GROVE®
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OPERATOR'S AND SAFETY HANDBOOK

RT860

S/N_____

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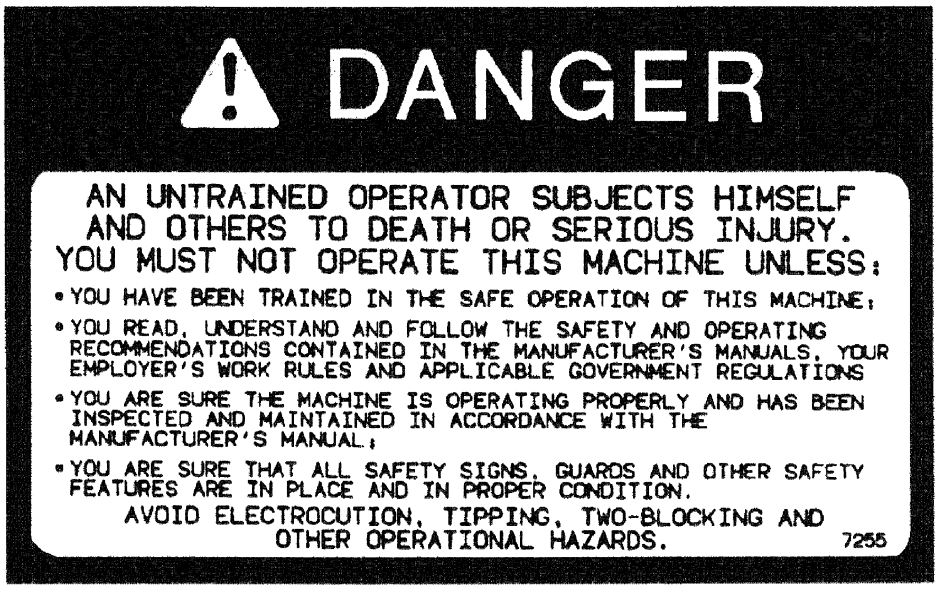
OPERATOR'S QUALIFICATION



An untrained operator subjects himself and others to death or serious injury.

YOU MUST NOT OPERATE THIS MACHINE UNLESS:

- You have been trained in the safe operation of this machine;
- You read, understand and follow the safety and operating recommendations contained in the manufacturer's manuals, your employer's work rules and applicable government regulations;
- You are sure the machine is operating properly and has been inspected and maintained in accordance with the manufacturer's manuals;
- You are sure that all safety signs, guards and other safety features are in place and in proper condition.

Do not attempt to operate the crane unless you are trained and thoroughly familiar with all operational functions. Controls and design may vary from crane to crane, therefore, it is important that you have specific training on the particular crane you will be operating.

Training is ESSENTIAL for proper crane operation. Never jeopardize your own well–being or that of others by attempting to operate a crane on which you have not been trained.

You must be mentally and physically fit to operate a crane. Never attempt to operate a crane while under the influence of medication, narcotics or alcohol. Any type of drug could impair physical, visual and mental reactions and capabilities.

Crane operation is dangerous when close to an energized electrical power source. Exercise extreme caution and prudent judgement. Operate slowly and cautiously when in the vicinity of power lines.

If the load, wire rope, crane boom or any portion of the crane contacts or comes too close to an electrical power source, everyone in, on, and around the crane can be seriously injured or killed.

The safest way to avoid electrocution is to stay away from electrical power lines and electrical power sources.

You, the operator, are responsible for alerting all personnel of dangers associated with electrical power lines and equipment. The crane is not insulated. Do not allow unnecessary personnel in the vicinity of the crane while operating. Permit no one to lean against or touch the crane. Permit no one including riggers and load handlers to hold the load, load lines, tag lines or rigging gear.

Even if the crane operator is not affected by an electrical contact, others in the area may become seriously injured or killed.

It is not always necessary to contact a power line or power source to become electrocuted. Electricity, depending on magnitude, can arc or jump to any part of the load, load line or crane boom if it comes too close to an electrical power source. Low voltages can also be dangerous.

Thoroughly read, understand and abide by all applicable federal, state and local regulations.

Federal law prohibits the use of cranes closer than 10 feet (3.05 m) to power sources up to 50,000 volts and greater distances for higher voltages. [29CFR1910.180 and 29CFR1926.550] Grove recommends keeping cranes twice the minimum distance (e.g., 20 FEET (6.10 m)) as specified by US Department of Labor – Occupational Safety and Health Administration (OSHA) standards.

SET-UP AND OPERATION

During crane use, assume that every line is energized ("hot" or "live") and take the necessary precautions.

Set–up the crane in a position such that the load, boom or any part of the crane and its attachments cannot be moved to within 20 FEET of electrical power lines or equipment. This includes the crane boom (fully extended to maximum height, radius and length) and all attachments (jibs, boom extensions, rigging, loads, etc.). Overhead lines tend to blow in the wind so allow for lines' movement when determining safe operating distance.

A suitable barricade should be erected to physically restrain the crane and all attachments (including the load) from entering into an unsafe distance from electrical power lines or equipment.

Exercise care when servicing the hydraulic system of the crane, as pressurized hydraulic oil can cause serious injury. The following precautions must be taken when servicing the hydraulic system:

1. Follow the manufacturer's recommendations when adding oil to the system. Mixing the wrong fluids could destroy seals, causing machine failure.

2. Be certain all lines, components and fittings are tight before resuming operation.

3. When checking for suspected leaks, use a piece of wood or cardboard and wear appropriate personal protective equipment.

4. Never exceed the manufacturers recommended relief valve settings.

TIRES

Inspect the tires for nicks, cuts, imbedded material and abnormal wear.

Ensure all lug nuts are properly torqued.

Ensure pneumatic tires are inflated to the proper pressure (Refer to the Tire Inflation Decal on the crane). When inflating tires, use a tire gauge, clip–on inflator, and extension hose which will permit standing clear of the tire while inflating.

WIRE ROPE

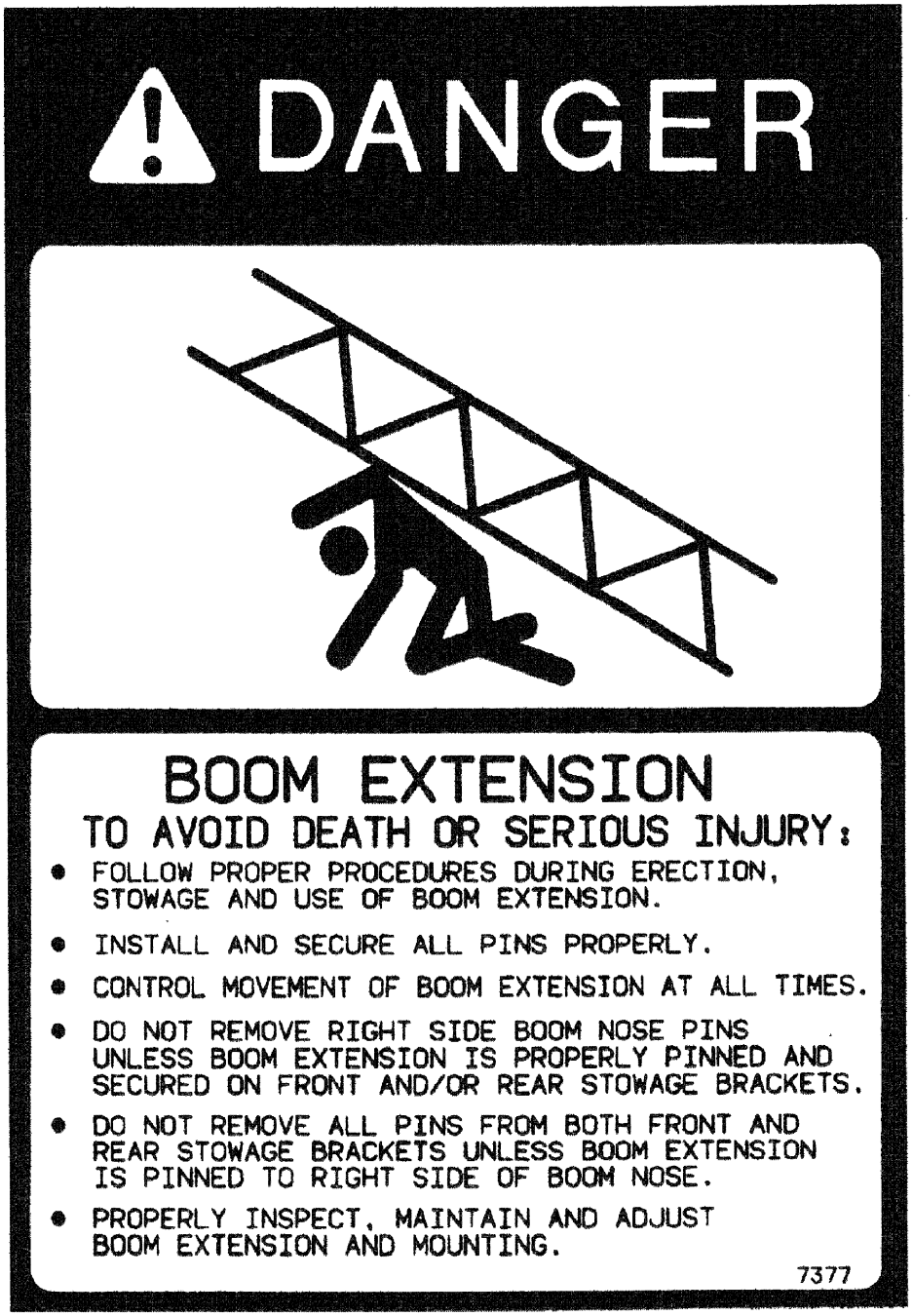
Use ONLY the wire rope specified by Grove as indicated on the crane's load capacity chart. Substitution of an alternate wire rope may require the use of a different permissible line pull and, therefore, require different reeving.

Always make daily inspections of the wire rope, keeping in mind that all wire rope will eventually deteriorate to a point where it is no longer usable. Wire rope shall be taken out of service when any of the following conditions exist:

1. For rotation resistant running ropes – more than two (2) broken wires in a length of rope equal to six(6) times the rope diameter, or more than four (4) broken wires in a length of rope equal to thirty (30) times the rope diameter.

2. For running ropes other than rotation resistant – six (6) broken wires in one rope lay or three (3) broken wires in one strand.

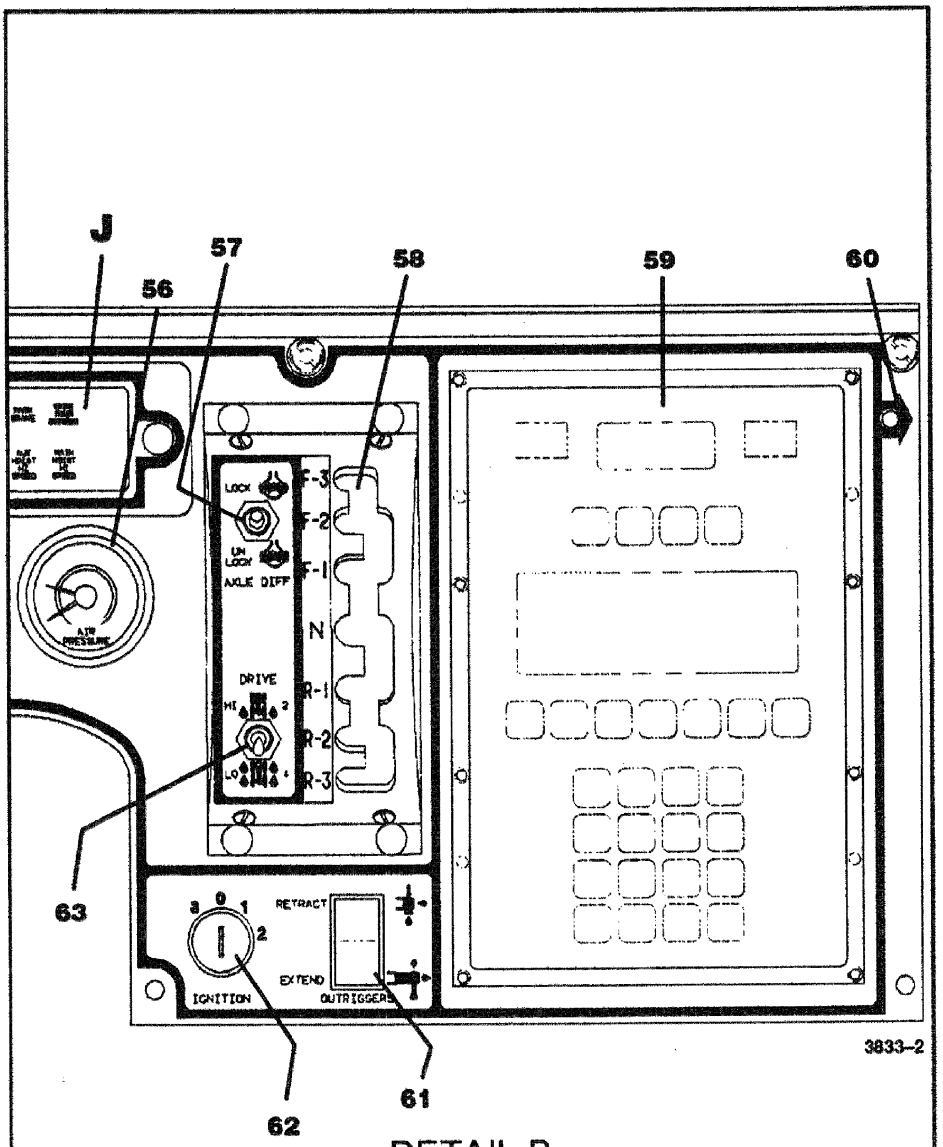
BOOM EXTENSION/JIB



To avoid death or serious injury, follow proper procedures during erection, stowage and use of the boom extension/jib.

Install and secure all pins properly.

Control movement of boom extension/jib at all times.



DETAIL B

56. Air Pressure Gauge
57. Differential Lock Control Switch
58. Transmission Shift Lever
59. LMI Console
60. Right Turn Signal Indicator
61. Outrigger Extension/Retraction Switch
62. Ignition Switch
63. Range Selector Switch

Cab Controls and Indicators (Sheet 6 of 9)

OUTRIGGER EXTENSION/RETRACTION SWITCH

The outrigger extension/retraction switch (61) is located on the right side of the front console. It has two placarded positions, EXTEND and RETRACT. It must be used in conjunction with the switches on the OUTRIGGER SELECTOR panel to control the operation of the stabilizer and extension cylinders. After positioning the switch on the OUTRIGGER SELECTOR panel, positioning the outrigger extension/retraction switch energizes the control solenoid to allow hydraulic fluid to flow through the control solenoid valve and the individual solenoid valve and move the selected component in the desired direction.

SWING BRAKE CONTROL SWITCH

The SWING BRAKE control switch (52) is located on the left side of the front console at the bottom. The switch has two positions; ON and OFF. It is used to control a hydraulic valve that directs a regulated flow of pressure to or from the swing brake.

SWING BRAKE PEDAL

The swing brake pedal (1) is located on the left side of the cab under the front console. The brake pedal is used to actuate the swing brake to slow or stop motion. Braking is proportional to pedal depression. With the pedal not depressed and the swing brake control valve disengaged, hydraulic pressure is applied to the brake, thereby, overcoming spring pressure and releasing the brake. Depressing the pedal actuates a swing power brake valve to apply pressure to the brake assembly. This pressure aids the spring pressure to overcome the hydraulic pressure being applied to the brake release circuit and applies the spring brake according to the pressure from the spring power brake valve.

SWING BRAKE ON INDICATOR

The SWING BRAKE ON indicator (73) is located at the top of the front console on the LED alert display. The indicator is a red light that will illuminate when the swing brake is applied.

SWING HORN BUTTON

The swing horn button (28) is located on the right armrest. The swing horn is used by the operator to provide a warning that the superstructure is rotating.

BRAKE FOOT PEDAL

The brake foot pedal (7) is the second pedal from the right on the cab floor. Depressing the pedal controls application of the service brakes.

PARK BRAKE CONTROL

The PARK BRAKE control (47) is located on the left side of the control panel at the bottom. The control switch has two positions; applied and released. The switch is used to set and release the parking brake.

Section 4
OPERATING PROCEDURES

PRE-STARTING CHECKS

A complete walk-around visual inspection of the machine should always be made with special attention to structural damage, loose equipment, leaks, or other conditions that would require immediate correction for safety of operation. The following checklist items are suggested specifically for the operator's benefit to make certain his machine is prepared for starting the days work.

FUEL SUPPLY

Ensure the fuel tank is full and the cap is on tight.

ENGINE OIL

Check oil level in the crankcase; fill to FULL mark on the dipstick. Do not overfill.

ENGINE COOLANT

Check coolant level in the radiator; fill to proper level, Do not overfill. Check cap for security.

BATTERIES

If the machine is equipped with a standard or low maintenance battery, check each cell for the correct electrolyte level. Add only clean, distilled water. Do not over fill. If equipped with a maintenance free battery, check the state of charge indicator if applicable. On all batteries ensure the cables and clamps are tight and not corroded.

SIGNAL AND RUNNING LIGHTS

Check all signal and running lights for proper operation. Replace burned out lamps with those of the same number, or equivalent.

FOOT AND PARKING BRAKES

Check for proper operation.

DAILY LUBRICATION

Make certain that all components requiring daily lubrication have been serviced. (Refer to Section 5, Lubrication.)

CAUTION

DO NOT DOWNSHIFT TO A LOWER GEAR IF CRANE IS TRAVELING AT A GREATER ROAD SPEED THAN THE MAXIMUM SPEED OF THE LOWER GEAR.

TRAVELING – REVERSE

CAUTION

APPLY THE SERVICE BRAKES AND BRING THE CRANE TO A COMPLETE STOP BEFORE SHIFTING THE TRANSMISSION INTO REVERSE.

Traveling in reverse is accomplished the same way as traveling forward, except for shifting the directional control lever to reverse (R) position. (Refer to TRAVELING – FORWARD).

FOUR-WHEEL DRIVE OPERATION

CAUTION

DO NOT OPERATE IN 4–WHEEL DRIVE ON A DRY, HARD SURFACE.

If more traction is required due to slipping or spinning wheels, engage the rear axle drive. Engage four–wheel drive as follows.

CAUTION

BEFORE SHIFTING FROM TWO–WHEEL DRIVE TO FOUR–WHEEL DRIVE (OR FROM FOUR BACK TO TWO), CRANE TRAVEL MUST BE STOPPED.

1. Position the DRIVE AXLE selector switch to 4WD.

2. Select gear speed and direction of travel as described under TRAVELING – FORWARD.

3. Return the DRIVE AXLE selector switch to the 2WD position as soon as two–wheel traction will suffice.

SETTING THE OUTRIGGERS

1. Position the outrigger floats directly out from each outrigger to where the outriggers will be properly extended.

CAUTION

ALWAYS POSITION A SWITCH ON THE OUTRIGGER SELECTOR PANEL BEFORE POSITIONING THE OUTRIGGER EXTENSION/RETRACTION SWITCH TO EXTEND OR RETRACT. FAILURE TO DO THIS MAY CAUSE A HYDRAULIC LOCK AGAINST THE INDIVIDUAL SOLENOID VALVES, PREVENTING THEM FROM OPENING.

2. Position the appropriate OUTRIGGER SELECTOR switch and position the outrigger extension/retraction toggle switch to EXTEND. The appropriate outrigger should begin to extend. Refer to Engaging the Mid–Extend Lock Pin if the crane is to be operated at the mid–extend position.

DANGER

ALL FOUR OUTRIGGER BEAMS MUST BE EQUALLY EXTENDED TO THE APPROPRIATE VERTICAL STRIPE BEFORE BEGINNING OPERATION.

NOTE

More than one outrigger may be extended at one time. However, to ensure that each outrigger is fully extended, each OUTRIGGER SELECTOR switch should be depressed individually and the outrigger extension/retraction switch momentarily positioned to EXTEND after multi–outrigger extension.

3. After all four outrigger beams have been fully extended, position the appropriate STABILIZER switch and position the outrigger extension/retraction switch to EXTEND.

4. Extend each stabilizer, positioning the float as necessary, until the locking levers of the float engage the stabilizer cylinder rod.

NOTE

More than one stabilizer may be extended at one time.

OPTIONAL EQUIPMENT OPERATION

BOOM LATCHING SYSTEM

NOTE

Before attempting to latch the boom, ensure the boom is telescoped out past the latch point that is before the latch point desired. For example, to latch the boom at the 85 foot boom length, it must be telescoped just past the 63 foot boom length.

When the control switch in the cab is positioned to EXTEND PIN, an electrical signal is sent to the actuator. The actuator rod retracts (allowing the pressure of the compression springs to extend the boom section pin) and the DISENGAGED indicator light in the cab will go out. The boom can then be extended or retracted until the pin engages and locks the boom section at the desired length. Upon engagement, the ENGAGED indicator light in the cab will illuminate.

To unlatch the boom, the control switch in the cab is positioned to RETRACT PIN and held until the ENGAGED indicator light goes out and the DISENGAGED indicator light illuminates. If the boom has been in the latched position for some time, or the operator has attempted to telescope considerably during a latched condition, the boom sections may not unlatch. To correct this, the boom telescope control may need to be jogged to relieve the weight of the boom sections from the latching pins. When both DISENGAGED indicators are illuminated, the boom is then free to telescope.

ENGINE COLD START SYSTEM

CAUTION

DO NOT USE THE COLD START SYSTEM FEATURE WITH A WARM ENGINE.

The engine cold start system is provided as an aid for starting the engine during cold weather. The system consists of a switch, a solenoid valve, an ether container, and the necessary tubing. The COLD START switch is located on the front control panel in the cab. The solenoid valve and ether container are mounted inside the engine compartment. The cold start is energized only when the ignition switch is in the START position and the COLD START button is pushed. (See COLD WEATHER STARTING).

11. **Telescope Cylinder Wear Pads.**

NOTE

The boom sections must be extended to gain entry through the access holes in the boom.

Lube Type – EP – MPG
Lube Interval – 500 hours
Lube Amount – Thoroughly coat the area the wear pad moves on
Application – By brush

12. **Boom Extension Alignment Device.**

Lube Type – EP – MPG
Lube Interval – As needed
Lube Amount –
Adjustment Bar – Until grease extrudes
Push Bar – Thoroughly coat the area the push bar moves on
Application –
Adjustment Bar – 1 grease fitting
Push Bar – By Brush

13. **Boom Latch Pins.**

Lube Type – EP – MPG
Lube Interval – 500 hours
Lube Amount – Until grease extrudes
Application – 1 grease fitting per latch pin

14. **Upper Lift Cylinder Pivot Shaft.**

NOTE

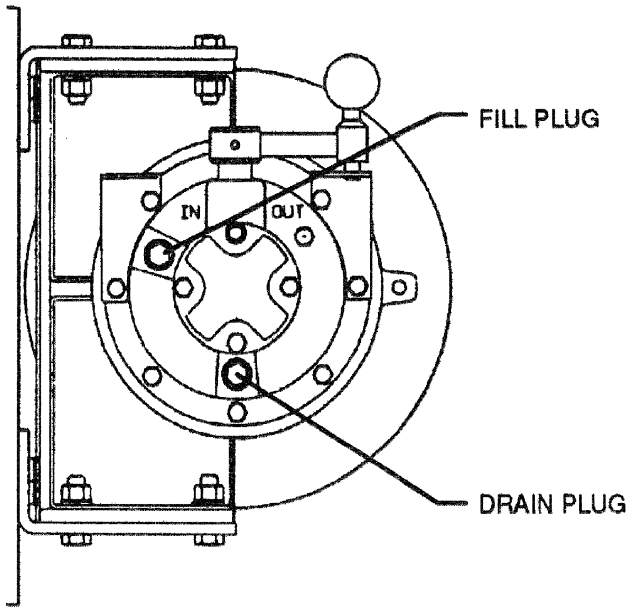
When greasing the lift cylinder pivot shafts, better distribution of grease within the shafts is obtained if the weight of the boom is removed from the shafts. If this is not possible, slowly elevate and lower the boom while pumping grease into the fitting.

Lube Type – EP–MPG
Lube Interval – 500 hours
Lube Amount – Until grease extrudes
Application – 1 grease fitting each side

43. Jib Lower Cord Adapter.

Lube Type – EP–MPG
Lube Interval – 500 hours
Lube Amount – Until grease extrudes
Application – 1 grease fitting on each side

44. Tow Winch.



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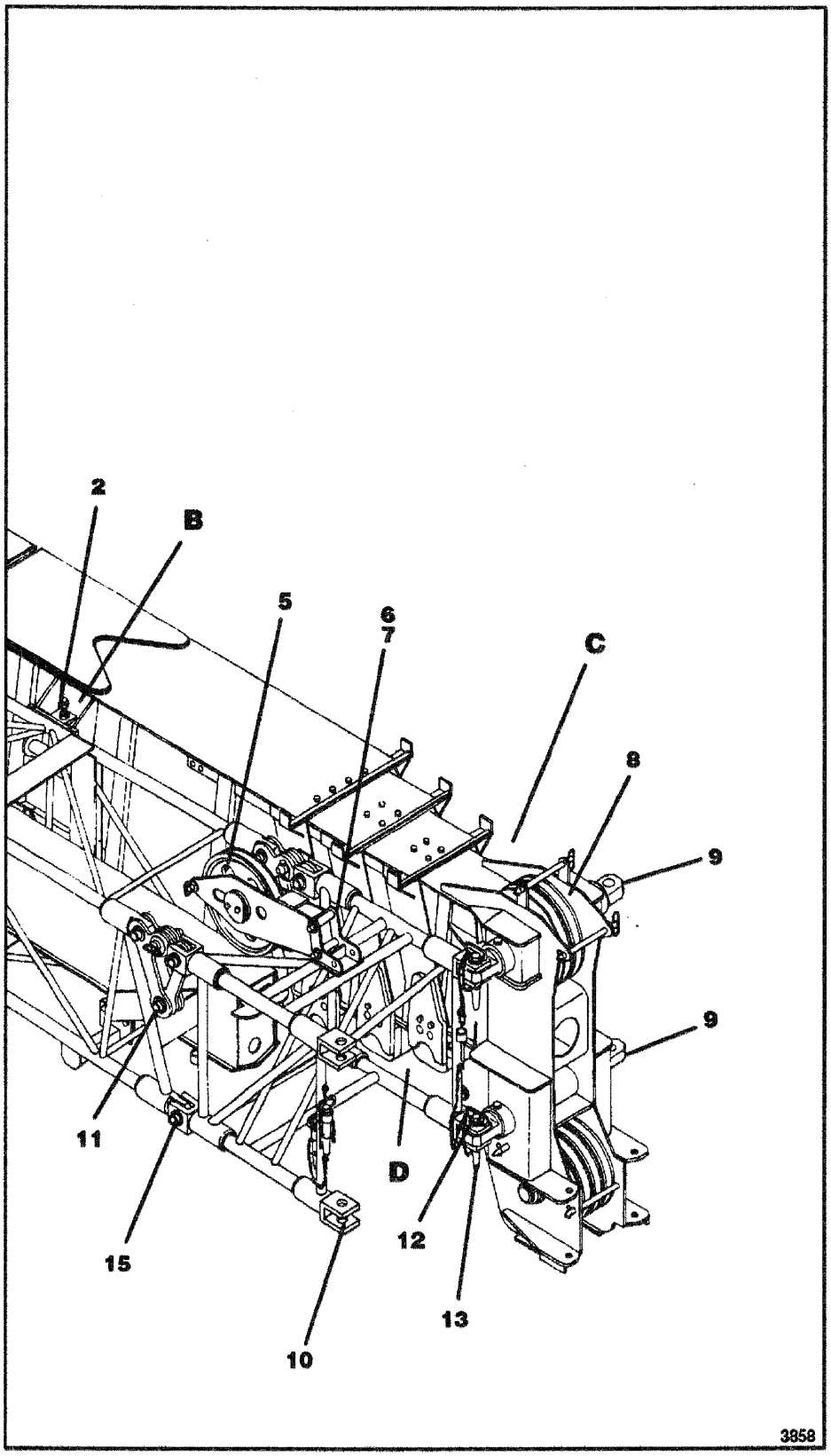
Lube Type – EPGL–5H
Lube Interval –
Initial Change – After 6 weeks or 10 hours of operation
Periodic Change – Lube should be changed on an annual basis or every 50 hours of operation
Check every 10 hours of operation
Lube Amount – Capacity – 2 qts. (1.9 L)
Application – Fill until level with the fill plug opening

45. Jack Cylinder Support Tubes.

Lube Type – EP–MPG
Lube Interval – 500 hours
Lube Amount – Thoroughly coat the area the cylinder rides on
Application – By brush

46. Cylinder Barrels.

Lube Type – UNDERCOAT
Lube Interval – As necessary
Lube Amount – Fully extend the outriggers and apply undercoat to the cylinder barrels
Application – By brush



Erecting and Stowing the Swingaway Boom Extension (Sheet 2 of 8)

1. Extend and set the outriggers and swing the boom to over the front. Position the boom to above horizontal.

2. Block up under the tip of the swingaway base section.

3. To set the offset from zero (0) degrees to 30 degrees perform the following procedures.

CAUTION

DO NOT OVERLOAD THE SWINGAWAY ANCHOR FITTINGS OR THE SWINGAWAY BASE SECTION WHEN LOWERING THE BOOM.

a. Slowly lower the boom until the pressure is relieved on the offset pin.

b. Remove the offset pin securing the offset links in the zero (0) degree offset position and store it in the stowage lug.

c. Slowly elevate and telescope the boom at the same time so that the swingaway does not move off of the blocking until the offset links take the full weight of the swingaway.

d. Reeve the hoist cable over the mast sheave.

4. To set the offset from 30 back to zero (0) degrees, perform the following procedures.

CAUTION

DO NOT OVERLOAD THE SWINGAWAY ANCHOR FITTINGS OR THE SWINGAWAY BASE SECTION WHEN LOWERING THE BOOM.

a. Slowly lower the boom until the pressure is relieved from the offset links (30 degree offset).

b. Remove the offset pin and lower the boom until the holes for the zero (0) degree offset position align with the offset links. Install the offset pin.