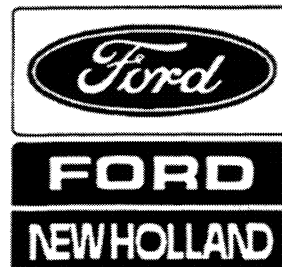
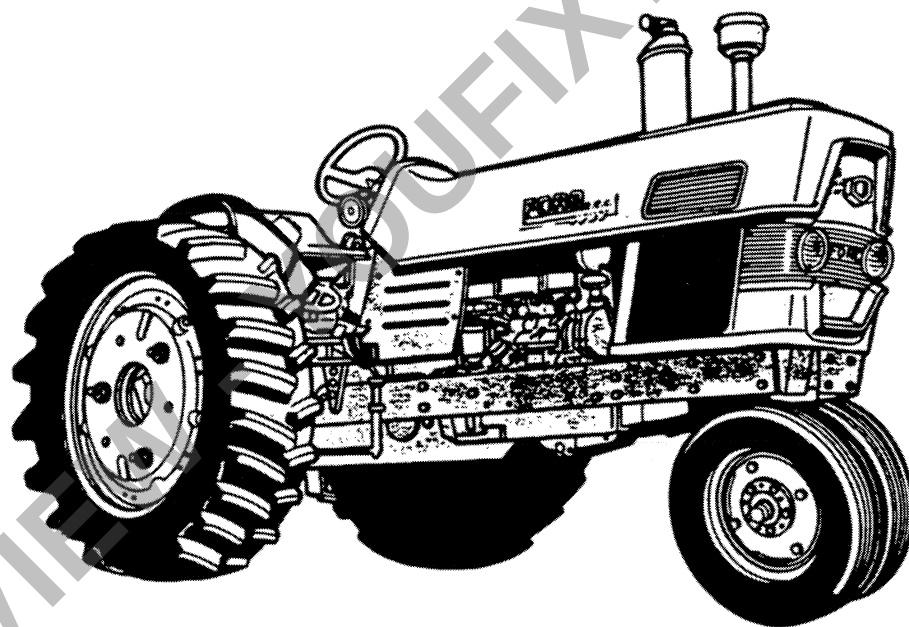


FORD

Service Manual



Tractor
6000



40600010

Reprinted

Part ONE

POWER PLANT

Chapter I

ENGINE

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1. ENGINE REMOVAL AND INSTALLATION

The engine used in the 6000 Series Ford Tractors, both gasoline and diesel, are of the six cylinder, four cycle, overhead valve type. The diesel engine has a 3.62 inch cylinder bore and a 3.90 inch stroke, giving a 242 cubic inch piston displacement. The gasoline engine has a 3.62 inch bore, 3.60 inch stroke, giving a 223 cubic inch piston displacement.

A. Engine Removal

1. Deactivate the hydraulic system (with the tractor engine "off") by depressing and releasing the brake pedals and by raising and lowering the hydraulic lift arms until the oil pressure is completely relieved.
2. Remove the air pre-cleaner and air inlet stack, which is a slip fit into the air cleaner inlet.
3. Remove the two screws which secure the muffler cover to the muffler and remove the cover. Loosen the muffler clamp nuts and lift the muffler off the exhaust pipe.
4. Remove the radiator and fuel tank caps.
5. Remove the front air inlet screens and upper screens and the rear side panels.
6. Remove the three Phillips head screws at the rear of the center hood section, the two bolts that secure the front hood support to the hood support rails, and the two slotted head screws that secure the hood to the front side panels. Remove the center hood section by lifting it out of position.
7. Remove the front side panels.
8. Remove the air intake lower baffle and splash shield and the upper air baffle.
9. Replace the radiator cap, the fuel tank cap, and position the exhaust rain cap on the exhaust pipe.
10. Clean the tractor thoroughly. The components immediately in front, behind, over, and under the radiator should be especially clean.
11. Position the tractor in the work area and again be sure the hydraulic system pressure is relieved as in step 1.

33. Drain the hydraulic system by disconnecting the reservoir hoses (4) and (5), Figure 1, at the unload valve and direct the oil (3-1/2 gal.) into a clean container.
34. Refer to Figure 1, and disconnect all the remaining hydraulic tubes and hoses at the unload valve. Disconnect the power steering hose (3), Figure 1, at the power steering motor and remove the power steering pump tube (2), Figure 1. Cap or plug all openings to prevent dirt entry. Use a plastic adhesive tape if caps or plugs are not available.
35. Remove the bolt which secures the hydraulic system supply and return tube bracket to the left side of the engine block. Tie the tubes to the left-hand tractor side rail at the front end of the tubes to give clearance for engine removal.
36. Remove the center steering shaft assembly by removing the two nuts and lock washers which secure the shaft bearings to the side rails and by backing off the spline anchor bolts. Work the assembly down and out of position.

NOTE: When reinstalling the shaft be sure the splines are aligned with both the steering wheel and front wheels in the straight-ahead position.

37. Position a floor jack under the front of the transmission.
38. Remove the manifold heat baffle and fire wall and attach the N-6000-AB Engine Lifting Fixture as shown in Figure 2, using two N-6000-A (Diesel) or two N-6000 (Gas) hex head bolts. Attach the lifting fixture to a suitable hoist and apply a very slight lifting pressure.
39. Loosen the hydraulic pump drive clamp bolt (15-18 lb.-ft.) and remove the hydraulic pump and engine front support as an assembly by removing the 8 bolts and two bolt anchor plates which secure the front engine support to the oil pan and side rails. The oil pan-to-support bolt torque specification is 120-130 lb.-ft.

NOTE: Separate the hydraulic pump and unload valve assembly from the front engine support before reassembly. Refer to the hydraulic section of this manual for pump installation instructions.

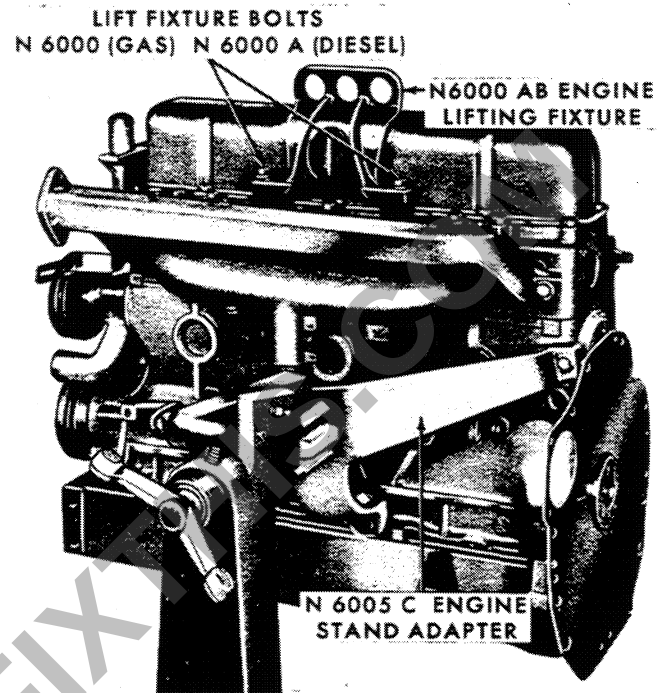


Figure 2
Engine Stand and Lifting Tool

40. Remove the power steering pump and hose as an assembly.
41. Remove the right and left transmission-to-side rail spacer blocks.
42. Remove all engine-to-transmission case mounting bolts.
43. Move the engine forward and up to the left, out of position. Mount the engine on an engine stand, as shown in Figure 2.

B. Engine Installation

1. Attach the N-6000-AB Engine Lifting Fixture to the engine using the two N-6000 A (Diesel) or N-6000 (Gas) hex head bolts.
2. Lift the engine into place, being careful to align the torque limiting clutch and transmission input shaft splines.
3. Install the engine-to-transmission mounting bolts. Tighten the 3/4" bolts to 200 ft. lbs. and the 5/8 inch bolts to 135 ft. lbs.

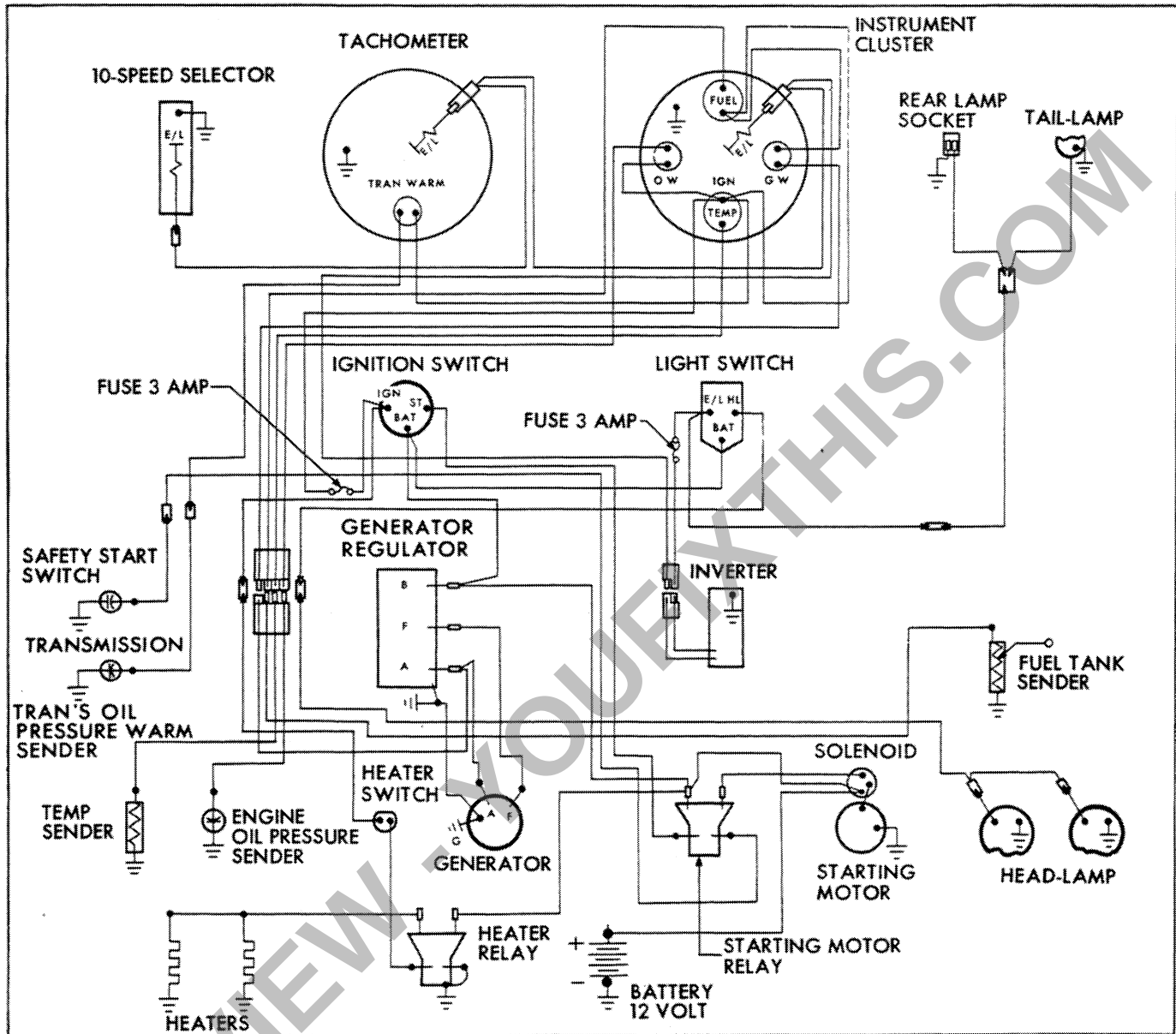
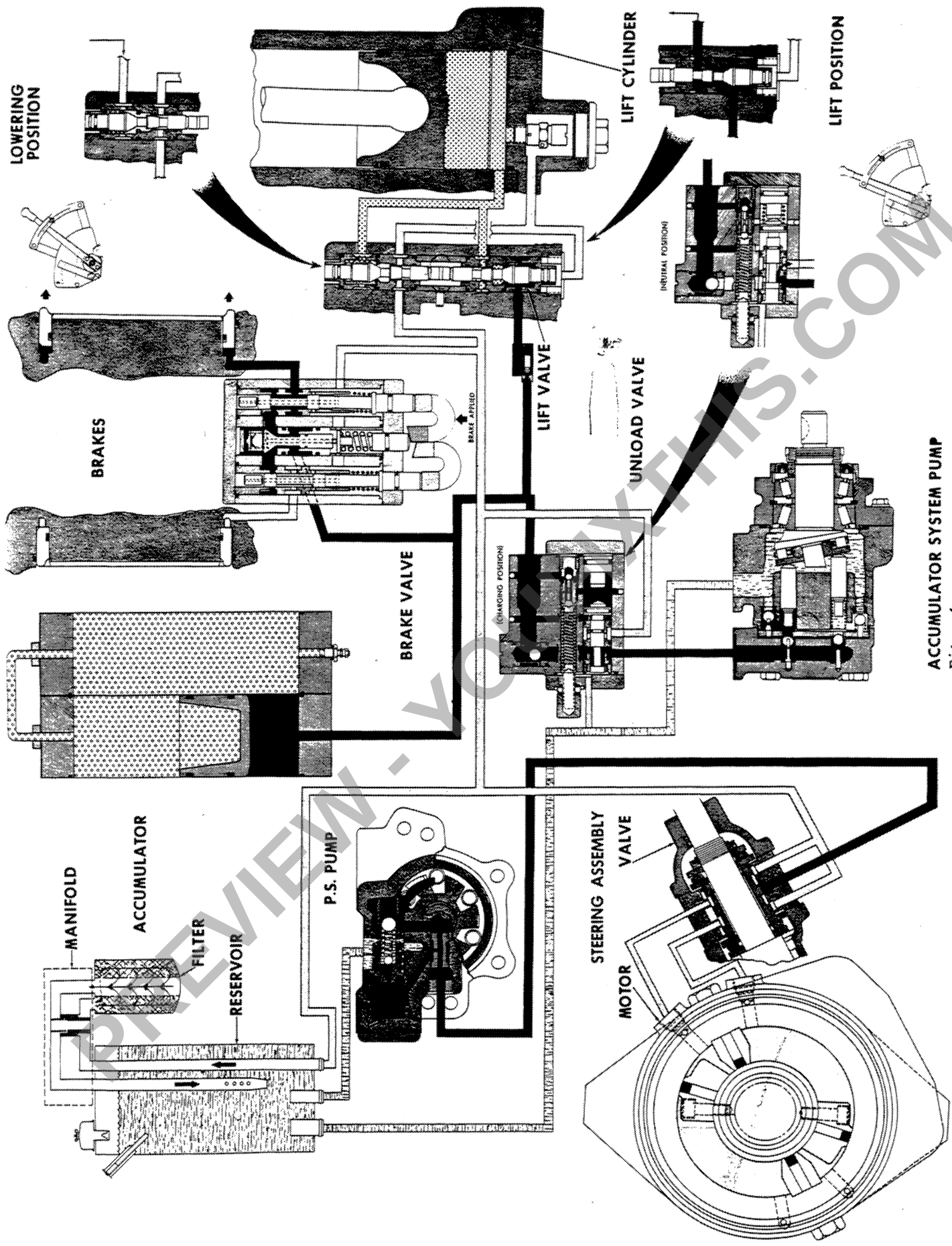


Figure 1
Wiring Diagram - Diesel

BATTERY SPECIFIC GRAVITY CHARGE

State of Charge	Specific Gravity	
	Temperate Climates	Tropical Climates
Fully Charged	1.280	1.225
75%	1.230	1.180
50%	1.180	1.135
25%	1.130	1.090
Discharged	1.080	1.040

Hydrometer readings will be accurate in temperatures from 70° F. to 90° F. Readings must be compensated to .004 specific gravity for each 10° F. For every 10° above 90° F., add .004 gravity points and for every 10° below 70° F., subtract .004 gravity points. For example: an uncorrected reading of 1.225 specific gravity with an acid temperature of -10° F., would falsely indicate a 50% charged battery. However, by using the correction factor of .004 gravity points for each 10° change from the reference temperature of 70° F., we find that the corrected specific gravity is 1.193 or approximately 25% charged. Most hydrometers have a thermometer and correction



ACCUMULATOR SYSTEM PUMP
 Figure 1
 Hydraulic System

INTAKE VALVES

	242 Cu. In. 6 Cyl. Diesel	223 Cu. In. 6 Cyl. Gasoline
Face Angle	45° 45' - 45° 30'	45° 45' - 45° 30'
Stem Diameter	.3415 - .3425	.3423 - .3415
Head Diameter	1.528 - 1.518	1.785 - 1.775
Stem to Guide Clearance	.0025 - .0005	.0035 - .0010
Lash (hot)	.015	.015
Port Diameter	1.40	1.52

TORQUE SPECIFICATIONS - DIESEL ENGINE

LUBRICATED THREADS

Operation	Size	Lbs. Ft. Torque
Main Bearing Bolts	9/16-12	105-115
Connecting Rod Bolts	3/8-24	45-50 (dry)
Cylinder Head Bolts	1/2-13	95-105 (dry)
Oil Pan-to-Cylinder Block Bolts	5/16-18	20-25
Front Cover-to-Cylinder Block Bolts	1/4-20	9-12
Oil Pan Drain Plug	7/8-16	20-25
Valve Rocker Cover Bolts	5/16-18	12-15
Valve Push Rod Cover Bolts	5/16-18	20-30 inch-lbs.
Damper Assembly-to-Crank	9/16-18	45-55
Rocker Arm Shaft Support-to-Cylinder Head	7/16-14	45-55
Flywheel to Crankshaft Bolts	7/16-20	75-85

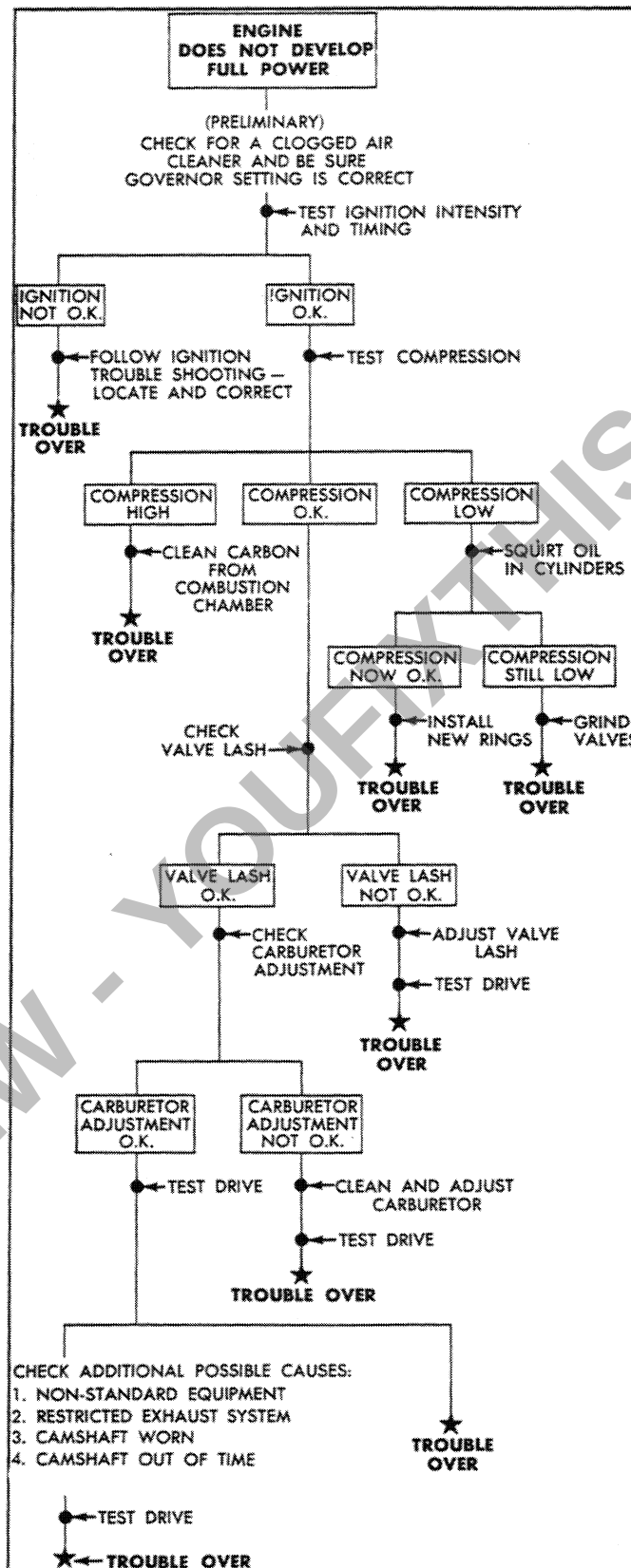


Figure 50
Engine Does Not Develop Full Power — Road Map

10. SPECIFICATIONS

ENGINE	242 Cu. In. 6 Cyl. Diesel	223 Cu. In. 6 Cyl. Gasoline
Valve Arrangement	Overhead	Overhead
Compression Ratio	16.5: 1	8.0: 1
Stroke	3.90	3.60
Bore	3.62	3.62
Firing Order	1, 5, 3, 6, 2, 4	1, 5, 3, 6, 2, 4
*Maximum Corrected Horse Power (Brake)	76.5 @ 2230 RPM.	77.5 @ 2230 RPM.
*Maximum Corrected Torque	187 @ 1600 RPM.	190 @ 800 RPM.
Oil Capacity - Crankcase		
Refill	4 Qts.	4 Qts.
Initial (An engine never previously filled with lubricant)	5 Qts.	5 Qts.
— Compression Pressure (sealevel @ cranking speed)	500 ± 20	160 ± 10
*Less a/c, Fan, and Muffler		
PISTONS		
Material	10-3 Aluminum Alloy	10-3 Aluminum Alloy
Length	4.092 - 4.088	4.10
No. of Compression Rings	3	2
No. of Oil Rings	1	1
Compression Height	2.0245 - 2.0205	1.880 - 1.876
Diameter	3.6198 - 3.6234	3.6271 - 3.6235
Weight	762 - 768 grams	582 - 588 grams
PISTON RINGS		
Side Clearance		
Top Ring	.0055 - .0040	.0035 - .0020
Second Compression Ring	.0035 - .002	.0035 - .0020
Third Compression Ring	.0035 - .0020	
Oil Ring	.0030 - .0015	.0030 - .0015
Radial Wall Thickness		
Top Ring	.149 - .159	.149 - .159
Second Compression Ring	.149 - .159	.149 - .159
Third Compression Ring	.149 - .159	
Oil Ring	.115 - .125	.115 - .125
Width		
Top Ring	.0935 - .0930	.0935 - .0930
Second Compression Ring	.0935 - .0930	.0935 - .0930
Third Compression Ring	.0935 - .0930	
Oil Ring	.1865 - .1860	.1865 - .1860

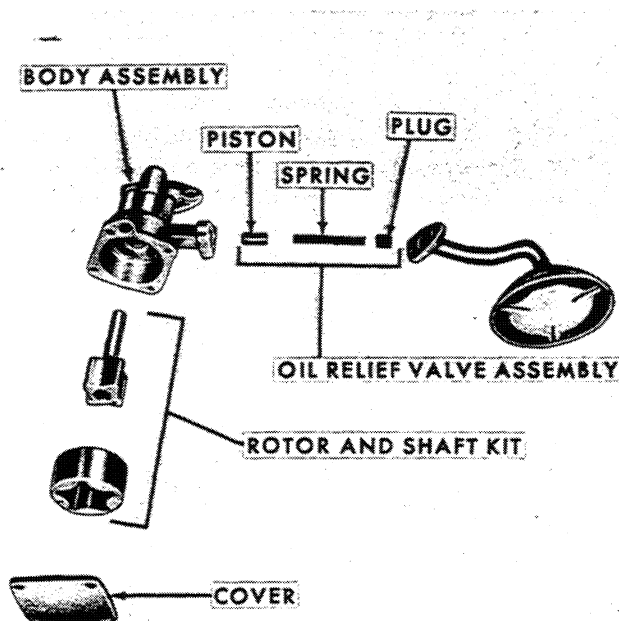


Figure 20
Oil Pump - Exploded View

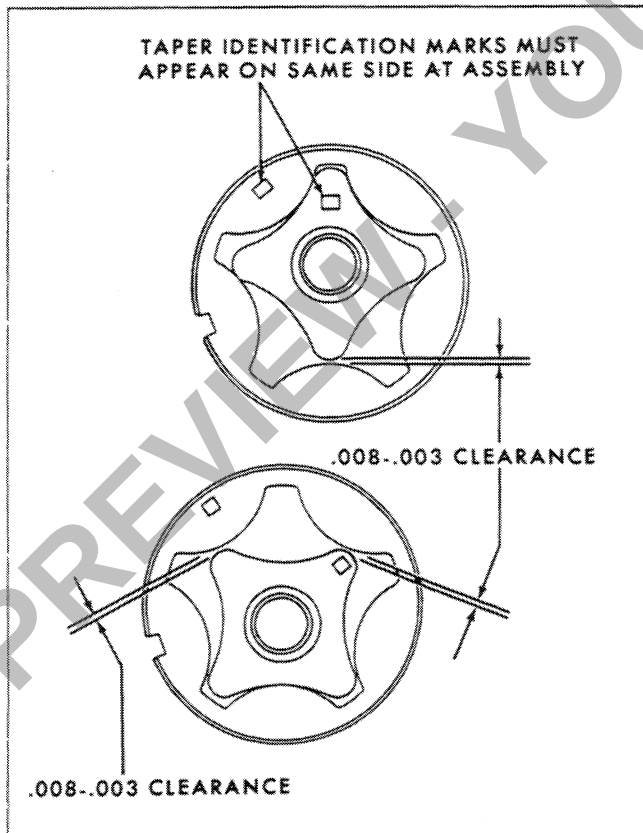


Figure 21
Oil Pump Rotor Clearance

A. Oil Pump Removal

1. Remove the oil pan.
2. Remove the two nuts and lock washers that attach the pump to the cylinder block. Remove the pump and inlet tube as an assembly.

B. Oil Pump Disassembly

1. Remove the two bolts that attach the oil inlet tube to the pump. Remove the inlet tube and screen assembly from the oil pump body. See Figure 20.
2. Remove the four bolts that attach the cover to the body. Remove the cover and the rotor assembly.
3. Remove the plug from the inlet tube body flange and remove the relief valve spring and valve.

C. Oil Pump Inspection

1. Check the mating surface of the pump cover for wear. If the cover is visibly worn, scored, or damaged, replace it.
2. Check the pump housing for scores, cracks, or damage and replace as necessary.
3. Install the rotor and shaft assembly in the housing and check the rotor-to-outer race clearance. With the rotor positioned as shown in Figure 21, the clearance should not exceed .008" at the points indicated.
4. With the rotor assembly installed in the housing, place a straight edge over the rotor assembly and the housing, as shown in Figure 22. Measure the

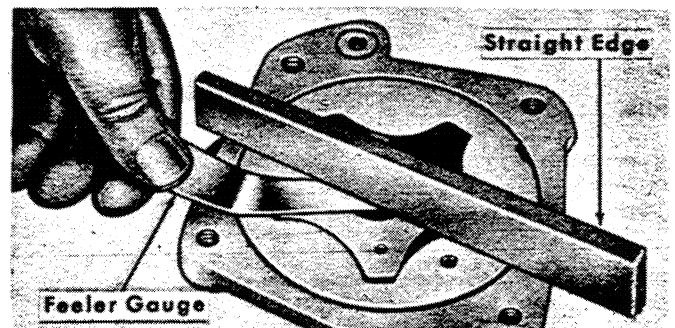


Figure 22
Checking Rotor End Play

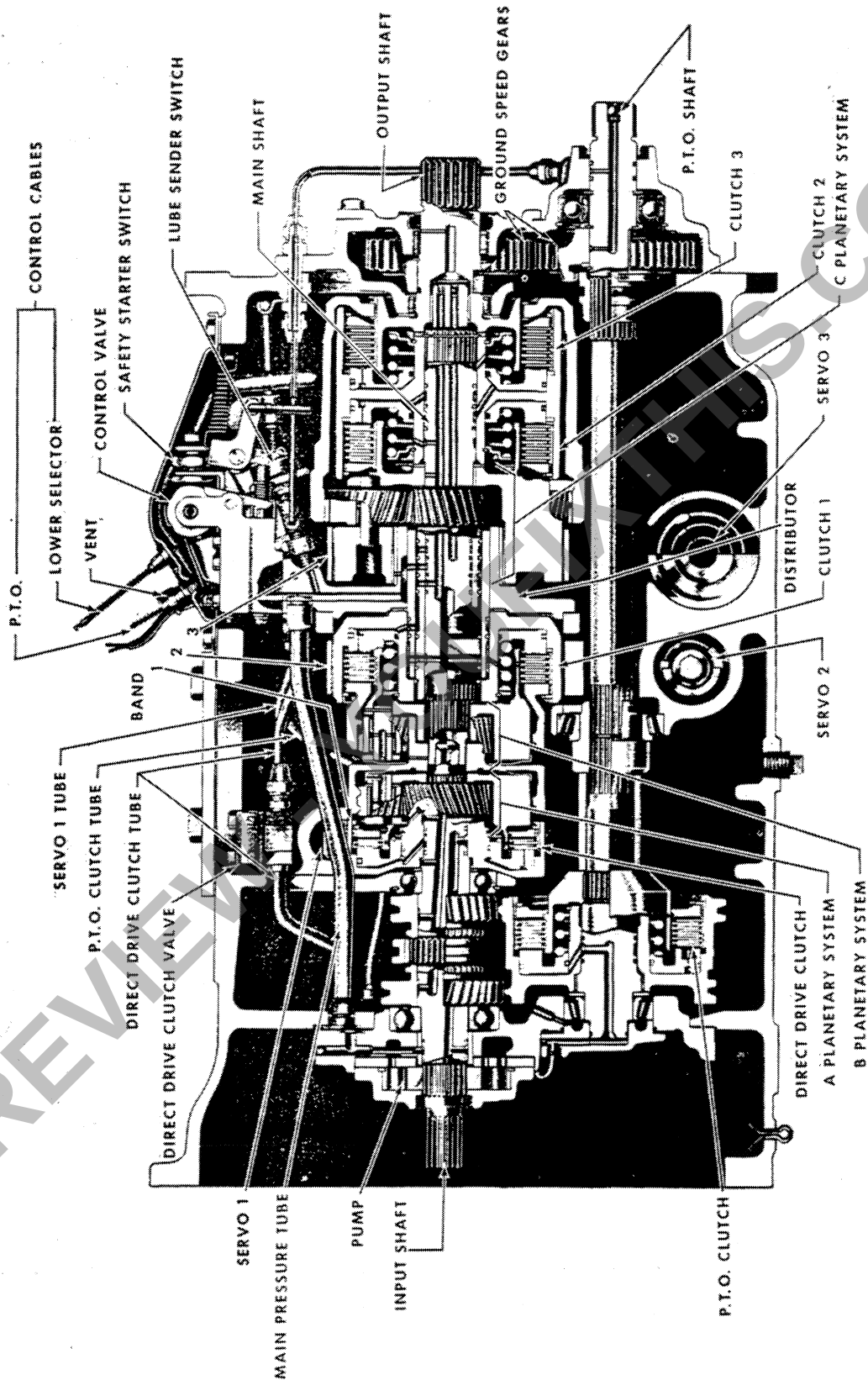


Figure 1
Select-O-Speed Transmission Sectional View



FORD SERIES 6000 TRACTOR

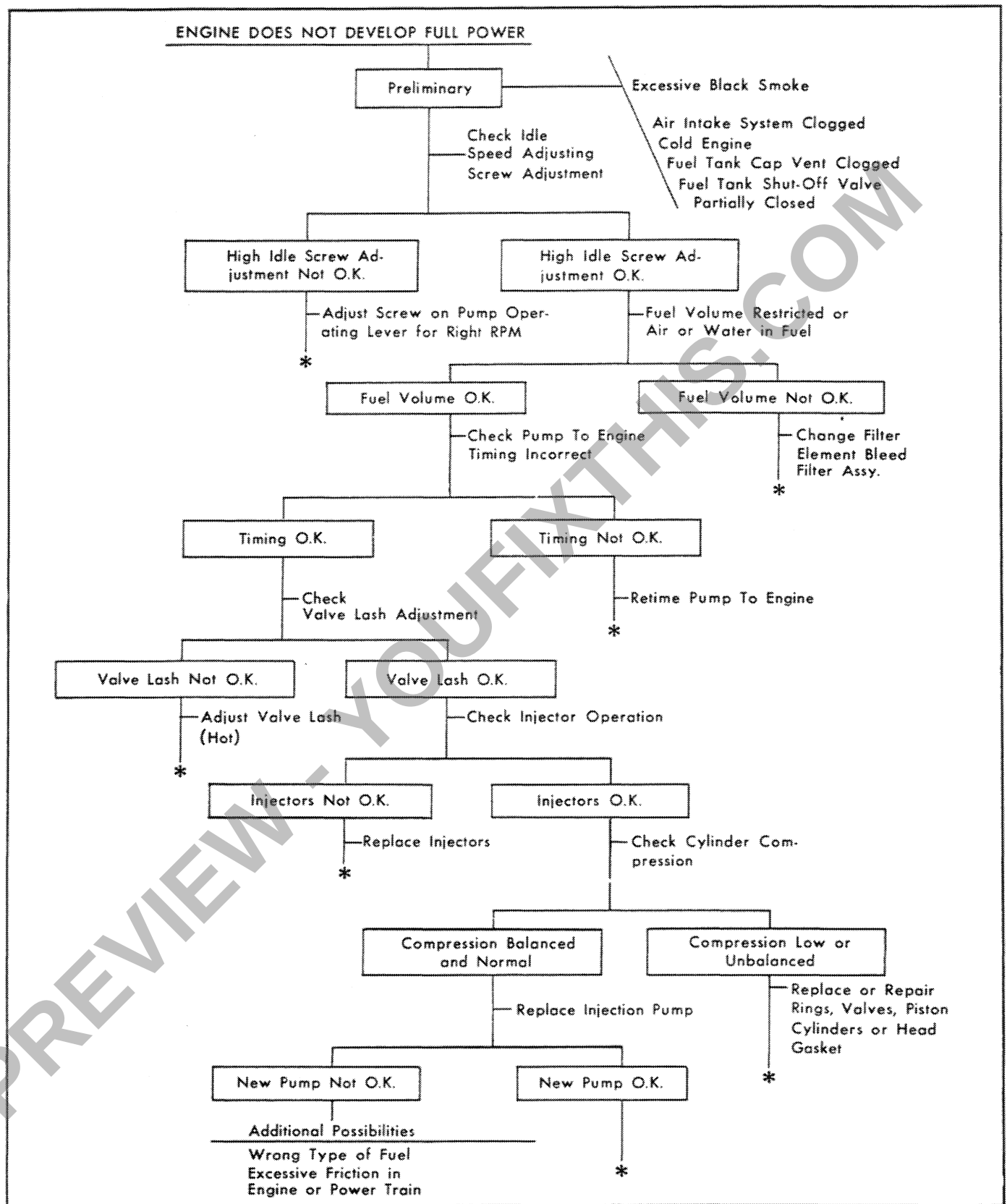


Figure 52
 Engine Does Not Develop Full Power — Road Map

connected, remove all the spark plugs and attempt to crank the engine with the starting motor (gasoline only).

If the engine cranks with the spark plugs removed, water has leaked into the cylinders, causing a hydrostatic lock. The cylinder head must be removed and the cause of leakage repaired.

3. If the engine will not crank, loosen the starter mounting bolts to free the starter pinion. If the starter drive is not locked, proceed to step 4. If the starter drive is locked, remove the starting motor from the engine and examine the starting motor drive pinion for burred or worn teeth. Examine the teeth on the flywheel ring gear for burrs and wear. Replace the pinion or the flywheel ring gear if they are worn or damaged.
4. If the starter drive is not locked, remove the starting motor from the engine and perform the no-load current test. The motor should run freely. Compare the reading obtained from the ammeter with the no-load current test specifications. The motor should run freely. Compare the reading obtained from the ammeter with the no-load draw specification for the starting motor. If the current reading is below specifications, the starting motor is high resistant and should be repaired. If the current reading is above normal, the starting motor is running slower than it should due to tight bearings, a bent shaft, or because the armature is rubbing the field poles. A shorted coil in the starting motor also causes the current reading to be high. Disassemble the starting motor and determine the cause. Repair if possible, or replace the starting motor.
5. If the current reading of the starting motor is 800 amps, the engine is seized and cannot be turned by the starter. Disassemble the engine and repair or replace the defective parts.

SYMPTOM B - STARTING MOTOR SPINS BUT DOES NOT CRANK ENGINE

If the starting motor spins, but will not crank the engine, the starting motor drive is dirty, worn, or broken.

1. Remove the starting motor from the engine and inspect the starting motor drive for broken or worn parts. Replace the drive if any parts are worn or broken. Clean the starting motor drive in solvent if dirty or greasy.

2. Install the starting motor drive, if removed, and mount the starting motor on the engine.

IMPORTANT: Do not lubricate the starting motor drive. It should work freely after cleaning in solvent.

SYMPTOM C - ENGINE CRANKS SLOWLY

When the engine cranks slowly, it may be due to any one of the following. The battery may be low in charge. There may be excessive resistance in the starting motor circuit. The starting motor may be faulty. The engine may have excessive friction.

Figure 48 shows the road map for the symptom, "Engine Cranks Slowly".

Test the state of charge of the battery. If the battery is low, recharge the battery and make a high rate discharge test. Replace the battery if the test indicates it to be worn out or under capacity. If the battery is charged, test the external circuit voltage drop. If the voltage drop is more than .125, follow 1., "Resistance Excessive". If the voltage drop is normal, follow 2., "Resistance Normal".

1. If the resistance (voltage drop) is high, locate the exact part of the circuit with excessive resistance, and follow the appropriate steps, a, b, c, or d, given below.
 - a. If the resistance is in the battery-to-starter relay cable, clean and tighten the cable connections. If voltage drop is still excessive, replace the cable.
 - b. If the resistance of the starting motor relay contacts is excessive, replace the relay.
 - c. If the resistance is in the starting motor relay-to-starter motor cable, clean and tighten the cable connections. If the voltage drop is still excessive, replace the cable.
 - d. If the resistance is in the battery-to-ground cable, clean and tighten the cable connections. If voltage drop is still excessive, replace the cable.
2. If the resistance is normal, test the starting motor current draw while the motor is cranking the engine. If the current draw is normal or excessive, see step b. below. If the current is low (normal 180-230 amperes), proceed with step a.

3. Loosen the lock nut on the connector bolt, Figure 8, and adjust the bolt to produce 1100–1150 engine rpm. Tighten the lock nut.

P.T.O. KICKDOWN

1. Position the hand throttle control lever against the high idle stop. Depress the inching pedal until the inching lever cam roller is about to move rearward from the constant radius area at the top of the inching pedal cam.
2. Loosen the kickdown arm adjusting bolt lock nut. Adjust the bolt so that the kickdown arm contacts the pedal at the position described in Step 1, above. Tighten the kickdown arm adjusting bolt lock nut.
3. Start the engine and move the hand throttle to the wide open position. Depress the inching pedal and note the operation of the transmission lube warning light. The light will illuminate through the feathering range, then go out when the transmission feathering valve is closed. The light should go out when the inching pedal is approximately 1/8" above the P.T.O. kickdown arm. If this condition is not obtained, remove the clevis pin from the inching pedal adjustment rod, and lengthen or shorten the rod as required, to obtain the correct adjustment. Tighten the lock nut and reinstall the rod.
4. Move the hand throttle control lever against the high idle stop. Fully depress the inching pedal so the pedal stop bolt, Figure 8, contacts the side rail. The engine speed should be 2150–2230 rpm. The correct speed is obtained by loosening the lock nut and adjusting the pedal stop bolt. Retighten the lock nut.
5. With the throttle lever against the high idle stop, push the feathering pedal down to the kickdown arm, Figure 8, to be sure the engine speed is 1100–1150 rpm.

4. MANIFOLD, MUFFLER, AND OUTLET PIPE

The intake and exhaust manifolds on the Series 6000 gasoline tractors are separate units bolted together with a stainless steel plate between them. A single manifold gasket is used for attaching both manifolds to the cylinder head. The muffler is mounted on the inlet pipe in a vertical position above and ahead of the manifolds. The muffler assembly includes the muffler, the muffler cover, and the rain cap. The outlet pipe is attached to the exhaust manifold with a gasket and two studs. The pipe is supported to the tractor hood mounting rail by a bracket bolted to the side rail. The muffler fits over the outlet pipe and is attached with a clamp. An engine heat deflector is bolted to the cylinder head at each end of the exhaust manifold and to the stud on the outlet pipe flange. The deflector aids in directing heat from the exhaust manifold away from the engine. See Figure 9.

A. Removal

1. Remove the two nuts securing the outlet pipe to the exhaust manifold. Move the outlet pipe forward off the studs.
2. Shut off the fuel at the fuel shut-off valve on the tank. Remove the fuel line from the sediment bowl. Remove the two nuts at the carburetor flange and move the carburetor down-out of the way.

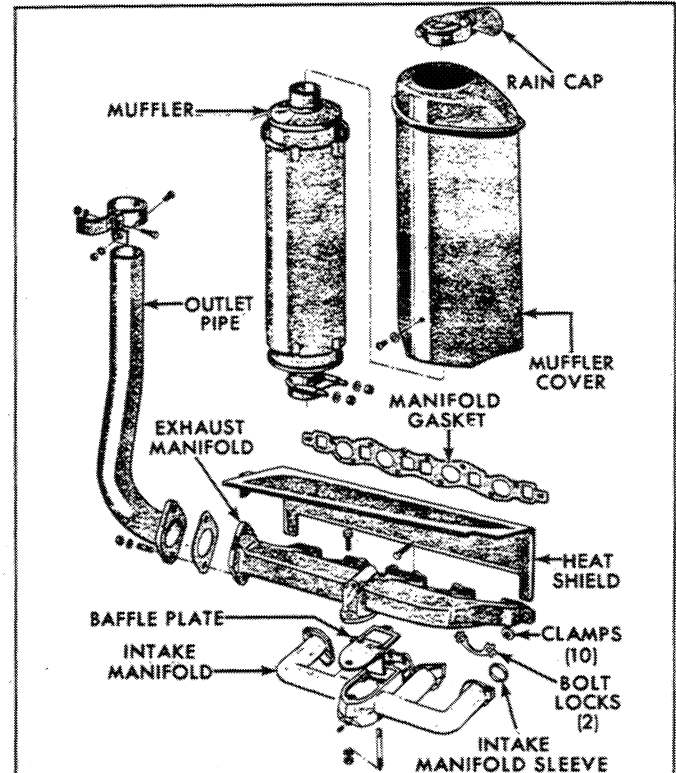


Figure 9

Exhaust System - Exploded View

SELECT-O-SPEED TROUBLE SHOOTING CHART

POSITION OR GEAR	DIRECT CIRCUIT									INDIRECT CIRCUIT								
	DIRECT DRIVE CLUTCH *			BAND						CLUTCH PACK								
				B1 *		B2 **		B3 **		C1 *		C2 *		C3 *				
	a	r	a	a	r	a	r	a	r	a	r	a	r	a	r			
Park (P)	P	A	P	L-P	P	P	A	N	P	A	N	L	P	L	P	L	P	P
R ₂	L	R ₂	R ₂	A	N	L	R ₂	R ₂	A	N	R ₂	A	N	L	R ₂	L	R ₂	R ₂
R ₁	R ₁	A	N	L-R ₂	R ₁	L	R ₁	R ₁	A	N	R ₁	A	N	L	R ₁	L	R ₁	R ₁
Neutral (N)	N	A	N	L-N	N	P	N	N	A	N	R ₁	N	2	N	1	N	N	N
1st	1	A	N	L-3	1	L	1	1	A	N	L	1	L	1	1	A	N	N
2nd	2	A	N	L-4	2	L	2	2	A	N	L	2	2	A	N	L	2	2
3rd	L	3	3	A	N	L	3	3	A	N	L	3	L	3	3	A	N	N
4th	L	4	4	A	N	L	4	4	A	N	L	4	4	A	N	L	4	4
5th	5	A	N	L-7	5	5	A	N	L	5	L	5	L	5	5	A	N	N
6th	6	A	N	L-8	6	6	A	N	L	6	L	6	6	A	N	L	6	6
7th	L	7	7	A	N	7	A	N	L	7	L	7	L	7	7	A	N	N
8th	L	8	8	A	N	8	A	N	L	8	L	8	8	A	N	L	8	8
9th	9	A	N	L-10	9	L	9	L	9	9	A	N	9	A	N	9	9	9
10th	L	10	10	A	N	L	10	L	10	10	A	N	10	A	N	10	10	10

A, applied for that position
L, indicates lock-up

☐ , hydraulic pressure on.

* pressure applied
** spring applied

Black columns "a" and "r" indicate inoperative condition for each band and clutch.-
a, applied and does not release.
r, released and does not apply.

The pump adapter plate sleeve is to be installed with the chamfered edge toward the rear (bearing side) of the plate. See Figure 100. Align the holes in the sleeve with the adapter plate holes and press the sleeve so that the chamfered end is flush with the recessed machined surface.

Clutch 1: To install, use Bushing Adapter N-776.

"C" Carrier: To install front bushings, use Bushing Adapter N-777.

"C" Carrier: To install rear bushing, use Bushing Adapter T-807.

P.T.O. Housing Front: To install, use Step Plate 630-8.

P.T.O. Housing Rear: To install, use Bushing Adapter T-811.

Output Shaft: To install, use Bushing Adapter 809.

"A" Sun Gear: To install two bushings, use Bushing Adapter T-807.

Pump Adapter Plate: To install sleeve, use Step Plate 630-6.

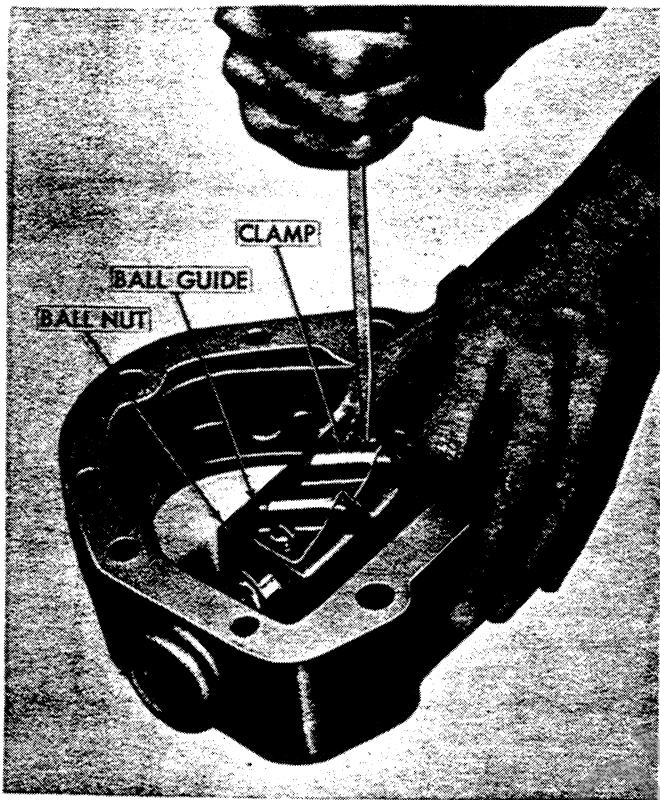


Figure 11

Removing Steering Gear Ball Nut Assembly

4. Remove the sector gear, Figure 10. Remove the steering valve and gear housing as an assembly from the motor assembly.
5. Scribe mating marks on the gear housing, both flanges of the valve housing, and the valve cover to aid in reassembly.
6. Remove the cover from the valve housing.
7. Remove and discard the staked valve retaining lock nut from the shaft, and slide the entire valve assembly, Figure 8, from the shaft. Hold the assembly by the smaller outer bearing retainers to prevent accidental dropping of internal parts. Place these parts on a clean work bench.
8. Remove the ball nut and the shaft:
 - a. With the ball nut rack facing down as shown in Figure 11, remove the two screws and the clamp that secure the two split ball bearing guides to the ball nut.



Figure 12

Removing Ball Bearing Guides

- b. Remove the two split guides, Figure 12, and the ball bearings they contain.
- c. Turn the ball nut to position the rack up, then rotate the shaft to remove the remaining ball bearings — a total of 66.
- d. Rotate the shaft out of the ball nut.

C. Cleaning and Inspection

1. Clean all parts in a solvent, drain, and air dry.
2. Examine the shaft needle bearings in each end of the gear housing. If necessary to replace, use Puller OTC 956-2 with slide hammer as shown in Figure 13. Use a suitable driver to install new needle bearings.
3. Replace the gear shaft oil seal and backup washer.
4. Check the teeth of the sector gear and the ball nut for excessive wear or damage that could cause improper operation. Replace defective parts.

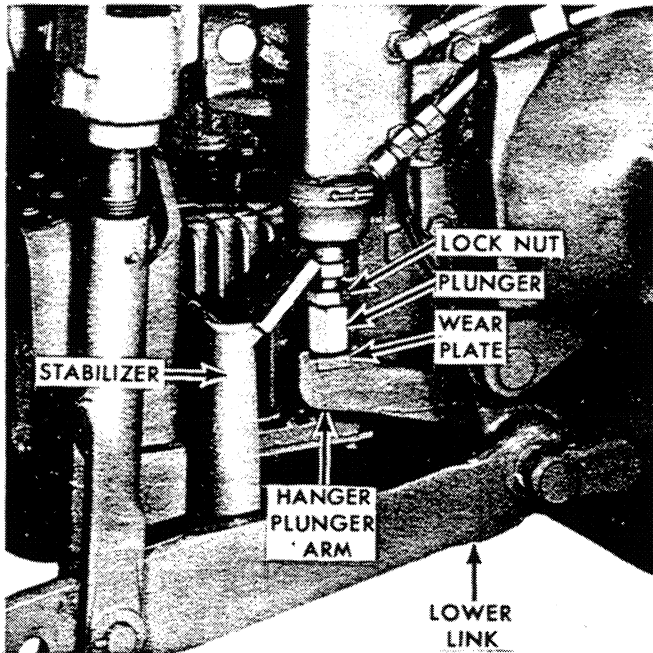


Figure 20
Lift Links, Hanger, and Sensing Plunger

b. With the lower links empty, push them forward to rock the hanger plunger arm downward as far as it will go. If there is any space between the hanger plunger arm wear plate and the sensing plunger bottom nut, do the following:

- (1). Loosen the lock nut from the sensing plunger bottom nut.
- (2). With the lower links being pushed forward, turn the sensing plunger bottom nut downward with fingers until the nut contacts the hanger arm wear plate. **Do not use a wrench for this easy adjustment.**
- (3). Tighten the lock nut against the plunger to a torque of 130–140 ft. lbs.

3. Constant Draft Control

This adjustment should be checked at tractor pre-delivery. Thereafter, the adjustment can be made by simply loosening the two touch control lever attaching bolts, changing the angle of the touch control lever by rotating it in its slotted holes, and retightening the attaching bolts, Figure 21.

a. To check the draft control adjustment:

- (1) Start the tractor engine
- (2) Move the lift control lever fully forward and downward to lower the lift arms.
- (3) Move the Multi-Trol lever to the forward notch marked with the letter "D" (for draft) on the quadrant.
- (4) Move the lift control lever upward and rearward. The lift arms should **start** to raise when the rear edge of the lever is between 1-1/2" and 2" from the quadrant rear stop spacer. If the lift arms do not begin to raise within that dimension range, adjust as follows:

b. Draft Control adjustment:

- (1) Loosen the bolts holding the lift lever to the lever hub.
- (2) Pivot the lever fully forward in its slots, Figure 21.
- (3) Tighten the lever-to-hub bolts.
- (4) Remove the right rear cover from the lift housing, Figure 22.
- (5) Remove the actuating lever spring.
- (6) Disconnect the connecting rod assembly from the actuating lever.
- (7) Loosen the ball joint body lock nut.
- (8) Turn the ball joint body on the connecting rod as required to cause the roller to contact the roller guide when the lift control lever is 2" from the rear quadrant stop.
- (9) Tighten the ball joint body lock nut, attach the connecting rod to the actuating lever, and install the spring.
- (10) Check the adjustment as explained in "A" above.
- (11) Reinstall the right rear lift housing cover plate.

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