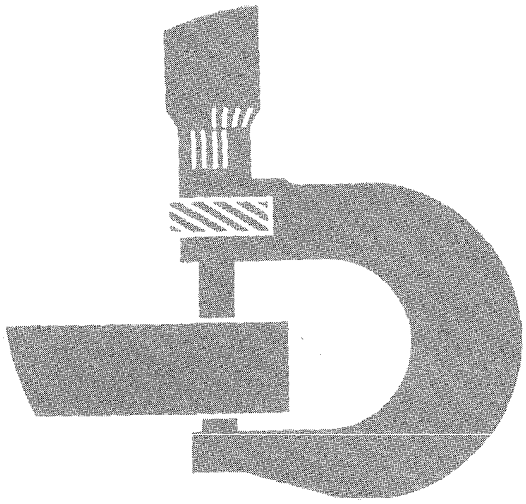
John Deere
400G
Crawler Bulldozer
Repair



TECHNICAL MANUAL

TM-1412 (Mar-88)
LITHO IN U.S.A.

400G CRAWLER BULLDOZER
TECHNICAL MANUAL
TM1412 (Mar–88)
REPAIR

SECTION AND GROUP CONTENTS

NOTE: This manual covers machine repair. For Operation and Test information, see TM–1411.

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.

INTRODUCTION

This manual is part of a total service support program.

FOS Manuals—reference

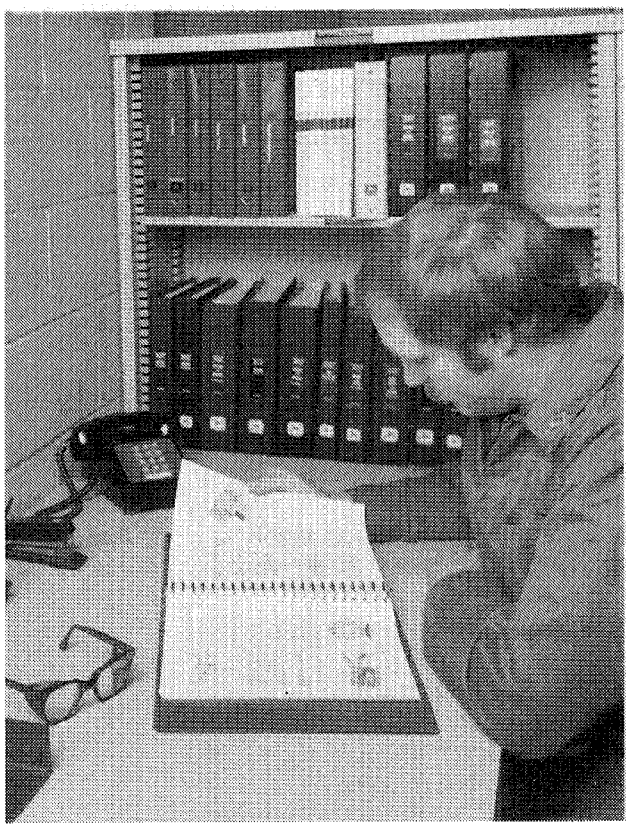
Technical Manuals—machine service

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.

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

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



AB6;RW5559 053;INTR02 030785

FEATURES OF THIS TECHNICAL MANUAL

John Deere ILLUSTRUCTION format emphasizing illustrations and concise instructions in easy-to-use modules.

Emphasis on diagnosis, analysis, and testing so you can understand the problem and correct it.

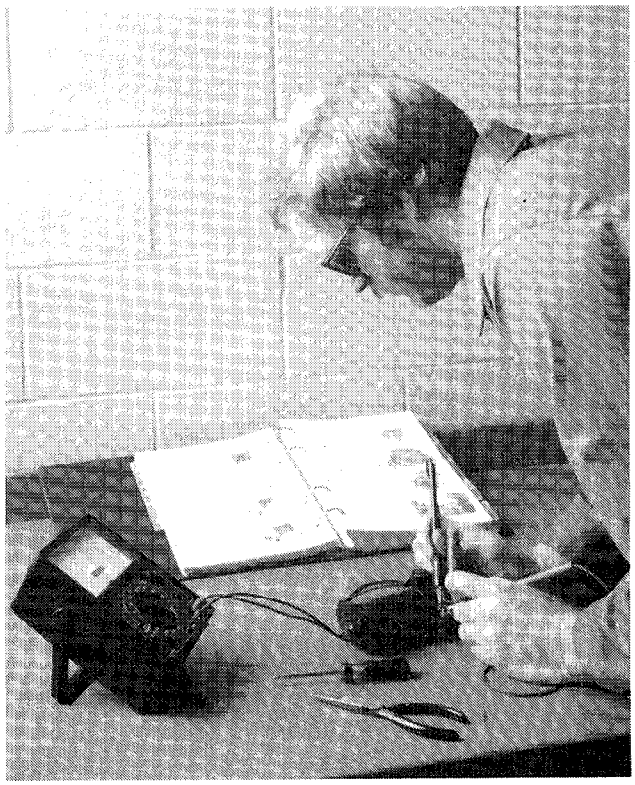
Diagnostic information presented with the most logical and easiest to isolate problems first to help you identify the majority of routine failures quickly.

Step-by-step instructions for teardown and assembly.

Summary listing at the beginning of each group of all applicable specifications, wear tolerances, torque values, essential tools, and materials needed to do the job.

An emphasis throughout on safety—so you do the job right without getting hurt.

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 when you need to know correct service procedures or specifications.



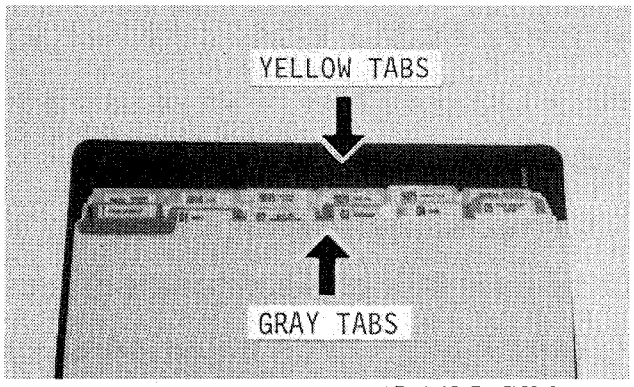
AB6;RW5560 053;INTR03 071085

USING TABS

To fully utilize this technical manual, you must understand how it is organized.

Only two tab colors are used—gray and yellow. Each color represents a different type of information.

Spend a minute reading this now and save many minutes of searching later.



018;T5933AB T82;FLPD I 260785

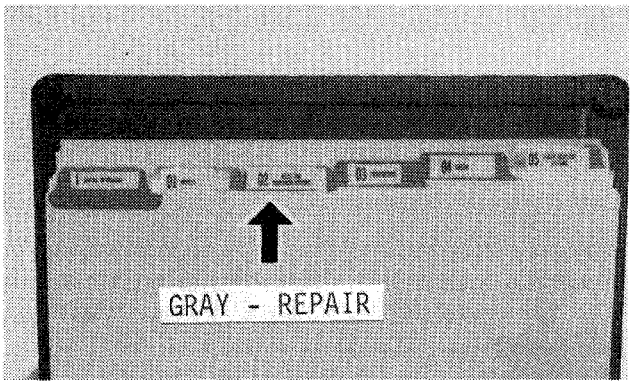
GRAY TAB SECTIONS

The gray tab sections are repair sections that tell how to repair the components of the various systems.

Repair of a component includes:

- Removal from machine (when necessary)
- Disassembly
- Inspection
- Replacement of parts
- Assembly
- Adjustment
- Installation on machine (when necessary)

The numbers used for the repair (gray tab) sections are part of an overall service publication numbering system. The numbers identify the same sections in the parts catalog, flat rate manual, service information bulletins, and service training courses.



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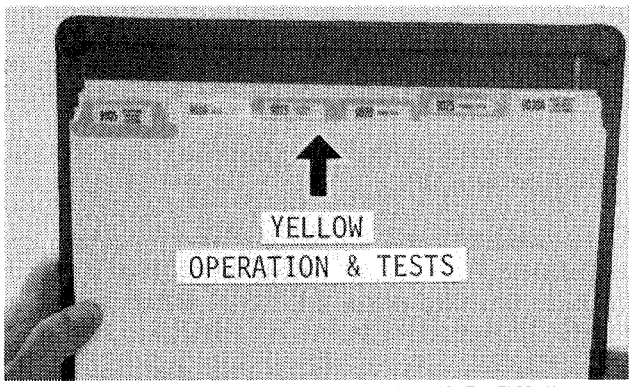
YELLOW TAB SECTIONS

Each yellow tab section contains information on:

Groups	
05	Theory of Operation
10	System Operational Checks
15	System Diagnostic Information
20	Adjustments
25	Tests



018;T5933AD T82;FLPD K 260785

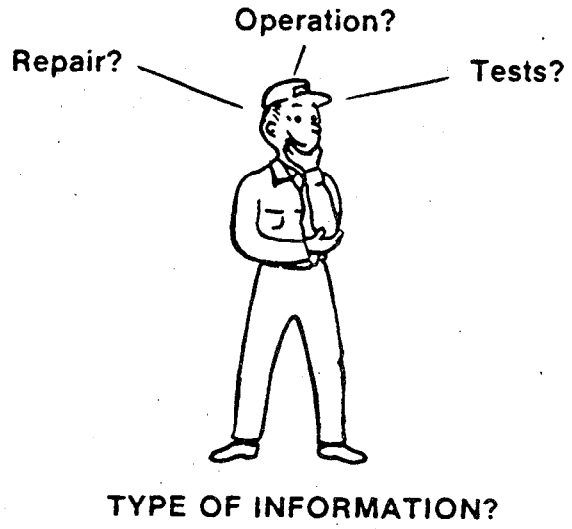
THREE-STEP PROCEDURE

Use the following three-step procedure to locate the desired information.

1. Determine the type of information you need. Is it repair, operation, or tests?

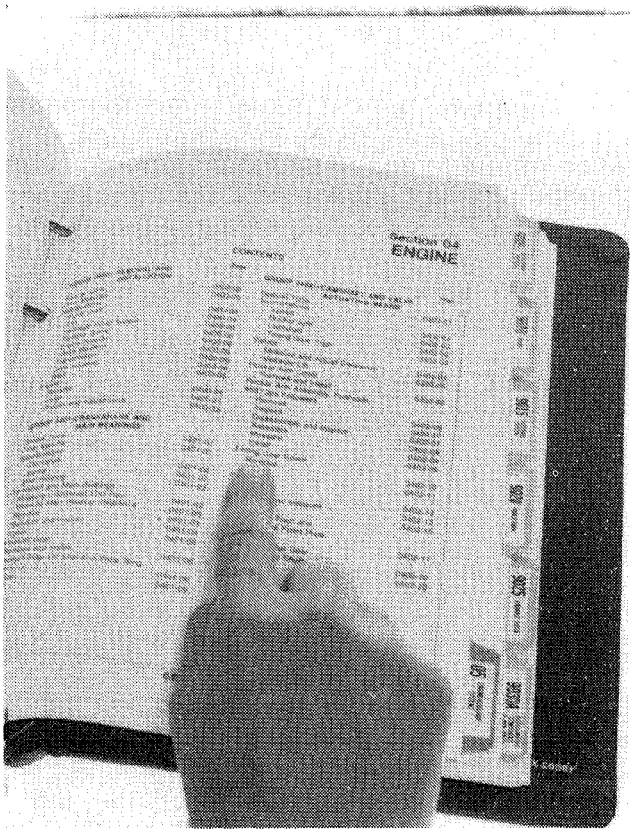
2. Go to the appropriate section tab:

   Gray for Repair
   Yellow for Operation or Tests



018;T5940AT T82;FLPD L 260785

3. Use the table of contents on the first page of the section to locate the information.



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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 operating practices.

AB6;T81389 053;ALERT 160687

UNDERSTAND SIGNAL WORDS

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

Safety signs with signal word DANGER or WARNING are typically near specific hazards.

General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

AB6;TS187 053;SIGNAL 071085

USE HANDHOLDS AND STEPS

Falling is one of the major causes of machine accidents.

When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine. Do not use any controls as handholds.

Never jump either on or off the machine. Never mount or dismount a moving machine.

Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.

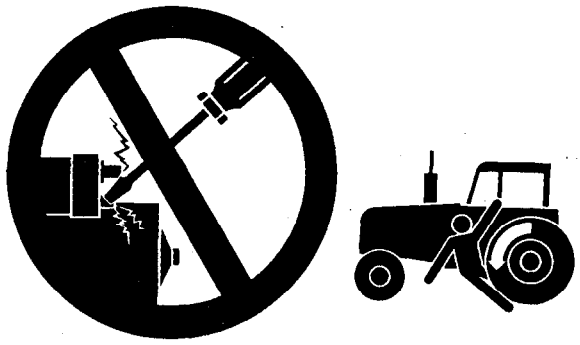
018;T6669AF 02T;05 K69 161287

PREVENT MACHINE RUNAWAY

Avoid possible injury or death from machinery runaway.

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

NEVER start engine while standing on ground. Start engine only from operator's seat, with transmission in neutral or park.



AB6;TS177 053;BYPAS1 210585

SUPPORT RAISED EQUIPMENT

Put a support under all raised equipment. Never work under raised equipment without a support.

If a support is not available, lower equipment to ground.

02T;05 J23 150188

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

HANDLE FUEL SAFELY—AVOID FIRES

Handle fuel with care: it is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks.

Always stop engine before refueling machine. Fill fuel tank outdoors.

Prevent fires by keeping machine clean of accumulated trash, grease, and debris. Always clean up spilled fuel.

AB6;TS202 053;FIRE1 230487

59T;00I00I 05 220188

HANDLE STARTING FLUID SAFELY

Starting fluid is highly flammable.

Keep all sparks and flame away when using it. Keep starting fluid away from batteries and cables.

To prevent accidental discharge when storing the pressurized can, keep the cap on the container, and store in a cool, protected location.

Do not incinerate or puncture a starting fluid container.

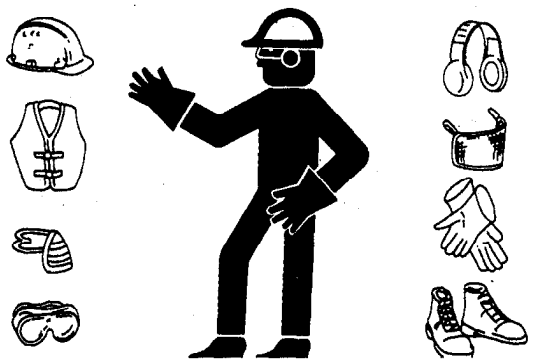
AB6;T6089A U 053;FIRE3 010288

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.

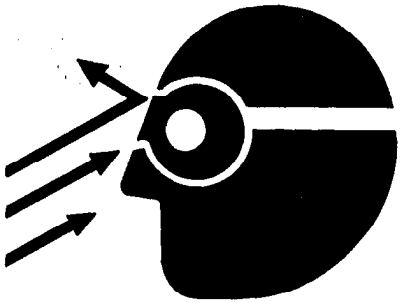
Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



AB6;TS206 053;WEAR 230487

PROTECT AGAINST FLYING DEBRIS

When you drive connecting pins in or out, guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.

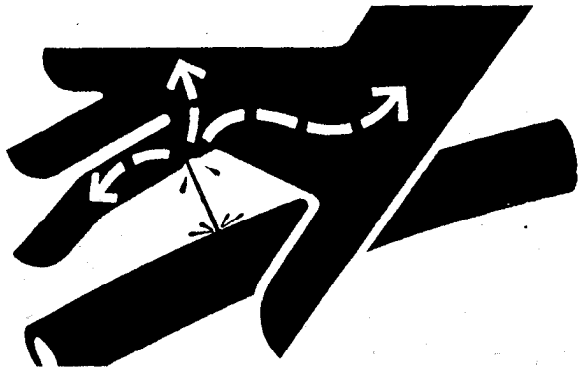


018;T6642DK 02T;05 J45 190188

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

SERVICE CRAWLER SAFELY

Before servicing crawler:
- Park machine on a level surface.
- Move H-L-R lever to neutral and lock it.
- Move transmission selector lever to neutral.
- Apply brake and engage brake lock.
- Lower all equipment to the ground.
- Turn key switch off to stop engine.
- Release hydraulic pressure by moving control lever(s) until equipment does not move.
- Turn battery disconnect switch off.

Understand service procedure before doing work.

Never lubricate or service machine while it is moving. Keep hands, feet and clothing from power-driven parts.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

Disconnect battery ground cable (—) or turn battery disconnect switch off before making adjustments on electrical systems or welding on machine.

When you work near the track recoil spring, use extreme care. Do not disassemble parts unless you know the correct procedure and have correct tools.

If it is necessary to make checks with the engine running. ALWAYS USE TWO PEOPLE--with the operator at the controls, able to see the person doing the checking.

02T;05 K72 190188

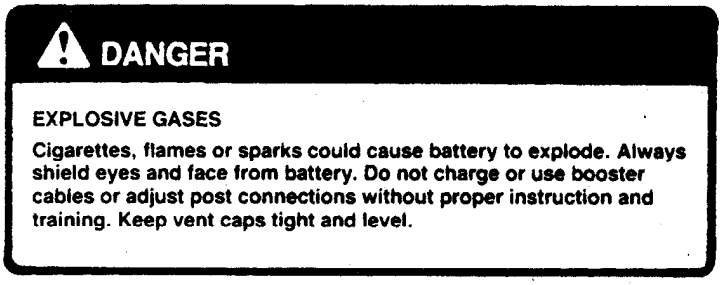
USE A LIFTING DEVICE FOR HEAVY COMPONENTS

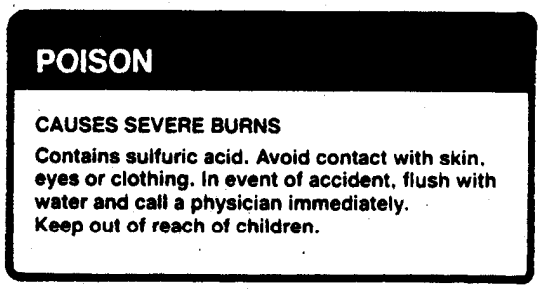
Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components.

02T;05 K74 120188

REPLACE SAFETY SIGNS





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

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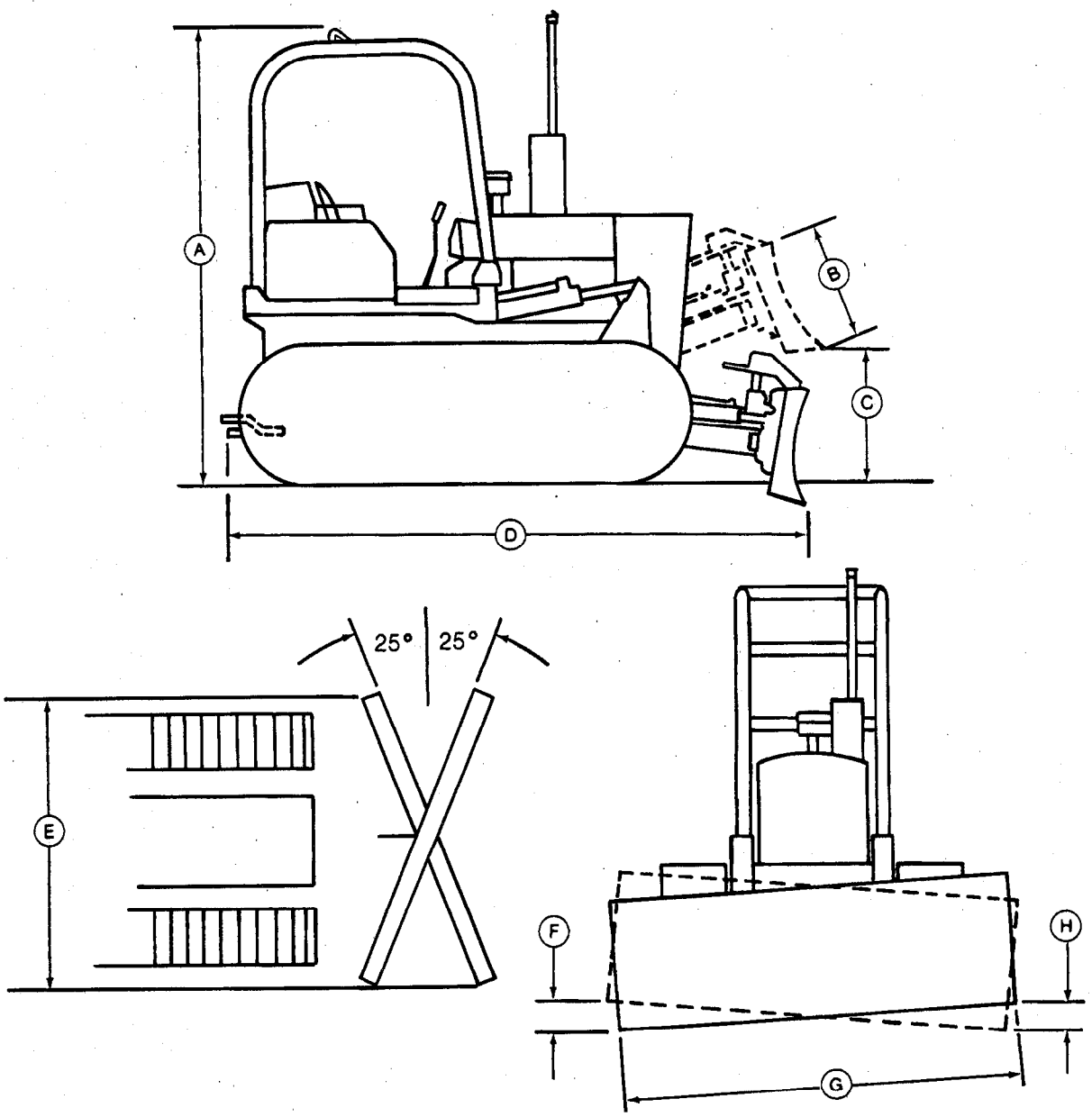
400G



NOTE: Specifications and design are subject to change without notice. Wherever applicable, specifications, are in accordance with SAE standards. Except where otherwise noted, these specifications are based on a unit with roll-over protective structure, full fuel tank, 175 lb (80 kg) operator and standard equipment.

	U.S.	Metric
A	8 ft 2 in.	2.49 m
B	28 in.	711 mm
C	3 ft	914 mm
D	11 ft 7 in.	3.54 m
E	73 in.	1.85 m
F	7 in.	178 mm
G	90 in.	2.29 m
H	8.5 in.	216 mm
SAE Operating weight with ROPS	11,400 lb	5169 kg

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Engine: John Deere 4-239D

Type	4-stroke cycle, naturally aspirated diesel
Bore and stroke	4.19 x 4.33 (106.5 x 110 mm)
Number of cylinders	4
Displacement	239 cu in. (3.9 L)
Compression ratio	17.8:1
Maximum net torque @ 1300 rpm	180 lb ft (244 N·m) (24.9 kgm)
Lubrication	Pressure system with full-flow filter
Cooling fan	Blower
Air cleaner	Dry
Electrical system	12 volt with alternator
Batteries	Reserve capacity: 180 minutes

Power @ 2100 engine rpm — SAE

Net	60 hp (36 kW)

Transmission ..... H-L-R

Steering Clutches ..... Oil-cooled, hydraulically actuated multiple disk

Brakes ..... Self-adjusting, oil-cooled

Travel Speeds—mph (km/h)

With machine at rated engine speed, travel speed will be:

Gear	High	Low	Reverse
1	1.7 (2.7)	1.2 (1.9)	1.6 (2.6)
2	2.6 (4.2)	1.9 (3.1)	2.5 (4.0)
3	4.0 (6.4)	2.8 (4.5)	3.8 (6.1)
4	6.2 (10.0)	4.4 (7.1)	5.9 (9.5)

Hydraulic system:

Pump	Gear, 15 gpm (57 L/min)
Pressure	2250 psi (15 514 kPa) (155.1 bar)

Tracks (5-roller track frames with track guides):

Grouser	14 ini. (356 mm)
Track shoes, each side	36
Ground contact area	1939 sq in. (12 510 cm²)
Ground pressure	5.9 psi (40.7 kPa) (0.407 bar)

Winch:

Drum diameter	6 iin. (152 mm)
Drum capacity	(no allowance for looseness or uneven spooling):
1/2 in. (12.7 mm) cable	159 ft (48.5 m)
5/8 in. (15.9 mm) cable	105 ft (31.9 m)
3/4 in. (19 mm) cable	74 ft (22.5 m)

Cable speed (at 2500 rpm engine speed with 5/8 in. (15.9 mm) cable:

With bore drum	119 fpm (36.3 mpm)
With full drum	186 fpm (56.7 mpm)

Cable pull (at 1300 rpm engine speed):

With bore drum	15,700 lb (7120 kg)
with full drum	10,020 lb (4544 kg)

Shipping weight:

Winch (without cable)	815 lb (370 kg)
Fairlead	110 lb (50 kg)
Drawbar	44 lb (20 kg)

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DRAIN AND REFILL CAPACITIES

	U.S.	Metric
Fuel tank	31 gal	117.3 L
Cooling system	3.5 gal	12.3 L
Engine oil, including filter	8.5 qt	8.0 L
Hydraulic system (reservoir only), including filter	6.0 gal	22.5 L
Transmission, steering clutch, final drive, including filter		
Steering clutches (each)	3.5 gal	(13.2 L)
Transmission	7.0 gal	(28.5 L)
Winch reservoir	9.0 qt	8.5 L

05T;115 K51. 010288

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 TRACK SHOE TORQUE

Track shoe cap screws should be checked periodically for tightness.

Tighten cap screws to 110 lb-ft (149 N·m) torque.

NOTE: Replacement hardware should be lubricated and tightened to above specification.

04T;90 K115. 140188

HARDWARE TORQUE VALUES

NOTE: Torque wrench tolerance is ± 10 per cent of specified torque.

Customary Hardware



Cap Screw Size-Inches	Grade B lb-ft.	(N-m)	Grade D lb-ft.	(N-m)	Grade F lb-ft.	(N-m)
1/4	6	(8)	10	(14)	14	(19)
5/16	10	(14)	20	(27)	27	(37)
3/8	20	(27)	35	(47)	50	(68)
7/16	30	(40)	55	(75)	80	(108)
1/2	45	(60)	85	(115)	120	(163)
9/16	70	(95)	120	(160)	170	(230)
5/8	95	(130)	165	(225)	235	(320)
3/4	165	(225)	300	(405)	420	(570)
7/8	170	(230)	450	(610)	675	(915)
1	255	(345)	720	(975)	1015	(1375)
1-1/8			900	(1220)	1430	(1940)
1-1/4			1250	(1700)	2025	(2750)

Seating Torque Values for Set Screws

INCH SCREWS

Screw Size	Seating Torque (Lb-in.)	(Nm)
5	9	1
6	9	1
8	20	2
10	33	4
1/4	87	10
5/16	165	19
3/8	290	33
7/16	430	49
1/2	620	70
9/16	620	70
5/8	1225	138
3/4	2125	240

METRIC SCREWS

Screw Size	Seating Torque (Nm)
M3	0.9
M4	2.5
M5	5.0
M6	8.5
M8	20
M10	40
M12	65
M16	160
M20	310
M24	520

018;T6603CK 04T;90 K64. 030987

METRIC HARDWARE TORQUE CHART

NOTE: Torque wrench tolerance is ± 10 percent of specified torque.

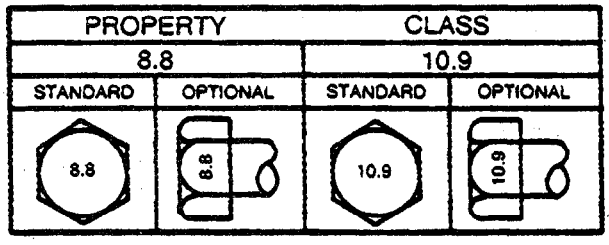
Metric Standard Thread

GRADE SIZE	8.8		10.9	
	Nm	LB FT	Nm	LB FT
M3	1.5	1.0	2.0	1.5
M4	3.5	2.6	5.0	4
M5	7.0	5	10.0	7
M6	12	9	12	12.0
M8	28	20	40	30
M10	55	40	80	59
M12	95	70	140	100
M14	150	110	220	160
M16	235	170	350	260
M20	475	350	675	500
M24	825	610	1170	860
M30	1630	1200	2320	1710
M36	2850	2100	4060	3000

1 Nm = .7376 (lb-ft)

For 9.8 fasteners, use 8.8 torque.

Head Markings - Bolts are marked as shown and with a letter to identify the manufacturer.



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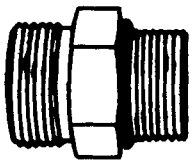
SERVICE RECOMMENDATIONS FOR O-RING BOSS FITTINGS

Straight Fitting

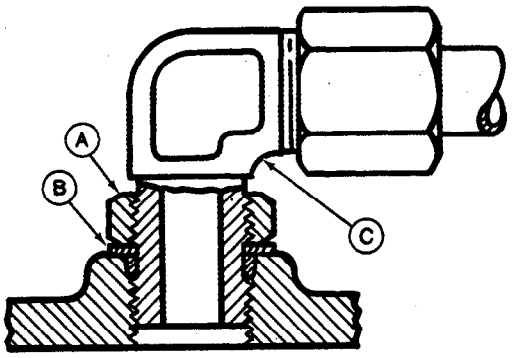


1. Inspect O-ring boss seat for dirt or defects.

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%.

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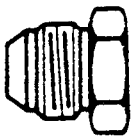
SERVICE RECOMMENDATIONS FOR 37° FLARE AND 30° CONE SEAT CONNECTORS



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. Overtightening 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 nut to torque value shown on the chart. Do not allow hoses to twist when tightening fittings.

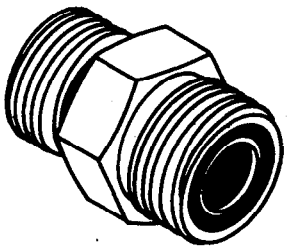
STRAIGHT FITTING OR SPECIAL NUT TORQUE

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 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;T6234AC T82;BHMA EL 061186

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	(in.)	Dash Size	Thread Size in.	Swivel Nut Torque Nm	(lb-ft)	Bulkhead Nut Torque Nm	(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%.

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