2630 Tractor

JOHN DEERE

TECHNICAL MANUAL

2630 Tractor

TM1085 (01FEB86) English

John Deere Tractor Works
TM1085 (01FEB86)

LITHO IN U.S.A.
ENGLISH

2630 TRACTOR

TECHNICAL MANUAL
TM-1085 (Aug-73)

CONTENTS

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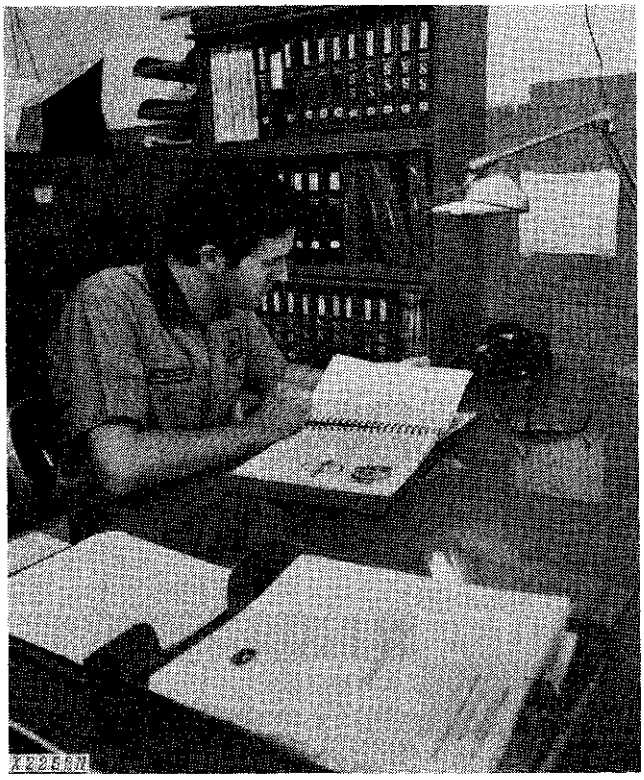
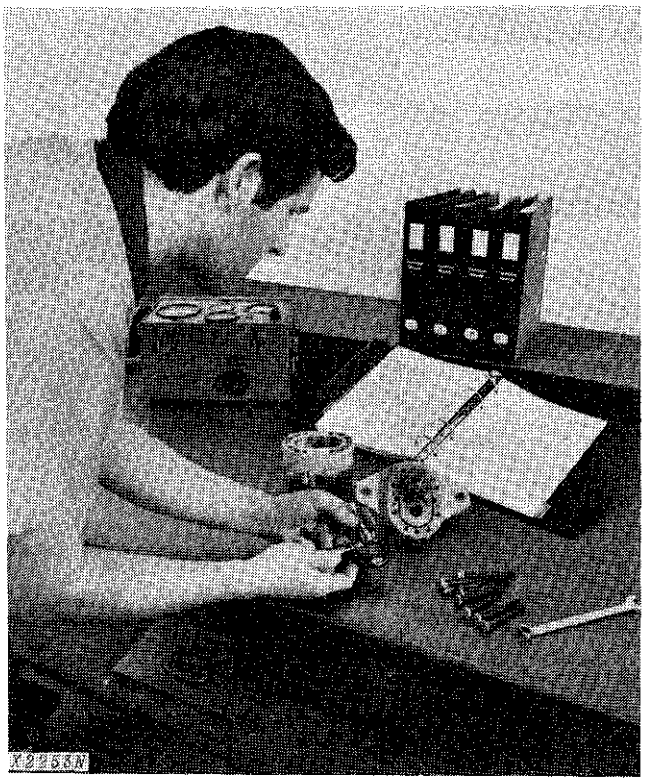
INTRODUCTION



Use FOS Manuals for Reference



Use Technical Manuals for Actual Service

This technical manual is part of a twin concept of service:

- **FOS Manuals—for reference**
- **Technical Manuals—for actual service**

The two kinds of manuals work as a team to give you both the general background and technical details of shop service.

Fundamentals of Service (FOS) Manuals cover *basic* theory of operation, *fundamentals* of trouble shooting, *general* maintenance, and *basic* types of failures and their causes. FOS Manuals are for training new men and for reference by experienced men.

Technical Manuals are concise service guides for a *specific* machine. Technical Manuals are on-the-job guides containing only the vital information needed by a journeyman mechanic.

When a serviceman should refer to a FOS Manual for more information, a FOS symbol like the one at the left is used in the TM to identify the reference.

Some features of this technical manual:

- *Table of contents at front of manual*
- *Exploded views showing parts relationship*
- *Photos showing service techniques*
- *Specifications grouped for easy reference*

This technical manual was planned and written for you—a journeyman mechanic. Keep it in a permanent binder in the shop where it is handy. Refer to it whenever in doubt about correct service procedures or specifications.

Using the technical manual as a guide will reduce error and costly delay. It will also assure you the best in finished service work.

This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

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Section 10
GENERAL

CONTENTS OF THIS SECTION

Group 5
GENERAL TRACTOR SPECIFICATIONS

ENGINE

Maximum PTO horsepower*	70.0
Number of cylinders	4
Bore and stroke, inches	4.17 x 5.00
Displacement in cubic inches	276
Compression ratio	16.2 to 1
Firing order	1-3-4-2
Intake valve clearance	0.014-in.
Exhaust valve clearance	0.018-in.
Slow idle	800 rpm
Fast idle	2650 rpm
Transport speed (foot throttle)	2800 rpm

* *Factory observed at 2500 engine rpm (650 or 1210 PTO rpm).*

ELECTRICAL SYSTEM

Battery dry voltage	12 volts
Battery specific gravity at full charge (corrected to 80°F.)	1.260
Battery terminal grounded	negative

CAPACITIES (U.S. Standard Measures)

Fuel tank	19-1/2 gals.
Cooling system	12 qts.
Crankcase (including filter)	9 qts.
Transmission-hydraulic system	10 gals.
Belt pulley	2-1/2 pts.

CLUTCH . . . . . Single or dual stage, spring-loaded, dry disk, foot-operated.

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TRANSMISSION

Type ..... Collar shift
Gear selections ..... 8 forward and 4 reverse
Shifting ..... 4 speeds each in high, low, and reverse ranges. Park lock included.

HI-LO SHIFT

Hydraulic wet clutches, no clutching required. Shifting from high to low decreases ground speed 21.4 percent and increases pull power up to 35 percent in any of the transmission speeds.

REVERSER

Hydraulic wet clutches, no clutching required. Provides reverse speeds for gear selections 1 through 4 which are 16% faster than corresponding forward speeds.

BRAKES ..... Hydraulically actuated, wet-disk type.

DIFFERENTIAL AND FINAL DRIVES

Type ..... Planetary reduction final drives with spiral bevel gear drive differential.
Differential lock ..... Hand or foot operated mechanical lock, spring-loaded out of engagement.

POWER TAKE-OFF

Type ..... Continuous-running or independent types available in 540 and/or 1000 rpm options.

HYDRAULIC SYSTEM

Type ..... Closed center, constant pressure. Actuates power steering and implement control.
Standby oil pressure ..... 2250 psi

STEERING

TYPE ..... Hydraulically actuated, with manual provision in case of hydraulic failure.

FRONT TIRES* 6.00-16

REAR TIRES* 16.9-28

DIMENSIONS

Over-all height ..... 81.2 in.
Over-all width, min. ..... 69.5 in.
Over-all length (with 3-point hitch) ..... 139.5 in.
Shipping weight (approx.) ..... 5100 lbs.

* *Additional tire sizes available.*

GROUND SPEEDS (Miles Per Hour: 16.9-28 Rear Tires and 2500 Engine RPM)

Gear	Collar Shift Transmission	Hi-Lo Shift Transmission		PTO SPEED (2100 RPM)	
		"Lo"	"Hi"	"Lo"	"Hi"
1st	1.56	1.33	1.56	1.12	1.31
2nd	2.23	1.75	2.23	1.47	1.87
3rd	3.30	2.60	3.30	2.18	2.78
4th	4.62	3.63	4.62	3.05	3.88
5th	5.49	4.32	5.49	3.63	4.61
6th	7.85	6.17	7.85	5.18	6.60
7th	11.64	9.16	11.64	7.69	9.77
8th	16.28	12.79	16.28	10.74	13.68
R1	1.81	1.42	1.81		
R2	2.59	2.03	2.59		
R3	3.84	3.02	3.84		
R4	5.37	4.22	5.37		

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Group 10
PREDELIVERY, DELIVERY AND AFTER-SALE SERVICES

PREDELIVERY SERVICE

Because of the shipping factors involved, plus extra finishing touches that are necessary to promote customer satisfaction, proper predelivery service is of prime importance to the dealer.

A tag pointing out the factory-recommended procedure for predelivery service is attached to each new tractor before it leaves the factory.

After completing the factory-recommended dealer checks and services listed on the predelivery tag, remove the tag from the tractor and file it with the shop order for the job. The tag will certify that the tractor has received the proper predelivery service when that portion of the customer's John Deere Delivery Receipt is completed.

Service	Specification	Reference
Temporary Tractor Storage		
Check radiator for coolant loss and antifreeze	Midway between core and filler neck	
Reduce shipping pressure of tires		Operator's manual
Cover tractor and tires for protection and cleanliness		
Before Delivering Tractor		
Electrical System		
Check battery electrolyte level and specific gravity		FOS-20 Manual
Punch date code on battery tag		
Check battery terminal connections		Section 40, Group 5
Check alternator belt tension	3/4 inch deflection, 20 lb. force	Operator's manual
Check light operation and adjustment. Remove flasher if required by local governmental regulations		Operator's manual

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Service	Specification	Reference
Before Delivering Tractor—Continued		
Cooling System		
Inspect radiator for coolant loss	Midway between core and filler neck	
Check antifreeze protection		
Tires and Wheels		
Adjust pressure of tires		Operator's manual
Check front wheel hub bolts, rear wheel rim clamp nuts, and rear wheel cap screws for tightness	Front hub bolts-85 ft-lbs torque Rear hub bolts-300 ft-lbs torque Rim clamp nuts-170 ft-lbs torque Rear wheel-to-flanged axle; cast-130 ft-lbs torque, steel wheel-100 ft-lbs torque	Operator's manual
Lubrication		
Check crankcase oil level	To upper marks on dipstick	Operator's manual
Check transmission-hydraulic system oil level	To top of "SAFE" range on dipstick. Type 303 Special-Purpose Oil	Operator's manual
Lubricate grease fittings	John Deere Multi-purpose Lubricant	Operator's manual
Check belt pulley oil level		Operator's manual
Engine		
Check air intake system—air cleaner and hose connections		Operator's manual
Drain sediment from fuel filter		Operator's manual
Fill fuel tank and start engine	19-1/2 U.S. gallons	Operator's manual
Check operation of starter, alternator, flashers, gauges, and indicator lights		Operator's manual
Check engine timing	Diesel - TDC	Operator's manual
Check speed control and fuel shut-off linkages for free operation and adjustment		Section 30, Group 20

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Service	Specification	Reference
Before Delivering Tractor—Continued		
Check engine speeds	Slow idle, 800 rpm High idle, 2650 rpm Foot throttle, 2800 rpm	Section 30, Group 20
Operation		
Check transmission clutch free travel (tractors without reverser)	Approximately 1-inch free pedal travel	Operator's manual
Check clutch wear adjustment (tractors with reverser)	5-1/4 in.	Operator's manual
Shift transmission through all speeds		Operator's manual
Check power takeoff operation		Operator's manual
Check differential lock operation		Operator's manual
Check steering operation		Operator's manual
Check brakes	Bleed brakes if spongy, check for excessive pedal travel, and even position	Operator's manual
Check hydraulic system operation: Rockshaft, and remote cylinder		Operator's manual
Check 3-point hitch operation		Operator's manual
Check negative stop screw adjustment		
Tractors without Independent PTO	1/4 turn	Section 70, Group 30
Tractors with Independent PTO	1/3 turn	Section 70, Group 30
Check operation of reverser, or Hi-Lo Shift		Operator's manual
Check seat operation		Operator's manual
General		
Check Roll-Gard Mounting bolts for correct torque	300 ft-lbs	Section 10, Group 25
Check front axle-to-knee bolts for correct torque	300 ft-lbs	Section 80, Group 5
Tighten accessible nuts and cap screws		
Clean tractor and touch up paint		

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DELIVERY SERVICE

A thorough discussion of the operation and service of a new tractor at the time of delivery helps to assure complete customer satisfaction. Proper delivery should be an important phase of a dealer's program. A portion of the John Deere Delivery Receipt emphasizes the importance of proper delivery service.

It is a well-known fact that many complaints have arisen simply because the owner was not shown how to operate and service his new tractor properly. Enough time should be devoted, at the customer's convenience, to introducing the owner to his new tractor and explaining to him how to operate and service it.

The following procedure is recommended before the serviceman and owner complete the delivery acknowledgments portion of the delivery receipt.

Using the tractor operator's manual as a guide, be sure that the owner understands these points thoroughly:

1. Controls and Instruments.
2. How to start and stop the engine.
3. The importance of the break-in period.
4. How to use liquid or cast-iron ballast.
5. All functions of the hydraulic system.
6. Using the power takeoff and belt pulley.
7. The importance of safety.
8. The importance of lubrication and periodic services

After explaining and demonstrating the above features, have the owner sign the delivery receipt and give him the operator's manual.

AFTER-SALE INSPECTION

The purchaser of a new John Deere tractor is entitled to a free inspection within the warranty period after the equipment has been "run in." The terms of this after-sale inspection are outlined on the back of the John Deere Delivery Receipt.

The purpose of this inspection is to make sure that the customer is receiving satisfactory performance from his tractor. At the same time, the inspection should reveal whether or not the tractor is being operated, lubricated, and serviced properly.

If the recommended after-sale service inspection is followed, the dealer can eliminate a needless volume of service work by preventing minor irregularites from developing into serious problems later on. This will promote strong dealer-customer relations and present the dealer an opportunity to answer questions that may have arisen during the first few days of operation. During the inspection service, the dealer has the further opportunity of promoting the possible sale of other new equipment.

The following inspection program is recommended within the first 100 hours of tractor operation.

Inspection Procedure

Service	Specification	Reference
Cooling System		
Check radiator coolant level	Midway between core and filler neck	

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Inspection Procedure—Continued

Service	Specification	Reference
Clean external surface of radiator core		
Check hoses and connections for leaks		
Fuel System		
Remove water and foreign matter from filter sediment bowl		Operator's manual
Bleed fuel system		Operator's manual
Tighten loose connections and check entire system for leaks. Correct if necessary		
Check air cleaner element and unloading valve. Clean element if necessary		Operator's manual
Electrical System		
Check specific gravity of battery(s)	Full charge - 1.260 at 80°F.	Operator's manual
Check level of battery electrolyte	To bottom of filler neck in each cell	Operator's manual
Check belt tension	3/4-inch deflection with a 20 lb. force	Operator's manual
Start engine and check operation of starter, lights, and indicator lamps		Operator's manual
Lubrication		
Check crankcase oil level	To upper marks on dipstick	Operator's manual
Check transmission-hydraulic system oil level	In "SAFE" range on dipstick. Use John Deere Type 303 Special-Purpose Oil	Operator's manual
Engine		
Check valve clearance (static)	Intake: 0.014 in. Exhaust: 0.018 in.	Operator's manual

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Inspection Procedure—Continued

Service	Specification	Reference
Check engine speed (under load), and horsepower	Specification	Group 15 of this Section.
Operation		
Check transmission clutch free travel (tractors without reverser)	Approximately 1-inch free pedal travel	Operator's manual
Check clutch wear adjustment (tractors with reverser)	5-1/4 in.	Operator's manual
Shift transmission through all speeds		Operator's manual
Check Reverser, Hi-Lo operation		Operator's manual
Check Power Take-Off operation		Section 50, Groups 35 & 40
Check differential lock operation		Operator's manual
Check rockshaft and remote cylinder operation		Section 70, Group 30
Check negative stop screw adjustment		
Tractors without Independent PTO	1/4 turn	Section 70, Group 30
Tractors with Independent PTO	1/3 turn	Section 70, Group 30
Check steering system operation	Smooth, without excessive freeplay	Section 70, Group 20
Check brakes	Bleed brakes if spongy, check for excessive pedal travel, and even position	Section 70, Group 25
Nuts and Cap Screws		
Tighten accessible nuts and cap screws that require adjustment		

Group 15
TUNE-UP

GENERAL INFORMATION

Before tuning up a tractor, determine whether a tune-up will restore operating efficiency. When there is doubt, the following preliminary tests will help to determine if the engine can be tuned-up. If the condition is satisfactory, proceed with the tune-up. Choose from the following procedures only those necessary to restore the unit.

Preliminary Engine Testing

Operation	Specification	Section-Group Reference
Dynamometer Test (at 2500 engine rpm, full load—650 or 1210 PTO rpm)	Compare with previous recorded output; compare with output after tune-up	FOS 30 Manual, Chapter 12
Compression Test	300 psi at full cranking speed	FOS 30 Manual
Engine Coolant Check Test	No air bubbles or oil film in radiator	FOS 30 Manual, Chapter 12

Engine Tune-Up

Operation	Specification	Section-Group Reference
Air Intake System		
Service air cleaner and check system for leaks		FOS 30 Manual, Chapter 12
Check system for restrictions using water manometer		
Normal reading with clean filter element (inches of water)	3-1/2 inches	FOS 30 Manual, Chapter 12
Maximum permitted reading	25 in. at 2500 rpm (full load)	FOS 30 Manual, Chapter 12
Exhaust System		
Check system for leaks		FOS 30 Manual, Chapter 12
Check muffler and exhaust pipe for restrictions		FOS 30 Manual, Chapter 12

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Engine Tune-Up—Continued

Operation	Specification	Section-Group Reference
Crankcase Ventilating System		
Check system for restrictions		FOS 30 Manual, Chapter 12
Cooling System		
Clean grille screen, radiator core, and oil cooler core		20-35
Clean and flush system; check thermostat opening temperature, if necessary		20-35
Check pressure cap	6.25 to 7.50 psi release pressure	20-35
Cylinder Head and Valves		
Torque cylinder head cap screws	110 ft-lbs in sequence	20-10
Set valve clearance	Intake-0.014 inch Exhaust-0.018 inch	20-10
Fuel System		
Check fuel tank for water or other foreign material		
Check fuel pump pressure	3-1/2 - 4-1/2 psi	30-10
		30-10
Injection Pump:		
Service and check timing	TDC	30-10
	4° advance at 1100 rpm (no load)	30-10
Adjust speed control linkage	Foot throttle - 2800 rpm Hand throttle High idle - 2650 rpm Slow idle - 800 rpm	20-40
Lubrication System		
Check engine oil pressure	45 - 65 psi at high idle	20-30
Charging System		
Check battery specific gravity	1.240 - 1.260	40-10
Check battery water consumption and electrolyte level		40-10
Clean battery, cables, and box		40-10
Check alternator belt tension	20 lb. with 3/4 in. belt deflection	40-10
Check alternator output	25 amps at 13 to 15 volts (2052 engine rpm, 3000 alternator rpm)	40-10
Check alternator regulated voltage	13.8 - 14.3 volts (operating)	40-10
Starting System		
Check start-safety switch operation		
Check battery voltage when starting	Min. 9 volts (cranking)	40-15
Check starter current draw	Approx. 400 amps	40-15
Check operation of alternator and oil pressure indicator lights		40-25

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Final Engine Test

Operation	Specification	Section-Group Reference
Dynamometer	Compare with previous recorded output. Record for future use.	FOS 30 Manual, Chapter 12

Tractor Tune-Up

Operation	Specification	Section-Group Reference
Adjust transmission clutch pedal free travel		
Tractors without reverser	1 inch	50-5
Tractors with reverser	5-1/4 inches	50-5
Check transmission shifting		50-20
Check transmission for proper operation without excessive noise		50-20
Check reverser, Hi-Lo operation		50-10&15
Check power take off for proper operation		50-35&40
Check differential lock operation		50-25
Check brake pedal travel and position	Bleed brakes if spongy	70-25
Check front wheel bearing adjustment and lubrication	35 ft-lbs torque; back off to nearest hole	
Check front wheel toe-in	1/8 - 3/8 in.	
Check tire inflation	See operator's manual	
Transmission pump	6 gpm at 2500 rpm	70-5
Main hydraulic pump	2200-2300 psi standby; 13 gpm or 23 gpm	70-5
Pressure control valve	1700 - 1800 psi at 1900 engine rpm	70-5
Rockshaft lift cycle time (60 degrees rotation)	1.5 - 1.6 seconds at 2100 rpm	70-30
Check selective control valve and remote cylinder cycle time	Remote cylinder (2-1/2 x 8-in.) extends in 1.5 to 2.0 sec.	70-35

Hydraulic system pressures and flow rates are for conditions specified in Section 70 (tractor at operating temperature, transmission-hydraulic oil at correct temperature, proper test equipment, correct test sequence, etc.)

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Group 20
LUBRICATION

GENERAL INFORMATION

Carefully written and illustrated lubrication instructions are included in the operator's manual furnished with your customer's machine. Remind him to follow these instructions.

For your convenience, the following chart shows capacities and types of lubricants for the tractor components and systems. Specifications for lubricants follow the chart.

Item	Capacity	Type of Lubricant	Interval of Service
Engine crankcase	9 U.S. quarts (Including filter)	See page 20-2	10 Hours—Check 100 Hours—Drain and refill 200 Hours—Change filter
Transmission and hydraulic system	10 U.S. gals.	JD303 Special Purpose Oil (or its equivalent)	50 Hours—Check 50 Hours—Change filter (end of initial break-in) 500 Hours—Change filter 1000 Hours—Drain and refill. Clean screen.
Belt pulley	2-1/2 pts.	JD303 Special Purpose Oil (or its equivalent) or SAE 80 multipurpose lubricant	200 Hours—Check 500 Hours—Drain, flush and refill
Grease fittings	. . . . .	John Deere Multi-Purpose Lubricant or its equivalent	See Operator's manual
Starter	Saturate wicks	SAE 10W engine crankcase oil	1000 Hours
	Lubricate armature shaft splines during assembly	SAE 10W engine crankcase oil	. . . . .

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LUBRICANTS

Engine Lubricating Oils

We recommended John Deere Torq-Gard or Torq-Gard Supreme engine oil for use in the engine crankcase. This oil is compounded specifically for use in John Deere engines, and provides superior lubrication under all conditions. NEVER PUT ADDITIVES IN THE CRANKCASE. Torq-Gard oil was formulated to provide all the protection your engine needs. Additives could reduce this protection rather than help it.

If oil other than Torq-Gard or Torq-Gard Supreme is used, it must conform to the following specifications:

SINGLE VISCOSITY OILS

API Service CD/SD
MIL-L-2104C*
Series 3*

MULTI-VISCOSITY OILS

API Service CC/SE, CC/SD, or SD
MIL-L-46152

* *As further assurance of quality, the oil should also be identified as suitable for API service designation SD.*

Depending on the expected prevailing temperature for the fill period, use oil of viscosity as shown in the following chart.

Air Temperature	John Deere Torq-Gard Oil	Other Oils: Single Viscosity Oil	Other Oils: Multi-Viscosity Oil
Above 32°F.	SAE 30	SAE 30	Not recommended.
−10°F. to 32°F.* *	SAE 10W-20	SAE 10W	SAE 10W-30
Below −10°F.	SAE 5W-20	SAE 5W	SAE 5W-20

* * *SAE 5W-20 oil may be used where required to insure optimum lubrication at starting, particularly for an engine subjected to −10°F. or lower for several hours.*

Some increase in oil consumption may be expected when SAE 5W-20 or SAE 5W oils are used. Check oil level more frequently.

Transmission Hydraulic Oils

Use only John Deere Type 303 Special Purpose Oil or its equivalent in the transmission-hydraulic system. Other types of oil will not give satisfactory service, and may result in eventual damage. This special oil may be used in all weather conditions.

Greases

John Deere Multi-Purpose Lubricant or an equivalent SAE Multipurpose-Type grease is recommended for most grease fittings. Wheel bearing grease is recommended for front wheel bearings. Application of grease as instructed in the lubrication section of the operator's manual will provide proper lubrication and will keep contamination out of bearings.

Storing Lubricants

A tractor can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination.

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Group 25
SEPARATION

SEPARATING ENGINE FROM CLUTCH HOUSING

Remove right-hand and left-hand cowl. Disconnect battery cables. Remove battery(s), side grille screens, hood, muffler, and front ballast (if used). Drain cooling system.

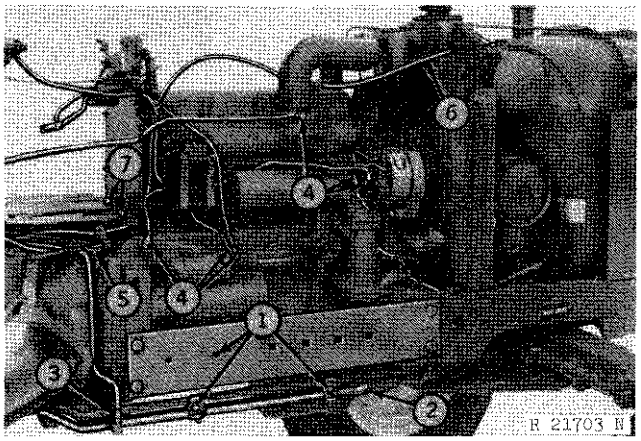

Fig. 1-Right-Hand Separation Procedures

1. Remove clamps securing hydraulic oil pipes (Fig. 1). Remove side frames (if used).

2. Disconnect hydraulic pump pressure pipe at connector.

3. Remove retaining clamp from pump inlet and reservoir return pipes. Remove power steering pressure pipe.

4. Disconnect battery cable and wiring harness from starter solenoid. Disconnect wiring harness at oil pressure switch, ignition coil, alternator, and fuel gauge sending unit connector. Disconnect ether starting aid pipe.

5. Disconnect tachometer cable, and remove from clutch housing.

6. Disconnect hydraulic oil reservoir vent hose from top of reservoir, and remove hose from support clamp.

7. Remove the two cowl-to-flywheel housing cap screws.

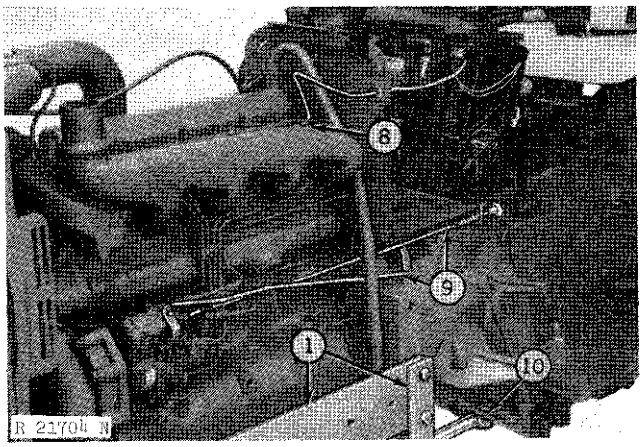

Fig. 2-Left-Hand Separation Procedures

8. Disconnect temperature gauge sensing bulb from engine (Fig. 2).

9. Disconnect and remove speed control rod. Disconnect fuel shut-off rod from pump. Remove cotter pin from shut-off rod (at front of return spring) and slide rod rearward.

10. Disconnect steering drag link rod from steering arm. Remove drag link rod from tractor, if desired.

Install JDG-9 support stand (Fig. 3). Place a floor jack under the rear portion of clutch housing.

⚠ CAUTION: Install a wood block between front axle and engine front support on both sides of tractor.

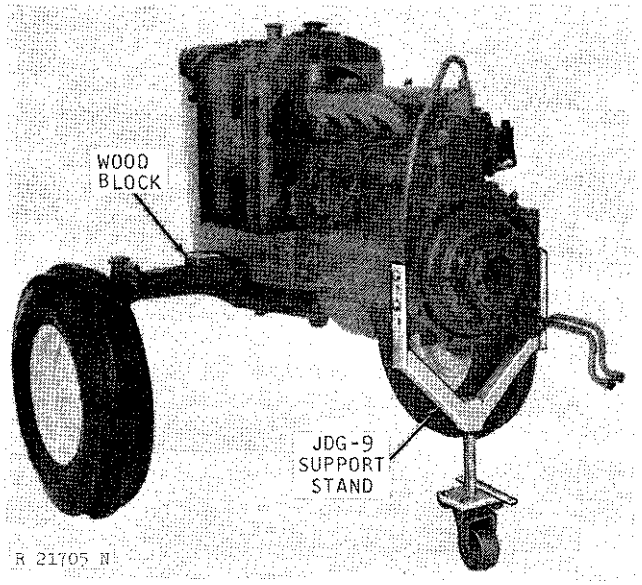

Fig. 3-Engine Separated From Clutch Housing

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Place a container under the rear portion of clutch housing to catch the hydraulic oil from the pump inlet pipe and the cooler return pipe, when the tractor is separated.

IMPORTANT: Do not lose check valve assembly (tractors without Hi-Lo or reverser) in end of hydraulic pump inlet pipe when separation is made. Install caplugs on hydraulic pipes and fittings to prevent entry of foreign material.

Remove the cap screws securing the clutch housing to the engine and roll rear portion of tractor away from engine. Place a metal support stand under transmission.

ASSEMBLY

Remove caplugs and join engine and clutch housing. Reverse the numbered removal steps. Remove JDG-9 support stand and floor jack. Tighten cap screws to specified torque.

Install battery, side grille screens, hood, muffler, and right-hand cowl. Start engine, inspect for leaks, and check operation.

SEPARATING CLUTCH HOUSING FROM TRANSMISSION CASE

Drain the transmission (remove both drain plugs). Remove the hydraulic oil filter cover and element.

Disconnect the clutch return spring. Remove the left-hand and right-hand footrests. Remove the transmission shield.

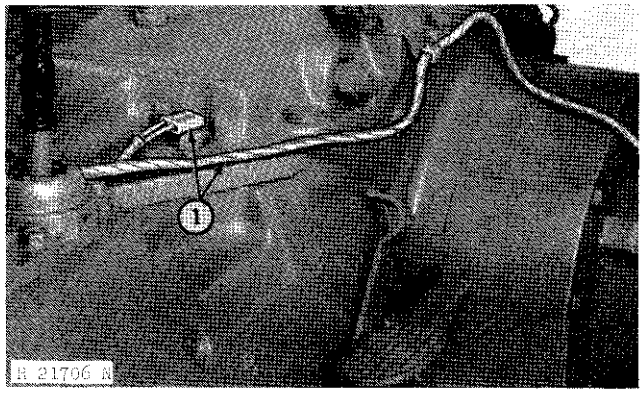

Fig. 4-Left-Hand Separation Procedures

1. Disconnect wiring harness from start-safety switch and light switch (Fig. 4).

2. Disconnect hydraulic oil reservoir vent hose (Fig. 5). Disconnect mid couplers (if equipped).

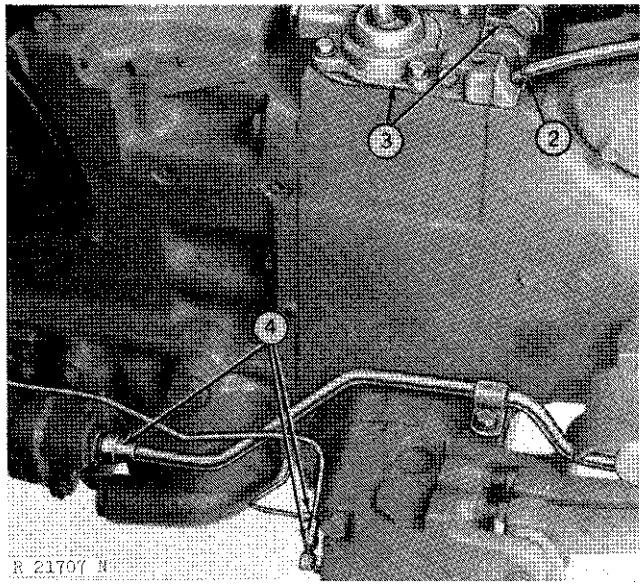

Fig. 5-Right-Hand Separation Procedures

3. Remove control valve cover, and remove shift cover cap screws (tractors with Hi-Lo shift). Remove shift cover from clutch housing. Inside the clutch housing, remove the two clutch housing-to-transmission case cap screws, and the gear shifter lever guide spring.

4. Disconnect brake pipes from brake valve housing, and disconnect pressure pipe at pressure control valve.

Install JDG-9 support stand on flywheel housing.

⚠ CAUTION: Install a wood block between front axle and front support on both sides of tractor to prevent assembly from tipping (Fig. 6).

Place floor jack under transmission case.

Remove the clutch housing-to-transmission case cap screws, and separate units. Install caplugs.

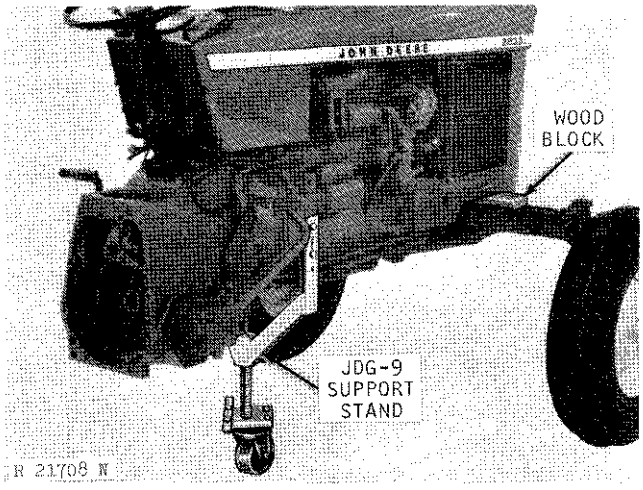

Fig. 6-Clutch Housing Separated From Transmission

ASSEMBLY

Install a new clutch housing-to-transmission case gasket and new rubber packings. Remove caplugs.

IMPORTANT: If tractor has a mid-PTO, be sure spring and ball are inserted in PTO drive shaft before joining units.

Join front and rear units. Reverse the numbered separation steps. Tighten cap screws to specified torque. See page 30-1 this section.

Install the transmission shield, footrests, clutch return spring, and drawbar.

Install hydraulic oil filter element and cover. Fill transmission to proper level.

Remove JDG-9 support stand, floor jack, and wood blocks.

SEPARATING TRACTOR FRONT END FROM ENGINE

Remove right-hand cowl. Disconnect battery cable and ground strap. Remove battery, side grille screens, hood, muffler, and front ballast (if used). Drain cooling system.

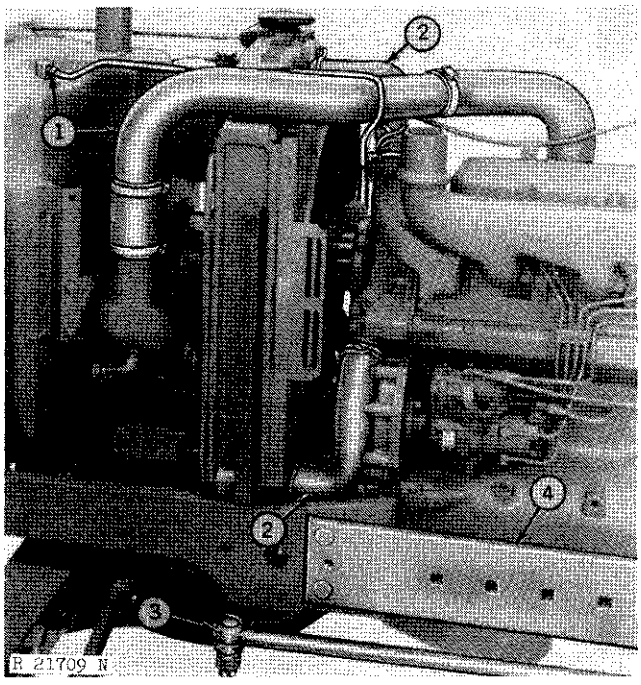

Fig. 7-Left-Hand Removal Procedures

1. Remove the air intake pipe (Fig. 7) and leak-off pipe.

2. Remove the upper and lower radiator hoses.

3. Disconnect drag link.

4. Remove side frames (if equipped).

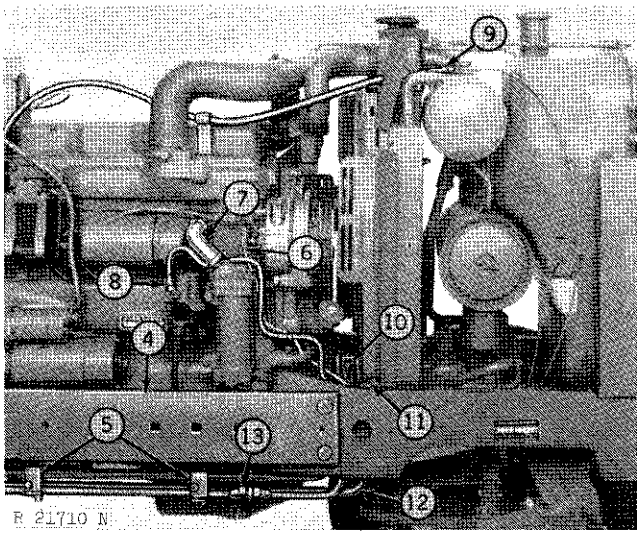

Fig. 8-Right-Hand Removal Procedures

5. Remove hydraulic pipe clamps (Fig. 8).

6. Disconnect fuel gauge wire at connector.

7. Disconnect and remove engine oil cooler upper hose.

8. Disconnect fuel pipe at fuel pump.

9. Disconnect hydraulic reservoir vent hose.

10. Disconnect hydraulic pump drive coupling.

11. Disconnect hydraulic oil cooler outlet hose on tractors with Hi-Lo shift or reverser.

12. Remove hydraulic oil cooler return pipe from tractor (tractors with Hi-Lo shift or reverser). On tractors without Hi-Lo shift or reverser, remove the reservoir outlet pipes.

13. Disconnect hydraulic pump pressure pipe at connector.

Install JDG-9 support stand on tractor front end (Fig. 9), and install a support stand under clutch housing.

⚠ CAUTION: Before separating tractor, install a wood block between front support and axle on both sides of tractor to prevent tipping sideways. If necessary, use a floor jack or some other suitable method of supporting the tractor front end while separating to prevent tipping forward.

Remove the six engine-to-front support cap screws.

Carefully separate the tractor front end from the engine by rolling the front end forward (Fig. 9).

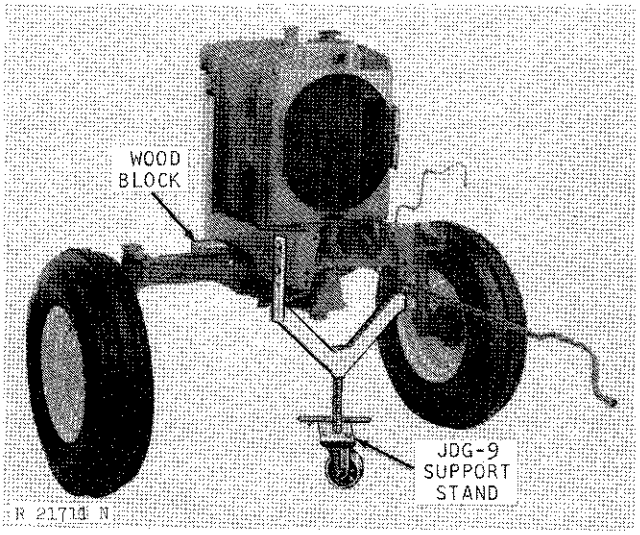

Fig. 9-Tractor Front End Separated From Engine

ASSEMBLY

IMPORTANT; Be sure hydraulic pump check valve (tractors without Hi-Lo or reverser) is installed in the pump inlet pipe before joining sections. Remove caplugs.

Join sections. Tighten bolts and cap screws to specified torque. Remove support stands.

After reversing the removal steps, install muffler, hood, side grille screens, batteries, cowls, and front ballast (if used).

Fill the cooling system, start engine, and check operation.

REMOVING ENGINE

Remove the front end from tractor as explained in SEPARATING TRACTOR FRONT END FROM ENGINE.

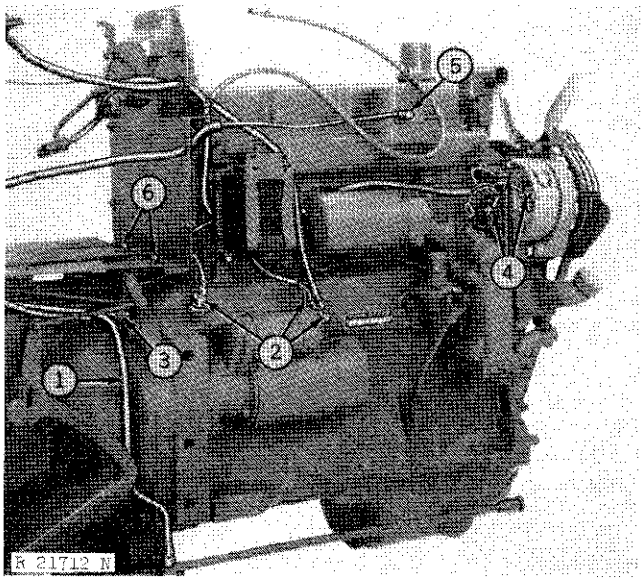

Fig. 10-Right-Hand Removal Procedure

1. Disconnect and remove the power steering pressure pipe (Fig. 10).

2. Disconnect battery cable and wiring from starter solenoid. Disconnect oil pressure sending unit wiring.

3. Disconnect speed-hour meter drive from flywheel housing.

4. Disconnect wiring harness from alternator.

5. Disconnect ether starting aid pipe.

6. Remove cowl-to-flywheel housing cap screws (Fig. 11).

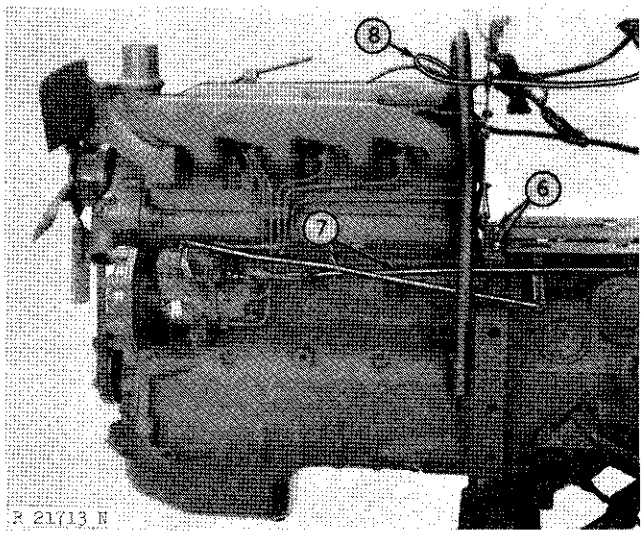

Fig. 11-Left-Hand Removal Procedure

7. Disconnect and remove speed control rod. Disconnect fuel shut-off rod from pump. Remove cotter pin from shut-off rod (at front of return spring) and slide rod rearward.

8. Disconnect temperature gauge sensing bulb.

Install JD-244 lifting eyes on engine. Using an overhead hoist, attach JDG-1 engine lift sling to JD-244 lifting eyes to support engine (Fig. 12).

Remove the engine-to-clutch housing cap screws. Separate engine from clutch housing (Fig. 12).

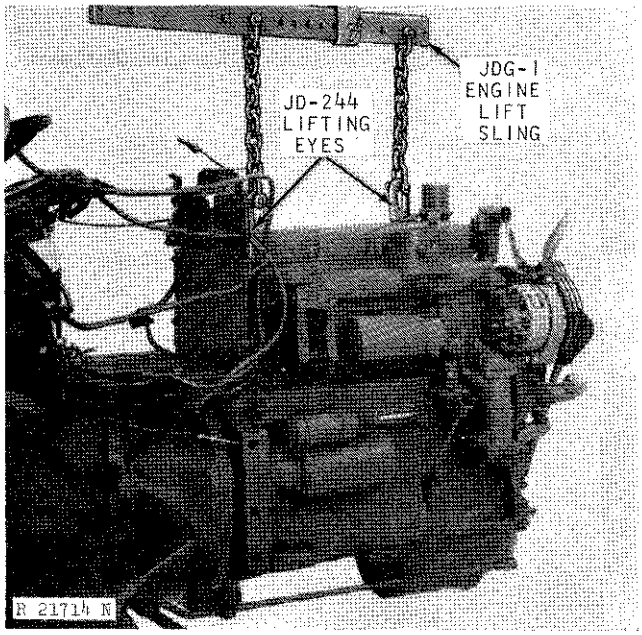

Fig. 12-Removing Engine

ASSEMBLY

Join engine to clutch housing, and tighten cap screws to specified torque. Refer to instructions given under SEPARATING TRACTOR FRONT END FROM ENGINE.

REMOVING FINAL DRIVE ASSEMBLY

Drain the transmission. Disconnect battery ground cable.

Disconnect wiring harness from lights, fender, and axle housing (Fig. 13).

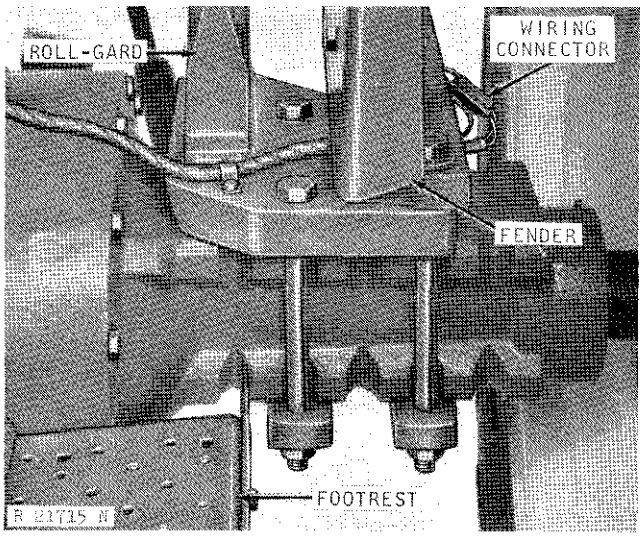

Fig. 13-Final Drive Assembly Removal Procedures

Remove Roll-Gard (if equipped), fender, fender extension, and underneath muffler (if equipped). On tractors with Row-Crop fenders, also remove footrest.

Raise rear of tractor enough to remove rear wheel. Support tractor with a metal stand under transmission case or drawbar support (Fig. 14).

Disconnect hydraulic brake pipe from axle housing.

When right-hand axle housing is to be removed, first remove the selective control valve.

Fasten a chain around axle housing, and attach to an overhead hoist (Fig. 14).

Remove axle housing-to-transmission case cap screws, and separate units. Install caplugs.

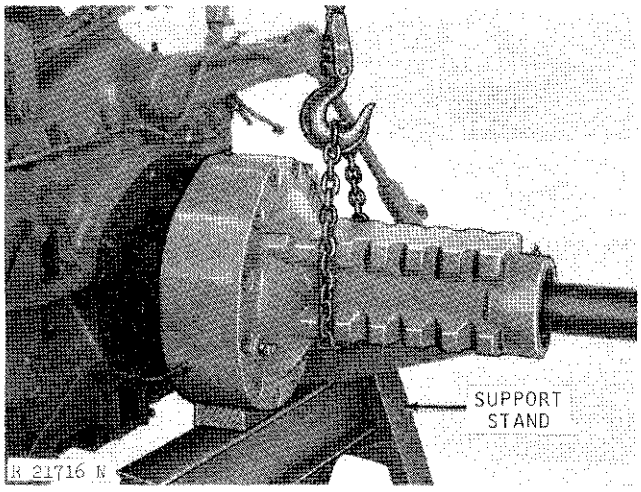

Fig. 14-Assembly Removed From Transmission Case

ASSEMBLY

Install a new gasket on transmission case. Be sure brake disk is properly positioned on final drive shaft.

Join axle housing to transmission case. Tighten cap screws to specified torque. Remove caplugs.

Reverse the removal steps. Fill transmission with oil to the proper level.

Start engine and check operation.

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Group 30
SPECIFICATIONS AND SPECIAL TOOLS

SPECIFICATIONS

Item	Specification
Fan belt adjustment	3/4-inch deflection, 20 lb. force
	Torque (ft-lbs)
Engine-to-clutch housing	170
Drag link nuts	55
Clutch housing-to-transmission case	85
Front end support-to-engine block	
5/8-inch	170
9/16-inch	130
Hydraulic pump drive coupling nuts	25
Axle housing-to-transmission case	85
Roll-Gard-to-axle housing	300
Rear wheel-to-hub bolts (rack and pinion axle)	300
Rim-to-wheel disk nuts	170
Rear wheel-to-flanged axle cap screws	
Cast wheel (regular and power adj.)	130
Steel wheel	100
Demountable rim wheel	100
Front wheel bearing	35
Front wheel hub bolts	
Tires 6.00-16	85
Tires larger than 6.00-16	100

TORQUE CHART (ft-lbs)

Bolt Diameter	Plain Head*	Three Radial Dashes*	Six Radial Dashes*
1/4	6	10	14
5/16	13	20	30
3/8	23	35	50
7/16	35	55	80
1/2	55	85	120
9/16	75	130	175
5/8	105	170	240
3/4	185	300	425
7/8	160* *	445	685
1	250* *	670	1030

** The types of bolts and cap screws are identified by head markings as follows:*

Plain Head: regular machine bolts and cap screws.

3-Dash Head: tempered steel high-strength bolts and cap screws.

6-Dash Head: tempered steel extra high-strength bolts and cap screws.

** * Machine bolts and cap screws 7/8-inch and larger are sometimes formed hot rather than cold, which accounts for the lower torque.*

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SPECIAL TOOLS

No.	Name	Use
JDG-1*	Engine Sling	Engine removal
JD-244*	Engine Lifting Eyes	Engine removal
JDG-9*	Support Stand	Tractor separation

* *Order from Service Tools, Inc., 1901 Indiana Avenue, Chicago, Illinois 60616.*

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Section 20
ENGINE

CONTENTS OF THIS SECTION

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Group 5
GENERAL INFORMATION AND DIAGNOSIS

GENERAL INFORMATION

The engine is a 4-cylinder valve-in-head, vertical in-line four cycle engine.

For basic theory of engine operation see the FOS Manual 30—ENGINES.

DIAGNOSING MALFUNCTIONS

Will not Start

Fuel System Malfunction—See Section 30
- Foreign matter in fuel
- Improper fuel
- Faulty fuel pump
- Fuel shut off at tank
- Restricted air intake system
- Faulty injection nozzles
- Plugged fuel filter

Electrical System Malfunction—See Section 40
- Corroded or loose battery connections
- Faulty or loose wiring
- Weak battery
- Faulty key switch
- Faulty safety start switches

Uneven Running or Frequent Stalling

Basic Engine Problem—See This Section
- Improper valve clearance
- Cylinder head gasket leaking
- Valves sticking or burned
- Worn or broken compression rings
- Low compression
- Incorrect timing
- Coolant temperature below normal
- Engine overheating

Fuel System Malfunction—See Section 30
- Low fuel supply
- Restricted fuel lines or filters
- Faulty fuel pump
- Faulty injection pump
- Faulty injection nozzles
- Exhaust system restricted

Engine Misses

Basic Engine Problem—See This Section
- Worn camshaft lobes
- Weak valve springs
- Incorrect valve clearance
- Burned, warped, pitted or sticking valves
- Low compression
- Incorrect timing
- Engine overheating

Fuel System Malfunction—See Section 30
- Air in fuel
- Faulty injection nozzles
- Faulty injection pump
- Water in fuel
- Mixture of gasoline and diesel fuels
- Faulty fuel pump

Lack of Power

Basic Engine Problem—See This Section
- Blown cylinder head gasket
- Worn camshaft lobes
- Incorrect valve clearance
- Burned, warped, pitted or sticking valves
- Weak valve springs
- Incorrect timing
- Low compression
- Wrong oil viscosity
- Coolant temperature above or below normal
- Engine overheating

Fuel System Malfunction—See Section 30
- Plugged fuel filters
- Improper fuel
- Faulty injection pump
- Faulty injection nozzles
- Faulty fuel pump
- Restricted air cleaner
- Restricted exhaust system
- Low intake manifold pressure
- Obstructed fuel line.

Power Train Malfunction—See Section 50
- Clutch slipping

Engine Overheats

Basic Engine Problem—See This Section
- Defective head gasket
- Incorrect timing
- Crankcase oil level low
- Low coolant level
- Radiator or side grille screen dirty
- Loose or broken fan belt
- Faulty thermostat
- Cooling system limed up
- Defective radiator pressure cap
- Faulty water pump

Service Problem—See Section 10
- Engine overloaded
- Crankcase oil level low
- Improper fuel

Fuel System Malfunction—See Section 30
- Excessive fuel delivery

Excessive Oil Consumption

Basic Engine Problem—See This Section
- Restricted oil passage from valve cover
- Worn valve guides or valve stems
- Oil control rings worn or broken
- Scored liners or pistons
- Excessive ring groove wear in piston
- Rings sticking in grooves of piston
- Oil return slots in piston clogged
- Insufficient piston ring tension
- Piston ring gaps not staggered
- Worn crankshaft thrust bearing (misaligned piston and rod)
- Excessive main or connecting rod bearing clearance
- Front or rear crankshaft oil seal faulty
- Crankcase oil too thin
- Oil pressure too high
- Oil level too high

Service Problem—See Section 10
- Crankcase oil too thin
- Oil level too high

Fuel System Malfunction—See Section 30
- Restricted air intake

Excessive Fuel Consumption

Basic Engine Problem—See This Section
- Low compression
- Incorrect timing

Service Problem—See Section 10
- Engine overloaded

Fuel System Malfunction—See Section 30
- Leaks in fuel system
- Restricted air cleaner
- Faulty injection nozzles
- Faulty injection pump

Black or Gray Exhaust Smoke

Basic Engine Malfunction—See This Section
- Incorrect engine timing

Service Problem—See Section 10
- Improper grade of fuel
- Engine overloaded

Fuel System Malfunction—See Section 30
- Excessive fuel delivery
- Restricted air cleaner
- Defective muffler
- Faulty injection nozzles

White Exhaust Smoke

Basic Engine Problem—See This Section
- Low compression
- Incorrect timing

Fuel System Malfunction—See Section 30
- Faulty injection nozzles
- Improper fuel

Slow Acceleration

Fuel System Malfunction—See Section 30
- Faulty injection pump
- Faulty injection nozzles

Engine Noises—General

Regular Clicking Noise
- Incorrect valve clearance

Light Knock or Pound
- Worn bearings
- Misaligned connecting rod
- Lack of oil

Light Double Knock at Idle
- Worn or loose piston pin or bushing
- Lack of oil

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DIAGNOSING MALFUNCTIONS—Continued

Chattering or Rattling during Acceleration
- Worn or broken piston rings
- Worn cylinder liners
- Low oil pressure
- Worn main bearings

Hollow, Muffled Bell-Sound—Cold Engine
- Worn pistons
- Worn liners
- Lack of oil
- Misaligned connecting rods

Dull, Heavy Knock Under Load
- Steady noise—worn main bearings
- Irregular noise—worn thrust bearing

Miscellaneous Engine Noises
- Excessive valve clearance
- Worn cam followers
- Bent push rods
- Worn rocker arm shafts
- Worn main or connecting rod bearings
- Foreign material in combustion chamber
- Worn piston pins and pin bushings
- Scored piston
- Incorrect timing
- Excessive crankshaft end play
- Loose main bearing caps
- Worn gears
- Broken oil pump shaft
- Low engine oil level or pressure

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