4320
Tractor

JOHN DEERE

TECHNICAL MANUAL

4320
Tractor

TM1029 (01DEC74) English

John Deere Tractor Works
TM1029 (01DEC74)

LITHO IN U.S.A.
ENGLISH

4320 TRACTOR

TECHNICAL MANUAL
TM-1029 (Aug-70)

CONTENTS

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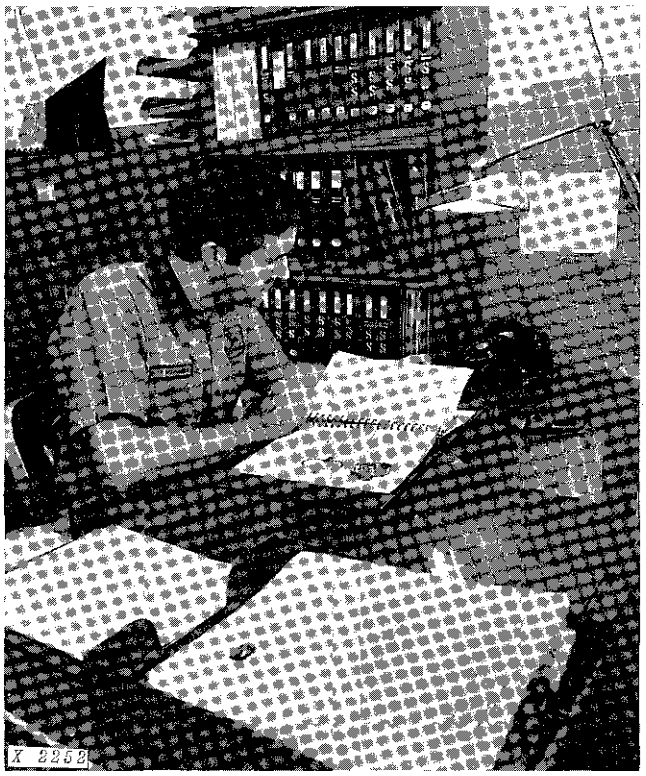
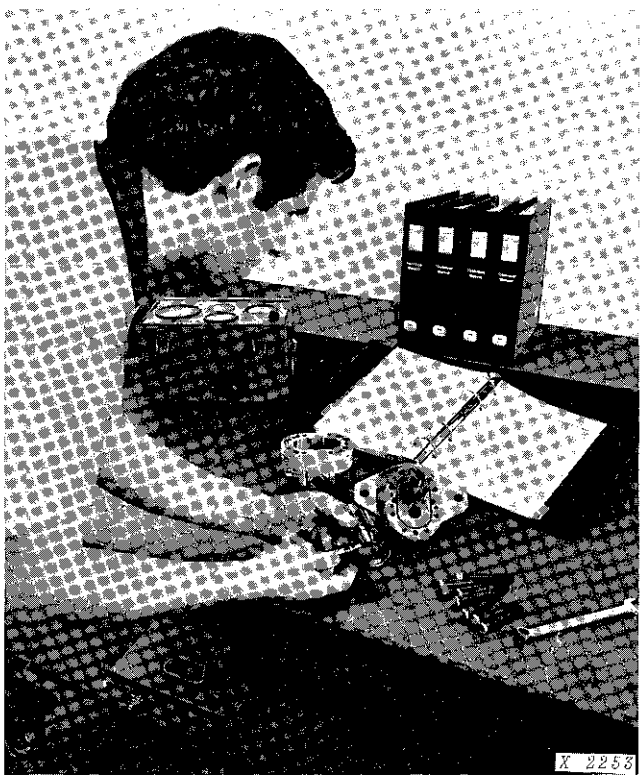
INTRODUCTION



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 whole manual*
- *Contents at front of each Section*
- *Specifications at end of each Group*
- *Special tools at end of each Group*

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.

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.

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Section 10
GENERAL

CONTENTS OF THIS SECTION

Group 5
GENERAL TRACTOR SPECIFICATIONS

HORSEPOWER:
Observed at PTO 115

ENGINE:
Type . . . . . 6-cylinder, in-line, valve-in-head, diesel, turbocharged
Bore and stroke . . . . . 4-1/4 in. x 4-3/4 in.
Displacement . . . . . 404 cu. in.
Compression ratio . . . . . 15.7 to 1
Firing order 1-5-3-6-2-4
Valve clearance . . . . . Intake-0.018 in. Exhaust-0.022 in.
Injection pump timing . . . . . TDC
Engine Speeds:
Working range . . . . . 1500 to 2200 rpm
Maximum transport speed . . . . . 2500 rpm
Engine speeds:
Slow idle . . . . . 800 rpm
1900 rpm load . . . . . 2150 rpm idle
2200 rpm load . . . . . 2400 rpm idle
2500 rpm load . . . . . 2650 rpm idle

LUBRICATION SYSTEM: Full pressurized with full-flow micronic oil filter, water cooled oil cooler, and bypass valves for filter and cooler.

FUEL SYSTEM:
Type . . . . . Direct injection
Filter . . . . . Two-stage with replaceable impregnated paper element.
Injection pump type . . . . . Inlet metering, distributing type
Air cleaner . . Dry type with safety element

COOLING SYSTEM:
Type . . . . . Pressurized with centrifugal pump
Temperature control . . . . . Heavy-duty thermostat

CAPACITIES:
Fuel tank . . . . . 44 U.S. gals.
Cooling system . . . . . 28 U.S. qts.
Crankcase (with filter change) . . . . . 16 U.S. qts.
Transmission-hydraulic system (add 4-1/2 gals. to capacity if equipped with Power Front Wheel Drive) . . . . . 14 U.S. gals.

TRANSMISSION:
Type . . . . . Syncro-Range, constant mesh
Clutch . . . . . Heavy-duty, 13-1/2 in. plate, foot operated
Gear selections . . . . . 8 forward and 2 reverse
Shifting . . . . . 4 stations, synchronized forward shifting within stations

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POWER TAKE-OFF:
- Type ..... Single 1-3/8-inch PTO shaft with rear power take-off.
- Speed (1900 engine rpm) ..... 540 or 1000 rpm
- Rear PTO Ahead of Drawbar Hitch Point:
  - 540 rpm ..... 14 in.
  - 1000 rpm ..... 16 in.

HYDRAULIC SYSTEM:
- Type ..... Closed center, constant pressure. Actuates power steering, power brakes, Power Front Wheel Drive, and implement control.
- Standby pressure ..... 2250 psi

BRAKES ..... Hydraulically power actuated, disk-type operating in oil Provision for manual operation with brake accumulator to supply oil.

STEERING ..... Full power, hydrostatic type. Provision for manual operation.

ELECTRICAL SYSTEM:
- Type ..... 12-volt, negative ground
- Alternator ..... 12-volt, 55 amps
- Air Conditioned tractors..... 12-volt, 72 amps
- Battery.....Two, 6-volt, 75-plate 172-ampere-hour

FRONT TIRES* 7.5L-15, 6-ply

REAR TIRES* 20.8-34, 10-ply

FRONT WHEEL TREAD.....51 to 80 in.

REAR WHEEL TREAD:
- 18.4-38 tire, regular axle ..... 60 to 91 in.

* *Additional tire sizes available.*

* * Tractors with air conditioned cabs and 18.4-34 tires.

GROUND SPEEDS IN MILES PER HOUR(2200 engine rpm and with 18.4-38 rear tires):

Gear	
1st	1.9
2nd	3.0
3rd	4.0
4th	5.1
5th	6.4
6th	8.3
7th	10.9
8th	17.7
1st reverse	3.9
2nd reverse	6.2

POWER FRONT-WHEEL DRIVE:
- Type ..... Hydraulic motor driven with planetary gear reduction in wheel hub, uses pressure oil from hydraulic system
- Torque ..... Low (series connected) and high (parallel connected)
- Controls ..... Solenoid operated control valves, synchronized with transmission controls
- Planetary disconnect ..... Hydraulic wet brake on ring gear releases when drive is disengaged

DIMENSIONS:
- Wheelbase (Subtract 1 inch for tractors equipped with Power Front-Wheel Drive) ..... 106-1/2 in.
- Over-all length ..... 159-1/2 in.
- Over-all height* * ..... 113 in.
- Height to steering wheel ..... 81-1/2 in.
- Over-all width ..... 89-3/4 in.
- Turning radius
  - Without Power Front Wheel Drive (minimum tread and brakes applied) ..... 136 in.
  - Power Front Wheel Drive (with drive engaged in "High Torque", brakes applied and minimum wheel tread) ..... 126 in.

SHIPPING WEIGHT(With equipment for average field service, less fuel and ballast). Add 385 lbs. if equipped with Roll Gard. Add 1,000 lbs. for Power Front-Wheel Drive
- Row-Crop ..... 9,050 lbs.
- Standard ..... 9,070 lbs.

(Specifications and design subject to change without notice.)

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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.

NOTE: A Caplug is placed in the muffler outlet to prevent turbocharger rotation during transit. Remove Caplug before unloading tractor. Reinstall Caplug before transporting the tractor to the customer.

TEMPORARY TRACTOR STORAGE

Service	Specification	Reference
Check radiator for coolant loss and antifreeze protection	2 inches above baffle.	.....
Reduce shipping pressure of tires	.....	Operator's manual
Cover tractor and tires for protection and cleanliness	.....	.....

BEFORE DELIVERING TRACTOR

ELECTRICAL SYSTEM		
Install electrolyte and charge batteries	.....	FOS-20 Manual —ELECTRICAL SYSTEMS
Stamp date code on battery	.....	FOS-20 Manual —ELECTRICAL SYSTEMS
Connect alternator. Do not attempt to polarize.	.....	Section 40, Group 10
Connect Power Front-Wheel Drive wiring harness at connector near control valves	.....	Section 40, Group 5
Install light switch knob	.....	.....
Clean terminals and connect battery cables	.....	Section 40, Group 5
Check alternator belt tension	1-inch deflection, 25 lb. force; 1-inch deflection, 20 lb. force on air conditioned tractors.	Operator's manual

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BEFORE DELIVERING TRACTOR—Continued

Service	Specification	Reference
COOLING SYSTEM		
Inspect radiator for coolant loss	2 inches above baffle.	
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 retainer cap screws for tightness	Front hub bolts - 85 ft-lbs Rear hub bolts - 300 ft-lbs Rim clamp nuts - 170 ft-lbs	
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	SAE multipurpose-type grease.	Operator's manual
ENGINE		
Check air cleaner		Operator's manual
Fill fuel tank and start engine	Capacity - 44 U.S. gallons	Operator's manual
Check operation of starter, alternator, flasher, gauges, and indicator lights		Operator's manual
Check engine timing	TDC	Section 30, Group 10
Check engine speeds	800 rpm, slow idle speed 2650 rpm idle speed, 2500 max. transport speed	Section 30, Group 10
OPERATION		
Check transmission clutch free travel	Approximately 1-1/2-inch free travel (at least 3/4 in.).	Operator's manual
Shift transmission through all speeds		Operator's manual
Check throttle linkage for free operation		Section 30, Group 10
Adjust headlights and check operation		Operator's manual

BEFORE DELIVERING TRACTOR—Continued

Service	Specification	Reference
Check Power Front-Wheel Drive operation		Operator's manual
Check power takeoff operation		Operator's manual
Check differential lock operation		Operator's manual
Check brakes and accumulator	3 in. maximum travel for one emergency application immediately after stopping engine.	Operator's manual
Check hydraulic system operation: Rockshaft, steering, and remote cylinder		Operator's manual
Check operation of air conditioning system and heater system		Operator's manual
Check air conditioner compressor drive belt	1/4 in. deflection, 15 lb. pull	Operator's manual
Check implement hitch operation		Operator's manual
Check seat operation		Operator's manual
GENERAL		
Tighten accessible nuts and cap screws		
Clean tractor and touch up paint		

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.

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.

IMPORTANT: Install Caplug in muffler outlet if transporting tractor to customer. This will prevent damage to the turbocharger caused by air passing through the turbocharger and rotating it without lubrication when the engine is stopped.

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.
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.

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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 irregularities 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	2 inches above baffle.	
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	1-inch deflection with a 25-pound force.	
	1-inch deflection with a 20-pound force on air conditioned tractors.	Operator's manual

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INSPECTION PROCEDURES—Continued

Service	Specification	Reference
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	Intake - 0.018 inch Exhaust - 0.022 inch	Operator's manual
Check engine speed under load, fuel consumption, and horsepower	Specification.	Group 15 of this Section.
CLUTCHES AND DIFFERENTIAL LOCK		
Check transmission clutch free travel	Approximately 1-1/2 inch free travel.	Operator's manual
Shift transmission through all speeds		Operator's manual
Check Power Front-Wheel Drive operation		Operator's manual
Check PTO clutch and brake operation		Section 50, Groups 35 & 40
Check differential lock operation		Operator's manual

INSPECTION PROCEDURES—Continued

Service	Specification	Reference
HYDRAULIC SYSTEM		
Check rockshaft and remote cylinder operation	.....	Section 70, Group 30
3-point hitch negative stop adjustment	1/8th turn back out after contacting transmission case.	Section 70, Group 30
Check power steering	Smooth, easy operation.	Section 70, Group 20
Check brakes and accumulator	3 in. maximum travel for one emergency application immediately after stopping engine.	Operator's manual
AIR CONDITIONING		
Check operation of air conditioning system and heating system	.....	Operator's manual
Check air conditioner compressor drive belt tension	1/4 in. deflection 15 lb. pull	Operator's manual
NUTS AND CAP SCREWS		
Tighten accessible nuts and cap screws that seem to require adjustment	.....	.....

RECOMMENDED TORQUE IN FOOT-POUNDS

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.

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Group 15

TUNE-UP

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 2200 engine rpm)	Compare with previous recorded output; compare with output after tune-up.	FOS - 30 Manual—ENGINES, Chapter 12
Compression Test	385-410 psi at 215-245 rpm.	FOS - 30 Manual—ENGINES, Chapter 12
Engine Coolant Check Test	No air bubbles or oil film in radiator.	FOS - 30 Manual—ENGINES, Chapter 12

ENGINE TUNE-UP

Operation	Specification	Section-Group Reference
Air Intake System		
Service air cleaner and check system for leaks		FOS - 30 Manual—ENGINES, Chapter 12
Check system for restrictions using water manometer (inches of water)		FOS - 30 Manual—ENGINES, Chapter 12
Normal reading (with clean filter elements)	8 in. at 2200 rpm	
Maximum permitted reading	25 in. at 2200 rpm	
Check restriction indicator light operation	24-26 in. at 2200 rpm	
Check manifold pressure	12.2-15 psi	
Exhaust System		
Check system for leaks		FOS - 30 Manual—ENGINES, Chapter 12
Check muffler and exhaust pipe for restrictions		FOS - 30 Manual—ENGINES, Chapter 12

ENGINE TUNE-UP—Continued

Operation	Specification	Section-Group Reference
Crankcase Ventilating System		
Check system for restrictions		FOS - 30 Manual—ENGINES, Chapter 12
Cooling System		
Clean grille screen, radiator core, and oil cooler core		20-30
Clean and flush system; check thermostat	Starts to open-177°F. to 182°F.	20-30
Check pressure cap	6.25 to 7.50 psi release pressure	20-30
Cylinder Head and Valves		
Torque cylinder head cap screws	130 ft-lbs in sequence	20-10
Set valve clearance	Intake - 0.018 in. Exhaust - 0.022 in.	20-10
Diesel Fuel System		
Check fuel tank for water		30-10
Check fuel pump pressure	3-1/2 to 4-1/2 psi	30-10
Drain sediment bowl and change filter		30-10
Service injection nozzles		30-10
Injection Pump:		
Service and check timing	TDC 5° advance at 1900 rpm (full load)	30-10 30-10
Adjust throttle linkage	2650 rpm high idle speed, 2500 max. transport speed 2150 rpm idle speed, 1900 load speed 2400 rpm idle speed, 2200 load speed 800 rpm, slow idle speed	30-10
Lubrication system		
Check engine oil pressure	40 to 50 psi (1900 rpm)	20-25
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	25 lbs. at 1 in. belt deflection; 20 lbs. at 1 in. belt deflection on air conditioned tractors	40-10
Check alternator output	45 amps at 1440 engine rpm (13-15 volts) on 55 amp alternators; 65 amps at 1400 engine rpm (13-15 volts) on 72 amp alternators	40-10
Check alternator regulated voltage	14.2 to 14.6 volts (operating)	40-10

ENGINE TUNE-UP—Continued

Operation	Specification	Section-Group Reference
Starting System		
Check start-safety switch operation		40-15
Check battery voltage when starting	Min. 9 volts (cranking)	40-15
Check starter current draw	Diesel - approx. 400 amps	40-15
Check operation of alternator and oil pressure indicator lights		40-25

FINAL ENGINE TEST

Operation	Specification	Section-Group Reference
Dynamometer Test (at 2400 engine rpm)	Compare with previous recorded output; record for future use.	FOS - 30 Manual—ENGINES, Chapter 12

TRACTOR TUNE-UP

Operation	Specification	Section-Group Reference
Adjust transmission clutch free travel	1-1/2 in.	50-5
Transmission		
Check shifting		50-10
Check for proper operation without excessive noise		50-10 & 15
Check differential lock operation	420 to 480 psi	50-15
Check brake pedal travel and even position	3 in. max. for one emergency application immediately after stopping engine	70-25
Check front wheel bearing adjustment and lubrication	35-ft.-lbs; back-off to nearest hole	....
Check front wheel toe-in	1/8 to 3/8 in.	....
Check tire inflation		Operator's Manual

TRACTOR TUNE-UP—Continued

Operation	Specification	Section-Group Reference
Check Power Front-Wheel Drive operation		50-30
Transmission pump	9 gpm at 1900 rpm	70-5
Main hydraulic pump	Standby - 2200 - 2300 psi (2300 psi for Power Front-Wheel Drive) Capacity - 22 gpm (2000 psi and 1900 rpm)	70-5
Pressure control valve	1650 - 1700 psi at 800 rpm (approximately 5 gpm flow)	70-5
Rockshaft:		
Lift cycle time (75 degrees rotation)	1.9 - 2.2 seconds at 1900 rpm	70-30
Maximum oil flow	10.5 to 11.5 gpm at 2000 psi and 1900 rpm	70-30
Lever position (depth control)	Complete raise at 1/32-inch from end of slot	70-30
Lever position (load control)	0 of quadrant to raise (rear lever edge)	
Negative stop adjustment	1/8th turn back out after contacting transmission case	70-30
Selective control valve	2 to 12-1/2 gpm at 1500 psi and 1900 rpm	70-5
Power Front-Wheel Drive pressure control	1900 - 2000 psi at 1200 rpm, 4th gear, high torque, and 2 gpm flow through jumper hose at breakaway coupler	50-30

Hydraulic system pressures, flow rates, or cycle times are for conditions specified in Section 70 (tractor at operating temperature, transmission-hydraulic oil at 140°F. to 160°F., proper test equipment, correct test sequence, etc.).

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Group 20
LUBRICATION

GENERAL INFORMATION

Carefully written and illustrated instructions are included in the tractor operator's manual. Remind your customer to follow the recommendations in these instructions.

For your convenience when servicing the tractor, the following chart showing capacities and type of lubricant for the various components has been included. Additional lubrication information is on page 20-2.

Component	Capacity	Type of Lubricant	Interval of Service
Engine Crankcase	16 U.S. quarts (includes filter)	See "Engine Lubricating Oils" on page 10-20-2	10 Hours - Check level 100 Hours - Change oil 200 Hours - Replace filter
Transmission and Hydraulic System	* 18 U.S. gallons	John Deere Type 303 Special-Purpose Oil	200 Hours - Check level 600 Hours - Replace filter 1200 Hours - Change Oil
Front Wheel Bearings		Wheel Bearing Grease	1200 Hours - Repack bearings
Grease Fittings		SAE Multipurpose-type Grease	See Operator's Manual

* *Add 4-1/2 gals. to capacity if equipped with Power Front-Wheel Drive.*

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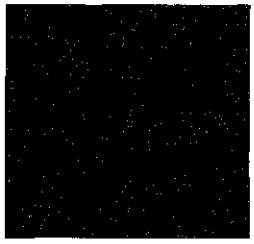
LUBRICANTS

Effective use of lubricating oils and greases is perhaps the most important step towards low upkeep cost, long tractor life, and satisfactory service. Use only those lubricants specified in this section; apply them at the intervals and according to the instructions in the lubrication section of the operator's manual.

ENGINE LUBRICATING OILS



We recommend John Deere Torq-Gard engine oil for use in the engine crankcase. Compounded specifically for use in John Deere engines, Torq-Gard provides optimum performance for API service classifications MS, DG, DM, and DS.

Torq-Gard oil provides superior lubrication under all conditions for diesel engines. 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 is used, oil meeting Series 3 (S-3) Specification of Military Specification MIL-L-45199A will meet requirements of a turbocharged diesel engine. This oil may also be designated API service classification DS. As further assurance of quality, use oil bearing the following statement on the container or words to the effect: "Passes Car Manufacturer's MS Sequence Tests."

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

Air Temperature	John Deere Torq-Gard Oil	Single Viscosity Oil	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 to facilitate starting.
* * 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.

GREASES

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

Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination.

Group 25
SEPARATION

REMOVING ROLL-GARD CAB

When the tractor is equipped with a Roll-Gard cab, it may be necessary to remove the cab in order to service tractor. Individual service requirements will dictate whether the serviceman will remove cab panels or remove the complete cab. For example, to remove the rockshaft housing, it is necessary only to remove the covers over the housing. However, service of the differential or final drives will require complete cab removal.

Use the following procedure to remove the cab.

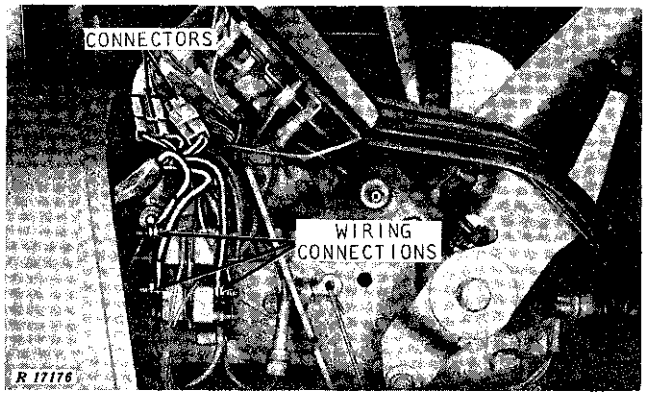


Fig. 1-Cab Wiring Connections

Disconnect battery ground cable and remove cowl. Disconnect cab wiring at connectors and circuit breakers under the instrument panel (Fig. 1). Disconnect wire from headlight dimmer switch.

Remove cab floor mat, platform, floor panels, side shields, and front panels (Fig. 3).

Remove perforated foam insulation from cab panels over rockshaft housing inside cab. Remove rear panels (Fig. 4).

On tractors with air conditioning, loosen the compressor drive belt, and remove the compressor (Fig. 2) with refrigerant hoses connected to the compressor. Bend hoses so that the unit can be placed inside the cab or fastened to the cab. Do not disconnect the refrigerant hoses unless absoutely necessary.

⚠ CAUTION: Whenever the refrigerant hoses are to be disconnected, first discharge the compressor or the complete system as explained in SM-2089, Tractor Air Conditioning and Heating Systems under DISCHARGING THE SYSTEM. Follow all safety precautions listed in the manual to avoid personal injury.

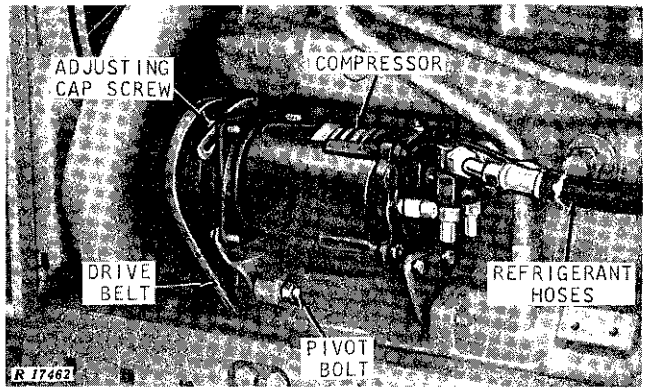


Fig. 2-Compressor Mounting

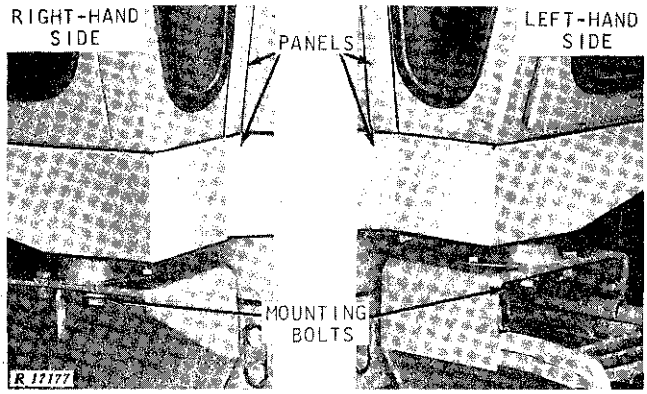


Fig. 3-Front Mounting Bolts and Panels

On tractors with a heater, drain a sufficient amount of coolant from the cooling system, and disconnect the heater hoses from the engine.

Fasten a chain to the lifting straps on roof of cab, and attach to a suitable overhead hoist.

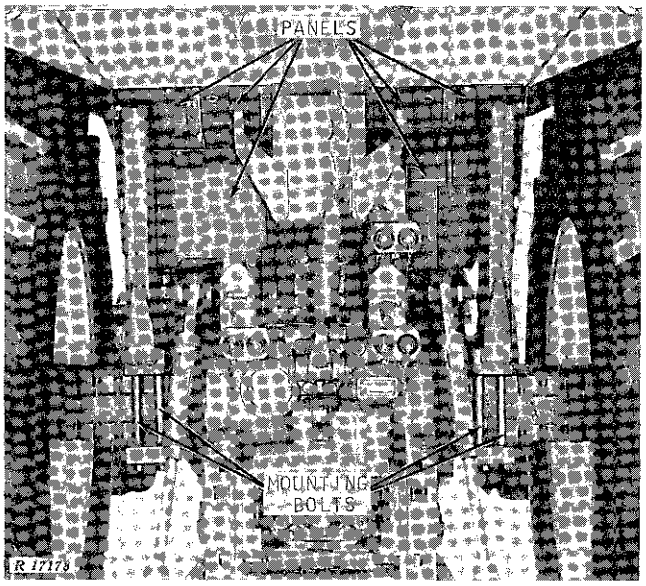


Fig. 4-Rear Mounting Bolts and Panels

Remove the cab front and rear mounting bolts (Figs. 3 and 4). Lift cab from tractor.

INSTALLING ROLL-GARD CAB

Reverse the removal steps. The centerline of cab should line up with centerline of tractor. The foam rubber seal on center cowl panel of cab should be equally compressed around the contour of hood. Shift cab as required to align correctly. Be sure to install rubber pads on rear axle housing, and tighten the rear mounting bolts to specification.

Adjust the compressor drive belt (on air conditioned cabs) to specification.

After the cab panels and extensions are in place, seal all holes and openings with tape, foam material, or sealant before installing floor pads and mats. Careful sealing of all openings must be done for the pressurizer to be effective in keeping out dust and dirt.

Install floor pads and mats.

SEPARATING ENGINE FROM CLUTCH HOUSING

Follow all precautions regarding safety, cleanliness, and general mechanical procedures. See the John Deere "Fundamentals of Service" manuals.

⚠ CAUTION: Before separating tractor, be sure that the brake accumulator is discharged. The accumulator can be discharged by opening the right-hand brake bleed screw, and holding the brake pedal down for a few minutes.

Drain cooling system and remove cowl, side shields, grille screens, muffler, hood, and right-hand control support cover.

Disconnect battery ground cable (left-hand battery is grounded).

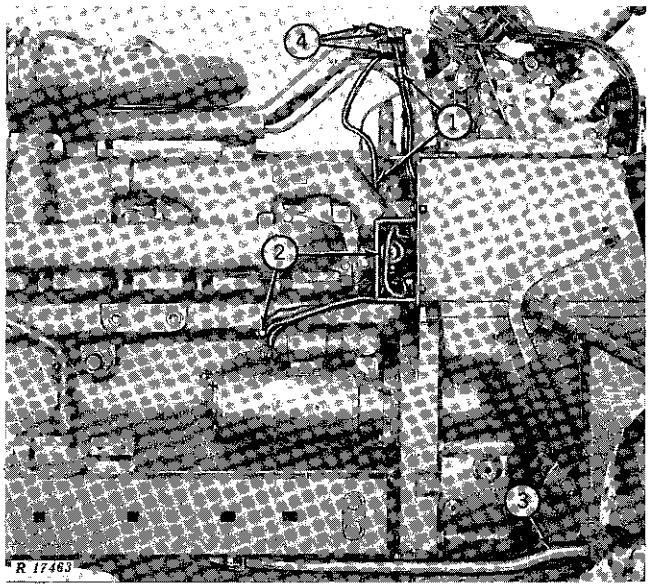


Fig. 5-Left-Hand Side Separation Procedures

1. Disconnect engine temperature gauge bulb, and ether starting aid pipe.

2. Detach starter circuit relay mounting bracket from control support and disconnect battery cable from starter.

3. Remove left-hand battery and the left-hand battery front support bracket. Disconnect the hydraulic pump inlet pipe.

4. Disconnect wiring from connectors.

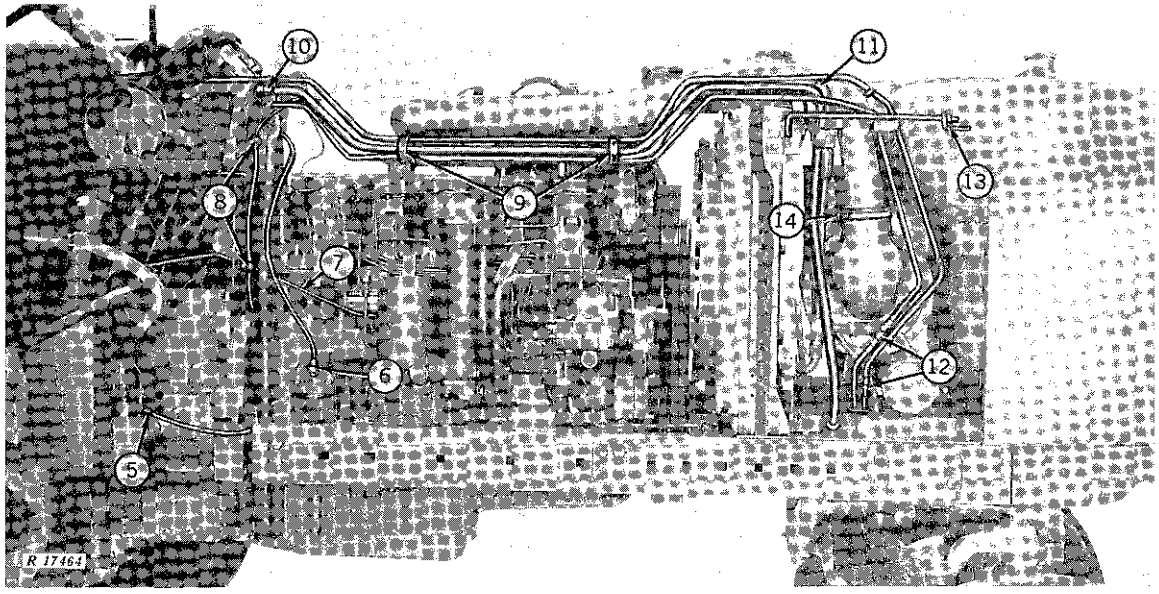


Fig. 6-Right-Hand Side Separation Procedures

5. Disconnect hydraulic pump oil seal drain tube (Fig. 7).

6. Disconnect tachometer cable.

7. Disconnect speed control rod from injection pump.

8. Detach wiring harness from clamp at control support.

9. Remove hydraulic pipe clamps.

10. Disconnect hydraulic pressure pipe.

11. Disconnect hydraulic oil return pipe.

12. Remove hydraulic pipe spacer clamps and disconnect steering pipes.

13. Remove the fuel tank support rod.

14. Loosen the air intake pipe to permit hydraulic oil cooler return pipe to clear during separation.

15. Disconnect Power Front-Wheel Drive drain pipe (Fig. 7).

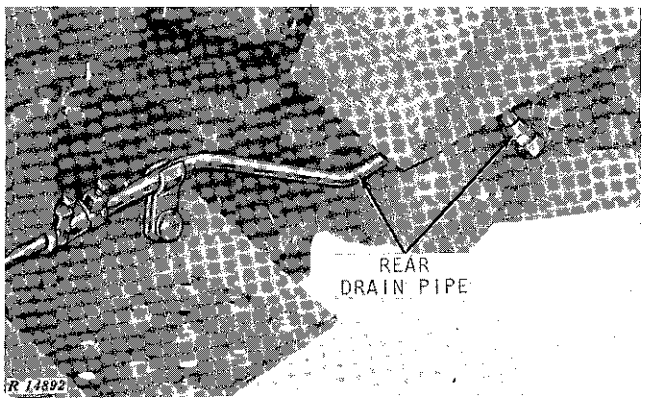


Fig. 7-Power Front-Wheel Drive Drain Pipe

Install front and rear support stands.

Remove cap screws securing engine to clutch housing and roll rear half of tractor away (Fig. 8).

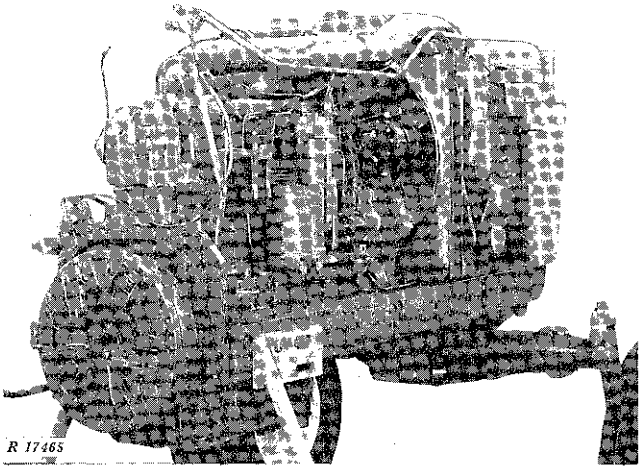


Fig. 8-Engine Separated From Clutch Housing

ASSEMBLY

Apply a light coating of Permatex No. 3 to mating surfaces, and move both sections together.

Tighten cap screws between clutch housing and engine to specified torque and remove stands.

Reverse the numbered separation procedures.

Fill the engine cooling system. Connect battery ground (tap cable on battery post first). Check engine crankcase and transmission oil levels.

Bleed steering system (Section 70, Group 20).

After checking for leaks, install tractor sheet metal.

SEPARATING CLUTCH HOUSING FROM TRANSMISSION CASE

Discharge accumulator (open brake bleed screw and depress pedal).

Drain the transmission.

Disconnect battery (ground first) and remove batteries and battery boxes.

Disconnect wiring from headlight dimmer switch, and remove differential lock pedal pivot pin. Remove platform and clutch return spring.

On tractors equipped with Power Front-Wheel Drive, remove the drain pipe (Fig. 7).

1. Remove both left-hand side battery box supports (Fig. 9).
2. Disconnect transmission oil temperature bulb, main hydraulic pump inlet pipe, and steering return pipe.
3. Disconnect differential lock control link (Fig. 10).
4. Disconnect pressure pipe from rockshaft housing.
5. Disconnect wiring harness from start-safety switch and lighting harness. Remove battery cable clamps.
6. Disconnect right-hand and left-hand brake pipes and brake return pipe.
7. Place shift lever in tow. Pull levers outward and disconnect shifter rods.

Remove the PTO shaft front bearing quill. Place a pan under the quill to catch the trapped oil.

Remove the transmission cover, and remove the cap screws fastening the transmission case to the clutch housing (inside transmission case).

Install JDG-2 support stands.

Separate transmission case from clutch housing and roll transmission away.

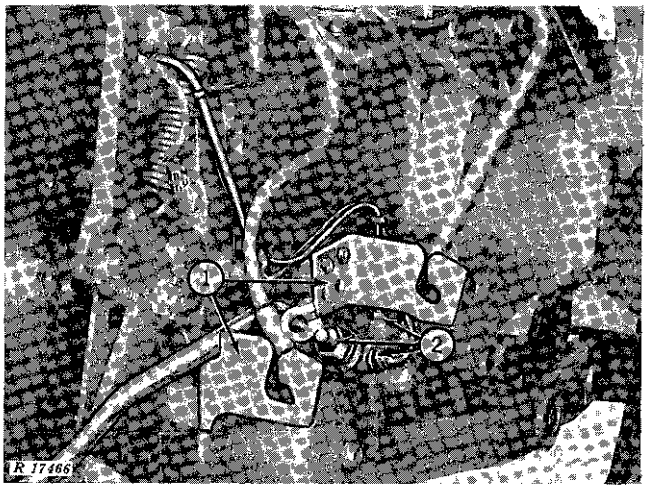


Fig. 9-Left-Hand Side of Transmission Case

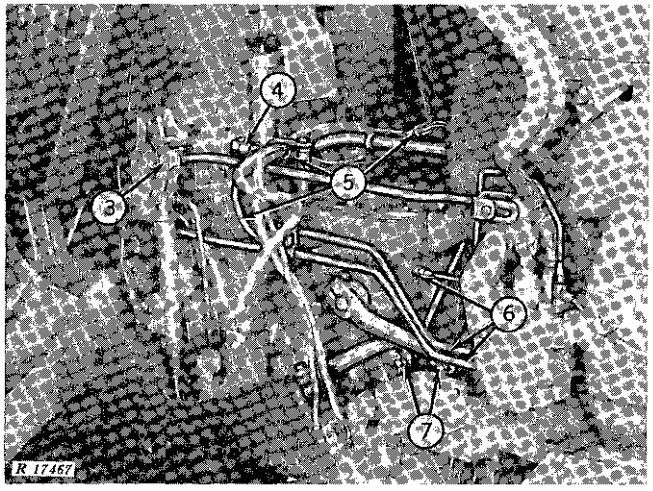


Fig. 10-Right-Hand Side of Transmission Case

ASSEMBLY

Before joining tractor, be sure cap screw in upper right corner of transmission case is in place. Also, be sure gasket and PTO thrust washer are in position (Fig. 11).

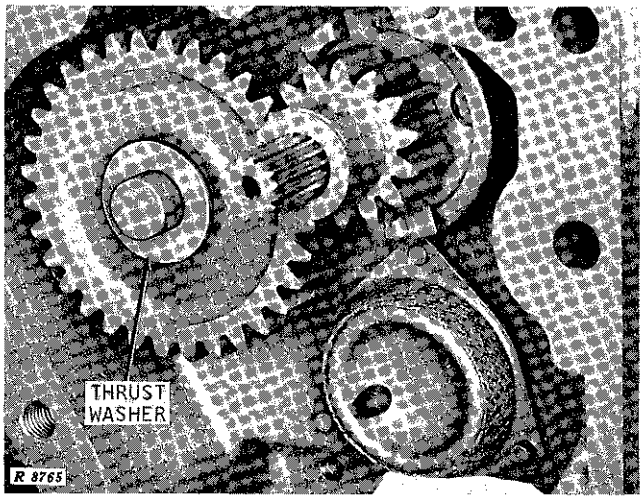


Fig. 11-Thrust Washer in Position

Mesh the PTO and transmission drive when joining the tractor. Tighten all cap screws and remove support stands.

Install PTO shaft front bearing quill. Pour oil in transmission and install transmission cover.

Connect hydraulic oil pressure pipe to rockshaft housing.

Connect differential lock control link.

Connect brake return pipe and right- and left-hand brake pipes.

Connect shifter rods. Tap arms inward to obtain specified end play.

Connect wiring harness and install battery cable clamps.

Install oil temperature sensing bulb. Connect main hydraulic pump inlet pipe and steering return pipe.

Install platform and differential lock pedal pivot pin. Connect clutch pedal return spring.

Connect Power Front-Wheel Drive drain pipe (Fig. 7).

Install battery box supports. Install battery boxes and connect batteries. Make ground connection last and tap cable on battery post first.

Bleed brakes (Section 70, Group 25) and recheck transmission oil level.

REMOVING ENGINE

Separate tractor between engine and clutch housing as previously instructed.

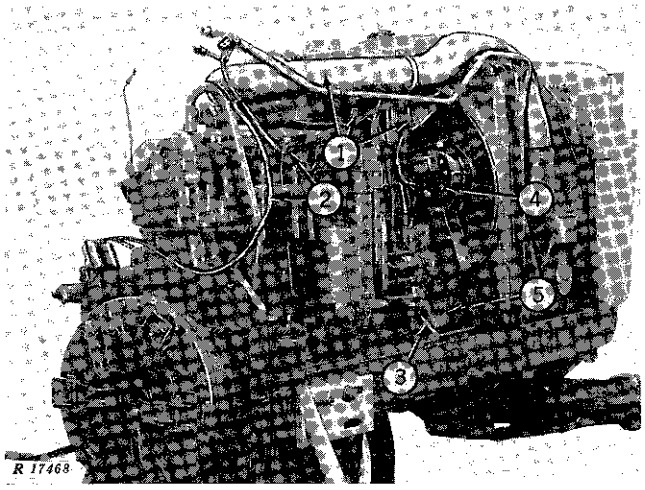


Fig. 12-Right-Hand Side of Engine

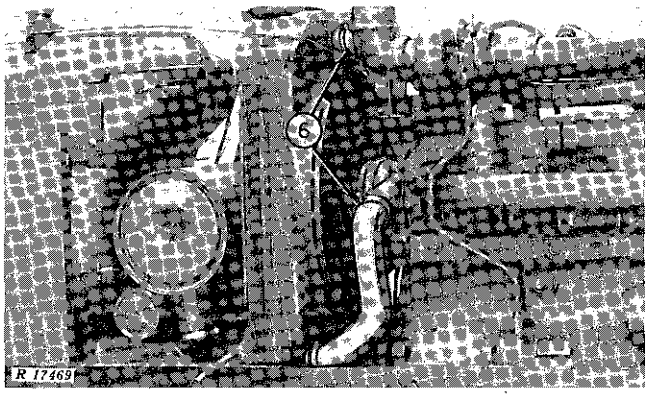


Fig. 13-Left-Hand Side of Engine

1. Remove the turbocharger air intake pipe and vertical support strap. Remove the water pump bypass pipe.

2. Disconnect wiring harness from the fuel shut-off solenoid, alternator, starter solenoid, and the oil pressure switch. Place wiring harness out of the way for engine removal.

3. Close fuel tank shut-off valve and disconnect fuel pump inlet pipe. Disconnect diesel fuel leak-off pipe.

4. Remove the alternator.

5. Remove hydraulic pump drive coupler and detach hydraulic pump support from engine.

6. Remove radiator hoses.

On tractors with Power Front-Wheel Drive, remove the drain pipe. Disconnect electrical connector, hydraulic pressure pipe, and return hose. Lower valve as shown in Fig. 14.

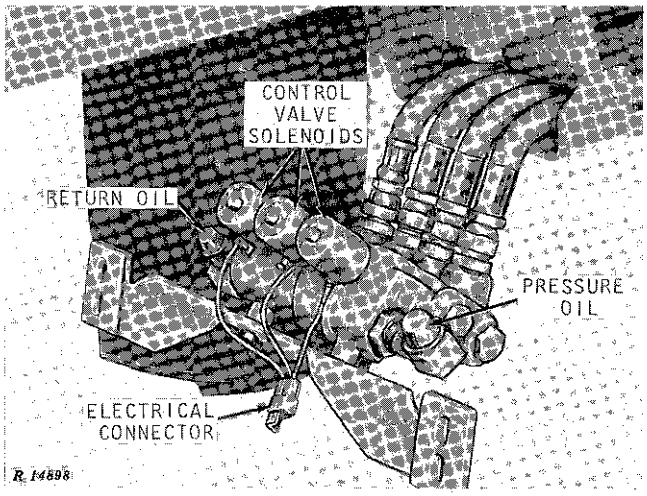


Fig. 14-Control Valve Assembly

Install JDE-63 engine lift brackets and JDG-1 engine lift sling.

NOTE: Remove front weights and drain fuel tank to prevent front of tractor from tipping.

Remove cap screws holding side frame to engine. Slide engine to rear.

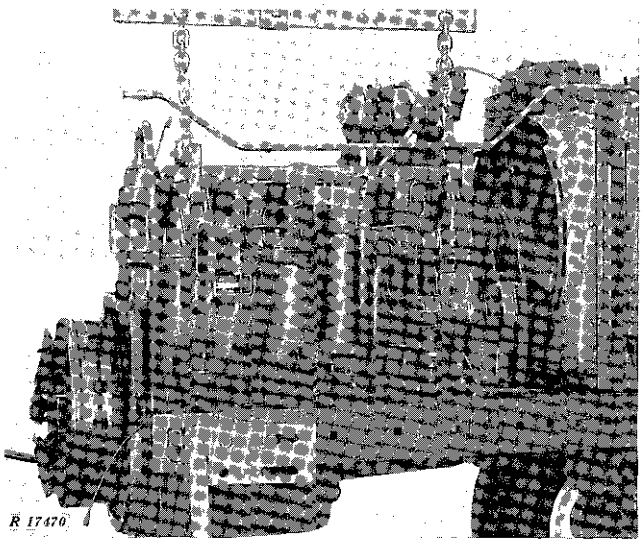


Fig. 15-Engine Removal

INSTALLATION

Slide engine into place and reverse the removal procedures to install engine. Tighten engine mounting cap screws and hydraulic pump support and coupler cap screws to specified torque.

On tractors with Power Front-Wheel Drive, install the front drain pipe and control valve assembly.

Apply a light coating of Permatex No. 3 to mating surfaces of engine and clutch housing, and join together.

SEPARATING ENGINE FROM TRACTOR FRONT END

Drain engine cooling system. Remove muffler and vertical air stack.

Remove the cowl, side shields, grille screens, and hood.

Disconnect battery ground cable (left-hand battery is grounded).

1. Remove clamp and disconnect hydraulic pump inlet pipe.
2. Remove radiator hoses.

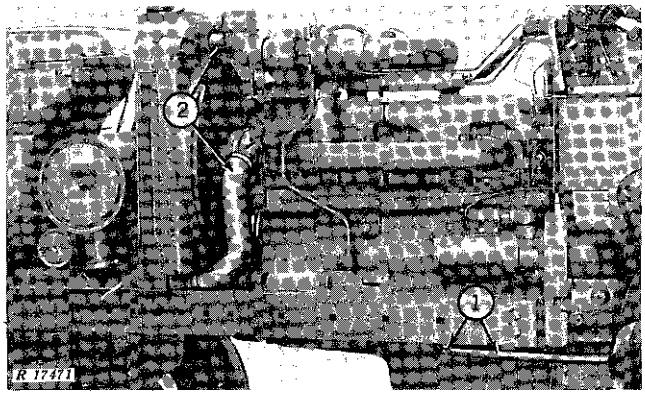


Fig. 16-Left-Hand Side of Tractor

3. Disconnect hydraulic pump oil seal drain tube (Fig. 17).
4. Remove hydraulic pipe clamps.
5. Disconnect hydraulic pressure pipe.
6. Disconnect hydraulic oil return pipe.
7. Disconnect fuel leak-off pipe.
8. Remove the turbocharger air intake pipe and hose, the vertical support bracket, and the water pump by-pass pipe.

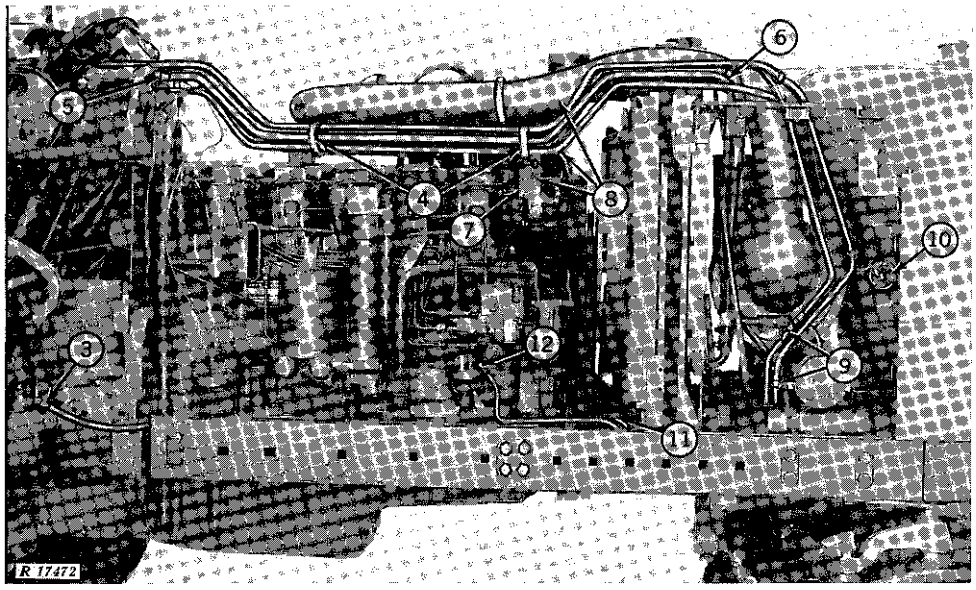


Fig. 17-Right-Hand Side of Tractor

9. Remove hydraulic pipe spacer clamps and disconnect steering pipes.

10. Disconnect wire from fuel gauge sender and remove wiring bands to hydraulic pipe.

11. Remove hydraulic pump drive coupler and detach hydraulic pump support from engine.

12. Close fuel tank shut-off valve and disconnect fuel inlet pipe.

If equipped with a Power Front-Wheel Drive, remove the drain pipe and disconnect electrical connector, hydraulic pressure pipe, and return hose. Lower valve as shown in Fig. 14.

Install JDE-63 engine lift brackets, engine lift sling, and front and rear support stands.

NOTE: Remove front weights and drain fuel tank to prevent front of tractor from tipping.

Remove cap screws holding side frame to engine. Separate front end from engine.

ASSEMBLY

Move the tractor sections together. Never use excessive force.

Tighten engine mounting screws and hydraulic pump and coupler cap screws to specified torque. Remove support stands and engine lift sling.

Reverse the numbered separation procedures. If equipped with Power Front-Wheel Drive, install the control valve assembly and drain pipe.

Fill the engine cooling system. Connect the battery ground (tap cable on battery post first).

Check engine crankcase and transmission oil levels.

Bleed steering system (Section 70, Group 20).

After checking for leaks, install tractor sheet metal, muffler, and vertical air stack.

REMOVING FINAL DRIVE ASSEMBLY

Drain transmission.

Disconnect fender wiring harness and remove fender.

Raise tractor and remove rear wheel.

Remove wiring harness protector.

If removing right-hand axle housing on a tractor with a differential lock, disconnect battery ground and remove the right-hand battery. Disconnect the differential lock control link. Remove the pressure inlet pipe, return pipe, and pressure pipe to differential lock (Fig. 10). Remove the differential lock valve.

If removing the left-hand rear axle housing, remove the rockshaft return pipe.

Install chain and remove final drive housing. Hold brake backing plate to transmission case when removing the housing.

To prevent damage from falling parts, remove sun pinion, brake backing plate, and brake disk.

INSTALLATION

Reverse the removal procedures to install the final drive assemblies.

IMPORTANT: To prevent serious damage, be sure that the sun pinion does not work outward far enough to allow the brake disk to drop inside the sun pinion teeth when installing the final drive housing.

SPECIFICATIONS

Item	Specification
Air conditioning compressor drive belt deflection	1/4 in. deflection-15 lb. pull
Alternator drive belts	
Tractors with air conditioning	1 in. deflection-20 lb. pull
Tractors without air conditioning	1 in. deflection-25 lb. pull

TORQUES FOR HARDWARE

Item	Torque (Ft-Lb)
Hydraulic pump drive coupling	30
Hydraulic pump support to cylinder block	85
Side frames-to-engine	250
Clutch housing-to-engine	1/2 in.- 85 3/4 in.-300
Clutch housing-to-transmission case screws and nuts	5/8 in.-170 3/4 in.-300
Axle housing-to-transmission case	170
Axle housing-to-Roll-Gard frame	300
Axle housing-to-Roll-Gard cab	55
Cab front support bracket-to-clutch housing cap screws	85
Nylon hydraulic bleed line	Finger tight, then 1/6 to 1/3 turn more

SPECIAL TOOLS

No.	Name	Use
JDE-63*	Engine Lift Brackets	Engine removal
JDG-1*	Engine Sling	Engine removal
JDG-2*	Support Stands	Tractor separation
JDG-3*	Hoist Bracket	Lifting tractor front end
.....	Lift Brackets (Fig. 18)	Lifting clutch housing assembly

**Order from: Service Tools, P.O. Box 314, Owatonna, Minnesota 55060.*

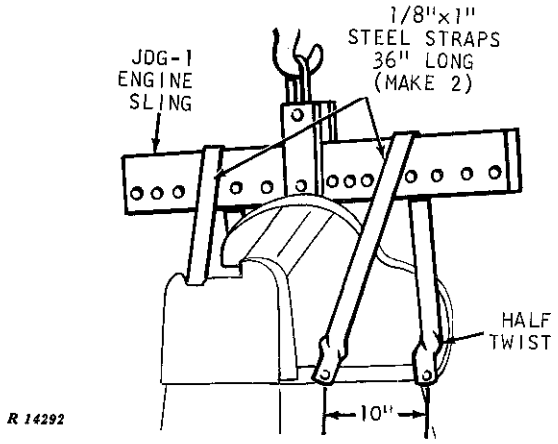


Fig. 18-Lift Brackets

Section 20
ENGINE

CONTENTS OF THIS SECTION

Litho in U.S.A.

Group 5

GENERAL INFORMATION AND DIAGNOSIS

GENERAL INFORMATION

This is a liquid cooled, 6-cylinder, turbocharged, valve-in-head, vertical in-line four-cycle diesel engine.

DIAGNOSING ENGINE 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
- Weak battery
- Faulty injection pump solenoid

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

Service Problem—See Section 10
- Low Fuel Supply
- Restricted fuel lines or filter
- Faulty fuel pump
- Faulty injection pump
- Faulty injection nozzles
- Exhaust system restricted

ENGINE MISSES

Basic Engine Problem—See This Section
- Weak valve springs
- Incorrect valve clearance
- Burned, warped, pitted, or sticking valves
- Low compression
- Worn camshaft lobes (may be caused by faulty damper)
- Incorrect timing
- Engine overheating

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

LACK OF POWER

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

Service Problem—See Section 10
- Dirty or obstructed air cleaners
- Improper fuel
- Wrong oil viscosity

Fuel System Malfunction—See Section 30
- Plugged fuel filter
- Faulty injection pump
- Faulty injection nozzles
- Faulty fuel pump
- Restricted exhaust system
- Low intake manifold pressure
- Incorrect throttle linkage

Power Train Malfunctions—See Section 50
- Clutch slipping

Litho in U.S.A.

ENGINE OVERHEATS

Basic Engine Problem—See This Section
- Defective head gasket
- Incorrect engine 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 holes in piston clogged
- Insufficient piston ring tension
- Piston ring gaps not staggered
- Excessive main or connecting rod bearing clearance
- 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
- Excessive engine speed

Fuel System Malfunction—See Section 30
- Restricted air intake system
- Turbocharger seal failure

LOW OIL PRESSURE

Basic Engine Problem—See This Section
- Excessive main and connecting rod bearing clearance
- Low oil level
- Leakage at internal oil passages
- Faulty oil pump
- Improper regulating valve adjustment
- Improper oil
- Defective oil pressure indicator lamp
- Faulty oil pressure sending unit

Service Problem—See Section 10
- Low oil level
- Improper oil

Electrical System Malfunction—See Section 40
- Defective oil pressure indicator lamp
- Faulty oil pressure sending unit

HIGH OIL PRESSURE

Basic Engine Problem—See This Section
- Stuck or improperly adjusted regulating valve

EXCESSIVE FUEL CONSUMPTION

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

Service Problem—See Section 10
- Engine overloaded

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

BLACK OR GREY EXHAUST SMOKE

Basic Engine Problem—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
- Faulty injection nozzles
- Restricted air cleaners
- Defective muffler

Thank you very much for your reading.

Please Click Here Then Get More Information.