 # 99903618

IMT Electric-Hydraulic Crane Operation & Safety Manual

(Models 3203i, 4004i, & 6006i)

20070212

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Contents

Revisions

DATE	LOCATION	DESCRIPTION
20050830		MODEL CHANGES TO 3203i, 4004i, AND 6006i

CHAPTER 1

Introduction

GENERAL

The information contained in this manual is designed to help provide you with the knowledge necessary in the safe and proper operation of your IMT crane. This information is not intended to replace any governmental regulations, safety codes or insurance carrier requirements. Operators, maintenance and test personnel must read and understand all safety procedures applicable to the equipment in use.

WARNING

FAILURE TO READ, UNDERSTAND AND FOLLOW ANY SAFETY PROCEDURES APPLICABLE TO YOUR EQUIPMENT MAY RESULT IN EQUIPMENT DAMAGE, SERIOUS INJURY, OR DEATH.

In addition to reading the manual, it is your responsibility to become familiar with government regulations, hazards, and the specific operation of your crane. Use caution and common sense while operating and maintaining the crane, and follow all safety procedures and regulations. Refer to ANSI/ASME B30.5, the standard for Telescoping and Mobile Boom Cranes, for more information on crane design and test criteria. (You may obtain this publication from the American Society of Mechanical Engineers at *www.asme.org*.) Crane operators must also be familiar with OSHA 29CFR, Subpart N, Article 1926.550 and CAL-OSHA Title 8, Article 93 (California).

CRANE AND SAFETY EQUIPMENT MODIFICATIONS

Modifications to your crane must be performed with IMT approved accessories, parts and optional equipment. If in doubt about the safety, compatibility, or appropriateness of any modifications, contact IMT prior to making those modifications. DO NOT alter or modify any safety device! All safety devices must be inspected, tested and maintained in proper working condition.

Decals regarding crane safety and operation are considered to be safety equipment. They must be maintained just as any other safety device. Decals must be kept clean and legible to the operator, operational personnel, and bystanders as specified in the decal section of this manual. DO NOT remove, disable, or disregard any safety device attached to your crane.

OWNER RESPONSIBILITIES

It is the user's responsibility to maintain and operate this unit in a manner that will result in the safest working conditions possible, and to be aware of existing Federal, State, and Local codes and regulations governing the safe use and maintenance of this unit.

The owner and/or designated employee is responsible for informing all operators, maintenance personnel, and others involved in equipment operation about the safe operation and maintenance of the crane. If questions arise concerning safe crane operation, contact IMT or your IMT distributor for clarification.

MANUAL STRUCTURE

Throughout this manual, three means are used to draw the attention of personnel. They are NOTEs, CAUTIONs and WARNINGs and are defined as follows:

NOTE

A NOTE is used to either convey additional information or to provide further emphasis for a previous point.

CAUTION

A CAUTION is used when there is the very strong possibility of damage to the equipment or premature equipment failure.

WARNING

A WARNING is used when there is the potential for personal injury or death.

WARRANTY

Warranty of this unit will be void on any part of the unit subjected to misuse due to overloading, abuse, lack of maintenance and unauthorized modifications. No warranty - verbal, written or implied - other than the official, published IMT new machinery and equipment warranty will be valid with this unit.

NOTICE TO THE OWNER / USER

If your equipment is involved in a property damage accident, contact your IMT distributor immediately and provide them with the details of the accident and the serial number of the equipment. If an accident involves personal injury, immediately notify your distributor and IMT's Technical Support at:

IOWA MOLD TOOLING CO., INC.
500 HWY 18 WEST
GARNER, IA 50438
641 - 923 - 3711

CHAPTER 2

Operation

In This Chapter

Safety

WARNING

KEEP CHILDREN, BY-STANDERS, AND PERSONS NOT REQUIRED IN THE OPERATION OF EQUIPMENT AT LEAST 10'-0" (3.05 m) FROM THE OUTERMOST RANGE OF THE CRANE.

CRANE OPERATION

- Before engaging the PTO, be sure the carrier vehicle's transmission is in neutral and the parking brake is applied.
- Stand clear of all moving outriggers.
- Know the position of the booms at all times while operating the crane.
- Eliminate swing by positioning the boom tip directly over the center of the load before lifting.
- Never drag a load.
- Check the safety of the load by first lifting the load barely off the ground.
- Stop all crane operation at a signal from anyone.
- When you rotate the crane, the load may change from being supported by the outriggers to the vehicle suspension. Be cautious as you rotate the crane, because the springs on the carrier vehicle will respond differently to the load than the tires will.
- Position the crane in its stowed position when not in use.

FIRE PRECAUTIONS

To avoid fires,

- Use safety-type portable gasoline containers equipped with an automatic closing cap and flame arrester.
- DO NOT refuel while the vehicle engine is running.
- DO NOT smoke in a refueling area.
- Install in the vehicle cab a portable fire extinguisher with a basic minimum extinguisher rating of 10 BC *and know how to use the fire extinguisher.*

READ THE ENTIRE MANUAL BEFORE OPERATING THE CRANE.

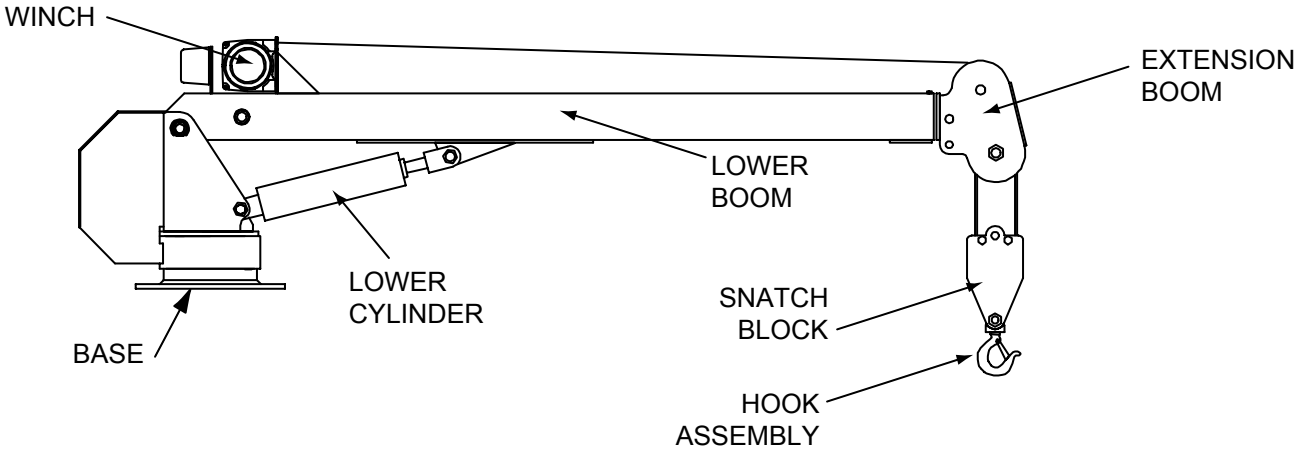
Use this manual for reference and for training operators. This manual covers the basics of safe and correct operation of your crane. However, success and safety depends greatly upon the skill and caution of the person actually doing the work. Persons engaging in these procedures do so entirely at their own risk.

Your new IMT crane includes the following safety features:

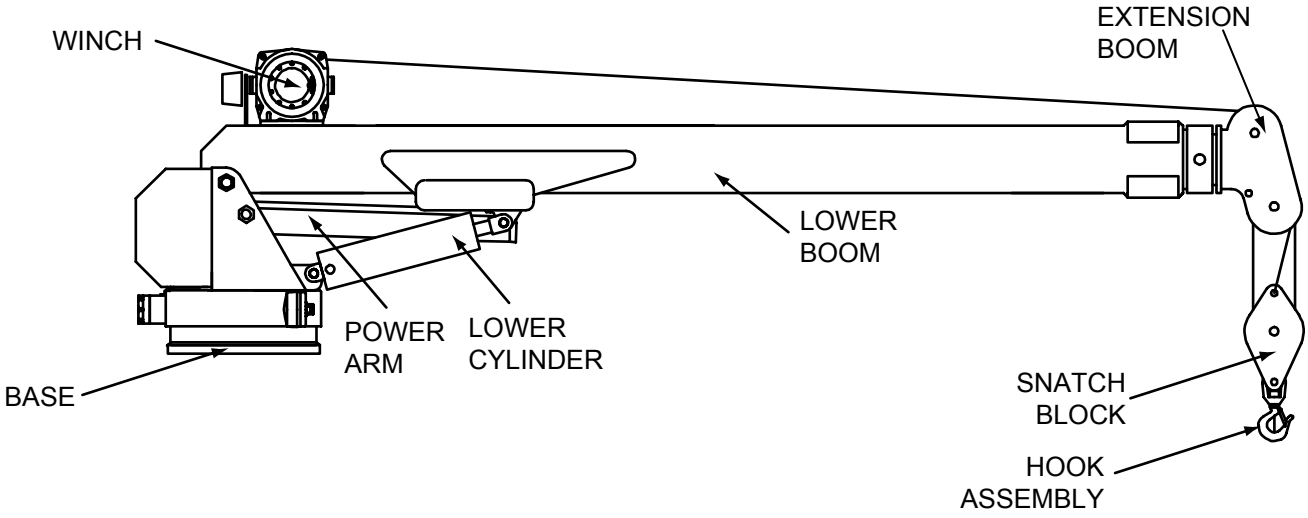
- Automatic Overload Protection (OLP) system which senses an overload and prevents winch up, boom extension and boom down functions.
- Load holding valves in the hydraulic cylinders which prevent the load from dropping in case of hydraulic hose failure.
- Manual reset circuit breaker which prevents over current damage to the electric motors and contactors.
- Arc–suppression circuits in the control module and power cable which minimize contact arcing and extend the life of switches and contactors.
- Anti-Two-Block (A2B) on all cranes with power extension, which stops the boom extension and/or the winch up functions before contact is made between the block assembly and the boom.

Crane Component Identification

IMT electric-hydraulic cranes are designed to lift a variety of materials. These cranes are typically mounted on a vehicle chassis, but they can have stationary mounts. Instructions on how to operate the crane may refer to various crane components. Use the crane layout to help you identify the appropriate crane components.



Model 6006i has a power arm to help lift larger loads.



General

To operate this crane, you must conform to physical and behavioral requirements and must have certain abilities as defined by ANSI B30.22 chapter 22-3 and the Occupational Safety and Health Administration (OSHA). There may be additional operator requirements defined by local, state or federal regulations in your area. Make sure you are following all regulations regarding crane operation.

Prior to beginning work at a job site, you should understand:

Crane Safety

Crane Controls

Crane Load Limits

Operating Procedures

You should have the chance to practice operating the crane prior to using the crane in a job site application.

The operator must understand what to do in case of emergency, and be prepared to take emergency action at any time. Safe operation is the responsibility of the operator, maintenance and inspection personnel. Safety has been a major consideration in the design and manufacture of this equipment, but only the operator and maintenance personnel can insure a safe work environment.

Daily Safety Inspection

Using the Crane Log, IMT Manual No. 99900686, or the inspection checklist in the reference section of this manual, inspect the crane on a daily, weekly, and monthly basis. Use the following list as a guide when you are inspecting your unit at start-up and during operation:

1 Vehicle - Check oil level, battery, lights, brakes, and tires for inflation, pressure, cuts, and loose or missing wheel lugs.

2 Safety Accessories - Check for proper function, oil levels, leaks and malfunctions.

3 Hydraulic Oil Reservoir - Check for proper oil level, leaks and blockages.

4 Weldments - Check visually for damage, especially cracks or breaks in welds.

5 Cylinders - Check for leakage and scored rods.

6 Fasteners - Check pins, sheaves, nuts and bolts for breakage, excessive wear and tightness.

7 Crane Hooks - Check for the presence of a safety catch, twists, cracks, or damage.

8 Covers and Guards - Check for missing or improperly maintained covers and guards.

9 Remote Control - Check engine stop switch for function and corrosion.

10 Operation Placards and Safety Decals - Check for illegible or missing decals and placards. Refer to the decal section of this manual for more information on the required decals.

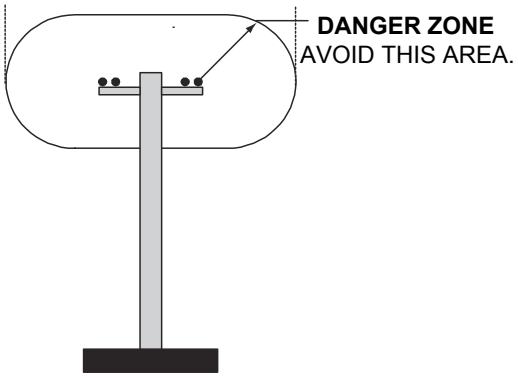
Replace or repair any items as needed prior to equipment operation.

Electrical Hazards

Always operate the crane so that no part of the crane or load enters the "Danger Zone", the minimum clearance distance for a powerline.

NOTE

THE DANGER ZONE OF A PARTICULAR POWERLINE IS BASED UPON ITS VOLTAGE. HIGH VOLTAGE LEVELS INCREASE THE DANGER ZONE. SEE FIGURE.



DANGER ZONE FOR CRANES OPERATING NEAR ELECTRICAL POWERLINES

REQUIRED CLEARANCE OF CRANES FROM ELECTRICAL TRANSMISSION LINES

	NORMAL VOLTAGE kV (Phase to Phase)	MINIMUM CLEARANCE REQUIRED Feet (meters)
OPERATION NEAR HIGH VOLTAGE POWERLINES	From 0 to 50	10 (3.05)
	From 50 to 200	15 (4.60)
	From 200 to 350	20 (6.10)
	From 350 to 500	25 (7.62)
	From 500 to 750	35 (10.67)
	From 750 to 1000	45 (13.72)
OPERATION IN TRANSIT WITH NO LOAD AND BOOM OR MAST LOWERED	From 0 to 0.75	4 (0.22)
	From 0.75 to 50	6 (0.83)
	From 50 to 345	10 (3.05)
	From 345 to 750	16 (4.87)
	From 750 to 1000	20 (8.10)

For maximum safety during work near powerlines, adhere to the following guidelines:

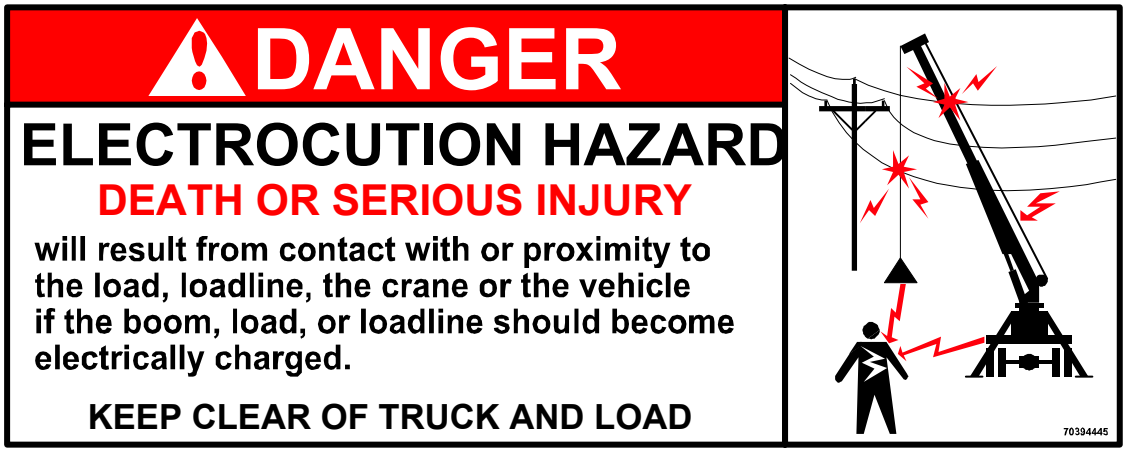
- During windy conditions, allow additional clearance.
- Do not rely on cage-type boom guards, insulating links, or proximity warning devices for safety. Adhere to the required distances listed in table titled *REQUIRED CLEARANCE OF CRANES FROM ELECTRICAL TRANSMISSION LINES*.
- Contact the utility company before beginning work near powerlines.
- Always assume overhead lines to be energized.
- Avoid transporting a crane over uneven terrain.
- When using rope to steady a load or restrain spinning of the load, be aware that rope will also conduct electricity, especially if wet or damp.
- Reduce operating speed when in close proximity to powerlines in order to allow the operator more reaction time.

IF ELECTRICAL CONTACT OCCURS:

1. Shut off all power.
2. Break contact of any person in contact with a live conductor by using rubber hose, dry rope, or dry wood. DO NOT attempt this unless you are certain that all power is off.
3. Call 911 or the local emergency service.
4. Administer first aid.
5. Avoid the area around the crane, as high voltage travelling through a crane will charge the ground.

ELECTRICAL CONTACT FOLLOW-UP:

1. Inspect and repair any equipment affected by electrical contact.
2. Replace any wire rope which has had high voltage contact.



Crane Capacity

The IMT crane is designed to lift specific loads. These loads are defined on the capacity placard mounted near the operator's station and on the crane. Exceeding the limits presented on the capacity placard will create severe safety hazards and will shorten the life of the crane. The operator and other concerned personnel must know the load capacity of the crane and the weight of the load being lifted!

WARNING

NEVER EXCEED THE CRANE'S RATED LOAD CAPACITIES. DOING SO WILL CAUSE STRUCTURAL DAMAGE AND DAMAGE TO WINCHES AND CABLES WHICH CAN LEAD TO DEATH OR SERIOUS INJURY.

NOTE

LOAD LIMIT INFORMATION ON THE CAPACITY PLACARD IS FORMULATED ON 85% OF TIPPING. TIPPING REFERS TO THE CRANE ACTUALLY TIPPING WITH ITS OPPOSITE OUTRIGGER AND TIRES HAVING BROKEN CONTACT WITH THE SURFACE.

Prior to lifting a load:

1 Determine the weight of the load.

2 Determine the weight of any load handling devices.

3 Add the weight of the load and the weight of the load handling devices. The sum is the total weight of the load being lifted.

4 Determine the distance from the centerline of crane rotation to the centerline of the load being lifted.

5 Determine the distance from the centerline of crane rotation to the centerline of where the load is to be moved to.

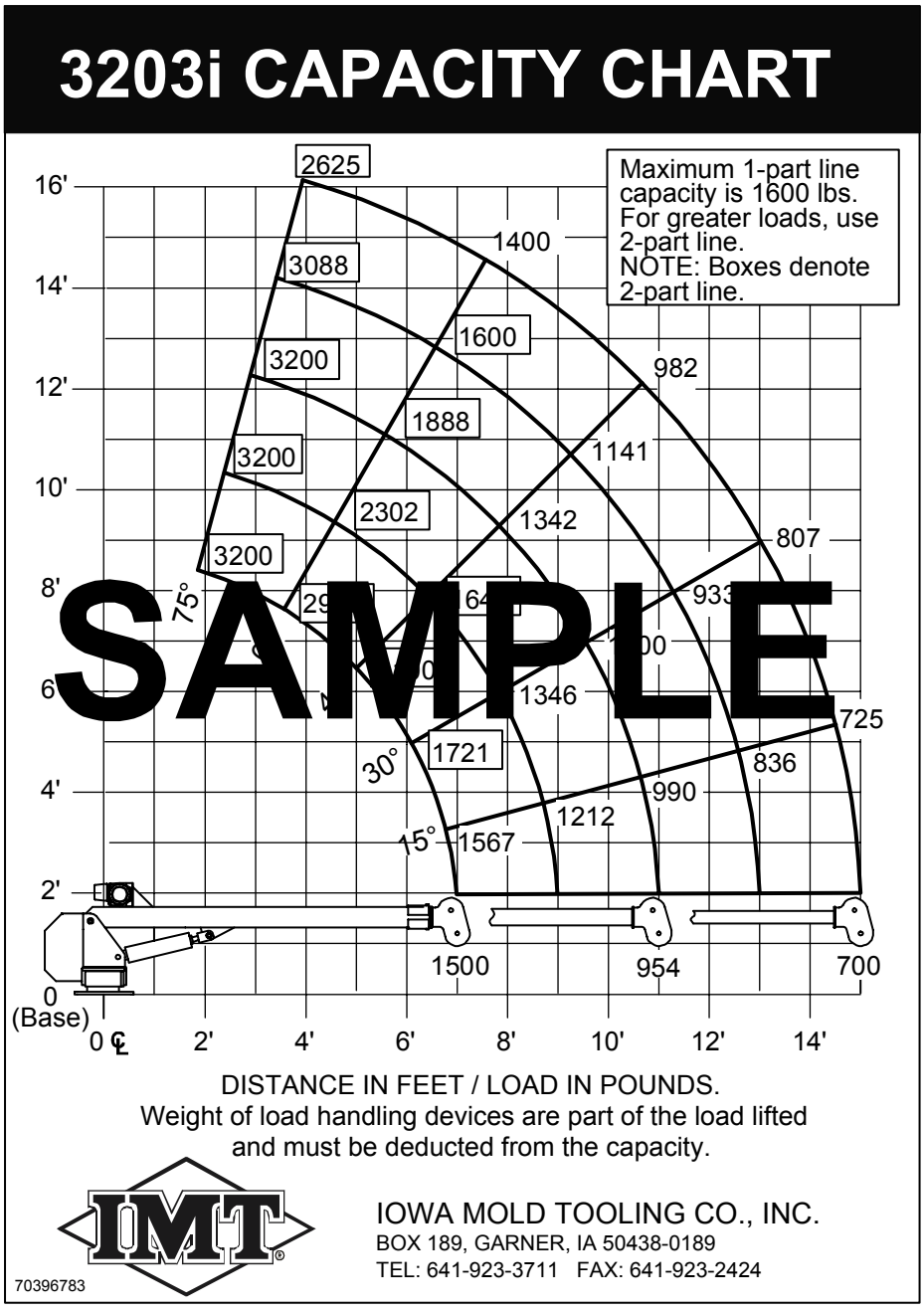
6 The actual distance used should be figured as the larger of items 4 and 5 above.

Load Ratings

The maximum load chart is a representation of the MAXIMUM loads for which your crane is rated. The Overload Protection System prevents loads significantly over these ratings. The actual load rating for your installation will be determined by other factors. Remember that just because the load chart says a given load is possible, that load may not be possible under some configurations without tipping the truck. Conduct a load stability test in accordance with Crane Load–Stability Test Code, Society of Automotive Engineers (SAE) J765, to determine the actual loading capacities for a given installation. Contact the factory for more information.

All crane functions are hydraulic except the hoist, which is electric. The hydraulic functions can be actuated simultaneously, but when the crane is loaded it is best to actuate one function at a time. Simultaneous actuation of two or more functions will momentarily result in a lower than rated load capacity.

Capacity Chart



Outriggers

An outrigger (part # 32000513) or stiffening leg is recommended for stabilizing the truck. It should be deployed before lifting any load. The outrigger extends three feet out to the side of the truck on the crane side, and has the ability to level the truck bed before lifting. Always level the truck bed to within 1% grade before lifting the load. Refer to SAEJ765 “Crane Load–Stability Test Code” procedures for determining crane load stability.

CAUTION

AVOID EQUIPMENT DAMAGE! NEVER LIFT A LOAD WITHOUT DEPLOYING OUTRIGGERS.

Prior to beginning a lift, fully deploy outriggers and lock them into position. If blocking is necessary, it should be strong enough to prevent crushing and of sufficient area and thickness to completely support the stabilizer pad.

Initial Operation

Before operating your crane for the first time, check the hydraulic oil level. The proper oil level is 1 to 1–1/2” below the top of the fill hole. Install the breather cap which is supplied with your crane. Before lifting a load, check the crane for proper function. If a problem is found, refer to the troubleshooting section in this manual. Rotate the crane a full circle and back to check for proper clearance.

Crane Operation

Size of Load

1. Do not load the crane beyond the specifications of the load rating chart, except for test purposes.
2. Be sure the load to be lifted is within the rated capacity of the crane in its existing configuration.
3. When loads that are not accurately known are to be lifted, make sure the weight of the load does not exceed the crane rating at the maximum radius at which the load is to be handled.

Operational Aids

1. The use of operational aids such as overload prevention or two–block prevention does not replace the need to comply with size of load requirements.

2 If operational aids are inoperative or malfunctioning, do not use the crane to lift any loads.

Warning Sign

If there is a warning sign on the crane controls, do not operate the crane until the warning sign has been removed by an appointed person.

Attaching the Load

1 Do not wrap the hoist rope around the load.

2 Attach the load to the hook using slings or other devices of sufficient capacity.

Holding the Load

1 Test crane controls at the start of a new shift. If any controls fail to operate properly, they must be adjusted or repaired before operations are begun.

2 Do not leave the controls while the load is suspended.

3 Do not allow anyone to stand or pass under a suspended load.

Moving the Load

1 Make sure:

a) The crane is level and blocked, where necessary.

b) The load is well secured and balanced in the sling or lifting device before it is lifted more than a few inches.

c) The lift and swing path is clear of obstructions.

2 Before starting the lift, make sure:

a) The hoist rope is not kinked.

b) Multiple–part lines are not twisted around each other.

c) The hook is secured to the load in such a manner as to minimize swinging.

d) In case of a slack rope condition, the rope must be seated on the drum and in the sheaves as the slack is removed.

e) The effect of ambient wind on the load and on crane stability is taken into consideration.

3 During the lifting operations, make sure:

a) There is no sudden acceleration or deceleration of the moving load.

b) The load, boom or other parts of the machine do not contact any obstruction.

4 Limit boom side loading to freely suspended loads. The crane must not be used for dragging loads sideways.

5 Do not move loads over people.

6 Keep more than five full wraps of rope on the winch drum.

7 While in transit, take the following additional precautions:

a) Position the crane boom in line with the direction of motion of the truck.

b) Lash or restrain the empty hook so that it cannot swing freely.

c) Do not leave loads suspended from the hook.

8 When rotating the crane, avoid sudden starts and stops. When reversing rotation direction, pause to allow load swing to subside before rotating in the opposite direction.

9 Do not use this crane for transporting or lifting personnel.

Power Failure

If power fails during operations:

1 Move all controls to the off or neutral position.

2 Land the suspended load, if practical.

Post Operation

Before leaving the crane unattended:

1 Land any load, bucket, lifting magnet or other device.

2 Put controls in the off or neutral position.

3 Disconnect and stow the control pendant.

The operator must be familiar with the equipment and its proper care. If adjustments or repairs are necessary, the operator shall promptly report this to the appointed person and shall also notify the next operator.

Overload Protection System

The crane is equipped with a system that, when activated by excess moment load, locks out the hoist up, boom extend, and boom down functions. An overload condition is sensed as excess pressure in the boom up hydraulic cylinder.

CAUTION

DO NOT HOIST OR EXTEND A LOAD WITH THE BOOM IN THE FULL DOWN POSITION.

To make sure that the overload protection system works properly, always raise the boom up off the bottom of the cylinder before hoisting or extending the load. Failure to do this may result in a crane overload condition with serious consequences. When the crane goes into overload mode, the operator should relieve the overload by lowering the hoist or retracting the boom. The best system for preventing overload is a well-trained, cautious crane operator. The overload protection system should not be viewed as a substitute for sensible safety precautions, but rather a backup system in case of operator error. Remember, when the overload system is triggered, the crane is OVERLOADED. The pressure setting of the overload protection system is factory set and should not be tampered with. If the operator is in doubt as to whether the overload protection system is working properly, he should contact his supervisor immediately.

Anti-Two-Block System

If your crane is equipped with power extension, it has a switch which stops the boom extension, hoist up and boom down functions. This switch is connected to a hanging weight at the crown block of the boom. It is activated before the traveling block can come in contact with the boom crown. This system is designed to be failsafe in that if any of the components should fail or become disconnected, the target functions will not work until it is replaced, repaired or reconnected. If the operator is in doubt as to whether the anti-two-block system is working properly, he should contact his supervisor immediately.

Operation in Adverse Conditions

Operating your crane in adverse weather conditions can affect the crane performance. Please note the following operation procedures for adverse weather conditions.

1 Dusty and Sandy Areas - Operating in dusty or sandy areas presents special problems due to the abrasive action of dust which shortens the life of parts. Make every effort to keep dust and sand out of the moving parts of the crane machinery and engine. Keep lubricants clean, and lubrication and fluid fill areas capped tightly.

2 High Humidity and Salt Air - Moisture and salt will cause deterioration of paint, cables, wiring and all exposed metallic parts. Keep parts dry and well lubricated in high humidity or salt air conditions. Keep parts thoroughly lubricated, and remove rust and corrosion if and when it appears.

3 High Altitudes - Operation at high altitudes presents special problems due to lower atmospheric pressure and wide temperature ranges. Consult the vehicle owner's manual regarding operating the vehicle at high altitudes.

Cold Weather

For cold weather operation with temperatures of -25º F or lower, the following procedures must be followed:

1 Start the truck and run at manufacturer's recommended idle speed for proper warm up.

2 After approximately 45 minutes of truck warm up time, engage the PTO.

3 With the PTO fully engaged and the truck engine running at idle speed, let the hydraulic system oil circulate.

CAUTION

DURING THE 45 MINUTES ALLOWED FOR WARM UP, DO NOT RACE TRUCK ENGINE AND OVER SPEED HYDRAULIC PUMPS. PUMP CAVITATION, WITH PERMANENT DAMAGE, MAY RESULT.

If at any time during oil circulation, and especially during the initial warm up time, any hydraulic pump noise such as metal grinding, or a popping noise is heard, shut down the unit immediately. Check that the hydraulic oil line leading to the suction port on the pump is not clogged, or that the hydraulic oil itself has not jelled.

CAUTION

FOR CRANE OPERATION IN TEMPERATURES BELOW -25º F, HYDRAULIC OIL CONFORMING TO MIL-L-46167 MUST BE USED IN THE CRANE HYDRAULIC SYSTEM.

CAUTION

FOR WINCH OPERATION IN TEMPERATURES BELOW -25º F, THE LUBRICATION OIL IN A WINCH GEARBOX MUST BE CHANGED TO LUBRICATING OIL CONFORMING TO MIL-L-2105C, GRADE 75W (GO-75).

After the 45 minute warm up period, begin crane operation as follows:

a) Slowly extend outriggers approximately 6 inches and retract, extend out again approximately half way and retract, and then extend fully.

b) Follow the procedure above on crane deployment, and extend cylinders.

c) When completed, begin crane swing operation by rotating slowly approximately one eighth revolution one way, return to previous position and rotate in opposite direction. Do this several times, then rotate 90º and return.

CAUTION

ENGAGE VALVES SLOWLY DURING WARM UP CYCLE TO PREVENT SUDDEN HYDRAULIC SPIKES WHICH WILL DAMAGE HYDRAULIC COMPONENTS.

NOTE

IT IS NORMAL FOR SOME OIL SEEPAGE TO OCCUR AROUND PISTON ROD SEALS DURING THE WARM-UP OPERATION. SEEPAGE SHOULD CEASE WHEN HYDRAULIC SYSTEM HAS REACHED OPERATING TEMPERATURE.

Hand Signals

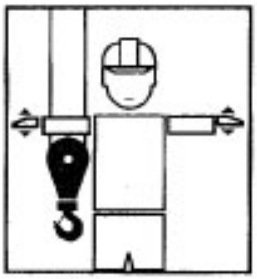
Hand signals can be used to communicate between crane operators and assistants when the job site noise level is too high to communicate in other ways.

Signals to the operator shall follow ASME B30.5 standards, unless voice communication is utilized. Signals shall be discernible or audible at all times. No response by the operator is to be made unless the signal is clearly understood.

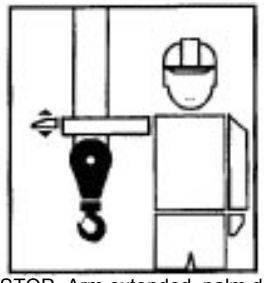
For operations not covered by the ASME hand signals, additions to or modifications may be made. These special signals must be agreed upon by the operator and signal person before the crane is operated.

If verbal instructions are required rather than hand signals, all crane motions must be stopped before doing so. Figure includes an illustration of the hand signal, the operation associated with the signal, and a description of the signal. The operator and signal person must review these signals and agree to their use before implementation. For complete hand signal information, refer to ASME/ANSI B30.5 - Mobile and Locomotive Cranes, published by the American Society of Mechanical Engineers.

The hand signals presented by The American Society of Mechanical Engineers have been accepted by the Occupational Safety and Health Administration (OSHA).



EMERGENCY STOP- Both arms extended, palms down, move arms back and forth horizontally.

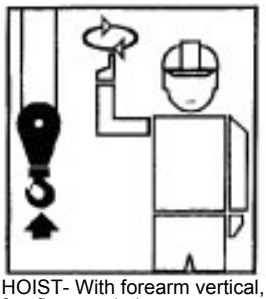


STOP- Arm extended, palm down, move arm back and forth horizontally.

MOVE SLOWLY- One hand gives any motion signal; place other hand motionless in front of that hand. (Hoist slowly shown.)

USE MAIN HOIST- Tap fist on head; then use regular signals.

EXTEND BOOM- (Telescoping Booms) One Hand Signal. One fist in front of chest with thumb tapping chest.

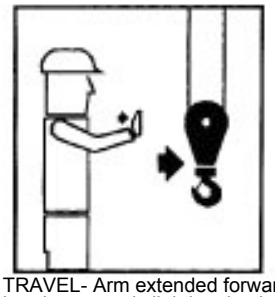


HOIST- With forearm vertical, forefinger pointing up, move hand in small horizontal circles.

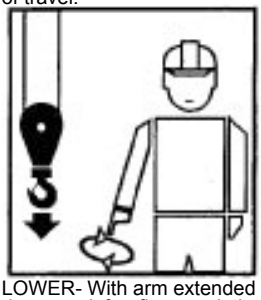
SWING - Arm extended, point with finger in direction of boom swing.

EXTEND BOOM- (Telescoping Booms) Both fists in front of body with thumb pointing outward.

USE WHIPLINE- (Auxiliary Hoist) - Tap elbow with one hand; then use regular signals.



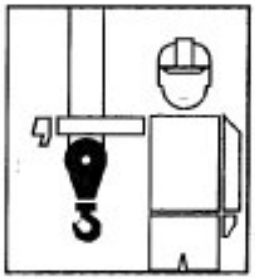
TRAVEL- Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



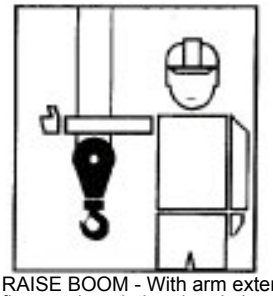
LOWER- With arm extended downward, forefinger pointing down, move hand in small horizontal circle.

RETRACT BOOM- (Telescoping Booms) Both fists in front of body with thumbs pointing inward.

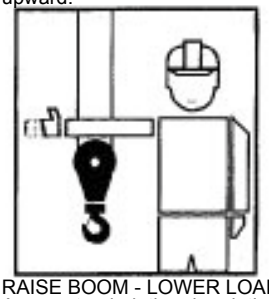
LOWER BOOM - RAISE LOAD Arm extended, thumb pointing down, flex fingers in and out until desired movement is completed.



LOWER BOOM - With arm extended, fingers closed, thumb pointing downward.



RAISE BOOM - With arm extended, fingers closed, thumb pointing upward.



RAISE BOOM - LOWER LOAD Arms extended, thumb pointing up flex fingers in and out until desired movement is completed.

DOG EVERYTHING - Clasp hands in front of body.

RETRACT BOOM - (Telescopic Booms) - One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.