

# TM

## Technical Manual

### John Deere 670A and 672A Motor Grader Operation and Tests

TM-1188 (Dec-87)



LITHO IN U.S.A.

REFERENCE COPY



TO JOHN DEERE DEALERS

IMPORTANT: Please remove this page and route through your service department.

This is a complete revision for TM-1188, JD670-A and JD672-A Motor Graders Operation and Test.

Binders and tabs from old manual may be saved and used with this bound manual.

The new pages are dated (Dec-87). Listed below is a brief explanation of "WHAT" was changed and "WHY" it was changed.

This manual was revised:

To add Section I.

To update HFWD story showing different front sensor on later units.

To add information on hour meter.

To delete automatic Blade Control material. This material covered by manufacturer.



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# JD670-A AND JD672-A MOTOR GRADERS

Technical Manual  
TM-1188 (Dec-87)

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## Group II INTRODUCTION AND SAFETY INFORMATION

### INTRODUCTION



Use FOS Manuals for Reference

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

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

#### • FOS Manuals - For Reference

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

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 technical manual.

#### • Technical Manuals - For Actual Service

Technical manuals are concise service guides for specific machines. Technical manuals are on-the-job guides containing only the vital information needed by an experienced service technician.

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Use Technical Manuals for Actual Service

This technical manual was written for you - an experienced service technician. Keep it in a permanent binder in the shop where it is handy. Read it when you need to know correct service procedures or specifications.

Some features of this manual:


- Inside front cover - "Table of Contents".
- Section I - General specifications and services.
- Sections 1 through 46 - Removal, repair, testing (components removed), installation, and adjustment.
- Section 90 - Detailed explanation of system operation, diagnosis, visual inspection, testing, and adjustments.
- Specifications are listed and illustrated at the end of each section.



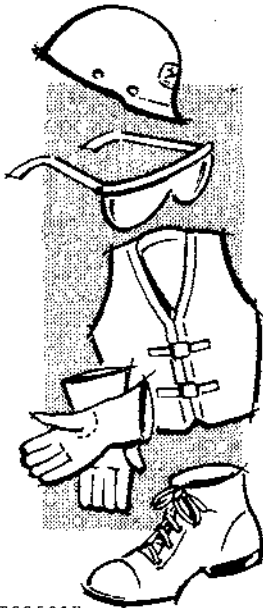
## MAINTENANCE WITHOUT ACCIDENT WORK SAFELY



T279858

 This safety symbol is used for important safety messages. When you see this symbol, follow the safety message to avoid personal injury.

### EVERY EMPLOYER HAS A SAFETY PROGRAM. KNOW WHAT IT IS!



T275018

See your shop supervisor for specific instructions on a job, and the safety equipment required.

For instance, you may need: Hard hat, safety shoes, safety goggles, heavy gloves, reflector vest, ear protectors, respirator.



RIGHT

WRONG

T275026

### BE ALERT!

Plan ahead—work safely—know how to use a first-aid kit and a fire extinguisher—and where to get assistance.



T275048

### Maintenance Area

Make sure the maintenance area has enough ventilation.

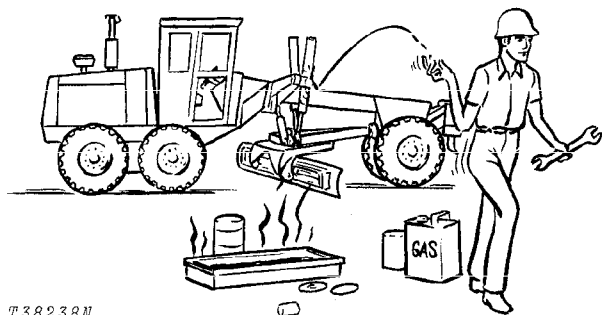
Keep the maintenance area CLEAN AND DRY. Oily and wet floors are slippery. Greasy rags are a fire hazard. Wet spots are dangerous when working with electrical equipment.

Keep starting aids in a cool, well-ventilated place, out of reach of unauthorized personnel.

## MAINTENANCE WITHOUT ACCIDENT

### AVOID FIRE HAZARDS—

#### Fuel Is Dangerous!



Do not smoke while putting fuel in the fuel tank.

Do not smoke while working with material that will start on fire easily.

Stop the engine before filling the fuel tank.

If the engine is hot, use care when putting fuel in the fuel tank.

Do not use gasoline or diesel fuel for cleaning parts. Use solvents that will not start on fire.

#### Battery Gas Is Highly Flammable!

When charging batteries, be sure there is enough ventilation.



Do not check the battery charge by putting metal objects across the posts.

Do not let sparks or open flame near batteries.

Do not smoke near battery.

#### Flame Is Not a Flashlight!

**NEVER USE OPEN FLAME AROUND THE MACHINE.**

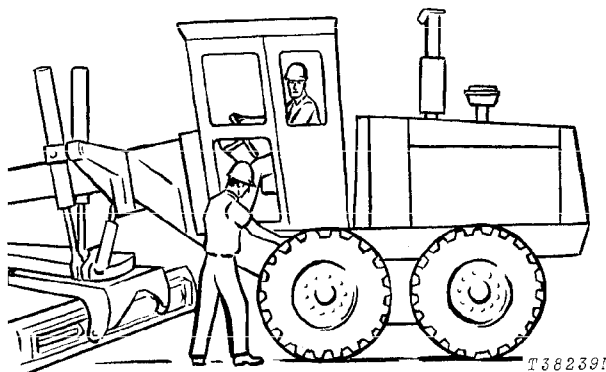
**KNOW WHERE FIRE EXTINGUISHERS ARE KEPT!**

Litho in U.S.A.

### UNDER ALL MAINTENANCE CONDITIONS—

Do not work on the equipment unless you are approved to do so. Then be sure you know the safe and correct procedure.

Never work on equipment while it is being operated.



When the engine is running, avoid working on equipment.

If you must work on the machine with the engine running, ALWAYS USE TWO service technicians. One must be at the controls. The other must be within sight of the operator.

### KEEP HANDS AWAY FROM MOVING PARTS

Put a support under all raised equipment.

Never work under a raised blade, ripper, or scarifier.

Lower all equipment to the ground.

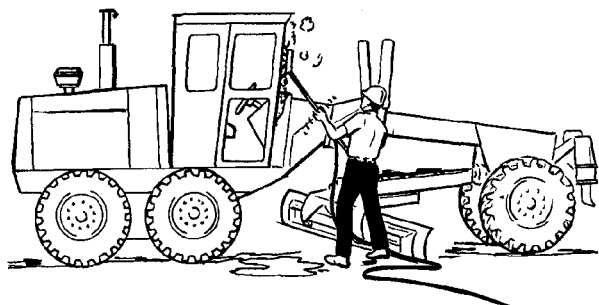
If the machine is on a slope, use blocks to hold it in place.

Do not lift heavy parts by yourself. Use hoisting equipment for this.

### TAKE CARE! WATCH OUT FOR OTHER PEOPLE IN THE AREA

When drilling, grinding, or hammering metal, wear safety glasses.

## BE CAREFUL DURING SERVICE AND REPAIR



T38242N

Keep ALL equipment free of dirt and oil.

Clean oil, grease, mud, ice or snow from the operator's station, steps and hand rails.

When getting the engine ready for storage, remember that inhibitor changes easily into gas and is dangerous. After adding the inhibitor, seal and tape openings. When you are not using the inhibitor, keep the can tightly closed.

Do not remove the radiator cap unless you can hold your hand on the radiator tank. First, loosen the cap slowly to the stop. Then release all pressure in the cooling system before removing the cap.

Check the exhaust system regularly for leaks.

Release hydraulic pressure before working on the hydraulic system. Stop the engine. Lower all equipment to the ground. Move the control levers until the equipment does not move.

When checking hydraulic pressure, be sure to use the correct test gauge.

Before working on the fuel system, close the fuel shutoff valve.

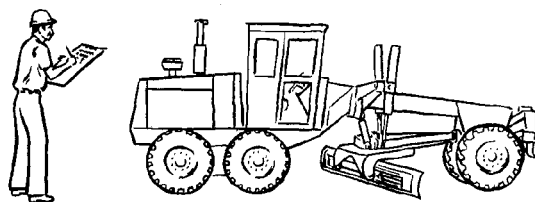
Before working on the electrical system, or making a major overhaul, disconnect the batteries.

## KNOW EQUIPMENT IS READY!

Check all guards, shields, and safety bars. Every one must be in place and tight.

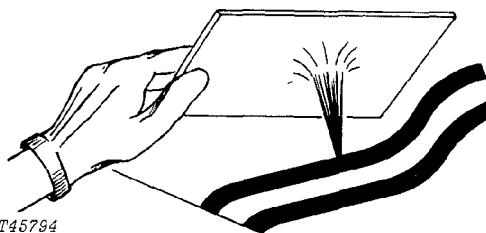
### CHECK IT OUT!

- GUARDS
- SHIELDS
- SAFETY BARS
- ROLL-OVER PROTECTIVE STRUCTURES
- SEAT BELTS, ETC.



T38243N

Carefully inspect all systems for leaks.



T45794

Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.

Escaping fluid under pressure can penetrate the skin.

If injured by escaping fluid, see a doctor at once.

## Group III

# GENERAL SPECIFICATIONS

(Specifications and design subject to change without notice. Wherever applicable, specifications are in accordance with ICED and SAE Standards. Except where otherwise noted, these specifications are based on a unit equipped with 13.00-24, 12 ply rating, tubeless tires, 12 ft. (3.66 m) moldboard, and standard equipment. Weights include lubricants, coolants, full fuel tank and 175 lb. (79 kg) operator.)

### Power

(at 2300 engine rpm):	<b>SAE</b>	<b>DIN</b>
Gross	135 hp (100.7 kW)	
Net	125 hp (93.2 kW)	126.7 PS

Net engine flywheel power is for an engine equipped with fan, air cleaner, water pump, lubricating oil pump, fuel pump, alternator, and muffler. The gross engine power is without fan. Flywheel power ratings are under SAE standard conditions of 500 ft. altitude and 85°F temperature, and DIN 70 020 conditions (non-corrected). No derating is required up to 10,000 ft. (3000 m) altitude.

**Engine:** John Deere turbocharged diesel, vertical 6-cylinder, valve-in-head, 4-stroke cycle.  
 Bore and stroke . . . . . 4.19x5 in. (106.5x127 mm)  
 Piston displacement . . . . . 414 cu. in. (6784 cm<sup>3</sup>)  
 Compression ratio . . . . . 16.2 to 1  
 Maximum torque @ 1300 rpm. 372 lb.-ft. (504 Nm)  
 (51.4 kg/m)  
 NACC or AMA (U.S. Tax) horsepower . . . . . 42.1  
 Main bearings . . . . . 7  
 Lubrication . . . . . Pressure system w/full-flow filter  
 Cooling..Pressurized, w/thermostat and fixed bypass  
 Fan . . . . . Suction  
 Air cleaner w/restriction indicator . . . . . Dry  
 Electrical system . . . . . 24 volt w/alternator  
 Batteries (2) 12 volt..Reserve capacity: 180 minutes

**Transmission** . . . . . Direct drive full Power Shift with planetary gear reductions. Foot inching pedal.

### Travel Speeds (2300 engine rpm, no tire slip):

Shift Lever Position	Forward		Reverse	
	mph	km/h	mph	km/h
1	2.3	3.6	2.8	4.5
2	3.2	5.1	3.9	6.3
3	4.8	7.8	5.9	9.5
4	6.3	10.1	7.6	12.3
5	8.2	13.2		
6	10.5	17.0		
7	14.1	22.8		
8	23.9	38.4		

**Differential Lock** . . . . . Foot-operated, hydraulically actuated

### Front Drive: (JD672-A only)

Hydrostatic motor in each wheel controlled through a flow divider to provide optimum traction. Free-wheeling in gears 5 through 8. Switch controlled for two modes of operation.

Pump . . 5.43 cu. in. (89 cm<sup>3</sup>) variable displacement pump driving a 2.03 cu. in (33 cm<sup>3</sup>) reversible motor in each wheel.

**Rear Drive** . . . . . Inboard planetary final drives with heat-treated, splined torque shafts. Oscillating welded construction tandems; nodular cast sprockets driving 2 in. (51 mm) pitch roller chain in oil bath.

**Front Axle:** Fabricated steel box-frame with steel spindles  
 Total oscillation . . . . . 30 deg.  
 Wheel lean range (either direction) . . . . . 20 deg.

**Steering:**  
 Front . . . . . Full hydraulic power system. Steering capabilities without power  
 Rear . . . . . Hydraulically articulated frame steering (25 deg. left or right)

Minimum turning radius  
 (JD670-A) . . . . . 22 ft. (6.7 m)  
 Minimum turning radius  
 (JD672-A) . . . . . 22 ft. 6 in. (6.86 m)

**Brakes:**  
 Service . . . . . Foot-operated, hydraulically-actuated, wet-disk, effective on 4 tandem wheels  
 Parking . . . . . Foot-operated, mechanical, dry-disk, effective on 4 tandem wheels

Hydraulic System: Closed-center  
 Pressure controlled variable-displacement  
 pump . . . . . 35 gpm (132 L/min)  
 @ 2300 engine rpm

**Blade:**  
 Length . . . . . 12 ft. (3.66 m)  
 Height . . . . . 24 in. (610 mm)  
 Thickness . . . . . 0.88 in. (22 m)

**Blade Range:**  
 Lift above ground . . . . . 1 ft. 4.10 in. (409 mm)  
 Blade side shift:  
 Right or left . . . . . 2 ft. 2.9 in. (683 mm)  
 Shoulder reach outside wheels:  
 Right or left . . . . . 7 ft. (2.13 m)  
 Pitch at ground line . . . . . 44 deg. forward  
 10 deg. back

**Blade Lifting Mechanism:**  
 Control . . . . . Dual-lever, hydraulic w/float position

**Lift Arms:** Nodular cast  
 Positions . . . . . 7  
 Control . . . . . Hydraulic, foot operated

**Circle:** Fabricated steel angle construction  
 Circle diameter . . . . . 4 ft. 10 in. (1.47 m)  
 Rotation . . . . . 360 deg.  
 Drive . . . . . Hydraulic motor and worm gear w/positive position lock  
 Sideshift, right and left . . . . . 31.2 in. (792 mm)

**Drawbar** . . . . . Welded box section, 3.5x7x0.5 in. (89x178x13 mm) wall w/ball and socket draft connection

**Frame:**  
 Rear main frame . . . . . Welded box section from articulation joint to main frame arch  
 Width, minimum . . . . . 9.25 in. (235 mm)  
 Height, minimum . . . . . 14.65 in. (372 mm)  
 Thickness, sides . . . . . 0.63 in. (16 mm)  
 top and bottom (min.) . . . . . 0.75 in. (19 mm)  
 Weight per ft. (m), minimum . . . . . 110 lb. (164 kg/m)  
 Minimum vertical section modulus . . . . . 125 inches cubed (2050 cm cubed)  
 Front main frame . . . . . Welded box section from main frame arch to front hood  
 Width . . . . . 10 in. (254 mm)  
 Height, minimum . . . . . 13 in. (330 mm)  
 Thickness, minimum . . . . . 0.50 in. (13 mm)  
 Weight per ft. (m), minimum . . . . . 110 lb. (164 kg/m)  
 Minimum vertical section modulus . . . . . 109 inches cubed (1786 cm cubed)

<b>Capacities:</b>	<b>U.S.</b>	<b>Imp.</b>	<b>Liters</b>
Fuel tank . . . . .	60 gal.	50.0 gal.	227
Cooling system . . . . .	7 gal.	5.8 gal.	26.5
Engine lubrication, including filter . . . . .	20 qt.	16.7 qt.	18.9
Transmission case . . . . .	14 gal.	12 gal.	53
Transmission and hydraulic system . . . . .	28 gal.	23.3 gal.	106
(JD670-A)			
Transmission and hydraulic system . . . . .	38 gal.	32 gal.	144
(JD672-A)			
Tandem housings (each) . . . . .	4 gal.	3.3 gal.	15.1
Worm gearbox . . . . .	3 qt.	2.5 qt.	2.8

**Additional Standard Equipment:**

- |  |   |
|--|---|
| Transistorized voltage regulator             | Gauges:                                   |
| Lights (2 white front w/stop and tail light) | Water temperature                         |
| Work lights (2 front and 2 rear floods)      | Transmission temperature                  |
| Turn signals                                 | Transmission lube pressure                |
| Horn   | Transmission pressure                     |
| Deluxe suspension seat                       | Engine oil pressure                       |
| Mechanical hour meter                        | Fuel                                      |
| Cold weather starting aid                    | Indicators:                               |
| Precleaner                                   | All-wheel drive charge pressure (JD672-A) |
| Engine side shields                          | Air filter                                |
| ROPS cab w/seat belt                         | Transmission filter                       |
| Front and rear windshield wipers             | All-wheel drive filter (JD672-A)          |
| Floor mat                                    |   |

**JD670-A**

SAE Operating Weight	On Front Wheels	On Rear Wheels	Total
Standard equipment . . . .	7728 lb. (3 505 kg)	18,252 lb. (8 279 kg)	25,980 lb. (11 784 kg)
Standard equipment and scarifier . . . . .	8828 lb. (4 004 kg)	18,252 lb. (8 279 kg)	27,080 lb. (12 283 kg)
Standard equipment, scarifier and ripper . . . .	8031 lb. (3 643 kg)	21,549 lb. (9 775 kg)	29,580 lb. (13 418 kg)

**JD672-A**

SAE Operating Weight	On Front Wheels	On Rear Wheels	Total
Standard equipment . . . .	8568 lb. (3 886 kg)	18,507 lb. (8 395 kg)	27,075 lb. (12 281 kg)
Standard equipment and scarifier . . . . .	9668 lb. (4 385 kg)	18,507 lb. (8 395 kg)	28,175 lb. (12 780 kg)
Standard equipment, scarifier and ripper . . . .	8871 lb. (4 024 kg)	21,804 lb. (9 890 kg)	30,675 lb. (13 914 kg)

**Tires:**

- 13.00-24, 8 or 12 ply rating; 8 in. rim
- 14.00-24, 10 or 12 ply rating; 8 or 10 in. rim
- 17.5-25, 12 ply rating; 14 in. rim

**Dimensions:**

Tire Size	Wheel Tread		Width		Ground Clearance (Front Axle)
	Front	Rear	Front	Rear	
13.00-24	76.60 in. (1.94 m)	79.61 in. (2.02 m)	7 ft. 10 in. (2.34 m)	7 ft. 10 in. (2.34 m)	1 ft. 10 in. (559 mm)
14.00-24	76.60 in. (1.94 m)	79.61 in. (2.02 m)	8 ft. (2.44 m)	8 ft. (2.44 m)	1 ft. 10.5 in. (571 mm)
17.5-25	79.36 in. (2.01 m)	82.37 in. (2.09 m)	8 ft. 6 in. (2.59 m)	8 ft. 6 in. (2.59 m)	1 ft. 11.2 in. (589 mm)
Height to top of steering wheel . . . . .					7 ft. 4.4 in. (2.25 m)

**Scarifier (Special Equipment):**

- V-type for 4 ft. (1.22 m) cut with 3 manual pitch positions and hydraulic float
- Number of teeth (9 possible) . . . . . 5
- Lift above ground . . . . . 1 ft. 10 in. (559 mm)
- Penetration . . . . . 12 in. (305 mm)
- Shank size . . . . . 1.25x4 in. (31.7x102 mm)

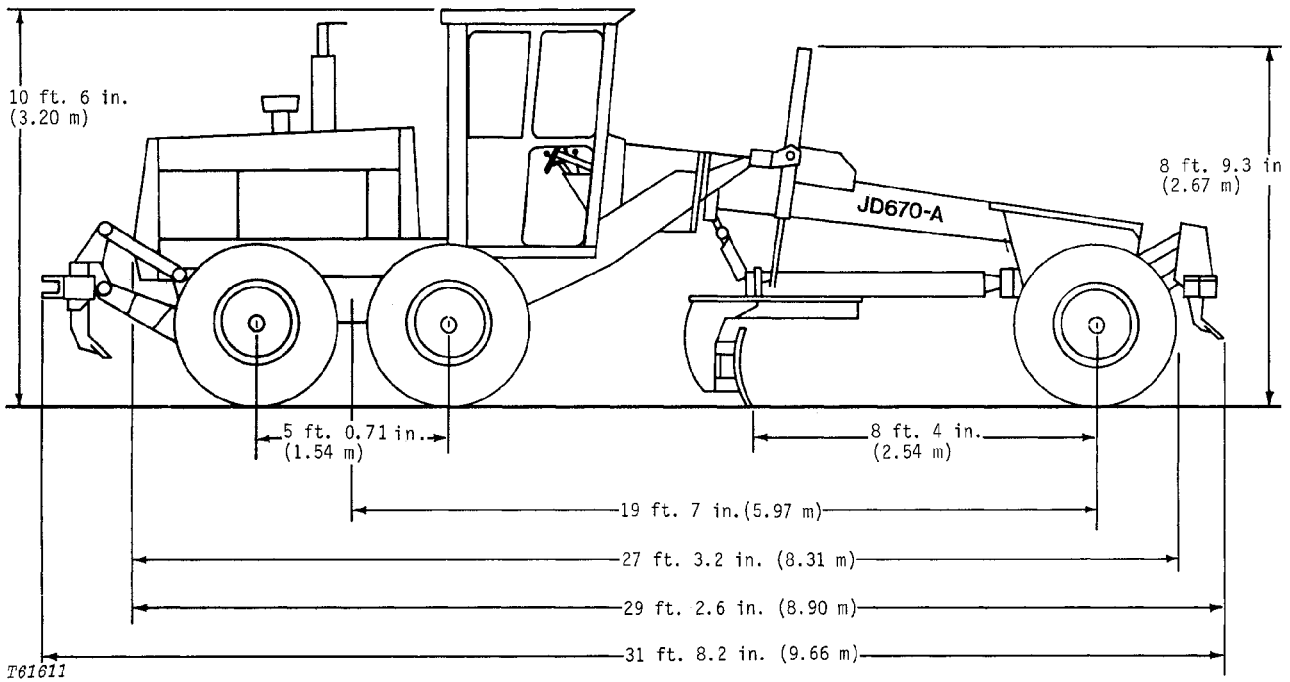
**Ripper (Special Equipment):** 8 ft. (2.44 m) cut width, parallelogram linkage, 2 manual shank vertical positions

- Number of shank pockets . . . . . 5
- Number of shanks . . . . . 3
- Lift above ground . . . . . 1 ft. 2.5 in. (368 mm)
- Penetration . . . . . 1ft. 2 in. (356 mm)
- Shank size . . . . . 2x5 in. (51x127 mm)
- Lift above ground (shanks in upper position) . . . . . 1 ft. 11.5 in. (597 mm)

**Special Equipment:**

- |   |   |
|---|---|
| Scarifier                                       | Overlay end bits                                  |
| Heavy-duty scarifier                            | Transmission bottom guard                         |
| Below-cab blade lights                          | Heavy-duty bottom guard w/drawbar                 |
| Bench seat                                      | Rear-mounted ripper w/drawbar hitch               |
| Cab heater (40,000 BTU)                         | Drawbar hitch                                     |
| Cab heater (19,000 BTU)                         | Toolbox   |
| Cab defroster fan                               | Articulation indicator                            |
| Air conditioning w/50 amp heavy-duty alternator | Engine disconnect                                 |
| Roof-mounted heater (w/air conditioner only)    | Reverse warning system                            |
| Outside rear view mirrors                       | Sound-baffled engine side shields                 |
| ROPS canopy w/seat belt                         | 3 in. seat belt                                   |
| Coolant heater                                  | Heavy-duty cutting edge extensions, right or left |
| 2 ft. (610 mm) moldboard                        | Automatic blade control                           |
| 13 ft. (3.96 m) and 14 ft. (4.27 m) moldboards  |   |

### DIMENSIONS



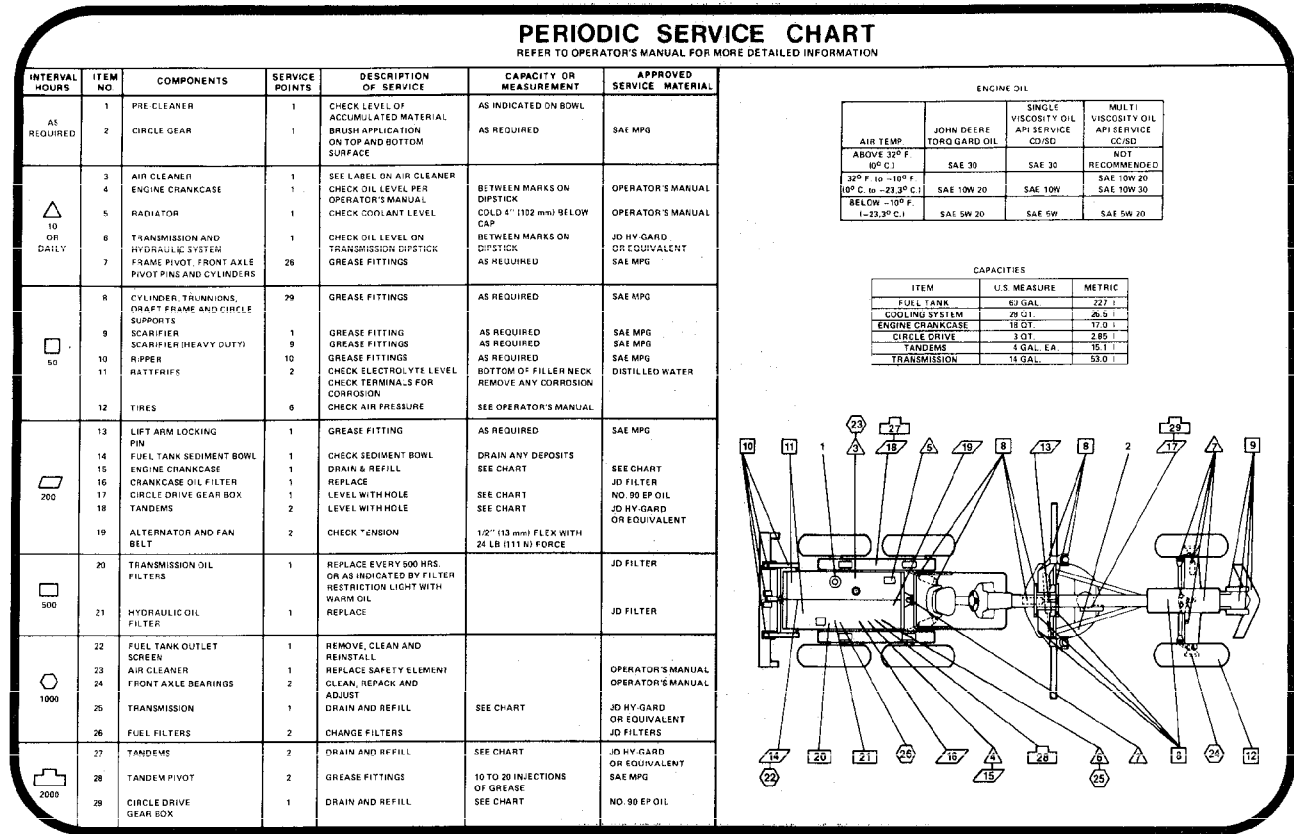
NOTE: Dimensions for the JD672-A are the same as those shown above. When a motor grader has air conditioning, the height is 10 ft. 7 in. (3.23 m).

# Group V LUBRICATION

## GENERAL INFORMATION

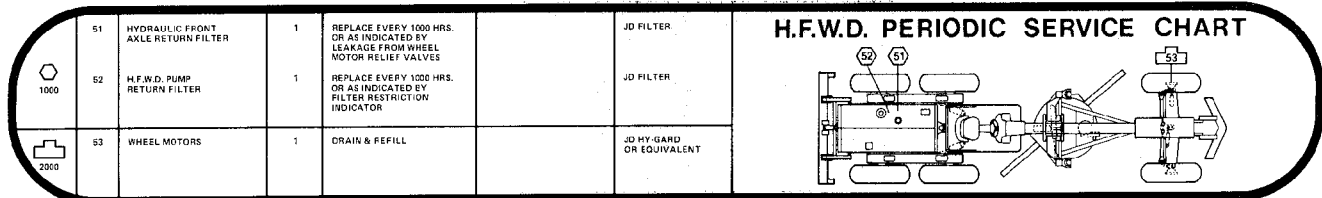
Below are copies of the periodic service charts which are on the motor grader right (R.H.) engine side shield. Read the current JD670-A and JD672-A Motor Grader Operator's Manual for more information on service.

Use the operator's manual and periodic service charts when working on the motor grader. Tell your customer to thoroughly read the operator's manual before attempting to service or operate the motor grader.



T61695N

Fig. 1-Periodic Service Chart



T61276N

Fig. 2-Hydraulic Front Wheel Drive Periodic Service Chart



## LUBRICANTS

Use only lubricants specified on this page. Apply them at intervals and according to instructions shown on periodic service chart.

### ENGINE LUBRICATING OILS



X3372N

Use John Deere TORQ-GARD SUPREME® Engine Oil in the engine crankcase.

Oils other than TORQ-GARD SUPREME must conform to one of 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 average temperature, use oil as follows.

Air Temperature	John Deere TORQ-GARD SUPREME Oil	Other Oils	
		Single Viscosity Oil	Multi-Viscosity Oil
Above 32°F (0°C)	SAE 30	SAE 30	Not recommended
—10°F to 32°F (—23°C to 0°C)	SAE 10W-20	SAE 10W	SAE 10W-30
Below —10°F (—23°C)	SAE 5W-20	SAE 5W	SAE 5W-20

When SAE 5W-20 or SAE 5W oils are used, machines can use more oil. Check oil level regularly.

### TRANSMISSION-HYDRAULIC OILS AND HYDRAULIC FRONT WHEEL DRIVE WHEEL MOTORS

Above —15°F (—26°C), use John Deere HY-GARD® Transmission and Hydraulic Oil (J20A) or an equivalent.

Use HY-GARD Winter Grade Oil (J20B) when temperature is below —15°F (—26°C).

Continued use of HY-GARD Winter Grade Oil (J20B) at temperatures above 32°F (0°C) may result in increased transmission and hydraulic component wear and shorter life.

### TANDEM DRIVES

Use John Deere HY-GARD Transmission and Hydraulic Oil (J20A) or an equivalent.

### CIRCLE DRIVE GEARBOX

Use SAE EP90 oil.

### GREASES

Use John Deere Multi-Purpose Grease or equivalent for all grease fittings and front wheel bearings.

### STORING LUBRICANTS

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

## Group 9005

# GENERAL INFORMATION

### SEVEN BASIC STEPS OF DIAGNOSIS AND TESTING

To prevent the unnecessary loss of time and money, use the following seven steps for a quick and accurate method of locating troubles:

#### 1. Know The Grader

In other words, "Do your Homework." Study this manual to know how the individual components work and what their function is in the over-all system.

Keep up with the latest service information. Read and then file in a handy place. Information received today may have the cause and remedy of a problem encountered.

#### 2. Ask The Operator

Question the operator as to how the grader acted when it started to fail. Find out what was unusual about it.

Also find out if any do-it-yourself service was performed. (You may find out later that the trouble is somewhere else, but you should know if any components were tampered with.)

Ask how the grader is used and when it is serviced. Many problems can be traced to poor maintenance or abuse.

#### 3. Operate The Grader

Get on the grader and operate it. Warm it up and put it through its paces. Don't completely rely on the operator's story - check it yourself.

Are the gauges reading normal? (If not, it may be that the component being monitored is not functioning correctly or it may mean that the gauge is faulty).

How's the performance? Is the action slow, erratic, or nil?

Do the controls feel solid or "spongy"? Do they seem to be "sticking"?

Smell anything? Any signs of smoke?

Hear any unusual sounds? Where? At what speeds or during what cycles?

#### 4. Inspect The Grader

Get off the grader and make a visual check. Use your eyes, ears, and nose to spot any signs of trouble.

Look closely at the components. Inspect for cracked welds, loose tie bolts, damaged linkages, worn or broken lines, etc.

During the inspection, make a note of all the trouble signs.

#### 5. List The Possible Causes

With the information obtained during steps 1 through 4, make a list of the possible causes.

What were the signs you found while inspecting the grader? What is the most likely cause?

#### 6. Reach A Conclusion

Look over the list of possible causes and decide which are most likely and which are easiest to verify.

"Diagnosing Malfunctions" given in the following groups will be a helpful guide.

Reach your decision on the leading causes and plan to check them first.

#### 7. Test Your Conclusion

Before repairing components in the system, test your conclusions to make sure they are correct.

Some of the possible causes can be verified without further testing. Check these possibilities first.

Tests will soon narrow the remaining list of possible causes and soon the actual source of trouble will be pinpointed.

With the trouble accurately located, it is now a simple matter to remove and repair the component at fault.

## HYDRAULIC FRONT WHEEL DRIVE (HFWD) SYSTEM CHECKOUT PROCEDURE

Use the HFWD system checkout procedure to check for normal HFWD operation.

The procedure is designed so a service technician can make a quick check of HFWD operation while sitting in operator's seat. The procedure can be done in less than 20 minutes if hydraulic oil is at operating temperature. An area is needed which is level and has adequate space to complete driving test. No special tools are needed.

If necessary, perform individual component test to verify problems.

### 1. Make a Visual Inspection of Motor Grader:

Visual Inspection of Hydraulic Components.

**LOOK:** Machine must not have any major oil leaks. Transmission oil level must be within specified range. Oil must not be in a "foamy" condition. "Foamy" oil is caused by air in the oil. Speed of front wheels will increase and decrease in cycles.

Air in the oil can be caused by a suction leak in the front wheel return oil filter.

Visual Inspection of Mechanical Components.

**LOOK:** Check air gap (clearance) between tip of rear sensor and parking brake disc teeth. Air gap must be approximately 1 mm (0.04 in.) (thickness of dime). If air gap is less, check sensor tip for damage. If air gap is more, it can result in no front wheel drive in first gear. The pump displacement control valve lever must be perpendicular to the actuator rod.

Visual Inspection of Electrical Components.

**LOOK:** Inspect wiring harness for damage. Bare wires, badly kinked or broken wires, or cut harness coverings can result in intermittent or no HFWD operation.

**LOOK:** Check terminals for being loose, corroded, bent, or pushed back into connectors. HFWD connectors are at the following locations:

Right battery	(2 used)
Electro-hydraulic actuator	(2 used)
Clutch valve	(2 used)
Transmission control valve	(6 used)
Forward-reverse modulator	(5 used)
HFWD control box (in cab)	(3 used)
Solenoid valve (behind front axle)	(3 used)
Front sensor (left front wheel)	(1 used)
Rear harness to console and cowl harnesses (near articulation joint)	(3 used)

### 2. Check Operation of HFWD Controls

**ACTION:** Turn key switch to "ON" position (engine stopped).

**LOOK:** HFWD filter light, alternator light, and transmission oil filter light must be "ON".

**ACTION:** Move HFWD rocker switch (on control box) to the "ON" position and move gear selector lever to first gear.

**LISTEN:** A "click" sound from the control box must be heard. A "click" sound indicates that the five-amp fuse (second down on the panel), 1 to 4 cam switch, (bottom of transmission control valve), shift lever linkage, and relay inside control box are operating.

**ACTION:** Move gear selector lever to fifth gear.

**LISTEN:** A "click" sound from control box must be heard. A "click" sound indicates the 1 to 4 cam switch (bottom of transmission control valve), and shift linkage are operating.

### 3. Check operation of HFWD (Driving Test).

**IMPORTANT: DO NOT operate machine above first gear with one set of tandems off the ground. Damage to differential can result.**

**ACTION:**

- a. Move transmission shift lever and direction selector lever to neutral position and engine speed control lever (hand throttle) to start position.
- b. Start the engine.
- c. Raise front wheels and one set of tandems off the ground using blade, or scarifier and ripper (if equipped).
- d. Run engine at fast idle.

**LOOK:** HFWD charge pressure must be over 2070 kPa (20.7 bar) (300 psi) on hydrostatic charge pressure gauge.

If pressure is less than 2070 kPa (20.7 bar) (300 psi) either the neutral charge pressure setting is too low or the front wheel drive hydraulic pump is remaining on operating charge pressure.

**ACTION:**

- a. Reduce engine speed to approximately 1500 rpms.
- b. Move transmission shift selector lever to first gear and direction selector lever to forward.
- c. Move HFWD switch to "ON" position.

**LOOK:** HFWD charge pressure must drop slightly but remain in green zone.

**LOOK:** Front wheels must turn in the forward direction but not at full speed. The slow front wheel turning checks operation of front and rear sensors, forward cam switch (lower switch on rear of transmission control valve), clutch pressure switch (on clutch valve), actuator, and oil flow to front wheels.

**ACTION:** Remove center connector from bottom of HFWD control box (front sensor).

**LOOK:** Speed of front wheels must increase to full speed. Full speed rotation of wheels indicates that without front sensor output, front wheels will be over-aggressive.

**ACTION:** Reconnect the center connector.

**LOOK:** Front wheels must return to original speed.

**ACTION:** Remove front connector (rear sensor) from bottom of control box.

**LOOK:** Front wheels must stop turning and pressure indication on charge pressure gauge must increase to a higher pressure. Increase in pressure is due to change from operating charge to neutral charge. If front wheels stop turning it indicates that without rear sensor output signal, the HFWD will not operate.

**ACTION:** Reconnect front connector.

**LOOK:** Front wheels must return to original speed.

**ACTION:** Move the aggressiveness switch (toggle switch) on control box to aggressive mode (forward) position.

**LOOK:** Front wheels must increase in speed and then decrease to approximately their original speed. Speed increase and decrease indicates aggressiveness mode is operational.

**ACTION:** Move aggressiveness switch to normal (rear) position.

### 4. Check HFWD Pulling Torque.



**CAUTION: Machine can move when wheels contact ground. Keep area around machine clear.**