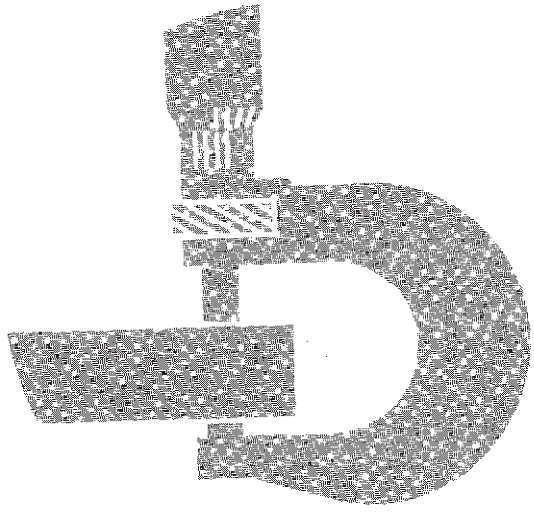
John Deere 495D Excavator Repair



TECHNICAL MANUAL

TM-1457 (Feb-89)
LITHO IN U.S.A.

Introduction

FOREWORD

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

This is the safety-alert symbol. When you see this symbol on the machine or in this manual, be alert to the potential for personal injury.

Technical manuals are divided in two parts: repair and diagnostics. Repair sections tell how to repair the components. Diagnostic sections help you identify the majority of routine failures quickly.

Information is organized in groups for the various components requiring service instruction. At the beginning of each group are summary listings of all applicable essential tools, service equipment and tools, other materials needed to do the job, service parts kits, specifications, wear tolerances, and torque values.

Binders, binder labels, and tab sets can be ordered by John Deere dealers direct from the John Deere Distribution Service Center.

This manual is part of a total product support program.

FOS Manuals-reference

Technical Manuals-machine service

Component Manuals-component service

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

Technicals Manuals are concise guides for specific machines. Technical manuals are on-the-job guides containing only the vital information needed for diagnosis, analysis, testing, and repair.

Component Technical Manuals are concise service guides for specific components. Component technicals manuals are written as stand-alone manuals covering multiple machine applications.

053;TMIFC 190188

1T3;.IFC 3 261088

495D EXCAVATOR TECHNICAL MANUAL TM-1457 (FEB-89)

SECTION AND GROUP CONTENTS

NOTE: This manual covers machine repair. For operation and tests information, see TM-1456.

Continued on next page

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

TX,1457 CC1 170589

TX,1457 CC2 170589

HANDLE FLUIDS SAFELY—AVOID FIRES

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.

AB6;TS227 053;FLAME 050188

PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

AB6;TS204 053;SPARKS 280688

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.

AB6;TS186 053;FIRE2 080785

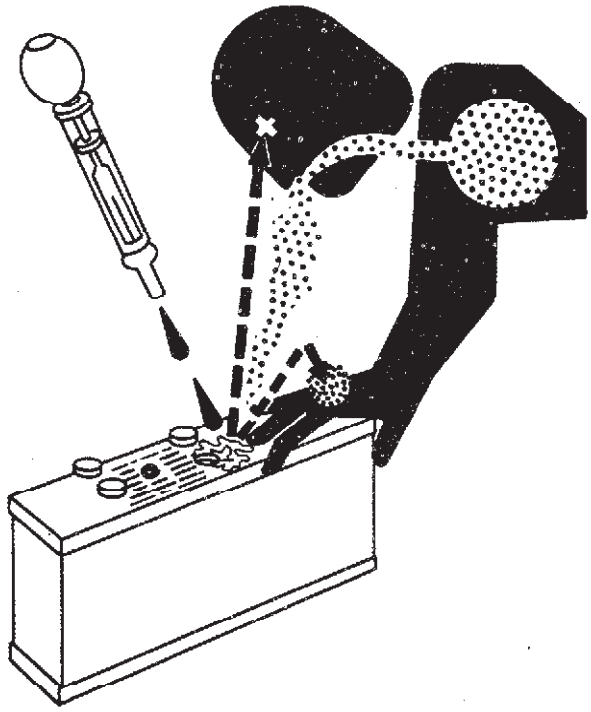
PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:
1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10-15 minutes. Get medical attention immediately.

If acid is swallowed:
1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.



AB6;TS203 053;POISON 211287

AVOID HIGH-PRESSURE FLUIDS

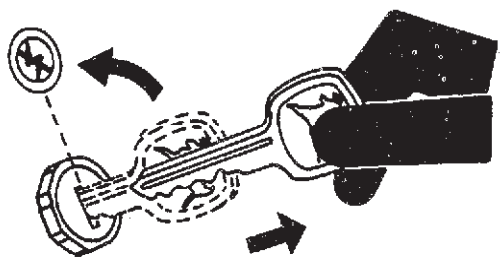
Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before unhooking hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard to search for leaks.

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.

AB6;X9811 053;FLUID 180987

PARK MACHINE SAFELY

Before working on the machine:
- Lower all equipment to the ground.
- Stop the engine and remove the key.
- Disconnect the battery ground strap.
- Hang a "DO NOT OPERATE" tag in operator station.

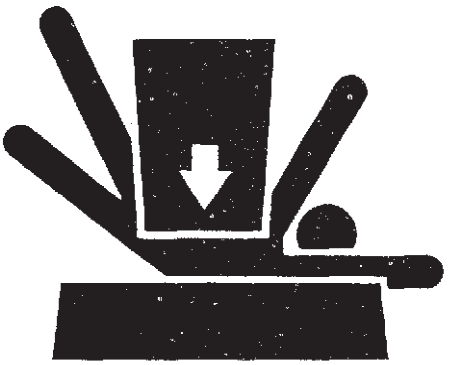


AB6;TS230 063;PARK 050188

SUPPORT MACHINE PROPERLY

Always lower the attachment or implement to the ground before you work on the machine. If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.



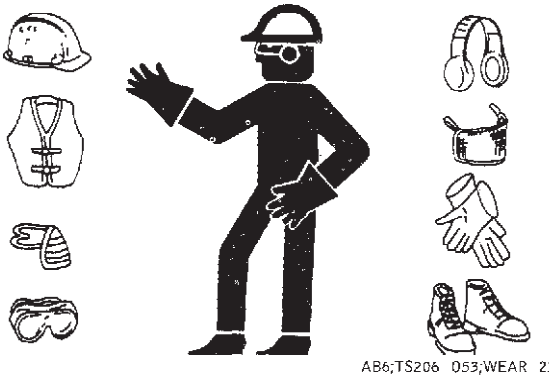
AB6;TS229 053;LOWER 211287

WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

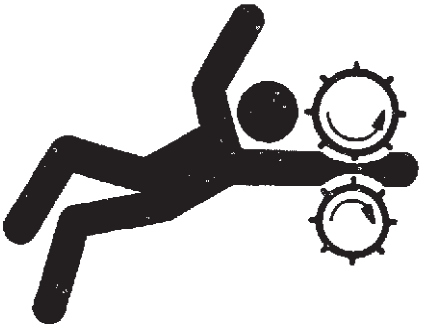


AB6;TS206 053;WEAR 230487

SERVICE MACHINE SAFELY

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



AB6;TS228 053;LOOSE 211287

WORK IN VENTILATED AREA

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

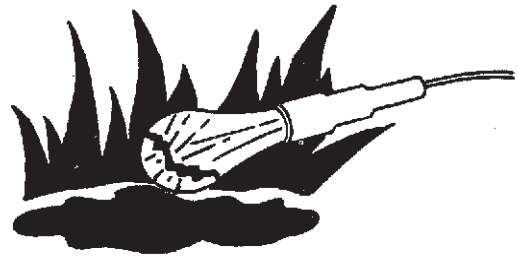
If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

AB6;TS220 053;AIR 050188

UNDERSTAND CORRECT SERVICE

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

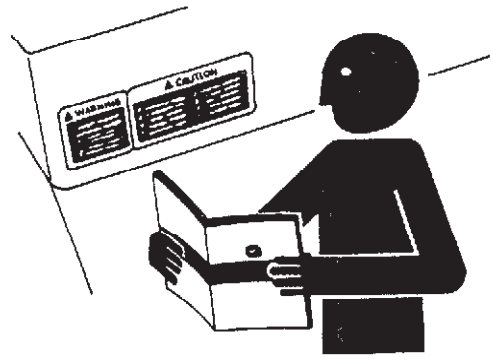
Catch draining fuel, oil, or other fluids in suitable containers. Do not use food or beverage containers that may mislead someone into drinking from them. Wipe up spills at once.



AB6;TS223 053;LIGHT 230288

REPLACE SAFETY SIGNS

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

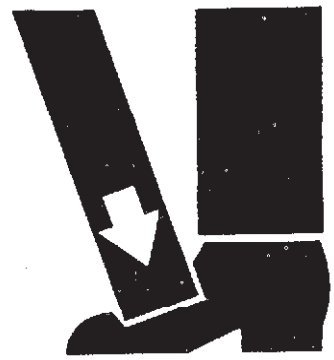


AB6;TS201 053;SIGNS1 221287

USE PROPER LIFTING EQUIPMENT

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.



AB6;TS226 053;LIFT 050188

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SERVICE TIRES SAFELY

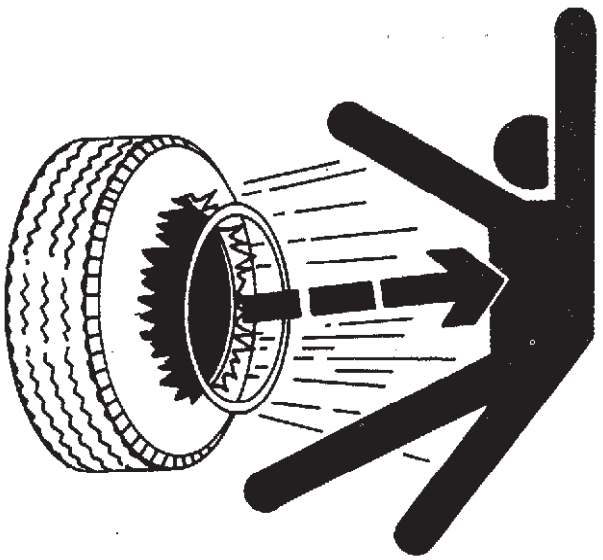
Explosive separation of a tire and rim parts can cause serious injury or death.

Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.



AB6;TS211 053;RIM 211287

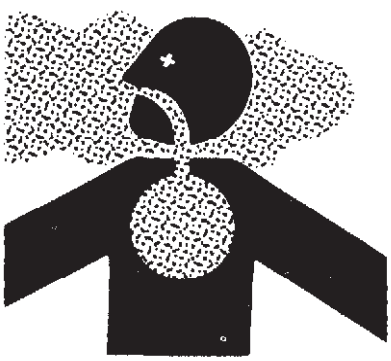
AVOID HARMFUL ASBESTOS DUST

Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

Components in John Deere products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates, and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos is not generated.

Avoid creating dust. Never use compressed air for cleaning. Avoid brushing or grinding of asbestos containing materials. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, wet the asbestos containing materials with a mist of oil or water.

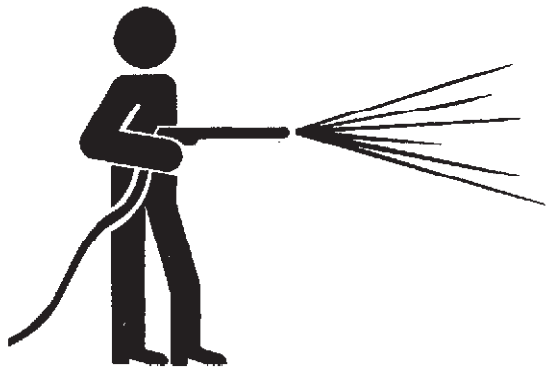
Keep bystanders away from the area.



AB6;TS220 053;DUST 140488

WORK IN CLEAN AREA

Before starting a job:
- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.



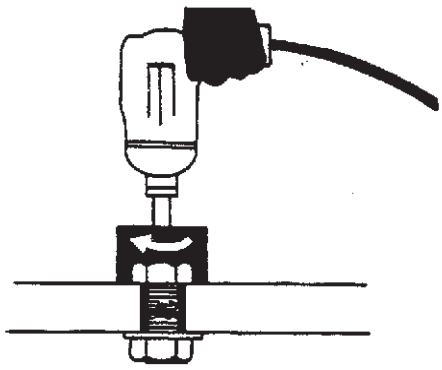
AB6;T6642E J 053;CLEAN 190188

USE TOOLS PROPERLY

Use tools appropriate to the work. Makeshift tools, parts, and procedures will not make good repairs.

Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use such tools to tighten fasteners, especially on light alloy parts.

Use only replacement parts meeting John Deere specifications.

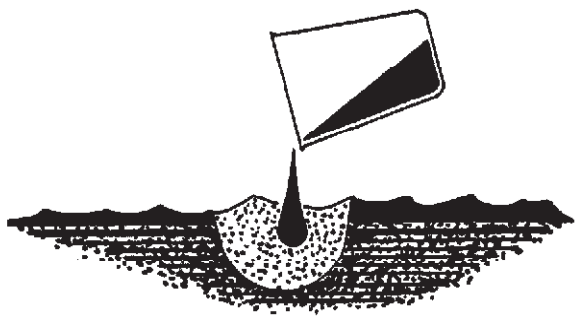


AB6;TS221 053;REPAIR 211287

DISPOSE FLUIDS PROPERLY

Be mindful of the environment and ecology. Before you drain fluids, find out the proper way to dispose of the oil.

Do not pour oil onto the ground, down a drain, or into a stream, pond, or lake. Consult local ordinances that govern the disposal of wastes.



AB6;TS222 053;DRAIN 211287

LIVE WITH SAFETY

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

AB6;TS231 053;LIVE 050188

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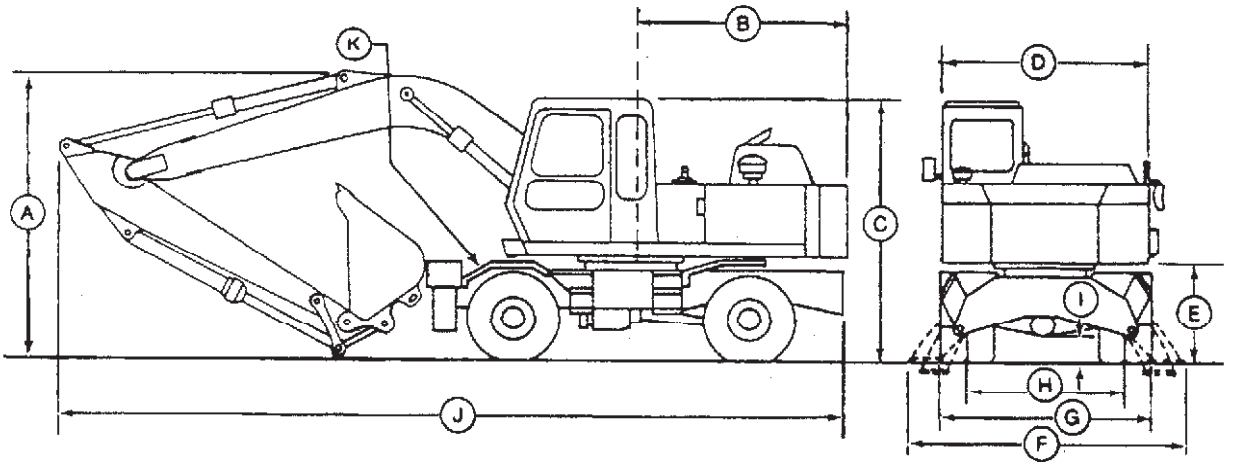
495D EXCAVATOR



A—Overall Height of Boom	3 510 mm (11'6") with 1.95 m (6'5") arm 3 700 mm (12'2") with 2.25 m (7'5") arm
B—Rear-end swing radius	2 100 mm (6'11")
Rear-end length	2 090 mm (6'10")
C—Cab Height.....	2 980 mm (9'9")
D—Superstructure Width	2 380 mm (7'10")
E—Superstructure clearance	1 210 mm (4'0")
F—Overall Width of outrigger extended	3 190 mm (10'6")
G—Center to center width of outrigger	2 890 mm (9'6")
H—Overall width (undercarriage width)	2 470 mm (8'1")
I—Minimum ground clearance	315 mm (1'0")
J—Overall length	6 910 mm (22'8") with 1.95 m (6'5") arm 7 080 mm (23'3") with 2.25 m (7'5") arm

K—REAR END OF UNDERCARRIAGE

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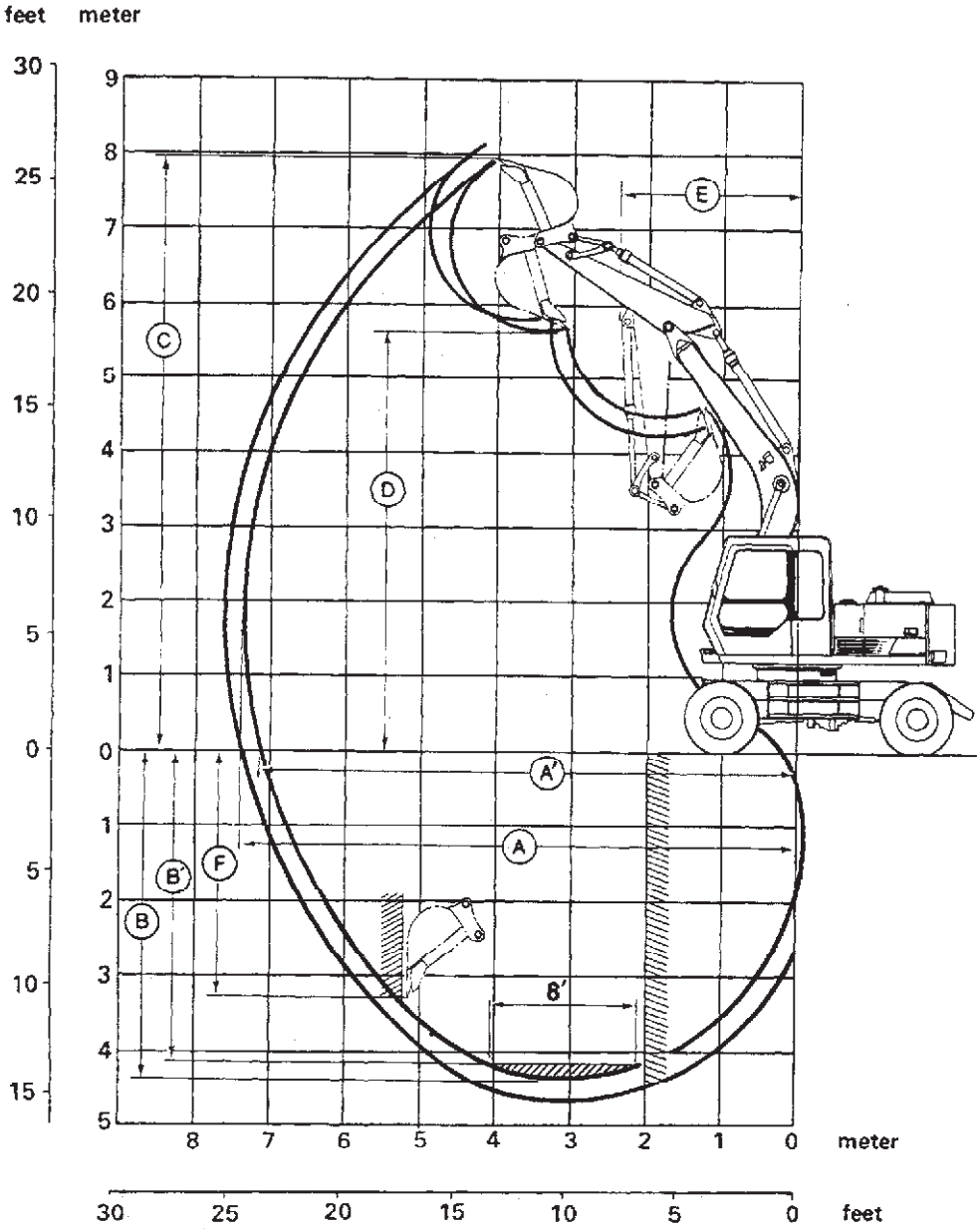
WORKING RANGES



	1.95 m (6'5") arm	2.25 m (7'5") arm
A—Max. digging reach	7 410 mm (24'4")	7 680 mm (25'2")
A'—Max. digging reach (on ground)	7 180 mm (23'7")	7 450 mm (24'5")
B—Max. digging depth	4 410 mm (14'6")	4 710 mm (15'5")
B'—Max. digging depth (8' level)	4 150 mm (13'7")	4 470 mm (14'8")
C—Max. cutting height	7 950 mm (26'1")	8 100 mm (26'7")
D—Max. dumping height	5 600 mm (18'4")	5 740 mm (18'10")
E—Min. swing radius	2 460 mm (8'1")	2 640 mm (8'8")
F—Max. vertical wall	3 320 mm (10'11")	3 800 mm (12'6")

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495D EXCAVATOR SPECIFICATIONS

Specifications and design subject to change without notice. Wherever applicable, specifications are in accordance with PCSA and SAE Standards. except where otherwise noted, these specifications are based on a unit with full fuel tank, 175 lb (80 kg) operator and standard equipment.

Engine: John Deere 4-276T
Type ..... 4-stroke cycle, turbocharged diesel
Bore and stroke .. 4.19 x 5.00 in. (106.5 x 127 mm)
No. of cylinders 4
Displacement ..... 276 cu. in. (4.524 L)
Compression ratio ..... 17.2 to 1
Maximum net torque @ 1300 rpm ..... 284 lb-ft (385 N·m) (39.3 kg·m)
Lubrication .... Pressure system with full flow filter
Coolant fan ..... Suction type
Electrical system ... 24-volt with 42-amp alternator
Batteries (two 12-volt) ..... Reserve capacity: 180 minutes

Rated Power	**SAE**	**DIN 70 020**
@ 2100 rpm (Dig Mode):		
Net	95 hp (71 kW)	71 kW
Gross	100 hp (75 kW)	
@ 2300 rpm (Travel Mode):		
Net	100 hp (75 kW)	75 kW
Gross	105 hp (78 kW)	

Net engine power is with standard equipment including air cleaner, exhaust system, alternator, and cooling fan, at standard conditions per SAE J1349 and DIN 70 020, using NO. 2-D fuel @ 35 API gravity. No derating is required up to 10,000 ft (3050 m) altitude. Gross power is without cooling fan.

Hydraulic System: Open center
Variable flow, constant horsepower hydraulic system provides independent and combined operation of all functions. Load-sensing adjusts hydraulic flow and pressure to individual function demands. Pump displacement is automatically reduced when controls are returned to neutral.

Main pumps: 2 variable-displacement, axial-piston
Pressure setting ..... 4620 psi (31 854 kPa) (319 kg/cm²)
Maximum oil flow ..... 2 x 30.4 gpm (2 x 115 L/min)
Pilot pump: Gear
Pressure setting ..... 570 psi (3930 kPa) (40 kg/cm²)
Maximum oil flow ..... 6.6 gpm (25 L/min)
Steering pump: Gear
Pressure setting ..... 1778 psi (12 258 kPa) (125 kg/cm²)
Maximum oil flow ..... 4.8 gpm (18.0 L/min)
Control valves: nine spool valves
System relief valve operating pressure:
Travel .... 4620 psi (31 860 kPa) (325 kg/cm²)
Front end . 4050 psi (27 950 kPa) (285 kg/cm²)
Circuit relief valves:
Boom ..... 4275 psi (29 420 kPa) (300 kg/cm²)
Arm ..... 4275 psi (29 420 kPa) (300 kg/cm²)
Bucket .... 4770 psi (32 888 kPa) (329 kg/cm²)
Stabilizers . 4050 psi (27 950 kPa) (285 kg/cm²)
Auxiliary ... 4275 psi (29 475 kPa) (295 kg/cm²)
Crossover relief valves:
Travel .... 4900 psi (33 830 kPa) (345 kg/cm²)
Swing ..... 3340 psi (23 050 kPa) (235 kg/cm²)

Cylinders:	Bore		Rod Diameter		Stroke	
	In.	(mm)	In.	(mm)	In.	(mm)
Boom (2)	3.7	95	2.8	70	42.7	1085
Arm	4.1	105	3.0	75	46.3	1175
Bucket	3.7	95	2.6	65	36.8	935
Stabilizer	4.3	110	2.8	70	14.2	360
Steering	2.2	55	1.0	25	8.5	217
Blade	3.9	100	2.4	60	6.7	170
Axle lock	3.5	90	3.5	90	4.5	115

Arm cylinder has a built-in hydraulic cushion at each end of the stroke. Boom and bucket cylinders have a cushion on the rod end.

Swing Mechanism
Swing speed ..... 0 to 12.5 rpm
Swing lock ..... Manual for transporting
Turntable bearing ..... Single-row, shear-type ball bearing with induction-hardened, lubricated internal gear and pinion, 500-hour lube interval

Wheeled Undercarriage:
The undercarriage is available with a blade or (2) stabilizers. The frame is an all-welded, stress-relieved structure.

Drive system ..... two speed-four wheel drive
Travel motor ... variable displacement, axial piston motor with hydraulic retarding valve for preventing overspeeding when traveling downhill.
Transmission ... Constant mesh with and high and low speed range
Travel speeds:
Low speed range ..... 0 to 6.8 mph (0 to 11.0 km/h)
(forward and reverse)
High speed range ..... 0 to 21.4 mph
(forward) (0 to 34.5 km/h)
Maximum traction force—
high ..... 3770 lb (17 kN)(1710 kg)
low ..... 13.095 lb (58 kN) (5940 kg)
Gradability ..... 50 percent (30 degrees)

Steering System:
Full hydraulic power steering using two steering cylinders. Provides manual steering without engine power.
Bore ..... 2.2 in. (55 mm)
Rod diameter ..... 1 in. (25 mm)
Stroke ..... 8.5 in. (217 mm)

Brakes:
Service ... Air over hydraulic brakes acting at each
(foot pedal or switch) wheel—internal-expanding shoe type
Parking (switch) ..... Spring actuated, air-released, internal-expanding shoe type, acting on horizontal drive shaft

NOTE: Applying brakes with switch also locks oscillating axle.

Axles:
Front ..... Oscillating axle with locking hydraulic cylinders; 14.0 total oscillation
Rear ..... Fixed to frame

Tires: (Traction type tread pattern)
9.00—20.0 x 12 PR, duals
18.00—19.5 x 18 PR, singles

Stabilizers:
Each stabilizer cylinder is fitted with a pilot-operated check valve for positive locking. Left and right stabilizers can be operated independently.

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DRAIN AND REFILL CAPACITIES

Item	Metric	U.S.
Fuel tank	250 L	66 gal
Cooling system	21 L	22 qts
Engine crankcase (including filter)	13 L	14 qt
Hydraulic system	133 L	35 gal
Hydraulic reservoir	72 L	19 gal
Swing bearing gear	9 kg	20 lb
Swing gear reduction	3.2 L	3.4 qt
Transmission	5.0 L	5.3 qt
Front axle case	6.0 L	6.4 qt
Wheel gear reduction—each	1.5 L	1.6 qt
Rear axle case	8.5 L	9.0 qt
Brake reservoir	.8 L	.85 qt

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495D EXCAVATOR LIFTING CAPACITIES

Ratings at bucket lift hook, machine situated on firm, uniform supporting surface. Total load includes weight of cables, hook, etc. **Boldface** type indicates hydraulic-limited capacities, lightface type indicates stability-limited capacities, in kg (lb.). Figures do not exceed 87 percent of hydraulic capacities or 75 percent of weight needed to tip machine.

Note: Upper No.: Without using outriggers
Lower No.: Outriggers fully extended

OVER SIDE
OVER REAR

Equipped with rear outriggers, 1.95 m (6 ft. 5 in.) arm and .4 m³ (½ cu. yd.) PCSA heaped bucket

Load Point Height	LOAD RADIUS 1.52 m (5 ft.)		3.05 m (10 ft.)		4.57 m (15 ft.)		6.10 m (20 ft.)	
6.10 m (20 ft.)								
4.57 m (15 ft.)					**4890 (2220)** **4890 (2220)**	**4890 (2220)** **4890 (2220)**		
3.05 m (10 ft.)					5060 (2300) **6250 (2840)**	5470 (2480) **6250 (2840)**	3080 (1400) 4110 (1860)	3350 (1520) **5330 (2420)**
1.52 m (5 ft.)					4640 (2100) 6220 (2820)	5050 (2290) **8060 (3660)**	2930 (1330) 3950 (1790)	3200 (1450) **6130 (2780)**
Ground Line					4380 (1990) 5950 (2700)	4790 (2170) **9160 (4150)**	2810 (1270) 3820 (1730)	3080 (1400) **6620 (3000)**
– 1.52 m (– 5 ft.)	**8420 (3820)** **8420 (3820)**	**8420 (3820)** **8420 (3820)**	8230 (3730) **8760 (3970)**	**8760 (3970)** **8760 (3970)**	4340 (1970) 5900 (2680)	4740 (2150) **9050 (4100)**		
– 3.05 m (– 10 ft.)			8520 (3860) **10390 (4710)**	9330 (4230) **10390 (4710)**	4530 (2050) 6100 (2770)	4940 (2240) **6840 (3100)**		

TM-1457 (Feb-89)

Equipped with rear blade, 1.95 m (6 ft. 5 in.) arm and .4 m³ (½ cu. yd.) PCSA heaped bucket

Load Point Height	LOAD RADIUS 1.52 m (5 ft.)		3.05 m (10 ft.)		4.57 m (15 ft.)		6.10 m (20 ft.)	
6.10 m (20 ft.)								
4.57 m (15 ft.)					**4890 (2220)** **4890 (2220)**	**4890 (2220)** **4890 (2220)**		
3.05 m (10 ft.)					4970 (2250) 5850 (2650)	5570 (2530) **6250 (2840)**	3030 (1370) 3590 (2870)	3420 (3370) **5330 (2420)**
1.52 m (5 ft.)					4560 (1290) 5420 (2460)	5140 (2330) **8060 (3660)**	2870 (1300) 3430 (1560)	3260 (1480) **6130 (2780)**
Ground Line					4300 (1950) 5160 (2340)	4880 (2210) **9160 (4150)**	2750 (1250) 3310 (1500)	3140 (1420) **6620 (3000)**
–1.52 m (–5 ft.)	**8420 (3820)** **8420 (3820)**	**8420 (3820)** **8420 (3820)**	8090 (3670) **8760 (3970)**	**8760 (3970)** **8760 (3970)**	4250 (1930) 5110 (2320)	4840 (2200) **9050 (4110)**		
–3.05 m (–10 ft.)			8370 (3800) 10150 (4600)	9490 (4300) **10390 (4710)**	4440 (2010) 5310 (2410)	5030 (2280) **6840 (3100)**		

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495D EXCAVATOR LIFTING CAPACITIES

Ratings at bucket lift hook, machine situated on firm, uniform supporting surface. Total load includes weight of cables, hook, etc. **Boldface** type indicates hydraulic-limited capacities, lightface type indicates stability-limited capacities, in kg (lb.). Figures do not exceed 87 percent of hydraulic capacities or 75 percent of weight needed to tip machine.

Note: Upper No.: Without using outriggers
Lower No.: Outriggers fully extended

OVER SIDE
OVER REAR

Equipped with rear outriggers, 2.25 m (7 ft. 5 in.) arm and .4 m³ (½ cu. yd.) PCSA heaped bucket

Load Point Height	LOAD RADIUS 1.52 m (5 ft.) Over Side	1.52 m (5 ft.) Over Rear	3.05 m (10 ft.) Over Side	3.05 m (10 ft.) Over Rear	4.57 m (15 ft.) Over Side	4.57 m (15 ft.) Over Rear	6.10 m (20 ft.) Over Side	6.10 m (20 ft.) Over Rear
6.10 m (20 ft.)								
4.57 m (15 ft.)							**3280 (1490)** **3280 (1490)**	**3280 (1490)** **3280 (1490)**
3.05 m (10 ft.)			**7870 (3570)** **7870 (3570)**	**7870 (3570)** **7870 (3570)**	5200 (2360) **5860 (2660)**	5610 (2540) **5860 (2660)**	3190 (1450) 4210 (1910)	3460 (1570) **5170 (2350)**
1.52 m (5 ft.)					4740 (2150) 6330 (2870)	5150 (2340) **7770 (3520)**	3010 (1370) 4030 (1830)	3280 (1490) **5980 (2710)**
Ground Line			8160 (3700) **9150 (4150)**	8970 (4070) **9150 (4150)**	4440 (2010) 6010 (2730)	4850 (2200) **9070 (4110)**	2870 (1300) 3880 (1760)	3130 (1420) **6590 (2990)**
−1.52 m (−5 ft.)	**8360 (3790)** **8360 (3790)**	**8360 (3790)** **8360 (3790)**	8190 (3710) **9050 (4100)**	8990 (4150) **9050 (4100)**	4360 (1980) 5920 (2690)	4760 (2160) **9210 (4180)**	2840 (1290) 3850 (1750)	3100 (1400) **5590 (2540)**
−3.05 m (−10 ft.)			8430 (3820) **11350 (5150)**	9240 (4190) **11350 (5150)**	4490 (2040) 6060 (2750)	4890 (2220) **7660 (3470)**		

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Equipped with rear blade, 2.25 m (7 ft. 5 in.) arm and .4 m³ (½ cu. yd.) PCSA heaped bucket

Load Point Height	LOAD RADIUS 1.52 m (5 ft.)		3.05 m (10 ft.)		4.57 m (15 ft.)		6.10 m (20 ft.)	
6.10 m (20 ft.)								
4.57 m (15 ft.)							3220 (1460) **3280 (1490)**	**3280 (1490)** **3280 (1490)**
3.05 m (10 ft.)			**7870 (3570)** **7870 (3570)**	**7870 (3570)** **7870 (3570)**	5110 (2320) **5860 (2660)**	5700 (2590) **5860 (2660)**	3130 (1420) 3690 (1670)	3520 (1600) **5170 (2350)**
1.52 m (5 ft.)					4660 (2110) 5530 (2510)	5250 (2380) **7770 (3520)**	2950 (1340) 3510 (1590)	3340 (1520) **5980 (2710)**
Ground Line			8020 (3640) **9150 (4150)**	9130 (4140) **9150 (4150)**	4360 (1980) 5210 (2360)	4940 (2240) **9070 (4110)**	2810 (1270) 3360 (1520)	3200 (1450) **6590 (2990)**
–1.52 m (–5 ft.)	**8360 (3790)** **8360 (3790)**	**8360 (3790)** **8360 (3790)**	8040 (3650) **9050 (4100)**	**9050 (4100)** **9050 (4100)**	4270 (1940) 5130 (2330)	4850 (2200) **9210 (4180)**	2780 (1260) 3330 (1510)	3170 (1440) **5590 (2540)**
–3.05 m (–10 ft.)			8290 (3760) 10060 (4560)	9440 (4260) **11350 (5150)**	4440 (2010) 5260 (2390)	4990 (2260) **7660 (3470)**		

BUCKET SELECTION CHART

MAXIMUM RECOMMENDED BUCKET SIZE
(2.25 M) (7 FT 5 IN.) ARM

kg/m³	lb/yd³	Material	Digging With Stabilizers Regular Duty	Heavy Duty	Digging Without Stabilizers Regular Duty
420	700	Wood chips	2.2 m³ (2-7/8 yd³)		1.7 m³ (2-1/4 yd³)
470	800	Peat, dry	1.9 m³ (2-1/2 yd³)		1.5 m³ (2 yd³)
740	1250	Peat, wet	1.2 m³ (1-5/8 yd³)		1.0 m³ (1-1/4 yd³)
860	1450	Cinders	1.1 m³ (1-3/8 yd³)		0.9 m³ (1-1/8 yd³)
1360	2300	Top soil	0.7 m³ (7/8 yd³)		0.6 m³ (3/4 yd³)
1360	2300	Coal, natural bed	0.7 m³ (7/8 yd³)		0.6 m³ (3/4 yd³)
1540	2600	Earth, dry loam	0.6 m³ (3/4 yd³)	0.5 m³ (5/8 yd³)	0.5 m³ (5/8 yd³)
1600	2700	Sand, dry	0.6 m³ (3/4 yd³)	0.4 m³ (1/2 yd³)	0.4 m³ (1/2 yd³)
1900	3200	Earth, moist loam	0.5 m³ (5/8 yd³)	0.4 m³ (1/2 yd³)	0.4 m³ (1/2 yd³)
1930	3250	Sand, gravel, dry	0.5 m³ (5/8 yd³)	0.4 m³ (1/2 yd³)	0.4 m³ (1/2 yd³)
1960	3300	Sand, moist	0.4 m³ (1/2 yd³)	0.3 m³ (3/8 yd³)	0.3 m³ (3/8 yd³)
2080	3500	Sand, wet	0.4 m³ (1/2 yd³)	0.3 m³ (3/8 yd³)	0.3 m³ (3/8 yd³)
2080	3500	Shale	0.4 m³ (1/2 yd³)	0.3 m³ (3/8 yd³)	
2140	3600	Clay, wet	0.4 m³ (1/2 yd³)	0.3 m³ (3/8 yd³)	
2490	4200	Limestone, broken		0.3 m³ (3/8 yd³)	
2730	4600	Rock, granite, blasted		.3 m³ (3/8 yd³)	

Bite Width W/O Sidecutters	Bite Width W/Sidecutters	SAE Heaped	CECE Heaped	Weight
680 mm (27 in.)	800 mm (32 in.)	0.4 m³ (1/2 cu yd)	0.33 m³	318 kg (700 lb)
850 mm (34 in.)	970 mm (38 in.)	0.46 m³ (5/8 cu yd)	0.40 m³	367 kg (810 lb)

05T;115 M66. 280788

BUCKET SELECTION CHART

MAXIMUM RECOMMENDED BUCKET SIZE
(1.95 M) (6 FT 5 IN.) ARM

kg/m³	lb/yd³	Material	Digging With Stabilizers Regular Duty	Digging With Stabilizers Heavy Duty	Digging Without Stabilizers Regular Duty
420	700	Wood chips	2.3 m³ (3 yd³)		1.9 m³ (2-1/2 yd³)
470	800	Peat, dry	2.1 m³ (2-3/4 yd³)		1.7 m³ (2-1/4 yd³)
740	1250	Peat, wet	1.3 m³ (1-3/4 yd³)		1.1 m³ (1-3/8 yd³)
860	1450	Cinders	1.1 m³ (1-1/2 yd³)		1.0 m³ (1-1/4 yd³)
1360	2300	Top soil	0.8 m³ (1 yd³)		0.6 m³ (3/4 yd³)
1360	2300	Coal, natural bed	0.8 m³ (1 yd³)		0.6 m³ (3/4 yd³)
1540	2600	Earth, dry loam	0.7 m³ (7/8 yd³)	0.6 m³ (3/4 yd³)	0.6 m³ (3/4 yd³)
1600	2700	Sand, dry	0.6 m³ (3/4 yd³)	0.5 m³ (5/8 yd³)	0.5 m³ (5/8 yd³)
1900	3200	Earth, moist loam	0.5 m³ (5/8 yd³)	0.4 m³ (1/2 yd³)	0.4 m³ (1/2 yd³)
1930	3250	Sand, gravel, dry	0.5 m³ (5/8 yd³)	0.4 m³ (1/2 yd³)	0.4 m³ (1/2 yd³)
1960	3300	Sand, moist	0.5 m³ (5/8 yd³)	0.4 m³ (1/2 yd³)	0.4 m³ (1/2 yd³)
2080	3500	Sand, wet	0.5 m³ (5/8 yd³)	0.4 m³ (1/2 yd³)	0.4 m³ (1/2 yd³)
2080	3500	Shale	0.5 m³ (5/8 yd³)	0.4 m³ (1/2 yd³)	
2140	3600	Clay, wet	0.5 m³ (5/8 yd³)	0.4 m³ (1/2 yd³)	
2490	4200	Limestone, broken		0.3 m³ (3/8 yd³)	
2730	4600	Rock, granite, blasted		0.3 m³ (3/8 yd³)	

Nominal Width	Bite Width W/O Sidecutters	Bite Width W/Sidecutters	SAE Heaped	CECE Heaped	Weight
785 mm (31 in.)	680 mm (27 in.)	800 mm (32 in.)	0.4 m³ (1/2 cu yd)	0.33 m³	318 kg (700 lb)
915 mm (36 in.)	850 mm (34 in.)	970 mm (38 in.)	0.46 m³ (5/8 cu yd)	0.40 m³	367 kg (810 lb)

05T;115 M67. 191088

HARDWARE TORQUE SPECIFICATIONS

Check cap screws and nuts to be sure they are tight. If hardware is loose, tighten to torque shown on the following charts unless a special torque is specified.

T82;SKMA AT 270286

CHECK WHEEL CAP SCREW TORQUE

SPECIFICATIONS

Wheel cap screw torque	441—541 N·m (325—399 lb-ft)

04T;90 C18. 310186

TORQUE CHART

CAUTION: Use only metric tools on metric hardware. Other tools may not fit properly. They may slip and cause injury.

Check tightness of cap screws periodically. Torque values listed are for general use only. Do not use these values if a different torque value or tightening procedure is listed for a specific application.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

Tighten cap screws having lock nuts to approximately 50 percent of amount shown in chart.

Nominal	T-Bolt		H-Bolt		M-Bolt	
Diam.	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
8	29	21	20	15	10	7
10	63	46	45	33	20	15
12	108	80	88	65	34	25
14	176	130	137	101	54	40
16	265	195	206	152	78	58
18	392	289	294	217	118	87
20	539	398	392	289	167	125
22	735	542	539	398	216	159
24	931	687	686	506	274	202
27	1372	1012	1029	759	392	289
30	1911	1410	1421	1049	539	398
33	2548	1890	1911	1410	735	542
36	3136	2314	2401	1772	931	687

Torque tolerance is +/— 10 percent.

T6873AA

T-Bolt

T6873AB

H-Bolt

T6873AC

M-Bolt

018;T6873AA T6873AB T6873AC 04T;90 M170 260788

SERVICE RECOMMENDATIONS FOR FLARED CONNECTIONS——STRAIGHT OR TAPERED THREADS

1. Inspect the flare and the flare seat. They must be free of dirt or obvious defects.

2. Defects in the tube flare cannot be repaired. Over-tightening a defective flared fitting will not stop leaks.

3. Align the tube with the fitting before attempting to start the nut.

4. Lubricate the male threads with hydraulic fluid or petroleum jelly.

5. Index angle fittings and tighten by hand.

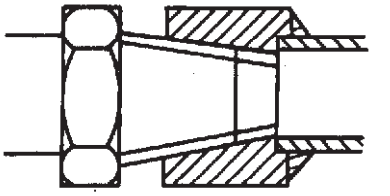
6. Tighten fitting or not to torque value shown on the chart. Do not allow hoses to twist when tightening fittings.

Thread Size	Straight Thread* N·m	lb-ft	Tapered Thread N·m	lb-ft
1/8	15	11	--	--
1/4	20	15	45	33
3/8	29	21	69	51
1/2	49	36	93	69
3/4	69	51	176	130
1	157	116	343	253
1-1/2	196	145	539	398
2	255	188	588	434

**With seat face.*

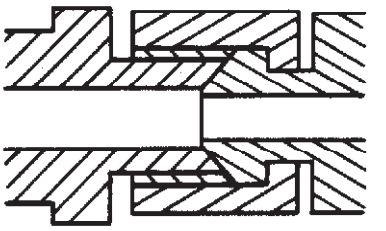
Torque tolerance is +/− 10 percent.

NOTE: If female thread is of cast iron (control valves, brake valves motors, etc.), the torque must be reduced approximately 10%.



T6873AD

Straight Threads



T6873AE

Tapered Threads

018;T6873AD T6873AE 04T;90 M171 260788

INCH SERIES TORQUE CHART

DO NOT use these values if a different torque value or tightening procedure is listed for a specific application. Torque values listed are for general use only.

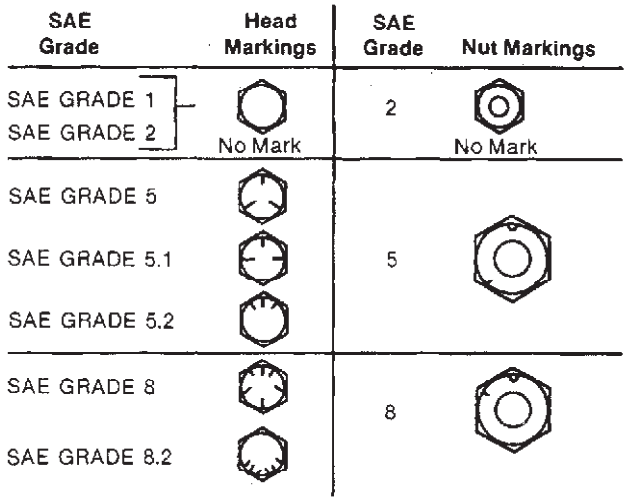
Check tightness of cap screws periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

Tighten cap screws with plastic insert or crimped steel-type lock nuts to approximately 50 percent of amount shown in chart. Tighten toothed or serrated-type lock nuts to full torque value.



DIA.	WRENCH SIZE	SAE GRADE 1		SAE GRADE 2		SAE GRADE 5		SAE GRADE 8	
		OIL	DRY	OIL	DRY	OIL	DRY	OIL	DRY
		N•m(lb-in)	N•m(lb-in)	N•m(lb-in)	N•m(lb-in)	N•m(lb-in)	N•m(lb-in)	N•m(lb-in)	N•m(lb-in)
#6		0.5 (4.5)	0.7(6)	0.8(7)	1(10)	1.4(12)	1.7(15)		
#8		0.9(8)	1.2(11)	1.5(13)	2(18)	2.4(21)	3.2(28)		
#10		1.4(12)	1.8(16)	2(19)	2.8(25)	3.4(30)	4.6(41)		
#12		2(19)	2.8(25)	3.4(30)	4.5(40)	5.4(48)	7.3(65)		
		N•m(lb-ft)	N•m(lb-ft)	N•m(lb-ft)	N•m(lb-ft)	N•m(lb-ft)	N•m(lb-ft)	N•m(lb-ft)	N•m(lb-ft)
1/4	7/16	3.5(2.5)	4(3.0)	5(4.0)	7(5.0)	8(6.0)	11(8.0)	12(8.5)	16(12)
5/16	1/2	7(5.0)	9(6.5)	10(7.5)	14(10.0)	16(12.0)	23(17.0)	24(18.0)	33(24)
3/8	9/16	12(8.5)	16(12.0)	19(14.0)	24(18.0)	30(22.0)	41(30)	41(30)	54(40)
7/16	5/8	19(14.0)	26(19.0)	30(22.0)	41(30)	47(35)	68(50)	68(50)	95(70)
1/2	3/4	24(21.0)	41(30)	47(35)	61(45)	75(55)	102(75)	102(75)	142(105)
9/16	13/16	41(30)	54(40)	68(50)	88(65)	108(80)	142(105)	149(110)	203(150)
5/8	15/16	54(40)	75(55)	88(65)	122(90)	149(110)	197(145)	203(150)	278(205)
3/4	1-1/8	102(75)	136(100)	163(120)	217(160)	258(190)	353(260)	366(270)	495(365)
7/8	1-5/16	163(120)	224(165)	163(120)	224(165)	414(305)	563(415)	590(435)	800(590)
1	1-1/2	244(180)	332(245)	244(180)	332(245)	624(460)	848(625)	881(650)	1193(880)
1-1/8	1-11/16	346(255)	468(345)	346(255)	468(345)	780(575)	1058(780)	1248(920)	1695(1250)
1-1/4	1-7/8	488(360)	664(490)	488(360)	665(490)	1098(810)	1492(1100)	1763(1300)	2393(1765)
1-3/8	2-1/16	637(470)	868(640)	637(470)	868(640)	1438(1061)	1953(1440)	2312(1705)	3140(2315)
1-1/2	2-1/4	848(625)	1153(850)	848(625)	1153(850)	1912(1410)	2590(1910)	3065(2260)	4163(3070)

AB6;TS236, TS237 053;TORQ3. 090888

1T3;00III 04 201088

METRIC SERIES TORQUE CHART

CAUTION: Use only metric tools on metric hardware. Other tools may not fit properly. They may slip and cause injury.

DO NOT use these values if a different torque value or tightening procedure is listed for a specific application. Torque values listed are for general use only.

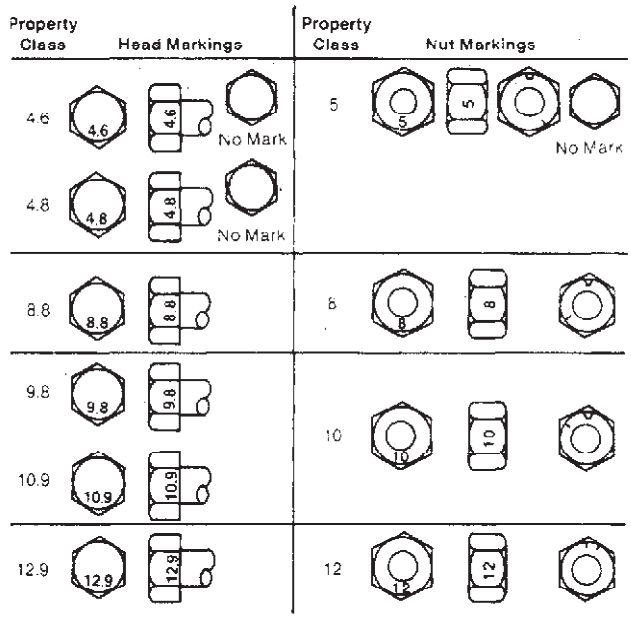
Check tightness of cap screws periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

Tighten cap screws with plastic insert or crimped steel-type lock nuts to approximately 50 percent of amount shown in chart. Tighten toothed or serrated-type lock nuts to full torque value.

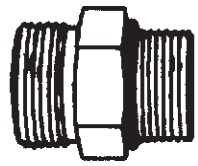


DIA.	WRENCH SIZE	4.6 OIL N-m(lb ft)	4.6 DRY N-m(lb ft)	4.8 OIL N-m(lb ft)	4.8 DRY N-m(lb-ft)	8.8 OIL N-m(lb-ft)	8.8 DRY N-m(lb-ft)	9.8 OIL N-m(lb-in)	9.8 DRY N-m(lb-in)	10.9 OIL N-m(lb-ft)	10.9 DRY N-m(lb-ft)	12.9 OIL N-m(lb-ft)	12.9 DRY N-m(lb-ft)
M5	8mm	1.5(1)	2.5(1.5)	2.5(1.5)	3.0(2)	4.5(3.5)	6.0(4.5)	5.0(3.5)	7.0(5)	6.5(4.5)	9.0(6.5)	7.5(5.5)	10.0(7.5)
M6	10mm	3.0(2)	4.0(3)	4.0(3)	5.5(4)	7.5(5.5)	10.0(7.5)	8.5(6)	12.0(9)	11.0(8)	15.0(11)	13.0(9.5)	18.0(13)
M8	13mm	7.0(5)	9.5(7)	10.0(7.5)	13.0(10)	18.0(13)	25(18)	21.0(15)	30(22)	25(18)	35(26)	30(22)	45(33)
M10	16mm	14.0(10)	19.0(14)	20.0(15)	25(18)	35(26)	50(37)	40(30)	55(41)	55(41)	75(55)	65(48)	85(63)
M12	18mm	25(18)	35(26)	35(26)	45(33)	65(48)	85(63)	70(52)	100(74)	95(70)	130(97)	110(81)	150(111)
M14	21mm	40(30)	50(37)	55(41)	75(55)	100(74)	140(103)	115(85)	155(114)	150(111)	205(151)	175(129)	240(177)
M16	24mm	60(44)	80(59)	85(63)	115(85)	160(118)	215(159)	180(133)	245(180)	235(173)	315(232)	275(203)	370(273)
M18	27mm	80(59)	110(81)	115(85)	160(118)	225(166)	305(225)			320(236)	435(321)	375(277)	510(376)
M20	30mm	115(85)	160(118)	165(122)	225(166)	320(236)	435(321)			455(356)	620(457)	535(395)	725(535)
M22	33mm	160(118)	215(159)	225(167)	305(225)	435(321)	590(435)			620(457)	840(620)	725(535)	985(726)
M24	36mm	200(148)	275 (203)	285(210)	390(288)	555(409)	750(553)			790(583)	1070(789)	925(682)	1255(926)
M27	41mm	295(218)	400 (295)	415(306)	565(417)	810(597)	1100(811)			1155(852)	1565(1154)	1350(996)	1835(1353)
M30	46mm	400(295)	545(402)	565(417)	770(568)	1100(811)	1495(1103)			1570(1158)	2130(1571)	1835(1353)	2490(1837)
M33	51mm	545(402)	740(546)	770(568)	1050(774)	1500(1106)	2035(1500)			2135(1575)	2900(2139)	2500(1844)	3390(2500)
M36	55mm	700(516)	950(700)	990(730)	1345(992)	1925(1420)	2610(1925)			2740(2021)	3720(2744)	3205(2364)	4355(3212)

AB6;TS234, TS235 053;TORQ4, 090888

SERVICE RECOMMENDATIONS FOR O-RING BOSS FITTINGS

Straight Fitting

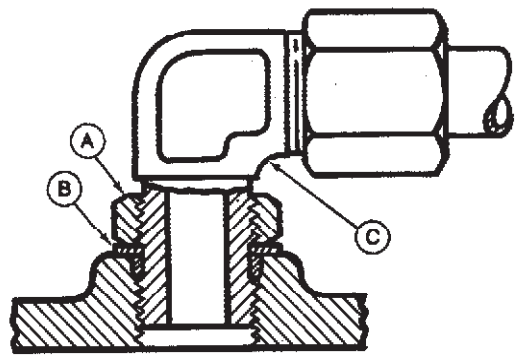


1. Inspect O-ring boss seat for dirt or defects.

2. Lubricate O-ring with petroleum jelly. Place electrical tape over threads to protect O-ring. Slide O-ring over tape and into O-ring groove of fitting. Remove tape.

3. Tighten fitting to torque valve shown on chart.

Angle Fitting



1. Back-off lock nut (A) and back-up washer (B) completely to head-end (C) of fitting.

2. Turn fitting into threaded boss until back-up washer (B) contacts face of boss.

3. Turn fitting head-end (C) counterclockwise to proper index (maximum of one turn).

4. Hold fitting head-end (C) with a wrench and tighten locknut (A) and back-up washer (B) to proper torque value.

NOTE: Do not allow hoses to twist when tightening fittings.

TORQUE VALUE CHART

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

NOTE: Torque tolerance is ± 10%.

018;T6243AE, T6520AB 04T;90 K66. 181187

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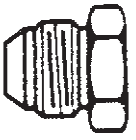
SERVICE RECOMMENDATIONS FOR 37° FLARE AND 30° CONE SEAT CONNECTORS



1. Inspect flare and flare seat. They must be free of dirt or obvious defects.

2. Defects in tube flare cannot be repaired. Overtightening a defective flared fitting will not stop leaks.

3. Align tube with fitting before attempting to start nut.

4. Lubricate male threads with hydraulic fluid or petroleum jelly.

5. Index angle fittings and tighten by hand.

6. Tighten fitting or nut to torque value shown on chart. Do not allow hoses to twist when tightening fittings.

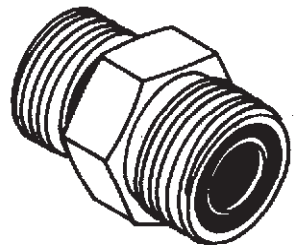
STRAIGHT FITTING OR SPECIAL NUT TORQUE

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

NOTE: Torque tolerance is ± 10%.

018;T6234AC 04T;90 C96. 261088

SERVICE RECOMMENDATIONS FOR FLAT FACE O-RING SEAL FITTINGS



1. Inspect the fitting sealing surfaces. They must be free of dirt or defects.

2. Inspect the O-ring. It must be free of damage or defects.

3. Lubricate O-rings and install into groove using petroleum jelly to hold in place.

4. Push O-ring into the groove with plenty of petroleum jelly so O-ring is not displaced during assembly.

5. Index angle fittings and tighten by hand pressing joint together to insure O-ring remains in place.

6. Tighten fitting or nut to torque value shown on the chart per dash size stamped on the fitting. Do not allow hoses to twist when tightening fittings.

FLAT FACE O-RING SEAL FITTING TORQUE

Nominal Tube O.D. mm	Nominal Tube O.D. (in.)	Dash Size	Thread Size in.	Swivel Nut Torque Nm	Swivel Nut Torque (lb-ft)	Bulkhead Nut Torque Nm	Bulkhead Nut Torque (lb-ft)
6.35	0.250	-4	9/16-18	16	12	5.0	3.5
9.52	0.375	-6	11/16-16	24	18	9.0	6.5
12.70	0.500	-8	13/16-16	50	37	17.0	12.5
15.88	0.625	-10	1-14	69	51	17.0	12.5
19.05	0.750	-12	1 3/16-12	102	75	17.0	12.5
22.22	0.875	-14	1 3/16-12	102	75	17.0	12.5
25.40	1.000	-16	1 7/16-12	142	105	17.0	12.5
31.75	1.250	-20	1 11/16-12	190	140	17.0	12.5
38.10	1.500	-24	2-12	217	160	17.0	12.5

NOTE: Torque tolerance is +15 −20%.

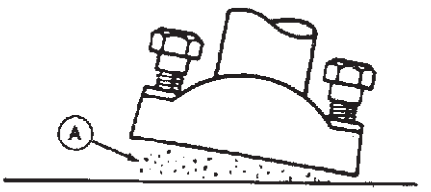
018;T6243AD 04T;90 K67. 100987

113;00111 08 201088

SAE FOUR BOLT FLANGE FITTING SERVICE RECOMMENDATIONS

1. Clean sealing surfaces and inspect for nicks or scratches, roughness or out-of-flat condition. Scratches cause leaks. Roughness causes seal wear. Out-of-flat causes seal extrusion. If these defects cannot be polished out, replace the component.

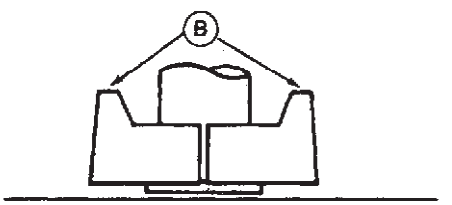
2. Install the correct O-ring (and backup washer if required) into the groove using petroleum jelly to hold it in place.



T6561AH

3. For split flange; loosely assemble split flange (B) halves, being sure that the split is centrally located and perpendicular to the port. Hand tighten cap screws to hold parts in place. Do not pinch O-ring (C).

4. For single piece flange (D); put hydraulic line in the center of the flange and install four cap screws. With the flange centrally located on the port, hand tighten cap screws to hold it in place. Do not pinch O-ring.

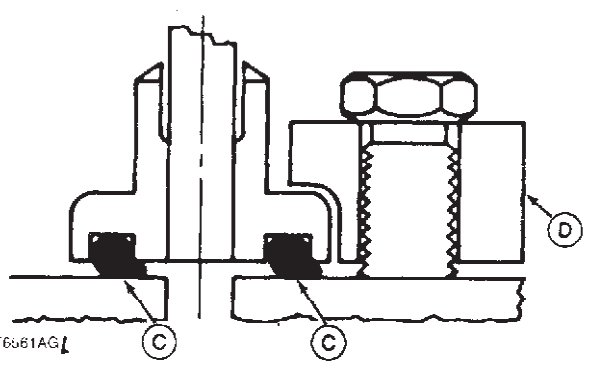


T6561AI

5. For both single piece flange and split flange, be sure the components are properly positioned and cap screws are hand tight. Tighten one cap screw, then tighten the diagonally opposite cap screw. Tighten the two remaining cap screws. Tighten all cap screws within the specified limits shown in the chart.

DO NOT use air wrenches. DO NOT tighten one cap screw fully before tightening the others. DO NOT overtighten.

NOTE: Torque values are given for SAE Grade 5 or better cap screws with plated hardware.



T6561AG

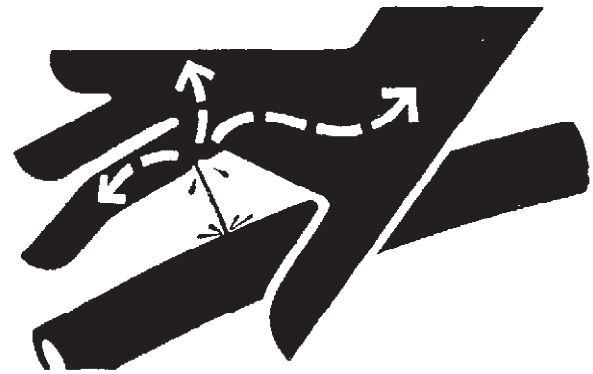
A—Sealing Surface
B—Split Flange
C—Pinched O-Ring
D—Single Piece Flange

Nominal Flange Size	Cap Screw Size[1]	Torque[2] N·m Min.	N·m Max.	(lb-ft) Min.	(lb-ft) Max..
1/2	5/16 - 18 UNC	20	31	(15)	(23)
3/4	3/8 - 16 UNC	28	54	(21)	(40)
1	3/8 - 16 UNC	37	54	(27)	(40)
1-1/4	7/16 - 14 UNC	47	85	(35)	(63)
1-1/2	1/2 - 13 UNC	62	131	(46)	(97)
2	1/2 - 13 UNC	73	131	(54)	(97)
2-1/2	1/2 - 13 UNC	107	131	(79)	(97)
3	5/8 - 11 UNC	158	264	(117)	(195)
3-1/2	5/8 - 11 UNC	158	264	(117)	(195)
4	5/8 - 11 UNC	158	264	(117)	(195)
5	5/8 - 11 UNC	158	264	(117)	(195)

1. Tolerance ± 10%. The torques given are enough for the given size connection with the recommended working pressure. Torques can be increased to the maximum shown for each cap screw size if desired. Increasing cap screw torque beyond this maximum will result in flange and cap screw bending and connection failures.

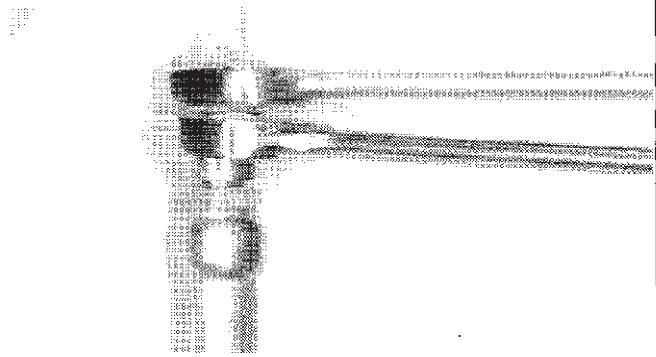
018;T6561AH1, T6561AI1, T6561AG1 04T;90 M169, 260788

CHECK OIL LINES AND FITTINGS



CAUTION: 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.



Check all oil lines, hose and fittings regularly for leaks or damage. Make sure all clamps are in position and tight. Make sure hoses are not twisted or touching machine parts which are moving.

Tubing with dents may cause the oil to overheat. If you find tubing with dents, install new tubing immediately.

IMPORTANT: Tighten fittings as specified in torque chart.

When you tighten connections, use two wrenches to prevent bending or breaking tubing and fittings.

018;X9811, T85401 T82;FLMA AI 271187

FUEL SPECIFICATIONS

Use ONLY clean, high-quality fuel.

Use Grade No. 2-D fuel above 4°C (40°F).

Use Grade No. 1-D fuel below 4°C (40°F).

Use Grade No. 1-D fuel for all air temperatures at altitudes above 1 500 m (5000 ft).

IMPORTANT: If fuel sulfur content exceeds 0.5 per cent, change the engine oil at one-half the normal interval.

Use fuel with less than 1.0 per cent sulfur. If possible, use fuel with less than 0.5 per cent sulfur.

For maximum filter life, sediment and water should not be more than 0.10 per cent.

The cetane number should be 40 minimum. If you operate your machine where air temperatures are normally low or where altitudes are high, you may need fuel with a higher cetane number.

Cloud Point—For cold weather operation, cloud point should be 6°C (10°F) below lowest normal air temperature.

02T;45 C25. 020487

FUEL STORAGE

NOTE: Diesel fuels stored for a long time may form gum or bacteria and plug filters.

Keep fuel in a clean container in a protected area. Water and sediment must be removed before fuel gets to the engine. Do not use de-icers to remove water from fuel. Do not depend on fuel filters to remove water.

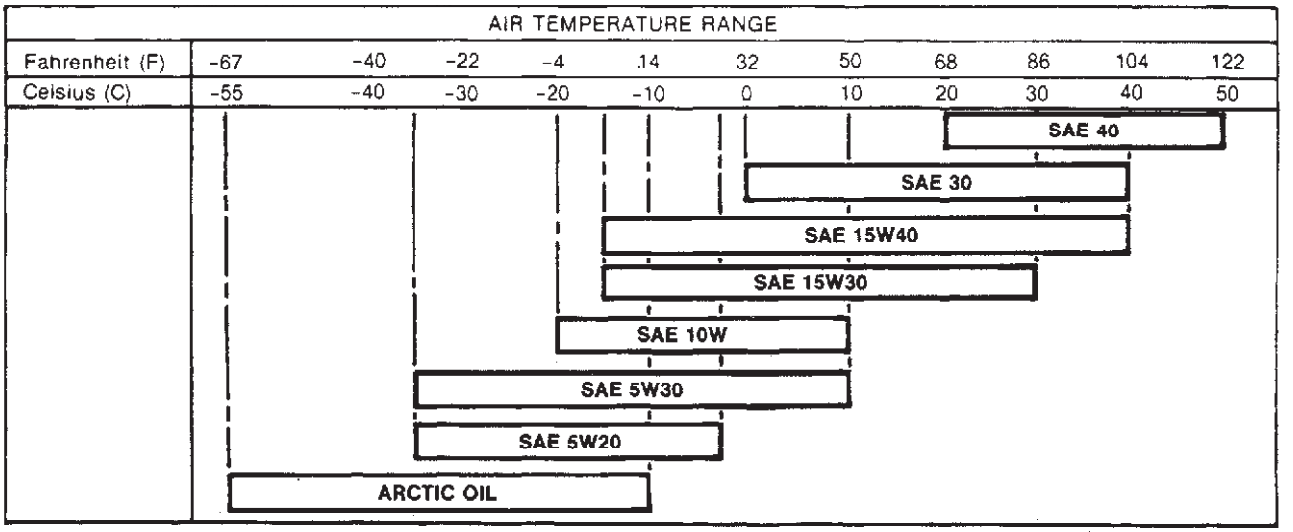
If possible, install a water separator at the storage tank outlet. (See your John Deere dealer).

IMPORTANT: Keep all dirt, scale, water or other foreign material out of fuel.

Store fuel drums on their sides with plug up.

T82;BHFL G. 310186

ENGINE OIL



Depending upon the expected air temperature range between oil changes, use oil viscosity shown on the temperature chart above.

Additives are not required nor recommended.

John Deere TORQ-GARD SUPREME® engine oil is recommended because it is a specifically balanced formulation to provide maximum engine life. It provides excellent protection against mechanical wear, carbon deposits, and lacquer formation, plus providing superior cold weather starting performance.

If other oils are used, they must have one of the following specifications:

Oil Specification	Use
API Service: CD/SF, CD/SE, CD/SD, CD/SC, or MIL-L-2104C, MIL-L-2104D	Recommended
*API Service CC/SF, CC/SE, CC/SD, CC/SC or *MIL-L-46152, *MIL-L-46152B	For SAE 5W20, SAE 5W30 and arctic oil only, use if recommended oil is not available.
*MIL-L-46167A	For arctic oil only

**Change oil at one-half the normal interval.*

018;T6172AI 02T;45 K22. 301187

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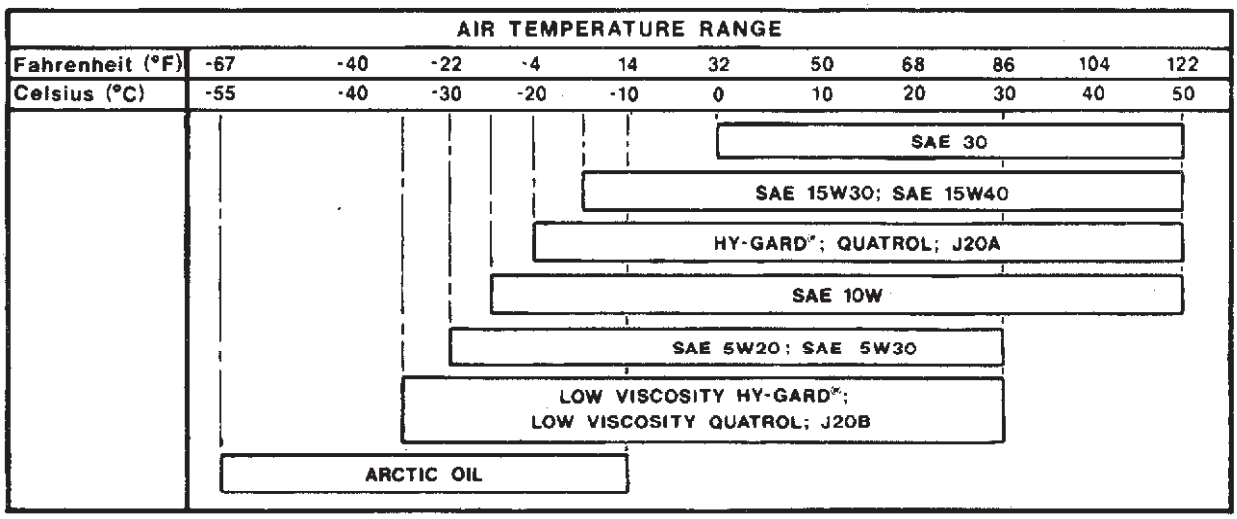
HYDRAULIC OIL



Depending upon the expected air temperature range between oil changes, use viscosity shown on the chart above.

John Deere HY-GARD® Transmission and Hydraulic Oil is recommended because it is specifically formulated to provide maximum protection against mechanical wear, rust, corrosion, and foaming.

Engine oil may be used provided it meets one or more of the following:

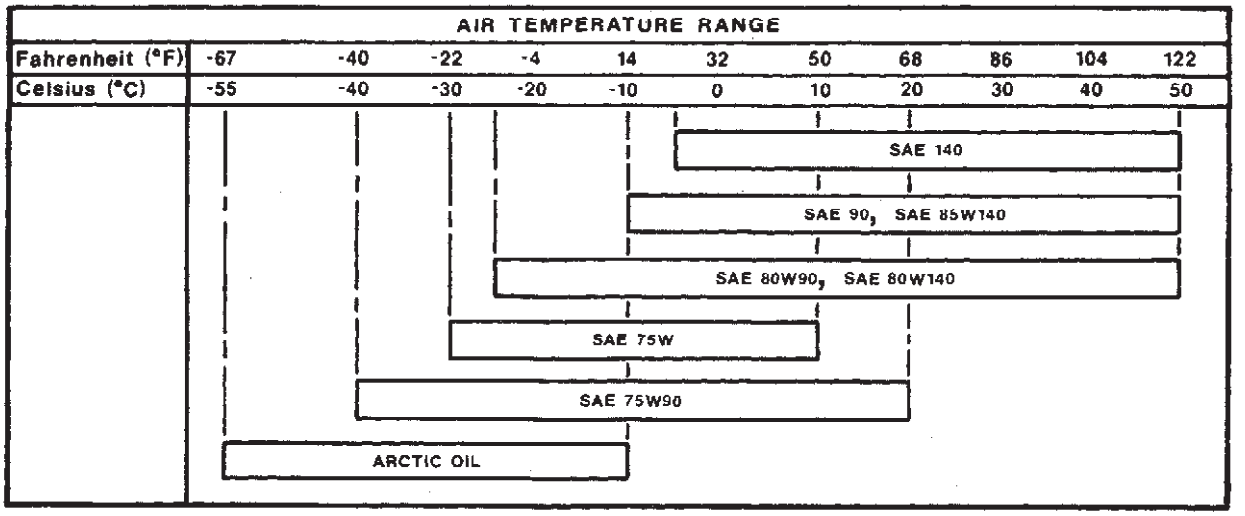
API Service CD/SF, CD/SE, CD/SD, CD/SC, CC/SF, CC/SE, CC/SD, CC/SC (MIL-L-2104C, MIL-L-2104D, MIL-L-46152B).

You may also use QUATROL® oils, which are oils that meet minimum John Deere Standards, or other oils meeting John Deere Standard J20A or J20B.

Oil meeting MIL-L-46167A may be used as an arctic oil.

018;T6442AA 02T;45 M24. 170688

SWING GEARBOX, TRANSMISSION, AXLES, AND WHEEL GEAR REDUCTION OIL



Depending on the expected air temperature range between oil changes, use oil viscosity shown on the temperature chart above.

The following oils are recommended:

John Deere API GL-5 Gear Oil

Oils meeting API Service GL-5 (MIL-L-2105B or MIL-2105C)

Oil meeting MIL-L-10324A may be used as arctic oil.

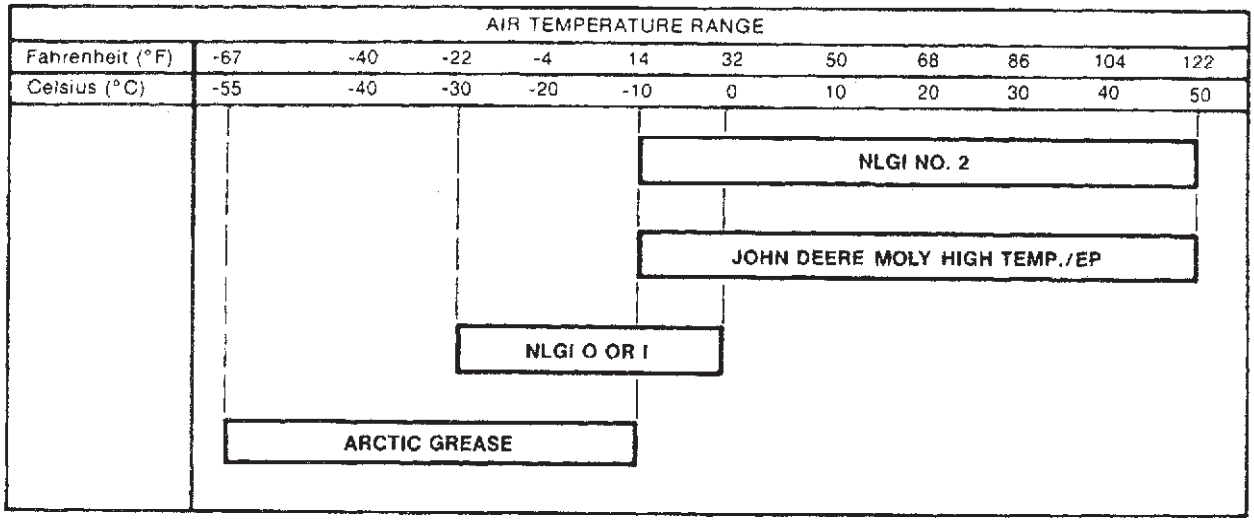
018;T6247AB 02T;45 C3. 310186

BRAKE FLUID

Use fluid meeting SAE 1703 or heavy duty brake fluid meeting Federal Vehicle Safety Standard (FVSS) #116.

02T;45 K41. 220788

GREASE



Depending on the expected air temperature range during use, use grease shown on chart above.

Greases recommended are:

John Deere Moly High Temperature/EP grease (preferred)

SAE Multipurpose Grease with Extreme Pressure (EP) performance and containing 3 to 5 per cent molybdenum disulfide (preferred).

SAE multi-purpose EP grease.

Grease meeting MIL-G-10924C specifications may be used as arctic grease.

44A;T91371 02T;45 K25 191187

SWING GEAR GREASE

Use an open gear grease containing a 25 per cent combination of graphite and molybdenum disulfide, and meeting NLGI consistency number 2 such as TEXACO TEXCLAD®2.

TEXCLAD is a trademark of Texaco.

T82;;EXFL-0. 170688

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ALTERNATIVE LUBRICANTS

Additional information on cold weather operation is available from your John Deere dealer.

Conditions in certain geographical areas may require special lubricants and lubrication practices which do not appear in this operator's manual. If you have any questions, consult your John Deere dealer to obtain the latest information and recommendations.

053;ALTER. 050886

LUBRICANT STORAGE

Your equipment can operate at top efficiency only if clean lubricants are used.

Use clean containers to handle all lubricants.

Store lubricants and containers in an area protected from dust, moisture, and other contamination.

053;LUBST. 290288

PREDELIVERY INSPECTION (PDI)

Do the predelivery services shown on the inspection checklist before you deliver the machine to the customer. The checklist is in the back of the Operator's Manual

06T;PIM C1 090586

AFTER-SALE INSPECTION (ASI)

Do the after-sale services shown on the inspection checklist during the warranty period after 50—100 hours of machine operation. The after-sale checks are also found on the inspection checklist in the back of the Operator's Manual

Terms of this inspection are outlined on the customers John Deere Delivery Receipt.

06T;PIM C2 090586

PLANNED INSPECTION PROGRAM I (PIP I)

When you deliver the machine, explain to the customer the advantages of the Planned Inspection Program I (PIP I):

Top production from the machine
Minimum downtime
Lower long-term operating costs
Overall greater satisfaction

Prepare a contract with the customer specifying the number of field inspections by your service technician and the cost.

Use the PIP I Inspection Checklists in this group as a guide in preparing the contract.

06T;PIM C3 140486

PLANNED INSPECTION PROGRAM II (PIP II)

PIP II is a continuation of PIP I.

This program tests critical machine systems and will enable the customer to keep the machine in the best possible condition.

Prepare a contract with the customer specifying the number of field inspections by your service technician and the cost. Use the PIP II Inspection Checklist in this group as a guide in preparing the contract.

06T;PIM C4 090586

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USING THE CHECKLISTS

Do an inspection procedure only if there is a "box" behind the procedure in the service column which you are following. Mark the box with an "x" when the procedure is done.

For specific instructions on how to do each procedure, refer to the operator's manual or the technical manual.

If a box is not marked, write an explanation in the comments column. For example:

If engine oil level is low, note amount of oil needed to fill crankcase.

If the machine is not lubricated according to the Periodic Maintenance Chart, note this.

When the inspection is done, put the checklist in the customer's file. Use the same checklist for additional inspections.

06T;PIM C5 120586

DELIVERY SERVICE

Use the operator's manual as a guide. Discuss the following points thoroughly with the customer:

The importance of safety.

Controls and instruments.

All functions of the hydraulic system.

How to start and stop the engine.

The importance of the break-in period.

The importance of lubrication and periodic maintenance.

Have the owner sign the Delivery Receipt.

Give the owner the operator's manual.

T82;TLPD P 040187