Parts, Specifications,
Operation and Maintenance

19140 Crane

REVISED

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MANUAL PART NUMBER 99900725

INTRODUCTION

This volume deals with information applicable to your particular crane. Before operation or performance of any maintenance on your IMT crane, familiarize yourself with the OPERATOR'S CRANE SAFETY MANUAL, part number 99900313. It provides information critical to the safe operation and maintenance of your crane. It is the user's responsibility to maintain and operate this unit in a manner that will result in the safest working conditions possible. We recommend that this volume be kept in the glove compartment of the vehicle for ready reference.

This manual is provided to assist you with ordering parts for you IMT truck-mounted articulating crane. It also contains additional instructions regarding you particular installation, maintenance and operation.

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

In addition, it is also the user's responsibility to be aware of existing Federal, State and Local codes and regulations governing the safe use and maintenance of this unit. Listed below is a publication that the user should thoroughly read and understand.

ANSI/ASME B30.22
ARTICULATING BOOM CRANES
The American Society of Mechanical Engineers
United Engineering Center
345 East 47th Street
New York, NY 10017

Three means are used throughout this manual to gain the attention of personnel. They are NOTE's, CAUTION's and WARNING's and are defined as follows:

NOTE

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

CAUTION

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

WARNING

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

Read and familiarize yourself with the IMT OPERATOR'S CRANE SAFETY MANUAL before operating or performing any maintenance on your crane.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Section 1. MODEL 19140 SPECIFICATIONS

1-1. GENERAL

	19140 - 3H	19140 - 4H	19140 - 4H1M	19140 - 4H2M
CRANE RATING	19 ton-meters	19 ton-meters	19 ton-meters	19 ton-meters
HORIZONTAL REACH from centerline of rotation	11.61m	13.82m	16.56m	19.28m
HYDRAULIC EXTENSION	610cm	813cm	813cm	813cm
MANUAL EXTENSION	None	None	272cm	272/272cm
VERTICAL REACH from mounting surface	13.89m	15.90m	18.33m	20.80m
VERTICAL REACH from ground / 1.02m frame ht.	14.91m	16.92m	19.35m	21.82m
****BASE CRANE WEIGHT**	2740 kg	2925 kg	3060 kg	3245 kg
OUTRIGGER SPAN - STANDARD	4.93m	4.93m	4.93m	4.93m
OUTRIGGER SPAN - OPTIONAL	6.30m	6.30m	6.30m	6.30m
OUTRIGGER PADS	30 x 30cm	30 x 30cm	30 x 30cm	30 x 30cm
CRANE STORAGE HEIGHT from mounting surface	2.76m	2.82m	2.82m	2.82m
CRANE STORAGE HEIGHT from ground / 1.02m frame ht.	3.78m	3.84m	3.84m	3.84m
***MOUNTING SPACE REQUIRED**	109cm	109cm	109cm	109cm
ROTATIONAL TORQUE	2510 kg-m	2510 kg-m	2510 kg-m	2510 kg-m
OPTIMUM PUMP CAPACITY	64 liters/min	64 liters/min	64 liters/min	64 liters/min
SYSTEM OPERATING PRESSURE	276 bar	276 bar	276 bar	276 bar
OIL RESERVOIR CAPACITY	151 liters	151 liters	151 liters	151 liters
HOOK APPROACH - HORIZONTAL from centerline of rotation	10cm	10cm	10cm	10cm
HOOK APPROACH - VERTICAL from mounting surface	2.36m	2.21m	2.21m	2.21m
****HORIZONTAL CTR OF GRAVITY** from centerline of rotation	6cm	6cm	6cm	6cm
****VERTICAL CTR OF GRAVITY** from mounting surface	81cm	83cm	84cm	85cm

* Allow an additional 5cm between the cab and crane base for swing clearance
** Without outriggers, hydraulic oil reservoir and mounting accessories
*** Crane in stowed position

1-2. PERFORMANCE CHARACTERISTICS

ROTATION:	450°/7.85 rad	60 seconds
INNER BOOM ELEVATION:	-1.31 to +1.12 rad	Up=23 / Down=15 seconds
OUTER BOOM ARTICULATION:	2.62 rad	Up=22 / Down=20 seconds
TELESCOPIC EXTENSIONS:		
1st Stage	203cm	Extend=12 / Retract=18 seconds
2nd Stage	203cm	Extend=11 / Retract=15 seconds
3rd Stage	203cm	Extend=11 / Retract=18 seconds
4th Stage	203cm	Extend=11 / Retract=13 seconds
VERTICAL OUTRIGGER STROKE:	61cm	Up=3 / Down=4 seconds
POWER OUT OUTRIGGER:	125cm	Ext=5 / Ret=8 seconds

1-3. POWER SOURCE

Integral-mounted hydraulic pump and PTO application. Other standard power sources may be utilized - minimum power required is 50 horsepower.

1-4. CYLINDER HOLDING VALVES

The holding sides of all standard cylinders are equipped with integral-mounted holding or counter-balance valves to prevent sudden cylinder collapse in case of hose or other hydraulic failure. The outrigger cylinders have positive, pilot-operated holding valves that open only on command.

The inner, outer and extension boom cylinders feature pilot-operated counter-balance valves on both the extend and retract sides. The counter-balance valve serves several functions. First, it is a holding valve. Secondly, it is so constructed that it will control the lowering function and allow that motion to be feathered while under load. Finally, if a hose breaks, the only oil loss will be that in the hose.

1-5. ROTATION SYSTEM

Rotation of the crane is accomplished through a turntable bearing, powered by a high torque hydraulic motor through a ring and pinion type spur gear train. A spring-loaded brake is supplied between the drive gear and the hydraulic drive motor providing rotational and parking brake action. Total gear reduction is 68.3:1.

1-6. HYDRAULIC SYSTEM

The hydraulic system is a closed center, pressure compensated hydraulic system requiring 64 liters/minute optimum oil flow at 276 bar. The main control valve is a nine-spool, stack type valve, eight of which are used for the standard crane and one is plugged, but easily adaptable to an additional optional feature. Dual operational handles for the standard crane functions are located at both sides of the crane for convenient operation with the outrigger functions operated from their respective side. The hydraulic system includes the hydraulic reservoir, pump, nine-section control valve, return line filter, suction strainer located inside the reservoir, and all hoses and fittings.

The hydraulic pump, which is supplied, requires the following conditions:

1. The engine RPM is to be controlled at approximately 1200 under load.
2. A second hydraulic system must not be operated from the pump.
3. The pump is set up for counter-clockwise (left-hand) rotation which is common for manual transmission applications.
4. A power take off (PTO) with output capabilities of up to 50 horsepower is required.
5. If the chassis transmission does not meet the above criteria, please contact IMT.

1-7. CAPACITY ALERT SYSTEM

Integral to the main control valve is a capacity alert system which will prevent the operator from lifting loads in excess of the crane capacity. The system senses the inner boom lift cylinder pressure and shuts down the offending function when the inner boom cylinder pressure reaches a preset level.

If an operator attempts to lift a load which exceeds the rated capacity of the crane, the system will prevent the operator from raising or lowering the inner boom, raising or lowering the outer boom, extending the telescoping booms, or hoisting with an optional winch.

To eliminate the excess load condition, the load may be lowered by retracting the telescoping booms, or actuating the outer boom to decrease the load radius or by lowering the load with the winch (if applicabe).

1-8. SELECTED WEIGHTS OF ANCILLARY EQUIPMENT

OUTRIGGERS-4 93m	375 kg
OUTRIGGERS-6 30m	562 kg
HYDRAULIC OIL RESERVOIR	42 kg

IMT reserves the right to change specifications and design without notice.

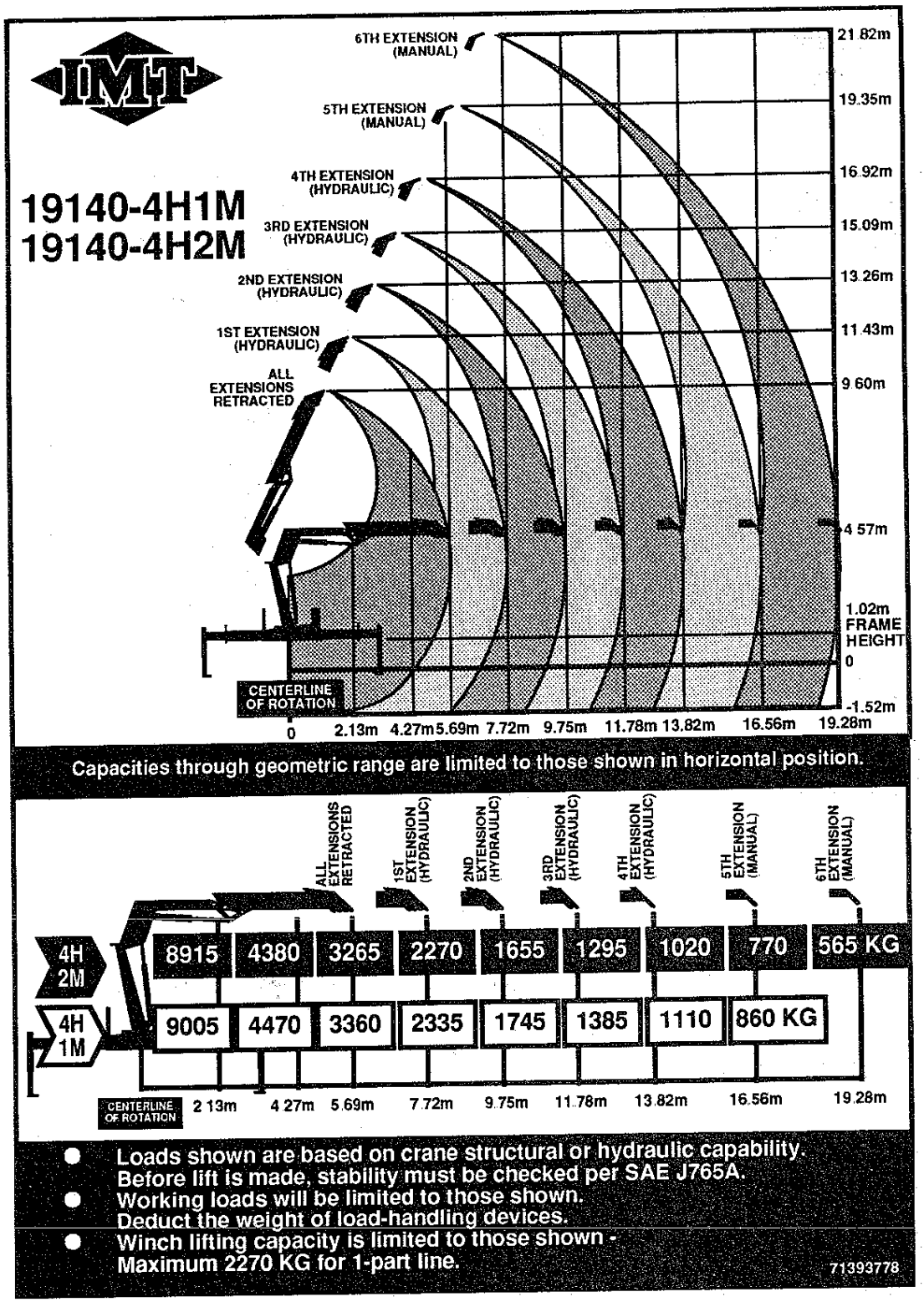


Figure A-1. CAPACITY CHART - 4H1M & 4H2M

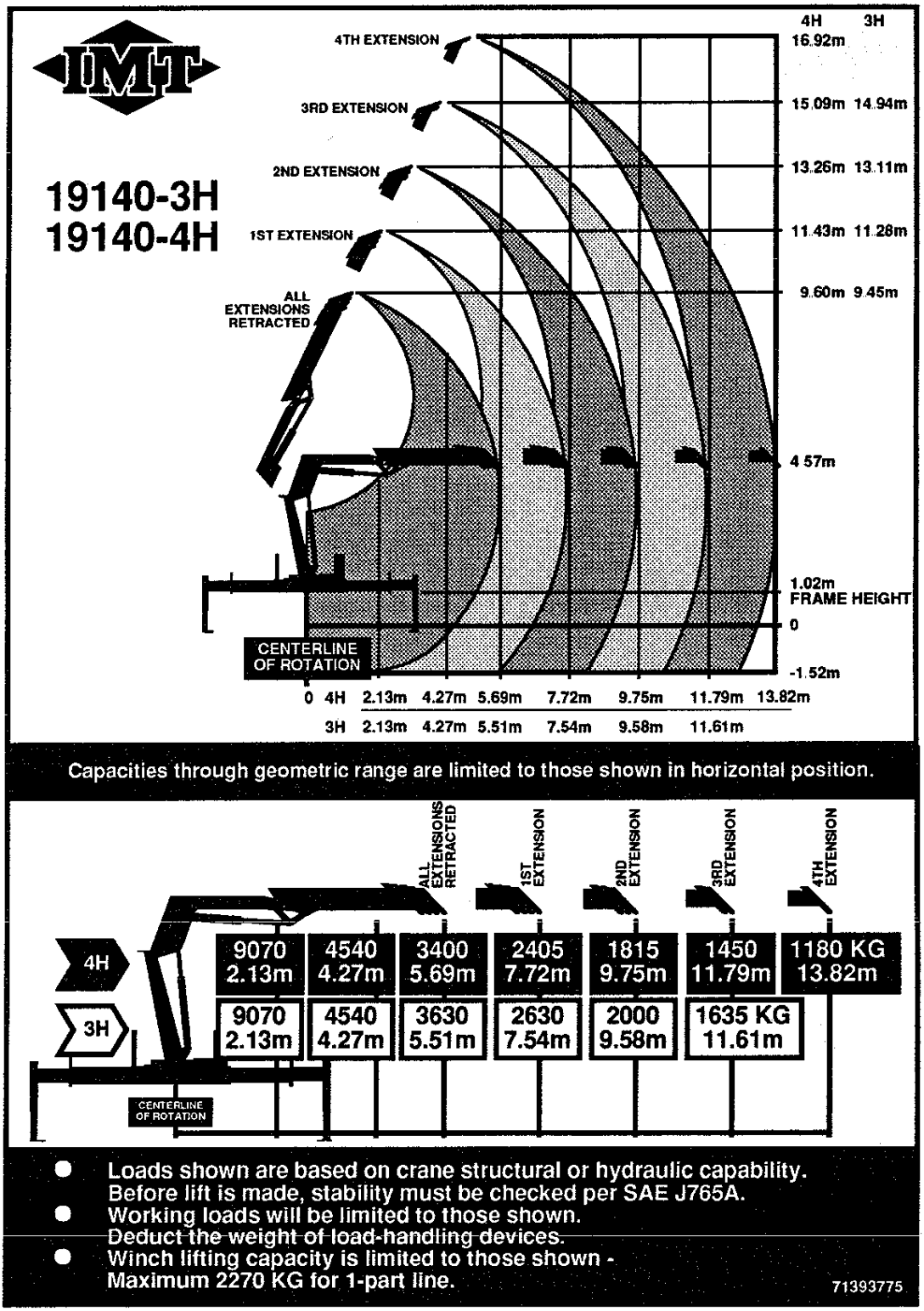
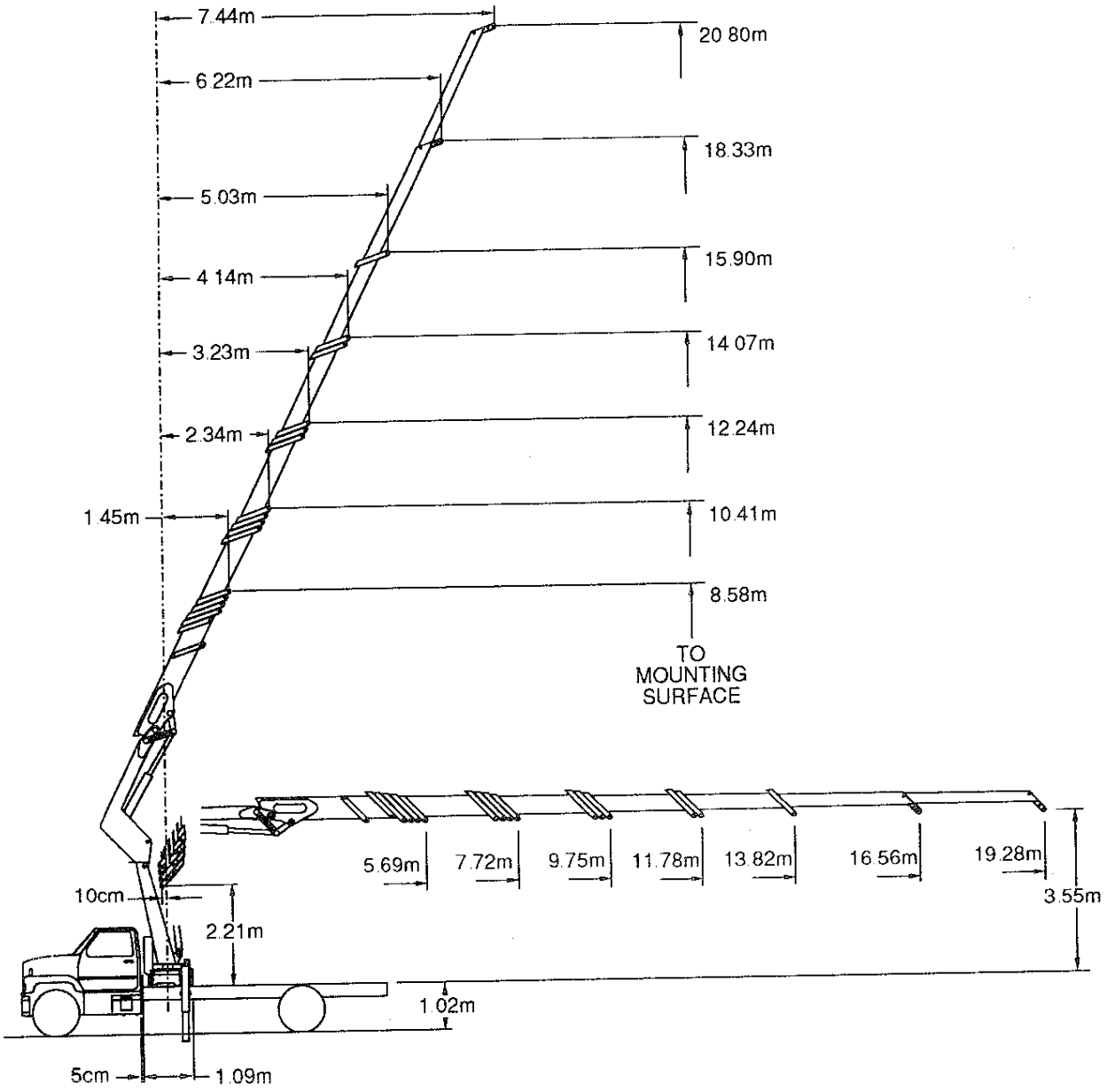


Figure A-2. CAPACITY CHART - 3H & 4H



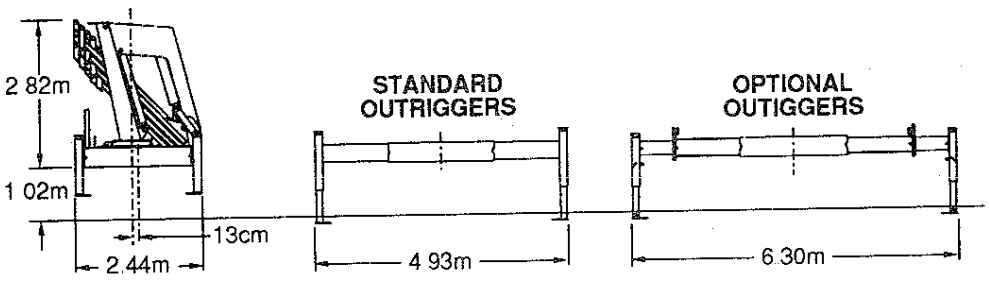


Figure A-3. GEOMETRIC CONFIGURATION - 4H/2M, 4H1M & 4H

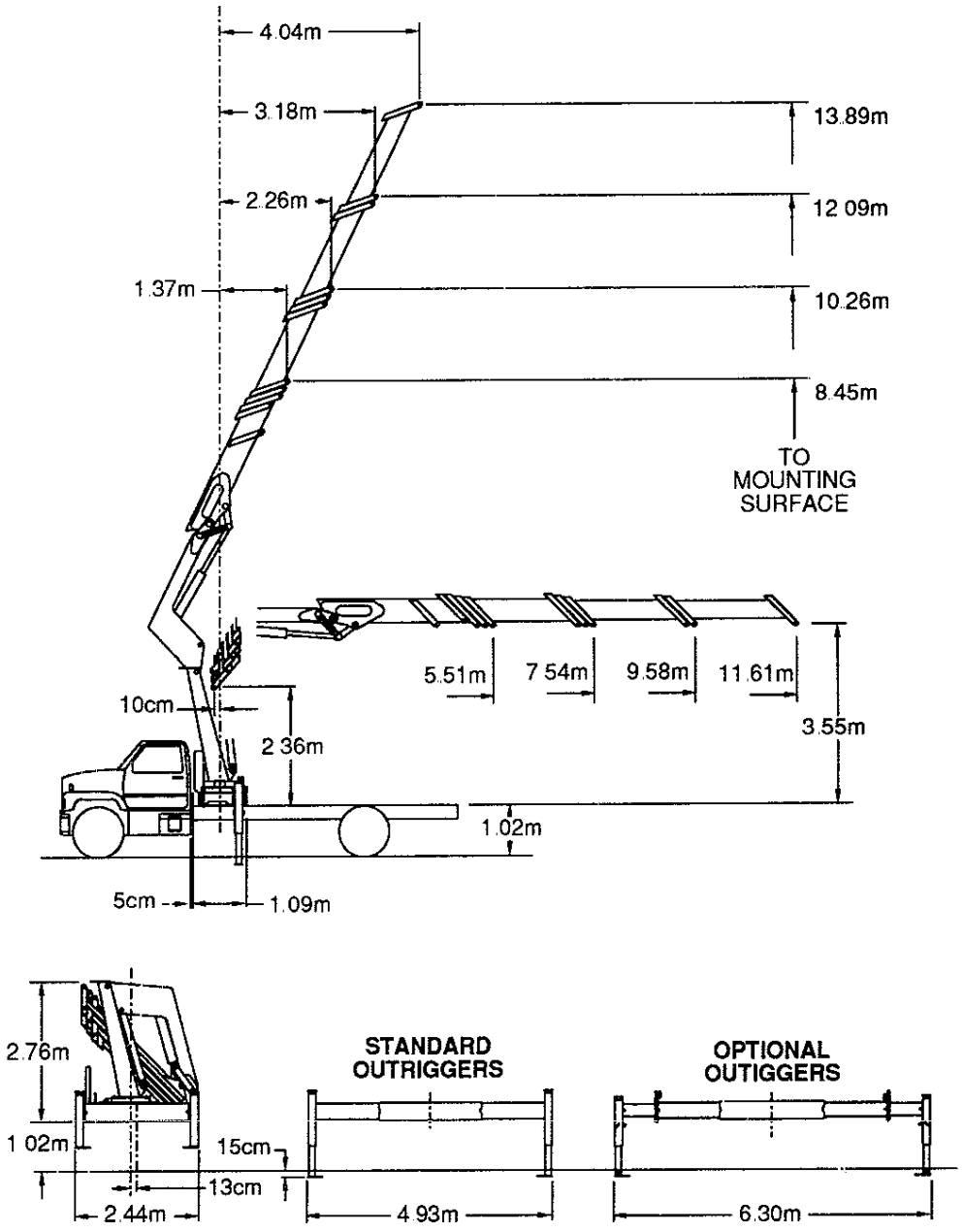


Figure A-4. GEOMETRIC CONFIGURATION - 3H

Section 2. CRANE DESCRIPTION

2-1. GENERAL

The IMT Model 19140 Crane is designed for use as a material handling crane. This section describes the major assemblies used on this crane and Figure B-1 shows their locations.

2-2. BASE

The base provides a platform for mounting the crane to a truck chassis. It incorporates a 450°/7.85 Rad. rotation mechanism and outriggers. The working area may be limited to 180°/3.14 Rad. rotation, depending on crane mounting location and truck capacity.

2-3. MAST

The mast provides the necessary elevation for crane operation as well as a hinge point for the inner boom. It is designed to stow in a tilted position to provide for minimum clearance requirements.

2-4. INNER BOOM

The inner boom will swing through a full 139°/2.43 Rad. from -75° to +64°/-1.31 to +1.12 Rad. It is raised and lowered through the use of two double-acting hydraulic cylinders.

2-5. OUTER BOOM

The outer boom will swing through a full 150°/2.62 Rad. The boom is raised and lowered with a single double-acting hydraulic cylinder mounted below the inner boom. It also provides storage for the extension booms in the retracted position.

2-6. EXTENSION BOOMS

The differences between the four crane model variations are in the extension booms. They are listed below for quick comparison. "H" means hydraulically operated and "M" means manually operated.

		EXTENSIONS			
1ST	2ND	3RD	4TH	5TH	6TH
19140-3H					
H	H	H			
203.2	203.2	203.2cm			
19140-4H					
H	H	H	H		
203.2	203.2	203.2	203.2cm		
19140-4H/1M					
H	H	H	H	M	
203.2	203.2	203.2	203.2	271.8cm	
19140-4H/2M					
H	H	H	H	M	M
203.2	203.2	203.2	203.2	271.8	271.8cm

2-7. CONTROLS

The crane is equipped with dual control stations, one on each side of the crane. All crane functions are operable from both control stations. Outrigger functions are operated from the nearest side only. The operator may choose the platform which provides the best view of crane operations. An elevated operator's platform is provided on both sides of the crane. The platforms provide enhanced safety to the operator in the event of contact with energized electrical powerlines. The operator can remain isolated from ground contact by staying on the platform.

2-8. HYDRAULICS

The closed-center hydraulic valve and the pressure-compensated hydraulic pump provide oil flow through the hydraulic system as required. When all control levers are in the normal (center) position, oil flow through the valve is blocked. In this position, the signal pressure from the control valve shifts the pump to minimum pressure and flow. This minimum flow is returned directly from the pump to the reservoir.

When a control lever is actuated, the corresponding valve spool shifts to allow oil flow in proportion to the amount of spool travel. In response, the pump increases flow and pressure as required. As additional control levers are operated simultaneously, the pump will continue to increase flow and pressure as required, up to maximum pump specifications.

When the crane function reaches the end of its travel, and no more flow is required, the pump returns to minimum flow.

2-9. OUTRIGGERS

The outriggers are a part of the crane base. They provide the added stability necessary to crane operation. The hydraulically powered out and down variety. The standard outriggers span 4.93m and the optional outriggers span 6.30m when deployed.

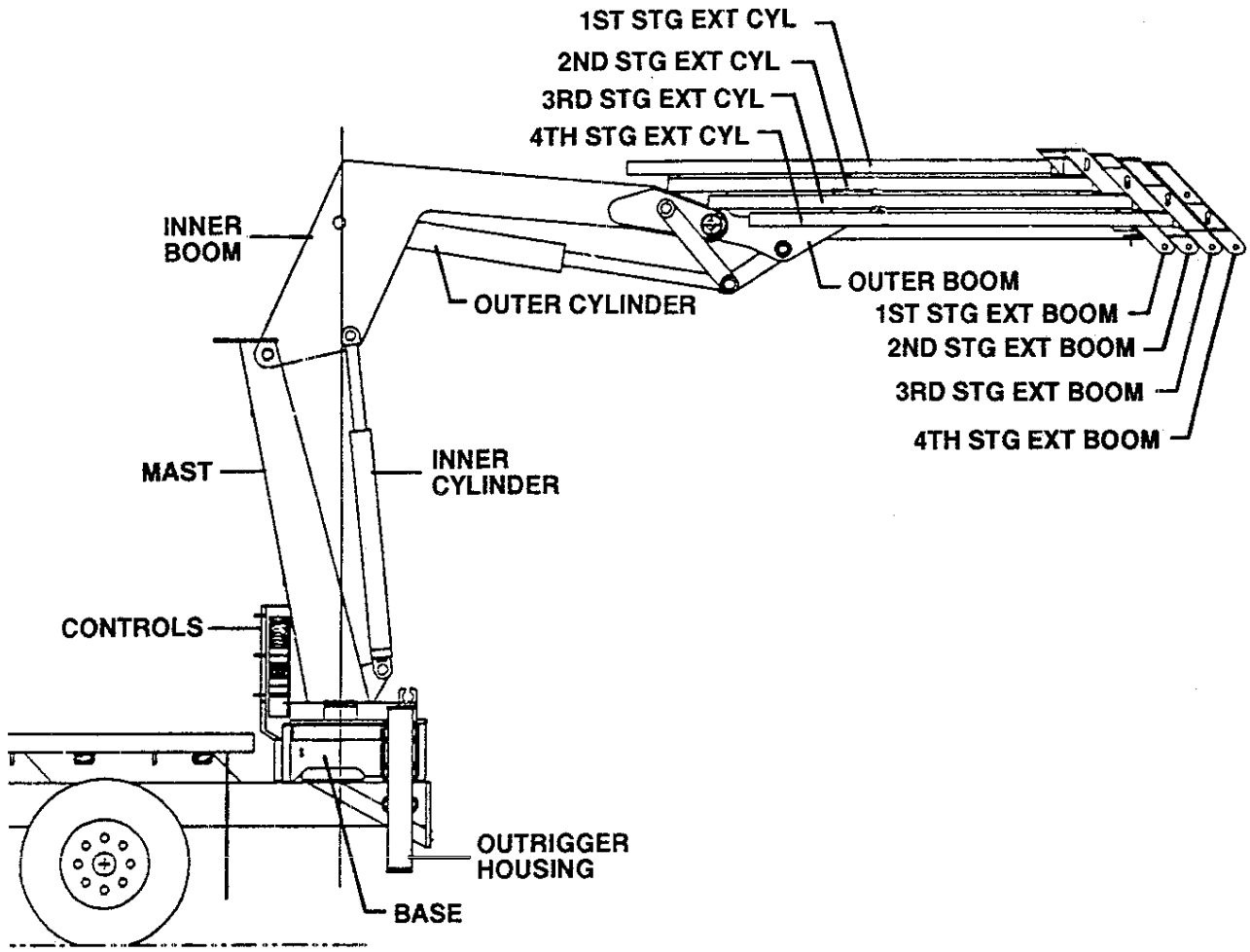


Figure B-1. 19140 CRANE GROUP

2-10. THEORY OF OPERATION

2-10-1. HYDRAULIC PUMP

The pressure-compensated hydraulic pump supplies hydraulic fluid under pressure to the directional control valve. The pumping rate and outlet pressure vary in response to a signal pressure from the control valve. This signal pressure varies according to the number of functions being operated and the extent of operator movement of the control lever. The hydraulic pump is set to provide up to a maximum of 64.3 liters/minute at 276 bar outlet pressure. Return flow is routed directly back to the hydraulic reservoir.

2-10-2. OUTRIGGERS

When the valve lever (POWER OUT) is operated in the direction marked "OUT", hydraulic fluid enters the piston end of the horizontal outrigger cylinder, which is mounted on the crane base. The hydraulic fluid will extend the cylinder out which will extend the outrigger beam out. When the valve lever (POWER OUT) is operated in the direction marked "IN", hydraulic fluid enters the rod end of the outrigger cylinder. This retracts the outrigger cylinder which retracts the outrigger beam.

The optional 6.40m span outriggers have manual sections that can be power extended. After extending the main outrigger beam and pulling a pin in the manual section, the link tube will hold the manual section while the main beam is being retracted. This repositions the manual section in relationship with the power section. The pin is then re-installed for extending to the full optional outrigger span. The sequence is reversed for retraction.

When the valve lever (OUTRIGGER CYLINDER) is operated in the direction marked "DOWN", hydraulic fluid enters the piston end of the vertical outrigger cylinder. The hydraulic fluid will extend the cylinder down which will extend the outrigger down. When the valve lever (OUTRIGGER CYLINDER) is operated in the direction marked "UP", hydraulic fluid enters the rod end of the vertical outrigger cylinder. The hydraulic fluid will retract the cylinder which will retract the outrigger up.

2-10-3. ROTATION

When the valve lever (ROTATION) is operated in the direction marker "CW", hydraulic fluid enters the rotation motor which is located on the crane base. The rotating torque is transmitted through the gear train which rotates the crane CLOCKWISE (looking down on the crane).

When the valve lever (ROTATION) is operated in the direction marked "CCW", hydraulic fluid enters the rotation motor which is located on the crane base. The rotating torque is transmitted through the gear train which rotates the crane COUNTER-CLOCKWISE (looking down on the crane).

2-10-4. INNER BOOM

When the valve lever (INNER) is operated in the direction marked "UP", hydraulic fluid enters the piston end of the two inner boom hoist cylinders. The hydraulic fluid extends the cylinders which raises the inner boom.

When the valve lever (INNER) is operated in the direction marked "DOWN", hydraulic fluid enters the rod end of the two inner boom hoist cylinders. The hydraulic fluid retracs these cylinders which lowers the inner boom.

2-10-5. OUTER BOOM

When the valve lever (OUTER) is operated in the direction marked "OUT", hydraulic fluid enters the piston end of the outer boom hoist cylinder. The hydraulic fluid extends this cylinder which raises the outer boom.

When the valve lever (OUTER) is operated in the direction marked "IN", hydraulic fluid enters the rod end of the outer boom hoist cylinder. The hydraulic fluid retracts this cylinder which lowers the outer boom.

2-10-6. EXTENSION BOOMS

When the valve lever (EXTENSION) is operated in the direction marked "OUT", hydraulic fluid enters the base end of the first extension cylinder. The hydraulic fluid extends the cylinder which extends the boom. The first extension cylinder extends first, followed by the second and third. The fourth extension is last to extend.

When the valve lever (EXTENSION) is operated in the direction marked "IN", hydraulic fluid enters the rod end of the boom extension cylinder. The hydraulic fluid retracts the last cylinder which retracts the boom. The last extension cylinder retracts first, followed by the others directly ahead of it. The first extension cylinder is the last to retract.

Section 3. INSTALLATION

3-1. GENERAL

The 19140 crane may be installed behind the cab or as a rear mount (rear of truck bed). In both locations, the crane is secured to the truck frame. Truck capacity and mounting position will affect crane capacity and working area. Also affected is the required outrigger width.

3-2. CRANE MOUNTING

1. See SPECIFICATIONS in Section 1 for crane weight. Using an overhead hoist and fabric slings of adequate capacity, lift the crane about a foot to see if the crane is adequately balanced. If not, lower hoist and adjust slings. Re-check balance and re-position crane until mounting surface is level.

2. Install the truck frame support so that the tie-down studs pass through the supports (Figure C-1). Cut the support to the inside dimensions of the truck frame. Allow about 1.6mm extra. Grind the end of the support to fit inside the frame channel. Use a hammer to drive it into position if necessary.

3. Position one bar on top of each frame rail where crane will be located, allowing sufficient clearance between the cab and crane base. Position the crane on the chassis per the applicable installation drawing, centering the mounting slots over the truck frame rails. While holding crane with hoist, start mounting hardware per Figure C-1. Note position of support weldments on truck frame. Hand tighten nuts. Observe underside of crane base. No clearance between base and frame bars is allowed. Grind bar on frame rails to eliminate clearance.

4. Torque the 1 1/4"-7 UNC Grade 5 mounting hardware to 116 kg-m. When torquing the mounting hardware the following precautions must be followed:

   A. Never use lock washers.

   B. Hardened washers must be used, and under the turning element, whether the turning element is the nut or the head of the bolt.

   C. Torque values specified are with residual oils or without special lubricants applied to the threads. If special lubricants are used, such as Never-Seize compound graphite and oil, molybdenum disulphite collodial copper or white lead, reduce torque values 10%. Torque values for threaded fasteners are not affected with the use of Loctite.

   D. Do not use rusty fasteners, the rust will alter torque values significantly.

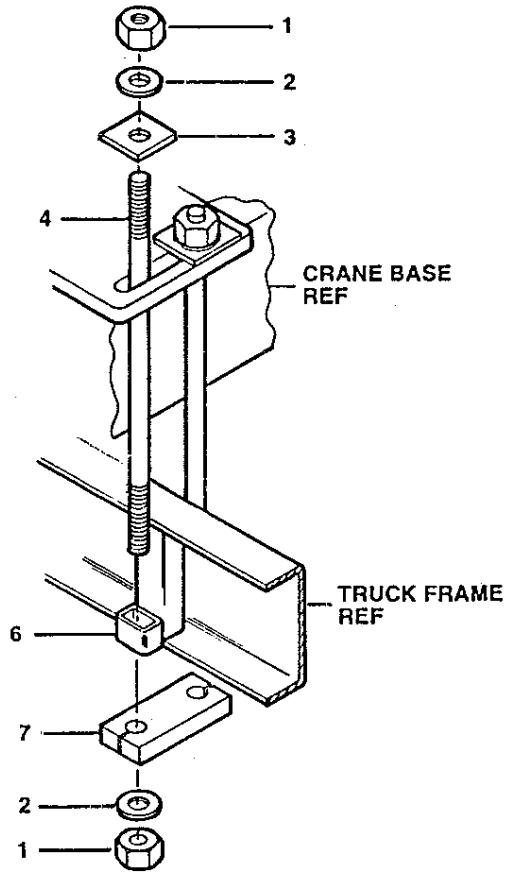
   E. Touch-up paint around mounting anchor plates.

5. Lay out and install hydraulic reservoir and hydraulic filter on truck frame.

CAUTION

Do not attempt to apply the same torque to the tie rod and self-locking nuts as shown in the Torque Data Chart. Do not exceed 116 kg-m. Exceeding this torque value could damage either the chassis or crane base.

Power wrenching is not recommended until the lead thread of the nut insert is engaged by hand turning.



ITEM	DESCRIPTION	QTY
1.	NUT 1 1/4-7 LOCK STL INSERT	16
2.	WASHER 1-1/4 HI STRENGTH	16
3.	SQUARE WASHER	8
4.	TIE-DOWN STUD 1 1/4-7X33	8
6.	SUPPORT	4
7.	CLAMP PLATE	4

Figure C-1. CRANE INSTALLATION

3-3. HYDRAULIC INSTALLATION

The hydraulic power required to run the crane is 64.3 liters/minute at 4000 PSI 276 bar.

1. Install hydraulic pump on vehicle. Pour a small quantity of hydraulic fluid into top port of pump.

2. Connect 1/2" diameter hydraulic hose from the "P" port of the chassis pump to "P" port of the control valve.

3. Connect 1" diameter hydraulic hose from the "R" port of the control valve to adapter on the inlet side of the return filter.

   Return filter element rating is 10-micron and is satisfactory for average atmospheric conditions. For dusty atmospheres, a 5-micron filter element is recommended.

   Return filter is equipped with a bypass feature to prevent blockage of hydraulic system. In case of replacement, the replacement filter housing should be similarly equipped.

4. On outlet side of return filter, use nipple to connect gate valve. Use adapters to connect 1" diameter hose between gate valve and reservoir.

5. Use 1/4" adapter to connect 1/4" diameter return hose between control valve and pump.

6. Connect 1/2" return hose between pump and reservoir using elbow adapter at pump and straight adapter at reservoir.

7. Connect 1-1/4" suction hose between pump and reservoir using adapter, barbed nipples, reducer and hose clamps.

8. Use hose clamps to secure hoses to chassis every meter and additional clamps as required.

9. Fill reservoir with hydraulic fluid above normal fluid level. Temporarily loosen the hydraulic suction line at pump to fill the hose. Re-tighten suction line. Crane hydraulic system is now complete.

NOTE

It is necessary to closely monitor the hydraulic fluid level in reservoir during initial operation while hydraulic fluid is filling hoses and cylinders. Add hydraulic fluid as necessary.

3-4. INITIAL CRANE RUN-IN PROCEDURE

1. With the unit in an open area for testing that will permit full operation of all its functions, engage the PTO and run the truck engine just fast enough to activate the pump. Operate the crane through all of its functions at least six (6) times to purge cylinders of air. Operate the control valves slowly and cycle each cylinder through its complete stroke each time. Check to see that movement of boom corresponds with direction indicated on crane controls decal. Reverse hoses if necessary.

NOTE

Add oil to reservoir as required to keep air from re-entering the system

2. Set throttle stops according to engine RPM and PTO ratio to get approximately 2000 RPM pump shaft speed. To see that you are getting the correct oil flow of 53 LPM at 172 bar.

3. When all cylinders have been operated through complete cycles, stow crane and place the outriggers in the up position. The oil level should be visible on the sight gauge.

4. Lift and stability test must now be performed on the unit (see Stability Check). Winch and boom tests should be conducted to ensure proper performance.

5. After testing is complete, the mounting bolts and all cable clamp bolts should be retorqued to specification.

6. Upon completion, overall height of crane/vehicle combination must be measured and the results posted inside of cab to inform driver of overall height.

3-5. STABILITY CHECK

The chassis weight, before the crane is mounted, is intended for use only as a guideline in determining the total weight required for the unit to be stable with an 85% tipping factor (i.e. when lifting capacity load, the unit is at 85% of tipping or less.).

In order to ensure the stability of the unit with an 85% tipping factor, a live load stability test must be performed **on each completed unit.** Proceed as follows:

Weigh the truck with the crane mounted and in the stowed position.

_____Front axle (FA) weight
_____Rear axle (RA) weight
_____Total gross weight = FA + RA
_____Measure the wheel base of the truck from the center of the rear bogie to the center of the front axle.
_____Measure the distance from the centerline of the rear bogie to the centerline of crane rotation.

NOTE

When weighing crane/unit, only permanently attached equipment weight is allowed. All other items such as personnel in cab, tools, tire chains, cargo, excess fuel in tanks, etc. is not allowed for weight consideration.

1. The crane/unit should be positioned in an area free from overhead obstructions to allow performance of the entire stability test without repositioning. Check the capacity chart for areas of reduced capacity and position vehicle accordingly.

2. Anytime the task requires setup in the vicinity of energized powerlines, a qualified signal person shall be assigned at a vantage point where he can accurately monitor the distance from the equipment to the powerlines and give warning before approaching the minimum safe distance. If the stability test requires any portion of the crane or its optional equipment to operate at less than the minimum required safe distance, the appropriate electric utility shall be notified to de-energize the powerline before any work is performed with the crane.

4. The vehicle shall be located on a firm and level surface that will provide adequate support for the outrigger loading. Use caution when setting up near overhanging banks or excavations.

5. Set the auxiliary (parking) brake.

6. Depress the clutch pedal. Shift the transmission into neutral and engage the PTO.

7. Operate the throttle control to achieve the proper engine speed.

8. While standing at the crane control station, raise outrigger control lever. The outrigger beams will extend outward from crane/unit to maximum horizontal position.

9. While standing at the crane control station, lower the driver's side outrigger and passenger's side outrigger levers. Extend the outrigger jack cylinders until firm ground contact is made. On soft ground, use cribbing to prevent sinking.

10. While standing at the crane control station extend the outrigger jack cylinders further and level the crane/unit from side to side.

11. At this time, inspect the crane/vehicle visually. Make certain the unit appears to be level.

12. While standing at the crane control station and after releasing the stow mechanism pin, raise the mast control lever, the mast will lift to the proper working position.

NOTE

As the mast is being deployed to the working position, no control action is needed, as the boom will remain in a horizontal position. Extend the mast to the furthest most position for proper crane operation.

13. At this time, you are ready to begin the crane operations necessary for stability testing, which will be done while standing at the crane control station and using the manual controls.

NOTE

For proper crane operation, please refer to the OPERATOR'S CRANE SAFETY MANUAL before proceeding.

STABILITY TEST CHECKLIST

- Outriggers properly extended and placed on the ground.
- Mast properly deployed.
- Boom extended.
- Boom angle of 40°/.70 radians.
- Crane/unit is visibly level.
- Load radius of 4.27m from centerline of crane rotation to centerline of load hook.
- Load = (1.18) (4536 kgs) = 5352 kgs.
- Rotate load through 270°/4.7 radian arc around the rear of the truck.
- Measure the distance the opposite side outrigger pad comes off the ground.

NOTE

Weights of accessories installed on the boom or loadline must be deducted from the calculated load when checking stability.

14. If slight tipping occurs, but load can be kept from coming in contact with ground by winching the load up, unit is stable. If not, counterweight will have to be added to get unit in a stable condition or decal must be added to define areas of full stability areas of reduced capacity because of stability.

15. When adding counterweight to the vehicle, it is usually most effective when added as close to the crane as possible. After adding counterweight, the above procedure must be repeated to ensure the added counterweight is adequate.

16. When adding counterweight for this crane/unit consult factory. If unit is not stable 270°/4.7 radians around the rear of the truck, a dealer-supplied stability chart must be added, showing the working area according to stability.

17. After stability testing is completed, pick the capacity load of 4536 kgs at 4.27m and rotate from outrigger to outrigger around the rear of the truck encompassing an arc of 270°/4,7 radians, 10 times. Does the crane/unit function properly?

18. After this testing is completed, retorque all crane mounting bolts.

NOTE

When retorquing mounting bolts stay clear for safety purposes.

This stability test must be performed by trained personnel with the person doing the testing to complete the form in the spaces provided, with any additional comments as needed. Pictures of the crane/unit in the testing phase are recommended for future reference. This information must be returned to the factory and will remain on file for reference purposes. Please send documents to:

IOWA MOLD TOOLING CO., INC.
P.O. BOX 189,
GARNER, IA 50438-0189
ATTN: QA MANAGER

COMMENTS:
DATE:
SER. NO. OF CRANE TESTED:
SER. NO. OF TRUCK CHASSIS:
TEST PERSONNEL:
TEST LOCATION:

Section 4. PARTS

4-1. GENERAL

This section contains the exploded parts drawings with the accompanying parts list for the assemblies used on this crane. These drawings are intended to be used in conjunction with the instructions found elsewhere in this manual. For optional equipment such as winches and remote controls, refer to the appropriate service manual.

WARNING

DO NOT ATTEMPT TO REPAIR ANY COMPONENT WITHOUT READING THE INFORMATION CONTAINED IN THE MAINTENANCE SECTION. PAY PARTICULAR ATTENTION TO THE WARNING'S, CAUTION'S AND NOTE'S CONTAINED IN THAT SECTION. FAILURE TO COMPLY WITH THESE INSTRUCTIONS MAY RESULT IN DAMAGE TO THE EQUIPMENT, INJURY OR DEATH.

4-2. CRANE IDENTIFICATION

Every crane has an identification placard (Figure D-1) attached to the mast. When ordering parts, communicating warranty information or referring to the unit in correspondence, always include the assigned serial and model numbers. All inquiries should be addressed to:

Iowa Mold Tooling Company, Inc.
Box 189, Garner, Iowa 50438-0189
Telephone: 515-923-3711
Product Support Fax: 515-923-3674

or

IMT Cranes Canada, Ltd.
385 West Street South,
Orillia, Ontario, L3V 5H2, Canada
Telephone: 705-325-7458
Fax: 705-325-7624

4-3. CYLINDER IDENTIFICATION

To ensure proper replacement parts are received, it is necessary to specify a complete number/letter sequence for any part request. Part numbers may be cross checked by comparing the stamped identification of the cylinder case (Figure D-2) against the information contained in this manual. You must use the part number stamped on the cylinder case when ordering parts.

4-4. WELDMENT INDENTIFICATION

Each of the major weldments - base, mast, inner boom, outer boom, extension booms and outrigger leg weldments bear a stamped part number. Any time a major weldment is replaced, you must specify the complete part number as stamped on the weldment.

4-5. ORDERING REPAIR PARTS

When ordering replacement parts:

1. Give the model number of the unit.
2. Give the serial number of the unit.
3. Specify the complete part number. When ordering cylinder parts or one of the main weldments, always give the stamped part number.
4. Give a complete description of the part.
5. Specify the quantity required.

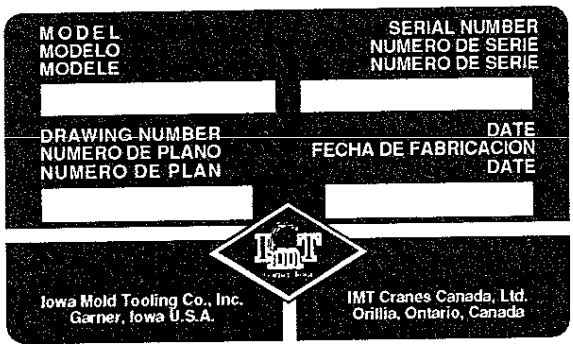


Figure D-1. SERIAL NUMBER PLACARD

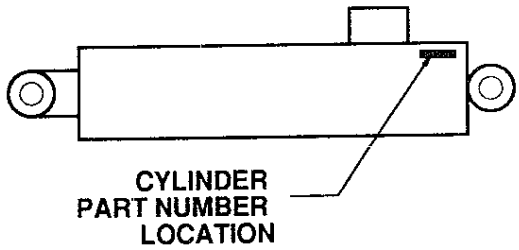


Figure D-2. CYLINDER IDENTIFICATION

Parts Index to Section 4

WARNING

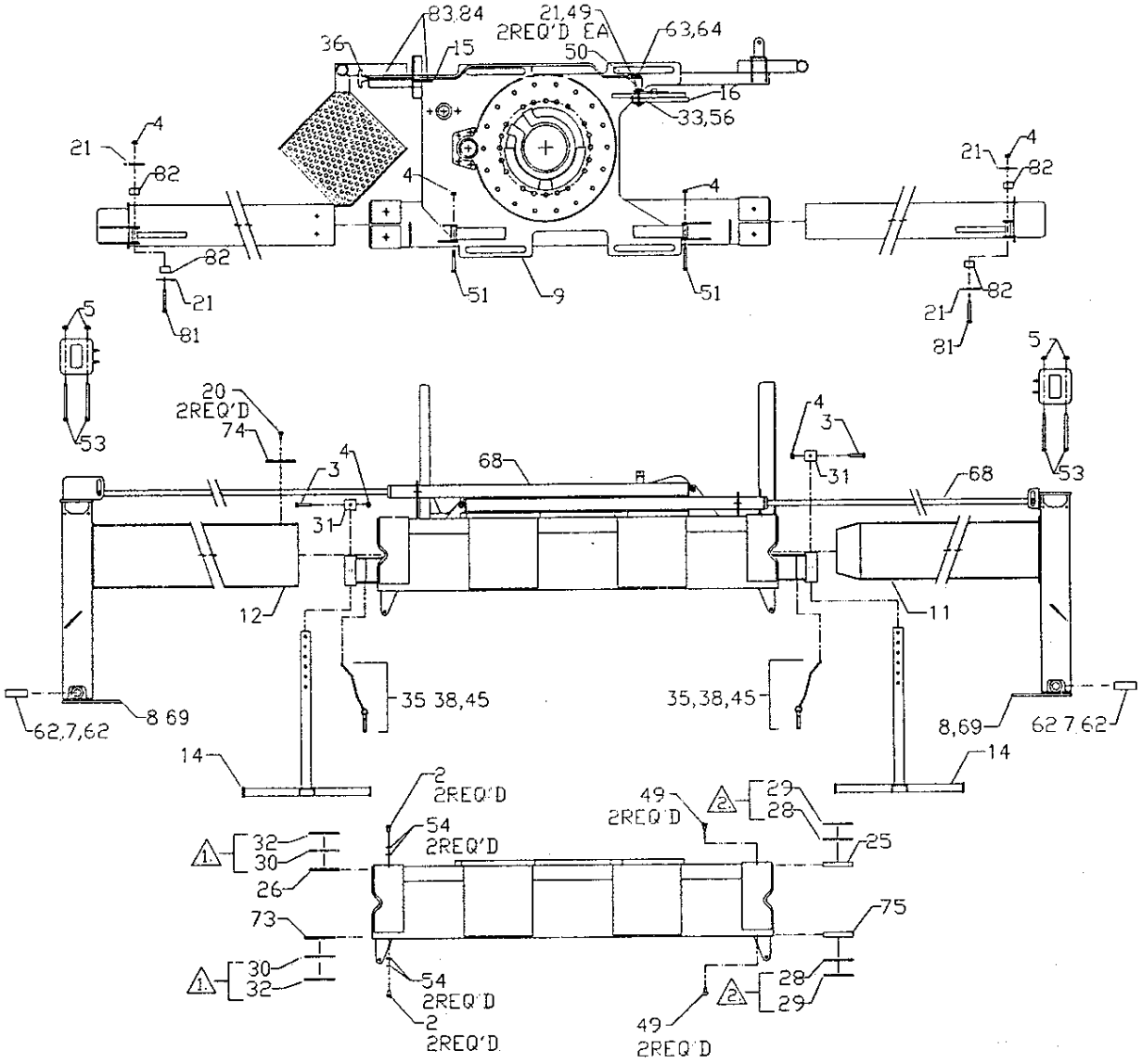
ANY TIME THE GEAR-BEARING BOLTS HAVE BEEN REMOVED, THEY MUST BE REPLACED WITH NEW BOLTS OF IDENTICAL GRADE AND SIZE. FAILURE TO REPLACE GEAR-BEARING BOLTS MAY RESULT IN BOLT FAILURE DUE TO METAL FATIGUE CAUSING SERIOUS INJURY OR DEATH

SEE FOLLOWING PAGES FOR DRAWING

ITEM	PART NO.	DESCRIPTION	QTY
1.	72060004	CAP SCR 1/4-20X1 HH GR5	2
2.	72060091	CAP SCR 1/2-13X1 HH GR5	4
3	72060986	CAP SCR 1/2-13X2-3/4 HH GR5	2
4.	72062080	NUT 1/2-13 LOCK	8
5.	72062179	NUT 3/8-16 CTR LOCK	4
6.	53000704	GREASE EXTENSION 34"	1
7.	60104977	PIN	2
8.	52709190	OUTRIGGER LEG	2
9.	52709776	BASE (INCL:13 & 76-79)	1
10.	53000701	GREASE EXTENSION 14"	1
11.	52710237	OUTRIGGER ARM - RH	1
12	52710236	OUTRIGGER ARM - LH	1
13	71056074	DRIVE GEAR (PART OF 9)	1REF
14.	52709922	PLATFORM	2
15.	52710165	LATCH ROD	1
16.	52710166	LATCH HOOK	1
17.	76391497	GASKET (PART OF 43)	1REF
18	60020123	THRUST WASHER	1
19.	76391498	GASKET (PART OF 43)	1REF
20.	72601026	SCR 3/8-16X1/2 FH SOC	2
21.	60105874	PIN RETAINER PLATE 2"	6
22	60105964	PINION SUPPORT PLATE	1
23.	60106032	STUD 1/2-13X2	2
24.	60010844	GREASE PLATE	1
25.	60114014	SPACER PLATE	1
26.	60114015	SPACER PLATE	1
27.	60114037	COVER	1
28.	60114041	WEAR PAD SHIM 1/4	2
29.	60114042	WEAR PAD SHIM 7GA	2
30	60114043	WEAR PAD SHIM 10GA	2
31	60114257	SLEEVE	2
32.	60114417	WEAR PAD SHIM 16GA	2
33	60114811	SLEEVE	1
34.	73054538	VALVE (PART OF 40)	2REF
35.	60114940	CHAIN 1/8X9	2
36	70029549	T-HANDLE	1
37	70055167	BEARING	1
38	70141075	HOOK	2
39.	70142838	SPRING	1
40.	70731795	VALVEPAC (INCL:34 & 80)	1
41	71056072	INTERMEDIATE GEAR	1
42.	71056073	PINION GEAR	1

ITEM	PART NO.	DESCRIPTION	QTY
43.	71056374	HYD BRAKE (INCL:17 & 19)	1
44	71143520	SLIDE 450°	1
45.	71732054	QUICK RELEASE PIN	2
46	72053281	STREET ELBOW 1/8NPT 90°	1
47.	72053301	COUPLING 1/8NPT	2
48.	72053508	ZERK 1/8NPT	3
49	72060092	CAP SCR 1/2-13X1-1/4 HH GR5	6
50.	60115062	LIFT BRACKET	1
51.	72060099	CAP SCR 1/2-13X4 HH GR5	2
52.	72063004	WASHER 7/16 WRT	2
53.	72060926	CAP SCR 3/8-16X7 HH GR5	4
54	72063132	WASHER 1/2 FLAT	8
55.	72060093	CAP SCR 1/2-13X1-1/2 HH GR5	2
56	72063014	WASHER 1-1/2 WRT	1
57.	72063039	MACH BUSHING 2X10GA	1
58.	72063049	WASHER 1/4 LOCK	2
59	72063053	WASHER 1/2 LOCK	2
60.	72063115	WASHER 7/8 FLAT HARD	23
61.	72066095	RETAINING RING 2" EXT STD	1
62.	72066132	RETAINING RING 1-1/2 HD	4
63.	72066168	COTTER PIN .09X3/4	1
64	72066338	CLEVIS PIN 5/16X1	1
65.	72601037	CAP SCR 9/16-12X4-1/2 HH GR8	2
66	72601144	CAP SCR 9/16-12X2 HH GR8	4
67.	72601609	CAP SCR 7/8-9X4-1/4 HH GR8	23
68.	3B055920	POWER OUT CYLINDER	2
69.	3B070920	POWER DOWN CYLINDER	2
70.	73051478	HYDRAULIC MOTOR	1
71.	72063117	WASHER 9/16 FLAT HARD GR8	6
72.	72060757	CAP SCR 3/8-16X2-1/2 SH	3
73.	60030229	WEAR PAD	1
74.	60030230	WEAR PAD	1
75.	60030231	WEAR PAD	1
76.	60020120	BUSHING (PART OF 9)	1REF
77	60020121	BUSHING (PART OF 9)	1REF
78.	60020122	BUSHING (PART OF 9)	1REF
79.	60020124	BUSHING (PART OF 9)	1REF
80	7Q072017	O-RING (PART OF 40)	3REF
81.	72060102	CAP SCR 1/2-13X5-1/2 HH GR5	2
82.	60106742	SPACER	4
83	60116660	SLEEVE	2
84.	72060556	SET SCR 1/4-20X1/4 SH	2

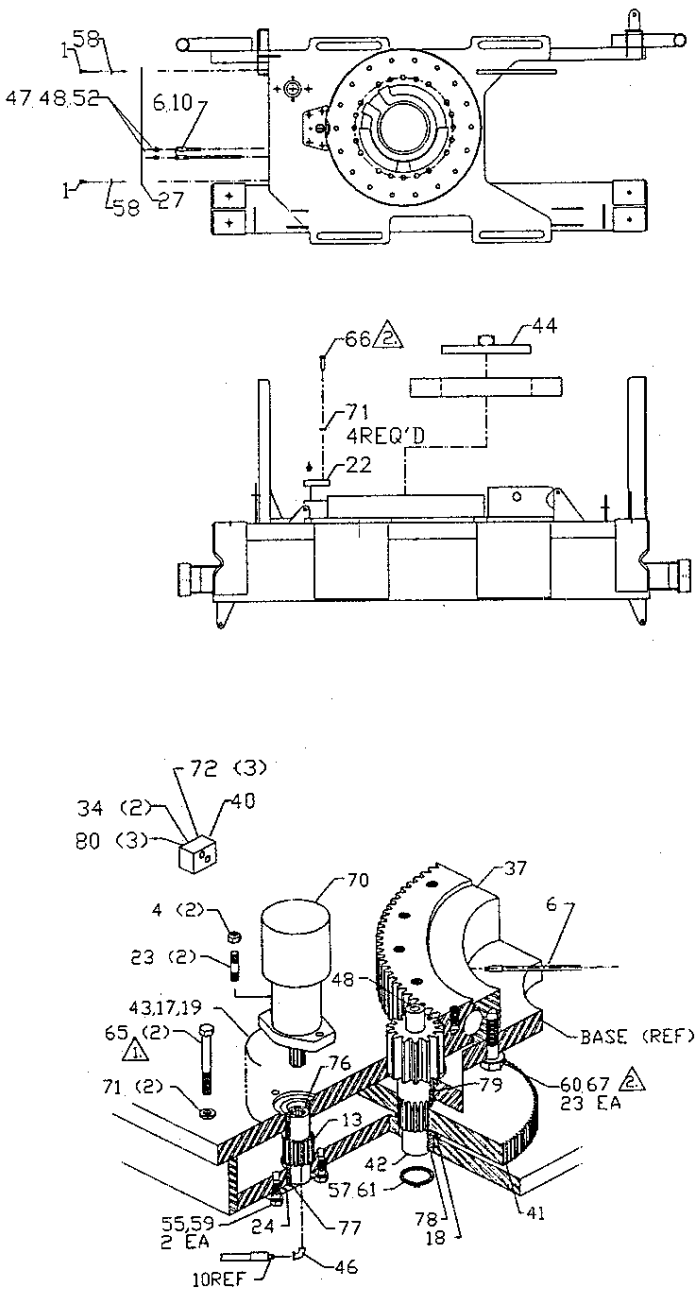
Figure D-4. BASE & 4.88m OUTRIGGER ASSEMBLY (41710040)



NOTES:

1. SHIM AS NEEDED. ITEM 54 WILL NEED TO BE REMOVED TO MAINTAIN THREAD DEPTH.
2. SHIM AS NEEDED.

Figure D-4A. BASE & 4.88m OUTRIGGER ASSEMBLY (41710040)



NOTES:

1. SEE TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE AND TORQUE DATA CHART IN REFERENCE SECTION BEFORE TORQUEING TURNTABLE BOLTS.
2. TORQUE ITEM 65 & 66 TO 18 KG-M
3. INSTALL TURNTABLE GEAR BEARING WITH A MINIMUM GEAR BACKLASH OF 0.006" TO 0.009", MEASURED BETWEEN SWING PINION AND TURNTABLE GEAR BEARING TEETH WITH YELLOW PAINT.

Figure D-4B. BASE & 4.88m OUTRIGGER ASSEMBLY (41710040)

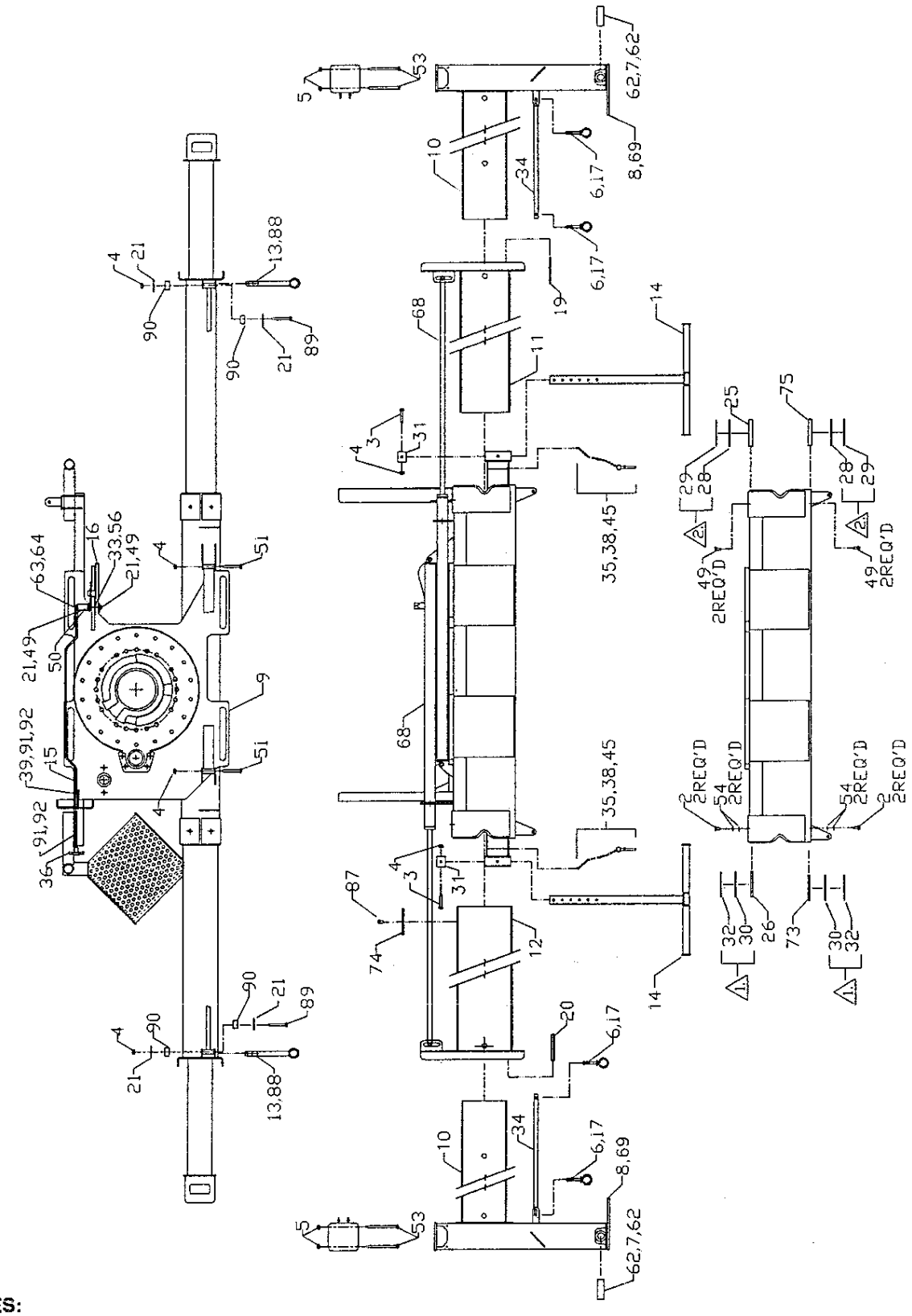
WARNING

ANY TIME THE GEAR-BEARING BOLTS HAVE BEEN REMOVED, THEY MUST BE REPLACED WITH NEW BOLTS OF IDENTICAL GRADE AND SIZE. FAILURE TO REPLACE GEAR-BEARING BOLTS MAY RESULT IN BOLT FAILURE DUE TO METAL FATIGUE CAUSING SERIOUS INJURY OR DEATH

SEE FOLLOWING PAGES FOR DRAWING

ITEM	PART NO.	DESCRIPTION	QTY
1	72060004	CAP SCR 1/4-20X1 HH GR5	2
2	72060091	CAP SCR 1/2-13X1 HH GR5	4
3	72060986	CAP SCR 1/2-13X2-3/4 HH GR5	2
4	72062080	NUT 1/2-13 LOCK	8
5	72062179	NUT 3/8-16 CTR LOCK	4
6	72066141	HAIR PIN 1/16	4
7	60104977	PIN	2
8	52709190	OUTRIGGER LEG	2
9	52709776	BASE (INCL:76-79 & 84)	1
10	52709779	OUTRIGGER LEG - MNL OUT	2
11	52709782	OUTRIGGER ARM - RH PO	1
12	52709783	OUTRIGGER ARM - LH PO	1
13	52709786	PIN	2
14	52709922	PLATFORM	2
15	52710165	LATCH ROD	1
16	52710166	LATCH HOOK	1
17	52710218	PIN	4
18	60020123	THRUST WASHER	1
19	60030204	WEAR PAD	1
20	60030205	WEAR PAD	1
21	60105874	PIN RETAINER PLATE 2"	6
22	60105964	PINION SUPPORT PLATE	1
23	60106032	STUD 1/2-13X2	2
24	60010844	GREASE PLATE	1
25	60114014	SPACER PLATE	1
26	60114015	SPACER PLATE	1
27	60114037	COVER	1
28	60114041	WEAR PAD SHIM 1/4	2
29	60114042	WEAR PAD SHIM 7GA	2
30	60114043	WEAR PAD SHIM 10GA	2
31	60114257	SLEEVE	2
32	60114417	WEAR PAD SHIM 16GA	2
33	60114811	SLEEVE	1
34	60114923	LINK TUBE	2
35	60114940	CHAIN 1/8X9	2
36	70029549	T-HANDLE	1
37	70055167	BEARING	1
38	70141075	HOOK	2
39	70142838	SPRING	1
40	70731795	VALVEPAC (INCL:80 & 81)	1
41	71056072	INTERMEDIATE GEAR	1
42	71056073	PINION GEAR	1
43	71056374	HYD BRAKE (INCL:85 & 86)	1
44	71143520	SLIDE 450°	1
45	71732054	QUICK RELEASE PIN	2
46	72053281	STREET ELBOW 1/8NPT 90°	1
47	72053301	COUPLING 1/8NPT	2
48	72053508	ZERK 1/8NPT	3
49	72060092	CAP SCR 1/2-13X1-1/4 HH GR5	6
50	60115062	LIFT BRACKET	1
51	72060099	CAP SCR 1/2-13X4 HH GR5	2
52	72063004	WASHER 7/16 WRT	2
53	72060926	CAP SCR 3/8-16X7 HH GR5	4
54	72063132	WASHER 1/2 FLAT	8
55	72060093	CAP SCR 1/2-13X1-1/2 HH GR5	2
56	72063014	WASHER 1-1/2 WRT	1
57	72063039	MACH BUSHING 2X10GA	1
58	72063049	WASHER 1/4 LOCK	2
59	72063053	WASHER 1/2 LOCK	2
60	72063115	WASHER 7/8 FLAT HARD	23
61	72066095	RETAINING RING 2" EXT STD	1
62	72066132	RETAINING RING 1-1/2 HD	4
63	72066168	COTTER PIN .09X3/4	1
64	72066338	CLEVIS PIN 5/16X1	1
65	72601037	CAP SCR 9/16-12X4-1/2 HH GR8	2
66	72601144	CAP SCR 9/16-12X2 HH GR8	4
67	72601609	CAP SCR 7/8-9X4-1/4 HH GR8	23
68	3B055920	POWER OUT CYLINDER	2
69	3B070920	POWER DOWN CYLINDER	2
70	73051478	HYDRAULIC MOTOR	1
71	72063117	WASHER 9/16 FLAT HARD GR8	6
72	72060757	CAP SCR 3/8-16X2-1/2 SH	3
73	60030229	WEAR PAD	1
74	60030230	WEAR PAD	1
75	60030231	WEAR PAD	1
76	60020120	BUSHING (PART OF 9)	1REF
77	60020121	BUSHING (PART OF 9)	1REF
78	60020122	BUSHING (PART OF 9)	1REF
79	60020124	BUSHING (PART OF 9)	1REF
80	7Q072017	O-RING (PART OF 40)	3REF
81	73054538	VALVE (PART OF 40)	2REF
82	53000704	GREASE EXTENSION 34"	1
83	53000701	GREASE EXTENSION 14"	1
84	71056074	DRIVE GEAR (PART OF 9)	1REF
85	76391497	GASKET (PART OF 43)	1REF
86	76391498	GASKET (PART OF 43)	1REF
87	72601026	SCREW 3/8-16X1/2 FH SOC	2
88	72066145	HAIR PIN .19	2
89	72060102	CAP SCR 1/2-13X5-1/2 HH GR5	2
90	60106742	SPACER	4
91	60116660	SLEEVE	2
92	72060556	SET SCR 1/4-20X1/4 SH	2

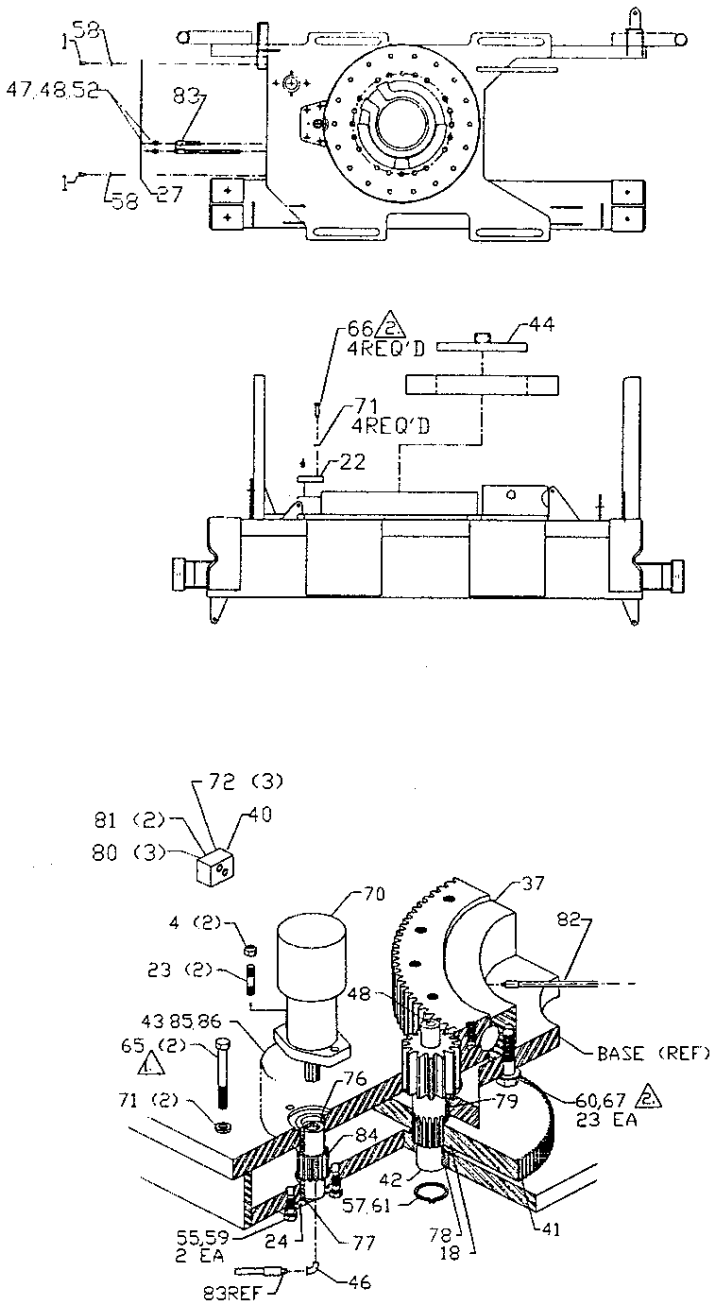
Figure D-5. BASE & 6.4m OUTRIGGER ASSEMBLY (41709801)



NOTES:

1. SHIM AS NEEDED. ITEM 54 WILL NEED TO BE REMOVED TO MAINTAIN THREAD DEPTH.
2. SHIM AS NEEDED.

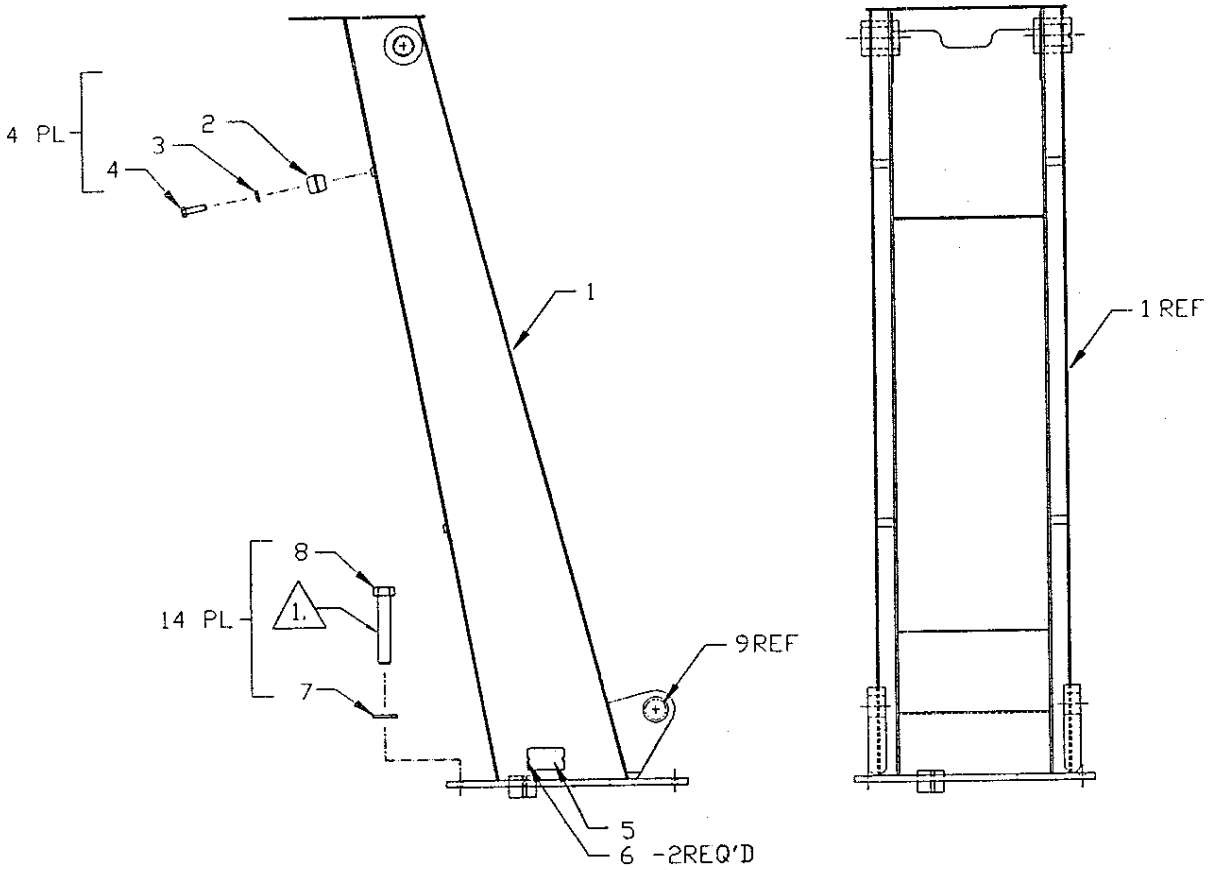
Figure D-5A. BASE & 6.4m OUTRIGGER ASSEMBLY (41709801)



NOTES:

1. SEE TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE AND TORQUE DATA CHART IN REFERENCE SECTION BEFORE TORQUEING TURNTABLE BOLTS
2. TORQUE ITEM 65 & 66 TO 18 KG-M.
3. INSTALL TURNTABLE GEAR BEARING WITH A MINIMUM GEAR BACKLASH OF .1524 TO .2286mm, MEASURED BETWEEN SWING PINION AND TURNTABLE GEAR BEARING TEETH WITH YELLOW PAINT.

Figure D-5B. BASE & 6.4m OUTRIGGER ASSEMBLY (41709801)



WARNING

ANY TIME THE GEAR-BEARING BOLTS HAVE BEEN REMOVED, THEY MUST BE REPLACED WITH NEW BOLTS OF IDENTICAL GRADE AND SIZE. FAILURE TO REPLACE GEAR-BEARING BOLTS MAY RESULT IN BOLT FAILURE DUE TO METAL FATIGUE CAUSING SERIOUS INJURY OR DEATH

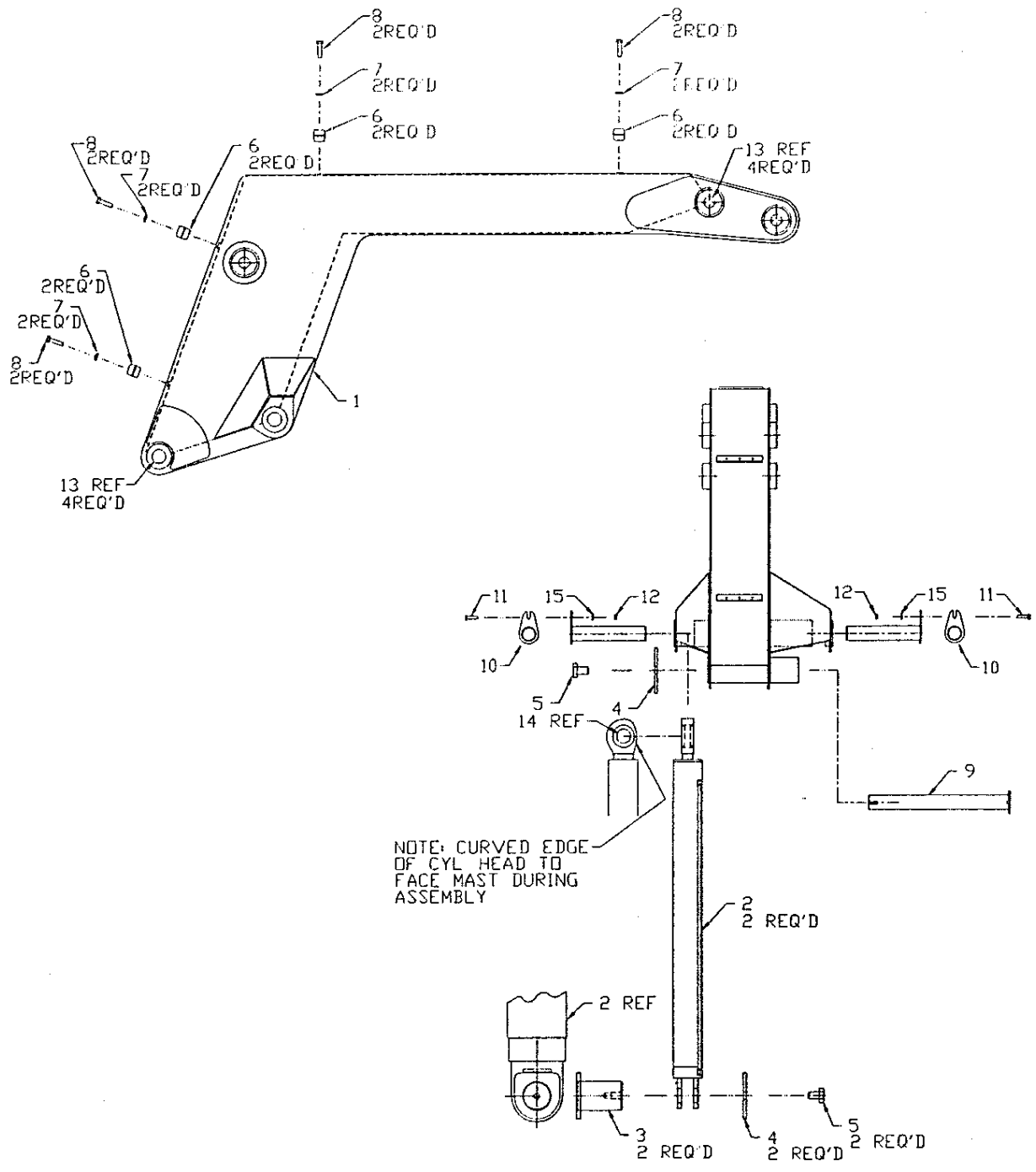
ITEM	PART NO.	DESCRIPTION	QTY
1	52709871	MAST (INCL: 9)	1
2.	70034402	TWIN CLAMP	4
3.	70143829	COVER PLATE	4
4.	72060733	CAP SCR 5/16-18X1-1/4 SH	4
5.	70029119	SERIAL NUMBER PLACARD	1
6.	72661216	GRIPNAIL 1/8	2
7.	72063116	WASHER 3/4 FLAT HARD	14
8.	72601629	CAP SCR 3/4-10X4 HH GR8	14
9.	70034283	BEARING (PART OF 1)	2REF

NOTES:

1. SEE TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE AND TORQUE DATA CHART IN REFERENCE SECTION BEFORE TORQUEING TURNTABLE BOLTS.

2 MOUNT MAST ON TURNTABLE BEARING SO THAT HARDNESS GAP "G" IS POSITIONED AT THE SIDE OF THE MAST.

Figure D-6. MAST ASSEMBLY (41709874)

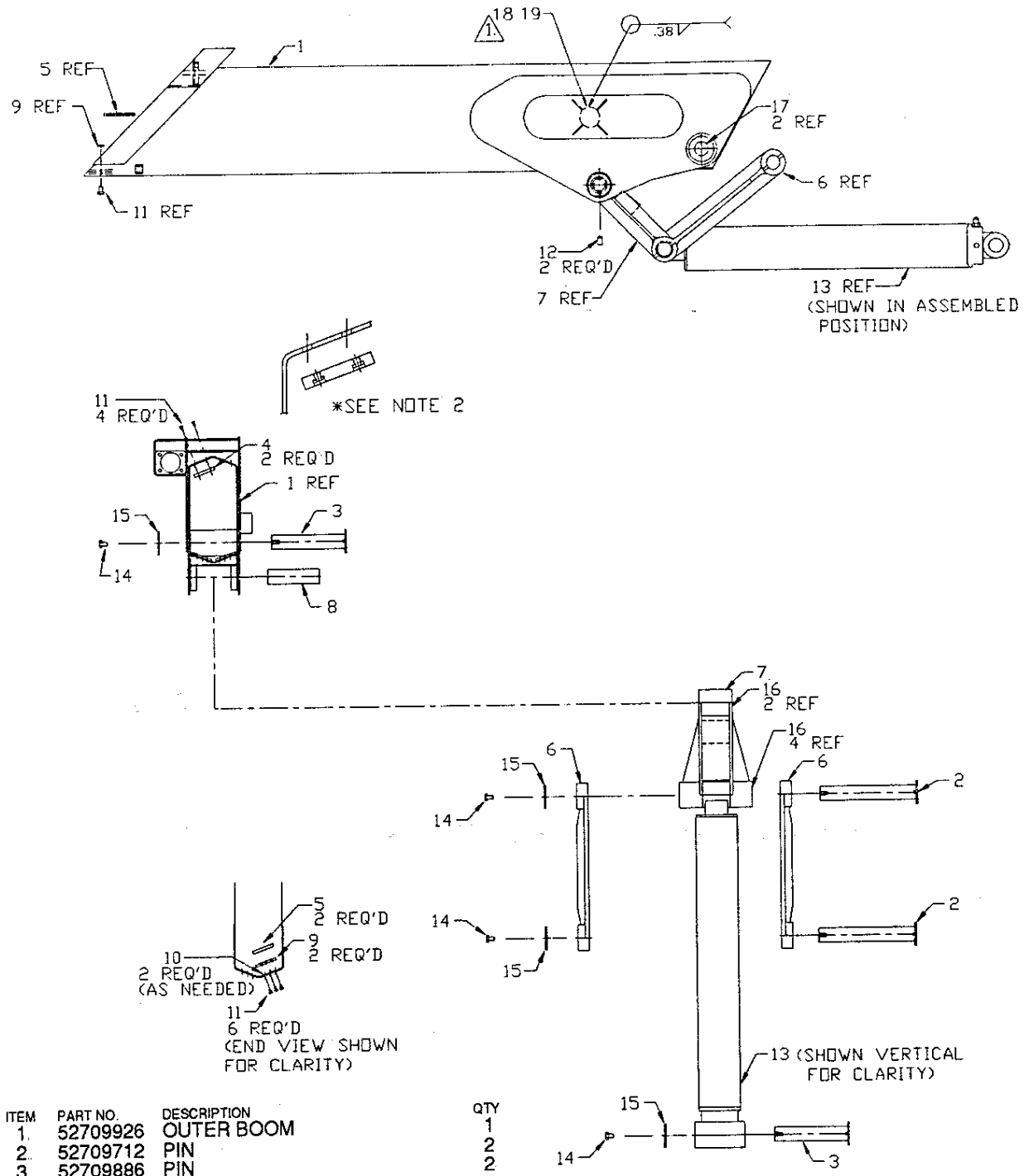


ITEM	PART NO.	DESCRIPTION	QTY
1.	52709872	INNER BOOM (INCL: 13)	1
2.	3C112920	INNER CYLINDER (INCL:14)	2
3.	52709885	PIN	2
4.	60106332	PIN RETAINER PLATE 4"	3
5	72060147	CAP SCR 5/8-11X1 HH GR5	3
6	70034402	TWIN CLAMP	8
7.	70143829	COVER PLATE	8
8	72060733	CAP SCR 5/16-18X1-1/4 SH	8
9	52709887	PIN	1
10	52710613	PIN	2
11.	72060092	CAP SCR 1/2-13X1-1/4 HH GR5	2
12.	72062080	NUT 1/2-13 LOCK	2
13	70034284	BEARING (PART OF 1)	8REF
14.	70143838	SPHERICAL BUSHING (PART OF 2)	2REF
15.	60112063	SPACER	2

NOTE

ANY TIME THE PIN RETAINER PLATE BOLTS HAVE BEEN REMOVED, APPLY LOCTITE 262 TO THE THREADS BEFORE RE-ASSEMBLY.

Figure D-7. INNER BOOM ASSEMBLY (41709875)



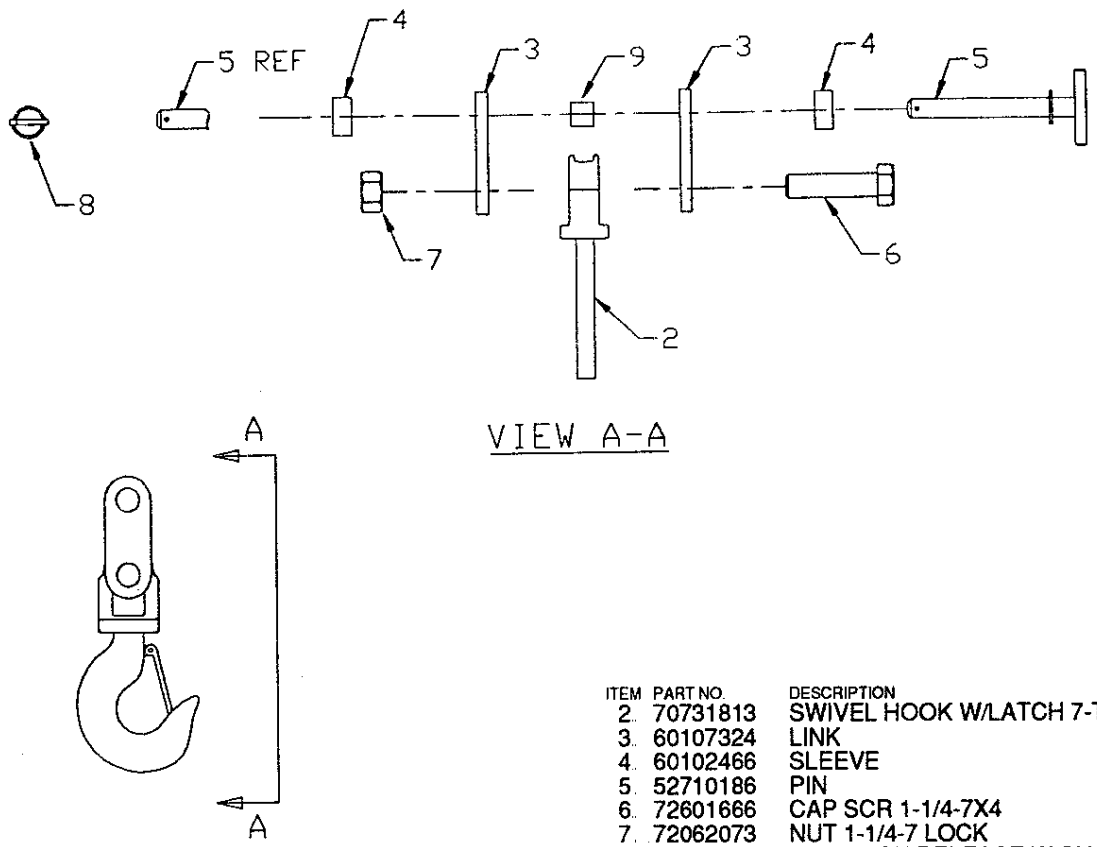
ITEM	PART NO.	DESCRIPTION	QTY
1.	52709926	OUTER BOOM	1
2.	52709712	PIN	2
3.	52709886	PIN	2
4.	60030208	WEAR PAD - FRONT/TOP	2
5.	60030212	WEAR PAD - 1ST EXT REAR	2
6.	60114186	OUTER LINK	2
7	60114187	INNER LINK	1
8	60114251	PIN	1
9	60114317	WEAR PAD RETAINER	2
10	60114330	SHIM	2
11	72060289	CAP SCR 5/16-24X1/2 HH GR5	10
12	72060581	SET SCR 3/8-16X3/4 SH	2
13.	3C124920	OUTER CYLINDER	1
14.	72060147	CAP SCR 5/8-11X1 HH GR5	4
15.	60106332	PIN RETAINER PLATE 4"	4
16.	70034283	BEARING	6REF
17	70034284	BEARING	2REF
18.	60114827	ROD-OUTER STOW LATCH	1
19.	60109626	GUSSET	4

NOTE

ANY TIME THE PIN RETAINER PLATE BOLTS HAVE BEEN REMOVED, APPLY LOCTITE 262 TO THE THREADS BEFORE RE-ASSEMBLY

ITEM 18 TO BE POSITIONED IN STOWED POSITION WITH REFERENCE TO STOW LATCH ON BASE.

Figure D-8. OUTER BOOM ASSEMBLY (41710030)



ITEM	PART NO	DESCRIPTION	QTY
2.	70731813	SWIVEL HOOK W/LATCH 7-TON	1
3.	60107324	LINK	2
4.	60102466	SLEEVE	2
5.	52710186	PIN	1
6.	72601666	CAP SCR 1-1/4-7X4	1
7.	72062073	NUT 1-1/4-7 LOCK	1
8.	72661367	PIN-QUICK RELEASE W/CHAIN	1
9.	60108857	PIPE	1

Figure 9. SWIVEL HOOK ASSEMBLY 7-TON (51710187)

NOTE

ANY TIME THE PIN RETAINER PLATE BOLTS HAVE BEEN REMOVED, APPLY LOCTITE 262 TO THE THREADS BEFORE RE-ASSEMBLY

TORQUE ITEM #12 TO 90 FT-LBS (12.45 kg-m).

ITEM	PART NO	DESCRIPTION	QTY
1.	52709925	1ST STG EXT BOOM	1
2.	73050142	1ST STG EXT CYL 80"	1
3.	60030211	WEAR PAD	2
5	60114318	WEAR PAD RETAINER	2
6.	72060289	CAP SCR 5/16-24X1/2 HH GR5	18
7.	60030212	WEAR PAD	2
8.	72060047	CAP SCR 3/8-16X1-1/4 HH GR5	3
9.	60114410	PIN RETAINER PLATE	3
10	60114314	PIN	3
11	72060581	SET SCR 3/8-16X3/4 SH	3
12.	72060796	CAP SCR 1/2-13X2 HH GR8	12
13.	73050143	2ND STG EXT CYL 80"	1
14.	60030215	WEAR PAD	4
15.	60030214	WEAR PAD	2
17.	60114320	WEAR PAD RETAINER	2
18.	72063110	WASHER 1/2 LOCK HARD	12
19.	52709924	2ND STG EXT BOOM	1
20.	60114331	SHIM 3"	2
21.	60114332	SHIM 2-1/2"	2
22.	52709931	3RD STG EXT BOOM	1
23.	73050145	4TH STG EXT CYL 80"	1
24.	60030218	WEAR PAD	4
25.	51710187	HOOK ASM 5-TON (INCL:26-33)	1
34	60030234	WEAR PAD	2
35	60030235	WEAR PAD	2
36.	60030236	WEAR PAD	2

Figure D-10. EXTENSION BOOM ASSEMBLY - 3H (41710036)

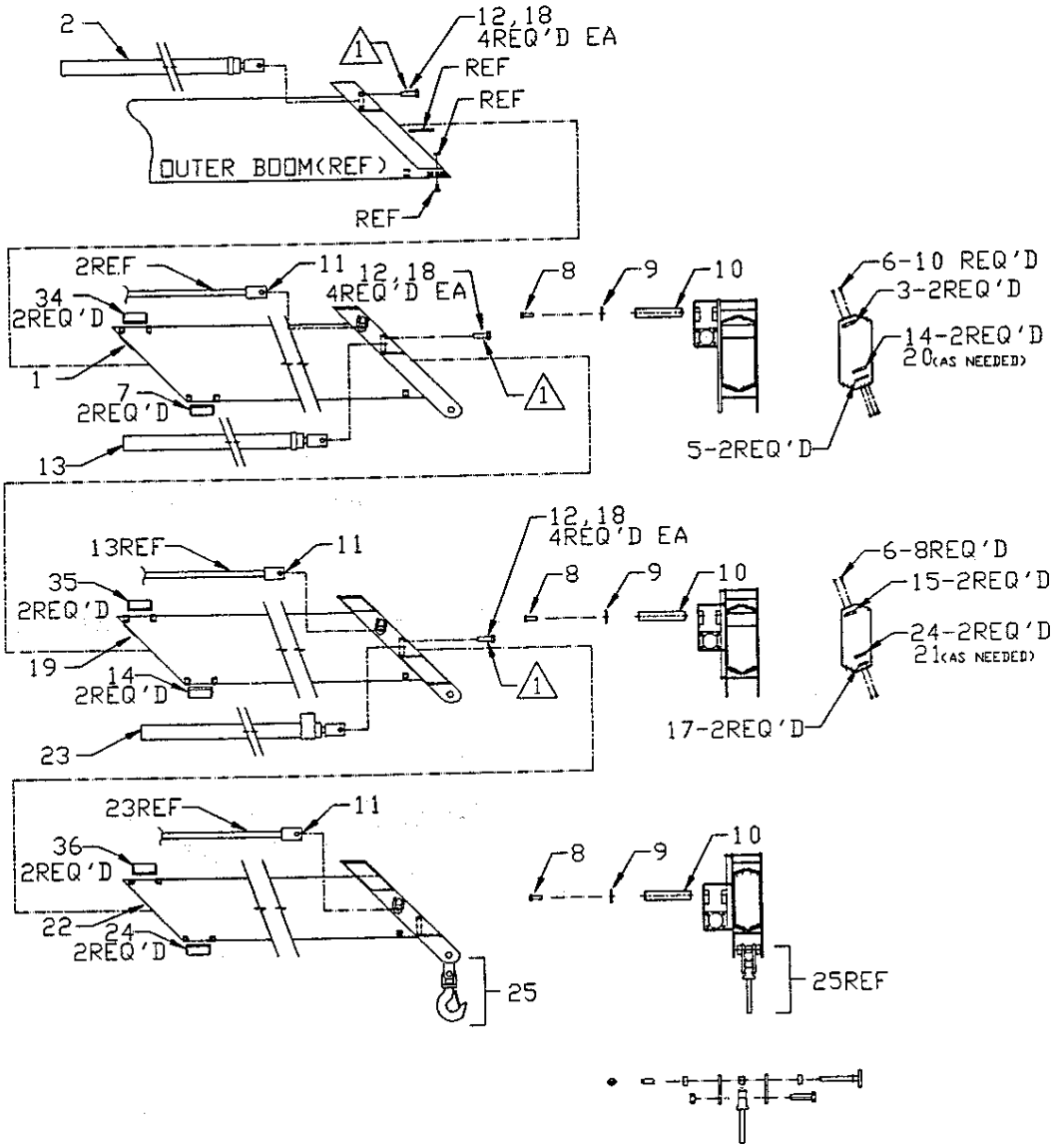


Figure D-10A. EXTENSION BOOM ASSEMBLY - 3H (41710036)

NOTE

ANY TIME THE PIN RETAINER PLATE BOLTS HAVE BEEN REMOVED, APPLY LOCTITE 262 TO THE THREADS BEFORE RE-ASSEMBLY

TORQUE ITEM #12 TO 90 FT-LBS (12.45 kg-m).

ITEM	PART NO	DESCRIPTION	QTY
1.	52709925	1ST STG EXT BOOM	1
2.	73050142	1ST STG EXT CYL 80"	1
3	60030211	WEAR PAD	2
5	60114318	WEAR PAD RETAINER	2
6	72060289	CAP SCR 5/16-24X1/2 HH GR5	26
7.	60030212	WEAR PAD	2
8.	72060047	CAP SCR 3/8-16X1-1/4 HH GR5	4
9.	60114410	PIN RETAINER PLATE	4
10.	60114314	PIN	4
11.	72060581	SET SCR 3/8-16X3/4 SH	4
12.	72060796	CAP SCR 1/2-13X2 HH GR8 SH	16
13.	73050143	2ND STG EXT CYL 80"	2
14.	60030215	WEAR PAD	4
15.	60030214	WEAR PAD	2
17.	60114320	WEAR PAD RETAINER	2
18	72063110	WASHER 1/2 LOCK HARD	16
19.	52709924	2ND STG EXT BOOM	1
20.	60114331	SHIM 3"	2
21	60114332	SHIM 2-1/2"	2
22	52709931	3RD STG EXT BOOM	1
23	73050145	EXT CYL 80" 4TH STG	1
25.	60030217	WEAR PAD	2
26.	60030216	WEAR PAD	2
27.	60114322	WEAR PAD RETAINER	2
28.	60114333	SHIM 16GA X 2-1/8"	2
29.	60030224	WEAR PAD	4
30.	52709932	4TH STG EXT BOOM	1
31.	51710187	HOOK ASM 5-TON (INCL:32-39)	1
41.	60030234	WEAR PAD	2
42.	60030235	WEAR PAD	2
43.	60030236	WEAR PAD	2
44.	60030237	WEAR PAD	2

Figure D-11. EXTENSION BOOM ASSEMBLY - 4H (41710183)

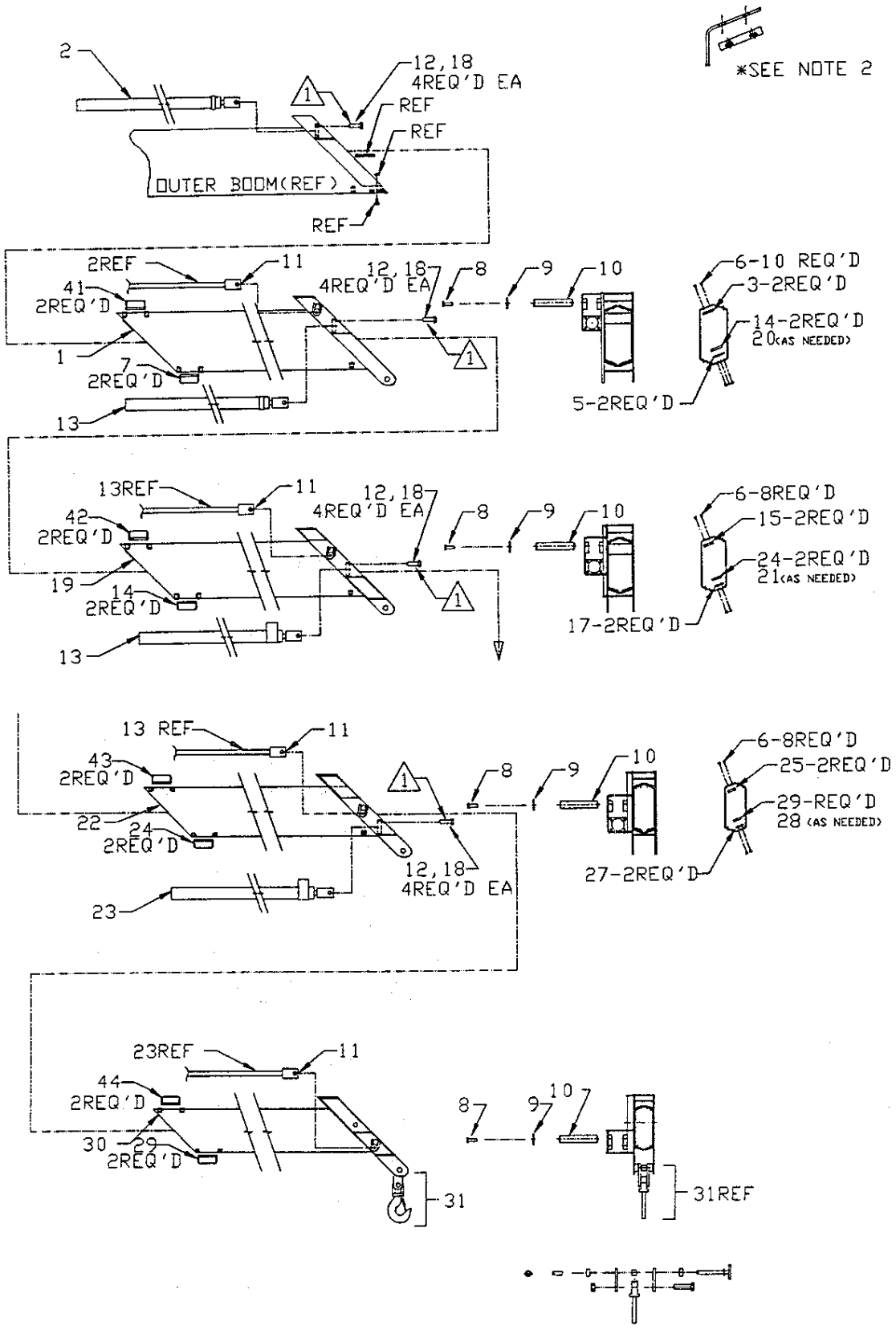


Figure D-11A. EXTENSION BOOM ASSEMBLY - 4H (41710183)

NOTE

ANY TIME THE PIN RETAINER PLATE BOLTS HAVE BEEN REMOVED, APPLY LOCTITE 262 TO THE THREADS BEFORE RE-ASSEMBLY

TORQUE ITEM #12 TO 90 FT-LBS (12.45 kg-m).

ITEM	PART NO	DESCRIPTION	QTY
1	52709925	1ST STG EXT BOOM	1
2	73050142	1ST STG EXT CYL 80"	1
3	60030211	WEAR PAD	2
5	60114318	WEAR PAD RETAINER	2
6	72060289	CAP SCR 5/16-24X1/2 HH GR5	26
7	60030212	WEAR PAD	2
8	72060047	CAP SCR 3/8-16X1-1/4 HH GR5	4
9	60114410	PIN RETAINER PLATE	4
10	60114314	PIN	4
11	72060581	SET SCR 3/8-16X3/4 SH	4
12	72060796	CAP SCR 1/2-13X2 HH GR8 SH	16
13	73050143	2ND STG EXT CYL 80"	2
14	60030215	WEAR PAD	4
15	60030214	WEAR PAD	2
17	60114320	WEAR PAD RETAINER	2
18	72063110	WASHER 1/2 LOCK HARD	16
19	52709924	2ND STG EXT BOOM	1
20	60114331	SHIM 3"	2
21	60114332	SHIM 2-1/2"	2
22	52709931	3RD STG EXT BOOM	1
23	73050145	4TH STG EXT CYL 80"	1
24	60030218	WEAR PAD	4
25	60030217	WEAR PAD	2
27	60114322	WEAR PAD RETAINER	2
28	60114333	SHIM 16GA X 2-1/8"	2
29	60114364	STOP BLOCK	2
30	60114363	STOP BLOCK	2
31	60030224	WEAR PAD	4
32	52709932	4TH STG EXT BOOM	1
33	52709921	5TH STG EXT BOOM - M	1
34	52710039	PIN	1
35	72661367	QUICK RELEASE PIN	1
36	51710187	HOOK ASM 5-TON (INCL:37-43)	1
44	72060042	CAP SCR 3/8-16X1/2 HH GR5	10
46	60030234	WEAR PAD	2
47	60030235	WEAR PAD	2
48	60030236	WEAR PAD	2
49	60030237	WEAR PAD	2

Figure D-12. EXTENSION BOOM ASSEMBLY - 4H/1M (41710184)

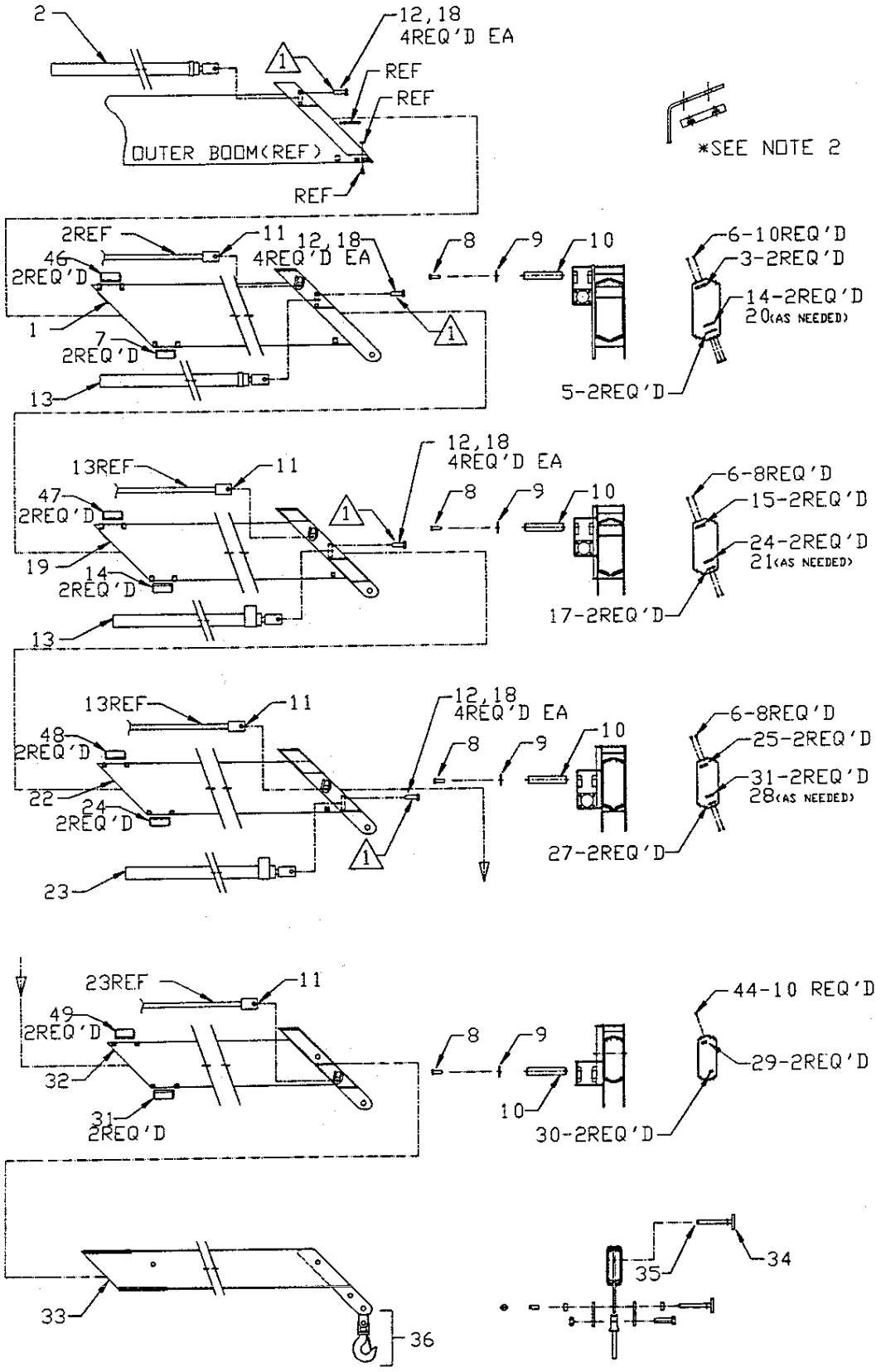


Figure D-12A. EXTENSION BOOM ASSEMBLY - 4H/1M (41710184)

NOTE

ANY TIME THE PIN RETAINER PLATE BOLTS HAVE BEEN REMOVED, APPLY LOCTITE 262 TO THE THREADS BEFORE RE-ASSEMBLY.

TORQUE ITEM #12 TO 90 FT-LBS (12.45 kg-m).

ITEM	PART NO	DESCRIPTION	QTY
1.	52709925	1ST STG EXT BOOM	1
2.	73050142	1ST STG EXT CYL 80"	1
3.	60030211	WEAR PAD	2
5	60114318	WEAR PAD RETAINER	2
6.	72060289	CAP SCR 5/16-24X1/2 HH GR5	26
7.	60030212	WEAR PAD	2
8.	72060047	CAP SCR 3/8-16X1-1/4 HH GR5	4
9.	60114410	PIN RETAINER PLATE	4
10.	60114314	PIN	4
11.	72060581	SET SCR 3/8-16X3/4 SH	4
12.	72060796	CAP SCR 1/2-13X2 HH GR8	16
13	73050143	2ND STG EXT CYL 80"	2
14.	60030215	WEAR PAD	4
15.	60030214	WEAR PAD	2
17.	60114320	WEAR PAD RETAINER	2
18.	72063110	WASHER 1/2 LOCK HARD	16
19.	52709924	2ND STG EXT BOOM	1
20.	60114331	SHIM 3"	2
21.	60114332	SHIM 2-1/2"	2
22.	52709931	3RD STG EXT BOOM	1
23.	73050145	4TH STG EXT CYL 80"	1
24.	60030218	WEAR PAD	4
25.	60030217	WEAR PAD	2
27.	60114322	WEAR PAD RETAINER	2
28.	60114333	SHIM 16GA X 2-1/8"	2
29.	60114364	STOP BLOCK	2
30.	60114363	STOP BLOCK	2
31.	60030224	WEAR PAD	4
32.	60114366	STOP BLOCK	2
33.	60114365	STOP BLOCK	2
34	72601610	SCREW 1/4-28x1/2 FLHD SLOT	12
35.	52709932	4TH STG EXT BOOM	1
36.	52709993	5TH STG EXT BOOM - M	1
37.	52709994	6TH STG EXT BOOM - M	1
38.	52710038	PIN	1
39.	52710039	PIN	2
40.	72661367	QUICK RELEASE PIN	3
41.	51710187	HOOK ASM 5-TON (INCL:42-48)	1
49.	72060042	CAP SCR 3/8-16X1/2 HH GR5	10
51.	60030234	WEAR PAD	1
52.	60030235	WEAR PAD	1
53	60030236	WEAR PAD	1
54.	60030237	WEAR PAD	1

Figure D-13. EXTENSION BOOM ASSEMBLY - 4H/2M (41710031)

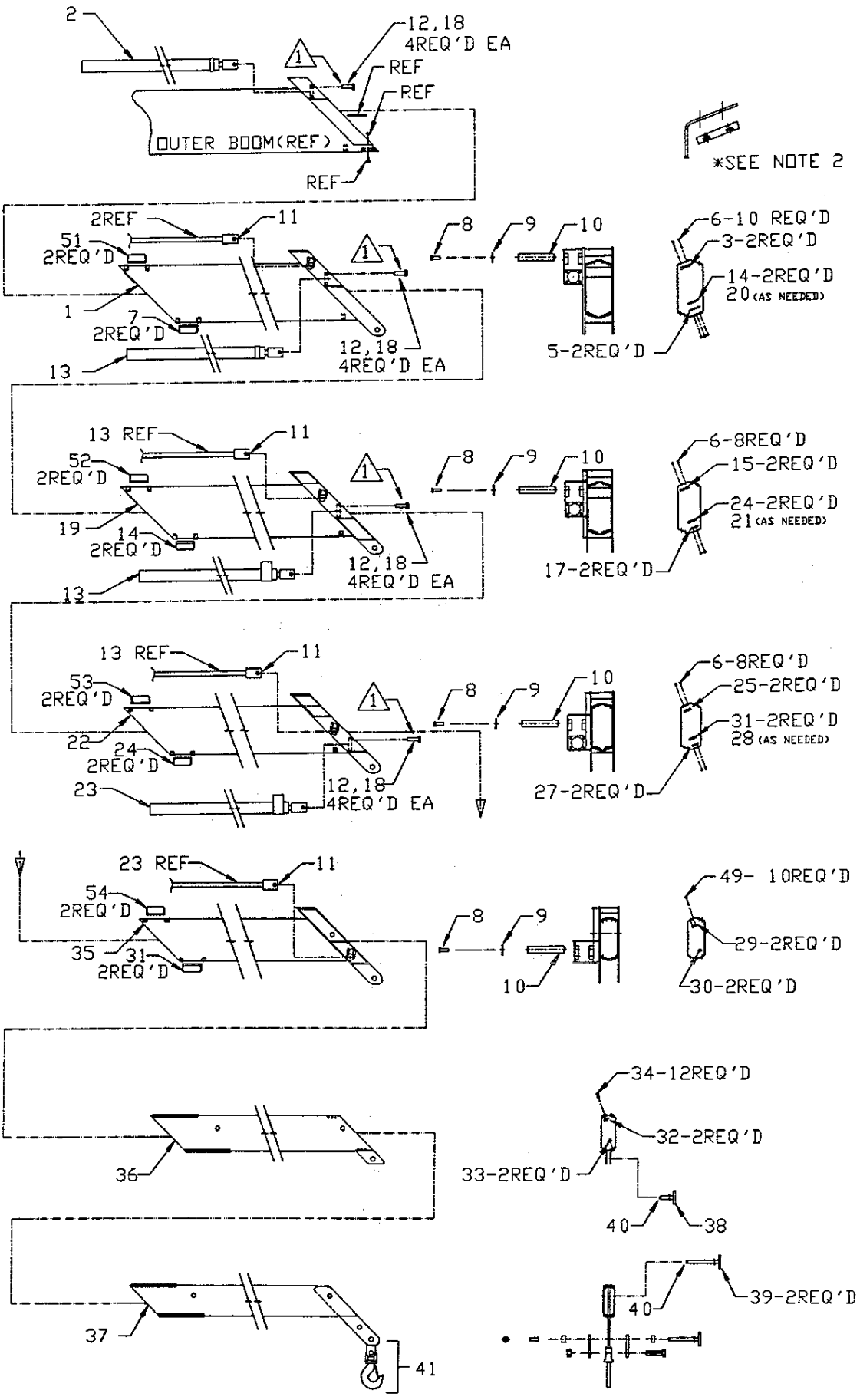


Figure D-13A. EXTENSION BOOM ASSEMBLY - 4H/2M (41710031)

ITEM	PART NO	DESCRIPTION	QTY
1.	51710337	HOSE ASM 1/2X22	2
2.	51710336	HOSE ASM 1/2X26	2
3.	72533162	ELBOW #8MFACE #8MSTR 90°	6
4.	72533166	ADAPTER #8MFACE #8MSTR	2
5.	51710335	HOSE ASM 1/2X36	1
6.	51710340	HOSE ASM 1/2X78	2
7.	51710751	HOSE ASM 1/2X50	4
8.	51710334	HOSE ASM 1/2X114	2
9.	51710347	HOSE ASM 1/4X10	1
10.	51710333	HOSE ASM 1/2X88	1
11.	51710331	HOSE ASM 1/4X39	1
12.	51710329	HOSE ASM 3/8X183	1
13.	51710332	HOSE ASM 1/4X103	1
14.	51710330	HOSE ASM 3/8X132	1
15	72533176	CAP #8FACE	2
16	72533158	ELBOW #4MSTR #4MFACE 90°	6
17.	72533186	ADAPTER #6MFACE #6MSTR	7
18.	72533160	TEE #8FACE UNION	2
19.	51710348	HOSE ASM 3/8X18	7
20.	51710339	HOSE ASM 1/2X43	2
21.	51710750	HOSE ASM 1/2X110	2
22.	51710338	HOSE ASM 1/2X139	2
23.	72533257	ELBOW #6MFACE #6MSTR 45°	11
24.	7253338	ELBOW #4MSTR #4FSTR 90°	1
25.	72533163	ELBOW #6MFACE #6MSTR 90°	2
26.	72533173	PLUG #6FACE	1
27.	51710796	HOSE ASM 1/4X84	1
28.	73054792	VELOCITY FUSE #6MSTR #6MJIC	2
29.	51710903	HOSE ASM 1/2X39	1
30.	51710904	HOSE ASM 1/2X88	1
31.	51710907	HOSE ASM 1/2X114	2
32.	51710905	HOSE ASM 3/8X132	1
33	51710906	HOSE ASM 3/8X183	1
34.	72533294	ELBOW #6MSTR #6FSTR 90° SWVL	4
35.	72533297	REDUCER-TUBE END #8 #4	4
36.	51710912	HOSE ASM 1/4X103	1
37	51710913	HOSE ASM 1/4X39	1
38	72533170	NUT-FACESEAL/STEEL TUBE	4
39.	72533181	UNION #8FACESEAL	12
40.	72533318	REDUCER TUBE END #8 #6	4
41.	72533336	TEE #4FACE UNION	1
42.	51711424	HOSE ASM 1/4X24	2
43.	72533337	ADAPTER #4MFACE #6MSTR	1

NOTE:
ITEM 28 TO BE INSTALLED INTO INNER CYLINDER EXTEND TEST PORT.

Figure D-14. HYDRAULIC KIT - 3 HYDRAULIC EXTENSIONS (91710352)

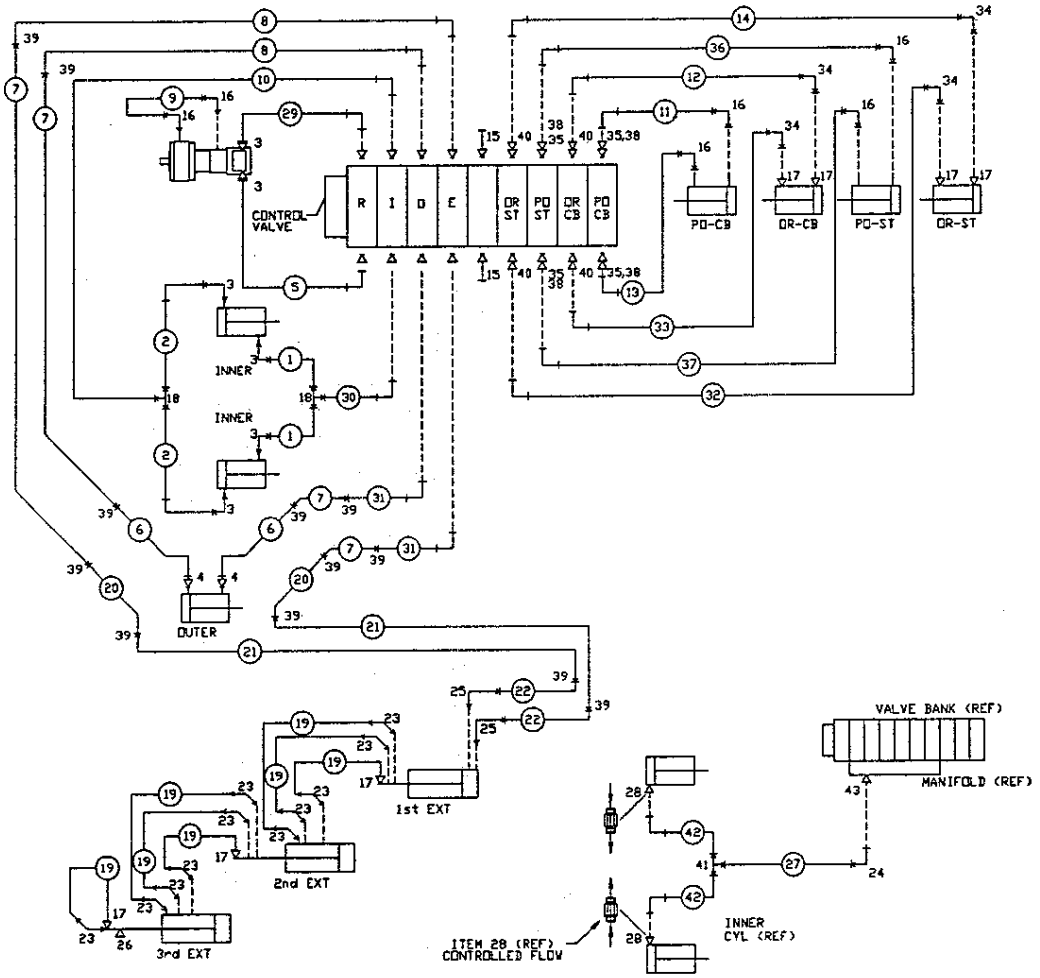


Figure D-14A. HYDRAULIC KIT - 3 HYDRAULIC EXTENSIONS (91710352)

ITEM	PART NO	DESCRIPTION	QTY
1	51710337	HOSE ASM 1/2X22	2
2	51710336	HOSE ASM 1/2X26	2
3	72533162	ELBOW #8MFACE #8MSTR 90°	6
4	72533166	ADAPTER #8MFACE #8MSTR	2
5	51710335	HOSE ASM 1/2X36	1
6	51710340	HOSE ASM 1/2X78	2
7	51710751	HOSE ASM 1/2X50	4
8	51710334	HOSE ASM 1/2X114	2
9	51710347	HOSE ASM 1/4X10	1
10	51710333	HOSE ASM 1/2X88	1
11	51710331	HOSE ASM 1/4X39	1
12	51710329	HOSE ASM 3/8X183	1
13	51710332	HOSE ASM 1/4X103	1
14	51710330	HOSE ASM 3/8X132	1
15	72533176	CAP #8FACE	2
16	72533158	ELBOW #4MSTR #4MFACE 90°	6
17	72533186	ADAPTER #6MFACE #6MSTR	8
18	72533160	TEE #8FACE UNION	2
19	51710348	HOSE ASM 3/8X18	10
20	51710339	HOSE ASM 1/2X43	2
21	51710750	HOSE ASM 1/2X110	2
22	51710338	HOSE ASM 1/2X139	2
23	72533257	ELBOW #6MACE #6MSTR 45°	16
24	72533338	ELBOW #4MSTR #4FSTR 90°	1
25	72533163	ELBOW #6MFACE #6MSTR 90°	2
26	72533173	PLUG #6FACE	1
27	51710796	HOSE ASM 1/4X84	1
28	73054792	VELOCITY FUSE #6MSTR #6MJIC	2
29	51710903	HOSE ASM 1/2X39	1
30	51710904	HOSE ASM 1/2X88	1
31	51710907	HOSE ASM 1/2X114	2
32	51710905	HOSE ASM 3/8X132	1
33	51710906	HOSE ASM 3/8X183	1
34	72533294	ELBOW #6MSTR #6FSTR 90° SWVL	4
35	72533297	REDUCER-TUBE END #8 #4	4
36	51710912	HOSE ASM 1/4X103	1
37	51710913	HOSE ASM 1/4X39	1
38	72533170	NUT-FACESEAL/STEEL TUBE	4
39	72533181	UNION-FACESEAL #8 #8	12
40	72533318	REDUCER-TUBE END #8 #6	4
41	72533336	TEE #4FACE UNION	1
42	51711424	HOSE ASM 1/4X24	2
43	72533337	ADAPTER #4MACE #6MSTR	1

NOTE:
ITEM 28 TO BE INSTALLED INTO INNER CYLINDER EXTEND TEST PORT.

Figure D-15. HYDRAULIC KIT - 4 HYDRAULIC EXTENSIONS (91710341)

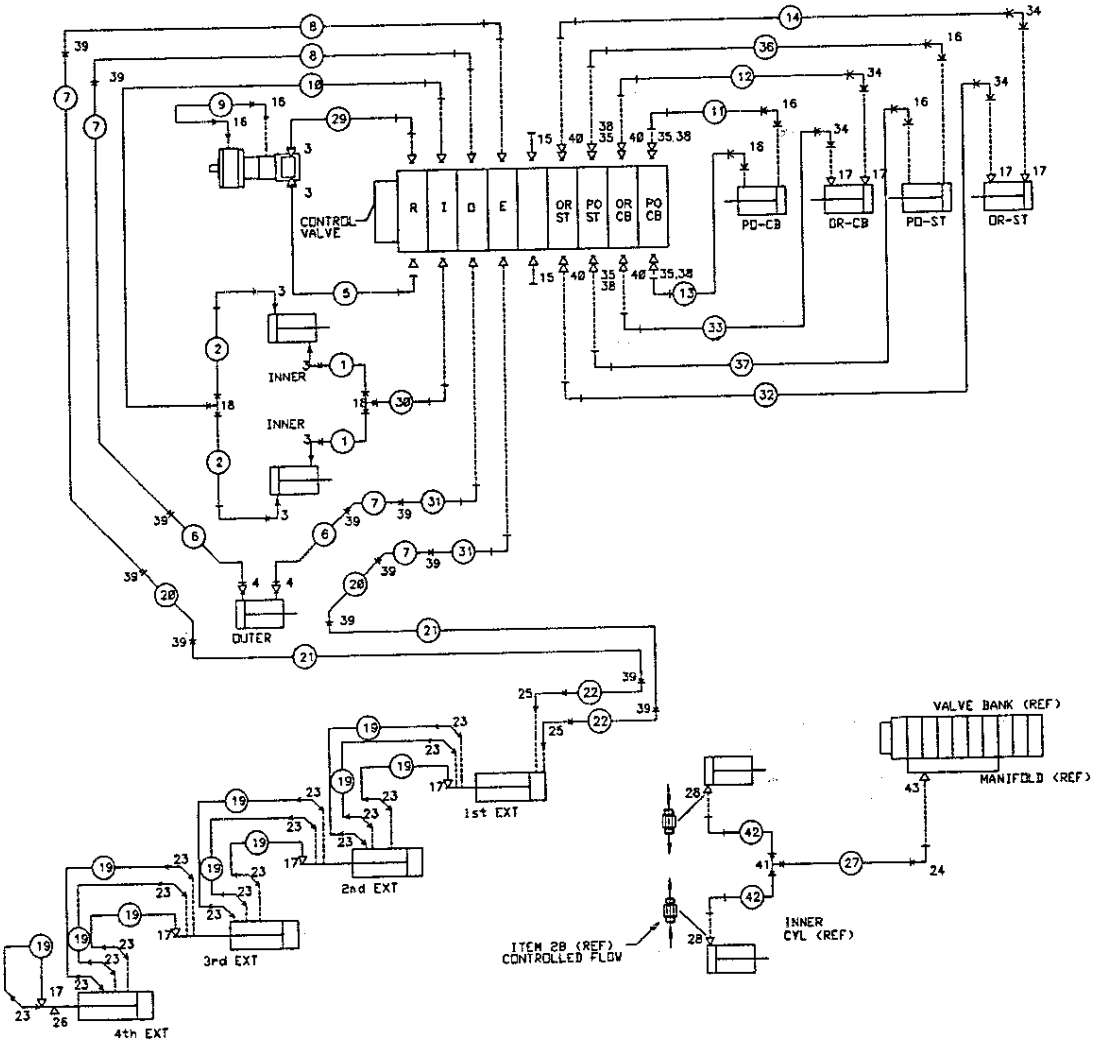
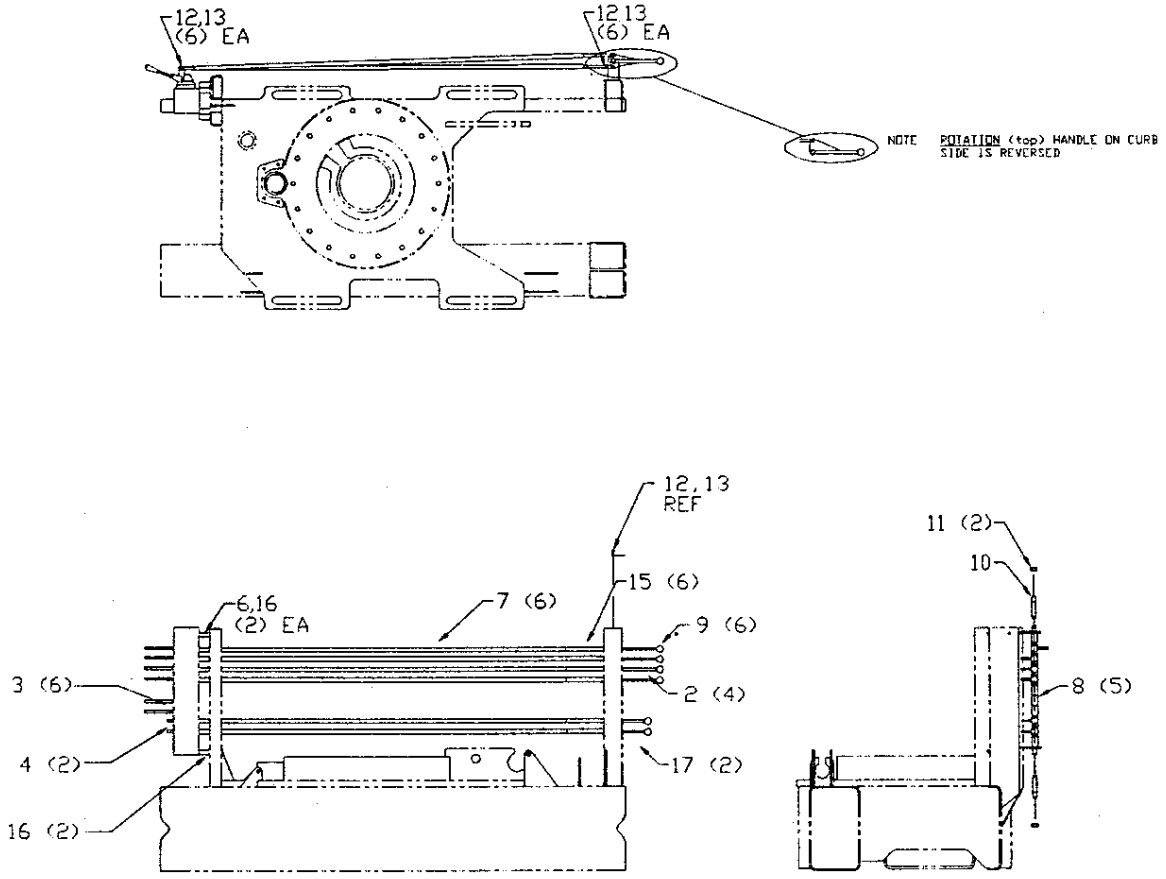


Figure D-15A. HYDRAULIC KIT - 4 HYDRAULIC EXTENSIONS (91710341)



ITEM	PART NO	DESCRIPTION	QTY
2	70029451	CONTROL HANDLE - VB	4
3	51710731	HANDLE ASM - VB	6
4	52710730	HANDLE-VB	2
6	60115960	TUBE	2
7	52710140	CONTROL ROD 68"	6
8	60030069	SPACER 5/8X1X1-3/4	4
9	71039096	CONTRL KNOB 1-1/2 BLK	6
10	60114751	CONTROL ROD	1
11	72062091	NUT 5/8-11 LOCK	2
12	72066168	COTTER PIN .09X.75	12
13	72066338	CLEVIS PIN 5/16X1	6
15	52704745	CONTROL ROD M	6
16	72060033	CAP SCR 5/16-18X3 HH GR5	4
17	60025254	CONTROL HANDLE-SHORT	2

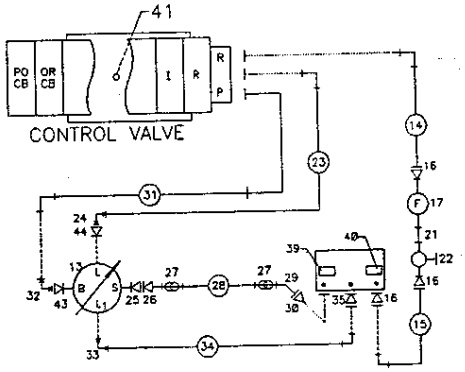
NOTES:

1. **ROTATION HANDLE (TOP ON CURBSIDE) IS REVERSED. OUTRIGGER HANDLES (BOTTOM ON CURBSIDE) ARE REVERSED.**

Figure D-16. CONTROL KIT (90710049)

ITEM	PART NO	DESCRIPTION	QTY
1.	72060102	CAP SCR 1/2-13X5-1/2 HH GR5	4
2.	72062080	NUT 1/2-13 LOCK	4
3	52706660	SUPPORT	4
4.	52711003	RESERVOIR MTG BRACKET LH	1
5.	52711004	RESERVOIR MTG BRACKET RH	1
6.	72063001	WASHER 1/4 WRT	2
7.	60010665	CLAMP PLATE	4
8.	60108621	TIE-DOWN STUD 1 1/4-7X33	8
9.	60112505	BAR	2
10.	70732776	RESERVOIR ASM	1
11.	72062142	NUT 1 1/4-7 LOCK STL INSERT	16
12.	72063067	WASHER 1-1/4 HI STR	16
13.	73051616	PUMP	1
14.	51710458	HOSE ASM 1X48	1
15.	51710459	HOSE ASM 1X205	1
16.	72533231	ADAPTER 3/4MPT #16MFACE	3
17.	73052000	FILTER	1
18.	72060003	CAP SCR 1/4-20X7/8 HH GR5	2
19.	60103870	FILTER MTG BRACKET	1
20.	72060047	CAP SCR 3/8-16X1-1/4 HH GR5	1
21.	72053161	PIPE NIPPLE 3/4 X CLOSE	1
22.	73054129	GATE VALVE	1
23.	51710454	HOSE ASM 1/4X312	1
24.	72533159	ELBOW #6MSTR #4MFACE 90°	1
25.	72532854	ADAPTER #24MSTR 1NPT	1
26.	72532833	BARB NIPPLE 1NPT 1-1/4HOSE	1
27.	72066516	HOSE CLAMP 1-1/4 2-BOLT	2
28.	60035679	HOSE 1-1/4 100R4 X 96	1
29.	72531196	BARB NIPPLE 1-1/4NPT 1-1/4 45°	1
30.	72531838	REDUCER BUSHING 1-1/2 X 1-1/4	1
31.	51710456	HOSE ASM 1/2X312	1
32.	72533162	ELBOW #8MSTR #8MFACE 90°	1
33.	72533230	ELBOW #8MSTR #10MFACE 90°	1
34.	51710455	HOSE ASM 1/2X115	1
35.	72533233	ADAPTER 3/8MPT #8MFACE	1
36.	M60113334	SPACER	8
37.	72063003	WASHER 3/8 WRT	3
38.	72062103	NUT 3/8-16 LOCK	3
39.	70392108	DECAL-SUCTION LINE	1
40.	70392109	DECAL-RETURN LINE	1
41.	77041458	PRESSURE SWITCH	1
42.	77041457	ELECTRICAL CONTROL BOX	1
43	72532963	ADAPTER #16MSTR #8FSTR	1
44.	72532722	ADAPTER #10MSTR #6FSTR	1
45	70144238	STRAP-HYD RESERVOIR 40"	2

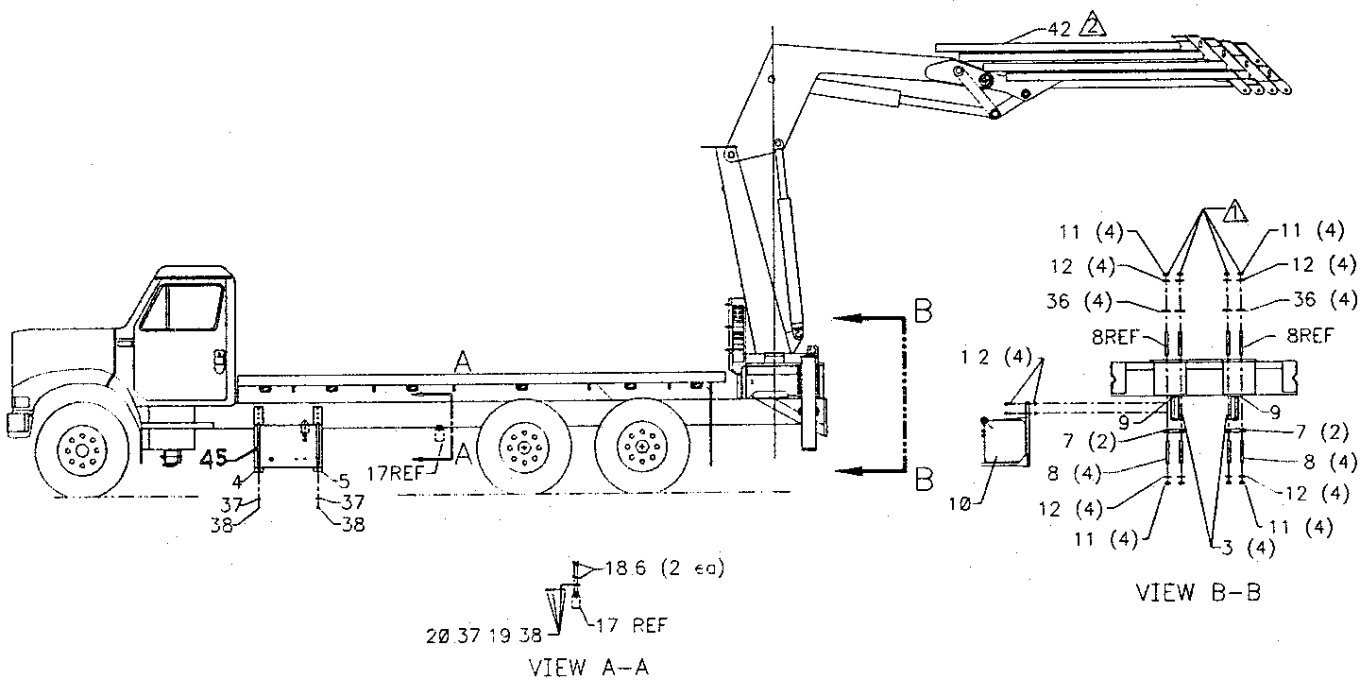
SEE NEXT PAGE FOR DRAWING



NOTE:

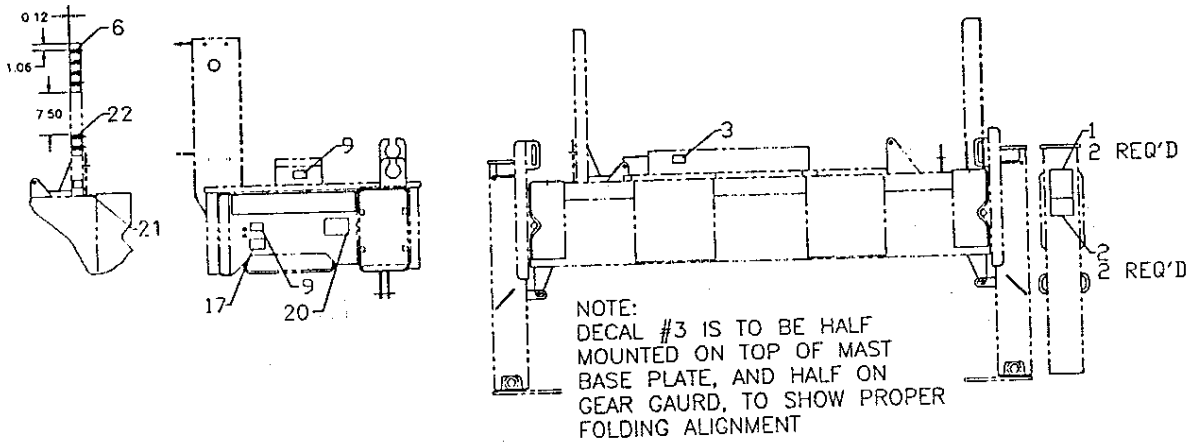
1. TORQUE ITEM 11 TO 116 KG-M
2. MOUNT ELECTRICAL CONTROL BOX (ITEM 42) TO OUTER BOOM.

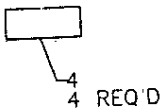
Figure D-17. INSTALLATION KIT - REAR MOUNT (93709811)



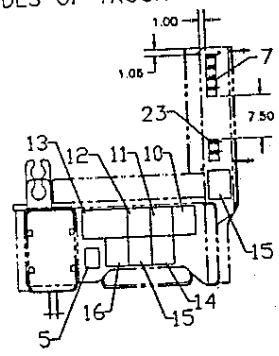
SEE PREVIOUS PAGE FOR PARTS

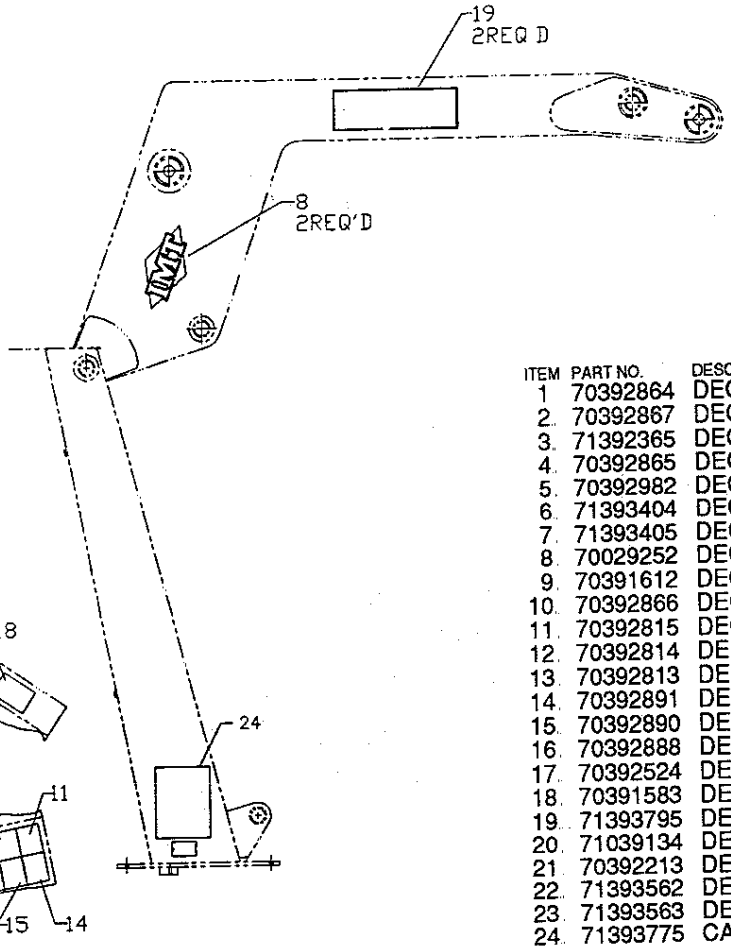
Figure D-17A. INSTALLATION KIT - REAR MOUNT (93709811)





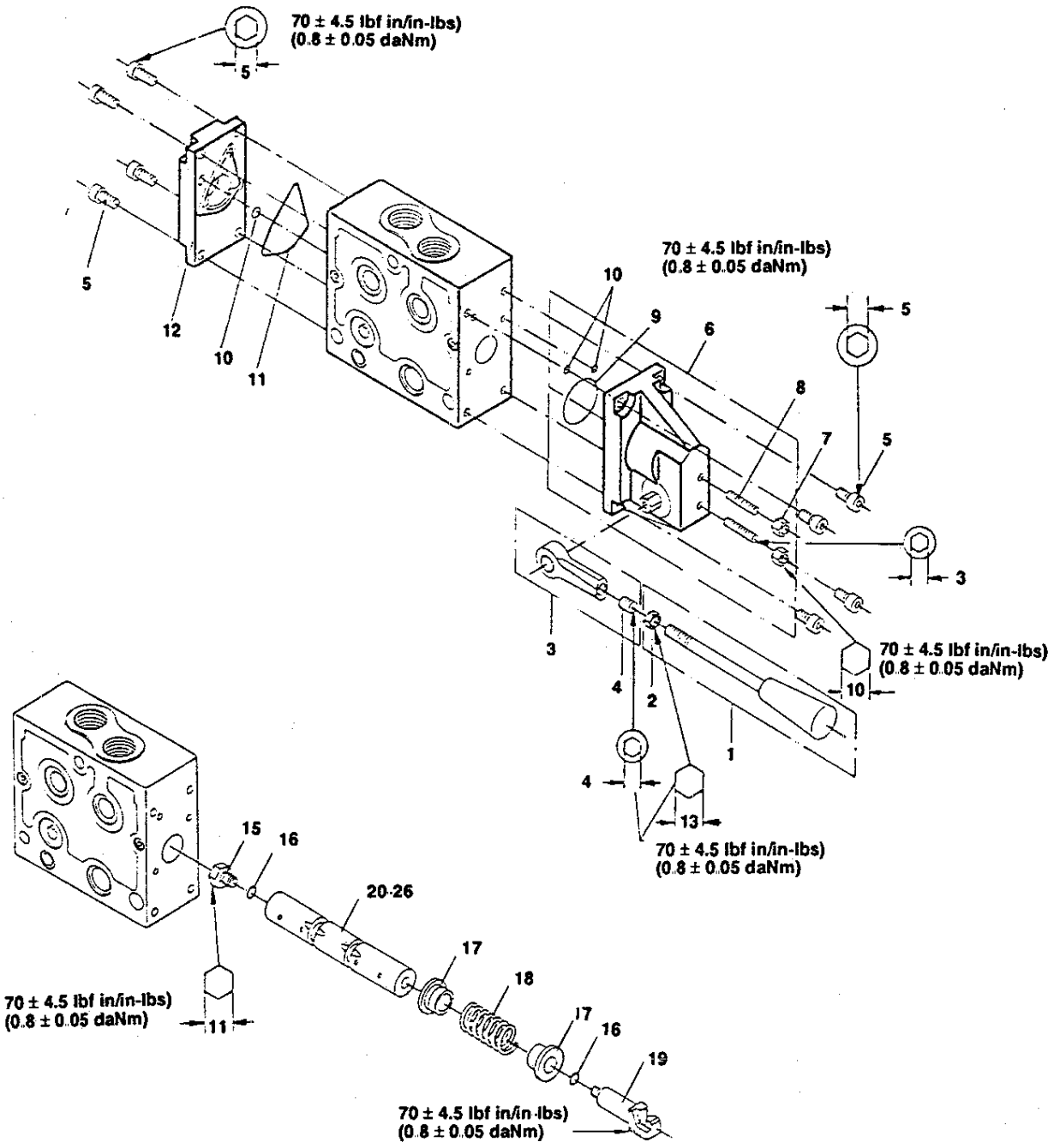
NOTE:
DECAL #4 IS TO BE MOUNTED ON FOUR SIDES OF TRUCK





ITEM	PART NO.	DESCRIPTION	95711916 QTY	95711917 QTY
1	70392864	DECAL-DANGER OUTRG STD CLR	2	2
2	70392867	DECAL-DANGER OUTRG MOVING	2	2
3	71392365	DECAL-ROTATION ALIGNMENT	1	1
4	70392865	DECAL-DANGER ELECTROCUTION	4	4
5	70392982	DECAL-CONTACT IMT	1	1
6	71393404	DECAL-CONTROL STREETSIDE	1	1
7	71393405	DECAL-CONTROL CURBSIDE	1	1
8	70029252	DECAL-IMT DIAMOND	2	2
9	70391612	DECAL-GREASE WKLY LEFT	2	2
10	70392866	DECAL-DANGER OPER COND	2	2
11	70392815	DECAL-DANGER OPERATION	2	2
12	70392814	DECAL-DANGER OPERATOR	2	2
13	70392813	DECAL-DANGER ELECTROCUTION	2	2
14	70392891	DECAL-DANGER DRIVELINE	2	2
15	70392890	DECAL-DANGER STOW/UNFOLD	4	4
16	70392888	DECAL-DANGER OPER RESTRICT	2	2
17	70392524	DECAL-ROTATE/GREASE	1	1
18	70391583	DECAL-SETUP/STOW INSTR.	1	1
19	71393795	DECAL-19140 IDENTIFICATION	2	2
20	71039134	DECAL-CAUTION OIL LEVEL	1	1
21	70392213	DECAL-DO NO WASH/WAX	1	1
22	71393562	DECAL-OUTRIGGER CTRLS-SS	1	1
23	71393563	DECAL-OUTRIGGER CTRLS-CS	1	1
24	71393775	CAPACITY PLACARD 3H & 4H	2	
	71393778	CAPACITY PLACARD 4H1M&4H2M		2

Figure D-18. DECAL KITS (3H & 4H-95711916, 4H1M & 4H2M-95711917)

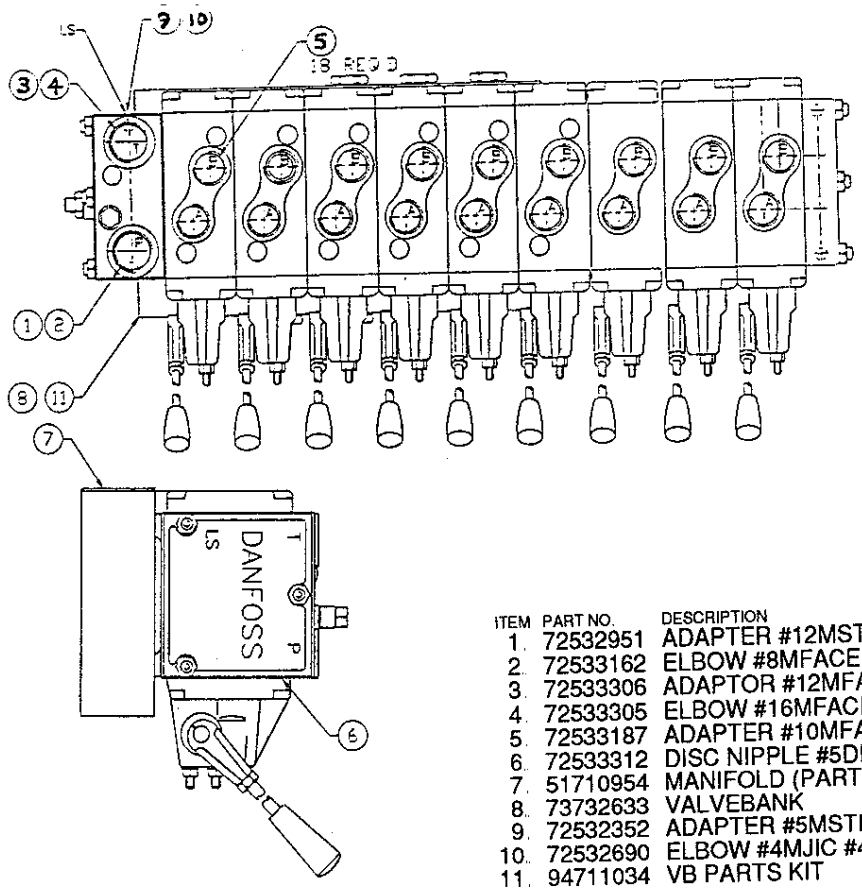


ITEM	PART NO.	DESCRIPTION	QTY
1	70144079	LEVER W/KNOB (INCL:2)	1
2	72062163	NUT 8mm	1
3	70144078	FOOR LEVER (INCL:4)	1
4	70144224	SCREW M8 L=8	4
5	70144225	SCREW M6 L=15	1
6	70144226	HOUSING ASM (INCL:7-10)	1
7	70144227	SEAL NUT 6mm	2
8	70144228	SCREW M6 L=25	2
9	76393603	O-RING ø33.0X2.5	1
10	76393604	O-RING ø5.0X2.0	3
11	76393605	O-RING ø41.0X2.5	1
12	70144229	COVER	1

ITEM	PART NO.	DESCRIPTION	QTY
15	70144217	PLUG	1
16	76393602	O-RING ø6.0X1 5	2
17	70144218	SPRING STOP	2
18	70144221	SPRING	1
19	70144219	TENSION ROD	1
20	70144212	MAIN SPOOL-ROTATION 6 6GPM	1
21	70144214	MAIN SPOOL-INNER CYL 17.2GPM	1
22	70144213	MAIN SPOOL-OUTER CYL 10.6GPM	1
23	70144215	MAIN SPOOL-OUTRG P.O. 10.6GPM	1
24	70144216	MAIN SPOOL-OUTRG P.D. 17.2GPM	1
25	70144213	MAIN SPOOL-EXT BOOM 10.6GPM	1
26	70144214	MAIN SPOOL-OPT(WINCH) 17.2GPM	1

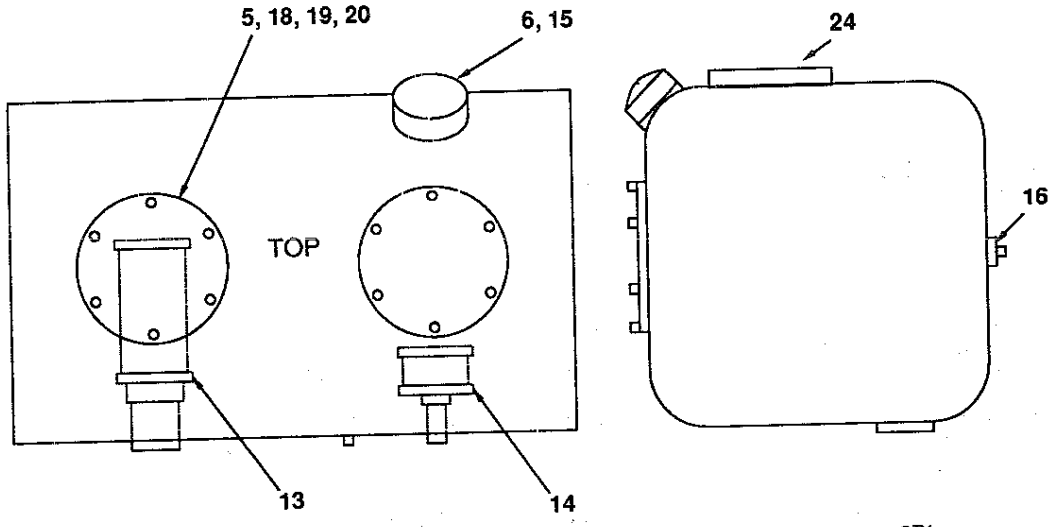
NOTE: REFERENCE DWG 94711034.

Figure D-19. REPLACEMENT PARTS-VALVEBANK ASSEMBLY 9-SECTION



ITEM	PART NO.	DESCRIPTION	QTY
1.	72532951	ADAPTER #12MSTR #8FSTR	1
2.	72533162	ELBOW #8MFACE #8MSTR 90°	1
3.	72533306	ADAPTOR #12MFACE #16MSTR	1
4.	72533305	ELBOW #16MFACE #16FSTR SW 90°	1
5.	72533187	ADAPTER #10MFACE #8MSTR	18
6.	72533312	DISC NIPPLE #5DIAG W/CAP	1
7.	51710954	MANIFOLD (PART OF VB)	REF
8.	73732633	VALVEBANK	1
9.	72532352	ADAPTER #5MSTR #4MJIC	1
10.	72532690	ELBOW #4MJIC #4FJIC SWVL	1
11.	94711034	VB PARTS KIT	REF

Figure D-20. VALVEBANK ASSEMBLY 9-SECTION (51711002)



ITEM	IMT PART NO	DSM PART NO	DESCRIPTION	QTY
5.		530047	COVER	2
6.		665032	FILL CAP BREATHER 10-MIC	1
13.		212036	STRAINER 1-1/2NPT 30GPM 100MESH	1
14.		212037	DIFFUSER 3/4NPT 33GPM	1
15.		212057	FILL SCREEN 30X30 MESH	1
16.		200480	PLUG 3/4NPTF SQHD MAGNETIC	1
18.	72062000		NUT 1/4-20 HEX	12
19	72063001		WASHER 1/4 WRT	12
20.		240310	O-RING 6 ID X 6-1/2 OD	2
24.		254019	SIGHT/TEMP GAUGE	1

Figure D-21. RESERVOIR ASSEMBLY - 40 GALLON (70732776)

ITEM	PART NO.	DESCRIPTION	QTY
1	94393574	SEAL KIT(INCL.:2-18)	1
2	76393576	WIPER (PART OF 1)	1REF
3	76393577	O-RING (PART OF 1)	1REF
4	76393578	U-CUP (PART OF 1)	1REF
5	76393579	STEP SEAL (PART OF 1)	1REF
6	76393580	WEAR RING (PART OF 1)	1REF
7	76393581	O-RING (PART OF 1)	1REF
8	70034411	BACK-UP (PART OF 1)	2REF
9	76393582	O-RING (PART OF 1)	1REF
10	76393583	O-RING (PART OF 1)	1REF
11	70034412	BACK-UP (PART OF 1)	2REF
12	76393584	WEAR RING (PART OF 1)	2REF
13	76393585	PISTON SEAL (PART OF 1)	2REF
14	76393586	O-RING (PART OF 1)	1REF
15	70034413	BACK-UP (PART OF 1)	2REF
16	76393587	PISTON RING (PART OF 1)	1REF
17	70034414	BACK-UP (PART OF 1)	1REF
18	76393588	O-RING (PART OF 1)	1REF
19	70144183	CASE	1REF
20	70144182	ROD	1REF
21	70144179	CYLINDER HEAD	1REF
22	73054812	C'BALANCE VALVE	2REF
23	70144184	BLEEDER PLUG	2REF
24	72533290	PLUG	4REF
25	70144181	PISTON	1REF
26	70144180	PISTON HEAD	1REF

NOTES

IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY,MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON, HEAD GLAND, AND HOLDING VALVE SEALS, NYLON LOCK RING, CAST IRON PISTON RINGS, AND ROD STINGER THREADS.

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO THREADS OF CYLINDER HEAD ONLY. KEEP AWAY FROM ALL SEALS.

Figure D-22. 1ST STAGE EXTENSION CYLINDER (73050142)

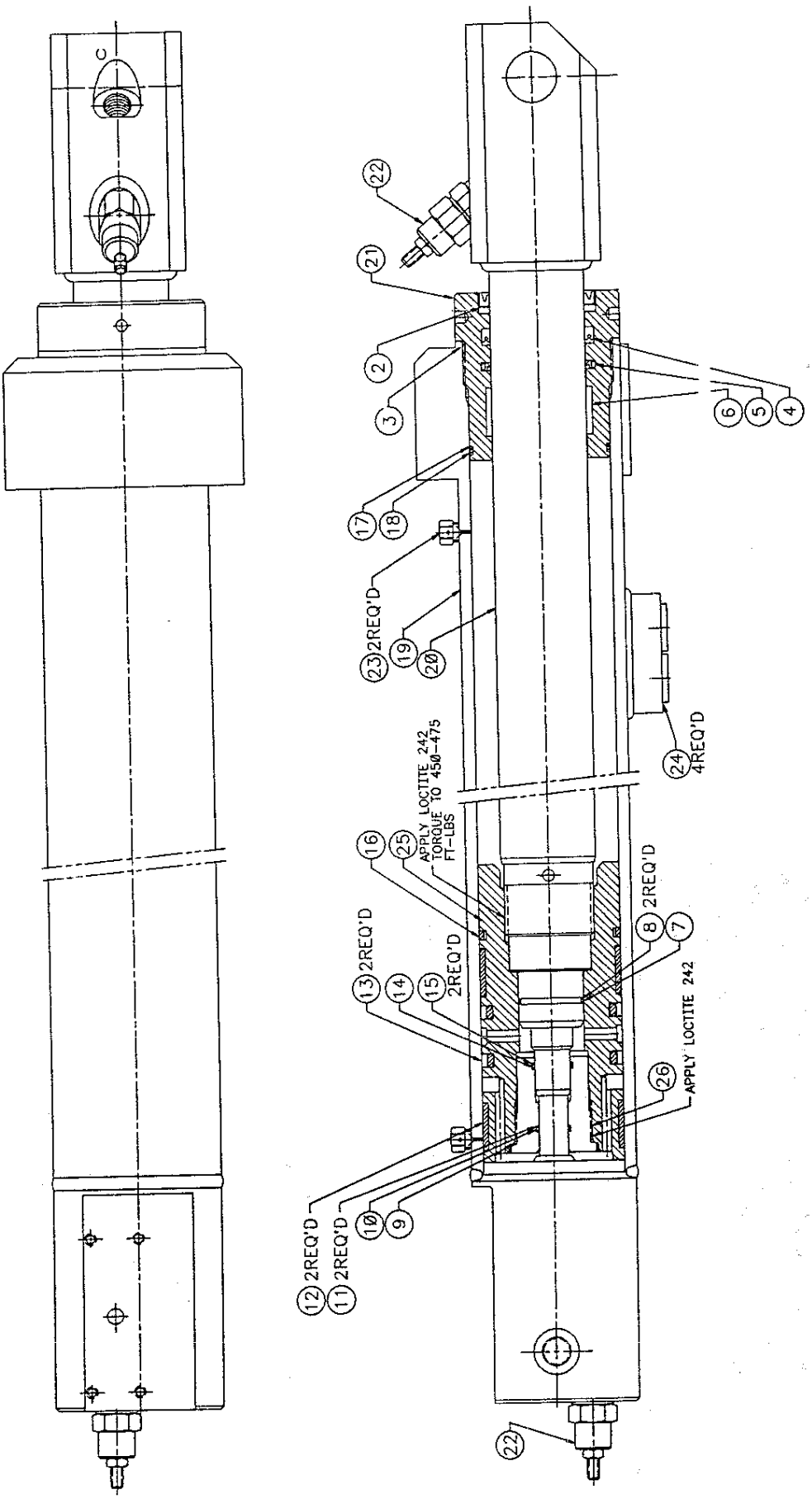


Figure D-22A. 1ST STAGE EXTENSION CYLINDER (73050142)

ITEM	PART NO.	DESCRIPTION	QTY
1	94393574	SEAL KIT (INCL:2-18)	1
2	76393576	WIPER (PART OF 1)	1REF
3	76393577	O-RING (PART OF 1)	1REF
4	76393578	U-CUP (PART OF 1)	1REF
5	76393579	STEP SEAL (PART OF 1)	1REF
6	76393580	WEAR RING (PART OF 1)	1REF
7	76393581	O-RING (PART OF 1)	1REF
8	70034411	BACK-UP (PART OF 1)	2REF
9	76393582	O-RING (PART OF 1)	1REF
10	76393583	O-RING (PART OF 1)	1REF
11	70034412	BACK-UP (PART OF 1)	2REF
12	76393584	WEAR RING (PART OF 1)	2REF
13	76393585	PISTON SEAL (PART OF 1)	2REF
14	76393586	O-RING (PART OF 1)	1REF
15	70034413	BACK-UP (PART OF 1)	2REF
16	76393587	PISTON RING (PART OF 1)	1REF
17	70034414	BACK-UP (PART OF 1)	1REF
18	76393588	O-RING (PART OF 1)	1REF
19	70144185	CASE	1
20	70144182	ROD	1
21	70144179	CYLINDER HEAD	1
22	73054812	COUNTERBALANCE VALVE	2
23	70144184	BLEEDER PLUG	2
24	72533290	PLUG	4
25	70144181	PISTON	1
26	70144180	PISTON HEAD	1
27	70144186	BAR	1
28	72063049	WASHER 1/4 LOCK	2
29	72060002	CAP SCR 1/4-20X3/4 HH GR5	2
30	73054813	SEQ. VALVE ASM (INCL:31)	1
31	94393589	VALVE SEAL KIT (PART OF 30)	1REF

NOTES

IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON, HEAD GLAND, AND HOLDING VALVE SEALS, NYLON LOCK RING, CAST IRON PISTON RINGS, AND ROD STINGER THREADS.

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO THREADS OF CYLINDER HEAD ONLY. KEEP AWAY FROM ALL SEALS.

Figure D-23. 2ND STAGE EXTENSION CYLINDER (73050143)

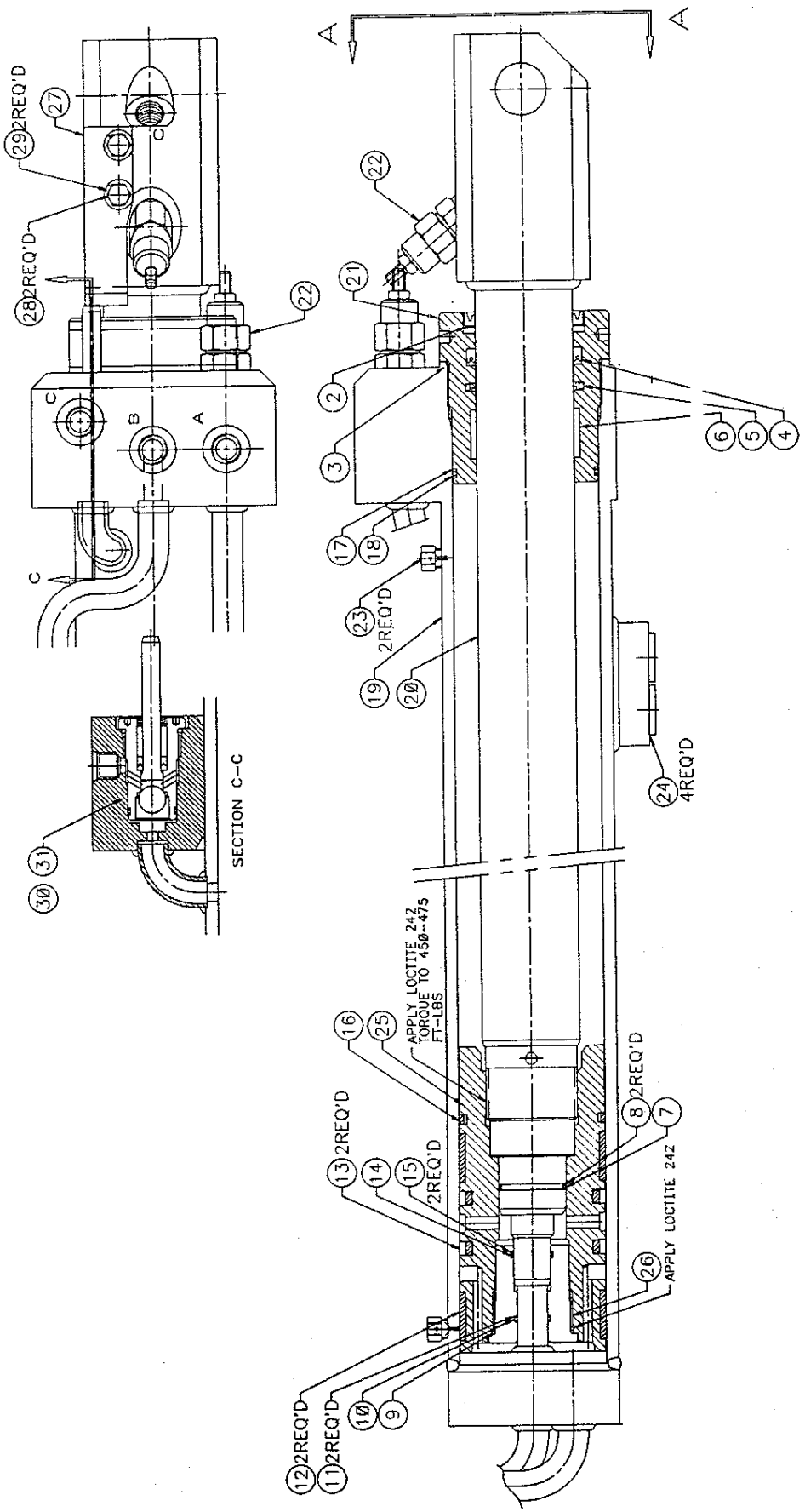


Figure D-23A. 2ND STAGE EXTENSION CYLINDER (73050143)

ITEM	PART NO.	DESCRIPTION	QTY
1	94393575	SEAL KIT (INCL:2-8,10-18)	1
2	76393576	WIPER (PART OF 1)	1REF
3	76393577	O-RING (PART OF 1)	1REF
4	76393578	U-CUP (PART OF 1)	1REF
5	76393579	STEP SEAL (PART OF 1)	1REF
6	76393580	WEAR RING (PART OF 1)	1REF
7	76393581	O-RING (PART OF 1)	1REF
8	70034411	BACK-UP (PART OF 1)	2REF
9	94393589	SEQ. VALVE SEAL KIT	1
10	76393583	O-RING (PART OF 1)	2REF
11	70034412	BACK-UP (PART OF 1)	2REF
12	76393584	WEAR RING (PART OF 1)	2REF
13	76393585	PISTON SEAL (PART OF 1)	1REF
14	76393586	O-RING (PART OF 1)	1REF
15	70034413	BACK-UP (PART OF 1)	2REF
16	73054813	SEQ. VALVE ASM (INCL:9)	1
17	70034414	BACK-UP (PART OF 1)	1REF
18	76393588	O-RING (PART OF 1)	1REF
19	70144192	CASE	1
20	70144191	ROD	1
21	70144179	CYLINDER HEAD	1
22	73054812	COUNTERBALANCE VALVE	2
23	70144184	BLEEDER PLUG	2
24	72060002	CAP SCR 1/4-20X3/4 HH GR5	2
25	70144190	PISTON	1
26	70144189	PISTON HEAD	1
27	70144186	BAR	1
28	72063049	WASHER 1/4 LOCK	2

NOTES

IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON, HEAD GLAND, AND HOLDING VALVE SEALS, NYLON LOCK RING, CAST IRON PISTON RINGS, AND ROD STINGER THREADS.

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO THREADS OF CYLINDER HEAD ONLY. KEEP AWAY FROM ALL SEALS.

Figure D-24. 4TH STAGE EXTENSION CYLINDER (73050145)

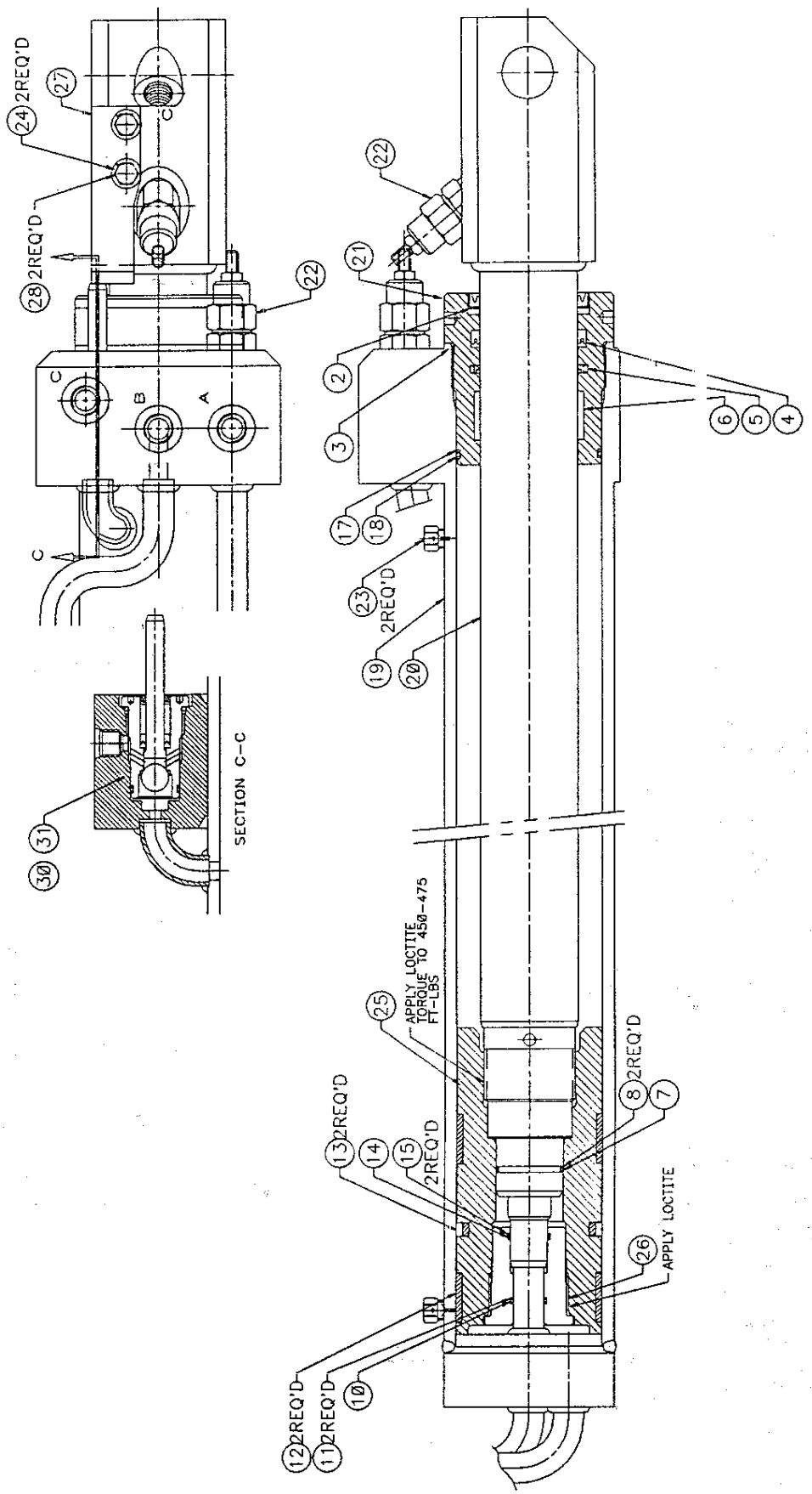
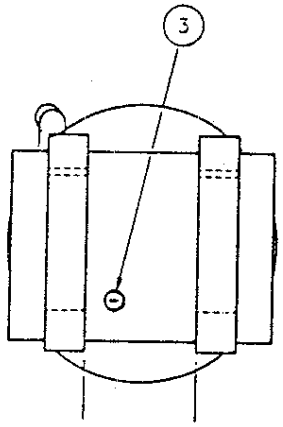
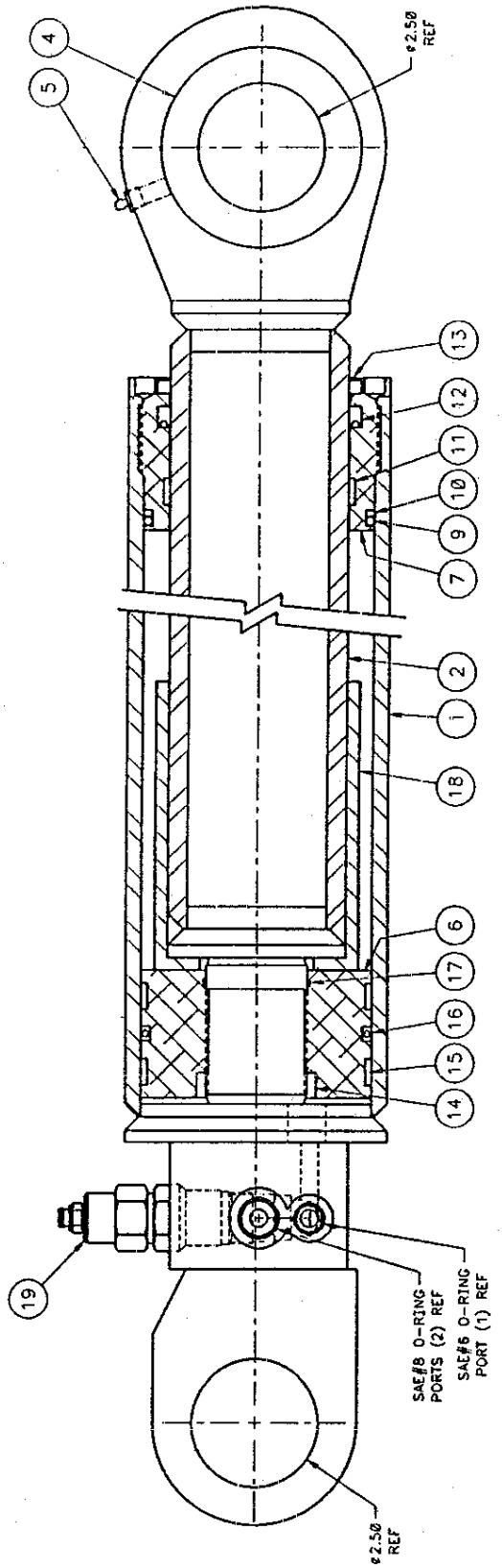


Figure D-24A. 4TH STAGE EXTENSION CYLINDER (73050145)





NOTES

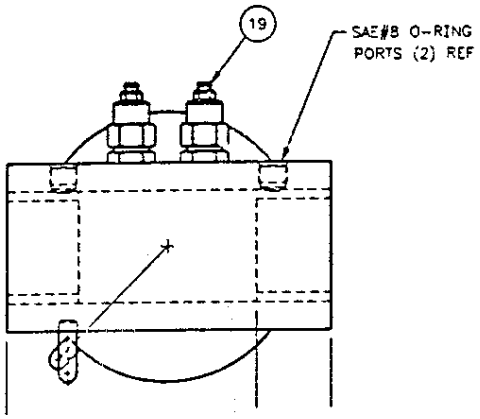
IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME

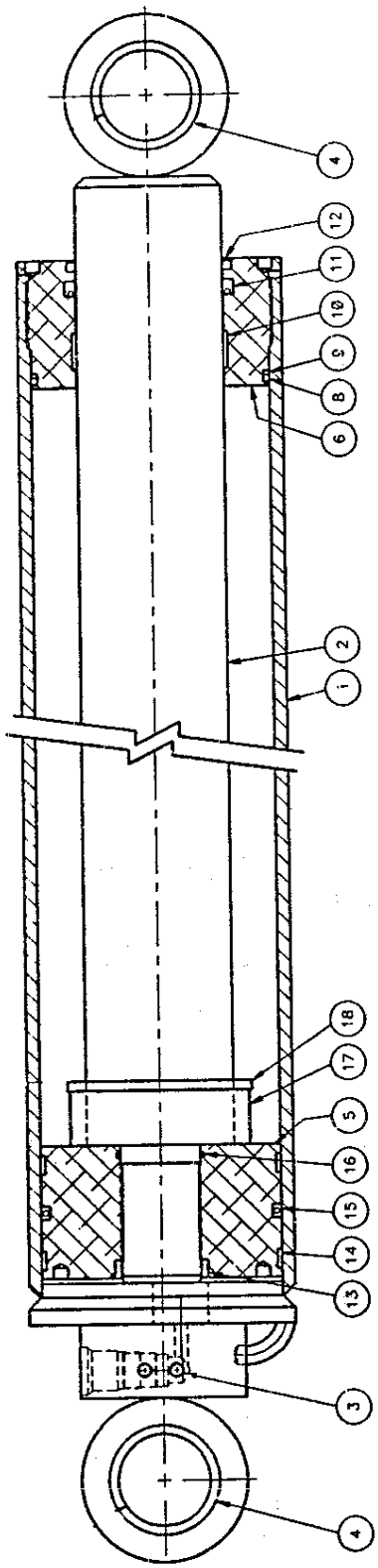
APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON, HEAD GLAND, AND HOLDING VALVE SEALS, NYLON LOCK RING, CAST IRON PISTON RINGS, AND ROD STINGER THREADS.

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO THREADS OF CYLINDER HEAD ONLY. KEEP AWAY FROM ALL SEALS

ITEM	PART NO.	DESCRIPTION	QTY
1.	4C112920	CASE ASM (INCL:3)	1
2	4H112920	ROD ASM (INCL:4,5)	1
3	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	2REF
4	70143838	BALL BUSHING (PART OF 2)	1REF
5.	72053508	ZERK 1/8NPT (PART OF 2)	1REF
6.	6I452200	PISTON	1
7.	6H045035	HEAD	1
8.	9B112920	SEAL KIT (INCL:9-17)	1
9.	7Q072346	O-RING (PART OF 8)	1REF
10.	7Q10P346	BAC-UP RING (PART OF 8)	1REF
11.	7T2N4037	WEAR RING (PART OF 8)	1REF
12.	7R546035	U-CUP SEAL (PART OF 8)	1REF
13.	7R14P035	ROD WIPER (PART OF 8)	1REF
14.	7T61N200	LOCK RING (PART OF 8)	1REF
15.	7T2N4040	WEAR RING (PART OF 8)	2REF
16	7T66P450	PISTON SEAL (PART OF 8)	1REF
17	7Q072033	O-RING (PART OF 8)	1REF
18	6C112920	STOP TUBE	1
19.	73054810	COUNTERBALANCE VALVE	2

Figure D-25. INNER BOOM CYLINDER (3C112920)





NOTES

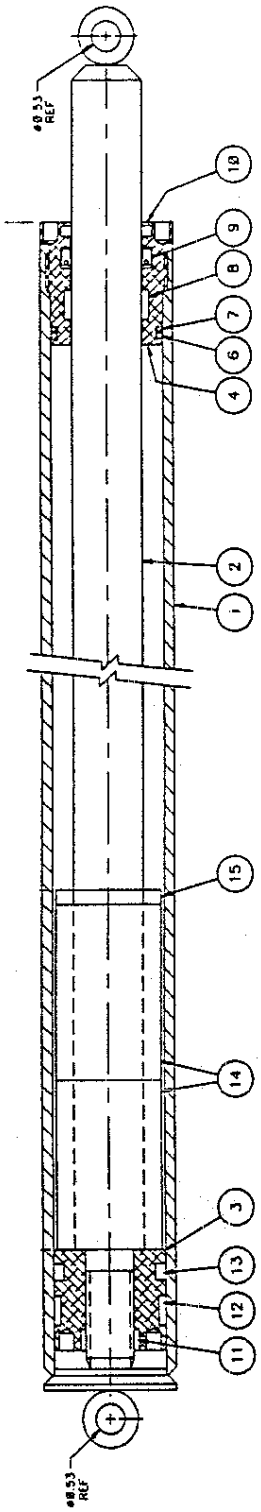
IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON, HEAD GLAND, AND HOLDING VALVE SEALS, NYLON LOCK RING, CAST IRON PISTON RINGS, AND ROD STINGER THREADS

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO THREADS OF CYLINDER HEAD ONLY. KEEP AWAY FROM ALL SEALS.

ITEM	PART NO.	DESCRIPTION	QTY
1	4C124920	CASE ASM (INCL:3 & 4)	1
2	4G124920	ROD ASM (INCL:4)	1
3	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	4REF
4	70034283	BEARING (PART OF 1 & 2)	4REF
5	6I654219	PISTON	1
6	6H654400	HEAD	1
7	9B124920	SEAL KIT (INCL:8-16,18)	1
8	7Q072361	O-RING (PART OF 7)	1REF
9	7Q10P361	BACK-UP RING (PART OF 7)	1REF
10	7T2N8042	WEAR RING (PART OF 7)	1REF
11	7R546040	U-CUP SEAL (PART OF 7)	1REF
12	7R14P040	ROD WIPER (PART OF 7)	1REF
13	7T61N218	LOCK RING (PART OF 7)	1REF
14	7T2N8065	WEAR RING (PART OF 7)	2REF
15	7T66P650	PISTON SEAL (PART OF 7)	1REF
16	7Q072139	O-RING (PART OF 7)	1REF
17	6C150040	STOP TUBE	1
18	6A025040	WAFER LOCK (PART OF 7)	1REF
19	73054810	COUNTERBALANCE VALVE	2

Figure D-26. OUTER BOOM CYLINDER (3C124920)



NOTES

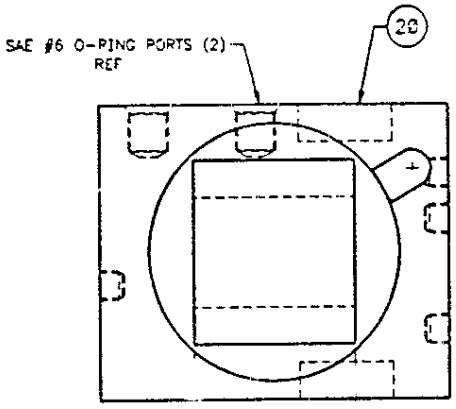
IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

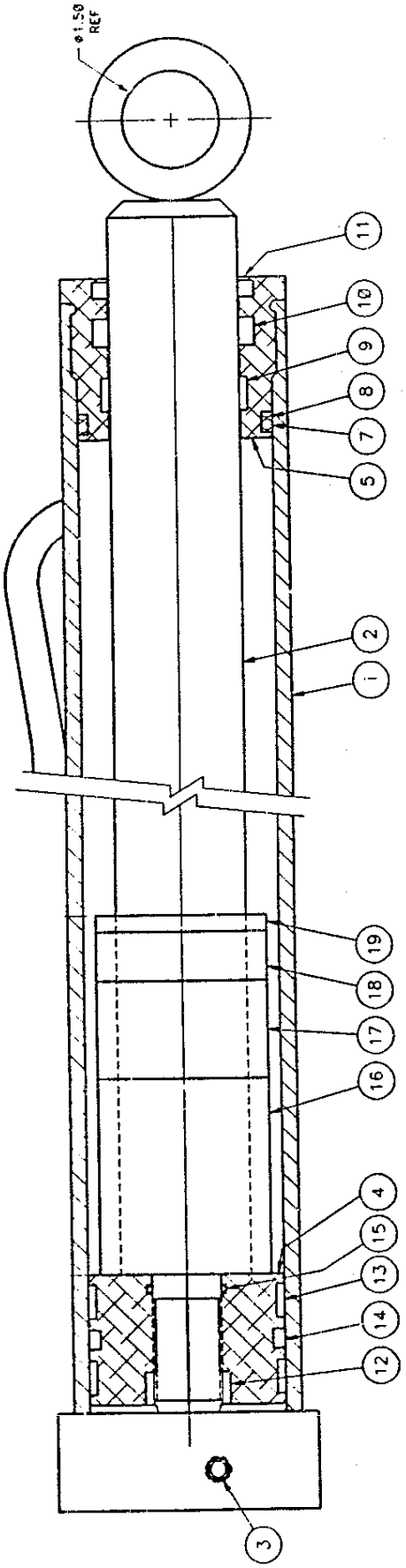
APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON, HEAD GLAND, AND HOLDING VALVE SEALS, NYLON LOCK RING, CAST IRON PISTON RINGS, AND ROD STINGER THREADS

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO THREADS OF CYLINDER HEAD ONLY. KEEP AWAY FROM ALL SEALS.

ITEM	PART NO.	DESCRIPTION	QTY
1.	4B055920	CASE ASM	1
2.	4G055920	ROD ASM	1
3.	6I201088	PISTON	1
4.	6H020012	HEAD	1
5.	9B055920	SEAL KIT (INCL:6-13,15)	1
6.	7Q072224	O-RING (PART OF 5)	1REF
7.	7Q10P224	BACK-UP RING (PART OF 5)	1REF
8.	7T2N8012	WEAR RING (PART OF 5)	1REF
9.	7R546012	U-CUP SEAL (PART OF 5)	1REF
10.	7R14P012	ROD WIPER (PART OF 5)	1REF
11.	7T61N087	LOCK RING (PART OF 5)	1REF
12.	7T2N4020	WEAR RING (PART OF 5)	1REF
13.	7T66P200	PISTON SEAL (PART OF 5)	1REF
14.	6C300012	STOP TUBE	2
15.	6A025012	WAFER LOCK (PART OF 5)	1REF

Figure D-27. POWER OUT OUTRIGGER CYLINDER (3B055920)





NOTES

IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON, HEAD GLAND, AND HOLDING VALVE SEALS, NYLON LOCK RING, CAST IRON PISTON RINGS, AND ROD STINGER THREADS.

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO THREADS OF CYLINDER HEAD ONLY. KEEP AWAY FROM ALL SEALS.

ITEM	PART NO.	DESCRIPTION	QTY
1.	4B070920	CASE ASM (INCL:3)	1
2.	4G070920	ROD ASM	1
3.	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	4REF
4.	6I302106	PISTON	1
5	6H030020	HEAD	1
6.	9B070920	SEAL KIT (INCL:7-15,19)	1
7	7Q072334	O-RING (PART OF 6)	1REF
8.	7Q10P334	BACK-UP RING (PART OF 6)	1REF
9.	7T2N4022	WEAR RING (PART OF 6)	1REF
10.	7R546020	U-CUP SEAL (PART OF 6)	1REF
11.	7R14P020	ROD WIPER (PART OF 6)	1REF
12.	7T61N106	LOCK RING SEAL (PART OF 6)	1REF
13.	7T2N4030	WEAR RING (PART OF 6)	2REF
14.	7T66P300	PISTON SEAL (PART OF 6)	1REF
15.	7Q072121	O-RING (PART OF 6)	1REF
16.	6C300020	STOP TUBE 3"	1
17.	6C150020	STOP TUBE 1-1/2"	1
18	6C075020	STOP TUBE 3/4"	1
19.	6A025020	WAFER LOCK (PART OF 6)	1
20.	73054794	VALVE-DBL PILOT OPERATED	1

Figure D-28. POWER DOWN OUTRIGGER CYLINDER (3B070920)

Section 5. OPERATION

5-1. CRANE CONTROLS

MANUAL SHIFT CONTROL

The PTO's are engaged when the knobs on dash or floor are pulled OUT and disengaged when the knobs are pushed IN. The truck gear shift lever must be in neutral and the clutch depressed whenever the knobs are moved.

AIR SHIFT CONTROL

The PTO is engaged when the switch is moved to apply air to PTO and disengaged when switch is in OFF position. The truck gear shift lever must be in neutral and clutch depressed when switch is moved.

ELECTRIC SHIFT CONTROL

Full torque electric shift PTO's are controlled by a switch. To operate, disengage the clutch, shift to fourth or fifth gear, and operate the switch DOWN to engage the PTO or UP to disengage the PTO. Return the gearshift to neutral and engage the clutch.

If the vehicle is equipped with automatic transmission, the power take-off may be engaged by placing the transmission selector lever in any driving position and then engaging the PTO. The transmission selector lever must be returned to "N" (neutral) for stationary vehicle operation. The PTO may be disengaged while in any transmission range provided that the load has first been removed from the PTO.

5-2. PARKING BRAKE

The truck brake must be firmly set before leaving the cab to begin operation. If the ground surface is icy, slick or sloped, help to immobilize the truck with wheel chocks.

NOTE

THE VEHICLE MAY BE EQUIPPED WITH A SAFETY LOCK WHICH PREVENTS ENGAGEMENT OF AN ELECTRIC OR AIR SHIFT PTO WHEN THE BRAKE IS OFF. IN THIS CASE, THE PARKING BRAKE MUST BE SET BEFORE THE ABOVE PROCEDURE IS FOLLOWED.

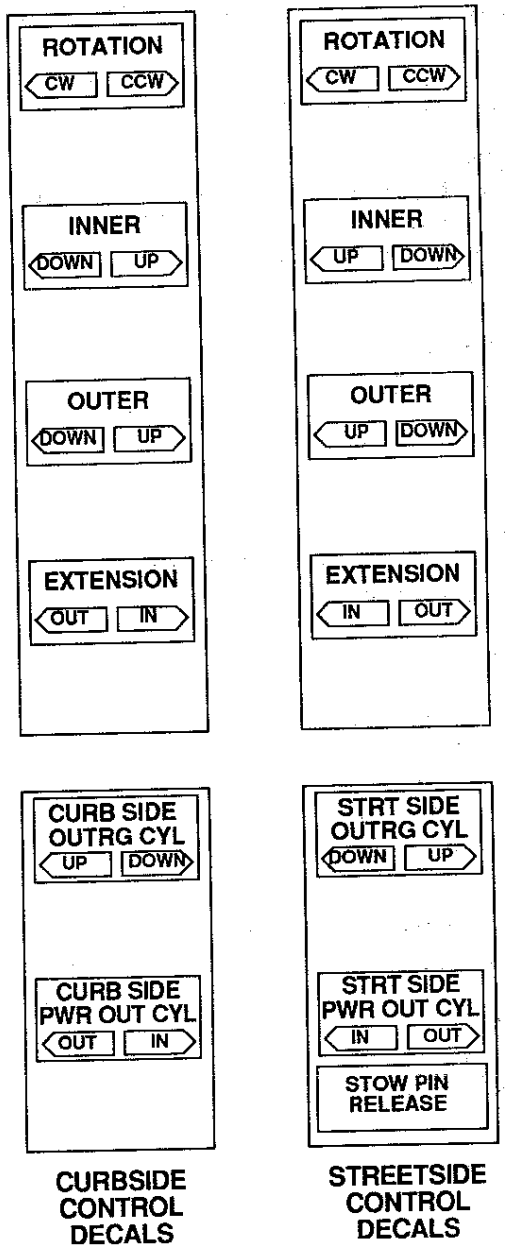
5-3. CRANE CONTROL STATIONS

The unit is equipped with two crane control stations, one mounted on each side of the crane base. The operator should operate the crane controls from the station that provides maximum visibility and personal safety.

NOTE

FOR MAXIMUM SAFETY AND VISIBILITY, ALWAYS OPERATE THE CRANE FUNCTIONS WHILE STANDING ON AN OPERATION PLATFORM.

Placards adjacent to the levers indicate the direction to actuate the controls for the various unit functions.



CURBSIDE CONTROL DECALS

STREETSIDE CONTROL DECALS

Figure E-1. CONTROL DECALS

5-4. VALVEBANK

All hydraulic control functions are proportional; the speed of each function is metered in proportion to the extent of control lever movement. Maximum lever movement will result in maximum function speed. Operators should become familiar with both the direction and speed of the various crane functions before making any lifts. In general, hydraulic cylinder extension is slower than cylinder retraction, and hydraulic motor rotation is the same in both directions.

ROTATION
Push the lever in the clockwise direction (looking down on the crane) to rotate the crane clockwise. Push the lever in the counterclockwise direction to rotate the crane in the counterclockwise direction.

INNER BOOM
Push the lever in direction opposite crane mast to raise the inner boom. Push the lever in direction toward the crane to lower the inner boom.

OUTER BOOM
Push the lever in direction opposite crane mast to raise the outer boom. Push the lever in direction toward the crane mast to lower the outer boom.

EXTENSION
Push the lever in direction toward crane mast to extend the telescoping boom sections. Push the lever in direction opposite crane mast to retract the telescoping boom sections.

OUTRIGGER CYLINDER
Push the lever in direction oppositie crane mast to extend the vertical outrigger cylinder down. Push the lever in direction toward crane mast to retract the vertical outrigger cylinder up. Repeat for opposite side outrigger.

POWER OUT CYLINDER
Push the lever in direction toward crane mast to extend the horizontal outrigger cylinder out. Push the lever in direction opposite crane mast to retract the horizontal outrigger cylinder in. Repeat for opposite side outrigger.

5-5. OTHER CRANE CONTROLS

STOW LOCK (furnished with crane)
PULL the handle to release the crane from the storage lock. PUSH the handle to lock the crane in the stored position.

THROTTLE (required on vehicle)
PULL the manual throttle to accelerate the truck engine speed, PUSH the manual throttle to return to idle speed. Increasing truck engine speed increases operating speed.

HORN (recommended on vehicle)
Operate horn button to warn fellow workers on site of pending movement of crane.

PRESSURE GAUGE (recommended on vehicle)
Operate pressure gauge while booming up or down at end of stroke to determine system pressure.

CAPACITY CHART (furnished with crane)
This chart shows capacities of crane at various operating areas, and precautions to observe while operating crane.

5-6. 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. See the Operator's Crane Safety Manual for additional information.

1. 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.

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.

2. 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 3.05 meters is absolutely the closest that any portion of the crane, loadline or load can be to electrical lines carrying up to 50,000 Volts. A minimum of 30.5 centimeters must be added to that distance for every additional 30,000 Volts or less.

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

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

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

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

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

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

6. With the gear shift in neutral, depress clutch (if equipped with a manual transmission) and engage the PTO by pulling out the shift knob.

7. Operate the throttle control to acheive the proper engine speed.

8. Pull quick release pin and swing the street side operator control platform outward to deployed position. Replace the pin. While standing on the operator control platform, PULL the STOW LATCH HOOK lever to release the crane from storage. Operate the

	NORMAL VOLTAGE kV (Phase to Phase)	MINIMUM REQUIRED CLEARANCE (meters)
OPERATION NEAR HIGH VOLTAGE POWERLINES	From 0 to 50 From 50 to 200 From 200 to 350 From 350 to 500 From 500 to 750 From 750 to 1000	3.05 4.60 6.10 7.62 10.67 13.72
OPERATION IN TRANSIT WITH NO LOAD AND BOOM OR MAST LOWERED	From 0 to 0.75 From 0.75 to 50 From 50 to 345 From 345 to 750 From 750 to 1000	1.22 1.83 3.05 4.87 6.10

Figure E-2.
REQUIRED CLEARANCES OF CRANES FROM ELECTRICAL TRANSMISSION LINES

outrigger control levers for the outrigger on that side of the crane. First, extend the horizontal outrigger beam outward from crane/vehicle to maximum cylinder stroke. Next, extend the vertical outrigger downward until the pad makes firm ground contact. On soft surfaces, use cribbing to prevent the outrigger from sinking.

9. Deploy the operator control platform on the curb side. While standing on the curb side operator contol platform, operate the outrigger control levers for the outrigger on that side of the crane by repeating the outrigger deployment sequence above.

10. While standing on the operator control platform, extend the vertical outrigger cylinders DOWN as needed to level the crane/vehicle from side to side.

11. For rear mounted cranes: While standing on the operator control platforms, operate the vertical outrigger cylinders further as needed to level the crane vehicle from front to rear.

12. At this time, the crane/vehicle should be level in all directions and stabilized by the outriggers.

WARNING

DO NOT ATTEMPT TO HANDLE A LOAD IF THE OUTRIGGERS ARE UNABLE TO MAKE SOLID CONTACT WITH THE GROUND.

13. While standing on the streetside operator control platform, release the stow mechanism. Operate the OUTER BOOM control lever in the DOWN direction to verify the outer boom to be in the full tuck position. Operate the INNER BOOM control lever in the UP direction to maximum travel.

14. Operate the OUTER BOOM control lever in the UP direction until the boom is clear of the crane base and outriggers.

15. At this time, the crane is out of the stow position, and you are ready to begin the crane operations necessary for the job, which can be done while standing at either of the crane control stations.

NOTE

REFER TO THE SAFETY MANUAL FOR ADDITIONAL INFORMATION ON SAFE CRANE OPERATION.

WARNING

THE CRANE OPERATOR CONTROL PLATFORMS ARE PROVIDED TO IMPROVE OPERATOR SAFETY IN EVENT OF CRANE/VEHICLE CONTACT WITH ENERGIZED POWERLINES. PROPERLY USED, THESE PLATFORMS CAN PREVENT THE OPERATOR FROM BEING IN DIRECT GROUND CONTACT. IN MOST CASES, THIS CAN PREVENT ELECTROCUTION OF THE OPERATOR. THE OPERATOR SHOULD ALWAYS STAND ON ONE OF THE CRANE CONTROL PLATFORMS WHILE OPERATING THE CRANE. ALSO, THE PLATFORMS SHOULD BE PINNED IN THE DEPLOYED POSITION.

5-7. PRECAUTIONS

1. Avoid holding tools or other items in hand that could make accidental contact with a powerline or ground while standing on a platform.

2. Avoid placing materials on the platforms or leaning materials against the platforms.

3. Avoid having more than one person on a platform at a time.

The following are suggestions for job site consideration in advance. Specific job site conditions may require other courses of action in the event of crane contact with an energized electric powerline.

1. The operator is advised to remain on the crane platform and attempt to maneuver the crane away from the electrical power source.

2. Alternatively, and barring any other circumstances, the operator might be advised to consider staying on the crane platform until the electrical power can be shut off by other personnel.

3. If the above options are not possible and dismounting from the crane/vehicle is necessary while it is in contact with live electric powerlines, the operator may be advised to jump clear of the crane onto dry ground. In such cases, DO NOT hold on to any part of the crane and/or platform while dismounting.

5-8. OPERATING PROCEDURES

5-8-1. EQUIPMENT FAMILIARIZATION

All members of the crew should become thoroughly familiar with the location and operation of controls, the correct operating procedure, the maximum lifting capacities and the safety precautions applicable to the unit before operating. This crane is a complex piece of equipment and can be overloaded in many ways. Carefully follow the operating procedures outlined below.

5-8-2. EQUIPMENT CHECKS

Perform the following checks prior to placing the unit into operation:

1. Inspect for any unusual conditions such as pools of hydraulic fluid or lubricating oil under the chassis, any outrigger which may have crept down or up and any signs of damage or improper maintenance.
2. Check that tires are inflated properly.
3. Check the level of the hydraulic reservoir.
4. Check any "KILL" or horn circuits which may be part of the crane or chassis.
5. Check for missing and loose bolts.
6. Check for damaged structural members and welds.
7. Check that hydraulic hoses and fittings are in good condition and show no signs of leaking. The hoses should be free from cuts and abrasions andthere should be no evidence of binding or pinching Any damage or leakage should be repaired immediately.

NOTE

SEE VEHICLE MANUAL FOR VEHICLE CHECKS

5-8-3. WORK SITE POSITION

Always seek the best possible work site when parking the crane. An ideal location at a job site is firm, level, dry ground, or pavement located in close proximity to the work station. Avoid uneven, rocky, or muddy terrain, steep grades or locations with unnecessary overhead obstructions.

Location should be selected such that outriggers can be fully extended and leg comes down on firm level surface. Particular care must be taken in selecting a site position to the location of overhead powerlines so that proper clearance conditions can be maintained. Ideally, one should select a location at which the boom could not come within recommended distance of powerlines at full extension.

It is best to select a location on the site that most of the lifting can be done over the outrigger support or rear of truck.

5-8-4. BEFORE LEAVING CAB

1. Set the truck hand brake securely and turn the front wheels into the curb, if applicable. Wheel chocks may be required under certain conditions.
2. With the gear shift in neutral, depress clutch (if equipped with a manual transmission) and engage the PTO by pulling out the shift knob.
3. Warm the hydraulic system oil by operating all crane controls while under a no-load condition.

5-8-5. CRANE DEPLOYMENT

CAUTION

BEFORE BEGINNING CRANE DEPLOYMENT THE OPERATOR MUST FULLY UNDERSTAND THE CRANE CONTROL FUNCTIONS.

1. Before conducting any boom operations, extend both outriggers and level the crane side to side. Provide blocks if necessary to level the unit on sloping ground or bearing pads if the outriggers tend to sink into soft terrain or hot asphalt. Some concrete or asphalt surfaces are relatively thin and cannot withstand the outrigger loading. Concrete can break through and cause instability.

CAUTION

DO NOT OPERATE THE BOOM UNTIL ALL OUTRIGGERS ARE FULLY EXTENDED AND PROVDING FIRM SUPPORT.

It is recommended to remove all of the vehicle weight from the wheels. Stability over the front (without front stabilizers) can be hampered by raising the vehicle excessively. Extreme caution must be used when operating in areas around the truck not supported by outriggers because of cushion of tires and springs. When swinging loads from areas supported by outriggers to areas not supported by outriggers, extreme caution must be used because of a potential sudden shifting of the support point. Always keep the load as close to the ground as possible.

CAUTION

DO NOT ATTEMPT TO ROTATE THE CRANE BEFORE PLACING IT IN THE DEPLOYED POSITION. DAMAGE TO EQUIPMENT AND INJURY TO PERSONNEL MAY RESULT.

2. Rotate the boom to the selected location. If the crane is equipped with a winch, be sure to lower the hook block to an adequate length to allow for extended boom length before extending the telescoping boom sections.

CAUTION

WHEN EXTENDING OR RETRACTING THE BOOM EXTENSIONS THE HEIGHT OF THE HOOK BLOCK WILL CHANGE DUE TO THE CHANGE IN WIRE ROPE LENGTH. BE SURE TO ALLOW ADEQUATE CABLE LENGTH DURING EXTENSION AND CLEARANCE UNDER THE HOOK BLOCK DURING BOOM RETRACTION.

5-8-6. BEFORE MAKING THE LIFT

1. Check all controls for proper operation by operating each system through one complete cycle. This is particularly important after the unit has been serviced or repaired. If any abnormal operations are detected, correct the condition before continuing.

2. During all operations, the controls should be metered when beginning or terminating a movement to prevent sudden starting or stopping which imposes undue shock loads on the equipment. This metering can be performed by metering the control lever and the throttle.

3. Check the operating area for electrical powerlines.

5-8-7. READING AND UNDERSTANDING THE CAPACITY CHART

The structure and components of your unit are designed to provide satisfactory service if the unit is not loaded in excess of the maximum capacities specified on the capacity chart. Overloading can create serious potential safety hazards and can also shorten the service life of your unit. It is important that you know the weight of any load that you are attempting to handle. This should be done by use of a dynameter or by contacting your supervisor.

Overloading a crane can cause many types of failure depending on the configuration and working position of the crane, i.e. structural damage to almost any part of the crane, winch or cable failure and tipping over of the unit.

The capacity chart shows the maximum rated load including load (weight being lifted), load handling equipment such as slings, buckets, and downhaul weights, etc. which can be handled by the crane and the winch. The weight of the load handling equipment and boom attachments must be deducted from the maximum load rating shown on the capacity chart to determine the payload which can be lifted. Additional reductions may be necessary to make allowance for such factors as the effects of freely suspended loads, wind, ground conditions, out-of-level conditions and operating speeds.

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.

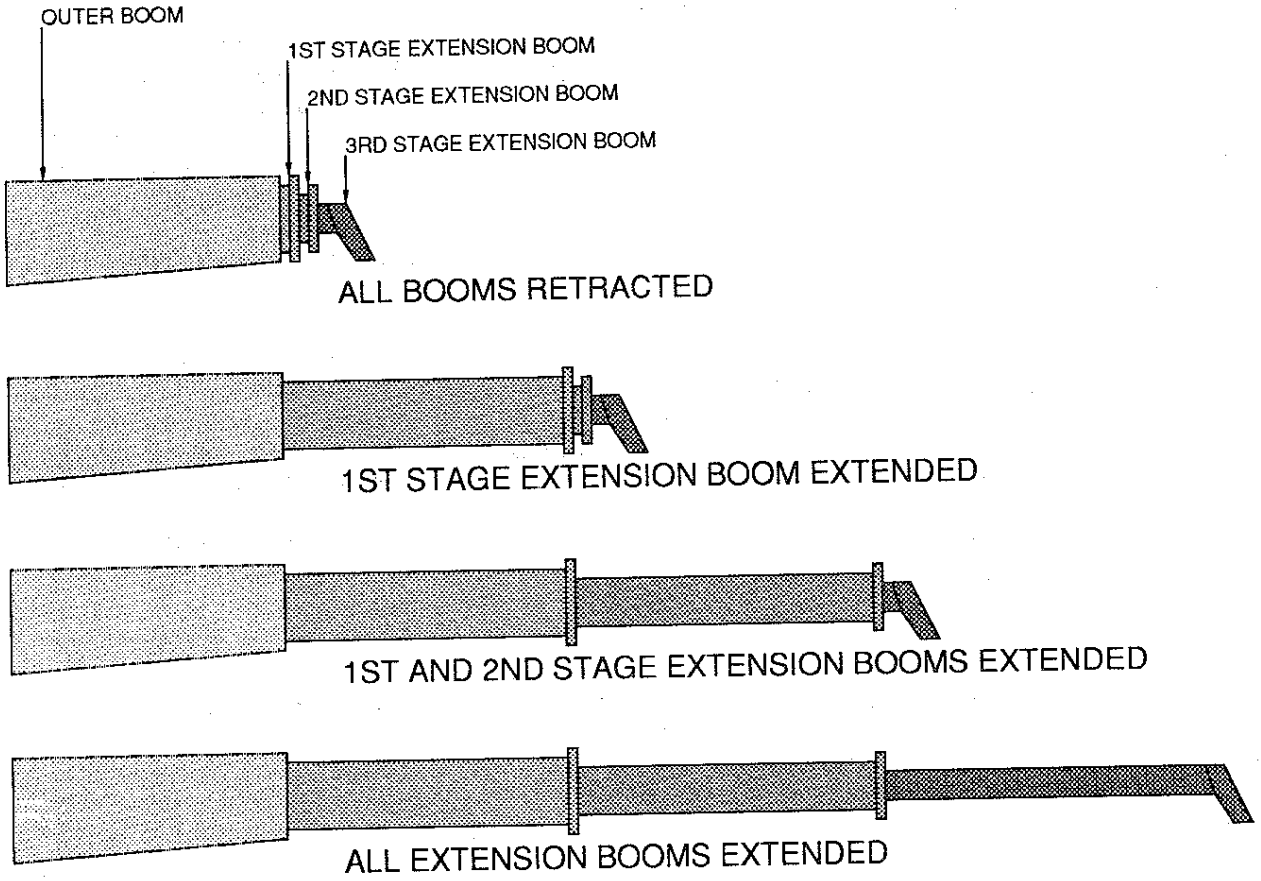


Figure E-3. PROPER EXTENSION BOOM DEPLOYMENT

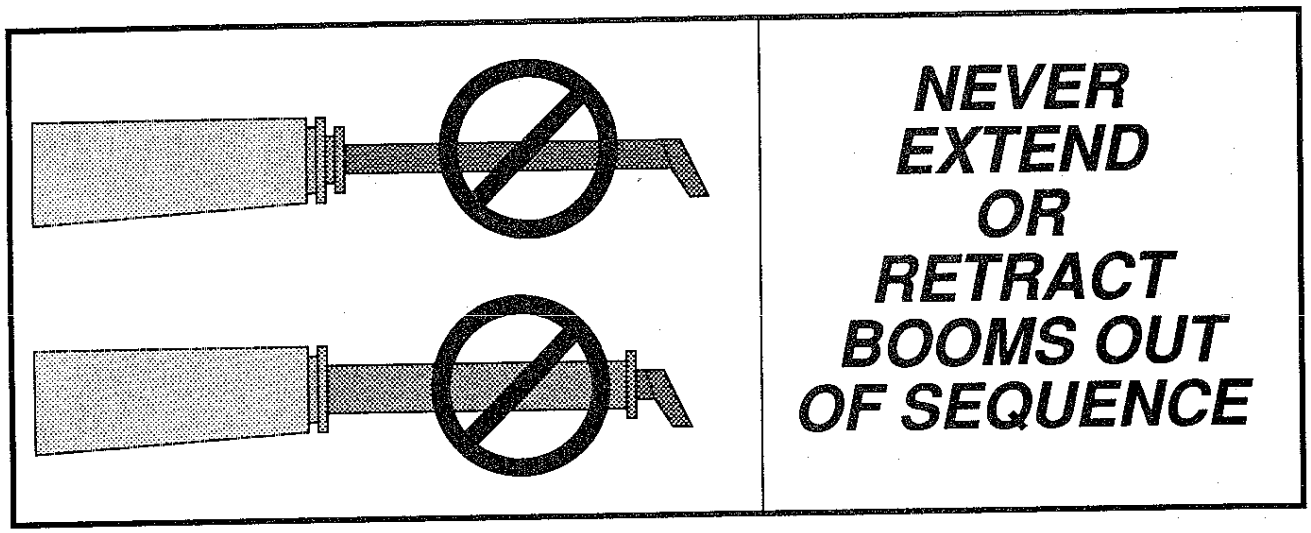


Figure E-4. IMPROPER EXTENSION BOOM DEPLOYMENT

The ratings shown on the capacity chart are based on the structural integrity of the frame and winch and represent a stability tipping factor of 85% when:

1. All outriggers are extended with positive contact on firm, level surface and the tires just free of the ground.
2. The proper amount of counterweight has been installed, if required.
3. The unit is mounted in accordance with factory instructions on a vehicle with proper specifications.
4. Tires inflated to the proper pressure.
5. The weight of load handling devices is considered as a part of the load being lifted.
6. Adverse environmental conditions such as wind are not present.
7. The operator controls the loads smoothly.

A stability test should have been performed on this crane and can be repeated by reference to the installation section.

All capacities are given in relationship to logical ranges of articulation. The radius shown on the capacity chart is the distance from the centerline of rotation to the load hook before the load is lifted. Lifting the load will cause the radius to increase due to boom deflection. This is not shown on the capacity chart but the crane has been designed with this deflection accounted for. All variances of load and boom position are shown on the capacity chart mounted on the main frame. The chart is located near the crane control station for the purpose of informing the operator when a load can or cannot be lifted.

The following procedure is a typical method which must be used to determine the crane's ability to handle a load:

1. Determine the weight of the load and load handling equipment.
2. Determine the radius from centerline of crane rotation to position of load.
3. Determine the radius from centerline of crane rotation to centerpoint where load is being moved to.
4. Refer to capacity chart for crane and determine that load and radius of lifting are within capacity of crane.

5-8-8. LIFTING THE LOAD

After the vehicle and crane have been properly set up and it has been determined the load to be lifted is within the ratings of the crane and/or winch reeving system (if equipped with a winch), again check the work area for electrical powerlines and other obstructions so that proper clearances can be maintained. If load is not visible to operator throughout lift, a person must be appointed to use hand signals as shown in this manual. Proceed with lifting the load.

1. Rotate, extend, or move up or down until boom tip is directly over the load.
2. The crane is normally equipped with a rotation stop. It is important that you be aware of the position of the stop before lifting in order to assure maximum rotation and prevent excessive handling of the load.
3. During operations, the controls should always be metered when beginning or terminating movement to prevent sudden starting or stopping, which imposes undue shock loads on the equipment. This is especialy true when handling heavy loads. The control should be slightly actuated to begin movement and then slowly increased to desired operating speed. The results obtained from metering the oil flow with the control lever can also be aided by carefully coordinating the throttle control.
4. Lower boom tip and attach load to load hook.
5. Control load by use of a non-conductive tag line, if necessary.

5-8-9. CAPACITY SHUT DOWN/ OVERSTRESS SYSTEM

The capacity shut down/overstress system is designed to prevent loads from being lifted which exceed the rated capacity of the crane. For a complete description of this system, see paragraph 7-21 in the Maintenance Section.

5-9. OPERATION IN ADVERSE CONDITIONS

5-9-1. OPERATION IN DUSTY AND SANDY AREAS

Operating in dusty or sandy areas presents special problems due to the abrasive action of dust which shortens the life of parts. Make every effort to keep dust and sand out of the moving parts of the crane machinery and engine.

1. All lubricants and lubricating equipment must be kept clean. Service breathers and air cleaners frequently to remove accumulated sand and dust. Lubricate more frequently to keep a supply of clean lubricant in the moving parts. Clean all lubrication fittings thoroughly before attaching the grease gun.

2. Keep the fuel tank filler cap tight to prevent sand or dust from entering the fuel tank. Service fuel filters frequently to keep them free of sand and dust.

3. Keep the hydraulic oil reservoir filler caps tight to prevent sand and dust from entering the hydraulic systems. Service the hydraulic oil filters frequently to keep the system free of sand and dust.

4. Use wood blocking or mats under the outrigger pads when operating in sand. See that the carrier vehicle does not shift during operation.

5. Before performing service on the crane such as replacing hoses, thoroughly clean hose connections and surrounding area. Failure to do so will allow sand particles into the hydraulic system which will ruin the pump, holding valves, valvebank and cylinders, leading to costly repairs.

5-9-2. OPERATION IN HIGH HUMIDITY OR SALT AIR CONDITIONS

Moisture and salt will cause deterioration of paint, cables, wiring and all exposed metallic parts. Keep parts dry and well lubricated in high humidity or salt air conditions.

1. Completely remove rust and corrosion as soon as it appears on any part of the machine. Wash off salt water and dry all parts thoroughly. Paint the exposed surfaces immediately. Place a film of lubricant or grease on all polished or machined metal surfaces and other surfaces which cannot be painted.

2. Keep parts thoroughly lubricated to repel water from polished metal surfaces and to prevent the entry of water into bearings. Keep lifting cables lubricated.

5-9-3. OPERATION AT HIGH ALTITUDES

Operation at high altitudes presents special problems due to lower atmospheric pressure and wide temperature ranges. At altitudes above 5000 feet (1524m) it may be necessary to change the engine fuel injectors. Make certain that the air cleaner is clean and free from obstructions. Check the engine frequently for overheating. For additional information, consult your vehicle owner's manual.

5-9-4. COLD WEATHER OPERATION

For cold weather operation with temperatures of -32°C or lower, the following procedures must be followed:

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

2. After a time period of approximately 45 minutes of truck warm up time, depress the clutch pedal. Shift the transmission into neutral and engage the PTO.

3. At engine idle, release clutch pedal slowly until full engagement of PTO is realized.

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

CAUTION

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

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

CAUTION

FOR CRANE OPERATION IN TEMPERATURES BELOW -32°C HYDRAULIC OIL CONFORMING TO MIL-L-46167 MUST BE USED IN THE CRANE HYDRAULIC SYSTEM.

CAUTION

FOR WINCH OPERATION IN TEMPERATURES BELOW -32°C THE LUBRICATION OIL IN THE WINCH GEARBOX MUST BE CHANGED TO LUBRICATING OIL CONFORMING TO MIL-L-2105C, GRADE 75W (GO-75).

5. After the 45 minute warm up period begin crane operations as follows:

   a. Slowly extend horizontal outrigger cylinders out approximately 6 inches and retract, extend out again approximately on half stroke and retract, and then extend full stroke.

   b. Follow this procedure on crane deployment, and extend cylinders.

   c. When completed, begin crane swing operation by rotating slowly approximately one eighth revolution one way, return to previous position and rotate in opposite direction. Do this several times, then rotate 90°/1.57 rad. and return.

   d. If equipped with a winch, begin winch operation by slowly opening the control valve allowing several revolutions in one direction. Then reverse the control valve and operate several revolutions in the opposite direction. Repeat several times allowing longer operation intervals.

CAUTION

VALVES SHOULD BE ENGAGED SLOWLY DURING THE WARM UP CYCLE TO PREVENT SUDDEN HYDRAULIC SPIKES WHICH WILL DAMAGE HYDRAULIC COMPONENTS.

NOTE

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

5-10. PREPARATION FOR ROAD TRAVEL

1. Operate ROTATION control lever into the swing storage position.
2. Operate EXTENSION boom control lever IN to completely retract telescoping boom sections.
3. Operate INNER boom control lever UP to raise inner boom to maximum.
4. Operate OUTER boom control lever DOWN to lower outer boom to maximum.
5. Operate INNER boom control lever DOWN to lower inner boom to maximum.
6. Operate OUTER boom control lever UP until boom is positioned against storage pads.
7. Operate OUTRIGGER CYLINDER control lever UP to maximum.
8. Operate POWER OUT CYLINDER control lever IN to maximum.

For optional 6.4m span outriggers, pin link tube between manual section and the base. Pull the pin holding manual outrigger section to power outrigger section. Operate POWER OUT CYLINDER control lever OUT to align holes on the side of power outrigger section with holes on side of the manual section nearest vertical cylinder. Insert pin in aligned holes. Remove link tube. Operate POWER OUT CYLINDER control lever IN to maximum.

9. Repeat steps 6 and 7 on opposite side.
10. Position and lock operator platforms in travel position - both sides.
11. Disengage PTO.
12. Store wheel chocks and cribbing.
13. Disengage parking brake before moving vehicle.
14. When travelling on the road, check all underpasses to be sure there is sufficient clearance for the unit.

5-11. SAFE VEHICLE TRANSPORT

1. Before transporting:

   a. Be sure that outriggers are stowed properly.

   b. Secure the loadline hook. Do not by any method, over tension the hook stow hardware or damage could result.

   c. Secure boom properly.

   d. Secure all loose items to the truck bed.

   e. Disengage the PTO.

   f. Release parking brake.

2. Do not travel with load on hook.

3. Be sure that tires are properly inflated.

4. Make sure that there is enough overhead clearance before entering any underpass.

5. Do not allow any persons to ride on the equipment when it is being transported.

6. A signal person may be required when moving or backing unit in areas where visibility is limited.

Section 6. CRANE INSPECTION

6-1. INSPECTIONS

An employer should perform daily and monthly inspections and maintain the results of those inspections for each hoisting machine. Thorough annual inspections should be made by a competent person. The following are suggested inspections to perform on IMT truck mounted hydraulic cranesand may be required by some local OSHA regulations.

6-2. GENERAL INSTRUCTIONS (See form on other side of this page)

All inspections listed should be performed as the schedule indicates. Check your local, in-state, regulations which may require recorded daily inspections. Daily inspections, at a minimum, should be verified and recorded on a monthly basis. This Inspection Form does not eliminate prescribed maintenance in other manuals furnished with the crane. A copy of this completed form should remain with the unit at all times.

NOTES IN REFERENCE TO INSPECTION SCHEDULE

* Crane hooks shall be taken out of service when any of the following conditions exist:
1. More than 15% excess of normal throat opening.
2. More than 10°/.17 rad. twist - hooks cannot be repaired.

** Wire ropes shall be taken out of service when any of the following conditions exist:
1. In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay.
2. Wear of one third the original diameter of outside individual wires. Kinking, crusting, bird caging, or any other damage resulting in distortion of rope structure.
3. Evidence of any heat damage from any cause
4. Reductions from nominal diameter of more than .4mm for diameters up to and including 7.9mm; .8mm for diameters 9.5mm to and including 12.7mm; 1.2mm for diameters 14mm and higher.

TO BE COMPLETED BY OWNER OF CRANE **TO BE COMPLETED BY INSPECTION PERSONNEL**

CRANE SERIAL NUMBER	DATE INSPECTED
DATE LAST INSPECTED	UNIT PASSED INSPECTION
NEXT INSPECTION DUE	UNIT FAILED INSPECTION
INSPECTED BY	SIGNATURE

INSPECTION SCHEDULE TO BE PERFORMED BY OPERATOR

Unit should not be operated until repairs have been made.

INSPECTION SCHEDULE D = Daily M = Monthly	INSPECTION DESCRIPTION	METHOD OF INSPECTION			REPAIRED			DATE INSPECTED
			ACCEPT	REJECT	YES	NO	DATE	
D	Check control mechanisms for excessive wear.	Visual and Operational						
D	Check all safety devices for malfunction.	Parts Manual and Operational						
D	Deterioration or leakage in air or hydraulic systems as tubes, fittings, hoses, seals, etc.	Visual and Operational						
D	Hydraulic system for proper oil level.	Visual						
D	Check for smooth and correct operation for each function including remote controls.	Operational						
D	Crane hooks *	Visual and Measure size						
D	Wire rope (cable).** Torque of end clamp attachments.	Visual						
M	Check for loose bolts, nuts, snap rings, and all other fasteners.	Visual						
M	Cracked or worn sheaves (Must be replaced)	Visual						
M	All decals and control knobs are present and legible	Visual						
M	Worn, cracked or distored parts such as pins, bearings, shafts, rollers, etc.	Visual and Operational						
M	Examine all exterior welds for cracks, separations, breaks, etc.	Visual						
M	Check for proper torque on base frame to truck and mast mounting bolts	Torque Wrench & Torque Chart						

Section 7. MAINTENANCE

7-1. MAINTENANCE

A regular schedule of maintenance is essential to keep your unit at peak operating efficiency. Operators or service personnel responsible for the care of the unit must be completely familiar with the type and frequency of inspections, maintenance and lubrication operations to be performed. The following pages outline the maintenance, lubrication and service required.

7-1-1. INSPECTION

The following pages list inspections which are to be conducted on your unit to help assure it is operating properly and safely. Check all items listed at the frequency listed and make necessary repairs prior to operating.

The inspections are separated into the following frequency classifications:

DAILY INSPECTIONS
These items should be visually inspected each day by the operator prior to using the unit.

WEEKLY INSPECTIONS
These items should be visually inspected weekly by the operator.

MONTHLY INSPECTIONS
These inspections are to be performed monthly by the personnel responsible for maintenance and service of the crane.

PERIODIC INSPECTION
This inspection is a thorough inspection conducted at least every 3 months and includes all items listed under DAILY, WEEKLY and MONTHLY INSPECTIONS in addition to those listed under PERIODIC INSPECTION. Federal laws (OSHA) and, ANSI B30.5 (a voluntary industry standard), require that dated and signed records of these PERIODIC INSPECTIONS be kept. An example of an OSHA inspection form is shown in Section 6 of this manual.

7-1-2. DAILY INSPECTIONS

Check the following items:

1. Engine oil level
2. Hydraulic oil level
3. Radiator coolant level
4. Loose parts or damage to structures or welds.
5. Operation of lights, safety equipment and gauges.
6. Condition of tires and suspension.
7. Lubrication of points required by Lubrication Chart.
8. Evidence of oil leaks from hoses or gearbox.
9. Controls including throttle for malfunctions or mis-alignment.
10. Truck parking brake operation.
11. Boom sequencing to insure that largest boom section extends first and retracts last.
12. All securing hardware such as cotter pins, snap rings, hairpins, and pin keepers for proper installations.
13. All safety covers for proper installation.

7-1-3. WEEKLY INSPECTIONS

Check the following items:

1. Battery water level.
2. Tire pressure.
3. Lubrication of points required by Lubrication Chart.
4. Boom lift and outrigger holding valves for proper operation.
5. Proper tightness of mounting bolts during first month of operation of new machine and then monthly thereafter.

7-1-4. MONTHLY INSPECTIONS

Check the following items:

1. All cylinders and valves for indications of leakage.
2. Lubrication of points by Lubrication Chart.

3. Load hook for cracks or having more than 15% from normal throat opening or 10° twist.

4. Main frame mounting bolts for proper torque (See Torque Data Chart).

5. Rotation system mounting bolts for proper torque.

6. All structural members (boom, mast, base, and outriggers) for bends, cracks or broken members.

7. All welds for breaks or cracks.

8. All pins for proper installation.

9. All control decals, safety decals and capacity charts for legibility and attachment.

7-1-5. PERIODIC INSPECTIONS

Check the following items:

1. All items listed under DAILY, WEEKLY and MONTHLY INSPECTIONS.

2. Loose bolts and fasteners in all areas.

3. All pins, bearings, shafts, and gears for wear, cracks or distortion to include all pivot, outriggers, pins and bearings.

4. Hydraulic systems for proper operating pressures.

5. Cylinders for damaged rods, dented barrels, drift from oil leaking by piston, leaks at rod seals, welds or holding valves.

6. PTO driveline system for proper alignment, lubrication and tightness.

7. Hydraulic hoses and tubing for evidence of damage such as blistering, crushing or abrasion.

8. Stability of unit throughout working area. Check stability procedure in Installation Section.

9. All electrical wires and connections for worn, cut, or deteriorated insulation and bare wire. Replace or repair wires as required.

7-1-6. ADJUSTMENTS AND REPAIRS

Any hazardous conditions disclosed by the inspection requirements listed above shall be corrected before operation of the crane is resumed. Adjustments and repairs shall be done only by designated personnel.

Adjustments shall be maintained to assure correct functioning of components. The following are examples:

FUNCTIONAL OPERATING MECHANISMS

SAFETY DEVICES

CONTROL SYSTEMS

POWER PLANTS

BRAKING SYSTEMS

Repairs or replacements shall be provided as needed for operation. Use only Iowa Mold Tooling Co., Inc. approved parts in repair of the crane.

7-2. LUBRICATION

Following the designated procedures is important in assuring maximum crane lifetime and utilization. The procedures and lubrication charts in this section include information on the types of lubricants used, the location of the lubrication point, the frequency of lubrication, and other information. The information included in this section does not include lubrication requirements for the truck chassis. Refer to appropriate truck manufacturer's manual for this information.

The service intervals specified are for normal operation where moderate temperature, humidity and atmospheric conditions prevail. In areas of extreme conditions, the service periods and lubrication specifications should be altered to meet existing conditions. For information on extreme condition lubrication, contact your local service representative or the Iowa Mold Tooling Co., Inc. service department.

7-2-1. LUBRICANTS

Specific recommendations of brand and grade of lubricants are not made here due to regional availability, operating conditions, and the continual development of improved products. Where questions arise, refer to the component manufacturer's manual and a reliable supplier.

CHASSIS GREASE

Lubricating grease of proper consistency is to be applied periodically at relatively frequent intervals with grease guns through grease fittings. Minimum apparent viscosity of 300 SSU at 100°F (38°C) is recommended.

EXTREME PRESSURE MULTIPURPOSE GEAR LUBRICANT (EPGL)

This gear lubricant is compounded to achieve high load carrying capacity and meet the requirements of either APD-GL-5 or MIL-L-2105. Unless otherwise specified, SAE 80W-90 viscosity may be used for year round service. Low temperature usage is restricted as follows:

SAE VISCOSITY NUMBER	MINIMUM AMBIENT TEMPERATURE - °C
75W	-40
80W	-26
85W	-18
90	-7
140	+5
25	+10

OPEN GEAR LUBRICANT

This is a special adhesive lubricant of heavy consistency for protection of wire rope and exposed gears where provision is not made for continuous lubricant replenishment. Select the viscosity that gives best protection and lubrication without peeling, scaling, or excessive throw off.

CHASSIS GREASE - LOW TEMP

This special grease for low temperatures remains plastic at -51°C with melting point of 138°C. It is a heavy duty extreme pressure type lubricant (Lubriplate Low Temp or equal).

HYDRAULIC OIL

Oil in a hydraulic system serves as the power transmission medium, system lubricant, and coolant. Selection of the proper oil is essential to ensure satisfactory system performance and life. The following types of oil are suitable under most operating conditions:

1. Good quality anti-wear hydraulic oils
2. Engine oil meeting the requirements of MIL-L-2104 or API Service Classification CB or CC, and having a minimum of 0.06% zinc by weight as zinc dithiophosphate.

The most important factors in selecting an oil for hydraulic service are:

1. Viscosity
2. Anti-wear additives

The oil must have proper viscosity to provide a lubricating film at system operating temperatures. Oil viscosity is important because it has a direct bearing on efficient transmission of power. An oil must flow readily through the system with a minimum of pressue and flow loss. Positive lubrication depends on viscosity. The oil must be sufficiently light to get between the components machined surfaces and maintain a lubricating film at system operating temperatures. Oil too light may cause the following conditions in the system:

1. Excessive leakage.
2. Lower volumetric efficiency of the pump.
3. Increased component wear.
4. Loss of system pressure.
5. Lack of positive hydraulic control.
6. Lower overall efficiency.

Oil too heavy may cause the following conditions in the system:

1. System pressure drop.
2. Increased system pressure.
3. Sluggish system operation.
4. Low mechanical efficiency.
5. Higher power consumption.

The following oil viscosity characteristics are recommended:

1. 80 to 180 SSU optimum at system operating temperature.
2. 60 SSU minimum at system operating temperature.
3. 7500 SSU maximum at starting temperature.
4. 90 Viscosity Index (VI) minimum.

When an engine crankcase oil is selected, the following grades will usually meet the above viscosity requirements.

SAE VISCOSITY	TEMPERATURE - °C
5W	-23 TO 82
10W	-12 TO 82
10W-30	-12 TO 99

ARCTIC CONDITIONS BELOW -31°C

In general, petroleum based fluids developed especially for low temperature service may be used with satisfactory results. However, certain fluids, such as halogenated hydrocarbons, nitro hydrocarbons, and phosphate ester hydraulic fluids, might not be compatible with hydraulic system seals and wear bands.

1. Engine oil meeting the requirements of MIL-L-46167 are satisfactory for arctic conditions and should be used if operating in temperatures below -32°C.

2. Gear oil in the winch must be changed to oil conforming to MIL-L-2105C, Grade 75W (GO-75) for operation in temperatures below -32°C.

Regardless of temperature and oil viscosity, always use suitable start-up procedures to ensure adequate lubrication during system warmup.

ANTI-WEAR ADDITIVES

Excessive wear in the system may cause a loss in volumetric efficiency, and may cause shutdowns for maintenance. An efficient anti-wear oil protects the components against rusting, resists oxidation, and helps prevent wear.

7-2-2. LUBRICATION POINTS

A regular frequency of lubrication must be established for all lubrication points. Normally, this is based on component operating time. The most efficient method of keeping track of lube requirements is to maintain a job log indicating crane usage.

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

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

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

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

When wear pads or rotation bearings are lubricated, cycle the components and re-lubricate to ensure complete lubrication of the entire wear area.

7-2-3. HYDRAULIC OIL DETERIORATION

Contamination of the hydraulic oil by solvents, water, dust or other abrasives will result in premature breakdown of oil's antifoam, lubrication, anti-rust and viscosity properties. Prolonged exposure to water or high operating temperatures above 82°C will cause an increase in the oxidation rate, producing varnish forming materials and sludge in the oil.

Periodically, a sample of hydraulic oil in the system should be drawn off and its condition checked for breakdown. To check oil quality:

1. Place oil sample in a clean glass.

2. Smell oil to detect a burnt or rancid odor.

3. Examine the oil for a cloudy or dark color.

4. Allow the sample to stand for several minutes and inspect it for water which will settle to the bottom. Water can result from a leak in the system or condensation due to temperature extremes.

When any of these conditions is observed, the system should be purged and filled with new oil.

7-2-4. HYDRAULIC SYSTEM PURGING

The oil should be changed in the reservoir and complete system after 800 hours of operation (or every six months, whichever occurs first) and after pump or other major hydraulic component failure.

Purging the system requires a new oil supply sufficient to completely fill the reservoir, lines, cylinders, etc., an extra quantity for loss during this procedure. To minimize oil loss during this process, operate the truck engine at low RPM.

During purging, new oil is supplied to the pump suction line through the reservoir fill cap and old oil is drained from the valvebank return bank.

Two operators are required during the purging operation: one to operate the crane controls and the other to regulate pump output (engine speed).

CAUTION

DO NOT ALLOW THE RESERVOIR OIL LEVEL TO DROP BELOW 1/3 CAPACITY DURING THIS OPERATION.

1. Locate the unit in an area which provides solid, level footing and space to accommodate the full operating range of the crane.

2. Stabilize the unit with the outriggers. Move the crane to either side of the truck and extend the inner, outer and extension cylinders.

3. Disengage the PTO, drain the hydraulic oil reservoir, remove the suction line filter and drain all hoses. Disconnect the pressure hose from the pump, drain and reassemble. Replace the suction line filter element and reassemble the system.

NOTE

DISPOSE OF WASTE OIL IN A RESPONSIBLE MANNER, FOLLOWING ALL FEDERAL, STATE AND LOCAL CODES.

4. Remove the reservoir return line and direct the flow into a sump or waste container. Plug the drain port on the reservoir and fill with new oil.

NOTE

BE THOROUGHLY FAMILIAR WITH THE FOLLOWING STEPS AND BE PREPARED TO PERFORM THEM IN AN UNINTERRUPTED SEQUENCE OR STOP THE ENGINE AT THE END OF EACH STEP. IF THIS IS NOT DONE, EXCESSIVE OIL WASTE WILL OCCUR.

5. Start the truck engine, depress the clutch, shift the transmission into neutral and engage the PTO. Rotate the crane 90°/ 1.57 Rad., retract extension booms, lower the outer boom to the lowest position and lower the inner boom.

6. Rotate the crane toward the rear center of the vehicle, raise the outriggers and kill the engine.

7. All components of the system are now purged. Replace the return line filter cartridge and reinstall the return line on the reservoir.

8. Check the reservoir oil level and add oil to the "FULL" mark.

7-2-5. PURGING AIR FROM THE SYSTEM

Air that is trapped in the cylinders will cause an erratic, "bumpy" motion. To expel the air, hold the affected control open after the function has "bottomed out". Move the function in the opposite direction and again hold the control open. Attempt to operate the crane in the normal manner to determine if the air has been purged.

7-2-6. HYDRAULIC COMPONENTS

7-2-6-1. SYSTEM RELIEF PRESSURE

System relief pressure is factory set. However, with time the spring may weaken and lower the system relief pressure. When this occurs, the relief valve unloads more often than it should with the rated load and causes the oil to overheat. To check the system relief pressure:

1. Start the truck engine, depress the clutch pedal, shift the transmission into neutral and engage the PTO. Allow the system to idle until it is warmed up.

2. Raise the main boom until the cylinder(s) are fully extended. Continue to hold the valve open and read the pressure on the pressure gauge. A reading of less than normal should be corrected.

7-2-6-2. CYLINDER HOLDING CAPABILITIES

The cylinders are equipped with holding valves that prevent sudden movement of the cylinder rods in the event of a hydraulic hose or other hydraulic component failure. The valve is non-adjustable and failure is unlikely. However, if a malfunction is suspected, it may be checked in the following manner:

1. With a full rated load, extend the cylinder in question and kill the engine.

2. Operate the valve to retract the cylinder. If the cylinder "creeps", replace the valve. If the cylinder does not "creep", the valve is serviceable.

7-2-6-3. FILTER ELEMENT REPLACEMENT

The unit contains hydraulic oil filters for removal of contaminating particles. To avoid residue accumulation in the reservoir and to protect hydraulic system components (valves, pumps, cylinders, etc.) the filter elements must be changed after 50 hours of new unit operation and every 200 hours thereafter. Periodically check the vacuum gauge reading of the suction line filter for a reading greater than 8", it could damage the pump due to pump cavitation. In addition, the filter elements should be replaced 50 hours after the repair of a major hydraulic component.

7-2-6-4. HYDRAULIC FILTER

To change filter cartridges:

1. Kill the engine.

NOTE

WHEN CHANGING THE SUCTION LINE FILTER, ALWAYS CLOSE THE GATE VALVE AT THE RESERVOIR FIRST.

2. Replace the cartridge with a new one ensuring proper rubber seal seating and tightening as much as possible with both hands.

3. Open the gate valve, engage the PTO and test the system for leaks.

7-3. MAINTENANCE AND SERVICE - LONG TERM STORAGE

7-3-1. HYDRAULIC SYSTEM

To ensure the life of the hydraulic system, which includes such items as seals, o-rings, hoses, filters, pumps, etc., the crane must be operated and maintained on a regular basis. If this maintenance is neglected, you run the risk of drying out critical components which will not perform correctly and could possibly cause numerous hydraulic leaks. Iowa Mold Tooling Co., Inc., therefore, recommends the crane be operated with all functions being operated or cycled fully as in normal crane operation every three months.

All wire rope which has been idle for a period of a month or more due to a shutdown or storage of a machine on which it is installed, shall be given a thorough inspection before it is placed into service. This inspection should cover all types of deterioration.

7-3-2. CORROSION CONTROL

To ensure the life and appearance of the crane, which includes booms, hydraulic hose, rotation bearings and rotation gearing, the crane must be thoroughly washed and lubricated after performing job functions in harsh environments, such as dirt, sand, salt water spray, etc. If this maintenance step is neglected, you run the risk of shortening the life of the crane through corrosion and abrasion. After a thorough washing, refer to the Lubrication Chart for the proper maintenance as scheduled.

7-4. SERVICE

7-4-1. GENERAL

The information supplied in this section of the manual is designed to assist you in service and repair of your IMT crane. Inspection, lubrication and general maintenance information are found in the previous sections of this manual. Before attempting to perform any service work, the machine must be shut down as outlined in the Operation Section.

Generally, a study of the hydraulic schematics in conjunction with a systematic procedure to locate and correct the problem will enable a skilled mechanic to determine the problem and correct it. If at any time you cannot find or correct the problem, contact your local distributor or the Iowa Mold Tooling Co., Inc. Service Department. Be sure you have your parts manual, model number and serial number at hand when you call. This information is on the serial number placard located on the crane mast.

The following general suggestions should be helpful in analyzing and servicing your crane. Use of the following systematic approach should be helpful in finding and fixing problems:

1. Determine the problem.
2. List possible causes.
3. Devise checks.
4. Conduct checks in a logical order to determine cause.
5. Consider the remaining service life of components against the cost of parts and labor necessary to replace them.
6. Make the necessary repair.
7. Recheck to ensure that nothing has been overlooked.
8. Functionally test the new part in its system.

NOTE

YOUR SAFETY AND THAT OF OTHERS IS ALWAYS THE NUMBER ONE CONSIDERATION WHEN WORKING AROUND CRANES. SAFETY IS A MATTER OF THOROUGHLY UNDERSTANDING THE JOB TO BE DONE AND THE APPLICATION OF GOOD COMMON SENSE. IT IS NOT JUST A MATTER OF "DO'S" AND DON'TS" STAY CLEAR OF ALL MOVING PARTS.

7-4-2. CLEANLINESS

An important item in preserving the long life of the crane is keeping dirt out of working parts. Enclosed compartments, seals, and filters have been provided to keep the supply of air, fuel, and lubricants clean. It is important that these enclosures be maintained.

Whenever hydraulic oil, fuel or lubricating oil lines are disconnected, clean any adjacent areas as well as the point of disconnect. As soon as the disconnection is made; cap, plug or tape each line or opening to prevent entry of foreign material. The same recommendations for cleaning and covering apply when access covers or inspection plates are removed.

Clean and inspect all parts. Be sure all passages and holes are open. Cover all parts to keep them clean. Be sure parts are clean when they are installed. Leave new parts in their containers until ready for assembly.

7-4-3. HYDRAULIC SYSTEMS

Contaminants in a hydraulic system affect operation and will result in serious damage to the system components. Dirty hydraulic systems are a major cause of component failures.

If evidence of foreign particles is found in the hydraulic system, flush the system and change filters.

Disassemble and assemble hydraulic components on a clean surface.

Clean all metal parts in nonflammable cleaning fluid. Then lubricate all components to aid in assembly.

Inspect all sealing elements (o-rings, gaskets, etc.) when disassembling and assembling the hydraulic components. Installation of new elements is always recommended.

When installing metal tubes, tighten all bolts finger tight. Then, in order, tighten the bolts at the rigid end, the adjustable end, and the mounting brackets. After tubes are mounted, install the hoses.

Connect both ends of the hose with all bolts finger tight. Position the hose so it does not rub the machine or another hose and has a minimum of bending and twisting. Tighten bolts in both couplings.

Due to manufacturing methods, there is a natural curvature to a hydraulic hose. The hose should be installed so any bend is with this curvature.

In case of replacement hoses with angled stem reusable fittings, the hose curvature must be taken into consideration when assembling and positioning the angled stem.

7-4-4. FASTENERS AND TORQUE VALUES

Use bolts of the correct length. A bolt which is too long may bottom before the head is tight against the part it is to hold. If a bolt is too short, there may not be enough threads engaged to hold the part securely. Threads can be damaged. Inspect them and replace fasteners as necessary. See Torque Data Chart.

Torque values should correspond to the type bolts, studs, and nuts being used. Always use hardened washers when torquing nuts or the bolts themselves.

The torque tables are provided for reference when performing maintenance.

Use of proper torque values is extremely important. Improper torquing can seriously affect performance and reliability.

Identification of fastener grade is always necessary. When marked as a high grade bolt (grade 5, 8, etc.) the mechanic must be aware that he is working with a highly stressed component and the fastener should be torqued accordingly.

If a fastener must be replaced and a similar grade is not available, always use a higher grade torqued to the same value as the original grade. As soon as available, the correct grade fastener should be installed to avoid a future state of confusion.

Special attention should be given to the existence of lubrication, plating, or other factors that might require variation from standard torque values.

When maximum recommended torque values have been exceeded, the fastener must be replaced.

NOTE

TEMPERATURE VARIATION, VIBRATION, AND ELASTICITY OF METALS CAN RESULT IN THE GRADUAL REDUCTION OF BOLT TORQUE. BOLTS SHOULD BE RETORQUED AS OUTLINED IN THE INSPECTION PROCEDURES.

Torque wrenches are precision instruments and are to be handled with care to ensure calibrated accuracy. Calibration checks should be made on a scheduled basis. Whenever the wrench might be either overstressed or damaged, it should immediately be removed from service until recalibrated. An erratic or jerking motion of the wrench can easily result in excessive torque. ALWAYS use a slow wrench movement and STOP when the predetermined value has been reached.

7-4-5. LABEL PARTS WHEN DISASSEMBLING

When removing or disconnecting a group of wires, cables, hoses, or other multiple parts, tag each one to ensure proper identification during assembly.

When shims are removed, tie them together and identify them as to location. Keep shims clean and flat until they are reinstalled.

7-5. BOOM WEAR PADS

The outer boom will house a number of extension boom sections, depending on crane options. The sections extend and retract on nylatron wear pads. With crane use, these pads wear and must be replaced. Replace wear pads when any of the following conditions exist:

1. When the pads wear such that the boom sections rub on boom sections, with the result of metal scraping and the removal of paint on the boom sections.

2. With the boom sections extended in the horizontal position, any noticeable droop of the boom sections would indicate the need for wear pad replacement.

To replace front wear pads, proceed as follows:

1. Retract all extension boom sections.

2. Operate OUTER BOOM and INNER BOOM control levers such that the outer boom is horizontal and at a comfortable working height.

3. Extend the required extension boom section sufficiently to allow access to front wear pads.

Manual sections may be extended as follows:

a. Extend a hydraulic section.

b. Secure outermost extension boom to a fixed object.

c. Remove the pin that secures the manual section.

d. Retract the hydraulic extension boom as required.

4 Remove upper pads by removing retaining cap screws and sliding pads out.

5. Slide in new pads and replace cap screws.

6. Remove lower pads by removing retaining cap screws. To relieve pressure on wear pad, either use a hoist to lift the end of the boom, or operate boom hoist control lever DOWN so that boom touches ground and allows ground pressure to lift up on front of boom slightly. Slide pad out.

7. Slide in new pad and replace retaining cap screws. Relieve hoist pressure on boom.

NOTE

SHIMS USED UNDER LOWER FRONT WEAR PADS ARE DESIRABLE TO REDUCE EXCESSIVE DEFLECTION.

To replace rear boom wear pads proceed as follows:

1. Retract all EXTENSION BOOMS.

2. Operate OUTER BOOM and INNER BOOM control levers such that the outer boom is horizontal and at a comfortable working height.

3. For hydraulic extension boom sections, remove cylinder rod pin by loosening set screw in end of rod eye and prying out the pin. Identify and remove hydraulic lines that supply the next telescoping section.

4. Cap or plug all open hydraulic fittings.

5. Position hoist for pulling boom section out of boom.

6. Using hoist, begin pulling disconnected sections from crane. When partially pulled out, remove top front stop block or wear pad by removing cap screws and sliding item out.

7. Lift boom end with hoist just sufficient to relieve pressure on bottom stop block or wear pad. Remove cap screws and slide block or pad out.

8 Re-position hoist for lifting boom sections. Use 2 fabric slings of adequate capacity. Use hoist to lift and remove extended boom section from crane. Position boom section on a firm work support while replacing rear wear pads.

9. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.

10. Start the crane and slowly cycle the boom in and out with no load to purge air from the system.

11. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

7-6. PIN AND BEARING INSPECTION AND INSTALLATION

7-6-1. PIN INSPECTION

1. Remove the protective covering from pins and inspect each pin for nicks, gouges or deep, wide scratches. A small nick or gouge up to 3.2mm diameter can be repaired by dressing the edges of the imperfection with a file so that no metal protrudes above the circular surface of the pin.

2. A circular scratch of up to 1.6mm wide or deep can be repaired in the same manner as described above.

3. A lengthwise scratch on the pin of up to .8mm wide or deep can be repaired as above.

4 Pins with defects larger than those listed in 1, 2 and 3 above, should be replaced.

7-6-2. PIN BEARING INSPECTION

The pin bearings (used at boom joints) furnished with this machine are made of a tough epoxy impregnated wound glass backing shell with a thin inner layer of filament wound bearing material. The outer bearing material should be visually checked for imperfections. Bearings with cracks or gouges larger than 1/4" diameter on the outside diameter should be replaced.

7-6-3. TRUNNION INSPECTION

The trunnion bore should either have a machined step or have a spring spacer installed to prevent inward movement of the bearing

7-6-4. INSTALLATION

1. Bearings are to be installed as shown.

2. The bearings should be started in their respective bores by rotating the bearing while applying inward pressure with the hand. Once the bearing has been started squarely into its bore, it can be driven to its full counterbored depth by tapping with a rubber mallet. The head diameter of the mallet should exceed the outside diameter of the bearing to ensure that the bearing is not damaged during assembly.

3. If the bearing appears to be loose in the bore (if it can be pushed in with hand pressure alone), it is permissible to tighten the bearing by centerpunching the bore diameter in approximately 50 places around and throughout the 5cm deep bored area. Centerpunching will raise the metal around the edge of the punch mark and this raised metal will hold the bearing firmly in place during machine operation.

4. After all bearings have been installed and before attempting to assemble the machine, insert the 5cm pins through both bearings in each end of the lift cylinders and through the boom pivot bearings to ensure alignment and fit are correct. Pins should slide freely through the leading hole and start in the opposite hole. If a pin starts to bind through the leading hole, do not force the pin any further to avoid damaging the pin surface finish. Remove the pin and clean any corrosion or burrs out of the holes with a round file or emery cloth. A heavy hammer is allowed for pin replacement as long as pin bearing material is not removed while driving pin.

7-7. TURNTABLE GEAR - REMOVAL AND REPLACEMENT

The following procedure is for when a hoist of adequate capacity is available to lift off the entire boom assembly.

If such a hoist is not available, some boom disassembly will be necessary.

1. Retract all extension booms.

2. Operate OUTER BOOM and INNER BOOM control levers to position outer boom in a vertical position with boom point as low as possible.

3. Position 2 fabric slings around boom and cinch on opposite sides of boom center of gravity. Hook slings on hoist and raise hoist to tension the slings.

4. Identify and remove hose connections between crane base and boom. Cap or plug all open hydraulic fittings.

5. With boom fully supported in position by hoist, remove bolts securing mast to turntable gear.

6. Disconnect lubrication line at turntable gear.

7. Remove cap screws that secure turntable gear to crane base.

8. Remove turntable gear from crane base.

9. Thoroughly clean the top of the crane base and bottom of the new turntable gear bearing. The mating surfaces must be clean and dry - no oil or grease.

10. Install the new gear bearing using new bolts and hardened flat washers. Hand tighten only.

For proper operation of the crane, the high spot on the turntable gear must be matched to the pinion gear.

NOTE

THE HIGH SPOT ON THE TURNTABLE GEAR IS MARKED WITH YELLOW PAINT.

Remove yellow paint and check gear backlash with a feeler gauge. Clearance between pinion gear and turntable gear bearing teeth should be .1524mm to .2286mm. Shift the turntable gear around to adjust the backlash.

11. Torque the turntable mounting bolts per Torque Data Chart in Reference Section.

CAUTION

BEFORE TORQUEING, SEE TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE IN THE REFERENCE SECTION.

12. Reverse procedure for reassembly. Use new cap screws and hardened washers when attaching mast to turntable gear. Torque mounting bolts to 44 kg-m.

13. Start the crane and slowly cycle the boom cylinders with no load to purge air from the system.

14. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

7-8. PINION AND DRIVE GEAR BUSHINGS - REMOVAL AND REPLACEMENT

To remove the pinion gear and bushings:

1. Rotate the crane mast until the notch on the mast base plate is positioned over the pinion gear.

2. Remove the pinion gear cover.

3. Locate and remove the retaining ring on the bottom of the pinion gear under the base.

4. Lift the pinion gear up and out of the intermediate gear. Slide the intermediate gear out of the way.

5. Install the bushing removal tool (IMT part number 92091200) as shown in Figure G-1.

6. Apply power to pull the bushings up and out of the base.

NOTE

POWER MAY BE SUPPLIED BY A SIMPLE HAND PUMP OR BY AN AIR-OVER-HYDRAULIC INTENSIFIER PUMP.

7. To install the bushings, assemble the tool as shown in Figure G-2.

7-9. REMOVAL AND REPLACEMENT OF OUTRIGGER ARMS

For standard 4.88m span outriggers:

1. Extend horizontal outrigger cylinder to maximum.

2. Disconnect rod end of horizontal cylinder from outrigger.

3. Retract horizontal cylinder.

4. Disconnect hydraulic hoses from vertical outrigger cylinder and beam. Cap or plug all open hydraulic fittings.

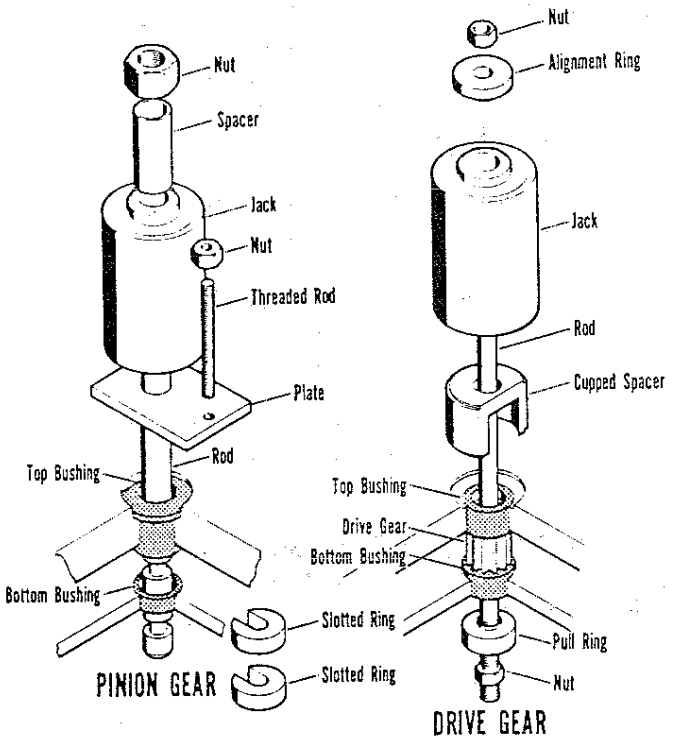


Figure G-1. BUSHING REMOVAL

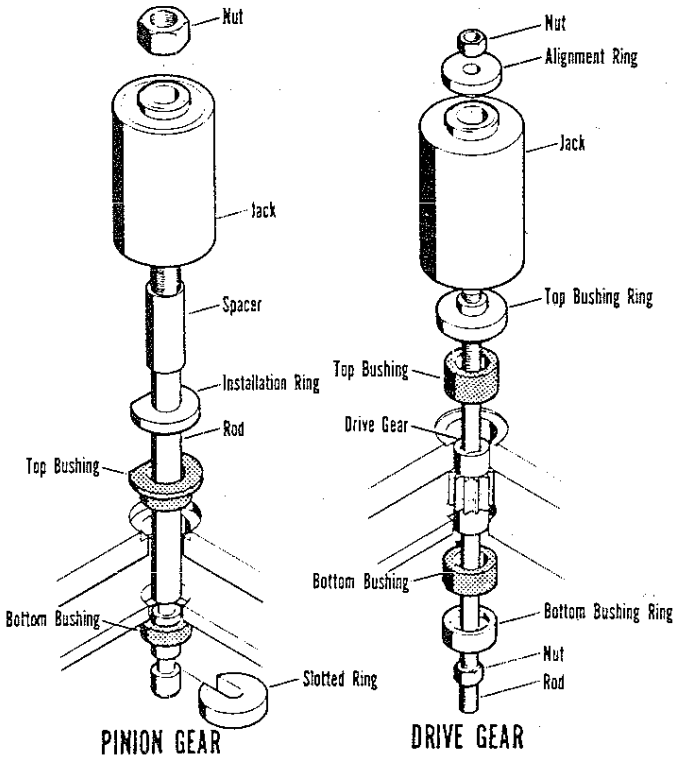


Figure G-2. BUSHING INSTALLATION

5. Position 2 fabric slings around outrigger beam and use hoist to lift and pull out the outrigger beam assembly. Position the beam assembly on a firm work support.

6. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.

7. Start the crane and slowly cycle the vertical outrigger cylinder down and up with no load to purge air from the system.

8. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

For optional 6,4m span outriggers:

1. Extend horizontal outrigger cylinder to maximum.

2. Position link tube between manual section and base.

3. Pull out the pin through the side of the manual section.

4. Retract the horizontal cylinder.

5. Disconnect hydraulic hoses from vertical outrigger cylinder and beam. Cap or plug all open hydraulic fittings.

6. Position 2 fabric slings around outrigger beam and use hoist to lift and pull out the outrigger beam assembly. Position the beam assembly on a firm work support.

7. Extend the horizontal cylinder.

8. Disconnect rod end of horizontal cylinder from outrigger.

9. Retract horizontal cylinder.

10. Position 2 fabric slings around outrigger beam and use hoist to lift and pull out the outrigger beam. Position the beam on a firm work support.

11. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.

12. Start the crane and slowly cycle the vertical outrigger cylinder down and up with no load to purge air from the system.

13. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

7-10. VERTICAL OUTRIGGER CYLINDERS - REMOVAL AND REPLACEMENT

1. Remove horizontal outrigger beam assembly as described above. For optional 6.4m span outriggers, it is not necessary to remove the powered outrigger section (lines 7-9 above).

2. Position outrigger beam assembly on side.

3. Remove the 2 cap screws that secure the vertical cylinder to the beam.

4. Position a fabric sling around leg weldment. Use a hoist to begin pulling leg and lower cylinder from beam weldment.

   Use a second sling around upper end of leg to finish pulling leg from beam. Position leg on a firm work support.

5. Remove retaining ring and pin that secures lower end of outrigger leg to rod end of vertical cylinder.

6. Position a fabric sling around upper end of vertical cylinder. Use hoist to begin pulling cylinder from leg weldment. Use a second sling around lower end of cylinder to finish pulling cylinder from leg. Position cylinder on firm work support.

7. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.

8. Start the crane and slowly cycle the vertical outrigger cylinder down and up with no load to purge air from the system.

9. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

7-11. HORIZONTAL OUTRIGGER CYLINDERS - REMOVAL AND REPLACEMENT

1. Remove hydraulic hoses from horizontal outrigger cylinder.

2. Remove retaining hardware on both ends of cylinder.

3. Slide cylinder out of support bracket and remove from base. Position cylinder on a firm work support.

4. Reverse procedure for re-assembly.

5. Start the crane and slowly cycle the horizontal outrigger cylinder out and in with no load to purge air from the system.

6. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

7-12. REMOVAL AND REPLACEMENT OF OPERATOR CONTROL VALVE

1. Remove cotter pins and clevis pins which secure control rods to valve sections.

2. Identify all hoses and position at the control valve first and then remove the hoses from the valve. Cap or plug all open hydraulic fittings.

3. Position a fabric sling around the valve to prepare for lifting. Hook the sling onto a hoist. Raise hoist to tension the sling. Remove hardware securing valve to crane base. Position valve on a firm work support.

4. Reverse procedure for re-assembly. DO NOT induce any distortion in valve body when mounting it. Use shims under mounting pads if necessary to prevent distortion. Torque threaded fasteners per Torque Data Chart. Observe hose identification when re-connecting hoses to valve.

5. Start the crane and slowly cycle all cylinders out and in with no load to purge air from the system.

6. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

7-13. EXTENSION CYLINDERS - REMOVAL

1. Retract all extension booms, both hydraulic and manual operated.

2. Position the outer boom below horizontal with outer boom cylinder extended, so as to have the end of the last extension boom approximately 61cm above the ground. See Figure G-3.

3. Secure the end of the last extension to a suitable place on the boom, such as the outer boom linkage - rod end side - with a "come along", to keep extension booms retracted during removal of extension cylinders. See Figure G-4.

4. Disconnect those hoses connected to the cylinder(s). Remove the sequence valve activating bar on the rod end (all cylinders except first extension). See figure G-5.

5. Remove pin at rod end, by removing the set screw holding the pin, located at the end of the rod.

6. When the rod pin has been removed, extend the boom by providing slack in the "come along" chain and letting the boom slide out approximately 30cm.

7. Open the bleeder screws to relieve hydraulic pressure on extend and retract sides of cylinder. Remove rod end counterbalance valve. Unscrew slowly to allow buildup hydraulic pressure, if any, to bleed off. See Figure G-6.

8. Secure cylinder with a lifting strap to an overhead hoist to prevent the cylinder from falling during removal of the mounting bolts.

9. Remove the four 1/2" bolts holding the cylinder flange to the boom.

NOTE

Take note as to where shims have been installed to level the cylinder with each other and with the boom

10. Lift the cylinder with the hoist and lay it carefully on a clean work table equipped with a vise. Be careful not to damage the port tubes running on the outside of the cylinder case.

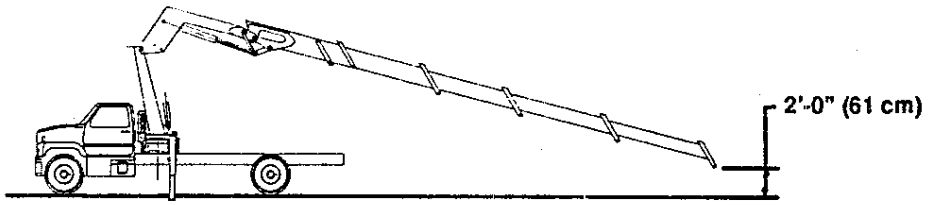


Figure G-3. CRANE POSITION

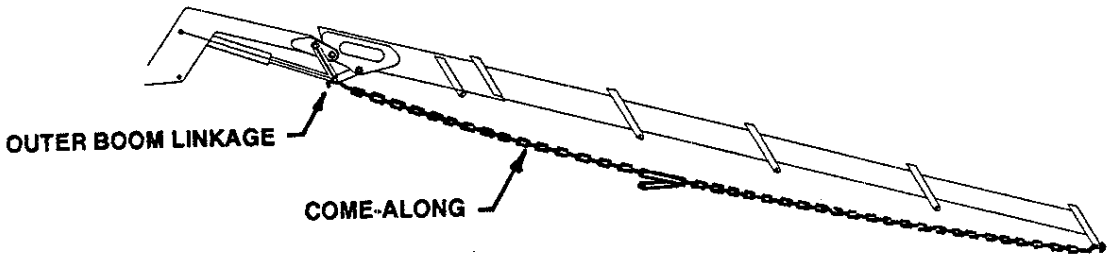


Figure G-4. SECURING BOOMS

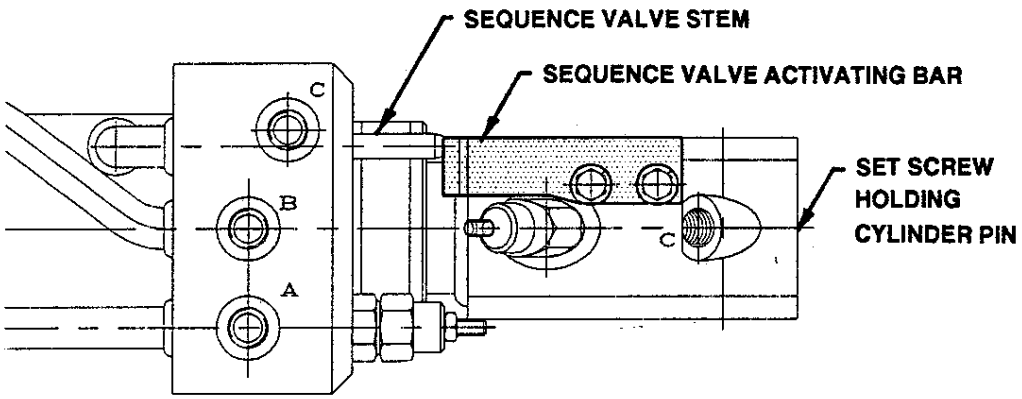


Figure G-5. CYLINDER ROD-END

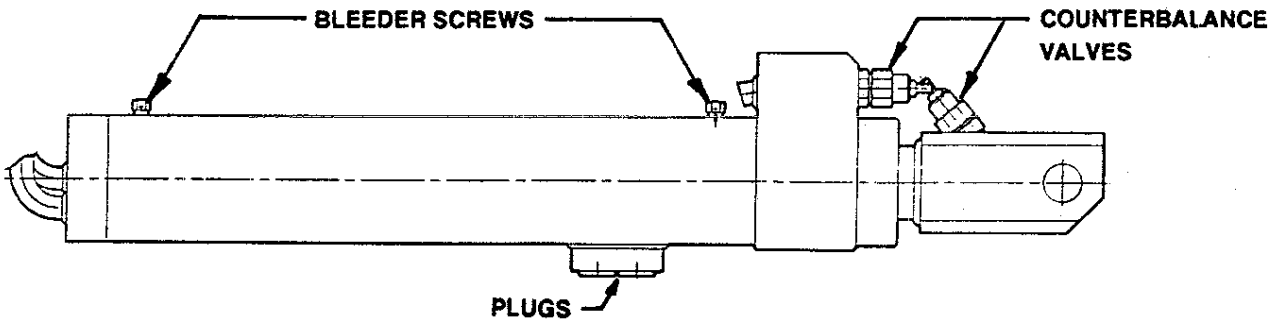


Figure G-6. BLEEDER SCREWS

7-14. EXTENSION CYLINDERS - REINSTALLATION

NOTE

If more than one cylinder is to be installed, start with the lowest one first to simplify reassembly

1. Secure the end of the last extension boom to the outer boom linkage to prevent the extension booms from sliding outward during reinstallation. (Ref paragraph 7-13, step 3). Secure extension booms so they are approximately 30 cm from their fully retracted position. Use a "come along" to permit extending or retracting the extensions during reassembly.

2. Position the outer boom below horizontal (outer boom cylinder extended), so as to have the end of the last extension approximately 61cm above the ground.

3. Remove the counterbalance valve and sequence valve activating bracket from rod end. See Figure G-5.

4. Lift the cylinder with the overhead hoist and position it in place on the boom. Reinstall the four 1/2" bolts holding the cylinder flange to the boom. Reinstall the shims that are provided to level the cylinder with the boom and the other cylinder in the same locations as they were used at disassembly.

5. Retract the appropriate boom extension by means of the "come along" and reinstall the cylinder pin and its retaining set screw located at the end of the rod.

6. Reconnect the hoses. Reinstall the counterbalance valve on rod end and reintall the sequence valve activating mechanism.

7-15. OUTER BOOM - REMOVAL AND REPLACEMENT

1. Retract all sections of the outer boom.

2. Operate OUTER BOOM and INNER BOOM control levers such that the outer boom is horizontal and at a comforable working height.

3. Position 2 fabric slings of adequate size around opposite ends of the outer boom assembly. Slings must not pinch hydraulic hoses. Position hoist to lift on slings and lift up to tension the slings.

4. Identify and disconnect hydraulic hoses from rear of outer boom assembly. Cap or plug all open hydraulic fittings.

5. Remove pin retaining bolt through hoist pin of outer boom base section.

6. With the aid of a heavy sledge hammer and a pin driving tool, drive the boom hoist pin from the base section of outer boom. Allow link to hang down.

7. Remove pin retaining bolt through pivot pin of outer boom base section. With aid of a heavy sledge hammer and a pin driving tool, drive the boom hoist pin from the base section of the outer boom. Hoist outer boom onto a firm work support.

8. Reverse procedure for reassembly. Torque threaded fasteners per Torque Data Chart.

9. Start the crane and slowly cycle the boom in and out with no load to purge air from the system.

10. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

7-16. OUTER CYLINDER - REMOVAL AND REPLACEMENT

1. Retract all sections of the outer boom.

2. Operate OUTER BOOM and INNER BOOM control levers to position outer boom as low as possible and supported at both ends. Outer boom hoist cylinder must be positioned to allow it to swing to vertical position when end rod is removed.

3 Identify and remove hose connections at outer boom hoist cylinder. Cap or plug all open hydraulic fittings.

4. Position 1 long sling of adequate capacity around outer boom hoist cylinder and cinch it near rod end. Hook sling on hoist and raise hoist to tension the sling.

5. Remove pin retaining bolt and keeper on rod end.

6. With the aid of a heavy sledge hammer and a pin driving tool, drive the rod end pin from the cylinder and linkage. Allow cylinder to hang down.

7. Re-position the sling toward piston end of cylinder. Cinch sling such that sling will support cylinder in vertical position.

8. Remove pin retaining bolt and keeper on piston end.

9. With aid of a heavy sledge hammer and a pin driving tool, drive the piston end pin from the cylinder and inner boom. An assistant will be required to hold the cylinder straight vertically while driving out the pin.

10. Position cylinder on a firm work support.

11. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.

12. Start the crane and slowly cycle boom hoist cylinder out and in with no load to purge air from the system.

13. After the air has been purged from the system, check reservoir oil level and top off if necessary.

7-17. INNER CYLINDER - REMOVAL AND REPLACEMENT

1. Retract all sections of the outer boom.

2. Operate OUTER BOOM and INNER BOOM control levers to position inner boom as low as possible and support the outer boom at both ends.

3. Identify and remove hose connections at inner boom hoist cylinders. Cap or plug all open hydraulic fittings.

4. Position a fabric sling of adequate capacity around one inner boom cylinder and cinch sling near rod end such that sling will lift cylinder in vertical position. Hook sling on hoist and raise hoist to tension the sling.

5. Remove retaining bolt from rod end of cylinder. Use pry bar to remove pin from inner cylinder.

6. Remove retaining bolt and keeper plate from piston end of cylinder. With aid of a heavy sledge hammer and pin driving tool, drive piston end pin from the mast. Position cylinder on a firm work support.

Repeat steps 4, 5 and 6 for opposite side.

7. Reverse procedure for reassembly. Torque threaded fasteners per Torque Data Chart.

8. Start the crane and slowly cycle inner boom hoist cylinder out and in with no load to purge air from the system.

9. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

7-18. INNER BOOM - REMOVAL AND REPLACEMENT

1. Remove outer boom as per 7-15.

2. Operate OUTER BOOM hoist control lever to retract the cylinder. If desired, remove outer boom hoist cylinder from inner boom per 7-16.

3. Operate INNER BOOM control lever to lower the inner boom point to firm contact on ground. A block between the boom and ground is desirable.

4. Identify and disconnect hydraulic hoses running between outer boom and inner boom. Cap or plug all open hydraulic fittings.

5. Disconnect rod ends of inner boom hoist cylinders per 7-17, steps 4 and 5. Position a block for cylinders to rest against. Be careful not to pinch or pull hydraulic hoses.

6. Position 2 fabric slings of adequate capacity around inner boom and cinch slings on opposite sides of center of gravity. Hook slings on hoist and raise hoist to tension the sling.

7. Remove cap screw and retainer from inner boom pivot pin. With aid of a heavy sledge hammer and pin driving tool, remove the inner boom and lay down on a firm work support.

7-19. MAST - REMOVAL AND REPLACEMENT

1. Remove outer boom as per 7-15.

2. Retract OUTER BOOM hoist cylinder. Operate INNER BOOM control lever to lower the inner boom point to firm contact on ground. A block between the boom and ground is desirable.

3. Identify and disconnect hydraulic hoses running between lower boom and mast. Cap or plug all open hydraulic fittings.

4. Remove inner boom hoist cylinders as per 7-17.

5. Position 2 fabric slings of adequate capacity around outer boom and cinch slings on opposite sides of center of gravity. Hook slings on hoist and raise hoist to tension the sling.

6. Remove retaining bolt and keeper plate from pivot end of inner boom. With aid of a heavy sledge hammer and pin diving tool, remove the inner boom pivot pin. Remove inner boom and lay on a firm work support.

7. Remove the cap screws that secure the mast to the turntable bearing.

8. Reverse procedure for assembly. Torque threaded fasteners per Torque Data Chart and Turntable Bearing Fastener Sequence in Reference Section.

9. Start the crane and slowly cycle all boom cylinders out and in with no load to purge air from the system.

10. After the air is purged from the system, check the reservoir oil level and top off if necessary.

7-20. ROTATION MOTOR, COUNTERBALANCE VALVE AND BRAKE - REMOVAL AND REPLACEMENT

1. Shut down hydraulic system to ensure there is no pressure in the system.

2. Remove the two input/output hoses and three drain hoses connected to the counterbalance valve.

3. Remove the four conterbalance valve mounting bolts, being careful to cover parts with clean rags to prevent contaminaion.

4. Remove the two hydraulic motor mounting cap screws and carefully remove the motor.

5. For removal of the hydraulic brake, remove the two cap screws (longest ones in the mounting flange) and remove the brake assembly.

6. Installation is the reverse of the steps above. Be sure the mounting bolts for all three items are torqued to the correct specification.

CAUTION

Always identify each hydraulic hose before removal to ensure proper hookup to new components.

7-21. CAPACITY SHUT DOWN/ OVERSTRESS SYSTEM

The capacity shut down/overstress system is designed to prevent loads from being lifted which exceed the rated capacity of the crane.

The capacity shut down system, an integral part of the main hydraulic system, will slow down, then disable those crane functions which are causing the over-capacity condition. Functions that decrease the over-capacity condition remain normal.

7-21-1. MODE OF OPERATION

The capacity shut down system will sense an overload condition when the induced hydraulic pressure at the base end of the inner lift cylinders exceeds 289.7 bar. This induced pressure is directed through a velocity fuse, to the pilot port of relief valve "A" in the manifold at the main control valve. When the relief valve is piloted open, it opens a passage to tank for the load sense signals of winch "up", inner lift cylinder "down", boom extension "out" and outer boom lift "up" and "down". Without the ability to build up pressure in the load sensing lines, these functions will be inoperative.

To relieve the overload condition, the boom extensions can be retracted or the winch can be lowered. If the boom is already retracted and the crane does not have a winch, a "crane lock up" condition could exist. To prevent this from happening, an electrical boom position sensing system, mounted on the outer boom has been

incorporated into the system (refer to Figures G-8 and G-9):

If the outer boom is horizontal, an electrical signal will close the normally open valves "B" & "C" (located in the manifold at the main control valve), thus restoring the outer boom "up" and "down" functions - previously negated by open piloted relief valve "A".

If the outer boom is moved downward, at approximately 5°/.087 rad., solenoid valve "C" only, will be be energized. It will then be possible to continue lowering the boom until it is out of overload.

If the outer boom is moved upward at approximately 5°/.087 rad., solenoid valve "B" only, will be energized. It will then be possible to continue raising the boom until it is out of overload.

The oveload condition will be apparent to the operator through indicator lights on the unit. If both lights are on, it indicates that the crane is overloaded and that the outer lift cylinder can be extended or retracted to raise or lower the boom to get out of the overloaded condition. If the top light only is on, the boom can be raised out of overload. If the lower light only is on, the boom can be lowered out of overload.

7-21-2. ANTI-TWO BLOCK (CRANE EQUIPPED WITH WINCH)

The anti-two block circuit disables the same functions as the capacity shut down system by connecting the load sense gallery to tank when solenoid valve "D" is energized. When this valve is energized, by the signal from the limit switch at the boom tip, all functions related to the overload become inoperable. This includes inner cylinder "down", outer cylinder "up" and "down", extension cylinder(s) "out" and winch "up". Once the anti-two block condition has been corrected by lowering the load, all functions return to normal operation.

CONDITION	POSSIBLE CAUSE	POSSIBLE SOLUTION
Crane in overload all the time	Relief valve "A" is stuck open.	Remove/clean or replace.
Crane does not overload	Relief valve "A" will not open.	Check pilot line.
		Remove/clean or replace
Crane overloads too soon or too late	Pressure setting on relief valve "A" has changed.	Reset or replace.
Can't maneuver out of overload condition by raising outer boom (from a horizontal or above horizontal position)	Solenoid valve "B" will not close.	Check pressure switch providing 12-volts to control box.
		Jump connections to raise the load out of overload.
		Replace switch.
		Check electrical control box of boom position sensing system.
Can't maneuver out of overload condition by lowering the outer boom from a horizontal or below horizontal position	Solenoid valve "C" will not close.	Same as above except, if needed, jump connection of pressure switch to lower the load out of overload.

Figure G-7. TROUBLESHOOTING - OVERSTRESS SYSTEM

7-21-3. CHECKING CONTROL BOX CIRCUIT (Electrical boom position sensing circuit)

See Figure G-9 for reference.

Apply 12-volts DC to red wire and ground the black wire.

When box is horizontal, there should also be 12-volts between the white and green wires and the ground. Both LED's will be "ON".

When the box is rotated to simulate 5°/.087 rad. or more above horizontal position, there should be 12-volts between the white wire and the ground. Top LED only will be "ON".

When the box is rotated to simulate the boom 5°/.087 rad. or more below horizontal position or more, there should be 12-volts between the green wire and the ground. Lower LED only will be "ON".

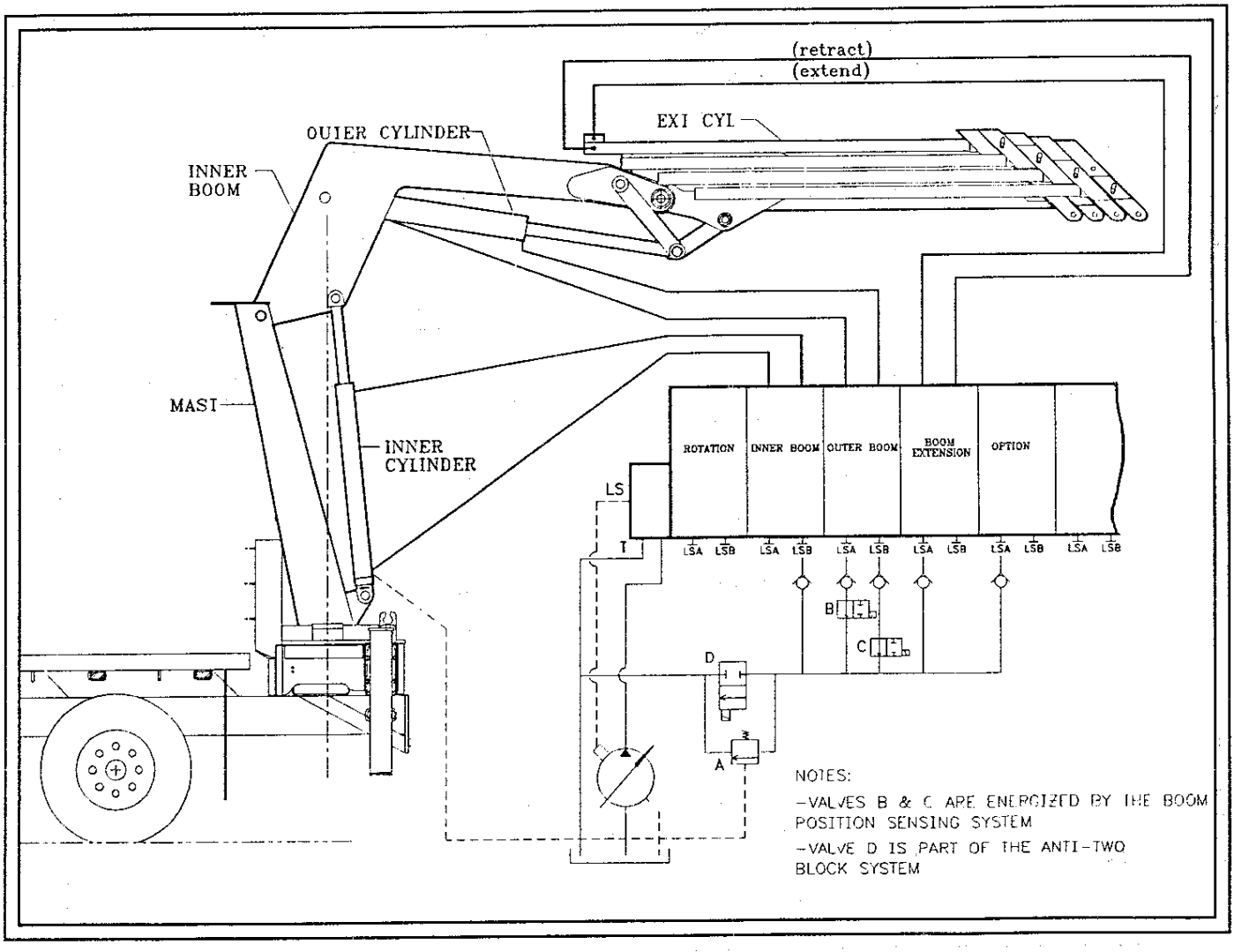


Figure G-8. CAPACITY SHUT DOWN SYSTEM

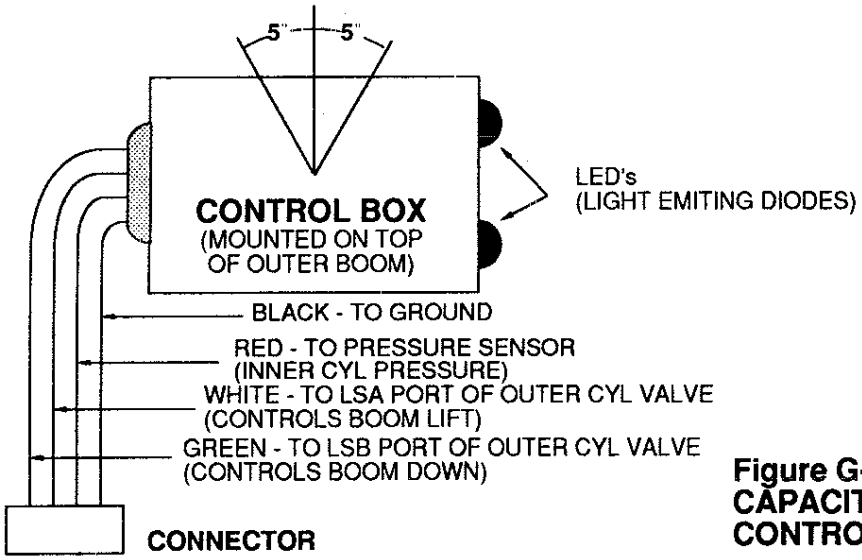


Figure G-9.
CAPACITY SHUT DOWN SYSTEM CONTROL BOX WIRING

CONDITION	POSSIBLE CAUSE	POSSIBLE SOLUTION
Crane will not rotate.	Crane is on excessive incline.	Level crane.
	Rotation circuit relief valves sticking.	Clean & check circuit.
	Turntable bearing drag.	Lubricate turntable bearing while rotating.
	Brake not releasing.	Bleed air from brake.
Excessive noise during operation.	Low oil temperature.	Allow unit to warm up.
	Low hydraulic oil supply.	Check and fill.
	Suction line kinked, collapsed or blocked.	Clear blockage.
	Hydraulic oil too thick	Warm oil or use oil applicable to environment.
	Plugged suction strainers	Remove from tank - clean or replace.
	Relief valve chattering.	Damaged or dirty relief valve - replace.
	Rotation Brake dragging.	Bleed air from brake.
	Tank breather plugged.	Clean breather.
Cylinders drift.	Oil not getting to cylinders	Clean and/or replace as required.
	Worn or damaged piston seals.	Replace.
	Air in hydraulic system	Purge air.
	Loose holding valve.	Tighten valve.
	Dirt in holding or check valve.	Clean.
Boom chatters during extension/retraction or does not sequence	Extension boom sections require lubrication.	Lubricate booms
	Worn wear pads.	Replace wear pads.

Figure G-10. TROUBLE DIAGNOSIS

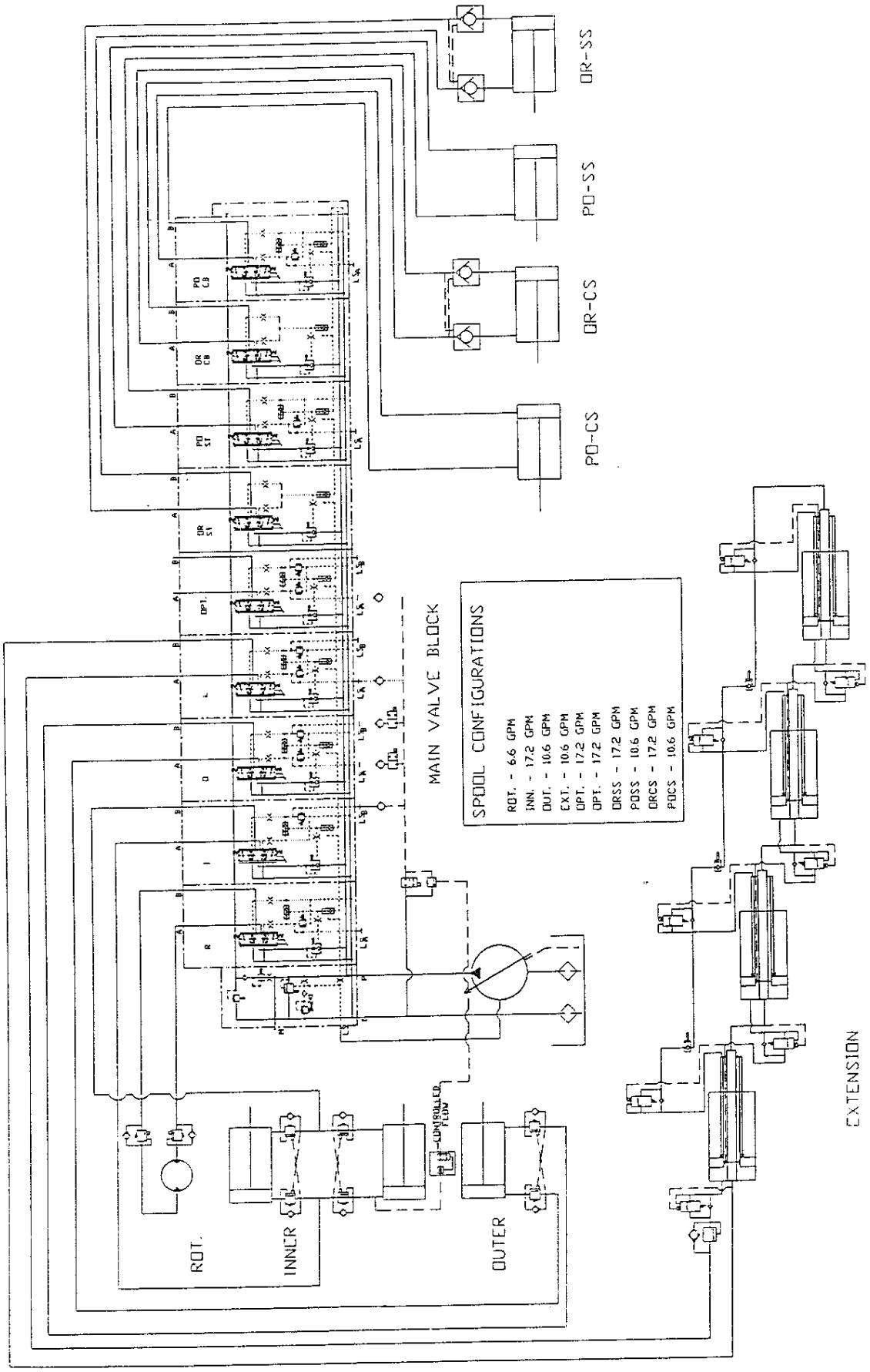


Figure G-11. HYDRAULIC SYSTEM SCHEMATIC

Section 7-A. CYLINDER REPAIR

7A-1. CYLINDER DISASSEMBLY

These instructions apply to the inner, outer, and outrigger cylinders only. For information on the extension cylinders, refer to paragraph 7A-3, 7A-4 and 7A-5.

The following list of tools will be a definite asset in the disassembly and repair of IMT cylinders:

SPANNER WRENCH (IMT part number 3Y140510)
FITS ALL IMT CYLINDERS.

NEEDLE-NOSE PLIERS
FOR REMOVAL AND REPLACEMENT OF SEALS.

ICE PICK OR SHARP AWL
FOR REMOVAL AND REPLACEMENT OF SEALS.

PLASTIC/RUBBER HAMMER
USED WITH SPANNER WRENCH FOR HEAD AND PISTON INSTALLATION.

CAUTION

IF SOLVENT IS USED TO CLEAN THE INTERNAL CYLINDER COMPONENTS, ALL TRACES OF SOLVENT MUST BE REMOVED. ANY RESIDUE WILL DAMAGE THE SEALS.

WARNING

USE TRICHLOROETHANE IN A WELL VENTILATED AREA. INCOORDINATION AND IMPAIRED JUDGEMENT MAY OCCUR AT VAPOR EXPOSURES FROM 500 PPM - 1000 PPM. DIZZINESS, DROWSINESS, LOSS OF CONSCIOUSNESS AND EVEN DEATH CAN OCCUR AT INCREASING LEVELS OF EXPOSURE. WHEN INVOLVED IN A FIRE, TRICHLOROETHANE EMITS HIGHLY TOXIC AND IRRITATING FUMES.

WARNING

DO NOT USE COMPRESSED AIR TO ASSIST IN WITHDRAWING THE PISTON/ROD ASSEMBLY. THE USE OF COMPRESSED AIR MAY RESULT IN PROPELLING THE PISTON/ROD ASSEMBLY OUT OF THE CYLINDER AND MAY CAUSE SERIOUS INJURY OR DEATH.

NOTE

IF THE CYLINDER IS BEING REPAIRED DUE TO A WORN SEAL, WE RECOMMEND REPLACING ALL OF THE COMPONENTS FOUND IN THE SEAL KIT. THE SMALL ADDITIONAL EXPENSE MAY SAVE YOU EXPENSIVE EQUIPMENT DOWNTIME IN THE FUTURE. REFER TO YOUR PARTICULAR CYLINDER IN THE PARTS SECTION FOR SEAL KIT PART NUMBERS.

1. Thoroughly wash the exterior of the cylinder case. Blow dry with compressed air.

NOTE

AFTER THE CASE HAS BEEN WASHED, PROCEED WITH DISASSEMBLY IN A CLEAN ENVIRONMENT WHICH IS FREE OF DUST AND DIRT.

2. Place the cylinder on a flat surface near a vise. Slip a pin through the pin boss and clamp the pin in a vise (Figure G1-1).

CAUTION

CLAMP ONLY THE PIN. DO NOT CLAMP THE CYLINDER IN A VISE. IT MAY DAMAGE THE CYLINDER.

3. Unscrew the head (Figure G1-2) with a spanner wrench (IMT part number 3Y140510). Withdraw the head from the cylinder case.

4. Secure the rod pin boss in the same manner as the base end pin boss (Figure G1-1).

5. Unscrew the piston from the rod with a spanner wrench in the same manner as the head.

CAUTION

DO NOT CLAMP THE MACHINED SURFACE OF THE ROD IN THE VISE. DAMAGE TO THE ROD WILL RESULT.

6. Remove the wafer lock ring and the stop tubes from the rod. The wafer lock was crushed to secure it. To remove it, slide the head into contact with the wafer lock and hammer on the head with the plastic hammer. Drive the wafer lock ring off the rod.

7. Slide the head off the rod.

8. Inspect the cylinder interior and the rod for dents, nicks, scratches, etc. and repair or replace as necessary.

CAUTION

FAILURE TO REPLACE A DAMAGED ROD OR CYLINDER CASE MAY RESULT IN LEAKS AND POOR PERFORMANCE. FURTHER EQUIPMENT DOWNTIME WILL BE NECESSARY TO REMEDY THIS PROBLEM.

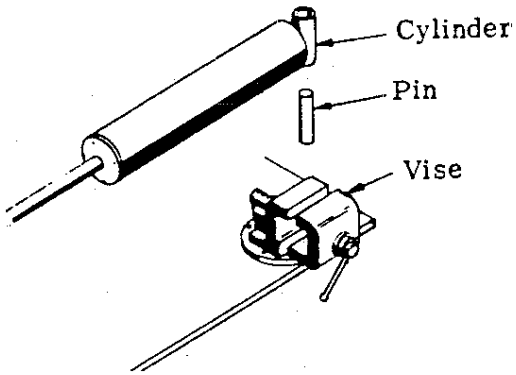


Figure G1-1. SECURING CYLINDER

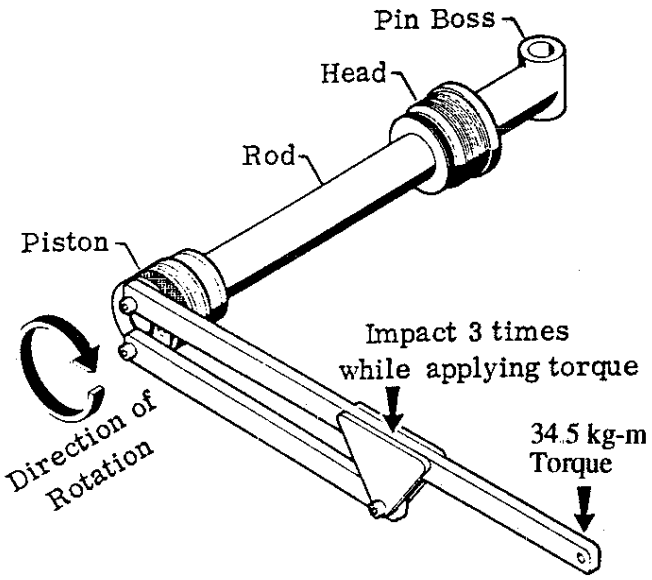


Figure G1-2. PISTON/ROD ASSEMBLY
(SPANNER WRENCH PART NO: 3Y140510)

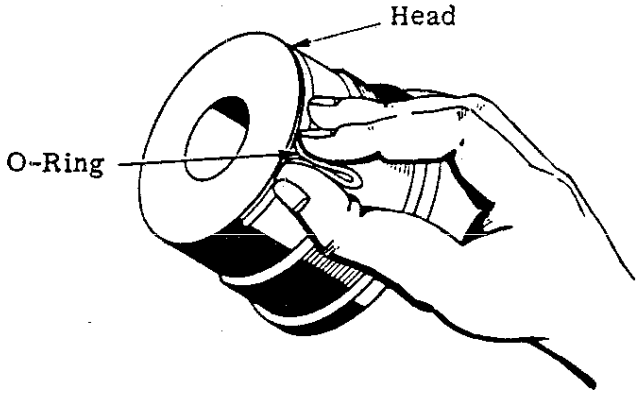


Figure G1-3. O-RING REMOVAL

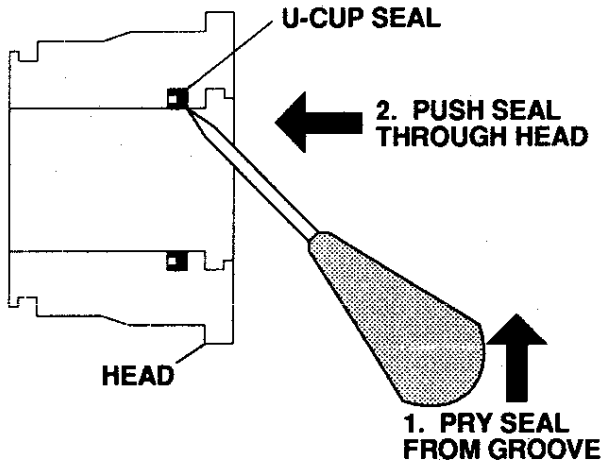


Figure G1-4. ROD SEAL REMOVAL

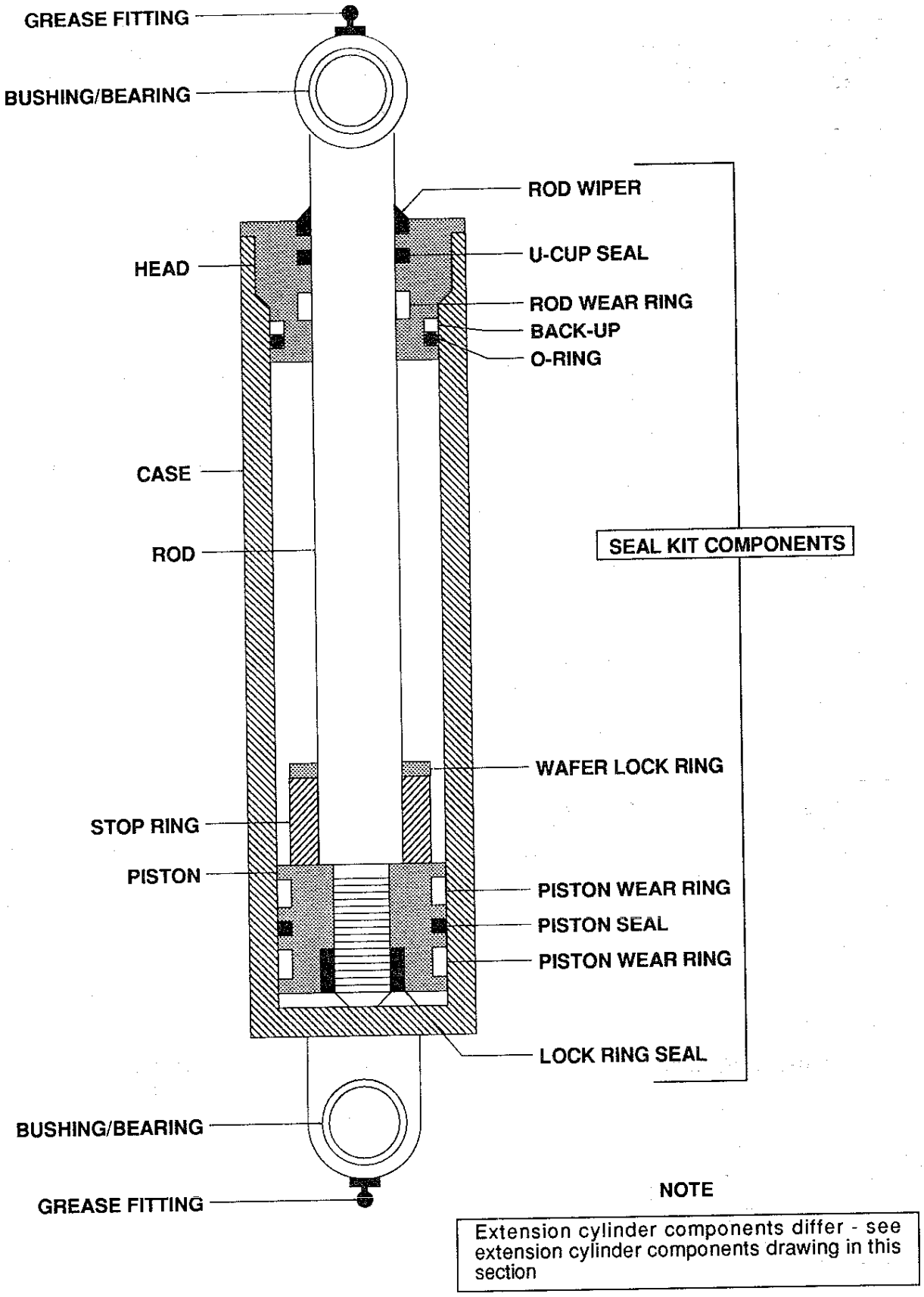


Figure G1-5. TYPICAL CYLINDER AND SEAL KIT COMPONENTS

NOTE

FURTHER WORK SHOULD BE DONE IN A WARM ENVIRONMENT, 21°C OR WARMER. THIS MAKES THE SEALS MORE FLEXIBLE AND EASIER TO WORK WITH.

9. Work a slack section into the head seal static o-ring and pick it up out of the groove (Figure G1-3). Lift the static back-up out of its groove with the needle nose pliers.

10. Pinch the lip of the rod wiper with the needle nose pliers and pull it out of the head.

11. Position the head with the top of the head up and puncture the u-cup seal with the ice pick or awl. Pry it out of the groove and push it through the head. (Figure G1-4).

12. Remove the rod wear ring using the awl and being careful not to damage the head.

13. Spread the piston wear rings, slip them over the land and off the end of the piston nearest the wear ring.

14. Carefully lift the dynamic piston seal out of the groove with a thin blade such as a putty knife blade. Take care not to nick the edges of the groove. Twist and break the seal.

CAUTION

DAMAGING THE EDGES OF THE GROOVE WILL LIKELY CAUSE PREMATURE SEAL FAILURE.

15. Pry the lock ring seal from its seat in the bottom of the piston.

16. Clean the piston, head, rod and cylinder case. Dress any nicks and gouges in the head and piston that may have occurred during disassembly.

7A-2. CYLINDER ASSEMBLY

NOTE

USE ALL OF THE SEALS IN THE SEAL KIT. DOING SO MAY SAVE YOU EXPENSIVE DOWNTIME IN THE NEAR FUTURE.

1. Install the piston seal. Make certain it is free of twists.

CAUTION

WORK THE PISTON SEAL CAREFULLY INTO POSITION FROM THE TOP OF THE PISTON USING THE ASSEMBLY GROOVE. DO NOT ATTEMPT DOING SO FROM THE BOTTOM OF THE PISTON. YOU MAY SCRATCH IT AND RENDER IT USELESS.

2. Slide the piston wear rings over the lands and allow them to snap into position in the grooves.

3. Carefully press the lock-ring seal into position.

4. Install the static back-up and o-ring on the head. Make certain the o-ring is not twisted.

5. Position the head with the rod wiper pocket "down" and insert the rod wear ring into its groove.

6. Position the head with the rod wiper pocket "up".

7. Press the u-cup seal into position using your fingers.

8. Install the rod wiper.

9. Lubricate the inside diameter of the head with a nonfibrous grease such as Lubriplate.

10. Carefully slide the head onto the rod. Make certain that the rod wiper does not catch on the rod when it is first started. Slide the head all of the way onto the rod and up to the pin boss.

11. Slide the wafer-lock ring and stop tubes onto the rod.

12. Lubricate the entire threaded area of the rod and inside of the piston with non-fibrous grease.

13. Secure the rod as shown in Figure G1-1 and screw the piston onto the rod by hand. You should be able to get the piston almost all the way onto the rod before using the spanner wrench.

CAUTION

MAKE SURE THAT THE LOCK RING SEAL STAYS IN POSITION. IT MUST STAY IN POSITION OR LEAKS MAY OCCUR RESULTING IN POOR PERFORMANCE.

14. Torque the piston onto the rod at 35 kg-m. Impact the wrench three times with a heavy plastic hammer while maintaining the torque (Figure G1-2).

15. Generously lubricate the outside diameter of the head and piston with the non-fibrous grease. Also lubricate the threads and beveled area of the top of the cylinder case.

16. With a side-to-side or up-and-down motion, work the piston into the cylinder past the threads and beveled area at the top of the cylinder case.

17. Slide the piston into the cylinder. With a rotating motion, work the piston seal and the wear rings past the threads and hand tighten the cylinder head.

18. Secure the cylinder (Figure G1-1) and torque the head in the same manner as the piston.

19. Install the holding valves and their o-rings. The o-rings must be in good condition and properly positioned.

7A-3. EXTENSION CYLINDER DISASSEMBLY

CAUTION

IF SOLVENT IS USED TO CLEAN THE INTERNAL CYLINDER COMPONENTS, ALL TRACES OF SOLVENT MUST BE REMOVED. ANY RESIDUE WILL DAMAGE THE SEALS.

WARNING

DO NOT USE COMPRESSED AIR TO ASSIST IN WITHDRAWING THE PISTON/ROD ASSEMBLY. THE USE OF COMPRESSED AIR MAY RESULT IN PROPELLING THE PISTON/ROD ASSEMBLY OUT OF THE CYLINDER AND MAY CAUSE SERIOUS INJURY OR DEATH.

NOTE

IF THE CYLINDER IS BEING REPAIRED DUE TO A WORN SEAL, WE RECOMMEND REPLACING ALL COMPONENTS FOUND IN THE SEAL KIT. THE SMALL ADDITIONAL EXPENSE MAY SAVE YOU EXPENSIVE DOWNTIME IN THE FUTURE.

1. Prepare the cylinder for disassembly by opening the bleeder screws to relieve pressure on extend and retract sides of hydraulic cylinder (if not already done during removal of cylinder from crane). Remove the counterbalance valve in cylinder case. Remove bleeder screw and drain oil from cylinder case. Remove one of the four plugs in the case in order to drain the oil, if desired. See Figure G1-6.

2. Remove the rod from the cylinder case by securing the cylinder case flange in a vise, and unscrew the head using a chain wrench or a spanner wrench. See Figure G1-6.

   Pull the rod weldment out of the cylinder case, being careful not to damage the inner oil feed tube, the chrome rod or the pin hole inner diameter at the end of the rod.

3. Remove the piston from the rod by securing the square end of the rod in a vise. With a spanner wrench, unscrew the inner head from the piston, then unscrew the piston from the rod while keeping the rod straight and supported in the center. See Figure G1-6.

   Insure that the orifice hole in the piston head is not obstructed. Remove the check valve plug, roll pin and ball. Inspect parts and drilled passages. Reassemble if no defect is found. See Figure G1-7.

4. Slide the head gland off the end of the rod.

5. Clean and inspect all parts. Note damaged parts.

6. Remove the sequence valve and check condition of all parts. See Figure G1-10.

7A-4. EXTENSION CYLINDER ASSEMBLY

NOTE

DURING REASSEMBLY, APPLY MOLYCOTE ON SEALS AND WEAR RINGS TO PREVENT DAMAGE. INSPECT AND REPLACE ALL DAMAGED PARTS.

1. Installation of head gland on rod:
   Inspect and replace internal and external seals, wear rings, back-up rings and rod wiper. Note the orientation of u-cup. Carefully slide the head gland to the other end of the rod so as not to damage the wiper. See Figure G1-8.

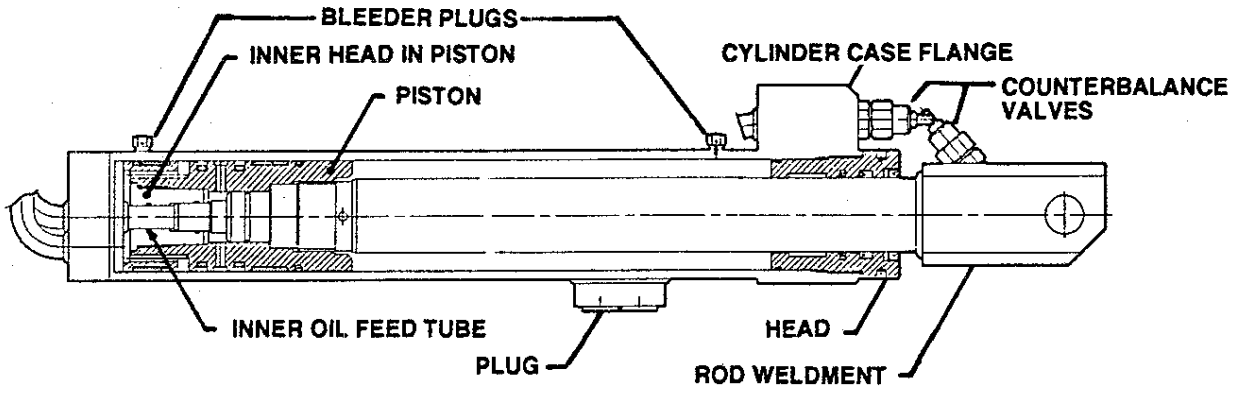


Figure G1-6. MAJOR COMPONENTS

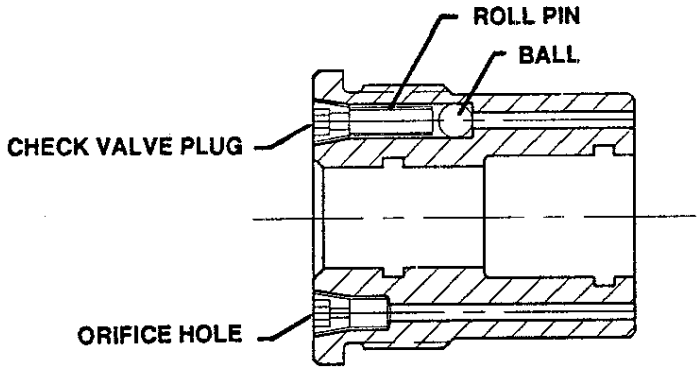


Figure G1-7. PISTON HEAD

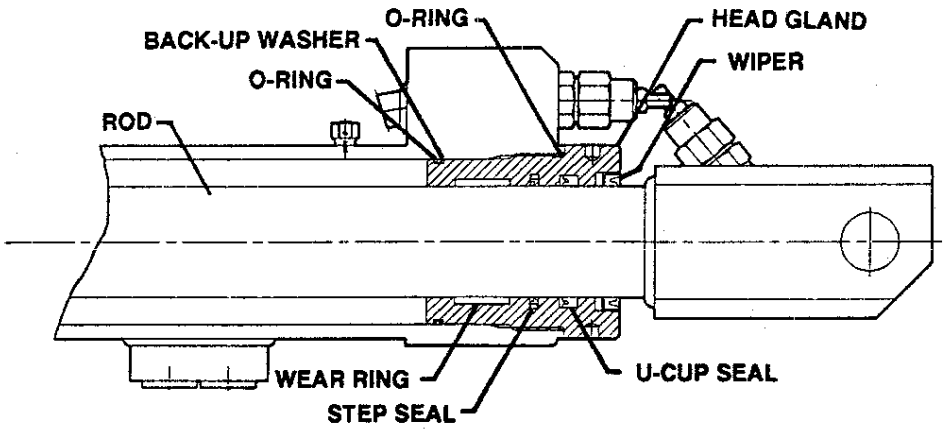


Figure G1-8. CYLINDER HEAD AND SEALS

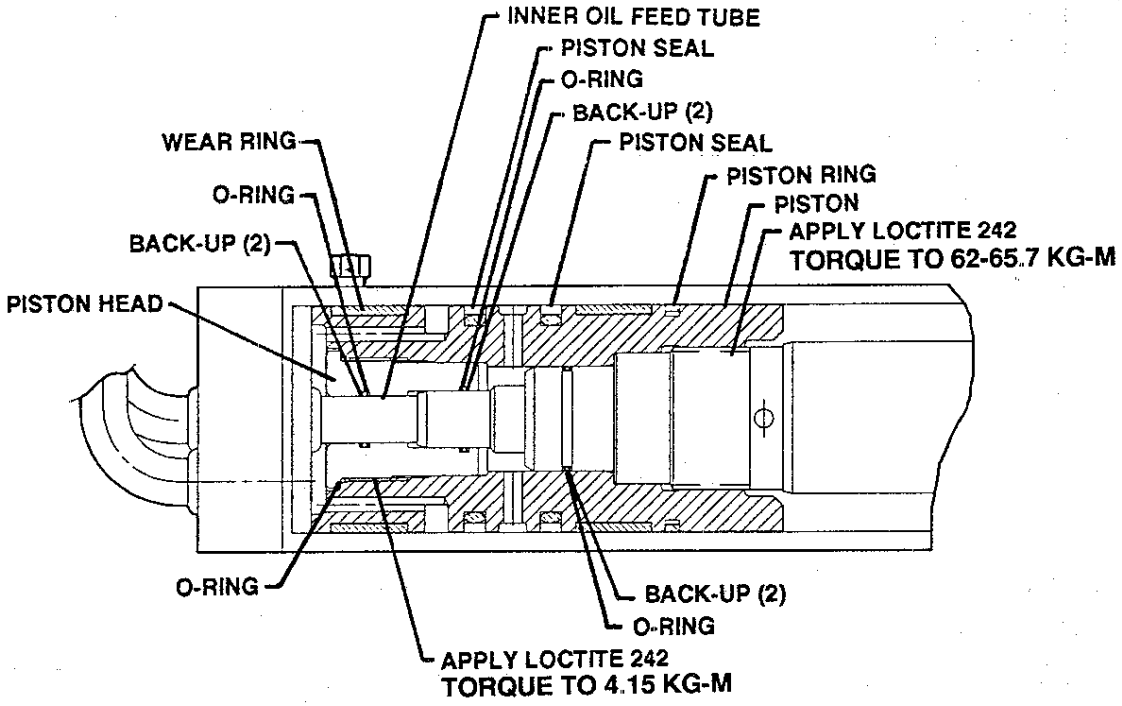


Figure G1-9. PISTON, PISTON HEAD AND SEALS

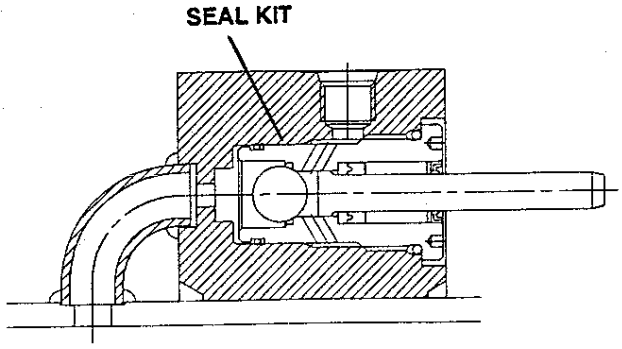


Figure G1-10. SEQUENCE VALVE

2. Reassembly of piston on rod:

   Clean remaining Loctite (with Loctite primer) from the two internal threads on the piston and on the rod. Replace seals and wear rings. See Figure G1-9.

   Install the pin end of the rod in a vise and torque the piston to 62-66 kg-m while supporting the rod in the center to keep it straight. Use Loctite 242.

   Clean remaining Loctite from the threads of the piston head and screw the head back into piston. Use Loctite 242 and torque head to 4.15 kg-m.

   Reinstall orifice plug and check valve in the piston head if they were removed and not reinstalled.

NOTE

The 4th stage extension cylinder will not have orifice plug or check valve.

3. Installation of rod assembly inside case: Line up cylinder rod with cylinder case, guide the inner oil feed tube inside the rod and the piston inside the case. Carefully drive the rod about 30 cm inside the case, then while holding the rod in line with the case, screw the head gland inside the cylinder case. Push the cylinder rod all the way inside the case.

4. Reassemble the sequence valve, bleeder plugs, case by-pass plugs and the counterbalance valves.

7A-5. EXTENSION CYLINDER TESTING BEFORE REINSTALLATION

7A-5-1. FIRST STAGE CYLINDER

1. Reinstall relief/check valve at base end of cylinder. See Figure G1-11.

2. Connect extend hose to valve block port at base end, side port. See Figure G1-12.

3. Connect retract hose to the base end, side port. See Figure G1-12.

4. Install steel plugs in port "A" at the end of the rod. See Figure G1-13.

5. Install hose connecting rod end ports "B" and "C". See Figures G1-11 and G1-13.

6. With cylinder fully retracted, open b6eed screw near the flange end of the cylinder. Apply extend pressure until the cylinder is fully extended. Close the bleed plug. See Figure G1-6.

7. Apply return pressure and retract cylinder. Close base end bleeder.

8. Extend and retract cylinder a minimum of 5 times to purge the air.

9. Extend cylinder until fully extended and keep pressurized at 310 bar. Check for external leaks.

10. With cylinder still extended, disconnect hose at port "C" of rod end. Hold pressure to check piston seal leakage. See Figure G1-11.

11. Retract cylinder, apply test pressure and check for leaks.

7A-5-2. SECOND AND THIRD STAGE CYLINDERS

1. Connect extend hose to port "A" on the cylinder flange. See Figure G1-13.

2. Connect retract hose to port "B" of flange. See Figure G1-13.

3. Install steel plugs in port "A" at the end of the rod. See Figure G1-13.

4. Install hose connecting rod end ports "B" and "C". See Figures G1-11 and G1-13.

5. With cylinder fully retracted, open bleed screw near the flange end of the cylinder. Apply extend pressure until the cylinder is fully extended. Close the bleed plug.

6. Apply return pressure and retract cylinder. Close base end bleeder.

7. Extend and retract cylinder a minimum of 5 times to purge the air.

8. Extend cylinder until fully extended and keep pressurized at 310 bar. Check for external leaks.

9. With cylinder still extended, disconnect hose at port "C" of rod end. Hold pressure to check piston seal leakage. See Figure G1-11.

11. Retract cylinder, apply test pressure and check for leaks.

7A-5-3. FOURTH STAGE CYLINDER

1. Connect extend hose to port "A" on the cylinder flange. See Figure G1-13.

2. Connect retract hose to port "B" of flange. See Figure G1-13.

3. With cylinder fully retracted, open bleed screw near the flange end of the cylinder. Apply extend pressure until the cylinder is fully extended. Close the bleed plug.

4. Apply return pressure and retract cylinder. Close base end bleeder.

5. Extend and retract cylinder a minimum of 5 times to purge the air.

6. Extend cylinder until fully extended and keep pressurized at 310 bar. Check for external leaks.

7. With cylinder fully extended, remove bleed screw near flange. Hold pressure to check for piston seal leakage.

8. Retract cylinder, apply test pressure and check for leaks.

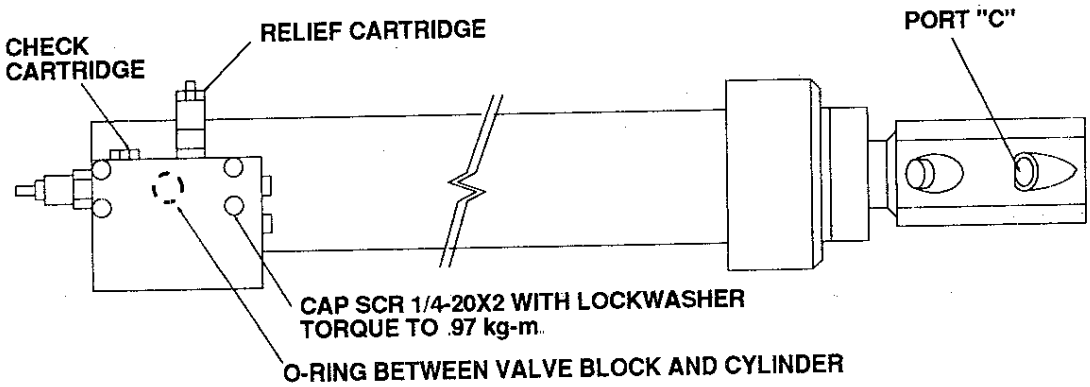


Figure G1-11. EXTENSION CYLINDER REFERENCE

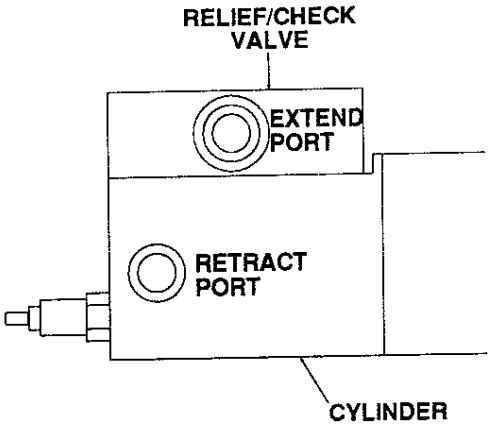
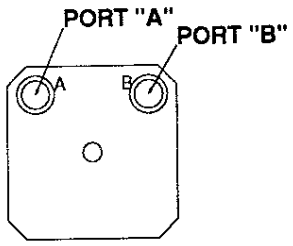


Figure G1-12. EXTEND & RETRACT PORTS



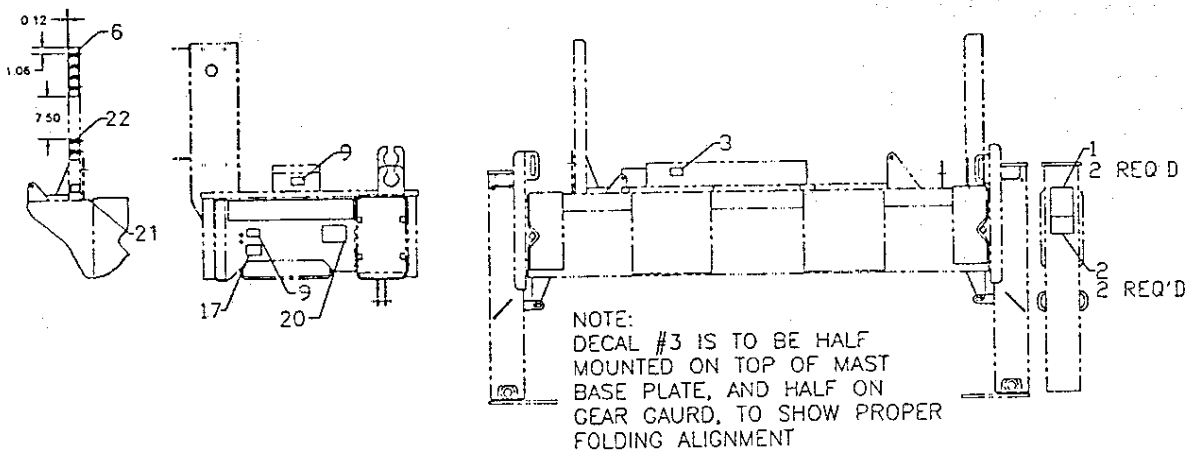
ROD END VIEW
(EXCEPT 4TH EXTENSION CYLINDER)

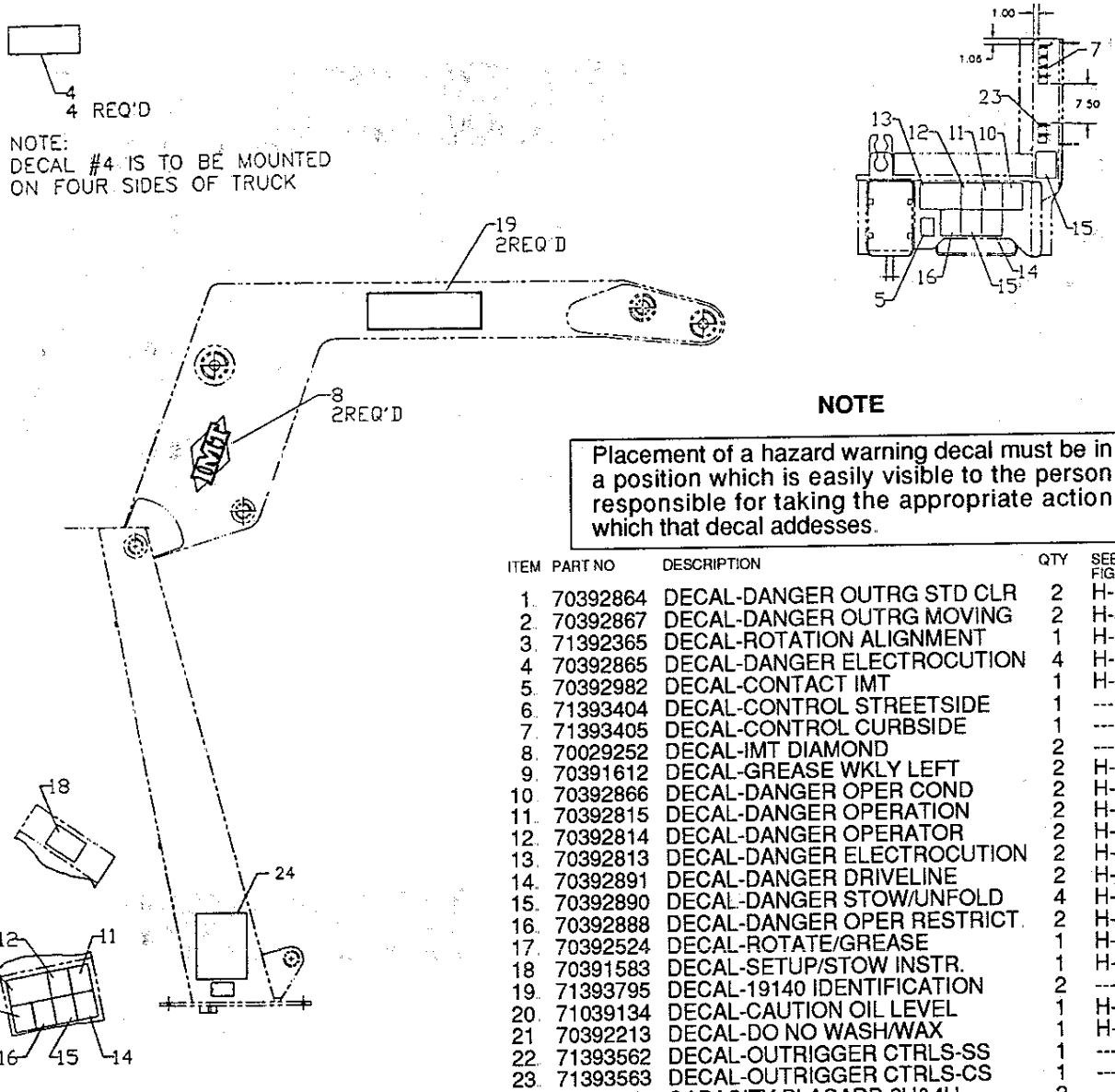
Figure G1-13. PORT A & B

Figure G1-14. EXTENSION CYLINDER TROUBLESHOOTING CHART

CONDITION	POSSIBLE CAUSE	POSSIBLE REMEDY
CYLINDER WILL NOT EXTEND OR RETRACT.	PRESSURIZED OIL NOT REACHING CYLINDER	CHECK OIL LEVEL IN HYDRAULIC TANK
		CHECK HYDRAULIC HOSE CONNECTIONS
		CHECK IF CONTROL VALVE SPOOLS ARE SHIFTING PROPERLY
	INSUFFICIENT PRESSURE TO MOVE THE LOAD	CHECK AVAILABLE SYSTEM PRESSURE AT CYLINDER (SHOULD BE 241 bar
		CRANE OVERLOADED
	BOOM EXTENSIONS BINDING	CHECK FOR DIRT, DEBRIS OR LOOSE WEAR PADS
	COUNTERBALANCE VALVE(S) DO NOT OPEN	REPLACE VALVES
CYLINDER WILL NOT EXTEND OR WILL EXTEND, SLOW DOWN, THEN STOP.	OVERLOAD PROTECTION SYSTEM	DECREASE LOAD ON CRANE
INNER EXTENSION CYLINDER(S) START TO RETRACT BEFORE OUTER EXTENSION CYLINDERS ARE FULLY RETRACTED.	LEAKAGE PAST SEQUENCE VALVE POPPET SEAL	REPLACE SEQUENCE VALVE SEALS (Figure G1-10)
CYLINDER WILL EXTEND OR RETRACT WITH CONTROL VALVE IN NEUTRAL.	COUNTERBALANCE VALVE SETTINGS TOO LOW	CHECK SETTINGS
	INDUCED LOAD TOO HIGH	REDUCE LOAD
1ST, 2ND OR 3RD EXTENSION CYLINDER WILL NOT RETRACT.	SEQUENCE VALVE DOES NOT OPEN	CHECK IF SEQUENCE VALVE ACTUATING BAR FULLY DEPRESSES STEM OF SEQUENCE VALVE (Figure G1-10)
CYLINDER RETRACT (DRIFT) WHILE RETRACTING OTHER CYLINDERS.	SEQUENCE VALVE DOES NOT CLOSE	REPLACE SEALS (Figure G1-10)

Section 8. DECAL DESCRIPTIONS





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 addesses.

ITEM	PART NO	DESCRIPTION	QTY	SEE FIG.
1.	70392864	DECAL-DANGER OUTRG STD CLR	2	H-8
2.	70392867	DECAL-DANGER OUTRG MOVING	2	H-3
3.	71392365	DECAL-ROTATION ALIGNMENT	1	H-14
4.	70392865	DECAL-DANGER ELECTROCUTION	4	H-10
5.	70392982	DECAL-CONTACT IMT	1	H-17
6.	71393404	DECAL-CONTROL STREETSIDE	1	---
7.	71393405	DECAL-CONTROL CURBSIDE	1	---
8.	70029252	DECAL-IMT DIAMOND	2	---
9.	70391612	DECAL-GREASE WKLY LEFT	2	H-15
10.	70392866	DECAL-DANGER OPER COND	2	H-4
11.	70392815	DECAL-DANGER OPERATION	2	H-11
12.	70392814	DECAL-DANGER OPERATOR	2	H-9
13.	70392813	DECAL-DANGER ELECTROCUTION	2	H-2
14.	70392891	DECAL-DANGER DRIVELINE	2	H-6
15.	70392890	DECAL-DANGER STOW/UNFOLD	4	H-7
16.	70392888	DECAL-DANGER OPER RESTRICT.	2	H-5
17.	70392524	DECAL-ROTATE/GREASE	1	H-16
18	70391583	DECAL-SETUP/STOW INSTR.	1	H-13
19.	71393795	DECAL-19140 IDENTIFICATION	2	---
20.	71039134	DECAL-CAUTION OIL LEVEL	1	H-12
21	70392213	DECAL-DO NO WASH/WAX	1	H-20
22.	71393562	DECAL-OUTRIGGER CTRLS-SS	1	---
23.	71393563	DECAL-OUTRIGGER CTRLS-CS	1	---
24.	71393775	CAPACITY PLACARD 3H&4H	2	---
	71393778	CAPACITY PLACARD 4H1M&4H2M	2	---

Figure H-1. DECAL LOCATIONS (DECAL KITS 95711916 & 95711917)

8-1. DANGER DECAL DESCRIPTIONS

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

The materials and adhesives used in the production of these decals were designed for maximum durability, adhesion and legibility. Nevertheless, if a decal becomes damaged or illegible, replace it at your earliest opportunity. If a crane is repaired or re-painted, replace all decals before the crane is put back into service. Individual decals as well as complete decal kits are available from IMT at a nominal cost.

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

ITEM 13

DECAL: Danger - Electrocution

PART NUMBER: 70392813

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

USED ON: All cranes

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

QUANTITY: 2

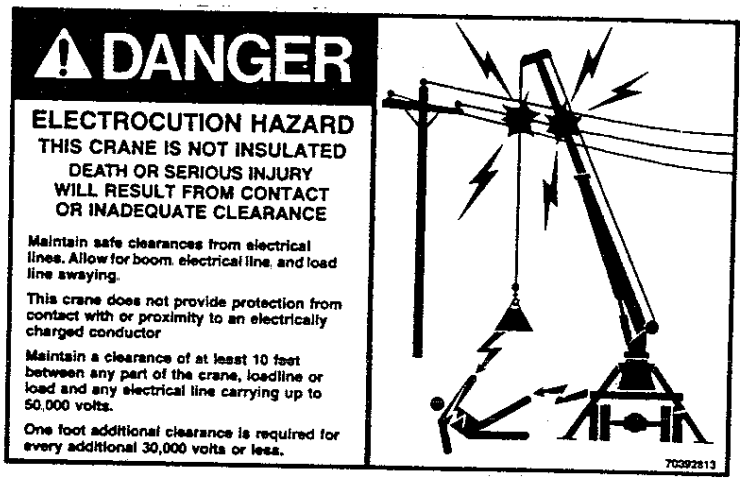


Figure H-2.

ITEM 2

DECAL: Danger - Outrigger Moving

PART NUMBER: 70392867

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

USED ON: All cranes with outriggers

PLACEMENT: At or near the outrigger operating station.

QUANTITY: 2

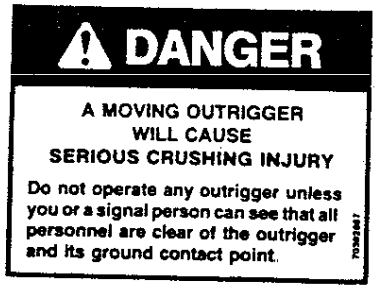


Figure H-3.

ITEM 10

DECAL: Danger - Operation Conditions

PART NUMBER: 70392866

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

USED ON: All cranes

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

QUANTITY: 2

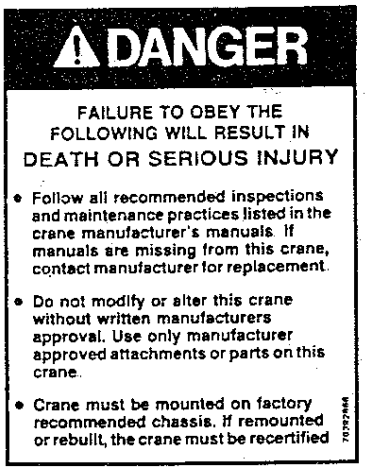


Figure H-4.

ITEM 16

DECAL: Danger - Operation Restrictions

PART NUMBER: 70392888

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

USED ON: All cranes

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

QUANTITY: 2

Figure H-5.

ITEM 14

DECAL: Danger - Rotating Driveline

PART NUMBER: 70392891

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

USED ON: All PTO operated cranes

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

QUANTITY: 2

Figure H-6.

ITEM 15

DECAL: Danger - Stowing / Unfolding

PART NUMBER: 70392890

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

USED ON: All folding cranes

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

QUANTITY: 2

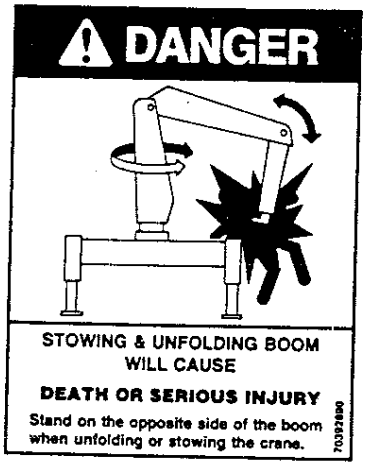


Figure H-7.

ITEM 1

DECAL: Danger - Outrigger Stand Clear

PART NUMBER: 70392864

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

USED ON: All cranes equipped with outriggers

PLACEMENT: On the outriggers.

QUANTITY: 2

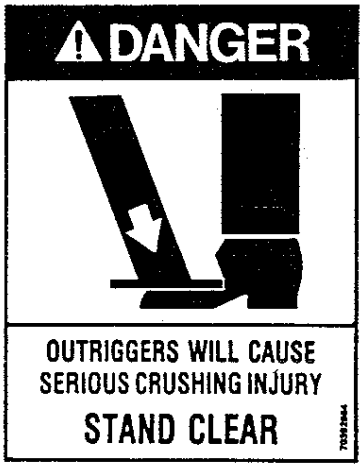


Figure H-8.

ITEM 12

DECAL: Danger - Untrained Operator

PART NUMBER: 70392814

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

USED ON: All cranes

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

QUANTITY: 2

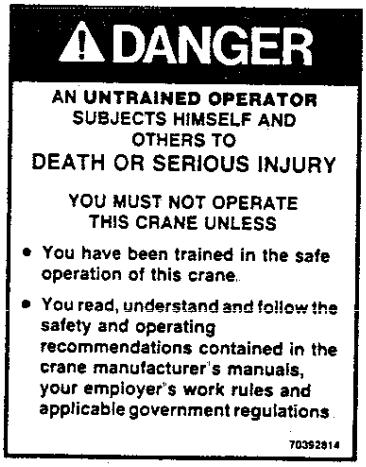


Figure H-9.

ITEM 4

DECAL: Danger - Electrocution

PART NUMBER: 70392865

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

USED ON: All cranes

PLACEMENT: All four sides of the carrier vehichle

QUANTITY: 4

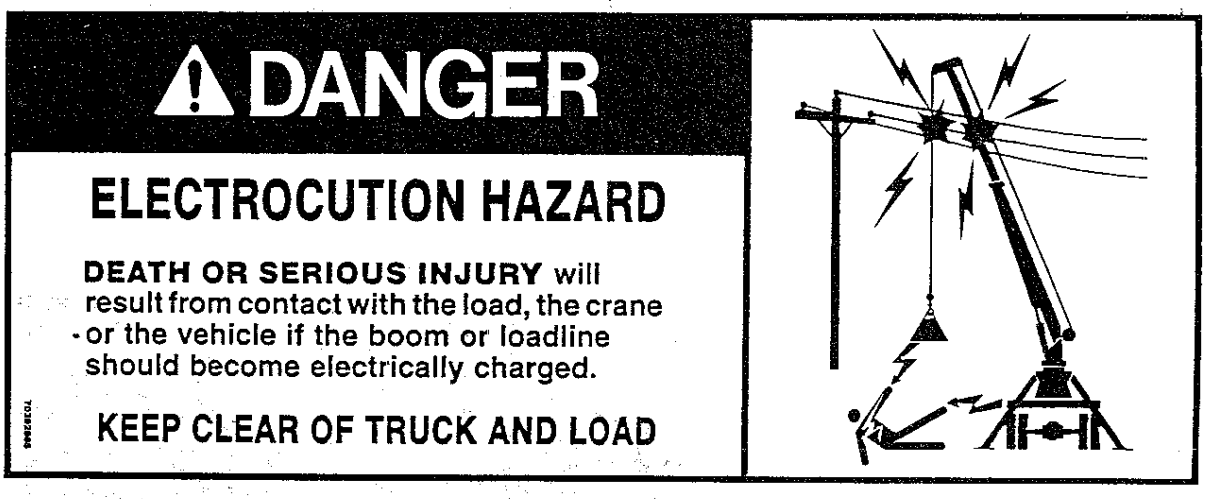


Figure H-10.

ITEM 11

DECAL: Danger - Operation

PART NUMBER: 70392815

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

USED ON: All cranes

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

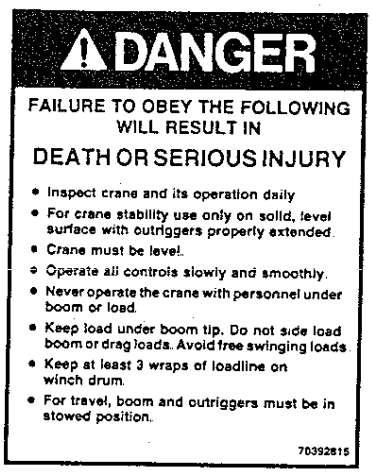


Figure H-11.

8-2. INSTRUCTIONAL DECALS

Listed below are instructional decals which are 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.

ITEM 20

DECAL: Caution - Oil Level

PART NUMBER: 71039134

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

USED ON: All cranes with hydraulic fluid reservoirs.

PLACEMENT: At or near the normal operating station

QUANTITY: 1

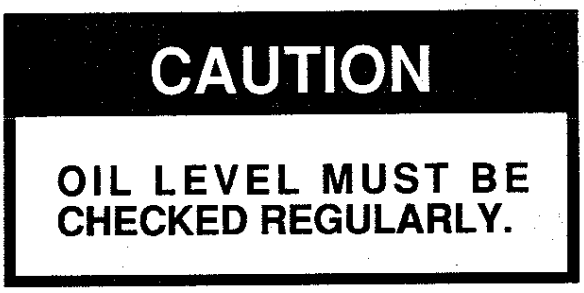


Figure H-12.

ITEM 18

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

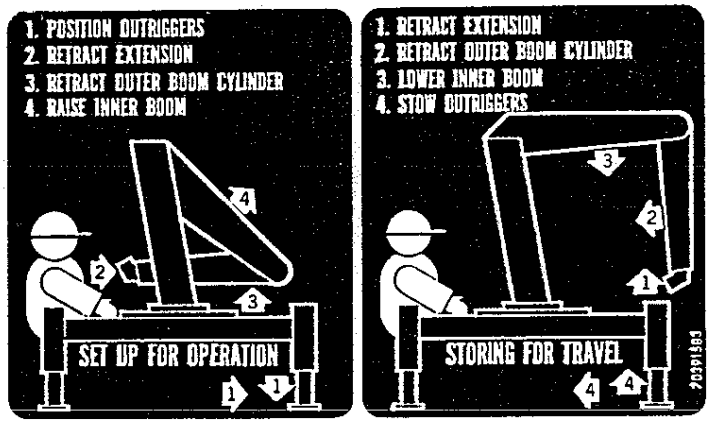


Figure H-13.

ITEM 3

DECAL: Rotational Alignment

PART NUMBER: 71392365

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

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

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

QUANTITY: 1

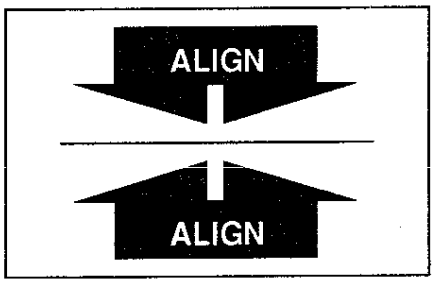


Figure H-14.

ITEM 9

DECAL: Grease Weekly - Left Arrow

PART NUMBER: 70391612

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 H-15.

ITEM 17

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

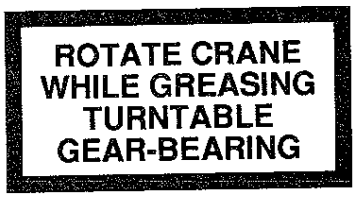


Figure H-16.

ITEM 5

DECAL: Contact IMT

PART NUMBER: 70392982

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

USED ON: All cranes

PLACEMENT: Visible from the operator's station

QUANTITY: 1

Figure H-17.

ITEM REF

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

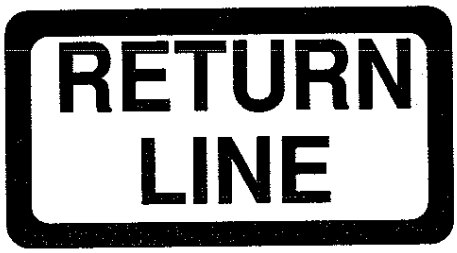


Figure H-18.

ITEM REF

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

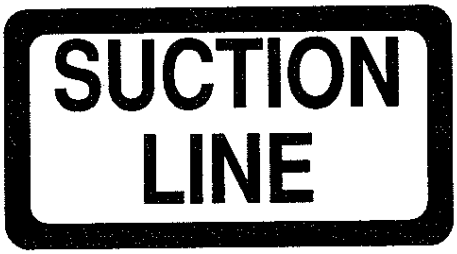


Figure H-19.

ITEM 21

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

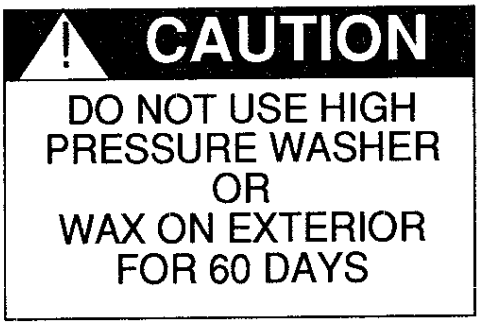
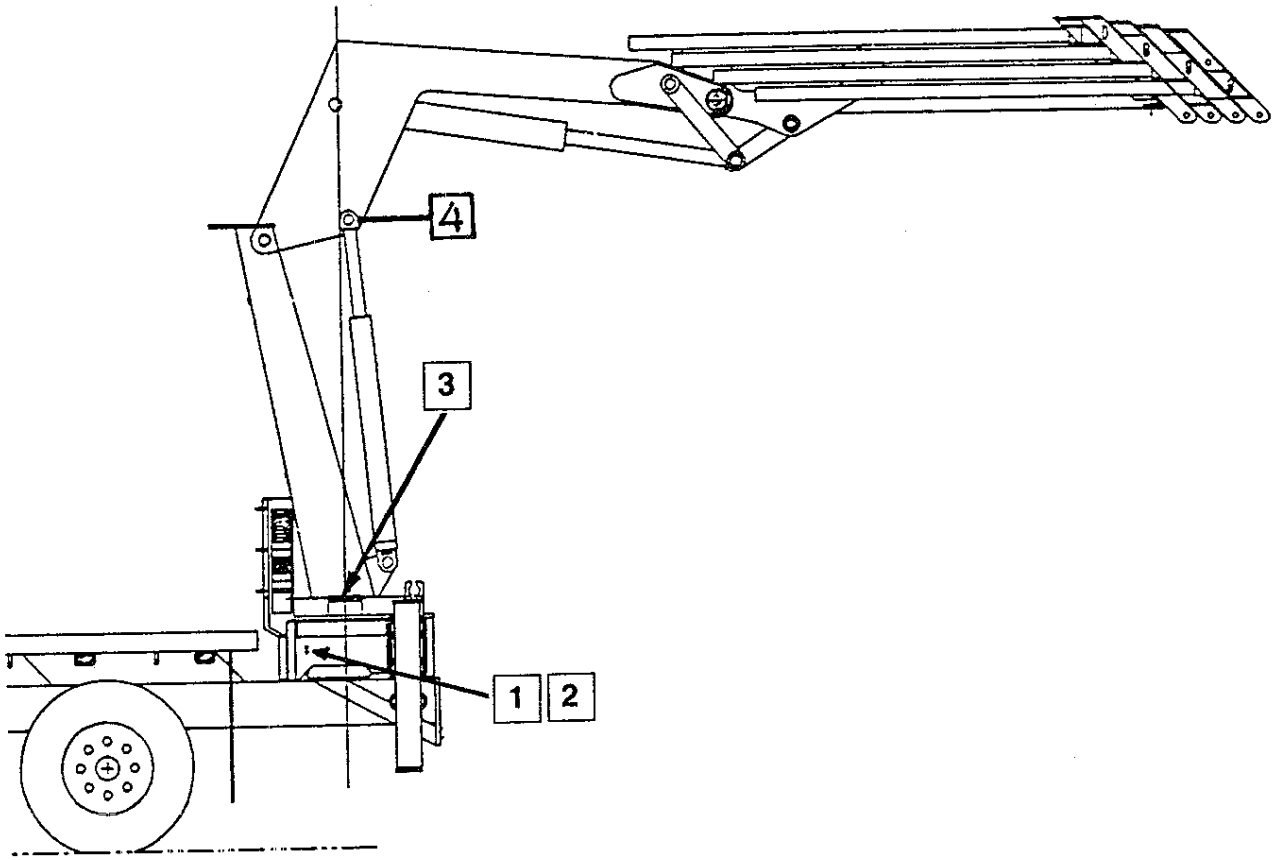


Figure H-20.

Section 9. REFERENCE

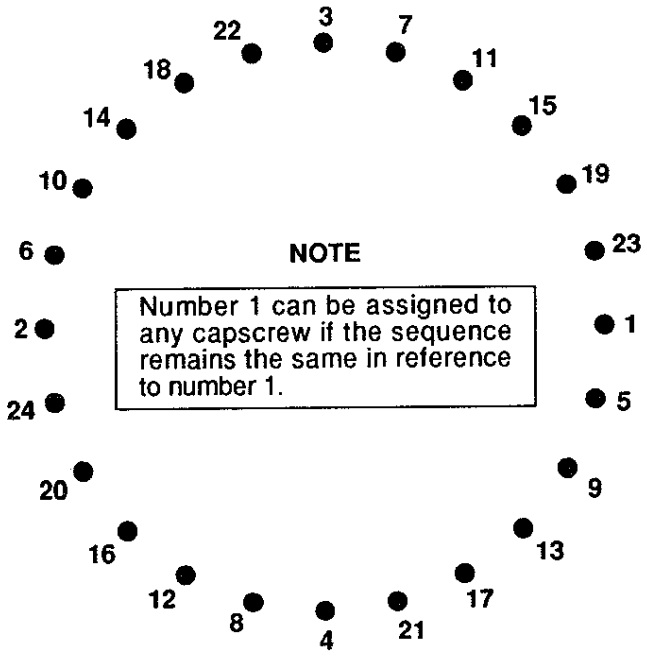


ITEM	LOCATION DESCRIPTION	LUBRICANT	FREQUENCY
1 2 3 4	DRIVE GEAR GREASE EXTENSION TURNTABLE/BEARING GREASE EXTENSION *ROTATE CRANE WHILE GREASING PINION GEAR INNER BOOM CYLINDER ROD	SHELL ALVANIA 2EP OR SHELL RETINAX "A"	WEEKLY

NOTE: All application points must be greased weekly under normal work loads and moderate weather conditions. Under severe operating conditions, lubrication should be performed more frequently.

Figure I-1. GREASE ZERK LOCATIONS AND LUBRICANT REQUIREMENTS

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 37 KG-M = 14.8 KG-M)

4. Repeat Step 3, but torqueing all capscrews to 75% of the specified torque value. Continue to follow the tightening sequence. (EXAMPLE: .75 x 37 KG-M = 27.75 KG-M)

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

Figure I-2. TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE

TORQUE DATA CHART

FINE THREAD BOLTS

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE SAE J429 GRADE 5 PLAIN (KG-M)	SAE J429 GRADE 5 PLATED (KG-M)	SAE J429 GRADE 8 PLAIN (KG-M)	SAE J429 GRADE 8 PLATED (KG-M)
5/16-24	0.3125	3	2	4	3
3/8-24	0.3750	5	4	7	5
7/16-20	0.4375	8	6	11	8
1/2-20	0.5000	12	9	17	12
9/16-18	0.5625	17	12	24	18
5/8-18	0.6250	24	18	33	25
3/4-16	0.7500	41	31	58	44
7/8-11	0.8750	62	45	93	69
1-12	1.0000	89	67	138	103
1 1/8-12	1.1250	123	93	200	150
1 1/4-12	1.2500	171	129	278	209
1-3/8-12	1.3750	232	174	375	281
1 1/2-12	1.5000	304	228	492	369

COARSE THREAD BOLTS

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE SAE J429 GRADE 5 PLAIN (KG-M)	SAE J429 GRADE 5 PLATED (KG-M)	SAE J429 GRADE 8 PLAIN (KG-M)	SAE J429 GRADE 8 PLATED (KG-M)
5/16-18	0.3125	2	2	3	2
3/8-16	0.3750	4	3	6	5
7/16-14	0.4375	7	5	10	7
1/2-13	0.5000	10	8	15	11
9/16-12	0.5625	15	11	21	16
5/8-11	0.6250	21	16	30	22
3/4-10	0.7500	37	28	52	39
7/8-9	0.8750	55	41	84	63
1-8	1.0000	82	62	126	94
1 1/8-7	1.1250	110	82	178	133
1 1/4-7	1.2500	155	116	251	188
1-3/8-6	1.3750	203	152	329	246
1 1/2-6	1.5000	270	210	438	328

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 kilogram-meters.
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.

Figure E-3. TORQUE DATA CHARTS

SUGGESTED SPARE PARTS LIST
1-YEAR SUPPLY

This spare parts list does not suggest that the parts listed can be expected to fail in the course of a year. It is intended to provide the user with a representative inventory of spare parts in order to minimize crane down-time due to not having replacement parts. It is only a suggested parts list and is not complete.

FIGURE	ITEM	PART NO	DESCRIPTION	QTY
BASE & 4.88m OUTRIGGER ASSEMBLY (41710040)				
D-4	13	71056074	DRIVE GEAR	1
D-4	17	76391497	GASKET	1
D-4	18	60020123	THRUST WASHER	1
D-4	19	76391498	GASKET	1
D-4	34	73054538	VALVE	2
D-4	37	70055167	BEARING	1
D-4	41	71056072	INTERMEDIATE GEAR	1
D-4	42	71056073	PINION GEAR	1
D-4	43	71056374	BRAKE	1
D-4	60	72063115	WASHER 7/8 FLAT HARD	23
D-4	67	72601609	CAP SCR 7/8-9X4-1/4 HH GR8	23
D-4	70	73051478	HYDRAULIC MOTOR	1
D-4	73	60030229	WEAR PAD	1
D-4	74	60030230	WEAR PAD	1
D-4	75	60030231	WEAR PAD	1
D-4	76	60020120	BUSHING	1
D-4	77	60020121	BUSHING	1
D-4	78	60020122	BUSHING	1
D-4	79	60020124	BUSHING	1
D-4	80	7Q072017	O-RING	3
BASE & 6.4m OUTRIGGER ASSEMBLY (41709801)				
D-5	18	60020123	THRUST WASHER	1
D-5	19	60030204	WEAR PAD	1
D-5	20	60030205	WEAR PAD	1
D-5	37	70055167	BEARING	1
D-5	41	71056072	INTERMEDIATE GEAR	1
D-5	42	71056073	PINION GEAR	1
D-5	43	71056374	HYDRAULIC BRAKE	1
D-5	60	72063115	WASHER 7/8 FLAT HARD	23
D-5	67	72601609	CAP SCR 7/8-9X4-1/4 HH GR8	23
D-5	70	73051478	HYDRAULIC MOTOR	1
D-5	73	60030229	WEAR PAD	1
D-5	74	60030230	WEAR PAD	1
D-5	75	60030231	WEAR PAD	1
D-5	76	60020120	BUSHING	1
D-5	77	60020121	BUSHING	1
D-5	78	60020122	BUSHING	1
D-5	79	60020124	BUSHING	1
D-5	80	7Q072017	O-RING	3
D-5	81	73054538	VALVE	2
D-5	84	71056074	DRIVE GEAR	1
D-5	85	76391497	GASKET	1
D-5	86	76391498	GASKET	1
MAST ASSEMBLY (41709874)				
D-6	7	72063116	WASHER 3/4 FLAT HARD	14
D-6	8	72601629	CAP SCR 3/4-10X4 HH GR8	14
D-6	9	70034283	BEARING	2
INNER BOOM ASSEMBLY (41709875)				
D-7	13	70034284	BEARING	8
D-7	14	70143838	SPHERICAL BUSHING	2
OUTER BOOM ASSEMBLY (41710030)				
D-8	4	60030208	WEAR PAD	2
D-8	5	60030212	WEAR PAD	2
D-8	16	70034283	BEARING	6
D-8	17	70034284	BEARING	2

SUGGESTED SPARE PARTS LIST (cont)

1-YEAR SUPPLY

FIGURE	ITEM	PART NO	DESCRIPTION	QTY
SWIVEL HOOK ASSEMBLY 7-TON (51710187)				
D-9	2	70731813	SWIVEL HOOK W/LATCH 7-TON	1
EXTENSION BOOM ASSEMBLY - 3H (41710036)				
D-10	3	60030211	WEAR PAD	2
D-10	7	60030212	WEAR PAD	2
D-10	14	60030215	WEAR PAD	4
D-10	15	60030214	WEAR PAD	2
D-10	24	60030218	WEAR PAD	4
D-10	34	60030234	WEAR PAD	1
D-10	35	60030235	WEAR PAD	1
D-10	36	60030236	WEAR PAD	1
EXTENSION BOOM ASSEMBLY - 4H (41710183)				
D-11	3	60030211	WEAR PAD	2
D-11	7	60030212	WEAR PAD	2
D-11	14	60030215	WEAR PAD	4
D-11	15	60030214	WEAR PAD	2
D-11	25	60030217	WEAR PAD	2
D-11	26	60030216	WEAR PAD	2
D-11	29	60030224	WEAR PAD	4
D-11	41	60030234	WEAR PAD	1
D-11	42	60030235	WEAR PAD	1
D-11	43	60030236	WEAR PAD	1
D-11	44	60030237	WEAR PAD	1
EXTENSION BOOM ASSEMBLY - 4H/1M (41710184)				
D-12	3	60030211	WEAR PAD	2
D-12	7	60030212	WEAR PAD	2
D-12	14	60030215	WEAR PAD	4
D-12	15	60030214	WEAR PAD	2
D-12	24	60030218	WEAR PAD	4
D-12	25	60030217	WEAR PAD	2
D-12	31	60030224	WEAR PAD	4
D-12	46	60030234	WEAR PAD	1
D-12	47	60030235	WEAR PAD	1
D-12	48	60030236	WEAR PAD	1
D-12	49	60030237	WEAR PAD	1
EXTENSION BOOM ASSEMBLY - 4H/2M (41710031)				
D-13	3	60030211	WEAR PAD	2
D-13	7	60030212	WEAR PAD	2
D-13	14	60030215	WEAR PAD	4
D-13	15	60030214	WEAR PAD	2
D-13	24	60030218	WEAR PAD	4
D-13	25	60030217	WEAR PAD	2
D-13	31	60030224	WEAR PAD	4
D-13	51	60030234	WEAR PAD	1
D-13	52	60030235	WEAR PAD	1
D-13	53	60030236	WEAR PAD	1
D-13	54	60030237	WEAR PAD	1
HYDRAULIC KIT - 3 HYDRAULIC EXTENSIONS (91710352)				
D-14	28	73054792	VELOCITY FUSE	1
HYDRAULIC KIT - 4 HYDRAULIC EXTENSIONS (91710341)				
D-15	28	73054792	VELOCITY FUSE	1
INSTALLATION KIT - REAR MOUNT (93709811)				
D-17	13	73051616	PUMP	1
D-17	17	73052000	RETURN FILTER 10-MIC	
		73052006	FILTER ELEMENT 10-MIC	6
RESERVOIR ASSEMBLY (70732776)				
D-21	13	212036	STRAINER	2

SUGGESTED SPARE PARTS LIST (cont)

1-YEAR SUPPLY

FIGURE	ITEM	PART NO	DESCRIPTION	QTY
1ST STAGE EXTENSION CYLINDER (73050142)				
D-22	1	94393574	SEAL KIT	1
D-22	22	73054812	COUNTERBALANCE VALVE	2
2ND STAGE EXTENSION CYLINDER (73050143)				
D-23	1	94393574	SEAL KIT	1
D-23	22	73054812	COUNTERBALANCE VALVE	2
D-23	30	94393589	SEQUENCE VALVE SEAL KIT	1
3RD & 4TH STAGE EXTENSION CYLINDER (73050145)				
D-24	1	94393575	SEAL KIT	1
D-24	9	94393589	SEQUENCE VALVE SEAL KIT	1
D-24	22	73054812	COUNTERBALANCE VALVE ASM	2
INNER BOOM CYLINDER (3C112920)				
D-25	4	70143838	BALL BUSHING	2
D-25	8	9B112920	SEAL KIT	2
D-25	19	73054810	COUNTERBALANCE VALVE	4
OUTER BOOM CYLINDER (3C124920)				
D-26	4	70034283	BEARING	4
D-26	7	9B124920	SEAL KIT	1
D-26	19	73054810	COUNTERBALANCE VALVE	2
POWER OUT OUTRIGGER CYLINDER (3B055920)				
D-27	5	9B055920	SEAL KIT	2
POWER DOWN OUTRIGGER CYLINDER (3B070920)				
D-28	6	9B070920	SEAL KIT	2
D-28	20	73054794	VALVE-DOUBLE PILOT OPERATED	2

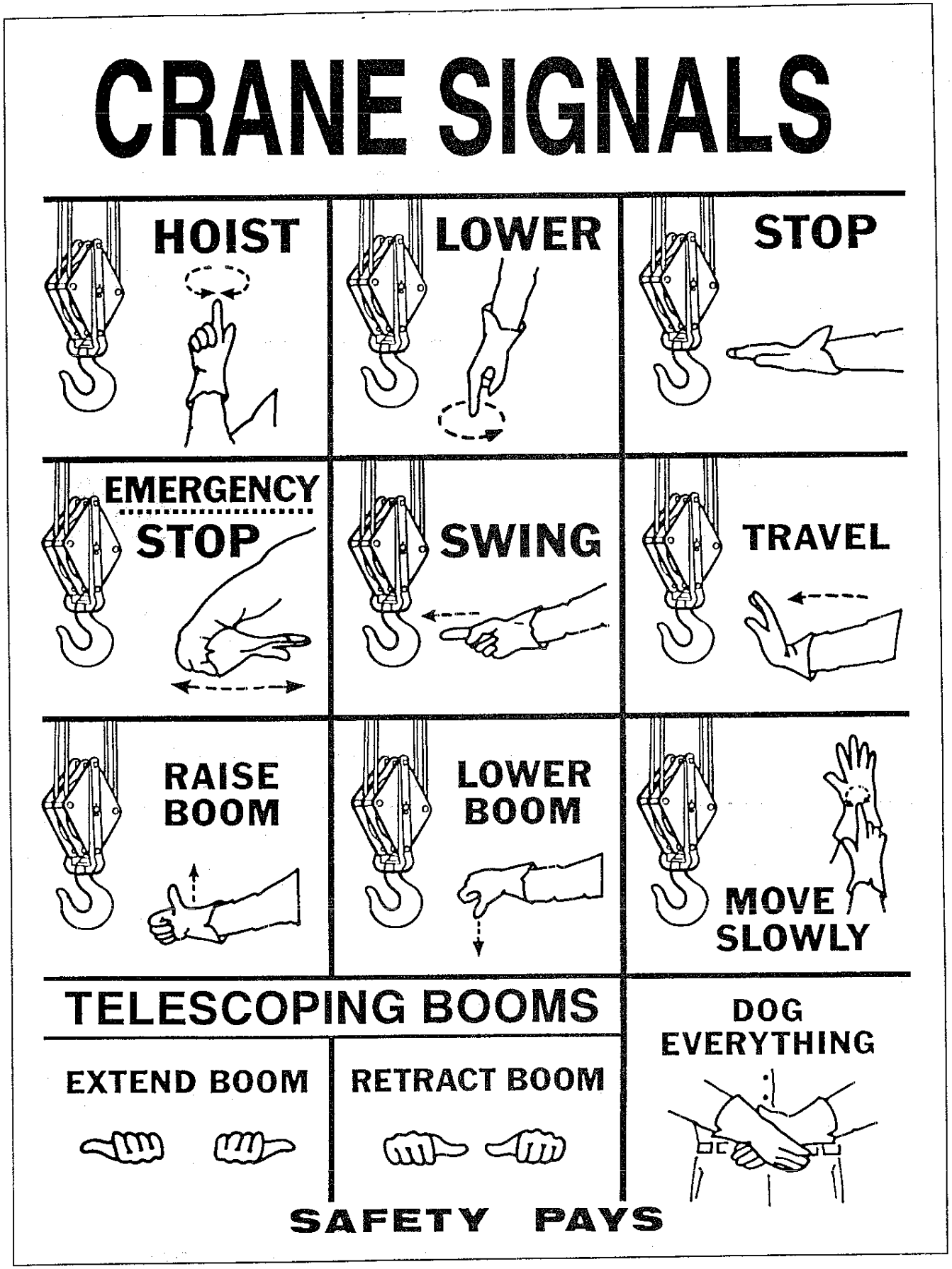


Figure I-4.
CRANE OPERATION HAND SIGNALS DECAL
(IMT PART NUMBER 70393407)

Before a bearing is removed from a crane for inspection, one of the following conditions should be evident:

1. Metal particles present in the bearing lubricant.
2. Increased drive power required to rotate the crane.
3. Noise emitting from the bearing during crane rotation.
4. Rough crane rotation.
5. Uneven or excessive wear between the pinion gear and turntable gear.

If none of the above conditions exists, the bearing is functioning properly and need not be replaced. But, if one or more of the above conditions exists, inspection may be required. Limits are measured in "TILT" which is dependent on the internal clearances of the bearing. TILT is the most practical determination of a bearings internal clearance once mounted on a crane.

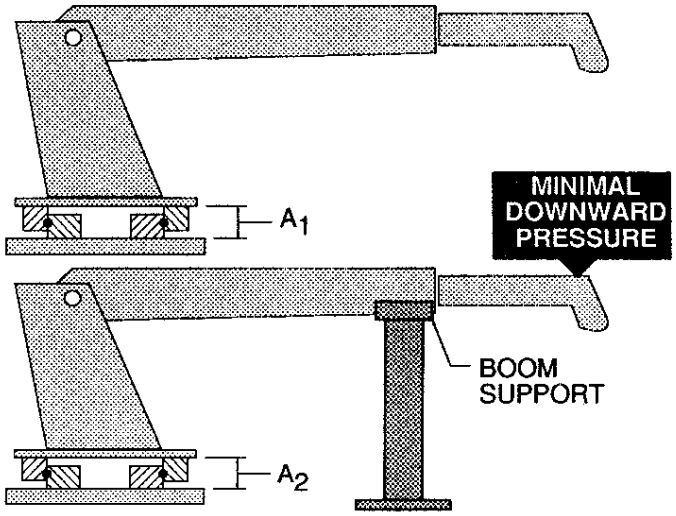
Periodic readings indicating a steady increase in TILT may be an indicator of bearing wear. Note that a bearing found to have no raceway cracks or other structural irregularities should be reassembled and returned to service.

TEST PROCEDURE

STEP 1.
With the crane horizontal and fully extended, measure between the top and bottom mounting surfaces of the turntable bearing (A_1), using a dial indicator for accuracy

STEP 2.
Reverse the load by applying minimal downward pressure on the boom while the boom is in the boom support or on a solid surface. Again measure A_2.

STEP 3.
Subtract A_1 from A_2 to determine tilt and compare the result with the accompanying chart.



COMPARISON CHART - MODEL TO MEASURED TILT DIMENSION

NOTE					
THE FIGURES LISTED IN THIS CHART ARE SERVICE GUIDELINES AND DO NOT, IN THEMSELVES, REQUIRE THAT THE BEARING BE INSPECTED. IF THERE IS REASON TO SUSPECT AN EXCESS OF BEARING WEAR AND THE MEASURED TILT DIMENSION EXCEEDS THE DIMENSION LISTED, REMOVE THE BEARING FOR INSPECTION.	**IMT CRANE OR TIREHAND MODEL**	814 1007 1014 2010 215 2015 2109 2815 3016 315A 320H 3515 3617 3625 421 425 5016 TH7 BODY ROT'N TH1449A BODY ROT'N TH15A CLAMP TH1836A CLAMP TH2551 CLAMP TH2557 CLAMP TH2557A CLAMP	4817 4825 516 525 5826 6014 6425 725 7020 7025 8025 8031 TH10 BODY ROT'N TH12 BODY ROT'N	32018 32030 HAWK-H1150 HAWK-H1150TL HAWK-H4961	9616 9825 9831 10020 10025 1216 1325 1331 13031 13034 13426 14018 14046/19140 14126 15033 1725 18026 20017 HAWK-H1200 TH1836 BODY ROT'N TH1836A BODY ROT'N TH2551 BODY ROT'N TH2557 BODY ROT'N TH2557A BODY ROT'N
	BALL DIA. (REF)	22mm	25mm	30 - 32mm	44mm
	TILT DIM. (A_1 - A_2)	**1.524mm**	**(1.778mm)**	**1.905mm**	**2.286mm**

Figure I-5. TURNTABLE BEARING INSPECTION FOR REPLACEMENT

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

MANUAL CHANGE REQUEST

DATE	PRODUCT MANUAL 19140 Crane	MANUAL PART NO. 99900725-11/93
SUBMITTED BY		
COMPANY		
ADDRESS		
CITY, STATE ZIP		
TELEPHONE		

☐ ERROR FOUND

LOCATION OF ERROR (page no): _____

DESCRIPTION OF ERROR: _____

☐ REQUEST FOR ADDITION TO MANUAL

DESCRIPTION OF ADDITION: _____

REASON FOR ADDITION: _____

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

MANUFACTURER'S LIMITED WARRANTY

WARRANTY COVERAGE - Products manufactured by Iowa Mold Tooling Co., Inc. (IMT) are warranted to be free from defects in material and workmanship, under proper use, application and maintenance in accordance with IMT's written recommendations, instructions and specifications as follows:

1. Ninety (90) days; labor on IMT workmanship from the date of delivery to the end user.

2. One (1) year; original IMT parts from the date of delivery to the end user.

IMT's obligation under this warranty is limited to, and the sole remedy for any such defect shall be the repair or replacement (at IMT's option) of unaltered parts returned to IMT, freight prepaid, provided such defect occurs within the above stated warranty period and is reported within fourteen (14) days of its occurence.

IMPLIED WARRANTY EXCLUDED - This is the only authorized IMT warranty and is in lieu of all other express or implied warranties or representations, including any implied warranties of merchantability or fitness for any particular purpose or of any other obligations on the part of IMT.

ITEMS EXCLUDED - The manufacturer gives no warranty on any components or parts purchased by the manufacturer, and such components as are covered only by the warranties of their respective manufacturers.

WARRANTY CLAIMS - Warranty claims must be submitted and shall be processed in accordance with IMT's established warranty claim procedure.

WARRANTY SERVICE - Warranty service will be performed by any IMT distributor authorized to sell new IMT products of the type involved or by any IMT Service Center authorized to service the type of product involved or by IMT in the event of direct sales made by IMT. At the time of requesting warranty service, the purchaser must present evidence of the date of delivery of the product. The purchaser shall pay any premium for overtime labor requested by the purchaser, any charge for making service calls and for transporting the equipment to the place where warranty work is performed.

WARRANTY VOIDED - All obligations of IMT under this warranty shall be terminated:(1) if service other than normal maintenance or normal replacement of service items is performed by someone other than an authorized IMT dealer, (2) if product is modified or altered in ways not approved by IMT.

PURCHASER'S RESPONSIBILITY - This warranty covers only defective material and workmanship. It does not cover depreciation or damage caused by normal wear, accident, improper protection in storage, or improper use. The purchaser has the obligation of performing the care and maintenance duties discussed in IMT's written recommendations, instructions and specifications. Any damage which results because of purchaser's failure to perform such duties shall not be covered by this warranty. The cost of normal maintenance and normal replacement of service items such as filters, belts, etc. shall be paid by the purchaser.

CONSEQUENTIAL DAMAGES - The only remedies the purchaser has in connection with the breach or performance of any warranty on IMT products are those set forth above. In no event will the dealer, IMT or any company affiliated with IMT, be liable for business interruptions, loss of sales and/or profits, rental or substitute equipment, costs of delay or for any other special, indirect, incidental or consequential losses, costs or damages.

REPRESENTATIONS EXCLUDED - IMT products are subject to no expressed, implied or statutory warranty other than herein set forth, and no agent, representative or distributor of the manufacturer has any authority to alter the terms of this warranty in any way whatsoever or to make any representations or promises, express or implied, as to the quality or performance of IMT products other than those set forth above.

CHANGE IN DESIGN - IMT reserves the right to make changes in design or improvements upon its products without imposing any obligation upon itself to install the same upon its products theretofore manufactured.

Effective January, 1984

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