

JOHN DEERE
WORLDWIDE CONSTRUCTION AND
FORESTRY DIVISION

Skid Steer
260 and 270
TM1780 NOV03

TECHNICAL MANUAL



JOHN DEERE

This technical manual is written for an experienced technician and contains sections that are specifically for this product. It is a part of a total product support program.

The manual is organized so that all the information on a particular system is kept together. The order of grouping is as follows:

- Table of Contents
- Specifications
- Theory of Operation
- Troubleshooting Diagram
- Diagnostics
- Tests & Adjustments
- Repair

Note: Depending on the particular section or system being covered, not all of the above groups may be used.

Each section will be identified with a symbol rather than a number. The groups and pages within a section will be consecutively numbered.

All information, illustrations and specifications in this 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.

We appreciate your input on this manual. To help, there are postage paid post cards included at the back. If you find any errors or want to comment on the layout of the manual please fill out one of the cards and mail it back to us.

Safety



Specifications and Information



Engine (Diesel)



Electrical



**Power Train
(Chain Case and Axles)**



**Power Train
(Hydrostatic)**



Steering



Brakes



Hydraulics



Miscellaneous

M

COPYRIGHT© 2003

JOHN DEERE

CONSTRUCTION AND FORESTRY DIVISION

Dubuque, Iowa

All rights reserved

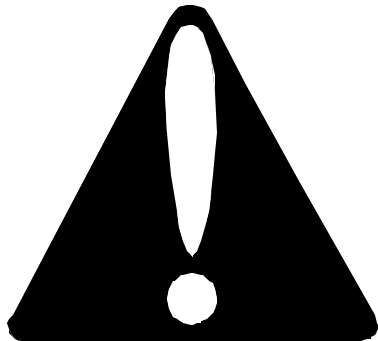
Previous Editions

Copyright© 1999, 2000, 2001, 2002 Deere & Company



SAFETY

RECOGNIZE SAFETY INFORMATION



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

Follow recommended precautions and safe servicing practices.

Understand Signal Words

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

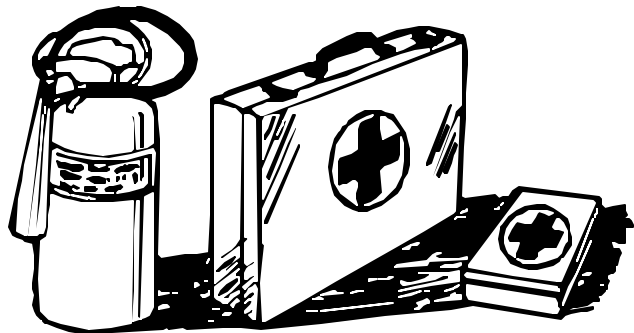
REPLACE SAFETY SIGNS



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

HANDLE FLUIDS SAFELY—AVOID FIRES

Be Prepared For Emergencies



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.

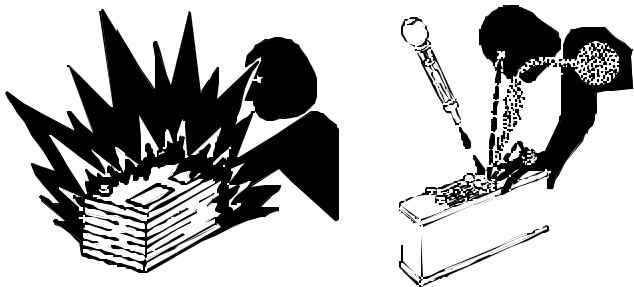
Do not store oily rags; they can ignite and burn spontaneously.

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.

USE CARE IN HANDLING AND SERVICING BATTERIES



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).

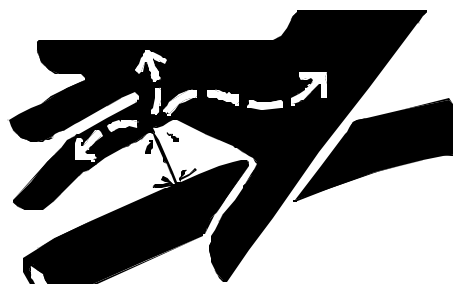
Prevent Acid Burns

- 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 acid burns 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. Using 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.
 4. 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.

USE CARE AROUND HIGH-PRESSURE FLUID LINES



Avoid High-Pressure Fluids



Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid injury from escaping fluid under pressure by stopping the engine and relieving pressure in the system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A., (1-800-822-8262 U.S.A. or Canada).



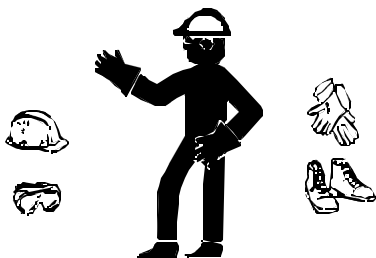
Avoid Heating Near Pressurized Fluid Lines



Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area.

USE SAFE SERVICE PROCEDURES

Wear Protective Clothing

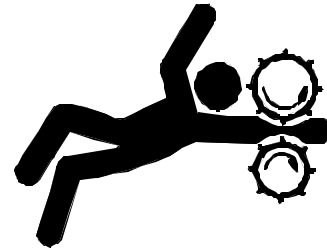


Wear close fitting clothing and safety equipment appropriate to the job.

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.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

Service Machines Safely



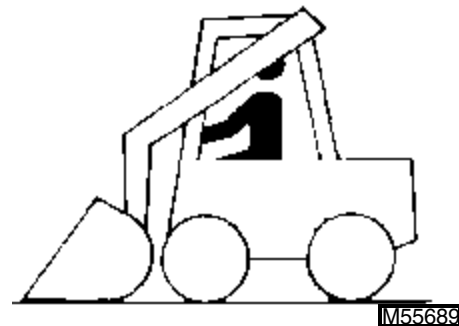
Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

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

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards. Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. **DO NOT** use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

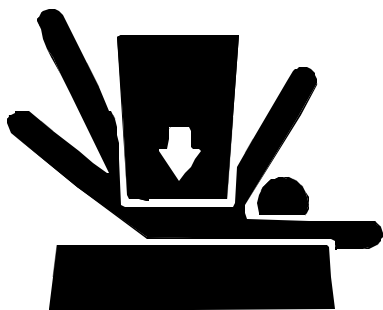
Park Machine Safely



Before working on the machine:

1. Lower all equipment to the ground.
2. Relieve hydraulic pressure.
3. Stop the engine and remove the key.
4. Disconnect the battery ground strap.
5. Hang a "DO NOT OPERATE" tag in operator station.

Support Machine Properly and Use Proper Lifting Equipment



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.

Lifting heavy components incorrectly can cause severe injury or machine damage. Follow recommended procedure for removal and installation of components in the manual.

Work In Clean Area

Before starting a job:

1. Clean work area and machine.
2. Make sure you have all necessary tools to do your job.
3. Have the right parts on hand.
4. Read all instructions thoroughly; do not attempt shortcuts.

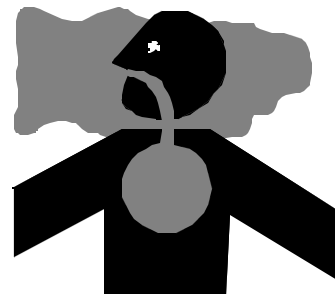
Using High Pressure Washers

Directing pressurized water at electronic/electrical components or connectors, bearings, hydraulic seals, fuel injection pumps or other sensitive parts and components may cause product malfunctions. Reduce pressure and spray component at a 45 to 90 degree angle.

Illuminate Work Area Safely

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.

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 duct system.

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

WARNING: California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

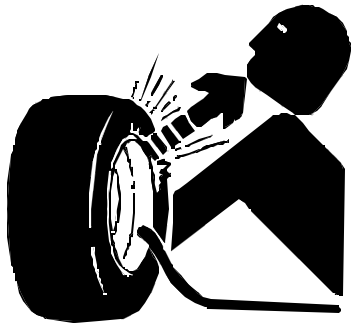
Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. Do all work outside or in a well-ventilated area. Dispose of paint and solvent properly. Remove paint before welding or heating. If you sand or grind paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.





SERVICE TIRES SAFELY



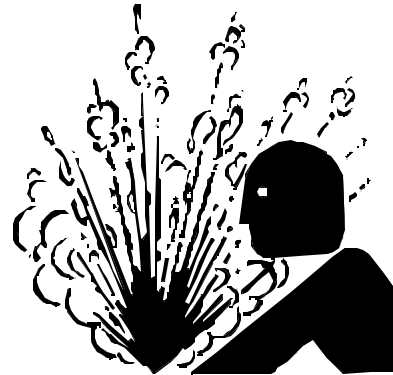
Explosive separation of a tire and rim parts can cause serious injury or death.

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. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

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.

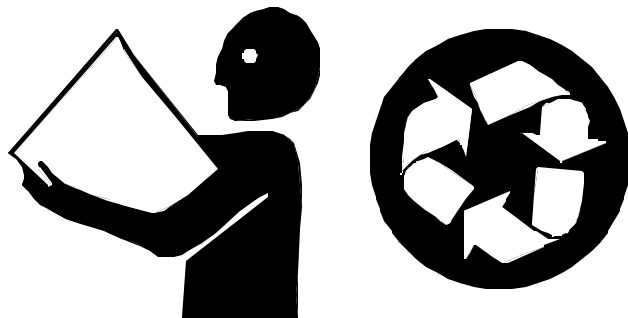
SERVICE COOLING SYSTEM SAFELY



Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off machine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

HANDLE CHEMICAL PRODUCTS SAFELY



Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

Dispose of Waste Properly

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries. Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them. Do not pour waste onto the ground, down a drain, or into any water source. Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.

LIVE WITH SAFETY



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

CONTENTS

SPECIFICATIONS AND INFORMATION

	Page
SPECIFICATIONS	2
ENGINE	2
FUEL SYSTEM	2
ELECTRICAL SYSTEM	2
CAPACITIES	3
HYDRAULICS AND HYDROSTATICS	3
DIMENSIONS	4
TIRES (STANDARD)	4
RECOMMENDED LUBRICANTS	4
METRIC FASTENER TORQUE VALUES	5
METRIC FASTENER TORQUE VALUES—GRADE 7	6
INCH FASTENER TORQUE VALUES	7
O-RING SEAL SERVICE RECOMMENDATIONS	8
FACE SEAL FITTINGS WITH INCH STUD ENDS TORQUE	8
FACE SEAL FITTINGS WITH METRIC STUD ENDS TORQUE	9
O-RING FACE SEAL FITTINGS	10
O-RING BOSS FITTINGS	10
DIESEL FUEL SPECIFICATIONS	11
LUBRICITY	11
STORAGE	11
ENGINE OIL SPECIFICATIONS	12
4-CYCLE DIESEL ENGINE OIL—NORTH AMERICA	12
BREAK-IN DIESEL ENGINE OIL—NORTH AMERICA	13
HYDROSTATIC TRANSMISSION AND HYDRAULIC OIL—NORTH AMERICA	13
CHAIN CASE OIL SPECIFICATIONS	14
CHAIN CASE OIL—NORTH AMERICA	14
GENERAL APPLICATION GREASE SPECIFICATIONS	15
GREASE—NORTH AMERICA	15
COOLANT SPECIFICATIONS	15
DIESEL AND GASOLINE ENGINE COOLANT—NORTH AMERICA	15
SUPPLEMENTAL COOLANT ADDITIVES	16
DIESEL AND GASOLINE ENGINE COOLANT DRAIN INTERVAL—NORTH AMERICA	16
SERIAL NUMBER LOCATION	17
SKID STEER PRODUCT IDENTIFICATION NUMBER	17
ENGINE SERIAL NUMBER	17



SPECIFICATIONS

ENGINE

Make John Deere
 Type..... Diesel
 Engine Model Number:
 Model 260 3029T
 Model 270 4045D
 Net Horsepower at Rated Engine RPM (2400 RPM):
 Model 260 51.5 kW (69 hp)
 Model 270 57.5 kW (77 hp)
 Cylinders:
 Model 260 3
 Model 270 4
 Bore..... 106 mm (4.17 in.)
 Stroke:
 Model 260 110 mm (4.33 in.)
 Model 270 127 mm (5.00 in.)
 Displacement:
 Model 260 2.9 L (179 cu in.)
 Model 270 4.5 L (276 cu in.)
 Compression Ratio:
 Model 260 17.8:1
 Model 270 17.6:1
 Engine Rated RPM 2400
 Lubrication..... Full pressure
 Oil Filter..... Full flow (replaceable)
 Air Cleaner Dry paper with primary and secondary elements
 Cooling System..... Liquid-cooled

FUEL SYSTEM

Fuel Diesel
 Fuel Filter In-line replaceable filter
 Fuel Pump..... Electric
 Fuel Delivery Rotary injection

ELECTRICAL SYSTEM

Type..... 12-volt, electric start
 Charging System..... Alternator, 55 amp
 Battery..... 950 CCA (cold cranking amps)

CAPACITIES

Fuel Tank	75.7 L (20.0 gal)
Hydraulic Reservoir	26.5 L (7 gal)
Hydraulic System	34.1 L (9 gal)
Cooling System:	
Model 260	10.6 L (11 qt)
Model 270	13.4 L (14 qt)
Engine Oil (with Filter):	
Model 260	7.4L (8.0 qt)
Model 270	12.0 L (12.7 qt)
Chain Case (per Side)	
Model 260 (S.N. —369999)	11.5 L (3.05 gal)
Model 260 (S.N. 460001—)	18.9 L (5.0 gal)
Model 270 (S.N. —379999)	11.5 L (3.05 gal)
Model 270 (S.N. 470001—)	18.9 L (5.0 gal)



HYDRAULICS AND HYDROSTATICS

Hydrostatic Pumps:	
Type	Tandem variable displacement piston pump
Displacement (Max)	49.1 cm ³ (3 in ³) per revolution
Hydrostatic Motor Type	
Single Speed	GEROLER® fixed displacement 45 series
2-speed	Poclain Hydraulics MS series
Hydraulic/Charge Pump:	
Type	High pressure gear pump
Flow:	
(Standard):	
260 (with 26000 series pump)	64.3 L/min (17 gpm) (minimum)
270 (and 260 with 27000 SERIES pump)	71.8 L/min (19 gpm) (minimum)
(High-Flow Option):	
260 (with 26000 series pump)	107.5 L/min (28.4 gpm) (minimum)
270 (and 260 with 27000 SERIES pump)	121.5 L/min (32.1 gpm) (minimum)
Hydrostatic System Relief Pressure	34 474 kPa (5000 psi)
Charge Circuit Pressure	
Single Speed	1379—1551 kPa (200—225 psi)
2-Speed	1928—2208 kPa (300—340 psi)
Hydraulic Control Valve3-spool open center
Filter	Spin-on canister
Hydraulic System Relief Pressure	21 374 ± 1034 kPa (3100 ± 150 psi)
Boom Circuit Relief Pressure	23 442 kPa (3400 psi)
Bucket Circuit Relief Pressure	N/A
<i>Note: Bucket relief valve should have been removed in Safety PIP 99KV004 or 00KV007</i>	
Skid Steer SAE Rated Operating Capacities:	
Model 260	998 kg (2200 lb)
Model 270	1 180 kg (2600 lb)
Maximum Ground Speed:	
Single Speed	10.6 km/h (6.6 mph)
2-Speed	19.3 km/h (12.0 mph)
Boom Breakout Force	2132 kg (4700 lb)
Bucket Breakout Force	3039 kg (6700 lb)

GEROLER is a registered trademark of Eaton Corporation.

DIMENSIONS

(See note below.)

Overall Operating Height	4000 mm (157.5 in.)
Height to ROPS	2106 mm (82.9 in.)
Height to Hinge Pin	3226 mm (127.0 in.)
Overall Width (less Bucket)	1953 mm (76.9 in.)
Overall Width (with Bucket)	1981 mm (78.0 in.)
Overall Length (less Bucket)	2921 mm (115.0 in.)
Overall Length (with Bucket)	3504 mm (138.0 in.)
Wheelbase	1227 mm (48.3 in.)
Operating Weight:	
Model 260	3787 kg (8350 lb)
Model 270	3890 kg (8575 lb)
Ground Clearance	280 mm (11.0 in.)
Dump Height	2591 mm (102.0 in.)
Dump Reach	813 mm (32.0 in.)
Dump Angle	45 degrees
Bucket Rollback	35 degrees
Angle of Departure	26 degrees

NOTE: Standard tires (14.00 x 17.50) and 1981 mm (78 in.) dirt bucket used in determining dimensions.

TIRES (STANDARD)

Size 14 x 17.5

RECOMMENDED LUBRICANTS

Engine Oil	John Deere TORQ-GARD SUPREME® John Deere PLUS-50®
	(See ENGINE OIL in the DIESEL ENGINE section for cold weather oil)
Engine Coolant	John Deere COOL-GARD™ John Deere ANTIFREEZE/SUMMER COOLANT
Hydraulic Oil and Hydrostatic Oil	John Deere HY-GARD® John Deere Low Viscosity HY-GARD (cold weather operation)
Chain Case Oil	John Deere HY-GARD John Deere Low Viscosity HY-GARD (cold weather operation)
	John Deere TORQ-GARD SUPREME John Deere PLUS-50
Grease	John Deere MOLY HIGH TEMPERATURE EP GREASE John Deere NON-CLAY HIGH TEMPERATURE EP GREASE

TORQ-GARD SUPREME, PLUS-50, and HY-GARD are registered trademarks of Deere & Company.
COOL-GARD is a trademark of Deere & Company.

METRIC FASTENER TORQUE VALUES

Property Class and Head Markings				

TS1163

SIZE	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a	
	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
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	109
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

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

Fasteners should be replaced with the same class. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

When bolt and nut combination fasteners are used, torque values should be applied to the **NUT** instead of the bolt head.

Tighten toothed or serrated-type lock nuts to the full torque value.

a. "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication.

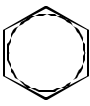


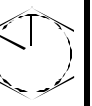


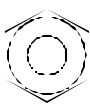
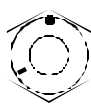

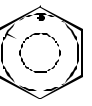

Reference: JDS—G200.

**METRIC FASTENER TORQUE
VALUES—GRADE 7**



Size	Steel or Gray Iron Torque		Aluminum Torque	
	N•m	lb-ft	N•m	lb-ft
M6	11	8	8	6
M8	24	18	19	14
M10	52	38	41	30
M12	88	65	70	52
M14	138	102	111	82
M16	224	165	179	132

INCH FASTENER TORQUE VALUES

SAE Grade and Head Markings	1 or 2 ^b No Marks 	5  5.1  5.2 	8  8.2 
	2 No Marks 	5  	8  

TS1162



SIZE	Grade 1		Grade 2 ^b		Grade 5, 5.1 or 5.2		Grade 8 or 8.2									
	Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a	
	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	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	215	160	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	470	300	510	375	470	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

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

Fasteners should be replaced with the same grade. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

When bolt and nut combination fasteners are used, torque values should be applied to the **NUT** instead of the bolt head.

Tighten toothed or serrated-type lock nuts to the full torque value.

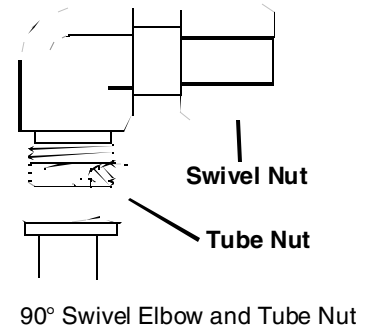
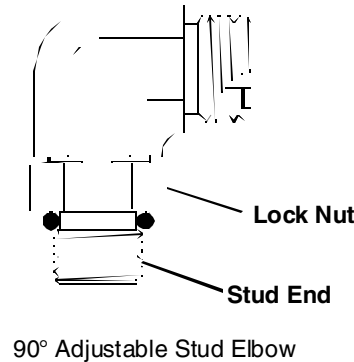
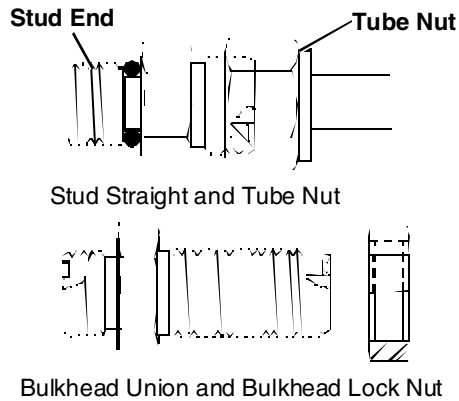
a. "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication.

b. "Grade 2" applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. "Grade 1" applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

Reference: JDS—G200.

O-RING SEAL SERVICE RECOMMENDATIONS

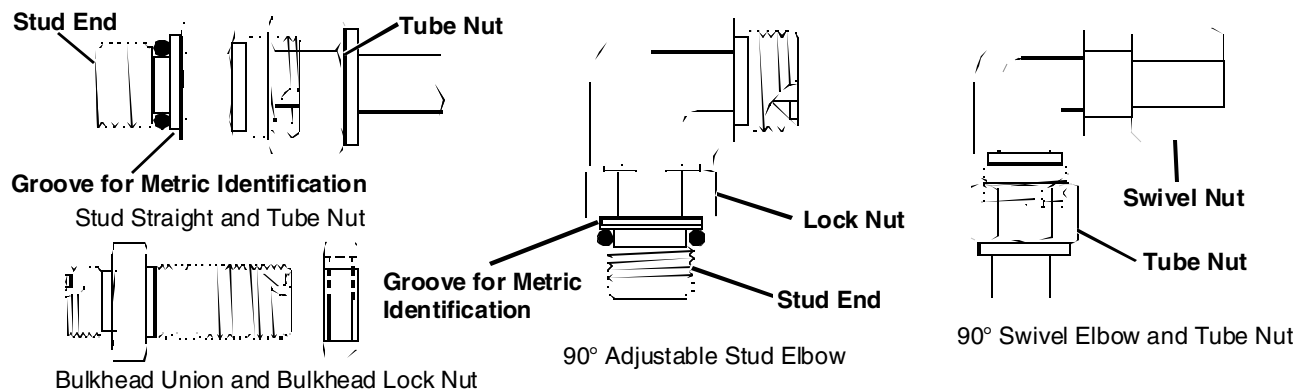
FACE SEAL FITTINGS WITH INCH STUD ENDS TORQUE



Nominal Tube OD/Hose ID				Face Seal Tube/Hose End					O-Ring Stud Ends		
Metric Tube OD	Inch Tube OD			Thread Size	Tube Nut/ Swivel Nut Torque		Bulkhead Lock Nut Torque		Thread Size	Straight Fitting or Lock Nut Torque	
	mm	Dash Size	in.		mm	in.	N•m	lb-ft		N•m	lb-ft
	-3	0.188	4.76						3/8-24	8	6
6	-4	0.250	6.35	9/16-18	16	12	12	9	7/16-20	12	9
8	-5	0.312	7.94						1/2-20	16	12
10	-6	0.375	9.52	11/16-16	24	18	24	18	9/16-18	24	18
12	-8	0.500	12.70	13/16-16	50	37	46	34	3/4-16	46	34
16	-10	0.625	15.88	1-14	69	51	62	46	7/8-14	62	46
	-12	0.750	19.05	1-3/16-12	102	75	102	75	1-1/16-12	102	75
22	-14	0.875	22.22	1-3/16-12	102	75	102	75	1-3/16-12	122	90
25	-16	1.000	25.40	1-7/16-12	142	105	142	105	1-5/16-12	142	105
32	-20	1.25	31.75	1-11/16-12	190	140	190	140	1-5/8-12	190	140
38	-24	1.50	38.10	2-12	217	160	217	160	1-7/8-12	217	160

NOTE: Torque tolerance is plus 15 minus 20%.

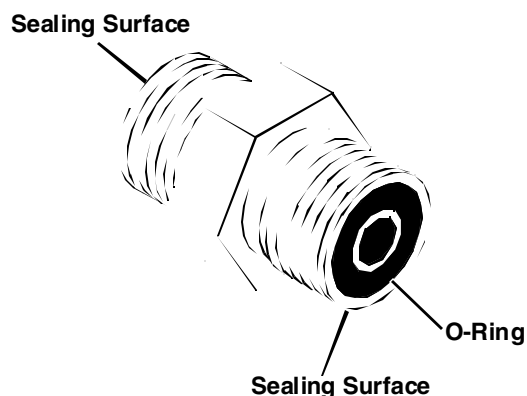
FACE SEAL FITTINGS WITH METRIC STUD ENDS TORQUE



Nominal Tube OD/Hose ID				Face Seal Tube/Hose End						O-Ring Stud Ends, Straight Fitting or Lock Nut					
Metric Tube OD	Inch Tube OD			Thread Size	Hex Size	Tube Nut/ Swivel Nut Torque		Bulkhead Lock Nut Torque		Thread Size	Hex Size	Steel or Gray Iron Torque		Aluminum Torque	
	mm	Dash Size	in.			mm	in.	N•m	lb-ft			N•m	lb-ft	mm	mm
6	-4	0.250	6.35	9/16-18	17	16	12	12	9	M12X1.5	17	21	15.5	9	6.6
8	-5	0.312	7.94												
										M14X1.5	19	33	24	15	11
10	-6	0.375	9.52	11/16-16	22	24	18	24	18	M16X1.5	22	41	30	18	13
12	-8	0.500	12.70	13/16-16	24	50	37	46	34	M18X1.5	24	50	37	21	15
16	-10	0.625	15.88	1-14	30	69	51	62	46	M22X1.5	27	69	51	28	21
	-12	0.750	19.05	1-3/16-12	36	102	75	102	75	M27X2	32	102	75	46	34
22	-14	0.875	22.22	1-3/16-12	36	102	75	102	75	M30X2	36				
25	-16	1.000	25.40	1-7/16-12	41	142	105	142	105	M33X2	41	158	116	71	52
28										M38X2	46	176	130	79	58
32	-20	1.25	31.75	1-11/16-12	50	190	140	190	140	M42X2	50	190	140	85	63
38	-24	1.50	38.10	2-12	60	217	160	217	160	M48X2	55	217	160	98	72

NOTE: Torque tolerance is plus 15 minus 20%.

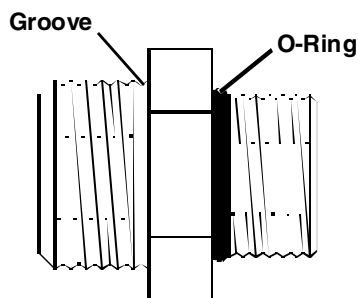
O-RING FACE SEAL FITTINGS



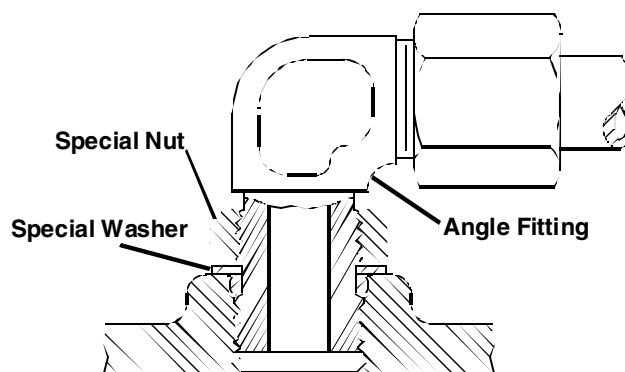
1. Inspect the fitting sealing surfaces. They must be free of dirt or defects.
2. Inspect the O-ring. It must be free of damage or defects.
3. Lubricate O-rings and install into groove using petroleum jelly to hold in place.
4. Push O-ring into the groove with plenty of petroleum jelly so O-ring is not 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.

O-RING BOSS FITTINGS

1. Inspect boss O-ring boss 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.



2. Put hydraulic oil or petroleum jelly on the O-ring. Place electrical tape over the threads to protect O-ring from nicks. Slide O-ring over the tape and into the groove of fitting. Remove tape.



3. For angle fittings, loosen special nut and push special washer against threads so O-ring can be installed into the groove of fitting.
4. 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.
5. To position angle fittings, turn the fitting counter-clockwise a maximum of one turn.
6. Tighten straight fittings to torque value shown on chart. For angle fittings, tighten the special nut to value shown in the chart while holding body of fitting with a wrench.

STRAIGHT FITTING OR SPECIAL NUT TORQUE

Thread Size	Torque ^a		Number of Flats ^b
	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 UN	102	(75)	1
1-3/16-12 UN	122	(90)	1
1-5/16-12 UN	142	(105)	3/4
1-5/8-12 UN	190	(140)	3/4
1-7/8-12 UN	217	(160)	1/2

a. Torque tolerance is $\pm 10\%$.

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

DIESEL FUEL SPECIFICATIONS

In general, diesel fuels are blended to satisfy the low air temperature requirements of the geographical area in which they are sold.

- Use Grade No. 2-D fuel at temperatures above 4°C (40°F).
- For maximum filter life, sediment and water should not be more than 0.10 per cent.
- The cetane number should be 45 minimum. If you operate your machine where air temperatures are normally low or in high altitudes, 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.
- In winter use special winter fuel or add an anti-gelling compound to fuel to maintain its proper viscosity.

If diesel fuel being used has a sulfur content **greater than 0.5%**, **reduce the service interval for engine oil and filter by 50%**.

Bio-Diesel Fuels with bio-degradable properties that meet specification DIN 51606 or equivalent may be used.

Consult your local diesel fuel distributor for properties of the diesel fuel available in your area.



WARNING

California Proposition 65 Warning: Diesel engine exhaust and some of its elements from this product are known to the State of California to cause cancer, birth defects, or other reproductive harm.

LUBRICITY

Diesel fuel must have adequate lubricity to ensure proper operation and durability of fuel injection system components. Fuel lubricity should pass a **minimum of 3300 gram load level** as measured by the **BOCLE** scuffing test.

STORAGE

IMPORTANT: DO NOT USE GALVANIZED CONTAINERS—diesel fuel stored in galvanized containers reacts with zinc coating in the container to form zinc flakes. If fuel contains water, a zinc gel will also form. The gel and flakes will quickly plug fuel filters and damage fuel injectors and injection pumps.

It is recommended that diesel fuel be stored **ONLY** in a clean, approved **POLYETHYLENE PLASTIC** container **WITHOUT** any metal screen or filter. This will help prevent any accidental sparks from occurring. Store fuel in an area that is well ventilated to prevent possible igniting of fumes by an open flame or spark, this includes any appliance with a pilot light.

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

Keep fuel in a safe, protected area and in a clean, properly marked ("**DIESEL FUEL**") container. **DO NOT** use de-icers to attempt to remove water from fuel. **DO NOT** depend on fuel filters to remove water from fuel. It is recommended that a water separator be installed in the storage tank outlet. **BE SURE** to properly discard unstable or contaminated diesel fuel and/or their containers when necessary.

ENGINE OIL SPECIFICATIONS

4-CYCLE DIESEL ENGINE OIL— NORTH AMERICA

Use the appropriate oil viscosity based on the expected air temperature range during the period between recommended oil changes. Operating outside of these recommended oil air temperature ranges may cause premature engine failure.

The following oil is preferred **AFTER** first 100 hours of break-in oil is used:

- John Deere PLUS-50
- John Deere TORQ-GARD SUPREME

Other oils may be used if they meet one of the following:

- API Service Classification CE
- API Service Classification CD
- CCMC Specification D5
- CCMC Specification D4

If John Deere PLUS-50 or John Deere TORQ-GARD SUPREME engine oil and a John Deere oil filter are used after first 100 hours, the oil and filter service interval may be extended by 50%.

If diesel fuel exceeding 0.5% sulfur content is used, reduce the service interval for engine oil and filter by 50%.

Oils meeting Military Specification MIL-L-46167B may be used as arctic oils.

