



Ford
Service Manual

TW10, TW20, TW30
Volume 1 of 2

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Tractors

TW-10, TW-20, TW-30

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Ford Tractor Operations

Ford Motor Company

PART 1

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Figure 6
Engine Access (TW30)

- | | |
|-----------------------|------------------------------------|
| 1. Fuel Tank | 8. Air Cleaner-to-Intercooler Tube |
| 2. Hood Panel | 9. Pre-Cleaner |
| 3. Side Panel Rail | 10. Turbocharger |
| 4. Oil Cooler | 11. Grille Support (Intercooler) |
| 5. Turbo Exhaust Tube | 12. Intercooler-to-Turbo Tube |
| 6. Radiator | 13. Engine Oil Filter |
| 7. Air Cleaner | 14. Front Weights |

Exhaust Valves: Remove the retainer locks, the seal from its groove, and the valve rotator and spring. The parts are shown in Figure 13.

- Lift the valves from the cylinder head and place them in a numbered rack so they can be reinstalled in their respective guides. Keep the exhaust valve rotators with the valves from which they were removed.

C. CLEANING

- After the valves are removed, clean the valve guide bores with a valve guide cleaning tool.

- Remove all dirt, grit, and grease from the cylinder head with cleaning solvent.

NOTE: Be sure to remove any injector washers that may have remained in the bores.

D. INSPECTION AND REPAIR

- Inspect the cylinder head for cracks, nicks, or burrs. Install a new head if necessary. Remove all burrs or nicks from the gasket surface.

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B. INSTALLATION

1. Secure the fuel filter assembly on the engine with the two cover bolts, Figure 10. Tighten to 20-25 lbs. ft. (27.1-33.9 Nm).

2. Connect the inlet and outlet lines to the fuel filter and sediment. Tighten to 18-25 lbs. ft. (24.4-33.9 Nm).
3. Turn the fuel shut-off valve on and bleed the system as outlined on page 10.

4. FUEL LIFT PUMP

A. REMOVAL

1. Turn the fuel shut-off valve, Figure 1, (TW-10 & 20) to the "OFF" position and disconnect the fuel inlet and outlet lines from the fuel lift pump. See Figure 10. The fuel shut-off valve on the TW-30 is located under the main tank.
2. Remove the two nuts securing the pump to the

injection pump cam box and remove the pump. Remove the pump gasket.

B. DISASSEMBLY

1. Remove the screw and washer which secure the pump cover plate and lift off the cover and rubber pulsator diaphragm. See Figure 11.

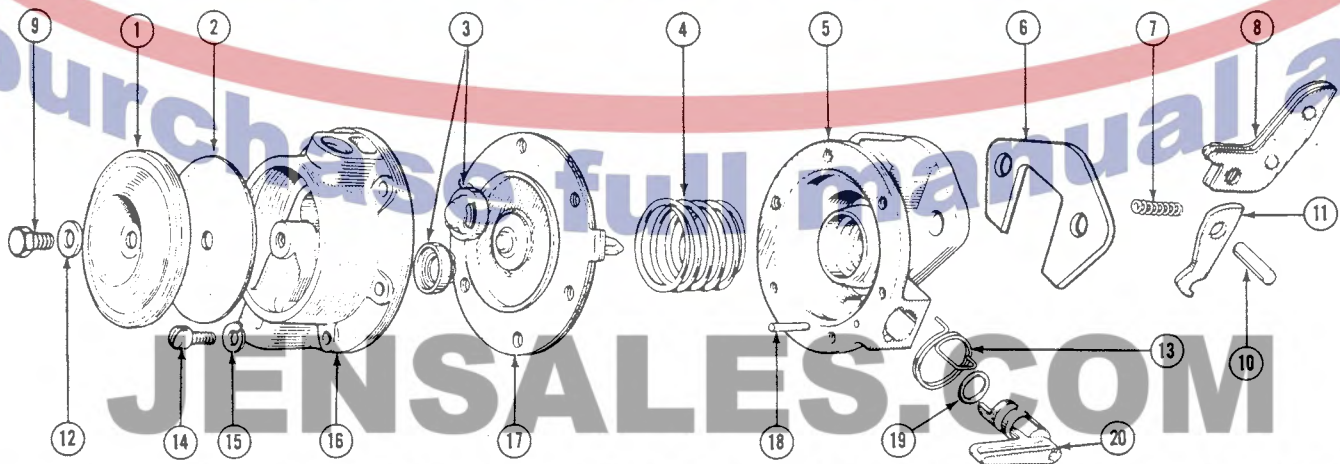


Figure 11
Fuel Lift Pump

- | | | | |
|-----------------------|----------------------|----------------------|-------------------------------------|
| 1. Pump Plate Cover | 6. Reinforcing Plate | 11. Rocker Arm Lever | 16. Outer Body Assembly |
| 2. Pulsator Diaphragm | 7. Rocker Arm Spring | 12. Washer | 17. Diaphragm and Pull Rod Assembly |
| 3. Valves | 8. Rocker Arm | 13. Spring | 18. Retaining Pin |
| 4. Return Spring | 9. Screw | 14. Screw | 19. Seal |
| 5. Inner Body | 10. Pivot Pin | 15. Washer | 20. Priming Lever |

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Figure 18
PTO Shaft Bearing

1. Snap Ring
2. Low Pressure Pump Assembly
3. PTO Shaft Bearing
4. PTO Shaft
5. Snap Ring

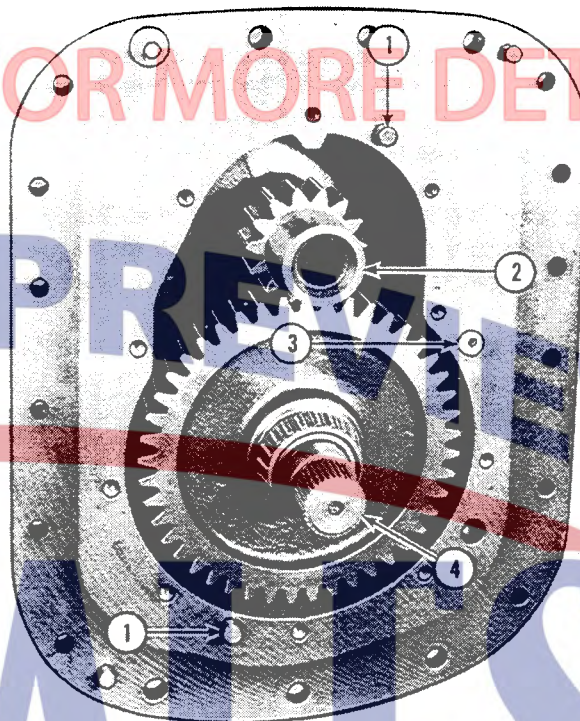


Figure 19
Secondary Countershaft Bearing Retainer Removed

1. Dowel Pins
2. Secondary Countershaft
3. Shift Rail
4. Output Shaft

8. Remove the output shaft assembly (4), Figure 19, by pulling it straight out. Remove the secondary countershaft (2), from the case. Remove the thin thrust needle bearing from the front of the countershaft by removing the retaining ring.

9. Remove the high/low gearshift sliding coupling (1), Figure 20, from the shift fork fingers (8). Loosen the high/low shift fork lock nut and screw (4). Remove the high/low detent seat (10), Figure 14, and remove the spring and ball. Use a magnet if necessary to remove the ball.

IMPORTANT: The high/low detent assembly must be removed from the case to avoid damage to the detent spring when the high/low shift rail is installed.

10. Remove the high/low shift rail (4), Figure 21, from the case and remove the shift fork (3) from the parking brake pawl (2).

B. Inspection and Repair

1. Inspect the PTO shaft for excessive wear or damage. Note wear or damage to the splines at the shaft ends. Inspect the area of the PTO shaft where the seal rides. The seal is located at the front of the mainshaft.
2. Inspect the PTO bearing for wear or damage. If necessary, remove the lock ring (1), Figure 18, securing the bearing on the shaft and remove the bearing. Use Tool Number 1002 as shown in Figure 22. Install a new bearing using a sleeve of convenient length and appropriate diameter, and Tool No. 951 as shown in Figure 23. Install both lock rings to secure the bearing.
3. Inspect the secondary countershaft bearing retainer for distortion or damage and replace if necessary. Examine the bearing for excessive wear or damage. Replace if necessary.

PART 5

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AND POWER TAKE-OFF

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1. HYDRAULIC SYSTEM — OPERATION

Figures 1, 2, and 3 illustrate the hydraulic system oil flow under three different conditions, i.e. "NEUTRAL", "LIFTING," and "LOWERING". For simplicity, these schematics show the hydraulic system without remote control valves. The valves, when used, have first priority to the oil flow. Therefore, they are mounted on top of the hydraulic pump cover (4) and under the manifold (2).

The key to the operation of the hydraulic lift system is the spring-loaded pilot controlled flow control valve (3) used in conjunction with the main control valve (8) and the pilot pressure tube (10). The operation of these components are explained under each different condition.

To protect the system from shock loads, caused by bouncing implements, a safety valve (1) is used to

relieve pressures above 2750 psi (189.5 bar) in the lift cylinder.

NEUTRAL

Figure 1 shows the hydraulic system oil flow in "NEUTRAL". The control valve (8) is positioned so that it shuts off supply pressure to the pilot pressure tube (10). At the same time, the check valve (7) stops oil flow to the cylinder. However, the pilot pressure tube is open at the control valve to allow trapped oil to return to sump. an orifice in the flow control valve causes a large pressure differential at the flow control valve, allowing the supply pressure to slide the flow control valve spool to the right against spring pressure. The flow control valve has now opened the supply pressure passage to sump.

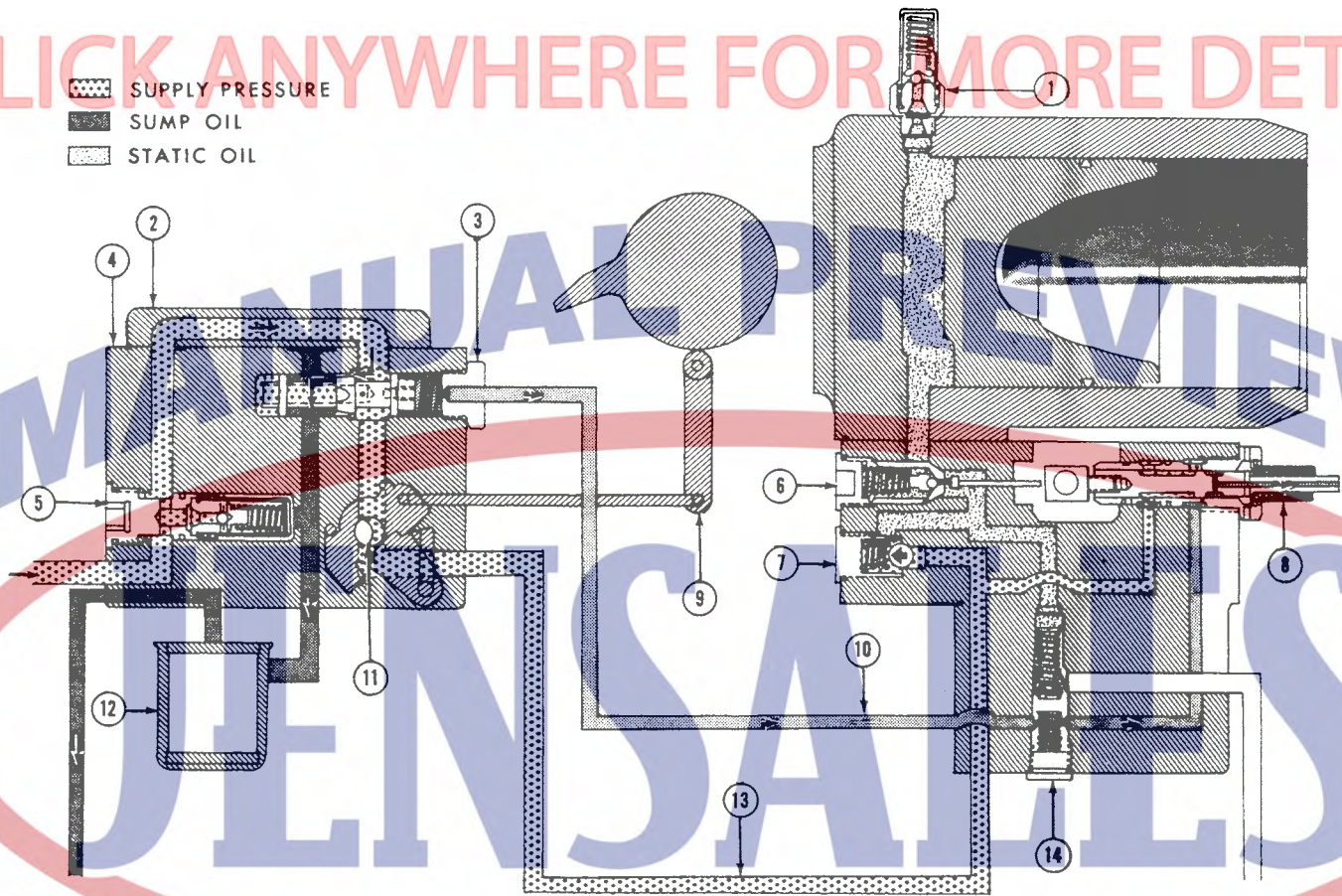


Figure 1
Hydraulic System Oil Flow — Neutral

- | | |
|--|--------------------------|
| 1. Safety Valve | 8. Control Valve |
| 2. Manifold | 9. Override Linkage |
| 3. Flow Control Valve | 10. Pilot Pressure Tube |
| 4. Hydraulic Pump Cover and Valve Assembly | 11. Variable Flow Valve |
| 5. System Relief Valve | 12. Return Filter |
| 6. Drop Valve | 13. System Pressure Tube |
| 7. Check Valve | 14. Exhaust Valve |

LIFTING

Figure 2 shows the hydraulic system oil flow during "LIFTING". When the control valve (8) is moved to the right, either manually or by an increased draft action at the lower links, it allows supply pressure to feed

the pilot pressure tube (10). In doing so, oil will flow through the pilot pressure tube and to the flow control valve (3). This pressure, at the flow control valve pilot pressure end, reduces the pressure differential to a minimum allowing the spring in the flow control valve to slide the spool to the left reducing the oil flow to sump.

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1. REMOVING AND INSTALLING THE CAB

The cab may be removed from the tractor without removing the engine hood and related sheet metal, but for easier access it is suggested the sheet metal be removed first.

SHEET METAL

TW-10 and TW-20

1. Remove the right and left hood side panels, Figure 1.
2. Remove the right and left grille panels, the grille, and the right and left cowl side panels, Figure 1.
3. Loosen the U-bolt clamp under the hood panel and remove the muffler. Remove the pre-cleaner, the fuel tank cap and the hood panel, Figure 1.

TW-30

1. Remove the right and left side panels, Figure 2.
2. Remove the grille.
3. Remove the air intake.



Figure 1
Tractor Sheet Metal
(TW-10 and 20)

- | | |
|----------------------|--------------------|
| 1. Hood Side Panel | 4. Cowl Side Panel |
| 2. Grille Side Panel | 5. Pre-Cleaner |
| 3. Grille | 6. Muffler |
| 7. Hood Panel | |

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1. TRANSFER BOX — DESCRIPTION AND OPERATION

Refer to Figure 1.

The front wheel drive transfer box bolts directly onto the existing transmission handbrake housing assembly, replacing the front cover.

The transfer box output shaft is supported at the rear end by a needle roller bearing located within the hollow shaft of the transmission handbrake. The front of the output shaft is supported by a taper roller bearing.

The front of the transmission handbrake shaft is splined externally and engages with the clutch drum in the transfer box. Dog teeth on the drive plates of the multi-plate clutch assembly engage with slots in the clutch drum. The driven plates engage with a plate carrier splined to the transfer box output shaft. Two pairs of Belleville (dished) washers compress the clutch pack to engage the drive to the output shaft.

A flange, splined to the front of the output shaft is bolted to a similar flange forming part of the front axle drive shaft. The drive shaft has a sliding coupling and is fitted with universal joints to facilitate articulation of the axle.

A control valve, actuated by a rod passing through the cab floor, is mounted on top of the transfer box and is designed to divert oil from the tractor hydraulic system to the clutch piston.

When the rod is pushed down the control valve allows hydraulic oil to pressurize the clutch piston and disengage the clutch.

When the rod is pulled up the oil return to sump via an oil pipe leading from the control valve to the front of the transfer box casing. In this position the clutch is engaged by the action of the Belleville washers.



Figure 1
Transfer Box Assembly

- | | |
|--------------------------|--------------------------------------|
| 1. Handbrake Housing | 12. Cover |
| 2. Needle Roller Bearing | 13. Output Shaft Flange |
| 3. Drive Plates | 14. Oil Deflector |
| 4. Driven Plates | 15. Belleville Washers |
| 5. Clutch Drum | 16. Clutch Piston |
| 6. Retainer Ring | 17. Oil Return (from Clutch) |
| 7. Split Ring | 18. Snap Ring |
| 8. Transfer Box Housing | 19. Roll-Pin (in Oil Feed to Clutch) |
| 9. Thrust Ring | 20. Thrust Ring |
| 10. Output Shaft | 21. Pressure Piece |
| 11. Taper Roller Bearing | 22. Plate Carrier |