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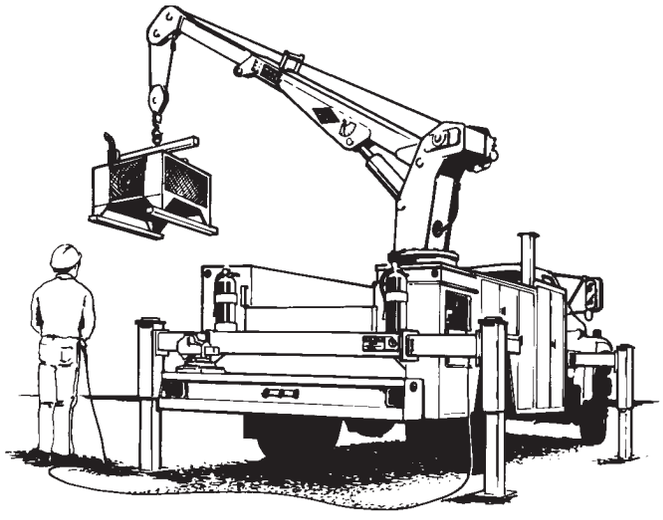
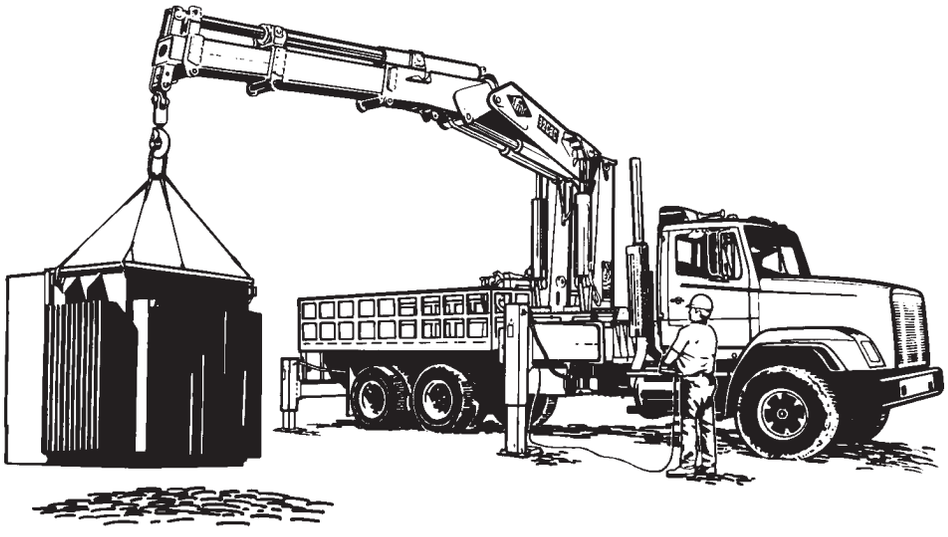
Operator's Crane Safety Manual





IOWA MOLD TOOLING CO., INC.

BOX 189, 500 HWY 18 WEST, GARNER, IA 50438

TEL: 641-923-3711

FAX: 641-923-2424

MANUAL PART NUMBER 99900313

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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
641 - 923 - 3711

REVISIONS LIST

DATE	LOCATION	DESCRIPTION OF CHANGE
-	-	-
20010907	12-12	CORRECTED MISSPELLING
20061020	1-1	UPDATE WITH NEW OWNER STATEMENT.
20080508	1-1	UPDATED OSHKOSH STATEMENT.
20090420	8-5	ADDED WIRE ROPE LAY INFORMATION
	9-5 THRU 8	ADDED STABILITY TEST
20111230	THROUGHOUT	ECN 11628 - UPDATED STABILIZER WORDING, SAFETY DECALS.
		ECN 11606 - ADDED OVERLOAD PROTECTION INFORMATION, ARTICULATED CRANE TWO-BLOCK PREVENTION DEVICE.
20120914	9-5 AND 6	EDITED STABILITY TEST
20140915	3-12	ECN 12264 - MOLUB-ALLOY 882 WAS MOLUB-ALLOY 936, UPDATED DECAL
	3-14	ECN 12279 - REMOVED MOBIL OIL INFO FROM 70394189

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TABLE OF CONTENTS

Section 1. GENERAL INFORMATION
General 1-1
Crane Safety Manual 1-2

Section 2. CRANE COMPONENT IDENTIFICATION
Component Identification 2-1

Section 3. DECALS
Decal Placement - Telescoping Cranes 3-1
Decal Placement - Articulating Cranes 3-2
"Danger" Decal Descriptions 3-3
Instructional Decals 3-10

Section 4. HAND SIGNALS
Signals 4-1

Section 5. THE OPERATOR
Operator Qualifications 5-1
Physical Condition 5-1
Operator Conduct 5-1
Knowledge And Abilities Required 5-2

Section 6. CRANE OPERATION
Operation Responsibilities 6-1
Inspections 6-1
Crane Transport 6-1
Crane Set-Up 6-2
Safe Crane Operation 6-3
Crane Capacity 6-3
Crane Controls 6-3
Operating The Crane 6-3
Maintenance 6-4
Important Precautions 6-4
Fire Precautions 6-4
Winch Related Precautions 6-5
Engaging The PTO 6-5
Disengaging The PTO 6-5

Section 7. CRANE OPERATION NEAR POWERLINES
Precautions 7-1
If Electrical Contact Occurs 7-2

Section 8. WIRE ROPE PRECAUTIONS
General 8-1
Wire Rope Description 8-1
Basic Information 8-1
Wire Rope Inspection 8-2
Wire Rope Precautions 8-2
Lubrication Of Wire Rope 8-2
When To Replace Wire Rope 8-3
Wire Rope Slings 8-4
Basic Hitches 8-4
Sling Loading 8-5
Wire Rope Lay 8-5
Wedge Socket Attachment 8-6
Cable Thimble Attachment 8-6

Section 8A. HOOK PRECAUTIONS
General 8A-1
Latches 8A-1
Hook Swivels 8A-2
Hook Precautions 8A-2
Hook Inspection 8A-3
New and Repaired Hooks 8A-3
Hooks in Regular Use 8A-3
Hooks Not in Regular Use 8A-3
Methods of Hook Inspection 8A-3
Hook Inspection Checklist 8A-4
Hook Testing 8A-4
Definitions 8A-5

Section 9. CAPACITY PLACARDS
Crane Capacity Placards 9-1
Capacity Conditions 9-1
Using The Capacity Placard (Articulating Cranes) 9-1
Using The Capacity Placard (Telescoping Cranes) 9-2
Crane Stability 9-5

Section 9A. OVERLOAD PROTECTION SYSTEMS
Crane Overload Protection System 9A-1
Overload Protection System (Hydraulically Operated) 9A-2
Overload Protection System (Electrically Operated) 9A-2

Section 10. OPERATIONAL REFERENCE
Extension Boom Sequence 10-1
Anti Two-Blocking Device 10-2
Figure-Four Folding Cranes 10-3
Stowing Telescoping Cranes 10-5
Stowing Articulating Cranes 10-6
Stabilizer Operation 10-7
Direction Terminology 10-9
Crane Lubrication 10-10

Section 11. MAINTENANCE PRECAUTIONS
Maintenance Precautions 11-1
General Precautions 11-1
Chemicals 11-2

Section 12. REFERENCE DATA
Turntable Bearing Fastener Tightening Sequence 12-1
Tire Inflation Pressures - Bias Ply 12-2
Tire Inflation Pressures - Radial Ply 12-3
Tire Inflation Pressures - Wide Base & Low Profile 12-4
Tire Inflation Pressures - Imported 12-5
Torque Data Chart 12-6
Crane Inspection Checklist 12-7

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LIST OF ILLUSTRATIONS

A-1. By-Stander Clearance 1-1
A-2. Typical Page Description 1-2
A-3. Revised Page 1-2
B-1. Telescoping Crane - Major Assemblies 2-1
B-2. Telescoping Crane - Hydraulic Components 2-1
B-3. Articulating Crane - Major Assemblies 2-2
B-4. Articulating Crane - Hydraulic Components 2-2
B-5. Typical Gear Train Configuration 2-3
C-1. Decal Locations On Telescoping Cranes 3-1
C-2. Decal Locations On Articulating Cranes 3-2
C-3. Decal - Electrocution Hazard 3-3
C-4. Decal - Electrocution Hazard 3-3
C-5. Decal - Electrocution Hazard 3-4
C-6. Decal - Electrocution Hazard 3-4
C-7. Decal - Electrocution Hazard-RC Oper 3-5
C-8. Decal - Electrocution Hazard-RC Oper 3-5
C-9. Decal - Electrocution Hazard-RC Oper 3-5
C-10. Decal - Electrocution Hazard-RC Oper 3-5
C-11. Decal - Stabilizer Foot Crushing Hazard 3-6
C-13. Decal - Moving Boom Hazard 3-6
C-14. Decal - Moving Driveline Hazard 3-7
C-15. Decal - Two Block Hazard 3-7
C-16. Decal - Riding on Boom Hazard 3-7
C-17. Decal - Hoisting Personnel Hazard 3-8
C-18. Decal - Untrained Operator Hazard 3-8
C-19. Decal - Multiple Operation Hazard 3-8
C-20. Decal - Failure to Obey Hazard 3-9
C-21. Decal - Failure to Obey Hazard 3-9
C-22. Decal - Free Falling Manual Boom Hazard 3-9
C-23. Decal - Warning Manual Stabilizers 3-10
C-24. Decal - Set Up / Stow Instructions 3-10
C-25. Decal - Rotational Alignment 3-10
C-26. Decal - Grease Weekly 3-11
C-27. Decal - Rotate Crane / Grease 3-11
C-28. Decal - Contact IMT 3-11
C-29. Decal - Return Line 3-12
C-30. Decal- Suction Line 3-12
C-31. Decal - Lubricate Worm Gear 3-12
C-32. Decal - Caution Do Not Wash / Wax 3-13
C-33. Decal - Boom Angle Indicator 3-13
C-34. Decal - Caution Oil Level 3-13
C-35. Decal - Hyd Oil Fill Recommendations 3-14
D-1. Crane Operation Hand Signals 4-2
E-1. Operator Qualifications 5-1
E-2. Physical Considerations 5-1
E-3. Safety Is Your Responsibility 5-2
F-1. Crane Set-Up Precautions 6-2
F-2. Do Not Ride The Loadline 6-5
F-3. PTO Danger Decal 6-5
G-1. Electrical Hazard Warning Decal 7-1
G-2. Required Clearances Of Cranes From Electrical Transmission Lines 7-2
G-3. Danger Zone For Cranes Operating Near Electrical Transmission Lines 7-2
H-1. When To Replace Wire Rope 8-3
H-2. Basic Hitches 8-4
H-3. Load at Various Sling Angles 8-5
H-4. Approved Wedge Socket Attachment Methods 8-6
H-5. Approved Cable Thimble Attachment Method 8-6
H1-1. Common Hooks 8A-1
H1-2. Hook Terminology 8A-2
I-1. One-Part Line Configuration 9-2
I-2. Two-Part Line Configuration 9-2
I-3. Three-Part Line Configuration 9-2
I-4. Articulating Crane Capacity Placard Description 9-3
I-5. Telescoping Crane Capacity Placard Description 9-4
I-6. Stability Chart 9-6
J-1. Proper Extension Boom Deployment 10-1
J-2. Improper Extension Boom Deployment 10-
1J-3. Two-Blocking Decal 10-2
J-4. Anti Two-Blocking Device Components 10-2
J-5. Normal Work Position 10-2
J-6. Approaching Two-Blocking Situation 10-2
J-7. Stow / Unfold Decal 10-3
J-8. Unfolding Sequence 10-3
J-9. Folding Sequence 10-4
J-10. Telescoping Crane Stowage Configuration 10-5
J-11. Articulating Crane Stowage Configuration - Boom Support 10-6
J-12. Articulating Crane Stowage Configuration - Retracted Outer Boom 10-6
J-13. Stabilizer Deployment Sequence 10-7
J-14. Moving Stabilizer Decal 10-8
J-15. Stand Clear Decal 10-8
J-16. Stabilizer Storage Sequence 10-8
J-17. Crane Operation Directional Terminology 10-9
J-18. Grease Weekly Decal 10-10
J-19. Lubrication Product and Schedule 10-10
J-20. Typical Grease Zerk Locations - Telescoping Cranes 10-11
J-21. Typical Grease Zerk Locations - Articulating Cranes 10-12
K-1. Chemical Container Label 11-2
L-1a. Turntable Bearing Fastener Tightening Sequence 12-1
L-1. Tire Load And Inflation Pressures - Bias Ply 12-2
L-1A. Tire Load And Inflation Pressures - Radial Ply 12-3
L-1B. Tire Load And Inflation Pressures - Wide Base & Low Profile Radial Ply 12-4
L-1C. Tire Load And Inflation Pressures - Imported Radial Ply 12-5
L-2. Recommended Bolt Torques 12-6

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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' lastest 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).

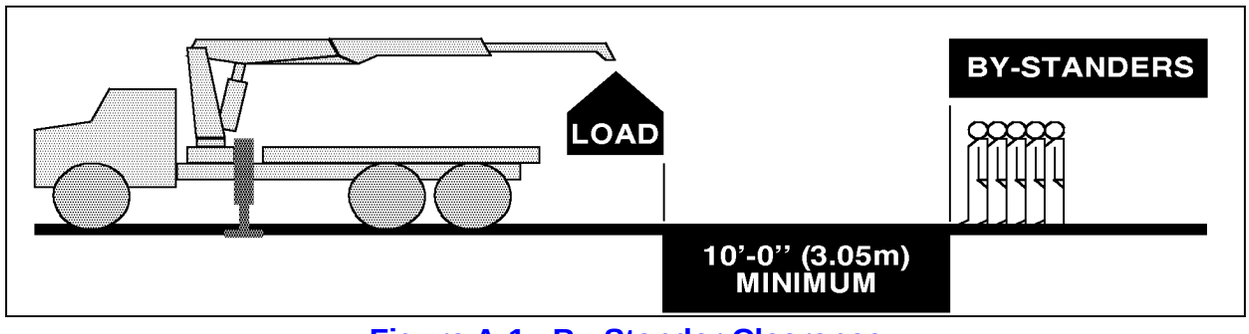

Figure A-1. By-Stander Clearance

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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.

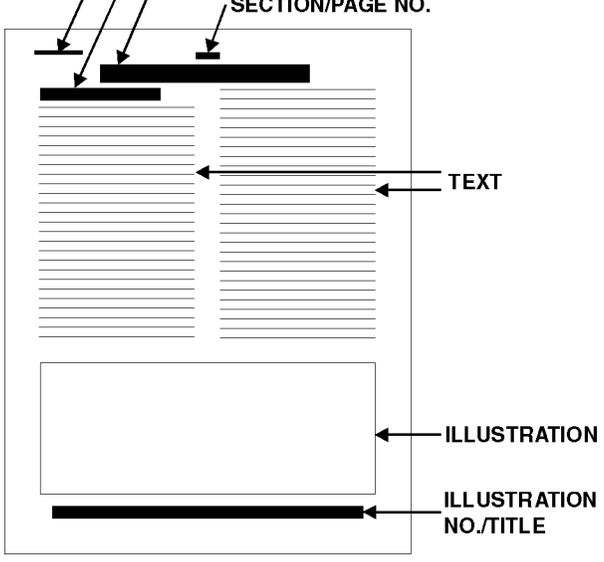

Figure A-2. Typical Page Description

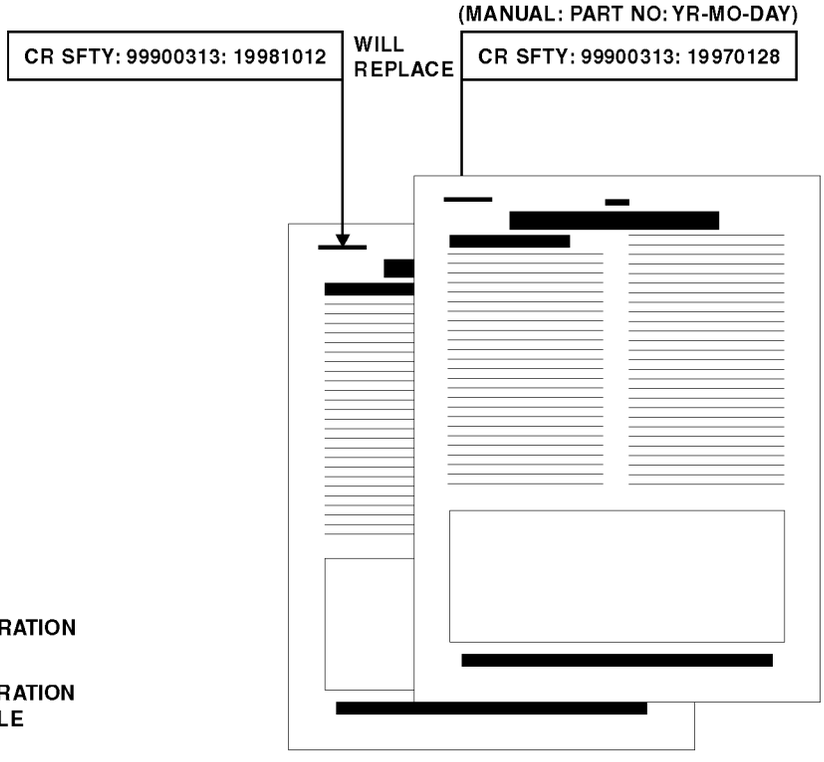

Figure A-3. Revised Page

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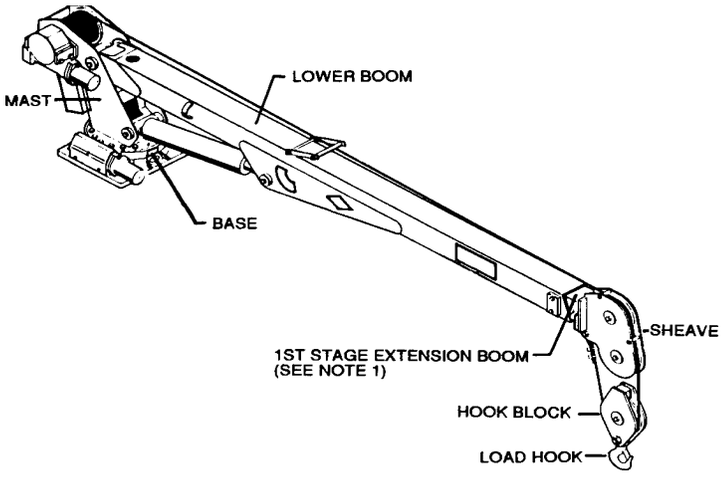
Section 2. CRANE COMPONENT IDENTIFICATION

COMPONENT IDENTIFICATION

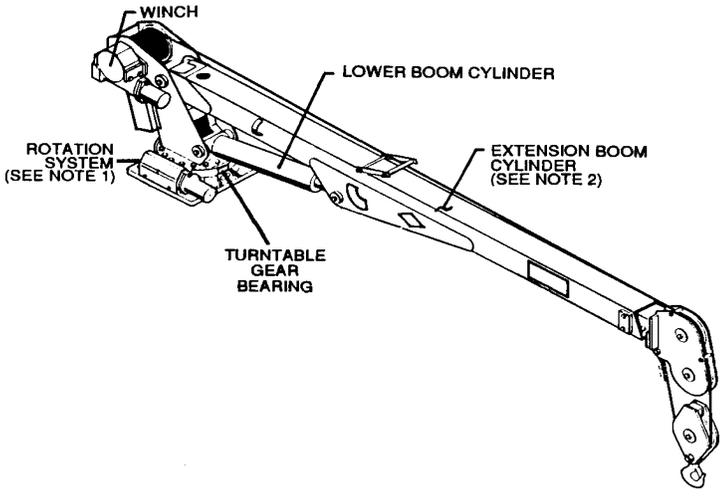
Know the components of your crane. Doing so will aid in the communication of problems to maintenance personnel as well as provide immediate reference during an emergency situation.

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

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NOTE 1.
STABILIZER 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.

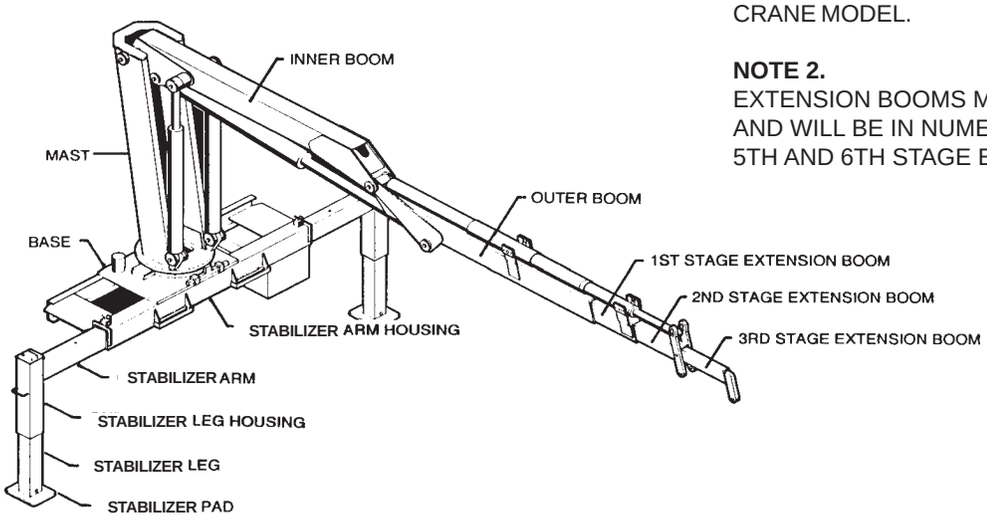

Figure B-3. Articulating Crane - Major Assemblies

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.

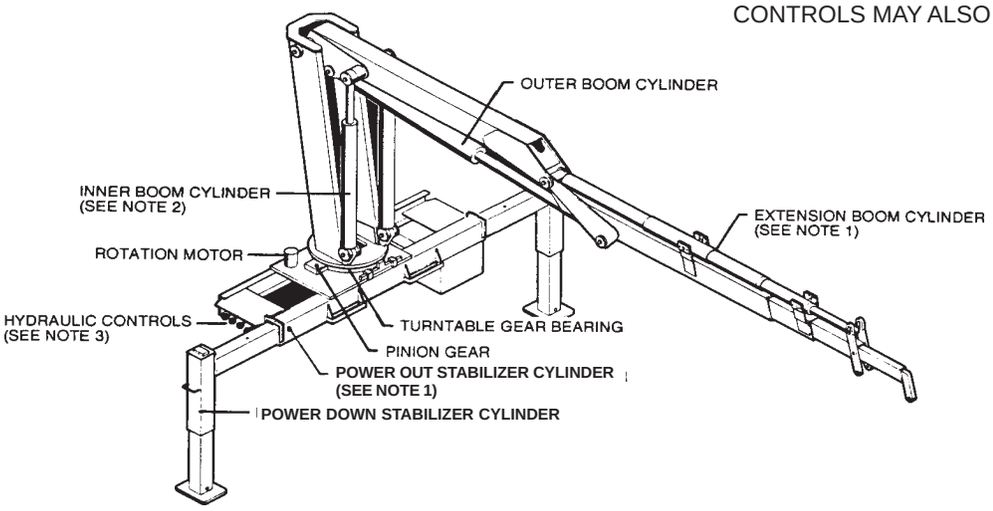

Figure B-4. Articulating Crane - Hydraulic Components

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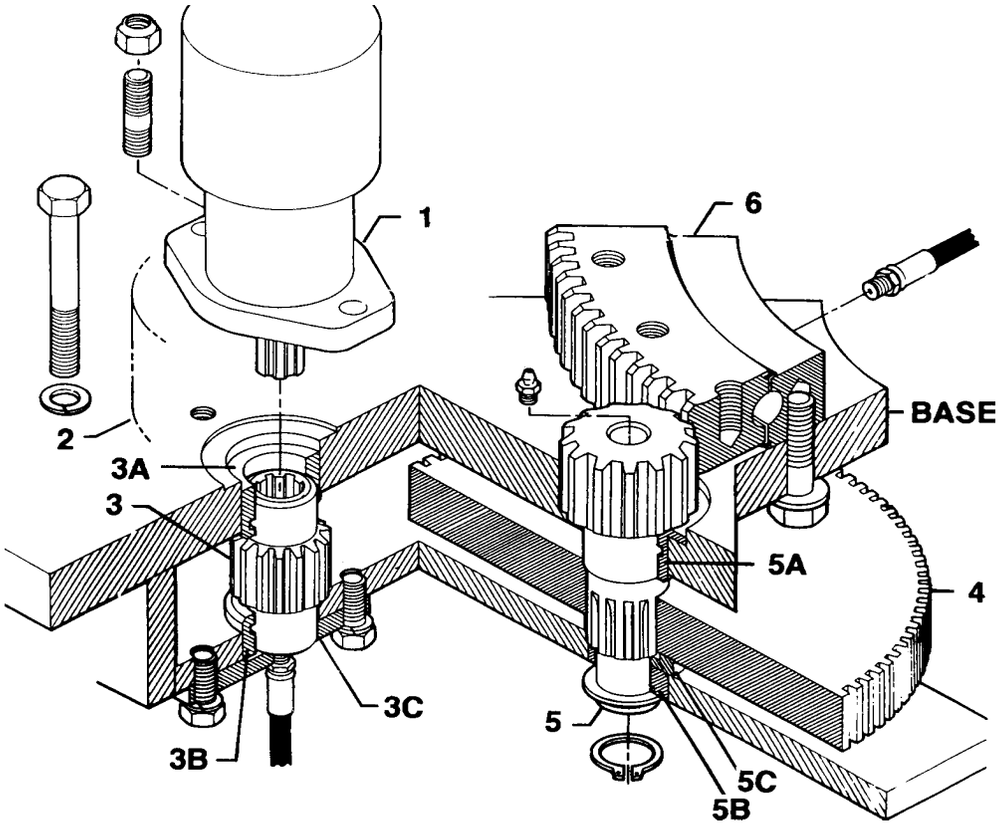

ITEM	DESCRIPTION
1.	ROTATION MOTOR
2.	HYDRAULIC BRAKE
3.	DRIVE GEAR
3A.	UPPER DRIVE GEAR BUSHING
3B.	LOWER DRIVE GEAR BUSHING
3C.	DRIVE GEAR GREASE PLATE
4.	INTERMEDIATE GEAR
5.	PINION GEAR
5A.	UPPER PINION GEAR BUSHING
5B.	LOWER PINION GEAR BUSHING
5C.	INTERMEDIATE GEAR THRUST BEARING
6.	TURNTABLE GEAR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

Figure B-5. Typical Gear Train Configuration

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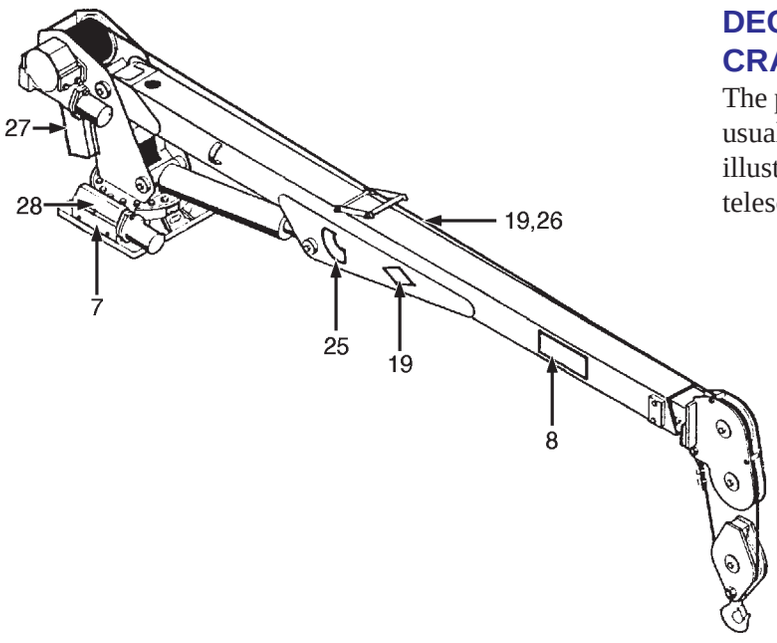
SECTION 3. DECALS

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.



ITEM	DECAL DESCRIPTION	QTY	SEE FIG.
1.	WARNING-MANUAL STAB	2	A1-23
2.	GREASE WEEKLY-LEFT ARROW	AR	A1-26
3.	GREASE WEEKLY-RIGHT ARROW	AR	A1-26
4.	SUCTION LINE	1	A1-30
5.	RETURN LINE	1	A1-29
6.	CAUTION-DO NOT WASH/WAX	1	A1-32
7.	ROTATE CRANE/GREASE	1	A1-27
8.	CRANE MODEL NUMBER	2	
9.	DANGER-ELECTROCUTION	1	A1-4
10.	WARNING-UNTRAINED OPER	2	A1-18
11.	DANGER-OPERATION	2	A1-19
12.	WARNING-TWO BLOCKING	2	A1-15
13.	WARNING-HOIST PERSONNEL	2	A1-17
14.	WARNING-STAB STAND CLR	2	A1-11
15.	DANGER-ELECTROCUTION	4	A1-6
16.	WARNING-OPER CONDITIONS	2	A1-20
18.	WARN-CRANE LDLINE (TRUCK)	4	A1-16
19.	IMT DIAMOND	2	
20.	WARNING-OPERN RESTRICT	2	A1-21
21.	DANGER-RC ELECTRO-LG	1	A1-8
22.	DANGER-ROTATING DRIVELINE	1	A1-14
23.	CONTACT IMT	1	A1-28
24.	CAUTION-OIL LEVEL	1	A1-34
25.	ANGLE CHART- RIGHT SIDE	1	A1-33
26.	ANGLE CHART-LEFT SIDE	1	A1-33
27.	CAPACITY CHART	2	
28.	LUBRICATE WORM GEAR	1	A1-31
29.	DANGER-RC ELECTRO-HANDLE	1	A1-10
30.	WARNING-FALL MNL BOOM	1	A1-22
31.	HYD OIL RECOMMENDATION	1	A1-35
32.	STABILIZER-FULLY DEPLOYED	2	A1-36

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 NUMBER	LOCATION
6,9,10,11,12,13,16, 20, 21, 23, 24, 27	AT OR NEAR REMOTE CONTROL HANDLE STORAGE POINT
1,14	ONE ON EACH STABILIZER
15,18	ONE ON EACH SIDE OF THE CARRIER VEHICLE
7	AT TURNTABLE 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
30	AT OR NEAR MANUAL EXTENSION BOOM RETENTION MECHANISM
31	ON OR NEAR HYD OIL RESERVOIR
22	AT OR NEAR DRIVELINE
28	ON WORM GEAR COVER
32	ON EACH STABIILZER ARM AT FULL EXTENSION

FIGURE C-1. DECAL LOCATIONS ON TELESCOPING CRANES

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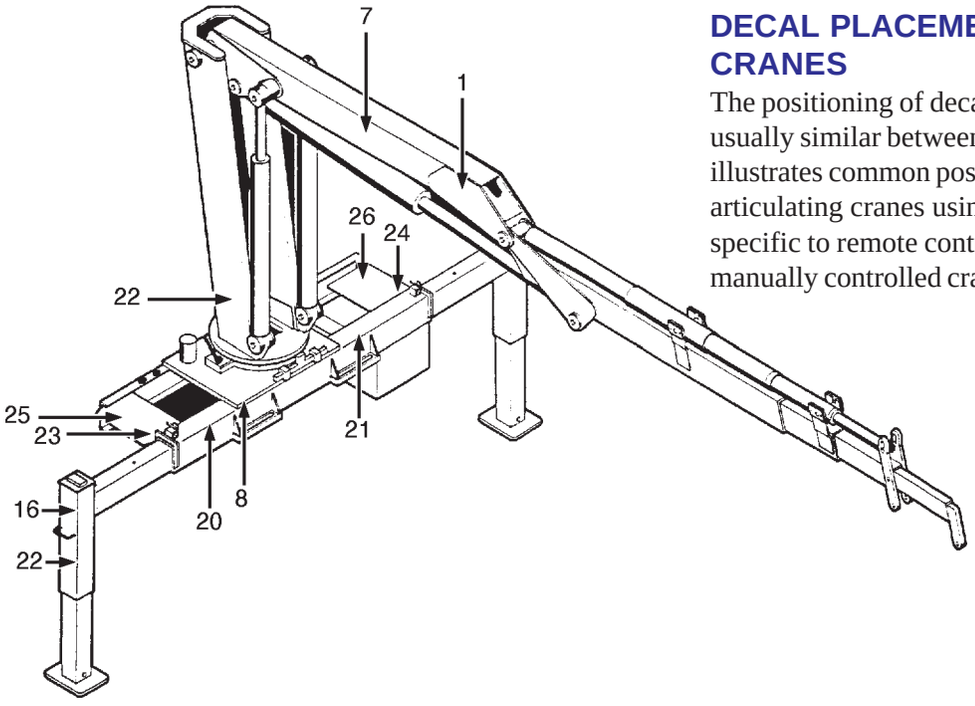

DECAL PLACEMENT -ARTICULATING CRANES

The positioning of decals on an articulating crane is usually similar between varying models. Figure A1-2 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	DECAL DESCRIPTION	QTY	SEE FIG.
1.	IMT DIAMOND	2	
2.	SET UP/STOW INSTRUCTIONS	1	A1-24
3.	GREASE WEEKLY-LEFT ARROW	AR	A1-26
4.	GREASE WEEKLY-RIGHT ARROW	AR	A1-26
5.	SUCTION LINE	1	A1-30
6.	RETURN LINE	1	A1-29
7.	CRANE MODEL NUMBER	2	
8.	CAUTION-DO NOT WASH/WAX	1	A1-32
9.	ROTATE CRANE/GREASE	1	A1-27
10.	DANGER-ELECTROCUTION	2	A1-3
11.	WARNING-UNTRAINED OPER	2	A1-18
12.	WARNINGOPERATION	2	A1-19
13.	WARNING-STAB STAND CLEAR	2	A1-11
14.	DANGER-ELECTROCUTION	4	A1-5
15.	WARNING-OPER CONDITIONS	2	A1-20
17.	WARNINGOPER RESTRICTIONS	2	A1-21
18.	DANGER-STOW/UNFOLDING	2	A1-13
19.	DANGER-ROTATING DRIVELINE	1	A1-14
20.	CONTACT IMT	1	A1-28
21.	CAUTION-OIL LEVEL	2	A1-34
22.	CAPACITY CHART	2	
23.	STREET SIDE CONTROLS	1	
24.	CURB SIDE CONTROLS	1	
25.	STABILIZER CONTROLS SS	1	
26.	STABILIZER CONTROLS CS	1	
27.	CRANE ROTATION ALIGNMENT	1	A1-25
28.	DANGER-RC ELECTRO-LG	2	A1-7
29.	DANGER-RC ELECTRO-HNDL	1	A1-9
30.	WARNING-TWO BLOCKING	2	A1-15
31.	WARN-CRANE -LINE (TRUCK)	4	1-16
32.	WARNING-HOISTING PERSON	2	A1-17
33.	WARNING-FREEFALL MNL BOOM	1	A1-22
34.	HYD OIL RECOMMENDATION	1	A1-35
35.	STABILIZER-FULLY DEPLOYED	2	A1-36

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 NUMBER	LOCATION
2,8,10,11,12,15, 17, 18, 20, 21 28, 30, 31, 32	AT OR NEAR THE NORMAL OPERATING STATIONS
13	ONE ON EACH STABILIZER
14,31	ONE ON EACH SIDE OF THE CARRIER VEHICLE
9	AT TURNTABLE 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
33	AT OR NEAR MANUAL EXTENSION BOOM RETENTION MECHANISM
34	ON OR NEAR HYD OIL RESERVOIR
19	AT OR NEAR DRIVELINE
27	ALIGNED ON MAST AND BASE
35	ON EACH STABIILZER ARM AT FULL EXTENSION

FIGURE C-2. DECAL LOCATIONS ON ARTICULATING CRANES

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"DANGER" DECAL DESCRIPTIONS

All operators must familiarize themselves with the "DANGER" decals shown 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 (including capacity chart) 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.

Shown in the following figures are the safety decals used on IMT cranes. They are shown 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. All decals are shown half-size.

Figure C-3

DECAL: Electrocution Hazard

PART NUMBER: 70392813

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

WHERE USED: Articulating cranes

PLACEMENT: At or near the operator's control station(s).

QUANTITY: 2

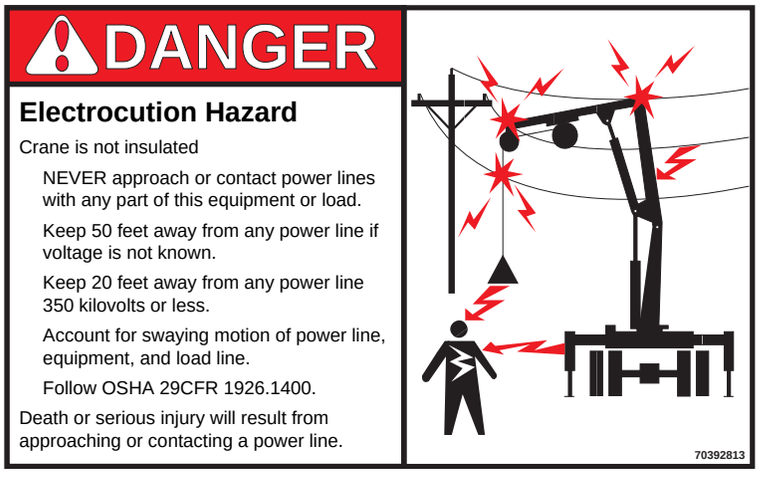


Figure C-4

DECAL: Electrocution Hazard

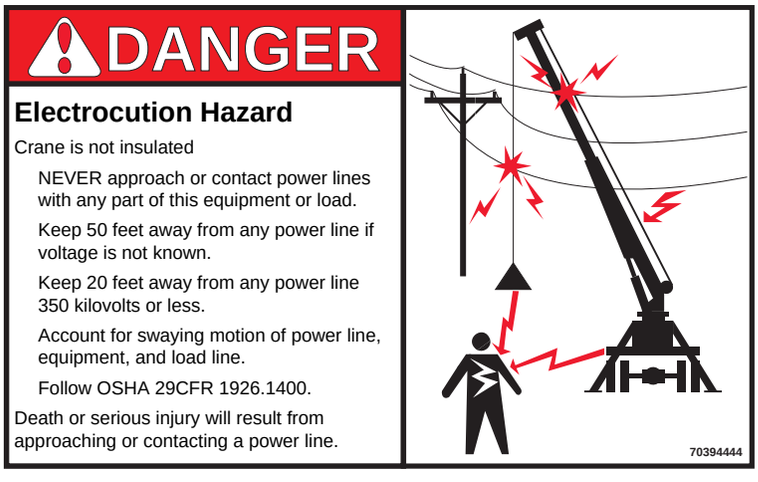
PART NUMBER: 70394444

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

WHERE USED: Service body mounted Telescoping Cranes - remote controls.

PLACEMENT: At or near the remote control handle storage point.

QUANTITY: 1



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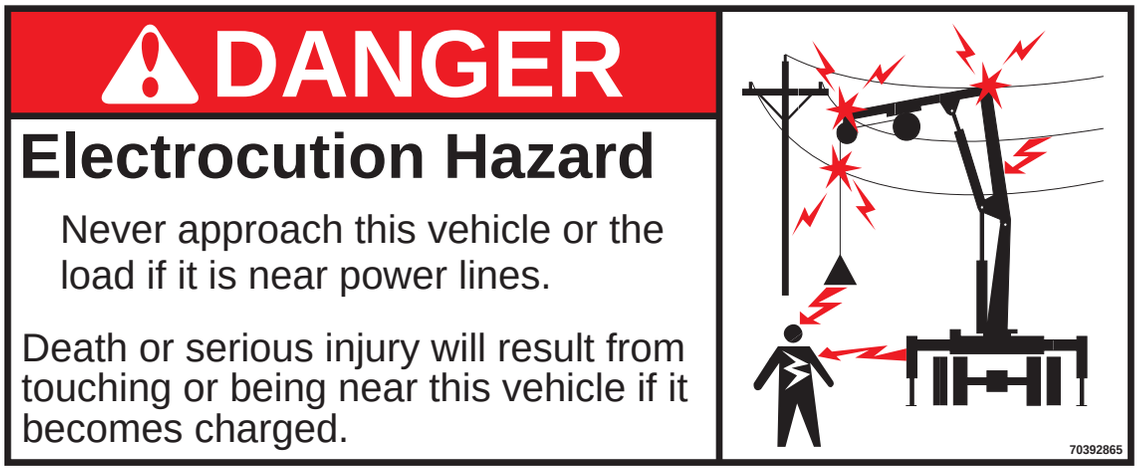

Figure C-5

DECAL: Electrocution Hazard

PART NUMBER: 70392865

FUNCTION: To inform the operator and other personnel in the work area of the hazard associated with contact or proximity to electrical lines, the possible consequences should the hazard occur, and how to avoid the hazard.

WHERE USED: Articulating cranes

PLACEMENT: On all four sides of the carrier vehicle.

QUANTITY: 4

Figure C-6

DECAL: Electrocution Hazard

PART NUMBER: 70394445

FUNCTION: To inform the operator and other personnel in the work area of the hazard associated with contact or proximity to electrical lines, the possible consequences should the hazard occur, and how to avoid the hazard.

WHERE USED: Service body mounted Telescoping Cranes - remote controls

PLACEMENT: On all four sides of the carrier vehicle.

QUANTITY: 4

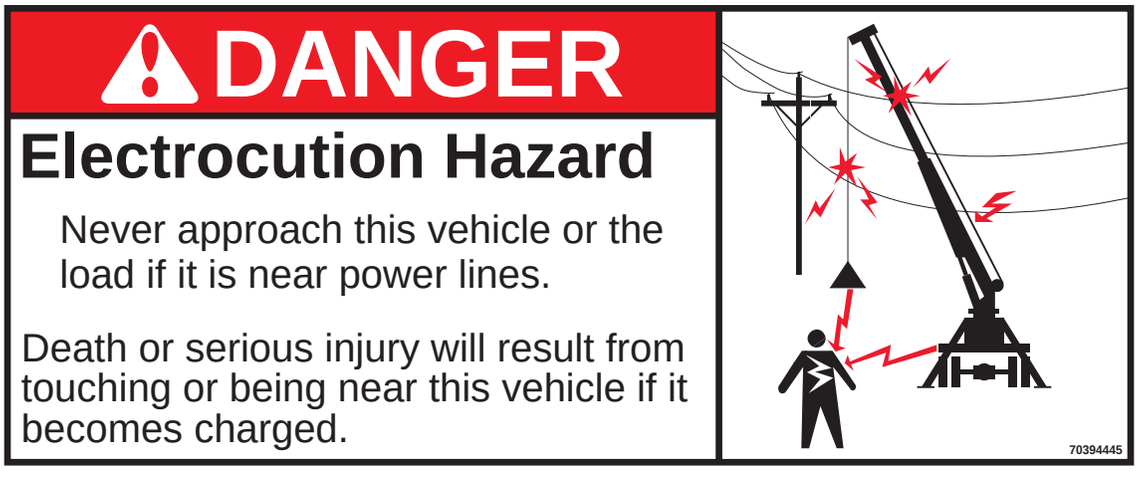

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Figure C-7

DECAL: Electrocution Hazard-Remote Control Operation

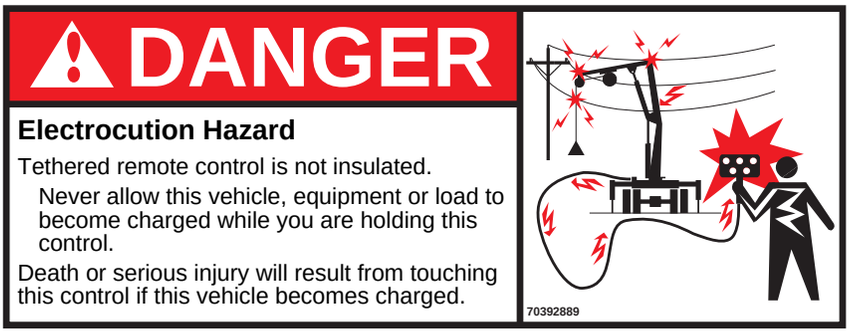
PART NUMBER: 70392889

FUNCTION: To inform the operator and other personnel 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.

WHERE USED: Articulating cranes - remote controls

PLACEMENT: If crane is equipped with manual control(s) in addition to remote controls, placed at or near the operator's manual control station(s). If crane is equipped with remote controls only, placed at remote control handle storage point.

QUANTITY: 2 or 1 if only with remote controls.



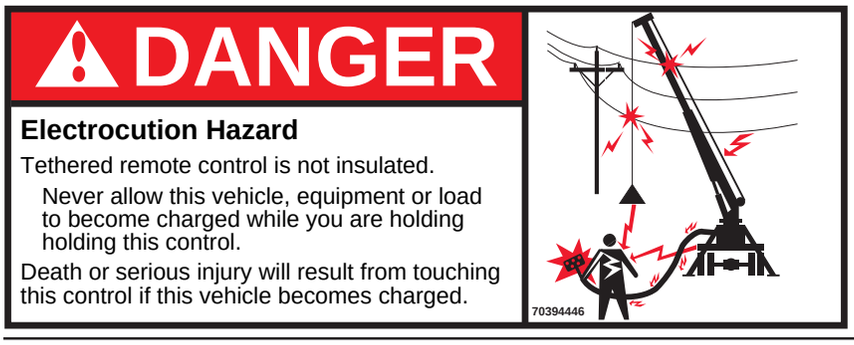


Figure C-8

DECAL: Electrocution Hazard-Remote Control Operation

PART NUMBER: 70394446

FUNCTION: To inform the operator and other personnel 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.

WHERE USED: Service body mounted Telescoping Cranes - remote controls

PLACEMENT: At or near the remote control handle storage point.

QUANTITY: 1

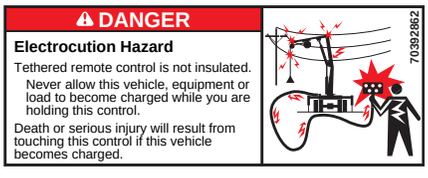


Figure C-9

DECAL: Electrocution Hazard-Remote Control Operation

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.

WHERE USED: Articulating cranes - Remote Controls

PLACEMENT: On the hand held controller.

QUANTITY: 1

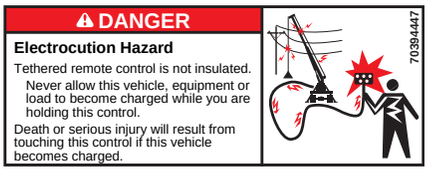


Figure C-10

DECAL: Electrocution Hazard-Remote Control Operation

PART NUMBER: 70394447

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.

WHERE USED: Service body mounted Telescoping Cranes - Remote Controls

PLACEMENT: On the hand held controller.

QUANTITY: 1

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Figure C-11

DECAL: Stabilizer Foot Crushing Hazard

PART NUMBER: 70392864

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

USED ON: Articulating and Service body mounted Telescoping Cranes

PLACEMENT: On each stabilizer.

QUANTITY: 2

Figure C-12

DECAL: Moving Stabilizer Hazard

Note- Combined with 70392864 effective January 1, 2012.

Figure C-13

DECAL: Moving Boom Hazard

PART NUMBER: 70392890

FUNCTION: To inform the operator and other personnel in the work area of the hazard associated with a moving boom especially while stowing and unfolding the crane, the possible consequences should the hazard occur, and how to avoid the hazard.

USED ON: Articulating Cranes

PLACEMENT: At or near the operator's control station(s) and/or the boom stow area(s).

QUANTITY: 2

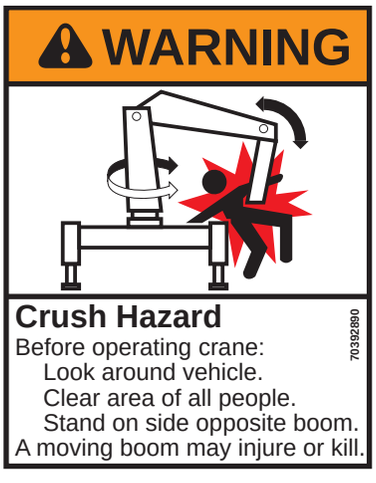

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Figure C-14

DECAL: Rotating Driveline Hazard

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: Articulating and Service body mounted Telescoping Cranes that are driven by a PTO/pump system.

PLACEMENT: At or near the drive line.

QUANTITY: 1

Figure C-15

DECAL: Two Block Hazard

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: Articulating and Service body mounted Telescoping Cranes.

PLACEMENT: At or near the operator's control station(s).

QUANTITY: 2

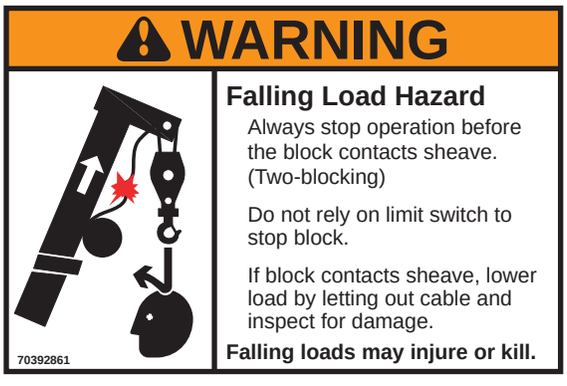

Figure C-16

DECAL: Riding on Boom, Hook, or Loadline Hazard

PART NUMBER: 70392868

FUNCTION: To inform personnel in the work area of the possible consequences of riding on the boom, boom hook, the load or winch loadline, and how to avoid the hazard.

USED ON: Articulating and Service body mounted Telescoping Cranes.

PLACEMENT: On all four sides of the vehicle.

QUANTITY: 4

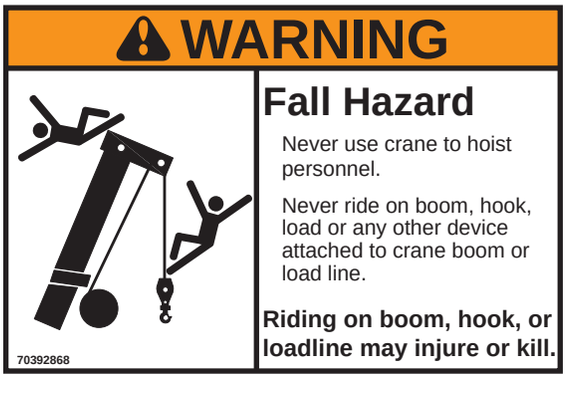

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Figure C-17

DECAL: Hoisting Personnel on Boom, Hook, or Loadline Hazard

PART NUMBER: 70392863

FUNCTION: To inform the operator of the hazard associated with lifting personnel with the boom, boom hook, the load or winch loadline, the possible consequences of lifting personnel, and how to avoid the hazard.

USED ON: Articulating and Service body mounted Telescoping Cranes.

PLACEMENT: At or near the operator's control station(s).

QUANTITY: 2

Figure C-18

DECAL: Untrained Operator Hazard

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: Articulating and Service body mounted Telescoping Cranes.

PLACEMENT: At or near the operator's control station(s).

QUANTITY: 2

Figure C-19

DECAL: Operation Hazards

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: Articulating and Service body mounted Telescoping Cranes.

PLACEMENT: At or near the operator's control station(s).

QUANTITY: 2

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Figure C-20

DECAL: Failure to Obey Hazards-Inspections, Modifications, and Chassis Selection.

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: Articulating and Service body mounted Telescoping Cranes.

PLACEMENT: At or near the operator's control station(s).

QUANTITY: 2

Figure C-21

DECAL: Failure to Obey Hazards-Load Charts, Crane Ratings, Winch Ratings, Accessories, and Manual Boom Extensions.

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: Articulating and Service body mounted Telescoping Cranes.

PLACEMENT: At or near the operator's control station(s).

QUANTITY: 2

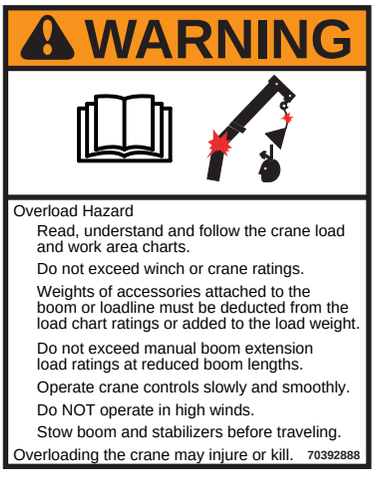


Figure C-22

DECAL: Free Falling Manual Boom Extension(s) Hazard

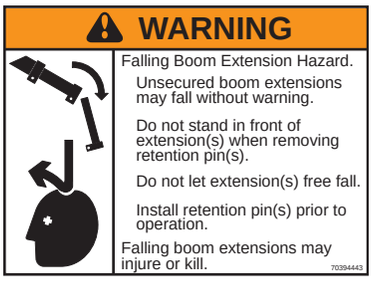
PART NUMBER: 70394443

FUNCTION: To inform the operator of precautions necessary in the safe deployment of manually operated extension booms, and the possible consequences of not taking those precautions.

USED ON: Articulating and Service body mounted Telescoping Cranes.

PLACEMENT: At or near the manual boom extension(s) retention mechanism(s).

QUANTITY: 1



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INSTRUCTIONAL DECALS

Shown in this section 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.

Figure C-23

DECAL: Warning - Manual Stabilizers

PART NUMBER: 70391598

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

USED ON: All cranes equipped with manual stabilizers.

PLACEMENT: On each stabilizer.

QUANTITY: 1 per stabilizer leg.

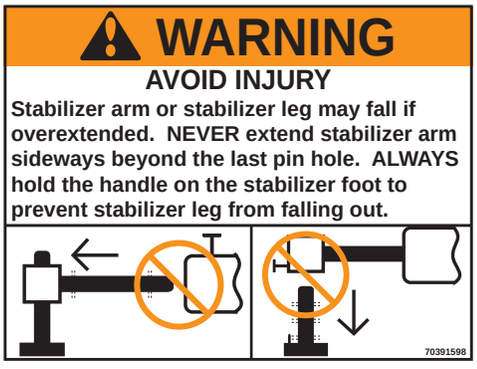

Figure C-24

DECAL: Set Up/Stow Instructions

PART NUMBER: 70391583

FUNCTION: To provide the operator with sequencial 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

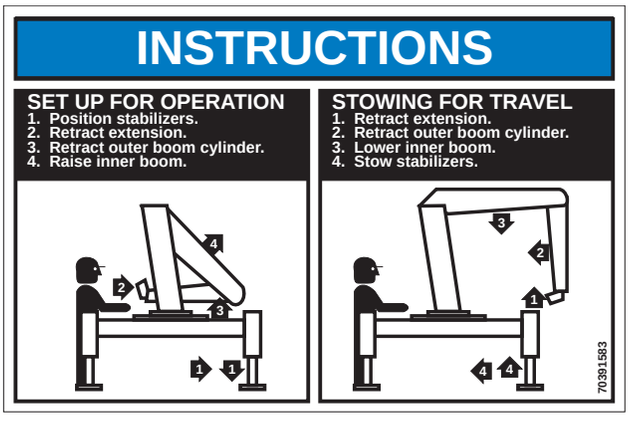

Figure C-25

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

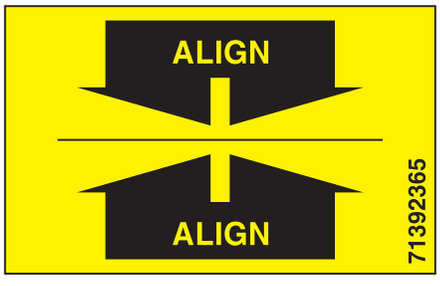

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Figure C-26

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-27

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-28

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

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Figure C-29

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-30

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-31

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

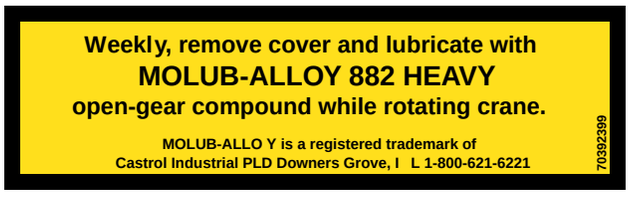

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Figure C-32

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-33

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

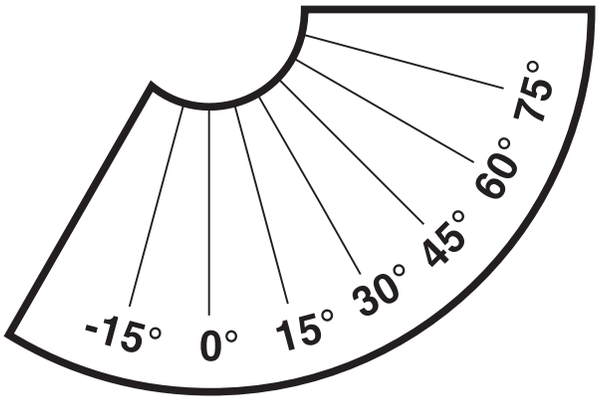

Figure C-34

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

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Figure C-35

DECAL: Hydraulic Oil Reservoir Fill Recommendations

PART NUMBER: 70394189

FUNCTION: To inform operator and maintenance personnel of the recommended hydraulic oil to be used under differing climatic conditions.

USED ON: All cranes.

PLACEMENT: On or near the hydraulic oil reservoir.

QUANTITY: 1

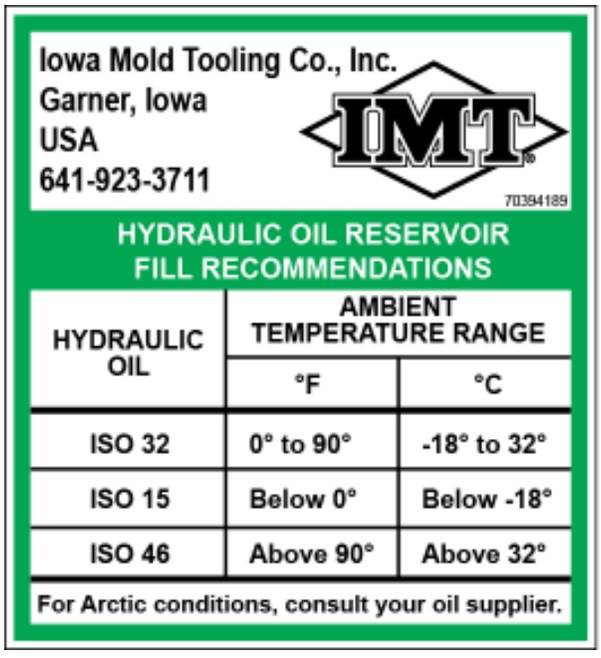

Figure C-36

DECAL: Stabilizer - Fully Deployed

PART NUMBER: 70399271

FUNCTION: To inform operator when the stabilizer arm is fully deployed (extended). When the stabilizer arm is fully extended, this decal will be completely visible.

USED ON: All cranes with stabilizers which extend out.

PLACEMENT: On the top of the stabilizer arm when fully deployed.

QUANTITY: 1 per stabilizer which extends out.

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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).

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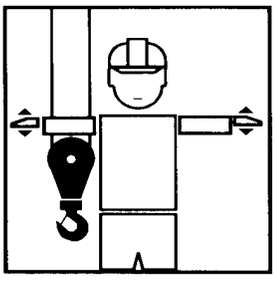
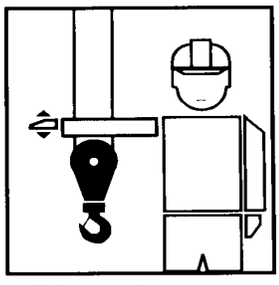
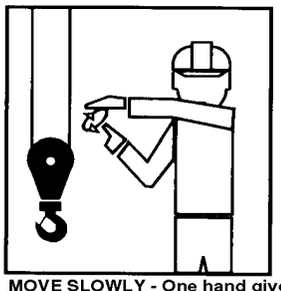


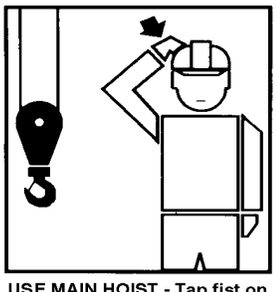
EMERGENCY STOP - Both arms extended, palms down, move arms back and forth horizontally.



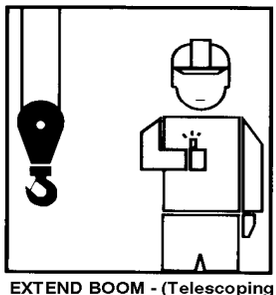
STOP - Arm extended, palm down, move arm back and forth horizontally.



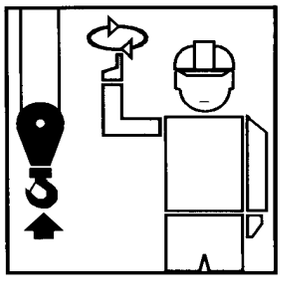
MOVE SLOWLY - One hand gives any motion signal; place other hand motionless in front of that hand. (Hoist slowly shown).



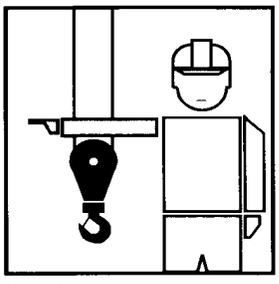
USE MAIN HOIST - Tap fist on head; then use regular signals.



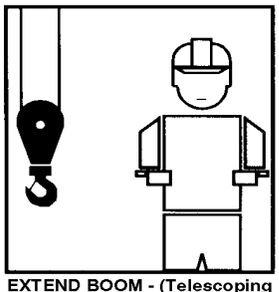
EXTEND BOOM - (Telescoping Booms). One Hand Signal. One fist in front of chest with thumb tapping chest.



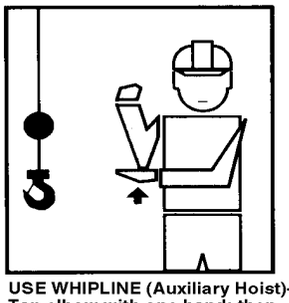
HOIST - With forearm vertical, forefinger pointing up, move hand in small horizontal circles.



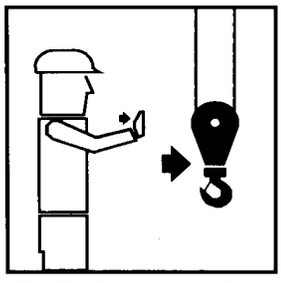
SWING - Arm extended, point with finger in direction of boom swing.



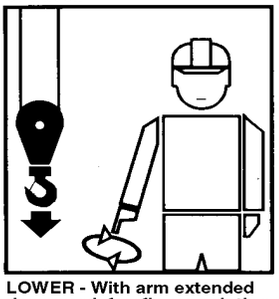
EXTEND BOOM - (Telescoping Booms). Both fists in front of body with thumbs pointing outward.



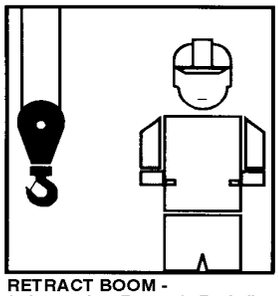
USE WHIPLINE (Auxiliary Hoist)- Tap elbow with one hand; then use regular signals.



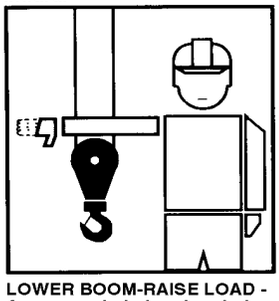
TRAVEL - Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



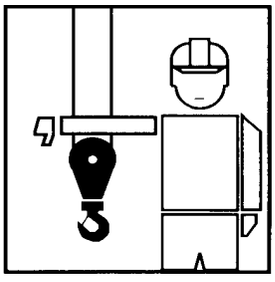
LOWER - With arm extended downward, forefinger pointing down, move hand in small horizontal circle.



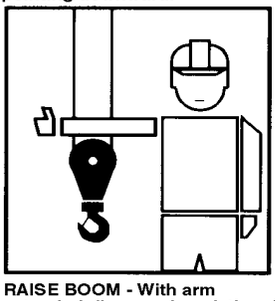
RETRACT BOOM - (telescoping Booms). Both fists in front of body with thumbs pointing inward.



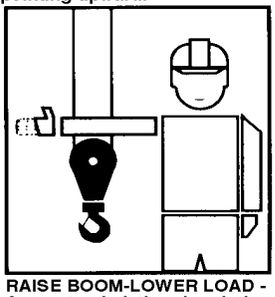
LOWER BOOM-RAISE LOAD - Arm extended, thumb pointing down, flex fingers in and out until desired movement is completed.



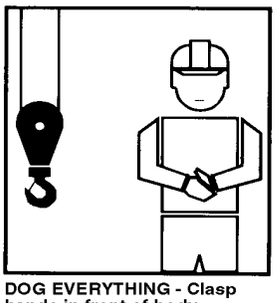
LOWER BOOM - With arm extended, fingers closed, thumb pointing downward.



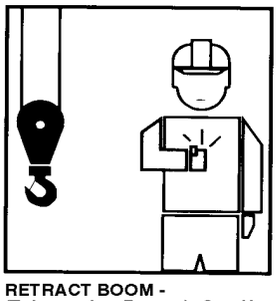
RAISE BOOM - With arm extended, fingers closed, thumb pointing upward.



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

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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.

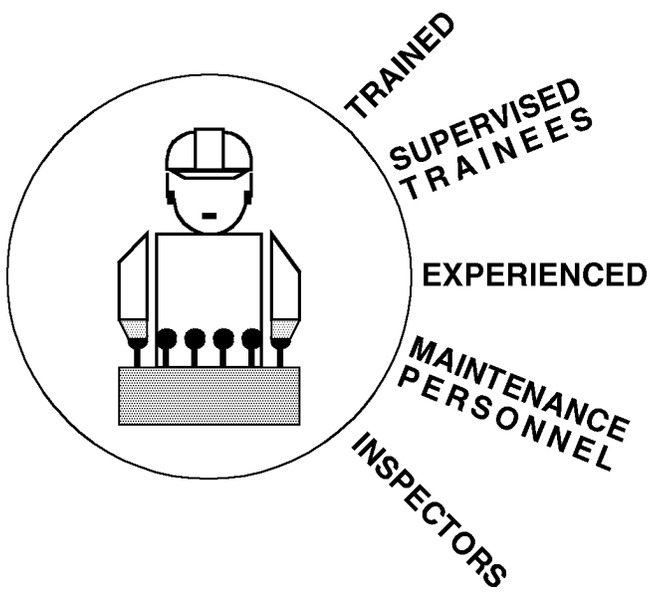

FIGURE E-1.
OPERATOR QUALIFICATIONS

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.

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.

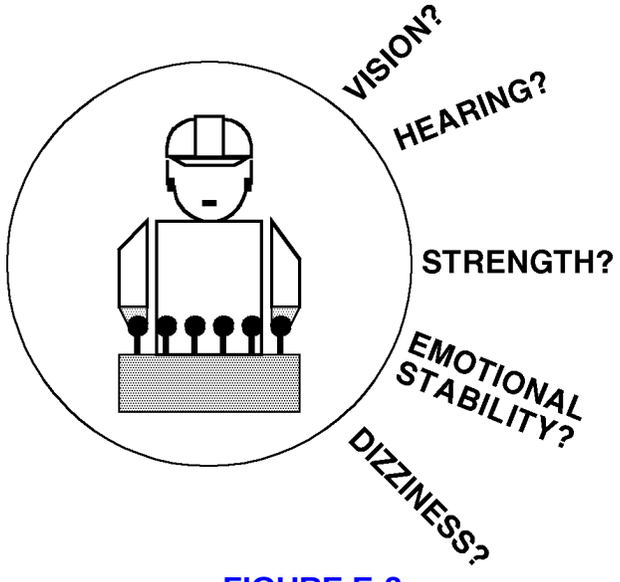

FIGURE E-2.
PHYSICAL CONSIDERATIONS

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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 relinguish 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.

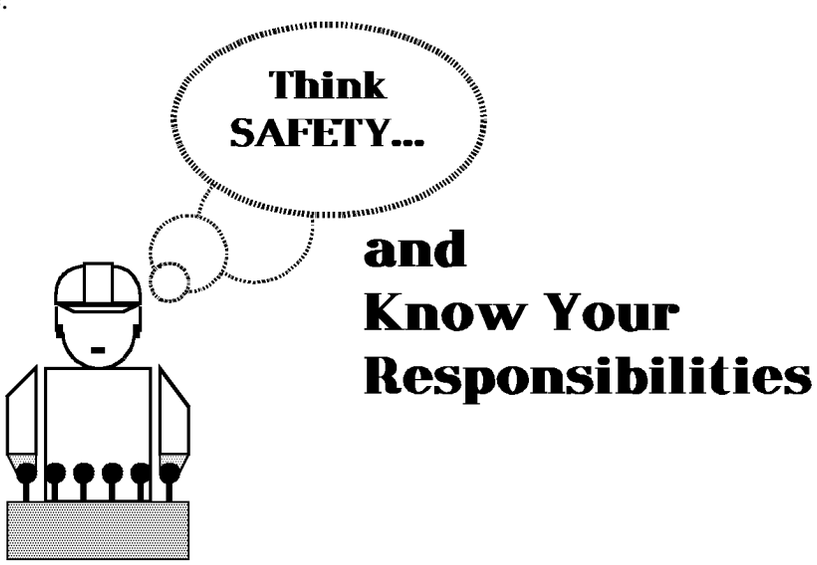

Figure E-3. SAFETY IS YOUR RESPONSIBILITY

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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 powerlines, 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. Stabilizers 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 inflaion pressure.

9. DO NOT drive the carrier vehicle in areas where the vertical clearance is not known.

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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 20 feet (6.10 meters) absolutely the closest that any portion of the crane, loadline or load can be to electrical lines carrying up to 350,000 Volts. Maintain 50 feet (15.25 m) for powerlines carrying voltages over 350,000 volts or those of unknown voltage.

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 stabilizer support. If stabilizers 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 stabilizers 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.

Stabilizers 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 stabilizer function to level the vehicle side-to-side, referring to the levels mounted on the front and side of the crane base. Utilize a signal person if the stabilizers are not in view from the operator's station when extending or lowering the stabilizers.

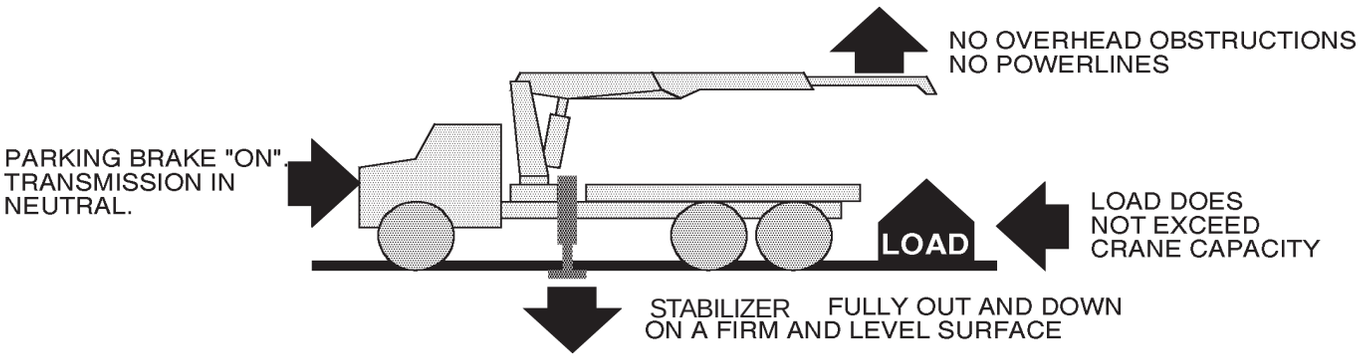

FIGURE F-1. CRANE SET-UP PRECAUTIONS

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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 stabilizers.

5. If the stabilizers 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 stabilizers 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.

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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.

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.

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.

FIRE PRECAUTIONS

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 extiguisher 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.

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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 boom, 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.

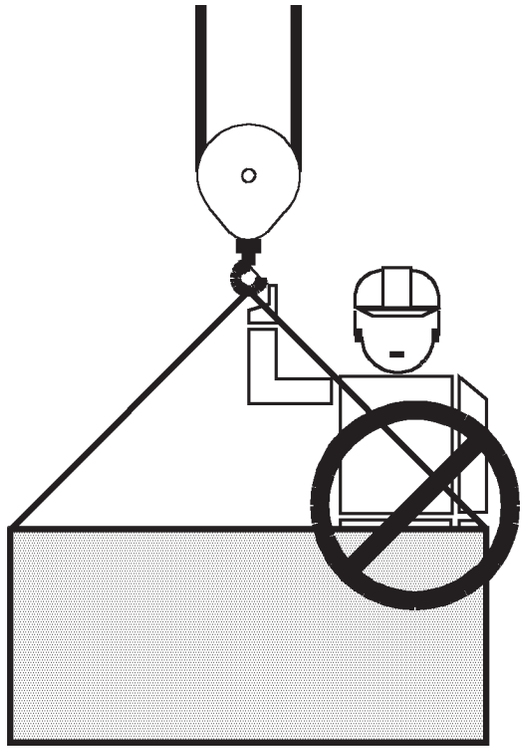

FIGURE F-2.
DO NOT RIDE LOAD, HOOK OR BOOM

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.

FIGURE F-3.
PTO DANGER DECAL

DISENGAGING THE PTO

1. Fully depress the vehicle’s clutch pedal.

2. Disengage the PTO (OFF).

3. Release the clutch pedal gradually.

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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.

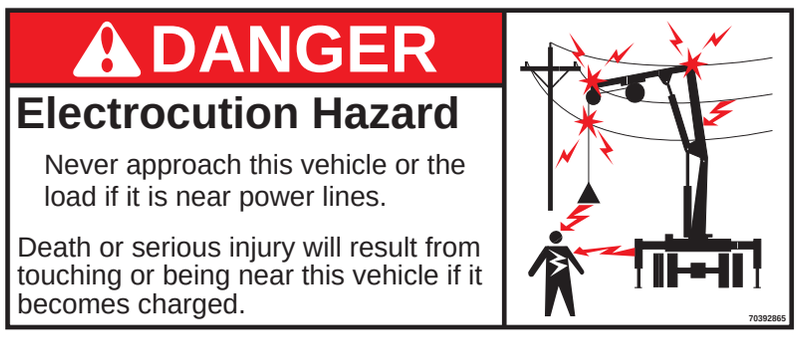

FIGURE G-1. ELECTRICAL HAZARD WARNING DECAL

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	NORMAL VOLTAGE kV (Phase to Phase)	MINIMUM CLEARANCE REQUIRED Feet (meters)
OPERATION NEAR HIGH VOLTAGE POWERLINES	From 0 to 350	20 (6.10)
	Above 350 or unknown	50 (15.24)
OPERATION IN TRANSIT WITH NO LOAD AND BOOM OR MAST LOWERED	From 0 to 0.75	4 (0.22)
	From 0.75 to 50	6 (0.83)
	From 50 to 345	10 (3.05)
	From 345 to 750	16 (4.87)
	From 750 to 1000	20 (8.10)

FIGURE G-2.
REQUIRED CLEARANCES OF CRANES FROM ELECTRICAL TRANSMISSION LINES

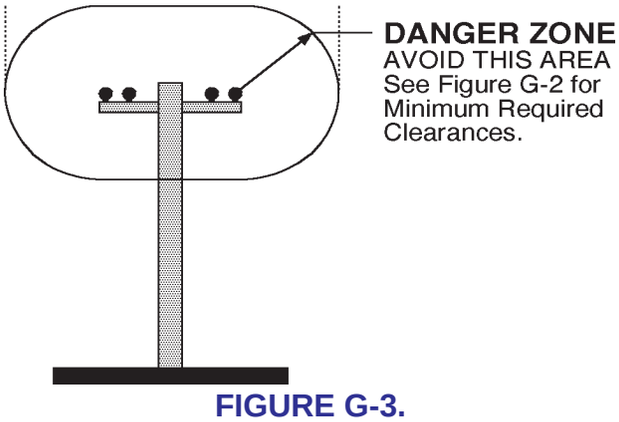

FIGURE G-3.
DANGER ZONE FOR CRANES OPERATING NEAR ELECTRICAL TRANSMISSION LINES

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.

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Section 8. WIRE ROPE PRECAUTIONS

GENERAL

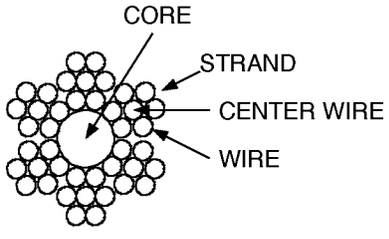
Wire rope can be the weak link in crane safety. It is subjected to heavy loads, abrasion, kinking, extreme weather conditions, chemical attack and other forces which can reduce its reliability. The inspection and care of wire rope is essential in the effort to provide for safe working conditions.

WIRE ROPE DESCRIPTION

By definition, a wire rope is a machine. A typical wire rope will contain many individual wires which are formed and fabricated to operate at close bearing tolerances with one another. As a wire rope bends, each of its many wires bend to accommodate the difference in length between the inside and outside of the bend. The sharper the bend, the greater the movement.

Every wire rope has three basic components:

1. The wires which form the strands and collectively provide rope strength.
2. The strands which are wound helically around the core.
3. The core which forms a foundation for the strands. The core of IWRC (independent wire rope core) wire rope is a smaller wire rope which is similar to an outer strand of the rope. Only IWRC or strand core contributes strength to the rope and an IWRC normally provides only about 7 1/2% of the rope's nominal strength.



The greatest difference in wire ropes are found in the strands, which may vary widely in the pattern and number of wires laid together.

Carbon steel wire rope come in various grades. The term "Grade" is used to designate the nominal strength of the rope. The most common rope grades are Traction Steel (TS), Plow Steel (PS), Improved Plow Steel (IPS), Extra Improved Plow Steel (EIPS), and Extra Extra Improved Plow Steel (EEIPS).

The grade of wire rope cannot be determined by feel or appearance. To properly evaluate a rope system, you must obtain the grade from the manufacturer or supplier.

BASIC INFORMATION

Wire rope will fail if worn out, overloaded, misused, damaged or improperly maintained.

In service, wire rope loses strength and work capability. Abuse and misuse increase the rate of loss.The nominal strength, sometimes called catalog strength, of wire rope applies only to a new, unused rope.

The nominal strength of wire rope should be considered the straight line pull which will actually break a new, unused rope. The nominal strength of a wire rope should never be used as its working load.

To determine the working load of a wire rope, the nominal strength must be reduced by a design factor which will vary depending upon the type of machine, installation and type of work performed. You must determine the applicable design factor for your use.

As an example: A design factor of "5" means that the nominal strength of the wire rope must be divided by 5 to determine the maximum load that can be applied to the rope system.

Design factors have been established by OSHA, ANSI, ASME and similar government and industrial organizations.

No wire rope or sling should ever be installed or used without full knowledge and consideration of the design factor for the application.

Wire ropes wear out. The strength of a wire rope begins to decrease when the rope is put in use, and continues to decrease with each use.

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WIRE ROPE INSPECTION

Regular, periodic inspections of the wire rope, and keeping of permanent records, signed by a qualified person, are required by OSHA. The purpose of inspection is to determine whether or not a wire rope or sling may continue to be safely used on that application. Inspection criteria, including number and location of broken wires, wear and elongation, have been established by OSHA, ANSI, ASME and similar organizations.

An inspection should include verification that none of the specified removal criteria for this usage are met. 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 uneveness
8. General corrosion
9. Broken strands
10. Cut strands
11. Heat damage
12. Integrity of end attachments

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

In addition, an inspection should include the condition of sheaves, drums and other apparatus with which the rope makes contact.

When a wire rope has been removed from service because it is no longer suitable for use, it must not be re-used on another application.

Every wire rope user should be aware of the fact that each type of fitting attached to a wire rope has a specific efficiecy rating which can reduce the working load of the rope assembly or rope system, and this must be given due consideration in determining the capacity of a wire rope system.

WIRE ROPE PRECAUTIONS

NEVER overload a wire rope. This means never use the wire rope where the load applied to it is greater than the working load determined by dividing the nominal strength of the rope by the appropriate design factor.

NEVER shock load a wire rope. A sudden application of force or load can cause both visible external damage and internal damage. There is no practical way to estimate the force applied by shock loading a rope. The sudden release of a load can also damage a wire rope.

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

DO NOT intentionally knot wire rope.

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.

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.

DO NOT use nicked or otherwise broken sheaves. Nicks and cracks in sheaves will cut the wire rope.

EVENLY WRAP wire rope onto the drum. Uneveness will cause crushing and/or crimping of the rope.

SELECT replacement wire rope to match the capacity and use of the crane. The crane was originally equipped with appropriate wire rope.

DO NOT expose the rope to corrosive chemicals, heat or electrical contact.

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.

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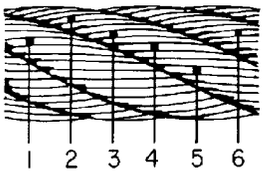
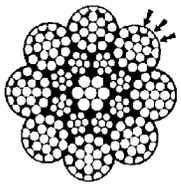
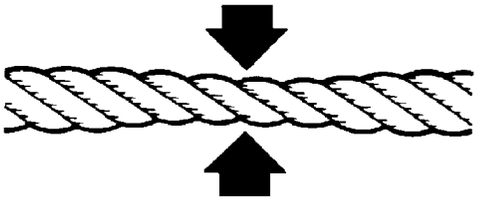
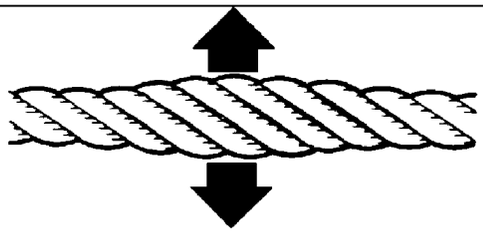
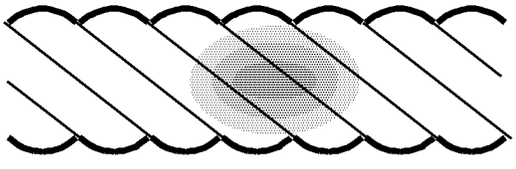
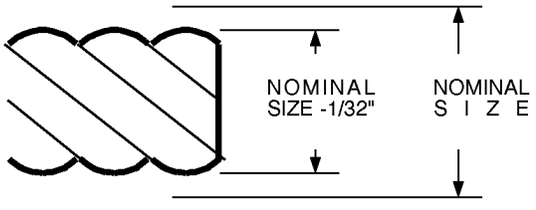
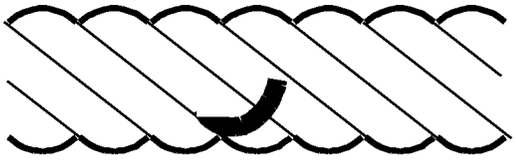
WHEN TO REPLACE WIRE ROPE

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

FIGURE H-1. WHEN TO REPLACE WIRE ROPE

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.	
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.	
3. When there is a decrease of diameter indicating a core failure.	
4. When kinking, crushing, birdcaging or other distortion occurs.	
5. When there is noticeable heat damage (discoloration) of the rope by any means.	
6. When the diameter is reduced from nominal size by 1/32" or more.	
7. If a broken wire protrudes or loops out from the core of the rope.	

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WIRE ROPE SLINGS

Rated load (rated capacity) of a wire rope sling is based on the nominal, or catalog strength of the wire rope used in the sling, and factors which affect the overall strength of the sling. These factors include attachment or splicing efficiency, the number of parts of rope in the sling, type of hitch (straight, choker, basket), diameter around which the body of the sling is bent, and the diameter of hook over which the eye of the sling is rigged.

Rated load of a sling is different for each of the three basic methods of rigging. These rated loads are availale from your wire rope sling supplier and may be indicated on a tag attached to the sling at the time it is fabricated.

WARNING

A HAND-TUCKED EYE SPLICE CAN UNLAY (UNRAVEL) AND FAIL IF THE SLING IS ALLOWED TO ROTATE DURING USE.

Never shock load a sling. There is no practical way to estimate the actual force applied by shock loading. The rated load of a wire rope sling can easily be exceeded by a sudden application of force, and damage can occur to the sling. The sudden release of a load can also damage a sling.

The body of a wire rope sling should be protected with corner protectors, blocking or padding against damage by sharp edges or corners of a load being lifted. Sharp bends that distort the sling body damage the wire rope and reduce its strength.

Any angle other than vertical at which a sling is rigged increases the loading on the sling.

A sling should be given a visual inspection before each lift or usage to determine if it is capable of safely making the intended lift.

An inspection of a wire rope sling should be no different that that for a wire rope.

Whenever a sling is found to be deficient, the eyes must be cut, or other end attachments or fittings removed to prevent further use, and the sling body discarded.

A sling eye should never be used over a hook or pin with a body diameter larger than the natural width of the eye. Never force an eye onto a hook. The eye should always be used on a hook or pin with at least the diameter of the rope.

BASIC HITCHES

VERTICAL or straight attachment, is simply the using of a sling to connect a lifting hook to the load. Full rated load of the sling may be used, but never exceeded. A tagline should be used on such a lift to prevent rotation which can damage the sling. A sling with a hand-tucked splice can unlay and fail if the sling is allowed to rotate.

CHOKER hitches reduce lifting capability of a sling, since this method of rigging affects the ability of the wire rope components to adjust during the lift, places angular loading on the body of the sling, and creates a small diameter bend in the sling body at the choke point.

BASKET hitches distribute a load equally between the two legs of a sling, within limitations imposed by the angles at which legs are rigged to the load.

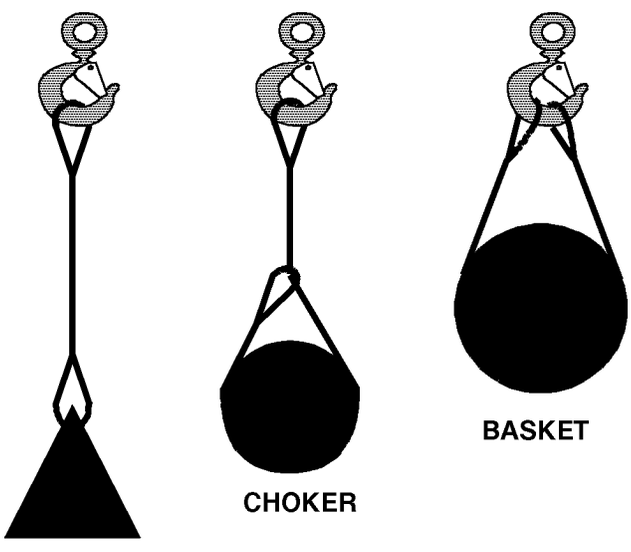

FIGURE H-2. BASIC HITCHES

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SLING LOADING

Sling angle (angle of loading) is the angle measured between a horizontal line and the sling leg or body. This angle is very important and can have a dramatic effect on the rated load of the sling. When this angle decreases, the load on each leg increases. This principle applies wheter one sling is used with legs at an angle in a basket hitch, or for multi-leg bridle slings. Horizontal sling angles of less than 30° shall not be used. See Figure H-3.

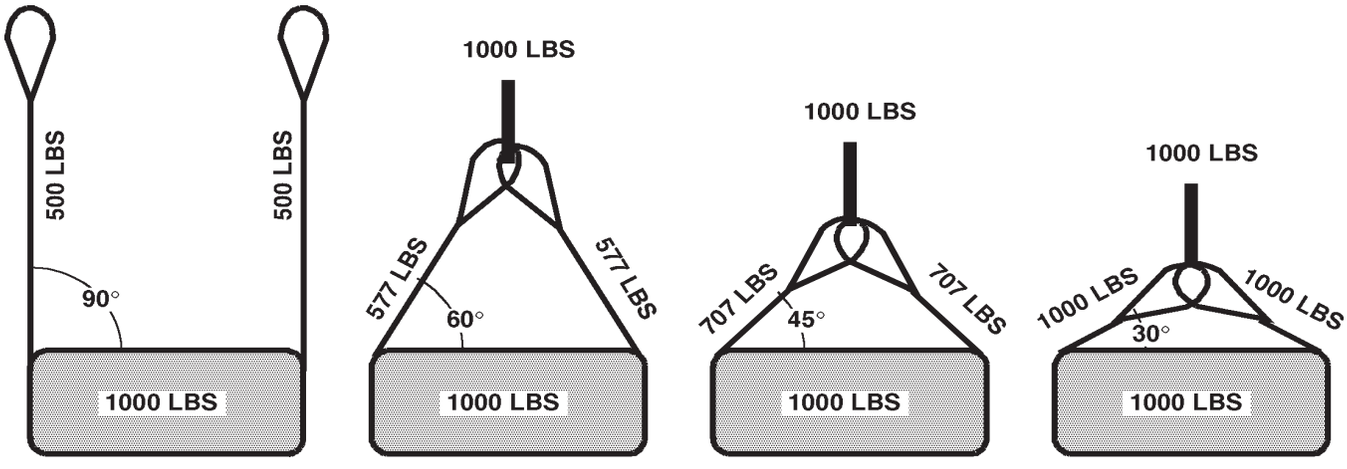
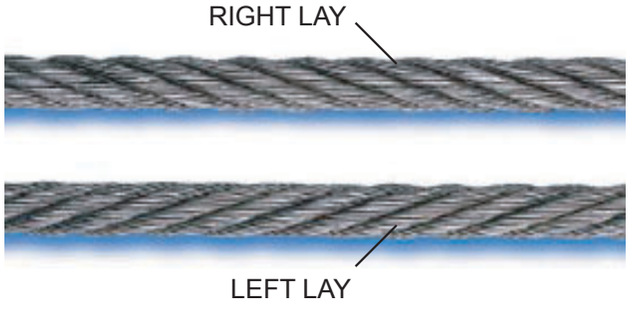


FIGURE H-3. LOAD AT VARIOUS SLING ANGLES

WIRE ROPE LAY

Wire rope “lay” indicates the directions strands lay in the rope - right or left. When you look down a rope, strands of a right lay rope go away from you to the right, like a right hand screw thread. Left lay is the opposite, and corresponds to a left hand screw thread.



You must choose the correct lay for your winch drum to avoid winch spooling problems and rope which does not lay correctly. Use the following graphics to help in selecting the correct wire rope based on the direction of drum winding.

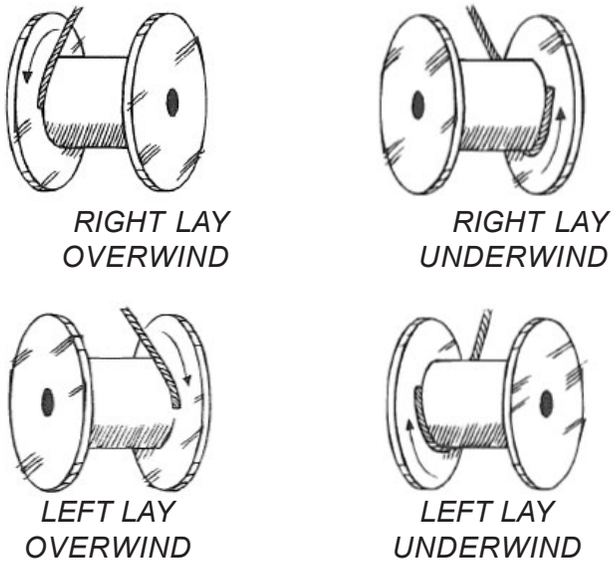


FIGURE H-4. WIRE ROPE LAY

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WEDGE SOCKET ATTACHMENT

When attaching a wedge socket, use one of the approved methods displayed in Figure H-4.

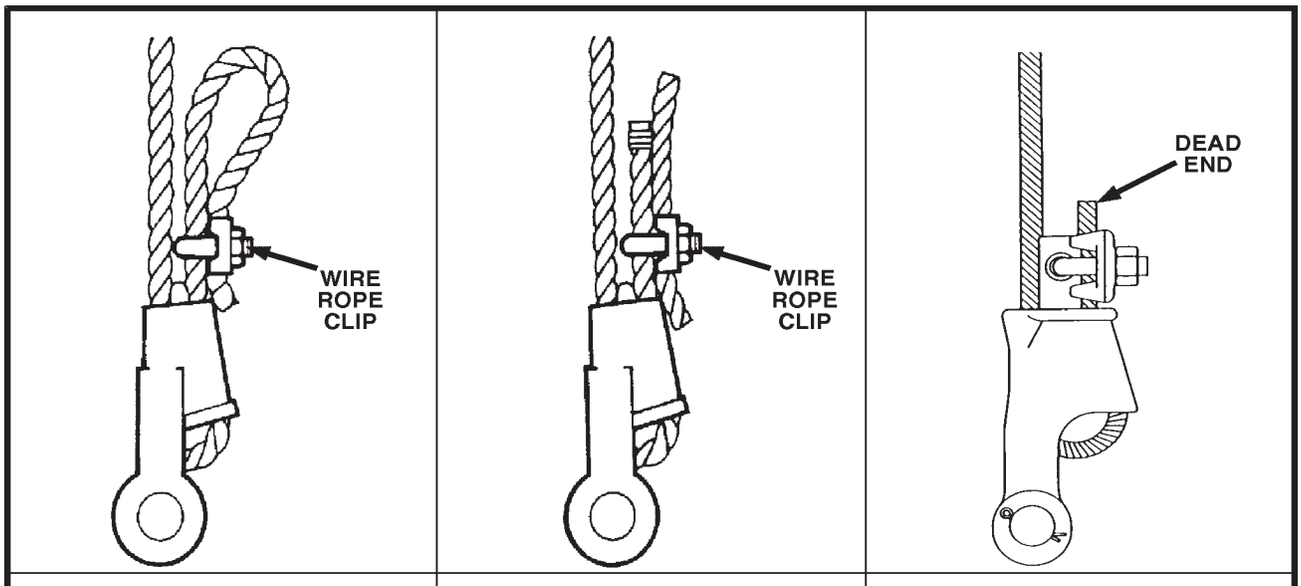


FIGURE H-5. APPROVED WEDGE SOCKET ATTACHMENT METHODS

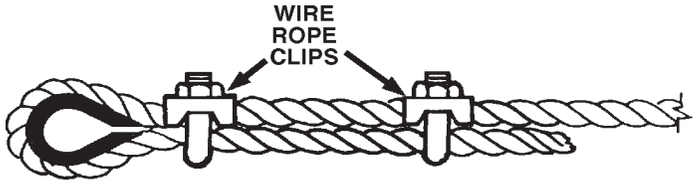
CABLE THIMBLE ATTACHMENT

When attaching a cable thimble to a winch wire rope, proceed as follows and refer to Figure H-5.

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-6. APPROVED CABLE THIMBLE ATTACHMENT METHOD

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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).

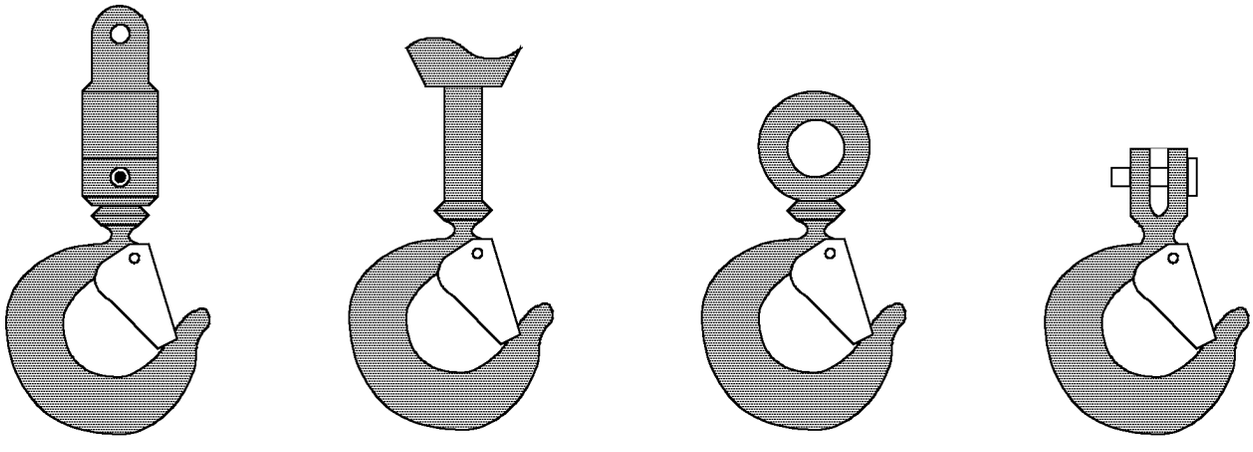
LATCHES

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.



NOTE: All hooks shown with Latch.

FIGURE H1-1. COMMON HOOKS

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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 manufacurer 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 maufacturer 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%.

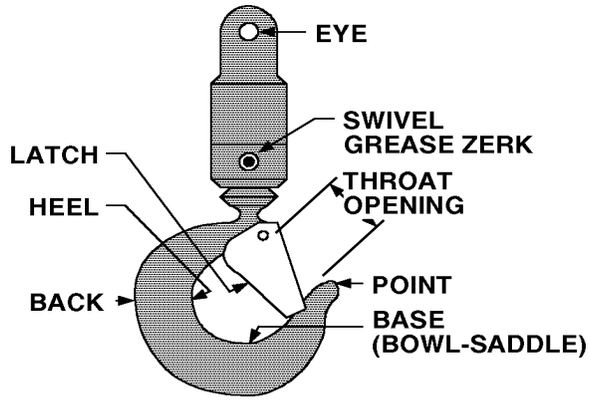

FIGURE H1-2. HOOK TERMINOLOGY

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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.

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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.

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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 ferro-magnetic 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.

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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 stabilizer 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 stabilizers 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. Stabilizers fully extended and stabilizer pads firmly contacted with a solid, stabile 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.

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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.

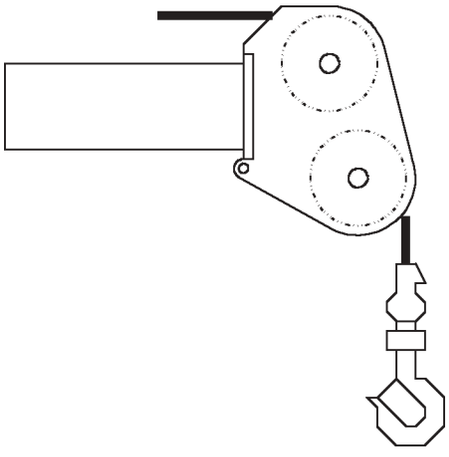

FIGURE I-1.
ONE-PART LINE CONFIGURATION

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 lifteddoes not exceed the crane's capacity at that angle and range.

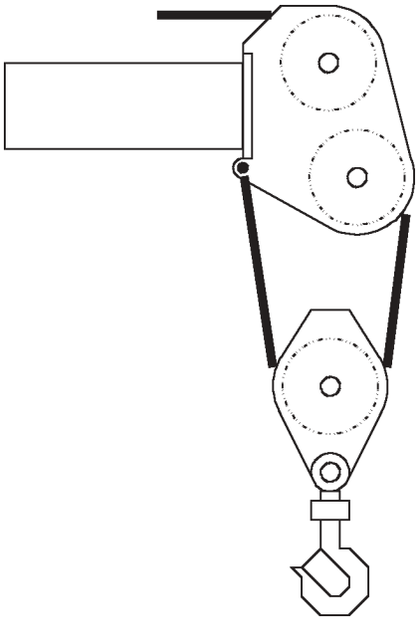

FIGURE I-2.
TWO-PART LINE CONFIGURATION

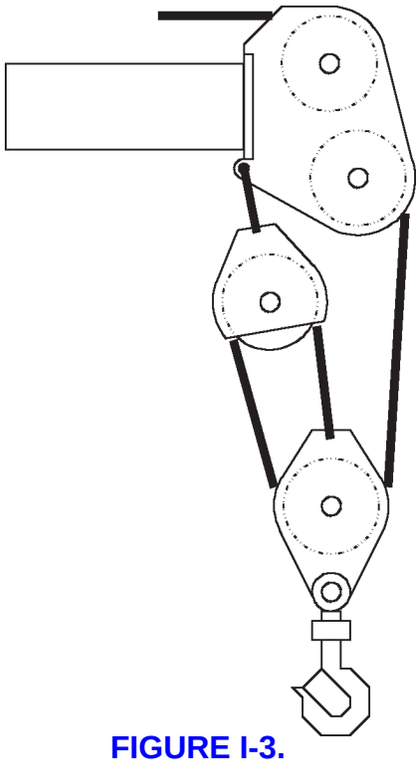

FIGURE I-3.
THREE-PART LINE CONFIGURATION

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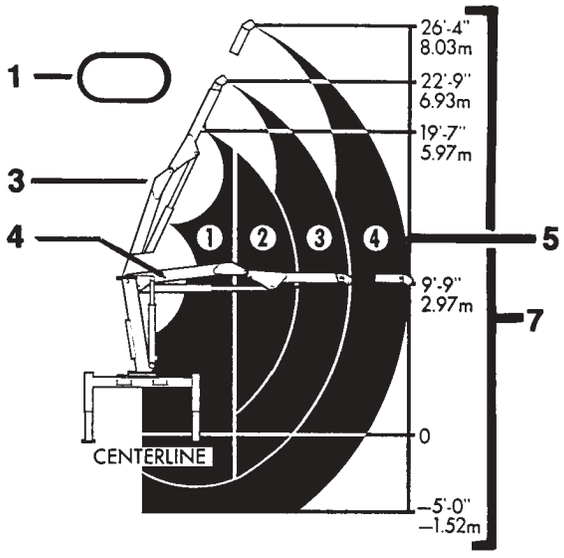
NOTE

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. (2)

(6)

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.

FIGURE I-4. ARTICULATING CRANE CAPACITY PLACARD

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.

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NOTE

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

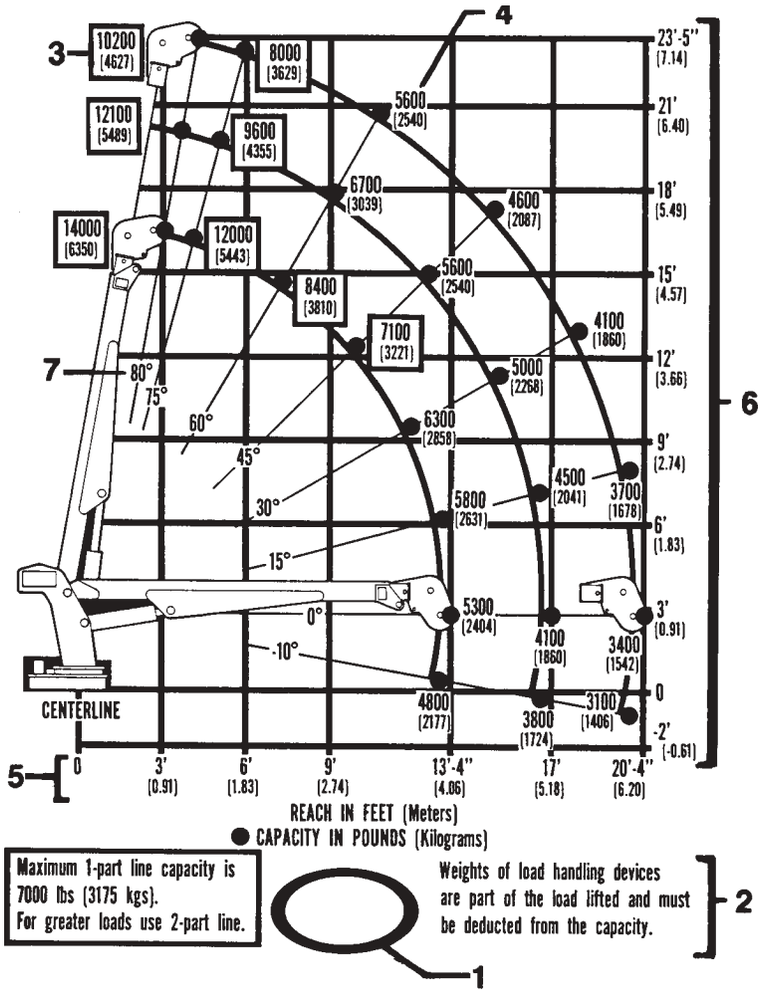

FIGURE I-5. TELESCOPIC CRANE CAPACITY PLACARD

1. Crane model number.

2. This note is a reminder that it isnecessary 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.

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STABILITY TEST

NOTE

The "tipping point" is defined as the balance point, which per SAE J765a is when the load on the crane is balanced with the load of the truck and stabilizers. Any additional load will cause the truck to tip. Cranes are tested for stability to 85% of the balance point.

SET-UP:

1. The testing area must be a flat, hard surface (ideally concrete, but asphalt or hard-packed gravel is acceptable). Only authorized testing personnel will be in or near the test area. SAE J765a specifies that the area must be within 1% of level.

2. Position and lower stabilizers until the weight of the crane has been removed from the truck springs. Use all stabilizers. Make sure the truck is level and all stabilizers are in contact with the ground.

3. Operate the crane under partial load to assure operator proficiency and proper machine function.

STABILITY TEST:

1. Extend the crane to full horizontal position, centered over the rear of the truck.

2. From the capacity placard, determine the rated load at the maximum horizontal reach. Place a weight equal to 118% of that rated load at the maximum horizontal reach (L).

Max horizontal reach (L) = _____ **ft.**

Test load value = _____ **lb.**

WARNING

At 118% of rated capacity, you are in overload! Operate the crane very carefully. Keep the load within 3.9" (0.1 m) of the ground at all times, and operate controls slowly.

3. Slowly start rotating the load counterclockwise. Through each area on Figure 1 (30° increments), check for stability. If the crane carries the load through the entire area without becoming unstable, the crane is stable in that area, and 100% can be noted in the area in Figure 1.

NOTE

The tires can lift from the ground without the truck becoming unstable. The truck is unstable when it reaches the balance point.

4. If at any point through the rotation cycle the vehicle becomes unstable, stop the rotation. Determine the area, as shown in Figure 1, in which the crane is positioned.

5. Retract the extension boom until stability is regained. Measure the horizontal reach when the unit is stable, from the center of rotation to the boom tip. Note this reach in Figure 1, in the area which became unstable in step #4.

6. Continue rotating the boom after stability has been regained. Again, watch for instability as defined by the balance point. If a point of instability reoccurs, retract the extension boom until stability is regained. Again, measure the stable horizontal reach at this point, and note this distance in the appropriate area in Figure 1.

7. Repeat this cycle through a full 180° of arc. Fill in all of the reach boxes for Areas 1 through 5 in Figure 1.

Repeat for Areas 6 through 10.

8. If the crane was stable in all areas, fill in 100% in all of the percentage boxes in Figure 1.

9. If the stable horizontal reach in any area was less than the maximum horizontal reach (L, noted in step 2), calculate the percent of full capacity allowed in the area as follows:

$$\frac{\text{Stable horizontal reach}}{\text{Maximum horizontal reach}} \times 100 = \text{Derated } \%$$

10. Enter the derated percent of full capacity, calculated in step 9, on Figure 1. In the derated zone, each individual capacity on the capacity placard must be multiplied by the derated percent of full capacity. The reduced capacities maintain 85% of tipping in the derated zone.

NOTES:

1. The figures obtained indicate the stability range of that particular truck and crane combination, only. If either the truck or crane is changed or modified, the stability calculations must be repeated.

2. Contact IMT if you need a modified stability chart for your vehicle.

3. Rotate the crane at least 5 times using the completed figures to ensure the rating is accurate.

4. Be sure all information is recorded on the appropriate figure, and in the service manual.

5. Record the total length of time to test the crane (total crane test and inspection time should approximate 4 hours - 1979 SAE J765a). _____ hrs.

Where applicable, this test conforms to SAE J765a, ASME B30.5 and ASME B30.22.

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BOOM IN STORED POSITION (no payload) ACTUAL WEIGHTS	
FRONT AXLE (lb)	
REAR AXLE (lb)	
TOTAL WEIGHT (lb)	
VEHICLE MILEAGE	

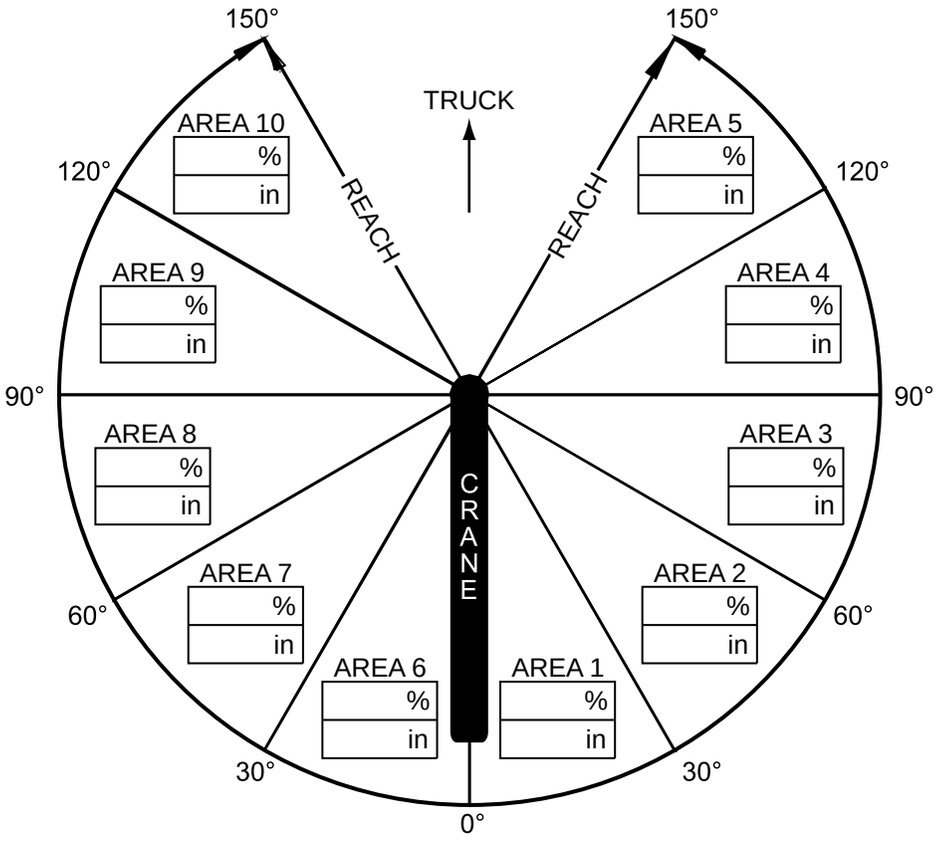

Figure I-6 Stability Chart

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Section 9A. OVERLOAD PROTECTION SYSTEMS

CRANE OVERLOAD PROTECTION SYSTEM

IMT cranes are equipped with an overload protection system. In an overload condition, no function will operate which results in an increase in operating radius. However, the same function may be operated in the opposite direction if it results in decreased operating radius.

Bear in mind that the overload protection system is not sensitive to carrier vehicle stability - it is still possible to cause vehicle instability. The operator must be aware that the overload proection system is not a substitute for good judgement. Always refer to the capacity chart before attempting to lift a load.

Overload protection is built into the electrical system on radio-controlled cranes, and is hydraulic on manually-controlled cranes.

The overload protection system stops the following functions at the point of overload:

1. Inner Boom “DOWN”
2. Outer Boom “UP”
3. Extension Cylinder “Extend”
4. Winch “Up”

If a function stops working due to overload, reverse the function which is causing the overload condition to reduce the load moment and bring the crane out of overload.

Test the overload system daily to determine if it is operating properly. If you determine that the overload system is not working properly, use the drawings in your crane parts manual to check the hydraulic overload kit on manually controlled cranes and the controls system on remote-controlled cranes.

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9A-1. OVERLOAD PREVENTION SYSTEM (ELECTRICALLY OPERATED)

IMT provides an electrically operated overload prevention system on its radio-controlled telescoping and articulated cranes. This system is designed to prevent loads from being lifted which exceed the rated capacity of the crane.

The overload prevention system consists of a pressure switch mounted on the lift side of the lower boom cylinder which senses hydraulic pressure. On telescoping cranes, 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. On articulated cranes, it is connected electrically to the lift side of the winch, the extend side of the extension boom, and the down side of the inner boom, and the up side of the outer boom.

If an operator attempts to lift a load which exceeds the rated capacity of the crane, the system will be activated. When activated, it will prevent the winch from lifting, the extension boom from extending, the lower (inner) boom from being lowered, and the outer boom from being raised (articulated-only).

To resume operation of the crane when the overload prevention system is activated, reverse the function which is causing the overload condition.

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.

9A-2. OVERLOAD PREVENTION SYSTEM (HYDRAULICALLY OPERATED)

IMT provides a hydraulically operated overload prevention system on manually-operated articulated and wallboard-handling cranes. The system is designed to prevent loads from being lifted which exceed the rated capacity of the crane.

The system functions such that when the inner cylinders are overloaded, the pressure switch, mounted on the inner cylinder, will activate the solenoid dump valve and dump oil to tank instead of the desired cylinder functions. Functions which will shut down, if overloaded, are:

1. Inner Boom “DOWN”
2. Outer Boom “UP”
3. Extension Cylinder “EXTEND”
4. Winch “UP”

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, extending the extension boom, or raising the winch (if equipped). 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. The system can be tested by unplugging the pressure switch on the inner cylinder, and attempting to operate the functions which will move the crane into overload. When the pressure switch is unplugged, the functions should not work, which indicates the overload system is working properly. Make sure to plug to switch in again after testing.

Refer to your particular crane manual for specific parts information on the overload system.

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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.

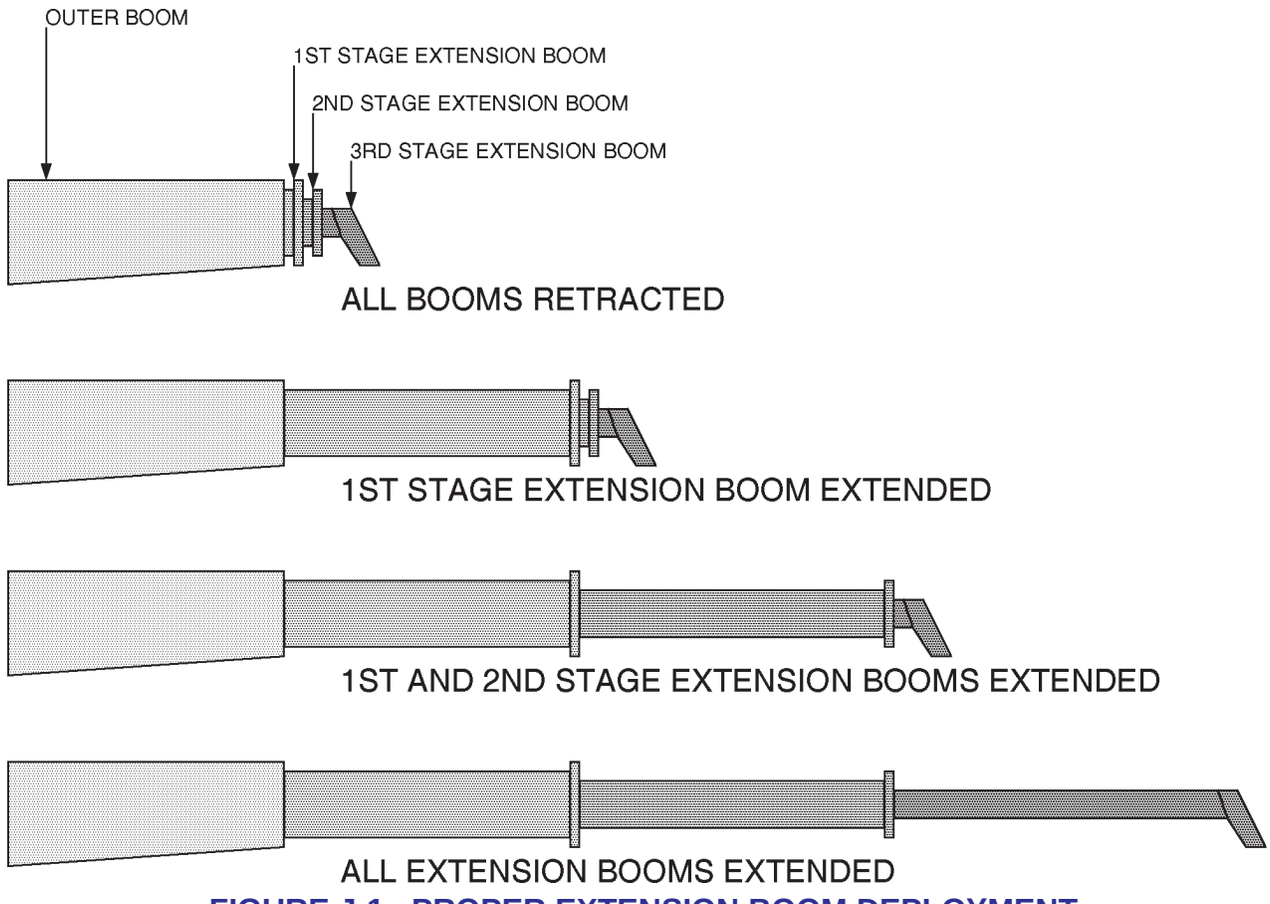

FIGURE J-1. PROPER EXTENSION BOOM DEPLOYMENT

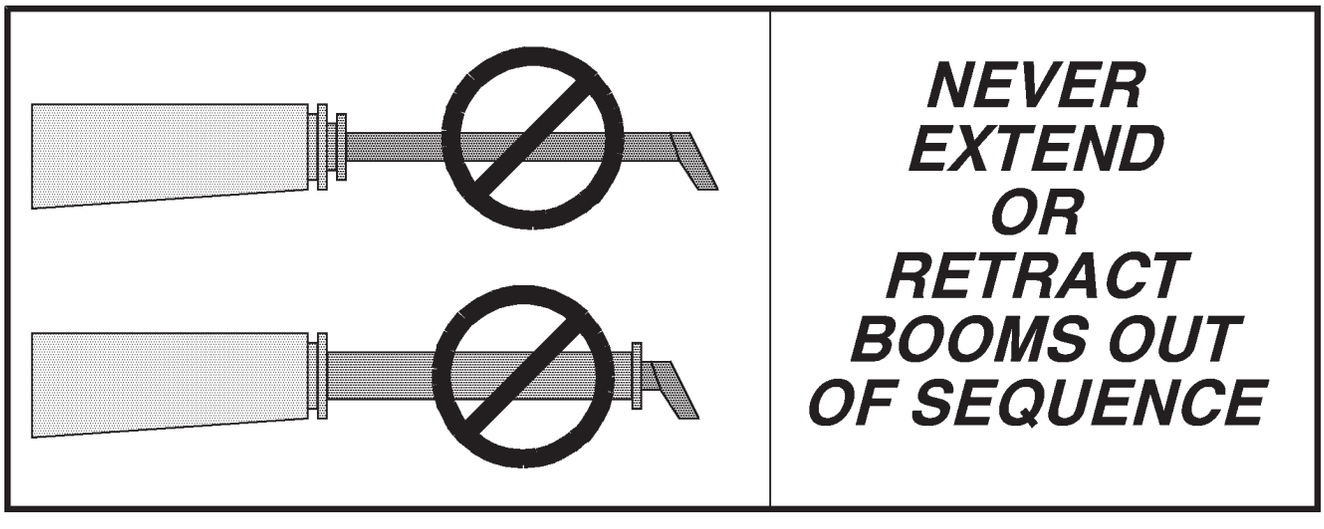

FIGURE J-2. IMPROPER EXTENSION BOOM DEPLOYMENT

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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.

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.

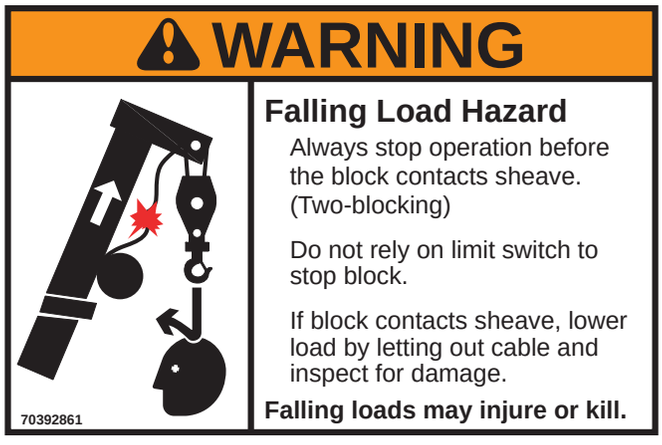

FIGURE J-3. TWO BOCKING DECAL

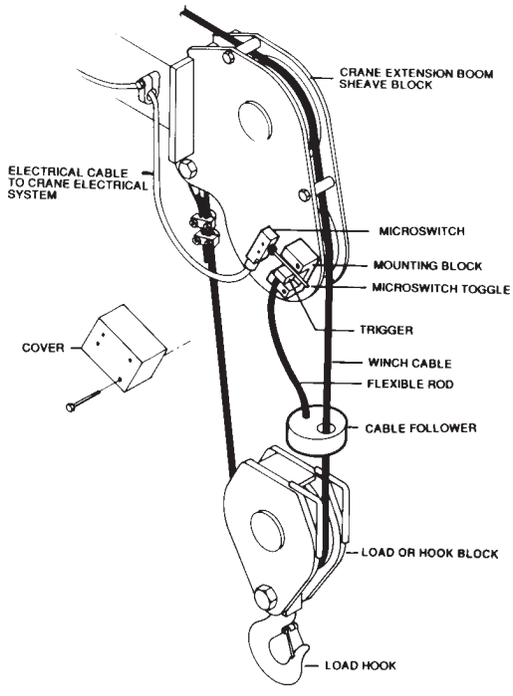

FIGURE J-4.
ANTI TWO-BLOCKING DEVICE COMPONENTS

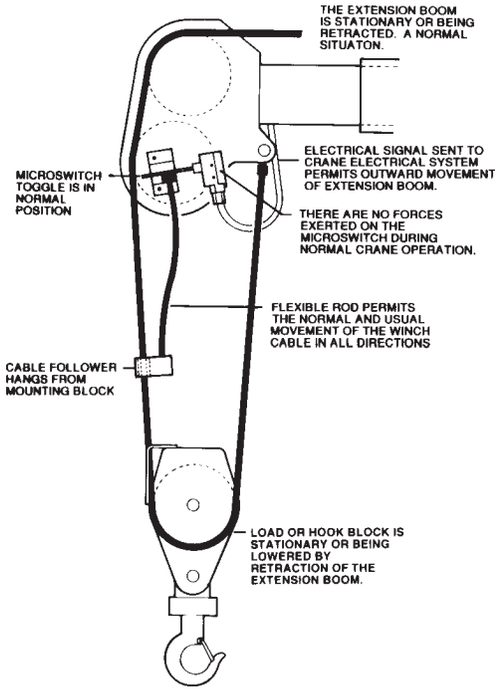

FIGURE J-5.
NORMAL WORK POSITION

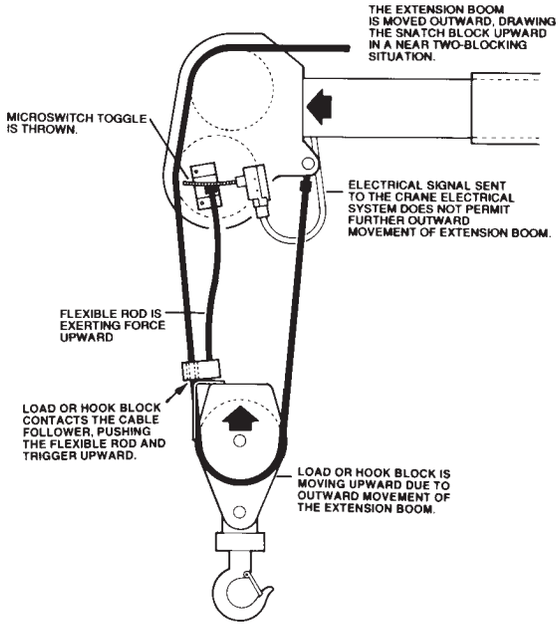

FIGURE J-6
APPROACHING TWO-BLOCKING SITUATION

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TWO-BLOCK PREVENTION SYSTEM

IMT articulated cranes using a winch are equipped with a two-block prevention device The two block prevention system halts the “winch-up” and “extension-out” crane functions before the block contacts the sheave. The two block prevention system should be checked daily as follows:

1. Examine flexible rod and weight to insure free unrestricted mechanical operation

2. Examine cord for damage, cuts or breaks. Grasp cord and pull to check operation of cord reel. The cord should retract on reel when released.

3. Start vehicle, engage PTO and slowly winch loadline up until anti-two block weight comes in contact with the hook end of the loadline cable. At the moment the weight is fully supported by the hook end, the winch up function should become non-functioning, because the two-block damage prevention switch will stop further movement.

If operation other than as described occurs, stop immediately and investigate. Failure to do so will risk damage to the cable or the crane.

Then, extend the winch cable to relieve the two-block condition, and actuate the boom extend function slowly. Again, once the weight is fully supported by the hook end, the boom extend function should become non-functioning, because the two-block damage prevention switch will stop further movement. If operation other than described occurs, stop immediately, reverse the function, and check the system.

If the anti two block function appears to be functioning normally, winch the cable down until the sensing weight swings free.

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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

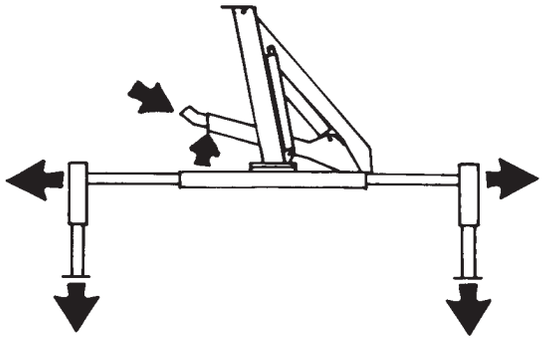
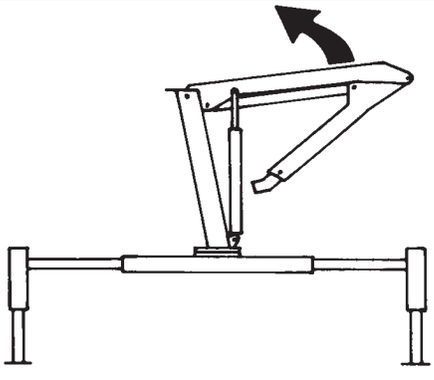
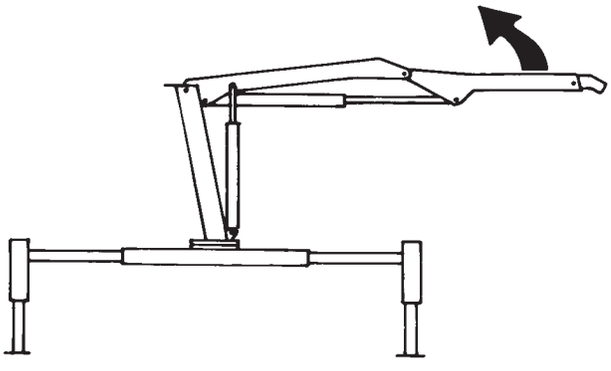
1. EXTEND AND LOWER STABILIZERS. (UNFASTEN HOOK-BLOCK IF PRESENT.) 2A. RETRACT EXTENSIONS. 2B. LOWER OUTER BOOM.	
2C. EXTEND INNER BOOM.	
3. EXTEND OUTER BOOM.	

FIGURE J-8. UNFOLDING SEQUENCE

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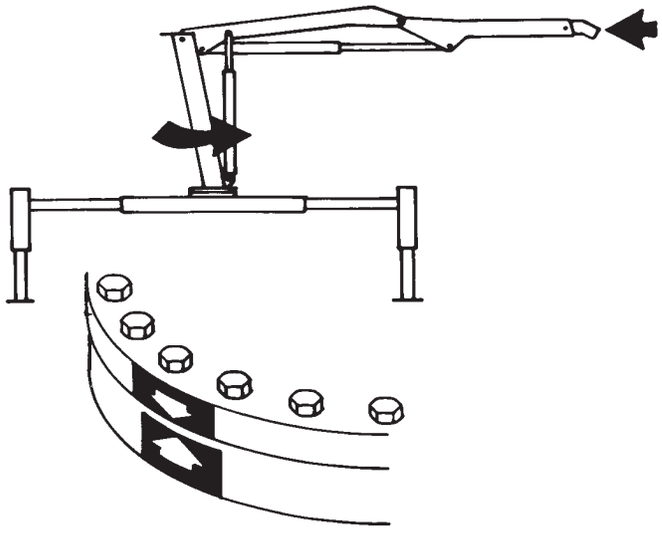
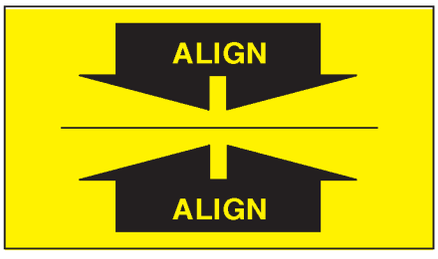
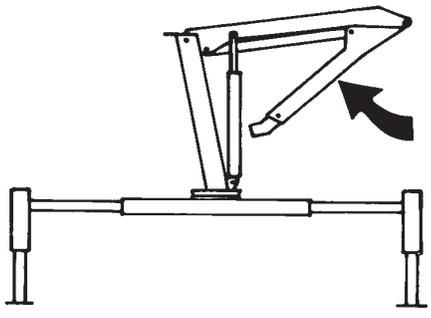
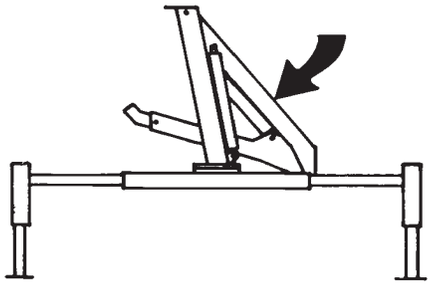
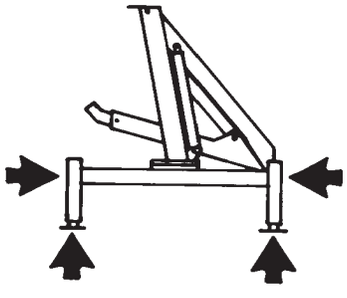
1. RETRACT ALL EXTENSION BOOMS.	
2. ROTATE CRANE TO ALIGN ARROWS ON THE BASE AND MAST BASE PLATE. 	
3. RETRACT THE OUTER BOOM COMPLETELY.	
4. RETRACT THE INNER BOOM.	
5. RAISE AND RETRACT THE STABILIZERS. (FASTEN HOOK-BLOCK IF PRESENT.)	

FIGURE J-9. FOLDING SEQUENCE

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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.

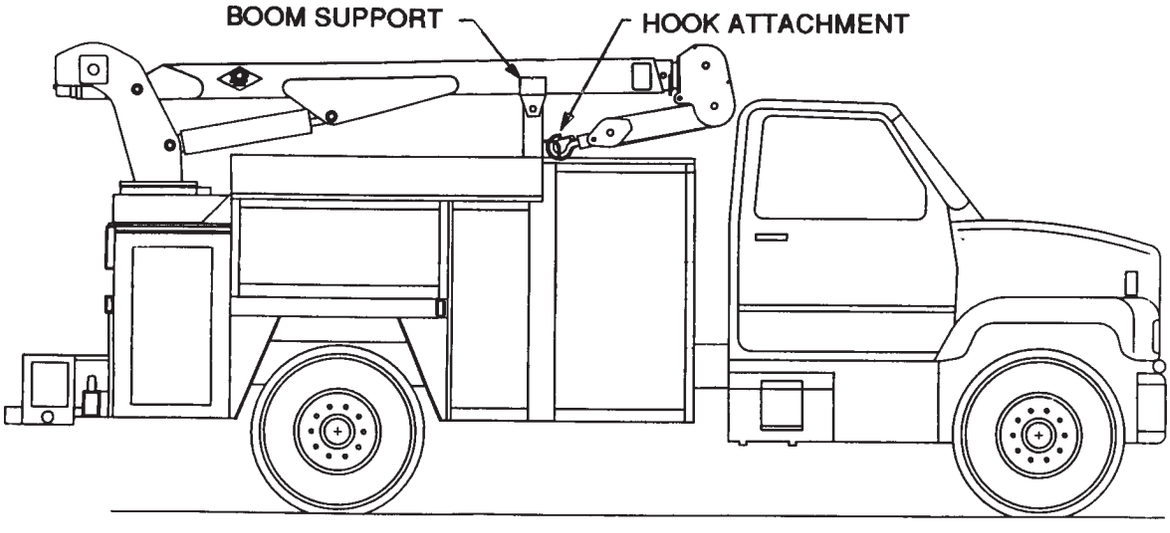

FIGURE J-10. TELESCOPING CRANE STOWAGE CONFIGURATION

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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.

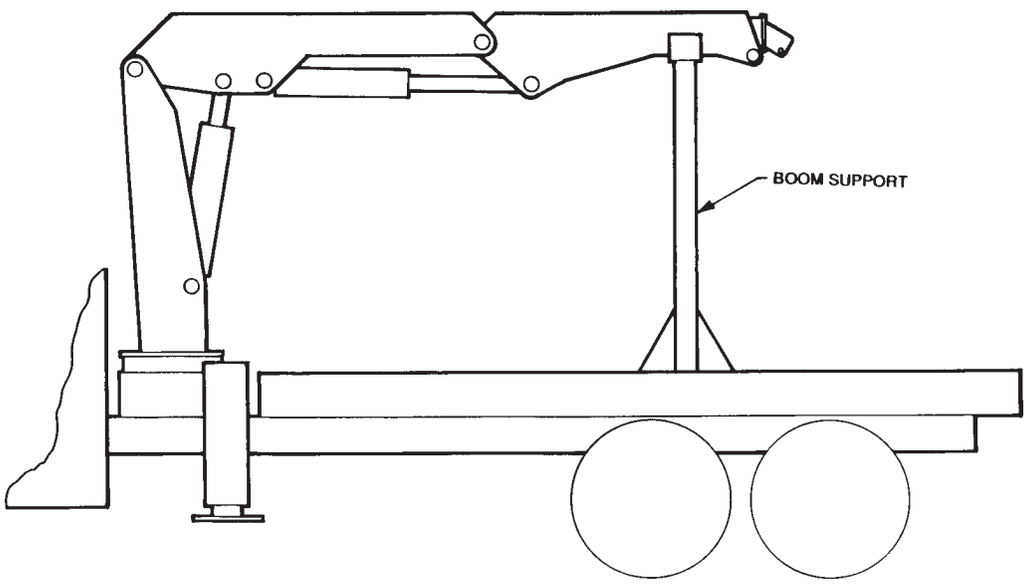

FIGURE J-11. ARTICULATING CRANE STOWAGE CONFIGURATION-BOOM SUPPORT

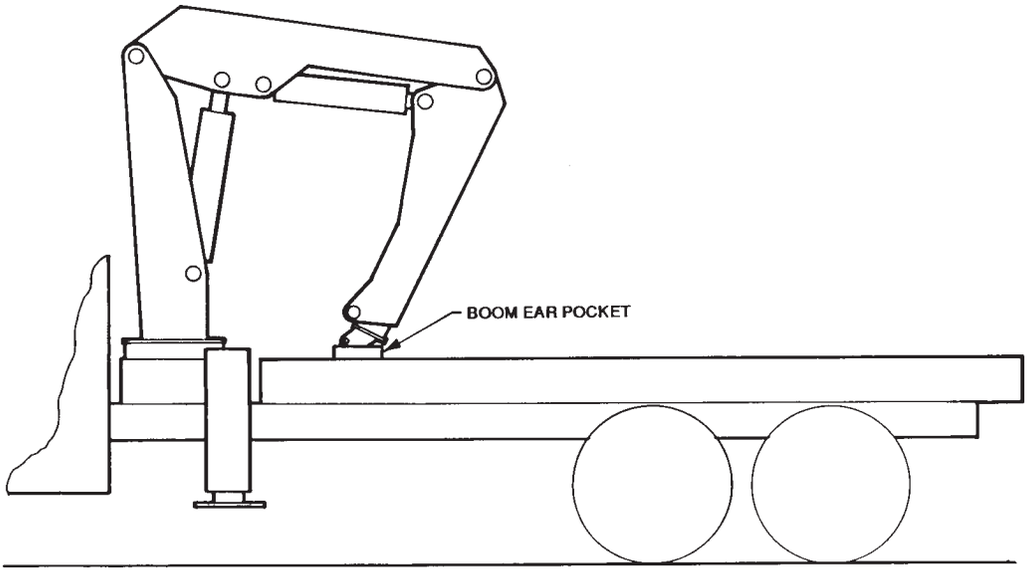

FIGURE J-12.
ARTICULATING CRANE STOWAGE CONFIGURATION-RETRACTED OUTER BOOM

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STABILIZER OPERATION

Of all of the hydraulically operated components on a crane, the stabilizers 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 possiblity of the stabilizers contacting persons while moving outward; secondly, the capability of the stabilizers causing severe crushing injury when contacting the ground; and thirdly, the possibility of pinching injuries occuring when the stabilizers are being retracted.

Extend stabilizers completely before operating crane. The yellow “Fully Deployed” decal will be visible on each extend-out stabilizer when fully extended.

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

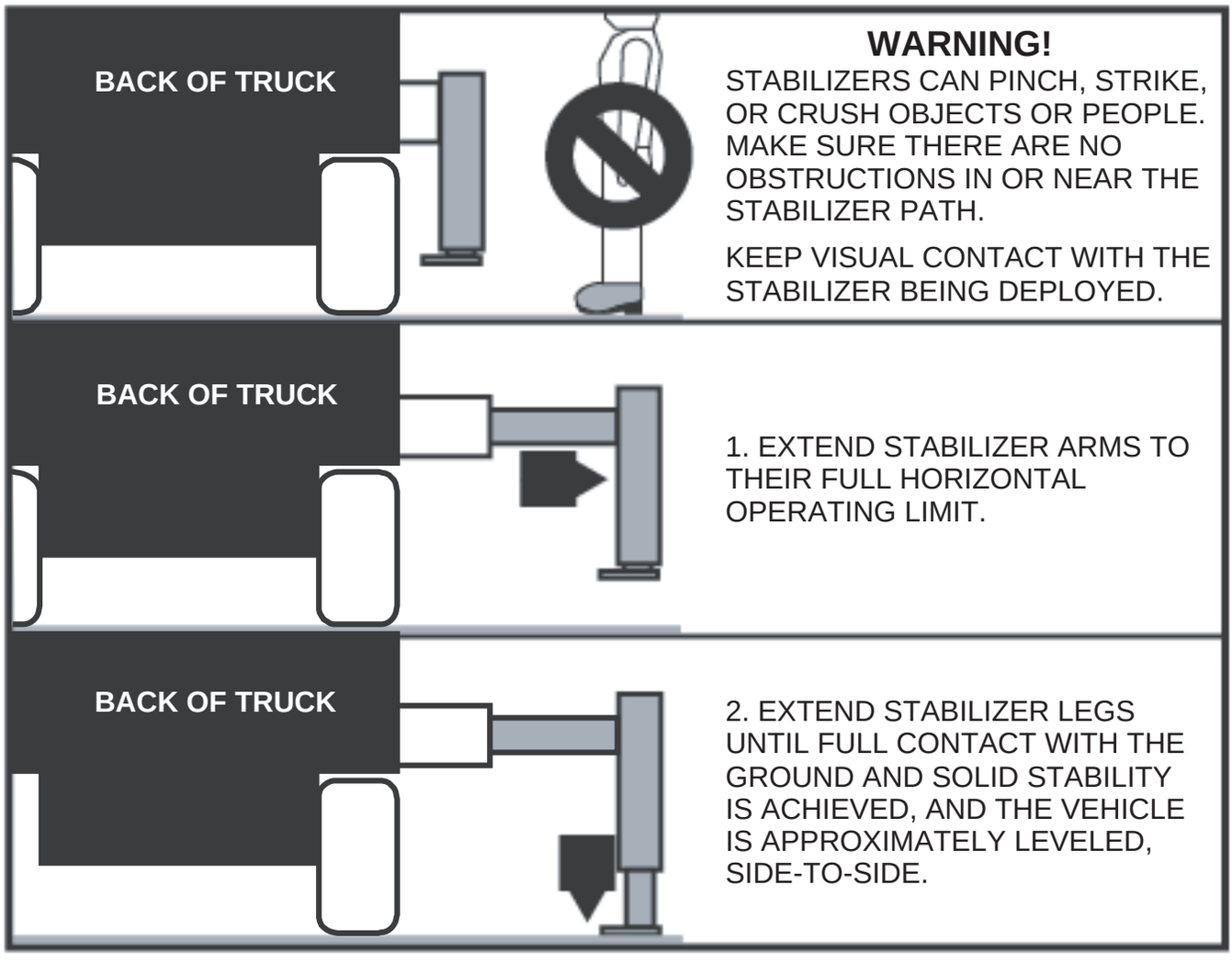

FIGURE J-13. STABILIZER DEPLOYMENT SEQUENCE

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FIGURE J-15.
STAND CLEAR DECAL

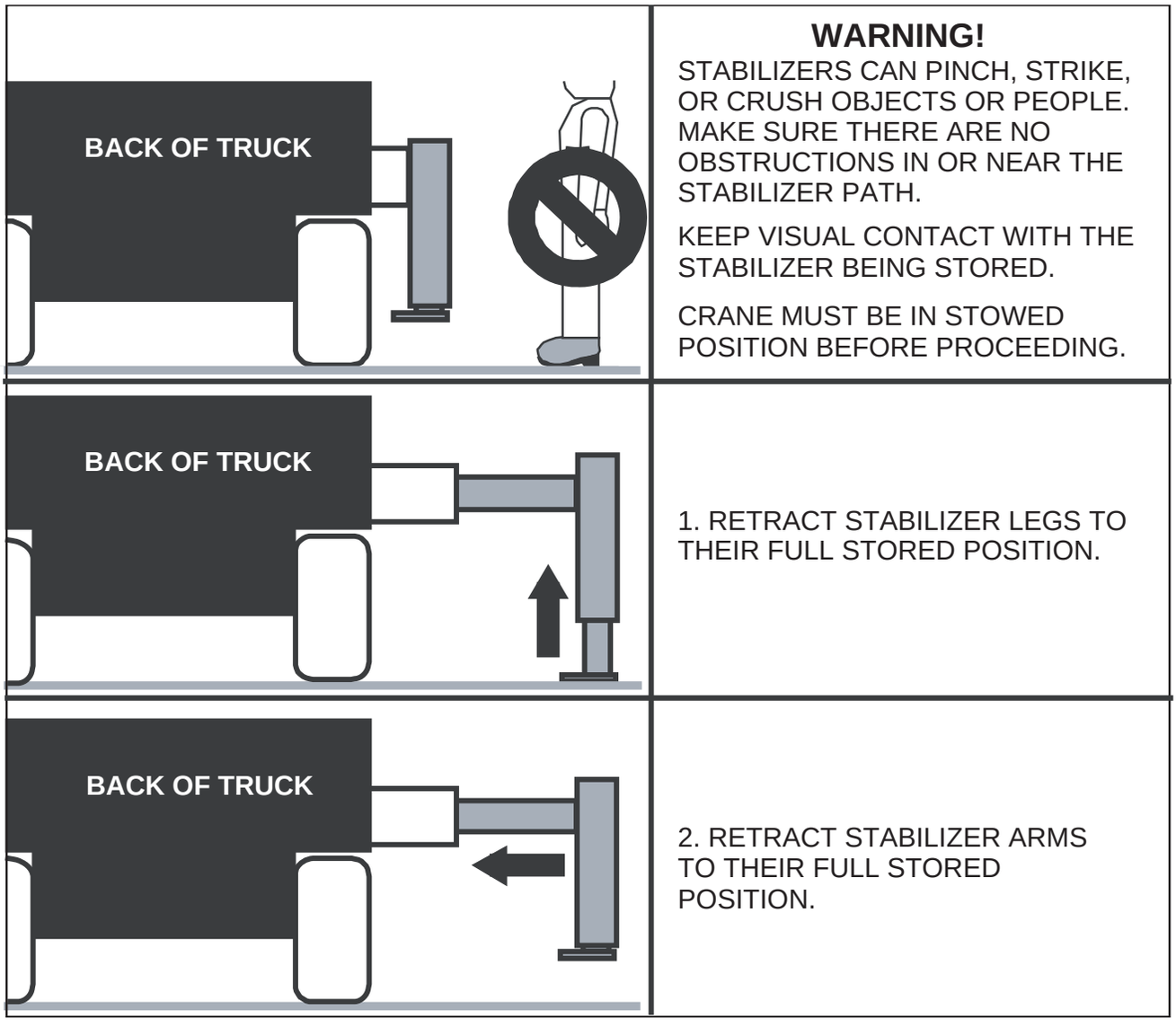

FIGURE J-16. STABILIZER STORAGE SEQUENCE

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DIRECTION TERMINOLOGY

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

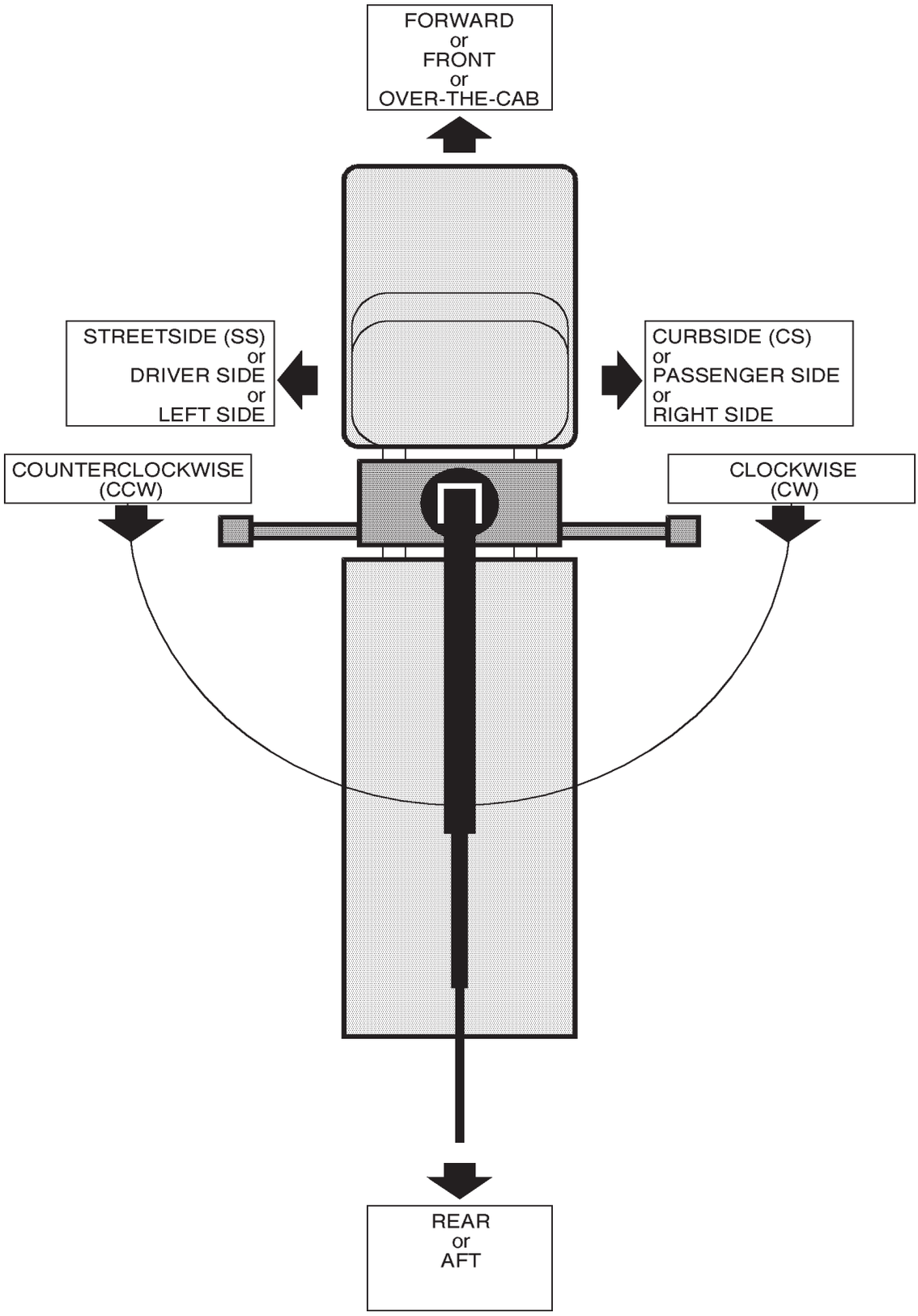

FIGURE J-17. CRANE OPERATION DIRECTIONAL TERMINOLOGY

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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 TURNTABLE-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

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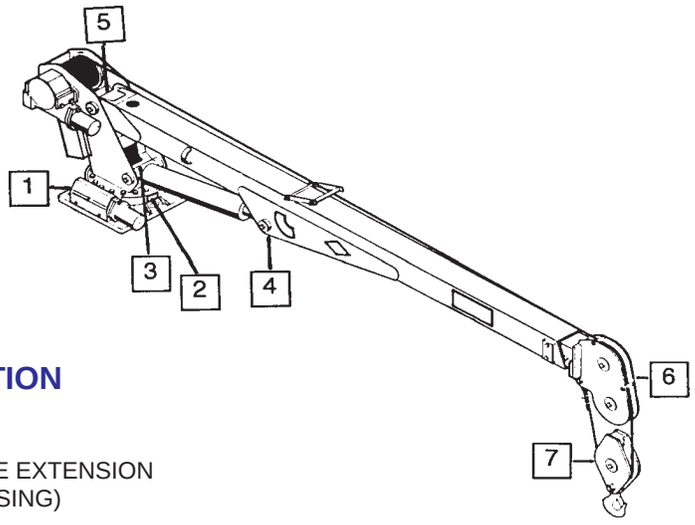
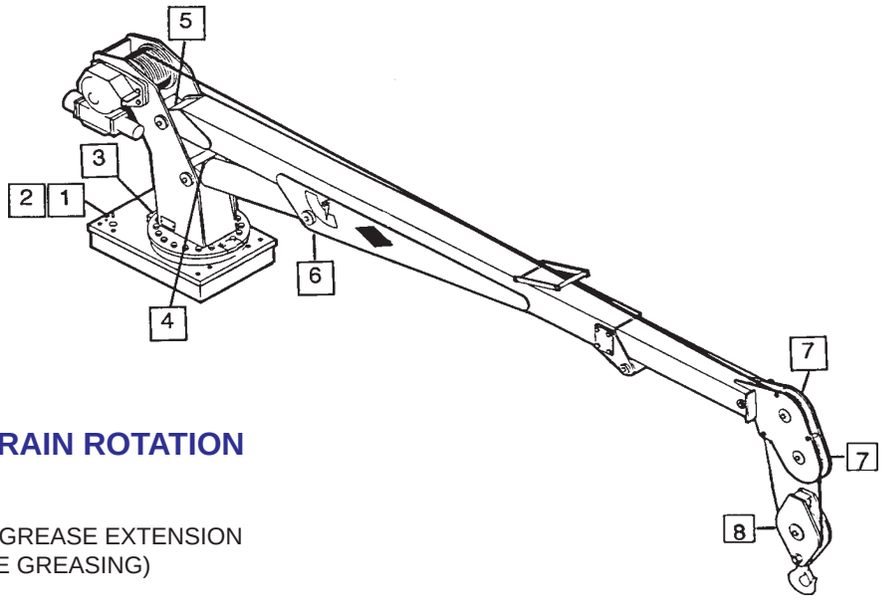


WITH WORM GEAR ROTATION

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 - TELESCOPING CRANES

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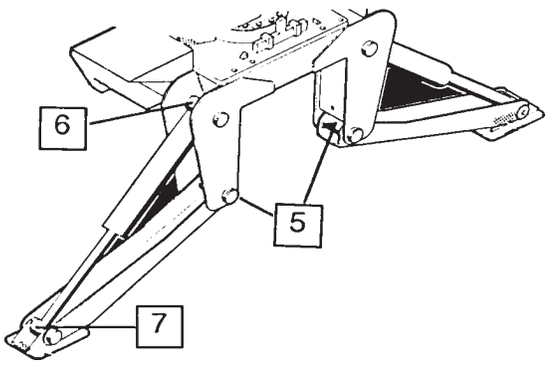
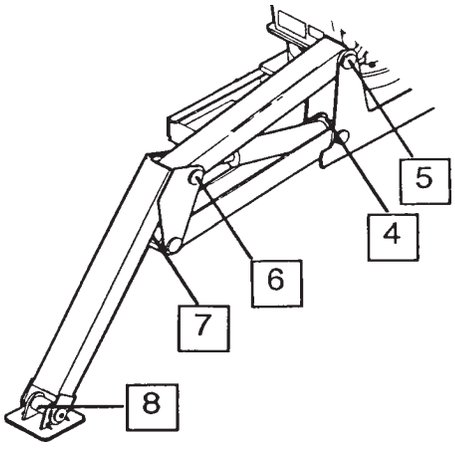


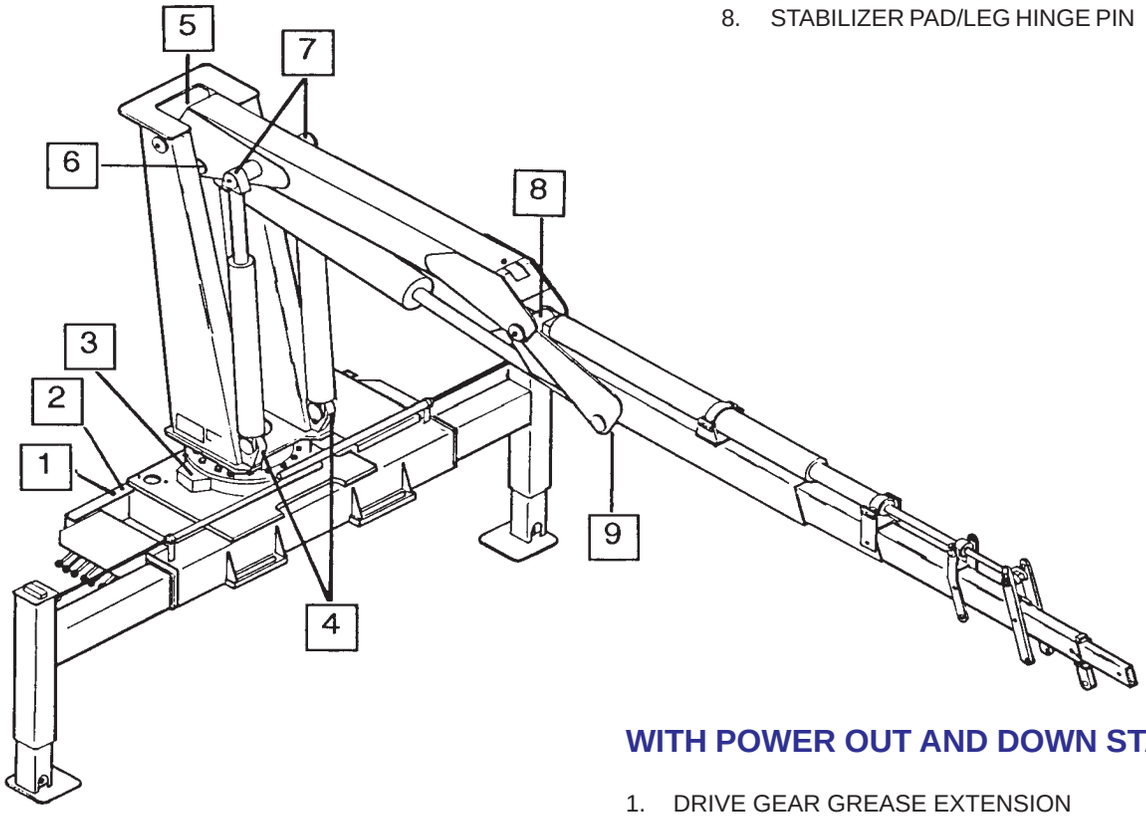
A-FRAME STABILIZER

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



SPIDER LEG STABILIZERS

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



WITH POWER OUT AND DOWN STABILIZERS

1. DRIVE GEAR GREASE EXTENSION
2. TURNTABLE-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

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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.

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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.

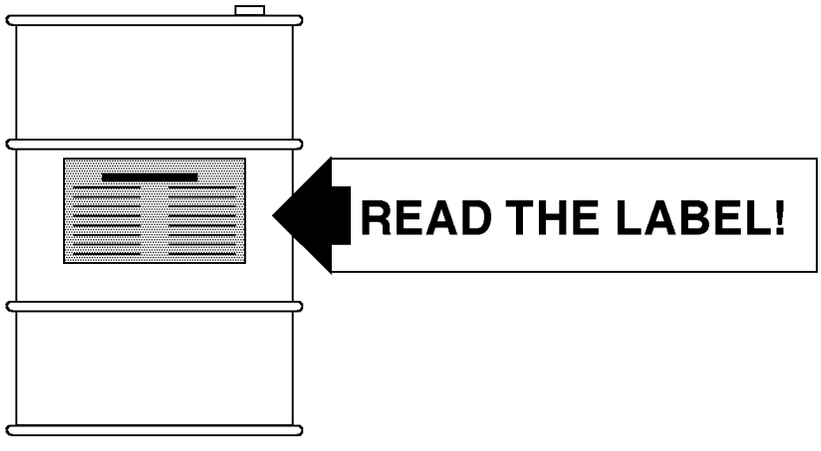

FIGURE K-1. CHEMICAL CONTAINER LABELS

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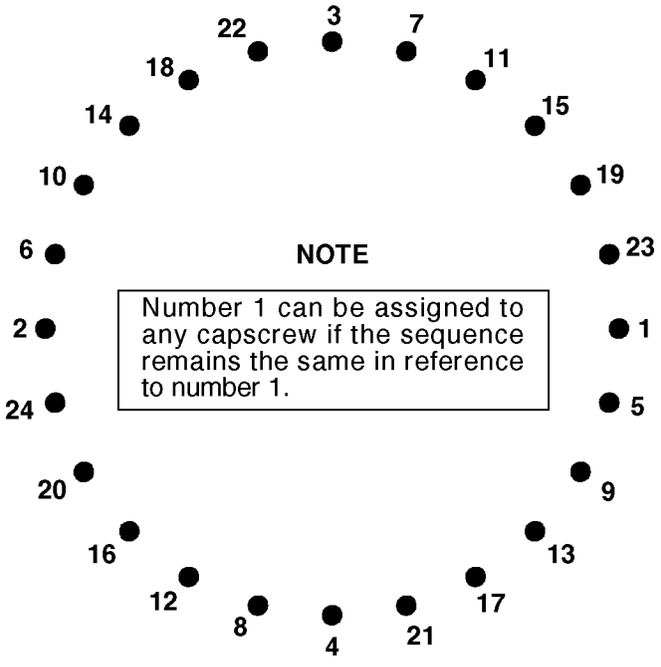
Section 12. REFERENCE DATA

Refer to the diagram below for proper tightening/torqueing 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 capscrew used.

2. Follow the tightening sequence shown in the diagram. Note that the quantity of capscrews may differ from the diagram, but the sequence must follow the criss-cross pattern as shown in the diagram.

3. Torque all capscrews to approximately 40% of the specified torque value, by following the sequence. (EXAMPLE: .40 x 265 FT-LBS = 106 FT-LBS)

4. Repeat Step 3, but torqueing all capscrews to 75% of the specified torque value. Continue to follow the tightening sequence. (EXAMPLE: .75 x 265 FT-LBS = 199 FT-LBS)

5. Using the proper sequence, torque all capscrews to the listed torque value as determined from the Torque Data Chart.

FIGURE L-1a.
TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE

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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	D=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	**3070(F)**				
		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

CR SFTY: 99900313: 19981012

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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	2350	**2460(D)**	2570	2680	**2780(E)**	2880	2980	**3070(F)**					
		S	2410	2540	2680	**2800(D)**	2930	3060	**3170(E)**	3280	3400	**3500(F)**			
7.50R20	8R22.5	D	2620	**2750(D)**	2870	2990	**3100(E)**	3210	3320	**3430(F)**					
		S	2680	2840	2990	**3140(D)**	3270	3410	**3530(E)**	3660	3780	**3910(F)**			
8.25R20	9R22.5	D	3120	3270	3410	**3550(E)**	3690	3820	**3950(F)**	4070	4200	**4320(G)**			
		S	3190	3370	3560	3730	3890	**4050(E)**	4210	4350	**4500(F)**	4640	4790	**4920(G)**	
9.00R20	10R22.5	D	3690	3870	**4040(E)**	4200	4360	**4520(F)**	4670	4820	**4970(G)**				
		S	3770	4000	4210	4410	**4610(E)**	4790	4970	**5150(F)**	5320	5490	**5670(G)**		
10.00R20	11R22.5	D				**4760(F)**	4950	5120	**5300(G)**	5470	5630	**5800(H)**			
		S				4900	5220	**5430(F)**	5640	5840	**6040(G)**	6240	6430	**6610(H)**	
10.00R22	11R24.5	D				**5070(F)**	5260	5450	**5640(G)**	5820	6000	**6170(H)**			
		S				5310	5550	**5780(F)**	6000	6210	**6430(G)**	6630	6840	**7030(H)**	
10.00/90R20		D				4885	**5070(F)**								
		S				4945	5155	5370	**5510(F)**						
11.00R20	12R22.5	D				**5190(F)**	5390	5590	**5780(G)**	5960	6150	**6320(H)**			
		S				5450	5690	**5920(F)**	6140	6370	**6590(G)**	6790	7010	**7200(H)**	
11.00R22	12R24.5	D				**5520(F)**	5730	5940	**6140(G)**	6330	6530	**6720(H)**			
		S				5790	6040	**6290(F)**	6530	6770	**7000(G)**	7220	7440	**7660(H)**	
11.00R24		D				**5860(F)**	6090	6310	**6520(G)**	6730	6930	**7130(H)**			
		S				6140	6420	**6680(F)**	6940	7190	**7430(G)**	7670	7900	**8130(H)**	
12.00R20		D				5910	**6140(G)**	6360	6580	**6790(H)**	7000	**7200(J)**			
		S				6200	6480	6740	**7000(G)**	7250	7500	**7740(H)**	7980	**8210(J)**	
12.00R24		D				6650	**6910(G)**	7160	7410	**7640(H)**	7870	**8100(J)**			
		S				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-1A.
TIRE LOAD AND INFLATION PRESSURES - RADIAL PLY

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

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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		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 bases 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

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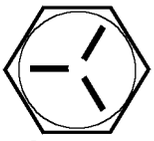
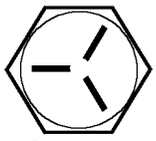
TORQUE DATA CHART - DOMESTIC

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, collodial 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 fatique causing serious injury or DEATH.

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The user of this form is responsible in determining that these inspections satisfy all applicable regulatory requirements

Inspection Checklist

CRANES

1

REV: 11-22-11

OWNER/COMPANY	TYPE OF INSPECTION (check one) ☐ DAILY (if deficiency found) ☐ QUARTERLY ☐ MONTHLY ☐ ANNUAL
CONTACT PERSON	DATE INSPECTED
CRANE MAKE & MODEL	HOUR METER READING (if applicable)
CRANE SERIAL NUMBER	INSPECTED BY (print)
UNIT I.D. NUMBER	SIGNATURE OF INSPECTOR
LOCATION OF UNIT	

TYPE OF INSPECTION

NOTES:

Daily and monthly inspections are to be performed by a "competent person", who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Quarterly and annual inspections are to be performed by a "qualified person" who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the project.

One hour of normal crane operation assumes 20 complete cycles per hour. If operation exceeds 20 cycles per hour, inspection frequency should be increased accordingly.

Consult Operator / Service Manual for additional inspection items, service bulletins and other information.

Before inspecting and operating crane, crane must be set up away from power lines and leveled with stabilizers deployed according to the crane manufacturer's directions.

DAILY (D): Before each shift of operation, those items designated with a (**D**) must be inspected.

MONTHLY (M): Monthly inspections or 100 hours of normal operation (which ever comes first) includes all daily inspections plus items designated with an (**M**). This inspection must be recorded and retained for a minimum of 3 months.

QUARTERLY (Q): Every three months or 300 hours of normal operation (which ever comes first) includes all daily and monthly inspection items plus items designated with a (**Q**). This inspection must be documented, maintained, and retained for a minimum of 12 months, by the employer that conducts the inspection.

ANNUAL (A): Each year or 1200 hours of normal operation (which ever comes first) includes all items on this form which encompasses daily, monthly and quarterly inspections plus those items designated by (**A**). This inspection must be documented, maintained, and retained for a minimum of 12 months, by the employer that conducts the inspection.

✓ = SATISFACTORY
R = RECOMMENDATION (Should be considered for corrective action)
NA = Not Applicable
X = Deficient (Note: If a deficiency is found, an immediate determination must be made as to whether the deficiency constitutes a safety hazard and must be corrected prior to operation.)

FREQUENCY	ITEM	KEY	INSPECTION DESCRIPTION	STATUS ✓, R, X, NA
D	1	Labels	All load charts, safety & warning labels, & control labels are present and legible.	
D	2	Crane	Check all safety devices for proper operation.	
D	3	Controls	Control mechanisms for proper operation of all functions, leaks & cracks.	
D	4	Station	Control and operator's station for dirt, contamination by lubricants, & foreign materials.	
D	5	Hyd System	Hydraulic system (hoses, tubes & fittings) for leakage & proper oil level.	
D	6	Hook	Presence & proper operation of hook safety latches.	
D	7	Wire Rope	Inspect for apparent deficiencies per applicable requirements and manufacturer's specifications.	
D	8	Pins	Proper engagement of all connecting pins & pin retaining devices.	
D	9	General covers.	Overall observation of crane for damaged or missing parts, cracked welds & presence of safety	
D	10	Operation	During operation, observe crane for abnormal performance, unusual wear (loose pins, wire rope damage, etc.). If observed, discontinue use & determine cause & severity of hazard.	
D	11	Remote Ctrls	Operate remote control devices to check for proper operation.	
D	12	Electrical	Operate all lights, alarms, etc. to check for proper operation.	
D	13	Anti Two-Block or Two-Block Damage Prevention	Operate anti-two-blocking or two-block prevention devices to check for proper operation.	

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Inspection Checklist — CRANES — 2

✓ = SATISFACTORY
R = RECOMMENDATION (Should be considered for corrective action)
NA = Not Applicable
X = Deficient (Note: If a deficiency is found, an immediate determination must be made as to whether the deficiency constitutes a safety hazard and must be corrected prior to operation.)

FREQUENCY	ITEM	KEY	INSPECTION DESCRIPTION	STATUS ✓, R, X, NA
D	14	Tires	Check tires (when in use) for proper inflation and condition.	
D	15	Ground	Ground conditions around the equipment for proper support, including ground settling under and conditions around and around stabilizers and supporting foundations, ground water accumulation, or similar.	
D	16	Level Position	The equipment for level position within tolerances specified by the equipment manufacturer's recommendations, both before each shift and after each move and setup.	
D	17	Operator Cab Windows	Significant cracks, breaks, or other deficiencies that would hamper the operator's view.	
D	18	Rails, rail stops, clamps, supporting surfaces.	Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling.	
D	19	Safety Devices	Safety devices and operational aids for proper operation.	
D	20	Electrical	Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.	
D	21	Other		
D	22	Other		
M	23	Daily	All daily inspection items.	
M	24	Cylinders	Visual inspection of cylinders for leakage at rod, fittings & welds. Damage to rod & case.	
M	25	Valves	Holding valves for proper operation.	
M	26	Valves	Control valve for leaks at fittings & between sections.	
M	27	Valves	Control valve linkages for wear, smoothness of operation & tightness of fasteners. Relief valve for proper pressure settings.	
M	28	General	Bent, broken or significantly rusted/corroded parts.	
M	29	Electrical	Electrical apparatus for malfunctioning, signs of apparent excess deterioration, dirt or moisture accumulation. Electrical systems for presence of dirt, moisture and frayed wires.	
M	30	Structure	All structural members for damage.	
M	31	Welds	All welds for breaks & cracks.	
M	32	Pins	All pins for proper installation & condition.	
M	33	Hardware	All bolts, fasteners & retaining rings for tightness, wear & corrosion	
M	34	Wear Pads	Condition of wear pads.	
M	35	Pump & Motor mounting bolts.	Hydraulic pumps & motors for leakage at fittings, seals & between sections. Check tightness of	
M	36	PTO	Transmission/PTO for leakage, abnormal vibration & noise, alignment & mounting bolt torque.	
M	37	Hyd Fluid	Quality of hydraulic fluid and for presence of water.	
M	38	Hyd Lines	Hoses & tubes for leakage, abrasion damage, blistering, cracking, deterioration, fitting leakage & secured properly.	
M	39	Hook	Load hook for abnormal throat distance, twist, wear & cracks.	
M	40	Wire Rope	Condition of load line.	
M	41	Manual	Presence of operator's manuals with unit.	
M	42		Other	
M	43		Other	
Q	44	Daily	All daily inspection items.	
Q	45	Monthly	All monthly inspection items.	
Q	46	Rotation Sys	Rotation bearing for proper torque of all mounting bolts.	
Q	47	Hardware	Base mounting bolts for proper torque.	
Q	48	Structure	All structural members for deformation, cracks & corrosion.	
	49		● Base	
	50		● Stabilizer beams & legs	
	51		● Mast	
	52		● Inner boom	
	53		● Outer boom	
	54		● Extension(s)	
	55		● Jib boom	
	56		● Jib extension(s)	
	57		● Other	
Q	58	Hardware	Pins, bearings, shafts, gears, rollers, & locking devices for wear, cracks, corrosion & distortion.	

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Inspection Checklist — CRANES — 3

FREQUENCY	ITEM	KEY	✓ = SATISFACTORY R = RECOMMENDATION (Should be considered for corrective action) *NA* = Not Applicable X = Deficient (Note: If a deficiency is found, an immediate determination must be made as to whether the deficiency constitutes a safety hazard and must be corrected prior to operation.) INSPECTION DESCRIPTION	STATUS ✓, R, X, NA
	59		● Rotation bearing(s)	
	60		● Inner boom pivot pin(s) & retainer(s)	
	61		● Outer boom pivot pin(s) & retainer(s)	
	62		● Inner boom cylinder pin(s) & retainer(s)	
	63		● Outer boom cylinder pin(s) & retainer(s)	
	64		● Extension cylinder pin(s) & retainer(s)	
	65		● Jib boom pin(s) & retainer(s)	
	66		● Jib cylinder pin(s) & retainer(s)	
	67		● Jib extension cylinder pin(s) & retainer(s)	
	68		● Boom tip attachments	
	69		● Other	
Q	70	Hyd Lines	Hoses, fittings & tubing for proper routing, leakage, blistering, deformation & excessive abrasion.	
	71		● Pressure line(s) from pump to control valve	
	72		● Return line(s) from control valve to reservoir	
	73		● Suction line(s) from reservoir to pump	
	74		● Pressure line(s) from control valve to each function	
	75		● Load holding valve pipe(s) and hose(s)	
	76		● Other	
Q	77	Pumps & Motors	Pumps & motors for loose bolts/fasteners, leaks, noise, vibration, loss of performance, heating & excess pressure.	
	78		● Winch motor(s)	
	79		● Rotation motor(s)	
	80		● Other	
Q	81	Valves	Hydraulic valves for cracks, spool return to neutral, sticking spools, proper relief valve setting, relief valve failure.	
	82		● Main control valve	
	83		● Load holding valve(s)	
	84		● Stabilizer or auxiliary control valve(s)	
	85		● Other	
	86		● Other	
Q	87	Cylinders	Hydraulic cylinders for drifting, rod seal leakage & leakage at welds. Rods for nicks, scores & dents. Case for damage. Case & rod ends for damage & abnormal wear.	
	88		● Stabiliizer cylinder(s)	
	89		● Inner boom cylinder(s)	
	90		● Outer boom cylinder(s)	
	91		● Extension cylinder(s)	
	92		● Rotation cylinder(s)	
	93		● Jib lift cylinder(s)	
	94		● Jib extension cylinder(s)	
	95		● Other	
Q	96	Winch	Winch, sheaves & drums for damage, abnormal wear, abrasions & other irregularities.	
Q	97	Hyd Filters	Hydraulic filters for replacement per maintenance schedule.	
A	98	Daily	All daily inspection items.	
A	99	Monthly	All monthly inspection items.	
A	100	Quarterly	All quarterly inspection items.	
A	101	Hyd Sys	Hydraulic fluid change per maintenance schedule.	
A	102	Controls	Control valve calibration for correct pressures & relief valve settings	
A	103	Valves	Safety valve calibration for correct pressures & relief valve settings.	
A	104	Valves	Valves for failure to maintain correct settings.	
A	105	Rotation Sys	Rotation drive system for proper backlash clearance & abnormal wear, deformation & cracks.	
A	106	Lubrication	Gear oil change in rotation drive system per maintenance schedule.	
A	107	Hardware	Check tightness of all fasteners and bolts.	
A	108	Wear Pads	Wear pads for excessive wear.	
A	109	Loadline	Loadline for proper attachment to drum.	

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Deficiency / Recommendation / Corrective Action Report 4

DATE	*OWNER*	*UNIT I.D. NUMBER*

GUIDELINES

A. A deficiency (**X**) may constitute a hazard. **X** must be corrected and/or faulty parts replaced before resuming operation.

B. Recommendations (**R**) should be considered for corrective actions. Corrective action for a particular recommendation depends on the facts in each situation.

C. Corrective actions (**CA**), repairs, adjustments, parts replacement, etc. are to be performed by a qualified person in accordance with all manufacturer's recommendations, specifications and requirements.

NOTE: *Deficiencies (X) listed must be followed by the corresponding corrective action taken (***CA***).*

X = DEFICIENCY **R** = RECOMMENDATION **CA** = CORRECTIVE ACTION TAKEN

X, R, CA	ITEM #	EXPLANATION	DATE CORRECTED

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MANUAL CHANGE REQUEST

DATE	PRODUCT MANUAL	MANUAL PART NO.
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: _____

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BOX 189, 500 HIGHWAY 18 WEST, GARNER, IA 50438
TEL: 641-923-3711
FAX: 641-923-2424