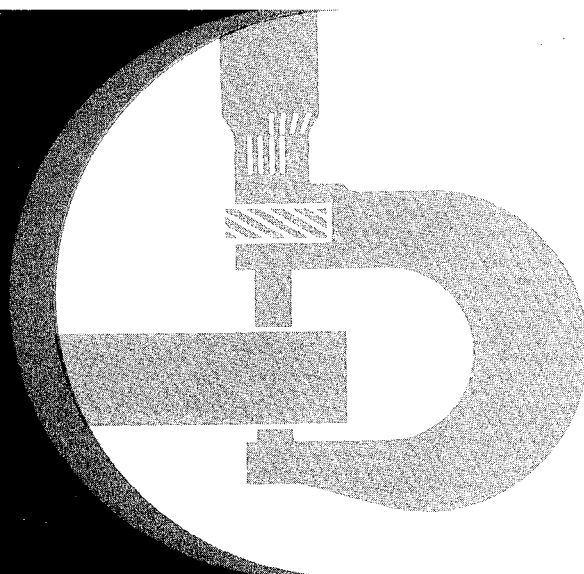


**John Deere  
JD850  
Crawler Bulldozer**



**TECHNICAL MANUAL**

**John Deere Dubuque Works  
TM-1164 (Mar-86)**



Litho in U.S.A.

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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 trouble shooting, *general* maintenance, and *basic* types of failures and their causes. FOS Manuals are for training new personnel and for reference by experienced service technicians.

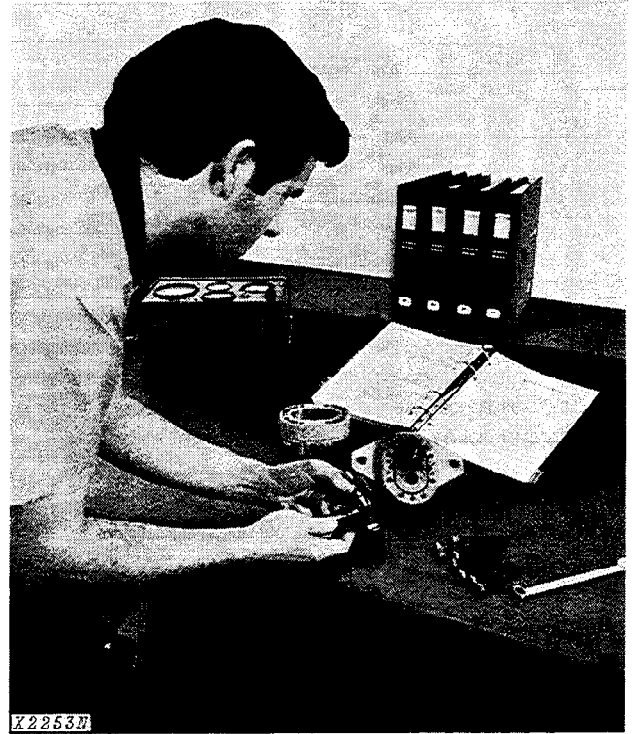


When a service technician should refer to a FOS Manual for more information, a FOS symbol like the one at the left is used in the TM to identify the reference.

### •Technical Manuals—for actual service

*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.

Litho in U.S.A.



Use Technical Manuals for Actual Service

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.


Some features of this manual:

- Inside front cover - "Table of Contents".
- Section 1 - Contents, safety information, general specifications and general services.
- Sections 1 through 42 - Removal, repair, testing (components removed), installation, and adjustment.
- Section 90 - Detailed explanation of system operation, diagnosis, visual inspection, testing, and adjustments.
- Specifications grouped and illustrated at the end of each section.

# MAINTENANCE WITHOUT ACCIDENT WORK SAFELY



T27999N

 This safety alert symbol is used for important safety messages. When you see this symbol, the possibility of personal injury exists if safety message is not followed.

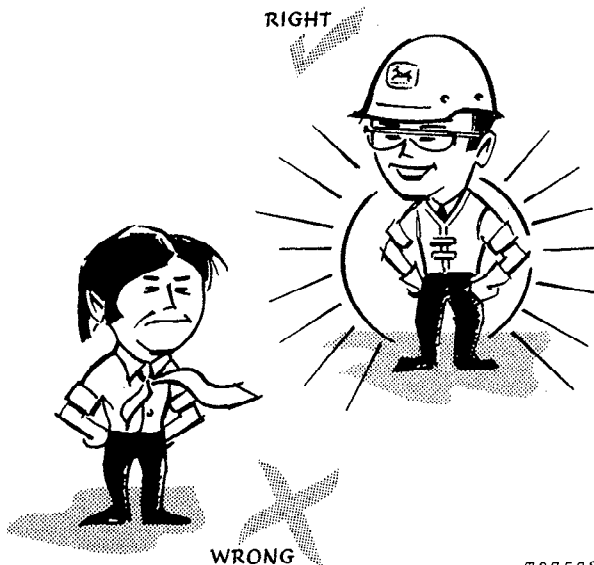
**EVERY EMPLOYER HAS A  
SAFETY PROGRAM. KNOW  
WHAT IT IS!**



T27501N

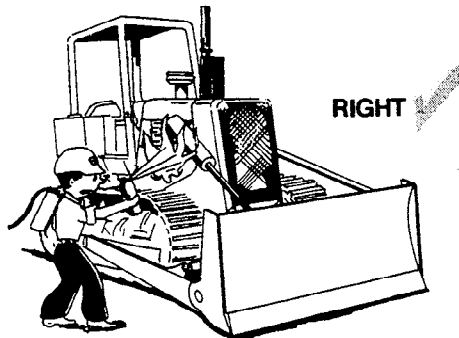
Consult your shop supervisor for specific instructions on a job, and the safety equipment required.

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



T27502N

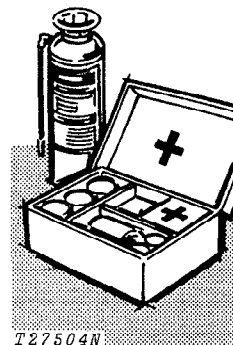
**ALWAYS AVOID** loose clothing or any accessory—flopping cuffs, dangling neckties and scarves, or rings and wrist watches—that can catch in moving parts and put you out of work.



T56994N

## BE ALERT!

Plan ahead — work safely — avoid accidental damage and injury. If a careless moment does cause an accident or fire, react quickly with the tools and skills at hand — know how to use a first aid kit and a fire extinguisher — and where to get aid and assistance. In an emergency, split-second action is the key to safety.



T27504N

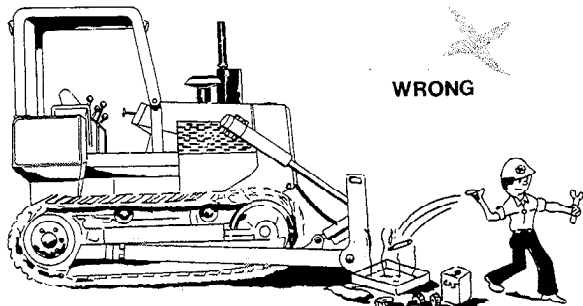
## MAINTENANCE WITHOUT ACCIDENT

Specific safety procedures should always be observed, whether servicing or making repairs on the crawler. Remembering these—in time!—can prevent an injury...or save your life...

### AVOID FIRE HAZARDS—

#### Fuel Is Dangerous!

- Don't smoke while refueling.
- Don't smoke while handling highly flammable material.
- Engine should be shut off when refueling.
- Use care in refueling if the engine is hot.



T56995N

Don't use open pans of gasoline or diesel fuel for cleaning parts. Good commercial, nonflammable solvents are preferred.

#### Battery Gas Is Highly Flammable!

Provide adequate ventilation when charging batteries.



T27508N

- Don't check battery charge by placing metal objects across the posts.
- Don't allow sparks or open flame near batteries.
- Don't smoke near battery.

#### Flame Is Not a Flashlight!

- Never check fuel, battery electrolyte or coolant levels with an open flame.
- Never use an open flame to look for leaks anywhere on the equipment.

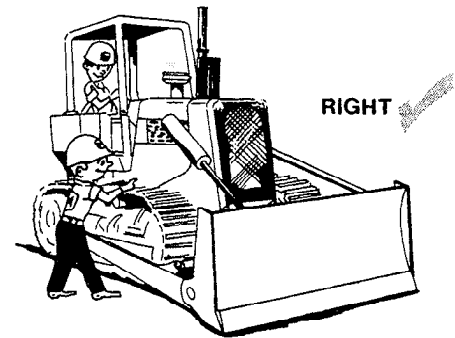
Never use an open flame as a light anywhere on or around the equipment.

### KNOW WHERE FIRE EXTINGUISHERS ARE KEPT!

#### UNDER ALL MAINTENANCE CONDITIONS—

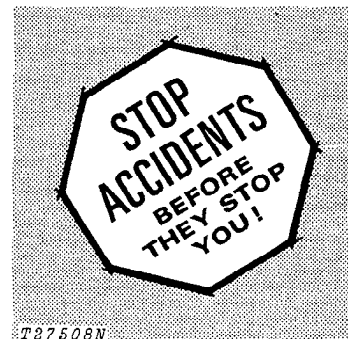
Do not perform any work on the crawler unless authorized to do so. Then be sure you understand the services required. Follow recommended procedures.

Never service the equipment while it is being operated.



T56996N

Avoid working on equipment with the engine running. If it is necessary to make checks with the engine running, **ALWAYS USE TWO SERVICE TECHNICIANS**—one, the operator, at the controls, the other checking in view of the operator. Also, put the forward-reverse speed control lever in neutral, set the park brake, and apply any safety locks provided. **KEEP HANDS AWAY FROM MOVING PARTS.**

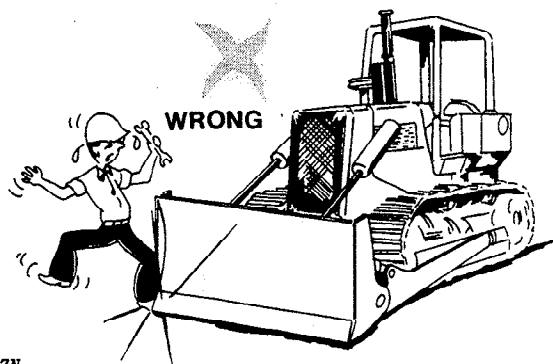


T27508N

## MAINTENANCE WITHOUT ACCIDENT

Before servicing, adjusting, or repairing crawlers which have attachments such as blades, etc—**LOWER** attachments to the ground—or, if necessary to raise them for access to certain parts, **SECURELY SUPPORT** by external means. **DO NOT** rely on controls to support or position attachments for maintenance.

Never allow **ANYONE** to walk under equipment that is raised and not properly blocked.



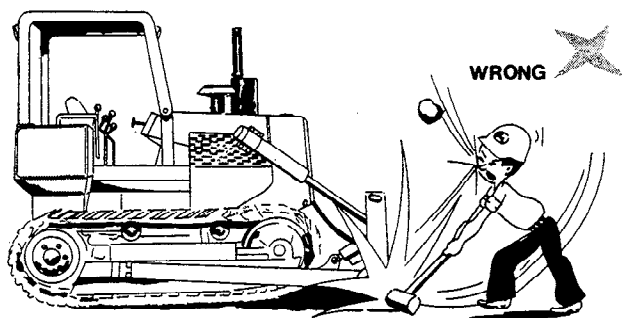
T56997N

Avoid working directly under raised and blocked equipment unless absolutely necessary.

If the crawler is on an incline, block it securely.

Use hoisting equipment for lifting heavy parts. **TAKE CARE! WATCH OUT FOR OTHER PEOPLE IN THE VICINITY.**

Use extreme caution in removing radiator caps, drain plugs, grease fittings, or hydraulic pressure caps.



T56998N

Wear safety glasses when drilling, grinding, or hammering metal.

Make sure the maintenance area is adequately vented.

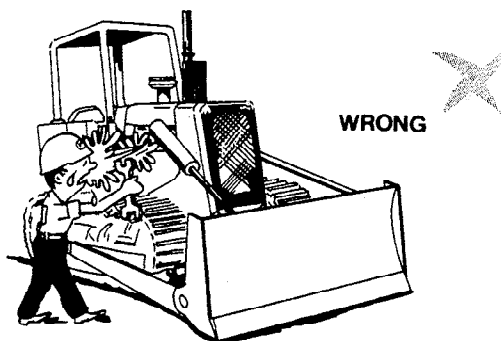
Keep maintenance area **CLEAN AND DRY**. Oily and wet floors are slippery; greasy rags are a fire hazard; wet spots are dangerous when working with electrical equipment.

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

### SERVICING PRECAUTIONS

Stop the engine before cleaning or lubricating the crawler.

Lower blade and ripper to the ground *carefully*.



T56999N

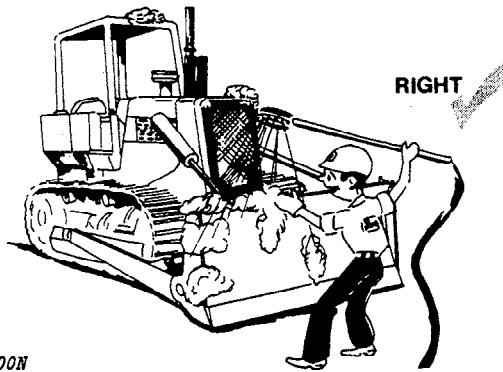
Engine coolant gets hot! Don't remove the radiator cap until coolant temperature is below the boiling point. Then turn cap slightly to relieve pressure before removing.

Exhaust gases are dangerous! Periodically check exhaust system for excessive leakage.

Don't forget a hydraulic system may be pressurized! To relieve system pressure, stop engine, lower blade and ripper and operate blade and ripper control levers until system fails to respond.

When checking hydraulic pressure, be sure to use the correct test gauge for the pressure in the particular system.

## MAINTENANCE WITHOUT ACCIDENT



T57000N

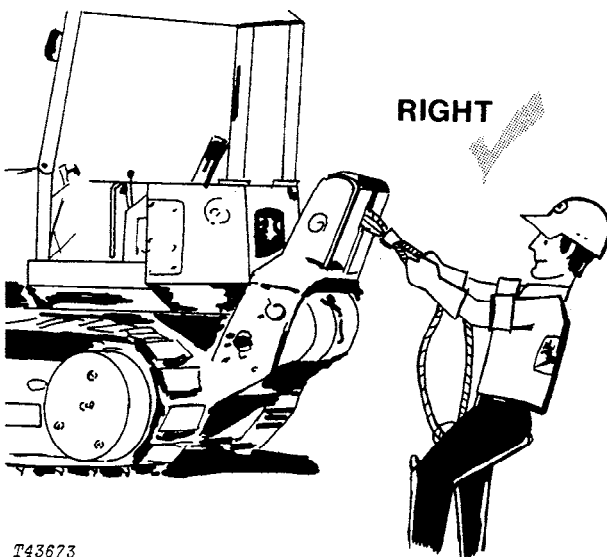
Keep ALL components free of dirt and oil. This attention will minimize fire hazards and facilitate spotting of loose or defective parts.

When preparing engine for storage, remember that inhibitor is volatile and therefore dangerous. Seal and tape openings after adding the inhibitor. Keep container tightly closed when not in use.

### ADJUSTING PRECAUTIONS

... for Operating Adjustments

Before making adjustments, stop engine.



T43673

Always wear gloves when handling cable.

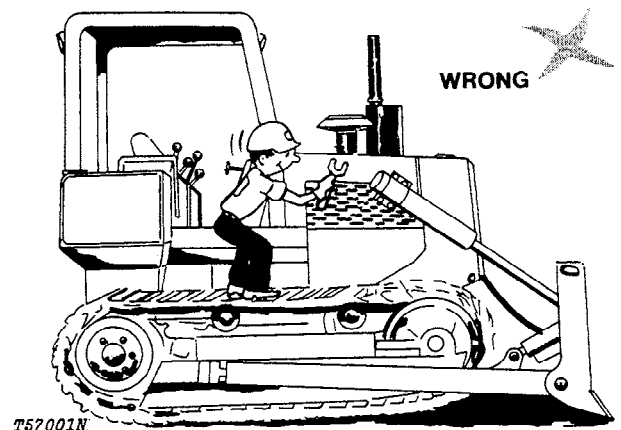


T67066N

Before removing any housing covers, stop engine. Take all objects from your pockets which could fall into the opened housings. Don't let adjusting wrenches fall into opened housings.

... for Maintenance Adjustments

Don't attempt to check belt tension while the engine is running.



T57001N

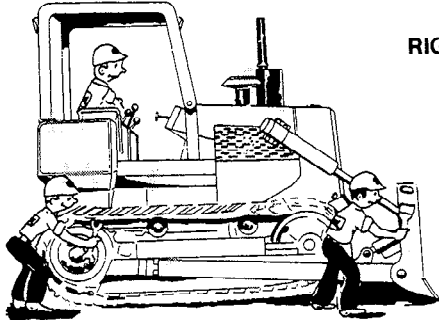
Don't adjust the fuel system while the machine is in motion.



## MAINTENANCE WITHOUT ACCIDENT

### PRECAUTIONS DURING REPAIR

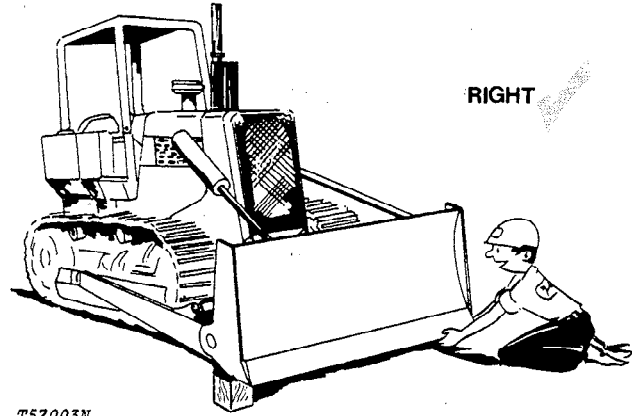
Before working on the engine fuel system—close fuel shutoff valve.



T57002N

Before repairing the electrical system, or performing a major overhaul, make sure the batteries are disconnected.

Stop the engine and securely block the blade.



T57003N

Never let your bare hands come in contact with sharp edges. WEAR GLOVES.

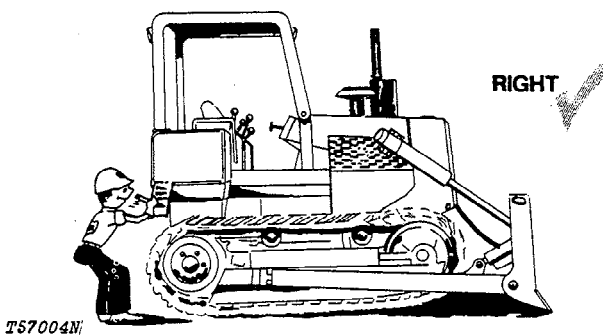
## MAINTENANCE WITHOUT ACCIDENT

### KNOW EQUIPMENT IS READY!

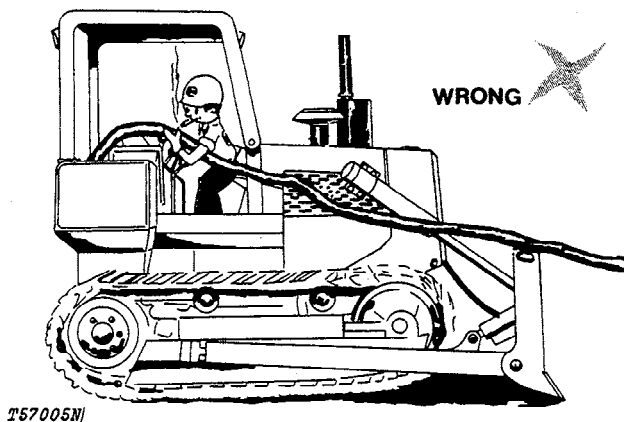
Check guards, ROPS, safety bars—all protective devices installed on the crawler. Every one should be in place and secure.

### CHECK IT OUT!

- GUARDS
- SHIELDS
- PROTECTIVE DEVICES
- ROLL-OVER PROTECTIVE STRUCTURES
- SEAT BELTS
- FIRE EXTINGUISHER, ETC.

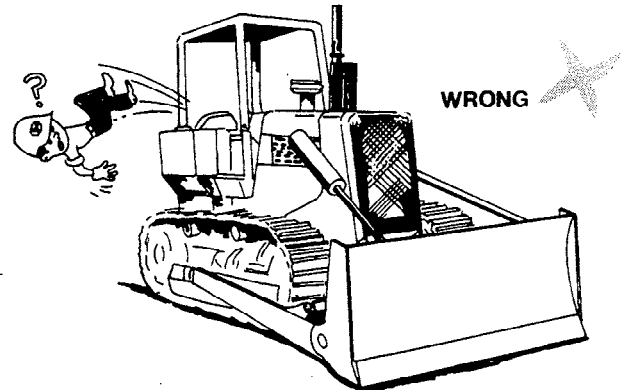


Carefully inspect equipment for visual defects—leaks in fuel, lubrication, and hydraulic systems. Do not search for pressurized fluid leaks with your hands. Use cardboard or wood to search for leaks.



Check levels of fuel, coolant, hydraulic fluid, and lubricating oil. If fuel must be added—**FIRST, PUT OUT THAT CIGARET.**

Check and secure all caps and filler plugs for fuel, oils, radiator, etc.



Be sure to clean any oil, grease or mud accumulation from floor of operator's compartment, stepping points, and grab rails to minimize the danger of slipping.

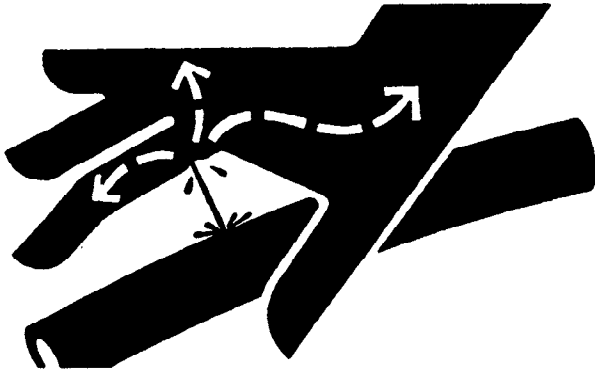
In freezing weather beware of snow or ice deposits on stepping points, grab rails, and floor.

Remove loose bolts, tools, or other objects from floor of operator's compartment.

Although it is impractical to try to cover every possible maintenance situation, the safety precautions recommended here should serve to develop and promote safe maintenance procedures.

The information contained in this manual is not intended to replace safety codes, insurance requirements, federal, state, and local laws, rules and regulations. In particular, your service area or jobsite activities may be subject to state safety rules and/or federal regulation under the Occupational Safety and Health Act (OSHA). Familiarize yourself with all regulations applicable to your situation in order to avoid possible safety violations.

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X9811

Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks. Do not use your hand.

If ANY fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result.

High pressure may be present in track cylinder. If grease does not immediately escape from vent hole, drive crawler forward and backward slowly, then tighten check valve.

Use extreme care when servicing area of track adjuster and recoil spring. Do not attempt to disassemble without proper tools and knowledge of disassembly procedure.

If ROLL-GARD® protective frame or ROLL-OVER protective equipment is loosened or removed for any reason, make certain all parts are reinstalled correctly. Tighten mounting bolts to proper torque. The protection offered by ROPS will be impaired if the ROPS is subject to structural damage, has been involved in an overturn incident or is in anyway altered. Damaged ROPS should be replaced, not reused.

### Prevent Fires Before Starting Engine

Check the fire extinguisher for correct charge.

Open both side shields and grille and remove trash.

Remove trash from bottom guards, drive lines, batteries, hydraulic lines, fuel tank and operator's station.

Check for leaking fuel lines, hydraulic lines, hoses, or fittings with a piece of cardboard or wood. Do not use your hands. Tighten loose fittings. If lines are bent or hoses kinked, install new parts.

### Prevent Fires After Stopping Engine

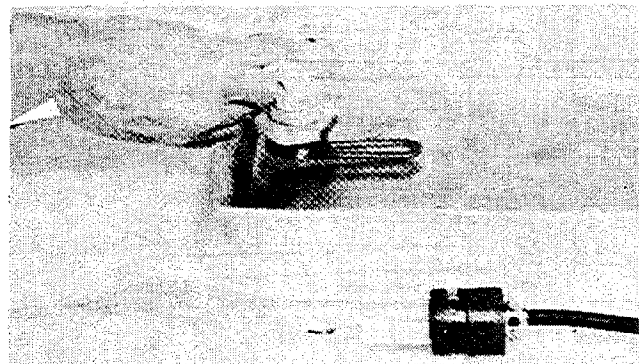
Temperature in engine compartment may go up immediately after you stop the engine. **BE ON GUARD FOR FIRES.**

Before you clean trash from the engine compartment, wait until the engine has cooled. Open side shields to cool the engine faster. While the engine cools, clean trash from other areas.

Avoid possible injury or death from machinery runaway.

Do not start engine by shorting across starter terminals. Machine will start in gear and will move if normal circuitry is bypassed.

**NEVER** start engine while standing on ground. Start engine only from operator's seat, with forward and reverse control lever in neutral, neutral lock lever in locked position and park brake applied.



T87098

Use a heavy-duty grounded cord to connect coolant heater to electrical power.

Do not plug into electrical power unless heating element is immersed in coolant. Sheath could burst and result in personal injury.

## 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 roll-over protective canopy, 20 in. (508 mm) grousers, full fuel tank, 175 lb (79 kg) operator, and standard equipment.*

<b>Power (@ 1800 rpm):</b>	<b>SAE</b>	
Gross .....	165 hp (123 kW*)	
Net .....	145 hp (108 kW*)	147 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. (150 m) altitude and 85°F (29°C) temperature, and DIN 6270 conditions (non-corrected). No derating is required up to 10,000 feet (3 000 m) altitude.

\* In the international System of units (SI), power is expressed in kilowatts (kW).

**Engine:**

John Deere turbocharged diesel, 6-cylinder, 4-stroke cycle.

Bore and stroke .....	5.12 x 5 in. (130 x 127 mm)
Piston displacement .....	619 cu. in. (10 144 cm <sup>3</sup> )
Compression ratio .....	15.2 to 1
Maximum torque @ 1200 rpm .....	550 lb-ft (746 N·m) (76.1 kg/m)
NACC or AMA (U.S. Tax) horsepower .....	62.9
Lubrication .....	Pressure sytem with full flow filters
Main bearings .....	7
Cooling .....	Pressurized with thermostat and controlled bypass
Fan .....	Blower
Air cleaner with restriction indicator .....	Dry
Electrical system .....	24 volt with alternator
Batteries, two-12 volt .....	Reserve capacity: 180 minutes each

**Transmission:**

Cold weather starting . . . disconnect clutch completely disengages splitter drive, hydrostatic drive and all hydraulics.

Splitter drive . . . Pressure-lubricated helical gears drive both hydrostatic transmissions, main hydraulic pump, winch drive shaft and auxiliary pump drive.

Drive . . . Dual-path, full automatic, infinitely variable hydrostatic transmissions.

Speeds . . Infinite form 0 to 6.5 mph (0 to 10.5 km/h) forward or reverse.

Control . . . Single-lever, variable speed, forward and reverse.

**Drawbar pull:**

Maximum drawbar pull .....

65,000 lb.
(291 kN) (29 484 kg)
at 0.20 mph
(0.33 km/h)

**Steering:**

Fully modulated infinitely variable lever steering for live power turns and counter rotation. Pedal steering optional. No need for steering clutches or steering brakes.

**Brakes:**

Service .....

Hydrostatic
-------------

Parking . . . . . Wet-disk brakes are automatically applied when engine is stopped, or manually applied with center pedal during normal operation.

### 850 GENERAL-PURPOSE CRAWLER

**Hydraulic System:** Open-center (optional)  
 Control ..... Single-lever, two-function control  
 Pump ..... Vane, 38 gpm (2.40 L/s) @ rated engine speed  
 Pressure ..... 2250 psi (15 514 kPa) (158.2 kg/cm<sup>2</sup>)

**Tracks:** 6-roller track frame w/front guide. DURA-TRAX™ deep-heat-treated sealed track links and through-hardened sealed rollers provide maximum wear resistance.

Grouser ..... 20 in. (508 mm)  
 Track shoes, each side ..... 37  
 Grounded contact area ..... 3800 sq. in. (24 516 cm<sup>2</sup>)  
 Ground pressure ..... 8.58 psi (59.1 kPa) (0.60 kg/cm<sup>2</sup>)  
 Length of track on ground ..... 95 in. (2.41 m)  
 Track gauge ..... 74 in. (1.88 mm)  
 Oscillation ..... 10 in. (254 mm)  
 Carrier rollers ..... 2 each side  
 Adjustment ..... Hydraulic  
 Minimum ground clearance ..... 16.4 in. (417 mm)

Capacities:	U.S.	Liters
Cooling system	9 gal.	34.0
Fuel tank	82 gal.	310.4
Crankcase	32 qt.	30.3
Crankcase, including filter	34 qt.	32.2
Splitter drive	1.5 gal.	5.7
Final drive, each		
Inner compartment	5.5 gal.	20.8
Outer compartment	3.5 gal.	13.2
Hydraulic system (optional)	35 gal.	132.5
Hydrostatic drives	40 gal.	151.4

SAE Operating Weight w/ROPS ..... 32,600 lb. (14 790 kg)

### 850/6540 ANGLEDZOZER

**Hydraulic System:** Open-center  
 Control ..... Single-lever, two function control  
 Pump ..... Vane, 38 gpm (2.40 L/s) @ rated engine speed  
 Pressure ..... 2250 psi (15 514 kPa) (158.2 kg/cm<sup>2</sup>)

Hydraulic Cylinders:	Bore	Stroke
Lift, two	4.25 in. (108 mm)	33.82 in. (859 mm)
Tilt, two	5.5 in. (140 mm)	4.33 in. (110 mm)
Cylinder rods	Ground, heat-treated, chrome-plated, polished	

**Tracks:** 6-roller track frame w/front and rear track guides and sprocket guard. DURA-TRAX™ deep-heat-treated sealed track links and through-hardened sealed rollers provide maximum wear resistance.

Grouser ..... 20 in. (508 mm)  
 Track shoes, each side ..... 37  
 Ground contact area ..... 3800 sq. in. (24 516 cm<sup>2</sup>)  
 Ground pressure ..... 9.77 psi (67.4 kPa) (0.69 kg/cm<sup>2</sup>)  
 Length of track on ground ..... 95 in. (2.41 m)  
 Track gauge ..... 74 in. (1.88 mm)  
 Oscillation ..... 10 in. (254 mm)  
 Carrier rollers ..... 2 each side  
 Adjustment ..... Hydraulic  
 Minimum ground clearance ..... 16.4 in. (417 mm)

**Blade:**  
 Cutting edge ..... 3-piece  
 Center section ..... 0.75 in. (19 mm)  
 End bits, boron steel ..... 0.75 in. (19 mm)

Capacities:	U.S.	Liters
Cooling system	9 gal.	34.0
Fuel tank	82 gal.	310.4
Crankcase	32 qt.	30.3
Crankcase, including filter	34 qt.	32.2
Splitter drive	1.5 gal.	5.7
Final drive, each:		
Inner compartment	5.5 gal.	20.8
Outer compartment	3.5 gal.	13.2
Hydraulic system (optional)	35 gal.	132.5
Hydrostatic drives	40 gal.	151.4

SAE Operating Weight w/ROPS ..... 37,120 lb. (16 840 kg)

### 850/6545 BULLDOZER

**Hydraulic System:** Open-center  
 Control ..... Single-lever, two function control  
 Pump ..... Vane, 38 gpm (2.40 L/s) @ rated engine speed  
 Pressure ..... 2250 psi (15 514 kPa) (158.2 kg/cm<sup>2</sup>)

Hydraulic Cylinders:	Bore	Stroke
Lift, two	4.25 in. (108 mm)	34.41 in. (874 mm)
Tilt, two	6.25 in. (159 mm)	4.41 in. (112 mm)
Cylinder rods	Ground, heat-treated, chrome-plated, polished	
Cylinder pivot pins	Hardened steel (replaceable bushings)	

**Tracks:** 6-roller track frame w/front and rear track guides and sprocket guard. DURA-TRAX™ deep-heat-treated sealed track links and through-hardened sealed rollers provide maximum wear resistance.

Grouser ..... 20 in. (508 mm)  
 Track shoes, each side ..... 37  
 Ground contact area ..... 3800 sq. in. (24 516 cm<sup>2</sup>)  
 Ground pressure ..... 9.68 psi (66.7 kPa) (0.68 kg/cm<sup>2</sup>)  
 Length of track on ground ..... 95 in. (2.41 m)  
 Track gauge ..... 74 in. (1.88 mm)  
 Oscillation ..... 10 in. (254 mm)  
 Carrier rollers ..... 2 each side  
 Adjustment ..... Hydraulic  
 Minimum ground clearance ..... 16.4 in. (417 mm)

**Blade:**  
 Cutting edge ..... 3-piece  
 Center section ..... 0.75 in. (19 mm)  
 End bits, boron steel ..... 0.75 in. (19 mm)

Capacities:	U.S.	Liters
Cooling system	9 gal.	34.0
Fuel tank	82 gal.	310.4
Crankcase	32 qt.	30.3
Crankcase, including filter	34 qt.	32.2
Splitter drive	1.5 gal.	5.7
Final drive, each:		
Inner compartment	5.5 gal.	20.8
Outer compartment	3.5 gal.	13.2
Hydraulic system	35 gal.	132.5
Hydrostatic drives	40 gal.	151.4

SAE Operating Weight w/ROPS ..... 36,785 lb. (16 690 kg)

## 850 LOW GROUND PRESSURE BULLDOZER

### Hydraulic System: Open-center

Control ..... Single-lever, two function control  
 Pump ..... Vane, 38 gpm (2.40 L/s) @ rated engine speed  
 Pressure ..... 2250 psi (15 514 kPa) (158.2 kg/cm<sup>2</sup>)

Hydraulic Cylinders:	Bore	Stroke
Lift, two .....	4.25 in. (108 mm)	40.16 in. (1020 mm)
Tilt, two .....	6.25 in. (159 mm)	4.41 in. (112 mm)

Cylinder rods ..... Ground, heat-treated, chrome-plated, polished

Tracks: 7-roller track frame w/front, center and rear track guides and sprocket guard. DURA-TRAX™ sealed chain, deep-hardened track links and rollers provide maximum wear resistance.

Shoe width ..... 38 in. (965 mm)  
 Track shoes, each side ..... 43  
 Ground contact area ..... 9044 sq. in. (58 352 cm<sup>2</sup>)  
 Ground pressure ..... 4.86 psi (33.5 kPa) (0.34 kg/cm<sup>2</sup>)  
 Length of track on ground ..... 119 in. (3.02 m)  
 Track gauge ..... 88 in. (2.24 m)  
 Oscillation (at front idler) ..... 15.7 in. (399 mm)  
 Carrier rollers ..... 2 each side  
 Adjustment ..... Hydraulic  
 Minimum ground clearance  
 With single bar grouser (excluding  
 grouser height) ..... 16.0 in. (406 mm)  
 With swamp shoe (including  
 grouser height) ..... 19.3 in. (490 mm)

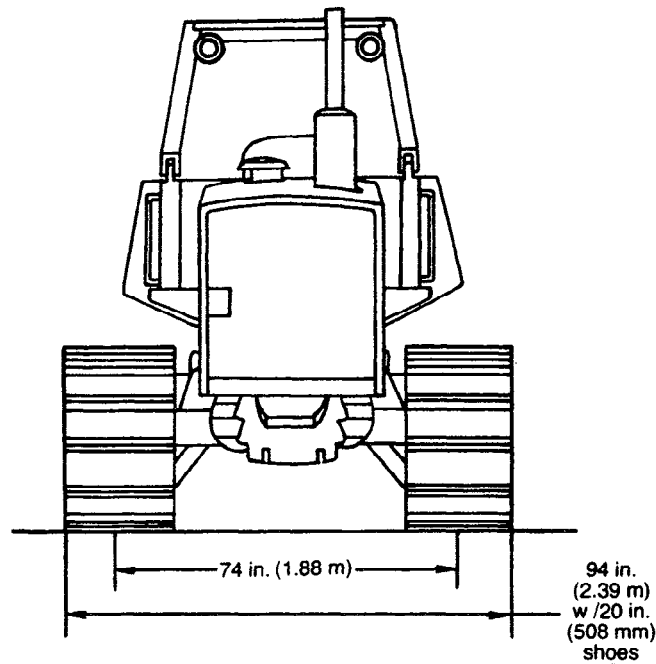
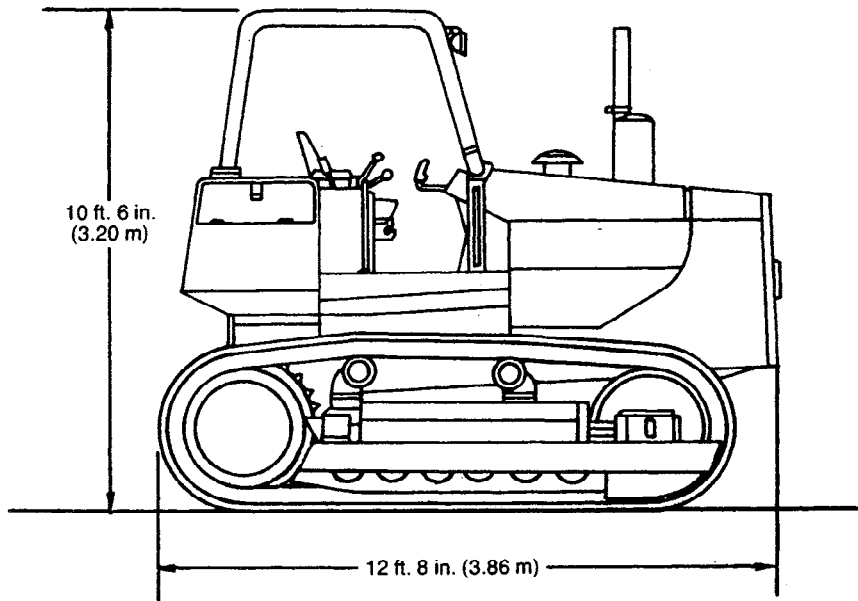
### Cutting Edge:

Center section, heat-treated boron  
 steel, reversible ..... 0.75 in. (19 mm)  
 End bits, boron steel ..... 0.75 in. (19 mm)

Capacities:	U.S.	Liters
Cooling system .....	9 gal.	34.0
Fuel tank .....	82 gal.	310.4
Crankcase .....	32 qt.	30.3
Crankcase, including full flow engine oil filter and engine oil bypass filter .....	36.5 qt.	34.5
Final drive, each: 1st reduction .....	10 gal.	37.9
2nd reduction .....	3.5 gal.	13.2
Hydraulic system .....	35 gal.	132.5
Hydrostatic drives .....	40 gal.	151.4
Splitter drive .....	1.5 gal.	5.7

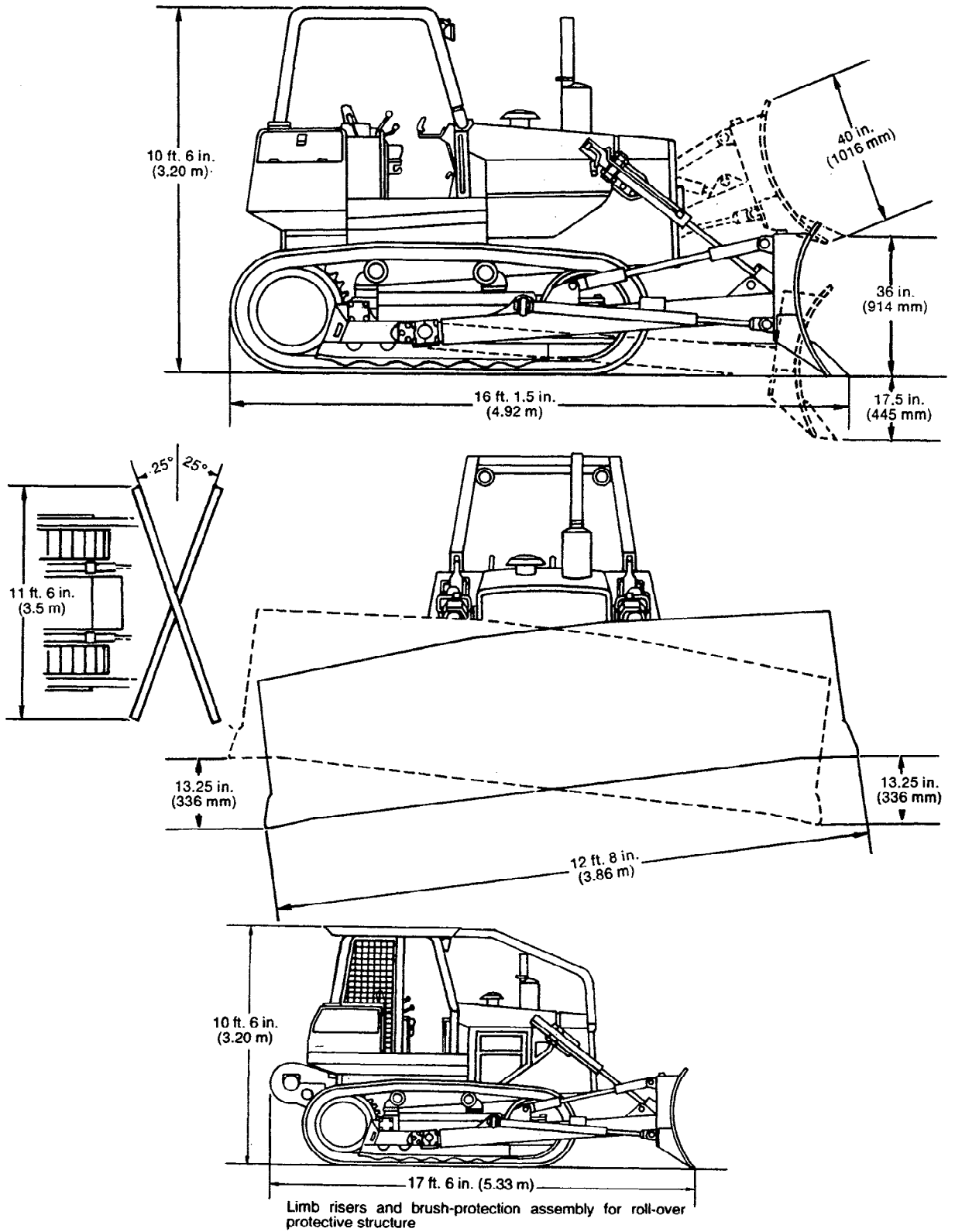
SAE Operating Weight w/ROPS ..... 44,000 lb. (19 960 kg)

### 850 GENERAL-PURPOSE CRAWLER DIMENSIONS



T94328

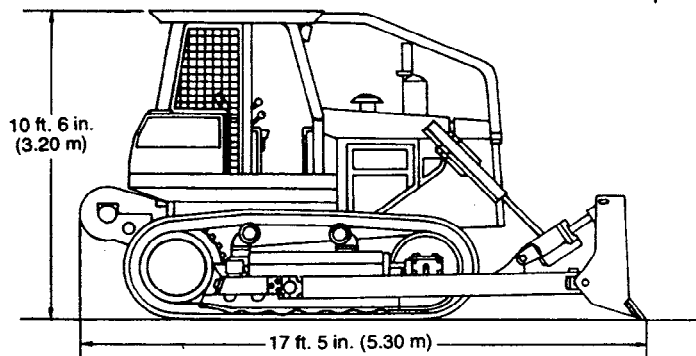
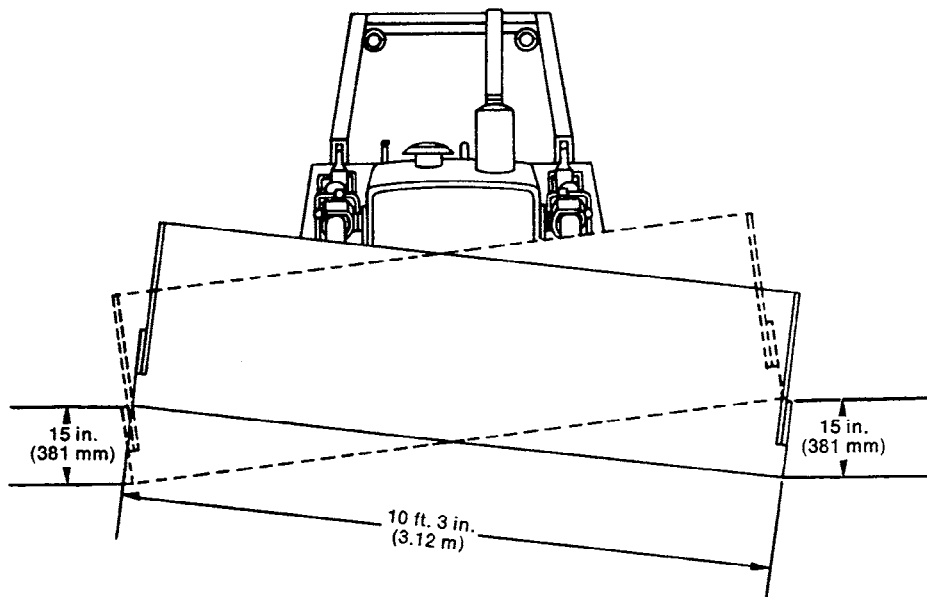
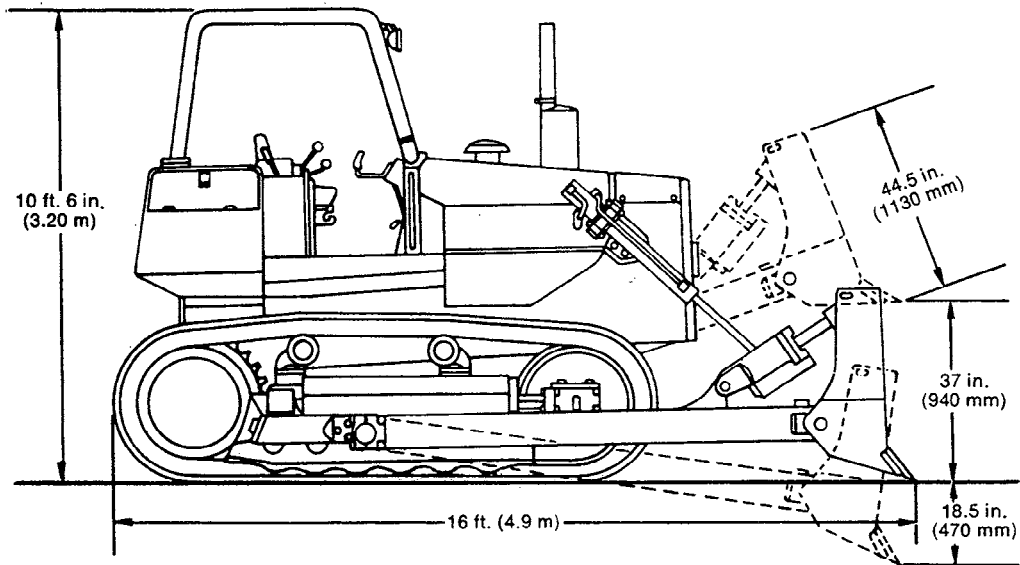
### 850/6540 ANGLEDOZER DIMENSIONS



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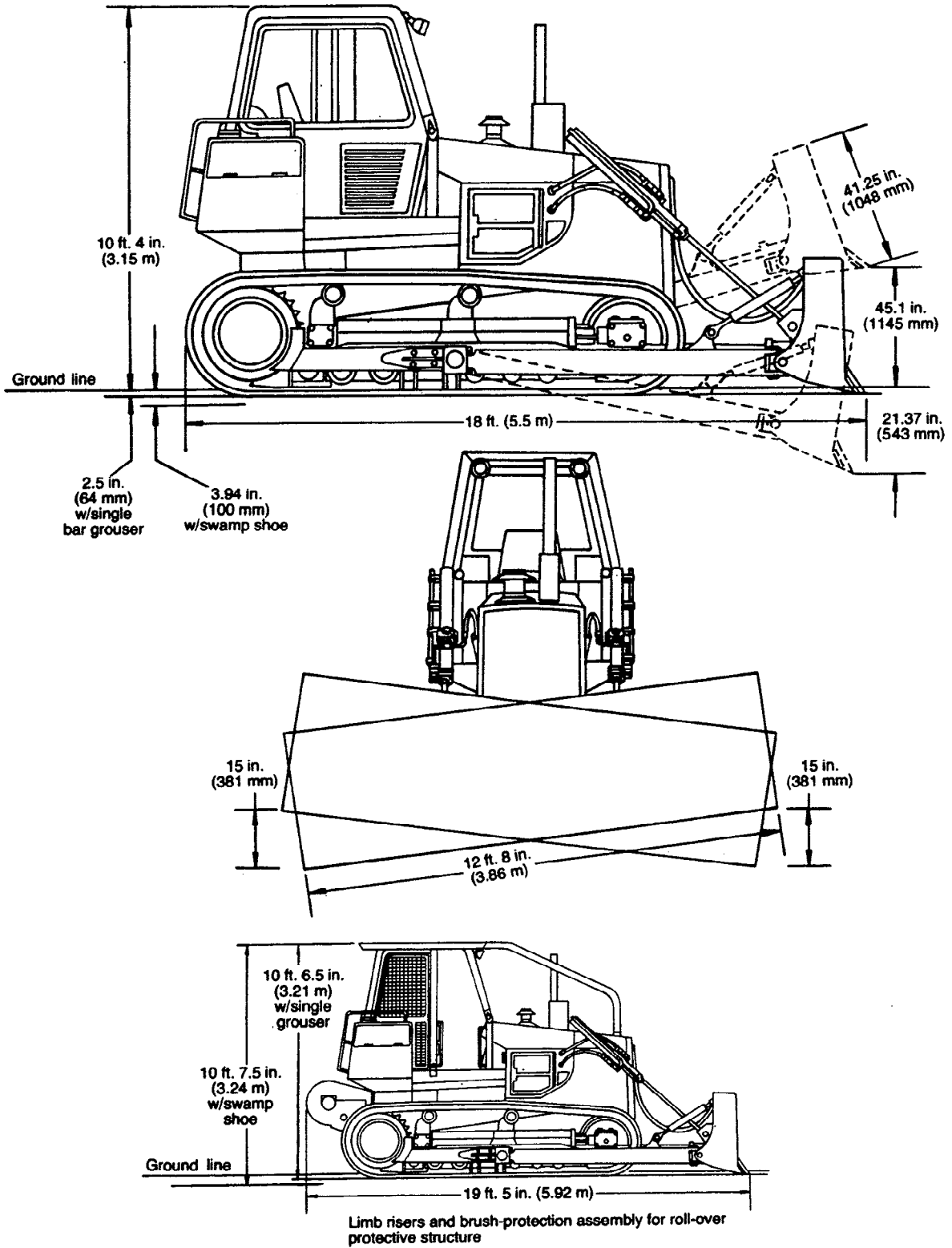
### 850/6545 BULLDOZER DIMENSIONS



Limb risers and brush-protection assembly for roll-over protective structure

T94330

### 850 LOW GROUND PRESSURE BULLDOZER DIMENSIONS



T94331

### METRIC HARDWARE TORQUE SPECIFICATIONS

NOTE: Torques shown are for hardware with SAE 30W oil on threads.

NOTE: Torque wrench tolerance is  $\pm 10$  percent of specified torque.

#### Metric Standard Thread

Thread	8.8		10.9		12.9	
	N·m	(lb-ft)	N·m	(lb-ft)	N·m	(lb-ft)
M5	5.9	( 4.4)	7.9	( 5.8)	9.8	( 7.2)
M6	9.8	( 7.2)	13.8	( 10.2)	16.7	( 12.3)
M8	24.6	( 18.1)	34.4	( 25.4)	40.2	( 29.6)
M10	48.1	( 35.5)	67.8	( 50.0)	81.5	( 60.1)
M12	84.4	( 62.2)	118.0	( 87.0)	142.0	(105.0)
M14	133.0	( 98.0)	187.0	(138.0)	226.0	(167.0)
M16	206.0	(152.0)	290.0	(214.0)	348.0	(257.0)
M18	285.0	(210.0)	398.0	(294.0)	476.0	(351.0)
M20	402.0	(296.0)	570.0	(420.0)	677.0	(499.0)
M22	540.0	(398.0)	765.0	(564.0)	914.0	(674.0)
M24	697.0	(514.0)	980.0	(723.0)	1180.0	(870.0)

#### Metric Fine Thread

Thread	8.8		10.9		12.9	
	N·m	(lb-ft)	N·m	(lb-ft)	N·m	(lb-ft)
M8 x 1	26.5	( 19.5)	37.3	( 27.5)	44.2	( 32.6)
M10 x 1	47.1	( 34.7)	68.8	( 50.7)	81.5	( 60.1)
M12 x 1.5	88.4	( 65.2)	123.0	( 91.0)	147.0	( 108.0)
M14 x 1.5	147.0	(108.0)	206.0	( 152.0)	246.0	( 181.0)
M16 x 1.5	221.0	(163.0)	309.0	( 228.0)	373.0	( 275.0)
M18 x 1.5	319.0	(235.0)	451.0	( 333.0)	540.0	( 398.0)
M20 x 1.5	451.0	(333.0)	628.0	( 463.0)	755.0	( 557.0)
M22 x 1.5	559.0	(442.0)	845.0	( 623.0)	1030.0	( 760.0)
M24 x 2	765.0	(564.0)	1080.0	( 796.0)	1275.0	( 940.0)
M26 x 2	1130.0	(833.0)	1570.0	(1158.0)	1915.0	(1412.0)

### CUSTOMARY HARDWARE TORQUE SPECIFICATIONS

NOTE: Torques shown are for dry (no lubrication on threads) hardware.

NOTE: Torque wrench tolerance is  $\pm 10$  percent of specified torque.

#### Customary Hardware

Cap Screw Size-Inches	Grade B		Grade D		Grade F	
	lb-ft.	(N-m)	lb-ft.	(N-m)	lb-ft.	(N-m)
1/4	----	----	10	(14)	14	(19)
5/16	----	----	20	(27)	30	(41)
3/8	----	----	35	(47)	50	(68)
7/16	35	(47)	55	(75)	80	(108)
1/2	55	(75)	85	(115)	120	(163)
9/16	75	(102)	130	(176)	175	(237)
5/8	105	(142)	170	(230)	240	(325)
3/4	185	(251)	300	(407)	425	(576)
7/8	160	(217)	445	(603)	685	(929)
1	250	(339)	670	(908)	1030	(1396)
1-1/8	330	(447)	910	(1234)	1460	(1979)
1-1/4	480	(651)	1250	(1695)	2060	(2793)

T88804

## O-RING BOSS FITTING SERVICE RECOMMENDATIONS

1. Inspect boss O-ring seat. It must be free of dirt and defects. If repeated leaks occur, inspect for defects with a magnifying glass. Some raised defects can be removed with a slip stone.

Occasionally a lower durometer O-ring will seal against a rough seat. If neither of these solutions work, the component must be replaced.

2. Put hydraulic oil, petroleum jelly or soap on the O-ring. Put a thimble over the threads to protect O-ring from nicks. Slide O-ring over the thimble and into the turned down section of fitting.

For angle fittings, loosen special nut and push special washer against threads so O-ring can be installed into the turned down section of fitting.

3. Turn fitting into the boss by hand until special washer or washer face (straight fitting) contacts boss face and O-ring is squeezed into its seat.

4. To position angle fittings, turn the fitting counter-clockwise a maximum of one turn.

5. Tighten straight fittings to the torque value shown in chart. For angle fittings, tighten the special nut to valve shown in the chart while holding body of fitting with a wrench.

### STRAIGHT FITTING OR SPECIAL NUT TORQUE (1)

Thread Size	Torque <sup>1</sup>		Number Of Flats <sup>2</sup>
	N·m	(lb-ft)	
3/8-24 UNF	8	(6)	2
7/16-20 UNF	12	(9)	2
1/2-20 UNF	16	(12)	2
9/16-18 UNF	24	(18)	2
3/4-16 UNF	46	(34)	2
7/8-14 UNF	62	(46)	1-1/2
1-1/16-12 UNF	102	(75)	1
1-3/16-12 UNF	122	(90)	1
1-5/16-12 UNF	142	(105)	3/4
1-5/8-12 UNF	190	(140)	3/4
1-7/8-12 UNF	217	(160)	1/2

1. Tolerance  $\pm$  10%.

2. To be used if a torque wrench cannot be used. After tightening fitting by hand, put a mark on nut and boss; then tighten special nut or straight fitting the number of flats shown.



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