TECHNICAL MANUAL

OPERATOR'S INSTRUCTIONS

FOR

CRANE, WHEEL-MOUNTED, SELF-PROPELLED FOR AIRCRAFT MAINTENANCE AND POSITIONING (SCAMP): 4 TON

GROVE MANUFACTURING COMPANY
MODEL RT41 AA

NSN 3810-01-144-4885

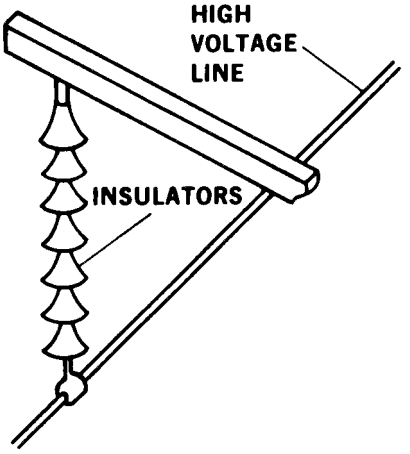
HEADQUARTERS, DEPARTMENT OF THE ARMY
20 FEBRUARY 1987

WARNING

Do not exceed 35 mph, when towing the SCAMP over highways.

WARNING

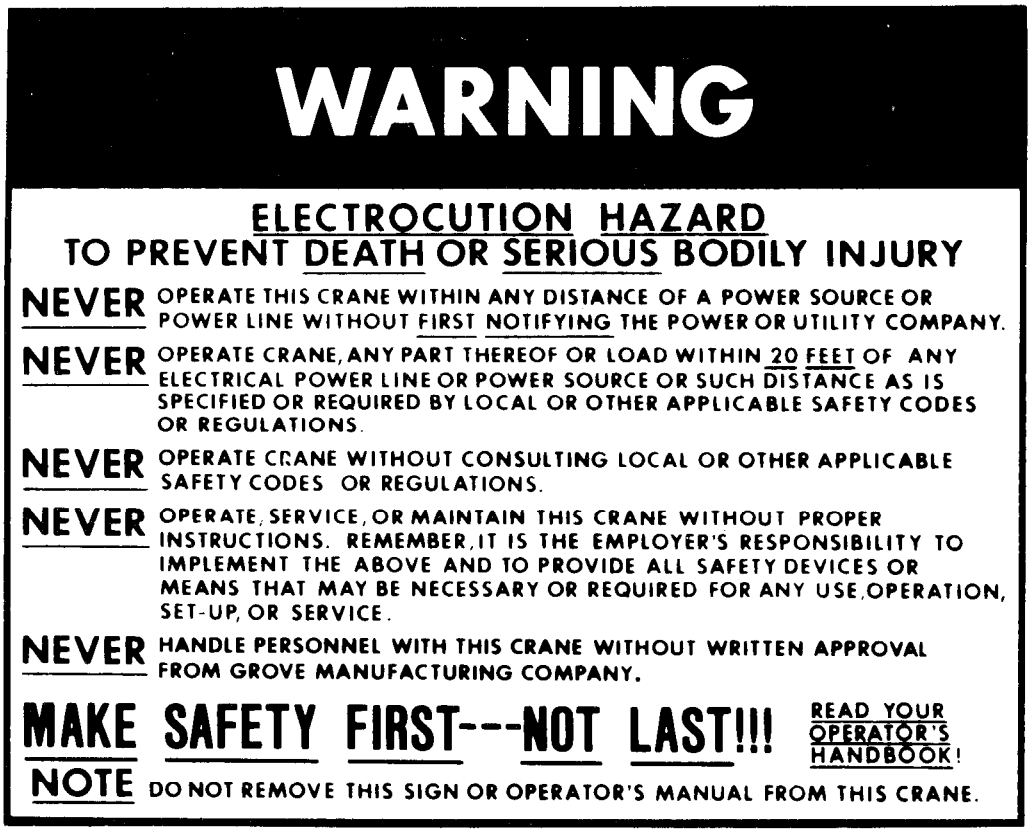
OPERATIONS ADJACENT TO OVERHEAD LINES IS PROHIBITED UNLESS ONE OF THE FOLLOWING CONDITIONS IS SATISFIED.

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 69 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
3		COUNT INSULATORS SUPPORTING LINE TO DETERMINE LINE VOLTAGE

INSULATORS IN A STRING	LINE VOLTAGE
2	13200
2-3	23000
2-3	34500
4-5	69000
5-6	88000
6-8	110000
8-10	138000
9-11	154000
12-16	230000
18	345000

ELECTRICAL HAZARDS.

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



WARNING

ELECTROCUTION HAZARD
TO PREVENT DEATH OR SERIOUS BODILY INJURY

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

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

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

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

NEVER HANDLE PERSONNEL WITH THIS CRANE WITHOUT WRITTEN APPROVAL FROM GROVE MANUFACTURING COMPANY.

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

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

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

Extreme caution must be exercised by all personnel working with and around your crane when in the proximity of an energized power source or power lines.

All personnel must be adequately warned of safety procedures.

Technical Manual
No.5-3810-302-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., *20 February 1987*

OPERATOR'S INSTRUCTIONS

FOR

CRANE, WHEEL-MOUNTED, SELF-PROPELLED FOR AIRCRAFT MAINTENANCE AND POSITIONING (SCAMP): 4 TON

GROVE MANUFACTURING COMPANY
MODEL RT41AA

NSN 3810-01-144-4885

REPORTING ERRORS

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 located in back of this manual direct to Commander, US Army Tank-Automotive Command, ATTN: AMSTA-MBS, Warren, Michigan 48397-5000. A reply will be furnished.

This technical manual is an authentication of the manufacturer's commercial literature and does not conform with the format and content specified in AR 310-3 Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment

FOREWORD

This manual has been compiled to assist you in properly operating and maintaining your crane.

Before placing the crane in service, take time to thoroughly familiarize yourself with the contents of this manual. After all sections have been read and understood, retain the manual for future reference in a readily accessible location.

The crane has been designed for maximum performance with minimum maintenance. With proper care, years of trouble-free service can be expected.

Information in this manual does not replace federal, state, or local regulations, safety codes, or insurance requirements.

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

The definitions of WARNING, CAUTION, and NOTE as used in this manual apply as follows:

WARNING

A WARNING IS USED TO EMPHASIZE THAT IF AN OPERATION, PROCEDURE, OR PRACTICE IS NOT FOLLOWED EXACTLY, DEATH OR INJURY TO PERSONNEL MAY RESULT.

CAUTION

A CAUTION IS USED TO EMPHASIZE THAT IF AN OPERATION, PROCEDURE, OR PRACTICE IS NOT FOLLOWED EXACTLY. EQUIPMENT DAMAGE MAY RESULT.

NOTE

A note is used to emphasize an important procedure or condition.

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INTRODUCTION

PURPOSE AND FUNCTION.

This handbook provides operation instructions for the Crane, Wheel-mounted, Self Propelled for Aircraft Maintenance and Positioning (SCAMP), Grove Manufacturing Co. Model RT41AA. The SCAMP is shown in figure 1-1 which identifies the major components.

CAPABILITIES.

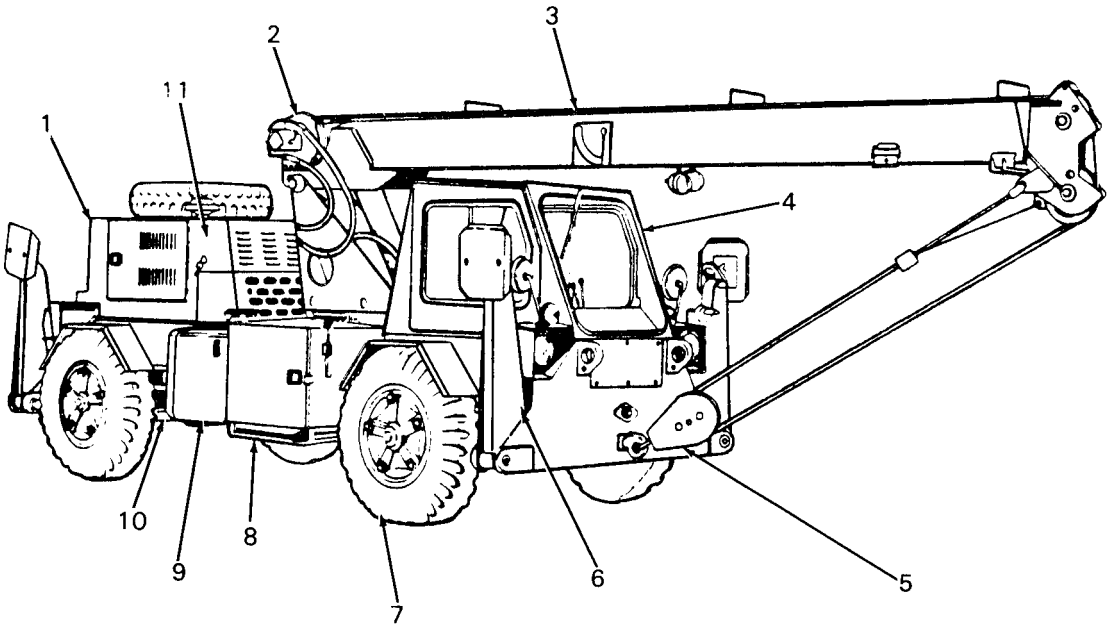
The Grove Model RT41AA hydraulic, telescoping boom, crane (SCAMP) was designed for the U.S. Army Tank-Automotive Command according to Procurement Specification 3810-APS-000. It is a rough terrain, four ton capacity machine intended for use in removing, replacing, and positioning components and assemblies and lifting Army aircraft. It is also used for towing or spotting aircraft on the flight line, unimproved airfields, and heliports. The crane is transportable, without disassembly, by C-130, C-141 and C-5A aircraft and may be air lifted by Army medium lift helicopters.

PERFORMANCE

SPEED AND GRADEABILITY.

GEAR	MAXIMUM SPEED		GRADEABILITY @ STALL (%)	TRACTIVE EFFORT AT STALL	
	MPH	KM/H		LBS	KG.
1 St	5.4	8.7	135.9	13206	5990
2nd	10.5	16,9	43.5	6704	3041
3rd	23.2	37.3	16.4	2902	1316

NOTE: All performance data is based on a 14,600 lb. (6623 KG) gross crane weight with 9.00 x 20 ties, White D-3400 engine and may vary plus or minus 10% due to variations in engine performance and vehicle weights. Grade-ability values above 45% (4 x 4) and 27'% (4 x 2) are theoretical. Cranes should be operated within the limits of engine crankcase design.



LEGEND

1. Engine/Transmission
2. Hoist
3. Boom
4. Operator's Cab
5. Hook Block (in Travel Mode)
6. Outrigger Arm
7. Front Axle
8. Tool/Storage Box
9. Hydraulic Reservoir
10. Rear Axle
11. Batteries

Figure 1-1. Army SCAMP, Grove Model RT 41AA

LIFTING CAPACITY

The Rated Lifting Capacity Charts (figure 1-2) provide the necessary information to ensure lifting within the crane's design limitations. Capacities are based on structural strength and stability determined by calculation and verified by test.

TOWING CAPACITY

As required by the procurement specification, the SCAMP crane is capable of continuous towing in forward and reverse from speeds of 10 feet per minute to 4 mph with a drawbar pull of 5,000 pounds.

RATED LIFTING CAPACITIES IN POUNDS
19 ft. - 33 ft. BOOM

ON OUTRIGGERS - 360°

Radius in Feet	Boom Length in Feet				
	19	22	26	30	33
8	9,500 (60)	9,500 (65)	9,500 (69.5)	9,500 (73)	9,500 (74)
10	8,000 (53)	8,000 (59)	8,000 (64)	8,000 (68)	8,000 (70)
12	7,350 (44)	6,000 (52)	6,000 (59)	6,000 (64)	6,000 (66.5)
15	4,500 (29)	4,500 (42)	4,500 (51)	4,500 (57)	4,500 (59.5)
20		3,100 (14.5)	3,100 (34)	3,100 (45)	3,100 (49)
25				2,100 (28.5)	2,100 (35.5)
30					1,350 (14)

NOTE: Boom angles shown in parenthesis are in degrees.

A6-829-006754D

ON RUBBER CAPACITIES
9.00x20 (8 ply rating) TIRES

Radius in Feet	Stationary Capacities - 360° Boom Length in Feet					2.5 MPH Capacities Boom Centered Over Front	Maximum Permissible Boom Length
	19	22	26	30	33		
8	**4,300** (60)	**4,300** (65)	**4,300** (69.5)	**4,300** (73)	**4,300** (74)		Boom Fully Retracted
10	**3,275** (53)	**3,275** (59)	**3,275** (64)	**3,275** (68)	**3,275** (70)	5,000 (53)	
12	**2,420** (44)	**2,420** (52)	**2,420** (59)	**2,420** (64)	**2,420** (66.5)	3,775 (44)	
15	**1,400** (29)	**1,400** (42)	**1,400** (51)	**1,400** (57)	**1,400** (59.5)	2,560 (29)	
20		**895** (14.5)	**895** (34)	**895** (45)	**895** (49)	1,375 (14.5)	22 ft.
25				**420** (28.5)	**420** (35.5)	660 (28.5)	30 ft.
30					**230** (14)	300 (14)	33 ft.

NOTE: Boom angles shown in parenthesis are in degrees. A6-829-006755C

Lifting Capacity Notes:
1. 360° on rubber capacities are reduced to meet specific Army requirements. Structural limits or 85% tipping do not apply.
2. Capacities are applicable to machines equipped with 9.00 x 20 (8 ply rating) bias ply tires at 75 psi cold inflation pressure.
3. All lifting depends on proper tire inflation, capacity and condition. Capacities must be reduced for lower tire inflation pressures. Damaged tires are hazardous to safe operation of crane.

Figure 1-2. Rated Lifting Capacity Chart (Sheet 1 of 4)

NOTES TO LIFTING CAPACITIES

GENERAL:

1. Rated lifting capacities shown on lift chart pertain to this crane as originally manufactured and equipped. Modifications to the crane, or use of equipment other than that specified, can result in a reduction of capacity.
2. Cranes can be hazardous if improperly operated or maintained. Operation and maintenance of this crane shall be in compliance with the Operator's and Safety Handbook and Service and Parts Manuals supplied with this crane. If these manuals are missing, order replacements from the Manufacturer.
3. The operator and other personnel associated with this crane shall fully acquaint themselves with latest applicable American National Standards Institute (ANSI) Safety Standards for cranes.

SETUP:

1. Determine the weight of the load to be lifted. Position the crane as near as practicable to the load consistent with outrigger spread, if required, and radius at which the load is to be handled.
2. Insure that the crane capacity, at the radius selected, exceeds the weight of the load. For crane capacities at intermediate radii not listed, use capacities for the next longer radius. Any boom length may be used with each radius/capacity.
3. Level the crane on a firm supporting surface. Less than firm surfaces may require installation of over-size floats provided, if on outriggers; or structural plates under the tires, if on rubber, to spread the crane weight, plus load, over a larger bearing surface.
4. On outriggers leveling may be accomplished using outrigger control. Use bubble level provided. Crane tires must be clear of ground after leveling.
5. For all capacities use Grove hookblock provided with two parts line. The hookblock plus chains, slings and other handling devices must be included in the weight of the load.
6. Plan each lift carefully. Double check capacity at geometry selected. Take into account soft or uneven ground, out of level conditions, wind, side loads and pendulum action of the load, when swung free of its supports. Avoid jerking or sudden stopping of the load.
7. Tires shall be inflated to the recommended pressure before lifting on rubber.

OPERATION:

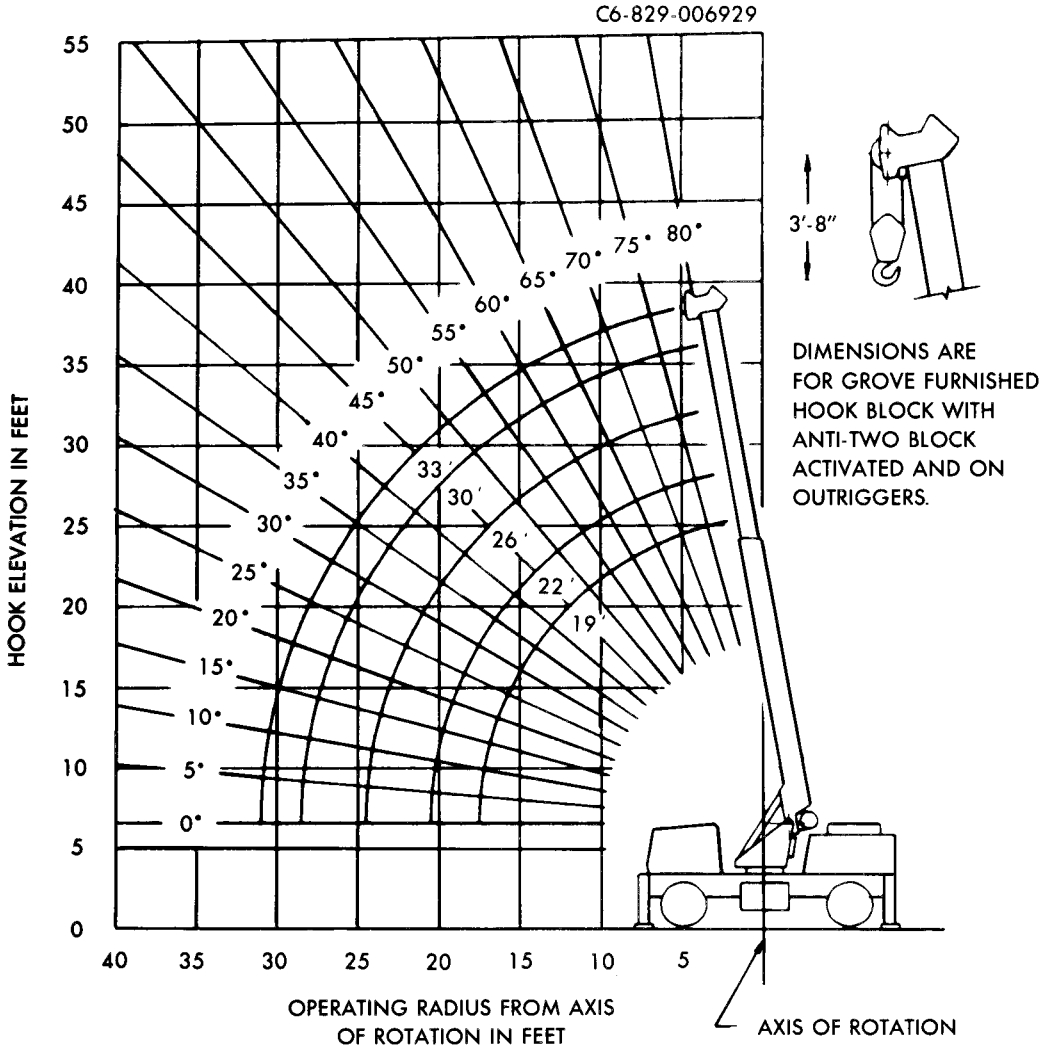
1. All capacities are based on crane structural strength. Never tip the crane to determine allowable load. Do not exceed the crane rated capacities at the radii indicated.
2. All rated loads meet the requirements of SAE J-1063-Cantilevered Boom Crane Structure-Method of Test, and do not exceed 85% of the tipping load as determined by SAE J-765a, Crane Stability Test Code.
3. Never attempt to drag a load horizontally on the ground in any direction. Capacities in load charts are for freely suspended loads only.
4. Handling of personnel suspended from the boom is prohibited.
5. INSURE THAT THE ANTI-TWO BLOCK AND CONTROL LEVER LOCKOUT ARE OPERATIVE PRIOR TO EACH LIFT. THE STOWAGE PIN BELOW THE ANTI-TWO BLOCK SWITCH ENCLOSURE ON THE BOOM NOSE MUST BE REMOVED TO ARM THE ANTI-TWO BLOCK SYSTEM. (SEE OPERATOR'S HANDBOOK).
6. A positive stop prevents continuous rotation of the turntable. When swinging, approach the boom-over-rear position (in either direction) with caution to prevent abrupt stops.
7. Avoid swinging any load over the crane cab. Loads at 8 ft. radius should be handled over the sides and rear only. Always sound horn when swinging load.
8. Boom angles, in parenthesis in load charts, are with loaded boom and should be used for reference only. To avoid exceeding capacity limits, measure each load radius.
9. For pick & carry operations position all loads directly over the front. Install turntable lock pin. Use shortest possible boom length, carry load as close to the ground as possible and do not exceed 2.5 MPH.
10. Capacities appearing above the bold line are based on structural strength and tipping should not be relied upon as a capacity limitation.

DEFINITIONS:

1. Load Radius: Horizontal distance from a projection of the axis of rotation to the supporting surface before loading to the center of the vertical hoist line or tackle with load applied.
2. Loaded Boom Angle: Loaded boom angle is the angle between the boom base section and the horizontal, after lifting the rated load at the rated radius. The boom angle before loading should be greater to account for deflections. The loaded boom angle combined with the boom length give only an approximation of the operating radius.
3. Working Area: Area measured in a circular arc about the centerline 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 hoist line.
5. Side Load: Horizontal side force applied to the lifted load either on the ground or in the air.

Figure 1-2. Rated Lifting Capacity Chart (Sheet 2 of 4)

HOOK ELEVATION DIAGRAM
(UNLADEN BOOM)

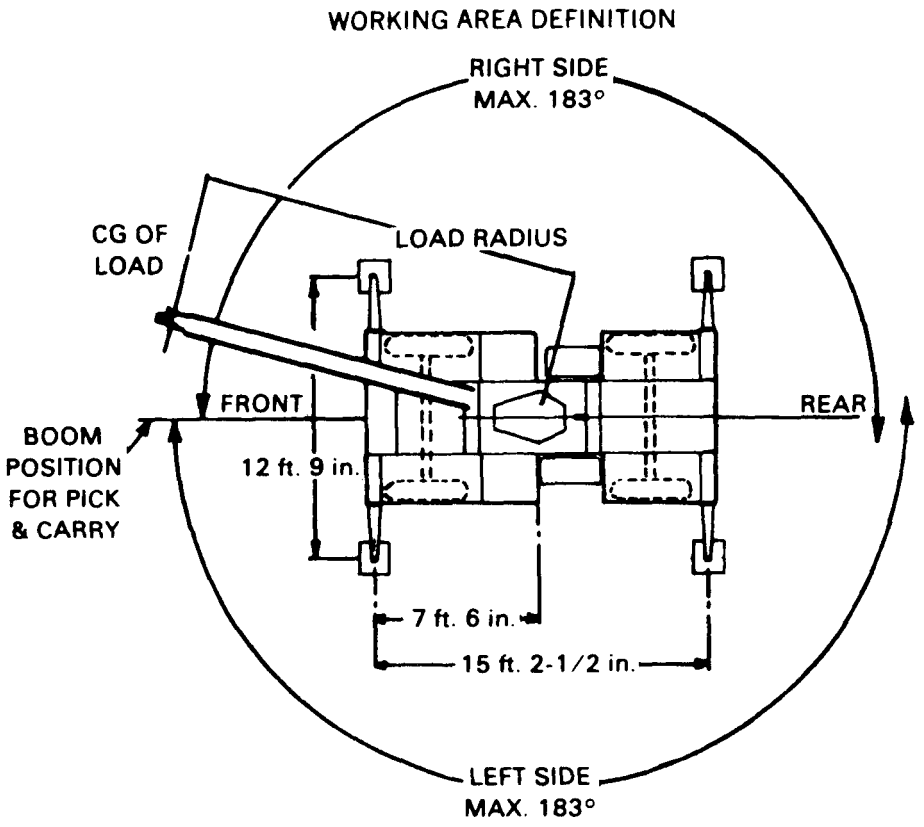


LINE PULLS & REEVING INFORMATION

HOIST	CABLE SPECS.	PERMISSIBLE LINE PULLS
Braden PD12A	1/2 in. 6x37, IPS, IWRC	6,571 lbs.

For multiple part reeving, use one line for each 4,750 lbs. of load or portion thereof.

Figure 1-2. Rated Lifting Capacity Chart (Sheet 3 of 4)



WEIGHT REDUCTIONS FOR LOAD HANDLING DEVICES

HOOKBLOCK:	
4-3/4 Ton, 1 Sheave	128 lbs.

Note: All Load Handling Devices and Boom Attachments are Considered Part of the Load and Suitable Allowances MUST BE MADE for Their Combined Weights. Weights are for Grove Furnished Equipment.

Figure 1-2. Rated Lifting Capacity Chart (Sheet 4 of 4)

LEADING PARTICULARS.

GENERAL.

Model Grove RT41AA . . . . . SCAMP
Rated Capacity . . . . . 4 tons @ 10 feet (3.6 metric tons @ 3.05 meters)
Drive 4x4
Gross Weight . . . . . .14,600 lbs. (6.6 metric tons)

NOTE

The gross weight listed is for a basic SCAMP crane with 25% fuel. For additional weight information, refer to Transportability, Section 5.

DIMENSIONS.

NOTE

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

Wheel Base . . . . . 123 inches (3.12 m)
Overall Crane Length . . . . . 26 feet 6 inches (8.08 m)
Overall Crane Width . . . . . 94-1 /4 inches (2.39 m)
Overall Crane Height . . . . . 100-1 /2 inches (2.55 m)
Tail-swing . . . . . 25-1/2 inches (64.77 cm)
Turning Radius . 2 wheel steer . . 25 feet 1-1/2 inches (7.66 m)
4 wheel steer . . 14 feet 6-3/4 inches (4.44 m)

CAPACITIES.

Fuel Tank . . . . . 31 gallons (1 17.3 liters)
Hydraulic Tank . . . . . 40 gallons (151.4 liters)
Coolant System . . . . . 3.1 gallons (11.8 liters)
Engine Lubrication System . . . . . 2 gallons (7.6 liters)
Hoist . . . . . 5 pints (2.4 liters)
Swing Gearbox . . . . . 1pint(.51iters)
Axles-Differential . . . . . 14 pints (6.6 liters)
Transmission-Converter . . . . . 18 quarts (1 7.0 liters)
Brake Master Cylinder . . . . . 3 pints (1.5 liters)

ENGINE.

Manufacturer	White
Model	D34OOX289
Type	6 cylinder OHV
Bore	4.0 inches (101.6 mm)
Stroke	4.50 inches (114 mm)
Displacement	339 cu. in, (5556 cm^3)
Horsepower	111 (gross) @ 2400rpm
Torque (Gross)	274 foot pounds (124.3 kgm) @ 1400 rpm
Combustion System	4 cycle naturally aspirated
Oil Filter	40-0000401 (spin-on)
Fuel Filter	40-0002514 (spin-on)
Water Separator	40-0002508 (spin-on)
Firing Order	.1-5-3-6-2-4

AIR FILTER.

Manufacturer	Donaldson
Model	FHG08-0185
Type	Paper Element
Primary Filter Element	P11-9363
Safety Filter Element	P11-9410
Restriction Indicator	RBX00-2252

TRANSMISSION.

Manufacturer	Clark
Model	.12.6 HR18327-8
Type	Powershift
Speeds	3
Gear Ratios 1st	7.19:1
2nd	3.65:1
3rd	1.58:1
Oil Filter	234099 (spin-on)

AXLES.

Manufacturer	Rockwell
Model	FDS75 with Five Spoke Wheels
Ring and Pinion Ratio	7.8

WHEEL AND TIRE.

Manufacturer (Wheel)	Goodyear
Manufacturer (Tire)	Goodrich
Wheel Part Number	7020LPD
Tire Part Number	577-314
Tube Part Number	691-316
Tire Size	9.00 x20
Tire Pressure . Normal	75 psi
When Towing Crane	65 psi
Lug Nuts	...5
Torque	200 foot pounds (90.7 kgm)

BRAKES.

Manufacturer	Dayton Walther
Type	Hydraulic Disc

STEERING PUMP.

Manufacturer	Eaton
Model	U091 (Modified)
Type	Vane
output	5 gpm(18.9 lpm)@2400rpm

STEERING CONTROL VALVE.

Manufacturer	Char-Lynn
Model	214-1131-001
Type	Hydrostatic
Displacement	10.2 cu. in. (1 67.2 cu. cm) per revolution
Capacity	6 gpm (22.7 lpm)

HYDARAULIC PUMP.

Manufacturer	Tyrone
Model	F (PI 6 Series)
Type	Gear
Sections	2
GPM . . . 2 Section	60.9 gpm - (230.5 lpm)

SWING MOTOR.

Manufacturer	Char-Lynn
Model	H Series
Type	Orbit
Displacement	6.2 inch^3 (102 cm^3) per rev.

SWING GEARBOX.

Manufacturer	Grove
Model	25-S
Type	Gear Reduction
Reduction Ratio	25.85

BOOM.

Manufacturer	Grove
Type	Trapezoidal, Full Power
Two Section	19-33 feet (5.8 -10.1 m)

HOIST.

Manufacturer	Braden
Model	PD12A36017-01
Drum Dimensions Diameter	9.63 inches (24.5 cm)
Length	13.75 inches (34.9 cm)
Cable Size	0.5 inch (13 mm)
Cable Capacity	335 feet (102.lm)

OUTRIGGERS.

Manufacturer	Grove
Type	Cantilever
Maximum Spread	12.8 feet (3.9m)

ELECTRICAL SYSTEM.

Type . . . . . Single wire negative ground return (chassis)
System and Starting Voltage 24
Batteries Number . . . . . Two 12V (Wired in Series)
Type MS35000-3

Cranking Motor . Manufacturer . . . . . Delco-Remy
Part Number 1113246

Alternator. . Manufacturer . . . . . Delco-Remy
Model . . . . . 10-SI Series
Rating . . . . . 40 amperes

CAB HEATER.

Manufacturer . . . . . Hunter
Model . . . . . 4-17140 -24
Type . . . . . Hot Water
Voltage 24
Rating . . . . . 12,000 BTU

HOOK BLOCK.

Manufacturer . . . . . Grove
Type . . . . Single Sheave
Capacity . . . . . 4-3/4 tons (4.31 metric tons)

Equipment Improvement Report and Maintenance Digest (EIR MD)

The quarterly Equipment Improvement Report and Maintenance Digest, TB43-0001 - 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 (MWO'S), warranties (if applicable), actions taken on some of your DA Forms 2028 (Recommended Changes to Publications), and advance information on proposed changes that may affect this manual. The information 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 DA PAM 310-1, Consolidated Index of Army Publications and Blank Forms, and Appendix A, References, of this manual.

WARRANTY INFORMATION.

WARRANTY STATEMENT

ISSUED TO U.S. ARMY TANK AUTOMOTIVE
COMMAND UNDER CONTRACT DAAE07-82-C-6602

WARRANTY

THERE ARE NO WARRANTIES EXPRESS, OR IMPLIED MADE BY EITHER THE DISTRIBUTOR OR THE MANUFACTURER ON NEW GROVE EQUIPMENT EXCEPT THE MANUFACTURERS WARRANTY AGAINST DEFECTS, MATERIAL AND WORKMANSHIP SET OUT BELOW.

NEW EQUIPMENT WARRANTY

THE MANUFACTURER WARRANTS EACH NEW PRODUCT MADE BY THE MANUFACTURER TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP, ITS OBLIGATION LIABILITY UNDER THIS WARRANTY BEING LIMITED TO REPLACING FREE OF CHARGE ANY PART PROVING DEFECTIVE UNDER NORMAL USE AND SERVICE FOR A PERIOD OF 15 MONTHS FROM THE DATE OF ACCEPTANCE AS INDICATED ON D.D. FORM 250, MATERIAL INSPECTION AND RECEIVING REPORT, OR 1500 HOURS OF OPERATION WHICHEVER OCCURS FIRST, PROVIDED, HOWEVER, THAT SHOULD THE GOVERNMENT ELECT TO PUT THE UNITS WARRANTED HEREUNDER INTO STORAGE PRIOR TO PLACING IN SERVICE AND SHALL HAVE NOTIFIED GROVE IN WRITING OF THIS FACT, THEN THE WARRANTY TIME PERIOD WILL NOT BEGIN UNTIL EACH UNIT IS WITHDRAWN FROM STORAGE (SAID DATE TO BE NOTIFIED IN WRITING TO GROVE) OR UNTIL SIX MONTHS FROM THE DATE OF ACCEPTANCE WHICHEVER SHALL FIRST OCCUR.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED AND THE OBLIGATION AND LIABILITY OF THE MANUFACTURER UNDER THIS WARRANTY SHALL NOT INCLUDE ANY TRANSPORTATION OR OTHER CHARGES OR THE COST OF INSTALLATION OR ANY LIABILITY FOR DIRECT INDIRECT OR CONSEQUENTIAL DAMAGES OR DELAY RESULTING FROM THE DEFECT, ANY OPERATION BEYOND RATED CAPACITY OR THE IMPROPER USE OR APPLICATION OF THE PRODUCT OR THE SUBSTITUTION UPON IT OF PARTS NOT APPROVED BY THE MANUFACTURER OR FAILURE TO ADHERE TO THE MANUFACTURERS STORAGE MAINTENANCE REQUIREMENT DURING ANY GOVERNMENT STORAGE PERIOD SHALL VOID THIS WARRANTY.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES EXPRESS OR IMPLIED INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND OF ANY OTHER OBLIGATIONS OR LIABILITY ON THE PART OF THE MANUFACTURER AND GROVE MANUFACTURING COMPANY NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH SUCH EQUIPMENT.

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SECTION 2

SAFETY PRECAUTIONS

GENERAL.

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 information has been provided to assist you, the crane 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 crane operation.

Because you, the crane 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.

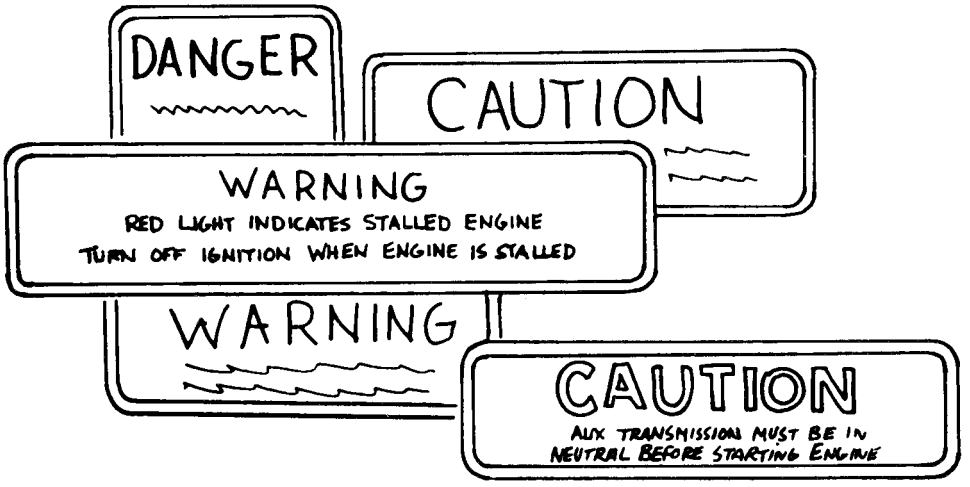
Ensure that you and those working with you are aware of any special dangers where you are operating the crane. Be especially careful of dangerous ground and objects, including buildings, near the crane.

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 level, properly maintained, and then pay attention to winds, boom deflection, rope sway, and any unusual things, which you, as a crane operator, may notice which would not be important to others.

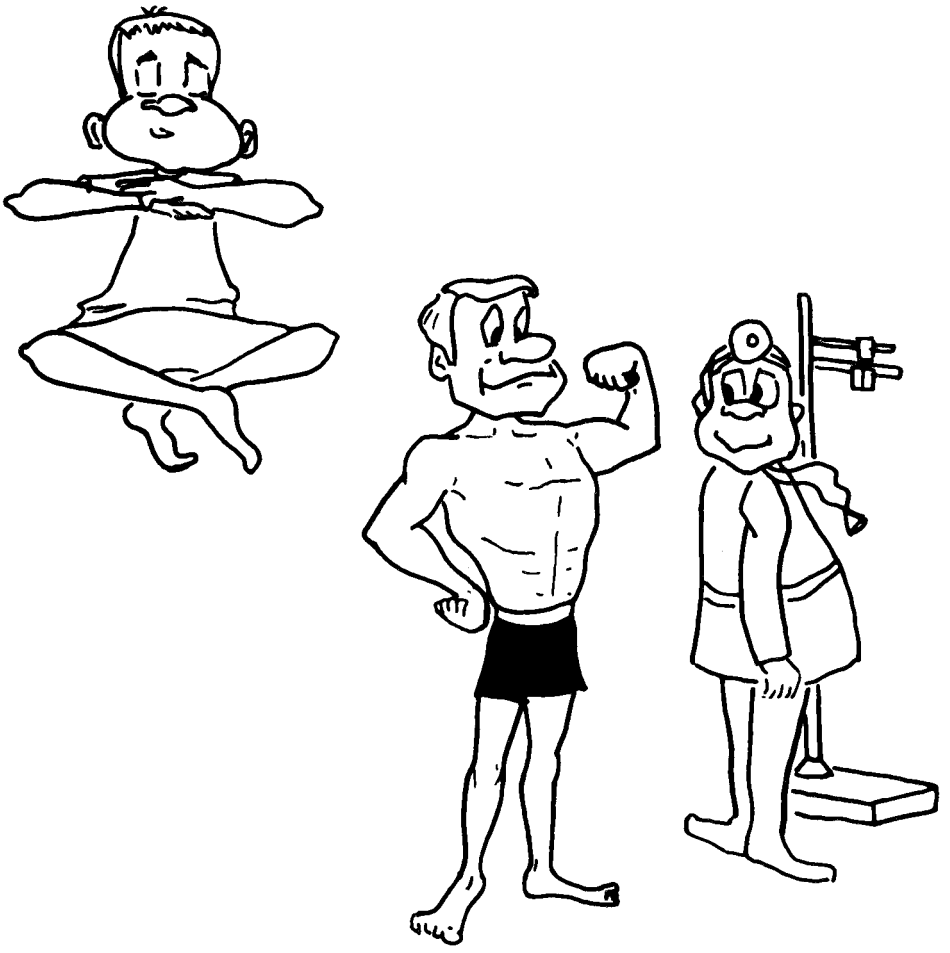
Know and abide by the basic safety rules.

Read and understand the operator's handbook before entering the cab.

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



Be prepared for the work day.



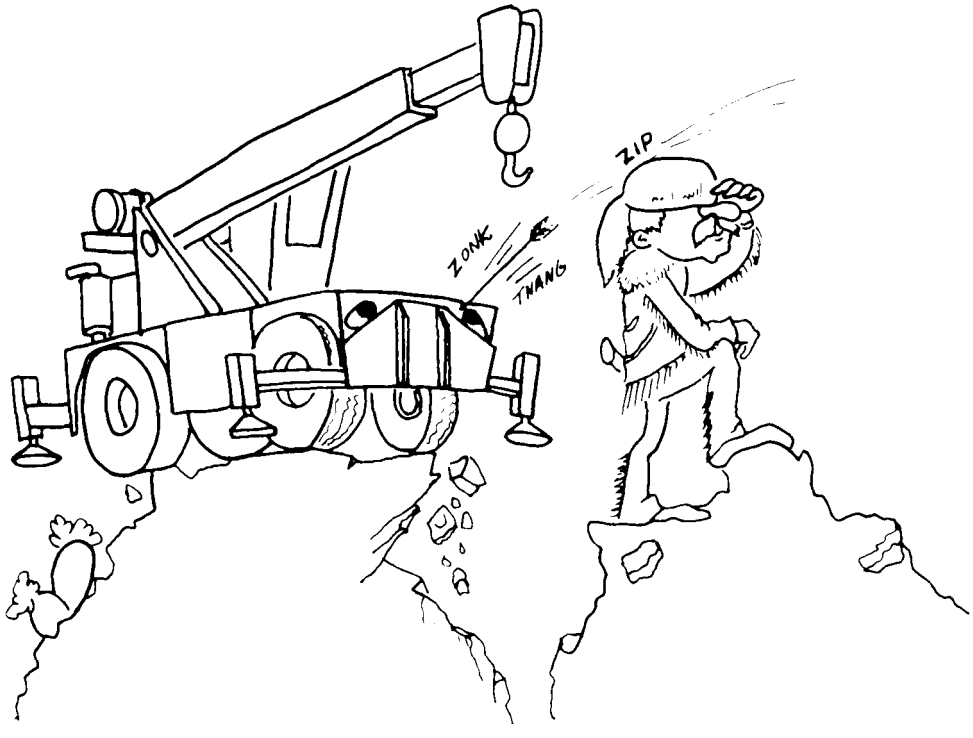
Crane operators must be thoroughly familiar with safe crane operating practices and have a complete understanding of all operation and maintenance instructions provided. Operators should be physically fit and thoroughly trained, with related experience, not be easily excitable, not be subject to epileptic 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.

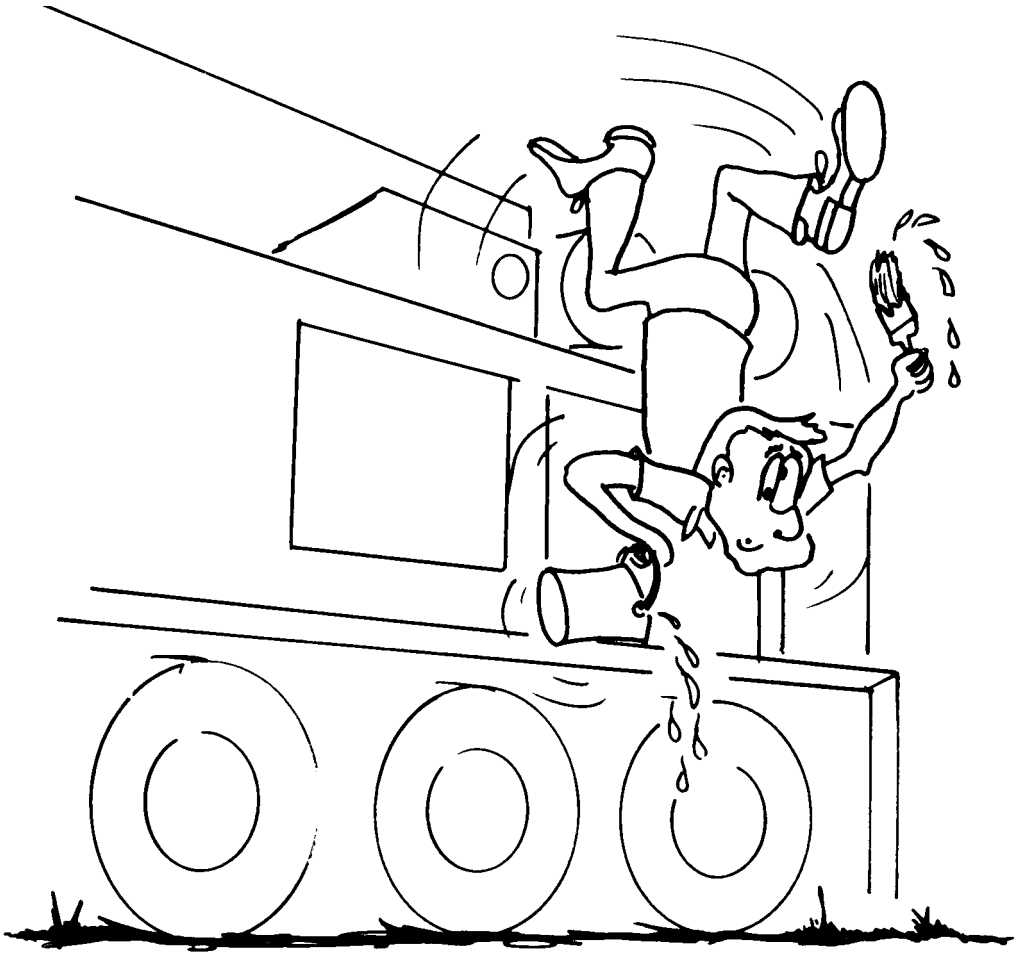
Inspect the crane every day. Ensure that routine maintenance and lubrication are being dutifully performed. Don't operate a damaged or poorly maintained crane. You risk lives when operating faulty machinery, including your own.

Know the area in which you are working. Familiarize yourself with work site obstructions 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 maintenance or other work.

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

Before performing maintenance, disconnect the battery, turn off the ignition switch, and place WARNING SIGNS in the cab.

Proper lubrication is a requirement in any heavy equipment operation. Follow the factory recommendations regarding the Lubrication time intervals and types of lubricants used. Adjust time intervals accordingly, when working under severe conditions. See Section 6 of this manual or the Lubrication Chart on the crane for lubrication recommendations.

When performing maintenance, refer to the appropriate manual for instructions. Consult the factory if there is any question regarding procedures or specifications.

Do not attempt repairs you do not understand!

Pressurized hydraulic oil can cause serious injury. Be certain all lines, components, and fittings are tight and serviceable. Use a piece of cardboard or wood to search for suspected leaks.

Never exceed the manufacturer's recommended relief valve pressure settings.

Always replace the guards or other safety devices which may have been removed during crane repair or adjustment.

Have an approved fire extinguisher available and know how to use it. Inspect as required to ensure it is fully charged and operable.

Maintain battery electrolyte at the proper level and check it with a flashlight.

A spark or flame could cause a battery explosion. Don't short across the posts to check the charge.

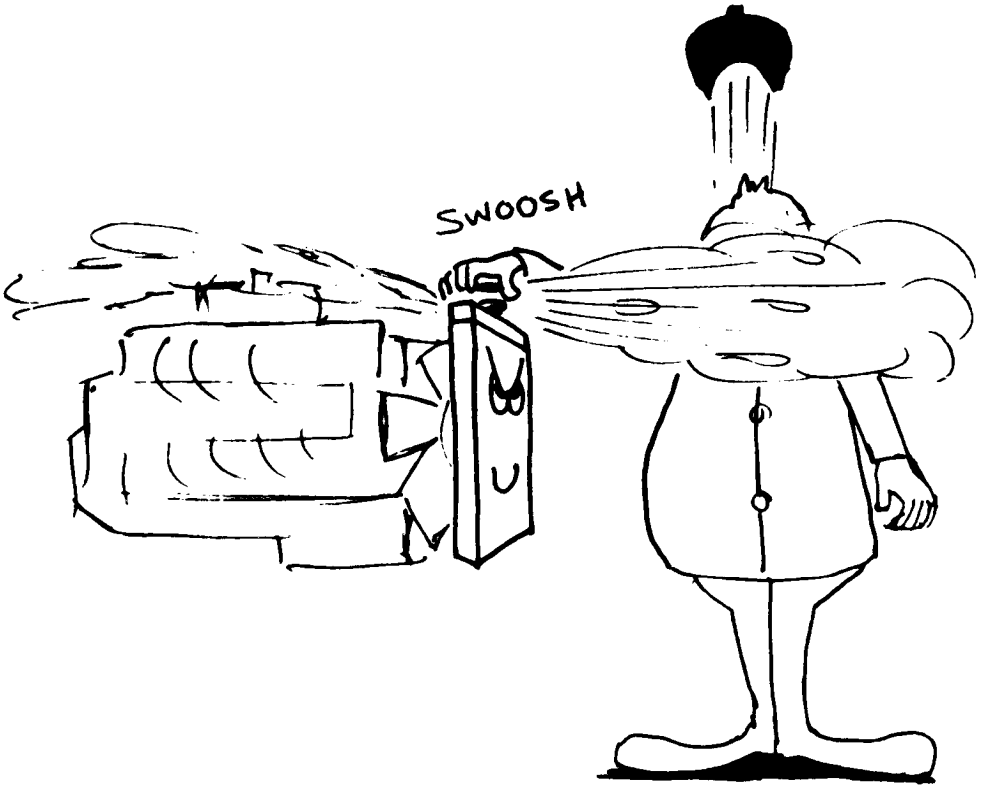
Check battery condition only with proper test equipment.

Wear your safety glasses when servicing batteries.

Don’t smoke while performing battery maintenance.

Disconnect the grounded battery clamp first when removing a battery and connect it last when installing battery.

Avoid battery acid contact with the skin and eyes. If accidently contacted, flush the area with water and consult a doctor immediately.



Be careful when checking the coolant level. Shut down the engine and allow the radiator time to cool before removing the radiator cap.

Follow standard safety precautions when refueling. FUEL IT SAFELY.

Unless specified in the Modification Work Order (MWO), modifications, alterations, or changes to a crane should not be made 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.

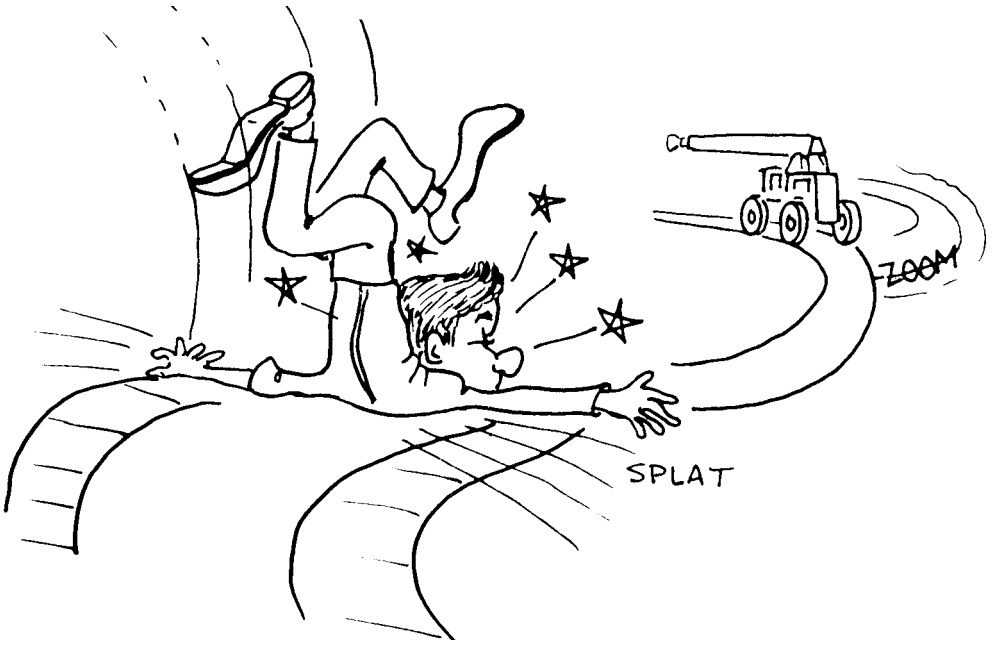
Keep your fingers away from potentially hazardous areas.

Keep brakes properly adjusted. Keep brake pucks free of oil and grease. Do not over lubricate the bearings or brake anchor pins. Refer to the Service Manual,

Use cleaning solutions that are non-flammable and approved for the work being performed.

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

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

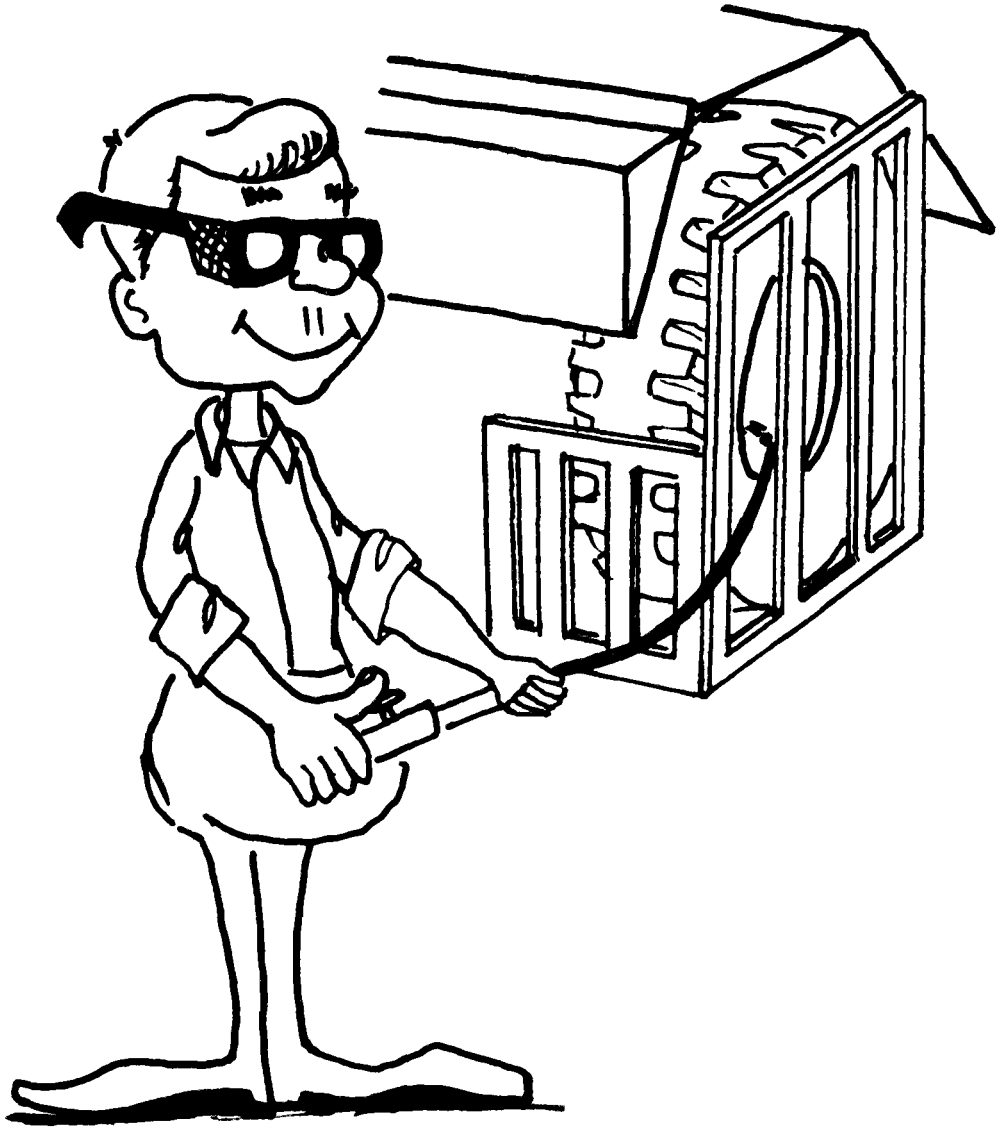


Never get off or on a moving crane.

Allow No One other than the operator to be on the crane while the crane is functioning or moving.

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

Inspect the tires for nicks and cuts, imbedded stones, and abnormal wear. Ensure all lug nuts are properly torqued.



Check the tire pressure daily. When inflating or adding air to the tires, use a tire cage and clip-on inflator. Use an extension hose which will permit standing behind the tire tread when inflating.

In freezing weather, park the crane in an area where it cannot become frozen to the ground. The drive line can be damaged when attempting to free a frozen crane.

When shutting down the crane:

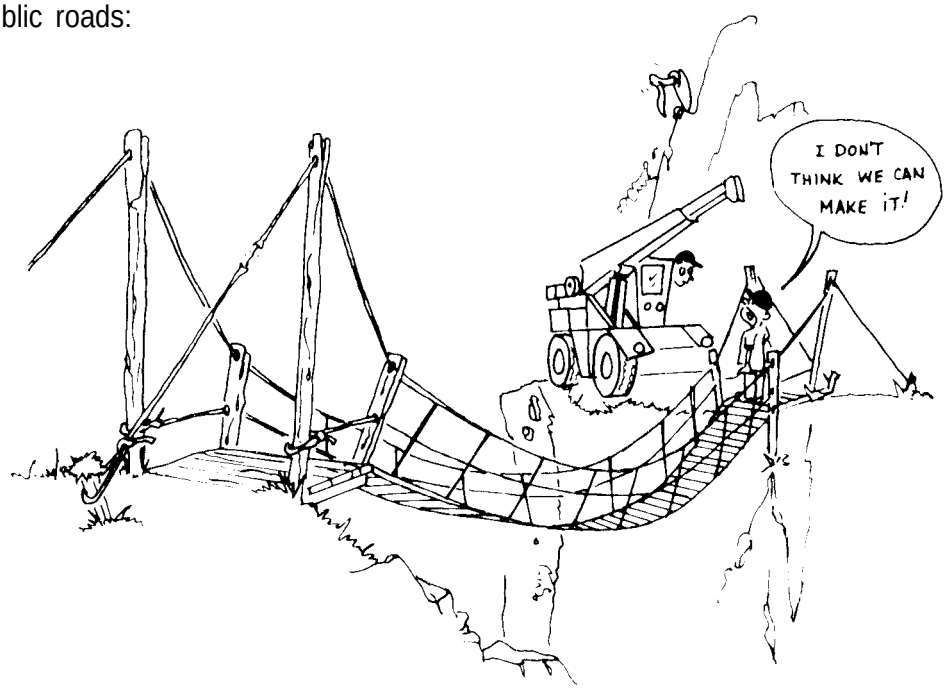
- Engage the parking brakes.
- Put controls in neutral.
- Chock the wheels.
- Turn off the ignition switch

CAUTION

Don't touch metal surfaces that could freeze you to them.

TRAVEL OPERATION.

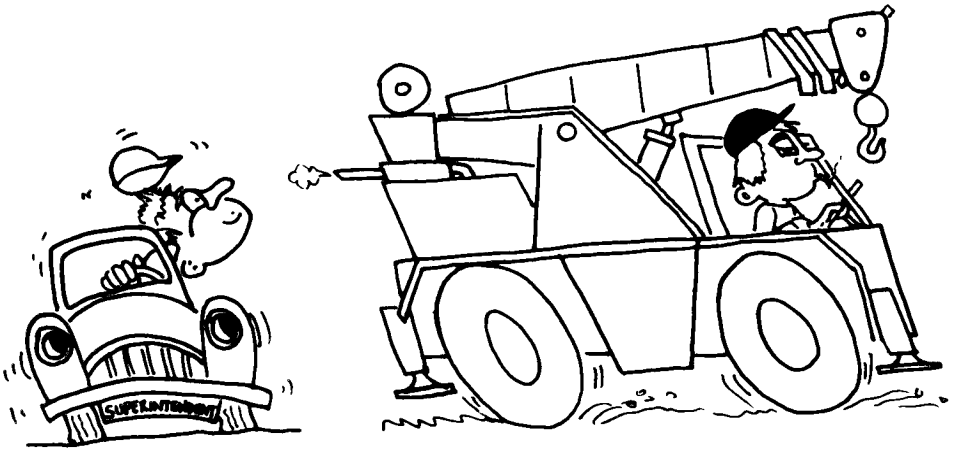
The following precautions should be observed when driving the SCAMP on public roads:



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

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 collisions or bumping structures.



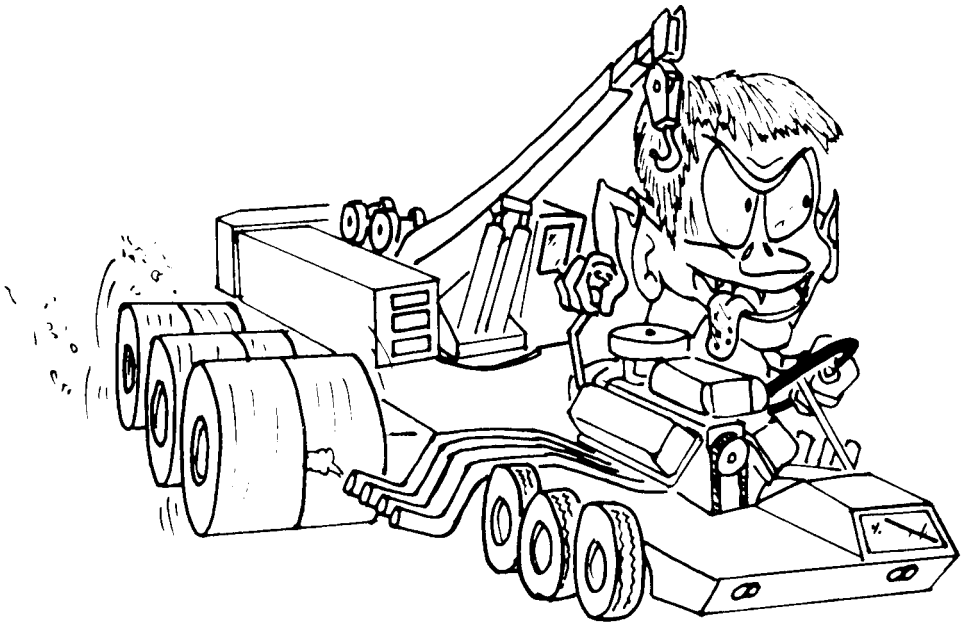
Never back up without the aid of a signalman to verify the area behind the crane is clear of obstructions and/or personnel.

When traveling, the boom should be completely retracted, lowered, and stowed in its travel position, over the front. Insert the turntable lock pin.

Check brake system before operating crane.

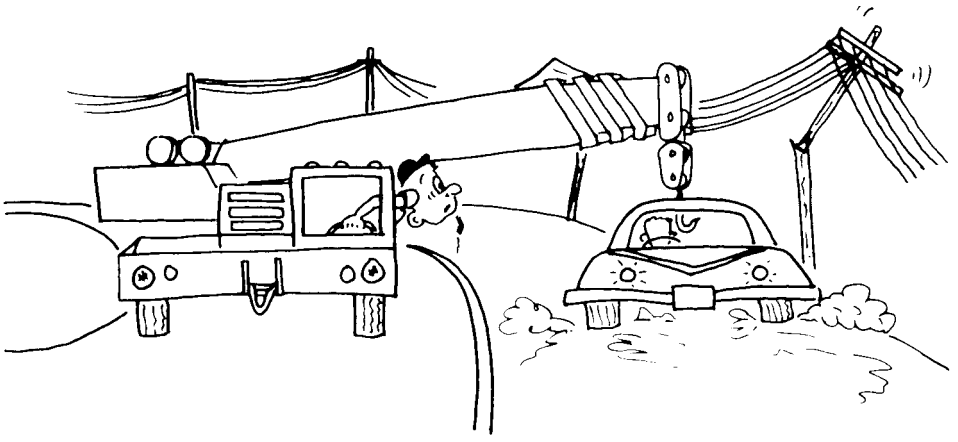
Secure the hook block to the front pintle and secure other items before moving the crane.

When traveling on a public thoroughfare, keep the lights on, use traffic warning flags and signs, and use front and rear flag vehicles. Check state and local restrictions and regulations.

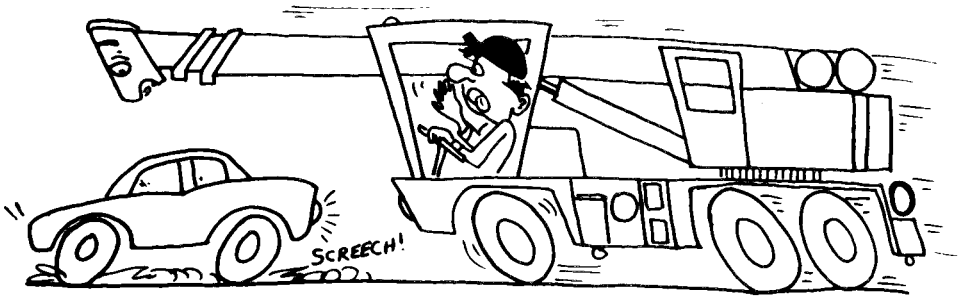


Drive carefully and avoid speeding.

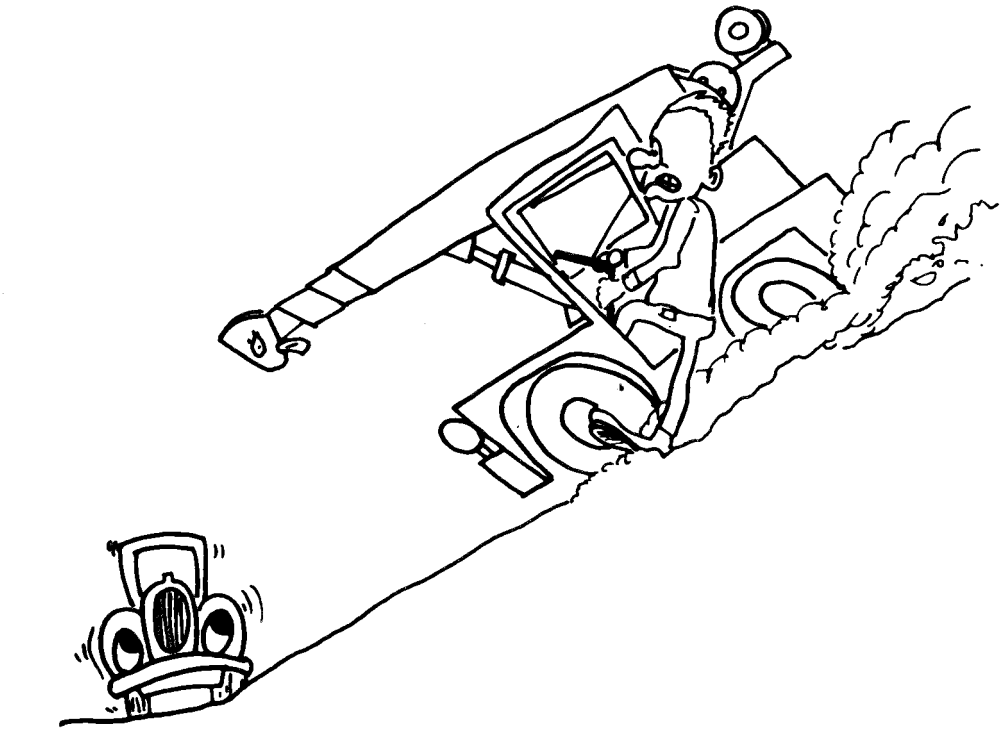
Before traveling a crane, check suitability of proposed route with regard to crane height, width, and length.



Secure the turntable before moving crane - use the turntable lock pin.



Stay alert at the wheel.



When parking on a grade, apply the parking brake and chock the wheels.

Per the SCAMP procurement specification the RT41AA has been designed for towing on public highways. Refer to Federal Motor Vehicle Safety Regulations for safety precautions and observe the following:

CAUTION

REFER TO SECTION 5 TRANSPORTABILITY FOR TOWING PREPARATION AND PROCEDURE.

- Stow the boom and lock the turntable as indicated above for travel operation. Secure the hook block to the front pintle.

- Tow the crane from the rear using the specified military tow bar. Attach appropriate flags and/or lights to the overhanging boom. Tow with a vehicle with sufficient braking and tractive effort to control the towed crane.

- Do not allow a passenger to ride in the crane cab while being towed.

- Reduce crane tire pressure to 65 psi.

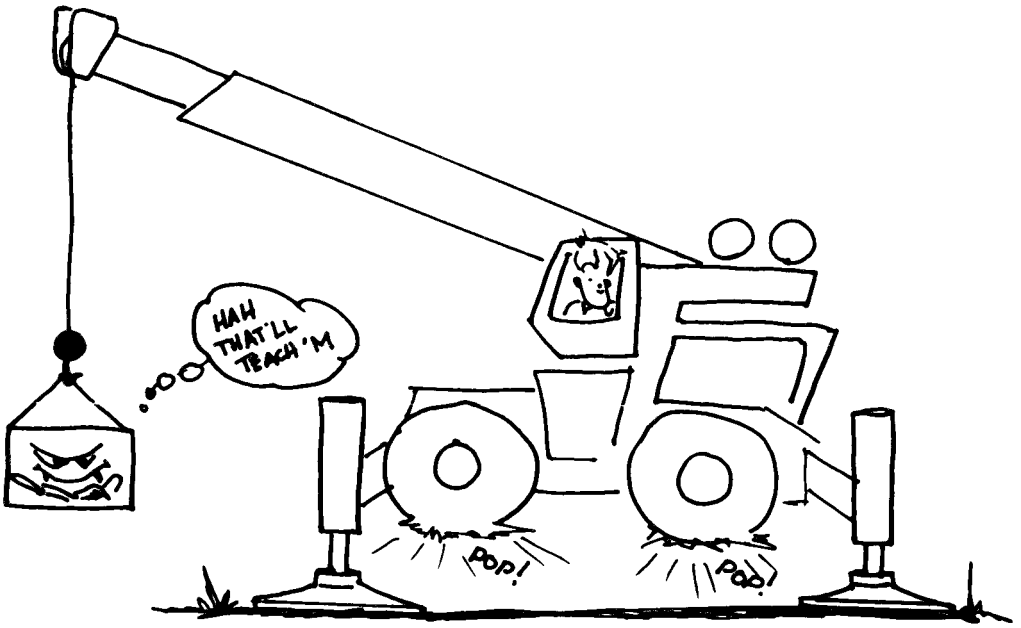
CRANING OPERATION.

Check crane stability before lifting loads. Ensure the outriggers (or tires if lifting on rubber) are firmly positioned on solid surfaces. Ensure the crane is level, brakes are set, and the load is properly rigged and attached to the hook. Lift the load slightly off the ground and recheck the stability before proceeding with the lift. Determine the weight of the load before you attempt the lift. Check the Rated Lifting Capacity Chart (see pages 1-3 through 1-6) against the weight of the load.

Most accidents involving mobile hydraulic cranes are caused by the following:

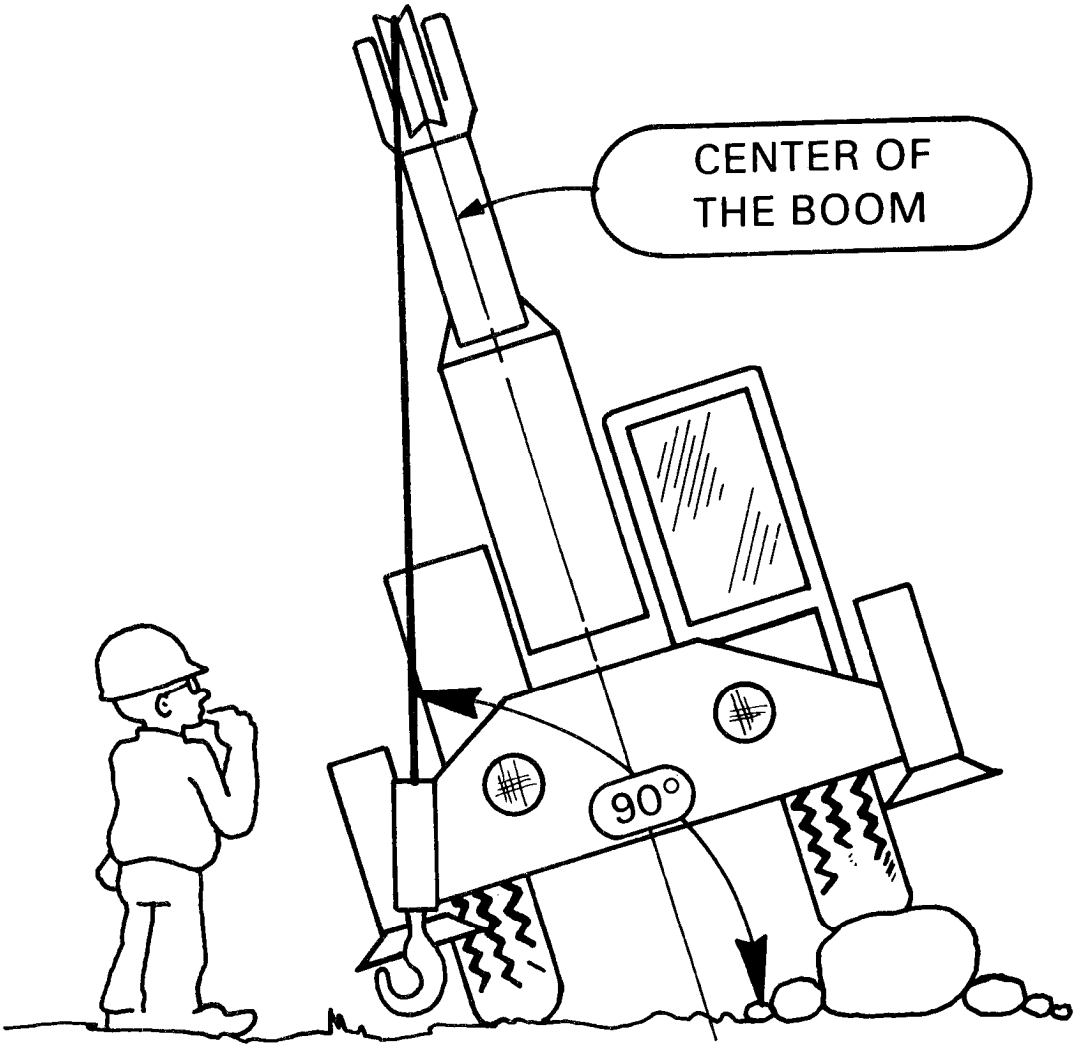
- crane out of level,
- bad surface conditions,
- outriggers used improperly or not used at all,
- inadequate blocking under outrigger floats,
- improper crane operation.

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



Level the crane before any lift. Use the bubble level in the cab. If on outriggers, level using the outrigger control. Make sure the tires are clear of the ground before the lift. On rubber use steel plates or other suitable cribbing under the tires to achieve maximum leveling.

On Soft surfaces use adequate cribbing or the oversize outrigger floats to distribute weight over a greater area. Check frequently for settling.



Use the load line to determine the levelness of the crane. It should always lie in the center of the boom.

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

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

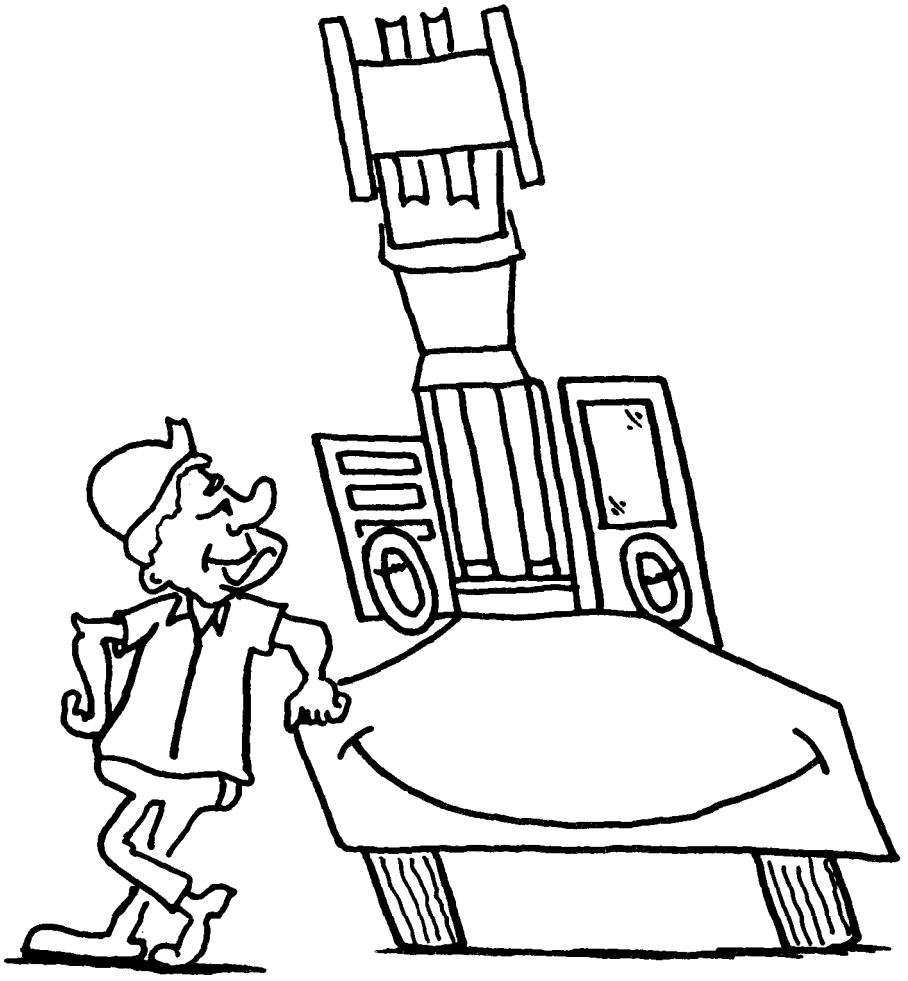
The importance of properly leveling a crane cannot be overstressed. A crane only slightly out-of-level can quickly encounter a tipping condition.

Barricade the area around which the crane is working.

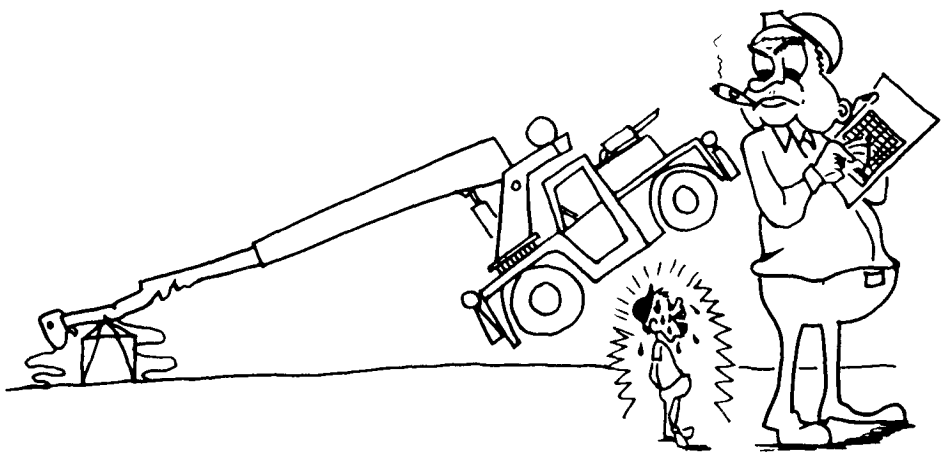
Don't interfere with the proper functioning of operational aids or warning devices. Monitor them regularly and see they get the proper care.

Always refer to the capacity on the load chart in the cab BEFORE making any lift. Position the hoist line to the radius required - then lift the load. Stay within the approved work area for the load being lifted.

Remember - all rigging equipment must be considered as part of the load. Lifting capacities vary with working areas. Permissible working areas are posted in the crane cab. When swinging from one working area to another, ensure load chart capacities are not exceeded. Know your crane!

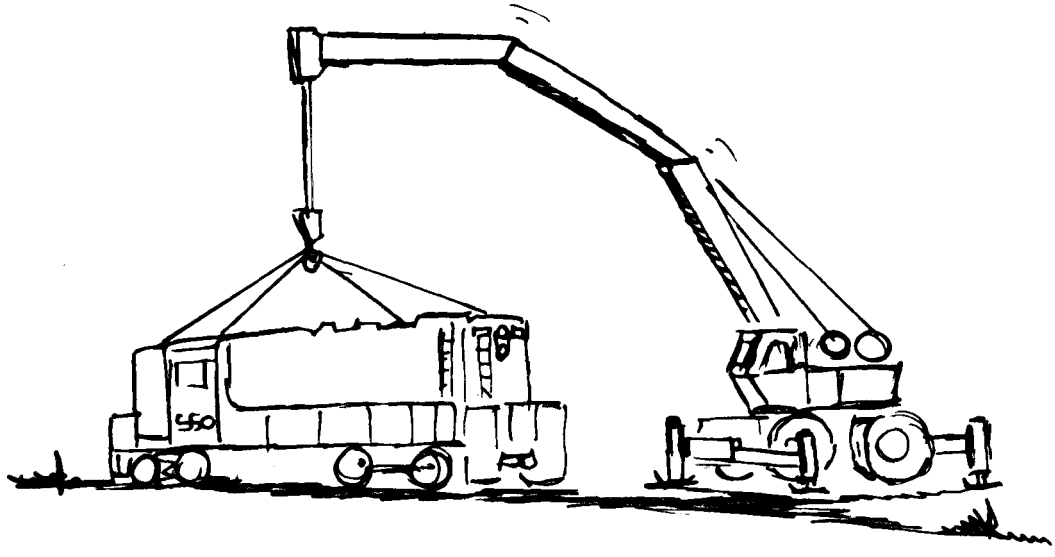


Operate the engine at or near governed RPM during performance of all crane operations.



WARNING

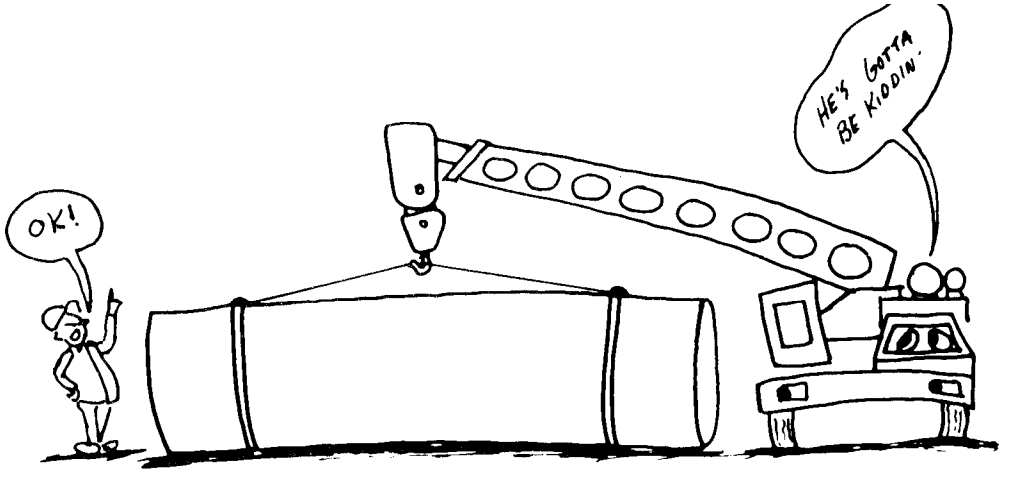
Do not exceed crane rating. Do not rely on the crane tipping stability to determine the maximum lifting capacity. Do not exceed the capacities shown on the load chart in the cab. REMEMBER: ALL LIFTING DEVICES (BLOCK, STRONGBACK, SLINGS, ETC.) - ARE PART OF THE LOAD.



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

Know the weight of all loads before you attempt a lift. Ensure the load to be lifted is within the rated lifting capacity of the crane.

Always keep the load as near to the crane and as close to the ground as possible.



NEVER exceed the rated lift capacity shown on the load chart. Always check the load chart to ensure the load to be lifted at the desired radius is within the rated capacity of the crane.

NEVER use the crane stability to determine capacity. It may be too late when you find out.

Multiple crane lifts are not recommended. The use of more than one crane to make a lift requires the ultimate in equipment, engineering, operating skill, and lift coordination.

BUT, if it is necessary to perform a multi-crane lift, the operator shall be responsible for assuring that the following minimum safety precautions are taken.

1. Secure the services of a qualified engineer to direct the operation.

2. Use one signal person and be sure he is qualified.

3. Coordinate lifting plans with the operator, engineer and signal person prior to beginning the lift.

4. Use cranes and rigging of equal capabilities and use the same boom length. Be certain cranes are of adequate lifting capacity.

5. Use outriggers on cranes so equipped.

6. Calculate the amount of weight to be lifted by each crane and attach slings at the correct points for proper weight distribution.

7. Lift only from a stationary position - DO NOT TRAVEL.

8. If possible, provide approved radio equipment for voice communication between all parties engaged in the lift.

9. Ensure the load lines are directly over the attach points to avoid side loading the cranes.

Always use enough parts-of-line to accommodate heavy lifts. Provide a safety allowance and reeve more parts of line, rather than fewer parts, than you need. Refer to the values on the load capacity chart for the line weight ratios.

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

Always make daily inspections of the wire-rope and replace worn, rusty, or frayed ropes.

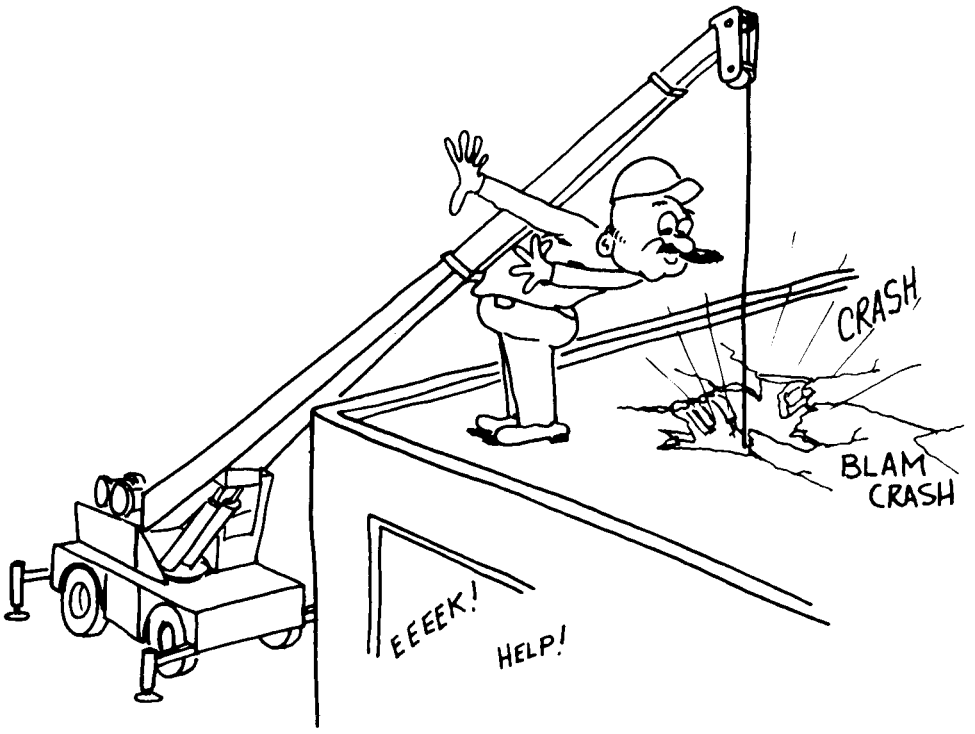
Always place the load on the ground when lubricating or adjusting.

A qualified signalman should be available at all times and especially when;

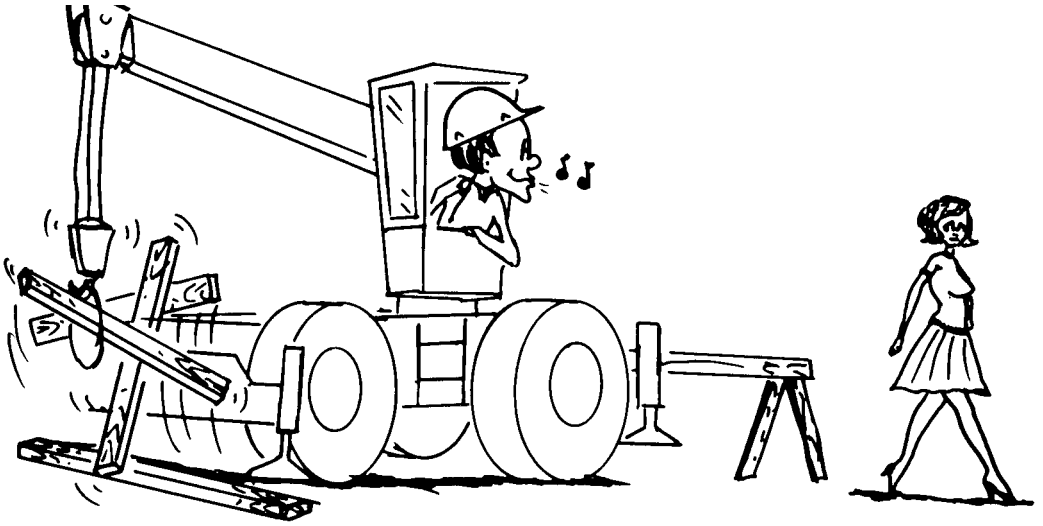
- working in vicinity of power lines,
- the crane operator cannot clearly see the load at all times,
- moving the crane in an area or direction in which the operator cannot clearly see the path of travel.

At all times use standardized hand signals previously agreed on and completely understood by the operator.

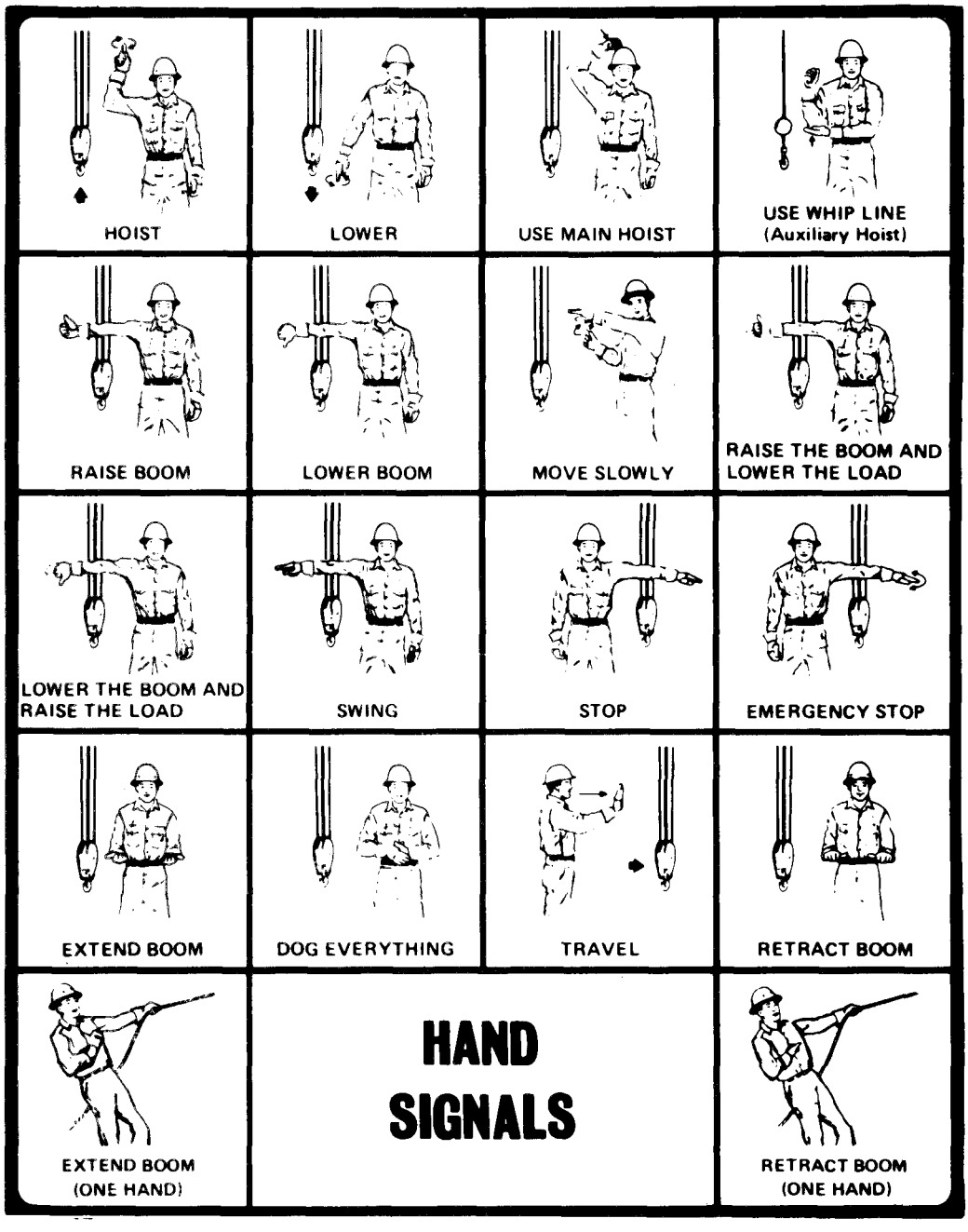
Allow No One other than the operator to be on the crane while the crane is functioning or moving.



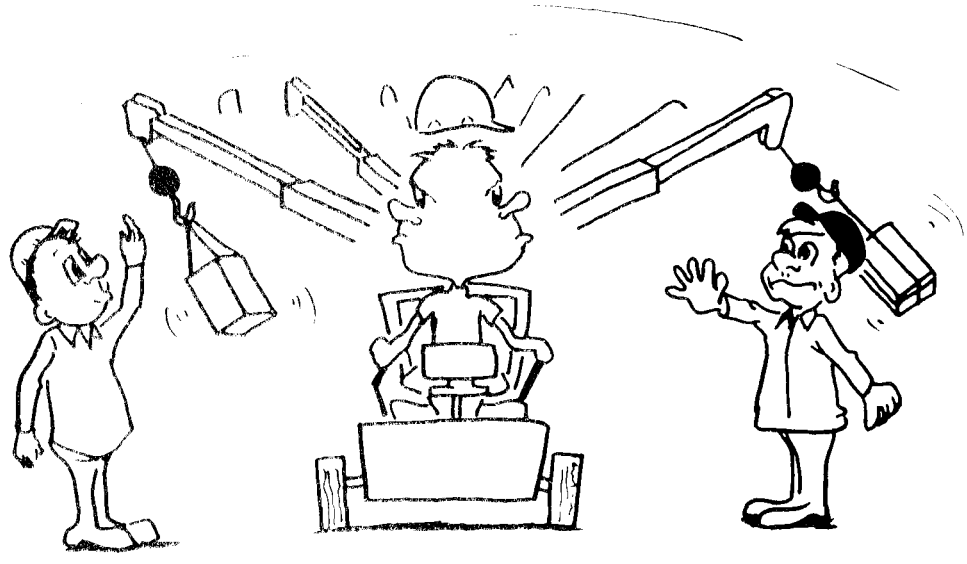
If communication with the signalman is lost, crane movement must be stopped until contact is regained.



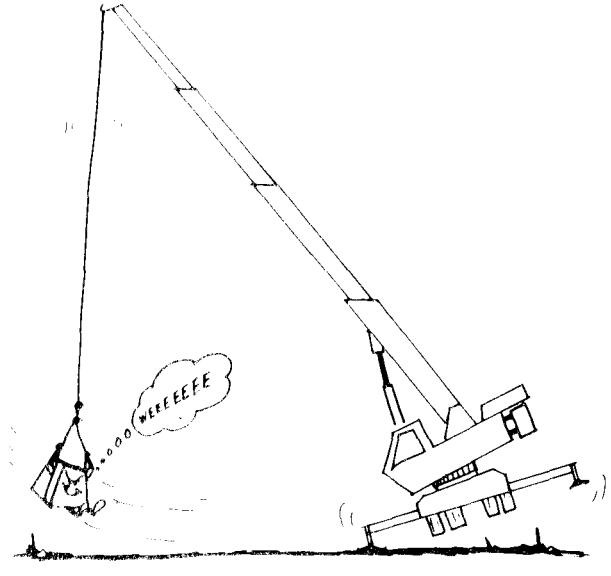
Watch the load at all times. Watch the signalman and/or load while it is moving. In case you must look in another direction, stop the operation immediately.


HOIST
LOWER
USE MAIN HOIST
USE WHIP LINE
(Auxiliary Hoist)
RAISE BOOM
LOWER BOOM
MOVE SLOWLY
RAISE THE BOOM AND
LOWER THE LOAD
LOWER THE BOOM AND
RAISE THE LOAD
SWING
STOP
EMERGENCY STOP
EXTEND BOOM
DOG EVERYTHING
TRAVEL
RETRACT BOOM
EXTEND BOOM
(ONE HAND)
HAND
SIGNALS
RETRACT BOOM
(ONE HAND)

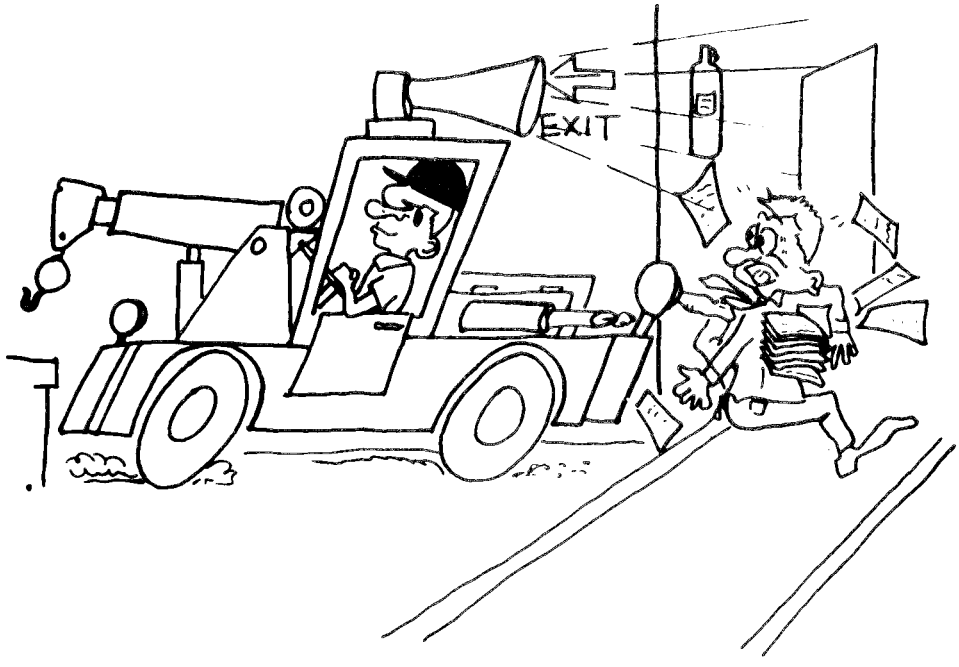
Use only one qualified signalman whenever vision is obscured and follow only his directions. But . . . . .



. . . . . .Obey a signal from anyone.



KEEP THE BOOM SHORT, Swinging loads with a long line can create an urstatble condition and possible structural failure of the boom.

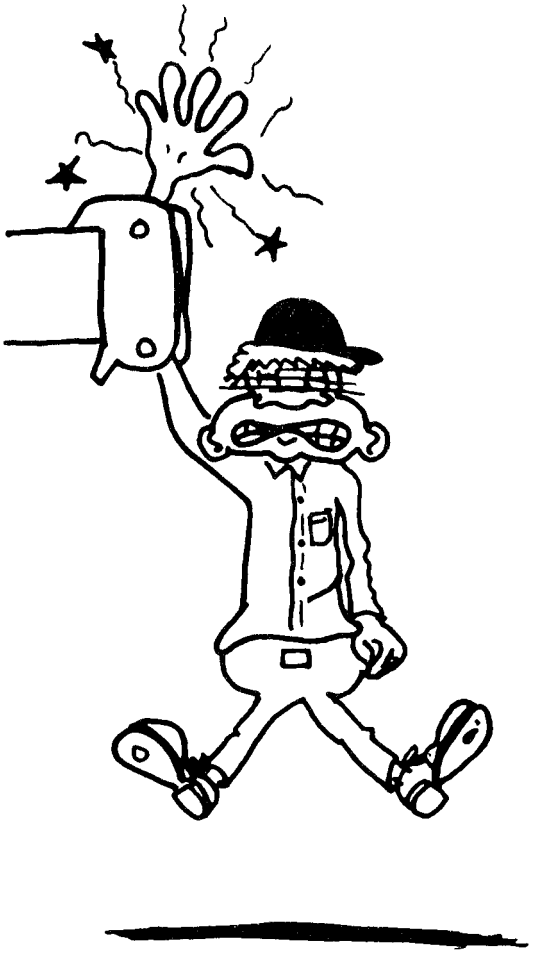


WARNING

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

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

Stay clear of the sheave wheels, holes, and lattice work in telescoping booms 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, and other moving parts of the crane. Be extremely careful when performing maintenance on the crane.

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

Never push or pull with a crane boom.

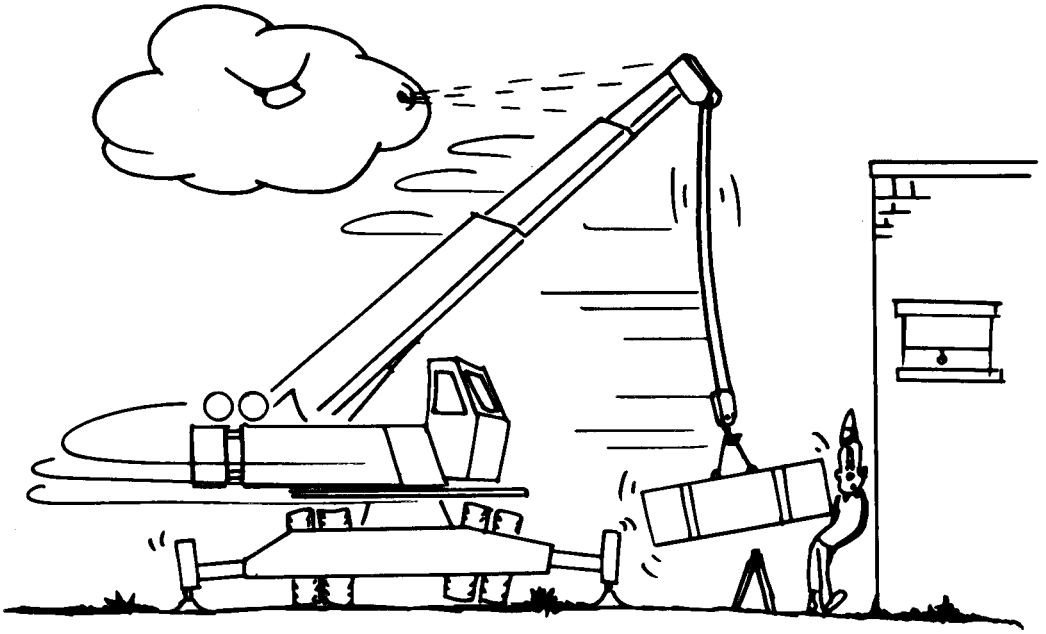
Do not add a counterweight to increase capacity.

When lifting loads, lift slowly and proceed with caution.

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

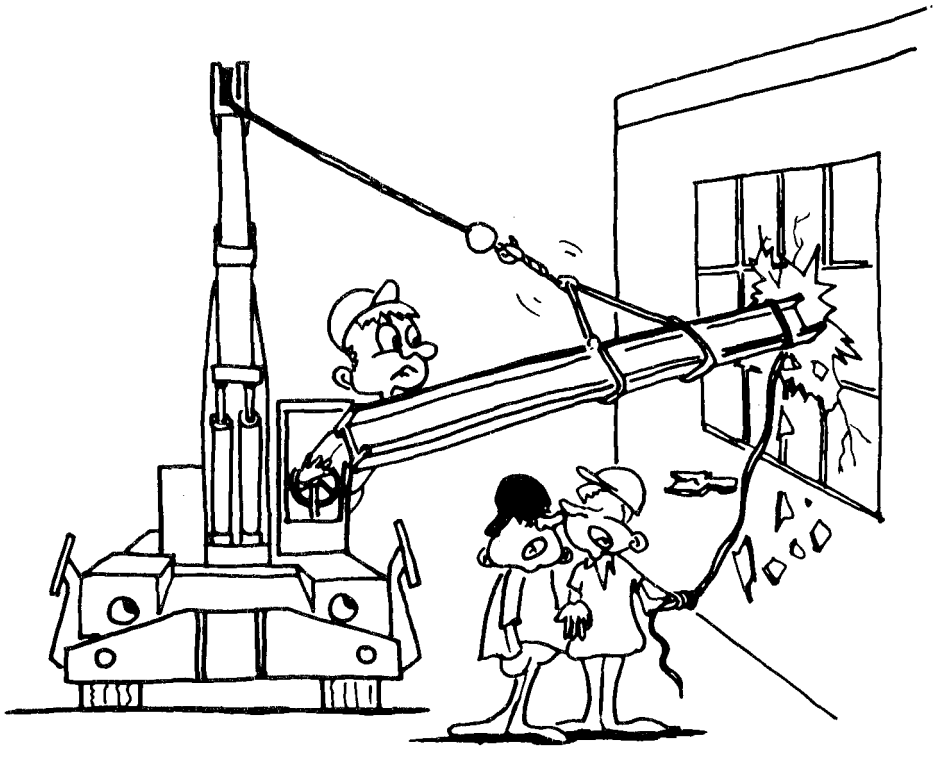
Cranes are designed and rated to handle freely suspended loads. Do not pull post, piling, or submerged articles that may have a heavy accumulation of mud, silt, or sand.

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



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

Wind and other factors such as boom length, boom angle, size and weight of load being lifted, etc. can affect crane stability and crane structures. Practical working loads for each particular job and lift shall be established by the user depending upon conditions that exist at the time a lift is being made. Appropriate capacity reductions shall be made whenever conditions indicate the possibility that a loss of crane stability or structural damage could occur. Be extremely cautious if wind velocity approaches 20 miles per hour.



Exercise caution when swinging loads.

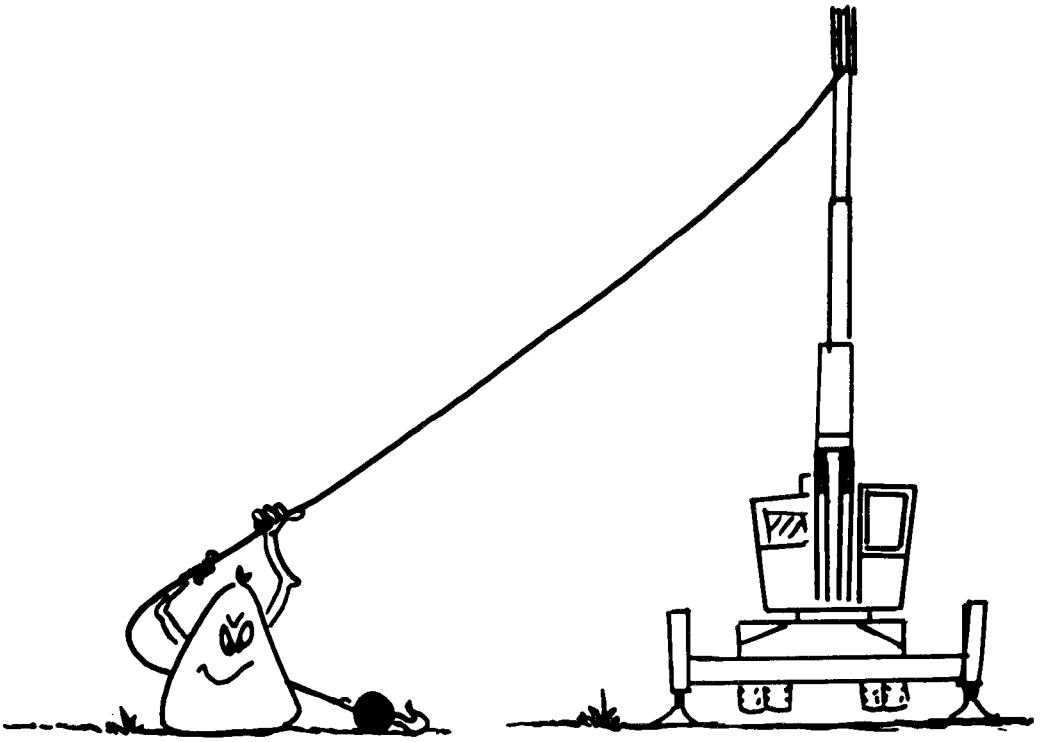
Stop the hook block from swinging when unhooking a load.

Swinging rapidly can cause the load to swing out and increase the load radius. Swing the load slowly. Swing with caution and keep the load lines vertical.

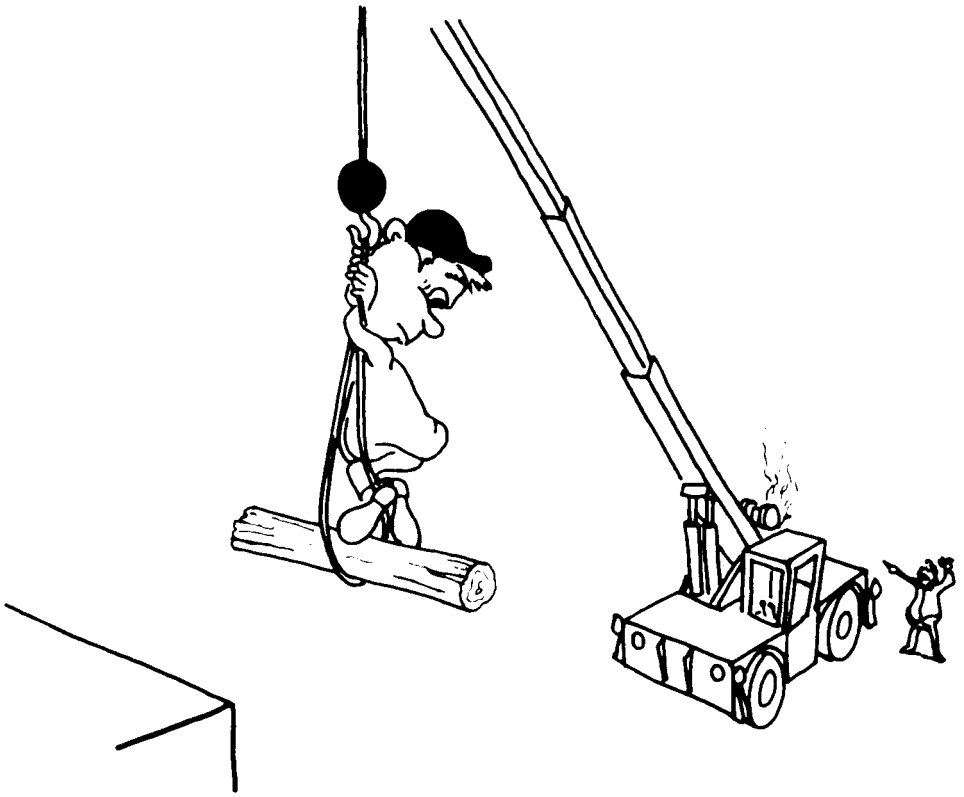
Operate the crane only from the crane operator's seat. Operating from any other position, such as reaching in a window, constitutes a safety hazard.

Never operate the crane with less than three wraps of rope on the hoist drum.

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



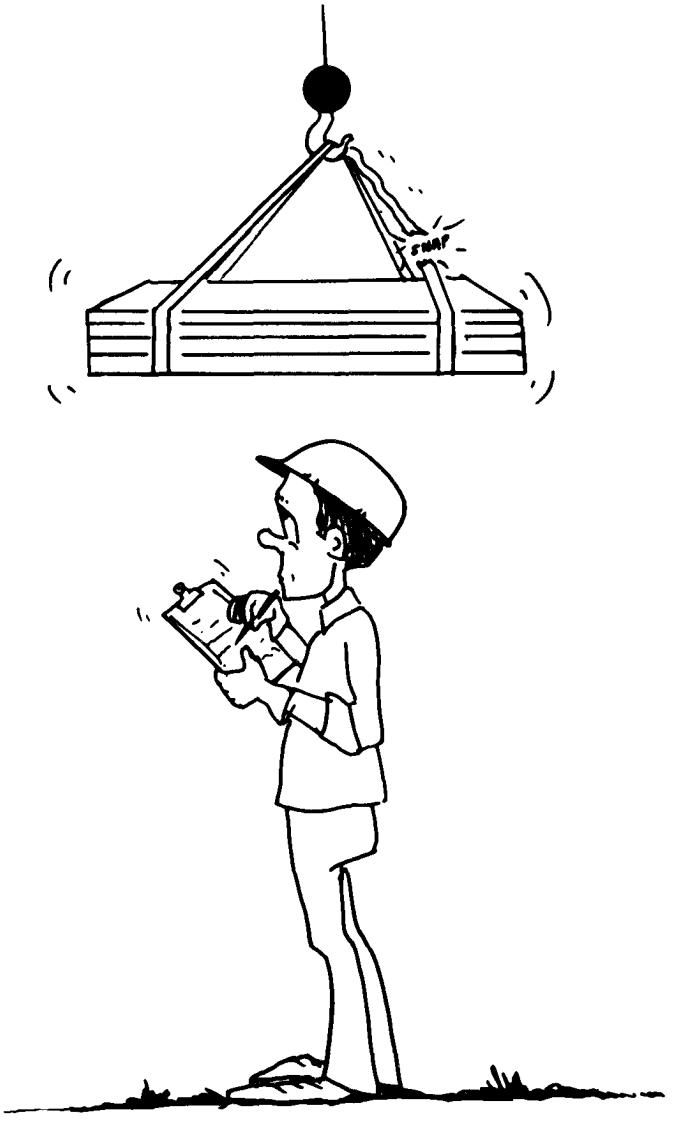
Never pull sideways with the boom. Booms and swing systems are not designed to side pull and may be damaged if subjected to excessive side loading. Booms are designed for lifting only freely suspended loads.



Do not permit anyone to ride loads, slings, hooks, etc., for any reason.

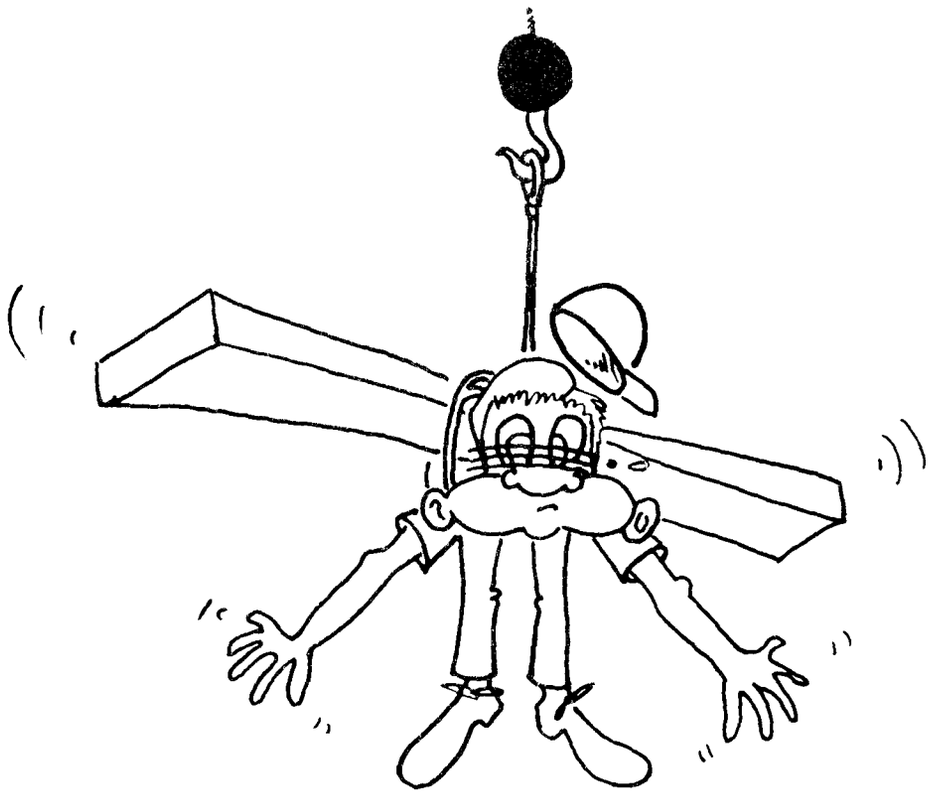
Look before swinging your crane. Even though the original set-up may have been checked, situations do change.

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

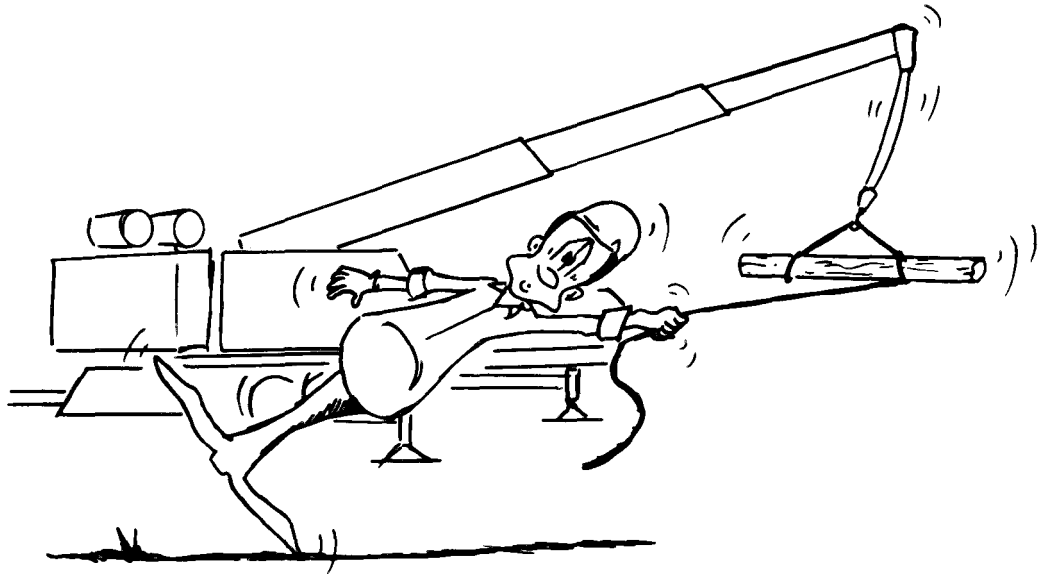


Keep everyone away from suspended loads. Allow no one to walk under a load. Ensure that all slings, ties, and hooks are correctly placed and secured before raising or lowering the load.

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



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

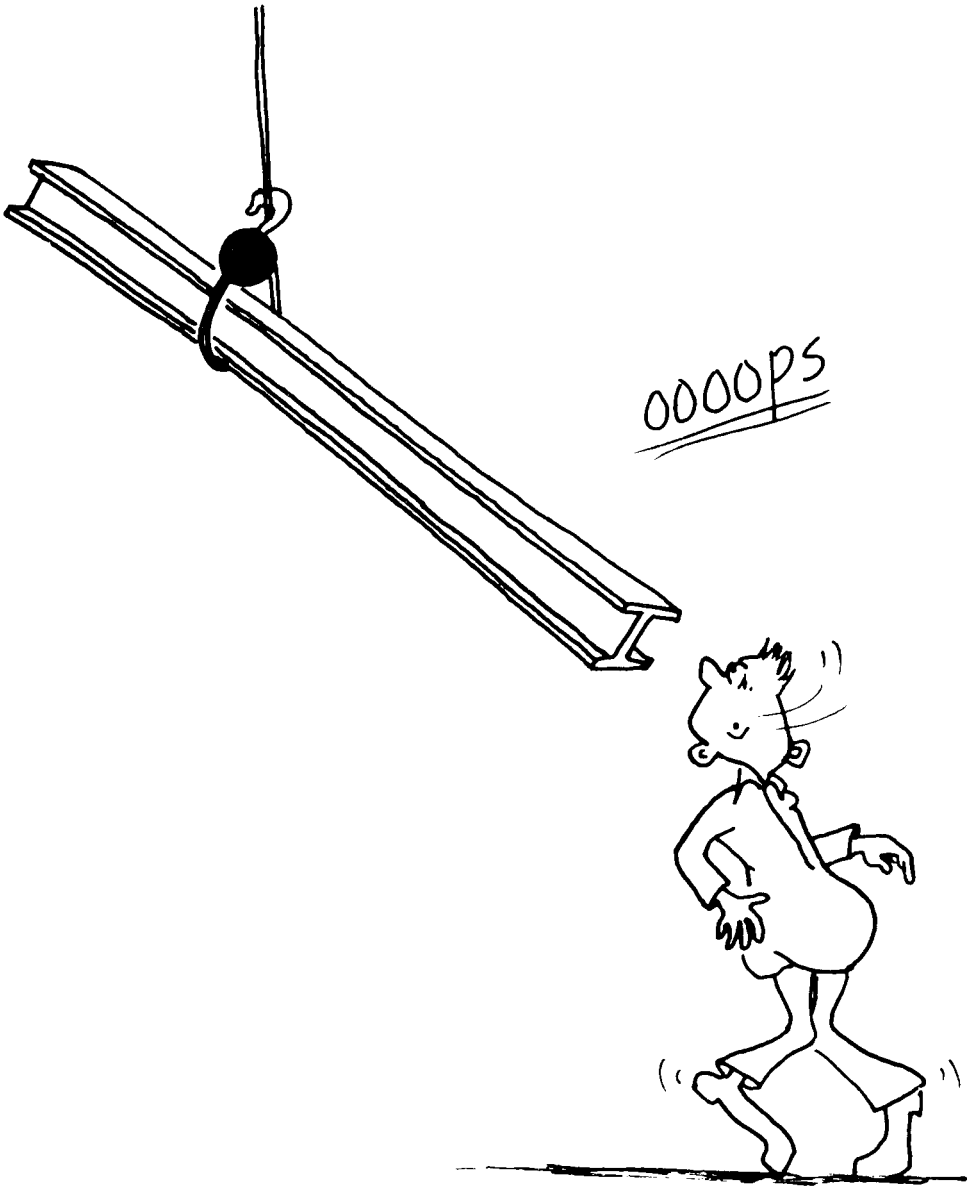


Check all braking and holding devices before operation. Perform an operational check of all braking (wheel and swing) and safety holding devices before starting any crane or traveling operations.

Be sure the load is well secured and attached to the hook with rigging of proper size and in good condition.

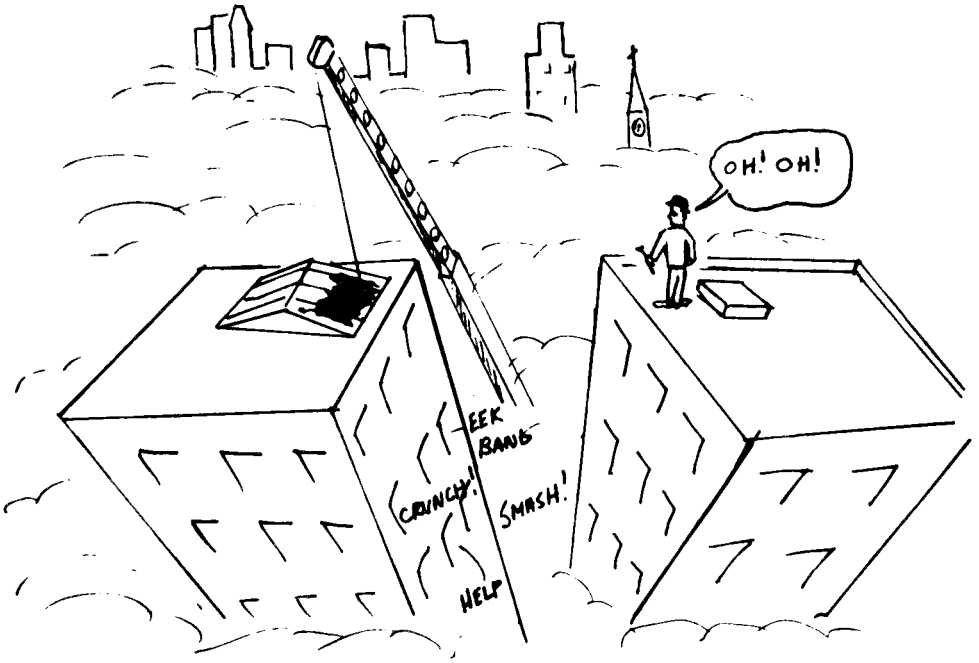
Allow no one to ride on the crane, carrier deck, engine compartment, etc.

Tag line personnel must guide the load from the ground.



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.



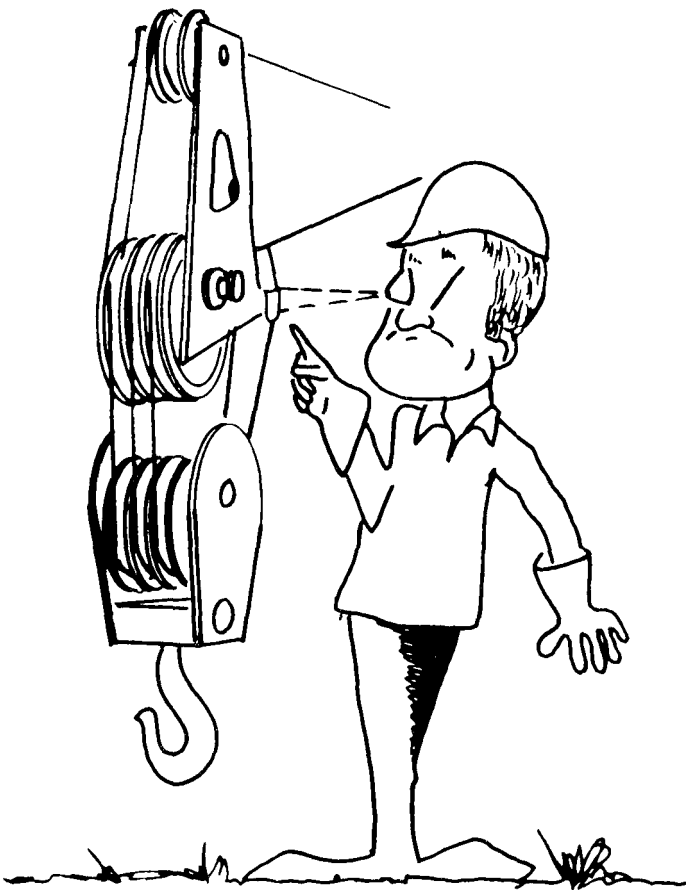
Never work the crane when darkness, fog, or other visibility restrictions make such operations unsafe.

Exercise extreme caution when picking and carrying a load. Never pick and carry a load with a crane that is not authorized for such operation.

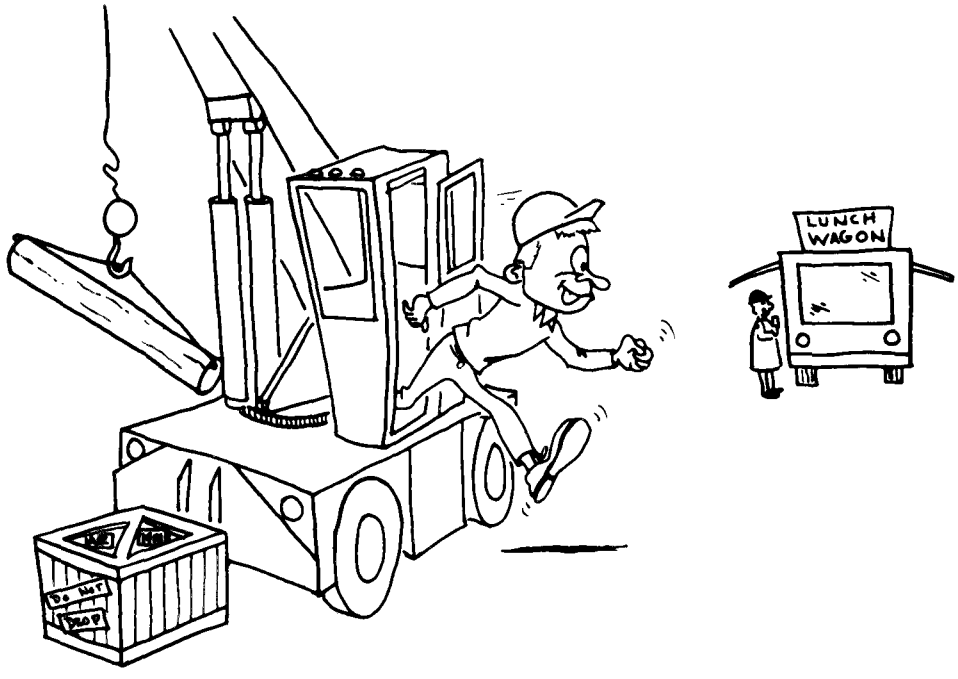
When performing pick and carry operations or operating on sloping ground, carry loads much less than capacity. Keep the load low, carry the load uphill from the crane, swing only to keep load uphill, and always place the loads on the high side.

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

Report any crane damage immediately.

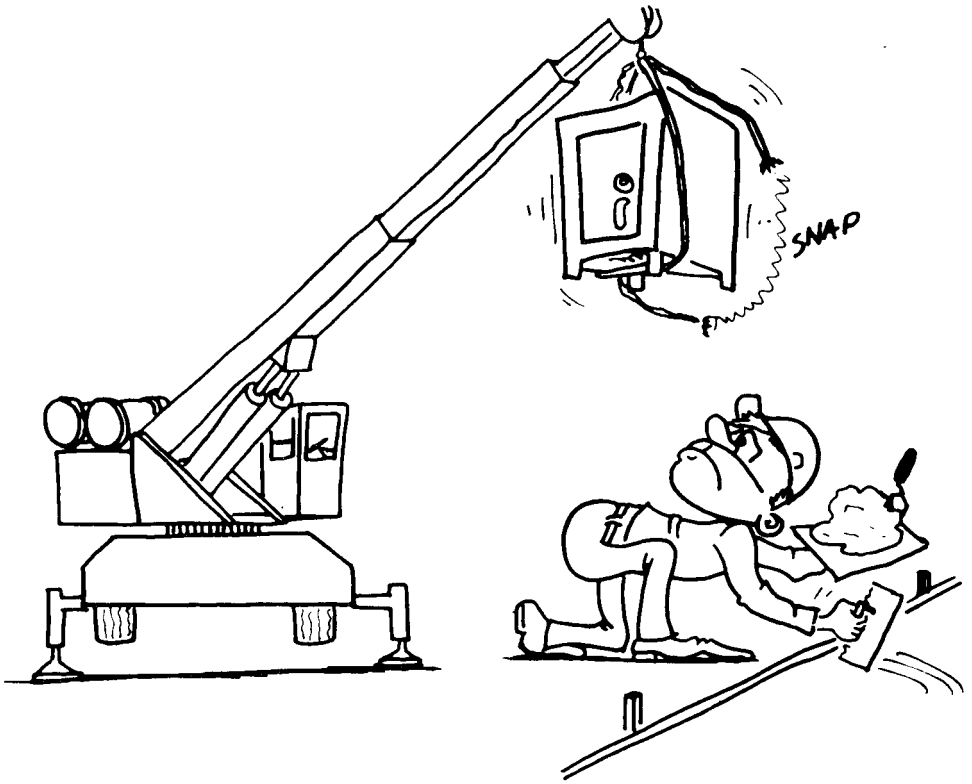


Check all pin connections, bolts, latches, locks, braking, and restraining devices before operation. Perform a visual inspection and replace/tighten any damaged or loose devices prior to initiating any crane or traveling operations.



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

Be alert - stay alert.



Never swing over personnel, regardless of whether load is suspended from or attached to the boom.

When shutting down the crane adhere to the following.

- Engage the brakes.
- Lower the boom and the load.
- Place the controls in neutral.
- Ensure the turntable lock pin is engaged.
- Turn off the ignition switch.

WIRE ROPE AND SHEAVES.

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. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure.

3. Evidence of any heat damage from any cause.

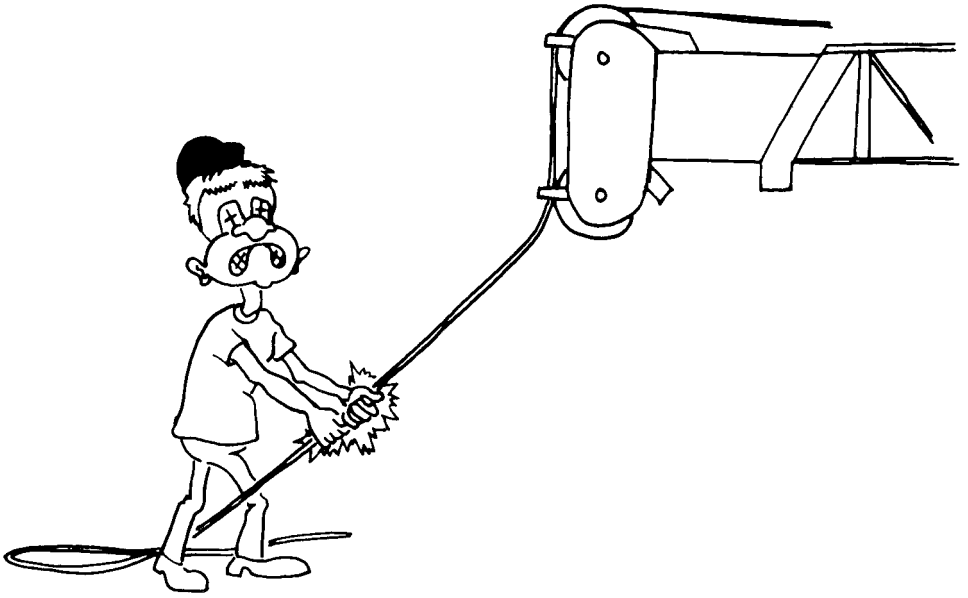
4. Reductions from nominal diameter of more than:

   1/64 inch for diameters up to and including 5/16 inch.
   1/32 inch for diameters 3/8 and 1/2 inch inclusive.
   3/64 inch for diameters 9/1 6 to 3/4 inch inclusive.
   1 /16 inch for diameters 7/8 to 1 1/8 inches inclusive.
   3/32 inch for diameters 1 1/4 to 1 1/2 inches inclusive.

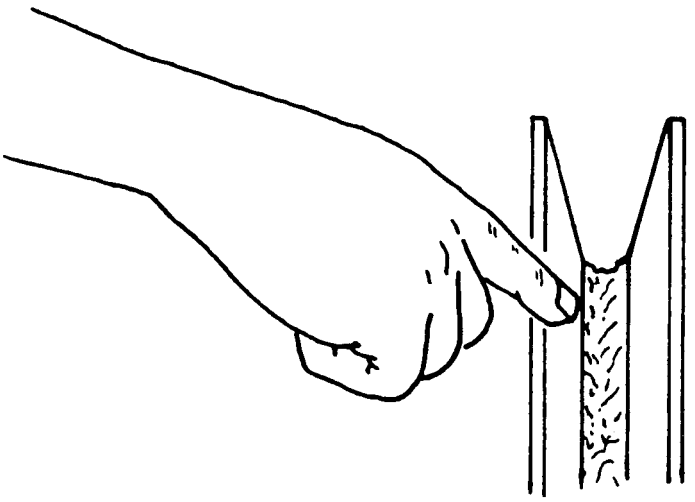
5. In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

Refuse to work with worn or damaged wire rope.

Demand to see the rope inspection record required by law and inspect the wire rope yourself. Don’t take another person’s word.

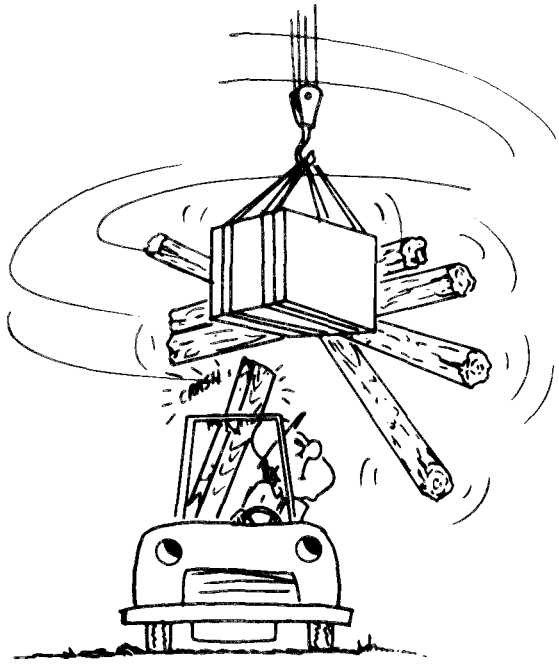


Never handle wire rope with bare hands,

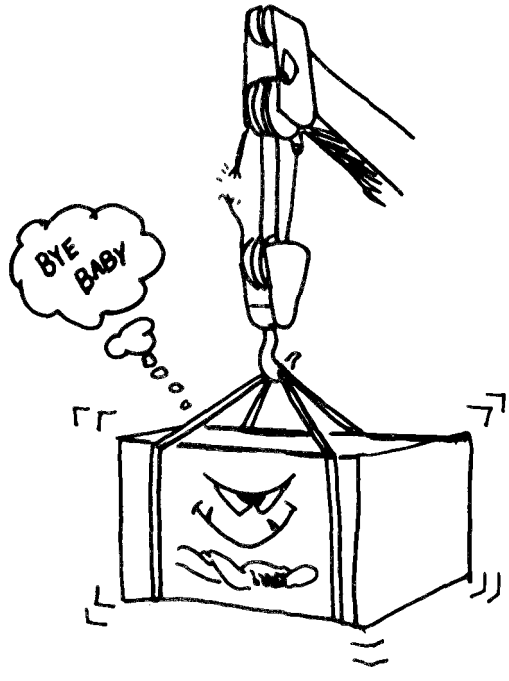


Inspect the boom nose and hook block sheaves for wear. Damaged sheaves cause rapid deterioration of wire rope.

Use the wire rope that is specified by the manufacturer.

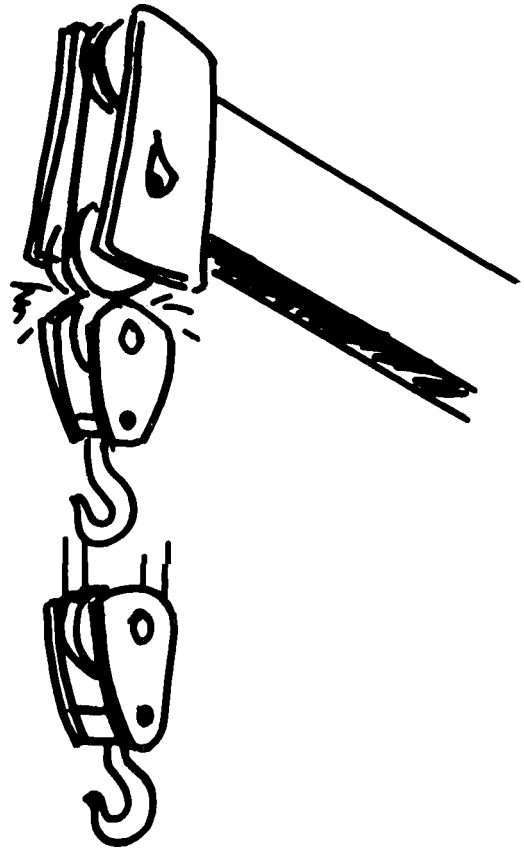


LIFT ONE LOAD AT A TIME. Do not lift two or more separately rigged loads at one time, even if the loads are within the rated crane capacity.



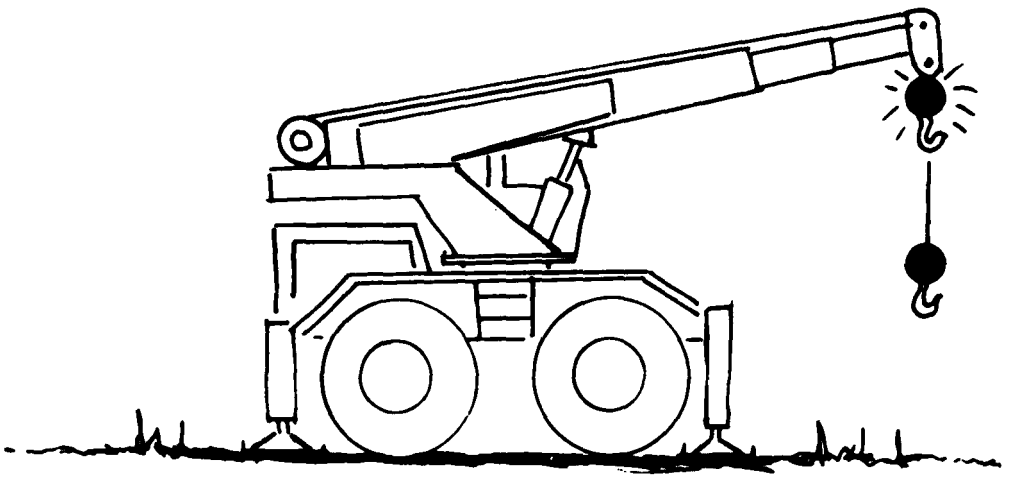
USE ENOUGH PARTS OF LINE FOR HEAVY LIFTS AND CHECK ALL LINES, SLINGS, AND CHAINS FOR CORRECT ATTACHMENT. To obtain maximum lifting capacities the hook block must be set up with enough parts of line. NO LESS THAN THREE. WRAPS of wire rope should remain on the hoist drum. When slings, ties, hooks, etc.,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

Two-Blocking MUST BE “AVOIDED, to prevent damage to your crane and to avoid creating a safety hazard. Two-Blocking exists whenever the load block, headache ball, rigging, etc. come into physical contact with the boom, boom nose, sheave, jib etc. Two-blocking can cause hoist lines (wire rope) rigging, reeving, and other components to become highly stressed and overloaded in which case the wire rope may fail allowing the load, block, etc. to free fall.



The SCAMP is equipped with an antitwo-block device with audio-visual alarms and control lever lockout to assist the operator in preventing two-blocking. Ensure that the system is operative prior to a lift.

An antitwo-block override switch (item 41, page 4-3), maybe used to allow closer approach of the hook block to the boom nose in special lifting situations, and to obtain 35 feet maximum ground to inside hook height on outriggers. The switch must be held in the OVERRIDE position to bypass the system. Exercise extreme caution when overriding the antitwo-block/control lever lockout system.



Caution must be used when extending the boom - let out cable simultaneously to prevent two-blocking the boom nose and hook block, The closer the load is carried to the boom nose the more important it becomes to simultaneously let out cable as the boom is extended. Keep the hook block, etc. at least 12 inches (30.48 cm) away from the boom nose at all times.

ELECTRICAL HAZARDS.

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

WARNING

ELECTROCUTION HAZARD
TO PREVENT DEATH OR SERIOUS BODILY INJURY

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

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

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

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

NEVER HANDLE PERSONNEL WITH THIS CRANE WITHOUT WRITTEN APPROVAL FROM GROVE MANUFACTURING COMPANY.

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

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

GROVE MANUFACTURING COMPANY
Division of Kidde, Inc.
KIDDE
Shady Grove PA 17256

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

Extreme caution must be exercised by all personnel working with and around your crane when in the proximity of an energized power source or power lines.

All personnel must be adequately warned of safety procedures.

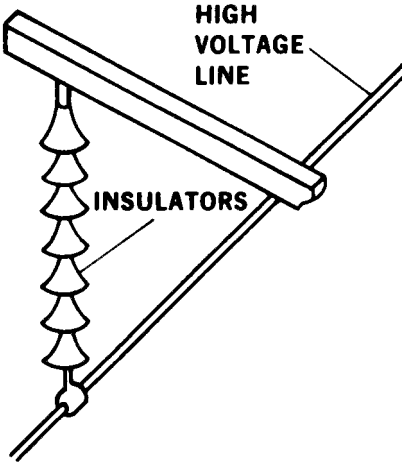
WARNING

OPERATIONS ADJACENT TO OVERHEAD LINES IS 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 69 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

3. 

COUNT INSULATORS SUPPORTING LINE TO DETERMINE LINE VOLTAGE

INSULATORS IN A STRING	LINE VOLTAGE
2	13200
2-3	23000
2-3	34500
4-5	69000
5-6	88000
6-8	110000
8-10	138000
9-11	154000
12-16	230000
18	345000

Assume all power sources are electrically energized (“hot” or “live”) until you have absolutely reliable information to the contrary.

When operating in the vicinity of power lines, have the power company cut off the power and ground the lines. Obey the following rules, at all times, whether the power is cut off or not.

Position the crane far enough away from power sources to ensure that no part of the crane or load can reach to within an unsafe zone. This includes the crane boom (fully extended to maximum height, radius, and length) and all attachments (rigging, tag lines, etc.).

- Erect a suitable barricade to physically restrain the crane and all attachments (including the load) from entering into an unsafe distance from the power source.

- Obtain positive and absolute assurance that power has been turned OFF.

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

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

Federal law prohibits use of cranes closer than 10 feet (3.048 m) to power sources - to be safe, double that (i.e. 20 ft. [6.096 m]).

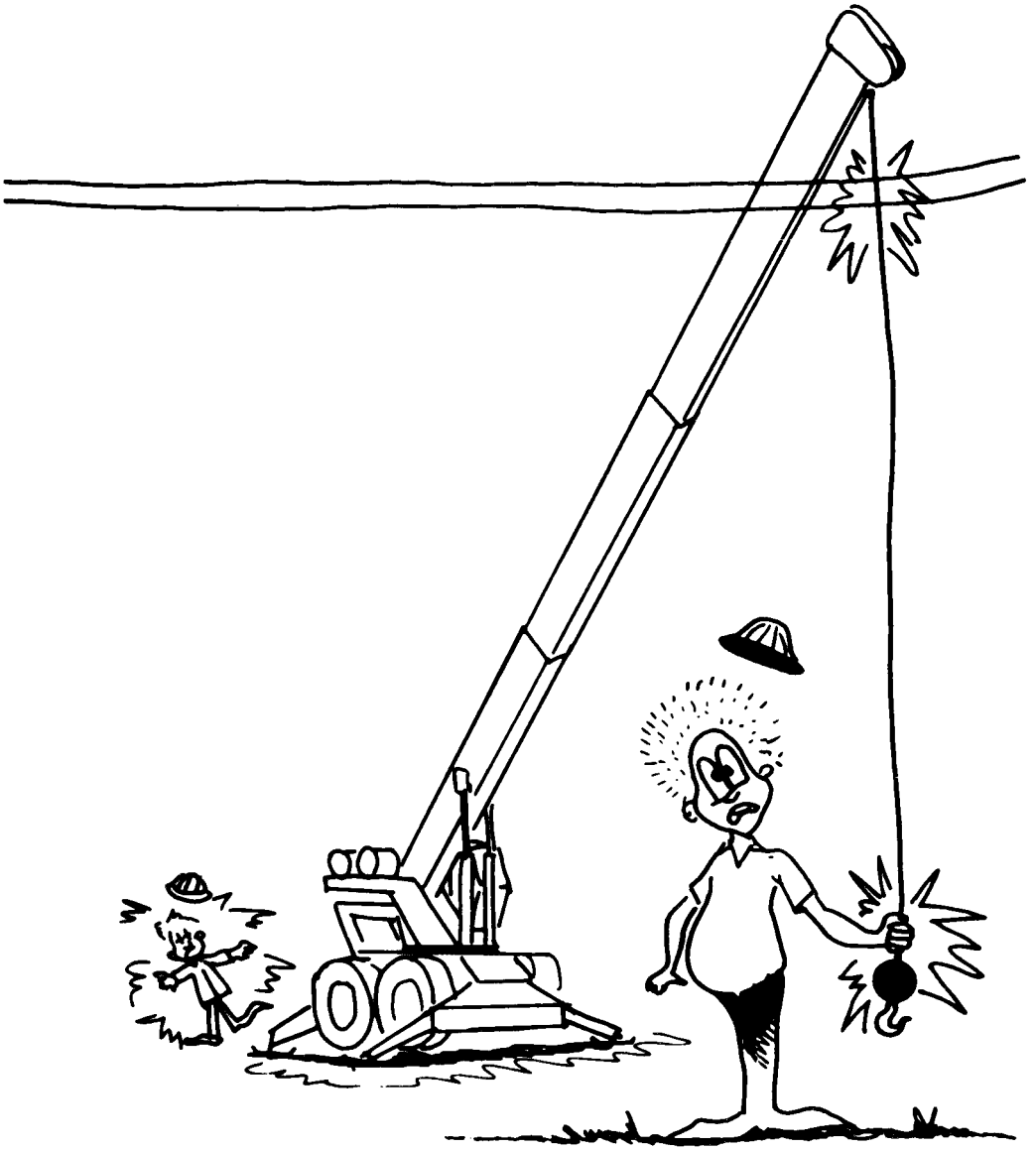
Comply with all federal, state, and local laws and regulations.

It is not necessary to touch a power line or power source to become electrocuted. Electricity, depending on magnitude, can jump or become induced into a crane. “Low” voltages can also be dangerous.

Be alert.

Keep all parts of the crane (ropes, lines, hook block, and load) at least 20 feet (6.096 m) from the line.

Slow down crane operations.



Whenever a load, wire rope, crane 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!

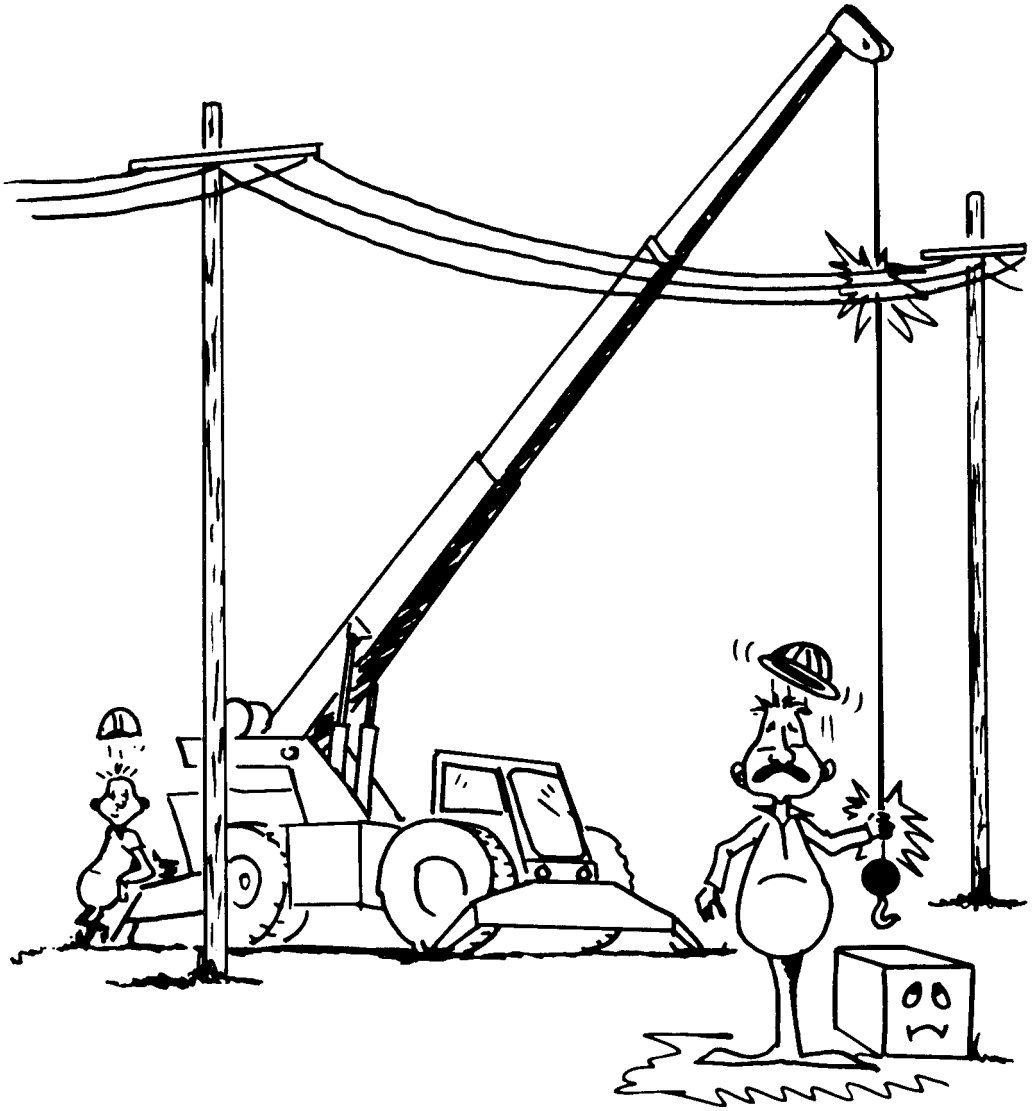
THE ONLY SAFE WAY TO OPERATE A CRANE IS TO STAY AWAY FROM ELECTRICAL SOURCES!

Assume that every line is “hot”.

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

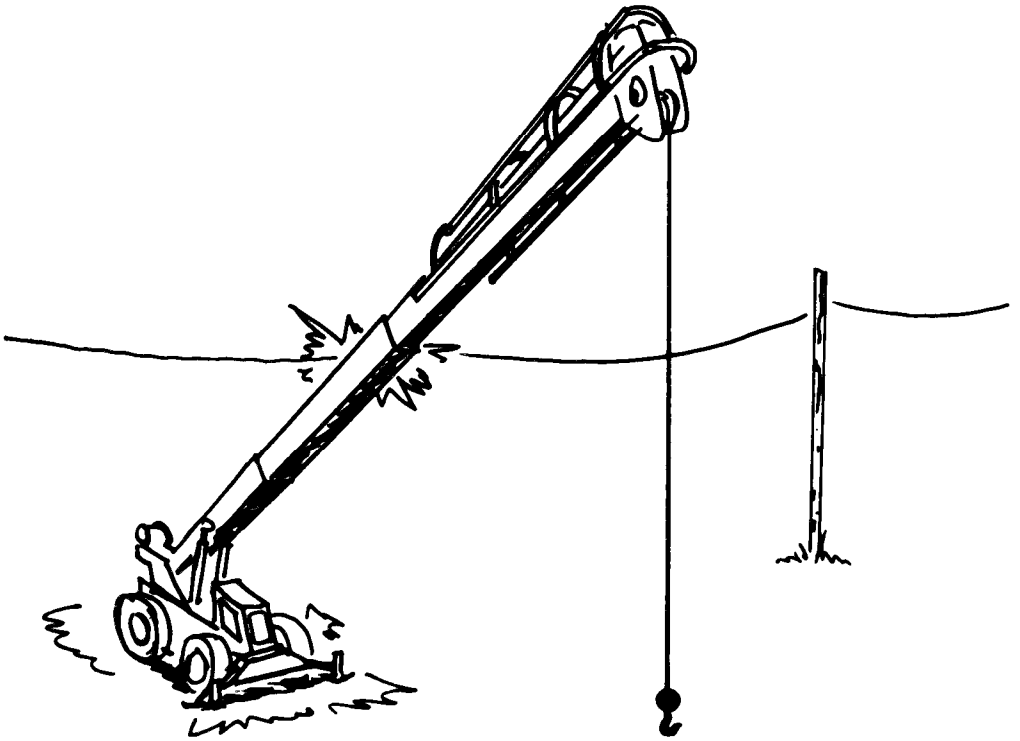
Warn all personnel of danger. Allow no unnecessary personnel in the area. Permit no one to lean against or touch the crane. Permit no one including sling men or load handlers to hold load, lines, or rigging gear.

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

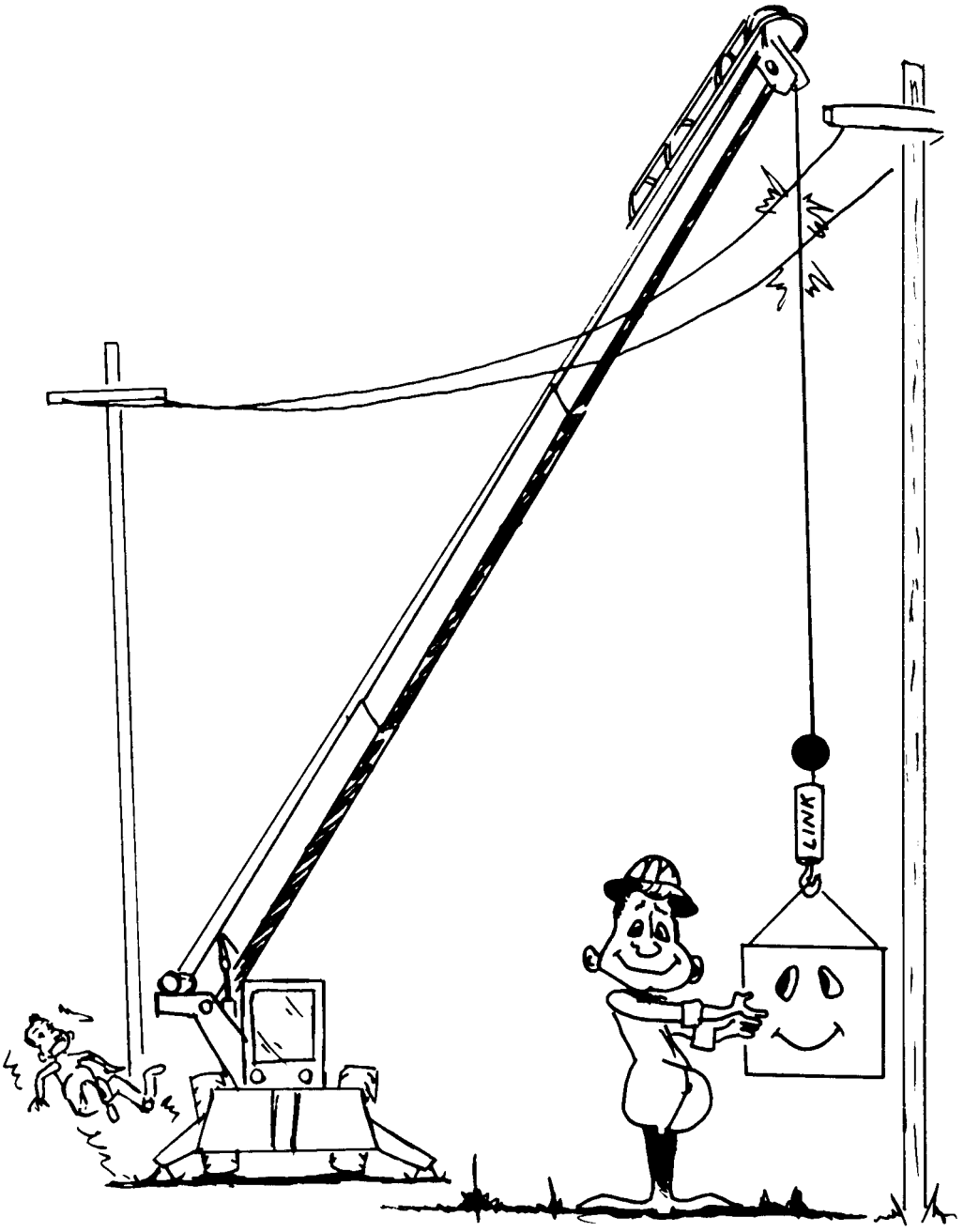


The use of boom guards, proximity devices, insulated hooks, links, or mechanical limit stops does not assure safety. Even if codes or regulations require the use of such devices, failure to follow rules listed here may result in serious injury or death. You should be aware of some of the limitations of the devices.

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

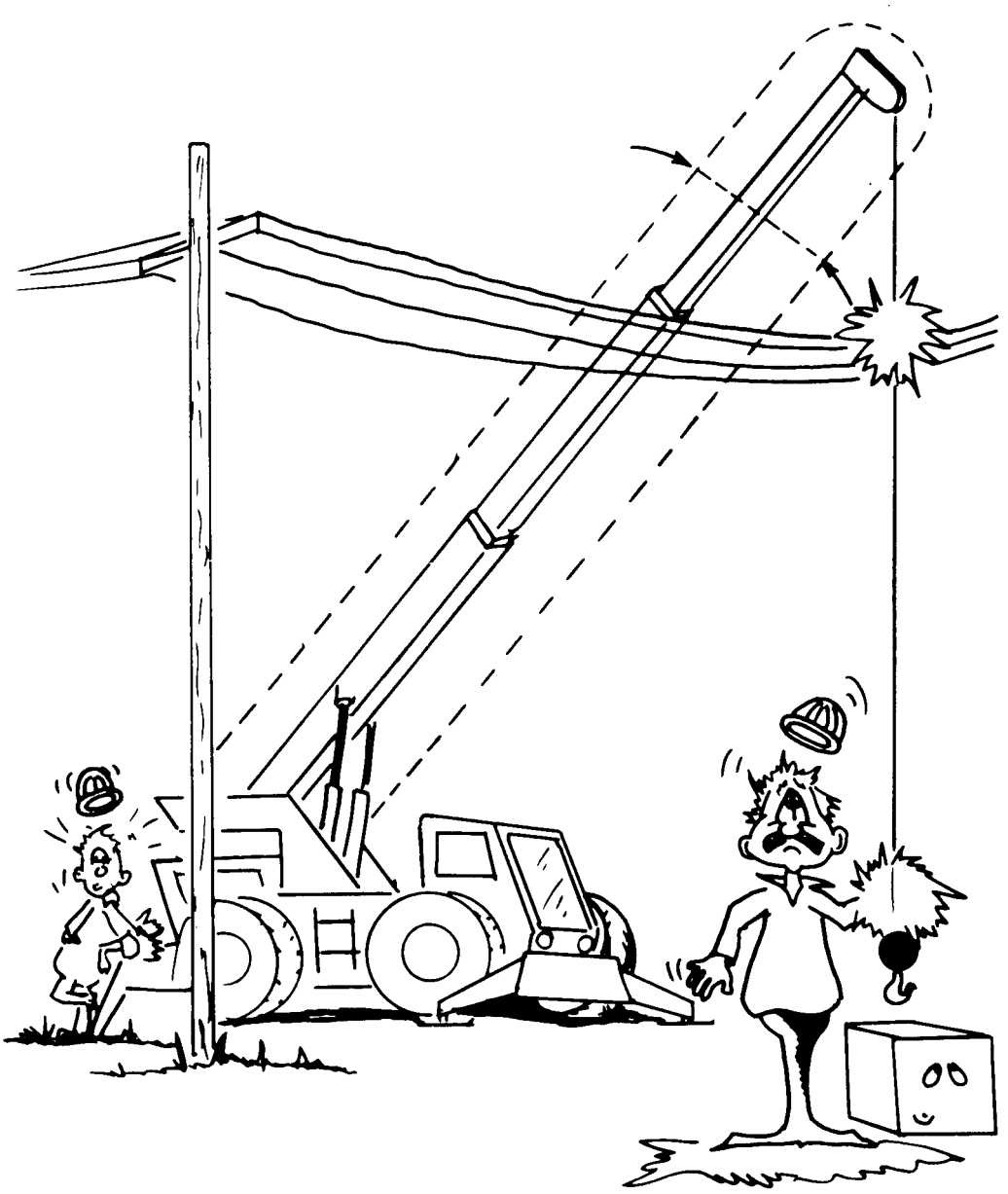


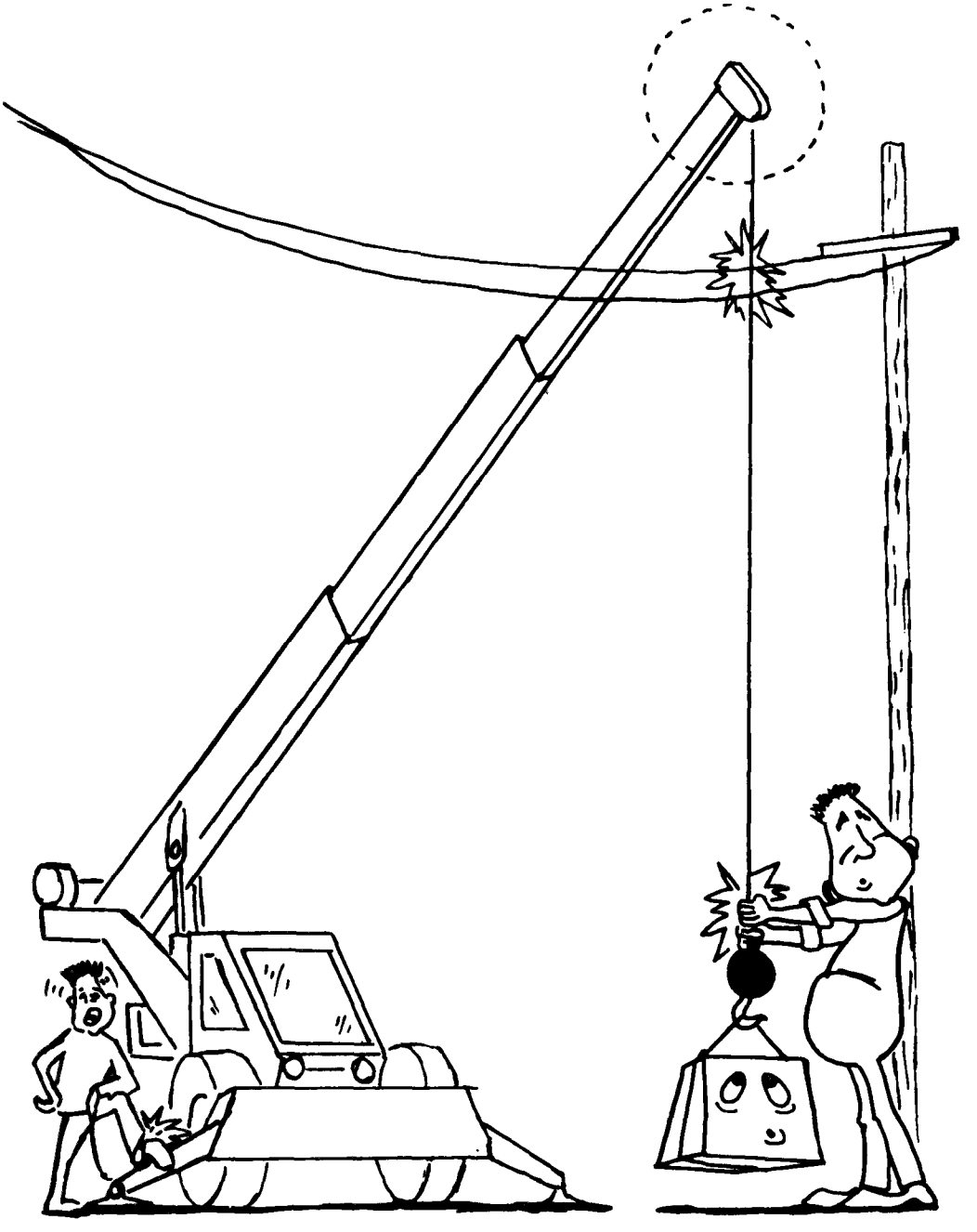
Insulating links installed into the load-line afford limited protection for those handling the load. Links have limited lifting, insulating, and other properties that affect their performance. Moisture, dust, dirt, oils, etc. can cause a link to conduct electricity. Due to their capacity ratings, some 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 periodically (right before use) tested for its dielectric integrity.

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. Much reliance is placed upon you, the operator, in selecting and properly setting the sensitivity of these devices.





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

Some variables with which you must be aware are:

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

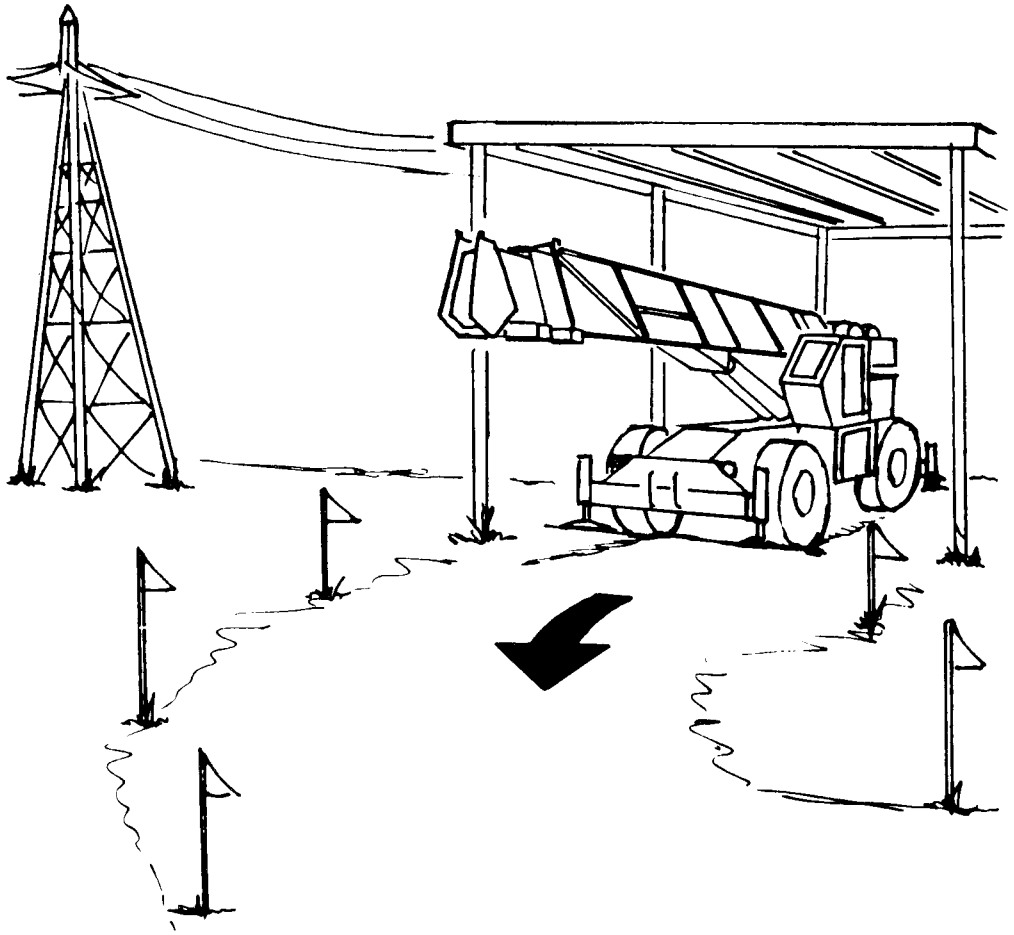
2. Some proximity devices will detect only alternating current (AC) - not direct current (DC).

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

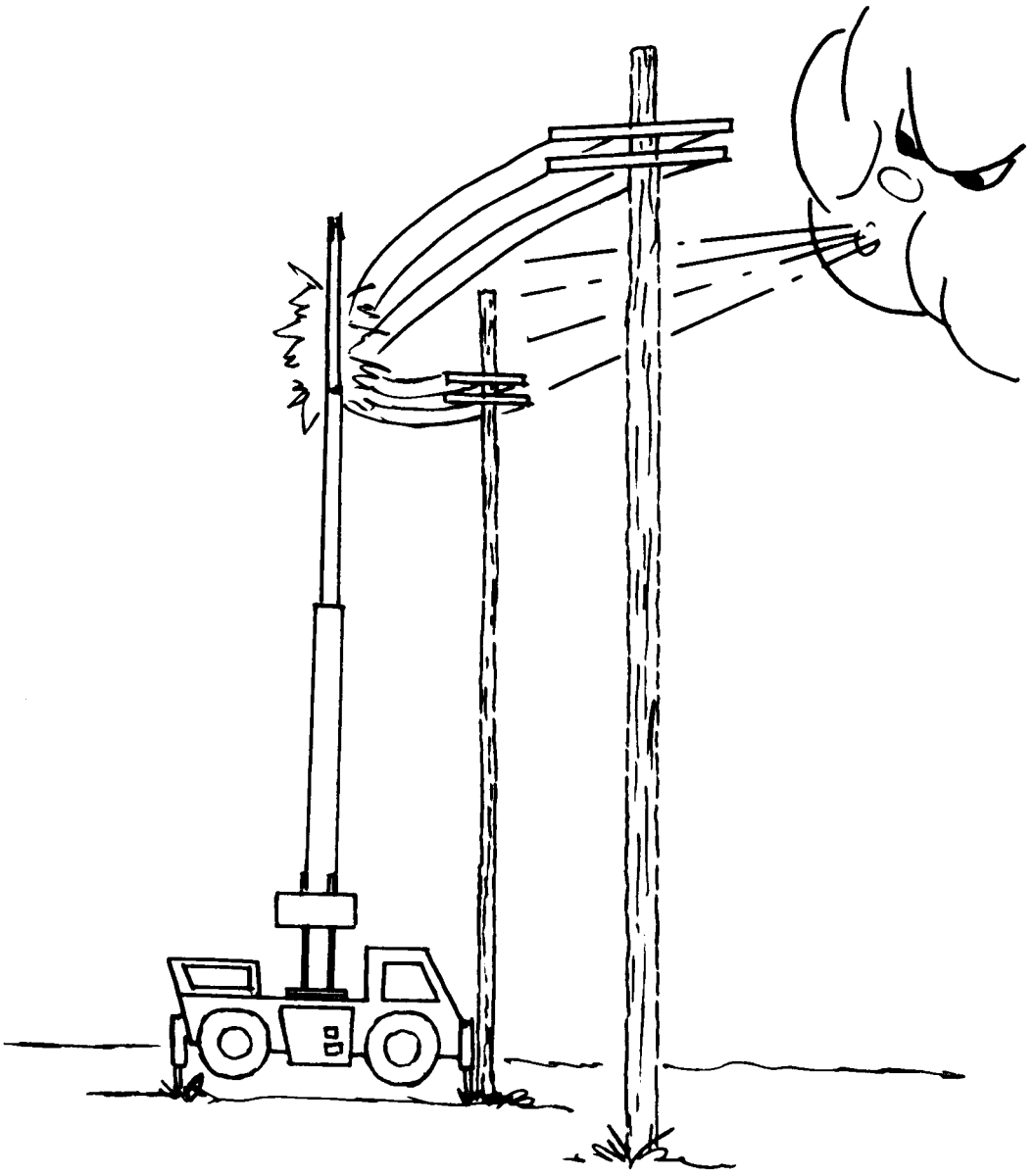
4. Most proximity devices simply provide a signal (audible, visual, or both) for the operator - the signal must not be ignored.

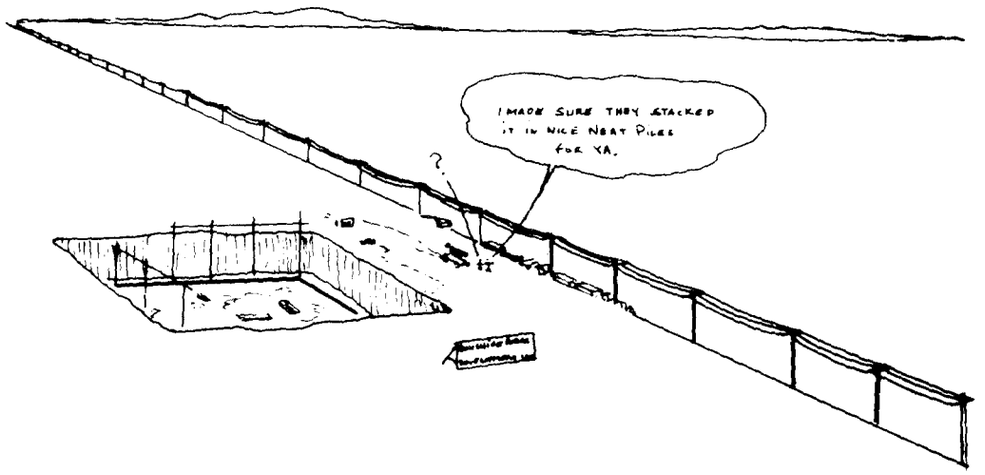
5. Sometimes the sensing portion of the proximity devices becomes confused by complex or differing arrays of power lines/sources.

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



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

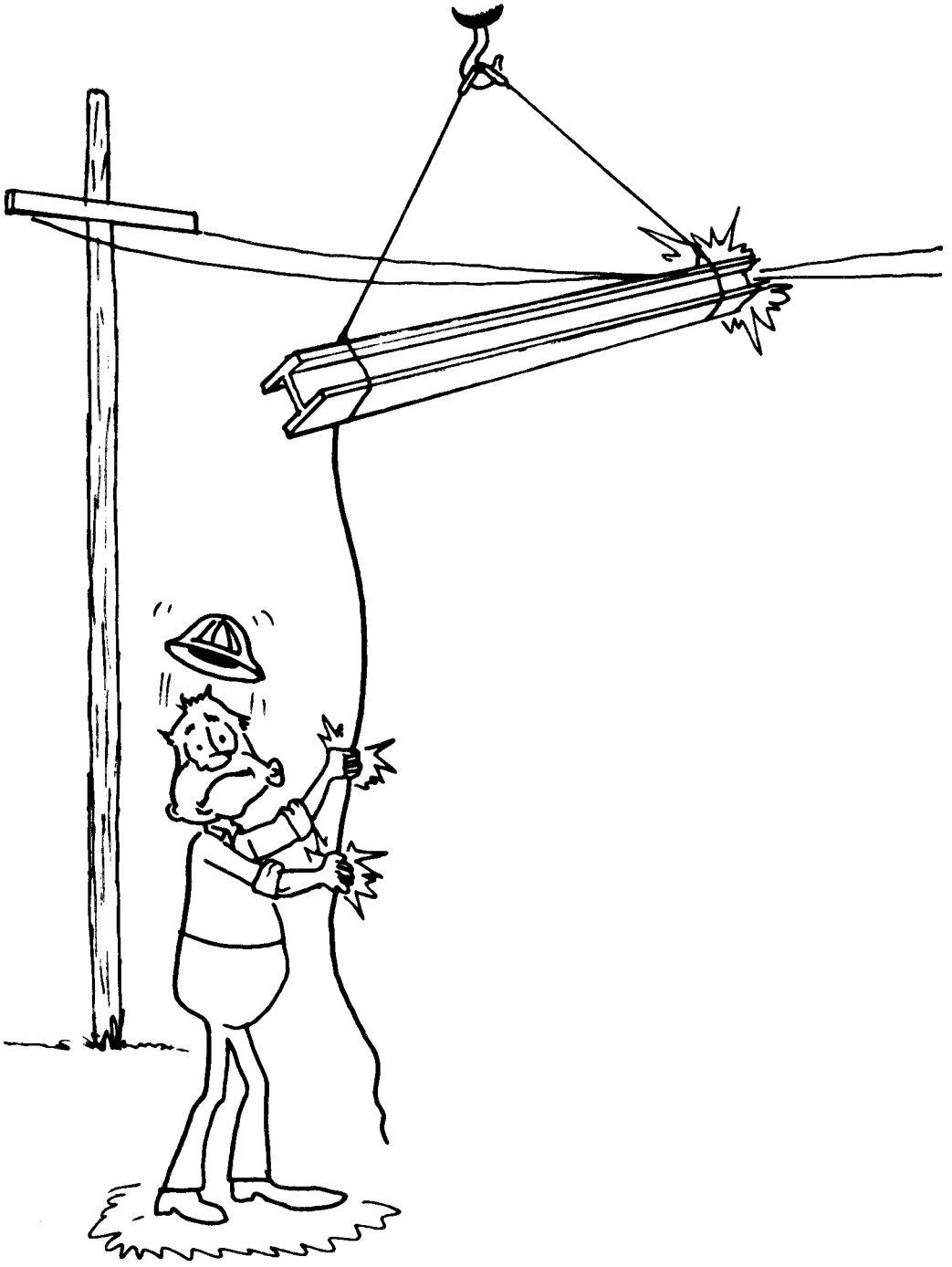




DO NOT store material under power lines or close to electrical power sources.

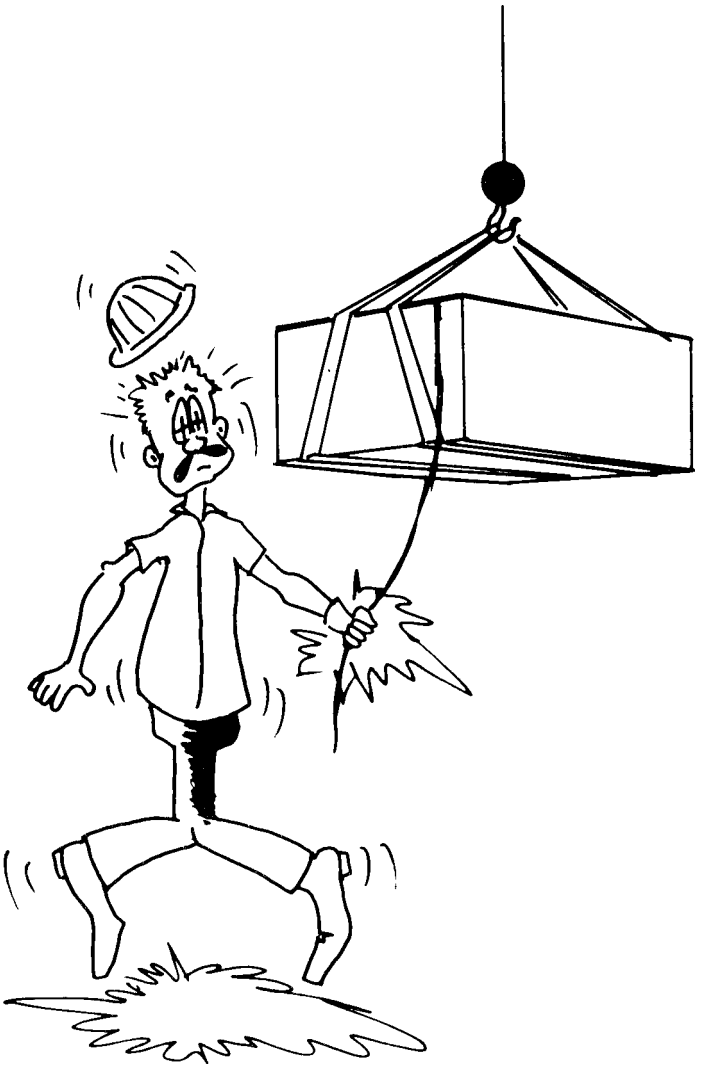
DO NOT depend on grounding!

Grounding of a crane affords little or no protection from electrical hazards. The effectiveness of grounding is limited by the size of the (wire) conductor used, the condition of the ground, the amount of the 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 enough 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. Stay in the crane until the power source has been deenergized.

Only as a Last Resort should an operator attempt to leave the crane upon contacting a power source.

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

When operating cranes equipped with electromagnets you must take additional precautions:

- Permit no one to touch the magnet or load.

- Alert personnel by sounding a warning signal when moving a load.

- Do not allow the cover of the electromagnet power supply to be open during operation or at any time the electrical system is activated.

- Shut down the crane completely and open magnet control switch prior to connecting or disconnecting magnet leads.

- Use only a nonconductive device when positioning a load.

- Lower magnet to stowing area and shut off power BEFORE leaving the operator's cab.

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

Advise your distributor on the incident and consult the factory for advice and crane inspection instructions prior to resuming operations.

HEARING PROTECTION REQUIRED.

Scamp test results have indicated steady state nose levels of 85dB(A) and greater, at governed engine rpm, during crane swing function. The maximum level of 87.5dB(A) occurs at the operator's station in the open or closed cab and decreases to 85dB(A) at the envelope contour shown in Figure 2-1. 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 earplugs, 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 in the Scamp Procurement Spec. is to conserve the hearing of personnel. Observe this notice and the posted caution decals on the crane and use hearing protection where required.

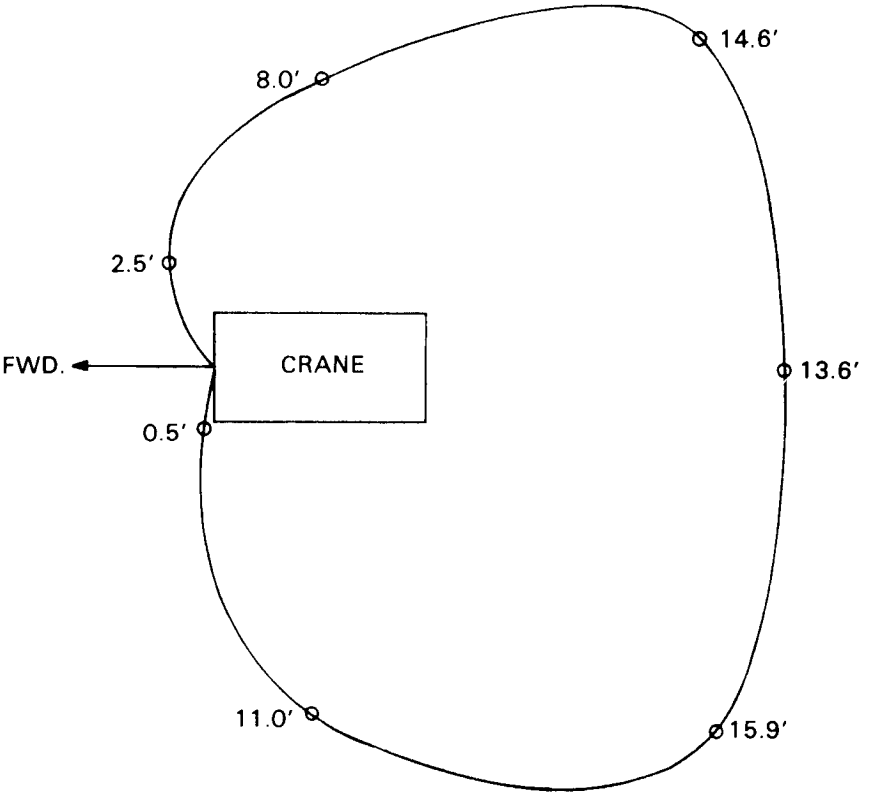


Figure 2-1. Hearing Protection Required

PERSONNEL PLATFORMS.

Handling of personnel from the boom is not authorized except with equipment furnished and installed by Grove Manufacturing Company. Upon approval by Grove of any personnel handling device, the following minimum safety requirements shall be strictly observed:

NOTE

Platform as used herein is defined as any attachment made to a crane boom which is intended to elevate or position people and includes work baskets, cages, or other devices for handling personnel.

- Whoever mounts a platform upon a crane shall perform stability tests before the unit is placed in operation. Thereafter, the installer shall perform a thorough visual inspection of the crane and platform for evidence of defects, deformation of any component, hydraulic leaks, and other items. All defects noted shall be corrected prior to handling personnel.

- The installation of platform(s) to the main boom or any boom extension (appurtenance) firmly secured by mechanical means (i.e., pins, bolts, etc.) to the main boom shall require the crane to be checked for stability. If such an arrangement cannot meet stability requirements of ANSI A92.2 with the platform positioned at its furthest operating radius and positioned in the least stable direction (i.e., over the side, end, etc.), then a means to warn the operator when he has reached the maximum operating radius must be supplied. Attachment of platform(s) to jibs supported by wire rope (e.g., pendants, backstays, etc.) is strictly prohibited.

- Materials shall not be handled or lifts performed when personnel are occupying the platform.

- Locks and brakes provided on the platform shall be set when the platform is in working position and personnel are at their work location.

- Prior to handling personnel, the crane and platform shall be thoroughly inspected and simulated lifts shall be made for each work situation to ensure all systems and controls are functioning properly, and all safety features provided are operating satisfactorily.

- A voice communication system shall be provided between crane operator and personnel occupying the platform.

- Audible and visual alert systems shall be provided to the personnel in the platform so they can signal for assistance in the event of an emergency.

- Special precautions shall be taken to protect personnel from electrical hazards. Maintain specified distances from power sources. Proximity devices maybe used, but not in lieu of meeting the minimum distance requirements as specified by Grove.

- Handling of personnel is prohibited when wind velocity exceeds 10 MPH.

- The crane shall be level during operation. When provided, outriggers shall be extended and jacks firmly set on level terrain at all times when handling personnel.

- Handling of personnel shall be discontinued upon any impending danger, including the presence of thunderstorms.

- Crane operators responsible for operating cranes used to handle personnel shall be thoroughly familiar with safe craning practices and have a complete understanding of all Operation and Maintenance instructions provided . They shall be thoroughly trained operators with related experience.

- Prior to handling personnel, the owner shall agree, in writing, to comply with all safety rules as specified by Grove.

- A means shall be provided to indicate to the operator the crane boom's extended length - in feet or meters.

- The weight of the platform, personnel, attachments, and all other items contributing to the total weight of the boom shall be taken into consideration and appropriate reductions to lifting capacity values shall be made prior to lifting personnel.

- The handling of personnel via wire rope or rigging suspended platforms installed upon boom extensions, shall be strictly prohibited.

Cranes should not be rigged for performing lifting service when personnel are being handled.

All precautions and instructions on the decals attached to the crane, supporting frame, and each platform shall be strictly observed.

- Clear, unobstructed visibility between personnel on the platform(s) and the crane operator shall be maintained at all times except where a special signal person shall have been assigned and positioned such that he is visible to both. The signal person shall have no other duties when personnel are on the platform.

- If the crane is to be used for materials handling or other lifting service with the platform(s) attached, appropriate reductions in load rating chart values shall be made.

- Prior to traveling (i.e., moving the crane) the boom shall be lowered, retracted, and secured in the travel position; personnel handling is prohibited when crane is traveling.

- Belting off or otherwise attaching a platform to an adjacent pole, structure, or equipment shall not be permitted.

- Personnel platforms shall be easily identifiable by high visibility color or marking.

- Personnel shall always stand firmly on the floor of the platform and shall not sit or climb on the edge of the platform or use planks, ladders, or other devices for a work position.

- Personnel shall wear a body belt with lanyard attached to the boom or platform when occupying a platform.

- Climbers shall not be worn while performing work from a platform.

- Users shall ensure that all duties set forth in this handbook are adhered to including compliance with ALL safety requirements.

- All manuals, operating instructions, etc. provided shall be read and understood by operating personnel prior to commencing operations.

Operating personnel shall have constant access to instruction manuals.

Approval from Grove Manufacturing Company shall be requested and obtained in writing prior to handling personnel,

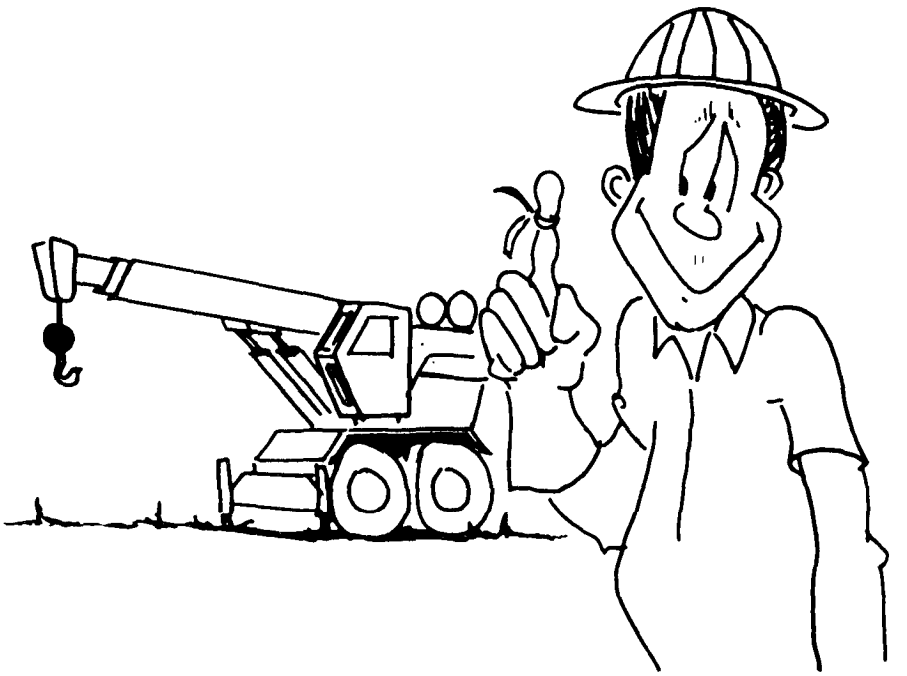
- Platforms shall be installed and used ONLY upon the specific crane for which they were tested and intended for use.

- Authorization from Grove shall be obtained PRIOR to any alterations or modifications to the basic crane or the platform.

- Grove parts should be used for replacement purposes in order to ensure that components are compatible with their original counterparts.

- Crane load rating capacities shall be reduced by 50% of published load chart values when handling personnel.

DON'T FORGET.



LOAD CAPACITY CHARTS REPRESENT THE ABSOLUTE MAXIMUMALLOWABLE LOADS, WHICH ARE BASED ON EITHER TIPPING OR STRUCTURALLIMITATIONS 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.

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 SHOULD ENCOUNTER A TIPPING CONDITION, START LOWERING THE LOAD WITH THE HOIST LINE AND RETRACTOR 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 TO OCCUR.

EVEN IF A HYDRAULIC LINE MAY BE SHEARED OR BROKEN ON THE LIFT OR EXTENSION CYLINDERS, THE CRANE WILL STILL FUNCTION SUFFICIENTLY TO GET THE LOAD DOWN.

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

SECTION 3

THEORY OF OPERATION

GENERAL.

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

A diesel engine provides drive power for the hydraulic pump and also drives an alternator which supplies electrical power for control, accessory, and lighting systems. The engine also provides power to the axles through a transmission, to drive the crane.

Hydraulic flow and electrical power are transferred from the carrier to the superstructure through hoses and conduits located at the center of rotation.

MAJOR COMPONENTS AND SYSTEMS.

CAB ASSEMBLY.

The cab is frame mounted, one man, all steel, and fully enclosed. Safety glass is used in all front, rear, side, and top panels. Lockable sliding glass windows are used in both side panels. Features include a windshield wiper and washer, heater, and adjustable defroster fan. Access is by a door on left side. A kick-out emergency escape panel is on the right. There is an adjustable operator’s seat with seat belt.

CARRIER FRAME ASSEMBLY.

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

ENGINE.

A White diesel engine is housed in the engine compartment at the rear of the frame. The engine is used to provide crane mobility, drive the hydraulic pump, and supply electrical power used for crane control circuits, accessories, and charging the batteries. All controls for the engine are located in the operator's cab.

ENGINE COLD START SYSTEM.

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

FUEL TANK.

A single 31 gallon (117 liter) capacity fuel tank is mounted on the left side of the frame between the axles. The filler cap is located on top of the tank and is accessible from ground level.

DRIVE TRAIN.

The drive train consists of a transmission, and two drive shafts.

The transmission is a powershift three speed forward and reverse transmission. The transmission is mounted on the engine and controlled by two shift levers to the right of the seat and the two-four wheel drive lever to the left of the seat.

One drive shaft connects the transmission to the front axle and a second connects it to the rear axle. The tow-drive lever to the left of the seat disconnects the transmission drive to the axles,

AXLES.

To allow maximum maneuverability, both front and rear axles are steer axles with hydraulic disc brakes at all four wheels. The 4 x 4 drive crane is equipped with Rockwell drive/steer axles both front and rear. Each drive

axle incorporates single reduction gearing mounted in the axle center. A park brake is installed on the front axle carrier and is controlled by a lever in the cab.

STEERING SYSTEM.

The crane incorporates a hydraulically controlled steering system, utilizing hydraulic steer cylinders mounted to the axles. The front axle is provided with full power steering. The rear axle utilizes full hydraulic control and is operated independently of the front steer.

SERVICE BRAKE SYSTEM.

The service brakes are hydraulically activated by a power boost unit and are applied on all four wheels. The power boost unit receives its power boost from the hydraulic pump flow divider primary circuit. In the event power boost hydraulic oil flow is lost, an electro-hydraulic pump on the boost unit will be energized (if the ignition switch is in ON and the brake pedal is depressed) to supply the boost power. If both of. these fail, the manual braking system will actuate the brakes by transferring as much force to the brake cylinders as the operator can apply to the brake pedal.

HYDRAULIC SYSTEM AND COMPONENTS.

The hydraulic system is designed to provide adequate pressure and volume for simultaneous operation of various crane functions.

Reservoir.

The hydraulic reservoir is a 40 gallon (151 liter) steel tank located on the right side of the frame. A full-flow, return-type, 10 micron filter and a sight gauge are installed in the reservoir.

Hydraulic Pump.

The crane has a two-section hydraulic pump mounted on and driven by the transmission. The pump provides a total of 60.9 gpm at up to 2,750 psi. Oil pressure is developed in each stage by a matched set of gears driven by the driveshaft. As the gears turn, the chamber volume of oil between the gear teeth increases as the gears pass the oil inlet section. This results in a low pressure condition which allows atmospheric pressure to suction more oil into the chamber. In turning, the gear teeth transport the trapped oil to the outlet section where the chamber volume decreases and the oil is forced out into the hydraulic system.

Directional Control Valves.

The directional control valves are four-way, three-position valves 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, and additionally, certain crane functions are also protected by a circuit relief valve.

TURNTABLE ASSEMBLY AND SWING MECHANISM.

An anti-friction ball, turntable bearing supports the superstructure on the carrier and allows 360 degrees stop to stop rotation. Swing is accomplished by a hydraulically-driven motor driving a gear box which in turn drives the bearing ring gear through a pinion. A non-free swing, spring actuated and hydraulically released brake is provided to stop swing and hold the superstructure in the desired position. The swing speed is reduced with a flow restrictor to improve swing brake performance and reduce impact with swing stops. To further secure the superstructure in travel position, a pin-type swing lock is provided.

Swing Motor.

The hydraulic swing motor is a low speed, high torque type. The motor provides indirect drive power for turntable swing through the swing gearbox.

Swing Gearbox.

The swing gearbox is a sun and planetary gear type, driven mechanically by the swing motor. The swing gearbox rotates the turntable at a reduced operational speed of approximately 2.9 rpm.

Swing Brake,

The swing brake is a multi-disc brake. Hydraulic pressure, controlled by movement of the SWING control lever to either left or right, holds the brake released against spring pressure. Returning the SWING control lever to neutral causes the hydraulic pressure to be removed and allow the springs to set the brake.

BOOM ASSEMBLY.

A two-section trapezoidal boom 19-33 feet (5.8 -10.1 m) is provided. Boom elevation is accomplished by a single, double-acting hydraulic cylinder with integral holding valve. The boom elevation range is from 0 to 80 degrees. A single telescope cylinder provides telescoping power for boom extension.

HOIST.

The hoist provides power and speed for all load raising and lowering operations. A gear type hydraulic motor drives the hoist drum by means of a planetary gear reduction system. A metallic disc brake is also an integral part of the hoist assembly.

OUTRIGGER SYSTEM.

The outriggers are the cantilever type and are controlled from the cab. They are positioned to provide a rigid four point platform (outriggers extended and set) capable of supporting the machine and its maximum load capacity. Integral holding valves, floats and oversize floats are standard equipment.

ELECTRICAL SYSTEM.

The electrical system is 24 VDC for operation and starting. The system consists of two 12-volt batteries (wired in series), an alternator, starting motor, lighting systems, warning devices, gages, and indicators. The system is single wire-ground return type utilizing the crane's structure as ground.

ANTITWO-BLOCK/CONTROL LEVER LOCK OUT SYSTEM.

The antitwo-block system provides a warning to the operator in preventing two-block conditions. The system consists of antitwo-block switch, a relay, a buzzer, a warning indicator light, and the associated wiring. The switch is held in the closed position by a weight suspended on a chain from the switch. The closed switch maintains the relay energized, which silences the buzzer and prevents illumination of the indicator light. As the hook block comes closer to the boom tip, the weight is contacted and the switch is allowed to spring open. This action deenergizes the relay, which sounds the warning buzzer, and illuminates the TWO-BLOCK indicator light on the left side of the front console. In addition to providing a warning, this system also activates the control lever lockout system.

The control lever lockout system is a safety system designed to prevent two-blocking during lifting operations. The control lever lockout system consists of a hydraulic solenoid valve and two hydraulic lockout cylinders. The cylinders are installed in the rod linkage between the control lever and the appropriate directional control valve. The cylinders are connected in such a manner as to prevent worsening the condition, i.e. hoist up or telescope out. With the solenoid valve energized (normal), its hydraulic valve is closed, allowing 200 psi (1379 kPa/13.79 bar) of hydraulic oil to be applied to the rod side of the cylinders, which provides a solid link in the control rods. Denergizing the solenoid valve allows the valve to open and removes the hydraulic pressure from the cylinders. This removes the solid link from the control rods and allows the directional control valve to move in a direction that will improve the condition.

SPECIAL ARMY FEATURES REQUIRED.

Aircraft Towbar Stowage Provisions.

Per SCAMP procurement specification, stowage for one G.F.E. aircraft towbar is provided on the right side of the crane. Stowage provisions only are part of the crane weight and consist of two cradle assemblies and hold down clamps. See figure 3-1 for stowage location.

Ground Handling Wheel Stowage Provisions.

Per SCAMP procurement specifications, stowage provisions for two sets of G.F.E. aircraft ground handling wheel assemblies (not included in crane weight) are provided on the left side of the crane. Stowage provisions include two cradle weldments attached to the frame and the top of the tool box. See figure 3-1 for stowage location.

Emergency Hand Pump Installation.

Per the SCAMP procurement specification, the design of the crane includes a means to return the crane to travel mode after loss of hydraulic power. The installation includes quick disconnect fittings in crane function hydraulic circuits, a hand pump, length of hose, bracket, and stowage provisions. See operating instructions, page 4-35.

Oversize Outrigger Floats.

Per SCAMP procurement specification quick-attach oversize floats are provided. Stowed in racks under the tool boxes on each side of the crane, the oversize floats when pinned to the standard floats reduce ground pressure of the crane and its maximum load, to no more than 14 psi.

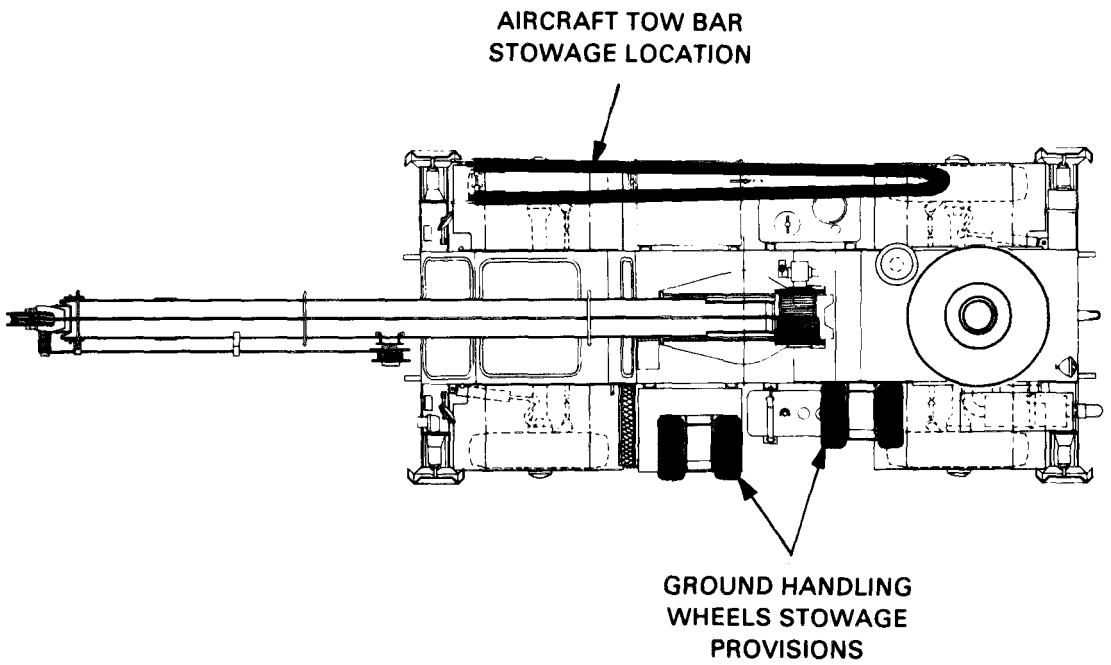


Figure 3-1. Location of Aircraft Tow Bar and Ground Handling Wheels Stowage

SECTION 4
OPERATING INSTRUCTIONS

CONTROLS AND INDICATORS.

Refer to figure 4-1 for the locations of the following operator controls and indicators:

ENGINE AIR CLEANER SERVICE INDICATOR.

The indicator (1) is located on the top left of the front console. It warns of an air flow restriction to the engine caused by defective or clogged air cleaner element.

SWING CONTROL LEVER.

The SWING control lever (2) is the left most lever on the right side of the steering wheel. The lever actuates a control valve through linkage rods to provide 360 degree rotation of the boom superstructure stop to stop. The SWING control lever also controls the swing brake. Push forward on the lever to rotate the boom superstructure to the right or pull back on lever to rotate the boom to the left.

TELESCOPE CONTROL LEVER.

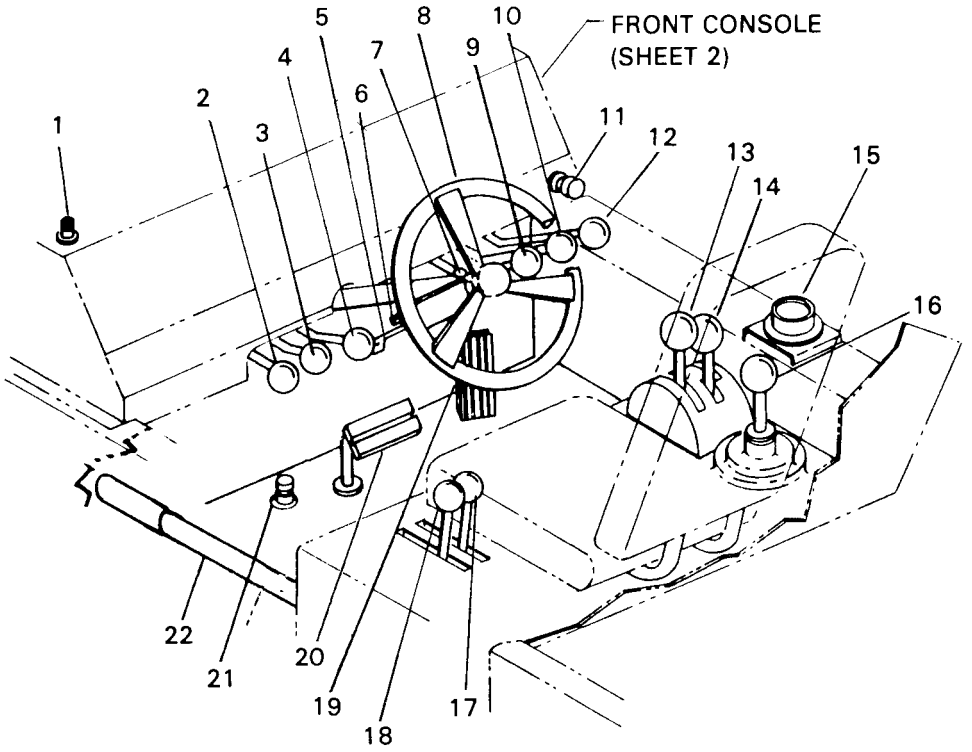
The boom TELESCOPE control lever (3) is the second lever to the left of the steering wheel. The lever actuates a control valve through linkage rods to exterd or retract the boom section. Push forward on the Iever to extend the boom section or pull back on lever to retract the boom section.

OUTRIGGER CONTROL LEVER.

The OUTRIGGER control lever (4) is the lever next to the steering wheel on the left side. The lever actuates a control valve through linkage rods to extend or retract the outriggers. The outrigger(s) to be operated is determined by the outrigger control selector Iever (l6) to the right side of the seat. Position the selector lever towards the outrigger(s) to be operted and push forward on the control lever to lower the outrigger(s). Position the selector lever towards the outrigger(s) to be operated and pull back on the control lever to raise the outrigger(s).

TURN SIGNAL SWITCH.

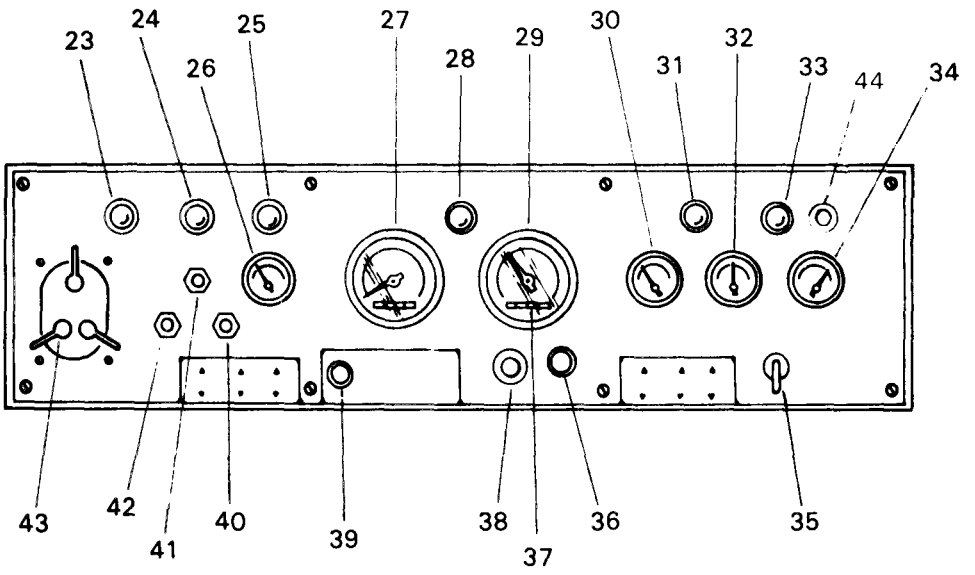
The turn signal switch (5) is located on the steering column. The switch actuates the left turn signals lights when in the down position. The up position actuates the right turn signal.



LEGEND

1. Engine Air Cleaner Service Indicator
2. Swing Control Lever
3. Telescope Control Lever
4. Outrigger Control Lever
5. Turn Signal Switch
6. Emergency Flasher Switch
7. Horn Button
8. Steering Wheel
9. Rear Steer Control Lever
10. Boom Control Lever
11. Hand Throttle
12. Hoist Control Lever
13. Shift Control Lever
14. Direction Control Lever
15. Bubble Level Indicator
16. Outrigger Selector Valve Lever
17. 2/4 Wheel Drive Lever
18. Tow-Drive Lever
19. Foot Throttle Pedal
20. Foot Brake Pedal
21. Headlights Dimmer Switch
22. Park Brake Lever

Figure 4-1. Cab Controls and Indicators (Sheet 1 of 2)



LEGEND

23. Emergency Service Brake System Activated Indicator
24. Two Block Warning Indicator
25. Rear Wheels Not Centered Indicator
26. Fuel Gage
27. Speedometer
28. High Beam Indicator
29. Tachometer
30. Engine Oil Pressure Gage
31. Lo Oil Press/Hi Eng Temp Warning Indicator
32. Water Temperature Gage
33. Trans Oil Temp Warning Indicator
34. Ammeter
35. Ignition Switch
36. Windshield Washer Button
37. Hourmeter
38. Heater Switch
39. Cold Start Switch
40. Boom Light Switch
41. Antitwo-Block Switch
42. Rear Floodlight Switch
43. Lights Switch
44. Transmission Oil Temp. Press to Test Switch

Figure 4-1. Cab Controls and Indicators (Sheet 2 of 2)

EMERGENCY FLASHER SWITCH.

The emergency flasher switch (6) actuates all four turn signal lights when the lever is pulled straight out.

HORN BUTTON.

The horn button (7) is a pushbutton type switch located on the right side of the steering column. Depressing the button sounds the horn.

STEERING WHEEL.

The steering wheel (8) controls the direction of the front wheels. Turning the wheel clockwise steers the crane to the right. Turning the wheel counterclockwise turns the crane to the left.

REAR STEER CONTROL LEVER,

The REAR STEER control lever (9) is the lever next to the steering wheel on the right side. The lever actuates a control valve through linkage rods to turn the rear wheels to the left or to the right. Push forward on the Iever to turn the wheels right or pull back on the lever to turn left,

BOOM CONTROL LEVER.

The BOOM control lever (1 0) is the second lever to the right of the steering wheel. The lever actuates a control valve through linkage rods to position the boom angle from 0 to 80 degrees above horizontal. Pull back on the lever to raise the boom or push forward on the lever to lower the boom,

HAND THROTTLE.

The hand THROTTLE (1 1) is located on the right side of the front console. The hand throttle is mechanically connected to the foot throttle and provides the operator with a means of maintaining specified engine rpm for crane operation. To use the hand throttle, depress the foot throttle to obtain the desired engine rpm, push the button on the hand throttle control knob and pull out on the knob. When pressure is felt, release the button and turn the locknut in a clockwise direction to lock the throttle at the desired rpm. To release the throttle, rotate the locknut counterclockwise, depress the button and push in on the cable. Fine adjustment of engine speed is accomplished by turning the control knob.

HOIST CONTROL LEVER.

The HOIST control lever (12) is the right most lever on the right side of the steering wheel. The lever actuates a control valve through linkage rods to drive the hoist to raise or lower the hoist cable. Push forward on the lever to lower the hoist cable or pull back on the lever to raise the hoist cable.

SHIFT CONTROL LEVER.

The shift control lever (13) is located to right of operator's seat and controls the speed spool of the transmission control valve. Select one of three speed positions (1, 2, &3).

DIRECTION CONTROL LEVER.

The direction control lever (14) is located to the right of operator's seat and controls the direction spool of the transmission control valve. Select F (forward), N (neutral), or R (reverse).

BUBBLE LEVEL INDICATOR.

The bubble level indicator (15) is located to the right of the operator's seat on top of the frame. The indicator provides a visual indication of the crane's levelness. The operator levels the crane by adjusting the position of the appropriate outrigger arm(s).

OUTRIGGER SELECTOR VALVE LEVER.

The OUTRIGGER SELECTOR valve lever (16) is located to the right of operator's seat. The joy stick control lever is used to lower a specific outrigger arm(s). The lever must be used in conjunction with the OUT-RIGGER control lever (4) and the bubble level (1 5).

2/4 WHEEL LEVER.

The 2/4 WHEEL DRIVE lever (17) is located to the left of the operator's seat. Select either two or four-wheel drive by positioning the lever at 2 or 4. Two-wheel drive is recommended for normal driving on improved surfaces.

TOW-DRIVE LEVER.

The TOW-DRIVE lever (18) is located to the left of the operator's seat. The lever is normally in the DRIVE position. To tow the crane, position the lever to TOW which will disconnect power to both drive shafts. This will also cause the 2/4 WHEEL DRIVE lever (17) to move to the 2-WHEEL position because of an interlock between the two levers. The solid link that secures the front axle straight must be installed and the rear axle steer cylinder disconnected before towing the crane.

FOOT THROTTLE PEDAL.

The foot throttle pedal (19) is the right most pedal on the cab floor. The pedal operates the engine speed governor through a control cable. Depressing the pedal increases engine speed up to the governed speed. Releasing the pedal returns the engine to idle speed.

FOOT BRAKE PEDAL.

The foot brake pedal (20) is the second pedal from the right on the cab floor, Depressing the pedal actuates the Hi-Power brake boost unit to control application of the service brakes. Should a loss of boost pressure occur, the emergency service brake system of the Hi-Power brake boost unit will be activated and depressing the pedal will cause application of the service brakes. If both boost systems fail, depressing the pedal will apply the service brakes proportional to pedal pressure.

HEADLIGHT DIMMER SWITCH.

The headlight dimmer switch (21) is located on the left side of the cab floor. The switch controls the headlight high or low beam intensity.

PARK BRAKE LEVER.

The park brake lever (22) is located on the left side of the cab near the floor. When pushed down, the lever actuates the park brake which locks the front axle drive shaft. The brake is released by pulling the brake lever.

EMERGENCY SERVICE BRAKE SYSTEM ACTIVATED INDICATOR.

The EMERGENCY SERVICE BRAKE SYSTEM ACTIVATED indicator (23) is located on the left side of the front console. The indicator is a red light that is on when the emergency system of the Hi-Power brake boost unit is energized due to a failure of the normal boost pressure.

TWO BLOCK WARNING INDICATOR.

The TWO BLOCK WARNING indicator (24) is located on the left side of the front console. The indicator is a red light that is lit when the antitwo-block switch is actuated indicating a two-block condition. In addition, a warning buzzer sounds.

REAR WHEELS NOT CENTERED INDICATOR.

The REAR WHEELS NOT CENTERED indicator (25) is located on the left side of the front console. The indicator is a red light that is lit when the rear wheels are not centered. It is controlled by a microswitch located on the left side of the rear axle.

FUEL GAGE.

The fuel gage (26) is located on the left side of the front console. The gage indicates the quantity of fuel in the tank and has a scale calibrated from zero (0) to 4/4. The fuel quantity gage receives a signal from a sending unit in the fuel tank.

SPEEDOMETER.

The speedometer (27) is located in the left center of the front console. It indicates speed 0 to 80 mph.

HIGH BEAM INDICATOR.

The high beam indicator (28) is located at the top center of the front console. The light is lit when the headlights are switched to high beam.

TACHOMETER.

The tachometer (29) is located in the right center of the front console. The tachometer registers engine rpm's. It is calibrated in rpm x 100 with a range of 0 to 40.

ENGINE OIL PRESSURE GAGE.

The engine oil pressure (OIL PRESS) gage (30) is located on the right side of the front console. The gage indicates the engine oil pressure on a dual scale calibrated from 0 to 100 psi and 0 to 690 kPa. It receives a signal from an oil pressure sending unit on the engine.

LO OIL PRESS/HI ENG TEMP WARNING INDICATOR.

The LO OIL PRESS/Hi ENG TEMP warning indicator (31) is located on the right side of the front console. The indicator light is lit when the engine oil pressure is low or the engine temperature is high.

WATER TEMPERATURE GAGE.

The water temperature (WATER TEMP) gage (32) is located on the right side of the front console. The gage indicates the engine coolant temperature on a dual scale calibrated from 100 t0 240 degrees F and 38 to 11 6 degrees C. The gage receives a signal from a temperature sending unit in the engine cooling system.

TRANS OIL TEMP WARNING INDICATOR.

The TRANS OIL TEMP warning indicator (33) is located on the right side of the front console. The light is lit when the transmission oil temperature is too high. The indicator receives a signal from a temperature sending unit in the transmission oil line. The light may be tested by pressing the test button (44) to the right of the light.

AMMETER.

The ammeter (34) is located on the left side of the front console. The gage measures current flow in amperes (-60 to +60).

IGNITION SWITCH.

The IGNITION switch (35) is located on the right side of the front console and has three placarded positions; OFF, ON, and START. The switch is spring return from START to ON. With the switch in the OFF position, all electrical power is off. Positioning the switch to ON energizes all electrical components. Positioning the switch to START energizes the starter relay which in turn energizes the cranking motor solenoid and cranks the engine for starting. Releasing the switch will spring return it to ON.

WINDSHIELD WASHER BUTTON.

The WINDSHIELD WASHER button (36) is located on the right-center of the front console. Depressing the button activates a pump injecting washer fluid onto the windshield.

HOURMETER.

The HOURMETER (37) is located in the center of the tachometer (29) on the front console. It shows hours of engine operation.

HEATER SWITCH .

The HEATER switch (38) is located on the center of the front console. The switch controls the cab heater located behind the operator's seat.

COLD START SWITCH.

The COLD START switch (39) is located on the left-center of the front console. The switch is the pushbutton type and is used to inject shots of ether into a cold engine during starting. The ignition switch must be in the START position for cold start operation.

BOOM LIGHT SWITCH.

The BOOM LIGHT switch (40) is an ON-OFF toggle switch located on the left side of the console. The switch controls two boom-mounted floodlights.

TWO-BLOCK SWITCH.

The TWO-BLOCK switch (41) is a two position toggle switch located on the left-center of the front console. To override the two-block lever lockout system, the TWO-BLOCK switch must be held in the OVERRIDE position.

REAR FLOODLIGHT SWITCH.

The REAR FLOODLIGHT switch (42) is an ON/OFF toggle switch located on the left side of the console. The switch controls the floodlight mounted on the engine hood.

LIGHTS SWITCH.

The LIGHTS switch (43) is an MS51113 control located on the left side of the console. The switch controls service, blackout drive, stop/tail, parking, and front console lights. During operation under normal conditions (not blacked out) this switch should be left in STOP LIGHT mode.

WINDSHIELD WIPER SWITCH.

The WINDSHIELD WIPER switch (not shown) is located on the windshield wiper motor. The switch has two positions (ON-OFF).

DOME LIGHT SWITCH.

The dome light switch (not shown) is an ON/OFF toggle switch located on the dome light,

BACKUP ALARM.

The backup alarm is an audio system used to warn personnel that the crane is backing up. The alarm system is electrical and consists of the backup alarm and associated wiring. The alarm is connected into the backup light electrical wiring, and is activated when the backup light is activated. The backup alarm is installed on the left-rear side of the frame above the out-rigger box.

PREOPERATIONAL CHECKS.

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

FUEL SUPPLY.

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

ENGINE OIL.

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

ENGINE COOLANT.

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

BATTERIES.

Check the electrolyte level in the batteries. Ensure the cables and clamps are tight and not corroded.

SIGNAL LIGHTS.

Check all signal lights for proper operation. Replace burned out lamps.

FOOT AND PARKING BRAKES.

Check for proper operation.

DAILY LUBRICATION.

Ensure all components requiring daily lubrication have been serviced. Refer to Section 6, Lubrication.

HYDRAULIC RESERVOIR AND FILTER,

Check hydraulic fluid quantity level gage and check filter condition indicator. Check breather for cleanliness and security.

TIRES.

Check for severe cuts, foreign objects imbedded in threads, and correct inflation pressures. A tire inflation decal is located on the rear outrigger box on the left side, providing the correct tire pressures. Refer to figure 4-2.

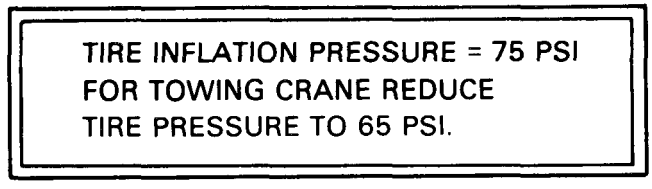


Figure 4-2. Tire Inflation Decal

WIRE ROPE.

Inspect wire rope in accordance with applicable Federal Regulations. Refer to Section 2, SAFETY.

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

HOOK BLOCK.

Visually inspect for nicks, gouges, cracks, and evidence of any other damage. Replace a hook containing cracks or showing evidence of excessive deformation of the hook opening (including twist). Be sure the safety latch is free and aligned.

AIR CLEANER.

Check the engine air cleaner service indicator (1, figure 4-1).

ENGINE OPERATION.

STARTING PROCEDURE.

WARNING

BEFORE STARTING THE ENGINE, ENSURE THE PARK BRAKE LEVER (22, FIGURE 4-1) IS APPLIED AND THE SWING LOCK IS ENGAGED.

CAUTION

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

CAUTION

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

NOTE

The engine will not crank unless the transmission control lever is in the neutral position.

1. Position direction control lever (14) to N (neutral).

2. Turn the ignition switch (35) to START and release immediately when the engine starts.

3. When start has been accomplished, check the engine instruments for proper indications.

CAUTION

NORMAL ENGINE WATER TEMPERATURE IS FROM 180-2000° F (82°-930 C). NORMAL ENGINE OIL PRESSURE AT IDLE SPEED IS 16 PSI (124 kPa) MINIMUM AND AT RATED SPEED IS40-60 PSI (276-414 kPa). IF ENGINE OIL PRESSURE GAGE (30) AND/OR WATER TEMPERATURE GAGE (32) DO NOT DISPLAY PROPER READINGS, SHUTDOWN ENGINE IMMEDIATELY AND CORRECT MALFUNCTION BEFORE RESUMING OPERATIONS.

4. Allow the engine and hydraulic oil to warm up five minutes before applying a load.

COLD WEATHER STARTING.

The correct grade of oil for the prevailing temperature should be used in the crankcase to prevent hard cranking. Diesel fuel should have a pour point of 10 degrees F (-12 degrees C) less than the lowest expected temperature. In case of emergency, white kerosene 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, it is advisable to use the COLD START switch (39, figure 4-1). See Cold Weather Operation, Page 4-37.

CAUTION

AVOID OVERLOADING THE AIR INTAKE WITH HIGHLY VOLATILE FLUID WHICH COULD RESULT IN A MINOR EXPLOSION.

1. To start the engine, position the ignition switch (35, figure 4-1) to START and push the COLD START switch (39) for one or two seconds and release. If the engine does not start within 30 seconds, allow the cranking motor to cool two minutes and repeat the procedure.

ENGINE SHUTDOWN.

CAUTION

UNDER NORMAL CONDITIONS, DO NOT SHUTDOWN ENGINE WITH A LOAD SUSPENDED IN THE AIR.

1, **Position direction control lever (14, figure 4-1) to N (neutral).**

2, Push down on the park brake lever (22),

NOTE

Turning the ignition switch (35) to OFF will turn off all lights and indicators,

3. Turn ignition switch (35) to OFF,

CRANE TRAVEL OPERATION

TRAVELING - GENERAL,

NOTE

The SCAMP was purposely wired to prevent back- up alarm and back-up lights from operating in black-out mode. During normal operating conditions the lights switch (43, figure 4-1) should be left in STOP LIGHT mode.

NOTE

Cranes are subject to the same road regulations as any truck with regard to gross weight, width, and length limitations.

Although the SCAMP is specifically designed for rough terrain applications, the operator should be extremely cautious and aware of the terrain in which he is operating.

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.

CAUTION

DO NOT DRIVE THE' CRANE ON ROUGH TERRAIN WITH THE LIFT CYLINDER BOTTOMED. POSITION THE BOOM TO JUST ABOVE HORIZONTAL.

Use four-wheel drive only when greater traction is necessary. (Refer to FOUR-WHEEL DRIVE OPERATION, this section, for operation instructions.)

WARNING

ON OPEN GROUND, TOW OR PULL ONLY ON **THE PINTLE HOOKS.**

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.

CAUTION

IF THE CRANE IS MIRED DOWN, UTILIZE THE TOW LUGS TO PULL OR TOW.

There are two tow lugs installed on each end of the crane. When using these lugs, always tow or pull using both lugs.

MOVING THE CRANE.

The following superstructure conditions should be strictly adhered to before moving the crane. Procedures for accomplishing the following can be found in the various Sections of this manual.

1. Ensure the boom section is fully retracted.

2. Swing the boom to over-the-front and lower the boom to horizontal.

3. Insert the turntable lock pin.

4. Secure the hook block to the front pintle hook. Take up rope slack with hoist.

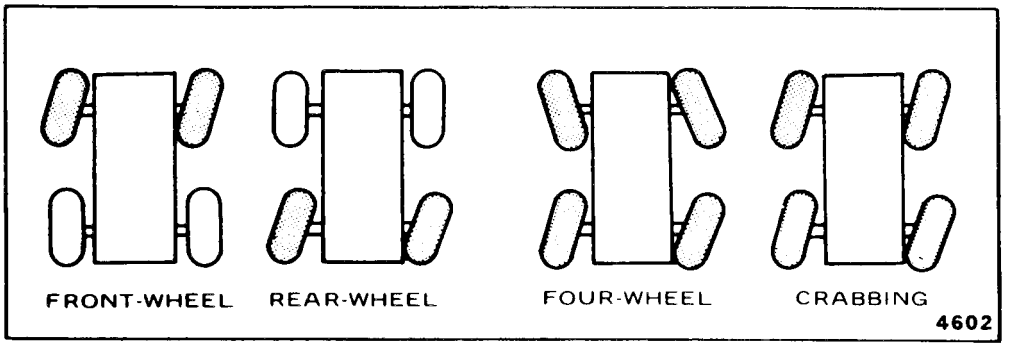


Figure 4-3. Steering Methods

STEERING.

Steering is accomplished by the steering wheel (8, figure 4-1) and the REAR STEER control lever (9). These controls, used singly or together provide front wheel steering, rear wheel steering, four-wheel steering, and crabbing capabilities. Refer to figure 4-3.

Front Wheel Steering.

Conventional front wheel steering is accomplished with the steering wheel (8). This method of steering should always be used when traveling at higher speeds.

WARNING

OPERATE THE REAR STEER ONLY FOR ADDED JOB SITE MANEUVERABILITY.

Rear Wheel Steering.

Rear wheel steering is controlled by a REAR STEER control lever (9). Actuating the control to the desired position activates the rear steer cylinder, thereby steering the machine in the selected direction.

Four-Wheel Steering.

Four-wheel steering is accomplished by using both the steering wheel (8) and the REAR STEER control lever (9). Depending upon which direction the operator wishes to travel, the steering wheel is turned in the same direction of the REAR STEER control lever position. This method of steering allows the machine to turn or maneuver in close, restricted areas.

Crabbing.

Crabbing is also accomplished by using both the steering wheel (8) and the REAR STEER control lever (9), Depending upon which direction the operator wishes to travel (crab), the steering wheel is turned in the opposite direction in which rear steer control is positioned, This method permits driving the machine forward or in reverse at any angle from straight ahead in a crabbing manner,

TRAVELING - FORWARD.

WARNING

ENSURE THAT TURNTABLE LOCK PIN IS ENGAGED BEFORE TRAVELING EXTENDED DISTANCES. ENSURE THAT LOCK PIN ON ANTITWO-BLOCK SWITCH IS IN - STALLED.

1. After engine has warmed up, place 2/4 WHEELDRIVE lever (17, figure 4-1) to either 2-WHEEL or 4-WHEEL.

2. Shift the direction control lever (14) from N (neutral) to F (forward).

CAUTION

USE OPTIONAL FOUR WHEEL DRIVE ONLY WHEN MORE TRACTION IS REQUIRED.

3. Position the shift control lever (13) to 1 (first gear) and release the parking brake.

4. Depress the foot throttle pedal (19) until maximum gear speed of 5.4 mph (8.7 km/h) is attained.

5. Move the shift control lever (13) to 2 (second gear); accelerate until the maximum gear speed of 10,5 mph (16.9 km/h) is attained.

6. Move the shift control lever (13) to 3 (third gear),

CAUTION

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

TRAVELING - REVERSE.

CAUTION

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

1. After engine has warmed up, place 2/4 WHEEL DRIVE lever (17, figure 1) to either 2-WHEEL or 4-WHEEL.

2. Shift direction control lever (14) from N (neutral) to R (reverse).

NOTE

The back-up alarm will not sound unless the lights switch (43, figure 4-1) is in the STOP LIGHT mode.

WARNING

THE BACK-UP ALARM SHOULD SOUND TO ALERT PERSONNEL IN YOUR VICINITY. IF THE ALARM DOES NOT SOUND, DEPRESS HORN BUTTON (7). REPAIR THE BACK-UP ALARM AS SOON AS PRACTICABLE.

IT IS ADVISABLE TO USE A SPOTTER WHEN BACKING THE CRANE.

3. Position shift control lever (13) to 1 (first gear) and release the parking brake.

4. Depress the foot throttle pedal (19).

FOUR-WHEEL DRIVE OPERATION.

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

CAUTION

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

1. Position 2/4 WHEEL DRIVE lever (17, figure 4-1) to 4-WHEEL.

2. Shift direction control lever (14) from N (neutral) to F (forward) or R (reverse).

NOTE

The back-up alarm will not sound unless the lights switch (43, figure 4-1) is in the STOP LIGHT mode.

WARNING

THE BACK-UP ALARM SHOULD SOUND WHEN SHIFTING TO R (REVERSE) TO ALERT PERSONNEL IN YOUR VICINITY. IF THE ALARM DOES NOT SOUND, DEPRESS HORN BUTTON (7). REPAIR THE BACK-UP ALARM AS SOON AS PRACTICABLE.

IT IS ADVISABLE TO USE A SPOTTER WHEN BACKING THE CRANE.

3 . Position shift control lever (13) to 1 (first gear) and release parking b r a k e .

4 . Daepress the foot throttle apedal (19)

5 . Return the 2/4 WHEEL DRIVE lever (17) to 2-WHEEL as soon as two-wheel traction will suffice.

STOPPING THE CRANE.

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.

Stop the crane as follows:

1. Release foot throttle pedal (19, figure 4-1) and depress foot brake pedal (20).

2. Shift direction control lever (14) to N (neutral).

3. Push down on park brake lever (22) and release foot brake pedal.

CAUTION

UNDER NORMAL CONDITIONS, DO NOT SHUTDOWN ENGINE WITH A LOAD SUSPENDED IN THE AIR.

4. If necessary, retract and lower the boom over the front (travel position).

5. Turn ignition switch (35) to OFF.

WARNING

BEFORE LEAVING THE CRANE, ENSURE THE TURNTABLE LOCK PIN IS ENGAGED.

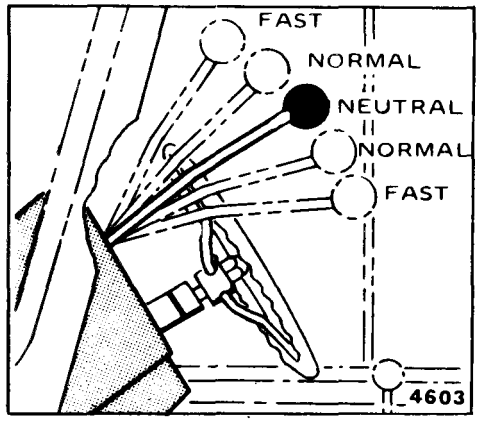
GENERAL CRANE OPERATION.

CONTROL LEVER OPERATION.

The control lever operation for crane functions is standard, i.e., the closer the lever is to neutral (center), the slower the system responds. This applies to both forward and rear movement of the applicable lever. The control lever should be returned to neutral to hold the load.

CAUTION

NEVER FEATHER THE HOIST CONTROL TO HOLD THE LOAD. (REFER TO FIGURE 4-4).



NOTE

Always operate the control levers with slow, even pressure.

Figure 4-4. Control Lever Operation

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.

CAUTION

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

NOTE

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

1. Remove turntable lock pin.

2. Ensure that lock pin for antitwo-block switch is removed.

3. Extend and set the outriggers.

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.

USING YOUR CRANE CAPACITY CHARTS.

NOTE

One of the most important tools of every Grove crane is the Rated Lifting Capacity Chart found in the crane operator's cab.

The Rated Lifting Capacity Chart (figure 4-5) contains a large amount of information, which must be thoroughly understood by the operator. Refer to figure 4-6 for terms to know concerning the chart.

RATED LIFTING CAPACITIES IN POUNDS
19 ft. - 33 ft. BOOM

ON OUTRIGGERS - 360°

Radius in Feet	Boom Length in Feet				
	19	22	26	30	33
8	9,500 (60)	9,500 (65)	9,500 (69.5)	9,500 (73)	9,500 (74)
10	8,000 (53)	8,000 (59)	8,000 (64)	8,000 (68)	8,000 (70)
12	7,350 (44)	6,000 (52)	6,000 (59)	6,000 (64)	6,000 (66.5)
15	4,500 (29)	4,500 (42)	4,500 (51)	4,500 (57)	4,500 (59.5)
20		3,100 (14.5)	3,100 (34)	3,100 (45)	3,100 (49)
25				2,100 (28.5)	2,100 (35.5)
30					1,350 (14)

NOTE: Boom angles shown in parenthesis are in degrees.

A6-829-006754D

ON RUBBER CAPACITIES
9.00x20 (8 ply rating) TIRES

Radius in Feet	Stationary Capacities - 360° Boom Length in Feet					2.5 MPH Capacities Boom Centered Over Front	Maximum Permissible Boom Length
	19	22	26	30	33		
8	4,300 (60)	4,300 (65)	4,300 (69.5)	4,300 (73)	4,300 (74)		Boom Fully Retracted
10	3,275 (53)	3,275 (59)	3,275 (64)	3,275 (68)	3,275 (70)	5,000 (53)	
12	2,420 (44)	2,420 (52)	2,420 (59)	2,420 (64)	2,420 (66.5)	3,775 (44)	
15	1,400 (29)	1,400 (42)	1,400 (51)	1,400 (57)	1,400 (59.5)	2,560 (29)	
20		895 (14.5)	895 (34)	895 (45)	895 (49)	1,375 (14.5)	22 ft.
25				420 (28.5)	420 (35.5)	660 (28.5)	30 ft.
30					230 (14)	300 (14)	33 ft.

NOTE: Boom angles shown in parenthesis are in degrees. A6-829-006755C

Lifting Capacity Notes:
1. 360° on rubber capacities are reduced to meet specific Army requirements. Structural limits or 85% tipping do not apply.
2. Capacities are applicable to machines equipped with 9.00 x 20 (8 ply rating) bias ply tires at 75 psi cold inflation pressure.
3. All lifting depends on proper tire inflation, capacity and condition. Capacities must be reduced for lower tire inflation pressures. Damaged tires are hazardous to safe operation of crane.

Figure 4-5. Rated Lifting Capacity Chart (Sheet 1 of 4)

NOTES TO LIFTING CAPACITIES

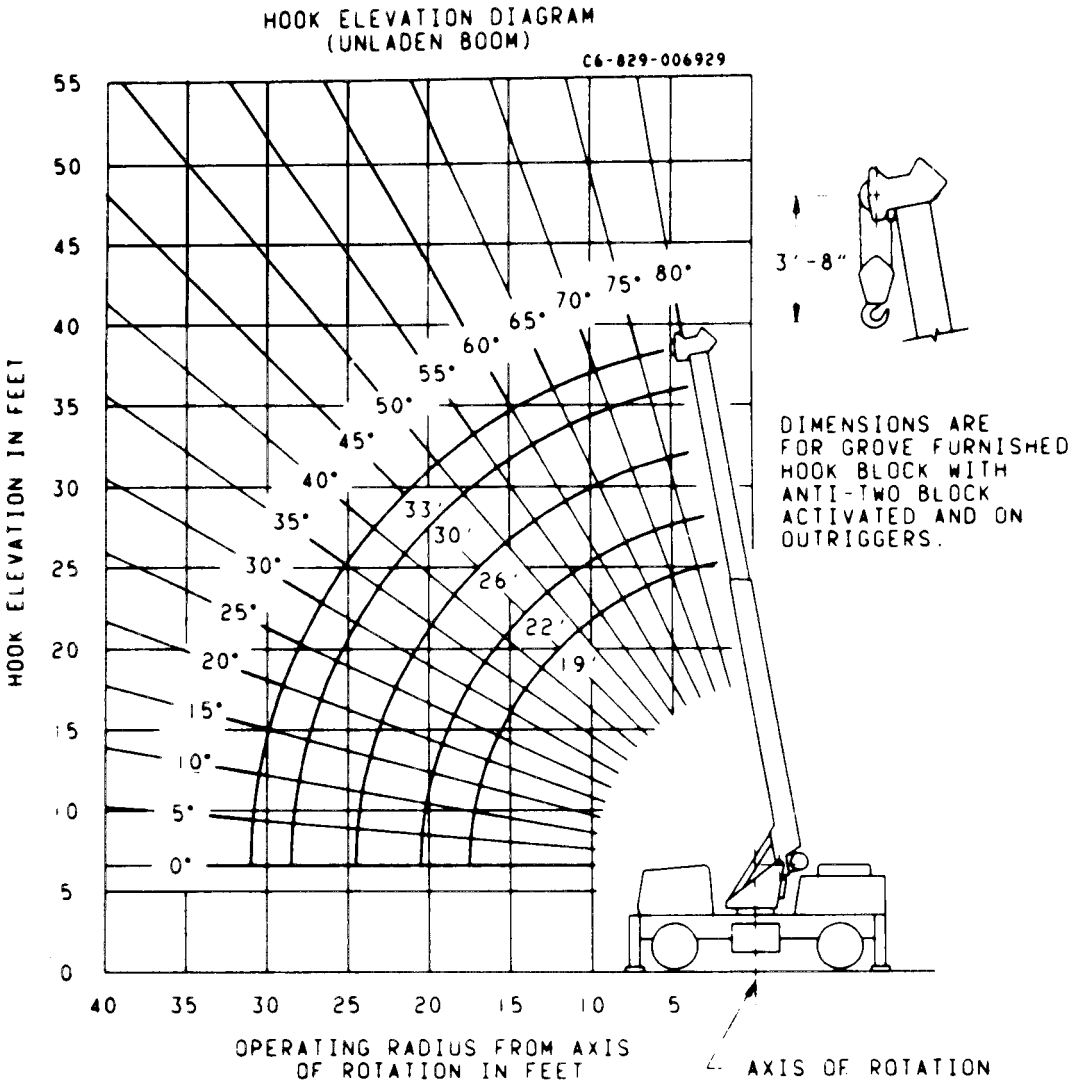
GENERAL:
1. Rated lifting capacities shown on lift chart pertain to this crane as originally manufactured and equipped. Modifications to the crane, or use of equipment other than that specified, can result in a reduction of capacity.
2. Cranes can be hazardous if improperly operated or maintained. Operation and maintenance of this crane shall be in compliance with the Operator's and Safety Handbook and Service and Parts Manuals supplied with this crane. If these manuals are missing, order replacements from the Manufacturer.
3. The operator and other personnel associated with this crane shall fully acquaint themselves with latest applicable American National Standards Institute (ANSI) Safety Standards for cranes.

SETUP:
1. Determine the weight of the load to be lifted. Position the crane as near as practicable to the load consistent with outrigger spread, if required, and radius at which the load is to be handled.
2. Insure that the crane capacity, at the radius selected, exceeds the weight of the load. For crane capacities at intermediate radii not listed, use capacities for the next longer radius. Any boom length may be used with each radius/capacity.
3. Level the crane on a firm supporting surface. Less than firm surfaces may require installation of over-size floats provided, if on outriggers; or structural plates under the tires, if on rubber, to spread the crane weight, plus load, over a larger bearing surface.
4. On outriggers leveling may be accomplished using outrigger control. Use bubble level provided. Crane tires must be clear of ground after leveling.
5. For all capacities use Grove hookblock provided with two parts line. The hookblock plus chains, slings and other handling devices must be included in the weight of the load.
6. Plan each lift carefully. Double check capacity at geometry selected. Take into account soft or uneven ground, out of level conditions, wind, side loads and pendulum action of the load, when swung free of its supports. Avoid jerking or sudden stopping of the load.
7. Tires shall be inflated to the recommended pressure before lifting on rubber.

OPERATION:
1. All capacities are based on crane structural strength. Never tip the crane to determine allowable load. Do not exceed the crane rated capacities at the radii indicated.
2. All rated loads meet the requirements of SAE J-1063-Cantilevered Boom Crane Structure-Method of Test, and do not exceed 85% of the tipping load as determined by SAE J-765a, Crane Stability Test Code.
3. Never attempt to drag a load horizontally on the ground in any direction. Capacities in load charts are for freely suspended loads only.
4. Handling of personnel suspended from the boom is prohibited.
5. INSURE THAT THE ANTI-TWO BLOCK AND CONTROL LEVER LOCKOUT ARE OPERATIVE PRIOR TO EACH LIFT. THE STOWAGE PIN BELOW THE ANTI-TWO BLOCK SWITCH ENCLOSURE ON THE BOOM NOSE MUST BE REMOVED TO ARM THE ANTI-TWO BLOCK SYSTEM. (SEE OPERATOR'S HANDBOOK).
6. A positive stop prevents continuous rotation of the turntable. When swinging, approach the boom-over-rear position (in either direction) with caution to prevent abrupt stops.
7. Avoid swinging any load over the crane cab. Loads at 8 ft. radius should be handled over the sides and rear only. Always sound horn when swinging load.
8. Boom angles, in parenthesis in load charts, are with loaded boom and should be used for reference only. To avoid exceeding capacity limits, measure each load radius.
9. For pick & carry operations position all loads directly over the front. Install turntable lock pin. Use shortest possible boom length, carry load as close to the ground as possible and do not exceed 2.5 MPH.
10. Capacities appearing above the bold line are based on structural strength and tipping should not be relied upon as a capacity limitation.

DEFINITIONS:
1. Load Radius: Horizontal distance from a projection of the axis of rotation to the supporting surface before loading to the center of the vertical hoist line or tackle with load applied.
2. Loaded Boom Angle: Loaded boom angle is the angle between the boom base section and the horizontal, after lifting the rated load at the rated radius. The boom angle before loading should be greater to account for deflections. The loaded boom angle combined with the boom length give only an approximation of the operating radius.
3. Working Area: Area measured in a circular arc about the centerline 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 hoist line.
5. Side Load: Horizontal side force applied to the lifted load either on the ground or in the air.

Figure 4-5. Rated Lifting Capacity Chart (Sheet 2 of 4)

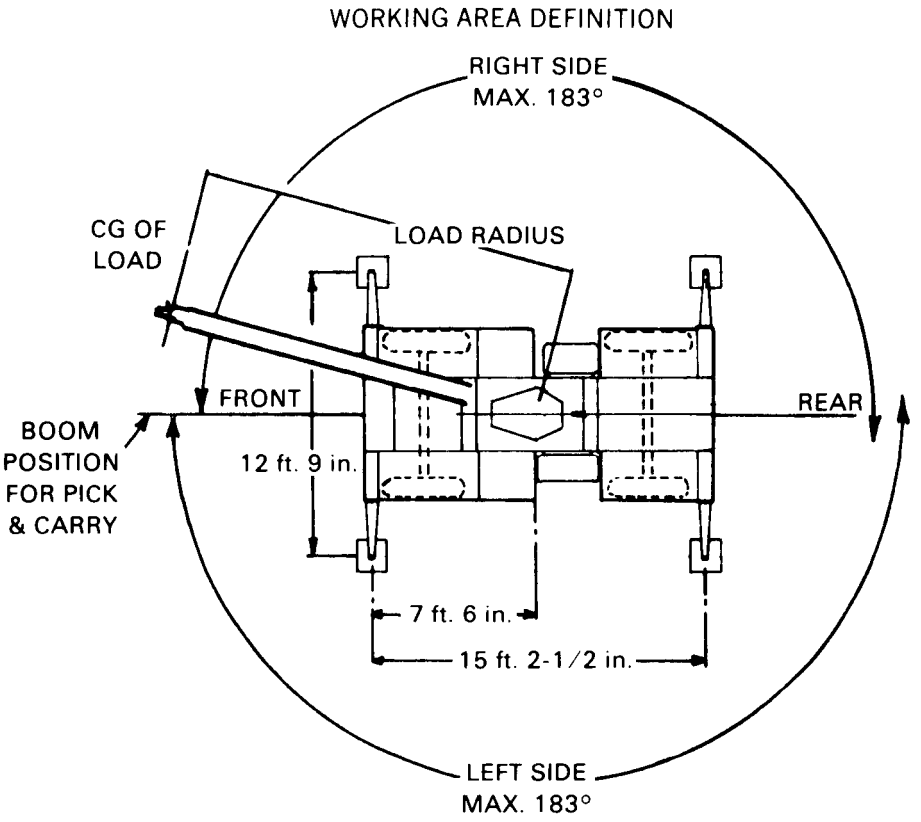


LINE PULLS & REEVING INFORMATION

HOIST	CABLE SPECS.	PERMISSIBLE LINE PULLS
Braden PD12A	1/2 in. 6x37, IPS, IWRC	6,571 lbs.

For multiple part reeving, use one line for each 4,750 lbs. of load or portion thereof.

Figure 4-5. Rated Lifting Capacity Chart (Sheet 3 of 4)



WEIGHT REDUCTIONS FOR LOAD HANDLING DEVICES

HOOKBLOCK:	
4-3/4 Ton, 1 Sheave	128 lbs.

Note: All Load Handling Devices and Boom Attachments are Considered Part of the Load and Suitable Allowances MUST BE MADE for Their Combined Weights. Weights are for Grove Furnished Equipment.

Figure 4-5. Rated Lifting Capacity Chart (Sheet 4 of 4)

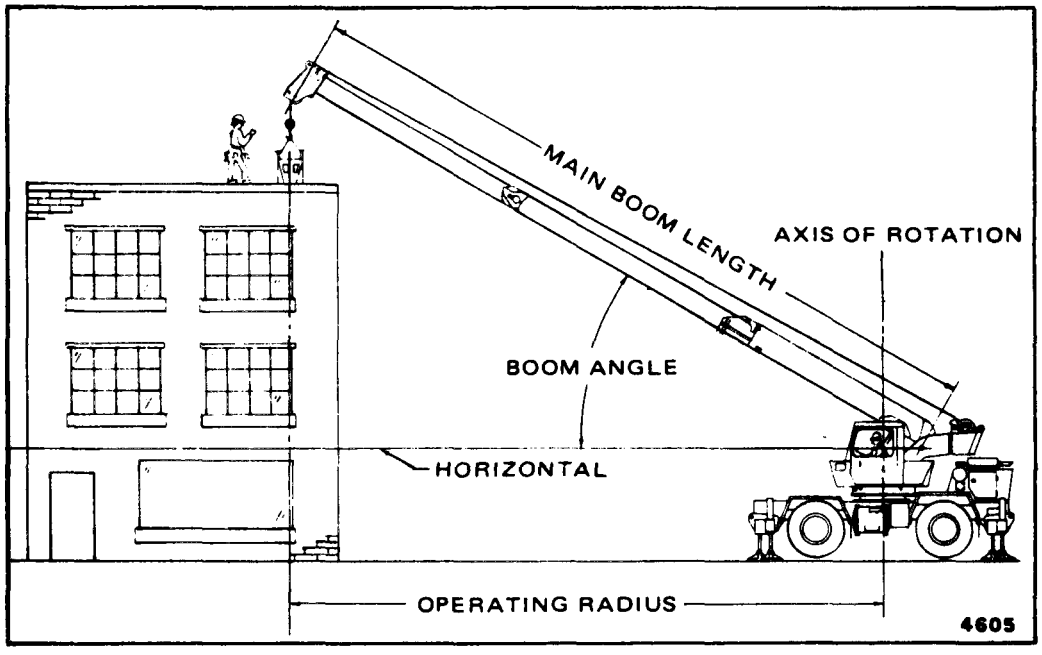


Figure 4-6. Terms to Know

The Rated Lifting Capacity Chart (figure 4-5) contains an On Outriggers Chart and an On Rubber Chart. The On Rubber Chart contains rated capacities for stationary and for pick and carry operation.

All SCAMP capacity charts are limited by structural strength. This is indicated by the bold line across the bottom of the chart.

Each chart shows the radius of the load in a column at the left. The radius is the distance between the axis of rotation of the turntable and the center of gravity of the load. Varius boom lengths are listed across the top, ranging from fully retracted to fully extended. The loaded boom angle (in degrees) required for the given lift is shown in parenthesis below the maximum total weight which can be listed. Note that capabilities at radii in between the increments shown should be always be treated as if the load was at the next longer radii. For example, the chart capacity at 13 feet radius is 4500 Ibs which is the capacity at the next longer radii, 15 feet.

Another important section of the Rated Lifting Capacity Chart is the range diagram. The range diagram illustrates the tip height which can reachieved at each boom length, angle, and radius. If the operator knows the radius

required for a specific lift and the tip height necessary, he can calculate the required boom length and angle needed for the lift, He then checks the Rated Lift Capacity Chart for the specific boom length and radius to find out if the crane is capable of performing the lift safely. Or, on the other hand, 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 chart to outline lifting areas. An examination of the lifting area diagram shows the slewing limits and outrigger locations in reference to the axis of rotation.

The last major portion of the Rated Lifting Capacity Chart is the section concerning notes to lifting capacities. Be sure to read all notes carefully so you understand what each one means. The chart also gives weight reductions for Grove load handling devices such as hook blocks, which must be taken into consideration as part of the load. Remember, any other load handling devices such as chains, slings, or spreader bars must also be considered, and the weight of these devices must be added to the weight of the load.

NOTE

The following is an example of how to compute a lift. Use the Rated Lifting Capacity Chart (figure 4-5) to verify the example findings.

TYPICAL TASK FOR A SCAMP CRANE.

The object is to remove the main transmission from aCH-54 helicopter at a weight of 3400 pounds.

Strategic placement of the crane allows for an on-outrigger lift at 15 foot radius (horizontally measured distance between the axis of rotation of the crane turntable and the center of the helicopter rotor mast). With the transmission rigged for lifting and the hook block (128 pounds) and required slings (100 pounds) in place over the rotor mast, a boom length of 30 feet (marked on sides of boom fly section) is found to be necessary for the desired tip height to swing the load clear of the aircraft.

By consulting the 'On Outriggers'360°Chart (figure 4-5), it is found that the crane capacity at 15 foot radius, for all boom lengths, is 4500 pounds. The actual load which will be lifted = 3400 pounds + 128 pounds (hook block) +100 pounds (slings) = 3628 pounds, is well within SCAMP capacity. The, transmission may be lifted and swung free of the aircraft and Iowered to the ground.

It is now desired to carry the transmission to a nearby hangar. Consulting the On Rubber Capacities/Boom Centered Over Front Chart, it is found that up to 5000 pounds may be carried at 10 foot radius over the front. A fully retracted boom is indicated for this lift and speed should not exceed 2.5 mph. Carry the transmission to the desired location.

USING THE CRANE FOR TOWING

The crane maybe used for towing and spotting aircraft using either the front or rear mounted pintle hooks. The turntable lock pin should be inserted to lock the boom over the opposite end from the end to be used for towing.

CRANE FUNCTIONS.

WARNING

THE OUTRIGGERS SHALL BE SET BEFORE EVERY CRANING OPERATION UNLESS CONDITIONS PRECLUDE THEIR USE. NOTE THAT LIFTING OBJECTS WITH THE CRANE''ON RUBBER'' GREATLY REDUCES THE CRANE'S LIFTING CAPACITY. REFER TO THE RATED LIFTING CAPACITY CHART (FIGURE 4-5).

SETTING THE OUTRIGGERS.

NOTE

More than one outrigger maybe extended at one time.

1. Position the outrigger selector valve lever (16) to front center. Move the OUTRIGGER control lever (4) to OUT until the front wheels clear the ground.

2. Release OUTRIGGER control lever (4).

3. Position the outrigger selector valve lever (16) to rear center. Move OUTRIGGER control lever (4) to OUT until the rear wheels are clear of the ground.

4. Release OUTRIGGER control lever (4).

5. Lower outrigger arms as necessary to center bubble in bubble level indicator (15).

NOTE

For 'on-outrigger' lifts the tires must be clear of the ground.

STOWING THE OUTRIGGERS.

NOTE

More than one outrigger may be retracted at one time.

1. Position the outrigger selector valve lever (16, figure 4-1) to rear center. Move OUTRIGGER control lever (4) to IN until the rear outrigger arms are fully retracted.

2. Release OUTRIGGER control lever (4).

3. Position the outrigger selector valve lever (1 6) to front center. Move OUTRIGGER control lever (4) to IN until the front outriggers are fully retracted.

4. Release OUTRIGGER control lever (4).

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 OBSTRUCTIONS AND PERSONNEL.

WARNING

WHEN SWINGING THE LOAD, REFER TO THE RATED LIFTING CAPACITY CHART TO MAKE CERTAIN THE APPLICABLE CAPACITY IS NOT EXCEEDED. TRAVELING WITH ANY LOAD OVER-THE-SIDE IS PROHIBITED.

CAUTION

ENSURE THE TURNTABLE LOCK PIN IS REMOVED BEFORE ATTEMPTING TO SWING.

CAUTION

NEVER PUSH OR PULL THE SWING CONTROL LEVER (2, FIGURE 4-1) THROUGH NEUTRAL TO THE OPPOSITE DIRECTION TO STOP SWING MOTION.

1. To swing the boom right (clockwise rotation), push forward on SWING control lever (2).

2. To swing the boom left (counterclockwise), pull back on SWING control lever (2).

NOTE

Always operate the SWING control lever (2) with a slow and even pressure.

3. Rotation is stopped by returning the SWING control lever (2) to its neutral position.

ELEVATING AND LOWERING THE BOOM.

Elevating The Boom.

WARNING

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

1. To raise the boom, pull back on the BOOM control lever (10, figure 4-1) until the boom reaches the desired angle.

Lowering The Boom.

WARNING

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

1. To lower the boom, push forward on the BOOM control lever (10) until the boom is lowered to the desired angle.

TELESCOPING THE BOOM.

Extending The Boom.

WARNING

WHEN EXTENDING THE BOOM, LET OUT CABLE SIMULTANEOUSLY TO PREVENT TWO-BLOCKING 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 the boom, push forward on the TELESCOPE control lever (3, figure 4-1) and push forward on HOIST control lever (12, figure 4-1) simultaneously until boom extends to the desired length.

Retracting The Boom.

WARNING

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

1. To retract the boom, pull back on the TELESCOPE control lever (3) until the boom retracts to the desired length.

LOWERING AND RAISING THE CABLE.

WARNING

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

CAUTION

WHEN STARTING OR STOPPING THE HOIST, DO NOT JERK THE CONTROL LEVER. JERKING THE LEVER CAUSES THE LOAD TO BOUNCE. WHICH COULD RESULT IN POSSIBLE DAMAGE TO THE CRANE.

NOTE

When the load is stopped at the desired height, the automatic brake will engage and hold the load as long as the control lever remains in neutral.

Lowering The Cable.

1. To lower the cable, push forward on the HOIST control lever (12, figure 4-1) until the hook (or load) is lowered to the desired position.

Raising The Cable.

To raise the cable, pull back on the HOIST control lever (l2) until the hook (or load) is raised to the desired height,

INSTALLING CABLE ON THE HOIST.

CAUTION

IF CABLE IS WOUND FROM A STORAGE REEL ONTO THE DRUM, THE REEL SHOULD BE ROTATED IN THE SAME DIRECTION AS THE HOIST.

Install cable on the hoist drum in accordance with the following procedure.

1. Position the cable over the boom nose sheave and route to the hoist drum.

2. Position the hoist drum with the cable anchor slot on top.

3. Insert the cable through the slot and position around the anchor wedge. Refer to figure 4-7.

NOTE

The end of the cable should be even with the bottom of the anchor wedge. See inset figure 4-7.

4. Position the anchor wedge in the drum slot; pull firmly on the free end of the cable to secure the wedge.

NOTE

If the wedge does not seat securely in the slot, carefully tap the op of the wedge with a mallet.

5. Slowly rotate the drum, ensuring the first layer of cable is evenly wound onto the drum.

6. Install the remainder of the cable, as applicable.

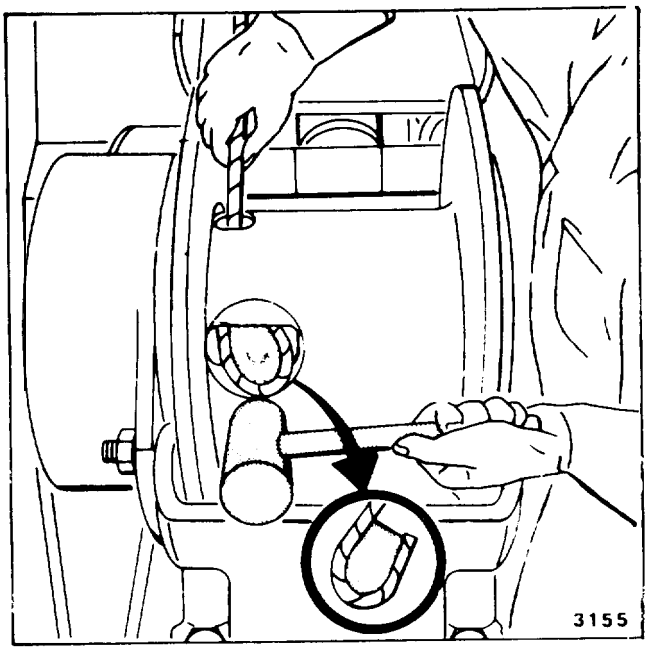


Figure 4-7
Installing Cable
Anchor Wedge

7. Reeve hoist cable through hook block. Secure hoist cable to boom point with wedge socket. Refer to figure 4-8.

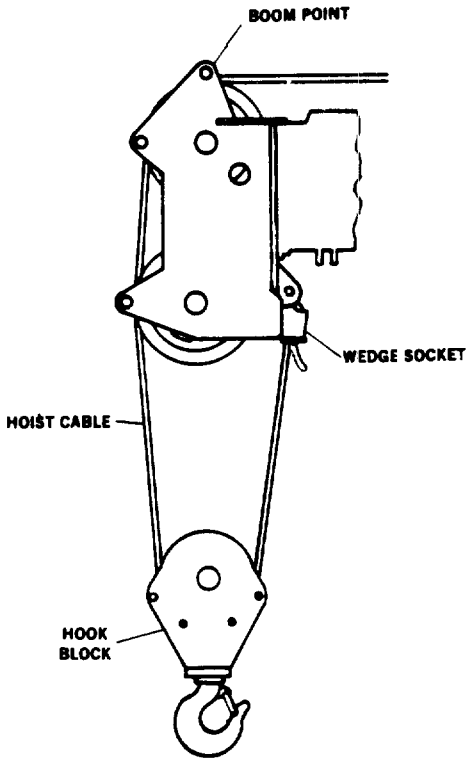


Figure 4-8. Cable Reeving Through
Point and Hook Block

EMERGENCY HAND PUMP OPERATION

Per procurement spec, provisions are included on the SCAMP to return the crane to travel mode in the event of hydraulic power loss. The following is the procedure:

1. Remove the access cover on front outrigger box. Locate the 1 /4” hand pump supply hose entering compartment on right side (facing front of crane). This hose has a female quick disconnect half on its end and lies loose across the compartment, having approximately 18 inches of slack.

2. Remove the hand pump, pump handle, and hose from their stowed positions in the right-hand tool compartment. The hose has a female quick disconnect half on one end and a male quick disconnect half on the other. The pump has one each male and female quick disconnect on its supply and pressure ports.

3. Using the bracket provided on the pump, clip the pump onto the lower edge of the access cut-out in the front outrigger box. Install the pump handle and attach the male end of the hose to the female outlet on the pump.

4. Remove the pump supply hose and plug it into the male quick disconnect half on the pump. Uncoil and extend the hand pump pressure hose,

5. Connect the hand pump pressure hose (with male quick disconnect half) to the female end of the hoist brake line quick disconnect installed on the hoist. Refer to figure 4-9.

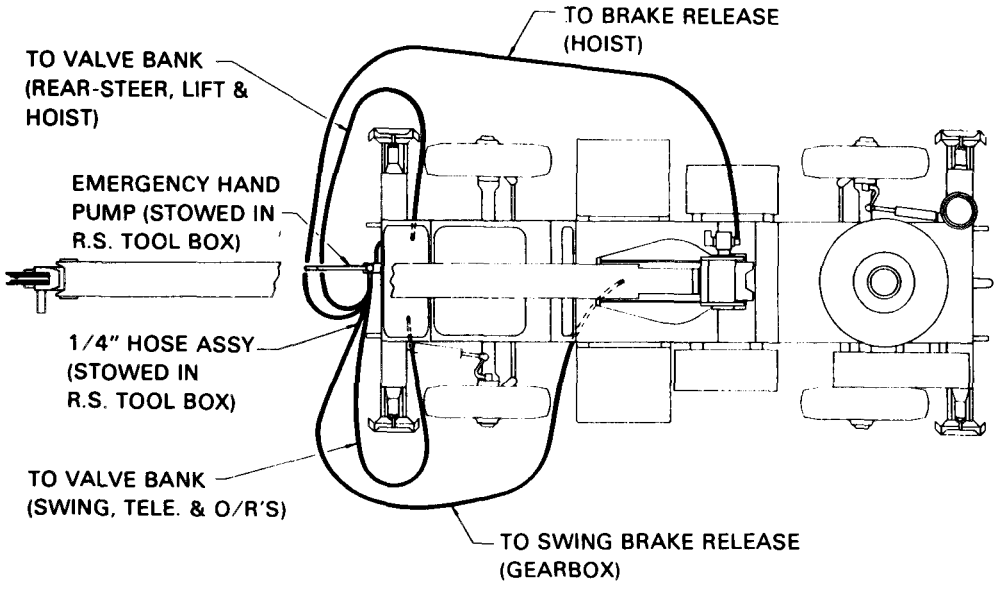


Figure 4-9 Hand Pump Installation

6. Lower the load by operating the hand pump. This slips the hoist brake in small increments allowing controlled descent of the load. Lower load to ground and pump to create slack to disconnect hook block.

7. With the load safely down, lower the boom. Disconnect the hand pump pressure hose from the hoist (reconnect the hoist brake line). Carry the end of the hand pump pressure line under the right front of the crane and plug it into the female quick disconnect half on the inlet side of the A-36 valve bank. Refer to figure 4-9.

8. Lowering the boom requires two operators. One must operate the pump while a second must sit in the operator's seat and hold the BOOM control lever (10, figure 4-1) in the DOWN position. Lower the boom to full down (horizontal) position.

9. With the load lowered and the boom down, swing the boom over the front. Disconnect the hand pump pressure hose from the A-36 valve bank and carry it further under the crane to the swing brake assembly forward of the center of rotation. Refer to figure 4-9. The disconnect in the swing brake line is at the brake housing. Pull apart the quick disconnect fitting in the swing brake line and plug the male end of the hand pump pressure hose into the female half of the brake hose.

10. Release the hoist brake by operating the pump. Attach a tag line to the boom nose and pull the boom around while pumping. Pull the boom to center, front, until the swing lock pin can be installed. Install the lock pin.

11. The boom fly section may now be retracted. Disconnect the pump pressure line from the swing brake line (reconnect the ends of the swing brake line). Plug the pump pressure line into the female disconnect half provided on the inlet side of the A-20 valve bank, under the left-front of the crane. Refer to figure 4-9.

12. While holding the TELESCOPE control lever (3, figure 4-1) at the RETRACT position, operate the hand pump to retract the boom. Retract the boom fully and secure the hook block to the front pintle hook.

13. To retract the outriggers, leave the pump pressure line connected to the A-20 valve bank. Operate the hand pump while the OUTRIGGER control lever (4, figure 4-1) is held in the RETRACT position and the outrigger selector valve lever (16) is positioned toward the selected outrigger(s) to be retracted. Complete the outrigger retraction to full-up, stowed position.

14. Disconnect, coil, and stow the hand pump pressure hose in the right hand tool box (inside the door). Disconnect the supply line to the hand pump and stow in front compartment. Remove the hand pump and handle from the front of the crane and stow them in the right tool box. Replace the front cover.

OPERATION AT TEMPERATURE EXTREMES

COLD WEATHER OPERATION

If sustained temperatures between +40° and -25°F are expected, the following precautions should be taken to ensure uninterrupted performance of the SCAMP crane:

1. Drain the MIL-L-2104, grade 10 oil from the hydraulic system and transmission/converter and replace with MIL-L-46167 arctic oil.

2. Ensure that engine anti-freeze coolant mixture is 50% solution of ethylene glycol, inhibited, heavy duty, per MIL-A-46153.

3. Drain the fuel tank of regular diesel fuel and refill with arctic diesel fuel. Run the crane engine for a sufficient length of time to purge the fuel system of the regular diesel fuel. Drain the fuel system water separator.

4. Maintain batteries at full charge. The MS52131 slave receptacle may be used for charging the batteries or slave starting the engine from an external power source.

5. Check cold start ether aerosol container. When starting using ether spray, inject with two-second spurts while cranking cold engine. Never use with warm engine.

6. Keep the crane clean of ice and snow, especially the boom.

7. Depending on the temperature, allow ample time (15 to 30 minutes at 0°F) to warm up the engine. Allow additional time to warm up the hydraulic oil. Cycle the functions slowly at first to raise hydraulic oil temperature.

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

9. Before lifting a load, make sure it is not frozen to the ground.

HOT WEATHER OPERATION.

If sustained temperatures approaching 120°F are experienced during craning operations, care should be taken to ensure adequate cooling of the engine and drive components. Keep the radiator clear and full of coolant and the cap tight. Keep the radiator, grill, and engine oil cooler clean. At ambients between 115° to 120°F, it may be desirable to replace the 50-50 antifreeze/water solution in the engine cooling system with pure water plus inhibiter.

At ambient temperatures of 120°F and above, tolerances in the temperature sending units may account for an indication that the engine coolant (and/or the transmission coolant) has overheated. If a continuous warning occurs for 3 minutes, unload the engine and allow the unit to cool. If warnings persist, shut down the machine and find the cause.

Constant crane operation at high ambients will result in premature break-down of the MIL-L-2104 hydraulic oil. 500 hours at high temperatures on this oil, should be followed by draining and replacement with fresh oil.

SECTION 5

TRANSPORTABILITY

WARNING

Do not exceed 35 mph, when towing the SCAMP over highways.

GENERAL.

As required by the Procurement Specification, ample provisions are included on SCAMP for highway, air, marine and rail transport. See figure 5-1 for weight distribution and location of slinging eyes, towing and tie-down lugs.

HIGHWAY TRANSPORT.

Although the SCAMP crane may be driven on public roads (see Travel Operation, page 2-10) or transported by truck or trailer, normal transport over highways should be accomplished by towing.

NOTE

If towing is required due to loss of power on the crane, refer to page 4-35 for Emergency Hand Pump Operation, to return the boom to travel mode.

Prepare the SCAMP for towing as follows:

1. Position the boom over the front at 0 (zero) degrees elevation.

2. Install the turntable lock pin provided.

3. Attach the hook block through the pintle hook and take up slack in hoist cable with the hoist.

4. Position the Tow-Drive lever (18, figure 4-1) to TOW. Note that the 2/4 Wheel Drive Lever (17) automatically moves to 2-WHEEL because of an interlock between the two levers (17 and 18).

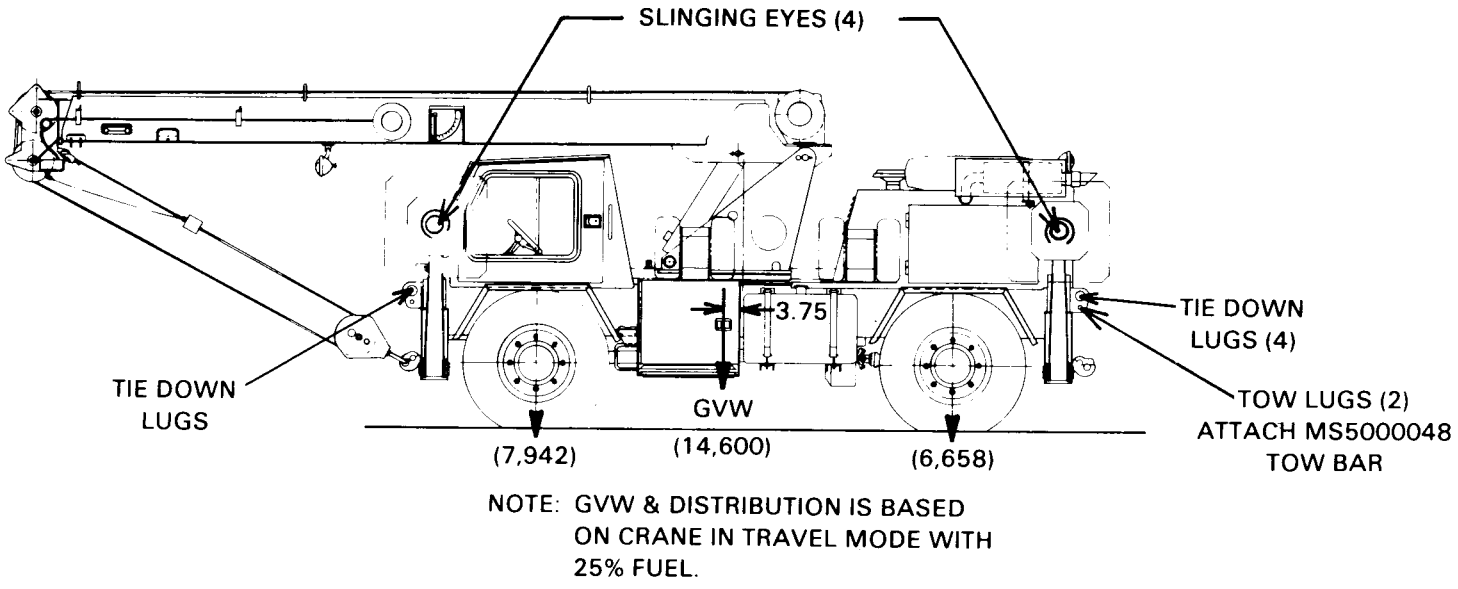


Figure 5-1. Crane Weight Distribution and Locations of Slinging Eyes, Tie Down and Tow Lugs

5. Disconnect and stow the rear steer cylinder (under right rear fender, between the wheel the frame) as follows (figure 5-2):

- Remove 1/4-inch bolt and nut which locks the pitman arm ball.

- Using a large screwdriver, back out the socket plug until the steer cylinder can be raised off the ball on the pitman arm.

- Screw the socket plug back in and replace the 1/4 inch bolt to lock it in place.

- Stow the cylinder on the pin provided. See figure 5-2.

- Secure the cylinder with the lock pin provided.

- Secure the cylinder with the lock pin provided.

NOTE

With the steer cylinder disconnected and stowed, the rear wheels are free to follow the towing vehicle.

CAUTION

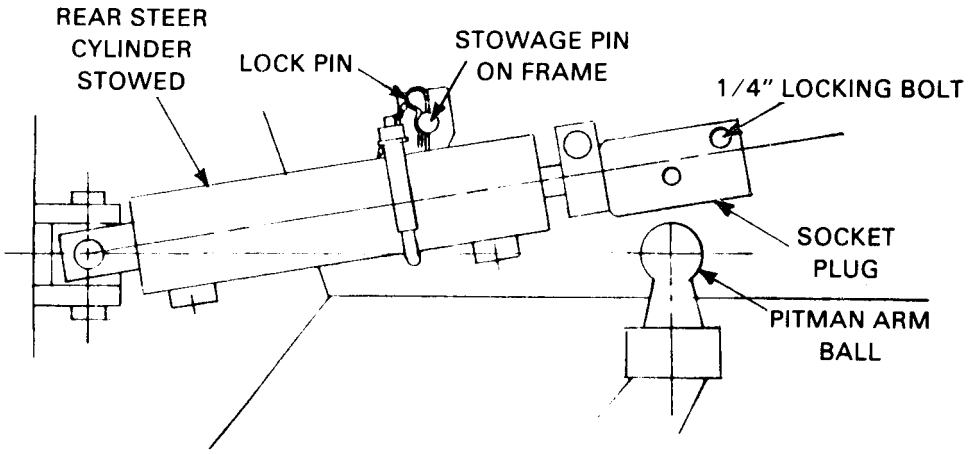
DO NOT ACTUATE THE REAR STEER LEVER WITH THE CYLINDER DISCONNECTED AND THE ENGINE RUNNING. THIS WILL DAMAGE THE REAR STEER CYLINDER ROD.

6. Install the rigid Iink (stowed in the left side tool compartment), between the front wheel pitman arm on the right side, and the clevis provided on the outrigger box.

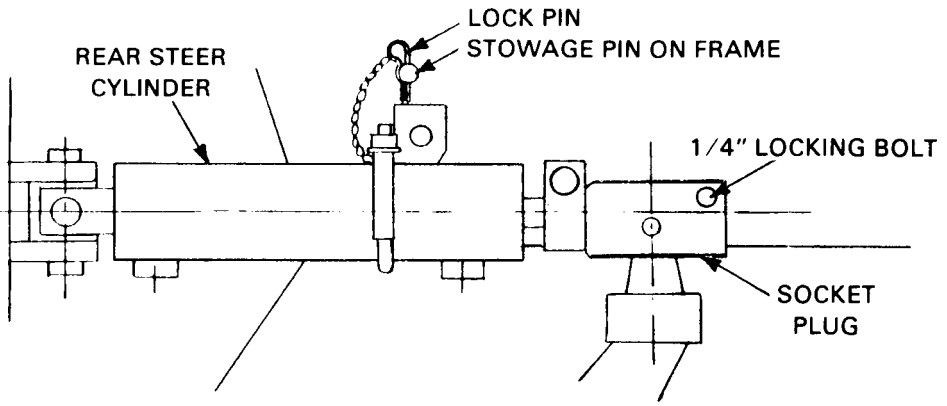
- Turn the front wheels until the link can be installed.

- Adjust the link as required to lock the front wheels straight ahead.

7. Reduce tire pressure to 65 psi.



REAR STEER CYLINDER STOWED AGAINST FRAME
REAR WHEELS FREE



REAR STEER CYLINDER ENGAGED WITH PITMAN
ARM ON REAR AXLE

Figure 5-2. Rear Steer Cylinder
Disconnect Provisions

8. Tow the SCAMP from the rear using a towbar that conforms to MS5000048, medium duty capacity.

- Fit clevises on towbar to tow/tie-down lugs on the face of the rear outrigger box. See figure 5-1. Use the lower, 1 -inch diameter holes in the lugs to attach the towbar.

Perform the following after reaching the destination and before any craning operation:

1. Engage rear steer cylinder (figure 5-2) as follows:

- Remove lock pin.
- Remove 1/4-inch bolt.
- Engage socket plug to pitman arm ball.
- Install 1/4-inch bolt and nut.
- Install lock pin to stowage pin on frame.

2. Remove and stow the rigid link installed on the right-front wheel pitman arm.

3. Position the Tow-Drive Lever (18, figure 4-1) to DRIVE.

4. Increase tire pressure to 75 psi.

5. Remove the turntable lock pin.

6. Remove hook block at front pintle hook.

AIR TRANSPORT.

TRANSPORT BY CARGO AIRCRAFT.

NOTE

The SCAMP's overall height allows the crane to be transported without disassembly by C-130, C-141, and C-5A aircraft.

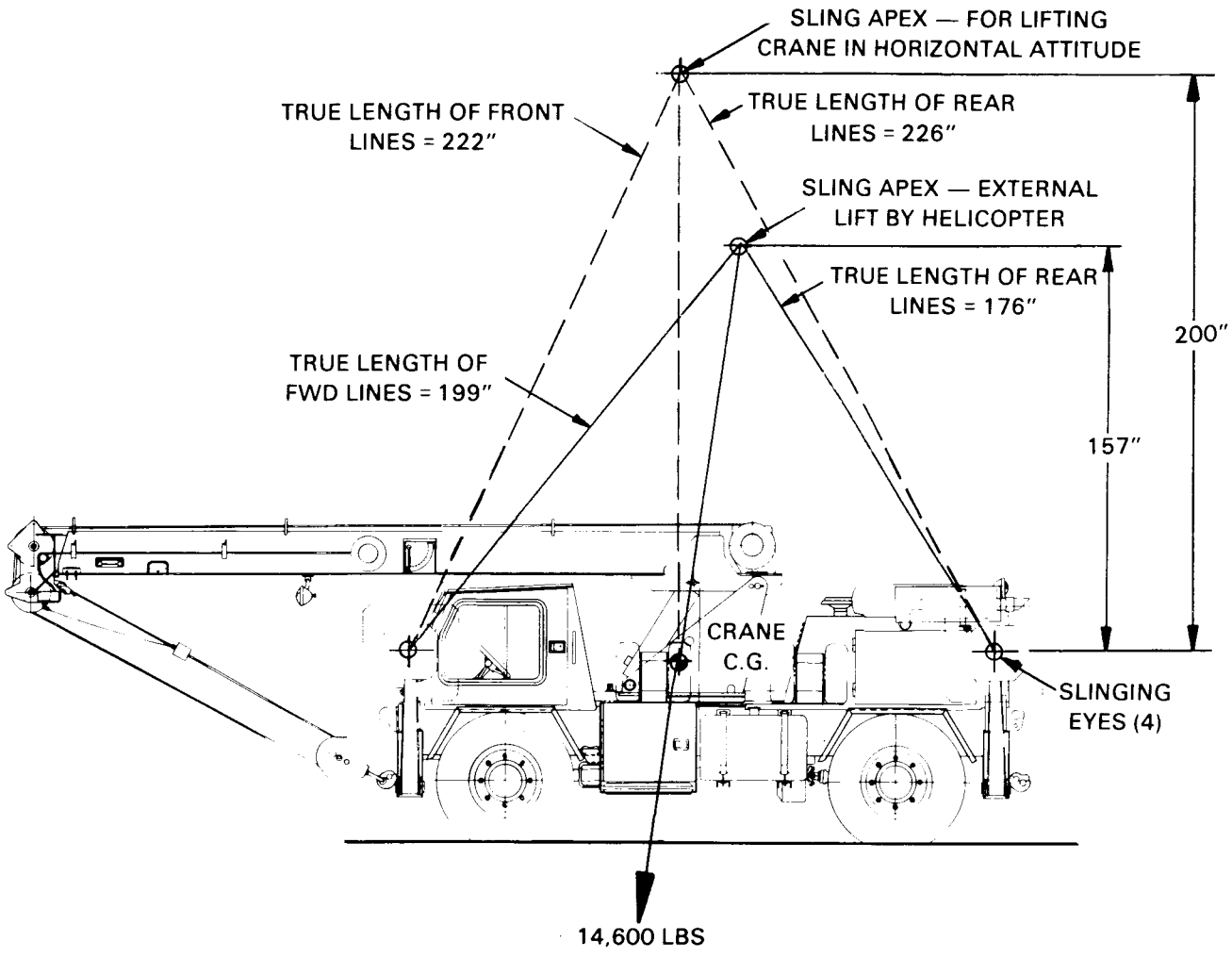


Figure 5-3. SCAMP Slinging Geometry

Prepare the SCAMP for transport as follows:

1. Retract the boom and lower it over the front.

2. Install the turntable lock pin.

3. Secure hook block in the front pintle hook.

4. Back the SCAMP aboard the C-130 and C-141 aircraft to avoid contact with the boom point and the plane's cargo bay overhead. The SCAMP maybe driven forward up the C-5A's ramp without danger of damaging the aircraft with the boom point.

5. Tie-down the SCAMP using the four lugs, front and rear. The 3-inch diameter lugs should be used for vehicle tie-down.

TRANSPORT BY HELICOPTER.

1. Retract the boom and lower it over the front.

2. Install the turntable lock pin.

3. Secure the hook block in the front pintle hook.

4. Ensure that outrigger arms are in the full up position.

5. The slinging eyes at the ends of the outrigger arms should be used for exterior air lift by helicopter. Figure 5-3 illustrates the four-fall sling geometry used for CH-54 air lift testing with SCAMP. This slinging arrangement allows for a nose-down attitude of the vehicle in flight, which tends to stabilize it from rotating under the helicopter.

MARINE TRANSPORT.

For loading aboard ship, the crane may be slung in a horizontal attitude from the eyes on the ends of the outrigger arms. Seethe four-fall sling geometry, figure 5-3, which places the apex directly over the crane center of gravity. If provisions exist, the crane may be driven aboard ship in a forward direction or backed. Once aboard, efficient stowage is enhanced by the ability of the crane to crab into tight quarters. Finally, tie-down the machines required using the 3 inch diameter holes in the four lugs provided.

RAIL TRANSPORT.

To avoid damage to the crane as a result of humping the open car on which it is shipped against other rail cars, extra care must be exercised in blocking and tie-downs. Figure 5-4 illustrates the blocking and tie-down method used for successful First Article hump testing.

Prepare the SCAMP for rail transport as follows:

1. Retract the boom and lower it over the front.

2. Install the turntable lock pin.

3. Remove the spare tire/wheel, hook block, and oversize outrigger pads. Box these items separately and anchor them to rail car.

4. Block under the outriggers and boom and chock front and rear of all four tires. Blocking must conform to Section 6, figure 55, of Association of American Railroads Rules governing the loading of Department of Defense Material on open top cars. Tie-downs, as shown, should conform to the diagram, figure 5-4, and Pull the crane down against the blocks and tires against the chocks.

5. Block between the tool box and fuel tank on the left side and between the hydraulic reservoir and tool box on the right side of the SCAMP.

6. Rotate the boom-mounted floodlights, lens up, and cushion and strap them against the underside of the boom.

7. Rotate the backup floodlight, lens down, and cushion it against the engine hood. Tighten the pivot bolt on which it adjusts.

8. Tighten the defroster fan (inside operator’s cab). Adjust pivot and cushion around fan guard.

9. Remove all loose tools and equipment from operator’s cab. Stow and secure all tools and equipment in tool boxes.

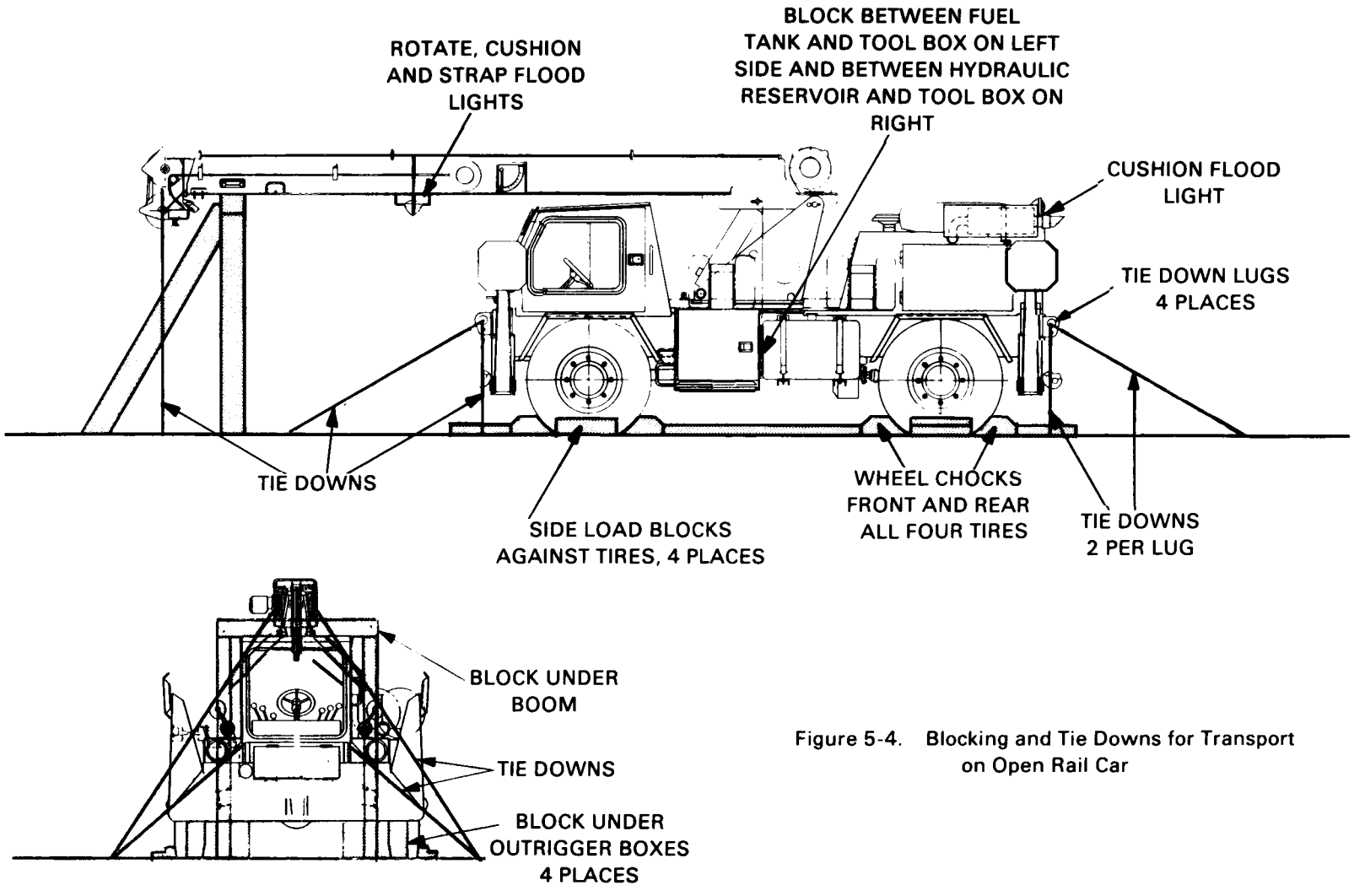


Figure 5-4. Blocking and Tie Downs for Transport on Open Rail Car

SECTION 6

LUBRICANTS, FUELS AND FLUIDS

GENERAL.

For easy reference, most of the data presented here IS duplicated on the RT41AA Lubrication Chart, located on the inside of the left side tool box door. In addition to lubricants, engine coolant and brake fluid specifications and fuel designation are included in this section. For maximum crane life span and utilization, it is important to follow the noted specifications and procedures.

LUBRICANTS USED IN SCAMP.

Lube Symbol	Description	*MIL Spec.*
EO-15W40	Engine Oil 15W40	MIL-L-2104 Multigrade 15W40
M P L	Multipurpose Type Gear Lube 85W140	MIL-L-2105
EO-1OW*	Engine Oil 10W	MIL-L-2104 Grade 1 0w
M P G	Multipurpose Grease	MIL-G-10924
A E O *	Arctic Engine Oil	MIL-L-46167

OTHER FLUIDS USED IN SCAMP.

SBF	Silicone Brake Fluid	MIL-B-46176
AFC	Anti-freeze Coolant	Ml L-A-46 153
ADF**	Arctic Diesel Fuel	

‘For sustained ambients between +40 and +120°F, use EO-1OW. For sustained ambients between +40 and -25°, use AEO.

** For sustained temperatures below O°F, use ADF. See Cold Weather Operation, page 4-37.

The following checking and draining provisions are provided on SCAMP:

	Method of Checking	Method of Draining
Hydraulic Reservoir	Sight Gauge	Drain Plug
Fuel Tank	Instrument Panel Gauge	Drain Plug
Axle Differential Housings	Check Plug	Drain Plug
Engine Crankcase	Dip Stick	Drain Plug
Transmission/Converter	Dip Stick	Drain Plug
Hoist	Check Plug	Drain Plug
Radiator	Radiator Cap	Pet Cock
Engine Cooling Jacket	Radiator Cap	Drain Plug
Swing Gearbox	Check Plug	Drain Plug

Check and drain plugs to conform to SAE J-371

LUBRICATION POINTS.

A regular frequency of lubrication must be established for all lubrication points. Normally, this is based on component operating time. The most efficient method of keeping track of lube requirements is to maintain a job log indicating crane usage. The log must use the engine hourmeter and the odometer to ensure coverage of lube points that will receive attention based on their readings. Other lubrication requirements must be made on a time basis, i.e. weekly, monthly, etc.

All oil levels are to be checked with the crane parked on a level surface in transport position, and while the oil is cold, unless otherwise specified.

On plug type check points, the oil levels are to be at the bottom edge of the check port.

On all hoists with a check plug in the drum, the fill plug shall be directly on top of the hoist, and the check plug level.

All grease fittings are SAE STANDARD unless otherwise indicated. Grease non-sea led fittings until grease is seen extruding from the fitting. One ounce (28 grams) of MPG equals one pump on a standard one pound (0.45 kg) grease gun.

Over lubrication of non-sealed fittings will not harm the fittings or components, but under lubrication will definitely lead to a shorter lifetime.

On sealed U-Joints, care must be exercised to prevent rupturing seals. Fill only until expansion of the seals first becomes visible.

Unless otherwise indicated, items not equipped with grease fittings, such as linkages, pins, levers, etc., should be lubricated with oil once a week. Motor oil, applied sparingly, will provide the necessary lubrication and help prevent the formation of rust. An Anti-Seeze compound maybe used if rust has not formed. Otherwise the component must be cleaned first.

Grease fittings that are worn and will not hold the grease gun, or those that have a stuck check ball, must be replaced.

Where wear pads are used, cycle the components and relubricate to ensure complete lubrication of the entire wear area.

The following describes the lubrication points and gives the lube type, lube interval, lube amount, and application for each. Each lubrication point is numbered, and this number corresponds to the index shown on the Lubrication Diagram, figure 6-1.

1. Steer Cylinder Pivot Shaft.

Lube Type - MPG
Lube Interval -50 hours or weekly
Lube Amount - Until grease extrudes
Application -1 grease fitting on each end of each cylinder

2. Tie Rods.

Lube Type - MPG
Lube Interval -50 hours or weekly
Lube Amount - Until grease extrudes
Application -1 grease fitting on each end

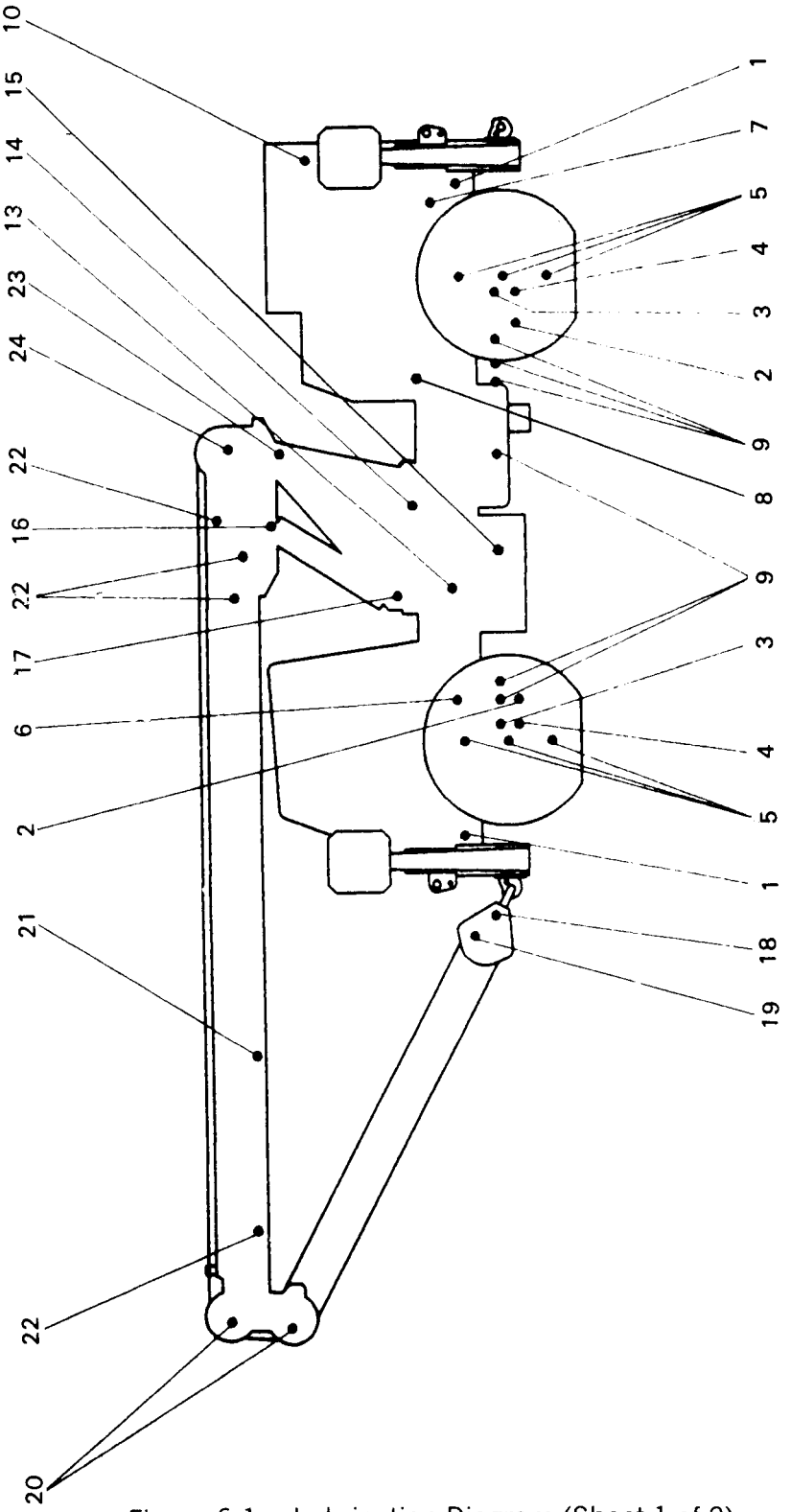
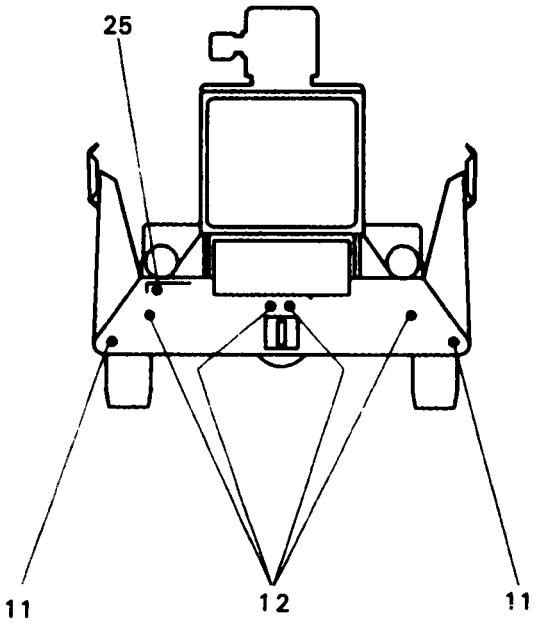


Figure 6-1. Lubrication Diagram (Sheet 1 of 2)

Figure 6.1. Lubrication Diagram (Sheet 1 of 2)



LEGEND

1. Steer Cylinder Pivot Pin
2. Tie Rods
3. Differentials
4. Wheel Bearings
5. Trunnion Bearings (Upper and Lower) and U-Joints
6. Brake Master Cylinder
7. Engine Crankcase
8. Transmission with Torque Converter
9. Drive Line Slip Joints and U-Joints
10. Engine Cooling System
11. Outrigger Pivot Pins
12. Outrigger Cylinder Pivot Pins
13. Swing Gearbox
14. Swing Gear and Pinion
15. Swing Bearing
16. Lift Cylinder (Upper Pin)
17. Lift Cylinder (Lower Pin)
18. Hook Block Swivel Bearings
19. Hook Block Sheave
20. Upper and Lower Boom Nose Sheaves
21. Adjustable Wear Pads
22. Boom Section Wear Pads (Upper and Lower)
23. Boom Pivot Shaft
24. Hoist
25. Hydraulic Tank

Figure 6-1. Lubrication Diagram (Sheet 2 of 2)

3. Differentials.

Lube Type - MPL
Lube Interval - Check every 1000 miles (1 605 km)
New Axles - 1st change before 3000 miles (4828 km)
Normal - 2000 hours or 25,000-30,000 miles (40234-42,280 km) - No less than twice yearly

CAUTION

IF THE MAKEUP AMOUNT IS SUBSTANTIALLY MORE THAN 0.5 PINT (0.23 L) CHECK FOR LEAKS.

Lube Amount - Capacity approximately 14 pints (6.4 L). Normal makeup - less than 0.5 pint (0.23L)
Application - Fill to bottom of hole in the housing

4. Wheel Bearings.

Lube Type - MPG
Lube Interval -500 hours
Application: Disassemble and repack

5. Trunnion Bearings (Upper and Lower) and U-Joints.

Lube Type - Rockwell Axles - MPG
Lube Interval -50 hours or weekly
Lube Amount - Until grease extrudes
Application -4 fittings on each axle end

6. Brake Master Cylinder.

Fluid Type - SBF
Interval -50 hours or weekly
Amount -3 pints
Application - Fill at top of cylinder

7. Engine Crankcase.

Lube Type - EO-15W40
Lube Interval -
Check daily
Drain and change oil and filter every 100 hours

8. Transmission with Torque Converter.

Lube Type - EO-10W
Lube Interval - Check daily with engine running and shift lever at N.
Change the filter every 250 hours
Drain every 500 hours or 12 months
Oil temperatures must be 150 to 180 degrees F (65.6 to 93.3 degrees C)
Lube Amount - Capacity of the torque converter, lines, and transmission as a system is approximately 4.5 gallons (1 7.0 L)
Application - Through the fill pipe to the indicated level on the dipstick

9. Drive Line Slip Joints and U-Joints.

Lube Type - MPG
Lube Interval -50 hours
Lube Amount - Until grease extrudes
Application -1 grease fitting per joint (4 total each drive line)

10. Engine Cooling System.

Fluid Type -50-50 solution AFC and water
Interval - Check daily
Amount -3.1 gallons
Application - Fill at radiator cap

NOTE
For ambients 11 5-120°F drain and replace with pure water.

11. Outrigger Pivot Pins.

Lube Type - MPG
Lube Interval -25 hours
Lube Amount - Until grease extrudes
Application -1 fitting on outrigger arm pivot shaft

12. Outrigger Cylinder Pivot Pins.

Lube Type - MPG
Lube Interval -25 hours
Lube Amount - Until grease extrudes
Application -2 fittings on the upper cylinder common pivot shaft
1 fitting on the lower cylinder pivot shaft, each cylinder

13. Swing Gearbox.

Lube Type - MPL
Lube Interval -
Check every 50 hours or weekly
Drain 1st time after 250 hours and every 500 hours or 12 months thereafter
Lube Amount -1 pint (.5 L)
Application - Fill to check plug

14. Swing Gear and Pinion,

Lube Type - MPG
Lube Interval -10 hours or daily
Lube Amount - Coat all teeth
Application - Brush on

15. Swing Bearing.

Lube Type - MPG
Lube Interval -50 hours
Lube Amount - Until grease extrudes from the whole circumference of the bearing
Application -1 grease fitting

16/17. Lift Cylinder.

NOTE

When greasing the lift cylinder pivot shafts, better distribution of grease within the shaft bearings is obtained if the weight of the boom is removed from the shafts.

Lube Type - MPG
Lube Interval - 10 hours
Lube Amount - Until grease extrudes
Application -2 fittings at top bushing and 2 on the bottom bearing blocks

18, Hook Block Swivel Bearings.

Lube Type - MPG
Lube Interval -100 hours
Lube Amount - Until grease extrudes
Application -1 grease fitting

19. Hook Block Sheave.

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

20. Upper and Lower Boom Nose Sheave.

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

21. Adjustable Wear Pads.

Lube Type - MPG
Lube Interval -25 hours
Lube Amount - Thoroughly coat the area the wear pads move on
Application - By brush

22. Boom Section Wear Pads (Upper and Lower).

Lube Type - MPG
Lube Interval -25 hours
Lube Amount - Thoroughly coat the area the pad moves on
Application - By brush

23. Boom Pivot Shaft.

NOTE

When greasing the boom pivot shaft, better distribution of grease within the shaft is obtained if the weight of the boom is removed from the shaft.

Lube Type - MPG
Lube Interval -10 hours or daily
Lube Amount - Until grease extrudes

Application -2 grease fittings -1 each side on bushing

24. Hoist.

Lube Type - MPL
Lube Interval - Check every 250 hours
Lube Amount - Capacity 5 pints
Application - With the crane level, position the drum so one of the plugs is directly at the top. Remove the other plug from the drum. The oil should be level with the bottom of this plug.

25. Hydraulic Reservoir.

Lube Type - EO-1OW
Lube Interval - Check daily. Drain as necessary. Change the filter when the flag is red
Lube Amount - Capacity 40 gallons (51.4 L)
Application - Fill through the clean out port on the top of the reservoir. When drained, clean the magnetic pipe plug and suction strainers.

WIRE ROPE LUBRICATION.

Wire rope is lubricated during manufacturing so the strands, and individual wires in strands, may move and adjust as the rope moves and bends. A wire rope cannot be lubricated sufficiently during manufacture to last its entire life. Therefore, new lubricant must be added periodically throughout the life of a rope to replace factory lubricant which is used or lost.

The surface of some ropes may become covered with dirt, rock dust, or other material during their operation. This covering can prevent field applied lubricants from properly penetrating into the rope. Therefore, these ropes should be cleaned before being lubricated.

The lubricant applied should be light bodied enough to penetrate to the core of the rope. Lubricant may be applied effectively by various methods as shown in figure 6-2. It maybe dripped on, sprayed on, or put on by brushing, but in any case it should be applied at a place where the rope is being bent, such as at a sheave. It should be applied at the top of the bend, because at that point the strands are spread by bending and are more easily penetrated. The service life of rope will be directly proportional to the effectiveness of the method used and amount of lubricant reaching the working parts of the rope.

A proper lubricant must reduce friction, protect against corrosion, adhere to every wire and be pliable and not crack or separate when cold and yet not drip when warm.

Special lubricant can be applied at the factory to meet unusual conditions.

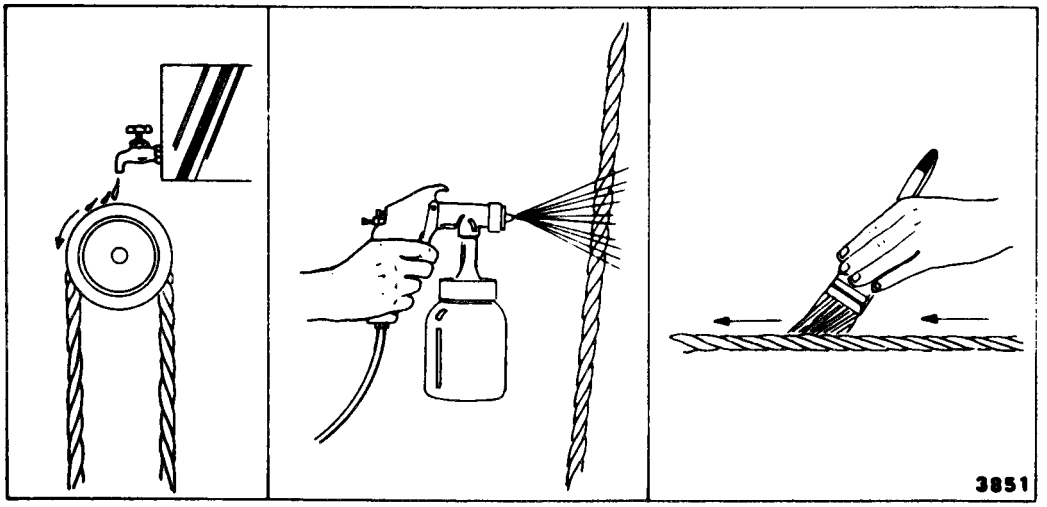


Figure 6-2. Wire Rope Lubrication

SECTION 7

OPERATOR/CREW
PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

GENERAL

Every mission begins and ends with the paperwork. There isn't much of it, but you have to keep it up. The forms and records you fill out have several uses. They are a permanent record of the services, repairs, and modifications made on your vehicle.
They are reports to organizational maintenance and to your commander. And they are a checklist for you when you want to know what is wrong with the vehicle after its last use, and whether those faults have been fixed. For the information you need on forms and records, see DA PAM 738-750.

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

1. Do your BEFORE (B) PREVENTIVE MAINTENANCE just before you operate the vehicle. Pay attention to the CAUTIONS and WARNINGS.

2. DURING (D) checks and services of PREVENTIVE MAINTENANCE will be performed while the equipment and/or its component systems are in operation. DURING (D) checks and services begin when the engine is started and continue until operation of the vehicle is terminated. Pay attention to the CAUTIONS and WARNINGS.

3. Do your AFTER (A) PREVENTIVE MAINTENANCE right after operating the vehicle. Pay attention to the CAUTIONS and WARNINGS.

4. Do your weekly (W) PREVENTIVE MAINTENANCE weekly.

5. Do your monthly (M) PREVENTIVE MAINTENANCE once a month.

6. If something doesn't work, troubleshoot it with the instructions in this manual or notify your supervisor.

7. Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

8. When you do your PREVENTIVE MAINTENANCE, take along a rag or two.

9. While performing PMCS observe caution notes and warning paragraphs preceding those operations which could endanger your safety or result in damage to the equipment.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in well ventilated area. Avoid contact with skin, eyes and clothes and don't breathe vapors. Do not use near open flame or excessive heat. If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with skin or clothing is made, flush with water. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

10. If anything looks wrong and you can't fix it, write it on your DA Form 2404. The number column is the source for the numbers used on the TM Number Column on DA Form 2404. If you find something seriously wrong, report it to organizational maintenance RIGHT NOW.

a. Keep it clean: Dirt, grease oil and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (P-D-680) to clean metal surfaces. Use soap and water when you clean rubber or plastic material.

b. Bolts, nuts and screws: Check that they are not loose, missing, bent or broken. You can't try them all with a tool, of course, but look for chipped paint, bare metal or rust around bolt heads. Tighten any that you find loose. Report it to organizational maintenance if you can't tighten it.

c. Welds: Look for loose or chipped paint, rust or gaps where parts are welded together. If you find a bad weld, report it to organizational maintenance.

d. Electric wires and connectors: Look for cracked or broken insulation, bare wires and loose or broken connectors. Report damaged or loose wiring to organizational maintenance.

e. Hoses and fluid lines: Look for wear, damage and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out report it to organizational maintenance (refer to Maintenance Allocation Chart).

11. It is necessary for you to know how fluid leaks affect the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them and REMEMBER - When in doubt, notify your supervisor.

LEAKAGE DEFINITIONS FOR OPERATOR/CREW PMCS

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 the 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, consideration must be given to the fluid capacity in the item/system being checked/inspected. When operating with Class I or 11 leaks, continue to check fluid levels as required on your PMCS. Class III leaks should be reported to your supervisor or Organizational Maintenance.

OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL					ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	W	M		
						All Preventive Maintenance Checks and Services (PMCS) listed are based on DA PAM 750-40, Reliability Centered Maintenance (RCM) Logic. Perform "Weekly" as well as "Before" PMCS if: a. You are the assigned operator but have not operated the equipment since the previous week. b. You are operating the equipment for the first time. GENERAL Assure that all daily/weekly lubrication requirements are performed on the SCAMP crane as directed in Section 6, LUBRICATION.	
1.	X					Perform a walk-around inspection of the vehicle checking for leaks and obvious damage that would require a more detailed inspection.	Class III leaks
2.	X					Levers, pins, linkage, etc not equipped with lubrication fittings should operate freely and be free of rust. When checking oil levels insure crane is on a level surface to obtain proper readings. ENGINE	
3.	X					a. Check crankcase oil for proper level. Maintain the oil level between the add and full marks on the dipstick at all times.	
	X					b. Check for oil leaks at the valve cover gasket.	Class III leaks
	X					c. Clean exterior of radiator of foreign materials.	

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OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL					ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	W	M		
						FUEL TANK & LINES	
4.	X					Check fuel lines at injectors, connections, pump and tank for fuel leaks.	Class III leaks.
						AIR CLEANER	
5.	X					a. Check for loose duct connections.	
		X				b. Visually monitor indicator gauge. If red flag appears, the air cleaner element requires servicing.	Red flag appears.
						HYDRAULIC RESERVOIR	
6.	X					a. Check and insure oil level is between "Add" and "Full" marks.	
	X					b. Inspect for hydraulic leaks at all connections	Class III leaks.
		X				c. Check hydraulic filter condition indicator at operating temperature and at governed RPM (2400).	White flag appears.
						LIGHTS AND SAFETY	
7.		X				Check all lighting, horn and switches for proper operation.	
						TRANSMISSION	
8.	X					Check and insure oil level is maintained between "Add" and "Full" marks.	
						TIRES	
9.	X					Inspect tires for severe cuts and obvious low pressure (Ref TM 9-2610-200-20, Chapter 2).	

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OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL					ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	W	M		
10.						INSTRUMENT PANEL	
		X				a. The following lights should illuminate when ingnition is switched to on	One or more lights inoperative
						(1) Emergency Service Brake System with pedal depressed.	
						(2) Two Block Warning in two block position.	
						(3) Rear Wheels Not Centered Indicator (when rear wheels are not centered).	
						(4) Low Oil Pressure/Hi Engine Temperature	
						NOTE Engine must be running at a normal operating temperature for the following checks:	
		X				b. Tachometer - needle moves when throttle is depressed.	
		X				c. Oil Pressure Gauge (Engine) - Minimum of 16 PSI at idle and 40-60 PSI at governed RPM.	Outside normal range
		X				d. Water Temperature Gauge - 180^{0} to 200^{0} during normal operation.	Outside normal range.
		X				e. Emergency Brake System Light - not lit during normal operation.	Indicator is lit.
		X				f. Rear Wheel Steer Light - Indicator is lit when rear wheels not centered.	Indicator is inoperative.

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B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL					ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	W	M		
11.						CONTROL LEVERS	
		X				Check Control levers for proper, smooth or noisy operation.	Controls fail to operate smoothly, properly or if controls operate unusually noisily.
12.						SAFETY AND LOCKING DEVICES	
		X				Check for proper operation of turntable locking device.	Turntable lock inoperative.
13.						BRAKES	
		X				Moving crane slowly forward, check for noise and stopping ability.	Noisy, grinding or no stopping ability.
						WARNING The cooling system is pressurized. Personal injury may result when removing the radiator cap after operating temperature is reached. If it becomes necessary to check coolant level during operation, use proper protection when removing the radiator cap.	
14.				X		RADIATOR Check for proper coolant level. Maintain coolant mixture to the full mark.	
15.						ALTERNATOR/STEERING BELTS	
	X					Check alternator belts for loose, broken, cracked or frayed condition. Belts should deflect approximately ½" at midspan.	Belt damaged or missing.

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B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL					ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	W	M		
	X					Check steering pump belt for loose, broken, cracked or frayed condition. Belt should deflect approximately 3/4" at midspan.	Belt damaged or missing.
						WARNING Batteries generated explosive gases. Keep sparks, flames or other ignition sources away at all times. Always shield eyes when working near batteries. If electrolyte is splashed on skin, flush with cool, clean water. If contact is made with eyes, flush with water and obtain medical attention promptly.	
						CAUTION In freezing weather, run engine for a minimum of one hour if water has been added to prevent freezing and damage to battery.	
16.						BATTERIES	
				X		a. Check the level of electrolyte. Maintain electrolyte level above plates with distilled water.	
				X		b. Check battery cables and connections for tightness and corrosion.	
				X		c. Check battery box for damage and corrosion.	
17.						UPPER STRUCTURE	
	X					a. Check hoist drum for loose connections, pinched, broken hydraulic lines and leaks.	Pinched, broken lines or Class III leaks.
	X					b. Check boom base for loose, missing or broken hardware.	Loose, missing or broken hardware.
	X					c. Inspect boom fly for bends, cracks, and loose or missing hardware.	Cracks, bends, loose or missing hardware.

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OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL					ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	W	M		
	X					d. Inspect wire rope, rope sockets and fittings for damage, wear, corrosion, fatigue and lubrication (Ref Oper. Handbook, Pg 6-11)	a. In running ropes, there are six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay. b. A loss of 1/3 of the original diameter of outside wires by abrasion, scrubbing or peening is found. c. There is rope deterioration from rust or corrosion. d. There is severe kinking or crushing or evidence or"birdcaging". e. Obvious reduction in wire rope diameter exists. f. There is evidence of heat damage from any cause. g. Four percent of total wire that make up one strand eg. 6X7 is unsafe with three broken wires in one strand. Ref: TM 5-725.

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OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

B - BEFORE D - DURING A - AFTER W - WEEKLY M - MONTHLY

ITEM NO	INTERVAL					ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
	B	D	A	W	M		
	X					e. Inspect anti two-block electrical wiring connections for loose or frayed wiring.	
	X					f. Inspect sheaves for cracks, wear and lubrication.	Cracks are detected.
	X					g. Inspect hook block for wear, cracks, deformation and damaged hook latch.	Cracks, damage or deformation are detected.
	X					h. Inspect hydraulic Cylinders (telescope/left) for leaks, loose connections and damaged hoses.	Class III leaks.
18.						FRAME	
	X					a. Inspect outrigger connections for leaks, cracks, and damaged hydraulic hoses.	Cracks or Class II or III leaks are detected.
				X		b. Check master brake cylinder for proper fluid level and for loose connections and leaks. Maintain fluid level with silicone brake fluid only.	Class III leaks.
				X		c. Check power steering pump for loose connections and damaged lines.	Class III leaks.
				X		d. Inspect frame for cracks and bends.	Cracks, broken or deformed frame.
						DRIVE TRAIN	
						a. Check drive shaft for cracks or loose or missing U-Joint bolts.	Cracks or missing U-Joint bolts.
						b. Check axle shaft for cracks, broken shaft, or loose or missing U-Joint bolts.	Cracks or missing U-Joint bolts

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 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

WEIGHTS

1 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

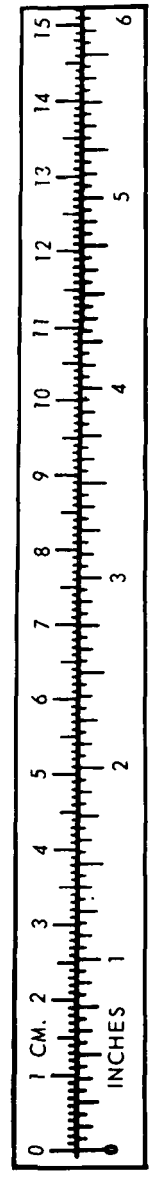
TEMPERATURE

$5/9\ (^0F - 32) = {}^0C$
212^0 Fahrenheit is equivalent to 100^0 Celsius
90^0 Fahrenheit is equivalent to 32.2^0 Celsius
32^0 Fahrenheit is equivalent to 0^0 Celsius
$9/5\ C^0 + 32 = F^0$

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
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	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
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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