TEREX

PARTS MANUAL

RT500-1

Revised: May 2006

12261-269

14. Make sure everyone is in a safe place before moving the hook, boom, load or outriggers.

15. Start and stop movements smoothly and swing at speeds that will keep the load under control.

16. Keep at least two full wraps of wire rope on drum when operating.

17. Feet must be kept on the pedals while foot pedal brake locks are in use.

18. Use tag lines to keep loads under control.

19. Keep load close to ground.

20. Use shortest boom possible.

21. Never leave a running machine unattended or load suspended.

22. Always use outriggers in accordance with requirements of Load Rating Chart and operators manuals.

⚠ SIGNAL PERSON'S RESPONSIBILITY

1. Standard crane signals must be used, and understood.

2. Assist the operator in safe and efficient operation, without endangering people or property.

3. Have a clear understanding of the work to be done.

4. Signal people must place themselves where they can be clearly seen and where they can safely observe the entire operation.

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OPERATOR AIDS

ANTI-TWO BLOCK SYSTEM Inspect all anti-two block switches found on boom, jib and auxiliary sheave heads for damage. Check the freedom of counterweight attached to these switches; and also, that counterweight is attached around correct line of hoisting cable in the proper manner. Inspect all electrical connections and wires as well as the entire length of cable attached to the cable reel and it's connections for evidence of excessive wear, damage or improper installation. Check spring loaded cable reel for proper tension and to insure that reel is free to rotate. Verify visual and audible warning devices by lifting each of the counterweights.

NOTE: A warning light will appear on the dash mounted panel and an audible signal will be heard when switch is in ON position.

RATED CAPACITY INDICATOR

The RCI will indicate an overload condition with an audible alarm and the exterior RCI lamp above the cab door will flash. All boom functions will be disabled except boom retract and winch down. Move the load into an acceptable condition to stop alarms and continue normal crane operation. (See RCI Section for further details.)

3RD WRAP

Winch down function will be disabled when less than 3 wraps of rope are available on the winch. You must retract boom or winch up.

OPERATOR'S ARMREST

When Operator's left arm rest is raised, all functions are disabled. Lower arm rest to resume normal crane operation.

STARTING THE ENGINE

Once the pre-start inspection has been completed, the engine may be started. At ambient temperatures over 32 deg. F. on Cummins Engines, follow the starting procedure below:

1. Open the governor to the idle position.

2. Move the transmission shift lever to the neutral position.

3. Put the parking brake switch in the "ON" position.

4. Turn the ignition switch to the "ON" position.

5. Turn the ignition switch to the "START" position to start the engine.

Release the ignition switch key as soon as the engine starts. If the engine stalls during the start-up procedure, allow the engine to stop revolving before re-engaging the starter.

Do not engage the starter motor for more than 30 seconds at a time. Should the engine fail to start within 30 seconds, allow the starter motor to cool for 2 minutes before attempting to start the engine again.

Once the engine is started, check the gauges for proper readings. If the gauges do not register normal readings, stop the engine and determine the cause. Avoid full Throttle operation when the engine is cold. Always allow the engine to reach normal operating temperature before commencing operations.

NOTE: On machines equipped with a turbocharged engine, the oil pressure gauge MUST register 10 psi (60 kpa) at idle speed to ensure full lubrication of turbocharger.

"ON TIRES" LIFTS

Listed below are special precautions for "On Tires" lifts.

All crane load ratings are based on nonuse of the travel function while handling loads. However, cranes may be utilized for pick and carry operations. Traveling with suspended loads involves so many variables such as ground conditions, boom length, momentum in starting and stopping, etc., that it is impossible to devise a single standard rating procedure with any assurance of safety. For such operations the user must evaluate prevailing conditions and determine safe practices, exercising precautions, such as the following:

1.The boom shall be carried straight over the front of the crane.

2. Travel speed reduced to suit conditions.

3. Maintain specified tire pressures.

4. Avoid sudden starts and stops.

5.Provide tag or restraint lines to snub swinging of the load.

6. Keep the load as close to ground as possible.

7. Set the swing brake and swing lock.

8. Travel must be on a smooth level surface that is capable of supporting the weight of the loaded crane. The travel surface must also be free of holes or debris that can cause crane instability.

These precautions are necessary to prevent a "pendulum" effect of a swinging load. The results of this happening can cause a machine tip over.

⚠ CAUTION

Any variation from the above conditions will require the operator to consider the prevailing conditions and reduce the lift capacities accordingly.

⚠ CAUTION

Insufficient tire pressure reduces the "ON TIRES" capacity. Attempts to pick rated capacity without properly inflated tires may cause crane to tip and/or result in damage to tires and rims.

⚠ CAUTION

The axle lockout system should be bled and filled whenever oil seepage, dirt or oil is detected at the breather plug or on the rod.

Air in the axle lockout system decreases stability. Bleed and fill the system IMMEDIATELY when- ever this condition occurs.

⚠ CAUTION

Excessive high hydraulic oil temperatures cause rapid deterioration of rubber components (hose, 0-rings, etc.). A hydraulic oil cooler is required if high cyclic operations (clam, concrete bucket, unloading) are performed. If hydraulic reservoir temperature reaches 200 deg. F, reduce the duty cycle. Stop operations as required to prevent further increase in the hydraulic oil temperature.

5. Special attention must be given to the hydraulic oil during very cold weather.

ATTENTION

NEVER ENGAGE THE HYDRAULIC PUMP AND ACTUATE THE HYDRUALIC SYSTEM BEFORE THE HYDRAULIC OIL IS WARM. Cold, sluggish oil can cause pump cavitation. If the crane is not equipped with a reservoir immersion heater and running the oil over relief will not warm it sufficiently to prevent pump cavitation with the engine running very slowly, cease attempts to engage the pump until an external heat source can be obtained.

Once the reservoir is warm to the touch, actuate the hydraulic system by engaging the hydraulic pump. Continue warming the oil and slowly cycle all crane functions, actuating all cylinders in turn, swinging the upper and operating the winches in both directions.

The hydraulic oil may be run over relief to aid in the warm-up process. To do this, actuate a func- tion, allow the cylinders involved to reach the limits of their travel and hold the control in the engaged position for a few seconds.

When running hydraulic oil over relief to warm it, be sure to restrict the flow to as slow a speed as possible by moderating pressure on the controls being engaged and running the engine at low speed.

6. At the end of the work period, or whenever the crane is to be left idle for extended periods, prevent it from being frozen to the ground by parking it on a wood, concrete, asphalt or mat surface.

EXTREME HEAT Like extreme cold, requires that precautions be taken with respect to the cooling system, the battery and lubrication. Protect the crane by performing the following recommended procedures:

1. High temperatures necessitate the use of lubricants which are both more viscous and which resist deterioration at higher operating temperatures. Refer to the Lubrication Chart and lubricate the crane using the lubricants recommended for the expected temperatures.

Crankcase oil is particularly important because it helps dissipate heat. Check the oil level frequently and add oil as necessary to maintain required level. Too little oil will hinder heat dissipation.

2. To ensure proper coolant circulation, drain and flush the cooling system, clean any foreign matter from the radiator cooling fins and through core air passages, replace defective hoses, tighten hose clamps, tension the water pump drive belt properly, eliminate any leaks detected and fill the system with a 50% solution of ethylene glycol. A corrosion inhibitor is recommended.

Engine overheating due to loss of coolant will most often be corrected by SLOWLY adding coolant while the engine is running at FAST IDLE. Should this fail to correct the problem, drain and flush the system and refill with fresh coolant (50% solution of ethylene glycol) and a corrosion inhibitor.

⚠ CAUTION

Allow the engine to cool before draining and flushing the cooling system.

Water containing more than small concentrations of salt or minerals should not be used in the cooling system. Salt facilitates corrosion and minerals deposited on the coolant passage walls. Both processes inhibit proper cooling.

3. Air circulation around the engine and battery must not be restricted. Keep air intake and exhaust openings clear of leaves, paper or other foreign matter which may restrict air flow.

4. Keep the engine clean of dirt, grease and other substances which inhibit heat dissipation.

5. Use sound judgment in operating the engine. Avoid the two extremes of racing and lugging.

RT500 SERIES

LUBRICATION

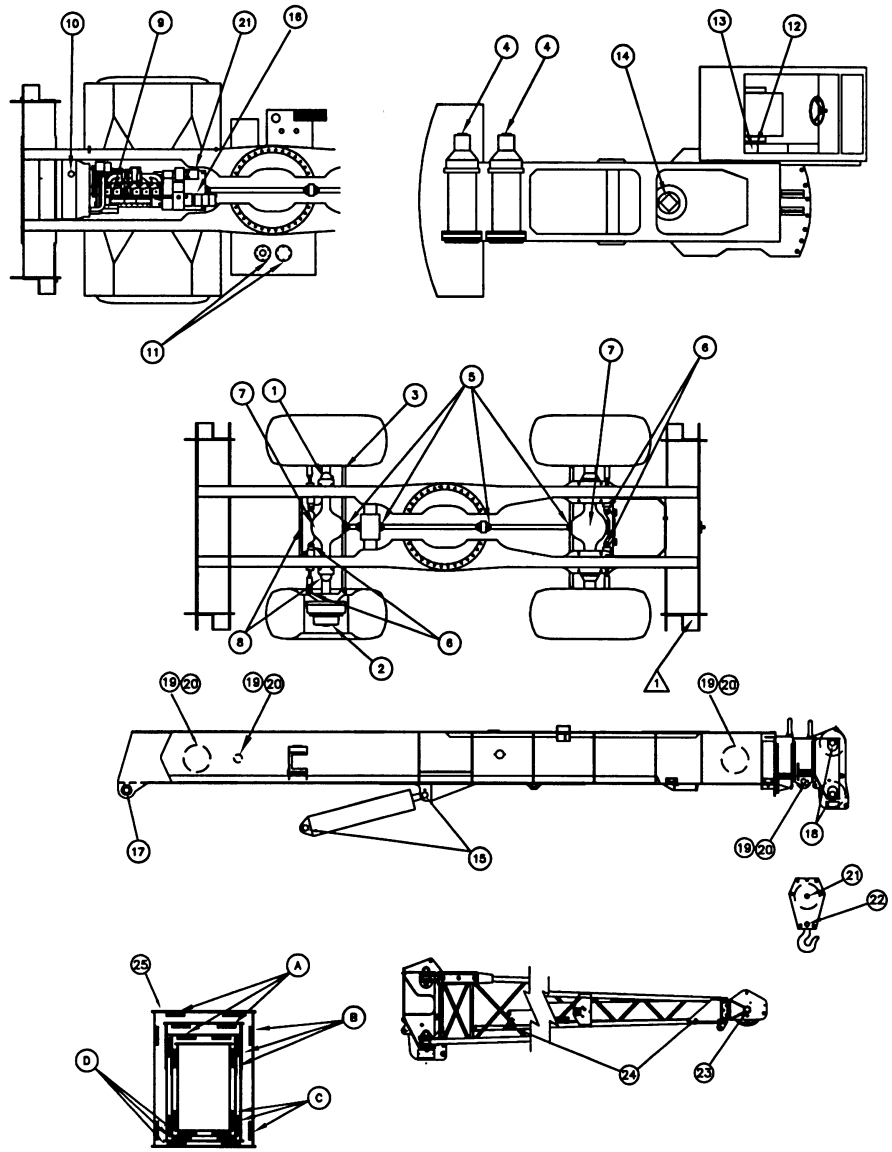


TABLE 1

LEGEND: ρ...DIPSTICK
CHK...CHECK
LUB...LUBRICATE
■...CHANGE FILTER
D/R...DRAIN & REFILL

*REFER TO OPERATORS MANUAL

DAILY (8 HOURS)	WEEKLY (40 HOURS)	TWO WEEKS (50 - 100 HOURS)	MONTHLY (100 - 200 HOURS)	THREE MONTHS (500 HOURS)	SIX MONTHS (1000 HOURS)	YEARLY (1500 - 2000 HOURS)	REF	DESCRIPTION	QUANTITY	NO.	LUBRICANT
	LUB						1	STEERING TRUNNION BEARINGS	PURGE	8	MPG
		INITIAL D/R	* CHK		D/R		2	AXLE HUB DRIVE	FILL PLUG LEVEL	4	GL-5
	LUB						3	TIE ROD ENDS	PURGE	4	MPG
		INITIAL D/R		CHK	D/R		4	WINCH	APPR. 2 GAL	2	AGMA NO. 4EP
			LUB				5	DRIVE SHAFTS (TRANS. - AXLES)	PURGE	6	MPG
	LUB						6	STEERING CYLINDER PINS	PURGE	4	MPG
		INITIAL D/R	CHK		D/R		7	AXLE DIFFERENTIALS	FILL PLUG LEVEL	2	GL-5
	LUB						8	AXLE PIVOT & CYLINDERS	PURGE	6	MPG
CHK ρ							9	CUMMINS QSB 5.9	14 QT + 1 QT FILTER	1	CONSULT ENGINE MANUFACTURER'S MANUAL
CHK							10	COOLING SYSTEM CAPACITY	48 QT	1	
CHK	INITIAL ■			■		D/R	11	HYDRAULIC RESERVOIR	HO - SEE TABLE 2 Keep Oil Level Between Marks		
	LUB						12	TURNTABLE GEAR **		2	GG (MPG BELOW 32°F)
		LUB					13	TURNTABLE BEARING RACE **	AS REQ'D	2	MPG BELOW 32°F: EP-1 ABOVE 32°F: EP-2
	CHK				D/R		14	SWING REDUCTION UNIT	11.5 PT.	1	SYNTHETIC GL - 5
	LUB						15	BOOM CYLINDER BUSHINGS	PURGE	4*	MPG
	CHK			■	D/R		16	TRANSMISSION & TORQUE CONVERTER	APPR. 4 GAL	2	-23°F & ABOVE: ATF
	LUB						17	BOOM PIVOT PIN	PURGE	2	MPG
	LUB						18	BOOM TIP SHEAVES	PURGE	7	MPG
	LUB						19	CHAIN ROLLER *	PURGE	4*	MPG
	LUB						20	BOOM EXTEND RETRACT CHAIN	AS REQ'D	4*	EO-SAE30 NON-DETERGENT
	LUB						21	HOOK BLOCK SHEAVES	PURGE	5	MPG
	LUB						22	HOOK BLOCK TRUNNION	PURGE	1	MPG
	LUB						23	JIB SHEAVE	PURGE	1	MPG
	LUB						24	JIB STINGER ROLLERS	PURGE	4	MPG
	LUB						25	BOOM SLIDE PADS (A,B,C,D) *	AS REQ'D	24	MPG
							26				
							27				
							28				
							29				
							30				

* See Operator's Manual.
** Apply lubricant while swinging the machine. See Operator's Manual
*** Change system oil & filter. See Operator's Manual.
• Lubricate Pads (A) thru access holes in boom and by applying grease to the top boom plate. Refer to Operator's Manual.
• • Lubricate thru front or rear access holes in axle housing. Move machine if necessary to access each fitting.

NOTE: Reduce all lubrication intervals under severe operating conditions. Refer to Operator's Manual for drain/refill procedures and additional information.

⚠1 Check outrigger beams daily and remove exess dirt.

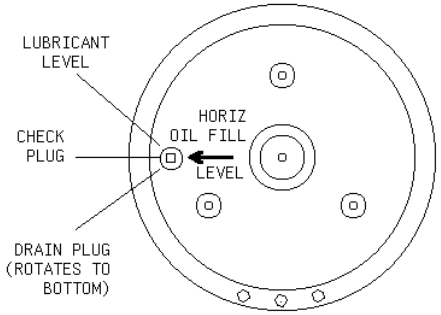
TABLE 2

SPECIFIED LUBRICANTS			
MPG GG GL-5 SYNTHETIC GL-5 HO EO ATF	MULTI-PURPOSE GREASE OPEN GEAR GREASE GEAR LUBRICANT, EP GEAR LUBRICANT, EP HYDRAULIC OIL ENGINE OIL TRANSMISSION FLUID	EP-2 Grade 8 SAE 90 (Mil-L-2105B) SAE 75W90 *Koehring Spec. 805 A.P.I. Class as Listed Type C-3	*Refer to Operator's Manual for complete listing of recommended oils for applicable temperature ranges, and for drain & refill procedures.

PART NUMBER 12400-1026

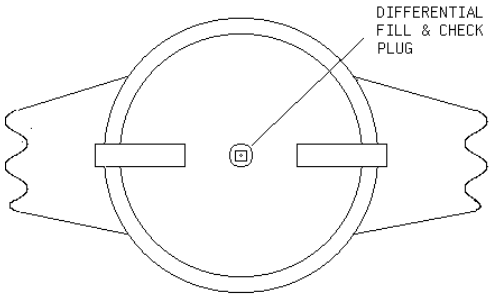
AXLE MAINTENANCE

MAINTENANCE CHECK As a part of the WEEKLY MAINTENANCE CHECK, inspect the axle and differential levels. When checking the AXLE OIL LEVEL, rotate each wheel until the planet cover is positioned as shown in the illustration below. the arrow on the planet cover points horizontal when the cover is properly positioned for checking the oil.



Remove the oil level plug in the planet cover and add oil as necessary to bring the oil level to the bottom of the fill and check hole See the lubrication chart.

Check the DIFFERENTIAL OIL LEVEL by removing the fill and check plug indicated in the illustration . Add oil as necessary to bring the oil level to the bottom of the hole. See lubrication chart.



On a SEMI-ANNUAL basis, drain the oil from the differential by removing the drain plug at the bottom of the differential housing. Replace the plug and refill the differential with the lubricant specified on the lubrication chart. To the level specified above.

Drain the oil from hubs removing the fill and check plug by rotating the hub until the hole is at the extreme low position. After draining, rotate the hub until the hole is at the check position. Refill the hub with the lubricant specified on the lubrication chart. Refill to the level of the bottom of the check plug.

A good lubrication program requires that all normal wear points be lubricated according to a set schedule with specific types of lubricants. Refer to the lubrication chart and the special items covered in this section for the recommended lubricants, time intervals and lubrication procedures.
Where components such as the engine, transmission and axles are not manufactured by this company, the original manufacturer's recommendations take precedence should any discrepancy occur. If there is any doubt about the proper lubricants, intervals or lubrication procedures, refer to the original manufacturer's manual.
The lubrication intervals recommended in this section assume normal operating conditions. Where dust, dirt, high humidity or extreme heat
are encountered, lubrication intervals should be shortened accordingly.

HYDRAULIC OIL REQUIREMENTS

The hydraulic system is filled with KOEHRING SPEC 805 hydraulic oil to give the unit the highest performance as a hydraulic machine and to provide proper lubrication for the hydraulic components. To ensure the longest life for this piece of equipment, particular attention must be paid to maintain oil at the proper level with an approved hydraulic oil and to keep the circuit system clean.

The oil for the hydraulic system performs the dual function of lubrication and transmission of power. Oil must, therefore, be selected with care and with the assistance of a reputable supplier. To guide in the selection of this oil, the general requirements are specified below. Good oils are economical in the long run. Check with the oil manufacturer prior to the use of his product.

Oils which conform to Koehring Specification 805 are recommended for most conditions. Under certain climate and operating conditions, it may be advisable to use a fluid of heavier or lighter viscosity in order to maintain a viscosity less than 7500 SSU at start-up and more than 50 SSU during operation. These machines should not be operated with hydraulic reservoir temperatures in excess of 200×F (87×C) due to possible excessive damage to the hydraulic oil and rubber components (hoses, seals, shaft seals, motor seals etc.). If over-heating occurs, discontinue operation and:

1. Check the hydraulic fluid level.

2. Check the oil cooler for cleanliness.

3. Check the oil viscosity versus the recommended Ambient Temperature may require an oil change.

4. Check the hydraulic system efficiency a pump may be failing or a relief valve set low.

5. Reduce the duty cycle of the machine.

6. Consult an authorized DISTRIBUTOR.

ENGINE OILS: Engine oils that meet Mil Spec 2104 and have the anti-wear additive zinc DO dithiophosphate can be used as hydraulic oils. NOT USE C.D. rated engine oil, some of which will not protect against wear in hydraulic pumps and motors.

ATTENTION

Not all motor oils have zinc dithiophosphate. Those that do not have this heavy duty additive can cause immediate failure of pumps.

Engine oils tend to form sludge in the presence of water. This sludge can plug the filters so they will require frequent changing. This is not detrimental to the machine unless the filters are allowed to plug so badly that they by-pass oil.

Never use multi-viscosity grades of engine oil because of the shear and thin out characteristics of this type of oil.

TRANSMISSION FLUIDS: DO NOT use transmission fluids. These fluids have been design- ed to work in automatic transmissions and they will not necessarily work in hydraulic systems.

CABLE REEVING

CABLE REEVING When reeving the machine for any job, remember that hoisting and lowering speeds decrease as the number of parts of line in- creases. For the most efficient use of the machine, it is desirable to use the minimum number of required parts for lifting the anticipated loads.

CAUTION

Never use less than the number of parts called for by the load rating chart. The minimum required - number of parts is determined by referring to the load rating chart.

This machine incorporates a “Quick Reeving” boom head and block which do not require removal of the wedge and socket from the rope in order to change the reeving. Removal of two pins in the boom head and three in the hook block will allow the wedge and socket to pass through.

CAUTION

NOTE: If a socket is changed or replaced, or if you are changing hook block weights, it is IMPORTANT to use the correct socket.

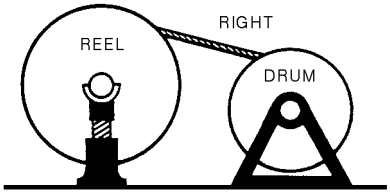
SPOOLING WIRE ROPE ON DRUMS

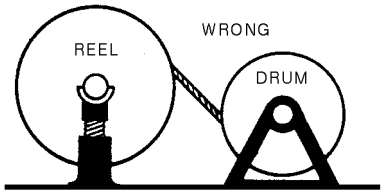
Care must be exercised when installing wire rope on the winch drum. Improper spooling can. result in rope damage through crushing, kinking, dog- legs, abrasion and cutting. Poorly installed wire rope will also adversely affect the operating characteristics of the machine by causing uneven application of force and motion. This, in turn, can cause premature fatiguing and failure of the rope.

Thoroughly inspect and clean the winch before proceeding with the installation. Check the lagging and drum flanges for cracks, breaks and excessive wear. Deformed or outsized drum and excessive undercutting at the base of the flange also indicate that repair or replacement of the drum is necessary.

Check the bearings for excessive wear and play.
After correcting any defects revealed by the inspection and determining that the winch is in good operating condition, spool the wire rope as follows:

Mount the cable shipping reel vertically on jacks or a suitable supporting structure, with a pipe or bar through the reel center. The cable should be drawn from the top of the reel, as shown, in order to avoid reverse bending as it is spooled onto the
If cable is wound from the storage reel onto the drum, the reel should be rotated in the same direction as the hoist.





Apply braking force to the reel flange in order to prevent overrun as the rope is being drawn off. Loops formed by overrun can cause kinks and doglegs in the rope, resulting in damage and premature rope failure. A timber or block forced against the shipping reel flange can be used to provide the required braking force.

AXLES

RAPID OR UNEVEN TIRE WEAR

CAUSE	REMEDY
Incorrect toe-setting	**Check and reset toe-in if necessary.**
Improper tire inflation	**Inflate to proper pressure.**

HARD STEERING

CAUSE	REMEDY
Inadequate or improper lubrication of knuckle pins	**Consult lubrication chart for proper lubricant, lubrication intervals and procedures.**
Overloaded Axle	**Reduce load.**

RAPID WEAR OF TIE ROD ENDS

CAUSE	REMEDY
Inadequate or improper lubrication	**Consult lubrication chart for proper lubricant, lubrication intervals and procedures.**
Severely contaminative environment	**Clean and lubricate more often.**

SWING CIRCUIT

SWING COMPLETELY INOPERATIVE

CAUSE	REMEDY
Mechanical swing lock applied, if equipped	**Disengage the swing lock.**
Swing brake applied	**Disengage the swing brake.**
Spring brake stuck in applied position	**Disassemble swing brake and free-up unit.**
Swing valve main relief valve stuck in open position	**See section on "Relief Valves".**
Swing motor leaks excessively internally	**See section of "Fluid Motor".**
Mechanical fault in swing reducer gear box or swing bearing	**Repair swing reducer or replace swing bearing.**
Hose plugged or liner collapsed	**Replace hose.**
Rotary manifold leaking internally	**Reseal rotary manifold.**
Swing pump faulty	**See section on "Pumps".**

SWING MOTION SLUGGISH

CAUSE	REMEDY
Main relief valve stuck in open position	**Replace.**
Faulty swing pump	**Repair or replace swing pump.**
Swing motor leaks excessively, internally	**Replace or reseal motor.**
Excessive leakage around swing control valve spool	**Replace or replace control valve.**

SWING MOTION ERRATIC

CAUSE	REMEDY
Brake not releasing completely	**Check operation of swing brake and/or swing lock.**
Low hydraulic oil level	**Add oil as required.**

CONTROL VALVES

STICKING PLUNGERS

CAUSE	REMEDY
Excessively high oil temperature	**See section on "Excessive Heating of Oil in System".**
Dirt in oil	**Change oil. Clean system.**
Fittings too tight	**Check torque.**
Valve warped from mounting	**Loosen valve mounting bolts and check.**
Excessively high flow in valve	**Check to see if hoses from pump are not crossed or reversed.**
Plunger damaged	**Replace valve.**
Return spring damaged	**Replace faulty parts.**
Spring or detent cap binding	**Loosen cap, re-center and re-tighten.**
Valve not at thermal equilibrium	**Let system warm up.**

LEAKING SEALS

CAUSE	REMEDY
Paint on or under seal	**Remove and clean.**
Excessive back pressure	**Open or enlarge line to reservoir.**
Dirt under seal	**Remove and clean.**
Scored plunger	**Replace valve.**
Loose seal plates	**Clean and tighten.**
Cut or scored seal	**Replace faulty parts.**

LOAD DROPS WHEN CONTROL MOVED FROM NEUTRAL

CAUSE	REMEDY
Dirt in check valve	**Disassemble and clean.**
Scored check valve poppet or seat	**Replace poppet or lap poppet to seat.**

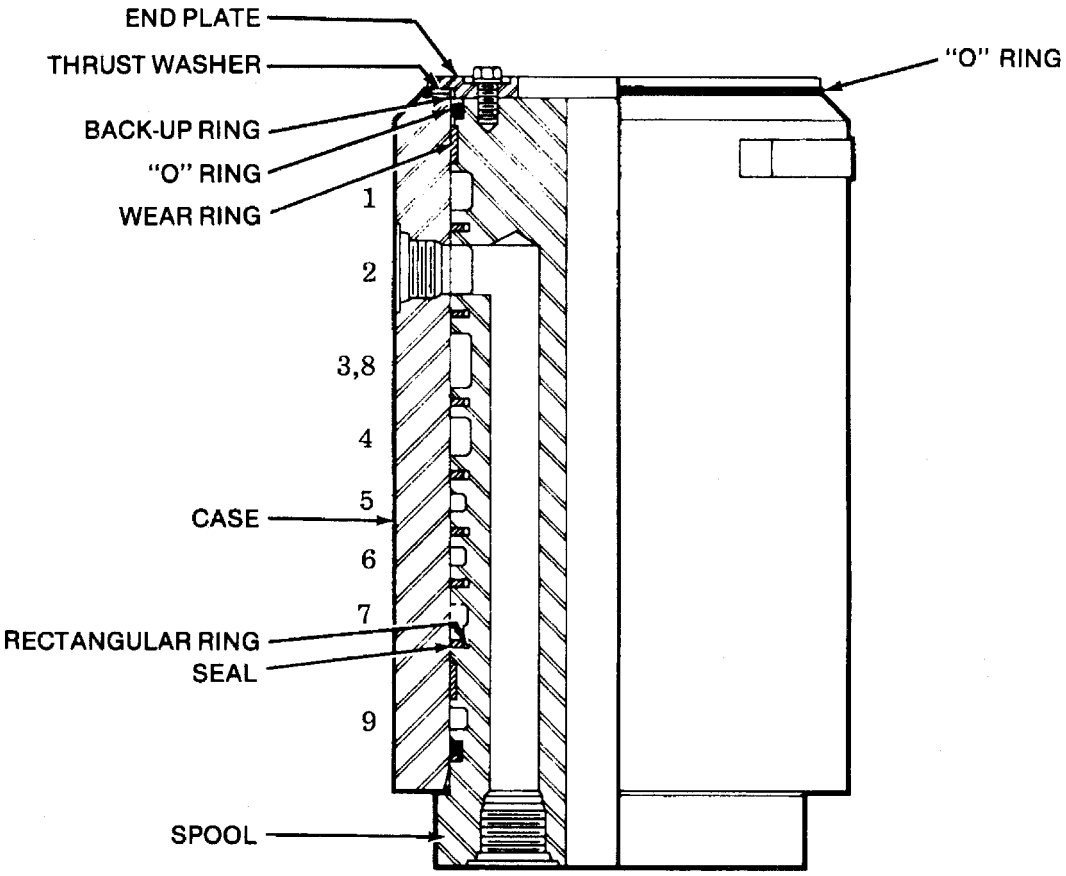
HEATER REMAINS ON BURNER CYCLE AFTER HEAT DEMANDS ARE MET

CAUSE	REMEDY
Temperature control &/or microswitch defective or out of adjustment	**Check temperature control switch and microswitch and microswitch for adjustment. Adjust, repair, or replace as necessary.**
Bi-metal blade broken or linkage out of adjustment	**Check bi-metal blade and linkage and adjust, repair or replace as necessary.**
Dirt on fuel solenoid valve lip	**Clean solenoid valve lip.**

EXCESSIVE POPPING OR BACKFIRING

Ignition pack defective or inoperative	**Check for spark by holding an insulated-handle screw driver with the shaft grounded and the tip approximately 1/8" away from the high tension lug of the ignition coil. There should be a continuous strong spark. If no spark is produced, check that here is voltage applied to the ignition pack. If input voltage is present and no spark or a weak spark is produced, replace or repair the ignition pack.**
Full voltage not available at heater	**Using voltmeter, check to be sure full voltage is available for heater operation, at least 11 VDC with heater turned on. Trace system to find fault.**
Solenoid defective	**Check solenoid. When the START-RUN-OFF switch is in the RUN position, the solenoid should produce an audible click and remain open until heater cycles off.**
In extremely cold weather, the regulator may become frosted. As it thaws and freezes, the heater will burn intermittently	**No action recommended.**
Clogged or restricted exhaust	**Check exhaust for blockage or restrictions. Clean and clear as necessary.**

ROTARY MANIFOLD



Use the following procedures when disassembling, inspecting, repairing, and reassembling the rotary manifold.

⚠ CAUTION

AS SOON AS THE ROTARY MANIFOLD IS READY TO BE PLACED INTO OPERATION, IT SHOULD BE SLOWLY ROTATED SEVERAL MINUTES TO ALLOW ANY ENTRAPPED AIR TO ESCAPE AND TO FACILITATE REFORMING OF SEALS THAT MAY HAVE TEMPORARILY DEFORMED DURING STORAGE.

All overhaul should be done in a clean, enclosed facility with personnel familiar with hydraulic systems and cleanliness procedures.

DISASSEMBLY

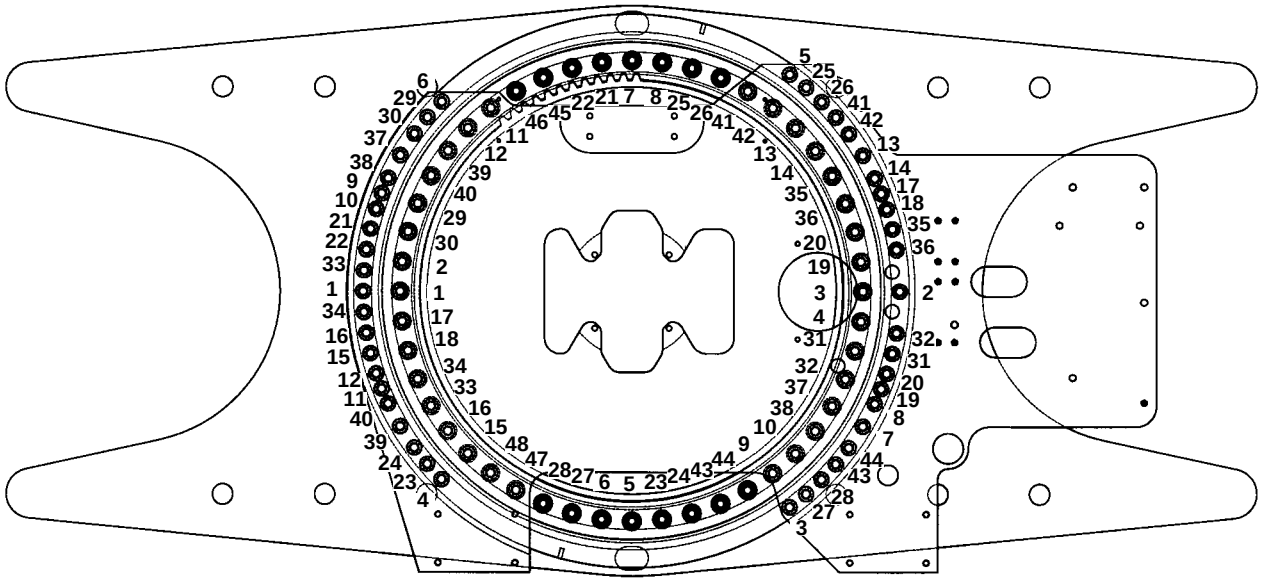
The rotary manifold may be disassembled by removing the four capscrews and the top plate.

NOTE: Be sure to mark an index point on the case and spool to insure proper reassembly.

INSPECTION AND SEAL REPLACEMENT

1. The "case" bore should be thoroughly washed with solvent or diesel fuel and inspected for signs of "scoring" or deep scratches. This type of damage is generally caused by the presence of foreign material in the hydraulic system. No satisfactory method of repairing this type of damage can be conducted in the field.

SWING BEARING



RING GEAR BOLTING SEQUENCE

MAINTENANCE CHECK

It is very important to perform periodic ring gear bolt checks. The bolts MUST BE KEPT TORQUE TIGHTENED to a rating of 720 Ft·Lbs. (976 NM). After the initial 40 hours of machine operation, check and tighten the bolts. If additional torque is required after the first 40 hours, then recheck each 40 hours until all bolts are found properly torqued. Thereafter, checks should be performed SEMI-ANNUALLY.

RING GEAR TORQUING

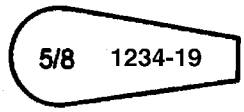
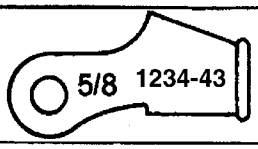
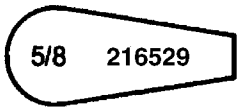
The gear and bearing assembly consists of an inner race and ring gear, an outer race, bearing rollers, spacer and a seal ring. The inner race is bolted to the carrier; the outer race to the turntable.

A number of causes can reduce tension in the bolts when torquing and after use. These include rust on the threads, damaged or rough threads on bolts and nuts, shanks of bolts which hang up on holes, etc. All of these causes have a tendency to absorb the torque when bolts are being tightened.

It is important to make periodic checks of the ring rear bolts. The bolts MUST be kept torque tightened.

Torque the inner race first, then the outer race as shown in the bolting sequence. Torque the 7/8 inch, 12 point, bolts to 720 Ft·Lbs. (976 NM)

CABLE SOCKETS

ROPE SIZE	PART NO. & DESCRIPTION	WHERE USED
5/8"		 USED ON FREE END OF WIRE ROPE (P/N 1234-18)
		USED IN WINCH DRUM WEDGE POCKET

LIQUID WEIGHTS AND MEASURES

LIQUID MEASURE		
4 gills	equals	1 pint
2 pints	“	1 quart
4 quarts	“	1 gallon
7.48 gallons	“	1 cu. ft.
240 gallons of water	“	1 Ton
340 gallons of gasoline	“	1 Ton

MEASURES OF WEIGHTS		
16 ounces	equals	1 pound
2000 pounds	“	1 short ton
2240 pounds	“	1 long ton
100 cu. feet	"	1 register ton
40 cu. feet	“	1 U.S. shipping ton

CIRCULAR MEASURE		
60 seconds	equals	1 minute
60 minutes	“	1 degree
90 degrees	“	1 quadrant
360 degrees	“	circumference

METRIC EQUIVALENTS

LIQUID MEASURE		
1 litre	equals	.0353 cu. ft.
1 litre	“	.2642 gallon
1 litre	“	61.023 cu. in.
1 litre	“	2.202 lbs. of water(62×F.)
1 cu. foot	“	28.32 litres
1 gallon	“	3.785 litres
1 cu. inch	“	.0164 litre

MEASURE OF WEIGHTS		
1 gram	equals	.0353 ounce
1 kilogram	“	2.205 lbs.
1 ounce	“	28.35 grams
1 pound	“	.454 kilogram
1 ton	“	.907 metric ton

ELECTRICAL UNITS		
1 kilowatt	equals	1.34 H.P.
1 horsepower	“	746 watts

SURVEYOR’S MEASURE		
7.92 inches	equals	1 link
100 links	“	66 feet or 4 rods or 1 chain
80 chains	“	1 mile

Table 1 WIRE ROPE CLASSIFICATIONS
Based on the Nominal Number of Wires in Each Strand

Classification	Description
6x7	Containing 6 strands that are made up of 3 through 14 wires, of which no more than 9 are outside wires.
6x19	Containing 6 strands that are made up of 15 through 26 wires, of which no more than 12 are outside wires.
6x37	Containing 6 strands that are made up of 27 through 49 wires, of which no more than 18 are outside wires.
6x61	Containing 6 strands that are made up of 50 through 74 wires, of which no more than 24 are outside wires.
6x127	Containing 6 strands that are made up of 75 through 109 wires, of which no more than 36 are outside wires.
8x19	Containing 8 strands that are made up of 15 through 26 wires, of which no more than 12 are outside wires.
19x7 and 18x7	Containing 19 strands, each strand is made up of 7 wires. It is manufactured by covering an inner rope of 7x7 left lang lay construction with 12 strands in right regular lay. (The rotation-resistant property that characterizes this highly specialized construction is a result of the counter torques developed by the two layers.) When the steel wire core strand is replaces by a fiber core, the description becomes 18x7.

When a center wire is replaces by a strand, it is considered as a single wire, and the rope classification remains unchanged.

There are, of course, many other types of wire rope, but they are useful only in a limited number of applications and, as such, are sold as specialties. Usually designated according to their actual construction, some of these special constructions are listed in Table 2 and show in Figure 8.

SOCKETING

Improperly attached wire rope terminals lead to serious-possibly unsafe- conditions. To perform properly, all wire rope elements must be held securely by the terminal. If this is not accomplished, the strands will "loaf on the job" and there is every likelihood that a strand will become "high". A high strand condition is illustrated in Figure 42. In the case shown, selective abrasive wear of the loose strand will necessitate early removal of the rope.

Poured Sockets-Spelter or Resin

When preparing a wire rope for socketing, it is of extreme importance to follow recommended procedures. (See Appendix D: SOCKETING PROCEDURES.) Procedures other than those stipulated here, may develop the required strength but this cannot be pre-determined without destructive test. It is far safer-and ultimately less costly-to follow well-established practices.

There are many ways to go wrong in socketing procedures. Some of the more common pitfalls that should be guarded against include:

1) Turning back the strands-inward or outward-before the "broom" is inserted into the socket;
2) Turning back the strands and seizing them to the body of the rope:
3) Turing back the strands and tucking them into the body of the rope:
4) Tying the knot in the rope:
5) Driving nails, spikes, bolts, and similar objects into the socket *after* the rope is in, so as to "jam" it tight; this is particularly dangerous-and ruinous.

To avoid these and many other dangerous practices, play it safe by following correct procedures.

WIRE ROPE CLIPS

Wire rope clips are widely used for attaching wire rope to haulages, mine cars, hoist, and for joining two ropes.

Clips are available in two basic designs: the *U-bolt* and *fist grip* (Fig. 23). The efficiency of both types is the same.

When using *U-bolt* clips, extreme care must be exercised to make certain that they are attached correctly, i.e., the *U-bolt* must be applied so the "U" section is in contact with the dead end of the rope (Fig. 24). Also, the tightening and retightening of the nuts must be accomplished as required.

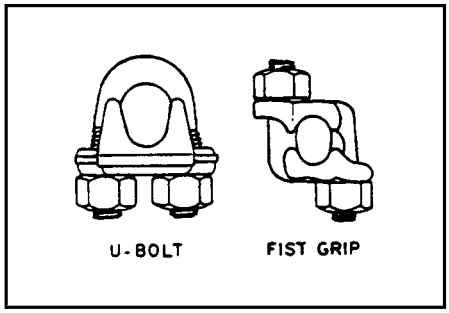


Figure 23. Wire rope clips are obtainable in two basic designs: *U-bolt* and *fist grip*. Their efficiency is the same.

HOW TO APPLY CLIPS

U-BOLT CLIPS (Table 6, page 30)

Recommended Method of Applying U-Bolt Clips to Get Maximum Holding Power of the Clip

1) Turn back the specified amount of rope from the thimble. Apply the first clip one base width from the dead end of the wire rope (U-bolt over dead end-live end rest in clip saddle). Tighten nuts evenly to recommended torque.
2) Apply the next clip as near the loop as possible. Turn on nuts firm but do not tighten.
3) Space additional clips is required equally between the first two. Turn on nuts-take up rope slack-tighten all nuts evenly on all clips to recommended torque.

If the fleet angle (Fig. 34) is large, it may be necessary to accept a smaller arc of contact at the throat; 130° for example instead of 150°. This is done to avoid scrubbing the rope on the flange of the sheave.

As previously noted, the groove size is evaluated on the basis of how the gage leaf fits the groove. Daylight under the gage is not tolerable when using the worn groove gage. If a full over-size gage is used, some daylight may be acceptable, but really must be judged by relating the measurement to the *actual* size of the rope.

For new rope, extra caution should be observed as to its fit in the groove. Characteristically, ropes become smaller in diameter immediately after being placed in service. As a result, they would operated satisfactorily in a "worn" groove; one that was gage OK by the "worn" groove gage. Nonetheless, in some cases, a rope may not "pull down," and it this happens, abnormal wear may occur.

It is important to remember that a tight groove not only pinches and damages the rope but that the inching prevents the necessary adjustment of the wires ann strands. On the other hand, a groove that is too large will not provide sufficient support; in this case, the rope will flatten and thereby restrict the free sliding action of the wires and strands.

The size of the groove is not only critical item to be examined closely. The *condition* of the groove is also an important factor of concern. Is it smooth or imprinted? If the groove is imprinted then it must be re-machined or, if it is imprinted too deeply, it means that sheave, roller or drum must be replaced. If replacement is indicated, a larger sheave or drum should be installed if possible, or a harder material should be specified for the replacement.

Groove examination should also concern itself with *how the groove is wearing*. If it is worn off-center, thereby forcing the rope to undercut or to rub against the flange, it then becomes necessary to correct the alignment of the reeving system, and to specify a harder material.

When checking the grooves, the bearings of the sheaves and rollers should also be examined. They should turn easily. If not, each bearing must be properly lubricated. "Wobble" in the sheave-from broken or worn bearings-is not acceptable. Bad bearings will set up vibrations in the wire rope that can cause rapid deterioration unless the condition is remedied. Bad bearings also increase the force on the rope that is needed to move a given load, since friction forces will e greatly increase.

Sheaves with broken flanges may allow the rope to jump from the sheave and become fouled in the machinery. When this happens, the rope is cut, curled, and the crowns of the wires in the strands are burred. There is ample evidence to support the rule that sheaves with broken flanges must be replaced immediately.

A sheave or drum with a flat spot can induce a "whip" into the line. This whip, or wave, travels until is stopped by the end terminal, at which point the rope may bend severely. This condition helps to accelerate the fatigue breakage of wires. Sometimes the reeving is such that the whip or wave is arrested by a sheave, or the drum itself. In these circumstances, the whipping will cause wire breaks along the crowns of the strands. Obviously sheaves or drums that excite vibrations of this sort, must be repaired or replaced.

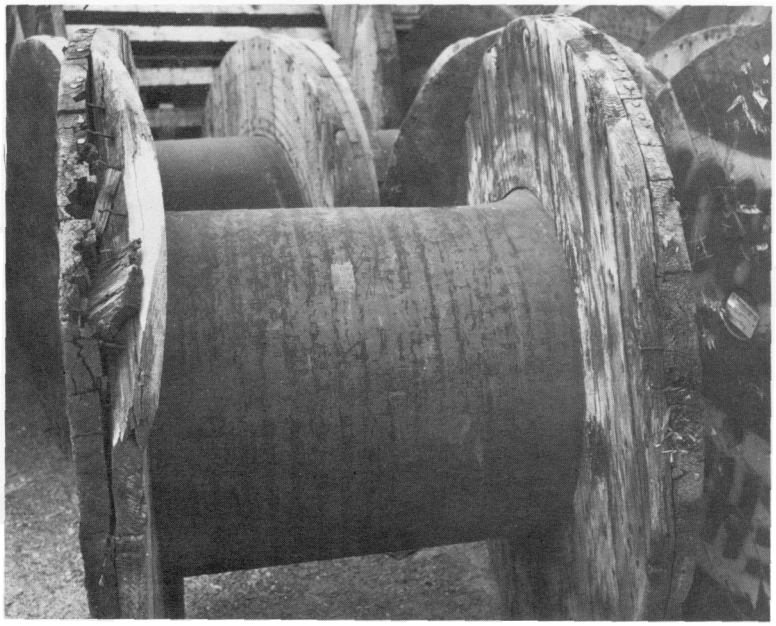


Figure 40. When a reel has been damaged in transit, it is a safe assumption that irreparable damage has been done to the rope.

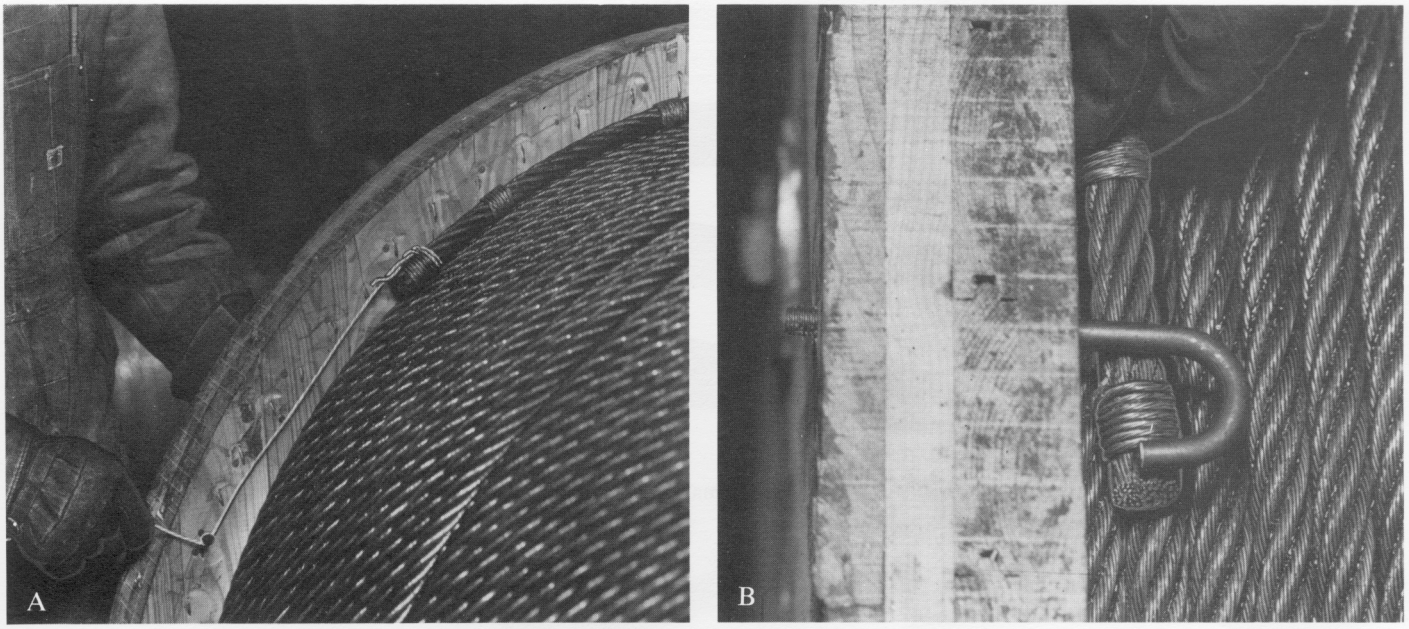


Figure 41. Wire rope abuses during shipment create serious problems. One of the more common causes is improper fastening of rope end to reel, e.g., nailing *through* the rope end. These photos show two *acceptable* methods: A) one end of a wire "noose" holds the rope, and the other end is secured to the reel; and B) the rope end is held in place by a J-bolt or U-bolt that is fixed to the reel.

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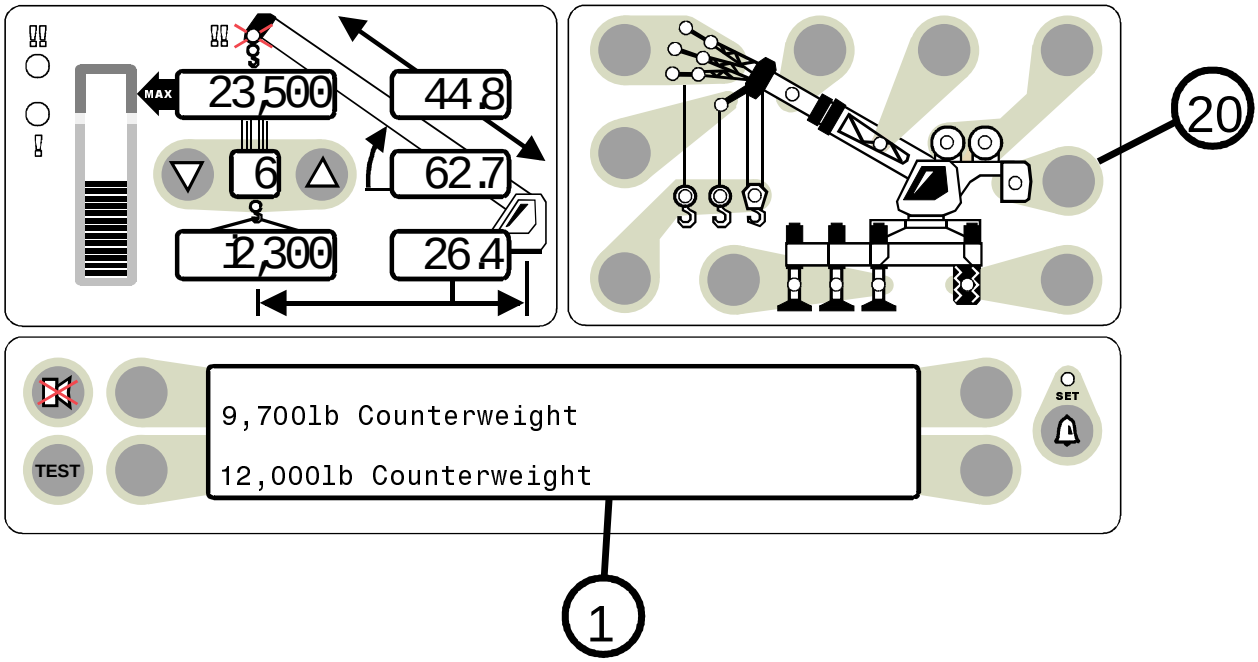
SYSTEM SETUP

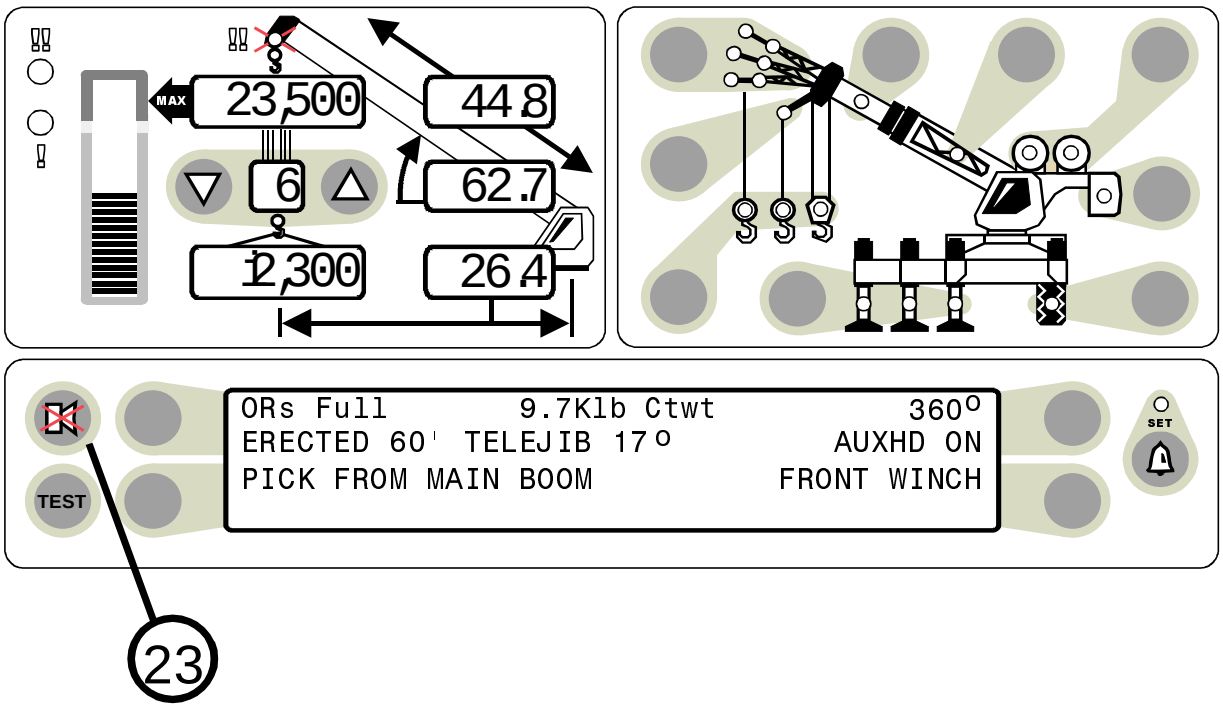


COUNTERWEIGHT

IF THE COUNTERWEIGHT PUSH BUTTON IS PRESSED ON A CRANE THAT DOES NOT HAVE COUNTERWEIGHT OPTIONS, THE MESSAGE **"NO OTHER COUNTERWEIGHT OPTIONS"** WILL APPEAR IN THE INFORMATION DISPLAY. REFER TO YOUR **CRANE RATING MANUAL** FOR DETAILS OF THE OPTIONS ON YOUR CRANE

- On cranes that have counterweight options the operator must tell the MicroGuard® System which counterweight is currently fitted. If there are no options, continue on to selection of outriggers.
- Start the choice by pressing the **counterweight push button** (item 20).
- The available counterweight options will be displayed in the information screen (1). There can be four options displayed at a time, one next to each selection key.
  - If the required option is visible, select the option by pressing the button next to it.
  - If more than 4 options are available, a second selection screen can be viewed by pressing the button next to the "next" label.
  - If only a single option is available, it will automatically be selected.

CANCEL AUDIBLE ALARM



PUSH BUTTON TO CANCEL AUDIBLE ALARM

The **cancel alarm push button** (item 23) is used to silence the audible alarm. **Pressing this button once will cancel an audible alarm that has occurred as a result of an:**

Overload

A2B Alarm

Operator Settable Alarm

The audible alarm remains canceled until the condition that caused the alarm has been removed. See page 23.

EXAMPLES:

AFTER CANCELING AN AUDIBLE ALARM:

- If the audible alarm sounded because of an overload condition, the alarm will remain canceled until the condition is corrected.
- If **another alarm condition occurs** that normally causes an alarm to sound (such as A2B) **or if a previous condition** (such as overload) **is removed and then recurs, the new alarm condition will cause the audible alarm to sound again.**

The CANCEL ALARM push button is also used to reset the function kick-out relay when it is necessary to bypass the function disconnects. **Examples of when it may be necessary to override a function disconnect condition are:**

If the boom hoist cylinder is fully extended, the pressure in it will rise. This will be seen by the system as an overload and will not allow the operator to boom down. Using the bypass is necessary in this situation to move away from the fully extended boom hoist cylinder position.