

How To Use This Manual, General Service Instructions, And Safety Procedures

The following information is provided to help guide the user of this manual. An explanation of how this manual is organized, as well as general information and safety considerations which should be understood when performing any service or maintenance procedure, is given. This information is general in nature and should supplement any of the specific procedures in this manual along with a constant awareness of safety and common sense.

How To Use This Manual

This Service Manual is a collection of written procedures which are used to service and maintain a specific crane model. The index, which is called a "Keysheet", is used to organize the procedures within this manual and serve as a Table Of Contents as well. Each procedure, in this manual, is written so that it can stand alone and typically covers only one procedure. Procedures are given a numerical designation, or "SM Code" Number, (Example: SM01—005—034.00) which is unique to that procedure and that procedure only. The following is a listing of the general area definitions which are designated by the first digits in the SM Code Number sequence:

General Area Descriptions

- SM01 — Rubber Tire Lower
- SM02 — Crawler Lower
- SM03 — Upper Revolving Frame & Machinery
- SM04 — Vertical Shafts
- SM05 — Horizontal Shafts
- SM06 — Upper Engine
- SM07 — Hydraulic Power Supply
- SM08 — Angle Boom
- SM09 — Tubular Boom
- SM10 — Tagline Winder
- SM11 — Fairleader
- SM12 — Shovel Attachment
- SM13 — Trench Hoe, Logger & Scraper Attachment & Prop Handler
- SM14 — Cab & House Assembly
- SM15 — Rotascope Attachment (Discontinued)
- SM16 — Wire Rope Requirements
- SM17 — Hydraulic Boom And Attachments
- SM18 — Special Attachments
- SM19 — Diesel Pile Hammer (Discontinued)
- SM20 — Tower, Climbing Assembly, Traveling Base & Gantry (Discontinued)
- SM21 — Log Skidder (Discontinued)
- SM22 — Hydraulic Hammer (Discontinued)

The procedures in this manual are collated by SM Code Number sequence. Use the Keysheet in the front of this manual, the general area descriptions shown previously, and the SM Code title shown on the

Keysheet to find the specific procedure required to service the crane.

Throughout this manual, reference is made to the left, right, front, and rear, pertaining to directions and locations. These reference directions are relative to the operator, sitting in the operator's seat, with the upper directly over the front of the carrier, unless otherwise stated. (Crawler mounted cranes: upper over the front of the crane with travel motors to the rear.)

Danger, warning, and caution captions as well as special notes are used throughout this manual and on the crane to emphasize important and critical instructions. **If any instruction, caution, warning, or danger labels, decals, or plates become lost, damaged, or unreadable, they must be replaced.** Information contained on such labels, decals, and plates is important and failure to follow the information they contain could result in an accident. Replacement labels, decals, and plates can be ordered through a Link-Belt Distributor. For the purpose of this manual, danger, warning, and caution captions and notes are defined as follows:



DANGER

An operating procedure, practice, etc. which, if not correctly followed, may result in severe personal injury, dismemberment, or loss of life.



WARNING

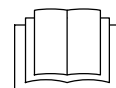
An operating procedure, practice, etc. which, if not correctly followed, may result in personal injury.

CAUTION

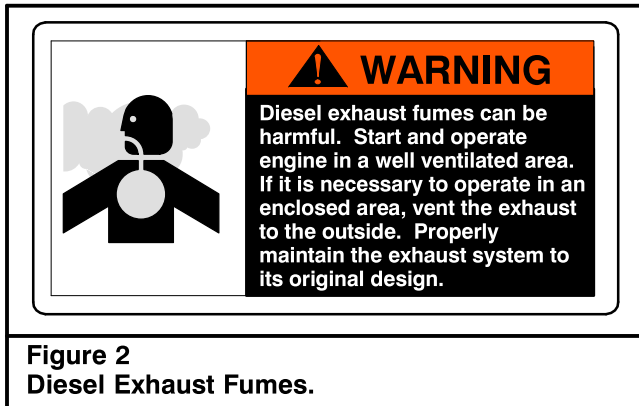
An operating procedure, practice, etc. which, if not correctly followed, may result in damage to, or destruction of, equipment or property.

NOTES

Note: An operating procedure step, condition, etc. which is essential in order for the process to be completed properly.

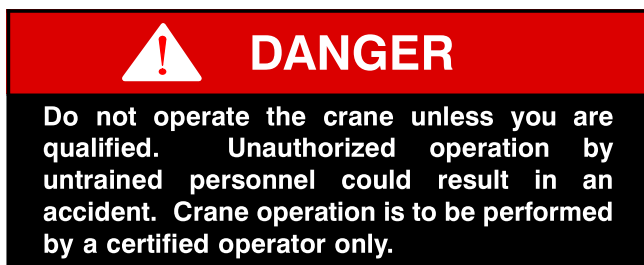


This symbol may appear in manuals or on a label on the crane to alert personnel that additional instructions are included in the crane Operator's Manual.



Service Safety And Set Up Guidelines

The following is a list of safety and set up considerations which may apply to any service or maintenance procedure. Review the entire list and understand the type of things you must consider to perform a safe service procedure and then apply these guidelines to each specific service or maintenance procedure.



Service Safety

1. Read and understand the service or maintenance procedure to be performed before beginning work. By reading the procedure ahead of time, you can be sure to have the replacement parts and tools on hand that are required to complete the job.
2. Wear protective gear to prevent injury; hard hat, safety glasses, gloves, steel toed shoes, etc.



3. First aid supplies and a fire extinguisher should be on the job site to assist in an unexpected situation. The location of these items should be known to all as well as access to a telephone for emergencies.
4. Work in a clean, dry, firm, level area whenever possible. Choosing the correct work site can make a big difference on how well the job goes.
5. Use caution around flammable materials. Be aware of all the materials in the work area which are a threat. Also make others aware of volatile materials; post signs if necessary.
6. Release all trapped pressure in air and hydraulic circuits before disconnecting any line or component. Shutdown the crane, exhaust all pressure from the crane's air reservoir(s) and work the hydraulic control levers back and forth before servicing the crane.
7. Do not disconnect any hydraulic line from a crane which has its attachment in the air. Trapped pressure may be all that is suspending it. Disconnecting a line could release the trapped pressure, causing the attachment to fall. Lower the attachment to the ground or on to its rest before servicing the crane.
8. Do not work on a crane which is in motion. Fans, belts, gear trains, etc. can catch an unexpected person and quickly dismember them.
9. Do not climb on the attachment or other hard to reach areas. If the steps and/or ladders which are installed on the crane do not provide adequate access to the area of the crane which needs servicing, use a step ladder or other approved device.
10. Pinch points exist between the upper and lower frames. Death or dismemberment may result from personnel caught in these points. Learn where these pinch points are and stay clear of the rotating upper frame.

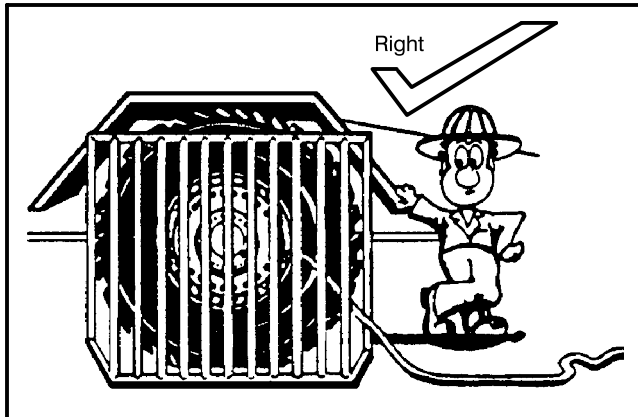


Figure 4
Use a guard when inflating tires.

11. If working in a confined area, be sure to provide adequate ventilation when running the engine(s), using toxic solvents, welding, or any other operation which contaminates the fresh air supply.
12. Post a sign in the operator's cab to alert others that the crane is under service. Starting the crane while it is being serviced could severely injure someone. Crane damage could also occur if systems are operated prematurely. Imagine starting the engine(s) before the oil is replaced.
13. Secure access panels, doors, and machinery hoods when in the open position to ensure they do not fall or slam shut due to wind or accidental disruption.
14. Crane parts may be heavy. Always use an appropriate lifting device to support work. Do not attempt to lift an object without knowing its weight. Get help if necessary.
15. Always use a safety rim cage when inflating or deflating tires. Worn or misassembled parts can "explode" from the assembly causing serious injury. Use a safety rim cage, clip on air chuck, and stand aside when inflating or deflating tires.

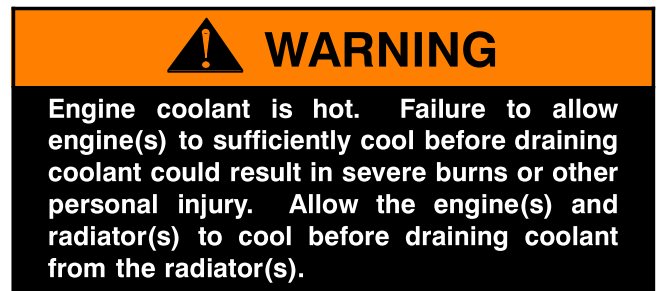
Crane Set Up And Disassembly

1. Properly park the crane as described in the Operator's Manual. Park the crane in an area which provides the most comfortable working conditions. However, do not park the crane where it will be an obstruction or an intrusion to traffic, coworkers, or to the public. Keep in mind that a major service procedure, or a repair part which requires a long lead time, could have the crane disabled for an extended period of time.
2. Keep in mind the mess which is sometimes caused by a crane under repair. Oil or other fluid leaks should be contained or prevented. Consider your responsibility of maintaining a safe clean work area and a healthy environment for all.



Figure 5
Allow engine to cool before removing the radiator cap.

3. If the crane is equipped with outriggers, it may be safer as well as an advantage to raise and level the crane on outriggers to provide easier access to areas underneath. Do not work under a crane that is improperly supported.
4. Shutdown the engine(s) per the instructions given in the Operator's Manual.
5. Post a sign in the operator's cab to alert others that the crane is being serviced.
6. Engines, transmissions, hydraulic systems, etc. generate extreme heat during operation. Temperatures can reach levels which may cause serious burns. Allow the crane to cool before attempting to service it.



7. Pressure is generated inside the engine's cooling system due to the heat transfer process from the engine(s) to the radiator(s). Do not attempt to open or drain the radiator(s) until it/they has/have had sufficient time to cool. Disconnecting hoses before the engine(s) and radiator(s) has/have cooled is even more dangerous. Wait until the engine(s) and radiator(s) have cooled and then drain the radiator(s) before disconnecting any hoses. Properly store or dispose of used coolant.

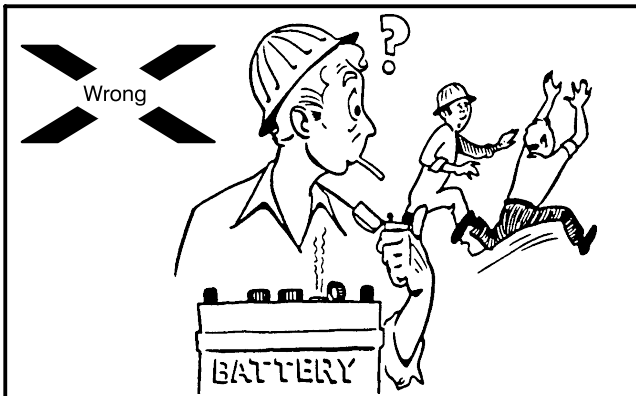


Figure 6
Do not use an open flame near the battery.

WARNING

Solvents and cleaning solutions can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all the manufacturer's recommendations concerning solvents and cleaning solutions.

8. Thoroughly clean the area of the crane which is to be serviced. Dirt or other contamination could enter the hydraulic, air, lubricating system, etc. and cause immediate and/or long term problems. Cleaning the service area not only prevents contamination problems but it also makes working on the crane easier and sometimes problems are more recognizable.
9. Before beginning any removal or disassembly procedure, take a moment to observe critical features of the assembly which may greatly simplify the installation or assembly process. Label electrical, hydraulic, air, or other connections. Index mark pump, motor, and valve sections. Lightly spray paint or count the threads of adjustment screws. Simple steps such as these can minimize the effort needed to put the crane back in service.

WARNING

Hydraulic oil is under pressure and may be hot. A sudden release of hot oil could cause severe burns and/or other serious injury. Shutdown the engine(s) and exhaust all trapped hydraulic pressure from the system before removing any line or component.

10. Hydraulic systems, while operating, are under high pressure. Even after the crane is shutdown these pressures can remain trapped in the hydraulic lines and system components. Some hydraulic systems utilize an air pressurized reservoir which maintains pressure on the system after the crane is shutdown. It is critical that all residual pressure, which is trapped in the system, be neutralized before disconnecting any line or hydraulic component. Use the following techniques to exhaust trapped hydraulic pressure from the system:

- a. Lower the attachment to the boom rest, onto blocking, or onto the ground and shutdown the engine(s).
- b. Open the drain valves on the air system reservoir(s), if equipped, to bleed the air system pressure.
- c. Relieve any residual or precharge pressure by pushing the button on the pressure relief valve, on the hydraulic reservoir, if equipped. Otherwise, loosen the filler cap 1/4 turn.
- d. Turn the ignition switch to the **ON POSITION**, but **DO NOT START THE ENGINE**.
- e. Operate the steering control(s) back and forth repeatedly until steering becomes hard. (On cranes equipped with emergency steering system, it will take several rotations of steering wheel before steering becomes hard.)
- f. Work the crane control levers and outrigger switches, if equipped, back and forth several times.
- g. Turn ignition switch to the **OFF POSITION**.
- h. When pressure is fully relieved, close the drain valves on the air system reservoir(s), if equipped.

WARNING

Air lines may contain high pressure. Opening lines and fittings before relieving air pressure may result in serious injury. Shutdown the engine(s) and drain the air system reservoir(s) before opening any line or fitting.

11. Air system circuits, like hydraulic circuits, contain high pressures also. Although the threat of a hot working fluid does not exist, highly pressurized lines and components can possibly "fly off" if lines are disconnected before the system pressure is relieved. Open the drain valve on the air system reservoir(s) to exhaust system pressure before working on the crane.



WARNING

Use care not to cause sparks at the battery terminals while disconnecting or connecting the battery. Battery gasses are volatile and could be ignited by a spark or flame causing the battery to explode. Keep the area around the battery well ventilated and disconnect the negative side of the battery first, with the ignition switch “OFF”, to minimize hazard.

Battery posts, terminals, and related accessories contain lead and lead compounds. Eating or smoking with lead residue on hands may cause lead poisoning. Wash hands after handling lead products.

12. When working on electrical circuits, disconnect the battery to minimize shock, burn, spark, or other hazard. When disconnecting the battery, confirm that the ignition switch is in the “OFF” position. Disconnect the negative side of the battery first to minimize the potential for sparks at the battery. Battery gases which are exposed to such sparks, could cause an explosion. Likewise when connecting the battery, confirm that the ignition switch is in the “OFF” position and install the positive cable(s), first and the negative connection(s) last.
13. It is a good practice when disassembling hydraulic components to lay the parts out in the order that they were disassembled. Keeping the parts in this order during disassembly, cleaning, and inspection will aid in the assembly process.

Welding

1. When making repairs which require welding, disconnect any electronic equipment (such as rated capacity limiters and engine computers) to prevent damage to them. Use the battery disconnect switch(es), if equipped.
2. Be aware of systems adjacent to areas being welded. Residual heat from the welding process could cause damage to other components. Heat may also vaporize materials which may become toxic or volatile.
3. Remove paint from areas to be welded to prevent toxic fumes.
4. The grounding connection should be within 3 feet (1 m) of the welded parts.
5. Connect the ground to the lower, if welding on the lower, or to the upper if welding on the upper. Electrical current through the turntable bearing could cause an arc which could damage it.

6. Do not position the ground connection where seals or bearing, as in transmissions or valves, will be between it and the welded parts.
7. Remove any flammable materials from the area.
8. Use the appropriate setting on the welder for the size of the welding operation. Do not use more than 200 Volts continuously.

Cleaning And Inspection



WARNING

Solvents and cleaning solutions can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all the manufacturer's recommendations concerning solvents and cleaning solutions.

1. All components should be thoroughly cleaned with an approved cleaning solvent, air dried and carefully inspected for damage, wear and corrosion.
2. All Loctite[®] or other sealant residue should be removed from threads of hardware and parts that are going to be reused.
3. All “soft parts”, such as seals, gaskets, back up rings, and o-rings, should be replaced.
4. Replacement of bearings and bushings is generally a good preventive maintenance measure. Even though a bearing or bushing seems to be intact and is functioning properly, its life span is limited. Replacing a simple bearing or bushing while the opportunity is at hand could save a complete component failure later.
5. In the event of severe defects, contact factory personnel for directions whether to repair or replace any major component.

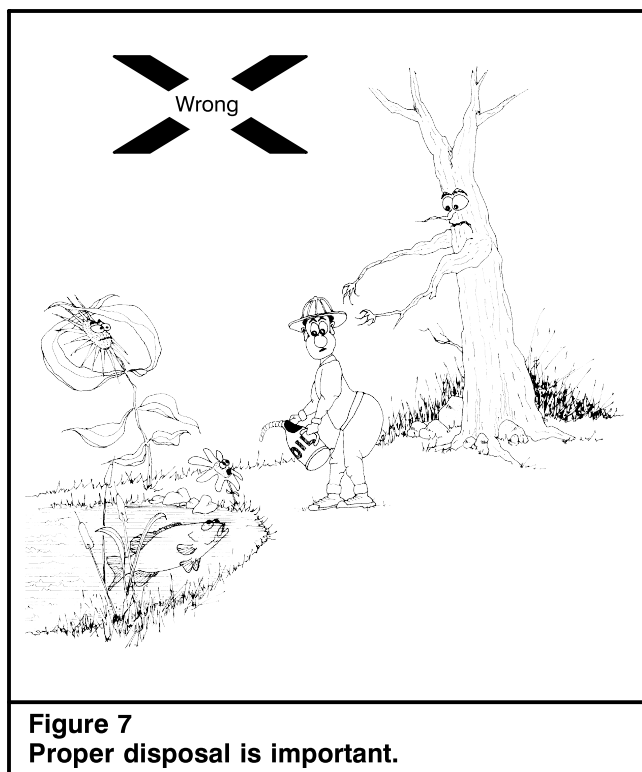
Crane Assembly

1. Loosely assemble parts to ensure all parts are in place and fasteners started before beginning torquing procedure. Always use a cross torquing sequence to ensure even and uniform installation.



WARNING

Lubricants, sealants, joint and thread locking compounds, etc. can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all manufacturer's recommendations concerning these products.



2. Unless otherwise stated, torque all fasteners per the instructions given in SM Code Area 18—000.
3. When installing hydraulic hoses, lines, and fittings, use two wrenches to ensure the hoses and lines are not twisted. One wrench must be on the male fitting, the other wrench on the female fitting.
4. Unless otherwise stated, torque all hydraulic fittings per the instructions given in SM Code Area 07—018.
5. Check all fluid levels before returning the crane to service; hydraulic reservoir oil level, transmission fluid level, engine(s) oil level, etc. Add oil as required. See Operator's Manual and/or engine(s) manufacturer's manual(s) for correct type of fluids and procedures.
6. Always replace guards, grilles, and other types of protective shields. Also, be sure that any systems which were disconnected such as load indicating systems, anti-two block devices, control cables, etc. are functioning properly before returning the crane to service.
7. Start the appropriate engine and let it idle for five minutes. Inspect the connections on the hydraulic, air, transmission, etc. lines for leaks. Repair if needed.
8. Check that all hydraulic, air, and electrical functions are operating normally before returning the crane to service.
9. After crane is assembled, refer to the Operator's Manual for any periodic type of adjustments which may have been affected by the service procedure.
10. Properly dispose of any used oils, solvents, cleaners, etc.

Solenoid Valves, General Recondition

This procedure covers the recondition of solenoid valves in general.

Disassembly



WARNING

Follow all manufacturer's recommendations concerning solvents and cleaning solutions. Serious personal injury may result from misuse of these products.

1. Thoroughly clean the exterior surface of the valve assembly with approved cleaning solvent.

CAUTION

Do not clamp valve housing in any form of vice unless jaws are protected by a soft material. Brass or wood are preferred.

2. Place the valve housing (10) in a vise.
3. Note position of prongs (5) on coil (4), to ensure proper alignment during assembly.
4. Remove nut (1), washer (2), coil housing (3), coil (4), and plate (6) from valve cartridge stem (8).
5. Remove valve cartridge stem (8) from valve housing (10).
6. Remove and discard o-rings (7,9).

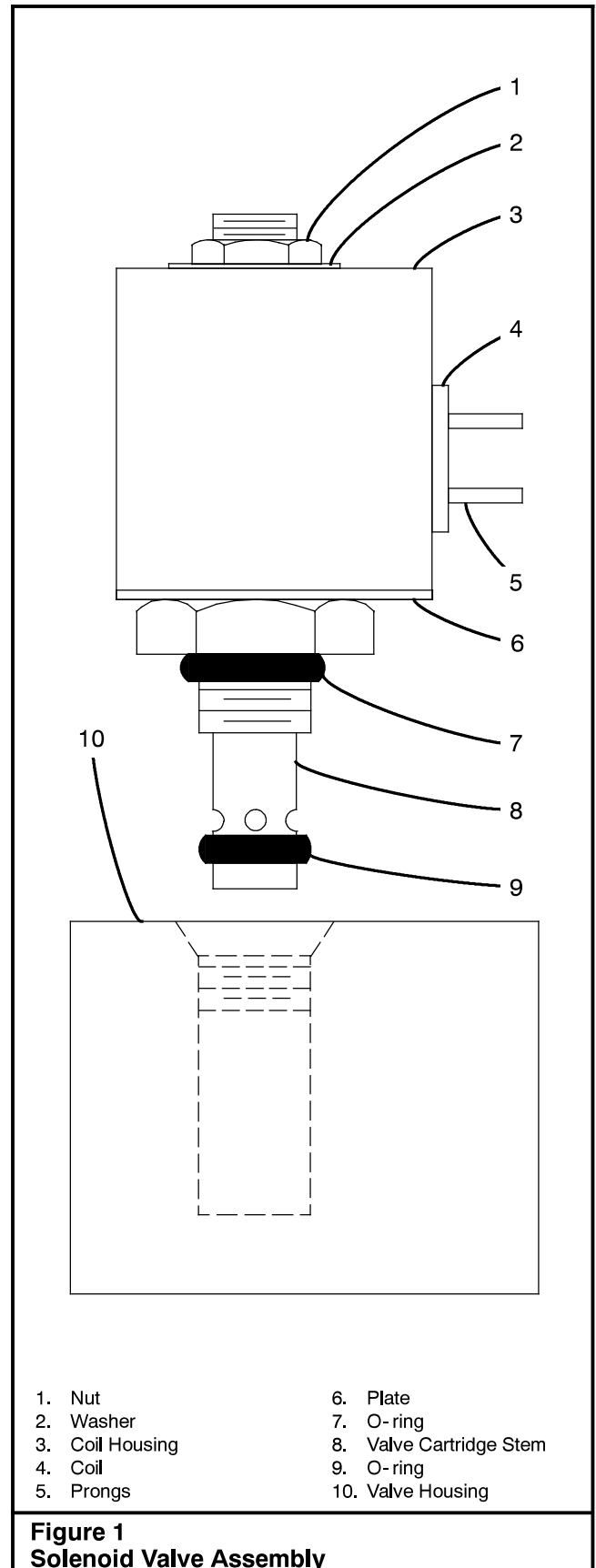
Cleaning And Inspection



WARNING

Follow all manufacturer's recommendations concerning solvents and cleaning solutions. Serious personal injury may result from misuse of these products.

1. Thoroughly clean all metal parts with an approved cleaning solvent. Place parts on a clean lint free surface and allow to air dry. Exercise every precaution possible to keep all parts free of dust, dirt, or any other foreign material during assembly.
2. Carefully inspect all components for damage, wear, corrosion, deep scratches, and scuffed metal. Replace any damaged component as required. Always use new o-rings.



Assembly

Lubricate o-rings and threads with clean hydraulic oil prior to assembly. Refer to the Operator's Manual for the correct type.

CAUTION

Do not clamp solenoid valve housing in any form of vice unless jaws are protected by a soft material. Brass or wood are preferred.

1. Place valve housing (10) in a vise.
2. Install plate (6), coil (4), coil housing (3), washer (2), and nut (1) onto valve cartridge stem (8).

Note: Do not torque nut at this time. Nut will be torqued after installation.

3. Install o-rings (7,9) onto valve cartridge stem (8).
4. Install valve cartridge stem (8) assembly into valve housing (10).

CAUTION

Torque is critical to operation of valve.

5. Torque valve cartridge stem (8) assembly to torque value specified in chart below.
6. Align prongs (5) on coil (4), as they were prior to disassembly and torque nut (1) to torque value specified in chart below.
7. If solenoid valve assembly is not to be installed on crane immediately, plug all ports to prevent contamination from entering and store properly.

Torque Specification Chart

Solenoid Thread Size	Solenoid Installation Torque	Coil Installation Torque
.438 - 20 UNF	10- 14 ft lb (14- 19Nm)	7- 11 ft lb (10- 15Nm)
.750 - 16 UNF	15- 19 ft lb (20- 26Nm)	7- 11 ft lb (10- 15Nm)
.875 - 14 UNF	20- 24 ft lb (27- 33Nm)	7- 11 ft lb (10- 15Nm)
1.000 - 14 UNF	25- 29 ft lb (34- 39Nm)	7- 11 ft lb (10- 15Nm)
1.250 - 14 UNF	30- 34 ft lb (41- 46Nm)	12- 16 ft lb (16- 22Nm)
1.313 - 12 UNF	35- 38 ft lb (47- 52Nm)	12- 16 ft lb (16- 22Nm)
1.500 - 12 UNF	39- 43 ft lb (53- 58Nm)	12- 16 ft lb (16- 22Nm)
1.625 - 12 UNF	44- 47 ft lb (60- 64Nm)	12- 16 ft lb (16- 22Nm)

Rear Winch, R & I

This procedure covers the removal and installation of the rear winch. For recondition and troubleshooting procedures, see SM Keysheet Area 05–006.

Removal

1. Lower, detach, and secure the load, as required.
2. Fully extend the side frames for added stability during crane service. See the Operator's Manual for complete instructions.
3. Park the crane, out of the way, on a firm and level surface.
4. Swing the upper directly over the front or rear of the crawler and position the boom, as required.
5. Engage the travel swing lock and/or apply the swing brake, as required.
6. Move all control levers to the neutral position and the lever locks to the locked position to prevent inadvertent operation of the crane.
7. Ensure all drum pawl lock switches are in the "LOCK" position.
8. Throttle the engine back to idle, and shutdown the engine. Allow the engine and hydraulic oil to cool.
9. Push gate lock lever to the "STOP" position.



WARNING

Hydraulic oil is under pressure and may be hot. A sudden release of hot oil could cause burns or other serious injury. Shutdown the engine and exhaust all trapped hydraulic pressure from the system before removing any line or component.

10. Relieve any residual pressure in the hydraulic system as follows:
 - a. With the engine shutdown and the starter key switch in the "ON" position, move the gate lock lever to the "OPERATION" position.
 - b. Release lever locks, as required, and work the hydraulic control levers back and forth several times.
 - c. Turn the starter key switch to the "OFF" position.
11. Move all control levers to the neutral position and the lever locks to the locked position to prevent inadvertent operation of the crane.
12. Push gate lock lever to the "STOP" position.



WARNING

Solvents and cleaning solutions can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all the manufacturer's recommendations concerning solvents and cleaning solutions.

13. Thoroughly clean the area to be disassembled with an approved cleaning solvent to prevent contamination. Allow the area to air dry.

Refer to Figure 1.

14. If necessary, loosen capscrews (7) and remove mirror (8).
15. Remove capscrews and washers (6) and remove cover (5).
16. Remove wire rope from rear winch (1). See Operator's Manual for correct procedure.
17. Label for assembly purposes and disconnect hydraulic lines (3) from rear winch (1).
18. Disconnect wire harness (2) from rear winch (1).

Note: The rear winch weighs approximately 915 lb (415kg).

19. Using an adequate lifting device, properly support the weight of the rear winch (1).
20. Remove capscrews and washers (9). and remove the rear winch (1) from the upper frame (4).

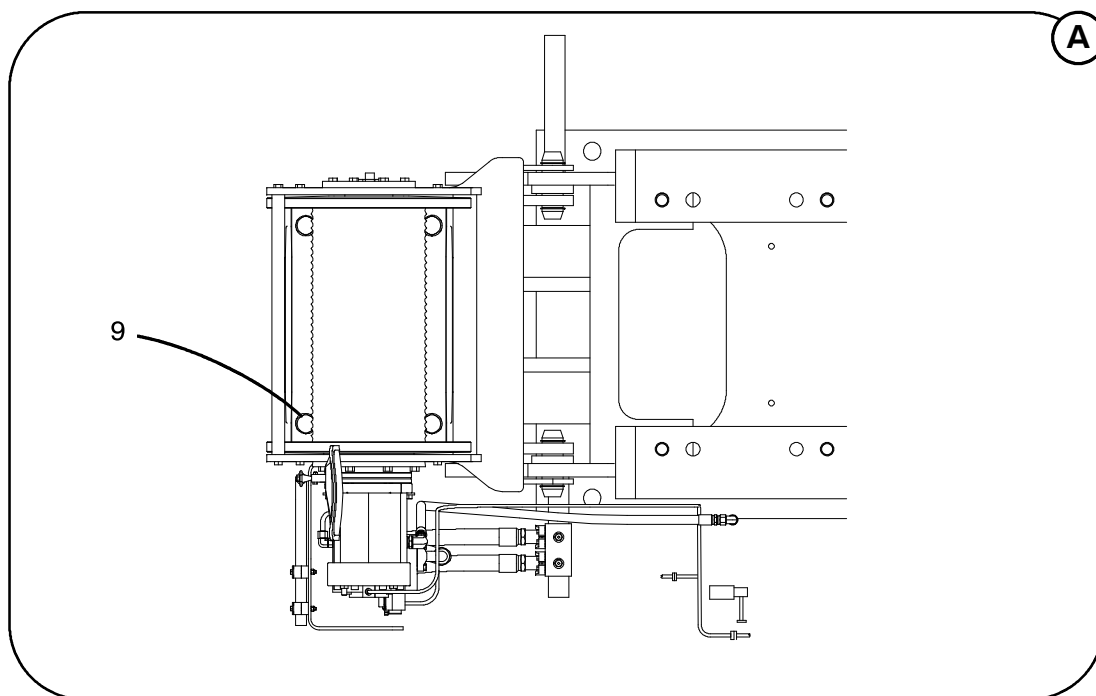
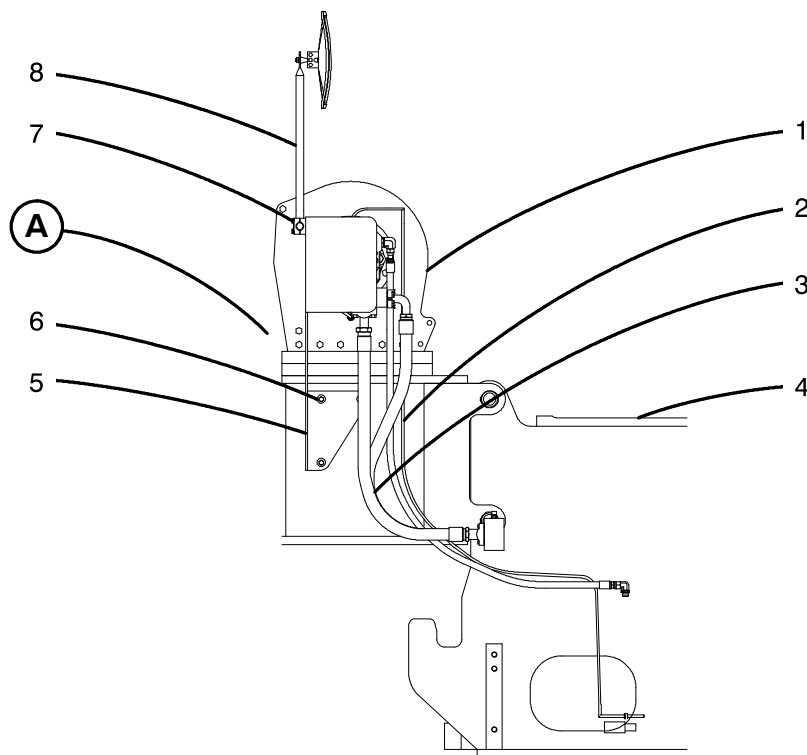
Cleaning And Inspection



WARNING

Solvents and cleaning solutions can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all the manufacturer's recommendations concerning solvents and cleaning solutions.

1. All components should be thoroughly cleaned with an approved cleaning solvent, air dried, and carefully inspected.
2. All Loctite®, Permatex®, or other sealant residue should be removed from threads of hardware and the mounting surfaces of parts that are going to be reused. Prior to applying new thread locking compounds or sealants, clean threads and surfaces with Loctite® 7070 Cleaner to ensure best performance of products.



- | | | |
|--------------------|------------------------|----------------------|
| 1. Rear Winch | 4. Upper Frame | 7. Capscrew |
| 2. Wire Harness | 5. Cover | 8. Mirror |
| 3. Hydraulic Lines | 6. Capscrews & Washers | 9. Capscrew & Washer |

Figure 1
Rear Winch

3. Thoroughly inspect all parts for damage, wear, fatigue or stress fractures, and corrosion. Repair or replace as required.
4. All “soft parts”, such as seals, gaskets, back up rings, and o-rings, should be replaced.
5. Inspect the integrity of the hydraulic lines that are connected to the rear winch. Repair or replace if required.
6. Inspect the integrity of the electrical wires and connectors that supply the rear winch. Repair or replace if required.
7. In the event of severe defects, contact factory personnel for directions whether to repair or replace any major component.

Installation



WARNING

Lubricants, sealants, joint and thread locking compounds, etc. can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all manufacturer's recommendations concerning these products.

Refer to Figure 1.

Note: The rear winch weighs approximately 915 lb (415kg).

1. Using an appropriate lifting device, properly position the rear winch (1) on the upper frame (4).
2. Apply Loctite® 242 to capscrews (9) and install capscrews and washers (9). Torque capscrews (9) to 1,100–1,200 ft lb (1 492–1 627Nm).

Note: When installing hydraulic lines, hoses, tubes, and fittings, use two wrenches to ensure that they are not twisted. One wrench must be on the male fitting, and the other wrench on the female fitting.

3. Install hydraulic lines (3) on rear winch (1).
4. Connect wire harness (2).
5. Install wire rope on rear winch (1). See Operator's Manual for correct procedure.
6. Properly position cover (5) and install capscrews and washers (6).
7. Properly position mirror (8) and tighten capscrews (7).
8. Fill rear winch (1) drum to proper level to prevent damage on initial use. Refer to Operator's Manual for correct type and procedure.
9. Check the hydraulic reservoir oil level. Add oil as required. See the Operator's Manual for correct type and procedure.
10. Check for correct fluid levels in any related components such as pump drives, gear reduction units, engine crankcase, radiator, etc. Refer to the crane or engine Operator's Manual for correct type/quantity of fluids and proper procedure.
11. Start the engine and let idle for five minutes.
12. Inspect the hydraulic connections for leaks. Repair leaks as required.
13. Complete the installation by testing all related functions of the rear winch for proper operation. Normal operation of the hydraulic and electrical systems should be confirmed. A general inspection of the components and systems in the areas adjacent to the repair should also be performed to ensure related damage or wear is not present.

Hydraulic System Cleaning Procedure

The hydraulic system of a crane can become contaminated very rapidly when a component in the system fails and breaks up. The contaminants from the failed component must be removed from the hydraulic system before they cause failure of other components in the system. To remove as much of the contaminants in the system as possible, the following procedure is recommended.



WARNING

Hydraulic oil is under pressure and may be hot. A sudden release of hot oil could cause burns or other serious injury. Shutdown the engine and exhaust all trapped hydraulic pressure from the system before removing any line or component.

1. Relieve any pressure in the hydraulic system and drain the hydraulic system oil from the reservoir. Follow the procedure as outlined in Operator's Manual.



WARNING

Solvents and cleaning solutions can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all the manufacturer's recommendations concerning solvents and cleaning solutions.

2. Thoroughly clean area to be disassembled with an approved cleaning solvent to prevent contamination from entering the oil circuits. Allow the area to air dry.
3. Remove, disassemble, clean, and reassemble all hydraulic components. (Control valves, cylinders, motors, etc.) Refer to the appropriate section of Service Manual for specific removal and recondition procedures.
4. Disconnect all hydraulic lines and drain as much oil as possible.
5. Install all the hydraulic components on the crane and connect all the lines. Refer to the appropriate section of Service Manual for specific installation procedures.
6. Follow the procedures in Operator's Manual to change all hydraulic oil filters and refill the hydraulic reservoir.
7. Start the crane and inspect all connections for leaks.
8. After 50 hours of operation, all hydraulic oil filters must be changed again. Refer to Operator's Manual for the correct procedure.

Rear Winch Motor, R & I

This procedure covers the removal and installation of the rear winch motor. For recondition and troubleshooting procedures, see SM Keysheet Area 07–006.

Removal

1. Lower, detach, and secure the load, as required.
2. Fully extend the side frames for added stability during crane service. See the Operator's Manual for complete instructions.
3. Park the crane, out of the way, on a firm and level surface.
4. Swing the upper directly over the front or rear of the crawler and position the boom, as required.
5. Engage the travel swing lock and/or apply the swing brake, as required.
6. Move all control levers to the neutral position and the lever locks to the locked position to prevent inadvertent operation of the crane.
7. Ensure all drum pawl lock switches are in the "LOCK" position.
8. Throttle the engine back to idle, and shutdown the engine. Allow the engine and hydraulic oil to cool.
9. Push gate lock lever to the "STOP" position.



WARNING

Hydraulic oil is under pressure and may be hot. A sudden release of hot oil could cause burns or other serious injury. Shutdown the engine and exhaust all trapped hydraulic pressure from the system before removing any line or component.

10. Relieve any residual pressure in the hydraulic system as follows:
 - a. With the engine shutdown and the starter key switch in the "ON" position, move the gate lock lever to the "OPERATION" position.
 - b. Release lever locks, as required, and work the hydraulic control levers back and forth several times.
 - c. Turn the starter key switch to the "OFF" position.
11. Move all control levers to the neutral position and the lever locks to the locked position to prevent inadvertent operation of the crane.
12. Push gate lock lever to the "STOP" position.



WARNING

Solvents and cleaning solutions can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all the manufacturer's recommendations concerning solvents and cleaning solutions.

13. Thoroughly clean the area to be disassembled with an approved cleaning solvent to prevent contamination. Allow the area to air dry.

Refer to Figure 1.

14. Remove wire rope from rear winch (1). See Operator's Manual for correct procedure.
15. Loosen capscrews (4) and remove mirror (5).
16. Remove capscrews and washers (3) and remove cover (2).
17. Label for assembly purposes and disconnect hydraulic lines (8) from rear winch motor (6).
18. Disconnect wire harness (9) from rear winch motor (6).

Note: The rear winch motor weighs approximately 120 lb (54kg).

19. Using an adequate lifting device, properly support the weight of the rear winch motor (6).
20. Remove capscrews and washers (7) and remove the rear winch motor (6) from the rear winch (1).

Cleaning And Inspection



WARNING

Solvents and cleaning solutions can be hazardous. Serious personal injury may result from misuse of these products. Read and follow all the manufacturer's recommendations concerning solvents and cleaning solutions.

1. All components should be thoroughly cleaned with an approved cleaning solvent, air dried, and carefully inspected.
2. All Loctite®, Permatex®, or other sealant residue should be removed from threads of hardware and the mounting surfaces of parts that are going to be reused. Prior to applying new thread locking compounds or sealants, clean threads and surfaces with Loctite® 7070 Cleaner to ensure best performance of products.