9230, 9330, 9430, 9530, and 9630 Tractors Repair

JOHN DEERE

TECHNICAL MANUAL

9230-9630
Tractors Repair

TM2267 05MAY23 (ENGLISH)

John Deere Waterloo Works
PRINTED IN U.S.A.

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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 operation and tests. Repair sections tell how to repair the components. Operation and tests 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.

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

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

DX,TMIFC-19-20220920

Dealer Predelivery Information Form

The John Deere Predelivery Form, when properly filled out and signed by dealer, verifies predelivery and delivery services were satisfactorily performed.

Because of the shipping factors involved, plus extra finishing touches necessary to promote customer satisfaction, there are certain predelivery services that must be performed by the dealer. These services are listed on the predelivery form with the tractor.

Perform all services listed and check each job off as it is completed. Fill form out completely and sign it.

OURX113,0000002-19-20010418

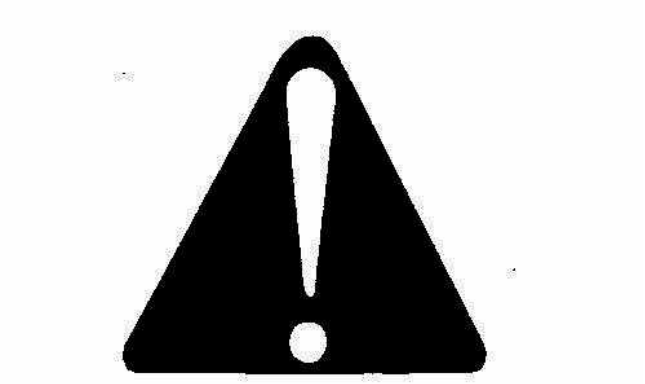
Section 10 - General Information

Contents

Recognize Safety Information

This is a 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.



T81389-UN: Safety-alert symbol

DX,ALERT-19-19980929

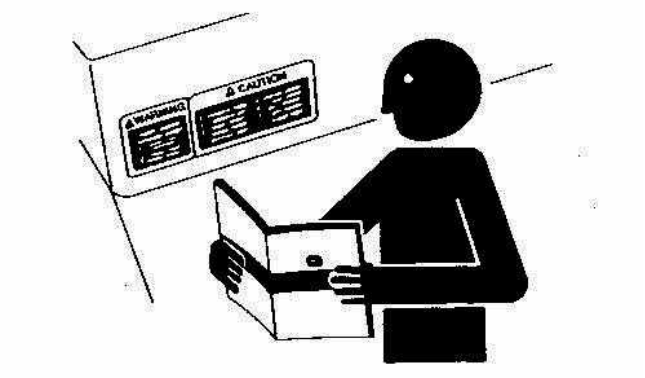
Follow Safety Instructions

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your John Deere dealer.



TS201-UN: Safety Messages

DX,READ-19-1993/03/03

Practice Safe Maintenance

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet , and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

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.

On self-propelled equipment, disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

TS218-UN: Keep Area Clean

DX,SERV-19-1999/02/17

Protect Against High Pressure Spray

Spray from high pressure nozzles can penetrate the skin and cause serious injury. Keep spray from contacting hands or body.

If an accident occurs, see a doctor immediately. Any high pressure spray 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.

TS1343-UN: High Pressure Spray

DX,SPRAY-19-1992/04/16

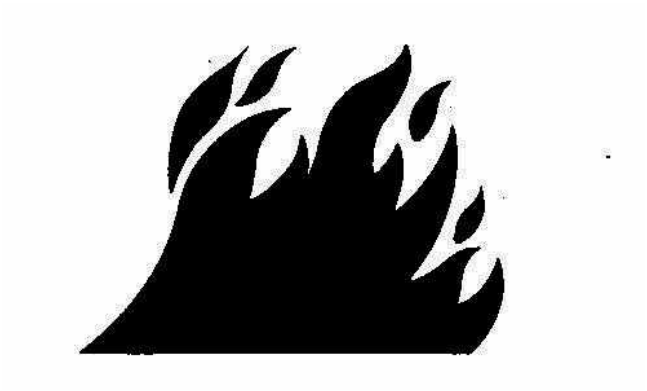
Handle Fluids Safely—Avoid Fires

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.



TS227-UN: Avoid Fires

DX,FLAME-19-19980929

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).

TS204-UN: Battery Explosions

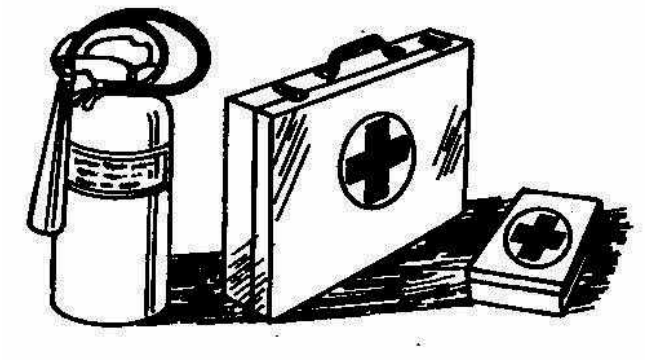
DX,SPARKS-19-19930303

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.



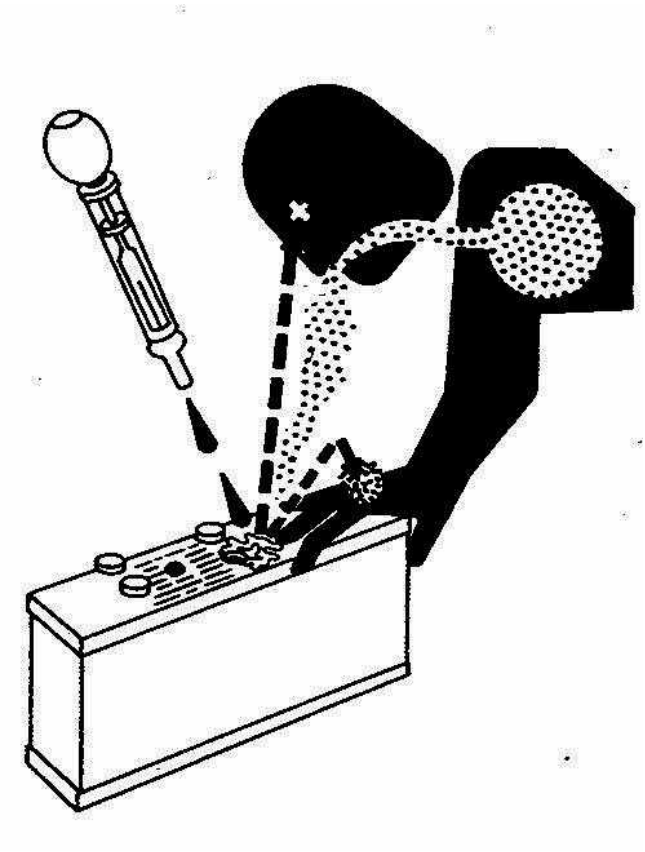
TS291-UN: First Aid Kit

DX,FIRE2-19-19930303

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:



TS203-UN: Acid Burns

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 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 quarts).
3. Get medical attention immediately.

DX,POISON-19-19930421

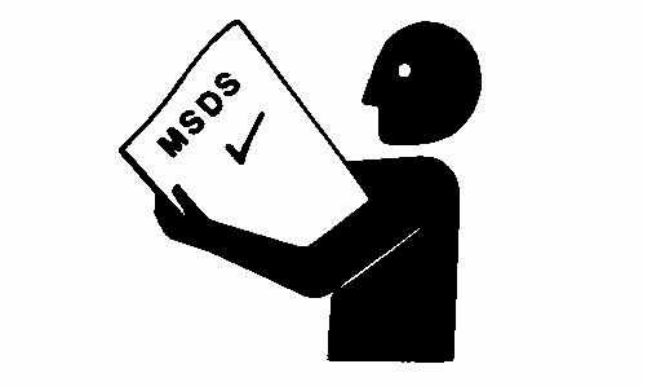
Handle Chemical Products Safely

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.

(See your John Deere dealer for MSDS's on chemical products used with John Deere equipment.)



TS1132-UN: Material Safety Data Sheet

DX,MSDS,NA-19-19930303

Avoid High-Pressure Fluids

Inspect hydraulic hoses periodically – at least once per year – for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage.

Replace worn or damaged hose assemblies immediately with John Deere approved replacement parts.

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

Avoid the hazard by relieving pressure before disconnecting 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 in English from Deere & Company Medical Department in Moline, Illinois, U.S.A., by calling 1-800-822-8262 or +1 309-748-5636.

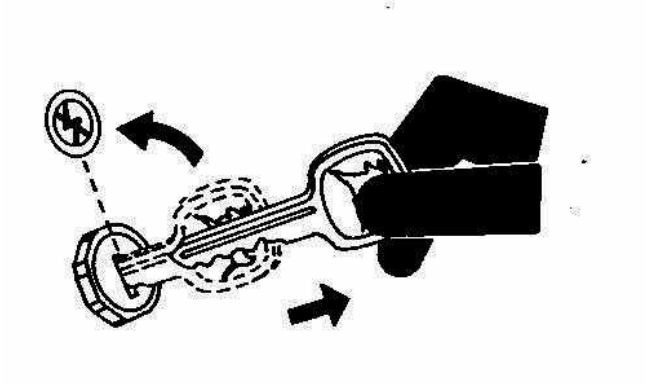
X9811-UN: High Pressure

DX,FLUID-19-20111012

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.



TS230-UN: Remove the Key

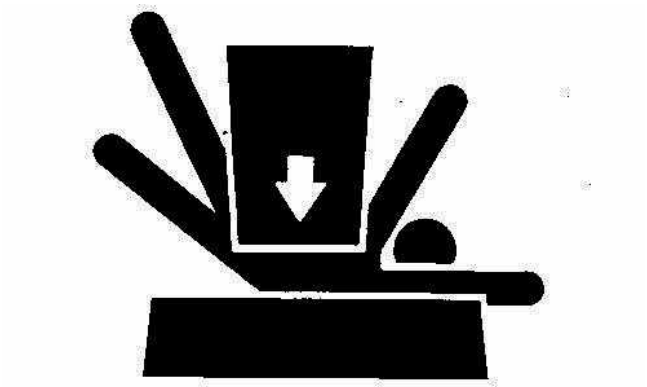
DX,PARK-19-19900604

Support Machine Properly

Always lower the attachment or implement to the ground before you work on the machine. If the work requires that the machine or attachment be lifted, provide secure support for them. If left in a raised position, hydraulically supported devices can settle or leak down.

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.

When implements or attachments are used with a machine, always follow safety precautions listed in the implement or attachment operator's manual.



TS229-UN: Support Properly

DX,LOWER-19-20000224

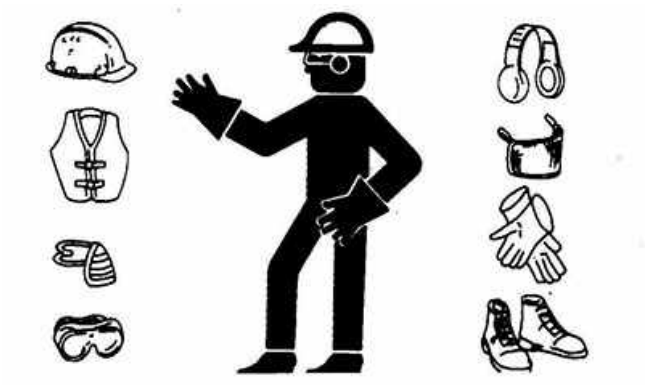
Wear Protective Clothing

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.



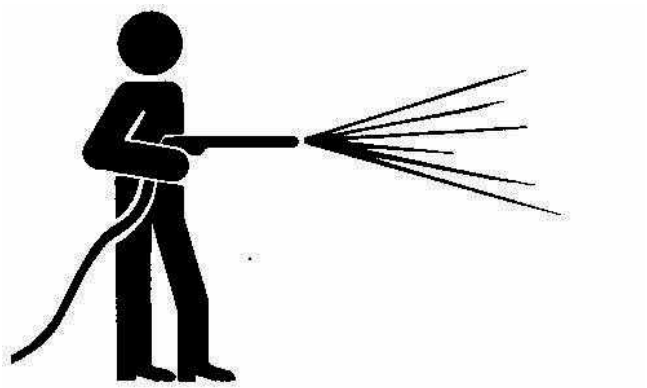
TS206-UN: Protective Clothing

DX,WEAR-19-19900910

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.



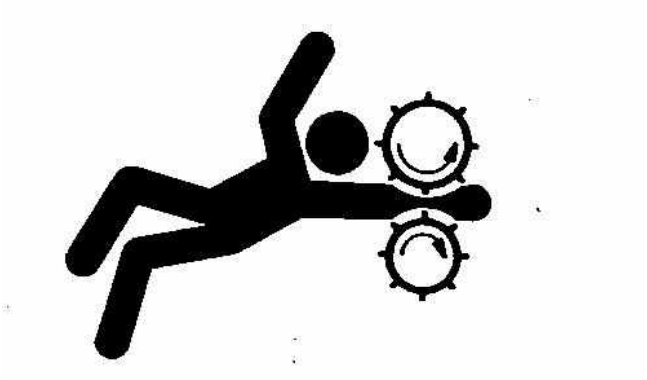
T6642EJ-UN: Clean Work Area

DX,CLEAN-19-19900604

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.



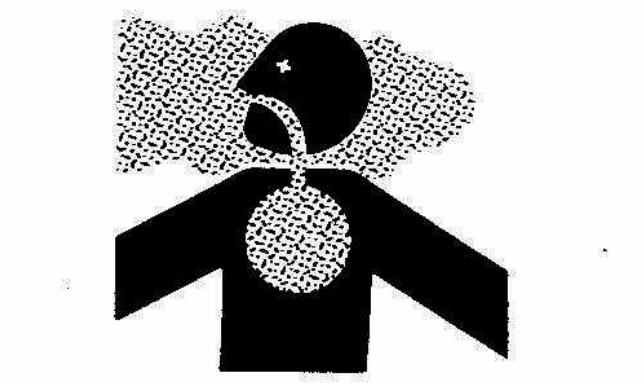
TS228-UN: Moving Parts

DX,LOOSE-19-19900604

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.

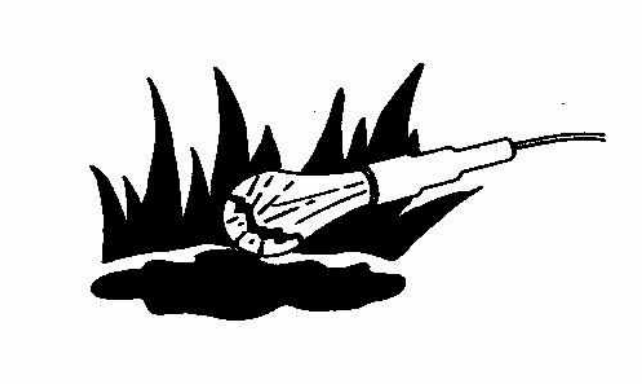


TS220-UN: Engine exhaust fumes

DX,AIR-19-19990217

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.

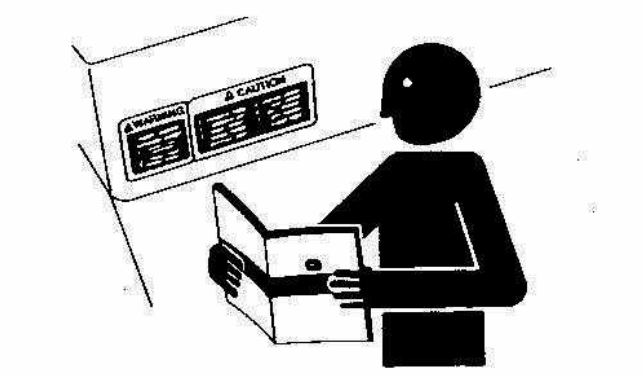


TS223-UN: Work Area Safely

DX,LIGHT-19-19900604

Replace Safety Signs

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



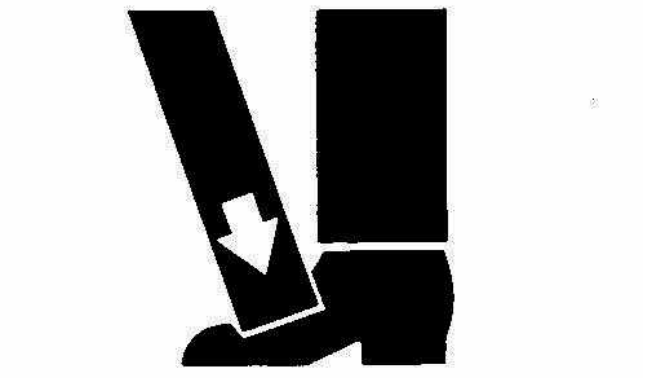
TS201-UN: Safety Signs

DX,SIGNS1-19-19900604

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.



TS226-UN: Proper Lifting Equipment

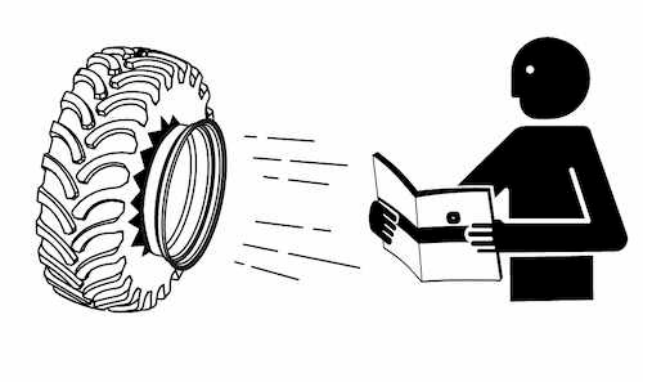
DX,LIFT-19-20230606

Follow Tire Recommendations

Keep your machine in proper working order.

Use only prescribed tire sizes with correct ratings and inflate to the pressure specified in this manual.

Use of other than prescribed tires may decrease stability, affect steering, result in premature tire failure, or cause other durability or safety issues.



H111235-UN: Read OM

DX,TIRE,INFO-19-20140519

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.

Wheels and tires are heavy. When handling wheels and tires use a safe lifting device or get an assistant to help lift, install, or remove.

RXA0103438-UN: Explosive Tire and Rim Parts

DX,WW,RIMS-19-20170228

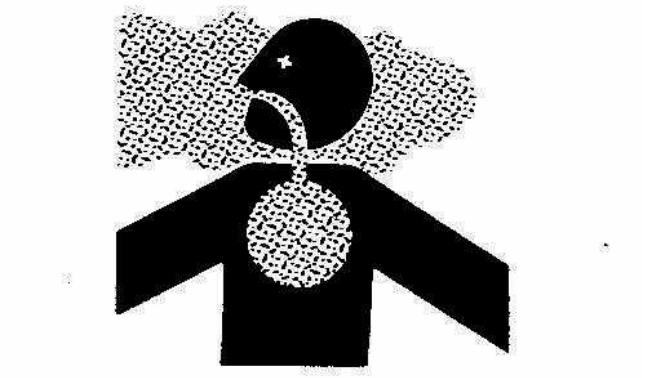
Avoid Harmful Asbestos Dust

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

Components in 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 material containing asbestos. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, apply a mist of oil or water on the material containing asbestos.

Keep bystanders away from the area.



TS220-UN: Asbestos Dust

DX,DUST-19-19910315

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 accidentally burst when heat goes beyond the immediate flame area.

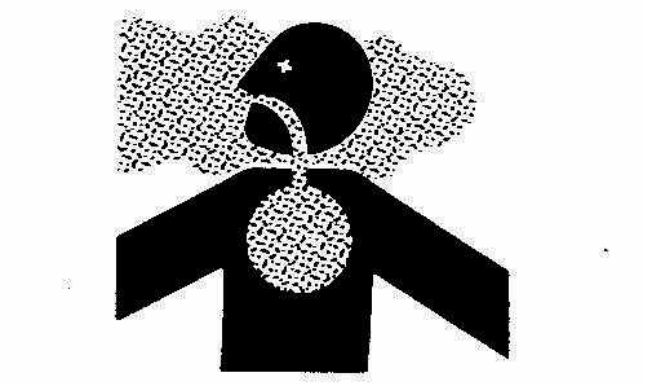
TS953-UN: Flammable Spray

DX,TORCH-19-20041210

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.
Remove paint before heating:

- Remove paint a minimum of 100 mm (4 in.) from area to be affected by heating. If paint cannot be removed, wear an approved respirator before heating or welding.
- 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.



TS220-UN: Toxic Fumes

Do not use a chlorinated solvent in areas where welding will take place.
Do all work in an area that is well ventilated to carry toxic fumes and dust away.
Dispose of paint and solvent properly.

DX,PAINT-19-20020724

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.

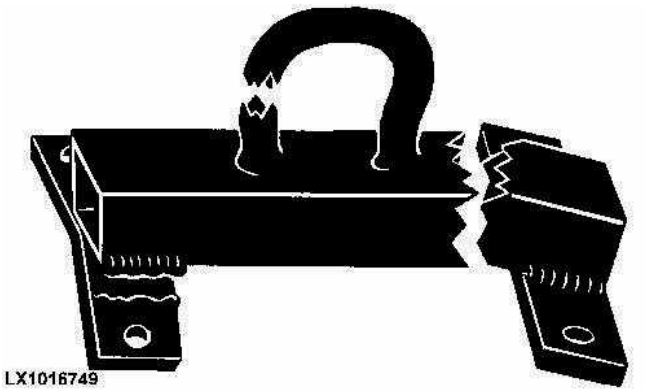
TS779-UN: Proper Tools

DX,REPAIR-19-19990217

Construct Dealer-Made Tools Safely

Faulty or broken tools can result in serious injury. When constructing tools, use proper, quality materials, and good workmanship.

Do not weld tools unless you have the proper equipment and experience to perform the job.

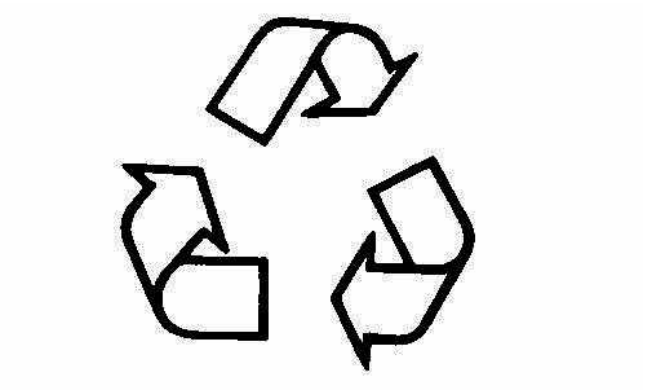


LX1016749-UN: Construct Dealer-Made Tools Safely

DX,SAFE,TOOLS-19-19971010

Decommissioning — Proper Recycling and Disposal of Fluids and Components

Safety and environmental stewardship measures must be taken into account when decommissioning a machine and/or component. These measures include the following:



TS1133-UN: Recycle Waste

- Use appropriate tools and personal protective equipment such as clothing, gloves, face shields or glasses, during the removal or handling of objects and materials.
- Follow instructions for specialized components.
- Release stored energy by lowering suspended machine elements, relaxing springs, disconnecting the battery or other electrical power, and releasing pressure in hydraulic components, accumulators, and other similar systems.
- Minimize exposure to components which may have residue from agricultural chemicals, such as fertilizers and pesticides. Handle and dispose of these components appropriately.
- Carefully drain engines, fuel tanks, radiators, hydraulic cylinders, reservoirs, and lines before recycling components. Use leak-proof containers when draining fluids. Do not use food or beverage containers.
- Do not pour waste fluids onto the ground, down a drain, or into any water source.
- Observe all national, state, and local laws, regulations, or ordinances governing the handling or disposal of waste fluids (example: oil, fuel, coolant, brake fluid); filters; batteries; and, other substances or parts. Burning of flammable fluids or components in other than specially designed incinerators may be prohibited by law and could result in exposure to harmful fumes or ashes.
- Service and dispose of air conditioning systems appropriately. Government regulations may require a certified service center to recover and recycle air conditioning refrigerants which could damage the atmosphere if allowed to escape.
- Evaluate recycling options for tires, metal, plastic, glass, rubber, and electronic components which may be recyclable, in part or completely.
- Contact your local environmental or recycling center, or your John Deere dealer for information on the proper way to recycle or dispose of waste.

DX,DRAIN-19-20150601

Live With Safety

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

TS231-19: Safety Systems

DX,LIVE-19-19920925

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.

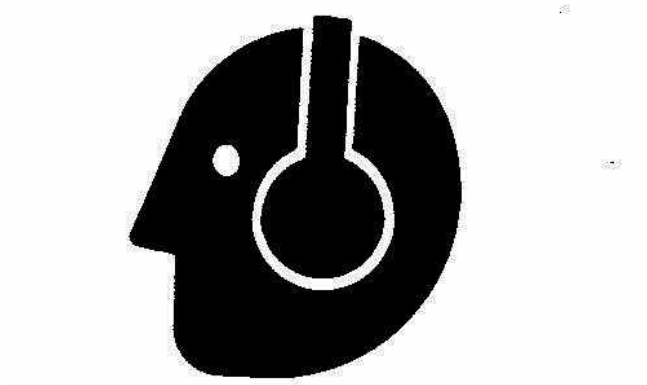
TS952-UN: Explosive Tire and Rim Parts

DX,TIRECP-19-1990/08/24

Protect Against Noise

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.



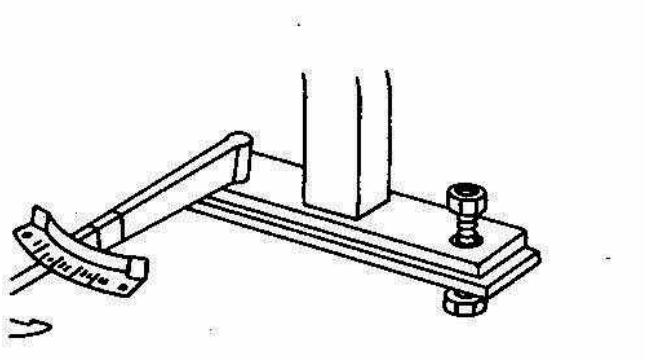
TS207-UN: Noise Exposure

DX,NOISE-19-1993/03/03

Keep ROPS Installed Properly

Make certain all parts are reinstalled correctly if the roll-over protective structure (ROPS) is loosened or removed for any reason. Tighten mounting bolts to proper torque.

The protection offered by ROPS will be impaired if ROPS is subjected to structural damage, is involved in an overturn incident, or is in any way altered by welding, bending, drilling, or cutting. A damaged ROPS should be replaced, not reused.



TS212-UN: Roll-Over Protective Structure

DX,ROPS3-19-1993/03/03

Service Accumulator Systems Safely

Escaping fluid or gas from systems with pressurized accumulators that are used in air conditioning, hydraulic, and air brake systems can cause serious injury. Extreme heat can cause the accumulator to burst, and pressurized lines can be accidentally cut. Do not weld or use a torch near a pressurized accumulator or pressurized line.

Relieve pressure from the pressurized system before removing accumulator. Never attempt to relieve a pressurized system or accumulator by loosening a fitting. Pressure checks should be done by a qualified service technician. (See your John Deere dealer for repair.)

Relieve pressure from the hydraulic system before removing accumulator. Never attempt to relieve hydraulic system or accumulator pressure by loosening a fitting.

Accumulators cannot be repaired.

TS281-UN: Hydraulic Accumulator

DX,WW,ACCLA-19-20030820

Servicing Electronic Control Units

1. **IMPORTANT:**

   Do not open control unit and do not clean with a high-pressure spray. Moisture, dirt, and other contaminants can cause permanent damage.

   Control units are not repairable; replace only if indicated in the diagnostic procedure.
2. Since control units are the components LEAST likely to fail, isolate failure before replacing by completing the diagnostic procedure.
3. The wiring harness terminals and connectors for electronic control units are repairable.
4. **IMPORTANT:**

   If an electronic control unit is not programmed identical to the original control unit, misleading diagnostic messages and poor performance will occur.

   Before putting back into service, verify that the control unit is programmed identical to the original control unit.

DX,WW,ECU01-19-20151002

Welding Near Electronic Control Units

TS953-UN: Welding Graphic

1. **IMPORTANT:**
   Do not jump-start engines with arc welding equipment. Currents and voltages are too high and may cause permanent damage.

   Disconnect the negative (-) battery cable(s).
2. Disconnect the positive (+) battery cable(s).
3. Connect the positive and negative cables together. Do not attach to vehicle frame.
4. Clear or move any wiring harness sections away from welding area.
5. Connect welder ground close to welding point and away from control units.
6. After welding, reverse Steps 1—5.

DX,WW,ECU02-19-20090814

Wait Before Opening High-Pressure Fuel System

High-pressure fluid remaining in fuel lines can cause serious injury. Only technicians familiar with this type of system should perform repairs. Before disconnecting fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system, wait a minimum of 15 minutes after engine is stopped.

TS1343-UN: High-Pressure Fuel Lines

DX,WW,HPCR2-19-2003/01/07

List of References

Below is a list of all items within this group.

AC20456,0000E71-19-20230103

Trademarks

Trademarks	
AccuDepth™	Trademark of Deere and Company
ACS™	Trademark of Deere and Company
ActiveSeat™	Trademark of Deere and Company
AMBLYGON™	Trademark of Kluber Lubrication
AMPSEAL 16™	Trademark of Tyco Electronics
AutoLoad™	Trademark of Deere and Company
AutoPowr™	Trademark of Deere and Company
AutoPowr™/IVT™	Trademark of Deere and Company
AutoQuad™ II	Trademark of Deere and Company
AutoQuad™ PLUS	Trademark of Deere and Company
AutoTrac™	Trademark of Deere and Company
Avdel™	Trademark of Avdel UK Limited
Bio Hy-Guard™	Trademark of Deere and Company
Break-In™	Trademark of Deere and Company
Break-In PLUS™	Trademark of Deere and Company
CINCH™	Trademark of Cinch Inc.
ClimaTrak™	Trademark of Deere and Company
ComfortCommand™	Trademark of Deere and Company
ComfortGard™	Trademark of Deere and Company
ComfortGard Deluxe™	Trademark of Deere and Company
CommandARM™	Trademark of Deere and Company
CommandCenter™	Trademark of Deere and Company
CommandQuad™	Trademark of Deere and Company
CommandView™	Trademark of Deere and Company
COOL-GUARD™ II	Trademark of Deere and Company
CoolScan™	Trademark of Deere and Company
CPC™	Trademark of AMP Incorporated
Deere™	Trademark of Deere and Company
DEUTSCH™	Trademark of Deutsch Company
DURABUILT™	Trademark of Camoplast Inc.
Efficiency Manager™	Trademark of Deere and Company
FieldCruise™	Trademark of Deere and Company
Field Doc™	Trademark of Deere and Company
Field Office™	Trademark of Deere and Company
GreenStar™	Trademark of Deere and Company
HY-GARD™	Trademark of Deere and Company
ILS™	Trademark of Deere and Company
iPhone®	Trademark of Apple, Inc.
iPod®	Trademark of Apple, Inc.
iPod Touch®	Trademark of Apple, Inc.
iTEC™	Trademark of Deere and Company
iTEC™ Pro	Trademark of Deere and Company
IVT™	Trademark of Deere and Company
IVT Selector™	Trademark of Deere and Company
JDLink™	Trademark of Deere and Company
JDOffice™	Trademark of Deere and Company
John Deere™	Trademark of Deere and Company
Loctite™	Trademark of Henkel Corporation
MATE-N-LOC™	Trademark of AMP Incorporated
METRIMATE™	Trademark of AMP Incorporated
METRI-PACK™	Trademark of Delphi Packard Electric Systems
NEVER-SEEZ™	Trademark of Bostik-Findley Inc.
Oilscan™	Trademark of Deere and Company
Parallel Tracking™	Trademark of Deere and Company
PLUS-50™ II	Trademark of Deere and Company
PowrQuad™	Trademark of Deere and Company
PowrQuad™ PLUS	Trademark of Deere and Company
PowerTech™	Trademark of Deere and Company
PowerTech™ Plus	Trademark of Deere and Company
Power Zero™	Trademark of Deere and Company
QUICK METAL™	Trademark of Henkel Corporation
QuickTatch™	Trademark of Deere and Company
Row-Trak™	Trademark of Deere and Company
ServiceADVISOR™	Trademark of Deere and Company
SERVICEGARD™	Trademark of Deere and Company
StarFire™	Trademark of Deere and Company
StarFire™ iTC	Trademark of Deere and Company

Trademarks

STC™	Trademark of Eaton Corporation
StellarSupport™	Trademark of Deere and Company
SUMITOMO™	Trademark of Sumitomo Corporation
TEFLON™	Trademark of DuPont Co.
TIA™	Trademark of Deere and Company
TLS™	Trademark of Deere and Company
TLS™ Plus	Trademark of Deere and Company
TouchSet™	Trademark of Deere and Company
Tractor-Implement Automation™	Trademark of Deere and Company
Vari-Cool™	Trademark of Deere and Company
Weather Pack™	Trademark of Packard Electric
YAZAKI™	Trademark of Yazaki Corporation

AC20456,0000A30-19-20160303

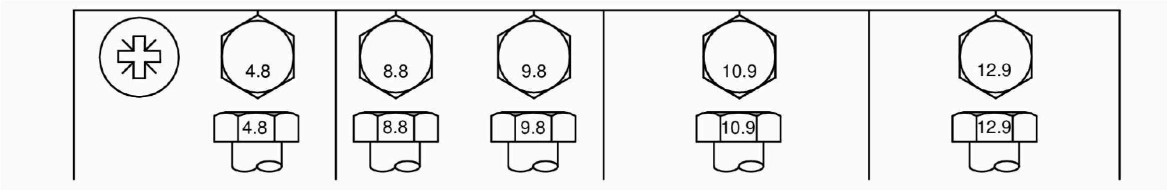
Sealants and Adhesives Cross-Reference Chart

U.S. Part Number	Canadian Part Number	Color	Size	Description	LOCTITE® /Permatex Number
Bonding					
PM37513	PM38606	BLACK AND WHITE	4 g	Epoxy Adhesive	21425
PM37391	PM38615	CLEAR	2 g	Gel Super Glue	454
PM37532	—	BLACK	5 oz	Weatherstrip Adhesive	30540
—	PM38603	YELLOW	147 ml	Weatherstrip Adhesive	30537
Gasketing					
PM38655	PM38625	PURPLE	50 ml	Flexible Form-in-Place Gasket	515
—	PM38600	BROWN	118 ml	Liquid Gasket Maker	30524
PM37559	PM38600	BROWN	4 oz	General Purpose Gasket Dressing (Aviation Gasket Sealant)	30517
PM38657	PM38628	BLUE	50 ml	High-Flex Form-in-Place Gasket	17430
PM37463	PM37463	CLEAR	80 g	RTV Clear Silicone	59530
PM37521		CLEAR	30 g	RTV Clear Silicone	59575
—	PM38618	CLEAR	300 g	RTV Clear Silicone	
PM37465	PM38616	METALLIC BLUE	80 ml	Ultra Blue RTV Silicone	58730
PM37553	PM37553	BURGUNDY	16 oz	High Tack Gasket Dressing	30525
PM37555	PM38607	BURGUNDY	9 oz aerosol	Hi-Tack Gasket Sealant	30524
PM37469	PM38609	RED	80 g	Hi-Temp RTV Silicone	59630
PM37529	—	RED	7.25 aerosol	Hi-Temp RTV Silicone	30541
PM37512	PM37512	—	—	Flexible Flange Sealant	5900
PM37616	—	—	20 g Stick	Copper Anti-Seize Stick	—
PM37617	—	—	20 g Stick	Silver-Grade Anti-Seize Stick	—
TY24810	TY24810	—	12.5 aerosol	NEVER-SEEZ®	—
TY24811	TY24811	—	8 oz can with brush	NEVER-SEEZ®	—
H154379	—	GREEN		Sealant	—
Priming					
PM37509	PM38611	GREEN	4.5 oz	Cure Primer	7649
Retaining					
PM38651	PM38612	SILVER	50 ml	QUICK METAL®	660
PM37485	—	GREEN	36 ml	Maximum Strength	680
—	PM38626	GREEN	50 ml	Maximum Strength	62083
PM38652	—	GREEN	36 ml	High-Temperature	620
Thread Locking and Sealing					
PM38653	—	PURPLE	6 ml	Low Strength	222
—	PM38645	PURPLE	2 g	Superglue Instant Adhesive	22200
PM37418	PM38621	BLUE	6 ml	Medium Strength	242
PM37477	PM38622	BLUE	36 ml	Medium Strength	242
PM37643	—	BLUE	9 g Stick	Blue Stick Threadlocker (medium-strength)	—
PM37614	—	BLUE	19 g Stick	Blue Stick Threadlocker (medium-strength)	—
PM37615	—	—	19 g Stick	PST Thread Sealant Stick	—
PM37421	PM38623	RED	6 ml	High Strength	271 (usually red in color)
PM38654	PM38623	RED	36 ml	High Strength	271
—	PM38624	RED	50 ml	High Strength	27140
PM38656	PM38627	RED	36 ml	High Strength	277
PM37700	—	RED	19 g Stick	Red Stick Threadlocker (High-Strength)	—
PM37701	—	RED	9 g Stick	Red Stick Threadlocker (High-Strength)	—
PM37398	PM38613	WHITE	6 ml	Pipe Sealant with TEFLON®	592
PM37397	PM38613	WHITE	50 ml	Pipe Sealant with TEFLON	592

LOCTITE is a trademark of Henkel Corporation
NEVER-SEEZ is a trademark of Emhart Chemical Group
TEFLON is a trademark of Du Pont Co.

AG,OURX113,17-19-20070718

Metric Bolt and Screw Torque Values



TS1742-UN: Metric Bolt and Screw

Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	
	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
M6	3.6	31.9	3.9	34.5	6.7	59.3	7.3	64.6	9.8	86.7	10.8	95.6	11.5	102	12.6	112
									N·m	lb·ft	N·m	lb·ft	N·m	lb·ft	N·m	lb·ft
M8	8.6	76.1	9.4	83.2	16.2	143	17.6	156	23.8	17.6	25.9	19.1	27.8	20.5	30.3	22.3
			N·m	lb·ft	N·m	lb·ft	N·m	lb·ft								
M10	16.9	150	18.4	13.6	31.9	23.5	34.7	25.6	46.8	34.5	51	37.6	55	40.6	60	44.3
	N·m	lb·ft														
M12	—	—	—	—	55	40.6	61	45	81	59.7	89	65.6	95	70.1	105	77.4
M14	—	—	—	—	87	64.2	96	70.8	128	94.4	141	104	150	111	165	122
M16	—	—	—	—	135	99.6	149	110	198	146	219	162	232	171	257	190
M18	—	—	—	—	193	142	214	158	275	203	304	224	322	245	356	263
M20	—	—	—	—	272	201	301	222	387	285	428	316	453	334	501	370
M22	—	—	—	—	365	263	405	299	520	384	576	425	608	448	674	497
M24	—	—	—	—	468	345	518	382	666	491	738	544	780	575	864	637
M27	—	—	—	—	683	504	758	559	973	718	1080	797	1139	840	1263	932
M30	—	—	—	—	932	687	1029	759	1327	979	1466	1081	1553	1145	1715	1265
M33	—	—	—	—	1258	928	1398	1031	1788	1319	1986	1465	2092	1543	2324	1714
M36	—	—	—	—	1617	1193	1789	1319	2303	1699	2548	1879	2695	1988	2982	2199

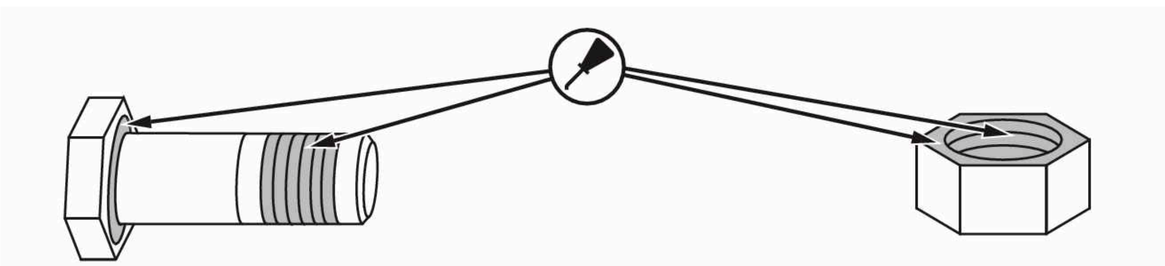
The nominal torque values listed are for general use only with the assumed wrenching accuracy of 20%, such as a manual torque wrench.

DO NOT use these values if a different torque value or tightening procedure is given for a specific application.

For lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application.

Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original.

- Make sure that fastener threads are clean.
- Apply a thin coat of Hy-Gard™ or equivalent oil under the head and on the threads of the fastener, as shown in the following image.
- Be conservative with the amount of oil to reduce the potential for hydraulic lockup in blind holes due to excessive oil.
- Properly start thread engagement.

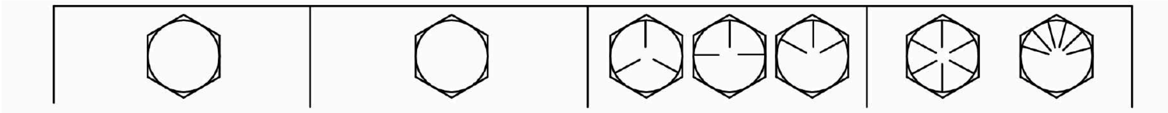


Bolt or Screw Size	Class 4.8		Class 8.8 or 9.8		Class 10.9		Class 12.9	
	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]	Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]	Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]	Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]	Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]

TS1741-UN: Lubricant Locations

DX,TORQ2-19-20180530

Unified Inch Bolt and Screw Torque Values



TS1671-UN: Unified Inch Bolt and Screw

Bolt or Screw Size	SAE Grade 1 [Grade 1 applies for hex cap screws over 6 in (152 mm) long, and for all other types of bolts and screws of any length.]				SAE Grade 2 [Grade 2 applies for hex cap screws (not hex bolts) up to 6 in (152 mm) long.]				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	
	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
1/4	3.1	27.3	3.2	28.4	5.1	45.5	5.3	47.3	7.9	70.2	8.3	73.1	11.2	99.2	11.6	103
													N·m	lb·ft	N·m	lb·ft
5/16	6.1	54.1	6.5	57.7	10.2	90.2	10.9	96.2	15.7	139	16.8	149	22.2	16.4	23.7	17.5
									N·m	lb·ft	N·m	lb·ft				
3/8	10.5	93.6	11.5	102	17.6	156	19.2	170	27.3	20.1	29.7	21.9	38.5	28.4	41.9	30.9
					N·m	lb·ft	N·m	lb·ft								
7/16	16.7	148	18.4	163	27.8	20.5	30.6	22.6	43	31.7	47.3	34.9	60.6	44.7	66.8	49.3
	N·m	lb·ft	N·m	lb·ft												
1/2	25.9	19.1	28.2	20.8	43.1	31.8	47	34.7	66.6	49.1	72.8	53.7	94	69.3	103	75.8
9/16	36.7	27.1	40.5	29.9	61.1	45.1	67.5	49.8	94.6	69.8	104	77	134	98.5	148	109
5/8	51	37.6	55.9	41.2	85	62.7	93.1	68.7	131	96.9	144	106	186	137	203	150
3/4	89.5	66	98	72.3	149	110	164	121	230	170	252	186	325	240	357	263
7/8	144	106	157	116	144	106	157	116	370	273	405	299	522	385	572	422
1	216	159	236	174	216	159	236	174	556	410	609	449	785	579	860	634
1-1/8	305	225	335	247	305	225	335	247	685	505	751	554	1110	819	1218	898
1-1/4	427	315	469	346	427	315	469	346	957	706	1051	775	1552	1145	1703	1256
1-3/8	564	416	618	456	564	416	618	456	1264	932	1386	1022	2050	1512	2248	1658
1-1/2	743	548	815	601	743	548	815	601	1665	1228	1826	1347	2699	1991	2962	2185

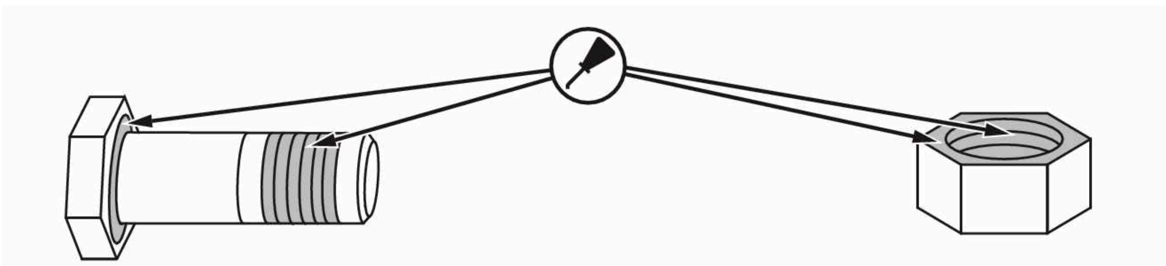
The nominal torque values listed are for general use only with the assumed wrenching accuracy of 20%, such as a manual torque wrench.

DO NOT use these values if a different torque value or tightening procedure is given for a specific application.

For lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application.

Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original.

- Make sure that fastener threads are clean.
- Apply a thin coat of Hy-Gard™ or equivalent oil under the head and on the threads of the fastener, as shown in the following image.
- Be conservative with the amount of oil to reduce the potential for hydraulic lockup in blind holes due to excessive oil.
- Properly start thread engagement.



DX,TORQ1-19-20180530

Face Seal Fittings Assembly and Installation—All Pressure Applications

Face Seal O-Ring to Stud End Installation

1. Inspect the fitting surfaces. They must be free of dirt and/or defects.
2. Inspect the O-ring. It must be free of damage and/or defects.
3. Lubricate O-rings using system oil, and install into groove.
4. Push O-ring into groove 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.

Face Seal Adjustable Stud End O-Ring Installation

1. Back off lock nut (jam nut) and washer to full exposed turned down section of the fitting.
2. Install a thimble over the fitting threads to protect the O-ring from nicks.
3. Slide the O-ring over the thimble into the turned down section of the fitting.
4. Remove thimble.

Face Seal Straight Stud End O-Ring Installation

1. Install a thimble over the fitting threads to protect the O-ring from nicks.
2. Slide the O-ring over the thimble into the turned down section of the fitting.
3. Remove thimble.

Fitting Installation

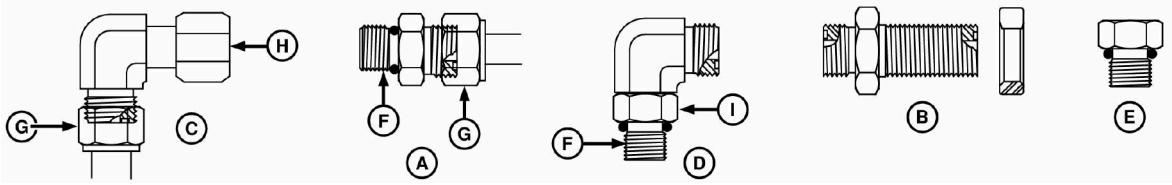
1. Install fitting by hand until snug.
2. Position adjustable fittings by unscrewing the fitting no more than one turn.
3. Apply assembly torque per table.

Assembly Torque

1. Use one wrench to hold the connector body and one wrench to tighten nut.
2. For a hydraulic hose, it may be necessary to use three wrenches to prevent twist; one on the connector body, one on the nut, and one on the body of the hose fitting.

OUO6435,0001557-19-20150406

Metric Face Seal And O-Ring Stud End Fitting Torque Chart—Standard Pressures



N79757-UN: Fitting

A - Straight Stud and Tube Nut
B - Bulkhead Union and Bulkhead Jam Nut
C - 90° Swivel Elbow and Tube Nut
D - 90° Adjustable Stud Elbow
E - Port Plug
F - Stud End
G - Tube Nut
H - Swivel Nut
I - Jam Nut

Metric Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressure-Below 27.6 MPA (4,000 PSI)

Nominal Tube OD / Hose ID				O-Ring Face Seal/ Tube Swivel Nut			Bulkhead Jam Nut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]						
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut/Swivel Nut Torque	Jam Nut Hex Size	Jam Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque		Aluminum or Brass Torque[C]	
mm	Dash Size	in	mm	in	mm	N˙m	lb-ft	mm	N˙m	lb-ft	mm	mm	mm	N·m	lb-ft	N˙m	lb-ft
4	-2	0.125	3.18	—	—	—	—	—	—	—	M8 X 1	12	12	8	6	5	4
5	-3	0.188	4.76	—	—	—	—	—	—	—	M10 X 1	14	14	15	11	10	7
6	-4	0.250	6.35	9/16-18	17	16	12	22	32	24	M12 X 1.5	17	17	25	18	17	12
8	-5	0.312	7.92	—	—	—	—	—	—	—	M14 X 1.5	19	19	40	30	27	20
10	-6	0.375	9.53	11/16-16	22	24	18	27	42	31	M16 X 1.5	22	22	45	33	30	22
12	-8	0.500	12.70	13/16-16	24	50	37	30	93	69	M18 X 1.5	24	24	50	37	33	25
16	-10	0.625	15.88	1-14	30	69	51	36	118	87	M22 X 1.5	27	27	69	51	46	34
20	-12	0.750	19.05	1-3/16-12	36	102	75	41	175	129	M27 X 2	32	32	100	74	67	49
22	-14	0.875	22.23	1-3/16-12	36	102	75	41	175	129	M30 X 2	36	36	130	96	87	64
25	-16	1.000	25.40	1-7/16-12	41	142	105	46	247	182	M33 X 2	41	41	160	118	107	79
28	—	—	—	—	—	—	—	—	—	—	M38 x 2	46	46	176	130	117	87
32	-20	1.250	31.75	1-11/16-12	50	190	140	50	328	242	M42 X 2	50	50	210	155	140	103
38	-24	1.500	38.10	2-12	60	217	160	60	374	276	M48 X 2	55	55	260	192	173	128
50	-32	2.000	50.80	—	—	—	—	—	—	—	M60 X 2	65	65	315	232	210	155

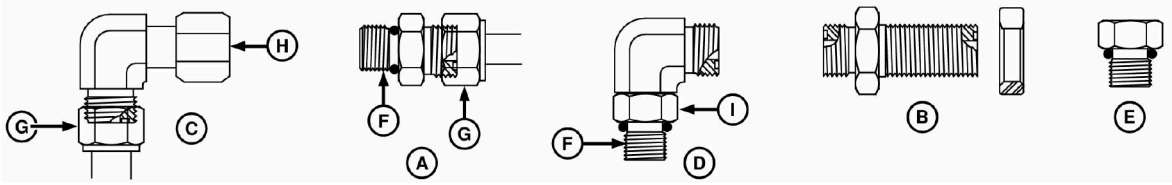
[A]Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.

[B]The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

[C]These torques were established using steel plated connectors in aluminum and brass.

OUO6083,000005C-19-20080702

Metric Face Seal and O-Ring Stud End Fitting Torque Chart—High-Pressure Applications



N79757-UN: Fitting

A - Stud Straight and Tube Nut
B - Bulkhead Union and Bulkhead Lock Nut
C - 90° Swivel Elbow and Tube Nut
D - 90° Adjustable Stud Elbow
E - Port Plug
F - Stud End
G - Tube Nut
H - Swivel Nut
I - Lock Nut

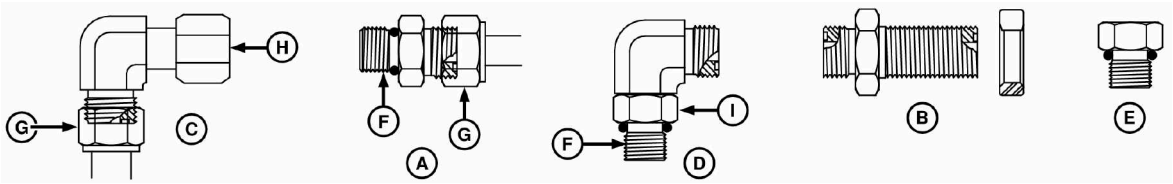
Metric Face Seal and O-Ring Stud End Fitting Torque Chart—High Pressure: Above 27580 kPa (275.8 bar) (4000 psi), Working Pressure: 41370 kPa (413.7 bar) (6,000 psi)

Nominal Tube OD Hose ID				O-Ring Face Seal/ Tube Swivel Nut				Bulkhead Lock Nut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]				
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut/Swivel Nut Torque		Lock Nut Hex Size	Lock Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque	
mm	Dash Size	in	mm	in	mm	N˙m	lb-ft	mm	N˙m	lb-ft	mm	mm	mm	N˙m	lb·ft
4	-2	0.125	3.18	—	—	—	—	—	—	—	M8 X 1	12	12	8	6
5	-3	0.188	4.76	—	—	—	—	—	—	—	M10 X 1	14	14	15	11
6	-4	0.250	6.35	9/16-18	17	24	18	22	32	24	M12 X 1.5	17	17	35	26
8	-5	0.312	7.92	—	—	—	—	—	—	—	M14 X 1.5	19	19	45	33
10	-6	0.375	9.53	11/16-16	22	37	27	27	42	31	M16 X 1.5	22	22	55	41
12	-8	0.500	12.70	13/16-16	24	63	46	30	93	69	M18 X 1.5	24	24	70	52
16	-10	0.625	15.88	1-14	30	103	76	36	118	87	M22 X 1.5	27	27	100	74
20	-12	0.750	19.05	1-3/16-12	36	152	112	41	175	129	M27 X 2	32	32	170	125
22	-14	0.875	22.23	1-3/16-12	36	152	112	41	175	129	M30 X 2	36	36	215	159
25	-16	1.000	25.40	1-7/16-12	41	214	158	46	247	182	M33 X 2	41	41	260	192
28	—	—	—	—	—	—	—	—	—	—	M38 x 2	46	46	320	236
32	-20	1.250	31.75	1-11/16-12	—	286	211	50	328	242	M42 X 2	50	50	360	266
38	-24	1.500	38.10	2-12	—	326	240	60	374	276	M48 X 2	55	55	420	310

[A]Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.
[B]The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

OUO1073,00022E2-19-20210910

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressures



N79757-UN: Fitting

A - Stud Straight and Tube Nut
B - Bulkhead Union and Bulkhead Lock Nut
C - 90° Swivel Elbow and Tube Nut
D - 90° Adjustable Stud Elbow
E - Port Plug
F - Stud End
G - Tube Nut
H - Swivel Nut
I - Lock Nut

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressure: Below 27580 kPa (275.8 bar) (4000 psi)

Nominal Tube OD / Hose ID				O-Ring Face Seal/ Tube Swivel Nut				Bulkhead LockNut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]					
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut Swivel Nut Torque		Lock Nut Hex Size	Lock Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque		Aluminum or Brass Torque[C]	
mm	Dash Size	in	mm	in	in	N˙m	lb·ft		N˙m	lb·ft	lb·ft in	in	in	N·m	lb·ft	N˙m	lb·ft
5	-3	0.188	4.78	—	—	—	—	—	—	—	3/8-24	5/8	9/16	12	9	8	6
6	-4	0.250	6.35	9/16-18	11/16	16	12	13/16	32	24	7/16-20	5/8	5/8	16	12	11	8
8	-5	0.312	7.92	—	—	—	—	—	—	—	1/2-20	3/4	11/16	24	18	16	12
10	-6	0.375	9.53	11/16-16	13/16	24	18	1	42	31	9/16-18	3/4	3/4	37	27	25	18
12	-8	0.500	12.70	13/16-16	15/16	50	37	1-1/8	93	69	3/4-16	7/8	15/16	50	37	33	25
16	-10	0.625	15.88	1-14	1-1/8	69	51	1-5/16	118	87	7/8-14	1-1/16	1-1/16	69	51	46	34
20	-12	0.750	19.05	1-3/16-12	1-3/8	102	75	1-1/2	175	129	1-1/16-12	1-1/4	1-3/8	102	75	68	50
22	-14	0.875	22.23	1-3/16-12	—	102	75	—	175	129	1-3/16-12	1-3/8	1-1/2	122	90	81	60
25	-16	1.000	25.40	1-7/16-12	1-5/8	142	105	1-3/4	247	182	1-5/16-12	1-1/2	1-5/8	142	105	95	70
32	-20	1.25	31.75	1-11/16-12	1-7/8	190	140	2	328	242	1-5/8-12	1-3/4	1-7/8	190	140	127	93
38	-24	1.50	38.10	2-12	2-1/4	217	160	2-3/8	374	276	1-7/8-12	2-1/8	2-1/8	217	160	145	107
50.8	-32	2.000	50.80	—	—	—	—	—	—	—	2-1/2-12	2-3/4	2-3/4	311	229	207	153

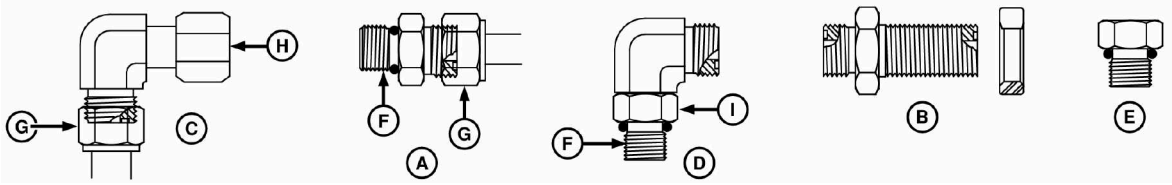
[A]Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.

[B]The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

[C]These torques were established using steel plated connectors in aluminum and brass.

OUO1073,00022DE-19-20210910

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—High Pressure Applications



N79757-UN: Fitting

A - Stud Straight and Tube Nut
B - Bulkhead Union and Bulkhead Lock Nut
C - 90° Swivel Elbow and Tube Nut
D - 90° Adjustable Stud Elbow
E - Port Plug
F - Stud End
G - Tube Nut
H - Swivel Nut
I - Lock Nut

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—High-Pressure: Above Below 27580 kPa (275.8 bar) (4000 psi), Working Pressure: 41370 kPa (413.7 bar) (6,000 psi)

Nominal Tube OD Hose ID				O-Ring Face Seal/ Tube Swivel Nut				Bulkhead Lock Nut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]				
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut/Swivel Nut Torque		Lock Nut Hex Size	Lock Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque	
mm	Dash Size	in	mm	in	in	N˙m	lb·ft		N˙m	lb·ft	in	in	in	N˙m	lb·ft
5	-3	0.188	4.78	—	—	—	—	—	—	—	3/8-24	5/8	9/16	18	13
6	-4	0.250	6.35	9/16-18	11/16	24	18	13/16	32	24	7/16-20	5/8	5/8	24	18
8	-5	0.312	7.92	—	—	—	—	—	—	—	1/2-20	3/4	11/16	30	22
10	-6	0.375	9.53	11/16-16	13/16	37	27	1	42	31	9/16-18	3/4	3/4	37	27
12	-8	0.500	12.70	13/16-16	15/16	63	46	1-1/8	93	69	3/4-16	7/8	15/16	75	55
16	-10	0.625	15.88	1-14	1-1/8	103	76	1-5/16	118	87	7/8-14	1-1/16	1-1/16	103	76
20	-12	0.750	19.05	1-3/16-12	1-3/8	152	112	1-1/2	175	129	1-1/16-12	1-1/4	1-3/8	177	131
22	-14	0.875	22.23	1-3/16-12	—	152	112	—	175	129	1-3/16-12	1-3/8	1-1/2	231	170
25	-16	1.000	25.40	1-7/16-12	1-5/8	214	158	1-3/4	247	182	1-5/16-12	1-1/2	1-5/8	270	199
32	-20	1.25	31.75	1-11/16-12	1-7/8	286	211	2	328	242	1-5/8-12	1-3/4	1-7/8	286	211
38	-24	1.50	38.10	2-12	2-1/4	326	240	2-3/8	374	276	1-7/8-12	2-1/8	2-1/8	326	240

[A]Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.

[B]The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

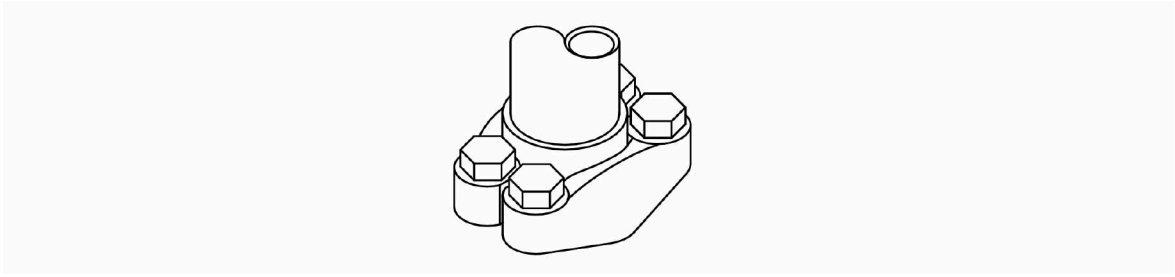
OUO1073,00022E0-19-20210910

Four Bolt Flange Fittings Assembly and Installation—All Pressure Applications

1. Inspect the sealing surfaces 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 back-up washer if required) into the groove using petroleum jelly to hold it in place.
3. For split flange; loosely assemble split flange 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.
4. For single piece flange; 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.
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.

OUO6435,0001558-19-20011217

SAE Four Bolt Flange Cap Screw Torque Values—Standard Pressure Applications



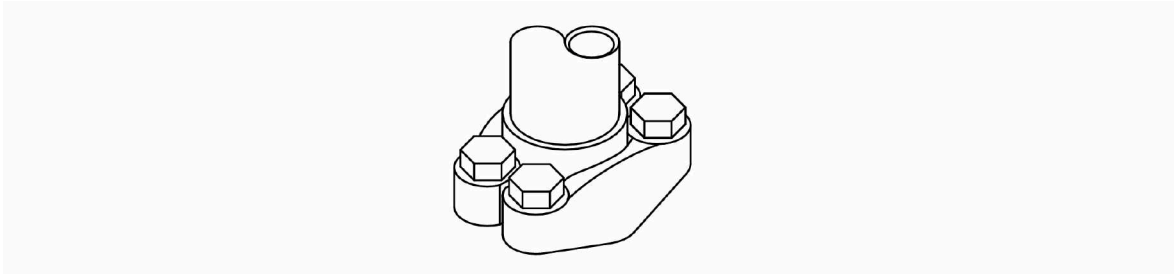
H70423-UN: Split Flange

SAE Four Bolt Flange Cap Screw Torque Values—27,600 KPA (4,000 PSI) Pressure Applications

		Torque			
		Newton Meters		Foot Pounds	
Nominal Flange Size	Screw Size [JDM A17D, SAE Grade 5 or better cap screws with plated hardware.] [1.5.1.2 Lock washers are permissible but not recommended.]	Min	Max	Min	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	187	264	138	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

OUO6435,0001549-19-20011120

SAE Four Bolt Flange Cap Screw Torque Values—High Pressure Applications



H70423-UN: Split Flange

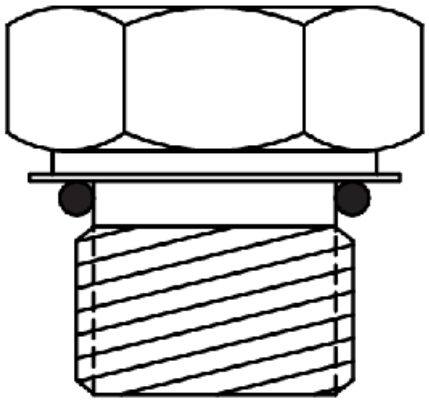
SAE Four Bolt Flange Cap Screw Torque Values—41,400 KPA (6,000 PSI) Pressure Applications

		Torque			
		Newton Meters		Foot Pounds	
Nominal Flange Size	Screw Size [JDM A17D, SAE Grade 5 or better cap screws with plated hardware.] [1.5.1.2 Lock washers are permissible but not recommended.]	Min	Max	Min	Max
1/2	5/16-18 UNC	20	31	15	23
3/4	3/8-16 UNC	34	54	25	40
1	7/16-14 UNC	57	85	42	63
1-1/4	1/2-13 UNC	85	131	63	63
1-1/2	5/8-11 UNC	159	264	117	195
2	3/4-10 UNC	271	468	200	345

OUO6435,000154C-19-20011129

External Hexagon Port Plug Torque Chart

Port or Stud End Thread Size [Port to JDS-G173.1; stud end to JDS-G173.3.]	Torque +15%/-20%
M8 x 1	10 N·m (89 lb-in)
M10 x 1	17 N·m (150 lb-in)
M12 x 1.5	28 N·m (20.6 lb-ft)
M14 x 1.5	39 N·m (28.7 lb-ft)
M16 x 1.5	48 N·m (35.4 lb-ft)
M18 x 1.5	60 N·m (44.2 lb-ft)
M20 x 1.5	60 N·m (44.2 lb-ft)
M22 x 1.5	85 N·m (62.7 lb-ft)
M27 x 2	135 N·m (99.6 lb-ft)
M30 x 2	165 N·m (121.7 lb-ft)
M33 x 2	235 N·m (173.3 lb-ft)
M38 x 2	245 N·m (180.7 lb-ft)
M42 x 2	260 N·m (191.8 lb-ft)
M48 x 2	290 N·m (213.9 lb-ft)
M60 x 2	330 N·m (243.4 lb-ft)



H70356-UN: External Plug

OUO6083,0000109-19-20080724

Prevent Hydraulic System Contamination

IMPORTANT:
Cleanliness is very important when working on the hydraulic system. Prevent contamination by assembling the cylinders, hoses, couplers, and valves in a clean area of the shop.
Leave protective caps on the fluid openings until ready to make the connection. When charging the system, use a tractor or other source that contains clean oil, free of abrasive materials. Keep couplers clean. Abrasive particles, like sand or metal fragments, can damage seals, barrels and pistons, causing internal leakage.

NX,T9005AE-19-20080610

Check Oil Lines and Fittings

Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting 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 may call Deere & Company Medical Department in Moline, Illinois or other knowledgeable medical source.

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

IMPORTANT:
Tighten fittings as specified in torque chart.

If necessary; e two wrenches to prevent hoses from twisting, bending or breaking tubing and fittings.

H58319-UN: Fitting Removal

OUO6083,00000FA-19-20210707

Basic Electrical Component Handling / Precautions For Vehicles Equipped With Computer Controlled Systems

Electrical Precautions To Take:

Never disconnect the batteries while the key switch is running. Why: This can cause electrical voltage spikes that can damage electronic components.

Do not connect jumper cables while the key switch is on. Why: This can cause electrical voltage spikes that can damage electronic components.

Disconnect batteries prior to recharging (if possible). Why: Electrical loads in the machine can slow the recharging process. Battery chargers can cause electrical voltage spikes that can damage electronic components.

Never jump start the machine with a voltage higher than the machine is designed to operate on. Why: This can damage electronic components.

Do not connect or disconnect electrical connectors while the key switch is on or the machine is running. Why: This can cause computer system errors from interrupting a computer program while it is running and electrical voltage spikes that are produced can damage electronic components.

Do not apply power or ground to any component as a test unless specifically instructed to do so. Why: Connecting the wrong voltage to the wrong point of an electronic system can cause electronic component failures.

When welding on the machine, make sure to connect ground lead to the parts being welded. For maximum protection, disconnect all electronic controller connectors before welding. Why: High currents associated with welding can damage wiring harnesses that are involved in the ground path. Welding can also cause electrical voltage spikes that can damage electronic components.

AG,OUO6022,1696-19-20131010

Identify Zinc-Flake Coated Fasteners

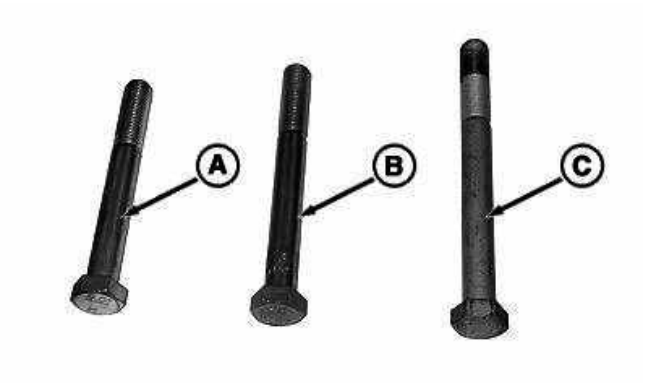
Standard cap screws (A) are a reflective silver color.

Zinc plated cap screws (B) are a reflective gold color.

Zinc-Flake Coated cap screws (C) are a dull silver color.

NOTE:

Zinc-Flake Coated fasteners are tightened to lubricated specifications, unless otherwise noted. (See Torque Value Charts in this group.)



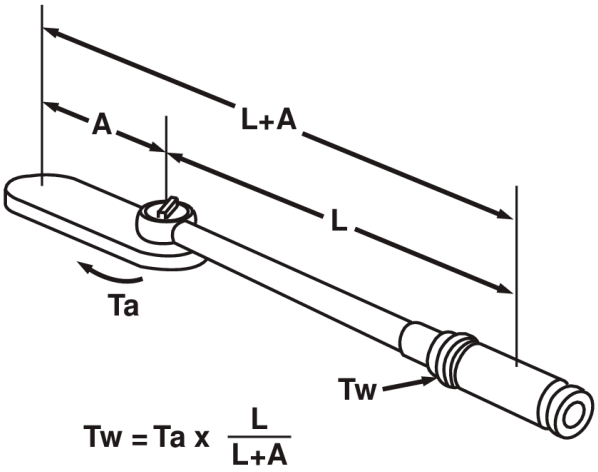
RXA0073812-UN: Fastener Identification

A - Standard Cap Screws
B - Zinc-plated Cap Screw
C - Zinc-Flake Cap Screw (16 mm and larger)

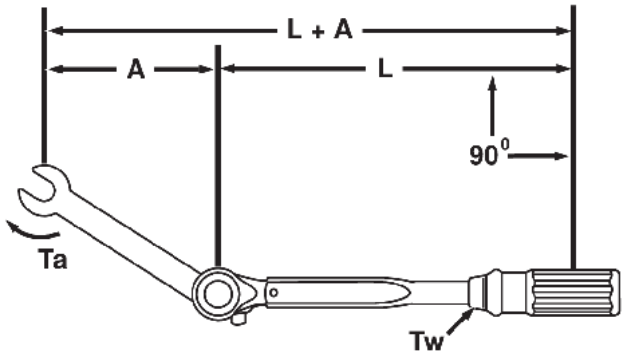
OURX985,0000024-19-20040325

Use Torque Wrench Adapter

Tw = Torque setting on the torque wrench
Ta = Torque actually being applied to the nut or cap screw
L = Length from the point of force (center of the wrench handle) to the center of head of torque wrench
A = Application distance from center of torque wrench head to the center of adapter



RXA0061214-UN: Torque Wrench

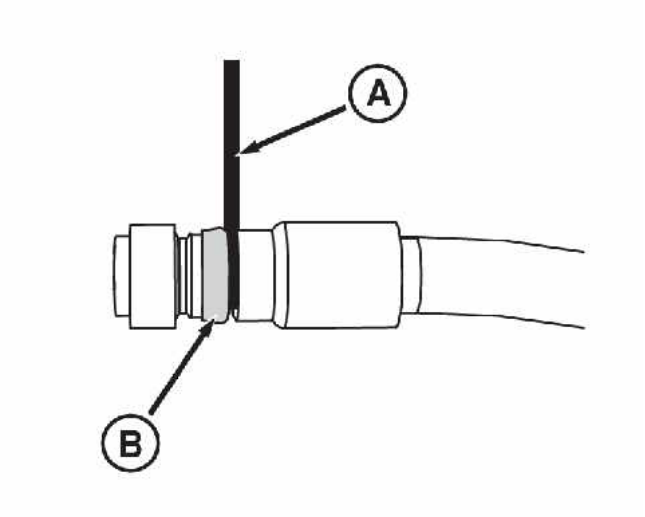


RXA0062101-UN: Torque Wrench Adapter

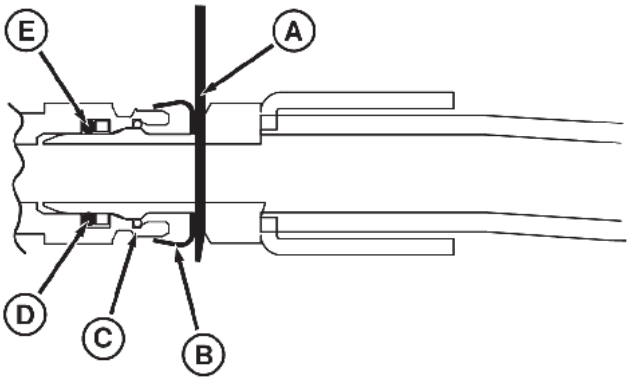
OURX985,0000E03-19-20121008

Servicing and Connecting Snap to Connect STC™ Fittings

Do NOT disconnect STC fitting when under pressure. Failure to relieve pressure before disconnecting fitting may result in personal injury, damage to equipment or both.



RXA0075330-UN: Tool Inserting



RXA0075327-UN: Cross Section of STC

A - JDG1885
B - Release Ring
C - Retaining Ring
D - Backup Ring
E - O-Ring

1. *NOTE:*
   Snap to Connect fittings are used on steel lines, hose connections and come in a variety of sizes. JDG1885 STC tools (A) are designed as a spacer to move release ring (B) inward which releases retaining ring (C). JDG1885 Snap-to-Connect Release Tools can be purchased through SERVICEGARD.

   IMPORTANT:
   Do not use tool to pry fitting apart, it is used only as a spacer to move release ring (B) inward to release retaining ring (C).

   For disassembly perform the following: Insert correct JDG1885 STC tool (A) between releasing ring (B) and fitting.
2. Remove hose or line pulling parallel from connector.
   NOTE:
   If retaining ring, backup ring (D) or O-ring (E) are damaged, replace all three parts.

Before connecting Snap to Connect fitting:

1. Check mating surfaces for nicks, scratches or flat spots.
2. Check O-ring, backup ring and retaining ring for wear or damage. Replace as needed.
3. Ensure both female and male ends are clean and free of contaminates.
4. Push fitting connections parallel together until a definite snap and solid stop is felt.
5. Pull parallel back on hose to ensure fitting connections are locked together.

OURX956,00007DC-19-20160613

Glossary of Terms

ITEM	ABBREVIATION	DESCRIPTION
Accessory	ACC	Secondary electrical system
AutoQuad-Plus Transmission	AQ+	Abbreviation
Automatic Powershift	APS	Transmission feature
Active Seat™ Control Unit	ASU	Computerized system used to control the ActiveSeat™
Air Conditioning	A/C	System used conditioning the air in the cab
Air Quality System	AQS	System used to control conditioned air in the cab
Alternating Current	AC	Electrical current that reverses its direction at regularly recurring intervals
Armrest Control Unit	ACU	Armrest control used to control tractor functions
Auto-Temperature Control	ATC	Automatically controlled air quality system
Battery	Bat	A device used to furnish electrical current
Brakes	BR	Abbreviation
Brake Control Unit	BRC	Computerized system for brake control
Brake Load Sense	BRL	Reference—Brake load sense
Cab Control Unit	CAB	Computerized system for controlling cab electronic functions
Controller Area Network	CAN	A communication system linking on-board electronics
Chassis Control Unit	CCU	Computerized system for tractor monitoring
Circuit	CCT	A complete path of an electrical current
Circulation Motor		Symbols for circulation motor speeds
	O	Medium Speed
	+	Fastest Speed
Cab Load Center	CLC	Computerized system for controlling cab electrical functions
Clean Oil Reservoir	COR	Reservoir used to contain oil for the tractor hydraulic system
ClimaTrak™		Automatically controlled air quality system
Clockwise	CW	Direction in which the hands of a clock rotate
Cold Cranking Amperes	CCA	Refers to a battery's capability to perform during cold-weather operation
Component Technical Manual	CTM	Technical manual developed for the servicing of major components
Counterclockwise	CCW	Direction opposite the rotation of the hands of a clock
Control Flow (Steering Pressure)	CF	Reference—Steering pressure control flow
Control Flow DR	CFD	Reference—Control flow diagnostic receptacle
Corner Post Display	CPD	Display for system control units
Diagnostic Receptacle	DR	A connection where hydraulic pressure can be measured
Digital Multimeter	DMM	An electrical multifunctional measuring device
Direct Current	DC	Electrical current flowing in one direction only
Displacement Control Valve	DCV	Controls hydraulic pump stroke
Economy Mode	ECO	Abbreviation
Electronic Displacement Control	EDC	Senses and communicates to the displacement control valve demand for hydraulic pump stroke
Electrohydraulic	EH	Refers to a hydraulic valve function that is controlled electrically
Electrohydraulic Depth Control	EHDC	Abbreviation
Electro-hydraulic Option Control Unit	EHO	Computerized system used to control the independent link suspension axle
Electrohydraulic Selective Control Valve	EH SCV	Selective control valve operated with electrical solenoids
Electronic Components Relay	ELX	Refers to the relay powering most of the electronic components
Engine Control Unit	ECU	Computerized system used to govern engine speed
Electronically Programmable Read-Only Memory	EPROM	Abbreviation
Evacuation Diagnostic Receptacle	EVAC	Diagnostic receptacle port used for pre-lubrication of the pump drive gears
Excess Flow (SCV/Hitch Flow)	EF	Reference—SCV/Hitch flow
Excess Flow Load Sense (SCV/Hitch Flow)	EFL	Reference—SCV/Hitch load sense
Forward-Neutral-Reverse	FNR	Abbreviation
Forward	FWD	Refers to direction of movement
Gallons Per Minute	gpm	Amount of fluid over a period of one minute
GreenStar™ System	GSS	Part of John Deere Precision Farming Systems
Ground-Driven Pump	GDP	Pump used to operate steering and brakes during emergency conditions
Global Positioning System	GPS	Abbreviation
Heating-Ventilating and Air Conditioning	HVAC	Abbreviation
High-Intensity Discharge Light	HID	Abbreviation
High Pressure - Common Rail	HPCR	Fuel injected engine that utilizes high pressure fuel injection and a common pressure rail
Hitch Control Unit	HCU	Computerized system used to control hitch functions
Hitch Slip Command	HSC	System to compensate for traction changes
Housing	Hsg	Abbreviation
Ignition	IGN	Control for starting and stopping the tractor
Implement Management System	IMS	Control for operating equipment
Independent Link Suspension	ILS	Front axle with an active suspension system that is electrohydraulic controlled

ITEM	ABBREVIATION	DESCRIPTION
Inside Diameter	ID	Abbreviation
Instrument Control Unit	ICU	Computerized system controlling tractor warning functions
International Standards Organization	ISO	Standards organization
Infinitely Variable Transmission	IVT	A hydro-mechanical transmission with infinitely variable speeds
Joint Industry Council Organization	JIC	Standards organization
Lateral Hitch Position	LHP	Refers to hitch positioning for a row guidance hitch application
Left-Hand	LH or L-H	Abbreviation
Liquid Crystal Display	LCD	A technology used for displaying information
Manifold Air Pressure	MAP	Abbreviation
Mechanical Front Wheel Drive	MFWD	A mechanically powered front axle
Negative	Neg (—)	Refers to a part of an electrical circuit
Number	No.	Abbreviation
O-Ring Face Seal	ORFS ORS	A type of seal used in making hydraulic connections
Outside Diameter	OD	Abbreviation
Performance Monitor	Perf Mon (PrF)	Abbreviation
Positive	Pos (+)	Refers to a part of an electrical circuit
Potentiometer	POT	A device used to vary electrical voltage
PowerQuad-Plus Transmission	PQ+	Abbreviation
Powershift Transmission	PST	Abbreviation
IVT Transmission Control Unit	PTI	Computerized system used to control IVT transmission shift functions
Power Take-Off	PTO	Abbreviation
Powershift Transmission Control Unit	PTP	Computerized system used to control powershift transmission shift functions
Pressure Control Valve	PCV	Valve used to control pressure within a system
Pressure Regulating Valve	PRV	A device used to regulate pressure in a system
Product Identification Number	PIN	Serial number relating to tractor identification
Pulse-Width-Modulation	PWM	Method of controlling electrical signals
Pump DR	PD	Reference—Pump diagnostic receptacle
Pump Load Sense	PLD	Reference—Pump load sense
Reverse	Rev	Refers to direction of movement
Revolutions Per Minute	rpm	Abbreviation
Right-Hand	RH or R-H	Abbreviation
Rockshaft	RS	Abbreviation
Selective Control Option	SCo	Control unit for selective control valves 4 and 5
Selective Control Unit	SCU	Computerized system used to control selective control valve functions for selective control valves 1, 2, and 3
Selective Control Valve	SCV	Device used to control remote hydraulic functions
Steering Control Unit	SSU	Computerized system controlling tractor steering
Setup Panel	SUP	Operator control panel used to set selective control valve function
Slow Moving Vehicle	SMV	Warning sign on the rear of the tractor
Society of Automotive Engineers	SAE	Engineering Standards Organization
Specification	SPEC	Abbreviation
Suspended Front Axle	SFA	Front axle with an active suspension system that is electronically controlled
Tracks Tractor Steering System Control Unit	SST	Computerized system controlling tractor steering for tracks tractors
Wheel Tractor Steering System Control Unit	SSU	Computerized system controlling tractor steering for wheel tractors equipped with AutoTrac™
Steering Load Sense	STL	Reference—Steering load sense
Switch	SW	Abbreviation
Tachometer	Tach	Abbreviation
Terrain Compensation Module	TCM	Electronic module that corrects for vehicle dynamics such as roll on side-slopes and rough terrain
Tail Light	TL	Abbreviation
Tractor Control Unit - Vehicle	TEC	Electronic system for communicating between vehicle and implement
Tractor Control Unit - Implement	TEI	Electronic system for communicating between implement and vehicle
Temperature	Temp	Abbreviation
Transmission	Trans	Abbreviation
TouchSet Depth Control	TSDC	Abbreviation-Same as EHDC
Transient Voltage Protection	TVP	An electrical device used to protect a circuit from voltage surge
Voltage (Volts)	V	Abbreviation
Voltage Detector	V Det	Abbreviation
Vehicle Load Center	VLC	Computerized system for controlling vehicle electrical functions
Warning Lamp	WL	Abbreviation
Without	W/O	Abbreviation
Wide-Open Throttle	WOT	Full throttle
Two Wheel Drive	2WD	Vehicle where only one pair of wheels is powered

RX33672,0000555-19-20110302

Contents

List of References

Below is a list of all items within this group.

AC20456,0000ED6-19-20120312

Essential, Recommended and Fabricated Tools

NOTE:
Order tools from the U.S. SERVICEGARD™ or European Microfiche Tool Catalogs.

Below are tools listed in this group.

JDG23 Lift Sling
JDG820 Flywheel Rotation Tool
JDG10042 Front Lifting Bracket
JDG10199 Rear Engine Lift Bracket
JDG10200 13.5L Front Engine Lift Bracket

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Specifications

Item	Measurement	Specification
Engine Lift Bracket Cap Screws	Torque	90 N·m (66 lb-ft)
Engine Mount-to-Engine Cap Screws	Torque	310 N˙m (230 lb-ft)
Engine Mount-to-Frame Cap Screws	Torque	325 N˙m (240 lb-ft)
Engine Coupler-to-Engine Cap Screws		
(9.0 L and 13.5 L) Engine	Torque	101 N˙m (75 lb-ft)
Damper-to-Flywheel Cap Screws		
	Torque	101 N˙m (75 lb-ft)
Engine Coupler-to-Drive Shaft Cap Screws		
(9.0 L and 13.5 L) Engine	Torque	210 N˙m (155 lb-ft)
Small Front Mount Cap Screws		
	Torque	300 N˙m (220 lb-ft)
Large Front Mount Cap Screws		
	Torque	325 N˙m (240 lb-ft)

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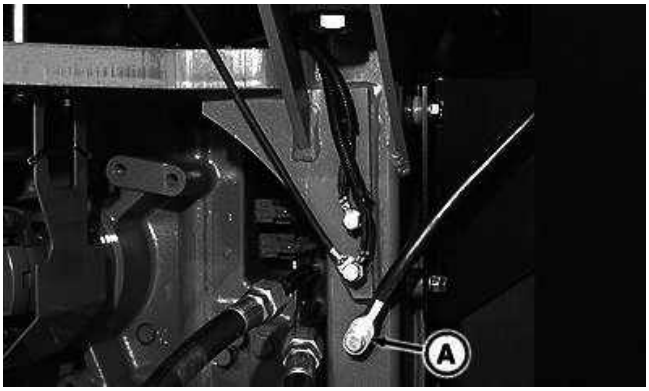
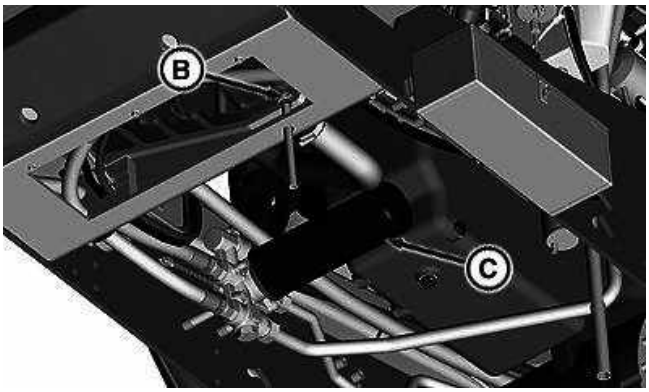
Remove 9.0 L Engine



RXA0090290-UN: Battery Ground Cable

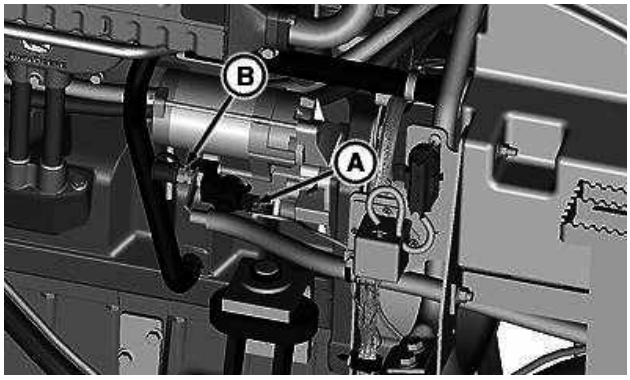


RXA0091908-UN: Radiator Drain and Hydraulic Oil Filter

A - Ground Cable **C - Hydraulic Oil Filter**
B - Radiator Drain

1. Disconnect battery ground cable (A).
2. Drain coolant from radiator drain (B).
3. Drain hydraulic reservoir and remove hydraulic oil filter (C).(See DRAIN AND FILL HYDRAULIC RESERVOIR in Section 70, Group 05.)
4. **Hood is heavy. Use care with hood to prevent personal injury.**

   NOTE:
   Hood may be raised to service position or removed from tractor. (See OPTIONAL HOOD SERVICE POSITION or REMOVE AND INSTALL HOOD in Section 80, Group 05.)
   Raise hood to service position.
5. Disconnect starter wiring (A).

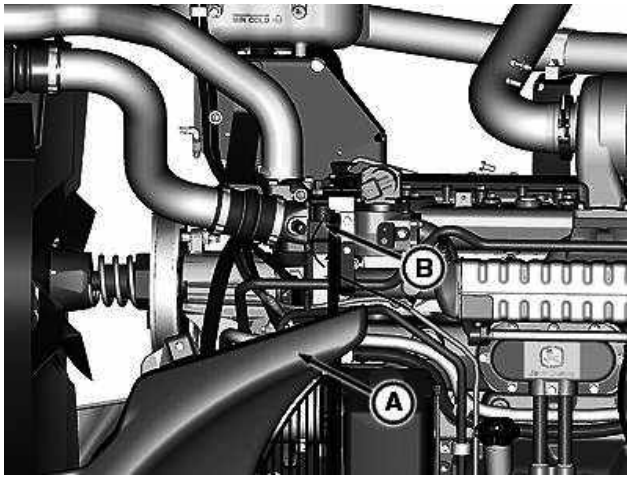


RXA0093083-UN: Engine

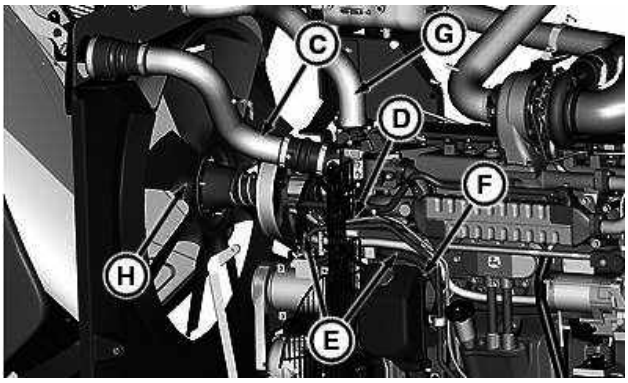
A - Starter Wiring **B - Positive Battery Cable**

6. Disconnect positive battery cable (B) from starter.

7. Remove side shield (A).



RXA0093084-UN: Side Shield

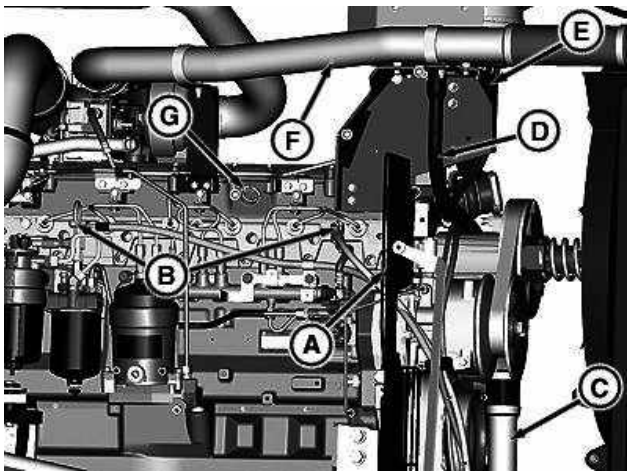


RXA0093085-UN: Coolant Recovery Tank

A - Side Shield
B - Ether Aid Starting Line
C - Air Intake Pipe
D - Finger Protection
E - Heater Hoses
F - Coolant Recovery Tank
G - Upper Radiator Hose
H - Fan

8. Disconnect ether aid starting line (B).
9. Remove air intake pipe (C).
10. Remove finger protection (D).
11. Label and disconnect heater hoses (E) from engine.
12. Label and disconnect all engine wiring harness connectors on left-hand side of engine.
13. Remove coolant recovery tank (F).
14. Remove upper radiator hose (G).
15. Remove fan (H) and move fan forward.

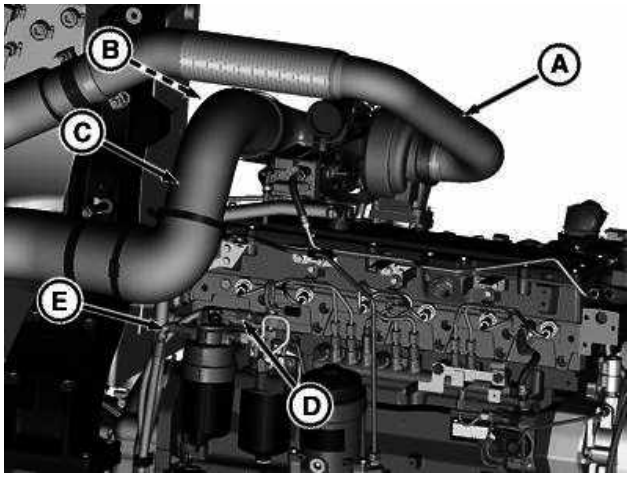
16. Remove finger protection (A).



RXA0093086-UN: Right-Hand Side

A - Finger Protection
B - Fuel Cooler Hoses
C - Lower Radiator Hose
D - Coolant Hose
E - Deaeration Tank and Bracket
F - Charge Air Pipe
G - Fuel Injector Connector

17. Disconnect fuel cooler hoses (B).
18. Remove lower radiator hose (C).
19. Disconnect coolant hose (D).
20. Remove deaeration tank and bracket (E).
21. Label and disconnect all engine wiring harness connectors on right-hand side of engine.
22. Route wiring harness to rear of engine.
23. Remove charge air pipe (F).
24. Disconnect fuel injector connector (G).
25. Remove exhaust pipe (A).



RXA0093087-UN: Air Intake Pipe