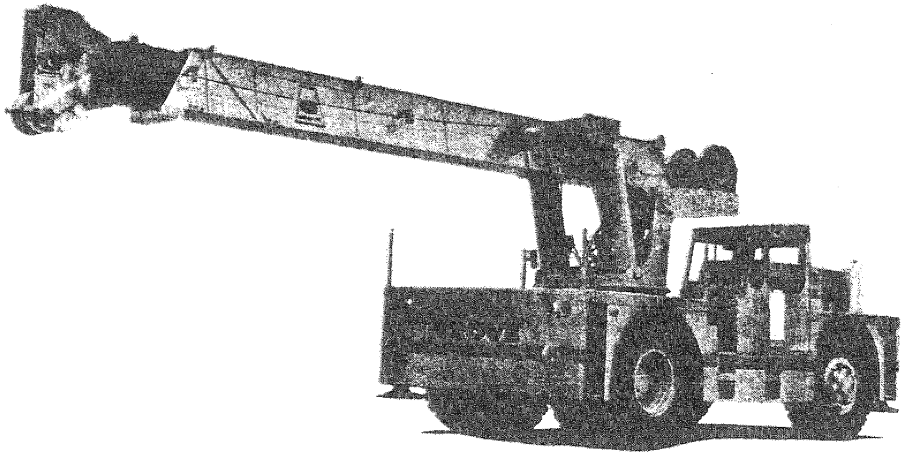
OPERATOR'S AND SAFETY HANDBOOK



INDUSTRIAL 2535

S/N_____

PUBLISHED: OCTOBER, 1981

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SECTION IV

OPERATING PROCEDURES

Type ..... Gear
Sections 3
GPM ..... 63.5 gpm (240 lpm)
37.0 gpm (140 lpm)
25.0 gpm (95 lpm)

SWING MOTOR.

Manufacturer ..... Char-Lynn
Model ..... H-series
Type ..... Orbit
Displacement ..... 17.9 inch^3 (293.3 cm^3) per rev

SWING GEARBOX.

Manufacturer ..... Grove
Model ..... Early Models GB-100
Later Models GB-100A
Type ..... Gear Reduction
Reduction Ratio 15:1

BOOM.

Length ..... 14-30 feet (4.3-9.1 m)
24-60 feet (7.3-18.3 m)
Power ..... Full
Elevation ..... 0 to +70 degrees
Optional Extension ..... 20 foot (6.1 m) A-frame jib

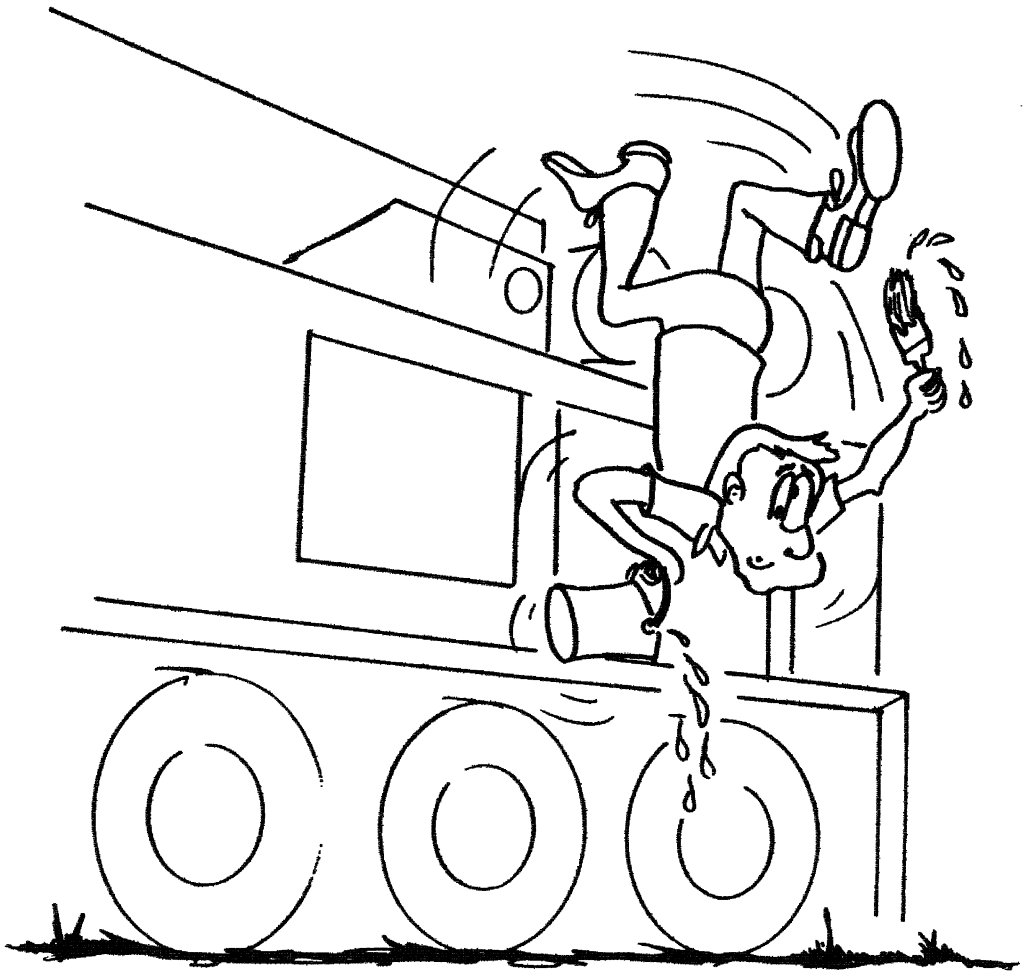
HOISTS.

Braden CH-12.5.

Drum Dimensions ..... Diameter ..... 12.75 inches (32.4 kg)
Length ..... 18.1875 inches (46.2 kg)
Cable Capacity (5/8 inch) ..... 1250 feet (381 m)
Permissible Line Pull ..... Refer to the Line Pulls and Reeving Info Chart in the cab

Braden PD10-77.

Drum Dimensions ..... Diameter ..... 9.5 inches (24.1 cm)
Length ..... 12.75 inches (32.4 kg)



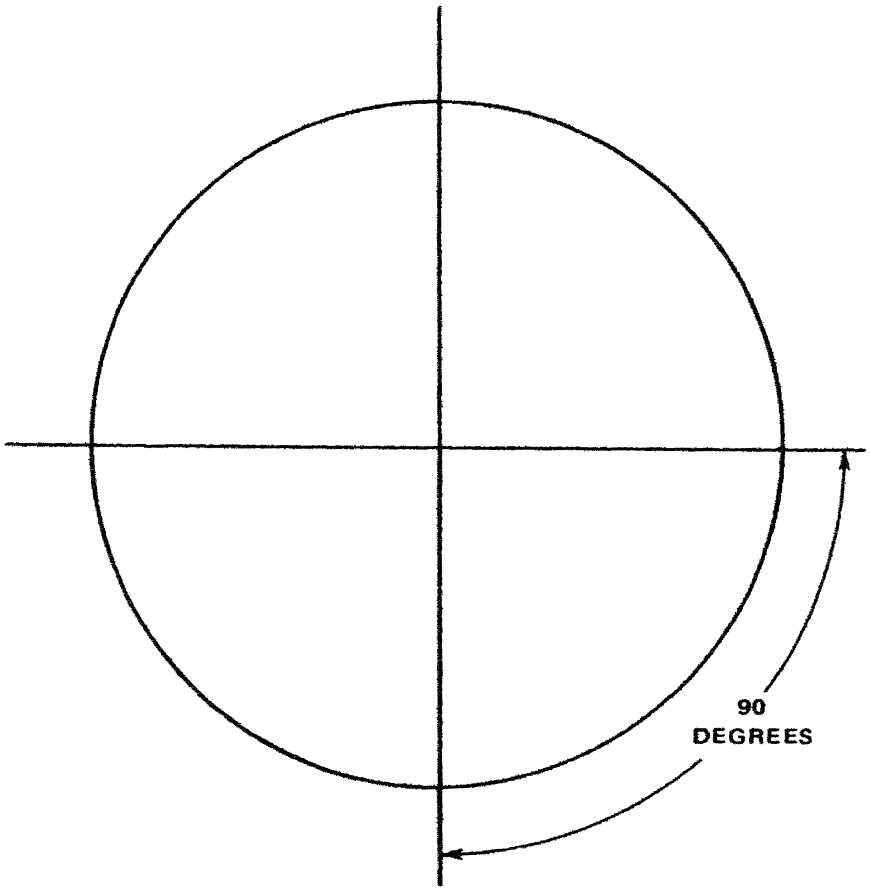
Since certain shoe sole materials are more slip resistant than others, all operating and service personnel should wear footwear with high slip resistant sole material.

Avoid a dirty or greasy crane. Keep the cab, deck, and foot and hand holds free of mud and grease for operator safety. Dirty equipment fails rapidly and makes good maintenance difficult.

Observe and heed possible pinch points while performing maintenance or other work.

Check for WARNING tags placed on the crane. If found, refuse to operate the crane until repairs are made and WARNING tags are removed by authorized personnel.

Before performing maintenance, disconnect the battery, remove the ignition key, and place WARNING SIGNS in the cab.



Use the load line to determine the levelness of the crane. It should always lie in the center of the boom. Check at two points 90 degrees apart.

Be sure the hoist line is vertical before starting the lift. Don't subject the crane to side loadings.

Measure the load radius before making lifts and stay within approved lifting areas. Check your load chart!

The importance of properly leveling a crane cannot be overstressed. A crane only slightly out-of-level can quickly encounter a tipping condition.

Barricade the area around which the crane is working.

Don't interfere with the proper functioning of warning devices. Monitor them regularly and see they get the proper care.

Pinch points are impossible to eliminate. Keep all portions of your body away from cable drums, sheaves, pulleys, and other moving parts of the crane. Be extremely careful when performing maintenance on the crane.

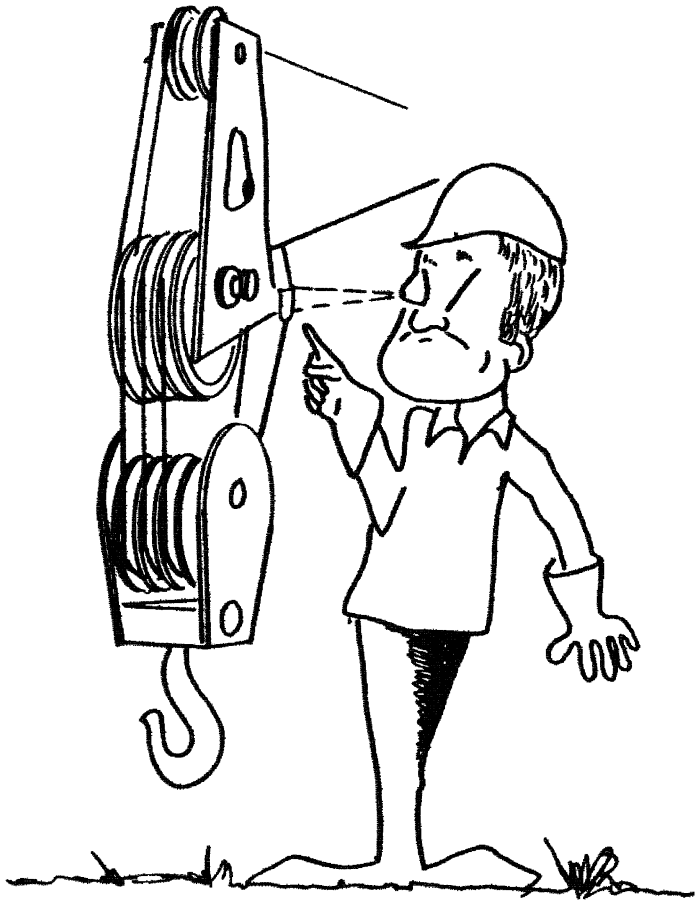
Cranes equipped with an extendable counterweight must have the counterweight in extended position prior to lifting.

Use extreme caution when lifting with more than one hoist.

Do not strike any obstruction with the boom. If the boom should accidently contact an object; stop immediately. Inspect the boom. Remove the crane from service if the boom is damaged.

Never push or pull with a crane boom.

Do not add to the counterweight to increase capacity.



Check all pin connections, bolts, latches, locks, braking, and restraining devices before operation. Perform a visual inspection and replace/tighten any damaged or loose devices prior to initiating any crane or traveling operations.

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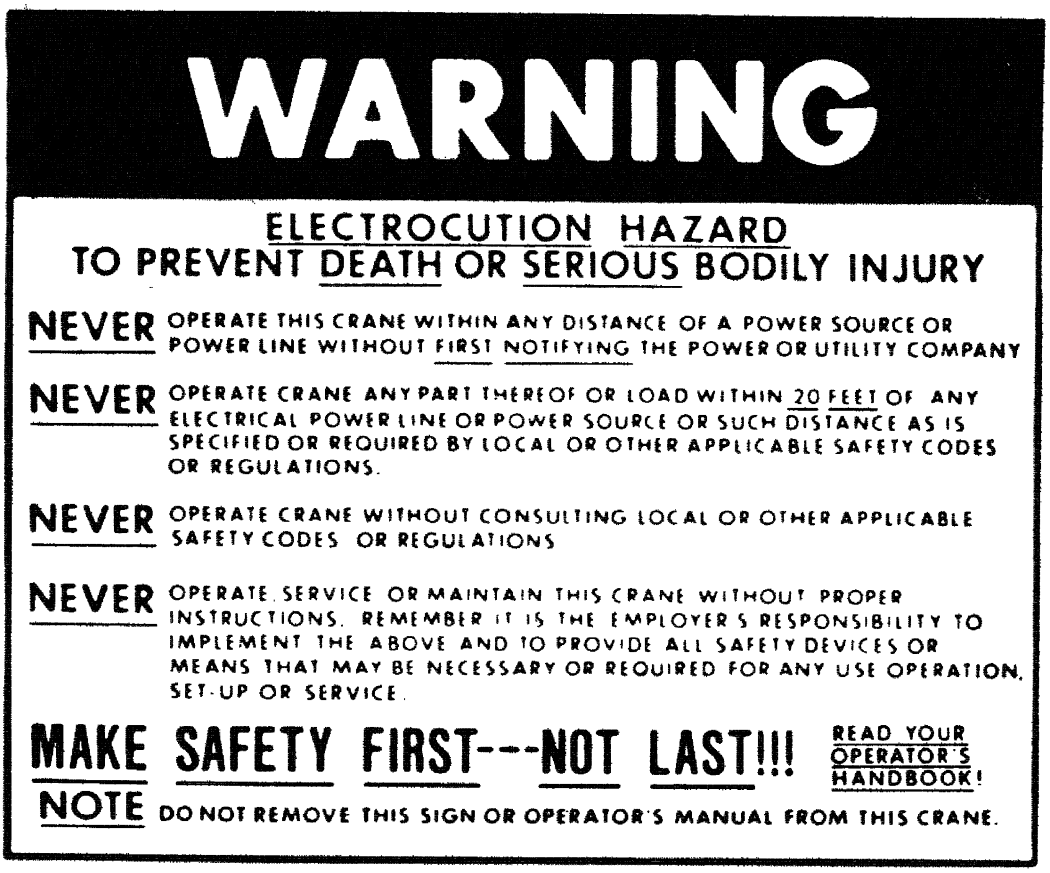
ELECTRICAL HAZARDS.

Read and abide by this WARNING placard posted on the crane.



WARNING

ELECTROCUTION HAZARD
TO PREVENT DEATH OR SERIOUS BODILY INJURY

NEVER OPERATE THIS CRANE WITHIN ANY DISTANCE OF A POWER SOURCE OR POWER LINE WITHOUT FIRST NOTIFYING THE POWER OR UTILITY COMPANY

NEVER OPERATE CRANE ANY PART THEREOF OR LOAD WITHIN 20 FEET OF ANY ELECTRICAL POWER LINE OR POWER SOURCE OR SUCH DISTANCE AS IS SPECIFIED OR REQUIRED BY LOCAL OR OTHER APPLICABLE SAFETY CODES OR REGULATIONS.

NEVER OPERATE CRANE WITHOUT CONSULTING LOCAL OR OTHER APPLICABLE SAFETY CODES OR REGULATIONS

NEVER OPERATE, SERVICE OR MAINTAIN THIS CRANE WITHOUT PROPER INSTRUCTIONS. REMEMBER IT IS THE EMPLOYER'S RESPONSIBILITY TO IMPLEMENT THE ABOVE AND TO PROVIDE ALL SAFETY DEVICES OR MEANS THAT MAY BE NECESSARY OR REQUIRED FOR ANY USE OPERATION, SET-UP OR SERVICE.

MAKE SAFETY FIRST---NOT LAST!!! READ YOUR OPERATOR'S HANDBOOK!

NOTE DO NOT REMOVE THIS SIGN OR OPERATOR'S MANUAL FROM THIS CRANE.

Crane operation is extremely dangerous when close to an electrical power source. A mobile hydraulic crane is more vulnerable due to the natural maneuverability and versatility of the crane.

Some variables with which you must be aware are:

1. Proximity devices are supposed to detect the existence of electricity - not it's quantity or magnitude.

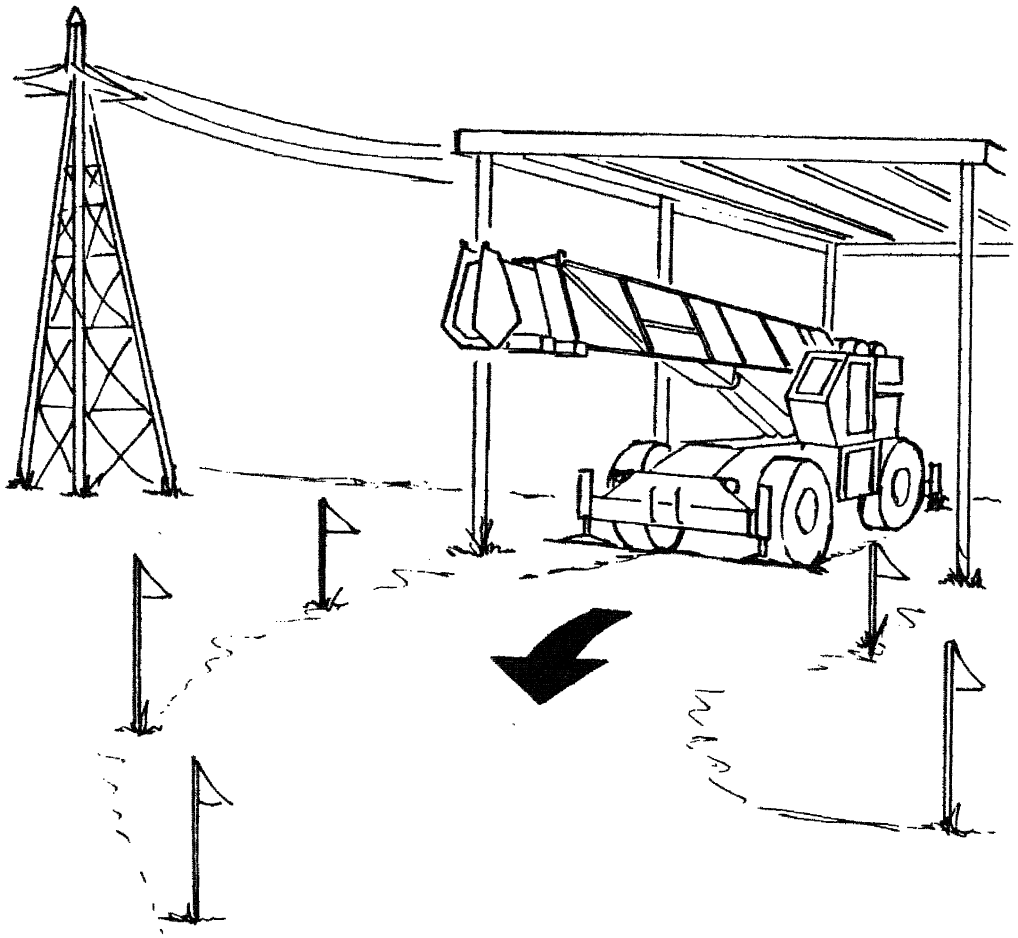
2. Some proximity devices will detect only alternating current (AC) not direct current (DC).

3. Some devices detect radio frequency (RF) energy - others do not.

4. Most proximity devices simply provide a signal (audible, visual, or both) for the operator - the signal must not be ignored.

5. Sometimes the sensing portion of the proximity devices becomes confused by complex or differing arrays of power lines/sources.

Plan ahead and plainly mark a safe route before traveling under power lines. Erect rider poles on each side of the crossing to assure sufficient clearance is maintained.



SECTION III

DESCRIPTION

GENERAL.

The Model 2535 Industrial crane is fully self-contained. All crane functions are either electrically or hydraulically controlled, and hydraulically operated. The main functions are raising and lowering the boom, extending or retracting the boom, raising and lowering loads with the hoist(s), swinging the boom, and extending and retracting the outrigger beams and stabilizers. Hydraulic cylinders activate the elevation, telescope, and outrigger systems. The hoist and swing systems are driven by hydraulic motors.

A diesel engine provides drive power for the hydraulic pump and also drives an alternator and a compressor which supply air and electrical power for control, accessory, and lighting systems. The engine also provides power to the front axle through a remote mounted transmission to travel (drive) the crane.

Hydraulic flow and electrical power are transferred from the carrier to the supersturcture by swivels located at the center of rotation.

MAJOR COMPONENTS AND SYSTEMS.

CAB ASSEMBLY.

The cab is all-steel, acoustically treated, fully-enclosed with tinted safety glass windows throughout. The cab contains all engine and crane controls and indicators for complete operation of the crane including outrigger controls and a sight leveling bubble indicator. The cab also contains the heater, electric windshield wiper, domelight, dash light, circulating air fan and a dry type fire extinguisher. The operator's seat is fully adjustable.

CARRIER FRAME.

The frame assembly is of a hi-strength steel, parallel box-type construction with boxed cross-members reinforced for maximum strength with towing lugs front and rear.

components except the engine fuel solenoid valve (CAT and Cummins only). Positioning the switch to on (first detent clockwise) is the same as accessories except the engine fuel solenoid valve becomes energized. Positioning the switch to the start position (second detent clockwise) energizes the starter relay which in turn energizes the cranking motor solenoid and cranks the engine for starting. Releasing the switch will spring return it to the on position. To shut down the engine (except GMC), position the ignition to the off position.

ENGINE EMERGENCY STOP SWITCH (GMC ONLY).

The ENGINE EMERGENCY STOP switch (22) is used on earlier models to shut off the engine in the event of failure of the normal engine stop. The switch is located on the right side console. The switch energizes a solenoid to shut the air intake shutoff valve. The emergency stop air shutoff valve, located at the air intake manifold, shuts off the engine air supply. To restart the engine after activating the emergency stop air shutoff valve, it is necessary to manually reset the valve at the engine.

ENGINE STOP SWITCH (GMC ONLY).

The ENGINE STOP switch (21) is used to shut down the GMC engine and is located on the right side console. The switch is a push-button type which, when depressed, energizes a solenoid on the engine which closes the governor and thereby shuts down the engine.

QUICK START SWITCH.

The QUICK START switch (36) is located beneath the front instrument panel. The switch is the push-button type and is used to inject shots of starting fluid into a cold engine during starting. The ignition switch must be in the start position for quick start operation.

FOOT THROTTLE PEDAL.

The foot throttle pedal (38) is the right most pedal on the cab floor. It is air operated and controls engine speed proportionately to the foot pressure applied. Foot pedal action actuates an air cylinder on the engine which controls the throttle.

HAND THROTTLE.

The hand THROTTLE (29) is located on the right side console. It is air operated

Ensure the hydraulic pump disconnect has been disengaged prior to starting a cold engine.

CAUTION

AVOID OVERLOADING THE AIR BOX WITH HIGH VOLATILE FLUID WHICH COULD RESULT IN A MINOR EXPLOSION.

To start the engine, position the ignition switch to the start position and push the QUICK START button for one or two seconds and release. If the engine does not start within 30 seconds, allow the starter to cool a minute or two and repeat the procedure.

SHUTDOWN PROCEDURE.

1. Allow the engine to operate at fast idle speed for approximately five minutes to avoid high internal heat rise and allow for heat dissipation.

2. Push the ENGINE STOP button. (GMC).

CAUTION

THE ENGINE STOP BUTTON MUST BE HELD DOWN UNTIL THE ENGINE COMES TO A COMPLETE STOP. FAILURE TO DO SO COULD CAUSE THE ENGINE TO RUN BACKWARDS.

3. Position ignition switch to OFF.

CRANE TRAVEL OPERATION.

TRAVELING - GENERAL.

CAUTION

DISENGAGE THE HYDRAULIC PUMP FOR EXTENDED TRAVELING, COLD WEATHER STARTING, OR ENGINE CHECKS.

Grove Industrial cranes are primarily designed for yard and close proximity

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.

5. With each stabilizer float firmly touching the ground, depress the F (front) STABILIZER switches and position the outrigger control lever to DOWN. Extend the front stabilizers approximately 3 to 4 inches (7.6 to 10.2 cm).

6. Depress the R (rear) STABILIZER switches and position the OUTRIGGER control lever to DOWN. Extend the rear stabilizers approximately 3 to 4 inches (7.6 to 10.2 cm).

7. Repeat the procedures in steps 5 and 6 until all four wheels are clear of the ground and the crane is level, as indicated by the sight level bubble located on the right side console. If it is suspected that the bubble level indicator is out of adjustment, verify and adjust it as follows.

a. Locate the crane on a firm level surface.

b. Extend and set the outriggers. Level the crane, as indicated by the bubble level indicator, using the outriggers.

c. Place a miracle pointer, carpenter level, or similar type device on a machined surface such as the turntable bearing or bearing mounting surfaces.

d. Using the outriggers, level the crane as indicated in the device used in step c

e. Using the mounting screws, adjust the bubble level indicator to show level.

STOWING THE OUTRIGGERS.

1. Depress the R (rear) STABILIZER push-button switches and position the OUTRIGGER control lever to UP until the rear stabilizers have retracted several inches.

SECTION VI

LUBRICATION

GENERAL.

Following the designated lubrication procedures is important in ensuring maximum crane lifetime and utilization. The procedures and lubrication charts in this section include information on the types of lubricants used, the location of the lubrication points, the frequency of lubrication, and other information.

The service intervals specified are for normal operation where moderate temperature, humidity, and atmospheric conditions prevail. In areas of extreme conditions, the service periods and lubrication specifications should be altered to meet existing conditions. For information on extreme condition lubrication, contact your local service representative or Grove Customer Services, Chambersburg, Pennsylvania.

LUBRICANTS.

CAUTION

CHASSIS GREASE LUBRICANTS MUST NOT BE APPLIED WITH AIR PRESSURE DEVICES AS THIS LUBRICANT IS USED ON SEALED FITTINGS.

CAUTION

THE MULTIPURPOSE GREASE INSTALLED DURING MANUFACTURE IS OF A LITHIUM BASE. USE OF A NON-COMPATIBLE GREASE COULD RESULT IN DAMAGE TO EQUIPMENT.

Specific recommendations of brand and grade of lubricants are not made here due to regional availability, operating conditions, and the continual development of improved products. Where questions arise, refer to the component manufacturer's manual and a reliable supplier.

9. **Hydraulic Hose Sheave.**

Lube Type - EP-MPG
Lube Interval - 50 hours
Lube Amount - Until grease extrudes
Application - 1 grease fitting

10. **Main Hoist.**

Lube Type - EPGL-90
Lube Interval - 250 hours
Lube Amount - 18 pints (8.5 L)
Application - Turn drum until fill plug is at its highest point

11. **Auxiliary Hoist.**

Lube Type - EPGL-90
Lube Interval - 250 hours
Lube Amount - 4 pints (PD 10-77)
5 pints (PD 12A)
Application - Turn drum until fill plug is at its highest point

12. **Boom Wear Pads.**

Lube Type - EP-MPG
Lube Interval - 50 hours
Lube Amount - Thoroughly coat the area the wear pad moves on
Application - By brush

13. **Boom Base Cross Shaft.**

Lube Type - EP-MPG
Lube Interval - Daily
Lube Amount - Until grease extrudes
Application - 2 grease fittings; one on each side

14. **Hose Reel.**

Lube Type - EP-MPG
Lube Interval - 50 hours
Lube Amount - Until grease extrudes
Application - 2 grease fittings; one on each side

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