2840
Tractor

JOHN DEERE

TECHNICAL MANUAL

2840
Tractor

TM4336 (01MAY79) English

TM4336 (01MAY79)

LITHO IN U.S.A. (REVISED)
ENGLISH

2840 Tractor Technical Manual TM-4336 (NOV-76)

CONTENTS

All information, illustrations and specifications contained in this technical manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

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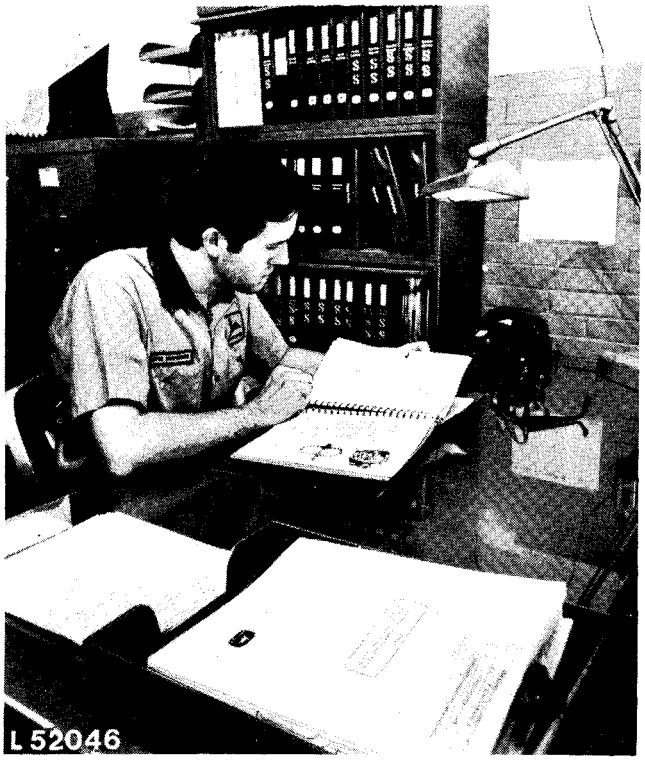
Introduction



Use FOS Manuals for Reference

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 personnel and for reference by experienced technicians.

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

IMPORTANT: Your technical manual contains the new SI metric measurements which have been standardized internationally.

Example:

New	Old
10 N (Newton)	1 kp
10 Nm (Newton-Meter)	1 mkp
1 bar	1 kp/cm2
1 kW	= 1.36 PS (1.34 HP)

Use Technical Manuals for Actual Service

When a technician 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*
- *Exploded views showing parts relationship*
- *Photos showing service techniques*
- *Specifications at end of each Group*
- *Special tools at end of each Group*

This technical manual was planned and written for you — an experienced technician. 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 10

CONTENTS OF THIS SECTION

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Group 5

10 Specifications

SERIAL NUMBERS

The engine serial number is stamped into the name plate located on the lower front right-hand side of the cylinder block.

NOTE: If ordering engine parts, indicate all digits of the serial number on the name plate.

The name plate showing the tractor serial number is located on the right-hand side of the front support.

NOTE: If ordering tractor parts (excluding engine parts), indicate all digits of the serial number on the name plate.

MODEL NUMBERS

The injection pump, injection nozzles, alternator, starting motor and hydraulic pump have model numbers to facilitate identification of different makes of a given unit.

ENGINE

Number of cylinders 6

Cylinder liner bore . . . . . 102 mm (4.02 in.)

Stroke . . . . . 110 mm (4.33 in.)

Displacement . . . . . .5390 cm3 (329 cu. in.)

Compression ratio . . . . . 16.8 : 1

Maximum torque at
1300 rpm . . . . . .320 Nm (235 ft-lb)

Firing order . . . . . .1 - 5 - 3 - 6 - 2 - 4

Valve clearance (engine hot or cold)
Intake valve . . . . . 0.35 mm (0.014 in.)
Exhaust valve . . . . 0.45 mm (0.018 in.)

Fast idle . . . . . 2660 rpm

Slow idle . . . . . 650 rpm

Working speed range . . . . . 1300 to 2500 rpm

PTO horsepower* . . . . . .60 kW (80 HP)
(at 2500 rpm engine speed)

ENGINE CLUTCH

Single dry disk clutch with torsion damper (isolator), foot-operated.

ELECTRICAL SYSTEM

Batteries . . . . . 2 x 12 volts, 88 ampere-hours

Starting motor . . . . . .12 volt, 3 kW (4 HP)

Alternator . . . . . 14 volts, 28 amps.

Battery terminal grounded . . . . . negative

TRANSMISSION

Collar shaft transmission with helical cut gears.

The tractor has 6 forward gears and three reverse gears, park lock included. However, by shifting the Hi-Lo shift unit, 12 forward and 6 reverse speeds may be selected.

HI-LO SHIFT UNIT

Hydraulically controlled reduction gear which can be shifted under load, with "wet" multiple disk clutch and "wet" multiple disk brake. Allows reduction of the individual gear speeds by 21 %.

* With the engine run in (above 100 hours of operation) and having reached operating temperature (engine and transmission); measured by means of a dynamometer. Permissible variation ± 5 %.

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DIFFERENTIAL AND FINAL DRIVES

Planetary reduction gear and differential with spiral bevel gears.

DIFFERENTIAL LOCK

Hand or foot operated; spring-loaded out of engagement.

POWER TAKE-OFF (PTO)

Independent of transmission, can be engaged and disengaged under load.

The independent PTO is engaged by a hydraulically operated disk clutch. Disengaging the PTO is achieved by operating the hydraulically actuated disk brake.

Changing PTO shaft speed from 540 rpm to 1000 rpm or vice-versa is effected by changing the PTO stub shaft.

PTO Speeds (in rpm)

Engine speed in rpm	540 rpm shaft	1000 rpm shaft
650	160	300
2175	540	1000
2500	620	1150
2660	660	1225

HYDRAULIC SYSTEM

Closed center, constant pressure system; also includes rockshaft, power steering and selective control valves.

System pressure . . . . . 155 bar (2250 psi)

Pump . . . . . 8-piston pump driven by the engine

POWER STEERING

The steering system is a "closed center" type incorporated in the hydraulic system and supplied with oil by the hydraulic pump. It is connected to the front wheels by means of a steering linkage.

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HYDRAULIC BRAKES

The disk brakes run in an oil bath and are hydraulically controlled.

CAPACITIES

	Liters	US.gals.
Fuel tank	106.0	28.0
Cooling system	19.0	5.0
Engine crankcase incl. filter	11.5	3.0
Transmission-hydraulic system		
Dry system	57.0	15.0
At service intervals.	49.0	12.9

TRAVEL SPEEDS

See Operator's Manual.

FRONT AND REAR WHEELS

For tire sizes, treads, inflation pressure and weights see Operator's Manual.

DIMENSIONS

See Operator's Manual.

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Group 10

Predelivery, Delivery and After-Sales Inspections

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PREDELIVERY INSPECTION

Every new JOHN DEERE tractor leaves the factory in such a condition that it can be delivered to the customer after a minimum of service.

To promote complete customer satisfaction, proper predelivery service including mending of possible shipping damage and giving the finishing touches to the tractor, are of prime importance to the dealer.

A tag pointing out the factory-recommended procedure for predelivery service is attached to every new tractor before it leaves the factory. The reverse side of this tag is filled in by the factory after the tractor has undergone a thorough inspection prior to shipping.

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 then serve as a basis for certifying that the tractor has received the proper predelivery service.

Temporary Tractor Storage

Service	Specifications	Reference
Check radiator for coolant loss and antifreeze protection (gravity of antifreeze and rust inhibitor mixture)	Coolant level should be midway between radiator core and bottom edge of filler neck	Operator's manual
If the tractor is to be operated for a short time without battery (using a slave battery for starting), do not, under any circumstances, interrupt the circuit by switching off the key switch before stopping the engine by means of fuel pump shut off cable. Use additional current (lights) whilst engine is running. Insulate terminal of battery cable before starting by means of slave battery. If this advice is disregarded, damage to alternator and regulator may result.	. . . . .	Section 40, group 10
Remove batteries. Drain electrolyte and store batteries	Store at room temperature	. . . . .
Reduce shipping pressure of tires	. . . . .	Operator's manual
Cover tractor and tires for protection and cleanliness	. . . . .	. . . . .

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PREDELIVERY INSPECTION (Contd.)

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Service	Specifications	Reference
COOLING SYSTEM		
Check radiator for coolant loss	Coolant level should be midway between radiator core and bottom edge of filler neck.	Operator's manual
Check gravity of antifreeze and rust inhibitor mixture	. . . . .	Operator's manual
ELECTRICAL SYSTEM		
If the tractor is to be operated for a short time without battery (using a slave battery for starting), do not, under any circumstances, interrupt the circuit by switching off the key switch before stopping the engine by means of fuel pump shut off cable. Use additional current (lights) whilst engine is running. Insulate terminal of battery cable before starting the engine by means of slave battery. **If this advice is disregarded, damage to alternator and regulator may result.**	. . . . .	Section 40, group 10
If the batteries are to be installed, connect them in the proper polarity (negative to ground). If they are improperly connected, the rectifier diodes will be immediately destroyed.	. . . . .	Section 40, group 10
First connect positive (+) cable and then ground (-) strap of each battery. Only then start tractor engine.	. . . . .	Section 40, group 10

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PREDELIVERY INSPECTION (Contd.)

Service	Specifications	Reference
TIRES AND WHEELS		
Check tire inflation pressure	. . . . .	Operator's manual
Retighten wheel bolts	. . . . .	Section 80, group 10 and Operator's manual
LUBRICATION		
Check crankcase oil level	Top mark on dip stick	Operator's manual
Check transmission-hydraulic system oil level	. . . . .	Operator's manual
Lubricate all lubrication points on the tractor	. . . . .	Operator's manual
ENGINE		
Check dry type air cleaner	. . . . .	Operator's manual
Fill fuel tank and start engine	Fuel tank capacity: 106.0 liters (28.0 U.S. gal.)	Operator's manual
Check lighting system, indicator lights and instruments for proper operation	. . . . .	Operator's manual
Check if speed control linkage moves easily	. . . . .	Section 20, group 40
Check engine idle speeds	. . . . .	Section 20, group 40
Check injection timing	. . . . .	Section 30, group 15
OPERATION		
Check clutch pedal adjustment	Approx. 25 mm (1 in.) clutch pedal free travel	Section 50, group 5
Check operation of Hi-Lo shift unit	. . . . .	Section 50, group 10
Shift transmission through all gears	. . . . .	Operator's manual
Check differential lock operation	. . . . .	Operator's manual
Check PTO operation	. . . . .	Operator's manual
Check 3-point hitch operation	. . . . .	Operator's manual
Check hydraulic system operation	. . . . .	Section 70, group 5
Check brake operation	. . . . .	Section 60, group 15

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PREDELIVERY INSPECTION (Contd.)

Service	Specifications	Reference
Check steering operation	. . . . .	Section 60, group 10
Check seat adjustment	. . . . .	Operator's manual
Check operation of remote hydraulic cylinder (if equipped)	. . . . .	Section 70, group 5
GENERAL		
Tighten accessible nuts and attaching screws	. . . . .	Section 10, group 20
Attach roll guard	. . . . .	Section 80, group 15
Clean tractor and touch up paint	. . . . .	. . . . .

DELIVERY INSPECTION

A thorough discussion of the operation and service of the tractor at the time of its delivery helps to assure complete customer satifaction.

Proper delivery should be an important phase of the dealer's program.

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. Therefore, enough time should be devoted, at the customer's convenience, to introducing him to this new tractor and explaining to him how to operate and service it.

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

1. Adjusting the seat
2. Operation of control levers and instruments
3. Starting and shutting off the engine
4. The importance of the tractor break-in period
5. Use of counterweights and proper tire inflation pressure as well as filling of tires with water and calcium chloride, if required
6. All functions of the hydraulic system
7. Operating the PTO
8. The importance of the safety rules
9. The importance of lubrication and periodic service

AFTER-SALES INSPECTION

In the interest of the purchaser and the dealer an after-sales inspection should be carried out by the dealer after the first 100 hours of using a new John Deere tractor.

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.

Through this inspection a needless volume of service work can be eliminated by preventing minor difficultes from developing into serious problems later on. It also will promote stronger dealer -customer relations and give the customer an opportunity to ask questions that may have arisen during the first few days of use.

Thereby the dealer has the further opportunity of promoting the possible sale of other new equipment.

The following inspection program is recommended:

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AFTER-SALES INSPECTION (Contd.)

Service	Specifications	Reference
COOLING SYSTEM		
Check coolant level	Coolant level should be midway between radiator core and bottom edge of filler neck	Operator's manual
Clean exterior of radiator	. . . . .	. . . . .
Check hose connections	. . . . .	. . . . .
FUEL SYSTEM		
Check fuel filter housing for water or sediment deposits and clean transfer pump screen	. . . . .	Operator's manual
Check line connections	. . . . .	. . . . .
ELECTRICAL SYSTEM		
Check gravity of battery electrolyte	Gravity should be 1.260 at an electrolyte temperature of 27° C (80°F)	
Check electrolyte level of batteries	To bottom of filler neck in each cell	Operator's manual
Check tension of fan belt	19 mm (3/4 in.) deflection with a 90 N (20 lb) force	Operator's manual and section 20, group 35
Start engine and check operation of lights, indicator lamps and instruments	. . . . .	Operator's manual
LUBRICATION		
Check crankcase oil level	Top mark on dip stick	Operator's manual
Check transmission oil level	. . . . .	Operator's manual
Lubricate 3-point hitch	. . . . .	Operator's manual

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AFTER-SALES INSPECTION (Contd.)

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Service	Specifications	Reference
ENGINE		
Check dry-type air cleaner	. . . . .	Operator's manual
Check valve clearance	Intake valve: 0.35 mm (0.014 in.) Exhaust valve: 0.45 mm (0.018 in.)	Section 20, group 10
Check engine speed under load as well as fast and slow idle speed	. . . . .	Section 20, group 40
Check engine performance	. . . . .	Section 10, group 20
GENERAL		
Check clutch pedal adjustment	Approx. 25 mm (1 in.) free travel	Section 50, group 5
Check operation of Hi-Lo shift unit	. . . . .	Section 50, group 10
Shift transmission through all gears	. . . . .	Operator's manual
Check operation of PTO	. . . . .	Operator's manual
Check differential lock	. . . . .	Operator's manual
Check operation of hydraulic system	. . . . .	Section 70, group 5
Check steering system	. . . . .	Section 60, group 10
Check brakes	. . . . .	Section 60, group 15
Tighten accessible nuts and cap screws	. . . . .	Section 10, group 20
Tighten roll guard attaching cap screws and nuts	. . . . .	Section 80, group 15
Tighten accessible hydraulic lines	. . . . .	. . . . .
Visual inspection of tractor	Damaged paint, loose connections, proper positioning of hoses and lines, leaks, operation of all mechanical parts	. . . . .

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Group 15
Lubrication 10

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	11.5 l (3 U.S. gal.) (including filter)	See page 15-2	10 Hours — Check 100 Hours — Drain and refill 200 Hours — Change filter
Transmission and hydraulic system	49.0 l (13 U.S. gal.)	John Deere Hy-GARD Transmission and Hydraulic Oil or its equivalent.	50 Hours — Check 50 Hours — Change filter 500 Hours — Change filter 1000 Hours — Drain and refill. Clean intake screen
Grease fittings	. . . . .	John Deere Multi-Purpose Lubricant or its equivalent.	See Operator's manual

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Lubricants

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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 lubricants specified in this section. Apply them at intervals and according to the instructions in the lubrication and periodic service section.

ENGINE LUBRICATING OILS

L 10456

We recommend John Deere Torq-Gard Supreme Engine Oil for use in the engine crankcase. These Torq-Gard oils are compounded specifically for use in John Deere engines and provide 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 one of the following specifications:

Single Viscosity Oils

API Service CD/SD
MIL-L-2104 C
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 atmospheric temperature at start 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 0° C (32° F)	SAE 30	SAE 30	Not recommended.
-23° C(-10° F) to 0° C(32° F)**	SAE 10W-20	SAE 10W	SAE 10W-30
Below -23° C(-10° F)	SAE 5W-20	SAE 5W	SAE 5W-20

*** If ambient temperature at start is below -12° C (10° F), use an engine heater. SAE 5W-20 oil may also be used if required. This will insure optimum lubrication of the engine when starting, particularly if the engine is subjected to -23° C (-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 SYSTEM OILS

Use only John Deere Hy-GARD Transmission and Hydraulic 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, available from your John Deere dealer, may be used in all weather conditions.

GREASES

Use John Deere Multi-Purpose Lubricant or an equivalent SAE multipurpose-type grease for all grease fittings. Application of grease as instructed in the lubrication section will provide proper lubrication and will prevent bearing contamination.

STORING LUBRICANTS

Your 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 20

Engine and Tractor Tune-Up

10

GENERAL INFORMATION

Before tuning up the engine, determine whether a tune-up will restore operating efficiency. If there is doubt, the following preliminary tests will help to determine if the engine can be tuned up.

PRELIMINARY ENGINE TESTING

Service	Specifications	Reference
Checking air intake system by means of vacuum gauge	355 to 635 mm (14 to 25 in.) water head: engine running at fast idle speed	FOS "Fundamentals of Service, Engine" manual under "Diagnosis and Testing"
Check radiator for air bubbles or oil film	. . . . .	. . . . .
Measure blow-by at crankcase vent tube*	3.5 m^3 (123 cu.ft./h.)	. . . . .
Check compression (min. reading)	21 bar (300 psi)	FOS "Fundamentals of Service, Engine" manual under "Diagnosis and Testing"
Measure engine horsepower at powershaft (using a dynamometer)	Record measured performance and compare with performance measured after carrying out "Engine Tune-up"	. . . . .

* *Measure with a standard gas gauge, placing hose over end of crankcase vent tube. The engine must be tested at 2500 rpm and full load, normal running temperature and should be run in (at least 100 hours). Measure over a period of 5 minutes and multiply measured value by 12 (for hourly rate). Compare with values quoted above.*

There is no undue wear on piston rings and cylinder liners if the measured value is lower than that quoted above. Should a further test be desired, carry out a compresssion test. If the "blow-by" reading is more than that quoted above, the decline in performance is due to excessive wear and the engine should be overhauled.

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ENGINE TUNE-UP

Service	Specifications	Reference
AIR INTAKE SYSTEM		
Service air cleaner and dust unloading valve, check system for leaks	. . . . .	Operator's manual and "Fundamentals of Service, Engine" manual.
Check crankcase vent tube for foreign particles (restriction)	. . . . .	. . . . .
CYLINDER HEAD		
Re-tighten cylinder head cap screws	150 Nm (110 ft-lb)	Section 20, group 10
Check and adjust valve clearance	Intake valve: 0.35 mm (0.014 in.) Exhaust valve: 0.45 mm (0.018 in.)	Section 20, group 10
BATTERIES		
Thoroughly clean cables, connections and batteries	. . . . .	. . . . .
Tighten cable clamp screws	. . . . .	. . . . .
Liberally coat battery terminals and cable connectors with petroleum jelly	. . . . .	. . . . .
Check electrolyte level of battery	. . . . .	Operator's manual
Check specific gravity of electrolyte	. . . . .	Operator's manual
ALTERNATOR		
Check fan belt tension	19 mm (3/4 in.) deflection with 90 N (20 lb) force	Section 20, group 35
FUEL SYSTEM		
Check fuel tank and lines for leaks or restriction	. . . . .	. . . . .
Clean screen of fuel transfer pump	. . . . .	Operator's manual
Check fuel filter element and replace, if necessary	. . . . .	Section 30, group 10 and Operator's manual
Check injection timing and adjust, if necessary	. . . . .	Section 30, group 15
Bleed fuel system	. . . . .	Section 30, group 15
Check engine speeds and adjust speed control linkage, if necessary	. . . . .	Section 20, group 40

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ENGINE TUNE-UP - Continued

Service	Specifications	Reference
ENGINE LUBRICATION SYSTEM		
Check minimum engine oil pressure	1 bar (14 psi) at 800 rpm	Section 20, group 30
COOLING SYSTEM		
Clean and flush cooling system	. . . . .	FOS "Fundamentals of Service, Engine" manual
Check radiator hoses for damage and leaks	. . . . .	. . . . .
Clear radiator core of restrictions	. . . . .	. . . . .

CHECKING ENGINE PERFORMANCE

FOS After the engine has been tuned up as explained above, determine powershaft horsepower by means of a dynamometer, see "Fundamentals of Service, Engine" manual. Compare measured performance in HP with output measured before carrying out "Engine Tune-Up".

TRACTOR TUNE-UP

After carrying out engine tune-up, make the following adjustments on the tractor:

Service	Specifications	Reference
ENGINE CLUTCH		
Adjust clutch pedal free travel	Approx. 25 mm (1 in.)	Section 50, group 5
FRONT WHEELS		
Clean and lubricate front wheel bearings	. . . . .	Section 80, group 10
Adjust front wheel bearings	. . . . .	Section 80, group 10
Check toe-in	3 to 6 mm (0.12 to 0.25 in)	Section 60, group 5
Check torque of front wheel bolts	180 Nm (130 ft-lb)	. . . . .
HYDRAULIC BRAKES		
Bleed brake system	. . . . .	Section 60, group 15

TRACTOR TUNE-UP - Continued

10

Service	Specifications	Reference
HYDRAULIC SYSTEM		
Check stand-by pressure of hydraulic pump	155 bar (2250 psi)	Section 70, group 5
Check rockshaft lift cycle time at 2500 rpm engine speed	1.8 to 2.3 sec.	Section 70, group 5
Check time required for extending or retracting remote cylinder at 2100 rpm engine speed	2 sec.	Section 70, group 5
Check operating pressure of Hi-Lo shift unit	9 to 9.5 bar (125 to 135 psi)	Section 50, group 10
Check operating pressure of PTO clutch and PTO brake	9 to 9.5 bar (125 to 135 psi)	Section 50, group 30
TIRES		
Check tire inflation pressure	. . . . .	Operator's manual
TORQUES		
Check all accessible cap screws and nuts of tractor for proper torque	. . . . .	Torque chart

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STANDARD TORQUES

Recommended torques in Nm and ft-lb for UNC and UNF cap screws

Head marking (identifying strength)	 or 6.8**		 or 10.9**		 or 12.9***	
Thread-O.D. (in.)	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb
1/4	—	—	15	10	20	14
5/16	—	—	30	20	40	30
3/8	—	—	50	35	70	50
7/16	50	35	80	55	110	80
1/2	80	55	120	85	170	120
9/16	100	75	180	130	240	175
5/8	150	105	230	170	320	240
3/4	260	185	400	300	580	425
7/8	220 ****	160 ****	600	445	930	685
1	340	250	910	670	1400	1030
1-1/8	450	330	1240	910	1980	1460
1-1/4	650	480	1700	1250	2800	2060

NOTE: A variation of ± 10% is permissible for all torques indicated in this chart.

Torque figures indicated above and in the Specifications sections of this manual are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or cap screws unless otherwise specified in this manual.

* Regular bolts and cap screws
** Tempered steel high strength bolts and cap screws
*** Tempered steel extra high strength bolts and cap screws
**** Bolts and screws 7/8 in. and larger are often formed hot rather than cold, which accounts for the lower torque.

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Group 25
Tractor Separation

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SEPARATING BETWEEN ENGINE AND TRACTOR FRONT END

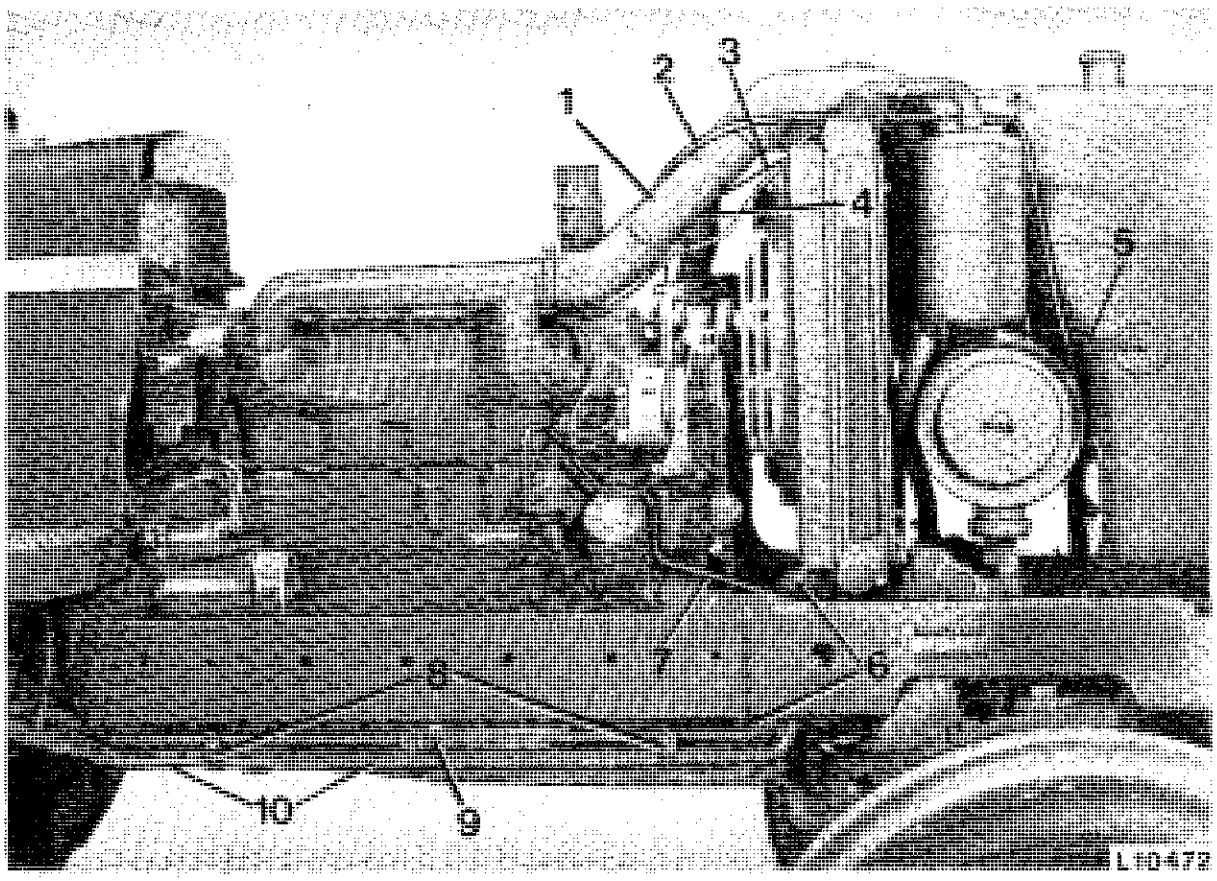

Fig. 1 — Separating between Tractor Front End and Engine

1 Air intake pipe
2 Leak-off and vent line
3 Fuel return line
4 Upper water hose
5 Cable of fuel gauge sending unit
6 Oil cooler return line
7 Fuel inlet line, tank to transfer pump
8 Hose clamps
9 Hydraulic pump inlet line
10 Hydraulic pump pressure line

REMOVAL

For safety disconnect ground straps from batteries. Remove front end weights (if equipped). Remove radiator cap and fuel tank cap. Remove radiator side grilles and hood.

Remove side frames.

Reinstall radiator and fuel tank caps.

Disconnect fuel return line 3 (fig. 1) at tank.

Disconnect cable 5 of fuel gauge sending unit at tank.

Disconnect cable at air cleaner restriction warning switch.

Disconnect air intake pipe 1 at engine intake manifold.

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Disconnect leak-off and vent line 2 leading to transmission shift cover at hydraulic oil reservoir.

10 Drain coolant and disconnect upper and lower water hoses at radiator.

Close fuel shut-off valve at bottom of fuel tank.

Disconnect fuel inlet line 7 at fuel tank and at fuel transfer pump. Remove fuel inlet line.

Relieve pressure in hydraulic system.

⚠ CAUTION: Escaping fluid under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Before disconnecting lines, be sure to relieve all pressure. Before applying pressure to system, be sure all connections are tight and that lines, pipes and hoses are not damaged. Fluid escaping from a very small hole can almost be invisible. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.

If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.

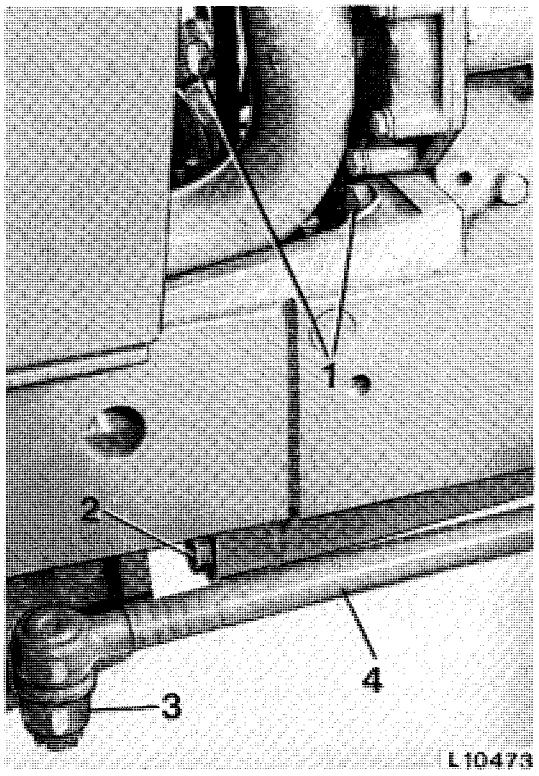

Fig. 2 — Attaching Points of Tractor Front End

1 Cap screws (4 used)
2 Cap screws (2 used)
3 Bell crank
4 Drag link

Disconnect hydraulic pump pressure line 10 (fig. 1) at T-piece. Disconnect inlet line 9 and disconnect return line 6 at oil cooler. Remove both hose clamps 8.

Disconnect drag link 4 (fig. 2) at bell crank 3.

Loosen clamping screws of hydraulic pump drive shaft.

Securely support rear of tractor under clutch housing.

Insert wooden blocks between front axle and front support to prevent the latter from tipping sideways. Attach front of tractor to a suitable hoist.

Remove cap screws 1 and 2 (fig. 2) of front support and separate front end from engine.

⚠ CAUTION: Take measures to prevent front of tractor from tipping to the front. If tank contains too much fuel, drain it or safely support front of tractor.

INSTALLATION

Make sure woodruff key is installed in shaft of hydraulic pump.

Move front of tractor toward engine.

Engage pump shaft in hydraulic pump drive shaft.

Connect pressure line 10 (fig. 1) and inlet line 9 of hydraulic pump and attach return line 6 to oil cooler.

Attach front of tractor to engine by means of cap screws 1 (fig. 2) and tighten to specified torque (see Torques for Hardware).

Make sure oil pan is flush against clutch housing. Attach oil pan to clutch housing, tightening cap screws to specified torque (see Torques for Hardware).

Eliminate gap between front support and crankcase by means of shims and attach front support to oil pan, tightening both cap screws 2 (fig. 2) to specified torque (see Torques for Hardware).

Also tighten pump shaft clamping screws to the specified torque.

IMPORTANT: Tighten pump shaft clamping screws only when tractor front end has been attached to engine and oil pan.

Connect fuel return line to fuel tank.

Connect fuel inlet line to fuel tank and fuel transfer pump.

Open fuel tank shut-off valve.

Connect cables to air cleaner restriction warning switch and fuel gauge sending unit.

Attach water hoses to radiator.

Connect leak-off and vent line to hydraulic oil reservoir. Install spacers and clamps of hydraulic lines.

Attach air intake pipe to air intake manifold.

Attach drag link to bell crank and tighten slotted nut to the specified torque.

Install hood and radiator side grilles.

Fill radiator with clear soft water, adding an anti-freeze-rust inhibitor mixture (see Operator's Manual).

Connect ground straps to batteries.

IMPORTANT: Always connect ground straps to negative (-) pole of batteries.

Start engine and check fuel lines, hydraulic lines and water hoses for leaks.

REMOVING AND INSTALLING ENGINE

NOTE: For most engine service operations the engine need not be removed. However, if the crankshaft has to be removed or in case of major overhaul, remove engine.

REMOVAL

For safety disconnect ground straps from batteries.

Separate tractor front end from engine, as explained previously.

Remove attaching screw of right-hand, front half of foot rest from flywheel housing.

Disconnect cables between alternator and regulator by removing three-terminal plug at alternator. Disconnect red cable at terminal B+ of alternator.

Disconnect all cables at starting motor.

Disconnect oil pressure warning switch cable (see 4, fig. 3).

Disconnect flexible shaft 2 (fig. 3) of speed-hour meter at clutch housing and camshaft. If necessary, replace rubber gasket of flexible shaft (it may remain in bore of clutch housing).

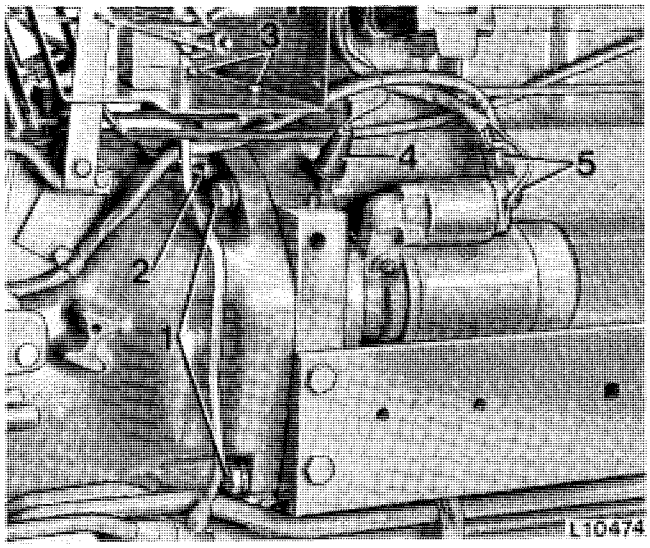

Fig. 3 — Separating between Engine and Clutch Housing, R.H. Side

1 Engine attaching screws
2 Flexible shaft of speed-hour meter
3 Cap screws attaching cowl
4 Oil pressure warning switch
5 Starter cables

Remove cap screws 3 attaching cowl to flywheel housing.

Free engine wiring harnesses as well as leak-off and vent line of hydraulic oil reservoir.

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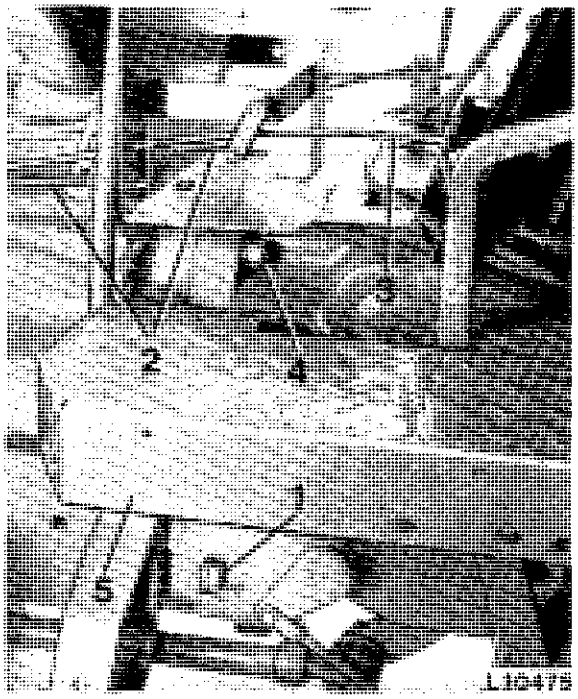

Fig. 4 — Separating between Engine and Clutch Housing, L.H. Side

1 Engine attaching screw
2 Speed control rod
3 Shut-off cable
4 Engine attaching hex. nut
5 Left-hand front half of foot rest

Disconnect speed control rod 2 (fig. 4) and shut-off cable 3 at fuel injection pump.

Screw retaining screw of coolant temperature gauge flexible tube out of cylinder head and withdraw flexible tube from cylinder head.

Remove attaching screw of left-hand, front half of foot rest 5 (fig. 4) from flywheel housing.

Attach JD 244-1 and 244-2 lifting eyes to cylinder head and attach engine to a suitable hoist.

Remove cap screws 1 and hex. nut 4 (figs. 3 and 4) securing flywheel housing to clutch housing and the cap screws securing clutch housing to oil pan.

Remove engine forward by means of the hoist.

IMPORTANT: Move engine properly in line with drive shaft and hollow drive shaft until these shafts come free of the clutch disk and torsion damper.

INSTALLATION

Align engine properly with drive shaft and hollow drive shaft. Move engine towards rear of tractor.

Align splines of both shafts with splines of clutch disk and torsion damper. Align screw holes of flywheel housing with holes in clutch housing. Slide engine evenly toward clutch housing, inserting both dowels of flyhweel housing in bores of clutch housing, until engine fully contacts clutch housing.

IMPORTANT: Make sure flywheel housing is flush against clutch housing before tightening cap screws and hex. nut to specified torque.

Secure oil pan to clutch housing, tightening both cap screws to specified torque (see Torques for Hardware).

Attach cowl to flywheel housing.

Connect speed control rod and shut-off cable to fuel injection pump.

Insert flexible tube of coolant temperature gauge in cylinder head and tighten retaining screw.

Connect three-terminal plug at alternator and red cable to alternator terminal B+.

Connect cables to starting motor.

Connect cable to oil pressure warning switch. Secure wiring harnesses.

Lubricate gasket of flexible speed-hour meter shaft and attach shaft to clutch housing (see 2, fig. 3). Make sure driving tab of flexible shaft engages in slot of camshaft. Do not tighten excessively to avoid damage to the gasket resulting in leakage.

Secure hydraulic oil reservoir breather line to rocker arm cover.

Attach both front foot rests to clutch housing.

Attach front of tractor to engine and oil pan (see under Installing Tractor Front End).

IMPORTANT: Connect ground straps of batteries to negative (-) poles.

NOTE: If engine has been overhauled, tune up engine as explained in group 20.

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REMOVAL AND INSTALLATION OF CLUTCH HOUSING

NOTE: Separating and joining the tractor between engine and clutch housing as well as between clutch housing and transmission case is explained below. Where the tractor is to be separated depends on the individual repair operation. If, e.g., repair work has to be carried out on the transmission, separation between the clutch housing and the transmission case will be sufficient.

REMOVAL

Disconnect battery ground straps.

Drain transmission oil.

Separate engine from clutch housing as explained under REMOVING ENGINE: the tractor front end may remain attached to the engine.

Remove cap screw and retainer securing hydraulic pump inlet line and oil cooler return line to front of clutch housing.

Disconnect pressure line 10 (fig. 1) at T-piece.

Disconnect pressure line of power steering at connections.

Insert wooden blocks between front axle and front support to prevent front support from tipping sideways.

Safely support rear end of tractor.

Attach tractor front end and engine to a suitable hoist and remove attaching screws and hex. nut between engine and clutch housing (see figs. 3 and 4) as well as between clutch housing and oil pan.

Roll engine and tractor front end away from clutch housing.

Remove brake pedals and both foot rests. Unhook clutch pedal return spring. Remove both batteries. Remove foot rest center section.

Disconnect hydraulic oil reservoir leak-off and breather line 5 (fig. 5) at transmission shift cover.

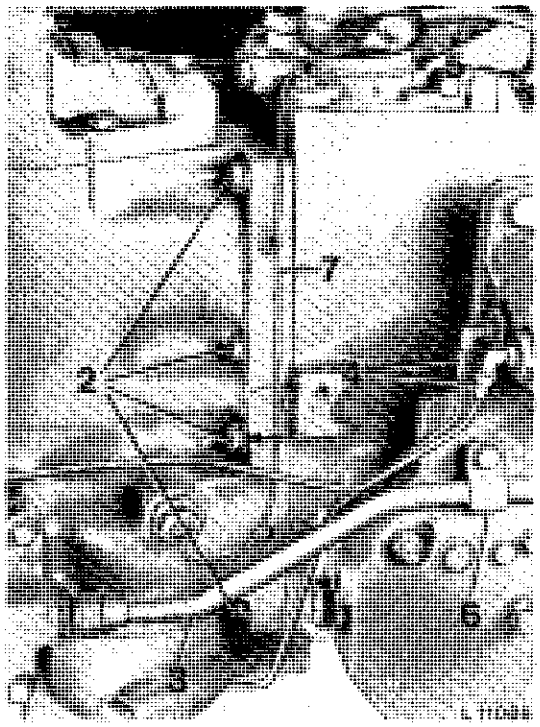

Fig. 5 — Separating between Clutch Housing and Transmission Case, R.H. Side

1 Start safety switch cables
2 Attaching screws
3 Pressure line of hydraulic pump
4 Brake lines
5 Leak-off and breather line
6 Clamp
7 Cable of transmission oil pressure warning switch

Disconnect section (see 3, fig. 5) of hydraulic pump pressure line at control valve and at T-piece. Loosen clamp 6 and remove line.

Disconnect brake lines 4 at brake cylinder.

Disconnect cable 7 of transmission oil pressure switch.

Disconnect wiring harnesses leading to rear fenders at connectors.

Disconnect cables to start safety switch.

Disconnect connecting rod 5 (fig. 6) at shaft of cover 4.

Remove both cap screws 3 of cover 4 and remove cover together with shaft and steering arm of Hi-Lo control valve assembly.

Remove cap screws attaching transmission shift cover to clutch housing. Remove cover complete with shift levers.

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Remove transmission oil filter. On tractors equipped with an external hydraulic motor: First disconnect hydraulic motor return line at elbow connector on transmission oil filter.

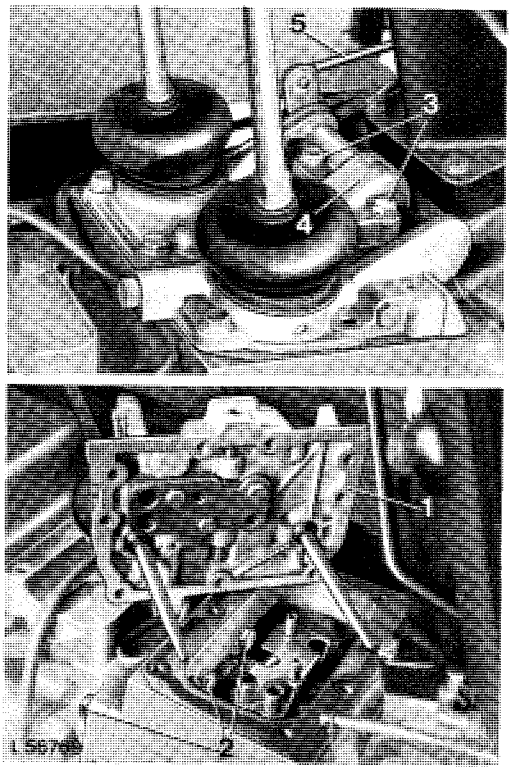

Fig. 6 — Removing Gear Shift Cover

1 Shift cover
2 Clutch housing attaching screws
3 Cap screws
4 Cover
5 Connecting rod

Remove cap screws 2 (figs. 5 and 6) securing clutch housing to transmission case and separate clutch housing from transmission case.

Discard seal rings provided between the two housings.

NOTE: The PTO clutch shaft slides out of the coupling provided on the shaft when separating the above housings. Make sure that the coupling does not slide off the PTO shaft and fall into the transmission case.

INSTALLATION

Install new seals in clutch housing front facing transmission case.

NOTE: If coupling has dropped off the PTO shaft when separating, slide a screw driver through opening of clutch housing and push coupling back on PTO shaft.

Move clutch housing toward transmission case. Engage splines of PTO clutch shaft in splines of coupling.

Make sure clutch housing is flush against transmission case when tightening attaching screws to the specified torque.

NOTE: Before screwing third cap screw from top (see arrow in fig. 5) into right-hand side of clutch housing, coat threads with an oil-resistant sealant.

NOTE: If clutch housing has also been separated from engine, assemble as explained under Installation of Engine.

Coat bores in clutch housing with grease, insert hydraulic pump inlet line and oil cooler return line and secure by means of screw and clamp. Tighten screw to the specified torque.

Attach hydraulic pump pressure line to flow control valve and T-piece.

As regards further installation operations, reverse removal procedure.

Reconnect pressure line of power steering.

IMPORTANT: Connect ground straps of batteries to negative (-) poles.

REMOVAL AND INSTALLATION OF FINAL DRIVES

REMOVAL

NOTE: The removal of both final drives is explained below. If only one final drive is to be removed, do necessary work only.

Raise rear of tractor by means of a suitable jack or hoist and remove rear wheels.

CAUTION: Support transmission safely to prevent tipping of tractor.

Drain transmission oil.

Remove both battery covers and disconnect both ground straps.

Disconnect rear wiring harnesses at connectors.

Disconnect both starter cables at batteries and lift batteries out of battery compartments.

Remove both rear fenders and roll gard.

Remove both battery compartments.

Disconnect brake lines on both final drive housings.

Disconnect inlet and return line as well as lines to breakaway couplers from selective control valves. Remove selective control valves complete with bracket.

Cover connections and exposed openings with plastic plugs or caps to prevent particles of dirt from entering the system.

CAUTION: Attach final drive to a hoist and unscrew attaching screws, but do not remove. Otherwise brake housing (see 4, fig. 7) will fall free (danger of accidents). Remove final drive together with brake housing.

INSTALLATION

Position new gasket between final drive housing and brake housing as well as between transmission case and brake housing.

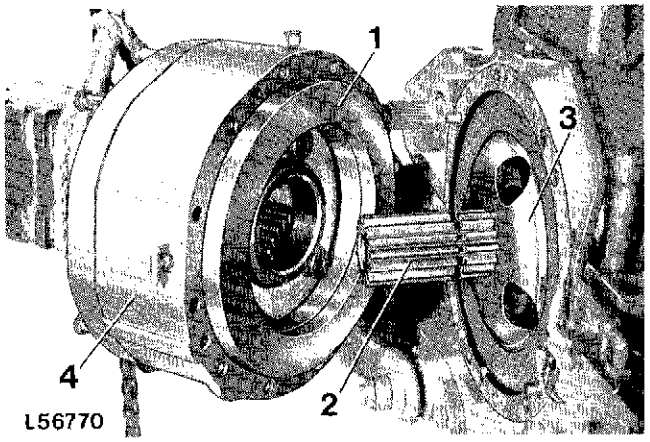

Fig. 7 — Removing Final Drive

1 Pressure ring hydraulic brake
2 Final drive shaft
3 Brake disk
4 Brake housing with ring gear

Attach final drives to transmission case by means of a suitable hoist (see fig. 7). Make sure final drive shaft gear engages with planetary gears and that the dowels are properly aligned.

Install battery compartments.

Install selective control valves complete with bracket. Tighten final drive cap screws to the specified torque.

Connect hydraulic lines and brake lines and bleed brakes, as explained in section 60, group 15.

Install roll gard and rear fenders, tightening cap screws and nuts to specified torque. Connect wiring harnesses to connectors and install center part of foot rest.

Install rear wheels and tighten to the specified torque.

Refill transmission case with oil (see Operator's Manual).

IMPORTANT: Tighten ground straps to negative (-) poles of batteries.

REMOVAL AND INSTALLATION OF ROCKSHAFT

10

REMOVAL

IMPORTANT: Work on the hydraulic system requires extreme care and cleanliness. Minute dirt or foreign particles, scratches, nicks or burrs may put the hydraulic system out of function. Before removing the rockshaft, check hydraulic system for leaks.

For safety, disconnect ground straps from batteries.

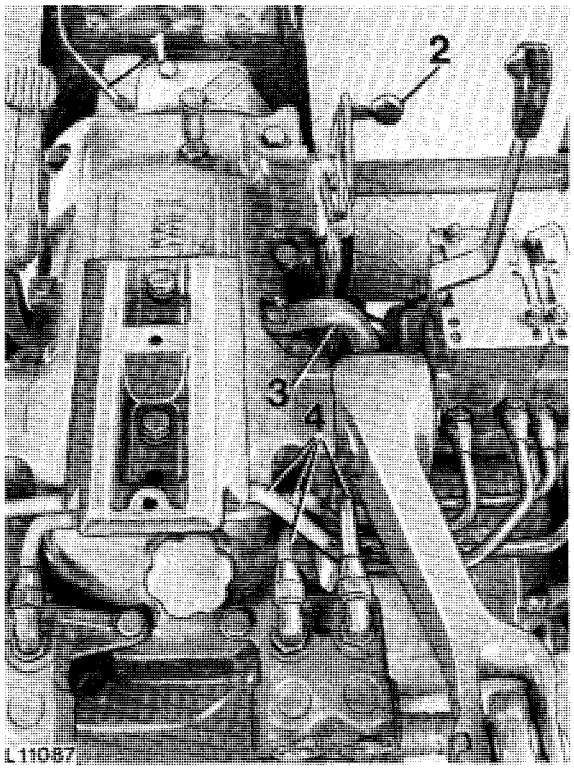

Fig. 8 — Rockshaft, Installed

1 Start safety switch cable
2 Selector lever
3 Oil return line
4 Pressure lines, to coupler

Remove center section of operator's platform. Disconnect cable 1 (fig. 8) at start safety switch.

Remove operator's seat. Disconnect both lift links at lift arms.

Remove oil return line 3 (fig. 8) of selective control valves and lines to breakaway couplers.

Free rear wiring harness.

Move selector lever in position "L" (load control) so that the control linkage roller slides along the cam of the control arm when removing the rockshaft.

Remove rockshaft attaching screws and lift rockshaft assembly off transmission case by means of a hoist.

NOTE: After removing rockshaft, cover transmission case to prevent foreign particles from falling into the transmission.

INSTALLATION

Use a new gasket between transmission case and rockshaft. Make sure dowels in transmission case and seal of oil inlet passage are installed.

Move selector lever in position "L" so that the control linkage with roller can be slid over the cam.

Install rockshaft, reversing removal procedure and tighten cap screws to specified torque.

As regards further installation operation reverse removal procedure.

For adjustment of rockshaft see Section 70, Group 20.

IMPORTANT: Connect ground straps to negative (-) poles of batteries.

TORQUES FOR HARDWARE

Front support to engine, cap screws	230 Nm	170 ft-lb
Front support to oil pan, cap screws	400 Nm	300 ft-lb
Hydraulic pump drive shaft, clamping screws	50 Nm	35 ft-lb
Drag link to bell crank or steering arm, slotted nut*	75 Nm	55 ft-lb
Clutch housing to engine block, cap screws	230 Nm	170 ft-lb
Oil pan to clutch housing, cap screws	230 Nm	170 ft-lb
Clutch housing to transmission, cap screws	160 Nm	120 ft-lb
Retainer of hydraulic lines to clutch housing, cap screw	45 Nm	32 ft-lb
Final drive housings to transmission case, cap screws	230 Nm	170 ft-lb
Rockshaft housing to transmission case, cap screws	120 Nm	85 ft-lb
Wheel disk to hub (rack-and pinion axle) wheel bolts	400 Nm	300 ft-lb
Roll gard support to final drive housing, cap screws	400 Nm	300 ft-lb

* *NOTE: If cotter pin cannot be inserted when tightening to the specified torque, turn nut to next slot and secure with cotter pin.*

SPECIAL TOOLS

No.	Description	Use
JD 244-1*	Lifting eye, straight	Removing and installing assemblies
JD 244-2*	Lifting eye, bent	Removing and installing assemblies

* SERVICE TOOLS, BOX 314, OWATONNA, MINNESOTA 55060

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Section 20
Engine

CONTENTS OF THIS SECTION

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Group 5

General Information, Diagnosing Malfunctions

20

GENERAL INFORMATION

The tractor is equipped with a 6-cylinder vertical in-line, valve-in-head, 4-cycle Diesel engine with direct fuel injection.

The "wet" cylinder liners can be replaced one at a time. The pistons are of forged aluminium alloy and cam-ground. Each piston has two single, cast-iron compression rings and one oil control ring. All ring grooves are above the piston pin. The case-hardened piston pins are full floating and are held in place by two snap rings each.

The crankshaft is a one-piece, heat-treated steel forging. It is supported in seven replaceable two-piece main bearings machined to close tolerances.

The connecting rods are provided with a bronze bushing and a two-piece, replaceable bearing cap each.

A camshaft supported in the cylinder block controls the valves and drives the fuel transfer pump.

The intake and exhaust valves are supported in the cylinder head. The valve stems slide in bores in the cylinder head. The rocker arm shaft assembly is fitted on top of the cylinder head.

The engine is supplied with lubricating oil by a gear pump. The lubricating oil passes through a full-flow oil filter in the main oil circuit. To ensure engine lubrication, the oil filter is provided with a by-pass valve which opens when the filter element is restricted.

The engine has a pressure cooling system consisting of the radiator, water pump, multi-blade fan and thermostat.

DIAGNOSING MALFUNCTIONS

ENGINE WILL NOT CRANK

Dead batteries

Bad battery connections

Defective key switch or start safety switch

Starting motor solenoid defective

Starting motor defective

ENGINE HARD TO START OR WILL NOT START

Loose or corroded battery connections

Low battery output

Excessive resistance in starter circuit

Too high viscosity crankcase oil

Water, dirt or air in fuel system

Fuel filter restricted

Stuck shut-off knob

Dirty or faulty fuel injection nozzles

Defective fuel injection pump

Defective fuel transfer pump

Shut-off valve at fuel tank closed

Injection pump incorrectly timed

ENGINE RUNS IRREGULARLY OR STALLS FREQUENTLY

Coolant temperature too low

Insufficient fuel supply

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Fuel injection nozzles defective or leaking

Fuel filter or fuel lines restricted

Defective fuel transfer pump

Incorrect engine timing

Improper valve clearance

Cylinder head gasket leaking

Worn or broken compression rings

Valves stuck or burnt

Exhaust system restricted

Engine compression too low

Engine overheated

Defective fuel injection pump

ENGINE MISSES

Water in fuel

Mixture of gasoline and Diesel fuel

Air in fuel system

Defective fuel injection nozzles

Defective fuel injection pump

Fuel injection nozzles improperly installed

Leaking fuel injection nozzles seals

Engine overheated

Lobes of camshaft worn

Weak valve springs

Worn or defective fuel transfer pump

Pre-ignition

Incorrect engine timing

Engine compression too low

Improper valve clearance

Burnt, damaged or stuck valves

LACK OF ENGINE POWER

Air cleaner restricted or dirty

Excessive resistance in air intake system

Fuel filter restricted

Defective fuel transfer pump

Defective fuel injection pump

Defective fuel injection nozzles

Improper crankcase oil

Engine overheated

Engine clutch drags

Defective cylinder head gasket

Lobes of camshaft worn

Improper valve clearance

Improper valve timing *

Burnt, damaged or stuck valves *

Weak valve springs *

Incorrect engine timing

Piston rings and cylinder liners excessively worn *

Engine compression too low *

Improper coolant temperature

ENGINE OVERHEATS

Lack of coolant in cooling system

Radiator core and/ or side grille screens dirty

Loose or defective fan belt

Defective thermostat

Cooling system limed up

Engine overloaded

Fuel injection pump delivers too much fuel

Damaged cylinder head gasket

* Measure blow-by at crankcase vent tube or carry out cylinder compression test. See section 10, group 20.

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Thank you very much for your reading.

Please Click Here Then Get More Information.