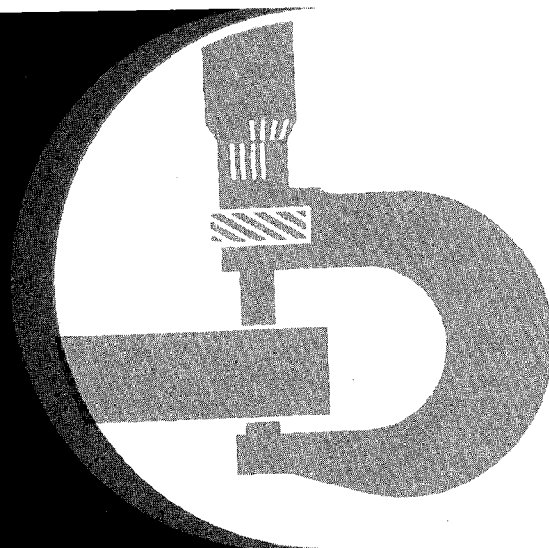


# John Deere 540 and 540A Skidders



## TECHNICAL MANUAL

John Deere Dubuque Works  
TM-1003

LITHO IN U.S.A.



# JD540 and JD540-A Skidders

TECHNICAL MANUAL  
TM-1003 (Mar-80)

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*The specifications and design information contained in this manual were correct at the time it was printed. It is John Deere's policy to continually improve and update our machines. Therefore, the specifications and design information are subject to change without notice. Wherever applicable, specifications and design information are in accordance with SAE and IEMC standards.*

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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.

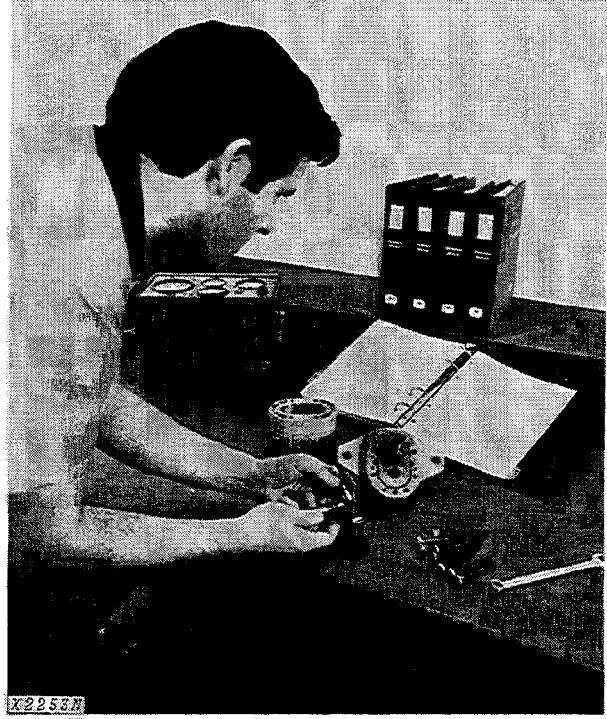
*Fundamentals of Service (FOS) Manuals* cover basic theory of operation, *fundamentals* of trouble shooting, *general* maintenance, and *basic* types of failures and their causes. FOS Manuals are for training new personnel and for reference by experienced technicians.

*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 service technician.



When a service 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.

Litho in U.S.A.



Use Technical Manuals for Actual Service

Some features of this technical manual:

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

This technical manual was planned and written for you—an experienced service 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

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## Group 5 SPECIFICATIONS

### SKIDDER DESIGN



Fig. 1-JD540-A Skidder

The skidder is an articulated, frame-steered machine for use primarily in skidding tree length logs from a felling area to a central loading location.

Main skidder parts are mounted in two frames: the engine frame (front) and the equipment frame (rear).

All references in this manual to front, rear, left, and right are in relation to the position of the operator seated in the operator's station.

### SERIAL NUMBERS

The skidder (chassis) serial number plate is located on the side of the clutch housing. *NOTE: When ordering skidder and engine parts, record ALL of the digits on this plate.*

The engine serial number plate is mounted on the right side of the engine cylinder block.

### MODEL NUMBERS

The skidder fuel injection pump, winch, and winch hydraulic pump each have a name plate giving model number and serial number.

Use this information whenever additional detailed service information is required on any of these components.

### SPECIFICATIONS

#### ENGINE

Fuel type . . . . .	Diesel
Net flywheel horsepower at 2500 rpm	
(JD540) . . . . .	94
(JD540-A) . . . . .	94
Number of cylinders . . . . .	6
Bore and stroke (JD540) . . . . .	3.86 x 4.33 in.
(JD540-A) . . . . .	4.02 x 4.33 in.
Total displacement (JD540) . . . . .	303 cu. in.
(JD540-A) . . . . .	329 cu. in.

Compression ratio . . . . .	16.7 to 1
Firing order . . . . .	1-5-3-6-2-4
Intake valve clearance . . . . .	0.014-in.
Exhaust valve clearance . . . . .	0.018-in.
Slow idle . . . . .	800 rpm
Fast idle . . . . .	2660 rpm
Governed speed range . . . . .	800 to 2660 rpm

#### ELECTRICAL SYSTEM

Battery voltage (nominal) . . . . .	12 volts
Battery specific gravity at full	
charge (corrected to 80° F.) . . . . .	1.260
Battery terminal grounded . . . . .	Negative
Alternator regulation . . . . .	Voltage regulator

#### TRANSMISSION

Type: Power Shift consisting of planetary gears with hydraulically actuated wet disk clutches and brakes. Eight forward and four reverse speeds hydraulically operated and controlled by a single lever.

#### DISCONNECT CLUTCH

Type: 12-inch dry-type clutch operated by a hand disconnect lever.



**TRAVEL SPEEDS (with 23.1 x 26 tires)**

Gear	1500 rpm	2500 rpm
1	1.0	1.7
2	1.4	2.4
3	2.2	3.7
4	2.9	4.8
5	3.7	6.2
6	4.8	8.1
7	6.3	10.6
8	10.7	17.8
1st reverse	1.2	2.0
2nd reverse	1.7	2.9
3rd reverse	2.7	4.5
4th reverse	3.5	5.8

**DRIVE AXLES**

Four wheel drive with inboard mounted planetary gears on all axles.  
 Oscillating front axle, fixed rear axle.

**DIFFERENTIALS**

Front-Full differential with hydraulic lock.  
 Rear-Solid axle with no differential action or full differential with differential lock.  
 -Full differential without differential lock.

**HYDRAULIC SYSTEM**

Type: Closed center, constant pressure system. Includes power steering, power brakes, differential lock, front blade, and remote functions.

**STEERING**

Full power steering controlled by steering wheel.  
 Frame steered by two cylinders.  
 Turning clearance circle (with blade) . . . . . 39 ft. 10 in.  
 Turning radius . . . . . 19 ft. 2 in.

**TIRE OPTIONS**

- 16.9 x 30 - 8 ply (Early Models)
- 18.4 x 26 - 10 ply
- 18.4 x 34 - 10 ply
- 18.4 x 38 - 10 ply (Early Models)
- 23.1 x 26 - 10 ply
- 24.5 x 32 - 10 ply (Early Models)
- 28.1 x 26 - 10 ply
- 34 x 25 - 10 ply (Early Models)

**BRAKES**

4 axle-mounted single wet-disk brakes hydraulically operated (power) with single pedal control.  
 Mechanical winching brake for parking and winching.

**WINCH**

- Model . . . . . No. 3305
- Drum speed (at 2200 rpm engine speed) . . . . . 58-1/2 rpm
- Drum diameter . . . . . 6 in.
- Drum capacities\*
  - (with 1/2-inch cable) . . . . . 195 ft.
  - (with 5/8-inch cable) . . . . . 125 ft.
  - (with 3/4-inch cable) . . . . . 100 ft.
- Cable speed (at 2200 rpm engine speed using 5/8-inch cable)
  - (with bare drum) . . . . . 100 fpm
  - (with full drum) . . . . . 159 fpm
- Cable pull (at 2200 rpm engine speed) (calculated)
  - (with bare drum) . . . . . 20,500 lb.
  - (with full drum) . . . . . 12,900 lb.

*\*Calculated capacities - allowance must be made for loose or uneven spooling.*

**CAPACITIES (U.S. Standard Measures)**

- Fuel tank . . . . . 42 gal.
- Cooling system . . . . . 6 gal.
- Engine lubrication (with internal crankcase oil cooler) . . . . . 14 qt.
- Engine lubrication (with external crankcase oil cooler) . . . . . 15 qt.
- Transmission case (includes hydraulic system) . . . . . 9 gal.
- Front differential . . . . . 9 gal.
- Rear differential without lock . . . . . 4-1/2 gal.
- Rear differential with lock . . . . . 9 gal.
- Winch housing . . . . . 9 qt.

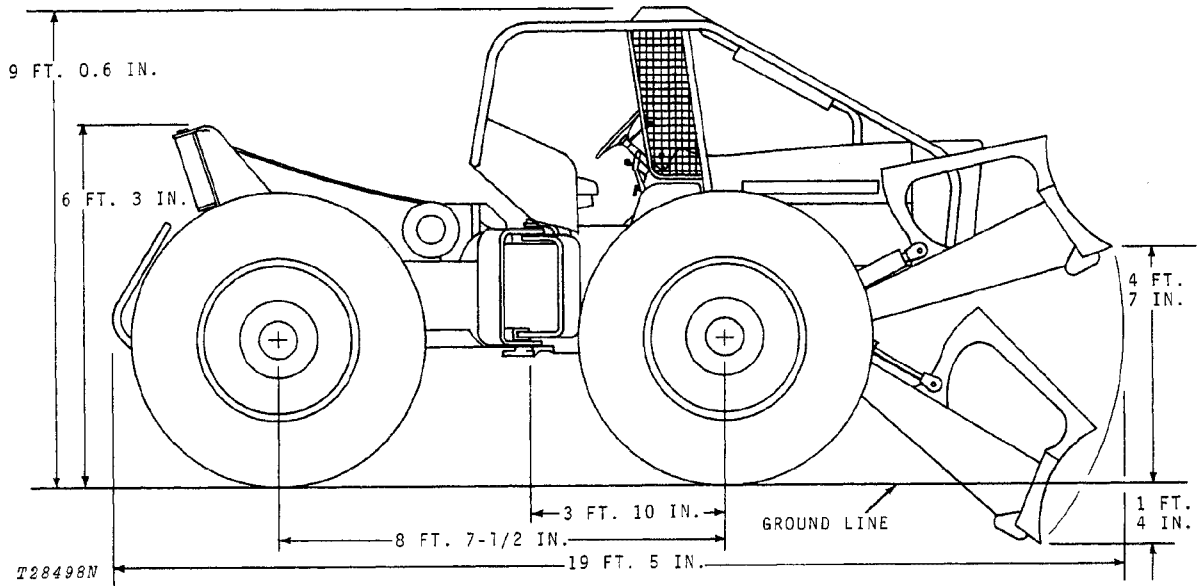


Fig. 3—Skidder Dimensions

**FRONT BLADE**

Width . . . . .	6 ft.
Height . . . . .	1 ft. 8 in.
Lift (max.) . . . . .	4 ft. 7 in.
Drop below ground level . . . . .	1 ft. 4 in.

**DIMENSIONS (23.1-26 tires)**

Over-all height (to top of exhaust deflector) . . . . .	9 ft. 0.6 in.
Over-all width . . . . .	8 ft.
Over-all length (front blade to log bumper) . . . . .	19 ft. 5 in.
Ground clearance . . . . .	1 ft. 8 in.
Wheel base . . . . .	103-1/2 in.
Operating weight (approx.) . . . . .	16,150 lbs.

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**Group 10**

**PREDELIVERY, DELIVERY, AND  
 AFTER-SALES SERVICES**

**PREDELIVERY SERVICE**

Every new John Deere skidder leaves the factory so it can be delivered to the customer after a minimum of servicing.

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

Shipping factors, in addition to extra finishing touches needed for customer satisfaction, necessitate proper predelivery service on the part of the dealer.

After completing the factory-recommended checks and services listed on the predelivery tag, remove and file the tag with the job shop order. The tag and the customer's John Deere Delivery Receipt certify proper predelivery service when that section of his receipt is completed.

**TEMPORARY MACHINE STORAGE**

Service	Specifications	Reference
Check radiator for coolant loss and antifreeze protection.	Midway between radiator cover and filler neck.	FOS Manual 30— ENGINES
Fill fuel tank.	.....	Operator's Manual
Check crankcase oil level.	.....	Operator's Manual
Relieve hydraulic pressure.	Stop engine, lower skidder blade and operate cylinders to relieve pressure.	.....
Cover exhaust inlet pipe.	.....	.....
Reduce shipping pressure of tires.	.....	Operator's Manual
Check torque on wheel nuts.	.....	Section 10, Group 25

**PREDELIVERY INSPECTION**

**ELECTRICAL SYSTEM**

Check battery terminals to be sure they are tight.	.....	Operator's Manual
--	-------	-------------------

**COOLING SYSTEM**

Inspect radiator for coolant loss.	Midway between radiator core and filler neck.	.....
Check antifreeze protection.	.....	FOS Manual 30— ENGINES

PREDELIVERY INSPECTION - Continued

Service	Specifications	Reference
<b>TIRES AND WHEELS</b>		
Adjust pressure of tires.	.....	Operator's Manual
Check torque on wheel nuts.	.....	Section 10, Group 25
<b>LUBRICATION</b>		
Check crankcase oil level.	To upper marks on dipstick.	Operator's Manual
Check transmission-hydraulic system oil level.	Between marks on dipstick. Type 303 Special-Purpose Oil.	Operator's Manual
Check winch housing oil level.	Level with oil level hole.	Operator's Manual
Check differential housing oil level.	Level with oil level hole.	Operator's Manual
Lubricate grease fittings.	.....	Operator's Manual
<b>ENGINE</b>		
Drain fuel tank sump and fuel filters.	.....	Operator's Manual
Check air cleaner.	.....	Operator's Manual
Fill fuel tank and start engine.	.....	Operator's Manual
Check operation of lights, gauges, and indicator lamps.	.....	Operator's Manual
Check speed control linkage for free operation.	.....	Section 20, Group 20
Check engine idle speeds.	.....	Section 20, Group 20
<b>OPERATION</b>		
Check engine clutch operation.	.....	Section 50, Group 20
Check air cleaner hose for loose connections.	.....	.....
Shift transmission through all speeds.	.....	.....
Check fire extinguisher.	.....	Operator's Manual
Check winching brake.	.....	Operator's Manual
Check steering, brakes, and hydraulic operations.	.....	Operator's Manual
Check seat operation.	.....	Operator's Manual
<b>GENERAL</b>		
Remove fire extinguisher cold shut.	.....	.....
Tighten accessible nuts and cap screws.	Refer to torque chart.	Section 10, Group 25
Clean skidder and touch up paint.	.....	.....

### DELIVERY SERVICE

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

Complaints may arise if the owner is not shown how to operate and service his new machine correctly. Devote enough time, at your customer's convenience, to introduce him to his new machine. Explain fully how to operate and service it.

The following procedure is recommended before the serviceman and owner complete the delivery acknowledgments section of the Delivery Receipt.

Using the operator's manual as a guide, make sure the owner thoroughly understands the following points:

1. Operation and use of controls and instruments.
2. Operation of the engine.
3. Importance of the break-in period.
4. Use of cast-iron ballast.
5. Operation and functions of the hydraulic system.
6. Importance of safety.
7. Importance of lubrication and periodic services.

After explaining and demonstrating the above points, have the owner sign the Delivery Receipt and give him his operator's manual.

### AFTER-SALES INSPECTION

The purchaser of a new John Deere machine is entitled to a free inspection at some mutually agreeable time within the warranty period after the equipment has been "run in." The terms of this after-sales inspection are outlined on the customer's John Deere Delivery Receipt.

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

If recommended after-sales service inspection is followed, the dealer can eliminate minor irregularities which can develop into major service problems at a later date. This will promote strong dealer-customer relations and give the dealer an opportunity to answer questions that may have arisen during the initial operation.

During the inspection service, the dealer has the opportunity to promote the sale of additional new equipment and accessories.

### AFTER-SALES INSPECTION

Service	Specifications	Reference
Check radiator coolant level.	Midway between radiator cover and filler neck.	Operator's Manual
Clean external surface of radiator core.	.....	.....
Check hoses and connections for leaks.	.....	.....
<b>FUEL SYSTEM</b>		
Drain fuel tank sump and clean strainer.	.....	Operator's Manual
Remove water and foreign matter from filter sediment bowls.	.....	Operator's Manual

**AFTER-SALES INSPECTION—CONTINUED**

Service	Specifications	Reference
Bleed fuel system. Tighten loose connections and check entire system for leaks. Correct if necessary.	.....	Operator's Manual
Check air cleaner element and clean, if necessary. Check hoses for tight connections.	.....	Operator's Manual
<b>ELECTRICAL SYSTEM</b>		
Check specific gravity and electrolyte level of batteries.	Full charge - 1.260 at 80° F.	FOS Manual 20 - ELECTRICAL SYS- TEMS
Check belt tension.	3/4-inch belt deflection with 20 lbs. force.	Operator's Manual
Start engine and check action of starter, lights, and indicator lamps.	.....	Operator's Manual
<b>LUBRICATION</b>		
Check engine crankcase oil level.	To upper marks on dipstick.	Operator's Manual
Check transmission-hydraulic system oil level.	Between marks on dipstick. Use John Deere Type 303 Special-Purpose Oil	
Check differential housing oil level.	Level with oil level hole.	Operator's Manual
Check winch housing oil level.	Level with oil level hole.	Operator's Manual
<b>ENGINE</b>		
Check valve clearance.	.....	Operator's Manual
Check engine speed under load, fuel consumption, and horsepower.	.....	FOS Manual 30 -EN- GINES
<b>GENERAL</b>		
Check winching brake free travel.	.....	Operator's Manual
Check transmission linkage adjustment.	.....	Section 50, Group 20
Check power steering, brakes, and other hydraulic functions.	.....	Section 70
Check winch operation.	.....	Section 80, Group 5
Tighten accessible nuts and cap screws.	Refer to torque chart.	Section 10, Group 25
Check fire extinguisher operation.	.....	.....

## Group 15

# TUNE-UP AND ADJUSTMENT

### GENERAL INFORMATION

Before tuning up an engine, determine if it is in condition so that performance can be restored by tune-up. Perform the following tests:

#### PRELIMINARY ENGINE TESTING

Operation	Specification	Reference
Vacuum test at air cleaner	8 to 25 inches of water at fast idle	
Check radiator for air bubbles and indication of oil	.....	.....
Check cylinder compression*	300 psi	
Intake manifold pressure (diesel engine with altitude compensating turbocharger)	6 to 8 psi at 2500 rpm <u>(full load)</u>	Section 30, Group 15

#### ENGINE TUNE-UP

##### AIR INTAKE SYSTEM

Air cleaner - clean filter element and dust cup	.....	Section 30, Group 15
Check breather pipe for restrictions	.....	.....
Retighten cylinder head cap screws	110 ft-lbs torque	Section 20, Group 10
Check valve clearances	0.014 in. intake 0.018 in. exhaust	Section 20, Group 10
Check for tight hose connections	.....	.....

##### BATTERY

Check electrolyte level	.....	.....
Clean cables, terminals, and box	.....	.....
Tighten cable clamps	.....	.....

##### ALTERNATOR

Check belt tension	3/4-inch deflection with 20 lbs. force	Operator's Manual
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##### FUEL SYSTEM

Check fuel tank and lines for leaks or restrictions	.....	.....
Clean fuel transfer pump bowl and strainer (early models)	.....	.....
Replace fuel filter elements	.....	.....
Drain fuel tank sump	.....	See Operator's Manual

*\*The most important factor in compression readings is the difference between cylinders. The difference should be no more than 50 psi.*

**ENGINE TUNE-UP -- Continued**

Operation	Specification	Reference
<b>FUEL SYSTEM (continued)</b>		
Time injection pump	.....	Section 30, Group 20
Check injection pump advance	.....	Section 30, Group 20
Bleed fuel system	.....	.....
Adjust speed control linkage and check engine speeds	.....	Section 20, Group 20
Check in-line filter for obstructions (late models)	.....	Operator's Manual
Back flush fuel tank strainer (late models)	.....	Operator's Manual
<b>ENGINE LUBRICATION SYSTEM</b>		
Check engine oil pressure	45 to 65 psi at 2500 rpm (180° to 220° F.)	Section 20, Group 15
<b>COOLING SYSTEM</b>		
Clean and flush system	.....	.....
Inspect hoses	.....	.....
Clean trash from radiator	.....	.....

**SKIDDER ADJUSTMENTS**

<b>BRAKES</b>		
Bleed brakes	.....	Section 70, Group 25
Check action of brake accumulator	.....	Section 70, Group 5
Check mechanical parking brake	.....	Section 70, Group 25
<b>POWER STEERING</b>		
Bleed steering system	.....	Section 70, Group 20
Check time cycle (lock to lock)	3.0 seconds at 1000 eng. rpm	Section 70, Group 5
<b>SELECTIVE CONTROL VALVE</b>		
Fully extend blade cylinder	2.5 to 3.0 seconds at 2500 eng. rpm	Section 70, Group 5
Fully extend remote cylinder	2.0 to 2.5 seconds at 2500 eng. rpm	Section 70, Group 5
<b>TIRES</b>		
Check tire inflation	.....	See Operator's Manual
<b>TIGHTEN ACCESSIBLE BOLTS AND CAP SCREWS</b>		
	See torque chart.	Section 10, Group 25
<b>POWER WINCH</b>		
Check control lever adjustment	.....	Section 80, Group 5
Check brake adjustment	.....	Section 80, Group 5



## Group 20 LUBRICATION

### GENERAL INFORMATION

Carefully written and illustrated instructions have been included in the operator's manual or Periodic Service Chart (late models) furnished with your customer's machine. Remind him to follow the recommendations in these instructions.

For your convenience, the following chart shows capacities and types of lubricants for the machine's various components and systems. Definitions of the lubricants follow the chart.

Component	Capacity	Type of Lubricant
Engine crankcase	14 U.S. quarts (with internal cooler) (15 qts. with external cooler)	See page 15-2
Transmission case (includes hydraulic system and filters)	9 U.S. gallons	John Deere Type 303 Special-Purpose Oil or an equivalent.
Cooling System	6 U.S. gallons	Summer coolant or anti-freeze
Differentials	4-1/2 U.S. gallons without lock 9 U.S. gallons with lock	John Deere Type 303 Special-Purpose Oil or an equivalent.
Grease fittings	.....	John Deere Multi-Purpose Lubricant or an equivalent.
Axle bearings*	8 shots	John Deere Multi-Purpose Lubricant or an equivalent.
Starter	Saturate wicks	Engine crankcase oil (SAE 10W)
	Lubricate armature splines during assembly	Engine crankcase oil (SAE 10W)

\*Lubricate daily when operating in deep mud or water.

## LUBRICANTS

Effective use of lubricating oils and greases is perhaps the most important step towards low upkeep cost, long skidder life, and satisfactory service. Use only lubricants specified in this section; apply them at intervals and according to the instructions in the lubrications and periodic service section.

### ENGINE LUBRICATING OILS



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

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

#### SINGLE VISCOSITY OILS

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

#### MULTI-VISCOSITY OILS

API Service CC/SD  
MIL-L-46152

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

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

\* SAE 5W-20 oil may also be used to insure optimum lubrication at starting, particularly when engine is subjected to -10° F. or lower temperatures for several hours.

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

### TRANSMISSION HYDRAULIC OILS

Use only John Deere Type 303 Special-Purpose Oil or an 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 Multi-Purpose type grease for all grease fittings. John Deere Multi-Purpose Lubricant or an equivalent wheel bearing grease is recommended for rear axle bearings and for front wheel bearings. Application of grease as instructed in the lubrication section will provide proper lubrication and will keep contamination out of bearings.

### STORING LUBRICANTS

Your skidder 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.

## REMOVING AND INSTALLING UPPER COWL

All components in the upper cowl may be serviced separately. The upper cowl is removed to facilitate servicing clutch housing and transmission without removing them from the skidder.

### REMOVAL

Disconnect battery cables.

Remove hood, operator side shields, cowl covers, footrest, and transmission top shield.

### DISCONNECTING RIGHT SIDE OF COWL

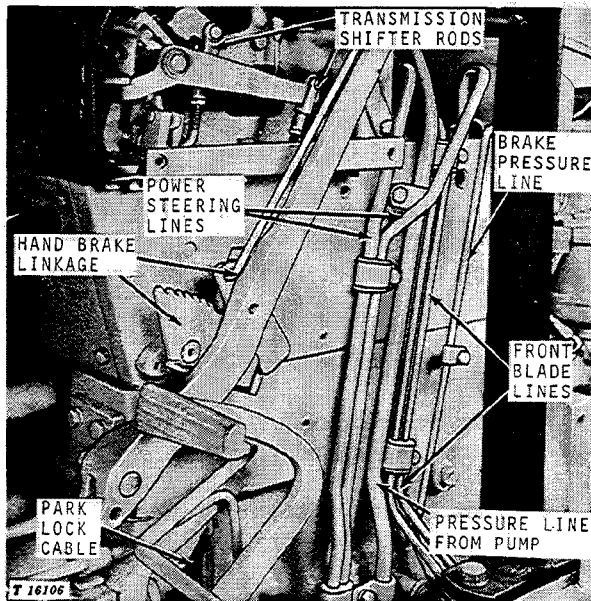


Fig. 5 - Disconnecting Right Side of Cowl

Disconnect foot throttle and hand brake linkage from cowl (Fig. 5).

Disconnect main pump pressure line, steering cylinder lines, brake pressure line, and front blade lines at both ends and remove lines from unit.

Disconnect oil cooler top lines, engine oil pressure tube, temperature sending unit, and diesel cold weather starting aid.

Disconnect two transmission shifter rods, park lock cable, and starter safety switch lead.

### DISCONNECTING LEFT SIDE OF COWL

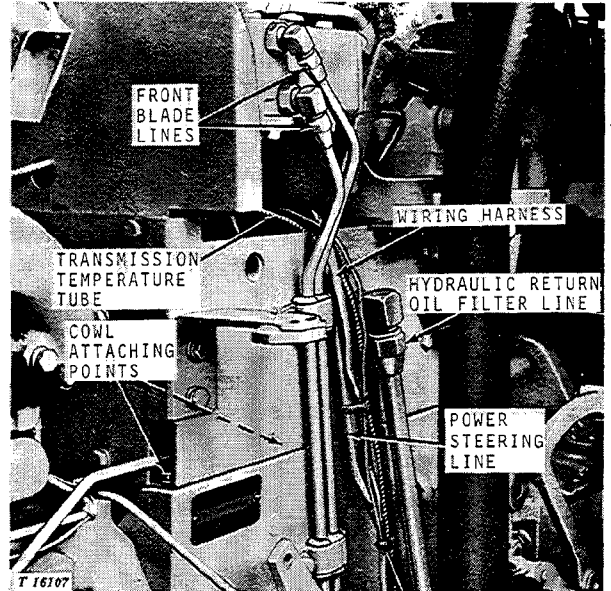


Fig. 6 - Disconnecting Left Side of Cowl

Disconnect transmission temperature tube.

Remove front blade lines, power steering line, and hydraulic filter line (Fig. 6).

Disconnect wiring harnesses from cowl.

Remove cap screws securing upper cowl to clutch housing and remove cowl assembly from unit.

### INSTALLING UPPER COWL

Install upper cowl on clutch housing and secure with attaching cap screws.

Install all lines removed from both sides of unit as shown in Figures 5 and 6.

Connect wiring harnesses and linkage on both sides of cowl.

Install all sheet metal and connect battery ground cables.

## REMOVING AND INSTALLING TRANSMISSION AND CLUTCH HOUSING

### REMOVAL

The transmission and clutch housing may be completely serviced within the skidder by removing the engine and upper cowl. If either assembly is to be completely replaced, remove the upper cowl, clutch housing, and transmission as a unit. See the following:

1. Remove engine with front support, main pump, and radiator as a unit. See "Engine Removal."

2. Disconnect oil lines and linkage as instructed in "Upper Cowl Removal." (Cowl may be removed with transmission and clutch housing.)

3. Remove seat with mounting bracket. For added hoisting clearance, remove canopy from unit.

4. Attach hoist to transmission and clutch housing.

5. Disconnect differential lock valve lines and remove valve(s) from unit. Disconnect oil lines from front junction block.

6. Disconnect transmission front and rear drive shafts. Disconnect winch drive shaft.

7. Remove transfer case rear mounting brackets (Fig. 7) and lift transmission-clutch housing assembly so that brake valve can be removed.

8. Using a hoist, remove transmission and clutch housing as an assembly.

Disassemble and service assemblies on a bench by referring to the specific section and group covering the components.

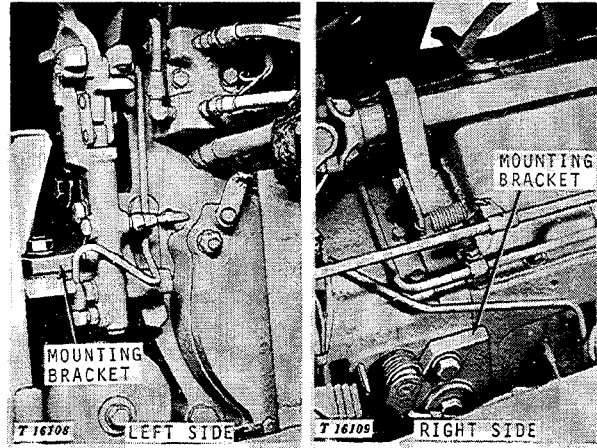


Fig. 7 - Transmission Attaching Points

### INSTALLATION

Connect clutch housing to transmission and hoist assemblies into engine frame. Install all hydraulic lines in the order that they were removed.

Install brake valve assembly.

Tighten transfer case to rear mounting bracket cap screws to specified torque (Fig. 7).

Connect transmission drive and winch drive shafts. Connect oil lines to front junction block.

Connect lines and linkage as instructed in "Installing Upper Cowl."

Install engine as instructed in this group.

Install all sheet metal. Install batteries and connect cables.

## REMOVING AND INSTALLING AXLE HOUSINGS AND DIFFERENTIALS

### REAR DIFFERENTIAL AND AXLE HOUSING REMOVAL

Disconnect battery ground strap; remove bottom plate, and support front and rear of equipment frame.

Drain oil from differential housing.

Attach a chain around each axle housing to support axles and differential assembly. Remove wheels from both axles.

Disconnect differential lock pressure and return lines at differential housing (if equipped with lock). Disconnect brake line.

Disconnect differential drive shaft.

Remove cap screws and clamps securing axle housings to equipment frame. Lower assembly from equipment frame.

Separate axle housings from differential housing as required.

An alternate method of removing rear differential is to disconnect axle housings from equipment frame, lift equipment frame, and roll assembly out from under frame.

### REAR DIFFERENTIAL AND AXLE INSTALLATION

Lift differential with axle housings in position under equipment frame.

Install equipment frame clamps around axle housing and insert top clamp cap screws from the rear and bottom clamp cap screws from the front. Tighten to the specified torque.

Connect differential lock lines (if equipped). Connect brake lines.

Install equipment frame bottom plate.

Fill rear differential with recommended oil to the proper level (Section 10, Group 15).

### FRONT AXLE HOUSING REMOVAL

Disconnect battery ground strap and support front and rear of engine frame.

Drain oil from front differential.

Remove wheel from the axle housing to be removed.

Pivot or block opposite axle up to provide clearance under frame. Remove cap screws and pull axle housing from differential.

### FRONT AXLE HOUSING INSTALLATION

Position axle drive shaft and brake facing plate in differential assembly. With axle housing positioned against final drive shaft, turn axle shaft slowly to align planet pinions with sun pinion.

Draw up two attaching cap screws finger tight and turn axle shaft to be sure that brake disk is splined correctly and axle shaft is free to turn.

Tighten axle housing attaching cap screws to the specified torque. Install wheel and tighten cap screws to specified torque.

Refill differential housing (see Section 10, Group 15).

### FRONT DIFFERENTIAL REMOVAL

Disconnect battery ground strap; remove engine frame bottom guards, and support front and rear of engine frame.

Drain oil from differentials.

Attach a chain around each axle housing to support axles and differential assembly. Remove wheels from both axles.

Disconnect differential lock pressure and return lines at differential housing. Disconnect brake line. Disconnect differential drive shaft.

Remove pin from front differential oscillating support bracket. Remove cap screws from rear support bracket and lower assembly from engine frame.

### FRONT DIFFERENTIAL INSTALLATION

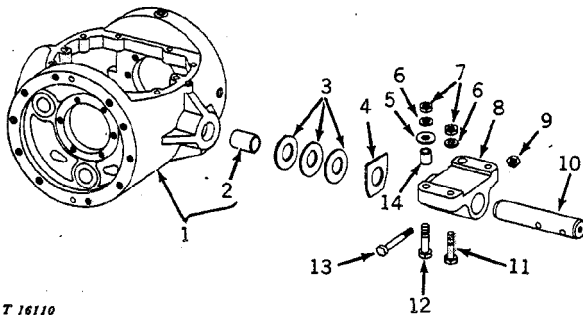
Lift differential with axle housing into position under engine frame.

Place three shims between thrust plates and front support (see Fig. 8). Install pin through front support into differential housing.

Secure rear support brackets to engine frame with dowels, cap screws, plain washers, and hex. nuts.

The large flat washers fit on top of engine frame over the two rear cap screws of each support to cover dowels.

#### *Adjusting End Play on Axle Oscillating Front Pivot*



- |                       |                            |
|-----------------------|----------------------------|
| 1 - Differential Case | 8 - Support                |
| 2 - Bushing           | 9 - Lock Nut               |
| 3 - Washer (3 used)   | 10 - Pin                   |
| 4 - Thrust Plate      | 11 - Cap Screw (2 used)    |
| 5 - Washer (3 used)   | 12 - Cap Screw (2 used)    |
| 6 - Washer (4 used)   | 13 - Cap Screw             |
| 7 - Hex. Nut (4 used) | 14 - Hollow Dowel (2 used) |

Fig. 8 - Axle Oscillating Pivot Assembly (Front)

Pivot and pry front differential assembly rearward as far as possible. With front oscillating support bracket thrust plate mounted next to differential case and its straight edge up, measure the distance between thrust plate and support bracket with a feeler gauge (see Fig. 8). Refer to "Specifications" for correct end play.

To adjust, do the following: (1) Support differential assembly with floor jack and remove cap screw securing front pin to support bracket. (2) Pull pin out halfway and add or deduct washers between thrust plate and support bracket to provide end play on front oscillating support bracket. (3) Push front pin back into differential case and install cap screw with hex. nut and grease fitting.

After checking front axle end play, check rotation of front axle. Check force required to oscillate axle assembly at axle hub end (without tires and rims). If force required to rotate axle is more than specified, readjust oscillating pivot end play.

#### *Final Assembly*

Connect differential drive lines and install wheels.

Connect differential lock pressure line and brake lines.

Install engine frame bottom plates.

Fill differential with recommended oil (Section 10, Group 15).




**SPECIFICATIONS**

**ASSEMBLY NOTES**

Differential oscillating pivot end play . . . . . 0.001 to 0.036 in.  
 Maximum force required to rotate front axle freely . . . . . 50 pounds  
 Length of winch control cable between pivot pin and clamping groove . . . . . 20 inches

**TORQUES FOR HARDWARE (FT-LBS)  
 (UNLESS OTHERWISE NOTED)**

Upper pivot pin nut . . . . . 300  
 Steering cylinder pin nut . . . . . 300  
 Engine-to-engine front support . . . . . 170  
 Engine-to-clutch housing . . . . . 170  
 Engine front support-to-engine frame . . 170  
 Rear transmission mounting bracket-to-  
 engine frame . . . . . 300  
 Rear transmission mounting bracket-to-  
 transfer case . . . . . 170  
 Axle housing-to-differential housing . . . 130  
 Drive shaft universal joint-to-yokes . . . 70  
 Oscillating supports-to-engine frame . . . 445  
 Oscillating front support pin screw . . . 130  
 Equipment frame-to-axle housing clamp  
 screws . . . . . 200  
 Cast drive wheel-to-rim stud nuts . . . . 275  
 Drive wheel retainer cap screws . . . . . 170  
 (Rap with hammer and retighten; repeat  
 3 times.)  
 Front blade pivot-to-engine frame  
 5/8-inch cap screws . . . . . 170  
 3/4-inch cap screws . . . . . 300  
 Canopy-to-engine frame clevis cap screws 300  
 All hydraulic pump and cooler hose  
 clamps . . . . . 25 in-lbs

RECOMMENDED TORQUE IN FT-LBS COARSE AND FINE THREADS			
	 (B STRENGTH)	 (D STRENGTH)	 (F STRENGTH)
Bolt Diameter	Plain Head*	Three Radial Dashes*	Six Radial Dashes*
1/4	Not used	10	14
5/16	Not used	20	30
3/8	Not used	35	50
7/16	35	55	80
1/2	55	85	120
9/16	75	130	175
5/8	105	170	240
3/4	185	300	425
7/8	160**	445	685
1	250**	670	1030
1-1/8	330**	910	1460
1-1/4	480**	1250	2060

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

Plain Head: regular machine bolts and cap screws.

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

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

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

**TOOLS**

No.	Name	Use
<b>CONVENIENCE TOOLS</b>		
JD244*	Engine Lift Eyes	To Remove Engine
JDG-1*	Engine Sling	To Remove Engine

\* These tools are available from Service Tools Inc., 1901 Indiana Avenue, Chicago, Illinois 60616

10 General  
20-8 Separation

Skidder - JD540  
TM-1003 (Aug-69)

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## Group 25 SEPARATION

### SEPARATING ENGINE AND EQUIPMENT FRAMES

Remove batteries.

Disconnect winch control cable from winch valve and cable clamp. Remove seat with mounting bracket.

Support front and rear sections of equipment frame and engine frame as evenly as possible to prevent frames from pivoting.

#### Upper Pivot

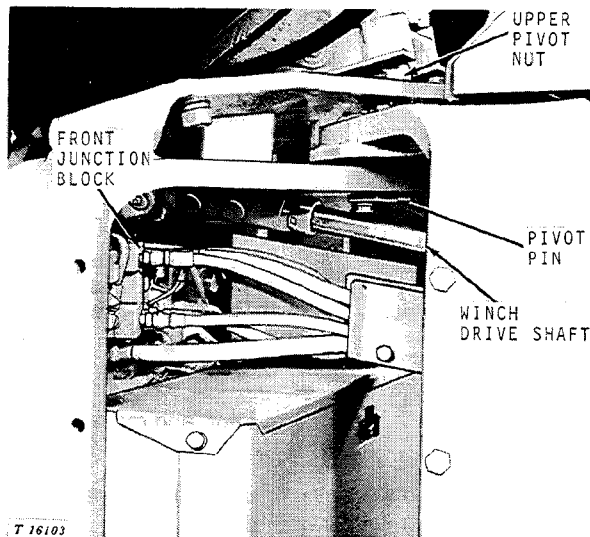


Fig. 1-Upper Pivot

Disconnect fuel tank sending unit lead and rear wiring harness lead connectors.

Disconnect oil lines from front junction block (Fig. 1). Oil lines are designed so that they may be installed in only their correct location.

Disconnect winch drive shaft.

Remove nut and drive upper pivot pin down through pivot.

#### Lower Pivot

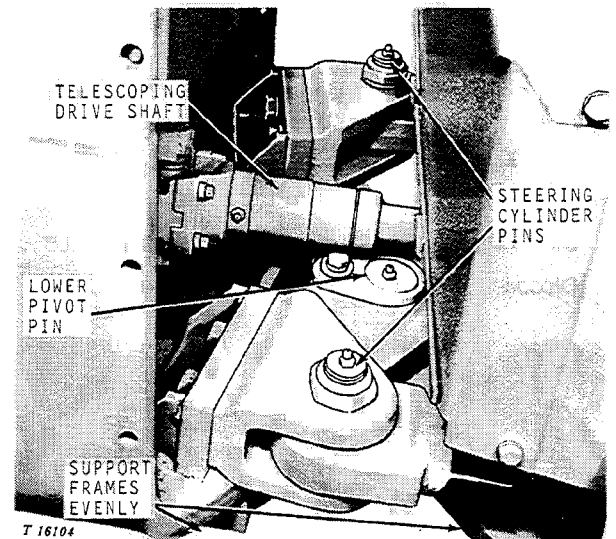


Fig. 2-Lower Pivot

Disconnect steering cylinders from supports on equipment frame.

Disconnect lower telescoping drive shaft.

Remove retaining screw and drive lower pivot pin up through pivot points.

Separate equipment frame from engine frame.

### JOINING ENGINE AND EQUIPMENT FRAMES

1. Align upper and lower pivot points, install pins, and tighten to specified torque.
2. Connect drive lines (See Section 50, Group 15).
3. Secure steering cylinders to equipment frame supports and tighten nuts to specified torque.
4. Connect oil lines to front junction block.
5. Connect wiring harness. Install seat.
6. Connect winch control cable and install clamp the specified distance between pivot pin and clamping groove. See "Specifications."
7. Connect batteries.

## REMOVING AND INSTALLING ENGINE

### REMOVAL

Disconnect battery cables and remove muffler and hood.

Remove grille screen and disconnect oil cooler and upper radiator support from grille housing. Disconnect air cleaner hose.

Disconnect grille housing and remove housing from engine frame. Remove front bottom guard.

Detach wiring and linkage on both sides of the engine necessary for engine removal.

Disconnect main pump inlet and pressure lines.

Disconnect oil cooler lines at top of cooler.

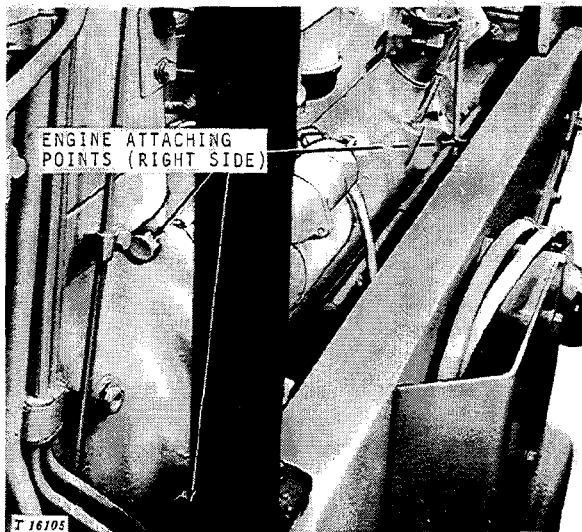


Fig. 3-Engine Attaching Points

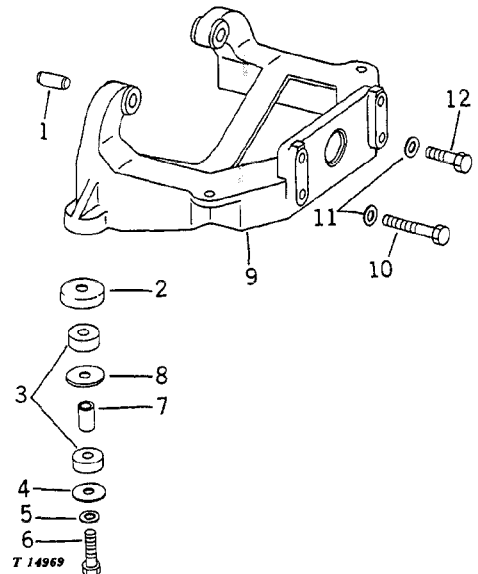
Attach JDG-1 or JDG-23 Engine Lifting Sling or D01043AA Load Positioning Sling to engine using two JD244 Lifting Eyes or JDG-19 Lifting Brackets

**IMPORTANT: Place blocking between engine frame and clutch housing at the front differential so that the clutch housing does not settle while engine is being removed.**

Remove cap screws securing engine to frame and clutch housing (Fig. 3). Remove engine from unit.

If complete engine repair is necessary, remove main pump, radiator, and front end support from engine.

### INSTALLATION



- |                          |                       |
|--------------------------|-----------------------|
| 1—Dowel Pin (2 used)     | 7—Spacer (2 used)     |
| 2—Cup (2 used)           | 8—Washer (2 used)     |
| 3—Rubber Washer (4 used) | 9—Support             |
| 4—Washer (2 used)        | 10—Cap Screw (2 used) |
| 5—Lock Washer (2 used)   | 11—Washer (4 used)    |
| 6—Cap Screw (2 used)     | 12—Cap Screw (2 used) |

Fig. 4-Engine Front Support

Attach front end support, radiator, and main pump to engine.

Using hoist install engine in unit. Bar engine over to index clutch shaft with clutch disk.

Secure engine to clutch housing and engine frame with attaching cap screws and tighten cap screws to the specified torque. Be sure rubber pads are on front mounts.

Coat tachometer cable gasket with Lubriplate and install on cable. Index slot in cable to coupler and tighten so that no oil leaks from around cable.

**IMPORTANT: Do not tighten too tight or gasket will be damaged and oil leaks will develop.**

Install grille housing and secure cooler and radiator to housing. Connect air cleaner.

Install hood, muffler, and grille screen.

Connect battery cables.

## REMOVING AND INSTALLING UPPER COWL

All components in the upper cowl may be serviced separately. The upper cowl is removed to facilitate servicing clutch housing and transmission without removing them from the skidder.

### REMOVAL

Disconnect battery cables.

Remove hood, operator side shields, cowl covers, footrest, and transmission top shield.

### DISCONNECTING RIGHT SIDE OF COWL

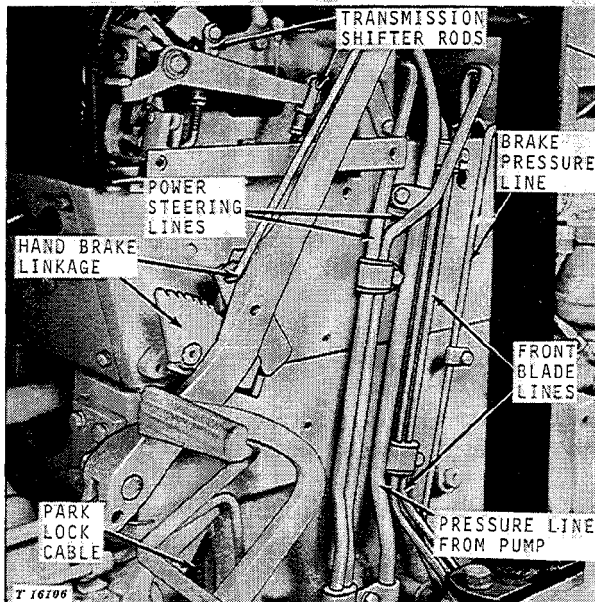


Fig. 5 - Disconnecting Right Side of Cowl

Disconnect foot throttle and hand brake linkage from cowl (Fig. 5).

Disconnect main pump pressure line, steering cylinder lines, brake pressure line, and front blade lines at both ends and remove lines from unit.

Disconnect oil cooler top lines, engine oil pressure tube, temperature sending unit, and diesel cold weather starting aid.

Disconnect two transmission shifter rods, park lock cable, and starter safety switch lead.

### DISCONNECTING LEFT SIDE OF COWL

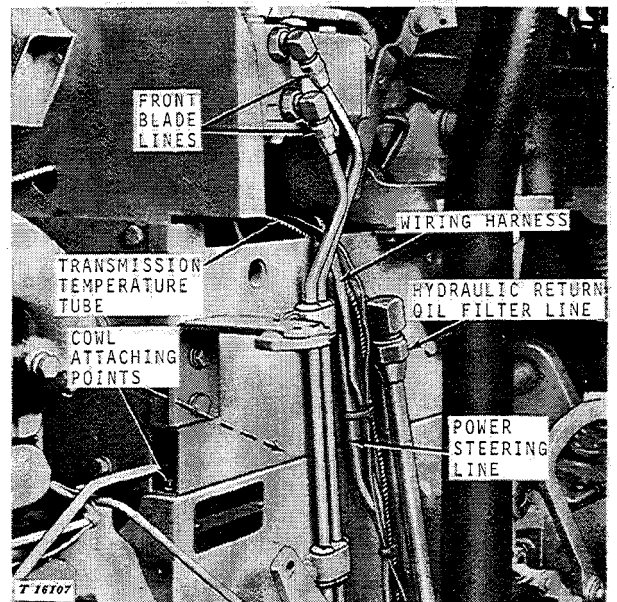


Fig. 6 - Disconnecting Left Side of Cowl

Disconnect transmission temperature tube.

Remove front blade lines, power steering line, and hydraulic filter line (Fig. 6).

Disconnect wiring harnesses from cowl.

Remove cap screws securing upper cowl to clutch housing and remove cowl assembly from unit.

### INSTALLING UPPER COWL

Install upper cowl on clutch housing and secure with attaching cap screws.

Install all lines removed from both sides of unit as shown in Figures 5 and 6.

Connect wiring harnesses and linkage on both sides of cowl.

Install all sheet metal and connect battery ground cables.

## REMOVING AND INSTALLING TRANSMISSION AND CLUTCH HOUSING

### REMOVAL

The transmission and clutch assemblies may be completely serviced within the skidder by removing the engine and upper cowl. If either transmission case or clutch housing assembly is to be completely replaced, remove the upper cowl, clutch housing, and transmission as a unit. See the following:

1. Remove engine with front support, main pump, and radiator as a unit. See "Engine Removal."
2. Disconnect oil lines and linkage as instructed in "Upper Cowl Removal." (Cowl may be removed with transmission and clutch housing.)
3. Remove seat with mounting bracket. For added hoisting clearance, remove canopy from unit.
4. Attach hoist to transmission and clutch housing.
5. Disconnect differential lock valve lines and remove valve(s) from unit. Disconnect oil lines from front junction block.
6. Disconnect transmission front and rear drive shafts. Disconnect winch drive shaft.
7. Remove transfer case rear mounting brackets (Fig. 7) and lift transmission-clutch housing assembly so that brake valve can be removed.
8. Using a hoist, remove transmission and clutch housing as an assembly.

Disassemble and service assemblies on a bench by referring to the specific section and group covering the components.

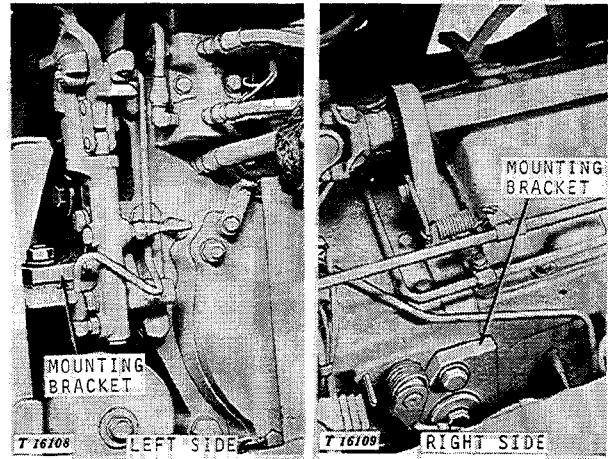


Fig. 7 - Transmission Attaching Points

### INSTALLATION

Connect clutch housing to transmission and hoist assemblies into engine frame. Install all hydraulic lines in the order that they were removed.

Install brake valve assembly.

Tighten transfer case to rear mounting bracket cap screws to specified torque (Fig. 7).

Connect transmission drive and winch drive shafts. Connect oil lines to front junction block.

Connect lines and linkage as instructed in "Installing Upper Cowl."

Install engine as instructed in this group.

Install all sheet metal. Install batteries and connect cables.

## REMOVING AND INSTALLING AXLE HOUSINGS AND DIFFERENTIALS

### REAR DIFFERENTIAL AND AXLE HOUSING REMOVAL

Disconnect battery ground strap; remove bottom plate, and support front and rear of equipment frame.

Drain oil from differential housing.

Attach a chain around each axle housing to support axles and differential assembly. Remove wheels from both axles.

Disconnect differential lock pressure and return lines at differential housing (if equipped with lock). Disconnect brake line.

Disconnect differential drive shaft.

Remove cap screws and clamps securing axle housings to equipment frame. Lower assembly from equipment frame.

Separate axle housings from differential housing as required.

An alternate method of removing rear differential is to disconnect axle housings from equipment frame, lift equipment frame, and roll assembly out from under frame.

### REAR DIFFERENTIAL AND AXLE INSTALLATION

Lift differential with axle housings in position under equipment frame.

Install equipment frame clamps around axle housing and insert top clamp cap screws from the rear and bottom clamp cap screws from the front. Tighten to the specified torque.

Connect differential lock lines (if equipped). Connect brake lines.

Install equipment frame bottom plate.

Fill rear differential with recommended oil to the proper level (Section 10, Group 20).

### FRONT AXLE HOUSING REMOVAL

Disconnect battery ground strap and support front and rear of engine frame.

Drain oil from front differential.

Remove wheel from the axle housing to be removed.

Pivot or block up opposite axle to provide clearance under frame. Remove cap screws and pull axle housing from differential.

### FRONT AXLE HOUSING INSTALLATION

Position axle drive shaft and brake facing plate in differential assembly. With axle housing positioned against final drive shaft, turn axle shaft slowly to align planet pinions with sun pinion.

Draw up two attaching cap screws finger tight and turn axle shaft to be sure that brake disk is splined correctly and axle shaft is free to turn.

Tighten axle housing attaching cap screws to the specified torque. Install wheel and tighten cap screws to specified torque.

Refill differential housing (see Section 10, Group 20).

### FRONT DIFFERENTIAL REMOVAL

Disconnect battery ground strap; remove engine frame bottom guards, and support front and rear of engine frame.

Drain oil from differentials.

Attach a chain around each axle housing to support axles and differential assembly. Remove wheels from both axles.

Disconnect differential lock pressure and return lines at differential housing. Disconnect brake line. Disconnect differential drive shaft.

Remove pin from front differential oscillating support bracket. Remove cap screws from rear support bracket and lower assembly from engine frame.

**FRONT DIFFERENTIAL INSTALLATION**

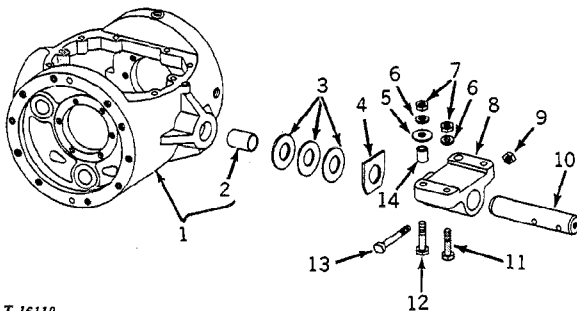
Lift differential with axle housing into position under engine frame.

Place three shims between thrust plates and front support (see Fig. 8). Install pin through front support into differential housing.

Secure rear support brackets to engine frame with dowels, cap screws, plain washers, and hex. nuts.

The large flat washers fit on top of engine frame over the two rear cap screws of each support to cover dowels.

*Adjusting End Play on Axle Oscillating Front Pivot*



T 16110

- |                       |                            |
|-----------------------|----------------------------|
| 1 - Differential Case | 8 - Support                |
| 2 - Bushing           | 9 - Lock Nut               |
| 3 - Washer (3 used)   | 10 - Pin                   |
| 4 - Thrust Plate      | 11 - Cap Screw (2 used)    |
| 5 - Washer (3 used)   | 12 - Cap Screw (2 used)    |
| 6 - Washer (4 used)   | 13 - Cap Screw             |
| 7 - Hex. Nut (4 used) | 14 - Hollow Dowel (2 used) |

Fig. 8 - Axle Oscillating Pivot Assembly (Front)

Pivot and pry front differential assembly rearward as far as possible. With front oscillating support bracket thrust plate mounted next to differential case and its straight edge up, measure the distance between thrust plate and support bracket with a feeler gauge (see Fig. 8). Refer to "Specifications" for correct end play.

To adjust, do the following: (1) Support differential assembly with floor jack and remove cap screw securing front pin to support bracket. (2) Pull pin out halfway and add or deduct washers between thrust plate and support bracket to provide end play on front oscillating support bracket. (3) Push front pin back into differential case and install cap screw with hex. nut and grease fitting.

After checking front axle end play, check rotation of front axle. Check force required to oscillate axle assembly at axle hub end (without tires and rims). If force required to rotate axle is more than specified, readjust oscillating pivot end play.

*Final Assembly*

Connect differential drive lines and install wheels.

Connect differential lock pressure line and brake lines.

Install engine frame bottom plates.

Fill differential with recommended oil (Section 10, Group 20).

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