SHOP MANUAL

CASE/INTERNATIONAL

MODELS

1896–2096

IDENTIFICATION

Tractor model number and identification serial number are located on a plate on right fender of tractors not equipped with a cab, or on a plate on upper right of cab interior on tractors so equipped. Cab serial number is located on a plate on upper right of cab interior. Engine serial number is located on a plate on left side of timing gear housing. Transmission serial number is on left side of transmission housing. On models so equipped, front-wheel drive serial number is located on a plate on rear of front drive axle housing.

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CONDENSED SERVICE DATA

	Models 1896	Models 2096
GENERAL		
Engine Make	Consolidated Diesel	
Engine Model	6T-590	6TA-590
Cylinders, No. of	6	6
Bore	4.016 in. (102 mm)	4.016 in. (102 mm)
Stroke	4.724 in. (120 mm)	4.724 in. (120 mm)
Displacement	359 cu. in. (5.9 L)	359 cu. in. (5.9 L)
Compression Ratio	17.5:1	17:1
Main Bearings, No. of	7	7
Cylinder Sleeves	None	None
Forward Speeds	12	12
TUNE-UP		
Firing Order	1-5-3-6-2-4	
Valve Tappet Gap, Cold—		
Intake	0.010 in. (0.254 mm)	0.010 in. (0.254 mm)
Exhaust	0.020 in. (0.508 mm)	0.020 in. (0.508 mm)
Injection Pump—		
Make	Robert Bosch	
Model	VE	
Timing	TDC	
Injection Nozzles—		
Make	Robert Bosch 117 mm	
Opening Pressure,		
New	3550-3670 psi (24476-25303 kPa)	3190-3310 psi (21994-22821 kPa)
Used	3200-3625 psi (22063-24994 kPa)	3120-3260 psi (21511-22476 kPa)
Turbocharger—		
Make	Holset	
Engine Governed Speeds (Rpm)—		
Low Idle	750-850	
High Idle	2210-2290	
Rated Load	2100	
Battery Terminal Grounded	Negative	
CAPACITIES		
Cooling System	22 U.S. qts. (20.8 L)	
Crankcase (w/filters)	16 U.S. qts. (15.1 L)	
Transmission & Hydraulic System	100 U.S. qts. (94.6 L)	
Oil Type	Hy-Tran Plus	

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and differential case half (28) assembly first, then remove differential case half (40) assembly. Remove side gear (36), thrust disc (37), friction discs (38) and friction plates (39) from differential case half (40). Remove side gear (32), thrust disc (31), friction discs (29) and friction plates (30) from differential case half (28). Ring gear (27) is secured to differential case half (28) by four sets of double spring pins (23 and 24). Use a press to remove case half from ring gear.

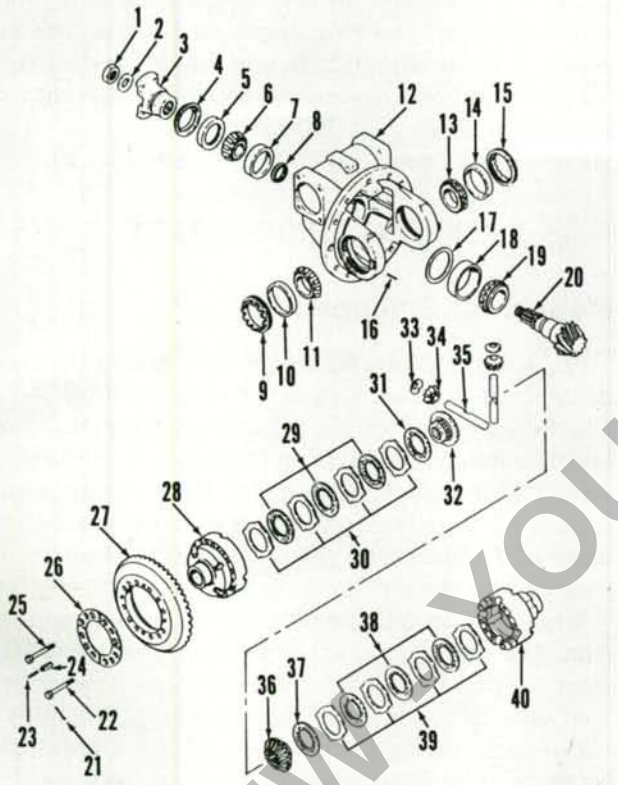


Fig. 10—Exploded view of limited slip differential and bevel drive gears assembly used on front drive axle. Note steering cylinder is removed from differential housing.

1. Nut
2. Washer
3. Drive yoke
4. Seal cover
5. Oil seal
6. Bearing cone
7. Bearing cup
8. Spacer
9. Adjusting nut
10. Bearing cup
11. Bearing cone
12. Differential housing
13. Bearing cone
14. Bearing cup
15. Adjusting nut
16. Lock pin
17. Shim
18. Bearing cup
19. Bearing cone
20. Bevel drive pinion
21. Cotter pin
22. Cap screw (drilled head)
23. Spring pin
24. Spring pin
25. Cap screw
26. Lockplate
27. Ring gear
28. Differential case half
29. Friction discs (internal teeth)
30. Friction plates (external tangs)
31. Thrust disc
32. Side gear
33. Thrust washer (4)
34. Differential pinion (4)
35. Cross pins
36. Side gear
37. Thrust disc
38. Friction discs (internal teeth)
39. Friction plates (external tangs)
40. Differential case half

Remove nut (1), washer (2) and drive yoke (3) with seal cover (4). Drive bevel pinion shaft (20) out of bearing cone (6) and remove pinion with spacer (8) and bearing cone (19). Remove oil seal (5) and bearing cone (6) from differential housing (12). Using a press, remove bearing cone (19) and spacer (8) from bevel pinion shaft. Drive bearing cups (7 and 18) from differential housing, then remove shims (17).

Clean and inspect all parts and renew any showing excessive wear or other damage. Bevel drive pinion (20) and ring gear (27) are available only as a matched set as are the differential case halves (28 and 40).

To install and adjust bevel drive pinion position, proceed as follows: Install bearing cups (7 and 18) without shims (17) in differential housing (12). Install bearing cone (19) over rod end of special tool CAS-1770 and install in differential housing. Install bearing cone (6) on other half of special tool and install in housing. Tighten tool by hand until bearing cones are seated in bearing cups (all end play removed). Install pilot discs CAS-1771 in carrier bearing bores in differential housing. Insert special tool CAS-1765 through the pilot discs. Using a feeler gage, measure the distance between end of tool CAS-1770 and tool CAS-1765. Add this distance to the metric dimension stamped on tool CAS-1770, then add ½ the diameter of tool CAS-1765. Subtract the metric dimension on end of bevel drive pinion from the previously determined sum to obtain thickness of shim (17) to be installed behind bearing cup (18). Shims are available in thicknesses of 0.004, 0.008, 0.012 and 0.020 inch (0.1, 0.2, 0.3 and 0.5 mm). Remove special tools and bearing cones, then remove bearing cup (18). Install the previously determined shim pack (17) and reinstall bearing cup (18). Heat bearing cone (19) to 250° F (120° C) and install on bevel drive pinion (20) until seated. Install bevel drive pinion and bearing cone in differential housing and install new spacer (8). Heat bearing cone (6) to 250° F (120° C) and install on bevel drive pinion. Install new oil seal (5) with lip toward bearing cone (6). If bearing cover (4) is damaged, press old cover off and a new cover on drive yoke (3). Install drive yoke and washer (2) on bevel drive pinion. Apply Loctite to threads of nut (1), then install and tighten nut until a rolling torque of 1.5-2.2 ft.-lbs. (2.0-3.0 N·m) is required to rotate bevel drive pinion.

To reassemble the ring gear and differential, proceed as follows: If spring pins (23 and 24) have been removed or if new differential case is being installed, refer to Fig. 11 and install spring pins as shown. Install large spring pins (24—Fig. 10) until seated with slot in pins aligned with bolt circle. Then, install small spring pins (23) until flush with top of large pins with slots 180 degrees from slots in large pins. Heat ring gear (27) to 400-450° F (204-232° C) and install on

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Subtract correct end play from the predetermined distance axle shaft and sun gear is free to travel to determine correct thickness of thrust washer (15—Fig. 6) to be installed. Thrust washers are available in thicknesses of 0.059, 0.067, 0.079, 0.087, 0.098 and 0.118 inch (1.5, 1.7, 2.0, 2.2, 2.5 and 3.0 mm).

When reassembling, install new wear ring (3—Fig. 7) and bearing cone (7—Fig. 6) on pivot housing. If removed, install bearing cups (5 and 7) in hub (6). Install new oil seal (1—Fig. 7) and dust seal (2) in hub. Lubricate seal and install hub and outer bearing cone (5—Fig. 6). Install ring gear (3) and slotted nut (1). Using a spanner wrench CAS-1762, tighten slotted nut until a rolling torque of 8.9-13.3 ft.-lbs. (12-18 N·m) with new bearings or 6.7-8.9 ft.-lbs. (9-12 N·m) with used bearings, is required to rotate hub. Use special tool CAS-1768 to check rolling torque. When rolling torque is correct, secure with lockplate (2) and cap screws tightened to a torque of 70 ft.-lbs. (96 N·m). Install new "O" ring (4) on hub (6). Use grease to stick predetermined thrust washer (15) in place in carrier (10), then install carrier on hub. Install the two socket head cap screws (8) and tighten to a torque of 70 ft.-lbs. (96 N·m). Rotate hub until the filler (drain) hole is horizontal to center of hub. Fill hub with GL5 85/140 EP gear oil to filler plug opening. Capacity is 1.5 U.S. quarts (1.4 L). Install plug (9). Install wheel and tire assembly and tighten wheel hub nuts to a torque of 115-130 ft.-lbs. (156-176 N·m). Lower tractor to the ground.

PIVOT HOUSING AND AXLE SHAFT

Models So Equipped

9. REMOVE AND REINSTALL. To remove the pivot housing (5—Fig. 7), first remove the wheel hub and planetary as outlined in paragraph 8. Remove snap ring (16—Fig. 6), splined thrust washer (18) and thrust washer (19) from sun gear (17). Disconnect tie rod end from arm on pivot housing. Unbolt upper and lower pivot pins (6 and 4—Fig. 7), then remove pivot pins with "O" rings (16), seal caps (17) and bearing cones (18). Keep shims (7) with upper pivot pin. Remove pivot housing (5), then withdraw sun gear, "U" joint and axle shaft assembly from axle housing. Drive out cup plugs (20) and remove bearing cups (19). Remove bearing cones (18), seal caps (17) and "O" rings (16) from pivot pins. Remove oil seals (9 and 14) and if necessary, remove sleeve bearings (8 and 15).

Loosen snap ring (10) in "U" joint and remove sun gear. Loosen snap ring (12) in "U" joint and remove axle shaft (13). Clean and inspect all parts and renew any showing excessive wear or other damage. "U" joint (11) is available only as an assembly. Reassemble sun gear and axle shaft to "U" joint by reversing disassembly procedure.

If removed, install sleeve bearings (8 and 15). Install new oil seals (9 and 14) with lips of seals toward sleeve bearings. Install cup plugs (20) and bearing cups (19) in axle housing. Lubricate lips of seals (9 and 14), then insert axle shaft into axle housing. Make certain axle shaft splines engage splines in differential side gears. Install new "O" rings (16), seal caps (17) and bearing cones (18) on pivot pins and lubricate bearing cones with lithium grease. Carefully install pivot housing (5) over sun gear and axle housing. Install lower pivot pin assembly with original shim (7) and cap screws tightened finger tight. Torque bottom cap screws first, then the upper cap screws to 140 ft.-lbs. (190 N·m.). Check swing resistance with a torque wrench which should be 16-21 ft.-lbs. (21-28 N·m) with new bearings or 8-10.5 ft.-lbs. (10.5-14 N·m) for used bearings. Adjust swing resistance by using alternate shim thickness. Shims are available in thicknesses of 0.024, 0.039, 0.055, 0.063, 0.071 and 0.079 inch (0.6, 1.0, 1.4, 1.6, 1.8 and 2.0 mm).

Install thrust washer (19—Fig. 6), splined thrust washer (18) and snap ring (16). Reinstall wheel hub and planetary as outlined in paragraph 8. Connect tie rod end to steering arm on pivot housing and tighten nut to 100-125 ft.-lbs. (136-169 N·m) torque.

DIFFERENTIAL AND BEVEL GEARS

Models So Equipped

10. R&R AND OVERHAUL. To remove the front differential assembly, place transmission in PARK and securely block rear wheels. Unbolt and remove drive shaft shield and front drive shaft. Raise front of tractor and support each end of axle housing with jack stands. Unbolt and remove front wheels. Disconnect steering cylinder lines and cap or plug all openings. Disconnect tie rod ends from steering arms on pivot housings. Remove drain plug (22—Fig. 7) and drain oil from axle housing. Attach a hoist to planetary hub. Unbolt and remove upper and lower pivot pins (6 and 4) with bearing cones. Keep shim (7) with upper pivot pin. Remove planetary hub, pivot housing and axle shaft from each end of axle housing. Place a floor jack under differential assembly, remove differential cap screws and install a guide stud at each side of differential housing. Separate differential housing from axle housing and using the floor jack, remove assembly from tractor.

To disassemble, remove lock pins (16—Fig. 10) from adjusting nuts (9 and 15). Remove the adjusting nuts and bearing cups (10 and 14). Using a suitable puller, remove bearing cones (11 and 13). Remove cotter pins (21), then pry off lockplates (26). Remove cap screws (22 and 25) and separate differential case halves (28 and 40). Remove differential pinions (34), cross pins (35) and thrust washers (33). Remove ring gear (27)

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just nut as required to obtain correct end play. Then, stake edge of nut in slots in shaft.

Install input shaft assembly in the torque tube and tighten cap screws to a torque of 149-179 ft.-lbs. (201-243 N·m). Refer to paragraph 157 and reassemble tractor.

TIE RODS AND TOE-IN

Models So Equipped

14. Toe-in should be 0-3/16 inch (0.0-4.763 mm) and is adjusted by turning the threaded studs between steering cylinder rod and tie rod ends. Both sides must be adjusted equally.

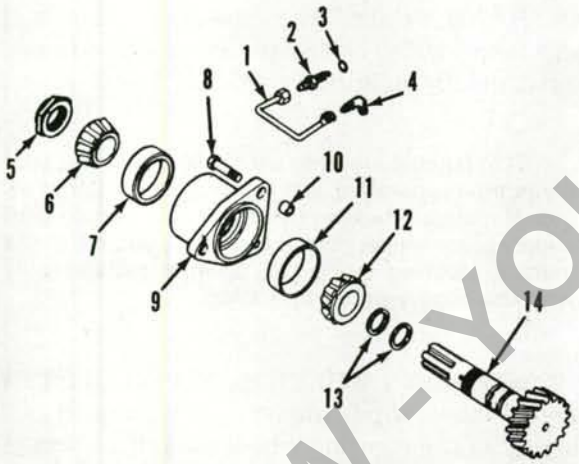


Fig. 14—Exploded view of transfer gearbox input shaft assembly which is located in the torque tube.

1. Lubrication tube
2. Straight fitting
3. "O" ring
4. Elbow fitting
5. Nut
6. Bearing cone
7. Bearing cup
8. Cap screw (3)
9. Housing
10. Dowel ring (3)
11. Bearing cup
12. Bearing cone
13. Seal rings
14. Input shaft

POWER STEERING SYSTEM

All models are equipped with hydrostatic power steering using a Ross steering unit and an 8 gpm (30.3 L/min.) gear type hydraulic pump as the power source. One double acting steering cylinder is used on the standard axle and the ZF front drive axle.

FLUID, FILTERS AND BLEEDING

All Models

15. The transmission and hydraulic system fluid is used in the power steering system. A dipstick located at the left rear of the tractor rear housing indicates fluid level. Use Hy-Tran Plus fluid in all models. Refer to CONDENSED SERVICE DATA tables for reservoir capacity and to HYDRAULIC SYSTEM SECTION for additional hydraulic system information.

Steering hydraulic circuit is combined with brake circuit and dual filter unit is located in right front side of transmission housing. See Fig. 15 for exploded view of filter assembly. Tractors are provided with a dash mounted warning light and filter elements should be renewed when TRANS FILTER warning light flashes. Filters should be 10 to 12 micron rating. Bypass valve (4) should be tightened finger tight plus ¼ turn. Filter cover bolts should be tightened to a torque of 35-42 ft.-lbs. (48-57 N·m).

To bleed the steering hydraulic system, run engine at half throttle and turn steering wheel from lock to lock several times until steering action is firm. Brake hydraulic system should be bled as outlined in paragraph 169.

TROUBLE-SHOOTING

All Models

16. Some of the troubles which may occur in the operation of the power steering system and their possible causes are as follows:

1. No power steering or steers slowly.
   a. Binding mechanical linkage.
   b. Excessive load on front wheels and/or air pressure low in front tires.
   c. Steering cylinder piston seal faulty or cylinder damaged.
   d. Faulty power steering supply pump.
   e. Faulty hand pump.
2. Will not steer manually.
   a. Binding mechanical linkage.
   b. Excessive load on front wheels and/or air pressure low in front tires.
   c. Pumping element in hand pump faulty.
   d. Faulty seal in steering cylinder or cylinder damaged.
3. Hard steering through complete cycle.
   a. Low pressure from supply pump.
   b. Internal or external leakage.
   c. Faulty steering cylinder.
   d. Binding mechanical linkage.
   e. Excessive load on front wheels and/or air pressure low in front tires.
   f. Cold hydraulic fluid.

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and collar. Slide drive clutch (12) with shift lever (13), washer (15) and center housing (16) from armature (27).

Using an ohmmeter, touch one probe to the field terminal stud and the other probe to the brush lead. If there is no continuity, field winding has an open and must be repaired or renewed. Touch one ohmmeter probe to field terminal stud and other probe to the surface of field frame. If there is continuity, the field coils have a ground and must be repaired or renewed.

Touch one probe of the ohmmeter to a commutator segment and the other probe to the armature core. If there is continuity, armature has a ground and must be renewed. Touch the two ohmmeter probes to two commutator segments. If there is no continuity, the armature winding has an open circuit and must be renewed.

Measure the inside diameter of bushings (6, 18 and 32) and the outside diameter of their corresponding surfaces on armature. Renew bushings if clearance is more than 0.008 inch (0.2 mm).

Check the length of brushes (30) and renew them if worn to a length of less than 0.67 inch (17.0 mm).

Inspect the drive clutch (12) to make certain that the pinion can rotate freely in direction of starter rotation and that it will lock up in opposite direction.

95. REASSEMBLY. When reassembling, install new oil seal (19—Fig. 69), "O" rings (9, 20 and 24) and gasket (33) and reverse disassembly procedure. Lubricate the lube wicks for bushings with 10W-30 engine oil. Tightening torques are as follows:

Drive housing screws	97-150 in.-lbs. (11-17 N·m)
Center housing to field frame screws	58-93 in.-lbs. (6.6-10.5 N·m)
Commutator end frame screws	97-150 in.-lbs. (11-17 N·m)
Shift lever pivot screw	26-44 ft.-lbs. (36-60 N·m)
Magnetic switch screws	58-93 in.-lbs. (6.6-10.5 N·m)
Magnetic switch hex nut	71-124 in.-lbs. (8-14 N·m)
Field terminal stud hex nut	43-60 in.-lbs. (4.8-6.8 N·m)

MAGNETIC SWITCH

All Models

96. TESTING. To test the magnetic switch for proper operation, connect a 12 V battery as shown in Fig. 70. Remove terminal connector between field terminal stud and magnetic switch. When test switch is closed, the drive clutch and pinion must move outward. When test switch is opened, drive clutch and pinion must move inward. If operation is incorrect, disconnect battery and wires. With terminal connector removed, connect a multimeter as shown in Fig. 71 and test for continuity. If there is no continuity, renew magnetic switch.

WIRING

All Models

97. When a problem is suspected in wiring harness, follow an orderly, step by step check of the problem circuit. Always check protective circuits (fuses, circuit breaker and diodes) first, then locate the primary point of current supply for circuit in question. Using a 12 volt test light or a voltmeter, check for adequate voltage at this point. If voltage is present at this

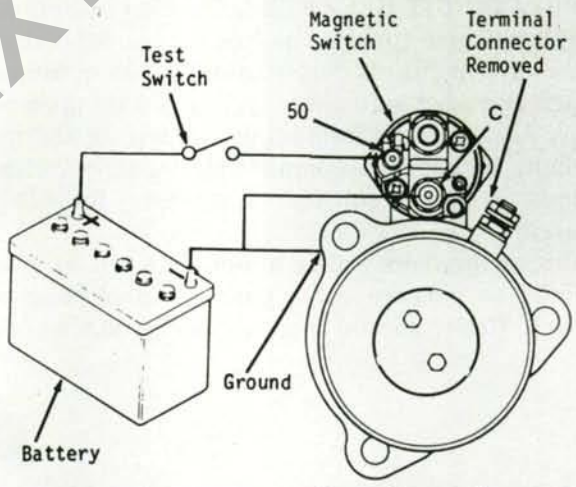


Fig. 70—View showing connections when testing starting motor magnetic switch.

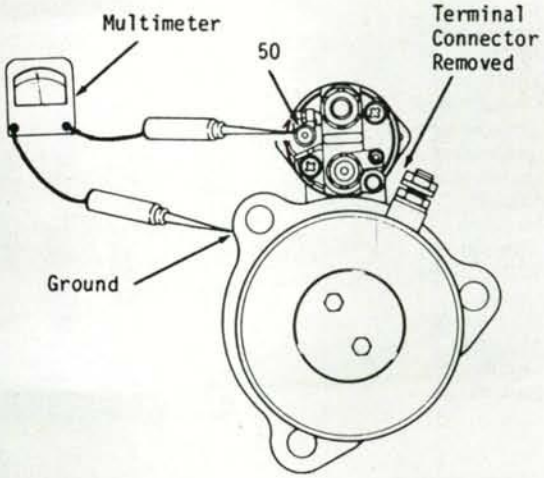


Fig. 71—Use a multimeter as shown to check for continuity.

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TESTING

All Models

189. PISTON PUMP AND CHARGE PUMP. To test hydraulic pump system, first place outlet hose to a CAS-10280 or other suitable flowmeter into transmission filler neck. Disconnect and plug outlet tube from piston pump, then connect hose from inlet port of flowmeter to outlet port of piston pump. Disconnect and plug compensator tube on pump compensator and install ¼ inch (6.35 mm) hose from flowmeter to pump compensator. Disconnect electrical connector to pressure switch on piston pump in-

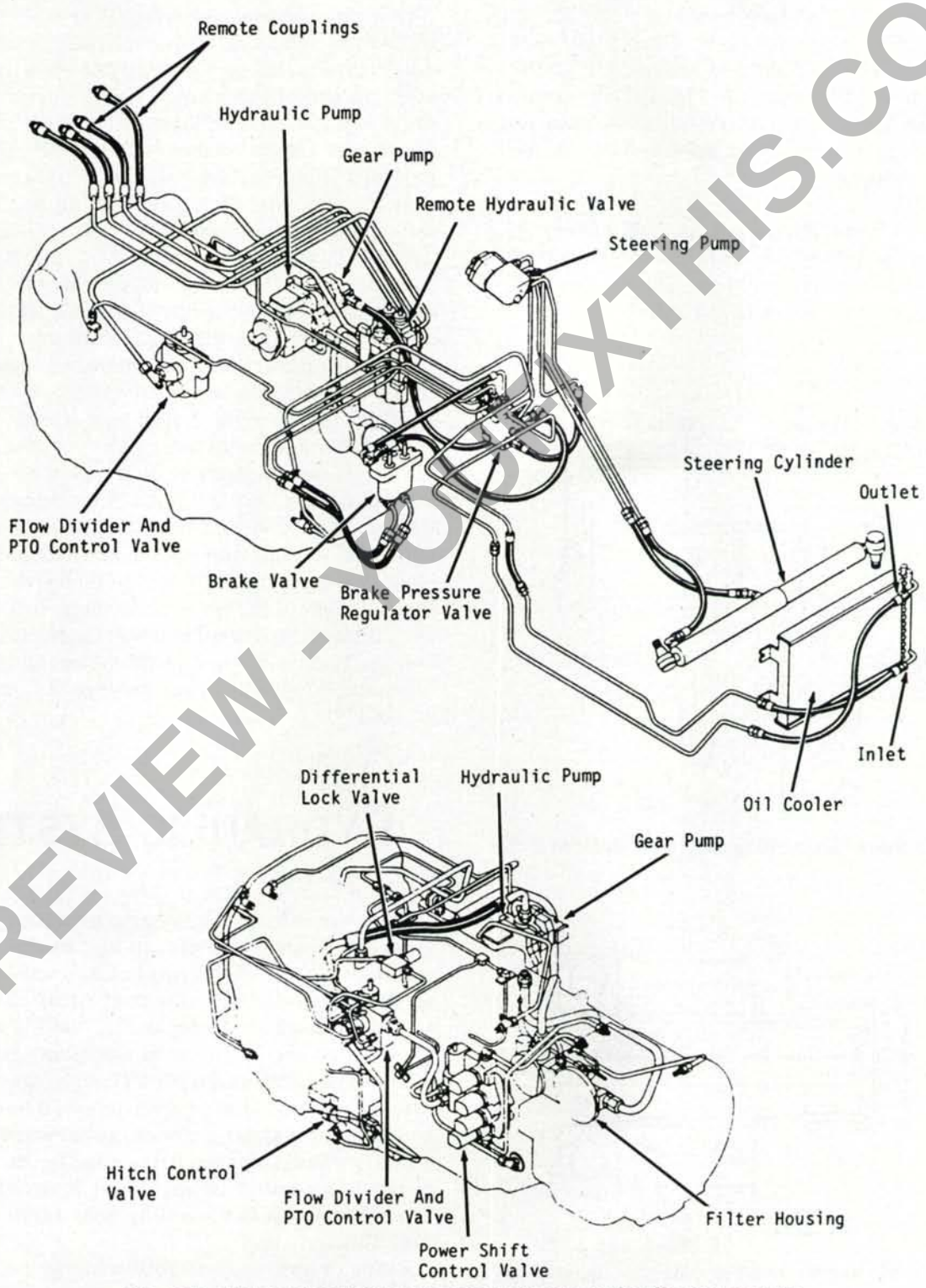


Fig. 163—Schematic showing location of main hydraulic components.

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gasket with no notches is a standard gasket. A gasket with one notch is to be used with 0.040 inch (1.00 mm) oversize bore. A gasket with two notches is to be used with 0.040 inch (1.00 mm) oversize bore and 0.010 inch (0.254 mm) machined from cylinder head or from cylinder block. A gasket with three notches is to be used with 0.040 inch (1.00 mm) oversize bore and 0.010 inch (0.254 mm) machined from the cylinder head and 0.010 inch (0.254 mm) from the cylinder block.

Install head gasket and cylinder head, then lubricate bolt threads and install head bolts except for rocker arm head bolts. Install push rods and rocker arm assemblies. Lubricate threads and install rocker arm head bolts and rocker arm bracket bolts. Tighten head bolts following the sequence shown in Fig. 26. Tighten head bolts in three steps as follows: Torque to 30 ft.-lbs. (41 N·m) in step one, 60 ft.-lbs. (81 N·m) in step two and 93 ft.-lbs. (126 N·m) in step three. Tighten rocker arm bracket bolts to a torque of 18 ft.-lbs. (24 N·m).

Using a new gasket, install intake manifold cover on Model 1896 or after cooler on Model 2096. Apply liguid Teflon on the retaining cap screws and tighten to a torque of 18 ft.-lbs. (24 N·m) following sequence shown in Fig. 27. Refer to paragraph 66 for procedure on installation of fuel injectors and to paragraph 73 for installation of turbocharger. Adjust valve tappet gap as outlined in paragraph 32.

Complete the assembly by reversing the disassembly procedure. Other tightening torques are as follows:

Filter housing nut	24 ft.-lbs. (32 N·m)
Thermostat housing bolts	18 ft.-lbs. (24 N·m)
Exhaust manifold bolts	32 ft.-lbs. (43 N·m)
Belt tensioner bracket bolts	18 ft.-lbs. (24 N·m)
Belt tensioner bolt	32 ft.-lbs. (43 N·m)
Fan pulley bracket bolts	18 ft.-lbs. (24 N·m)
Fan retaining bolts	32 ft.-lbs. (43 N·m)
Valve cover bolts	18 ft.-lbs. (24 N·m)

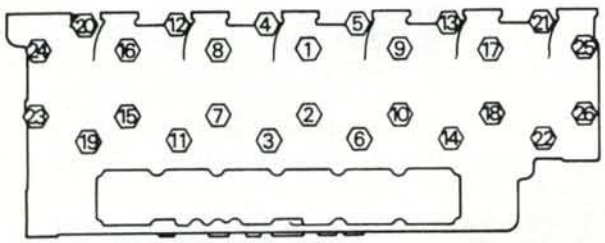


Fig. 26— Tighten cylinder head bolts in three steps, using sequence shown.

VALVES AND SEATS

All Models

31. Intake and exhaust valves seat directly in the cylinder head. However, service seat inserts are available for both intake and exhaust valves. Stem seals are used on all valves. Check valves against the following specifications:

INTAKE

Face angle	29°
Seat angle	30°
Stem diameter	0.313-0.314 in. (7.960-7.980 mm)
Stem to guide clearance	0.0015-0.003 in. (0.039-0.079 mm)
Seat width	0.052-0.076 in. (1.32-1.92 mm)
Valve tappet gap (cold)	0.010 in. (0.254 mm)
Valve recession from face of cylinder head (max.)	0.060 in.) (1.52 mm)

EXHAUST

Face angle	44°
Seat angle	45°
Stem diameter	0.313-0.314 in. (7.960-7.980 mm)
Stem to guide clearance	0.0015-0.003 in. (0.039-0.079 mm)
Seat width	0.058-0.081 in. (1.47-2.09 mm)

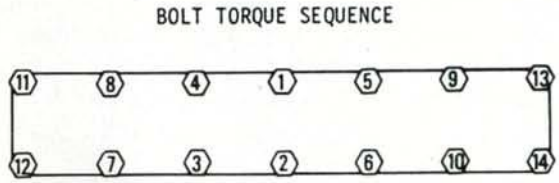


Fig. 27—Bolt torque sequence for intake manifold cover on Model 1896 or after cooler on Model 2096.

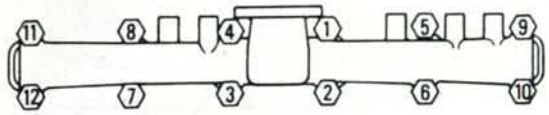


Fig. 28—Bolt torque sequence for exhaust manifold on all models.

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CONDENSED SERVICE DATA (CONT.)

	Models	
	1896	2096
CAPACITIES (Cont.)		
Fuel Tank	65 U.S. gal. (246 L)	
Front Drive Axle—		
Differential (Axle) Housing	9 U.S. qts. (8.5 L)	
Oil Type	85/140 EP	
Planetary (Each Side)	1.5 U.S. qts. (1.4 L)	
Oil Type	85/140 EP	

FRONT AXLE (TWO WHEEL DRIVE)

FRONT WHEEL BEARINGS

All Models

1. Refer to Fig. 1 for typical wheel hub and bearing assembly.

The tapered inner and outer roller bearings are not interchangeable. Clean and inspect bearing cups and cones and renew as necessary. Install inner seal (10) with lip facing spindle flange. Install outer seal (9) with lip facing away from bearing (8). Fill hub cavity and pack bearings with No. 2 lithium grease. Coat surface of seal lips with grease.

When adjusting wheel bearings, tighten nut (2) until drag on hub is felt, then back nut off ¼ turn or until next pin hole lines up. Bearings should have zero end play. Install cotter pin.

SPINDLES

All Models

2. R&R SPINDLES. To remove spindle, lift and support front of tractor and remove wheel. Disconnect tie rod ball joint from steering arm (3—Fig. 2). Remove bolt (1) and washer (2) from arm (3). Note index punch marks on arm and shaft indicating location of tapered splines for left or right steering arm, then remove steering arm. Support spindle and remove snap ring (4) and washer (5), then remove spindle (8) from axle extension (7).

3. SPINDLE BUSHINGS. With spindles removed, spindle bushings (6—Fig. 2) can be removed using a suitable drift punch. New bushings are presized and should not require reaming if carefully installed.

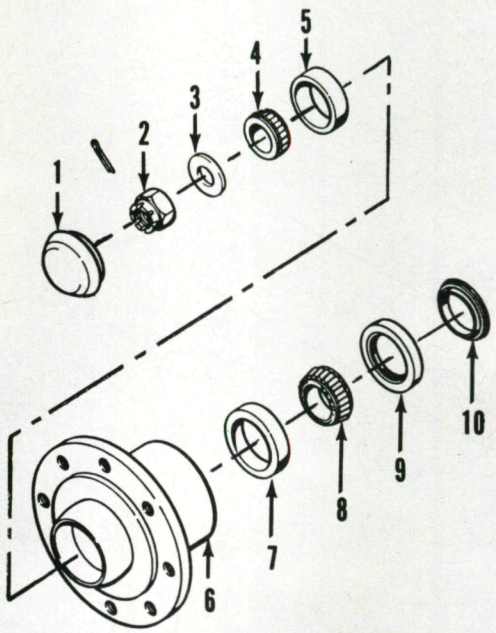


Fig. 1—Exploded view of wheel hub and bearing assembly used on all two-wheel drive tractors.

1. Cap
2. Nut
3. Washer
4. Bearing cone
5. Bearing cup
6. Hub
7. Bearing cup
8. Bearing cone
9. Seal (outer)
10. Seal (inner)

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When installing oil pump assembly, tighten the four mounting bolts evenly to a torque of 18 ft.-lbs. (24 N·m) following the sequence shown in Fig. 39. Do not overtighten. A small clearance will exist between pump flange and cylinder block.

With pump installed, check backlash between the pump idler gear and the crankshaft gear. If backlash exceeds 0.018 inch (0.450 mm), renew pump assembly.

Refer to paragraphs 36 and 49 and reassemble tractor.

OIL PRESSURE REGULATOR

All Models

54. The oil pressure regulator is located in the oil filter head (6—Fig. 40). Remove plug (2), gasket (3), spring (4) and regulator valve (5). Free length of spring (4) should be 2.198 inches (55.83 mm). Spring should test 14.2-17.8 lbs. (63-79 N) when compressed to a length of 1.77 inches (44.98 mm) and 21.4-25.4 lbs. (95-113 N) when compressed to a length of 1.57 inches (39.98 mm).

When reinstalling, use new gasket (3) and tighten plug (2) to a torque of 90 ft.-lbs. (120 N·m). Oil pressure should be 30-55 psi (207-378 kPa) with engine warm and operating at 2100 rpm.

OIL COOLER

All Models

55. The engine oil cooler (9—Fig. 40) is located in right side of engine block behind the oil filter head. To remove the oil cooler, drain cooling system and remove the oil filter cartridge. Disconnect the turbocharger pressure line and remove line fitting from oil filter head. Unbolt and remove filter head (6) and gasket (8). Remove oil cooler (9) and gasket (10).

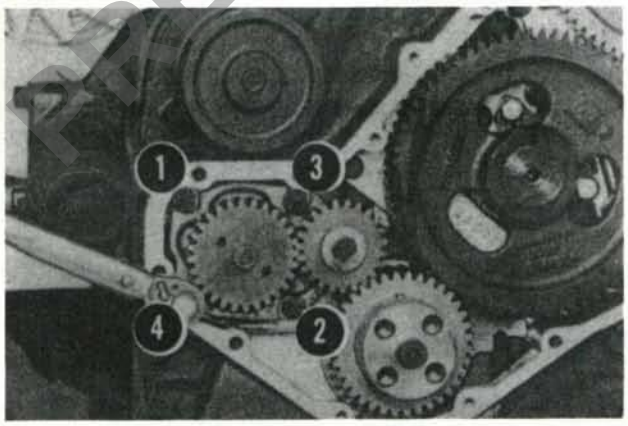


Fig. 39—Use tightening sequence shown when installing oil pump.

Clean all surfaces of foreign material. Cleaning procedures for the oil cooler consists of flushing the oil circuit with clean solvent and removing scale or rust from exterior of cooling plates.

Using new gaskets, reinstall by reversing the removal procedure. Make certain the cold oil relief valve (7) is in position in backside of filter header. Tighten filter head bolts to a torque of 18 ft.-lbs. (24 N·m).

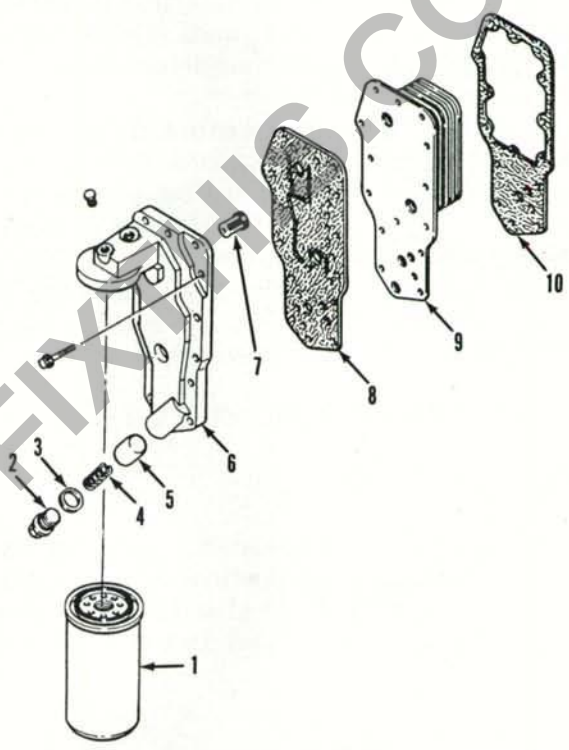


Fig. 40—Exploded view of engine oil cooler, oil filter head and relative components.

1. Filter cartridge
2. Regulator valve plug
3. Gasket
4. Spring
5. Regulator valve
6. Filter head
7. Cold oil relief valve
8. Gasket
9. Oil cooler
10. Gasket

DIESEL FUEL SYSTEM

All models are equipped with a Robert Bosch Model VE injection pump. Robert Bosch multihole injector nozzles are used on all models.

FUEL, FUEL FILTERS AND TRANSFER PUMP

All Models

56. FUEL. The manufacturer recommends the use of a good grade No. 2 diesel fuel having a Cetane rating of 40 or better be used for normal operation. For

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sound, segments one to twelve will flash ON and OFF and the green "Systems Normal" light will go OFF.

If the voltage level bar graph indicates a too high or too low voltage indication, turn key switch OFF, and using a voltmeter, check voltage across battery terminals. Voltage should be 11 to 15 volts. If so, batteries are good. Turn key switch ON and check the energized segments on bar graph. The voltmeter reading should correspond to the energized segments as shown on chart in Fig. 92. For example, if voltmeter reading was about 12.5 volts, segments 1 to 5 should be energized. If readings do not correspond, check wiring and connections from pin (35—Fig. 91) to batteries.

115. HOURMETER. An hourmeter is used to count engine hours. This device is electromechanical and it uses an odometer type display to accumulate engine hours. The hourmeter numbers rotate, accumulating hours, only when the engine speed is above 400 rpm.

116. DIGITAL DISPLAY. The instrument cluster display is an LCD (liquid crystal diode) which displays the operators selections and contains several message legends to indicate the selection. The digital display (Fig. 93) reads out in either english or metric units. A switch at the back of the cluster can be set to make this selection.

The seven function buttons (F—Fig. 94) on the digital instrument cluster are located as shown. After programming the cluster, the operator can depress a function button and the desired information will be shown on the digital display. Engine rpm and ground speed function buttons depend upon sensors for their operation. All other function buttons work strictly through calculations of a microprocessor chip. The microprocessor is inside the cluster box.

The five program buttons (P) are located as shown in Fig. 94. Program buttons are: Tire Size, Attach Width, Select Digit, Set Digit and Start/Stop. These buttons actuate the digital display. The operator "feeds" information into the digital cluster box using the program buttons. Ground Speed, Area/Hour, Area Done and Wheel Slip will not indicate accurate readings until Tire Size and Attach Width are programmed into the cluster.

Refer to the appropriate following paragraphs for information on operation, tests and programming.



Fig. 94—View showing location of the seven function buttons (F) and the five program buttons (P) on digital instrument cluster.

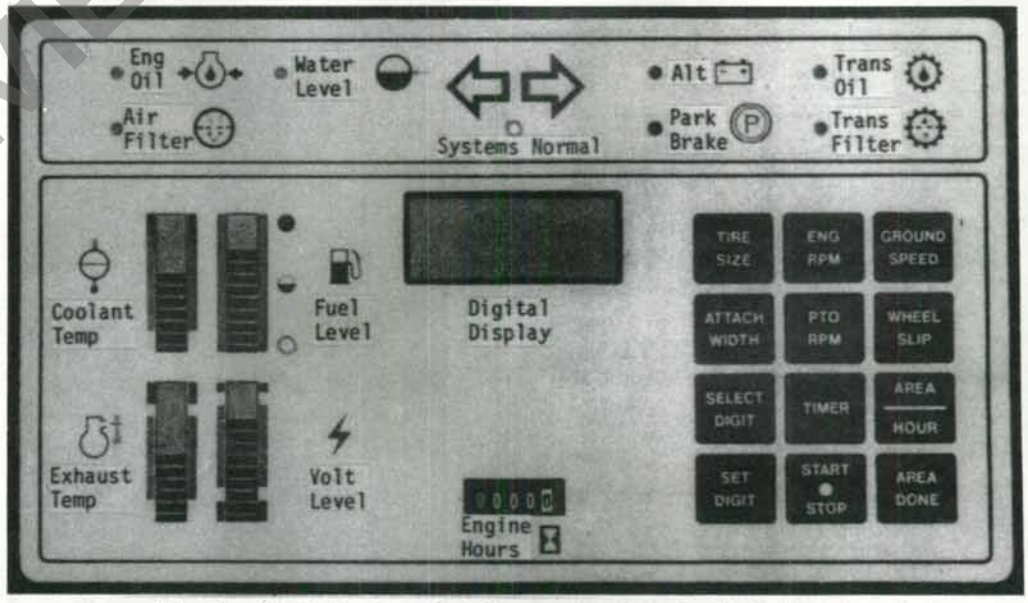


Fig. 93—Digital instrument cluster showing the digital display.

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166. ARM SHIM PROCEDURE. Disengage gear stop arm and push shaft into transmission as far as possible. Install a dial indicator on end of shaft, pull shaft out as far as possible to find and record total end travel. See Fig. 146. Raise right rear tire off the ground engage the gear stop arm with gear, then rotate the right rear tire counterclockwise to remove backlash in drive train. While pushing the shaft in as far as possible and pulling the shaft out as far as possible, record the amount of end travel. See Fig. 147. Subtract 0.150 inch (3.81 mm) from this end travel to obtain correct shim pack thickness (4—Fig. 143) for right side of gear stop arm. To obtain the correct shim pack for the left hand side of the gear stop arm, subtract the right hand side shim pack thickness from the total end travel found in the first measurement. See Fig. 148. Remove shaft and related parts, install proper shim packs for left and right side of gear stop arm, and reinstall shaft and parts with new "O" ring (16—Fig. 143). Apply Loctite 271 or equivalent to set screw (6) on gear stop arm and install and tighten to 15-20 ft.-lbs. (20.4-27.1 N·m) torque. Install roll pin (12) into detent lever (15). Install key (18), lever (20) and snap ring (21). Pull park lock lever away from transmission as far as possible and measure distance between transmission case and back of lever with feeler gage and record measurement. Remove lever (20) and add sufficient shims (19) to obtain a clearance of 0.040-0.100 inch (1.016-2.540 mm) between lever

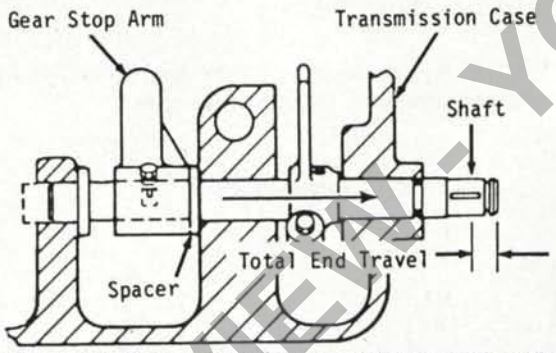


Fig. 146—Pull shaft out as far as possible to find total end travel and record measurement. Refer to text.

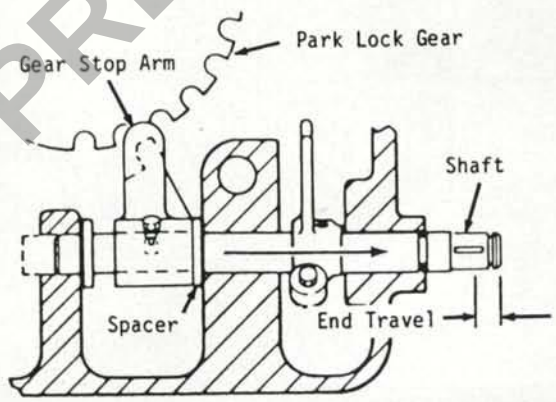


Fig. 147—Illustration showing procedure for finding right hand shim pack for park lock shaft. Refer to text.

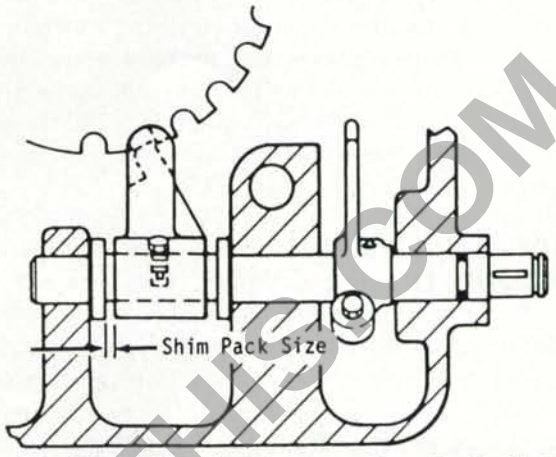


Fig. 148—Illustration showing procedure for finding left hand shim pack for park lock shaft. Refer to text.

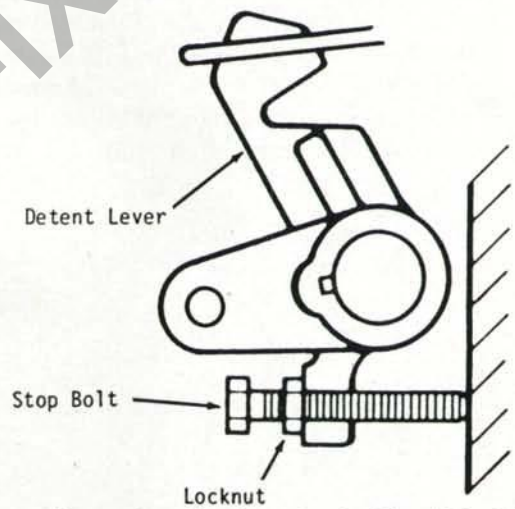


Fig. 149—Illustration showing stop bolt for detent lever travel adjustment.

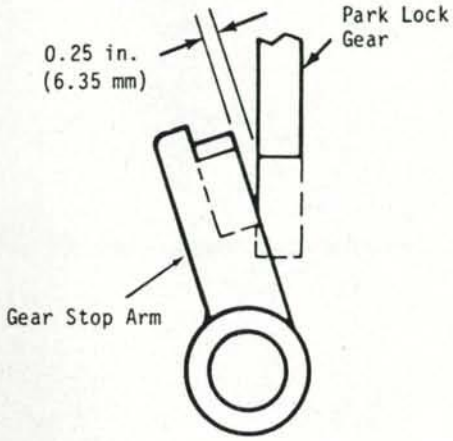


Fig. 150—Adjust stop bolt on detent lever until face of gear stop arm is 0.25 inches (6.35 mm) away from park lock gear.

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