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TC-200 TRANSFER CASE SERVICE MANUAL

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1. TC-200 TRANSFER CASE

INTRODUCTION

The Fabco Model TC- 200 is a two- speed, four- shaft trans fer case for use in all- wheel drive vehi cles. The front out put shaft is off set to the right to com ple ment a spe cial off set front axle as sem bly. All shifting is ac com plished by in te gral, air- actuated cyl in ders. Early pro duction ver sions of the TC- 200 were equipped with parallel- sided spline in put and out put shafts while later pro duction mod els uti lize in vo lute spline shafts. All TC- 200 trans fer cases have pro vi sions for an electro- mag netic speed ome ter sen sor. The ad di tion of a lu bri ca tion pump and a de clutch able power take- off unit may be ac com plished by parts kits avail able from Fabco.

The front drive axle may be en gaged at any ve hi cle speed, pro vided the rear wheels are not spin ning. Shifts be tween ranges, how ever, must be made while the ve hi cle is sta tion ary to avoid se ri ous dam age to the trans fer case. The TC- 200 is also equipped with a rear drive de clutch which is nor mally kept en gaged un less the op tional PTO unit is in operation.

SPECIFICATIONS

The Fabco Model TC- 200 Trans fer Case is a two- speed, four- shaft, constant- mesh de sign with front and rear axle en gage ment de clutches.

RATINGS

Maximum Input Torque	7,000 Lbs.-Ft.
Maximum Input Horsepower	300 HP
Maximum Input Speed	2,800 RPM

RATIOS

Direct	1:1
Underdrive	2.11:1

GEAR TYPE

Helical, Case Hardened

SHAFT SIZES – Early Production Units

Input/Front Output	2.250 Inches, 10 Spline
Rear Output	2.500 Inches, 10 Spline

SHAFT SIZES – Current Production Units

Input/Front Output	2.062/2.057 Inches, 32 Involute Spline
Rear Output	2.312/2.307 Inches, 36 Involute Spline

SHAFT SPACING (DROP)

Rear Output	9.25 Inches
Front Output	10.6 Inches (8.9 Inch Off set to Right)

SHIFT MECHANISM

Integral Air Cylinders

BEARINGS

Tapered Roller

OIL CAPACITY

5.5 Quarts

WEIGHT

570 Lbs.

HOUSING

Gray Iron

OPTIONS

Lubrication Pump
Full Power PTO

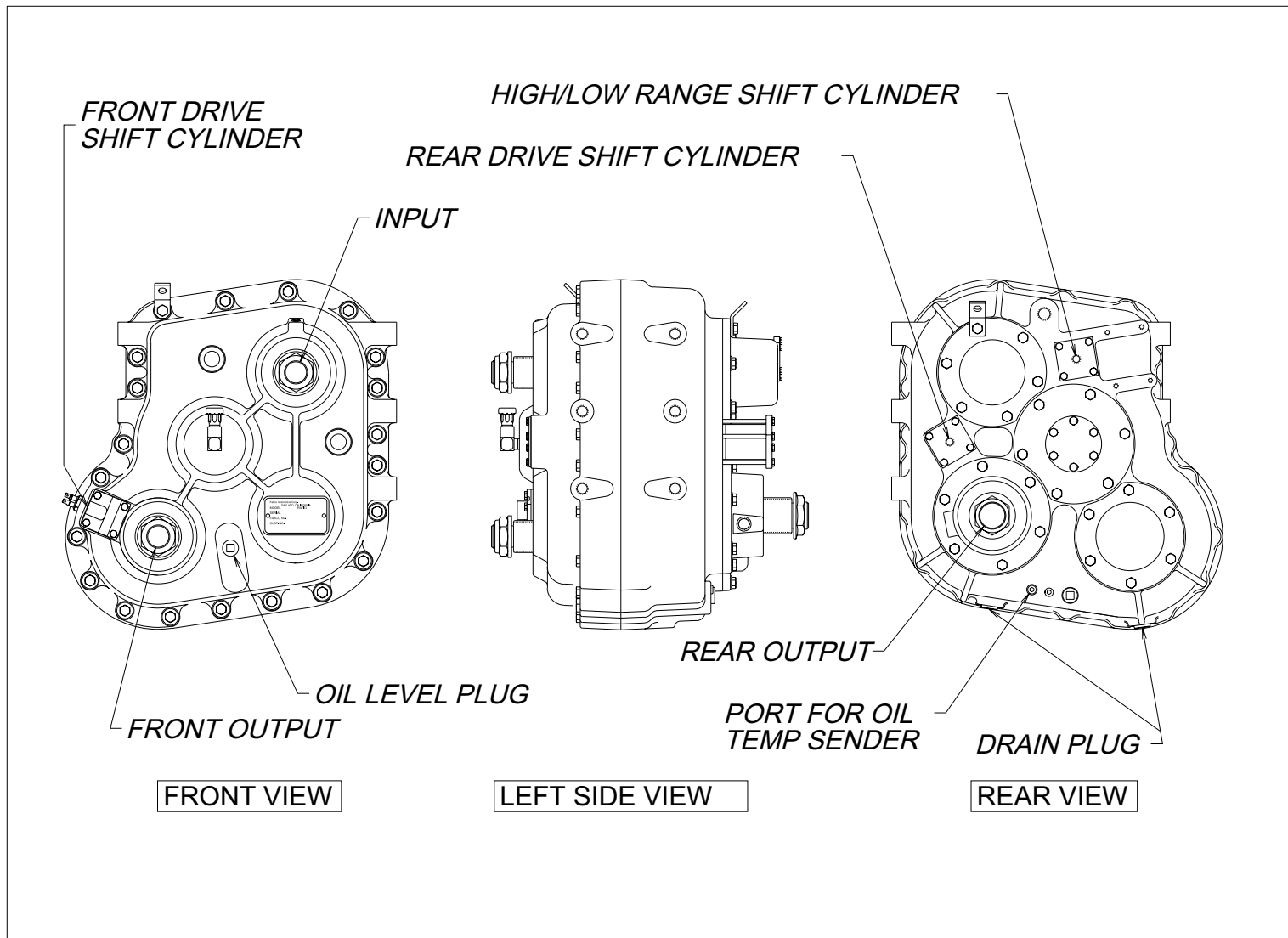


Figure 1.1 - Fabco TC-200 Transfer Case

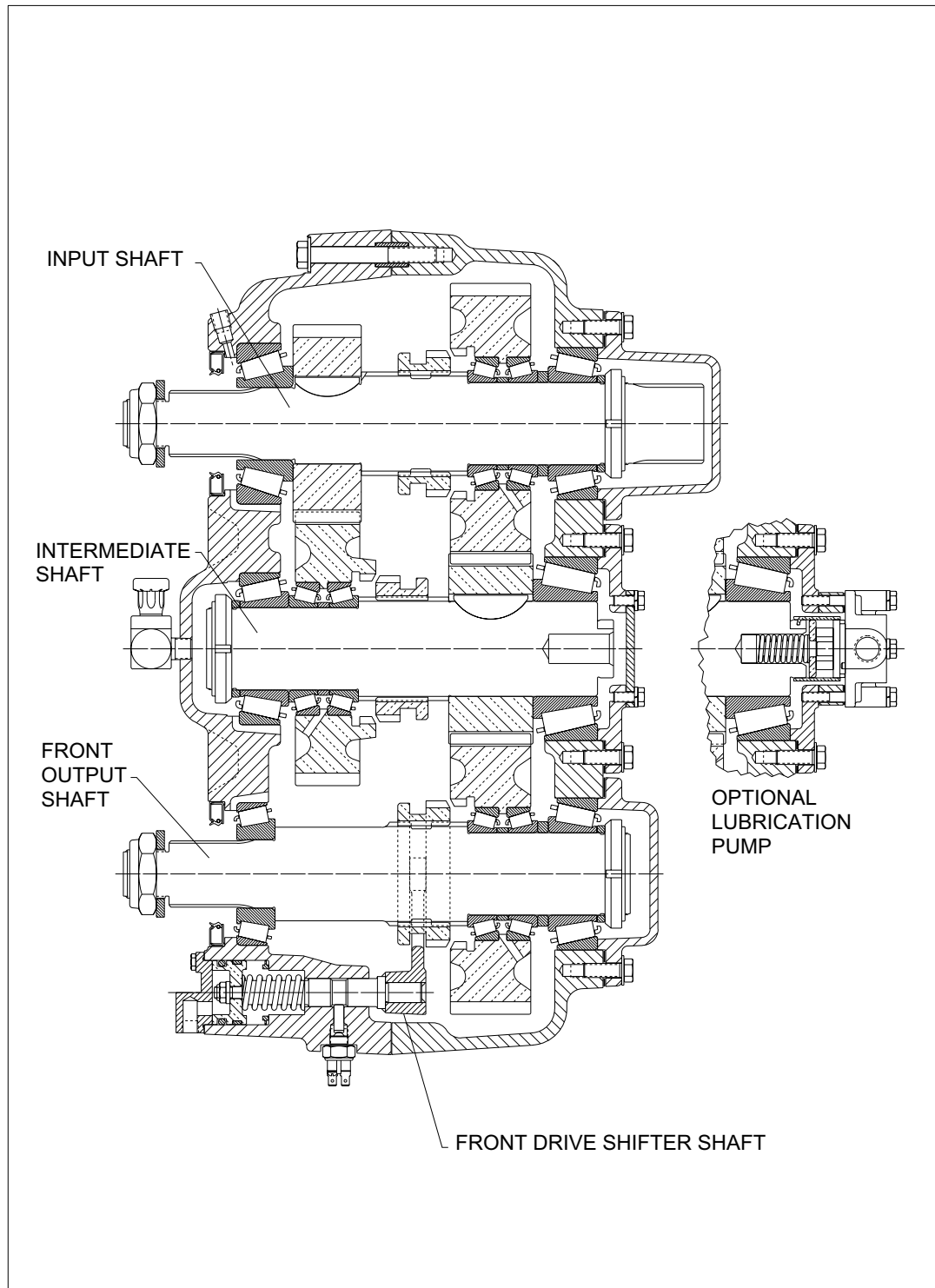


Figure 1.2a – TC-200 Sectional Views

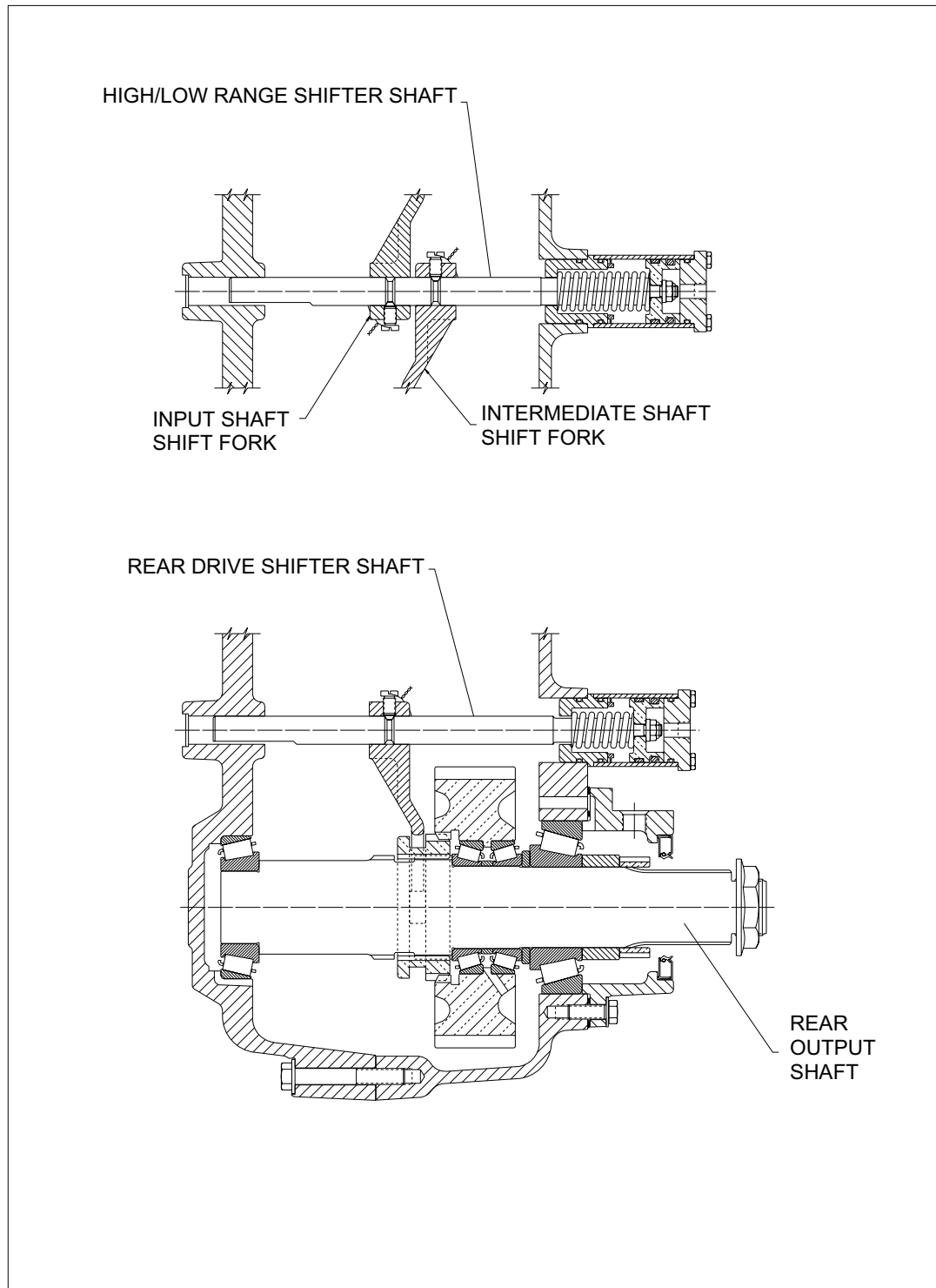


Figure 1.2b – TC-200 Sectional Views

2. LUBRICATION

RECOMMENDED LUBRICANTS

On-Highway Vehicles

1. Heavy-Duty Engine Oil:

Temperature	Grade
Above + 10° F	SAE 50
Below + 10° F	SAE 30

Be sure to specify heavy-duty type meeting MIL-L-2104B specifications.

2. Mineral Gear Oil:

Temperature	Grade
Above + 10° F	SAE 90
Below + 10° F	SAE 80

Must be inhibited against corrosion, oxidation, and foam.

Off-Highway & Mining Equipment

1. Heavy-Duty Engine Oil:

Temperature	Grade
Above + 10° F	SAE 50
Below + 10° F	SAE 30

Be sure to specify heavy-duty type meeting MIL-L-2104B specifications.

2. Special Recommendation: For extreme cold weather where temperature is consistently below 0° F, use SAE 20W heavy-duty engine oil meeting MIL-L-2104B specifications.

NOTE: Extreme pressure (EP) oils are no longer recommended for use in Fabco transfer cases. Under certain operating conditions these oils might form carbon deposits on gears, shafts or bearings, possibly causing malfunctions and premature failure.

INSPECTION

The oil is to be maintained at the level of the fill plug at all times. Check at the following intervals:

Highway Service	1,000 Miles
Off-Highway Service	40 Hours

With every oil change, the shift cylinder air lines and valves should be inspected for leaks and possible malfunctioning. Low pressure conditions can cause partial clutch engagement which may result in premature wear or damage.

OIL CHANGE

The transfer case lubricant should be changed on all new transfer cases after the first 3,000 to 5,000 miles (on-highway), or the first 40 hours (off-highway); thereafter oil changes should be done at the following intervals:

On-Highway Service10,000-15,000 Miles

Off-Highway Service (Logging, dirt moving, mining, and associated operations).....500-750 Hours

The recommended oil change and inspection periods are based on the average use and operating conditions that the unit may encounter. It is suggested that the individual owner make a periodic lab analysis of the lubricant to determine contamination based on the unit's specific operating conditions. With this data, the oil change and inspection periods can be better determined.

DRAINING THE OIL

Draining is best accomplished after the vehicle has been operated briefly, allowing the oil to become warm and flow more freely. Remove both drain and fill plugs. Allow the housing to empty completely. Before the unit is refilled, it should be thoroughly flushed with clean flushing oil or kerosene.

If the unit is equipped with an oil pump, the lube oil filter should be replaced whenever the oil is changed. The element is of the spin-on type. A film of clean oil should be applied to the rubber gasket of the new element before installing. Do not overtighten.

REFILLING THE OIL

If the transfer case has been removed from the vehicle for service, it is best to refill the oil after the unit has been reinstalled into the vehicle.

Clean and replace the drain plug and fill the transfer case with the appropriate oil with the vehicle on level ground. Fill the transfer case to the level of the fill plug.

For each transfer case the oil capacity will vary somewhat, depending on the model and the inclination of the unit; therefore, always fill to the level of the fill plug. Do not overfill. Inspect for leaks.

OPERATING TEMPERATURE

The operating temperature of the transfer case should not exceed 250°F (120°C). Extensive operation at temperature exceeding 250° F will result in rapid breakdown of the oil and may shorten the transfer case life. If reduction of operating speed is not acceptable then the case may have to be equipped with an external oil cooler to maintain the operating temperature below 250° F.

The following conditions may contribute to excessive oil temperature.

1. A vehicle remaining stationary for extended periods while operating the power take-off.
2. A vehicle which is used in tropical or desert conditions.
3. A vehicle where extended body work or an accumulation of dirt and plant material may shield the case from air ventilation and circulation.
4. A vehicle that is operated for extended distances at high speed with the main transmission in overdrive.

3. GENERAL INSTRUCTIONS

SAFETY

The servicing and maintenance of components from any automotive vehicle present possible hazards and every endeavor should be made to minimize the risks taken to successfully complete the task. For your protection we offer these warnings and suggestions:

1. When working on, around, or under the vehicle the parking brake should be securely applied and all wheels should be blocked to prevent wheel movement. Do not rely on the vehicle being in gear with a dead engine to prevent movement. All work should be performed on a flat level surface free of loose material.
2. When having to work under a vehicle it should be raised and supported with appropriate frame stands or very secure blocking.

WARNING: Never work under a vehicle while supported only on a floor jack or hoist.

3. Be sure any lifting equipment has adequate capacity to raise the vehicle or component being lifted. This includes hydraulic floor jacks, crane type hoists, transmission jacks, and axle support dollies, etc. The weight of Fabco components is given in the specifications of the applicable service manual.
4. Caution must be exercised when cleaning the component or underside of the vehicle. Compressed air should not be used to blow dirt away as any harmful contaminant material on the bottom of the vehicle will be spread around the work area.

Appropriate solvents and cleaning solutions should be used in accordance with their labelling instructions or by referring to the Material Safety Data sheet (MSDS) that is available for each cleaner. Approved protective eyewear, gloves, masks and clothing should always be worn.

5. Fabco has not used Asbestos in any of its products manufactured since May of 1989 and was used only in axle brake linings prior to that time. See the sepa-

rate Asbestos Warning if you suspect asbestos may be present on the vehicle or component in the area to be serviced.

REMOVAL FROM VEHICLE

1. Remove fill and lower drain plugs and drain gear lubricant.
2. Disconnect wires leading to indicator light switch, and temperature sensor, if used.
3. Disconnect and tag shift cylinder air lines.
4. Disconnect speedometer wiring.
5. Disconnect drivelines at flanges or yokes.
6. Position a transmission jack of suitable capacity beneath the transfer case. The transfer case must be seated on the jack in a safe and firm position.
7. Disconnect transfer case mountings at rubber shock insulators. Since mounting designs vary, consult vehicle service manual.
8. After inspecting that all mountings and connections to the transfer case are disconnected lower the transfer case gradually to the floor. It is imperative that the transfer case is ALWAYS safely positioned on the transmission jack to safeguard the transfer case falling off the jack. Remove the transfer case from beneath the vehicle. It may be necessary to jack the truck up to allow room to remove transfer case.

INSTALLATION INTO VEHICLE

1. Place transfer case on transmission jack.
2. Position transmission jack underneath vehicle. Some vehicles may require that one side be jacked up in order to achieve sufficient clearance to replace the transfer case between the frame rails.
3. Raise the transmission jack to properly locate transfer case.
4. Connect transfer case mountings. Since mounting designs vary, consult vehicle service manual.
5. Connect drivelines.
6. Connect speedometer wiring.
7. Connect shift cylinder air lines.
8. Connect indicator light and temperature sensor wires.
9. Fill housing with appropriate lubricant to correct level and install fill plug.
10. Check transfer case for leaks around gaskets and seals.

ASBESTOS WARNING

SUGGESTED PROCEDURES FOR WORKING WITH COMPONENTS SUSPECTED OF CONTAINING ASBESTOS

Asbestos has been found to be a primary cause of various forms of respiratory disease and cancer of several vital body organs. Primary ingestion is by breathing or swallowing dust containing fibers and can place smokers at a greater risk than those who do not smoke. The onset of disease can be at an extended period of time, (several years) after the exposure. The Occupational and Safety Health Administration (OSHA) has established very stringent limitations for exposure to asbestos fibers by workers using the material, and every precaution should be taken to minimize the risks involved. The following are some suggested procedures to adopt when working with material that has, or may be suspected of containing, asbestos.

1. Approved protective clothing, gloves, eye shield and aprons should be worn whenever working around the suspected material. NIOSH & OSHA approved respirator masks suitable for asbestos dust should be worn at all times. Disposable dust face masks are not allowed by OSHA.
2. Do not smoke while working on any asbestos related material or wearing protective apparel.
3. Do not eat or drink food while wearing protective clothing. Always wash before eating or drinking.
4. Do not use compressed air for any dirt removal. Use only approved high efficiency vacuum cleaners suitable for use with asbestos. Do not dry brush deposits or accumulations of dirt from components. What cannot be removed with the high efficiency vacuum cleaner should be washed with a water soaked rag. The rag should not be wrung dry but should be disposed of, together with other wastes containing asbestos in specially sealed and marked containers in accordance with EPA and OSHA regulations.
5. Do not wear protective clothing away from the working area, vacuum clean clothing before removal. Shower, if possible, before going home.

These suggestions are neither complete nor authoritative on the subject of working with asbestos but are meant as a warning of possible risk. It is the responsibility of the supervising authority to be aware of the possible dangers involved and to provide suitable training, precaution and protection for those working in an asbestos environment.

4. DISASSEMBLY

The disassembly and assembly procedures in this manual are based on the four shaft subassemblies: Input, intermediate, front output, and rear output. The shift components and power take-off unit are considered separately. The components for each subassembly should be kept together to avoid unnecessary confusion upon reassembly.

PRELIMINARY STEPS

1. After removing the transfer case from the vehicle, thoroughly clean the exterior.
2. Remove the drain plug and drain the oil.
3. Mount the transfer case in a suitable fixture. The ideal fixture would be such that the transfer case can be rotated so that either the front or the rear of the case is facing upward. The transfer case must be attached by its front housing half only. A unit mounted in a typical fixture is shown in Figure 4.1. If the fixture does not allow rotation, mount the unit with its rear end facing upward.

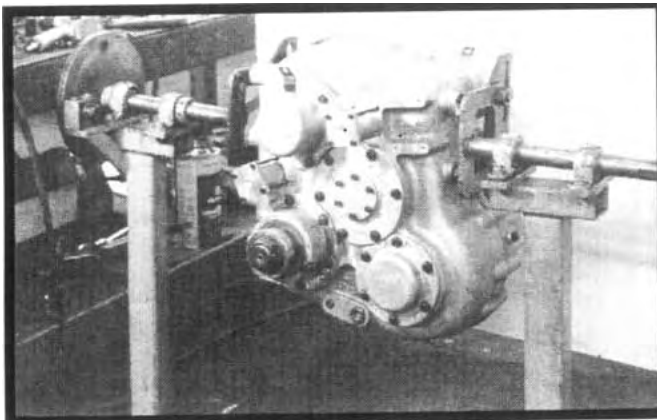


Figure 4.1

4. Remove the input, front output and rear output drive yokes or flanges.
5. If so equipped, remove the lubrication lines and oil filter. Note the location and routing of the lines so that they may be correctly reinstalled.

HOUSING DISASSEMBLY

1. Remove the front drive indicator switch, washer, and pin. See Figure 4.2.

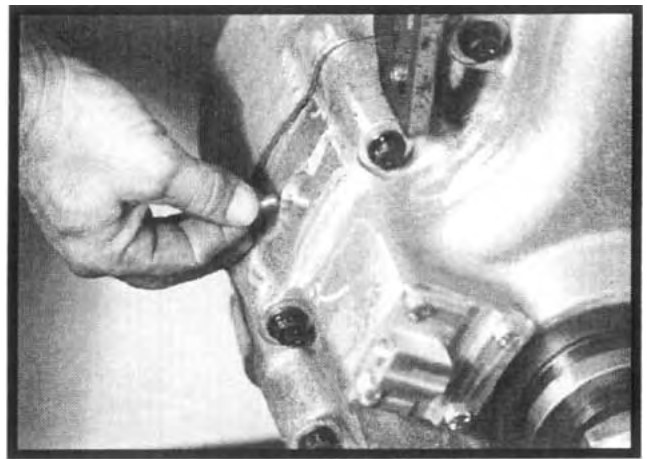


Figure 4.2

2. Remove the (4) cap screws securing the front output shift cylinder cap (transfer case front face). Remove the cap and discard the O-ring. See Figure 4.3.

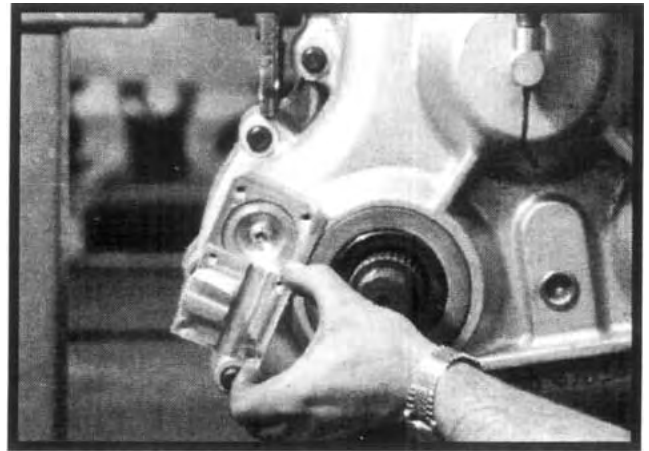


Figure 4.3

3. Remove the nut from the piston. Exercise caution as the piston is spring loaded. Remove the washer, piston, spring, and nylon stop ring.
4. Position the transfer case with its rear face upward.
5. Remove the (4) cap screws securing the two remaining shift cylinder caps (transfer case rear face). Lift off the cylinders and caps.
6. Remove the nut from each piston. Exercise caution as the pistons are spring loaded. Remove the washer, piston, spring, and nylon stop ring from each assembly.
7. If the unit is equipped with a lubrication pump, remove the (4) cap screws securing the pump assembly. Lift off the pump assembly and gasket. Discard the gasket. Remove the pump assembly by lifting from the shaft.
8. If the transfer case is equipped with a power take-off, remove the (6) larger (5/8" hex) cap screws and washers securing the power take-off unit to the transfer case housing. Lift the power take-off unit clear as an assembly.

9. Remove the remaining caps and carriers from the rear housing half. Keep the shims together with its cap or carrier to facilitate reassembly.
10. **Be sure the rear face of the transfer case is upward and that the unit is attached to the holding fixture by its front case half only.** Remove the (23) 12-point cap screws and washers. See Figure 4.4.

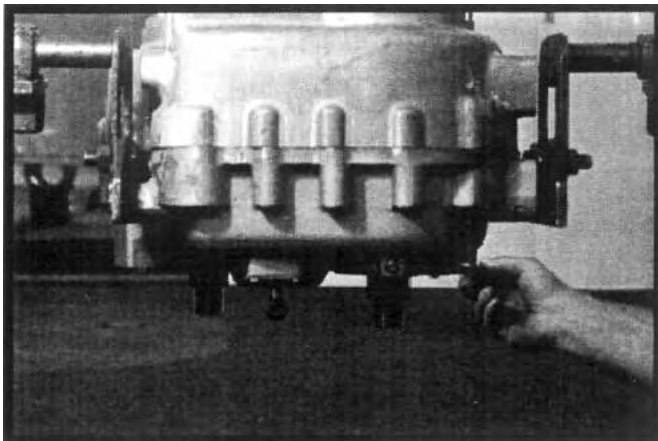


Figure 4.4

11. Separate the housing halves. If difficulty is encountered, temporarily install 3/8-16 bolts into the two tapped holes in the front housing half to force the housing halves apart. See Figure 4.5. Lift the rear housing half clear. Discard the housing gasket. See Figure 4.6.

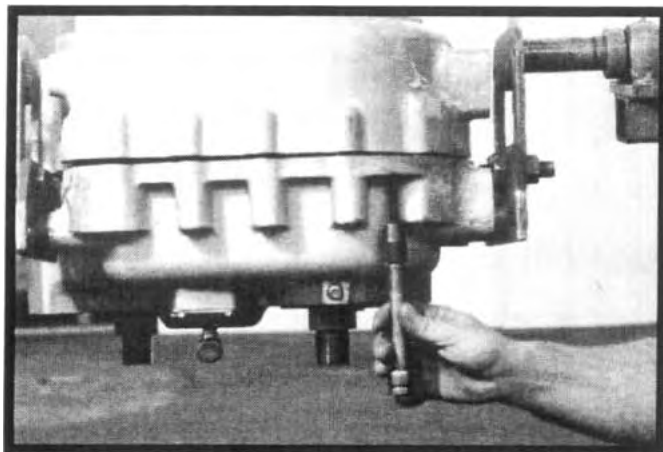


Figure 4.5

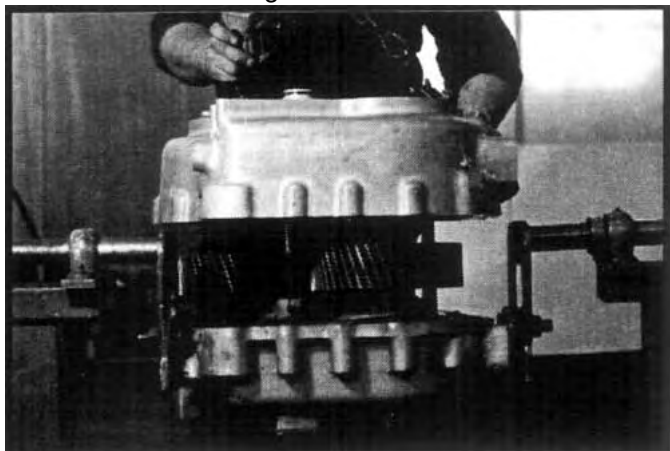


Figure 4.6

12. Cut the lockwires and remove the (2) shift fork screws from the high/low range shifter shaft. Lift the shifter shaft out. See Figure 4.7. Remove the (2) shift forks.

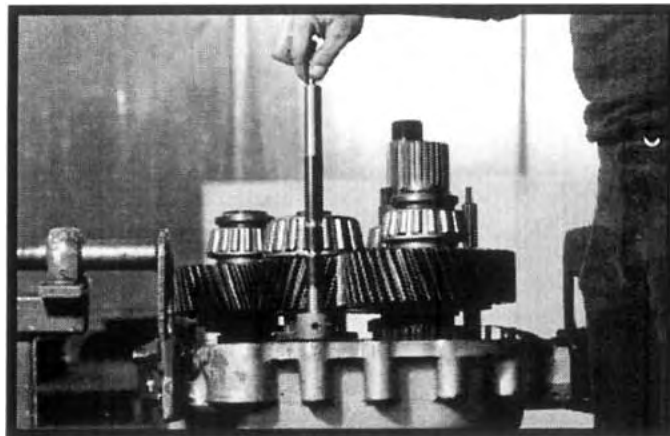


Figure 4.7

13. Lift the input shaft subassembly from the housing. See Figure 4.8.

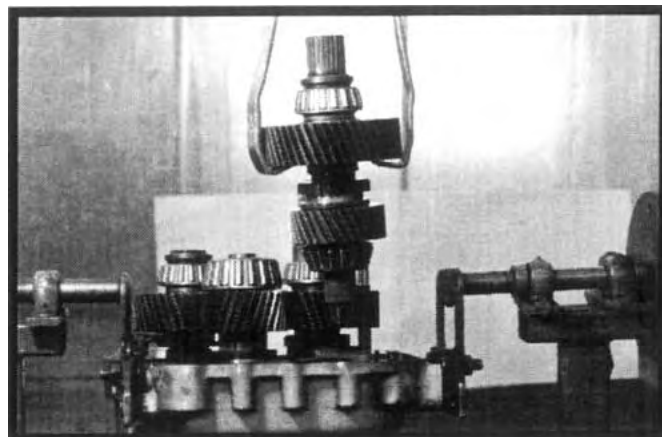


Figure 4.8

14. Lift the rear output shaft subassembly, together with its shifter shaft subassembly, from the housing. Do not force - it may be necessary to rock the shifter shaft from side to side to prevent binding. See Figure 4.9.

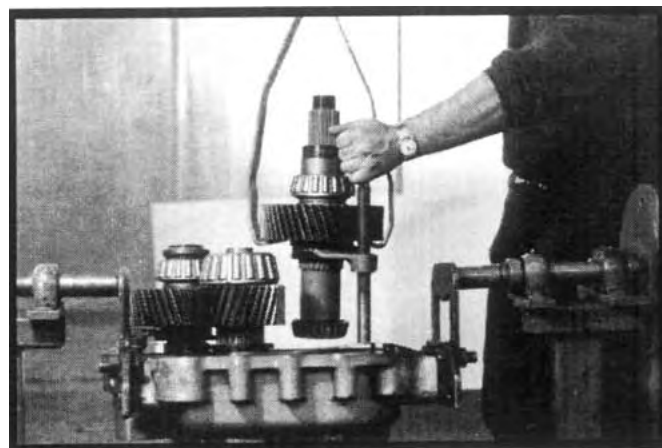


Figure 4.9

15. Lift the front output shaft subassembly, together with its shifter shaft/fork, from the housing. See Figure 4.10.

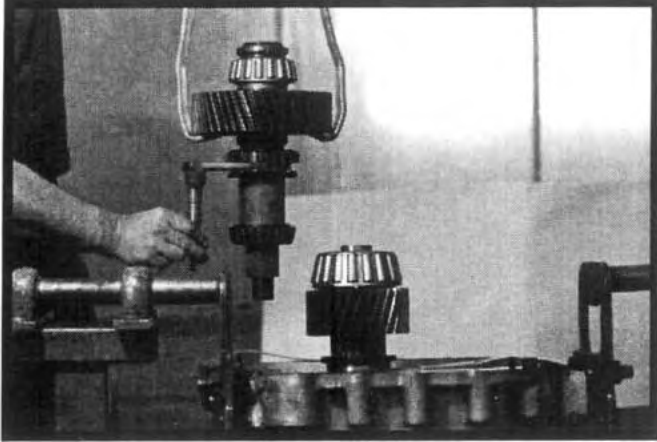


Figure 4.10

16. Lift the intermediate shaft subassembly from the case. See Figure 4.11.

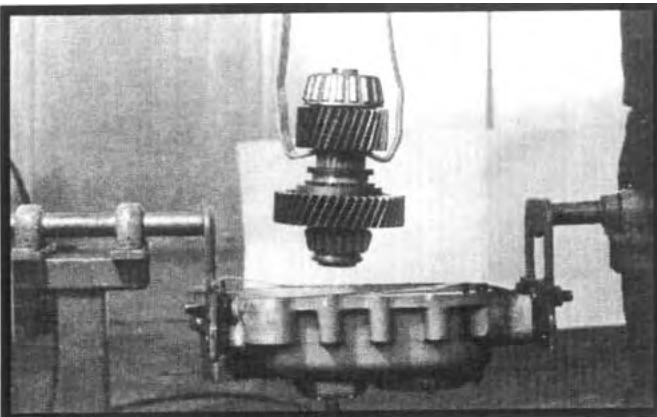


Figure 4.11

SUBASSEMBLIES

INPUT SHAFT DISASSEMBLY

Refer to Section P.2 in the parts manual.

1. To facilitate reassembly, the gear end float on the shaft should be checked prior to disassembly. Install a dial indicator with a magnetic base as pictured in Figure 4.12. Lift upward on the gear and note the amount of end float. The specified amount of end float is between .000 and .002 inches. A greater amount usually indicates worn bearings.

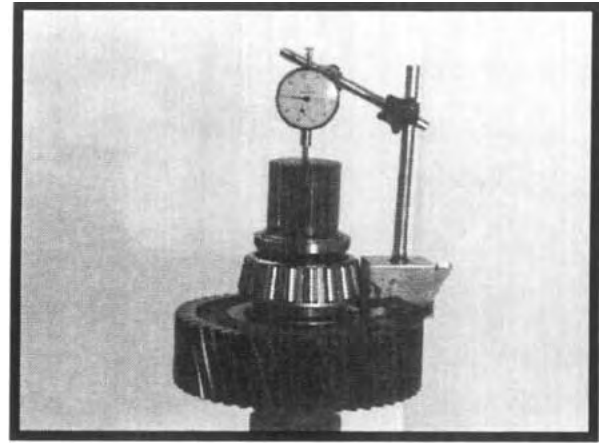


Figure 4.12

2. Remove the bearing locknut with Fabco Tool 866-0687-004 or equivalent. See Section 8.1 in this manual. Lift off the spacer ring.
3. Place the shaft assembly in a press so that the clutch collar is supported and the press arbor bears against the end of the shaft. **Do not support the assembly by either one of the gears.** See Figure 4.13. Remove the (3) bearing cone assemblies, the gear assembly, the two spacer rings, and the clutch collar.

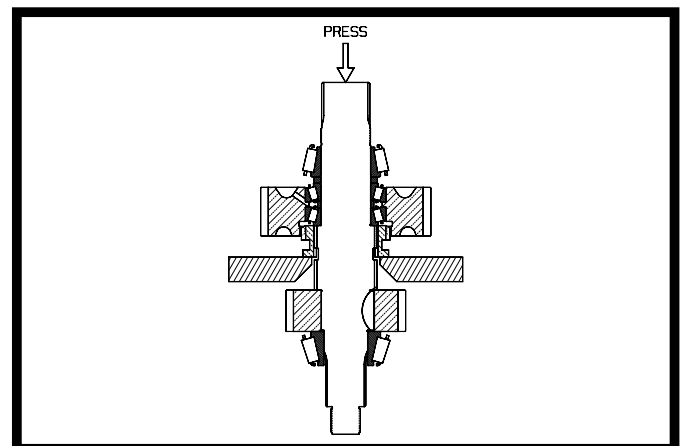


Figure 4.13

4. Invert the shaft assembly in the press so that the remaining gear is supported. See Figure 4.14. Remove the bearing cone assembly and the gear. Remove the woodruff key if necessary.

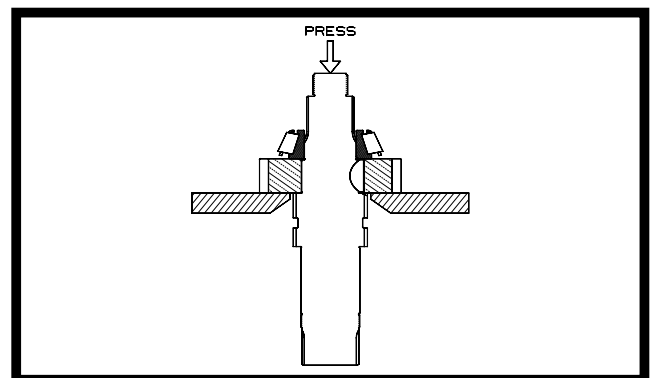


Figure 4.14

INTERMEDIATE SHAFT DISASSEMBLY

Refer to Section P.3 in the parts manual.

1. To facilitate reassembly, the gear end float on the shaft should be checked prior to disassembly. Install a dial indicator with a magnetic base as pictured in Figure 4.15. Lift upward on the gear and note the amount of end float. The specified amount of end float is between .000 and .002 inches. A greater amount usually indicates worn bearings.

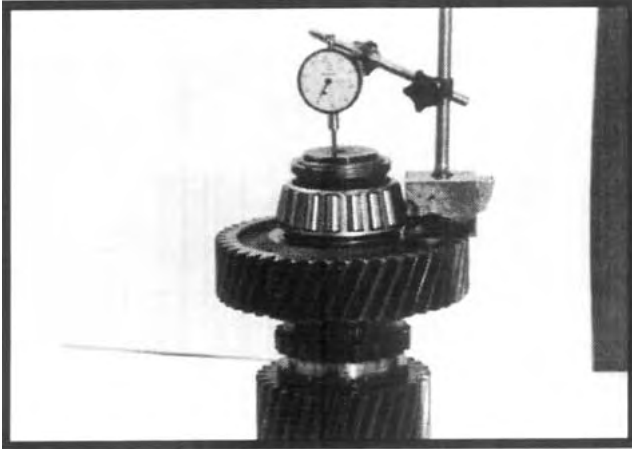


Figure 4.15

2. Remove the bearing locknut with Fabco Tool 866-0687-004 or equivalent. See Section 8.1 in this manual. Lift off the spacer ring.
3. Place the shaft assembly in a press so that the clutch collar is supported and the press arbor bears against the shaft. **Do not support the assembly by either one of the gears.** See Figure 4.16. Remove the (3) bearing cone assemblies, the gear assembly, the spacer ring, and the clutch collar.

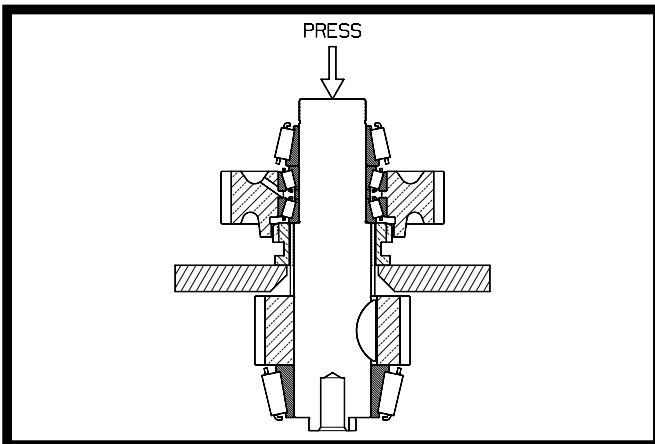


Figure 4.16

4. Invert the shaft assembly in the press so that the remaining gear is supported. See Figure 4.17. Remove the bearing cone assembly and the gear. Remove the woodruff key if necessary.

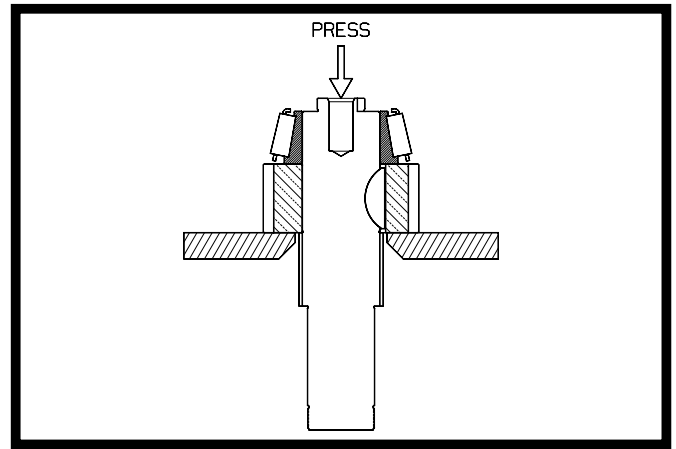


Figure 4.17

FRONT OUTPUT SHAFT DISASSEMBLY

Refer to Section P.4 in the parts manual.

1. To facilitate reassembly, the gear end float on the shaft should be checked prior to disassembly. Install a dial indicator with a magnetic base as pictured in Figure 4.18. Lift upward on the gear and note the amount of end float. The specified amount of end float is between .000 and .002 inches. A greater amount usually indicates worn bearings.

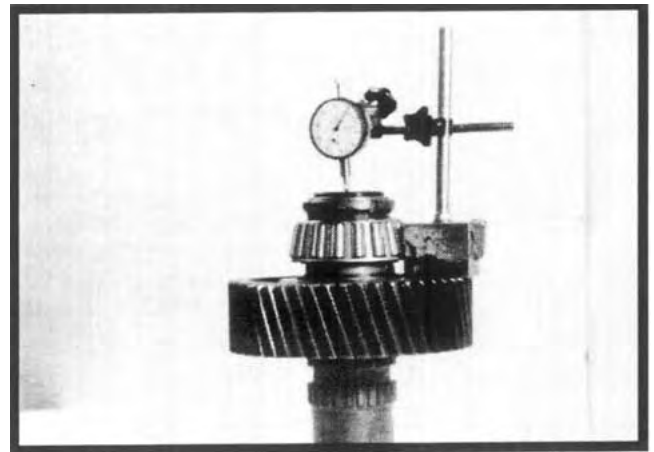


Figure 4.18

2. Remove the bearing locknut with Fabco Tool 866-0687-004 or equivalent. See Section 8.1 in this manual. Lift off the spacer ring.
3. Place the shaft assembly in a press so that the clutch collar is supported and the press arbor bears against the end of the shaft. **Do not support the assembly by the gear.** See Figure 4.19. Remove the (3) bearing cone assemblies, the gear assembly, the (2) spacer rings, and the clutch collar.

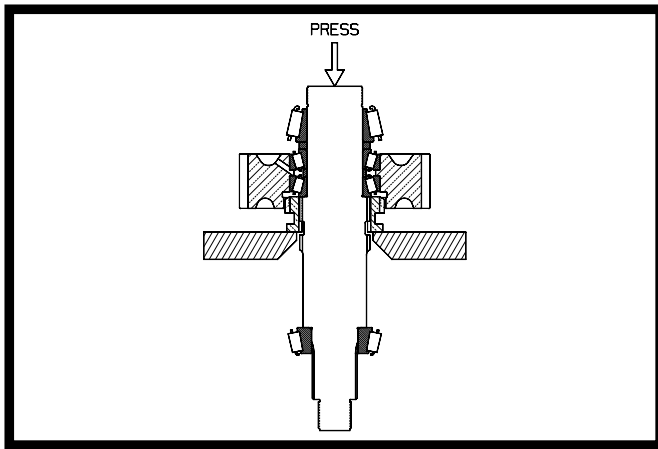


Figure 4.19

4. Invert the shaft assembly in the press so that the remaining bearing cone is supported. See Figure 4.20. Remove the bearing cone assembly.

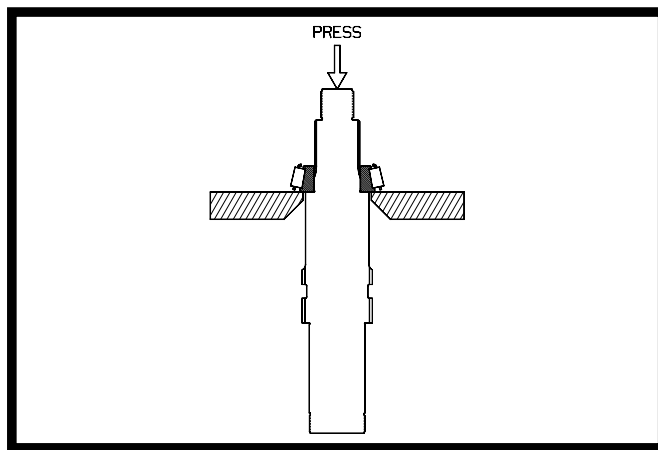


Figure 4.20

REAR OUTPUT SHAFT DISASSEMBLY

Refer to Section P.5 in the parts manual.

1. To facilitate reassembly, the gear end float on the shaft should be checked prior to disassembly. Temporarily install the drive yoke (or flange) on the shaft and torque the locknut to specification. For convenience, Fabco Tool 884-0246 may be used instead of the yoke. See Section 8.2 in this manual. Install a dial indicator with a magnetic base as pictured in Figure 4.21. Lift upward on the gear and note the amount of end float. The specified amount of end float is between .000 and .002 inches. A greater amount usually indicates worn bearings.

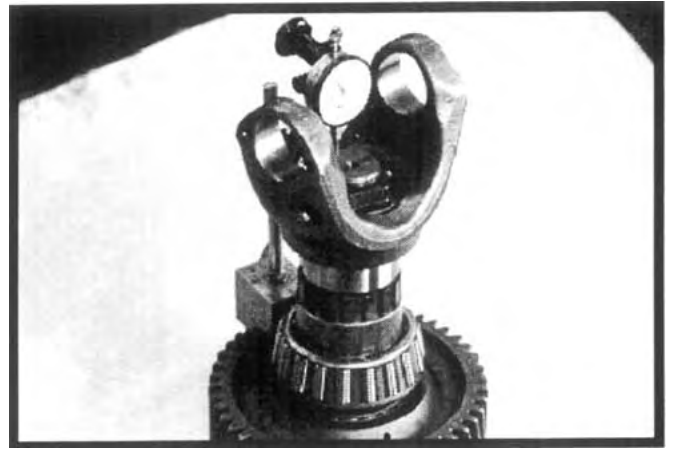


Figure 4.21

2. Remove the drive yoke.
3. Place the shaft assembly in a press so that the clutch collar is supported and the press arbor bears against the end of the shaft. **Do not support the assembly by the gear.** See Figure 4.22. Remove the speedometer sensor gear and its spacer, the (3) bearing cone assemblies, the gear assembly, the two spacer rings, and the clutch collar.

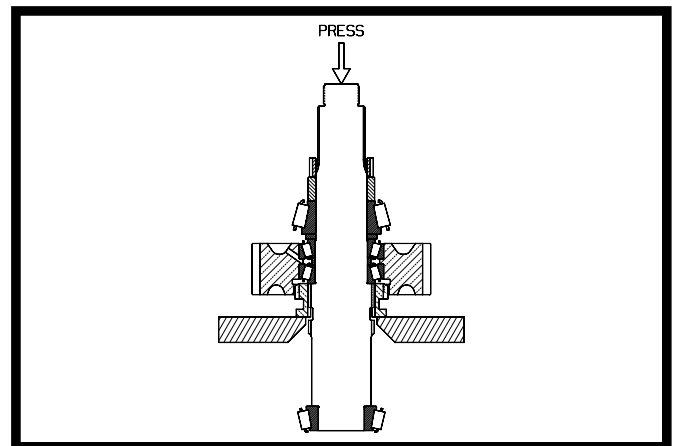


Figure 4.22

4. Invert the shaft assembly in the press so that the remaining bearing cone is supported. See Figure 4.23. Remove the bearing cone assembly.

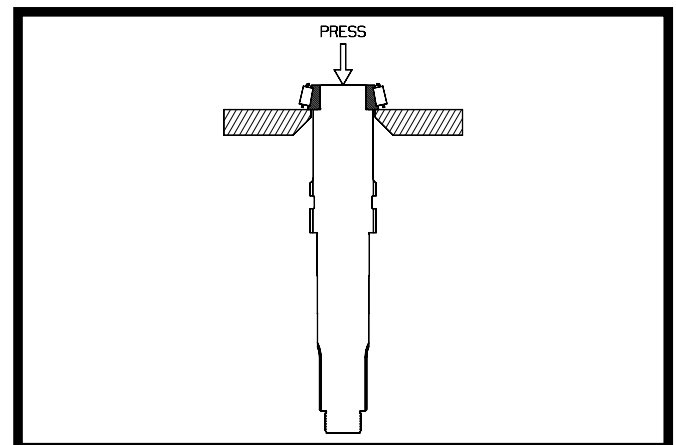


Figure 4.23

5. CLEANING AND INSPECTION

CLEANING

Steam may be used for external cleaning of completely assembled units. Care must be taken to ensure that water is kept out of the assembly by sealing breather caps and other openings.

Parts should be cleaned with emulsion cleaners or petroleum solvents. To avoid damage, alkaline solutions should not be used.

DRYING AND CORROSION INHIBITION

Dry compressed air or clean, soft shop towels should be used to dry parts after cleaning. Bearings should never be spun dry with compressed air.

Dried parts should be immediately coated with a light oil or corrosion inhibitor to prevent corrosion damage. Parts which are to be stored should also be wrapped in heavy waxed paper or plastic bags and kept dust-free.

INSPECTION

Prior to reassembly, parts which are to be reused must be carefully inspected for signs of wear or damage. Replacement of such parts can prevent costly downtime at a future date.

All bearing surfaces, including roller bearing cups and cones, should be examined for pitting, wear, or overheating. Gears may also show pits, as well as scoring and broken teeth. Shafts may be nicked or marred, or have damaged threads. Parts which show any sign of damage should be repaired or replaced.

Inspect the rotor, housing, and idler of the oil pump (if equipped) for scoring. Inspect the drive tab of the rotor assembly. If any damage is noted, the pump cartridge assembly should be replaced as a unit.

Check all shift forks and slots in sliding clutches for wear or discoloration due to heat. Check the engaging teeth for a partial engagement wear pattern.

6. ASSEMBLY

ASSEMBLY PRECAUTIONS

1. Read the instructions completely before starting re-assembly. Refer to the appropriate exploded view in the parts manual.
2. All parts must be clean. The gasket surfaces must be free of old gasket material. Do not reuse old gaskets.
3. Bearing cup bores, and shaft spline and bearing mounting surfaces, should be coated with Lubriplate or equivalent. This is necessary to reduce the possibility of galling.

4. All used oil seals must be replaced and the new oil seals should be coated with Loctite 601 or equivalent on their outer diameter prior to being installed in their bores. Their sealing lips should be coated with Lubriplate or equivalent to provide initial lubrication.
5. Any external cap screw not to be installed in a blind hole should have its threads coated with Permatex Form-A-Gasket #2 or equivalent non-hardening sealer to prevent an oil leak.
6. All threaded fasteners should be tightened to the torque specified in the torque chart.
7. Any sharp edges on the seal diameter of the universal joint yoke or companion flanges should be removed with emery cloth. The seal operating area should be coated with Lubriplate or equivalent before installation.
8. In many of the procedures, when a part is assembled with a press fit, it is recommended that the part be heated prior to installation. The part should be placed in an oven and heated to no more than 300°F. Excessive heat may change the metallurgical properties of the part. Heated components should be allowed to cool to room temperature before end float measurements are made.

CAUTION: Although Fabco does not recommend its use in transfer cases, if a formed-in-place gasket is used for repair, extreme caution must be exercised to prevent the compound from entering bearings, oil galleries, passages or tapped holes. All beads must be kept smaller than .125 inch diameter.

INPUT SHAFT ASSEMBLY

Refer to Section P.2 in the parts manual.

1. Install the woodruff key. Be sure of the correct key. The input shaft key is 2 inches long while the intermediate shaft key is 2 5/16 inches long.
2. Position the shaft as shown in Figure 6.1.



Figure 6.1

3. Heat and install a gear bearing cone assembly (one of the narrower two) against the shaft shoulder. See Figure 6.2.



Figure 6.2

4. Slide the bearing spacer ring against the cone. Note that the bearing spacer ring is a select-fit part that is used to adjust the gear end float. If the end float checked prior to disassembly was within specification (.000 to .002 inch) and no parts were replaced, the original bearing spacer ring should provide the correct end float upon reassembly.
5. Press the two bearing cups into the gear. Be sure that the cups are seated.
6. Position the gear assembly onto the shaft. The face of the gear with the internal clutch splines must face downward. See Figure 6.3.



Figure 6.3

7. Heat and install the remaining gear bearing cone assembly against the bearing spacer ring. Slide the larger of the remaining spacer rings against the bearing cone.
8. A fabricated steel sleeve is desirable at this time to check the gear end float. See Section 8 in this manual for construction details. If the construction of this sleeve is impractical, skip to step 12, but be sure to check the end float as directed in step 10.

9. Slip the fabricated sleeve over the shaft. Install the bearing locknut with Fabco Tool 866-0687-004 or equivalent. Torque to specification.

10. Install a dial indicator as depicted in Figure 6.4. Lift upward on the gear assembly and note the gear end float on the dial indicator. If the end float is not within specification (.000 to .002 inch), it will be necessary to disassemble the shaft by performing Steps 2 and 3 under "INPUT SHAFT DISASSEMBLY" in Section 4. Measure the thickness of the original spacer ring and select a new ring to provide end float within specification. See item 12 in Section P.2 in the parts manual for a list of available spacer rings.

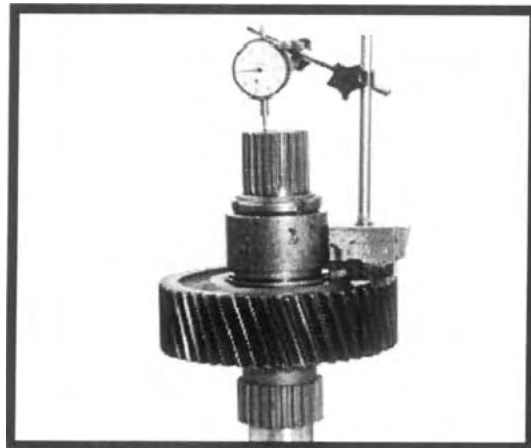


Figure 6.4

1. After the correct end float is obtained, remove the locknut and the fabricated sleeve.
12. **Be sure that the spacer ring is still in place.** Heat and install the shaft bearing cone assembly against the spacer ring. Slide the remaining spacer ring against the bearing cone.
13. Install the bearing locknut with Fabco Tool 866-0687-004 or equivalent. Torque to specification.
14. The gear end float should be rechecked at this time.
15. Invert the assembly and install the sliding clutch collar. The external teeth on the collar must face downward. See Figure 6.5.



Figure 6.5

16. Heat and install the remaining gear. See Figure 6.6.

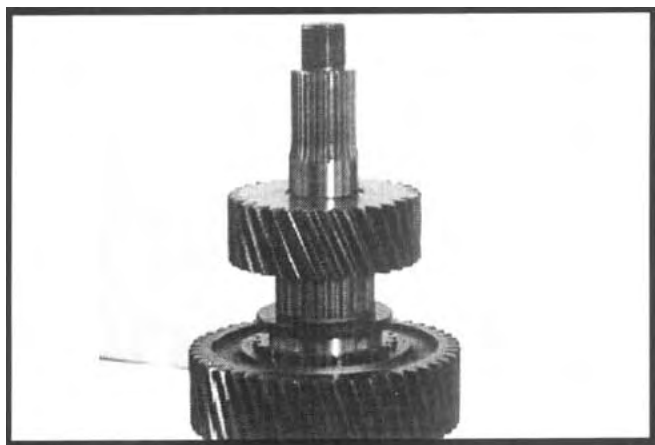


Figure 6.6

17. Heat and install the front bearing cone assembly against the gear. See Figure 6.7.

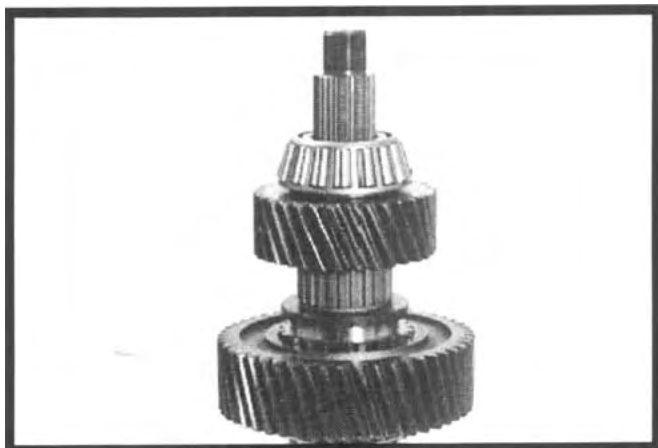


Figure 6.7

INTERMEDIATE SHAFT ASSEMBLY

Refer to Section P.3 in the parts manual.

1. Install the woodruff key. Be sure of the correct key. The intermediate shaft key is 2 5/16 inches long while the input shaft key is 2 inches long.
2. Position the shaft as shown in Figure 6.8.



Figure 6.8

3. Heat and install the smaller of the two gears. See Figure 6.9.

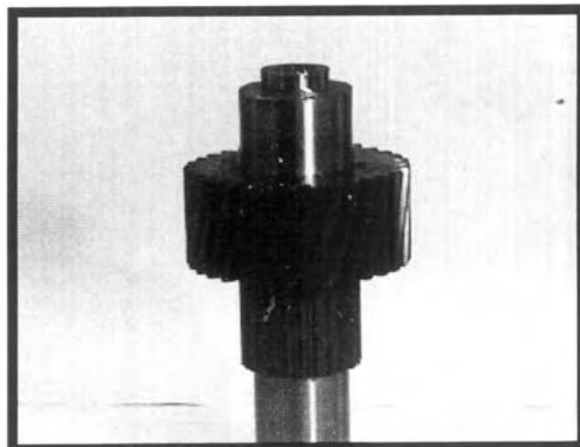


Figure 6.9

4. Heat and install the rear bearing cone assembly against the gear. See Figure 6.10.

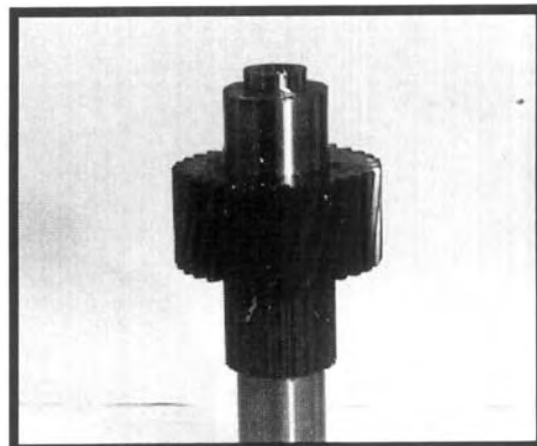


Figure 6.10

5. Invert the assembly and install the sliding clutch collar. The external teeth on the collar must face upward. See Figure 6.11.



Figure 6.11

6. Heat and install a gear bearing cone assembly (one of the narrower two) against the shaft shoulder.

7. Slide the bearing spacer ring against the cone. See Figure 6.12. Note that the bearing spacer ring is a select-fit part that is used to adjust the gear end float. If the end float checked prior to disassembly was within specification (.000 to .002 inch) and no parts were replaced, the original bearing spacer ring should provide the correct end float upon reassembly.



Figure 6.12

8. Press the two bearing cups into the gear. Be sure that the cups are seated.
9. Position the gear assembly onto the shaft. The face of the gear with the internal clutch splines must face downward. Heat and install the remaining gear bearing cone assembly against the bearing spacer ring. See Figure 6.13.



Figure 6.13

10. A fabricated steel sleeve is desirable at this time to check the gear end float. See Section 8 in this manual for construction details. If the construction of this sleeve is impractical, skip to step 14, but be sure to check the end float as directed in Step 12.
11. Slip the fabricated sleeve over the shaft. Install the bearing locknut with Fabco Tool 866-0687-004 or equivalent. Torque to specification.

12. Install a dial indicator as depicted in Figure 6.14. Lift upward on the gear assembly and note the gear end float on the dial indicator. If the end float is not within specification (.000 to .002 inch), it will be necessary to disassemble the shaft by performing Steps 2 and 3 under "INTERMEDIATE SHAFT DISASSEMBLY" in Section 4. Measure the thickness of the original spacer ring and select a new ring to provide end float within the specification. See item 8 in Section P.3 or P.4 in the parts manual for a list of available spacer rings.

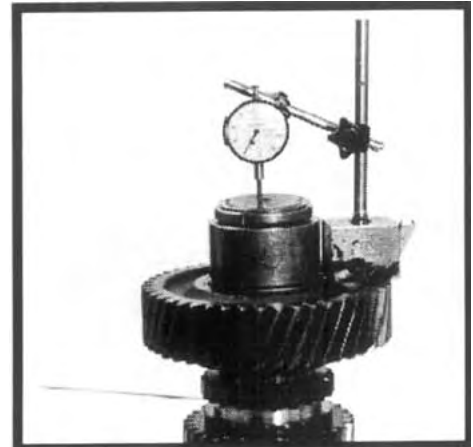


Figure 6.14

13. After the correct end float is obtained, remove the locknut and the fabricated sleeve.
14. Heat and install the shaft bearing cone assembly against the gear bearing cone. Slide the remaining spacer ring against the bearing cone.
15. Install the bearing locknut with Fabco Tool 866-0687-004 or equivalent. Torque to specification.
16. The gear end float should be rechecked at this time.

FRONT OUTPUT SHAFT ASSEMBLY

Refer to Section P.4 in the parts manual.

1. Heat and install the front bearing cone assembly against the shaft shoulder. After the bearing cools to room temperature, position the shaft as shown in Figure 6.15.

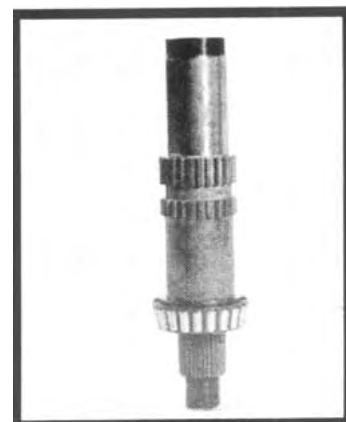


Figure 6.15

2. With its external teeth facing upward, slip the clutch collar over the shaft as shown in Figure 6.16.

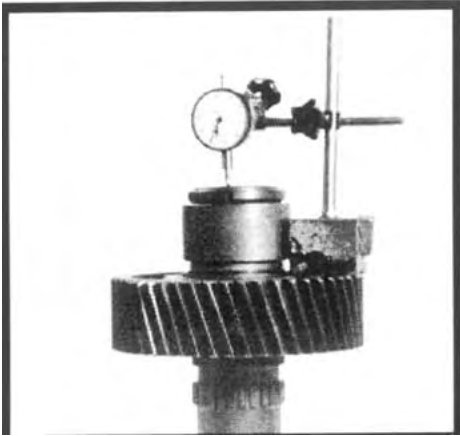


Figure 6.16

3. Heat and install a gear bearing cone assembly (one of the narrower two) against the shaft shoulder. See Figure 6.17.



Figure 6.17

4. Slide the bearing spacer ring against the cone. Note that the bearing spacer ring is a select-fit part that is used to adjust the gear end float. If the end float checked prior to disassembly was within specification (.000 to .002 inch) and no parts were replaced, the original bearing spacer ring should provide the correct end float upon reassembly.
5. Press the two bearing cups into the gear. Be sure that the cups are seated.
6. Position the gear assembly onto the shaft. The face of the gear with the internal clutch splines must face downward.
7. Heat and install the remaining gear bearing cone assembly against the bearing spacer ring. Slide the larger of the remaining spacer rings against the bearing cone. See Figure 6.18.



Figure 6.18

8. A fabricated steel sleeve is desirable at this time to check the gear end float. See Section 8 in this manual for construction details. If the construction of this sleeve is impractical, skip to Step 12, but be sure to check the end float as directed in Step 10.
9. Slip the fabricated sleeve over the shaft. Install the bearing locknut with Fabco Tool 866-0687-004 or equivalent. Torque to specification.
10. Install a dial indicator as depicted in Figure 6.19. Lift upward on the gear assembly and note the gear end float on the dial indicator. If the end float is not within specification (.000 to .002 inch), it will be necessary to disassemble the shaft by performing Steps 2 and 3 under "FRONT OUTPUT SHAFT DISASSEMBLY" in Section 4. Measure the thickness of the original spacer ring and select a new ring to provide end float within specification. See item 10 in Section P.5 in the parts manual for a list of available spacer rings. Be sure to recheck the gear end float after a new spacer ring is installed.

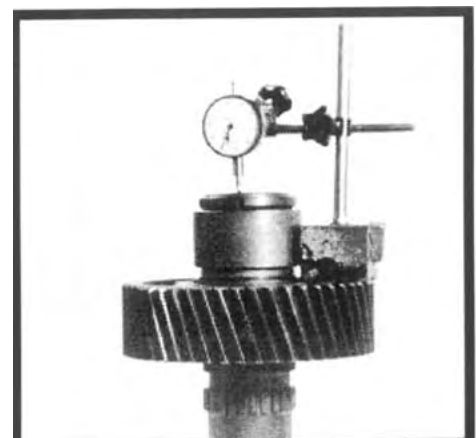


Figure 6.19

11. After the correct end float is obtained, remove the locknut and the fabricated sleeve.
12. **Be sure that the spacer ring is still in place.** Heat and install the shaft bearing cone assembly against the spacer ring. Slide the remaining spacer ring against the bearing cone.

13. Install the bearing locknut with Fabco Tool 866-0687-004 or equivalent. Torque to specification.

14. The gear end float should be rechecked at this time.

REAR OUTPUT SHAFT ASSEMBLY

Refer to Section P.5 in the parts manual.

1. Heat and install the front bearing cone assembly against the shaft shoulder. After the bearing cools to room temperature, position the shaft with the bearing downward.
2. With its external teeth facing upward, slip the clutch collar over the shaft as shown in Figure 6.20.



Figure 6.20

3. Heat and install a gear bearing cone assembly (one of the narrower two) against the shaft shoulder.
4. Slide the bearing spacer ring against the cone. See Figure 6.21. Note that the bearing spacer ring is a select-fit part that is used to adjust the gear end float. If the end float checked prior to disassembly was within specification (.000 to .002 inch) and no parts were replaced, the original bearing spacer ring should provide the correct end float upon reassembly.



Figure 6.21

5. Press the two bearing cups into the gear. Be sure that the cups are seated.
6. Position the gear assembly onto the shaft. The face of the gear with the internal clutch spline must face downward. See Figure 6.22.



Figure 6.22

7. Heat and install the remaining gear bearing cone assembly against the bearing spacer ring. Slide the thin spacer ring against the bearing cone. See Figure 6.23.



Figure 6.23

8. A fabricated steel sleeve is desirable at this time to check the gear end float. See Section 8 in this manual for construction details. If the construction of this sleeve is impractical, perform Step 12, and then temporarily install the yoke or flange (or Fabco Tool 884-0246) and check the end float as directed in Step 10.
9. Slip the fabricated sleeve over the shaft. Install the yoke retaining nut and torque to specifications.

10. Install a dial indicator as depicted in Figure 6.24. Lift upward on the gear assembly and note the gear end float on the dial indicator. If the end float is not within specification (.000 to .002 inch), it will be necessary to disassemble the shaft by performing Steps 2 and 3 under “REAR OUTPUT SHAFT DISASSEMBLY” in Section 4. Measure the thickness of the original spacer ring and select a new ring to provide end float within specification. See item 7 in Section P.6 in the parts manual for a list of available spacer rings. Be sure to recheck the gear end float after a new spacer ring is installed.



Figure 6.24

11. After the correct end float is obtained, remove the locknut and the fabricated sleeve.
12. **Be sure that the spacer ring is still in place.** Heat and install the shaft bearing cone assembly against the spacer ring. Slide the spacer sleeve and then the speedometer sensor gear against the bearing cone. The sensor gear may be heated if necessary. See Figure 6.25.



Figure 6.25

HOUSING ASSEMBLY

1. If removed install new expansion plugs into the two shift shaft bores in the front housing half. Use a non-hardening sealer to prevent an oil leak. See Figure 6.26

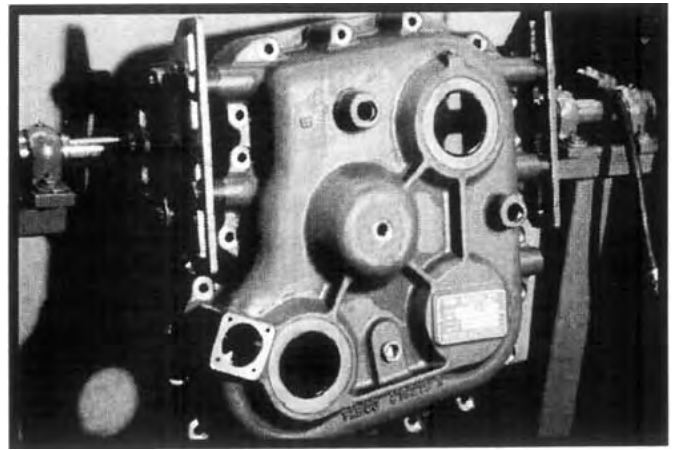


Figure 6.26

2. Install the input and the front output shaft oil seals in the front housing half. See Figure 6.26.
3. Mount the front housing half to the work fixture as shown in figure 6.27.



Figure 6.27

4. Tap the two hollow dowel pins into place in the front housing half. See Figure 6.28.

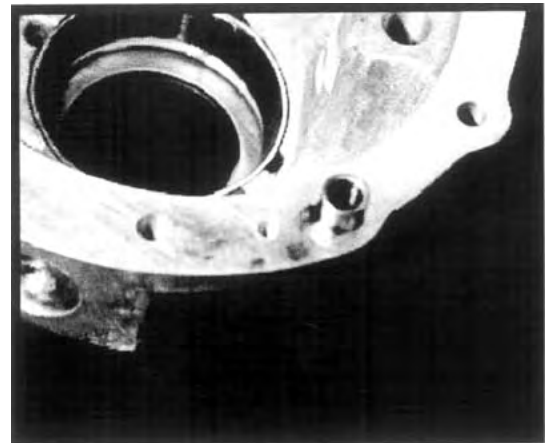


Figure 6.28

5. Install the (4) bearing cups into the inside of the front housing half. See Figure 6.29.

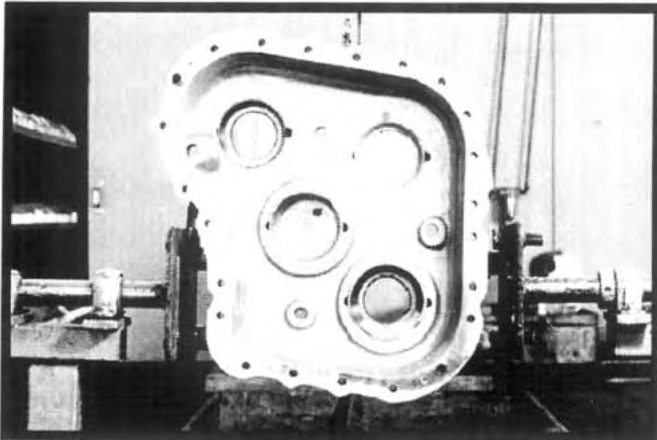


Figure 6.29

6. Lower the intermediate shaft subassembly into place (larger gear down). See Figure 6.30.

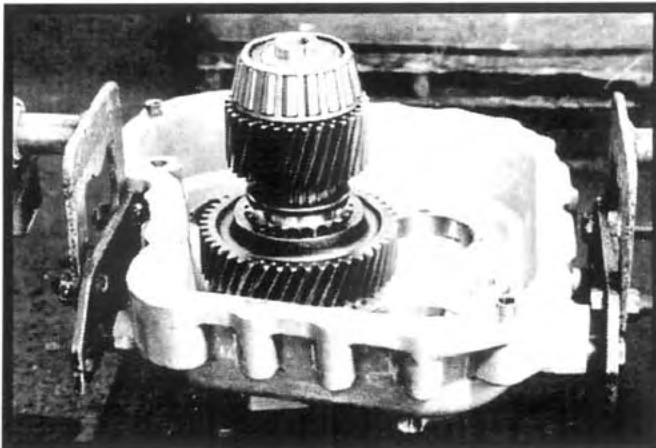


Figure 6.30

7. Position the front output shift shaft/fork to the front output shaft clutch collar and lower into place (gear end upward). See Figure 6.31.

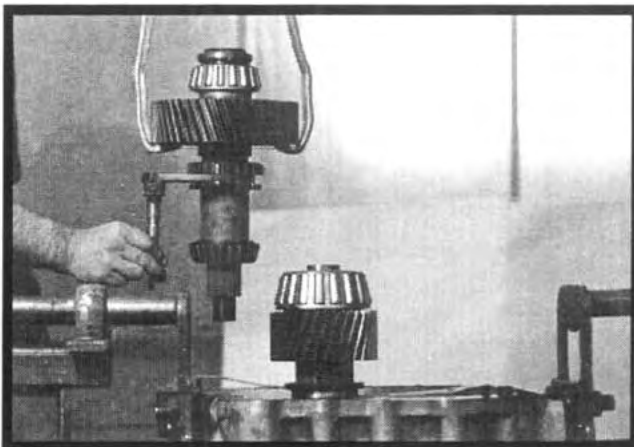


Figure 6.31

8. Assemble the rear output shift fork to the shift shaft, observing the orientation depicted in Figure 6.32. Install the fork locking screw. Be sure that the screw is seated in the shaft groove. Torque to specification and lockwire to the shaft as shown in Figure 6.32.



Figure 6.32

9. Position the rear output shift shaft/fork subassembly to the rear output shaft clutch collar and lower into place. See Figure 6.33.

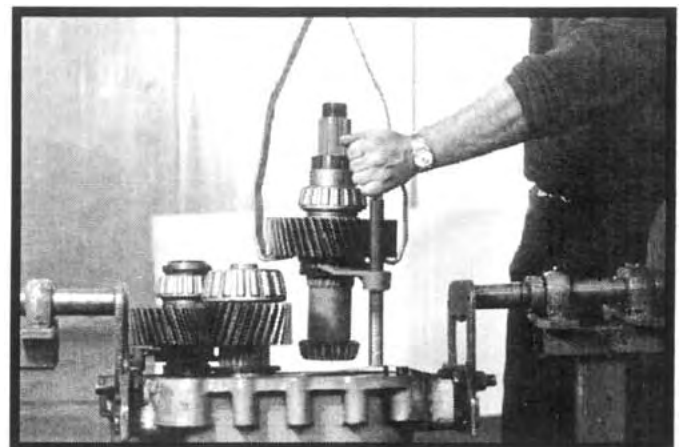


Figure 6.33

10. Lower the input shaft subassembly into place (smaller gear downward). See Figure 6.34.

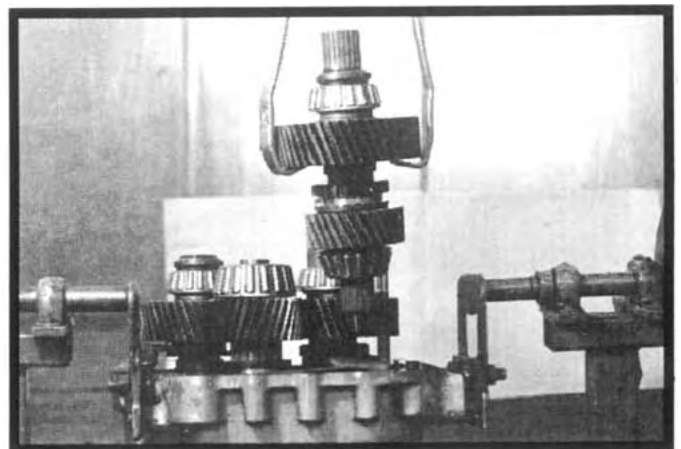


Figure 6.34

11. Position a shift fork to the input shaft clutch collar and the remaining shift fork to the intermediate shaft clutch collar observing the directions as in Figure 6.35. Locate the shift fork bores in line with the shaft bore in the front housing half.

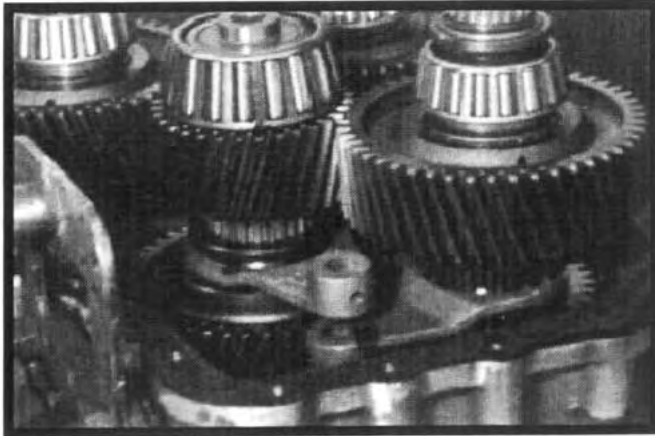


Figure 6.35

12. Insert the high/low range shift shaft through the bores in the shift forks and into the bore in the front housing (threaded end of the shaft upward). See Figure 6.36.

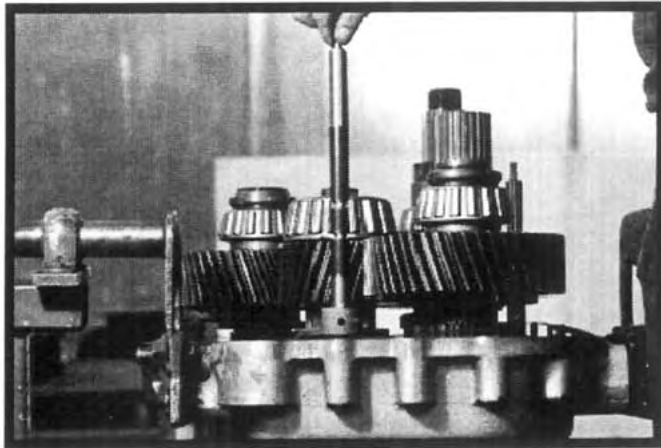


Figure 6.36

13. Install the input shaft shift fork locking screw and torque to specification. Be sure that the screw is seated in the lower groove. Rotate both shift forks clockwise until no further movement is possible. Install the intermediate shaft shift fork locking screw and torque to specification, insuring that the screw is seated in its groove. Attempt to rotate the shift shaft back and forth. There should be some obvious free play. Lockwire the two screws as shown in Figure 6.37.

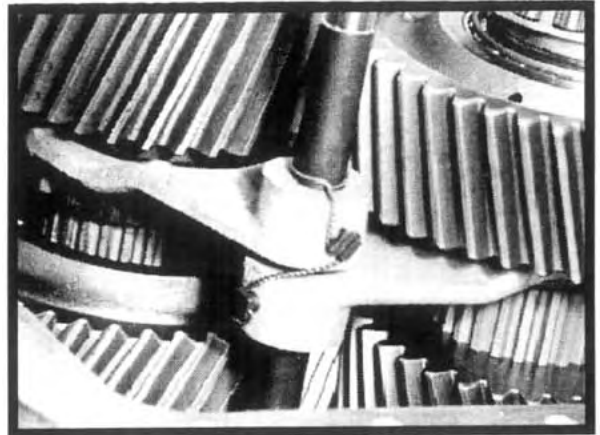


Figure 6.37

14. Gently tap the four bearing cups into the rear case half bores. See Figure 6.38.

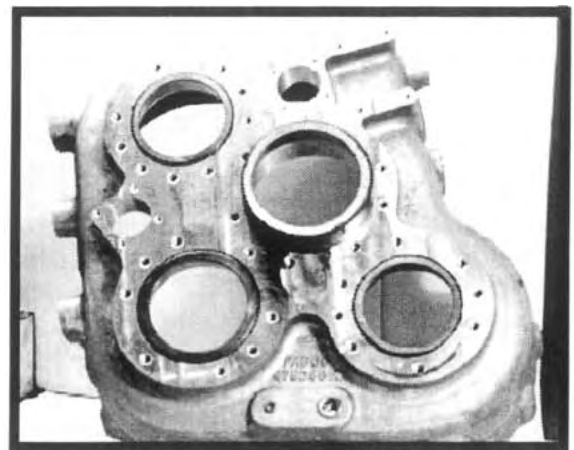


Figure 6.38

15. Place a new housing gasket over the two hollow dowel pins and lower the rear housing half into place. Secure with two of the 4 inch long hex head bolts at the pin locations. The remaining 4 inch long bolt is to be used with the lifting bracket at the location pictured in Figure 1.1. Use two flat washers between the bracket and the housing. Install the remaining (18) bolts. Torque all (21) bolts to specification in a criss-cross sequence.

In the steps that follow, a selected shim pack is used to adjust the end float of each of the assemblies. The correct setting is .003 to .008 inches. See the parts manual for a list of available shims.

Temporary guide studs may be used to assist in locating the shims and the cap or carrier. To make the studs, cut the heads off of two 7/16-14 x 2 inch long cap screws.

16. Temporarily install the rear output carrier with a shim pack thickness of .120 inch. See Figure 6.39.

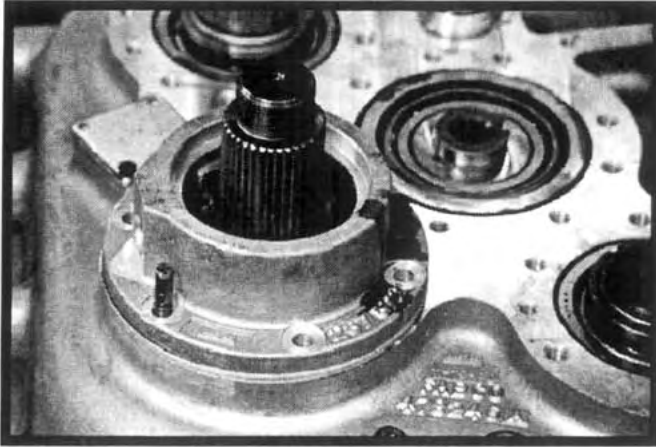


Figure 6.39

For convenience, Fabco Tool 884-0246 may be used during the shim selection procedure. See Section 8.2 in this manual.

17. Temporarily install the rear output yoke or flange (or Tool 884-0246). Torque the locknut to specification.
18. Pry the rear output shaft up and tap down several times to seat the bearing cups. Mount a dial indicator as shown in Figure 6.40. Pry the shaft up and down and note the amount of end float.

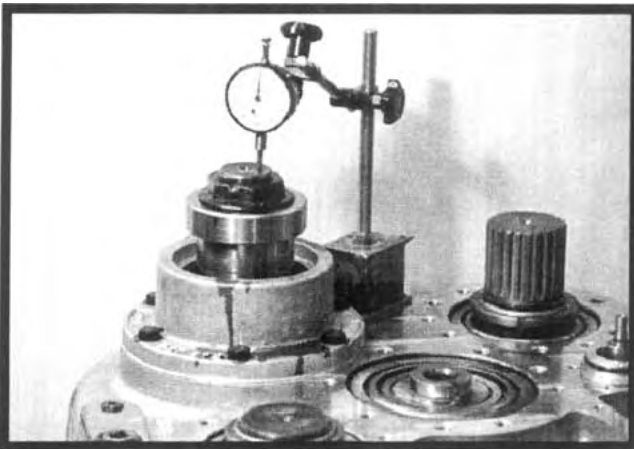


Figure 6.40

19. Temporarily install the intermediate shaft cap, the input shaft cap, and the front output shaft cap with a shim pack thickness each of .120 inch. See Figure 6.41. Install the power take-off unit in place of the input shaft cap if the unit is so equipped. See the parts manual for a list of available shims.

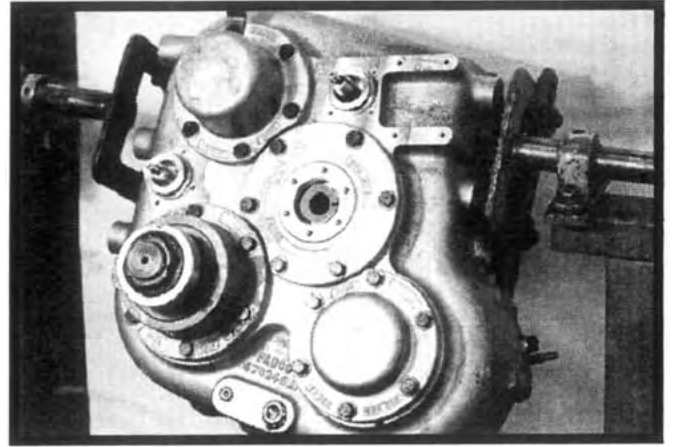


Figure 6.41

20. Rotate the unit over so that its front face is upward.
21. Install the input and front output yokes or flanges. Torque their locknuts to specification.
22. Pry the front output shaft up and tap down several times to seat the bearing cups. Mount a dial indicator as shown in Figure 6.42. Pry the shaft up and down and note the amount of end float.

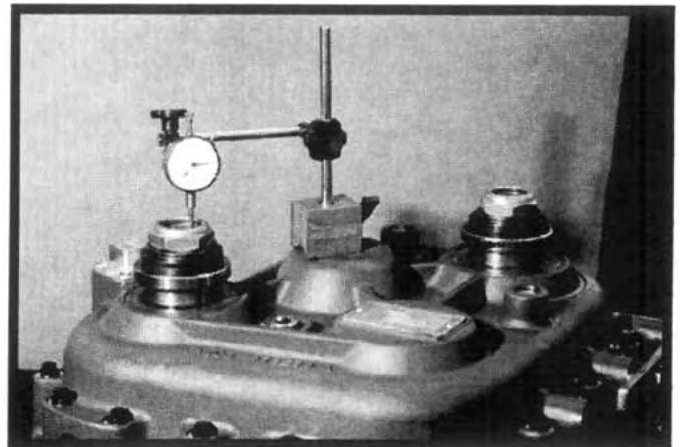


Figure 6.42

23. Pry the input shaft up and tap down several times to seat the bearing cups. Mount a dial indicator as shown in Figure 6.43. Pry the shaft up and down and note the amount end float.

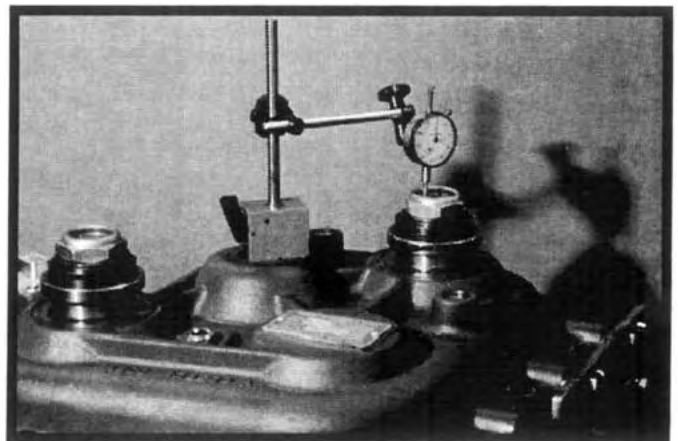


Figure 6.43

24. Working through the breather elbow hole in the front housing and the opening in the rear intermediate shaft cap, tap the intermediate shaft up and down several times to seat the bearing cups. Make sure that the shaft is all the way down before proceeding.
25. Install a dial indicator such that its probe is resting against the front of the intermediate shaft through the breather elbow hole. See Figure 6.44.

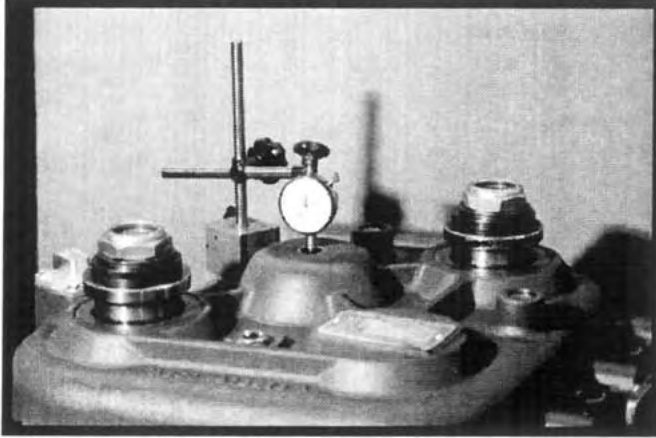


Figure 6.44

26. Push upward on the intermediate shaft and note the amount of end float on the dial indicator.
27. Repeat steps 24 through 26 several times to be sure of consistent results.
28. Assemble the front output shift cylinder as follows: Install a new piston-to-shaft O-ring over the threaded portion of the shifter shaft. Slip the spring over the shaft. Insert the nylon stop ring into the cylinder bore. See Figure 6.45.

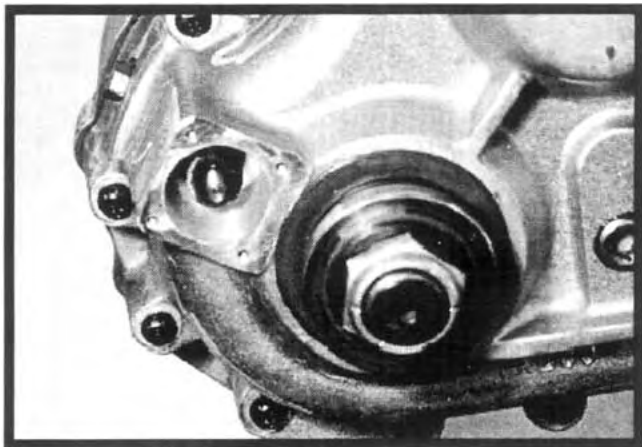


Figure 6.45

29. Install the piston O-ring in the deeper groove in the front output piston. Soak the felt strip in gear oil and install in the other groove. Insert the piston into its bore. The end of the piston with the felt strip must go in first. See Figure 6.46. Install the washer and nut over the piston. Torque the nut to specification.



Figure 6.46

30. Install a new O-ring on the shift cylinder cap. Install the cap such that the air inlet port points away from the front output shaft. See Figure 6.47. Torque the four cap screws to specification.

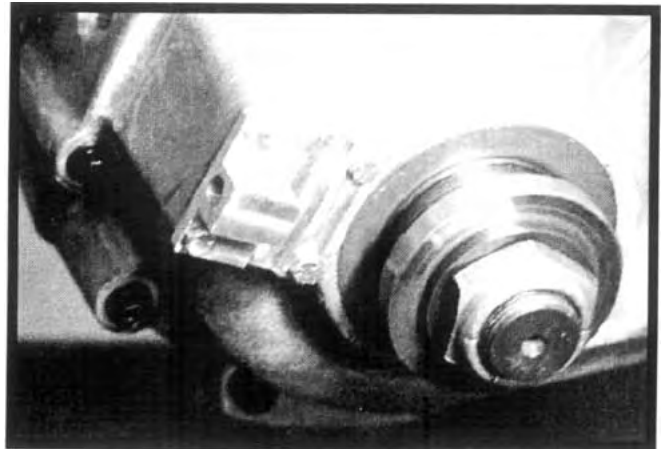


Figure 6.47

31. Insert the front drive indicator switch actuating pin into place. The rounded end of the pin must face inward. See Figure 6.48. Install the switch using a new copper washer and torque to specification.

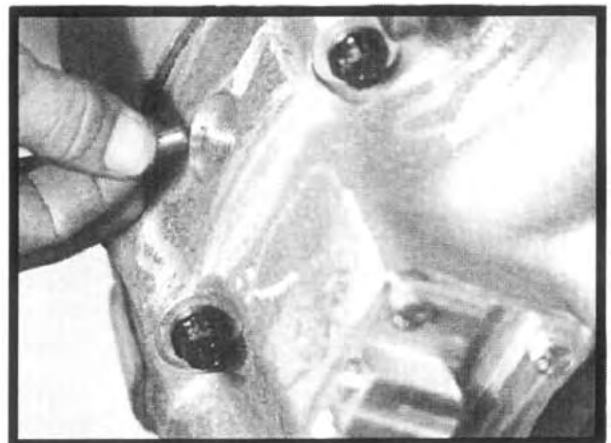


Figure 6.48

32. At this point, it is advantageous to verify the operation of the shift indicator switch. Apply and release shop air (150 psi maximum) to the shift cylinder while observing switch operation with a continuity tester. See Figure 6.49. It may be necessary to rotate the gear train slightly to permit clutch engagement.

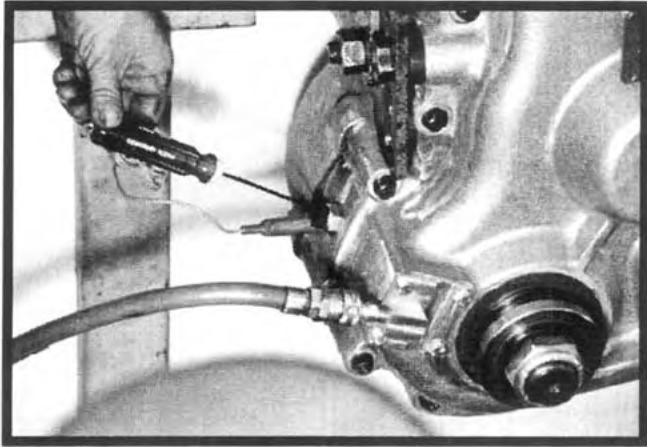


Figure 6.49

33. Install the breather vent and elbow in the front housing. The vent must point toward the top of the transfer case. See Figure 6.50.

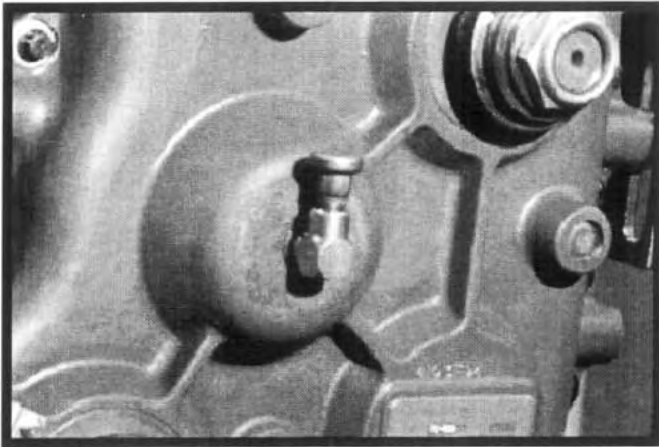


Figure 6.50

34. Rotate the transfer case over so that its rear end is facing upward.
35. Remove the rear output yoke or flange (or Tool 844-0246).
36. Remove the rear output carrier, the front output shaft cap, the intermediate shaft cap, and the input shaft cap (or power take-off unit).
37. To determine each correct shim pack thickness, subtract the measured amount of end play from the shim pack thickness used (.120 inch). The result of the subtraction is the shim pack thickness that would provide for zero end float of the shaft. Select a combination of shims to add up to as close as possible to this amount.

See the parts manual for a list of available shims. Since the thinnest shim available is .002 inch thick, the shim pack may be plus or minus .001 inch from the desired amount. If this procedure is carefully followed, the shaft end float after reassembly should be within the specified range of .003 to .008 inches. Always recheck the final end float with the dial indicator.

38. Press the oil seal into the rear output carrier (Figure 6.51) and install on the transfer case using the shim pack determined in Step 37.



Figure 6.51

39. Install the intermediate shaft cap, the front output shaft cap, and the input shaft cap (or power take-off unit) using the respective shim pack determined in Step 37. When installing the input shaft cap, use the lifting bracket in place of the washer at the uppermost location. See Figure 6.52. Torque the (18) cap screws to specification.

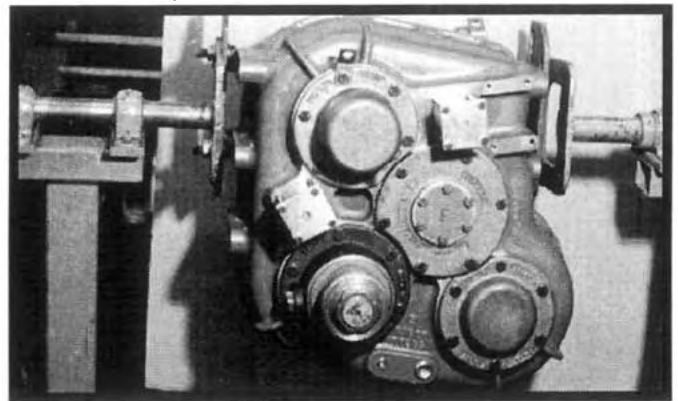


Figure 6.52

40. If the unit is not equipped with a lubrication pump, install the blanking cap with a new gasket on the intermediate shaft cap. Torque the (6) cap screws to specification. See Figure 6.53.

If the unit is equipped with a lubrication pump, follow the lubrication pump installation instructions contained in the PTO conversion kit.

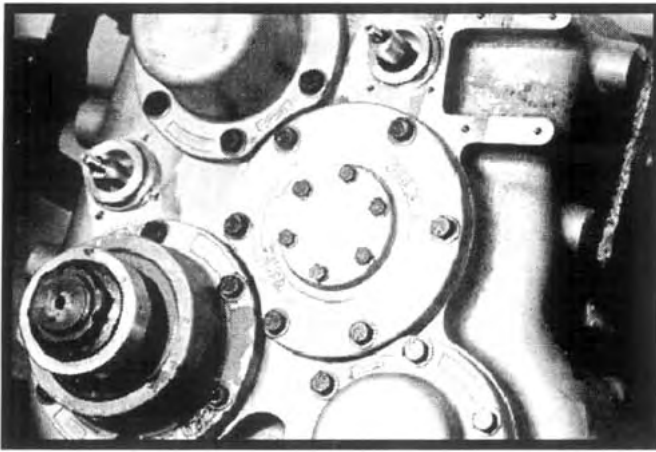


Figure 6.53

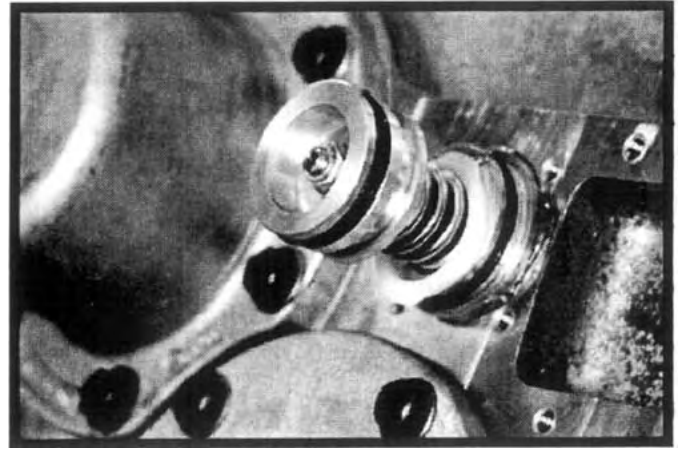


Figure 6.55

41. Assemble the high/low range air shift cylinder as follows: Install two new O-rings on the shift cylinder adapter tube and push into the rear transfer case housing bore. See Figure 6.54. The end of the tube with the counterbore must face outward.

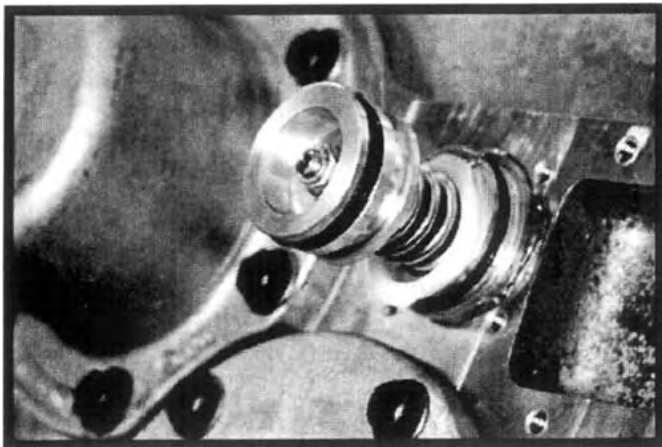


Figure 6.54

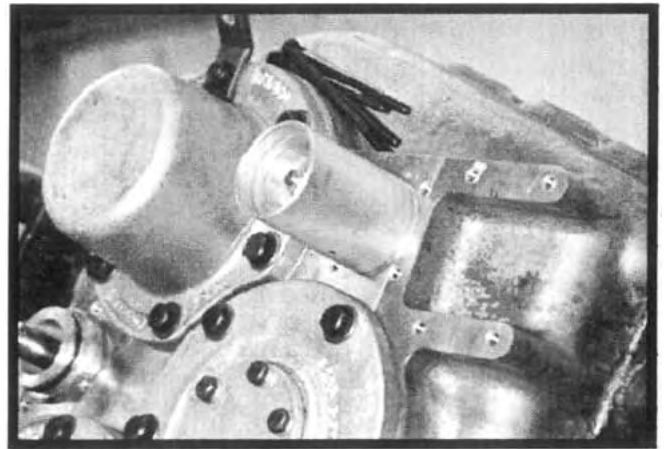


Figure 6.56

42. Install a new piston-to-shaft O-ring over the threaded portion of the shaft. Slide the spring over the shaft. Note that this spring is longer than the rear output shift spring. Place the nylon stop ring over the shaft and spring.
43. Install a new piston O-ring in the deeper groove in the piston. Position the piston on the shifter shaft. The end of the piston with the O-ring must face outward. Push the piston down to compress the spring and install the shifter shaft washer and locknut. See Figure 6.55. Torque the nut to specification.
44. Soak the felt strip in gear oil and install in its groove on the piston. Slip the air shift cylinder into position over the piston. See Figure 6.56. Note that this cylinder is longer than the rear output shift cylinder.
45. Install a new O-ring on the shift cylinder cap and insert into the cylinder. Secure the assembly with the (4) cap screws and torque to specification. See Figure 6.57.
46. Assemble the rear output air shift cylinder similarly.
47. If so equipped, install the lubrication lines and a new filter.

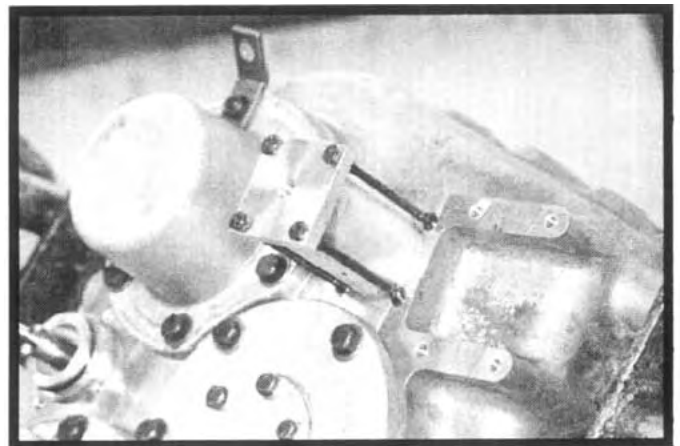


Figure 6.57

NOTES:

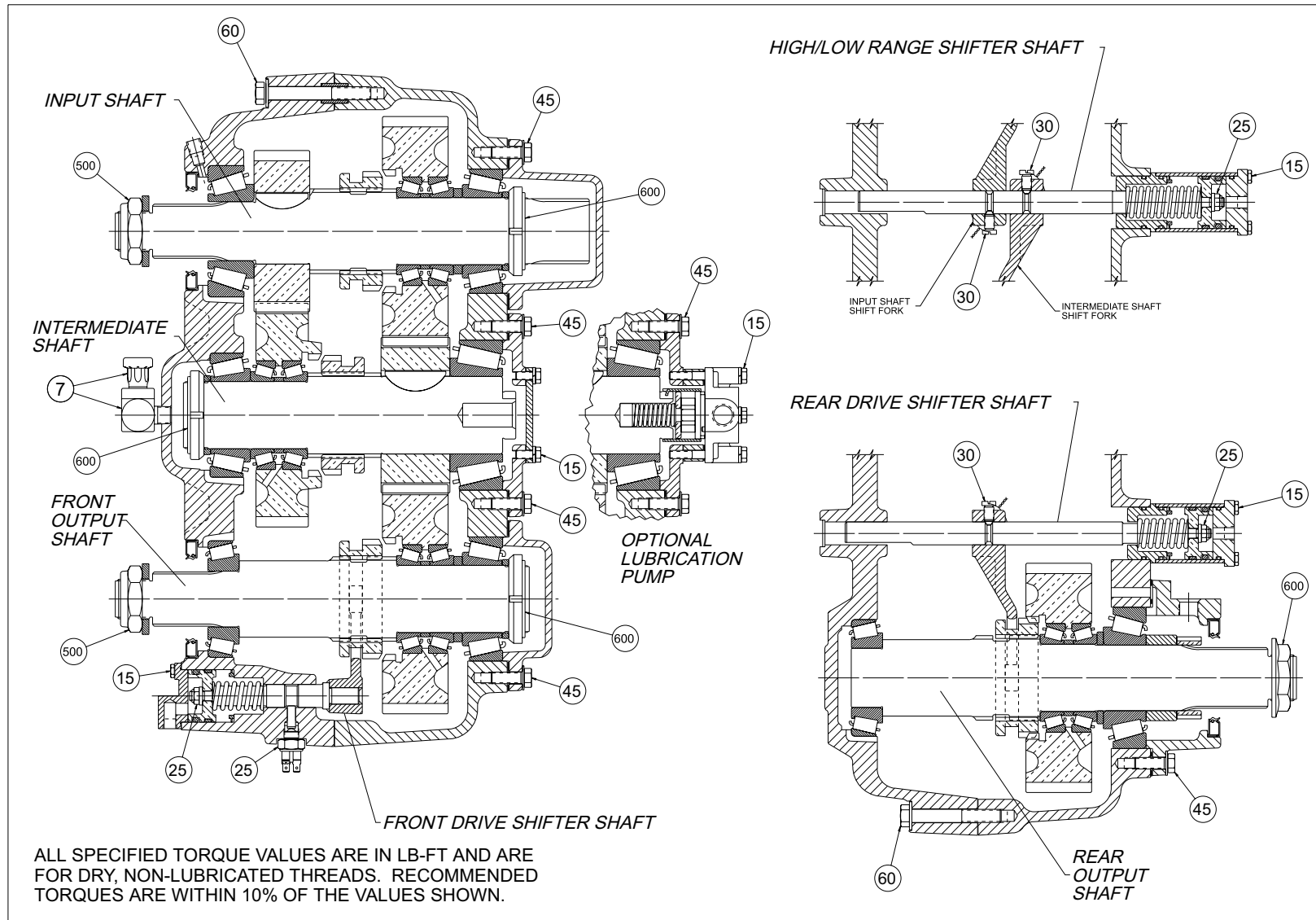


Figure 7.1 - TC-200 Recommended Torques

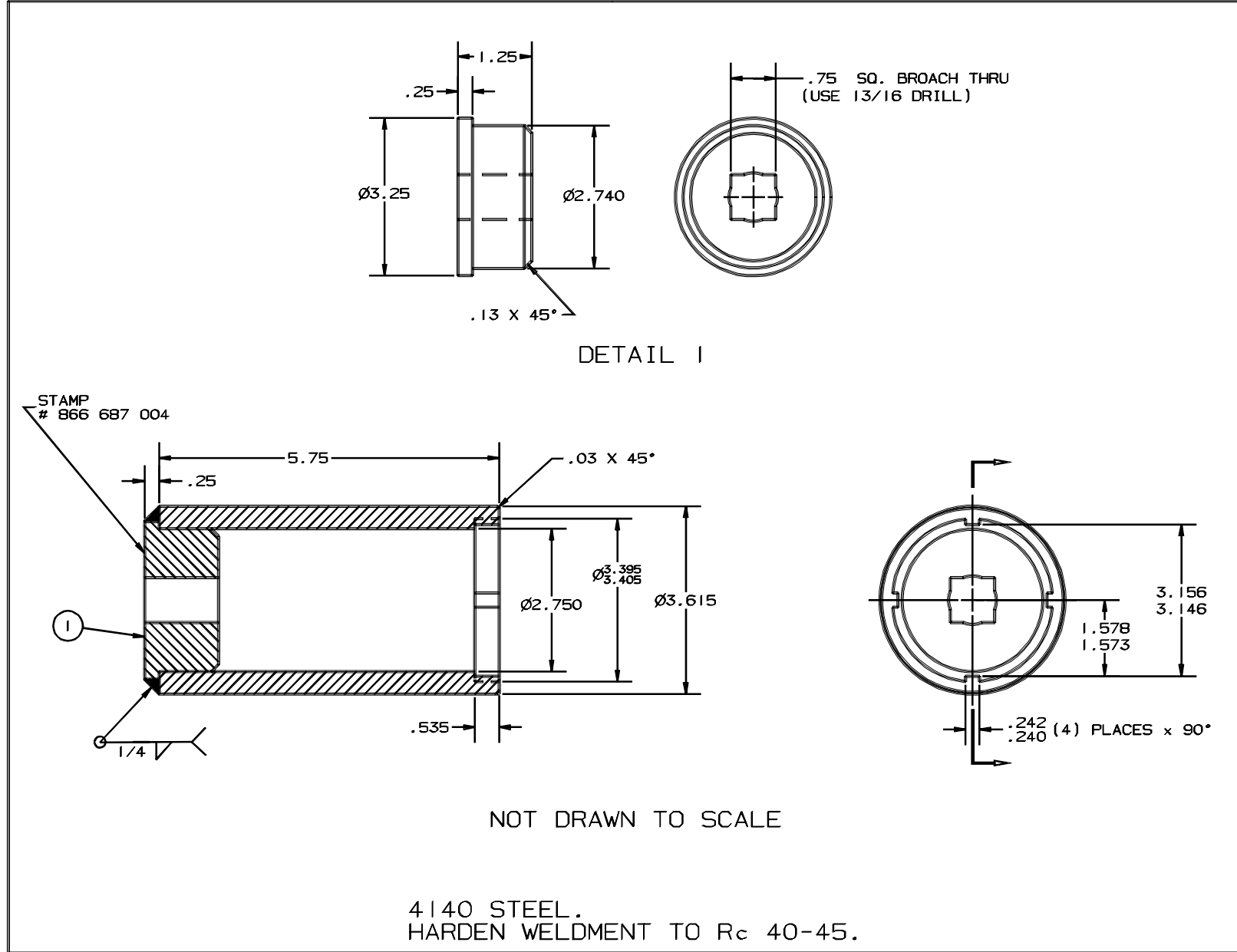


Figure 8.1 - 866-0687-004 Bearing Locknut Wrench

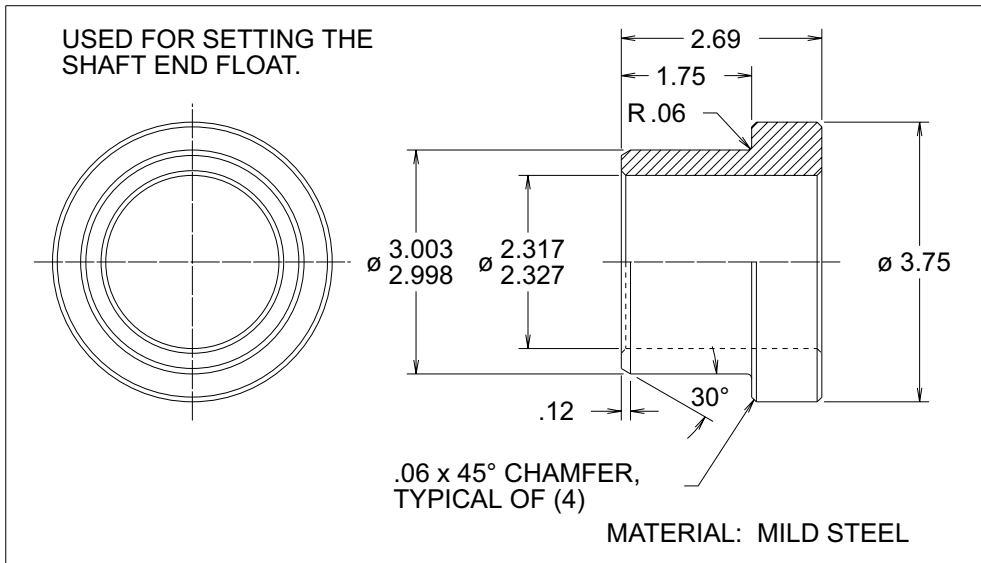


Figure 8.2 - 884 246 Rear Output Shaft Sleeve

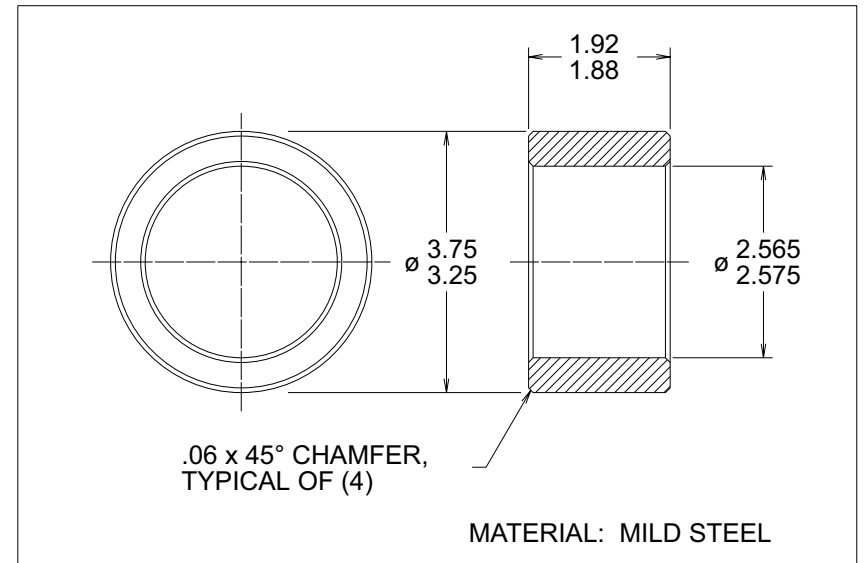


Figure 8.3 - Input, Intermediate,
and Front Output Shaft Sleeve

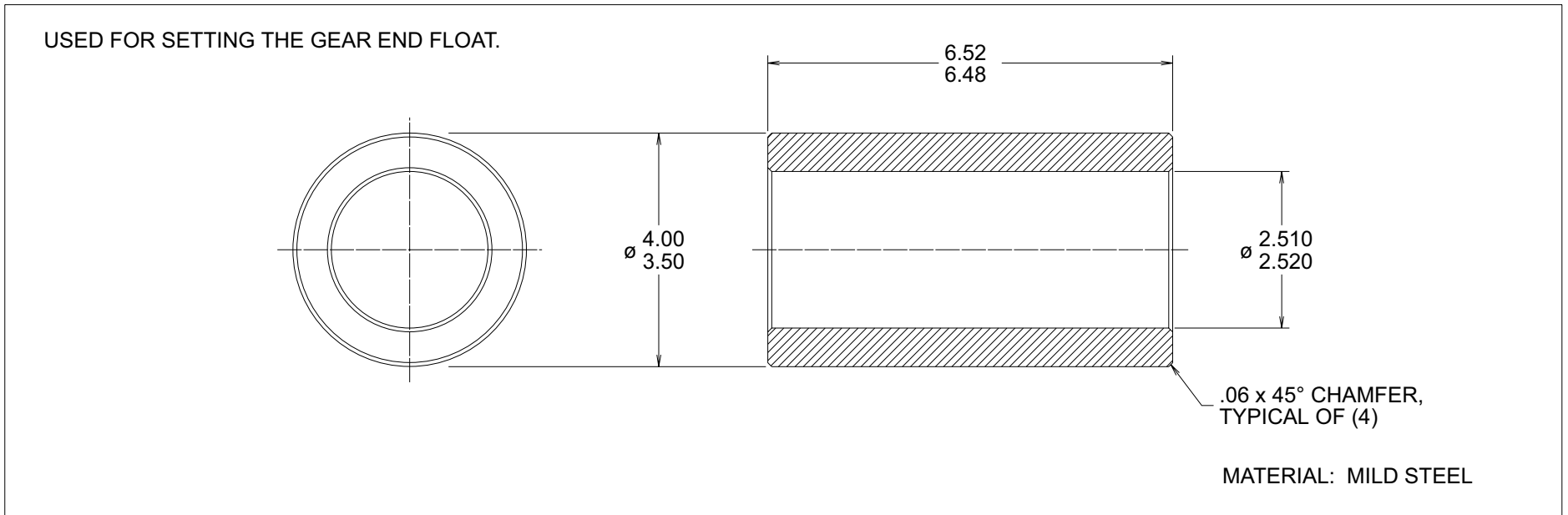


Figure 8.4 - Rear Output Shaft Sleeve