2130 Tractor

JOHN DEERE

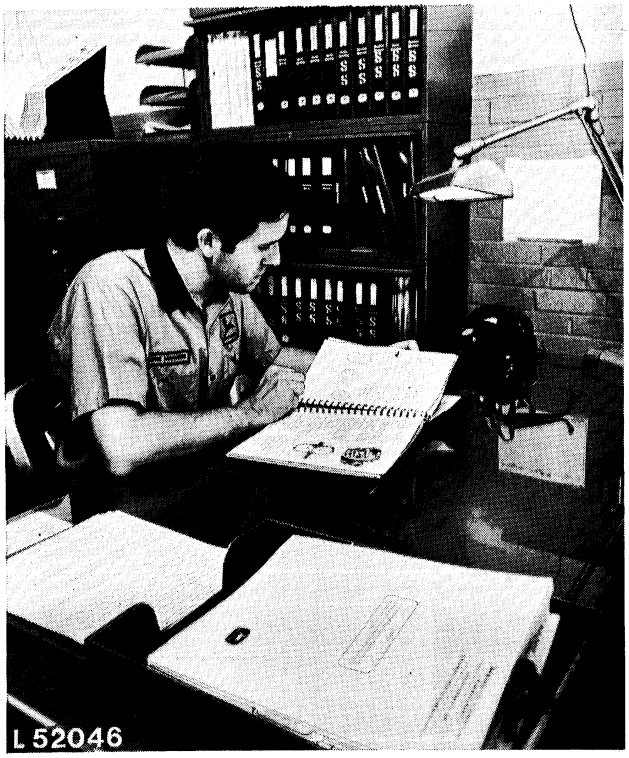
Technical Manual

John Deere Werke Mannheim
TM-4272
Printed in Germany (English)

CONTENTS

Printed in Germany (K 8)

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.

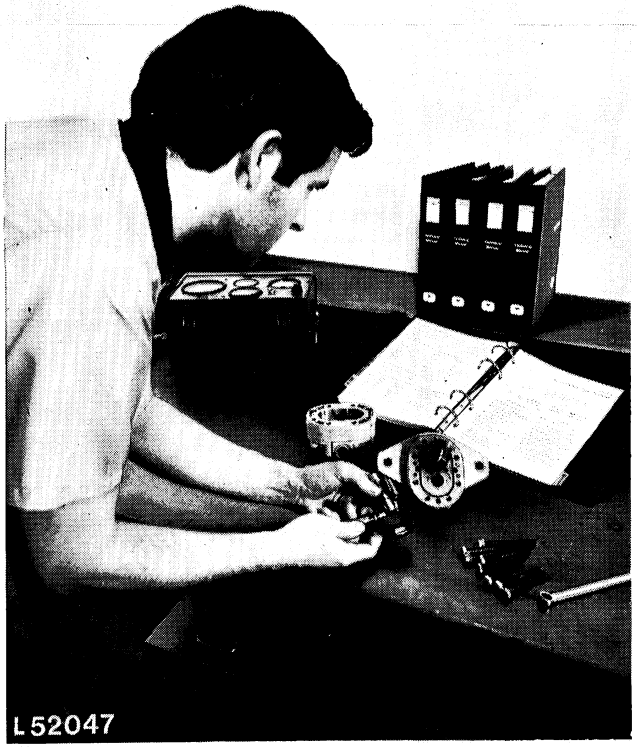
Technical Manuals are concise service guides for a *specific* machine. Technical Manuals are on-the-job guides containing only the vital information needed by an experienced technician.

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/cm^2
1 kW = 1.36 PS (1.34 HP)		

Exact conversion: 1 kp = 9.81 N; 1 mkp = 9.81 Nm; 1 kp/cm^2 = 0.981 bar



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 on page 1*
- *Contents at front of each Section*
- *Specifications at end of each Group*
- *Torques for hardware 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 follow.

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Section 10
General

CONTENTS OF THIS SECTION

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Group 5
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 indentification of different makes of a given unit.

ENGINE

Number of cylinders 4

Cylinder liner bore . . . . . 106.5 mm (4.19 in.)

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

Displacement . . . . . 3920 cm^3 (239 cu. in.)

Compression ratio . . . . . 16.8 : 1

Maximum torque at
1400 rpm . . . . 246 Nm = 24.6 mkp (181 ft-lb)

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

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 . . . . . 750 rpm

Working speed range . . . . . 1400 to 2500 rpm

Flywheel horsepower at rated
engine speed of 2500 rpm
according to DIN 70020 . . . . . 55 kW (75 HP)

PTO horsepower*
at rated engine speed of:
2500 rpm engine speed
according to DIN 70020 . . . . . 51 kW (69 HP)
according to SAE J 816 B . . . . 49 kW (66 HP)

ENGINE CLUTCH

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

ELECTRICAL SYSTEM

Batteries . . . . . 2 x 12 volts, 55 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.

This transmission is available in two variations:

8 speed transmission with parking lock, without independent hand brake and
8 speed transmission without parking lock and with independent hand brake;

With this transmission 8 forward and 4 reverse speeds are available.

* 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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HIGH-LOW 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 %.

CREEPER TRANSMISSION

Mechanically controlled reduction gear. Allows reduction of range I and reverse gear speeds by 77 %.

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 clutch is achieved by operating the hydraulically actuated band type brake.

PTO Speeds (in rpm)

Engine speed in rpm	540 rpm shaft	1000 rpm shaft
750	195	365
2070	540	1000
2500	650	1210
2660	695	1285

HYDRAULIC SYSTEM

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

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

Pump . . . . . 4 or 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.

MANUAL STEERING

The manual steering is a recirculating ball bearing, worm and nut type. A number of steel balls between ball nut and steering wheel shaft provide for positive engagement of steering wheel and steering linkage.

HYDRAULIC BRAKES

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

HANDBRAKE

Band-type locking brake acting on differential.

CAPACITIES

	Liters	U.S.gals.
Fuel tank	90.0	23.8
Cooling system	11.4	3.0
Engine crankcase		
incl. filter	8.5	2.25
without filter	8.00	2.1
Transmission-hydraulic system		
Dry system	36.0	9.5
At service intervals.	28.0	7.4
Belt pulley	1.0	0.3

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

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 main 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	Store in a cool and dry room	. . . . .
Reduce shipping pressure of tires	. . . . .	Operator's manual
Cover tractor and tires for protection and cleanliness	. . . . .	. . . . .

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PREDELIVERY INSPECTION (Contd.)

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 main 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 15 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: 90 liters (23.8 U.S. gals.)	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		
Engine clutch	Check clutch pedal adjustment-should be 25 mm (approx. 1 in.)	Section 50, group 5
Check operation of High-Low shift	. . . . .	Section 50, group 10
Check operation of creeper transmission	. . . . .	Section 50, group 11
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 20
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 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 comvenience, 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 and belt pulley (if equipped)
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: 1.28 with normal and arctic conditions and 1.23 with tropical conditions at an electrolyte temperature of 20°C (68°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
Check oil level of manual steering gear housing	Add oil up to filler hole	Operator's manual
Check oil level of belt pulley housing	Add oil up to filler hole	Operator's manual
Lubricate 3-point hitch	. . . . .	Operator's manual

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AFTER-SALES INSPECTION (Contd.)

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	25 mm (approx. 1 in.) free travel	Section 50, group 5
Check operation of High-Low 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 20
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 and Periodic Service

For brands of oil and lubricants to be used as well as for lubricating and servicing the 2130 tractor see operator's manual.

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Group 20
Engine and Tractor Tune-Up

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	35 to 60 mbar (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*	2.2 m^3 (77 cu-ft/h)	. . . . .
Check compression which should be at least (using special tool No. 19.58-90.578)	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 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	130 NM = 13 mkp (95 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 wires, 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 15
Adjust front wheel bearings	. . . . .	Section 80, group 15
Check toe-in	3 to 6.5 mm (1/8 to 1/4 in.)	Section 60, group 5
Check torque of front wheel bolts	180 Nm (18 mkp; 130 ft-lb)	
HYDRAULIC BRAKES		
Bleed brake system	. . . . .	Section 60, group 15

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TRACTOR TUNE-UP - Continued

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 High-Low 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, mkp and ft.lbs. for UNC and UNF cap screws

Head marking (identifying strength)	 or 6.8 *			 or 10.9 **			 or 12.9 ***		
Thread-O.D. (in.)	Nm	mkp	ft.lbs.	Nm	mkp	ft.lbs.	Nm	mkp	ft. lbs.
1/4	—	—	—	15	1.5	10	20	2	14
5/16	—	—	—	30	3	20	40	4	30
3/8	—	—	—	50	5	35	70	7	50
7/16	50	5	35	80	8	55	110	11	80
1/2	80	8	55	120	12	85	170	17	120
9/16	100	10	75	180	18	130	240	24	175
5/8	150	15	105	230	23	170	320	33	240
3/4	260	26	185	400	41	300	580	59	425
7/8	220****	22****	160****	600	61	445	930	95	685
1	340	35	250	910	92	670	1400	142	1030
1-1/8	450	46	330	1240	126	910	1930	202	1460
1-1/4	650	66	480	1700	173	1250	2800	285	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.

SPECIAL TOOLS*

Part No.	Description	Use
19.58-90.578	Special adapter	Checking compression pressure
19.58-90.260**	Special tool	Checking oil pressure

* For ordering instructions please contact your sales branch service department
** Details see section 70, group 5

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Group 25
Tractor Separation

SEPARATING BETWEEN ENGINE AND TRACTOR FRONT END

REMOVAL

For safety disconnect ground straps from batteries.

Remove front end weights (if equipped).

Remove radiator cap and fuel tank cap. Remove radiator side grille screens and hood.

On tractors with operator's cab: Before removing hood disconnect turn-signal light cables at plug.

Install radiator and fuel tank caps.

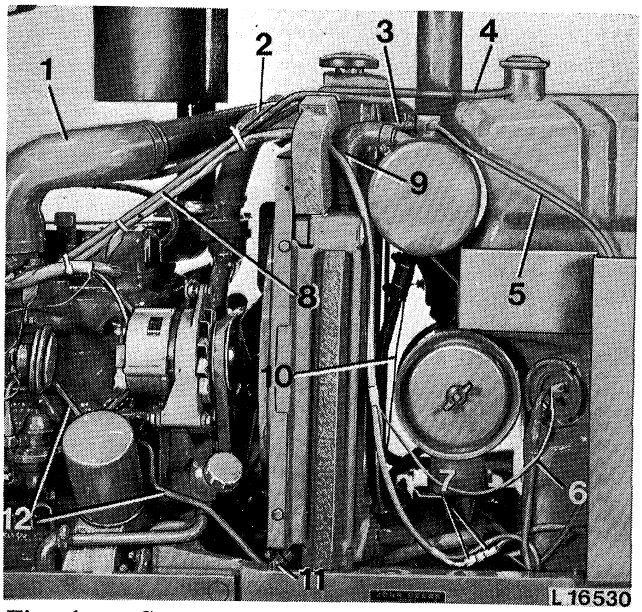

Fig. 1 — Separating between Tractor Front End and Engine

1 Air intake pipe
2 Upper water hose
3 Leak-off and bleed line
4 Fuel return line
5 Leak-off and bleed line
6 Cable of fuel gauge sending unit
7 Cable distributor
8 Radiator support rod
9 Hose
10 Cable of air cleaner restriction warning switch
11 Oil cooler return line
12 Fuel inlet line, tank to fuel transfer pump

Disconnect air intake pipe 1 (fig. 1) at engine intake manifold and at air cleaner.

Disconnect leak-off and bleed lines 3 and 5 at hydraulic oil reservoir.

Remove support rod 8 at top of radiator. Disconnect fuel return line 4 at fuel tank.

Disconnect cable 6 of fuel gauge sending unit at fuel tank.

Disconnect cables leading to headlights at distributor 7.

On headlights with parking lights disconnect cables at distributor.

Disconnect cable 10 at air cleaner restriction warning switch.

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

Remove hose elbow 9 between hydraulic oil reservoir and oil cooler at oil cooler end. Disconnect return oil line 11 at bottom of oil cooler.

NOTE: Plug lines and openings immediately with plugs or caps to prevent loss of oil and entering of dirt into the system.

Remove screws securing fan shroud to radiator and slide over fan to the rear.

Remove screws securing radiator to front axle support and lift out radiator to the left of tractor.

Up to serial no. 294 961 L: Close fuel shut-off valve at bottom of fuel tank.

Disconnect fuel inlet line 12 at fuel tank and fuel transfer pump. Remove fuel inlet line.

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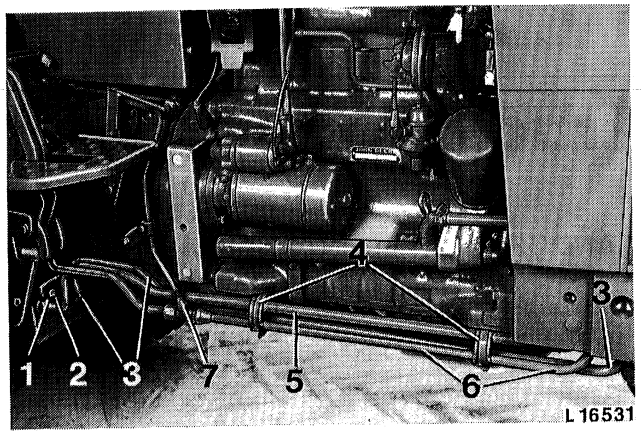

Fig. 2 — Disconnecting Hydraulic Lines

1 Retainer
2 Cap screw
3 Return line to transmission case
4 Clamps
5 Hydraulic pump inlet line
6 Hydraulic pump pressure line
7 Power steering pressure line

Remove tool box and side frame.

Remove both clamps 4 (fig. 2).

Drain transmission oil.

Unscrew cap screw 2 and remove retainer 1 which supports the hydraulic pump inlet line 5 and return line 3 of oil cooler.

Remove power steering pressure line 7 (if equipped).

Disconnect pressure line 6 at union (front of engine).

Disconnect drag link at bell crank.

Remove clamping screw of hydraulic pump drive shaft.

Place a support stand under clutch housing or support transmission case using support stand No. 19.58-90.619.

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

Attach front of tractor to a suitable hoist or support using support stand No. 19.58-90.618.

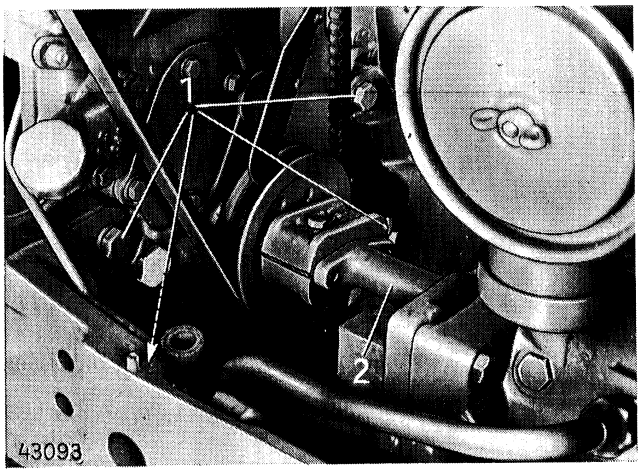

Fig. 3 — Attaching Points of Tractor Front End

1 Attaching screws of front axle support
2 Hydraulic pump drive shaft

Remove cap screws 1 (fig. 3) of front support and both cap screws located at the rear of front support and separate front end from engine. Take measures to prevent front of tractor from tipping forward (drain fuel tank if it contains too much fuel or support front end of tractor).

INSTALLATION

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

Move tractor front end toward engine.

Engage pump shaft in hydraulic pump drive shaft and at the same time slide oil return line and hydraulic pump inlet line into clutch housing bores (making sure both seal rings have been installed) and tighten both lines (see fig. 2). Tighten cap screw 2 (fig. 2) of retainer 1 to the specified torque.

NOTE: Before installing return line 3 (fig. 2) and inlet line 5 coat both bores in transmission case with grease.

Attach front end of tractor to engine. Tighten cap screws to specified torque. Tighten hydraulic pump drive shaft clamping screw to specified torque.

NOTE: Do not tighten clamping screw of hydraulic pump drive shaft until tractor front end is secured to engine.

Install fuel transfer pump and connect fuel lines.

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On earlier tractor models: Make sure transfer pump inlet line is behind and below fuel pressure line.

Up to serial no. 294 861 L: Open fuel tank shut-off valve.

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

Connect headlight cables at distributor.

Lift and slide radiator into location from the left side of tractor. Slide fan shroud forward over radiator and secure with screws. Secure radiator to front axle support. Install upper and lower water hoses.

Connect hose elbow between hydraulic oil reservoir and oil cooler at top of oil cooler and return line at bottom of oil cooler.

Connect breather lines to hydraulic reservoir.

Connect hydraulic pump pressure line and install line spacers and clamps (see fig. 2).

Connect air intake pipe at manifold and air cleaner.

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

Install hood and radiator side grille screens.

On tractors with operator's cab: Connect turn-signal light cables at plug.

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

Connect battery ground straps.

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 explaines previously.

On tractors without operator's cab:

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

Disconnect all cables 4 at starting motor (see fig. 4). Disconnect oil pressure warning switch cable 3 and cable at signal horn.

Disconnect flexible shaft 2 of speed-hour meter at clutch housing and camshaft.

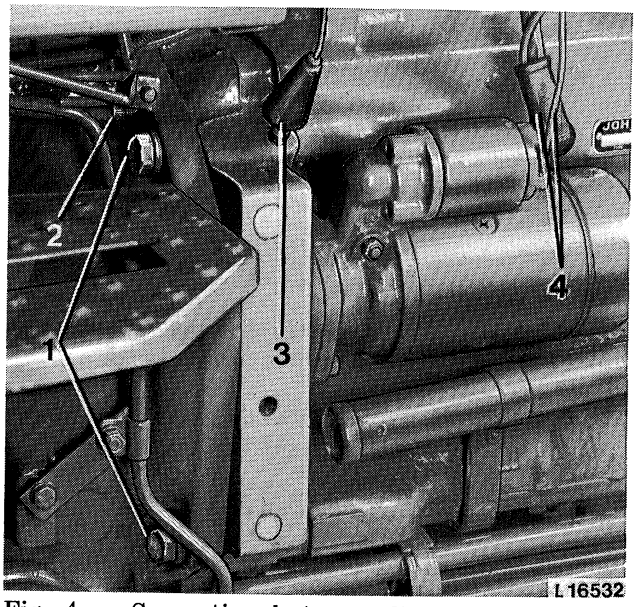

Fig. 4 — Separating between Engine and Clutch Housing, R.H. Side

1 Engine attaching points
2 Flexible shaft of speed-hour meter
3 Oil pressure warning switch
4 Starter cables

If necessary, replace gasket of flexible shaft.

On tractors equipped with starting fluid aid: Disconnect starting fluid line at intake manifold.

On tractors equipped with Thermostart aid: Disconnect cable at heater of intake manifold.

Remove breather line of hyraulic oil reservoir from clamp at rocker arm cover.

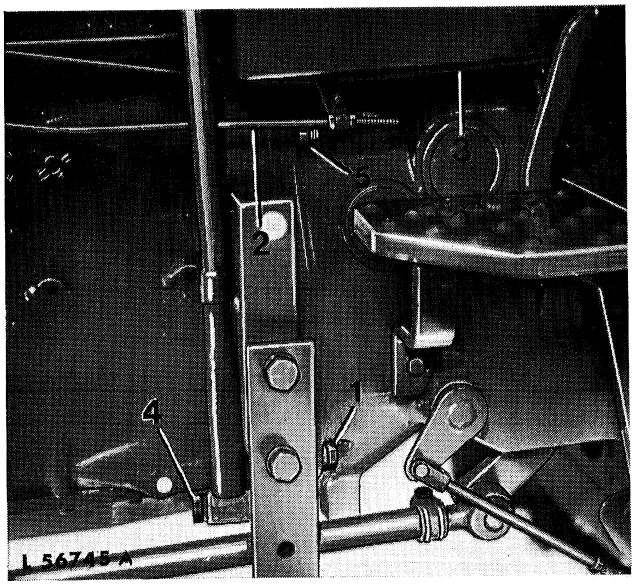

Fig. 5 — Separating between Engine and Clutch Housing, L.H. Side

1 Cap screws (3 used)
2 Speed control rod
3 Shut-off cable
4 Cap screws (2 used)
5 Hex. nut

Disconnect speed control rod 2 (fig. 5) and shut-off cable 3 at fuel injection pump.

On tractors with underneath muffler: Remove muffler.

Up to serial no. 268 526 L: Disconnect temperature gauge sensing bulb from cylinder head.

From serial no. 268 527 L: Disconnect cable at coolant temperature gauge sending unit.

Remove left dash panel as well as both batteries.

Remove cap screws attaching cowl to flywheel housing.

On tractors with operator's cab

Tilt operator's cab (see under Tilting Operator's Cab).

Disconnect flexible shaft of speed-hour meter 2 (fig. 4) at clutch housing and camshaft.

Disconnect air breather line of hydraulic oil reservoir at bracket on rocker arm cover.

Disconnect cables at start safety switch and stop light switch.

Disconnect cable at transmission oil pressure warning switch.

Remove batteries and free starter cable.

On all tractors

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

Remove cap screws 1 (figs. 4 and 5) and hex. nut 5 (fig. 5) securing flywheel housing to clutch housing.

Remove both cap screws 4 (fig. 5) securing engine crankcase to clutch housing.

Removing engine 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 flywheel 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 engine crankcase to clutch housing, tightening both cap screws to specified torque (see Torques for Hardware).

On tractors without operator's cab

Attach cowl to flywheel housing.

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

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Up to serial no. 268 526 L: Insert flexible tube of coolant temperature gauge in cylinder head and tighten retaining screw.

From serial no. 268 527 L: Connect cable to coolant temperature gauge sending unit.

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 and signal horn.

Install both batteries.

IMPORTANT: Connect starter cable to positive poles of batteries.

Lubricate gasket of flexible speed-hour meter shaft and attach shaft to clutch housing (see 2, fig. 4). 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.

On tractors equipped with starting fluid aid: Connect starting fluid line to intake manifold.

On tractors equipped with Thermostart aid: Connect Thermostart aid wire to heater in intake manifold.

On tractors equipped with underneath muffler: Install muffler.

Secure hydraulic oil reservoir breather line to rocker arm cover.

On tractors with operator's cab

Lubricate rubber seal of flexible speed-hour meter shaft (fig. 4) and attach shaft to clutch housing 2.

Secure hydraulic oil reservoir breather line to clamp at rocker arm cover.

Connect cables at start safety switch, stop light switch and transmission oil pressure warning switch.

Install batteries.

Attach front of tractor to engine.

On all tractors

Attach front of tractor to engine.

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

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

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.

Disconnect drag link at steering arm.

Disconnect hydraulic oil reservoir breather line 5 (fig. 6) at transmission shift cover.

Remove hose clips 4 (fig. 2), cap screw 2 and retainer 1 which secure suction line 5 of hydraulic pump and return line 3 of oil cooler to front side of clutch housing.

On tractors equipped with power steering: Disconnect power steering pressure line at connectors.

Only on tractors equipped with a hydraulic trailer brake: Disconnect pressure line 6 (fig. 6) of trailer brake valve at pressure line 3.

Remove clamp and hydraulic pump pressure line 3 (fig. 6).

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

Suspend tractor front end and engine to a suitable hoist or support under the engine by means of assembly stand 19.58-90.618. Similarly the rear of

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tractor should be suspended to a suitable hoist or be supported under the transmission case by means of assembly stand 19.58-90.619.

Roll engine and tractor front end away from clutch housing.

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

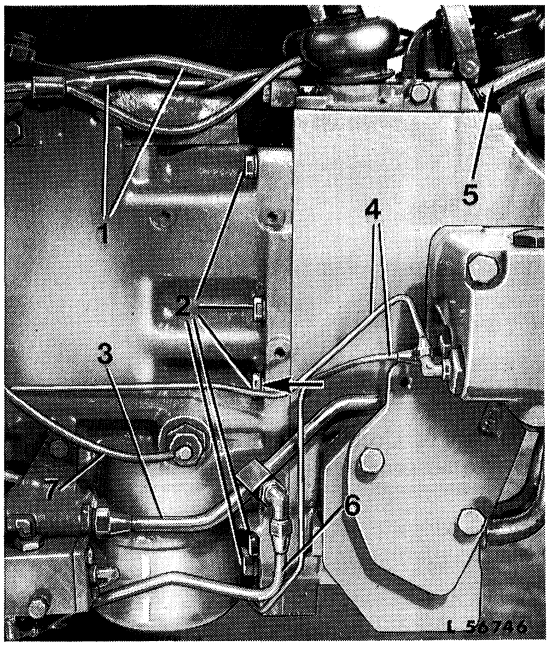

Fig. 6 — Separating between Clutch Housing and Transmission Case, R.H. Side (Earlier Model Shown)

1 Wiring harness
2 Attaching screws
3 Hydraulic pump pressure line
4 Brake lines
5 Hydraulic oil reservoir line
6 Brake valve pressure line (tractors with hydraulic trailer brake)
7 Transmission oil pressure switch cable (tractors with High-Low shift unit)

Disconnect brake lines 4 (fig. 6) at brake valve.

On tractors without operator's cab: Remove transmission shield. Disconnect both harnesses to rear fenders at connectors.

Disconnect cables at start safety switch and stop light switch.

On tractors equipped with High-Low shift unit: Disconnect cable 7 (fig. 6) at transmission oil pressure indicator switch. Disconnect connecting rod 5 (fig. 7) at cover 4.

Move independent PTO shift lever forward into engaged position.

On tractors with operator's cab: Disconnect PTO control lever linkage.

Remove both cap screws 3 (fig. 7) from cover 4. Lift out cover. After cover 4 has been removed, do not move PTO shift lever otherwise lock balls and springs will drop out of cover.

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

Remove transmission oil filter. On tractors equipped with a connection for an external hydraulic motor: First disconnect hydraulic motor return line at elbow connector on transmission oil filter, then screw elbow connector out of transmission oil filter.

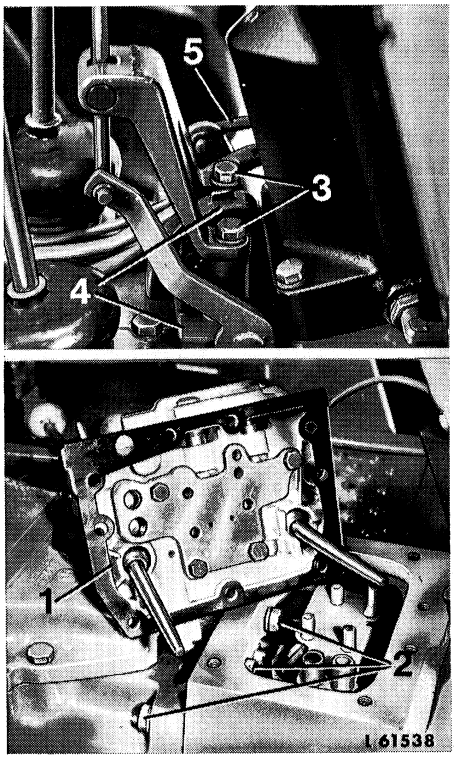

Fig. 7 — Removing Gear Shift Cover

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

Remove cap screws 2 (figs. 6 and 7) securing clutch housing to transmission case, and separate clutch housing from transmission case.

Discard seal rings located between the two housings.

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INSTALLATION

Installation new seal rings in clutch housing front facing transmission case.

Slide clutch housing against transmission case.

Slide PTO drive shaft into needle bearing sleeve of front bearing cover.

Align clutch housing with centerline of PTO drive shaft and slide against transmission case. Mesh powershaft gears with splines of hollow PTO drive shaft.

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

NOTE: Before installing the third (from top) retaining screw at right-hand of clutch housing (see arrow, fig. 6), coat screw with oil-resistant sealant.

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

Insert hydraulic pump inlet line 5 (fig. 2) and oil cooler return line 3 in bore of clutch housing and secure by means of screw and retainer. Tighten screw to the specified torque.

NOTE: Before installing return line 3 (fig. 2) and inlet line 5, coat both bores in clutch housing with grease.

Install hydraulic pump pressure line.

On tractors equipped with power steering: Connect power steering pressure line.

As regards further installation operations reverse removal procedure.

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.

For safety disconnect ground straps at batteries.

On tractors with operator's cab: Remove operator's cab (see under "Removing Operator's Cab").

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.

On tractors without operator's cab:
Disconnect both rear wiring harnesses at connectors. Remove both rear fenders and roll-over guard.

On earlier tractor models:
Disconnect cables at stop light switch located in left-hand final drive housing.

Disconnect brake lines on both brake housings 5 (fig. 8).

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

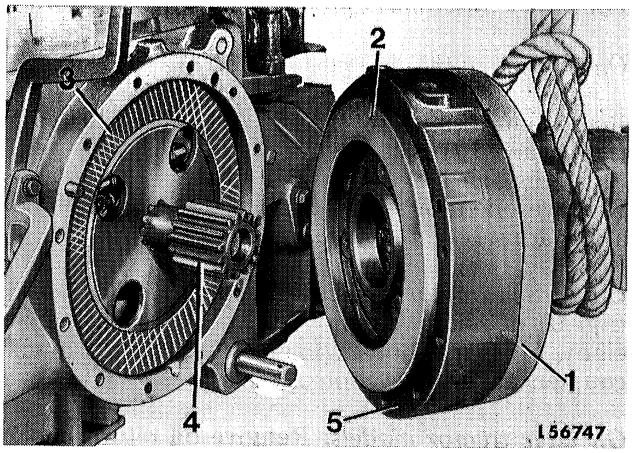

Fig. 8 — Removing Final Drive

1 Final drive housing
2 Pressure ring
3 Brake disk
4 Final drive shaft
5 Brake housing

Attach final drive to hoist and remove attaching screws. Separate final drive housing from transmission case. Withdraw housing evenly until final drive shaft gear is no longer in mesh with planetary gears of final drive.

CAUTION: Take care that brake housing 5 (fig. 8) is correctly supported and cannot fall.

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INSTALLATION

NOTE: If the brake disk was removed, install it with the brass-interwoven upper facing toward brake surface of transmission case.

Position new gasket between final drive housing and transmission case.

Attach final drive to transmission case by means of a suitable hoist. Make sure final drive shaft gear engages with planetary gears and that the dowels are guided into their respectives bores.

Tighten final drive attaching screws to the specified torque.

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

On tractors without operator's cab: Install rear fenders and roll-over guard. Tighten hex. nuts to specified torque. Connect wiring harnesses.

On earlier tractor models: Connect cables at stop light switch.

Install rear wheels and tighten to the specified torque.

On tractors with operator's cab: Install operator's cab (see under "Installing Operator's Cab").

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

REMOVAL AND INSTALLATION OF ROCKSHAFT

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.

On tractors without operator's cab

Remove transmission shield. Disconnect cables 1 (figs. 9 and 10) at start safety switch.

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

On earlier tractor models: Disconnect inlet line 6 (fig. 9) of selective control valves (if equipped) at elbow on spacer housing 5 and lines to front quick couplers at selective control valves.

On later tractor models: Remove oil return line 2 (fig. 10) of selective control valves (if equipped) and lines to quick couplers.

Free both rear wiring harnesses 4.

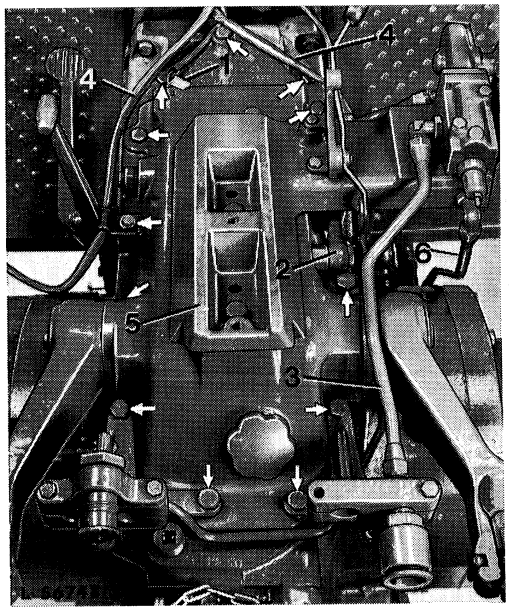

Fig. 9 — Rockshaft, Installed (Earlier Model Shown)

1 Wire of start safety switch
2 Oil return line
3 Lines to quick couplers
4 Wiring harnesses
5 Rockshaft spacer housing
6 Inlet line to selective control valves (if equipped)