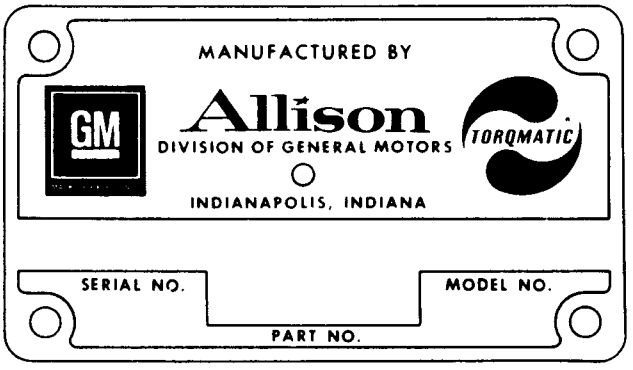

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Fig. 1-9. Converter nameplate

1-4. ORDERING PARTS

All replacement parts should be ordered from your transmission dealer. The current issue of Parts Catalog SA 1039 lists replacement parts, service kits and subassemblies. Furnish complete nameplate information with each order (para 1-3, above). Refer to paragraph 4-5.

1-5. DESIGN FEATURES AND OPTIONS

a. Compact Design

(1) The torque converter occupies little more space than the conventional power take-off and is available with several optional outputs. The charging oil pump is mounted inside the torque converter housing. The oil system is contained entirely within the converter assembly.

(2) Versatility of installation is possible through the use of optional accessories. Figures 1-1 through 1-8 illustrate some of these options.

b. Horsepower Range. The TC 200 and TC 300 series Torqmatic converters are designed for operation in the 40 to 170 horsepower range. The various torque absorption capacities are determined by the vane angles of the stator (or stators) and the converter pump.

c. Type Converter. The TC 200 and TC 300 series torque converters employ the rotating housing principle. The TC 200 and TC 300 series are single stage, polyphase. The earlier model TC 300 series has four elements: pump, two stators and turbine. The later model TC 300 series and all TC 200 converters have three elements: pump, stator and turbine. Refer to Section 2 for a complete description and explanation of the operation of the torque converter. Refer to paragraph 1-7 for specifications of the various models.

d. Torque Multiplier and Fluid Coupling. The Allison Torqmatic converter combines all the desirable characteristics of a hydraulic torque multiplier and a fluid coupling, and transmits engine power to automotive or stationary equipment. The Torqmatic converter automatically adjusts output torque to load demand, and permits the engine to operate within its most effective power range.

e. Manual Overcenter Input Disconnect Clutch. Provisions have been made for an input disconnect clutch for applications requiring complete isolation of engine power from the converter. The overcenter input disconnect clutch is a dry-type, single-plate clutch and is manually operated. The clutch can be serviced independently of the converter or the engine (fig. 1-6 and 1-7). The clutch is not available with the TC 250 or TC 300 equipped with a flex plate drive.

f. Input Drive Ring. This type of input drive is currently available for the TC 300 series converters only. This drive configuration eliminates drive noise and extends service life of the drive components. Refer to items 1, 2 and 3 (A, foldout 5).

NOTE

A form of this input drive was used on earlier TC 200 series units. Also it is used on TC 200 series converters equipped with an input disconnect clutch.

g. Flex Plate Drive. A flex plate drive assembly, consisting of four flex plates, is standard equipment on all TC 250 series converters (items 1 through 10 in A, foldout 4) and optional on the TC 300 Series (items 55 through 58 in A, foldout 6). This type of input drive incorporates a nose pilot which aids in holding drive alinement and provides a quiet and durable drive. This proven drive configuration compensates for minor angular misalinement.

h. Over-running Clutch. The over-running clutch facilitates safe lowering of crane loads, utilizing full engine braking. Clutch 9 (B, foldout 3) is a sprag-type clutch, located between converter gear and cover assembly 8, and the hub of converter turbine assembly 10. This feature prevents the turbine speed (output) from over-running the speed of the converter pump (input) or engine speed. The clutch is not available with the TC 250 or flex plate drive TC 300 converters.

i. Oil Cooler. A direct-mount oil cooler option is available. It mounts on a pad on the top of the converter housing. Engine water is circulated around a core through which the hot oil is flowing, thus cooling the oil (fig. 1-1).

j. Rear Disconnect Output. For installations requiring disconnect of the converter output shaft from the load, a clutch housing and adapter are provided. This type of clutch is needed for installations with a selective gear transmission requiring shifts while the vehicle or other mechanism is in motion. A V-belt pulley is attached to the turbine shaft so that a remote-mount governor may be used. The clutch housing is available in SAE 2- or SAE 3-size mounting face (fig. 1-8).

k. Accessory Drive. An accessory drive, operated by the converter output shaft (industrial shafts only) is available with the TC 200 and the TC 300. This drive may be adapted to a cable drive for an engine-mount governor (fig. 1-7).

l. Chain Coupling Output. A 46-tooth coupling (item 45 in A, foldout 8) for use with a No. 66 (dual-row) chain is available with the TC 200 and TC 300. The coupling is attached to the turbine shaft in the same manner as the automotive-type output flange.

1-6. TORQMATIC DRIVE ADVANTAGES

The Torqmatic converter permits the engine to operate within its most effective power range. It protects the engine from damaging shock loads and harmful engine lugging and stalling, thereby increasing the life of the engine and the equipment. Because torque is multiplied hydraulically and automatically, engine power is matched to the load more efficiently.

1-7. SPECIFICATIONS AND DATA

The specifications and data which follow apply to all TC 200 and TC 300 series Torqmatic converters.

SPECIFICATIONS, DATA
TC 200 and TC 300 Series

	Model 240	Model 250	Model 320	Model 330	Model 350	Model 370
Max input speed — rpm	3000	3000	3000	3000	3000	3000
Max input torque — lb ft	200	200	270	270	270	350
Max torque multiplication ratio	1.92	2.05	3.50	2.48	3.42	2.60*
Charging oil pump capacity at 1800 rpm — gpm	4.5	4.5	12	12	12	12
Converter-out pressure at full-throttle stall — psi	15-30	15-30	25-35	25-35	25-35	25-35
Converter-out pressure at full-throttle no load — psi (max)	60	60	60	60	60	60
Converter oil temp (max)	250°F	250°F	250°F	250°F	250°F	250°F
Oil capacity — qt (approx)	10	10	10	10	10	10
Converter elements	Pump, turbine, stator	Pump, turbine, stator	Pump, turbine, 1st stator, 2nd stator	Pump, turbine, 1st stator, 2nd stator	Pump, turbine, stator	Pump, turbine, stator
Output shafts (all models)	Automotive, industrial, rear disconnect	Automotive, industrial, rear disconnect	Automotive, industrial, rear disconnect	Automotive, industrial, rear disconnect	Automotive, industrial, rear disconnect	Automotive, industrial, rear disconnect
Flywheel housing size	SAE 3	SAE 3	SAE 3	SAE 3	SAE 3	SAE 3
Rotation (all models)	Designed for right engine rotation					
Oil type: above -10°F below -10°F	Hydraulic transmission fluid type C 2 (all models) Hydraulic transmission fluid type C 2 (all models) (preheated to raise temperature in sump)					
Dry weight (depending on model)	TC 200 series — 170 to 270 lb TC 300 series — 202 to 302 lb					

*Earlier model — 2.50

Section 2. DESCRIPTION AND OPERATION

2-1. SCOPE OF SECTION 2

This section describes and explains the operation of both the TC 200 and TC 300, three- and four-element, Torqmatic converters. The hydraulic components and their functions are also described and explained.

2-2. TORQMATIC CONVERTER CONSTRUCTION

a. Converter Elements. All TC 300 Torqmatic converters include three main elements — the pump, turbine and stator (fig. 2-1). Earlier models of the TC 300 contained four elements — pump, turbine, first stator and second stator (fig. 2-2). Refer to paragraph 2-3 for functional differences.

(1) The converter pump is the input member of the torque converter assembly and is connected to the engine. The vanes of the pump direct the oil against the vanes of the turbine.

(2) Since the turbine is splined to the converter output shaft, the impact of the oil from the pump drives the turbine, transmitting torque to the output shaft.

(3) The freewheeling stator is the reaction member necessary for torque multiplication. The stators are so designed that they can lock up to provide the necessary reaction for torque multiplication, or, they can freewheel as the demand for torque multiplication decreases.

(4) Earlier TC 200, and all TC 300 model converter elements are constructed so that they may be disassembled. Later TC 200 converters are of welded, unit construction and cannot be disassembled.

b. Converter Charging Oil Pump. This pump is mounted inside the torque converter housing and is driven by the hub of the converter pump. It is an internal, external gear-type pump. It operates at engine speed and supplies oil pressure to charge the converter, and to cool and lubricate the moving parts.

c. Pressure Regulating Valve. A relief valve, integral with the converter housing, controls the converter charging pressure during cold starts. This ball-type valve exhausts excess charging pressure to the sump, thus preventing damage to the converter assembly during starts at low ambient temperatures.

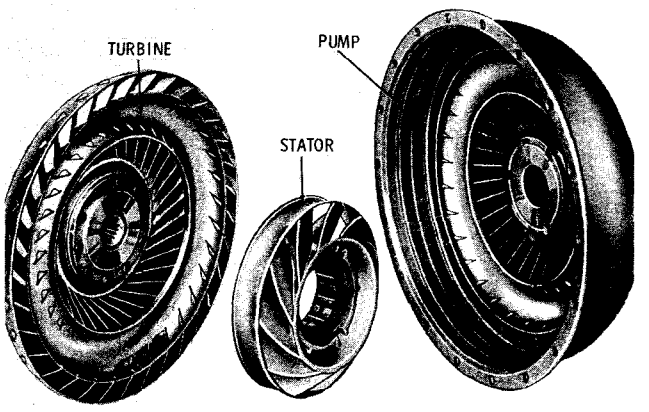

Fig. 2-1. Three-element Torqmatic converter

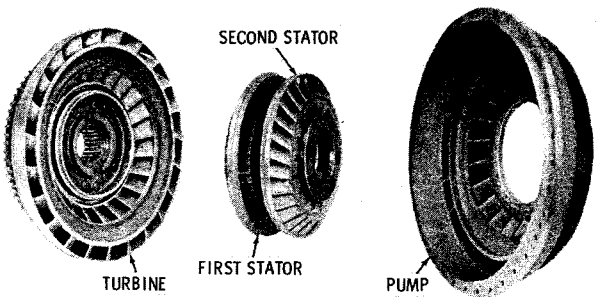

Fig. 2-2. Four-element Torqmatic converter

d. Oil Flow to, from Converter

(1) Oil from the sump flows through the internal passages in the converter housing and into the charging oil pump. It then flows through the ground sleeve and enters the converter elements between the stator and the converter pump.

(2) The oil flows through the converter pump and turbine, then out between the turbine and stator, inside the ground sleeve along the turbine shaft, then out through a passageway in the converter housing to the cooler. After going through the cooler, the oil is returned to sump.

2-3. HOW TORQUE CONVERTER WORKS

a. Operation Principle. Whether the 3-element converter (fig. 2-1) or the 4-element converter (fig. 2-2) is discussed, the principle of operation is the same. However, to have the complete story, the 4-element converter will be discussed.

b. First-Converter Phase

(1) In the 4-element, single-stage converter, first-converter phase means both stators are held stationary (locked up) by the cams and rollers. As a result, torque multiplication between input and output is taking place.

(2) Since the stators are locked up, the oil leaving the turbine is redirected by the stators so that it enters the pump in the same direction it is turning. This redirected flow aids the pump, and multiples torque.

c. Second-Converter Phase

(1) In the 4-element converter, second-converter phase means that the first stator is freewheeling, while the second stator remains locked to the ground sleeve. The first stator starts to freewheel as demand for output torque becomes less.

(2) As turbine speed increases, the oil leaving the turbine strikes the vanes of the first stator in such a manner that it is no longer stationary, but starts to freewheel in the direction of the turbine. Torque multiplication decreases as turbine speed increases. Since the TC 200, and later TC 300 series do not have a second stator, they do not go through a second-converter phase.

d. Fluid Coupling

(1) The torque converter goes into fluid coupling when, with the first stator already freewheeling, the second stator starts to freewheel. This means that the turbine speed is approaching pump speed; input torque and output torque are approaching a 1:1 ratio. As turbine speed increases, oil leaving the turbine strikes the vanes of the second stator in such a manner that the stator unlocks and starts to freewheel. Since the oil flow has practically stopped, the second stator freewheels with the first stator. In this phase, the converter operates as a fluid coupling.

(2) But just as soon as the turbine slows down (due to increased load at the output), torque output is automatically adjusted to load demand. First one stator (second), then the other (first), locks up, and torque multiplication increases.

2-4. OPTIONS

Refer to paragraph 1-5 for description and operation of optional components.

Section 3. PREVENTIVE MAINTENANCE

3-1. SCOPE OF SECTION 3

a. This section outlines the routine and periodic procedures necessary to maintain the Torqmatic converter. Inspection, cleaning, care of the oil system, lubrication, adjustments and operating tests are covered.

b. Oil pressure and temperature checks are outlined. Instruction for stall testing are given. Checks and inspection of the driveline are covered.

c. Storage instructions, vehicle towing information, and troubleshooting information are provided.

3-2. PERIODIC INSPECTIONS, CLEANING

a. Regular Inspections. The exterior of the converter should be cleaned and inspected at regular intervals. The severity of service and operating environment will determine the frequency of such inspections. The converter should be checked for loose bolts, oil leaks, and damaged or loose oil lines.

b. Cleaning Breather. The breather (fig. 3-1) should be frequently inspected. If the breather is clogged, condensation will accumulate inside the converter, causing rapid oxidation and sludging of the oil. A clean breather is essential.

c. Water or Dirt in Oil. Because the hydraulic system is the power-transmitting and control medium of the Torqmatic converter, the oil that goes into it, and stays in it, must be kept clean. At each oil change, examine the oil that is drained for evidence of dirt or water. A normal amount of condensation will emulsify in the oil during operation of the converter. However, if there is evidence of water, check the cooler (heat exchanger) for leakage between the water and oil areas. Oil in the water side of the cooler (vehicle radiator) is another sign of leakage. However, this may indicate leakage of oil from the engine into the cooling system.

NOTE

When engine coolant containing ethylene glycol leaks into the converter oil system, immediate action must be taken to prevent malfunction and possible serious damage. The converter must be completely disassembled, inspected and cleaned. All traces of the coolant, and varnish deposits resulting from coolant contamination, must be be removed.

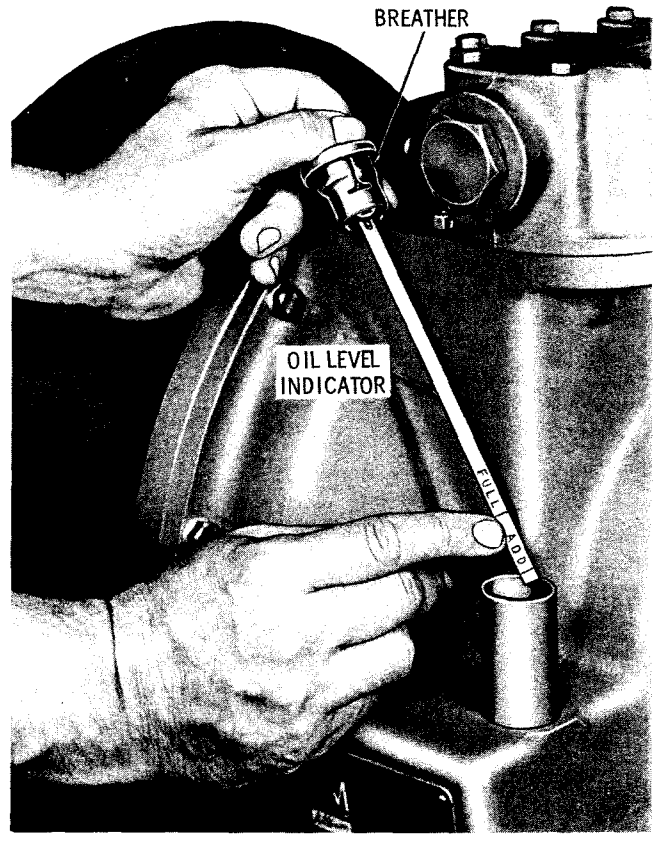

Fig. 3-1. Checking converter oil level

d. Metal Particles in Oil. Metal particles (except the usual minute particles trapped by the oil filter) may indicate a damaged part. When this condition exists, the torque converter, oil lines, filter, reservoir, strainer, cooler, valves, oil pump, and any other component associated with the hydraulic system must be completely disassembled and thoroughly cleaned.

3-3. CHECKING OIL LEVEL

a. Hot Check. The oil level must be checked while the converter is operating, engine at idle and the oil at operating temperature (180° to 200°F). If your converter is equipped with an input disconnect clutch, the clutch must be engaged. Withdraw the oil level indicator (fig. 3-1) and wipe it off, then insert it, making certain it is "bottomed." Pull it out and check the reading. If the oil is at, or below, the Add mark, add enough oil to bring the level to the Full mark. Do not overfill the converter, because too much oil will cause foaming and high oil temperature.

b. Cold Check. A cold check is necessary to insure that there is sufficient oil in the converter to show on the oil level indicator before starting the engine. If more oil is needed, do not fill above the Add mark. Otherwise, as the oil reaches operating temperature, it will expand, resulting in overfilling. The cold check should be followed by the hot check (a, above). It may be necessary, during the hot check, to add or drain some oil to bring the level to the Full mark.

3-4. CHANGING OIL, FILTERS

a. When to Change Oil. Oil should be changed every 1000 hours of operation, or oftener, depending upon the type of service or the condition of the oil. The oil should be changed whenever the oil shows traces of dirt or the effects of high temperature, evidenced by discoloration or strong odor. If the oil shows metal contamination, the converter should be drained and thoroughly cleaned. (Refer to para 3-2d, above, and b, below.)

b. How to Change Oil. Remove the oil drain plug from the lower-right corner of the front (fig. 5-1) of the torque converter housing and drain the oil. The oil should be warm when draining it from the converter. Remove the oil level indicator (fig. 3-1) and pour in enough oil to bring the level to the Add mark. Start the engine and operate the converter until the system is fully charged and the oil is at operating temperature. Then add or drain oil, as required, to bring the oil level to the Full mark. Refer to paragraph 3-3, above.

c. When to Change Filters. If an oil filter is used, it should be changed whenever the oil is changed.

3-5. OIL COOLER MAINTENANCE

The oil cooler will need only such maintenance as will be necessary for the engine cooling system. Occasional flushing will prevent sediment from settling in the water system of the cooler. Cleaning procedures similar to those used in cleaning the engine radiator are satisfactory for the cooler core. Refer to figure 3-2 for coolant system schematic.

WARNING

If it is necessary to drain the coolant system to prevent freezing (engine radiator, etc.), make sure to drain the coolant from the oil cooler. A plug is provided for this purpose (fig. 1-5). Failure to drain the cooler could result in damage due to freezing.

3-6. CHECKING OIL PRESSURE, TEMPERATURE

a. Checking Oil Pressure. With the converter output stalled and the engine at full throttle, the oil pressure should be 15 psi minimum to 30 psi maximum for the TC 200 series. For the TC 300 series, the pressure should be 25 psi minimum and 40 psi maximum. At full throttle, no load, the pressure should range from 0 to 60 psi maximum for both series. To check converter oil pressure, remove the plug from the upper-right opening just below the cooler mounting pad (fig. 5-1) and install a pressure gage.

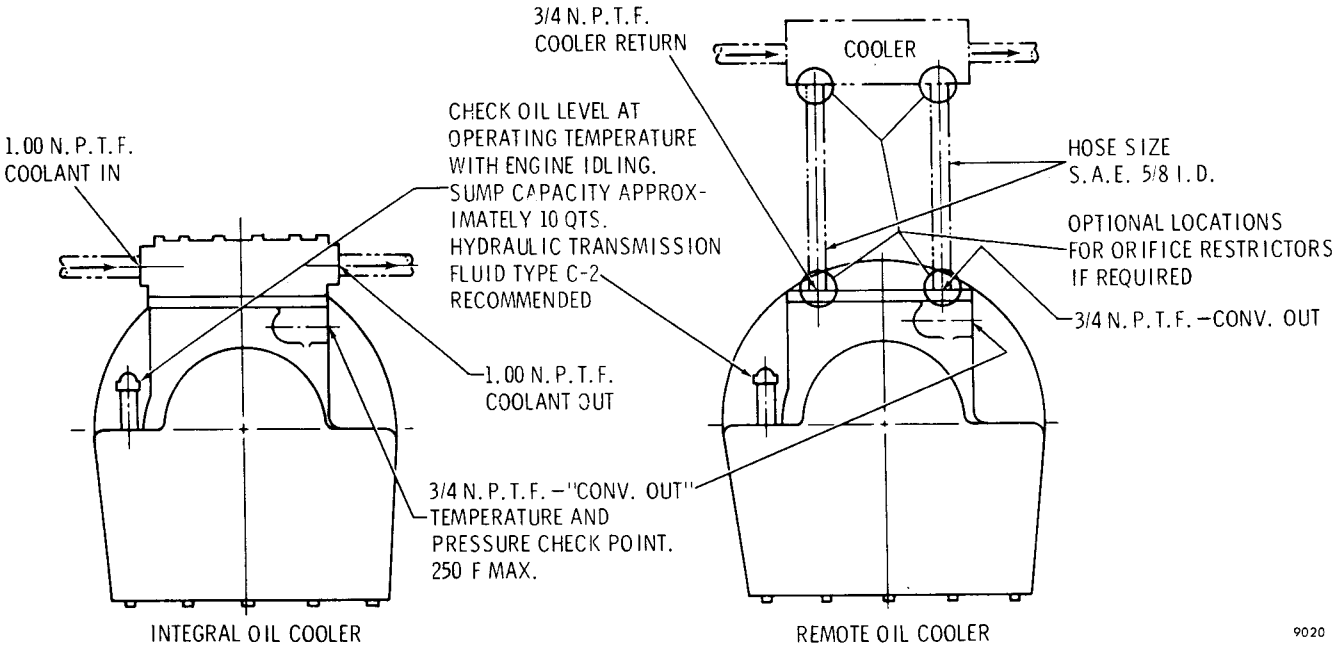

Fig. 3-2. Converter coolant system—schematic view

b. Temperature Check Point. The maximum converter-out oil temperature is 250°F. This reading can be taken at the oil pressure check point (fig. 5-1).

c. Locked Stators. A locked stator, or stators, can be checked by observing the temperature drop rate. Increase the converter-out temperature to 230°F by stalling the converter output shaft at full engine throttle. Then release the converter output shaft and immediately check the rate of temperature drop with no load on the converter and maximum input rpm. The temperature should start to drop after 15 seconds. A slow temperature drop rate probably indicates a locked stator or stators. A rapid temperature drop indicates normal stator operation.

3-7. MANUAL OVERCENTER INPUT DISCONNECT CLUTCH

a. Lubrication. Using a grease gun and high temperature grease, lubricate the clutch throwout bearing daily. This fitting is the one nearest the right side of the clutch housing (fig. 3-3). Lubricate the shaft bearing about every 60 hours of operation. This fitting is the one nearest the top of the clutch housing. Operating conditions may vary this time interval. Two "shots" of grease should be enough.

CAUTION

Overlubrication will cause grease to be thrown onto the clutch facing, causing the clutch either to slip or grab.

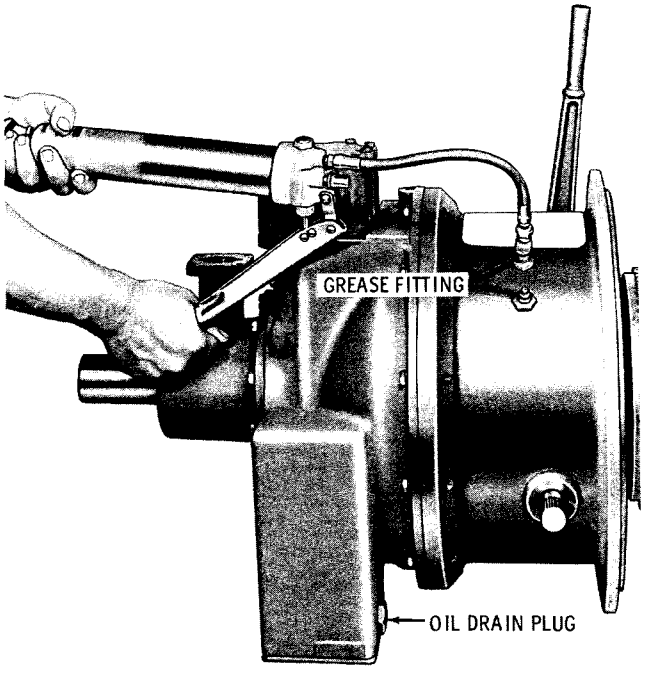

Fig. 3-3. Lubricating input disconnect clutch bearings

b. Adjustment

(1) It will be necessary to occasionally adjust the clutch in order to compensate for normal wear. Should the clutch slip, check the effort required to move the clutch lever. This can be done by attaching a spring scale to the apply lever at a point 16 inches from the center of the clutch shifter shaft. The engagement force should be from 40 to 45 pounds.

(2) If the scale reads less than 40 pounds, or more than 45 pounds, the clutch must be adjusted. Remove the cover plate from the housing. Remove the adjusting nut screw and lock (fig. 3-4). If the spring scale reads less than 40 pounds, use a spanner wrench or a hammer and drift to rotate the adjusting nut counterclockwise (standing at the rear of the clutch and facing the engine flywheel end). If the spring scale reads more than 45 pounds, turn the adjusting nut clockwise to reduce the pressure. Replace the adjusting lock and screw.

(3) If the clutch adjustment has been made and the clutch still slips, check the clutch facing and contact surfaces for grease. If grease is found, the entire clutch assembly will have to be removed and all parts thoroughly cleaned. Grease-soaked clutch facing must be replaced.

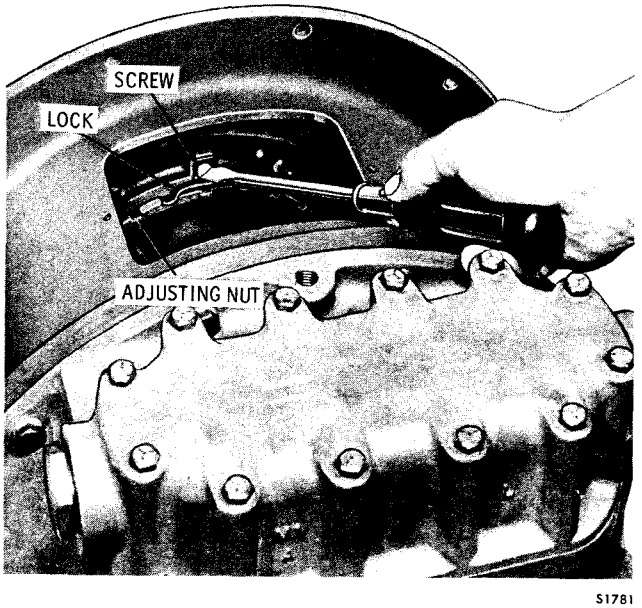

Fig. 3-4. Removing (or installing) clutch adjusting lock

3-8. CONVERTER STALL CHECK

a. Purpose. The stall check determines whether or not the engine and the Torqmatic converter are functioning satisfactorily as a unit. It will be necessary to refer to the engine-converter matched performance curve to determine the recommended engine speed at stall. This curve is available from your dealer or from Detroit Diesel Allison Division of General Motors.

b. Vehicle Installations

(1) Start the engine and allow it to warm up to operating temperature.

(2) Check the vehicle brakes to see that they are operating satisfactorily. Apply the brakes.

(3) Shift the transmission to high range and increase the engine speed to full throttle. Do not stall converter more than 30 seconds. Do not allow converter oil temperature to exceed 250°F.

(4) Record the engine speed. Compare the recorded engine speed at stall with the recommended engine speed at stall shown on the engine-converter match performance curve. This stall speed is for normal conditions and some variation should be expected.

NOTE

Because of the effects of ambient temperature, altitude, engine accessory loss variations, etc., on the power input to the converter, the actual engine stall speed may vary ± 150 rpm from the recommended stall speed. When the deviation can be attributed to the causes cited, the actual speed can be accepted as normal.

c. Stationary Installations. The only difference in procedure from that described in b, above, is that a method other than vehicle brake application must be used to hold the converter output shaft stationary.

3-9. PRESERVATION AND STORAGE

a. Preservative Selection. When converters are to be stored or remain inactive for extended periods of time, specific preservative methods are recommended to prevent rust and corrosion damage. The length of storage will usually determine the preservative method to be used and is described below.

b. Storage, New Units. New units contain preservative oil when shipped from Allison and can be safely stored for 6 weeks without further treatment.

c. Storage, Month to 6 Weeks

(1) The following procedures will prepare a converter for 1 month to 6 weeks storage, depending on the environment.

(2) Drain the oil as described in paragraph 3-4, above. Remove the converter oil filter element(s).

(3) Install the drain plugs and the new filter element(s).

(4) Fill the unit to operating level with any commercial preservative oil which meets US Military specifications MIL-L-21260, grade 1, to latest specifications.

(5) Operate the unit for at least 5 minutes at a minimum of 1000 rpm, then stall the converter to raise the oil temperature to 225°F.

CAUTION

Do not allow temperature to exceed 225°F. If the unit does not have a temperature gage, do not stall for more than 30 seconds.

(6) As soon as the unit is cool enough to touch, seal all openings and breathers with moistureproof tape.

(7) Coat all exposed, unpainted surfaces with a good grade of preservative grease, such as Petrolatum (MIL-C-11796) class 2.

(8) Repeat the above procedures — (5) through (7) — at monthly intervals for indefinite storage.

d. Storage, 1 Year — Without Oil

(1) Drain the oil as described in paragraph 3-4, above.

(2) Seal all openings and breathers with moistureproof tape.

(3) Coat all exposed, unpainted surfaces with a good grade of preservative grease.

(4) Atomize or spray 2 ounces of Motorstor* (or equivalent) into the converter through the oil drain plug.

(5) If additional storage time is required, (3) and (4) above should be repeated at yearly intervals.

e. Storage, 1 Year — With Oil

(1) Drain oil as described in paragraph 3-4, above. Remove converter oil filter(s).

(2) Install the drain plugs and the new filter element(s).

(3) Fill the converter to operating level with a mixture of 30 parts hydraulic transmission fluid, type C 2, and 1 part Motorstor preservative or equivalent.

(4) Operate the unit for approximately 5 minutes at a minimum of 1000 rpm, then stall the converter to raise the oil temperature to 225°F.

CAUTION

Do not allow temperature to exceed 225°F. If the unit does not have a temperature gage, do not stall for more than 30 seconds.

*Motorstor is a preservative additive manufactured by the Daubert Chemical Company, Chicago, Illinois. Motorstor (under the designation of "Nucle Oil") is covered by US Military Specifications MIL-L-46002 (ORD) and MIL-1-23310 (WEP).

(5) As soon as the unit is cool enough to touch, seal all openings and breathers with moistureproof tape.

(6) Coat all exposed, unpainted surfaces with a good grade of preservative grease.

(7) If additional storage time is required, (3) through (6) above should be repeated at yearly intervals, except it is not necessary to drain the converter each year; just add the Motorstor.

f. Restoring Units to Service

(1) If Motorstor or equivalent was used in preparing the converter for storage, use the following procedures to restore unit to service.

(2) Remove the tape from openings and breather.

(3) Wash off all the external grease with solvent.

(4) Fill unit with hydraulic transmission fluid, type C 2 to proper level.

NOTE

It is not necessary to drain the C 2 oil and Motorstor mixture from the converter.

(5) If Motorstor was not used in preparing the converter for storage, use the following procedures to restore the unit to service.

(6) Remove the tape from openings and breathers.

(7) Wash off all the external grease with solvent.

(8) Drain the oil as described in paragraph 3-4, above.

(9) Install a new oil filter element(s).

(10) Refill the converter with hydraulic transmission fluid, type C 2 to proper level.

3-10. TROUBLESHOOTING

The troubleshooting chart, below, will help you locate the source of trouble within the converter. It should be kept in mind that the Torqmatic converter is part of a power package, and, therefore, the whole package must be considered when locating the source of trouble.

TROUBLESHOOTING CHART

Cause	Remedy
(A) LOW CONVERTER CHARGING PRESSURE	
1. Low oil supply	1. Add oil (para 3-3)
2. Defective oil pump	2. Check for wear in oil pump; overhaul if necessary
(B) HIGH OIL TEMPERATURE	
1. Low oil level (low flow rate)	1. Add oil (para 3-3)
2. High oil level	2. Refer to para 3-3
3. Low water level in cooling system	3. Add water
4. Low converter charging pressure	4. Refer to A, above
5. Clogged or dirty heat exchanger	5. Clean or replace as necessary
6. Operating too long in an inefficient converter range	6. Readjust work cycle to allow converter operation in an efficient converter range

TROUBLESHOOTING CHART – Continued

Cause	Remedy
7. One or both stators locked	7. (a) Check for insufficient top speed of vehicle or other equipment (b) Refer to para 3-6c
8. Stator installed backwards	8. (a) Check for lack of power at converter stall; refer to para 3-8 (b) Disassemble converter and check stator
9. Stator(s) installed without rollers (low stall speed)	9. Disassemble converter and install rollers; refer to para 5-11 and 7-5

Ⓒ HIGH ENGINE SPEED AT CONVERTER STALL
(Refer to para 3-8 for further information on converter stall)

1. Low oil supply	1. Add oil (para 3-3)
2. Low converter charging pressure	2. Refer to A, above
3. High oil temperature	3. Refer to B, above

Ⓓ LOW ENGINE SPEED AT CONVERTER STALL
(Refer to para 3-8 for further information on converter stall)

1. Low engine output torque	1. Tune engine and check output
2. Converter element interference	2. Check for noise at stall; overhaul converter if interference is apparent
3. Stator installed backwards	3. (a) Check for lack of power at converter stall (para 3-8) (b) Disassemble converter and check stator; refer to paragraph 5-11 and 7-5
4. Stator(s) installed without rollers	4. Disassemble converter and install rollers; refer to paragraph 5-11 and 7-5

Ⓔ LOSS OF POWER

1. Stator installed backwards	1. (a) Check for lack of power at stall (para 3-8) (b) Disassemble converter and check stator; refer to paragraph 5-11 and 7-5
2. Stator(s) installed without rollers (low stall speed)	2. Disassemble converter and install rollers; refer to paragraph 5-11 and 7-5
3. Low converter charging pressure	3. Refer to A, above
4. Low engine speed, at converter stall	4. Refer to D, above

Section 4. GENERAL OVERHAUL INFORMATION

4-1. SCOPE OF SECTION 4

This section provides information required before proceeding with the overhaul of the torque converter. Tools and equipment for overhaul are discussed. Replacement parts and service kit information is provided. The importance of careful handling and cleanliness is stressed. Helpful information on cleaning and inspection is given. General information on the removal and installation of the converter assembly is included. Torque specifications for bolts and nuts are tabulated. Information on wear limits and spring specifications is referenced.

4-2. PROCEDURES SUBJECT TO CHANGE

The release of new assemblies and/or product improvements may require new or different procedures. Major changes will be covered in information supplementary to this manual. Therefore, always check with your dealer for the latest service information. Give model number, serial number and part number found on the nameplate (fig. 1-9).

4-3. REMOVAL, INSTALLATION OF CONVERTER ASSEMBLY

a. Vehicle-related Components. Refer to the vehicle service manual for removal and installation of all vehicle-related components that are associated with the converter assembly. Follow the vehicle manufacturer's instructions for removing and installing the converter assembly.

b. Input Drives

(1) Three types of input drives are used. Earlier TC 200 models use a dry ring gear drive. Later TC 200 models use a flex disk drive.

(2) A greased ring gear drive, or a flex disk drive, is used on TC 300 models. Application, and optional components, determine which drive is used.

(3) Remove the flex disk assembly or ring gear from the engine for inspection or parts replacement.

(4) Follow the installation and lubrication instructions in paragraph 7-12 for installing the greased ring gear onto the engine.

(5) Follow the vehicle manufacturer's recommendations when attaching the flex disk drive to the engine.

4-4. TOOLS AND EQUIPMENT

a. Equipment. Proper equipment should be available before overhaul is started — a suitable hoist, proper hand tools, receptacles for small parts, and a press. A disassembly-assembly table (fig. 4-1) and an overhaul stand (fig. 4-2) are helpful but not essential.

b. Special Tools. Only two special tools are essential for overhaul operation. The installation of the stator thrust bearing is critical and a special tool shown in figure 4-3 is required. The special tool shown in figure 4-4 is required to remove or install the snap-ring which retains the welded torque converter assembly (TC 250 Series).

4-5. REPLACEMENT PARTS

a. Ordering Information. Refer to paragraph 1-4 for the proper procedures when ordering parts.

b. New Parts Needed. Replace all gaskets, sealrings, and cotter pins. If the con-

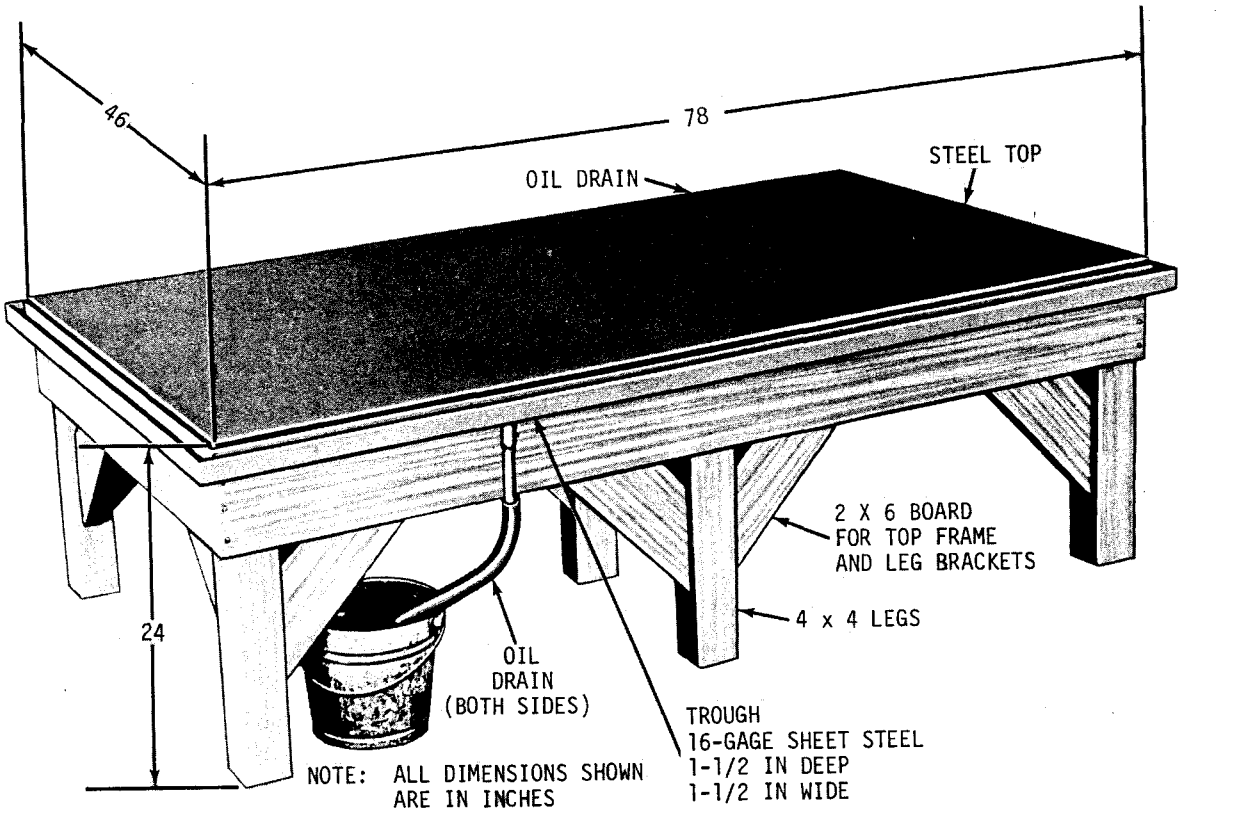

Fig. 4-1. Disassembly and assembly table

verter has been overheated, replace all springs. Handle rubber and metal sealrings with care to prevent damage.

c. Service Kits. For your convenience in ordering parts, use Allison Torqmatic Converter Service Kits. Service kits are listed in the 200-300 Series Parts Catalog (SA 1039 — current issue) or are available through your dealer. Order one part number and you will receive a complete kit, including seals, gaskets, and other frequently needed items.

4-6. CLEANING AND INSPECTION

a. Dirt Causes Malfunction. Whenever the converter contains dirt or other abrasive matter, unnecessary wear will result. Inspect all parts for abrasive material anytime the converter is disassembled. Metallic contamination of oil is evidence of the failure of some part in the converter. When metal particles are found, the converter and associated hydraulic system must be thoroughly cleaned. Refer to paragraph 3-2.

b. Cleaning Parts

(1) All metallic parts of the converter except bearings should be thoroughly cleaned with dry-cleaning solvent, mineral spirits, paint thinner, or by the steam-cleaning method.

(2) Parts should be dried with compressed air. Steam-cleaned parts should be oiled immediately after drying.

(3) Clean oil passages by working a piece of wire back and forth through the passages and flushing them with cleaning solvent or paint thinner. Dry the passages with compressed air.

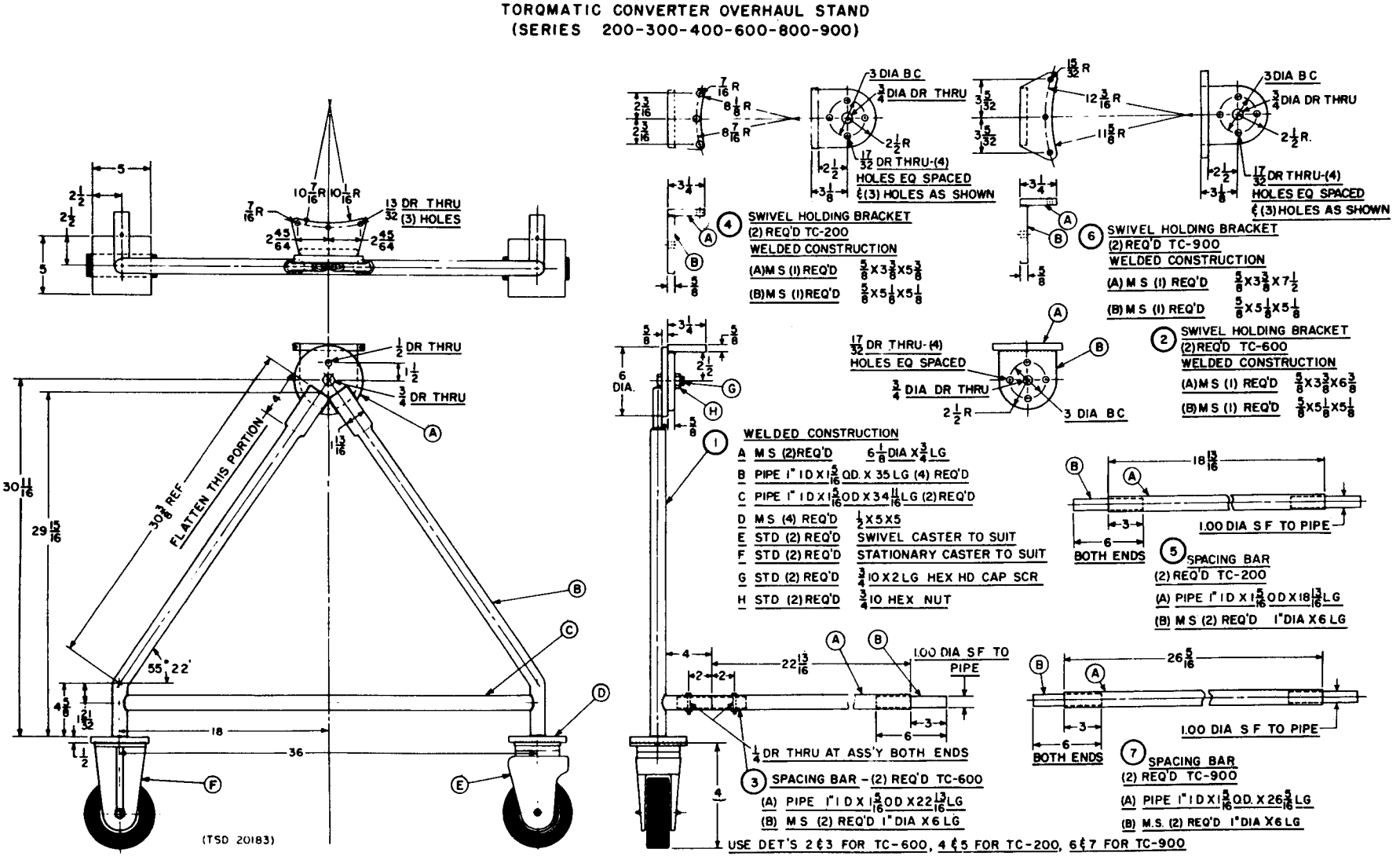

Fig. 4-2. Torqmatic converter overhaul stand

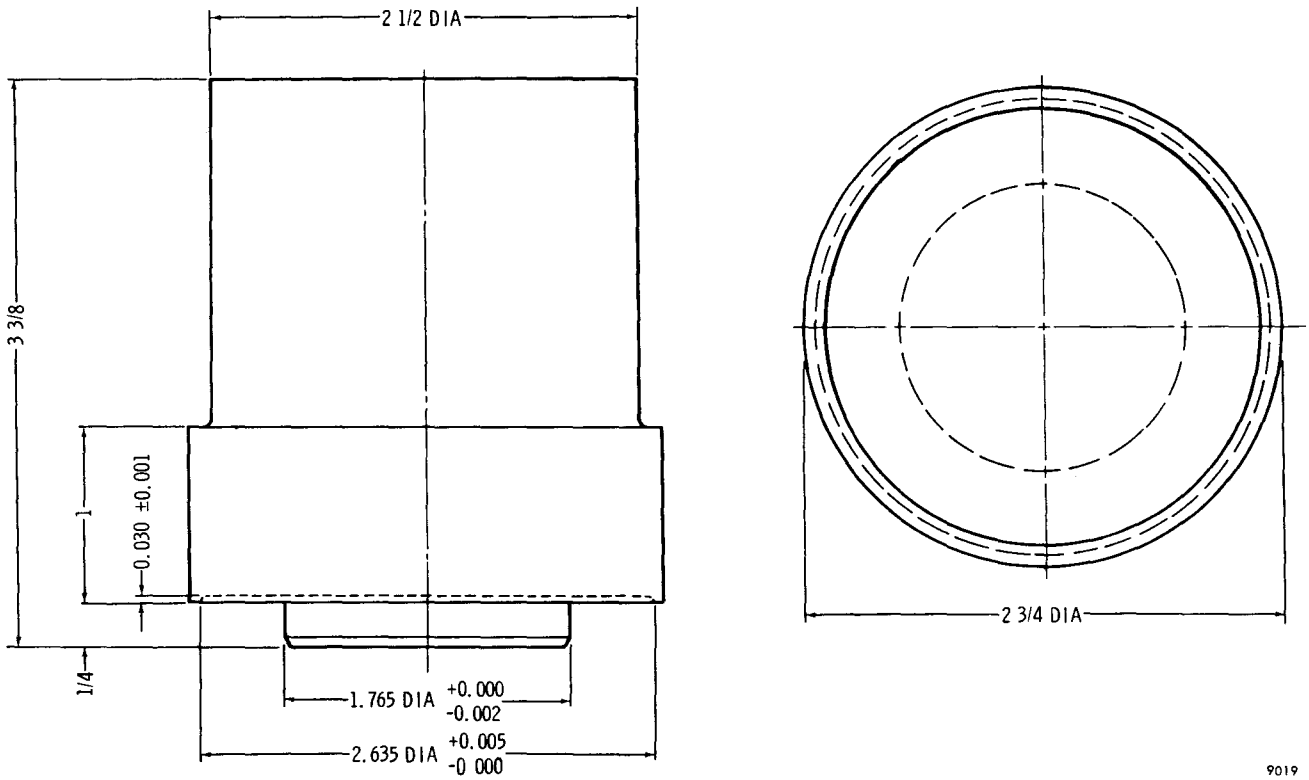

Fig. 4-3. Special tool for installing stator thrust bearing in TC 300, 3-element converter

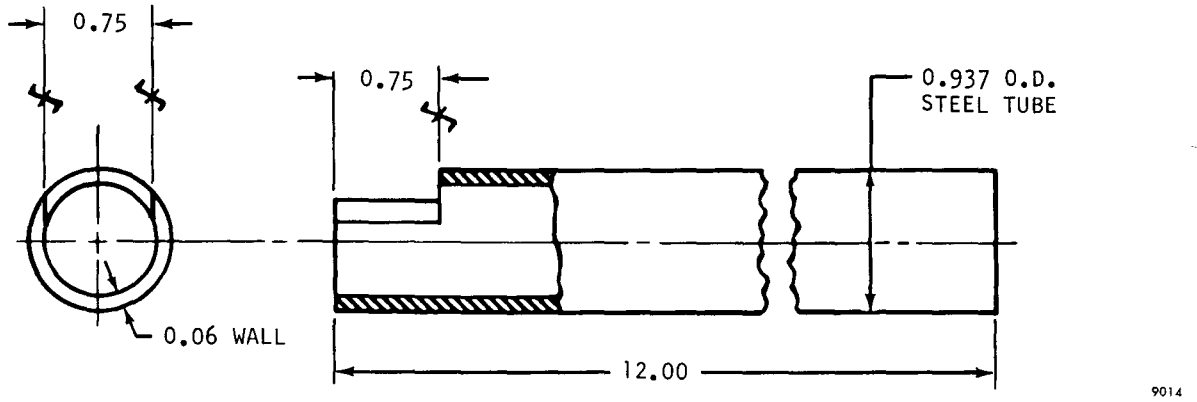

Fig. 4-4. Special tool for removing (or installing) TC 250 converter unit assembly snapring

(4) Examine parts, especially oil passages, after cleaning to make certain they are entirely clean and reclean them if necessary.

c. Cleaning Bearings

(1) Bearings that have been in service should be thoroughly washed in dry-cleaning solvent, volatile mineral spirits, or paint thinner.

(2) If the bearings are particularly dirty or filled with hardened grease, soak them in solvent before trying to clean them.

(3) Before inspection, oil bearings with the same type of oil that will be used in the converter.

NOTE

Never dry bearings with compressed air. Do not spin bearings while they are not lubricated.

d. Keeping Bearings Clean. Since the presence of dirt or grit in ball bearings is usually responsible for bearing failures, it is important to keep bearings clean during installation and removal. Observance of the following rules will do much to insure maximum bearing life.

(1) Do not remove the wrapper from new bearings until read to install them.

(2) Do not remove the grease in which new bearings are packed.

(3) Do not lay bearings on a dirty bench; place them on clean paper.

(4) If assembly is not to be completed at once, wrap or cover the exposed bearings with clean paper or cloth to keep out dust.

e. Inspecting Cast Parts, Machined Surfaces

(1) Inspect bores for wear, scratches, grooves, and dirt. Remove scratches and burs with crocus cloth. Remove foreign matter. Replace parts that are deeply grooved or scratched.

(2) Inspect all oil passages for obstructions. If an obstruction is found, remove it with compressed air or by working a wire back and forth through the passage and flushing it out with cleaning solvent.

(3) Inspect mounting faces for nicks, burs, scratches, and foreign matter. Remove such defects with crocus cloth or a soft stone. If scratches are deep, replace the defective part.

(4) Inspect threaded openings for damaged threads. Chase damaged threads with the correct size used tap.

(5) Replace housings or other cast parts that are cracked.

(6) Inspect all machined surfaces for damage that could cause oil leakage or other malfunction of the part. Rework or replace the defective parts.

f. Inspecting Bearings

(1) Inspect bearings for roughness of rotation. Replace a bearing if its rotation is still rough after cleaning and oiling.

(2) Inspect bearings for scored, pitted, scratched, cracked, or chipped races, and for indication of excessive wear of rollers or balls. If one of these defects is found, replace the bearing.

(3) Inspect a defective bearing's housing and shaft for grooved, burred or galled conditions that indicate that the bearing has been turning in its housing or on its shaft. If the damage cannot be repaired with crocus cloth, replace the defective part.

(4) When installing a bearing on a shaft, heat the bearing to 200°F on an electric hot plate or in an oil bath. Coat the mating surfaces with white lead and use the proper size installation sleeve and a press to seat the bearing.

(5) If a bearing must be removed or installed without a sleeve, be careful to press only on the race which is adjacent to the mounting surface. If a press is not available, seat the bearing with a drift and a hammer, driving against the supported race.

g. Inspecting Bushings, Thrust Washers

(1) Inspect bushings for scores, sharp edges, roundness, burs, and evidence of overheating. Remove scores with crocus cloth. Remove burs and sharp edges with a scraper or knife blade. If the bushing is out-of-round, deeply scored, or excessively worn, replace it, using the proper size replacer.

NOTE

Sometimes it is necessary to cut out a defective bushing. Be careful not to damage the bore into which the bushing fits.

(2) Inspect thrust washers for distortion, scores, burs, and wear. Replace the thrust washer if it is defective or worn. It is much less expensive to replace such parts

than to replace converter elements, which can fail due to defective bearings, bushings, or thrust washers.

h. Inspecting Oil Seals, Gaskets

(1) Inspect sealrings for cuts and hardness. Replace sealrings if these defects are found.

(2) When replacing lip-type sealrings or oil seals (metal encased), make sure the lip side of the sealring or the spring-loaded side of the oil seal is facing the oil to be sealed in (toward the inside of the unit). Use non-hardening sealing compound on the outside diameter of the oil seal to help prevent oil leaks.

(3) Replace all composition gaskets.

(4) Inspect hook-type sealrings for wear, broken hooks, and distortion.

(5) Install a new hook-type sealring, if it is worn so much that there is no gap between the hooks of the sealring when it is installed.

(6) The sides of the sealring should be smooth (0.005-inch maximum side wear). The sides of the shaft groove (or the bore) in which the sealring fits should be smooth (50 micro inches equivalent) and square with the axis of rotation within 0.002 of an inch. If the sides of ring grooves have to be reworked (0.020-inch maximum side wear), install a new sealring.

i. Inspecting Gears

(1) Inspect gears for scuffed, nicked, burred or broken teeth. If the defect cannot be removed with a soft stone, replace the gear.

(2) Inspect gear teeth for wear that may have destroyed the original tooth shape. If this condition is found, replace the gear.

(3) Inspect the thrust faces of gears for scores, scratches, and burs. Remove such defects with a soft stone. If scratches and scores cannot be removed with a soft stone, replace the gear.

j. Inspecting Splined Parts. Inspect parts for stripped, twisted, chipped, or burred splines. Remove burs with a soft stone. Replace the part if other defects are found. Spline wear is not considered detrimental except where it affects tightness of fit of the splined parts.

k. Inspecting Threaded Parts. Inspect parts for burred or damaged threads. Remove burs with a soft stone or fine file. Replace damaged parts.

l. Inspecting Snaprings. Install all snaprings for nicks, distortion, and excessive wear. Replace the part if one of these defects is found. The snapring must snap tight in its groove for proper functioning.

m. Inspecting Springs. Inspect all the springs for signs of overheating, permanent set or wear due to rubbing adjacent parts. Replace the spring if any one of these defects is found. Refer to paragraph 8-8 for load-height specifications.

4-7. WEAR LIMITS

All wear limits information has been collected into a separate section at the end of this manual. Section 8 contains general information on wear limits as well as pertinent tabular data. The items in the tabular data are keyed to the exploded views at the end of this manual.

4-8. TORQUE SPECIFICATIONS

Unless otherwise specified in assembly procedures, the torque specifications listed in the following chart will apply to all assembly procedures. Refer also to figure 6-9 for cross-section views showing torque specifications.

GENERAL TORQUE SPECIFICATIONS – BOLTS AND SCREWS

(All torque values are given in pound feet)

Size	Threads per inch	Standard heat-treated bolts and screws	Special heat-treated bolts, screws, Allen-head screws, and self-locking capscrews
			
1/4	20	6-8	9-11
	28	8-10	10-12
5/16	18	15-18	17-20
	24	17-20	19-23
3/8	16	26-32	36-43
	24	33-40	41-49
7/16	14	42-50	54-65
	20	50-60	64-77
1/2	13	67-80	81-97
	20	83-100	96-115
9/16	12	85-100	103-123
	18	100-120	122-146
5/8	11	117-140	164-192
	18	134-160	193-225
3/4	10	180-210	284-325
	16	215-250	337-385
7/8	9	315-360	490-550
	14	372-425	575-650

NOTE

Any special torque requirements different from the standard torques listed above will be specified in the text or illustrations.

Section 5. DISASSEMBLY OF CONVERTER INTO SUBASSEMBLIES

5-1. SCOPE OF SECTION 5

a. This section includes instructions for the disassembly of all TC 200 and TC 300 Series torque converter assemblies into subassemblies. The subassemblies are rebuilt as outlined in Section 6.

b. Paragraph 5-3 covers the removal of the oil cooler and the sump plate for all subassemblies.

c. Paragraph 5-4 covers the removal of the input disconnect clutch from all assemblies. The disconnect clutch is an optional feature for all TC 200 and TC 300 Series converters.

d. Paragraph 5-5 covers the removal of the rear disconnect clutch from all assemblies having an "RD" in the model designation.

e. Paragraphs 5-6 and 5-7 cover the removal of the rear bearing retainer with an output flange, or with an industrial output shaft.

f. Paragraph 5-8 covers removal of the bearing housing and output shaft with an accessory drive from all assemblies which have an "A" in the model designation.

g. Paragraph 5-9 covers the removal of converter drive units from all assemblies.

h. Paragraph 5-10 covers removal of the over-running clutch from all assemblies having an "O" in the model designation.

i. Paragraph 5-11 covers the removal of converter elements from all assemblies.

j. Paragraph 5-12 covers the removal of the charging oil pump and the converter bypass valve from all assemblies.

k. Paragraph 5-13 covers the removal of the hollow turbine shaft.

5-2. PRELIMINARY STEPS (ALL MODELS)

Remove the oil drain plug (fig. 5-1) and gasket from the front of the converter housing and drain the oil. Replace the plug and gasket.

5-3. REMOVAL OF OIL COOLER AND SUMP PLATE (TC 200, 300)

a. Removing Oil Cooler. Remove 12 bolts from the oil cooler cover (fig. 5-1). Remove the cover and gasket. Remove the core assembly and gasket (fig. 5-2).

NOTE

If a remote filter was used, inspect the four 5/16-inch bolts 50 (A, fold-out 3) on the cooler mounting pad for damage, and replace if necessary.

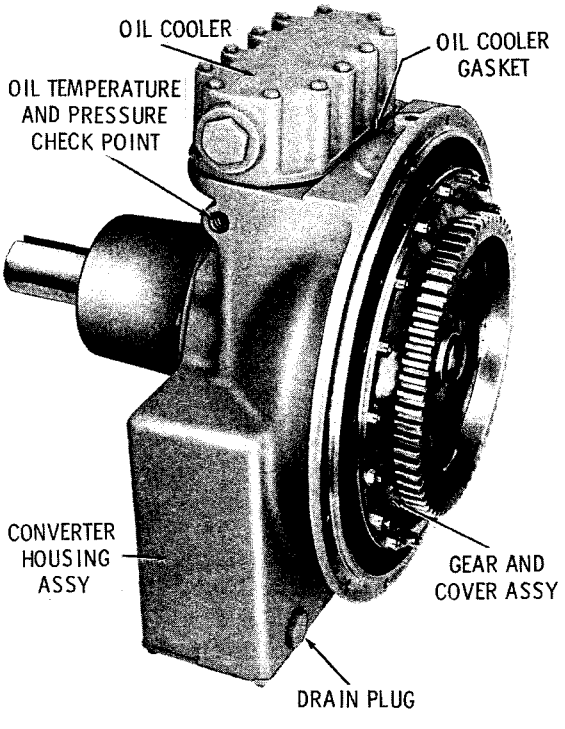

Fig. 5-1. Model TC 245 converter—right-front view

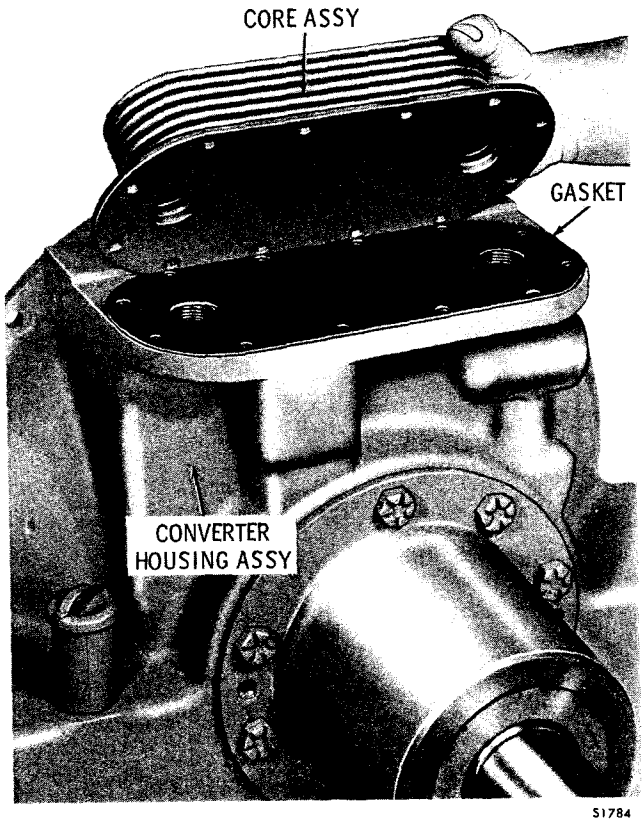

Fig. 5-2. Removing oil cooler core assembly

b. Removing Sump Plate

NOTE

The following steps describe the removal of the sump plate for the TC 300 series. Removal of the sump plate for the TC 200 is the same. TC 200 parts are shown in A, foldout 3.

(1) Turn the converter housing on its side.

(2) Remove nine bolts 41 (A, foldout 5) and lockwashers 40 from sump plate 42.

(3) Remove sump plate 42 and gasket 43 from housing assembly 46.

5-4. REMOVAL OF INPUT DISCONNECT CLUTCH (TC 200, 300)

The torque converter housing and the input disconnect clutch housing may be separated by removing twelve bolts 14 (B, foldout 7) and lockwashers 13. Refer to paragraph 6-13 for rebuild of disconnect clutch assembly.

5-5. REMOVAL OF REAR DISCONNECT CLUTCH HOUSING

a. TCRD 200 Series. Remove eight self-locking bolts 38 (B, foldout 4) from rear disconnect clutch housing 40. Remove housing 40, turbine shaft 39, bearing assembly 4, snapring 3, oil seal 8 and gasket 5, as a unit. Refer to paragraph 6-15 for rebuild of housing components.

b. TCRD 300 Series

(1) Remove eight self-locking bolts 9 (A, foldout 8) from rear disconnect clutch housing 8.

(2) Remove housing 8, turbine shaft 11, bearing assembly 2, snapring 1, and oil seal 10, as a unit. Remove eight sealrings 3 and gasket 4.

5-6. REMOVAL OF REAR BEARING RETAINER, OUTPUT SHAFT (AUTOMOTIVE FLANGE)

NOTE

The following paragraph describes removal of the output flange and bearing retainer from the TC 200 Series. Removal of these parts from the TC 300 is the same. TC 300 parts are shown in A, foldout 8.

a. Remove eight self-locking bolts 7 (B, foldout 4) that secure the bearing retainer to the converter housing.

b. Remove, as a unit, flange 9, bearing retainer 6, gasket 5, bearing 4, snapring 3, and turbine shaft 1. (Refer to fig. 5-3 for removal of TC 200 shaft parts. Refer to fig. 5-4 for TC 300.) From TC 300 series only, remove eight sealrings (fig. 5-4). Refer to paragraph 6-6 for rebuild of the shaft assembly.

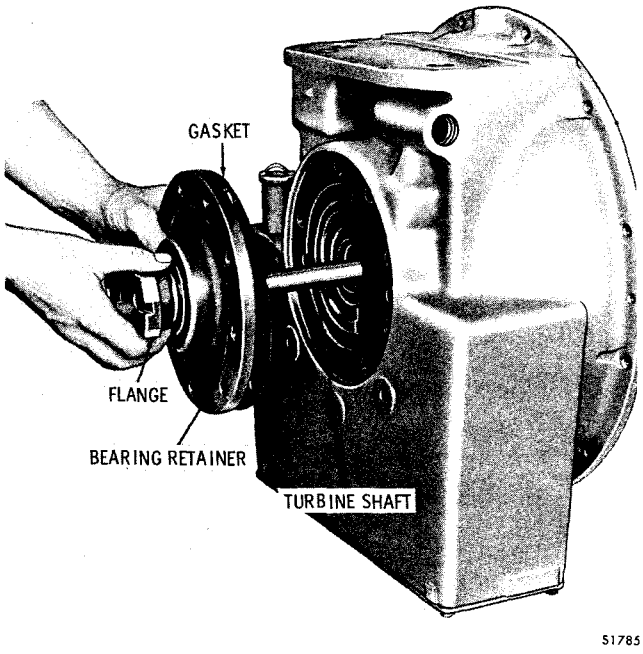

Fig. 5-3. Removing automotive shaft assembly (TC 200)

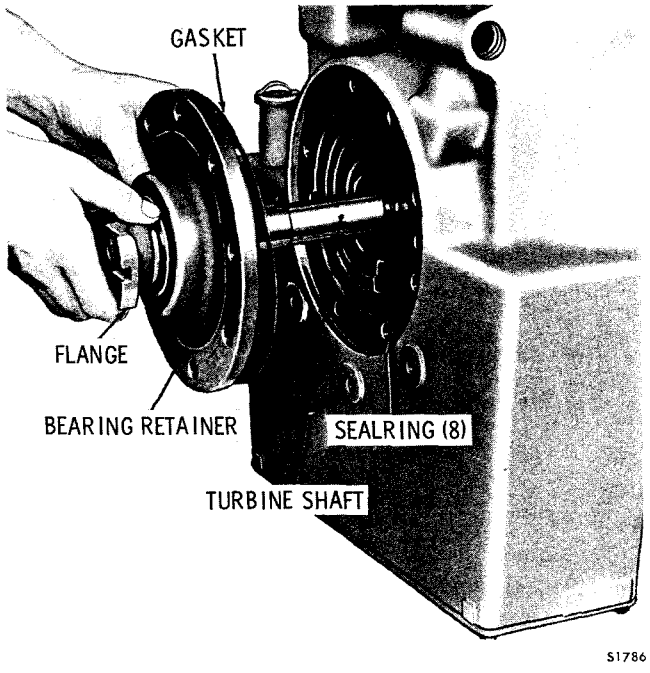

Fig. 5-4. Removing automotive shaft assembly (TC 300)

NOTE

Refer to paragraph 5-13 for removal of bearing retainer and hollow output shaft.

5-7. REMOVAL OF REAR BEARING HOUSING, OUTPUT SHAFT (INDUSTRIAL)

a. TC 200 Series

(1) Remove eight self-locking bolts 7 (B, foldout 4) that secure the bearing housing to the converter housing (fig. 5-5).

(2) Remove, as a unit, bearing housing 16 (B, foldout 4), output shaft 13 or 18, bearings 12, turbine shaft 1 and shims 15.

(3) Carefully remove the shims and tie them together. Refer to paragraph 6-5 for rebuild of the shaft and related components.

b. TC 300 Series

(1) Remove eight self-locking bolts 23 (A, foldout 8) that secure bearing housing 21 to the converter housing.

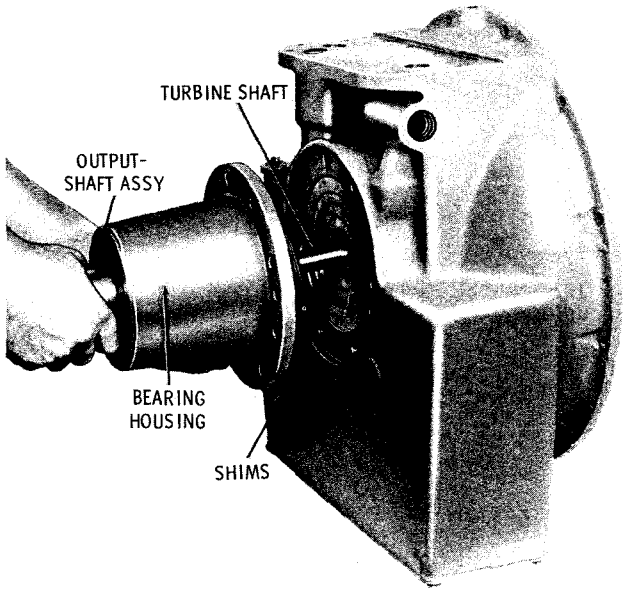

Fig. 5-5. Removing industrial output shaft asse

(2) Remove, as a unit, bearing ho ing 21, output shaft 17, bearings 16, and shims 20. Tie shims together. Refer to para graph 6-10 for rebuild of the shaft and related parts.

(3) Remove eight sealrings 19 (A, foldout 8) from the rear of the converter housing.

5-8. REMOVAL OF REAR BEARING HOUSING, OUTPUT SHAFT (ACCESSORY DRIVE)

a. TCA 200 Series

(1) If the assembly includes a cable drive adapter, remove four bolts 7 (B, foldout 8), lockwashers 8, adapter 9, oil seal 10, shaft 11, gasket 27 (B, foldout 4) and spacer 26. If no cable adapter is included, remove only gasket 27 and spacer 26.

(2) Using a slide hammer remover and an adapter in the 3/8-16 hole at the end of the accessory driven gear 23 (B, foldout 4), remove gear 23, bearing 24 and sleeve 25. Press the bearing and sleeve from gear 23.

(3) Remove eight self-locking bolts 7 from bearing housing assembly 21 or 30. Remove bearing housing 21 or 30, converter output shaft 19, 28 or 32, turbine shaft 1 and attached parts as a unit. Remove shims 15 and carefully tie them together. Refer to paragraph 6-10 for rebuild of the bearing housing, shaft and related parts.

b. TCA 300 Series

(1) If the assembly includes a cable drive adapter, remove four bolts 7 (B, foldout 8), lockwashers 8, adapter 9, oil seal 10, shaft 11, gasket 33 (A, foldout 8) and spacer 32. If no cable adapter is included, remove only gasket 33 and spacer 32.

(2) Using a slide hammer remover and an adapter in the 3/8-16 hole at the end of accessory driven gear 29 (A, foldout 8), remove sleeve 31, bearing assembly 30 and driven gear 29. Press the bearing and sleeve from gear 29.

(3) Remove eight self-locking bolts 9 from bearing housing 27 or 36. Remove the bearing housing, converter output shaft 26, 35, 39 or 40 and attached parts as a unit. Remove bearing housing shims 20 and eight sealrings 19. Tie the shims together. Refer to paragraph 6-10 for rebuild of housing, output shaft, and related parts.

5-9. REMOVAL OF CONVERTER DRIVE COVER

a. TC 200 Series

NOTE

The converter may be driven by a gear and cover (fig. 5-1) or by a flex disk assembly (fig. 5-6). The removal of the gear and cover is described in (1), below. The flex disk assembly is described in (2) and (3), below.

(1) Remove 18 nuts from the gear and cover (fig. 5-1). Remove the gear and cover 2 (A, foldout 3) and sealring 20.

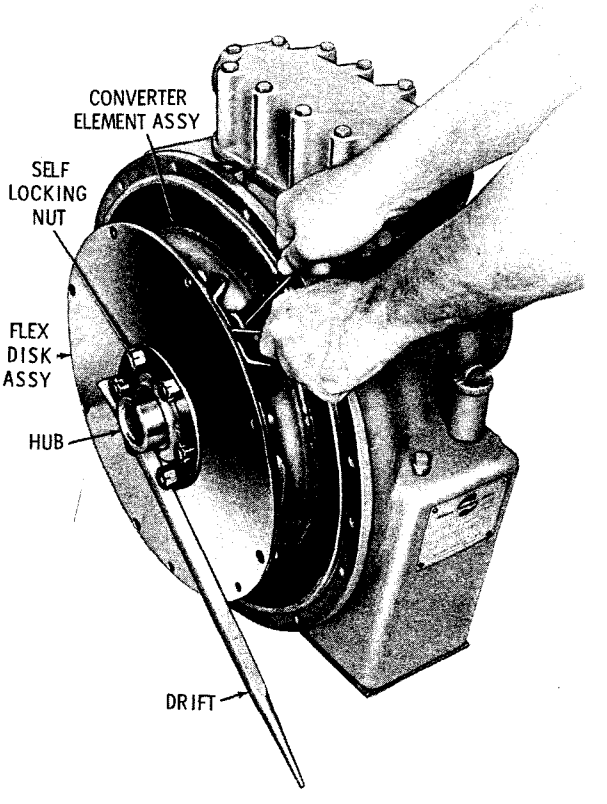

Fig. 5-6. Removing flex disk assembly bolts

(2) Remove three bolts and three nuts from the front of the converter (fig. 5-6). Remove the disk assembly and the hub. Use a bar as shown, to prevent converter rotation.

(3) Remove six self-locking nuts (fig. 5-6) that secure the disks to the hub. Separate disks 3 (A, foldout 4), plate 2, disk and washer assembly 4, drive hub 7, plate 8 and bolts 9.

b. TC 300 Series

NOTE

The converter may be driven by a gear and cover or by a flex disk assembly. Before S/N 13596, converters are equipped with gear and cover assembly 5 (A, foldout 5). After S/N 13595, they are equipped with gear and cover 8 or cover assembly 60 (A, foldout 6). The later serial numbers equip the drive cover wtih a ball bearing in place of a bushing. Incorporation of the greased drive ring became effective with S/N 23242. The removal of the cover assemblies is described in (1), below. The removal of the flex disk assembly is described in (2) and (3), below.

(1) Remove twenty-four nuts 4 (A, foldout 5) from gear and cover assembly 5 or 8. Remove the cover. Remove sealring 3 (after S/N 23241) from the cover. Remove thrust washer 7 (before S/N 13596).

(2) Remove six self-locking bolts 55 (A, foldout 6) from the front of the torque converter. Use a bar in the manner shown in figure 5-6 to prevent the converter from rotating.

(3) Remove flex disk plate 56 (A, foldout 6), flex disks 57, and disk and washer assembly 58.

(4) Remove twenty-four locknuts 59 and cover 61 or cover assembly 60 from the converter pump.

NOTE

Earlier models contained cover assembly 60, consisting of cover 61 and plug 62.

5-10. REMOVAL OF OVER-RUNNING CLUTCH

a. TCO 200 Series

(1) Remove eighteen nuts 7 (B, foldout 3) from gear and cover 8.

(2) Remove, as a unit, gear and cover 8, turbine assembly 10, two snaprings 1 and 4, sealring 3, sprag assembly 9, retainer 6, bearing assembly 5 and bearing cover 2.

(3) Remove snapring 1 from gear and cover 8, then remove cover 2.

(4) Remove snapring 4 from turbine assembly 10 and remove the turbine assembly from gear and cover 8.

(5) Remove sealring 3 and bearing assembly 5 from gear and cover 8.

(6) Remove sprag retainer 6 and sprag assembly 9 from gear and cover 8.

b. TCO 300 Series

(1) Remove twenty-four lock nuts 10 (B, foldout 5) from gear and cover 11.

(2) Remove, as a unit, gear and cover 11, turbine assembly 13, two snaprings 1 and 4, sealring 3, sprag assembly 12, retainer 6, bearing 5 and bearing cover 2.

(3) Remove snapring 1 from gear and cover 11 and remove bearing cover 2.

(4) Remove snapring 4 from turbine assembly 13 and separate the turbine assembly from gear and cover 11.

(5) Remove sealring 3 and bearing assembly 5 from gear and cover 11.

(6) Remove retainer 6 and sprag assembly 12 from gear and cover 11.

5-11. REMOVAL OF CONVERTER ELEMENTS

a. TC 240 Series

NOTE

Some earlier TC 240 series torque converter elements were replaced with a welded converter unit, when repair parts were no longer available. Refer to b, below, for removal.

(1) Refer to (2) through (10), below, for servicing converters before S/N 31823. Refer to (11) through (16) after S/N 31822.

(2) Remove thrust washer 4 (A, foldout 3) from turbine assembly 5.

(3) Remove the turbine assembly and stator front thrust washer (fig. 5-7).

(4) Remove stator assembly (fig. 5-7).

(5) Remove snapring 6 (A, foldout 3) at the front of freewheel roller race 11.

(6) Remove freewheel roller race 11.

(7) Remove snapring 12 from stator support 32.

(8) Remove stator rear thrust washer 57 (used before S/N 31823).

(9) Remove converter pump thrust washer 58 (used before S/N 31823).

(10) Remove the converter pump assembly (fig. 5-8). Refer to paragraph 6-3 for rebuild of the stator assembly.

(11) On converters after S/N 31822, use the following procedure. Remove thrust washer 4 (A, foldout 3).

(12) Remove turbine assembly 5.

(13) Remove the stator assembly (fig. 5-7).

(14) Remove snapring 6 (A, foldout 3) and freewheel roller race 11.

(15) Remove snapring 12 and converter pump thrust washer 19.

(16) Remove the converter pump assembly (fig. 5-8). Refer to paragraph 6-3 for rebuild of the stator assembly.

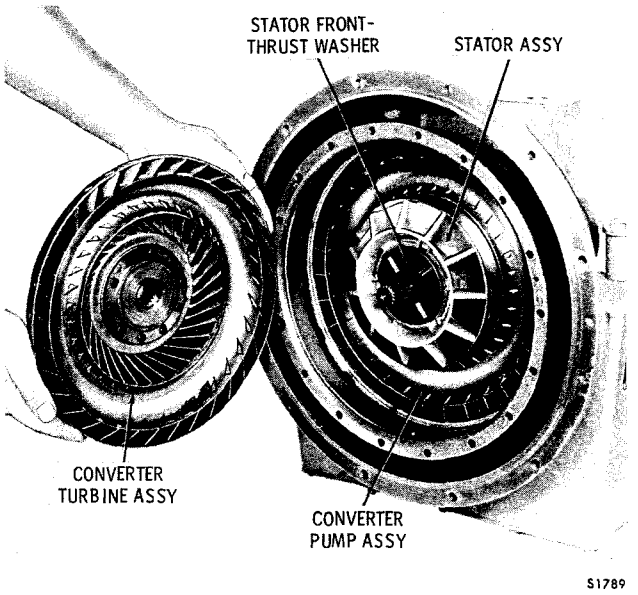

Fig. 5-7. Removing converter turbine assembly (TC 200)

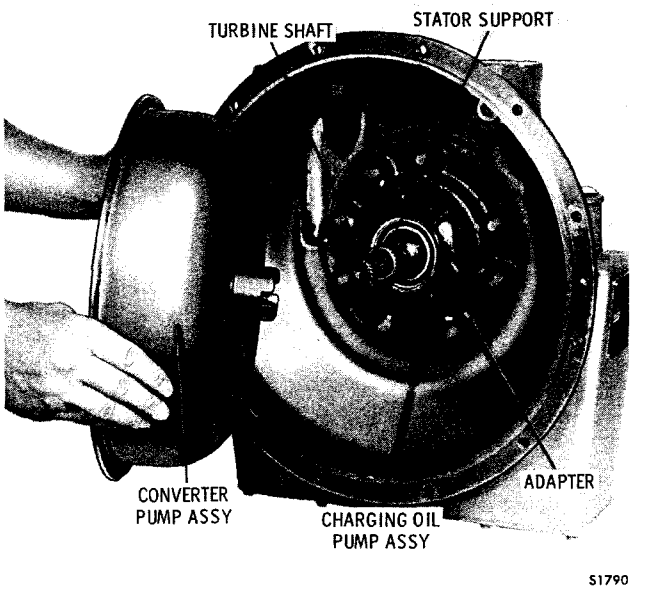

Fig. 5-8. Removing converter pump assembly (TC 200)

b. TC 250 Series

(1) Insert the special tool (fig. 4-4), slotted end first, into the rear of the torque converter housing, engaging the converter element snapring (fig. 5-9).

(2) With light hand effort, rotate the tool either clockwise or counterclockwise slightly, until the converter element can be removed with the other hand. Too much force will distort the snapring.

NOTE

Figure 5-10 shows the special tool engaging the snapring.

(3) Remove the snapring from the stator support (fig. 5-11).

CAUTION

To avoid distortion, remove one end of the snapring from the groove and "skate" it around the stator support to free the opposite end.

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Fig. 5-9. Using special tool to remove converter unit assembly (TC 250)

c. TC 300 Series

NOTE

The 4-element converter is covered in steps (1) through (5), below. The 3-element converter is covered in steps (6) through (9), below.

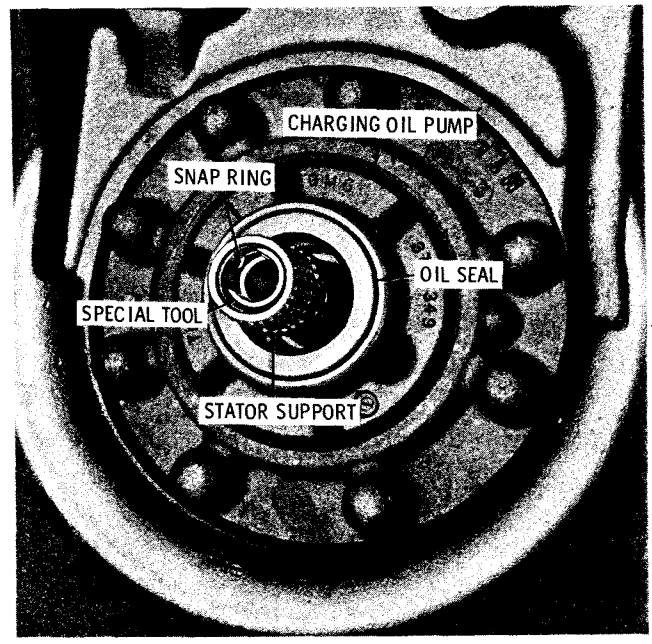

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Fig. 5-10. Special tool engaging snapring (TC 250)

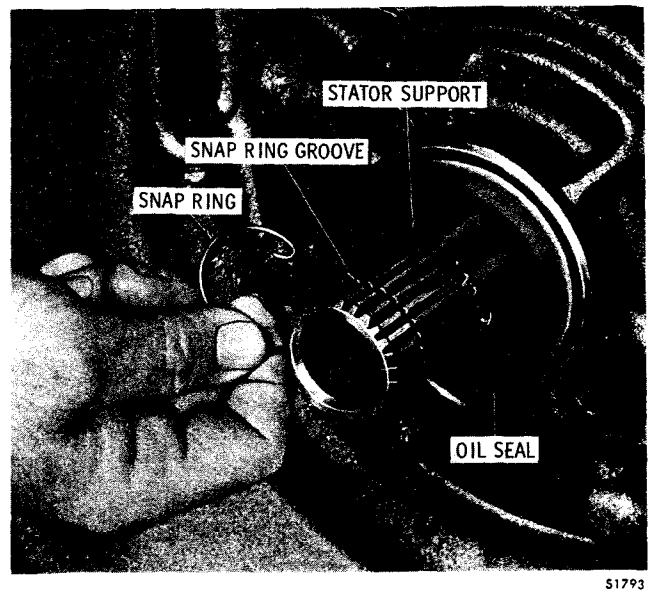

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Fig. 5-11. Removing converter snapring (TC 250)

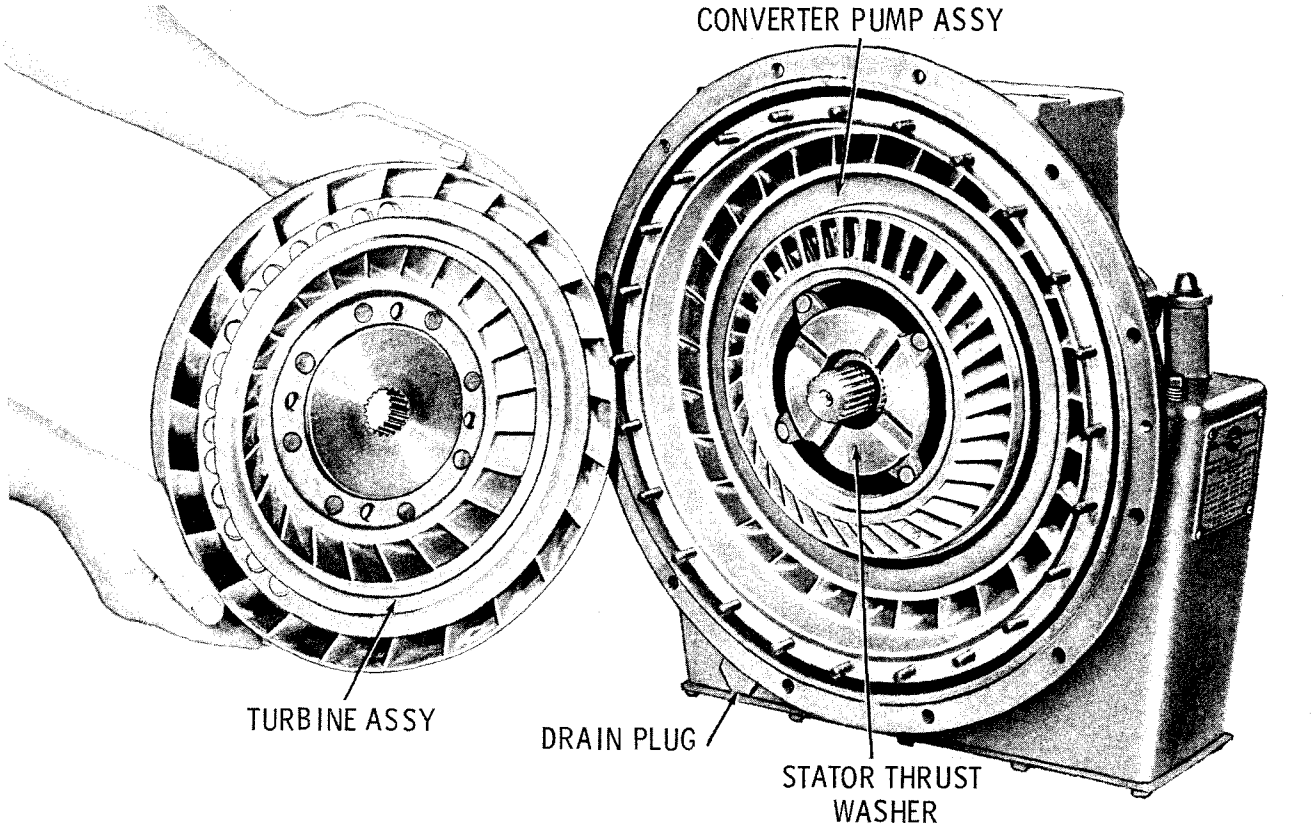


Fig. 5-12. Removing converter turbine assembly (TC 300, 4-element)

(1) Remove the turbine assembly (fig. 5-12). Remove bearing assembly 9 (A, foldout 5) from turbine assembly 10. When the converter is equipped with an industrial-type output shaft 17, 26, 35, 39 or 40 (A, foldout 8), remove snapring 13 and turbine shaft 14.

(2) Remove, as a unit, the first-stator assembly, the freewheel roller race and the second stator (fig. 5-13). Stator washer 14 (A, foldout 5) separates the first- and second-stator assemblies and is removed simultaneously with the stator assemblies. Refer to paragraph 6-7 for rebuild of stator assemblies.

(3) Remove snapring 17 (A, foldout 5).

(4) Remove freewheel roller race spacer 18. Before S/N 7144, remove spacer 19.

(5) Remove the converter pump (fig. 5-14). Refer to paragraph 6-7 for rebuild of the pump assembly.

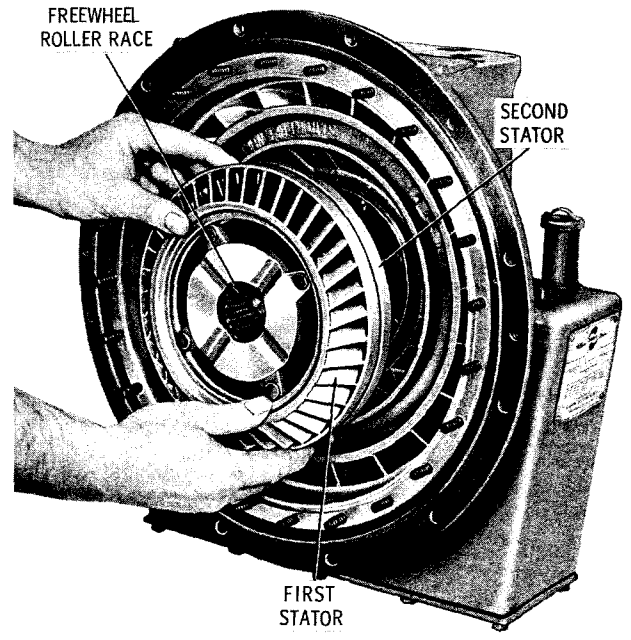
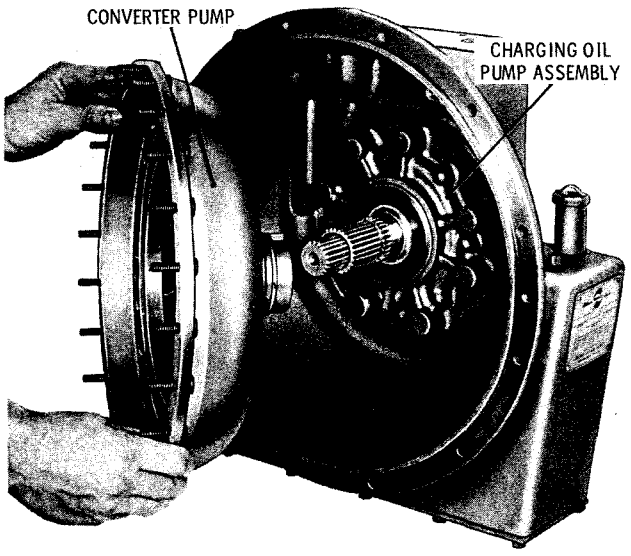


Fig. 5-13. Removing first-and-second stator assembly (TC 300)



S1796

Fig. 5-14. Removing converter pump assembly (TC 300)

(6) The removal of the 3-element torque converter is as follows: Remove turbine assembly 7 (A, foldout 6) and bearing assembly 6. On models which use an industrial-type output shaft, remove snapring 13 (A, foldout 8), and remove turbine shaft 14.

(7) Rotate stator assembly 8 (A, foldout 6) counterclockwise to lock it to freewheel roller race 12. Remove the stator and race from the ground sleeve. Refer to paragraph 6-8 for rebuild of the stator assembly.

NOTE

If the race separates from the stator assembly, rollers 10 (A, foldout 6) and roller springs 11 will drop out of the stator. There are ten rollers and ten roller springs which should be accounted for before continuing with the disassembly.

(8) Remove snapring 13 (A, foldout 6) and roller race spacer 14.

(9) Remove the converter pump assembly, items 15 through 24 (A, foldout 6) as a unit. Refer to paragraph 6-7c and d for rebuild of the pump assembly.

5-12. REMOVAL OF CHARGING OIL PUMP AND CONVERTER BYPASS VALVE

a. Charging Oil Pump (TC 200)

(1) Remove two flat-head screws 55 (A, foldout 3) from the rear of converter housing assembly 39.

(2) Remove the charging oil pump assembly and adapter (fig. 5-8).

(3) Remove adapter gasket 34 (A, foldout 3). Refer to paragraph 6-4 for rebuild of the pump assembly.

b. Charging Oil Pump (TC 300)

(1) Remove two flat-head screws 35 (A, foldout 6) from the rear of converter housing assembly 42.

(2) Thread two of eight bolts 23 (A, foldout 8) through the converter housing into the pump body. Tap lightly with a soft hammer on the bolt heads until the charging oil pump assembly is loose. Remove the bolts and then remove the charging oil pump assembly (fig. 5-14). Refer to paragraph 6-9 for rebuild of the pump assembly.

c. Converter Bypass Valve (TC 200)

(1) Remove plug 49 (A, foldout 3) converter bypass valve spring 48 and ball 47.

(2) Only if necessary, remove plug 41 (if used) from the converter-out passage.

d. Converter Bypass Valve (TC 300)

(1) Remove plug 51 (A, foldout 6), spring 52 and ball 53 from the cooler mounting pad of converter housing assembly 42.

(2) Only if necessary, remove orifice plug 6 (B, foldout 8) from the converter-out passage in the converter housing.

5-13. REMOVAL OF HOLLOW OUTPUT SHAFT

NOTE

If desired, an engine-driven accessory shaft (provided by the vehicle manufacturer), may be used inside the hollow turbine shaft. Converter drive cover 60 (A, foldout 5) is provided for this purpose. Removal of the converter drive cover (para 5-9) is necessary prior to removal of the hollow turbine shaft.

a. Remove sealring 46 (A, foldout 8). Remove eight self-locking bolts 9 from retainer 41. Remove retainer 41, shaft assembly 48, bearing 2, snapring 1, and oil seal 10, as a unit.

b. Remove snapring 1, bearing 2, and sealring 47 from the turbine shaft 48. Remove turbine shaft assembly 48 and oil seal 10. Remove gasket 4 and eight sealrings 3 from the converter housing.

Section 6. REBUILD OF SUBASSEMBLIES

6-1. SCOPE OF SECTION 6

This section covers the rebuild of subassemblies for both the TC 200 series and the TC 300 series Torqmatic converters. Paragraphs 6-3 through 6-6, below, cover the TC 200 Series; paragraphs 6-7 through 6-12 cover the TC 300 Series; and paragraphs 6-13 through 6-15 cover subassemblies common to both the TC 200 Series and the TC 300 Series.

6-2. GENERAL INFORMATION FOR SUBASSEMBLY REBUILD

a. Tools, Parts, Methods. Refer to Section 4.

b. Cleaning, Inspection. Refer to paragraph 4-6 for the cleaning and the inspection procedures.

c. Torque Specification. The specific torque value for each threaded fastener is stated at each assembly step. Torque values are also tabulated in paragraph 4-8. Refer to figure 6-9 for cross-section views, showing torque values.

d. Wear Limits, Spring Data. Refer to Section 8 for wear limits and spring data.

e. Pipe Plugs. Prior to installation, apply a small amount of nonhardening sealant (or Teflon tape) into the threads of each plug. Tighten plugs sufficiently to prevent leakage.

6-3. TC 200 SERIES CONVERTER ELEMENTS

NOTE

Where alternate callout numbers are given below, the higher numbers refer to components of assemblies with serial numbers before 31823.

a. Disassembly

(1) Remove snapring 7 or 60 (A, foldout 3) and thrust washer 8 or 62 from stator assembly 9 or 59.

(2) Remove stator freewheel rollers 15 and springs 16.

NOTE

On models before S/N 19439, stator assemblies contained roller guide 17 and roller spring 18.

(3) Remove stator cam 10 or 63 and the remaining thrust washer 13 or 62. Remove the remaining snapring and thrust washer only if replacement is necessary.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

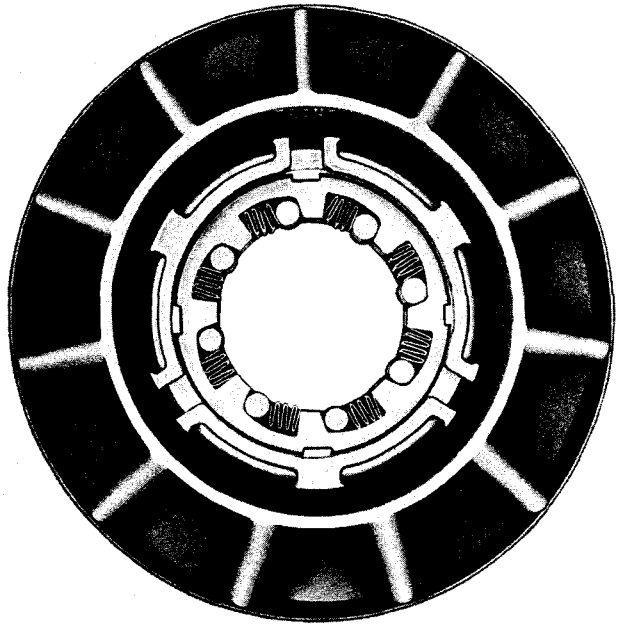
(1) If snapring 14 or 60 (A, foldout 3) was removed, install a new snapring. Install one thrust washer 13 or 62 into stator 9 or 61.

(2) Install stator freewheel cam 10 or 63 into stator 9 or 61 from the front side of the stator so that the deep end of the roller pockets are in a counterclockwise direction (fig. 6-1).

(3) Install the stator freewheel rollers and springs into the cam pockets, as shown in figure 6-1.

NOTE

Make sure the springs are installed with the open ends toward the inside diameter of the cam.



S1797

Fig. 6-1. Model TC 240 stator with cam, rollers and springs

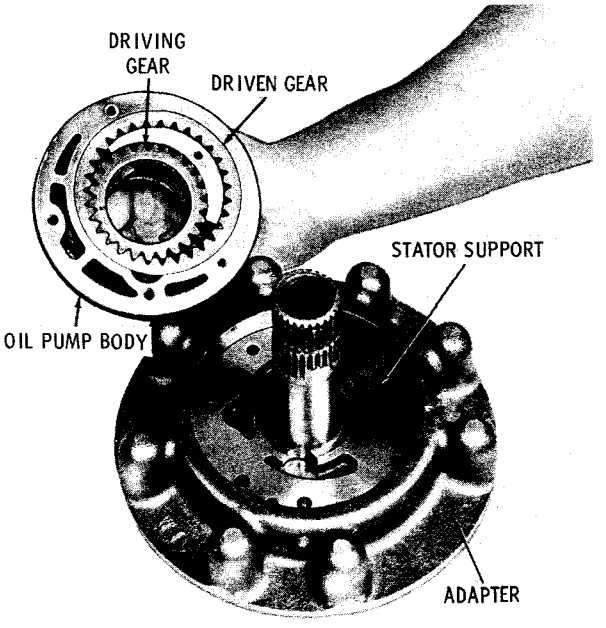


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Fig. 6-2. Removing oil pump body and gears (TC 200)

(4) Install freewheel roller race 11 (A, foldout 3) into stator 9 or 61.

(5) Install the remaining thrust washer 8 or 62, and snapring 7 or 60 into the stator.

6-4. TC 200 SERIES CHARGING OIL PUMP

a. Disassembly

(1) Remove five bolts 36 (A, foldout 3) from oil pump body adapter 33. Remove the oil pump body and gears (fig. 6-2).

(2) Remove gears 29 and 30 (A, foldout 3) from pump body 28.

NOTE

The gears and pump body are a matched assembly and cannot be serviced separately.

(3) Remove stator support 32 from adapter 33.

(4) Remove sealring 31.

(5) If oil seal 25 in pump body 28 must be replaced, remove it.

(6) If bushing 27 must be replaced, drive it out of pump body 28.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) If bushing 27 (A, foldout 3) was removed, press a new bushing into the pump body. The bushing must be flush with, to 0.010 below, the inner edge of the chamfer in the front of the pump body. Bore the bushing to 1.8750 to 1.8760 inside diameter.

(2) If oil seal 25 was removed, press a new seal into pump body 28 with the spring side of the seal next to the bushing.

(3) Install sealring 31 onto the pump body 28.

(4) Install stator support 32 into adapter 33 and aline the bolt holes.

(5) Install oil pump gears 29 and 30 into pump body 28.

(6) Using two 1/4-20 headless guide bolts, threaded into the pump body to aline the bolt holes, install oil pump body assembly 26 into adapter 33.

(7) Start two bolts 36 into the rear of adapter 33 and remove the two headless guide bolts. Install the three remaining bolts 36. Tighten the bolts to 9 to 11 pound feet torque.

6-5. TC 200 SERIES OUTPUT SHAFT ASSEMBLY (INDUSTRIAL TYPE)

a. Disassembly

(1) Remove hook-type sealring 2 (B, foldout 4). Only if necessary for parts replacement, remove turbine shaft 1 from industrial shaft 13, 18, 19, 28 or 32. Hold the turbine shaft secure and tap on the output shaft to separate the two shafts.

(2) Remove output shaft 13, 18, 19, 28 or 32 and roller bearing assemblies 12 from the bearing housing. Press on the rear end of the output shaft to remove it from the housing.

(3) Press roller bearing assemblies 12 from the shaft. If spacer 29 is used, remove the spacer from the shaft.

(4) Do not remove the outer race of rear bearing assembly 12 or oil seal 17 (B, foldout 4) from bearing housing 16, 21, 30, or 33 unless replacement is necessary. If replacement is necessary, press them out of the housing.

(5) If drive gear 20 must be replaced, press it from the output shaft.

(6) If bushing 22, 31 or 34 requires replacement, remove it from housing 21, 30, or 33.

b. Assembly

(1) If bushing 22, 31, or 34 (B, foldout 4) was removed, install a new bushing. Press the bushing into housing 21, 30, or 33 until the bushing shoulder seats against the housing.

(2) If the outer race of rear bearing 12 was removed, install a new race by pressing the thick side of the race toward the rear of housing 16. If seal 17 was removed, press a new seal into housing 16, 21, 30 or 33 with the spring-loaded side of the seal toward the bearing. The rear side of the seal should be flush with the rear surface of the housing.

(3) If facilities are available, heat roller bearing assemblies 12 and, if used, drive gear 20 to 250°F.

(4) If used, install drive gear 20 onto converter shaft 19. If spacer 29 is used, install it against gear 20.

(5) Install the inner races of bearing assemblies 12 (B, foldout 4) onto shaft 13, 18, 19, 28, or 32.

(6) Install shaft assembly 13, 18, 19, 28 or 32 into bearing housing 16, 21, 30 or 33.

(7) Install turbine shaft 1 into output shaft 13, 18, 19, 28 or 32.

(8) Stake three splines of the output shaft to secure the turbine shaft to the output shaft.

(9) Install hook-type sealring 2 onto shaft 1.

6-6. TC 200 SERIES OUTPUT SHAFT ASSEMBLY (AUTOMOTIVE FLANGE)

a. Disassembly

(1) Remove bolt 11 (B, foldout 4) and lockwasher 10 which secure flange 9 to turbine shaft 1.

(2) Remove flange 9, bearing retainer 6 and bearing 4 from shaft 1.

(3) Remove hook-type sealring 2 from turbine shaft 1.

(4) Remove external snapring 3 from flange 9 and press the flange out of bearing assembly 4. Remove the bearing from retainer 6.

(5) If necessary for parts replacement, press oil seal 8 out of retainer 6.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) If oil seal 8 (B, foldout 4) was removed, press in a new seal, with the spring-loaded side toward the bearing assembly. The rear of the seal should be flush with the rear of retainer 6.

(2) Install bearing assembly 4 into bearing retainer 6, and press the bearing onto flange 9.

(3) Install external snapring 3 onto the flange.

(4) Install sealring 2 onto turbine shaft 1.

(5) Install a 1/2-20 x 1 1/4 bolt and lockwasher through flange 9 into shaft 1. Tighten the bolt 83 to 100 pound feet torque.

6-7. TC 300 CONVERTER ELEMENTS (4-ELEMENT)

a. Disassembly of Stators

(1) Remove first-stator assembly 11 (A, foldout 5) from freewheel roller race 16.

(2) Remove washer 14.

(3) Remove second-stator assembly 15 from freewheel roller race 16.

(4) Remove stator freewheel rollers 12 and spring 13 from each of the stators.

NOTE

Refer to paragraph 6-2, above.

b. Assembly of Stators

(1) Place first-stator assembly 11 (A, foldout 5) on the work bench with the thrust washer side (front) down. Coat the cam pockets with oil-soluble grease and install rollers 12 into the shallow part of the cam pocket.

(2) Install springs 13 against the rollers in the position shown in figure 6-3. The springs must be installed with the open ends toward the inside diameter of the stator.

(3) Install freewheel roller race 16 (A, foldout 5) into the stator until it rests on the thrust washer. Install washer 14 onto roller race 16.

(4) Place second-stator assembly 15 on the work bench with the flat side (front) down. Install rollers 12 and springs 13 in the same manner as in (1) and (2), above.

(5) With the rollers and springs properly positioned, lift the second-stator assembly up and install it onto freewheel roller race 16.

c. Disassembly of Converter Pump

(1) Remove eight self-locking bolts 21 (A, foldout 5) and four lockstrips 63 from converter pump hub 23.

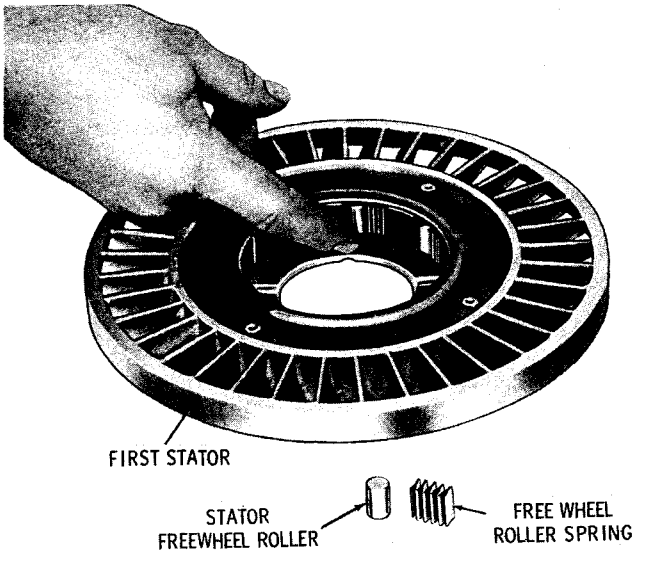


Fig. 6-3. Assembling first-stator assembly (TC 300)

(2) Remove bearing retainer 20 and converter pump assembly 27 from hub 23. Remove sealring 25.

(3) Remove sealring 24 from hub 23.

(4) Only if necessary for parts replacement, press bearing assembly 22 from hub 23.

NOTE

Refer to paragraph 6-2, above.

d. Assembly of Converter Pump

(1) Install sealring 25 (A, foldout 5) into the groove of converter pump assembly 27, near the inside diameter.

(2) Install hub 23, with bearing 22, into pump assembly 27. Install retainer 20, and retain it with four lockstrips 63 and eight 1/4-20 x 5/8-inch bolts 21 (or 1/4-20 x 3/4-inch, self-locking bolts without lockstrips).

NOTE

In assemblies which have a single-row, separable bearing assembly 22, it is essential that the manufacturer's identification on the inner race, and the thinner edge of the outer race, be toward the front of the torque converter.

(3) Tighten the 5/8-inch bolts to 6 to 8 pound feet torque. Tighten the 3/4-inch, self-locking bolts to 9 to 11 pound feet torque. Bend the lockstrips (when used) against the heads of the bolts.

(4) Install hook-type sealring 24 (A, foldout 5) onto hub 23.

NOTE

If bearing assembly 9 (A, foldout 5) must be replaced, pull it from the hub of turbine assembly 10 and press a new bearing onto the turbine hub. Press on the inner race, at the lettered side of the bearing.

6-8. TC 300 SERIES CONVERTER ELEMENTS (3-ELEMENT)

a. Disassembly of Stator

(1) Remove springs 11 (A, foldout 6) and rollers 10 from the stator assembly.

(2) Do not remove thrust bearing 9 unless replacement is necessary.

NOTE

After thorough cleaning, and lubrication with transmission fluid, freewheel roller race 12 can be installed to check for the roughness of bearing 9. Install roller race 12, shouldered side first, and rotate it while pressing it against bearing 9. If roughness is felt, the bearing should be replaced.

(3) If bearing 9 must be replaced, remove it carefully to avoid damaging the aluminum bore which holds it.

(4) Do not disassemble the stator further. If inspection reveals any damage or excessive wear, replace the assembly.

NOTE

Refer to paragraph 6-2, above.

b. Assembly of Stator

(1) If bearing 9 (A, foldout 6) was removed, install a new bearing assembly. The bearing must be installed as shown in figure 6-4. A special tool (fig. 4-3) should be used to insure proper assembly.

(2) Coat the cam pockets in the stator with oil-soluble grease. Install rollers 10 (A, foldout 6) into the shallow ends of the cam pockets. Install springs 11 into the deep ends of the pockets with one open end (next to roller) toward the inside diameter of the stator (fig. 6-5).

(3) Install freewheel roller race 12 (A, foldout 6), shouldered end first, into the stator

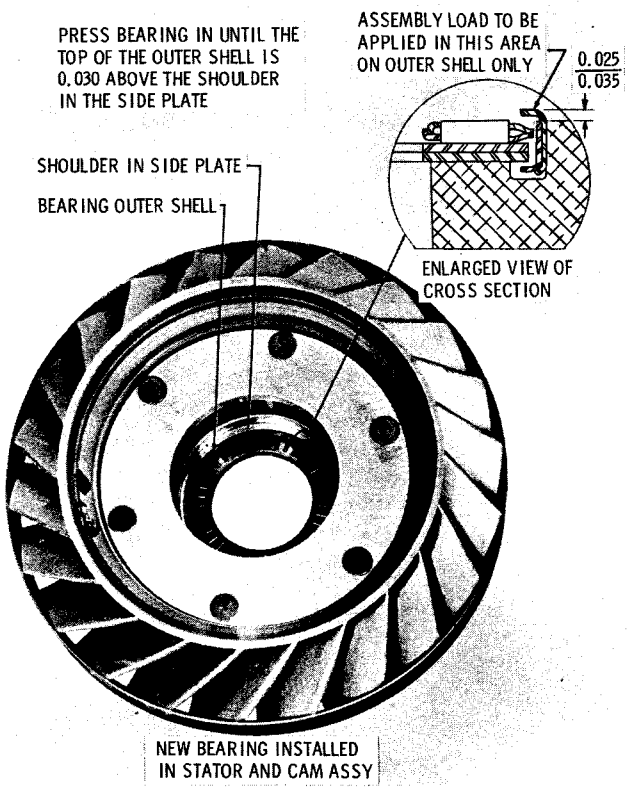


Fig. 6-4. Installation of thrust bearing assembly in stator (TC 300)

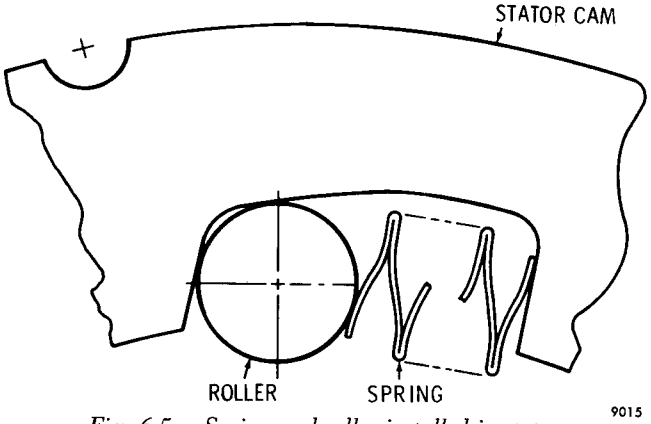


Fig. 6-5. Spring and roller installed in stator cam —view at rear

assembly. Rotate the race clockwise while installing it. This will roll the rollers towards the deep ends of the pockets, allowing the race to enter the stator assembly.

(4) When the roller race is firmly seated against the thrust bearing, twist it firmly in a counterclockwise direction to lock it into place. Lay the stator assembly aside until it is ready for installation into the converter.

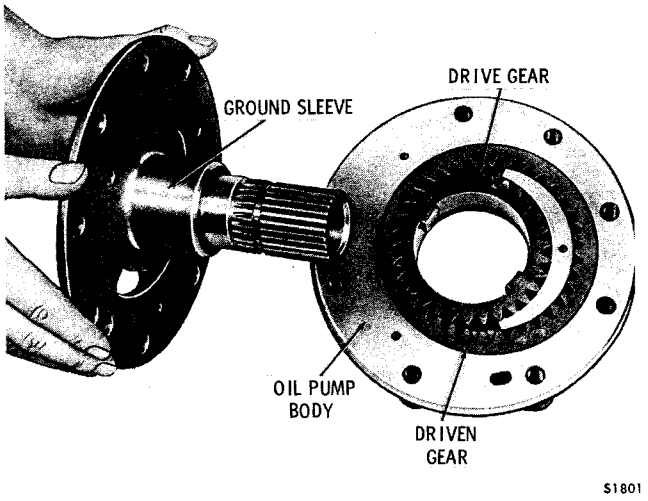


Fig. 6-6. Removing (or installing) stator support (TC 300)

c. Disassembly, Assembly of Pump Assembly

Paragraph 6-7c and d, applicable to rebuild of the pump assembly in 4-element converters, may be followed to rebuild the pump assembly in 3-element converters.

6-9. TC 300 SERIES CHARGING OIL PUMP

a. Disassembly

(1) Remove sealring 35 (A, foldout 5) from pump body 32.

(2) Using an Allen wrench, remove three screws 37 from stator support 36.

(3) Remove the converter ground sleeve (fig. 6-6).

(4) Remove the drive gear and the driven gear from the pump body (fig. 6-6).

NOTE

The gears are serviced as a matched set.

(5) If necessary for parts replacement, drive out oil seal 31 (A, foldout 5) from pump body 32.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) If oil seal 31 (A, foldout 5) was removed from body 32, install a new seal, lip side first. Seat it lightly in body 32.

(2) Install gears 33 and 34 into oil pump body 32.

(3) Install converter stator support 36 into oil pump body 32.

(4) Install three screws 37 into the rear of stator support 36, to secure the support to the pump body.

(5) Install sealring 35 onto oil pump body 32.

6-10. TC 300 SERIES OUTPUT SHAFT ASSEMBLY (INDUSTRIAL TYPE)

a. Disassembly

(1) Remove output shaft 17 (A, foldout 8), 26, 35, 39 or 40 from housing 21, 25, 27 or 36 by pressing on the rear of the shaft.

(2) Press the inner races of bearing assemblies 16 from the output shaft.

(3) Remove accessory drive gear 34, and spacer 38, when used.

(4) If necessary, pull outer race rear bearing assembly 16 from the housing.

(5) Remove oil seal 22 from the housing.

(6) If necessary, remove bushing 28 or 37 from housing 27 or 36.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) If bushing 28 or 37 (A, foldout 8) was removed from housing 27 or 36, install a new bushing. Press the bushing in until the bushing shoulder seats on the housing.

(2) If the outer race of rear bearing assembly 16 was removed, press it into housing 21, 25, 27 or 36.

(3) If oil seal 22 was removed, press a new seal, spring-loaded lip first, into the rear of housing 21, 25, 27 or 36. Locate the rear of seal 22 flush with the rear of the housing.

(4) Install accessory drive gear 34, toothed end first, onto the rear of shaft 35, 39 or 40. Install spacer 38 onto the rear of shaft 40. Press gear 34 against the shaft shoulder. Press spacer 38 against gear 34.

(5) Install the inner races of bearing assemblies 16, larger ends first onto the front and rear ends of shaft 17, 26, 35, 39 or 40.

(6) Install shaft 17, 26, 35, 39 or 40. rear end first, into the front of housing 21, 25, 27 or 36. Seat the rear bearing inner race in its outer race in the housing.

(7) Install the outer race of front bearing assembly 16, thinner edge first, into housing 21, 25, 27 or 36.

6-11. TC 300 SERIES OUTPUT SHAFT ASSEMBLY (WITH OUTPUT FLANGE)

a. Disassembly

(1) Remove bolt 44 (A, foldout 8) and lockwasher 43 that secure flange 42 to shaft 14.

(2) Remove flange 42, bearing retainer 41 and bearing assembly 2 from shaft 14.

(3) Remove sealring 15 and snapring 1 from shaft 14.

(4) Do not remove oil seal 10 from retainer 41 unless replacement is necessary. If necessary, press the seal from the housing.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) If oil seal 10 (A, foldout 8) was removed, press a new seal into bearing retainer 41, with the spring-loaded side next to bearing 2. The rear surface of the seal should be flush with the rear of the retainer.

(2) Install snapring 1 and ball bearing 2 onto shaft 14, positioning the bearing against the snapring.

(3) Install bearing retainer 41 onto bearing 2.

(4) Install flange 42 onto shaft 14.

(5) Install 1/2-inch bolt 44 and lockwasher 43 through the flange and into shaft 14. Tighten the bolt 83 to 100 pound feet torque.

(6) Install sealring 15 onto shaft 14.

6-12. TC 300 SERIES OUTPUT SHAFT ASSEMBLY (HOLLOW SHAFT)

a. Disassembly

(1) Remove sealrings 46 and 47 (A, foldout 8) from shaft 48. Remove snapring 1.

(2) Support bearing retainer 41 and press shaft 48 from bearing 2 and the retainer.

(3) Remove bearing 2 from retainer 41.

(4) If necessary for parts replacement, remove oil seal 10 from retainer 41 by pressing it out.

NOTE

See paragraph 6-2, above.

b. Assembly

(1) If oil seal 10 (A, foldout 8) was removed, press a new seal into retainer 41 with the spring-loaded side next to bearing 2.

(2) Install bearing 2 into retainer 41, positioning the bearing against the shoulder of the retainer.

(3) Support the bearing and bearing retainer assembly on the bearing and press in output shaft 48.

(4) Install snapring 1 onto shaft 48 against bearing 2.

(5) Install sealrings 46 and 47.

6-13. TC 200, 300 INPUT DISCONNECT CLUTCH

a. Disassembly

(1) Use an 11/16-inch wrench to prevent flexible lubrication tube assembly 27 (A, foldout 7) from turning inside housing 4 (B, foldout 7); remove jam nut 26 (A, foldout 7). Push the tube assembly to the inside of the housing. The housing is marked for proper installation of the tube.

(2) Place clutch control hand lever 34 (A, foldout 7) in released (rearward) position and remove 3-segment facing 7.

(3) Remove bolt 36 and lockwasher 35 from hand lever 34. Remove the lever.

(4) Place the input disconnect clutch housing on its rear face (fig. 6-7).

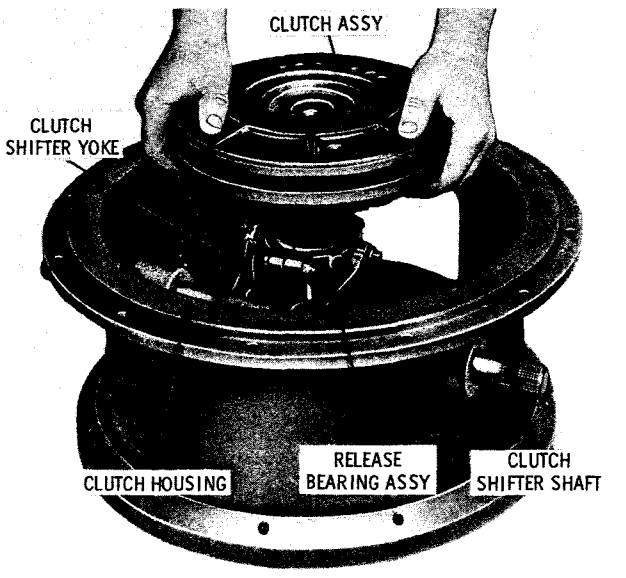


Fig. 6-7. Removing (or installing) input disconnect clutch assembly

(5) Straighten the tab on lockwasher 3 (A, foldout 7).

(6) Remove nut 2 and lockwasher 3.

(7) Remove clutch assembly 4 and key 28 from the shaft (fig. 6-7).

(8) Remove two bolts 29 (A, foldout 7) and lockwashers 30 from clutch shifter yoke 31.

(9) Remove clutch shifter shaft 33, from either side. Two Woodruff keys 32 can be removed from the shaft as the shaft is removed from the yoke and housing (fig. 6-8).

(10) Remove tube assembly 27 (A, foldout 7) from release bearing 22.

(11) Remove the external snapring from the shaft (fig. 6-8).

(12) Place the input clutch housing in a vertical position.

(13) Remove converter input shaft assembly (fig. 6-8).

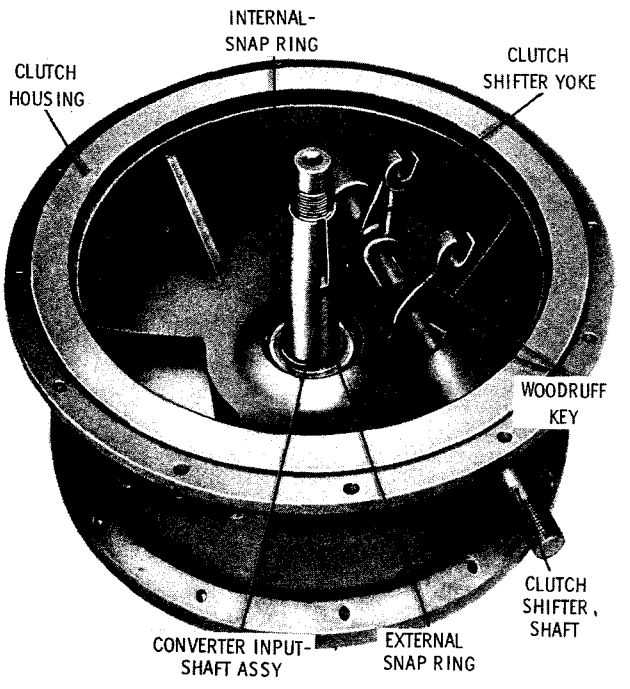


Fig. 6-8. Input disconnect clutch shifter shaft and yoke

(14) Remove internal snapring 2 (B, foldout 7), and bearing 3.

(15) Remove eight bolts 10 and nuts 9. Remove drive ring 11 (and gasket 12 on TC 300 models).

(16) Disassemble clutch assembly 4 (A, foldout 7) as outlined in (17) through (24), below.

(17) Remove two bolts 24 (A, foldout 7) and nuts 23 from release bearing assembly 21 and remove bearing 22.

(18) Remove lever springs 14.

(19) Remove retainer rings 15 from the three clevis pins 13 that secure levers 16 to clutch body 5.

(20) Remove the three pins 13 and remove release sleeve 20 and levers 16.

(21) Remove retainer rings 18 (A, foldout 7) from clevis pins 19, disassembling connecting links 17 from levers 16 and release sleeve 20.

(22) Remove three separator springs 6 and pressure plate 8.

(23) Remove fillister-head screw 11, shakeproof washer 10, and adjusting lock 9.

(24) Thread adjusting nut 12 out of pressure plate 8.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) Thread adjusting nut 12 (A, foldout 7) into pressure plate 8.

(2) Lay clutch body 5 on the table with the clutch facing side up.

(3) Install three separator springs 6 into clutch body 5.

(4) Install pressure plate 8 onto separator springs 6.

(5) Install the three levers 16 and three clevis pins 13 on clutch body 5 and install the three retainer rings 15 on clevis pins 13.

(6) Install the six connecting links 17 and the three clevis pins 19 on levers 16. Install the three retainer rings 18 on clevis pins 19.

(7) Install release sleeve 20 (A, foldout 7) and three clevis pins 19 to the connecting links 17. Install three retainer rings 18 on clevis pins 19.

(8) Install lever springs 14.

(9) Install release bearing 22 and secure it with two 5/16-24 x 1 3/4-inch bolts 24 and nuts 23. Tighten the nuts to 14 to 18 pound feet torque.

(10) Turn adjusting nut 12 to a position that will allow links 17 to be past center when the clutch is in the applied position and the 3-segment facing is installed. This facing must be held tightly in the clutch.

NOTE

Position the facing segments so that, as the clutch is applied, the inner diameter edge of the segments will not be broken by the shoulder on the clutch body.

(11) Do not install the lock on the adjusting nut until after final adjustment has been made. Refer to paragraph 7-3b for adjustment.

(12) On TC 300 models, apply Permatex no. 3 sealer (or equivalent) to both sides of gasket 12 (B, foldout 7). Apply sealer also to the rear mounting surface of shaft assembly 8, and to front of drive ring 11.

(13) Install the gasket and drive ring. Retain the drive ring with eight bolts 10 and nuts 9. Tighten the nuts to 36 to 43 pound feet torque.

(14) On TC 200 models, no gasket nor sealer is used. Install drive ring 11, bolts 10 and nuts 9. Tighten the nuts to 36 to 43 pound feet torque.

(15) Install shaft assembly 8, with drive ring attached, into housing 4. Install bearing 3 and retain it with snapring 2.

(16) Install snapring 1 to retain shaft assembly 8.

(17) Install tube assembly 27 (A, foldout 7) into release bearing 22.

(18) Install clutch shifter shaft 33 through one bore in the housing. Install two Woodruff keys and the clutch shifter yoke onto the shaft, and then push the shaft through the other bore in the housing (fig. 6-8).

(19) Center shaft 33 (A, foldout 7) in the housing and center yoke 31 on the shaft. Install two 3/8-16 x 1 1/4-inch bolts 29, with washers 30, in the yoke and tighten them 26 to 32 pound feet.

(20) Use a good quality heavy grease on key 28 and install the key in the clutch assembly keyway.

(21) Install the clutch assembly and the key on the shaft assembly. The yoke must be engaged with the clutch release bearing as the clutch assembly is lowered onto the shaft (fig. 6-7).

(22) Install lockwasher 3 (A, foldout 7) and nut 2 on the end of shaft assembly 8 (B, foldout 7). Position the washer with the tab in the keyway. Tighten the nut to 200 to 250 pound feet torque.

(23) Using a drift, bend a section of the washer against a flat on the nut.

(24) Install clutch control hand lever 34 (A, foldout 7).

(25) Install a 3/8-16 x 1 3/8-inch bolt 36 and washer 35 into lever 34 and tighten the bolt 26 to 32 pound feet torque.

NOTE

Prior to S/N 42917, use a 1/2-13 x 1 3/4-inch bolt. Tighten the bolt to 67 to 80 pound feet torque.

(26) Push lubrication tube 27 through the hole in the housing and install jam nut 26 on the tube. Prevent the tube assembly from turning by holding the tube fitting inside the housing with an 11/16-inch wrench. Tighten the jam nut with a 15/16-inch wrench.

6-14. TCA 200, 300 ACCESSORY DRIVE

a. Disassembly

(1) Remove oil seal 10 (B, foldout 8) from adapter 9.

(2) Support the inner race of ball bearing 30 (A, foldout 8), and press accessory driven gear 29 from the bearing and sleeve 31.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) Support accessory driven gear 29 (A, foldout 8) and press bearing 30 onto the upper end of the shaft.

(2) Press sleeve 31, unsplined end first, against bearing 30.

(3) Install a new oil seal 10 (B, foldout 8) into adapter 9. The lip of the oil seal must be facing away from adapter 9.

6-15. TC 200, 300 REAR DISCONNECT CLUTCH HOUSING

a. Disassembly

(1) Remove hook-type sealring 12 (A, foldout 8) or 2 (B, foldout 4) and snapring 1 (A, foldout 8) or 3 (B, foldout 4) from turbine shaft 11 (A, foldout 8) or 39 (B, foldout 4).

(2) Press turbine shaft from ball bearing assembly and rear disconnect clutch housing 8 (A, foldout 8) or 40 (B, foldout 4).

(3) Remove the ball bearing assembly from the housing.

(4) Press oil seal 10 (A, foldout 8) or 8 (B, foldout 4) from the housing.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) Install ball bearing assembly 2 (A, foldout 8) or 4 (B, foldout 4).

(2) Press a new oil seal into the housing.

(3) Press turbine shaft 11 (A, foldout 8) or 39 (B, foldout 4) into the bearing and housing 8 (A, foldout 8) or 40 (B, foldout 4).

(4) Install snapring 1 (A, foldout 8) or 3 (B, foldout 4) and sealring 12 (A, foldout 8) or 2 (B, foldout 4) onto the turbine shaft.

6-16. TORQUE VALUES — ILLUSTRATED

Figure 6-9, which follows, shows the torque values for the threaded fasteners visible in the illustration.

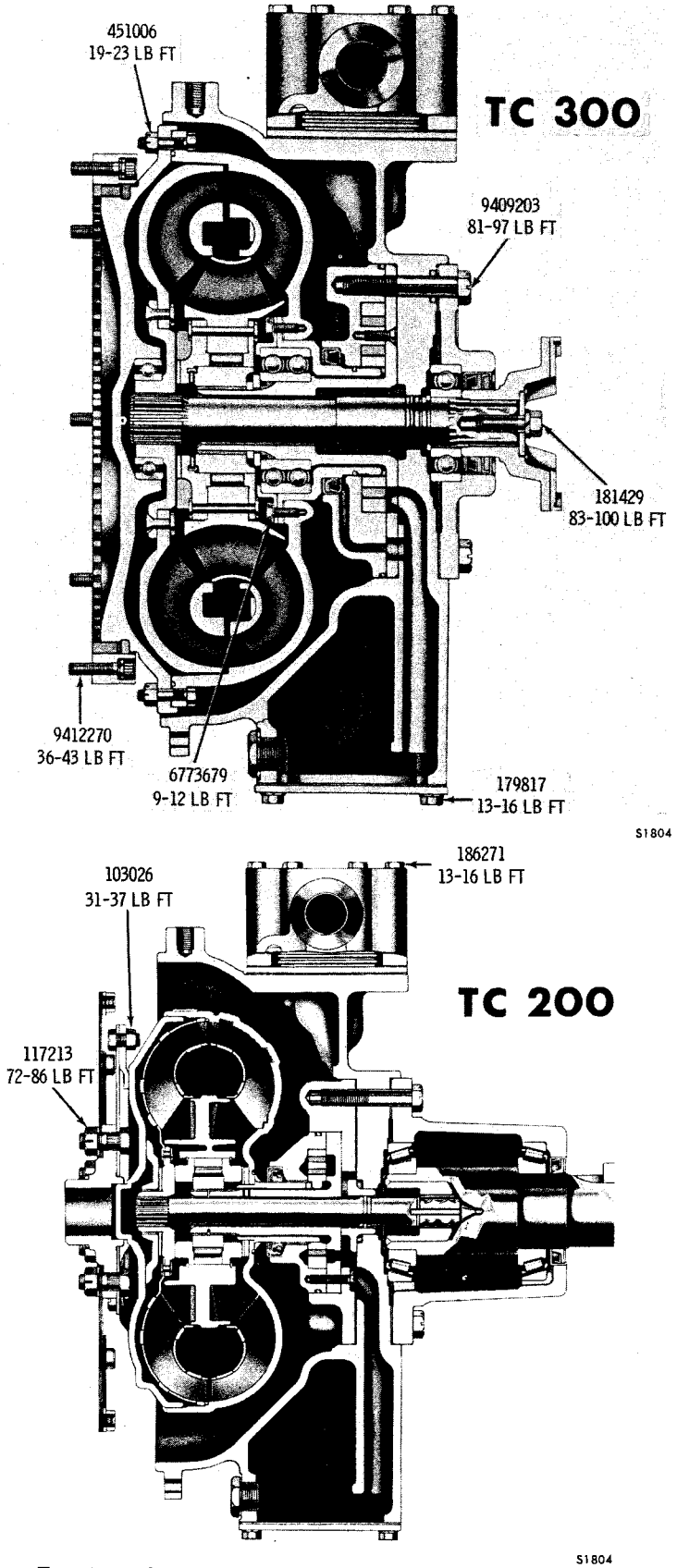


Fig. 6-9. Cross-section views, showing torque specifications

Section 7. ASSEMBLY OF CONVERTER FROM SUBASSEMBLIES

7-1. SCOPE OF SECTION 7

a. This section includes instructions for the assembly of all TC 200 and TC 300 series torque converter assemblies from subassemblies. The subassemblies are rebuilt as outlined in Section 6.

b. Paragraph 7-2 covers the installation of the charging oil pump for all assemblies.

c. Paragraph 7-3 covers the installation of converter elements for all assemblies.

d. Paragraph 7-4 covers the installation of the converter turbine and output shafts for all assemblies.

e. Paragraph 7-5 covers the installation of input drive components for all assemblies.

f. Paragraph 7-6 covers the installation of exterior components for all assemblies.

g. Paragraph 7-7 covers the installation of the input disconnect clutch for all assemblies.

7-2. INSTALLATION OF CHARGING OIL PUMP

a. TC 200 Models

(1) Install charging oil pump assembly 23 (A, foldout 3) into adapter 33. Secure the adapter to the pump with five 1/4-20 x 1-inch bolts 36. Tighten the bolts to 9 to 11 pound feet torque.

(2) Install two 1/2-13 x 3-inch headless guide bolts into adapter 33 (A, foldout 3).

(3) Install adapter gasket 34 onto adapter 33.

(4) Install two flat-head screws 55 (A, foldout 3) from the rear of converter housing assembly 39 and secure the adapter to the converter housing.

b. TC 300 Models

(1) Install two 1/2-13 x 3-inch headless guide bolts into the rear of charging oil pump assembly 29 (A, foldout 5).

(2) Install greased sealring 35 onto pump body 32.

(3) Install the charging oil pump assembly into the front of converter housing assembly 46. Secure the charging oil pump to the converter housing with two flat-head, 1/4-20 x 1 3/4-inch screws 39.

7-3. INSTALLATION OF CONVERTER ELEMENTS

a. TC 240 Models

NOTE

If welded converter assembly 64 (A, foldout 3), or 69 (B, foldout 3) is used, refer to b, below.

(1) Install the converter pump assembly (fig. 7-1). Index the slot in the pump hub with the tangs on the charging pump drive gear.

(2) Install converter pump thrust washer 19 (A, foldout 3) and snapring 12 into assemblies after S/N 31822. Install thrust washers 58 and 57, and snapring 12 into assemblies before S/N 31823.

(3) Install the stator assembly, as rebuilt in paragraph 6-3.

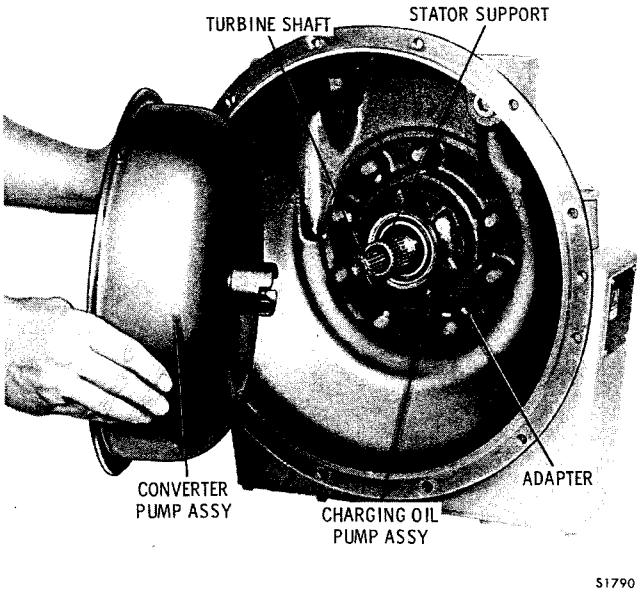


Fig. 7-1. Installing converter pump assembly (TC 200)

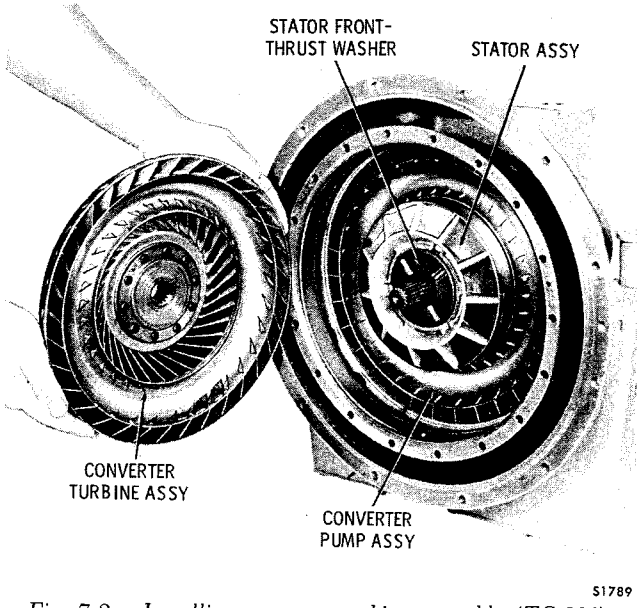


Fig. 7-2. Installing converter turbine assembly (TC 200)

(4) Install snapring 6 (A, foldout 3) into its groove on the stator support. In addition, install thrust washer 56 into assemblies before S/N 31823.

(5) Install turbine assembly (fig. 7-2).

(6) Install thrust washer 4 (A, foldout 3).

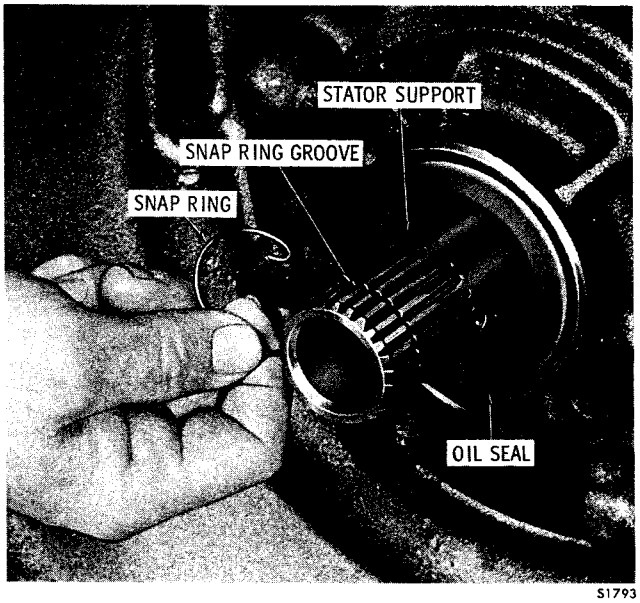


Fig. 7-3. Installing converter snapring (TC 250)

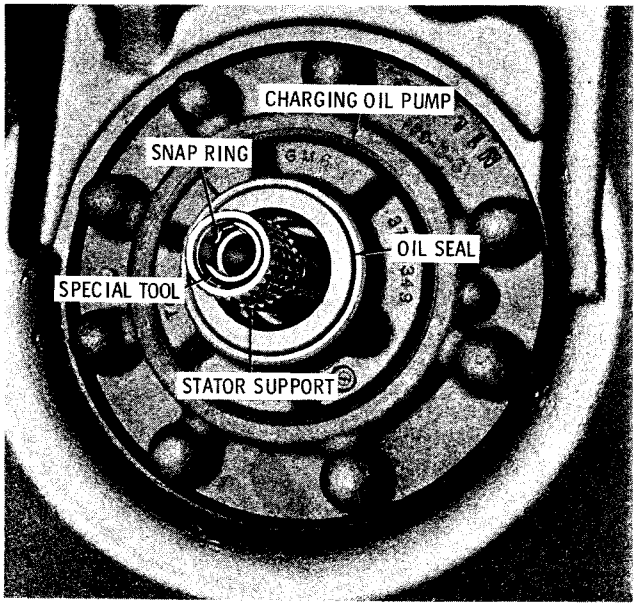


Fig. 7-4. Special tool engaging converter snapring (TC 250)

b. TC 250 Models (welded converter)

(1) Install snapring 12 (A, foldout 4) onto stator support 22, placing the ends of the snapring in the slot opening in the stator support. Install the snapring by first inserting one end onto the slot of the support, then "skating" the other end around the support, into the slot (fig. 7-3).

(2) Install the special tool (fig. 4-4) into the stator support (fig. 7-4).

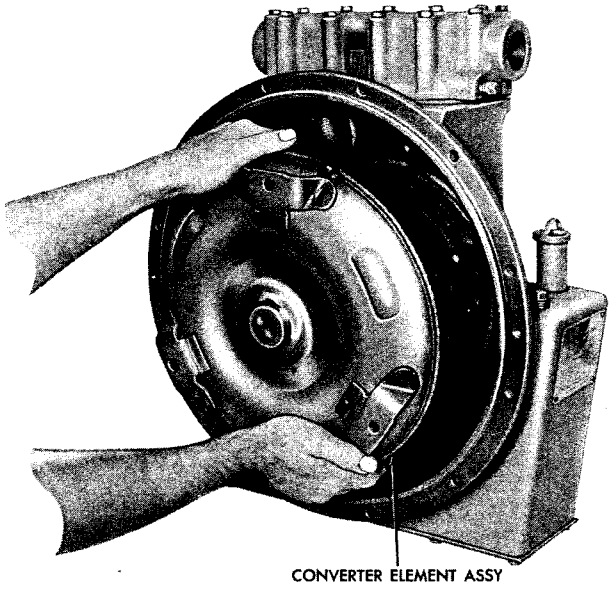


Fig. 7-5. Installing torque converter assembly (TC 250)

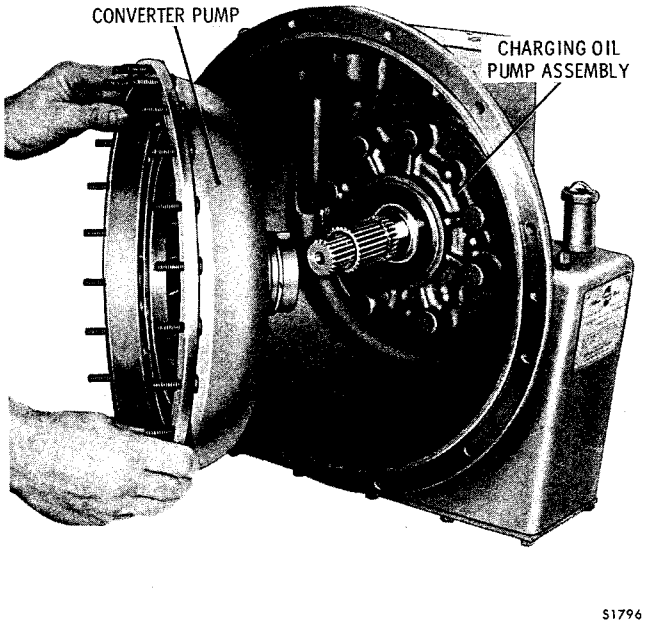


Fig. 7-6. Installing converter pump assembly (TC 300)

(3) Install the torque converter assembly onto the stator support (fig. 7-5). Be very careful that the converter is kept concentric with the stator support. Serious damage to the charging pump oil seal may occur if the converter assembly is not kept concentric.

(4) Push the converter onto the support until the stator race in the assembly contacts the snapring on the support. Twist the special tool slightly and push the converter over the snapring.

CAUTION

The converter assembly has no positive stop when installed. Therefore, after contacting the snapring the assembly should be moved 1/2 inch or less. Remove the tool. Then move assembly until the snapring springs into position. If the converter assembly is moved 1/4 to 1/2 inch beyond its proper location, the weld bead on the converter hub may damage the oil seal (fig. 7-3) in the charging oil pump.

(5) When the special tool is removed, the snapring is released and will locate in the groove of the stator race. This retains the converter assembly. Use reasonable effort on the assembly to make sure the converter assembly is secure. There should be a normal end play of 0.010 to 0.035 inch.

c. TC 300 Models (3-element)

(1) Install converter pump assembly, as rebuilt in paragraph 6-7c and d (fig. 7-6).

(2) Install spacer 14 (A, foldout 6) and snapring 13 onto stator support 32.

(3) Install the stator assembly, as rebuilt in paragraph 6-8a and b.

(4) Install turbine assembly 7 (A, foldout 6) with bearing 6.

d. TC 300 Models (4-element)

(1) Install the converter pump assembly, as rebuilt in paragraph 6-7c and d (fig. 7-6).

(2) On assemblies before S/N 7144, install spacer 19 (A, foldout 5).

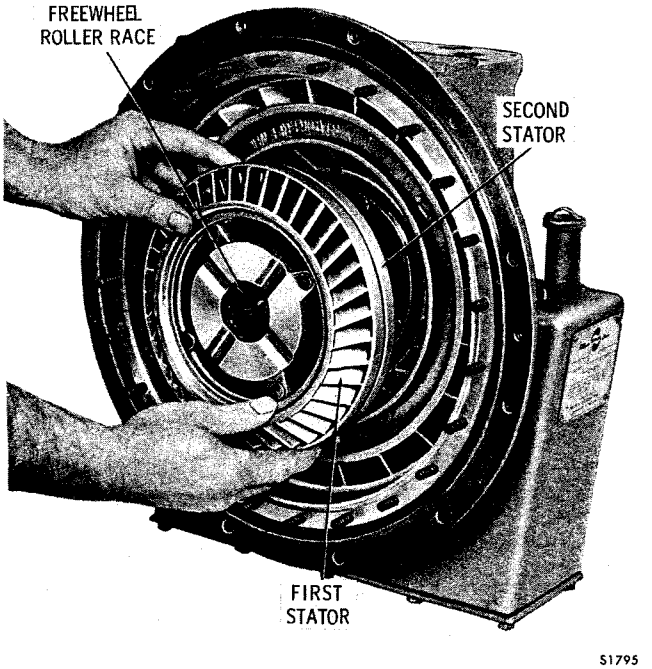


Fig. 7-7. Installing first-and-second stator assembly (TC 300)

(3) Install freewheel roller race spacer 18 and snapring 17.

(4) Install, as a unit, the first-stator assembly, the freewheel roller race and the second-stator assembly, as rebuilt in paragraph 6-7a and b (fig. 7-7). Be sure stator washer 14 (A, foldout 5) is in its proper location between the first and second stators prior to installation.

(5) Install the turbine assembly with its front bearing assembly (fig. 7-8).

7-4. INSTALLATION OF TURBINE SHAFTS, OUTPUT SHAFTS

a. TC 200 with Automotive Flange

(1) Set the converter housing in a vertical position, top upward.

(2) Install gasket 5 (B, foldout 4) and the output shaft assembly, as rebuilt in paragraph 6-6 (fig. 7-9).

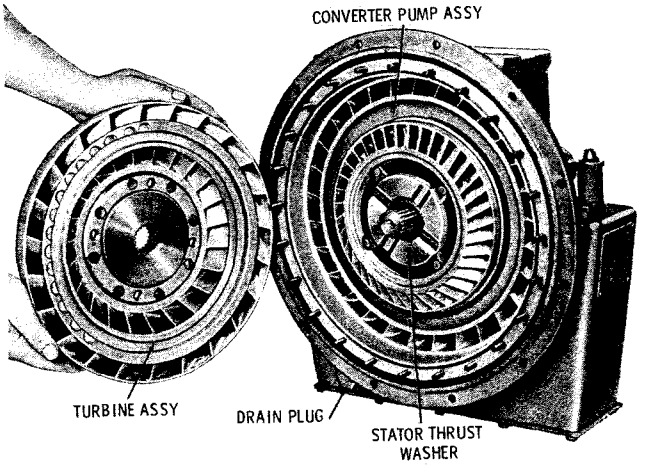


Fig. 7-8. Installing converter turbine assembly (TC 300)

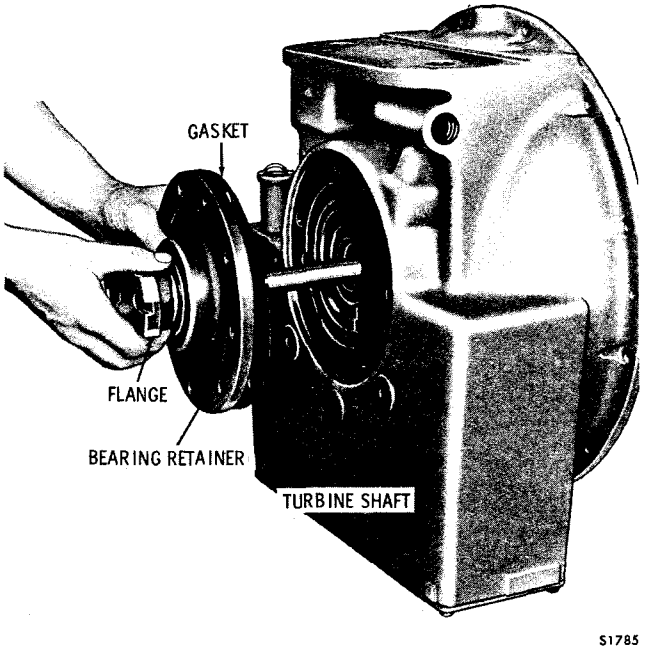


Fig. 7-9. Installing automotive shaft assembly (TC 200)

(3) Secure the bearing retainer with eight 1/2-13 x 2 1/2-inch, self-locking bolts 7 (B, foldout 4). Tighten the bolts to 81 to 97 pound feet torque.

b. TC 300 with Automotive Flange

(1) Set the converter housing in a vertical position, top upward.

(2) Install eight sealrings 3 (A, foldout 8) and gasket 4.

(3) Install the output shaft assembly, as rebuilt in paragraph 6-11 (fig. 7-10).

(4) Secure the assembly with eight 1/2-13 x 2 3/4-inch, self-locking bolts 9 (A, foldout 8). Tighten the bolts to 81 to 97 pound feet torque.

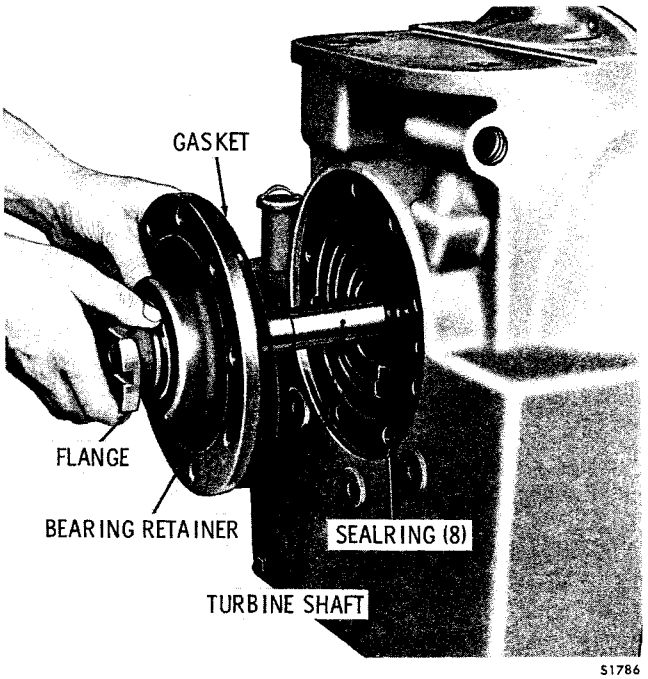


Fig. 7-10. Installing automotive shaft assembly (TC 300)

c. TC 200 with Industrial Shaft

NOTE

Four types of bearing housings are used with the industrial shaft. Bearing housing 16 (B, foldout 4), 21, 30 or 33. The latter three, 21, 30, or 33, are required when an accessory drive is included (TCA). Installation of all four housings to the converter housing is identical and can be accomplished as follows.

(1) Set the converter housing in a vertical position, top upward.

(2) Install shims 15 (B, foldout 4) onto the rear of the converter housing. Coat each side of the shim pack with a nonhardening sealer.

(3) Install the output shaft assembly, as rebuilt in paragraph 6-5.

(4) Install eight 1/2-13 x 2 1/2-inch, self-locking bolts 7 (B, foldout 4) for housings 16, 21; or 2 3/4-inch for housings 30, 33; into the bearing housing. Tighten the bolts 81 to 97 pound feet torque.

(5) The end play of the output shaft must be 0.001 to 0.003 inch. If the end play is not within limits, add or subtract shims until the end play is correct.

d. TC 300 with Industrial Shaft

CAUTION

To prevent improper assembly of these models, install the drive cover and over-running clutch (para 7-5b, below) or drive cover (para 7-5d, below) prior to installing the turbine and output shafts. Failure to follow this sequence can result in the turbine shaft slipping forward, and sealring 15 (A, foldout 8) being out of its bore.

NOTE

Four types of bearing housings are used with the industrial shaft: housing 21 (A, foldout 8), 25, 27 or 36. The latter two, 27 or 36, are required when an accessory drive is included (TCA). Installation of all four housings to the converter housing is identical and can be accomplished as follows.

(1) Set the converter housing in a vertical position, top upward.

(2) Install eight sealrings 19 (A, foldout 8) and shims 20 onto the rear of the converter housing. Coat each side of the shim pack with nonhardening sealer before installation.

(3) Install the long-spline end of turbine shaft 14 (A, foldout 8), with sealring 15 and snapring 13, into the splined end of output shaft 17, 26, 35, 39 or 40, (as assembled with other components in para 6-10).

(4) Install the turbine shaft and output shaft components into the rear of the converter housing. When adapter plate 24 (A, foldout 8) is used, install it.

(5) Secure bearing housings 21, 25, 27 or 36 to the converter housing with eight 1/2-13 x 3-inch bolts 23 (A, foldout 8); 3 1/4-inch bolts on assemblies including plate 24. Tighten the bolts 81 to 97 pound feet torque.

(6) End play tolerance of shaft assemblies is 0.001 to 0.003 inch. Add or subtract shims to meet the above requirements.

e. TC 200 with Rear Disconnect Adapter

(1) Set the converter housing in a vertical position, top upward.

(2) Install gasket 5 and housing 40 (B, foldout 4) and its attached parts (as rebuilt in para 6-15) onto the converter housing. Install eight 1/2-13 x 2 3/4-inch, self-locking bolts 38 through the clutch housing into the converter housing. Tighten the bolts 81 to 97 pound feet torque.

f. TC 300 with Rear Disconnect Adapter

(1) Repeat e(1), above.

(2) Install eight sealrings 3 (A, foldout 8) into their recesses in the converter housing. Install gasket 4 onto the converter housing.

(3) Install rear disconnect clutch housing 8 or bearing retainer 50, turbine shaft 11 and bearing assembly 2, as assembled in paragraph 6-15, onto the converter housing.

(4) Install eight 1/2-13 x 2 3/4-inch, self-locking bolts 9 (A, foldout 8); 3-inch bolts used with retainer 50; through housing 8 or bearing retainer 50 into the converter housing. Tighten the bolts 81 to 97 pound feet torque.

g. TC 300 with Hollow Output Shaft

(1) Place the converter housing in a vertical position, top upward.

(2) Install eight sealrings 3 (A, foldout 8) and gasket 4 onto the converter housing.

(3) Install the output shaft assembly, as rebuilt in paragraph 6-12.

(4) Secure bearing retainer 41 (A, foldout 8) to the converter housing with eight 1/2-13 x 2 3/4-inch, self-locking bolts 9. Tighten the bolts to 81 to 97 pound feet torque.

7-5. INSTALLATION OF INPUT DRIVE COMPONENTS

a. Over-running Clutch, Drive Cover (TCO 240)

(1) Place the rear of the hub of turbine assembly 10 (B, foldout 3) on a support and install sprag assembly 9 onto the front of the turbine hub, with the flanged side of the sprag away from the hub (forward). Refer to figure 7-11.

(2) Install gear and cover 8 (B, foldout 3) over sprag 9 and install sprag retainer 6 into gear and cover 8. Refer to figure 7-11.

(3) Install bearing 5 (B, foldout 3) and sealring 3 into the gear and cover.

(4) Install snapring 4.

(5) Install bearing cover 2 and secure it with snapring 1. Refer to figure 7-11.

(6) Install sealring 24 (B, foldout 3) into the groove in pump assembly 27. Retain the sealring with oil-soluble grease.

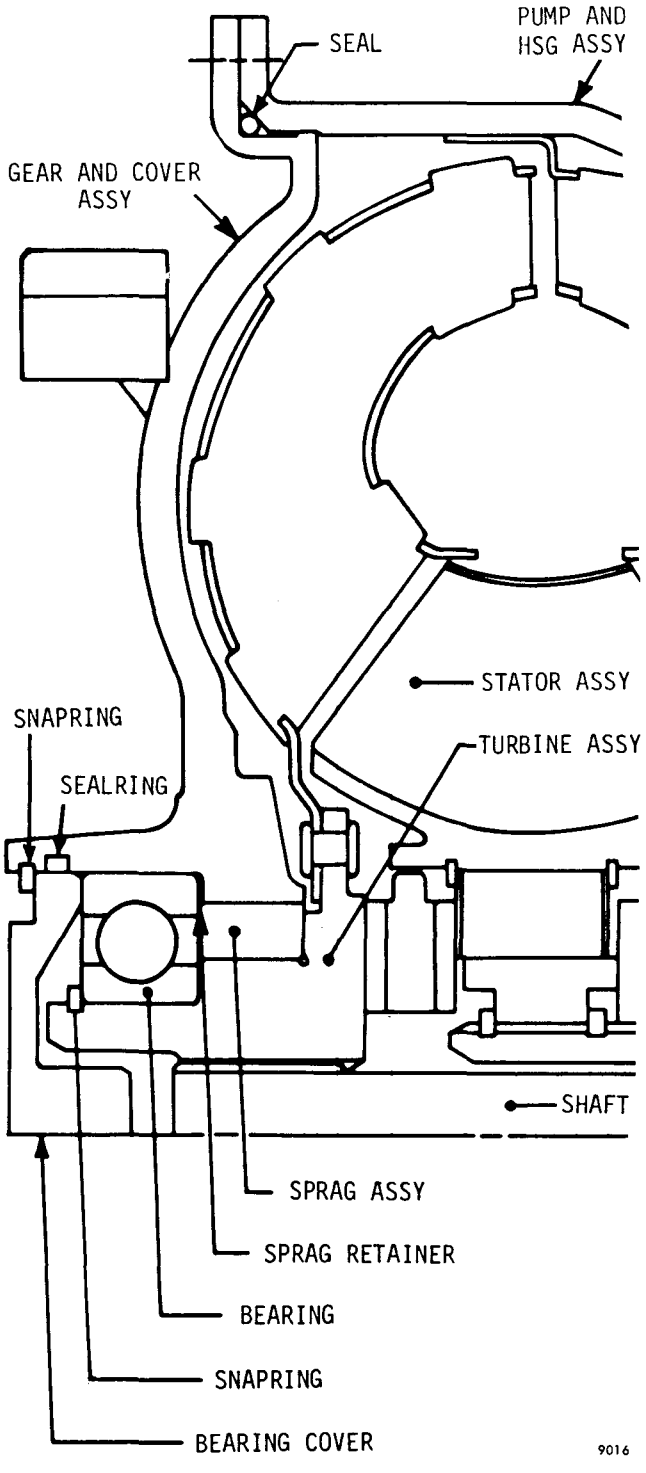


Fig. 7-11. Over-running clutch (TCO 240)

(7) Install the gear and cover, and the turbine assembly with attached parts onto the converter output shaft.

(8) Secure the front cover to the converter pump by tightening eighteen 5/16-inch nuts 7 (B, foldout 3) to the special serrated bolts 26. Tighten the nuts to 19 to 23 pound feet torque.

b. Over-running Clutch, Drive Cover (TCO 300)

(1) Position turbine 13 (B, foldout 6) flat (rear) side down and install sprag assembly 12, flange side upward (forward).

(2) Install gear and cover 11 over the sprag assembly.

(3) Install retainer 6 and bearing 5 into gear and cover 11. Install snapring 4.

(4) Install sealring 3 into the internal groove in cover 11. Install cover 2 and snapring 1.

(5) Install sealring 28 into the groove in pump assembly 29. Retain it with oil-soluble grease.

(6) Carefully install the assembled gear and cover, and the turbine assembly with attached parts onto the converter pump.

(7) Install twenty-four self-locking nuts 19 (B, foldout 6) to retain gear and cover 11 to converter pump assembly 29. Tighten the nuts to 19 to 23 pound feet torque.

c. Drive Cover (TC 240)

(1) Install sealring 20 (A, foldout 3) onto pump 22. Use an oil-soluble grease to retain the sealring.

(2) Aline the bolt holes in the converter pump and the gear and cover. Install the gear and cover.

(3) Secure the gear and cover assembly with eighteen 5/16-inch nuts 1 to the special bolts 21. Tighten the nuts to 19 to 23 pound feet torque.

d. Drive Cover (TC 300)

NOTE

The converter may be driven by a gear and cover assembly or by a flex disk assembly. Converters with S/N before 13596 are equipped with gear and cover assembly 5 (A, foldout 5). Converters after S/N 13595 are equipped with gear and cover 8. The greased drive ring was incorporated after S/N 23241. An optional gear and cover assembly 60 (A, foldout 5) is used when an engine-driven accessory drive is required.

(1) Install thrust washer 7 (A, foldout 5) and gear and cover assembly 5, on assemblies before S/N 13596. Install gear and cover 8 and bearing assembly 9, on assemblies after S/N 13595.

(2) Install sealring 26 into converter pump 27. Retain the sealring with oil-soluble grease.

(3) Install gear and cover 5 or 8 onto converter pump assembly 27.

(4) Secure the cover by installing twenty-four nuts 4 (A, foldout 5). Tighten the nuts to 19 to 23 pound feet torque.

e. Flex Plate (TC 250)

(1) Place six 1/2-20 x 1 1/4-inch bolts 9 (A, foldout 4), through flex drive plate 8.

(2) Install drive hub 7, disk and washer assembly 4, flex disks 3, and plate 2. Secure the assembly with six 1/2-20 self-locking nuts 1 (A, foldout 4). Tighten the nuts to 72 to 86 pound feet torque.

(3) Install plate 8 onto converter assembly 11 and secure it with three 3/8-24 x 5/8-inch bolts 5, and nuts 10. Tighten the nuts to 41 to 49 pound feet torque (fig. 7-12).

f. Flex Plate (TC 300)

(1) Install disk and washer assembly 58 (A, foldout 6) and three flex disks 57 onto cover 61.

(2) Install six self-locking 1/2-13 bolts 55 through flex disk plate 56, flex disks 57 and disk and washer assembly 58 into cover 61. Tighten the bolts to 81 to 97 pound feet torque.

g. Greased Ring Drive (TC 300)

NOTE

The following installation procedures are applicable to both engine-mounted and input disconnect ring gears.

(1) Apply sealer (Permatex No. 3 or equivalent) to the front and rear of the gasket furnished by the equipment manufacturer or gasket 12 (B, foldout 7), and to drive ring 11 mounting surface on the engine or disconnect clutch.

(2) Secure the drive ring, flat side first, to the vehicle engine or converter input shaft assembly 8 (B, foldout 7), with eight 3/8-24 self-locking bolts 10 (and nuts, when used). Tighten bolts (or nuts) to 36 to 43 pound feet torque.

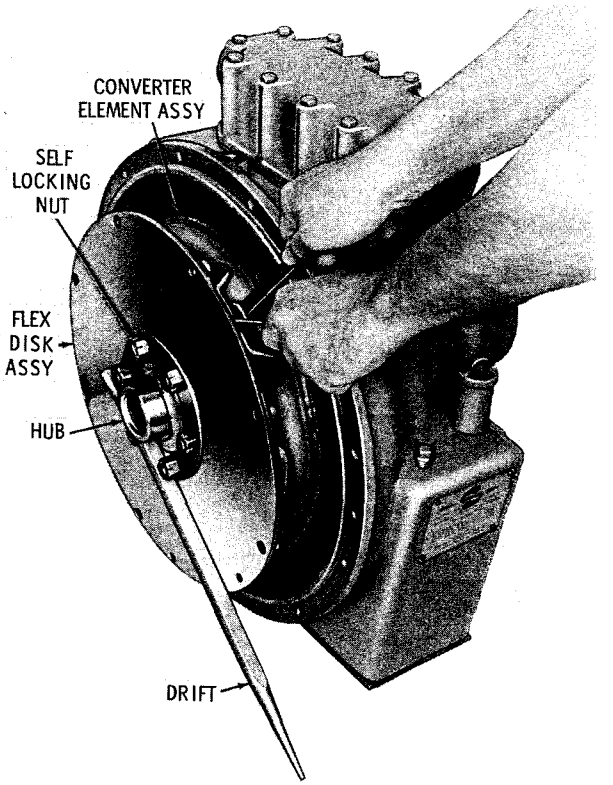


Fig. 7-12. Installing flex disk outer bolts, nuts (TC 250)

(3) Install sealring 3 (A, foldout 6) onto drive gear and cover 5, after lubricating it with grease specified in (4), below. The sealring fits into a groove behind the drive gear teeth.

(4) When ready to install the converter assembly, pack the spaces between the internal teeth of drive ring gear 1 (A, foldout 6), with a high quality molybdenum disulphide grease (Allison P/N 6769877 or equivalent). Fill the teeth completely, but do not use an excessive amount of grease.

NOTE

The grease used must not attack Buna or Polyacrylate (seal material). Mobil-Grease Special with molybdenum disulphide (or equivalent) is recommended.

7-6. INSTALLATION OF EXTERIOR COMPONENTS

a. Drain Plug. If the oil drain plug (fig. 7-13) and gasket at the front of the converter housing was not installed, install and tighten it.

b. Converter Bypass Valve

NOTE

Installation of the bypass valve for the TC 300 is the same as in steps (1) and (2), below, except it is shown in A, foldout 6.

(1) If plugs 41 (A, foldout 3) were removed, install the plugs in the converter-out passage.

(2) Install ball 47, bypass valve spring 48 and plug 49.

c. Sump Plate

NOTE

The following steps describe the installation of the sump plate for the TC 300 series. Installation of the sump plate for the TC 200 series is the same, except it is shown in A, foldout 3.

(1) Turn the converter housing on its side and install gasket 39 (A, foldout 6). Install sump plate 38.

(2) Install nine 5/16-18 x 7/8-inch bolts 37 and lockwashers 36 through the sump plate, into the converter housing. Tighten the bolts to 13 to 16 pound feet torque.

d. Oil Cooler

(1) If orifice plug 6 (B, foldout 8) was removed, replace it. Use a 0.218 diameter orifice for the TC 200, or 0.312 diameter orifice for the TC 300.

(2) Install oil cooler core gasket 5 and cooler core 4 onto the oil cooler mounting pad (fig. 7-14).

(3) Install cover gasket 3 (B, foldout 8) and cover 2. Install twelve 5/16-18 x 3 3/4-inch bolts 1 into the oil cooler cover and tighten the bolts to 13 to 16 pound feet torque.

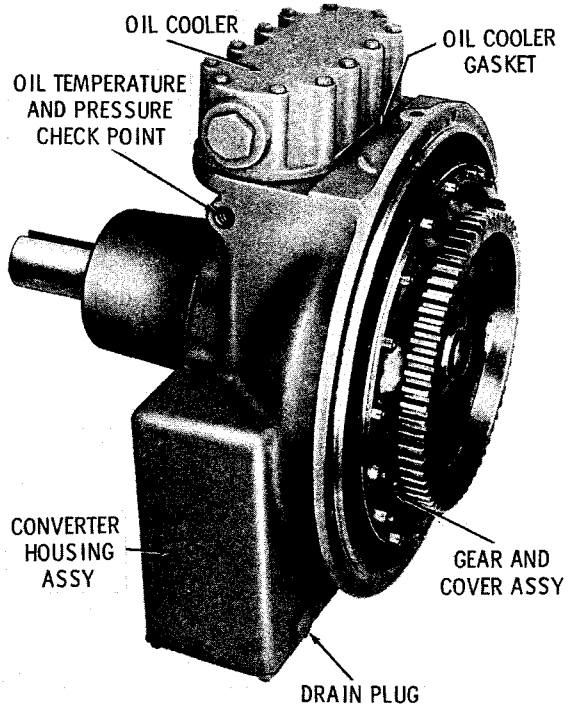


Fig. 7-13. Exterior components of TC 200 converter assembly

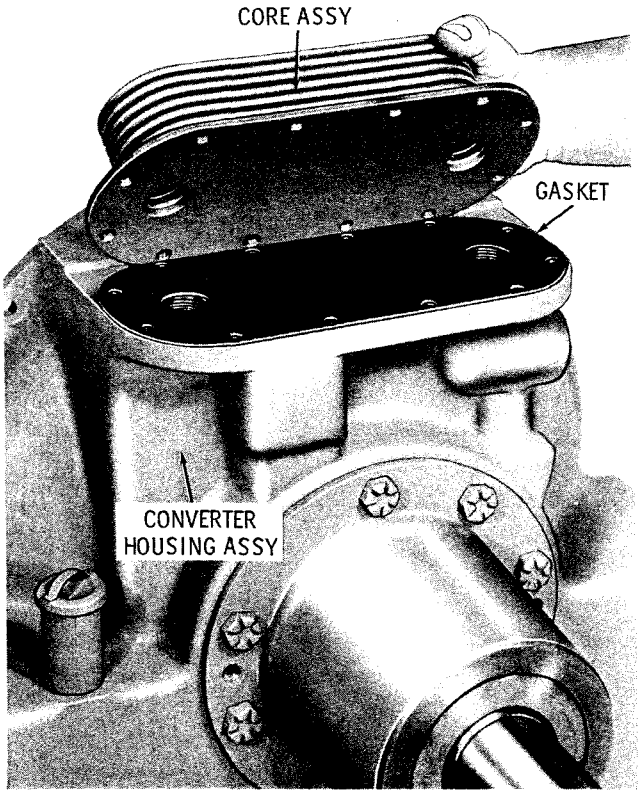


Fig. 7-14. Installing oil cooler core

(4) Install 1/4-inch pipe plug 19.

CAUTION

If the oil cooler option is not used, install four 5/16-18 x 1-inch bolts 50 (A, foldout 3) into the four holes located at the front (engine end) of the cooler mounting pad.

e. Accessory Drive

NOTE

The following steps describe the installation of the accessory drive for the TC 200 series. Installation of the accessory drive for the TC 300 series is the same except it is shown in A, foldout 8.

(1) Press bearing 24 (B, foldout 4) and sleeve 25 onto accessory drvien gear 23 so that the bearing is against the shoulder on the shaft of the gear. Install driven gear 23 and attached parts into bearing housing 21, 30 or 33.

(2) Install spacer 26 and gasket 27.

(3) If the assembly includes a cable drive adapter, install shaft 11 (B, foldout 8), seal 10, adapter 9, four washers 8, and four 5/16-18 x 1 1/8-inch bolts 7. Tighten the bolts to 13 to 16 pound feet torque.

7-7. INSTALLATION OF INPUT DISCONNECT CLUTCH

NOTE

Prior to proceeding with steps (1) and (2) below, refer to paragraph 7-5g, for important lubricating instructions.

a. Place the rear face of the input disconnect clutch housing against the front face of the converter housing. Make sure the gear and cover assembly on the converter is in line with input drive ring 11 (B, foldout 7).

b. Install twelve 3/8-16 x 1 1/8-inch bolts 14 and washers 13 through the converter housing, into the disconnect housing. Tighten the bolts to 26 to 32 pound feet torque.

Section 8. WEAR LIMITS AND SPRING DATA

8-1. SCOPE OF SECTION 8

This section tabulates wear limits and spring data.

8-2. WEAR LIMITS DATA

a. Maximum Variations. Wear limits information in this section shows the maximum wear at which components are expected to function satisfactorily.

b. Cleaning, Inspection. Parts must be clean to permit effective inspection for wear or damage. Refer to paragraph 4-6, above.

c. Bearings, Bearing Journals, Bores. The application of bearings to any product is based on the recommendations of the bearing manufacturer and, therefore, no diametral dimensional deviation should be permitted in the bearing or mated parts. Bearings should be carefully checked for signs of distress before reinstalling in the transmission.

d. Gears. Gears should be inspected for load pattern and signs of distress. Any distress indicates a possible future failure, and the reuse of such gears should be the decision of the individual customer, based on experience. Backlash cannot be used to establish critical wear of a gear. The backlash tolerances are of such nature that a gear usually pits, scuffs, scores, or galls long before the gear wear becomes critical.

e. Splines. Unless severe, spline wear is not considered detrimental except where it affects tightness of an assembly such as driveline flanges. Here, again, backlash cannot be used to establish critical wear because both mating parts must be concentrically located to obtain accurate measurement of backlash.

f. Hook-type Sealrings. Sides of the sealring should be smooth (maximum wear 0.005 inch). The sides of the groove into which the sealrings fit should be smooth (50 microinch equivalent), and square with the axis of rotation within 0.002 inch. A new sealring should be installed if grooves are reworked, or sealring outside diameter wear causes the possibility of a closed gap between sealring hooks when the ring is installed.

g. Illustrations. Figures 8-1 and 8-2 show wear limits to be observed in assembly of the torque converter elements.

8-3. SPRING DATA

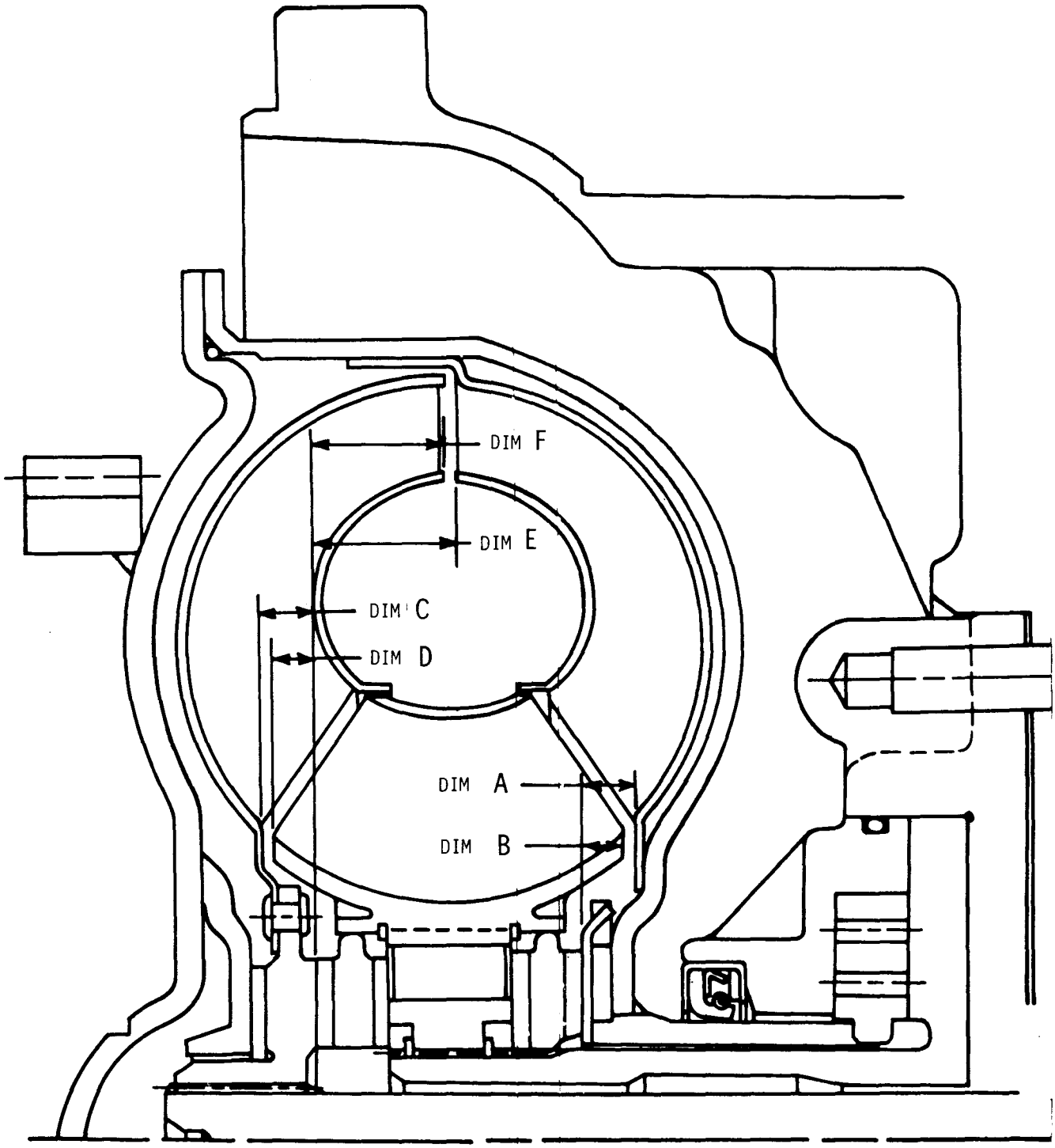
Springs must be clean to permit effective inspection. Springs should be replaced if there are signs of overheating, wear due to rubbing adjacent parts, or permanent set. Discard springs which do not meet the load-height specifications in the spring chart.

8-4. WEAR LIMITS CHART

The chart, which follows, lists the wear limits data and is referenced to the exploded views (foldouts 3 through 8) in the back of this manual.

8-5. SPRING CHART

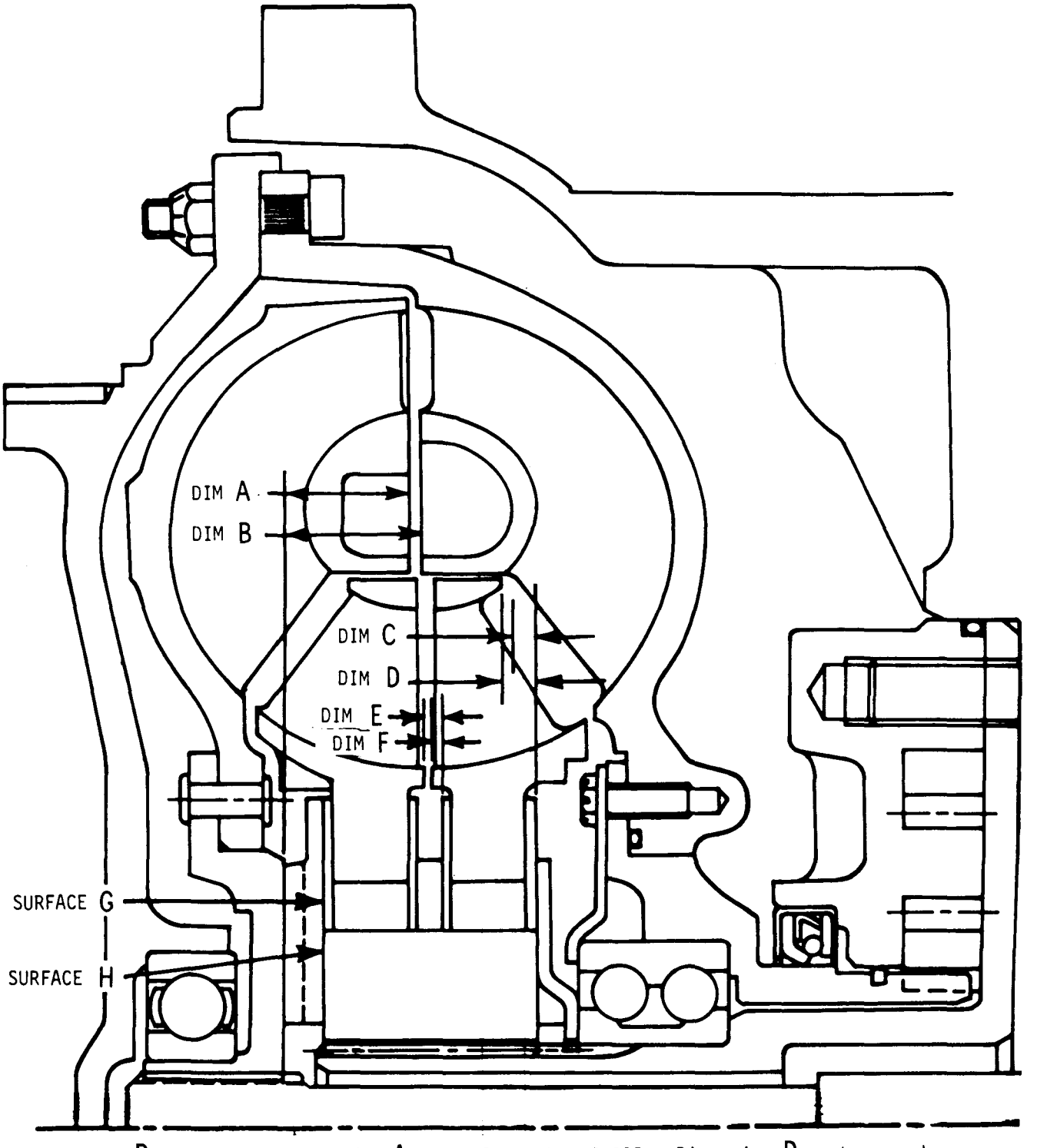
Inspection criteria (load vs height) and identification characteristics of the springs are presented in the chart following the wear limits chart. The spring chart data are keyed to the exploded views (foldouts 3 through 8) in the back of this manual.



Dimension A must exceed dimension B by no less than 0.005. Dimension C must exceed dimension D by no less than 0.005. Dimension E must exceed diemnsion F by no less than 0.005.

9017

Fig. 8-1. Model TC 240 converter, wear limits points of measurement



Dimension B must exceed dimension A by no less than 0.005. Dimension D must exceed dimension C by no less than 0.005. Dimension E must exceed dimension F by no less than 0.005 (may be measured by inserting a 0.005 feeler gage between the shroud diameter of the stators). Surface H (roller race) must project 0.007 minimum beyond surface G (rotor side plate). Clearance at G (between thrust washer and rotor side plate) must be 0.007 minimum.

9018

Fig. 8-2. Model TC 300 converter, wear limits points of measurement

WEAR LIMITS DATA

Illustration	Description	Part number	Dimension	Wear limits	Cone (max)
A, foldout 3	TC 200 SERIES BASIC 3-ELEMENT TORQUE CONVERTER				
3	Bushing bore diameter	3790478	1.247 to 1.249	1.254	
4	Thrust washer thickness	3719262	0.118 to 0.122	0.108	
5	Turbine assy, wear on each thrust face	3702724		0.010	
8	Thrust washer thickness	3735785	0.588 to 0.598	0.568	
10	Freewheel cam inner diameter	3719260	2.190 to 2.192	2.196	
11	Freewheel roller race outside diameter	6754958	2.187 to 2.188	2.187	
19	Thrust washer thickness	3702744	0.0722 to 0.0772	0.060	
24	Gear and body assy	6756644			
	gear side clearance;			0.007	
	gear diametral clearance			0.007	
27	Bushing bore diameter	3702069	1.875 to 1.876	1.880	
32	Stator support pump gear face wear (surface may be reworked to 0.420 min thickness and 80 micro finish)	6773199		0.003	
56	Thrust washer thickness	3709094		0.534	
57	Thrust washer thickness	6756233	0.560 to 0.564	0.540	
58	Thrust washer thickness	6756629	0.071 to 0.074	0.060	
62	Thrust washer thickness	3702103	0.028 to 0.032	0.023	
63	Freewheel cam inner diameter	3719260	2.190 to 2.192	2.196	
B, foldout 3.	TC 200 SERIES BASIC 3-ELEMENT TORQUE CONVERTER WITH OVER-RUNNING CLUTCH				
8	Gear and cover assy, inside diameter at sprag area	6759928	2.8119 to 2.8124	2.8149	
10	Turbine assy, outside diameter of hub at sprag	6759932	2.1540 to 2.1545	2.152	
	wear area on each thrust face			0.010	
13	Thrust washer thickness	3735785	0.588 to 0.598	0.568	
15	Freewheel cam inner diameter	3719260	2.190 to 2.192	2.196	
16	Freewheel race outside diameter	6754958	2.187 to 2.188	2.187	
25	Thrust washer thickness	3702744	0.0722 to 0.0772	0.060	
29	Gear and body assy, gear side clearance;	6756644		0.007	
	gear diametral clearance			0.007	

WEAR LIMITS DATA (Continued)

Illustration	Description	Part number	Dimension	Wear limits	Cone (max)
B, foldout 3.	TC 200 SERIES BASIC 3-ELEMENT TORQUE CONVERTER WITH OVER-RUNNING CLUTCH — Continued				
32	Bushing bore diameter	3702069	1.875 to 1.876	1.880	
37	Stator support, pump gear face wear (surface max be reworked to 0.420 min thickness and 80 micro finish)	6773199		0.003	
63	Thrust washer thickness	6756629	0.071 to 0.074	0.060	
67	Thrust washer thickness	3702103	0.028 to 0.032	0.023	
68	Freewheel cam inner diameter	3719260	2.190 to 2.192	2.196	
A, foldout 4.	TC 200 SERIES BASIC 3-ELEMENT TORQUE CONVERTER WELDMENT				
14	Gear and body assy, gear side clearance; gear diametral clearance	6756644		0.007 0.007	
17	Bushing bore	3702069	1.875 to 1.876	1.880	
22	Stator support, pump gear face wear (surface may be reworked to 0.420 min thickness and 80 micro finish)	6774104		0.003	
A, foldout 5.	TC 300 SERIES BASIC 4-ELEMENT TORQUE CONVERTER				
5	Gear and cover assy, thrust face wear	6755325		0.010	
6	Bushing bore	6754922	1.626 to 1.629	1.634	
7	Thrust washer thickness	6755004	0.122 to 0.128	0.112	
8	Gear and cover assy, thrust face wear	6772408		0.010	
10	Turbine assy, thrust face wear	6769453		0.010	
11	First-stator assy, front thrust washer thickness; rear side plate thickness	6768903	0.316 to 0.320 0.058 to 0.063	0.296 0.048	
12	Freewheel roller diameter	7450737	0.3748 to 0.3750	0.3743	
14	Thrust washer thickness	6754994	0.201 to 0.211	0.191	
15	Second-stator assy, front and rear side plate thickness	6768902	0.058 to 0.063	0.048	
16	Freewheel roller race diameter	6755892	3.499 to 3.500	3.499	

WEAR LIMITS DATA (Continued)

Illustration	Description	Part Number	Dimension	Wear limits	Cone (max)
A, foldout 5.	TC 300 SERIES BASIC 4-ELEMENT TORQUE CONVERTER — continued				
18	Spacer face wear	6769856	0.100 to 0.124	0.007	
19	Spacer face wear	6755896	0.487 to 0.493	0.007	
30	Gear and body assy	6768706			
	gear side clearance;			0.007	
	gear diametral clearance			0.007	
36	Stator support, pump gear face wear (surface may be reworked to 0.270 min thickness and 80 micro finish)	6769530		0.003	
B, foldout 5.	TC 300 SERIES BASIC 4-ELEMENT TORQUE CONVERTER WITH OVER-RUNNING CLUTCH				
11	Converter pump cover	6772301			
	diameter at sprag area		2.8119 to 2.8124	2.8149	
13	Turbine assy, hub diameter	6772310			
	at sprag area;		2.1540 to 2.1545	2.152	
	thrust face wear			0.010	
14	First-stator assy, front thrust	6768903			
	washer thickness;		0.316 to 0.320	0.296	
	rear side plate thickness		0.058 to 0.063	0.048	
15	Stator freewheel roller,	7450737			
	diameter		0.3748 to 0.3750	0.3743	
17	Thrust washer thickness	6754994	0.201 to 0.211	0.191	
18	Second-stator assy, thickness of front and rear side plates	6768902	0.058 to 0.063	0.048	
19	Freewheel roller race, diameter	6755892	3.499 to 3.500	3.499	
21	Spacer face wear	6769856	0.100 to 0.124	0.007	
32	Gear and body assembly,	6768706			
	gear side clearance;			0.007	
	gear diametral clearance			0.007	
38	Stator support, pump gear face wear (surface may be reworked to 0.270 min thickness and 80 micro finish)	6769530		0.003	

WEAR LIMITS DATA (Continued)

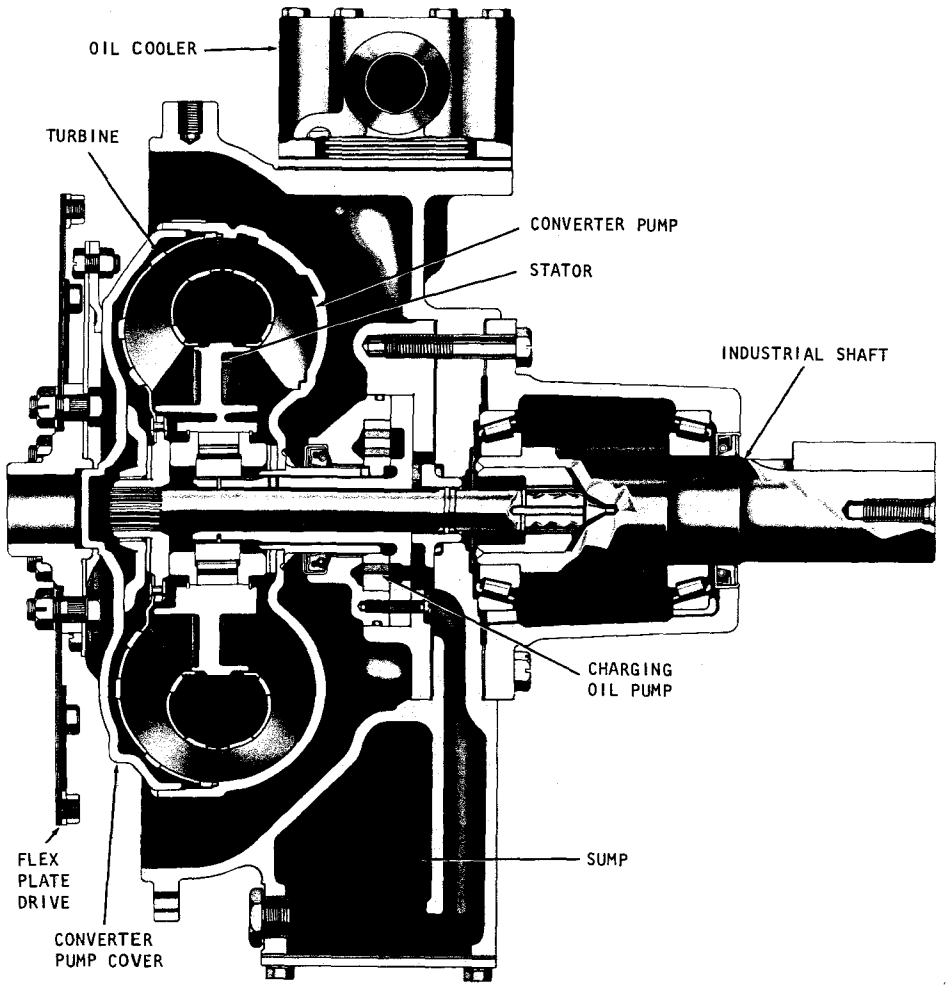
Illustration	Description	Part number	Dimension	Wear limits	Cone (max)
A, foldout 6.	TC 300 SERIES BASIC 3-ELEMENT CONVERTER				
7	Turbine assy, wear on each thrust face	6774622		0.010	
8	Stator assy, thickness of stator thrust washer and thrust bearing installed	6774962	0.4439 to 0.4561	0.435	
10	Freewheel roller, diameter	6774968	0.3748 to 0.3750	0.3743	
12	Freewheel roller race, diameter	6774847	2.8425 to 2.8435	2.8415	
26	Gear and body assy, gear side clearance;	6768706		0.007	
	gear diametral clearance			0.007	
32	Stator support, pump gear face wear (surface may be reworked to 0.270 min thickness and 80 micro finish)	6774626		0.003	
B, foldout 6.	TC 300 SERIES BASIC 3-ELEMENT TORQUE CONVERTER WITH OVER-RUNNING CLUTCH				
11	Converter pump cover, inside diameter at sprag area	6772301	2.8119 to 2.8124	2.8149	
13	Turbine assy, outside diameter at sprag area;	6774816	2.1540 to 2.1545	2.152	
	wear at each thrust face			0.010	
14	Stator assy, thickness of stator thrust washer and thrust bearing installed	6774962	0.4439 to 0.4561	0.435	
16	Freewheel roller diameter	6774968	0.3748 to 0.3750	0.3743	
18	Freewheel roller race diameter	6774847	2.8425 to 2.8435	2.8415	
32	Gear and body assy, gear side clearance;	6768706		0.007	
	gear diametral clearance			0.007	
38	Stator support, pump gear face wear (surface may be reworked to 0.270 min thickness and 80 micro finish)	6774626		0.003	

SPRING CHART

Model TC 200, 300 **Valve body assy.** _____ **Transmission assy.** _____

Fold-out	Ref	Spring	Part No.	No. coils	Diameter of wire	Outside diameter	Free length	under load Length	under load Pounds
A, 3	16	Freewheel roller *	3719261	4	0.0025-0.0035	0.812(W)	0.390	0.218	0.30 to 0.40
A, 3	18	Freewheel roller	3689751	20	0.0177-0.0183	0.172	0.750	0.484	0.500 to 0.650
A, 3	48	Converter bypass valve	6757709	14	0.103-0.107	0.765	2.78	2.15	28 to 31
B, 3	21	Freewheel roller *	3719261	4	0.0025-0.0035	0.812(W)	0.390	0.218	0.30 to 0.40
B, 3	23	Freewheel roller	3689751	20	0.0177-0.0183	0.172	0.750	0.484	0.500 to 0.650
B, 3	46	Converter bypass valve	6757709	14	0.103-0.107	0.765	2.78	2.15	28 to 31
A, 4	38	Converter bypass valve	6757709	14	0.103-0.107	0.765	2.78	2.15	28 to 31
A, 5	13	Freewheel roller *	6771296	6.5	0.003 (thk)	0.56(W)	0.640	0.300	0.20 to 0.35
A, 5	58	Converter bypass valve	6758597	13	0.118-0.122	0.794	2.81	2.11	57.20 to 63.60
B, 5	16	Freewheel roller *	6771296	6.5	0.003 (thk)	0.56(W)	0.640	0.300	0.20 to 0.35
B, 5	58	Converter bypass valve	6758597	13	0.118-0.122	0.794	2.81	2.11	57.20 to 63.60
A, 6	11	Freewheel roller *	6774966	6.5	0.896 (thk)	0.0025(W)	0.640	0.300	0.15 to 0.33
A, 6	52	Converter bypass valve	6758597	13	0.118-0.122	0.794	2.81	2.11	57.20 to 63.60
B, 6	17	Freewheel roller *	6774966	6.5	0.896 (thk)	0.0025(W)	0.640	0.300	0.15 to 0.33
B, 6	58	Converter bypass valve	6758597	13	0.118-0.122	0.794	2.81	2.11	57.20 to 63.60
A, 7	6	Clutch separator	5193431	8	0.063	0.4375	1.0625	0.8125	15 to 20

*Convoluted type spring



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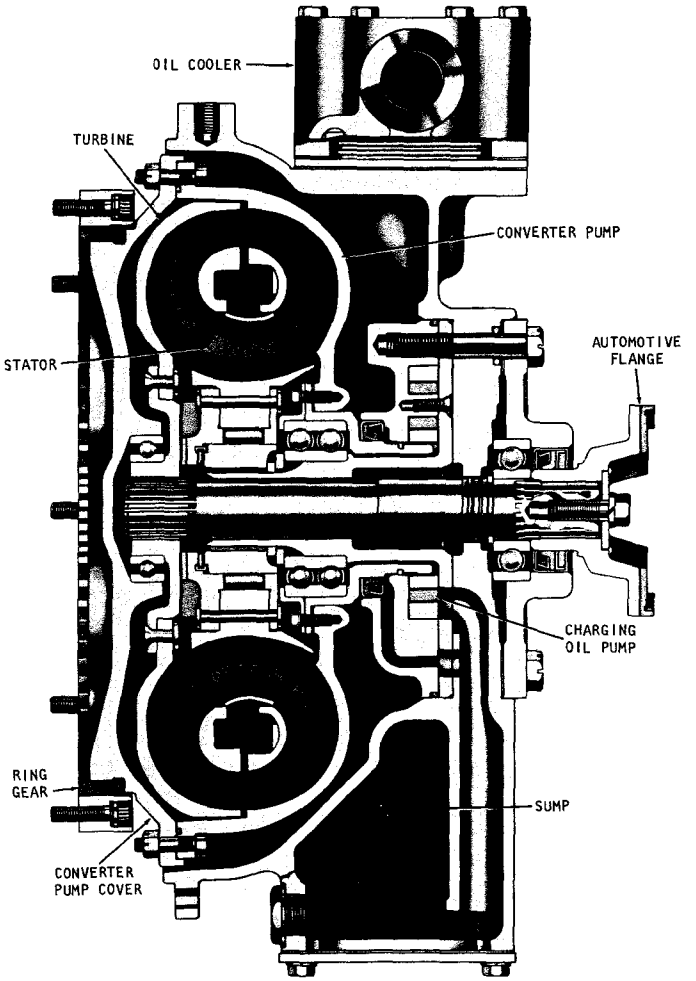
A, foldout 1. Model TC 250 converter—cross-section view



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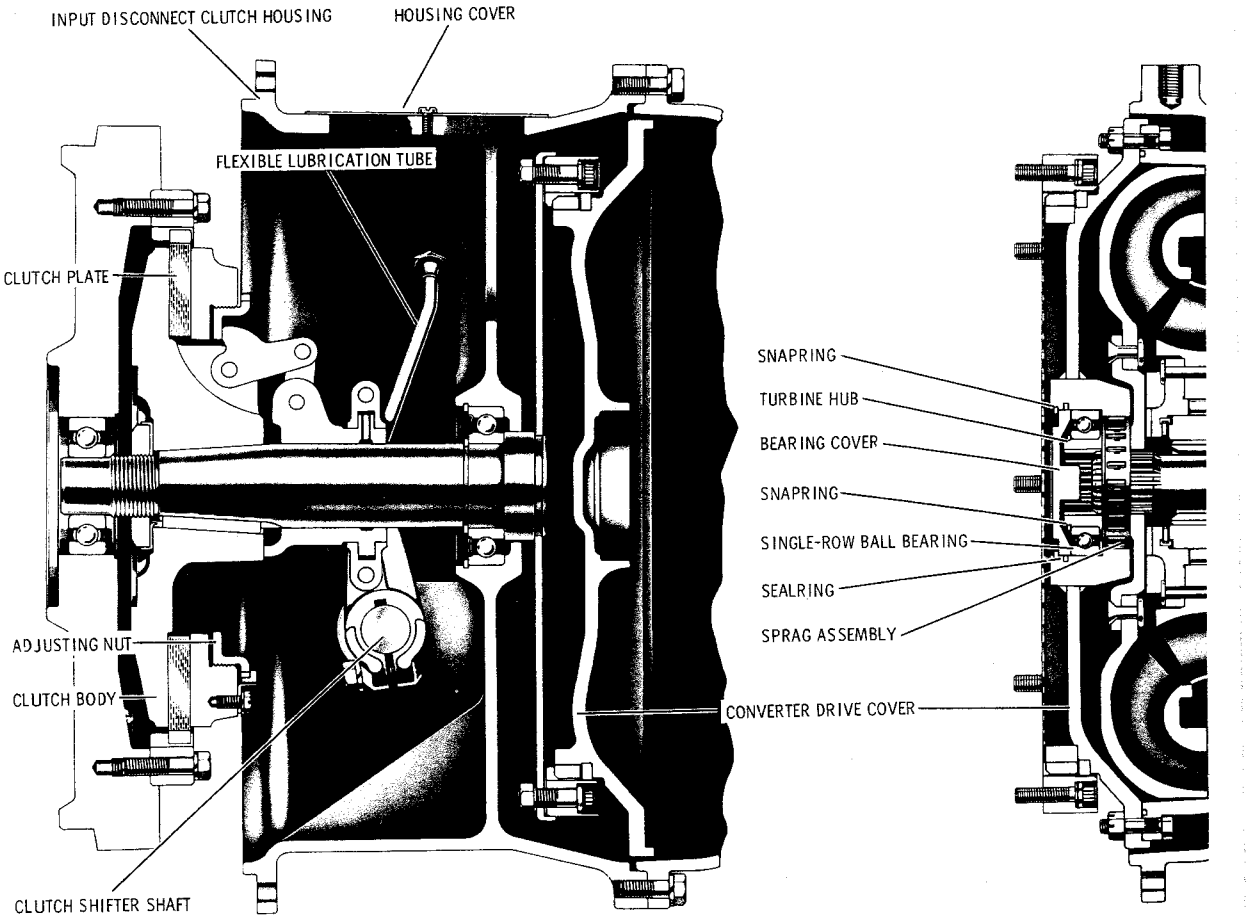
B, foldout 1. Model TC 300 converter (3-element)—cross-section view



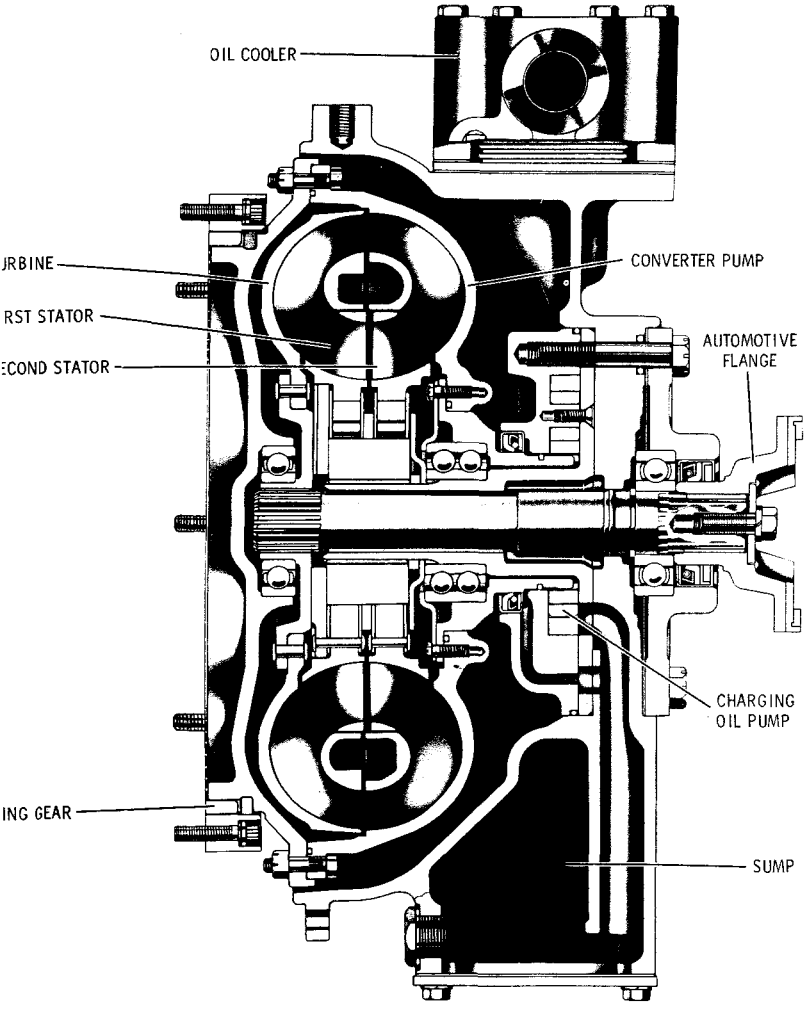
INPUT DISCONNECT CLUTCH

OVER-RUNNING CLUTCH

Foldout 2. M

TC 200, 300 SERIES CONVERTER

FOLDOUT 2



S1808

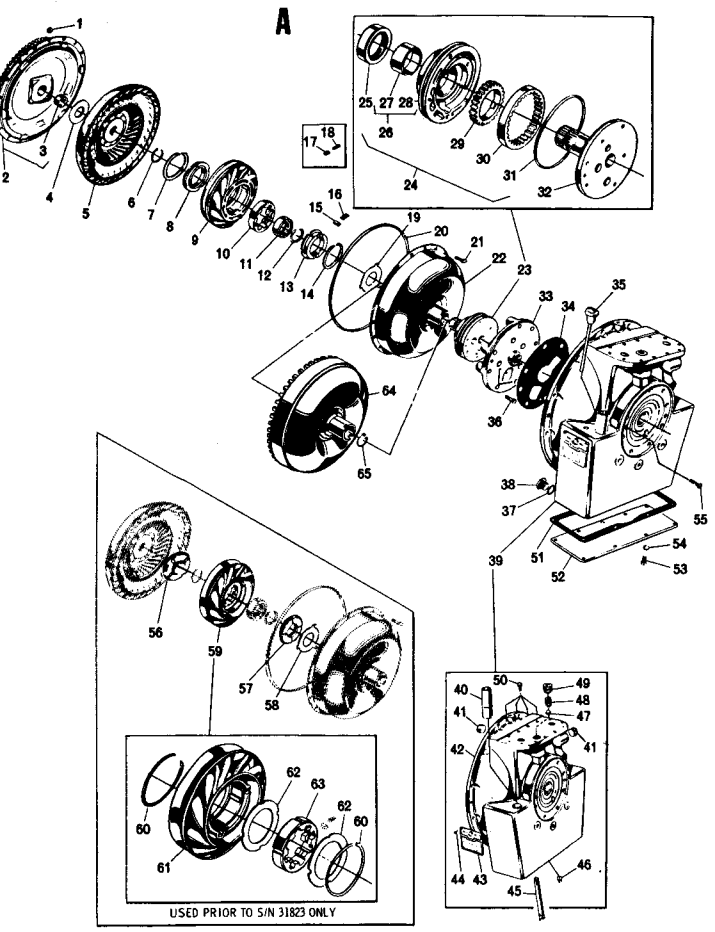
1 TC 300 converter (1-element) with input disconnect and over-running clutches—cross-section view

A

1 - Nut (18)
2 - Gear and cover assembly
3 - Bushing
4 - Turbine thrust washer
5 - Turbine assembly
6 - Snapring
7 - Snapring
8 - Thrust washer
9 - Stator
10 - Stator freewheel cam
11 - Freewheel roller race
12 - Snapring
13 - Thrust washer
14 - Snapring
15 - Stator freewheel roller (8)
16 - Roller spring (8)
17 - Roller guide (8)
18 - Roller spring (8)
19 - Thrust washer
20 - Sealring
21 - Special bolt (18)
22 - Converter pump assembly
23 - Charging oil pump assembly
24 - Pump gear and body assembly
25 - Oil seal
26 - Pump body assembly
27 - Bushing
28 - Body
29 - Pump drive gear
30 - Pump driven gear
31 - Sealring
32 - Stator support (ground sleeve)
33 - Charging oil pump adapter
34 - Gasket
35 - Oil level indicator
36 - Bolt, 1/4-20 x 1 (5)
37 - Gasket
38 - Drain plug
39 - Converter housing assembly
40 - Oil filler sleeve
41 - Pipe plug, 3/4 (2)
42 - Converter housing
43 - Nameplate
44 - Screw (4)
45 - Oil cooler return tube
46 - Pipe plug, 1/4
47 - Converter bypass valve ball
48 - Converter bypass valve spring
49 - Plug
50 - Bolt, 5/16-18 x 1 (4)
51 - Sump plate gasket
52 - Sump plate
53 - Bolt, 5/16-18 x 7/8 (9)
54 - Lockwasher, 5/16 (9)
55 - Flat-head screw, 1/4-20 x 1 3/4 (2)
56 - Stator front thrust washer
57 - Stator rear thrust washer
58 - Converter pump thrust washer
59 - Stator assembly
60 - Snapring
61 - Stator
62 - Stator cam thrust washer
63 - Stator freewheel cam
64 - Torque converter
65 - Snapring

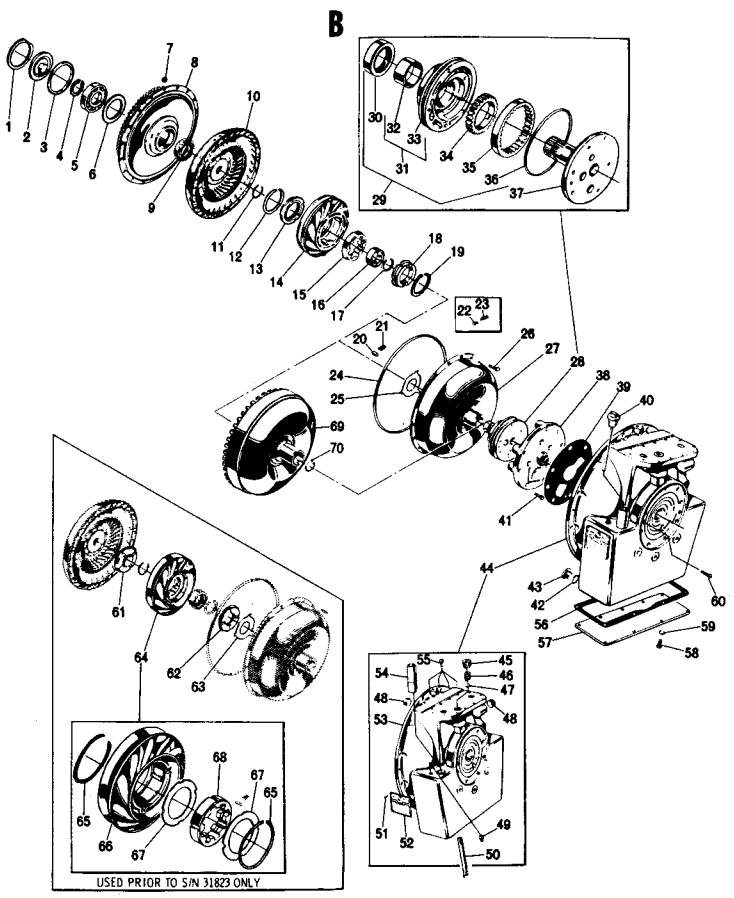
B

1 - Snapring
2 - Bearing cover
3 - Sealring
4 - Snapring
5 - Bearing
6 - Sprag retainer
7 - Nut (18)
8 - Gear and cover
9 - Sprag assembly (over-running clutch)
10 - Turbine assembly
11 - Snapring
12 - Snapring
13 - Thrust washer
14 - Stator assembly
15 - Stator freewheel cam
16 - Freewheel roller race
17 - Snapring
18 - Thrust washer
19 - Snapring
20 - Stator freewheel roller (8)
21 - Roller spring (8)
22 - Roller guide (8)
23 - Roller spring (8)
24 - Sealring
25 - Converter pump thrust washer
26 - Special bolt (18)
27 - Converter pump assembly
28 - Charging oil pump assembly
29 - Gear and body assembly
30 - Oil seal
31 - Oil pump body assembly
32 - Bushing
33 - Oil pump body
34 - Pump drive gear
35 - Pump driven gear
36 - Sealring
37 - Stator support (ground sleeve)
38 - Charging oil pump adapter
39 - Gasket
40 - Oil level indicator
41 - Bolt, 1/4-20 x 1 (5)
42 - Gasket
43 - Drain plug
44 - Converter housing assembly
45 - Plug
46 - Converter bypass valve spring
47 - Converter bypass valve ball
48 - Plug, 3/4 (2)
49 - Pipe plug, 1/4
50 - Oil cooler return tube
51 - Screw (4)
52 - Nameplate
53 - Converter housing
54 - Oil filler sleeve
55 - Bolt, 5/16-18 x 1 (4)
56 - Sump plate gasket
57 - Sump plate
58 - Bolt, 5/16-18 x 7/8 (9)
59 - Lockwasher, 5/16 (9)
60 - Flat-head screw, 1/4-20 x 1 3/4 (2)
61 - Stator front thrust washer
62 - Stator rear thrust washer
63 - Converter pump thrust washer
64 - Stator assembly
65 - Snapring
66 - Stator
67 - Cam thrust washer
68 - Freewheel cam
69 - Torque converter
70 - Snapring



4671A

A, foldout 3. TC 240 basic 3-element torque converter—exploded view



4672A

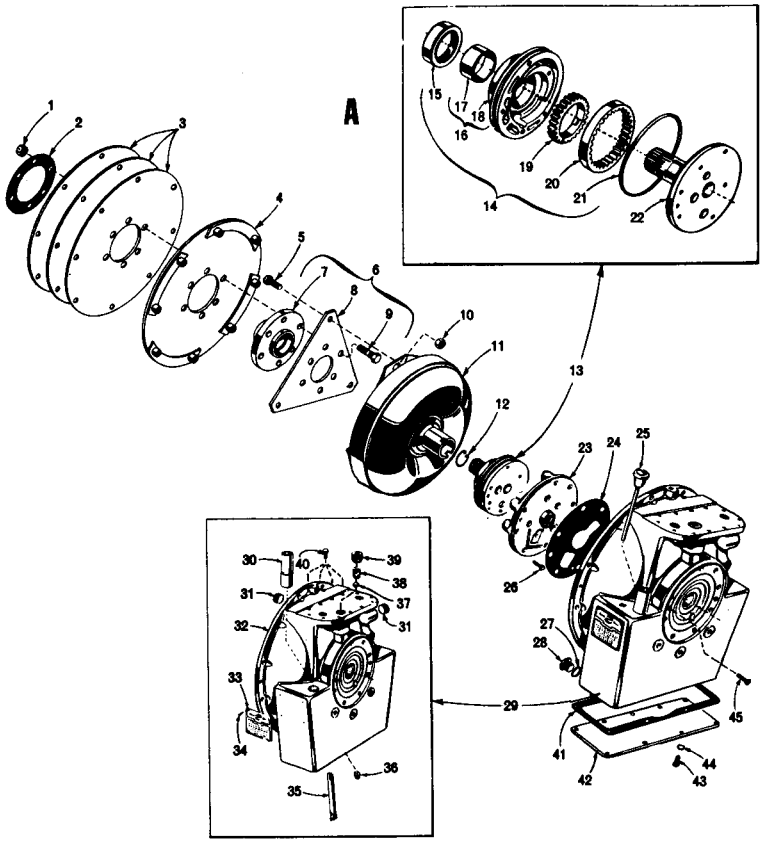
B, foldout 3. TC 240 basic 3-element torque converter with over-running clutch—exploded view

A

1 - Locknut, 1/2-20 (6)
2 - Flex disk plate
3 - Flex disk (3)
4 - Flex disk and washer assembly
5 - Bolt, 3/8-24 x 5/8 (3)
6 - Drive hub assembly
7 - Drive hub
8 - Drive plate
9 - Bolt, 1/2-20 x 1 1/4 (6)
10 - Nut, 3/8-24 (3)
11 - Converter assembly
12 - Snapring
13 - Charging oil pump assembly
14 - Gear and body assembly
15 - Oil seal
16 - Oil pump body assembly
17 - Bushing
18 - Oil pump body
19 - Oil pump drive gear
20 - Oil pump driven gear
21 - Sealring
22 - Stator support (ground sleeve)
23 - Charging oil pump adapter
24 - Adapter gasket
25 - Oil level indicator
26 - Self-locking bolt, 1/4-20 x 1 (5)
27 - Gasket
28 - Drain plug
29 - Converter housing assembly
30 - Oil filler sleeve
31 - Plug
32 - Converter housing
33 - Nameplate
34 - Screw (4)
35 - Oil cooler return tube
36 - Pipe plug, 1/4
37 - Converter bypass valve ball
38 - Converter bypass valve spring
39 - Plug
40 - Bolt, 5/16-18 x 1 (4)
41 - Sump plate gasket
42 - Sump plate
43 - Bolt, 5/16-18 x 7/8 (9)
44 - Lockwasher, 5/16 (9)
45 - Flat-head screw, 1/4-20 x 1 3/4 (2)

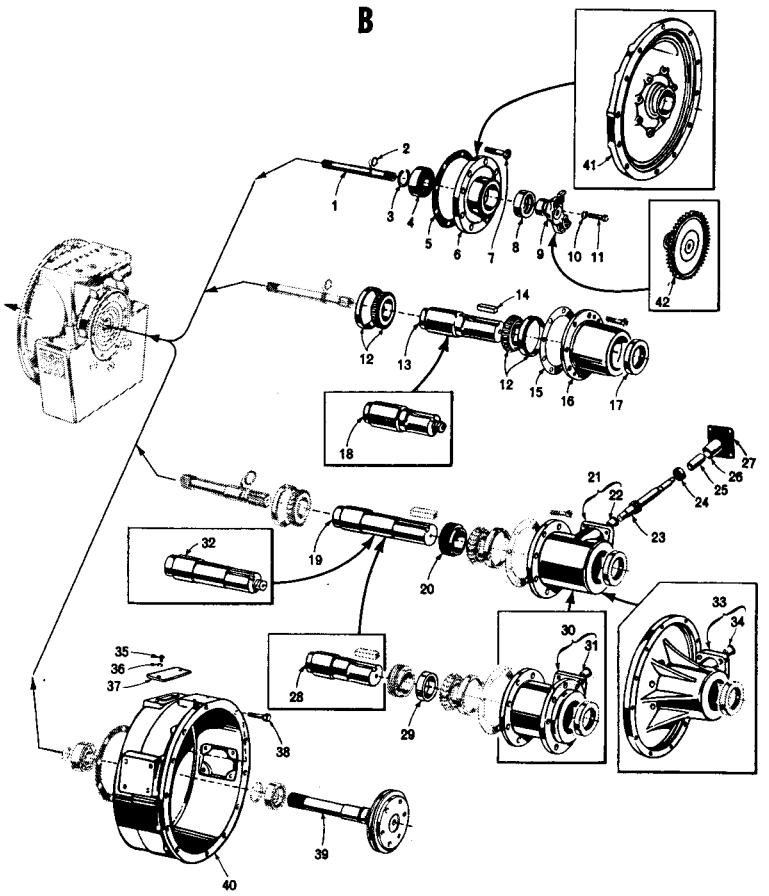
B

1 - Turbine shaft
2 - Hook-type sealring
3 - External snapring
4 - Bearing assembly
5 - Bearing retainer gasket
6 - Bearing retainer
7 - Self-locking bolt, 1/2-13 x 2 1/2 (8)
8 - Oil seal
9 - Flange
10 - Lockwasher, 1/2
11 - Bolt, 1/2-20 x 1 1/4
12 - Bearing assembly (2)
13 - Output shaft assembly (industrial)
14 - Key, 5/8 x 5/8 x 3
15 - Shim, 0.003 or 0.010 (ar)
16 - Bearing housing
17 - Oil seal
18 - Output shaft assembly (bevel pinion mounting)
19 - Output shaft assembly (industrial shaft with accessory drive)
20 - Accessory drive gear
21 - Bearing housing assembly
22 - Bushing
23 - Accessory driven gear
24 - Bearing assembly
25 - Accessory drive sleeve
26 - Spacer
27 - Gasket
28 - Output shaft assembly (heavy-duty and accessory drive)
29 - Spacer
30 - Bearing housing assembly
31 - Bushing
32 - Output shaft assembly (bevel pinion mounting and accessory drive)
33 - Bearing housing assembly
34 - Bushing
35 - Bolt, 3/8-16 x 3/4 (2)
36 - Lockwasher, 3/8 (2)
37 - Dust shield
38 - Self-locking bolt, 1/2-13 x 2 3/4 (8)
39 - Turbine shaft (rear disconnect clutch)
40 - Rear disconnect clutch housing
41 - Bearing retainer
42 - Output drive coupling



4673

A, foldout 4. TC 250 basic torque converter—exploded view



4688

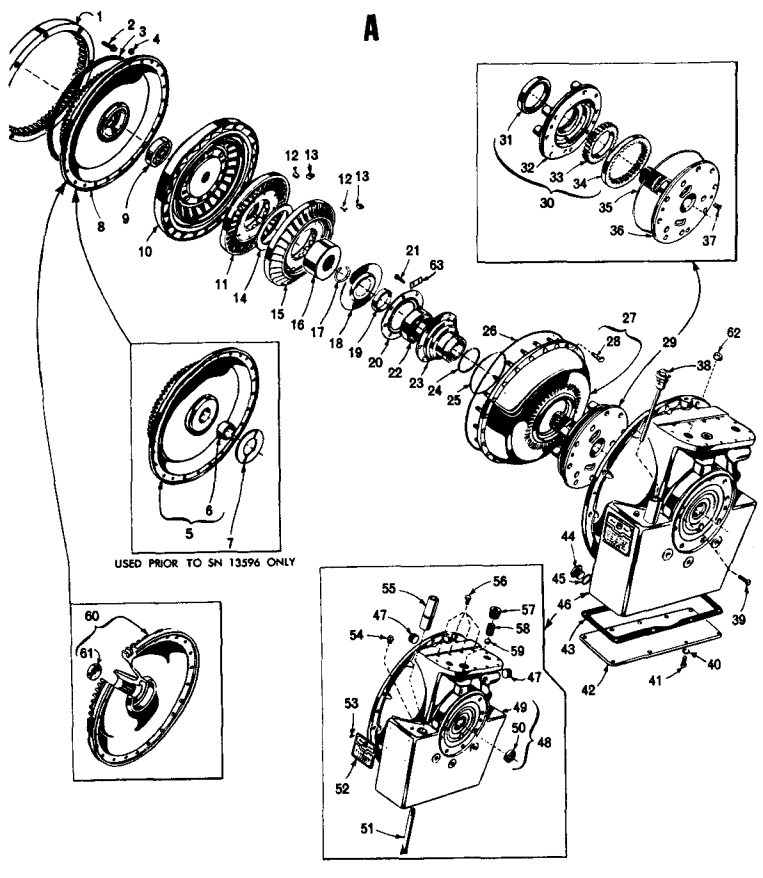
B, foldout 4. TC 200 series torque converter output shafts and bearing housings—exploded view

A

1 - Ring gear
2 - Special bolt, 3/8-16 x 1 1/4 (8)
3 - Sealring
4 - Locknut, 5/16-24 (24)
5 - Gear and cover assembly
6 - Bushing
7 - Turbine thrust washer
8 - Gear and cover
9 - Bearing assembly
10 - Turbine assembly
11 - First-stator assembly
12 - Stator freewheel roller (16)
13 - Freewheel roller spring (16)
14 - Washer
15 - Second-stator assembly
16 - Freewheel roller race
17 - Snapring
18 - Freewheel roller race spacer
19 - Spacer (use prior to S/N 7144)
20 - Bearing retainer
21 - Self-locking bolt, 1/4-20 x 3/4 (8)
22 - Bearing assembly
23 - Converter pump hub
24 - Hook-type sealring
25 - Sealring
26 - Sealring
27 - Converter pump assembly
28 - Special bolt, 5/16-24 x 1.30 (24)
29 - Charging oil pump assembly
30 - Gear and body assembly
31 - Oil seal
32 - Oil pump body
33 - Oil pump drive gear
34 - Oil pump driven gear
35 - Sealring
36 - Stator support (ground sleeve)
37 - Screw, 1/4-20 x 5/8 (3)
38 - Oil level indicator
39 - Flat-head screw, 1/4-20 x 1 3/4 (2)
40 - Lockwasher, 5/16 (9)
41 - Bolts, 5/16-18 x 7/8 (9)
42 - Sump plate
43 - Sump plate gasket
44 - Drain plug
45 - Gasket
46 - Converter housing assembly
47 - Pipe plug, 3/4 (2)
48 - Converter housing assembly
49 - Converter housing
50 - Converter housing sleeve
51 - Oil cooler return tube
52 - Nameplate
53 - Screw (4)
54 - Pipe plug, 1/4
55 - Oil filler sleeve
56 - Bolt, 5/16-18 x 1 (4)
57 - Plug
58 - Converter bypass valve spring
59 - Converter bypass valve ball
60 - Gear and cover assembly
61 - Plug
62 - Orifice plug
63 - Lockstrip

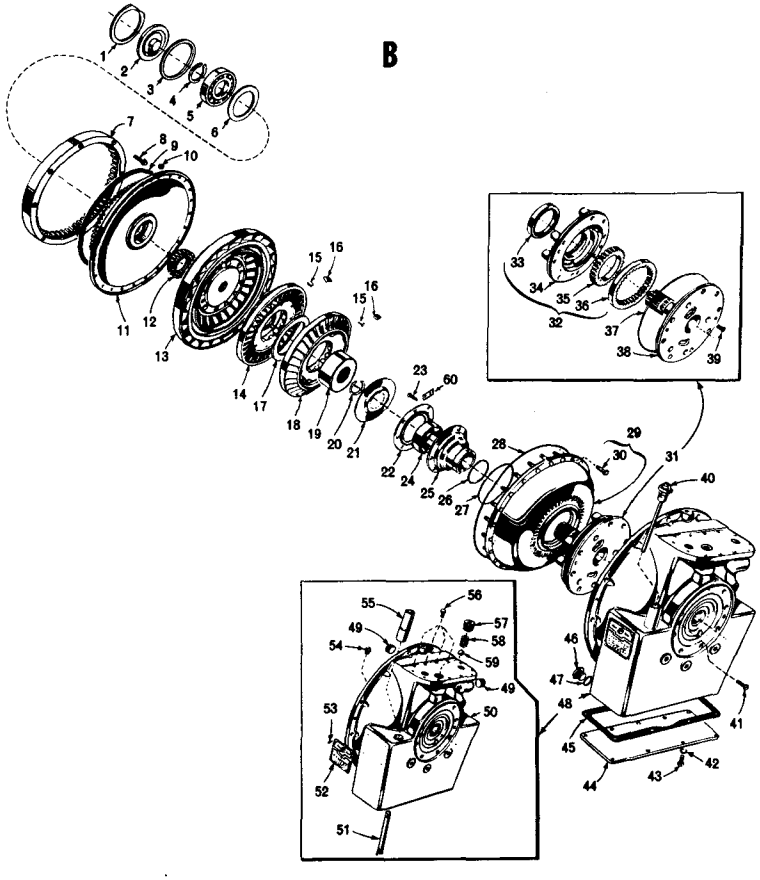
B

1 - Internal snapring
2 - Bearing cover
3 - Sealring
4 - Snapring
5 - Bearing assembly
6 - Sprag retainer
7 - Ring gear
8 - Special bolt, 3/8-16 x 1 1/4 (8)
9 - Sealring
10 - Locknut, 5/16-24 (24)
11 - Gear and cover
12 - Sprag assembly (over-running clutch)
13 - Turbine assembly
14 - First-stator assembly
15 - Stator freewheel roller (16)
16 - Freewheel roller spring (16)
17 - Spacer washer
18 - Second-stator assembly
19 - Freewheel roller race
20 - Snapring
21 - Freewheel roller race spacer
22 - Bearing retainer
23 - Self-locking bolt, 1/4-20 x 3/4 (8)
24 - Bearing assembly
25 - Converter pump hub
26 - Hook-type sealring
27 - Sealring
28 - Sealring
29 - Converter pump assembly
30 - Special bolt, 5/16-24 x 1.30 (24)
31 - Charging oil pump assembly
32 - Gear and body assembly
33 - Oil seal
34 - Oil pump body
35 - Oil pump drive gear
36 - Oil pump driven gear
37 - Sealring
38 - Stator support (ground sleeve)
39 - Flat-head screw, 1/4-20 x 5/8 (3)
40 - Oil level indicator
41 - Flat-head screw, 1/4-20 x 1 3/4 (
42 - Lockwasher, 5/16 (9)
43 - Bolt, 5/16-18 x 7/8 (9)
44 - Sump plate
45 - Sump plate gasket
46 - Drain plug
47 - Gasket
48 - Converter housing assembly
49 - Pipe plug, 3/4 (2)
50 - Converter housing
51 - Oil cooler return tube
52 - Nameplate
53 - Screw (4)
54 - Pipe plug, 1/4
55 - Oil filler sleeve
56 - Bolt, 5/16-18 x 1 (4)
57 - Plug
58 - Converter bypass valve spring
59 - Converter bypass valve ball
60 - Lockstrip



4674

A, foldout 5. TC 300 series basic 4-element torque converter—exploded view



4675

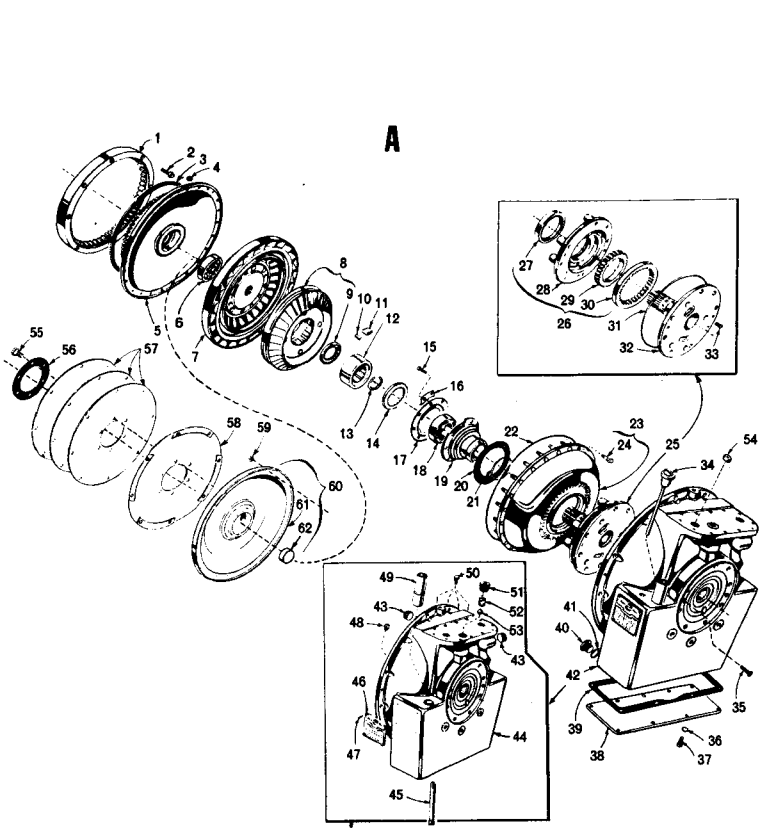
B, foldout 5. TC 300 series basic 4-element torque converter with over-running clutch—exploded view

A

1 - Ring gear
2 - Special bolt, 3/8-16 x 1 1/4 (8)
3 - Sealring
4 - Locknut, 5/16-24 (24)
5 - Gear and cover
6 - Bearing assembly
7 - Turbine assembly
8 - Stator assembly
9 - Thrust bearing
10 - Stator freewheel roller (10)
11 - Freewheel roller spring (10)
12 - Freewheel roller race
13 - Snapring
14 - Roller race spacer
15 - Bolt, 1/4-20 x 3/8 (8)
16 - Locktab (4)
17 - Bearing retainer
18 - Bearing
19 - Converter pump hub
20 - Gasket
21 - Hook-type sealring
22 - Sealring
23 - Converter pump assembly
24 - Special bolt, 5/16-24 x 1.30 (24)
25 - Charging oil pump assembly
26 - Gear and body assembly
27 - Oil seal
28 - Oil pump body
29 - Oil pump drive gear
30 - Oil pump driven gear
31 - Sealring
32 - Stator support (ground sleeve)
33 - Flat-head screw, 1/4-20 x 5/8 (3)
34 - Oil level indicator
35 - Flat-head screw, 1/4-20 x 1 3/4 (2)
36 - Lockwasher, 5/16 (9)
37 - Bolt, 5/16-18 x 7/8 (9)
38 - Sump plate
39 - Sump plate gasket
40 - Drain plug
41 - Gasket
42 - Converter housing assembly
43 - Pipe plug, 3/4 (2)
44 - Converter housing
45 - Oil cooler return tube
46 - Nameplate
47 - Screw (4)
48 - Pipe plug, 1/4
49 - Oil filler sleeve
50 - Bolt, 5/16-18 x 1/2 (4)
51 - Plug
52 - Converter bypass valve spring
53 - Converter bypass valve ball
54 - Orifice plug
55 - Bolt, 1/2-13 (6)
56 - Flex disk plate
57 - Flex disk (3)
58 - Disk and washer assembly
59 - Locknut, 5/16-24 (24)
60 - Torque converter cover assembly
61 - Torque converter cover
62 - Plug

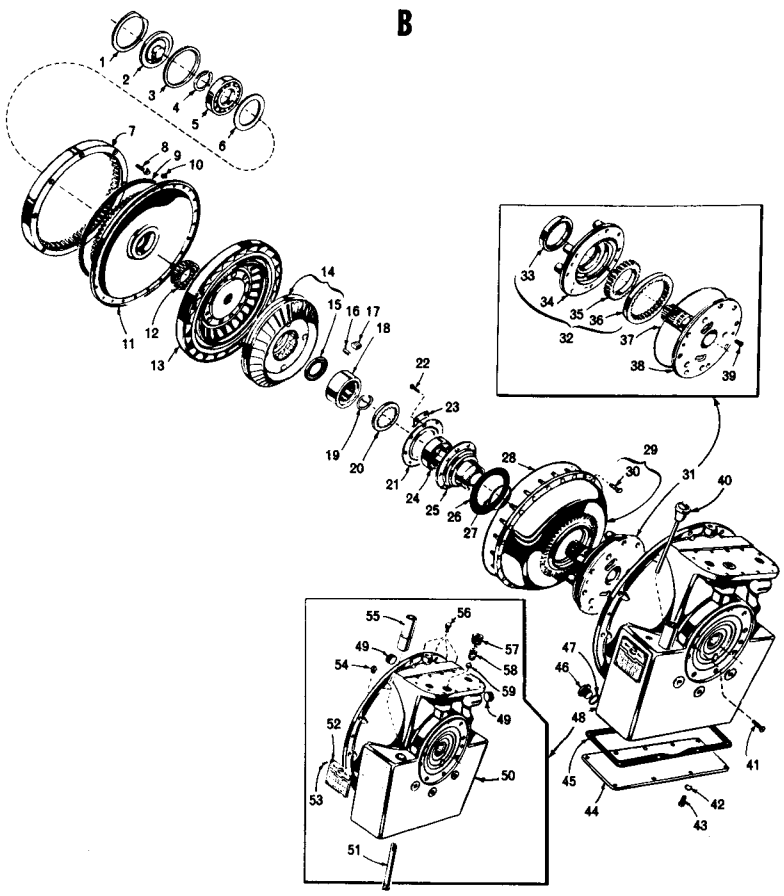
B

1 - Snapring
2 - Bearing cover
3 - Sealring
4 - Snapring
5 - Bearing assembly
6 - Sprag retainer
7 - Ring gear
8 - Special bolt, 3/8-16 x 1 1/4 (8)
9 - Sealring
10 - Locknut, 5/16-24 (24)
11 - Gear and cover
12 - Sprag assembly (over-running clutch)
13 - Turbine assembly
14 - Stator assembly
15 - Thrust bearing
16 - Stator freewheel roller (10)
17 - Freewheel roller spring (10)
18 - Freewheel roller race
19 - Snapring
20 - Freewheel race spacer
21 - Bearing retainer
22 - Bolt, 1/4-20 x 5/8 (8)
23 - Locktab (4)
24 - Bearing assembly
25 - Converter pump hub
26 - Gasket
27 - Hook-type sealring
28 - Sealring
29 - Converter pump assembly
30 - Special bolt, 5/16-24 x 1.30 (24)
31 - Charging oil pump assembly
32 - Gear and body assembly
33 - Oil seal
34 - Oil pump body
35 - Oil pump drive gear
36 - Oil pump driven gear
37 - Sealring
38 - Stator support (ground sleeve)
39 - Flat-head screw, 1/4-20 x 5/8 (3)
40 - Oil level indicator
41 - Flat-head screw, 1/4-20 x 1 3/4 (2)
42 - Lockwasher, 5/16 (9)
43 - Bolt, 5/16-18 x 7/8 (9)
44 - Sump plate
45 - Sump plate gasket
46 - Drain plug
47 - Gasket
48 - Converter housing assembly
49 - Pipe plug, 3/4 (2)
50 - Converter housing
51 - Oil cooler return tube
52 - Nameplate
53 - Screw (4)
54 - Pipe plug, 1/4
55 - Oil filler sleeve
56 - Bolt, 5/16-18 x 1/2 (4)
57 - Plug
58 - Converter bypass valve spring
59 - Converter bypass valve ball



4679

A, foldout 6. TC 300 series basic 3-element torque converter—exploded view



4680

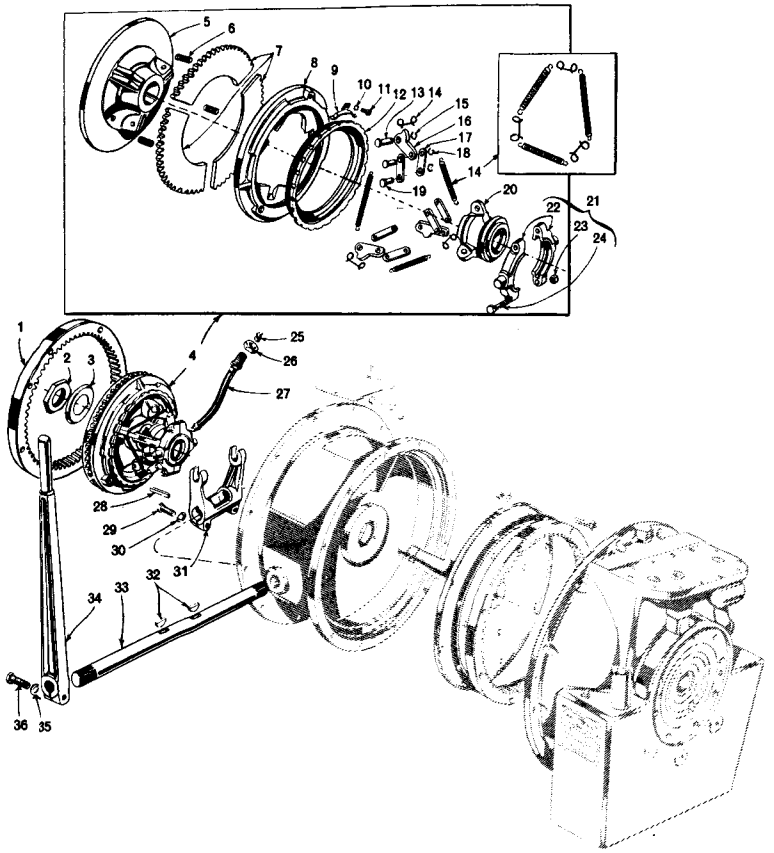
B, foldout 6. TC 300 series basic 3-element torque converter with over-running clutch—exploded view

A

1 - Drive ring
2 - Nut
3 - Washer
4 - Manual input disconnect clutch assembly
5 - Clutch body
6 - Separator spring (3)
7 - Clutch facing assembly
8 - Pressure plate
9 - Adjusting lock
10 - Lockwasher
11 - Screw, 1/4-20 x 3/8
12 - Adjusting nut
13 - Clevis pin (3)
14 - Lever spring (set)
15 - Retainer ring (3)
16 - Lever (3)
17 - Connecting link (6)
18 - Retainer ring (6)
19 - Clevis pin (6)
20 - Release sleeve
21 - Release bearing assembly
22 - Release bearing
23 - Stop nut, 5/16-24 (2)
24 - Bolt, 5/16-24 x 1 3/4 (2)
25 - Grease fitting
26 - Jam nut
27 - Flexible lubrication tube assembly
28 - Key, 1/4 x 1/4 x 2
29 - Bolt, 3/8-16 x 1 1/4 (2)
30 - Lockwasher, 3/8 (2)
31 - Clutch shifter yoke
32 - Woodruff key (2)
33 - Clutch shifter shaft
34 - Clutch control lever
35 - Lockwasher, 1/2
36 - Bolt, 3/8-16 x 1 3/8

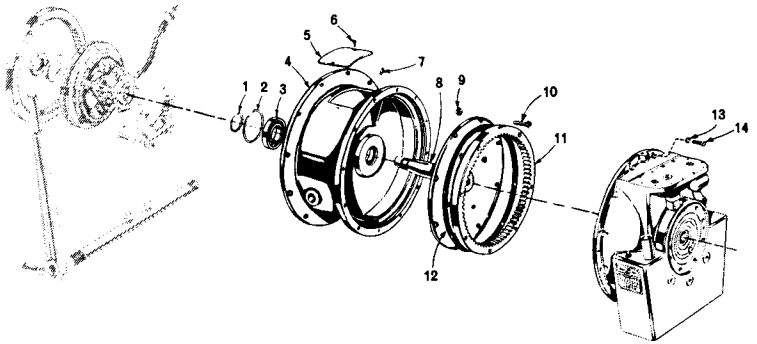
B

1 - Snapring
2 - Snapring
3 - Bearing assembly
4 - Manual input disconnect clutch housing
5 - Housing cover
6 - Screw, 10-24 x 7/16 (2)
7 - Grease fitting
8 - Converter input shaft assembly
9 - Nut, 3/8-24 (8)
10 - Bolt, 3/8-24 x 1 1/2 (8)
11 - Drive ring
12 - Gasket
13 - Lockwasher, 3/8 (12)
14 - Bolt, 3/8-16 x 1 1/8 (12)



4676

A. foldout 7. TC 200, 300 series manual input disconnect clutch—exploded view



4677

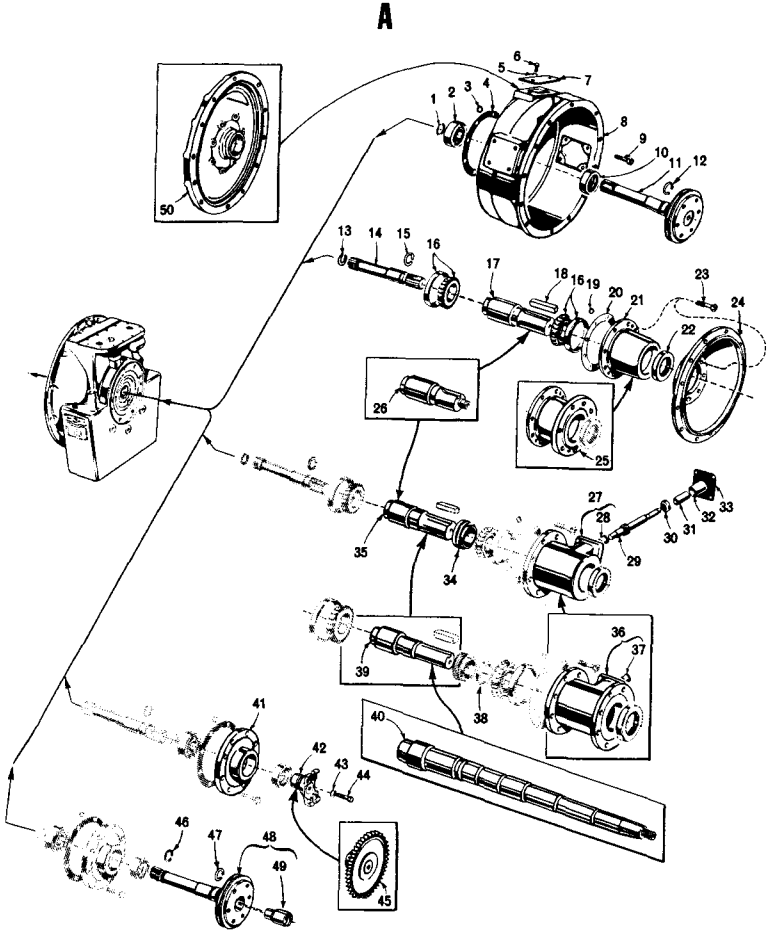
B. foldout 7. TC 200, 300 series manual input disconnect clutch housing and drive ring—exploded view

A

1 - Snapring
2 - Bearing assembly
3 - Sealring (8)
4 - Gasket
5 - Lockwasher, 3/8 (2)
6 - Bolt, 3/8-16 x 3/4 (2)
7 - Dust shield
8 - Rear disconnect clutch housing
9 - Self-locking bolt, 1/2-13 x 2 3/4 (8)
10 - Oil seal
11 - Turbine shaft (output disconnect clutch)
12 - Hook-type sealring
13 - Snapring
14 - Turbine shaft
15 - Hook-type sealring
16 - Bearing assembly
17 - Converter output shaft (industrial)
18 - Key, 5/8 x 5/8 x 3
19 - Sealring (8)
20 - Shim — 0.003 (ar)
— 0.010 (ar)
21 - Bearing housing
22 - Oil seal
23 - Self-locking bolt, 1/2-13 x 3 (8)
24 - Transmission adapter plate
25 - Bearing housing
26 - Converter output shaft (bevel pinion mounting)
27 - Bearing housing assembly
28 - Bushing
29 - Accessory driven gear
30 - Bearing assembly
31 - Sleeve
32 - Spacer
33 - Gasket
34 - Accessory drive gear
35 - Converter output shaft (industrial, with accessory drive)
36 - Bearing housing assembly
37 - Bushing
38 - Spacer
39 - Converter output shaft (industrial, heavy duty, accessory drive)
40 - Converter output shaft (industrial, heavy duty)
41 - Bearing retainer
42 - Output flange
43 - Lockwasher, 1/2
44 - Bolt, 1/2-20 x 1 1/4
45 - Output drive coupling
46 - Hook-type sealring
47 - Hook-type sealring
48 - Turbine shaft assembly (output disconnect clutch)
49 - Plug
50 - Bearing retainer

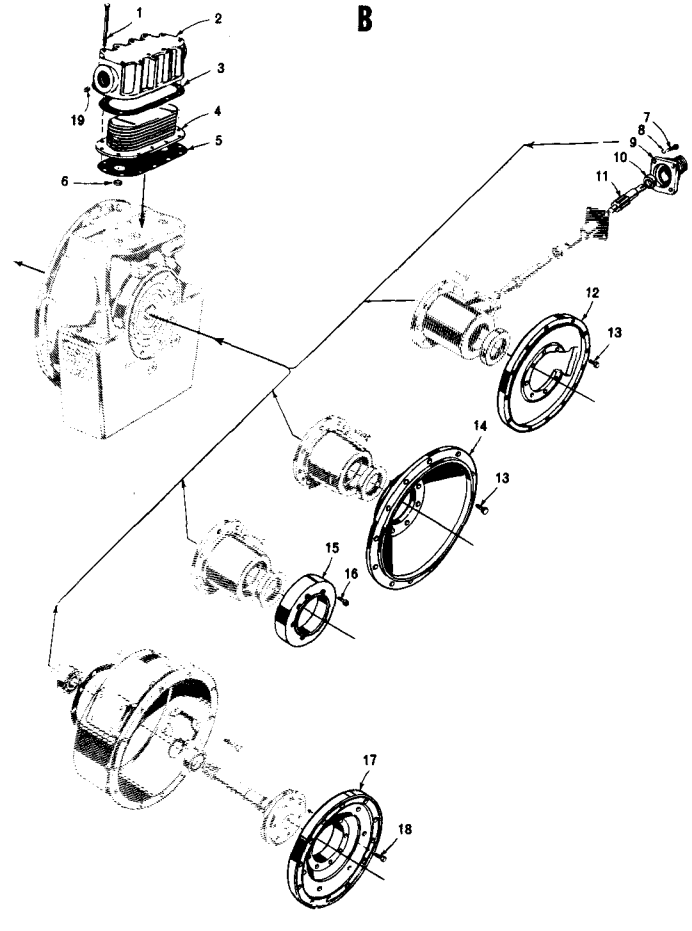
B

1 - Bolt, 5/16-18 x 3 3/4 (12)
2 - Oil cooler cover
3 - Oil cooler cover gasket
4 - Oil cooler core
5 - Oil cooler gasket
6 - Orifice plug
7 - Bolt, 5/16-18 x 1 1/8 (4)
8 - Lockwasher, 5/16 (4)
9 - Cable drive adapter
10 - Oil seal
11 - Cable drive adapter shaft
12 - Mounting plate
13 - Self-locking bolt, 1/2-13 x 3 1/4 (8)
14 - Mounting plate
15 - Mounting plate
16 - Socket-head bolt, 1/2-13 x 3 3/4 (8)
17 - Rear disconnect clutch adapter
18 - Self-locking bolt, 1/2-20 x 1 1/2 (6)
19 - Coolant drain plug, 1/4



4689

A, foldout 8. TC 300 series torque converter output shafts and bearing housings—exploded view



4678

B, foldout 8. TC 200, 300 series oil cooler, cable drive adapter and mounting plate options—exploded view