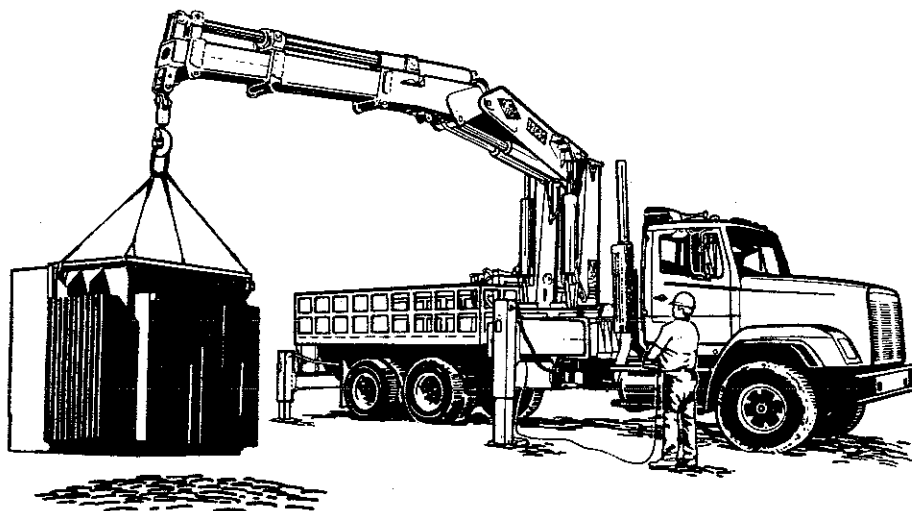
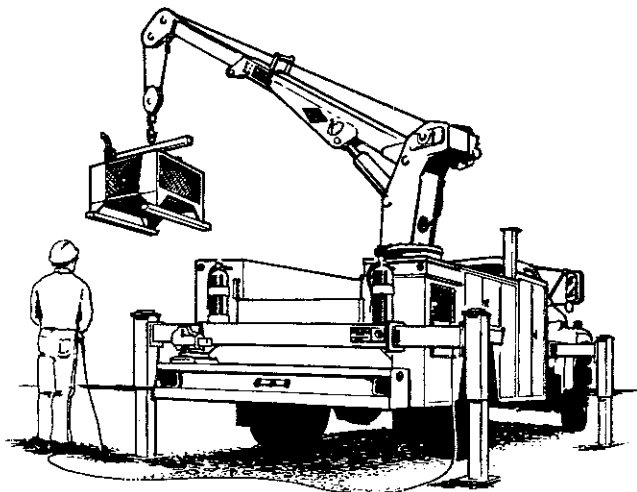




Operator's Crane Safety Manual

7-14-93



IOWA MOLD TOOLING CO., INC.

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MANUAL PART NUMBER 99900313

REVISED
08-04-92
09-21-92
07-14-93

INTRODUCTION

This Crane Safety Manual is intended as a basic source of information on the safe operation of your crane. It provides general information as well as specific information on IMT cranes and their operation as concerns safety. It is not intended as an all encompassing "rule-book" on crane safety. IMT presents this information as a reference and guide only. It is your responsibility to identify specific safety hazards and determine proper procedures to prevent those hazards from inflicting injury.

We at IMT believe that safety is paramount in the operation of its equipment. Please furnish a copy of this manual to all persons involved in the operation and maintenance of your IMT crane. IMT grants you, the purchaser, the right to reproduce this document for that purpose and to further the education in safe operation and maintenance.

Copies of this manual are also available from IMT and its distributors at a nominal price. Please contact your distributor or IMT for additional copies.

NOTICE TO THE OWNER / USER

If your crane 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 crane. If an accident involves personal injury, immediately notify your distributor and IMT's Safety Director at:

IOWA MOLD TOOLING CO., INC.
500 HWY 18 WEST, GARNER, IA 50438
515 - 923 - 3711

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Section 1. GENERAL INFORMATION

GENERAL

The information contained in this Safety Manual is to help provide you with the knowledge necessary in the safe and proper operation of your crane. This information is not intended to replace any governmental regulations, safety codes or requirements of insurance carriers. 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.

Familiarization with this Safety Manual, government regulations, hazards and the specific operations of your crane is a necessity. The operation and maintenance of your crane must be done with caution, while following all safety procedures and applicable regulations. Common sense is essential to a safe work environment.

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 before those modifications are made. DO NOT make any alterations or modifications to any safety device, whether electrical, hydraulic or mechanical in nature. All safety devices must be inspected, tested and maintained in proper working condition.

Decals instructing the safe use and operation of your crane are considered safety equipment and must be maintained as would

any other safety device. Decals must be kept clean and legible to the operator, operational personnel and by-standers as specified in the decal section of this manual. DO NOT remove, disable or disregard any safety device attached to your crane.

The owner and/or designated employee is responsible to inform all operators, maintenance personnel and others involved in the operation of your equipment, in the safe operation and maintenance of your equipment.

If any questions concerning safe operation or maintenance arise, please contact IMT or your IMT distributor for clarification.

WARNING

CHILDREN, BY-STANDERS AND PERSONS NOT REQUIRED IN THE OPERATION OF EQUIPMENT MUST BE KEPT AT A SAFE DISTANCE FROM THAT EQUIPMENT. A DISTANCE OF 10'-0" (3.05m) FROM THE OUTERMOST RANGE OF THE CRANE AND ITS LOAD IS AN ABSOLUTE MINIMUM.

Much of the material contained in this manual is specific to IMT cranes. Much of the general crane safety information is as presented by The American Society of Mechanical Engineers' latest revisions of Mobile and Locomotive Cranes (ASME/ANSI B30.5) and Articulating Boom Cranes (ASME/ANSI B30.22), industry safety standards. These publications are available from The American Society of Mechanical Engineers, 345 East 47th St., New York, NY 10017.

Crane operators must be familiar with OSHA 29CFR, Subpart N, Article 1926.550 and CAL-OSHA Title 8, Article 93 (California).

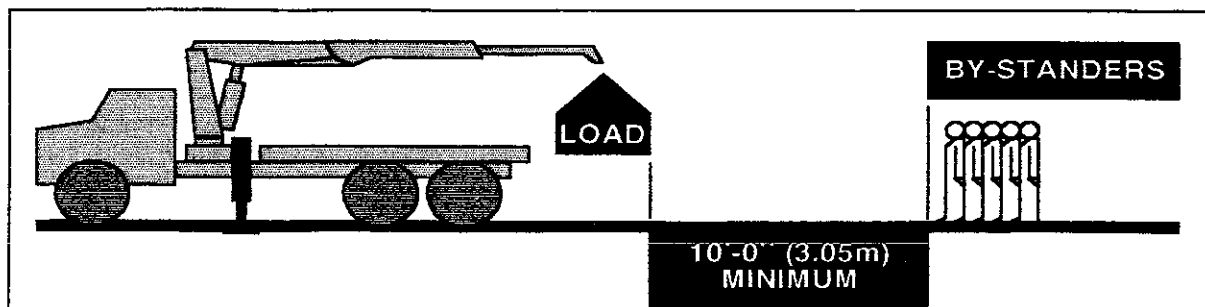


Figure A-1. By-Stander Clearance

CRANE SAFETY MANUAL

This manual is divided into specific sections in order to keep similar subject matter under one heading. There will however be instances when a particular subject may be presented in more than one section of the manual. This redundancy is necessary in providing comprehensive information.

This manual will also be subject to revisions and additions. As new or revised information is released, new pages will be available which will be identified in the upper-right-hand corner by a revision number and date. Any new pages released should be inserted into your manual in place of "old pages". See Figure A-2 and A-3 for page information.

New sections may also be provided. When received, they should be inserted into your manual in its proper numerical sequence.

Three means are used throughout this manual to gain your attention. 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 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.

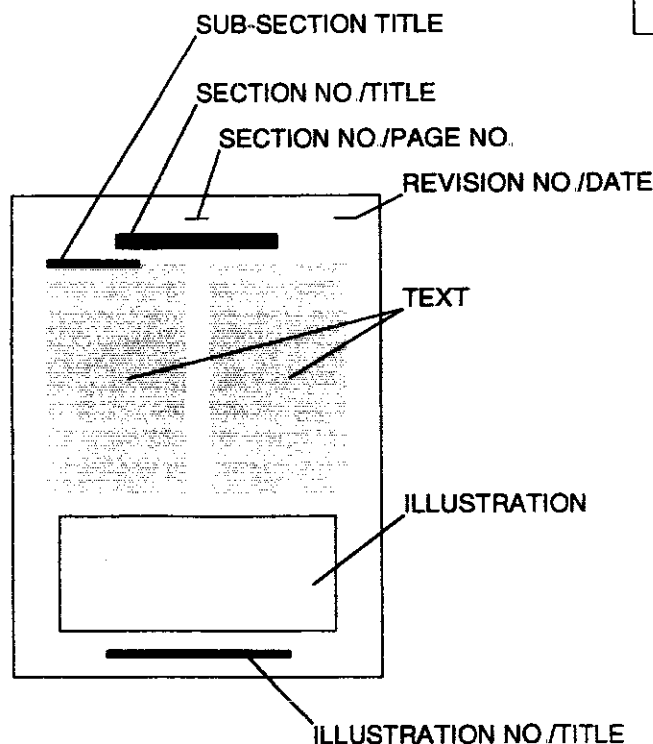


Figure A-2. Typical Page Description

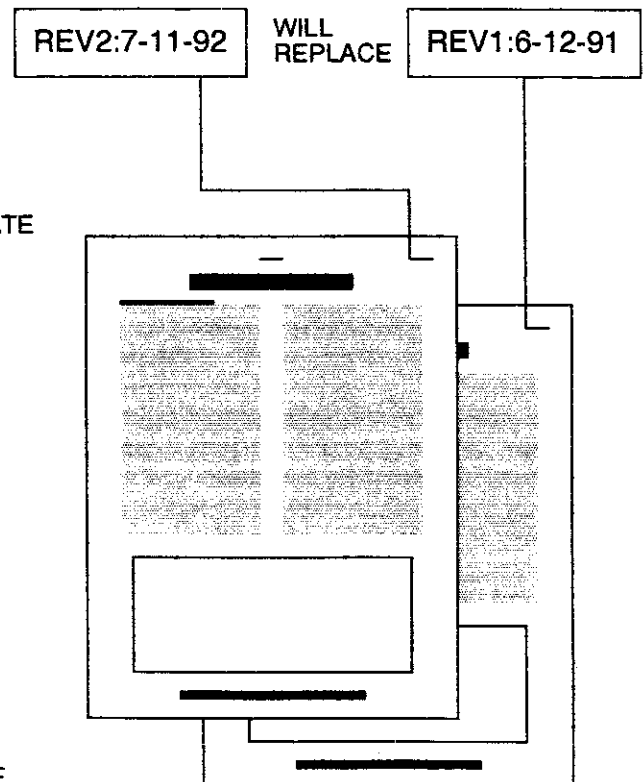


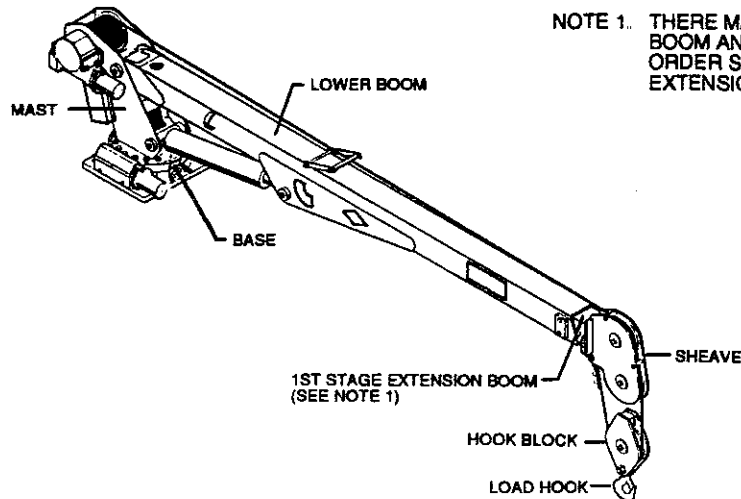
Figure A3. Revised Page

Section 2. CRANE COMPONENT IDENTIFICATION

COMPONENT IDENTIFICATION

Know the components of your crane. Doing so will aid in the communication of problems to maintenance personnel as well as provide immediate reference during an emergency situation.

Refer to the illustrations provided in this section. Determine the type of crane specific to your operation and study the illustrations of main assemblies and hydraulic components. This reference is to IMT cranes specifically and should not be considered universal. There are variances between different crane models and the illustrations should be used as reference and compared to the actual equipment in use.



NOTE 1. THERE MAY BE MORE THAN ONE EXTENSION BOOM AND THEY WILL BE IN NUMERICAL ORDER SUCH AS 2ND STAGE OR 3RD STAGE EXTENSION BOOMS.

Figure B-1. Telescoping Crane - Major Assemblies

NOTE 1. ROTATION SYSTEMS WILL VARY DEPENDING ON THE CRANE MODEL. WORM GEAR SYSTEM IS SHOWN

NOTE 2. EXTENSION BOOM CYLINDERS MAY BE INTERNALLY MOUNTED OR EXTERNALLY MOUNTED, DEPENDING ON THE CRANE MODEL.

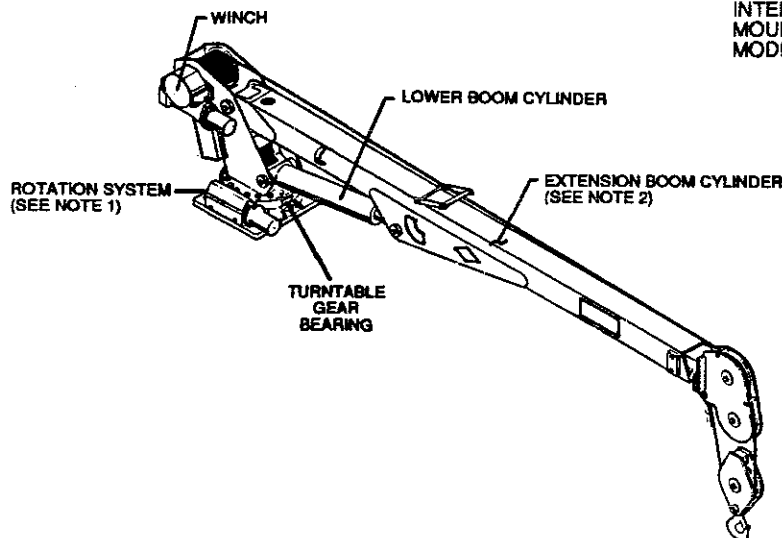


Figure B-2. Telescoping Crane - Hydraulic Components

NOTE 1. OUTRIGGER DESIGN MAY VARY DEPENDING ON THE CRANE MODEL.

NOTE 2. EXTENSION BOOMS MAY NUMBER MORE THAN 3 AND WILL BE IN NUMERICAL ORDER SUCH AS 4TH, 5TH AND 6TH STAGE EXTENSION BOOMS.

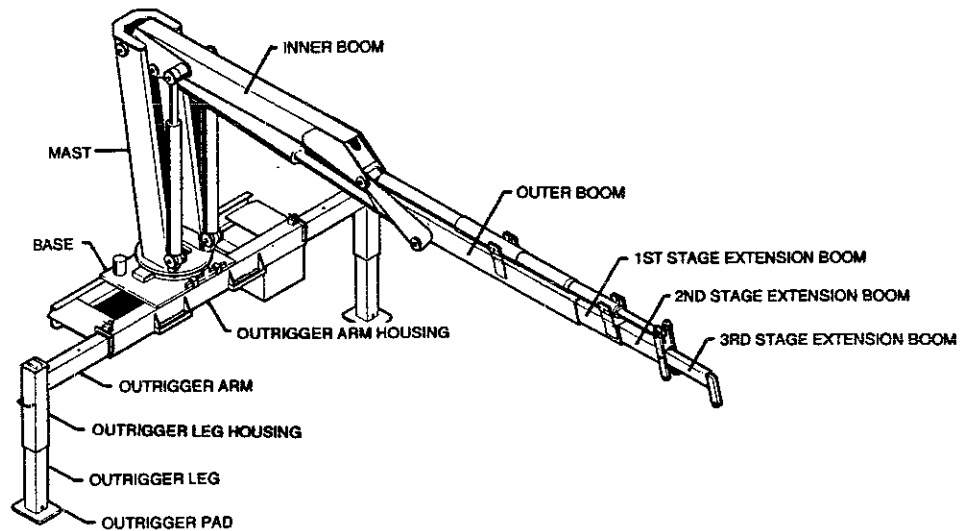


Figure B-3. Articulating Crane - Major Assemblies

NOTE 1. CYLINDER MAY BE INTERNALLY OR EXTERNALLY MOUNTED DEPENDING ON THE CRANE MODEL.

NOTE 2. "FIGURE-4 FOLDING" ARTICULATING CRANES UTILIZE TWO INNER BOOM CYLINDERS WHILE MOST ARTICULATING CRANES USE ONE INNER BOOM CYLINDER.

NOTE 3. HYDRAULIC CONTROLS ARE NORMALLY PRESENT ON BOTH SIDES OF CRANE BASE. REMOTE CONTROLS MAY ALSO BE USED.

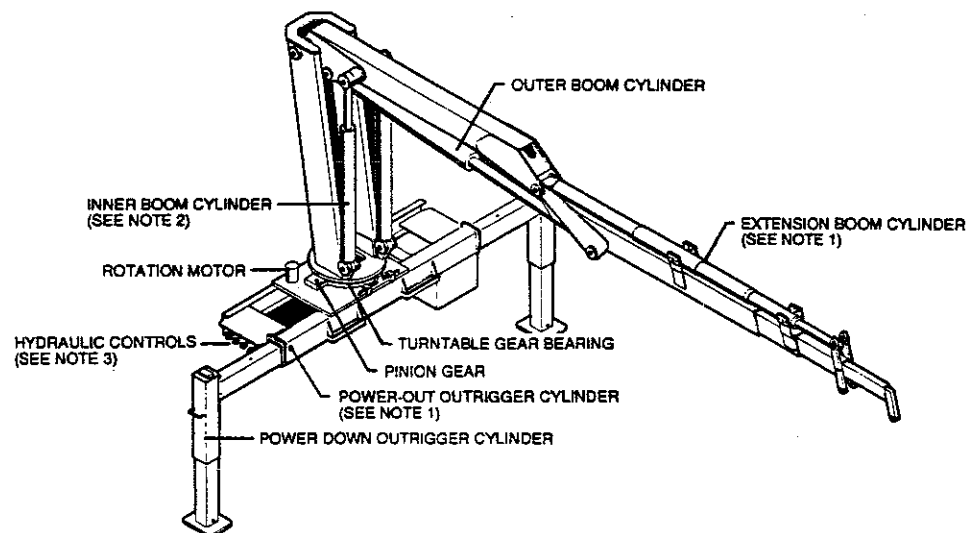
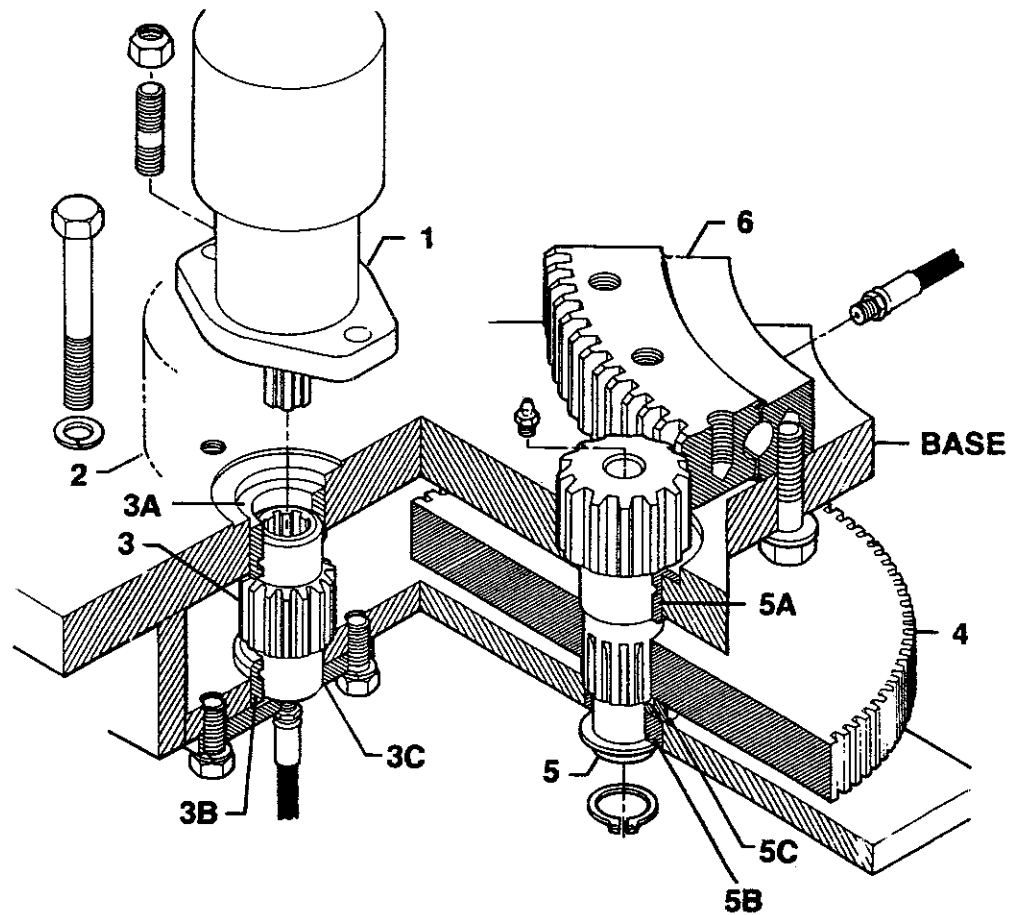


Figure B-4. Articulating Crane - Hydraulic Components



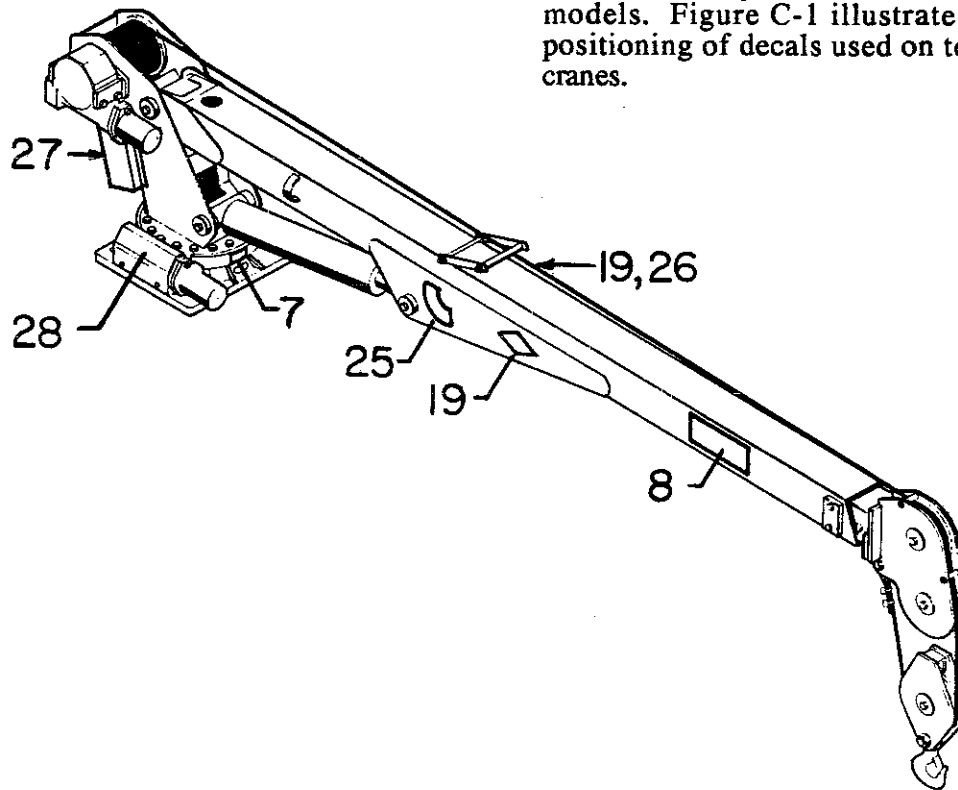
ITEM	DESCRIPTION
1.	ROTATION MOTOR
2.	HYDRAULIC BRAKE
3.	DRIVE GEAR
3A.	UPPER DRIVE GEAR BUSHING
3B.	LOWER DRIVE GEAR BUSHING
3C.	DRIVE GEAR GREASE PLATE
4.	INTERMEDIATE GEAR
5.	PINION GEAR
5A.	UPPER PINION GEAR BUSHING
5B.	LOWER PINION GEAR BUSHING
5C.	INTERMEDIATE GEAR THRUST BEARING
6.	TURNTABLE GEAR BEARING

Figure B-5. Typical Gear Train Configuration

Section 3. DECALS

DECAL PLACEMENT - TELESCOPING CRANES

The positioning of decals on a telescoping crane is usually similar between varying models. Figure C-1 illustrates common positioning of decals used on telescoping cranes.



NOTE

Placement of a hazard warning decal must be in a position which is easily visible to the person responsible for taking the appropriate action which that decal addresses.

ITEM	DESCRIPTION	QTY	SEE FIG.
1.	DECAL-WARNING OUTRIGGER	2	C-30
2.	DECAL-GREASE WEEKLY LEFT	AR	C-33
3.	DECAL-GREASE WEEKLY RIGHT	AR	C-33
4.	DECAL-SUCTION LINE	1	C-37
5.	DECAL-RETURN LINE	1	C-36
6.	DECAL-CAUTION DON'T WASH/WAX	1	C-39
7.	DECAL-ROTATE CRANE/GREASE	1	C-34
8.	DECAL-CRANE MODEL NUMBER	2	
9.	DECAL-DANGER ELECTROCUTION	1	C-3
10.	DECAL-DANGER OPER. TRAINING	1	C-16
11.	DECAL-DANGER OPERATION	1	C-15
12.	DECAL-DANGER 2-BLOCKING	1	C-11
13.	DECAL-DANGER HOIST PERSONNEL	1	C-9
14.	DECAL-DANGER OUTRG. STD. CLEAR	2	C-10
15.	DECAL-DANGER ELECTROCUTION	4	C-18
16.	DECAL-DANGER OPER. COND.	1	C-5
17.	DECAL-DANGER OUTRG. MOVING	1	C-4
18.	DECAL-DANGER CRANE LOADLINE	4	C-17
19.	DECAL-IMT DIAMOND	2	
20.	DECAL-DANGER OPER. RESTRIC.	1	C-6
21.	DECAL-DANGER REM. CTRL. ELEC.	1	C-12
22.	DECAL-DANGER DRIVELINE	1	C-7
23.	DECAL-CONTACT IMT	1	C-35
24.	DECAL-CAUTION OIL LEVEL	1	C-38
25.	DECAL-ANGLE CHART RIGHT-SIDE	1	C-40
26.	DECAL-ANGLE CHART LEFT-SIDE	1	C-40
27.	CAPACITY PLACARD	2	
28.	DECAL-LUBRICATE WORM	1	C-41
29.	DECAL-RC ELECTROCUTION (HANDLE)	1	C-13

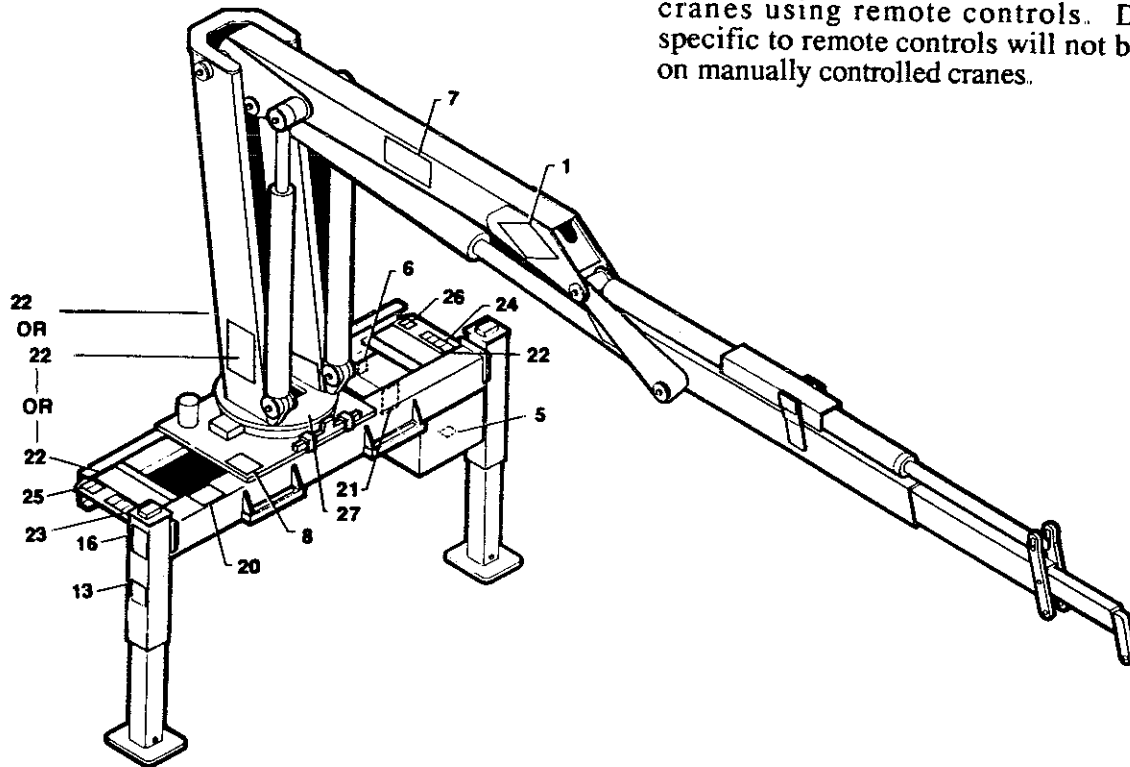
DECAL PLACEMENT

ITEM NUMBER	LOCATION
6, 9, 10, 11, 12, 13, 16, 17, 20, 21, 22, 23, 24, 27	AT OR NEAR REMOTE CONTROL STORAGE POINT
1, 14	ONE ON EACH OUTRIGGER
15, 18	ONE ON EACH SIDE OF THE CARRIER VEHICLE
7	AT TURNABLE GREASE ZERK
2, 3	AT ALL GREASE ZERKS
5	ON RESERVOIR AT RETURN LINE
4	ON RESERVOIR AT SUCTION LINE
29	ON REMOTE CONTROL HANDLE

Figure C-1. Decal Locations on Telescoping Cranes

DECAL PLACEMENT - ARTICULATING CRANES

The positioning of decals on an articulating crane is usually similar between varying models. Figure C-2 illustrates common positioning of decals used on articulating cranes using remote controls. Decals specific to remote controls will not be used on manually controlled cranes.



ITEM	DESCRIPTION	QTY	SEEF FIG.
1.	IMT DIAMOND	2	
2.	DECAL-SET UP/STOW INSTRUCTIONS	2	C-31
3.	DECAL-GREASE WEEKLY LEFT	AR	C-33
4.	DECAL-GREASE WEEKLY RIGHT	AR	C-33
5.	DECAL-SUCTION LINE	1	C-37
6.	DECAL-RETURN LINE	1	C-36
7.	DECAL-CRANE MODEL NUMBER	2	
8.	DECAL-CAUTION DON'T WASH/WAX	1	C-39
9.	DECAL-ROTATE CRANE/GREASE	1	C-34
10.	DECAL-DANGER ELECTROCUTION	2	C-3
11.	DECAL-DANGER OPERATOR	2	C-16
12.	DECAL-DANGER OPERATION	2	C-15
13.	DECAL-DANGER OUTRIGGER STD CLR	2	C-10
14.	DECAL-DANGER ELECTROCUTION	4	C-18
15.	DECAL-DANGER OPERATING COND.	2	C-5
16.	DECAL-DANGER OUTRIGGER MOVING	2	C-4
17.	DECAL-DANGER OPERATOR RESTRICT	2	C-6
18.	DECAL-DANGER STOW/UNFOLD	2	C-8
19.	DECAL-DANGER DRIVELINE	2	C-7
20.	DECAL-CONTACT IMT	1	C-35
21.	DECAL-CAUTION OIL LEVEL	2	C-38
22.	CAPACITY PLACARD	2	
23.	DECAL-STREET SIDE CONTROLS	1	
24.	DECAL-CURB SIDE CONTROLS	1	
25.	DECAL-OUTRIGGER CONTROLS SS	1	
26.	DECAL-OUTRIGGER CONTROLS CS	1	
27.	DECAL-CRANE ROTATION ALIGNMENT	1	C-32
28.	DECAL-DANGER RC ELECTROCUTION	2	C-12
29.	DECAL-RC ELECTROCUTION (HANDLE)	1	C-13

NOTE

Placement of a hazard warning decal must be in a position which is easily visible to the person responsible for taking the appropriate action which that decal addresses.

DECAL PLACEMENT

ITEM NUMBER	LOCATION
2, 10, 11, 12, 15, 17, 18, 19, 21, 28	AT OR NEAR THE NORMAL OPERATING STATIONS
13, 16	ONE ON EACH OUTRIGGER
14	ONE ON EACH SIDE OF THE CARRIER VEHICLE
9	AT TURNABLE GREASE ZERK
3, 4	AT ALL GREASE ZERKS
6	ON RESERVOIR AT RETURN LINE
5	ON RESERVOIR AT SUCTION LINE
29	ON REMOTE CONTROL HANDLE

Figure C-2. Decal Locations on Articulating Cranes

"DANGER" DECAL DESCRIPTIONS (Figures C-3 through C-18)

All operators must familiarize themselves with the decals presented under the "DANGER" DECAL DESCRIPTIONS heading in this section. Your equipment may have additional safety decals that are not described here. Any safety decals affixed to your equipment must be identified, read and understood.

The materials and adhesives used in the production of these decals were designed for

maximum durability, adhesion and legibility. Nevertheless, if a decal becomes damaged or illegible, replace it at your earliest opportunity. If a crane is repaired or repainted, replace all decals before the crane is put back into service. Individual decals as well as complete decal kits are available from IMT.

Listed below are the safety decals used on IMT cranes. They are listed here as an aid in their identification with an explanation of their purpose, where they are placed on the crane and the normal quantity used on each crane.

DECAL: Danger - Electrocution

PART NUMBER: 70392813

FUNCTION: To inform the operator of the hazard associated with contact or proximity to power lines, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: All cranes

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point.

QUANTITY: 2

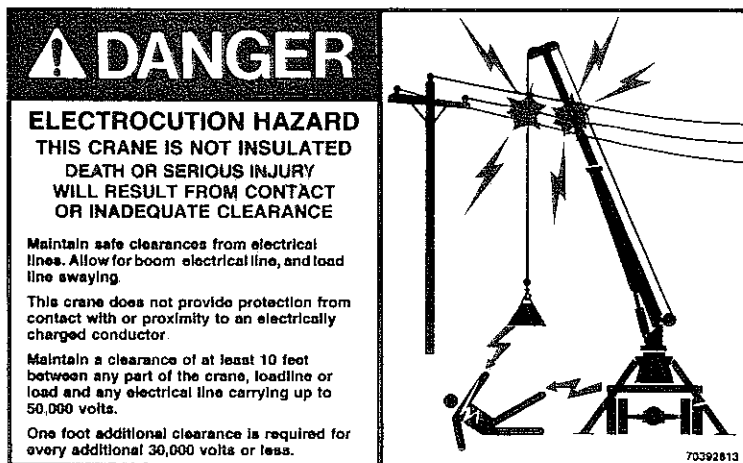


Figure C-3.

DECAL: Danger - Outrigger Moving

PART NUMBER: 70392867

FUNCTION: To inform the operator of the hazard associated with outrigger operation, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: All cranes with outriggers

PLACEMENT: At or near the outrigger operating station.

QUANTITY: 2

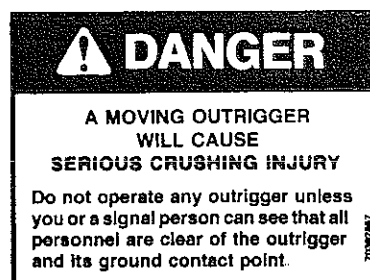


Figure C-4.

DECAL: Danger - Operation Conditions

PART NUMBER: 70392866

FUNCTION: To inform personnel of the hazard associated with improper maintenance and unauthorized modifications, the possible consequences should the hazard occur, and how to avoid the hazard

USED ON: All cranes

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point

QUANTITY: 2

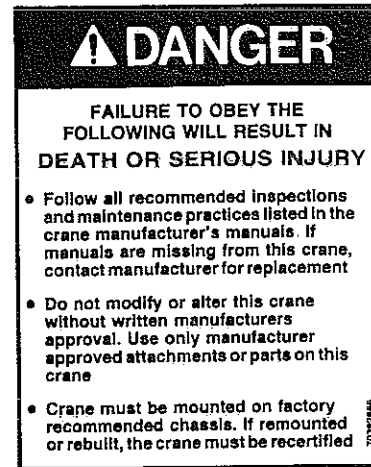


Figure C-5.

DECAL: Danger - Operation Restrictions

PART NUMBER: 70392888

FUNCTION: To inform the operator of the hazard associated with overloading the crane, the possible consequences should the hazard occur, and how to avoid the hazard

USED ON: All cranes

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point.

QUANTITY: 2

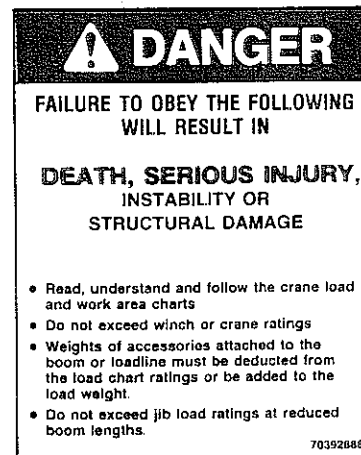


Figure C-6.

DECAL: Danger - Rotating Driveline

PART NUMBER: 70392891

FUNCTION: To inform personnel of the hazard associated with servicing an operating driveline or PTO, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: All PTO operated cranes

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point. Alternate placement is in the vicinity of the driveline

QUANTITY: 2



Figure C-7.

DECAL: Danger - Stowing / Unfolding

PART NUMBER: 70392890

FUNCTION: To inform the operator of the hazard associated with stowing and unfolding the crane, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: All folding cranes

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point.

QUANTITY: 2

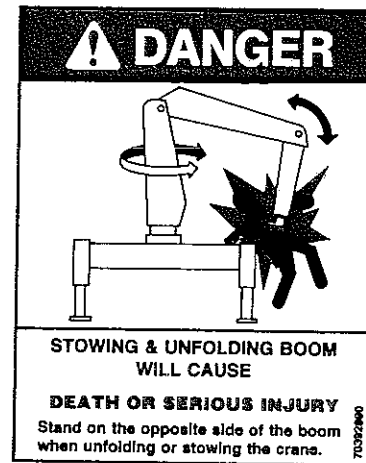


Figure C-8.

DECAL: Danger - Hoisting Personnel

PART NUMBER: 70392863

FUNCTION: To inform the operator and personnel of the hazard associated with lifting personnel with a winch and wire rope, the possible consequences of lifting personnel, and how to avoid the hazard.

USED ON: All cranes equipped with a winch

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point.

QUANTITY: 2

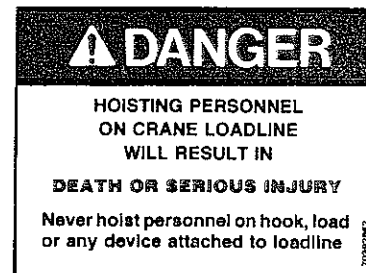


Figure C-9.

DECAL: Danger - Outrigger Stand Clear

PART NUMBER: 70392864

FUNCTION: To inform the operator and personnel in the work area of the hazard associated with the operation of the outriggers, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: All cranes equipped with outriggers

PLACEMENT: On the outriggers

QUANTITY: 2

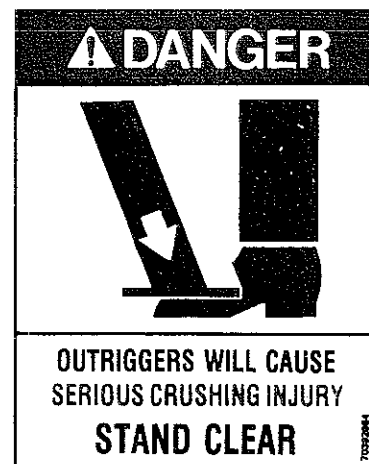


Figure C-10.

DECAL: Danger - Two Blocking

PART NUMBER: 70392861

FUNCTION: To inform the operator of the hazard associated with bringing the sheave(s) into contact with the hook, snatch block or load, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: All cranes equipped with a winch

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point

QUANTITY: 2

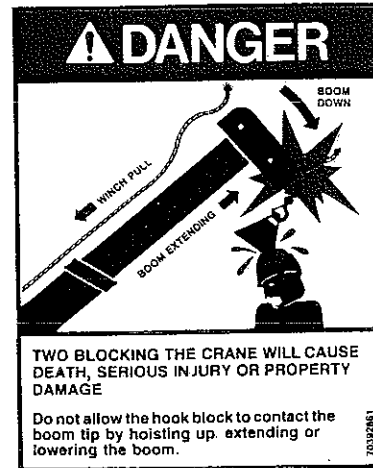


Figure C-11.

DECAL: Danger - Remote Control Electrocutation (Large)

PART NUMBER: 70392889

FUNCTION: To inform the operator and others in the work area of the lack of protection from electrocution afforded by the remote control handle, the possible consequences of the crane becoming electrically charged, and how to avoid the hazard

USED ON: All cranes equipped with a remote control

PLACEMENT: At manual control stations and at the remote control handle storage point

QUANTITY: 2

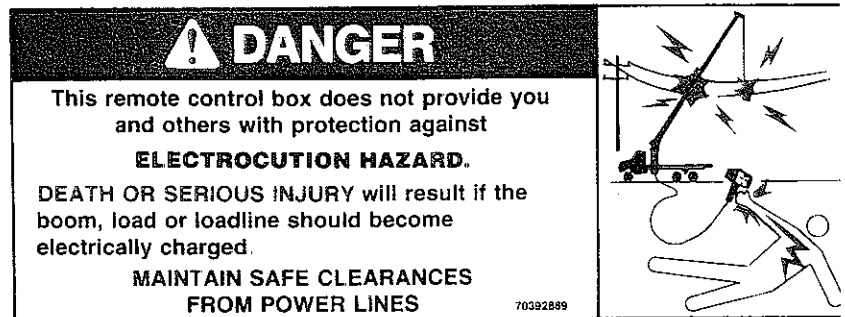


Figure C-12.

DECAL: Danger - Remote Control Electrocutation (Handle)

PART NUMBER: 70392862

FUNCTION: To inform the operator of the lack of protection from electrocution afforded by the remote control handle, the possible consequences of the crane becoming electrically charged, and how to avoid the hazard.

USED ON: All cranes equipped with remote control

PLACEMENT: Directly on the remote control handle

QUANTITY: 1

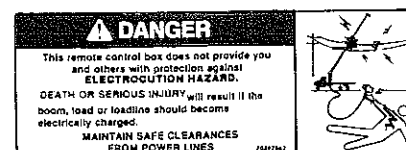


Figure C-13.

DECAL: Danger - Operation

PART NUMBER: 70392815

FUNCTION: To inform the operator of precautions necessary in the safe operation of the crane, and the possible consequences of operation without taking those precautions.

USED ON: All cranes

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point

QUANTITY: 2

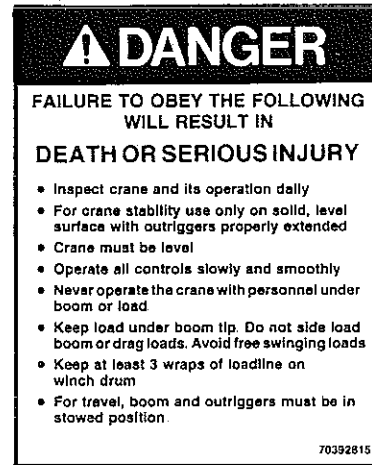


Figure C-14.

DECAL: Danger - Untrained Operator

PART NUMBER: 70392814

FUNCTION: To inform the operator of the need for proper training, familiarity with safe operating procedures, and the possible consequences of operation without training

USED ON: All cranes

PLACEMENT: At or near the crane operating station. On cranes with remote control only, at the remote control handle storage point

QUANTITY: 2

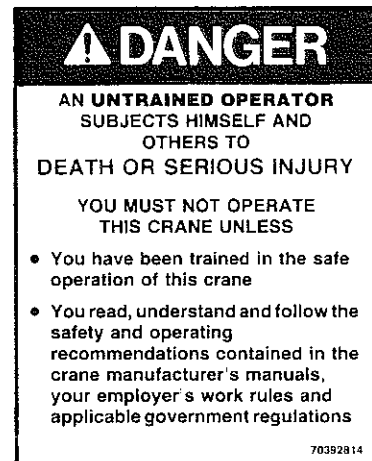


Figure C-15.

DECAL: Danger - Crane Loadline (Truck)

PART NUMBER: 70392868

FUNCTION: To inform personnel in the work area of the possible consequences of lifting personnel with a winch and wire rope, and how to avoid the hazard

USED ON: All cranes equipped with a winch

PLACEMENT: All four sides of the carrier vehicle

QUANTITY: 4

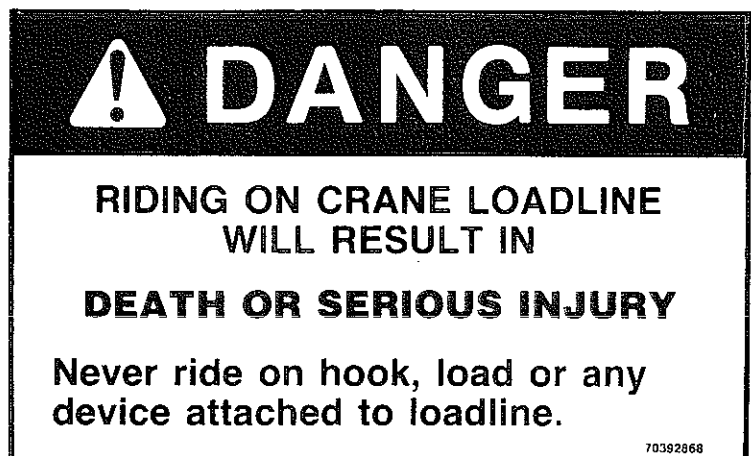


Figure C-16.

DECAL: Danger - Electrocution

PART NUMBER: 70392865

FUNCTION: To inform the operator and others in the work area of the hazard associated with contact with or proximity to power lines, the possible consequences should the crane become electrically charged, and how to avoid the hazard.

USED ON: All cranes

PLACEMENT: All four sides of the carrier vehicle

QUANTITY: 4

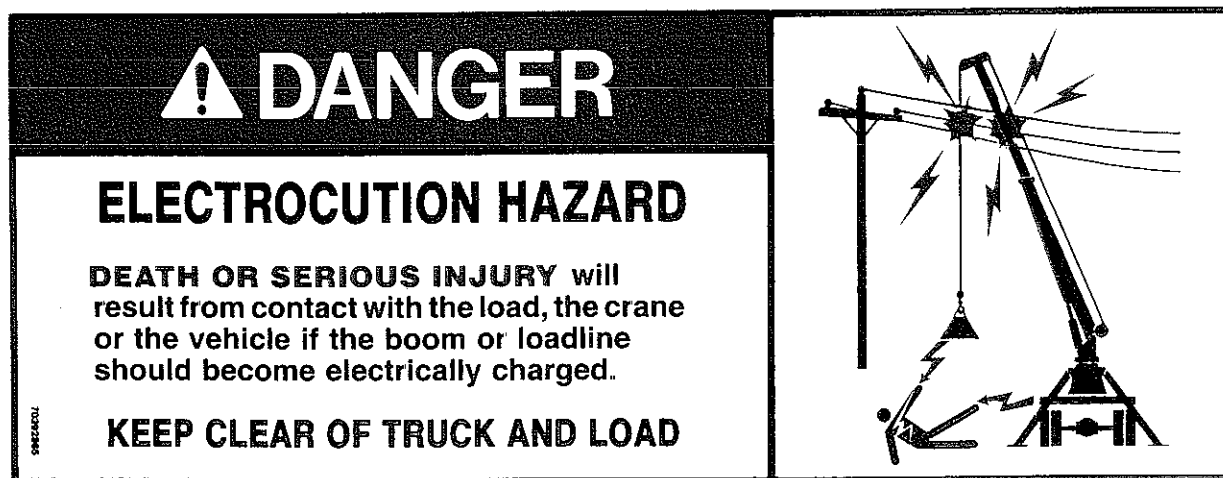


Figure C-17.

INSTRUCTIONAL DECALS

Listed below are instructional decals which may be affixed to your crane. Some are relevant to maintenance while others focus on operation. They are provided here as reference in the understanding of their purpose and placement.

DECAL: Warning - Manual Outriggers

PART NUMBER: 70391598

FUNCTION: To warn the operator of precautions necessary in the deployment of manual outriggers and to instruct in their use

USED ON: All cranes equipped with manual outriggers

PLACEMENT: On each outrigger

QUANTITY: 1 per outrigger leg

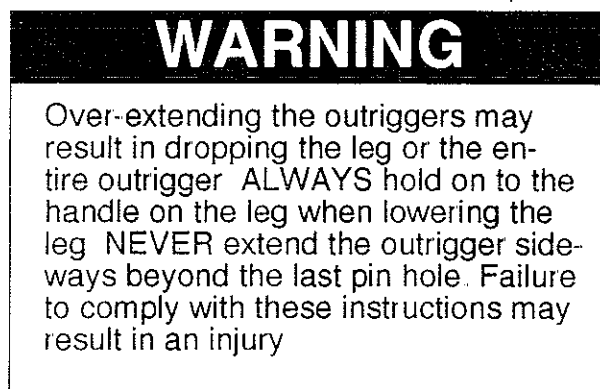


Figure C-30.

DECAL: Set Up/Stow Instructions

PART NUMBER: 70391583

FUNCTION: To provide the operator with sequential steps to be taken in the set up and storing of a Figure-4 folding crane.

USED ON: All Figure-4 folding cranes

PLACEMENT: At or near the operator's station

QUANTITY: 1

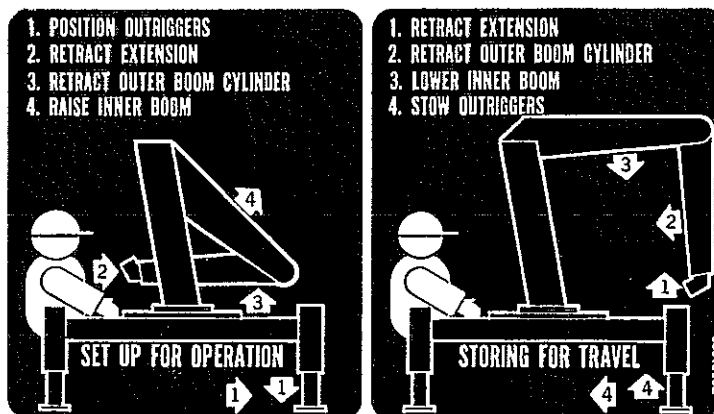


Figure C-31.

DECAL: Rotational Alignment

PART NUMBER: 71392365

FUNCTION: To provide the operator with a method of knowing when the crane mast and base are in alignment for placing the crane into the stored position

USED ON: All cranes requiring alignment of mast and base before storing.

PLACEMENT: Upper half on the mast base plate edge. Lower half on the base gear-bearing guard. To be applied when the crane is in its approved stored position.

QUANTITY: 1

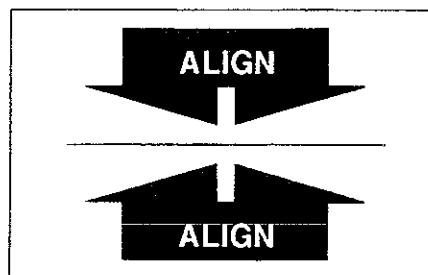


Figure C-32.

DECAL: Grease Weekly - Left Arrow

PART NUMBER: 70391612

DECAL: Grease Weekly - Right Arrow

PART NUMBER: 70391613

FUNCTION: To inform maintenance personnel of the location and necessity to apply grease to zerks on a weekly basis.

USED ON: All cranes.

PLACEMENT: At grease zerks with arrow pointing toward the zerk

QUANTITY: 1 per grease zerk



Figure C-33.

DECAL: Rotate Crane/Grease

PART NUMBER: 70392524

FUNCTION: To inform maintenance personnel that it is necessary to rotate the crane while greasing the turntable gear-bearing. Rotation is required for proper and even distribution of grease to the gear-bearing

USED ON: All cranes with turntable gear-bearings

PLACEMENT: At or near the gear-bearing's grease zerk location

QUANTITY: 1

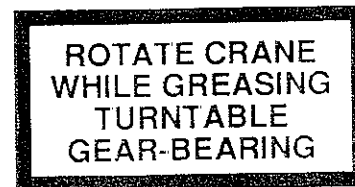


Figure C-34.

DECAL: Contact IMT

PART NUMBER: 70392982

FUNCTION: To provide the owners/operators and maintenance personnel with the address and telephone number of IMT for service and repair purposes, safety questions, etc.

USED ON: All cranes

PLACEMENT: Visible from the operator's station.

QUANTITY: 1



Figure C-35.

DECAL: Return Line

PART NUMBER: 70392109

FUNCTION: To aid in the identification of the hydraulic system return line to minimize errors during hydraulic maintenance.

USED ON: All cranes with hydraulic fluid reservoirs.

PLACEMENT: On the hydraulic fluid reservoir at the return line

QUANTITY: 1

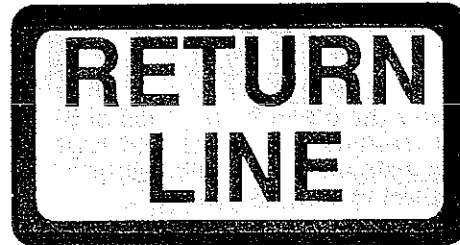


Figure C-36.

DECAL: Suction Line

PART NUMBER: 70392108

FUNCTION: To aid in the identification of the hydraulic system suction line to minimize errors during hydraulic maintenance

USED ON: All cranes with hydraulic fluid reservoirs.

PLACEMENT: On the hydraulic fluid reservoir at the suction line.

QUANTITY: 1



Figure C-37.

DECAL: Lubricate Worm Gear

PART NUMBER: 70392399

FUNCTION: To inform maintenance personnel of the need to lubricate the worm gear on a weekly basis

USED ON: All cranes which use a worm gear drive for crane swing.

PLACEMENT: On the worm gear cover.

QUANTITY: 1

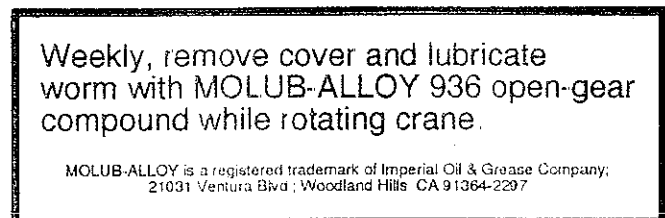


Figure C-38.

DECAL: Caution - Do Not Wash/Wax

PART NUMBER: 70392213

FUNCTION: To inform maintenance personnel not to use high pressure washers and not to wax the crane for a period of 60 days after delivery. The use of high pressure washers and wax is detrimental to the crane's paint until cured.

USED ON: All cranes

PLACEMENT: Near the crane operating station.

QUANTITY: 1

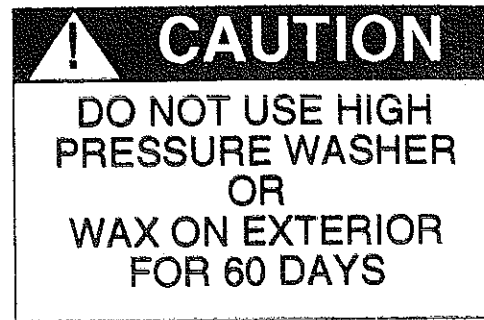


Figure C-39.

DECAL: Boom Angle Indicator - Left Hand

PART NUMBER: 71391523

DECAL: Boom Angle Indicator - Right Hand

PART NUMBER: 71391522

FUNCTION: To display to the operator the actual angle of the boom of a telescoping crane

USED ON: All telescoping cranes

PLACEMENT: On the left or right side of the lower boom in alignment with the angle indicator arrow.

QUANTITY: 1

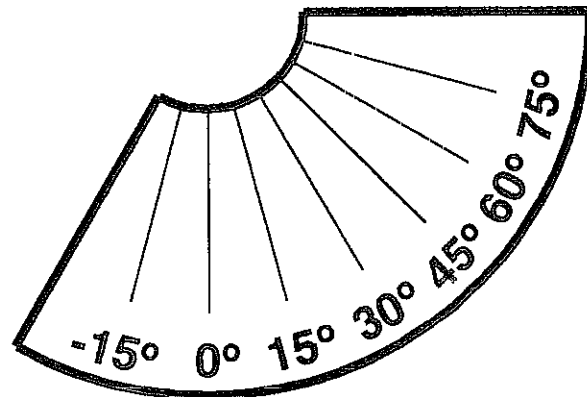


Figure C-40.

DECAL: Caution - Oil Level

PART NUMBER: 71039134

FUNCTION: To caution the operator to check the hydraulic reservoir oil level regularly

USED ON: All cranes with hydraulic fluid reservoirs

PLACEMENT: At or near the normal operating station.

QUANTITY: 1



Figure C-41.

Section 4. HAND SIGNALS

SIGNALS

Under certain circumstances, in order to provide a safe working environment, it will be necessary for communication between the crane operator and a signal person. Hand signals provide such a means of communication as well as voice communication equipment such as telephone and radio.

Hand signals to the operator shall be in accordance with those signals illustrated in this section, unless voice communication equipment 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 illustrated 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.

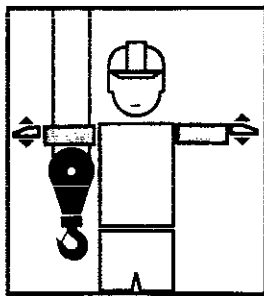
If it is desired to give instructions verbally to the operator, instead of by hand signals, all crane motions must be stopped before doing so.

The following illustrations of hand signals 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 implementing them. The illustrations have been provided on a single page to facilitate a convenient form for duplication and reference (see following page).

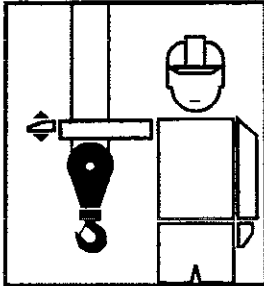
For complete hand signal information, refer to the following publication of The American Society of Mechanical Engineers:

Mobile and Locomotive Cranes
(ASME/ANSI B30.5)

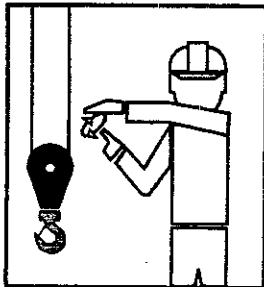
The hand signals presented by The American Society of Mechanical Engineers have been accepted by the Occupational Safety and Health Administration (OSHA).



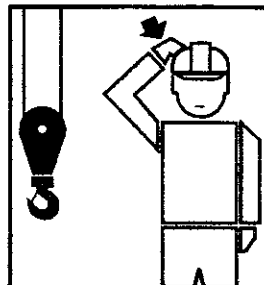
EMERGENCY STOP - Both arms extended, palms down, move arms back and forth horizontally.



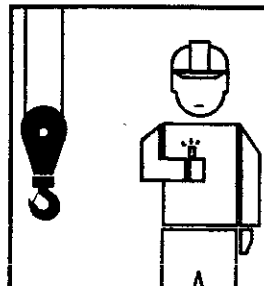
STOP - Arm extended, palm down, move arm back and forth horizontally.



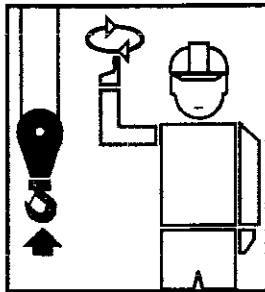
MOVE SLOWLY - One hand gives any motion signal; place other hand motionless in front of that hand. (Hoist slowly shown).



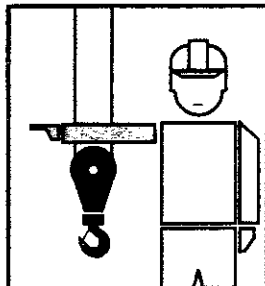
USE MAIN HOIST - Tap fist on head; then use regular signals.



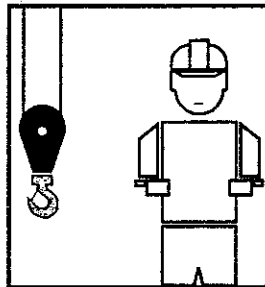
EXTEND BOOM - (Telescoping Booms). One Hand Signal. One fist in front of chest with thumb tapping chest.



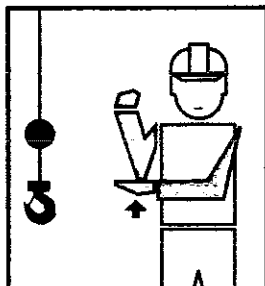
HOIST - With forearm vertical, forefinger pointing up, move hand in small horizontal circle.



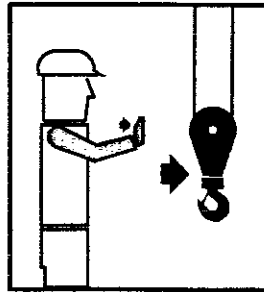
SWING - Arm extended, point with finger in direction of boom swing.



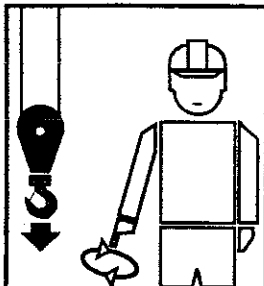
EXTEND BOOM - (Telescoping Booms). Both fists in front of body with thumbs pointing outward.



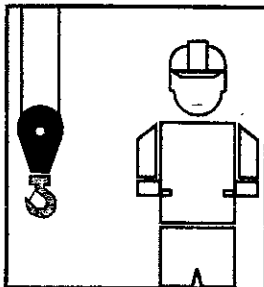
USE WHIPLINE (Auxiliary Hoist) - Tap elbow with one hand; then use regular signals.



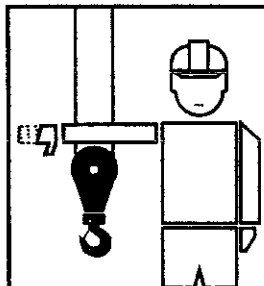
TRAVEL - Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



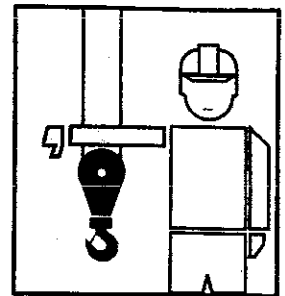
LOWER - With arm extended downward, forefinger pointing down, move hand in small horizontal circle.



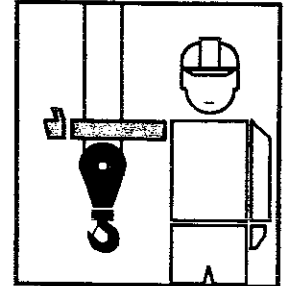
RETRACT BOOM - (Telescoping Booms). Both fists in front of body with thumbs pointing inward.



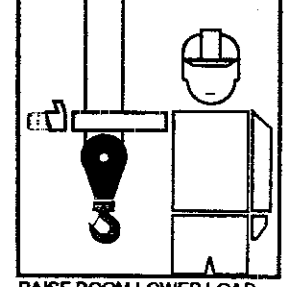
LOWER BOOM- RAISE LOAD - Arm extended, thumb pointing down, flex fingers in and out until desired movement is completed.



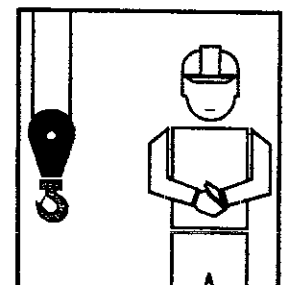
LOWER BOOM - With arm extended, fingers closed, thumb pointing downward.



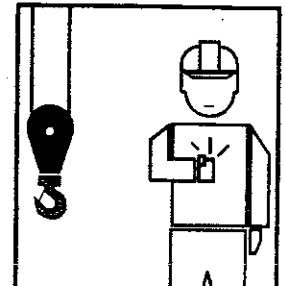
RAISE BOOM - With arm extended, fingers closed, thumb pointing upward.



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



DOG EVERYTHING - Clasp hands in front of body.



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

Figure D-1.
Crane Operation Hand Signals

Section 5. THE OPERATOR

OPERATOR QUALIFICATIONS

Personnel permitted to operate a crane must have the following minimum qualifications:

1. Previously trained and experienced operating personnel.
2. Trainees under the direct supervision of a trained, experienced operator.
3. Maintenance and test personnel in the performance of their duties.
4. Supervisory personnel under the direct observation of a trained, experienced operator.
5. Crane inspectors.

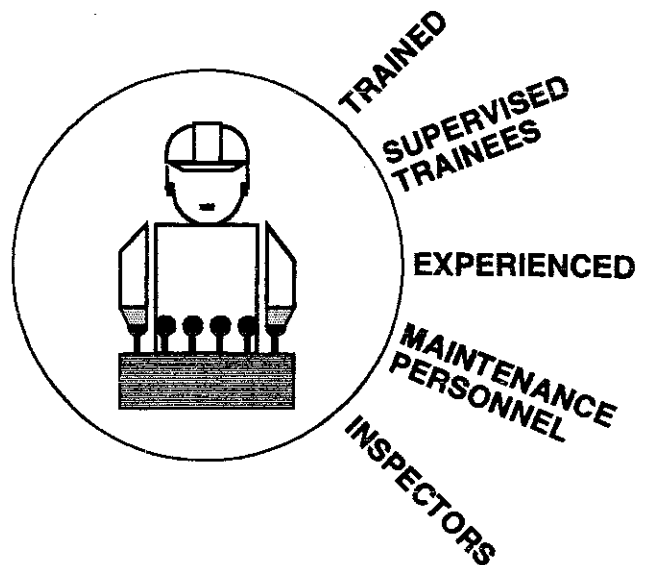


Figure E-1. Operator Qualifications

PHYSICAL CONDITION

Physical condition of all operators and trainees must conform to the following guidelines:

1. Vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without the aid of corrective lenses.
2. Normal depth perception and field of vision (peripheral vision).
3. Ability to distinguish colors if color recognition or differentiation is required for safe operation.
4. Adequate hearing, with or without a hearing aid.
5. Sufficient strength, endurance, agility and coordination to meet equipment operation demands.
6. Emotionally stable.
7. Not subject to seizures, loss of physical control, dizziness or have physical limitations which could impair the ability to safely operate the crane.

WARNING

OPERATION OF A CRANE MUST NOT BE PERFORMED BY PERSONS UNDER THE INFLUENCE OF ALCOHOL, DRUGS, MEDICATIONS OR ANY CHEMICALS CAPABLE OF IMPAIRING THE ABILITIES OF THAT PERSON

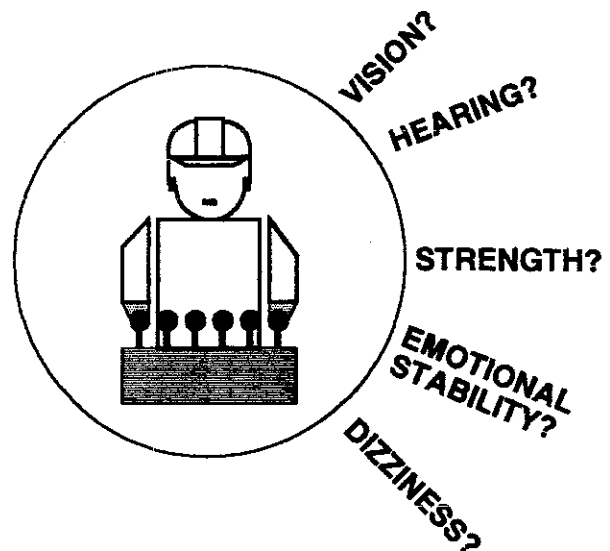


Figure E-2. Physical Considerations

OPERATOR CONDUCT

1. The operator will not engage in any activity which can divert his attention from the operation of the crane.
2. The operator will relinquish control of the crane to another qualified operator if he is physically or mentally unfit.
3. The operator must respond to signals from a signal person or spotter during all lifts. If a signal person is not being utilized then the lift is the responsibility of the operator.
4. The operator will respond to a stop signal at any time, from anyone.
5. The operator will be held responsible for all operations under the operator's direct control. The operator, if in doubt about safety, must consult with his superior before making a lift.
6. Before leaving a crane unattended, the operator must:
 - A. Land the load.
 - B. Disengage the main power source.
 - C. Set any locking devices.
 - D. Put all controls in the off or neutral position.
 - E. Secure the crane against accidental travel.
 - F. Stop the engine.

KNOWLEDGE AND ABILITIES REQUIRED

1. The ability to read and understand all decals, placards, operation and safety manuals, and any information relevant to the proper and safe operation of this equipment.
2. Knowledge of any emergency procedures necessary to safe operation.
3. Evidence of, or demonstration of the proper and safe operation of the equipment.
4. Familiarization with all relevant safety codes and governmental regulations pertaining to the operation of this equipment.
5. The responsibility to recognize all maintenance requirements of the equipment being operated.
6. The familiarity with the equipment and all control functions associated with its operation.
7. Have read and understood the procedures for the operation of the equipment.

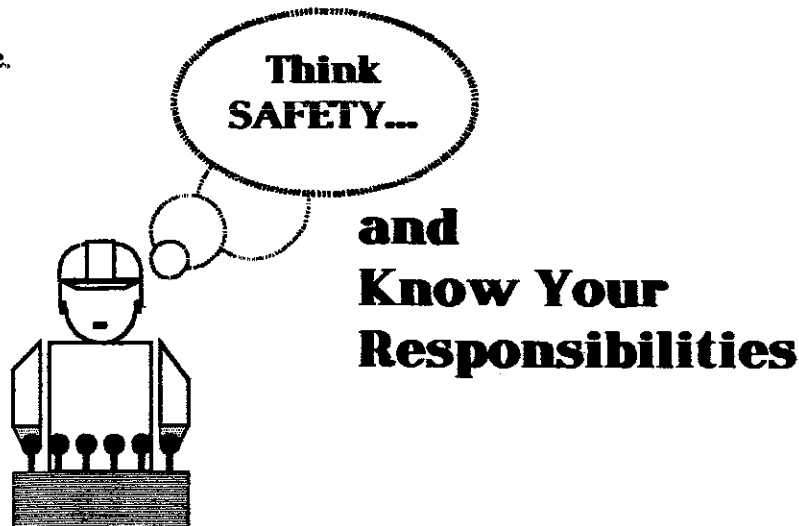


Figure E-3. Safety is Your Responsibility

Section 6. CRANE OPERATION

OPERATION RESPONSIBILITIES

Safe operation is the responsibility of the operator, maintenance and inspection personnel. They must insure that the operation, inspection and maintenance is carried out in a conscientious and timely manner which will provide the most efficient and safest work environment possible. 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.

INSPECTIONS

The following inspections and checks must be made on a continuing basis both at start-up and during operation:

1. Chassis - Check oil level, battery, lights and brakes.
2. Tires - Check for proper inflation pressure, cuts, loose or missing wheel lugs. Refer to Tables L-1, L-1A, L-1B and L-1C in Section 12.
3. Safety Accessories - Check for proper function, oil levels, leaks and malfunctions.
4. Hydraulic Oil Reservoir - Check for proper oil level, leaks and blockages.
5. Weldments - Check visually for damage, especially cracks or breaks in welds.
6. Cylinders - Check for leakage and scored cylinder rods.
7. Fasteners - Check pins, sheaves, nuts and bolts for breakage, excessive wear and tightness.
8. Sheaves - Check for defects which could damage wire rope.
9. Ropes and Slings - Check for frayed edges, broken strands, kinks, flat spots and end attachments. Refer to Section 8.
10. Crane Hooks - Check for the presence of a safety catch, twists, cracks or damage. Refer to Section 8A.

11. Covers and Guards - Check for missing or improperly maintained covers and guards.
12. Operation Placards and Safety Decals - Check for illegible, or missing decals and placards. Refer to Section 3.
13. Engine Stop Switch on remote operated cranes - Check for proper operation and the presence of corrosion.
14. Work area - Check for hazards such as power lines, obstructions, etc.

Relace or repair any items needed prior to the operation of the equipment. The checklist above is in addition to any other prescribed maintenance or repair procedures described elsewhere in this or other manuals relevant to the equipment. See Inspection Checklist in the Reference Data Section.

CRANE TRANSPORT

Before transporting the crane, adhere to the following precautions:

1. The crane must be in its stored position.
2. Outriggers must be securely stowed and NOT extended horizontally or vertically.
3. Hook and sheave assemblies must be securely fastened to prevent swinging.
4. All loose accessories, tools and remote controls must be securely stored in their respective compartments or fasteners.
5. The PTO must be disengaged.
6. The parking brake must not be released until all of the above procedures are completed.
7. DO NOT drive the carrier vehicle while a load is present on the hook.
8. DO NOT drive the carrier vehicle with less than the proper tire inflation pressure.
9. DO NOT drive the carrier vehicle in areas where the vertical clearance is not known.

10. DO NOT allow personnel to ride on the equipment during transport.
11. DO NOT attempt to operate the vehicle or equipment without a signalperson if visibility is limited.

CRANE SET-UP

Work site preparation is extremely important to a safe work environment. Plan your lifts carefully, taking into account the presence of powerlines, by-standers, overhead obstructions, and solid surface support.

Determine the weight of the load to be lifted. Refer to the crane's capacity chart, making certain that all lifts are performed within the rated capacity of the crane. Position the carrier vehicle with these capacities in mind and avoid any overhead obstructions which can impair the lift. See Section 9.

WARNING

THE PRESENCE OF ANY ELECTRICALLY CHARGED POWERLINES MUST BE AVOIDED. READ AND UNDERSTAND SECTION 7, CRANE OPERATION NEAR POWERLINES, BEFORE ATTEMPTING ANY CRANE OPERATIONS NEAR POWERLINES.

Position the carrier vehicle in such a manner that it is impossible for the crane, in its fully extended position, to come into contact with electrically charged lines or apparatus. A distance of 10 feet (3.05 meters) absolutely the closest that any portion of the crane, loadline or load can be to electrical lines carrying up to 50,000 Volts. A minimum of 12 inches (30.5 centimeters) must be added to that distance for every additional 30,000 Volts or less.

If windy conditions exist, it is imperative that deflection and sway of powerlines and

loadlines be allowed for. Additional clearance between the crane and electrical lines must be provided. If the voltage of powerlines or apparatus is not known to the operator of the crane, then it is his responsibility to contact the electrical utility for that information, and to use that information in the set-up of the lift.

If a lift is impossible to perform within the minimum distance between electrical source and crane, then it is the responsibility of the operator to notify the electrical utility of the situation and have the electrical lines or apparatus de-energized before any lift is attempted.

A qualified signal person or spotter must be utilized when working near electrical sources. This is advisable even if the powerline has been de-energized.

The carrier vehicle must be positioned over a firm and level surface for adequate outrigger support. If outriggers appear to bury themselves in a less than firm surface, then DO NOT perform a lift until a suitable location is found. DO NOT position the outriggers near sharp drop-offs or areas of uncertain firmness.

Before a lift is made, be certain that the parking brake is set and the drive axle is disengaged.

Outriggers are to be extended fully out and then down. The carrier vehicle should be parked level from the front to the rear. Utilize the power down outrigger function to level the vehicle side-to-side. Utilize a signal person if the outriggers are not in view from the operator's station when extending or lowering the outriggers.

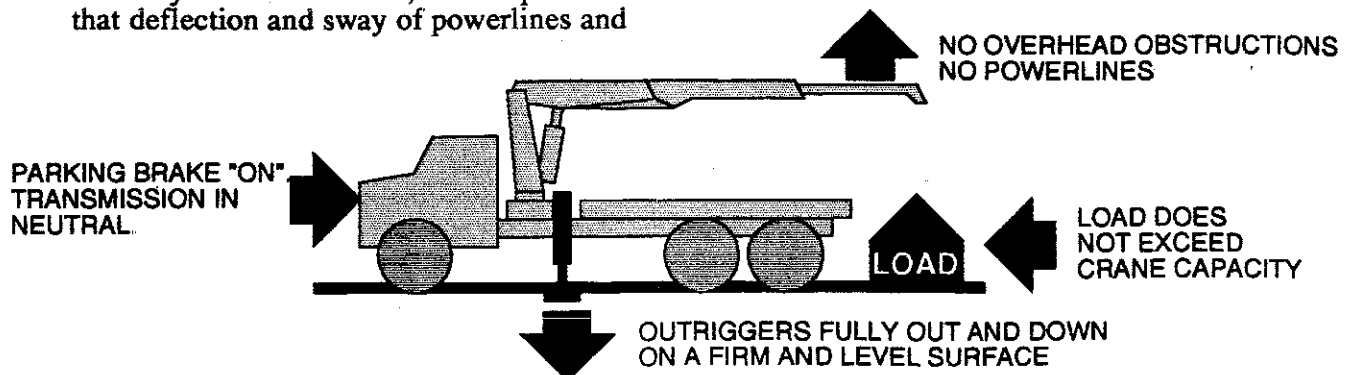


Figure F-1. Crane Set-Up Precautions

SAFE CRANE OPERATION

The crane operator and maintenance personnel have the responsibility to familiarize themselves with all safety precautions applicable to the operation of this equipment. This includes the material presented here as well as elsewhere in the crane manuals and by governmental regulations and/or codes.

CRANE CAPACITY

1. Know the capacity of the crane in its various configurations.
2. Know the weight of the load being lifted and **DO NOT**, under any circumstances, exceed the rated capacity of the crane.
3. Deduct the weight of any and all load handling devices from the load capacities of the crane to determine the actual load capacity.

CRANE CONTROLS

1. Check the specific crane manual for proper sequence and operation of controls.
2. The individual crane functions should have control function decals. If they are missing or illegible, replace them immediately.
3. Hydraulic valve control levers should be moved in a slow, smooth fashion for the even flow of hydraulic fluid. Excessively sudden or sharp movements of the control levers causes excessive wear and dangerous lifting hazards.
4. **DO NOT** operate the control levers with hands that are oily or greasy. Keep the control levers clean and free of oil and grease.
5. It is advisable to wear gloves which are clean and provide a secure grip on control handles during crane operation.
6. All controls shall be tested by the operator at the start of a new shift. If any controls fail to operate properly, they shall be adjusted or repaired before operations are begun.

OPERATING THE CRANE

1. The operator and operating personnel must read and understand all safety and operating decals before any operation of the crane is permitted.
2. Make certain the carrier vehicle's transmission is in neutral and the parking brake is on before engaging the PTO.
3. Wear hard hat, and goggles or safety glasses during operation.
4. Stand clear of all moving outriggers.
5. If the outriggers are manual pull-out variety, make certain the arm pin is in place.
6. Know the position of the booms at all times while operating the crane.
7. Eliminate swing by positioning the boom tip directly over the center of the load before lifting.
8. Utilize any extension booms in their proper sequence, largest to smallest.
9. When releasing manual extension boom pins - **DO NOT** stand directly in line with the boom travel should it slide forward uncontrollably.
10. Secure all unused manual boom extensions before operating the crane.
11. Check the safety of the load by first lifting the load barely off the ground.
12. When lifting a load, keep it as close to the ground as possible. Most lift operations can be accomplished without great height.
13. Stop all crane operation at a signal from anyone.
14. When rotating the crane load from that supported by outriggers to that supported by the carrier vehicles suspension, take precautions to do so smoothly as a carrier vehicles springs and tires will respond differently.
15. Position the crane in its stowed position when not in use.

MAINTENANCE

1. Only authorized service personnel are to perform maintenance on the crane.
2. Disengage the PTO before any service or repair is performed.
3. DO NOT disconnect any hydraulic components or hoses while there is pressure in those components.
4. Stand clear of high pressure hydraulic fluid leaks. Hot hydraulic fluid will cause serious injury, burns and possibly DEATH.
5. Keep the crane clean and free from built-up grease, oil and dirt to prevent slippery conditions and as an aid in the inspection of the crane.
6. Perform all checks before each period of use.
7. Replace parts with factory approved parts, only.
8. Repair or have repaired any components found to be inadequate, immediately.
7. DO NOT lift a load if that load is not in sight of the operator.
8. DO NOT operate the crane during electrical storms.
9. DO NOT operate the crane in high winds.
10. DO NOT operate the crane when suitable lighting is not available.
11. Keep all children, by-standers and persons not required in the operation of the crane at a distance of at least 10 feet (3.05 meters) from the outermost range of the crane and its load.
12. DO NOT leave a suspended load unattended by the operator.

IMPORTANT PRECAUTIONS

1. DO NOT use the boom or the winch to drag a load. No crane is designed for these types of loads.
2. DO NOT lift loads which are fixed or attached to other structures. The loads are unpredictable and most likely exceed crane capacities.
3. DO NOT apply side-loads to the booms.
4. DO NOT position any load over a person nor should any person be permitted to place themselves under a load.
5. DO NOT use the crane boom to push downward onto anything.
6. DO NOT operate the crane if there are any loose objects on the booms or on the load.
1. Portable gasoline containers shall be of a safety-type and equipped with an automatic closing cap and flame arrester.
2. DO NOT refuel while the vehicle engine is running.
3. Smoking is prohibited in a refueling area.
4. A portable fire extinguisher, with a basic minimum extinguisher rating of 10 BC, shall be installed in the cab.
5. Operating and maintenance personnel must be familiar with the operation of the fire extinguisher.

WINCH RELATED PRECAUTIONS

1. DO NOT pull the load block or sheave back so that it makes contact with the boom tip. This act is called "two-blocking" and is to be avoided.
2. Pay out loadline before the boom is extended to avoid "two-blocking".
3. DO NOT permit personnel to ride the loadline, hook or load. This action may cause DEATH or serious injury.
4. Use only specified wire rope for lifting.
5. Retain at least three full wraps of wire rope on the winch drum at all times.
6. See Section 9. (Wire Rope Precautions) for additional information.

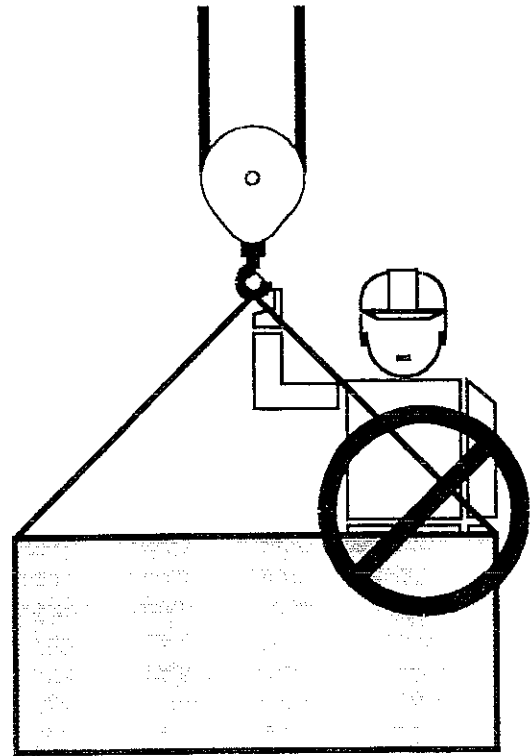


Figure F-2. DO NOT Ride the Loadline

ENGAGING THE PTO

1. Set the parking brake.
2. Place the transmission in "Neutral".
3. Make certain the PTO lever is in the "OFF" position.
4. Start the vehicle's engine.
5. Fully depress the clutch.
6. Engage the PTO.
7. Release the clutch gradually.
8. Warm the engine to operating temperature.
9. Commence crane operation.

DISENGAGING THE PTO

1. Fully depress the vehicle's clutch pedal.
2. Disengage the PTO (OFF).
3. Release the clutch pedal gradually.

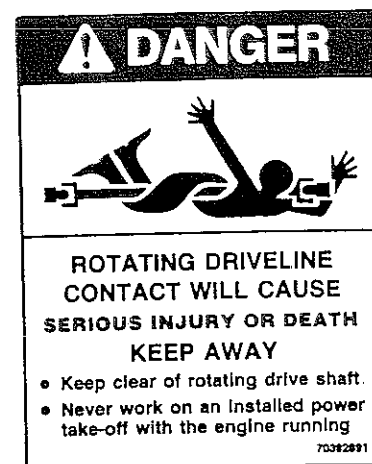


Figure F-3. PTO Danger Decal

WINCH RELATED PRECAUTIONS

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2. Pay out loadline before the boom is extended to avoid "two-blocking".
3. DO NOT permit personnel to ride the loadline, hook or load. This action may cause DEATH or serious injury.
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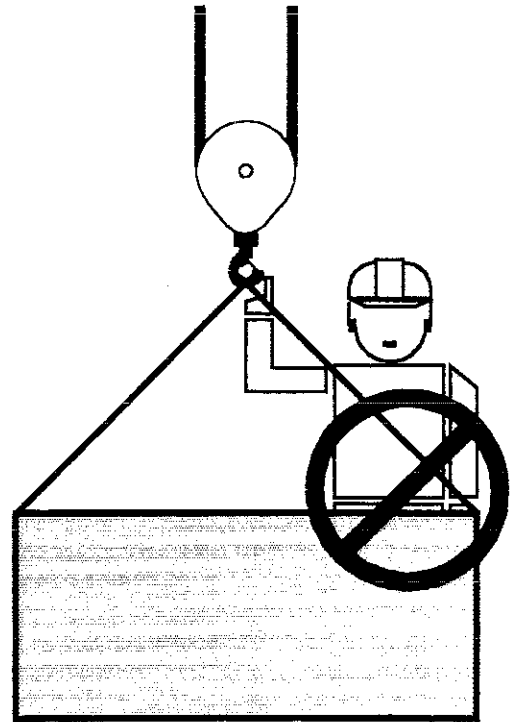


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6. Engage the PTO.
7. Release the clutch gradually.
8. Warm the engine to operating temperature.
9. Commence crane operation.

DISENGAGING THE PTO

1. Fully depress the vehicle's clutch pedal.
2. Disengage the PTO (OFF).
3. Release the clutch pedal gradually.



Figure F-3. PTO Danger Decal



Section 7. CRANE OPERATION NEAR POWERLINES

PRECAUTIONS

No crane shall be operated so that part of the crane or load enters the "DANGER ZONE" as shown in Figure G-3.

No portion of a crane, its load or attachments shall come any closer to electrical transmission lines than indicated in Figure G-2.

Sway or whipping of transmission lines caused by wind must be taken into consideration in determining working proximity to those lines.

Cranes in transit and in their stored position shall not operate closer to electrical transmission lines than specified in Figure G-2.

A qualified signal person or spotter shall be assigned to observe the clearance when a crane, its load or attachment is within a boom's length of the limits in Figure G-2. This is advisable even if the powerline has been de-energized.

An operator is not in the best position to judge powerline-to-crane distances. Use a signal person.

Even if cage-type boom guards, insulating links, or proximity warning devices are used on cranes, they are no substitute to the warnings listed above. The required distances listed in Figure G-2 are to be adhered to.

Before beginning work near powerlines, the person responsible for the job shall inform the owner of the electrical lines or their representative, of all pertinent information related to the job and request their

cooperation. Ask the utility to insulate the lines or to have the lines moved.

All overhead lines shall be considered to be energized unless and until the owner of those lines or the electrical utility authorities verify that the lines are de-energized.

Warning signs or decals must be posted at the operator's station and on all sides of the crane or its carrier vehicle, warning that electrocution, serious bodily injury or DEATH will occur unless minimum clearances between the crane and powerlines are maintained. See Section 3, Decals.

Avoid operating a crane near powerlines if there is an alternative.

When it is necessary to operate a crane in close proximity to powerlines, carefully plan all work which may be required to eliminate any chance of contact with powerlines.

When an energized powerline is in proximity to the work area, it is advisable to erect a barrier on ground level which is readily identifiable as a "Danger Zone". This barrier must be readily visible to the crane operator and, at a minimum, conform to the distances shown in Figure G-2.

Be aware of, and avoid transporting a crane over uneven terrain. Doing so can cause the crane to sway into powerlines.

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.

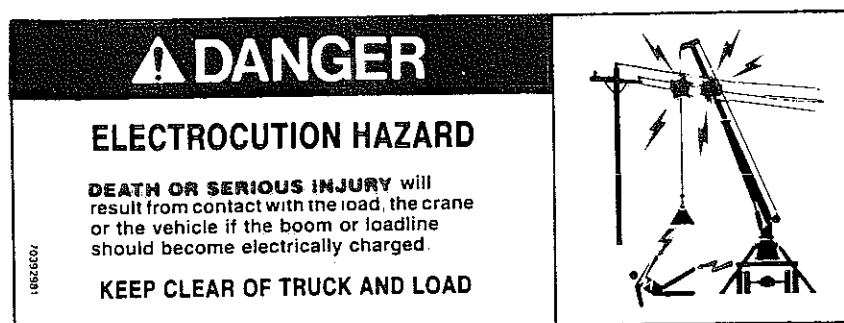


Figure G-1. Electrical Hazard Warning Decal

	NORMAL VOLTAGE kV (Phase to Phase)	MINIMUM REQUIRED CLEARANCE 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 (1.22)
	From 0.75 to 50	6 (1.83)
	From 50 to 345	10 (3.05)
	From 345 to 750	16 (4.87)
	From 750 to 1000	20 (6.10)

NOTE: This chart per ASME/ANSI B30.5.

Figure G-2. Required Clearances of Cranes from Electrical Transmission Lines

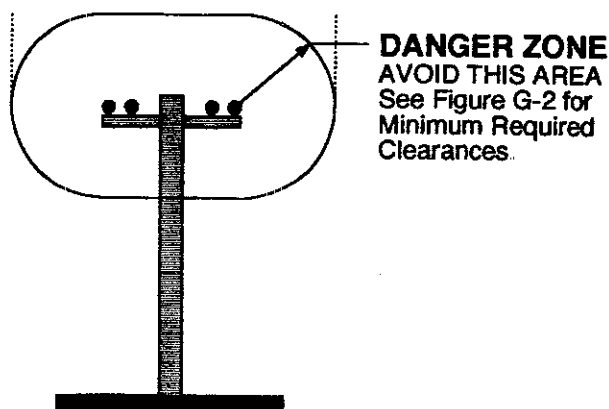


Figure G-3. Danger Zone for Cranes Operating near Electrical Transmission Lines

IF ELECTRICAL CONTACT OCCURS

If electrical contact with a powerline or other source of voltage does occur, the following procedures should be taken:

1. Shut off all power or have it shut off by the utility.
2. Break contact of any person in contact with a live conductor by using rubber hose, dry polypropylene rope or a dry length of wood. **DO NOT** attempt this action unless certain that all power is off.
3. Call the local emergency service such as a fire department, ambulance service or "911" if available. Contact the utility.
4. Administer first aid if qualified or find someone who is qualified.
5. Warn any personnel in the area of the presence of an electrical hazard.
6. Break contact of any equipment from the electrical contact only if all power is off.
7. If in doubt as to what may be electrically charged - **DO NOT MOVE**.
8. High voltage travelling through a crane will charge the ground below the crane. Avoid that area.
9. Inspect and repair any equipment affected by any contact with an electrical contact.
10. Replace any wire rope which has been contacted by high voltage.

Section 8. WIRE ROPE PRECAUTIONS

GENERAL

Wire rope can be the weak link in crane safety. It is subjected to heavy loads, abrasion, kinking, extreme weather conditions, chemical attack and other forces which can reduce its reliability. The inspection and care of wire rope is essential in the effort to provide for safe working conditions.

WIRE ROPE INSPECTION

Each day and before use, inspect the wire rope for the following conditions:

1. Kinking (Sharp bends)
2. Crushing
3. Unstranding
4. Birdcaging
5. Core protrusion
6. Rope diameter loss
7. Rope strand unevenness
8. General corrosion
9. Broken strands
10. Cut strands

DO NOT open the rope for inspection. Inspect the rope daily or before use each day and also inspect the rope eye for abrasion, corrosion and broken wires.

Inspect the wire rope monthly as follows:

1. The entire length of the rope
2. The wire rope eye

WIRE ROPE PRECAUTIONS

1. Avoid the formation of kinks. Kinks will cause severe weakness in the rope. No corrections are available for kinked rope.

2. **DO NOT** drag wire rope over a non-rotating support such as a non-functioning sheave. Severe abrasion caused to outer wire strands will result from friction.
3. **DO NOT** use worn sheaves or flat grooved sheaves. They do not provide support to the full radius of the rope. Flattening and distortion will result.
4. **DO NOT** use nicked or otherwise broken sheaves. Nicks and cracks in sheaves will cut the wire rope.
5. Evenly wrap wire rope onto the drum. Unevenness will cause crushing and/or crimping of the rope.
6. Select replacement wire rope to match the capacity and use of the crane. The crane was originally equipped with appropriate wire rope.
7. **DO NOT** expose the rope to corrosive chemicals.
8. Lubricate the rope frequently to reduce friction and help prevent corrosion.

LUBRICATION OF WIRE ROPE

Wire rope is lubricated during its manufacture but this lubrication will not protect the rope for its service life. It is necessary to lubricate wire rope in order to prevent corrosion, friction created heat and to extend its life.

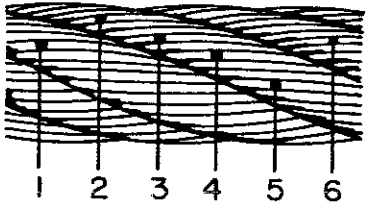
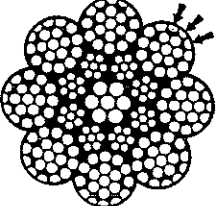
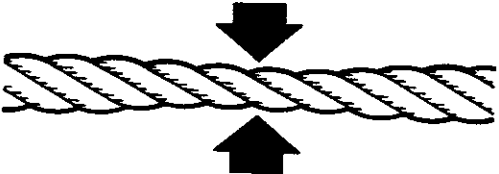
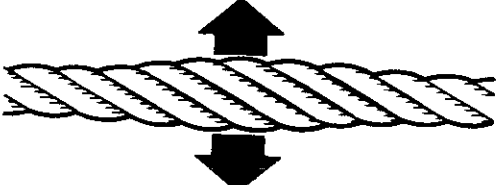
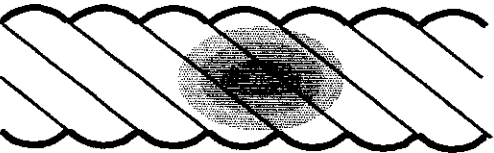
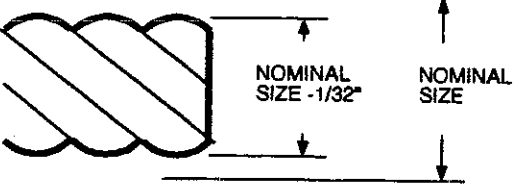
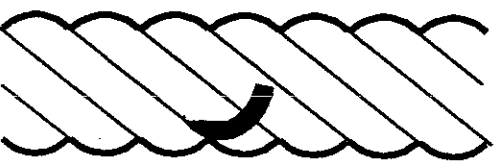
Lubricate the wire rope as follows:

1. Clean the rope of dirt, dust and any other foreign matter.
2. Apply a light lubricant which will penetrate the strands of the rope. Apply by dropping on, spraying on or brushing on.
3. Apply lubricant heavily to portions which encounter bending such as at the sheave and winch.

WHEN TO REPLACE WIRE ROPE

Replace the entire wire rope when any of the following conditions exist:

Figure H-1. When to Replace Wire Rope

<p>1. When there are either 3 broken wires in one strand or a total of six broken wires in all strands in any one rope lay.</p>	
<p>2. When flat spots on the outer wires appear and those outside wires are less than 2/3 the thickness of the unworn outer wire.</p>	
<p>3. When there is a decrease of diameter indicating a core failure.</p>	
<p>4. When kinking, crushing, birdcaging or other distortion occurs.</p>	
<p>5. When there is noticeable heat damage (discoloration) of the rope by any means.</p>	
<p>6. When the diameter is reduced from nominal size by 1/32" or more.</p>	
<p>7. If a broken wire protrudes or loops out from the core of the rope.</p>	

WEDGE SOCKET ATTACHMENT

When attaching a wedge socket, use one of the approved methods displayed in Figure H-2.

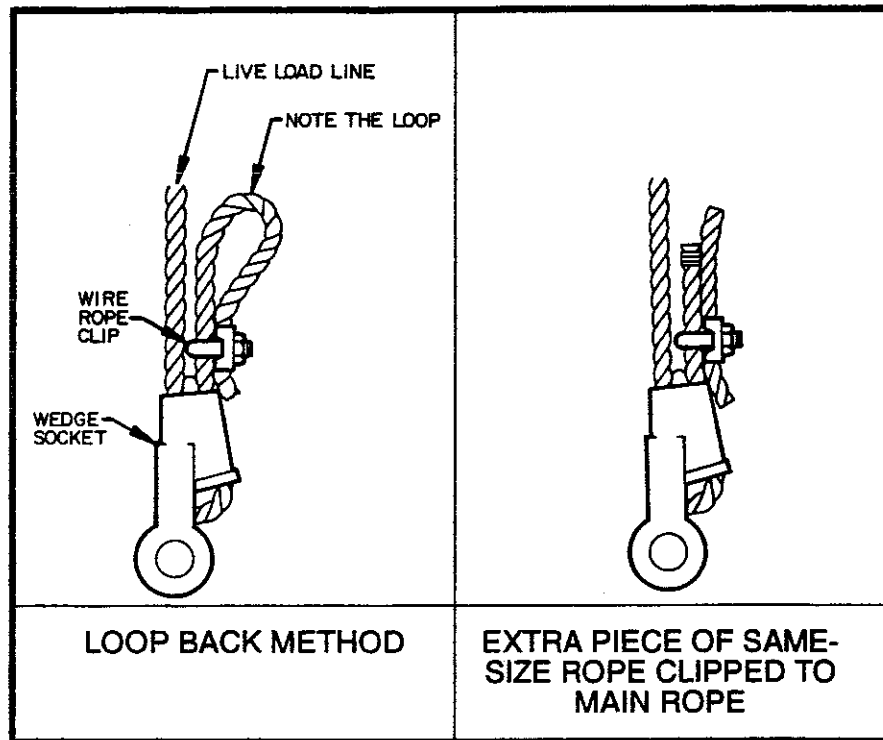


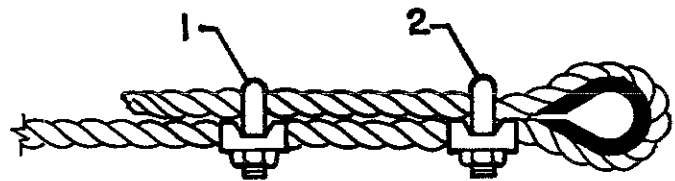
Figure H-2. Approved Wedge Socket Attachment Methods

CABLE THIMBLE ATTACHMENT

When attaching a cable thimble to a winch wire rope, proceed as follows and refer to Figure H-3.

1. Note that the base of the clip is applied to the live end of the rope and the U-bolt is applied to the dead end.
2. Attach the first clip (item 1) so the U-bolt is no less than the clip base width from the dead end of the rope.

3. Attach the second clip (item 2) as near the loop as possible.



WIRE ROPE DIAMETER (in.)	MINIMUM NO. OF CLIPS	AMOUNT OF ROPE TO TURN BACK (in.)	SPACE BETWEEN CLIPS (in.)	TORQUE (FT-LBS)
1/4"	2	4-3/4"	3-1/4"	15
5/16"	2	5-1/4"	3-1/4"	30

Figure H-3. Approved Cable Thimble Attachment Method

Section 8A. HOOK PRECAUTIONS

GENERAL

Crane hooks are designed and manufactured to lift specific loads. The specified Rated Load of a hook applies to loads held uniformly in direct tension and does not take into account shock loads, hook tip loading, side loading, bending, torsional or related loads.

The Rated Load applies to new and unused hooks; age, type of service and environmental conditions can alter a hook's ability to handle these loads. Testing of the hook should be performed periodically to assure that the hook is in sound condition.

Hook material is designed to permanently deform before a failure occurs. Manufacturer's identification is normally forged, cast or stamped in the hook but the rated load may not necessarily be shown on the hook. Contact the manufacturer of the hook if in doubt about its suitability for your application.

For complete information on hook safety, see Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings (ANSI/ASME B30.10).

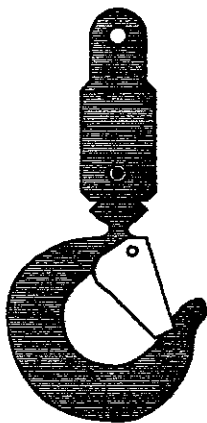
LATCHES

It is advisable to use a hook equipped with a latch at all times except when a latch proves impractical or poses a danger in your particular application. The latch is used to retain such items as slings and chains under slack conditions.

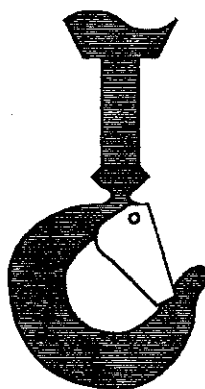
Hook latches, for loose sling retention, are not anti-fouling devices. They must never be allowed to support any portion of the load. Hook latches must be inspected for damage just as the hook is to be inspected. Is the latch in place and properly centered on the hook?

Hook latches should never be "crowded" by over-sized rope or stiff riggings. Make certain the load is properly seated on the "bowl-saddle" before a lift is attempted.

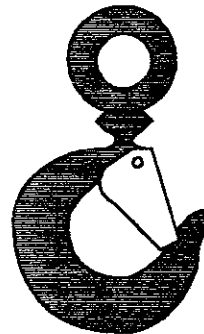
See HOOK INSPECTION for additional information.



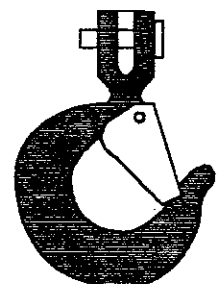
**SWIVEL
HOOK**



**SHANK
HOOK**



**EYE
HOOK**



**CLEVIS
HOOK**

NOTE: All hooks shown with Latch.

Figure H1-1. Common Hooks

HOOK SWIVELS

Hook swivels prevent a load from twisting caused by a natural tendency for wire rope to unwind under load. These swivels, usually a part of the hook, are fitted with bearings to provide for rotation. Regular lubrication of the swivel bearings is extremely important and is normally applied by way of a grease zerk located on the swivel.

HOOK PRECAUTIONS

DO NOT attempt lifting a load which is larger than the load rating of the hook.

NEVER use a hook's yield point as an indicator of its capacity.

DO NOT use a hook to lift personnel. IMT prohibits the transport of personnel on any load, wire, or rope attachment.

Read and understand all information, maintenance instructions and safety warnings which accompany the hook and related attachments.

Know the **RATED LOAD** of the hook in use. This information may be attached to the hook, if not, contact the manufacturer.

Contact the hook manufacturer if in doubt about a hook's serviceability.

Use hooks designed for your particular application (salt water exposure, etc.).

NEVER weld attachments to a finished hook in field applications. The heat from the welding process will alter and destroy the design properties of the hook material.

Center the load in the base (bowl-saddle) of the hook to prevent applying load to the point.

AVOID shock loading.

DO NOT apply side loads on a hook.

DO NOT apply back loads on a hook.

DO NOT apply loads of any nature on a latch device.

DO NOT place hands, fingers or body between a hook and the load.

Inspect regularly for excessive wear and maintain the hook in safe operating condition.

If not qualified, arrange for testing and analysis of the hook with the manufacturer or qualified repair facility.

Worn components do not provide the same safe working limits as a new hook.

Painted hooks, if suspected of defects, should be stripped of paint before inspection.

DO NOT paint over nameplates, warning decals or placards.

Replace any missing placards which may have been a part of the hook by contacting the manufacturer for replacement.

CHECK wedge sockets after a jolt or impact for a dislodged wedge.

CAUTION

THE CRIMPING EFFECT OF WEDGE SOCKETS CAN REDUCE THE SAFE WORKING LIMIT OF A LINE BY AS MUCH AS 30%.

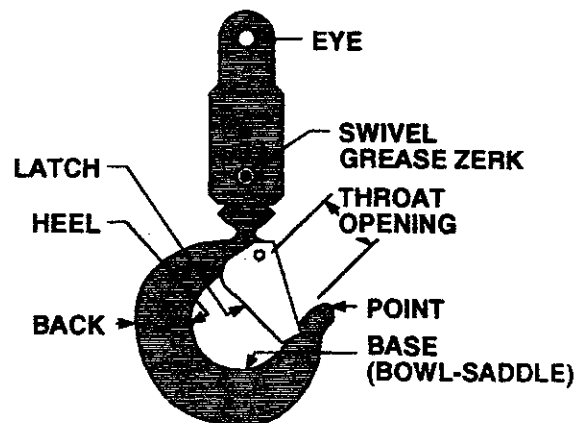


Figure H1-2. Hook Terminology

HOOK INSPECTION

Inspections and record keeping requirements for hooks shall be governed by the kind of equipment the hooks are used on. When the inspection requirements for hooks are specified in regulations applicable to your equipment, those regulations will take precedence over the information presented here.

NEW AND REPAIRED HOOKS

Prior to initial use, all new and repaired hooks shall be inspected to assure compliance with the items listed in the INSPECTION CHECKLIST.

HOOKS IN REGULAR USE

Inspection of hooks in regular use is to be performed in one of either of two methods; FREQUENT or PERIODIC, as described below.

HOOKS NOT IN REGULAR USE

Hooks not in regular use should be inspected before they are returned to service. See INSPECTION CHECKLIST.

METHODS OF HOOK INSPECTION

	FREQUENT INSPECTION	PERIODIC INSPECTION
MEANS	VISUAL EXAMINATION BY THE OPERATOR OR DESIGNATED PERSON.	VISUAL INSPECTIONS BY AN APPOINTED PERSON
RECORDS	RECORDS OF THE INSPECTION ARE NOT REQUIRED	RECORDS OF APPARENT EXTERNAL HOOK CONDITIONS ARE TO BE MADE TO PROVIDE THE BASIS FOR CONTINUING HOOK EVALUATION.
NORMAL SERVICE Less than 85% of rated load except for isolated instances.	MONTHLY	YEARLY
HEAVY SERVICE 85% to 100% of rated load on a regular basis.	WEEKLY TO MONTHLY	YEARLY - UNLESS HOOK CONDITIONS INDICATE A NEED FOR DETAILED INSPECTION
SEVERE SERVICE 85% to 100% of rated load regularly and under environmental conditions unfavorable, harmful or detrimental to the hook.	DAILY TO WEEKLY	QUARTERLY - AS ABOVE UNLESS DETAILED INSPECTION SHOWS A NEED FOR NON-DESTRUCTIVE TESTING.
SPECIAL or INFREQUENT SERVICE	AS AUTHORIZED BY A QUALIFIED PERSON AND BEFORE AND AFTER EACH PERIOD OF SERVICE WITH RECORDS MADE OF THE OPERATION	AS AUTHORIZED BY A QUALIFIED PERSON AND BEFORE THE FIRST PERIOD OF SERVICE AND AS DIRECTED BY THE QUALIFIED PERSON FOR ANY SUBSEQUENT OPERATION.

HOOK INSPECTION CHECKLIST

CHECK FOR:	REASON TO REMOVE HOOK FROM SERVICE (See Note 1)
DISTORTION BENDING TWISTING	A bend or twist exceeding 10° from the plane of the unbent hook.
INCREASED THROAT OPENING	HOOK WITHOUT LATCH: An increase in throat opening exceeding 15% (Or as recommended by the manufacturer) HOOK WITH LATCH: An increase of the dimension between a fully-opened latch and the tip section of the hook exceeding 8% (Or as recommended by the manufacturer)
WEAR	If wear exceeds 10% of the original sectional dimension. (Or as recommended by the manufacturer)
CRACKS, NICKS, GOUGES	Repair of cracks, nicks, and gouges shall be carried out by a designated person by grinding longitudinally, following the contour of the hook, provided that no dimension is reduced more than 10% of its original value. (Or as recommended by the manufacturer) (A qualified person may authorize continued use if the reduced area is not critical.)
LATCH ENGAGEMENT DAMAGE MALFUNCTION	If a latch becomes inoperative because of wear or deformation, and is required for the service involved, it shall be replaced or repaired before the hook is put back into service. If the latch fails to fully close the throat opening, the hook shall be removed from service or "moused" until repairs are made.
HOOK ATTACHMENTS & SECURING MEANS	If any indication of distortion, wear, cracks, nicks or gouges are present unless a qualified person authorizes their use. (Or as recommended by the manufacturer)

NOTE 1: Hooks having any of the listed deficiencies shall be removed from service unless a qualified person approves their continued use and initiates corrective action. Hooks approved for continued use shall be subjected to periodic inspection.

NOTE 2: See DEFINITIONS for added information.

HOOK TESTING

Hooks should be tested at least once a year by magnafluxing, X-ray, or other qualified method (See DEFINITIONS, TEST).

Intermittent tests can be conducted by the readily available, though less accurate, oil stain method, as follows:

1. Immerse hook into lube oil.
2. Wipe hook dry.
3. White-wash hook surface.
4. Inspect hook for seepage of white-wash into fractures.

DEFINITIONS (Per ANSI/ASME B30.10-1982)**ABNORMAL OPERATING CONDITIONS**

Environmental conditions that are unfavorable, harmful, or detrimental to or for the use of a hook.

ADMINISTRATIVE OR REGULATORY AUTHORITY

Governmental agency or the employer in the absence of governmental jurisdiction.

APPOINTED

Assigned specific responsibilities by the employer or the employer's representative.

CRACK

A crevice-type discontinuity in material.

DESIGNATED

Selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

FORGING LAP

A condition caused by folding over metal and then forging into the material surface without cohesion.

HOT TEAR

A condition caused by the rupture of metal while cooling from a plastic state to the solid state.

LATCH

A mechanical device used to close the throat opening of a hook.

LOAD

The total weight imposed on the hook.

LOAD, PROOF

The specific load applied in performance of the proof test.

LOAD, RATED

The maximum allowable working load.

MOUSE

Using rope or wire to close the opening of a hook for the purpose of retaining sling under slack conditions.

NICK or GOUGE

Sharp notch in hook surface which may act as stress raiser in the area of the notch.

QUALIFIED

A person who, by possession of a recognized degree, certificate of professional standing or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work.

SEAM

A crack-like discontinuity caused by rolling or working in defects.

SERVICE, HEAVY

Service that involves operating at 85% to 100% of rated load as a regular specified procedure.

SERVICE, NORMAL

Service that involves operating at less than 85% of rated load except for isolated instances.

SERVICE, SEVERE

Heavy service coupled with abnormal operating conditions.

TEST, DYE PENETRANT

A nondestructive test method for detecting surface discontinuity based on capillary action. A liquid penetrant is applied to the surface; the excess penetrant is then removed and any subsequent bleeding indicates seams, laps, or cracks.

TEST, MAGNETIC PARTICLE

A nondestructive test method for revealing discontinuities in ferromagnetic materials by means of finely divided magnetic particles applied to the magnetized part.

TEST, PROOF

A nondestructive load test made to verify construction and workmanship of the hook.

TEST, RADIOGRAPHY

A nondestructive test employing x-ray or gamma radiation for revealing internal discontinuities in the material.

TEST, ULTRASONIC

A nondestructive test method for revealing discontinuities in dense homogenous materials by means of acoustic waves or frequencies above the audible range.

Section 9. CAPACITY PLACARDS

CRANE CAPACITY PLACARDS

Your IMT crane is designed for specific loads. Those loads are described on the capacity placard which is mounted near the normal operator's station. 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 capacities 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 SERIOUS INJURIES OR DEATH.

Capacity placards for telescoping and articulating cranes vary in their graphic representation of load limits while presenting load ranges (See Figures I-4 and I-5 for comparison). Any load handling equipment such as hooks, cables and attachments must be added to the weight of the load being lifted. As these attachments vary widely, it is the operator's responsibility to account for their added weight.

Other variables which must be accounted for and considered in the amount of weight being lifted are conditions of the surface supporting the outrigger and carrier vehicle, wind speed, out-of-level positioning of the vehicle or crane, and variations in operating speed.

CAPACITY CONDITIONS

The capacity placard information is based on the crane, winch, cable and outriggers being structurally sound and a stability tipping factor of 85%.

Conditions which must be met to provide for stated capacity placard ratings are as follows:

1. Outriggers fully extended and outrigger pads firmly contacted with a solid, stable and level surface.
2. The crane has been installed on a factory approved vehicle and in a factory approved fashion.

3. The carrier vehicle's tires are properly inflated.
4. Any load handling devices have been added to the weight being lifted.
5. Extreme wind velocities are not present.
6. The crane is operated in a smooth and controlled manner.
7. Any required counterweights have been added.

USING THE CAPACITY PLACARD (ARTICULATING CRANES)

Perform the following steps before a load is lifted (Refer to Figure I-4):

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 will be 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.
7. Refer to the crane's capacity placard and determine within which range the lift will be accomplished.
8. Refer to the capacity of that range to be certain the load being lifted does not exceed the crane's capacity within that range.
9. If a winch is used for the lift, make certain the load does not exceed the winch or winch line capacity. See Figures I-1, I-2 and I-3.

USING THE CAPACITY PLACARD (TELESCOPING CRANES)

Perform the following steps before a load is lifted:

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 will be 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.
7. Determine at what angle the crane will be operated (for example 30°, 45°, etc.) by referencing the angle indicator on the lower boom.
8. Make certain that 2-part line is used for any lift which requires 2-part line. See Figures I-1 and I-2.

See Figure I-5 for reference.

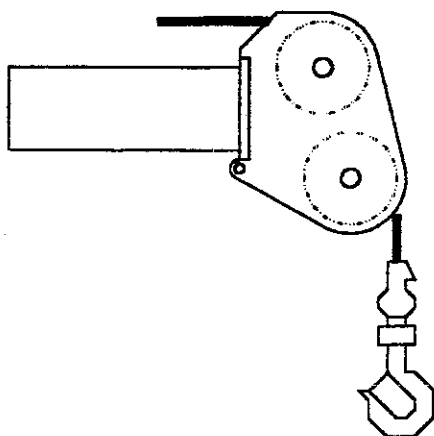


Figure I-1. One-Part Line Configuration

WARNING

Winchs rigged with single or multi-part lines may have the ability to exceed crane capacities. Refer to the crane's capacity placard noting the angle required for the lift and the range of the lift at that angle. Make certain the total load being lifted does not exceed the crane's capacity at that angle and range.

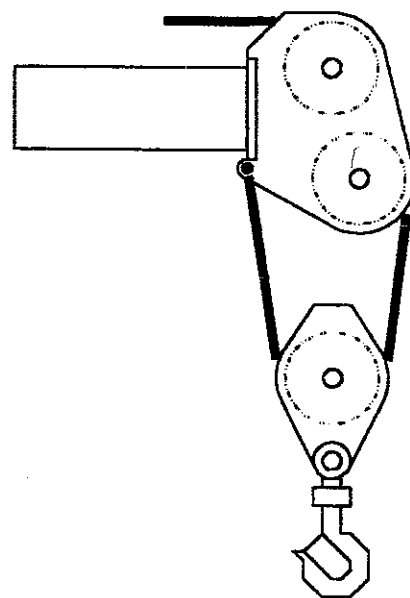


Figure I-2. Two-Part Line Configuration

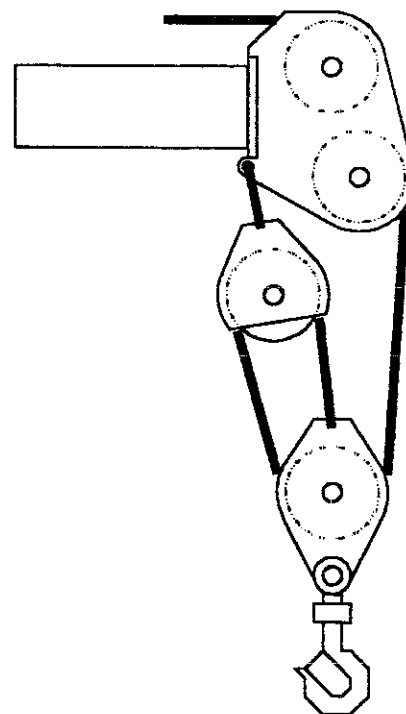
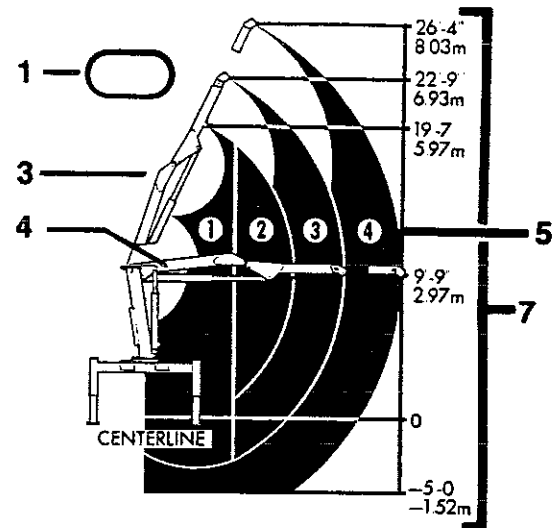


Figure I-3. Three-Part Line Configuration

NOTE

THE CAPACITY PLACARD SHOWN ON THIS PAGE IS AN EXAMPLE ONLY! THE CAPACITIES ARE NOT INTENDED FOR USE ON ANY PARTICULAR CRANE.



Working loads will be limited to those shown. Deduct the weight of load handling devices.

RANGE	REACH	CAPACITY	RANGE	REACH	CAPACITY
1	6'-0"	8,000 LBS.	3	13'-5"	3,600 LBS.
	1.83m	3,629 KG.		4.09m	1,633 KG.
2	10'-0"	4,800 LBS.	4	17'-5"	2,700 LBS.
	3.05m	2,177 KG.		5.31m	1,225 KG.

1. Crane model number.
2. This note is a reminder that it is necessary to add the weight of load handling devices to the weight of the object being lifted in order to derive the actual total load being lifted.
3. Crane booms shown at their maximum elevation.
4. Crane booms shown at their maximum reach from centerline of rotation.
5. Range designation (1, 2, 3, 4) which are to be compared to the range capacity chart shown as item 6. Range 1 indicates a load attached to the outer boom hook and kept within a distance of 6'-0" (1.83 meters) from the centerline of rotation. Range 2 indicates a load attached to the outer boom hook but operated through its maximum range of 10'-0" (3.05 meters) from centerline of rotation. Range 3 indicates a load attached to the fully retracted extension boom at a maximum distance from centerline of rotation of 13'-5" (4.09 meters). Range 4 indicates a load attached to the fully extended extension boom at the cranes maximum range of 17'-5" (5.31 meters).
6. The load/range chart indicates the maximum total load allowable within specified ranges. For example: any lift within Range 3 will be limited to 3600 pounds (1633 kilograms) at 13'-5" from centerline of rotation. See Note 1, 2 and 3.
7. Lifting height reference dimensions from ground level. If your crane is mounted on other than a normal carrier vehicle, add or subtract variances to or from these dimensions. See Note 2

Note 1. Capacities are normally shown in pounds first with their converted metric equivalent in kilograms also listed.

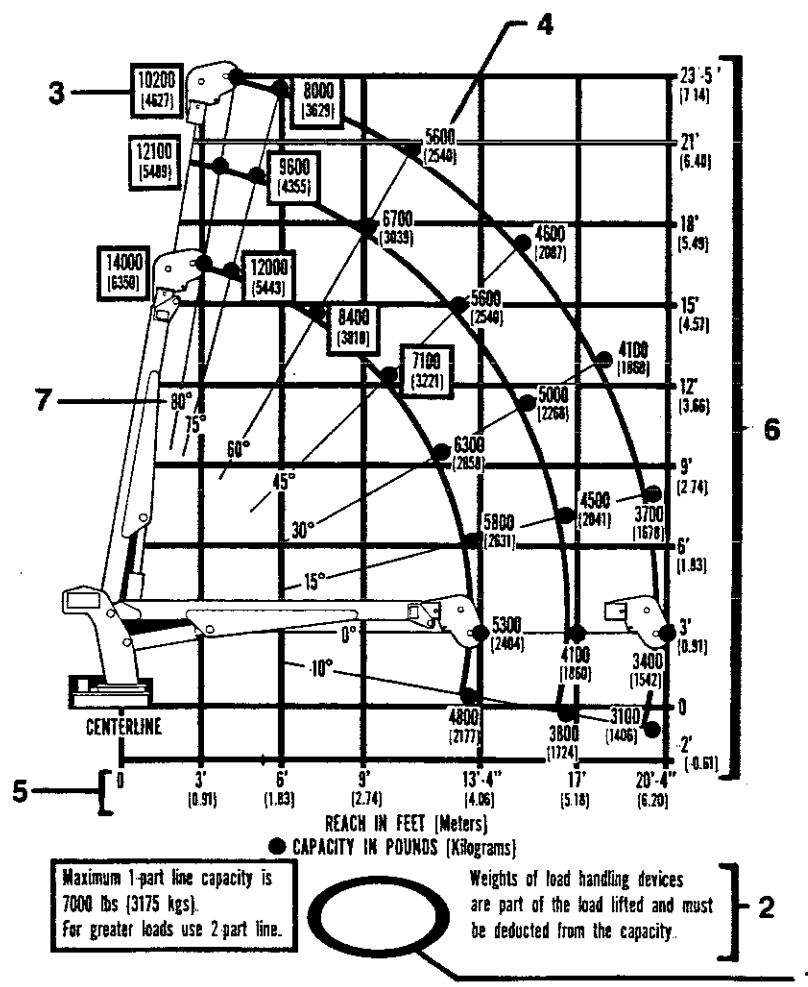
Note 2. Dimensions are normally shown in feet and inches first with their converted metric equivalent in meters also listed.

Note 3. Occasionally capacity placards may contain translations of the English language in French, Spanish, etc.

Figure I-4. Articulating Crane Capacity Placard Description

NOTE

THE CAPACITY PLACARD SHOWN ON THIS PAGE IS AN EXAMPLE ONLY! THE CAPACITIES ARE NOT INTENDED FOR USE ON ANY PARTICULAR CRANE.



1. Crane model number.
 2. This note is a reminder that it is necessary to add the weight of load handling devices to the weight of the object being lifted in order to derive the actual total load being lifted.
 3. Capacities which are "boxed" indicate crane capacities which exceed 1-part line capabilities. To lift these maximum loads in these ranges, it is necessary to use 2-part line. See Note 1.
 4. Capacities which are not "boxed" are within 1-part line limits. See Note 1.
 5. Distances from centerline of rotation to various lifting points. See Note 2.
 6. Lifting height reference dimensions from base of crane. The mounting height of the crane must be added to these dimensions to determine accurate vertical heights. See Note 2.
 7. Crane boom angle reference figures. The angle of the lower boom as shown by the angle indicator on the lower boom should be compared to these figures.
- Note 1 Capacities are normally shown in pounds first with their converted metric equivalent in kilograms also listed.
- Note 2 Dimensions are normally shown in feet and inches first with their converted metric equivalent in meters also listed.
- Note 3 Angles are shown in degrees from horizontal.
- Note 4 Occasionally capacity placards may contain translations of the English language in French, Spanish, etc.

Figure I-5. Telescoping Crane Capacity Placard Description

CRANE STABILITY

Included with a factory installed crane is a completed stability chart. Any installer, other than IMT, also has the responsibility to complete a stability chart. Cranes are tested for stability to 85% of "tipping". "Tipping" refers to the crane actually tipping with its opposite outrigger and tires having broken contact with the surface. The Stability Test is per SAE J765A.

Figures entered on the stability chart are for a specific truck and crane combination. If the crane or vehicle are modified or replaced with another, then it is necessary to recalculate stability.

Crane stability is calculated on a testing area which is flat, hard and level. Factors which must also be taken into account before crane operation include the presence of wind, less than ideal surface conditions, tire inflation pressures and careful, controlled crane operation. All of these conditions can have an affect on stability.

By referring to the stability chart for your crane/chassis combination, it is possible to determine the loads permitted in the derated load range of your crane.

If it is absolutely necessary to perform a lift within the derated load capacity zones (Y or Y₁), proceed as follows:

1. Determine the distance from centerline of rotation to the centerline of the load being lifted.
2. Determine the distance from centerline of rotation to the centerline of where the load is to be moved to.
3. The actual distance used should be figured as the larger of items 1 and 2 above.
4. Refer to the crane's capacity placard and determine within which range the lift will be accomplished.
5. Refer to the capacity of that range and multiply that figure by the derated capacity percentage (Z or Z₁).
6. Make certain that the weight of the load plus any load handling devices does not exceed that figure.

EXAMPLE

If Z% = 70% and crane capacity at the desired range = 2000 lbs then:

$$.70 \times 2000 \text{ lbs} = 1400 \text{ lbs}$$

Thus, even though the crane is rated for 2000 lbs at that particular range, by making the lift within the derated load capacity zone the load is not to exceed 1400 lbs.

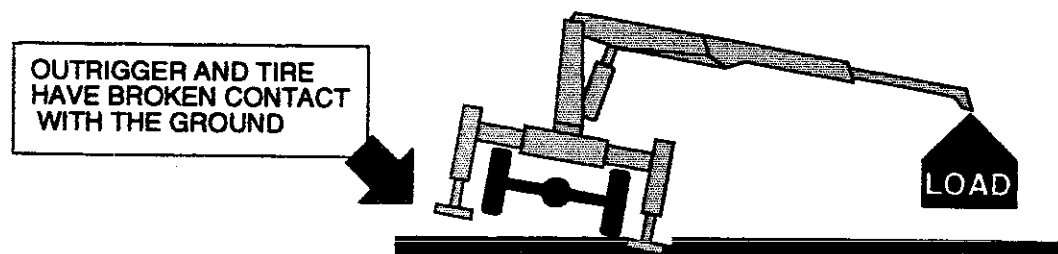


Figure I-6. Crane Instability

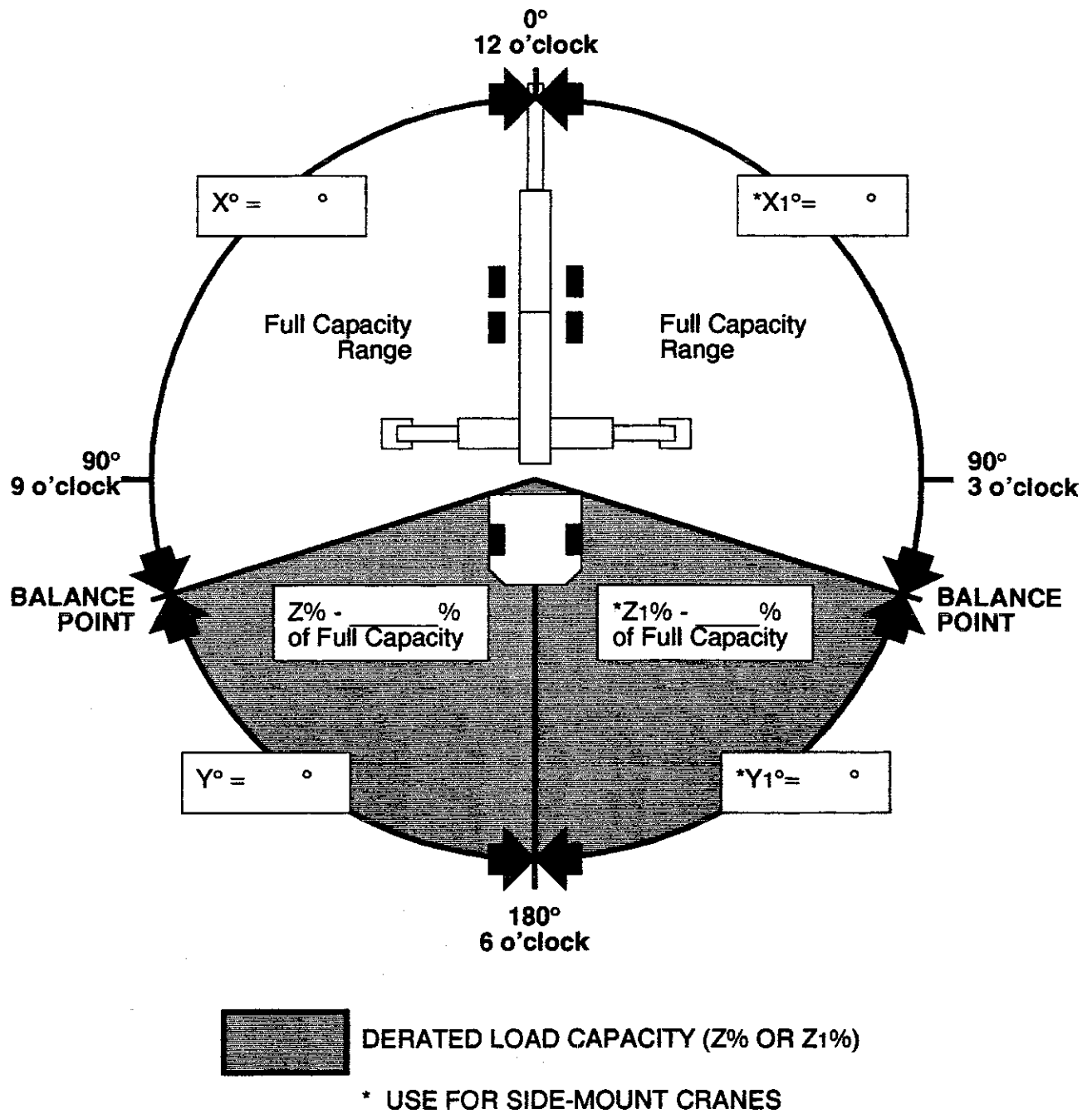


Figure I-7. Stability Chart (Simplified)

Section 9A. CAPACITY ALERT SYSTEMS

CRANE CAPACITY ALERT SYSTEM (ELECTRICALLY OPERATED)

IMT provides an electrically operated capacity alert system on all of its field service, telescoping, stick-boom cranes. This system is designed to prevent loads from being lifted which exceed the rated capacity of the crane.

The capacity alert system consists of a pressure switch mounted on the lift side of the lower boom cylinder which senses hydraulic pressure. It is connected electrically to the lift side of the winch, the extend side of the extension boom, and the down side of the lower boom.

If an operator attempts to lift a load which exceeds the rated capacity of the crane, the capacity alert system will be activated. When activated, it will prevent the winch from lifting, the extension boom from extending, and the lower boom from being lowered.

To resume operation of the crane when the capacity alert system is activated, the winch may be lowered or the extension boom retracted. Being able to lower the winch will give the operator the opportunity to reevaluate the load and adjust it. Retracting the extension boom will move the load closer to the centerline of rotation and within acceptable limits of load capacity.

It is important that this system be maintained in good operating condition at all times. Wiring should be checked on a regular basis for loose connections, corrosion and broken wires. The manifold should be checked for leakage from its o-ring seal. The pressure switch is available through IMT and its distributors and easily replaced.

See Figure I1-1 for general electrical wiring reference and refer to your particular crane manual for specific information on parts and wiring.

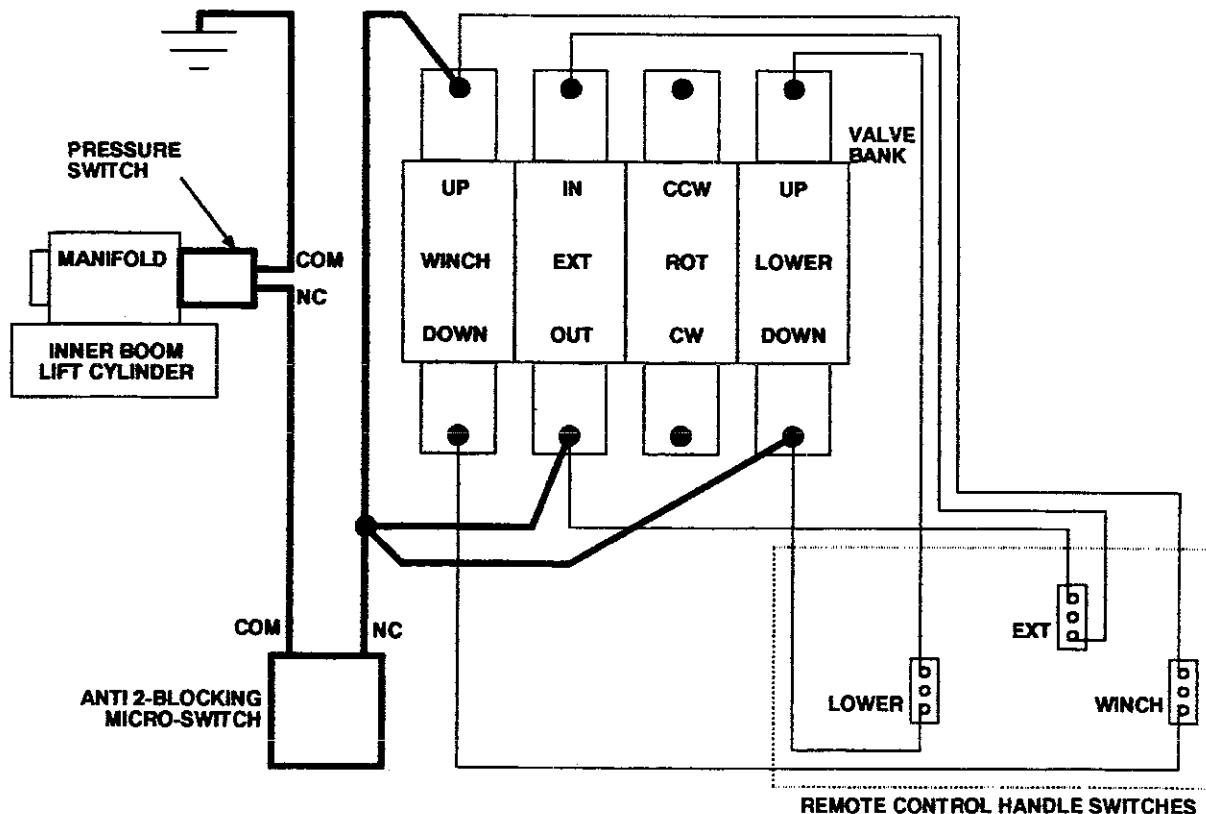


Figure I1-1. General Capacity Alert System Wiring Diagram (Electrical)

CAPACITY ALERT SYSTEM (HYDRAULICALLY OPERATED)

IMT provides a hydraulically operated capacity alert system on cranes designed for wallboard handling. The system is designed to prevent loads from being lifted which exceed the rated capacity of the crane.

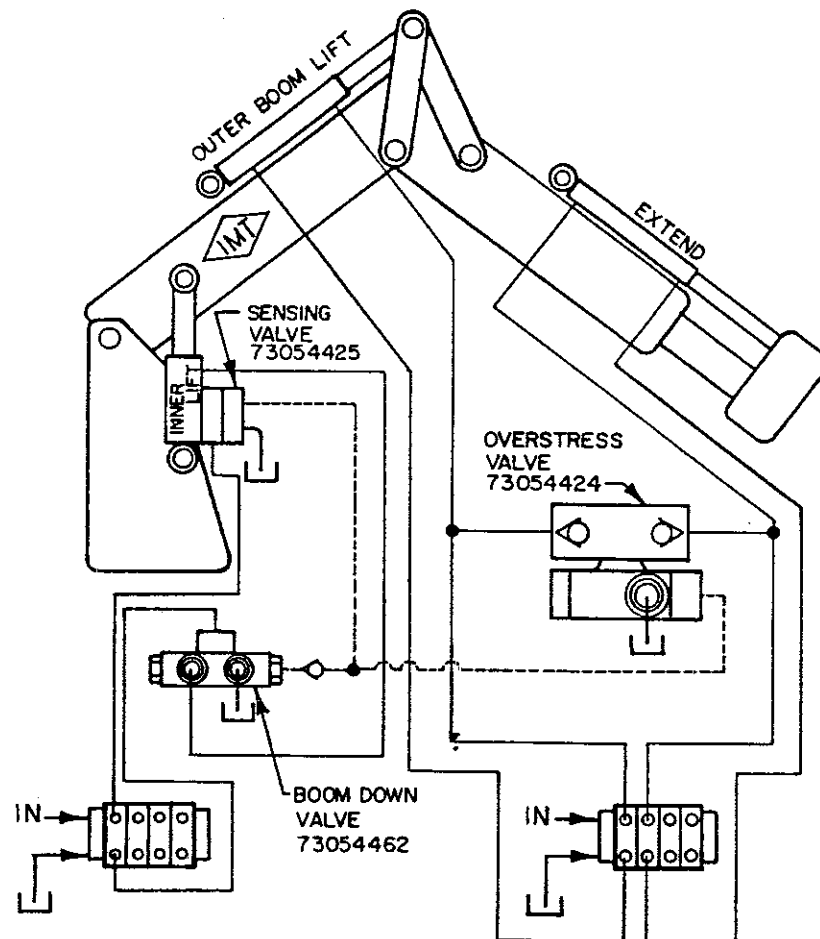
The capacity alert system, consisting of a sensing valve, overstress valve, and a boom-down valve, senses the inner boom lift cylinder pressure and disables the offending function when the cylinder pressure reaches a preset level.

If an operator attempts to lift a load which exceeds the rated capacity of the crane, the

system prevents the operator from raising the outer boom, lowering the inner boom or extending the extension boom. The operator will be able to lower the outer boom or retract the extension boom, but will not be able to work these functions both ways until the inner boom cylinder pressure has been lowered below the preset level. The sensing valve is typically set at 10% over system pressure.

It is important that this system be maintained in good operating condition at all times. All hydraulic lines and fittings should be checked regularly for leakage. Refer to the Capacity Shut-Down System Troubleshooting Guide and your particular crane manuals for specific information.

See Figure I1-2 for a diagram of the system.



NOTES:

One sensing valve controls two dump valves.

The boom down valve is plumbed in a 3-way configuration.

Figure I1-2. General Capacity Alert System Diagram (Hydraulic)

CRANE CAPACITY AUDIBLE ALERT SYSTEM (ELECTRICALLY OPERATED)

IMT provides an electrically operated capacity audible alert system on its articulating cranes. This system is designed to inform the operator, by audible means, when a load is being lifted which exceeds the rated capacity of the crane.

This capacity alert system consists of a pressure switch mounted on the lift side of the inner boom lift cylinder which senses hydraulic pressure. It is to be connected electrically to an audible warning device such as the truck chassis horn.

If an operator attempts to lift a load which exceeds the rated capacity of the crane, the audible warning device will be activated.

To eliminate the overload condition, the winch may be lowered or the extension boom retracted. Being able to lower the winch will give the operator the opportunity to reevaluate the load and adjust it. Retracting the extension boom will move the load closer to the centerline of rotation and within acceptable limits of load capacity.

The overload condition can also be eliminated by lowering the outer boom in those instances when, by doing so, it will bring the load closer to the centerline of rotation and within acceptable limits of load capacity.

It is important that this system be maintained in good operating condition at all times. Wiring should be checked on a regular basis for loose connections, corrosion and broken wires. The manifold should be checked for leakage from its o-ring seal. The pressure switch is available through IMT and its distributors and easily replaced.

See Figure I1-3 for general electrical wiring reference and refer to your particular crane manual for specific information on parts and wiring.

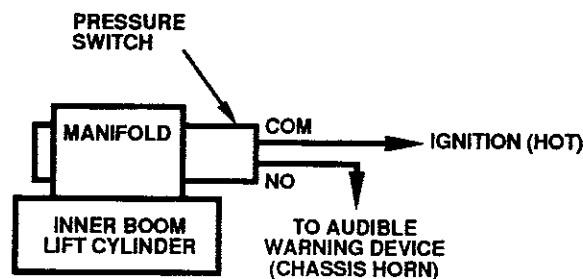


Figure I1-3. General Capacity Audible Alert System Wiring Diagram

Section 10. OPERATIONAL REFERENCE

EXTENSION BOOM SEQUENCE

Extension booms are to always be extended in their proper sequence, largest to smallest. NEVER extend booms out of sequence.

Extension booms are to always be retracted in their proper sequence, smallest to largest. NEVER retract booms out of sequence.

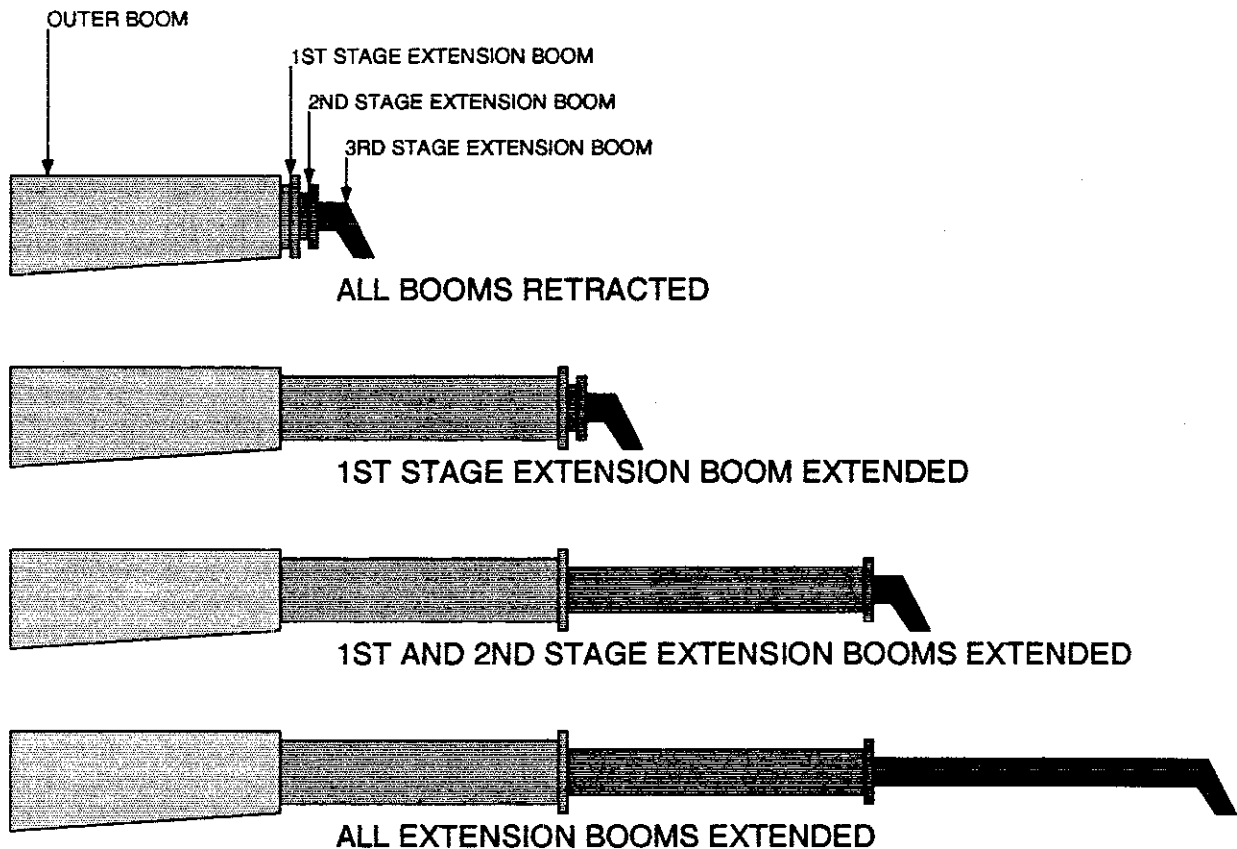


Figure J-1. Proper Extension Boom Deployment

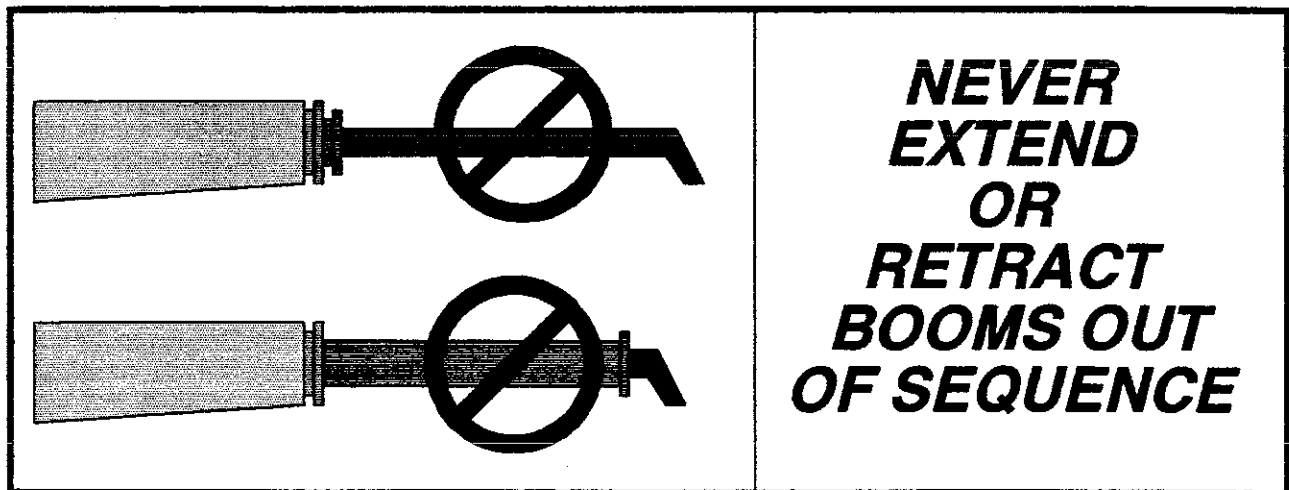


Figure J-2. Improper Extension Boom Deployment

ANTI TWO-BLOCKING DEVICE

IMT telescoping cranes using a winch are equipped with an Anti Two-Blocking Device which is designed to provide a method of sensing an approaching Two-Blocking situation and prevent the crane from entering that situation. It is the operator's responsibility to avoid Two-Blocking and not to rely on this device alone. The device must be checked daily for proper operation.

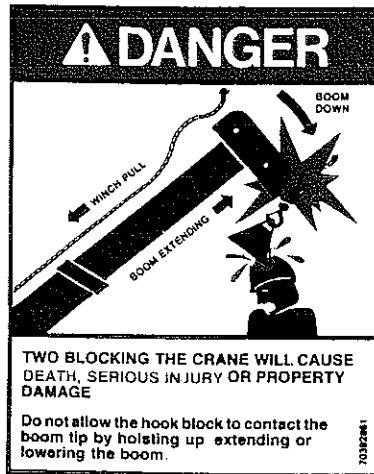


Figure J-3. Two-Blocking Decal

NOTE

"Two-Blocking" is the condition in which the lower load block or hook assembly comes in contact with the upper load block or boom point sheave assembly.

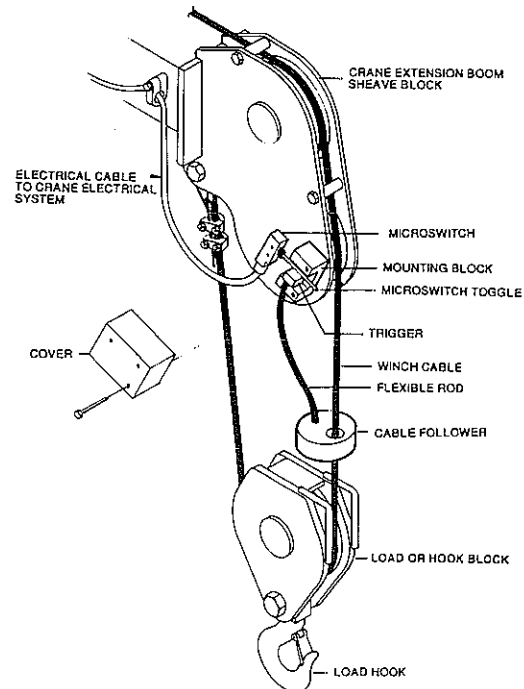


Figure J-4. Anti Two-Blocking Device Components

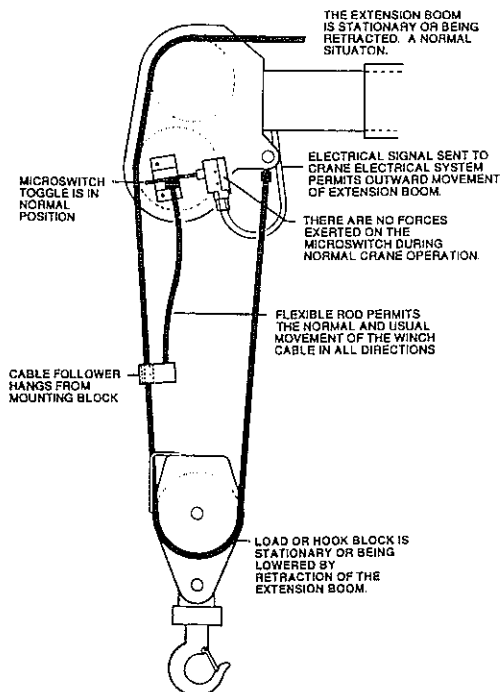


Figure J-5. Normal Work Position

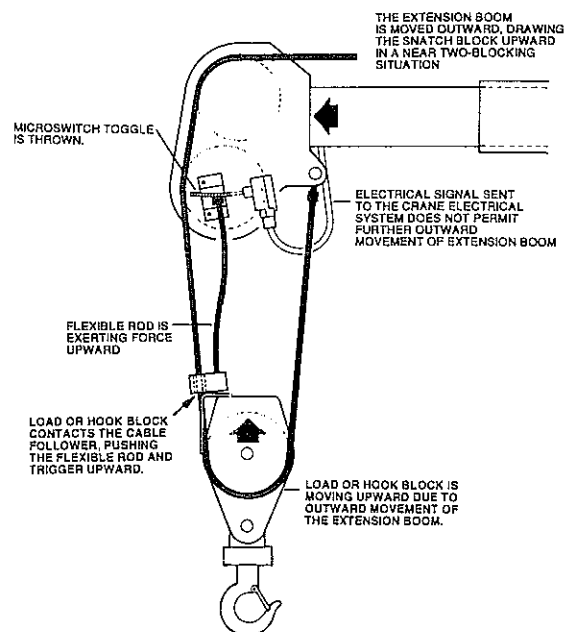


Figure J-6. Approaching Two-Blocking Situation

FIGURE-FOUR FOLDING CRANES

The Figure-Four folding cranes can be considered as self-storing as the inner, outer and extension booms are stored within the mast structure. Although this feature provides convenience of storage it also requires special safety considerations during the act of folding and unfolding. Figures J-7, J-8 and J-9 illustrate the steps to be taken during these procedures.

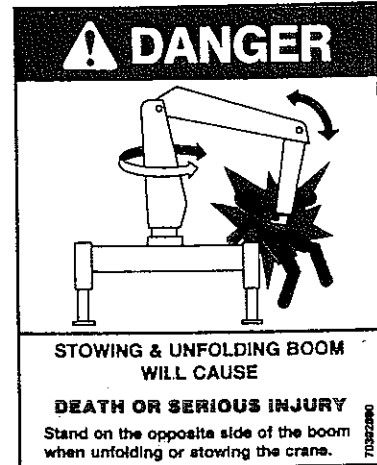


Figure J-7. Stow/Unfold Decal

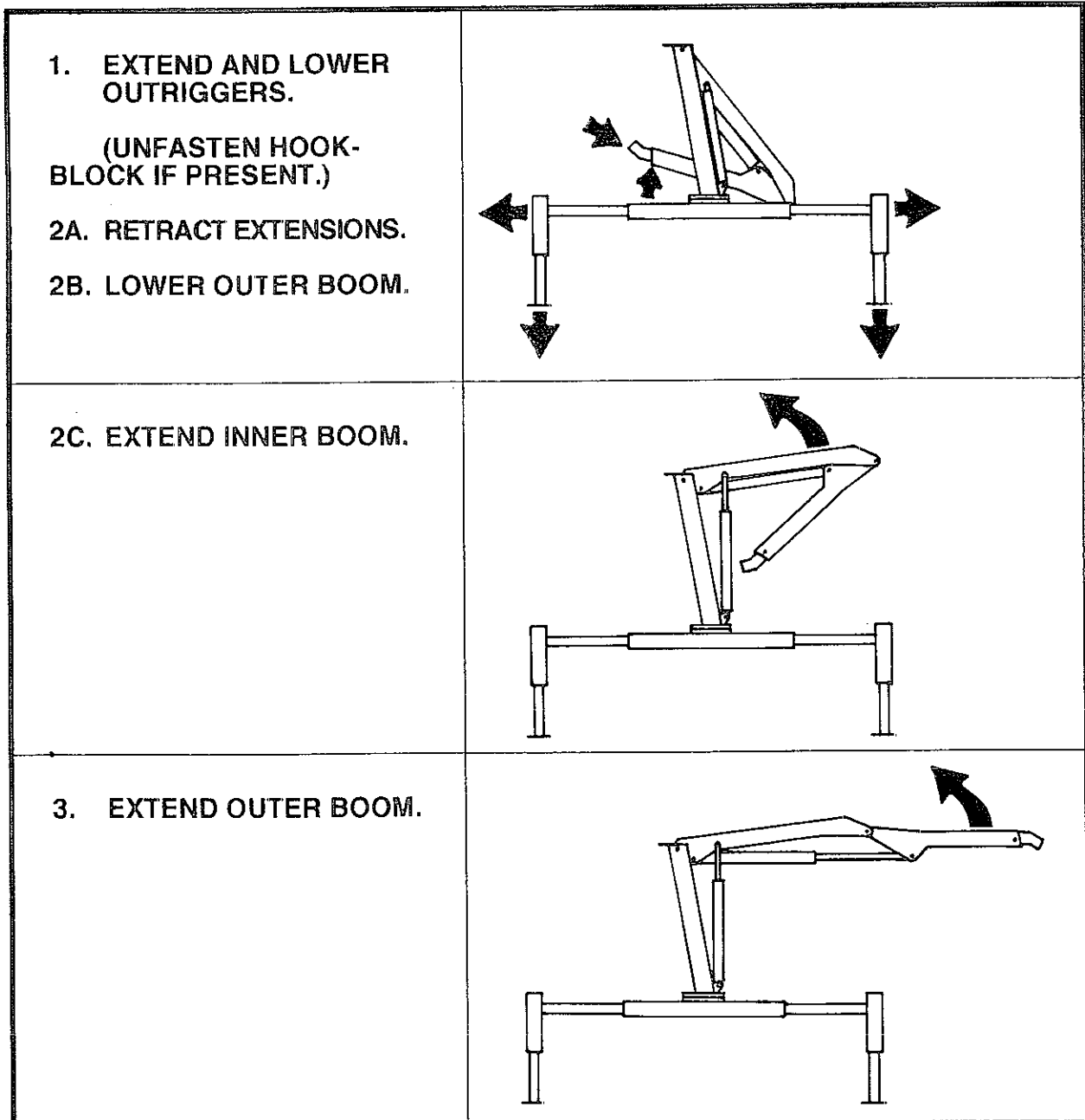


Figure J-8. Unfolding Sequence

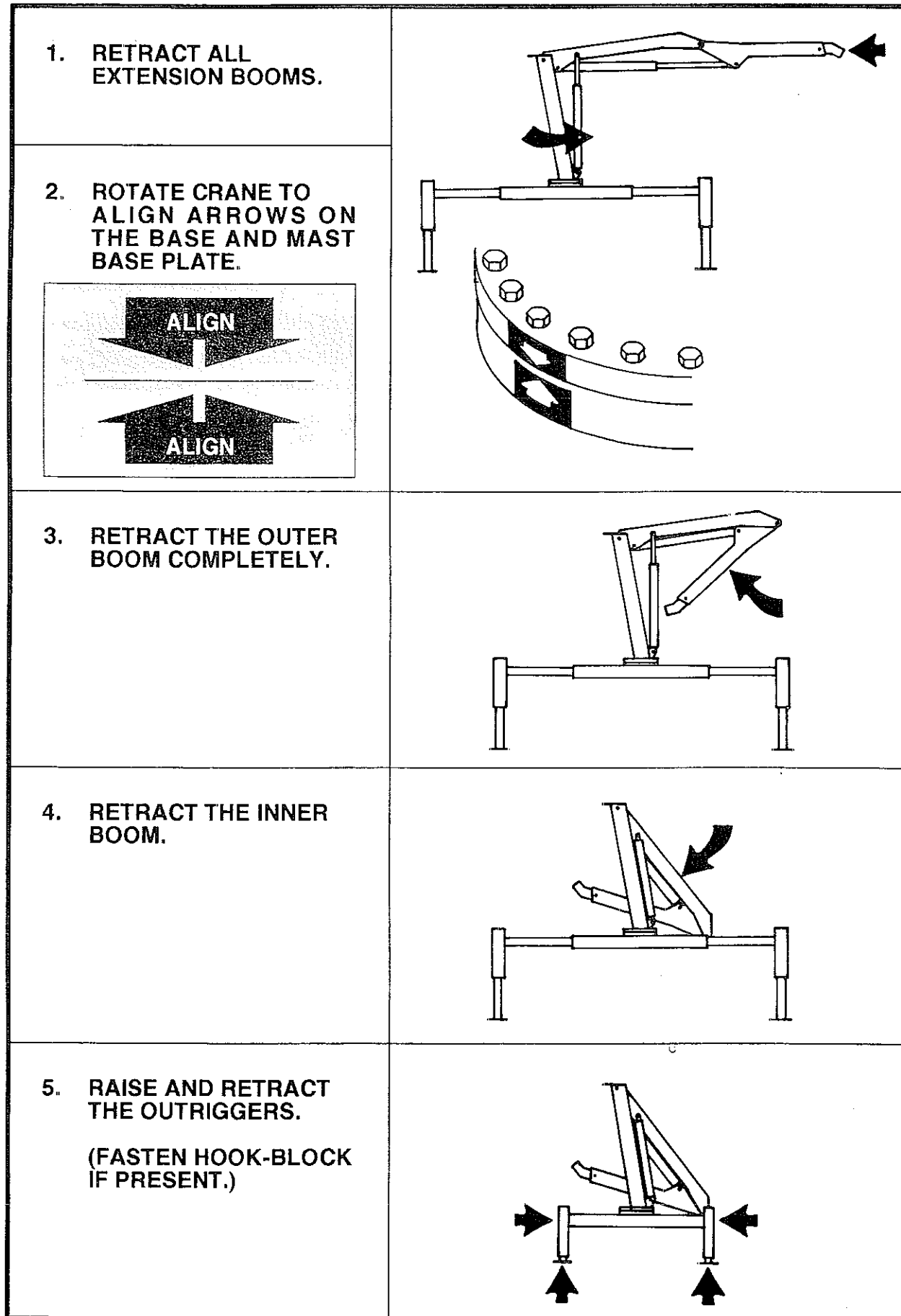


Figure J-9. Folding Sequence

STOWING TELESCOPING CRANES

Telescoping cranes are normally stowed in a boom support device as shown in Figure J-10. The boom support provides a saddle which supports the lower boom and also prevents the boom from lateral movement. The boom support also provides for crane hook attachment to prevent the crane hook from swing during travel. ALWAYS stow the crane in the boom support before travel.

WARNING

WHEN STORING A CRANE FOR LONG PERIODS OR JUST FOR OVERNIGHT, PUT THE CRANE IN ITS DESIGNED STOWING POSITION. REMOVE THE IGNITION KEYS AND LOCK THE CARRIER VEHICLE TO PREVENT UNAUTHORIZED OPERATION OF THE CRANE AND ASSOCIATED EQUIPMENT. UNAUTHORIZED USE CAN RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

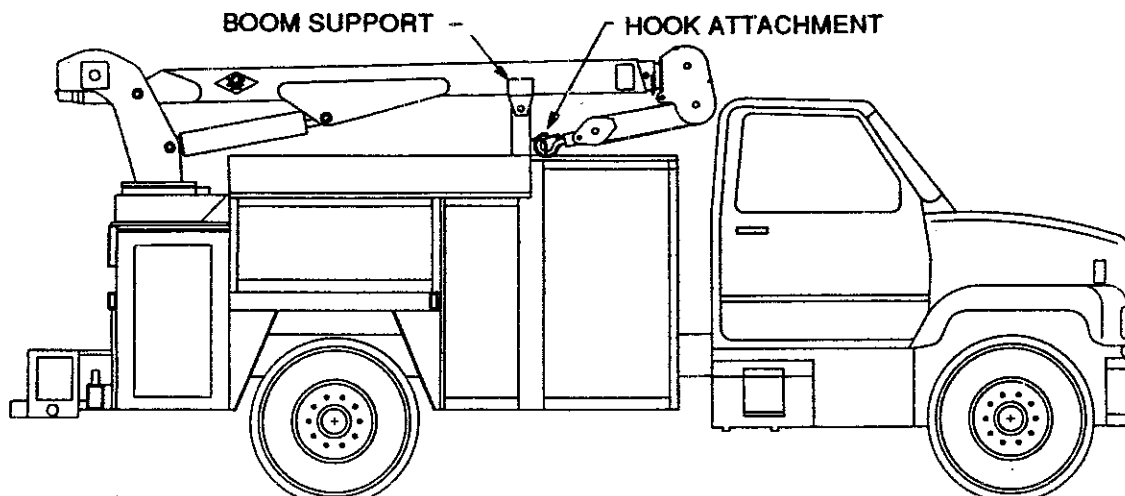


Figure J-10. Telescoping Crane Stowage Configuration

STOWING ARTICULATING CRANES

Articulating cranes, other than Figure-4 Folding models, are stowed in boom supports (Figure J-11) or as in Figure J-12 where a fabricated pocket is provided for the ears. Whatever the approved stowage method, ALWAYS stow the crane before travel.

WARNING

WHEN STORING A CRANE FOR LONG PERIODS OR JUST FOR OVERNIGHT, PUT THE CRANE IN ITS DESIGNED STOWING POSITION. REMOVE THE IGNITION KEYS AND LOCK THE CARRIER VEHICLE TO PREVENT UNAUTHORIZED OPERATION OF THE CRANE AND ASSOCIATED EQUIPMENT. UNAUTHORIZED USE CAN RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

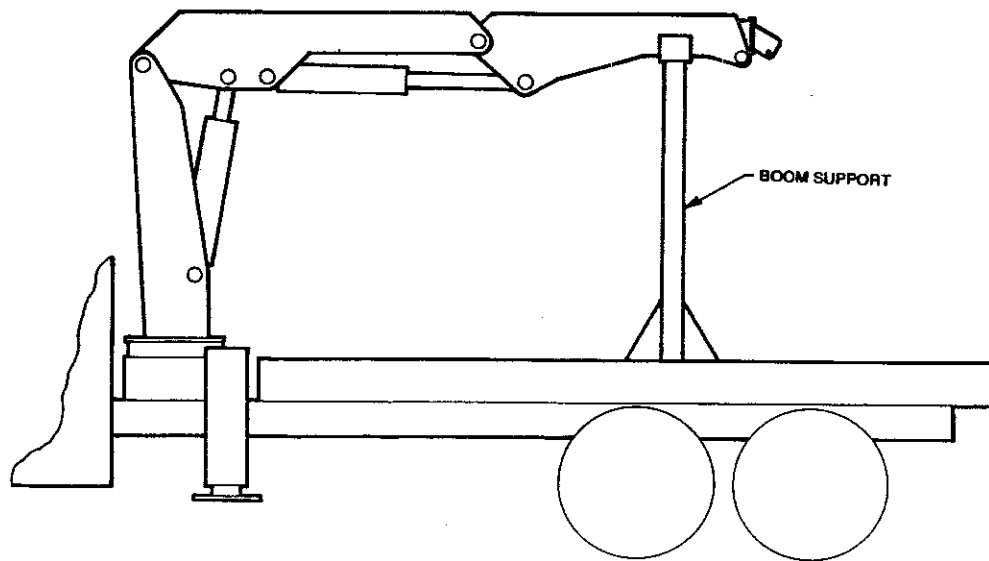


Figure J-11. Articulating Crane Stowage Configuration-Boom Support

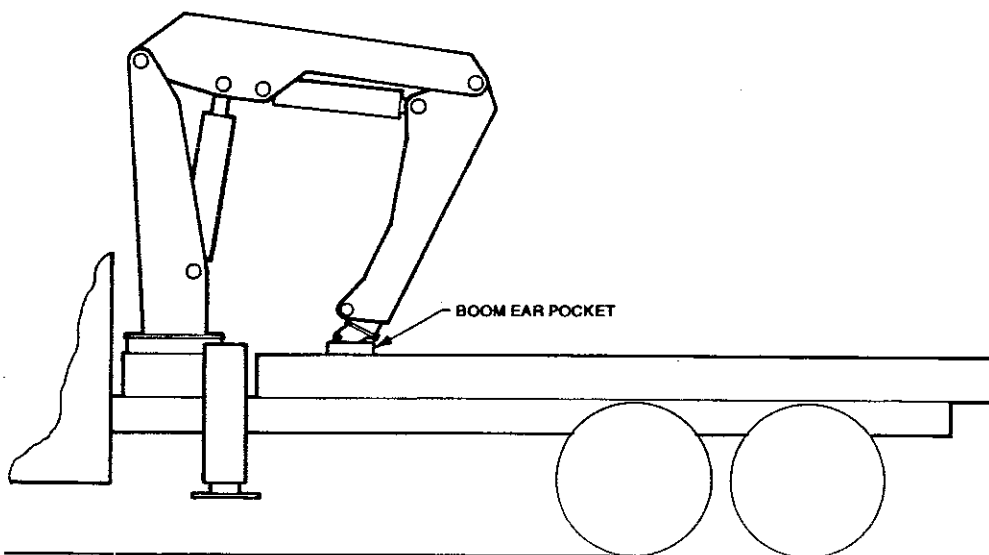


Figure J-12. Articulating Crane Stowage Configuration-Retracted Outer Boom

OUTRIGGER OPERATION

Of all of the hydraulically operated components on a crane, the outriggers can be the most hazardous. This is because of their close proximity to the operator and other personnel. They are the only component of the crane which normally contacts the ground. Three distinct hazards exist in their operation: first, the possibility of the outriggers contacting persons while moving

outward; secondly, the capability of the outriggers causing severe crushing injury when contacting the ground; and thirdly, the possibility of pinching injuries occurring when the outriggers are being retracted.

There are various outrigger designs available, but all require extreme caution in their use. Refer to Figures J-13, J-14, J-15 and J-16 for proper outrigger operation sequence and warnings.

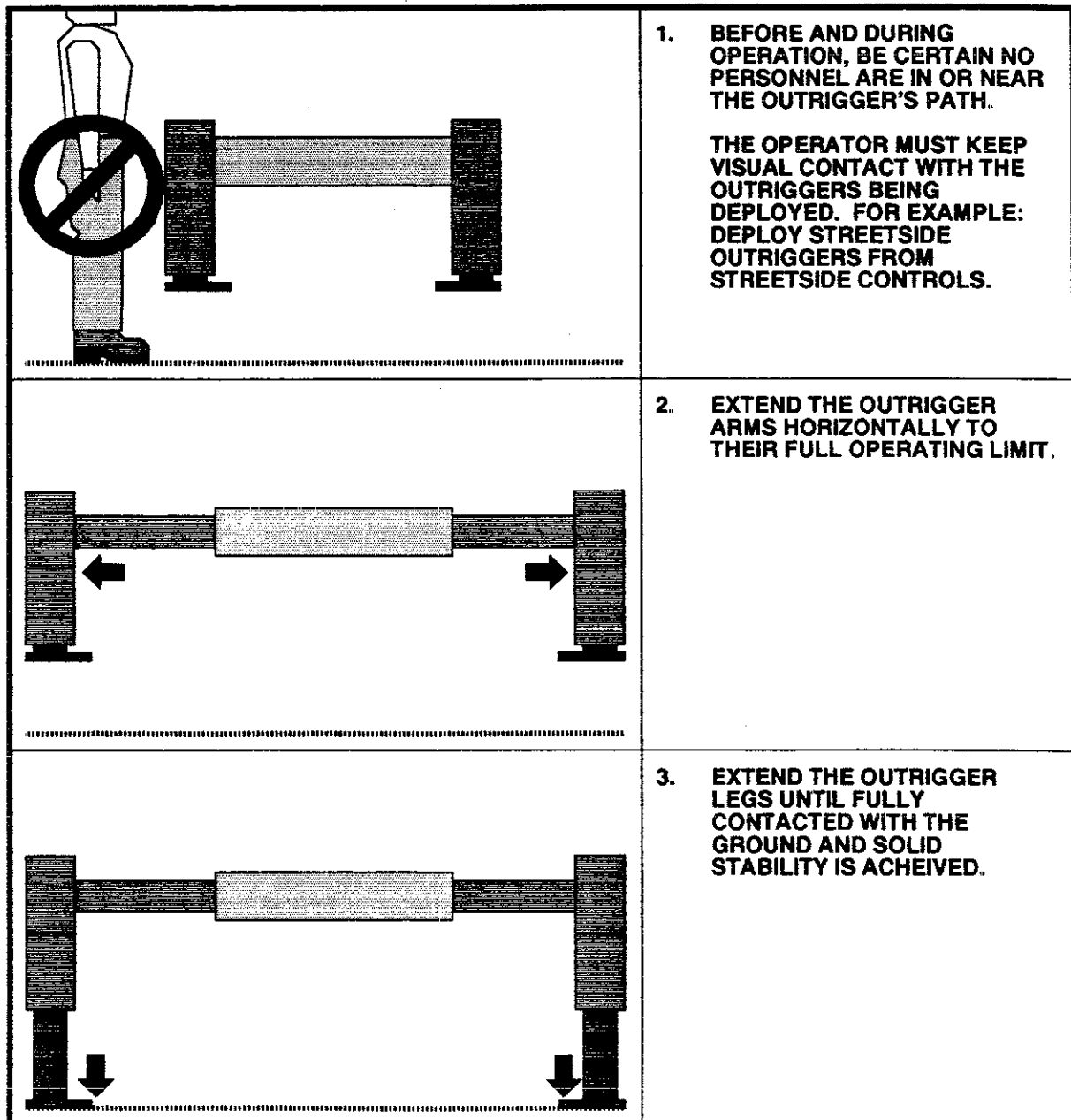


Figure J-13. Outrigger Deployment Sequence

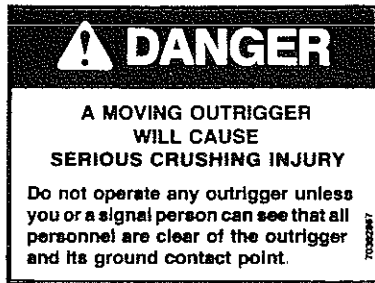


Figure J-14. Moving Outrigger Decal

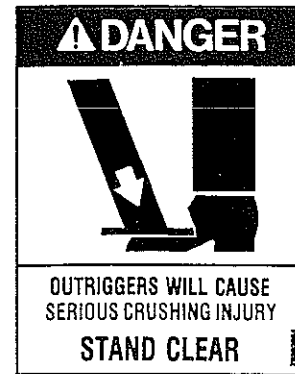


Figure J-15. Stand Clear Decal

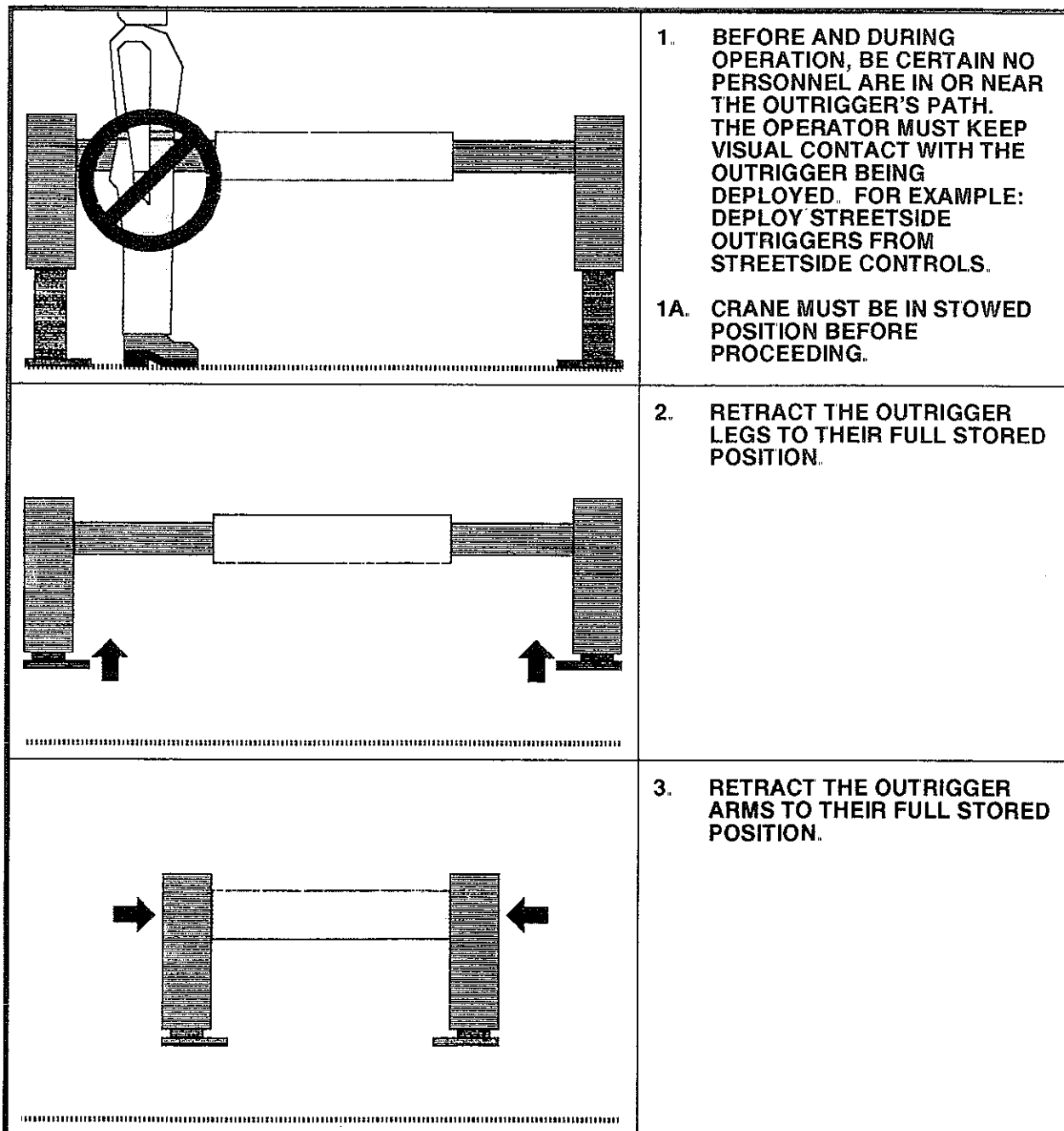


Figure J-16. Outrigger Storage Sequence

DIRECTION TERMINOLOGY

Various terms may be used to describe directions associated with crane operation. Illustrated here are some of those terms and their variations.

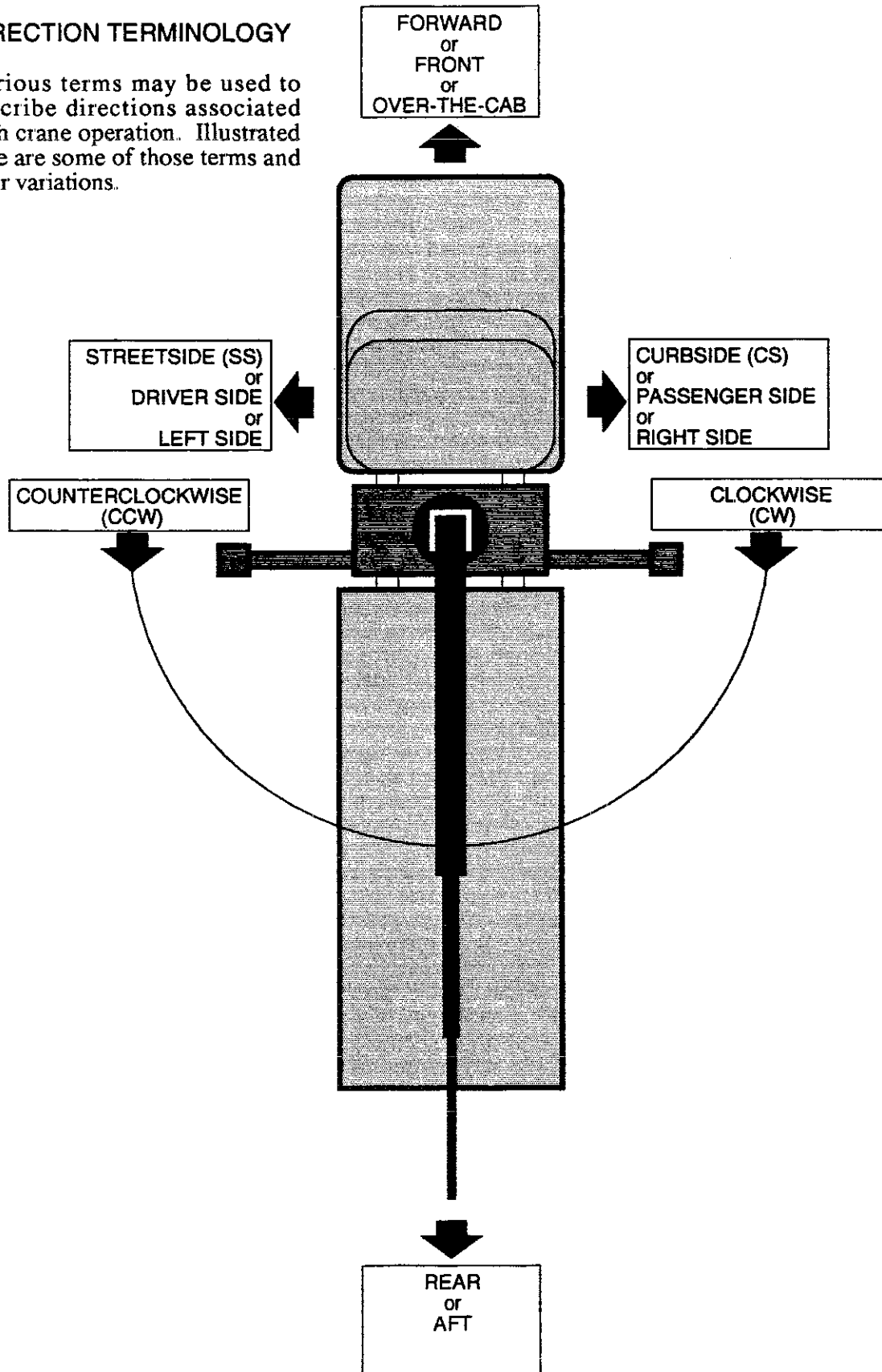


Figure J-17. Crane Operation Directional Terminology

CRANE LUBRICATION

Although crane lubrication requirements are normally thought of in terms of maintenance, crane lubrication can also be considered a safety factor. By reducing friction on pins and gears the crane will be more reliable and safer to operate.

Maintaining a lubrication schedule will vary dependent on climatic conditions and the frequency of crane use. Figure J-19 is intended to reflect crane lubrication requirements for units under normal working frequencies and normal weather conditions. Periods of heavy use and severe weather conditions will require more frequent lubrication.

Lubrication points will vary per crane model and will usually be referenced in the crane's parts manual. As a guide to the general locations of grease zerks, see Figures J-20 and J-21 but for actual locations refer to your specific crane's parts manual.

Each grease zerk used on a crane will be marked by a "Grease Weekly" decal similar to the one shown in Figure J-18.

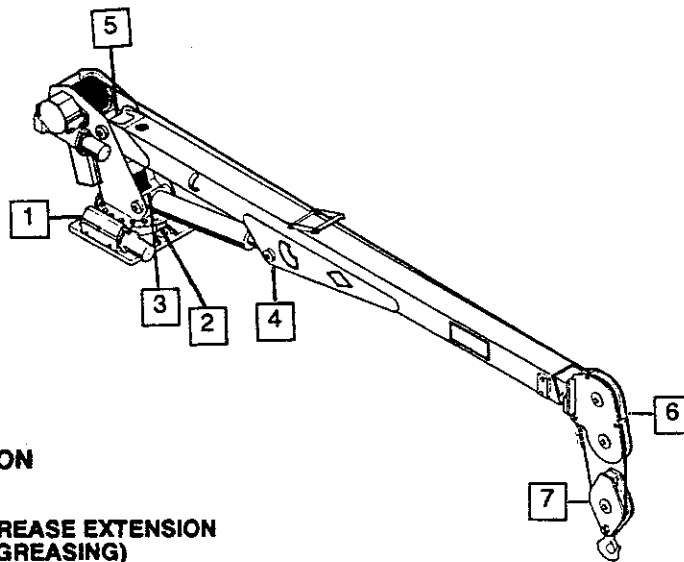
Keep in mind that some crane designs and models may vary from the information presented here. Know the requirements of your specific crane.



Figure J-18. Grease Weekly Decal

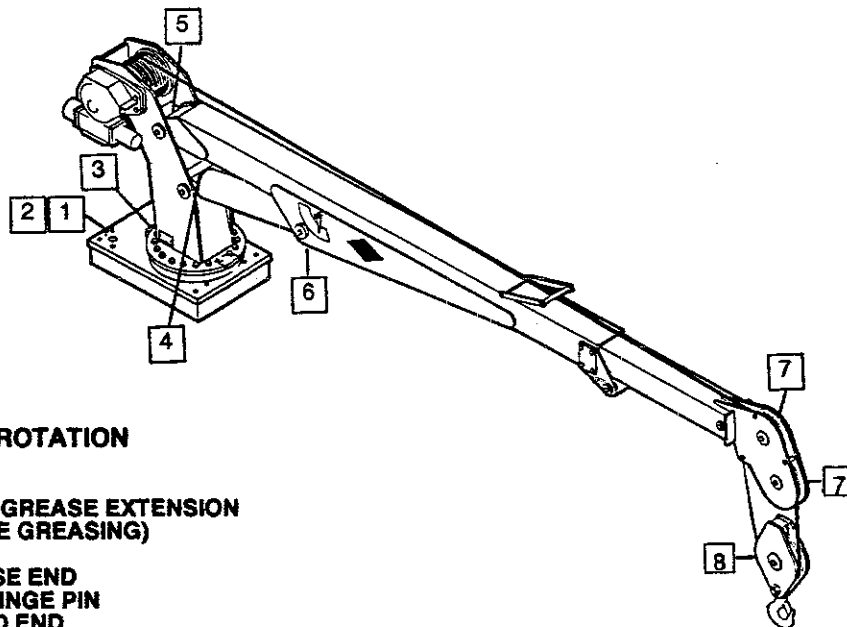
APPLICATION POINT	LUBRICATION PRODUCT	APPLICATION MEANS	INTERVAL
PINION AND DRIVE GEAR ROTATION BRAKE WINCH BRAKE WINCH SHEAVE TURNABLE-BEARING CYLINDER PINS BOOM HINGE PINS BOOM ROLLERS	SHELL ALVANIA 2EP OR SHELL RETINAX "A" OR EQUIVALENT	HAND GREASE GUN OR PNEUMATIC PRESSURE GUN	WEEKLY
ROTATION WORM GEAR	MOLUB-ALLOY 936	BRUSH-ON	WEEKLY
POWER TAKE-OFF TRANSMISSION	EP-90 GEAR OIL	FILL TO CHECK PLUG	MONTHLY
WINCH SUMP			

Figure J-19. Lubrication Product and Schedule



WITH WORM GEAR ROTATION

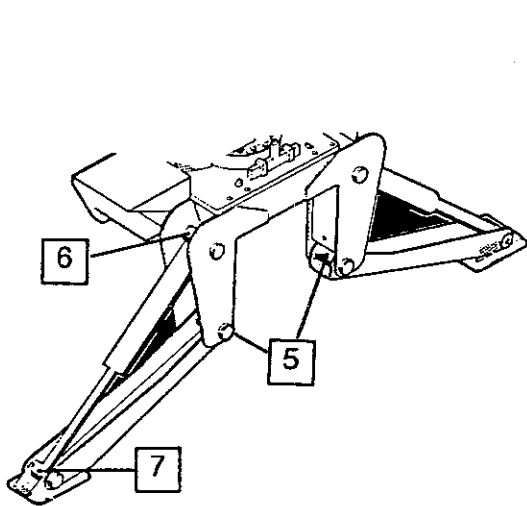
1. WORM GEAR
2. TURNTABLE-BEARING GREASE EXTENSION
(ROTATE CRANE WHILE GREASING)
3. LOWER CYLINDER-BASE END
4. LOWER CYLINDER-ROD END
5. MAST/LOWER BOOM HINGE PIN
6. SHEAVE PIN
7. SNATCH BLOCK PIN



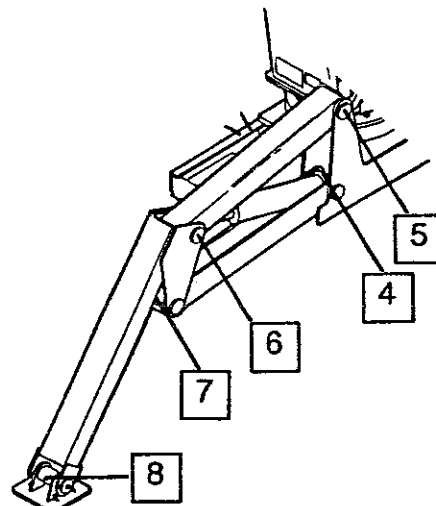
WITH SPUR GEAR TRAIN ROTATION

1. DRIVE GEAR
2. TURNTABLE-BEARING GREASE EXTENSION
(ROTATE CRANE WHILE GREASING)
3. PINION GEAR
4. LOWER CYLINDER-BASE END
5. MAST/LOWER BOOM HINGE PIN
6. LOWER CYLINDER-ROD END
7. SHEAVE PIN
8. SNATCH BLOCK PIN

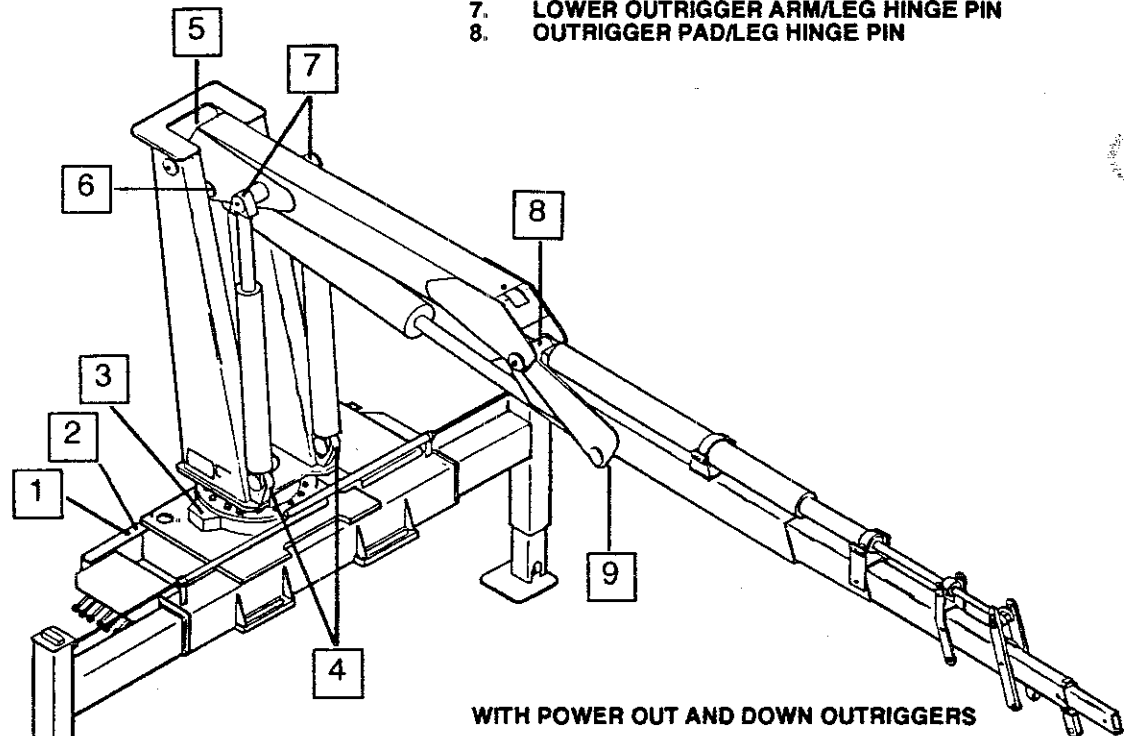
Figure J-20. Typical Grease Zerk Locations - Telecoping Cranes

**A-FRAME OUTRIGGERS**

- 5. BASE/OUTRIGGER LEG HINGE PIN
- 6. OUTRIGGER CYLINDER-BASE END
- 7. OUTRIGGER CYLINDER-ROD END

**SPIDER LEG OUTRIGGERS**

- 4. OUTRIGGER CYLINDER-BASE END
- 5. UPPER OUTRIGGER ARM/BASE HINGE PIN
- 6. OUTRIGGER CYLINDER-ROD END
- 7. LOWER OUTRIGGER ARM/LEG HINGE PIN
- 8. OUTRIGGER PAD/LEG HINGE PIN

**WITH POWER OUT AND DOWN OUTRIGGERS**

- 1. DRIVE GEAR GREASE EXTENSION
- 2. TURNABLE-BEARING GREASE EXTENSION (ROTATE CRANE WHILE GREASING)
- 3. PINION GEAR
- 4. MAST/INNER CYLINDER HINGE PIN
- 5. MAST/INNER BOOM HINGE PIN
- 6. OUTER CYLINDER-BASE END
- 7. INNER CYLINDER-ROD END
- 8. INNER BOOM/OUTER BOOM HINGE PIN
- 9. OUTER CYLINDER-ROD END

Figure J-21. Typical Grease Zerk Locations - Articulating Cranes

Section 11. CRANE MAINTENANCE PRECAUTIONS

MAINTENANCE PRECAUTIONS

Proper and regular maintenance of the crane is a very important safety factor. As in the operation of the crane, there are also precautions to take during crane maintenance. Before beginning any maintenance, familiarize yourself with the maintenance sections of any manuals for the equipment being repaired.

Listed below are precautions to consider before maintenance is performed:

1. Place the crane in an area where other equipment is not operating and where there is no through traffic.
2. Make certain the carrier vehicle's parking brake is set. Use wheel chocks to prevent vehicle movement.
3. Position the crane in its stowed position if possible or with the boom lowered to the ground so that any booms will be prevented from collapsing during maintenance.
4. Place all controls in the "OFF" position and disable any means of starting the carrier vehicle or powering the crane.
5. Disconnect the PTO.
6. Secure sheaves and/or load blocks so they will not swing or fall during maintenance.
7. Relieve the hydraulic oil pressure from all circuits before disconnecting any hydraulic fittings or components.
8. Replace any parts with only factory approved replacements.

Before the crane is placed back into service:

1. Replace all shrouds, guards and safety devices which may have been removed during maintenance.
2. Remove all trapped air in the hydraulic system to prevent erratic operation.
3. Make certain all controls are free of grease and oil.
4. Make certain all decals are present and legible.
5. DO NOT return to the worksite until all repairs are proven to be in proper working condition.

GENERAL PRECAUTIONS

1. DO NOT wear loose clothing while working near machinery.
2. ALWAYS wear safety hat and safety glasses or goggles.
3. DO NOT place your hands near operating gear trains.
4. ALWAYS know where you are and what is happening around you.
5. DO NOT place yourself close to hot hydraulic fluid leaks, which will cause serious burns and injuries.
6. REVIEW all maintenance procedures before attempting.
7. NEVER perform maintenance procedures when unnecessary personnel are in the vicinity.

CHEMICALS

Many chemicals are available for the cleaning and lubrication of equipment. In advance of opening or using any chemical for cleaning, lubrication or other procedure, **READ THE LABEL.**

Labels on chemical containers list important information on health, safety and the product itself. This information can save you from serious injury or even DEATH. Some of this information may be the chemicals scientific name and/or common name which is useful when describing poisoning conditions to a poison control center or a doctor. Also described on the label will be notices of whether the chemical is flammable, combustible, explosive or corrosive. This information can save your life.

The label will also provide advisories in the way the product is to be used, such as, "Use only in a well-ventilated area", or "Keep away from heat" or "Avoid contact with skin". Never ignore these and other warnings and always follow the instructions. Also, refer to the container for any first aid instructions.

Many times these warnings and advisories will also be posted in areas where chemicals are stored or used.

Chemicals require specific methods of handling, storage and disposal. If these are not noted on the container, acquire this information from your chemical distributor or responsible governmental agency for the use, storage and disposal of chemicals.

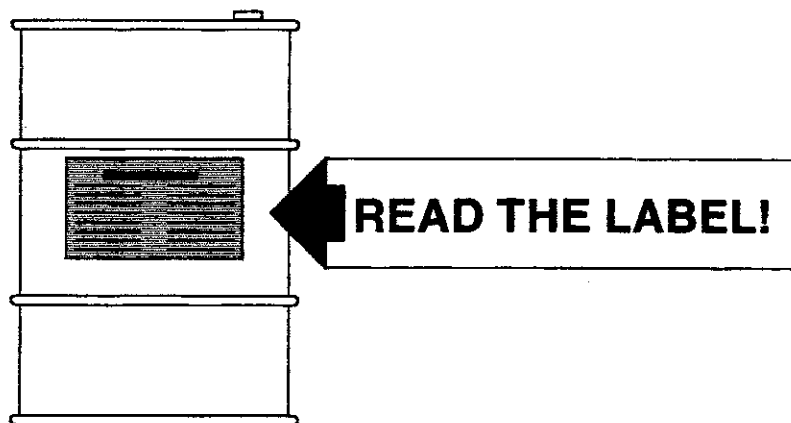
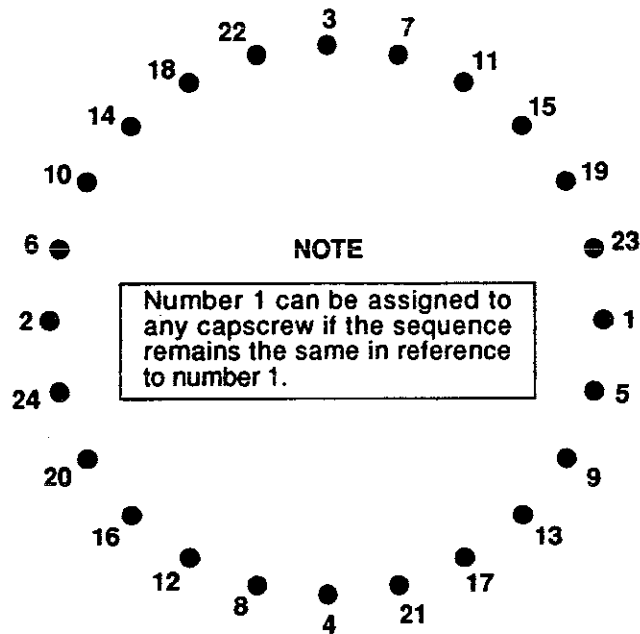


Figure K-1. Chemical Container Labels

Section 12. REFERENCE DATA

Refer to the diagram below for proper tightening/torquing sequence of the turntable bearing to the crane base and crane mast. The total quantity of cap screws varies dependent on crane model.



TIGHTENING PROCEDURE:

1. Refer to the Torque Data Chart to determine the proper torque value to apply to the size of cap screw used.
2. Follow the tightening sequence shown in the diagram. Note that the quantity of cap screws may differ from the diagram, but the sequence must follow the criss-cross pattern as shown in the diagram.
3. Torque all cap screws to approximately 40% of the specified torque value, by following the sequence. (EXAMPLE: $.40 \times 265 \text{ FT-LBS} = 106 \text{ FT-LBS}$)
4. Repeat Step 3, but torquing all cap screws to 75% of the specified torque value. Continue to follow the tightening sequence. (EXAMPLE: $.75 \times 265 \text{ FT-LBS} = 199 \text{ FT-LBS}$)
5. Using the proper sequence, torque all cap screws to the listed torque value as determined from the Torque Data Chart.

Figure L-1a. TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE

BIAS PLY

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI)

(Tires mounted on Type I, II, and III rims or 15° drop center rims.)

TIRE SIZE	DUAL	S-SINGLE	55	60	65	70	75	80	85	90	95	100	105	110	115
7.00-18		D	2060	2170	2270(D)										
		S	2090	2220	2350	2470	2590(D)								
7.50-17	8-19.5	D	2230	2350	2460(D)	2570	2680	2780(E)	2880	2980					
		S	2270	2410	2540	2680	2800(D)	2930	3060	3170(E)	3280	3400	3500(F)		
7.50-20	8-22.5	D	2490	2620	2750(D)	2870	2990	3100(E)	3210	3320	3430(F)	3540	3640(G)		
		S	2530	2680	2840	2990	3140(D)	3270	3410	3530(E)	3660	3780	3910(F)	4040	4150(G)
8.25-20	9-22.5	D	2960	3120	3270	3410	3550(E)	3690	3820	3950(F)	4070	4200	4320(G)		
		S	3010	3190	3370	3560	3730	3890	4050(E)	4210	4350	4500(F)	4640	4790	4920(G)
9.00-20	10-22.5	D	3510	3690	3870	4040(E)	4200	4360	4520(F)	4670	4820	4970(G)			
		S	3560	3770	4000	4210	4410	4610(E)	4790	4970	5150(F)	5320	5490	5670(G)	
10.00-20	11-22.5	D		4380	4580	4760(F)	4950	5120	5300(G)	5470	5630	5800(H)			
		S		4530	4770	4990	5220	5430(F)	5640	5840	6040(G)	6240	6430	6610(H)	
10.00-22	11-24.5	D	4660	4870	5070(F)	5260	5450	5640(G)	5820	6000	6170(H)				
		S	4820	5070	5310	5550	5780(F)	6000	6210	6430(G)	6630	6840	7030(H)		
11.00-20	12-22.5	D	4780	4990	5190(F)	5390	5590	5780(G)	5960	6150	6320(H)				
		S	4940	5200	5450	5690	5920(F)	6140	6370	6590(G)	6790	7010	7200(H)		
11.00-22	12-24.5	D	5080	5300	5520(F)	5730	5940	6140(G)	6330	6530	6720(H)				
		S	5240	5520	5790	6040	6290(F)	6530	6770	7000(G)	7220	7440	7660(H)		
11.00-24		D	5390	5630	5860(F)	6090	6310	6520(G)	6730	6930	7130(H)				
		S	5570	5860	6140	6420	6680(F)	6940	7190	7430(G)	7670	7900	8130(H)		
12.00-20		D	5440	5680	5910	6140(G)	6360	6580	6790(H)	7000	7200(J)				
		S	5620	5920	6200	6480	6740	7000(G)	7250	7500	7740(H)	7980	8210(J)		
12.00-24		D	6120	6390	6650	6910(G)	7160	7410	7640(H)	7870	8100(J)				
		S	6330	6660	6980	7280	7580	7880(G)	8160	8450	8710(H)	8970	9230(J)		

NOTE: Letters in parenthesis indicate Load Range for which loads are maximum.

CAUTION

Always use approved tire and rim combinations for diameters and contours.

Figure L-1. Tire Load and Inflation Pressures - Bias Ply

RADIAL PLY

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI) (Tires mounted on Type I, II, and III rims or 15° drop center rims.)

TIRE SIZE D=DUAL S=SINGLE	65	70	75	80	85	90	95	100	105	110	115	120	125
7.50R17 8R19.5 D S	2350 2410	2460(D) 2540	2570 2680	2680 2800(D)	2780(E) 2930	2880 3060	2980 3170(E)	3070(F) 3280	3400	3500(F)			
7.50R20 8R22.5 D S	2620 2680	2750(D) 2840	2870 2990	2990 3140(D)	3100(E) 3270	3210 3410	3320 3530(E)	3430(F) 3660	3780	3910(F)			
8.25R20 9R22.5 D S	3120 3190	3270 3370	3410 3560	3550(E) 3730	3690 3890	3820 4050(E)	3950(F) 4210	4070 4350	4200 4500(F)	4320(G) 4640	4790	4920(G)	
9.00R20 10R22.5 D S	3690 3770	3870 4000	4040(E) 4210	4200 4410	4360 4610(E)	4520(F) 4790	4670 4970	4820 5150(F)	4970(G) 5320	5490	5670(G)		
10.00R20 11R22.5 D S				4760(F) 4900	4950 5220	5120 5430(F)	5300(G) 5640	5470 5840	5630 6040(G)	5800(H) 6240	6430	6610(H)	
10.00R22 11R24.5 D S				5070(F) 5310	5260 5550	5450 5780(F)	5640(G) 6000	5820 6210	6000 6430(G)	6170(H) 6630	6840	7030(H)	
10.00/90R20 D S				4885 4945	5070(F) 5155	5370	5510(F)						
11.00R20 12R22.5 D S				5190(F) 5450	5390 5690	5590 5920(F)	5780(G) 6140	5960 6370	6150 6590(G)	6320(H) 6790	7010	7200(H)	
11.00R22 12R24.5 D S				5520(F) 5790	5730 6040	5940 6290(F)	6140(G) 6530	6330 6770	6530 7000(G)	6720(H) 7220	7440	7660(H)	
11.00R24 D S				5860(F) 6140	6090 6420	6310 6680(F)	6520(G) 6940	6730 7190	6930 7430(G)	7130(H) 7670	7900	8130(H)	
12.00R20 D S				5910 6200	6140(G) 6480	6360 6740	6580 7000(G)	6790(H) 7250	7000 7500	7200(J) 7740(H)	7980	8210(J)	
12.00R24 D S				6650 6980	6910(G) 7280	7160 7580	7410 7880(G)	7640(H) 8160	7870 8450	8100(J) 8710(H)	8970	9230(J)	

NOTE: Letters in parenthesis indicate Load Range for which loads are maximum.

CAUTION

Always use approved tire and rim combinations for diameters and contours.

Figure L-1A. Tire Load and Inflation Pressures - Radial Ply

WIDE BASE RADIAL PLY

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI) (Tires mounted on 15" drop center rims. The pressure is minimum for the load.)

TIRE SIZE D=DUAL S=SINGLE	75	80	85	90	95	100	105	110	115	120
385/65R22.5 S		7040	7350	7650	7950	8230	8510	8790	9050	9370(J)
425/65R22.5 S		8370	8740	9100	9450	9790	10100	10500(J)		
445/65R22.5 S		9120	9540	9930	10300	10700	11000	11400	11700	12300(L)

LOW PROFILE RADIAL PLY

CAUTION

Always use approved tire and rim combinations for diameters and contours.

TIRE SIZE D=DUAL S=SINGLE	75	80	85	90	95	100	105	110	115	120
225/70R19.5 D S	2855 3035	3000(E) 3195(E)	3110 3310	3240 3445	3415(F) 3640(F)					
245/70R19.5 D S	3215 3420	3365 3580	3510 3735	3650 3885	3860(F) 4080(F)	3935 4185	4080(G) 4300(G)	4205 4475	4300(H) 4540(H)	
255/70R22.5 D S		3595 3950	3785 4160	3975 4370	4165 4580	4355 4790	4540(G) 4940(G)	4740 5205	5070(H) 5510(H)	
245/75R22.5 D S		3765 3810	3915 3975	4055 4140	4195 4300	4300(G) 4455	4610	4675(G)		
265/75R22.5 D S		4205 4255	4370 4440	4525 4620	4685 4800	4805(G) 4975	5150	5205(G)		
295/75R22.5 D S		4885 4945	5070(F) 5155	5260 5370	5440 5510(F)	5675(G) 5780	5800 5980	6005(H) 6175(G)	6375 6610(H)	
285/75R24.5 D S		4930 4990	5205(F) 5210	5310 5420	5495 5675(F)	5675(G) 5835	5855 6040	6175(H) 6175(G)	6435 6780(H)	

NOTES: Letters in parenthesis indicate Load Range for which loads are maximum.
An additional 10 PSI cold inflation is recommended to compensate for pressure loss between airings.
NEVER should rim load and inflation limits be exceeded.

Figure L-1B. Tire Load and Inflation Pressures - Wide Base & Low Profile Radial Ply

IMPORTED RADIAL PLY

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI) (Tires mounted on 15° drop center rims. The pressure is minimum for the load.)

TIRE SIZE D-DUAL S-SINGLE	75	80	85	90	95	100	105	110	115	120
315/80R22.5	D				6425	6690	6955	7220	7480	7750(J)
	S				7460	7770	8080	8380	8690	9000(J)

NOTES: Letters in parenthesis indicate Load Range for which loads are maximum.
An additional 10 PSI cold inflation is recommended to compensate for pressure loss between airings.
NEVER should rim load and inflation limits be exceeded.
This chart is based on ETRTO STANDARDS.



CAUTION

Always use approved tire and rim combinations for diameters and contours.



Figure L-1C. Tire Load and Inflation Pressures - Imported Radial Ply

TORQUE DATA CHART

FINE THREAD BOLTS

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
					
		SAE J429 GRADE 5		SAE J429 GRADE 8	
		PLAIN (FT-LB)	PLATED (FT-LB)	PLAIN (FT-LB)	PLATED (FT-LB)
5/16-24	0.3125	19	14	27	20
3/8-24	0.3750	35	26	49	35
7/16-20	0.4375	55	41	78	58
1/2-20	0.5000	90	64	120	90
9/16-18	0.5625	120	90	170	130
5/8-18	0.6250	170	130	240	180
3/4-16	0.7500	300	225	420	315
7/8-11	0.8750	445	325	670	500
1-12	1.0000	645	485	995	745
1 1/8-12	1.1250	890	670	1445	1085
1 1/4-12	1.2500	1240	930	2010	1510
1-3/8-12	1.3750	1675	1255	2710	2035
1 1/2-12	1.5000	2195	1645	3560	2670

COARSE THREAD BOLTS

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
					
		SAE J429 GRADE 5		SAE J429 GRADE 8	
		PLAIN (FT-LB)	PLATED (FT-LB)	PLAIN (FT-LB)	PLATED (FT-LB)
5/16-18	0.3125	17	13	25	18
3/8-16	0.3750	31	23	44	33
7/16-14	0.4375	49	37	70	52
1/2-13	0.5000	75	57	105	80
9/16-12	0.5625	110	82	155	115
5/8-11	0.6250	150	115	220	160
3/4-10	0.7500	265	200	375	280
7/8-9	0.8750	395	295	605	455
1-8	1.0000	590	445	910	680
1 1/8-7	1.1250	795	595	1290	965
1 1/4-7	1.2500	1120	840	1815	1360
1-3/8-6	1.3750	1470	1100	2380	1780
1 1/2-6	1.5000	1950	1460	3160	2370

When using the torque data in the charts above, the following rules should be observed.

1. Bolt manufacturer's particular specifications should be consulted when provided.
2. Flat washers of equal strength must be used.
3. All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.
4. Torque values specified are for bolts with residual oils or no special lubricants applied. If special lubricants of high stress ability, such as Never-Seez compound graphite and oil, molybdenum disulphite, colloidal copper or white lead are applied, multiply the torque values in the charts by the factor .90. The use of Loctite does not affect the torque values listed above.
5. Torque values for socket-head capscrews are the same as for Grade 8 capscrews.

WARNING

Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing. Failure to replace gear-bearing bolts may result in bolt failure due to metal fatigue causing serious injury or DEATH

Table L-2. Recommended Bolt Torques

PERIODIC VEHICLE INSPECTIONS

This Inspection Checklist is designed to assist you in maintaining the vehicle in safe operating condition. The vehicle should be inspected before moving any crane or equipment. Inspect to the frequency indicated by the darkened block.

Vehicle Inspection Checklist

ITEM	DESCRIPTION	FREQUENCY		
		DAILY	WEEKLY	MONTHLY
VEHICLE				
BATTERY	Inspect for correct fluid level. Increase frequency in hot, dry climates.			
ENGINE OIL	Check for proper level (At dipstick "ADD" mark)			
SERVICE BRAKE, PARKING BRAKE	Test both systems for positive, efficient functioning.			
RADIATOR	Check coolant level and anti-freeze mixture.			
SAFETY EQUIPMENT, WARNING SIGNALS, LIGHTS	Check all safety devices and lights for operation.			
SUSPENSION	Check for broken or weak springs.			
TIRES	Inspect for bruises, cuts and proper inflation.			
WHEELS	Check for loose stud nuts, bends and mud lumps or stones between dual wheels.			

Figure L-3. Vehicle Inspection Checklist

PERIODIC CRANE INSPECTIONS

This Inspection Checklist is designed to assist you in maintaining the crane in safe operating condition. Items which apply to your crane should be checked before it is put into operation. Inspect to the frequency indicated by the darkened block.

NOTE

WRITTEN, DATED AND SIGNED INSPECTION REPORTS AND RECORDS SHALL BE MADE MONTHLY ON CRITICAL ITEMS (AS MARKED BY AN * ON THE CRANE INSPECTION CHECKLIST) SUCH AS BRAKES, CRANE HOOKS, WIRE ROPE, HYDRAULIC CYLINDERS AND HYDRAULIC RELIEF PRESSURE VALVES. RECORDS SHALL BE KEPT WHERE READILY ACCESSIBLE. ANSI/ASME B30.5A.

SEE NEXT PAGE FOR
CRANE INSPECTION CHECKLIST.



Crane Inspection Checklist

* Indicates a critical item.

NOTE: SEE PREVIOUS PAGE
FOR ADDITIONAL INFORMATION.

ITEM	DESCRIPTION	FREQUENCY		
		DAILY	WEEKLY	MONTHLY
CRANE				
WALK-AROUND INSPECTION	Inspect for hydraulic leaks, loose parts and obvious structural member damage.			
MOUNTING BOLTS *	Check torque (power-wrench tight).			
ROTATION SYSTEM	Check for excessive backlash (play) between pinion gear and turntable gear-bearing. Variation is not to exceed 0.025" to 0.050".			
STRUCTURAL DAMAGE *	Check for broken welds, fatigue cracks, structural defects, bends and dents.			
POWER TAKE-OFF	Check transmission lubrication, leakage, alignment and mounting bolts.			
CONTROLS	Check for excessive wear and cleanliness.			
LEAKAGE	Check for oil leaks in rotation system.			
ROTATION SYSTEM MOUNTING BOLTS *	Check torque of top and bottom gear-bearing bolts.(see Torque Data Chart).			
CRANE HOOK *	Check for deformation or cracks. Discard hooks with cracks or which have a throat opening that is 15% larger than normal or more than 10° from the plane of the unbent hook. See Section 8A, Hook Precautions.			
WIRE ROPE *	See Section 8, Wire Rope Precautions.			
ELECTRICAL	Check remote controls, auxiliary lighting, etc. for proper functioning			
	Check for deterioration, dirt and moisture.			
HYDRAULIC FLUID RESERVOIR	Check for proper oil level.			
HYDRAULIC OIL	Check quality of oil			
HYDRAULIC HOSE	Check for leakage on surface and at ends.			
	Check for blistering, deformation and abrasion.			
PUMP AND MOTOR	Check loose bolts, leaks, unusual noise, vibration, reduced operating speed and excessive oil heating			
HYDRAULIC FILTER	Check vacuum reading with engine running and PTO engaged. A vacuum of 8" of mercury or higher indicates an obstructed filter			
CONTROL VALVES	Check for leaks, cracks and slow return to neutral.			
CYLINDERS *	Check for leaks, scored, nicked or dented rods, dented case, deformed pin boss, rust on rod.			
WINCH *	Check for cracks or worn sheaves and drum.			
HOLDING VALVES *	Conduct a holding test with loaded boom.			

Figure L-4. Crane Inspection Checklist

The information within this manual has been compiled and checked but errors do occur. To provide our customers with a method of communicating those errors we have provided the Manual Change Request form below. In addition to error reporting, you are encouraged to suggest changes or additions to the manual which would be of benefit to you. We cannot guarantee that these additions will be made but we do promise to consider them. When completing the form, please write or print clearly. Submit a copy of the completed form to the address listed below.

MANUAL CHANGE REQUEST

DATE	PRODUCT MANUAL	Crane Safety	MANUAL PART NO.	99900313-8/91
SUBMITTED BY				
COMPANY				
ADDRESS				
CITY, STATE, ZIP				
TELEPHONE				

☐ ERROR FOUND

LOCATION OF ERROR (page no.): _____

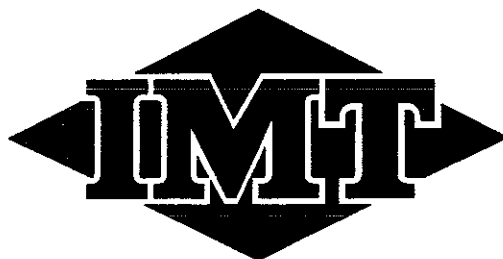
DESCRIPTION OF ERROR: _____

☐ REQUEST FOR ADDITION TO MANUAL

DESCRIPTION OF ADDITION: _____

REASON FOR ADDITION: _____

MAIL TO: IOWA MOLD TOOLING Co , Inc
Box 189,
Garner IA 50438
ATTN: Technical Publications



IOWA MOLD TOOLING CO., INC.
BOX 189, 500 HWY 18 WEST, GARNER, IA 50438
TEL: 515-923-3711
FAX: 515-923-2424

MANUAL PART NUMBER 99900313