TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

CONTAINER CRANE, 40-TON, ROUGH TERRAIN, MODEL RT875CC NSN 3810-01-205-2716

This manual shall be used in place of the GROVE Manufacturing Company Commercial Operator's and Safety Handbook Manual No. 1-187-000004-1 dated 1 Feb 89 and the PAT Advanced Technology, Inc., Operator's Handbook DS-350M dated January 1989 that were originally overpacked with the crane.

Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY
25 FEBRUARY 1993

WARNING

OPERATIONS ADJACENT TO OVERHEAD LINES ARE PROHIBITED UNLESS ONE OF THE FOLLOWING CONDITIONS IS SATISFIED.

1	POWER HAS BEEN SHUT OFF AND POSITIVE MEANS TAKEN TO PREVENT LINES FROM BEING ENERGIZED.	
2	POSITION AND BLOCK EQUIPMENT INSURING NO PARTS. INCLUDING CABLE. CAN COME WITHIN THE FOLLOWING CLEARANCES:	VOLTAGE REQD CLEARANCE UNDER 50 KV -- 10 FEET 69 KV -- 12 FEET 115-161 KV -- 15 FEET 230-285 KV -- 20 FEET 345 KV -- 25 FEET 500 KV -- 35 FEET

CHECK WITH YOUR LOCAL POWER SUPPLIER FOR CORRECT LINE VOLTAGE

a

THIS MACHINE IS NOT EQUIPPED WITH ANY WARNING OR INSULATING DEVICES. EXTREME CAUTION MUST BE EXERCISED BY ALL PERSONNEL WORKING WVTH AND AROUND THIS MACHINE WHEN IN THE PROXIMITY OF ENERGIZED POWER SOURCE OR POWER LINES.
ELECTRICITY CAN CAUSE SEVERE BODILY INJURY OR DEATH IF CONTACT OCCURS. ALL PERSONNEL MUST BE ADEQUATELY WARNED OF SAFETY PROCEDURE

SAFETY SUMMARY

WARNING

BEFORE STARTING THE ENGINE. ENSURE THE PARKING BRAKE IS APPLIED AND SWING LOCK IS ENGAGED.

WARNING

AVOID OVERLOADING THE AIR BOX WHEN USING THE QUICK START BUTTON. DO NOTATTEMPT MORE THAN THREE CONSECUTIVE STARTS WITHOUT ALLOWING THE QUICK START FLUID TO DISSIPATE. OTHERWISE. AN OVERLOADING OF THE AIR BOX WITH HIGHLY VOLATILE FLUID AND A MINOR EXPLOSION COULD OCCUR.

WARNING

ALWAYS SET THE PARKING BRAKE WHEN THE TRANSMISSION IS DISENGAGED.

WARNING

DO NOT DRIVE THE CRANE WITH THE BOOM OFF CENTER AS AUTOMATIC OSCILLATION LOCKOUTWILLOCCUR. MAKING THE CRANE SUBJECT TO TIPPING ON UNEVEN SURFACES.

WARNING

DO NOT TRAVEL WITH AN EMPTY HOOK IN A POSITION WHERE IT CAN SWING FREELY.

WARNING

AVOID HOLES, ROCKS, EXTREMELY SOFT SURFACES, AND ANY OTHER OBSTACLES WHICH MIGHT SUBJECT THE CRANE TO UNDUE STRESSES OR POSSIBLE OVERTURN.

WARNING

ON OPEN GROUND. TOW OR PULL ONLY ON THE PINTLE HOOK OR UFT LUGS.

WARNING

OPERATE THE REAR STEER ONLY FOR ADDED JOB SITE MANEUVERABILITY.

WARNING

ENSURE THE SWING LOCK AND THE SWING BRAKE ARE ENGAGED BEFORE STARTING EXTENDED TRAVELING.

WARNING

THE ENGINE MUST BE SHUT DOWN BEFORE ATTEMPTING TO ENGAGE THE HYDRAULIC PUMP DRIVE.

WARNING

THE OUTRIGGERS MUST BE FULLY EXTENDED AND SET BEFORE ANY OTHER OPERATION OF THE CRANE IS ATTEMPTED. UNLESS LIFTING ON RUBBER.

WARNING

KEEP FEET AND HANDS CLEAR OF THE OUTRIGGER FLOATS WHEN UNLOCKING THEM FROM THE STABILIZERS.

SAFETY SUMMARY (Cont'd)

WARNING

BEFORE INITIATING ANY SWING OPERATIONS. MAKE CERTAIN THE AREA IN THE SWING PATH OFTHE HOOK AND/OR LOAD. AS WELL AS THE TAIL SWING AREA. IS CLEAR OF ALL OBSTRUCTIONS AND PERSONNEL.

WARNING

WHEN SWINGING THE LOAD FROM OVER-THE-FRONTTO OVER-THE-SIDE, CHECK THE LOAD CHART TO MAKE CERTAIN THE APPUCABLE CAPACITY IS NOT EXCEEDED. TRAVELING WITH ANY LOAD OVER-THE-SIDE IS PROHIBITED.

WARNING

IF THE "ELEVATE BOOM" MESSAGE APPEARS ON THE LED ALERT DISPLAY DURING SWING, STOP SWING IMMEDIATELY AND ELEVATE THE BOOM TO CLEAR THE ENGINE HOOD.

WARNING

BEFORE ELEVATING THE BOOM. ENSURE THE AREA ABOVE AND BENEATH THE BOOM IS CLEAR OF ALL OBSTRUCTIONS AND PERSONNEL.

WARNING

BEFORE LOWERING THE BOOM. MAKE CERTAIN THE AREA BENEATH THE BOOM IS CLEAR OF ALL OBSTRUCTIONS AND PERSONNEL.

WARNING

WHEN LOWERING THE BOOM. LET OUT THE CABLE SIMULTANEOUSLY TO PREVENT TWOBLOCKING THE BOOM NOSE AND THE HOOK BLOCK.

WARNING

DO NOT OPERATE THE CRANE WITH A WORN OR DAMAGED HOIST ROPE.

WARNING

CHECK THE LOAD CHART FOR MAXIMUM LOAD AT GIVEN RADIUS, BOOM ANGLE. AND LENGTH BEFORE EXTENDING BOOM WITH A LOAD.

WARNING

WHEN RETRACTING THE BOOM, THE LOAD WILL LOWER UNLESS THE CABLE IS TAKEN IN SIMULTANEOUSLY.

WARNING

BEFORE LOWERING OR RAISING THE CABLE (LOAD). ENSURE THE AREA BENEATH THE LOAD IS CLEAR OF ALL OBSTRUCTIONS AND PERSONNEL

WARNING

NEVER PARK THE CRANE NEAR HOLES. OR ON ROCKY OR EXTREMELY SOFT SURFACES. THIS MAY CAUSE THE CRANE TO OVERTURN, RESULTING IN INJURY TO PERSONNEL

WARNING

BEFORE LEAVING THE CRANE. ENSURE THE SWING LOCK AND THE SWING BRAKE ARE BOTH ENGAGED.

SAFETY SUMMARY (Cont'd)

WARNING

FOLLOW STANDARD SAFETY PRECAUTIONS WHEN REFUELING. FUEL IT SAFELY.

WARNING

BE CAREFUL WHEN CHECKING THE COOLANT LEVEL. SHUT DOWN THE ENGINE AND ALLOW THE RADIATOR TIME TO COOL BEFORE REMOVING THE RADIATOR CAP.

WARNING

ALWAYS SOUND THE HORN TO ALERT PERSONNEL IN THE AREA BEFORE SWINGING THE BOOM.

WARNING

ALLOW NO ONE OTHER THAN THE OPERATOR TO BE ON THE CRANE WHILE THE CRANE IS FUNCTIONING OR MOVING.

WARNING

WHEN INFLATING OR ADDING AIR TO THE TIRES, USE A TIRE GAGE AND SCREW-ON-INFLATOR. USE AN EXTENSION HOSE WHICH WILL PERMIT STANDING BEHIND THE TIRE TREAD WHEN INFLATING.

WARNING

ELECTRICITY CAN CAUSE SEVERE INJURY OR DEATH IF CONTACT OCCURS.

WARNING

PINCH POINTS ARE IMPOSSIBLE TO ELIMINATE. KEEP ALL PORTIONS OF YOUR BODY AWAY FROM CABLE DRUMS, SHEAVES. PULLEYS, LIFT CYLINDERS. AND OTHER MOVING PARTS OF THE CRANE. BE EXTREMELY CAREFUL WHEN PERFORMING MAINTENANCE ON THE CRANE.

WARNING

NEVER HANDLE WIRE ROPE WITH BARE HANDS.

WARNING

ASSUME ALL POWER SOURCES ARE ELECTRICALLY ENERGIZED ("HOT" OR "LIVE") UNTIL YOU HAVE ABSOLUTELY RELIABLE INFORMATION TO THE CONTRARY.

WARNING

LOAD CHARTS REPRESENT THE ABSOLUTE MAXIMUM ALLOWABLE LOADS. WHICH ARE BASED ON EITHER TIPPING OR STRUCTURAL UMITATIONS UNDER SPECIFIC CONDITIONS. KNOWING THE PRECISE RADIUS OF OPERATION, BOOM LENGTH. AND ANGLE SHOULD BE A PART OF YOUR ROUTINE PLANNING AND OPERATION. ACTUAL LOADS. INCLUDING NECESSARY ALLOWANCES. SHOULD BE KEPT BELOW THESE CAPACITY FIGURES.

WARNING

THIS CRANE IS NOT EQUIPPED WITH ANY ELECTRICAL WARNING OR INSULATING DEVICES. EXTREME CAUTION MUST BE EXERCISED BY ALL PERSONNEL WORKING WITH AND AROUND THIS CRANE WHEN NEAR AN ENERGIZED POWER SOURCE OR POWER LINES.

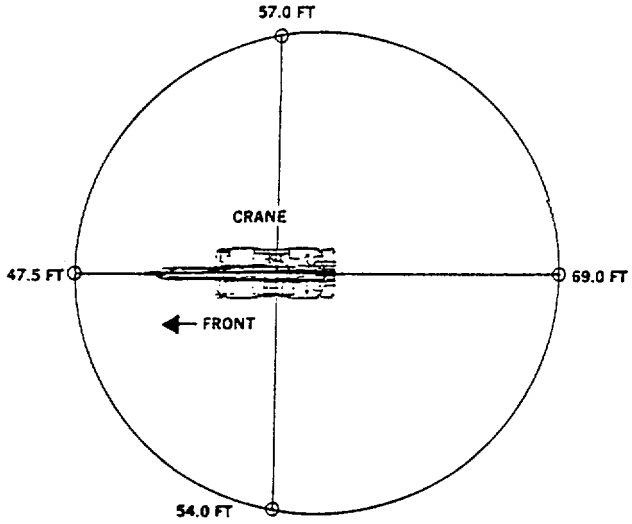
SAFETY SUMMARY (Cont'd)

WARNING

TEST RESULTS HAVE INDICATED STEADY STATE NOISE LEVELS OF 85dB(A) AND GREATER, AT GOVERNED ENGINE RPM, DURING CRANING OPERATIONS. THE MAXIMUM LEVEL OF 89dB(A) OCCURS AT THE OPERATOR'S STATION WITH THE DOORS CLOSED AND DECREASES TO 85dB(A) AT THE ENVELOPE CONTOUR SHOWN. OUTSIDE THIS CONTOUR THE LEVEL IS BELOW 85dB(A).

WITHIN THE 85dB(A) ENVELOPE HEARING PROTECTION IS REQUIRED. HEARING PROTECTION DEVICES MUST REDUCE THE NOISE REACHING THE AUDITORY SYSTEM TO A LEVEL BELOW 85dB(A). THESE DEVICES INCLUDE EAR PLUGS, EAR MUFFS, ATTENUATING HELMETS AND HEADSETS PROVIDED THEY ARE APPROVED BY THE SURGEON GENERAL OF THE UNITED STATES.

PHYSICAL HARM WHICH CAN RESULT FROM UNSAFE OPERATION OF THIS EQUIPMENT IS NOT RESTRICTED TO THOSE WHICH ARE VISIBLE. THE PURPOSE OF THE HEARING PROTECTION REQUIREMENT IS TO CONSERVE THE HEARING OF PERSONNEL. OBSERVE THIS NOTICE AND THE POSTED CAUTION DECALS ON THE CRANE AND USE HEARING PROTECTION WHERE REQUIRED.



Hearing Protection Required

WARNING

THE CRANE IS EQUIPPED WITH AN ANTI-TWO-BLOCK WARNING SYSTEM. ENSURE THAT ANTI-TWO-BLOCK PINS ARE REMOVED PRIOR TO OPERATING THE CRANE. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN PERSONAL INJURY AND EQUIPMENT DAMAGE.

INSERT LATEST UPDATED PAGES / WORK PACKAGES. DESTROY SUPERSEDED DATA

LIST OF EFFECTED PAGES / WORK PACKAGES

Note: The portion of text or illustration effected by the updates is indicated by a vertical line in the outer margins of the page. Updates to wiring diagrams are indicated by shaded areas.

Dates of issue for original and updated pages / work packages are:

Original	0	25 Feb 93
Change	1	01 May 01

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 51 AND TOTAL NUMBER OF PAGES IS 102 CONSISTING OF THE FOLLOWING:

Page No.	*Revision No.	Page No.	*Revision No.	Page No.	*Revision No.
Cover 1	0				
Warning A-F	0				
i-ii	0				
Chp 1					
1-1 thru 1-12	0				
Chp 2					
2-1 thru 2-8	0				
2-9 thru 2-10	1				
2-11 thru 2-24	0				
2-25 thru 2-28	1				
2-29 thru 2-60	0				
Chp 3					
3-1 thru 3-30	0				
Appendix A-F	0				
Index 1-7	0				

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *1 May 2001*

CHANGE

NO. 1

TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

CONTAINER CRANE, 40-TON, ROUGH TERRAIN, MODEL RT875CC NSN 3810-01-205-2716

TM 5-3810-306-10, 25 February 1993 is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin.
3. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration.

Remove Pages	Insert Pages
	List of Effective Pages
i and ii	i and ii
2-9 and 2-10	2-9 and 2-10
2-25 thru 2-28	2-25 thru 2-28

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0100902

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TECHNICAL MANUAL
No. 5-3810-306-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., 25 February 1993

OPERATOR'S MANUAL
FOR
CONTAINER CRANE, 40-TON
ROUGH TERRAIN, MODEL RT875CC
NSN 3810-01-205-2716

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 direct to: U.S. Army Tank Automotive Command, Attn: AMSTA-MB, Warren MI 48397-5000. A reply will be furnished to you.

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CHAPTER 1 - INTRODUCTION

Section I - GENERAL INFORMATION

SCOPE

Type of Manual

This Operator's Manual provides information for the operation of the Container Crane, Rough Terrain, Wheel Mounted, Hydraulic, Diesel Powered, Model RT875CC.

NOTE

Throughout this manual, reference is made to left, right, front and rear when describing locations. These reference locations are to be considered as those viewed from the operator's seat with the boom facing forward over the front of the carrier frame.

Purpose of Equipment

The crane is used to pick and position 40-foot ISO containers within a 22-foot load radius and 20-foot ISO containers within a 27-foot load radius at U.S. Army supply depots.

Special Limitations on Equipment

Refer to the Load Chart, Appendix F.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System. Accidents involving injury to personnel or damage to material will be reported on DA Form 285 (Accident Report) in accordance with AR385-40. Explosives and ammunition malfunctions will be reported in accordance with AR75-1.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your RT875CC Container Crane needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put in on an SF 368 (Quality Deficiency Report). Mail it to us at U.S. Army Tank - Automotive Command, Attn: AMSTA-QRT, Warren, MI 48090. We'll send you a reply.

EQUIPMENT IMPROVEMENT REPORT AND MAINTENANCE DIGEST (EIR MD).

The quarterly Equipment Improvement Report and Maintenance Digest, TB 43-0001-39 series, contains valuable field information on the equipment covered in this manual. The information in the TB 43-0001-39 series is compiled from some of the Equipment Improvement Reports that you prepared on the vehicles covered in this manual. Many of these articles result from comments, suggestions, and improvement recommendations that you submitted to the EIR program. The TB 43-0001-39 series contains information on equipment improvements, minor alterations, proposed Modification Work Orders (MWOs) warranties (if applicable), actions taken on some of your DA Forms 2028-2 (Recommended Changes to Publications), and advance information which will help you in doing your job better and will help in keeping you advised of the latest changes to this manual. Also refer to Appendix A, References, of this manual.

WARRANTY INFORMATION

The Container Crane is warranted by Grove Manufacturing Co. for 18 months. It starts on the date, found in block 23, DA form 2408-9, in the logbook. Report all defects in material or workmanship to your supervisor, who will take appropriate action through your organizational maintenance shop. Refer to Warranty Technical Bulletin TB 5-3810-306-14.

Section II - EQUIPMENT DESCRIPTION

EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

The crane is fully self-contained. All functions are either electrically or hydraulically controlled and hydraulically operated. Main functions include:

a. Raising and lowering the boom.

b. Extending and retracting the boom.

c. Raising and lowering loads with the hoist(s).

d. Swinging the boom.

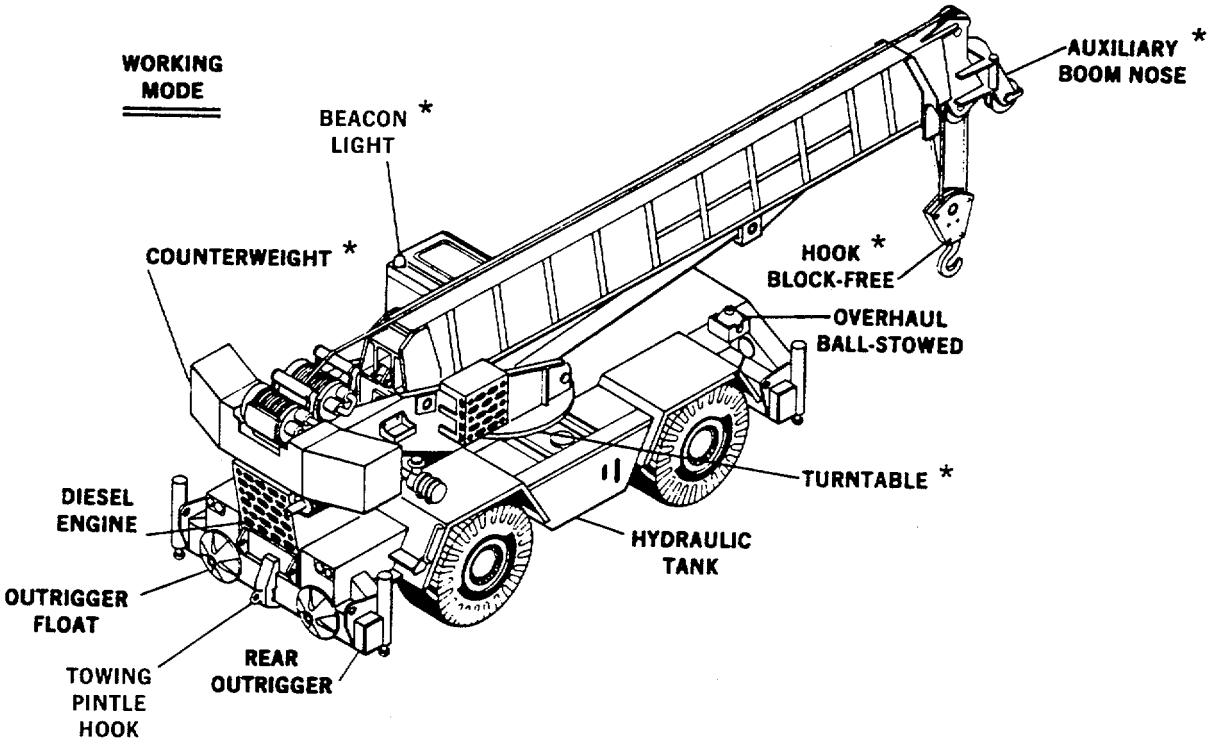
e. Extending and retracting the outrigger beams and stabilizers.

A diesel engine provides drive power for the hydraulic pumps and also drives a compressor and an alternator which supply air and electrical power for control, accessory and lighting systems. The engine also provides power to the axles through a remote mounted, six-speed (forward and reverse) transmission to drive the crane. Planetary drive axles provide four-wheel drive. Axle steering is accomplished through hydraulic steer cylinders.

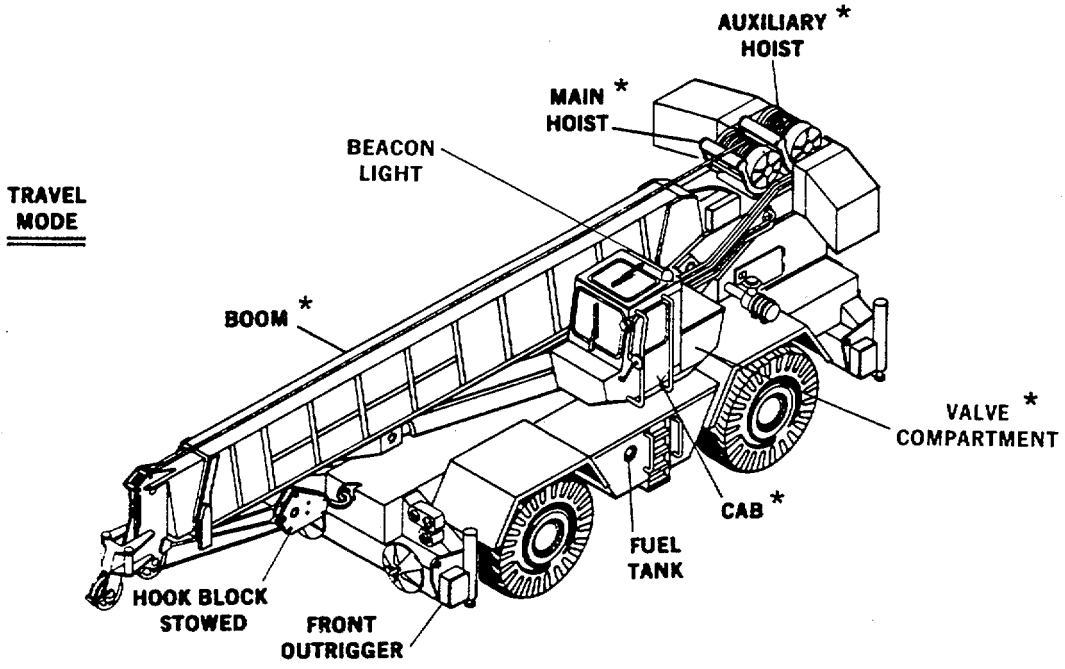
The carrier frame features an integral fifth wheel, to which the rear axle is mounted, to allow the axle to pivot. Axle pivot lockout is automatic when the superstructure rotates more than five degrees in either direction from its straight ahead position. The carrier frame has towing lugs located front and rear.

Air and hydraulic flow and electrical power are transferred from the carrier frame to the superstructure by swivels located at the center of rotation. Hydraulic cylinders activate the elevation, telescope and outrigger systems. The hoist and swing systems are driven by hydraulic motors.

The superstructure is capable of 360- degree continuous rotation in either direction. The crane is equipped with a two-section boom. Lifting is provided by a main hoist and an auxiliary hoist.



Right Side, Exterior



Left Side, Exterior

NOTE: Items marked * form the crane's superstructure.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Cab Assembly

The cab is all-steel, acoustically-treated, and fully-enclosed with tinted safety glass window. It contains all engine and crane controls and indicators for complete operation of the crane including outrigger controls. The cab also contains an operator's seat, heater, defroster, electric windshield wiper, dome light and fire extinguisher.

Engine

A diesel engine is housed in a compartment at the rear of the frame. The engine provides crane mobility, drives the hydraulic pumps, charges the air system via the compressor, and drives the alternator.

Fuel Tank

A 100-gallon (378-liter) capacity fuel tank is mounted on the left side of the frame between the axles. The filler cap, located on the side of the tank, is accessible from ground level.

Torque Converter

The torque converter is mounted on and driven by the engine. It drives the three-section hydraulic pump, the two-section hydraulic pump, and the converter/transmission charging pump.

Transmission

The transmission is a powershift six-speed (forward and reverse) type. The transmission is mounted on the carrier frame near the center of the crane.

Axles

The front and rear axles are drive and steer (axles) with brakes at all four wheels.

Hydraulic Reservoir

The hydraulic reservoir is located on the right side of the carrier. The reservoir contains hydraulic system oil and includes a filter and by-pass valve.

Turntable Assembly and Swing Mechanism

An anti-friction roller bearing supports the superstructure on the carrier frame allowing 360 degrees continuous rotation (swing) in either direction. The bearing is driven by a hydraulic motor and gear reducer/brake arrangement mounted above the bearing in the turntable.

Boom Assembly

The two-section boom extends from 34.4 to 60.4 feet (10.52 to 18.46 meters). The boom is mounted on a turntable and is raised/lowered and extended/retracted by hydraulic cylinders.

Auxiliary Boom Nose

The auxiliary boom nose consists of a welded extension with a sheave assembly. The auxiliary boom nose is mounted on the boom nose. Main Hoist

The main hoist provides power for all load raising and lowering operations. The main hoist is mounted at the rear of the boom on the turntable.

Auxiliary Hoist

The auxiliary hoist provides power for all load raising and lowering operations when the auxiliary boom nose is installed and the overall ball is being used. The auxiliary hoist is mounted on the counterweight.

Outriggers

The outriggers consist of hydraulically-actuated, box-type beams and vertical jack cylinders, one at each corner of the crane. The outriggers provide a rigid, four-point platform capable of supporting the crane and its maximum load capacity.

Swivels

Air/transmission, electrical and hydraulic swivels route the air, transmission, electrical and hydraulic circuits from the superstructure to the carrier frame. These swivels are mounted as a single assembly above the turntable bearing and drive.

EQUIPMENT DATA

General

Grove Manufacturing Co. Model No.	RT875CC
Drive	4 x 4
Gross Weight	94,500 lbs (42,865 kg)

Dimensions

NOTE

Dimensions listed are for a crane with all components fully retracted and in the travel mode.

Wheel Base	170 in.	(431.8 cm)
Overall Crane Length	46.3 ft	(14.1 m)
Overall Crane Width	144 in.	(365.76 cm)
Overall Crane Height	156.75 in.	(398.15 cm)
Tail-swing	171 in.	(434.34 cm)
Curb Clearance Circle (4W Steer Mode)	50.2 ft	(15.3 m)

Capacities

Fuel Tank	100 gal.	(378.50 1)
Hydraulic Tank	165 gal.	(624.52 1)
Coolant System	44 qts	(41.6 1)
Engine Lubrication System	23.7 qts	(22.42 1)
Hoists (each)	10 qts	(9.46 1)
Swing Gearbox	15 qts	(14.2 1)
Axle Planetary End	29 qts	(27.45 1)
Axle Drive Unit	15 qts	(14.2 1)
Transmission	34.4 qts	(32.6 1)

Fire Extinguisher

Manufacturer	Walter Kidde
Model	897213-10BC-23/4
Type	Dry
Rating	10 BC
Weight	2.75 lbs (1.2 kg)

Engine

Manufacturer	Cummins
Model	6CTA8.3
Type	6 cyl OHV, diesel
Combustion	4 cycle, turbo-charged, after-cooled
Bore and Stroke	4.49 in. x 5.32 in. (114 mm x 135 mm)
Displacement	504.5 cu in. (8.27 1)

Horsepower (Gross)	250
Torque (Gross)	650 ft lbs @ 1800 rpm
Cooling System	44 qts (41.6 1)
Lube System	23.7 qts (22.5 1)
Air Cleaner	2-stage, dry type
RPM, Engine Idle	800 RPM
RPM, Engine Full (Governed)	2500 RPM

Torque Converter

Manufacturer	Clark
Model	C273.5
Stall Torque Ratio	1.820:1
Charge Pump	21 gpm (80 1pm)
Pump Drive Ratio	0.95:1

Transmission

Manufacturer		Clark
Model		R28661
Speeds		6
Gear Ratios	1	13.91:1
	2	6.58:1
	3	2.41:1
	4	4.84:1
	5	2.29:1
	6	0.84:1

Axles

Manufacturer	Rockwell
Model	PSC 1794
Rings and Pinion Ratio	5.287:1
Planetary Ratio	5.200:1
Total Overall Ratio	27:490:1

Wheels and Tires

Manufacturer	Grove
Model	6-970-001386
Lugs	24
Torque	300 to 330 lb ft (41.47 to 45.62 kgm)
Tire Size	29.5 x 25
Ply Rating	28

Brakes

Manufacturer	Rockwell
Model	KDA-20004
Type Operator	Air
Type	Double Wedge

Steering Control Valve

Manufacturer	Eaton
Model	211-1041-001

Displacement ..... 47.5 cu in. (778.69 cu cm) per revolution
Capacity ..... 12 gpm (454 pm)

Air Compressor

Manufacturer ..... Cummins
Model 3051041
Number of Cylinders 1
Piston Displacement @ 1250 rpm ..... 13.2 cfm (6230 cm^3 /sec)

Hydraulic Pumps

Manufacturer ..... Commercial Shearing
Model - 3-section 313-9632-022
2-section 312-9320-536
Type ..... Gear
Sections ..... 1 - two section and 1 - three section
GPM ..... 3 - 50 gpm (189 1pm) and 2 - 27 gpm (102.1 1pm) @ 2400 rpm

Swing Motor

Manufacturer ..... Char-Lynn
Model 101-1086
Type ..... Gerotor
Displacement ..... 17.9 cu in./rev. (293 cu cm)

Swing Gearbox

Manufacturer ..... Grove
Model GB-200A
Type ..... Gear Reduction
Reduction Ratio2:1

Boom

Manufacturer ..... Grove
Model 2-187-900028
Length ..... 34.4 - 60.4 ft (10.5 - 18.4 m)
Elevation ..... 4° to +80°

Main and Auxiliary Hoists

Manufacturer ..... Grove
Model ..... HO 30E-16
Drum ..... Dimensions
Diameter ..... 16-in. (40.64 cm)
Length ..... 16-in. (40.64 cm)
Cable Capacity With Cable Dia. of ..... 0.75 in. (19 mm)
16 inch (40.64 cm) Drum ..... 525 ft (160 m)

Permissible Line Pull ..... Refer to the Line Pulls and Reeving Info Chart in the Cab

Counterweight

- Manufacturer ..... Grove
- Model 2-187-200063
- Type ..... Fixed-Bolted On
- Weight ..... 12,500 lbs (5,670 k)

Outriggers

- Manufacturer ..... Grove
- Model 2-187-100108
- Type ..... Double box beam and jack
- Extended Length ..... 288 in. (731.52 cm)
- Retracted Length ..... 133 in. (337.82 cm)

Hydraulic Swivel

- Manufacturer ..... Grove
- Model 6-364-001438
- Ports ..... 11 with dual ports on #1

Air/Transmission Swivel

- Manufacturer ..... Grove
- Model 6-364-001600
- Air Ports 5
- Oil Ports 7

Electrical System

Type ..... Single wire ground return (chassis)
System Voltage 24
Starting Voltage 24
Batteries
- Number 4
- Rating ..... 610 CCA @ 0°F

Alternator ..... 65 amp, 24 volt

Emergency Steer Pump

- Manufacturer ..... John S. Barnes
- Model 1380004
- Type ..... Gear
- Capacity ..... 5.3 gpm (20.1 1pm)
- RPM 2400
- Voltage ..... 24 volts
- Voltage ..... 24 volts

Cab Heater

- Manufacturer ..... Webasto
- Model 468-657
- Type ..... Internal Combustion
- Voltage ..... 24 volts
- Fuel ..... Diesel
- Heat Output ..... 15,000 Btu/hr

Section III - TECHNICAL PRINCIPLES OF OPERATION

INTRODUCTION

This section contains functional descriptions of the operation of the crane's major subsystems. Emphasis is on how the operator's controls interface with the rest of the equipment.

HYDRAULIC SYSTEM

The hydraulic system provides adequate pressure and volume for simultaneous operation of various crane functions. It consists of two pumps, a reservoir, an oil cooler and control valves.

The 165-gallon (624 liter) hydraulic reservoir is located on the right side of the frame. A full flow return type 25-micron filter and a sight gauge are installed in the reservoir.

Pumps. The crane utilizes one three-section pump and one two-section pump. Two pump drive assemblies transmit power from the torque converter to the hydraulic pumps. The three-section pump can be disengaged from the engine for cold weather starting. This is accomplished by a PUMP DISCONNECT lever located on the pump. Pump engagement must be performed with the engine shut down.

Directional Control Valves. The directional control valves are four-way, three-position with either an open or closed spool. The valves are grouped into valve banks permitting simultaneous, independent control of crane functions. The closed spool type valve contains an integral load check valve to prevent back sliding of components which support heavy loads. Each bank contains a main relief valve. Certain crane functions are additionally protected by a circuit relief valve.

Outriggers. The outriggers, part of the carrier frame, are controlled and operated from the cab. They are full hydraulic, double box type. When positioned they provide a rigid four-point platform (fully extended and set) capable of supporting the machine and its maximum load capacity. Integral holding valves and floats are provided. A sight level bubble indicator is located in the vicinity of the outrigger control panel to assist the operator in leveling the crane.

Turntable Assembly and Swing Mechanism. An anti-friction roller bearing supports the superstructure on the carrier frame, allowing 360 degrees of continuous rotation (swing) in either direction. Swing is accomplished by a hydraulically-driven motor driving a gearbox which in turn drives the roller bearing. A hydraulically actuated brake is used to stop swing and hold the superstructure in the desired position. To further secure the superstructure in a desired position, a positive swing lock is also provided.

Boom Assembly. The boom assembly is a two-section, trapezoidal design and extends from 34.4 to 60.4 feet (10.52 to 18.46 meters). The boom is elevated by two hydraulic cylinders with integral holding valves. Boom elevation is from -4 degrees to +80 degrees.

Main Hoist. The main hoist provides power for all load raising and lowering operations. Two hydraulic motors drive the hoist drum by means of a planetary gear reduction system. A metallic disc brake is also an integral part of the hoist assembly, and operates automatically when the control lever is in neutral.

Auxiliary Hoist. The auxiliary hoist provides power for all load raising and lowering operations when the auxiliary boom nose is installed. Two hydraulic motors drive the hoist drum by means of a planetary gear reduction system. A disc brake is also an integral part of the hoist assembly. It operates automatically when the control lever is in neutral position.

Control Lever Lockout System. The control lever lockout will automatically deactivate various control directions or functions which would tend to hasten an impending overload condition of the crane or two-block direction or condition. The system consists of a solenoid controlled air cylinder, and the associated linkage and rods to lockout functions that may worsen the condition, i.e, boom down, telescope out or hoist up; therefore, when control lever lockout occurs, the control levers can only be moved in a direction that will alleviate the condition. Lockout occurs when the solenoid is deenergized, closing an exhaust port and allowing air pressure to be supplied to the cylinder piston. Lockout is removed when the solenoid is energized, exhausting the air and allowing spring pressure to retract the cylinder piston.

Swing/Boom Warning System. The swing/boom warning system provides a visual and audible warning to the operator that the boom is not elevated sufficiently to clear the engine hood when swinging the boom over the rear. The red warning light is located in the LED alert display. The light and buzzer are controlled by two micro-switches electrically connected in series. One switch senses boom elevation and the other switch senses boom position in relation to swing. If boom elevation is below 7.5 degrees and swing is initiated, the warning indicator will illuminate and an alarm will sound when swing exceeds 90 degrees in either direction from directly over the front.

STEERING SYSTEM

The steering system uses hydraulically controlled steering cylinders mounted to the axles. For maximum maneuverability, the front and rear axles are drive and steer (axles). Two-wheel drive or four-wheel drive can be selected. The front axle has full power steering. The rear axle utilizes full hydraulic control and is operated independently of the front steer via a control lever adjacent to the steering wheel.

An electric motor driven, hydraulic pump provides emergency steering hydraulic pressure.

AIR SYSTEM

The engine compressor provides the air supply to operate the air service brakes, parking brakes, engine throttle, and transmission range shift and rear axle disconnect. Air flow is transmitted from the carrier frame to the superstructure through a swivel located at the center of rotation.

ELECTRICAL SYSTEM

The electrical system is a 24-volt operation and starting system, consisting of an alternator and four lead-acid batteries, which are series-parallel connected. The system is single wire-ground return type utilizing the machine's structure as ground.

PAT/LMI SYSTEM

WARNING

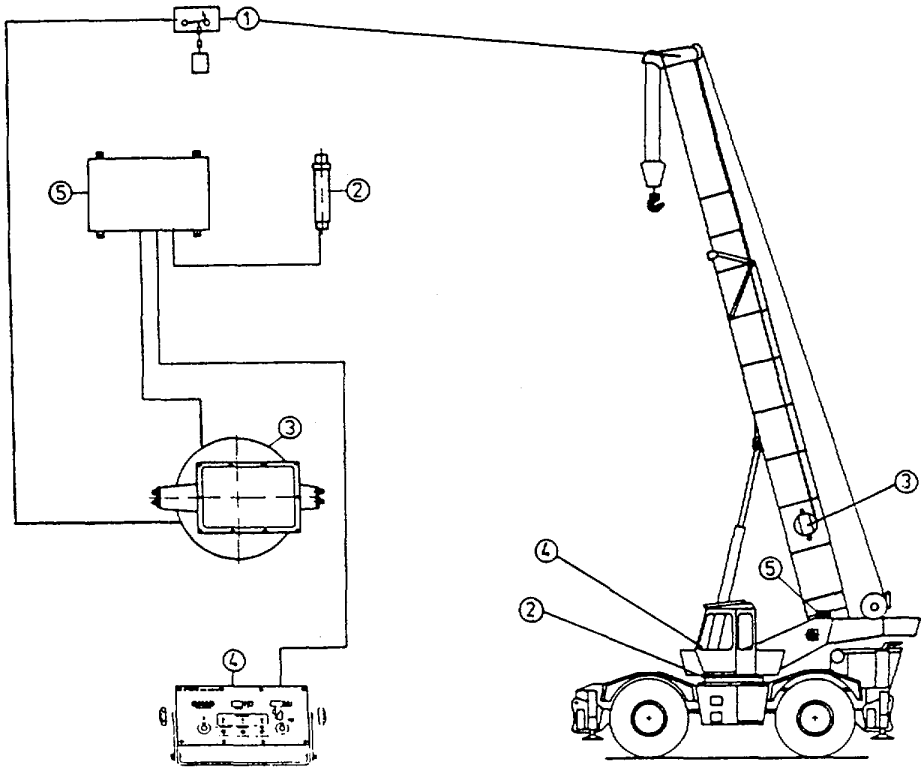
The LMI is an operational aid only.

The device is not, and shall not be, a substitute for good operator judgement, experience and use of accepted safe crane operating procedures.

The responsibility for the safe operation of the crane shall remain with the crane operator who shall ensure that all warnings and instructions supplied are fully understood and observed.

Prior to operating the crane, the operator must carefully and thoroughly read and understand the information in this manual to ensure that he knows the operation and limitations of the indicator and crane.

The PAT/LMI (Load Moment Indicator) System is an electro-mechanical sensing and alarm system that provides vital lift data to the operator. The system senses current boom length, boom angle, and degree of rotation as well as load boom weight. This data is displayed on a control panel mounted above the instrument panel in the cab. When an impending overload condition is sensed, the system provides the operator with visual and audible warnings. It locks out the control levers to prevent lowering the boom, extending the boom or raising the main/auxiliary hoist cables. Antitwo-block devices prevent the hook block from coming into contact with the boom nose. This condition will also cause a lockout of the above mentioned control functions.



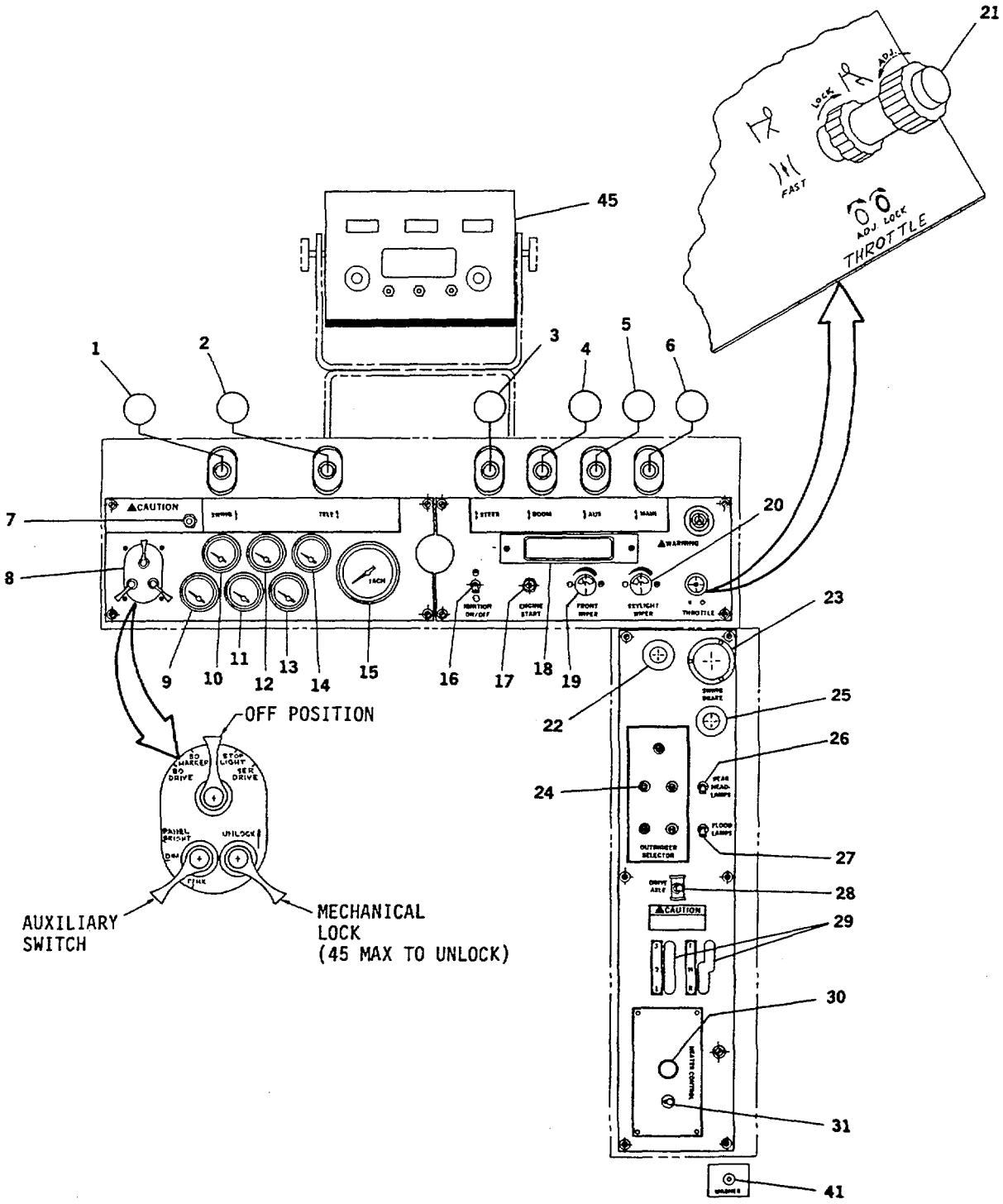
① Anti-Two-Block Switch
② Pressure Transducers
③ Length/Angle Sensor - Anti-Two-Block Cable Reel
④ Operating Console
⑤ Central Micro-Processor Unit

CHAPTER 2 - OPERATING INSTRUCTIONS

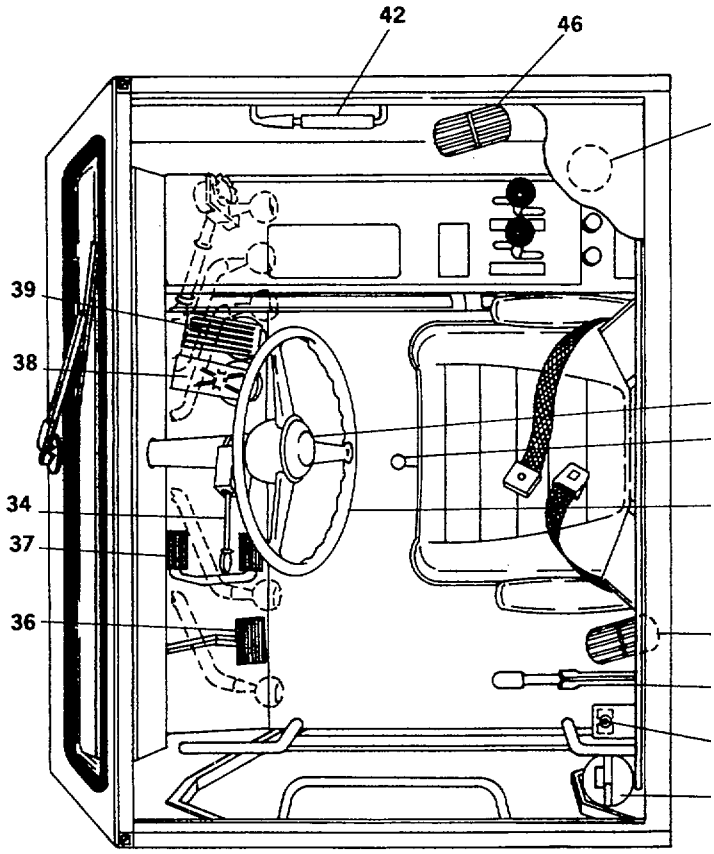
Section I - DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

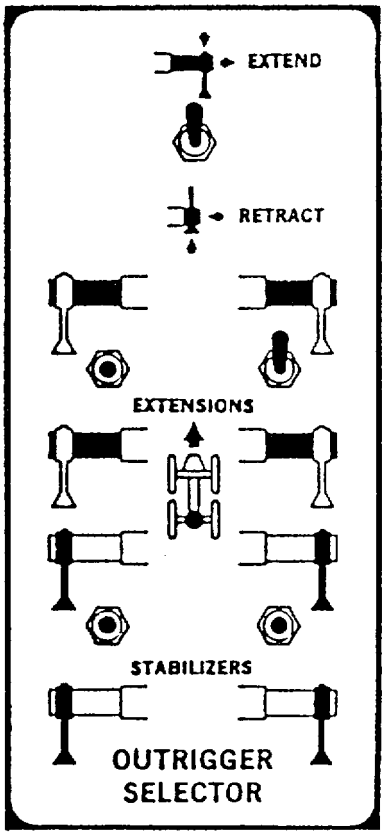
PURPOSE

This section shows the operator controls and indicators, including the associated panel markings. It provides a functional description from the operator's point of view.



Cab Controls and Indicators





OUTRIGGER SELECTOR PANEL

Table 2-1. Control Panel Controls and Indicators

Key	Control or Indicator	Function
1	SWING Control lever	Push lever foward to rotate boom superstructure clockwise (right). Pull lever to rotate boom superstructure counterclockwise (left).
2	TELE Control lever	Push lever forward to telescope (extend) boom. Pull lever to retract boom.
3	STEER Control lever	Push lever foward to steer rear of crane to left. Pull lever to steer rear of crane to right.

Table 2-1. Control Panel Controls and Indicators (Cont'd)

Key	Control or Indicator	Function
4	BOOM Control lever	Pull lever back to increase boom elevation angle. Push lever to lower boom elevation.
5	AUX Control lever	Push lever forward to lower auxiliary hoist cable. Pull lever to raise auxiliary hoist cable.
6	MAIN Control lever	Push lever forward to lower main hoist cable and hook block. Pull lever to raise main hoist cable and hook block.
7	Quick Start Push-button	Depress pushbutton while IGNITION swich is ON and ENGINE START is depressed to inject ether start fluid into engine air intake.
8	Blackout Lights Switch	BO DRIVE/BO MARKER/OFF/STOP LIGHT/SER DRIVE selects which outside lights are controlled. PANEL BRIGHT/ DIM/OFF/PARK selects condition of control panel lights. UNLOCK selects blackout or normal mode.
9	OIL PRESS Gauge	Indicates engine lube oil pressure, 0 to 100 psi (0 to 690 kPa).

Table 2-1. Control Panel Controls and Indicators (Cont'd)

Key	Control or Indicator	Function
10	AIR PRESSURE Gauge	Indicates air pressure in primary air system (green pointer) and secondary air system (red pointer). Scale reads 0 to 150 psi (100 to 1000 kPa).
11	WATER TEMP Coolant temperature gauge	Indicates engine coolant temperature, 100-280°F (38 to 138°C).
12	OIL TEMP Transmission temperature gauge	Indicates transmission oil temperature, 140 to 320°F (60 to 160°C).
13	FUEL Gauge	Indicates fuel level in fuel tank 0 to full 4/4.
14	BATTERY DC Voltmeter	Indicates voltage to or from battery. In volts (DC) from 20 to 32.
15	TACH/HOURS Tachometer/Hourmeter	Indicates engine speed in RPMs 0 to 40 (times 100). Indicates total diesel engine operating hours (including tenths).
16	IGNITION ON/OFF Switch	ON - Energizes 24 VDC circuit enabling diesel engine start circuit. OFF - Shuts down diesel engine.
17	ENGINE START Pushbutton	Depress to energize diesel engine starting circuit. Engages starting motor solenoid while pushbutton is depressed.

Table 2-1. Control Panel Controls and Indicators (Cont'd)

Key	Control or Indicator	Function
18	LED ALERT Display	Provides visual and audible indication of crane malfunctions and conditions.
19	FRONT WIPER Switch	Turn switch clockwise to first stop for slow wiper speed. Turn switch clockwise to second stop for fast wiper speed. Turn switch counterclockwise to stop wipers.
20	SKYLIGHT WIPER Switch	Turn switch clockwise to first stop for slow wiper speed. Turn switch clockwise to second stop for fast wiper speed. Turn switch counterclockwise to stop wipers.
21	THROTTLE Control knob	Push button and pull knob to set engine speed. Depress button and push knob to release throttle. Rotate collar to lock engine speed at desired level.
22	Park Brake Knob	Push knob to release park brake. Pull knob to set park brake.
23	Bubble Level	Indicates crane levelness.

Table 2-1. Control Panel Controls and Indicators (Cont'd)

Key	Control or Indicator	Function
24	OUTRIGGER SELECTOR Control panel	EXTEND - extends selected outrigger cylinder. RETRACT - Retracts selected outrigger cylinder.
25	SWING BRAKE Control knob	Push to set swing brake and prevent crane superstructure rotation.
26	REAR HEAD LAMPS Switch	ON - Lights rear floodlights mounted on crane frame. OFF - Turns off rear floodlights mounted on crane frame.
27	FLOOD LAMP Switch	ON - Lights boom mounted floodlights. OFF - Turns off boom mounted floodlights.
28	DRIVE AXLE Switch	2WD HI - Selects two-wheel drive mode. Front wheels are driven. 4WD LO - Selects four-wheel drive mode. All wheels are driven.
29	1-2-3/FNR Transmission shift Levers	1 - Selects low gear in transmission. 2 - Selects second gear in transmission. 3 - Selects high gear in transmission. F - Selects forward travel direction for crane. N - Selects neutral. No wheels are driven. R - Selects rear direction for crane travel.

Table 2-1. Control Panel Controls and Indicators (Cont'd)

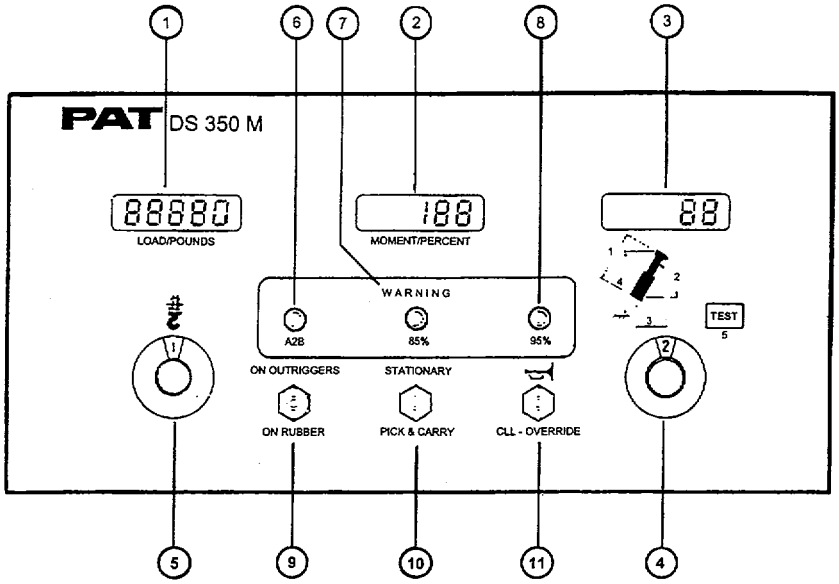
Key	Control or Indicator	Function
30	HEATER Control switch	PULL - Turns cab heater on. PUSH - Shuts cab heater off.
31	AIR TEMP Switch	HI - Turns cab heater circulating fan on high speed. LO - Turns cab heater circulating fan on slow (low) speed.
32	Steering Wheel	Turn clockwise to steer front wheels to right. Turn counterclockwise to steer left.
33	Horn Pushbutton	Depress to sound horn.
34	Turn Signal/Four-Way Flashers Control lever and switch	Pull lever up to light right-side turn signals. Push lever down to light left-side turn signals. Push down small switch behind lever to light four-way flashers.
35	Swing Lock Control Lever	Push lever to engage mechanical swing lock to prevent boom superstructure rotation. Pull lever to release mechanical swing lock.
36	Swing Brake Pedal	Depress pedal to apply swing brake and slow/stop crane superstructure rotation.

Table 2-1 Control Panel Controls and Indicators (Cont'd)

Key	Control or Indicator	Function
37	Boom Lift Control Pedal	Depress toe of pedal to lower boom. Depress heel of pedal to raise boom.
38	Service Brake Foot Pedal	Depress brake pedal to engage service brakes at all four wheels.
39	Throttle Pedal	Depress pedal to increase fuel flow through diesel engine governor increasing diesel engine speed.
40	Fire Extinguisher	Pull ring and depress lever to operate fire extinguisher. Charge gauge indicates green (for charged) and red (for service required).
41	Front Windshield Washer	Push to operate front windshield washer spray.
42	Skylight Window and counterbalance cylinder Adjustment	Turn knob counterclockwise to loosen cylinder brake. Position skylight as desired. Turn knob clockwise to tighten cylinder brake and hold skylight in desired position.
43	Domelight	Provides light for cab. ON/OFF switch located on light.

Table 2-1. Control Panel Controls and Indicators (Cont'd)

Key	Control or Indicator	Function
44	Operator Seat Adjustment	Push lever to side to unlock seat and slide seat forward or back. Release lever to lock seat.
45	Load Moment Indicator	Refer to Table 2-2.
46	Cab Fans	Provides air circulation within cab. On/off switch with speed control located on base of fan.
47	Beacon Light Switch	ON - Lights beacon light on top of cab. OFF - Turns off beacon light on top of cab.
48	Boom Assembly (Illustration Not Shown)	The boom features a mechanical boom angle indicator mounted on the left-rear side of the boom.



Load Moment Indicator

Table 2-2. Load Moment Indicator

Key	Control or Indicator	Function
1	LOAD/POUNDS Digital display	Indicates actual load (gross load) in pounds being picked up by the crane. Indication includes loads on both hoists (main/auxiliary) and all lifting equipment (slings, hook block, overhaul ball, etc.). When load on hook is less than 9,000 lbs., error code E80 will appear. Refer to TROUBLESHOOTING PROCEDURES, page 3-2, for an explanation of error code.

Table 2-2. Load Moment Indicator (Cont'd)

Key	Control or Indicator	Function
2	MOMENT/PERCENT Digital display	Indicates percent of total crane lifting capacity being used at any given moment in the craning cycle. In the case of a malfunction of the Load Moment Indicator System or an operating error, the display will indicate an error code used to identify system problems. Refer to TROUBLESHOOTING PROCEDURES, page 3-2, for an explanation of error codes.
3	Data Digital Display	Displays cranes operating data as selected by Data Selector Switch.
4	Data Selector Switch	Determines which crane operating data is displayed by the digital display by positions. 1 - Selects boom lenth for display (in feet). 2 - Selects boom angle for display (in degrees). 3 - Selects operating radius for display (in feet). 4 - Selects boom tip height above ground for display (in feet).

Table 2-2. Load Moment Indicator (Cont'd)

Key	Control or Indicator	Function
		5 - Test. Lights all lamps and sounds horn. MOMENT display (2) and data display (3) show "-188.8" and LOAD display shows "88880". Dangerous crane movement being performed during test will stop.
		WARNING Selecting the correct number of line parts is critical to the operation of the load moment indicator. Selecting the wrong number will result in faulty indications and possible personnel injury or equipment damage.
5	Reeving Selector Switch	Select number 1 thru 6 to correspond to number of parts of line being used. The container crane with the standard hook block is a six (6) part configuration. With the overhaul ball, the line is one (1) part.
6	A2B Red indicator light	Lights when anti-twoblock (A2B) switch is tripped causing the system to lockout craning operations.
7	85% Yellow indicator light	Lights when crane is lifting 85% of its rated capacity. Warning does not lock out operations.
8	95% Red indicator light	Lights when crane is lifting 95% of its rated capacity. An audible alarm will also sound. Warning does not lock out craning operations.

Table 2-2. Load Moment Indicator (Cont'd)

Key	Control or Indicator	Function
	NOTE At 100% of rated capacity, hoist up, boom down and telescope out functions will be locked out. **WARNING** Ensure that when performing craning operations on rubber (i.e. without extending the outriggers) the ON OUTRIGGERS/ON RUBBER selector switch is set to ON RUBBER. Otherwise the load moment indicator will show craning values that are not accurate. Failure to follow this procedure could result in personnel injury and/or equipment damage.	
9	ON OUTRIGGERS/ON RUBBER	ON OUTRIGGERS -Select this Selector switch position when operating crane on outriggers (i.e. outriggeres lowered and extended). ON RUBBER - Select this position when operating crane on rubber (i.e. with outrigger up and retracted).

WARNING

Ensure that when performing pick and carry operations (i.e. moving the crane while lifting a load) the STATIONARY/PICK & CARRY switch is set at PICK & CARRY. Otherwise, the load moment indicator will show craning values that are not accurate. Failure to follow these procudures could result in personnel injury and/or equipment damage.

Table 2-2. Load Moment Indicator (Cont'd)

Key	Control or Indicator	Function
10	STATIONARY/PICK & CARRY Selector switch	STATIONARY - Select this position when performing craning operations with the crane standing still. PICK & CARRY - Select this position when performing craning operations with the crane moving.
	WARNING Before using the CLL-OVERRIDE be aware that you are disabling a safety device: The automatic control lever lockout system. Do not assume that safety devices installed on this crane have failed when craning operations "appear" to be within crane operating capacities when the alarm occurs investigate first! Failure to observe this warning could result in personnel injury and/or equipment damage.	
11	CLL - OVERRIDE Momentary Selection Switch	UP - When alarm is on, overrides audible alarm for 15 seconds. CLL- OVERRIDE - Depress and hold to override the load moment indicator and anti-twoblock. Enables the operator to override the automatic control lever lockout system. Release switch to reactivate the protective system.

END OF TASK

Section II - PREVENTIVE MAINTENANCE CHECKS AND SERVICES

GENERAL

1. Before you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

2. While you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

3. After you operate. Be sure to perform your after (A) PMCS.

4. If your equipment fails to operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See TM 38-750.

Procedure

PMCS procedures in the table are intended to insure that the crane is ready to be operated safely and with minimum crane wear and tear.

The PMCS table lists the checks and services that need to be performed at various intervals. The intervals were determined by crane design and expected use.

1. "Before" or (B) PMCS shall be performed by the operator prior to starting the engine and attempting to operate the crane.

2. "During" or (D) PMCS shall be performed while operating the crane both while sitting in the cab manipulating the controls and when outside the cab doing other tasks associated with operations.

3. "After" or (A) PMCS shall be performed after crane operation and when it is being shut down for a period of time.

4. "Weekly"' or (W) PMCS need not be done every day or every time the crane is operated, but must be done relatively frequently, and not delayed or forgotten. A weekly routine must be established to check and service these items.

5. "Monthly" or (M) PMCS provides checks and services that need not be done weekly but cannot be ignored more than a month. A monthly service routine must be established.

6. There are checks and services that must be done on the basis of the number of hours of engine operation, or based on special environmental conditions. These more frequent checks are marked with an asterisk. An appropriate footnote explains the special service interval.

Additional Special Checks and Services

Perform weekly (W) as well as before (B) operations PMCS if:

1. You are the assigned operator and have not operated the crane since the last weekly.

2. You are operating the crane for the first time.

Leakage definitions for operator/crew PMCS shall be classified as follows:

Class I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

Class II Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.

Class III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.

When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS.

Class III leaks should be reported to your supervisor or organizational maintenance.

Equipment is Not Ready/Available If: Column provides clear description of the conditions in which the crane shall not ever unequivocally be operated, due to personnel safety and/or prospect of equipment damage.

Deficiencies in the crane and its performance shall be reported to your supervisor, and/or to your organizational maintenance group on Form 2408-X as well as noted in the Equipment Daily Log, Form 2408-1.

PMCS can be performed by the operator without removing any assemblies.

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

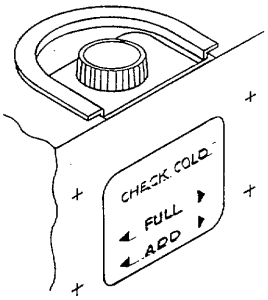
NOTE

Within designated interval, these checks are to be performed in the order listed.

B - Before A - After M - Monthly
D - During W - Weekly

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED FILLED, OR ADJUSTED. . .	EQUIPMENT IS NOT READY/AVAILABLE IF:
						General	
	.					Assure that all daily/weekly lubrication requirements are performed on the RTCC as directed by the Lubrication Order.	
	.					Perform a walk-around inspection of the vehicle, checking for leaks and obvious damage that would require a more detailed inspection.	
						CAUTION When checking all liquid levels, the crane should be level to obtain proper readings.	
	.					Levers, pins, linkage, etc., not equipped with lubrication fittings should operate freely and be free of rust. Lubricate with SAE 30 oil.	
						IMPORTANT Perform weekly (W) as well as before (B) Operator's PMCS if: 1. You are the assigned operator and have not operated the vehicle since the last weekly check. 2. You are operating the vehicle for the first time.	

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED FILLED, OR ADJUSTED. . .	EQUIPMENT IS NOT READY/AVAILABLE IF:
1						ENGINE OIL LEVEL	
		.				Check engine oil level. Maintain oil level between "Add and Full" mark on the dipstick (left side of engine).	Engine oil low; Class III leaks exist.
						WARNING The cooling system is pressurized. Personal injury may result when removing the radiator cap after operating temperature is reached. Do not remove radiator cap when radiator is hot to touch.	
2						ENGINE COOLANT	
	.					Check coolant level, maintain coolant level at "Full" mark on recovery tank sight gauge. Add coolant through the overflow tank cap filler tube.	
3						SEDIMENT BOWL	
	.					Check sediment bowl for dirt/water. The bowl is located on the left rear inner frame rail.	Sediment bowl is missing/broken.
4						FUEL FILTER	
						CAUTION Drain fuel into a container, not on the ground.	
	.					Check for water in primary fuel filter by opening the petcock (right side of engine) to drain water. Do not overtighten petcock!	Class II leak exists.
5						AIR TANKS	
	.					Open two secondary air tank drain cocks slightly to drain water. Push automatic drain valve on primary air tank.	Air/leak exists.



ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED FILLED, OR ADJUSTED. . .	EQUIPMENT IS NOT READY/AVAILABLE IF:
6						TIRES	
	.					Check tires for excessive wear, cuts, cracks, low or flat tires (75 psi).	Any tire missing, flat or unserviceable.
7						WIRE ROPE	
	.					Inspect wire rope, rope sockets and fitting for damage, wear, corrosion, heat damage and lubrication.	See Page 2-36 for wire rope not ready criteria.
8						FUEL TANK AND LINES	
	.					Check for fuel leaks	Class II leaks exist.
9						DRIVE BELT	
	.					Check belt for loose, broken, cracked or frayed condition. Belt should deflect approximately 1/2" at mid span. Note: Belt tension is maintained by automatic belt tensioner.	Belt damaged or missing.
10						WINDSHIELD WIPERS AND WASHER BOTTLE	
	.					a. Check for proper operation; condition of arms and blades.	
	.					b. Check fluid level in windshield washer bottle (in valve compartment).	
11						SEAT BELTS	
	.					Check seat belts for damage; proper operation	
12						CAB HEATER	
	.					Check that fuel tank (located behind cab on turntable) is full and sediment bowl is free of contaminents.	Class II leaks exist.

OPERATOR PMCS (CONTD)

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED FILLED, OR ADJUSTED. . .	EQUIPMENT IS NOT READY/AVAILABLE IF:
13						HOOK BLOCK AND OVERHAUL BALL	
	.					a. Check hook block for cracks deformation and damaged hook latch.	Cracks, damage or deformation are detected. Hook catch missing or inoperative.
	.					b. Check overhaul ball for cracks, deformations and damaged hook latch.	Cracks, damage or deformation are detected. Hook catch missing or inoperative.
						WARNING Do not touch sheave edge. Visually check the edge for sharpness.	
14						SHEAVES	
	.					Check sheaves for sharp edges/cracks. Edges are sharp if cable shows sign of fraying or cuts.	Sharp edges, cracks are detected.
15						TOOL BOX Ensure that emergency load lowering hoses (3) and pump handle are stowed. Ensure that drain pan is stowed.	
16						HYDRAULIC RESERVOIR	
						CAUTION Ensure all hydraulic cylinders are fully retracted when checking hydraulic fluid level.	
	.					Check hydraulic oil level (on right side of crane). Maintain oil level at "Full" mark on reservoir sight gauge.	Oil level low; Class III leaks exist.

OPERATOR PMCS (CONTD)

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED FILLED, OR ADJUSTED. . .	EQUIPMENT IS NOT READY/AVAILABLE IF:
						HYDRAULIC FILTER	
	.					Check hydraulic filter indicator.	Red flag indicates fouled filter.
17						AIR CLEANERS	
	.					a. Check for loose duct connections.	
	.					b. Check air restriction indicator (left side). If red flag appears, the air cleaner elements require servicing.	Red flag appears.
	.					c. Pinch vacuator valves. Check for cracks and clogging.	
18						TRANSMISSION OIL	
						CAUTION Do not attempt this check with cold oil.	
						NOTE In cold weather, it may be necessary to stall the torque converter in order to increase the transmission oil temperature level. Stall the torque converter as follows:	
						a. Start engine. (Refer to page 2-29).	
						b. Level crane by using outriggers. (Refer to page 2-45.)	

OPERATOR PMCS (CONTD)

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED FILLED, OR ADJUSTED. . .	EQUIPMENT IS NOT READY/AVAILABLE IF:
						c. Apply air parking brakes. d. Position transmission shift lever to F (forward) and high range. e. Accelerate engine to between 1500-1800 RPM. **CAUTION** Full throttle stall speeds for an excessive length of time will overheat the torque converter. f. Hold converter stalled until transmission oil temperature is between 180° - 200°F.	
	.					Check oil level when oil temperature is between 180° to 200°(F). Maintain oil between "Add and Full" mark on dipstick. Fill through transmission dipstick pipe.	Class II leaks exist.
19						LIGHTS AND SAFETY DEVICES	
	.					Check all lights, horns for proper operation.	

OPERATOR PMCS (CONTD)

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED FILLED, OR ADJUSTED. . .	EQUIPMENT IS NOT READY/AVAILABLE IF:
20						CONTROL LEVERS	
		.				Check proper operation of all control levers and pedals.	Controls/pedals fail to operate or control/pedals chatter.
21						SAFETY AND LOCKING DEVICES	
		.				a. Positive swing locks: Check for proper operation of turntable locking devices.	Turntable cannot be locked from moving.
	.					b. Anti-two block: Check for smooth proper operation.	Not operating correctly
	.					c. Load Moment Indicator: Check all cables and hardware for damage.	
	.					d. Spring Loaded Cable Reel: Ensure spring-loaded cable reel is free to rotate; has tension; cable is reeled properly.	
	.					e. Fire Extinguisher. Check charge indicator .	Indicator is in red zone.
22						INSTRUMENTS	
	.					a. Tachometer: Needle moves when throttle is depressed Max. 2500 rpm.	Tachometer is inoperative.
	.					b. Oil pressure gauge (engine): Minimum 10 psi at idle. Max 70 psi at full rpm (2500).	Outside normal range.
	.					c. Water temperature gauge: Minimum 180°(F), Max 205°(F).	Outside normal range.
	.					d. Transmission temperature: Minimum 140°(F), Max 250°(F).	Outside normal range.

OPERATOR PMCS (CONTD)

ITEM NO	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED FILLED, OR ADJUSTED. . .	EQUIPMENT IS NOT READY/AVAILABLE IF:
		.				e. Air pressure gauge: Minimum 105 psi, maximum 120 psi.	Outside normal range.
		.				f. LED Alert Display: Check that all lights illuminate during engine start-up.	Any one light does not light.
23						STEERING	
		.				Check steering, front and rear for smooth and proper operation.	No or rough steering is detected.
						WARNING Retract all outrigger stabilizers and beams to perform the following inspections.	
24						BRAKES, SERVICE AND PARKING	
		.				a. Check for forward or reverse motion of vehicle with parking brake applied.	Any movement of vehicle.
		.				b. Check/listen for noise and stopping ability with vehicle moving in either a slow forward motion or a slow reverse motion when applying the brakes.	Chattering, grinding or inability to stop.
25						LOAD MOMENT INDICATOR	
						WARNING	
		.				Tests for the Load Moment Indicator (LMI) system must be performed with care to prevent damage to the machine or injury to personnel. Proper functioning of the system requires successful completion of the following tests. (Refer to table 2-2.)	One test fails.

OPERATOR PMCS (CONTD)

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED	EQUIPMENT IS NOT READY/AVAILABLE IF:
						NOTE **See item 27 to check function of Boom Angle Indicator.** **NOTE** **If you cannot clearly see the hook block approaching the boom, you should have an assistant watch the hook block. You should be prepared to stop the crane immediately if the LMI system does not function properly by lighting the red warning light, sounding the audible alarm and locking the dangerous crane movements.** a. Check anti-twoblock alarm light and audible alarm by manually lifting the weight attached to anti-twoblock switches. b. Slowly raise the main boom hook block to bring it into contact with switch weight. When the hook block lifts weight, audible alarm should sound; anti-twoblock alarm light should light and motion of hook block should be stopped. Lower hook block slightly to eliminate this condition. c. Slowly lower or extend boom to create a potential two-block condition. When hook block lifts weight, alarm should sound, anti-twoblock alarm light should light and boom lowering and/or boom extension function should be stopped. **NOTE: If the light and audible alarm do not function as described and the crane movements are not stopped, the system is not working properly. The malfunction must be corrected before operating the crane.**	

OPERATOR PMCS (CONTD)

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED	EQUIPMENT IS NOT READY/AVAILABLE IF:
						d. Check that display of main boom length agrees with the actual boom length. e. Check that display of main boom angle agrees with actual angles. f. Check that display of crane operating radius agrees with actual radius. **NOTE** **After being properly set, the operation of the LMI is fully automated. Therefore, the operator must be thoroughly familiar with all controls of the LMI and must properly set each switch before operating the crane. All settings must be checked by lifting a load of known weight and comparing the load to the information displayed on the load moment indicator.** **Rated loads include the weight of slings and auxiliary lifting devices and their weights shall be subtracted from the listed ratings to obtain the net load to be lifted.**	
26						BATTERIES **WARNING** **Do not smoke or allow flame or spark in the vicinity while checking or filling the batteries. The batteries generate hydrogen - a highly explosive gas. Wear safety goggles when adding distilled water.**	

OPERATOR PMCS (CONTD)

ITEM NO.	INTERVAL B	D	A	W	M	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED	EQUIPMENT IS NOT READY/AVAILABLE IF:
						CAUTION **In cold operation, charge batteries immediately after water has been added to prevent freezing and damage to batteries; run crane engine for one hour at 1500 rpms.**	
				•		a. Check the electrolyte level. Electrolyte level should be above the plates and below the fill hole.	Batteries will not crank engine.
				•		b. Check battery cables and connections for corrosion.	Batteries will not crank engine.
				•		c. Check battery box for damage and corrosion.	
27	•					Mechanical Boom Angle Indicator and LMI lockout.	
						a. Check for proper operation. Raise boom to verify that light and error code occurs on LMI console. Refer to Appendix G.	
						b. While raising boom, verify that mechanical angle indicator moves from 0 to 70° without sticking or binding.	Mechanical boom angle indicator is inoperative, missing, or binds/sticks.

Section III - OPERATION UNDER USUAL CONDITIONS

GENERAL SAFETY PRECAUTIONS

It is impossible to compile a list of safety precautions covering all situations. However, there are basic safety precautions that MUST be followed during your daily routine. Safety is YOUR PRIME RESPONSIBILITY, since any piece of equipment is only as safe AS THE PERSON AT THE CONTROLS.

With this thought in mind, this section of the operator's manual will assist you, the operator, in promoting a safe working atmosphere for yourself and those around you. It is not meant to cover every conceivable circumstance which could arise. It is intended to present basic safety precautions that should be followed in daily operation. Because you, the operator, are the only part of the crane that can think and reason, your responsibility is not lessened by the addition of operational aids or warning devices. Indeed, you must guard against acquiring a false sense of security when using them. They are there to assist, NOT direct the operation. Operational aids or warning devices can be mechanical, electrical, electronic, or a combination thereof. They are subject to failure or misuse.

You, the operator, are the only one who can be relied upon to assure the safety of yourself and those around you. Be a PROFESSIONAL and follow the RULES of safety.

REMEMBER, failure to follow just one safety precaution can cause that accident to people or equipment.

You are responsible for the safety of yourself and those around you.

Ensure you and those working with you are aware of any special dangers where you are operating the crane. Be especially careful of dangerous ground and objects, including buildings, near the crane.

Be aware at all times that you are responsible for the safety of yourself, your co-workers, the crane and everything around it. Make certain the crane is properly maintained, and then pay attention to winds, boom deflections, rope sway, and any unusual things, which you, as a crane operator, may notice which would not be important to others.

Know and abide by the basic safety rules.

Read and understand the Operator's Manual before entering the cab.

Follow directions on all placards. Know what they mean and follow their instructions.

Operators must be thoroughly familiar with safe crane operating practices and have a complete understanding of all operation and maintenance instructions provided. Operators should be physically fit and thoroughly trained, with related experience, not be easily excitable, not be subject to epileptic seizures, and not be using any drug that could impair physical, visual, or mental reactions or capabilities.

Wear the proper clothing for the job. Wear personnel protective equipment as required by local or job regulations.

Inspect the crane every day (before the start of each shift). Ensure that routine maintenance and lubrication are being dutifully performed. Don't operate a damaged or poorly maintained crane. You risk lives when operating faulty machinery, including your own.

Know the area in which you are working. Familiarize yourself with work site and other potential hazards in the area.

Use caution when in the vicinity of overhanging banks or edges.

Keep your shoes clean. Before entering the cab, clean any mud or grease from your shoes. This will reduce the possibility of your foot slipping off a control pedal, possibly resulting in an accident.

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 checks and services.

Unless authorized and approved by U.S. Army Tank Automotive Command, do not make any modifications, alterations, or changes to a crane which could in any way affect its original design. Such action invalidates all warranties and capacity charts, and makes the owner/user liable for any resultant accidents.

Keep the crane properly maintained and adjusted at all times. Shut down the crane while making repairs or adjustments.

Keep your fingers away from potentially hazardous areas.

Always perform a function check after repairs have been made to ensure proper operation. Load test should be performed when structural or lifting members are involved.

Do not store flammable materials on the crane at any time.

Never get off (or on) a moving crane.

When getting on or off a stationary crane, use both hands and use handrails and steps provided.

Allow NO ONE other than the operator to be on the crane while the crane is functioning or moving.

PREPARATION FOR USE/SERVICE UPON RECEIPT

BEFORE TURNING ON IGNITION SWITCH

The crane is shipped ready for use, i.e., all engine oil, transmission oil, hydraulic oil and axles are ready for service.

1. Remove all packing materials securing the cab door. Remove all protective material in the cab.

2. Remove straps securing tool box.

3. Remove fire extinguisher. Remove fire extinguisher packing materials and install fire extinguisher in the cab.

4. Service all lubrication points in accordance with LO 5-3810-306-12.

5. Service fuel tank.

6. Perform all B (before) and W (weekly) PMCS.

7. Install Quick Start Bottle.

ENGINE OPERATION

The following starting and shutdown procedures should be used to operate engine.

STARTING PROCEDURE

WARNING

HEARING PROTECTION REQUIRED WHEN OPERATING THE CRANE.

WARNING

BEFORE STARTING ENGINE, ENSURE THAT PARKING BRAKE IS APPLIED AND SWING LOCK IS ENGAGED.

CAUTION

NEVER CRANK ENGINE FOR MORE THAN 30 SECONDS DURING AN ATTEMPTED START. IF ENGINE FAILS TO START AFTER 30 SECONDS, ALLOW STARTER MOTOR TO COOL FOR APPROXIMATELY TWO MINUTES BEFORE ATTEMPTING ANOTHER START.

CAUTION

IF ENGINE FAILS TO START AFTER FOUR ATTEMPTS, CORRECT THE MALFUNCTION BEFORE ATTEMPTING ANY FURTHER STARTS.

NOTE

Engine will not crank unless transmission gearshift lever is in neutral (N) position.

1. Position IGNITION switch to ON and depress ENGINE START pushbutton.

2. After engine starts, check engine instruments for proper indications as follows:

Trans. Oil Temp. °F (°C)	180-250 (82-121)
Eng. Water Temp. °F (°C)	175-185 (79-85)
Eng. Oil Press. psi (kPa) - min.	
Idle	10-30(70-210)
Rated	60-70(420-490)
Air Pressure psi (kPa)	105-120 (724-827)

CAUTION

IF OIL PRESSURE AND/OR TEMPERATURE GAUGE(S) DO NOT DISPLAY PROPER READINGS, SHUT DOWN THE ENGINE AND CORRECT THE MALFUNCTION BEFORE RESUMING OPERATION.

3. Allow engine and hydraulic oil to warm up at least five minutes before applying a load.

4. Perform all During (D) PMCS procedures.

SHUTDOWN PROCEDURE

1. Return crane to travel mode.

   a. Retract boom and swing boom over the front.

   b. Lower boom to horizontal.

   c. Raise and retract outriggers. Stow stabilizer floats

2. Put all controls in neutral.

3. Set parking brake and swing lock.

4. Allow engine to fast idle speed (1000 to 1200 RPM) for approximately five minutes to avoid high internal heat rise and allow for heat dissipation.

5. Position IGNITION switch to OFF.

6. Chock wheels.

CRANE TRAVEL OPERATION

PREPARATION FOR TRAVEL

1. Ensure crane is in travel mode. Strictly adhere to the following superstructure conditions before moving the crane whether under its own power or when being towed. Procedures for accomplishing the following are located in various sections of this manual.

   a. Fully retract boom.

   b. Swing boom over the front. Lower boom to horizontal.

WARNING

Do not drive the crane with the boom off center. Automatic oscillation lockout will occur, making the crane subject to tipping on uneven surfaces.

Do not drive the crane with the lift cylinders bottomed. Position the boom to horizontal.

   c. Push SWING BRAKE control knob. Engage mechanical swing lock by pushing down on SWING LOCK control handle.

   d. Remove hook block and/or overhaul ball from hoist cable(s). Stow them securely before traveling, or ensure hook block or overhaul ball is properly secured to tie down provided.

   e. Ensure outrigger stabilizers and outriggers are fully retracted and stablilizer floats are removed.

   f. Ensure all four (4) stabilizer floats are properly stowed.

CAUTION

Do not engage or disengage hydraulic pump with engine running. Otherwise, damage to pump and drive could occur.

2. Disengage hydraulic pump.

3. Check cold tire pressure (75 psi).

NOTE

Do not attempt to move crane until brake system air pressure is at normal operating level (approximately 75 psi).

4. Before traveling, check suitability of proposed route with regard to crane height, width and length. Ensure that all required permits are on board.

TRAVEL SAFETY PRECAUTIONS

1. Tire Temperatures - After every one hour of travel time, stop and allow tires to cool off 30 minutes.

2. Terrain - You should be cautious when moving over rough terrain.

3. Traction - Use four-wheel drive only when greater traction is necessary. (Refer to FOUR-WHEEL DRIVE OPERATION, for operating instructions.)

4. Bridges - Check load limit of bridges. Before traveling across bridges, ensure they will carry a load greater than the crane's weight.

5. Clearances. Watch clearances when traveling. Do not take a chance of running into overhead or side obstructions.

When moving in tight quarters, post a look-out to help guard against running into objects.

Never back up without the aid of signalman. He should assure that the area behind the crane is clear of objects and/or personnel.

6. Traffic - When traveling, keep lights on, use traffic warning flags and signs, and use front and rear flag vehicles. Check state and local restrictions and regulations.

   Drive carefully and avoid speeding.

7. Towing - Should the crane become mired down, use a tow truck or tractor to free the crane. The transmission or axles can be damaged if you attempt to free the crane without help.

   On open ground, tow or pull using only on the pintle hook or the two tow lugs installed on each end of the crane. When using tow lugs, always tow using a towbar conforming to MS50048, heavy duty capacity.

   Contact Organizational Maintenance to disconnect the front drive line before towing the crane. Ensure the drive axle selector is at 2WD-HI, to lockout the rear drive line.

STEERING - Steer the front wheels by turning the steering wheel and steer the rear by pushing/pulling the STEER control lever. Used singly or together, these controls provide:

1. Front Wheel Steering. The steering wheel controls the front wheels. This method of steering should always be used when traveling at higher speeds. Turning the wheel clockwise steers the crane to right. Turning the wheel counterclockwise steers the crane to the left.

CAUTION

Use rear steering only on the job site.

2. Rear Wheel Steering. Rear wheel steering is controlled by the STEER control lever. Pushing or pulling the control lever moves the rear steer cylinders.

   a. To steer the rear of the crane to the left, push STEER lever forward.

   b. To steer the rear of the crane to the right, pull STEER lever.

   c. Four Wheel Steering. Four-wheel steering is performed using the steering wheel and STEER control lever. Four-wheel steering requires turning the front and rear wheels in the same direction. The effect is in a tighter turning radius which will enable you to work the crane in-close when necessary.

   d. Crabbing. Crabbing implies turning the front and rear wheels in opposite directions (i.e., if the front wheels are steered left, then the rear wheels are steered right). The effect of crabbing is the crane moves in a diagonal direction, enabling you to work the corners of crane in close when necessary.

MOVING THE CRANE - FORWARD

1. Position DRIVE AXLE selector switch to either 2 WD-HI or 4WD-LO.

2. Position transmission shifting lever to first gear (1) position.

3. After engine warmup, shift transmission directional control lever from neutral (N) to forward (F) position. Release parking brake and depress foot throttle pedal until maximum gear speed is attained.

4. Shift transmission lever to second gear (2) position; accelerate until maximum gear speed is attained.

5. Shift to third gear (3) position and accelerate to desired travel speed.

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.

SPEED SELECTOR POSITION	MAXIMUM SPEED (MPH) Hydraulic Pump Engaged 4WD LO	2WD HI
1	1.4	3.8
2	2.8	7.9
3	7.6	19.9
	Hydraulic Pump Disengaged	
	4WD LO	**2WD HI**
1	1.4	3.8
2	2.8	8.0
3	7.6	20.1

MOVING THE CRANE IN REVERSE

CAUTION

Apply the service brakes and bring the crane to a complete stop before shifting transmission direction control lever to R (reverse).

Moving the crane in reverse requires the same steps as moving forward except for Step 3 where the transmission direction control lever is placed to F (forward). Place the lever to R (reverse).

FOUR-WHEEL DRIVE OPERATION

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

CAUTION

Before shifting from two-wheel drive to four-wheel drive (or from four back to two) the crane must be standing still.

1. Place transmission shift lever to N (neutral).

2. Position DRIVE AXLE selector switch to 4WD LO.

3. Select gear speed and direction of travel as described under MOVING THE CRANE - FORWARD.

4. Return DRIVE AXLE selector switch to 2WD HI as soon as conditions allow.

PARKING

WARNING

Always set parking brake when transmission is disengaged.

1. Stop crane with service brakes.

2. Move transmission shift lever to N (neutral)

3. Set parking brake.

4. If parked on a hill, chock wheels.

WARNING

After moving the crane, allow tires to cool before lifting any loads with the outriggers retracted (i.e., on rubber). Failure to follow this warning could result in a tire exploding causing personnel injury and/or equipment damage.

CRANING OPERATIONS

GENERAL SAFETY PRECAUTIONS

Most accidents involving mobile hydraulic cranes are caused by:

- crane out of level,
- bad surface conditions,
- outriggers used improperly or not used at all,
- unstable blocking under outrigger floats, and
- improper crane operation.

Don't interfere with the proper operation of aids and/or warning devices. Check them regularly and see they get proper care.

Operate engine at full governed RPM (2500) during performance of all crane operations.

Watch tail--swing of counterweight, especially if there are people or obstacles in the area.

Stay clear of sheaves, holes in telescoping boom and other potentially dangerous areas whenever the crane is in operation.

Pinch points are impossible to eliminate. Keep all portions of your body away from cable drums, sheaves, pulleys, lift cylinders and other moving parts of the crane.

Never operate the crane with less than one complete layer of rope on the hoist drum.

NEVER permit anyone to ride load, slings, hooks, etc., for any reason.

Allow no one to ride on the crane, carrier deck, engine compartment, etc.

Operate the crane only from the operator's seat. Operating from any other position, such as reaching in a window, creates a safety hazard.

Never work the crane when darkness, fog or other visibility problems make such operating unsafe.

Always check capacity of the crane as shown on load chart before making any lifts.

Report any crane damage immediately. Do not operate crane until inspected and approved for use.

ESTABLISHING A SIGNALPERSON

A qualified signalperson should be on site at all times when:

- working in vicinity of power lines,
- you cannot clearly see the load at all times, and
- moving the crane in direction in which you cannot clearly see the path of travel.

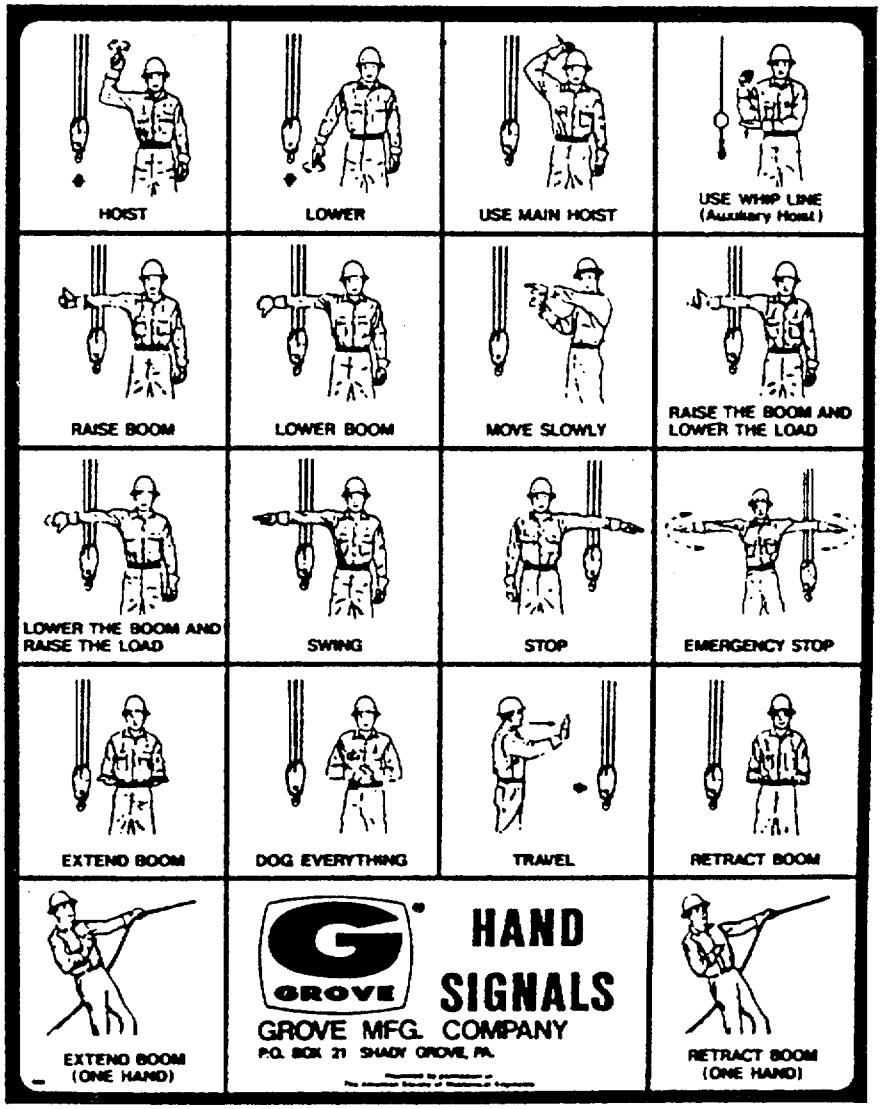
Use the standard hand signals shown below.

If communication between you and your signalperson is lost, stop craning operations until the problem is cleared up.

Watch the load at all times. Watch signalperson and/or load while it is moving. In case you must look in another direction, stop operation immediately.

Use only one qualified signalperson whenever your vision is blocked and follow his directions. But. . .

. . . .Obey a signal to stop from anyone.



Standard Hand Signals

WIRE ROPE AND SHEAVES SAFETY PRECAUTIONS

Always make daily inspections of wire rope and replace worn, rusty or frayed ropes. The following information is taken from a National Consensus Standard as referenced by Federal Government Agencies.

All wire rope will eventually deteriorate to a point where it is no longer useable. Wire rope shall be taken out of service when any of the following conditions exist:

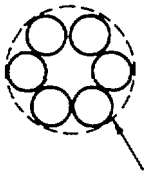
1. In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.

2. Wear of one-third the original diameter of outside individual wires.

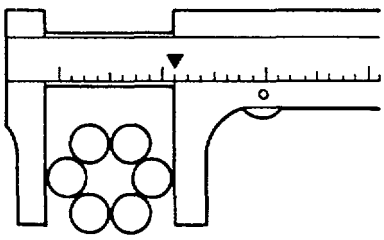
3. Evidence of heat damage from any cause.

4. Reductions from nominal diameter more than 3/64 inch for 3/4 diameters.

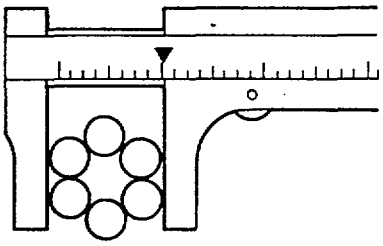
   How to measure or caliper a wire rope (allowable limits -0 + 5%)



A. "TRUE" DIAMETER



B. CORRECT



C. INCORRECT

To measure wire rope correctly, always measure the larger dimension. *Measurement methods are for 1/4" (6.35mm) and larger wire rope.

5. In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

6. Crushing - Because of loose windings on a drum, rope was pulled between laying wraps of wire rope and crushed when the loose wraps were tightened.

7. Birdcaging - Sudden release of a load causing birdcaging. Birdcaging is strands open/pulled away from each other displaying the core.

8. Locking, Corrosion, Pitting and Abrasion - Lack of lubrication, premature braking of wires, excessive dirt, sand or gravel embedded in the strands of the wire rope.

9. Reverse Bending - Caused by running the wire rope over one sheave and under another sheave.

10. Pinch - Caused by undersized sheave grooves; breaking wire strands.

Refuse to work with worn or damaged wire rope.

Never handle wire rope with bare hands.

Use the wire rope that is specified in TM 5-3810-306-24P.

Sheaves, guards, guides, drums, flanges and other surfaces that come in contact with rope should be inspected for conditions that could cause possible damage to rope.

Inspect the boom nose and hook block sheaves for wear. Damaged sheaves cause rapid deterioration of wire rope.

USE ENOUGH PARTS OF LINE FOR HEAVY LIFTS AND CHECK ALL LINES, SLINGS AND CHAINS FOR CORRECT ATTACHMENT. To obtain maximum lifting capacities, hook block must be set up with enough parts of line. NO LESS THAN ONE LAYER of wire rope should remain on hoist drum. When slings, ties, hooks, etc., are used, make certain they are correctly positioned and secured before raising or lowering the loads.

Ensure the wire rope is properly routed. If not properly routed, notify Organizational Maintenance.

Two-blocking MUST BE AVOIDED to prevent damage to the crane and to avoid creating a safety hazard. Two-blocking occurs when the hook block, overhaul ball, rigging, etc. contact the boom nose or auxiliary boom nose. Two-blocking can damage the wire rope rigging, reeving, and other crane components. These parts become highly stressed and overloaded until the wire rope fails allowing load, block, etc. to free fall.

WARNING

The crane is equipped with an anti-two-block warning system. Ensure that anti-two-block pins are removed prior to operating the crane. Failure to follow this procedure could result in personal injury and equipment damage.

When lowering or extending the boom let out cable to prevent two-blocking the boom nose and the hook block. The closer the load is carried to the boom nose, the more important it becomes to let out cable as the boom is lowered. Keep hook block, etc. at least 12 inches (30.48 cm) away from boom nose at all times.

ENSURING CRANE IS STABLE

Ensure crane is stable before lifting a load. Ensure outriggers (or tires if lifting on rubber) are placed firmly on solid ground. Ensure crane is level, brakes are set and load is properly rigged and attached to the hook block. Lift load slightly off the ground then recheck stability before proceeding with the lift.

Wind and other factors such as boom length, boom angle, size and weight of load being lifted, etc. can affect crane stability. You should establish safe working loads for each job depending on conditions that exist at the time. Capacity reductions shall be made when conditions indicate the crane could be damaged or become unstable. Be cautious if the wind speed reaches 20 miles per hour.

KEEP THE BOOM SHORT Swinging loads with the boom extended can cause boom damage and an unstable crane.

ELECTRICAL HAZARDS

Read and observe the WARNING plates posted in and on the crane.

Crane operation is extremely dangerous when close to an electrical power source.

Use extreme care when operating near an energized power source or power lines. Assume all power sources are hot.

When operating near power lines, have the power company cut off the power and ground the lines.

Obey the following rules at all times, whether power is cut off or not.

Move the crane away from power sources. Ensure that no part of the crane or load comes closer than the minimum clearances allowed below.

Get assurance that power has been turned OFF.

IMPORTANT - Always consider wire rope, hoist cable, pendant cables, tag lines, etc. as electrical conductors.

EXERCISE EXTREME CAUTION AND PRUDENT JUDGEMENT WHENEVER ELECTROCUTION HAZARDS EXIST - OPERATE SLOWLY AND CAUTIOUSLY.

Comply with all federal, state, and local laws and regulations.

Remember you do not have to touch a power line or power source to become electrocuted. Electricity can jump from the power line into the crane. "Low" voltages can also be dangerous.

Keep all parts of crane (ropes, hookblock and load) at least:

Power Source	Min Clearance
Under 50 KV	- 10 FEET
69 KV	- 12 FEET
115-161 KV	- 15 FEET
230-285 KV	- 20 FEET
345 KV	- 25 FEET
500 KV	- 35 FEET

Whenever a load, wire rope, boom or any Portion of a crane contacts or approaches too closely to an electrical power source, everyone in, on and around the crane can be seriously injured or killed!

THE ONLY SAFE WAY TO OPERATE A CRANE IS TO STAY AWAY FROM ELECTRICAL SOURCES!

Appoint a signalperson, equipped with a loud signal whistle or horn and voice communication equipment, to warn you when any part of the crane or load is near a power source. This person should have no other duties while the crane is working.

Warn all personnel of danger. Keep unnecessary personnel away from the working area. Permit no one to lean against or touch the crane. Permit no one including sling men or load handlers to hold load, lines or rigging gear.

Even if you are not affected by an electrical contact, others in the area may become seriously injured or killed. The use of boom guards, proximity devices, insulated hooks, links or mechanical limit stops do not assure safety. Even if codes or regulations require use of such devices, failure to follow rules listed here may result in serious injury or death. You should be aware of some of the limitations of devices.

Boom cage/guards afford limited protection from electrocution. They are designed to cover only boom-nose/point and a portion of the boom. Boom cages/guards are limited by their physical lengths, insulating abilities and operating conditions (e.g., dust, dirt, moisture, etc.).

Insulating links installed into the load line afford limited protection for those handling the load. Links have limited lifting, insulating and other properties that affect their performance. Moisture, dust, dirt, oils, etc. can cause a line to conduct electricity. Due to their capacity/ratings, some links are not effective for large cranes and/or high voltages/currents.

The only protection afforded by a link is that which is obtained below the link -- electrically downstream, provided the link has been kept clean and free of contamination and is tested prior to use for its non-conducting capability.

Proximity sensing devices are available in different types. Some use boom nose (localized) sensors and others use full boom length sensors. No warning may be given for components, cables, loads, etc. located outside of the sensing area. Responsibility is on you, the operator, in selecting and properly setting sensitivity of these devices.

Never rely soley on a device to protect you and your fellow workers from danger!

Some variables which you must be aware of are:

1. Proximity devices 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) -- the signal must not be ignored.

5. Proximity devices often become 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.

Overhead lines tend to blow with wind. Allow for this when determining safe operating distances.

DO NOT store material under power lines or close to electrical power sources.

Grounding the crane offers little or no protection from electrical hazards. The grounding effect is limited by the wire size used, the condition of the ground, amount of voltage and current present, etc. Power source contacts have been known to cause serious arcing due to grounding.

Tag lines should always be made of non-conductive materials.

Any tag line that is wet or dirty can conduct electricity.

Working in the vicinity of radio frequency transmission towers/sources may cause a crane to become electrically "charged." Survey the work site and develop specific safety precautions and operating procedures, prior to commencing operations.

If contact is made with a power source - THINK - DON'T PANIC.

1. Warn everyone to stay away from the crane.

2. Attempt to free the crane by operating the crane functions.

3. Stay in the crane until the power source has been turned off.

You should, only as a last resort, attempt to leave the crane after contacting a power source.

If it is absolutely necessary to leave the cab, JUMP COMPLETELY CLEAR OF THE CRANE - DO NOT STEP OFF. Hop away with both feet together. DO NOT walk or run.

Following any contact with an energized electrical source, thoroughly inspect the wire rope and all points of contact with the crane.

Advise your supervisor of the incident, who should consult TACOM for advice and crane inspection instructions prior to resuming operations.

CRANE MISUSE

Do not strike anything with the boom. If the boom should contacts an object; stop immediately. Inspect the boom. Do not use the crane if the boom is damaged.

Never push or pull something with the boom.

Do not add weight to counterweight to increase the cranes capacity.

Cranes are rated to handle freely suspended loads. Do not pull post, piling or submerged articles that may have a heavy accumulation of mud, silt or sand.

Never pull sideways with boom. Booms and swing systems are not designed to side pull and may be damaged from side loading. Booms are designed for lifting only freely suspended loads.

LIFT ONE LOAD AT A TIME. Do not lift two or more separately rigged loads at one time, even if loads are within the rated crane capacity.

PLANNING AND SET UP

1. Review the safety precautions in previous section.
2. Study the job site and select best location for the crane, where the:
   a. Surface is solid,
   b. Surface is level as possible,
   c. Crane is as far away from electrical power sources, overhead power lines, etc., as possible,
   d. Crane is sheltered from wind. (Be cautious if wind speed approaches 20 mph.)
3. Know weight of all loads before you attempt a lift. Ensure load to be lifted is within rated lifting capacity of the crane.

   Remember - all rigging equipment must be considered as part of load.
4. Measure load radius before making lifts and stay within approved lifting areas. Check your load chart.

   Lifting capacities vary with working areas. Permissible working areas are posted in crane cab. When swinging from one working area to another, ensure load chart capacities are not exceeded. Know your crane!

   When lifting loads, crane will lean toward boom and load will swing out, increasing load radius. Ensure load capacity chart is not exceeded when this happens.

   Always keep the load as near to the crane and as close to the ground as possible.
5. Position crane and extend outrigger beams.
6. Place cribbing on ground and position floats under jack cylinders at four places. Use cribbing under outrigger floats to distribute weight over a greater area. Check frequently for settling.
7. Extend jack cylinders and latch cylinder ends to floats.

CAUTION

Unless lifting within On Rubber capacities, outrigger beams must be fully extended with jack cylinders extended to provide maximum leveling of crane. Remove all weight from tires before lifting on outriggers.

8. Use sight level bubble indicator to ensure crane is level.

NOTE

You can also 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.

WARNING

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

9. After crane has been set-up, make a dry run before making the first lift. Become familiar with all factors peculiar to job site. Know what moves to make BEFORE attaching first load.

USING YOUR LOAD CHART (REFER TO APPENDIX F.)

NOTE

One of the most important tools of every crane is the load chart found in the crane operator's cab. It contains information which must be thoroughly understood.

The load chart contains a 360 degree on- outriggers capacity chart and an on-rubber capacity chart.

The capacity charts are divided into capacities limited by structural strength and capacities limited by stability. This is shown by the bold lines across the chart. Capacities above the line are limited by structural strength and capacities below the line are limited by crane stability.

The chart shows the radius of the load in a column at the left. The radius is the distance between the centerline of rotation of the crane and the center of gravity of the load. Various boom lengths are listed across the top, ranging from fully retracted to fully extended. The boom angle (in degrees) required for the given lift is shown in parentheses below the maximum total weight which can be lifted. Note that the boom lengths in between the increments shown should always be treated as if the boom was extended to the next longer length. For example, if the load chart has capacities for 50-foot and 55-foot boom lengths and the actual length of the boom in use is 52 feet, then the maximum capacity will be listed under the 55 foot boom length because the boom is beyond 50 feet in length.

Another important section of the load chart is the range diagram. The range diagram shows the tip height at each boom length, angle and radius. If the you know the radius required for a specific lift and the tip height you can calculate the required boom length and angle needed for the lift. Check the capacity chart for the specific boom length and radius to find out if the crane is capable of performing the lift safely. If the boom length and angle are known, the radius can be determined from the range diagram.

A lifting area diagram is included as part of the load chart to describe over-the-side, over-the-rear, and over-the-front lifting areas. The lifting area diagram shows that the locations of the outrigger stabilizer cylinders in the fully extended position are used to mark the boundaries of the lifting areas.

The last major portion of the load chart is the section concerning notes on lifting capacities. Be sure to read all notes carefully so you understand what each one means. The weights of any load handling devices must be added to the weight of the load.

NOTE

The following is a typical example of a lifting problem and how to compute a lift. However, numbers used in the example may not coincide with the loadchart in the crane cab.

The problem is to lift a container weighing 22.4 tons to a height of 46 feet at a radius of 27 feet. Determine whether or not the lift can be made safely. The range diagram shows the lift can be made using a boom length of 60 feet. A check of the on outrigger-360 degrees load chart at a 27 foot radius with a 60 foot boom length shows the crane has a lifting capacity of 48,000 pounds.

It appears from the listed capacity that 22.4 tons (44,800 pounds) can be lifted. But wait! The listed weight of all load handling devices such as slings, chains, spreader bars, or other rigging must be added to the load weight in order to obtain the actual weight of the load being lifted. For the purpose of this example we will assume that these load handling devices weigh 1500 pounds and must be added to the load weight (i.e., 44,800 + 1,500 = 46,300 pounds). Therefore, the total load weight of 46,300 pounds can be lifted since the total weight of the load is less than the (48,000 pounds) maximum crane capacity in this configuration. Following the initial calculation, the load chart should be rechecked to assure that the crane is capable of making the lift. Also note the laden boom angle (found in parentheses under the weight capacity of the load chart) will be approximately 55.5 degrees.

DON'T FORGET

LOAD CHARTS REPRESENT THE ABSOLUTE MAXIMUM ALLOWABLE LOADS, WHICH ARE BASED ON EITHER TIPPING OR STRUCTURAL LIMITATIONS UNDER SPECIFIC CONDITIONS. KNOWING THE EXACT RADIUS OF OPERATION, BOOM LENGTH AND BOOM ANGLE SHOULD BE A PART OF YOUR ROUTINE PLANNING AND OPERATION. ACTUAL LOADS, INCLUDING NECESSARY ALLOWANCES, SHOULD BE KEPT BELOW THESE CAPACITY FIGURES.

WORKING AREAS MUST BE ADHERED TO WHEN DETERMINING ALLOWABLE LOAD FROM LOAD CHART(S).

IF THE CRANE IS NOT LEVEL, LOAD CAPACITIES ARE REDUCED WHEN LIFTING ON THE LOW SIDE. DON'T BE MISLED BY OPTICAL ILLUSIONS. USE YOUR BUBBLE LEVEL.

IF YOU FEEL THE CRANE IS BEGINNING TO TIP, LOWER THE LOAD WITH THE HOIST LINE AND RETRACT OR ELEVATE THE BOOM TO BRING THE LOAD IN. NEVER LOWER OR EXTEND THE BOOM, THIS WILL AGGRAVATE THE CONDITION.

WHEN USING THE HOIST AVOID SUDDEN STOPS. INCREASED LOADING WILL RESULT AND COULD CAUSE TIPPING OR A STRUCTURAL FAILURE.

EVEN IF A HYDRAULIC LINE BREAKS ON THE LIFT OR TELESCOPE CYLINDER(S), THE CRANE WILL STILL FUNCTION SUFFICIENTLY TO GET THE LOAD DOWN.

MAXIMUM LIFTING CAPABILITY OCCURS AT THE SHORTEST RADIUS, MINIMUM BOOM LENGTH AND HIGHEST BOOM ANGLE.

THIS CRANE IS NOT EQUIPPED WITH ANY WARNING OR INSULATING DEVICES THAT CAN PROTECT YOU FROM ELECTRICAL SHOCK. USE EXTREME CAUTION WHEN WORKING AROUND OR NEAR AN ENERGIZED POWER SOURCE OR POWER LINES.

ELECTRICITY CAN CAUSE SEVERE INJURY OR DEATH IF CONTACT OCCURS.

ENSURE THAT ALL PERSONNEL ARE AWARE OF SAFETY PROCEDURES.

NOTE

Carefully read and become familiar with all crane operating instructions before attempting a preload check and operating the crane under load.

OPERATE THE ENGINE AT OR NEAR FULL GOVERNED RPM DURING PERFORMANCE OF ALL CRANE FUNCTIONS.

PRELOAD CHECK.

After the crane has been readied for service, an operational check of all crane functions (with no load applied) should be performed. Accomplish the Preload Check as follows:

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

2. Check all braking and holding devices before operation. Perform an operational check of all brake (wheel and swing) and safety holding devices before starting any crane or traveling operations.

3. Check swing brake. Make certain the swing brake operates correctly. Unexpected free swinging of a boom can be dangerous.

   Be sure everyone is clear of the crane and work area before swinging boom.

4. Raise, lower and swing the boom right and left a minimum of 45 degrees.

5. Telescope the boom in and out.

6. Raise and lower the cable a few times at various boom lengths. Ensure there is no kinking.

INITIAL LIFTING LOADS

1. Ensure that all slings, ties and hooks are correctly placed and secured before raising or lowering load.

2. Use tag lines, as appropriate, for positioning and restraining loads. Check load slings before lifting.

WARNING

Use only slings or other rigging devices rated for the job and use them properly. Never wrap the hoist cable around a load. Check all tackle, hardware and slings before use. Refuse to use faulty equipment.

3. Be sure load is secured and attached to hook with rigging.

4. Be sure everyone is clear of crane and work area before making any lifts.

5. Always refer to the capacity on load chart in the cab BEFORE making any

lift. Position hoist line to the radius required then lift load. Stay within approved work area for the load being lifted.

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

7. Check hoist brake by raising the load a few inches and holding it there. Be sure hoist brake is working correctly before continuing lift.

8. Check for settling of outrigger floats. Watch bubble level and alignment of load line with boom.

CAUTION

The engine must be shut down before attempting to engage the hydraulic pump drive.

CAUTION

Always disengage the hydraulic pump for extended traveling, cold weather starting, or engine checks.

CAUTION

Do not force the pump disconnect lever in an attempt to engage the pump drive.

9. Check that pump disconnect lever is in the appropriate position for the function being performed.

   a. The hydraulic pumps and disconnect are mounted on the torque converter driver pads and operate anytime the engine is running and the pump disconnect lever is in the ENGAGE position.

   b. The manual pump disconnect is actuated by a knobbed lever located on the deck between the turntable and front of the engine hood. It has two positions marked ENGAGE and DISENGAGE.

   c. The disconnect can be used to prevent the three section hydraulic pump from being driven when the engine is running.

NOTE

It may be necessary to bump the starter to engage the pump drive.

PROGRAMING LMI FOR NORMAL OPERATION

1. Position Reeving Selector switch to correct number for parts of line being used.

2. Position ON OUTRIGGERS/ON RUBBER switch to ON OUTRIGGERS.

3. Position Data Selector switch to display desired information on Data Display.

NORMAL CRANING OPERATION

WARNING

Be sure everyone is clear of the crane and work area before making any lifts.

1. Keep everyone away from suspended loads. Allow no one to walk under a load.

2. Sound a warning before moving crane or when approaching personnel.

3. Always move toward the load and move slowly. Use a tagline to control the load.

4. Tag line personnel must guide the load from the ground.

5. When lifting loads, lift slowly and proceed with caution.

NOTE

Maintaining a steady tension may free load without shock loading crane.

WARNING

Look before swinging your crane. Even though original set-up may have been checked, situations do change.

6. Use caution when swinging loads.

7. Swinging rapidly can cause load to swing out and increase load radius. Swing the load slowly. Keep load lines vertical.

8. Never stand or work on or near the superstructure while crane is moving or swinging.

WARNING

Never leave crane with a load suspended. Should it become necessary to leave the crane, lower load to the ground and stop engine before leaving cab.

9. Stop hook block from swinging when unhooking a load.

CRANE FUNCTIONS

WARNING

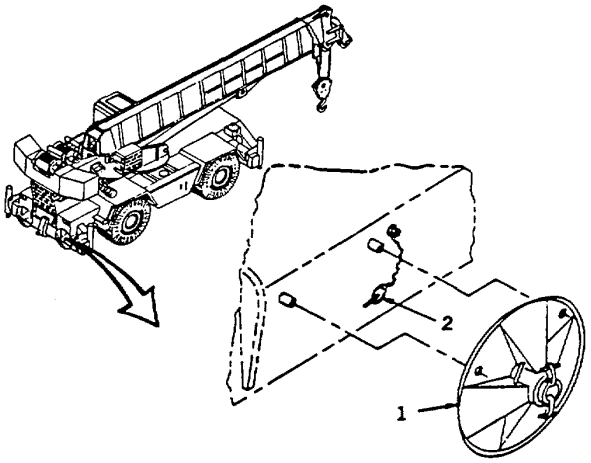
The outriggers must be fully extended and set before any other operation of the crane is attempted, unless lifting on rubber. Refer to ensuring crane is stable, page 2-37.

SETTING THE OUTRIGGERS

1. Position outrigger floats 6.5 feet (2 m) directly out from each outrigger as follows:

WARNING

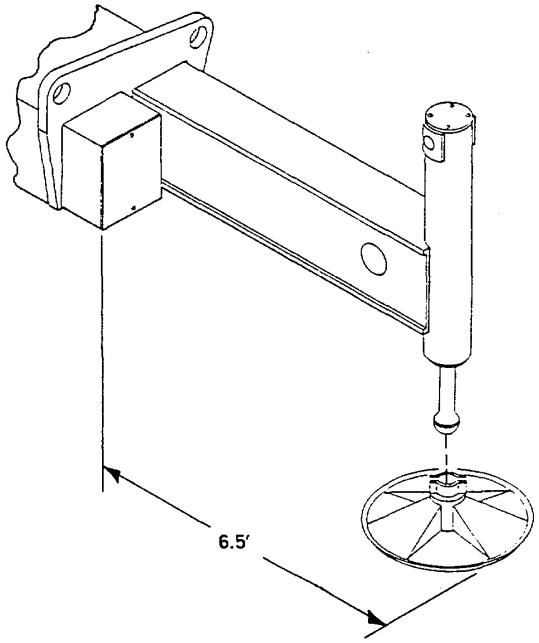
Each outrigger float weighs approximately 90 pounds. Use two people to remove each float. Use caution when lifting.



a. Support weight of outrigger float (1).

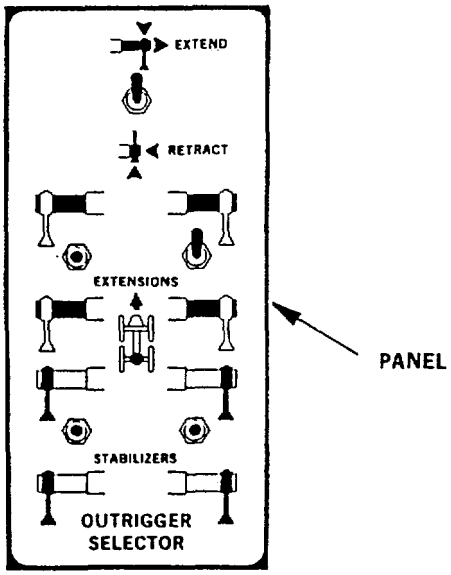
b. Remove quick disconnect pins (2) from mounting studs.

c. Remove outrigger floats (1) from studs.



Positioning Outrigger Floats

2. Set EXTEND/RETRACT toggle switch to EXTEND position.



3. Set left or right EXTENSION toggle switch to extend either front or rear outrigger. The appropriate outrigger should begin to extend.

NOTE

More than one outrigger can be extended at one time. However, to ensure that all four outriggers are fully extended, each outrigger extension should be performed individually.

4. After all four outrigger beams are fully extended, use left or right STABILIZER toggle switch to extend front or rear stabilizer. (The EXTEND/RETRACT toggle switch should remain in the EXTEND position.)

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

6. With each stabilizer float firmly touching ground, use STABILIZER toggle switches to extend front stabilizers 3 to 4 inches (7.6 to 10.2 cm).

7. Then, use STABILIZER toggle switches to extend rear stabilizers 3 to 4 inches (7.6 to 10.2 cm).

8. Repeat the procedures in steps 6 and 7 until all wheels are clear of ground and crane is level, as indicated by the sight bubble level indicator located at right side control panel. If you suspect that the sight bubble level indicator is out of adjustment, verify and adjust it as follows.

   a. Locate crane on a firm level surface.

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

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

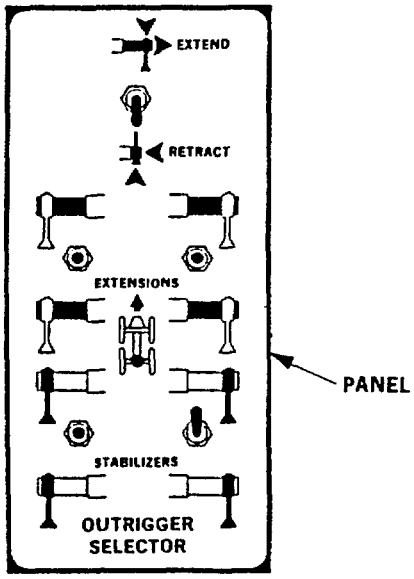
d. Using outriggers, level crane as indicated on the device used in step c.

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

STOWING OUTRIGGERS

1. Set R (rear) STABILIZER toggle switches and position toggle switch to RETRACT until rear stabilizers retract several inches.

2. Set F (front) STABILIZER toggle switches and position toggle switch to RETRACT until front stabilizers retract several inches.



3. Repeat steps 1 and 2 until crane is resting on all 4 wheels and stabilizer floats are several inches off ground.

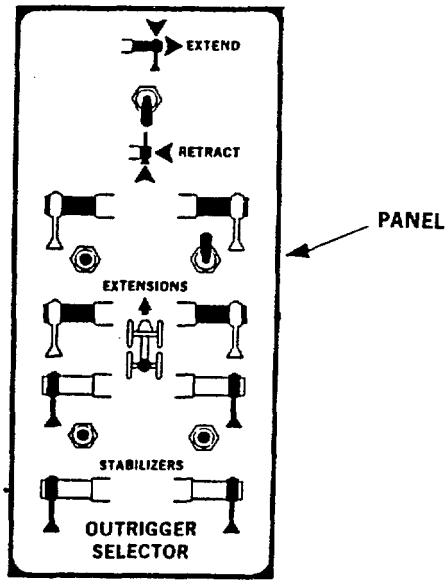
WARNING

Keep feet and hands clear of the floats when unlocking them from the stabilizer. Failure to follow this procedure could result in personnel injury.

4. Release locking levers and allow floats to drop to ground.

5. Continue to retract stabilizers until they are fully retracted.

6. Set appropriate EXTENSION toggle switch and position toggle switch to RETRACT each outrigger.



NOTE

More than one outrigger can be retracted at a time.

7. Stow outrigger floats on pins provided. Secure with lock pins.

SWINGING THE BOOM

WARNING

Before initiating any swing operations, make certain the area in the swing path of the hook and/or load, as well as the tail swing area, is clear of all objects and personnel.

WARNING

When swinging the load from over-the-front to over-the-side, check the load chart to make certain the applicable capacity is not exceeded. Traveling with any load over-the-side is unsafe.

WARNING

Always sound the horn to alert personnel in the area before swinging the boom.

WARNING

If the ELEVATE BOOM message appears on the LED alert display during swing, stop swing immediately and elevate the boom to clear the engine hood.

CAUTION

Ensure the swing lock is disengaged and the swing brake control is in the disengaged position before attempting the swing.

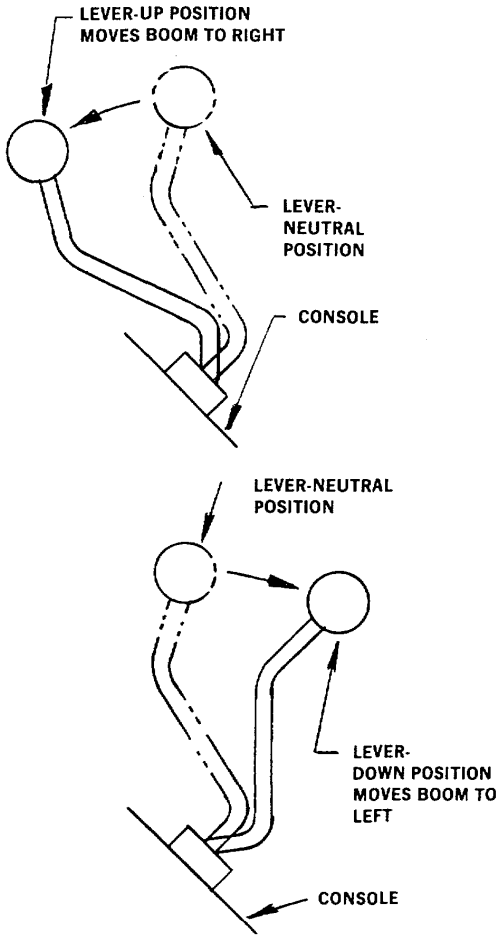
CAUTION

Never push or pull the swing control lever through neutral to the opposite direction to stop swing motion.

NOTE

Automatic rear axle oscillation lockout will activate when the boom swings more than five (5) degrees right or left of the crane centerline.

1. To swing boom, push the SWING control lever forward, away from you for RIGHT (clockwise) swing; and pull back, toward you for LEFT (counterclockwise) swing. Always operate control lever with a slow, even pressure.



2. Depress swing brake foot pedal on left side of the cab under front console to stop boom swing.

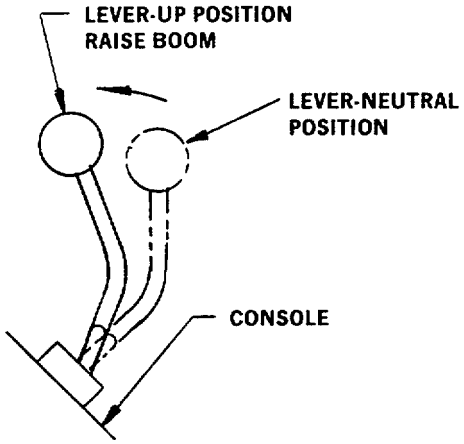
3. When swinging has stopped, push the SWING BRAKE control to engage swing lock.

RAISING AND LOWERING BOOM

WARNING

Before raising the boom, ensure the area above and beneath the boom is clear of all objects and personnel.

1. To raise boom, pull BOOM lift control lever back toward you and hold until boom reaches desired angle.



WARNING

Before lowering the boom, make certain the area beneath the boom is clear of all objects and personnel.

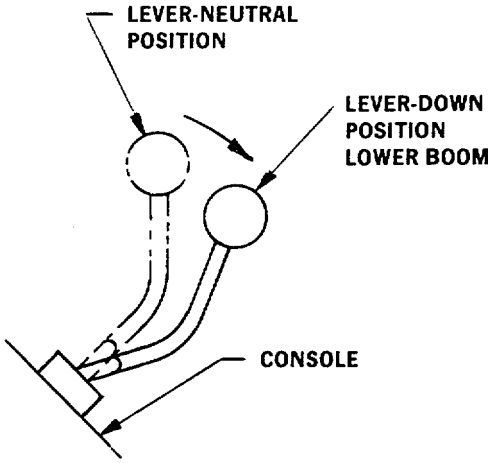
WARNING

When lowering the boom, let out hoist cable to prevent twoblocking the boom nose and the hook block.

CAUTION

The closer the load is carried to the boom nose, the more important it becomes to let out hoist cable as the boom is lowered.

2. To lower boom, push BOOM lift control lever forward, away from you, and hold until boom reaches desired angle.



Boom Lift Control Pedal.

NOTE

The boom may also be raised or lowered using the boom lift control pedal.

1. Depress toe of pedal to lower boom angle.

2. Depress heel of pedal to raise boom.

TELESCOPING (EXTENDING) BOOM

WARNING

When extending the boom, let out hoist cable to prevent twoblocking the boom nose and hook block.

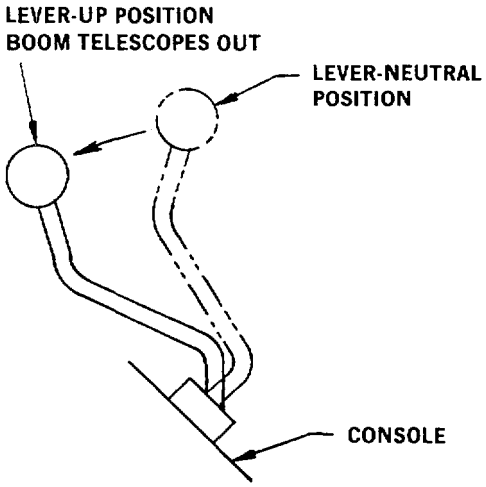
WARNING

Check the load chart for maximum load at given radius, boom angle, and length before extending boom with a load.

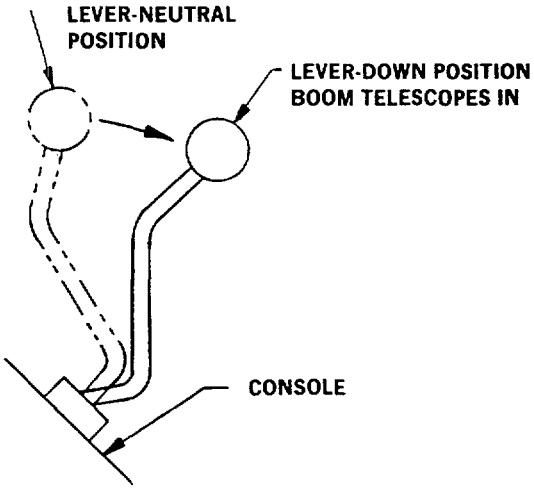
1. To extend boom, push TELE control lever forward away from you and hold until boom extends to desired length.

WARNING

When extending the boom, the load will raise unless the cable is let out.



2. To retract boom, pull TELE control lever back, toward you and hold until boom retracts to desired length.



LOWERING AND RAISING HOIST CABLE

WARNING

Before lowering or raising the cable (load), ensure the area beneath the load is clear of all objects and personnel.

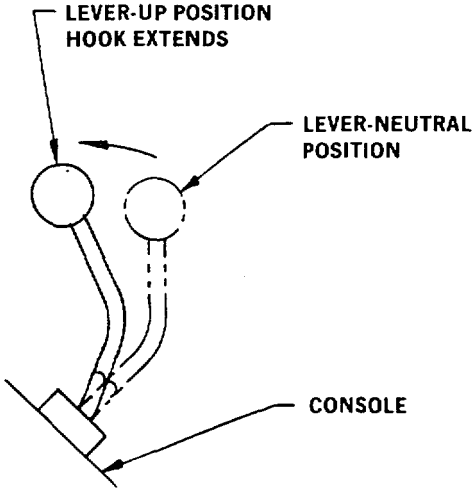
CAUTION

When starting or stopping the cable, do not jerk the control lever, jerking the lever causes the load to bounce, which could result in damage to the crane.

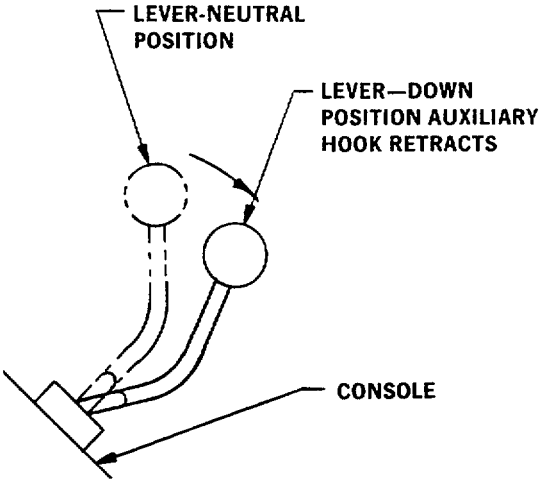
NOTE

When the load is stopped at the desired height, the hoist brakes will engage and hold the load as long as the control lever remains centered.

1. To lower hoist cable, push MAIN hoist or AUX hoist control lever forward, away from you, and hold until hook or load is lowered to desired height.



2. To raise hoist cable pull MAIN hoist or AUX hoist control lever back, toward you, and hold until hook or load is raised to desired height.



PARKING AND STOWING

WARNING

Never park the crane near holes or on rocky or extremely soft surfaces. This may cause the crane to overturn, resulting in injury to personnel and damage to the equipment.

After crane is parked, complete following:

1. If crane has been working on job site, retract and lower boom over-the-front (travel position).

2. Set parking brake.

WARNING

Before leaving the crane, ensure swing lock and swing brake are both engaged.

3. Chock the wheels if parking crane overnight or longer.

CAB HEATER

STARTING

1. Switch AIR TEMP toggle switch to HI.

2. Pull HEATER ON/OFF switch to ON to begin the automatic starting sequence.

3. Set AIR TEMP toggle switch to HI (raises temperature) or LO (lowers temperature).

STOPPING

1. Depress HEATER ON/OFF switch.

NOTE

The heater may not shut off immediately, since heater has a purge cycle. The blower will run until all fuel in the burner is consumed and heat exchanger cools sufficiently to open the flame switch. When this occurs, the blower motor will stop.

Section IV - OPERATION UNDER UNUSUAL CONDITIONS

INTRODUCTION

This section provides special procedures, safety precautions, etc. for weather conditions and modes of operation that are not ordinary. This section supplements the section "Operation Under Usual Conditions."

COLD WEATHER OPERATION

NOTE

Cold weather operation requires additional caution on the part of the operator.

1. Check operating procedures for cold weather starting.
2. Don't touch metal surfaces that could freeze you to them.
3. Clean crane, especially the boom, of all ice and snow.
4. Allow ample time for hydraulic oil to warm up.
5. During freezing weather, frequently check all air tanks for water.
6. Before lifting, ensure load is not frozen to ground or other surfaces.

WARNING

The use of aerosol spray or other types of starting fluids containing ether/ volatiles can cause explosions or fire.

7. Use the cold weather starting aid provided for diesel engine. Refer to TM 5-3810-306-24P.

CAUTION

The drive line can be damaged when attempting to free a frozen crane.

8. In freezing weather, park crane in an area where it cannot become frozen to ground.

COLD WEATHER STARTING

The correct grade of oil for the prevailing temperature should be used in the crankcase to reduce hard cranking. Refer to LO 5-3810-306-12. Diesel fuel should have a pour point of 10°F (-12°C) less than the lowest expected temperature. In case of emergency, Diesel Fuel Inhibitor, NSN 6850-00-753- 5061 may be added to the fuel to bring the pour point down to the required temperature to prevent clogging of filters and small passages by wax crystals. The addition of kerosene is NOT recommended for general use. If low temperatures are ONLY expected at start-up, use the cold weather starting aid provided. Start crane as follows:

CAUTION

Do not engage or disengage hydraulic pump with the engine running. Otherwise, damge to the pump and drive could occur.

1. Disengage hydraulic pump at disconnect.
2. Position IGNITION switch to ON.
3. Depress and hold both ENGINE START and quick start pushbutton. After two seconds, release quick start pushbutton.
4. If engine does not start within 30 seconds, allow starter to cool for one or two minutes and repeat procedure.

WARNING

Avoid overloading the air box when using the quick start button. Do not attempt more than three consecutive starts without allowing the quick start fluid to dissipate. Otherwise, an overloading of the air box with highly explosive fluid and minor explosion could occur.

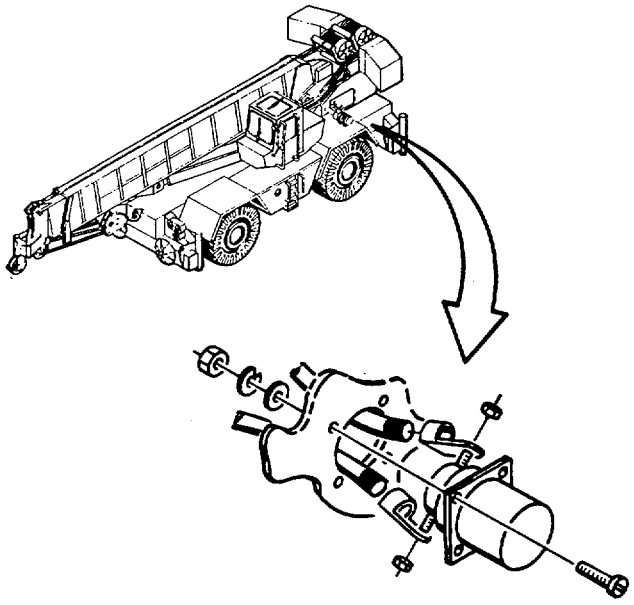
5. Allow engine and hydraulic oil to warm up to normal temperature before applying a load.

EMERGENCY STARTING

1. A NATO slave receptacle is located at the battery box for engine start from an external 24 VDC power source in the event the crane's batteries fail.

NOTE

The crane cannot be started by pushing or towing.



Slave Receptacle

PROGRAMING LMI FOR LIFTING ON RUBBER

1. Position Reeving Selector switch to correct number for parts of line being used.
2. Position ON OUTRIGGERS/ON RUBBER switch to ON RUBBER.
3. Position STATIONARY/PICK & CARRY switch to desired position for type of on rubber lift.
4. Position Data Selector switch to display desired information on Data Display.

LIFTING ON RUBBER

1. When lifting a load on rubber (i.e. without extending outriggers), review all safety precautions for operating on rubber.
2. Study job site and determine best location for crane.
3. Get weight of load, measure load radius and check On-Rubber Capacity Chart (Refer to Appendix F) to determine boom length and angle.
4. Position crane on level surface.
5. Dry Run - Follow Preload Check procedure.
6. Rig load and attach to hook.
7. Be sure everyone is clear of the crane and the work area.
8. Raise load a few inches and hold it there. Check that hoist brake is working correctly. Check for settling of tires. Watch bubble level and alignment of the load line with boom. If there is any sign of instability, put the load down and move crane to flatter surface.

PICK AND CARRY OPERATIONS

WARNING

Exercise extreme caution when picking and carrying a load.

1. When performing pick and carry operations or operating on sloping ground, carry loads much less than capacity. Keep load low and uphill from crane. Swing load only to keep the load uphill, and always place loads on high side.

2. When traveling with a load, boom should be carried in line with direction of motion.

EMERGENCY BOOM OPERATING PROCEDURES

Although improbable the boom lift cylinders hydraulic equalizer line could fail. If this occurs, there are devices that allow continued crane operation. All crane functions remain operable until the hydraulic oil in the reservoir is depleted. The most important thing is to get the boom in a safe position so that repairs can be made. The following procedures are recommended for getting the boom to a safe position should the equalizer line fail.

1. Don't panic. Remain in cab. All functions can be accomplished from cab.

2. Maintain engine at normal operating speed.

3. Maintain desired boom angle by pulling back on boom control lever, as necessary. With oil leaking from the hydraulic system, boom angle will drop if you do not react.

4. While maintaining boom at this angle: activate swing; retract boom; and operate hoist(s) as necessary until load is safely lowered to ground.

5. If over-the-side, retract as much boom as possible and then lower boom. If over-the-front, it will not be necessary to retract boom. Remember, boom cannot be lowered to minimum elevation over-the-rear, as boom would hit engine hood.

EMERGENCY LOAD LOWERING PROCEDURE

In the event of a hydraulic system failure (pumps, diesel engines, etc.), it will be necessary to lower a suspended load, retract the boom, swing the boom over the front and retract the outriggers in order to tow the crane to a maintenance area.

To return the crane to the travel mode from; elevated and extended boom; over-the-side; with suspended load and outriggers extended and set; proceed as follows:

NOTE

A hand pump is permanently installed behind the sheet metal, on the right hand side of the crane, forward of the hydraulic reservoir. Refer to the figure titled - Hand Pump Operation, provided for this procedure.

1. Install pump handle and hoses.

   a. Remove pump handle and three (3) hoses (one each at 12-feet, 18-feet and 38-feet long) from tool box.

   b. Install pump handle.

c. Connect 38-foot long hose (with couplings on both ends) to quick coupler on hand pump. This is the hand pump pressure hose.

2. Lower load.

a. Check to make sure that load can be lowered without contacting extended outrigger or crane carrier. If necessary, retract boom, (step 3) or rotate boom (step 5) enough to assure safe load lowering.

b. Loop hand pump pressure hose out from under hydraulic tank cover and carry loose end up onto superstructure to hoist (main or auxiliary as applicable).

c. Uncouple hoist brake release quick coupler of hoist supporting load.

d. Install loose end of hand pump pressure hose to half of quick coupler leading to hoist brake.

e. Pump hand pump lever. By pumping the handle, hydraulic pressure is applied to the hoist brake, releasing the brake and slowly lowering the load.

f. Disconnect hand pump pressure line and reconnect hoist brake release quick coupler after load has been lowered to ground.

3. Retract boom.

NOTE

Retracting the boom is a two person operation.

a. Carry loose end of hand pump pressure line onto superstructure.

b. Open cover on control valve compartment (behind cab).

c. Locate tele-rear steer-lift valve bank (center of control valve compartment).

d. Remove dust cover on male coupler installed on inlet section of valve bank. Connect hand pump pressure hose at coupler.

e. Instruct operator in cab to pull back on TELE control lever. Hold lever in this position.

f. Pump hand pump lever. By pumping the handle, hydraulic pressure is applied to the telescope cylinder control valve causing the boom telescope section to slowly retract.

g. Return TELE control lever to neutral position after boom has been retracted.

h. Disconnect hand pump pressure hose at control valve bank and install dust cap on male coupling.

4. Lower boom.

NOTE

If transporting crane, do not lower boom beyond horizontal.

a. Carry bleed-down hose (12-foot long hose with only one coupling) onto superstructure.

b. Ensure that lift bleed-down valve is in OFF position.

c. Remove dust cover on male coupler on bleed-down valve.

d. Connect female coupler on bleed-down hose to male coupler on valve.

e. Remove breather/fill cap on hydraulic tank by turning it one-quarter turn counterclockwise.

CAUTION

When inserting bleed-down hose in the hydraulic reservoir, use care to avoid damaging the inlet strainer.

f. Insert cut off end of bleed-down hose in the hydraulic reservoir opening.

g. Slowly open bleed-down valve to lower boom.

h. Close bleed-down valve when boom has lowered to desired height.

i. Disconnect bleed-down hose at bleed-down valve. Reinstall dust cap on male coupler.

j. Carefully remove bleed-down hose from hydraulic reservoir opening.

k. Replace breather/fill cap on hydraulic reservoir.

5. Rotate boom over-the-front.

NOTE

This procedure requires a towing vehicle and pull cable or chain of sufficient capacity and length to pull the superstructure around to the front with the swing brake released.

a. Connect 38-foot long pump pressure hose to hand pump.

b. Loop free end of hand pump pressure hose out from under hydraulic tank cover and carry free end of hose up onto crane superstructure.

c. Remove dust cap on male quick coupler located on swing brake.

d. Connect free end of hand pump pressure line to swing brake quick coupler.

e. Attach pull chain or cable to counterweight sling lug.

CAUTION

Do not pull on boom. Applying a side load to boom could cause irrepairable damage.

f. Unlock positive swing lock.

g. Pump hand pump to release swing brake while applying steady pull with towing vehicle. Pull boom around until boom is centered over the front.

h. Engage positive swing lock.

6. Retract outrigger.

NOTE

Each outrigger jack and beam must be retracted/raised separately.

a. Disconnect 38-foot long hose at hand pump (if installed).

b. Connect 18-foot long hose (shorter hose with two connectors) to quick coupler on hand pump. This is hand pump pressure hose.

c. Connect female end of hand pump pressure hose to male fitting located on inside surface of left hand carrier side rail.

d. Close shut-off valve located near connection made in step c. This valve must be closed to manually retract outriggers.

e. Locate front outrigger valve stack (back side of front outrigger box). Locate rear outrigger valve stack (inside surface of left hand carrier side rail just forward of rear outrigger box).

f. Locate four (4) quick couplers (four on each outrigger valve stack). The two inside couplers retract jack cylinders. The two outside couplers retract extension cylinders (beams).

g. Connect 38-foot long hose (with couplers on each end) to quick coupling on back of hydraulic reservoir. This is the hydraulic return line.

h. Select first jack cylinder to be retracted.

i. Connect free end of hydraulic return line to appropriate quick coupler on front (or rear) outrigger valve stack. Jack cylinders are retracted using the two inside quick couplers on each valve stack.

j. Pump hand pump until jack cylinder is completely retracted.

k. Repeat steps i and j for each of the other three outrigger jack cylinders.

l. Select first extension cylinder (beam) to be retracted.

m. Connect free end of hydraulic return line to appropriate quick coupler on front (or rear) outrigger valve stack. Extension cylinders are retracted using the two outside quick couplers on each valve stack.

n. Pump hand pump until extension cylinder (beam) is completely retracted.

o. Repeat steps m and n for each of the other three outrigger extension cylinders.

p. Disconnect all hoses and reinstall dust caps where provided.

q. Open shut-off valve that was closed in step d.

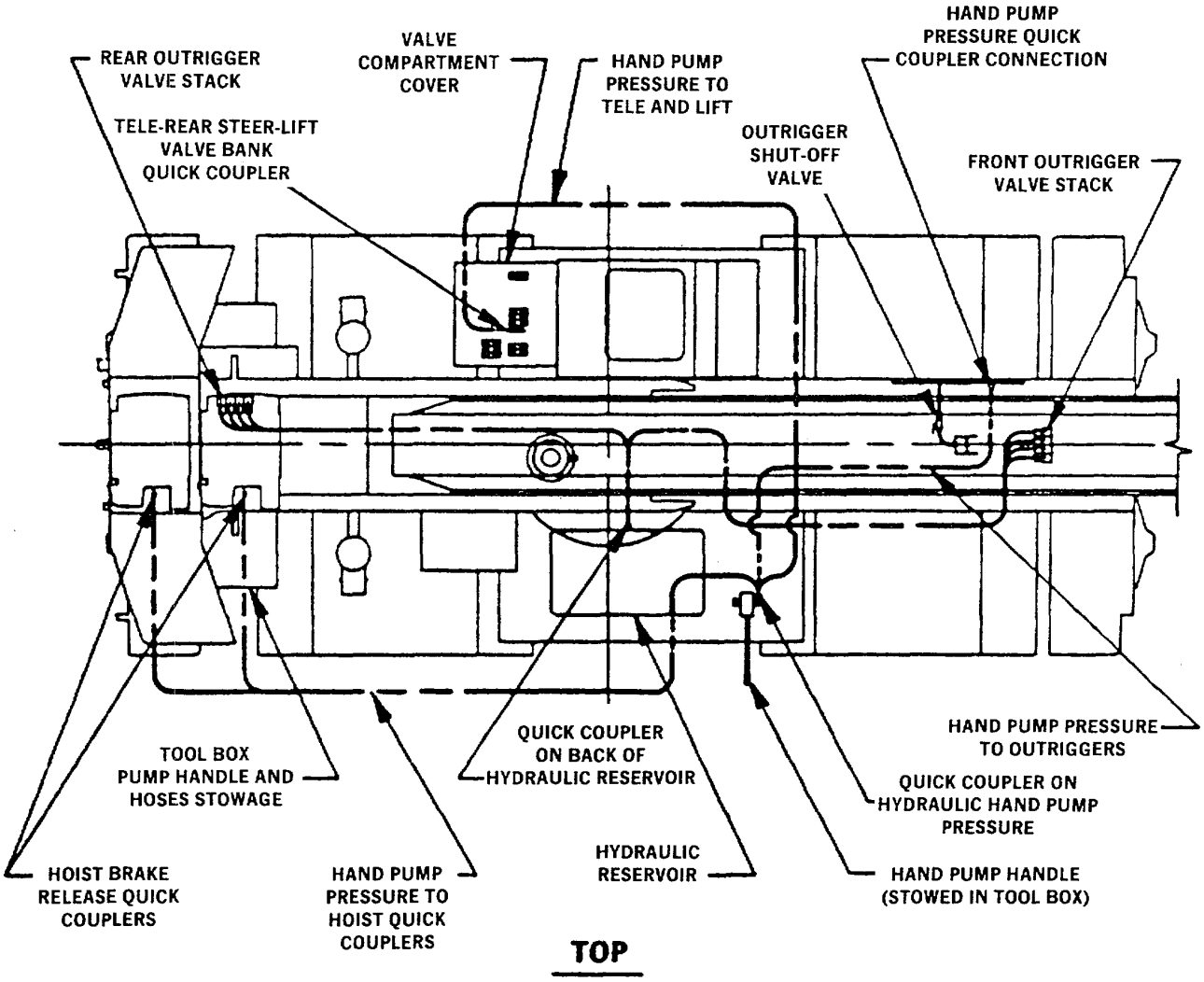
7. Stow equipment.

   a. Disconnect hand pump pressure line. Cap all quick disconnect couplings.

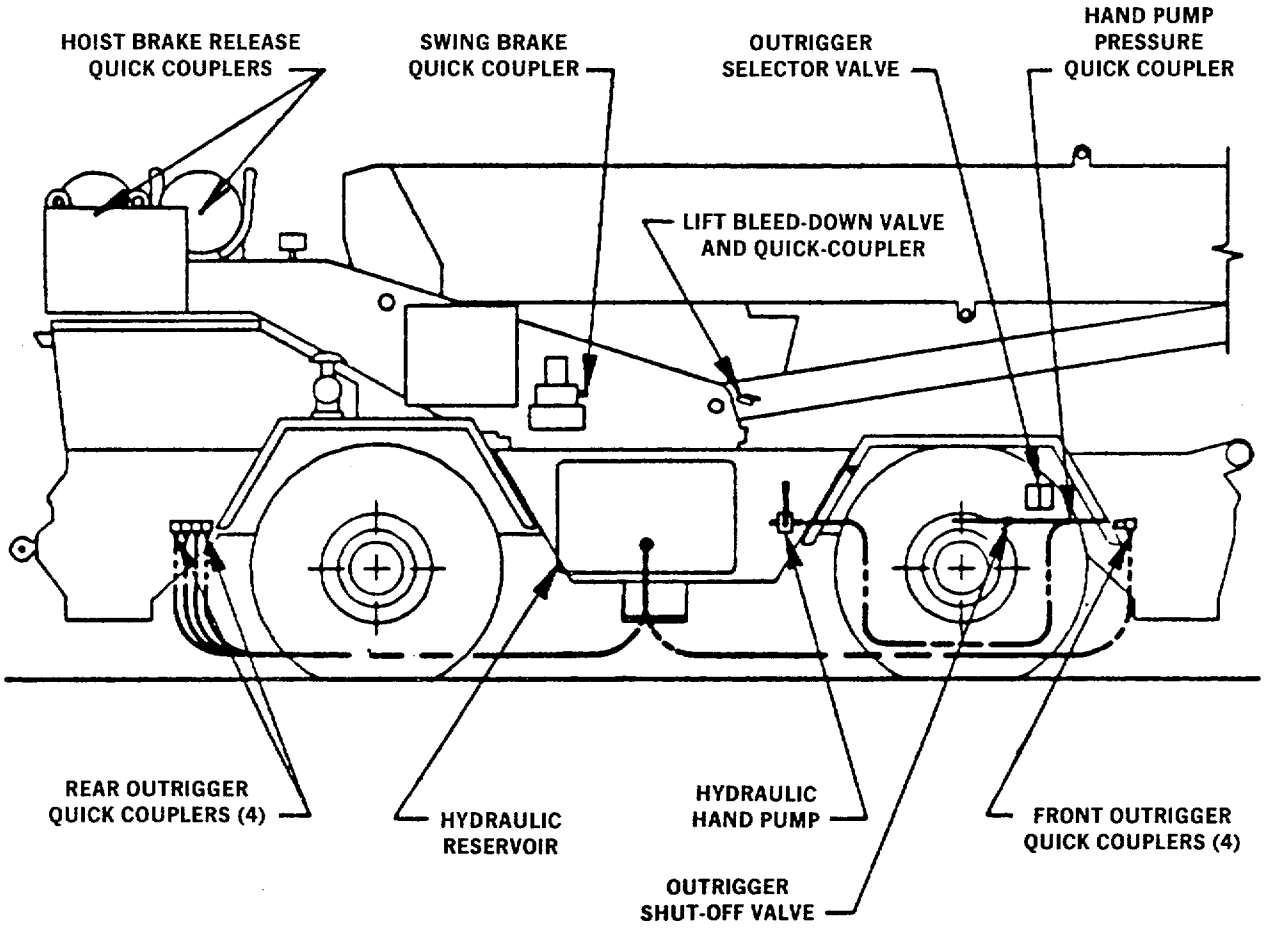
   b. Coil three (3) hoses and stow them in tool box.

   c. Remove pump handle and stow it in tool box.

8. When towing crane, refer to shipping plate posted on crane and use towing lugs provided.



Hand Pump Operation



SIDE

Hand Pump Operation

TOWING

WARNING

On open ground, tow or pull only on the pintle hook or tow lugs.

CAUTION

Should the crane become mired down, use a tow truck or tractor to free the vehicle. Severe damage to the transmission or axles may occur if the operator attempts to free the crane unassisted.

Two tow lugs are located on each end of 1 the crane. When using these lugs, always tow using a towbar conforming to MS50048, heavy duty capacity.

CAUTION

Contact Organizational Maintenance to disconnect the front drive line before towing the crane. Ensure the drive axle selector is at 2WD-HI, to lockout the rear drive line.

CHAPTER 3

Section I - LUBRICATION INSTRUCTIONS

LUBRICATION ORDER

Lubricate the crane in accordance with the Lubrication Order, LO 5-3810-306-12.

Section II - TROUBLESHOOTING PROCEDURES

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TROUBLESHOOTING TABLE

INTRODUCTION

a. The table lists the common malfunctions which you may find during the operation or maintenance of the Container Crane or its components. You should perform the tests/ inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all test or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

TABLE 3-1. OPERATOR TROUBLESHOOTING

MALFUNCTION **TEST OR INSPECTION** **CORRECTIVE ACTION**
1. ENGINE WILL NOT CRANK OR CRANKS SLOWLY
Step 1. Hydraulic pump engaged.
a. Check position of hydraulic pump disconnect lever. If pump disengaged, do step 2.
b. Disengage hydraulic pump.
Step 2. Starting circuit connections loose or corroded.
a. Inspect connections at starting motor. If tight and corrosion free, do step 3.
b. Clean and tighten connections.
Step 3. Battery charge low.
a. Contact Organizational Maintenance to charge/service batteries.
2. ENGINE HARD TO START OR WILL NOT START - EXHAUST SMOKE PRESENT
Step 1. Starting aid needed for cold weather.
a. Use cold weather starting aid. If engine does not start do step 2.
Step 2. Intake air system restricted.
a. Inspect air cleaner inlet hood. If ok, do step 3.

TABLE 3-1. OPERATOR TROUBLESHOOTINC (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

b. Contact Organizational Maintenance to remove intake hood and air filter element. Replace air filter element and clean intake hood.

Step 3. Fuel contaminated.

a. Check fuel sediment bowl for contamination. If fuel ok, do step 4.

Step 4. Contact Organizational Maintenance.

3. ENGINE CRANKS, BUT WILL NOT START - NO SMOKE FROM EXHAUST

Step 1. No fuel in tank.

a. Check fuel level in tank. If ok, do step 2.

b. Service fuel tank.

Step 2. Fuel-water separator plugged with water.

a. Drain fuel-water separator.

4. ENGINE STARTS BUT WILL NOT KEEP RUNNING

Step 1. Engine starting with hydraulic pump engaged.

a. Check position of hydraulic pump disconnect lever. If pump disengaged, do step 2.

b. Disengage hydraulic pump.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Fuel waxing due to cold weather.

a. Drain fuel-water separator. If ok do step 3.

b. Contact Organizational Maintenance to drain fuel tank and service with cold weather fuel grade.

Step 3. Fuel contaminated

a. Check fuel sediment bowl for contamination. If fuel ok, do step 4.

Step 4. Contact Organizational Maintenance

5. ENGINE WILL NOT SHUT OFF

Step 1. Fuel system malfunction.

a. Lower and extend outriggers. Shut off fuel supply at fuel sediment bowl.

b. Contact Organizational Maintenance.

6. ROUGH IDLE, WARM ENGINE

Step 1. Intake air system restricted.

a. Inspect air cleaner inlet hood. If ok, do step 2.

b. Contact Organizational Maintenance to remove intake hood and air filter element. Replace air filter element and clean intake hood.

Step 2. Fuel contaminated.

a. Check fuel sediment bowl for contamination. If fuel ok, do step 3.

Step 3. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TRCUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

7. ENGINE SURGES AT IDLE

Step 1. Low fuel level in the fuel tank.

a. Check fuel level in tank.

b. Service fuel tank.

8. LOW LUBRICATING OIL PRESSURE

Step 1. Incorrect oil level.

a. Check engine oil level. If ok, do step 2.

b. Add engine oil to correct level. Refer to LO 5-3810-306-12.

Step 2. Oil diluted with water.

a. Inspect for missing oil fill cap, dipstick, etc. If ok, do step 3.

b. Contact Organizational Maintenance to drain and refill engine oil.

Step 3. Oil leak due to loose or missing pipe plug.

a. Check for external leak at rear of cylinder head, along fuel pump side of block, oil cooler cover and gear housing.

b. Contact Organizational Maintenance.

9. LUBRICATING OIL PRESSURE TOO HIGH

Step 1. Engine lubrication system malfunction.

a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

10. LUBE OIL LOSS

Step 1. External leaks.

a. Visually inspect for oil leaks. If no leaks, do step 2.

b. Contact Organizational Maintenance.

Step 2. Crankcase overfilled.

a. Remove dipstick and check oil level. Refer to LO 5- 3810-306-12. If ok, do step 3.

b. Contact Organizational Maintenance to drain engine oil to proper level.

Step 3. Engine lubrication system malfunction.

a. Contact Organizational Maintenance.

11. CONTAMINATED ENGINE OIL

Step 1. Engine lubrication system malfunction.

a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
12 EXHAUST SMOKE EXCESSIVE UNDER LOAD
Step 1. Engine overloaded.
a. Downshift to lower gear.
Step 2. Fuel system malfunction.
a. Contact Organizational Maintenance.
13. ENGINE WILL NOT REACH RATED SPEED WHEN LOADED
Step 1. Vehicle overloaded.
a. Reduce load or downshift to lower gear.
Step 2. Fuel system malfunction.
a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
14. LOW POWER
Step 1. Vehicle overloaded.
a. Reduce load or downshift to lower gear.
Step 2. Engine oil level too high.
a. Remove dipstick and check engine oil level. Refer to LO 5 3810-306-12. If ok, do step 3.
b. Contact Organizational Maintenance to drain engine oil to proper level.
Step 3. Fuel system malfunction.
a. Contact Organizational Maintenance.
15. ENGINE MISFIRING
Step 1. Fuel system malfunction.
a. Contact Organizational Maintenance.
16. FUEL KNOCK
Step 1. Engine overloaded.
a. Downshift to lower gear.
Step 2. Fuel system malfunction.
a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
17. EXCESSIVE FUEL CONSUMPTION
Step 1. Operator Technique. a. Review Chapter 2-Operating Instructions. If ok, do step 2.
Step 2. Fuel leak. a. Inspect for fuel leaks. If ok, do step 3. b. Contact Organizational Maintenance to repair leaks.
Step 3. Fuel system malfunction. a. Contact Organizational Maintenance.
18. EXCESSIVE VIBRATION
Step 1. Engine drive component failure. a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

19. EXCESSIVE ENGINE NOISES

Step 1. Drive belt squeal, insufficient tension or abnormally high loading.

a. Check belt tension and condition of drive belt. (Refer to page 3-26.)

b. Make sure water pump tensioner pulley, fan hub and alternator turn freely. If ok, do step 2.

c. Contact Organizational Maintenance to replace drive belt or tensioner.

Step 2. Defective engine.

a. Contact Organizational Maintenance.

20. FUEL OR OIL LEAKING FROM EXHAUST MANIFOLD

Step 1. Defective engine.

a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

21. COOLANT TEMPERATURE ABOVE NORMAL

Step 1. Low coolant level.

a. Check coolant level. If ok, do step 2.

b. Add coolant to proper level.

Step 2. Radiator fins damaged or obstructed with debris.

a. Inspect radiator fins for damage and debris. If ok, do step 3.

b. Clean debris from radiator.

c. Contact Organizational Maintenance to replace defective radiator.

Step 3. Collapsed radiator hose.

a. Inspect upper and lower radiator hoses. If ok, do step 4.

b. Contact Organizational Maintenance to replace radiator hose(s).

Step 4. Engine oil level too high or too low.

a. Remove dipstick and check engine oil level. If ok, do step 5.

b. Add engine oil to proper level. Refer to LO 5-3810-306-12.

c. Contact Organizational Maintenance to drain engine oil to proper level.

Step 5. Loose fan drive belt.

a. Inspect fan drive belt and belt tensioner. (Refer to page 3-26.) If ok, do step 6.

b. Contact Organizational Maintenance to replace fan drive belt and/or tensioner.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 6.	Engine overloaded.
	a. Reduce load and downshift to lower gear.
Step 7.	Defective engine.
	a. Contact Organizational Maintenance.
22. COOLANT LOSS	
Step 1.	Radiator leaking coolant.
	a. Visually inspect radiator hoses and connections to locate leak. If ok, do step 2.
	b. Contact Organizational Maintenance to replace radiator components.
Step 2.	External engine leaks.
	a. Visually inspect engine and components for seal or gasket leaks. If ok, do step 3.
	b. Contact Organizational Maintenance to repair leaks.
Step 3.	Turbocharger aftercooler leaks.
	a. Inspect turbocharger aftercooler, piping and connections for leaks.
	b. Contact Organizational Maintenance to repair leaks.
23. COOLANT TEMPERATURE BELOW NORMAL	
Step 1.	Temperature sensor or gauge malfunction.
	a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
24. CONTAMINATED COOLANT
Step 1. Coolant system malfunction.
a. Contact Organizational Maintenance to repair coolant system.
25. ALTERNATOR NOT CHARGING OR INSUFFICIENT CHARGING
Step 1. Loose or corroded battery connections.
a. Inspect battery connection. If ok, do step 2.
b. Contact Organizational Maintenance to clean or tighten battery connections.
Step 2. Fan drive belt slipping.
a. Inspect fan drive belt tensioner by hand. Refer to page 3-26. If ok, do step 3.
b. Contact Organizational Maintenance to replace fan drive belt and/or tensioner.
Step 3. Alternator pulley loose on shaft.
a. Inspect alternator pulley. If ok, do step 4.
b. Contact Organizational Maintenance to tighten alternator pulley.
Step 4. Charging system malfunction.
a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

26. CRANE WILL NOT MOVE OR MOVES ERRATICALLY (TRANSMISSION FAILURE)

Step 1. Low transmission oil level.

a. Remove dipstick and check transmission oil level. Refer to LO 5-3810-306-12. If ok, do step 2.

b. Fill to proper level. Refer to LO 5-3810-306-12.

Step 2. Transmission shift lever at N-Neutral.

a. Check position of transmission shift lever.

Step 3. Defective transmission.

a. Contact Organizational Maintenance.

26A. TRANSMISSION OIL TEMPERATURE ABOVE NORMAL

Step 1. Low transmission oil level.

a. Remove dipstick and check oil level. Refer to LO 5- 3810-306-12. If ok do step 2.

b. Fill to proper level. Refer to LO 5-3810-306-12.

Step 2. Defective transmission.

a. Contact Organizational Maintenance.

27. BRAKES ARE POOR OR DO NOT APPLY

Step 1. Insufficient air pressure.

a. Air brake system failure. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

28. HARD TO STEER LEFT AND RIGHT

Step 1. Hydraulic oil low.

a. Check hydraulic oil level in reservoir, If ok, do step 2.

b. Fill hydraulic reservoir to proper level. Refer to LO 5-3810-306-12.

Step 2. Steering system failure.

a. Contact Organizational Maintenance.

29. REAR STEERING INOPERATIVE

Step 1. Hydraulic oil low.

a. Check hydraulic oil level in reservoir. If ok, do step 2.

b. Fill hydraulic reservoir to proper level. Refer to LO 5-3810-306-12.

Step 2. Steering system failure.

a. Contact Organizational Maintenance.

30. SLOW OR ERRATIC OPERATION OF OUTRIGGER CYLINDERS

Step 1. Low hydraulic oil.

a. Check hydraulic oil level. If ok, do step 2.

b. Fill hydraulic reservoir to proper level. Refer to LO 5-3810-306-12.

Step 2. Outrigger system malfunction.

a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
31. JACK CYLINDER RETRACTS UNDER LOAD
Step 1. Outrigger system malfunction.
a. Contact Organizational Maintenance.
32. JACK CYLINDER EXTENDS WHILE MACHINE IS TRAVELING
Step 1. Outrigger system malfunction.
a. Contact Organizational Maintenance.
33. OUTRIGGER SYSTEM WILL NOT ACTIVATE
Step 1. Hydraulic oil low.
a. Check hydraulic oil level. If ok, do step 2.
b. Fill hydraulic reservoir. Refer to LO 5-3810-306-12.
Step 2. Outrigger system malfunction.
a. Contact Organizational Maintenance.
34. OUTRIGGER SYSTEM ACTIVATES, BUT SELECTED OUTRIGGER WILL NOT RETRACT OR EXTEND AND LOWER AS DESIRED
Step 1. Outrigger system malfunction.
a. Contact Organizational Maintenance.
35. OUTRIGGERS WILL NOT SET
Step 1. Improper sequence of activation.
a. Activate individual control switch; then activate EXTEND/RETRACT switch.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
36. BOOM RAISES OR LOWERS ERRATICALLY
Step 1. Hydraulic oil low.
a. Check hydraulic oil level. If ok, do step 2.
b. Fill hydraulic reservoir. Refer to LO 5-3810-306-12.
Step 2. Low engine rpm.
a. Increase engine rpm.
Step 3. Hydraulic system failure.
a. Contact Organizational Maintenance.
37. BOOM RAISES OR LOWERS SLOWLY
Step 1. Low hydraulic oil.
a. Check hydraulic oil level. If ok, do step 2.
b. Fill hydraulic reservoir. Refer to LO 5-3810-306-12.
Step 2. Low engine rpm.
a. Increase engine rpm.
Step 3. Cold hydraulic oil.
a. Operate crane to bring oil to operating temperature.
Step 4. Hydraulic system failure.
a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
38. BOOM WILL NOT RAISE OR LOWER
Step 1. Low hydraulic oil.
a. Check hydraulic oil level. If ok, do step 2.
b. Fill hydraulic reservoir. Refer to LO 5-3810-306-12.
Step 2. Excessive load.
a. Reduce load as required. Refer to Appendix F.
Step 3. Hydraulic system failure.
a. Contact Organizational Maintenance.
39. ERRATIC OPERATION OF TELESCOPING CYLINDER
Step 1. Low hydraulic oil.
a. Check hydraulic oil level. If ok, do step 2.
b. Fill hydraulic reservoir. Refer to LO 5-3810-306-12.
Step 2. Low engine rpm.
a. Increase engine rpm.
Step 3. Lack of lubrication on boom section.
a. Lubricate boom sections. Refer to LO 5-3810-306-12.
Step 4. Side loading causing improper boom alignment.
a. Reduce load. Refer to Appendix F. Use proper hoisting procedures.
Step 5. Hydraulic system failure.
a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

40. TELESCOPE CYLINDER WILL NOT EXTEND OR RETRACT

Step 1. Low hydraulic oil level.

a. Check hydraulic oil level. If ok, do step 2.

b. Fill hydraulic oil level. Refer to LO 5-3810-306-12.

Step 2. Excessive load.

a. Reduce load. Refer to Appendix F.

Step 3. Hydraulic system failure.

a. Contact Organizational Maintenance.

41. HOIST WILL NOT RAISE LOAD

Step 1. Load capacity exceeded.

a. Reduce load. Refer to Appendix F.

Step 2. Low hydraulic oil.

a. Check hydraulic oil level. If ok, do step 3.

b. Fill hydraulic reservoir. Refer to LO 5-3810-306-12.

Step 3. Hydraulic system failure.

a. Contact Organizational Maintenance.

42. HOIST WILL NOT LOWER LOAD.

Step 1. Malfunctioning hoist brake.

a. If necessary, perform Emergency Load Lowering Procedures (Refer to page 2-54).

b. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
43. SLOW OR ERRATIC HOIST OPERATION
Step 1. Low engine rpm.
a. Increase rpm.
Step 2. Hydraulic system failure.
a. Contact Organizational Maintenance.
44. BOOM SWING OPERATIONS ERRATIC IN EITHER DIRECTION
Step 1. Low engine rpm.
a. Increase engine rpm.
Step 2. Low hydraulic oil.
a. Check hydraulic oil level. If ok, do step 3.
b. Fill hydraulic reservoir. Refer to LO 5-3810-306-12.
Step 3. Insufficient lubricant on swing bearing.
a. Inspect swing bearing. Lubricate bearing. Refer to LO 5-3810-306-12.
Step 4. Crane not level.
a. Level crane using outriggers (Refer to page 2-45).
Step 5. Crane overloaded.
a. Reduce load (Refer to Appendix F).
Step 6. Swing system failure.
a. Contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

45. SWING BRAKE SYSTEM WILL NOT OPERATE.

Step 1. Low hydraulic oil.

a. Check hydraulic oil level. If ok, do step 2.

b. Fill hydraulic reservoir. Refer to LO 5-3810-306-12.

Step 2. Swing system failure.

a. Contact Organizational Maintenance.

46. CAB HEATER STOPS OR DOES NOT START

Step 1. Fuel tank empty.

a. Check fuel tank level and fill as required. If ok, do step 2.

Step 2. Heater failure.

a. Contact Organizational Maintenance.

47. CAB HEATER EXHAUSTS BLACK SMOKE

Step 1. Heater failure.

a. Contact Organizational Maintenance.

NOTE

If any error code appears on the Load Moment Indicator Console that is not listed below, contact Organizational Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
48 ERROR CODE E01 ON LMI MOMENT DISPLAY
Step 1. Minimum radius or maximum angle exceeded due to raising the boom too far.
a. Lower boom to a radius or angle given in the load chart. Refer to Appendix F.
Step 2. Load moment indicator system malfunction.
a. Contact Direct Support Maintenance.
49. ERROR CODE E02 ON LMI MOMENT DISPLAY
Step 1. Maximum radius or minimum angle exceeded due to lowering boom too far.
a. Raise boom to a radius or angle given in the load chart. Refer to Appendix F.
Step 2. Load moment indicator system malfunction.
a. Contact Direct Support Maintenance.
50. ERROR CODE E04 ON LMI MOMENT DISPLAY
Step 1. Operating mode switches on console set incorrectly.
a. Set operating mode switches to match operation mode of crane. Refer to Table 2-2.
Step 2. Load moment indicator system malfunction.
a. Contact Direct Support Maintenance.

TABLE 3-1. OPERATOR TROUBLESHOOTING (CONTD)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

51. ERROR CODE E05 ON LMI MOMENT DISPLAY

Step 1. Maximum or minimum boom length exceeded.

a. Telescope boom to correct length given in load chart. Refer to Appendix F.

Step 2. Load moment indicator system malfunction.

a. Contact Direct Support Maintenance.

52. ERROR CODE E80 ON LMI LOAD DISPLAY

Step 1. Indicates load on hook is below 9,000 lbs.

a. No corrective action required. Information code only.

53. ERROR CODE EEE ON LMI MOMENT DISPLAY

Step 1. Actual load exceeds 200% of rated machine capacity at a given operating condition.

a. Correct to operate within approved load chart and operating conditions. Refer to Appendix F.

Step 2. Load moment indicator system malfunction.

a. Contact Direct Support Maintenance.

END OF TASK

Section III - MAINTENANCE PROCEDURES

INTRODUCTION

This section contains maintenance procedures which are the responsibility of the operator. The operator shall be responsible for maintaining the good running order of all functions and features of the Container Crane, following the procedures provided here. When a malfunction occurs that is beyond the scope of these procedures (and thus beyond your responsibility) report that malfunction to your supervisor to be serviced by a higher maintenance level.

To ensure good running order, perform your PMCS.

Consult the PMCS for guidance in determining whether or not the crane is available for operation.

ENGINE INSPECTION AND SERVICE

ENGINE INSPECTION

1. Open engine access doors and inspect the following:
    a. Oil fill cap is secure.
    b. Oil dipstick is secure.
    c. All electrical wiring is secure.
    d. Coolant fill cap is secure.
    e. Evidence of oil, fuel, and coolant leaks.
2. Close engine access doors and secure.

AIR CLEANER ASSEMBLY

1. Check the air restriction indicator. If red line is low on the scale, have Organizational Maintenance replace filter elements.
2. Inspect vacuator valve. The valve lips should be open only when the engine is shut down, or running at low idle speed. If the valve is turned inside out, check for a clogged air cleaner inlet. Malfunction of this valve does not reduce the air cleaner effectiveness, but does allow the element to get dirty faster and reduces serviceable life. If a valve is lost or damaged, have Organizational Maintenance replace it with a new valve of the same part number.
3. Check the air cleaner intake pipe caps and screens for accumulation of leaves and other debris that could restrict air flow. Have Organizational Maintenance repair screens or replace caps if any large holes are found in the screen.
4. Check mounting hardware for security to eliminate possible vibration of intake piping. Such vibration leads to early failure of hoses, clamps and mounting parts, and can cause hoses to slip off the connecting pipes, allowing unfiltered air into the engine air intake.
5. Check hoses for cracks, chafing or deterioration, and have Organizational Maintenance replace at the first sign of probable failure.

FUEL

FUEL SUPPLY

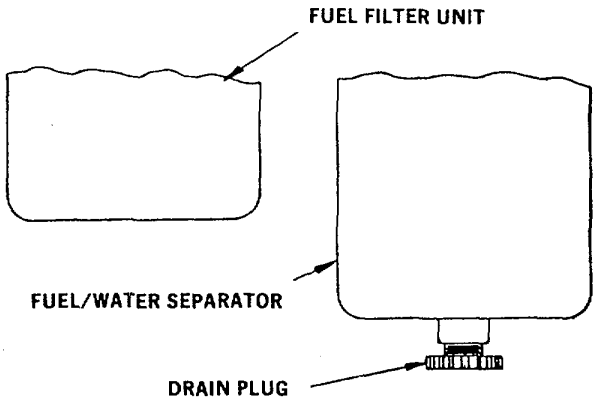
Check fuel level. If necessary, add diesel fuel. IGNITION SWITCH must be OFF when adding fuel.

FUEL FILTER-WATER SEPARATOR

Draining

The fuel filter-water separator should be drained daily, 30 minutes after the engine is shut down, to remove any water and sediment. Proceed as follows:

1. Open drain valve, 1/4 turn.
2. Drain until fuel appears.
3. Close drain valve. Do not over- tighten.



Fuel Filter/Water Separator

EXHAUST SYSTEM MUFFLER AND PIPES

Inspect muffler and pipes for the following:

1. Check all supports and hangers are intact.
2. Check for exhaust leaks. Look for excessive corrosion, holes and misaligned parts.

COOLING SYSTEM

Coolant Supply

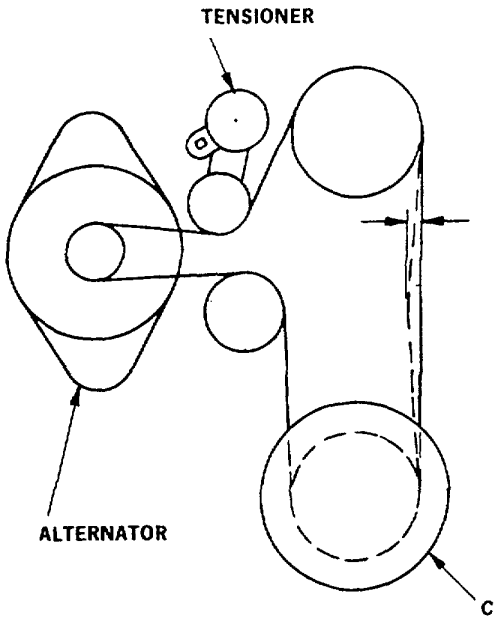
Check when cool. The coolant expansion tank is on the left side of the hood. If below FULL when cold, add coolant (50/50 mix of antifreeze AFC, MIL-A-46153, and clean water).

RADIATOR

1. Inspect radiator and hoses for secure mounting.
2. Check for coolant leaks at hose, pipe fittings and joints.

FAN DRIVE BELT

1. With engine off, press long vertical run of fan belt on right side of engine and measure belt deflection.
2. If deflection exceeds 1/4-inch, the belt is either stretched or belt tensioner is defective. In either case, contact Organizational Maintenance.



Checking Belt Tension

ELECTRICAL SYSTEM

Sending Units and Warning Switches

The LED alert display performs a five-second self-test of the alarm indicators and audible alarm when the engine IGNITION switch is on. When these indicators turn off due to normal operation the warning switches are working successfully.

1. With IGNITION SWITCH-ON and engine running ensure that panel gauges operate properly. This confirms the sending units are functional.

HORNS AND ALARMS

1. With IGNITION switch ON and blackout light switch in either SERV DRIVE or STOP LIGHT positions, press horn button. Horn should sound.

2. With transmission direction lever in R (reverse), engine running and blackout light switch in either SERV DRIVE or STOP LIGHT position, backup alarm should sound.

BATTERIES

1. Ensure cable and clamps are tight and not corroded, and batteries are secure.

TRANSMISSION SERVICE

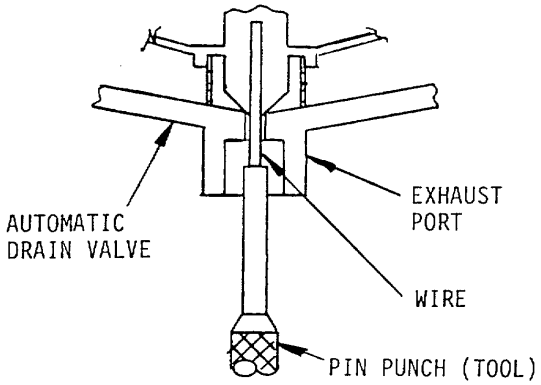
1. Check oil level in transmission. This should be done with the oil temperature gauge reading between 180-200 degrees F. Add oil if level is below FULL mark on dipstick.

HYDRAULIC FLUID COOLER

1. Inspect for leaks and dirt fouling the air path through the oil cooler.

AIR RESERVOIR SERVICE

1. Check for moisture in air system by opening the reservoir's drain cock or automatic drain valve. Use a tool to drain the automatic drain valve. Move the wire in the exhaust port up, holding it until draining is complete. In areas where more than a 30 degree temperature range is common, small amounts of water can condense in air system. Small amounts of water are normal and are not an indication that the dryer is not working.



Automatic Drain Valve

2. Have Organizational Maintenance replace the desiccant cartridge in the air dryer when it has been determined that the desiccant is contaminated and cannot absorb water.

TIRES

1. Check air pressure in each tire. Pressure should be 75 psi.

WARNING

The rim is made up of three pieces with a locking ring. If not properly seated, the locking ring and rim parts can fly apart with lethal force. Always use a tire inflation cage and clip on inflator. Failure to follow this procedure could result in personnel injury.

2. If low, place tire inflation cage around tire and using clip on inflator, fill tire to 75 psi.

3. Have Organizational Maintenance check torque of wheel lug nuts. This torque should be 325 ft-lbs (44.9 kgm), dry.

STEERING SYSTEM

HYDRAULIC HOSES, LINES AND FITTINGS

1. Inspect for leaks, loose fittings and damaged hoses.

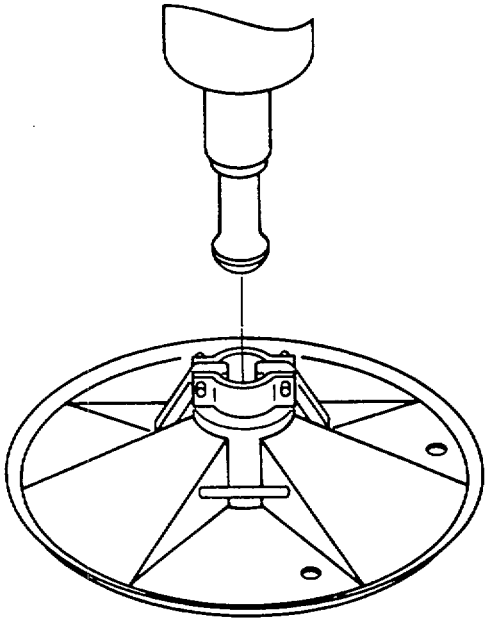
FRAME

OUTRIGGERS

1. Inspect outriggers for smooth operation, lubrication, clean cylinder rods and no hydraulic leaks.

OUTRIGGER PADS

1. Inspect outrigger pads and their locking collars for damage and loose parts.



Outrigger Pads

BODY, CAB, HOOD AND HULL

DOOR ASSEMBLY WITH LATCH/HANDLE

1. Inspect for loose or missing weatherstripping, loose door, latch and/or handle. Ensure door slide moves freely without binding, and that door latch locks.

FRONT CONSOLE

1. Inspect for loose mounting screws, loose gauge mounts, loose lever mechanisms, torn rubber boots on levers, broke switches and knobs.

HOOD ASSEMBLY

1. Inspect for loose screws, fittings, attachments and corrosion.

FENDERS AND REAR DECKING INSTALLATION

1. Inspect for loose screws, fittings, attachments and corrosion.

SEAT ASSEMBLY

1. Inspect for loose screws, torn upholstery and broken slides. Inspect seat belt buckle and belt fabric for wear. Ensure that the seat slides freely on its tracks.

FIRE EXTINGUISHER

1. Inspect charge indicator. Pointer shold be in green zone.

2. Inspect for loose mounting, damage to hose, nozzle, etc.

BODY, CHASSIS, OR HULL AND ACCESSORY ITEMS

ACCESSORY ITEMS

1. Inspect windshield wiper blades on both the front window and skylight; replace if worn.

2. Operate control switches for wipers and for windshield washer.

3. Check washer fluid level in bottle in the valve compartment and fill if needed.

CAB HEATER/DEFROSTER

1. Inspect for fuel leaks, exhaust leaks and rust corrosion.

CAB HEATER FUEL TANK

1. Inspect fuel supply. If low, add diesel fuel.

2. Inspect for fuel leaks, loose mounting, loose tubing and fillings, etc.

HYDRAULIC SYSTEM

HYDRAULIC CONTROL VALVES

1. Ensure all components are secure and there are no leaks.

STRAINERS, FILTERS, LINES AND FITTINGS SERVICE

1. Ensure all components are secure and there are no leaks. Check filter indicator on hydraulic reservoir; if white indicator is at or below the halfway mark on the window have Organizational Maintenance replace filter element.

HYDRAULIC LIFT CYLINDERS

1. Ensure all components are secure and not leaking.

2. Inspect cylinder rod for dirt and/or scoring.

3. Inspect oil seals for accumulated dirt and clean if needed.

HYDRAULIC TELE CYLINDER

1. Ensure all components are secure and not leaking.

2. Inspect cylinder rod for dirt and/or scoring.

3. Inspect oil seals for accumulated dirt and clean if necessary.

HYDRAULIC RESERVOIR

1. Inspect reservoir level sight gauge. If level is low, add oil. Inspect breather cap on top of the reservoir; clean if necessary.

LOAD MOMENT INDICATOR (LMI) SYSTEM

1. Inspect inter-connecting electrical cables for damage and security.

2. Inspect length sensor cable for damaged insulation.

3. Inspect cable guides for damage that may cause damage to length sensor cable and for security.

4. Check for freedom of movement of anti-two block switches.

5. Check that cable reel is operating under tension.

6. Inspect the pressure transducers for hydraulic leaks and damaged hoses.

CRANE ATTACHMENTS

BOOM INSPECTION

1. Ensure all components of boom are secure and in good condition

2. Inspect for corrosion, dirt and oil leaks.

3. Inspect the telescope section for adequate lubrication of bottom plates; inspect telescope and base sections for evidence of cracks, warping or other damage.

4. Check security of boom wear pads.

5. Check boom nose sheaves for security and freedom of movement.

BOOM SERVICE

1. Where bottom plates lack lubrication add grease. Refer to Lubrication Order L05-3810-306-12.

GUIDES AND ROLLER

1. Ensure all components are secure and in good condition; look for dirt, grease, cracks scoring or grooving.

HOOK BLOCK INSPECTION

1. Inspect hook block; ensure all components are secure and in good condition. Look for freedom of movement of sheaves, hook and hook latch. Inspect for hook distortion and cracks.

HOOK BLOCK SERVICE

1. IF HOOK IS CRACKED OR DISTORTED, CALL ORGANIZATIONAL MAINTENANCE IMMEDIATELY.

TURNTABLE

SWING SYSTEM TEST

1. Check swing system operation by engaging the swing brake control, then position swing control lever in both directions. Superstructure rotation should not occur. Then disengage the swing brake control and swing the superstructure in both directions. Use the swing brake to stop rotation.

END OF TASK

APPENDIX A

REFERENCES

A-1. SCOPE

This appendix lists forms, field manuals, technical manuals, and other publications referenced in this manual and which apply to operation of the RT875CC Rough Terrain Container Crane.

A-2. DEPARTMENT OF THE ARMY PAMPHLETS.

Consolidated Index of Army Publications and Blank Forms..... DA Pam 25-30

Using Unit Supply System (Manual Procedures) ..... DA Pam 710-2-1

The Army Maintenance Management System (TAMMS)..... DA Pam 738-750

A-3. FORMS

Recommended Changes to Publications and Blank Forms.....DA Form 2028

Recommended Changes to Equipment Technical Publications ..... DA Form 2028-2

Organizational Control Record for Equipment.....DA Form 2401

Equipment Inspection and Maintenance Worksheet.....DA Form 2404

Maintenance Request.....DA Form 2407

Preventive Maintenance Schedule and Record ..... DD Form 314

Product Quality Deficiency Report (NSN 7540-00-105-0078) ..... SF 369

A-4. FIELD MANUALS.

NEC Contamination Avoidance.....FM 3-3

NEC Protection.....FM 3-4

NEC Decontamination.....FM 3-5

Camouflage .....FM 5-20

Operation and Maintenance of Ordnance Materiel in Cold Weather
(0 Deg to Minus 65 Deg F).....FM 9-207

First Aid for Soldiers .....FM 21-11

Manual for the Wheeled Vehicle Driver.....FM 21-305

Basic Cold Weather Manual.....FM 31-70

Northern Operations.....FM 31-71

Army Motor Transport Units and Operations.....FM 55-30

Desert Operations.....FM 90-3

Mountain Operations (How to Fight).....FM 90-6

A-5. TECHNICAL BULLETINS.

Tactical Wheeled Vehicles: Repair of Frames.....TB 9-2300-247-30

Equipment Improvement Report and Maintenance Digest (US Army Tank-Automotive Command) Tank-Automotive Equipment.....TB 43-0001-39 series

Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment, and Materiels Handling Equipment.....TB 43-0209

Maintenance in the Desert.....TB 43-0239

Description, Use, Bonding Techniques, and Properties of Adhesives.....TB ORD 1032

A-6. TECHNICAL MANUALS.

Inspection, Care, and Maintenance of Antifriction Bearings.....TM 9-214

Operator's Manual for Welding Theory and Application.....TM 9-237

Deepwater Fording of Ordnance Materiel.....TM 9-238

Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Matriels, Including Chemicals.....TM 9-247

Organization, Direct Support, and General Support Care, Maintenance, and Repair of Pneumatic Tires and Inner Tubes.....TM 9-2610-200-24

Painting Instructions for Field Use.....TM 43-0139

Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use.....TM 750-244-6

Lubrication Order for Container Crane, 40-Ton, Rough Terrain, Model RT8755CC, NSN 3810-01-205-2716.....LO 5-3810-306-12

A-7. SPECIFICATIONS AND STANDARDS.

Dry Cleaning Solvent.....Fed Spec F-D-680

Methyl Ethyl Ketone, Technical TT-M-261

Inspection, Liquid Penetrant Methods MIL-I-6866

Inspection Process, Magnetic Particles MIL-I-6868

Human Engineering Design Criteria for Military Systems,
Equipment and Facilities MIL-STD-1472

A-8. OTHER PUBLICATIONS.

Army Medical Department Expendable/Durable Items ..... CTA 8-100

Expendable/Durable Items (Except Medical,
Class V, Repair Parts, and Heraldic Items) ..... CTA 5-970

A-3/A-4 Blank

APPENDIX B

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

SECTION I. INTRODUCTION

B-1. SCOPE

This Appendix lists components of end item and basic issue items for the Container Crane to help you inventory items required for safe and efficient operation.

B-2. GENERAL

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. These are the minimum essential items required to place the Container Crane in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the Container Crane during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

B-3. EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

SECTION I. INTRODUCTION - CONTINUED

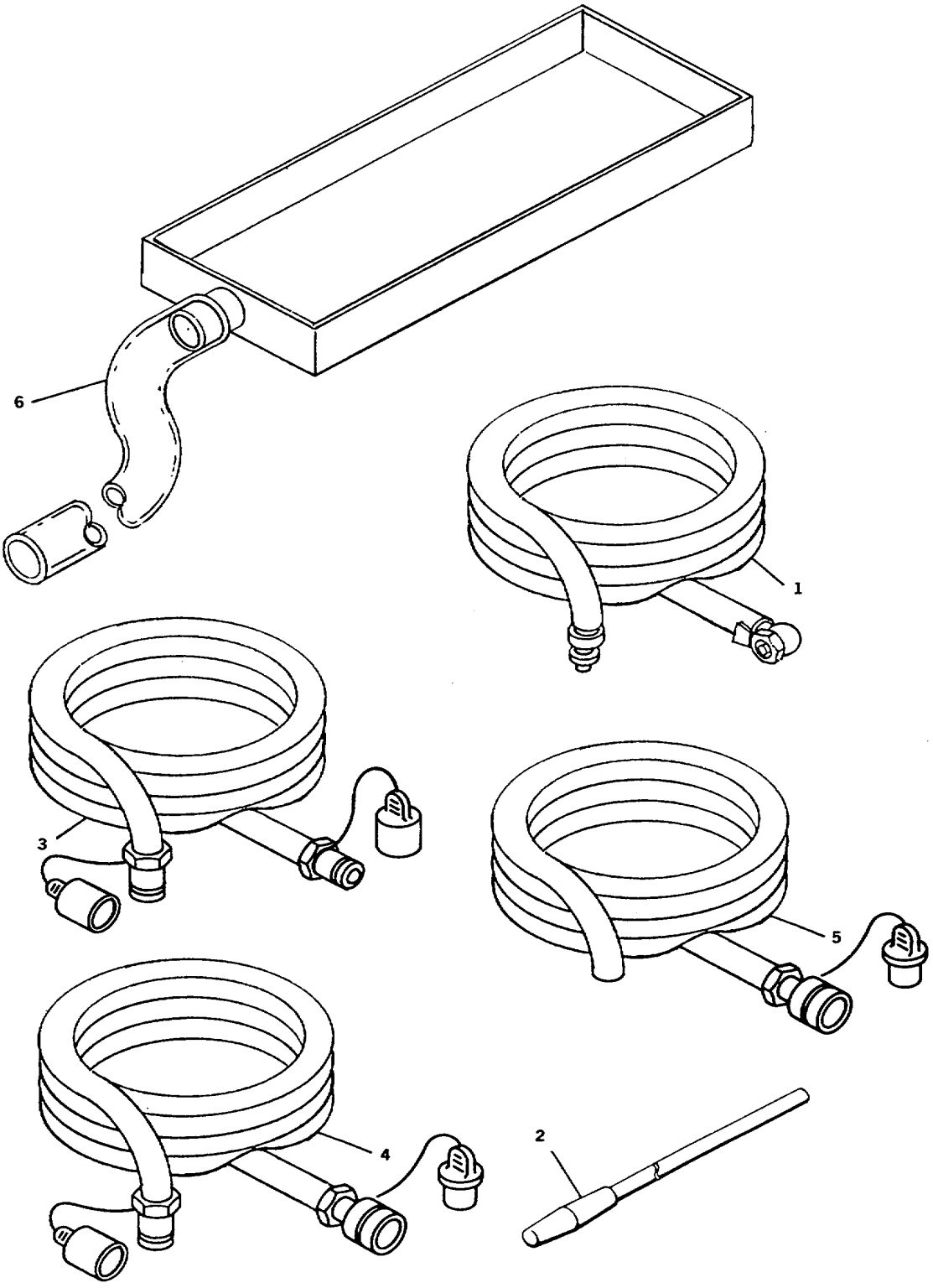
d. Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/ maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) - Quantity requirerd (Qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. COMPONENTS OF END ITEM

(NONE)

SECTION III. BASIC ISSUE ITEMS



(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, FSCM AND PART NUMBER	(4) U/M	(5) QTY RQR
1		Tire Inflation Air Chuck and Hose(tool box)	EA	1
2		Handle Hand Hydraulic Pump (tool box)	EA	1
3		Hose, Hydraulic, Pump, 38 Ft. (tool box)	EA	1
4		Hose, Hydraulic, Pump 18 Ft. (tool box)	EA	1
5		Hose, Hydraulic, 12 Ft., Bleeddown (tool box)	EA	1
6		Hoist Drain Pan (tool box)	EA	1

B-5/B-6 Blank

APPENDIX C
ADDITIONAL AUTHORIZATION LIST

SECTION I. INTRODUCTION

C-1. SCOPE

This appendix lists additional items you are authorized for the support of the Container Crane.

C-2. GENERAL

This list identifies items that do not have to accompany the Container Crane and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

C-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorizes the item(s) to you.

SECTION II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM AND PART NUMBER	(3) U/M	(4) QTY AUTH
	MTOE AUTHORIZED ITEMS		
7520-00-559-9618	Bag, Pamphlet	EA	1
4240-00-052-3776	Goggles, Eye Protection	PR	2
8415-00-889-3767	Helmet, Construction	EA	2
6545-00-922-1200	Kit, First Aid	EA	1
	CTA AUTHORIZED ITEMS		
	NONE		

APPENDIX D
EXPENDABLE SUPPLIES AND MATERIALS LIST

SECTION I. INTRODUCTION

D-1 SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the Container Crane. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS

a. Column (1)-Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, APP. D").

b. Column (2)-Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Organizational Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column (3)-National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4)-Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5)-Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit if issue, requisition the lowest unit of issue that will satisfy your requirements.

APPENDIX D

EXPENDABLE MATERIAL LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
			MPL-85W140 Multipurpose gear oil (MIL-L-2105)	
			EO-15W40 Engine Oil (MIL-L-2104-15W40)	
			EO-10W Engine Oil (MIL-L-2401-15W40)	
			EO-10W Hydraulic Oil (MIL-L-210)	
			AFC Anti-freeze Coolant (MIL-A-46153)	
			SPC Anti-Seize Lube (MIL-A-907C)I	

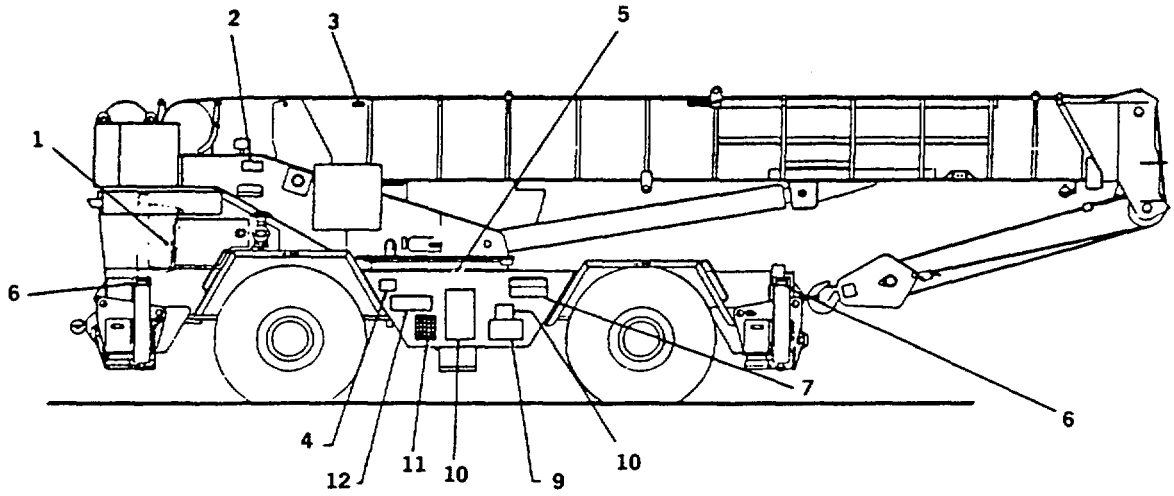
APPENDIX E
STOWAGE AND SIGN GUIDE

E-1. SCOPE

This appendix shows the locations for stowage of equipment and materiel required to be carried on the Container Crane.

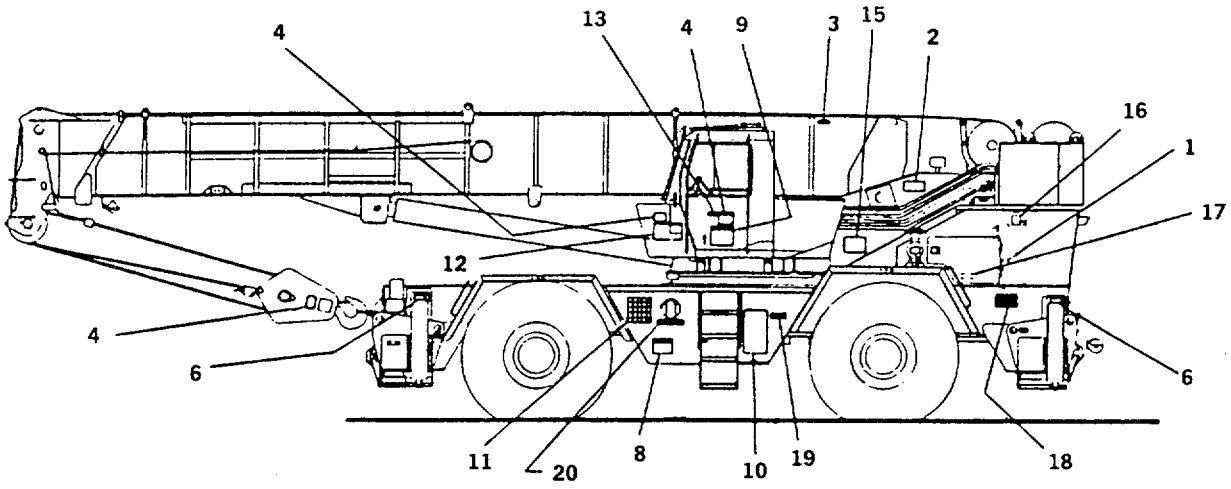
E-2. GENERAL

The pictures below and on the following pages show the location of decals, stencils, and metal signs used on the crane. Most of these signs are cautions or information you need to operate the crane safely. Some mark the places where equipment should be stowed. Number callouts refer to the legend on page E-5.

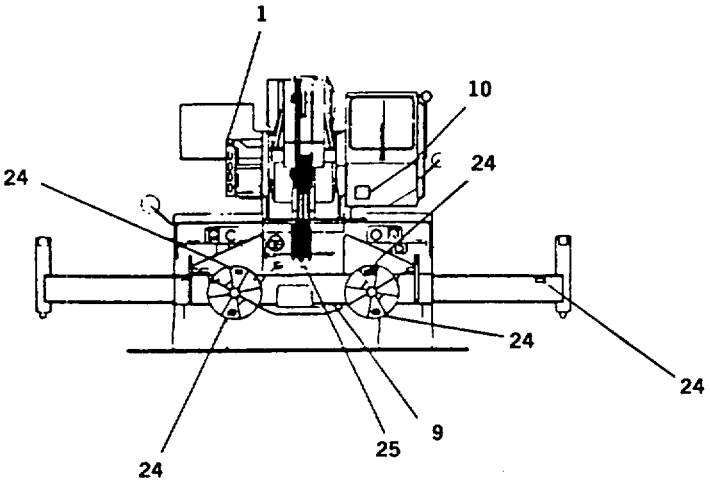


RIGHT SIDE VIEW

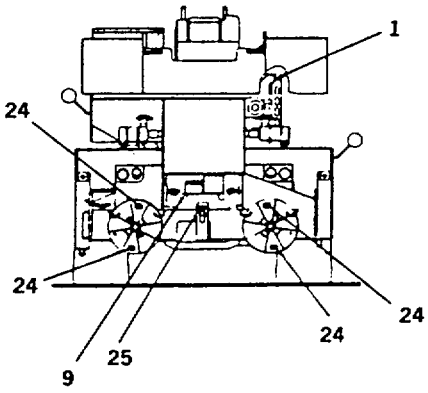
STOWAGE AND SIGN GUIDE (Cont'd)



LEFT SIDE VIEW

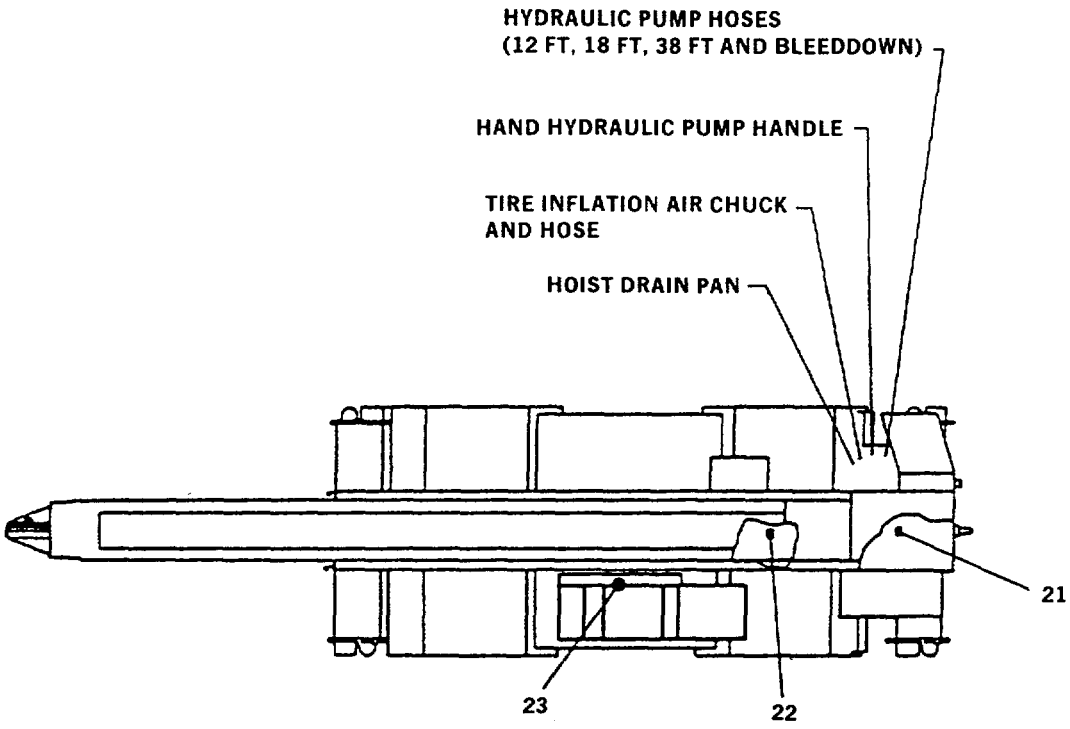


FRONT VIEW



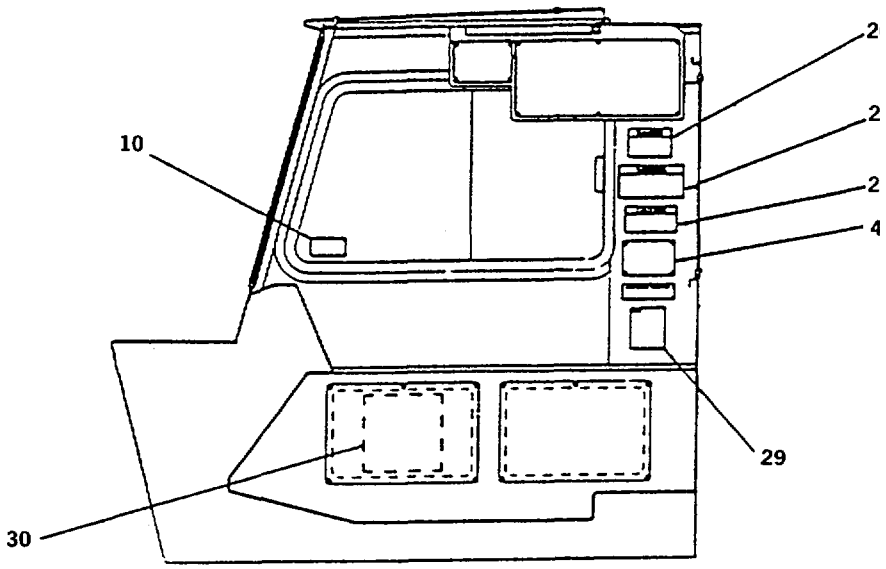
REAR VIEW

STOWAGE AND SIGN GUIDE (Cont'd)



TOP VIEW

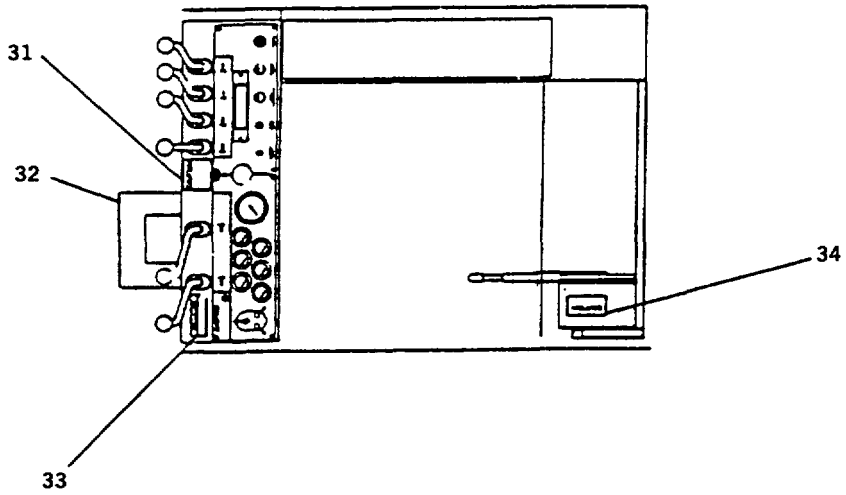
STOWAGE AND SIGN GUIDE (Cont'd)



INSIDE -- R.H. SIDE CAB

NOTE:

SEE LEGEND (PAGE G-4)



TOP VIEW -- INSIDE CAB

STOWAGE AND SIGN GUIDE (Cont'd)

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1. Fan Decal
2. Rotating Machine Decal
3. Boom Not A Walkway Decal
4. Identification Decal
5. Hydraulic Fill Decal
6. Warning Decal
7. Lube Chart Decal
8. Danger Decal
9. Warning Nameplate
10. Electrical Warning Decal
11. Hand Signals Decal
12. Shipping Data Decal
13. Hearing Protection Decal
14. Caution Nameplate
15. Heater Fuel Decal
16. Radiator Decal
17. Oil Filter Decal
18. Slave Receptacle Decal
19. Transmission Decal
20. Diesel Decal
21. Radiator Coolant Decal
22. Pump Disconnect Decal
23. Emergency Exit Decal
24. No Step Decal
25. No Lifting Decal
26. Danger Decal
27. Steep Grades Decal
28. S/S Demount Decal
29. Patents Decal
30. Electrical Decal
31. Fender Damage Decal
32. No-Load Travel Decal
33. Swing Horn Decal
34. Swing Lock Decal

E-5/E-6 Blank

APPENDIX F
LOAD CHART

RT875CC 34'-60' BOOM 85% LIFTING CAPACITIES (POUNDS) ON OUTRIGGERS - 360°

Radius in Feet	Main Boom Length in Feet					
	34	40	45	50	55	60
10	80,000 (65)	80,000 (68.5)	80,000 (71.5)	80,000 (73.5)	80,000 (75)	80,000 (76.5)
12	80,000 (61)	80,000 (65.5)	80,000 (68.5)	80,000 (71)	80,000 (73)	80,000 (74.5)
15	80,000 (55)	80,000 (60.5)	80,000 (64.5)	80,000 (67)	80,000 (69.5)	79,000 (71.5)
20	80,000 (43.5)	80,000 (52)	80,000 (57)	80,000 (60.5)	75,000 (64)	70,000 (66.5)
22	73,000 (38.5)	73,000 (48)	73,000 (53.5)	73,000 (58)	70,000 (61.5)	65,000 (64.5)
25	62,200 (30)	62,200 (41.5)	62,200 (48.5)	62,200 (53.5)	60,000 (57.5)	58,000 (61)
30		50,000 (28.5)	50,000 (39)	50,000 (46)	50,000 (51)	48,000 (55.5)
31			48,000 (37)	48,000 (44.5)	48,000 (50)	44,000 (54)
35			39,500 (27)	39,500 (37)	39,500 (44)	39,500 (49.5)
40				31,600 (25.5)	31,600 (35.5)	31,600 (42.5)
45					25,800 (24.5)	25,800 (34.5)
50						21,500 (24.5)

NOTE: Boom angles are in degrees.

LOAD CHART (Cont'd)

RT875CC 34'-60' BOOM LIFTING CAPACITY NOTES

GENERAL:

1. Rated loads as shown on lift chart pertain to this machine as originally manufactured and equipped. Modifications to the machine or use of optional equipment other than that specified can result in a reduction of capacity.

2. Construction equipment can be hazardous if improperly operated or maintained. Operation and maintenance of this machine shall be in compliance with the information in this manual.

3. The operator and other personnel associated with machine shall fully acquaint themselves with the safety standards set forth in this manual.

SETUP:

1. The machine shall be leveled on a firm supporting surface. Depending on the nature of the supporting surface, it may be necessary to have structural supports under the outrigger floats or tires to spread the load to a larger bearing surface.

2. For outrigger operation, outriggers shall be fully extended with tires raised free of crane weight before operating the boom or lifting loads.

3. Tires shall be inflated to the recommended pressure before lifting on rubber.

OPERATION:

1. Rated loads at rated radius shall not be exceeded. Do not tip the machine to determine allowable loads.

2. All rated loads have been tested to and meet minimum requirements of SAE J1063 OCT80 - Cantilevered Boom Crane Structures - Method of Test, and do not exceed 85% of the tipping load on outriggers as determined by SAE J765 OCT80 Crane Stability Test Code.

3. Rated loads apply to loads on hook for machines equipped with originally furnished hookblock, auxiliary boom nose and overhaul ball.

4. Load ratings are based on freely suspended loads. No attempt shall be made to move a load horizontally on the ground in any direction.

5. Rated loads do not account for wind on lifted load or boom. It is recommended when wind velocity is above 20 mph (32km/h), rated loads and boom lengths shall be appropriately reduced.

LOAD CHART (Cont'd)

6. Rated loads are for lift crane service only.

7. Do no operate at a radius or boom length where capacities are not listed. At these positions, the machine may overturn without any load on the hook.

8. The maximum load which can be telescoped is not definable because of variations in loadings and crane maintenance, but it is safe to attempt retraction and extension within the limits of the capacity chart.

9. When either boom length or radius or both are between values listed, the smallest load shown at either the next larger radius or boom length shall be used.

10. For safe operation, the user shall make due allowances for his particular job conditions, such as: soft or uneven ground, out of level conditions, high winds, side loads, pendulum action, jerking or sudden stopping of loads, hazardous conditions, experience of personnel, two machine lifts, traveling with loads, electric wires, etc. Side pull on boom is extremely dangerous.

11. Handling of personnel from the boom is not authorized except with equipment furnished and installed by Grove Manufacturing Company.

12. Keep load handling devices a minimum of 18 inches (45.7 cm) below boom head at all times.

13. The boom angle before loading should be greater than the loaded boom angle to account for deflection.

14. Capacities appearing above the bold line are based on structural strength and tipping should not be relied upon as a capacity limitation.

15. The LMI is calibrated to include originally furnished hookblock, auxiliary boom nose and overhaul ball as an integral part of the machine.

16. Load indicating device meets SAE J376 Section 4.2 accuracy requirements for loads on hook from 9,000 to 80,000 pounds.

DEFINITIONS:

1. Operating Radius: Horizontal distance from a projection of the axis of rotation to the center of the vertical hoist line or tackle with load applied.

2. Loaded Boom Angle (Shown in Parenthesis on Main Boom Capacity Chart): is the angle between the boom base section and the horizontal, after lifting the rated load at the rated radius with the rated boom length.

LOAD CHART (Cont'd)

3. Working Area: Areas measured in a circular arc about the center line of rotation as shown on the working area diagram.

4. Freely Suspended Load: Load hanging free with no direct external force applied except by the lift cable.

5. Side Load: Horizontal force applied to the lifted load either on the ground or in the air.

RT875CC 34'-60' BOOM 75% LIFTING CAPACITIES
ON RUBBER (POUNDS) 29.5 x 25 (28 PLY) TIRES

Radius in Feet	Stationary Capacity Defined Arc (3) Over Front	Stationary Capacity 360 Degree Arc	Pick & Carry Cap. Up to 2.5 MPH Boom Centered (7) Over Front
10	72,000 (a)	56,400 (e)	69,700 (a)
12	64,100 (a)	46,850 (f)	60,600 (b)
15	54,000 (a)	36,900 (f)	50,200 (d)
20	43,450 (a)	23,650 (f)	38,200 (d)
25	35,700 (c)	16,750 (f)	30,100 (f)
30	26,100 (d)	12,500 (f)	22,150 (f)
35	20,100 (e)	9,480 (f)	18,500 (f)
40	16,000 (f)		15,600 (f)
45	13,000 (f)		13,000 (f)
50	10,700 (f)		10,700 (f)

LOAD CHART (Cont'd)

Maximum Permissible Boom Lengths:

(a) 34 ft. (d) 50 ft.

(b) 40 ft. (e) 55 ft.

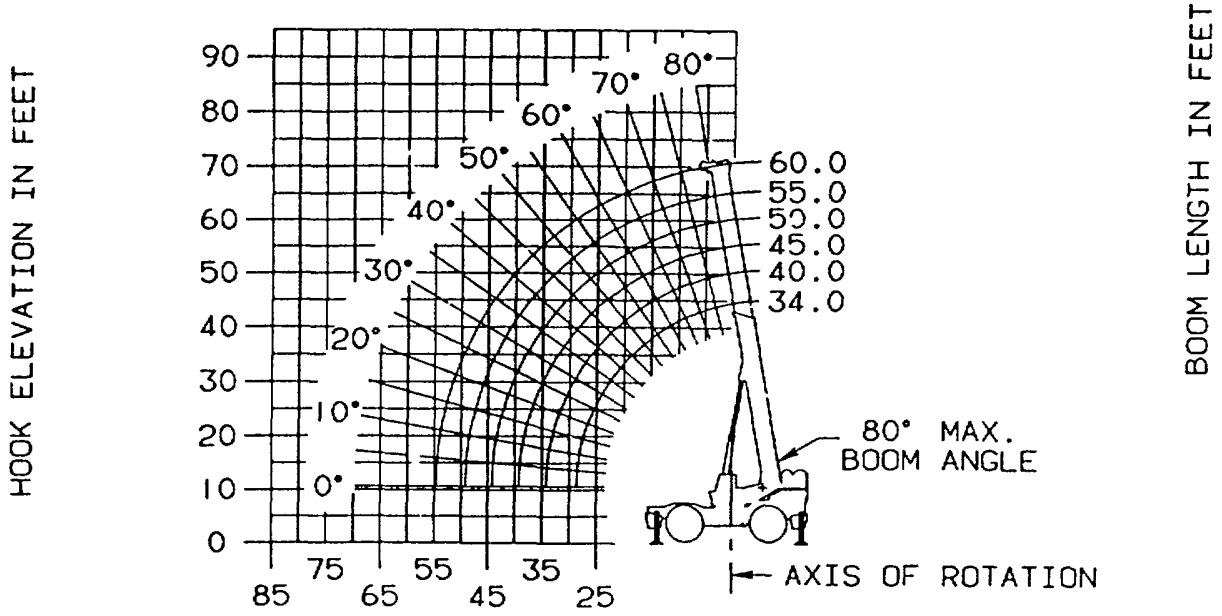
(c) 45 ft. (f) 60 ft.

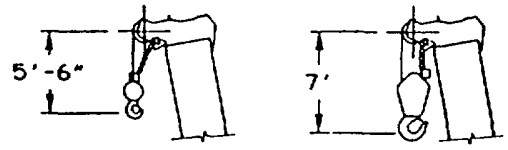
	No Load Stability Data	Main Boom 60 ft.
Front	Min. boom angle (deg.) for indicated length	0
(No load)	Max. boom length (ft.) at 0 deg. boom angle	60
360 Deg.	Min. boom angle (deg.) for indicated length	0
(No load)	Max. boom length (ft.) at 0 deg. boom angle	60

1. Capacities are in pounds and do not exceed 75% of tipping loads as determined by test in accordance with SAE J765 OCT80.
2. Capacities are applicable to machines equipped with 29.5 x 25 (28 PR) bias ply tires, at 75 psi cold inflation pressure.
3. Defined Arc - Over front includes 6' on either side of longitudinal centerline of machine.
4. Capacities are applicable only with machine on firm level surface.
5. Rear axle lockout valve must be functioning properly before lifting on rubber. Refer to TM5-3810-306-20.
6. All rubber lifting depends on proper tire inflation and condition. Capacities must be reduced for lower tire inflation pressures. Damaged tires are hazardous to safe operation of crane.
7. For pick and carry operation, boom must be centered over front of machine, mechanical swing lock engaged and load restrained from swinging. when handling loads in the structural range with capacities close to maximum ratings, travel must be reduced to creep speeds.
8. Creep-not over 200 ft. of movement in any 30 min. period and not exceeding 1 mph.

LOAD CHART (Cont'd)

RANGE DIAGRAM (UNLADEN BOOM)





DIMENSIONS ARE FOR LARGEST FURNISHED HOOK BLOCK AND OVERHAUL BALL, WITH ANTI-TWO BLOCK ACTIVATED.

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By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

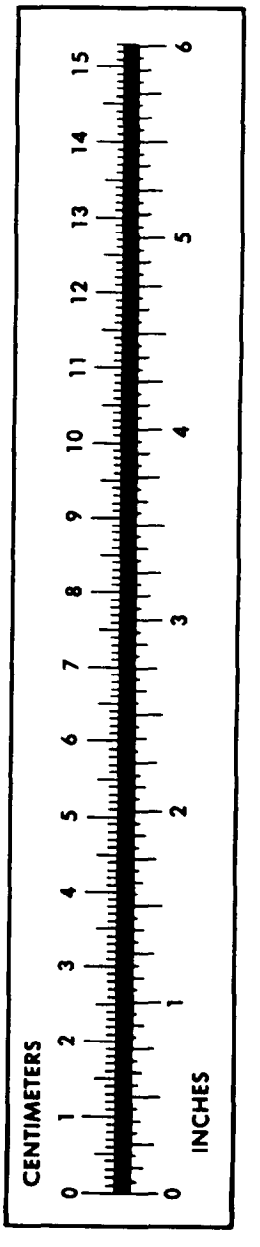
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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