

35G Excavator Repair

(PIN: 1FF035GX__K270001—)

**REPAIR TECHNICAL MANUAL
35G Excavator (PIN: 1FF035GX_
_K270001—)**

TM12894 17MAY21 (ENGLISH)


**Worldwide Construction
And Forestry Division**
PRINTED IN U.S.A.

Introduction

Foreword

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

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

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

Technical manuals are divided in two parts: repair and operation and tests. Repair sections tell how to repair the components. Operation and test sections help to quickly 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.

MM16284,00026ED -19-19JAN21-1/1

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TX,TM,FAX -19-03JUL01-1/2

Introduction

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THANK YOU!

TX, TM, FAX -19-03JUL01-2/2

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

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Previous Editions
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Section 00 General Information

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Contents

Recognize Safety Information

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

Follow the precautions and safe operating practices highlighted by this symbol.

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

On your machine, DANGER signs are red in color, WARNING signs are orange, and CAUTION signs are yellow. DANGER and WARNING signs are located near specific hazards. General precautions are on CAUTION labels.



TX,RECOGNIZE -19-28JUN10-1/1

T133555 —UN—15APR13

T133588 —19—28AUG00

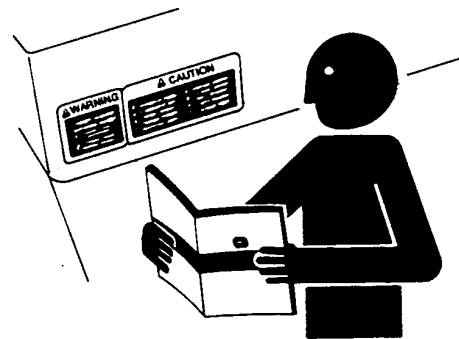
Follow Safety Instructions

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. Use this operator's manual for correct safety sign placement. Be sure that new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

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 could impair the function or safety and affect machine life.



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

TX,FOLLOW -19-20JAN11-1/1

TS201 —UN—15APR13

Operate Only If Qualified

Do not operate this machine unless the operator's manual has been read carefully, and you have been qualified by supervised training and instruction.

Operator should be familiar with the job site and surroundings before operating. Try all controls and

machine functions with the machine in an open area before starting to work.

Know and observe all safety rules that may apply to every work situation and work site.

TX,QUALIFIED -19-18JAN11-1/1

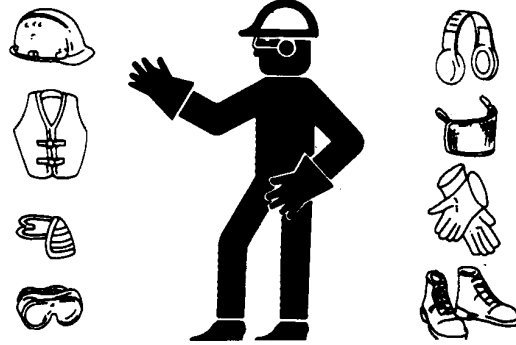
Wear Protective Equipment

Guard against injury from flying pieces or metal or debris; wear goggles or safety glasses.

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

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

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protection such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises. Radio or music headphones are not suitable to use for hearing protection.



TS206—UN—15APR13

TX,WEAR,PE -19-22SEP10-1/1

Avoid Unauthorized Machine Modifications

John Deere recommends using only genuine John Deere replacement parts to ensure machine performance. Never substitute genuine John Deere parts with alternate parts not intended for the application as these can create hazardous situations or hazardous performance. Non-John Deere parts, or any damage or malfunctions resulting from their use, are not covered by any John Deere warranty.

Modifications of this machine, or addition of unapproved products or attachments, may affect machine stability or

reliability, and may create a hazard for the operator or others near the machine. The installer of any modification which may affect the electronic controls of this machine is responsible for establishing that the modification does not adversely affect the machine or its performance.

Always contact an authorized dealer before making machine modifications that change the intended use, weight or balance of the machine, or that alter machine controls, performance, or reliability.

AM40430,00000A9 -19-01JUL15-1/1

Control Pattern Selector—If Equipped

This machine may be equipped with a control pattern selector valve. Ensure all bystanders are clear of machine

and area is large enough to operate machine functions. Verify the machine response to each control movement.

TX,CTRL,PAT,IFEQUIP -19-24FEB20-1/1

Add Cab Guarding for Special Uses

Special work situations or machine attachments could create an environment with falling or flying objects. Working near an overhead bank, demolition work, using a hydraulic hammer or winch, working in a forestry application or wooded area, or working in a waste management application, for example, could require added guarding to protect the operator.

Additional level II FOPS (falling object protective structure), forestry protection packages, and special screens or guarding should be installed when falling or flying objects could enter or damage the machine. A rear screen should always be used with a winch to protect against a snapping cable. Before operating in any special work environments, follow the operator protection recommendations of the manufacturer of any specialized attachment or equipment. Contact your authorized John Deere dealer for information on protective guarding.

TX,CABGUARD -19-12FEB13-1/1

Inspect Machine

Inspect machine carefully each day by walking around it before starting.

Keep all guards and shields in good condition and properly installed. Fix damage and replace worn or broken parts immediately. Pay special attention to hydraulic hoses and electrical wiring.



T6607AQ —UN—15APR13

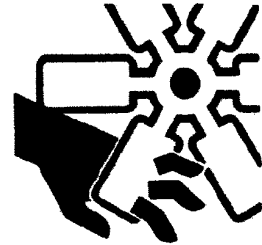
TX,INSPECT -19-08SEP10-1/1

Stay Clear of Moving Parts

Entanglements in moving parts can cause serious injury.

Stop engine before examining, adjusting, or maintaining any part of machine with moving parts.

Keep guards and shields in place. Replace any guard or shield that has been removed for access as soon as service or repair is complete.



T133592 —UN—15APR13

TX,MOVING,PARTS -19-20JAN11-1/1

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.

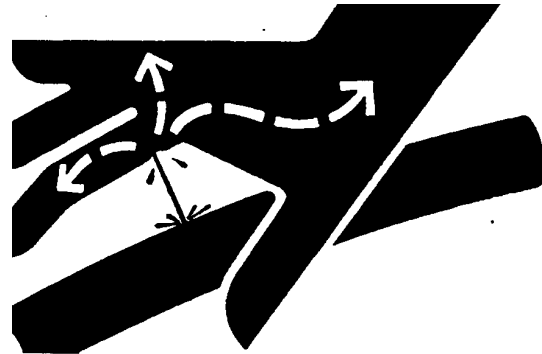
Replace worn or damaged hose assemblies immediately with John Deere approved replacement parts.

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.

X9811 —UN—23AUG88

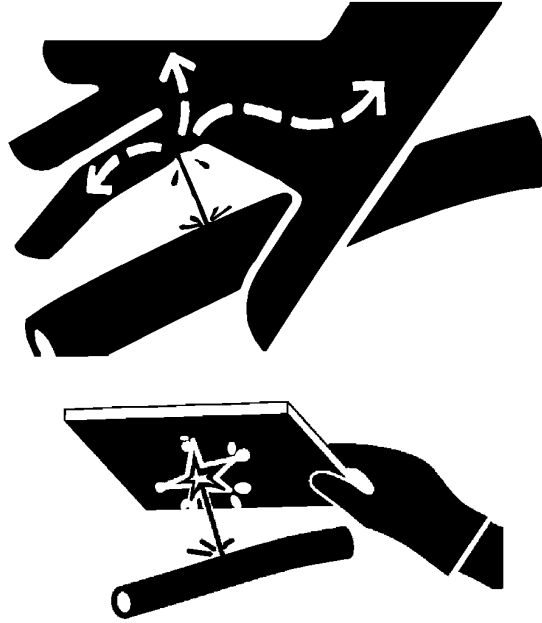
KR46761,00007FD -19-18DEC12-1/1

Avoid High-Pressure Oils

This machine uses a high-pressure hydraulic system. Escaping oil under pressure can penetrate the skin causing serious injury.

Never search for leaks with your hands. Protect hands. Use a piece of cardboard to find location of escaping oil. Stop engine and relieve pressure before disconnecting lines or working on hydraulic system.

If hydraulic oil penetrates your skin, see a doctor immediately. Injected oil must be removed surgically within hours or gangrene could result. Contact a knowledgeable medical source or the Deere & Company Medical Department in Moline, Illinois, U.S.A.



T133509—UN—15APR13

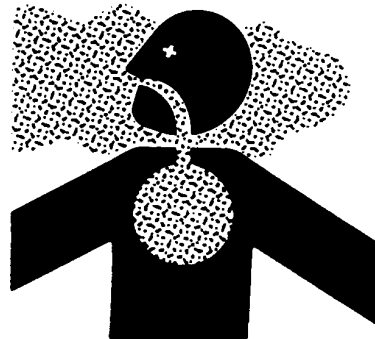
T133840—UN—20SEP00

TX,HPOILS -19-20JAN11-1/1

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—15APR13

DX,AIR -19-17FEB99-1/1

Prevent Fires

Handle Fluids Safely: All fuels, most lubricants, and some coolant mixtures are flammable. Store flammable fluids away from fire hazards. Never refuel machine while smoking or when near sparks or flame.

Clean Machine Regularly: Keep flammable debris (trash, leaves, twigs, straw, and other debris) and grease and oil from accumulating in engine compartment and away from fuel lines, hydraulic lines, exhaust components, and electrical wiring. Never store oily rags or flammable materials inside a machine compartment.

Maintain Hoses, Tubes, and Wiring: Replace hoses and tubes immediately if they begin to leak. Clean up any oil spills. Examine electrical wiring and connectors frequently for damage.

Keep a Fire Extinguisher Available: Always keep a multipurpose fire extinguisher on or near the machine. Know how to use an extinguisher properly.

Be Aware of the Operating Environment: Airborne debris may contain sparks or embers. Do not operate near any flame.

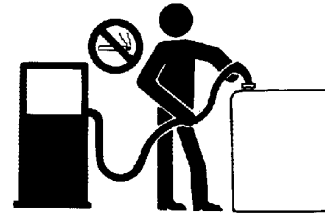
Lithium-Ion Battery Safety:

- To reduce the risk of fire or burns, do not attempt to open, disassemble, or service the display unit. Servicing of this unit is to be performed only by an authorized dealer. There are no user-serviceable parts inside the display unit. Accessing the inside of the equipment will void the warranty.
- Do not remove or handle a damaged or leaking Lithium-Ion Polymer battery.
- Do not crush or puncture battery, short battery contacts, or dispose of battery in fire or water.
- Do not expose to temperatures above 60°C (140°F).



Handle Fuel Safely

T133553 —UN—07SEP00



Clean Machine Regularly

T133554 —UN—07SEP00



Carry a Fire Extinguisher



Caution

TX,PREVENT,FIRE -19-28APR20-1/1

T133552 —UN—15APR13

T133555 —UN—15APR13

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).



DX,SPARKS -19-03MAR93-1/1

TS204 —UN—15APR13

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.)



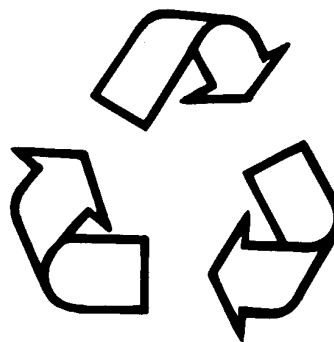
TS1132 —UN—15APR13

DX,MSDS,NA -19-03MAR93-1/1

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:

- 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);



TS1133 —UN—15APR13

- 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.

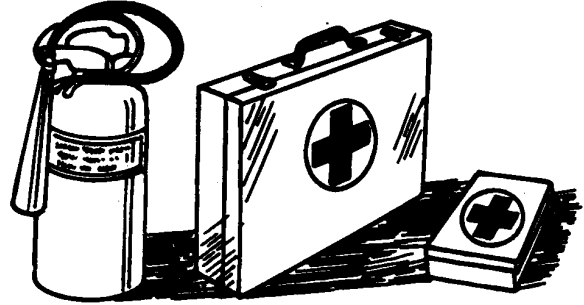
DX,DRAIN -19-01JUN15-1/1

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—15APR13

DX,FIRE2 -19-03MAR93-1/1

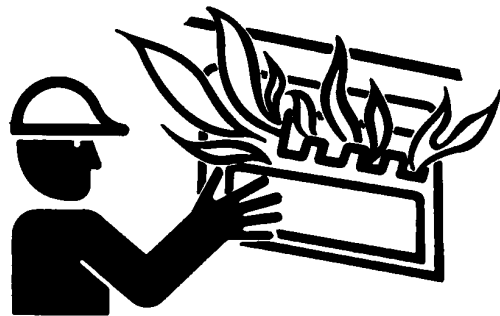
Clean Debris from Machine

Keep engine compartment, radiator, batteries, hydraulic lines, exhaust components, fuel tank, and operator's station clean and free of debris.

Clean any oil spills or fuel spills on machine surfaces.

Temperature in engine compartment could go up immediately after engine is stopped. **BE ON GUARD FOR FIRES DURING THIS PERIOD.**

Open access door(s) to cool the engine faster, and clean engine compartment.



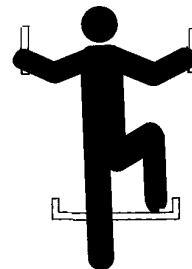
T6669AG —UN—15APR13

TX,DEBRIS -19-20JAN11-1/1

Use Steps and Handholds Correctly

Prevent falls by facing the machine when you get on and off. Maintain 3-point contact with steps and handrails. Never use machine controls as handholds.

Use extra care when mud, snow, or moisture present slippery conditions. Keep steps clean and free of grease or oil. Never jump when exiting machine. Never mount or dismount a moving machine.



T133468 —UN—15APR13

TX,STEPS -19-09FEB11-1/1

Start Only From Operator's Seat

Avoid unexpected machine movement. Start engine only while sitting in operator's seat. Ensure that all controls and working tools are in proper position for a parked machine.

Never attempt to start engine from the ground. Do not attempt to start engine by shorting across the starter solenoid terminals.



T133715 —UN—15APR13

TX,SOFOS -19-20JAN11-1/1

Use and Maintain Seat Belt

Use seat belt when operating machine. Remember to fasten seat belt when loading and unloading from trucks and during other uses.

CAUTION: Prevent personal injury. Check condition of seat belt and mounting hardware before operating machine. Replace if worn, frayed, or damaged.

Replace seat belt at least every 3 years, regardless of condition.



USE SEAT BELT

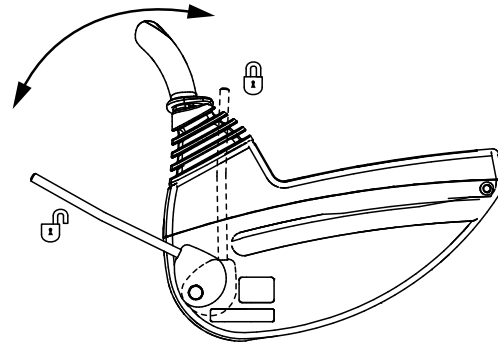
TX1165594 —19—23JUL14

TX,SEAT,BELT -19-27JUL20-1/1

Prevent Unintended Machine Movement

Be careful not to accidentally actuate control levers when coworkers are present. Pull pilot shutoff lever to locked (UP) position during work interruptions. Pull pilot shutoff lever to locked (UP) position and stop engine before allowing anyone to approach machine.

Always lower work equipment to the ground and pull pilot shutoff lever to locked (UP) position before standing up or leaving the operator's seat. Stop engine before exiting.



TZ16779 —UN—22NOV05

VD76477,000036D -19-19APR11-1/1

Avoid Work Site Hazards

Avoid contact with gas lines, buried cables, and water lines. Call utility line location services to identify all underground utilities before digging.

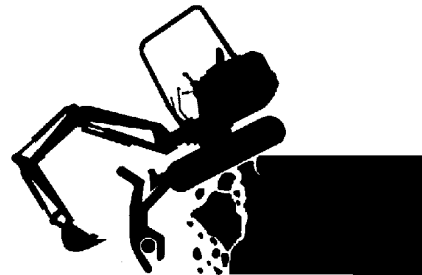
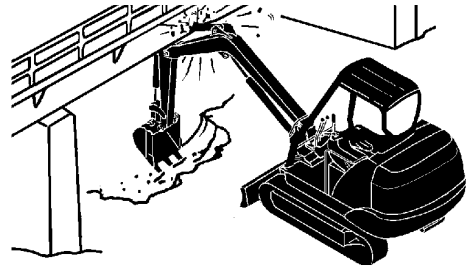
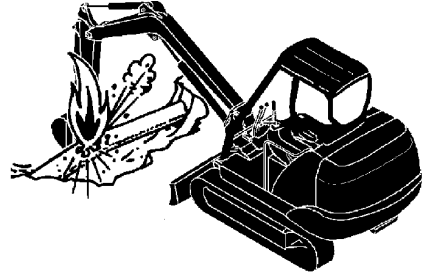
Prepare work site properly. Avoid operating near structures or objects that could fall onto the machine. Clear away debris that could move unexpectedly if run over.

Avoid boom or arm contact with overhead obstacles or overhead electrical lines. Never move any part of machine or load closer than 3 m (10 ft) plus twice the line insulator length to overhead wires.

Keep bystanders clear at all times. Keep bystanders away from raised booms, attachments, and unsupported loads. Avoid swinging or raising booms, attachments, or loads over or near bystanders. Use barricades or a signal person to keep vehicles and pedestrians away. Use a signal person if moving machine in congested areas or where visibility is restricted. Always keep signal person in view. Coordinate hand signals before starting machine.

Operate only on solid footing with strength sufficient to support machine. When working close to an excavation, position travel motors away from the hole.

Reduce machine speed when operating with tool on or near ground when obstacles may be hidden (e.g., during snow removal or clearing mud, dirt, etc). At high speeds, hitting obstacles (rocks, uneven concrete, or manholes) can cause a sudden stop. Always wear seat belt.



VD76477,0000136 -19-27FEB17-1/1

T153094—UN—01APR02

T153096—UN—01APR02

T153097—UN—01APR02

Keep Riders Off Machine

Always use seat belt.

Only allow operator on machine.

The instructional seat, if equipped, is used to accommodate trainers, persons that need to observe machine operation, and for coworkers to provide further operational instructions.

Riders are subject to injury due to fall from machine, being caught between machine parts, or being struck by foreign objects. Riders may obstruct the operator's view or impair the operator's ability to operate machine safely.



T120807

TX,NO,RIDERS,CEXC -19-23APR20-1/1

T120807—UN—14APR99

Avoid Backover Accidents

Before moving machine, be sure that all persons are clear of machine path. Turn around and look directly for best visibility. Use mirrors to assist in checking all around machine. Keep windows and mirrors clean, adjusted, and in good repair.

Be certain reverse warning alarm is working properly.

Use a signal person when backing if view is obstructed or when in close quarters. Keep signal person in view at all times. Use prearranged hand signals to communicate.

Do not rely on the rear camera and radar object detection systems, if equipped, to determine if personnel are behind the machine. The system has limitations due to maintenance practices, environmental conditions, and operating range.



PC10857XW —UN—15APR13

TX,AVOID,BACKOVER -19-04MAR16-1/1

Inspect and Maintain ROPS

A damaged rollover protective structure (ROPS) should be replaced, not reused.

The protection offered by ROPS could 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.

If ROPS was loosened or removed for any reason, inspect it carefully before operating the machine again.

To maintain the ROPS:

- Replace missing hardware using correct grade hardware.
- Check hardware torque.
- Check isolation mounts for damage, looseness, or wear; replace them if necessary.
- Check ROPS for cracks or physical damage.

TX,ROPS -19-20JAN11-1/1

Avoid Machine Tip Over and Machine Damage

Use seat belt at all times.

Do not jump if the machine tips. Operator is unlikely to jump clear and the machine may crush the operator.

Load and unload from trucks or trailers carefully. Be sure that truck is wide enough and on a firm, level surface. Use loading ramps and attach them properly to truck bed. Avoid trucks with steel beds because tracks slip more easily on steel.

Be careful on slopes. Use extra care on soft, rocky, or frozen ground. Machine may slip sideways in these conditions. When traveling up or down slopes, keep the bucket on uphill side and just above ground level.

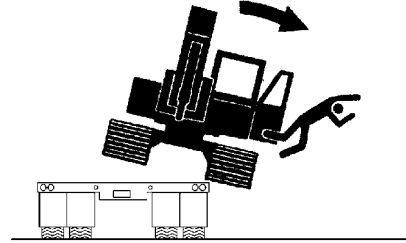
Be careful with heavy loads. Using oversize buckets or lifting heavy objects reduces machine stability. Extending a heavy load or swinging it over side of undercarriage may cause machine to tip.

Ensure solid footing. Use extra care when operating near banks or excavations that may cave-in and cause machine to tip or fall.

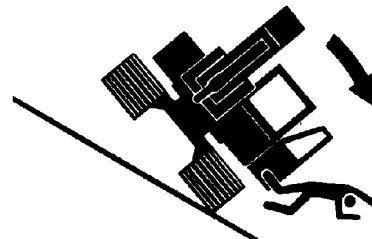


USE SEAT BELT

Use Seat Belt



Unloading Machine



Do Not Jump

TX03679,00016DF -19-24OCT19-1/1

T133716 —UN—17APR13

T133545 —UN—15SEP00

T133803 —UN—27SEP00

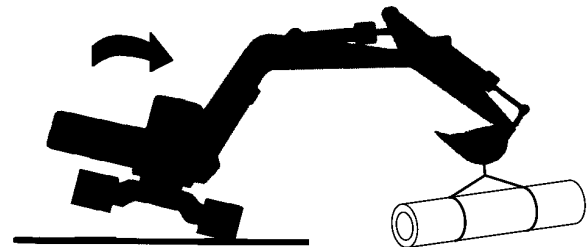
Use Special Care When Lifting Objects

Never use this machine to lift people.

Never lift a load above another person. Keep bystanders clear of all areas where a load might fall if it breaks free. Do not leave the seat when there is a raised load.

Do not exceed lift capacity limits posted on machine and in this manual. Extending heavy loads too far or swinging over undercarriage side may cause machine to tip over.

Use proper rigging to attach and stabilize loads. Be sure slings or chains have adequate capacity and are in good



Use Special Care When Lifting Objects

condition. Use tether lines to guide loads and prearranged hand signals to communicate with co-workers.

TX,LIFT,CARE -19-08MAY20-1/1

T133839 —UN—27SEP00

Add and Operate Attachments Safely

Always verify compatibility of attachments by contacting your authorized dealer. Adding unapproved attachments could affect machine stability or reliability and could create a hazard for others near the machine.

Ensure that a qualified person is involved in attachment installation. Add guards to machine if operator protection

is required or recommended. Verify that all connections are secure and attachment responds properly to controls.

Carefully read attachment manual and follow all instructions and warnings. In an area free of bystanders and obstructions, carefully operate attachment to learn its characteristics and range of motion.

TX,ATTACH -19-20JAN11-1/1

Park and Prepare for Service Safely

Warn others of service work. Always park and prepare machine for service or repair properly.

- Park machine on a level surface and lower equipment to the ground.
- Place pilot shutoff lever in locked (UP) position. Stop engine and remove key.
- Attach a “Do Not Operate” tag in an obvious place in the operator’s station.

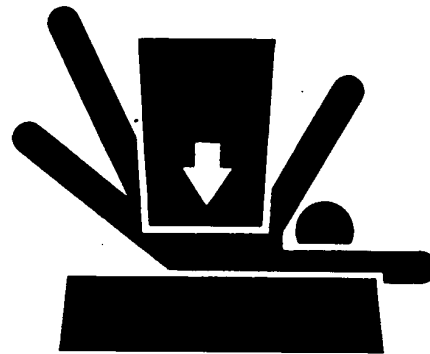
Securely support machine or attachment before working under it.

- Do not support machine with any hydraulically actuated equipment.
- Do not support machine with cinder blocks or wooden pieces that may crumble or crush.
- Do not support machine with a single jack or other devices that may slip out of place.

Understand service procedures before beginning repairs. Keep service area clean and dry. Use two people whenever the engine must be running for service work.



Do Not Operate Tag



Support Machine Properly

OUT4001,000089A -19-02JUL15-1/1

T133332—19—17APR13

TS229 —UN—23AUG08

Service Cooling System Safely

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

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



DX,RCAP -19-04JUN90-1/1

TS281 —UN—15APR13

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.

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 -19-24JUL02-1/1

TS220 —UN—15APR13

Make Welding Repairs Safely

IMPORTANT: Disable electrical power before welding. Turn off main battery switch and disconnect positive (+) and negative (-) battery cables.

Do not weld or apply heat on any part of a reservoir or tank that has contained oil or fuel. Heat from welding and cutting can cause oil, fuel, or cleaning solution to create gases which are explosive, flammable, or toxic.

Avoid welding or heating near pressurized fluid lines. Flammable spray may result and cause severe burns if pressurized lines malfunction as a result of heating. Do not let heat go beyond work area to nearby pressurized lines.

Remove paint properly. Do not inhale paint dust or fumes. Use a qualified welding technician for structural repairs.



Heating Near Pressurized Fluid Lines

Make sure there is good ventilation. Wear eye protection and protective equipment when welding.

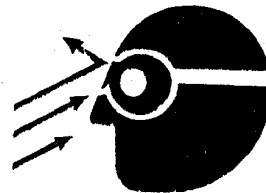
MB60223,0000212 -19-02JUL15-1/1

T133547 —UN—15APR13

Drive Metal Pins Safely

Always wear protective goggles or safety glasses and other protective equipment before striking hardened parts. Hammering hardened metal parts such as pins and bucket teeth could dislodge chips at high velocity.

Use a soft hammer or a brass bar between hammer and object to prevent chipping.

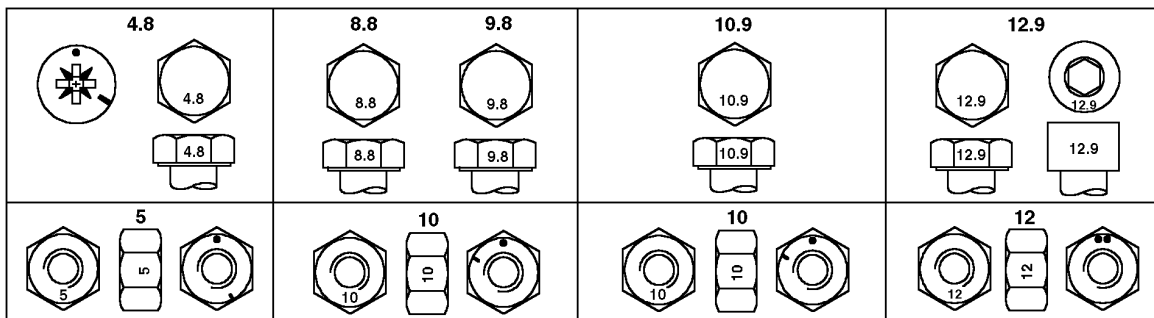


TX,PINS -19-20JAN11-1/1

T133738 —UN—15APR13

Group 0003 Torque Values

Metric Bolt and Cap Screw Torque Values



Top—Property Class and Head Markings; Bottom—Property Class and Nut Markings

Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b	
	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, stainless steel fasteners, or 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. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

TORQ2—UN—15APR13

Continued on next page

OUT3035,TORQUE2 -19-20FEB20-1/2

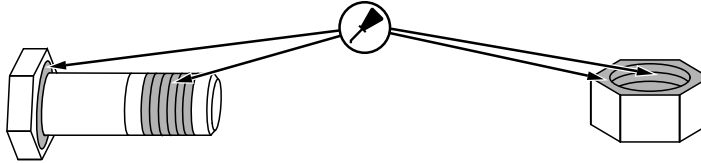
Torque Values

Bolt or Screw Size	Class 4.8		Class 8.8 or 9.8		Class 10.9		Class 12.9	
	Hex Head ^a	Flange Head ^b	Hex Head ^a	Flange Head ^b	Hex Head ^a	Flange Head ^b	Hex Head ^a	Flange Head ^b

⚠ CAUTION: Avoid injury. Use only metric tools on metric hardware. Other tools may not fit properly, causing tool to slip resulting in injury.

- 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 because of excessive oil.
- Properly start thread engagement.

TS1741 —UN—22MAY18



Lubricant Locations

^aHex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.

^bHex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.

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OUT3035,TORQUE2 -19-20FEB20-2/2

Additional Metric Cap Screw Torque Values

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

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

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

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

Make sure fastener threads are clean and that the thread engagement is properly started. This will prevent fasteners from failing when tightening.

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

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

^aTorque tolerance is ±10%.



T6873AA

T-Bolt



T6873AB

H-Bolt



T6873AC

M-Bolt

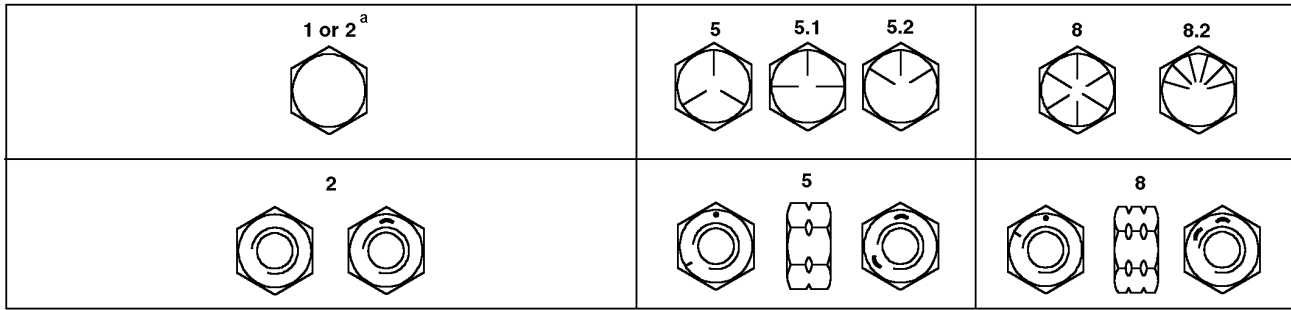
T6873AA —UN—15APR13

T6873AB —UN—18OCT88

T6873AC —UN—18OCT88

Torque Values

Unified Inch Bolt and Cap Screw Torque Values



TORQ1A—UN—15APR13

Top—SAE Grade and Head Markings; Bottom—SAE Grade and Nut Markings

Bolt or Screw Size	SAE Grade 1 ^a				SAE Grade 2 ^b				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Hex Head ^c		Flange Head ^d		Hex Head ^c		Flange Head ^d		Hex Head ^c		Flange Head ^d		Hex Head ^c		Flange Head ^d	
	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

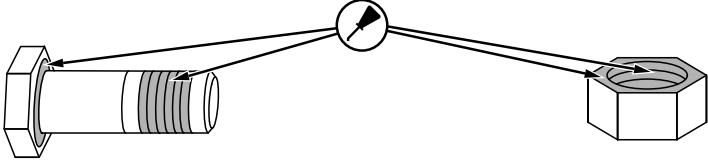
The nominal torque values listed are for general use only with the assumed wrenching accuracy of 20%, such as a manual torque wrench. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For lock nuts, stainless steel fasteners, or nuts on U-bolts, 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. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Continued on next page

OUT3035,TORQUE1 -19-20FEB20-1/2

Torque Values

Bolt or Screw Size	SAE Grade 1 ^a		SAE Grade 2 ^b		SAE Grade 5, 5.1 or 5.2		SAE Grade 8 or 8.2	
	Hex Head ^c	Flange Head ^d	Hex Head ^c	Flange Head ^d	Hex Head ^c	Flange Head ^d	Hex Head ^c	Flange Head ^d
<ul style="list-style-type: none"> 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 because of excessive oil. Properly start thread engagement. 								
<p>TS1741 —UN—22MAY18</p> <div style="text-align: center;">  <p>Lubricant Locations</p> </div>								

^aGrade 1 applies for hex cap screws over 6 in (152 mm) long, and for all other types of bolts and screws of any length.

^bGrade 2 applies for hex cap screws (not hex bolts) up to 6 in (152 mm) long.

^cHex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.

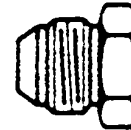
^dHex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.

Hy-Gard is a trademark of Deere & Company

OUT3035,TORQUE1 -19-20FEB20-2/2

Service Recommendations for 37° Flare and 30° Cone Seat Connectors

1. Inspect flare and flare seat. They must be free of dirt or obvious defects.
2. Defects in tube flare cannot be repaired. Overtightening a defective flared fitting will not stop leaks.
3. Align tube with fitting before attempting to start nut.
4. Lubricate male threads with hydraulic fluid or petroleum jelly.
5. Index angle fittings and tighten by hand.
6. Tighten fitting or nut to torque value shown on torque chart. Do not allow hoses to twist when tightening fittings.



Cone Seat Connector

STRAIGHT FITTING OR SPECIAL NUT TORQUE CHART		
Thread Size	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	190	140
1-7/8 - 12 UN	217	160

NOTE: Torque tolerance is ± 10%.

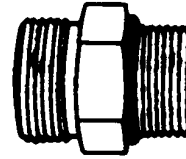
T82,BHMA,EL -19-29SEP99-1/1

T6234AC —UN—15APR13

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 value shown on chart.



Straight Fitting

04T,90,K66 -19-29SEP99-1/2

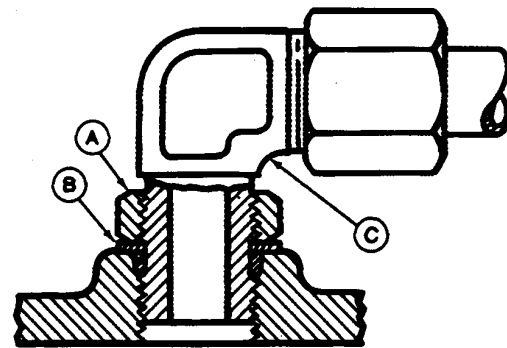
T6243AE —UN—15APR13

Angle Fitting

1. Back off lock nut (A) and backup washer (B) completely to head end (C) of fitting.
2. Turn fitting into threaded boss until backup washer contacts face of boss.
3. Turn fitting head end counterclockwise to proper index (maximum of one turn).

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

4. Hold fitting head end with a wrench and tighten locknut and backup washer to proper torque value.



Angle Fitting

A—Lock Nut
B—Backup Washer
C—Head End

04T,90,K66 -19-29SEP99-2/2

T6520AB —UN—15APR13

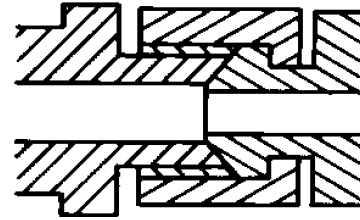
STRAIGHT FITTING OR SPECIAL NUT TORQUE CHART

Thread Size	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%.

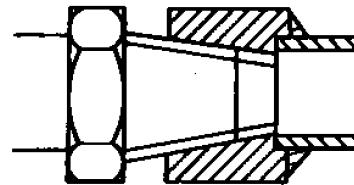
Service Recommendations for Flared Connections—Straight or Tapered Threads

1. Inspect flare and 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.



T6873AE

Straight Thread



T6873AD

Tapered Thread

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

^aTorque tolerance is $\pm 10\%$.

^bWith seat face.

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

04T,90,M171 -19-28JAN92-1/1

T6873AE—UN—15APR13

T6873AD—UN—15APR13

Torque Values

Service Recommendations for Flat Face O-Ring Seal Fittings

1. Inspect the fitting sealing surfaces and O-ring. They must be free of dirt or defects.
2. Lubricate O-rings and install into groove using petroleum jelly to hold in place.
3. Index angle fittings and tighten by hand pressing joint together to ensure O-ring remains in place.

4. Tighten fitting or nut to torque value shown on the chart. Do not allow hoses to twist when tightening fittings, use backup wrench on straight hose couplings.

IMPORTANT: Tighten fittings to 150% of listed torque value if indexing is necessary or if fitting is attached to an actuating device.

Tighten fittings to 50% of listed torque value if used in aluminum housing.

FLAT FACE O-RING SEAL FITTING TORQUE*						
Nominal Tube OD		Thread Size	Swivel Nut		Bulkhead Nut	
mm	in	in	N·m	lb·ft	N·m	lb·ft
6.35	0.250	9/16-18	16	12	12	9
9.52	0.375	11/16-16	24	18	24	18
12.70	0.500	13/16-16	50	37	46	34
15.88	0.625	1-14	69	51	62	46
19.05	0.750	1-3/16-12	102	75	102	75
22.22	0.875	1-3/16-12	102	75	102	75
25.40	1.000	1-7/16-12	142	105	142	105
31.75	1.250	1-11/16-12	190	140	190	140
38.10	1.500	2-12	217	160	217	160

*Torque tolerance is +15 -20% unless otherwise specified.

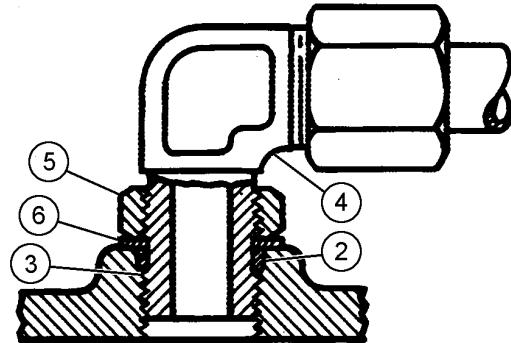
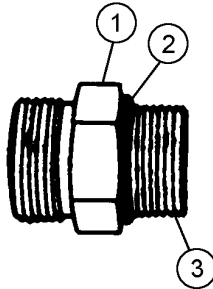
Stud End O-ring Seal Torque for Straight and Adjustable Fittings*				
Thread Size	Straight Hex Size	Locknut Hex Size	Straight Fitting or Locknut Toque	
in	in	in	N·m	lb·ft
3/8-24	5/8	9/16	12	9
7/16-20	5/8	5/8	21	15
1/2-20	3/4	11/16	26	19
9/16-18	3/4	3/4	34	25
3/4-16	7/8	15/16	73	55
7/8-14	1-1/16	1-1/16	104	76
1-1/16-12	1-1/4	1-3/8	176	130
1-3/16-12	1-3/8	1-1/2	230	170
1-5/16-12	1-1/2	1-5/8	285	210

*Torque tolerance is +15 -20% unless otherwise specified.

OUO6092.00010A4 -19-04MAR16-1/1

O-Ring Boss Fittings in Aluminum Housing Service Recommendations—Excavators

O-RING BOSS STRAIGHT OR ADJUSTABLE FITTING STUD END NUT WITH METRIC THREAD IN ALUMINUM HOUSING
TORQUE VALUES—Tolerance is $\pm 10\%$ unless otherwise specified.



T196315

O-Ring Boss Straight and Adjustable Fittings

1— Straight Fitting
2— O-Ring

3— Stud End
4— Adjustable Fitting

5— Hex Nut
6— Backup Washer

Thread Size mm	Hex Nut Size mm	N·m (lb·ft)
M12 x 1.5	17	39 (29)
M14 x 1.5	19	39 (29)
M16 x 1.5	22	55 (41)
M22 x 1.5	27	75 (55)
M27 x 2	32	110 (81)
M30 x 2	36	141 (104)
M33 x 2	41	165 (122)
M38 x 2	46	165 (122)
M42 x 2	50	275 (203)

O-RING BOSS STRAIGHT OR ADJUSTABLE FITTING STUD END NUT WITH INCH THREAD IN ALUMINUM HOUSING TORQUE VALUES—Tolerance is $\pm 10\%$ unless otherwise specified.

Thread Size in	N·m (lb·ft)
1/8	—
1/4	28 (20)
3/8	39 (29)
1/2	75 (55)
3/4	126 (93)
1	165 (122)
1-1/8	—
1-1/4	259 (191)
1-3/8	—
1-1/2	330 (243)
1-3/4	—
2	—

O-RING BOSS PLUG STUD END WITH INCH THREAD IN ALUMINUM HOUSING TORQUE VALUES—Tolerance is $\pm 10\%$ unless otherwise specified.

Thread Size in	N·m (lb·ft)
1/8	7.8 (5.80)
1/4	11.8 (8.70)
3/8	23 (17)
1/2	39 (29)
3/4	55 (41)
1	86 (64)
1-1/4	126 (93)
1-1/2	157 (116)
2	204 (150)

1. Inspect fitting and O-ring boss sealing surfaces and the O-ring. They must be free of dirt, scratches, nicks, or burrs. O-ring must be free of dirt, cuts, cracks, swelling, or flatten condition.

Continued on next page

OUT3035.0000353 -19-04MAR16-1/2

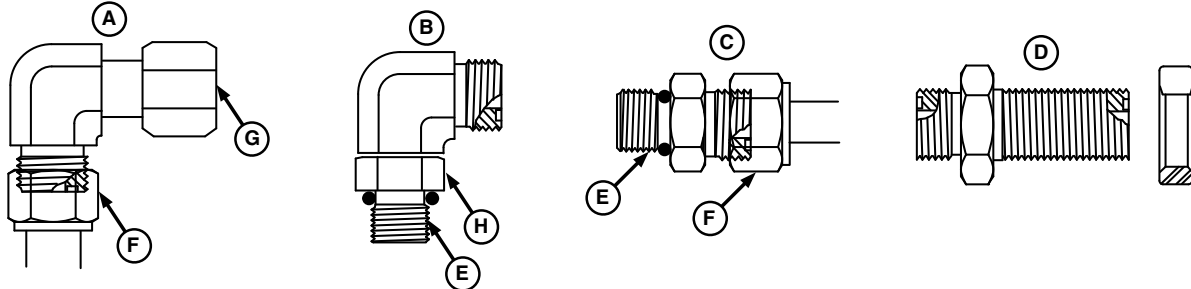
Torque Values

2. Back the stud end hex nut (5) off as far as possible. Push backup washer (6) towards the nut to fully expose the turn down section of stud end. Washer must fit turned down section and not be too loose.
3. Wrap electrical tape over threads to protect O-ring. Slide O-ring over the tape into turned down section. Remove tape. Apply hydraulic oil to the threads of stud end, turned down section, and O-ring.
4. Turn fitting into the boss by hand until face of nut or backup washer squeezes O-ring into the seat and contacts face of boss. Loosen an adjustable fitting no more than one turn for alignment.
5. Tighten straight fitting or hex nut to the torque value given. Hold body of adjustable fitting using a second wrench when tightening hex nut.

OUT3035,0000353 -19-04MAR16-2/2

O-Ring Face Seal Fittings With SAE Inch Hex Nut and Stud End for High-Pressure Service Recommendations

O-RING FACE SEAL FITTINGS WITH SAE INCH HEX NUT AND STUD END FOR HIGH-PRESSURE, ABOVE 27 600 kPa (276 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.



O-Ring Face Seal Fittings

- A—90° Swivel Elbow and Tube Nut
- B—90° Adjustable Stud Elbow
- C—Stud Straight and Tube Nut
- D—Bulkhead Union and Nut
- E—Stud End
- F—Tube Nut
- G—Swivel Nut
- H—Hex Nut

Nominal Tube OD or Hose ID			O-Ring Face Seal Hose or Tube Swivel Nut			Bulkhead Nut	
Metric Tube OD	Inch Tube OD or Hose ID		Thread Size	Hex Size	Torque	Hex Size	Torque
mm	Dash Size	mm (in)	in	in	N·m (lb·ft)	in	N·m (lb·ft)
5	-3	4.78 (0.188)	—	—	—	—	—
6	-4	6.35 (0.250)	9/16-18	11/16	24 (18)	13/16	32 (24)
8	-5	7.92 (0.312)	—	—	—	—	—
10	-6	9.53 (0.375)	11/16-16	13/16	37 (27)	1	42 (31)
12	-8	12.70 (0.500)	13/16-16	15/16	75 (55)	1-1/8	93 (69)
16	-10	15.88 (0.625)	1-14	1-1/8	103 (76)	1-5/16	118 (87)
20	-12	19.05 (0.750)	1-3/16-12	1-3/8	152 (112)	1-1/2	175 (129)
22	-14	22.23 (0.875)	1-3/16-12	—	152 (112)	—	175 (129)
25	-16	25.40 (1.000)	1-7/16-12	1-5/8	214 (158)	1-3/4	247 (182)
32	-20	31.75 (1.250)	1-11/16-12	1-7/8	286 (211)	2	328 (242)
38	-24	38.10 (1.500)	2-12	2-1/4	326 (240)	2-3/8	374 (276)

O-RING STRAIGHT, ADJUSTABLE, AND EXTERNAL HEX PLUG WITH SAE INCH STUD END FOR HIGH PRESSURE, ABOVE 27 600 kPa (276 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.

Thread Size	Straight Hex Size ^a	Adjustable Nut Hex Size	Steel or Gray Iron Torque
in	in	in	N·m (lb·ft)
3/8-24	5/8	9/16	18 (13)
7/16-20	5/8	5/8	24 (18)
1/2-20	3/4	11/16	30 (22)
9/16-18	3/4	3/4	37 (27)
3/4-16	7/8	15/16	75 (55)
7/8-14	1-1/16	1-1/16	103 (76)
1-1/16-12	1-1/4	1-3/8	177 (131)
1-3/16-12	1-3/8	1-1/2	231 (170)

Continued on next page

OUT3035.0000420 -19-04MAR16-1/2

H70406—UN—15APR13

Torque Values

O-RING STRAIGHT, ADJUSTABLE, AND EXTERNAL HEX PLUG WITH SAE INCH STUD END FOR HIGH PRESSURE, ABOVE 27 600 kPa (276 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.

Thread Size	Straight Hex Size ^a	Adjustable Nut Hex Size	Steel or Gray Iron Torque
in	in	in	N·m (lb·ft)
1-5/16-12	1-1/2	1-5/8	270 (199)
1-5/8-12	1-3/4	1-7/8	286 (211)
1-7/8-12	2-1/8	2-1/8	326 (240)

^a***Straight hex size applies to fittings only and may not be the same as the corresponding plug of the same thread size.***

1. Inspect fitting and connector sealing surfaces and the O-rings. They must be free of dirt, scratches, nicks, and burrs. O-ring must be free of dirt, cuts, cracks, swelling, or flatten condition.
2. Back the stud end hex nut off as far as possible. Push backup washer towards the nut to fully expose the turn down section. Washer must fit turned down section and not be too loose.
3. Lubricate O-rings using a thin film of clean hydraulic oil or as needed, petroleum jelly to hold O-ring in place.

Install O-ring into groove making sure it is seated at the bottom. Excess petroleum jelly will prevent seating of O-ring and cause it to pop out.

To protect an O-ring from threads, wrap electrical tape over the threads. Slide O-ring over the tape into the turned down section. Remove the tape.

4. Turn fitting into the boss by hand until face of nut or washer squeezes the O-ring into the seat and contacts face of boss. Loosen adjustable fittings no more than one turn for alignment.

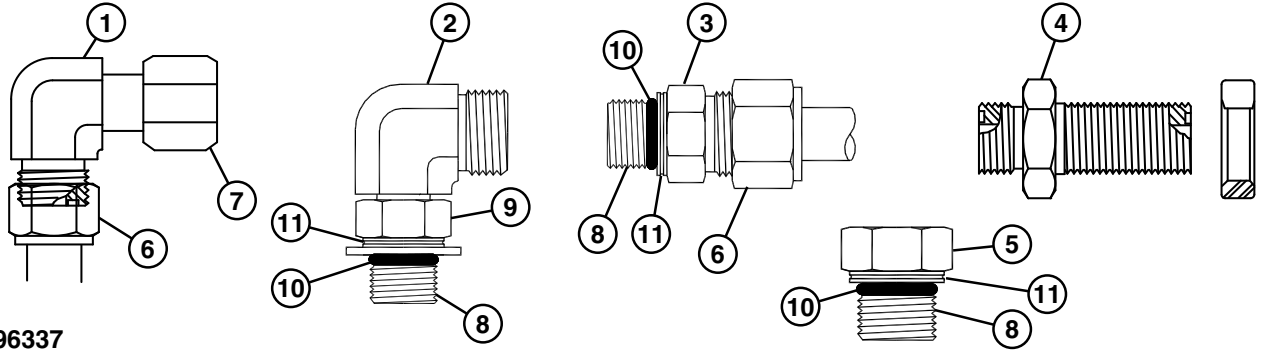
Hold connections together while tightening nut to ensure O-ring remains in place.

5. Tighten fitting or nut to torque value shown. Use a second wrench to hold the fitting in position or to keep hose from twisting while tightening nut.

OUT3035,0000420 -19-04MAR16-2/2

O-Ring Face Seal Fittings With Metric Hex Nut and Stud End for Standard Pressure Service Recommendations

O-RING FACE SEAL AND FITTINGS WITH METRIC HEX NUT AND STUD END FOR STANDARD PRESSURE, BELOW 27 600 kPa (275.8 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.



T196337

O-Ring Face Seal Fittings

- 1— 90° Swivel Elbow
- 2— 90° Adjustable Stud Elbow
- 3— Stud Straight
- 4— Bulkhead Union and Nut
- 5— External Hex Stud End Plug
- 6— Tube Nut
- 7— Swivel Nut
- 8— Stud End
- 9— Hex Nut
- 10— O-Ring
- 11— Identification Groove

Nominal Tube OD or Hose ID			O-Ring Face Seal Hose or Tube Swivel Nut			Bulkhead Nut	
Metric Tube OD	Inch Tube OD or Hose ID		Thread Size	Hex Size	Torque	Hex Size	Torque
mm	Dash Size	mm (in)	in	mm	N·m (lb·ft)	mm	N·m (lb·ft)
4	-2	3.18 (0.125)	—	—	—	—	—
5	-3	4.78 (0.188)	—	—	—	—	—
6	-4	6.35 (0.250)	9/16-18	17	16 (12)	22	32 (24)
8	-5	7.92 (0.312)	—	—	—	—	—
10	-6	9.53 (0.375)	11/16-16	22	24 (18)	27	42 (31)
12	-8	12.70 (0.500)	13/16-16	24	50 (37)	30	93 (69)
16	-10	15.88 (0.625)	1-14	30	69 (51)	36	118 (87)
20	-12	19.05 (0.750)	1-3/16-12	36	102 (75)	41	175 (129)
22	-14	22.23 (0.875)	1-3/16-12	36	102 (75)	41	175 (129)
25	-16	25.40 (1.000)	1-7/16-12	41	142 (105)	46	247 (182)
28	—	—	—	—	—	—	—
32	-20	31.75 (1.250)	1-11/16-12	50	190 (140)	50	328 (242)
38	-24	38.10 (1.500)	2-12	60	217 (160)	60	374 (276)
50	-32	50.80 (2.000)	—	—	—	—	—

O-RING STRAIGHT, ADJUSTABLE, AND EXTERNAL HEX PLUG WITH METRIC STUD END FOR STANDARD PRESSURE, BELOW 27 600 kPa (275.8 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.

Thread Size ^a	Straight Hex Size ^b	Adjustable Nut Hex Size	Steel or Gray Iron Torque	Aluminum or Brass Torque
mm	mm	mm	N·m (lb·ft)	N·m (lb·ft)
M8 x 1	12	12	8 (6)	5 (4)
M10 x 1	14	14	15 (11)	10 (7)
M12 x 1.5	17	17	25 (18)	17 (12)
M14 x 1.5	19	19	40 (30)	27 (20)

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OUT3035.0000366 -19-04MAR16-1/2

T196337—UN—15APR13

Torque Values

O-RING STRAIGHT, ADJUSTABLE, AND EXTERNAL HEX PLUG WITH METRIC STUD END FOR STANDARD PRESSURE, BELOW 27 600 kPa (275.8 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.

Thread Size ^a	Straight Hex Size ^b	Adjustable Nut Hex Size	Steel or Gray Iron Torque	Aluminum or Brass Torque
mm	mm	mm	N·m (lb·ft)	N·m (lb·ft)
M16 x 1.5	22	22	45 (33)	30 (22)
M18 x 1.5	24	24	50 (37)	33 (25)
M22 x 1.5	27	27	69 (51)	46 (34)
M27 x 2	32	32	100 (74)	67 (49)
M30 x 2	36	36	130 (96)	87 (64)
M33 x 2	41	41	160 (118)	107 (79)
M38 x 2	46	46	176 (130)	117 (87)
M42 x 2	50	50	210 (155)	140 (103)
M48 x 2	55	55	260 (192)	173 (128)
M60 x 2	65	65	315 (232)	210 (155)

^aStud end threads are identified as metric by an identification groove in the hex nut next to the O-ring.

^bStraight hex size applies to fittings only and may not be the same as the corresponding plug of the same thread size.

1. Inspect fitting and connector sealing surfaces and the O-rings. They must be free of dirt, scratches, nicks, and burrs. O-ring must be free of dirt, cuts, cracks, swelling, or flatten condition.
2. Back the stud end hex nut off as far as possible. Push backup washer towards the nut to fully expose the turn down section. Washer must fit turned down section and not be too loose.
3. Lubricate O-rings using a thin film of clean hydraulic oil or as needed, petroleum jelly to hold O-ring in place.

Install O-ring into groove making sure it is seated at the bottom. Excess petroleum jelly will prevent seating of O-ring and cause it to pop out.

To protect an O-ring from threads, wrap electrical tape over the threads. Slide O-ring over the tape into the turned down section. Remove the tape.

4. Turn fitting into the boss by hand until face of nut or washer squeezes the O-ring into the seat and contacts face of boss. Loosen adjustable fittings no more than one turn for alignment.

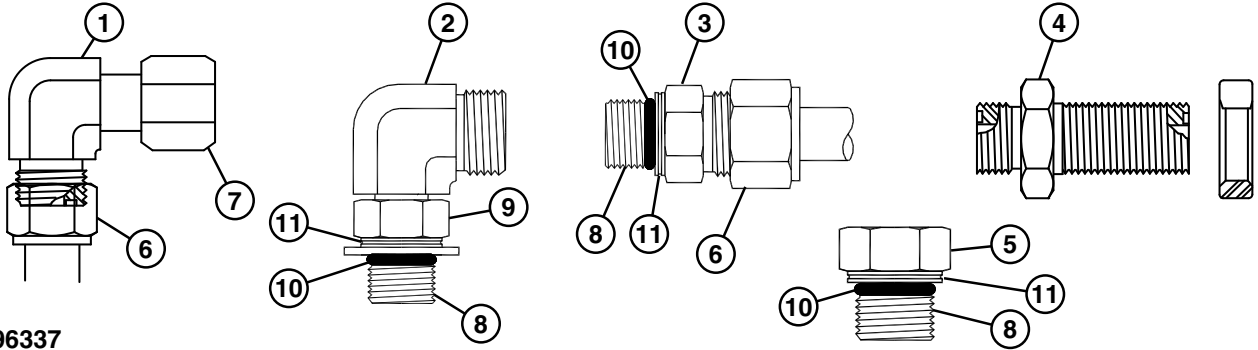
Hold connections together while tightening nut to ensure O-ring remains in place.

5. Tighten fitting or nut to torque value shown. Use a second wrench to hold the fitting in position or to keep hose from twisting while tightening nut.

OUT3035,0000366 -19-04MAR16-2/2

O-Ring Face Seal Fittings With Metric Hex Nut and Stud End for High-Pressure Service Recommendations

O-RING FACE SEAL FITTINGS WITH METRIC HEX NUT AND STUD END FOR HIGH-PRESSURE, ABOVE 27 600 kPa (275.8 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.



T196337

O-Ring Face Seal Fittings

- 1— 90° Swivel Elbow
- 2— 90° Adjustable Stud Elbow
- 3— Stud Straight
- 4— Bulkhead Union and Nut
- 5— External Hex Stud End Plug
- 6— Tube Nut
- 7— Swivel Nut
- 8— Stud End
- 9— Hex Nut
- 10— O-Ring
- 11— Identification Groove

Nominal Tube OD or Hose ID			O-Ring Face Seal Hose or Tube Swivel Nut			Bulkhead Nut	
Metric Tube OD	Inch Tube OD or Hose ID		Thread Size	Hex Size	Torque	Hex Size	Torque
mm	Dash Size	mm (in)	in	mm	N·m (lb·ft)	mm	N·m (lb·ft)
4	-2	3.18 (0.125)	—	—	—	—	—
5	-3	4.78 (0.188)	—	—	—	—	—
6	-4	6.35 (0.250)	9/16-18	17	24 (18)	22	32 (24)
8	-5	7.92 (0.312)	—	—	—	—	—
10	-6	9.53 (0.375)	11/16-16	22	37 (27)	27	42 (31)
12	-8	12.70 (0.500)	13/16-16	24	75 (55)	30	93 (69)
16	-10	15.88 (0.625)	1-14	30	103 (76)	36	118 (87)
20	-12	19.05 (0.750)	1-3/16-12	36	152 (112)	41	175 (129)
22	-14	22.23 (0.875)	1-3/16-12	36	152 (112)	41	175 (129)
25	-16	25.40 (1.000)	1-7/16-12	41	214 (158)	46	247 (182)
28	—	—	—	—	—	—	—
32	-20	31.75 (1.250)	1-11/16-12	—	286 (211)	50	328 (242)
38	-24	38.10 (1.500)	2-12	—	326 (240)	60	374 (276)

O-RING STRAIGHT, ADJUSTABLE, AND EXTERNAL HEX PLUG WITH METRIC STUD END FOR HIGH PRESSURE, ABOVE 27 600 kPa (275.8 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.

Thread Size ^a	Straight Hex Size ^b	Adjustable Nut Hex Size	Steel or Gray Iron Torque
mm	mm	mm	N·m (lb·ft)
M8 x 1	12	12	8 (6)
M10 x 1	14	14	15 (11)
M12 x 1.5	17	17	35 (26)
M14 x 1.5	19	19	45 (33)
M16 x 1.5	22	22	55 (41)
M18 x 1.5	24	24	70 (52)

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OUT3035.0000421 - 19-04MAR16-1/2

T196337—UN—15APR13

Torque Values

O-RING STRAIGHT, ADJUSTABLE, AND EXTERNAL HEX PLUG WITH METRIC STUD END FOR HIGH PRESSURE, ABOVE 27 600 kPa (275.8 bar) (4000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified.

Thread Size ^a	Straight Hex Size ^b	Adjustable Nut Hex Size	Steel or Gray Iron Torque
mm	mm	mm	N·m (lb-ft)
M22 x 1.5	27	27	100 (74)
M27 x 2	32	32	170 (125)
M30 x 2	36	36	215 (159)
M33 x 2	41	41	260 (192)
M38 x 2	46	46	320 (236)
M42 x 2	50	50	360 (266)
M48 x 2	55	55	420 (310)

^aStud end threads are identified as metric by an identification groove in the hex nut next to the O-ring.

^bStraight hex size applies to fittings only and may not be the same as the corresponding plug of the same thread size.

1. Inspect fitting and connector sealing surfaces and the O-rings. They must be free of dirt, scratches, nicks, and burrs. O-ring must be free of dirt, cuts, cracks, swelling, or flatten condition.
2. Back the stud end hex nut off as far as possible. Push backup washer towards the nut to fully expose the turn down section. Washer must fit turned down section and not be too loose.
3. Lubricate O-rings using a thin film of clean hydraulic oil or as needed, petroleum jelly to hold O-ring in place.

Install O-ring into groove making sure it is seated at the bottom. Excess petroleum jelly will prevent seating of O-ring and cause it to pop out.

To protect an O-ring from threads, wrap electrical tape over the threads. Slide O-ring over the tape into the turned down section. Remove the tape.

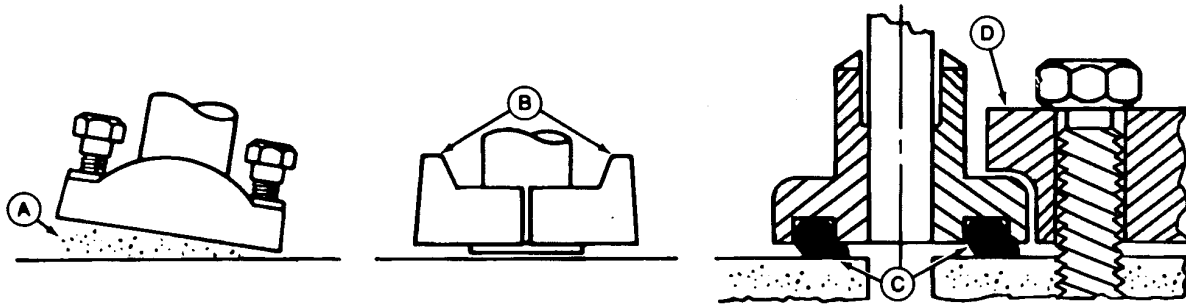
4. Turn fitting into the boss by hand until face of nut or washer squeezes the O-ring into the seat and contacts face of boss. Loosen adjustable fittings no more than one turn for alignment.

Hold connections together while tightening nut to ensure O-ring remains in place.

5. Tighten fitting or nut to torque value shown. Use a second wrench to hold the fitting in position or to keep hose from twisting while tightening nut.

OUT3035,0000421 -19-04MAR16-2/2

Service Recommendations for Metric Series Four Bolt Flange Fitting



Metric Series Four Bolt Flange Fitting

A—Sealing Surface
B—Split Flange

C—Pinched O-Ring
D—Single Piece Flange

1. Clean sealing surfaces (A). Inspect. Scratches cause leaks. Roughness causes seal wear. Out-of-flat causes seal extrusion. If defects cannot be polished out, replace component.
2. Install the correct O-ring (and backup washer if required) into groove using petroleum jelly to hold it in place.
3. Split flange: Loosely assemble split flange (B) halves. Make sure split is centrally located and perpendicular to the port. Hand tighten cap screws to hold parts in place. Do not pinch O-ring (C).
4. Single piece flange (D): Place hydraulic line in center of flange and install four cap screws. Flange must be centrally located on port. Hand tighten cap screws to hold flange in place. Do not pinch O-ring.
5. After components are properly positioned and cap screws are hand tightened, tighten one cap screw, then tighten the diagonally opposite cap screw. Tighten two remaining cap screws. Tighten all cap screws as specified in the chart below.

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

TORQUE CHART ^a		
Thread ^b	N·m	lb·ft
M6	12	9
M8	30	22
M10	57	42
M12	95	70
M14	157	116
M16	217	160
M18	334	246
M20	421	318

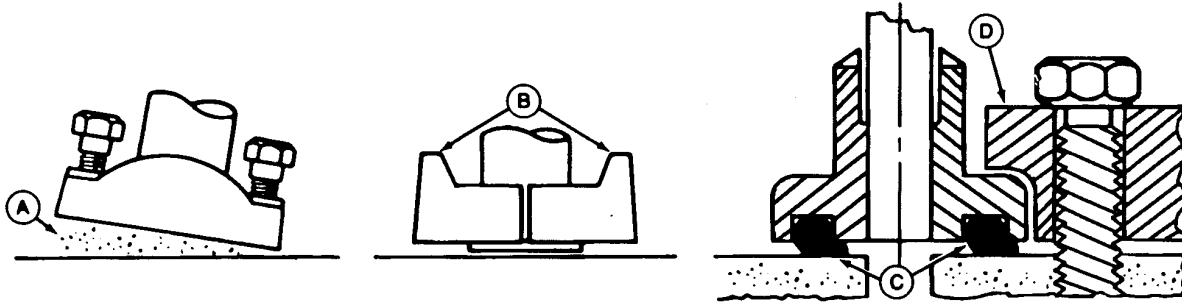
^aTolerance $\pm 10\%$. The torques given are enough for the given size connection with the recommended working pressure. Increasing cap screw torque beyond these amounts will result in flange and cap screw bending and connection failures.

^bMetric standard thread.

04T,90,K175 -19-29SEP99-1/1

T6890BB—UN—15APR13

Service Recommendations For Inch Series Four Bolt Flange Fittings



Flange Fittings

A—Sealing Surface
B—Split Flange

C—Pinched O-Ring
D—Single Piece Flange

1. Clean sealing surfaces (A). Inspect. Scratches cause leaks. Roughness causes seal wear. Out-of-flat causes seal extrusion. If defects cannot be polished out, replace component.
2. Install O-ring (and backup washer if required) into groove using petroleum jelly to hold it in place.
3. Split flange: Loosely assemble split flange (B) halves. Make sure split is centrally located and perpendicular to port. Hand tighten cap screws to hold parts in place. Do not pinch O-ring (C).
4. Single piece flange (D): Place hydraulic line in center of flange and install cap screws. Flange must be centrally located on port. Hand tighten cap screws to hold flange in place. Do not pinch O-ring.
5. Tighten one cap screw, then tighten the diagonally opposite cap screw. Tighten two remaining cap screws. Tighten all cap screws as specified in the chart below.

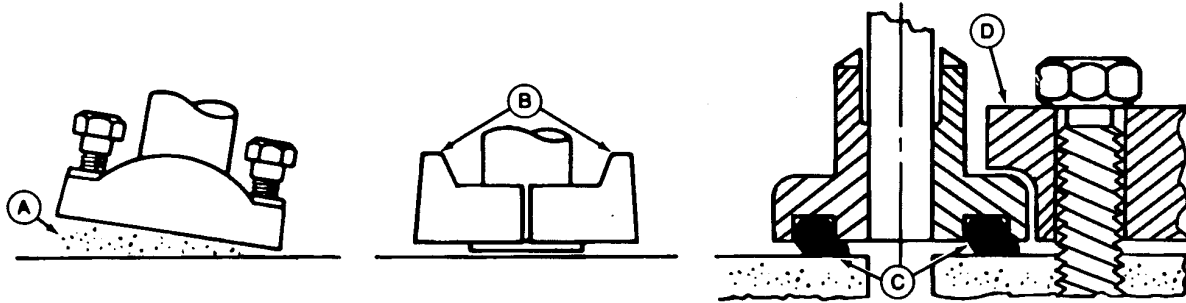
DO NOT use air wrenches. DO NOT tighten one cap screw fully before tightening the others. DO NOT over tighten.

TORQUE CHART					
Nom-inal Flange Size	Cap Screw Size	N-m		lb-ft	
		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	158	264	117	195
3-1/2	5/8-11 UNC	158	264	117	195
4	5/8-11 UNC	158	264	117	195
5	5/8-11 UNC	158	264	117	195

04T,90,K174 -19-01AUG94-1/1

T6890BB—UN—15APR13

Inch Series Four Bolt Flange Fitting for High-Pressure Service Recommendations



Four Bolt Flange Fittings

A—Sealing Surface
B—Split Flange

C—Pinched O-Ring
D—Single Piece Flange

INCH SERIES FOUR BOLT FLANGE FITTING FOR 41 400 kPa (414 bar) (6000 psi) PRESSURE SERIES TORQUE VALUES—Tolerance is ± 10% unless otherwise specified.

Nominal Flange Size	Cap Screw Size ^a	Min—Max Torque
in	in	N·m (lb·ft) ^b
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—97)
1-1/2	5/8-11 UNC	159—264 (117—195)
2	3/4-10 UNC	271—468 (200—345)

^aJDM A17D, SAE Grade 5 or better cap screws with plated hardware. Lock washers are permissible but not recommended.

^bMinimum torques given are enough for the given size connection with the recommended working pressure. Torques can be increased to the maximum shown for each cap screw size if desired. Increasing cap screw torque beyond the maximum will result in flange and cap screw bending and connection failures.

O-ring wear. Out-of-flat causes O-ring extrusion. If imperfection cannot be polished out, replace component.

2. Install the O-ring (and backup ring, if used) into groove. Use petroleum jelly to hold it in place.

IMPORTANT: DO NOT use air wrenches. DO NOT tighten one cap screw fully before tightening the others. DO NOT over tighten.

3. Split flange: Loosely assemble split flange (B) halves. Make sure split is centrally located and perpendicular to port. Hand tighten cap screws to hold flange halves and line in place. Do not pinch O-ring (C).

Single piece flange (D): Make sure flange is centrally located on port and line is centered in flange. Install the cap screws. Hand tighten cap screws to hold flange and line in place. Do not pinch O-ring.

4. Tighten one cap screw and then the diagonally opposite cap screw. Tighten the two remaining cap screws. Tighten cap screws within the specified torque values.

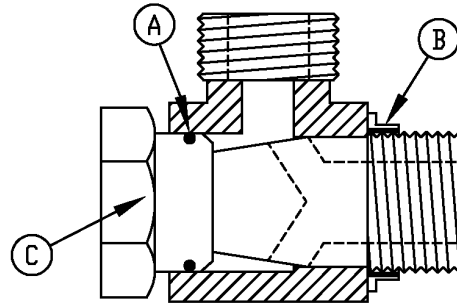
1. Clean sealing surfaces (A). Inspect. Scratches, nicks, and burrs cause leaks. Roughness causes

OUT3035.0000422 -19-04MAR16-1/1

T6890BB—UN—15APR13

Service Recommendations For Non-Restricted Banjo (Adjustable) Fittings

1. Inspect all fitting sealing surfaces. They must be free of dirt and defects.
2. Inspect O-ring (A). It must be free of damage or defects.
3. Inspect sealing ring (B) for damage or defects.
4. Hold body in desired position while tightening stud by hand.
5. Tighten stud (C) to torque value shown on the chart. Do not allow body to twist when tightening stud.



NOTE: The L in the Tube Fitting OD Size column indicates "light" designed fitting and the S indicates "heavy" designed fitting.

Tube Fitting O.D. Size	Torque Value		
	Metric Thread	N·m	lb-ft
6 L	M 10 x 1	30	22
8 L	M 12 x 1.5	40	30
10 L	M 14 x 1.5	60	44
12 L	M 16 x 1.5	100	74
15 L	M 18 x 1.5	130	96
18 L	M 22 x 1.5	160	118
22 L	M 26 x 1.5	250	184
28 L	M 33 x 2	400	295
35 L	M 42 x 2	600	443
42 L	M48 x 2	800	590
6 S	M 12 x 1.5	40	30
8 S	M 14 x 1.5	60	44
10 S	M 16 x 1.5	100	74
12 S	M 18 x 1.5	130	96
14 S	M 20 x 1.5	160	118
16 S	M 22 x 1.5	160	118
20 S	M 27 x 2	250	184
25 S	M 33 x 2	400	295
30 S	M 42 x 2	600	443
38 S	M 48 x 2	800	590

T113948

Tube Fitting O.D. Size	Torque Value		
	Inch Size	N·m	lb-ft
6 L	1/8	25	18
8 L	1/4	50	37
10 L	1/4	50	37
12 L	3/8	90	66
15 L	1/2	130	96
18 L	1/2	150	111
22 L	3/4	250	184
28 L	1	400	295
35 L	1-1/4	600	443
42 L	1-1/2	800	590
6 S	1/4	50	37
8 S	1/4	50	37
10 S	3/8	90	66
12 S	3/8	100	74
14 S	1/2	130	96
16 S	1/2	150	111
20 S	3/4	250	184
25 S	1	400	295
30 S	1-1/4	600	443
38 S	1-1/2	800	590

T113948—UN—06MAR98

JA66566,0002A47 -19-17JAN13-1/1

Service Recommendations For O-Ring Boss Fittings With Shoulder

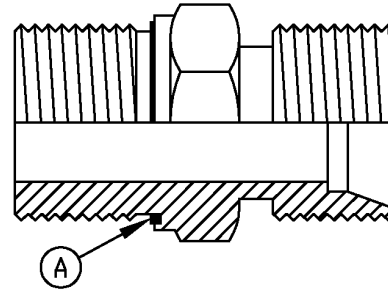
1. Inspect component seal boss seat for dirt or defects.
2. Inspect EOlastic seal (A) for damage. Replace seal or fitting as necessary.

To replace seal, put electrical tape over threads to protect seal. Slide seal over tape and into seal groove of fitting. Remove tape.

3. Tighten fitting to torque value shown on chart.

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

NOTE: The L in the Tube Fitting OD Size column indicates "light" designed fitting and the S indicates "heavy" designed fitting.



T113957

O-Ring Boss Fitting With Shoulder

Tube Fitting O.D. Size	Torque Value		
	Metric Thread	N·m	lb·ft
6 L	M10 x 1	20	15
8 L	M12 x 1.5	30	22
10 L	M14 x 1.5	45	33
12 L	M16 x 1.5	60	44
15 L	M18 x 1.5	80	59
18 L	M22 x 1.5	130	96
22 L	M26 x 1.5	190	140
28 L	M33 x 2	300	221
35 L	M42 x 2	600	443
42 L	M48 x 2	800	590
6 S	M12 x 1.5	40	30
8 S	M14 x 1.5	60	44
10 S	M16 x 1.5	80	59
12 S	M18 x 1.5	110	81
14 S	M20 x 1.5	140	103
16 S	M22 x 1.5	170	125
20 S	M27 x 2	250	184
25 S	M33 x 2	450	332
30 S	M42 x 2	600	443
38 S	M48 x 2	800	590

Tube Fitting O.D. Size	Torque Value		
	Inch Size	N·m	lb·ft
6 L	1/8	20	15
8 L	1/4	40	30
10 L	1/4	40	30
12 L	3/8	80	59
15 L	1/2	140	103
18 L	1/2	100	74
22 L	3/4	180	133
28 L	1	300	221
35 L	1-1/4	600	443
42 L	1-1/2	800	590
6 S	1/4	50	37
8 S	1/4	50	37
10 S	3/8	90	66
12 S	3/8	90	66
14 S	1/2	160	118
16 S	1/2	140	103
20 S	3/4	250	184
25 S	1	400	295
30 S	1-1/4	650	479
38 S	1-1/2	800	590

T113957 - UN - 06MAR98

Continued on next page

CED,OUO1002,563 -19-09MAR98-1/2

Torque Values

Hex Socket Head Plugs Only		
Torque Value		
Thread Size	N·m	lb·ft
M10 x 1	13	10
M12 x 1.5	30	22
M14 x 1.5	40	30
M16 x 1.5	60	44
M18 x 1.5	70	52
M20 x 1.5	90	66
M22 x 1.5	100	74
M26 x 1.5	120	89
M27 x 2	150	111
M33 x 2	250	184
M42 x 2	400	295
M48 x 2	500	369
1/8	15	11
1/4	33	24
3/8	70	52
1/2	90	66
3/4	150	111
1	220	162
1-1/4	600	443
1-1/2	800	590

CED.OUO1002,563 -19-09MAR98-2/2

Metric 24° O-Ring Seal DIN 20078 Service Recommendations

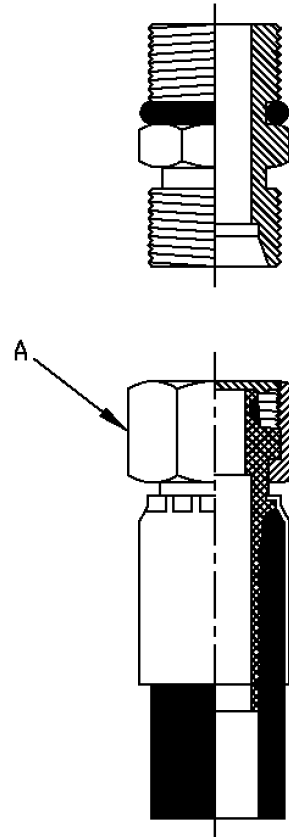
METRIC 24° O-RING SEAL DIN 20078 TORQUE VALUES			
Fitting Tube OD Size	Heavy Fitting Size	Light Fitting Size	Torque
mm	mm	mm	Turns
6	—	M12 x 1.5	Hand tighten so O-ring contacts seat plus an additional 1/4—1/3 turn using a wrench
8	M16 x 1.5	M14 x 1.5	
10	M18 x 1.5	M16 x 1.5	
12	M20 x 1.5	M18 x 1.5	
14	M22 x 1.5	—	
15	—	M22 x 1.5	
16	M24 x 1.5	—	
18	—	M26 x 1.5	
20	M30 x 2	—	
22	—	M30 x 2	
25	M36 x 2	—	
28	—	M36 x 2	
30	M42 x 2	—	
35	—	M45 x 2	
38	M52 x 2	—	

NOTE: These fittings are also referred to as EO and EO-2 Bite Type or Ermeto style fittings.

IMPORTANT: In this style of fittings, there are “heavy” and “light” designs. Usually “heavy” is used for pressure lines and “light” for return lines.

Some “heavy” and “light” sizes can be threaded together but do not seal properly. Be sure not to mix “heavy” and “light” fittings.

1. Inspect the fitting sealing surfaces. They must be free of dirt scratches, nicks, and burrs.
2. Inspect the O-ring. It must be free dirt, cuts, cracks, swelling or flatten condition.
3. Lubricate O-rings using a thin film of clean hydraulic oil.



T113889

Connection

4. Align an adjustable fitting with the tube.
Hold connections together while tightening nut to ensure proper seal.
5. Tighten nut (A) hand tight so O-ring contacts seat and then an additional 1/4—1/3 turn using a wrench.

CED.OUO1002,517 -19-14JAN04-1/1

T113889—UN—15APR13

Torque Values

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Group 0130—Track System	
Track Roller Remove and Install	01-0130-1
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Track Carrier Roller Remove and Install	01-0130-6
Inspect Metal Face Seals	01-0130-8
Rubber Track Remove and Install.....	01-0130-9
Track Shoe Remove and Install	01-0130-11
Track Chain Remove and Install	01-0130-12
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Track Chain Repair to Replace Broken Part.....	01-0130-17
Sprocket Remove and Install.....	01-0130-23
Front Idler Remove and Install	01-0130-24
Front Idler Disassemble and Assemble.....	01-0130-25
Track Adjuster and Recoil Spring Remove and Install.....	01-0130-27
Track Adjuster and Recoil Spring Disassemble and Assemble	01-0130-28

Contents

Track Roller Remove and Install

SPECIFICATIONS	
Canopy Machine Weight (approximate)	3520 kg 7760 lb.
Cab Machine Weight (approximate)	3690 kg 8135 lb.
Cap Screw Torque	180 N·m 133 lb.-ft.
Track Adjuster Valve Torque	90 N·m 66 lb.-ft.

OTHER MATERIAL	
271 Loctite® Thread Lock and Sealer (high strength)	

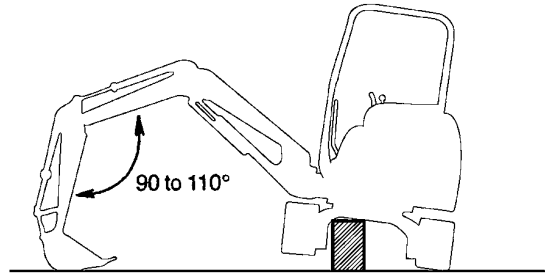
1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid possible injury from unexpected machine movement. Machine could slide backwards causing personal injury. Keep angle between boom and arm 90—110°.

2. Swing upperstructure to the side as shown. Keeping angle between boom and arm at 90—110°, lower boom to raise track off ground.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate supporting equipment.

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T121510

Machine Position

T121510—UN—28OCT99

3. Place shop stands under machine.

Specification

Canopy Machine—Weight (approximate).....	3520 kg 7760 lb.
Cab Machine—Weight (approximate).....	3690 kg 8135 lb.

Continued on next page

JS20420.0000968 -19-27MAR13-1/2

⚠ CAUTION: Avoid possible personal injury. Grease fitting is under high pressure and may fly off if loosened too quickly or completely. Loosen grease fitting slowly but do not remove.

IMPORTANT: Prevent possible machine damage from gravel or mud packed between sprocket and track. Debris should be removed before loosening track.

- Loosen track adjuster valve (1) by turning valve counterclockwise 1 to 2 turns. Grease will escape through grease fitting (2). Allow track to lower completely.

⚠ CAUTION: Prevent possible injury from unexpected machine movement. Alert bystanders to stay clear before performing procedure.

- To relieve track tension, start machine and slowly rotate track so idler fully retracts.
- Remove cap screws (4) and track roller (3).
- Inspect and repair as necessary. See Track Roller Disassemble and Assemble. (Group 0130.)
- Apply PM37421 Thread Lock and Sealer (high strength) to cap screw threads. Install track roller and tighten cap screws to specification.

Specification

Cap Screw—Torque..... 180 N·m
133 lb.-ft.

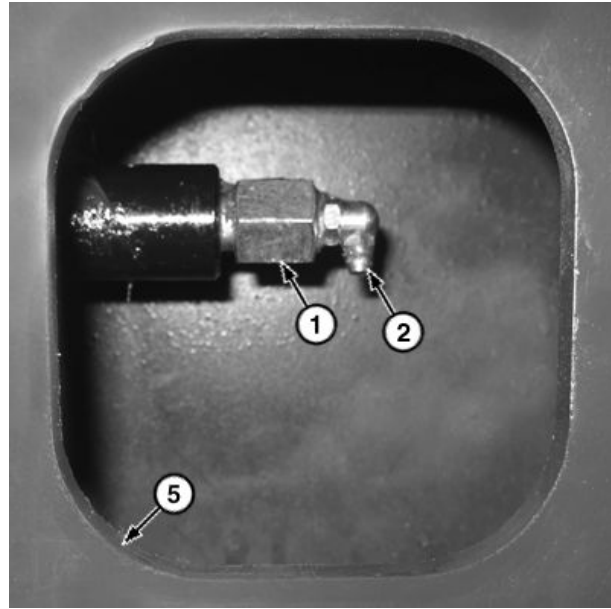
- Tighten track adjuster valve to specification.

Specification

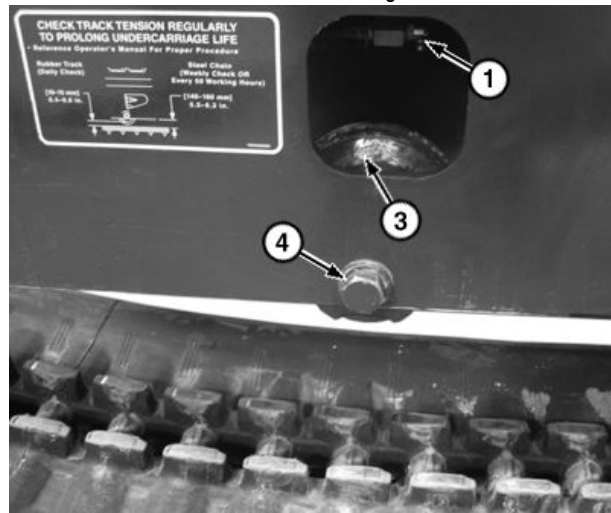
Track Adjuster Valve—Torque..... 90 N·m
66 lb.-ft.

- Adjust track tension. See Check Track Sag—Rubber Track or see Check Track Sag—Steel Track—If Equipped. (Operator's Manual.)

- Raise machine and remove shop stands.
- Lower machine to ground.



Grease Fitting



Track Roller

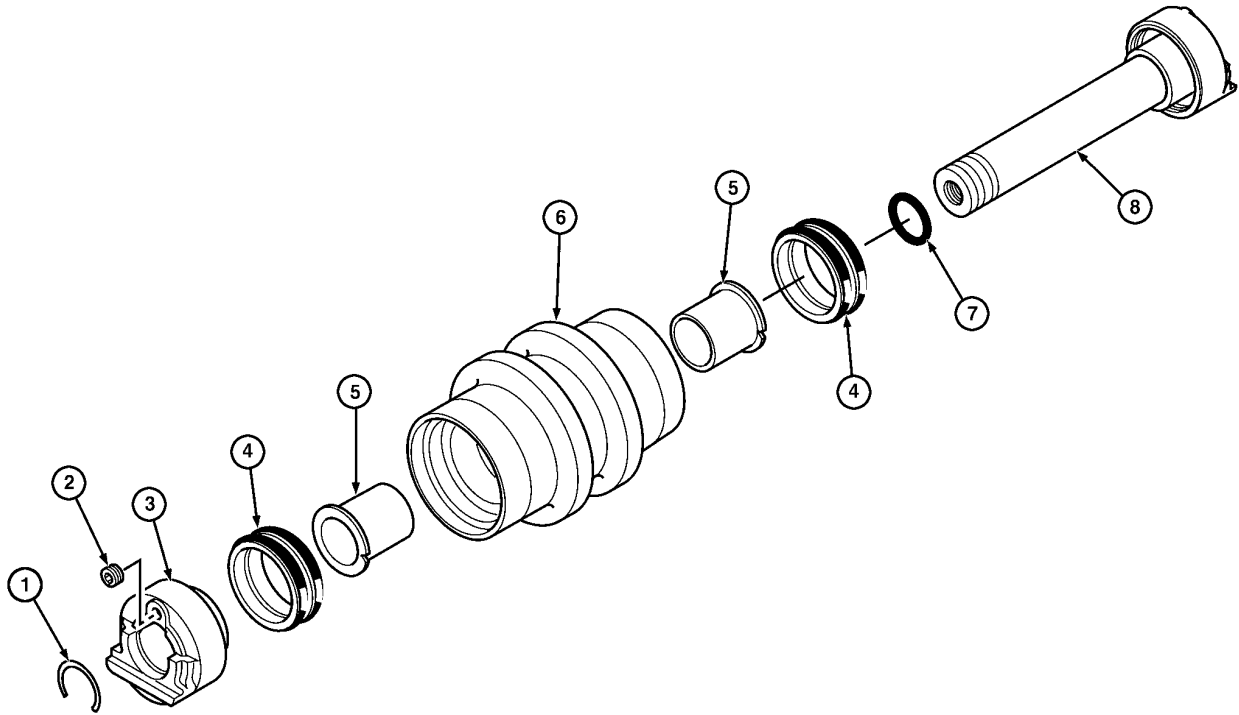
- 1— Track Adjuster Valve
- 2— Grease Fitting
- 3— Track Roller
- 4— Cap Screw (2 used)
- 5— Track Frame

TX1132728A —UN—11MAR13

TX1132919A —UN—13MAR13

JS20420,0000968 -19-27MAR13-2/2

Track Roller Disassemble and Assemble



T121516

Track Roller

- | | | |
|-----------------|-----------------------------|-----------|
| 1— Stopper Ring | 4— Metal Face Seal (2 used) | 6— Roller |
| 2— Oil Plug | 5— Bushing (2 used) | 7— O-Ring |
| 3— Collar | | 8— Axle |

SPECIFICATIONS	
Track Roller (engine oil SAE 30) Capacity	50 mL 1.7 oz.

OTHER MATERIAL	
7649 Loctite® Klean N Prime	
592 Loctite® Pipe Sealant	

- Remove track roller. See Track Roller Remove and Install. (Group 0130.)
- Remove oil plug (2) and drain oil.

Specification

Track Roller (engine oil SAE 30)—Capacity.....	50 mL 1.7 oz.
---	------------------

- Remove stopper ring (1).
- Remove collar (3).

NOTE: Metal face seals can be reused if they are not worn or damaged. A used seal must be kept together as a set because of wear patterns on seal ring face.

For seals that are reused, use a piece of cardboard between seal rings to protect seal face.

- Remove metal face seals (4). Keep seal rings together as a matched set with seal ring faces together to protect surfaces.
- Inspect metal face seals. See Inspect Metal Face Seals. (Group 0130.)
- Remove axle (8) and O-ring (7).

NOTE: Bushings (5) can not be repaired or replaced if worn or damaged.

- Inspect bushings (5). Replace track roller assembly if worn or damaged.
- Inspect and replace parts as necessary. See 35G Track Roller Tread Diameter. (SP326VOL1 Undercarriage Appraisal Manual.)
- Apply a thin film of oil to bushings.

IMPORTANT: Prevent possible machine damage due to improper seal. O-ring and seat surfaces for O-ring must be clean, dry, and oil free so O-ring does not slip when roller is turning. Seat O-ring properly.

- Thoroughly clean O-rings and seat surfaces in brackets and in seal rings using volatile, non-petroleum base solvent and lint-free tissues.

Continued on next page

JS20420,0000969 -19-04APR13-1/2

T121516 —JUN—28OCT99

Track System

12. Wipe fingerprints and foreign material off seal face using clean oil and lint-free tissues. Apply a thin film of oil to each seal ring face.

NOTE: A volatile, non-petroleum base solvent or talcum powder may be used as a lubricant.

13. Install metal face seals into roller (6). Apply equal pressure with fingers at four equally spaced points on seal face. Metal face seal must “pop” down into place so that O-ring is tight against seal bore. A volatile, non-petroleum base solvent or talcum powder may be used as a lubricant.

14. Install O-ring and axle.

15. Install collar.

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16. Install stopper ring.

17. Fill track roller assembly with oil to specification.

Specification

Track Roller (engine oil
SAE 30)—Capacity..... 50 mL
1.7 oz.

18. Apply PM37509 Klean N Prime and PM37397 Pipe Sealant to threads of oil plug. Install oil plug.

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

19. Install track roller. See Track Roller Remove and Install. (Group 0130.)

JS20420,0000969 -19-04APR13-2/2

Track Roller Pressure Test

SPECIFICATIONS	
Track Roller (engine oil SAE 30) Capacity	50 mL 1.7 oz.
Track Roller Pressure	82—138 kPa 0.8—1.4 bar 12—20 psi

OTHER MATERIAL	
7649 Loctite® Klean N Prime	
592 Loctite® Pipe Sealant	

1. Remove track roller. See [Track Roller Remove and Install](#). (Group 0130.)
2. Remove oil plug (7).
3. Fill track roller to specification.

Specification

Track Roller (engine oil SAE 30)—Capacity.....	50 mL 1.7 oz.
--	------------------

4. Assemble parts (1—6).
5. Slowly pressurize track roller to specification.

Specification

Track Roller —Pressure.....	82—138 kPa 0.8—1.4 bar 12—20 psi
-----------------------------	--

6. Close valve and wait 30 seconds. Check for oil leaks or pressure decrease.
7. If leakage is found, disassemble roller and replace parts as necessary. See [Track Roller Disassemble and Assemble](#). (Group 0130.)
8. Fill track roller to specification.

Specification

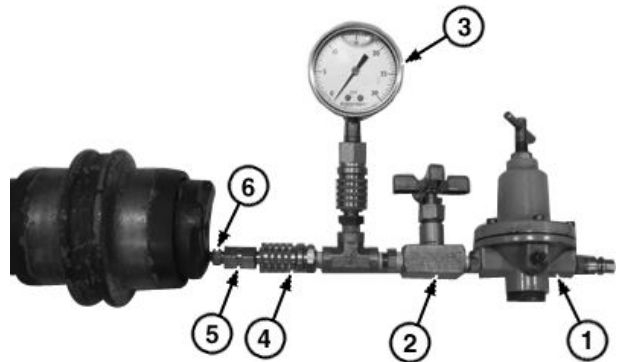
Track Roller (engine oil SAE 30)—Capacity.....	50 mL 1.7 oz.
--	------------------

9. Apply PM37509 Klean N Prime and PM37397 Pipe Sealant to threads of oil plug. Install oil plug.

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Track Roller



Track Roller Pressure Test Equipment

- | | |
|----------------------------|----------------------------|
| 1— Air Pressure Regulator | 5— 1/4 in. Pipe Adapter |
| 2— Needle Valve | 6— 1/4 in. Fitting Adapter |
| 3— Pressure Gauge | 7— Oil Plug |
| 4— 1/4 in. Coupler Fitting | |

TX1132748A —UN—13MAR13

TX1132957A —UN—14MAR13

JS20420,000096A -19-03APR13-1/1

Track Carrier Roller Remove and Install

SPECIFICATIONS

Canopy Machine Weight (approximate)	3520 kg 7760 lb.
Cab Machine Weight (approximate)	3690 kg 8135 lb.
Cap Screw Torque	270 N·m 199 lb.-ft.
Track Adjuster Valve Torque	90 N·m 66 lb.-ft.

OTHER MATERIAL

271 Loctite® Thread Lock and Sealer (high strength)

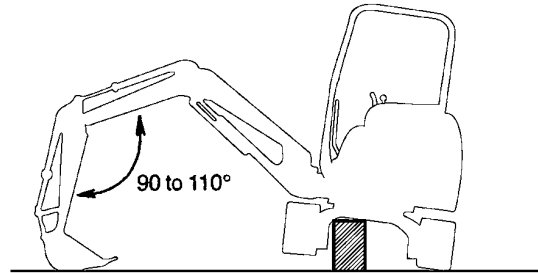
1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid possible injury from unexpected machine movement. Machine could slide backwards causing personal injury. Keep angle between boom and arm 90—110°.

2. Swing upperstructure to the side as shown. Keeping angle between boom and arm at 90—110°, lower boom to raise track off ground.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate supporting equipment.

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T121510

Machine Position

3. Place shop stands under machine.

Specification

Canopy Machine—Weight (approximate).....	3520 kg 7760 lb.
Cab Machine—Weight (approximate).....	3690 kg 8135 lb.

T121510—UN—28OCT99

Continued on next page

JS20420,000096B -19-22MAY13-1/2

⚠ CAUTION: Avoid possible personal injury. Grease fitting is under high pressure and may fly off if loosened too quickly or completely. Loosen grease fitting slowly but do not remove.

IMPORTANT: Prevent possible machine damage from gravel or mud packed between sprocket and track. Debris should be removed before loosening track.

- Loosen track adjuster valve (1) by turning valve counterclockwise 1 to 2 turns. Grease will escape through grease fitting (2). Allow track to lower completely.

⚠ CAUTION: Prevent possible injury from accidental lowering of track by securely supporting track before attempting service procedure.

- Use appropriate jack to raise track (4) enough to permit carrier roller (3) removal.
- Install wood blocks (7) between track and track frame (5).
- Remove cap screw (6) and carrier roller.

NOTE: Track carrier roller can not be disassembled. Replace carrier roller as an assembly.

- Inspect and replace as necessary. See 35G Carrier Roller Tread Diameter. (SP326VOL1 Undercarriage Appraisal Manual.)
- Apply PM37421 Thread Lock and Sealer (high strength) to cap screw. Install track carrier roller and tighten cap screw to specification.

Specification

Cap Screw—Torque.....270 N·m
199 lb.-ft.

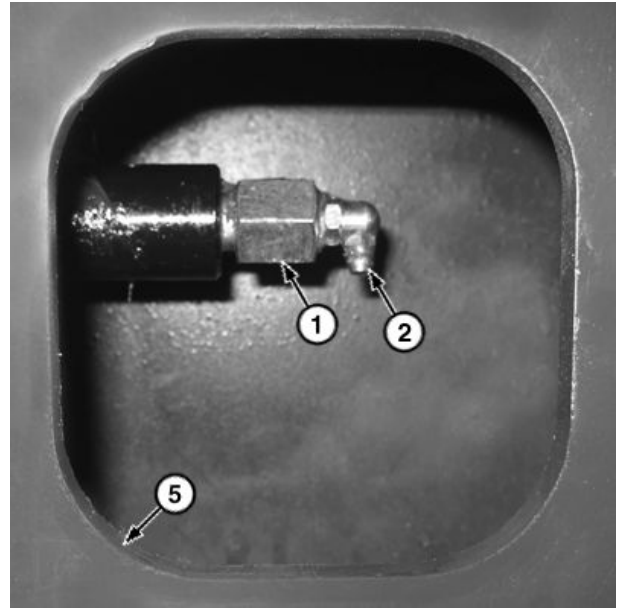
- Remove wood blocks and jack.
- Tighten track adjuster valve to specification.

Specification

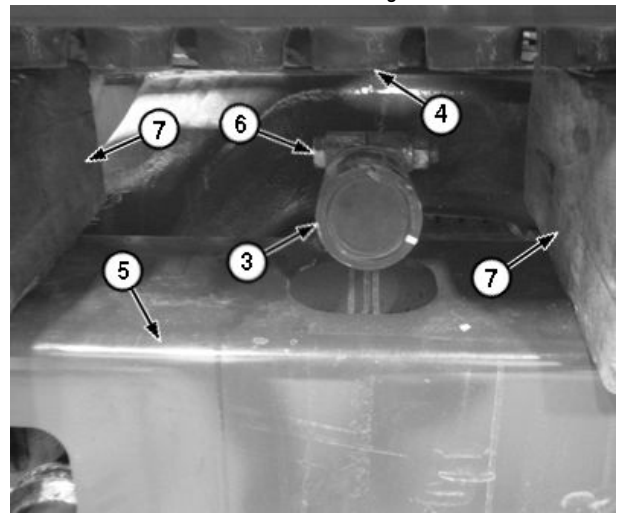
Track Adjuster Valve—Torque.....90 N·m
66 lb.-ft.

- Adjust track tension. See Check Track Sag—Rubber Track or see Check Track Sag—Steel Track—If Equipped. (Operator's Manual.)

- Raise machine and remove shop stands.



Grease Fitting



Carrier Roller

- | | |
|-------------------------|------------------------|
| 1— Track Adjuster Valve | 5— Track Frame |
| 2— Grease Fitting | 6— Cap Screw |
| 3— Carrier Roller | 7— Wood Block (2 used) |
| 4— Track | |

- Lower machine to ground.

JS20420,000096B -19-22MAY13-2/2

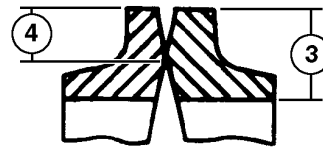
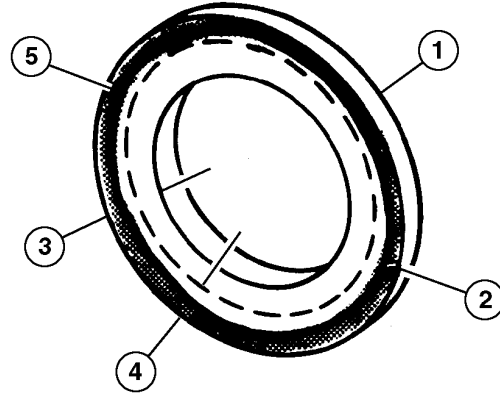
TX1132728A—UN—11MAR13

TX1133001A—UN—14MAR13

Inspect Metal Face Seals

1. Inspect for the following conditions to determine if seals can be reused:
 - a. The narrow, highly polished sealing area (5) must be in the outer half of seal ring face (4).
 - b. Sealing area must be uniform and concentric with the inside diameter and outside diameter of seal ring (1).
 - c. Sealing area must not be chipped, nicked, or scratched.

- | | |
|----------------------------|---------------------------------|
| 1— Seal Ring | 4— Outer Half of Seal Ring Face |
| 2— Worn Area (shaded area) | 5— Sealing Area (dark line) |
| 3— Seal Ring Face | |



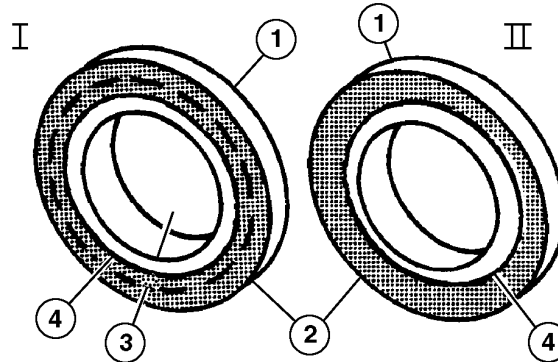
Seal Inspection Areas

JS20420,0000982 -19-04MAR13-1/3

TX1008208 —UN—24MAY06

2. Illustration shows examples of worn seal rings (1).
 - I—Sealing area (4) is in inner half of seal ring face (3).
 - II—Sealing area (4) not concentric with inside diameter and outside diameter of seal ring.

- | | |
|----------------------------|---------------------------------|
| 1— Seal Ring | 3— Inner Half of Seal Ring Face |
| 2— Worn Area (shaded area) | 4— Sealing Area (dark line) |



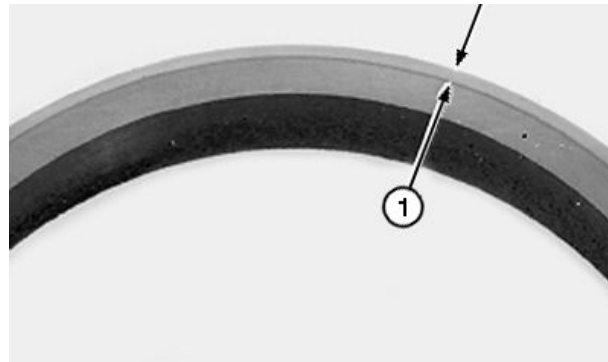
Examples Of Worn Seal Rings

JS20420,0000982 -19-04MAR13-2/3

TX1008209 —UN—31MAY06

3. Clean reusable seals by removing all foreign material from seal rings, except seal face (1), using a scraper or a stiff bristled fiber brush.
 4. Wash seal rings and O-rings using a volatile, non-petroleum base solvent to remove all oil. Thoroughly dry parts using a lint-free tissue.
- Apply a thin film of oil to seal ring face. Put face of seal rings together and hold using tape.

- 1— Seal Face



Seal Face

JS20420,0000982 -19-04MAR13-3/3

TX1008335A —UN—26MAY06

Rubber Track Remove and Install

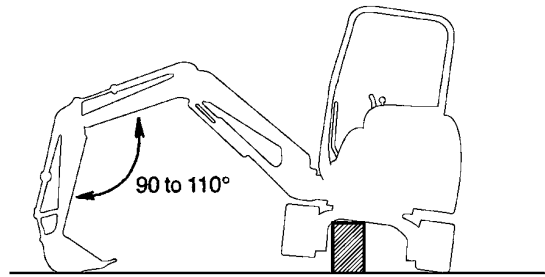
SPECIFICATIONS	
Canopy Machine Weight (approximate)	3520 kg 7760 lb.
Cab Machine Weight (approximate)	3690 kg 8135 lb.
Rubber Track Weight	122 kg 270 lb.
Track Adjuster Valve Torque	90 N·m 66 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid possible injury from unexpected machine movement. Machine could slide backwards causing personal injury. Keep angle between boom and arm 90—110°.

2. Swing upperstructure to the side as shown. Keeping angle between boom and arm at 90—110°, lower boom to raise track off ground.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate supporting equipment.



T121510

Machine Position

3. Place shop stands under machine.

Specification

Canopy Machine—Weight (approximate).....	3520 kg 7760 lb.
Cab Machine—Weight (approximate).....	3690 kg 8135 lb.

T121510—UN—28OCT99

Continued on next page

JS20420.000097A -19-22MAY13-1/3

CAUTION: Avoid possible personal injury. Grease fitting is under high pressure and may fly off if loosened too quickly or completely. Loosen grease fitting slowly but do not remove.

IMPORTANT: Prevent possible machine damage from gravel or mud packed between sprocket and track. Debris should be removed before loosening track.

- Loosen track adjuster valve (1) by turning valve counterclockwise 1 to 2 turns. Grease will escape through grease fitting (2).

CAUTION: Prevent possible injury from unexpected machine movement. Alert bystanders to stay clear before performing procedure.

- To relieve track tension, start machine and slowly rotate track so idler fully retracts.
- Install steel pipes (6) into spaces between sprocket (3) and rubber track (4).

CAUTION: Prevent possible injury. Steel bars may discharge while moving sprocket and cause injury. Adjust engine speed, turn to slow travel (turtle), and alert bystanders to stand clear before performing procedure.

- Rotate sprocket in reverse direction until rubber track (4) is raised off of sprocket by steel pipes.

CAUTION: Prevent possible injury from heavy component. Use appropriate lifting device.

NOTE: A pry bar may assist in sliding rubber track off of sprocket.

- Attach appropriate lifting device to rubber track. Slide rubber track away from track frame (5) and remove.

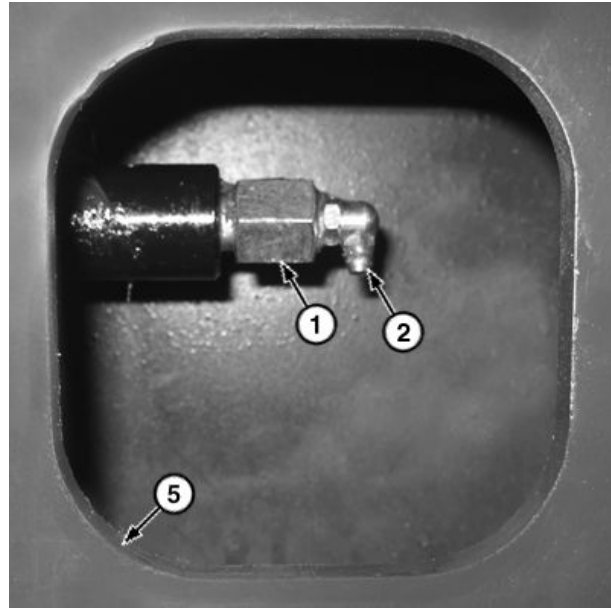
Specification

Rubber Track—Weight
(approximate)..... 122 kg
270 lb.

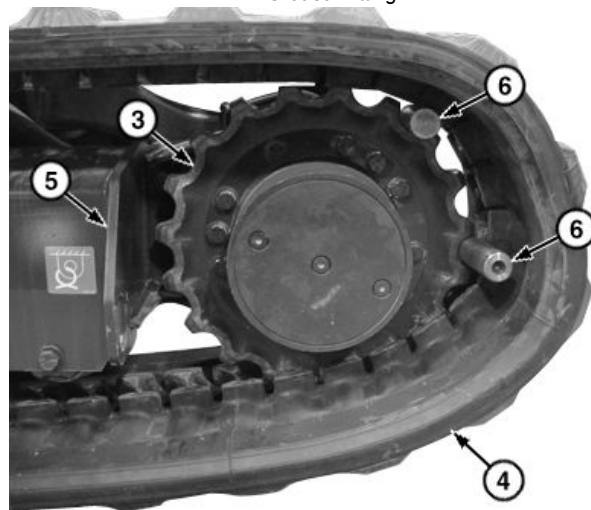
- Inspect track lugs and area between lugs for cracks that exceed 3 mm (0.12 in.) in depth, reach steel core, or exceed 30 mm (1.20 in.) in length. Inspect for any signs of exposed steel core. Inspect roller side of track for cracks that reach steel core. Inspect for separation of steel core anywhere on track. See 35G Lug Height—Rubber Track. (SP326VOL1 Undercarriage Appraisal Manual.)

- Repair or replace as necessary.

CAUTION: Prevent possible injury from heavy component. Use appropriate lifting device.



Grease Fitting



Rubber Track Removal

- | | |
|-------------------------|------------------------|
| 1— Track Adjuster Valve | 4— Rubber Track |
| 2— Grease Fitting | 5— Track Frame |
| 3— Sprocket | 6— Steel Pipe (2 used) |

NOTE: A pry bar may assist in guiding rubber track over front idler.

- Using appropriate lifting device, install rubber track on sprocket teeth and guide opposite end over front idler.

Specification

Rubber Track—Weight
(approximate)..... 122 kg
270 lb.

TX1132728A —UN—11MAR13

TX1133029A —UN—14MAR13

Track System

⚠ CAUTION: Prevent possible injury from unexpected machine movement. Alert bystanders to stay clear before performing procedure.

IMPORTANT: Avoid possible damage to track or sprocket. Make sure rubber track is securely engaged on sprocket and front idler.

12. Rotate sprocket in reverse direction to sufficiently mesh rubber track on to sprocket and position completely on to front idler.

13. Tighten track adjuster valve to specification.

Specification

Track Adjuster Valve—Torque.....	90 N-m 66 lb.-ft.
----------------------------------	----------------------

14. Adjust track tension. See Check Track Sag—Rubber Track. (Operator's Manual.)

15. Raise machine and remove shop stands.

16. Lower machine to ground.

JS20420,000097A -19-22MAY13-3/3

Track Shoe Remove and Install

SPECIFICATIONS

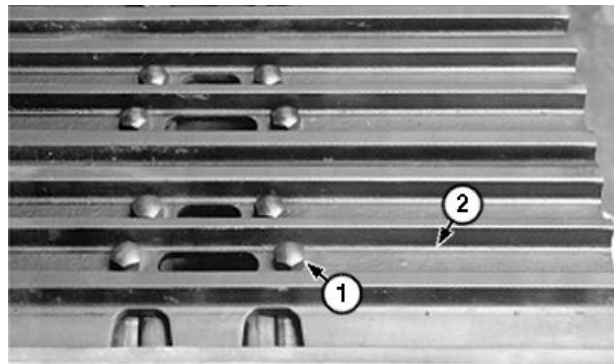
Cap Screw Torque	140 N-m 103 lb.-ft.
------------------	------------------------

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove cap screws (1), nuts (5), and track shoe (2).
3. Inspect and replace parts as necessary. See 35G Grouser Height—Steel Track. (SP326VOL1 Undercarriage Appraisal Manual.)
4. Apply a light coat of lubrication to cap screw threads and install shoe.

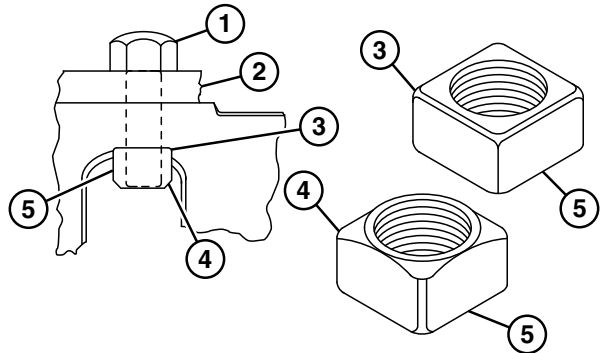
IMPORTANT: Prevent possible machine damage from improperly installed nut. Always install nut with rounded edges (3) against track link and chamfered edges (4) away from the link.

5. Install cap screws and properly position nuts.

- | | |
|-----------------------|-------------------|
| 1— Cap Screw (4 used) | 4— Chamfered Edge |
| 2— Track Shoe | 5— Nut (4 used) |
| 3— Rounded Edge | |



Track Shoes



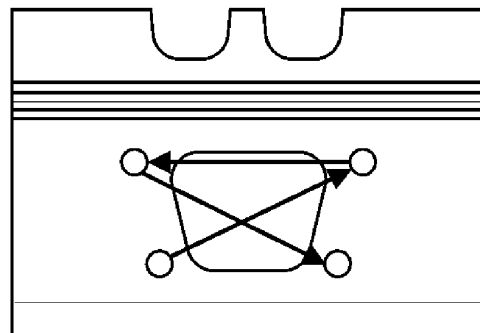
Track Shoe Cap Screw and Nut

JS20420,000096D -19-22MAY13-1/2

6. Tighten cap screws to specification in sequence shown.

Specification

Cap Screw—Torque.....	140 N-m 103 lb.-ft.
-----------------------	------------------------



Cap Screw Tightening Sequence

JS20420,000096D -19-22MAY13-2/2

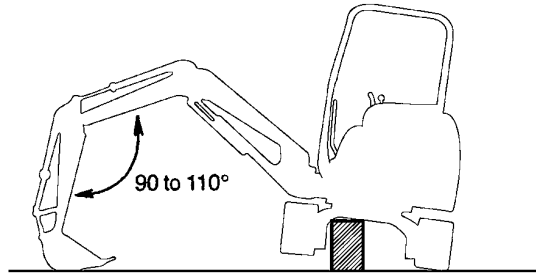
Track Chain Remove and Install

SPECIFICATIONS

Canopy Machine Weight (approximate)	3520 kg 7760 lb.
Cab Machine Weight (approximate)	3690 kg 8135 lb.
Track Chain Weight (approximate)	285 kg 630 lb.
Track Adjuster Valve Torque	90 N·m 66 lb.-ft.

ESSENTIAL TOOLS

ST1970 Press Tool



T121510

Machine Position

T121510—UN—28OCT99

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid possible injury from unexpected machine movement. Machine could slide backwards causing personal injury. Keep angle between boom and arm 90—110°.

2. Swing upperstructure to the side as shown. Keeping angle between boom and arm at 90—110°, lower boom to raise track off ground.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate supporting equipment.

3. Place shop stands under machine.

Specification

Canopy Machine—Weight (approximate).....	3520 kg 7760 lb.
Cab Machine—Weight (approximate).....	3690 kg 8135 lb.

4. Rotate track in both directions to clear track chain of mud and debris.

Continued on next page

JS20420,0000A8E -19-22MAY13-1/3

Track System

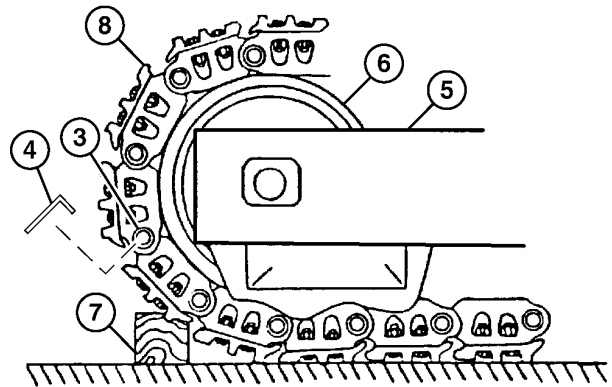
5. Rotate track until master pin (3) is positioned over front idler (6).
6. With boom still at side of machine and keeping the angle between boom and arm at 90—110°, lower boom to raise machine off floor stands.
7. Remove floor stands and lower track to ground.

⚠ CAUTION: Avoid possible personal injury. Grease fitting is under high pressure and may fly off if loosened too quickly or completely. Loosen grease fitting slowly and do not remove.

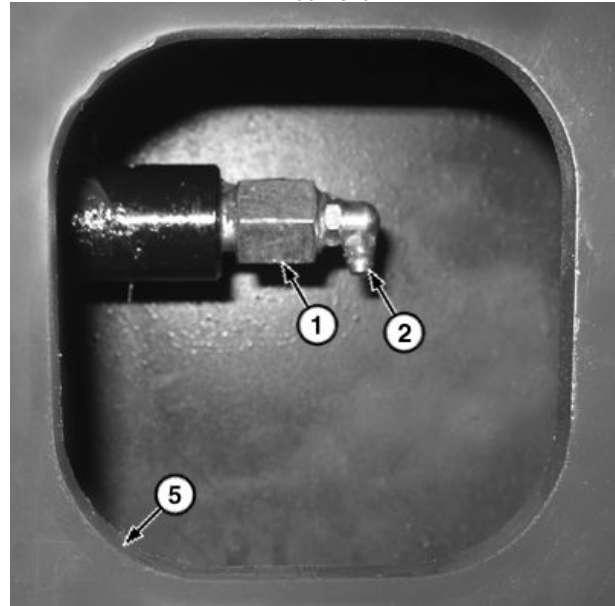
IMPORTANT: Prevent possible machine damage from gravel or mud packed between sprocket and track. Debris should be removed before loosening track.

8. Loosen track adjuster valve (1) counterclockwise 1 to 2 turns. Grease will escape through grease fitting (2).
9. Place wood block (7) in front of track to support bar on grouser (8).
10. Remove track shoes on each side of track chain master pin. See Track Shoe Remove and Install. (Group 0130.)
11. Remove retainer (4).
12. Remove master pin using ST1970 Press Tool and a hammer.

- | | |
|------------------------|---------------|
| 1—Track Adjuster Valve | 5—Track Frame |
| 2—Grease Fitting | 6—Front Idler |
| 3—Master Pin | 7—Wood Block |
| 4—Retainer | 8—Grouser |



Track Chain



Track Adjuster Valve

TX1133754 —UN—25MAR13

TX1132728A —UN—11MAR13

Continued on next page

JS20420,0000A8E -19-22MAY13-2/3

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

13. Using appropriate lifting device, remove track from front idler (6).

Specification

Track Chain—Weight (approximate).....	285 kg 630 lb.
---------------------------------------	-------------------

CAUTION: Avoid possible injury from machine sliding backwards. Keep angle between boom and arm at 90—110°.

14. With boom still at side of machine and keeping the angle between boom and arm at 90—110°, lower boom to raise track off ground.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate supporting equipment.

15. Place shop stands under machine.

Specification

Canopy Machine—Weight (approximate).....	3520 kg 7760 lb.
Cab Machine—Weight (approximate).....	3690 kg 8135 lb.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

16. Using appropriate lifting device attached to track chain, slowly rotate travel motor in reverse direction to remove chain, guiding the chain over carrier roller and sprocket.

17. Remove track chain.

18. Inspect and repair as necessary. See Track Chain Disassemble and Assemble. (Group 0130.)

NOTE: Check track direction before installing on sprocket.

19. Align track chain under rollers, front idler, and sprocket. Check the direction of the track at this time.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

20. Using appropriate lifting device, lift and place leading edge of track chain on to sprocket.



Track Chain Removal

6— Front Idler

Specification

Track Chain—Weight (approximate).....	285 kg 630 lb.
---------------------------------------	-------------------

21. Rotate sprocket in forward direction and guide track chain over carrier roller until it reaches front idler.

22. Place wood block under grouser in front of idler to support track shoe.

23. Install both ends of track chain together. Install master pin and retainer.

24. Install track shoes. See Track Shoe Remove and Install. (Group 0130.)

25. Tighten track adjuster valve to specification and fill grease fitting.

Specification

Track Adjuster Valve—Torque.....	90 N·m 66 lb.-ft.
----------------------------------	----------------------

26. Adjust track tension. See Check Track Sag—Steel Track—If Equipped. (Operator's Manual.)

CAUTION: Avoid possible injury from machine sliding backwards. Keep angle between boom and arm at 90—110°.

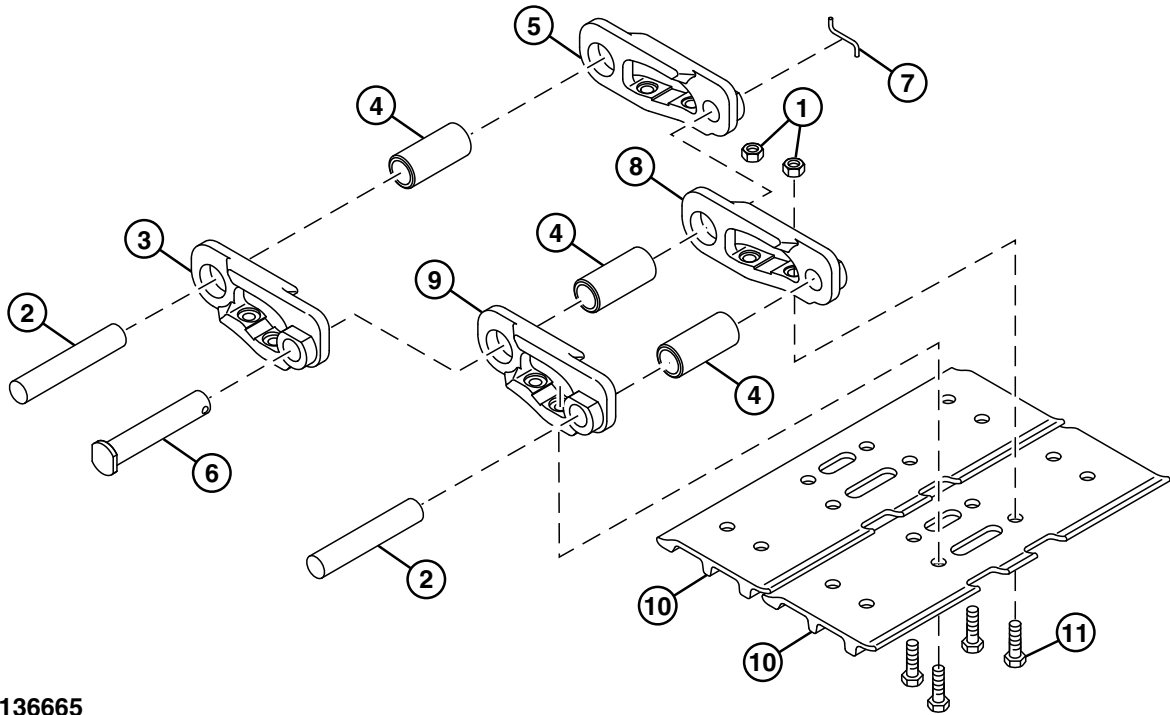
27. With boom still at side of machine and keeping the angle between boom and arm at 90—110°, lower boom to raise machine off shop stands.

28. Remove shop stands.

29. Lower machine to ground.

TX113429A—UN—19MAR13

Track Chain Disassemble and Assemble



TX1136665

Track Chain Exploded View

- | | | |
|---------------------------|-------------------------------|------------------------------|
| 1— Nut (156 used) | 5— Master Link (right hand) | 9— Link (left hand, 38 used) |
| 2— Pin (38 used) | 6— Master Pin | 10— Track Shoe (39 used) |
| 3— Master Pin (left hand) | 7— Retainer | 11— Cap Screw (156 used) |
| 4— Bushing (39 used) | 8— Link (right hand, 38 used) | |

SPECIFICATIONS	
Track Chain Master Pin Outside Diameter (new)	21.83 mm 0.86 in.
Track Chain Master Pin Outside Diameter (limit of use)	19.20 mm 0.756 in.
Track Chain Track Pin Outside Diameter (new)	22.15 mm 0.872 in.
Track Chain Track Pin Outside Diameter (limit of use)	20.30 mm 0.80 in.
Track Chain Bushing Inside Diameter (new)	22.50 mm 0.886 in.
Track Chain Bushing Inside Diameter (limit of use)	23.50 mm 0.925 in.
Track Chain Bushing Outside Diameter (new)	35.10 mm 1.382 in.
Track Chain Bushing Outside Diameter (limit of use)	33 mm 1.30 in.

ESSENTIAL TOOLS
ST1970 Press Tool

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

1. Remove track chain. See Track Chain Remove and Install. (Group 0130.)
2. Remove pins (2) using ST1970 Special Tool and a hammer.
3. Remove track shoes (10). See Track Shoe Remove and Install. (Group 0130.)
4. Remove bushings (4), master links (3 and 5), and links (8 and 9).

Continued on next page

JS20420.0000A8F -19-21MAY13-1/2

Track System

5. Inspect master pin (6), pins, and bushings. Replace parts not in specification.

Specification

Track Chain Master	
Pin—Outside Diameter	
(new).....	21.83 mm 0.86 in.
Track Chain Master	
Pin—Outside Diameter	
(limit of use).....	19.20 mm 0.756 in.
Track Chain Track	
Pin—Outside Diameter	
(new).....	22.15 mm 0.872 in.
Track Chain Track	
Pin—Outside Diameter	
(limit of use).....	20.30 mm 0.80 in.
Track Chain	
Bushing—Inside	
Diameter (new).....	22.50 mm 0.886 in.
Track Chain	
Bushing—Inside	
Diameter (limit of use).....	23.50 mm 0.925 in.
Track Chain	
Bushing—Outside	
Diameter (new).....	35.10 mm 1.382 in.

Track Chain	
Bushing—Outside	
Diameter (limit of use).....	33 mm 1.30 in.

6. Measure track chain link height. See 35G Track Chain Link Height. (SP326VOL1 Undercarriage Appraisal Manual.)
7. Measure track chain link pitch. See 35G Track Chain Pitch. (SP326VOL1 Undercarriage Appraisal Manual.)
8. Measure grouser height. See 35G Grouser Height—Steel Track. (SP326VOL1 Undercarriage Appraisal Manual.)
9. Repair and replace parts as necessary.
10. Clean dust or rust from surfaces of track chain components.
11. Apply grease to bores in track links, bushing seals, and end of bushings.
12. Install bushings to master links.
13. Install bushings to links.
14. Install pins.
15. Install track shoes. See Track Shoe Remove and Install. (Group 0130.)
16. Install track chain. See Track Chain Remove and Install. (Group 0130.)

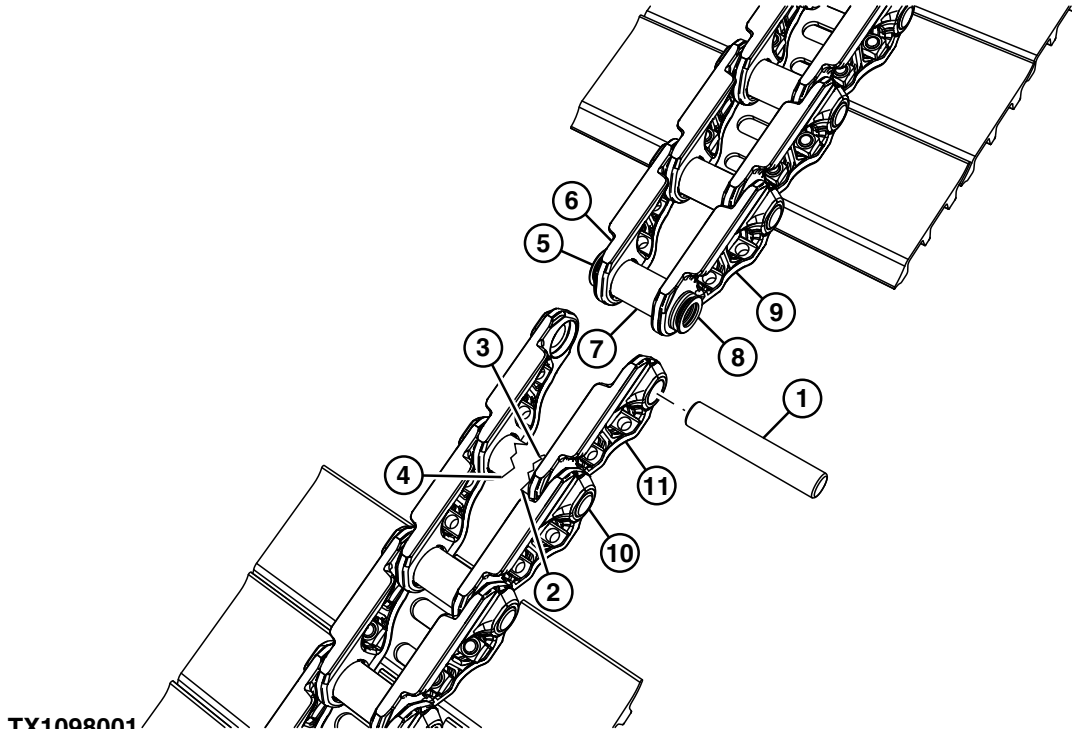
JS20420,0000A8F -19-21MAY13-2/2

Track Chain Repair to Replace Broken Part

NOTE: This procedure is to address a broken track pin or broken track link.

1. Remove three track shoes surrounding damaged area. See Track Shoe Remove and Install. (Group 0130.)

Broken Track Pin Replacement



TX1098001

TX1098001—UN—16SEP11

- 1— Broken Track Pin
- 2— Bushing
- 3— Cut Point

- 4— Cut Point
- 5— Grind Point
- 6— Track Link

Track Pin

- 7— Bushing
- 8— Grind Point
- 9— Track Link
- 10— Track Pin

- 11— Track Link Assembly

NOTE: All track pins, bushings, and links will be discarded and replaced with new parts.

IMPORTANT: Avoid damage to good parts. Use care when operating cutting torch.

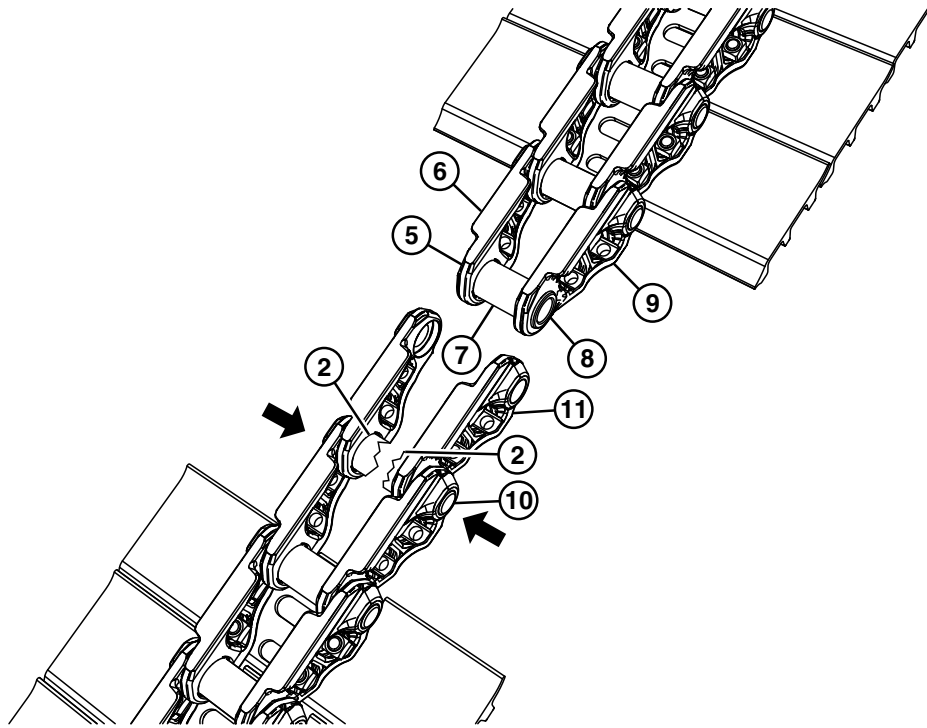
2. Remove broken track pin (1).

3. Cut bushing (2) and pin at cut points (3 and 4).

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JS20420.0000AEA -19-21MAY13-1/6

Track System



TX1098002

TX1098002 —UN—21SEP11

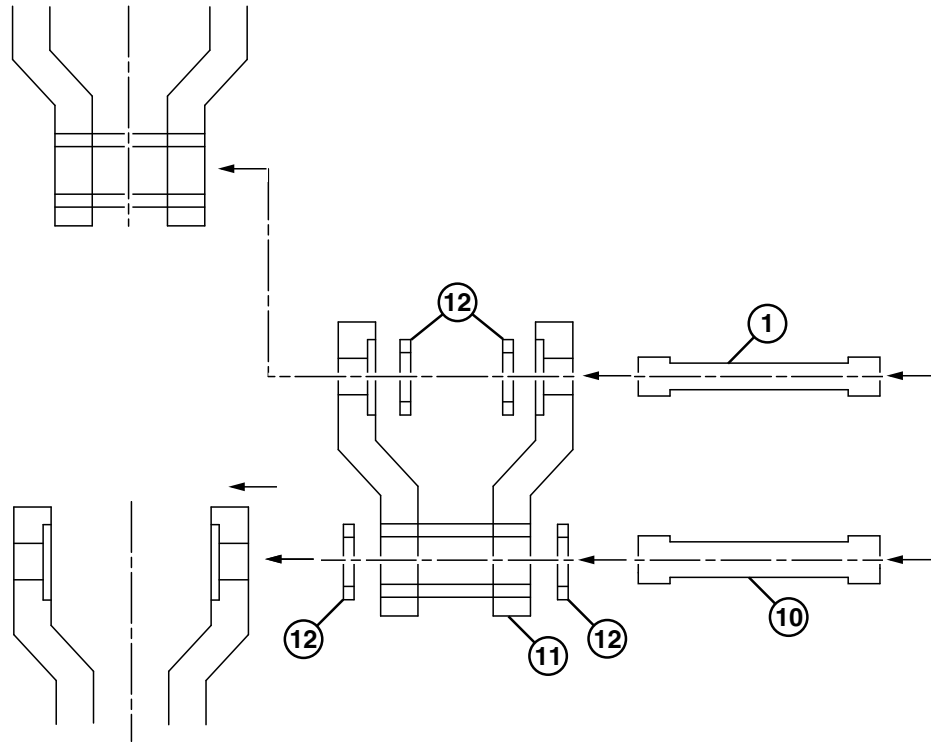
Bushing

- | | | |
|----------------|----------------|-------------------------|
| 2— Bushing | 7— Bushing | 10— Track Pin |
| 5— Grind Point | 8— Grind Point | 11— Track Link Assembly |
| 6— Track Link | 9— Track Link | |

4. Push remaining sections of bushing (2) and track pin (10) inward to remove and discard damaged parts.
5. Grind bushing (7) at grind points (5 and 8) until flush with track links (6 and 9).
6. Inspect and replace parts as necessary.

Continued on next page

JS20420,0000AEA -19-21MAY13-2/6



TX1098003

Track Link Assembly

1— Replacement Track Pin
10— Replacement Track Pin

11— Replacement Track Link
Assembly

12— Collar (4 used)

7. Install replacement track link assembly (11) and collars (12).
8. Install replacement track pin (10).
9. Install replacement track pin (1).
10. Install three track shoes surrounding damaged area.
See Track Shoe Remove and Install. (Group 0130.)

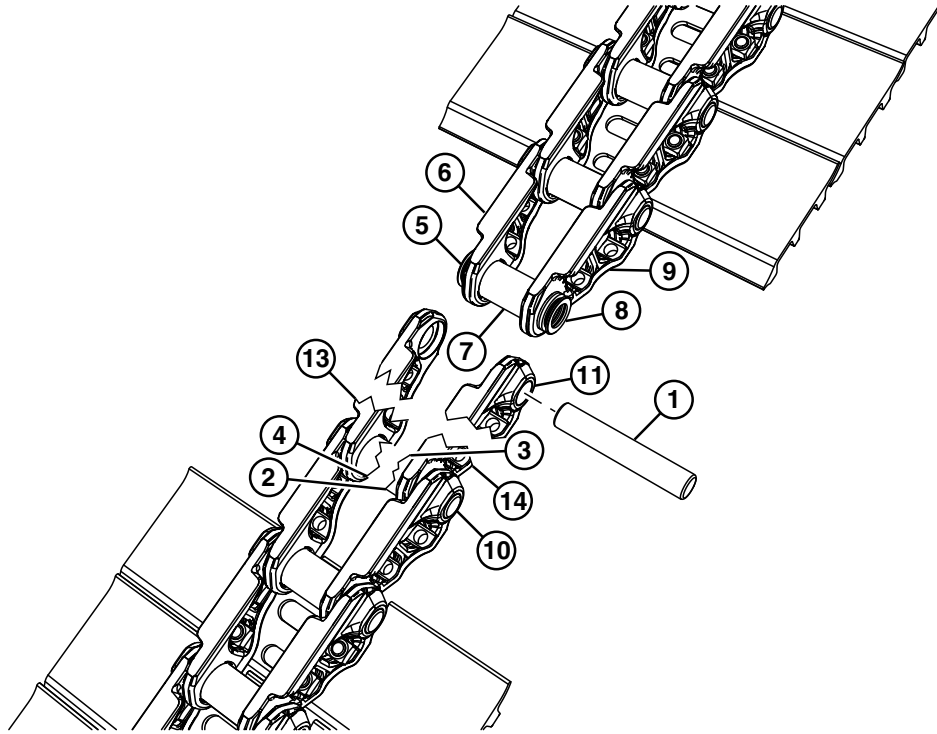
Broken Track Link Assembly Replacement

1. Remove three track shoes surrounding damaged area.
See Track Shoe Remove and Install. (Group 0130.)

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JS20420,0000AEA -19-21MAY13-3/6

TX1098003 —UN—16SEP11



TX1098008—UN—16SEP11

TX1098008

Track Pin

- 1— Track Pin
- 2— Bushing
- 3— Cut Point
- 4— Cut Point

- 5— Grind Point
- 6— Track Link
- 7— Bushing
- 8— Grind Point

- 9— Track Link
- 10— Track Pin
- 11— Track Link Assembly

- 13— Cut Point
- 14— Cut Point

IMPORTANT: Avoid damage to good parts. Use care when operating cutting torch.

IMPORTANT: Avoid damage to good parts. Use care when operating cutting torch.

NOTE: All track pins, bushings, and links will be discarded and replaced with new parts.

2. Cut bushing (2) and pin at cut points (3 and 4).

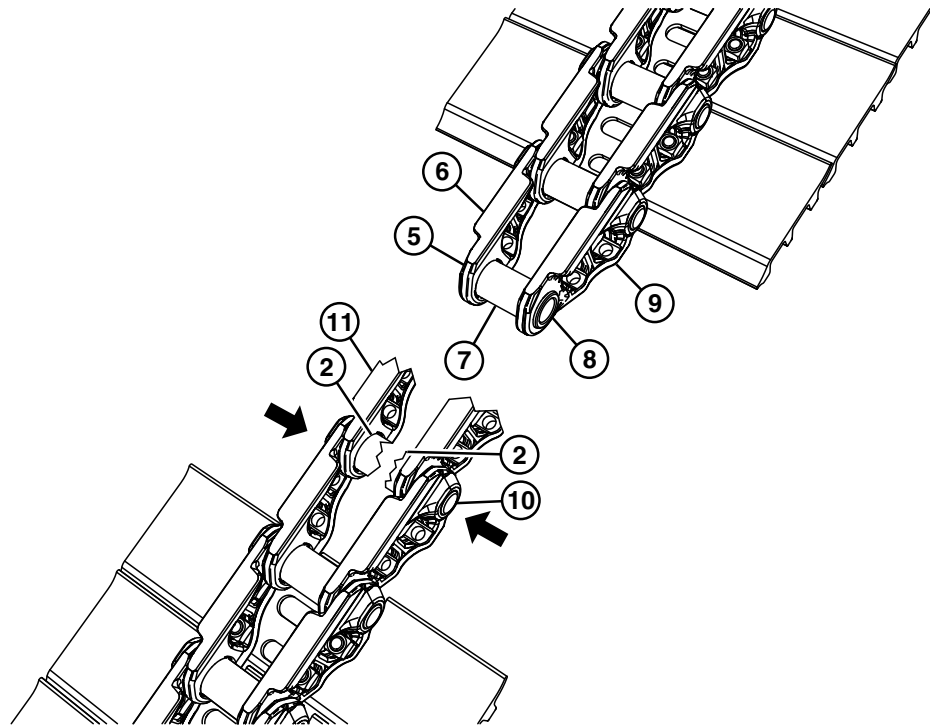
3. Cut track link assembly (11) at cut points (13 and 14).

4. Remove track pin (1) and remaining sections of track link assembly (11). Discard damaged parts.

Continued on next page

JS20420,0000AEA -19-21MAY13-4/6

Track System



TX1098035

2— Bushing
5— Grind Point

6— Track Link
7— Bushing
8— Grind Point

10— Track Pin
11— Track Link Assembly

Bushing

5. Push remaining sections of track pin (10) and track link assembly (11) inward to remove and discard damaged parts.
6. Grind bushing (7) at grind points (5 and 8) until flush with track links (6 and 9).

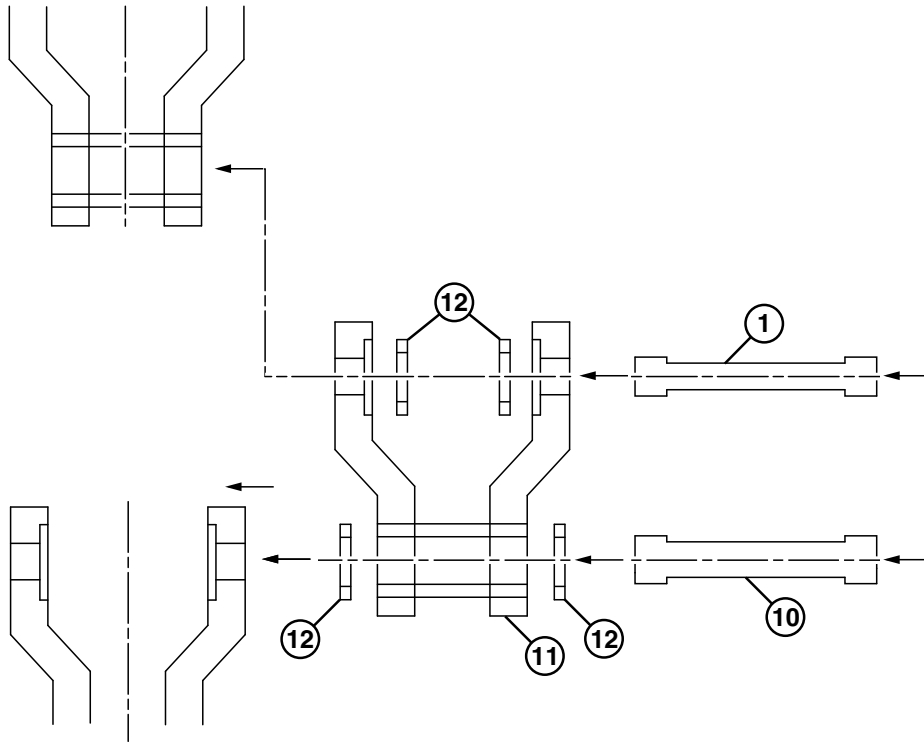
7. Inspect and replace parts as necessary.

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JS20420,0000AEA -19-21MAY13-5/6

TX1098035 —UN—21SEP11

Track System



TX1098003—UN—16SEP11

TX1098003

Track Link Assembly

- | | | |
|---------------------------|-------------------------------------|---------------------|
| 1— Replacement Track Pin | 11— Replacement Track Link Assembly | 12— Collar (4 used) |
| 10— Replacement Track Pin | | |

8. Install replacement track link assembly (11) and collars (12).
9. Install replacement track pin (10).
10. Install replacement track pin (1).
11. Install three track shoes surrounding damaged area. See Track Shoe Remove and Install. (Group 0130.)

JS20420,0000AEA -19-21MAY13-6/6

Sprocket Remove and Install

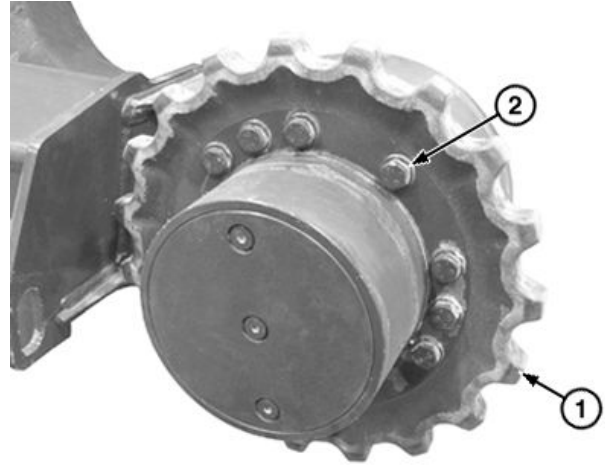
SPECIFICATIONS	
Cap Screw Torque	110 N·m 81 lb.-ft.

OTHER MATERIAL	
7649 Loctite® Klean N Prime	
271 Loctite® Thread Lock and Sealer (high strength)	

NOTE: Prevent excessive wear to track. Sprocket must be replaced when the tooth tips become excessively rounded, worn, or chipped. If machine is driven in one direction a majority of the time, wear will be on one side of teeth. To extend service life, change sprockets from one side of machine to the other.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove track. See Rubber Track Remove and Install or see Track Chain Remove and Install. (Group 0130.)
3. Remove cap screws (2) and sprocket (1).
4. Repair or replace as necessary.
5. Apply PM37509 Klean N Prime and PM37421 Thread Lock and Sealer (high strength) to threads of cap screws.
6. Install sprocket.

Loctite is a trademark of Henkel Corporation



Sprocket

1— Sprocket

2— Cap Screw (12 used)

7. Install cap screws and tighten to specification.

Specification

Cap Screw—Torque.....	110 N·m 81 lb.-ft.
-----------------------	-----------------------

8. Install track. See Rubber Track Remove and Install or see Track Chain Remove and Install. (Group 0130.)

TX1133091A—JUN—15MAY13

JS20420.0000971 -19-03APR13-1/1

Front Idler Remove and Install

SPECIFICATIONS

Front Idler Weight (approximate)	26 kg 58 lb.
----------------------------------	-----------------

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove track. See Rubber Track Remove and Install or see Track Chain Remove and Install. (Group 0130.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

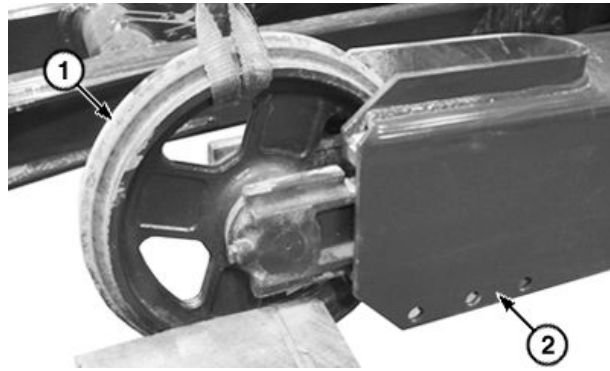
3. Attach appropriate lifting device to support front idler (1).

Specification

Front Idler—Weight (approximate).....	26 kg 58 lb.
---------------------------------------	-----------------

4. Remove front idler from track frame (2).
5. Measure front idler wear. See 35G Front Idler Flange Height. (SP326VOL1 Undercarriage Appraisal Manual.)
6. Repair or replace as necessary. See Front Idler Disassemble and Assemble. (Group 0130.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.



Front Idler

1— Front Idler

2— Track Frame

7. Using an appropriate lifting device, install front idler.

Specification

Front Idler—Weight (approximate).....	26 kg 58 lb.
---------------------------------------	-----------------

8. Install track. See Rubber Track Remove and Install or see Track Chain Remove and Install. (Group 0130.)
9. Adjust track tension. See Check Track Sag—Rubber Track. (Operator's Manual.)

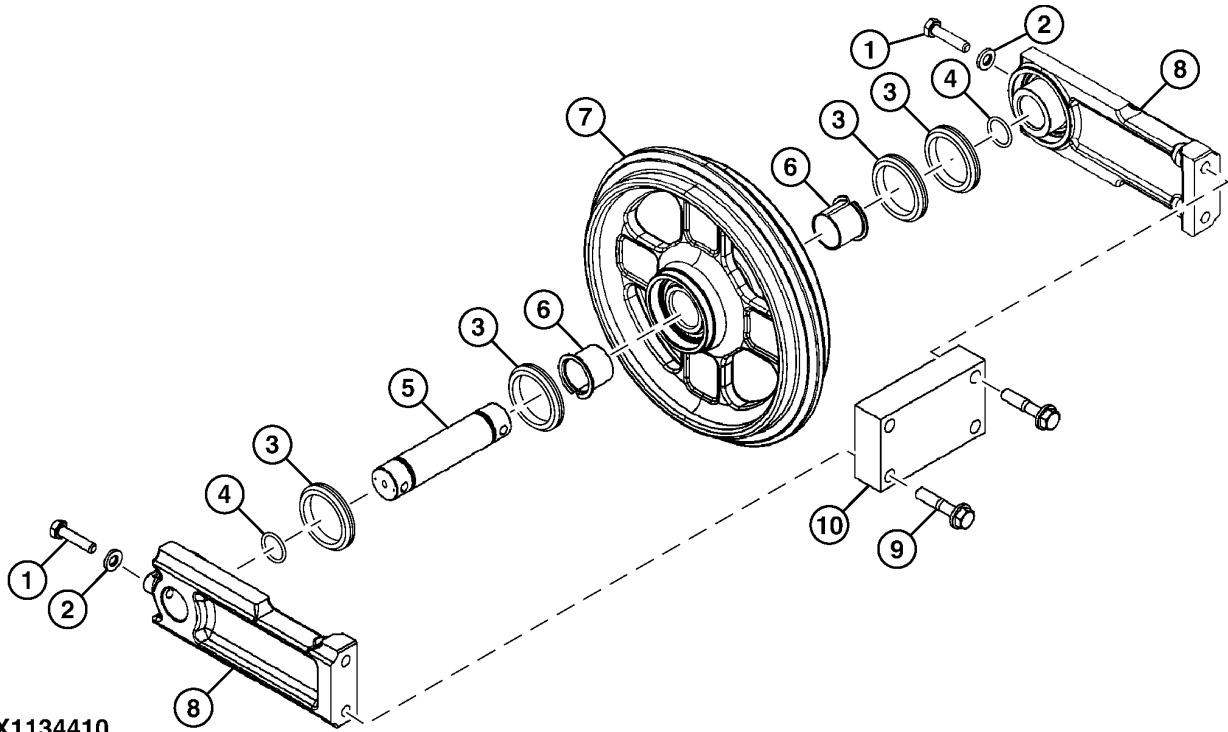
TX 1192776A —UN—12MAR13

JS20420,0000972 -19-17MAY13-1/1

Front Idler Disassemble and Assemble

SPECIFICATIONS	
Front Idler Weight (approximate)	26 kg 57 lb
Yoke-to-Axle Cap Screw Torque	65 N·m 48 lb·ft
Front Idler Capacity	30 mL 1.01 fl oz
Yoke-to-Plate Cap Screw Torque	90 N·m 66 lb·ft

OTHER MATERIAL
TY24811 U.S. NEVER-SEEZ® Anti-Seize Lubricant
PM37421 U.S. Thread Lock and Sealer (high strength)
271 Loctite® Thread Lock and Sealer (high strength)



TX1134410

Front Idler

- | | | | |
|-----------------------------|---------------------|-----------------------|-----------|
| 1— Cap Screw (2 used) | 4— O-Ring (2 used) | 7— Idler | 10— Plate |
| 2— Washer (2 used) | 5— Axle | 8— Yoke (2 used) | |
| 3— Metal Face Seal (2 used) | 6— Bushing (2 used) | 9— Cap Screw (4 used) | |

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

For seals that are reused, use a piece of cardboard between seal rings to protect seal face.

- Remove front idler using appropriate lifting device. See Front Idler Remove and Install. (Group 0130.)

- Remove metal face seals (3). Keep seal rings together as a matched set with seal ring faces together to protect surfaces.

Specification

Front Idler—Weight
(approximate)..... 26 kg
57 lb

- Remove cap screws (9) and plate (10).
- Remove cap screws (1), washers (2), and yokes (8).

- Inspect metal face seals. See Inspect Metal Face Seals. (Group 0130.)

- Remove O-rings (4) and axle (5).

NOTE: Bushings (6) cannot be repaired if worn or damaged, do not remove unless necessary.

NOTE: Metal face seals (3) can be reused if they are not worn or damaged. A used seal must be kept together as a set because of wear patterns on seal ring face.

- Inspect bushings (6). Replace bushings if worn or damaged.

Continued on next page

JS20420,0000973 -19-18FEB21-1/3

8. Inspect and replace parts as necessary. See 35G Front Idler Flange Height. (SP326VOL1 Undercarriage Appraisal Manual.)

IMPORTANT: To prevent seizing, apply clean engine oil to parts before assembling.

9. Apply a thin film of engine oil to bushings. Install bushings so flange is tight against shoulder of idler (7).
 10. Wipe fingerprints and foreign material off seal face using clean oil and lint-free tissues. Apply a thin film of engine oil to each metal face seal surface.

IMPORTANT: Prevent possible machine damage due to improper seal. Face seal O-rings and seat surfaces for O-rings must be clean, dry, and oil free so O-rings do not slip when idler is turning. Seat O-rings properly.

NOTE: A volatile, non-petroleum base solvent or talcum powder may be used as a lubricant.

11. Thoroughly clean O-rings and seat surfaces using volatile, non-petroleum base solvent, and lint-free tissues.

NOTE: Repeat procedure for opposite side.

12. Install metal face seal in yoke. Apply equal pressure with fingers at four equally spaced points on seal face.

*NEVER-SEEZ is a trademark of Emhart Chemical Group
 Loctite is a trademark of Henkel Corporation*

Metal face seal must “pop” down into place so O-ring is tight against seal bore.

NOTE: Repeat procedure for opposite side.

13. Install metal face seal in idler. Apply equal pressure with fingers at four equally spaced points on seal face. Metal face seal must “pop” down into place so O-ring is tight against seal bore.
 14. Wipe fingerprints and foreign material off seal face using clean oil and lint-free tissues. Apply a thin film of engine oil to each seal ring face.
 15. Install axle and O-rings.
 16. Apply a thin layer of TY24811 NEVER-SEEZ® Anti-Seize Lubricant to end of one side of axle from O-ring grooves to bore of yoke.
 17. Install one yoke on axle.
 18. Apply PM37421 Thread Lock and Sealer (high strength) to threads of cap screw (1). Install washer (2) and cap screw (1) to yoke and tighten to specification.

Specification

Yoke-to-Axle Cap	
Screw—Torque.....	65 N·m 48 lb·ft

Continued on next page

JS20420,0000973 -19-18FEB21-2/3

19. Place idler assembly on a work bench with yoke installed side facing down.

IMPORTANT: To prevent seizing, apply clean engine oil between idler (7) and axle (5) to specification.

20. Fill area with engine oil between idler (7) and axle (5) to specification.

Specification	
Front Idler—Capacity.....	30 mL 1.01 fl oz

21. Apply a thin layer of TY24811 NEVER-SEEZ® Anti-Seize Lubricant to end of axle from O-ring grooves to bore of yoke.

22. Install second yoke on axle.

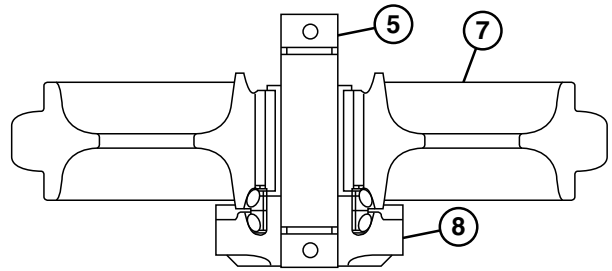
23. Apply PM37421 Thread Lock and Sealer (high strength) to threads of cap screw (1). Install washer (2) and cap screw (1) to yoke and tighten to specification.

Specification	
Yoke-to-Axle Cap Screw—Torque.....	.65 N·m 48 lb·ft

24. Install plate and tighten cap screws (9) to specification.

Specification	
Yoke-to-Plate Cap Screw—Torque.....	.90 N·m 66 lb·ft

NEVER-SEEZ is a trademark of Bostik Findley Inc.



Front Idler Lubrication

5— Axle
7— Idler

8— Yoke

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

25. Install front idler using appropriate lifting device. See [Front Idler Remove and Install](#). (Group 0130.)

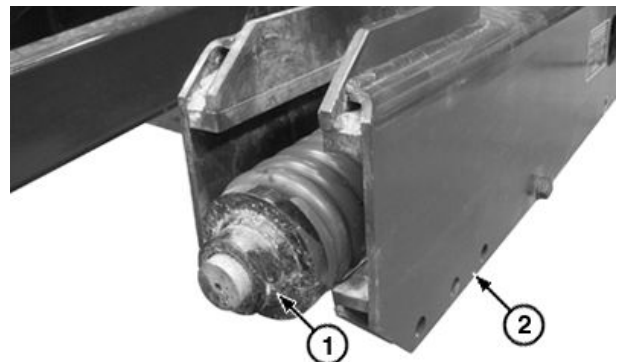
Specification	
Front Idler—Weight (approximate).....	26 kg 57 lb

JS20420,0000973 -19-18FEB21-3/3

TX1134411 —UN—05APR13

Track Adjuster and Recoil Spring Remove and Install

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)
2. Remove track. See [Rubber Track Remove and Install](#) or see [Track Chain Remove and Install](#). (Group 0130.)
3. Remove front idler. See [Front Idler Remove and Install](#). (Group 0130.)
4. Remove track adjuster and recoil spring (1) from track frame (2).
5. Repair or replace parts as necessary. See [Track Adjuster and Recoil Spring Disassemble and Assemble](#). (Group 0130.)
6. Install track adjuster and recoil spring into track frame.
7. Install front idler. See [Front Idler Remove and Install](#). (Group 0130.)
8. Install track. See [Rubber Track Remove and Install](#) or see [Track Chain Remove and Install](#). (Group 0130.)



Track Adjuster and Recoil Spring

1— Track Adjuster and Recoil Spring 2— Track Frame

JS20420,0000974 -19-01APR13-1/1

TX1132784A —UN—12MAR13

Track Adjuster and Recoil Spring Disassemble and Assemble

SPECIFICATIONS	
Track Recoil Spring Disassembly and Assembly Tool Weight (approximate)	227 kg 500 lb
Rubber Track Compressed Recoil Spring Length	176 mm 6.9 in
Steel Track Compressed Recoil Spring Length	198 mm 7.8 in
Plug Torque	15 N·m 133 lb·in
Track Adjuster Valve Torque	90 N·m 66 lb·ft

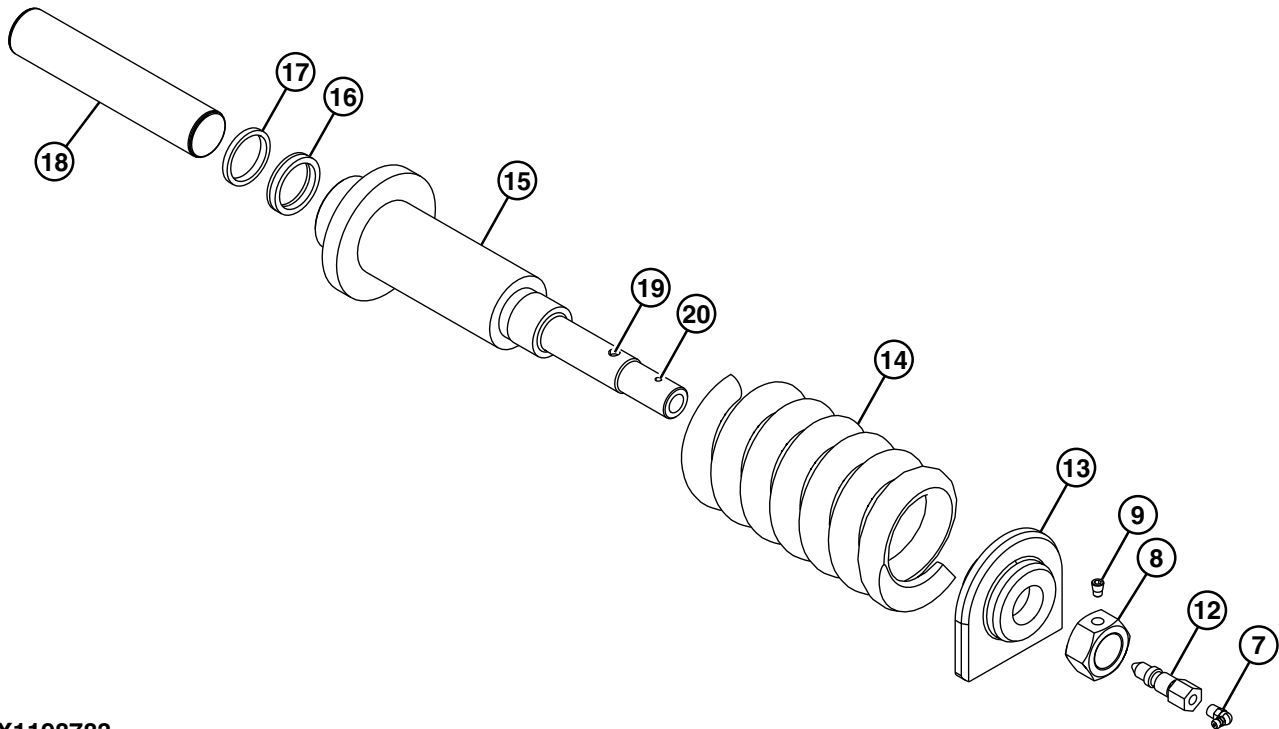
SERVICE EQUIPMENT AND TOOLS
20-Ton Hydraulic Jack
ST4920 ^a Track Recoil Spring Disassembly and Assembly Tool
DFT1110 ^a Spacer
DFT1087 ^a Track Recoil Spring Disassembly and Assembly Guard Tool

^aFabricated tool, dealer made. (See Group 9900 for instructions to make tool.)

CAUTION: Prevent possible injury. Recoil spring or rod may break if dropped while handling, transporting, or disassembling. Nicks or weld craters in spring and rod assembly can cause stress concentration resulting in a weak spot. Weak spots may result in immediate or eventual malfunction. Use heavy protective covering around spring assembly when handling, transporting, or disassembling track adjuster.

To avoid personal injury from extreme preload on spring, a compression tool must be used for disassembly and assembly.

1. Remove track adjuster and recoil spring. See [Track Adjuster and Recoil Spring Remove and Install](#). (Group 0130.)



TX1198783 —UN—30JUL15

TX1198783

Track Adjuster and Recoil Spring Assembly

- | | | | |
|--------------------------|--------------------|----------------------------------|---------------------------------|
| 7— Grease Fitting | 13— Retainer Plate | 17— Dust Seal | 20— Hole Position (steel track) |
| 8— Nut | 14— Recoil Spring | 18— Piston Rod | |
| 9— Plug | 15— Cylinder | 19— Hole Position (rubber track) | |
| 12— Track Adjuster Valve | 16— U-Ring Packing | | |

NOTE: It is not necessary to remove the recoil spring to replace dust seal (17) and U-ring packing (16) on piston rod (18).

2. Remove piston rod (18).

Continued on next page

JS20420,000098D -19-17AUG15-1/6

Track System

3. Remove dust seal (17) and U-ring packing (16).

Continued on next page

JS20420.000098D -19-17AUG15-2/6

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

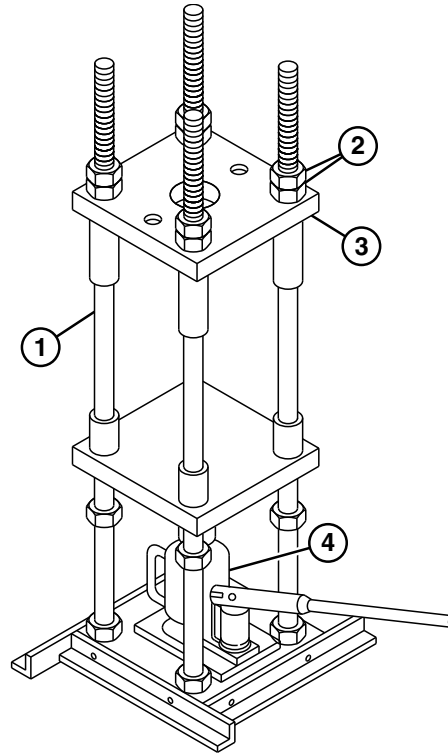
- Place 20-ton hydraulic jack (4) on bottom of ST4920 Track Recoil Spring Disassembly and Assembly Tool (1). See ST4920 Track Recoil Spring Disassembly and Assembly Tool. (Group 9900.)

Specification

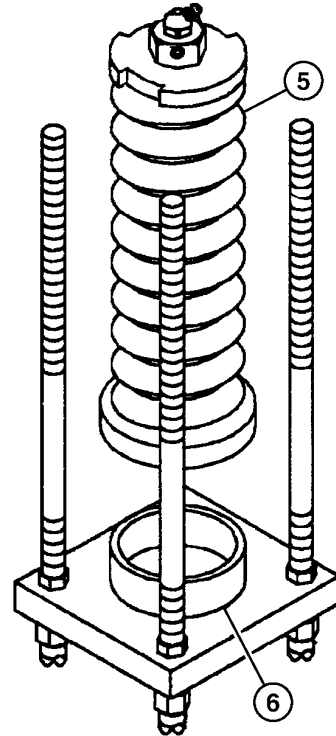
Track Recoil Spring Disassembly and Assembly Tool—Weight (approximate)..... 227 kg
500 lb

- Remove nuts (2) and top plate (3).
- Extend 20-ton hydraulic jack to provide enough travel to release recoil spring (14).
- Install DFT1110 Spacer (6) on to ST4920 Track Recoil Spring Disassembly and Assembly Tool. See DFT1110 Spacer. (Group 9900.)
- Position track adjuster and recoil spring (5) in ST4920 Track Recoil Spring Disassembly and Assembly Tool with cylinder end on DFT1110 Spacer.

- | | |
|---|-------------------------------------|
| 1— ST4920 Track Recoil Spring Disassembly and Assembly Tool | 4— 20-Ton Hydraulic Jack |
| 2— Nut (8 used) | 5— Track Adjuster and Recoil Spring |
| 3— Top Plate | 6— DFT1110 Spacer |



Track Recoil Spring Tool



Installing Track Adjuster in Disassembly and Assembly Tool

Continued on next page

JS20420,000098D -19-17AUG15-3/6

TX1133214 —UN—20MAR13

TX1133218 —UN—20MAR13

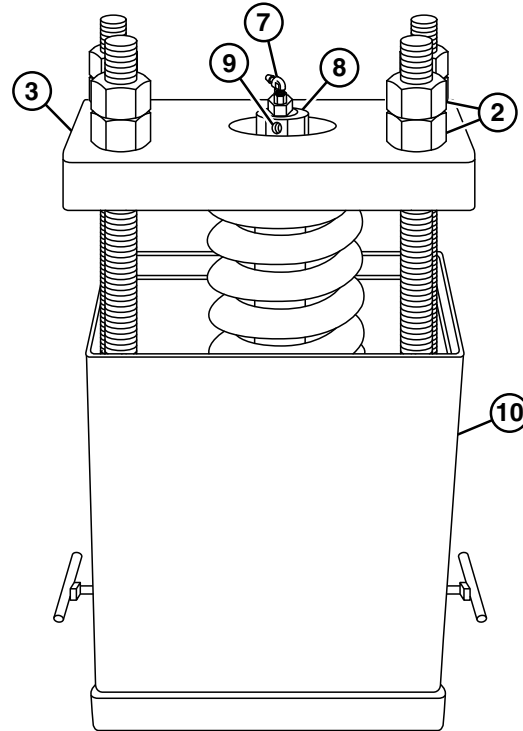
9. Install DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool (10). See DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool. (Group 9900.)

NOTE: The ST4920 Track Recoil Spring Disassembly and Assembly Tool is the same as used on other machines except the top plate. Use the top plate (3) with the smallest opening that allows access to nut (8).

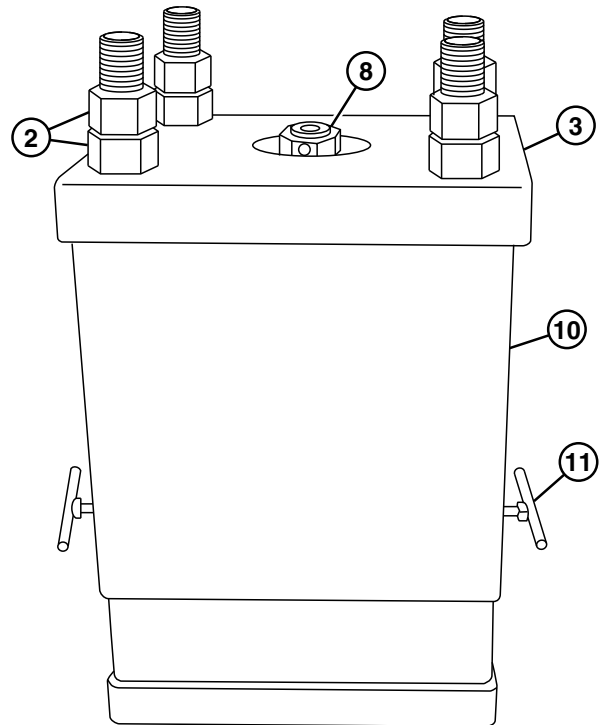
10. Install top plate and nuts (2).
11. Tighten nuts (2) so top plate is tight against retainer plate (13) on track adjuster.
12. Remove grease fitting (7) and plug (9).
13. Raise upper half of DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool and tighten T-handles (11).
14. Extend 20-ton hydraulic jack to release pressure on nut (8).
15. Remove nut (8).
16. Lower 20-ton hydraulic jack to release recoil spring tension.
17. Remove nuts (2), top plate, and DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool.

2— Nut (8 used)
 3— Top Plate
 7— Grease Fitting
 8— Nut

9— Plug
 10— DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool
 11— T-Handle (2 used)



Track Recoil Spring Guard Tool



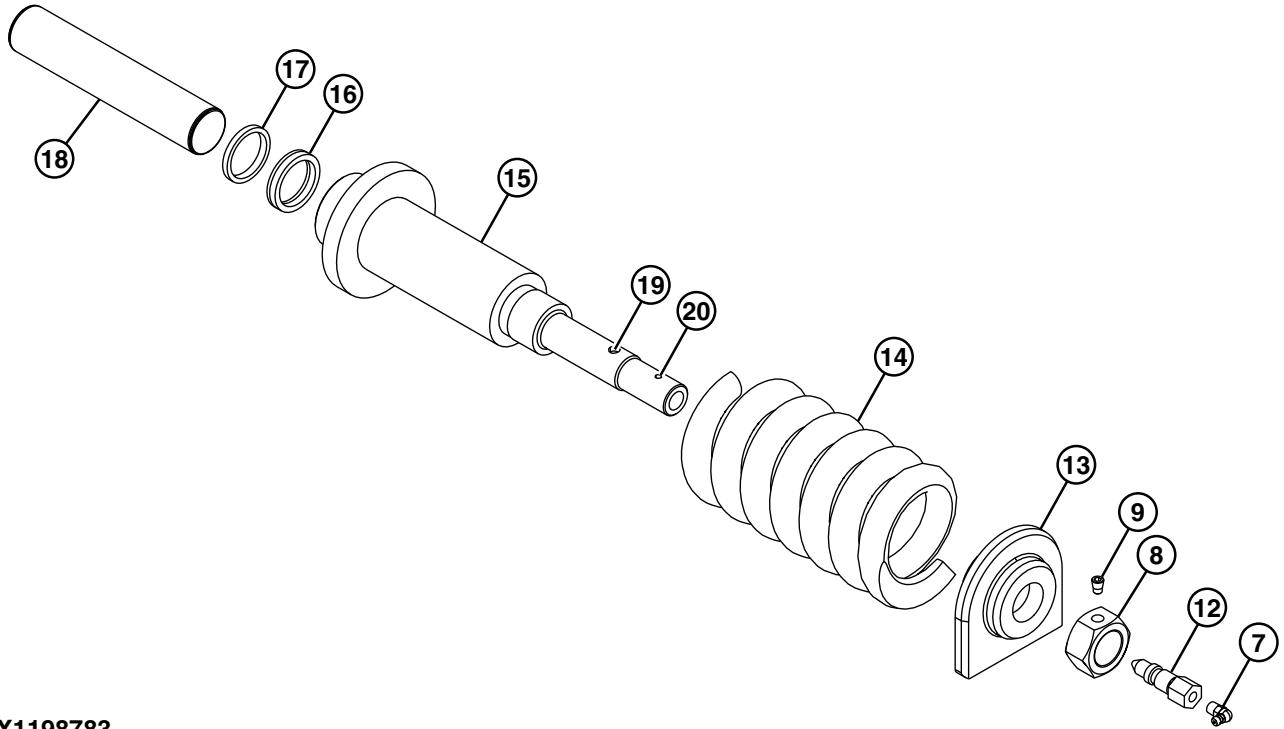
Track Recoil Spring Guard Tool—Guard Raised

TX1133220—UN—20MAR13

TX1133223—UN—20MAR13

Continued on next page

JS20420,000098D -19-17AUG15-4/6



TX1198783—UN—30JUL15

TX1198783

Track Adjuster and Recoil Spring Assembly

- | | | | |
|--------------------------|--------------------|----------------------------------|---------------------------------|
| 7— Grease Fitting | 13— Retainer Plate | 17— Dust Seal | 20— Hole Position (steel track) |
| 8— Nut | 14— Recoil Spring | 18— Piston Rod | |
| 9— Plug | 15— Cylinder | 19— Hole Position (rubber track) | |
| 12— Track Adjuster Valve | 16— U-Ring Packing | | |

18. Remove retainer plate (13), recoil spring (14), and track adjuster valve (12).

19. Inspect and replace parts as necessary.

20. Install DFT1110 Spacer on to ST4920 Track Recoil Spring Disassembly and Assembly Tool.

21. Install cylinder into DFT1110 Spacer.

22. Install recoil spring and retainer plate.

23. Install DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool.

24. Install top plate and nuts (2).

25. Tighten nuts (2) so top plate is tight against retainer plate.

26. Raise upper half of DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool and tighten T-handles.

27. Extend 20-ton hydraulic jack to compress recoil spring to specification.

Specification

Rubber Track—Compressed Recoil Spring
Length..... 176 mm
6.9 in

Steel Track—Compressed Recoil Spring
Length..... 198 mm
7.8 in

NOTE: Nut (8) must be positioned correctly for either steel or rubber track.

28. Install nut (8) so threaded hole is aligned with either hole position (19 or 20).

29. Install plug. Tighten plug to specification.

Specification

Plug—Torque..... 15 N·m
133 lb·in

30. Install track adjuster valve to specification.

Specification

Track Adjuster Valve—Torque..... 90 N·m
66 lb·ft

31. Install and tighten grease fitting.

32. Lower 20-ton hydraulic jack to release recoil spring tension.

33. Remove nuts (2), top plate, and DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool.

Continued on next page

JS20420,000098D -19-17AUG15-5/6

Track System

34. Remove track adjuster and recoil spring assembly from ST4920 Track Recoil Spring Disassembly and Assembly Tool.

IMPORTANT: To prevent seizing, apply clean hydraulic oil to parts before assembling.

35. Install U-ring packing and dust seal.

36. Apply multipurpose grease to piston rod, U-ring packing, and dust seal. Fill cylinder with grease.

37. Push piston rod into cylinder and completely bleed air from cylinder.

38. Install track adjuster and recoil spring into machine. See Track Adjuster and Recoil Spring Remove and Install. (Group 0130.)

JS20420,000098D -19-17AUG15-6/6

Track System

Section 02
Axles and Suspension Systems (Travel)
Contents

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Reduction Gears**

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Travel Gear Case Disassemble and Assemble	02-0250-3

Group 0260—Hydraulic System

Travel Motor and Park Brake Remove and Install	02-0260-1
Travel Motor and Park Brake Disassemble and Assemble	02-0260-2
Park Brake Valve Disassemble and Assemble	02-0260-8
Travel Motor and Park Brake Start-Up Procedure	02-0260-10

Contents

Group 0250

Axle Shaft, Bearings, and Reduction Gears

Travel Gear Case Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Travel Gear Case Assembly Weight (approximate)	48 kg 110 lb.
Cap Screw Torque	110 N·m 81 lb.-ft.

NOTE: The travel gear case, travel motor, and park brake are enclosed in the same housing.

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)
2. Remove track. See [Rubber Track Remove and Install](#) or see [Track Chain Remove and Install](#). (Group 0130.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank fill cap. See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
4. Apply vacuum or drain hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

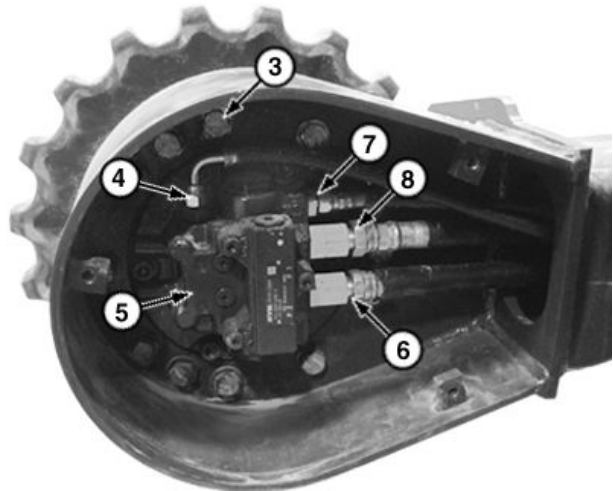
Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

5. Remove cap screws (1) and travel motor access panel (2).
6. Install identification tags and disconnect hoses (4 and 6—8). Close all openings using caps and plugs. See [Travel Hydraulic System Line Connection](#). (Group 9025-15.)



Travel Motor Cover



Travel Motor

- | | |
|------------------------------|------------------------------|
| 1— Cap Screw (3 used) | 5— Travel Gear Case Assembly |
| 2— Travel Motor Access Panel | 6— Travel Forward Hose |
| 3— Cap Screw (12 used) | 7— Travel Speed Hose |
| 4— Drain Hose | 8— Travel Reverse Hose |

7. Apply alignment marks between travel gear case assembly and track frame.

Continued on next page

JS20420.0000A21 -19-20MAY13-1/2

TX1132633A—UN—13MAR13

TX1132632A—UN—11MAR13

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

NOTE: The travel gear case assembly (5) is shown removed with sprocket for balance.

- Using appropriate lifting device, remove cap screws (3) and travel gear case assembly (5).

Specification

Travel Gear Case Assembly—Weight (approximate).....	48 kg 110 lb.
---	------------------

- Remove sprocket (9). See Sprocket Remove and Install. (Group 0130.)

- Clean, inspect, and replace parts as necessary.

- See Travel Gear Case Disassemble and Assemble. (Group 0250.)
- See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.)
- See Park Brake Valve Disassemble and Assemble. (Group 0260.)

- Install sprocket. See Sprocket Remove and Install. (Group 0130.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- Using appropriate lifting device, install travel gear case assembly.

Specification

Travel Gear Case Assembly—Weight (approximate).....	48 kg 110 lb.
---	------------------

- Align mark on travel gear case assembly to mark on track frame. Install cap screws (3) and tighten to specification.

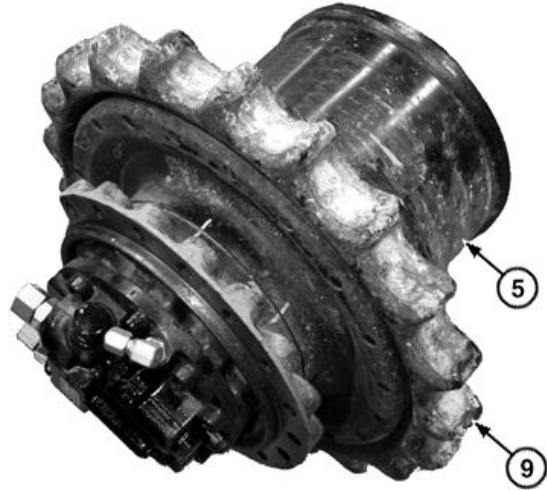
Specification

Cap Screw—Torque.....	110 N·m 81 lb.-ft.
-----------------------	-----------------------

NOTE: Drain hose (4) will remain capped and plugged until travel motor start-up procedure is performed.

- Connect hydraulic hoses (6—8). See Travel Hydraulic System Line Connection. (Group 9025-15.)

- Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See



Travel Gear Case Assembly

5— Travel Gear Case Assembly 9— Sprocket

Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

- Perform travel motor start-up procedure and connect drain hose (4). See Travel Motor and Park Brake Start-Up Procedure. (Group 0260.)

IMPORTANT: Hydraulic pumps will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housings whenever oil has been drained from the pumps or hydraulic oil tank.

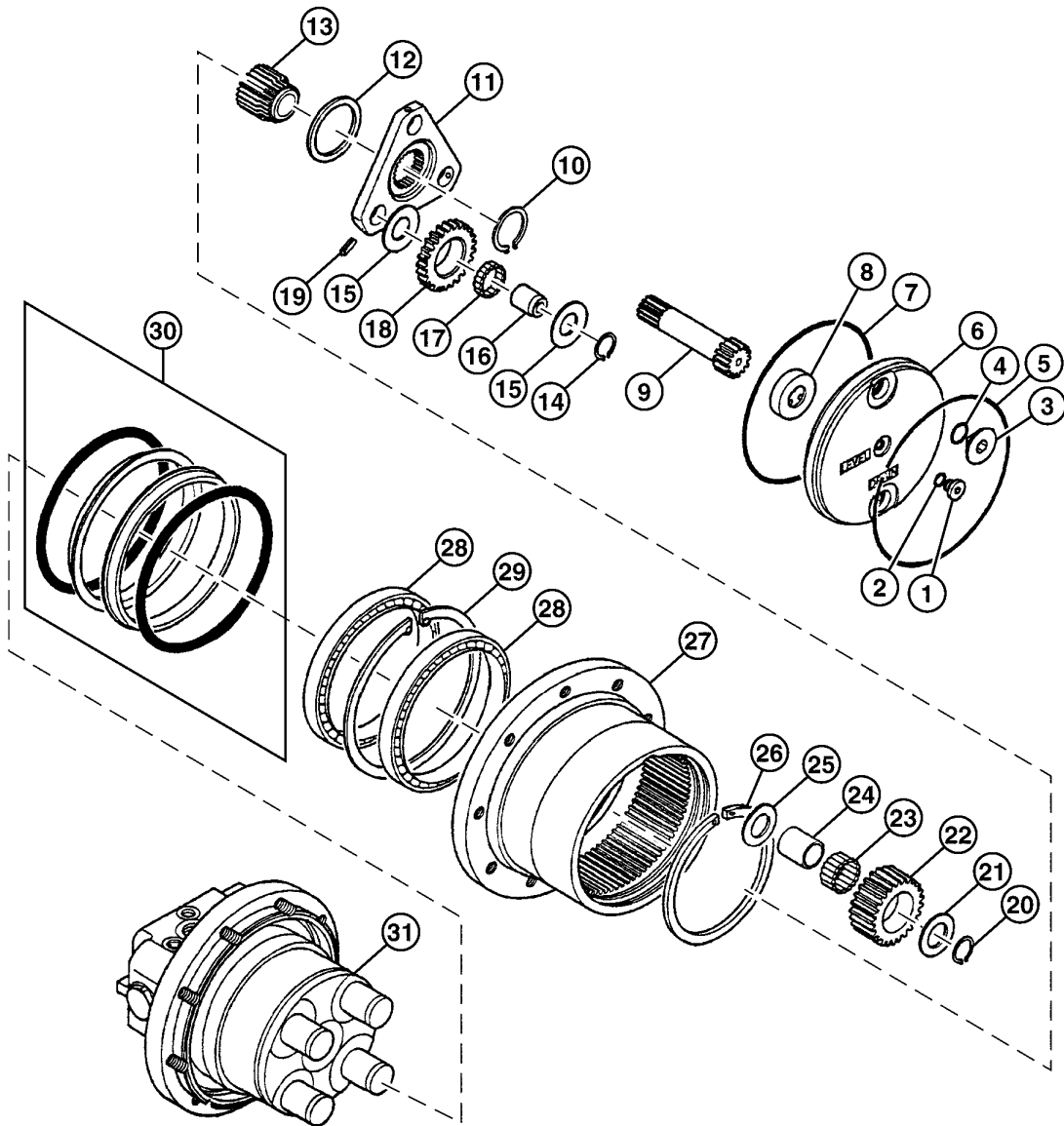
- If hydraulic oil tank was drained, perform pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)
- Check hydraulic oil level. See Check Hydraulic Tank Oil Level. (Operator's Manual.)
- Install track. See Rubber Track Remove and Install or see Track Chain Remove and Install. (Group 0130.)
- Operate machine and check for leaks.
- Install travel motor access panel and cap screws (1).

TX1133494A—UN—20MAR13

JS20420,0000A21 -19-20MAY13-2/2

Travel Gear Case Disassemble and Assemble

Disassemble Travel Gear Case



TX1135944

Travel Gear Case

- | | | | |
|---|---|--|---|
| 1— Check Plug | 12— Thrust Washer | 19— Spring Pin (3 used) | 26— Snap Ring |
| 2— O-Ring | 13— Second Stage Sun Gear | 20— Snap Ring (4 used) | 27— Ring Gear |
| 3— Plug (2 used) | 14— Snap Ring (3 used) | 21— Thrust Washer (4 used) | 28— Bearing (2 used) |
| 4— O-Ring (2 used) | 15— Thrust Washer (6 used) | 22— Second Stage Planetary Gear (4 used) | 29— Snap Ring |
| 5— Snap Ring | 16— Bearing Pin (3 used) | 23— Needle Bearing (4 used) | 30— Metal Face Seal |
| 6— Cover | 17— Needle Bearing (3 used) | 24— Bearing Race (4 used) | 31— Travel Motor Housing and Second Stage Planetary Carrier |
| 7— O-Ring | 18— First Stage Planetary Gear (3 used) | 25— Thrust Washer (4 used) | |
| 8— Thrust Ring | | | |
| 9— Input Shaft and First Stage Sun Gear | | | |
| 10— Snap Ring | | | |
| 11— First Stage Planetary Carrier | | | |

Continued on next page

JS20420.0000AD4 -19-11DEC18-1/6

TX1135944 —UN—06MAY13

SPECIFICATIONS

Travel Gear Case and Motor Assembly Weight (approximate)	48 kg 110 lb.
Travel Gear Case Oil Capacity	0.6 L 20 oz.
Plug-to-Cover Torque	50 N·m 37 lb.-in.
Check Plug-to-Cover Torque	16 N·m 142 lb.-in.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

1. Remove travel gear case using appropriate lifting device. See Travel Gear Case Remove and Install. (Group 0250.)

Specification

Travel Gear Case and Motor Assembly—Weight (approximate).....	48 kg 110 lb.
---	------------------

2. Drain gear oil. See Drain and Refill Travel Gear Case Oil. (Operator's Manual.)

Specification

Travel Gear Case Oil—Capacity.....	0.6 L 20 oz.
------------------------------------	-----------------

3. Remove sprocket. See Sprocket Remove and Install. (Group 0130.)
4. Apply alignment marks at mating positions of cover (6), ring gear (27), and travel motor housing and second stage planetary carrier (31).

5. Remove check plug (1), plugs (3) and O-rings (2 and 4).
6. Remove snap ring (5).

IMPORTANT: Avoid possible damage to O-ring (7). Use caution not to damage O-ring when removing cover.

7. Remove cover (6) and O-ring (7).
8. Remove thrust ring (8).

IMPORTANT: Avoid possible damage to gear case components. Spring pins (19) and bearing pins (16) are compressed into first stage planetary carrier (11) and cannot be removed. If spring pins or bearing pins are damaged, replace first stage planetary carrier as an assembly.

NOTE: Keep parts for each planetary gear together.

9. Remove snap rings (14), thrust washers (15), first stage planetary gears (18), and needle bearings (17) from bearing pins (16).
10. Remove input shaft and first stage sun gear (9).
11. Remove snap ring (10), first stage planetary carrier (11), and thrust washer (12).

NOTE: Keep parts for each planetary gear together.

12. Remove second stage sun gear (13), snap rings (20), thrust washers (21 and 25), second stage planetary gears (22), needle bearings (23), and bearing races (24).

Continued on next page

JS20420,0000AD4 -19-11DEC18-2/6

NOTE: Further disassembly is not necessary unless bearings (28) or metal face seal (30) require replacement. Bearings will be destroyed during removal; if removed replace with new bearings.

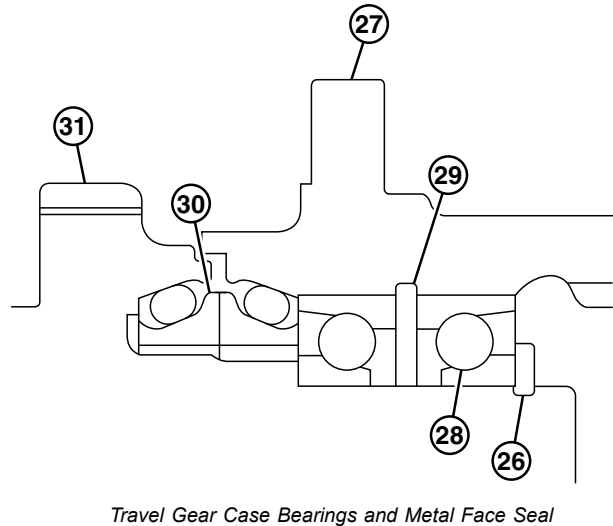
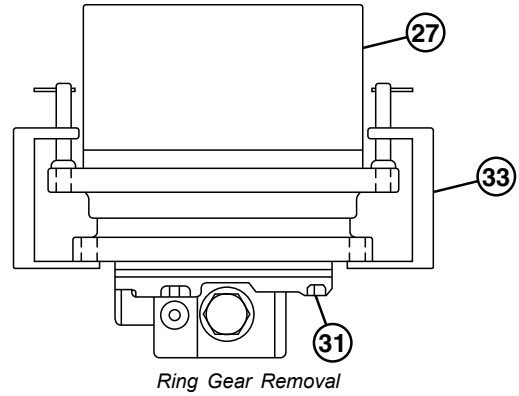
13. Compress ring gear using clamps (33) so snap ring (26) can be removed. Remove snap ring (26).
14. Push travel motor housing and second stage planetary carrier out of ring gear using a shop press.

IMPORTANT: Avoid damage to metal face seal (30). Seal must be kept together as a set because of wear patterns. Metal face seals can be reused if they are not worn or damaged.

NOTE: Keep seal rings together as a matched set with a piece of clean cardboard between them to protect the seal ring face.

15. Remove metal face seal (30) from ring gear and travel motor housing and second stage planetary carrier.
To determine if seals can be reused, see [Inspect Metal Face Seals](#). (Group 0130.)
16. Remove snap ring (29) and bearings (28) from ring gear for replacement only. Bearings are a pressed fit.
17. Repair or replace parts as necessary.

- | | |
|----------------------|---|
| 26— Snap Ring | 30— Metal Face Seal |
| 27— Ring Gear | 31— Travel Motor Housing and
Second Stage Planetary
Carrier |
| 28— Bearing (2 used) | 33— Clamp (3 used) |
| 29— Snap Ring | |



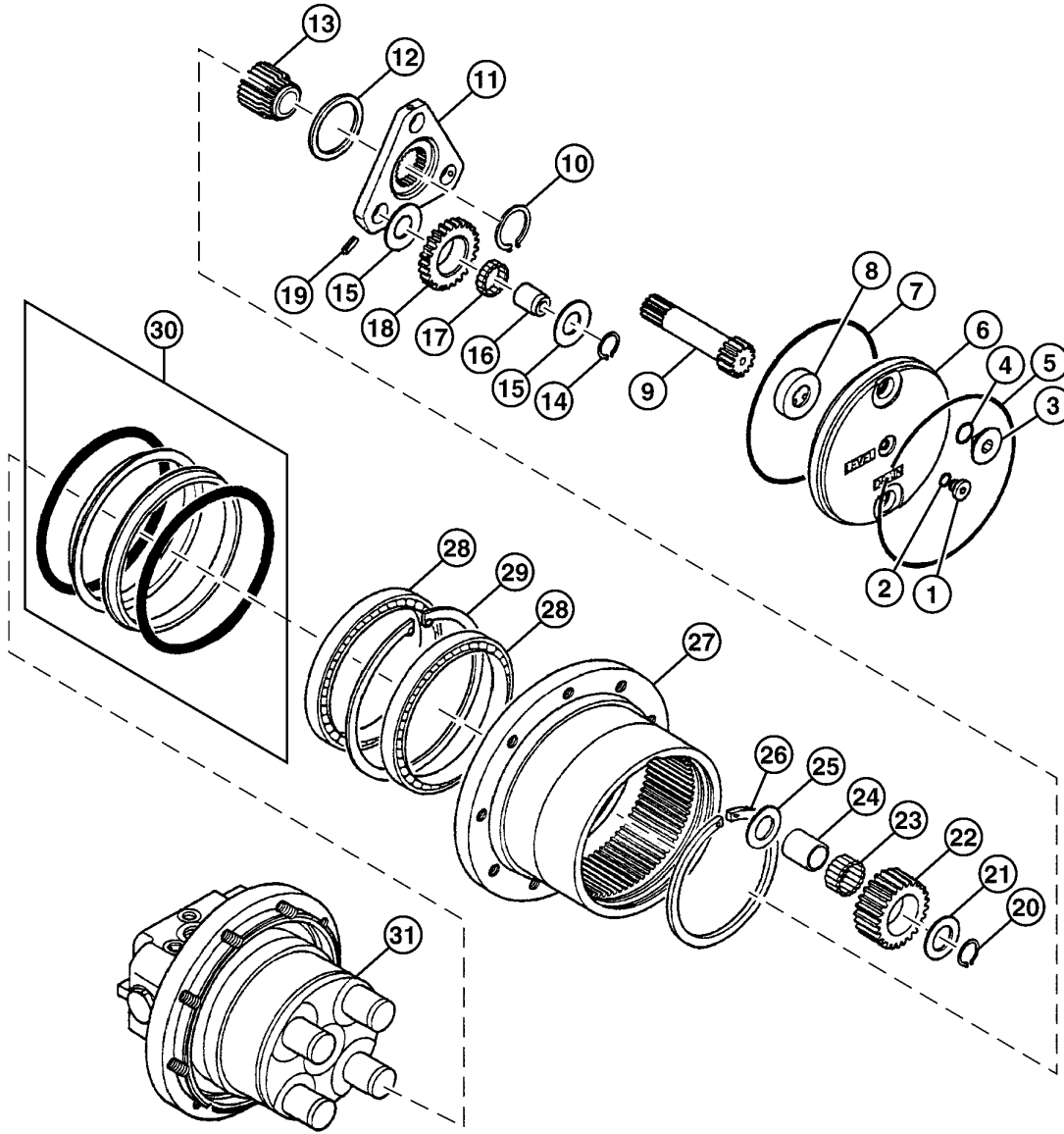
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JS20420.0000AD4 -19-11DEC18-3/6

TX1135954—UN—06MAY13

TX1135945—UN—06MAY13

Assemble Travel Gear Case



TX1135944

Travel Gear Case

- | | | | |
|---|---|--|---|
| 1—Check Plug | 12— Thrust Washer | 19— Spring Pin (3 used) | 26— Snap Ring |
| 2— O-Ring | 13— Second Stage Sun Gear | 20— Snap Ring (4 used) | 27— Ring Gear |
| 3— Plug (2 used) | 14— Snap Ring (3 used) | 21— Thrust Washer (4 used) | 28— Bearing (2 used) |
| 4— O-Ring (2 used) | 15— Thrust Washer (6 used) | 22— Second Stage Planetary Gear (4 used) | 29— Snap Ring |
| 5— Snap Ring | 16— Bearing Pin (3 used) | 23— Needle Bearing (4 used) | 30— Metal Face Seal |
| 6— Cover | 17— Needle Bearing (3 used) | 24— Bearing Race (4 used) | 31— Travel Motor Housing and Second Stage Planetary Carrier |
| 7— O-Ring | 18— First Stage Planetary Gear (3 used) | 25— Thrust Washer (4 used) | |
| 8— Thrust Ring | | | |
| 9— Input Shaft and First Stage Sun Gear | | | |
| 10— Snap Ring | | | |
| 11— First Stage Planetary Carrier | | | |

Continued on next page

JS20420,0000AD4 -19-11DEC18-4/6

TX1135944—UN—06MAY13

IMPORTANT: Prevent possible machine damage.
Apply clean gear oil on to parts to prevent parts from seizing.

1. If removed, install new bearings (28) and snap ring (29) in ring gear (27).

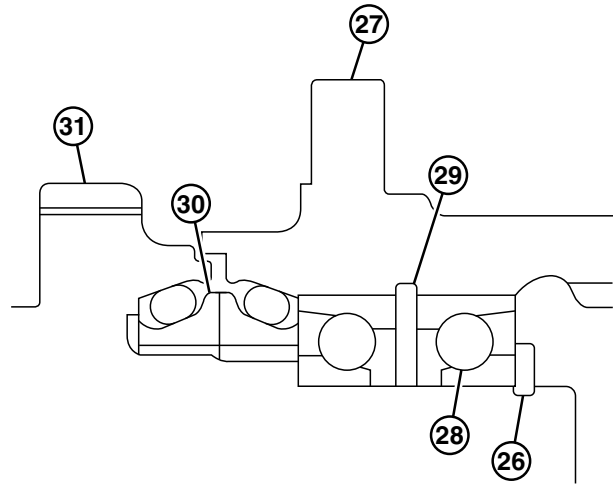
IMPORTANT: Avoid damage to metal face seal (30).
Metal face seal and seat surfaces must be clean, dry and oil free so seal does not slip.

2. Thoroughly clean seat surfaces on travel motor housing and second stage planetary carrier (31), ring gear, and metal face seal (30) using non-petroleum base solvent and lint-free tissues.

NOTE: A volatile, non-petroleum base solvent or talcum powder may be used as a lubricant.

Apply equal pressure with fingers at four equally spaced points on metal face seal. Metal face seal must "pop" down into place so it is tight against seat surface.

3. Install metal face seal to ring gear and travel motor housing and second stage planetary carrier. Apply equal pressure with fingers at four equally spaced points on seal face. Metal face seal must "pop" down into place so O-ring is tight against seal bore.
4. Wipe fingerprints and foreign material off seal ring face using volatile, non-petroleum base solvent and lint-free tissues. Apply a thin film of oil to metal seal face.



Travel Gear Case Bearings and Metal Face Seal

26— Snap Ring
 27— Ring Gear
 28— Bearing (2 used)

29— Snap Ring
 30— Metal Face Seal
 31— Travel Motor Housing and Second Stage Planetary Carrier

5. Using alignment marks, install travel motor housing and second stage planetary carrier to ring gear.

Continued on next page

JS20420,0000AD4 -19-11DEC18-5/6

TX1135945 —UN—06MAY13

6. Compress ring gear using clamps (33) so snap ring (26) can be installed. Install snap ring (26).
7. Check that ring gear can be turned. If not, bearings or metal face seals are not installed properly, disassemble and assemble again.
8. Install thrust washers (21 and 25), bearing races (24), needle bearings (23), second stage planetary gears (22), and snap rings (20).
9. Install second stage planetary sun gear (13) and thrust washer (12).
10. Install first stage planetary carrier (11) and snap ring (10) to second stage planetary sun gear.
11. Install thrust washers (15), needle bearings (17), first stage planetary gears (18), and snap rings (14) to bearing pins (16).
12. Install input shaft and first stage sun gear (9) and thrust ring (8).
13. Install O-ring (7) to cover (6).
14. Using alignment marks, install cover into ring gear.
15. Install snap ring (5).
16. Install plugs (3) and O-ring (4). Tighten to specification.

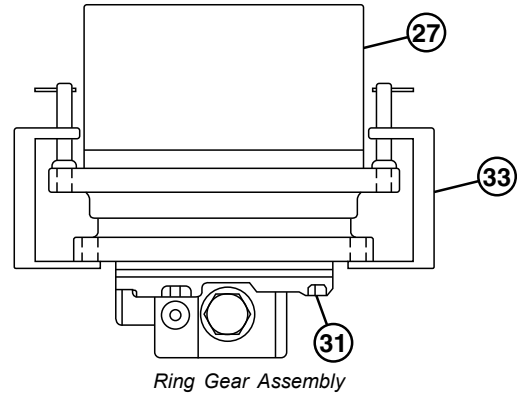
Specification

Plug-to-Cover—Torque.....50 N·m
37 lb.-in.

17. Install check plug (1) and O-ring (2). Tighten to specification.

Specification

Check Plug-to-Cover—Torque.....16 N·m
142 lb.-in.



27— Ring Gear
31— Travel Motor Housing and Second Stage Planetary Carrier
33— Clamp (3 used)

18. Install travel gear case using appropriate lifting device. See Travel Gear Case Remove and Install. (Group 0250.)

Specification

Travel Gear Case and Motor Assembly—Weight (approximate)..... 48 kg
110 lb.

19. Install sprocket. See Sprocket Remove and Install. (Group 0130.)
20. Add gear oil to travel gear case. See Drain and Refill Travel Gear Case Oil. (Operator's Manual.)
21. Perform travel motor and park brake start-up procedure. See Travel Motor and Park Brake Start-Up Procedure. (Group 0260.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

TX1135954—UN—08MAY13

Group 0260 Hydraulic System

Travel Motor and Park Brake Remove and Install

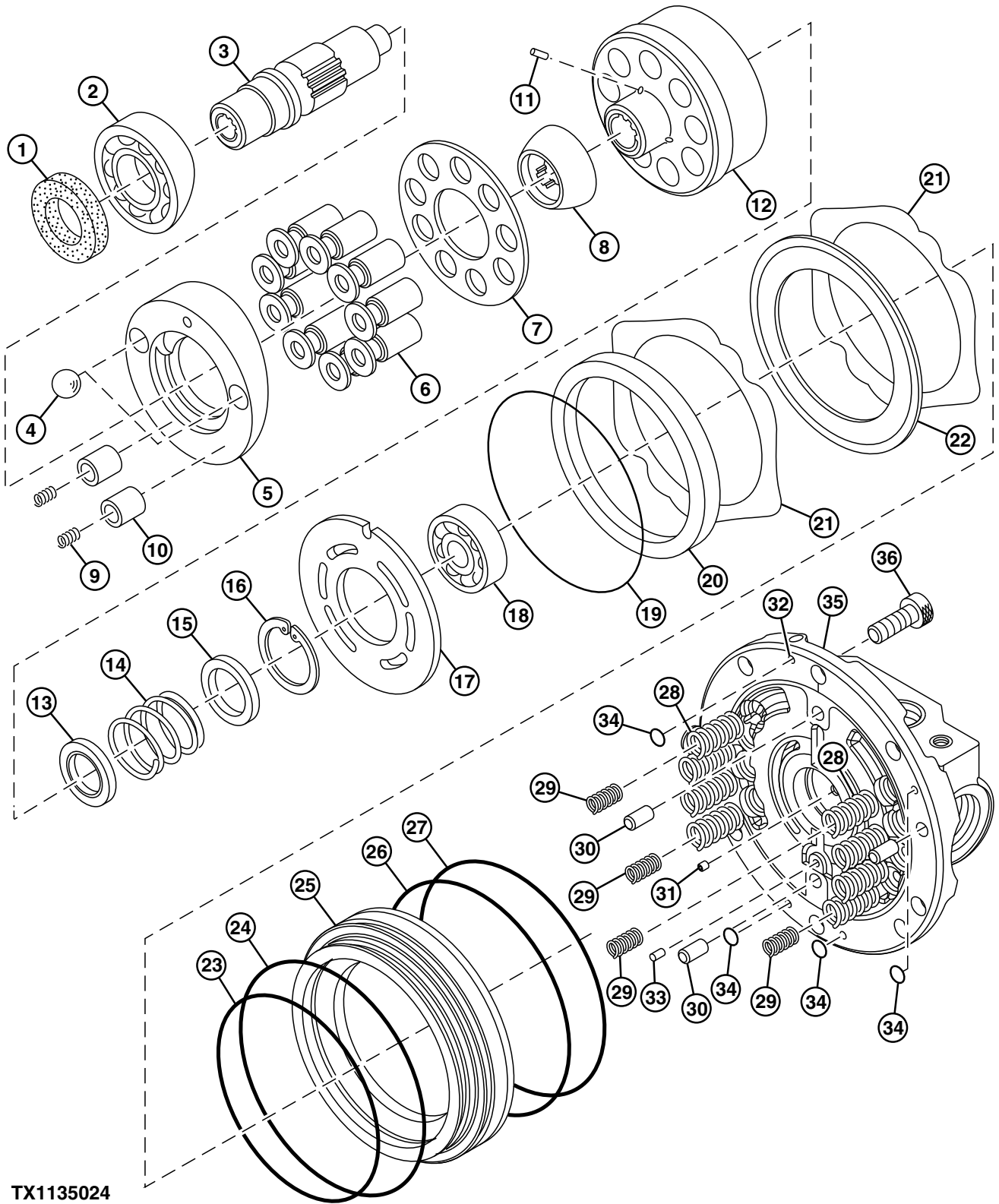
NOTE: The travel gear case, travel motor, and park brake are enclosed in the same housing.

See Travel Gear Case Remove and Install. (Group 0250.)

To access travel motor, travel gear case must be disassembled. See Travel Gear Case Disassemble and Assemble. (Group 0250.)

JS20420,00009FE -19-16APR13-1/1

Travel Motor and Park Brake Disassemble and Assemble Disassemble Travel Motor and Park Brake



TX1135024

Travel Motor and Park Brake

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JS20420,0000A28 -19-09MAY13-1/6

TX1135024 -UN-17APR13

Hydraulic System

- | | | | |
|-----------------------------|--------------------|--------------------------------|------------------------------|
| 1— Oil Seal | 11— Pin (3 used) | 22— Park Brake Disk | 30— Dowel Pin (2 used) |
| 2— Ball Bearing | 12— Cylinder Block | 23— Backup Ring | 31— Dowel Pin |
| 3— Drive Shaft | 13— Washer | 24— O-Ring | 32— Orifice |
| 4— Pivot Ball (2 used) | 14— Spring | 25— Park Brake Piston | 33— Orifice |
| 5— Swash Plate | 15— Washer | 26— O-Ring | 34— O-Ring (4 used) |
| 6— Piston (9 used) | 16— Snap Ring | 27— Backup Ring | 35— Park Brake Valve Housing |
| 7— Retainer Plate | 17— Valve Plate | 28— Park Brake Spring (8 used) | 36— Cap Screw (6 used) |
| 8— Ball Guide | 18— Ball Bearing | 29— Park Brake Spring (4 used) | |
| 9— Spring (2 used) | 19— O-Ring | | |
| 10— Control Piston (2 used) | 20— Spacer | | |
| | 21— Plate (2 used) | | |

SPECIFICATIONS	
Travel Gear Case and Motor Assembly Weight (approximate)	48 kg 110 lb.
Piston-to-Shoe Clearance (maximum)	0.30 mm 0.012 in.
Cylinder Block Bore-to-Piston Clearance (maximum)	0.023 mm 0.001 in.
Cap Screw Torque	52 N·m 38 lb.-ft.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

1. Remove travel gear case assembly using appropriate lifting device. See Travel Gear Case Remove and Install. (Group 0250.)

Specification

Travel Gear Case and Motor Assembly—Weight (approximate).....	48 kg 110 lb.
---	------------------

CAUTION: Prevent possible injury from components under pressure. Park brake

valve housing contains springs under load and can release suddenly if proper procedure is not followed. To prevent possible injury, loosen cap screws evenly.

2. Loosen cap screws (36) evenly to release force of park brake springs (28 and 29).
3. Measure and record distance between park brake valve housing (35) and motor housing as a reference for assembly.
- IMPORTANT:** Prevent possible damage to valve plate. When removing park brake valve housing, valve plate can stick to park brake valve housing causing valve plate to drop, damaging highly machined surfaces. Use care when removing the park brake valve housing.
4. Remove park brake valve housing (35).
5. Remove dowel pins (30 and 31) and O-rings (34).
6. Remove park brake springs (28 and 29) and O-ring (19).

Continued on next page

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CAUTION: Prevent possible injury from components under pressure. Park brake piston may come out quickly with excessive force. Use only regulated air pressure, stand clear of park brake piston when removing, and cover piston with a cloth to prevent piston from flying out.

NOTE: Note position of park brake piston (25) before removal as an aid for installation. Piston must be installed so dowel pin holes and springs align with dowel pins in park brake valve housing.

- Carefully apply 100—300 kPa (14—43 psi) air pressure to orifice (32) to release park brake piston (25). Remove backup ring (27), O-ring (26), and park brake piston.

IMPORTANT: Prevent possible damage due to improper handling. Position brake piston with seating surface facing up on bench.

- Position brake piston with seating surface facing up on bench.
- Remove O-ring (24) and backup ring (23) from brake piston.

NOTE: Note position of valve plate (17) prior to removal.

- Remove valve plate (17) and ball bearing (18).

IMPORTANT: Prevent possible damage to machine parts. Pistons can easily fall out when disassembling rotary group as an assembly. Use care when removing rotary group.

NOTE: Holding the travel motor and park brake housing in a horizontal position can assist in removing rotary group (6—8 and 11—16).

- Remove rotary group (6—8 and 11—16) as an assembly.



Park Brake Release

32— Orifice

- Remove spacer (20), plates (21), and park brake disk (22).

CAUTION: Prevent possible injury from components under pressure. Rotary group contains a spring under load and can release suddenly. To prevent possible injury, compress spring before removing snap ring.

NOTE: Disassemble rotary group (6—8 and 11—16) for inspection and cleaning only. Rotary group is serviced as an assembly.

- Compress spring (14) using a press. Remove snap ring (16).
- Remove washers (13 and 15), spring (14), pistons (6), retainer plate (7), ball guide (8), and pins (11) from cylinder block (12).

Continued on next page

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TX1135003A—UN—17APR13

15. Inspect pistons for wear or damage. Verify clearance between piston (37) and shoe (38) is within specification.

Specification

Piston-to-Shoe—Clearance
(maximum)..... 0.30 mm
0.012 in.

16. Inspect inside diameter of cylinder block bore (39) and piston. Verify clearance between block bore and piston is within specification.

Specification

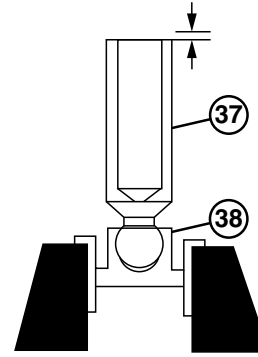
Cylinder Block Bore-to-Piston—Clearance
(maximum)..... 0.023 mm
0.001 in.

17. Remove swash plate (5), pivot balls (4), control pistons (10), and springs (9).

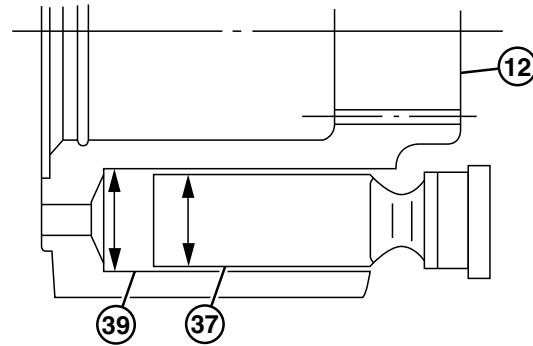
IMPORTANT: Prevent possible damage to travel motor components. Oil seal cannot be reused if removed. Only remove drive shaft (3), ball bearing (2), and oil seal (1) if necessary.

18. Remove drive shaft (3), ball bearing (2), and oil seal (1) for replacement only.

19. Inspect and replace parts as necessary. For more information on travel motor, see Travel Gear Case Disassemble and Assemble. (Group 2050.)



Piston and Shoe Clearance



Piston and Cylinder Block Bore Diameter

12— Cylinder Block
37— Piston

38— Shoe
39— Cylinder Block Bore

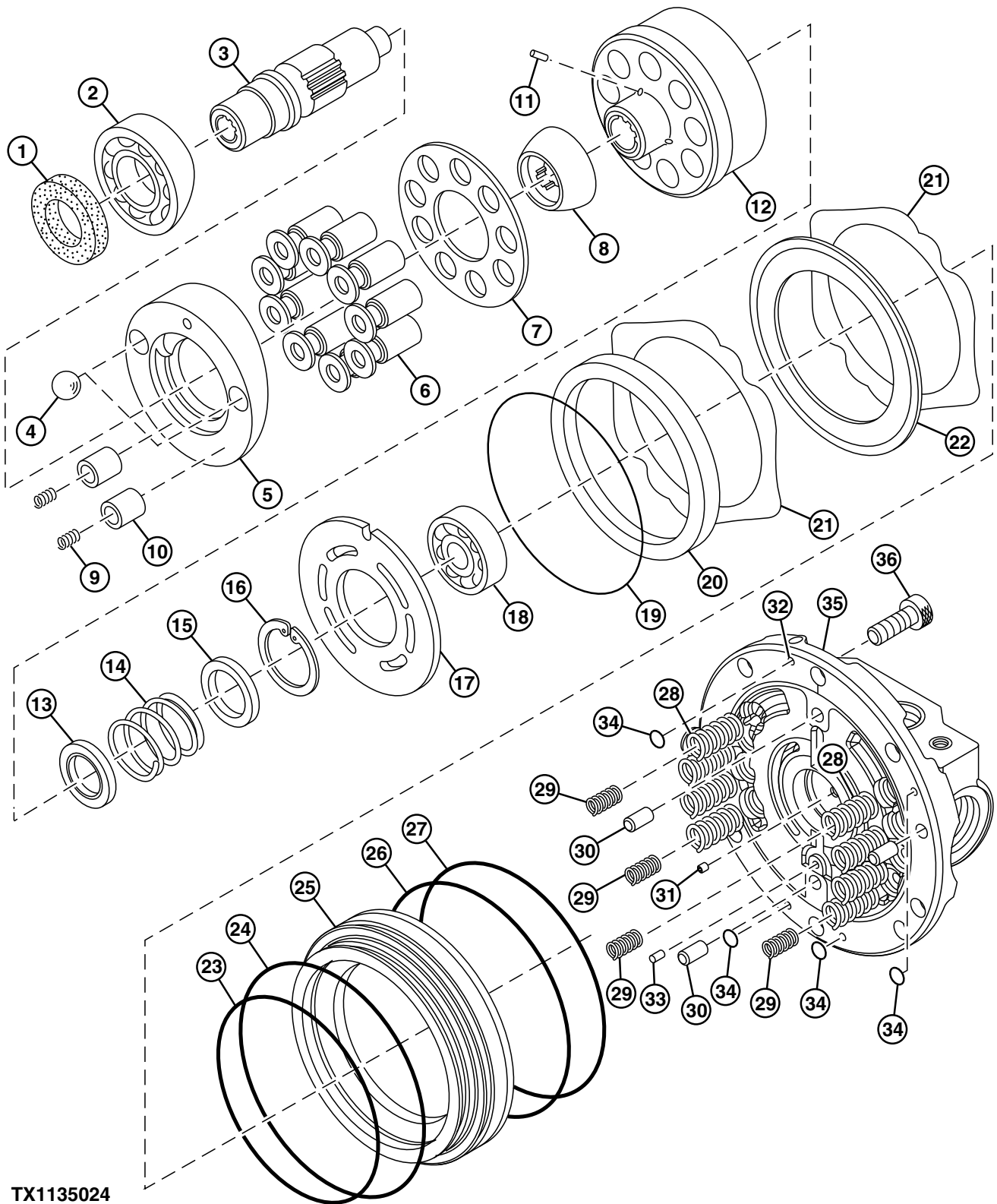
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TX1135061 —UN—17APR13

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Assemble Travel Motor and Park Brake



TX1135024

Travel Motor and Park Brake

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Continued on next page

JS20420,0000A28 -19-09MAY13-5/6

Hydraulic System

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> 1— Oil Seal 2— Ball Bearing 3— Drive Shaft 4— Pivot Ball (2 used) 5— Swash Plate 6— Piston (9 used) 7— Retainer Plate 8— Ball Guide 9— Spring (2 used) 10— Control Piston (2 used) | <ul style="list-style-type: none"> 11— Pin (3 used) 12— Cylinder Block 13— Washer 14— Spring 15— Washer 16— Snap Ring 17— Valve Plate 18— Ball Bearing 19— O-Ring 20— Spacer 21— Plate (2 used) | <ul style="list-style-type: none"> 22— Park Brake Disk 23— Backup Ring 24— O-Ring 25— Park Brake Piston 26— O-Ring 27— Backup Ring 28— Park Brake Spring (8 used) 29— Park Brake Spring (4 used) 30— Dowel Pin (2 used) 31— Dowel Pin 32— Orifice 33— Orifice 34— O-Ring (4 used) 35— Park Brake Valve Housing 36— Cap Screw (6 used) |
|---|--|--|

IMPORTANT: To prevent seizing, apply clean hydraulic oil to parts before assembling.

NOTE: Applying petroleum jelly to lip of oil seal (1) can assist in adhering to ball bearing during installation.

1. If removed, install oil seal (1) to bottom of park brake valve housing (35).
2. Install ball bearing (2).
3. Install springs (9) into control pistons (10).
4. Install control pistons and pivot balls (4).
5. Install swash plate (5) by aligning holes with pivot balls.
6. Install spacer (20), plates (21), and park brake disk (22).

NOTE: Applying petroleum jelly to pins (11) can assist in adhering to cylinder block during installation. Pins (11) can easily fall out of assembly.

7. Assemble rotary group. Install pistons (6), retainer plate (7), ball guide (8), pins (11), washers (13 and 15), and spring into cylinder block (12). Install snap ring (16).

IMPORTANT: Prevent possible damage to machine parts. Pistons can easily fall out when disassembling rotary group as an assembly. Use care when removing rotary group.

NOTE: Holding the travel motor and park brake housing in a horizontal position can assist in installing rotary group (6—8 and 11—16).

8. Install rotary group as an assembly on to drive shaft, aligning splines of ball guide (8) and cylinder block (12) with the spline on drive shaft and park brake disk.
9. Install O-ring (24) and backup ring (23) to park brake piston (25).
10. Install dowel pins (30 and 31) and O-rings (34) in park brake valve housing.

IMPORTANT: Prevent damage to brake piston seating surface during installation. Handle with care.

11. Install park brake piston so dowel pin holes and park brake springs (28 and 29) in brake piston are aligned

with dowel pins (30 and 31) and holes in park brake valve housing.

12. Install O-ring (26) and backup ring (27).
13. Add approximately 0.2 L (0.2 qt.) of hydraulic oil to assembly.

NOTE: Applying petroleum jelly to valve plate (17) can assist in holding valve in place while installing park brake valve housing.

14. Install valve plate (17) so notch engages dowel pin (31).
15. Install ball bearing (18) and O-ring (19).
16. Add clean hydraulic oil into housing until valve plate is submerged.
17. Install park brake valve housing, aligning dowel pin holes and springs in brake piston with dowel pins and holes in park brake valve housing.
18. Inspect clearance between the two housings and compare to measurement made during disassembly. If not the same, disassemble and check for correct assembly.
19. Install cap screws (36) in steps to pull housing down evenly against spring force. Tighten to specification.

Specification

Cap Screw—Torque.....52 N·m
38 lb.-ft.

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

20. Install travel gear case assembly using appropriate lifting device. See Travel Gear Case Remove and Install. (Group 0250.)

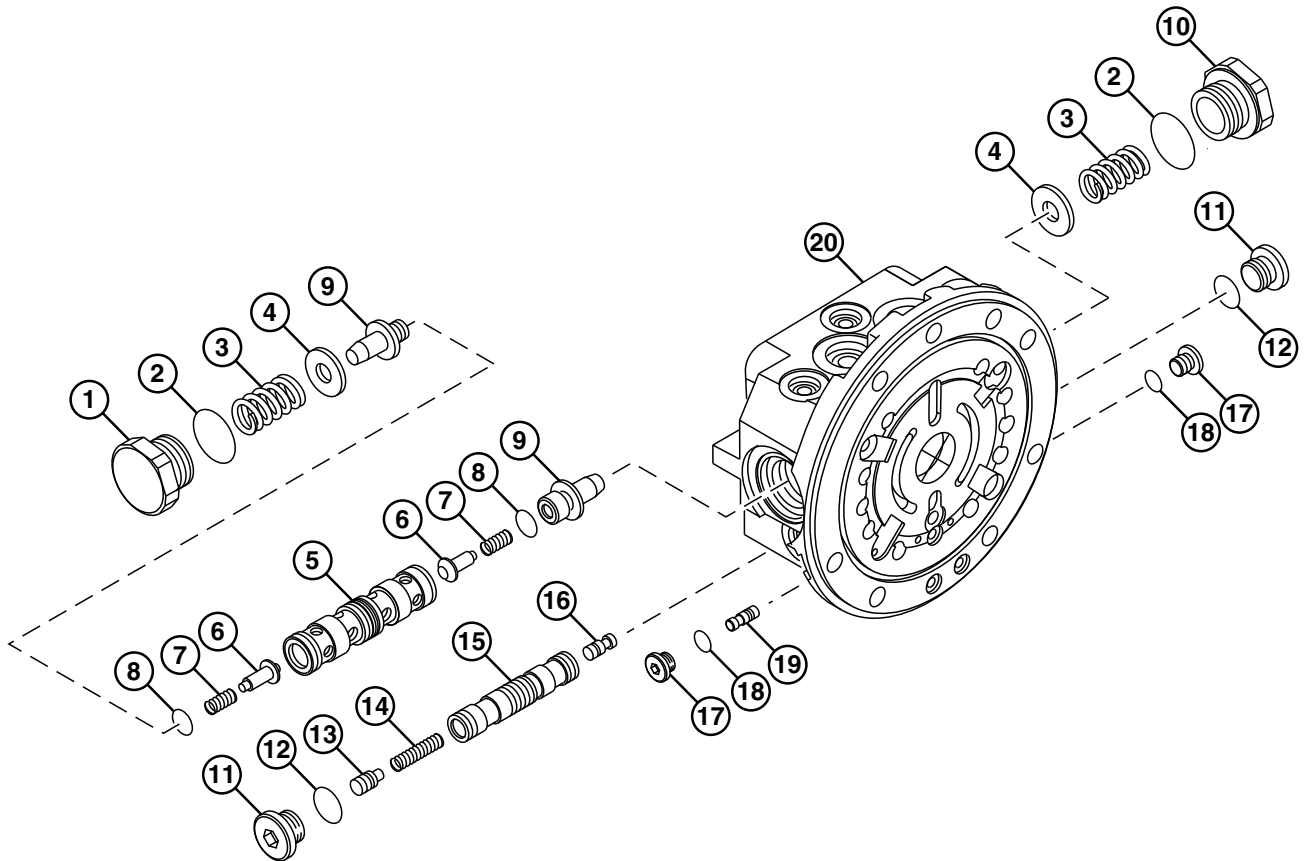
Specification

Travel Gear Case and Motor Assembly—Weight (approximate)..... 48 kg
110 lb.

21. Perform travel motor and park brake start-up procedure. See Travel Motor and Park Brake Start-Up Procedure. (Group 0260.)

JS20420,0000A28 -19-09MAY13-6/6

Park Brake Valve Disassemble and Assemble



TX1136123

Park Brake Valve

- | | | | |
|-------------------------|-------------------------|------------------------|---------------------|
| 1— Plug | 7— Spring (2 used) | 13— Spring Seat | 18— O-Ring (2 used) |
| 2— O-Ring (2 used) | 8— O-Ring (2 used) | 14— Spring | 19— Shuttle Valve |
| 3— Spring (2 used) | 9— Spring Seat (2 used) | 15— Speed Change Spool | 20— Valve Housing |
| 4— Washer (2 used) | 10— Plug | 16— Speed Change Valve | |
| 5— Counterbalance Spool | 11— Plug (2 used) | 17— Plug (2 used) | |
| 6— Valve (2 used) | 12— O-Ring (2 used) | | |

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Continued on next page

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Hydraulic System

SPECIFICATIONS

Shuttle Valve Plug-to-Valve Housing Torque	17 N·m 150 lb.-in.
Speed Change Plug-to-Valve Housing Torque	48 N·m 35 lb.-ft.
Counterbalance Plug-to-Valve Housing Torque	240 N·m 177 lb.-ft.

1. Remove travel motor and park brake. See Travel Motor and Park Brake Remove and Install. (Group 0260.)
2. Remove plugs (17), O-rings (18), and shuttle valve (19).
3. Drain hydraulic oil from valve housing (20).

IMPORTANT: Damage to travel counterbalance spool can occur if disassembled. Do not disassemble unless necessary.

4. Remove plugs (1 and 10), O-rings (2 and 8), springs (3), washers (4), counterbalance spool (5), valves (6), springs (7), and spring seats (9).
5. Remove plugs (11), O-rings (12), spring seat (13), spring (14), speed change spool (15), and speed change valve (16).
6. Repair and replace parts as necessary.
7. Thoroughly clean O-rings and seat surfaces using volatile, non-petroleum base solvent and lint-free tissues.

IMPORTANT: To prevent seizing, apply clean hydraulic oil to parts before assembling.

8. Apply a thin film of clean hydraulic oil to components.

9. Install shuttle valve (19), O-rings (18), and plugs (17). Tighten to specification.

Specification

Shuttle Valve Plug-to-Valve Housing—Torque.....	17 N·m 150 lb.-in.
---	-----------------------

10. Install speed change valve (16), speed change spool (15), spring (14), spring seat (13), O-rings (12), and plugs (11). Tighten to specification.

Specification

Speed Change Plug-to-Valve Housing—Torque.....	48 N·m 35 lb.-ft.
--	----------------------

11. Install O-rings (2 and 8), plug (10), spring seats (9), springs (7), valves (6), counterbalance spool, washers, and springs (3).
12. Fill travel motor and park brake with clean hydraulic oil.
13. Install plug (1) and tighten to specification.

Specification

Counterbalance Plug-to-Valve Housing—Torque.....	240 N·m 177 lb.-ft.
--	------------------------

14. Install travel motor and park brake. See Travel Motor and Park Brake Remove and Install. (Group 0260.)
15. Perform travel motor and park brake start-up procedure. See Travel Motor and Park Brake Start-Up Procedure. (Group 0260.)

JS20420,0000A2A -19-14MAY13-2/2

Travel Motor and Park Brake Start-Up Procedure

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.

IMPORTANT: Avoid component damage from insufficient lubrication. This procedure must be performed whenever the travel motor is replaced, disassembled, or the case has been drained.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

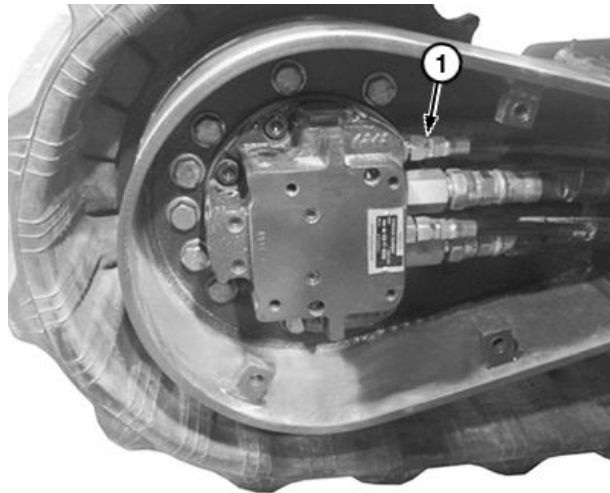
CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank fill cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Disconnect travel motor drain hose (1).
5. Fill the travel motor case with hydraulic oil through case drain port until full. For approved hydraulic oils, see Hydraulic Oil. (Operator's Manual.)
6. Connect travel motor drain hose.
7. Remove vacuum pump or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.)



Travel Motor Drain Hose

1— Travel Motor Drain Hose

See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

IMPORTANT: Hydraulic pumps will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housings whenever oil has been drained from the pumps or hydraulic oil tank.

8. If hydraulic oil tank was drained, perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)
9. Check hydraulic oil level. See Check Hydraulic Tank Oil Level. (Operator's Manual.)
10. Operate machine and check for leaks.

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**Section 04
Engine**

Contents

Page

Group 0400—Removal and Installation
Engine Remove and Install..... 04-0400-1

Engine Remove and Install

SPECIFICATIONS	
Engine Cooling System Capacity	5 L 1.3 gal.
Hydraulic Oil Tank Capacity	32 L 8.5 gal.
Engine Weight (approximate)	215 kg 475 lb.
Rear Engine Mount Cap Screw Torque	90 N·m 66 lb.-ft.
Front Engine Mount Cap Screw Torque	90 N·m 66 lb.-ft.
Hydraulic Pump Cap Screw Torque	90 N·m 66 lb.-ft.

Engine Remove

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Disconnect battery negative (-) cable.
3. Remove counterweight. See Counterweight Remove and Install. (Group 1910.)

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

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

4. Drain engine cooling system. See Drain Cooling System. (Operator's Manual.)

Specification

Engine Cooling System—Capacity..... 5 L
1.3 gal.

⚠ CAUTION: Avoid personal injury from high pressure fluid. High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Slowly loosen hydraulic oil tank cap to release pressure.

5. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
6. Drain hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

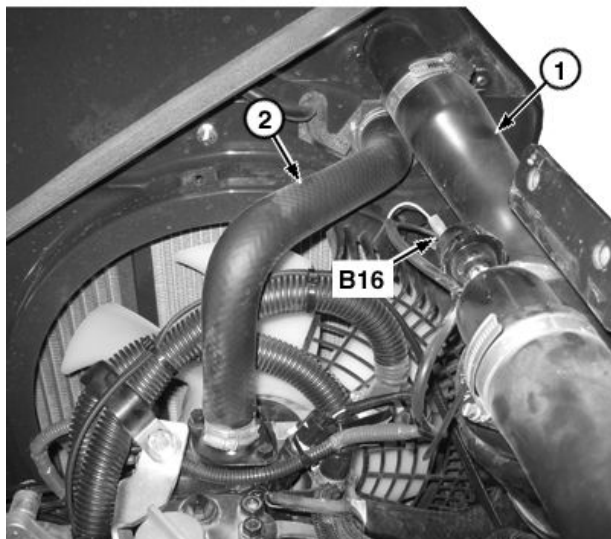
Specification

Hydraulic Oil Tank—Capacity..... 32 L
8.5 gal.

7. Install identification tag and disconnect air filter restriction switch (B16). See Engine Harness (W2) Component Location. (Group 9015-10.)
8. Remove air filter system (1). Close all openings using caps and plugs.
9. Remove upper radiator hose (2). Close all openings using caps and plugs.

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Air Filter System

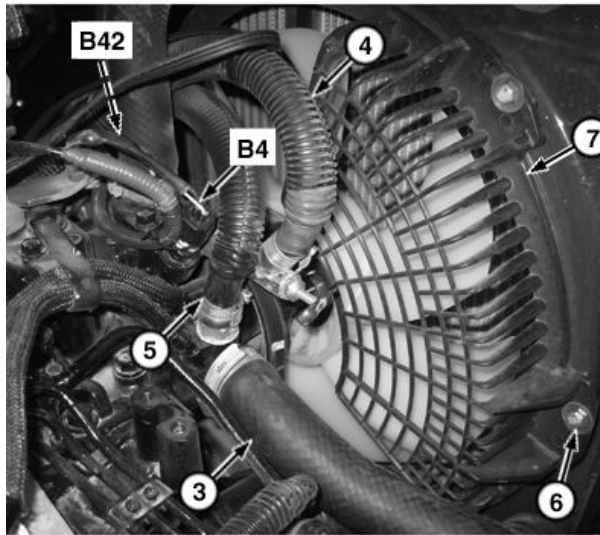
- 1— Air Filter System
- 2— Upper Radiator Hose
- B16— Air Filter Restriction Switch

TX1133228A —UN—18MAR13

JA66566,0002A7B -19-22MAY13-2/14

10. Install identification tags and disconnect lower radiator hose (3), heater core supply hose (4), and heater core return hose (5). Close all openings using caps and plugs. See Engine Cooling System Component Location. (Group 9010-05.)
11. Remove cap screws (6) and fan guard (7).
12. Install identification tags and disconnect engine coolant temperature sensor (B4) and engine overheat switch (B42). See Engine Harness (W2) Component Location. (Group 9015-10.)

- 3— Lower Radiator Hose
- 4— Heater Core Supply Hose
- 5— Heater Core Return Hose
- 6— Cap Screw (2 used)
- 7— Fan Guard
- B4— Engine Coolant Temperature Sensor
- B42— Engine Overheat Switch



Engine Cooling System Hoses

Continued on next page

JA66566,0002A7B -19-22MAY13-3/14

TX1133232A —UN—25MAR13

13. Install identification tags and disconnect alternator (G3) connectors. See Engine Harness (W2) Component Location. (Group 9015-10.)

G3—Alternator



Alternator

JA66566,0002A7B -19-22MAY13-4/14

TX113233A—UN—18MAR13

14. Install identification tags and disconnect exhaust gas recirculation (EGR) valve actuator (M3) connector and engine harness-to-glow plug connector (X88). See Engine Harness (W2) Component Location. (Group 9015-10.)

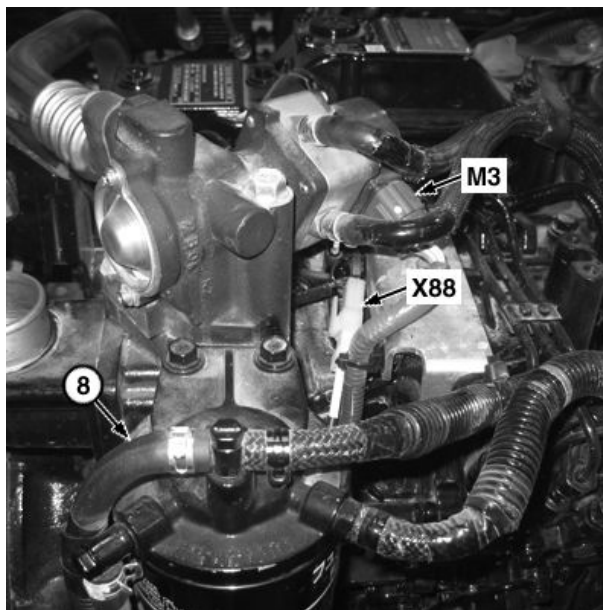
IMPORTANT: Prevent possible fuel spill. On machines without a fuel shutoff valve, install clamp on fuel hose to prevent the release of fuel.

15. Install clamp on return fuel hose (8).

16. Install identification tag and disconnect return fuel hose. Close all openings using caps and plugs. See Engine Fuel System Component Location. (Group 9010-05.)

8—Return Fuel Hose
M3—Exhaust Gas Recirculation (EGR) Valve Actuator

X88— Engine Harness-to-Glow Plug Connector



Exhaust Gas Recirculation (EGR) Valve

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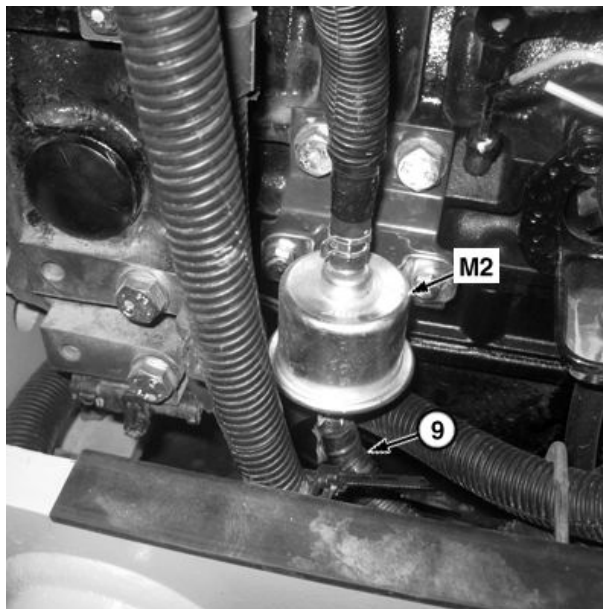
TX113234A—UN—18MAR13

Removal and Installation

17. Install clamp on supply fuel hose (9).
18. Install identification tag and disconnect supply fuel hose. Close all openings using caps and plugs.
19. Install identification tag and disconnect fuel transfer pump (M2) connector. See Engine Harness (W2) Component Location. (Group 9015-10.)

9— Supply Fuel Hose

M2—Fuel Transfer Pump



Fuel Transfer Pump

TX1133238A —UN—15APR13

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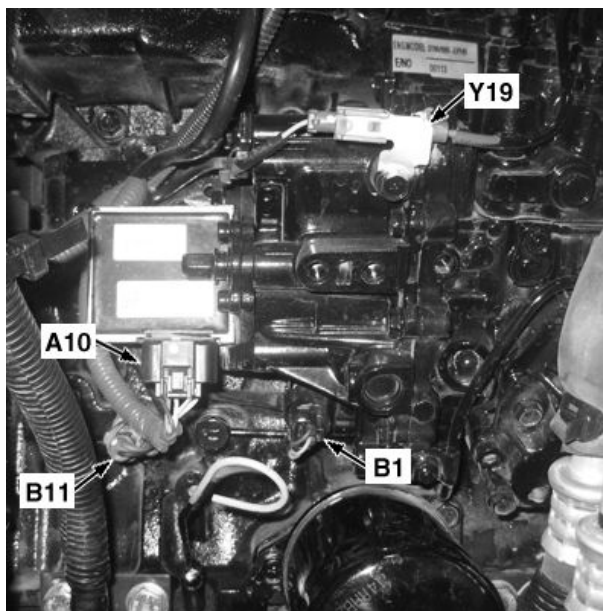
20. Install identification tags and disconnect injection pump rack module (A10), engine speed sensor (B1), engine oil pressure switch (B11), and cold start advance solenoid (Y19). See Engine Harness (W2) Component Location. (Group 9015-10.)

A10— Injection Pump Rack Module

B11— Engine Oil Pressure Switch

B1—Engine Speed Sensor

Y19— Cold Start Advance Solenoid



Engine Harness Connectors

TX1133239A —UN—18MAR13

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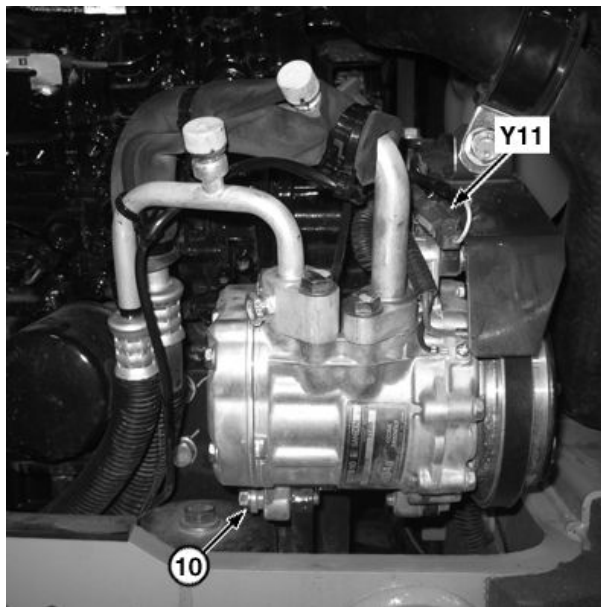
JA66566,0002A7B -19-22MAY13-7/14

NOTE: It is not necessary to evacuate the air conditioning system.

21. Release tension and remove air conditioner compressor belt. Check and Adjust Air Conditioner Belt—If Equipped. (Operator's Manual.)
22. Install identification tag and disconnect air conditioner compressor clutch (Y11) connector. See Air Conditioner Compressor Harness (W8) Component Location. (Group 9015-10.)
23. Remove cap screws (10) and set air conditioner compressor aside.

10— Cap Screw (3 used)

Y11— Air Conditioner Compressor Clutch



Air Conditioner Compressor

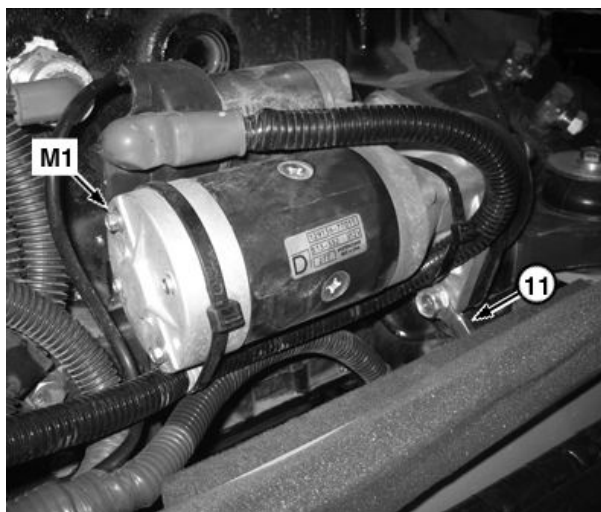
JA66566,0002A7B -19-22MAY13-8/14

TX1133240A—UN—18MAR13

24. Install identification tags and disconnect starter motor (M1) connectors. See Engine Harness (W2) Component Location. (Group 9015-10.)
25. Disconnect ground cable (11).

11— Ground Cable

M1—Starter Motor



Starter Motor

Continued on next page

JA66566,0002A7B -19-22MAY13-9/14

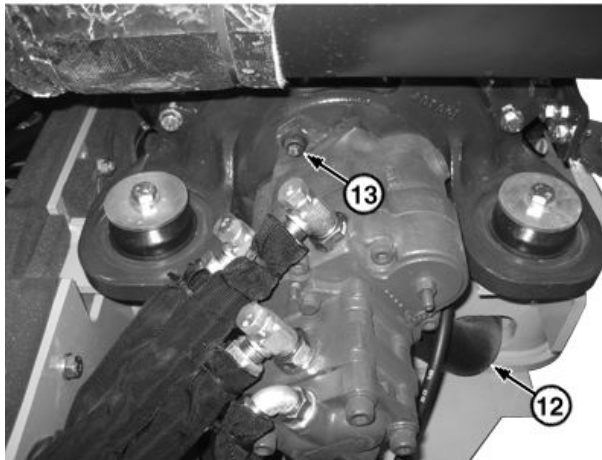
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Removal and Installation

- 26. Disconnect suction hose (12) from hydraulic pump.
Close all openings using caps and plugs.
- 27. Remove cap screws (13) and set hydraulic pump aside.

12— Suction Hose

13— Cap Screw (2 used)



Hydraulic Pump

JA66566,0002A7B -19-22MAY13-10/14

TX1133735A —UN—22MAR13

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- 28. Support engine by attaching appropriate lifting device to engine lifting points (14).

Specification

Engine—Weight	
(approximate).....	215 kg
	475 lb.

14— Lifting Point (2 used)



Lifting Points

Continued on next page

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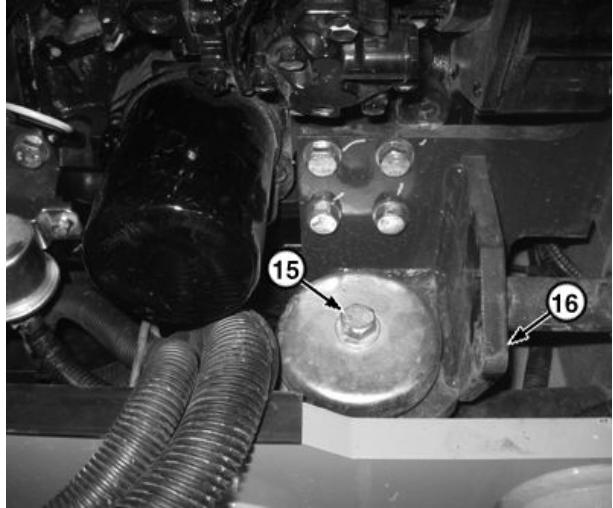
TX1133740A —UN—22MAR13

Removal and Installation

29. Remove cap screws (15) from front engine mounts (16).

15— Cap Screw (2 used)

16— Front Engine Mount (2 used)



Front Engine Mount

Continued on next page

JA66566,0002A7B -19-22MAY13-12/14

TX1133743A —UN—22MAY13

30. Remove cap screws (17) from rear engine mounts (18).
31. Remove engine using appropriate lifting device.
32. Remove and inspect damper drive (flex coupling). See Damper Drive (Flex Coupling) Remove and Install. (Group 0752.)
33. Repair or replace parts as necessary. See Yanmar Industrial Engine TNV Series Service Manual.

Engine Install

1. Install damper drive (flex coupling). See Damper Drive (Flex Coupling) Remove and Install. (Group 0752.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

2. Install engine using an appropriate lifting device.

Specification

Engine—Weight (approximate).....	215 kg 475 lb.
-------------------------------------	-------------------

3. Install cap screws (17) in rear engine mounts and tighten to specification.

Specification

Rear Engine Mount Cap Screw—Torque.....	90 N·m 66 lb.-ft.
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4. Install cap screws (15) in front engine mounts and tighten to specification.

Specification

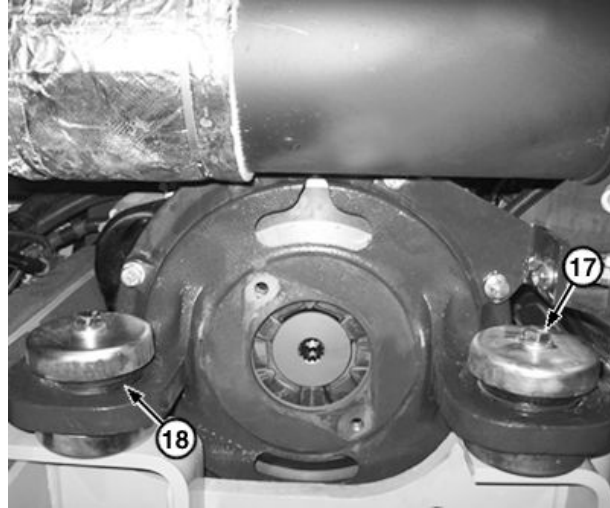
Front Engine Mount Cap Screw—Torque.....	90 N·m 66 lb.-ft.
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5. Install hydraulic pump and tighten cap screws (13) to specification.

Specification

Hydraulic Pump Cap Screw—Torque.....	90 N·m 66 lb.-ft.
---	----------------------

6. Connect suction hose to hydraulic pump.
7. Connect ground cable and starter motor (M1) connectors. See Engine Harness (W2) Component Location. (Group 9015-10.)
8. Install air conditioner compressor and cap screws (10).
9. Connect air conditioner compressor clutch (Y11) connector. See Air Conditioner Compressor Harness (W8) Component Location. (Group 9015-10.)
10. Install and tighten air conditioner compressor belt. See Check and Adjust Air Conditioner Belt—If Equipped. (Operator's Manual.)
11. Connect injection pump rack module (A10), engine speed sensor (B1), engine oil pressure switch (B11),



Rear Engine Mount

- | | |
|------------------------|--------------------------------|
| 17— Cap Screw (2 used) | 18— Rear Engine Mount (2 used) |
|------------------------|--------------------------------|

and cold start advance solenoid (Y19). See Engine Harness (W2) Component Location. (Group 9015-10.)

IMPORTANT: Prevent possible fuel spill. On machines without a fuel shutoff valve, a clamp is installed on fuel hose to prevent the release of fuel.

12. Connect supply fuel hose, return fuel hose, and release clamps. See Engine Fuel System Component Location. (Group 9010-05.)
13. Connect exhaust gas recirculation (EGR) valve actuator (M3) connector, engine harness-to-glow plug connector (X88), and fuel transfer pump (M2) connector. See Engine Harness (W2) Component Location. (Group 9015-10.)
14. Connect electrical connectors to alternator (G3). See Engine Harness (W2) Component Location. (Group 9015-10.)
15. Install fan guard and cap screws (6).
16. Connect lower radiator hose, heater core supply hose, heater core return hose, and upper radiator hose. See Engine Cooling System Component Location. (Group 9010-05.)
17. Install air filter system.
18. Connect engine coolant temperature sensor (B4), engine overheat switch (B42), and air filter restriction switch (B16). See Engine Harness (W2) Component Location. (Group 9015-10.)
19. Fill hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Continued on next page

JA66566,0002A7B -19-22MAY13-13/14

TX1133744A—UN—04APR13

Removal and Installation

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

20. Perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)

21. Fill engine cooling system. See Cooling System Fill and Deaeration Procedure. (Operator's Manual.)

22. Install counterweight. See Counterweight Remove and Install. (Group 1910.)

23. Connect battery negative (-) cable.

24. Operate machine and check for leaks.

JA66566,0002A7B -19-22MAY13-14/14

Section 05 Engine Auxiliary System

Contents

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Group 0510—Cooling Systems	
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Group 0560—External Fuel Supply Systems	
Fuel Tank Remove and Install	05-0560-1
Fuel Pump Remove and Install	05-0560-3
Primary Fuel Filter and Water Separator Housing Remove and Install	05-0560-4
Final Fuel Filter Housing Remove and Install	05-0560-5

Contents

Radiator Remove and Install

SPECIFICATIONS	
Cooling System Capacity	5 L 1.3 gal.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Disconnect battery negative (-) cable.

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

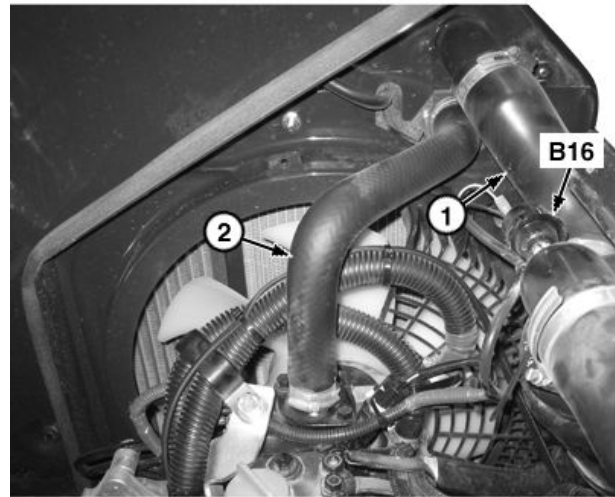
Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

3. Drain engine cooling system. See Drain Cooling System. (Operator's Manual.)

Specification

Cooling System—Capacity.....	5 L 1.3 gal.
------------------------------	-----------------

4. Remove hydraulic oil cooler. See Hydraulic Oil Cooler Remove and Install. (Group 0510.)
5. Install identification tags and disconnect air filter restriction switch (B16). See Engine Harness (W2) Component Location. (Group 9015-10.)



Upper Radiator Hose

1— Air Filter System
2— Upper Radiator Hose

B16— Air Filter Restriction Switch

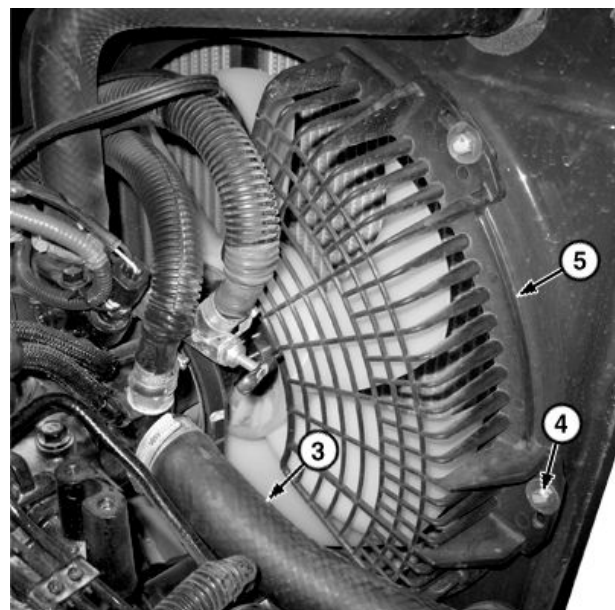
6. Remove air filter system (1). Close all openings using caps and plugs.
7. Remove upper radiator hose (2). Close all openings using caps and plugs.

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8. Remove lower radiator hose (3). Close all openings using caps and plugs.
9. Remove cap screws (4) and fan guard (5).

3— Lower Radiator Hose 5— Fan Guard
4— Cap Screw (2 used)



Lower Radiator Hose

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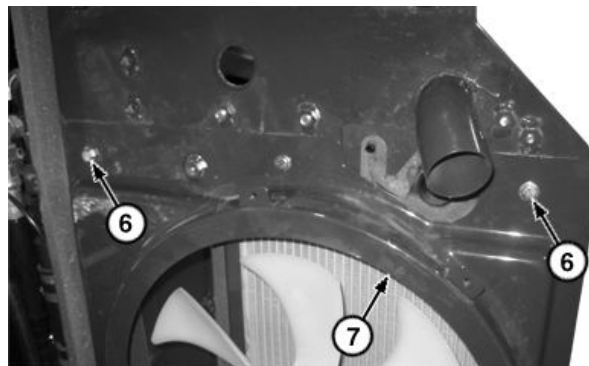
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10. Remove cap screws (6) and set fan shroud (7) aside.

6— Cap Screw (6 used)

7— Fan Shroud

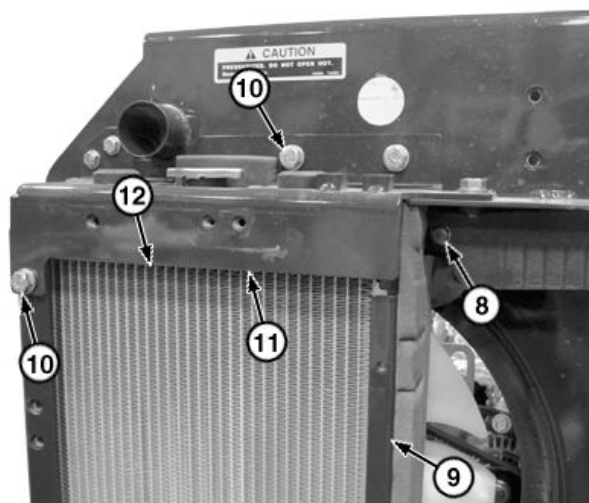


Fan Shroud

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11. Remove cap screws (8) and side bracket (9).
12. Remove cap screws (10) and top bracket (11).
13. Remove radiator (12).
14. Repair or replace parts as necessary.
15. Install radiator, top bracket, and cap screws (10).
16. Install side bracket and cap screws (8).
17. Install fan shroud and cap screws (6).
18. Install fan guard and cap screws (4).
19. Install upper and lower radiator hoses.
20. Install air filter system and connect air filter restriction switch (B16). See Engine Harness (W2) Component Location. (Group 9015-10.)
21. Install hydraulic oil cooler. See Hydraulic Oil Cooler Remove and Install. (Group 0510.)
22. Fill engine cooling system. Cooling System Fill and Deaeration Procedure. (Operator's Manual.)
23. Connect battery negative (-) cable.
24. Operate machine and check for leaks.



Radiator

TX1134851A—UN—12APR13

8— Cap Screw (2 used)
9— Side Bracket
10— Cap Screw (6 used)

11— Top Bracket
12— Radiator

JA66566,0002A85 -19-16APR13-4/4

Hydraulic Oil Cooler Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Disconnect battery negative (-) cable.

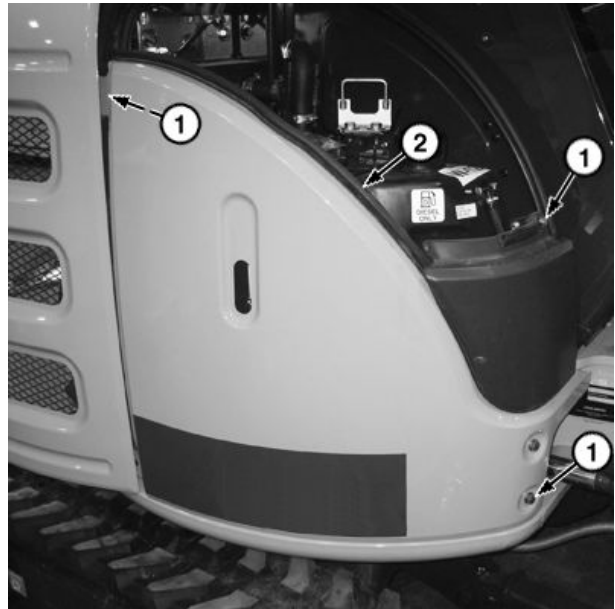
CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
4. Drain hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

5. Remove counterweight. See Counterweight Remove and Install. (Group 1910.)
6. Remove cap screws (1) and side panel (2).



Side Panel

1— Cap Screw (5 used)

2— Side Panel

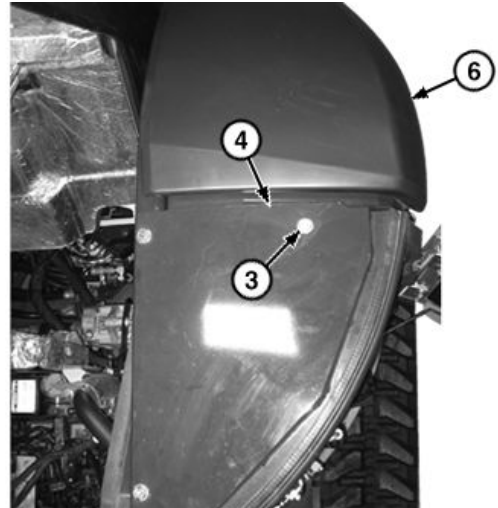
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JA66566,0002A83 -19-01MAY13-1/9

7. Remove cap screws (3) and cover (4).

3— Cap Screw (3 used)
4— Cover

6— Upper Maintenance Access Door



Cover

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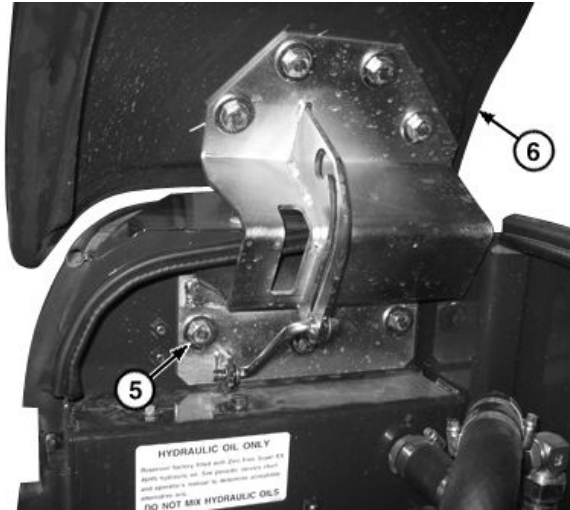
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JA66566,0002A83 -19-01MAY13-2/9

8. Remove cap screws (5) and upper maintenance access door (6).

5— Cap Screw (3 used)

6— Upper Maintenance Access Door



Upper Maintenance Access Door

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JA66566,0002A83 -19-01MAY13-3/9

9. Disconnect locking arm (7). Remove cap screws (8) and remove battery compartment maintenance access door (9).

7— Locking Arm

8— Cap Screw (4 used)

9— Battery Compartment Maintenance Access Door



Battery Compartment Maintenance Access Door

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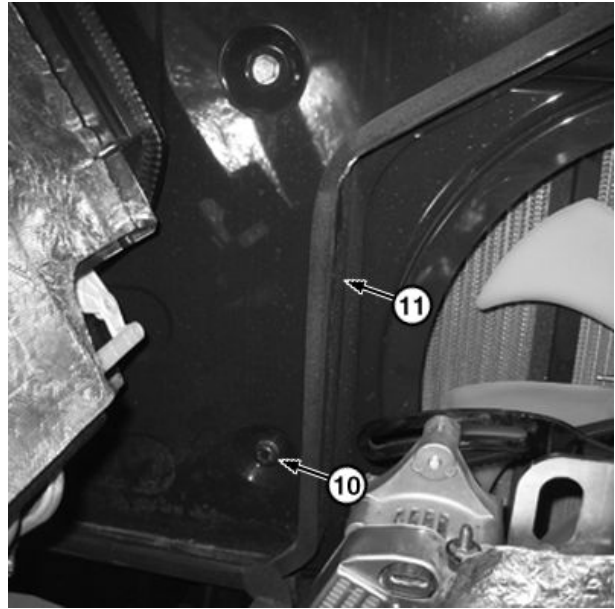
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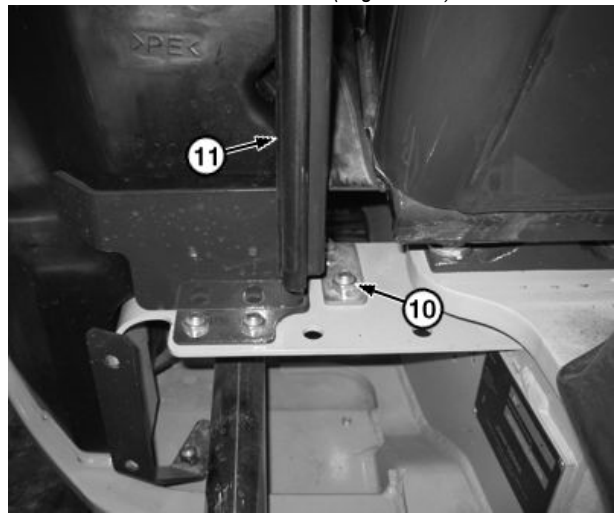
10. Remove cap screws (10) and inside panel (11).

10— Cap Screw (4 used)

11— Inside Panel



Inside Panel (engine side)



Inside Panel (front of machine)

TX1134631A —UN—11APR13

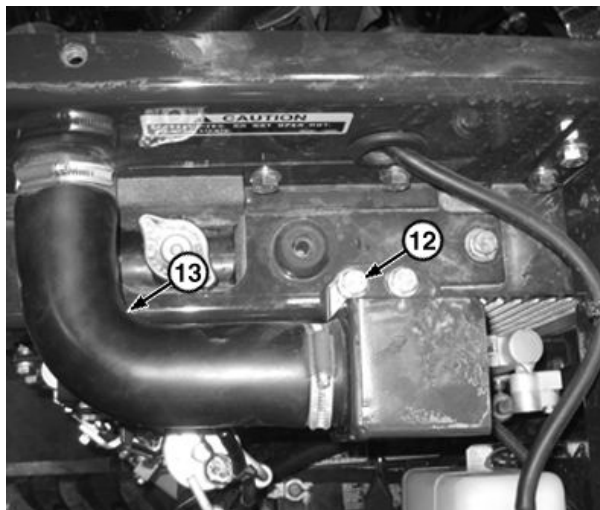
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11. Remove cap screws (12) and intake hose (13). Close all openings using caps and plugs.

12— Cap Screw (2 used) 13— Intake Hose



Intake Hose

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12. Remove cap screws (14) and set Service ADVISOR™ diagnostic connector bracket (15) aside.

13. Remove cap screws (16) and door latch (17).

NOTE: It is not necessary to evacuate air conditioning system.

14. Remove cap screws (18) and set receiver-dryer (19) aside.

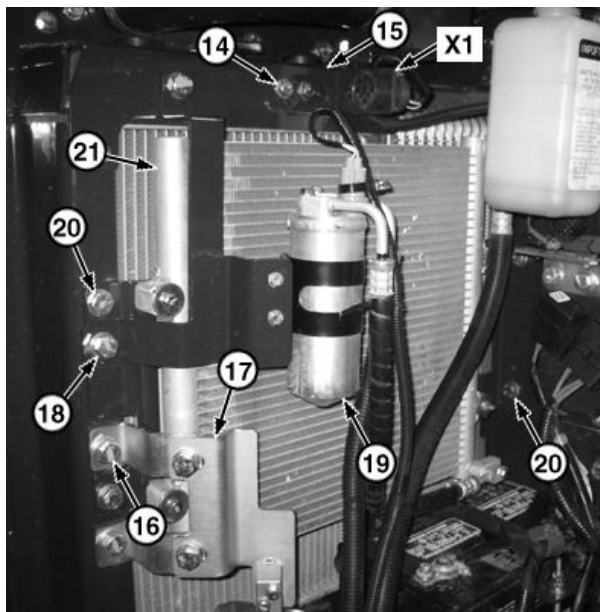
15. Remove cap screws (20) and set condenser (21) aside.

16. Remove coolant recovery tank. See Coolant Recovery Tank Remove and Install. (Group 0510.)

17. Remove engine control unit (ECU). See Engine Control Unit (ECU) Remove and Install. (Group 9015-20.)

18. Remove battery. See Battery Remove and Install. (Group 9015-20.)

14— Cap Screw (2 used)	19— Receiver-Dryer
15— Service ADVISOR™ Diagnostic Connector Bracket	20— Cap Screw (4 used)
16— Cap Screw (2 used)	21— Condenser
17— Door Latch	X1— Service ADVISOR™ Diagnostic Connector
18— Cap Screw (2 used)	



Receiver-Dryer and Condenser

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Service ADVISOR is a trademark of Deere & Company

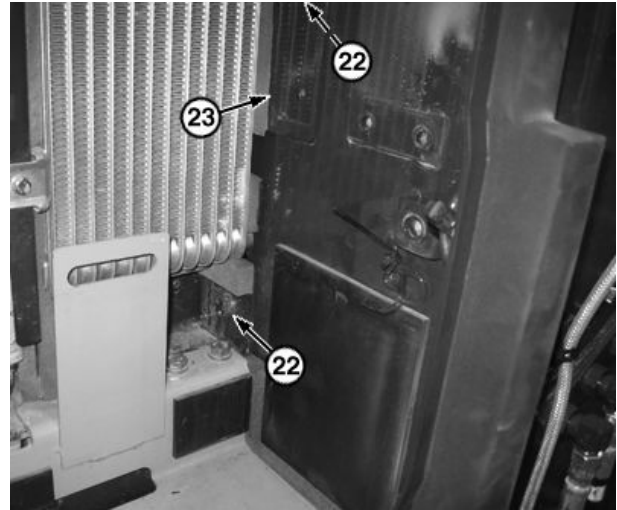
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19. Remove cap screws (22) and bulkhead (23).

22— Cap Screw (5 used)

23— Bulkhead



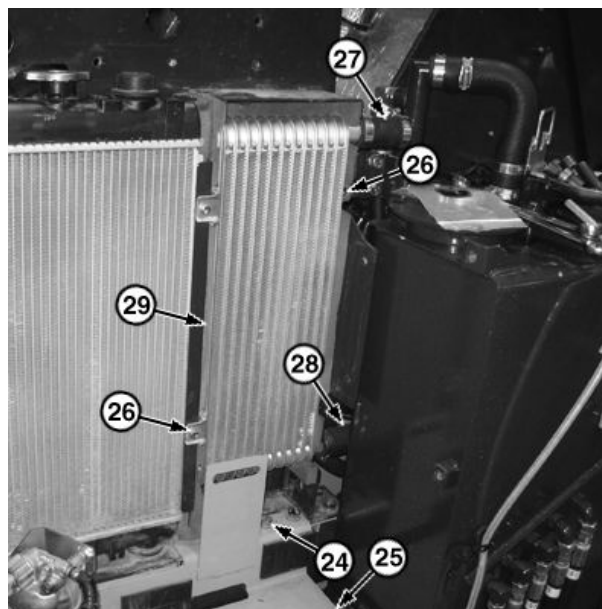
Bulkhead

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20. Remove cap screws (24) and battery bracket (25).
21. Remove cap screws (26).
22. Disconnect upper hydraulic oil cooler hose (27) and lower hydraulic oil cooler hose (28). Remove hydraulic oil cooler (29). Close all openings using caps and plugs.
23. Repair or replace parts as necessary.
24. Install hydraulic oil cooler and cap screws (26). Connect hydraulic oil cooler hoses.
25. Install battery bracket and cap screws (24).
26. Install bulkhead and cap screws (26).
27. Install battery. See Battery Remove and Install. (Group 9015-20.)
28. Install engine control unit (ECU). See Engine Control Unit (ECU) Remove and Install. (Group 9015-20.)
29. Install coolant recovery tank. See Coolant Recovery Tank Remove and Install. (Group 0510.)
30. Install condenser and cap screws (20).
31. Install receiver-dryer and cap screws (18).
32. Install door latch and cap screws (16).
33. Install Service ADVISOR™ diagnostic connector bracket and cap screws (14).
34. Install intake hose and cap screws (12).
35. Install inside panel and cap screws (10).
36. Install battery compartment maintenance access door and cap screws (8). Connect locking arm.
37. Install upper maintenance access door and cap screws (5).
38. Install cover and cap screws (3).



Hydraulic Oil Cooler

- | | |
|------------------------|-------------------------------------|
| 24— Cap Screw (4 used) | 27— Upper Hydraulic Oil Cooler Hose |
| 25— Battery Bracket | 28— Lower Hydraulic Oil Cooler Hose |
| 26— Cap Screw (4 used) | 29— Hydraulic Oil Cooler |

39. Install side panel and cap screws (1).
40. Install counterweight. See Counterweight Remove and Install. (Group 1910.)
41. Fill hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
42. Connect battery negative (-) cable.
43. Operate machine and check for leaks.

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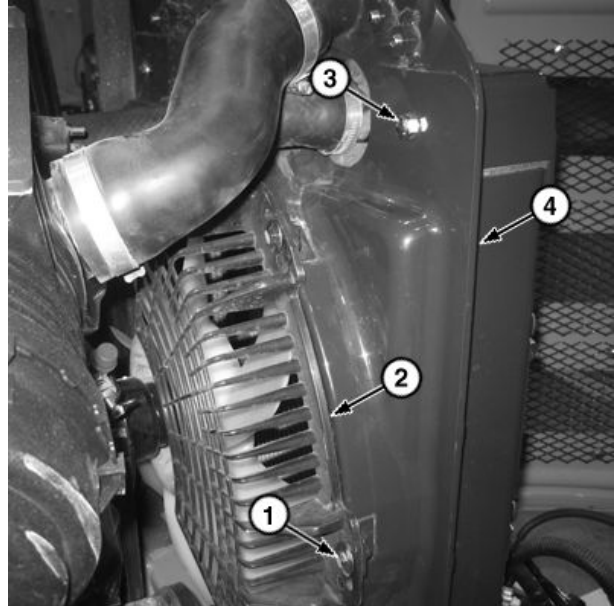
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Fan, Fan Guard, and Fan Shroud Remove and Install

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)
2. Remove counterweight. See [Counterweight Remove and Install](#). (Group 1749.)
3. Loosen fan belt. See [Check and Adjust Fan Belt Tension](#). (Operator's Manual.)
4. Remove cap screws (1) and fan guard (2).
5. Remove cap screws (3) and lay fan shroud (4) against engine.

1— Cap Screw (2 used)
2— Fan Guard

3— Cap Screw (6 used)
4— Fan Shroud

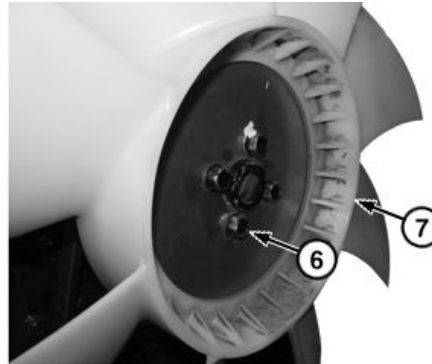


Fan Guard and Fan Shroud

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6. Remove cap screws (6) and fan (7).
7. Remove fan shroud.
8. Repair or replace parts as necessary.
9. Place fan shroud over fan pulley and install fan.
10. Install cap screws (6).
11. Install fan shroud and cap screws (3).
12. Install fan guard and cap screws (1).
13. Adjust fan belt. See [Check and Adjust Fan Belt Tension](#). (Operator's Manual.)
14. Install counterweight. See [Counterweight Remove and Install](#). (Group 1749.)



Fan

6— Cap Screw (4 used)

7— Fan

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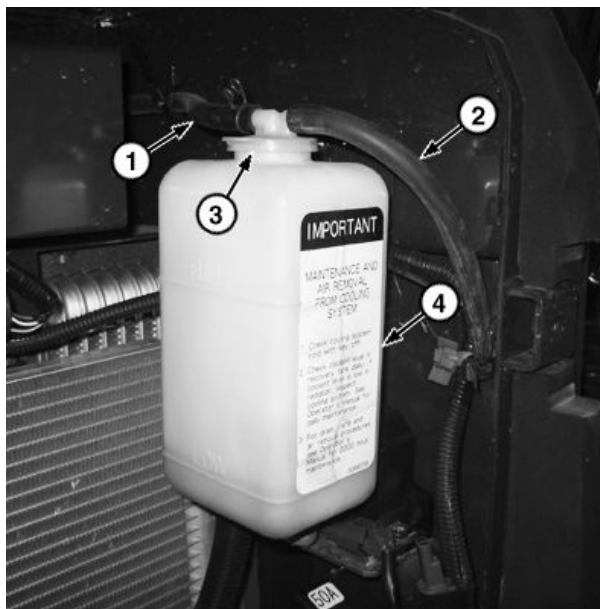
Coolant Recovery Tank Remove and Install

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

⚠ CAUTION: Touching coolant recovery tank when hot can cause serious burns. Only remove recovery tank when cool enough to touch with bare hands.

IMPORTANT: Prevent possible fluid spill. On machines without a shutoff valve, install clamps on hose to prevent the release of fluid.

2. Install clamp on coolant recovery tank hose (1).
3. Install identification tags and disconnect hoses (1 and 2) from cap (3). Close all openings using caps and plugs.
4. Lift coolant recovery tank (4) upward and remove.
5. Dispose of coolant properly.
6. Repair or replace parts as necessary.
7. Install coolant recovery tank.
8. Connect hoses. Remove clamp from coolant recovery tank hose.
9. Check coolant level. See Check Coolant. (Operator's Manual.)



Coolant Recovery Tank

- | | |
|-------------------------------|--------------------------|
| 1— Coolant Recovery Tank Hose | 3— Cap |
| 2— Drain Hose | 4— Coolant Recovery Tank |

10. Operate machine and check for leaks.

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Fuel Tank Remove and Install

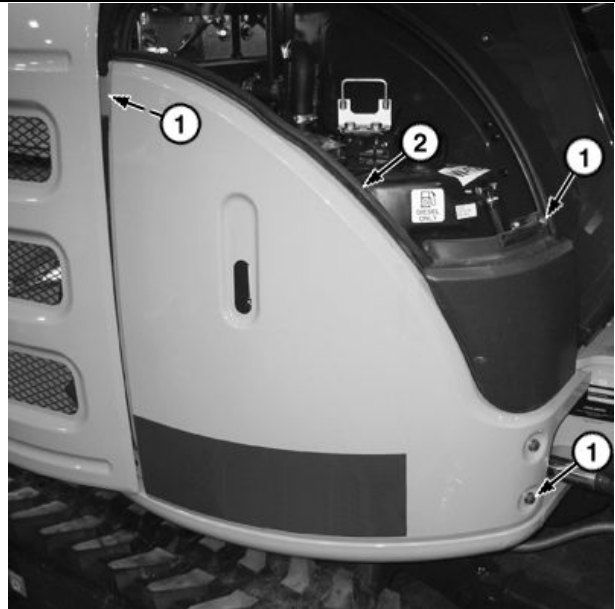
SPECIFICATIONS

Fuel Tank Capacity	42 L 11.1 gal.
--------------------	-------------------

1. Park and prepare machine for service safety. See Park and Prepare for Service Safety. (Group 0001.)
2. Remove cap screws (1) and side panel (2).

1—Cap Screw (5 used)

2—Side Panel



Side Panel

TX1134627A —UN—16APR13

BD53302,000175A -19-01MAY13-1/5

3. Remove cap screws (3) and bracket (4).

3—Cap Screw (2 used)

4—Bracket



Bracket

TX1135065A —UN—17APR13

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BD53302,000175A -19-01MAY13-2/5

External Fuel Supply Systems

4. Remove cap screws (5) and upper maintenance access door (6).

5— Cap Screw (3 used)

6— Upper Maintenance Access Door



Upper Maintenance Access Door

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BD53302,000175A -19-01MAY13-3/5

5. Remove cap screws (7) and bottom access panel (8).
 6. Drain fuel from fuel tank. See Drain Water and Sediment From Fuel Tank Sump. (Operator's Manual.)

Specification

Fuel Tank—Capacity..... 42 L
 11.1 gal.

7— Cap Screw (4 used)

8— Bottom Access Panel



Bottom Access Panel

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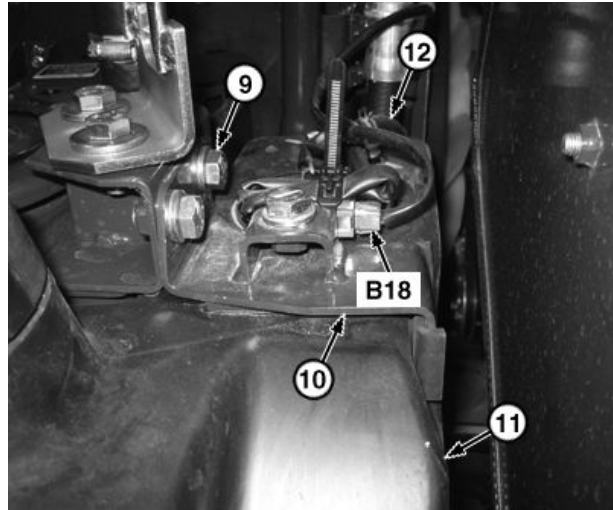
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7. Install identification tags and disconnect fuel return hose (12) and fuel supply hose (13). Close all openings using caps and plugs. See Engine Fuel System Component Location. (Group 9010-05.)
8. Install identification tags and disconnect fuel level sensor (B18). See Engine Harness (W2) Component Location. (Group 9015-10.)
9. Remove cap screws (9) and bracket (10).
10. Remove fuel tank (11).
11. Repair or replace as necessary.
12. Install fuel tank.
13. Install bracket (10) and cap screws (9).
14. Connect fuel level sensor (B18.) See Engine Harness (W2) Component Location. (Group 9015-10.)
15. Connect fuel return hose and fuel supply hose. See Engine Fuel System Component Location. (Group 9010-05.)
16. Install bottom access panel and cap screws (7).
17. Install upper maintenance access door and cap screws (5).
18. Install bracket and cap screws (3).
19. Install side panel and cap screws (1).
20. Fill fuel tank. See Fuel Tank. (Operator's Manual.)
21. Bleed fuel system. See Bleed Fuel System. (Operator's Manual.)
22. Operate machine and check for leaks.

9— Cap Screw (3 used)
10— Bracket
11— Fuel Tank

12— Fuel Return Hose
13— Fuel Supply Hose
B18— Fuel Level Sensor



Fuel Tank



Fuel Supply Hose

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TX1135073A—UN—17APR13

BD53302,000175A -19-01MAY13-5/5

Fuel Pump Remove and Install

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove counterweight. See Counterweight Remove and Install. (Group 1910.)

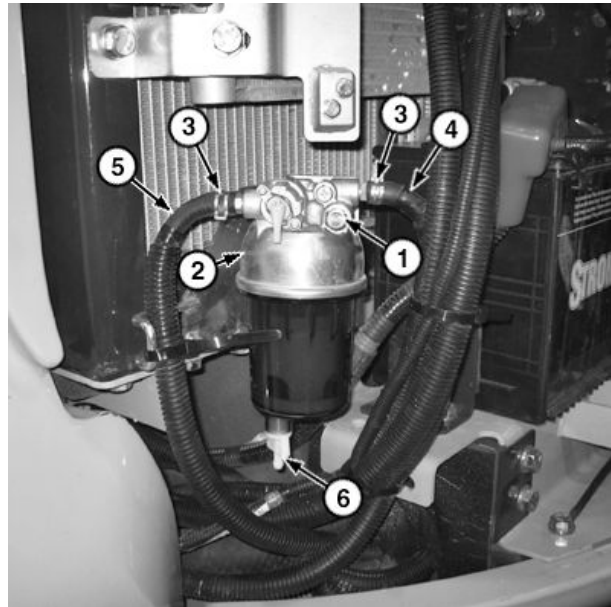
IMPORTANT: Avoid possible engine damage. When engine fuel pump is replaced, the fuel pump replacement calibration must be performed.

3. Replace fuel pump. See Yanmar Industrial Engine TNV Series Service Manual for procedure.
4. Perform fuel pump calibration procedure. See Fuel Pump Replacement Calibration. (Group 9015-20.)
5. Install counterweight. See Counterweight Remove and Install. (Group 1910.)

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Primary Fuel Filter and Water Separator Housing Remove and Install

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)
 2. Open right rear access door.
 3. Install clamp on fuel tank-to-primary fuel filter and water separator hose (5).
 4. Loosen drain valve (6) and drain fuel into suitable container. See [Drain Water and Sediment from Primary Fuel Filter and Water Separator](#). (Operator's Manual.)
 5. Remove hose clamps (3). Install identification tags and disconnect primary fuel filter and water separator-to-fuel transfer pump hose (4) and fuel tank-to-primary fuel filter and water separator hose (5). Close all openings using caps and plugs.
 6. Remove cap screw (1) and primary fuel filter and water separator housing (2).
 7. Repair or replace parts as necessary.
 8. Install primary fuel filter and water separator housing. Install and tighten cap screw.
 9. Connect fuel hoses and install hose clamps.
- IMPORTANT: Prevent possible fuel spill. On machines without a fuel shutoff valve, a clamp is installed on fuel hose to prevent the release of fuel.**
10. Remove clamp from fuel tank-to-primary fuel filter and water separator hose.
 11. Bleed fuel system. For more information on bleeding fuel system, see [Bleed Fuel System](#). (Operator's Manual.)



Primary Fuel Filter and Water Separator

- | | |
|--|---|
| 1— Cap Screw | 4— Primary Fuel Filter and Water Separator-to-Fuel Transfer Pump Hose |
| 2— Primary Fuel Filter and Water Separator Housing | 5— Fuel Tank-to-Primary Fuel Filter and Water Separator Hose |
| 3— Hose Clamp (2 used) | 6— Drain Valve |

12. Close right rear access door.
13. Operate machine and check for leaks.

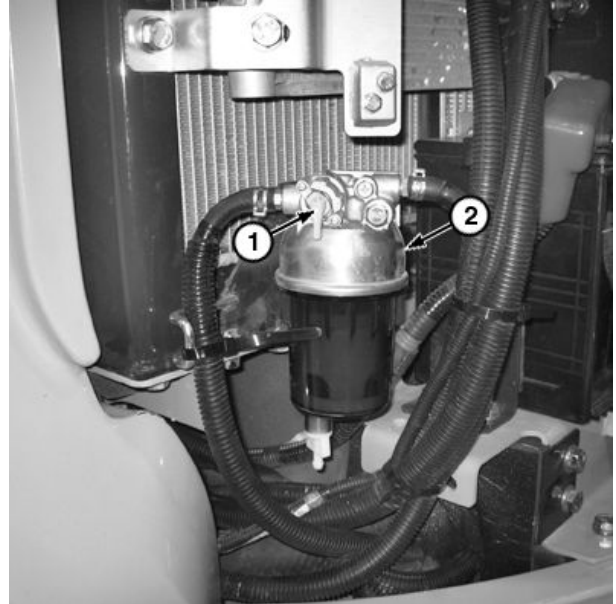
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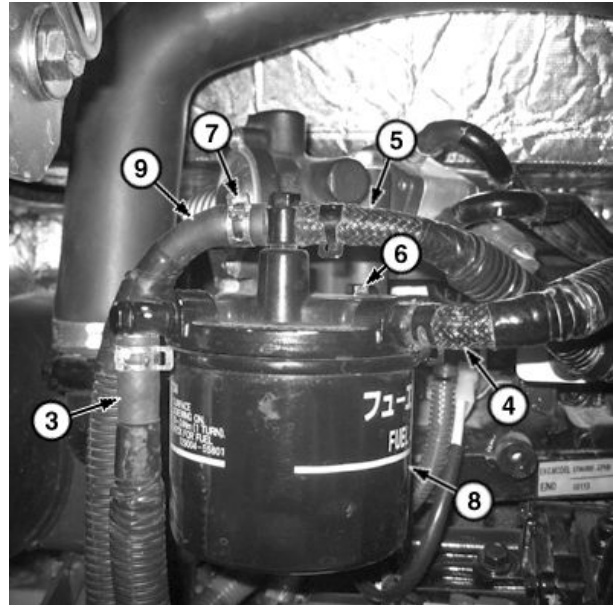
Final Fuel Filter Housing Remove and Install

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Turn fuel shutoff valve (1) located on primary fuel filter (2) to OFF position.
3. Remove hose clamps (7). Install Identification tags and disconnect transfer pump-to-final fuel filter hose (3), final fuel filter-to-injection pump rack module hose (4), final fuel filter-to-engine hose (5), and final fuel filter-to-fuel cooler hose (9). Close all openings using caps and plugs. See Engine Fuel System Component Location. (Group 9010-05.)
4. Remove cap screws (6) and final fuel filter (8).
5. Repair or replace parts as necessary.
6. Install final fuel filter. Install and tighten cap screws.
7. Connect fuel hoses and install hose clamps.
8. Bleed fuel system. For more information on bleeding fuel system, see Bleed Fuel System. (Operator's Manual.)
9. Turn fuel shutoff valve to ON position.
10. Operate machine and check for leaks.

- | | |
|---|--|
| 1— Fuel Shutoff Valve | 6— Cap Screw (2 used) |
| 2— Primary Fuel Filter | 7— Hose Clamp (4 used) |
| 3— Transfer Pump-to-Final Fuel Filter Hose | 8— Final Fuel Filter |
| 4— Final Fuel Filter-to-Injection Pump Rack Module Hose | 9— Final Fuel Filter-to-Fuel Cooler Hose |
| 5— Final Fuel Filter-to-Engine Hose | |



Shutoff Valve



Final Fuel Filter

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TX1136611A—UN—16MAY13

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**Section 07
Dampener Drive (Flex Coupling)**

Contents

Page

Group 0752—Elements

Damper Drive (Flex Coupling)
Remove and Install..... 07-0752-1

Contents

Damper Drive (Flex Coupling) Remove and Install

SPECIFICATIONS	
Damper Drive-to-Flywheel Cap Screw Torque	83—92 N·m 61—68 lb.-ft.
Cover-to-Flywheel Housing Cap Screw Torque	49 N·m 36 lb.-ft.

OTHER MATERIAL	
242 Loctite® Thread Lock and Sealer (medium strength)	

1. Remove engine. See Engine Remove and Install. (Group 0400.)
2. Remove cap screws (1).
3. Remove bracket (2) and flywheel cover (3).
4. Remove socket head cap screws (4).
5. Remove damper drive (5).
6. Repair or replace parts as necessary.
7. Install damper drive.
8. Apply PM37418 Thread Lock and Sealer (medium strength) to socket head cap screws. Install socket head cap screws and tighten to specification.

Specification

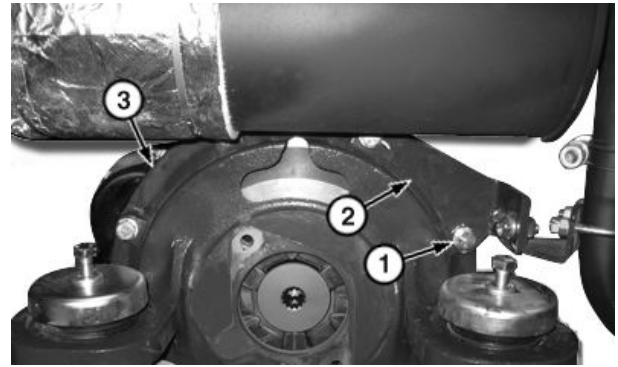
Damper Drive-to-Flywheel Cap Screw—Torque.....	83—92 N·m 61—68 lb.-ft.
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9. Install flywheel cover, bracket, and cap screws. Tighten cap screws to specification.

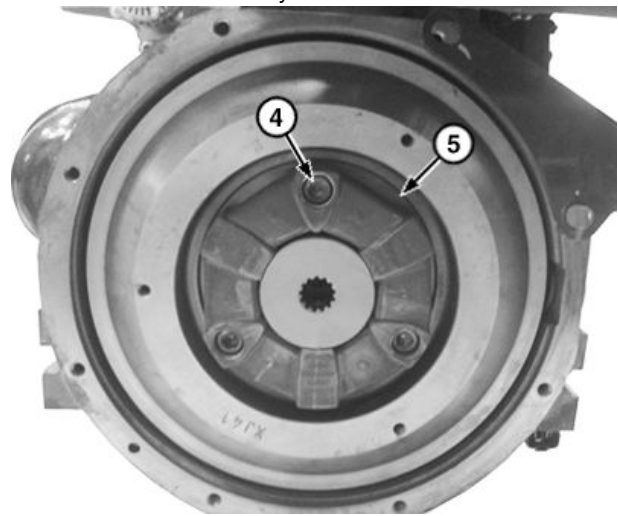
Specification

Cover-to-Flywheel Housing Cap Screw—Torque.....	49 N·m 36 lb.-ft.
---	----------------------

Loctite is a trademark of Henkel Corporation



Flywheel Cover



Damper Drive

- | | |
|-----------------------|-----------------------------------|
| 1— Cap Screw (8 used) | 4— Socket Head Cap Screw (3 used) |
| 2— Bracket | 5— Damper Drive |
| 3— Flywheel Cover | |

10. Install engine. See Engine Remove and Install. (Group 0400.)

JD29379.0000301 -19-15APR13-1/1

TX1134953A—JUN—16APR13

TX1134959A—JUN—16APR13

Elements

Section 17 Frame or Supporting Structure

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Welding on Machine

⚠ CAUTION: Do not weld or apply heat on any part of a reservoir or tank that has contained oil or fuel. Heat from welding and cutting can cause oil, fuel, or cleaning solution to create gases which are explosive, flammable, or toxic. Avoid welding or heating near pressurized fluid lines. Flammable spray may result and cause severe burns if pressurized lines fail as a result of heating. Do not let heat go beyond work area to nearby pressurized lines.

⚠ CAUTION: Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. Complete all work outside or in a well ventilated area. Dispose of paint and solvent properly.

When sanding or grinding painted surfaces, avoid breathing the dust. Wear an approved respirator. If using 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.

1. Remove paint before welding or heating.
 - When sanding or grinding paint, avoid breathing the dust.
 - Wear an approved respirator. When using 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.

IMPORTANT: Avoid machine damage to diesel exhaust fluid (DEF) system. After key switch is switched to OFF position, wait at least 10 minutes before turning battery disconnect switch to OFF position or disconnecting battery cables. During cold-weather exposure, if adequate time is not allowed for lines to be purged, residual DEF can freeze and possibly damage components of the DEF system.

IMPORTANT: Avoid damage to electrical system from welding current. Disconnect negative (-) and positive (+) battery cables before welding on machine.

2. Disconnect the negative (-) battery cable(s).
3. Disconnect the positive (+) battery cable(s).

4. Cover, protect, or move any wiring harness sections away from welding area.

IMPORTANT: Have only a qualified welder perform this job. Connect welder ground clamp close to each weld area so electrical current does not pass through any bearings, articulation joints, or pivot points. Remove or protect all parts that can be damaged by heat or weld splatter.

5. Connect welder ground close to welding point and away from control units.
6. Use one of the following weld processes:
 - AWS-E-7018 covered electrode with shielded metal arc welding (SMAW) process.
 - AWS-ER-70S-3 wire electrode with gas metal arc welding (GMAW) process.
 - AWS-E70T-1 or E71T-1 wire electrode with flux core arc welding (FCAW) process.

Welding Repair of Major Structure—Specification

Weld Metal—Tensile Strength.....	482.6 MPa 70 000 psi 4 826 bar
Yield Strength	413.7 MPa 60 000 psi 4 137 bar
Elongation.....	22%

IMPORTANT: Avoid insufficient weld penetration. Preheat area that will be repaired to allow better weld penetration. Insufficient weld penetration can lead to further damage.

7. To repair weld metal failure, remove failed weld metal using arc gouging or grinding equipment. Thoroughly clean area to be welded. Preheat structural assemblies to a minimum of 38°C (100°F). Preheat ground engaging tools (cutting edges, skid shoes, and teeth shanks) to 177°C (350°F).

To repair base metal failure remove enough material to allow weld to penetrate to the bottom of crack. Preheat structural assemblies to a minimum of 38°C (100°F). Preheat ground engaging tools (cutting edges, skid shoes, and teeth shanks) to 177°C (350°F).

Welding Repair of Major Structure—Specification

Structural Assemblies—Preheat Temperature.....	38°C 100°F
Ground Engaging Tools—Preheat Temperature.....	177°C 350°F

TP97644.000011E -19-04MAR16-1/1

Frame Installation

Counterweight Remove and Install

SPECIFICATIONS	
Additional Counterweight Weight (approximate)	230 kg 510 lb.
Counterweight Weight (approximate)	550 kg 1212 lb.
Counterweight Cap Screw Torque	550 N·m 405 lb.-ft.
Additional Counterweight Cap Screw Torque	270 N·m 200 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove cap screws (9) and rear panel (10).
3. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)

9— Cap Screw (4 used)

10— Rear Panel



Rear Panel

JA66566,0002A77 -19-27MAR13-1/5

TX1133965A—UN—03APR13

4. Install lifting eyebolts (1) into additional counterweight (2).

CAUTION: Avoid crushing injury from heavy component. Use appropriate lifting device.

5. Support additional counterweight by attaching appropriate lifting device to lifting eyebolts.

Specification

Additional Counterweight—Weight (approximate)..... 230 kg
510 lb.

6. Remove cap screws (3) and remove additional counterweight.

1— Lifting Eyebolt (2 used)

2— Additional Counterweight

3— Cap Screw (2 used)



Additional Counterweight

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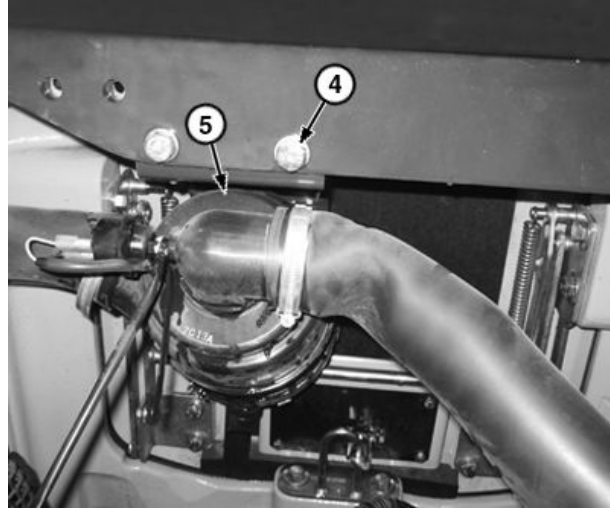
JA66566,0002A77 -19-27MAR13-2/5

TX1132847A—UN—12MAR13

IMPORTANT: Avoid possible air cleaner housing damage. Air cleaner housing is attached to counterweight. Remove air cleaner housing before removing counterweight.

- Remove cap screws (4) and set air cleaner housing (5) aside.

4— Cap Screw (2 used) 5— Air Cleaner Housing



Air Cleaner Housing

TX1132848A—UN—12MAR13

JA66566,0002A77 -19-27MAR13-3/5

- Install lifting eyebolts (6) into counterweight (7).

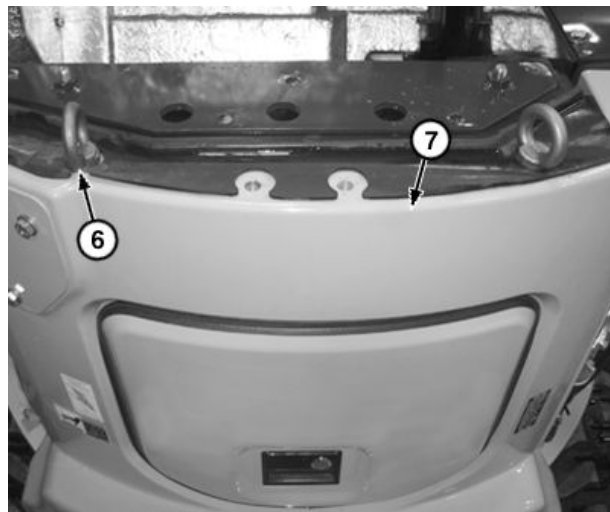
CAUTION: Avoid crushing injury from heavy component. Use appropriate lifting device.

- Support counterweight by attaching appropriate lifting device to lifting eyebolts.

Specification

Counterweight—Weight	
(approximate).....	550 kg
	1212 lb.

6— Lifting Eyebolt (2 used) 7— Counterweight



Counterweight Lifting Eyebolts

TX1132849A—UN—12MAR13

Continued on next page

JA66566,0002A77 -19-27MAR13-4/5

- 10. Remove cap screws (8) and remove counterweight.
- 11. Repair or replace as necessary.

CAUTION: Avoid crushing injury from heavy component. Use appropriate lifting device.

- 12. Install counterweight using appropriate lifting device.

	Specification
Counterweight—Weight (approximate).....	550 kg 1212 lb.

- 13. Install counterweight cap screws (8) and tighten to specification.

	Specification
Counterweight Cap Screw—Torque.....	550 N·m 405 lb.-ft.

- 14. Install air cleaner housing and cap screws (4).

CAUTION: Avoid crushing injury from heavy component. Use appropriate lifting device.

- 15. Install additional counterweight using appropriate lifting device.

	Specification
Additional Counterweight—Weight (approximate).....	230 kg 510 lb.



Counterweight Cap Screws

8— Cap Screw (3 used)

- 16. Install additional counterweight cap screws (3) and tighten to specification.

	Specification
Additional Counterweight Cap Screw—Torque.....	270 N·m 200 lb.-ft.

- 17. Remove all lifting eyebolts.

JA66566,0002A77 -19-27MAR13-5/5

TX1132850A—UN—12MAY13

Chassis Weights

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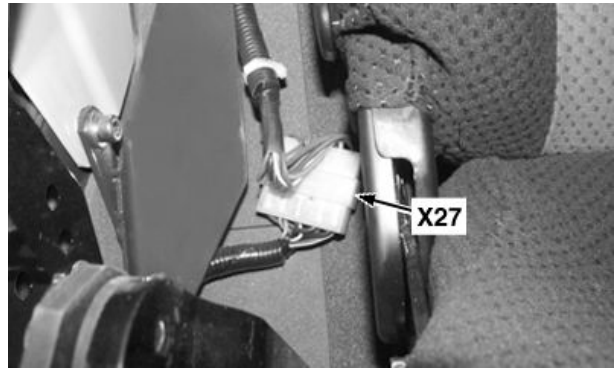
Group 1800 Removal and Installation

Cab Remove and Install

SPECIFICATIONS	
Cab Weight (approximate)	197 kg 434 lb.
Cab Mount Torque	110 N·m 81 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Install identification tag and disconnect cab harness connector (X27). See Cab Harness (W5) Component Location. (Group 9015-10.)

X27— Cab Harness Connector



Cab Harness Connector

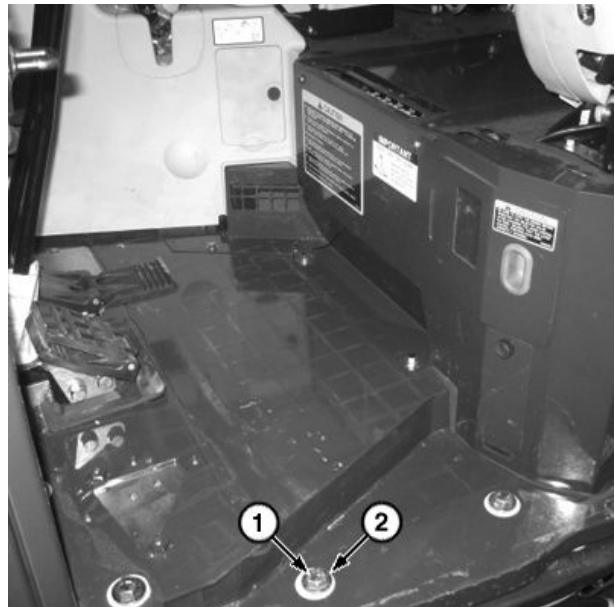
TX1133196A—UN—15APR13

JD29379,000036B -19-02MAY13-1/4

3. Remove floor mat.
4. Remove cap screws (1) and washers (2) from cab floor and from behind operator's seat.

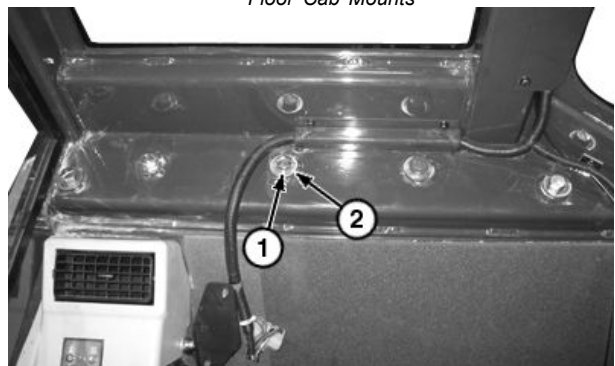
1— Cap Screw (11 used)

2— Washer (11 used)



Floor Cab Mounts

TX1133196A—UN—15APR13



Rear Cab Mounts

TX1135912A—UN—03MAY13

Continued on next page

JD29379,000036B -19-02MAY13-2/4

Removal and Installation

- Disconnect window washer fluid tube (3). Close all openings using caps and plugs.

3— Window Washer Fluid Tube



Window Washer Fluid Tube

JD29379,000036B -19-02MAY13-3/4

TX1135203A —UN—18APR13

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- Attach appropriate lifting device (4) to cab lifting points (5) and remove cab.

Specification

Cab—Weight	
(approximate).....	197 kg 434 lb.

- Repair or replace parts as necessary.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- Using appropriate lifting device, install cab.

Specification

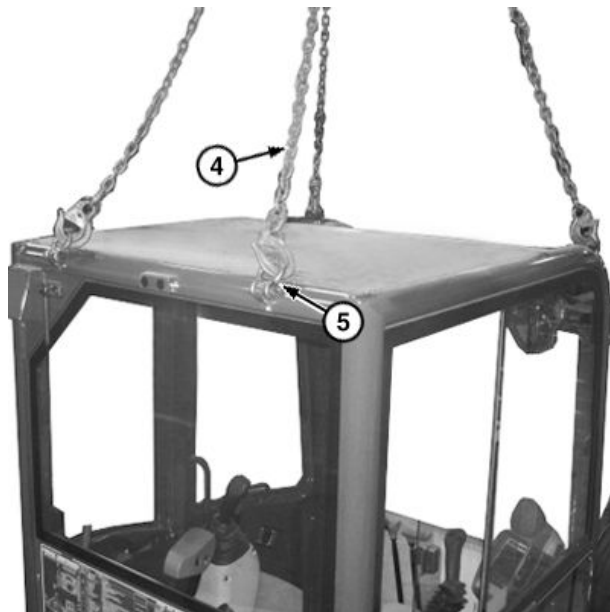
Cab—Weight	
(approximate).....	197 kg 434 lb.

- Install washers and cap screws. Tighten to specification.

Specification

Cab Mount—Torque.....	110 N·m 81 lb.-ft.
-----------------------	-----------------------

- Install floor mat and connect cab harness connector (X27). See Cab Harness (W5) Component Location. (Group 9015-10.)



Cab

4— Lifting Device

5— Cab Lifting Point (4 used)

JD29379,000036B -19-02MAY13-4/4

TX1133219A —UN—16APR13

Canopy Remove and Install

SPECIFICATIONS	
Canopy Weight (approximate)	82 kg 180 lb.

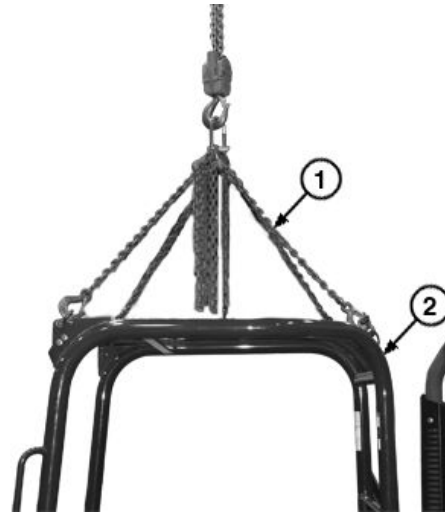
1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

2. Support canopy. Attach appropriate lifting device (1) to canopy lifting points (2).

Specification	
Canopy—Weight (approximate).....	82 kg 180 lb.

- 1—Lifting Device 2—Canopy Lifting Point (4 used)



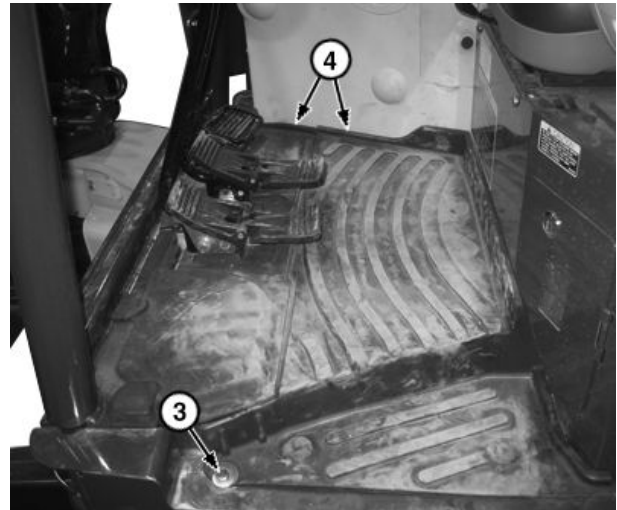
Canopy Lifting Points

BD53302,0001727 -19-22APR13-1/5

TX1134208A —UN—04APR13

3. Remove cap screw (3) and floor mats (4).

- 3—Cap Screw 4—Floor Mat (2 used)



Floor Mats

Continued on next page

BD53302,0001727 -19-22APR13-2/5

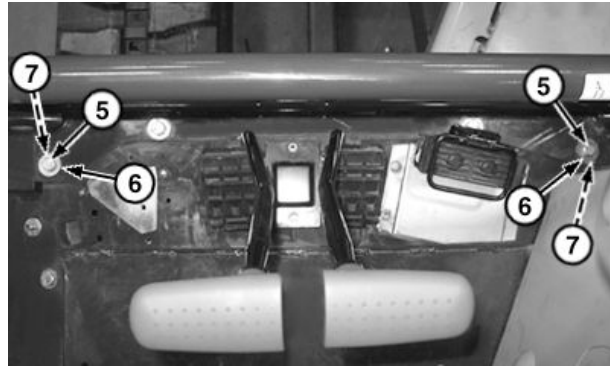
TX1134208A —UN—04APR13

Removal and Installation

4. Remove cap screws (5), washers (6), and spacers (7).

5— Cap Screw (4 used)
6— Washer (4 used)

7— Spacer (2 used)



Front Cap Screws

BD53302,0001727 -19-22APR13-3/5

TX1134210A—UN—23APR13

NOTE: If necessary, seat can be moved forward to access rear cap screws.

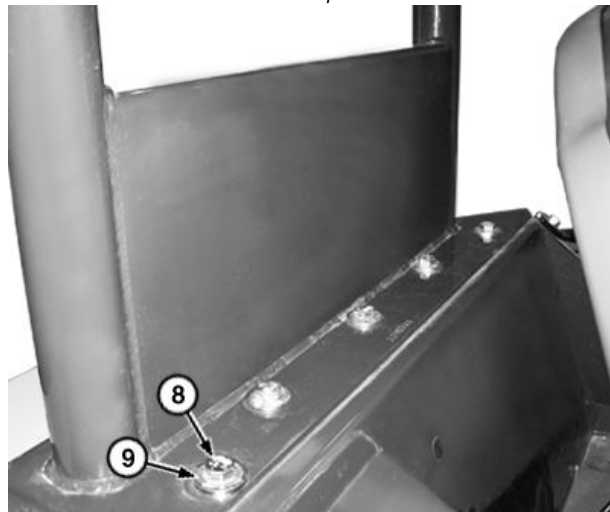
5. Remove cap screws (8) and washers (9).

8— Cap Screw (7 used)

9— Washer (7 used)



Rear Cap Screws



Rear Cap Screws

Continued on next page

BD53302,0001727 -19-22APR13-4/5

TX1134213A—UN—04APR13

TX1134211A—UN—04APR13

6. Install identification tags and disconnect canopy work light harness connector (X47). See Canopy Work Light Harness (W13) Component Location. (Group 9015-10.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

7. Using appropriate lifting device, remove canopy.

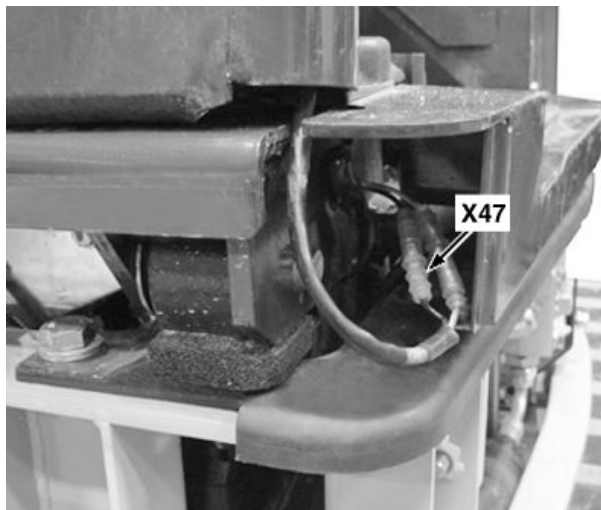
Specification

Canopy—Weight	
(approximate).....	82 kg
	180 lb.

8. Repair or replace parts as necessary.

IMPORTANT: Avoid possible wire harness damage. When installing canopy, check that wire harness does not become pinched when canopy is lowered.

9. Using appropriate lifting device, install canopy.
10. Connect canopy work light harness connector (X47). See Canopy Work Light Harness (W13) Component Location. (Group 9015.)
11. Install washers and cap screws.



Canopy Work Light Harness Connector

X47— Canopy Work Light Harness Connector

12. Install spacers, washers, and cap screws.
13. Install floor mats and cap screw.

BD53302,0001727 -19-22APR13-5/5

TX1134214A —UN—04APR13

Platform Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Cooling System Capacity	5 L 1.3 gal.
Platform Weight (approximate)	200 kg 440 lb.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove cap screws (1) and rear panel (2).

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
4. Drain hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

5. Recover refrigerant from air conditioning system. See Recover R134a Refrigerant. (Group 1830.)
6. Drain cooling system. See Drain Cooling System. (Operator's Manual.)



Rear Panel

- 1— Cap Screw (4 used) 2— Rear Panel

Specification

Cooling System—Capacity..... 5 L
1.3 gal.

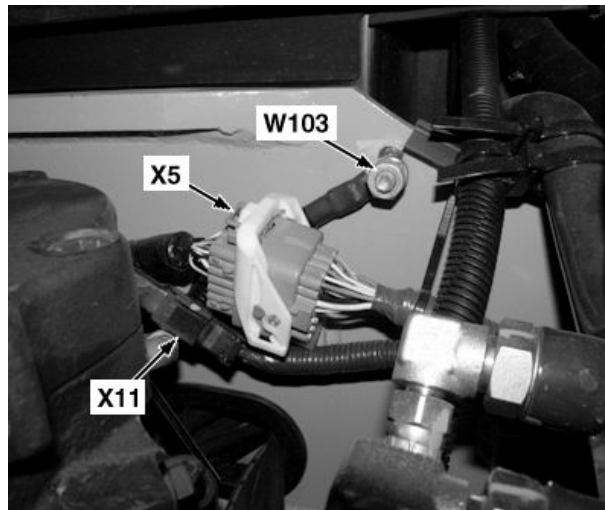
7. Remove cab. See Cab Remove and Install. (Group 1800.)
8. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)

JS20420,0000AE5 -19-22MAY13-1/10

TX1136395A —UN—14MAY13

9. Install identification tags and disconnect engine harness-to-floor harness connector (X5), engine harness-to-floor harness power connector (X11), and floor harness ground 1 (W103). See Floor Harness (W1) Component Location. (Group 9015-10.)

W103—Floor Harness Ground 1 **X11— Engine Harness-to-Floor Harness Power Connector**
X5—Engine Harness-to-Floor Harness Connector



Floor Harness Electrical Connectors

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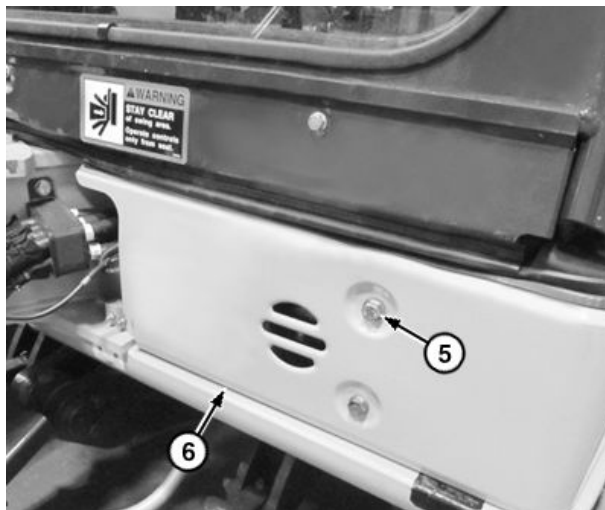
TX1136396A —UN—13MAY13

Removal and Installation

10. Remove cap screws (5) and front panel (6).

5— Cap Screw (3 used)

6— Front Panel



Top and Front Panel

JS20420,0000AE5 -19-22MAY13-3/10

TX1136398A—JUN—14MAY13

11. Install identification tags and disconnect pilot shutoff solenoid (Y10), travel speed solenoid (Y25), horn (B23), cab tilt switch (S7), boom work light harness connector (X48), and floor harness ground 2 (W104). See Floor Harness (W1) Component Location. (Group 9015-10.)

B23— Horn

S7— Cab Tilt Switch

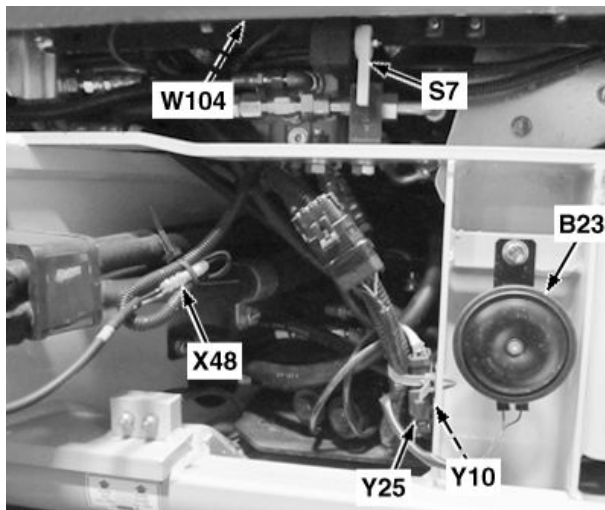
W104— Floor Harness Ground
2

X48— Boom Work Light

Harness Connector

Y10— Pilot Shutoff Solenoid

Y25— Travel Speed Solenoid



Electrical Connectors

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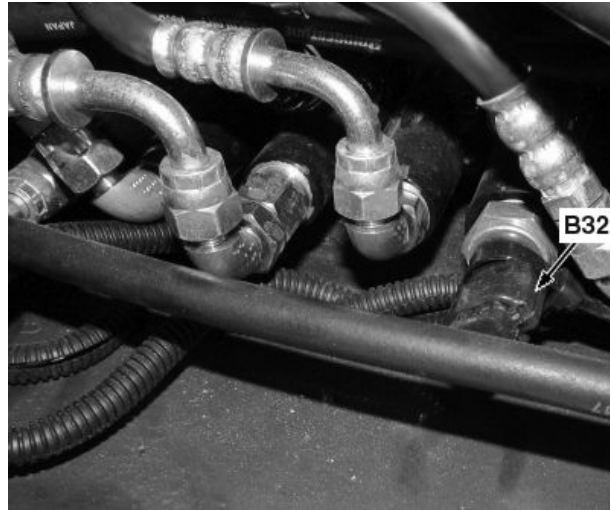
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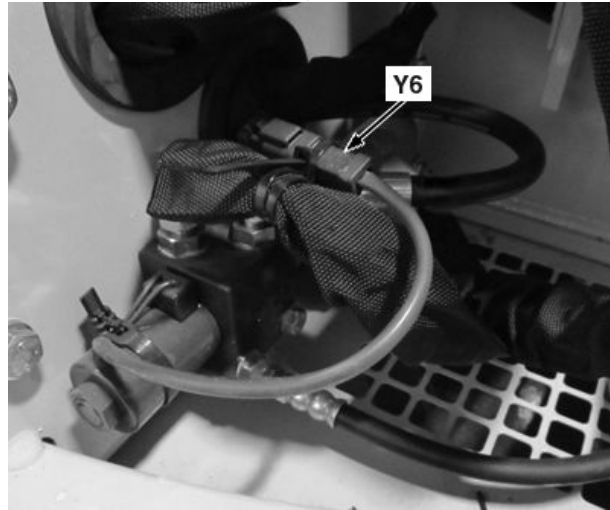
12. Install identification tags and disconnect auto-idle (A/I) pressure sensor (B32) and air conditioner torque control solenoid (Y6). See Floor Harness (W1) Component Location. (Group 9015-10.)

B32— Auto-Idle (A/I) Pressure Sensor

Y6— Air Conditioner Torque Control Solenoid



Auto Idle (A/I) Pressure Sensor



Air Conditioner Torque Control Solenoid

TX1136400A—UN—14MAY13

TX1136401A—UN—20MAY13

Continued on next page

JS20420.0000AE5 -19-22MAY13-5/10

Removal and Installation

13. Install identification tags and disconnect refrigerant lines (13 and 14) and drain hoses (15) from under operator's station. Close all openings using caps and plugs. See Heater and Air Conditioner Component Location. (Group 9031-15.)

14. Install identification tags and disconnect heater hoses (16 and 17). Close all openings using caps and plugs. See Heater and Air Conditioner Component Location. (Group 9031-15.)

- | | |
|------------------------------------|------------------------|
| 13— Low-Pressure Refrigerant Line | 16— Heater Supply Hose |
| 14— High-Pressure Refrigerant Line | 17— Heater Return Hose |
| 15— Drain Hose (2 used) | |



Heater and Air Conditioner Lines

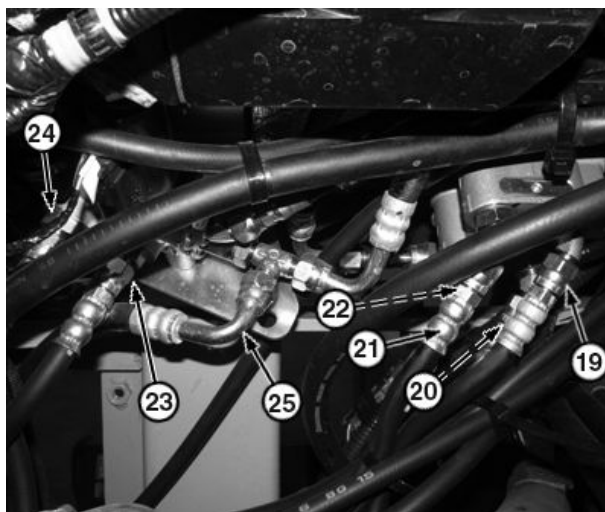
JS20420,0000AE5 -19-22MAY13-6/10

TX1136402A —JUN—13MAY13

15. Install identification tags and disconnect travel lines (19—22). Close all openings using caps and plugs. See Hydraulic System Pilot Line Connection. (Group 9025-15.)

16. Install identification tags and disconnect auxiliary pilot control line 1 (23), auxiliary pilot control line 2 (24), and solenoid valve line (25). Close all openings using caps and plugs. See Hydraulic System Pilot Line Connection. (Group 9025-15.)

- | | |
|-------------------------------|------------------------------------|
| 19— Right Travel Reverse Line | 23— Auxiliary Pilot Control Line 1 |
| 20— Left Travel Forward Line | 24— Auxiliary Pilot Control Line 2 |
| 21— Left Travel Reverse Line | 25— Solenoid Valve Line |
| 22— Right Travel Forward Line | |



Travel Pilot Control and Auxiliary Solenoid Lines

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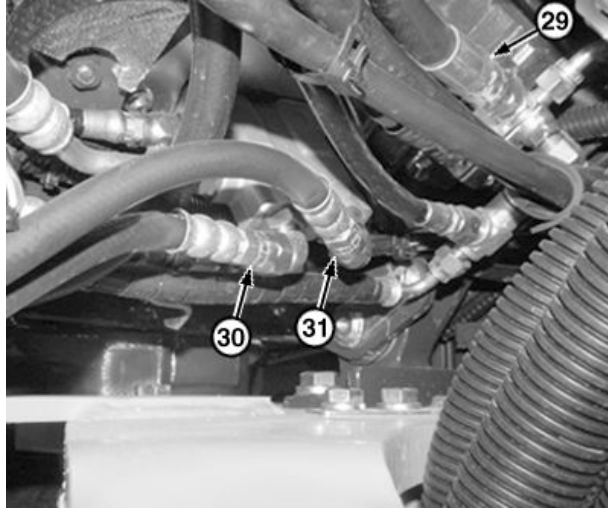
JS20420,0000AE5 -19-22MAY13-7/10

TX1136403A —JUN—14MAY13

Removal and Installation

17. Install identification tags and disconnect pilot return manifold line (29). Close all openings using caps and plugs.
18. Install identification tags and disconnect swing boom left line (30) and swing boom right line (31). Close all openings using caps and plugs. See Hydraulic System Pilot Line Connection. (Group 9025-15.)

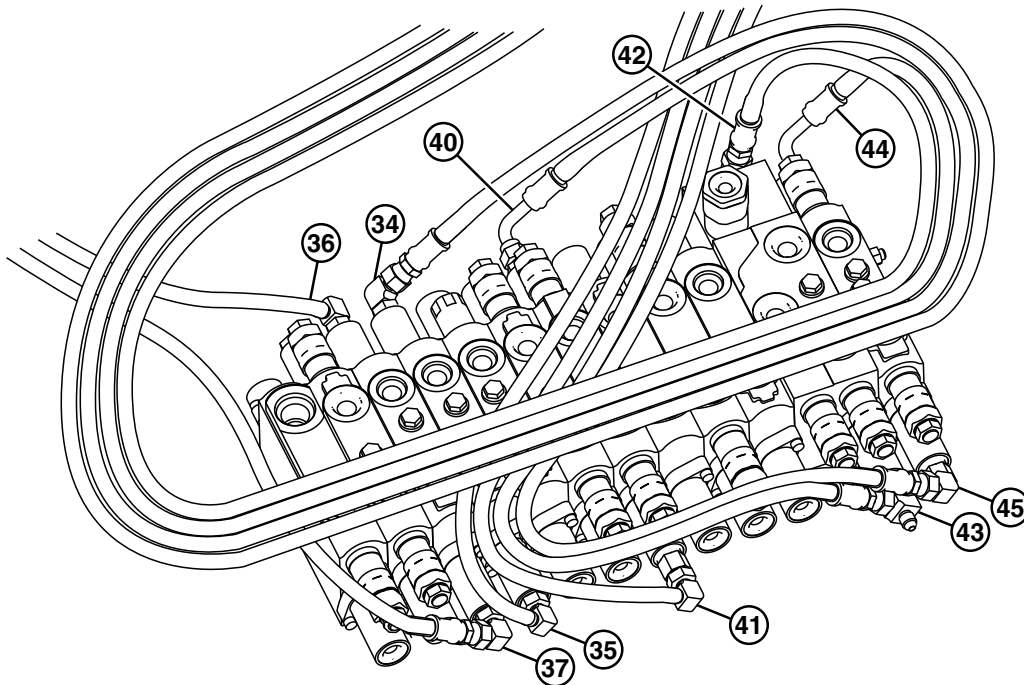
29— Pilot Return Manifold Line 31— Swing Boom Right Line
 30— Swing Boom Left Line



Swing Boom Pilot Control Valve

JS20420,0000AE5 -19-22MAY13-8/10

TX1136404A —UN—13MAY13



TX1136426

Control Valve Line Connections

- | | | | |
|--|-----------------------------------|--------------------|----------------------|
| 34— Pilot Control Valve Left Swing Line | 36— Blade Up Pilot Control Line | 40— Arm In Line | 44— Bucket Dump Line |
| 35— Pilot Control Valve Right Swing Line | 37— Blade Down Pilot Control Line | 41— Arm Out Line | 45— Bucket Curl Line |
| | | 42— Boom Up Line | |
| | | 43— Boom Down Line | |

19. Install identification tags and disconnect lines (34—37 and 40—45). Close all openings using caps and plugs. See Hydraulic System Pilot Line Connection and see Control Valve Line Identification. (Group 9025-15.)

20. Lower operator's station. See Tilting Operator's Station. (Operator's Manual.)

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JS20420,0000AE5 -19-22MAY13-9/10

TX1136426 —UN—14MAY13

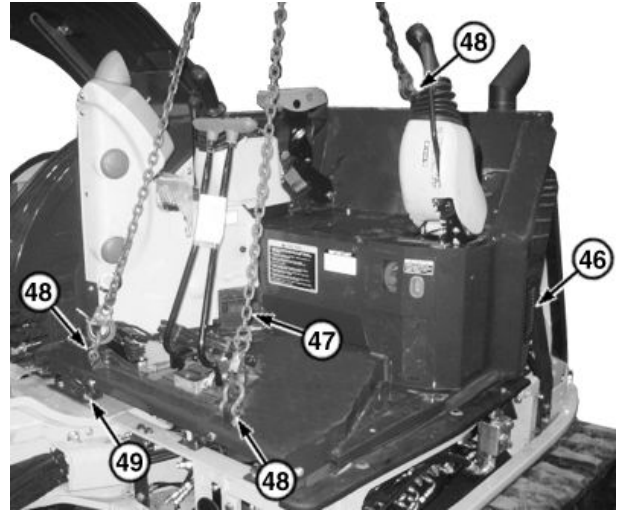
CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

21. Support platform (46) by attaching appropriate lifting device (47) to lifting points (48).

Specification

Platform—Weight (approximate).....	200 kg 440 lb.
---------------------------------------	-------------------

22. Remove cap screws (49) and platform.
23. Repair or replace parts as necessary.
24. Using appropriate lifting device, install platform and cap screws (49).
25. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)
26. Connect lines (34—37 and 40—45). See Hydraulic System Pilot Line Connection and see Control Valve Line Identification. (Group 9025-15.)
27. Connect pilot return manifold line, swing boom left line, and swing boom right line. See Hydraulic System Pilot Line Connection. (Group 9025-15.)
28. Connect auxiliary pilot control line 1, auxiliary pilot control line 2, and solenoid valve line. See Hydraulic System Pilot Line Connection. (Group 9025-15.)
29. Connect travel lines (19—22). See Hydraulic System Pilot Line Connection. (Group 9025-15.)
30. Connect heater hoses (16 and 17), refrigerant lines (13 and 14), and drain hoses from under operator's station. See Heater and Air Conditioner Component Location. (Group 9031-15.)
31. Connect auto-idle (A/I) pressure sensor (B32) and air conditioner torque control solenoid (Y6). See Floor Harness (W1) Component Location. (Group 9015-10.)
32. Connect pilot shutoff solenoid (Y10), travel speed solenoid (Y25), horn (B23), cab tilt switch (S7), boom work light harness connector (X48), and floor harness ground 2 (W104). See Floor Harness (W1) Component Location. (Group 9015-10.)
33. Install front panel (6) and cap screws (5).
34. Connect engine harness-to-floor harness connector (X5), engine harness-to-floor harness power connector (X11), and floor harness ground 1 (W103). See Floor Harness (W1) Component Location. (Group 9015-10.)
35. Lower operator's station. See Tilting Operator's Station. (Operator's Manual.)



Platform

- | | |
|--------------------|----------------------------|
| 46— Platform | 48— Lifting Point (3 used) |
| 47— Lifting Device | 49— Cap Screw (4 used) |

36. Install cab. See Cab Remove and Install. (Group 1800.)
 37. Fill cooling system. See Cooling System Fill and Deaeration Procedure. (Operator's Manual.)
 38. Evacuate and charge air conditioning system. See Evacuate R134a System and see Charge R134a System. (Group 1830.)
 39. Fill hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
- IMPORTANT:** Hydraulic pump can be damaged when not filled with oil before starting engine. Procedure must be performed whenever the pump is installed or oil has been drained from the pump or hydraulic oil tank.
40. Perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)
 41. Install rear panel (2) and cap screws (1).

CAUTION: Prevent possible injury from unexpected machine movement. Clear all personnel from area before operating machine.

42. Operate machine and check for leaks. Verify all machine functions operate correctly. See Operational Checkout. (Group 9005-10.)

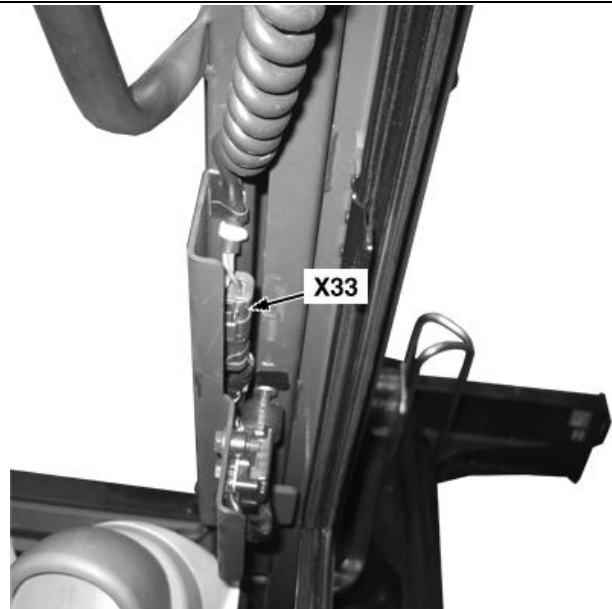
JS20420,0000AE5 -19-22MAY13-10/10

TX1136432A—UN—13MAY13

Windshield Remove and Install

1. Park and prepare machine for service safely. [See Park and Prepare for Service Safely.](#) (Group 0001.)
2. Install identification tags and disconnect windshield wiper harness connector (X33). [See Windshield Wiper Harness \(W17\) Component Location.](#) (Group 9015-10.)

**X33— Windshield Wiper
Harness Connector**



Windshield Wiper Harness

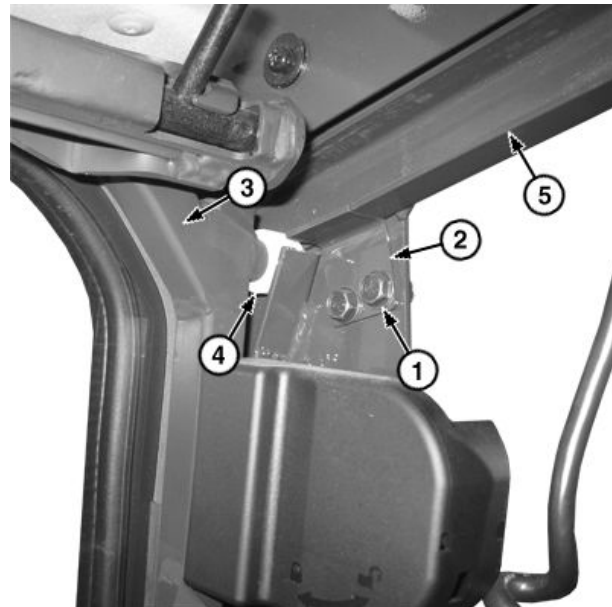
JD29379,0000373 -19-02MAY13-1/2

TX1135672A —UN—29APR13

3. Remove cap screws (1) and plates (2).

IMPORTANT: Avoid damage to window. Use two technicians during window removal to prevent window from falling out of machine.

4. Lift windshield (3) and slide upper rollers (4) through openings in windshield tracks (5).
5. Tilt top of windshield into interior until horizontal.
6. Holding horizontally, slide lower rollers through openings in windshield tracks.
7. Remove windshield through cab door.
8. Repair or replace parts as necessary. [See Windshield Disassemble and Assemble.](#) (Group 1810.)
9. Install windshield through cab door.
10. Holding horizontally, slide lower rollers into openings in windshield tracks.
11. Tilt top of windshield until vertical and slide upper rollers through openings in windshield tracks.
12. Install plates and cap screws.
13. Connect windshield wiper harness connector (X33). [See Windshield Wiper Harness \(W17\) Component Location.](#) (Group 9015-10.)



Windshield

1— Cap Screw (4 used)
2— Plate (2 used)
3— Windshield

4— Roller (4 used)
5— Windshield Track (2 used)

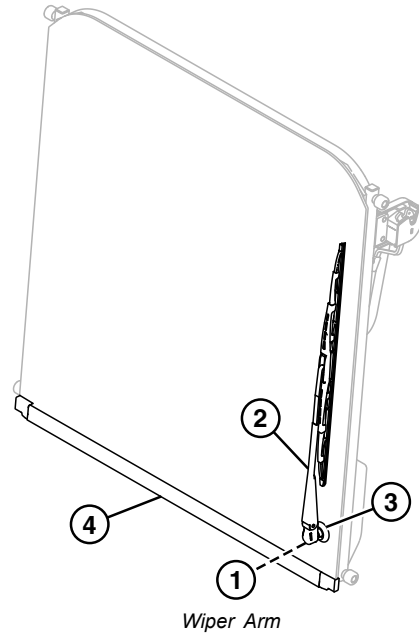
JD29379,0000373 -19-02MAY13-2/2

TX1135673A —UN—29APR13

Windshield Disassemble and Assemble

1. Remove nut (1), wiper arm assembly (2), cap (3), and isolator (4).

- | | |
|-----------------------|-------------|
| 1— Nut | 3— Cap |
| 2— Wiper Arm Assembly | 4— Isolator |

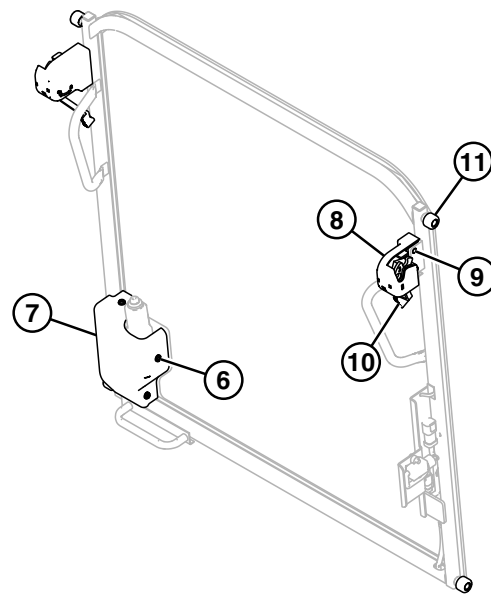


JD29379,0000374 -19-22MAY13-1/4

TX1135851 —UN—02MAY13

2. Remove cap screws (6) and cover (7).
3. Remove covers (8), cap screws (9), and latches (10).
4. Remove rollers (11).

- | | |
|-----------------------|-----------------------|
| 6— Cap Screw (3 used) | 9— Cap Screw (4 used) |
| 7— Cover | 10— Latch (2 used) |
| 8— Cover (2 used) | 11— Roller (4 used) |



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JD29379,0000374 -19-22MAY13-2/4

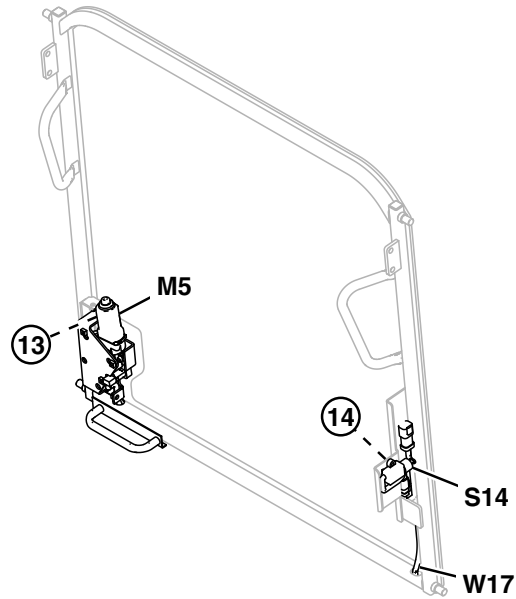
TX1135852 —UN—02MAY13

Operator Enclosure

5. Install identification tags and disconnect windshield wiper motor (M5) and windshield wiper disconnect switch (S14). See Windshield Wiper Harness (W17) Component Location. (Group 9015-10.)
6. Remove cap screws (13) and windshield wiper motor (M5).
7. Remove cap screws (14), windshield wiper disconnect switch (S14), and windshield wiper harness (W17).

13— Cap Screw (2 used)
14— Cap Screw (2 used)
M5—Wiper Motor

S14— Windshield Wiper
Disconnect Switch
W17—Windshield Wiper
Harness



Wiper Motor

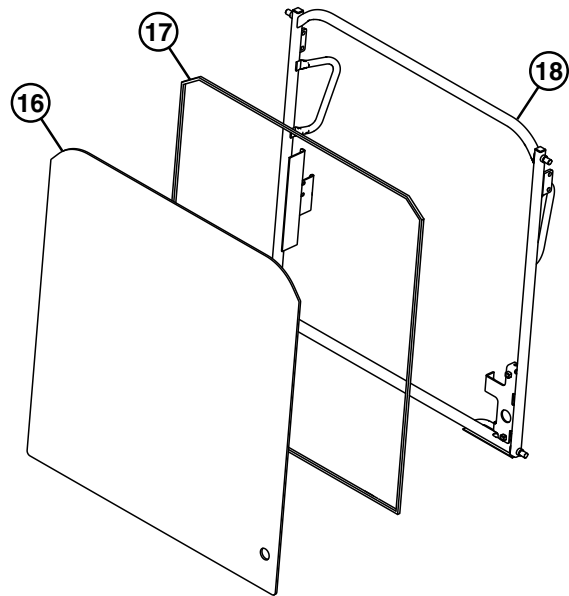
JD29379,0000374 -19-22MAY13-3/4

TX1135853 —UN—02MAY13

8. Remove windowpane (16) and weatherstrip (17) from windshield frame (18). See Windowpanes Remove and Install. (Group 1810.)
9. Repair or replace parts as necessary.
10. Install weatherstrip and windowpane onto windshield frame. See Windowpanes Remove and Install. (Group 1810.)
11. Install windshield wiper harness (W17), windshield wiper disconnect switch (S14), and cap screws (14).
12. Install windshield wiper motor (M5) and cap screws (13).
13. Connect windshield wiper disconnect switch (S14) and windshield wiper motor (M5). See Windshield Wiper Harness (W17) Component Location. (Group 9015-10.)
14. Install rollers, latches, cap screws (9), and covers (8).
15. Install cover (7) and cap screws (6).
16. Install isolator, cap, wiper arm assembly, and nut.

16— Windowpane
17— Weatherstrip

18— Windshield Frame



Windowpane

JD29379,0000374 -19-22MAY13-4/4

TX1135854 —UN—02MAY13

Sliding Windows Remove and Install

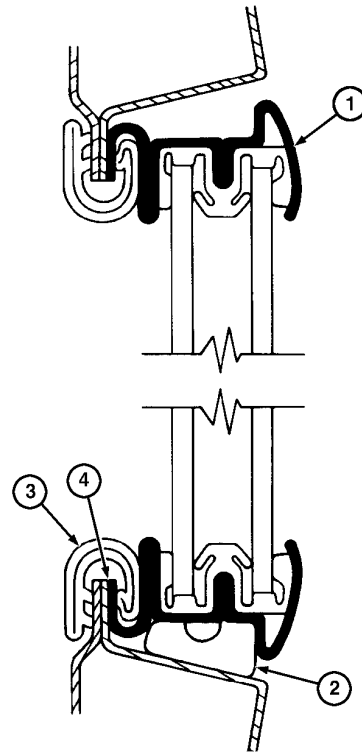
1. Pull molding (3) from inside of window.
2. Using a putty knife, cut adhesive (4) between cab flange and window frame (1).

IMPORTANT: Use extreme care to avoid damaging frame and windowpane. Remove window using two people; one to press window out, the other to keep window from falling.

3. Carefully press out window frame from cab.

1— Window Frame
2— Spacer (4 used)

3— Molding
4— Adhesive



T140968

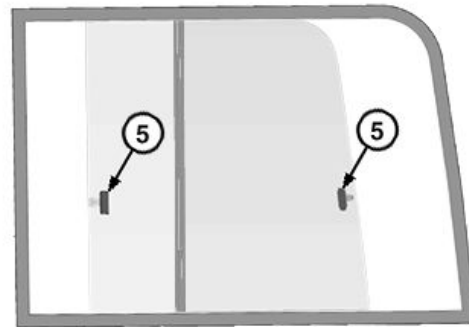
Sliding Window (cut away view shown)

MB00333,00000F9 -19-07JUL20-1/9

T140968—UN—30APR01

4. Remove locks (5) from windowpanes.

5— Lock (2 used)



Window Frame With Windowpanes

Continued on next page

MB00333,00000F9 -19-07JUL20-2/9

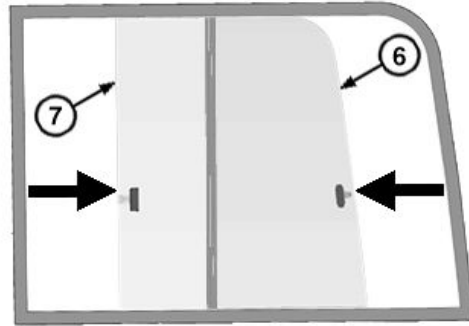
TX1296965A—UN—29JUN20

Operator Enclosure

- Slide front and rear windowpanes (6 and 7) to the center of the frame as shown.

6—Front Windowpane

7—Rear Windowpane



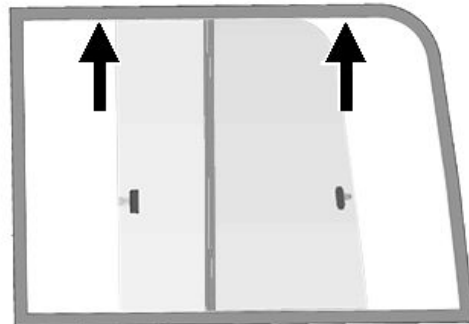
Windowpanes Removal Position

MB00333,00000F9 -19-07JUL20-3/9

TX1296966A —UN—29JUN20

IMPORTANT: Prevent damage to window frame. Lifting excessively can distort the frame. Lift only enough to allow removal or installation of windowpanes.

- Secure window frame on the floor and lift frame slightly at the top-center as shown to remove windowpanes.
- Replace windowpanes as necessary.
- Lift frame slightly at top-center to install front windowpane.



Removing Windowpanes

MB00333,00000F9 -19-07JUL20-4/9

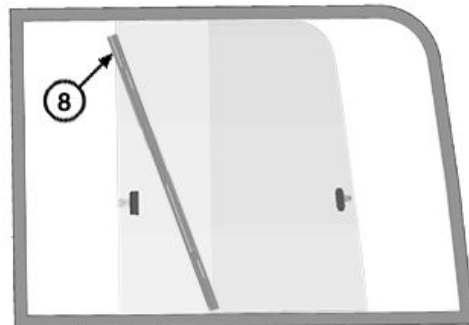
TX1296967A —UN—29JUN20

- Insert the X-seal (if equipped) (8) in the bottom of the window frame as shown.

IMPORTANT: Prevent damage to window frame. Lifting excessively can distort the frame. Lift only enough to allow removal or installation of windowpanes.

- Lift frame slightly at top-center and install rear windowpane.

8—X-Seal (if equipped)



X-Seal (if equipped) Installation

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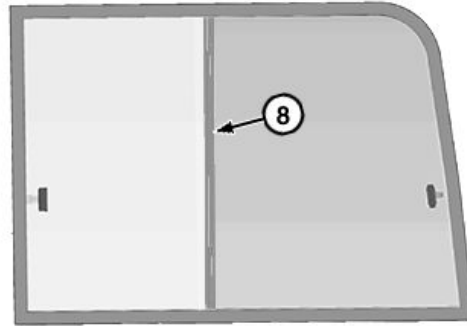
MB00333,00000F9 -19-07JUL20-5/9

TX1296970A —UN—29JUN20

Operator Enclosure

11. Carefully bow the X-seal (if equipped) just enough to insert the top end into the window frame.

8— X-Seal (if equipped)



X-Seal (if equipped) Installation

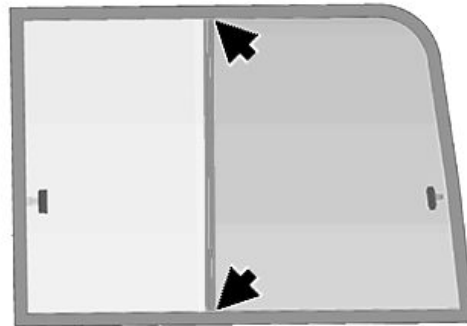
TX1296971A —UN—29JUN20

MB00333,00000F9 -19-07JUL20-6/9

12. Seal the top and bottom ends of the X-seal (if equipped) where the seal meets the window frame with a silicone-based window sealant to the specified thickness.

Specification

Silicone-Based Window Sealant—Thickness (maximum)..... 3 mm
0.118 in



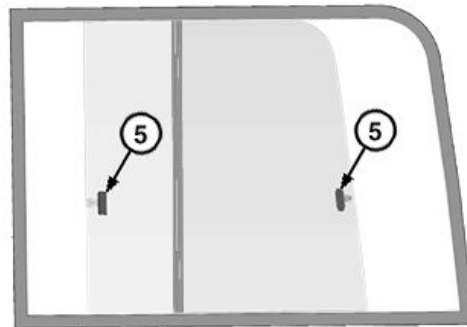
Sealing Ends of X-Seal (if equipped)

TX1296972A —UN—26JUN20

MB00333,00000F9 -19-07JUL20-7/9

13. Install locks (5) on windowpanes.

5— Lock (2 used)



Window Frame With Windowpanes

TX1296965A —UN—29JUN20

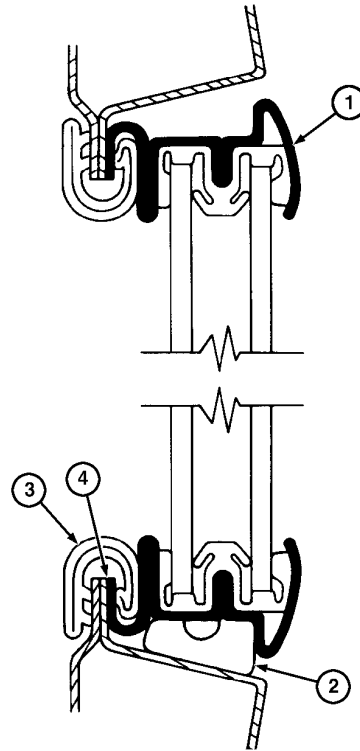
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MB00333,00000F9 -19-07JUL20-8/9

14. Apply instant gel adhesive to cab flange as shown.
15. Install windows and frame with spacers (2) at the bottom.
16. Using water as a lubricant, press window frame tight against cab flange.
17. Install molding (3) around window and cab flange.

1— Window Frame
2— Spacer (4 used)

3— Molding
4— Adhesive



T140968

Sliding Window (cut away view shown)

MB00333,00000F9 -19-07JUL20-9/9

T140968 —UN—30APR01

Windowpanes Remove and Install

The adhesive used to hold the windowpanes in place is a urethane adhesive that is used on most automobile windshields. Urethane adhesive manufactured by Loctite® Corporation or equivalent is recommended. Do not use any other type of adhesive. It is recommended that an auto glass dealer install the windowpanes.

IMPORTANT: Windowpanes must have an ultra-violet barrier around the edge of the glass since ultra-violet rays will deteriorate the adhesive. Windowpanes ordered through John Deere Parts have the ultra-violet barrier. If the windowpane is purchased through a glass dealer, the dealer must put an ultra-violet barrier on the glass. Do not apply paint to the border of the glass.

NOTE: If the windowpane is installed in a removable frame, the window frame must be removed from the cab in order to replace the windowpane.

If an auto glass dealer is not installing the windowpanes, use the following procedure:

1. Purchase urethane adhesive from a local auto glass dealer.
2. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
3. Perform one of the following:
 - Scrape broken glass off existing adhesive. Do not remove adhesive from window frame or cab.
 - Using a professional windshield removal tool, remove the window frame or windowpane from the cab. Follow the manufacturer's instructions for using the tool.

NOTE: Adhesive will not stick to bare metal.

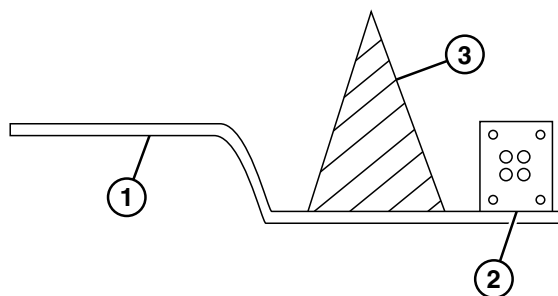
NOTE: Paint must be fully cured before installing windowpane.

4. If existing adhesive is removed from frame and paint is scraped off window frame, paint window frame. Paint must be fully cured before installing windowpane.
5. Trim existing adhesive so it has a smooth surface.
6. Follow the manufacturer's instructions for using the adhesive.

NOTE: Sliding windowpanes need seal (2) installed before applying adhesive (3) to window frame (1).

7. Apply a 6 mm (1/4 in) bead of adhesive on top of the existing adhesive.
8. Put a new windowpane into position. Use hand pressure to force down windowpane around the edges.

Loctite and its related brand marks are trademarks of Henkel Corporation



Windowpane Seal

1— Window Frame
2— Seal

3— Adhesive

9. Use duct tape to hold windowpane in place while adhesive cures.
10. If windowpane was installed in a removable window frame, repeat the steps to prepare the frame for adhesive and install the frame in the cab.
11. Allow adhesive to cure for 24 hours before operating machine.

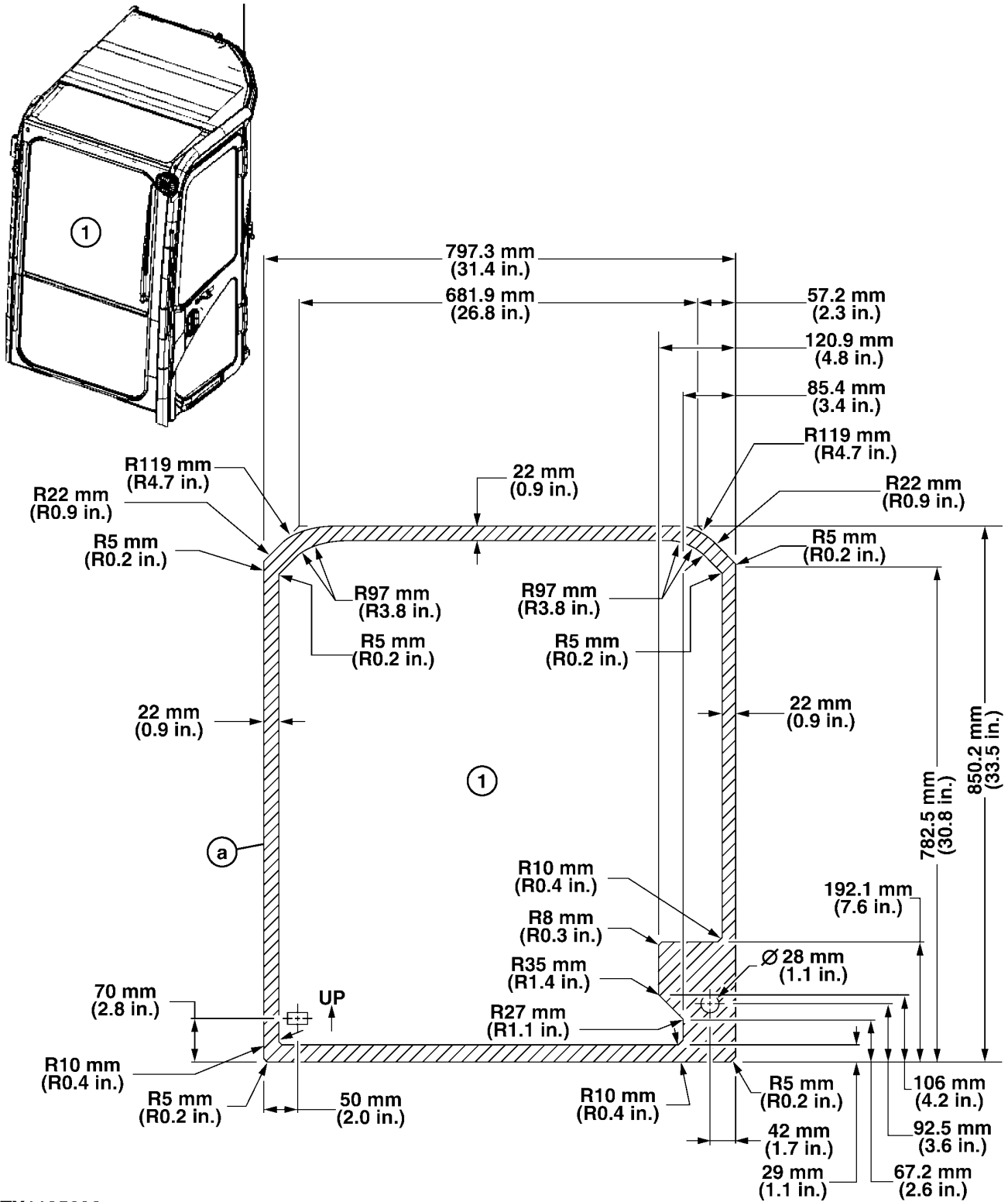
TX1270969—UN—08/JAN19

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JD29379,0000328 -19-05SEP19-1/2

Windowpanes Dimensions

⚠ CAUTION: Prevent breakage and possible injury. Use caution when handling glass.



TX1135626

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JD29379,0000324 -19-26APR13-1/8

TX1135626—UN—09MAY13

Operator Enclosure

Upper Front Glass Dimension

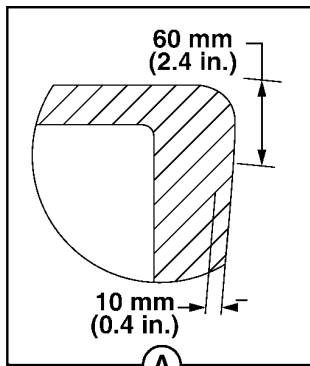
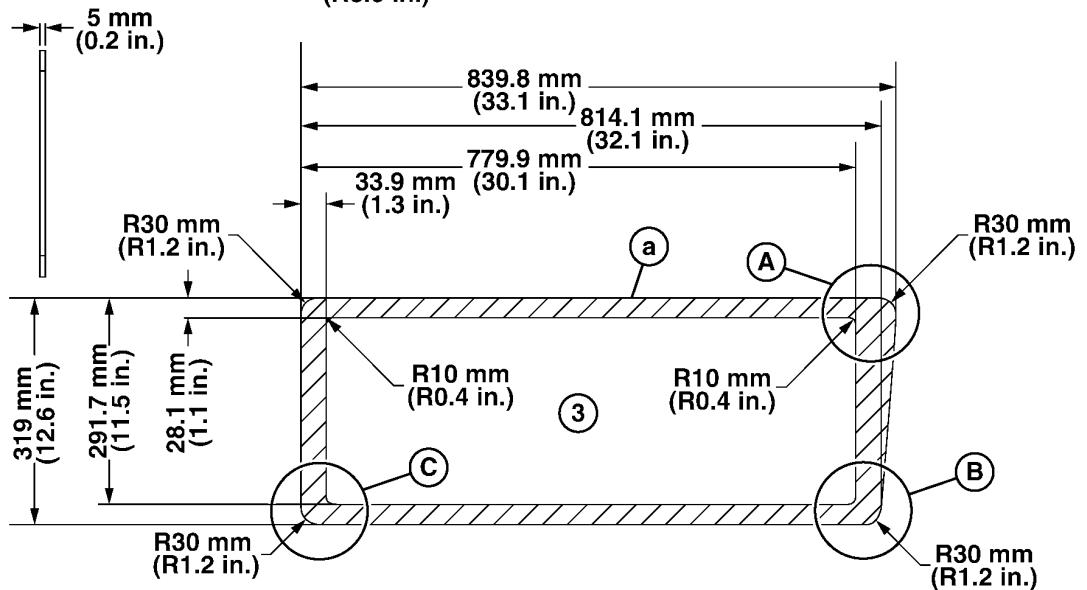
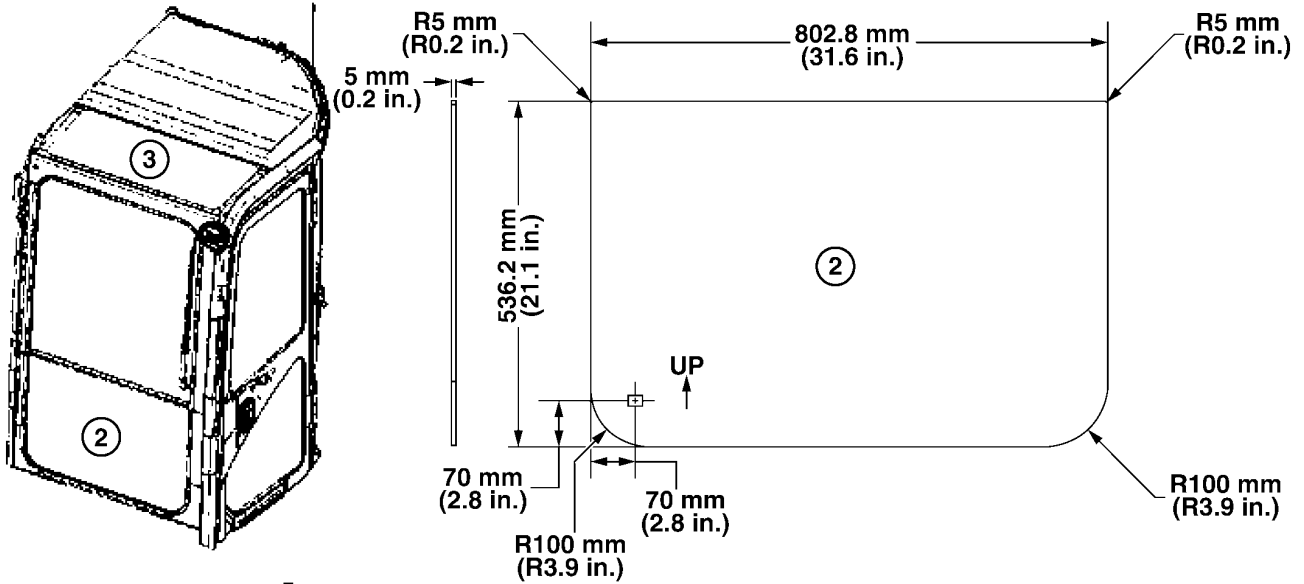
1— Upper Front Glass

**a— Black Ceramic Painted
Surface**

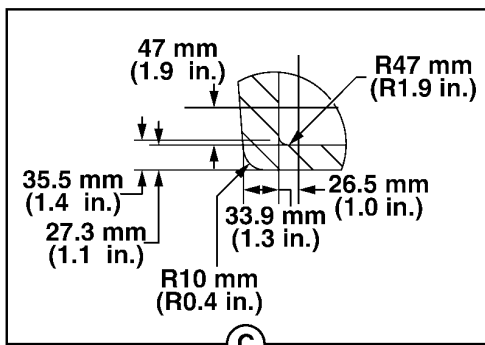
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JD29379,0000324 - 19-26APR13-2/8

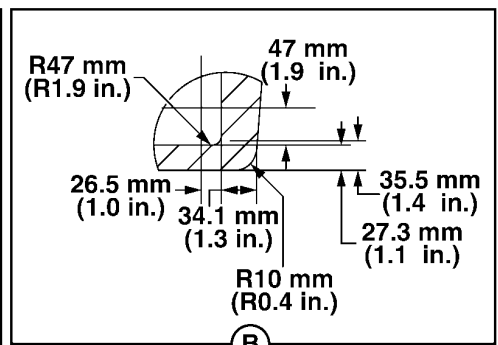
Operator Enclosure



TX1135629



2— Lower Front Glass
3— Roof Glass
a— Black Ceramic Painted Surface



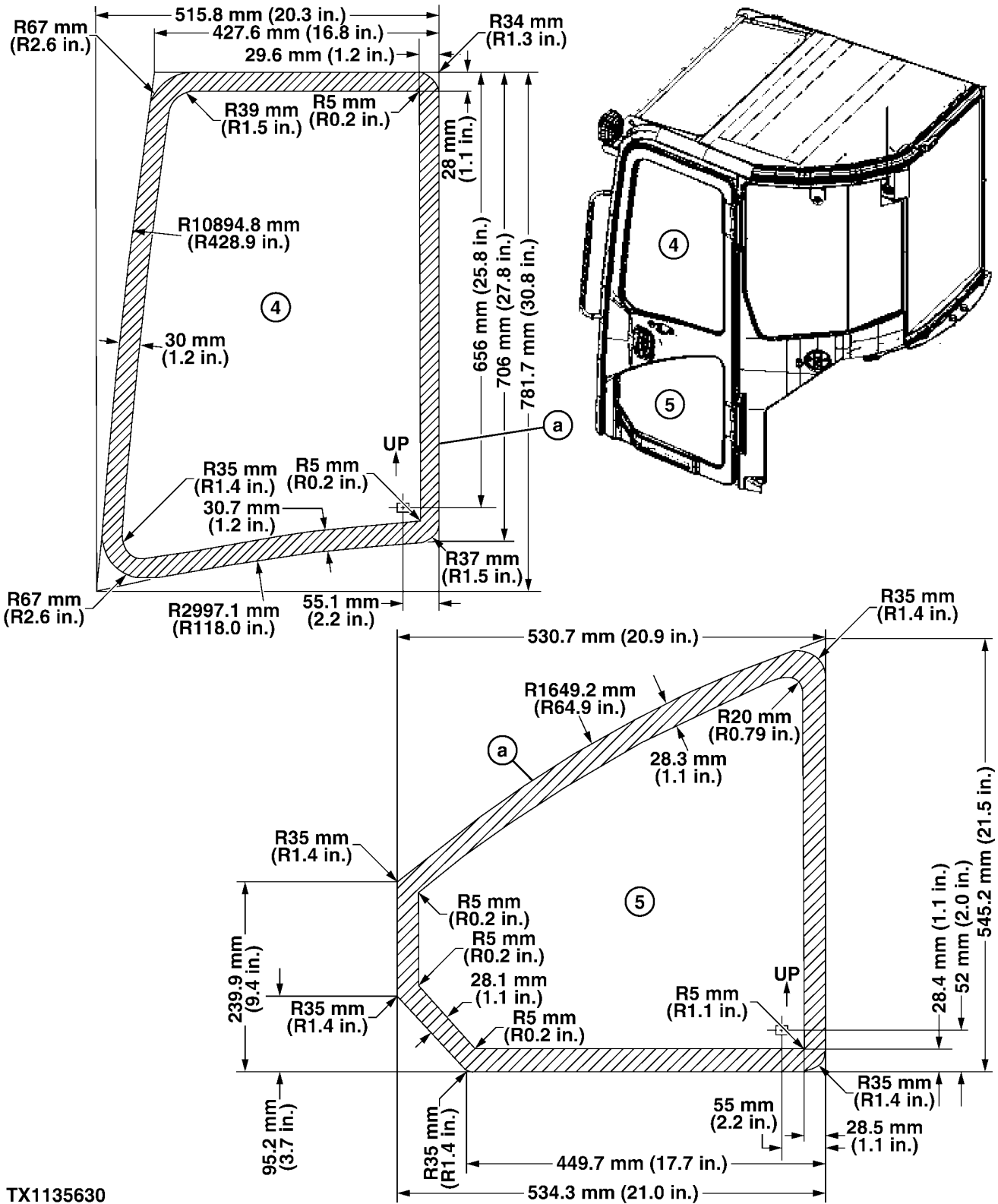
Lower Front and Roof Glass Dimension

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JD29379,0000324 -19-26APR13-3/8

TX1135629—UN—06MAY13

Operator Enclosure



TX1135630

Upper and Lower Cab Door Glass Dimension

4—Upper Cab Door Glass

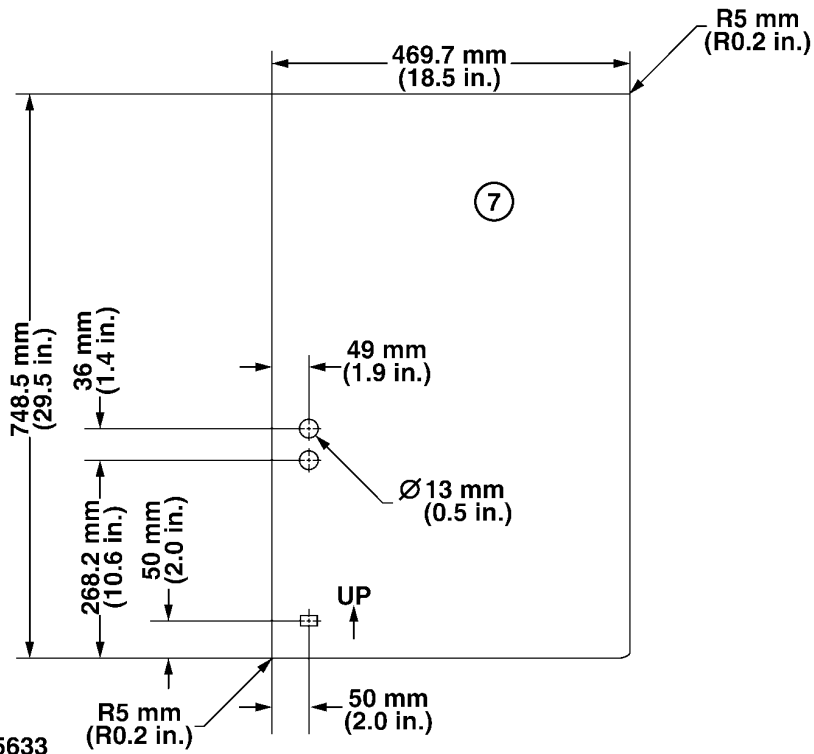
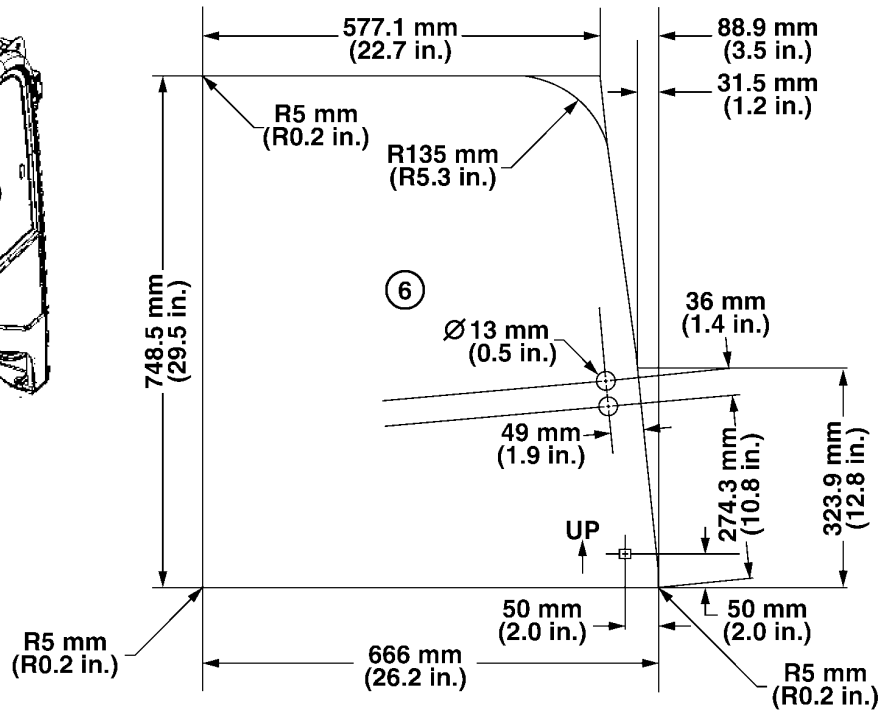
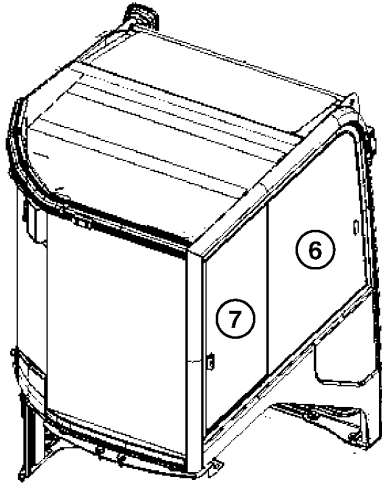
5—Lower Cab Door Glass

a—Black Ceramic Painted Surface

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JD29379,0000324 -19-26APR13-4/8

TX1135630—UN—03MAY13



TX1135633

Cab Sliding Glass Dimension

6—Front Cab Sliding Glass

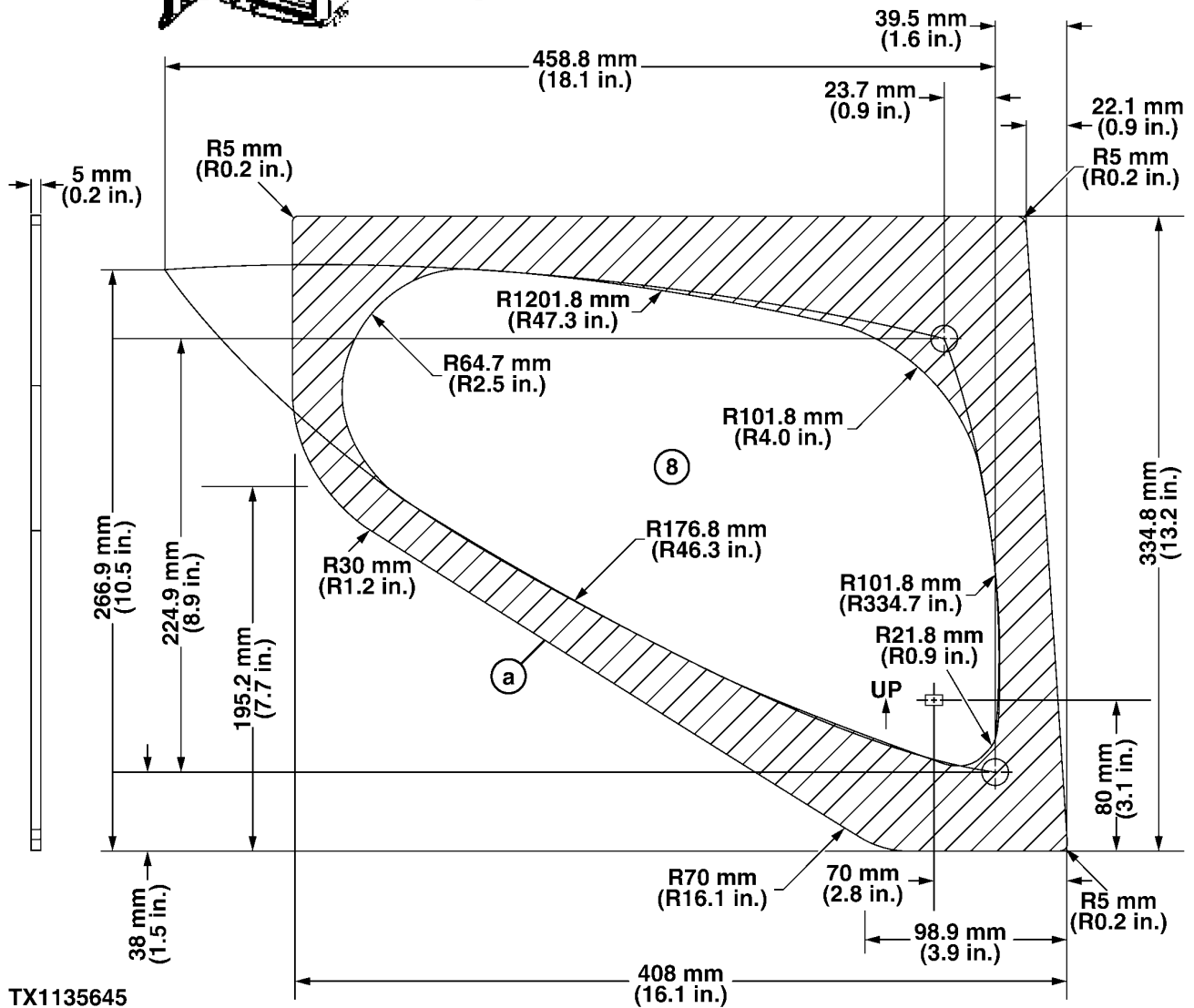
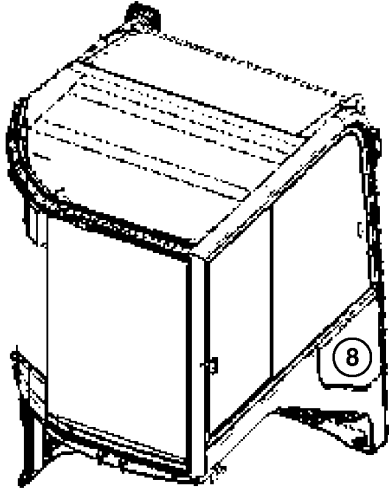
7—Rear Cab Sliding Glass

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JD29379,0000324 -19-26APR13-5/8

TX1135633—UN—03MAY13

Operator Enclosure



TX1135645

Right-Side Lower Cab Glass Dimension

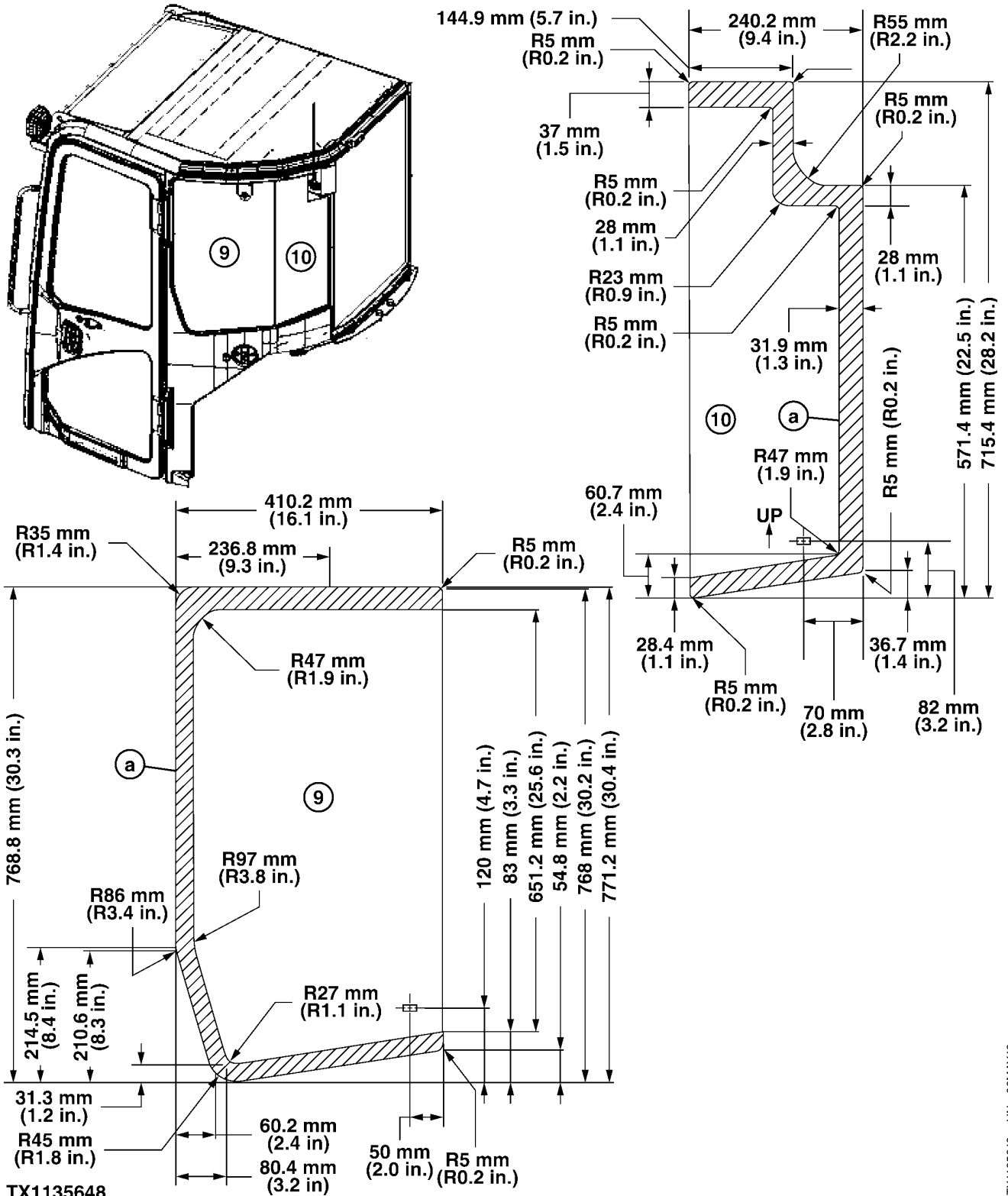
8—Right-Side Lower Cab Glass a—Black Ceramic Painted Surface

TX1135645—UN—03MAY13

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JD29379,0000324 -19-26APR13-6/8

Operator Enclosure



TX1135648

Left-Side Cab Glass Dimension

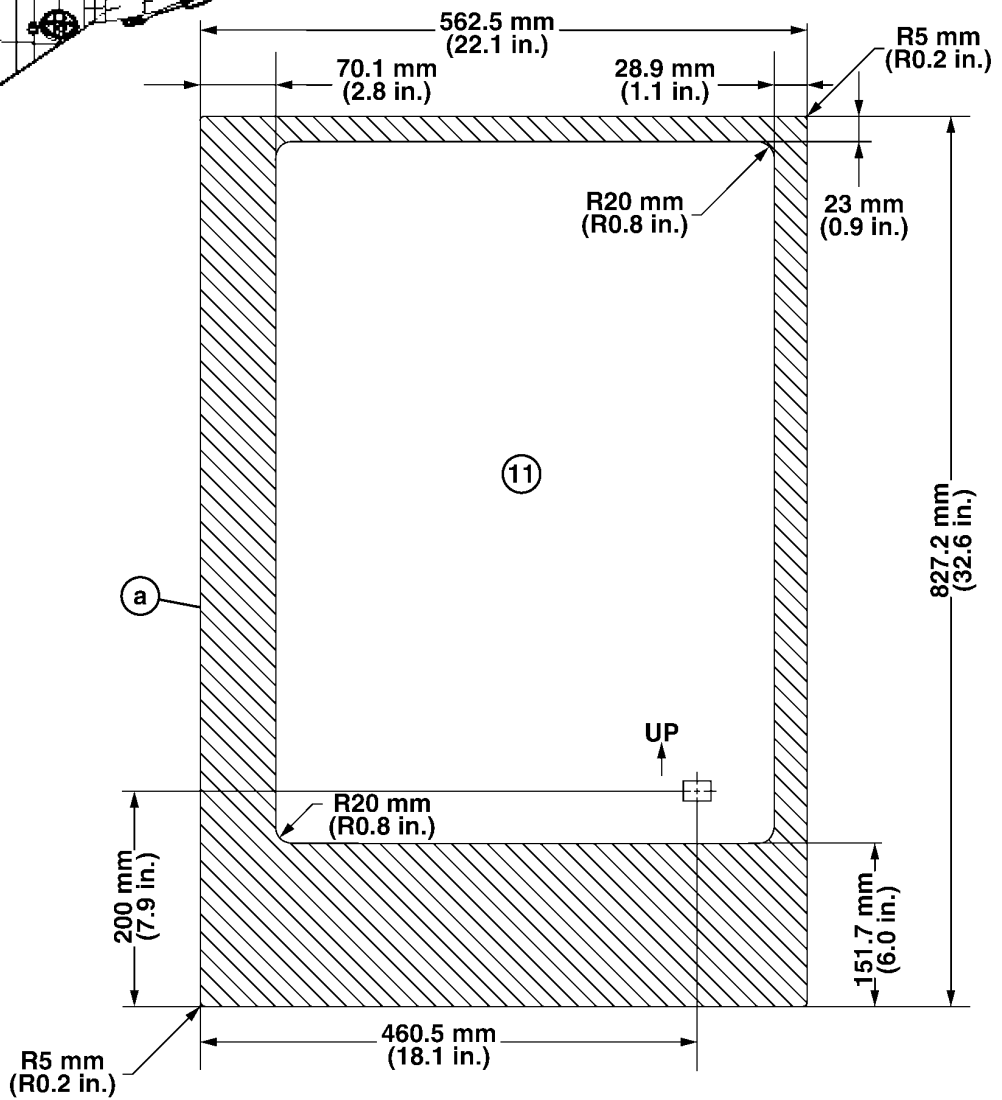
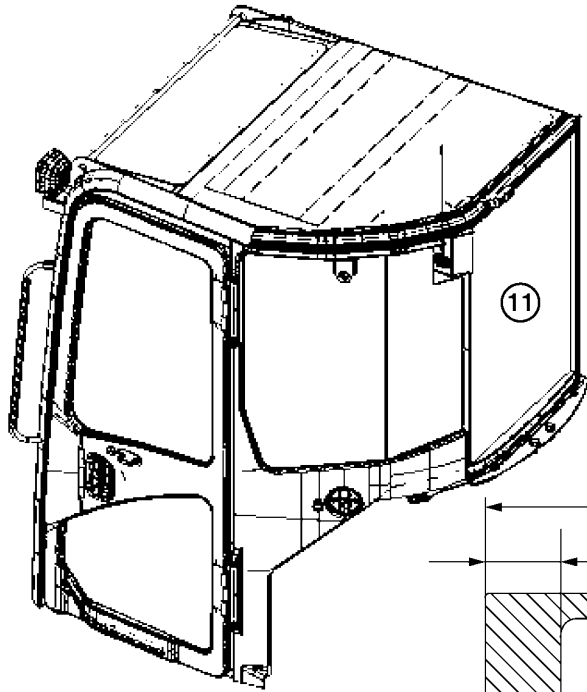
9— Front Left-Side Cab Glass 10— Rear Left-Side Cab Glass a— Black Ceramic Painted Surface

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JD29379.0000324 -19-26APR13-7/8

TX1135648 —UN—03MAY13

Operator Enclosure



TX1135654

11— Rear Cab Glass

a— Black Ceramic Painted Surface

Rear Cab Glass Dimension

TX1135654 —UN—03MAY13

JD29379.0000324 -19-26APR13-8/8

Seat Remove and Install

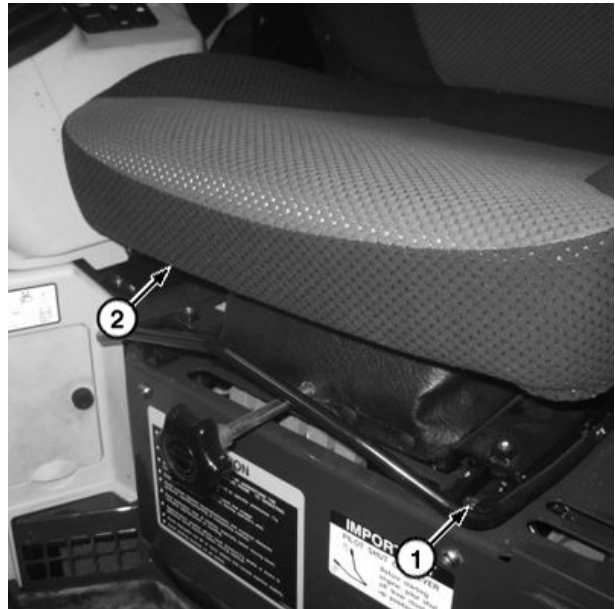
1. Park and prepare machine for service safely. *See Park and Prepare for Service Safely.* (Group 0001.)

NOTE: Sliding seat to different positions may aid in the removal of cap screws.

2. Remove cap screws (1) and operator's seat (2).
3. Repair or replace parts as necessary.
4. Install operator's seat and cap screws.

1— Cap Screw (4 used)

2— Operator's Seat



Operator's Seat

JD29379,0000305 -19-15APR13-1/1

TX1133119A —UN—15MAR13

Seat Belt Remove and Install

OTHER MATERIAL

242 Loctite® Thread Lock and Sealer (medium strength)

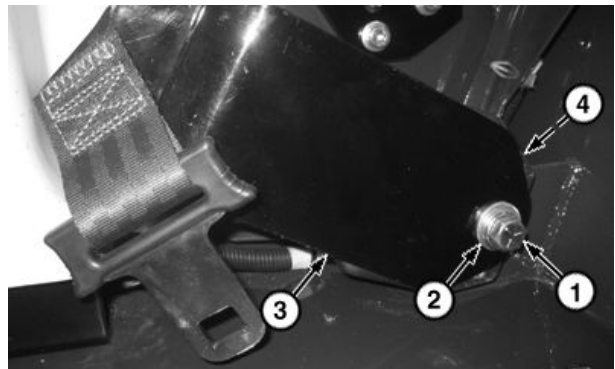
1. Park and prepare machine for service safely. *See Park and Prepare for Service Safely.* (Group 0001.)
2. Remove cap screw (1), washer (2), right side seat belt (3), and spacer (4).

1— Cap Screw

2— Washer

3— Right Side Seat Belt

4— Spacer



Seat Belt (right side)

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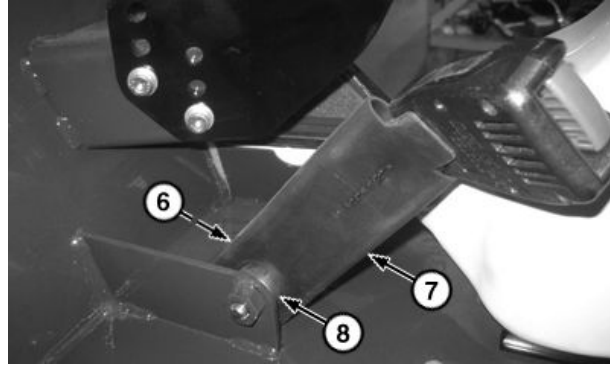
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JD29379,0000306 -19-15APR13-1/2

TX1132924A —UN—13MAR13

Seat and Seat Belt

3. Remove cap screw (6), left side seat belt (7), and spacer (8).
4. Repair or replace parts as necessary.
5. Apply PM37477 Thread Lock and Sealer (medium strength) to cap screw (6).
6. Install spacer (8), left side seat belt, and cap screw (6).
7. Apply PM37477 Thread Lock and Sealer (medium strength) to cap screw (1).
8. Install spacer (4), right side seat belt, washer (2), and cap screw (1).



Seat Belt (left side)

- 6— Cap Screw 8— Spacer
7— Left Side Seat Belt

TX1132925A —UN—13MAR13

JD29379,0000306 -19-15APR13-2/2

Left and Right Console Covers Remove and Install

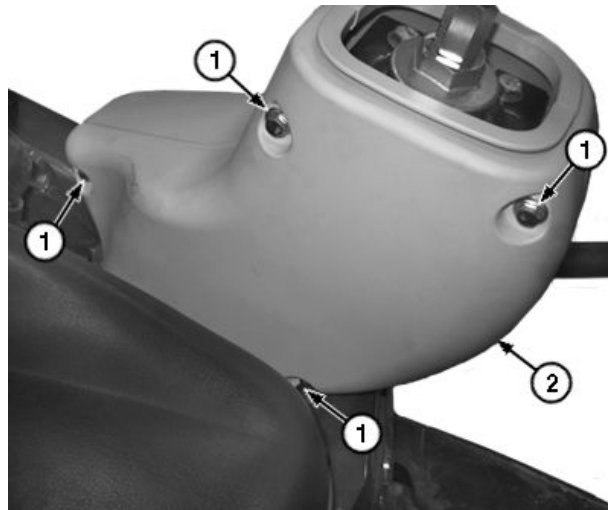
Left Console Covers Remove and Install

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Slide pilot control lever boot up during removal of covers.

NOTE: Sliding seat to different positions may aid in the removal of cap screws.

3. Remove cap screws (1) and inside cover (2).

- 1— Cap Screw (4 used) 2— Inside Cover



Left Console Cover

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BD53302,000172B -19-12APR13-1/4

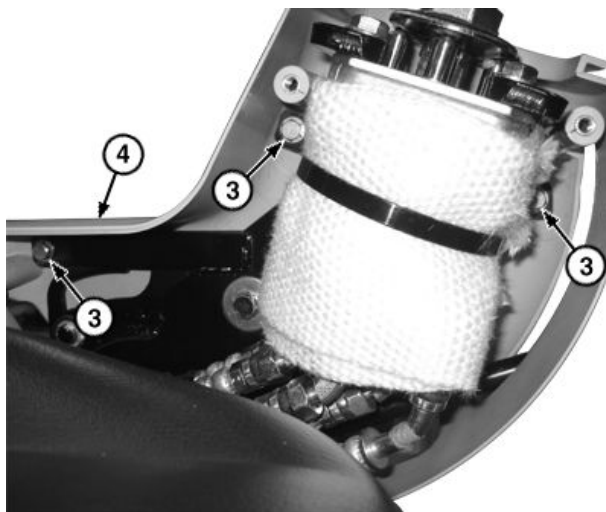
TX1134006A —UN—01APR13

Seat and Seat Belt

4. Remove cap screws (3) and outside cover (4).
5. Repair or replace parts as necessary.
6. Install outside cover and cap screws (3).
7. Install inside cover and cap screws (1).
8. Slide pilot control lever boot to proper position.

3— Cap Screw (3 used)

4— Outside Cover



Left Console Cover

BD53302,000172B -19-12APR13-2/4

TX1134224A —UN—04APR13

Right Console Covers Remove and Install

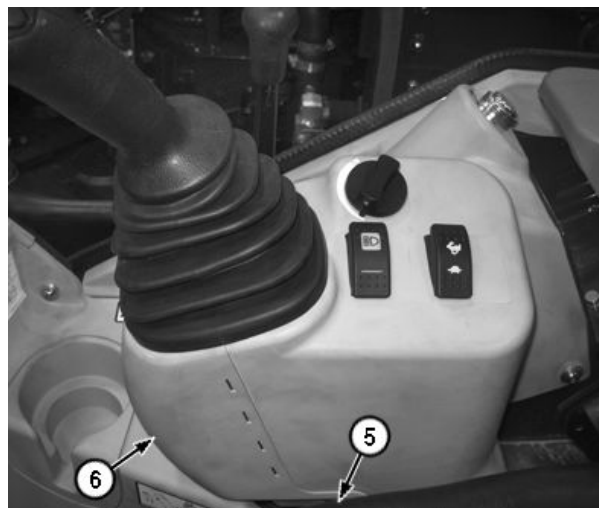
1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Slide pilot control lever boot up during removal of covers.

NOTE: Sliding seat to different positions may aid in removal of cap screws.

3. Remove cap screw (5) and front cover (6).

5— Cap Screw

6— Front Cover



Right Console Cover

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BD53302,000172B -19-12APR13-3/4

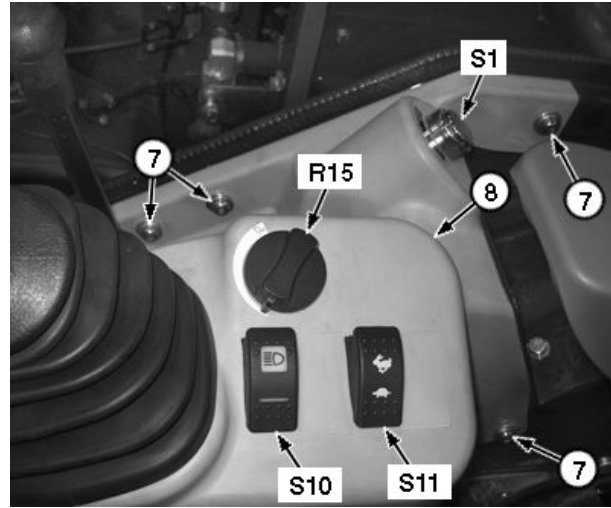
TX1134016A —UN—28MAR13

Seat and Seat Belt

- Remove cap screws (7) and cover (8).
- Install identification tags and disconnect connectors for engine speed dial (R15), key switch (S1), work light switch (S10), and travel speed switch (S11). See [Floor Harness \(W1\) Component Location](#). (Group 9015.)
- Repair or replace parts as necessary.
- Connect connectors for engine speed dial (R15), key switch (S1), work light switch (S10), and travel speed switch (S11). See [Floor Harness \(W1\) Component Location](#). (Group 9015.)
- Install cover and cap screws (7).
- Install front cover and cap screw (5).
- Slide pilot control lever boot to proper position.

7— Cap Screw (4 used)
8— Cover
R15— Engine Speed Dial

S1— Key Switch
S10— Work Light Switch
S11— Travel Speed Switch



Right Console Cover

TX1134015A—UN—01APR13

BD53302,000172B -19-12APR13-4/4

Refrigerant Cautions and Proper Handling

SERVICE EQUIPMENT AND TOOLS

JT02167A Prism Pro Refrigerant Identification Instrument

CAUTION: DO NOT allow liquid refrigerant to contact eyes or skin. Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves and protective clothing.

If liquid refrigerant contacts eyes or skin, DO NOT rub the area. Splash large amounts of COOL water on affected area. Go to a physician or hospital immediately for treatment.

DO NOT allow refrigerant to contact open flames or very hot surfaces such as electric welding arc, electric heating element and lighted smoking materials.

DO NOT heat refrigerant over 52°C (125°F) in a closed container. Heated refrigerant will develop high pressure which can burst the container.

Keep refrigerant containers away from heat sources. Store refrigerant in a cool place.

DO NOT handle damp refrigerant container with your bare hands. Skin may freeze to container. Wear gloves.

If skin freezes to container, pour COOL water over container to free the skin. Go to a physician or hospital immediately for treatment.

IMPORTANT: To meet government standards relating to the use of refrigerants, R134a is used in the air conditioning system. Because it does not contain chlorine, R134a is not detrimental to the ozone in the atmosphere. However, it is illegal to discharge any refrigerant into the atmosphere. It must be recovered using the appropriate recovery stations.

Use correct refrigerant recovery, recycling and charging stations. Never mix refrigerants, hoses, fittings, components or refrigerant oils.

Use only John Deere approved R134a refrigerant products. Mixing of products not compatible will cause system damage and contaminate recovery, recycling and charging station equipment. Care must be taken to identify and use equipment, refrigerant oil and refrigerant designed only for R134a refrigerant systems. Refrigerant should be tested for type and purity before recovery, recycling or charging of system. JT02167A refrigerant test instrument should be used before any testing or repair to system is performed.

JD29379,000029B -19-05MAR13-1/2

Prism Pro Refrigerant Identification Instrument
.....JT02167A

To safely identify type and check purity of refrigerant prior to recovery, recycling, and recharging of air conditioning systems.

JD29379,000029B -19-05MAR13-2/2

Flush and Purge Air Conditioning System

SPECIFICATIONS	
Flusher Tank Capacity	4 L 1 gal.
Air Pressure Minimum Pressure (for flushing and purging)	620 kPa 6.2 bar 90 psi
Flushing Solvent in Suction Port Volume	240 mL 8 fl. oz.
Flushing Solvent in Discharge Port Volume	120 mL 4 fl. oz.

ESSENTIAL TOOLS	
JT02075 Air Conditioner Flusher	
JT02099 Cap	
JT03194 Cap	

OTHER MATERIAL	
R134a Flushing Solvent	

CAUTION: Prevent possible injury. Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves, and protective clothing.

- Handle refrigerant carefully. See Refrigerant Cautions and Proper Handling. (Group 1830.)
- Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
- Recover refrigerant from system. See Recover R134a Refrigerant. (Group 1830.)
- Add flushing solvent to system with JT02075 Air Conditioner Flusher and flusher fitting kit.
- Remove and discard receiver-dryer. See Receiver-Dryer Remove and Install. (Group 1830.)

NOTE: Flushing can be performed with all components on machine.

- Connect flusher outlet hose to inlet end of compressor discharge line using appropriate adapter.
- Fill flusher tank with solvent and fasten all connections. Dispose of solvent properly.

Specification

Flusher Tank—Capacity.....	4 L 1 gal.
----------------------------	---------------

NOTE: Air pressure must be at specification for flushing and purging.

Specification

Air Pressure—Minimum Pressure (for flushing and purging).....	620 kPa 6.2 bar 90 psi
---	------------------------------

- Connect supply line of moisture-free compressed air or dry nitrogen to flusher air valve.
- Open air valve to force flushing solvent into condenser circuit. Flusher tank is empty when hose pulsing stops. Additional flushing cycles are required if system is heavily contaminated with burned oil or metal particles.

10. Clean compressor as follows:

- Remove compressor and measure oil drained from both manifold ports. See Air Conditioner Compressor Remove and Install. (Group 1830.)
- Connect flusher outlet hose to inlet end of compressor discharge line using appropriate adapter.
- Pour R134a flushing solvent into suction port and discharge port. Plug both ports in compressor manifold, using JT02099 and JT03194 Caps.

Specification

Flushing Solvent in Suction Port—Volume.....	240 mL 8 fl. oz.
--	---------------------

Flushing Solvent in Discharge Port—Volume.....	120 mL 4 fl. oz.
--	---------------------

- Turn compressor end for end and roll it side to side.
- Remove both plugs from manifold ports and drain solvent from compressor.
- Connect battery power to compressor clutch coil. Rotate pulley a minimum of five revolutions to move solvent out of cylinders.
- Invert compressor. Roll end for end and side to side. Drain thoroughly.
- Repeat previous two steps a minimum of three times.

11. Divide system into two circuits:

- Condenser circuit, including inlet and outlet hoses.
- Evaporator circuit, including inlet and outlet hoses.

12. Flush/purge condenser:

IMPORTANT: Prevent possible air conditioning system contamination. Do not attempt to flush through compressor or receiver-dryer. Flushing through expansion valve is acceptable if refrigerant oil has a normal odor and appearance.

- Remove and discard receiver-dryer. See Receiver-Dryer Remove and Install. (Group 1830.)
- Connect flusher outlet hose to inlet end of compressor discharge line using appropriate adapter.

Continued on next page

JD29379,000029C -19-15APR13-1/2

- c. Fill flusher tank with solvent and fasten all connections.

Specification

Flusher Tank—Capacity..... 4 L
1 gal.

- d. Air pressure must be to specification for flushing and purging.

Specification

Air Pressure—Minimum
Pressure (for flushing and
purging)..... 620 kPa
6.2 bar
90 psi

- e. Connect supply line of moisture-free compressed air or dry nitrogen to flusher air valve.
- f. Open air valve to force flushing solvent into condenser circuit. Flusher tank is empty when hose pulsing stops. Additional flushing cycles are required if system is heavily contaminated with burned oil or metal particles.
- g. Attach return hose and aerator nozzle to end of receiver-dryer inlet hose using appropriate adapter. Put nozzle in container to collect flushing solvent.

NOTE: Purging the condenser circuit takes 10—12 minutes to thoroughly remove solvent.

- h. Disconnect hose from aeration nozzle to check circuit for solvent. Hold hose close to piece of cardboard; continue purging until cardboard is dry.

- 13. See flush evaporator, if evaporator requires flushing.

If system is contaminated with burned refrigerant oil or debris, remove and bench flush evaporator. See following steps to flush evaporator through expansion valve, if oil appears normal.

14. Flush evaporator:

- a. Remove evaporator and expansion valve. See Heater and Air Conditioner Remove and Install. (Group 1830.)
- b. Force flushing solvent through evaporator inlet with compressed air.

- c. Purge system until dry.
- d. Install evaporator and then go to step 13. See Heater and Air Conditioner Remove and Install. (Group 1830.)

15. Flush evaporator through expansion valve:

- a. Connect flusher outlet hose to connection of receiver-dryer outlet hose using appropriate adapter.
- b. Fill flusher tank and fasten all connections.

Specification

Flusher Tank—Capacity..... 4 L
1 gal.

- c. Air pressure must be to specification for flushing and purging.

Specification

Air Pressure—Minimum
Pressure (for flushing and
purging)..... 620 kPa
6.2 bar
90 psi

- d. Connect supply line of moisture-free compressed air or dry nitrogen to flusher air valve.
- e. Attach hose and aerator nozzle to compressor inlet line using appropriate adapter. Put nozzle in container to collect solvent.

NOTE: Purging evaporator circuit takes 12—15 minutes to thoroughly remove solvent.

- 16. Disconnect hose from aeration nozzle to check circuit for solvent. Hold hose close to piece of cardboard and continue purging until cardboard is dry.

- 17. Install new receiver-dryer compatible with R134a refrigerant. Fasten connections and mounting bracket. See Receiver-Dryer Remove and Install. (Group 1830.)

- 18. Add required oil. See R134a Refrigerant Oil Information. (Group 1830.)

- 19. Install compressor and connect refrigerant lines to manifold. See Air Conditioner Compressor Remove and Install. (Group 1830.)

JD29379,000029C -19-15APR13-2/2

R134a Refrigerant Oil Information

SPECIFICATIONS	
Oil Volume	100 mL 3.38 fl. oz.
R134a Charge Weight	650 g 1.43 lb.

CAUTION: All new compressors are charged with a mixture of nitrogen, R134a refrigerant, and R134a refrigerant oil. Wear safety goggles and discharge compressor slowly to avoid possible injury.

If installing a new compressor, make sure oil level is visible through suction port. Oil level is normally below the drive shaft.

Normal operating oil level of compressor removed from operation cannot be seen through suction port of compressor.

Compressors can be divided into three categories when determining correct oil charge for system:

- New compressor
- Used compressor removed from operation
- Compressor internally washed with flushing solvent

IMPORTANT: Prevent possible air conditioning system damage. Do not add any more oil than required or maximum cooling will be reduced.

Do not leave system or R134a compressor oil containers open. Refrigerant oil easily absorbs moisture. Do not spill R134a compressor oil on acrylic or ABS plastic. This oil will deteriorate these materials rapidly. Identify R134a oil containers and measures to eliminate accidental mixing of different oils.

Determine the amount of system oil charge prior to installation of compressor on a machine.

When complete system, lines, and components are flushed, add correct amount of oil as described.

Specification

Oil—Volume.....	100 mL 3.38 fl. oz.
R134a—Charge Weight.....	650 g 1.43 lb.

If any section of hose is removed and flushed or replaced, measure length of hose and use formula 3 mL per 30 cm (0.1 fl. oz. per ft.) to determine correct amount of oil to be added.

Drain compressor oil into graduated container while rotating compressor shaft and record amount.

If oil drained from compressor is very black or amount of oil is less than 100 mL (3.38 fl. oz.), perform the following and discard oil properly:

- Determine if R134a leakage was detected. If leak was found, remove component and repair or replace.
- Remove and discard receiver-dryer. See Receiver-Dryer Remove and Install. (Group 1830.)
- Flush complete system with R134a flushing solvent. See Flush and Purge Air Conditioning System. (Group 1830.)

If component is serviceable, pour flushing solvent in ports, internally wash out old oil, and discard oil properly.

1. Install new receiver-dryer. See Receiver-Dryer Remove and Install. (Group 1830.)
2. Install required amount of R134a compressor oil. See R134a Compressor Oil Charge Check. (Group 1830.)
3. Connect all components.
4. Evacuate air conditioning system. See Evacuate R134a System. (Group 1830.)
5. Charge R134a air conditioning system. See Charge R134a System. (Group 1830.)

JD29379,00002F3 -19-15APR13-1/1

R134a Refrigerant Recovery, Recycling, and Charging Station Installation Procedure

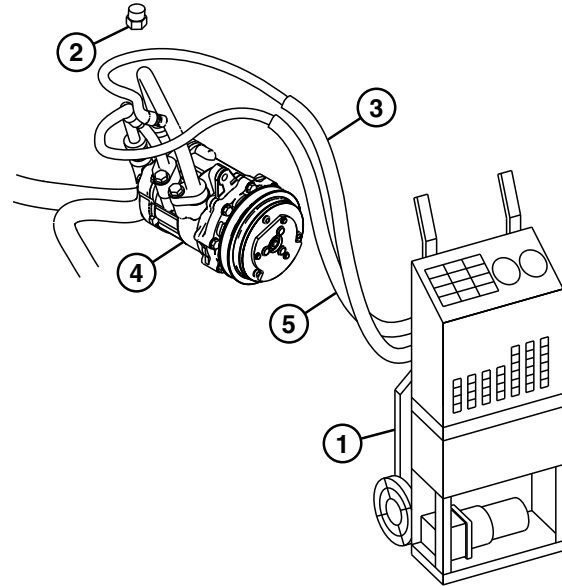
CAUTION: Prevent possible injury. Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves, and protective clothing.

1. Handle refrigerant carefully. See Refrigerant Cautions and Proper Handling. (Group 1830.)
2. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

IMPORTANT: Prevent possible air conditioning system contamination. Use correct refrigerant recovery, recycling, and charging station. Do not mix refrigerant, hoses, fittings, components, or refrigerant oils.

CAUTION: Avoid possible injury. Do not remove high-pressure relief valve. Air conditioning system will discharge rapidly.

3. Close both high and low-pressure valves on refrigerant recovery, recycling, and charging station (1).
4. Remove caps (2) from test ports.
5. Connect low side pressure (blue) hose (3) from refrigerant recovery, recycling, and charging station to low-pressure test port on air conditioner compressor (4).
6. Connect high side pressure (red) hose (5) to high-pressure test port on air conditioner compressor.



Refrigerant Recovery, Recycling, and Charging Station

1— Refrigerant Recovery, Recycling, and Charging Station
 2— Cap (2 used)
 3— Low Side Pressure (blue) Hose

4— Air Conditioner Compressor
 5— High Side Pressure (red) Hose

7. Follow manufacturer's instructions when using refrigerant recovery, recycling, and charging station.

JD29379,00002F4 -19-15APR13-1/1

TX1134932—UN—16APR13

R134a Compressor Oil Charge Check

SPECIFICATIONS	
Compressor Oil Volume	100 mL 3.38 fl. oz.

OTHER MATERIAL	
TY16134 R134a Flushing Solvent	
TY22025 R134a Compressor Oil	

IMPORTANT: Prevent air conditioning system damage. Do not add any more oil than required or maximum cooling will be reduced.

Do not leave system or R134a compressor oil containers open. Refrigerant oil easily absorbs moisture. Do not spill R134a compressor oil on acrylic or ABS plastic. This oil will deteriorate these materials rapidly. Identify R134a oil containers and measures to eliminate accidental mixing of different oils.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Determine if R134a leakage was detected. Remove and repair or replace compressor. See Air Conditioner Compressor Remove and Install. (Group 1830.)

⚠ CAUTION: Avoid possible injury. All new compressors are charged with a mixture of nitrogen, R134a refrigerant and R134a refrigerant oil. Wear safety goggles and discharge the compressor slowly.

3. Drain oil from compressor and record amount if new compressor is required. See R134a Compressor Oil Removal. (Group 1830.)

If oil drained from a compressor removed from operation is very black or amount of oil is less than specification, perform the following:

	Specification
Compressor	
Oil—Volume.....	100 mL 3.38 fl. oz.

- a. Remove and discard receiver-dryer. See Receiver-Dryer Remove and Install. (Group 1830.)
- b. Remove, clean, but do not disassemble valve.
- c. Flush complete system with air conditioner flushing solvent. See Flush and Purge Air Conditioning System. (Group 1830.)
- d. If compressor is serviceable, pour flushing solvent in manifold ports and internally wash out old oil.
- e. Install new receiver-dryer. See Receiver-Dryer Remove and Install. (Group 1830.)
- f. Install required amount of refrigerant oil in compressor.

	Specification
Compressor	
Oil—Volume.....	100 mL 3.38 fl. oz.

4. Connect all components. Evacuate, and charge system. See Evacuate R134a System and see Charge R134a System. (Group 1830.)

JD29379,00002F6 -19-15APR13-1/1

R134a Compressor Oil Removal

⚠ CAUTION: Avoid possible injury. All new compressors are charged with a mixture of nitrogen, R134a refrigerant, and R134a refrigerant oil. Wear safety goggles and discharge compressor slowly.

1. Handle refrigerant carefully. See Refrigerant Cautions and Proper Handling. (Group 1830.)
2. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
3. Remove compressor from machine. See Air Conditioner Compressor Remove and Install. (Group 1830.)
4. Remove inlet/outlet manifold from compressor and clutch dust cover.
5. Drain oil into graduated container while rotating compressor shaft.

6. Record measured oil and discard oil properly.

IMPORTANT: Prevent possible air conditioning system damage. Do not add any more oil than required or maximum cooling will be reduced.

Do not leave system or R134a compressor oil containers open. Refrigerant oil easily absorbs moisture. Do not spill R134a compressor oil on acrylic or ABS plastic. This oil will deteriorate these materials rapidly. Identify R134a oil containers and measures to eliminate accidental mixing of different oils.

7. Install new oil. See R134a Compressor Oil Charge Check. (Group 1830.)
8. Install inlet/outlet manifold from compressor and clutch dust cover.
9. Install compressor. See Air Conditioner Compressor Remove and Install. (Group 1830.)

JD29379,00002F7 -19-15APR13-1/1

Recover R134a Refrigerant

⚠ CAUTION: Prevent possible injury. Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves, and protective clothing.

1. Handle refrigerant carefully. See Refrigerant Cautions and Proper Handling. (Group 1830.)
2. Run air conditioning system for 3 minutes to help in recovery process.
3. Turn air conditioning system off before proceeding with recovery steps.
4. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

IMPORTANT: Prevent possible air conditioning system damage. Use correct refrigerant

recovery, recycling, and charging stations. Do not mix refrigerant, hoses, fittings, components, or refrigerant oils.

⚠ CAUTION: Avoid possible injury from air conditioning system refrigerant. Do not remove high-pressure relief valve. Air conditioning system will discharge rapidly.

5. Connect refrigerant recovery, recycling, and charging station. See R134a Refrigerant Recovery, Recycling, and Charging Station Installation Procedure. (Group 1830.)
6. Follow the manufacturer's instructions when using the refrigerant recovery, recycling, and charging station.

JD29379.00002A1 -19-15APR13-1/1

Evacuate R134a System

SPECIFICATIONS	
Vacuum Pressure at Sea Level	98 kPa 980 mbar 29 in. Hg
Vacuum Pressure Above Sea Level	Subtract 3.4 kPa from 98 kPa for each 300 m elevation Subtract 34 mbar from 980 mbar for each 300 m elevation Subtract 1 in. Hg from 29 in. Hg for each 1000 ft. elevation
Leak Present Decrease in Vacuum (5 minutes)	3.4 kPa 34 mbar 1 in. Hg

CAUTION: Prevent possible injury. Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves, and protective clothing.

1. Handle refrigerant carefully. See Refrigerant Cautions and Proper Handling. (Group 1830.)
2. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

IMPORTANT: Prevent possible air conditioning system damage. Use correct refrigerant recovery, recycling, and charging stations. Do not mix refrigerant, hoses, fittings, components, or refrigerant oils.

CAUTION: Avoid possible injury from air conditioning system refrigerant. Do not remove high-pressure relief valve. Air conditioning system will discharge rapidly.

3. Connect refrigerant recovery, recycling, and charging station. See R134a Refrigerant Recovery, Recycling, and Charging Station Installation Procedure. (Group 1830.)
4. Open low and high-pressure valves on refrigerant recovery, recycling, and charging station.
5. Follow the manufacturer's instructions and evacuate system.

NOTE: The vacuum specifications listed are for sea level conditions. Subtract 3.4 kPa (34 mbar) (1 in. Hg)

from 98 kPa (980 mbar) (29 in. Hg) for each 300 m (1000 ft.) elevation above sea level.

6. Evacuate system until low-pressure gauge registers specified vacuum.

If specified vacuum cannot be obtained in 15 minutes, a leak may be present. Repair any leaks.

Specification

Vacuum—Pressure at Sea Level..... 98 kPa
980 mbar
29 in. Hg

Specification

Vacuum—Pressure Above Sea Level..... Subtract 3.4 kPa from 98 kPa for each 300 m elevation
Subtract 34 mbar from 980 mbar for each 300 m elevation
Subtract 1 in. Hg from 29 in. Hg for each 1000 ft. elevation

7. When vacuum reaches specified level, close low side and high side valves. Turn vacuum pump off.

8. If the vacuum decreases more than specified amount in 5 minutes, there is a leak in the system.

Specification

Leak Present—Decrease in Vacuum (5 minutes)..... 3.4 kPa
34 mbar
1 in. Hg

9. Repair leak.
10. Start to evacuate.
11. Open low side and high side valves.
12. Evacuate system for 30 minutes after initial specified vacuum is reached.
13. Close low side and high side valves. Stop evacuation.
14. Charge system. See Charge R134a System. (Group 1830.)

Charge R134a System

SPECIFICATIONS	
Air Conditioning System Refrigerant Charge Weight	650 g 1.43 lb.

CAUTION: Prevent possible injury. Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves, and protective clothing.

1. Handle refrigerant carefully. See Refrigerant Cautions and Proper Handling. (Group 1830.)
2. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

IMPORTANT: Prevent possible damage to air conditioning system. Use correct refrigerant recovery, recycling, and charging stations. Do not mix refrigerant, hoses, fittings, components, or refrigerant oils.

CAUTION: Avoid possible injury from air conditioning system refrigerant. Do not remove high-pressure relief valve. Air conditioning system will discharge rapidly.

3. Connect refrigerant recovery, recycling, and charging station. See R134a Refrigerant Recovery, Recycling,

and Charging Station Installation Procedure. (Group 1830.)

4. Evacuate system. See Evacuate R134a System. (Group 1830.)

NOTE: Before beginning to charge air conditioning system, the following conditions must exist: Engine STOPPED, the pump must be capable of pulling at least 28.6 in. Hg vacuum (sea level). Subtract 3.4 kPa (34 mbar) (1 in. Hg) from 98 kPa (980 mbar) (29 in. Hg) for each 300 m (1000 ft.) elevation above sea level.

5. Follow manufacturer's instructions and charge system.
6. Add specified weight of refrigerant to air conditioning system.

	Specification
Air Conditioning System Refrigerant—Charge Weight.....	650 g 1.43 lb.

7. Perform air conditioner check. See Operational Checkout. (Group 9005-10.)

JD29379.0000311 -19-22MAY13-1/1

Air Conditioner Compressor Remove and Install

SPECIFICATIONS

Pressure Line Cap Screw Torque	28 N·m 21 lb.-ft.
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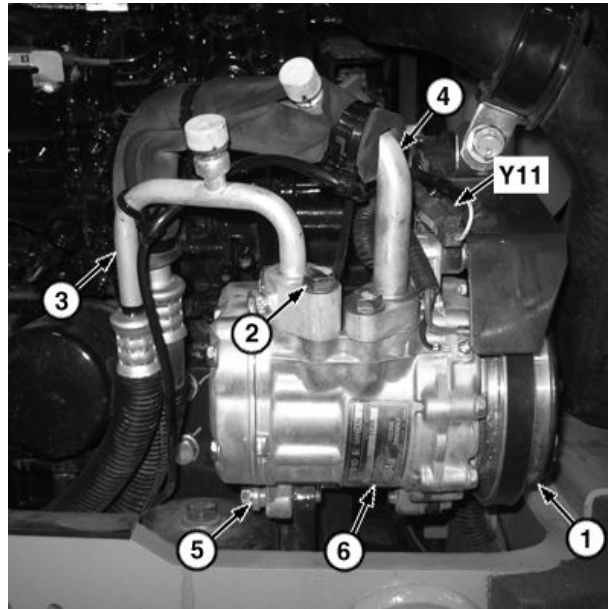
1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Recover refrigerant from system. See Recover R134a Refrigerant. (Group 1830.)
3. Disconnect air conditioner compressor clutch (Y11) electrical connector. See Air Conditioner Compressor Harness (W8) Component Location. (Group 9015-10.)
4. Remove air conditioner belt (1). See Check and Adjust Air Conditioner Belt—If Equipped. (Operator's Manual.)
5. Remove cap screws (2). Install identification tags and disconnect high-pressure line (3) and low-pressure line (4). Close all openings using caps and plugs. See Heater and Air Conditioner Component Location. (Group 9031-15.)
6. Remove cap screws (5) and compressor (6).

NOTE: When replacing with a new compressor, flush and purge each component in the air conditioning system individually. See Flush and Purge Air Conditioning System. (Group 1830.)

7. Repair or replace parts as necessary. See R134a Compressor Oil Charge Check. (Group 1830.)
8. Install compressor and cap screws (5).
9. Connect high-pressure line and low-pressure line. Install and tighten cap screws (2) to specification. See Heater and Air Conditioner Component Location. (Group 9031-15.)

Specification

Pressure Line Cap	
Screw—Torque.....	28 N·m 21 lb.-ft.



Air Conditioner Compressor

- | | |
|-------------------------|--|
| 1— Air Conditioner Belt | 5— Cap Screw (3 used) |
| 2— Cap Screw (2 used) | 6— Compressor |
| 3— High-Pressure Line | Y11— Air Conditioner Compressor Clutch |
| 4— Low-Pressure Line | |

10. Connect air conditioner compressor clutch (Y11) electrical connector. See Air Conditioner Compressor Harness (W8) Component Location. (Group 9015-10.)
11. Install air conditioner belt. See Check and Adjust Air Conditioner Belt—If Equipped. (Operator's Manual.)
12. Evacuate and charge the system. See Evacuate R134a System and see Charge R134a System. (Group 1830.)

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Condenser Remove and Install

Condenser Remove and Install (S.N. —270726)

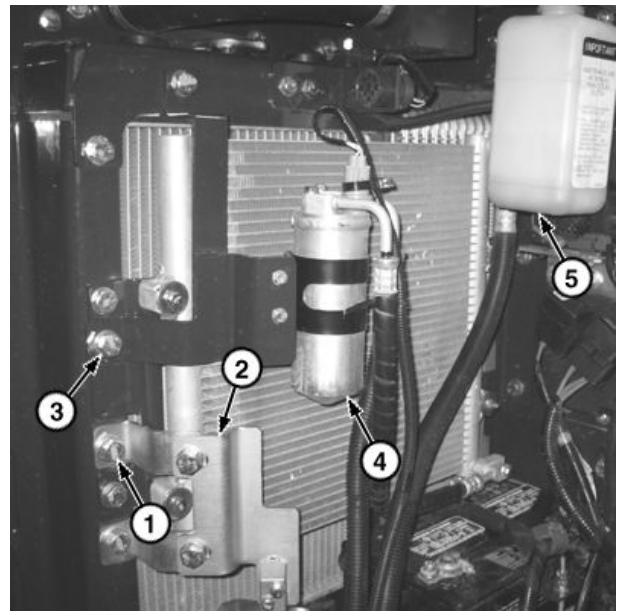
SPECIFICATIONS

Condenser-to-Hose Cap Screw Torque	28 N·m 21 lb.-ft.
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1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Recover refrigerant from system. See Recover R134a Refrigerant. (Group 1830.)
3. Remove cap screws (1) and door latch (2).
4. Remove cap screws (3) and set receiver-dryer (4) aside.
5. Remove coolant recovery tank (5). See Coolant Recovery Tank Remove and Install. (Group 0510.)

1— Cap Screw (2 used)
2— Door Latch
3— Cap Screw (2 used)

4— Receiver-Dryer
5— Coolant Recovery Tank



Receiver-Dryer

TX1135196A—UN—17APR13

Continued on next page

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6. Remove cap screws (6). Install identification tags and disconnect high-pressure hose (7) and low-pressure hose (8). Close all openings using caps and plugs. See Heater and Air Conditioner Component Location. (Group 9031-15.)
7. Remove cap screws (9) and condenser (10).
8. Repair or replace parts as necessary.
9. Install condenser and cap screws (9).
10. Connect high and low-pressure hoses. Install cap screws (6) and tighten to specification.

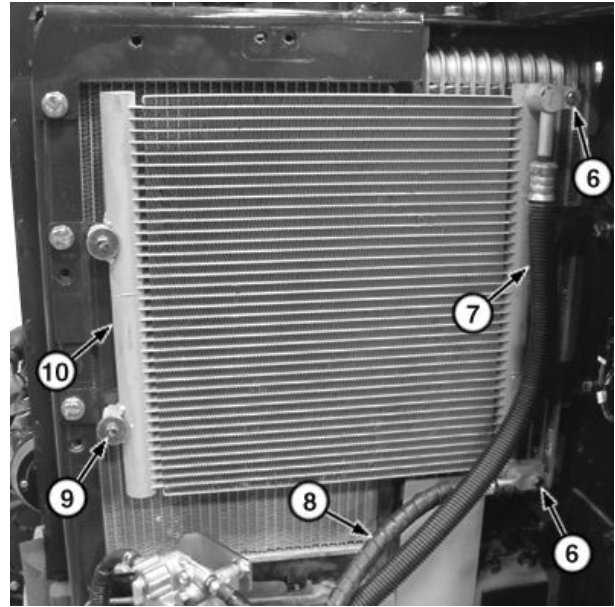
Specification

Condenser-to-Hose Cap
Screw—Torque.....28 N·m
21 lb.-ft.

11. Install coolant recovery tank. See Coolant Recovery Tank Remove and Install. (Group 0510.)
12. Install receiver-dryer and cap screws (3).
13. Install door latch and cap screws (1).
14. Evacuate and charge air conditioning system. See Evacuate R134a System and see Charge R134a System. (Group 1830.)
15. Operate machine and check for leaks.

Condenser Remove and Install (S.N. 270727—)

SPECIFICATIONS	
Condenser-to-Hose Cap Screw Torque	28 N·m 21 lb-ft



Condenser

- 6— Cap Screw (2 used)
- 7— High-Pressure Hose
- 8— Low-Pressure Hose
- 9— Cap Screw (4 used)
- 10— Condenser

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Recover refrigerant from system. See Recover R134a Refrigerant. (Group 1830.)

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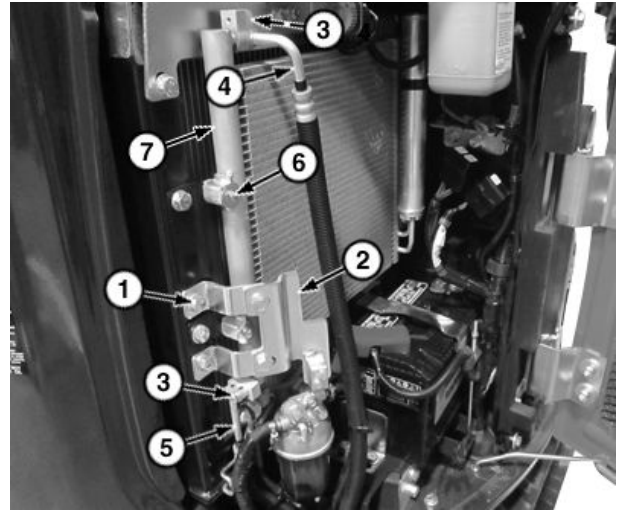
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3. Remove cap screws (1) and door latch (2).
4. Remove coolant recovery tank. See Coolant Recovery Tank Remove and Install. (Group 0510.)
5. Remove cap screws (3). Install identification tags and disconnect high-pressure hoses (4 and 5). Close all openings using caps and plugs. See Heater and Air Conditioner Component Location. (Group 9031-15.)
6. Remove cap screws (6) and condenser (7).
7. Repair or replace parts as necessary. Replace receiver-dryer. See Receiver-Dryer Remove and Install. (Group 1830).
8. Install condenser and cap screws (6).
9. Connect high-pressure hoses. Install cap screws (3) and tighten to specification.

Specification

Condenser-to-Hose Cap	
Screw—Torque.....	28 N·m 21 lb·ft

10. Install coolant recovery tank. See Coolant Recovery Tank Remove and Install. (Group 0510.)
11. Install door latch and cap screws (1).
12. Evacuate and charge air conditioning system. See Evacuate R134a System and see Charge R134a System. (Group 1830.)



Condenser

- | | |
|---|---|
| 1— Cap Screw (2 used) | 5— Condenser-to-Evaporator High-Pressure Hose |
| 2— Door Latch | 6— Cap Screw (4 used) |
| 3— Cap Screw (2 used) | 7— Condenser |
| 4— Compressor-to-Condenser High-Pressure Hose | |

13. Operate machine and check for leaks.

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TX1240340A —JUN—14JUN17

Heater and Air Conditioner Remove and Install

SPECIFICATIONS

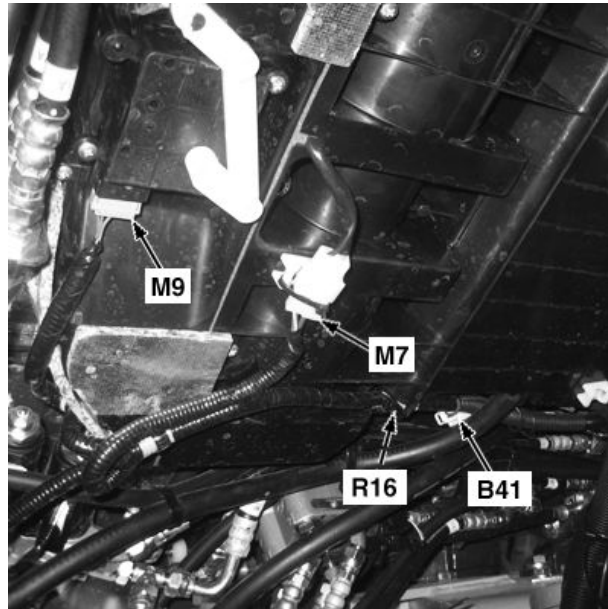
Cooling System Capacity	5 L 1.3 gal.
-------------------------	-----------------

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Recover refrigerant from system. See Recover R134a Refrigerant. (Group 1830.)
3. Drain cooling system. See Drain Cooling System. (Operator's Manual.)

Specification

Cooling System—Capacity..... 5 L
1.3 gal.

4. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)
5. Install identification tags and disconnect air conditioner freeze control switch (B41), heater and air conditioner blower motor (M7), heater and air conditioner internal and external servo motor (M9), and blower motor resistor (R16). See Air Conditioner Harness (W3) Component Location. (Group 9015-10.)



Electrical Connectors (left side)

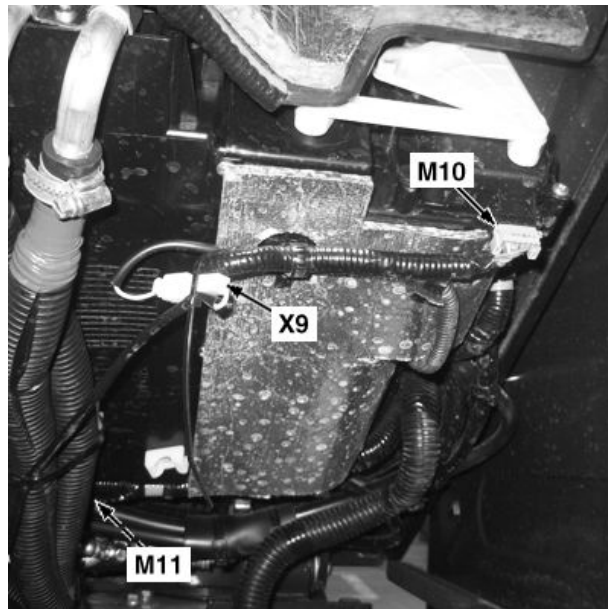
- | | |
|---|--|
| B41— Air Conditioner Freeze Control Switch | M9—Heater and Air Conditioner Internal and External Servo Motor |
| M7—Heater and Air Conditioner Blower Motor | R16— Blower Motor Resistor |

JA66566,0002A90 -19-13MAY13-1/4

TX1135982A —UN—03MAY13

6. Install identification tags and disconnect heater and air conditioner blower port change servo motor (M10), heater and air conditioner mixer servo motor (M11), and air conditioner compressor harness connector (X9). See Air Conditioner Harness (W3) Component Location. (Group 9015-10.)

- | | |
|---|---|
| M10— Heater and Air Conditioner Blower Port Change Servo Motor | X9— Air Conditioner Compressor Harness Connector |
| M11— Heater and Air Conditioner Mixer Servo Motor | |



Electrical Connectors (right side)

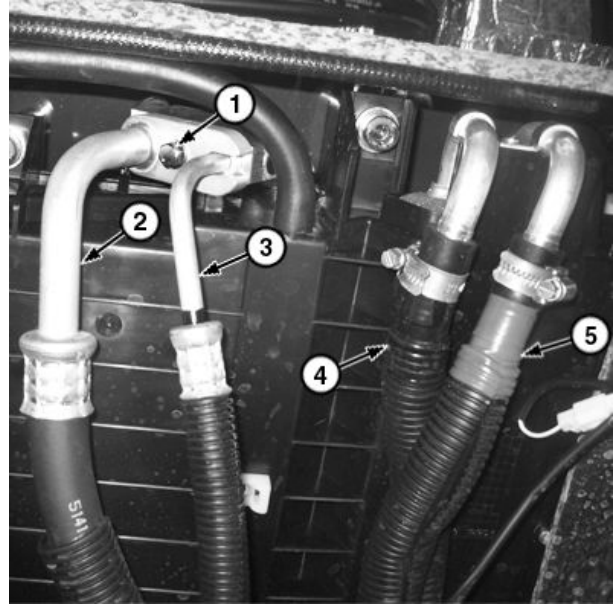
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JA66566,0002A90 -19-13MAY13-2/4

TX1135984A —UN—03MAY13

7. Install identification tags on refrigerant lines (2 and 3). Remove cap screw (1) and disconnect refrigerant lines. Close all openings using caps and plugs. See Heater and Air Conditioner Component Location. (Group 9031-15.)
8. Install identification tags and disconnect heater hoses (4 and 5). Close all openings using caps and plugs. See Heater and Air Conditioner Component Location. (Group 9031-15.)

- | | |
|-----------------------------------|-----------------------|
| 1— Cap Screw | 4— Heater Supply Hose |
| 2— Low-Pressure Refrigerant Line | 5— Heater Return Hose |
| 3— High-Pressure Refrigerant Line | |

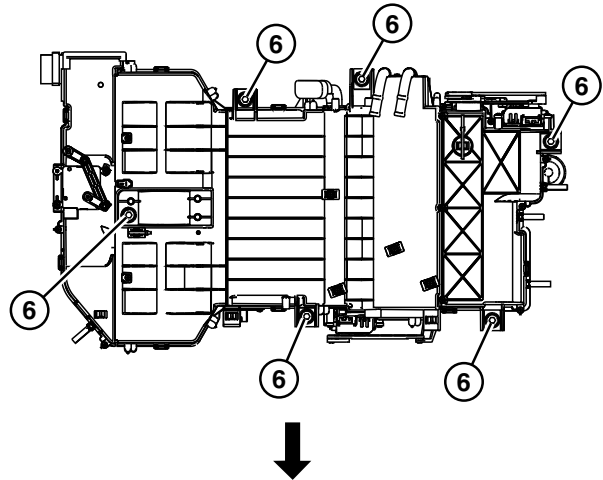


Refrigerant Lines

JA66566.0002A90 -19-13MAY13-3/4

TX1135985A—UN—03MAY13

9. Remove cap screws (6) and heater and air conditioner assembly.
10. Repair or replace parts as necessary.
11. Install heater and air conditioner assembly and cap screws (6).
12. Connect heater hoses. See Heater and Air Conditioner Component Location. (Group 9031-15.)
13. Connect refrigerant lines and install cap screw (1). See Heater and Air Conditioner Component Location. (Group 9031-15.)
14. Connect heater and air conditioner blower port change servo motor (M10), heater and air conditioner mixer servo motor (M11), and air conditioner compressor harness connector (X9). See Air Conditioner Harness (W3) Component Location. (Group 9015-10.)
15. Connect air conditioner freeze control switch (B41), heater and air conditioner blower motor (M7), heater and air conditioner internal and external servo motor (M9), and blower motor resistor (R16). See Air Conditioner Harness (W3) Component Location. (Group 9015-10.)
16. Evacuate and charge air conditioning system. See Evacuate R134a System and see Charge R134a System. (Group 1830.)
17. Fill cooling system. See Cooling System Fill and Deaeration Procedure. (Operator's Manual.)



Heater and Air Conditioner Cap Screw Locations

6— Cap Screw (6 used)

18. Lower operator's station. See Tilting Operator's Station. (Operator's Manual.)
19. Operate machine and check for leaks.

JA66566.0002A90 -19-13MAY13-4/4

TX1135986—UN—03MAY13

Receiver-Dryer Remove and Install

Receiver-Dryer Remove and Install (S.N. —270726)

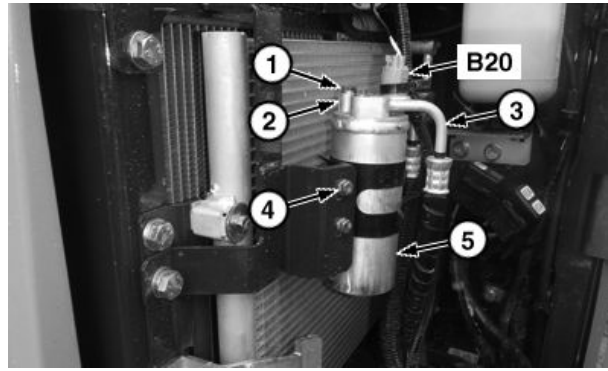
SPECIFICATIONS

Receiver-Dryer Line Cap Screw Torque	16 N·m 144 lb.-in.
--------------------------------------	-----------------------

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Recover refrigerant from system. See Recover R134a Refrigerant. (Group 1830.)
3. Disconnect air conditioner high/low pressure switch (B20). See Engine Harness (W2) Component Location. (Group 9015-10.)
4. Remove cap screws (1). Install identification tags and disconnect condenser-to-receiver-dryer line (2) and receiver-dryer-to-evaporator line (3). Close all openings using caps and plugs. See Heater and Air Conditioner Component Location. (Group 9031-15.)
5. Remove cap screws (4) and receiver-dryer (5).
6. Repair or replace parts as necessary.
7. Install receiver-dryer and cap screws (4).
8. Connect condenser-to-receiver-dryer line and receiver-dryer-to-evaporator line. Install cap screws (1) and tighten to specification. See Heater and Air Conditioner Component Location. (Group 9031-15.)

Specification

Receiver-Dryer Line Cap Screw—Torque.....	16 N·m 144 lb.-in.
---	-----------------------



Receiver-Dryer

- | | |
|--------------------------------------|---|
| 1— Cap Screw (2 used) | 4— Cap Screw (2 used) |
| 2— Condenser-to-Receiver-Dryer Line | 5— Receiver-Dryer |
| 3— Receiver-Dryer-to-Evaporator Line | B20— Air Conditioner High/Low Pressure Switch |

9. Connect air conditioner high/low pressure switch (B20). See Engine Harness (W2) Component Location. (Group 9015-10.)
10. Evacuate and charge system. See Evacuate R134a System and see Charge R134a System. (Group 1830.)

Receiver-Dryer Remove and Install (S.N. 270727—)

For information on removal and installation of receiver-dryer, see Condenser Remove and Install. (Group 1830.)

TX1183762A —UN—26MAR13

JA66566,0002A89 -19-27JUL17-1/1

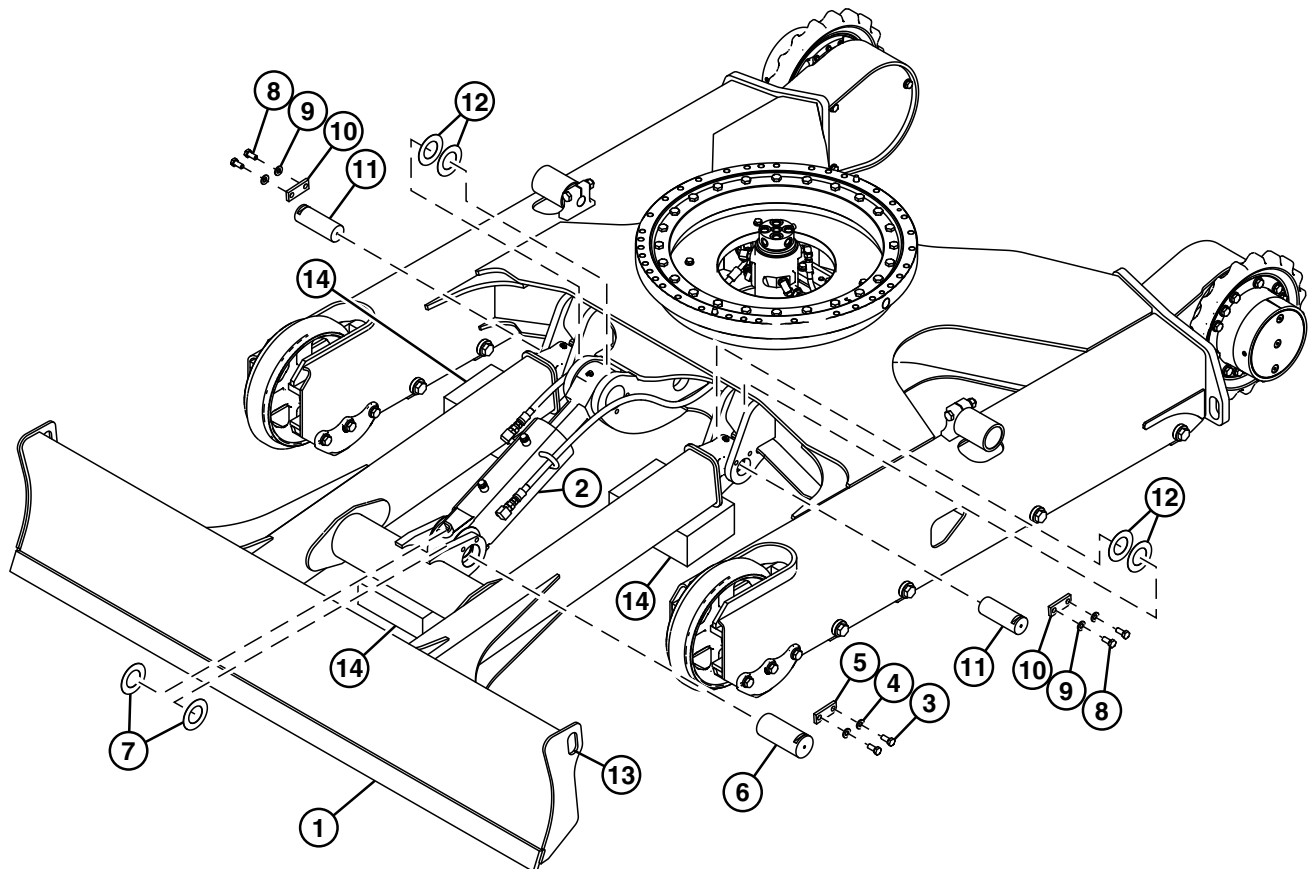
**Section 32
Blade (Backfill)**

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Contents

Blade Remove and Install



TX1134612

- 1— Blade
- 2— Hydraulic Cylinder
- 3— Cap Screw (2 used)
- 4— Washer (2 used)
- 5— Cylinder Locking Plate

- 6— Cylinder Pin
- 7— Cylinder Shim (2 used)
- 8— Cap Screw (4 used)
- 9— Washer (4 used)

Blade

- 10— Frame Locking Plate (2 used)
- 11— Frame Pin (2 used)
- 12— Frame Shim (4 used)
- 13— Lifting Point (2 used)
- 14— Support Block (3 used)

SPECIFICATIONS

Blade Weight (approximate)	138 kg 305 lb.
----------------------------	-------------------

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

Continued on next page

JS20420,0000ABE -19-02MAY13-1/2

TX1134612—UN—17APR13

Blades

2. Support blade (1) by attaching appropriate lifting device to lifting points (13).

Specification

Blade—Weight
(approximate)..... 138 kg
305 lb.

3. Place support blocks (14) under rear frame of blade and under blade frame near hydraulic cylinder (2).
4. Remove cap screws (3) and washers (4) from cylinder locking plate (5).
5. Remove cylinder locking plate and cylinder pin (6).

NOTE: Cylinder shims (7) may not be able to be removed until blade has been removed.

6. Remove cylinder shims (7).
7. Remove cap screws (8) and washers (9) from frame locking plates (10).
8. Remove frame locking plates and frame pins (11).

NOTE: Frame shims (12) may not be able to be removed until blade has been removed.

9. Remove frame shims (12).

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

10. Using appropriate lifting device, remove blade.

Specification

Blade—Weight
(approximate)..... 138 kg
305 lb.

11. Repair or replace parts as necessary.

- See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)
- See Blade Disassemble and Assemble. (Group 3201.)
- See Welding on Machine. (Group 1740.)

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

12. Using appropriate lifting device, install blade.

Specification

Blade—Weight
(approximate)..... 138 kg
305 lb.

13. Line up blade frame mounts. Install frame shims and frame pins.

14. Install frame locking plates, washers (9), and cap screws (8).

15. Line up head end of hydraulic cylinder with blade cylinder mount.

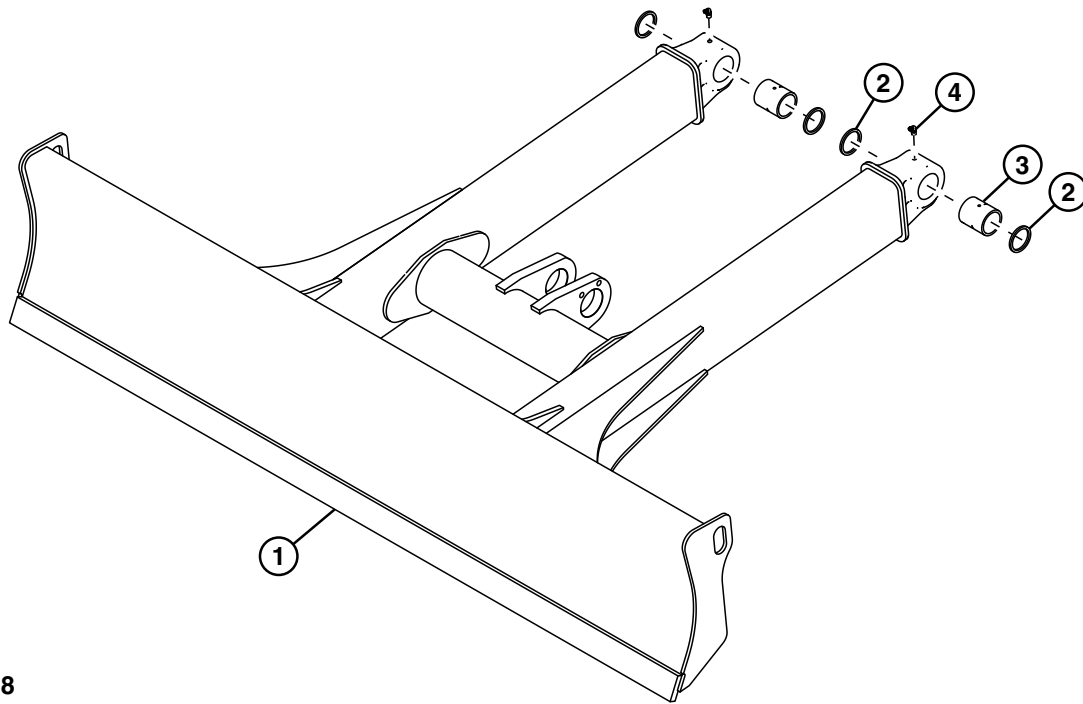
16. Install cylinder shims and cylinder pin.

17. Install cylinder locking plate, washers (4), and cap screws (3).

18. Lubricate blade components. See Lubricate Blade Pins. (Operator's Manual.)

JS20420,0000ABE -19-02MAY13-2/2

Blade Disassemble and Assemble



TX1134688

Blade

1— Blade
2— Dust Seal (4 used)

3— Bushing (2 used)

4— Grease Fitting (2 used)

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Using appropriate lifting device, remove blade (1). See Blade Remove and Install. (Group 3201.)
3. Remove dust seals (2), bushings (3), and grease fittings (4).
4. Repair and replace parts as necessary. See Inspect Pins and Bushings—Front Attachment and Blade.
5. Install dust seals, bushings, and grease fittings.
6. Using appropriate lifting device, install blade. See Blade Remove and Install. (Group 3201.)

JS20420,0000ABF -19-02MAY13-1/1

TX1134688 —UN—17APR13

Angle Blade Remove and Install—If Equipped

SPECIFICATIONS

Angle Blade Weight (approximate)	118 kg 260 lb.
----------------------------------	-------------------

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

2. Support angle blade (7) by attaching appropriate lifting device to lifting points (8).

Specification

Angle Blade—Weight (approximate).....	118 kg 260 lb.
---------------------------------------	-------------------

3. Place support blocks under front of angle blade frame (2).
4. Remove cap screw (6) and cylinder pin (5).
5. Remove cap screw (3) and angle blade pin (4).

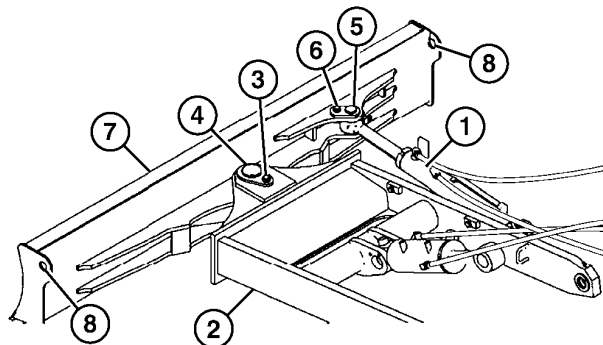
CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

6. Using appropriate lifting device, remove angle blade.

Specification

Angle Blade—Weight (approximate).....	118 kg 260 lb.
---------------------------------------	-------------------

7. Repair or replace parts as necessary. Inspect angle blade pin and cylinder pin. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.) See Welding on Machine. (Group 1740.)



Angle Blade

- | | |
|-------------------------|---------------------------|
| 1— Angle Blade Cylinder | 5— Cylinder Pin |
| 2— Angle Blade Frame | 6— Cap Screw |
| 3— Cap Screw | 7— Angle Blade |
| 4— Angle Blade Pin | 8— Lifting Point (2 used) |

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

8. Using appropriate lifting device, install angle blade.

Specification

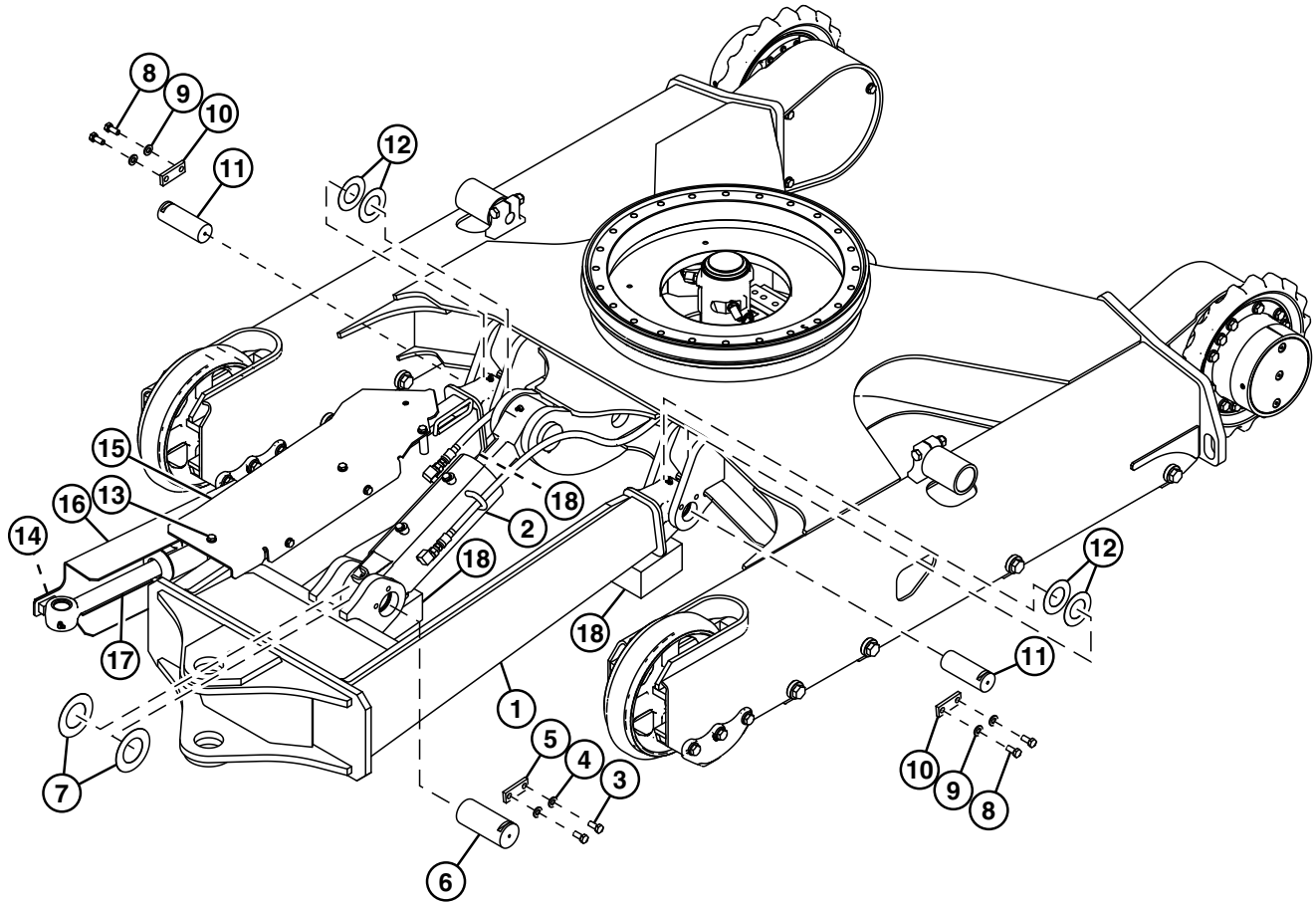
Angle Blade—Weight (approximate).....	118 kg 260 lb.
---------------------------------------	-------------------

9. Line up angle blade with angle blade frame mount. Install angle blade pin and cap screw (3).
10. Line up rod end of angle blade cylinder (1) with mounting point on blade. Install cylinder pin and cap screw (6).
11. Lubricate blade components. See Lubricate Blade Pins. (Operator's Manual.)

JS20420,0000AC0 -19-02MAY13-1/1

TX1134909 —UN—15APR13

Angle Blade Frame Remove and Install—If Equipped



TX1134689

Angle Blade Frame

- | | | | |
|---------------------------|----------------------------------|-------------------------|----------------------------|
| 1— Angle Blade Frame | 6— Cylinder Pin | 11— Frame Pin (2 used) | 16— Side Cylinder Guard |
| 2— Hydraulic Cylinder | 7— Cylinder Shim (2 used) | 12— Frame Shim (4 used) | 17— Angle Blade Cylinder |
| 3— Cap Screw (2 used) | 8— Cap Screw (4 used) | 13— Cap Screw (6 used) | 18— Support Block (3 used) |
| 4— Washer (2 used) | 9— Washer (4 used) | 14— Cap Screw (2 used) | |
| 5— Cylinder Locking Plate | 10— Frame Locking Plate (2 used) | 15— Top Cylinder Guard | |

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Angle Blade Frame Weight (approximate)	136 kg 300 lb.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

Continued on next page

JS20420,0000AC1 -19-22MAY13-1/3

TX1134689 —JUN—17APR13

⚠ CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank fill cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil
Tank—Capacity
(approximate)..... 32 L
8.5 gal.

4. Remove angle blade. See Angle Blade Remove and Install—If Equipped. (Group 3201.)
5. Place support blocks (18) under rear of angle blade frame (1) and below front of angle blade frame.
6. Remove cap screws (13) and top cylinder guard (15).
7. Remove cap screws (14) and side cylinder guard (16).

Continued on next page

JS20420,0000AC1 -19-22MAY13-2/3

8. Install identification tags and disconnect head end hydraulic hose (19) and rod end hydraulic hose (20) from angle blade cylinder (17). Close all openings using caps and plugs.
9. Remove cap screws (3) and washers (4) from cylinder locking plate (5).
10. Remove cylinder locking plate and cylinder pin (6).

NOTE: Cylinder shims (7) may not be able to be removed until blade has been removed.

11. Remove cylinder shims (7).
12. Remove cap screws (8) and washers (9) from frame locking plates (10).
13. Remove frame locking plates and frame pins (11).

NOTE: Frame shims (12) may not be able to be removed until blade has been removed.

14. Remove frame shims (12).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

15. Using appropriate lifting device, remove angle blade frame.
16. Repair or replace parts as necessary.
 - See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)
 - See Angle Blade and Frame Disassemble and Assemble—If Equipped. (Group 3201.)
 - See Welding on Machine. (Group 1740.)

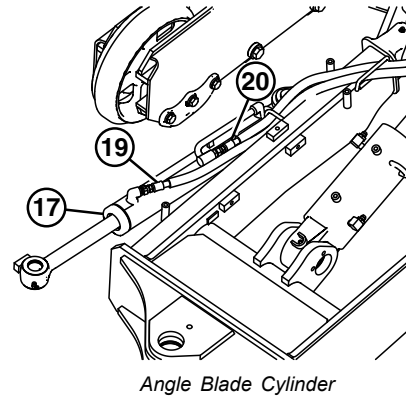
CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

17. Using appropriate lifting device, install angle blade frame.

Specification

Angle Blade	
Frame—Weight	
(approximate).....	136 kg
	300 lb.

18. Line up blade frame mounts. Install frame shims and frame pins.



Angle Blade Cylinder

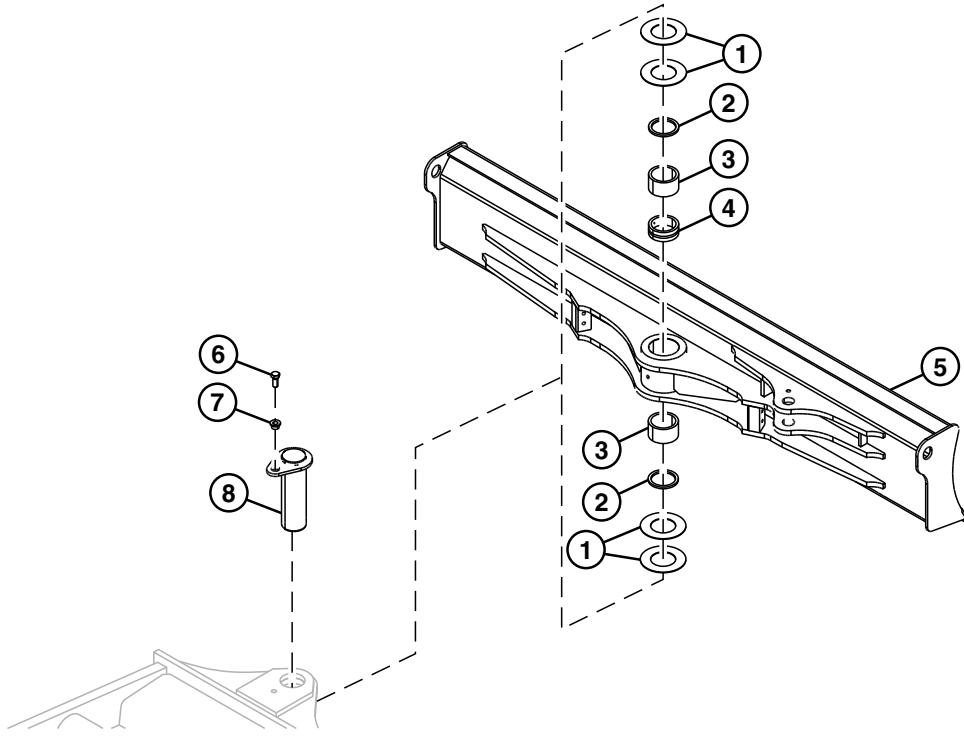
- 17— Angle Blade Cylinder
- 19— Head End Hydraulic Hose
- 20— Rod End Hydraulic Hose

19. Install frame locking plates, washers (9), and cap screws (8).
20. Line up head end of hydraulic cylinder with blade cylinder mount.
21. Install cylinder shims and cylinder pin.
22. Install cylinder locking plate, washers (4), and cap screw (3).
23. Connect hydraulic hoses (19 and 20) to angle blade cylinder.
24. Install angle blade. See Angle Blade Remove and Install—If Equipped. (Group 3201.)
25. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
26. Lubricate blade components. See Lubricate Blade Pins. (Operator's Manual.)
27. Operate hydraulic cylinder to stroke end 4—5 times to bleed air from hydraulic circuit. Check for leaks.
28. Install side cylinder guard and cap screws (14).
29. Install top cylinder guard and cap screws (13).

TX1134692—UN—17APR13

JS20420,0000AC1 -19-22MAY13-3/3

Angle Blade and Frame Disassemble and Assemble—If Equipped



TX1135252—UN—18APR13

TX1135252

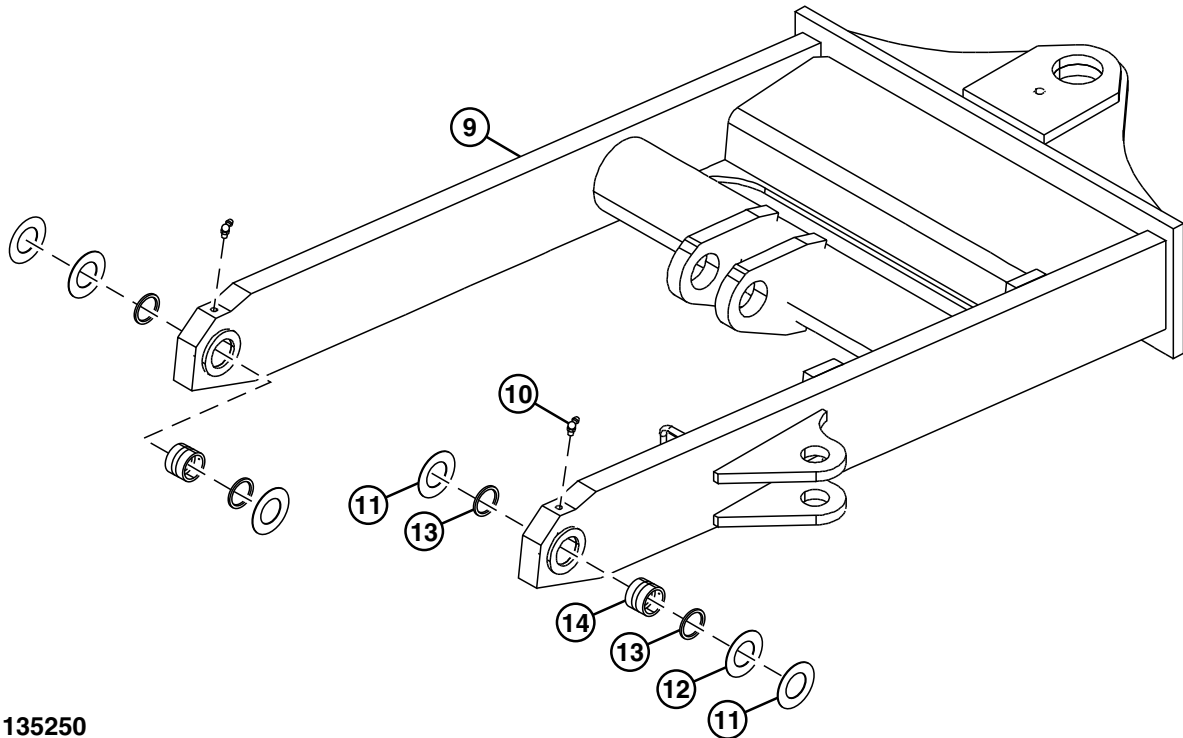
Angle Blade

- | | | |
|--------------------------|--------------------|-------------------|
| 1—Thrust Washer (4 used) | 3—Bushing (2 used) | 6—Cap Screw |
| 2—Dust Seal (2 used) | 4—Collar | 7—Spacer |
| | 5—Angle Blade | 8—Angle Blade Pin |

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove angle blade (5). See Angle Blade Remove and Install—If Equipped. (Group 3201.)
3. Remove thrust washers (1), dust seals (2), bushings (3), and collar (4).

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JS20420,0000AC2 -19-22MAY13-1/2



TX1135250

Angle Blade Frame

- | | | |
|-----------------------------|----------------------------|------------------------|
| 9— Angle Blade Frame | 11— Thrust Washer (4 used) | 13— Dust Seal (4 used) |
| 10— Grease Fitting (2 used) | 12— Shim (2 used) | 14— Bushing (2 used) |

4. Remove angle blade frame (9). See Angle Blade Frame Remove and Install—If Equipped. (Group 3201.)
5. Remove thrust washers (11), shims (12), dust seals (13), and bushings (14).
6. Remove grease fittings (10).
7. Repair or replace parts as necessary. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.) See Welding on Machine. (Group 1740.)
8. Install grease fittings.
9. Install bushings (14), dust seals (13), shims (12), and thrust washers (11).
10. Install angle blade frame. See Angle Blade Frame Remove and Install—If Equipped. (Group 3201.)
11. Install collar, bushings (3), dust seals (2), and thrust washers (1).
12. Install angle blade. See Angle Blade Remove and Install—If Equipped. (Group 3201.)

JS20420,0000AC2 -19-22MAY13-2/2

TX1135250—UN—19APR13

Blades

Blade Cylinder Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Blade Cylinder Weight (approximate)	24 kg 53 lb.

1. Park and prepare machine for service safely. [See Park and Prepare for Service Safely.](#) (Group 0001.)
2. Operate blade control lever 4—5 times to release any pressure in hydraulic circuit.

⚠ CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank fill cap. [See Hydraulic Oil Tank Pressure Release Procedure.](#) (Group 9025-25.)
4. Apply vacuum or drain hydraulic oil tank. [See Apply Vacuum to Hydraulic Oil Tank.](#) (Group 3360.) [See Drain and Refill Hydraulic Tank Oil.](#) (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

5. Remove cap screws (2) and cylinder guard (1).
6. Install identification tags and disconnect rod end hydraulic hose (8) and head end hydraulic hose (9). Close all openings using caps and plugs.

⚠ CAUTION: Prevent possible injury from crushing. Blade cylinder is a heavy component. Use appropriate lifting device.

7. Attach appropriate lifting device to support blade cylinder (10).

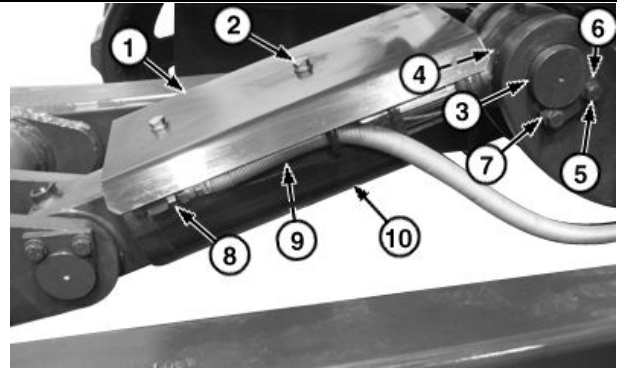
Specification

Blade Cylinder—Weight (approximate).....	24 kg 53 lb.
--	-----------------

8. Remove cap screws (5) and washers (6).
9. Remove cylinder locking plates (7) and cylinder pins (3).

NOTE: Cylinder shims (4) may not be able to be removed until blade cylinder has been removed.

10. Remove cylinder shims (4).



Blade Cylinder

- | | |
|--------------------------|-----------------------------------|
| 1—Cylinder Guard | 6—Washer (4 used) |
| 2—Cap Screw (2 used) | 7—Cylinder Locking Plate (2 used) |
| 3—Cylinder Pin (2 used) | 8—Rod End Hydraulic Hose |
| 4—Cylinder Shim (4 used) | 9—Head End Hydraulic Hose |
| 5—Cap Screw (4 used) | 10—Blade Cylinder |

11. Remove blade cylinder.
12. Repair or replace parts as necessary. [See Inspect Pins and Bushings—Front Attachment and Blade.](#) (Group 3340.) [See Blade Disassemble and Assemble.](#) (Group 3201.)

⚠ CAUTION: Prevent possible injury from crushing. Blade cylinder is a heavy component. Use appropriate lifting device.

13. Attach appropriate lifting device to blade cylinder. Line up blade cylinder mounts. Install cylinder shims and cylinder pins.

Specification

Blade Cylinder—Weight (approximate).....	24 kg 53 lb.
--	-----------------

14. Install cylinder locking plates, washers, and cap screws (5).
15. Connect hydraulic hoses (8 and 9) to blade cylinder.
16. Remove vacuum or fill hydraulic oil tank. [See Apply Vacuum to Hydraulic Oil Tank.](#) (Group 3360.) [See Drain and Refill Hydraulic Tank Oil.](#) (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

17. Lubricate blade components. [See Lubricate Blade Pins.](#) (Operator's Manual.)
18. Operate blade cylinder to stroke end 4—5 times to bleed air from hydraulic circuit. Check for leaks.

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JS20420,0000AC8 -19-02MAY13-1/2

Hydraulic System

19. Install cylinder guard and cap screws (2).

JS20420,0000AC8 -19-02MAY13-2/2

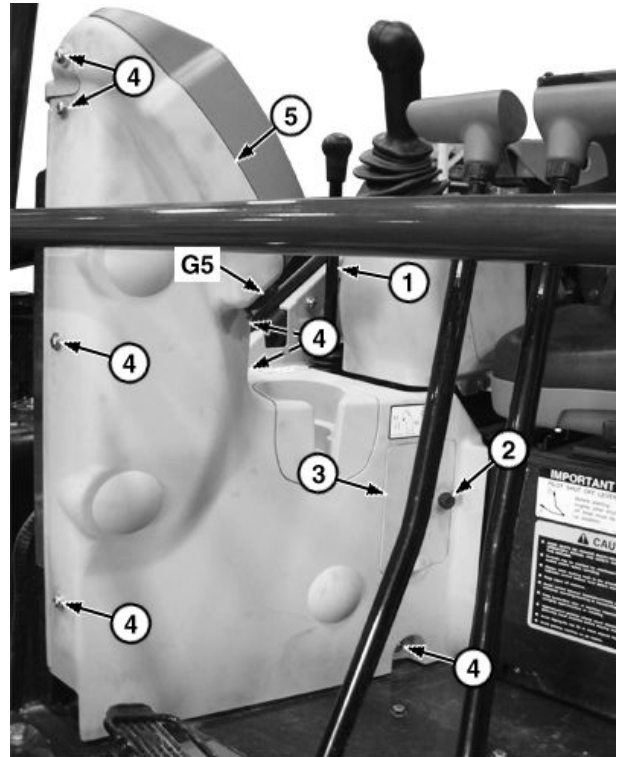
Blade Pilot Valve Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.

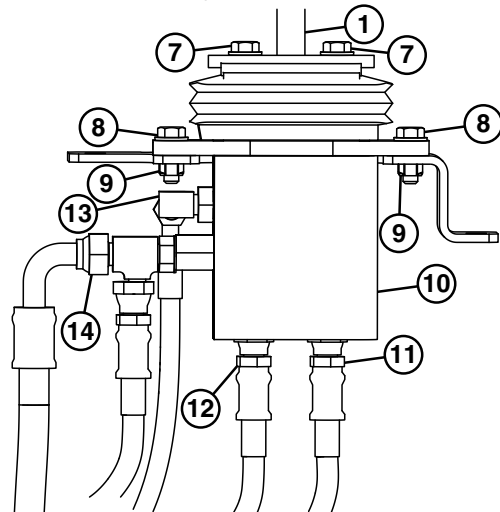
1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)
2. Operate blade pilot lever (1) 4—5 times to release any pressure in hydraulic circuit.

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank fill cap. See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
4. Apply vacuum or drain hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)



Operator's Station



Blade Pilot Valve

- | | |
|-----------------------|-------------------------|
| 1— Pilot Lever | 9— Nut (2 used) |
| 2— Cap Screw | 10— Blade Pilot Valve |
| 3— Fuse Cover | 11— Blade Down Hose |
| 4— Cap Screw (7 used) | 12— Blade Up Hose |
| 5— Cover | 13— Return Hose |
| 7— Cap Screw (2 used) | 14— Supply Hose |
| 8— Cap Screw (2 used) | G5—12-Volt Power Outlet |

5. Remove cap screw (2) and fuse cover (3).
 6. Remove cap screws (4).
- IMPORTANT:** Prevent possible damage to wire leads. Damage to wire leads will result in electrical component malfunction. Disconnect wiring leads and remove cover at the same time.
7. While disconnecting wire leads to 12-volt power outlet (G5), remove cover (5).
 8. Remove cap screws (7) and pilot lever.
 9. Install identification tags and disconnect blade down hose (11), blade up hose (12), return hose (13), and supply hose (14). Close all openings using caps and plugs. See [Blade Hydraulic System Line Connection](#). (Group 9025-15.)
 10. Remove cap screws (8), nuts (9), and blade pilot valve (10).
 11. Repair and replace parts as necessary. See [Blade Pilot Valve Disassemble and Assemble](#). (Group 3260.)
 12. Install blade pilot valve, cap screws (8), and nuts.
 13. Connect blade down hose, blade up hose, return hose, and supply hose.

14. Install pilot lever and cap screws (7).

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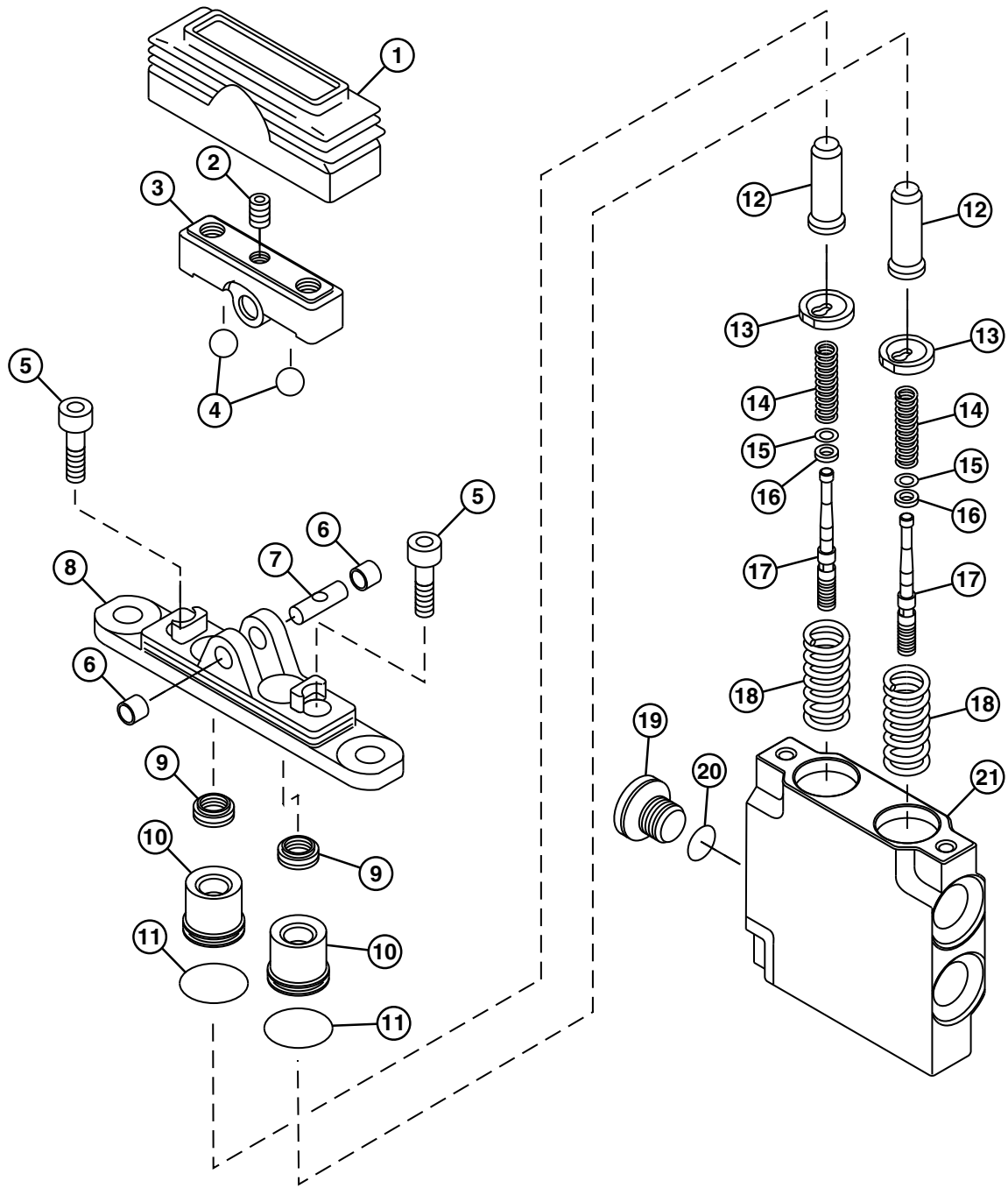
JS20420.0000AC3 -19-22MAY13-1/2

Hydraulic System

15. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
16. Operate blade cylinder to stroke end 4—5 times to bleed air from hydraulic circuit. Check for leaks.
17. Connect wiring leads to 12-volt power outlet.
18. Install cover (5) and cap screws (4).
19. Install fuse cover (3) and cap screw (2).

JS20420,0000AC3 -19-22MAY13-2/2

Blade Pilot Valve Disassemble and Assemble



TX1045655

Blade Pilot Valve

- | | | | |
|------------------------|-----------------------|---------------------------|---------------------------|
| 1— Boot | 7— Shaft | 13— Spring Seat (2 used) | 18— Outer Spring (2 used) |
| 2— Set Screw | 8— Bracket | 14— Inner Spring (2 used) | 19— Plug |
| 3— Cam | 9— Packing (2 used) | 15— Shim (2 used) | 20— O-Ring |
| 4— Steel Ball (2 used) | 10— Plug (2 used) | 16— Washer (2 used) | 21— Housing |
| 5— Cap Screw (2 used) | 11— O-Ring (2 used) | 17— Spool (2 used) | |
| 6— Bushing (2 used) | 12— Push Rod (2 used) | | |

Continued on next page

JS20420,0000A58 -19-09MAY13-1/2

TX1045655 —UN—07NOV17

Hydraulic System

SPECIFICATIONS

Cover-to-Housing Cap Screw—Torque	23.5 N·m 208 lb.-in.
Cam-to-Shaft Set Screw—Torque	5 N·m 44 lb.-in.

OTHER MATERIAL

242 Loctite® Thread Lock and Sealer (medium strength)

IMPORTANT: If damage to cam (3), bracket (8), push rods (12), spools (17), or housing (21) is noticed, the pilot valve must be replaced.

NOTE: The housing (21) and spools (17) are replaced as an assembly because the spools are select-fitted to bores in housing.

Note port location and quantity of shims (15) when removing. Same number of shims must be used when installing.

NOTE: Remember to keep parts removed from each port together. Identify each group of parts by port numbers stamped on casing.

1. Remove set screw (2).
2. Remove shaft (7) to remove cam (3) from bracket (8). Do not remove steel balls (4).
3. Loosen cap screws (5) to relieve the slight spring force. Remove bracket (8) from housing (21).
4. Remove packing (9), plugs (10), O-rings (11), and push rods (12).

NOTE: Note port location of spools (17) when removing. Spool must be installed in same port.

5. Remove spools, spring guides (13), balance springs (14), shims (15), and spacers (16) from casing by rotating.
6. Record number of shims removed.
7. Compress balance spring and remove spring guide, balance spring, shims, and spacer from spool.

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8. Remove springs (18).
 9. Repair or replace parts as necessary.
 10. Install springs (18).
 11. Using the same number of shims (15) as removed, install spacers (16), shims, and balance springs (14) on to spool.
 12. Compress balance springs and install spring guides (13) with stepped end facing down.
- NOTE: Note port location of spools when installing. Spool must be installed in same port.*
13. Install spools, spring guides, balance springs, shims, and spacers into casing by rotating.
 14. Install O-rings (11) on plugs.
 15. Apply grease to packing (9). Install packing in plugs (10) with lip toward O-ring end of plug.
 16. Apply hydraulic oil to push rods (12) before pushing rod through the packing in plugs. Install plug and push rod into housing.
 17. Install bracket and cap screws tighten to specification.

Specification

Cover-to-Housing Cap Screw—Torque.....	23.5 N·m 208 lb.-in.
--	-------------------------

18. Install cam. Install the shafts through cover and cam so hole in shaft aligns with tapped hole in cam.
19. Apply PM37418 Thread Lock and Sealer (medium strength) to threads of set screw. Install set screw and tighten to specification.

Specification

Cam-to-Shaft Set Screw—Torque.....	5 N·m 44 lb.-in.
------------------------------------	---------------------

JS20420,0000A58 -19-09MAY13-2/2

Angle Blade Cylinder Remove and Install—If Equipped

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)
2. Operate blade control lever 4—5 times to release any pressure in hydraulic circuit.

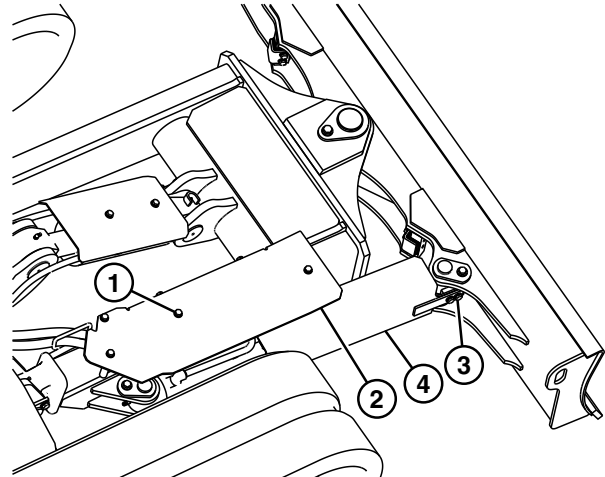
CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank fill cap. See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
4. Apply vacuum or drain hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

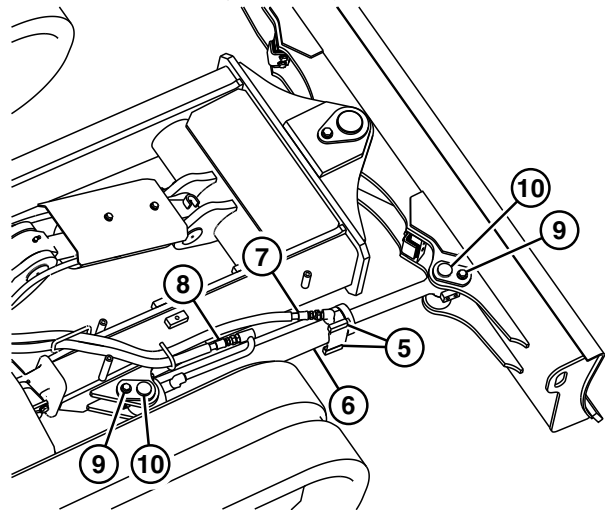
Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

5. Remove cap screws (1) and top cylinder guard (2).
6. Remove cap screws (3) and side cylinder guard (4).
7. Remove rubber pads (5) from angle blade cylinder (6).
8. Install identification tags and disconnect head end hydraulic hose (7) and rod end hydraulic hose (8). Close all openings using caps and plugs.
9. Remove cap screws (9) and cylinder pins (10).
10. Remove angle blade cylinder.
11. Repair or replace parts as necessary. See [Inspect Pins and Bushings—Front Attachment and Blade](#). (Group 3340.) See [Angle Blade Cylinder Disassemble and Assemble—If Equipped](#). (Group 3360.)
12. Line up angle blade cylinder mounts and install cylinder pins.
13. Install cap screws (9).
14. Install rubber pads.
15. Connect hydraulic hoses (7 and 8) to angle blade cylinder.
16. Remove vacuum or fill hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See



Angle Blade Cylinder Guards



Angle Blade Cylinder

- | | |
|-----------------------|---------------------------|
| 1—Cap Screw (6 used) | 6—Angle Blade Cylinder |
| 2—Top Cylinder Guard | 7—Head End Hydraulic Hose |
| 3—Cap Screw (2 used) | 8—Rod End Hydraulic Hose |
| 4—Side Cylinder Guard | 9—Cap Screw (2 used) |
| 5—Rubber Pad (2 used) | 10—Cylinder Pin (2 used) |

[Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

17. Lubricate blade components. See [Lubricate Blade Pins](#). (Operator's Manual.)
18. Operate cylinder to stroke end 4—5 times to bleed air from hydraulic circuit. Check for leaks.
19. Install side cylinder guard and cap screws (3).

Continued on next page

JS20420,0000ACB -19-21MAY13-1/2

TX1134780—UN—11APR13

TX1134781—UN—17APR13

20. Install top cylinder guard and cap screws (1).

JS20420.0000ACB -19-21MAY13-2/2

Angle Blade Solenoid Valve Remove and Install—If Equipped

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	80 L 21.1 gal.
---	-------------------

1. Park and prepare machine for service safely. [See Park and Prepare for Service Safely.](#) (Group 0001.)

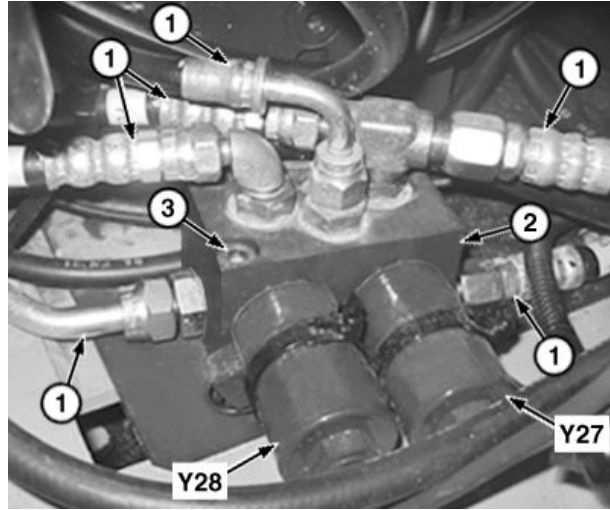
CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Slowly loosen hydraulic oil tank cap to release pressure.

2. Release hydraulic oil tank pressure by slowly loosening hydraulic oil tank cap. [See Hydraulic Oil Tank Pressure Release Procedure.](#) (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. [See Apply Vacuum to Hydraulic Oil Tank.](#) (Group 3360.) [See Drain and Refill Hydraulic Tank Oil.](#) (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 80 L
21.1 gal.

4. Tilt operator's station. [See Tilting Operator's Station.](#) (Operator's Manual.)
5. Install identification tags and disconnect angle blade left solenoid (Y27) and angle blade right solenoid (Y28) electrical connectors. [See Angle Blade Floor Harness \(W14\) Component Location.](#) (Group 9015-10.)
6. Install identification tags and disconnect hydraulic hoses (1). Close all openings using caps and plugs. [See Angle Blade Hydraulic System Line Connection—If Equipped.](#) (Group 9025-15.)
7. Remove cap screws (3) and manifold body (2).
8. Repair or replace parts as necessary. [See Angle Blade Solenoid Valve Disassemble and Assemble—If Equipped.](#) (Group 3260.)



Angle Blade Solenoid Valve Manifold

- | | |
|----------------------------|---------------------------------|
| 1— Hydraulic Hose (6 used) | Y27— Angle Blade Left Solenoid |
| 2— Manifold Body | Y28— Angle Blade Right Solenoid |
| 3— Cap Screw (2 used) | |

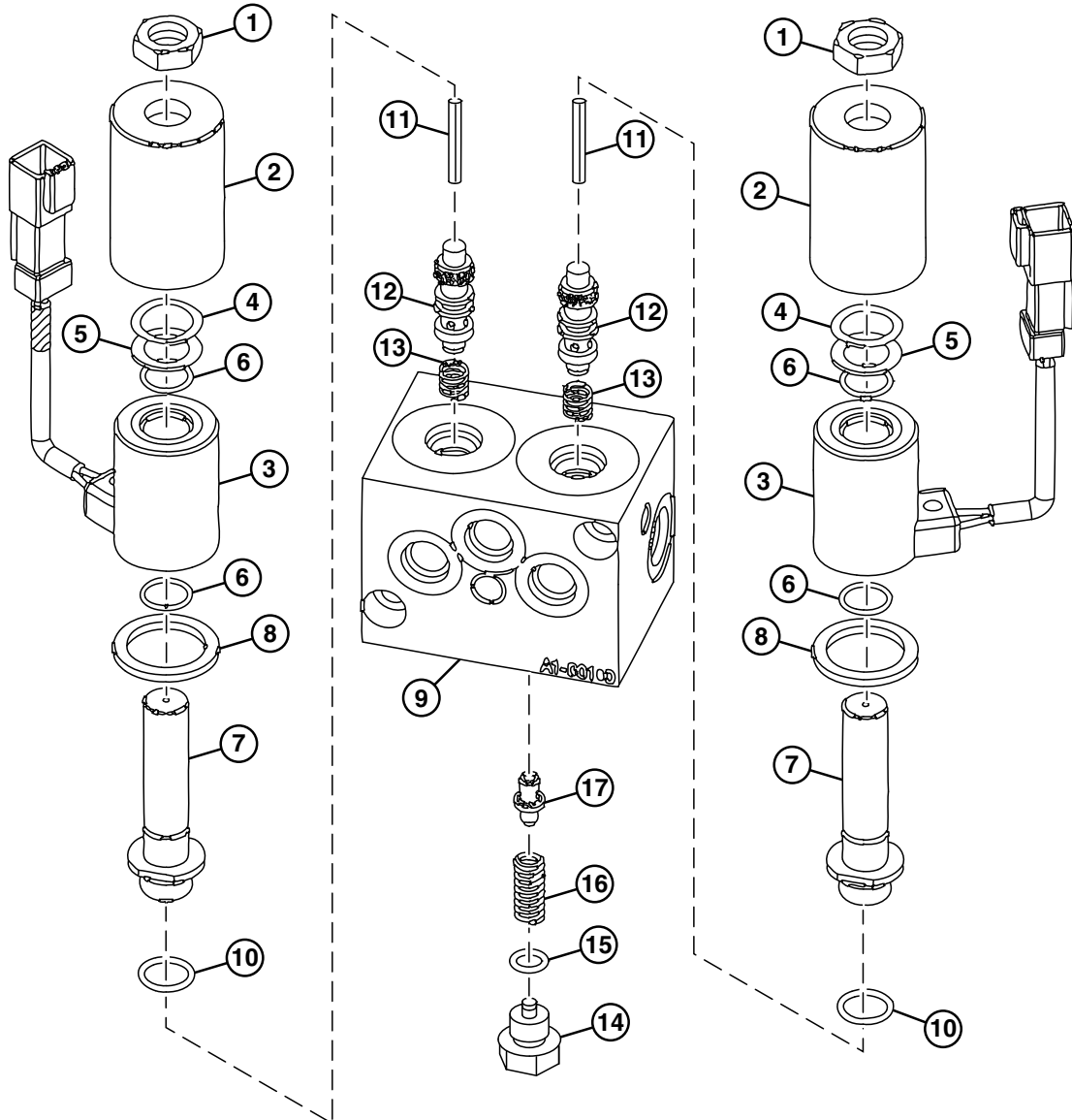
9. Install manifold body and cap screws.
10. Connect hydraulic hoses.
11. Connect angle blade left solenoid (Y27) and angle blade right solenoid (Y28) electrical connectors.
12. Tilt operator's station to original position. [See Tilting Operator's Station.](#) (Operator's Manual.)
13. Remove vacuum or fill hydraulic oil tank. [See Apply Vacuum to Hydraulic Oil Tank.](#) (Group 3360.) [See Drain and Refill Hydraulic Tank Oil.](#) (Operator's Manual.)
14. Check hydraulic oil level. [See Check Hydraulic Tank Oil Level.](#) (Operator's Manual.)

TX1135107A —UN—18APR13

CW08338.0000ED3 -19-21MAY13-1/1

Angle Blade Solenoid Valve Disassemble and Assemble—If Equipped

Angle Blade Solenoid Valve Manifold Disassemble and Assemble



TX1133644

Pilot Pressure Regulator and Angle Blade Solenoid Valve Manifold

- | | | | |
|---------------------------|----------------------------|---------------------------|--------------------|
| 1— Nut (2 used) | 6— O-Ring (4 used) | 10— O-Ring (2 used) | 14— Adjustable Cap |
| 2— Case (2 used) | 7— Threaded Shaft (2 used) | 11— Shaft (2 used) | 15— O-Ring |
| 3— Solenoid Body (2 used) | 8— Large Plate (2 used) | 12— Spool (2 used) | 16— Spring |
| 4— Washer (2 used) | 9— Valve Body | 13— Spool Spring (2 used) | 17— Seat |
| 5— Plate (2 used) | | | |

1. Remove angle blade solenoid valve. See Angle Blade Solenoid Valve Remove and Install—If Equipped. (Group 3260.)
2. Secure valve body (9) with solenoids positioned upright.

Continued on next page

CW08338,0000ED0 -19-22MAY13-1/4

TX1133644 —UN—05APR13

Hydraulic System

NOTE: Disassembly of both solenoids are identical. Steps for single solenoid disassembly shown.

3. Remove nut (1) and slide case (2) off solenoid.
4. Remove solenoid body (3), washer (4), plate (5), and O-rings (6) from threaded shaft (7).
5. Remove large plate (8).
6. Remove threaded shaft (7) and O-rings (10).
7. Remove shaft (11) and spool (12).

NOTE: Using a magnet may aid in removal of spool spring (13).

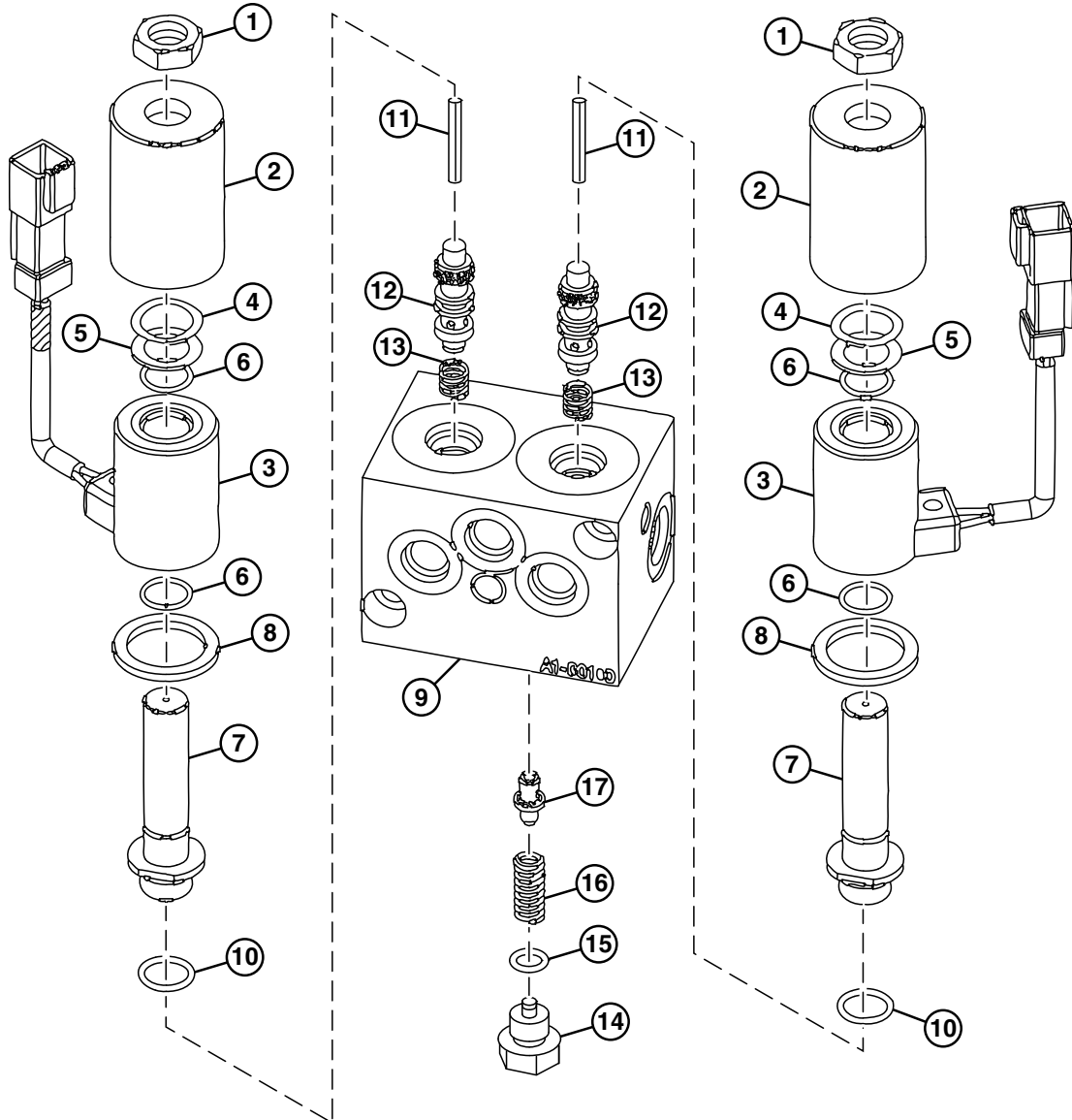
8. Remove spool spring (13) from valve body using a magnet.

9. Inspect and repair or replace parts as needed.
10. Clean and dry machined surfaces and components retained for assembly. Lubricate components with clean hydraulic oil.
11. Install spool spring, spool, shaft, O-rings (10), and threaded shaft into valve body.
12. Install large plate, O-rings (6), plate, washer, and solenoid body on to threaded shaft.
13. Install case and nut on to threaded shaft. Tighten nut.
14. Install angle blade solenoid valve. See Angle Blade Solenoid Valve Remove and Install—If Equipped. (Group 3260.)

Continued on next page

CW08338,0000ED0 -19-22MAY13-2/4

Pilot Pressure Regulator Disassemble and Assemble



TX1133644

Pilot Pressure Regulator and Angle Blade Solenoid Valve Manifold

- | | | | |
|---------------------------|----------------------------|---------------------------|--------------------|
| 1— Nut (2 used) | 6— O-Ring (4 used) | 10— O-Ring (2 used) | 14— Adjustable Cap |
| 2— Case (2 used) | 7— Threaded Shaft (2 used) | 11— Shaft (2 used) | 15— O-Ring |
| 3— Solenoid Body (2 used) | 8— Large Plate (2 used) | 12— Spool (2 used) | 16— Spring |
| 4— Washer (2 used) | 9— Valve Body | 13— Spool Spring (2 used) | 17— Seat |
| 5— Plate (2 used) | | | |

SPECIFICATIONS	
Adjustable Cap Torque	77 N·m 177 lb.-in.

1. Remove angle blade solenoid valve. See Angle Blade Solenoid Valve Remove and Install—If Equipped. (Group 3260.)
2. Secure valve body (9) with solenoids positioned downward.

Continued on next page

CW08338,0000ED0 -19-22MAY13-3/4

TX1133644 —UN—05APR13

Hydraulic System

- 3. Remove adjustable cap (14), regulator O-ring (15), spring (16), and seat (17) from valve body.
- 4. Inspect and repair or replace parts as needed.
- 5. Clean and dry machined surfaces and components retained for assembly. Lubricate components with clean hydraulic oil.
- 6. Install seat, spring, O-ring (15), and adjustable cap into valve body. Tighten cap to specification.

Specification

Adjustable
Cap—Torque.....22 N·m
177 lb.-in.

- 7. Install angle blade solenoid valve. See Angle Blade Solenoid Valve Remove and Install—If Equipped. (Group 3260.)

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Section 33 Excavator

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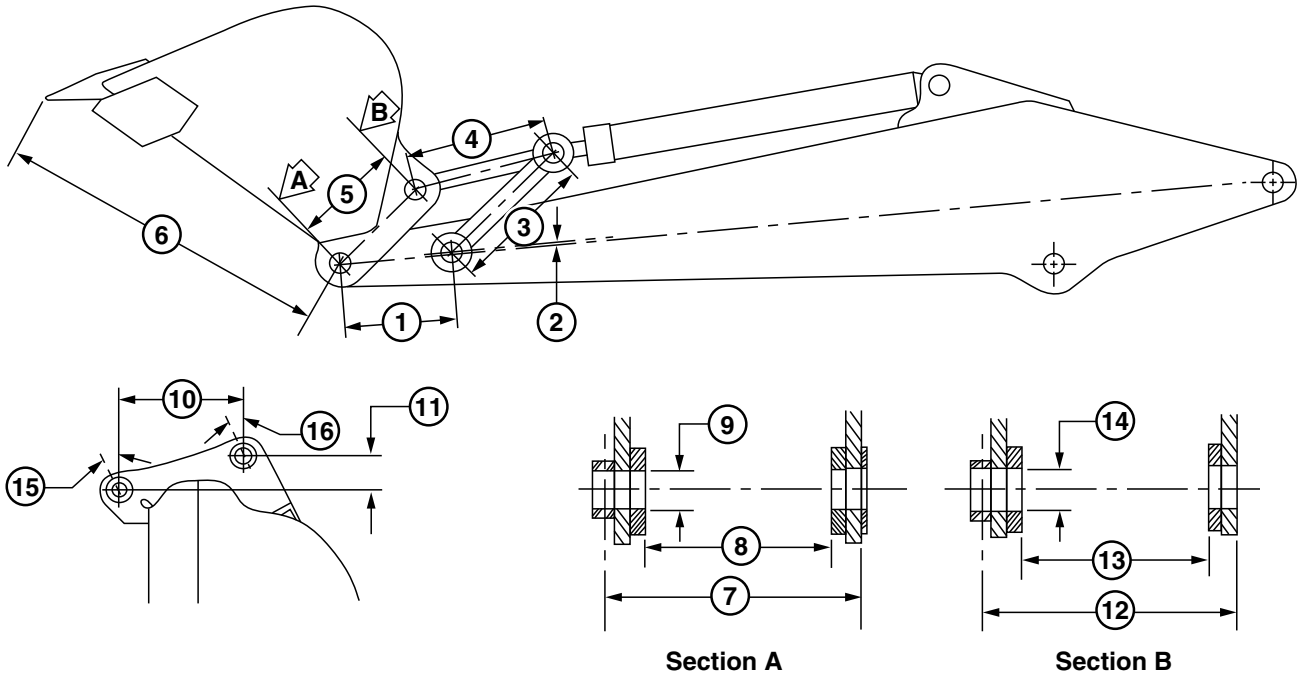
Contents

Bucket Remove and Install

For additional information, see Removing the Bucket or see Installing Bucket With Quick Coupler. (Operator's Manual.)

BE78919,000075F -19-19JUL17-1/1

Bucket Pin-Up Data



TX1136469

Excavator Bucket Pin-Up Data

NOTE: If the front attachment of a previous model machine is used, use the grease intervals for previous model machine.

TX1136469—UN—14MAY13

35G Excavator Bucket Pin-Up Data	
Item	
1	152 mm 5.9 in.
2	13 mm 0.5 in.
3	251 mm 9.8 in.
4	230 mm 9.1 in.
5	185 mm 7.3 in.
6	720 mm 28.3 in.
7	235 mm 9.2 in.
8	141 mm 5.5 in.
9	40 mm 1.6 in.
10	185 mm 7.3 in.
11	0 mm 0 in.

Continued on next page

DV53278,000051B -19-20MAY13-1/2

Buckets

35G Excavator Bucket Pin-Up Data

12	235 mm 9.2 in.
13	141 mm 5.5 in.
14	40 mm 1.6 in.
15	90°
16	90°

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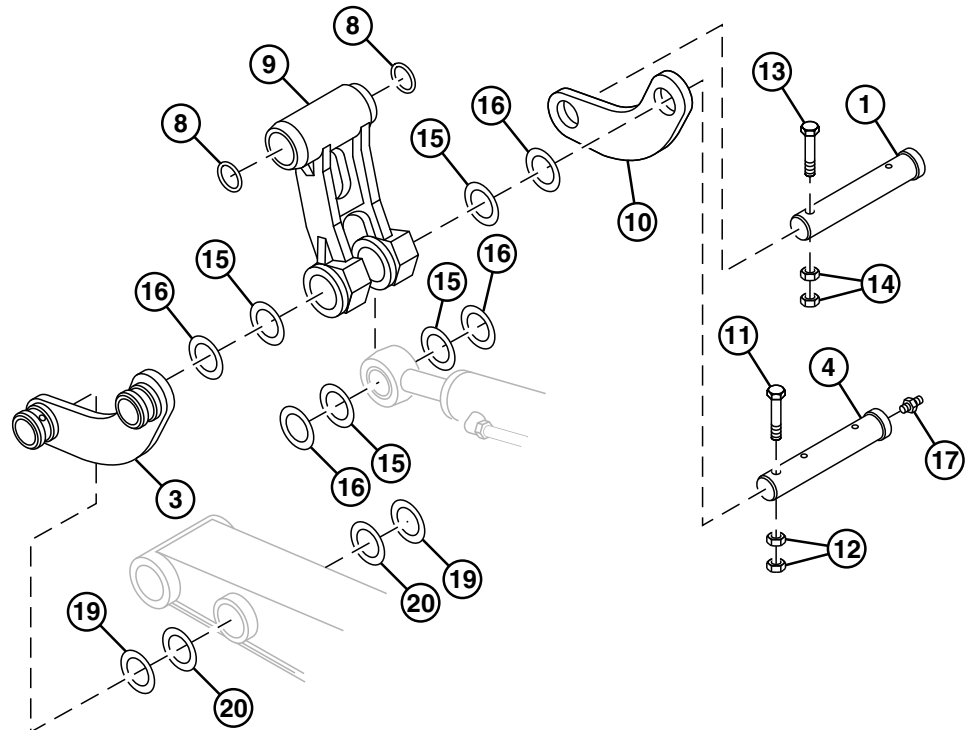
Buckets

Bucket Links Remove and Install

SPECIFICATIONS	
Bucket Link Clearance	0.05 mm 0.020 in.

OTHER MATERIAL
271 Loctite® Thread Lock and Sealer (high strength)

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove bucket. See Installing Bucket With Quick Coupler. (Operator's Manual.)
3. Remove quick coupler. See Bucket Quick Coupler Remove and Install. (Group 3340.)



TX1133726

Bushings and Dust Seals

- | | | | |
|--------------------------|----------------------------|-------------------------|-------------------|
| 1— Bucket Link Pin | 9— Center Link | 13— Cap Screw | 19— Shim (2 used) |
| 3— Left Side Bucket Link | 10— Right Side Bucket Link | 14— Nut (2 used) | 20— Shim (2 used) |
| 4— Cylinder Pin | 11— Cap Screw | 15— Shim (4 used) | |
| 8— O-Ring (2 used) | 12— Nut (2 used) | 16— Shim (4 used) | |
| | | 17— Lubrication Fitting | |

4. Record location of shims (19 and 20) for assembly procedure.
5. Remove nuts (14), cap screw (13), bucket link pin (1), and shims (19 and 20).
6. Install a wooded block between bucket cylinder and arm to hold up cylinder when cylinder pin (4) is removed.
7. Record location of shims (15 and 16) for assembly procedure.
8. Remove nuts (12), cap screw (11), and left side bucket link (3).
9. Remove cylinder pin, center link (9), right side bucket link (10), and shims (15 and 16).
10. Repair or replace parts as necessary.
11. Clean pins and bushings.

12. Apply multipurpose grease to pins.
13. Install shims (15 and 16) equally on each side to attain proper clearance.

Specification

Bucket Link—Clearance.....	0.05 mm
	0.020 in.

14. Install right side bucket link, center link, shims (15 and 16), and cylinder pin.
15. Install shims (19 and 20) equally on each side to attain proper clearance.

Specification

Bucket Link—Clearance.....	0.05 mm
	0.020 in.

16. Install bucket link pin and shims (19 and 20) in to right side bucket link and arm frame.

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BG71631.000060B -19-22MAY13-1/2

TX1133726—UN—08MAY13

Frames

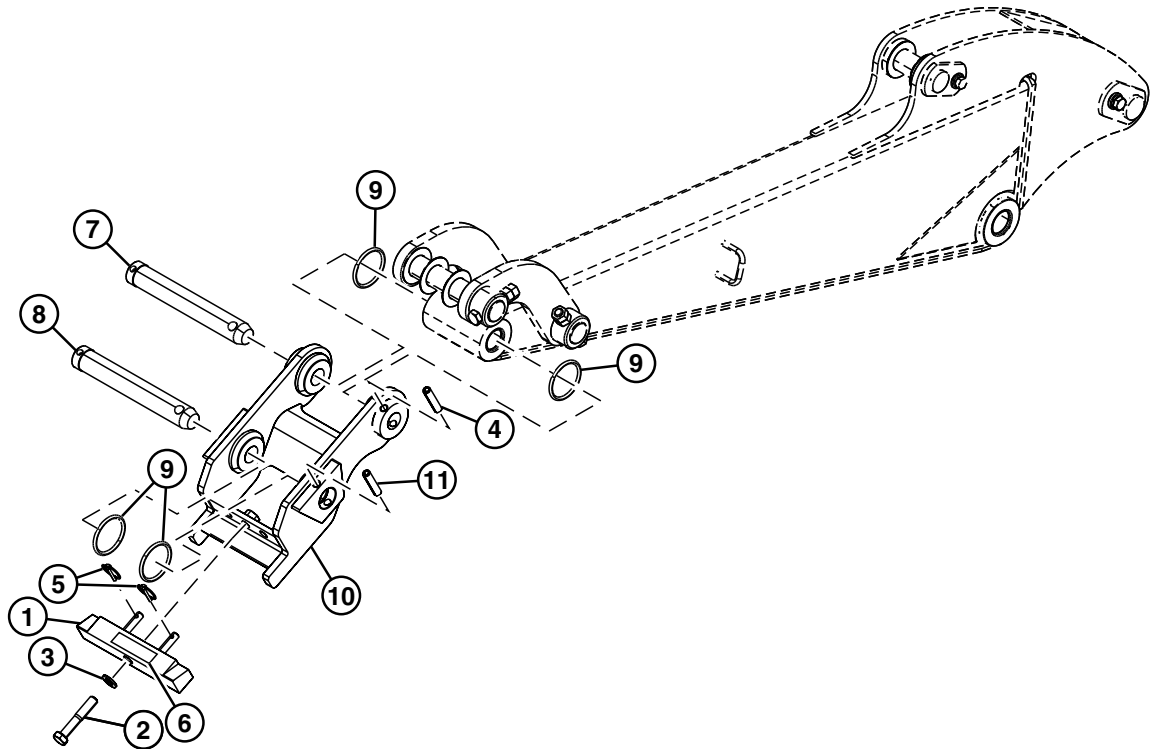
17. Install left side bucket link.
18. Apply PM37421 Thread Lock and Sealer (high strength) to cap screw (13).
19. Install cap screw (13) and nuts (14). Tighten nuts against each other.
20. Apply PM37421 Thread Lock and Sealer (high strength) to cap screw (11).
21. Install cap screw (11) and nuts (12). Tighten nuts against each other.
22. Install quick coupler. See Bucket Quick Coupler Remove and Install. (Group 3340.)
23. Install bucket. Installing Bucket With Quick Coupler. (Operator's Manual.)
24. Apply grease to all joints. See Lubricate Front End Pin Joints. (Operator's Manual.)

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BG71631,000060B -19-22MAY13-2/2

Bucket Quick Coupler Remove and Install

SPECIFICATIONS	
Quick Coupler Weight (approximate)	27 kg 60 lb.



TX1078664

- | | | |
|---------------|--------------------|--------------------|
| 1— Bar | 5— Pin (2 used) | 9— O-Ring (4 used) |
| 2— Cap Screw | 6— Label | 10— Quick Coupler |
| 3— Washer | 7— Arm Pin | 11— Spring Pin |
| 4— Spring Pin | 8— Center Link Pin | |

Quick Coupler

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove bucket. Installing Bucket With Quick Coupler. (Operator's Manual.)
3. Lower boom to ground.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

4. Support quick coupler (10) using appropriate lifting device.

Specification

Quick Coupler—Weight
(approximate)..... 27 kg
60 lb.

5. Remove spring pin (11), center link pin (8), and O-rings (9).
6. Remove spring pin (4), arm pin (7), and O-rings (9).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

7. Using appropriate lifting device, remove quick coupler.

Specification

Quick Coupler—Weight
(approximate)..... 27 kg
60 lb.

8. Inspect pins and bushings. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)
9. Replace or repair as necessary.
10. Clean pins and bushings.
11. Apply multipurpose grease to pins.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

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TX1078664 —JUN—15JUL 10

12. Using appropriate lifting device, install quick coupler.

Specification

Quick Coupler—Weight
(approximate)..... 27 kg
60 lb.

13. Install O-rings, arm pin, and spring pin (4).

14. Install O-rings, center link pin, and spring pin (11).

15. Install bucket. Installing Bucket With Quick Coupler. (Operator's Manual.)

16. Apply grease to all joints. See Lubricate Front End Pin Joints. (Operator's Manual.)

BG71631,000060C -19-22MAY13-2/2

Arm Remove and Install

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Arm Weight (approximate)	150 kg 331 lb.
Arm and Cylinder Clearance	0.5 mm or less 0.020 in. or less
Arm Cylinder Pin Cap Screw Torque	137 N·m 101 lb.-ft.
Arm-to-Boom Pin Cap Screw Torque	137 N·m 101 lb.-ft.

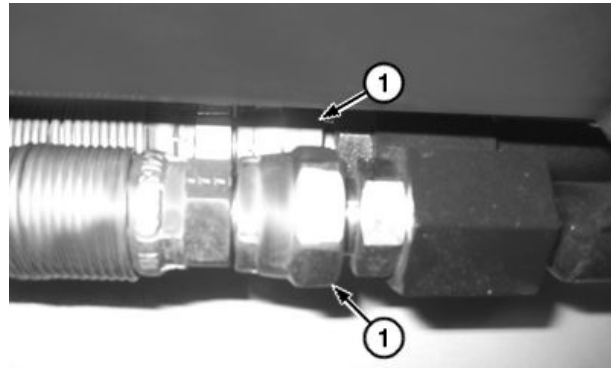
OTHER MATERIALS

271 Loctite® Thread Lock and Sealer (high strength)

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Remove bucket. Installing Bucket With Quick Coupler. (Operator's Manual.)
3. Retract arm cylinder and lower front attachment to ground.
4. Stop engine.

CAUTION: High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic oil tank is pressurized. Cap must be loosened to relieve air pressure in hydraulic oil tank.

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Hydraulic Hoses

1— Hydraulic Hose (2 used)

5. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)

Specification

Hydraulic Oil
Tank—Capacity..... 32 L
8.5 gal.

6. Apply vacuum pump or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
7. Install Identification tags and disconnect hydraulic hoses (1). Close all openings using caps and plugs.

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Continued on next page

BG71631,000060D -19-22MAY13-1/3

8. Install a wooden block between arm cylinder and boom to hold cylinder up when arm cylinder pin (8) is removed.
9. Remove cap screw (5), lock washer (6), and bushing (7).
10. Record location of arm cylinder shims (3) for assembly procedure.
11. Remove arm cylinder pin (8) and arm cylinder shims (3).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

12. Support arm using appropriate lifting device.

Specification

Arm—Weight (approximate).....	150 kg 331 lb.
----------------------------------	-------------------

13. Record location of arm-to-boom shims (4) for assembly procedure.
14. Remove cap screw (9), lock washer (10), and bushing (11).
15. Remove arm-to-boom pin (12), and arm-to-boom shims (4).

16. Remove arm.
17. Repair or replace parts as necessary.
18. Inspect pins and bushings for wear. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)

19. Clean pins and bushings.
20. Apply multipurpose grease to pins.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

21. Install arm using appropriate lifting device.

Specification

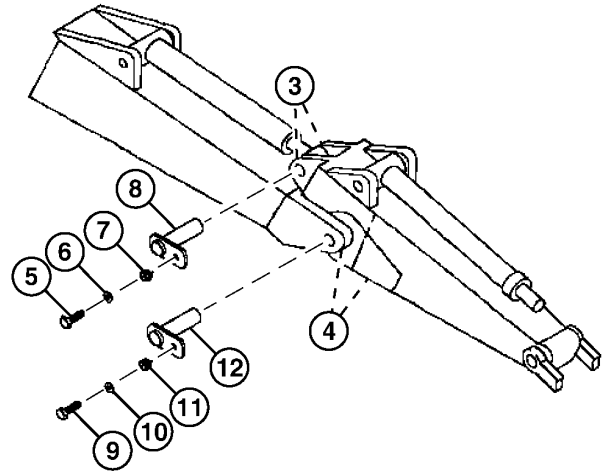
Arm—Weight (approximate).....	150 kg 331 lb.
----------------------------------	-------------------

22. Install arm-to-boom shims (4) equally to each side to attain proper clearance.

Specification

Arm and Cylinder—Clearance.....	0.5 mm or less 0.020 in. or less
------------------------------------	-------------------------------------

23. Install arm-to-boom pin (12) and bushing (11).
24. Apply PM37421 Thread Lock and Sealer (high strength) to cap screw (9). Install lock washer (10) and cap screw (9). Tighten to specification.



Arm

- | | |
|-------------------------------|---------------------|
| 3— Arm Cylinder Shim (2 used) | 8— Arm Cylinder Pin |
| 4— Arm-to-Boom Shim (2 used) | 9— Cap Screw |
| 5— Cap Screw | 10— Lock Washer |
| 6— Lock Washer | 11— Bushing |
| 7— Bushing | 12— Arm-to-Boom Pin |

Specification

Arm Cylinder Pin Cap Screw—Torque.....	137 N·m 101 lb.-ft.
---	------------------------

25. Install arm cylinder shims (3) equally to each side to attain proper clearance.

Specification

Arm and Cylinder—Clearance.....	0.5 mm or less 0.020 in. or less
------------------------------------	-------------------------------------

26. Install arm cylinder pin (8) and bushing (7).
27. Apply PM37421 Thread Lock and Sealer (high strength) to cap screw (5).
28. Install lock washer (6) and cap screw (5). Tighten to specification.

Specification

Arm-to-Boom Pin Cap Screw—Torque.....	137 N·m 101 lb.-ft.
--	------------------------

29. Connect hydraulic hoses.
30. Install bucket. Installing Bucket With Quick Coupler. (Operator's Manual.)
31. Bleed air from hydraulic system. See Hydraulic Cylinder Bleed Procedure. (Group 3360.)

Continued on next page

BG71631,000060D -19-22MAY13-2/3

TX1133728—UN—17APR13

Frames

32. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

33. Apply grease to all joints. See Lubricate Front End Pin Joints. (Operator's Manual.)

BG71631,000060D -19-22MAY13-3/3

Boom Remove and Install

SPECIFICATIONS	
Boom Cylinder Weight (approximate)	59 kg 130 lb.
Boom, Arm, and Bucket Weight (approximate)	671 kg 1480 lb.
Boom, Arm, and Cylinder Joints Clearance	0.5 mm 0.020 in.
Boom Cylinder-to-Frame Pin Cap Screw and Nut Torque	140 N·m 101 lb.-ft.
Cover-to-Boom Cylinder Cap Screw Torque	90 N·m 65 lb.-ft.

OTHER MATERIAL
271 Loctite® Thread lock and Sealer (high strength)

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)
2. Retract arm cylinder and lower front attachment to ground.

CAUTION: High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic oil tank is pressurized. Cap must be loosened to relieve the air pressure in hydraulic oil tank.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
4. Apply vacuum pump or drain hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)
5. Install identification tags and disconnect hydraulic lines (1). Close all openings using caps and plugs. See [Hydraulic System Main Line Connection](#). (Group 9025-15.)
6. Remove cap screw (7) and cover (8).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

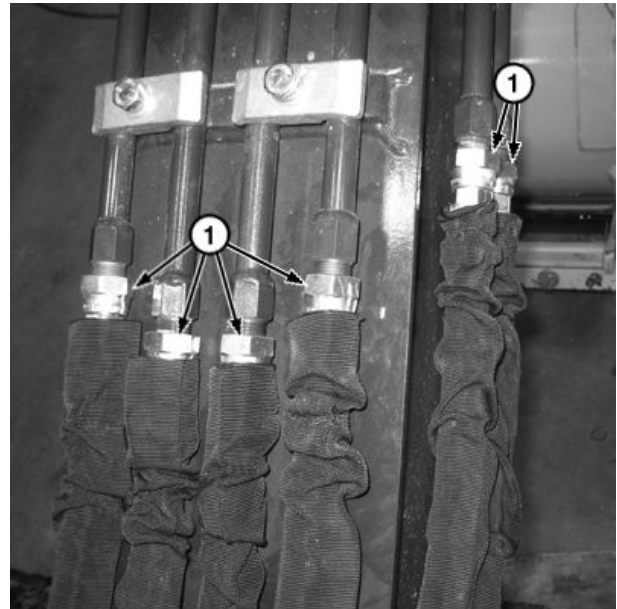
7. Support boom cylinder using appropriate lifting device.

Specification	
Boom Cylinder—Weight (approximate).....	59 kg 130 lb.

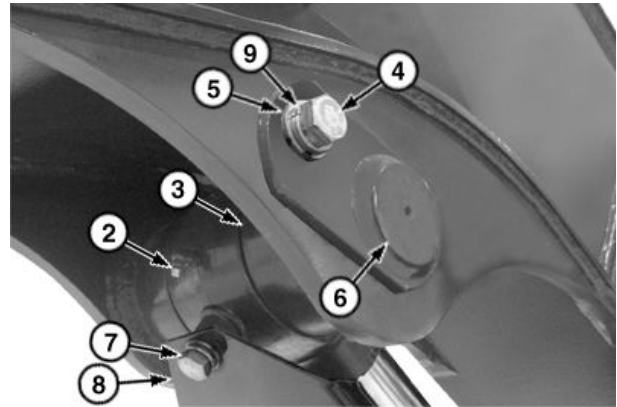
8. Remove cap screw (4), washer (9), and bushing (5).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

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Boom Hydraulic Lines



Boom Hydraulic Lines

- | | |
|-------------------------------|----------------------|
| 1—Hydraulic Line (6 used) | 6—Boom Cylinder Pin |
| 2—Boom Cylinder Shim (2 used) | 7—Cap Screw (2 used) |
| 3—Boom Cylinder Shim (2 used) | 8—Cover |
| 4—Cap Screw | 9—Washer |
| 5—Bushing | |

9. Remove boom cylinder pin (6) and boom cylinder shims (2 and 3). Lower boom cylinder to ground.

Specification	
Boom Cylinder—Weight (approximate).....	59 kg 130 lb.

Continued on next page

BG71631.000060E -19-22MAY13-1/2

TX1134531A—UN—09APR13

TX1134544A—UN—17APR13

10. Disconnect boom light connector (X48). See [Boom Work Light Harness \(W9\) Component Location](#). (Group 9015-10.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

11. Support boom using appropriate lifting device.

Specification

Boom Arm and Bucket	
—Weight (approximate).....	671 kg 1480 lb.

12. Remove nuts (12), cap screw (13), boom-to-frame pin (10), and frame shims (11).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

13. Remove boom using appropriate lifting device.

Specification

Boom, Arm, and Bucket	
—Weight (approximate).....	671 kg 1480 lb.

14. Inspect pins and bushings for wear. See [Inspect Pins and Bushings—Front Attachment and Blade](#). (Group 3340.)

15. Repair or replace parts as necessary.

16. Clean pins and bushings.

17. Apply multipurpose grease to pins and bushings.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

18. Install boom using appropriate lifting device.

Specification

Boom, Arm, and Bucket—Weight (approximate).....	671 kg 1480 lb.
---	--------------------

19. Install frame shims (11) equally on each side to attain proper clearance.

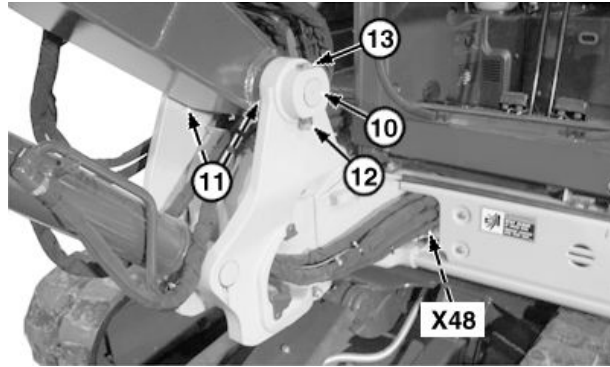
Specification

Boom, Arm, and Cylinder Joints—Clearance.....	0.5 mm 0.020 in.
---	---------------------

20. Install boom-to-frame pin (10).

21. Apply PM37421 Thread Lock and Sealer (high strength) to threads of nuts (12).

22. Install cap screw (13) and nuts (12).



Boom Pin

- 10— Boom-to-Frame Pin
- 11— Frame Shim (4 used)
- 12— Nut (2 used)
- 13— Cap Screw
- X48— Boom Light Connector

23. Connect boom light connector.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

24. Using appropriate lifting device, install boom cylinder pin, shims (2 and 3), bushing (5), washer (9) and cap screw (4). Tighten cap screw to specification.

Specification

Boom Cylinder—Weight (approximate).....	59 kg 130 lb.
Boom Cylinder-to-Frame Pin Cap Screw and Nut—Torque.....	140 N·m 101 lb.-ft.

25. Install cover and cap screws (7). Tighten to specification.

Specification

Cover-to-Boom Cylinder Cap Screw—Torque.....	90 N·m 65 lb.-ft.
--	----------------------

26. Connect hydraulic lines.

27. Remove Vacuum or fill hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

28. Bleed air from boom, arm, and bucket cylinder. See [Perform Hydraulic Cylinder Bleed Procedure](#). (Group 3360.)

29. Apply grease to all joints. See [Lubricate Front End Pin Joints](#). (Operator's Manual.)

TX1134540A—UN—24APR13

Boom Swing Post Remove and Install

SPECIFICATIONS	
Boom Swing Frame Weight (approximate)	125 kg 275 lb.

OTHER MATERIALS	
271 Loctite® Thread Lock and Sealer (High Strength)	

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

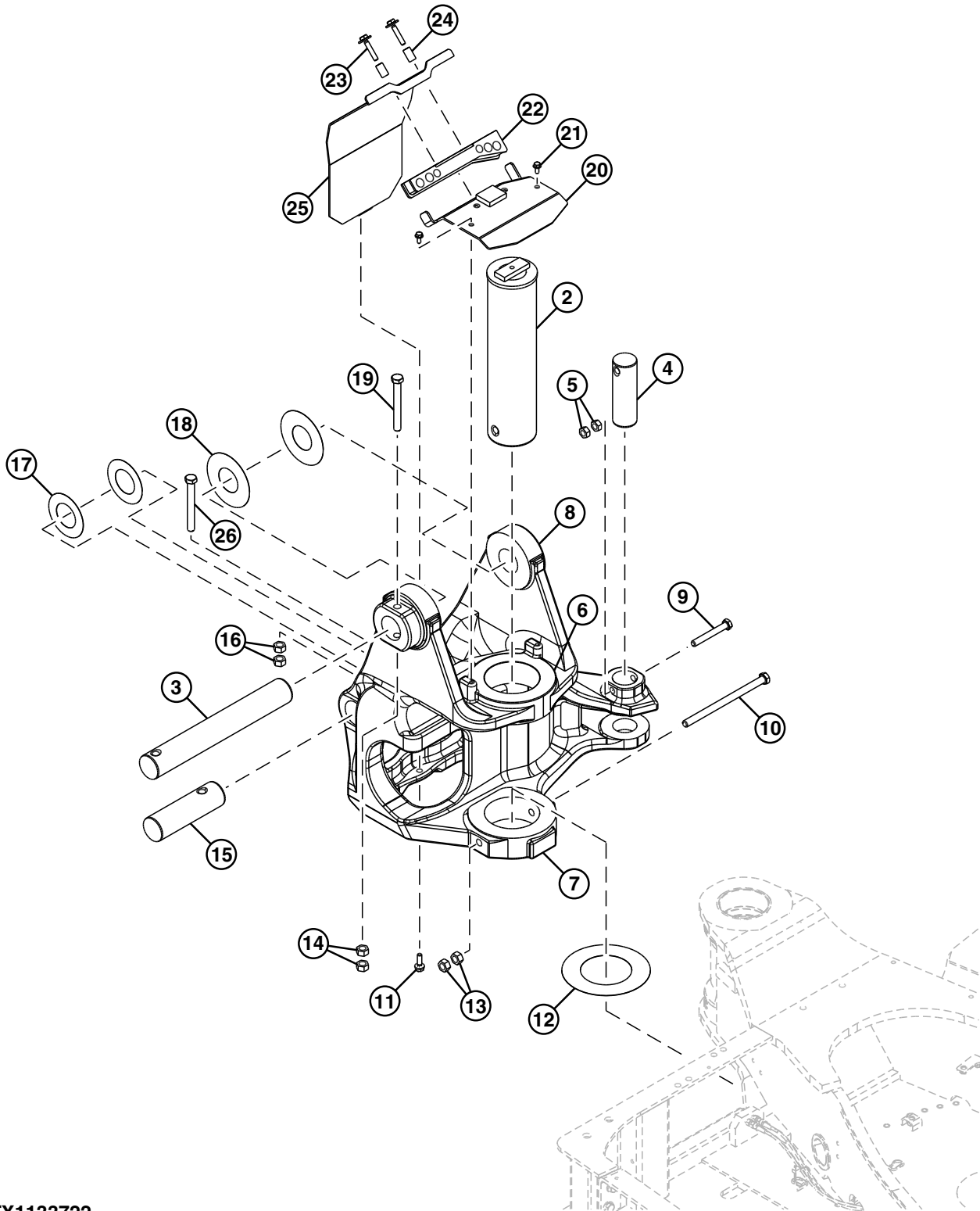
⚠ CAUTION: High-pressure release of oil from pressurized system can cause serious burns

or penetrating injury. The hydraulic oil tank is pressurized. Cap must be loosened to relieve air pressure in hydraulic oil tank.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum pump or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
4. Remove boom. See Boom Remove and Install. (Group 3340.)

Continued on next page

BG71631,000060F -19-22MAY13-1/2



TX1133722

Swing Post

TX1133722 —UN—01APR13

BG71631,000060F -19-22MAY13-2/2

Frames

- 2— Boom Swing Pin
- 3— Boom-to-Boom Swing Pin
- 4— Boom Swing Cylinder Pin
- 5— Nut (2 used)
- 6— Upper Bushing
- 7— Lower Bushing

- 8— Boom Swing Frame
- 9— Cap Screw
- 10— Cap Screw
- 11— Cap Screw
- 12— Shim (2 used)
- 13— Nut (2 used)
- 14— Cap Screw (2 used)

- 15— Boom Swing-to-Boom Cylinder Pin
- 16— Nut (2 used)
- 17— Shim (2 used)
- 18— Shim (2 used)
- 19— Cap Screw
- 20— Plate
- 21— Cap Screw (2 used)

- 22— Isolator
- 23— Cap Screw (2 used)
- 24— Spacer (2 used)
- 25— Cover
- 26— Cap Screw

- 5. Remove cap screws (23), spacers (24), and cover (25).
- 6. Remove hydraulic hoses from isolator (22).
- 7. Remove cap screws (21) and plate (20).
- 8. Remove nuts (5), cap screw (9), and boom swing cylinder pin (4). Disconnect boom swing cylinder.
- 9. Remove nuts (13) and cap screw (10).
- 10. Record location of shims for assembly procedure.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- 11. Support boom swing frame (8) using appropriate lifting device.

Specification

Boom Swing Frame—Weight (approximate).....	125 kg 275 lb.
--	-------------------

- 12. Push boom swing pin (2) on the bottom and remove out of the top of boom swing frame.
- 13. Inspect pins and bushings for wear. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)
- 14. Make repairs or replace parts as necessary. Make Welding Repairs Safely. (Group 0001.)
- 15. Clean pins and bores.
- 16. Apply grease to pins and bores.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- 17. Using an appropriate lifting device, install shims (12) and boom swing frame.

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Specification

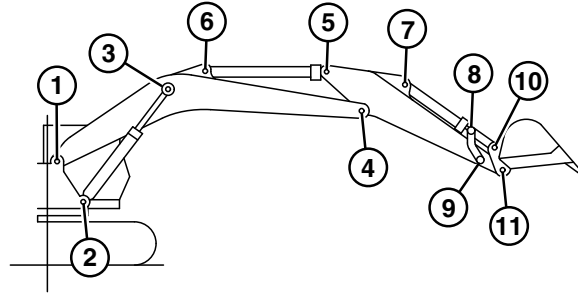
Boom Swing Frame—Weight (approximate).....	125 kg 275 lb.
--	-------------------

- 18. Install boom swing pin from top of boom swing frame down.
- 19. Apply PM37421 Thread Lock and Sealer (high strength) to threads of cap screw (10) and install. Install nuts (13) and tighten against each other.
- 20. Apply PM37421 Thread Lock and Sealer (high strength) to threads of cap screw (9) and install. Install nuts (5) and tighten against each other.
- 21. Install plate with isolator and install cap screws (21). Connect hoses to isolator.
- 22. Install cover, spacers (24) and cap screws (23).
- 23. Connect boom swing cylinder and install boom swing cylinder pin (4).
- 24. Install boom. See Boom Remove and Install. (Group 3340.)
- 25. Apply grease to all joints. See Lubricate Front End Pin Joints. (Operator's Manual.)
- 26. Remove vacuum pump or fill hydraulic oil tank. Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
- 27. Bleed air from hydraulic cylinders. See Hydraulic Cylinder Bleed Procedure. (Group 3360.)
- 28. Operate machine and check for leaks.

BG71631,000060F -19-22MAY13-3/2

Inspect Pins and Bushings—Front Attachment and Blade

- | | |
|--|---|
| 1— Boom-to-Frame Joint | 7— Bucket Cylinder Head End-to-Arm Joint |
| 2— Boom Cylinder Head End-to-Frame Joint | 8— Bucket Cylinder Rod End-to-Side and Bucket Links Joint |
| 3— Boom Cylinder Rod End-to-Boom Joint | 9— Side Links-to-Arm Joint |
| 4— Boom-to-Arm Joint | 10— Bucket Link-to-Bucket Joint |
| 5— Arm Cylinder Rod End-to-Arm Joint | 11— Bucket-to-Arm Joint |
| 6— Arm Cylinder Head End-to-Boom Joint | |



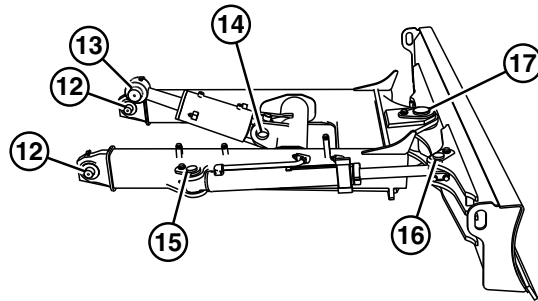
TX1004442

Boom, Arm, and Bucket

AB51738,0000B22 -19-17JAN19-1/4

TX1004442 —UN—06MAR06

- | | |
|--|--|
| 12— Blade-to-Frame Joint | 15— Angle Blade Cylinder Head End-to-Angle Blade Frame Joint |
| 13— Blade Cylinder Rod End-to-Frame Joint | 16— Angle Blade Cylinder Rod End-to-Blade Joint |
| 14— Blade Cylinder Head End-to-Blade Joint | 17— Angle Blade Pivot Joint |



Angle Blade

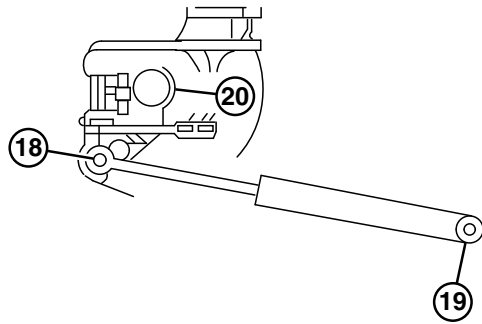
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TX1242532 —UN—01AUG17

Frames

- 18— Boom Swing Cylinder Rod End-to-Boom Swing Joint
- 19— Boom Swing Cylinder Head End-to-Frame Joint
- 20— Boom Swing Pivot Joint



Boom Swing

TX1242529—JN—01AUG17

Pins and Bushings				
	Item	Standard	Allowable Limit	Remedy
1	Pin	45.0 mm 1.77 in	44.0 mm 1.73 in	Replace
	Bushing	45.0 mm 1.77 in	46.5 mm 1.83 in	Replace
2	Pin	45.0 mm 1.77 in	44.0 mm 1.73 in	Replace
	Bushing (boom cylinder)	45.0 mm 1.77 in	46.5 mm 1.83 in	Replace
3	Pin	40.0 mm 1.58 in	39.0 mm 1.54 in	Replace
	Bushing	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
4	Pin	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
	Bushing (bucket cylinder)	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
	Bushing (links)	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
5	Pin	40.0 mm 1.58 in	39.0 mm 1.54 in	Replace
	Bushing (arm cylinder)	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
6	Pin	40.0 mm 1.58 in	39.0 mm 1.54 in	Replace
	Bushing (arm cylinder)	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
	Bushing (link)	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
7	Pin	40.0 mm 1.58 in	39.0 mm 1.54 in	Replace
	Bushing (bucket cylinder)	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
8	Pin	45.0 mm 1.77 in	44.0 mm 1.73 in	Replace
	Bushing (arm cylinder)	45.0 mm 1.77 in	46.5 mm 1.83 in	Replace
9	Pin	45.0 mm 1.77 in	44.0 mm 1.73 in	Replace

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AB51738.0000B22 -19-17JAN19-3/4

Frames

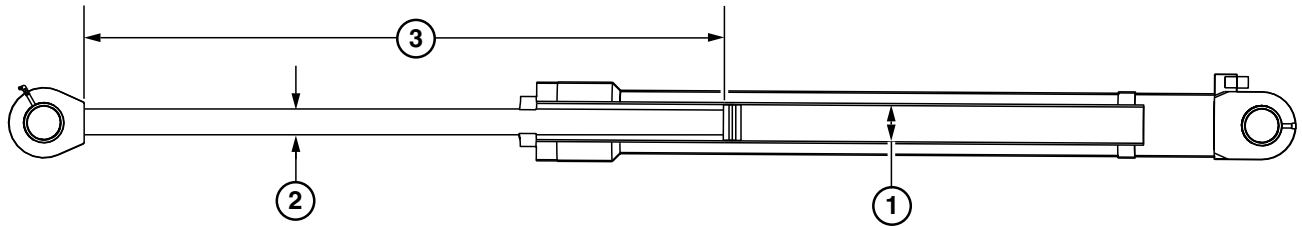
Pins and Bushings

	Item	Standard	Allowable Limit	Remedy
	Bushing (arm)	45.0 mm 1.77 in	46.5 mm 1.83 in	Replace
10	Pin	40.0 mm 1.58 in	39.0 mm 1.54 in	Replace
	Bushing (link 1)	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
11	Pin	40.0 mm 1.58 in	39.0 mm 1.54 in	Replace
	Bushing (arm)	40.0 mm 1.58 in	41.5 mm 1.63 in	Replace
12	Pin	50.0 mm 1.97 in	51.5 mm 2.03 in	Replace
	Bushing (bucket cylinder)	50.0 mm 1.97 in	56.5 mm 2.22 in	Replace
13	Pin	50.0 mm 1.97 in	49.0 mm 1.93 in	Replace
	Bushing (blade cylinder)	50.0 mm 1.97 in	51.5 mm 2.03 in	Replace
14	Pin	35.0 mm 1.38 in	34.0 mm 1.34 in	Replace
	Bushing (arm)	35.0 mm 1.38 in	36.5 mm 1.44 in	Replace
15	Pin	45.0 mm 1.77 in	46.5 mm 1.83 in	Replace
	Bushing	45.0 mm 1.77 in	46.5 mm 1.83 in	Replace
16	Pin	45.0 mm 1.77 in	44.0 mm 1.73 in	Replace
	Bushing	45.0 mm 1.77 in	46.5 mm 1.83 in	Replace
17	Pin	80.0 mm 3.15 in	79.0 mm 3.11 in	Replace
	Bushing	80.0 mm 3.15 in	81.5 mm 3.21 in	Replace
18	Pin	60.0 mm 2.36 in	59.0 mm 2.32 in	Replace
	Bushing	60.0 mm 2.36 in	61.5 mm 2.42 in	Replace
19	Pin	35.0 mm 1.38 in	34.0 mm 1.34 in	Replace
	Bushing	35.0 mm 1.38 in	36.5 mm 1.44 in	Replace
20	Pin	35.0 mm 1.38 in	34.0 mm 1.34 in	Replace
	Bushing	35.0 mm 1.38 in	36.5 mm 1.44 in	Replace

Pins and Bushings

AB51738,0000B22 -19-17JAN19-4/4

Cylinder Specifications



TX1241088

Cylinder

1— Bore
2— Rod Diameter

3— Stroke

TX1241088 — JUN — 29JUN17

Specifications				
	Bore (1)	Rod Diameter (2)	Stroke (3)	Fully Retracted Length
Boom Cylinder (cab)	85 mm 3.35 in	50 mm 1.97 in	564 mm 22.20 in	932 mm 36.69 in
Boom Cylinder (canopy)	85 mm 3.35 in	50 mm 1.97 in	576 mm 22.68 in	932 mm 36.69 in
Arm Cylinder	75 mm 2.95 in	45 mm 1.77 in	597 mm 23.50 in	929 mm 36.57 in
Bucket Cylinder	65 mm 2.56 in	40 mm 1.57 in	435 mm 17.13 in	729 mm 28.70 in
Boom Swing Cylinder	85 mm 3.35 in	45 mm 1.77 in	525 mm 20.67in	822 mm 32.36 in
Blade Cylinder	95 mm 3.74 in	50 mm 1.97 in	140 mm 5.51 in	470 mm 18.50in

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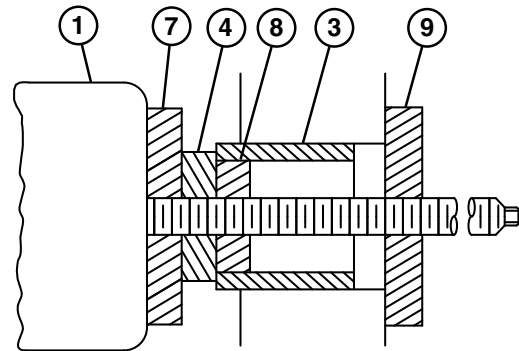
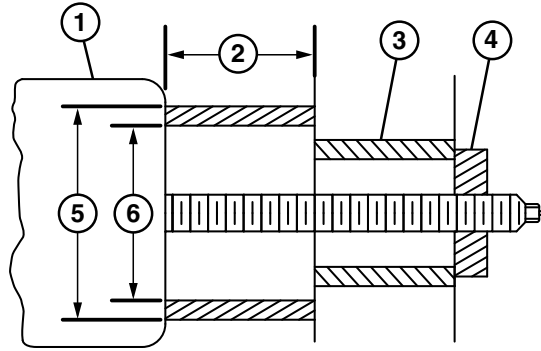
Bushing and Seal Remove and Install

IMPORTANT: Only install bushings using press as shown. Bushings will be damaged if installed with driver.

NOTE: Bushing can also be removed by welding three to five beads on the inside of bushing. Bushing will shrink enough to permit removal using a hammer.

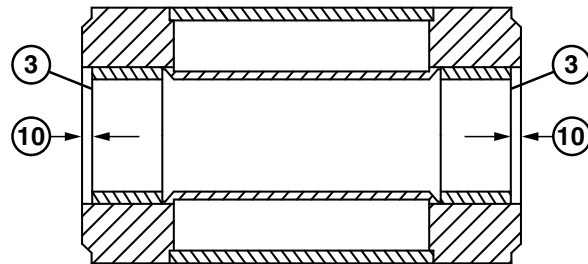
1. Remove bushings (3) and dust seals using bushing, bearing, and seal driver set.
2. Install bushings with lubrication hole in alignment with lubrication passage in pivot.
3. Install bushing to a depth equal to the thickness of dust seal (10).
4. Install dust seals with lip toward the outside of component.

- | | |
|--------------------------------|--|
| 1— Hydraulic Ram | 6— Pipe-Minimum Inner Diameter to Clear Bushing Outer Diameter |
| 2— Pipe-Length of Bushing | 7— Bushing Stop (disk) |
| 3— Bushing | 8— Pilot (disk) |
| 4— Disk | 9— Ram Stop (disk) |
| 5— Pipe-Maximum Outer Diameter | 10— Thickness of Dust Seal |



TX1040490

Pipe Dimensions



TX1040491

Dust Seals

TX1040490 —UN—15APR08

TX1040491 —UN—15APR08

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Apply Vacuum to Hydraulic Oil Tank

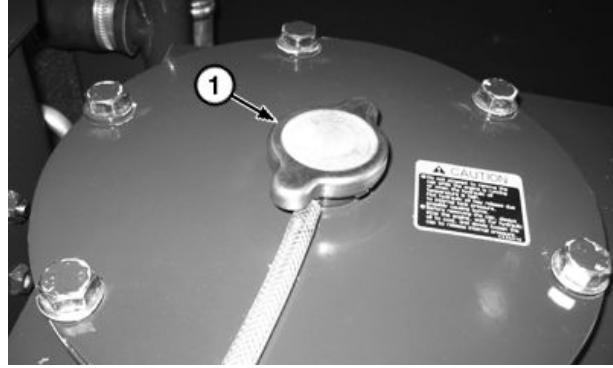
ESSENTIAL TOOLS

D15032NU Vacuum Pump Kit

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)

⚠ CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil cap (1). See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
3. Remove hydraulic oil cap.
4. Assemble fittings and hydraulic oil tank adapter from D15032NU Vacuum Pump Kit. Install vacuum fitting



Hydraulic Oil Cap

1— Hydraulic Oil Cap

in hydraulic tank opening. Refer to manufacturer's instructions for operating pump.

JS20420,0000AEC -19-22MAY13-1/1

TX1135675A —UN—29APR13

General Hydraulic Oil Cleanup Procedure

ESSENTIAL TOOLS

JDG10712 Super Caddy

This procedure is to be used on machines that have had hydraulic system repair without a catastrophic component failure. Super Caddy procedure must be done prior to starting machine after a component has been repaired or replaced.

IMPORTANT: Intermixing of oils can cause premature hydraulic component damage and oil contamination. Oil types and filters must not be intermixed. Use filter element in same type oil to avoid intermixing of oils.

Oil contamination could result if Super Caddy is used in dusty or wet conditions. Clean work practices and cleanliness of Super Caddy and attachments are critical when filtering oil.

NOTE: Filter oil should be at 27°C (80°F) or above for best Super Caddy performance. Reduce flow rate to filter oil below 27°C (80°F).

Super Caddy requires a 20-amp electric circuit. Use of electrical extension cord is not recommended.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 9001-01.)

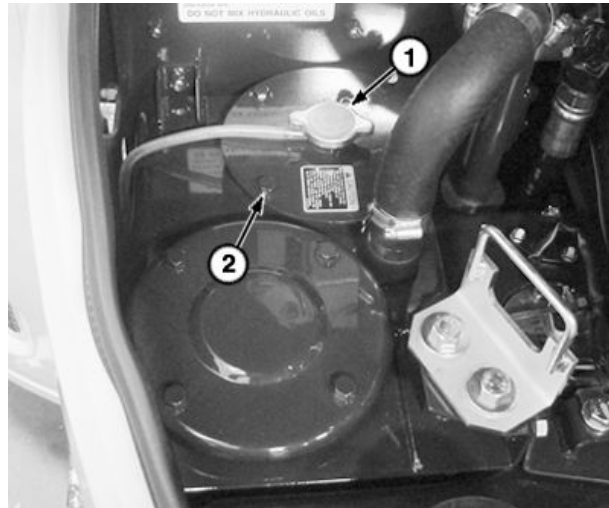
CAUTION: Avoid personal injury from high pressure fluid. High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank fill cap (1). See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)

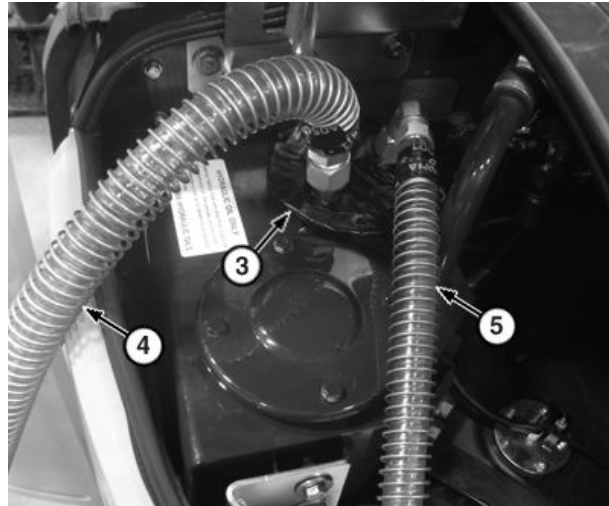
3. Remove hydraulic oil tank cover (2).

NOTE: When installing suction and discharge wands (4 and 5) into hydraulic oil tank, locate the submerged ends of wands as far away from each other as possible to ensure maximum oil movement during cleanup procedure.

4. Install JDG10712 Super Caddy discharge wand (5) and suction wand (4) into hydraulic oil tank.
5. Cover the wands and tank opening (3) with tape to prevent contamination.
6. Use JDG10712 Super Caddy to remove oil contaminants. Refer to the Super Caddy operator's manual or see Super Caddy in Service ADVISOR™ for operating procedure.
7. When cleaning process is done, disconnect Super Caddy from machine.



Hydraulic Oil Tank Fill Cap



Hydraulic Oil Tank and Wands

- | | |
|--------------------------------|-------------------|
| 1— Hydraulic Oil Tank Fill Cap | 4— Suction Wand |
| 2— Hydraulic Oil Tank Cover | 5— Discharge Wand |
| 3— Tank Opening | |

CAUTION: Prevent possible personal injury from unexpected machine movement. Clear all persons from area before operating machine.

Avoid entanglement and possible electrocution from Super Caddy power cord. Do not operate machine while Super Caddy is connected to machine.

8. Make sure machine is parked in an area that will allow all hydraulic functions to be operated.
9. Fill hydraulic oil tank to operating level. See Check Hydraulic Tank Oil Level. (Operator's Manual.)

Continued on next page

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Hydraulic System

10. Run machine at slow idle. Operate each circuit a minimum of 2 minutes in each direction to flush any remaining contaminants back through hydraulic system filters.
11. Stop engine. Install Super Caddy to machine.
12. Repeat Super Caddy operation procedure until contaminant value is at specifications per Super Caddy operator's manual or see Super Caddy in Service ADVISOR™ for operating procedure.
13. When oil reaches an acceptable level of cleanliness, disconnect Super Caddy from machine.
14. Install new hydraulic oil filters. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

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15. Install hydraulic oil tank cover and fill cap.

NOTE: Instrument cleanliness and clean work practices are critical when taking oil samples. Dust, wind, and moisture, as well as contaminated sample pumps, bottles, and tubing, can affect results.

Oil sample must be taken from system before oil passes through the filter when oil is warm.

16. Obtain oil sample for fluid analysis.
17. Fill hydraulic oil tank to proper operating level. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
18. Return machine to service.

JS20420,00000A8 -19-23MAR18-2/2

Hydraulic Component Failure Cleanup Procedure

ESSENTIAL TOOLS

JDG1770 Ultra Clean Hose Kit

JDG10712 Super Caddy

This procedure is to be used on machines that have had a catastrophic hydraulic system component failure. Cleanup procedure must be done prior to starting machine after a component has been repaired or replaced. The use of attachments increases the need to monitor and filter oil to a safe contamination value.

IMPORTANT: Intermixing of oils can cause premature hydraulic component damage and oil contamination. Oil types and Super Caddy filters must not be intermixed. Use Super Caddy filter element in same type oil to avoid intermixing of oils.

Oil contamination could result if Super Caddy is used in dusty or wet conditions. Clean work practices and cleanliness of filter caddy and attachments are critical when filtering oil.

NOTE: Filter oil should be at 27°C (80°F) or above for best Super Caddy performance. Reduce flow rate to filter oil below 27°C (80°F).

Super Caddy requires a 20-amp electric circuit. Use of electrical extension cord is not recommended.

Hydraulic System Cleanup Procedure

1. Park and prepare machine for service safely. [See Park and Prepare for Service Safely.](#) (Group 9001-01.)

⚠ CAUTION: Avoid personal injury from high pressure fluid. High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. [See Hydraulic Oil Tank Pressure Release Procedure.](#) (Group 9025-25.)
3. Disconnect battery negative (-) cable.
4. Remove hydraulic oil tank. [See Hydraulic Oil Tank Remove and Install.](#) (Group 3360.)

IMPORTANT: To prevent hydraulic system contamination, after cleaning, disassembling, and assembling each hydraulic component, store component in a dry, dust-free area until installation.

5. Remove covers and clean hydraulic oil tank completely. [See Hydraulic Oil Tank Disassemble and Assemble.](#) (Group 3360.)

6. Install hydraulic oil tank. [See Hydraulic Oil Tank Remove and Install.](#) (Group 3360.)
7. Remove each hydraulic component from the machine. Disassemble, clean, inspect, and assemble each component, working one circuit at a time. Repair or replace damaged components.

- [See Travel Motor and Park Brake Remove and Install.](#) (Group 0260.)
- [See Hydraulic Oil Cooler Remove and Install.](#) (Group 0510.)
- [See Blade Cylinder Remove and Install.](#) (Group 3260.)
- [See Blade Pilot Valve Remove and Install.](#) (Group 3260.)
- [See Angle Blade Cylinder Remove and Install-If Equipped.](#) (Group 3260.)
- [See Angle Blade Solenoid Valve Remove and Install-If Equipped.](#) (Group 3260.)
- [See Hydraulic Pump 1, 2, and 3 Remove and Install.](#) (Group 3360.)
- [See Pilot Pump Remove and Install.](#) (Group 3360.)
- [See Pilot Pressure Regulator and Solenoid Valve Manifold Remove and Install—Pilot Shutoff and Travel Speed Solenoids.](#) (Group 3360.)
- [See Air Conditioner Torque Control Solenoid Valve Remove and Install.](#) (Group 3360.)
- [See Pilot Valve \(Left and Right\) Remove and Install.](#) (Group 3360.)
- [See Travel Pilot Valve Remove and Install.](#) (Group 3360.)
- [See Boom Swing Pilot Valve Remove and Install.](#) (Group 3360.)
- [See Control Valve Remove and Install.](#) (Group 3360.)
- [See Control Lever Pattern Selector Remove and Install.](#) (Group 3360.)
- [See Hydraulic Oil Cooler Bypass Valve Remove and Install.](#) (Group 3360.)
- [See Boom Cylinder Remove and Install.](#) (Group 3360.)
- [See Arm Cylinder Remove and Install.](#) (Group 3360.)
- [See Bucket Cylinder Remove and Install.](#) (Group 3360.)
- [See Boom Swing Cylinder Remove and Install.](#) (Group 3360.)
- [See Swing Gear Case Remove and Install.](#) (Group 4350.)
- [See Center Joint Remove and Install.](#) (Group 4360.)
- [See Swing Motor and Park Brake Remove and Install.](#) (Group 4360.)
- [See Crossover Relief Valve and Make-Up Check Valve Remove and Install.](#) (Group 4360.)
- [See Swing Park Brake Check Valve and Orifice Remove and Install.](#) (Group 4360.)

IMPORTANT: Debris trapped and then later dislodged from oil coolers can cause premature hydraulic component failure. If system contains a large amount of debris, oil cooler cannot be completely cleaned of contamination and must be replaced.

Continued on next page

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8. Replace hydraulic oil cooler when required. See Hydraulic Oil Cooler Remove and Install. (Group 0510.)

IMPORTANT: Prevent hydraulic system blockage. Disconnect hydraulic hoses and lines from all tee fittings before cleaning. Cleaning sponge will become trapped in hose and lines as it passes through a tee fitting.

9. Install identification tags and disconnect all hydraulic hoses and lines. Close all openings using caps and plugs.
- See Hydraulic System Component Location. (Group 9025-15.)
 - See Travel System Component Location. (Group 9025-15.)
 - See Travel Hydraulic System Line Connection. (Group 9025-15.)
 - See Cylinder Drift Test—Boom, Arm, Bucket, and Blade. (Group 9025-15.)
 - See Pump 1, Pump 2, Pump 3, and Pilot Pump Line Identification. (Group 9025-15.)
 - See Control Valve Line Identification. (Group 9025-15.)
 - See Pilot Control Lever Pattern Selector Valve Line Connection. (Group 9025-15.)
 - See Swing Motor Line Identification. (Group 9025-15.)
 - See Blade Hydraulic System Line Connection. (Group 9025-15.)
 - See Angle Blade Hydraulic System Line Connection—If Equipped. (Group 9025-15.)

IMPORTANT: Airborne debris can cause premature hydraulic component failure. After hoses and

lines are cleaned, close all openings with caps and plugs to minimize additional contamination.

10. Clean all hydraulic hoses and lines using JDG1770 Ultra Clean Hose Kit.

NOTE: During installation, fill hydraulic components, hoses, and lines with clean hydraulic oil to prevent a dry start-up.

11. Install all cleaned hydraulic components, hoses, and lines.
12. Install new hydraulic oil filters. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
13. With all components installed, fill tank to proper level. See Check Hydraulic Tank Oil Level. (Operator's Manual.)
14. Connect battery negative (-) cable.

IMPORTANT: Trapped air suddenly compressed in a cylinder can make enough heat to ignite the oil used for assembly, causing cap seal and ring damage. Start with cylinder rod retracted and the rod end filled with clean oil. Operate function to slowly extend rod. Procedure will eliminate most of the air and reduce the possibility of damage.

15. Remove remaining air from hydraulic system. Slowly operate all hydraulic functions without holding over relief valves.
16. Remove residual oil contaminants using JDG10712 Super Caddy. See General Hydraulic Oil Cleanup Procedure. (Group 9025-25.)

Hydraulic Pump 1, 2, and 3 Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Hydraulic Pump Weight (approximate)	23 kg 50 lb.
Hydraulic Pump-to-Flywheel Housing Cover Cap Screw Torque	90 N·m 66 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Drain hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

4. Remove cap screws (1) and left-hand side cover (2).



Left-Hand Side Cover

1— Cap Screw (5 used)

2— Left-Hand Side Cover

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Continued on next page

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5. Loosen hose clamp (4) and disconnect hydraulic pump supply hose (5). Close all openings using caps and plugs. *See Hydraulic System Main Line Connection.* (Group 9025-15.)
6. Install identification tags and disconnect hydraulic hoses (6—10). Close all openings using caps and plugs. *See Hydraulic System Main Line Connection.* (Group 9025-15.)

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

7. Support hydraulic pump (11) using appropriate lifting device.

Specification

Hydraulic Pump—Weight (approximate).....	23 kg 50 lb.
---	-----------------

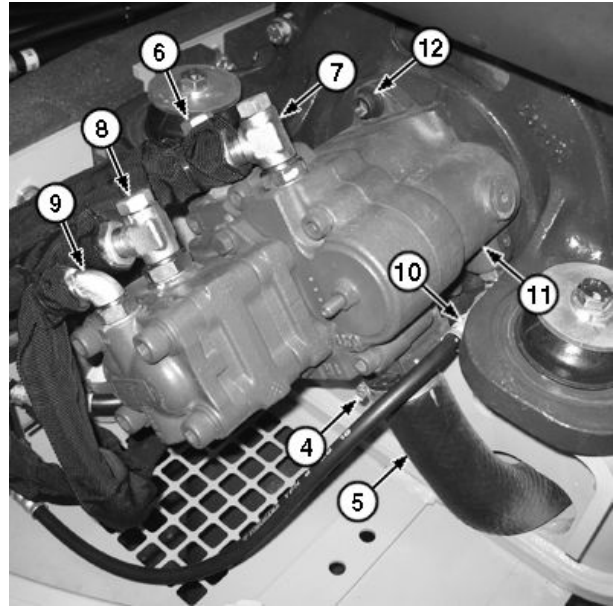
8. Remove cap screws (12) and hydraulic pump.
9. Repair or replace parts as needed. *See Hydraulic Pump 1, 2, and 3 Disassemble and Assemble.* (Group 3360.)
10. Install hydraulic pump and cap screws (12). Tighten cap screws to specification.

Specification

Hydraulic Pump-to- Flywheel Housing Cover Cap Screw—Torque.....	90 N·m 66 lb.-ft.
---	----------------------

11. Connect hydraulic hoses (6—10). Connect hydraulic pump supply hose and tighten hose clamp. *See Hydraulic System Main Line Connection.* (Group 9025-15.)
12. Fill hydraulic oil tank. *See Drain and Refill Hydraulic Tank Oil.* (Operator’s Manual.)

IMPORTANT: Hydraulic pump can be damaged when not filled with oil before starting engine. Procedure must be performed whenever the pump is installed or oil has been drained from the pump or hydraulic oil tank.



Hydraulic Pump

- | | |
|--|------------------------------------|
| 4— Hose Clamp | 9— Pilot Pump Hydraulic Hose |
| 5— Hydraulic Pump Supply Hose | 10— Hydraulic Oil Tank Return Hose |
| 6— Control Valve Hydraulic Hose (pump 1) | 11— Hydraulic Pump |
| 7— Control Valve Hydraulic Hose (pump 2) | 12— Cap Screw (4 used) |
| 8— Control Valve Hydraulic Hose (pump 3) | |

13. Perform hydraulic pump start-up procedure. *See Hydraulic Pump Start-Up Procedure.* (Group 3360.)
14. Install left-hand side cover and cap screws (1).

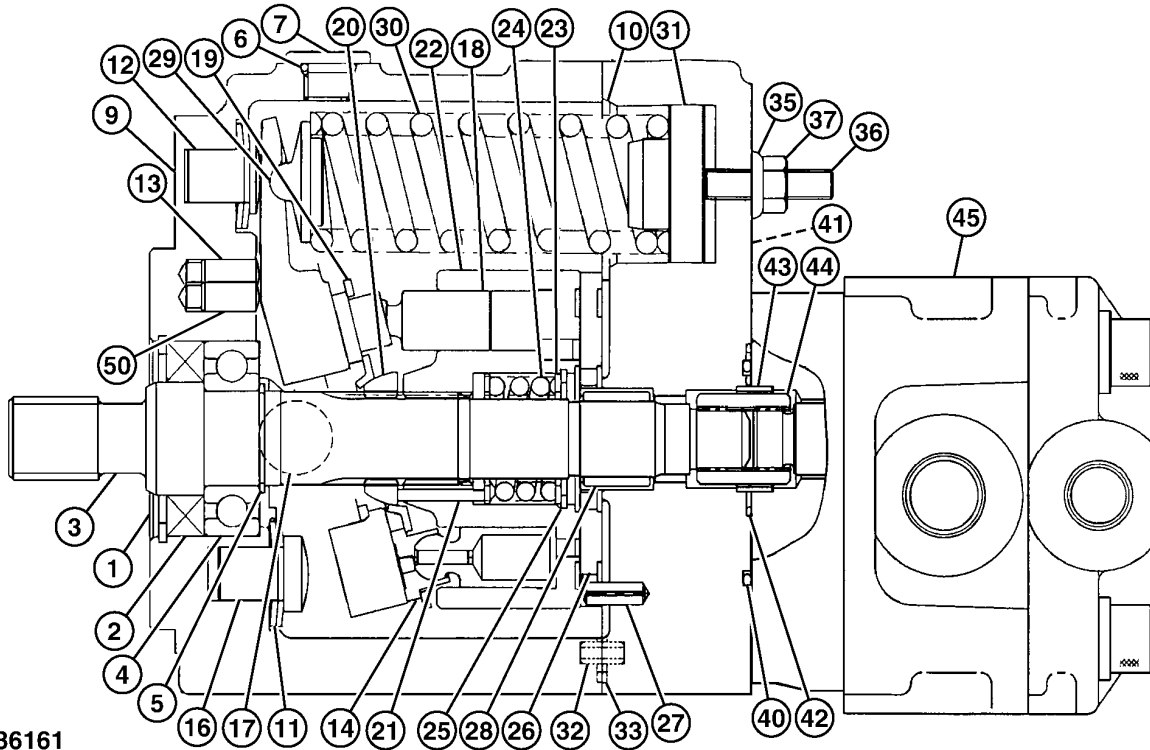
⚠ CAUTION: Prevent possible injury from unexpected machine movement. Clear all personnel from area before operating machine.

15. Operate machine and check for leaks. Verify all machine functions operate correctly. *See Operational Checkout.* (Group 9005-10.)

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Hydraulic Pump 1, 2, and 3 Disassemble and Assemble
Disassemble Hydraulic Pump 1, 2, and 3



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TX1136161

Hydraulic Pump

- | | | | |
|------------------------------|---------------------------|---------------------|--|
| 1— Snap Ring | 14— Swash Plate | 25— Snap Ring | 37— Nut |
| 2— Seal | 16— Pin | 26— Valve Plate | 40— O-Ring |
| 3— Shaft | 17— Ceramic Ball (2 used) | 27— Spring Pin | 41— O-Ring |
| 4— Bearing | 18— Piston (10 used) | 28— Bearing | 42— O-Ring |
| 5— Snap Ring | 19— Retainer | 29— Spring Seat | 43— Bushing |
| 6— O-Ring (2 used) | 20— Bushing | 30— Spring | 44— Coupling |
| 7— Plug (2 used) | 21— Pin (3 used) | 31— Spring Seat | 45— Hydraulic Pump 3 |
| 9— Pump Housing | 22— Cylinder Block | 32— Pin | 50— Air Conditioner Flow Rate Control Piston |
| 10— Gasket | 23— Washer (2 used) | 33— O-Ring (2 used) | |
| 11— Disk Spring (4 used) | 24— Spring | 35— Sealing Washer | |
| 12— Pin | | 36— Adjusting Screw | |
| 13— Flow Rate Control Piston | | | |

SPECIFICATIONS	
Piston-to-Shoe Clearance	0.2 mm or less 0.008 in. or less
Piston-to-Cylinder Block Bore Clearance	0.050 mm or less 0.002 in. or less
Housing-to-Housing Cap Screw Torque	59 N·m 44 lb.-ft.
Hydraulic Pump 3-to-Pump Housing Cap Screw Torque	12 N·m 108 lb.-in.

1. Remove hydraulic pump 1, 2, and 3. See Hydraulic Pump 1, 2, and 3 Remove and Install. (Group 3360.)

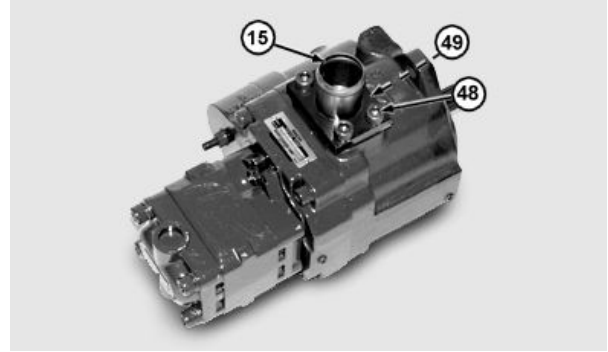
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- Remove cap screws (48), hose fitting (15), and O-ring (49).

15— Hose Fitting
48— Cap Screw (4 used)

49— O-Ring



Hydraulic Pump Hose Fitting

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T125691 —UN—14JAN00

NOTE: Bushing (43) and coupling (44) may come off with hydraulic pump 3 (45) or remain on hydraulic pump.

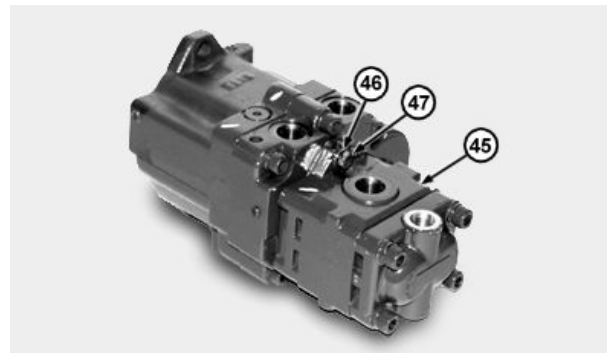
- Remove cap screws (47) and washers (46) to remove hydraulic pump 3 (45).
- Remove bushing (43) and coupling (44).
- Remove O-rings (40—42).

NOTE: Adjusting screw controls the maximum pump flow rate. Removal will require a test and adjustment to get the correct setting for maximum pump flow rate.

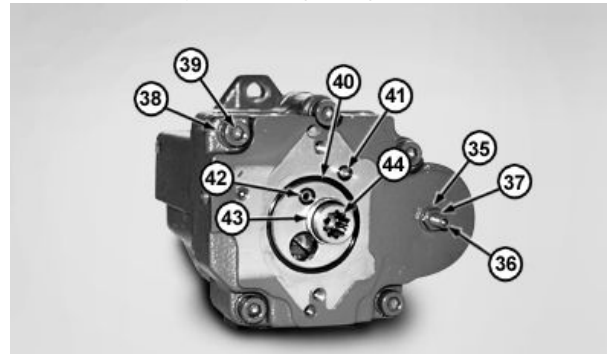
- Remove nut (37), sealing washer (35), and adjusting screw (36) for inspection or replacement only. Measure length of adjusting screw from pump housing to end of screw to aid assembly.
- Remove cap screws (39) and lock washers (38).

35— Sealing Washer
36— Adjusting Screw
37— Nut
38— Lock Washer (5 used)
39— Cap Screw (5 used)
40— O-Ring
41— O-Ring

42— O-Ring
43— Bushing
44— Coupling
45— Hydraulic Pump 3
46— Washer (2 used)
47— Cap Screw (2 used)



Hydraulic Pump 3 Cap Screw



Hydraulic Pump Coupling and O-Rings

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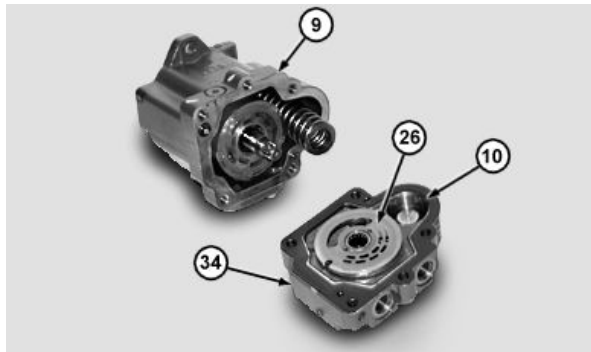
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T125693 —UN—14JAN00

IMPORTANT: Valve plate has highly machined surfaces and can be damaged. When separating pump housing, use care not to drop the valve plate.

8. Separate pump housing (9 and 34).
9. Remove gasket (10) and valve plate (26).

- | | |
|-----------------|------------------|
| 9— Pump Housing | 26— Valve Plate |
| 10— Gasket | 34— Pump Housing |



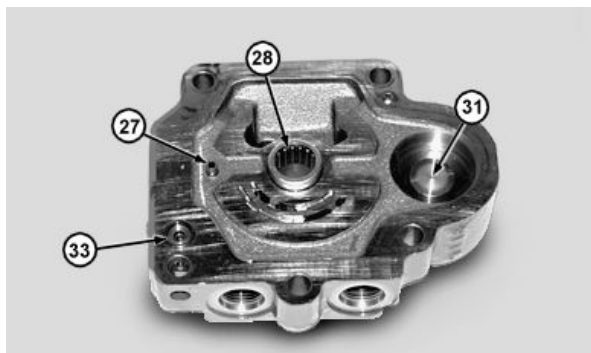
Hydraulic Pump Housing

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10. Remove spring pin (27), spring seat (31), and O-ring (33).
11. Remove bearing (28) for replacement only. Bearing is press fit.

- | | |
|----------------|---------------------|
| 27— Spring Pin | 31— Spring Seat |
| 28— Bearing | 33— O-Ring (2 used) |



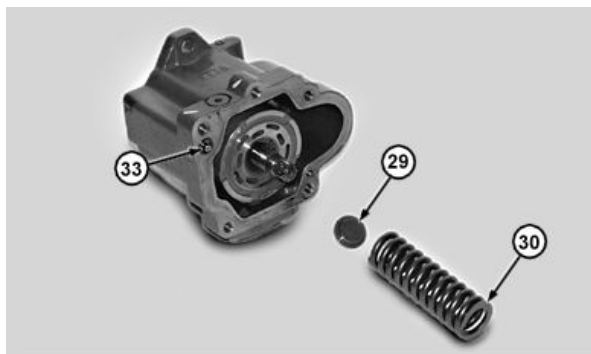
Pump Housing Bearing and Spring Seat

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12. Remove spring (30), spring seat (29), and O-ring (33).

- | | |
|-----------------|---------------------|
| 29— Spring Seat | 33— O-Ring (2 used) |
| 30— Spring | |



Hydraulic Pump Housing and Spring

T125696—UN—14JAN00

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JL58967.0000297 -19-12MAY15-6/24

IMPORTANT: When removing rotary group, use care not to damage cylinder block and piston assembly.

The original pistons must be installed into the same bores of original cylinder block because of wear patterns.

13. Mark pistons (18) with respect to cylinder block (22) bores for assembly. Remove pistons (18), retainer (19), bushing (20), pin (21), and cylinder block (22).

18— Piston (10 used)
19— Retainer
20— Bushing

21— Pin (3 used)
22— Cylinder Block



Rotary Group

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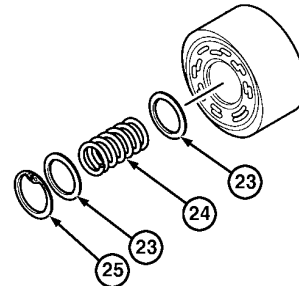
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⚠ CAUTION: Prevent possible injury. Spring is under load. Spring must be compressed before removing snap ring.

14. Remove snap ring (25), washers (23), and spring (24) for inspection or replacement only. Apply force to outer washer using a press. Remove snap ring.

23— Washer (2 used)
24— Spring

25— Snap Ring



Cylinder Block

T125698

T125698—UN—14JAN00

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15. Check the clearance between piston and shoe.

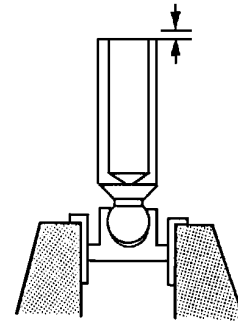
Specification

Piston-to-Shoe—Clearance.....	0.2 mm or less 0.008 in. or less
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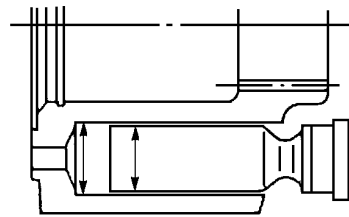
Subtract piston diameter from cylinder block bore diameter to check for wear.

Specification

Piston-to-Cylinder Block Bore—Clearance.....	0.050 mm or less 0.002 in. or less
--	---------------------------------------



T164706
Piston-To-Shoe Clearance



T164714

Piston-To-Cylinder Block Bore Clearance

JL58967,0000297 -19-12MAY15-9/24

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T164714 —UN—03FEB03

16. Remove swash plate (14) and ceramic balls (17).

NOTE: Pin (16) has two cavities and is longer than pin (12). Note location of pins to aid in assembly.

17. Remove disk springs (11), pin (12), flow rate control piston (13), pin (16), and air conditioner flow rate control piston. (50).

18. Remove plugs (7) and O-rings (6).

- | | |
|------------------------------|--|
| 6— O-Ring (2 used) | 14— Swash Plate |
| 7— Plug (2 used) | 16— Pin |
| 11— Disk Spring (4 used) | 17— Ceramic Ball (2 used) |
| 12— Pin | 50— Air Conditioner Flow Rate Control Piston |
| 13— Flow Rate Control Piston | |



Hydraulic Pump Swash Plate

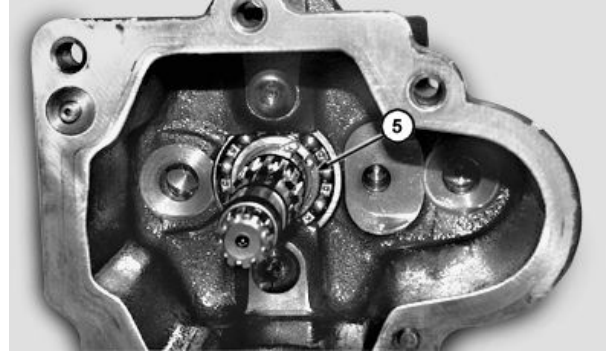
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19. Remove snap ring (5).

5—Snap Ring



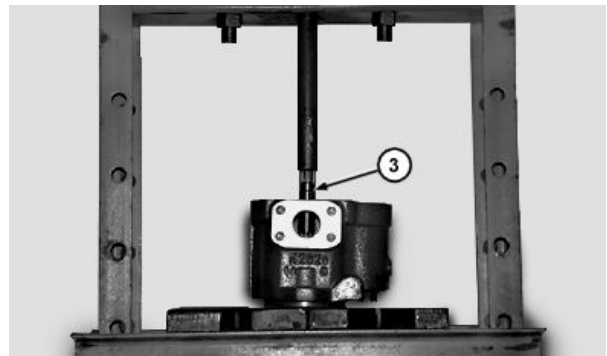
Shaft Snap Ring

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20. Remove shaft (3) using a press.

3—Shaft



Press and Shaft

T125701—UN—14JAN00

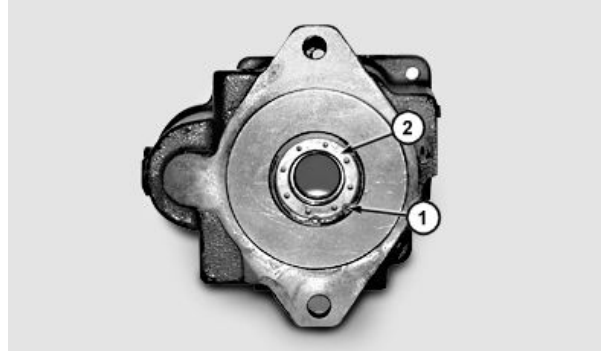
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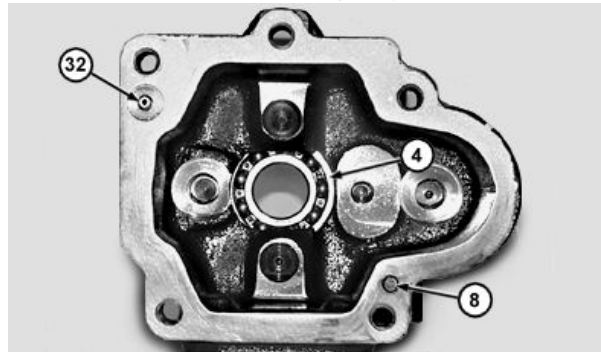
21. Remove snap ring (1) and seal (2).
22. Remove bearing (4) for replacement only. Bearing is press fit in pump housing.
23. Remove pins (8 and 32) for replacement only.
24. Repair and replace parts as necessary.

1— Snap Ring
2— Seal
4— Bearing

8— Pin
32— Pin



Seal and Snap Ring



Bearing and Pins

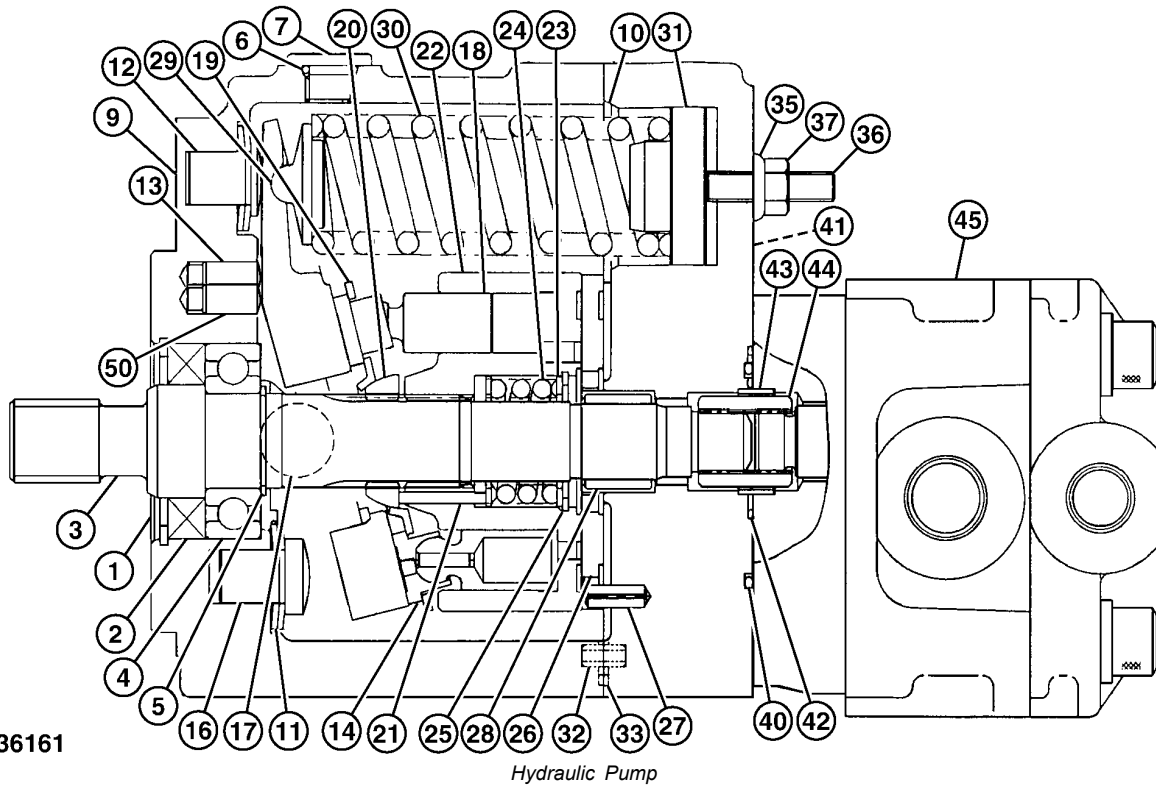
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Assemble Hydraulic Pump 1, 2, and 3



TX1136161

- | | | | |
|------------------------------|---------------------------|--------------------------|--|
| 1— Snap Ring | 15— Hose Fitting | 28— Bearing | 41— O-Ring |
| 2— Seal | 16— Pin | 29— Spring Seat | 42— O-Ring |
| 3— Shaft | 17— Ceramic Ball (2 used) | 30— Spring | 43— Bushing |
| 4— Bearing | 18— Piston (10 used) | 31— Spring Seat | 44— Coupling |
| 5— Snap Ring | 19— Retainer | 32— Pin | 45— Hydraulic Pump 3 |
| 6— O-Ring (2 used) | 20— Bushing | 33— O-Ring (2 used) | 46— Washer (2 used) |
| 7— Plug (2 used) | 21— Pin (3 used) | 34— Pump Housing | 47— Cap Screw (2 used) |
| 8— Pin | 22— Cylinder Block | 35— Sealing Washer | 48— Cap Screw (4 used) |
| 9— Pump Housing | 23— Washer (2 used) | 36— Adjusting Screw | 49— O-Ring |
| 10— Gasket | 24— Spring | 37— Nut | 50— Air Conditioner Flow Rate Control Piston |
| 11— Disk Spring (4 used) | 25— Snap Ring | 38— Lock Washer (5 used) | |
| 12— Pin | 26— Valve Plate | 39— Cap Screw (5 used) | |
| 13— Flow Rate Control Piston | 27— Spring Pin | 40— O-Ring | |
| 14— Swash Plate | | | |

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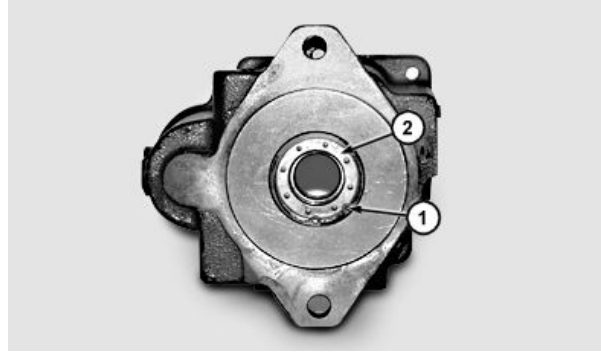
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Hydraulic System

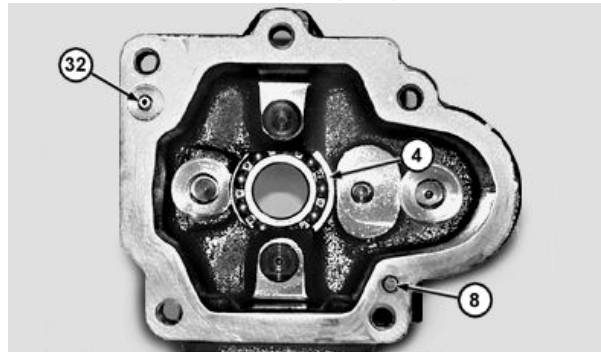
1. Install pins (8 and 32).
2. Install bearing (4) using a press.
3. Install seal (2).
4. Install snap ring (1).

1— Snap Ring
2— Seal
4— Bearing

8— Pin
32— Pin



Seal and Snap Ring



Bearing and Pins

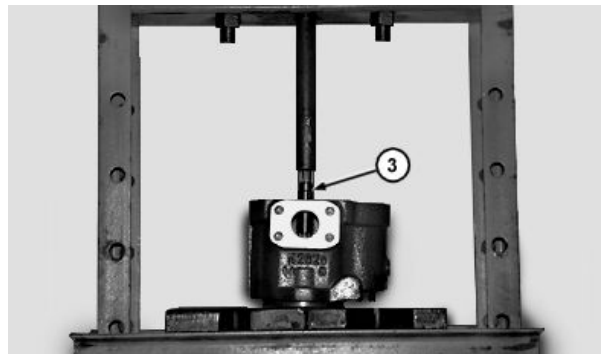
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5. Install shaft (3) using a press.

3— Shaft



Press and Shaft

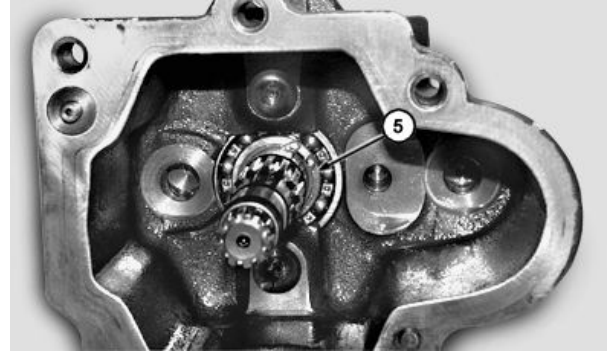
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JL58967,0000297 -19-12MAY15-16/24

T125701—UN—14JAN00

6. Install snap ring (5).

5— Snap Ring



Shaft Snap Ring

T125700—UN—14JAN00

JL58967.0000297 -19-12MAY15-17/24

7. Install O-rings (6) and plugs (7).

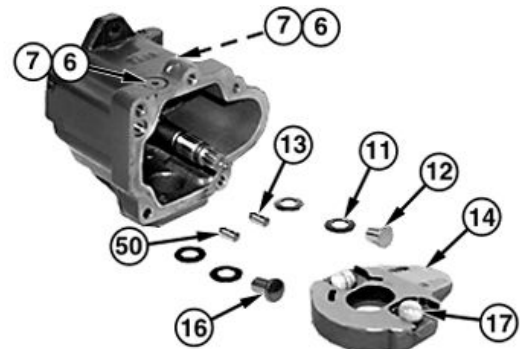
8. Install disk springs (11) so convex side is against head of pins (12 and 16).

9. Install pins (12 and 16) into their original bores.

NOTE: Air conditioner flow rate control piston (50) is only installed in the machine if equipped with air conditioning.

10. Install flow rate control piston (13) and air conditioner flow rate control piston (50) so the larger diameter end is toward the swash plate (14).

11. Install ceramic balls (17) and swash plate (14).



Hydraulic Pump Swash Plate

- | | |
|------------------------------|--|
| 6— O-Ring (2 used) | 14— Swash Plate |
| 7— Plug (2 used) | 16— Pin |
| 11— Disk Spring (4 used) | 17— Ceramic Ball (2 used) |
| 12— Pin | 50— Air Conditioner Flow Rate Control Piston |
| 13— Flow Rate Control Piston | |

T207939A—UN—07FEB05

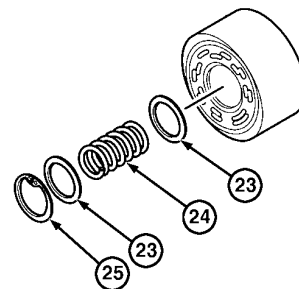
JL58967.0000297 -19-12MAY15-18/24

12. Install washers (23) and spring (24).

13. Apply force to outer washer to compress spring. Install snap ring (25).

23— Washer (2 used)
24— Spring

25— Snap Ring



T125698

Cylinder Block

T125698—UN—14JAN00

Continued on next page

JL58967.0000297 -19-12MAY15-19/24

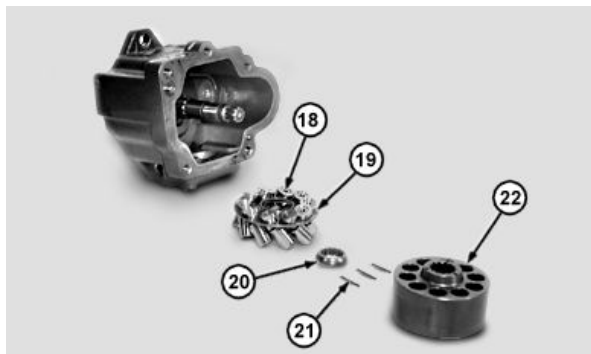
Hydraulic System

14. Install pins (21), bushing (20), retainer (19), and pistons (18) into cylinder block (22) so marks on pistons and cylinder block are aligned.

15. Install cylinder block (22).

18— Piston (10 used)
19— Retainer
20— Bushing

21— Pin (3 used)
22— Cylinder Block



Rotary Group

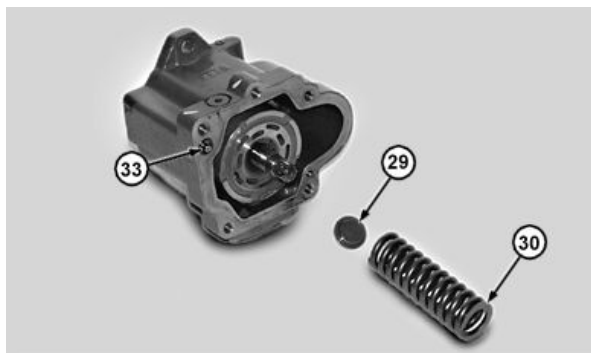
JL58967,0000297 -19-12MAY15-20/24

T125697—UN—14JAN00

16. Install O-ring (33), spring seat (29), and spring (30).

29— Spring Seat
30— Spring

33— O-Ring (2 used)



Hydraulic Pump Housing and Spring

JL58967,0000297 -19-12MAY15-21/24

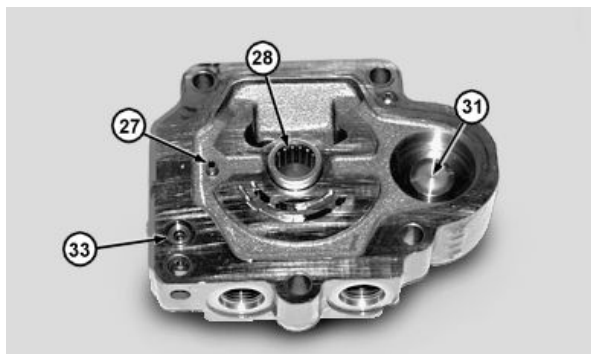
T125696—UN—14JAN00

17. Install bearing (28) using a press.

18. Install O-ring (33), spring seat (31), and spring pin (27).

27— Spring Pin
28— Bearing

31— Spring Seat
33— O-Ring (2 used)



Pump Housing Bearing and Spring Seat

Continued on next page

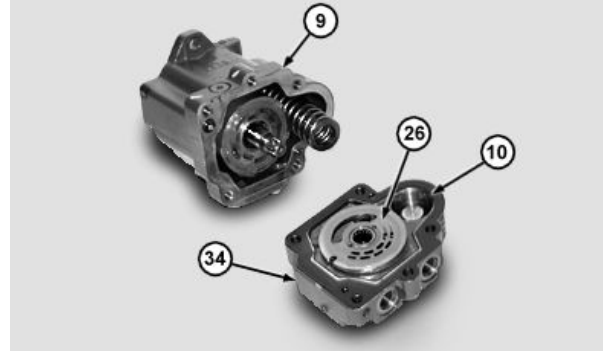
JL58967,0000297 -19-12MAY15-22/24

T125695—UN—14JAN00

IMPORTANT: Valve plate has highly machined surfaces and can be damaged. Do not drop valve plate.

19. Apply petroleum jelly to valve plate (26) to help hold it in place on pump housing (34).
20. Install gasket (10).
21. Join pump housing (9 and 34). Pull the housing together against the spring using M10 x 65 mm cap screw.

- | | |
|-----------------|------------------|
| 9— Pump Housing | 26— Valve Plate |
| 10— Gasket | 34— Pump Housing |



Hydraulic Pump Housing

JL58967.0000297 -19-12MAY15-23/24

T125694 —UN—14JAN00

22. Install lock washers (38) and cap screws (39). Tighten cap screws to specification.

Specification

Housing-to-Housing Cap	
Screw—Torque.....	59 N·m 44 lb.-ft.

23. Install adjusting screw (36), sealing washer (35), and nut (37) so screw is to the measurement taken at disassembly.

24. Install O-rings (40—42).

25. Install bushing (43) and coupling (44).

26. Install hydraulic pump 3 (45), washers (46), and cap screws (47). Tighten cap screws to specification.

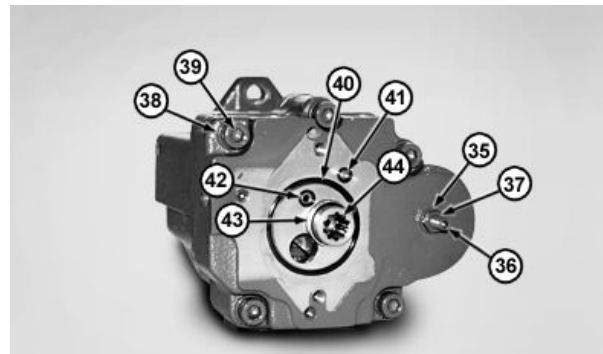
Specification

Hydraulic Pump	
3-to-Pump Housing Cap	
Screw—Torque.....	12 N·m 108 lb.-in.

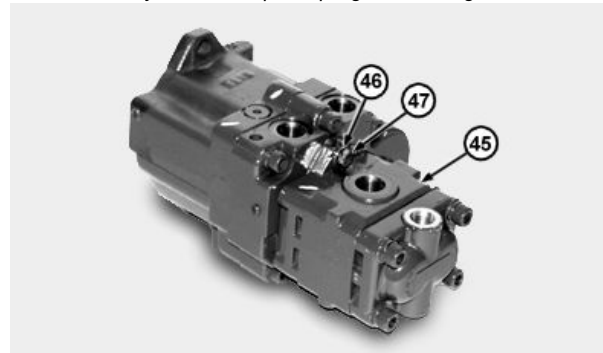
27. Install O-ring (49), hose fitting (15), and cap screws (48).

28. Install hydraulic pump 1, 2, and 3. See Hydraulic Pump 1, 2, and 3 Remove and Install. (Group 3360.)

- | | |
|--------------------------|------------------------|
| 35— Sealing Washer | 42— O-Ring |
| 36— Adjusting Screw | 43— Bushing |
| 37— Nut | 44— Coupling |
| 38— Lock Washer (5 used) | 45— Hydraulic Pump 3 |
| 39— Cap Screw (5 used) | 46— Washer (2 used) |
| 40— O-Ring | 47— Cap Screw (2 used) |
| 41— O-Ring | |



Hydraulic Pump Coupling and O-Rings



Hydraulic Pump 3 Cap Screw

JL58967.0000297 -19-12MAY15-24/24

T125693 —UN—14JAN00

T125692 —UN—14JAN00

Pilot Pump Remove and Install

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Cap Screw Torque	27 N·m 239 lb.-in.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

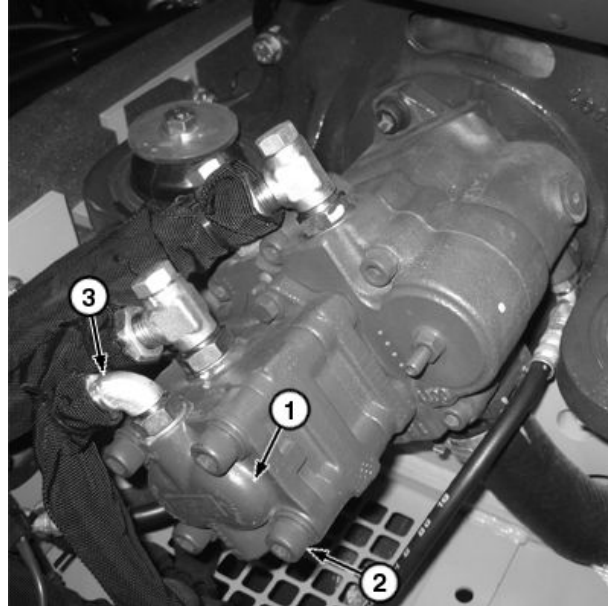
Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
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4. Install identification tags and disconnect pilot pump-to-pilot filter and bypass valve hose (3). Close all openings using caps and plugs. See Hydraulic System Pilot Line Connection. (Group 9025-15.)
5. Remove cap screws (2) and pilot pump (1).
6. Repair or replace as necessary. See Pilot Pump Disassemble and Assemble. (Group 3360.)
7. Install pilot pump and cap screws. Tighten to specification.

Specification

Cap Screw—Torque.....	27 N·m 239 lb.-in.
-----------------------	-----------------------



Pilot Pump

- 1— Pilot Pump
- 2— Cap Screw (4 used)
- 3— Pilot Pump-to-Pilot Filter and Bypass Valve Hose

8. Connect pilot pump-to-pilot filter and bypass valve hose. See Hydraulic System Pilot Line Connection. (Group 9025-15.)
9. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

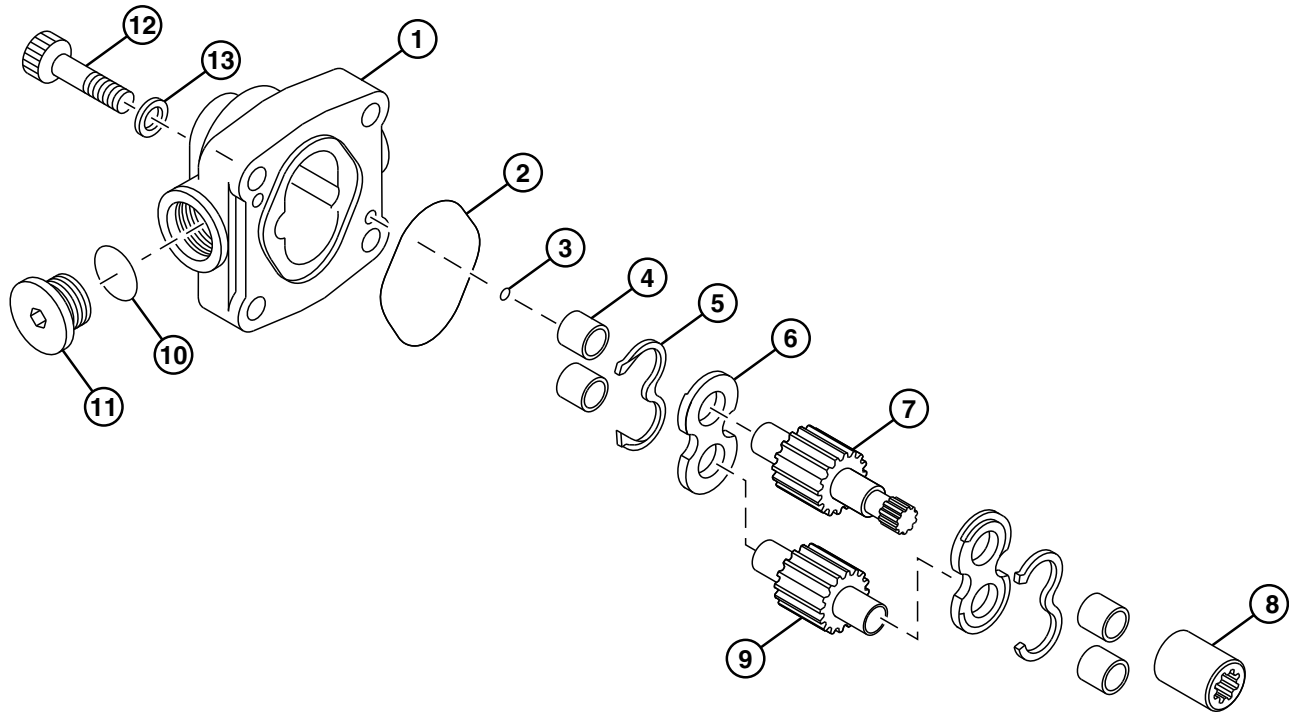
IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

10. Perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)
11. Operate machine and check for leaks.

TX1135923A —UN—03MAY13

BD53302,000176B -19-22MAY13-1/1

Pilot Pump Disassemble and Assemble



TX1135934—UN—03MAY13

TX1135934

Pilot Pump Components

- 1— Housing
- 2— O-Ring
- 3— Pin (2 used)
- 4— Bushing (4 used)

- 5— Seal (2 used)
- 6— Plate (2 used)
- 7— Drive Gear
- 8— Coupling

- 9— Drive Gear
- 10— O-Ring
- 11— Plug
- 12— Cap Screw (4 used)

- 13— Washer (4 used)

1. Remove pilot pump. See Pilot Pump Remove and Install. (Group 3360.)
2. Remove plug (11) and O-ring (10).
3. Remove drive gears (7 and 9) from housing (1).
4. Remove coupling (8), bushings (4), seals (5), and plates (6) from drive gears.
5. Remove O-ring (2).
6. Inspect parts. If parts appear to be rough or worn, replace pump.
7. Install O-ring (2).
8. Install plates, seals, bushings, and coupling to drive gears.
9. Install drive gears into housing.
10. Install O-ring (10) and plug.
11. Install pilot pump. See Pilot Pump Remove and Install. (Group 3360.)

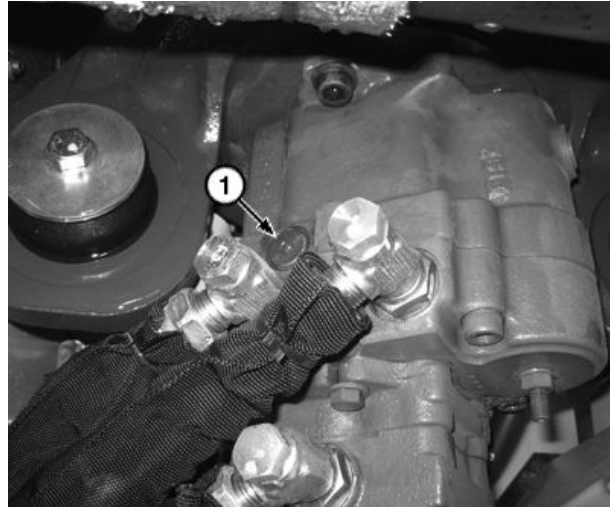
BD53302.000176A -19-03MAY13-1/1

Hydraulic Pump Start-Up Procedure

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting engine. Procedure must be performed whenever a new hydraulic pump is installed or oil has been drained from the pump or hydraulic oil tank.

Procedure is to ensure pump is filled with oil and air is bled from suction side of pump to prevent cavitation.

1. Check oil level in hydraulic oil tank. See Check Hydraulic Tank Oil Level. (Operator's Manual.) Add correct oil as necessary. See Hydraulic Oil. (Operator's Manual.) Tighten hydraulic oil tank cap.
2. Bleed air from hydraulic pump using following procedure:
 - a. Remove air bleed plug (1) from top of pump and fill pump with hydraulic oil.
 - b. Temporarily tighten air bleed plug.
 - c. Start engine and run at slow idle.
 - d. Slightly loosen air bleed plug until all air escapes and oil flows without air bubbles. Tighten air bleed plug.



Air Bleed Plug

1— Air Bleed Plug

3. Check oil level in hydraulic oil tank before operating machine.

TX1132872A—UN—13MAR13

JJ03229,0000846 -19-12MAR13-1/1

Pilot Pressure Regulator and Solenoid Valve Manifold Remove and Install—Pilot Shutoff and Travel Speed Solenoids

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32.0 L 8.5 gal.

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)

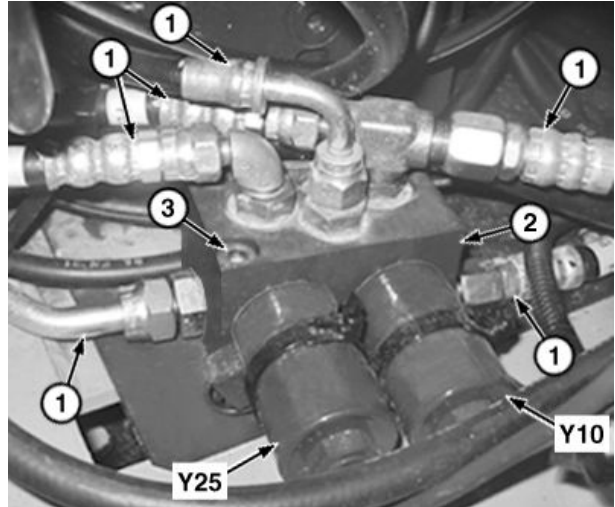
CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Slowly loosen hydraulic oil tank cap to release pressure.

2. Release hydraulic oil tank pressure by slowly loosening hydraulic oil tank cap. See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
3. Apply vacuum or drain hydraulic tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32.0 L 8.5 gal.
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4. Tilt operator's station. See [Tilting Operator's Station](#). (Operator's Manual.)
5. Install identification tags and disconnect pilot shutoff solenoid (Y10) and travel speed solenoid (Y25) electrical connectors. See [Floor Harness \(W1\) Component Location](#). (Group 9015-10.)
6. Install identification tags and disconnect hydraulic hoses (1). See [Hydraulic System Pilot Line Connection](#). (Group 9025-15.) Close all openings using caps and plugs.
7. Remove cap screws (3) and manifold body (2).
8. Inspect and repair as necessary. See [Pilot Pressure Regulator and Solenoid Valve Manifold Disassemble](#)



Pilot Pressure Regulator and Solenoid Valve Manifold

- 1— Hydraulic Hose (6 used)
- 2— Manifold Body
- 3— Cap Screw (2 used)
- Y10— Pilot Shutoff Solenoid
- Y25— Travel Speed Solenoid

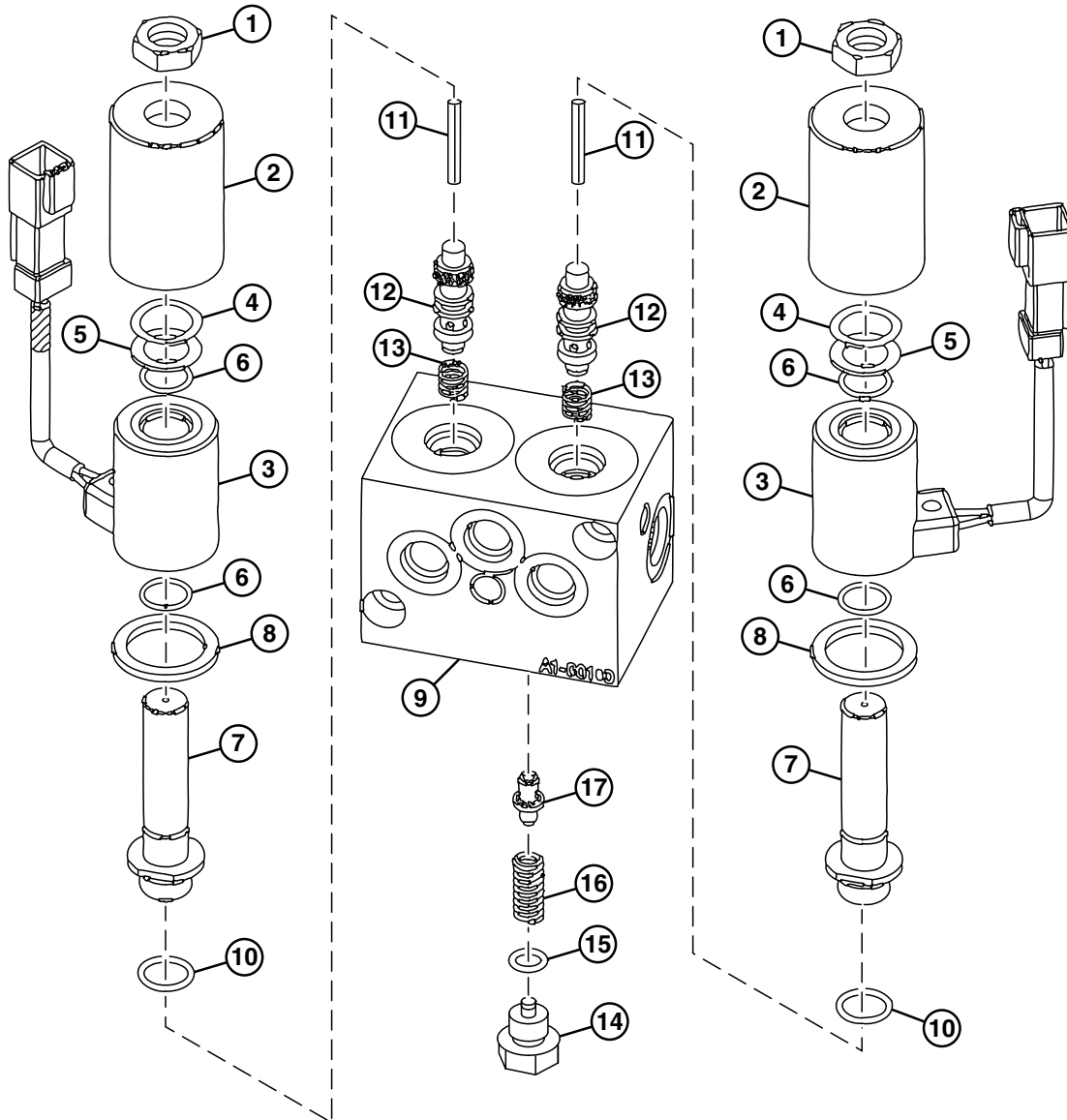
and Assemble—Pilot Shutoff and Travel Speed Valves. (Group 3360.)

9. Install manifold body and cap screws.
10. Connect hydraulic hoses.
11. Connect pilot shutoff solenoid (Y10) and travel speed solenoid (Y25) electrical connectors.
12. Lower operator's station. See [Tilting Operator's Station](#). (Operator's Manual.)
13. Remove vacuum or fill hydraulic tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)
14. Check hydraulic oil level. See [Check Hydraulic Tank Oil Level](#). (Operator's Manual.)

CW08338,0000EC5 -19-22MAY13-1/1

TX1134613A—UN—17APR13

Pilot Pressure Regulator and Solenoid Valve Manifold Disassemble and Assemble—Pilot Shutoff and Travel Speed Valves
Pilot Pressure Regulator Disassemble and Assemble



TX1133644

Pilot Pressure Regulator and Solenoid Valve Manifold

- | | | | |
|---------------------------|----------------------------|---------------------------|--------------------|
| 1— Nut (2 used) | 6— O-Ring (4 used) | 10— O-Ring (2 used) | 14— Adjustable Cap |
| 2— Case (2 used) | 7— Threaded Shaft (2 used) | 11— Shaft (2 used) | 15— O-Ring |
| 3— Solenoid Body (2 used) | 8— Large Plate (2 used) | 12— Spool (2 used) | 16— Spring |
| 4— Washer (2 used) | 9— Valve Body | 13— Spool Spring (2 used) | 17— Seat |
| 5— Plate (2 used) | | | |

SPECIFICATIONS

Adjustable Cap Torque	20 N·m 177 lb.-in.
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CW08338,0000EC0 -19-21MAY13-1/4

TX1133644 —UN—05APR13

Hydraulic System

1. Remove pilot pressure regulator and solenoid valve manifold. See Pilot Pressure Regulator and Solenoid Valve Manifold Remove and Install—Pilot Shutoff and Travel Speed Solenoids. (Group 3360.)
2. Secure valve body (9) with solenoids positioned downward.
3. Remove adjustable cap (14), O-ring (15), spring (16), and seat (17) from valve body.
4. Inspect and repair or replace parts as needed.
5. Clean and dry machined surfaces and components retained for assembly. Lubricate components with clean hydraulic oil.

6. Install seat, spring, O-ring (15), and adjustable cap into valve body. Tighten cap to specification.

Specification

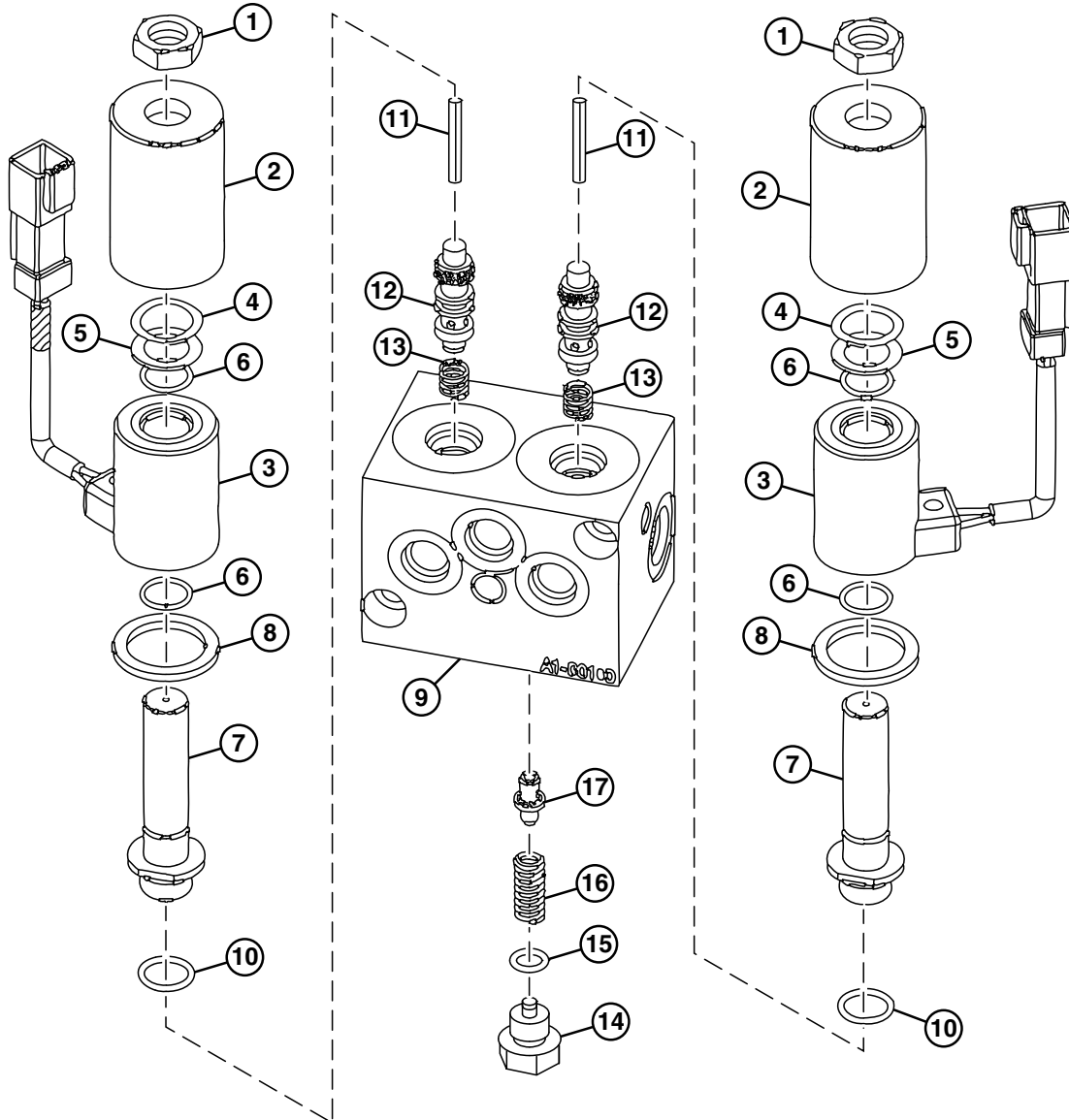
Adjustable
Cap—Torque.....20 N·m
177 lb.-in.

7. Install pilot pressure regulator and solenoid valve manifold. See Pilot Pressure Regulator and Solenoid Valve Manifold Remove and Install—Pilot Shutoff and Travel Speed Solenoids. (Group 3360.)

Continued on next page

CW08338,0000EC0 -19-21MAY13-2/4

Solenoid Valve Manifold Disassemble and Assemble



TX1133644

Pilot Pressure Regulator and Solenoid Valve Manifold

- | | | | |
|---------------------------|----------------------------|---------------------------|--------------------|
| 1— Nut (2 used) | 6— O-Ring (4 used) | 10— O-Ring (2 used) | 14— Adjustable Cap |
| 2— Case (2 used) | 7— Threaded Shaft (2 used) | 11— Shaft (2 used) | 15— O-Ring |
| 3— Solenoid Body (2 used) | 8— Large Plate (2 used) | 12— Spool (2 used) | 16— Spring |
| 4— Washer (2 used) | 9— Valve Body | 13— Spool Spring (2 used) | 17— Seat |
| 5— Plate (2 used) | | | |

1. Remove pilot pressure regulator and solenoid valve manifold. See Pilot Pressure Regulator and Solenoid Valve Manifold Remove and Install—Pilot Shutoff and Travel Speed Solenoids. (Group 3360.)

NOTE: Disassembly of both solenoids are identical. Steps for single solenoid disassembly shown.

2. Secure valve body (9) with solenoids positioned upright.

3. Remove nut (1) and slide case (2) off solenoid.

Continued on next page

CW08338,0000EC0 -19-21MAY13-3/4

TX1133644—UN—05APR13

Hydraulic System

4. Remove solenoid body (3), washer (4), plate (5), and O-rings (6) from threaded shaft (7).
 5. Remove large plate (8).
 6. Remove threaded shaft and O-rings (10).
 7. Remove shaft (11) and spool (12).
- NOTE: Using a magnet may aid in removal of spool spring (13).*
8. Remove spool spring (13) from valve body using a magnet.
 9. Inspect and repair or replace parts as needed.
 10. Clean and dry machined surfaces and components retained for assembly. Lubricate spools with clean hydraulic oil.
 11. Install spool spring, spool, shaft, O-ring (10), and threaded shaft into valve body.
 12. Install large plate, O-rings (6), plate, washer, and solenoid body on to threaded shaft.
 13. Install case and nut on to threaded shaft. Tighten nut.
 14. Install pilot pressure regulator and solenoid valve manifold. See Pilot Pressure Regulator and Solenoid Valve Manifold Remove and Install—Pilot Shutoff and Travel Speed Solenoids. (Group 3360.)

CW08338,0000ECO -19-21MAY13-4/4

Air Conditioner Torque Control Solenoid Valve Remove and Install

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	32.0 L 8.5 gal.
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1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

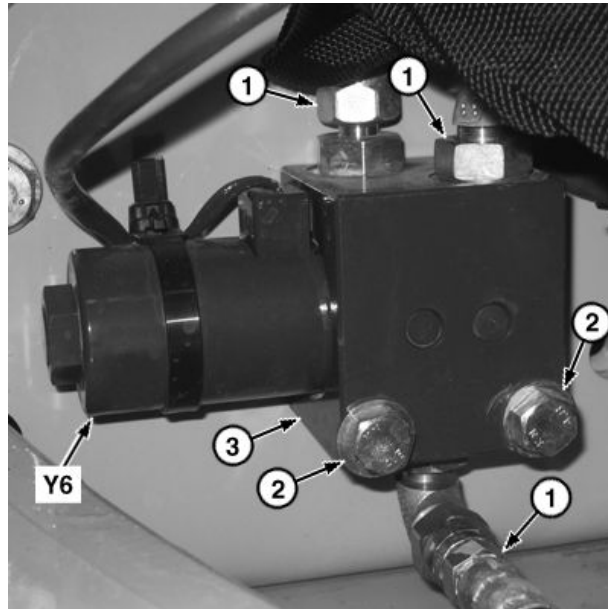
CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Slowly loosen hydraulic oil tank cap to release pressure.

2. Release hydraulic oil tank pressure by slowly loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum or drain hydraulic tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32.0 L 8.5 gal.
--	--------------------

4. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)
5. Install identification tags and disconnect air conditioner torque control solenoid (Y6) electrical connector. See Air Conditioner Harness (W3) Component Location. (Group 9015-10.)
6. Install identification tags and disconnect hydraulic hoses (1) from valve body (3). See Hydraulic System Pilot Line Connection. (Group 9025-15.) Close all openings using caps and plugs.
7. Remove cap screws (2) and valve body.
8. Repair or replace parts as necessary. See Air Conditioner Torque Control Solenoid Valve Disassemble and Assemble. (Group 3360.)



Air Conditioner Torque Control Solenoid

- 1—Hydraulic Hose (3 used)
- 2—Cap Screw (2 used)
- 3—Valve Body
- Y6—Air Conditioner Torque Control Solenoid

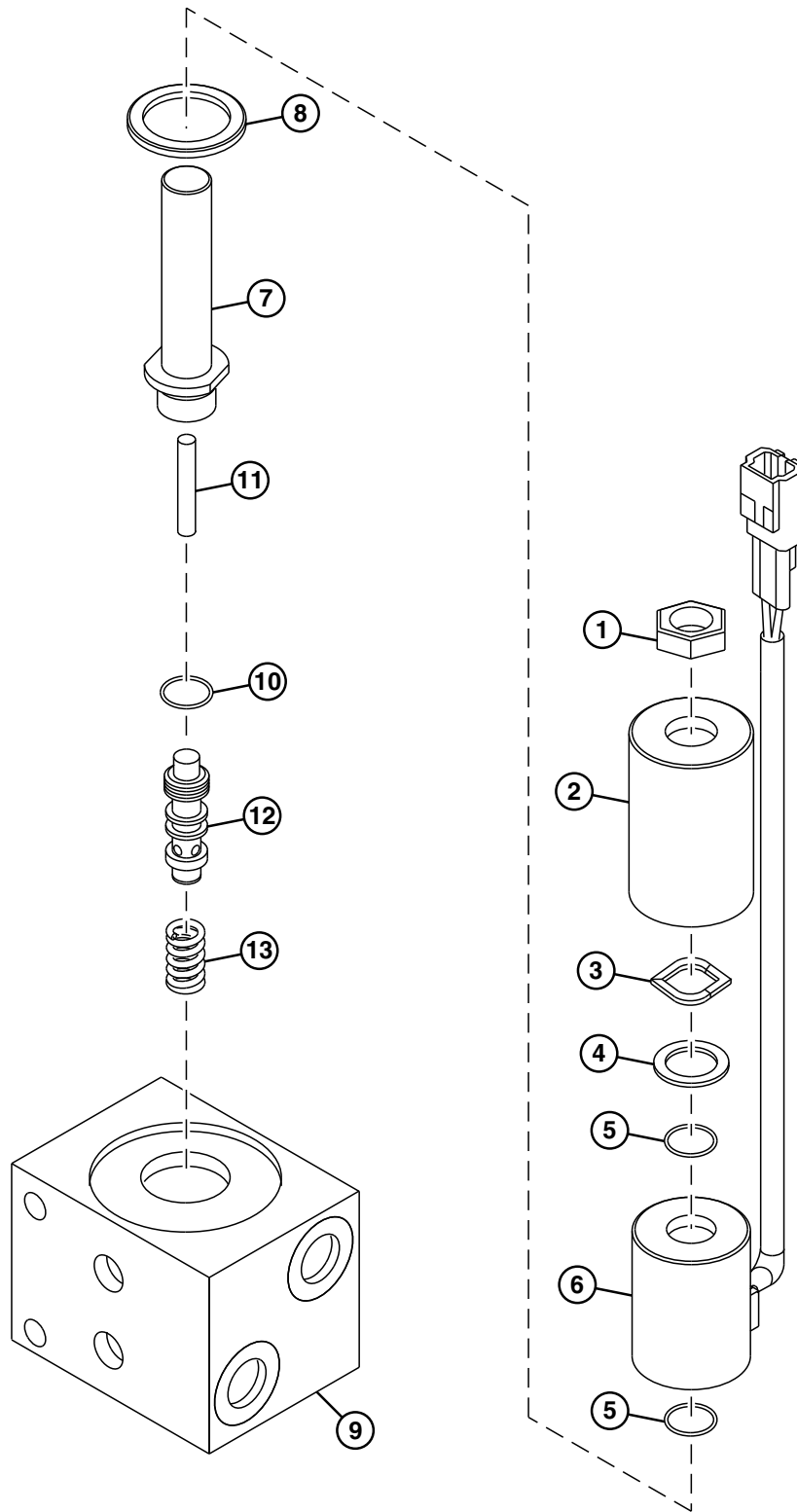
9. Install valve body and cap screws.
10. Connect hydraulic lines.
11. Connect air conditioner torque control solenoid (Y6) electrical connector.
12. Lower operator's station. See Tilting Operator's Station. (Operator's Manual.)
13. Remove vacuum or fill hydraulic tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
14. Operate machine and check for leaks.

TX1134640A—UN—17APR13

CW08338,0000EC6 -19-22MAY13-1/1

Hydraulic System

Air Conditioner Torque Control Solenoid Valve Disassemble and Assemble



TX1134424

Air Conditioner Torque Control Solenoid Valve

TX1134424 —UN—05APR13

Continued on next page

CW08338,0000EBF -19-19APR13-1/2

Hydraulic System

1— Nut
2— Case
3— Washer
4— Plate
5— O-Ring (2 used)

6— Solenoid Body
7— Threaded Shaft
8— Large Plate

9— Valve Body
10— O-Ring
11— Shaft
12— Spool

13— Spool Spring

1. Remove nut (1) and slide case (2) off solenoid body (6).
 2. Remove solenoid body, washer (3), plate (4), and O-rings (5) from threaded shaft (7).
 3. Remove large plate (8).
 4. Remove threaded shaft from valve body (9) and remove O-ring (10).
 5. Remove shaft (11) and spool (12).
 6. Remove spool spring (13) from valve body using a magnet.
 7. Inspect and repair or replace parts as needed.
 8. Clean and dry machined surfaces and components retained for assembly. Lubricate spool with clean hydraulic oil.
 9. Install spool spring, spool, shaft, O-ring (10), and threaded shaft into valve body.
 10. Install large plate, O-rings (5), plate, washer, and solenoid body onto threaded shaft.
 11. Install case and nut onto threaded shaft. Tighten nut.
- NOTE: Using a magnet may aid in removal of spool spring (13).*

CW08338,0000EBF -19-19APR13-2/2

Pilot Valve (Left and Right) Remove and Install

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Lock Nut Torque	30 N·m 22 lb.-ft.

1. Park and prepare for machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

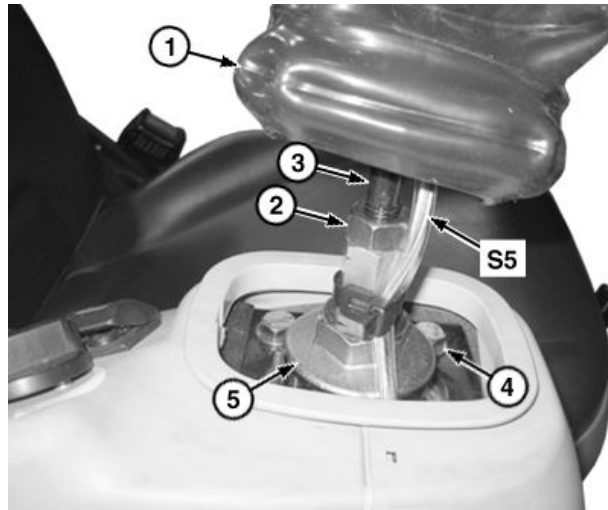
Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Remove console covers. See Left and Right Console Covers Remove and Install. (Group 1821.)

NOTE: Right and left pilot valves are identical. Remove and install procedure is the same.

5. Raise boot (1) and remove tie band from horn switch (S5).



Pilot Valve

- | | |
|-------------|-----------------------|
| 1— Boot | 4— Cap Screw (4 used) |
| 2— Lock Nut | 5— Pilot Valve |
| 3— Lever | S5— Horn Switch |

6. Install identification tag and disconnect horn switch (S5) connector. See Cab Harness (W5) Component Location. (Group 9015-10.)
7. Remove lock nut (2) and remove lever (3) from threaded shaft.

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BD53302,000172F -19-22MAY13-1/2

TX1134250A—UN—04APR13

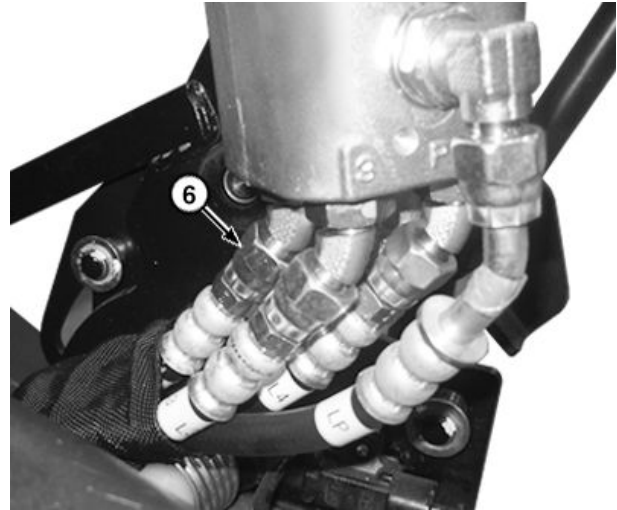
8. Install identification tags and disconnect pilot valve hydraulic hoses (6) from pilot valve (5). Close all openings using caps and plugs. See Pilot Control Lever Pattern Selector Valve Line Connection. (Group 9025-15.)
9. Remove cap screws (4) and pilot valve.
10. Repair or replace parts as necessary. See Pilot Valve (Left and Right) Disassemble and Assemble. (Group 3360.)
11. Install pilot valve and cap screws.
12. Connect pilot valve hydraulic hoses. See Pilot Control Lever Pattern Selector Valve Line Connection. (Group 9025-15.)
13. Install lever by threading onto shaft. Install lock nut and tighten to specification.

Specification

Lock Nut—Torque.....30 N·m
22 lb.-ft.

14. Connect horn switch (S5) connector and install tie band. See Cab Harness (W5) Component Location. (Group 9015-15.)
15. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.



Pilot Valve Hydraulic Hoses

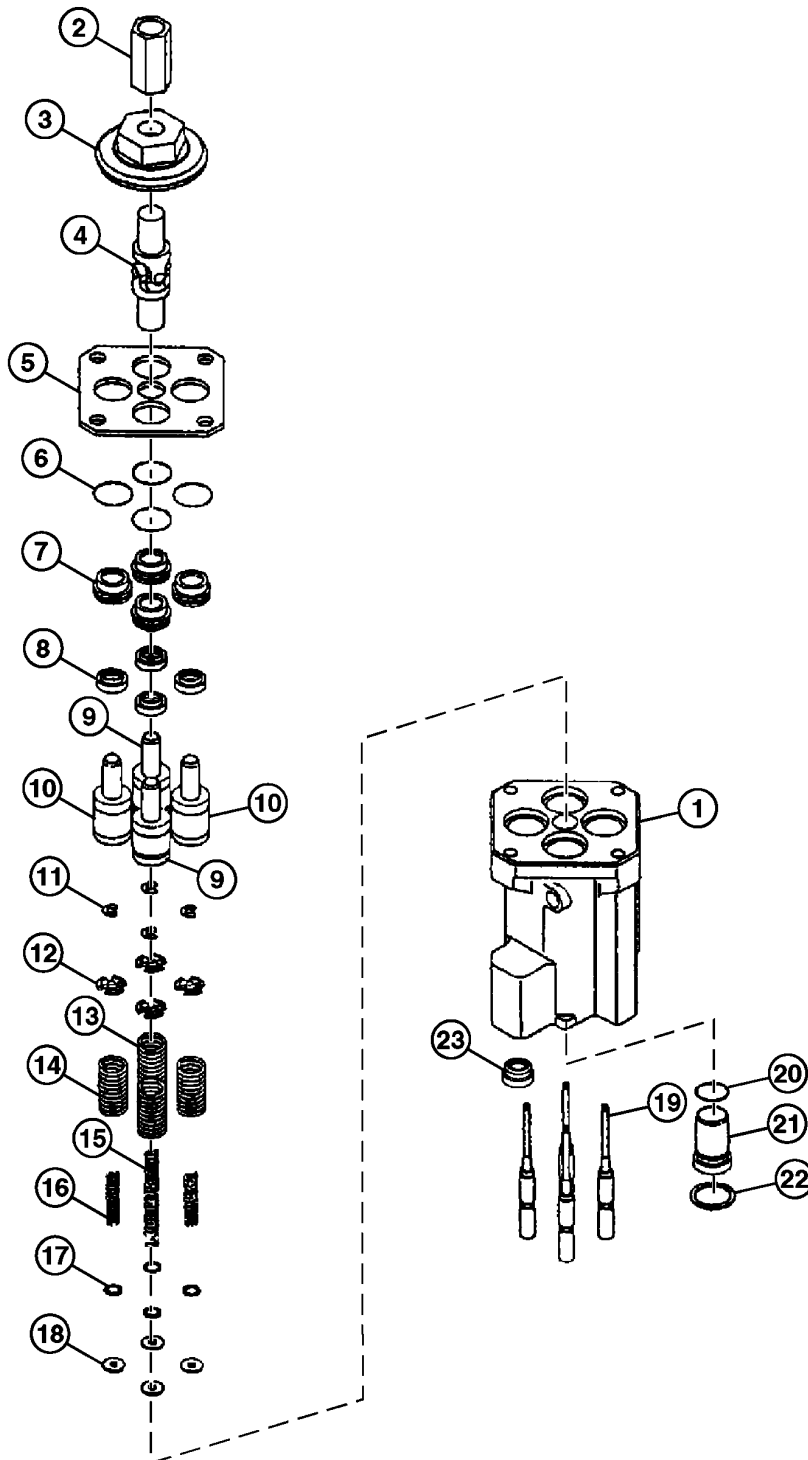
6— Hydraulic Hose (6 used)

16. Perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)
17. Operate machine and check for leaks. Verify all pilot control functions operate correctly. See Operational Checkout. (Group 9005-10.)
18. Install console covers. See Left and Right Console Covers Remove and Install. (Group 1821.)

TX1134249A—UN—04APR13

BD53302.000172F -19-22MAY13-2/2

Pilot Valve (Left and Right) Disassemble and Assemble



TX1096302

Pilot Control Valve

Continued on next page

JJ03229,0000874 -19-01MAY13-1/7

TX1096302—UN—18AUG11

Hydraulic System

- 1— Housing
- 2— Coupling
- 3— Cam
- 4— Universal Joint
- 5— Plate
- 6— O-Ring (4 used)
- 7— Sleeve (4 used)
- 8— Oil Seal (4 used)

- 9— Pusher (2 used)
- 10— Pusher (2 used)
- 11— Snap Ring (4 used)
- 12— Spring Guide (4 used)
- 13— Return Spring (2 used)

- 14— Return Spring (2 used)
- 15— Balance Spring (2 used)
- 16— Balance Spring (2 used)
- 17— Shim (4 used)
- 18— Spacer (4 used)

- 19— Spool (4 used)
- 20— O-Ring
- 21— Plug
- 22— Snap Ring
- 23— Plug

SPECIFICATIONS	
Plug Torque	20 N·m 178 lb.-in.
Universal Joint Torque	25 N·m 222 lb.-in.
Cam-to-Pusher Clearance	0—0.2 mm 0—0.008 in.
Coupling-to-Cam and Universal Joint Torque	70 N·m 52 lb.-ft.

ESSENTIAL TOOLS	
ST4145 Spool Holder	
ST4146 Spring Compressor	
ST4144 Snap Ring Holder	

OTHER MATERIAL	
TY6341 Multipurpose SD Polyurea Grease	
271 Loctite® Thread Lock and Sealer (high strength)	

1. Remove pilot valve (left and right). See Pilot Valve (Left and Right) Remove and Install. (Group 3360.)

Loctite is a trademark of Henkel Corporation

2. Remove cam (3) from universal joint (4).

NOTE: Do not remove universal joint (4) unless worn or damaged.

3. Remove universal joint if replacement is needed.

IMPORTANT: Avoid possible component damage. Do not attempt to remove oil seals (8) from sleeves (7).

4. Remove sleeves (7) and O-rings (6).

5. Remove O-rings (6) from sleeves.

IMPORTANT: Avoid possible housing damage. Some parts from housing ports 1 and 3 are different than parts from housing ports 2 and 4. Parts for each port must be kept together and installed into the same port from which they were removed. Port numbers are stamped on the housing.

6. Remove pushers (9 and 10) and install identification tags.

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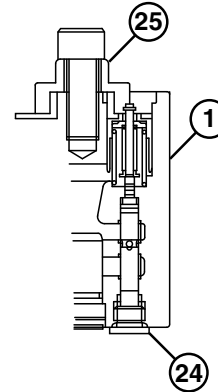
JJ03229,0000874 -19-01MAY13-2/7

IMPORTANT: Avoid possible component damage. Do not lower spool (19) when compressing return springs (13 and 14).

7. Install ST4145 Spool Holder (24) into port hole on housing.
8. Install ST4146 Spring Compressor (25) into pusher hole on housing.
9. Push tool to compress return springs and tighten tool by using an M14 x 2.0 mm pitch cap screw.
10. Remove snap rings (11) from spools.
11. Remove ST4146 Spring Compressor.
12. Remove spring guides (12), return springs (13 and 14), and balance springs (15 and 16) from spools and install identification tags.

IMPORTANT: Avoid possible spool damage. Keep shims (17) in order during removal. Quantity of shims has been determined for each port during the performance testing.

13. Remove shims (17) and spacers (18).
14. Remove spool holder.
15. Remove spools (19).
16. Remove snap ring (22).
17. Install an M8 x 1.25 mm pitch cap screw to plug (21) to remove from housing.
18. Remove O-ring (20) from plug.



Spring Removal Tools

- | | |
|-------------------------|------------------------------|
| 1— Housing | 25— ST4146 Spring Compressor |
| 24— ST4145 Spool Holder | |

19. Remove plug (23).

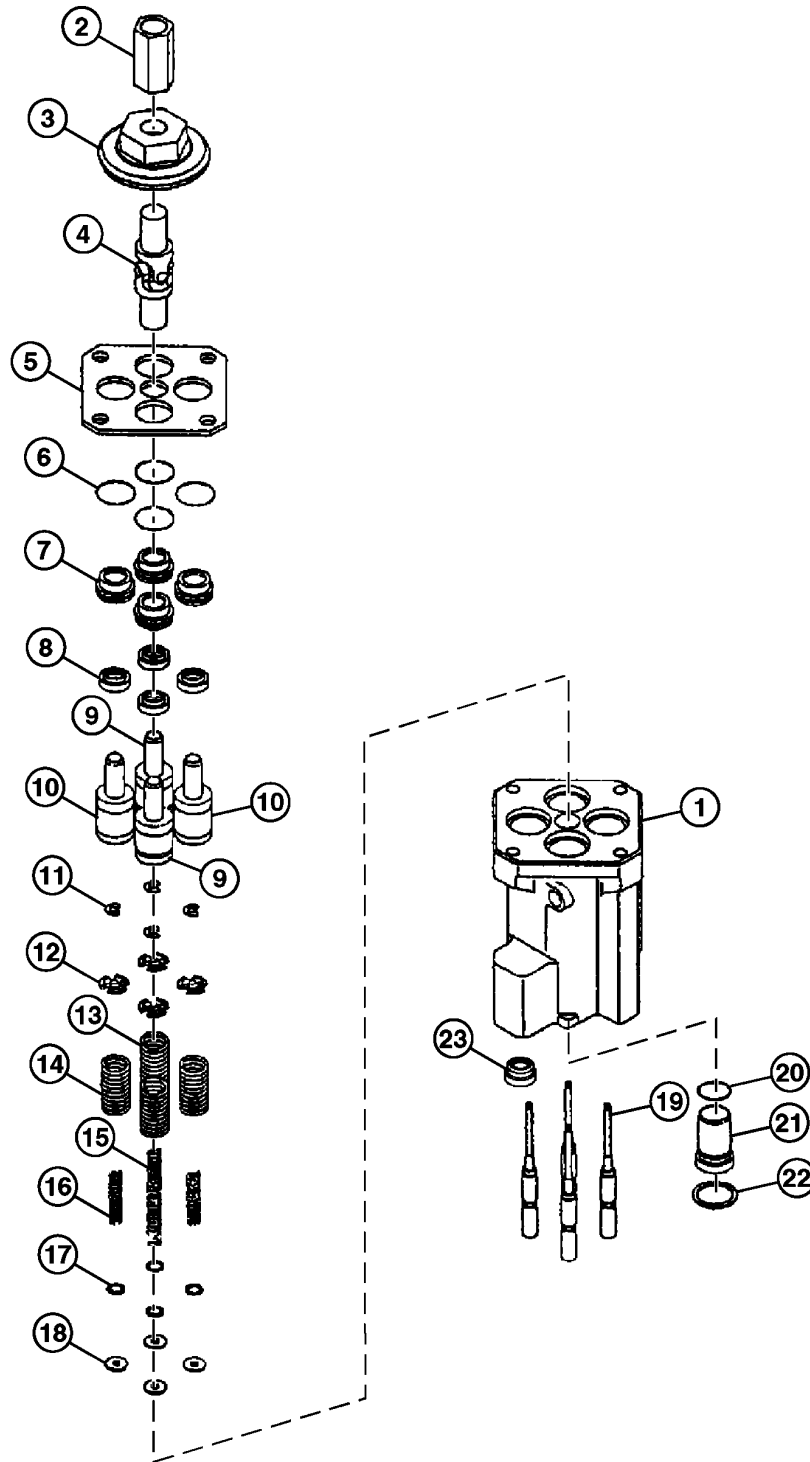
NOTE: Spools have been selected to match the holes of housing. Spools and housing must be replaced as an assembly.

20. Clean and inspect parts. Repair or replace as necessary.

Continued on next page

JJ03229,0000874 -19-01MAY13-3/7

TX1096325—UN—24AUG11



TX1096302

Pilot Control Valve

Continued on next page

JJ03229,0000874 -19-01MAY13-4/7

TX1096302—UN—18AUG11

Hydraulic System

- | | | | |
|---|--|--|---|
| 1— Housing
2— Coupling
3— Cam
4— Universal Joint
5— Plate
6— O-Ring (4 used)
7— Sleeve (4 used)
8— Oil Seal (4 used) | 9— Pusher (2 used)
10— Pusher (2 used)
11— Snap Ring (4 used)
12— Spring Guide (4 used)
13— Return Spring (2 used) | 14— Return Spring (2 used)
15— Balance Spring (2 used)
16— Balance Spring (2 used)
17— Shim (4 used)
18— Spacer (4 used) | 19— Spool (4 used)
20— O-Ring
21— Plug
22— Snap Ring
23— Plug |
|---|--|--|---|

IMPORTANT: Avoid possible valve damage. Apply clean hydraulic oil to parts prior to installation.

21. Install plug (23) and tighten to specification.

Specification

Plug—Torque.....20 N·m
 178 lb.-in.

22. Install O-ring (20) on to plug (21).

23. Install plug and snap ring (22).

IMPORTANT: Avoid possible component damage. Components are select fit to bores. Install components in the same bore that they were removed from otherwise leaks will occur.

24. Install spools to their correct port holes in housing.

JJ03229,0000874 -19-01MAY13-5/7

25. Install ST4145 Spool Holder to the port hole on housing.

26. Install spacers to spools.

27. Install shims to spools. Use same amount of shims as disassembly.

IMPORTANT: Avoid possible component damage. Ports 1 and 3 use short balance springs. Ports 2 and 4 use long balance springs.

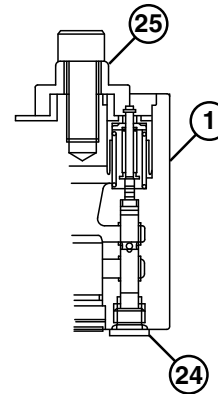
28. Install balance springs to spools.

IMPORTANT: Avoid possible component damage. Ports 1 and 3 use short return springs. Ports 2 and 4 use long return springs.

29. Install return springs to spools.

30. Install ST4146 Spring Compressor into pusher holes in housing. Tighten spring compressor with M14 x 2.00 mm pitch cap screw.

31. Install spring guides with protrusion facing upward.



Spring Removal Tools

- | | |
|---------------------------------------|------------------------------|
| 1— Housing
24— ST4145 Spool Holder | 25— ST4146 Spring Compressor |
|---------------------------------------|------------------------------|

Continued on next page

JJ03229,0000874 -19-01MAY13-6/7

TX1096325—UN—24AUG11

32. Install snap rings (11) to ST4144 Snap Ring Holder (26).
33. Install snap rings (11) into groove on head of spools remaining out of spring compressor.

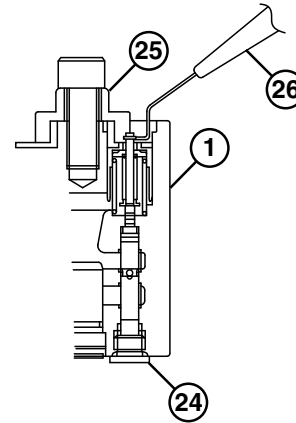
IMPORTANT: Avoid possible component damage. Ports 1 and 3 use pushers with one outer groove. Ports 2 and 4 use pushers with two outer grooves.

34. Install pushers into housing by hand.
35. Verify snap rings (11) and balance springs are installed correctly.
36. Install pushers to housing.
37. Apply TY6341 Multipurpose SD Polyurea Grease to ball at ends of pushers.
38. Apply TY6341 Multipurpose SD Polyurea Grease to joint of universal joint and to inner surface of sleeve seals.
39. Apply TY6341 Multipurpose SD Polyurea Grease to inner surface of oil seals.
40. Install O-rings (6) and sleeves.
41. Apply PM37421 Thread Lock and Sealer (high strength) to the threads of universal joint.
42. Secure plate by aligning cap screw holes in plate with cap screw holes in housing and install universal joint. Tighten universal joint to specification.

Specification

Universal Joint—Torque.....25 N·m
222 lb.-in.

43. Install cam on to universal joint. Check clearance between cam and pushers.



Snap Ring Installation Tool

- | | |
|-------------------------|------------------------------|
| 1— Housing | 25— ST4146 Spring Compressor |
| 24— ST4145 Spool Holder | 26— ST4144 Snap Ring Holder |

Specification

Cam-to-Pusher—Clearance.....0—0.2 mm
0—0.008 in.

44. Hold cam and tighten coupling to specification.

Specification

Coupling-to-Cam and Universal Joint—Torque.....70 N·m
52 lb.-ft.

45. Install pilot valve (left and right). See Pilot Valve (Left and Right) Remove and Install. (Group 3360.)

JJ03229.0000874 -19-01MAY13-7/7

TX1096326—JUN—24AUG11

Travel Pilot Valve Remove and Install

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
---	------------------

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)
5. Disconnect travel alarm pressure sensor (B34). See Floor Harness (W1) Component Location. (Group 9015-10.)



Travel Pilot Valve Hoses (under cab)

1— Travel Pilot Hose (6 used) B34— Travel Alarm Pressure Sensor

6. Install identification tags and disconnect travel pilot hoses (1). See Travel Hydraulic System Line Connection. (Group 9025-15.) Close all openings using caps and plugs.

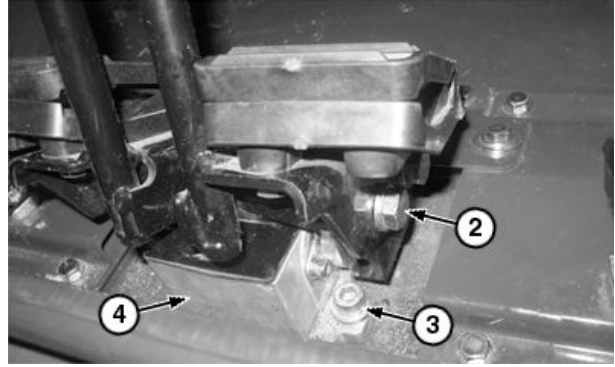
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JA66566,0002A88 -19-22MAY13-1/2

TX1135099A —UN—16APR13

Hydraulic System

7. Remove floor mat from inside cab.
8. Remove cap screws (2), pedals, and levers.
9. Remove cap screws (3) and remove travel pilot valve (4).
10. Repair or replace parts as necessary. See Travel Pilot Valve Disassemble and Assemble. (Group 3360.)
11. Install travel pilot valve and cap screws (3).
12. Install pedals, levers, and cap screws (2).
13. Install floor mat.
14. Connect hydraulic hoses. See Travel Hydraulic System Line Connection. (Group 9025-15.)
15. Lower operator's station. See Tilting Operator's Station. (Operator's Manual.)
16. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)



Travel Pilot Valve

2— Cap Screw (4 used)
3— Cap Screw (2 used)

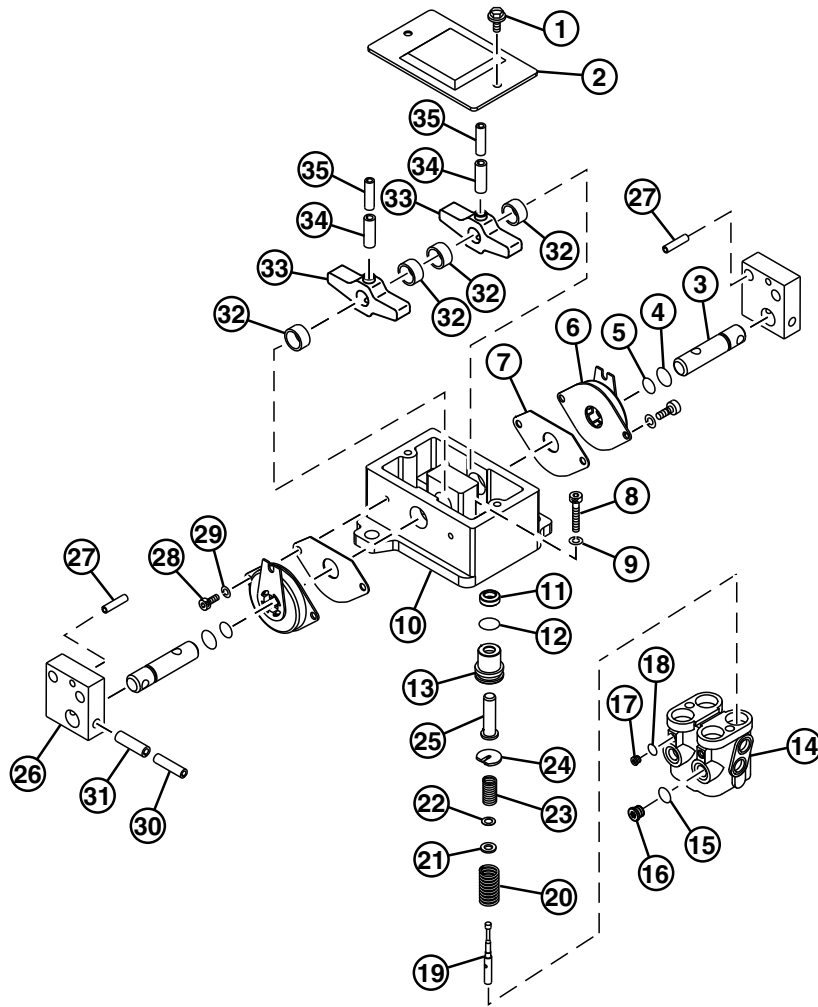
4— Travel Pilot Valve

17. Operate machine and check for leaks. Verify all travel functions for correct operation. See Operational Checkout. (Group 9005-10.)

JA66566,0002A88 -19-22MAY13-2/2

TX1135103A—JN—16APR13

Travel Pilot Valve Disassemble and Assemble



Travel Pilot Valve Components

TX1114720 —UN—25MAY12

TX1114720

- | | | | |
|-------------------------|-----------------------|-----------------------------|-------------------------|
| 1— Cap Screw (2 used) | 10— Holder | 22— Shim (as required) | 30— Spring Pin (2 used) |
| 2— Cover | 11— Oil Seal (4 used) | 23— Balance Spring (4 used) | 31— Spring Pin (2 used) |
| 3— Pin (2 used) | 12— O-Ring (4 used) | 24— Spring Guide (4 used) | 32— Bushing (4 used) |
| 4— O-Ring (2 used) | 13— Bushing (4 used) | 25— Pusher (4 used) | 33— Cam (2 used) |
| 5— O-Ring (2 used) | 14— Casing | 26— Bracket (2 used) | 34— Spring Pin (2 used) |
| 6— Damper (2 used) | 15— O-Ring | 27— Spring Pin (2 used) | 35— Spring Pin (2 used) |
| 7— Rubber Seat (2 used) | 16— Plug | 28— Cap Screw (4 used) | |
| 8— Cap Screw (2 used) | 17— Plug | 29— Lock Washer (4 used) | |
| 9— Lock Washer (2 used) | 18— O-Ring | | |
| | 19— Spool (4 used) | | |
| | 20— Spring (4 used) | | |
| | 21— Spacer (4 used) | | |

SPECIFICATIONS	
Damper-to-Holder Cap Screw Torque	7 N·m 62 lb.-in.
Plug (small) Torque	10 N·m 89 lb.-in.
Plug (large) Torque	20 N·m 177 lb.-in.
Holder-to-Casing Cap Screw Torque	50 N·m 37 lb.-ft.
Cover-to-Holder Cap Screw Torque	5 N·m 44.3 lb.-in.

1. Remove travel pilot valve. See Travel Pilot Valve Remove and Install. (Group 3360.)

NOTE: The casing (14) and spools (19) are replaced as an assembly because the spools are select-fitted to bores in housing.

Note port location and quantity of shims (22) when removing. Same number of shims must be used when installing.

Continued on next page

JL58967,00002A2 -19-12MAY15-1/3

NOTE: Remember to keep parts removed from each port together. Identify each group of parts by port numbers stamped on casing.

2. Remove cover (2) and cap screws (1).
3. Remove cap screws (8), lock washers (9), and holder (10) from casing (14).
4. Remove pushers (25) as assemblies from casing.
5. Remove pushers, oil seals (11), and O-rings (12) from bushings (13).

NOTE: Note port location of spools (19) when removing. Spool must be installed in same port.

6. Remove spools, spring guides (24), balance springs (23), shims (22), and spacers (21) from casing by rotating.
7. Record number of shims removed.
8. Compress balance spring and remove spring guide, balance spring, shims, and spacer from spool.
9. Remove springs (20).
10. Remove O-ring (15) and plug (16).
11. Remove O-ring (18) and plug (17).

IMPORTANT: Avoid pin (3) damage. Place a stand under bracket (26) for support.

NOTE: Remove spring pins (27) only if necessary.

NOTE: Spring pins (30 and 31) are stepped and can only be removed from one direction. Marks should be installed on brackets to show installation direction of spring pins.

12. Remove spring pins (30 and 31) and brackets.
13. Remove cap screws (28) and lock washers (29).
14. Remove rubber seats (7), dampers (6), and O-rings (4) from pins (3).

NOTE: Spring pins (34 and 35) are stepped and can only be removed from one direction.

15. Remove spring pins (34 and 35) from cams (33) and pins.
16. Remove pins and cams.
17. Remove O-rings (5).
18. Remove bushings (32) only if necessary.
19. Repair or replace parts as necessary.

IMPORTANT: To prevent seizing, apply clean hydraulic oil to parts before assembling.

NOTE: Bushings must be flush with hole end in holder.

20. Install bushings if removed.
21. Apply multipurpose grease to O-rings (5) and install on pins (3).

NOTE: Note direction of insertion for spring pins (34 and 35).

22. Assemble cams (33) in holder (10) with spring pins and pins. Install spring pins with slits 90° apart.
23. Lock spring pins in position by displacing the bore above spring pin using a punch and hammer.
24. Install rubber seats (7) and dampers (6) on pins with lever facing upward.
25. Install cap screws (28) and lock washers (29). Tighten to specification.

Specification

Damper-to-Holder Cap	
Screw—Torque.....	7 N·m 62 lb.-in.

26. Apply multipurpose grease to O-rings (4) and install on pins.

NOTE: Note direction of insertion for spring pins (30 and 31).

Spring pins must be positioned with slits 90° apart.

IMPORTANT: Avoid pin damage. Place a stand under bracket (26) for support.

27. Align brackets with marks made during disassembly and install with spring pins.
28. Lock spring pins in position by slightly displacing the bore above spring pin using a punch and hammer.
29. Install O-ring (18) and plug (17). Tighten plug to specification.

Specification

Plug (small)—Torque.....	10 N·m 89 lb.-in.
--------------------------	----------------------

30. Install O-ring (15) and plug (16). Tighten plug to specification.

Specification

Plug (large)—Torque.....	20 N·m 177 lb.-in.
--------------------------	-----------------------

31. Install springs (20).
32. Using the same number of shims (22) as removed, install spacers (21), shims, and balance springs (23) on to spool.
33. Compress balance springs and install spring guides (24) with stepped end facing down.

NOTE: Note port location of spools when installing. Spool must be installed in same port.

Hydraulic System

34. Install spools, spring guides, balance springs, shims, and spacers into casing by rotating.
35. Install oil seals (11), O-rings (12), and pushers (25) to bushings (13).
36. Apply multipurpose grease to the end of each pusher and to oil seals.
37. Install pusher assemblies into casing.
38. Install holder (10) to casing (14) with cap screws (8) and lock washers (9). Tighten to specification.

Specification

Holder-to-Casing Cap	
Screw—Torque.....	50 N·m 37 lb.-ft.

39. Install cover (2) and cap screws (1). Tighten to specification.

Specification

Cover-to-Holder Cap	
Screw—Torque.....	5 N·m 44.3 lb.-in.

40. Apply multipurpose grease to spring pins (27).
41. Install travel pilot valve. See Travel Pilot Valve Remove and Install. (Group 3360.)

JL58967,00002A2 -19-12MAY15-3/3

Boom Swing Pilot Valve Remove and Install

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
---	------------------

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

⚠ CAUTION: Avoid personal injury from high-pressure fluid. High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum to hydraulic system or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------



Boom Swing Pilot Valve

1— Cap Screw (2 used) 2— Boom Swing Pilot Valve

4. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)

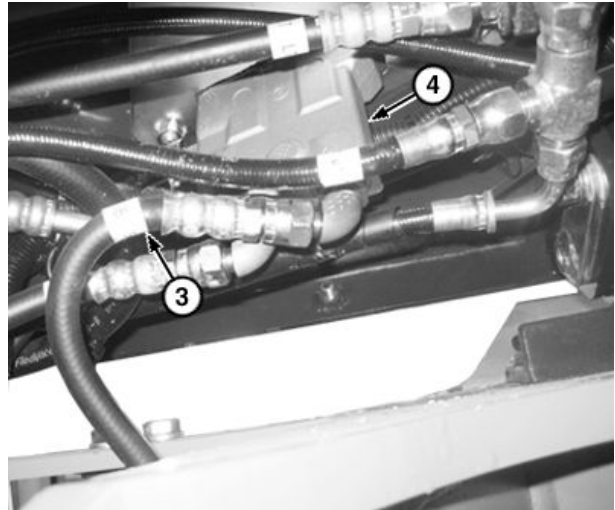
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JJ03229,0000867 -19-23MAY13-1/2

Hydraulic System

5. Install identification tags and disconnect hydraulic hoses underneath cab. Close all openings using caps and plugs.
6. Remove cap screws (1) and remove boom swing pilot valve (2).
7. Repair or replace parts as necessary. See Boom Swing Pilot Valve Disassemble and Assemble. (Group 3360.)
8. Install boom swing pilot valve and cap screws.
9. Connect hydraulic hoses.
10. Lower operator's station. See Tilting Operator's Station. (Operator's Manual.)
11. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
12. Operate machine and check for leaks. Verify all travel functions for correct operation. See Operational Checkout. (Group 9005-10.)



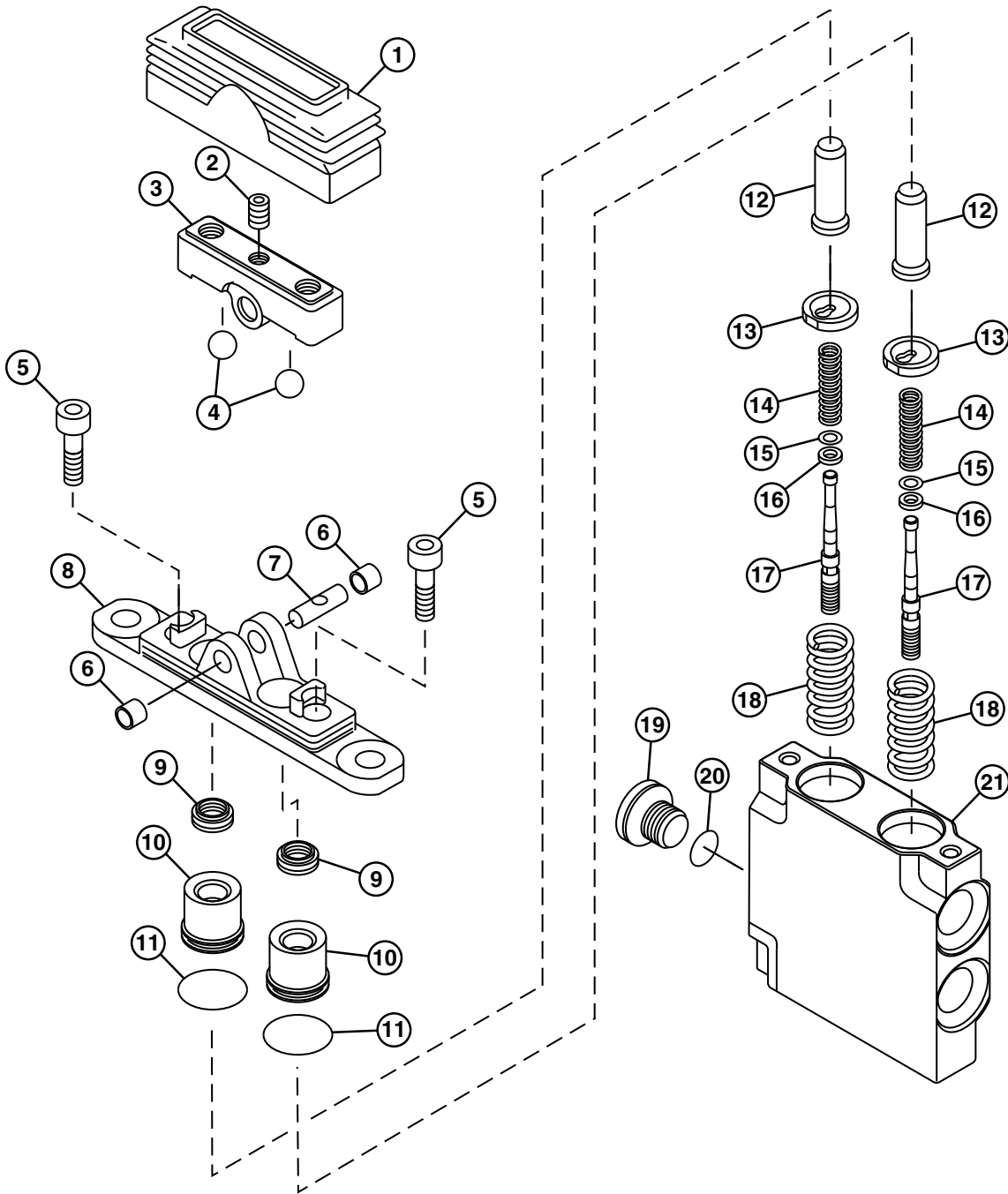
Boom Swing Valve Hoses (under cab)

3— Boom Swing Hose (4 used) 4— Boom Swing Valve

TX1135848A—UN—07MAY13

JJ03229,0000867 -19-23MAY13-2/2

Boom Swing Pilot Valve Disassemble and Assemble



TX1045655

Boom Swing Control

- | | | | |
|------------------------|-----------------------|---------------------------|---------------------------|
| 1— Boot | 7— Shaft | 13— Spring Seat (2 used) | 18— Outer Spring (2 used) |
| 2— Set Screw | 8— Bracket | 14— Inner Spring (2 used) | 19— Plug |
| 3— Cam | 9— Packing (2 used) | 15— Shim (2 used) | 20— O-Ring |
| 4— Steel Ball (2 used) | 10— Plug (2 used) | 16— Washer (2 used) | 21— Housing |
| 5— Cap Screw (2 used) | 11— O-Ring (2 used) | 17— Spool (2 used) | |
| 6— Bushing (2 used) | 12— Push Rod (2 used) | | |

Continued on next page

JJ03229,000088E -19-10MAY13-1/2

TX1045655 —UN—07NOV17

Hydraulic System

SPECIFICATIONS	
Cover-to-Housing Cap Screw—Torque	23.5 N·m 208 lb.-in.
Cam-to-Shaft Set Screw—Torque	5 N·m 44 lb.-in.

OTHER MATERIAL
242 Loctite® Thread Lock and Sealer (medium strength)

IMPORTANT: If damage to cam (3), bracket (8), push rods (12), spools (17), or housing (21) is noticed, the pilot controller must be replaced.

NOTE: The housing (21) and spools (17) are replaced as an assembly because the spools are select-fitted to bores in housing.

Note port location and quantity of shims (15) when removing. Same number of shims must be used when installing.

NOTE: Remember to keep parts removed from each port together. Identify each group of parts by port numbers stamped on casing.

1. Remove set screw (2).
2. Remove shaft (7) to remove cam (3) from bracket (8). Do not remove steel balls (4).
3. Loosen cap screws (5) to relieve the slight spring force. Remove bracket (8) from housing (21).
4. Remove packing (9), plugs (10), O-rings (11), and push rods (12).

NOTE: Note port location of spools (17) when removing. Spool must be installed in same port.

5. Remove spools, spring guides (13), balance springs (14), shims (15), and spacers (16) from casing by rotating.
6. Record number of shims removed.
7. Compress balance spring and remove spring guide, balance spring, shims, and spacer from spool.

Loctite is a trademark of Henkel Corporation

8. Remove springs (18).
9. Repair or replace parts as necessary.
10. Install springs (18).
11. Using the same number of shims (15) as removed, install spacers (16), shims, and balance springs (14) on to spool.
12. Compress balance springs and install spring guides (13) with stepped end facing down.
13. Install spools, spring guides, balance springs, shims, and spacers into casing by rotating.
14. Install O-rings (11) on plugs.
15. Apply grease to packing (9). Install packing in plugs (10) with lip toward O-ring end of plug.
16. Apply hydraulic oil to push rods (12) before pushing rod through the packing in plugs. Install plug and push rod into housing.
17. Install bracket. Tighten cap screws to specification.

Specification

Cover-to-Housing Cap Screw—Torque.....	23.5 N·m 208 lb.-in.
--	-------------------------

18. Install cam. Install the shafts through cover and cam so hole in shaft aligns with tapped hole in cam.
19. Apply PM37418 Thread Lock and Sealer (medium strength) to threads of set screw. Tighten set screw to specification.

Specification

Cam-to-Shaft Set Screw—Torque.....	5 N·m 44 lb.-in.
------------------------------------	---------------------

JJ03229,000088E -19-10MAY13-2/2

Control Valve Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Control Valve Weight (approximate)	35 kg 77.2 lb.
Control Valve Cap Screw Torque	50 N·m 37 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Disconnect battery negative (-) cable.

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
4. Drain hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

5. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)
6. Install identification tags and disconnect auto-idle (A/I) pressure sensor (B32). See Floor Harness (W1) Component Location. (Group 9015-10.)
7. Install Identification tags and disconnect hydraulic hoses (1) from control valve (2). Close all openings using caps and plugs. See Control Valve Line Identification. (Group 9025-15.)
8. Remove cap screws (3) from underside of main frame.

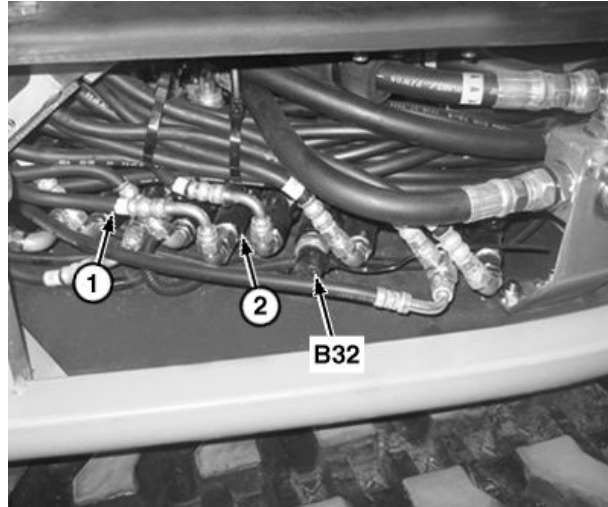
CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

9. Using appropriate lifting device, remove control valve.

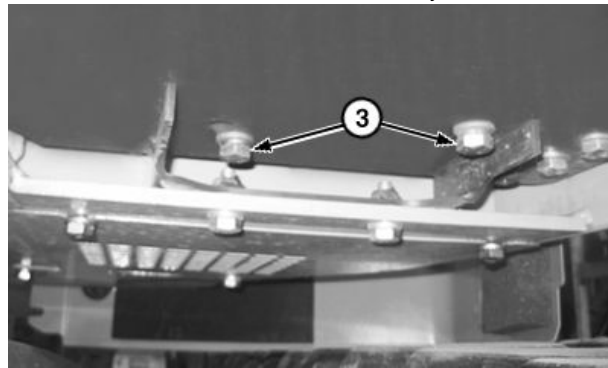
Specification

Control Valve—Weight (approximate).....	35 kg 77.2 lb.
---	-------------------

10. Repair or replace parts as necessary. See Control Valve Disassemble and Assemble. (Group 3360.)
11. Install control valve.
12. Install cap screws and tighten to specification.



Control Valve Assembly



Main Frame Plate

- 1— Hydraulic Hose (44 used)
- 2— Control Valve
- 3— Cap Screw (4 used)
- B32— Auto-Idle (A/I) Pressure Sensor

Specification

Control Valve Cap Screw—Torque.....	50 N·m 37 lb.-ft.
-------------------------------------	----------------------

13. Connect hydraulic hoses. See Control Valve Line Identification. (Group 9025-15.)
14. Connect auto-idle (A/I) pressure sensor (B32). See Floor Harness (W1) Component Location. (Group 9015-10.)
15. Lower operator's station. See Tilting Operator's Station. (Operator's Manual.)
16. Fill hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
17. Connect battery negative (-) cable.

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

Continued on next page

CW08338,0000EFA -19-22MAY13-1/2


TX1136329A—UN—10MAY13

TX1136330A—UN—10MAY13

Hydraulic System

18. Perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)

19. Operate machine and check for leaks. Verify all machine functions operate correctly. See Operational Checkout Procedure. (Group 9005-10.)

 **CAUTION: Prevent possible injury from unexpected machine movement. Clear all personnel from area before operating machine.**

CW08338,0000EFA -19-22MAY13-2/2

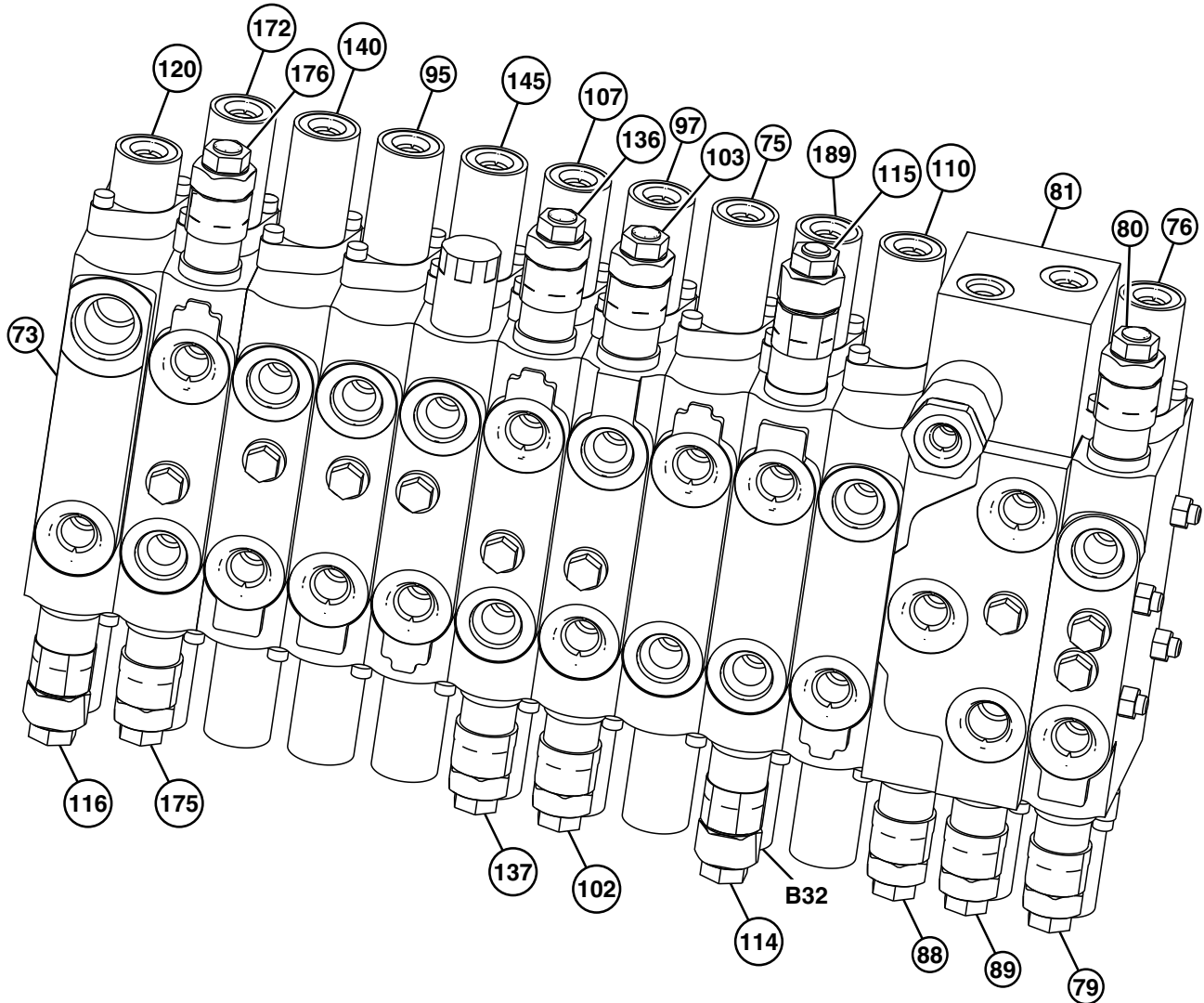
Control Valve Disassemble and Assemble

SPECIFICATIONS	
Relief Valve Torque	63 N·m 46 lb.-ft.
Socket Head Screw Torque	9 N·m 80 lb.-in.
Angle Blade Right Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Angle Blade Left Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Plug Torque	31 N·m 23 lb.-ft.
Socket Head Screw Torque	9 N·m 80 lb.-in.
Swing Boom Make-Up Valve Torque	63 N·m 46 lb.-ft.
Auxiliary Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Orifice Torque	2 N·m 18 lb.-in.
Fitting Plug Torque	30 N·m 22 lb.-ft.
Arm Out Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Arm In Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Main Relief Valve Torque	63 N·m 46 lb.-ft.
Boom Down Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Boom Up Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Bucket Dump Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Bucket Curl Circuit Relief and Anticavitation Valve Torque	63 N·m 46 lb.-ft.
Hex Nut Torque	28 N·m 21 lb.-ft.

Continued on next page

CW08338,0000EF9 -19-21MAY13-1/27

Control Valve Disassemble



TX1136020

Control Valve Component Identification and Location

Continued on next page

CW08338,0000EF9 - 19-21MAY13-2/27

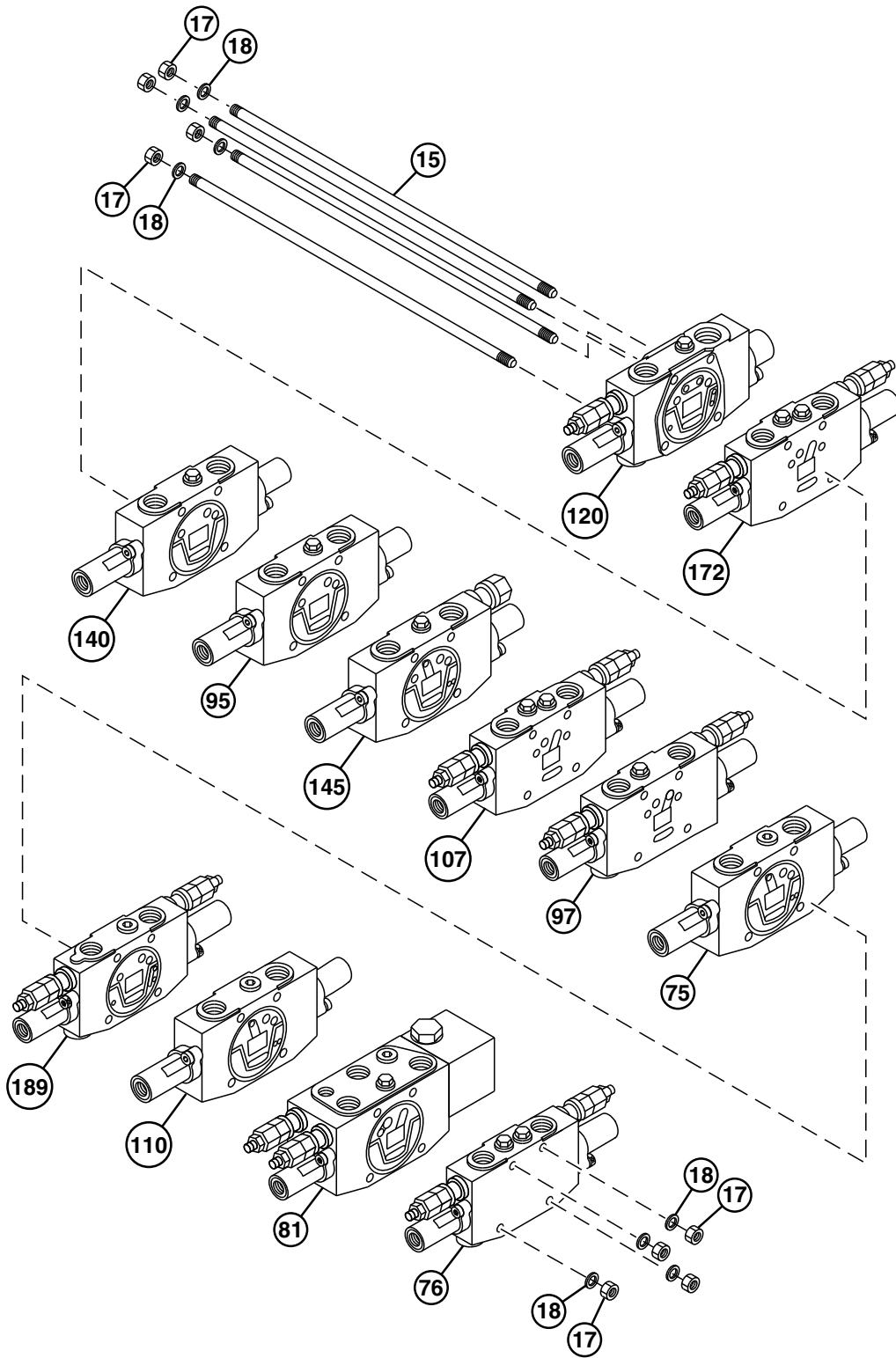
TX1136020—UN—08MAY13

Hydraulic System

73— Control Valve	95— Swing Spool	116— Main Relief Valve (pump 3)	176— Angle Blade Right Circuit Relief and Anticavitation Valve
75— Right Travel Spool	97— Arm Spool	120— Flow Combiner Valve Spool	
76— Bucket Spool	102— Arm In Circuit Relief and Anticavitation Valve	136— Auxiliary Circuit Relief and Anticavitation Valve	189— Pump 1 and 2 Input Section
79— Bucket Dump Circuit Relief and Anticavitation Valve	103— Arm Out Circuit Relief and Anticavitation Valve	137— Auxiliary Circuit Relief and Anticavitation Valve	B32— Auto-Idle (A/I) Pressure Sensor
80— Bucket Curl Circuit Relief and Anticavitation Valve	107— Auxiliary Spool	140— Blade Spool	
81— Boom Spool	110— Left Travel Spool	145— Swing Boom Spool	
88— Boom Up Circuit Relief and Anticavitation Valve	114— Main Relief Valve (pump 1)	172— Angle Blade Spool	
89— Boom Down Circuit Relief and Anticavitation Valve	115— Main Relief Valve (pump 2)	175— Angle Blade Left Circuit Relief and Anticavitation Valve	

Continued on next page

CW08338.0000EF9 -19-21MAY13-3/27



TX1135935

Control Valve Exploded Section

Continued on next page

CW08338,0000EF9 -19-21MAY13-4/27

TX1135935 —UN—06MAY13

Hydraulic System

15— Tie Rod (4 used)
17— Hex Nut (8 used)
18— Lock Washer (8 used)
75— Right Travel Valve Body
76— Bucket Valve Body

81— Boom 1 Valve Body
95— Swing Valve Body
97— Arm 1 Valve Body
107— Auxiliary Valve Body
110— Left Travel Valve Body

120— Flow Combiner Valve
Spool Body
140— Blade Valve Body
145— Boom Swing Valve Body
172— Angle Blade Valve Body

189— Pump 1 and 2 Input Valve
Body

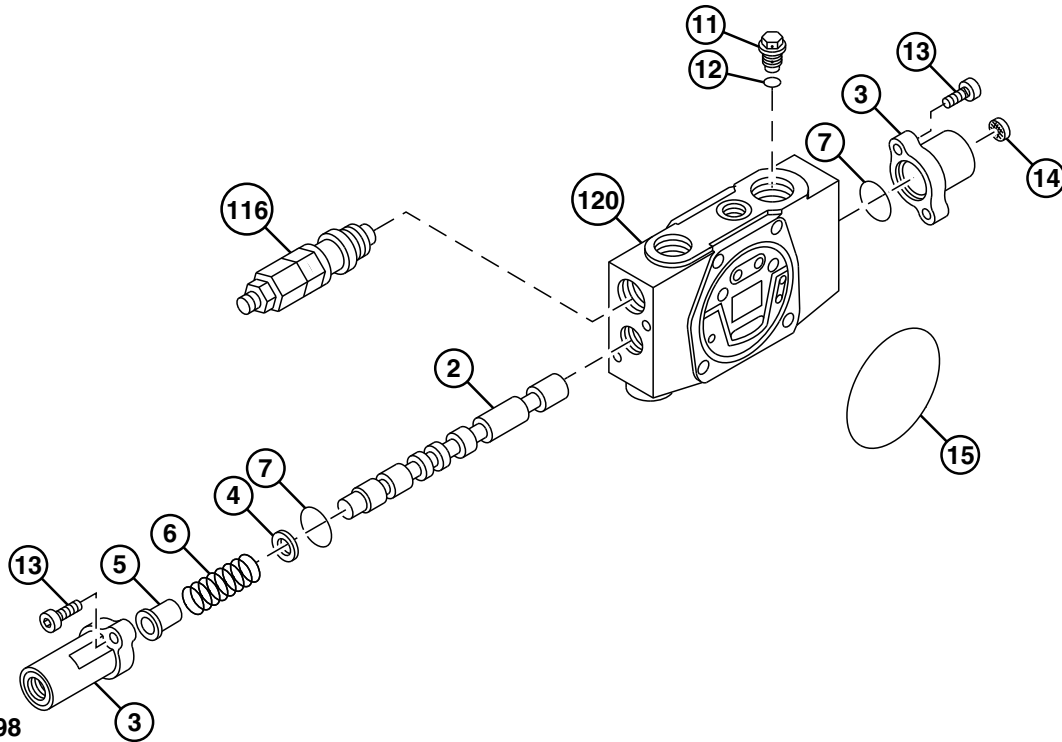
1. Loosen hex nuts (17) evenly, then remove. Remove lock washers (18) and tie rods (15).

2. Divide control valve assembly into individual valve bodies (120, 172, 140, 95, 145, 107, 97, 75, 189, 110, 81 and 76).

Continued on next page

CW08338.0000EF9 -19-21MAY13-5/27

Flow Combiner Valve Spool



TX1134398

Flow Combiner Valve Section

- | | | |
|-----------------|--------------------------------|-------------------------------|
| 2— Spool | 7— O-Ring (2 used) | 14— Filter |
| 3— Cap (2 used) | 11— Cap Screw | 15— O-Ring |
| 4— Seat | 12— O-Ring | 116— Relief Valve |
| 5— Guide | 13— Socket Head Screw (4 used) | 120— Flow Combiner Valve Body |
| 6— Spring | | |

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

IMPORTANT: Prevent possible damage to components. Do not drop spring (6), guide (5), or seat (4) when removing caps (3).

1. Remove socket head screws (13) and caps (3).
2. Remove guide (5), spring (6), seat (4), and O-rings (7).
3. Remove spool (2) from flow combiner valve body (120).
4. Remove relief valve (116), cap screw (11), and O-ring (12) from flow combiner valve body.
5. Remove O-ring (15).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

6. Replace parts as needed.
7. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
8. Install O-rings (15 and 12) and cap screw.
9. Install relief valve. Tighten to specification.

Specification

Relief Valve—Torque.....63 N·m
46 lb.-ft.

10. Install spool, O-rings (7), seat, spring, guide, and caps.
11. Install socket head screws. Tighten socket head screws to specification.

Specification

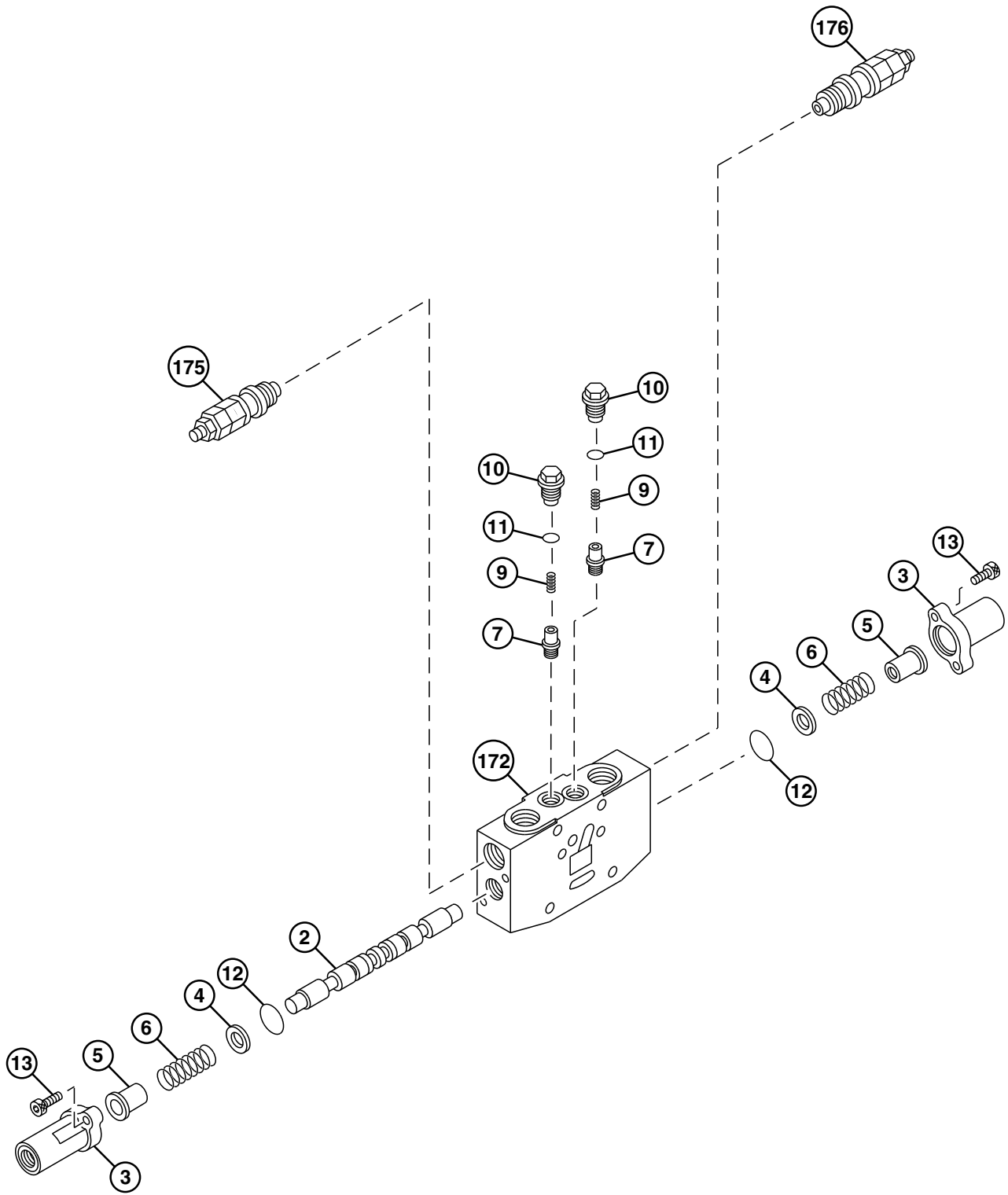
Socket Head
Screw—Torque.....9 N·m
80 lb.-in.

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CW08338,0000EF9 -19-21MAY13-6/27

TX1134398 —UN—07MAY13

Angle Blade Valve Spool Repair



TX1134397

Angle Blade Section

TX1134397 —UN—07MAY13

Continued on next page

CW08338,0000EF9 - 19-21MAY13-7/27

Hydraulic System

- 2— Spool
- 3— Cap (2 used)
- 4— Seat (2 used)
- 5— Guide (2 used)
- 6— Spool Spring (2 used)
- 7— Poppet (2 used)

- 9— Poppet Spring (2 used)
- 10— Plug (2 used)
- 11— O-Ring (2 used)
- 12— O-Ring (2 used)
- 13— Socket Head Screw (4 used)

- 172— Angle Blade Valve Body
- 175— Angle Blade Left Circuit Relief and Anticavitation Valve
- 176— Angle Blade Right Circuit Relief and Anticavitation Valve

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

1. Remove socket head screws (13), and caps (3).
2. Remove guides (5), spool springs (6), seats (4), and O-rings (12).
3. Remove spool (2) assembly from angle blade valve body (172).
4. Remove plugs (10), O-rings (11), poppet springs (9), and poppets (7).
5. Remove angle blade left circuit relief and anticavitation valve (175).
6. Remove angle blade right circuit relief and anticavitation valve (176).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

7. Replace parts as needed.
8. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.

9. Install angle blade right circuit relief and anticavitaion valve. Tighten to specification.

Specification

Angle Blade Right Circuit Relief and Anticavitation Valve—Torque.....	63 N·m 46 lb.-ft.
---	----------------------

10. Install angle blade left circuit relief and anticavitaion valve. Tighten to specification.

Specification

Angle Blade Left Circuit Relief and Anticavitation Valve—Torque.....	63 N·m 46 lb.-ft.
--	----------------------

11. Install poppets, poppet springs, O-rings (11), and plugs. Tighten plugs to specification.

Specification

Plug—Torque.....	31 N·m 23 lb.-ft.
------------------	----------------------

12. Install spool (2) assembly to angle blade valve body.
13. Install O-rings (12), seats, spool springs, and guides.
14. Install caps to angle blade valve body using socket head screws. Tighten to specification.

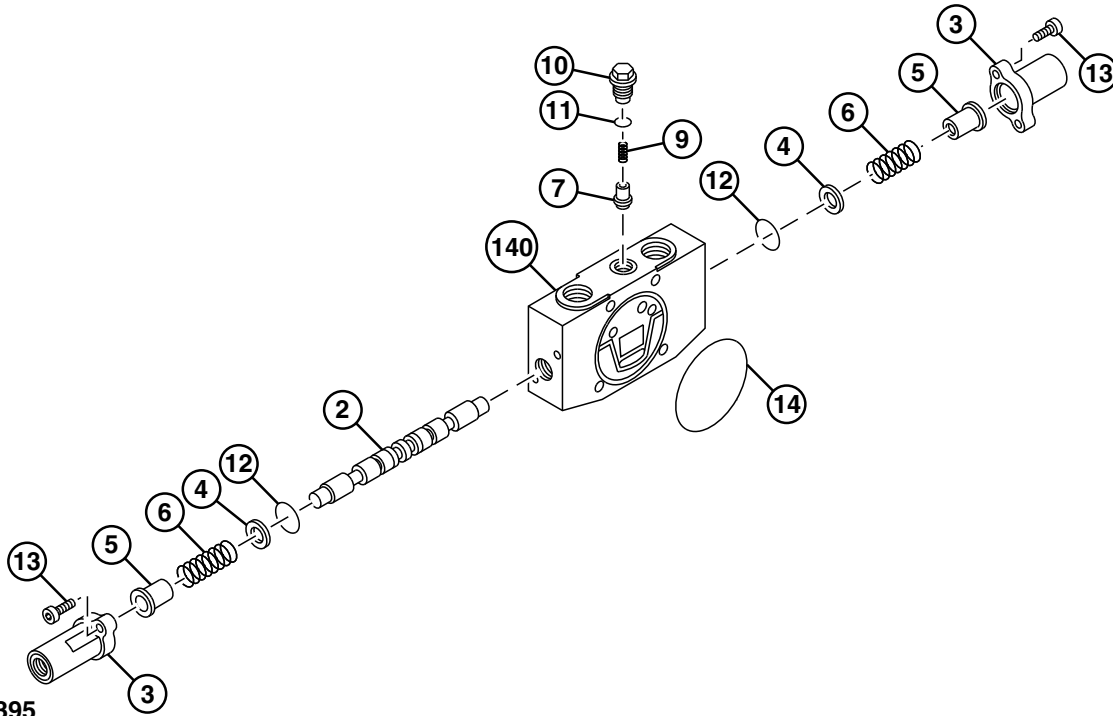
Specification

Socket Head Screw—Torque.....	9 N·m 80 lb.-in.
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CW08338,0000EF9 - 19-21MAY13-8/27

Blade Valve Spool Repair



TX1134395—UN—04APR13

TX1134395

Blade Section

- | | | | |
|-------------------|--------------------------|--------------------------------|-----------------------|
| 2— Spool | 6— Spool Spring (2 used) | 11— O-Ring | 14— O-Ring |
| 3— Cap (2 used) | 7— Poppet | 12— O-Ring (2 used) | 140— Blade Valve Body |
| 4— Seat (2 used) | 9— Spring | 13— Socket Head Screw (4 used) | |
| 5— Guide (2 used) | 10— Plug | | |

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

1. Remove socket head screws (13) and caps (3).
2. Remove guides (5), spool springs (6), seats (4), and O-rings (12).
3. Remove spool (2) assembly from blade valve body (140).
4. Remove plug (10), spring (9), poppet (7), and O-ring (11).
5. Remove O-ring (14).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

6. Replace parts as needed.
7. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
8. Install O-ring (14).
9. Install poppet, O-ring (11), spring, and plug. Tighten plug to specification.

Specification

Plug—Torque.....31 N·m
23 lb.-ft.

10. Install spool, O-rings (12), seats, spool springs, and guides.

11. Install caps and socket head screws. Tighten to specification.

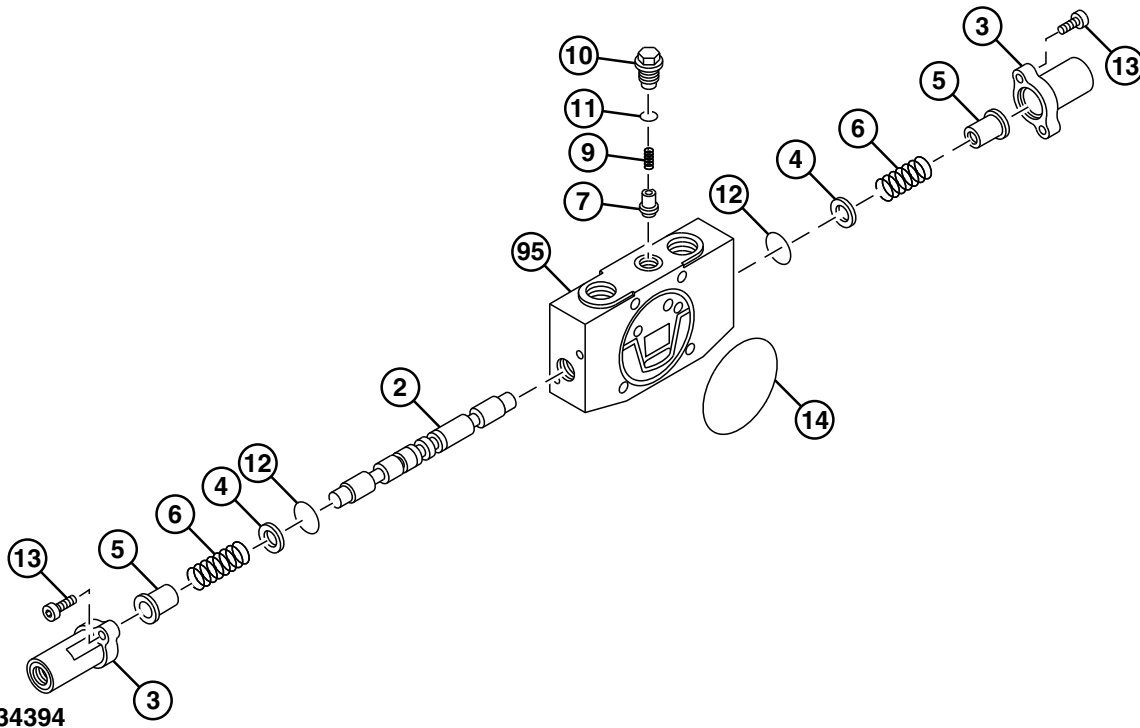
Specification

Socket Head
Screw—Torque.....9 N·m
80 lb.-in.

Continued on next page

CW08338,0000EF9 -19-21MAY13-9/27

Swing Valve Spool Repair



TX1134394

Swing Section

- 2— Spool
- 3— Cap (2 used)
- 4— Seat (2 used)
- 5— Guide (2 used)

- 6— Spool Spring (2 used)
- 7— Poppet
- 9— Spring
- 10— Plug

- 11— O-Ring
- 12— O-Ring (2 used)
- 13— Socket Head Screw (4 used)

- 14— O-Ring
- 95— Swing Valve Body

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

1. Remove socket head screws (13), and caps (3).
2. Remove guides (5), spool springs (6), seats (4), and O-rings (12).
3. Remove spool (2) assembly from swing valve body (95).
4. Remove plug (10), spring (9), poppet (7), and O-ring (11).
5. Remove O-ring (14).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

6. Replace parts as needed.
7. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
8. Install O-ring (14).
9. Install poppet, O-ring (11), spring, and plug. Tighten plug to specification.

Specification

Plug—Torque.....	31 N·m
	23 lb.-ft.

10. Install spool, O-rings (12), seats, spool springs, and guides.
11. Install caps and socket head screws. Tighten to specification.

Specification

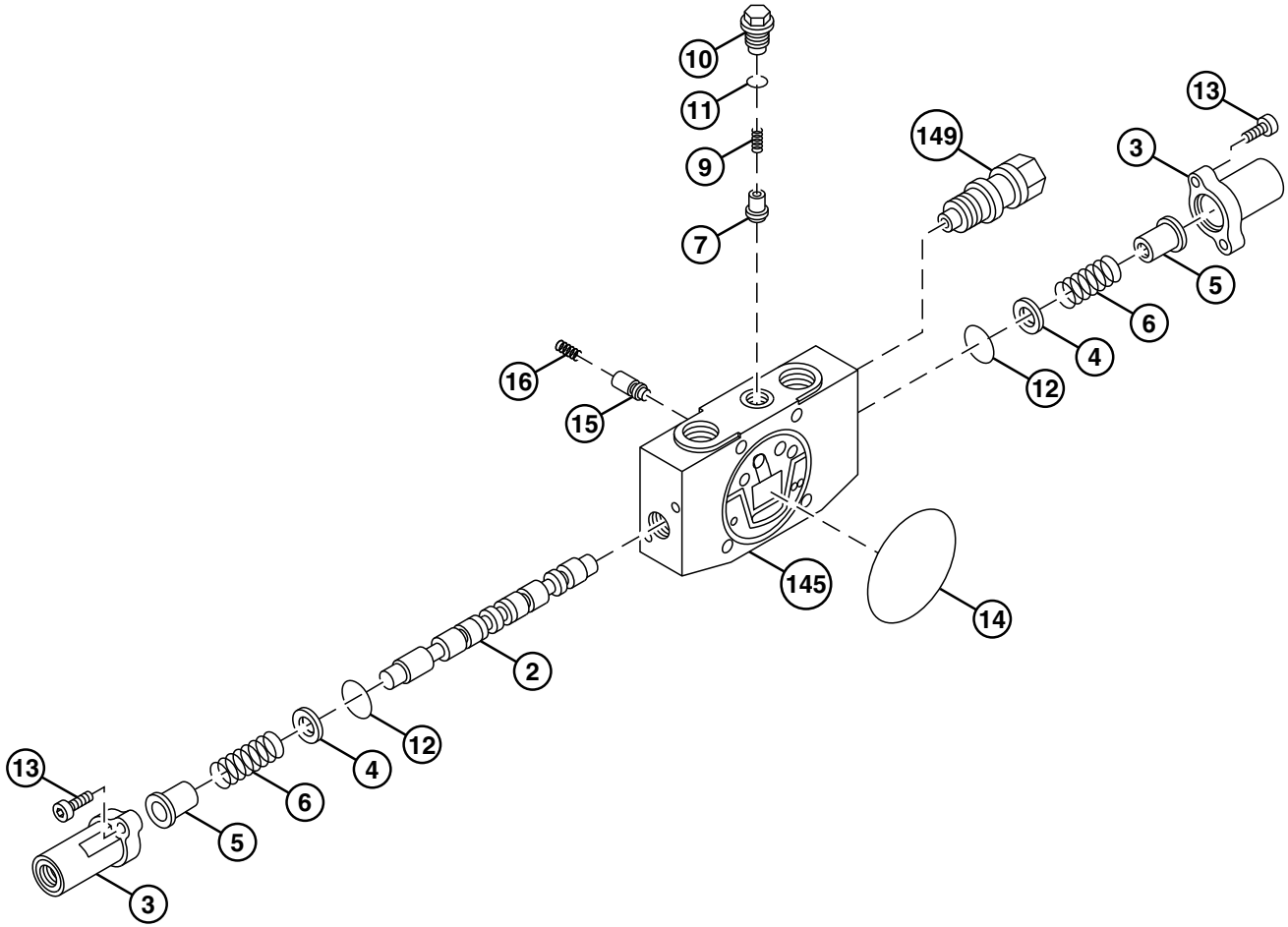
Socket Head	
Screw—Torque.....	9 N·m
	80 lb.-in.

Continued on next page

CW08338,0000EF9 -19-21MAY13-10/27

TX1134394 —UN—04APR13

Boom Swing Valve Spool Repair



TX1134393

Boom Swing Valve

- | | | |
|--------------------------|--------------------------------|-------------------------------|
| 2— Spool | 7— Poppet | 14— O-Ring |
| 3— Cap (2 used) | 9— Spring | 15— Poppet |
| 4— Seat (2 used) | 10— Plug | 16— Spring |
| 5— Guide (2 used) | 11— O-Ring | 145— Boom Swing Valve Body |
| 6— Spool Spring (2 used) | 12— O-Ring (2 used) | 149— Swing Boom Make-Up Valve |
| | 13— Socket Head Screw (4 used) | |

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

Continued on next page

CW08338,0000EF9 -19-21MAY13-11/27

TX1134393—UN—05APR13

Hydraulic System

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

1. Remove socket head screws (13) and caps (3).
2. Remove guides (5), springs (6), seats (4), and O-rings (12).
3. Remove spool (2) assembly from boom swing valve body (145).
4. Remove plug (10), spring (9), poppet (7), and O-ring (11).
5. Remove spring (16) and poppet (15).
6. Remove swing boom make-up valve (149).
7. Remove O-ring (14).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

8. Replace parts as needed.
9. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.

10. Install O-ring (14).
11. Install swing boom make-up valve. Tighten to specification.

Specification

Swing Boom Make-Up Valve—Torque.....	63 N·m 46 lb.-ft.
--------------------------------------	----------------------

12. Install poppet (15) and spring (16).

13. Install poppet (7), O-ring (11), spring (9), and plug. Tighten plug to specification.

Specification

Plug—Torque.....	31 N·m 23 lb.-ft.
------------------	----------------------

14. Install spool, O-rings (12), seats, spool springs, and guides.

15. Install caps and socket head screws. Tighten to specification.

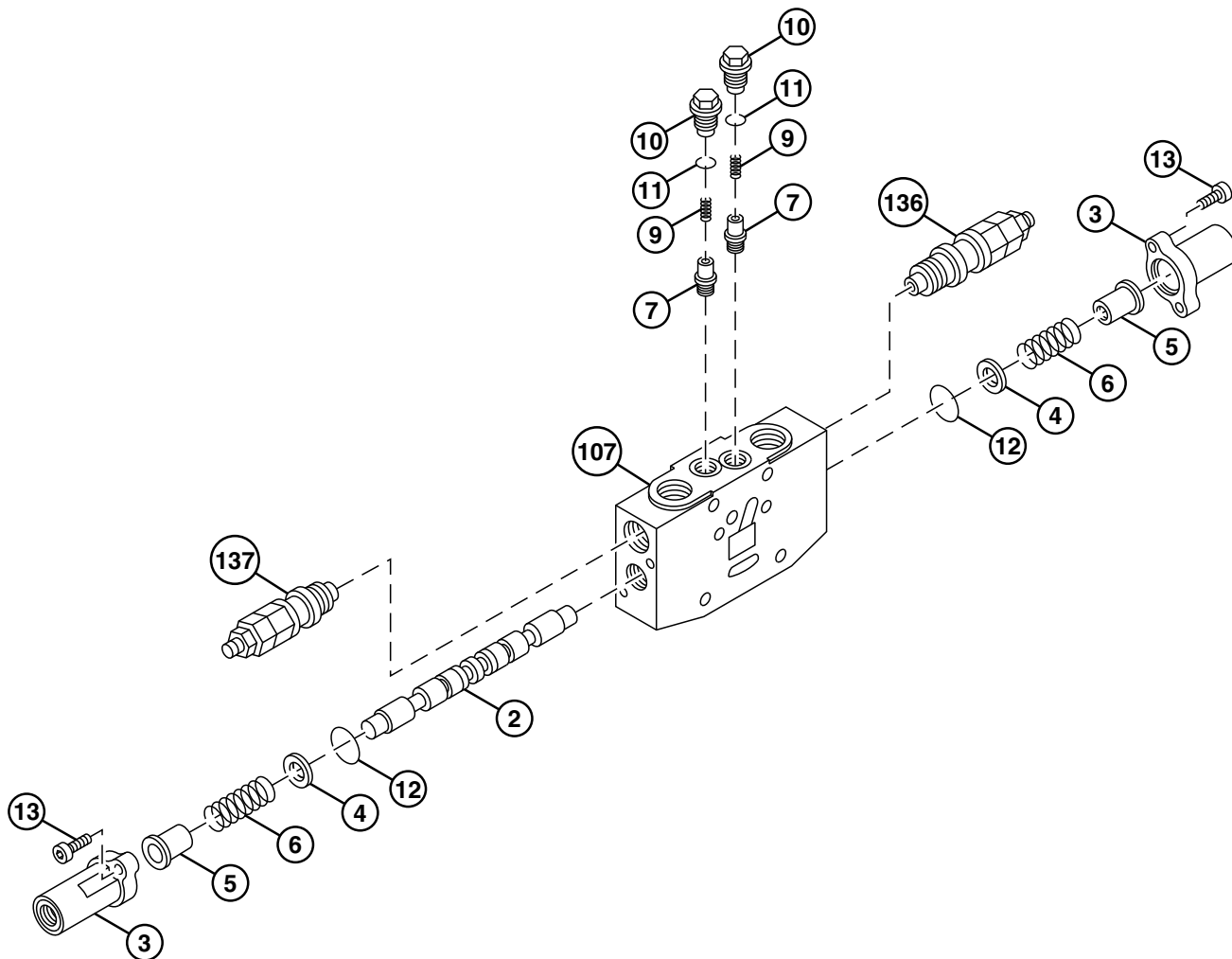
Specification

Socket Head Screw—Torque.....	9 N·m 80 lb.-in.
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CW08338,0000EF9 -19-21MAY13-12/27

Auxiliary Valve Spool Repair



TX1134390

- 2— Spool
- 3— Cap (2 used)
- 4— Seat (2 used)
- 5— Guide (2 used)
- 6— Spool Spring (2 used)
- 7— Poppet (2 used)

- 9— Spring (2 used)
- 10— Plug (2 used)
- 11— O-Ring (2 used)
- 12— O-Ring (2 used)
- 13— Socket Head Screw (4 used)

Auxiliary Valve

- 107— Auxiliary Valve Body
- 136— Auxiliary Circuit Relief and Anticavitation Valve
- 137— Auxiliary Circuit Relief and Anticavitation Valve

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

Continued on next page

CW08338,0000EF9 -19-21MAY13-13/27

TX1134390 —UN—05APR13

Hydraulic System

1. Remove auxiliary circuit relief and anticavitaion valves (136 and 137).

2. Remove plugs (10), springs (9), poppets (7), and O-rings (11).

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

3. Remove socket head screws (13) and caps (3).

4. Remove guides (5), springs (6), seats (4), and O-rings (12).

5. Remove spool (2) from auxiliary valve body (107).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

6. Replace parts as needed.

7. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.

8. Install spool into auxiliary valve body.

9. Install O-rings (12), seats, spool springs, and guides.

10. Install caps and socket head screws. Tighten to specification.

Specification

Socket Head
Screw—Torque.....9 N·m
80 lb.-in.

11. Install poppets, springs, O-rings (11), and plugs. Tighten plugs to specification.

Specification

Plug—Torque.....31 N·m
23 lb.-ft.

12. Install auxiliary circuit relief and anticavitaion valves (136 and 137). Tighten to specification.

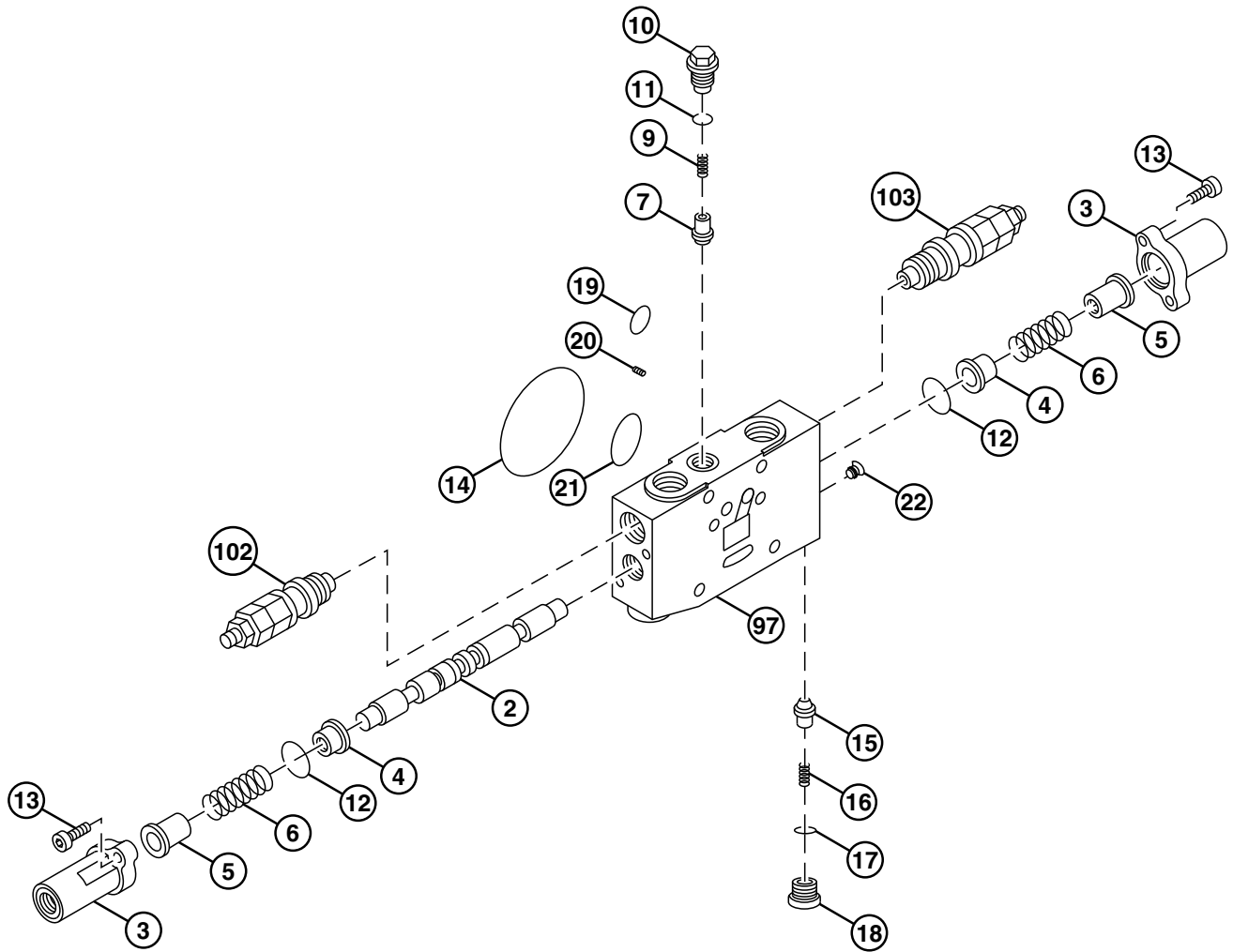
Specification

Auxiliary Circuit Relief
and Anticavitaion
Valve—Torque.....63 N·m
46 lb.-ft.

Continued on next page

CW08338.0000EF9 -19-21MAY13-14/27

Arm Valve Spool Repair



TX1134387

- 2— Spool
- 3— Cap (2 used)
- 4— Seat (2 used)
- 5— Guide (2 used)
- 6— Spool Spring (2 used)
- 7— Poppet
- 9— Spring

- 10— Plug
- 11— O-Ring
- 12— O-Ring (2 used)
- 13— Socket Head Screw (4 used)
- 14— O-Ring
- 15— Poppet
- 16— Spring

Arm Valve

- 17— O-Ring
- 18— Fitting Plug
- 19— O-Ring
- 20— Orifice
- 21— O-Ring
- 22— Plug
- 97— Arm Valve Body
- 102— Arm In Circuit Relief and Anticavitation Valve

- 103— Arm Out Circuit Relief and Anticavitation Valve

Continued on next page

CW08338,0000EF9 -19-21MAY13-15/27

TX1134387—UN—05APR13

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

1. Remove arm in circuit relief and anticavitation valve (102).
2. Remove arm out circuit relief and anticavitation valve (103).

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

3. Remove socket head screws (13) and caps (3).
4. Remove guides (5), spool springs (6), and seats (4).
5. Remove O-rings (12) and spool (2).
6. Remove plug (10), O-ring (11), spring (9), and poppet (7).
7. Remove fitting plug (18), O-ring (17), spring (16), and poppet (15).
8. Remove O-rings (14, 19 and 21) and orifice (20).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

9. Replace parts as needed.
10. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
11. Install O-ring (14, 19, and 21).
12. Install orifice. Tighten to specification.

Specification

Orifice—Torque.....2 N·m
18 lb.-in.

13. Install poppet (15), spring (16), O-ring (17), and fitting plug. Tighten fitting plug to specification.

Specification

Fitting Plug—Torque.....30 N·m
22 lb.-ft.

14. Install spool, seats, spool springs (6), guides, and O-rings (12).

15. Install caps and socket head screws. Tighten to specification.

Specification

Socket Head
Screw—Torque.....9 N·m
80 lb.-in.

16. Install arm out circuit relief and anticavitation valve. Tighten to specification.

Specification

Arm Out Circuit Relief
and Anticavitaion
Valve—Torque.....63 N·m
46 lb.-ft.

17. Install arm in circuit relief and anticavitation valve. Tighten to specification.

Specification

Arm In Circuit Relief
and Anticavitaion
Valve—Torque.....63 N·m
46 lb.-ft.

18. Install poppet (7), spring (9), O-ring (11), and plug (10). Tighten to specification.

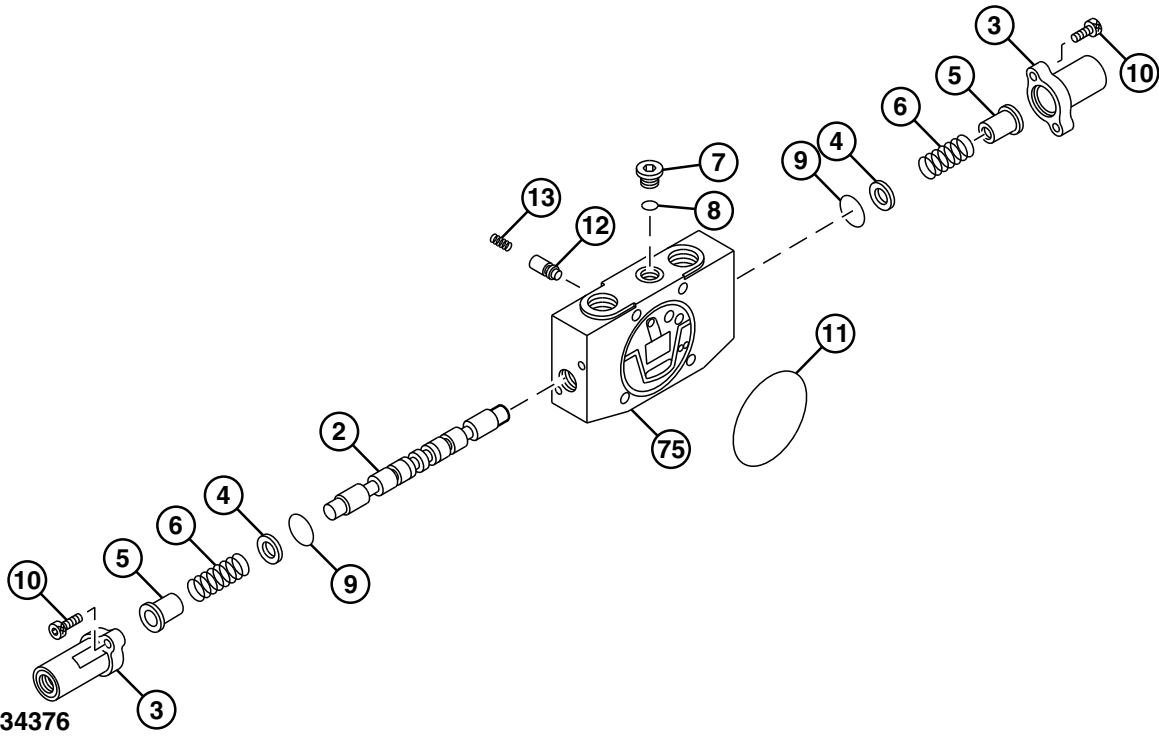
Specification

Plug—Torque.....31 N·m
23 lb.-ft.

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CW08338,0000EF9 -19-21MAY13-16/27

Right Travel Valve Spool Repair



TX1134376 —UN—05APR13

TX1134376

Right Travel Valve

- | | | | |
|-------------------|--------------------------|--------------------------------|-----------------------------|
| 2— Spool | 6— Spool Spring (2 used) | 10— Socket Head Screw (4 used) | 75— Right Travel Valve Body |
| 3— Cap (2 used) | 7— Plug | 11— O-Ring | |
| 4— Seat (2 used) | 8— O-Ring | 12— Poppet | |
| 5— Guide (2 used) | 9— O-Ring (2 used) | 13— Spring | |

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

1. Remove socket head screws (10) and caps (3).
2. Remove guides (5), spool springs (6), seats (4), and O-rings (9).
3. Remove spool (2) from right travel valve body (75).
4. Remove spring (13) and poppet (12).
5. Remove O-ring (11).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

6. Replace parts as needed.
7. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
8. Install spool into right travel valve body.
9. Install O-rings (9), seats, spool springs (6), and guides (5).
10. Install caps and socket head screws. Tighten to specification.

Specification

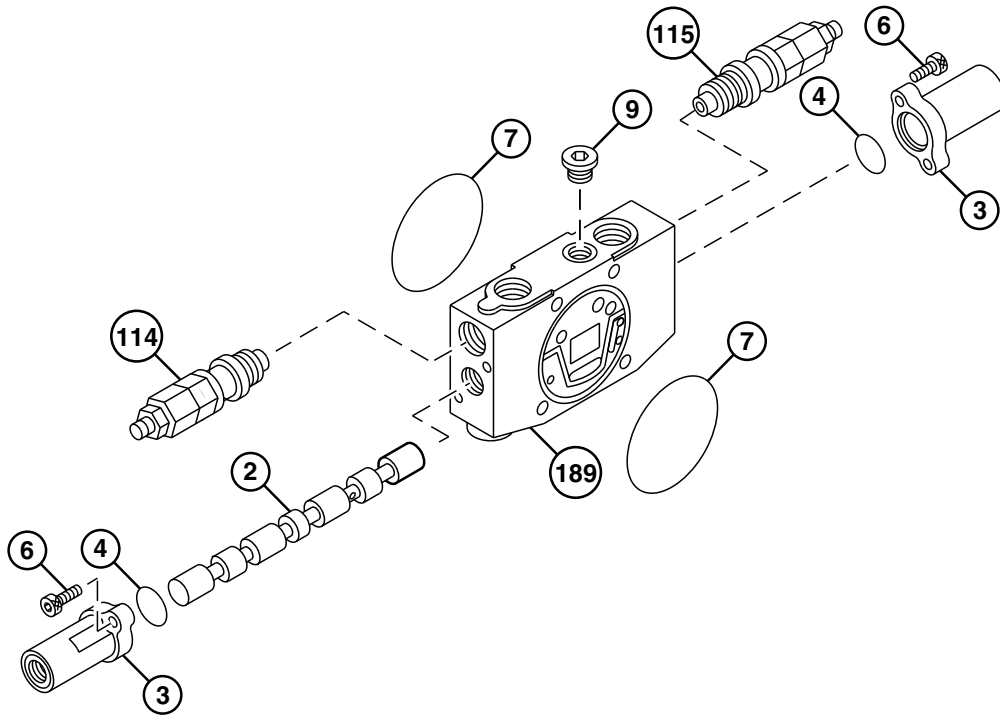
Socket Head Screw—Torque.....	9 N·m 80 lb.-in.
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11. Install poppet and spring (13).
12. Install O-ring (11).

Continued on next page

CW08338,0000EF9 -19-21MAY13-17/27

Inlet Spool Repair



TX1134375

Inlet Section

- | | | |
|-------------------------------|---------------------------------|---------------------------------|
| 2— Spool | 7— O-Ring (2 used) | 115— Main Relief Valve (pump 2) |
| 3— Cap (2 used) | 9— Plug | 189— Inlet Valve Body |
| 4— O-Ring (2 used) | 114— Main Relief Valve (pump 1) | |
| 6— Socket Head Screw (4 used) | | |

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

1. Remove socket head screws (6) and caps (3).
2. Remove O-rings (4) and spool (2).
3. Remove O-rings (7).
4. Remove main relief valves (114 and 115).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

5. Replace parts as needed.

6. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
7. Install main relief valves (114 and 115). Tighten to specification.

Specification

Main Relief Valve—Torque.....	63 N·m 46 lb.-ft.
-------------------------------	----------------------

8. Install O-rings (7).
9. Install spool and O-rings (4).
10. Install caps and socket head screws. Tighten to specification.

Specification

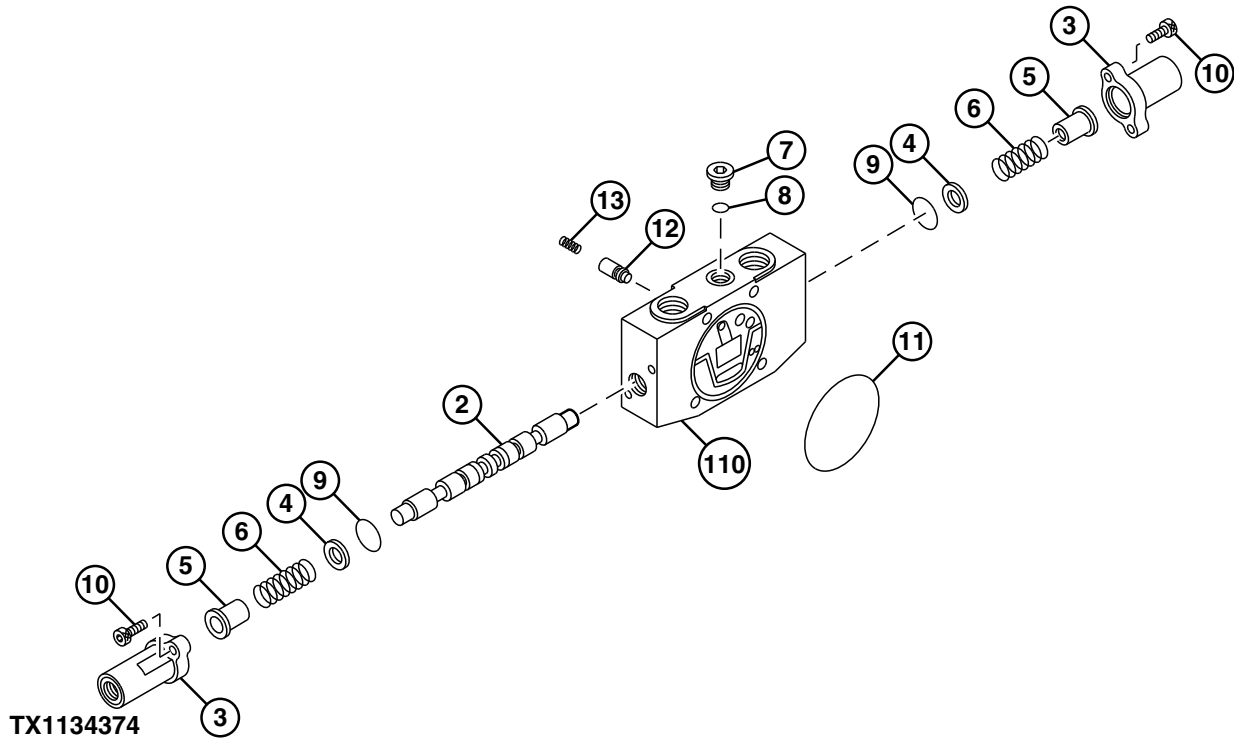
Socket Head Screw—Torque.....	9 N·m 80 lb.-in.
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CW08338.0000EF9 -19-21MAY13-18/27

TX1134375 —UN—08MAY13

Left Travel Valve Spool Repair



TX1134374 —UN—05APR13

Left Travel Section

- | | | | |
|-------------------|--------------------------|--------------------------------|-----------------------------|
| 2— Spool | 6— Spool Spring (2 used) | 10— Socket Head Screw (4 used) | 110— Left Travel Valve Body |
| 3— Cap (2 used) | 7— Plug | 11— O-Ring | |
| 4— Seat (2 used) | 8— O-Ring | 12— Poppet | |
| 5— Guide (2 used) | 9— O-Ring (2 used) | 13— Spring | |

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

1. Remove socket head screws (10) and caps (3).
2. Remove guides (5), spool springs (6), seats (4), and O-rings (9).
3. Remove spool (2) from left travel valve body (110).
4. Remove spring (13) and poppet (12).
5. Remove O-ring (11).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

6. Replace parts as needed.
7. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
8. Install spool into left travel valve body.
9. Install O-rings (9), seats, spool springs (6), and guides (5).
10. Install caps and socket head screws. Tighten to specification.

Specification

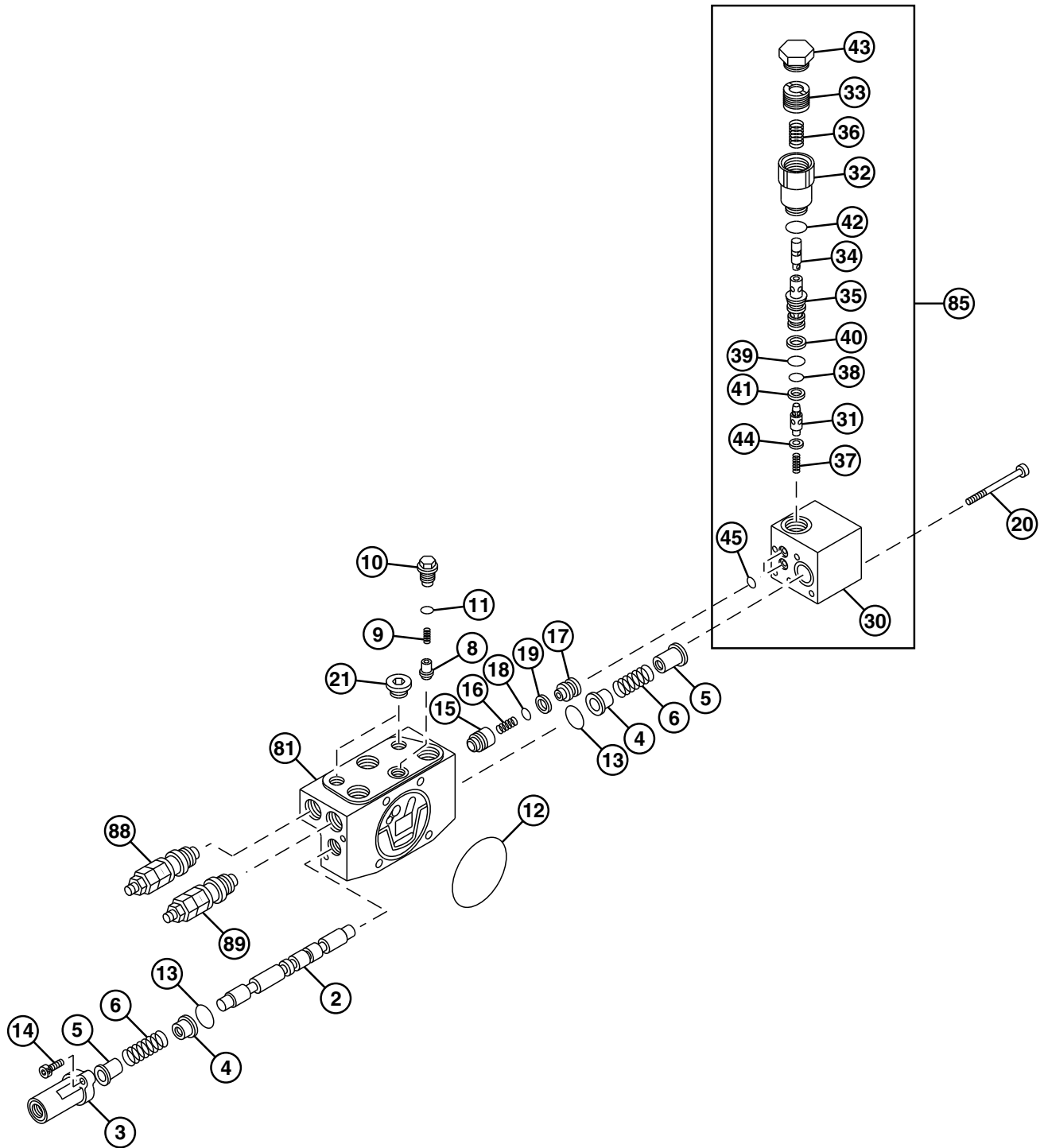
Socket Head	
Screw—Torque.....	9 N·m 80 lb.-in.

11. Install poppet and spring (13).
12. Install O-ring (11).

Continued on next page

CW08338,0000EF9 -19-21MAY13-19/27

Boom Valve Spool Repair



TX1134373

Boom Valve Section

Continued on next page

CW08338.0000EF9 -19-21MAY13-20/27

TX1134373—UN—05APR13

Hydraulic System

- | | | | |
|--------------------------------|--------------------------------|---------------------|---|
| 2— Spool | 15— Check Valve | 35— Sleeve | 85— Boom 1 Reduced Leakage Valve |
| 3— Cap | 16— Spring | 36— Spring | 88— Boom Up Circuit Relief and Anticavitation Valve |
| 4— Seat (2 used) | 17— Spacer | 37— Spring | 89— Boom Down Circuit Relief and Anticavitation Valve |
| 5— Guide (2 used) | 18— O-Ring | 38— O-Ring | |
| 6— Spring (2 used) | 19— Backup Ring | 39— O-Ring | |
| 8— Poppet | 20— Socket Head Screw (5 used) | 40— Backup Ring | |
| 9— Spring | 21— Fitting Plug | 41— Backup Ring | |
| 10— Plug | 30— Housing | 42— O-Ring | |
| 11— O-Ring | 31— Valve | 43— Plug | |
| 12— O-Ring | 32— Plug | 44— Spring Seat | |
| 13— O-Ring (2 used) | 33— Piston | 45— O-Ring (2 used) | |
| 14— Socket Head Screw (2 used) | 34— Spool | 81— Boom Valve Body | |

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

IMPORTANT: Prevent possible damage to components. Do not drop spring (6), guide (5), or seat (4) when removing boom 1 reduced leakage valve (85).

1. Remove socket head screws (20) and boom 1 reduced leakage valve (85).

IMPORTANT: Prevent possible damage to components. Do not drop spring (6), guide (5), or seat (4) when removing cap (3).

2. Remove socket head screws (14) and cap (3).
3. Remove guides (5), springs (6), and seats (4).
4. Remove O-rings (13) and spool (2).
5. Remove spacer (17) from boom valve body (81).
6. Remove O-ring (18) and backup ring (19) from spacer (17).
7. Remove spring (16) and check valve (15).
8. Remove plug (43).

NOTE: Using a screwdriver may aid in removing piston (33), spring (36), and plug (32).

9. Remove piston (33), spring (36), plug (32), and O-ring (42).
10. Remove spool (34) from sleeve (35).
11. Remove sleeve, backup rings (40 and 41), and O-rings (38 and 39) from housing (30).

NOTE: Using a magnet may aid in removal of check valve (31), spring seat (44), and spring (37).

12. Remove check valve (31), spring seat (44), and spring (37).
13. Remove plug (10), O-ring (11), spring (9), O-ring (12), and poppet (8) from boom valve body.

14. Remove boom up and boom down circuit relief and anticavitation valves (88 and 89).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

15. Replace parts as needed.
16. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
17. Install boom up and boom down circuit relief and anticavitation valves. Tighten to specification.

Specification

Boom Down Circuit Relief and Anticavitation Valve—Torque.....	63 N·m
	46 lb.-ft.

Specification

Boom Up Circuit Relief and Anticavitation Valve—Torque.....	63 N·m
	46 lb.-ft.

18. Install poppet, spring (9), O-ring (11), and plug. Tighten to specification.

Specification

Plug—Torque.....	31 N·m
	23 lb.-ft.

19. Install O-ring (12).
20. Install backup rings (40 and 41) and O-rings (38 and 39) to sleeve.
21. Install check valve (31) to sleeve.
22. Install spring seat (44) and spring (37) to sleeve.
23. Install sleeve to housing.
24. Install O-ring (42) to plug (32), and install plug (32) to housing. Tighten to specification.

Specification

Plug—Torque.....	31 N·m
	23 lb.-ft.

25. Install spool (34) and spring (36) to sleeve.

Continued on next page

CW08338,0000EF9 - 19-21MAY13-21/27

Hydraulic System

26. Install piston and plug (43) to plug (32). Tighten to specification.

Specification

Plug—Torque.....31 N·m
23 lb.-ft.

27. Install check valve and spring (16) to boom valve body.

28. Install backup ring (19) and O-ring (18) to spacer.
Install spacer to boom valve body.

29. Install spool (2) and O-rings (13).

30. Install seats (4), springs (6), and guides (5) to boom valve body.

31. Install boom 1 reduced leakage valve to boom valve body with socket head screws (20). Tighten to specification.

Specification

Socket Head
Screw—Torque.....9 N·m
80 lb.-in.

32. Install cap and socket head screws (14). Tighten to specification.

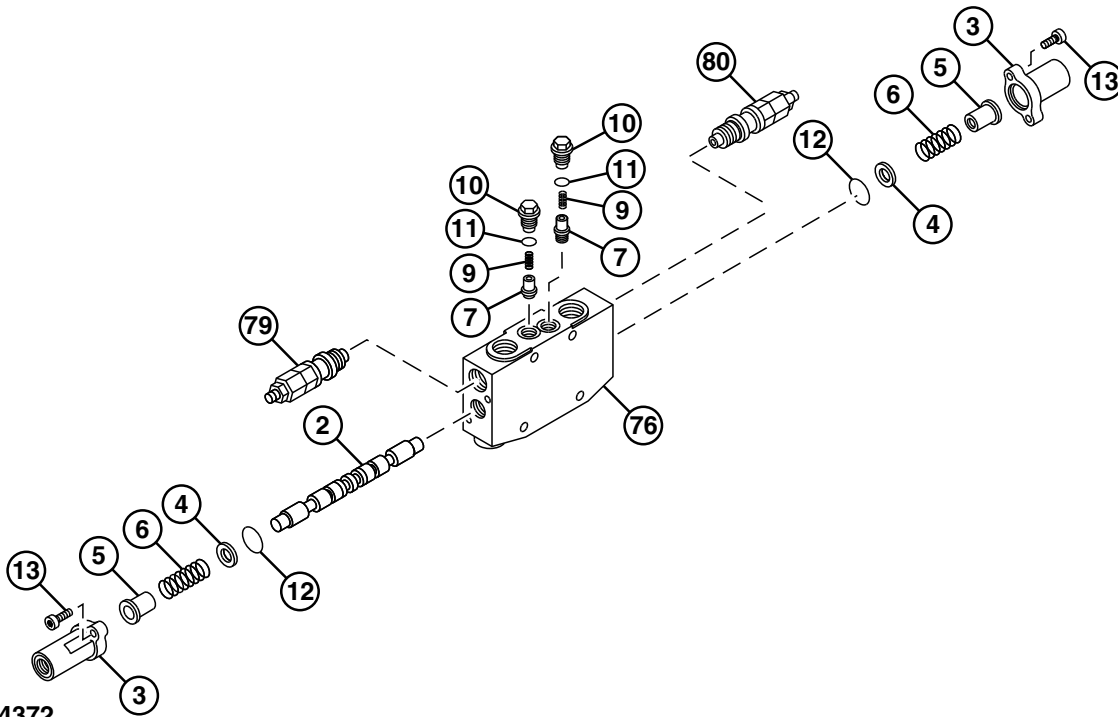
Specification

Socket Head
Screw—Torque.....9 N·m
80 lb.-in.

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CW08338,0000EF9 -19-21MAY13-22/27

Bucket Valve Spool Repair



TX1134372

Bucket Section

- | | | |
|--------------------------|--------------------------------|---|
| 2— Spool | 9— Spring (2 used) | 76— Bucket Valve Body |
| 3— Cap (2 used) | 10— Plug (2 used) | 79— Bucket Dump Circuit Relief and Anticavitation Valve |
| 4— Seat (2 used) | 11— O-Ring (2 used) | 80— Bucket Curl Circuit Relief and Anticavitation Valve |
| 5— Guide (2 used) | 12— O-Ring (2 used) | |
| 6— Spool Spring (2 used) | 13— Socket Head Screw (4 used) | |
| 7— Poppet (2 used) | | |

IMPORTANT: Because spools are fitted to a bore and the design is different for each valve section, spools must be installed into the same bores from which they were removed for proper operation.

Spools are disassembled for inspection and cleaning only. Each spool and housing is serviced as an assembly.

IMPORTANT: Prevent possible damage to components. Do not drop spool springs (6), guides (5), or seats (4) when removing caps (3).

1. Remove socket head screws (13) and caps (3).
2. Remove guides (5), spool springs (6), seats (4), and O-rings (12).
3. Remove spool (2) from bucket valve body (76).
4. Remove plugs (10), springs (9), poppets (7), and O-rings (11).
5. Remove bucket dump circuit relief and anticavitation valve (79).
6. Remove bucket curl circuit relief and anticavitation valve (80).

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

7. Replace parts as needed.
8. Clean and dry components retained for assembly. Apply a thin coat of clean hydraulic oil to components to prevent seizing.
9. Install bucket dump circuit relief and anticavitation valve and bucket curl circuit relief and anticavitation valve. Tighten to specification.

Specification

Bucket Dump Circuit Relief and Anticavitation Valve—Torque.....	63 N·m 46 lb.-ft.
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Specification

Bucket Curl Circuit Relief and Anticavitation Valve—Torque.....	63 N·m 46 lb.-ft.
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CW08338,0000EF9 -19-21MAY13-23/27

TX1134372 —UN—08MAY13

Hydraulic System

10. Install poppets, springs (9), O-rings (11), and plugs.
Tighten to specification.

Specification

Plug—Torque.....31 N·m
23 lb.-ft.

11. Install spool, O-rings (12), and seats to bucket valve
body.

12. Install spool springs (6) and guides (5) to spool.

13. Install caps and socket head screws. Tighten to
specification.

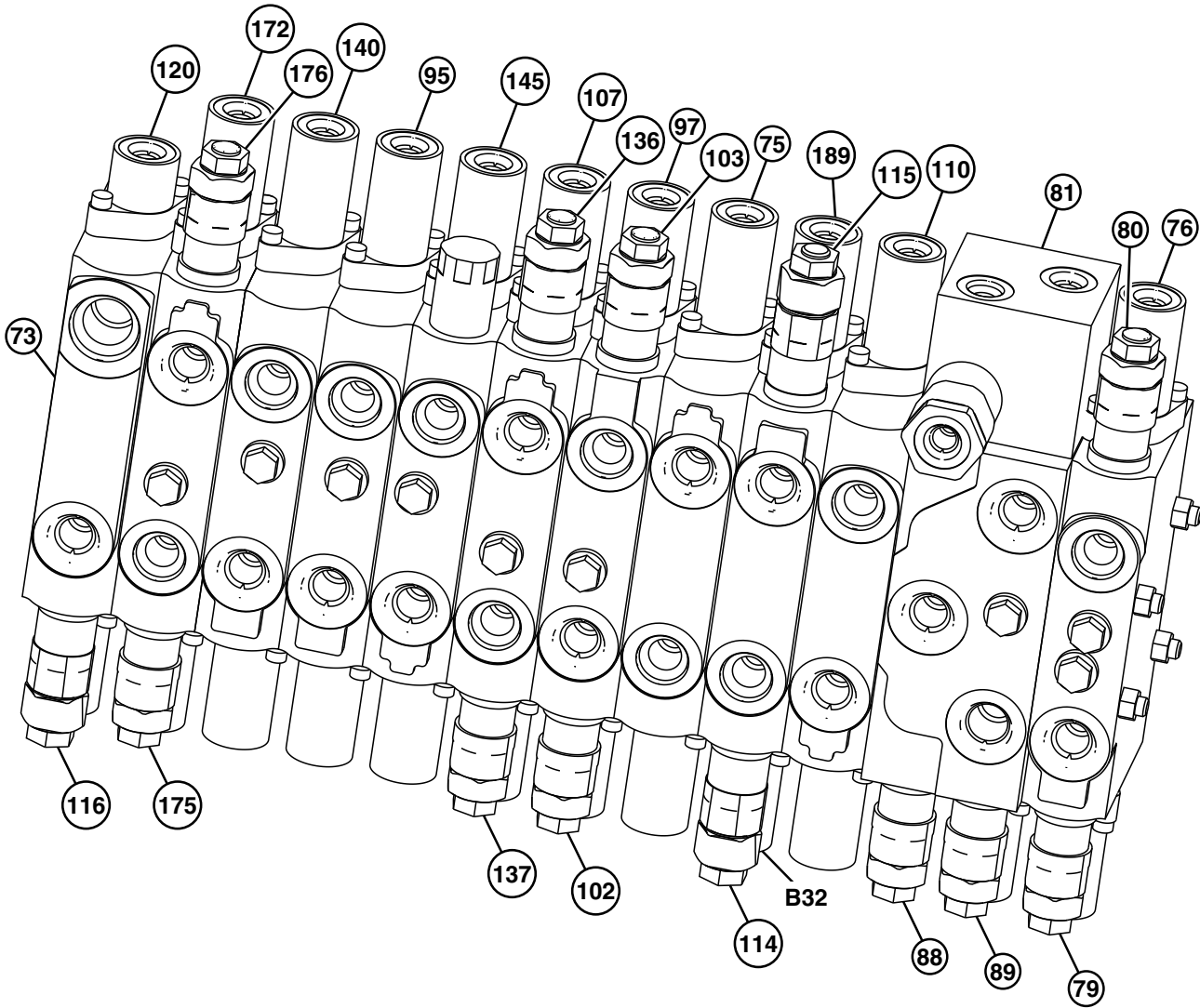
Specification

Socket Head
Screw—Torque.....9 N·m
80 lb.-in.

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CW08338,0000EF9 - 19-21MAY13-24/27

Control Valve Assemble



TX1136020

Control Valve Component Identification and Location

Continued on next page

CW08338,0000EF9 -19-21MAY13-25/27

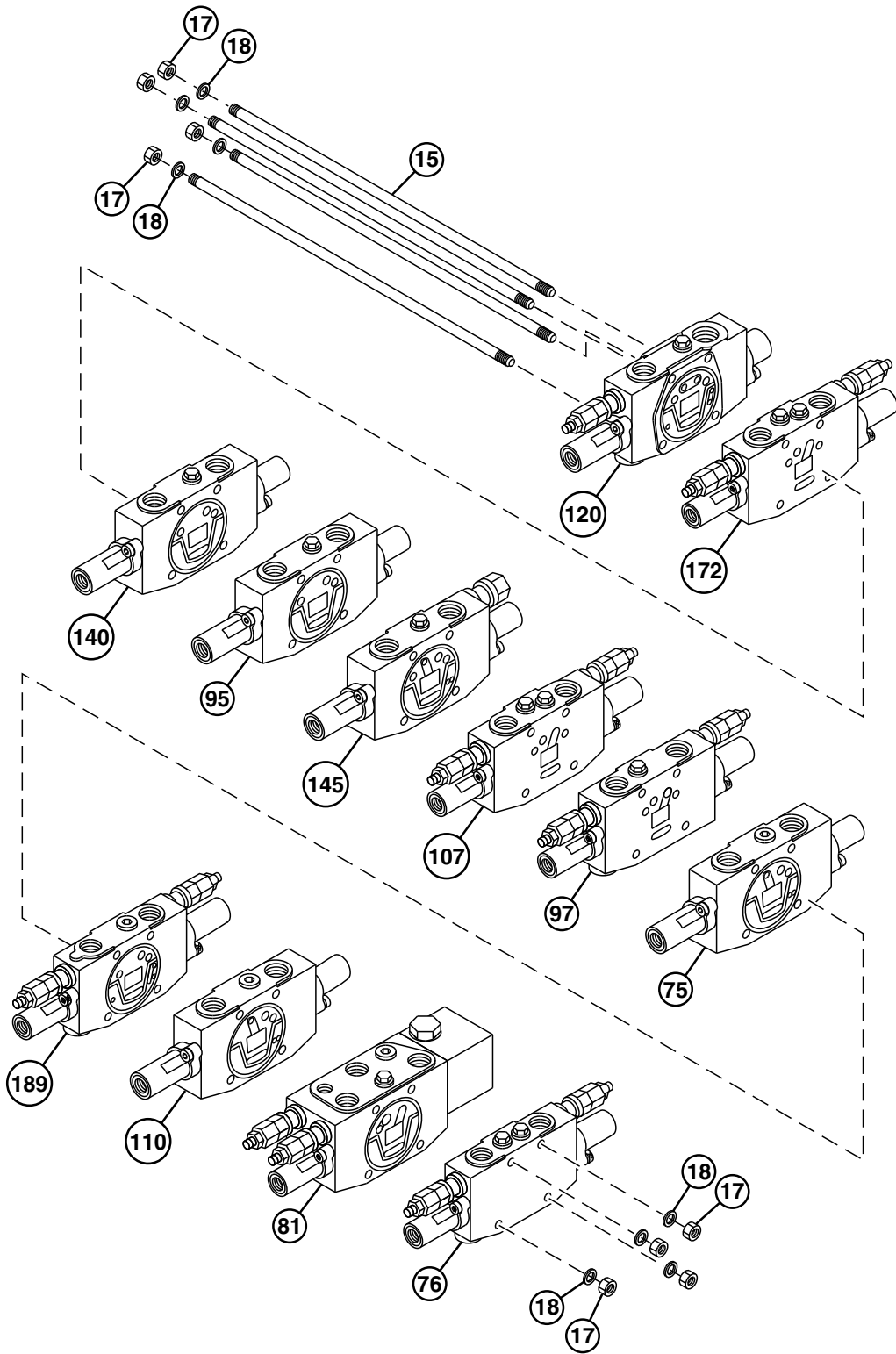
TX1136020 —UN—06MAY13

Hydraulic System

73— Control Valve	95— Swing Spool	116— Main Relief Valve (pump 3)	176— Angle Blade Right Circuit Relief and Anticavitation Valve
75— Right Travel Spool	97— Arm Spool	120— Flow Combiner Valve Spool	
76— Bucket Spool	102— Arm In Circuit Relief and Anticavitation Valve	136— Auxiliary Circuit Relief and Anticavitation Valve	189— Pump 1 and 2 Input Section
79— Bucket Dump Circuit Relief and Anticavitation Valve	103— Arm Out Circuit Relief and Anticavitation Valve	137— Auxiliary Circuit Relief and Anticavitation Valve	B32— Auto-Idle (A/I) Pressure Sensor
80— Bucket Curl Circuit Relief and Anticavitation Valve	107— Auxiliary Spool	140— Blade Spool	
81— Boom Spool	110— Left Travel Spool	145— Swing Boom Spool	
88— Boom Up Circuit Relief and Anticavitation Valve	114— Main Relief Valve (pump 1)	172— Angle Blade Spool	
89— Boom Down Circuit Relief and Anticavitation Valve	115— Main Relief Valve (pump 2)	175— Angle Blade Left Circuit Relief and Anticavitation Valve	

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CW08338.0000EF9 -19-21MAY13-26/27



TX1135935

Control Valve Exploded Section

TX1135935—UN—06MAY13

CW08338,0000EF9 -19-21MAY13-27/27

Hydraulic System

- 15— Tie Rod (4 used)
- 17— Hex Nut (8 used)
- 18— Lock Washer (8 used)
- 75— Right Travel Valve Body
- 76— Bucket Valve Body

- 81— Boom 1 Valve Body
- 95— Swing Valve Body
- 97— Arm 1 Valve Body
- 107— Auxiliary Valve Body
- 110— Left Travel Valve Body

- 120— Flow Combiner Valve Spool Body
- 140— Blade Valve Body
- 145— Boom Swing Valve Body
- 172— Angle Blade Valve Body

- 189— Pump 1 and 2 Input Valve Body

IMPORTANT: Used O-rings can cause leaks and reduce function. Replace all O-rings with new O-rings.

1. Install valve bodies (120, 172, 140, 95, 145, 107, 97, 75, 189, 110, 81 and 76) on tie rods (15).

2. Install lock washers (18) and hex nuts (17) on tie rods. Equally tighten hex nuts to specification.

Specification

Hex Nut—Torque.....28 N·m
21 lb.-ft.

CW08338,0000EF9 -19-21MAY13-28/27

Control Lever Pattern Selector Remove and Install

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
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1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

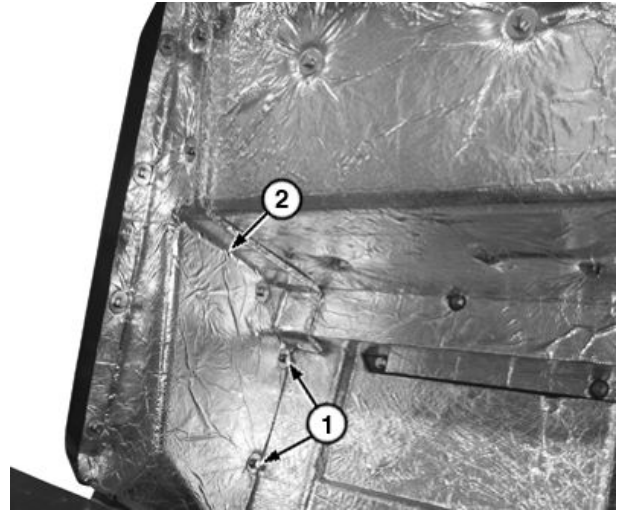
⚠ CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum to hydraulic system or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

4. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)
5. Remove cap screws (1) and back cover (2).



Back Cover

- 1— Cap Screw (11 used) 2— Back Cover

TX1134319A—UN—05APR13

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BD53302,0001731 -19-22MAY13-1/3

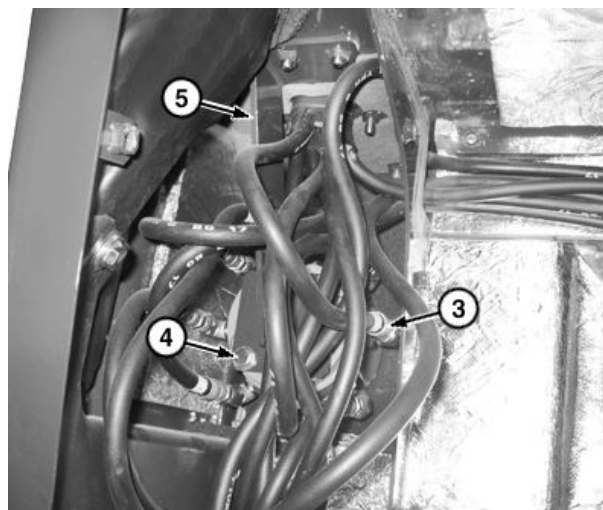
Hydraulic System

- Install identification tags and disconnect hydraulic hoses (3). Close all openings using caps and plugs. See [Pilot Control Lever Pattern Selector Valve Line Connection](#). (Group 9025-15.)

NOTE: Upper cap screws (4) are located behind left pilot control valve inside the cab. Unlocking pilot control shutoff lever and moving seat forward may be necessary to access cap screws.

- Remove cap screws (4) and bracket (5).

3— Hydraulic Hose (8 used) 5— Bracket
4— Cap Screw (4 used)



Hydraulic Hoses

BD53302,0001731 -19-22MAY13-2/3

TX1134320A—UN—05APR13

NOTE: Control lever pattern selector access door is located to the left, below the operator's seat.

- Open access door. Remove pin (6), washer (7), and handle (8).

- Remove cap screws (9) and control lever pattern selector (10).

- Repair or replace parts as necessary. See [Control Lever Pattern Selector Disassemble and Assemble](#). (Group 3360.)

- Install control lever pattern selector and cap screws.

- Install handle, washer, and pin.

- Install bracket and cap screws.

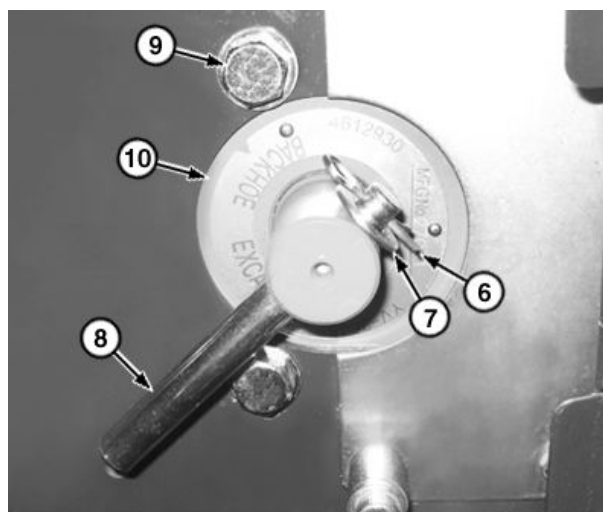
- Connect hydraulic hoses. See [Pilot Control Lever Pattern Selector Valve Line Connection](#). (Group 9025-15.)

- Install back cover and cap screws.

- Lower operator's station. See [Tilting Operator's Station](#). (Operator's manual.)

- Remove vacuum or fill hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.



Control Lever Pattern Selector

6— Pin
7— Washer
8— Handle

9— Cap Screw (2 used)
10— Control Lever Pattern Selector

- Perform hydraulic pump start-up procedure. See [Hydraulic Pump Start-Up Procedure](#). (Group 3360.)

- Operate machine and check for leaks. Verify all pilot control functions operate correctly. See [Operational Checkout](#). (Group 9005-10.)

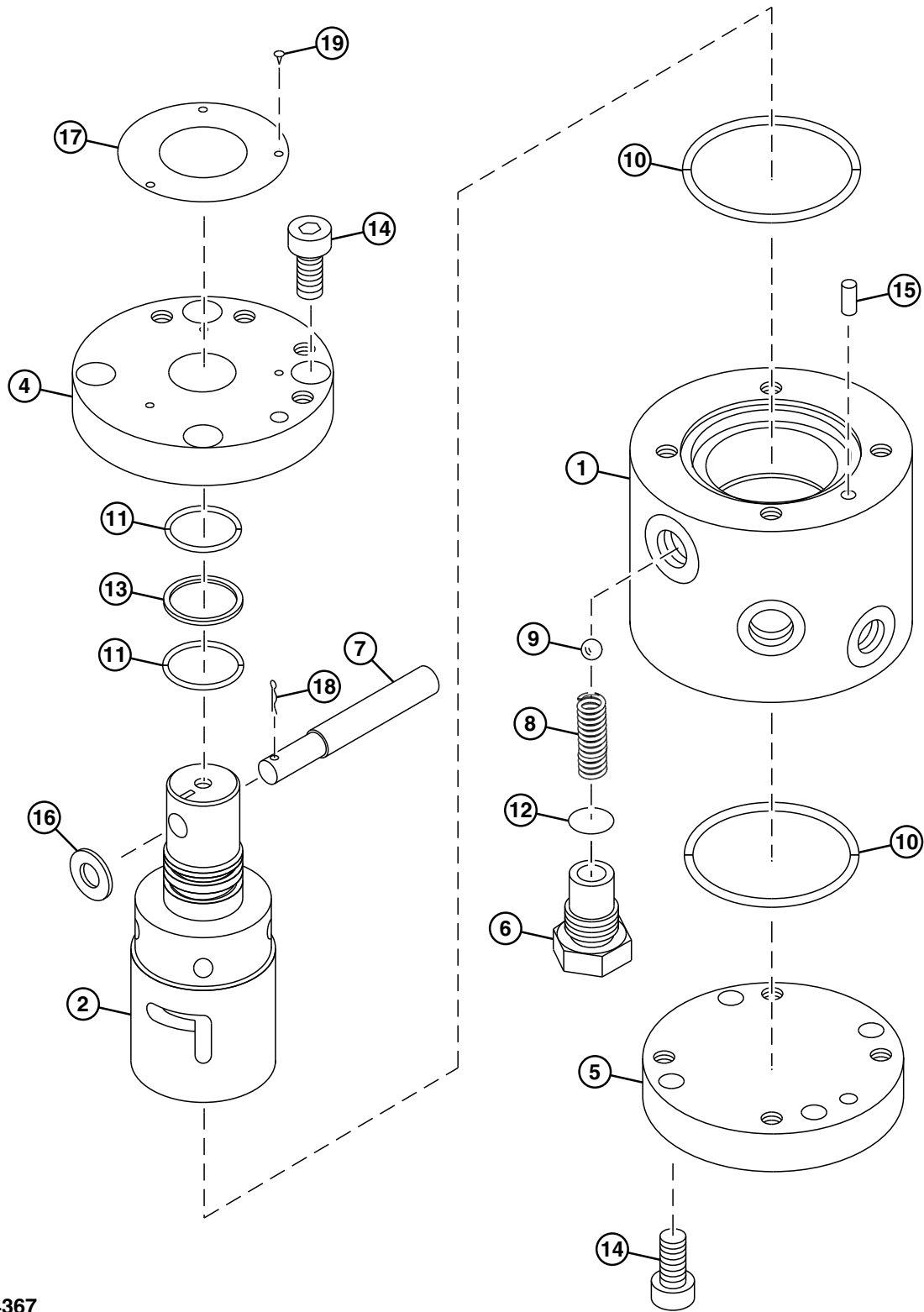
- Close access door.

BD53302,0001731 -19-22MAY13-3/3

TX1134321A—UN—05APR13

Hydraulic System

Control Lever Pattern Selector Disassemble and Assemble



TX1134367

Control Lever Pattern Selector

Continued on next page

JL58967,00002A0 -19-12MAY15-1/2

TX1134367—UN—05APR13

Hydraulic System

- | | | | |
|---|---|--|--|
| 1— Housing
2— Spindle
4— Front Cover
5— Rear Cover
6— Plug
7— Handle | 8— Spring
9— Ball
10— Dust Seal (2 used)
11— O-Ring (2 used)
12— O-Ring | 13— Backup Ring
14— Cap Screw (8 used)
15— Alignment Pin
16— Washer | 17— Plate
18— Pin
19— Rivet (3 used) |
|---|---|--|--|

1. Remove control lever pattern selector. See Control Lever Pattern Selector Remove and Install. (Group 3360.)
2. Remove plug (6), O-ring (12), spring (8), and ball (9).
3. Remove pin (18), washer (16), and handle (7).
4. Install alignment marks on front cover (4), rear cover (5), and housing (1) to aid during assembly.
5. Remove cap screws (14). Remove front cover (4) and rear cover (5) from housing (1).
6. Remove spindle (2) and dust seals (10) from housing.
7. Remove O-rings (11) and backup ring (13) from spindle.
8. Remove alignment pin (15).
9. Clean and inspect parts. Repair or replace if necessary.
10. Install alignment pin.
11. Install backup ring and O-rings (11) onto spindle.
12. Install dust seals and spindle into housing.
13. Using alignment marks, install front cover, rear cover, and cap screws.
14. Install handle, washer, and pin.
15. Install ball, spring, O-ring (12), and plug.
16. Install control lever pattern selector. See Control Lever Pattern Selector Remove and Install. (Group 3360.)

JL58967,00002A0 -19-12MAY15-2/2

Hydraulic Oil Tank Remove and Install

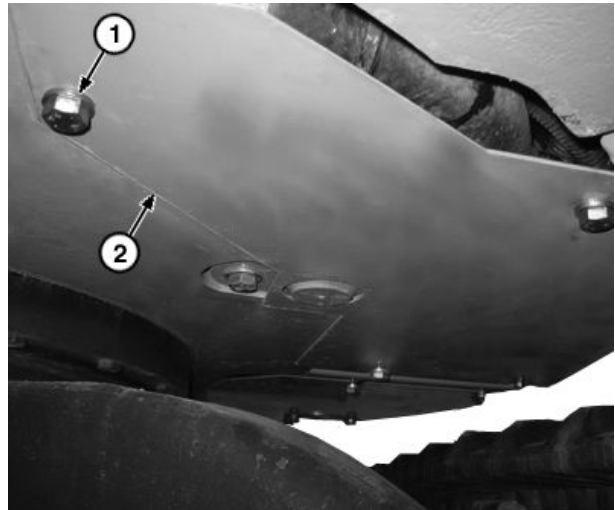
SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Hydraulic Oil Tank Weight (approximate)	28 kg 62 lb.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
- ⚠ CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.**
2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
 3. Drain hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

4. Remove fuel tank. See Fuel Tank Remove and Install. (Group 0560.)
5. Remove cap screws (1) and bottom access panel (2).



Bottom Access Panel

1— Cap Screw (4 used)

2— Bottom Access Panel

TX1135148A—JUN—25APR13

Continued on next page

BD53302,0001759 -19-09MAY13-1/5

Hydraulic System

6. Install identification tags and disconnect hydraulic oil return line (3) and hydraulic oil supply line (4). Close all openings using caps and plugs. See Hydraulic System Main Line Connection. (Group 9025-15.)

3— Hydraulic Oil Return Line 4— Hydraulic Oil Supply Line



Hydraulic Oil Return Line



Hydraulic Oil Supply Line

TX1135150A—UN—17APR13

TX1135126A—UN—17APR13

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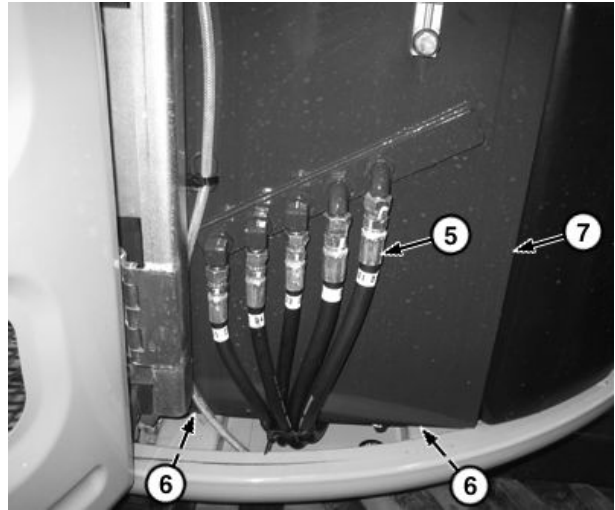
BD53302,0001759 -19-09MAY13-2/5

Hydraulic System

7. Install identification tags and disconnect hydraulic oil return lines (5). Close all openings using caps and plugs. See [Hydraulic System Main Line Connection](#) and see [Hydraulic System Pilot Line Connection](#). (Group 9025-15.)

8. Remove cap screws (6) from bottom of hydraulic oil tank (7).

5—Hydraulic Oil Return Line (5 used)
6—Cap Screw (4 used)
7—Hydraulic Oil Tank (7 used)



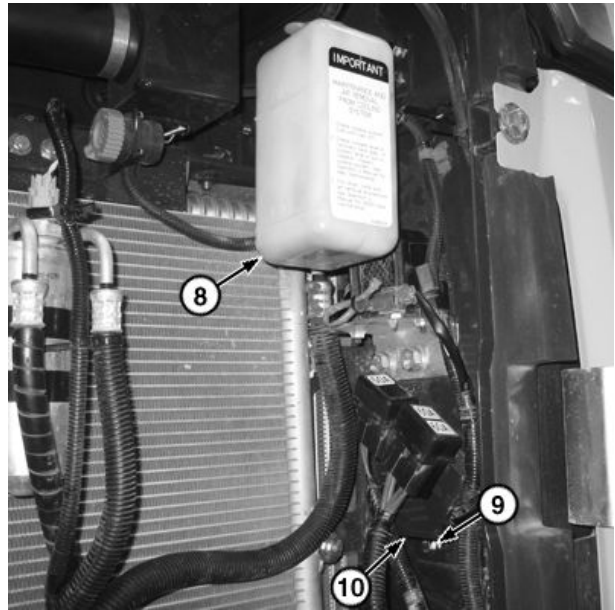
Hydraulic Oil Return Lines

BD53302.0001759 -19-09MAY13-3/5

TX1135131A—UN—17APR13

9. Remove coolant recovery tank (8). See [Coolant Recovery Tank Remove and Install](#). (Group 0510.)
10. Remove cap screws (9) and engine control unit (ECU) cover (10).

8—Coolant Recovery Tank (8 used)
9—Cap Screw (2 used)
10—Engine Control Unit (ECU) Cover (10 used)



Engine Control Unit (ECU) Cover

Continued on next page

BD53302.0001759 -19-09MAY13-4/5

TX1135146A—UN—17APR13

11. Remove cap screws (11).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

12. Using appropriate lifting device, remove hydraulic oil tank.

Specification

Hydraulic Oil Tank—Weight (approximate).....	28 kg 62 lb.
--	-----------------

13. Repair or replace as necessary.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

14. Using appropriate lifting device, install hydraulic oil tank.

Specification

Hydraulic Oil Tank—Weight (approximate).....	28 kg 62 lb.
--	-----------------

15. Install cap screws (11).

16. Install engine control unit (ECU) cover and cap screws (9).

17. Install coolant recovery tank. See Coolant Recovery Tank Remove and Install. (Group 0510.)

18. Install cap screws (6) into bottom of hydraulic oil tank.

19. Connect hydraulic oil return lines (5). See Hydraulic System Main Line Connection and see Hydraulic System Pilot Line Connection. (Group 9025-15.)

20. Connect hydraulic oil supply line and hydraulic oil return line (3). See Hydraulic System Main Line Connection. (Group 9025-15.)



Hydraulic Oil Tank Cap Screws

11— Cap Screw (2 used)

21. Install bottom access panel and cap screws (1).

22. Install fuel tank. See Fuel Tank Remove and Install. (Group 0560.)

23. Fill hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

24. Perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)

25. Operate machine and check for leaks.

TX1135151A—UN—17APR13

BD53302,0001759 -19-09MAY13-5/5

Hydraulic Oil Tank Disassemble and Assemble

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Rod (top of rod-to-bottom of filter element) Length	445 mm 17.5 in.
Filter Element-to-Rod Nut Torque	17 N·m 153 lb.-in.
Cover-to-Hydraulic Oil Tank Cap Screw Torque	49 N·m 36 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

⚠ CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of

oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Drain hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

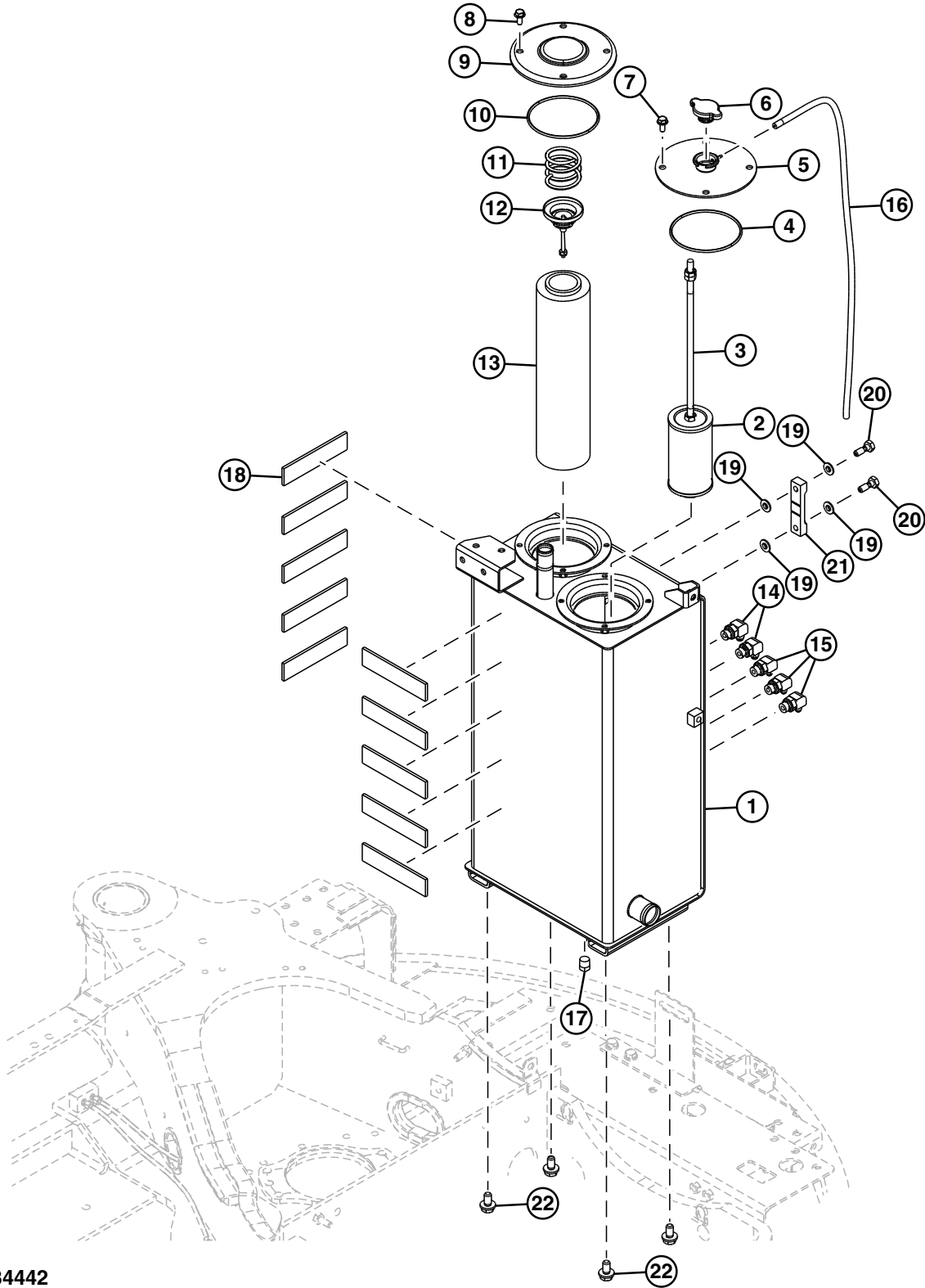
Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

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BD53302,0001733 -19-20MAY13-1/2

Hydraulic System



TX1134442

Hydraulic Oil Tank

TX1134442 —UN—10APR13

BD53302,0001733 -19-20MAY13-2/2

Hydraulic System

- | | | | |
|-----------------------|----------------------------------|----------------------------|------------------------|
| 1— Hydraulic Oil Tank | 8— Cap Screw (4 used) | 14— Elbow Fitting (2 used) | 19— Washer (4 used) |
| 2— Filter Element | 9— Filter Cover | 15— Elbow Fitting (3 used) | 20— Cap Screw (2 used) |
| 3— Rod | 10— O-Ring | 16— Bulk Hose | 21— Level Gauge |
| 4— O-Ring | 11— Spring | 17— Fitting | 22— Cap Screw (4 used) |
| 5— Filter Cover | 12— Flow Control Hydraulic Valve | 18— Isolator (10 used) | |
| 6— Filler Cap | 13— Filter Element | | |
| 7— Cap Screw (4 used) | | | |

NOTE: Removal of hydraulic oil tank is not necessary for disassembly. Hydraulic oil tank should only be removed if replacement is necessary.

4. If necessary, remove hydraulic oil tank. See Hydraulic Oil Tank Remove and Install. (Group 3360.)
5. Remove cap screws (7 and 8).
6. Remove filter covers (5 and 9) and O-rings (4 and 10).
7. Remove spring (11).
8. Remove filter elements (2 and 13) and rod (3).
9. Remove cap screws (20), washers (19), and level gauge (21).
10. Remove elbow fittings (14 and 15).
11. Clean and inspect parts. Repair or replace as necessary.
12. Install elbow fittings.
13. Install level gauge, washers, and cap screws (20).
14. Adjust length of rod on filter element (2).

Specification

Rod (top of rod-to-bottom of filter element)—Length..... 445 mm
17.5 in.

15. Tighten rod nuts on filter element (2) to specification.

Specification

Filter Element-to-Rod
Nut—Torque..... 17 N·m
153 lb.-in.

16. Install filter elements and rod.
17. Install spring.
18. Install O-rings and filter covers.
19. Install cap screws (7 and 8) and tighten to specification.

Specification

Cover-to-Hydraulic
Oil Tank Cap
Screw—Torque..... 49 N·m
36 lb.-ft.

20. If removed, install hydraulic oil tank. See Hydraulic Oil Tank Remove and Install. (Group 3360.)
21. Fill hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

22. Perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)

BD53302.0001733 -19-20MAY13-3/2

Hydraulic Oil Cooler Bypass Valve Remove and Install (S.N. —272504)

SPECIFICATIONS

Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
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1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

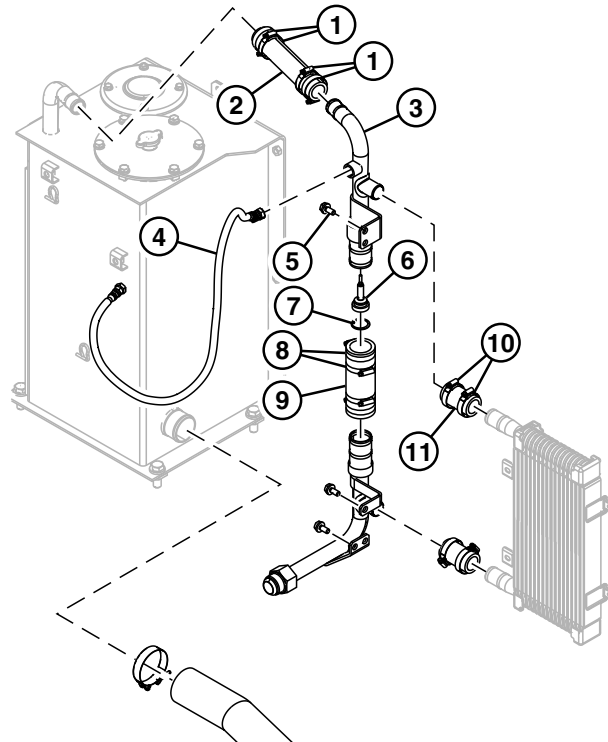
Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Loosen clamps (1) and remove upper hydraulic return hose (2).
5. Install identification tags and disconnect control valve return line (4). Close all openings using caps and plugs.
6. Loosen clamps (10) on upper oil cooler return hose (11).
7. Loosen clamps (8) on bypass valve hydraulic hose (9).
8. Remove cap screws (5) and upper hydraulic oil return line (3).

NOTE: Hydraulic oil cooler bypass valve (6) is held in place by snap ring (7) in upper hydraulic oil return line.

9. Remove snap ring (7) and hydraulic oil cooler bypass valve (6) from upper hydraulic oil return line.
10. Inspect and repair or replace as necessary.
11. Install hydraulic oil cooler bypass valve and snap ring in upper hydraulic oil return line.
12. Install upper hydraulic oil return line and cap screws.
13. Tighten clamps on bypass valve hydraulic hose and upper oil cooler return hose.



Hydraulic Oil Cooler Bypass Valve

- | | |
|-------------------------------------|---------------------------------|
| 1—Clamp (4 used) | 7—Snap Ring |
| 2—Upper Hydraulic Return Hose | 8—Clamp (2 used) |
| 3—Upper Hydraulic Oil Return Line | 9—Bypass Valve Hydraulic Hose |
| 4—Control Valve Return Line | 10—Clamp (2 used) |
| 5—Cap Screw (2 used) | 11—Upper Oil Cooler Return Hose |
| 6—Hydraulic Oil Cooler Bypass Valve | |

14. Connect control valve return line.
15. Install upper hydraulic return hose and tighten clamps.
16. Remove vacuum or fill hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

17. Perform hydraulic pump start-up procedure. See [Hydraulic Pump Start-Up Procedure](#). (Group 3360.)
18. Operate machine and check for leaks.

TX1135190—UN—18APR13

Hydraulic Oil Cooler Bypass Valve Remove and Install (S.N. 272505—)

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)

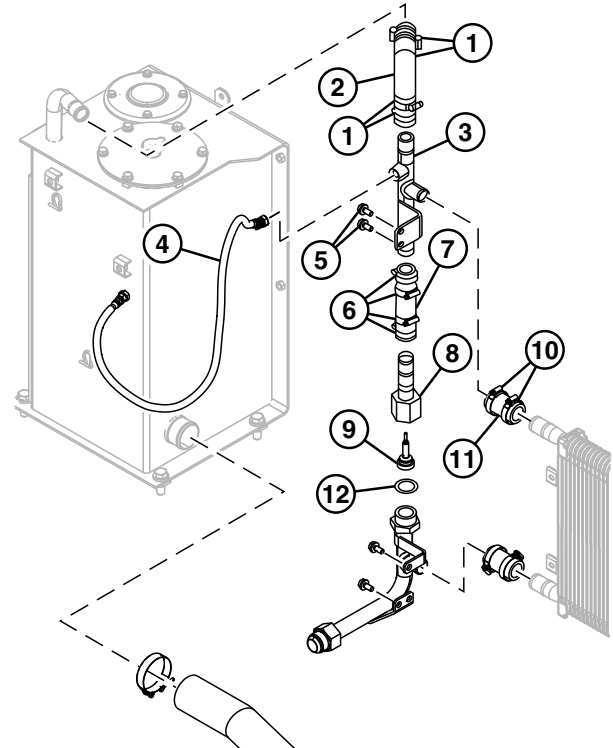
CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Loosen clamps (1) and remove upper hydraulic return hose (2).
5. Install identification tags and disconnect control valve return line (4). Close all openings using caps and plugs.
6. Loosen clamps (10) on upper oil cooler return hose (11).
7. Loosen clamps (6) on lower hydraulic return hose (7).
8. Remove cap screws (5) and upper hydraulic oil return line (3).
9. Remove lower hydraulic return hose (7).
10. Remove hydraulic oil cooler bypass valve housing (8) and hydraulic oil cooler bypass valve (9).
11. Inspect and repair or replace parts as necessary.
12. Install hydraulic oil cooler bypass valve and hydraulic oil cooler bypass valve housing.
13. Install lower hydraulic return hose.
14. Install upper hydraulic oil return line and cap screws.
15. Tighten clamps (6) on lower hydraulic return hose.
16. Tighten clamps (10)) on upper oil cooler return hose.



Hydraulic Oil Cooler Bypass Valve

- | | |
|------------------------------------|--|
| 1— Clamp (4 used) | 7— Lower Hydraulic Return Hose |
| 2— Upper Hydraulic Return Hose | 8— Hydraulic Oil Cooler Bypass Valve Housing |
| 3— Upper Hydraulic Oil Return Line | 9— Hydraulic Oil Cooler Bypass Valve |
| 4— Control Valve Return Line | 10— Clamp (2 used) |
| 5— Cap Screw (2 used) | 11— Upper Oil Cooler Return Hose |
| 6— Clamp (4 used) | 12— O-Ring |

17. Install upper hydraulic return hose and tighten clamps (1).

18. Remove vacuum or fill hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

19. Perform hydraulic pump start-up procedure. See [Hydraulic Pump Start-Up Procedure](#). (Group 3360.)
20. Operate machine and check for leaks.

TX03742,000010B -19-13JAN17-1/1

TX1230190 —UN—13JAN17

Boom Cylinder Remove and Install

SPECIFICATIONS

Hydraulic Oil Capacity (approximate)	32 L 8.5 gal.
Boom Cylinder Weight (approximate)	59 kg 130 lb.
Rod End Cylinder Pin Torque	140 N.m 101 lb.-ft.
Cover Cap Screw Torque	90 N.m 65 lb.-ft.

OTHER MATERIALS

271 Loctite® Thread Lock and Sealer (high strength)

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Position machine with boom and arm cylinder fully retracted.
3. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
4. Apply vacuum or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

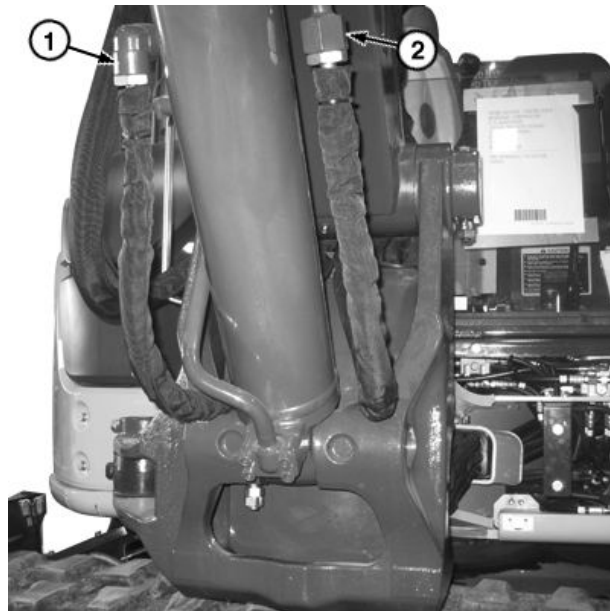
Specification

Hydraulic Oil—Capacity (approximate)..... 32 L
8.5 gal.

5. Install identification tags and disconnect hydraulic hoses (1 and 2). Close all openings using caps and plugs.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

Loctite is a trademark of Henkel Corporation



Hydraulic Hoses

1— Boom Up Hose

2— Boom Down Hose

6. Support boom cylinder using appropriate lifting device.

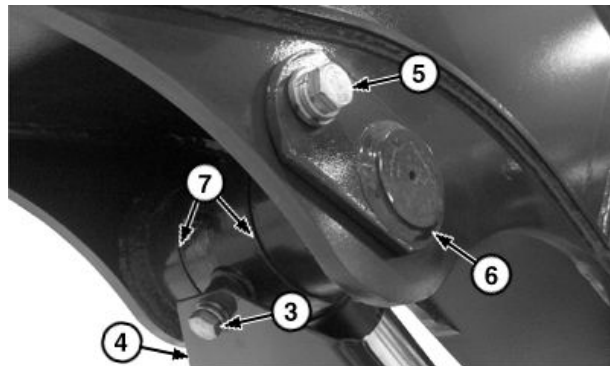
Specification

Boom Cylinder—Weight (approximate)..... 59 kg
130 lb.

7. Remove cap screws (3) and cover (4).
8. Remove cap screw (5).
9. Remove rod end cylinder pin (6) and rod end shims (7).

3— Cap Screw (2 used)
4— Cover
5— Cap Screw

6— Rod End Cylinder Pin
7— Rod End Shim (2 used)



Boom Cylinder Rod End

Continued on next page

BG71631,0000610 -19-22MAY13-1/3

TX1135767A —UN—01MAY13

TX1135768A —UN—01MAY13

10. Remove nuts (8) and cap screw (9).
11. Remove cylinder end pin (10) and cylinder end shims (11).

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

12. Remove boom cylinder using appropriate lifting device.

Specification

Boom Cylinder—Weight (approximate).....	59 kg 130 lb.
--	------------------

13. Repair or replace parts as necessary. See Boom Cylinder Disassemble and Assemble. (Group 3360.)
14. Inspect pins and bushings for wear. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)
15. Clean pins and bushings.
16. Apply grease to pins and bushings. See Lubricate Front End Pin Joints. (Operator's Manual.)

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

17. Install boom cylinder using appropriate lifting device.

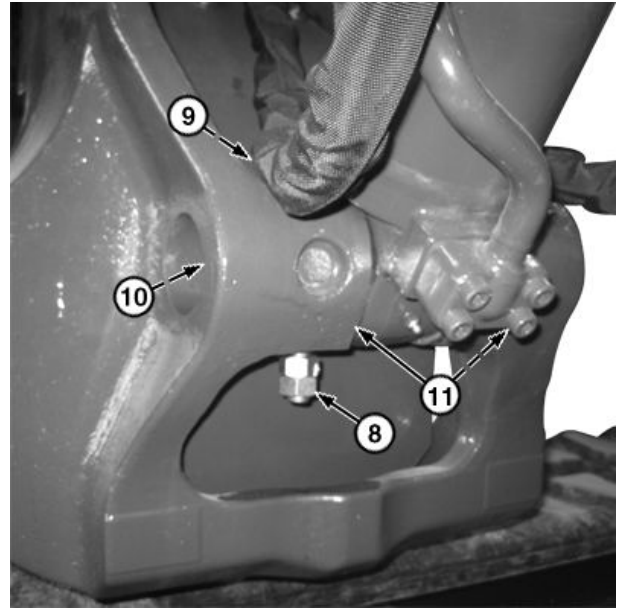
Specification

Boom Cylinder—Weight (approximate).....	59 kg 130 lb.
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18. Install cylinder end shims and cylinder end pin.
19. Apply PM37421 Thread Lock and Sealer (high strength) to cap screw (9). Install cap screw and nuts (8).
20. Install rod end shims and rod end cylinder pin.
21. Apply PM37421 Thread Lock and Sealer (high strength) to cap screw (5) and install. Tighten to specification.

Specification

Rod End Cylinder Pin—Torque.....	140 N.m 101 lb.-ft.
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Cylinder Pin

8— Nut (2 used)
9— Cap Screw

10— Cylinder End Pin
11— Cylinder End Shim (2 used)

22. Connect hydraulic hoses.
23. Install cover and cap screws (3). Tighten to specification.

Specification

Cover Cap Screw—Torque.....	90 N.m 65 lb.-ft.
--------------------------------	----------------------

24. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
25. Apply grease to all joints. See Lubricate Front End Pin Joints. (Operator's Manual.)
26. Bleed air from hydraulic system. See Hydraulic Cylinder Bleed Procedure. (Group 3360.)

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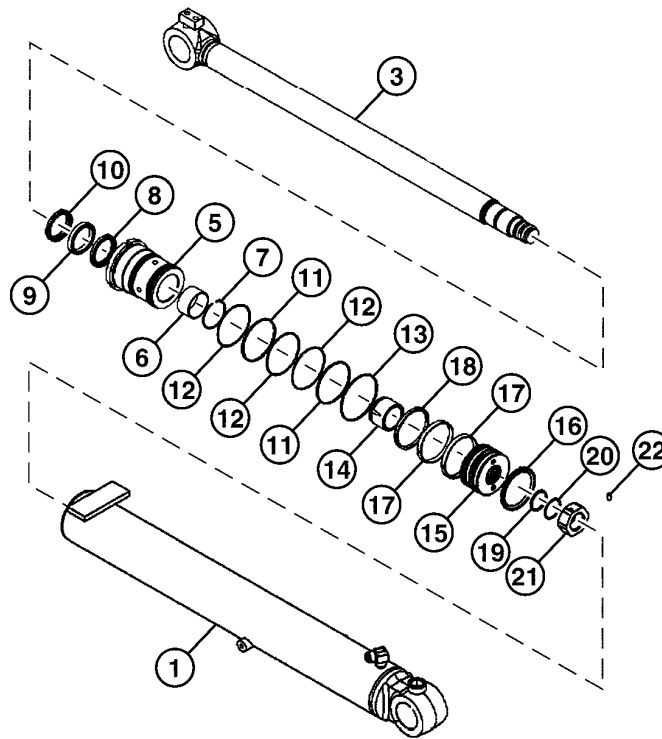
Boom Cylinder Disassemble and Assemble

SPECIFICATIONS

Boom Cylinder Weight (approximate)	59 kg 130 lb.
Boom Rod Curvature	0.5 mm per 1 m 0.020 in. per 3 ft.
Piston Torque	540 N·m 398 lb.-ft.
Piston Nut Torque	810 N·m 594 lb.-ft.
Set Screw Torque	15 N·m 133 lb.-in.
Cylinder Head Torque	756 N·m 556 lb.-ft.

SERVICE EQUIPMENT AND TOOLS

JT30043 Cylinder Service Stand
JDG28 Spanner Wrench
ST5908 Nut Wrench
ST3440 Piston Wrench
ST8040 Bushing Driver



Boom Cylinder

TX1136235

- | | | | |
|-------------------|--------------------------|------------------------|-----------------|
| 1— Cylinder Tube | 9— Packing Seal | 14— Cushion Ring | 19— O-Ring |
| 3— Cylinder Rod | 10— Dust Wiper | 15— Piston | 20— Backup Ring |
| 5— Cylinder Head | 11— O-Ring (2 used) | 16— Piston Seal | 21— Piston Nut |
| 6— Bushing | 12— Backup Ring (2 used) | 17— Wear Ring (2 used) | 22— Set Screw |
| 7— Retaining Ring | 13— O-Ring | 18— Dust Ring | |
| 8— Buffer Seal | | | |

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

Specification

Boom Cylinder—Weight
(approximate)..... 59 kg
130 lb.

2. Bend lock washer crimp from notch in cylinder head (5).
3. Install alignment mark on cylinder rod (3) and cylinder head to aid in installation.

IMPORTANT: Avoid cylinder component damage. Carefully remove components to avoid damaging sliding surfaces.

1. Fasten head end of cylinder to JT30043 Cylinder Service Stand.

Continued on next page

BG71631,0000611 -19-16MAY13-1/2

TX1136235—UN—09MAY13

Hydraulic System

4. Pull cylinder rod out so piston (15) is against cylinder head. Remove cylinder head using JDG28 Spanner Wrench.
5. Pull cylinder rod from cylinder tube (1).
6. Remove the staking from set screw (22). Remove set screw.
7. Remove piston nut (21) using ST5908 Nut Wrench.
8. Remove piston (15) using ST3440 Piston Wrench.
9. Remove cushion ring (14).
10. Remove cylinder head from cylinder rod.

IMPORTANT: Cylinder components can be damaged during seal removal. Use caution when removing seals to avoid damage to other components.

11. Remove dust rings (18), wear rings (17), piston seal (16), O-ring (19), and backup ring (20) from piston.
12. Remove dust wiper (10), retaining ring (7), buffer seal (8), packing seal (9), backup rings (12), and O-rings (11 and 13).

IMPORTANT: Avoid possible cylinder component damage. Bushing (6) cannot be reused. Bushing must be replaced when removed.

13. Remove bushing (6) from cylinder head.
14. Check for rod curvature on V-blocks using dial indicator.

Specification

Boom Rod—Curvature..... 0.5 mm per 1 m
0.020 in. per 3 ft.

15. Repair or replace parts as necessary.
16. Install bushing on to cylinder head using ST8040 Bushing Driver. Press to bottom of bore.
17. Clean and dry parts to be reused. Apply a light film of clean hydraulic oil to all sealing parts and machined surfaces.

18. Install packing seal with flat surface towards cylinder head.
19. Install buffer seal, dust wiper, retaining ring, O-rings (11 and 13), and backup ring on to piston head.
20. Install wear rings (17), dust ring, piston seal, backup ring (20), and O-ring (19) on to piston.
21. Install cylinder head on to cylinder rod.
22. Install cushion ring on to cylinder rod.
23. Install piston on to cylinder rod using ST3440 Piston Wrench. Tighten to specification.

Specification

Piston—Torque.....540 N·m
398 lb.-ft.

24. Install piston nut using ST5908 Nut Wrench. Tighten to specification.

Specification

Piston Nut—Torque.....810 N·m
594 lb.-ft.

25. Install set screw. Tighten set screw to specification and stake set screw head in two places to prevent loosening.

Specification

Set Screw—Torque..... 15 N·m
133 lb.-in.

26. Install cylinder rod into cylinder tube.
27. Install cylinder head using JDG28 Spanner Wrench. Tighten to specification.

Specification

Cylinder Head—Torque.....756 N·m
556 lb.-ft.

28. Bend lock washer in to notch in cylinder head to prevent loosening.

BG71631.0000611 -19-16MAY13-2/2

Arm Cylinder Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Arm Cylinder Weight (approximate)	29 kg 65 lb.
Arm Cylinder Joint Clearance	0.5 mm 0.020 in.
Arm Cylinder Cap Screw Torque	140 N·m 101 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Fully retract bucket cylinder and arm cylinder. Lower front attachment to ground.

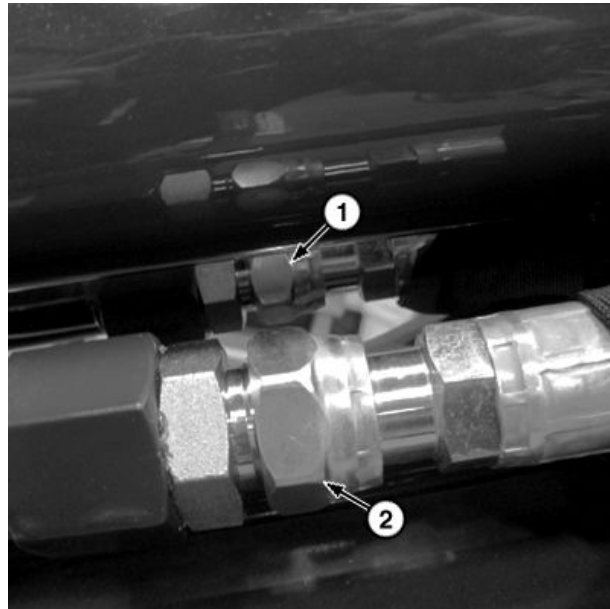
CAUTION: High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic oil tank is pressurized. Cap must be loosened to relieve the air pressure in hydraulic oil tank.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
4. Apply vacuum pump or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

5. Install identification tags and disconnect hydraulic hoses (1 and 2). Close all openings using caps and plugs.



Hydraulic Hoses

1— Boom Up Hose

2— Boom Down Hose

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

6. Support arm cylinder using appropriate lifting device.

Specification

Arm Cylinder—Weight (approximate)..... 29 kg
65 lb.

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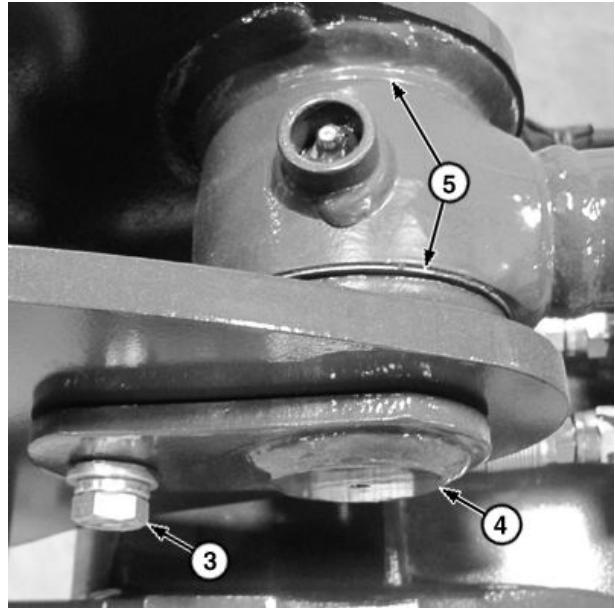
BG71631,0000612 -19-22MAY13-1/3

TX1135959A —UN—03MAY13

7. Remove cap screw (3), cylinder pin (4), and rod end shims (5).

3— Cap Screw
4— Cylinder Pin

5— Rod End Shim (2 used)



Cylinder Pin

Continued on next page

BG71631,0000612 -19-22MAY13-2/3

TX1135960A —UN—03MAY13

- Remove cap screw (7), arm cylinder pin (6), and cylinder end shims (8).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- Remove arm cylinder.

Specification

Arm Cylinder—Weight (approximate).....	29 kg 65 lb.
---	-----------------

- Inspect pins and bushings for wear. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)

- Repair or replace parts as necessary. See Arm Cylinder Disassemble and Assemble. (Group 3360.)

- Apply multipurpose grease to pins and bushings.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- Install arm cylinder using appropriate lifting device.

Specification

Arm Cylinder—Weight (approximate).....	29 kg 65 lb.
---	-----------------

- Install cylinder end shims (8) equally on each side to attain proper clearance.

Specification

Arm Cylinder Joint—Clearance.....	0.5 mm 0.020 in.
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- Install arm cylinder pin (6) and cap screw (7). Tighten to specification.

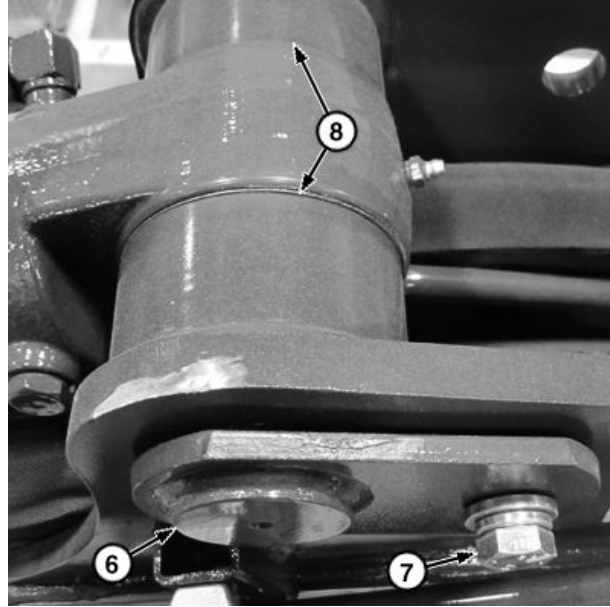
Specification

Arm Cylinder Cap Screw—Torque.....	140 N·m 101 lb.-ft.
---------------------------------------	------------------------

- Install rod end shims (5) equally on both sides to attain proper clearance.

Specification

Arm Cylinder Joint—Clearance.....	0.5 mm 0.020 in.
--------------------------------------	---------------------



Cylinder Pin

6— Cylinder Pin
7— Cap Screw

8— Cylinder End Shim (2 used)

- Install arm cylinder pin (4) and cap screw (3). Tighten to specification.

Specification

Arm Cylinder Cap Screw—Torque.....	140 N·m 101 lb.-ft.
---------------------------------------	------------------------

- Connect hydraulic hoses (1 and 2).

- Apply grease to all joints. See Lubricate Front End Pin Joints. (Operator's Manual.)

- Remove vacuum pump or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

- Bleed air from hydraulic cylinders. See Hydraulic Cylinder Bleed Procedure. (Group 3360.)

- Operate machine and check for leaks.

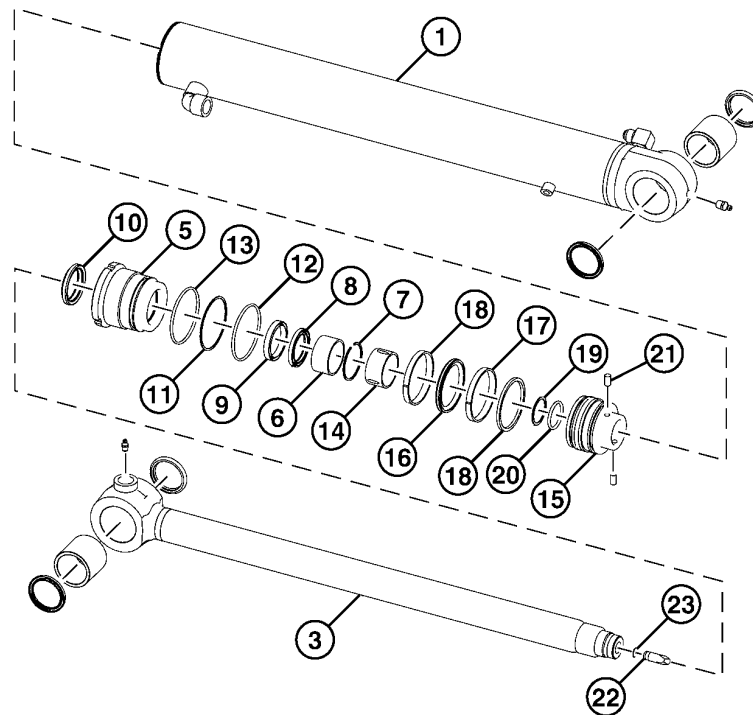
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Arm Cylinder Disassemble and Assemble

SPECIFICATIONS	
Arm Cylinder Weight (approximate)	29 kg 65 lb
Arm Cylinder Rod Curvature	0.5 mm per 1 m 0.020 in. per 3 ft
Piston Torque	540 N·m 398 lb·ft
Set Screw Torque	15 N·m 133 lb·in
Cylinder Head Torque	756 N·m 558 lb·ft

SERVICE EQUIPMENT AND TOOLS
JT30043 Cylinder Service Stand
JDG28 Spanner Wrench
ST3440 Piston Wrench
ST8040 Bushing Driver



TX1136238

Arm Cylinder

- | | | | |
|-------------------|-----------------|------------------------|-----------------|
| 1— Cylinder Tube | 8— Buffer Seal | 14— Cushion Ring | 19— O-Ring |
| 3— Cylinder Rod | 9— Packing Seal | 15— Piston | 20— Backup Ring |
| 5— Cylinder Head | 10— Dust Wiper | 16— Piston Seal | 21— Set Screw |
| 6— Bushing | 11— O-Ring | 17— Wear Ring | 22— Plunger |
| 7— Retaining Ring | 12— Backup Ring | 18— Dust Ring (2 used) | 23— Stop Ring |
| | 13— O-Ring | | |

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

Specification

Arm Cylinder—Weight
(approximate)..... 29 kg
65 lb

- Fasten head end of cylinder to JT30043 Cylinder Service Stand.
- Bend lock washer crimp from notch in cylinder head (5).
- Install alignment mark on cylinder rod (3) and cylinder head to aid in installation.
- Pull cylinder rod out so piston (15) is against cylinder head. Remove cylinder head using JDG28 Spanner Wrench.
- Pull cylinder rod from cylinder tube (1).

IMPORTANT: Avoid cylinder component damage. Carefully remove components to avoid damaging sliding surfaces.

Continued on next page

MB00333,0000477 -19-28SEP20-1/2

Hydraulic System

6. Remove the staking from set screw (21). Remove set screw.
7. Remove piston (15) using ST3440 Piston Wrench.
8. Remove cushion ring (14).
9. Remove cylinder head from cylinder rod.

IMPORTANT: Cylinder components can be damaged during seal removal. Use caution when removing seals to avoid damage to other components.

10. Remove dust rings (18), piston seal (16), wear ring (17), O-ring (19), and backup ring (20) from piston.
11. Remove dust wiper (10), retaining ring (7), buffer seal (8), packing seal (9), backup ring (12), and O-rings (11 and 13).

IMPORTANT: Avoid possible cylinder component damage. Bushing (6) cannot be reused. Bushing must be replaced when removed.

12. Remove bushing (6) from cylinder head.
13. Check for rod curvature on V-blocks using dial indicator.

Specification

Arm Cylinder	
Rod—Curvature.....	0.5 mm per 1 m 0.020 in. per 3 ft

14. Repair or replace parts as necessary.
15. Install bushing on to cylinder head using ST8040 Bushing Driver. Press to bottom of bore.
16. Clean and dry parts to be reused. Apply a light film of clean hydraulic oil to all sealing parts and machined surfaces.

17. Install packing seal with flat surface towards cylinder head.
18. Install buffer seal, dust wiper, O-rings (11 and 13), backup ring (12), and retaining ring.
19. Install backup ring (20), O-ring (19), dust rings (18), piston seal, and wear ring (17) on to piston.
20. Install cylinder head on to cylinder rod.
21. Install cushion ring on to cylinder rod.
22. Install piston on to cylinder rod using ST3440 Piston Wrench. Tighten to specification.

Specification

Piston—Torque.....	540 N·m 398 lb·ft
--------------------	----------------------

23. Install set screw. Tighten set screw to specification and stake set screw head in two places to prevent loosening.

Specification

Set Screw—Torque.....	15 N·m 133 lb·in
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24. Install cylinder rod into cylinder tube.
25. Install cylinder head using JDG28 Spanner Wrench. Tighten to specification.

Specification

Cylinder Head—Torque.....	756 N·m 558 lb·ft
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26. Bend lock washer in to notch in cylinder head to prevent loosening.

MB00333,0000477 -19-28SEP20-2/2

Bucket Cylinder Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal
Bucket Cylinder Clearance	0.5 mm or less 0.020 in. or less

1. Park and prepare machine for service safely. See Park and Prepare For Service Safely. (Group 0001.)
2. Fully retract bucket cylinder and arm cylinder. Lower front attachment to ground.

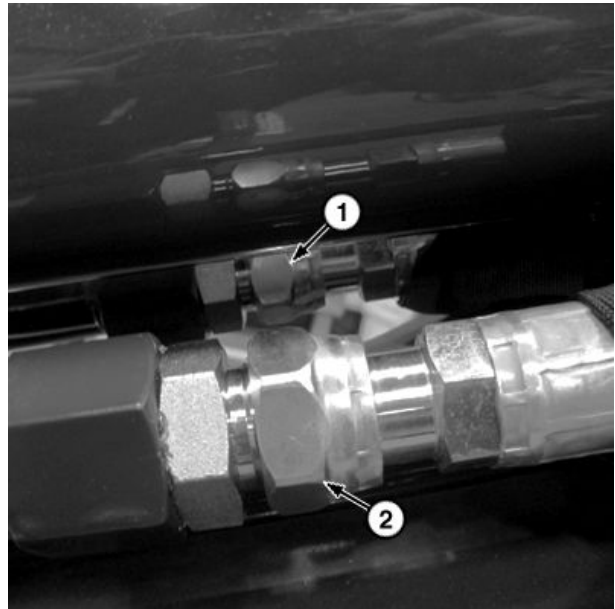
⚠ CAUTION: High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic oil tank is pressurized. Cap must be loosened to relieve air pressure in hydraulic oil tank.

3. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
4. Apply vacuum pump or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

5. Install identification tags and disconnect hydraulic hoses (1 and 2). Close all openings using caps and plugs.



Hydraulic Hoses

1— Bucket Up Hose

2— Bucket Down Hose

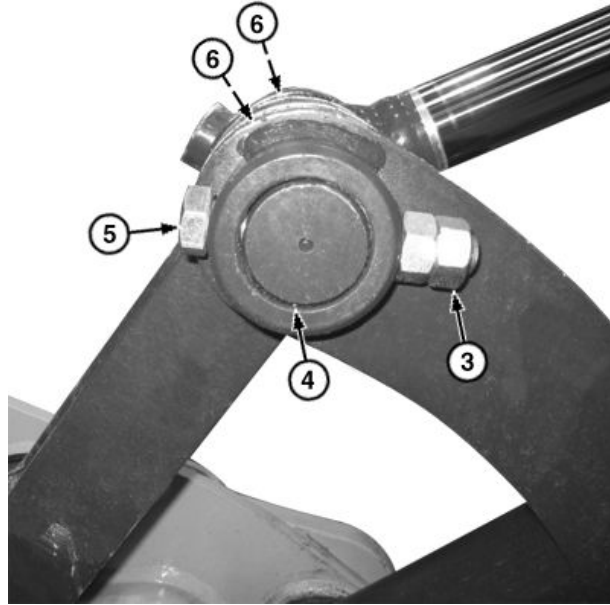
TX1135959A —UN—03MAY13

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BG71631,0000614 -19-23MAY13-1/3

6. Remove cap screw (5) and nuts (3).
7. Remove bucket cylinder pin (4) and rod end shims (6).

3— Nut (2 used) 5— Cap Screw
4— Bucket Cylinder Pin 6— Rod End Shim (2 used)



Cylinder Pin

TX1136128A —UN—08MAY13

Continued on next page

BG71631,0000614 -19-23MAY13-2/3

8. Remove cap screw (7), cylinder pin (8), and cylinder end shims (9).
9. Remove bucket cylinder.
10. Inspect pins and bushings for wear. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)
11. Repair or replace parts and necessary. See Bucket Cylinder Disassemble and Assemble. (Group 3360.)
12. Apply multipurpose grease to pins and bushings.
13. Install bucket cylinder.
14. Install cylinder end shims (9) equally on each side to attain proper clearance.

Specification

Bucket Cylinder—Clear-	
ance.....	0.5 mm
	0.020 in.

15. Install cylinder end pin (8), and cap screw (7). Tighten to specification.

Specification

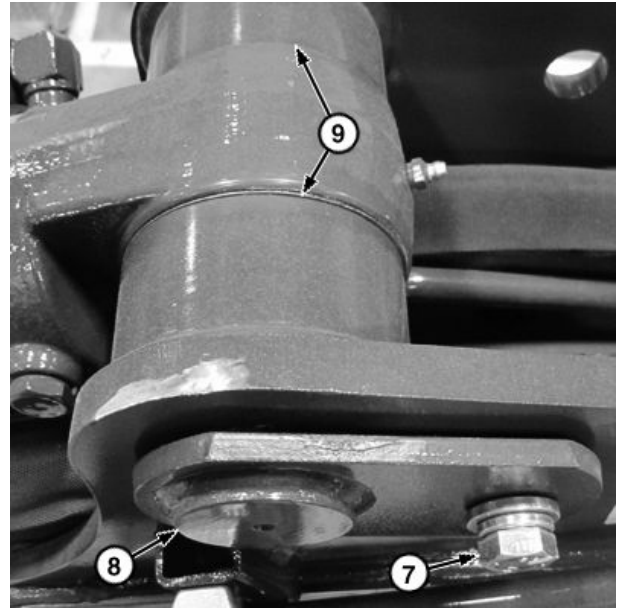
Bucket Cylinder Cap	
Screw—Torque.....	140 N-m
	101 lb.-ft.

16. Install rod end shims (6) equally on both sides to attain proper clearance.

Specification

Bucket Cylinder—Clear-	
ance.....	0.5 mm
	0.020 in.

17. Install bucket cylinder pin (4) cap screw (5), and nuts (3). Tighten to specification.
18. Connect hydraulic hoses (1 and 2).
19. Bleed air from hydraulic cylinders. See Hydraulic Cylinder Bleed Procedure. (Group 3360.)



Cylinder End Pin

- | | |
|---------------------|-------------------------------|
| 7— Cap Screw | 9— Cylinder End Shim (2 used) |
| 8— Cylinder End Pin | |

20. Remove vacuum pump or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
21. Apply grease to all joints. See Lubricate Front End Pin Joints. (Operator's Manual.)
22. Operate machine and check for leaks.

TX1136130A—UN—08MAY13

BG71631,0000614 -19-23MAY13-3/3

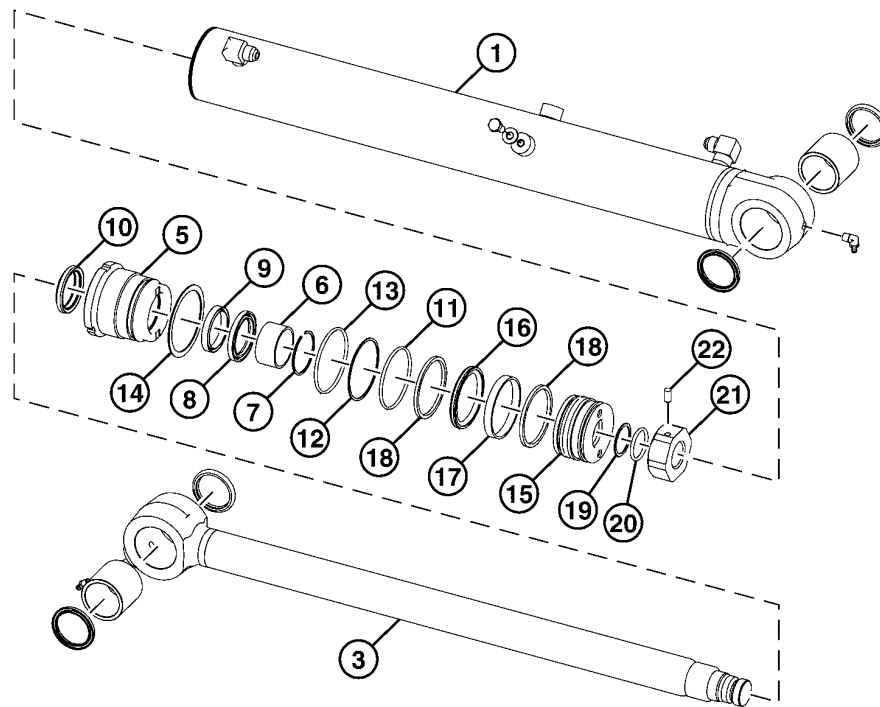
Bucket Cylinder Disassemble and Assemble

SPECIFICATIONS

Bucket Cylinder Weight (approximate)	28 kg 62 lb.
Bucket Cylinder Rod Curvature	0.5 mm per 1 m 0.020 in. per 3 ft.
Piston Torque	540 N·m 398 lb.-ft.
Piston Nut Torque	810 N·m 597 lb.-ft.
Set Screw Torque	15 N·m 133 lb.-in.
Cylinder Head Torque	756 N·m 558 lb.-ft.

SERVICE EQUIPMENT AND TOOLS

JT30043 Cylinder Service Stand
JDG28 Spanner Wrench
ST3239 Nut Wrench
ST3440 Piston Wrench
ST8039 Bushing Driver



TX1136240—UN—09MAY13

TX1136240

Bucket Cylinder

- | | | | |
|------------------|----------------|-----------------------|----------------|
| 1—Cylinder Tube | 8—Buffer Seal | 14—Washer | 19—O-Ring |
| 3—Cylinder Rod | 9—Packing Seal | 15—Piston | 20—Backup Ring |
| 5—Cylinder Head | 10—Dust Wiper | 16—Piston Seal | 21—Piston Nut |
| 6—Bushing | 11—O-Ring | 17—Wear Ring | 22—Set Screw |
| 7—Retaining Ring | 12—Backup Ring | 18—Dust Ring (2 used) | |
| | 13—O-Ring | | |

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

Specification

Bucket Cylinder—Weight
(approximate)..... 28 kg
62 lb.

2. Bend lock washer crimp from notch in cylinder head (5).
3. Install alignment mark on cylinder rod (3) and cylinder head to aid in installation.

IMPORTANT: Avoid cylinder component damage. Carefully remove components to avoid damaging sliding surfaces.

1. Fasten head end of cylinder to JT30043 Cylinder Service Stand.

Continued on next page

BG71631.0000615 -19-23MAY13-1/2

Hydraulic System

4. Pull cylinder rod out so piston nut (21) is against cylinder head. Remove cylinder head using JDG28 Spanner Wrench.
5. Pull cylinder rod from cylinder tube (1).
6. Remove the staking from set screw (22). Remove set screw.
7. Remove piston nut using ST3239 Nut Wrench.
8. Remove piston (15) using ST3440 Piston Wrench.
9. Remove cylinder head from cylinder rod.

IMPORTANT: Cylinder components can be damaged during seal removal. Use caution when removing seals to avoid damage to other components.

10. Remove dust rings (18), piston seal (16), wear ring (17), backup ring (20) and O-ring (19) from piston.
11. Remove dust wiper (10), packing seal (9), buffer seal (8), retaining ring (7), O-rings (11 and 13), backup ring (12), and washer (14) from cylinder head.

IMPORTANT: Avoid cylinder component damage. Bushing (6) cannot be reused. Bushing must be replaced when removed.

12. Remove bushing (6) from cylinder head.
13. Check for rod curvature on V-blocks using dial indicator.

Specification

Bucket Cylinder	
Rod—Curvature.....	0.5 mm per 1 m 0.020 in. per 3 ft.

14. Repair or replace parts as necessary.
15. Clean and dry parts to be reused. Apply a light film of clean hydraulic oil to all sealing parts and machined surfaces.
16. Install bushing to cylinder head using ST8039 Bushing Driver. Press to bottom of bore.

17. Install packing seal with flat surface towards cylinder head.
18. Install dust wiper into cylinder head using ST8039 Bushing Driver.
19. Install buffer seal, washer, O-rings (13 and 11), backup ring, and retaining ring.
20. Install piston seal (16), wear ring (17), dust rings (18), O-ring (19), and backup ring (20) on to piston.
21. Install cylinder head on to cylinder rod.
22. Install piston on to cylinder rod using ST3440 Piston Wrench. Torque to specification.

Specification

Piston—Torque.....	540 N·m 398 lb.-ft.
--------------------	------------------------

23. Install piston nut using ST3239 Nut Wrench. Tighten to specification.

Specification

Piston Nut—Torque.....	810 N·m 597 lb.-ft.
------------------------	------------------------

24. Install set screw. Tighten set screw to specification and stake set screw head in two places to prevent loosening.

Specification

Set Screw—Torque.....	15 N·m 133 lb.-in.
-----------------------	-----------------------

25. Install cylinder rod into cylinder tube.

26. Install cylinder head using JDG28 Spanner Wrench. Tighten to specification.

Specification

Cylinder Head—Torque.....	756 N·m 558 lb.-ft.
---------------------------	------------------------

27. Bend lock washer in to notch in cylinder head to prevent loosening.

BG71631,0000615 -19-23MAY13-2/2

Boom Swing Cylinder Remove and Install

SPECIFICATIONS

Hydraulic Oil Tank Capacity	32 L 8.5 gal.
Boom Swing Cylinder Weight (approximate)	55 kg 125 lb.
Cap Screw Torque	88 N·m 66 lb.-ft.

OTHER MATERIAL

271 Loctite® Thread Lock and Sealer (high strength)

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Rotate operator's station 90degrees to right of the blade.
3. Retract boom, arm, and bucket cylinders, and lower bucket to ground.

CAUTION: High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic oil tank is pressurized. Cap must be loosened to relieve air pressure in hydraulic oil tank.

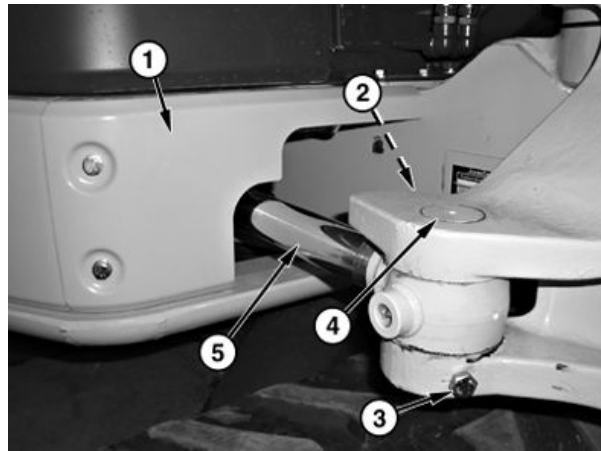
4. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
5. Apply vacuum pump or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity.....	32 L 8.5 gal.
----------------------------------	------------------

6. Remove front cover (1).

Loctite is a trademark of Henkel Corporation



Boom Swing Cylinder

- | | |
|-----------------|------------------------|
| 1— Cover | 4— Boom Pin |
| 2— Nut (2 used) | 5— Boom Swing Cylinder |
| 3— Cap Screw | |

7. Insert wood block between boom swing cylinder (5) and frame.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

8. Support boom swing cylinder using appropriate lifting device.

Specification

Boom Swing Cylinder—Weight (approximate).....	55 kg 125 lb.
---	------------------

9. Remove nuts (2), cap screw (3), and boom pin (4).

10. Remove both access panels located under right side of the operator's station.

Continued on next page

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T209098A—UN—01MAR05

11. Install identification tags and disconnect hydraulic hoses (6). Close all openings using caps and plugs.
12. Remove cap screw (7) and frame pin (8).

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

13. Using appropriate lifting device, remove boom swing cylinder (5).

Specification

Boom Swing Cylinder—Weight (approximate).....	55 kg 125 lb.
---	------------------

14. Inspect pins and bushings for wear. See Inspect Pins and Bushings—Front Attachment and Blade. (Group 3340.)
15. Repair or replace parts as necessary. See Boom Swing Cylinder Disassemble and Assemble. (Group 3360.)
16. Apply multipurpose grease to pins and bushings.

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

17. Using appropriate lifting device install boom swing cylinder.

Specification

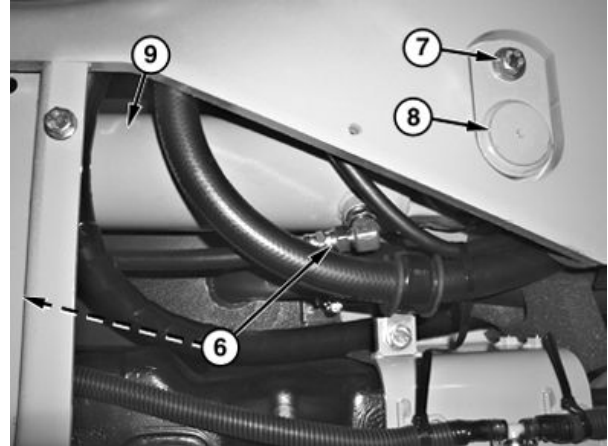
Boom Swing Cylinder—Weight (approximate).....	55 kg 125 lb.
---	------------------

18. Apply PM37421 Thread Lock and Sealer (high strength) to cap screw (7).
19. Install frame pin and cap screw (7). Tighten to specification.

Specification

Cap Screw—Torque.....	88 N·m 66 lb.-ft.
-----------------------	----------------------

20. Install access panels under machine.



Boom Swing Cylinder Hose

- | | |
|----------------------------|--------------|
| 5— Boom Swing Cylinder | 7— Cap Screw |
| 6— Hydraulic Hose (2 used) | 8— Frame Pin |

21. Apply PM37421 Thread Lock and Sealer (high strength) to cap screw (3).

NOTE: Nuts must be tightened against each other, not retainer. Cap screw must turn freely in hole.

22. Install boom pin, cap screw (3), and nuts (2). Tighten nuts against each other.
23. Install front cover.
24. Apply grease to all joints. See Lubricate Front End Pin Joints. (Operator's Manual.)
25. Remove vacuum pump or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
26. Bleed air from hydraulic cylinders. See Hydraulic Cylinder Bleed Procedure. (Group 3360.)
27. Operate machine and check for leaks.

BG71631,0000616 -19-23MAY13-2/2

T209098A—UN—01MAR05

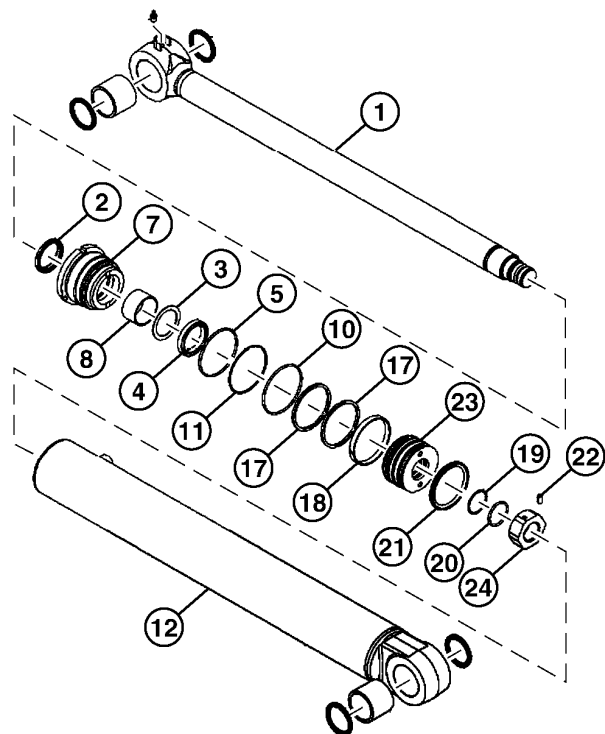
Boom Swing Cylinder Disassemble and Assemble

SPECIFICATIONS

Boom Swing Cylinder Weight (approximate)	55 kg 125 lb.
Boom Swing Rod Curvature	0.5 mm per 1 m 0.020 in. per 3 ft.
Piston Torque	540 N·m 398 lb.-ft.
Piston Nut Torque	810 N·m 594 lb.-ft.
Set Screw Torque	15 N·m 133 lb.-in.
Cylinder Head Torque	810 N·m 594 lb.-ft.

SERVICE EQUIPMENT AND TOOLS

JT30043 Cylinder Service Stand
JDG28 Spanner Wrench
ST3239 Nut Wrench
ST3440 Piston Wrench
ST8040 Bushing Driver



Boom Swing Cylinder

TX1136239—UN—09MAY13

TX1136239

- | | | | |
|-----------------|-------------------|------------------------|----------------|
| 1— Cylinder Rod | 7— Cylinder Head | 17— Dust Ring (2 used) | 22— Set Screw |
| 2— Dust Wiper | 8— Bushing | 18— Wear Ring | 23— Piston |
| 3— Backup Ring | 10— Backup Ring | 19— Backup Ring | 24— Piston Nut |
| 4— Packing Seal | 11— O-Ring | 20— O-Ring | |
| 5— O-Ring | 12— Cylinder Tube | 21— Seal | |

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

Specification

Boom Swing Cylinder—Weight (approximate).....	55 kg 125 lb.
---	------------------

1. Fasten head end of cylinder to JT30043 Cylinder Service Stand.
2. Bend lock washer crimp from notch in cylinder head (7).
3. Install alignment mark on cylinder rod (1) and cylinder head to aid in installation.

IMPORTANT: Avoid cylinder component damage. Carefully remove components to avoid damaging sliding surfaces.

Continued on next page

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Hydraulic System

4. Pull cylinder rod out so piston nut (24) is against cylinder head. Remove cylinder head using JDG28 Spanner Wrench.
5. Pull cylinder rod from cylinder tube (12).
6. Remove the staking from set screw (22). Remove set screw.
7. Remove piston nut using ST3239 Nut Wrench.
8. Remove piston (23) using ST3440 Piston Wrench.
9. Remove cylinder head from cylinder rod.

IMPORTANT: Cylinder components can be damaged during seal removal. Use caution when removing seals to avoid damage to other components.

10. Remove dust rings (17), wear ring (18), seal (21), backup ring (19), and O-ring (20) from piston.
11. Remove dust wiper (2), backup rings (3 and 10), packing seal (4), and O-rings (5 and 11) from cylinder head.

IMPORTANT: Avoid possible cylinder component damage. Bushing (8) cannot be reused. Bushing must be replaced when removed.

12. Remove bushing (8) from cylinder head.
13. Check for rod curvature on V-blocks using dial indicator.

Specification

Boom Swing	
Rod—Curvature.....	0.5 mm per 1 m 0.020 in. per 3 ft.

14. Repair or replace parts as necessary.
15. Clean and dry parts to be reused. Apply a light film of clean hydraulic oil to all sealing parts and machined surfaces.
16. Install bushing to cylinder head using ST8040 Bushing Driver. Press to bottom of bore.

17. Install backup ring (3).
18. Install packing seal with flat surface towards cylinder head.
19. Install dust wiper into cylinder head using ST8040 Bushing Driver.
20. Install O-rings (5 and 11) and backup ring (10).
21. Install backup ring (19), O-ring (20), seal, wear ring, and dust rings on to piston.
22. Install cylinder head on to cylinder rod.
23. Install piston on to cylinder rod using ST3440 Piston Wrench. Tighten to specification.

Specification

Piston—Torque.....	540 N·m 398 lb.-ft.
--------------------	------------------------

24. Install piston nut using ST3239 Nut Wrench. Tighten to specification.

Specification

Piston Nut—Torque.....	810 N·m 594 lb.-ft.
------------------------	------------------------

25. Install set screw. Tighten set screw to specification and stake set screw head in two places to prevent loosening.

Specification

Set Screw—Torque.....	15 N·m 133 lb.-in.
-----------------------	-----------------------

26. Install cylinder rod into cylinder tube.
27. Install cylinder head using JDG28 Spanner Wrench. Tighten to specification.

Specification

Cylinder Head—Torque.....	810 N·m 594 lb.-ft.
---------------------------	------------------------

28. Bend lock washer in to notch in cylinder head to prevent loosening.

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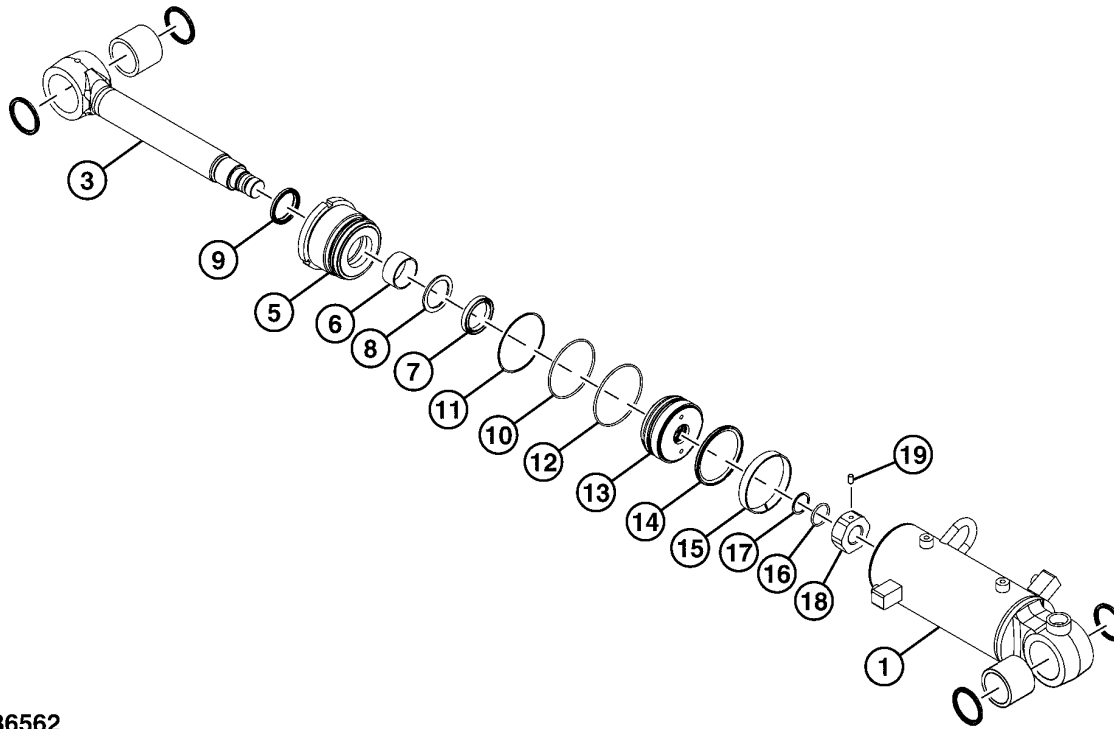
Blade Lift Cylinder Disassemble and Assemble

SPECIFICATIONS

Blade Lift Cylinder Weight (approximate)	24 kg 53 lb.
Blade Lift Cylinder Rod Curvature	0.5 mm per 1 m 0.020 in. per 3 ft.
Piston Torque	540 N·m 398 lb.-ft.
Piston Nut Torque	810 N·m 594 lb.-ft.
Set Screw Torque	15 N·m 133 lb.-in.
Cylinder Head Torque	810 N·m 594 lb.-ft.

SERVICE EQUIPMENT AND TOOLS

JT30043 Cylinder Service Stand
JDG28 Spanner Wrench
ST3239 Nut Wrench
ST3440 Piston Wrench
ST8040 Bushing Driver



TX1136562—UN—15MAY13

TX1136562

Blade Lift Cylinder

- 1— Cylinder Tube
- 3— Cylinder Rod
- 5— Cylinder Head
- 6— Bushing

- 7— Packing Seal
- 8— Backup Ring
- 9— Dust Wiper
- 10— O-Ring
- 11— Backup Ring

- 12— O-Ring
- 13— Piston
- 14— Seal
- 15— Wear Ring
- 16— O-Ring
- 17— Backup Ring

- 18— Piston Nut
- 19— Set Screw

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

Specification

Blade Lift Cylinder—Weight (approximate).....	24 kg 53 lb.
---	-----------------

1. Fasten head end of cylinder to JT30043 Cylinder Service Stand.
2. Bend lock washer crimp from notch in cylinder head (5).
3. Install alignment mark on cylinder rod (3) and cylinder head to aid in installation.

Continued on next page

BG71631,0000618 -19-21MAY13-1/2

IMPORTANT: Avoid cylinder component damage. Carefully remove components to avoid damaging sliding surfaces.

4. Pull cylinder rod out so piston nut (18) is against cylinder head. Remove cylinder head using JDG28 Spanner Wrench.
5. Pull cylinder rod from cylinder tube (1).
6. Remove the staking from set screw (19). Remove set screw.
7. Remove piston nut using ST3239 Nut Wrench.
8. Remove piston (13) using ST3440 Piston Wrench.
9. Remove cylinder head from cylinder rod.

IMPORTANT: Cylinder components can be damaged during seal removal. Use caution when removing seals to avoid damage to other components.

10. Remove seal (14), wear ring (15), backup ring (17), and O-ring (16) from piston.
11. Remove dust wiper (9), backup rings (8 and 11), packing seal (7), and O-rings (10 and 12) from cylinder head.

IMPORTANT: Bushing (6) cannot be reused. Bushing must be replaced when removed.

12. Remove bushing (6) from cylinder head.
13. Check for rod curvature on V-blocks using dial indicator.

Specification

Blade Lift Cylinder	
Rod—Curvature.....	0.5 mm per 1 m 0.020 in. per 3 ft.

14. Repair or replace parts as necessary.
15. Install bushing to cylinder head using ST8040 Bushing Driver. Press to bottom of bore.

16. Clean and dry parts to be reused. Apply a light film of clean hydraulic oil to all sealing parts and machined surfaces.
17. Install packing seal with flat surface towards cylinder head.
18. Install dust wiper, backup rings (8 and 11), and O-rings (10 and 12) on cylinder head.
19. Install seal, wear ring, O-ring (16), and backup ring (17) on to piston.
20. Install cylinder head on to cylinder rod.
21. Install piston on to cylinder rod using ST3440 Piston Wrench. Tighten to specification.

Specification

Piston—Torque.....	540 N·m 398 lb.-ft.
--------------------	------------------------

22. Install piston nut using ST3239 Nut Wrench. Tighten to specification.

Specification

Piston Nut—Torque.....	810 N·m 594 lb.-ft.
------------------------	------------------------

23. Install set screw. Tighten set screw to specification and stake set screw head in two places to prevent loosening.

Specification

Set Screw—Torque.....	15 N·m 133 lb.-in.
-----------------------	-----------------------

24. Install cylinder rod into cylinder tube.
25. Install cylinder head using JDG28 Spanner Wrench. Tighten to specification.

Specification

Cylinder Head—Torque.....	810 N·m 594 lb.-ft.
---------------------------	------------------------

26. Bend lock washer in to notch in cylinder head to prevent loosening.

BG71631,0000618 -19-21MAY13-2/2

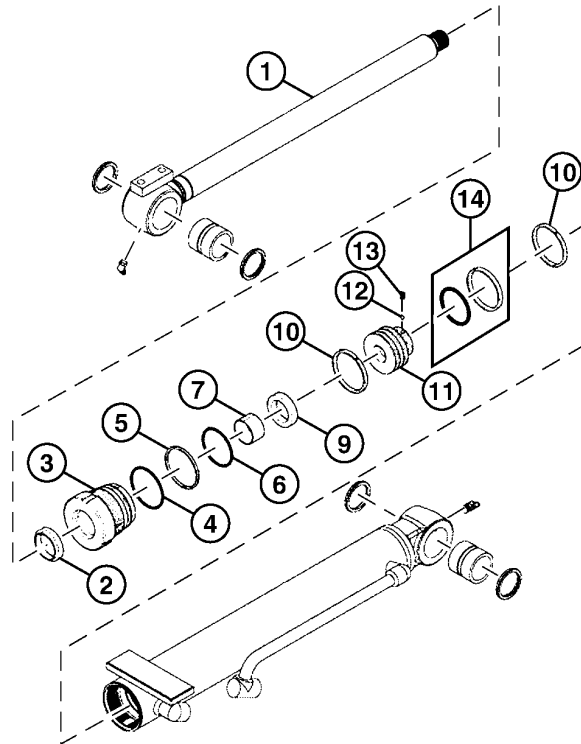
Angle Blade Cylinder Disassemble and Assemble—If Equipped

SPECIFICATIONS

Angle Blade Cylinder Weight (approximate)	17 kg 37 lb.
Angle Blade Cylinder Rod Curvature	0.5 mm per 1 m 0.020 in. per 3 ft.
Piston Torque	586 N·m 430 lb.-ft.
Set Screw Torque	15 N·m 133 lb.-in.
Cylinder Head Torque	382 N·m 282 lb.-ft.

SERVICE EQUIPMENT AND TOOLS

JT30043 Cylinder Service Stand
JDG28 Spanner Wrench
ST3239 Nut Wrench
ST8056 Bushing Driver



Angle Blade Cylinder

TX1136574

- | | | | |
|------------------|----------------|----------------|-------------------|
| 1— Cylinder Rod | 6— O-Ring | 11— Piston | 16— Slide Ring |
| 2— Wiper Ring | 7— Backup Ring | 12— Steel Ball | 17— Cylinder Tube |
| 3— Cylinder Head | 8— Bushing | 13— Set Screw | |
| 4— O-Ring | 9— U-Ring | 14— O-Ring | |
| 5— Backup Ring | 10— Slide Ring | 15— Seal Ring | |

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

Specification

Angle Blade
Cylinder—Weight
(approximate)..... 17 kg
37 lb.

3. Install alignment mark on cylinder rod (1) and cylinder head to aid in installation.

IMPORTANT: Avoid cylinder component damage. Carefully remove components to avoid damaging sliding surfaces.

1. Fasten head end of cylinder to JT30043 Cylinder Service Stand.
2. Bend lock washer crimp from notch in cylinder head (3).

4. Pull cylinder rod out so piston (11) is against cylinder head. Remove cylinder head using JDG28 Spanner Wrench.

5. Pull cylinder rod from cylinder tube (17).

Continued on next page

BG71631.0000619 -19-22MAY13-1/2

TX1136574 —UN—16MAY13

Hydraulic System

6. Remove the staking from set screw (13). Remove set screw and steel ball (12).
7. Remove piston and cylinder head from cylinder rod.

IMPORTANT: Avoid possible cylinder damage. Do not reuse slide rings (10 and 16).

IMPORTANT: Cylinder components can be damaged during seal removal. Use caution when removing seals to avoid damage to other components.

8. Remove slide rings (10 and 16), seal ring (15), and O-ring (14) from piston.
9. Remove wiper ring (2), U-ring (9), backup ring (5 and 7) and O-ring (4 and 7) from cylinder head.

IMPORTANT: Avoid possible cylinder damage. Bushing (8) cannot be reused. Bushing must be replaced when removed.

10. Remove bushing (8) from cylinder head.
11. Check for rod curvature on V-blocks using dial indicator.

Specification

Angle Blade	
Rod—Curvature.....	0.5 mm per 1 m 0.020 in. per 3 ft.

12. Repair or replace parts as necessary.
13. Install bushing to cylinder head using ST8056 Bushing Driver. Press to bottom of bore.

14. Clean and dry parts to be reused. Apply a light film of clean hydraulic oil to all sealing parts and machined surfaces.
15. Install backup ring, U-ring, wiper ring, O-ring (4 and 6) and backup ring on to cylinder head.
16. Install O-ring, seal ring, and slide rings (10 and 16) on to piston.
17. Install cylinder head on to cylinder rod.
18. Install piston on to cylinder rod using ST3440 Piston Wrench. Tighten to specification.

Specification

Piston—Torque.....	586 N·m 430 lb.-ft.
--------------------	------------------------

19. Install set screw. Tighten set screw to specification and stake set screw head in two places to prevent loosening.

Specification

Set Screw—Torque.....	15 N·m 133 lb.-in.
-----------------------	-----------------------

20. Install cylinder rod into cylinder tube.
21. Install cylinder head using JDG28 Spanner Wrench. Tighten to specification.

Specification

Cylinder Head—Torque.....	382 N·m 282 lb.-ft.
---------------------------	------------------------

22. Bend lock washer in to notch in cylinder head to prevent loosening.

BG71631.0000619 -19-22MAY13-2/2

Hydraulic Cylinder Bleed Procedure

SPECIFICATIONS

Engine Speed	Slow Idle
--------------	-----------

CAUTION: Prevent injury from unexpected machine movement. Perform this procedure when repairs or maintenance is done on hydraulic system, or when machine has been stored for a period of time.

IMPORTANT: Trapped air suddenly compressed in a cylinder is heated and ignites the oil used for assembly causing cap seal and ring damage. Start with cylinder rod retracted and the rod end filled with clean oil. Connect the cylinder head end and lines. Operate function to slowly extend rod. Procedure will eliminate most of the air and reduce the possibility of damage.

NOTE: Bleed air at initial start-up, whenever major repairs or maintenance (oil change) is done on

hydraulic system, or when machine has been in storage for a period of time.

IMPORTANT: Prevent component damage from cavitation. Perform this procedure when repairs or maintenance is done on hydraulic system, or when machine has been stored for a period of time.

1. Operate engine to specification.
- Specification**
- | | |
|-------------------|-----------|
| Engine—Speed..... | Slow Idle |
|-------------------|-----------|
2. Slowly extend and retract cylinder several times to approximately 100 mm (4 in.) from end of stroke.
 3. Operate cylinder several times to full stroke.
 4. Check hydraulic oil level. See Check Hydraulic Tank Oil Level. (Operator's Manual.)

DV53278.0000555 -19-16MAY13-1/1

Hydraulic System

Section 43 Swing or Pivoting System

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Swing Gear Case Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Swing Gear Case Assembly Weight (approximate)	38 kg 84 lb.
Swing Gear Case Assembly Cap Screw Torque	144 N·m 103 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum to hydraulic system or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)
5. Install identification tags and disconnect hydraulic lines (1—5). Close all openings using caps and plugs. See Swing Motor Line Identification. (Group 9025-15.)

NOTE: Swing motor may be removed by itself or with swing gear case. To remove swing motor, see Swing Motor and Park Brake Remove and Install. (Group 4360.)

6. Install alignment marks on swing gear case housing and upperstructure to aid in assembly.

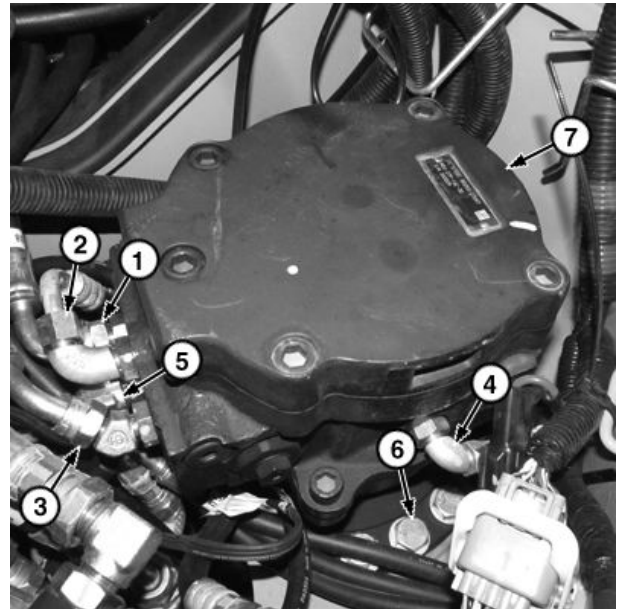
CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

7. Remove cap screws (6) and swing gear case assembly (7) using appropriate lifting device.

Specification

Swing Gear Case Assembly—Weight (approximate).....	38 kg 84 lb.
--	-----------------

8. Repair or replace parts as necessary. See Swing Gear Case Disassemble and Assemble. (Group 4350.)



Swing Gear Case Assembly

- | | |
|---------------------|-----------------------------|
| 1— Left Swing Line | 5— Center Joint Line |
| 2— Return Line | 6— Cap Screw (6 used) |
| 3— Right Swing Line | 7— Swing Gear Case Assembly |
| 4— Pilot Line | |

9. Using appropriate lifting device, install swing gear case assembly.
10. Align swing gear case assembly mark with mark on upperstructure.
11. Install cap screws and tighten to specification.

Specification

Swing Gear Case Assembly Cap Screw—Torque.....	144 N·m 103 lb.-ft.
--	------------------------

12. Connect hydraulic lines (1—5) and remove identification tags. See Swing Motor Line Identification. (Group 9025-15.)

IMPORTANT: Swing motor and gear case will be damaged if not filled with oil before operating swing function. Swing motor and park brake start-up procedure must be performed whenever a new swing motor or gear case is installed or oil has been drained from the motor or gear case.

13. Perform swing motor and park brake start-up procedure. See Swing Motor and Park Brake Start-Up Procedure. (Group 4360.)
14. Fill hydraulic oil tank or remove vacuum. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

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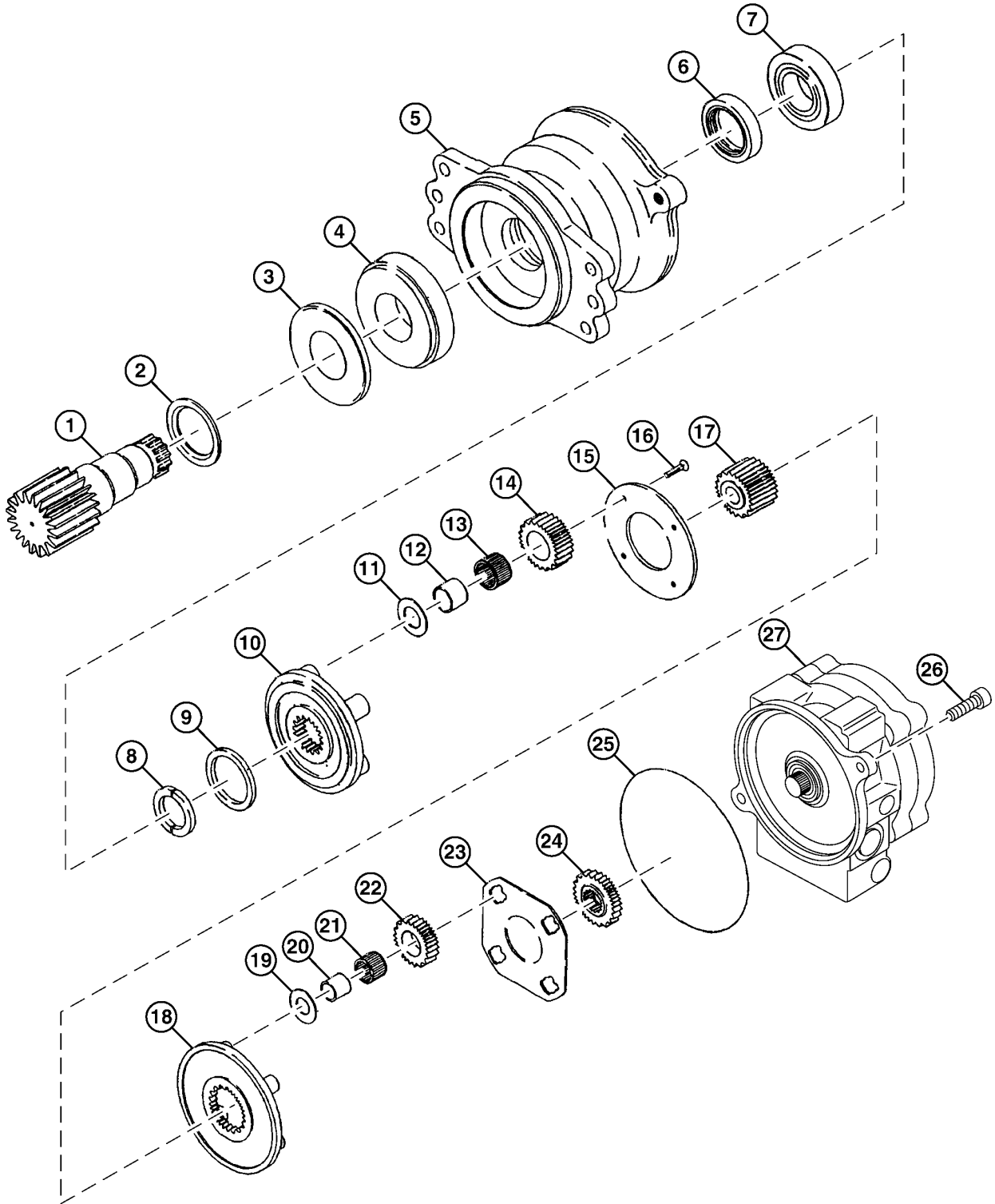
Mechanical Drive Elements

15. Operate machine and check for leaks.

16. Check hydraulic oil level. See Check Hydraulic Tank Oil Level. (Operator's Manual.)

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Swing Gear Case Disassemble and Assemble



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Swing Gear Case

Continued on next page

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TX1135704 —UN—30APR13

Mechanical Drive Elements

- 1— Shaft
- 2— Spacer
- 3— Bearing Plate
- 4— Tapered Bearing
- 5— Housing
- 6— Oil Seal
- 7— Tapered Bearing
- 8— Split Retaining Ring
- 9— Collar
- 10— Second Stage Planetary Carrier

- 11— Thrust Washer (4 used)
- 12— Inner Race (4 used)
- 13— Needle Bearing (4 used)
- 14— Second Stage Planetary Gear (4 used)
- 15— Thrust Plate
- 16— Cap Screw (4 used)

- 17— Second Stage Planetary Sun Gear
- 18— First Stage Planetary Carrier
- 19— Thrust Washer (4 used)
- 20— Inner Race (4 used)
- 21— Needle Bearing (4 used)
- 22— First Stage Planetary Gear (4 used)

- 23— Thrust Plate
- 24— First Stage Planetary Sun Gear
- 25— O-Ring
- 26— Cap Screw (2 used)
- 27— Swing Motor

SPECIFICATIONS	
Gear Case Bearing Split Retaining Ring Force	6870 N 1550 lb.-force
Thrust Plate-to-Second Stage Planetary Carrier Torque	4 N·m 35 lb.-in.
Gear Case Housing-to-Swing Motor Torque	128 N·m 94 lb.-ft.

ESSENTIAL TOOLS	
ST7711 Bearing Tool	

OTHER MATERIAL	
242 Loctite® Thread Lock and Sealer (medium strength)	

1. Remove swing gear case. See Swing Gear Case Remove and Install. (Group 4350.)
2. Apply alignment marks at mating positions of housing (5) and swing motor (27).
3. Remove cap screws (26) and housing from swing motor.

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4. Remove O-ring (25), thrust plate (23), and first stage planetary sun gear (24).

NOTE: Parts for each planetary gear should be kept together.

5. Remove first stage planetary gears (22), needle bearings (21), inner races (20), and thrust washers (19).
6. Remove first stage planetary carrier (18).
7. Remove cap screws (16), thrust plate (15), and second stage planetary sun gear (17).

NOTE: Parts for each planetary gear should be kept together.

8. Remove second stage planetary gears (14), needle bearings (13), inner races (12), and thrust washers (11).
9. Remove second stage planetary carrier (10).

Continued on next page

JS20420.0000AA4 -19-14MAY13-2/3

10. Using ST7711 Bearing Tool (29) apply downward force to tapered bearing (7). Remove collar (9) and split retaining ring (8).
11. Remove tapered bearing (7) and shaft (1).
12. Remove tapered bearing (4), bearing plate (3), and spacer (2) from shaft using a press.

IMPORTANT: Prevent possible damage to machine parts. Damage to oil seal or inside surfaces of housing can occur when removing oil seal (6). Use care when removing oil seal.

13. Remove oil seal (6) from housing.
14. Repair and replace parts as necessary.

IMPORTANT: Prevent possible machine damage. Apply clean hydraulic oil on to parts to prevent parts from seizing.

IMPORTANT: Prevent possible damage to gear case components. Oil seal must be installed properly to avoid oil leak and damage to gears. Install oil seal with metallic surface on ring gear side of housing.

15. Install oil seal into housing with metallic surface on ring gear side of housing.
16. Apply grease to tapered bearing (4). Install spacer, bearing plate, and tapered bearing (4) to shaft using a shop press.

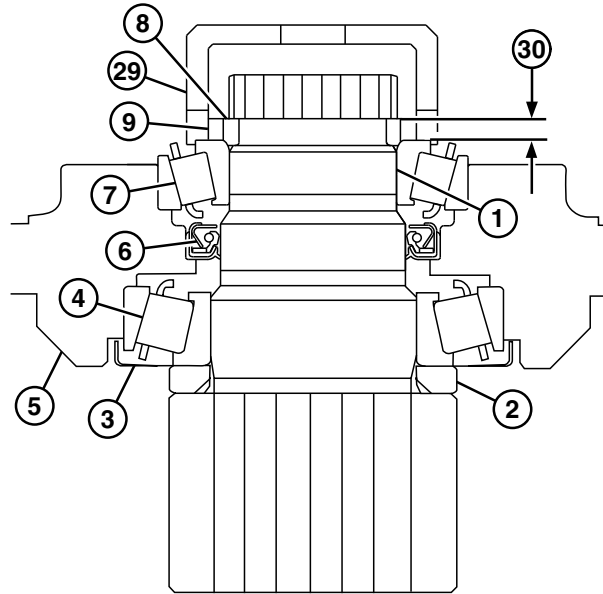
IMPORTANT: Prevent possible damage to gear case components. Damage to oil seal could cause oil leak and damage to gears. Take care not to damage oil seal when installing shaft (1) in housing.

17. Install shaft assembly in housing.
18. Install tapered bearing (7).
19. Push down on tapered bearing (7) using ST7711 Bearing Tool and a shop press. Rotate housing 10 turns, install split retaining ring and collar.

Specification

Gear Case Bearing Split Retaining Ring—Force.....	6870 N
	1550 lb.-force

20. Install second stage planetary carrier.
21. Install thrust washers (11), inner races (12), needle bearings (13), and second stage planetary gears.
22. Install second stage planetary sun gear and thrust plate (15).
23. Apply PM37418 Thread Lock and Sealer (medium strength) to threads of cap screws (16). Install cap screws (16) and tighten to specification.



Swing Gear Case Shaft

- | | |
|--------------------|-------------------------|
| 1— Shaft | 7— Tapered Bearing |
| 2— Spacer | 8— Split Retaining Ring |
| 3— Bearing Plate | 9— Collar |
| 4— Tapered Bearing | 29— ST7711 Bearing Tool |
| 5— Housing | 30— Clearance |
| 6— Oil Seal | |

Specification

Thrust Plate-to-Second Stage Planetary Carrier—Torque.....	4 N·m
	35 lb.-in.

24. Install first stage planetary carrier.
25. Install thrust washers (19), inner races (20), needle bearings (21), and first stage planetary gears.
26. Install first stage planetary sun gear and thrust plate (23).
27. Install O-ring to housing.
28. Install housing to swing motor using cap screws (26) and tighten to specification.

Specification

Gear Case Housing-to-Swing Motor—Torque.....	128 N·m
	94 lb.-ft.

29. Install swing gear case. See Swing Gear Case Remove and Install. (Group 4350.)

TX1135649—UN—03MAY13

Upperstructure Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Upperstructure Weight (approximate)	2094 kg 4617 lb.
Upperstructure Cap Screw Torque	110 N·m 80 lb.-ft.

1. Park and prepare machine for service safely. See [Park and Prepare for Service Safely](#). (Group 0001.)

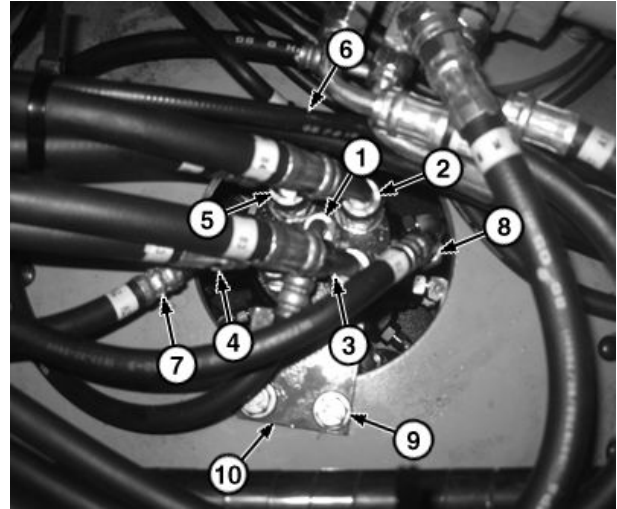
CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening hydraulic oil cap. See [Hydraulic Oil Tank Pressure Release Procedure](#). (Group 9025-25.)
3. Drain hydraulic oil tank. See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate)..... 32 L
8.5 gal.

4. Remove cab. See [Cab Remove and Install](#). (Group 1800.)
5. Install identification tags and disconnect hydraulic lines (1—8). Close all openings using caps and plugs. See [Travel Hydraulic System Line Connection](#) and



Center Joint

- | | |
|-------------------------------------|----------------------------|
| 1— Return Line | 6— Pilot line |
| 2— Right Forward Travel Supply Line | 7— Blade Lower Supply Line |
| 3— Left Forward Travel Supply Line | 8— Blade Raise Supply Line |
| 4— Left Reverse Travel Supply Line | 9— Cap Screw (2 used) |
| 5— Right Reverse Travel Supply Line | 10— Bracket |

see [Blade Hydraulic System Line Connection](#). (Group 9025-15.)

NOTE: Center joint remains attached to undercarriage when upperstructure is removed.

6. Remove cap screws (9) and stop bracket (10).

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TX1135340A—UN—22APR13

7. Install lifting eyebolts (12) into counterweight.

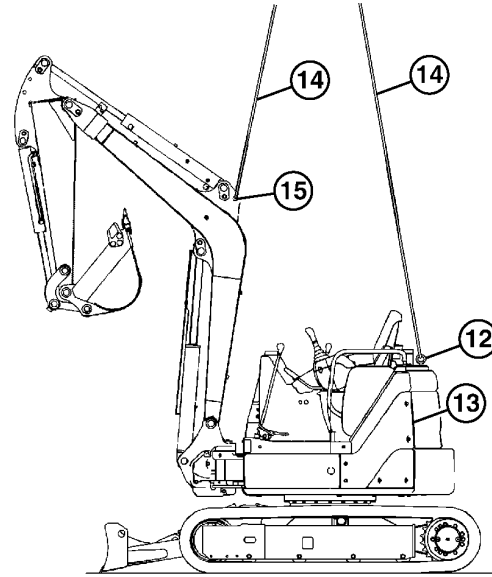
CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

8. Support upperstructure (13) by attaching appropriate lifting device (14) to lifting eyebolts and arm cylinder mounting bracket (15).

Specification

Upperstructure—Weight
 (approximate)..... 2094 kg
 4617 lb.

- | | |
|------------------------------|-----------------------------------|
| 12— Lifting Eyebolt (2 used) | 14— Lifting Device |
| 13— Upperstructure | 15— Arm Cylinder Mounting Bracket |



Upperstructure

Continued on next page

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TX1135324A —UN—19APR13

9. Install alignment marks (17) on upperstructure and outer race on swing bearing (18) to aid during installation.
10. Remove upperstructure cap screws (19). Record location of cap screws to aid during installation.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

11. Using appropriate lifting device, remove upperstructure from undercarriage.

Specification

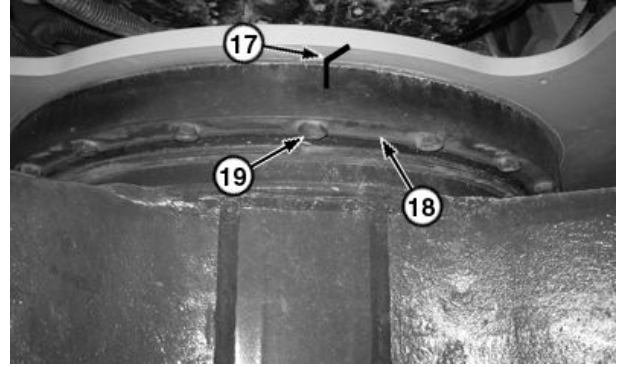
Upperstructure—Weight (approximate).....	2094 kg 4617 lb.
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12. Repair or replace parts as necessary.
13. Attach appropriate lifting device to lifting eyebolts and arm cylinder mounting bracket.
14. Align upperstructure and swing bearing using alignment marks.
15. Install upperstructure cap screws and tighten to specification.

Specification

Upperstructure Cap Screw—Torque.....	110 N·m 80 lb.-ft.
---	-----------------------

16. Install stop bracket and cap screws (9).
17. Connect hydraulic lines. See Travel Hydraulic System Line Connection and see Blade Hydraulic System Line Connection. (Group 9025-15.)



Upperstructure Cap Screws

- 17— Alignment Mark
- 18— Swing Bearing
- 19— Cap Screw (22 used)

18. Install cab. See Cab Remove and Install. (Group 1800.)
 19. Fill hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
- IMPORTANT:** Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.
20. Perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)
 21. Operate machine and check for leaks.

TX113593A—JN—06MAY13

JD29379,000038B -19-03MAY13-3/3

Swing Bearing Remove and Install

SPECIFICATIONS

Swing Bearing Weight (approximate)	43 kg 95 lb.
Cap Screw Torque	110 N·m 80 lb.-ft.

SERVICE EQUIPMENT AND TOOLS

ST 0050 Lifting Bracket

OTHER MATERIAL

277 Loctite® Thread Lock and Sealer (high strength)

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)
2. Position machine so upperstructure and tracks face forward and are aligned.
3. Remove upperstructure. See Upperstructure Remove and Install. (Group 4350.)

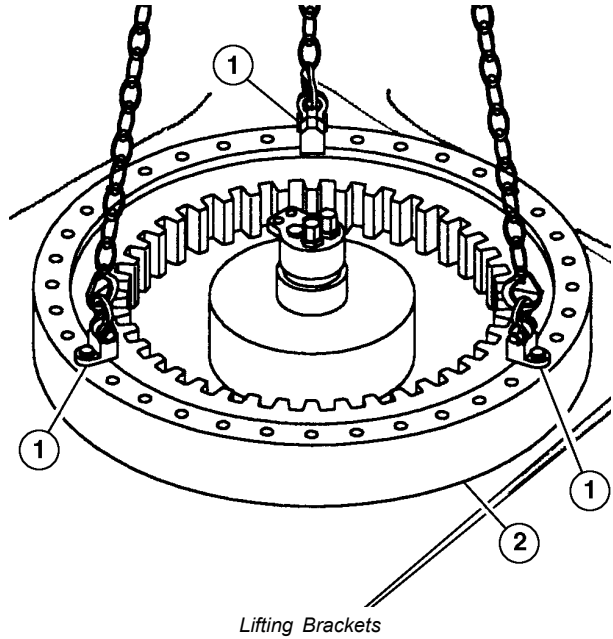
⚠ CAUTION: Prevent possible crushing injury from heavy components. Use appropriate lifting device.

4. Install lifting brackets (1) to swing bearing (2). Support swing bearing by attaching appropriate lifting device to lifting brackets.

Specification

Swing Bearing—Weight (approximate).....	43 kg 95 lb.
---	-----------------

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1— Lifting Bracket (3 used) 2— Swing Bearing

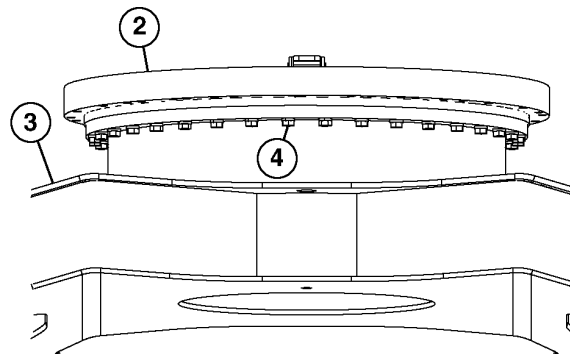
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5. Install alignment marks on inner race of swing bearing and track frame (3).
6. Remove cap screws (4) and remove swing bearing.
7. Repair or replace parts as necessary.
8. Clean mating surfaces of swing bearing and track frame (3).
9. Apply PM38656 Thread Lock and Sealer (high strength) to mating surfaces of swing bearing and track frame.

2— Swing Bearing
3— Track Frame

4— Cap Screw (20 used)



Swing Bearing Cap Screws

TX1122088—UN—12SEP12

Continued on next page

DV53278,0000518 -19-22MAY13-2/3

⚠ CAUTION: Prevent possible crushing injury from heavy components. Use appropriate lifting device.

10. Attach appropriate lifting device to swing bearing.

Specification

Swing Bearing—Weight
(approximate)..... 43 kg
95 lb.

IMPORTANT: Prevent possible damage to swing bearing. Alignment mark (6) on inner race must be installed on the left side of the machine so the use of that portion of the swing bearing is minimized.

11. Install swing bearing on track frame. Position alignment mark (6) facing left side of machine.

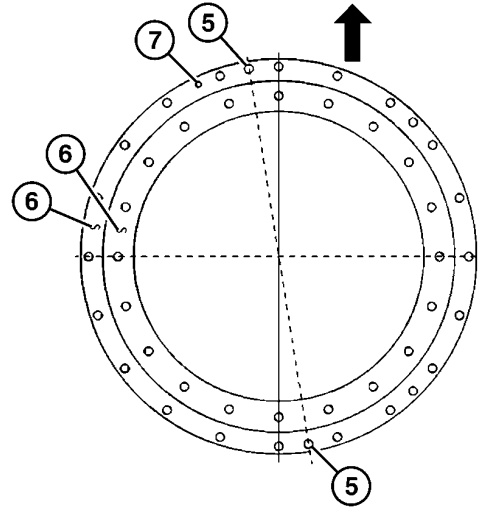
12. Install cap screws and tighten to specification.

Specification

Cap Screw—Torque..... 110 N·m
80 lb.-ft.

13. Apply multipurpose grease to swing bearing teeth and pinion shaft. See Lubricate Swing Bearing and See Lubricate Swing Bearing Gear. (Operator's Manual.)

14. Install upperstructure. See Upperstructure Remove and Install. (Group 4350.)



Position of Machine

5— Position for Knock Pin (2 used)
7— Grease Fitting used)
6— Alignment Mark (2 used)

TX1136162 —UN—08MAY13

DV53278.0000518 -19-22MAY13-3/3

Center Joint Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Center Joint Weight	23 kg 50 lb.
Center Joint Cap Screw Torque	90 N·m 66 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

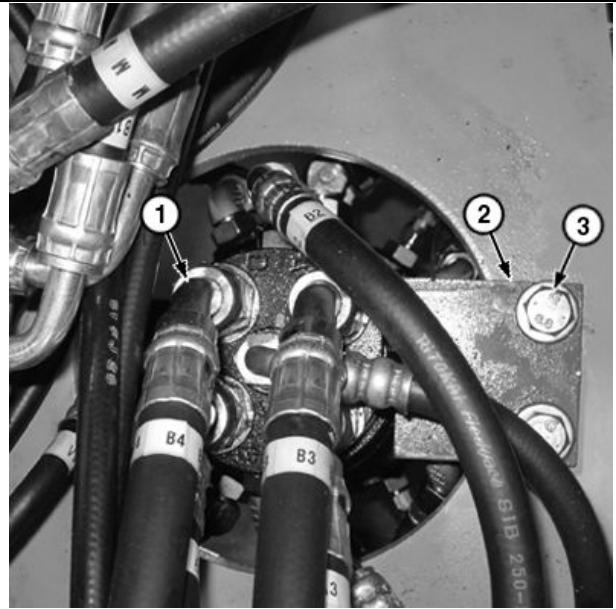
⚠ CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by loosening oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Apply vacuum or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

Specification

Hydraulic Oil
Tank—Capacity
(approximate)..... 32 L
8.5 gal.

4. Tilt operator's station. See Tilting Operator's Station. (Operator's Manual.)
5. Install identification tags and disconnect upper hydraulic lines (1). Close all openings using caps and plugs.



Center Joint

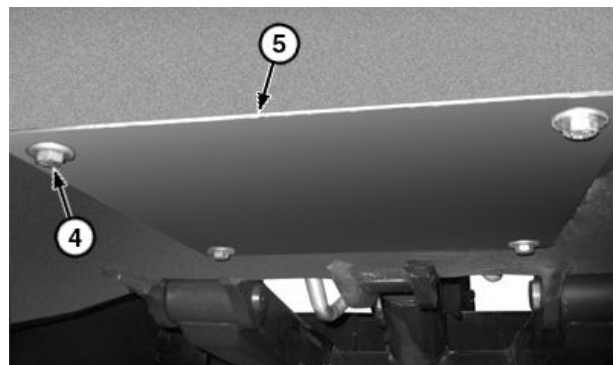
- 1— Upper Hydraulic Line (8 used)
2— Stopper
3— Cap Screw (2 used)

- See Travel Hydraulic System Line Connection. (Group 9025-15.)
 - See Blade Hydraulic System Line Connection. (Group 9025-15.)
 - See Angle Blade Hydraulic System Line Connection—If Equipped. (Group 9025-15.)
6. Remove cap screws (3) and stopper (2).

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7. Remove cap screws (4) and cover (5) from track frame.

- 4— Cap Screw (4 used) 5— Cover



Center Joint Cover

Continued on next page

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8. Install identification tags and disconnect lower hydraulic lines (6). Close all openings using caps and plugs.

- See [Travel Hydraulic System Line Connection](#). (Group 9025-15.)
- See [Blade Hydraulic System Line Connection](#). (Group 9025-15.)
- See [Angle Blade Hydraulic System Line Connection—If Equipped](#). (Group 9025-15.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

9. Support center joint (7) using appropriate lifting device.

Specification

Center Joint—Weight..... 23 kg
50 lb.

10. Remove center joint cap screws (8).

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

11. Using appropriate lifting device, lower center joint from track frame.

Specification

Center Joint—Weight..... 23 kg
50 lb.

12. Repair or replace parts as necessary. See [Center Joint Disassemble and Assemble](#). (Group 3360.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

13. Using appropriate lifting device, raise and support center joint to track frame.

Specification

Center Joint—Weight..... 23 kg
50 lb.

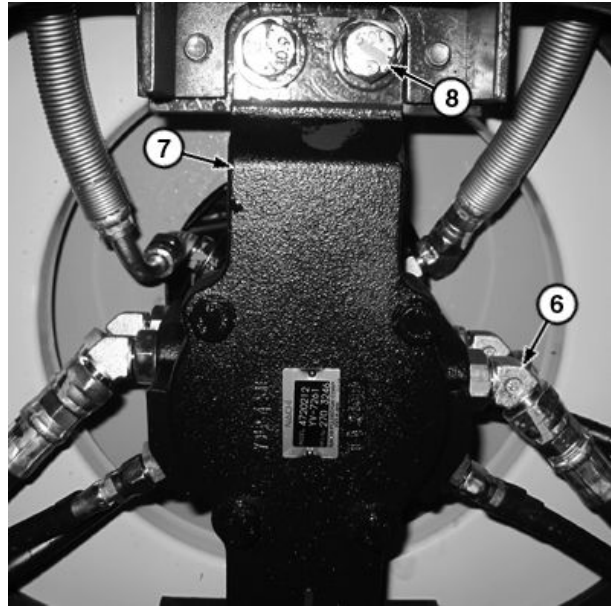
14. Install center joint cap screws. Tighten to specification.

Specification

Center Joint Cap
Screw—Torque..... 90 N·m
66 lb.-ft.

15. Connect upper and lower hydraulic lines.

- See [Travel Hydraulic System Line Connection](#). (Group 9025-15.)
- See [Blade Hydraulic System Line Connection](#). (Group 9025-15.)
- See [Angle Blade Hydraulic System Line Connection—If Equipped](#). (Group 9025-15.)



Center Joint

- 6— Lower Hydraulic Line (10 used)
- 7— Center Joint
- 8— Center Joint Cap Screw (4 used)

16. Install cover and cap screws (4).

17. Install stopper and cap screws (3).

18. Lower operator's station. See [Tilting Operator's Station](#). (Operator's Manual.)

19. Remove vacuum or fill hydraulic oil tank. See [Apply Vacuum to Hydraulic Oil Tank](#). (Group 3360.) See [Drain and Refill Hydraulic Tank Oil](#). (Operator's Manual.)

IMPORTANT: Hydraulic pump will be damaged if not filled with oil before starting. Procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

20. Perform hydraulic pump start-up procedure. See [Hydraulic Pump Start-Up Procedure](#). (Group 3360.)

CAUTION: Prevent possible injury from unexpected machine movement. Clear all personnel from area before operating machine.

21. Operate machine and check for leaks. Verify all machine functions operate correctly. See [Operational Checkout](#). (Group 9005-10.)

TX1136093A—UN—07MAY13

Center Joint Disassemble and Assemble

SPECIFICATIONS	
Center Joint Weight (approximate)	28 kg 62 lb.
Cover-to-Housing Cap Screw Torque	55 N·m 41 lb.-ft.

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

- Using appropriate lifting device, remove center joint. See Center Joint Remove and Install. (Group 4360.)

Specification

Center Joint—Weight (approximate)..... 28 kg
62 lb.

- Place center joint on a flat clean work area.
- Install alignment marks on spindle (1), housing (7), and cover (11) to aid in assembly.
- Remove cap screws (12).
- Remove cover (11), O-ring (10), snap ring (9), and ring (8) from housing.

IMPORTANT: Avoid damage to internal components of center joint. Do not damage the seal sliding surface of spindle (1).

- Remove the housing from the spindle (1).
- Remove oil seals (6) from housing.
- Remove dust seal (2) and O-rings (3 and 5) from housing.
- Inspect housing and spindle for wear and damage. Sliding surfaces with seals that are heavily damaged by seizure or foreign matter should be replaced.
- Remove backup ring (4) if surface shows wear, scores, or damage.

NOTE: If backup ring is removed, install new backup ring first. Apply clean hydraulic oil onto parts in order to prevent them from seizing.

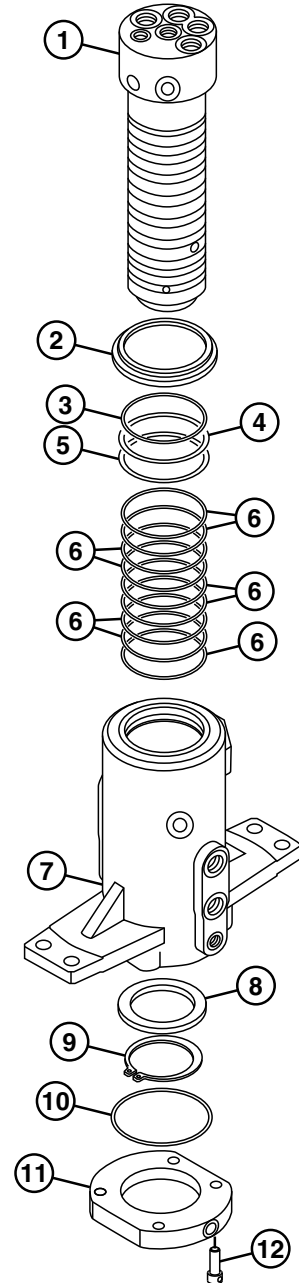
- Clean housing and new backup ring. Apply clean hydraulic oil to housing and new backup ring.

IMPORTANT: Prevent possible component damage from installing dust seal (2) incorrectly. Install dust seal with lip side toward housing (7).

- Install dust seal (2) and O-rings (3 and 5).
- Install oil seals (6) to housing.

IMPORTANT: Prevent possible component damage. Install spindle (1) assembly slowly into housing (7) so oil seals (6) are not damaged.

- Lubricate spindle (1) assembly with clean hydraulic oil and install into housing (7). Align reference marks made during disassembly.



TX1136023

Center Joint Components

- | | |
|----------------------|------------------------|
| 1— Spindle | 7— Housing |
| 2— Dust Seal | 8— Ring |
| 3— O-Ring | 9— Snap Ring |
| 4— Backup Ring | 10— O-Ring |
| 5— O-Ring | 11— Cover |
| 6— Oil Seal (9 used) | 12— Cap Screw (4 used) |

TX1136023—UN—07MAY13

Hydraulic System

IMPORTANT: Prevent possible component damage from installing ring (8) incorrectly. Install ring with chamfered side facing spindle assembly.

- 15. Install ring (8) and O-ring (10) to housing.
- 16. Install snap ring (9) to spindle.
- 17. Install cover and cap screws to housing. Tighten cap screws to specification.

Specification

Cover-to-Housing Cap
 Screw—Torque.....55 N·m
 41 lb.-ft.

18. Install center joint. See Center Joint Remove and Install. (Group 4360.)

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Center Joint Air Test

SERVICE EQUIPMENT AND TOOLS

JDG185 Air Test Plug

- 1. Install a plug in one port.
- 2. Apply air pressure, using JDG185 Air Test Plug and regulated air pressure through the other port in that passage.
- 3. Listen for air leaks at ports on either side of pressurized port.
- 4. Repair or replace if air leaks are found. See Center Joint Disassemble and Assemble. (Group 4360.)



Center Joint Air Test

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JJ03229,0000714 -19-06MAY13-1/1

Swing Motor and Park Brake Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.
Swing Motor and Park Brake Weight (approximate)	38 kg 84 lb.
Cap Screw Torque	140 N·m 101 lb.-ft.

1. Park and prepare machine for service safely. [See Park and Prepare for Service Safely.](#) (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Slowly loosen hydraulic oil tank cap to release pressure.

2. Release hydraulic oil tank pressure by slowly loosening hydraulic oil tank cap. [See Hydraulic Oil Tank Pressure Release Procedure.](#) (Group 9025-25.)
3. Apply vacuum to hydraulic system or drain hydraulic oil tank. [See Apply Vacuum to Hydraulic Oil Tank.](#) (Group 3360.) [See Drain and Refill Hydraulic Tank Oil.](#) (Operator's Manual.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Tilt operator's station. [See Tilting Operator's Station.](#) (Operator's Manual.)
5. Install identification tags and disconnect hydraulic lines (1—5). Close all openings using caps and plugs. [See Swing Motor Line Identification.](#) (Group 9025-15.)
6. Remove cap screws (6).

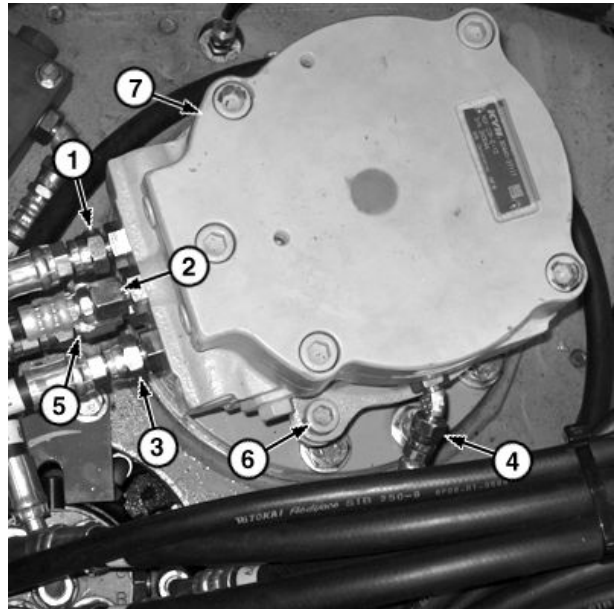
CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

7. Using appropriate lifting device, remove swing motor and park brake (7).

Specification

Swing Motor and Park Brake—Weight (approximate).....	38 kg 84 lb.
--	-----------------

8. Inspect parts, repair or replace as necessary. [See Swing Motor and Park Brake Disassemble and Assemble.](#) (Group 4360.)
9. Install swing motor and park brake and cap screws. Tighten cap screws to specification.



Swing Motor and Park Brake

- | | |
|---------------------|-------------------------------|
| 1— Left Swing Line | 5— Center Joint Line |
| 2— Return Line | 6— Cap Screw (2 used) |
| 3— Right Swing Line | 7— Swing Motor and Park Brake |
| 4— Pilot Line | |

Specification

Cap Screw—Torque.....	140 N·m 101 lb.-ft.
-----------------------	------------------------

10. Connect hydraulic lines (1—5) and remove identification tags. [See Hydraulic System Main Line Connection.](#) (Group 9025-15.)
11. Remove vacuum or fill hydraulic tank. [See Apply Vacuum to Hydraulic Oil Tank.](#) (Group 3360.)

Specification

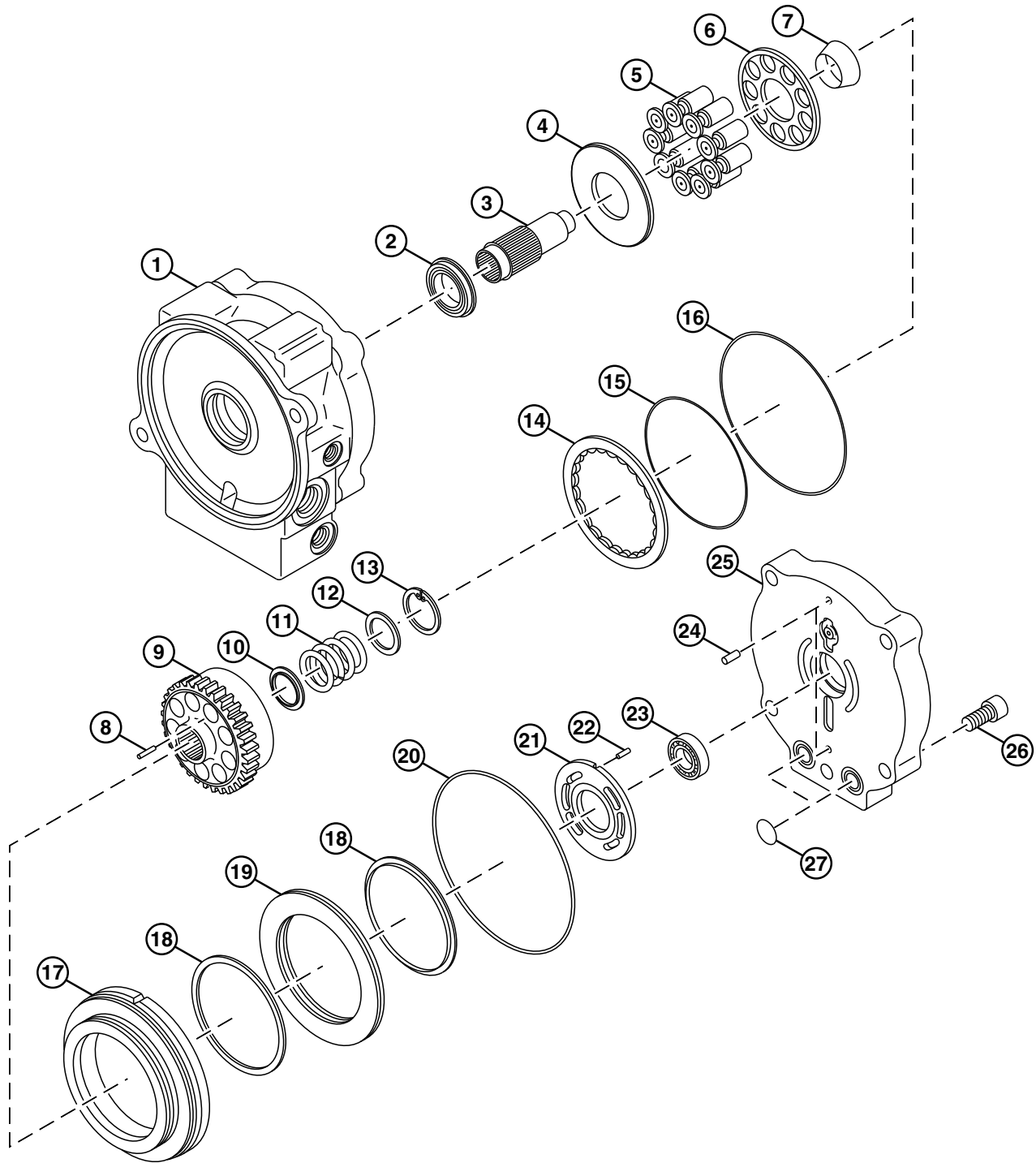
Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

12. Perform swing motor and park brake start-up procedure. [See Swing Motor and Park Brake Start-Up Procedure.](#) (Group 4360.)
13. Lower operator's station. [See Tilting Operator's Station.](#) (Operator's Manual.)
14. Check hydraulic oil level. [See Check Hydraulic Tank Oil Level.](#) (Operator's Manual.)
15. Operate machine and check for leaks.

CW08338,0000EBA -19-22MAY13-1/1

TX1134314A—UN—05APR13

Swing Motor and Park Brake Disassemble and Assemble Disassemble Swing Motor and Park Brake



TX1135606

Swing Motor and Park Brake

Continued on next page

JS20420,0000AD7 -19-09MAY13-1/5

TX1135606—UN—25APR13

Hydraulic System

- 1— Case
- 2— Ball Bearing
- 3— Shaft
- 4— Wear Plate
- 5— Piston (9 used)
- 6— Retainer Plate
- 7— Ball Guide
- 8— Pin (3 used)

- 9— Cylinder Block
- 10— Washer
- 11— Spring
- 12— Washer
- 13— Snap Ring
- 14— Disk Plate
- 15— O-Ring
- 16— O-Ring

- 17— Park Brake Piston
- 18— Spring Seat (2 used)
- 19— Park Brake Spring
- 20— O-Ring
- 21— Valve Plate
- 22— Pin

- 23— Bearing
- 24— Dowel Pin (2 used)
- 25— Cover
- 26— Cap Screw (5 used)
- 27— O-Ring (2 used)

SPECIFICATIONS	
Piston-to-Shoe Clearance (maximum)	0.04 mm 0.002 in.
Cylinder Block Bore-to-Piston Diameter Clearance (maximum)	0.40 mm 0.016 in.

1. Remove swing motor and park brake. See Swing Motor and Park Brake Remove and Install. (Group 4360.)
2. Loosen cap screws (26) evenly to release force of park brake spring (19), remove cap screws.
3. Measure and record clearance between cover (25) and case (1) as a reference for assembly.

IMPORTANT: Prevent possible damage to valve plate (21). When removing cover, valve plate can stick to cover causing valve plate to drop, damaging highly machined surfaces. Use care when removing cover.

4. Remove cover.
5. Remove dowel pins (24) and O-rings (27).

NOTE: Note position of valve plate (21) prior to removal.

6. Remove valve plate (21), pin (22), bearing (23), and O-ring (20).
7. Remove park brake spring (19), spring seats (18), and park brake piston (17).
8. Remove O-rings (15 and 16) from park brake piston.

IMPORTANT: Prevent possible damage to machine parts. Pistons can easily fall out when removing rotary group as an assembly. Use care when removing rotary group.

NOTE: Holding the swing motor and park brake case in a horizontal position can assist in removing rotary group (5—13).

NOTE: Disassemble rotary group assembly (5—13) for inspection and cleaning only. Rotary group is serviced as an assembly.

9. Remove rotary group (5—13) as an assembly.
10. Compress spring (11) using a press. Remove snap ring (13).
11. Remove washers (10 and 12) and spring.
12. Remove pistons (5), retainer plate (6), ball guide (7), and pins (8) from cylinder block (9).
13. Remove disk plate (14).

IMPORTANT: Prevent possible damage to machined surfaces of wear plate (4). Machined surfaces of wear plate can easily be scratched or damaged if dropped. Use care when removing wear plate.

14. Remove wear plate (4).
15. Remove shaft (3) and ball bearing (2).

Continued on next page

JS20420,0000AD7 -19-09MAY13-2/5

16. Inspect pistons for wear or damage. Verify clearance between piston (36) and shoe (37) is within specification.

Specification

Piston-to-Shoe—Clearance
(maximum)..... 0.04 mm
0.002 in.

17. Inspect inside diameter of cylinder block bore (38) and piston. Verify clearance between block bore and piston is within specification.

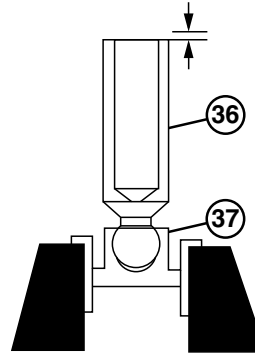
Specification

Cylinder Block Bore-to-Piston Diameter—Clearance
(maximum)..... 0.40 mm
0.016 in.

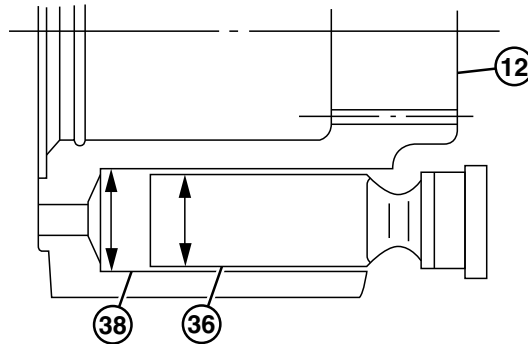
18. Repair and replace parts as necessary.

12— Cylinder Block
36— Piston

37— Shoe
38— Cylinder Block Bore



Piston and Shoe Clearance



Piston and Cylinder Block Bore Diameter

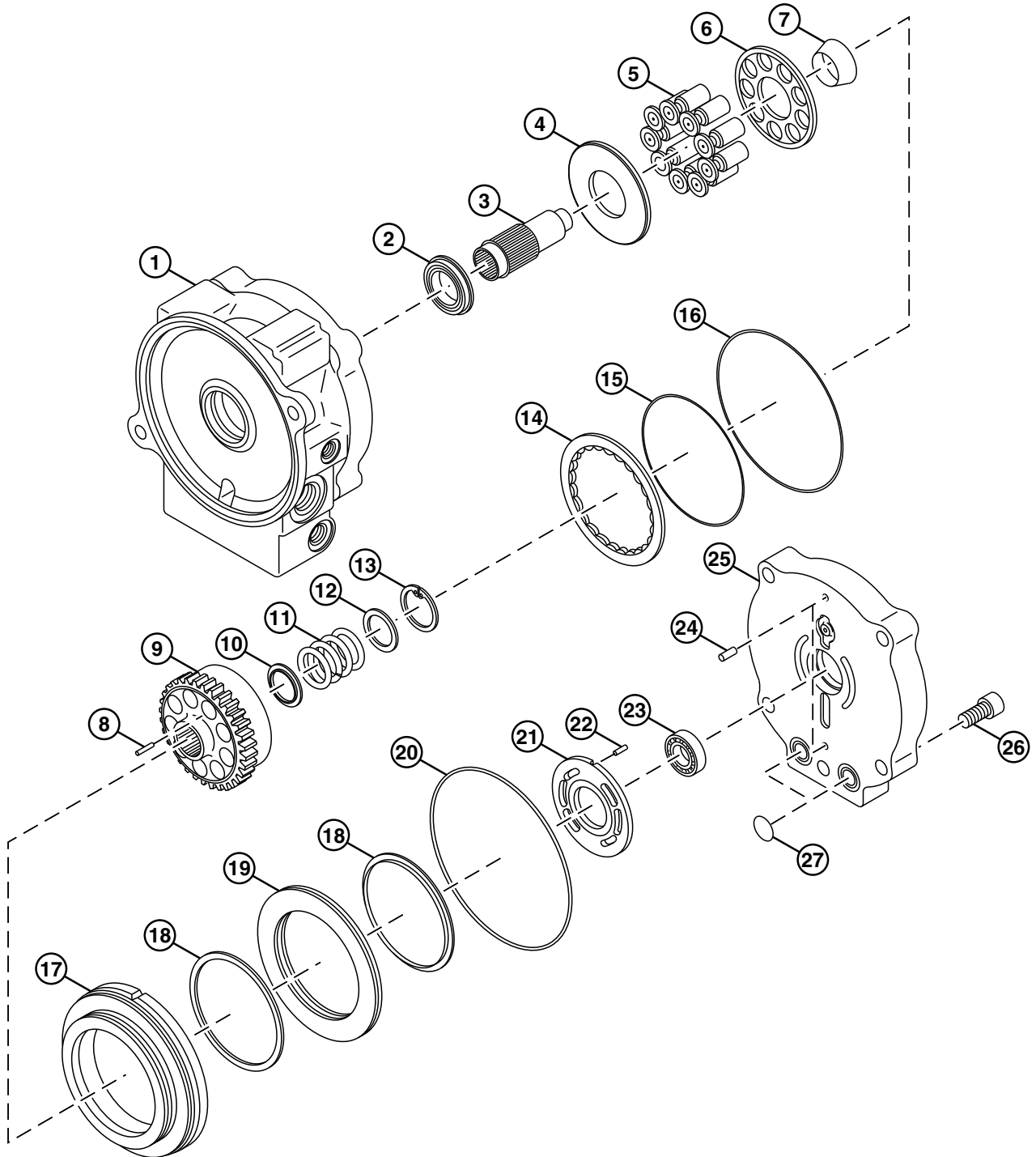
TX1133634—UN—21MAR13

TX1133635—UN—21MAR13

Continued on next page

JS20420,0000AD7 -19-09MAY13-3/5

Assemble Swing Motor and Park Brake



TX1135606

Swing Motor and Park Brake

Continued on next page

JS20420.0000AD7 -19-09MAY13-4/5

TX1135606—UN—25APR13

Hydraulic System

1— Case	9— Cylinder Block	17— Park Brake Piston	23— Bearing
2— Ball Bearing	10— Washer	18— Spring Seat (2 used)	24— Dowel Pin (2 used)
3— Shaft	11— Spring	19— Park Brake Spring	25— Cover
4— Wear Plate	12— Washer	20— O-Ring	26— Cap Screw (5 used)
5— Piston (9 used)	13— Snap Ring	21— Valve Plate	27— O-Ring (2 used)
6— Retainer Plate	14— Disk Plate	22— Pin	
7— Ball Guide	15— O-Ring		
8— Pin (3 used)	16— O-Ring		

IMPORTANT: To prevent seizing, apply clean hydraulic oil to parts before assembling.

1. Install ball bearing (2) and shaft (3) in case (1).

IMPORTANT: Prevent possible damage to machined surfaces of wear plate (4). Machined surfaces of wear plate can easily be scratched or damaged if dropped. Use care when removing wear plate.

2. Install wear plate (4).
3. Install disk plate (14).

NOTE: Applying petroleum jelly to pins (8) can assist in adhering to cylinder block (9) during installation. Pins (8) can easily fall out of assembly.

4. Assemble rotary group. Install pistons (5), retainer plate (6), ball guide (7), pins (8), washers (10 and 12), and spring (11) into cylinder block (9). Compress spring and install snap ring (13).

IMPORTANT: Prevent possible damage to machine parts. Pistons can easily fall out when installing rotary group. Use care when installing rotary group.

NOTE: Holding the swing motor and park brake case in a horizontal position can assist in installing rotary group (5—13).

5. Install rotary group as an assembly in case, aligning splines of ball guide and cylinder block with the spline on drive shaft and disk plate.
6. Install O-rings (15 and 16) to park brake piston (17).

IMPORTANT: Prevent damage to brake piston seating surface during installation. Handle with care.

7. Install park brake piston so dowel pin holes align with dowel pins (24), holes in cover (25), and case.

8. Install spring seats (18) and park brake spring (19).

NOTE: Applying petroleum jelly to valve plate (21) can assist in holding valve in place while installing cover.

9. Install valve plate (21) and pin (22), as noted during disassembly.

10. Install bearing (23) and O-ring (20).

11. Install O-rings (27) and dowel pins (24).

12. Install cover, aligning dowel pin holes with dowel pins and holes in case.

13. Inspect clearance between the case and cover, compare to measurement made at disassembly. If not the same, disassemble and check for correct assembly.

14. Install cap screws (26) in steps to pull housing down evenly against spring force.

15. Install swing motor and park brake. See Swing Motor and Park Brake Remove and Install. (Group 4350.)

16. Perform swing motor and park brake start-up procedure. See Swing Motor and Park Brake Start-Up Procedure. (Group 4360.)

JS20420,0000AD7 -19-09MAY13-5/5

Swing Motor and Park Brake Start-Up Procedure

1. Park and prepare machine for service safely. See *Park and Prepare for Service Safely*. (Group 0001.)

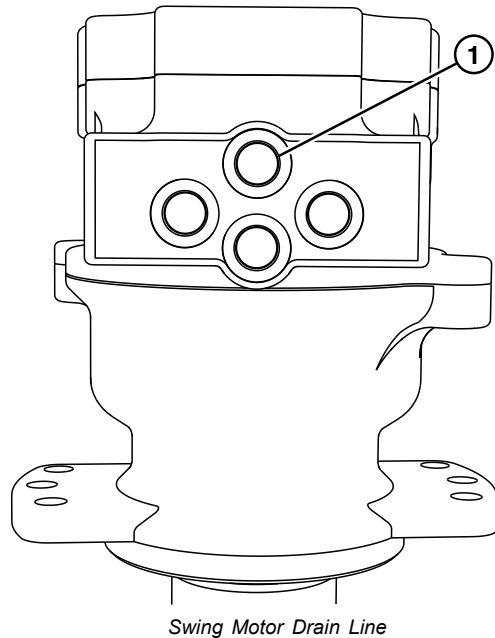
IMPORTANT: Swing motor will be damaged if not filled with oil before operating swing function. Procedure must be performed whenever a new swing motor is installed or oil has been drained from swing motor.

2. Disconnect swing motor drain line (1).

NOTE: Air must be allowed to escape from swing motor while filling.

3. Fill swing motor with hydraulic oil through port until oil reaches level of port.
4. Connect swing motor drain line.

1— Swing Motor Drain Line



TX1135624 —UN—06MAY13

CW08338,0000EEE -19-25APR13-1/1

Crossover Relief Valve and Make-Up Check Valve Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity (approximate)	32 L 8.5 gal.

Remove and Install Crossover Relief Valve

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. Slowly loosen hydraulic oil tank cap to release pressure.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Drain hydraulic oil tank or apply vacuum to hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.) See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Remove crossover relief valves (1).

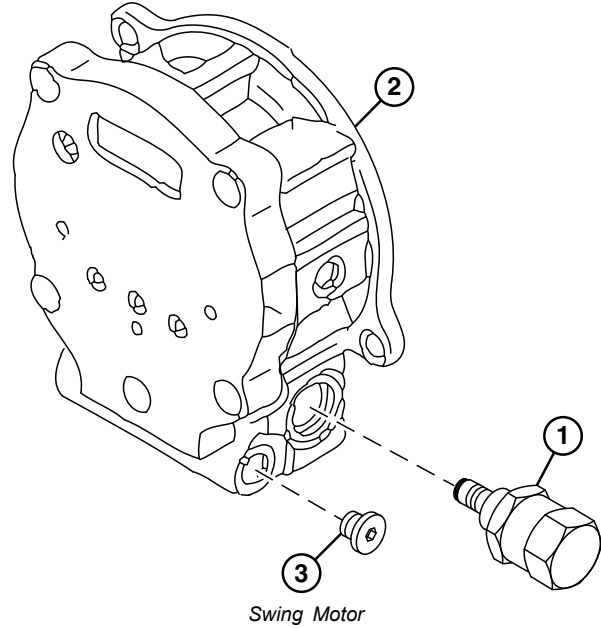
NOTE: Crossover relief valves are not serviceable. Replace only.

5. Inspect and replace as necessary.
6. Install crossover relief valves.
7. Remove vacuum pump or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)
8. Perform swing motor crossover relief valve test and adjustment. See Swing Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.)

Remove and Install Make-Up Check Valve

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

CAUTION: Avoid personal injury from high-pressure fluid. High-pressure release of oil from pressurized system can cause serious



- 1—Crossover Relief Valve (2 used) 3—Make-Up Check Valve (2 used)
2—Swing Motor

burns or penetrating injury. Slowly loosen hydraulic oil tank cap to release pressure.

2. Release hydraulic oil tank pressure by loosening hydraulic oil tank cap. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Drain hydraulic oil tank or apply vacuum to hydraulic oil tank. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.) See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.)

Specification

Hydraulic Oil Tank—Capacity (approximate).....	32 L 8.5 gal.
--	------------------

4. Remove swing motor make-up check valves (2).
5. Inspect and replace parts as necessary.
6. Install make-up check valves.
7. Remove vacuum pump or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.) See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

CW08338,0000EFB -19-22MAY13-1/1

TX1135635—UN—06MAY13

Swing Park Brake Check Valve and Orifice Remove and Install

SPECIFICATIONS	
Hydraulic Oil Tank Capacity	32 L 8.5 gal.
Cap Screw Torque	440 N·m 320 lb.-ft.

1. Park and prepare machine for service safely. See Park and Prepare for Service Safely. (Group 0001.)

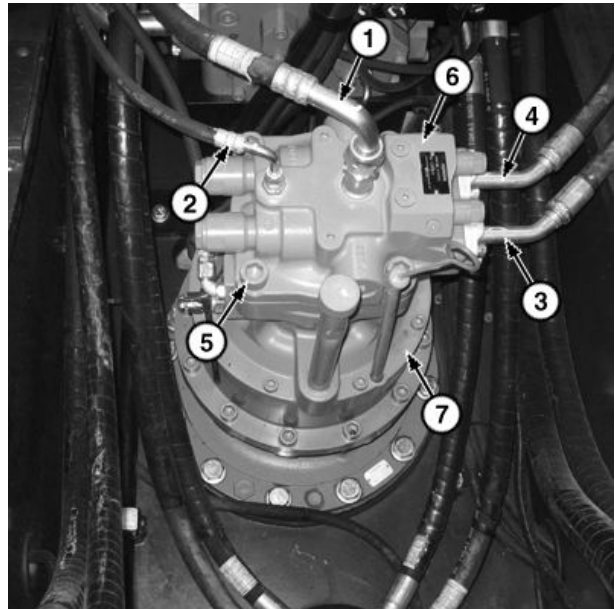
CAUTION: Avoid personal injury from high pressure fluid. High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure from hydraulic system before servicing.

2. Release hydraulic oil tank pressure by pressing pressure release button at top of hydraulic oil tank. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
3. Install vacuum pump or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank or see Drain and Refill Hydraulic Tank Oil. (Group 3360.)

Specification

Hydraulic Oil Tank—Capacity.....	32 L 8.5 gal.
----------------------------------	------------------

4. Install identification tags and disconnect hydraulic hoses (1—4). Close all openings using caps and plugs. See Swing Motor Line Identification. (Group 9025-15.)



Hydraulic Hoses

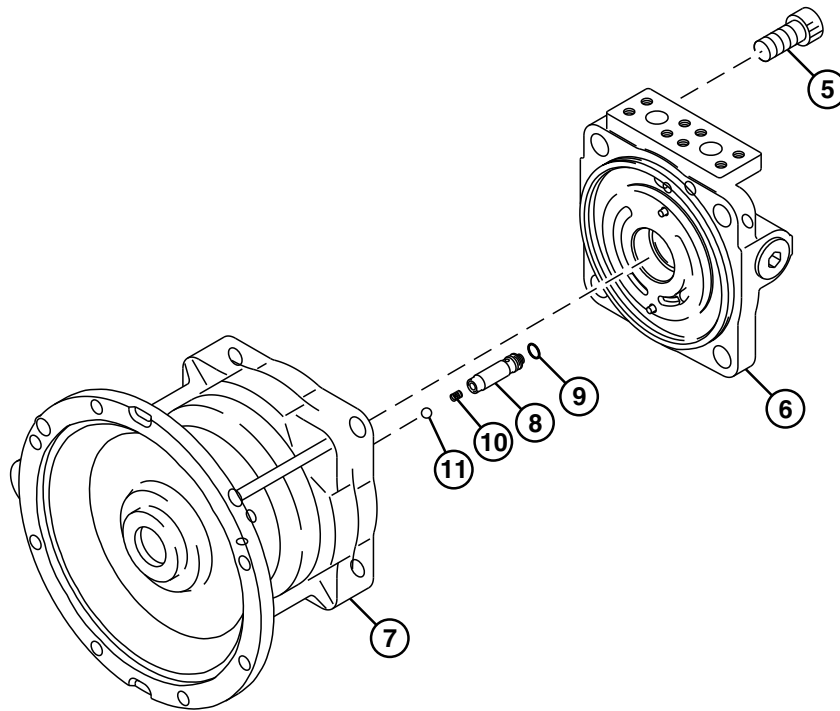
- | | |
|--------------------------------------|---------------------------|
| 1— Return To Control Valve Hose | 5— Cap Screw (4 used) |
| 2— Return To Hydraulic Oil Tank Hose | 6— Swing Park Brake Valve |
| 3— Swing Left Hose | 7— Swing Motor |
| 4— Swing Right Hose | |

5. Remove cap screws (5) and remove swing park brake valve (6).

Continued on next page

JJ03229,000071C -19-22MAY13-1/3

TX1125212A —UN—02NOV12



TX1125192 —UN—02NOV12

TX1125192

Swing Motor and Park Brake Valve (exploded view)

- 5— Cap Screw (4 used)
- 6— Swing Park Brake Valve
- 7— Swing Motor
- 8— Piston
- 9— O-Ring
- 10— Spring
- 11— Ball

NOTE: The filter and orifice are installed into piston.
Replace piston as an assembly.

6. Remove piston (8) from swing motor (7).
7. Remove spring (10) and ball (11).
8. Remove O-ring (9) from piston.
9. Inspect, clean, and replace parts as necessary.
See Swing Motor and Park Brake Disassemble and Assemble. (Group 4360.)
10. Install O-ring onto piston.
11. Install ball, spring, and piston.
12. Install swing park brake valve and tighten cap screws to specification.

Specification

Cap Screw—Torque.....440 N·m
320 lb.-ft.

13. Connect hydraulic hoses.
14. Perform swing motor and park brake start-up procedure. See Swing Motor and Park Brake Start-Up Procedure. (Group 4360.)



Swing Motor and Park Brake Valve

TX1125209A —UN—02NOV12

15. Remove vacuum or fill hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank or see Drain and Refill Hydraulic Tank Oil. (Group 3360.)

IMPORTANT: To prevent possible hydraulic pump damage, pump 1 and 2 start-up procedure must be performed to fill pump housing whenever oil has been drained from the pump or hydraulic oil tank.

Continued on next page

JJ03229,000071C -19-22MAY13-2/3

Hydraulic System

16. When hydraulic oil tank is drained, perform hydraulic pump start-up procedure. See Hydraulic Pump Start-Up Procedure. (Group 3360.)

17. Operate machine and check for leaks.

JJ03229.000071C -19-22MAY13-3/3

Hydraulic System

**Section 99
Dealer Fabricated Tools**

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Group 9900—Dealer Fabricated Tools

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DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool	99-9900-5
DFT1110 Spacer	99-9900-6

ST4920 Track Recoil Spring Disassembly and Assembly Tool

NOTE: It is recommended that DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool be used with track recoil spring disassembly and assembly tool. See DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool. (Group 9900.)

Dimensions given are metric.

Tool is the same as used on other machines except the holder (C). For each track adjuster use the holder with the correct size hole for the nut on that track adjuster.

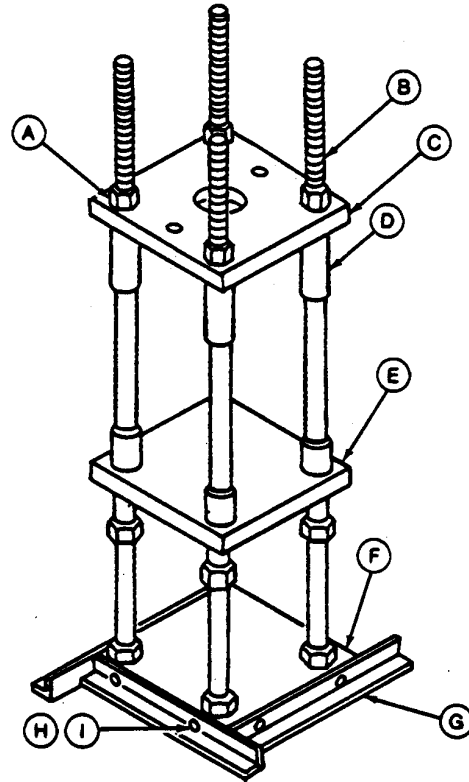
Track Recoil Spring Disassembly and Assembly Tool (compression tool) is used with hydraulic jack to compress recoil spring in track adjuster repair.

Material required:

- 1020 HR Steel for Holder (C), Supporting Plate (E), Base Plate (F), and Base (G).
- "D" Grade (SAE Grade 5) for Eyebolts (D), Nuts (A), and Cap Screws (H).
- "F" Grade (SAE Grade 8) for Studs (B).

Print Numbers:

- A-ST4050 Nut
- B-ST4045 Stud
- C-ST4035 Holder (Plate)
- C-ST4036 Holder (Plate)
- C-ST4037 Holder (Plate)
- D-ST4047 Eyebolt
- E-ST4040 Supporting Plate
- F-ST4042 Base Plate
- G-ST4041 Base
- H-ST4046 Cap Screw
- I-ST4049 Lock Washer



Track Recoil Spring Disassembly and Assembly Tool

- | | |
|--------------------|------------------------|
| A—Nut (12 used) | F—Base Plate |
| B—Stud (4 used) | G—Base (4 used) |
| C—Holder | H—Cap Screw (4 used) |
| D—Eyebolt (2 used) | I—Lock Washer (8 used) |
| E—Supporting Plate | |

JD29379.000034D -19-23APR13-1/5

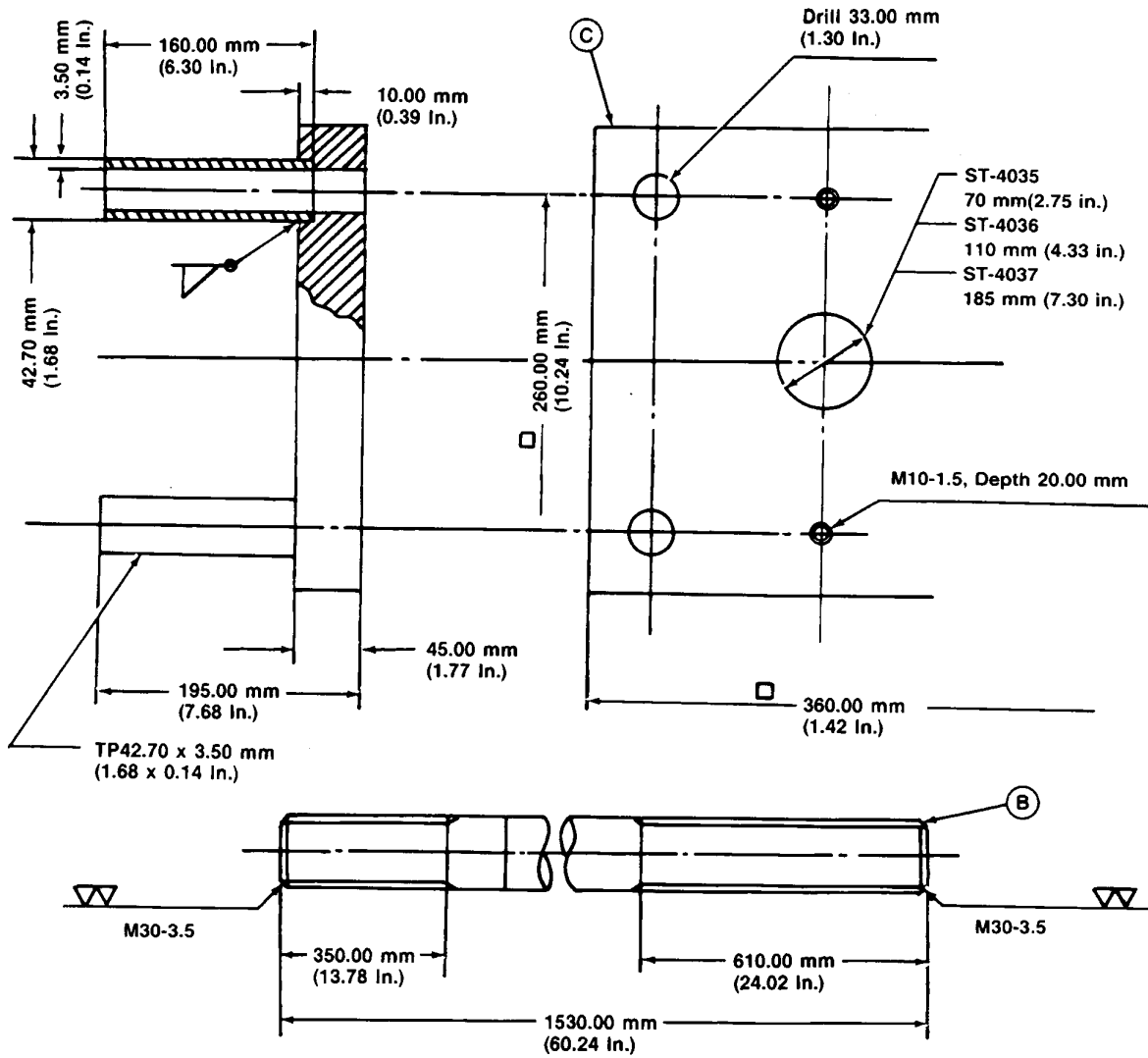
T6585UY—UN—24MAR98

Track Recoil Spring Tool.....ST4920

Used with hydraulic jack to compress recoil spring in track adjuster repair.

Continued on next page

JD29379.000034D -19-23APR13-2/5



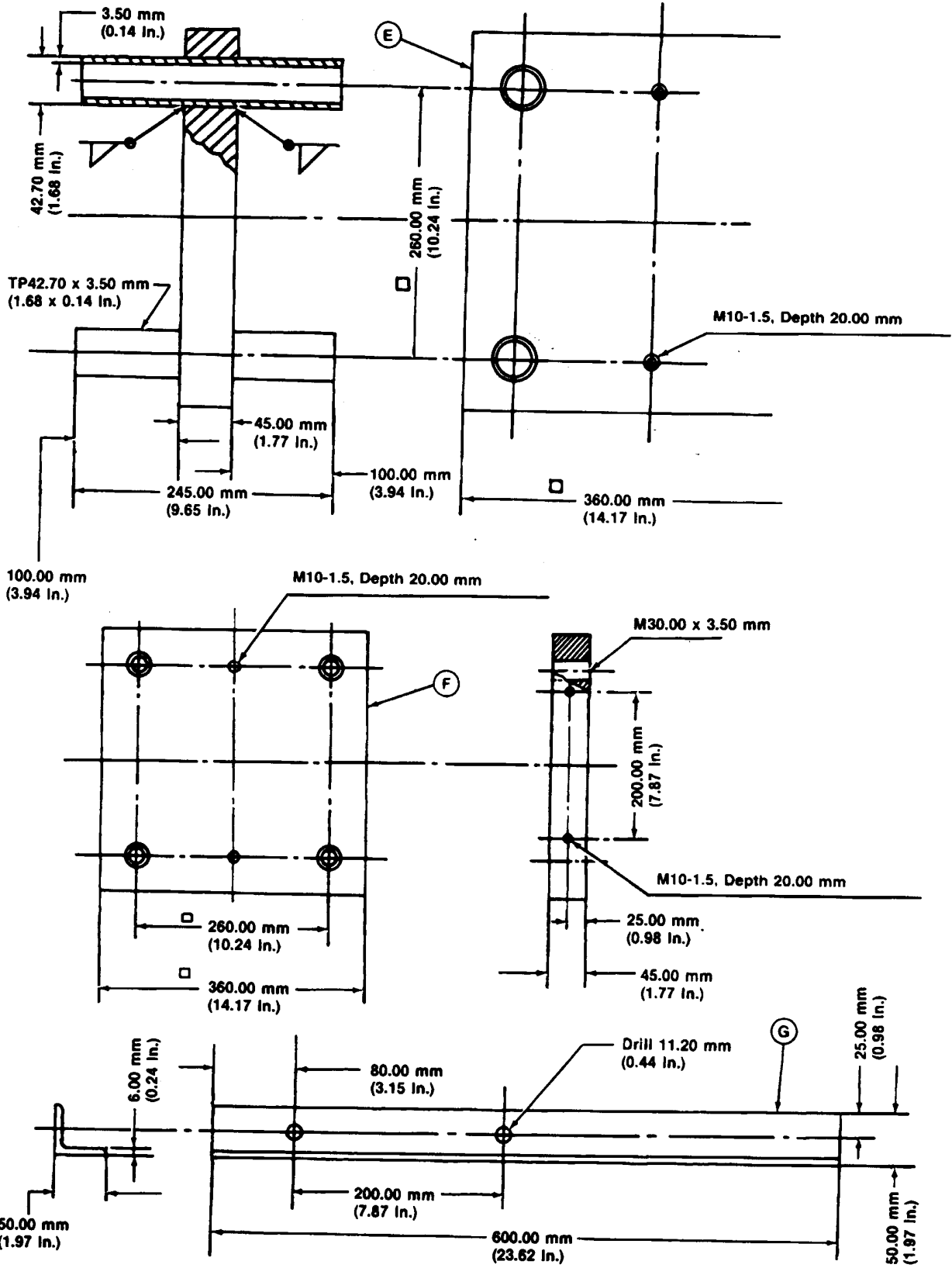
ST4920 Dimensions

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JD29379,000034D -19-23APR13-3/5

T7029CI -UN-06JUL89

Dealer Fabricated Tools



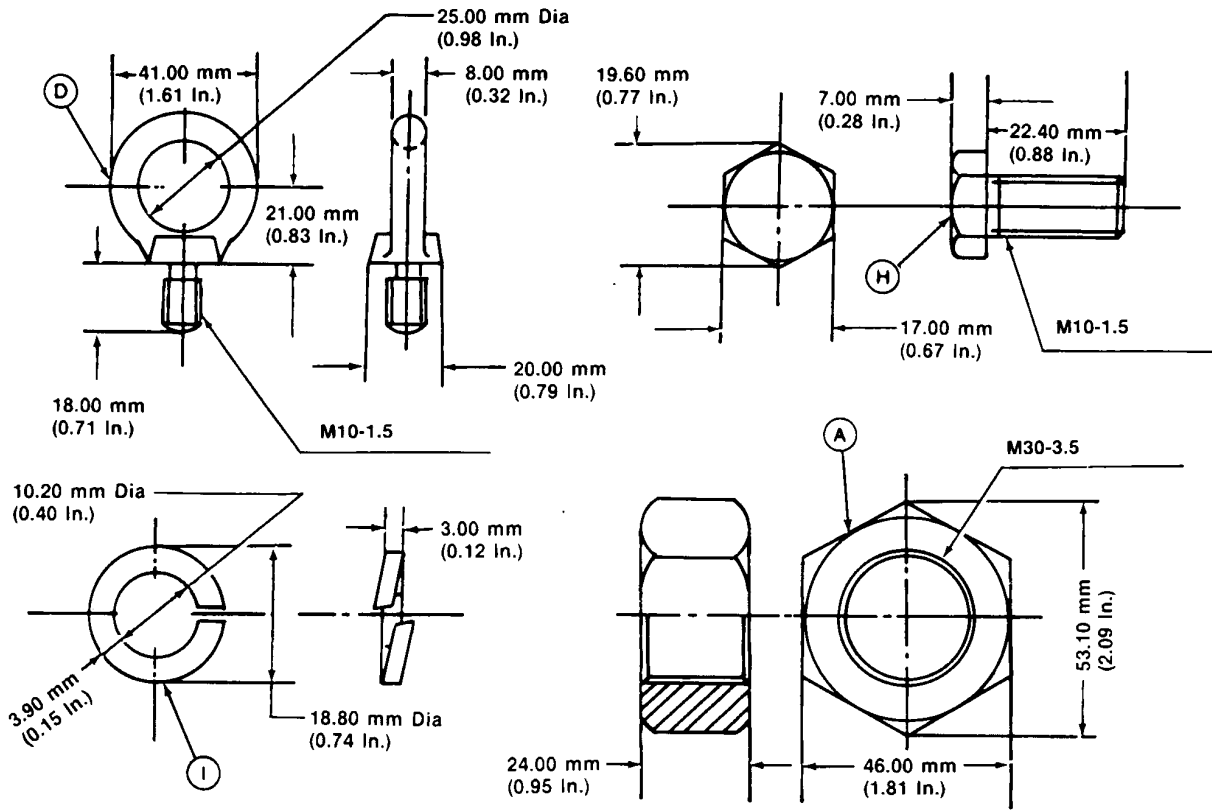
ST4920 Dimensions

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JD29379,000034D -19-23APR13-4/5

T7029CH—UN—06.JUL.89

Dealer Fabricated Tools

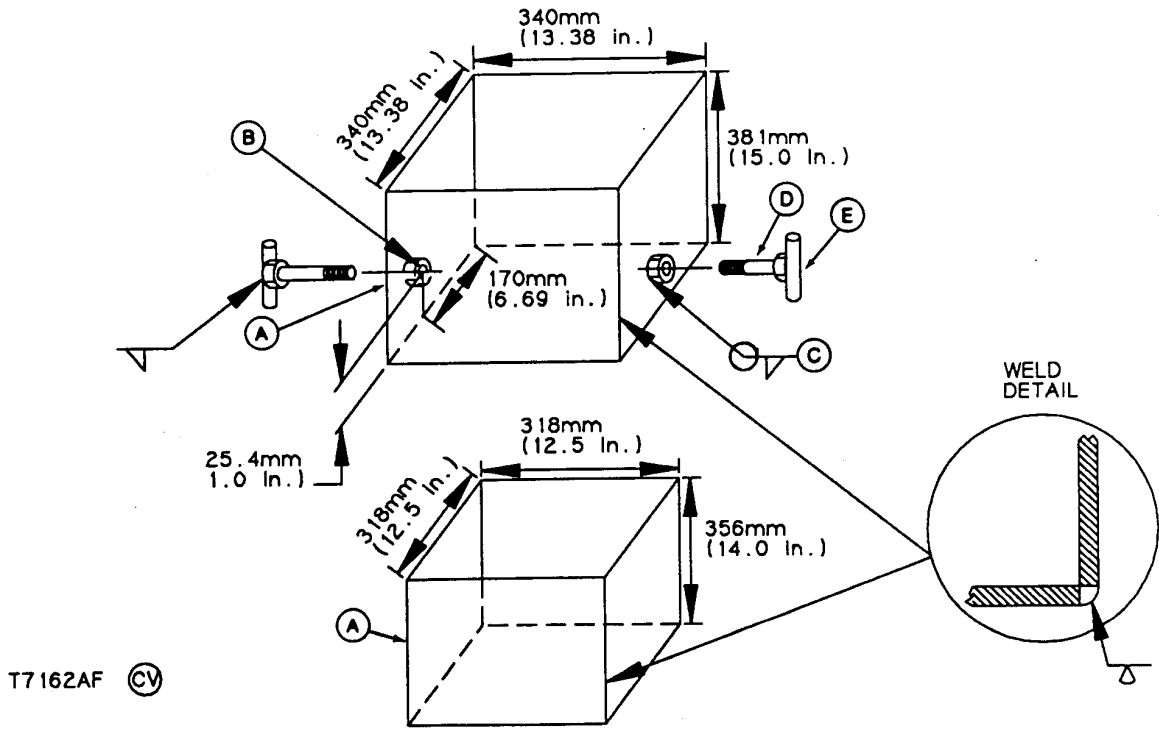


ST4920 Dimensions

JD29379,000034D -19-23APR13-5/5

T7029CG—JN—06.JUL.89

DFT1087 Track Recoil Spring Disassembly and Assembly Guard Tool



DFT1087 Dimensions

- | | | |
|--------------------------------|----------------------------------|--|
| A—3/16 in. 1020 CR Steel Plate | C—1/2 in. Nut (2 used) | E—1/2 x 3 in. Steel Round Stock (2 used) |
| B—9/16 in. Hole (2 places) | D—1/2 x 2 in. Cap Screw (2 used) | |

Track Recoil Spring Disassembly and Assembly Guard Tool is used with ST4920 Track Recoil Spring Disassembly and Assembly Tool. See ST4920 Track Recoil Spring Disassembly and Assembly Tool. (Group 9900.)

- 3/16 in. 1020 CR Steel Plate (A)
- 9/16 in. Hole (2 places) (B)
- 1/2 in. Nut (2 used) (C)
- 1/2 x 2 in. Cap Screw (D) (2 used)
- 1/2 x 3 in. Steel Round Stock (E) (2 used)

Material required:

JD29379,000034E -19-23APR13-1/2

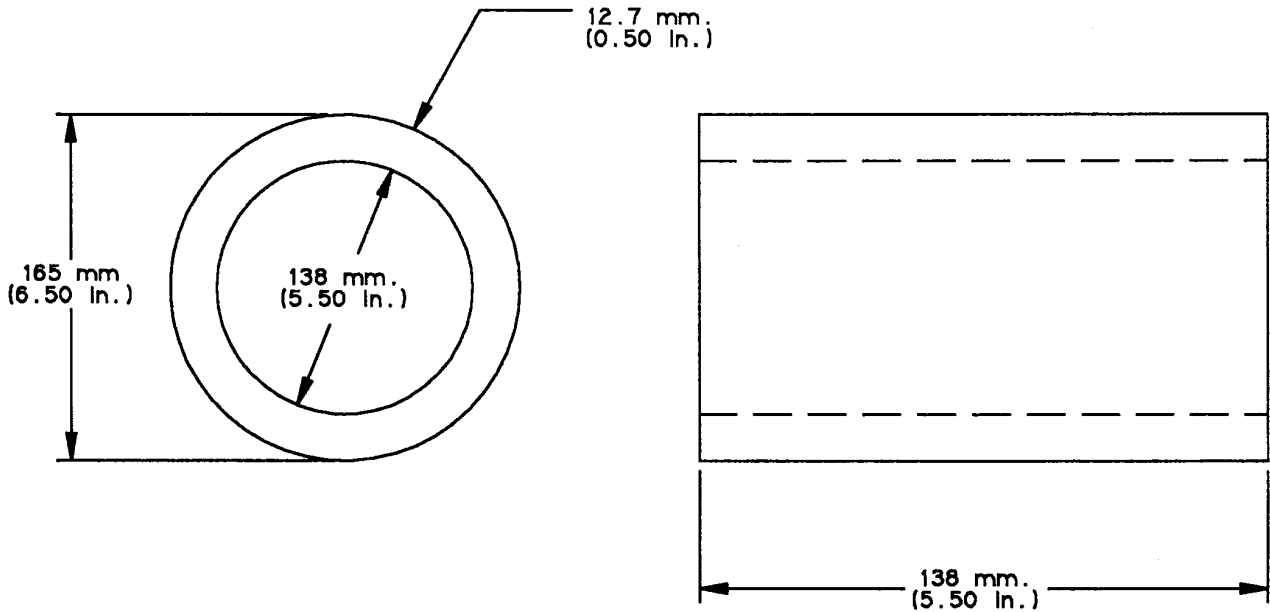
Track Recoil Spring Guard Tool.....DFT1087

Used with ST4920 Track Recoil Spring Disassembly and Assembly Tool.

JD29379,000034E -19-23APR13-2/2

T7162AF—UN—17OCT89

DFT1110 Spacer



T7708AC (CV)

T7708AC—UN—23FEB92

DFT1110 Spacer

Spacer is used with ST4920 Track Recoil Spring Disassembly and Assembly Tool. Spacer is installed on the bottom plate so force is applied to spring flange on cylinder and not to the piston. See ST4920 Track Recoil Spring Disassembly and Assembly Tool. (Group 9900.)

Material required:

- 165 x 138 x 138 mm (6.50 x 5.50 x 5.50 in.) Heavy Wall Steel Pipe

Cut the ends of spacer so they are parallel to each other.

JD29379,000034F -19-23APR13-1/2

Spacer DFT1110

Spacer is used to apply force to spring flange on cylinder and not to the piston.

JD29379,000034F -19-23APR13-2/2

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