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Manual # 99905833

# Model 12916 Crane Parts & Specifications

Effective August 2014



IOWA MOLD TOOLING CO., INC.

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# Revisions

| DATE | LOCATION | DESCRIPTION |
|------|----------|-------------|
|      |          |             |
|      |          |             |





## CHAPTER 1

# Introduction

This volume deals with information applicable to your particular crane. For operating, maintenance and repair instructions, refer to Volume 1, OPERATION, MAINTENANCE AND REPAIR.

We recommend that this volume be kept in a safe place in the office.

This manual is provided to assist you with ordering parts for your IMT crane. It also contains additional instructions regarding your particular installation.

In addition to reading the manual, it is your responsibility to become familiar with government regulations, hazards, and the specific operation of your equipment. Use caution and common sense while operating and maintaining the equipment and follow all safety procedures and regulations. Treat this equipment with respect and service it regularly.

### MODIFICATIONS

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

Decals regarding safety and operation are considered safety equipment, and must be kept clean and legible.

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

### WARRANTY

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

### NOTICE TO THE OWNER / USER

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

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



## RESPONSIBILITY

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

## MANUAL STRUCTURE

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

### NOTE

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



### CAUTION

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



### WARNING

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



CHAPTER 2

# Specifications

## In This Chapter

Model 12916 Specifications ..... 8

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## Model 12916 Specifications

| GENERAL SPECIFICATIONS                                  |                 |
|---------------------------------------------------------|-----------------|
| *CRANE RATING (ANSI B30.22)                             | 129,000 FT-LBS  |
| *MAXIMUM CRANE RATING                                   | 129,000 FT-LBS  |
| HORIZONTAL REACH<br>from centerline of rotation         | 16'-2"          |
| HYDRAULIC EXTENSION                                     | 40"             |
| MANUAL EXTENSION                                        | NONE            |
| VERTICAL REACH<br>from mounting surface                 | 23'-1"          |
| VERTICAL REACH<br>from ground/41" frame ht.             | 26'-6"          |
| CRANE WEIGHT                                            | 6,040 LBS       |
| STABILIZER SPAN                                         | 15'-0"          |
| STABILIZER PADS                                         | 12" X 19"       |
| CRANE STORAGE HEIGHT<br>from mounting surface           | 8'-2"           |
| CRANE STORAGE HEIGHT<br>from ground/41" frame ht.       | 11'-7"          |
| **MOUNTING SPACE REQUIRED                               | 32"             |
| ROTATIONAL TORQUE                                       | 16,200 FT-LBS   |
| OPTIMUM PUMP CAPACITY                                   | 13 U.S. GPM     |
| SYSTEM OPERATING PRESSURE                               | 2300 PSI        |
| OIL RESERVOIR CAPACITY                                  | 21 U.S. GALLONS |
| HOOK APPROACH-HORIZONTAL<br>from centerline of rotation | 5'-10"          |
| HOOK APPROACH-VERTICAL<br>from mounting surface         | 9'-8"           |

\* Maximum Crane Rating (ft-lbs) is defined as that rated load (lbs) which when multiplied by its respective distance (ft) from centerline of rotation gives the greatest ft-lb value.

ANSI B30.22 Crane Rating (ft-lbs)= With all extensions retracted and inner plus outer boom in a horizontal position, rated load (lbs) X respective distance (ft) from centerline of rotation = nominal ft-lb value.

\*\* Allow an additional 3" between the cab and crane base for swing clearance.

IMT reserves the right to change specifications and design without notice. Where applicable, specifications are in accordance with SAE standards and ISO/DIS 3691-1, the international standard for Industrial Trucks - Safety Requirements and Verification.

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| PERFORMANCE CHARACTERISTICS  |                |            |
|------------------------------|----------------|------------|
|                              | SPECIFICATIONS | SPEED      |
| CRANE ROTATION WITH TIREHAND | 370°           | 45 seconds |
| INNER BOOM ELEVATION         | -23° to +67°   | 25 seconds |
| OUTER BOOM ARTICULATION      | 112°           | 19 seconds |
| EXTENSION BOOM               | 40"            | 6 seconds  |
| STABILIZER EXTENSION         | 29-1/4"        | 40 seconds |

### POWER SOURCE

Integral-mounted hydraulic pump and PTO application. Other standard power sources may be utilized-minimum power required is 21 horsepower.

### CYLINDER HOLDING VALVES

The holding sides of all 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 stabilizer cylinders have positive, pilot-operated holding valves that open only on command.

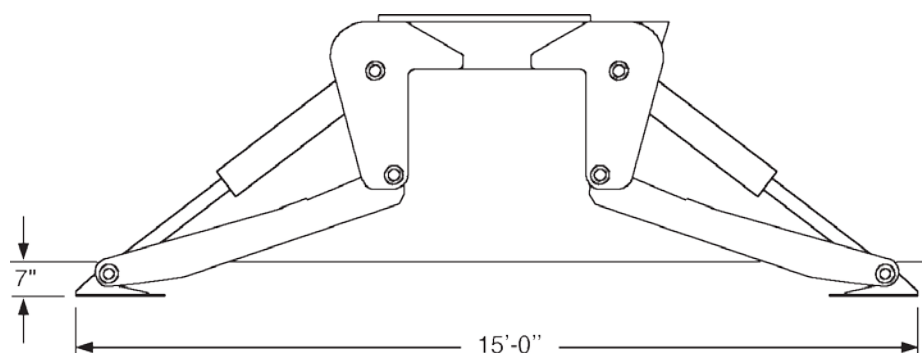
The inner cylinders have single pilot-operated counter balance valves while the outer and extension boom cylinders have double counter-balance valves. The counter-balance valve serves several functions. First, it is a holding valve. Secondly, it is so constructed that it will control the lowering function 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.

### 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. Total gear reduction is 56.7 : 1.

### HYDRAULIC SYSTEM (PTO DRIVEN)

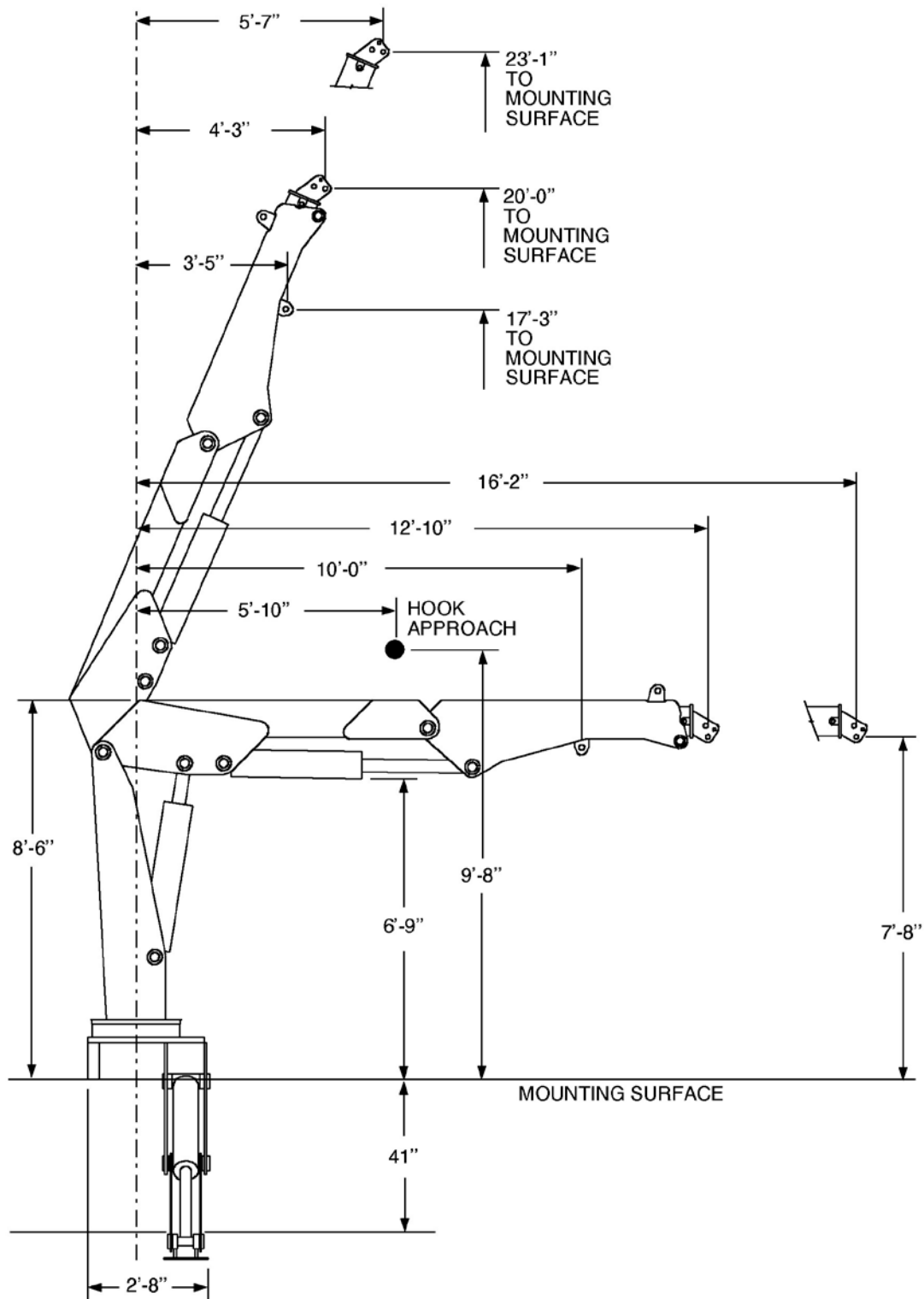
The hydraulic system is an open-centered, full-pressure system that requires 13 GPM optimum oil flow at 2300 PSI. Eight-spool, stack-type control valve, six of which are used for the standard crane and the remaining two are plugged, but easily adapted for additional optional features. Dual operational handles for six functions are located at both sides of the crane for convenient operation. System includes hydraulic oil reservoir, suction-line strainer, pump, 8-section control valve, return-line filter and all hoses and fittings.



STABILIZER DIMENSIONS



## Geometric Configuration





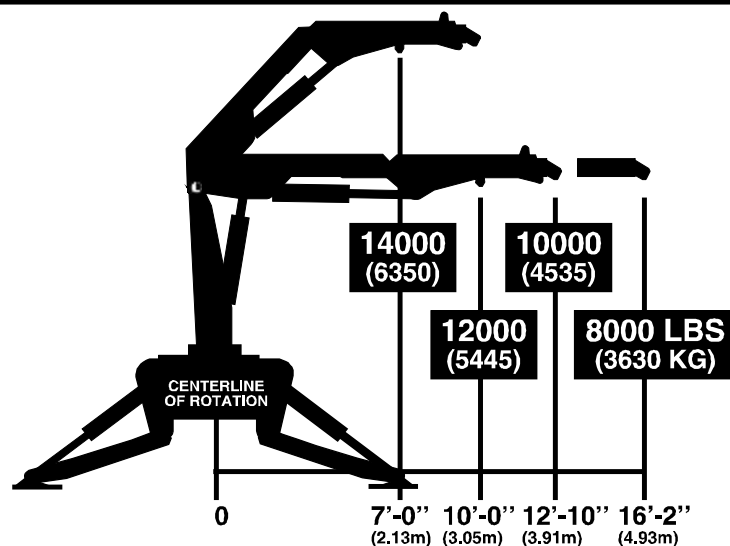
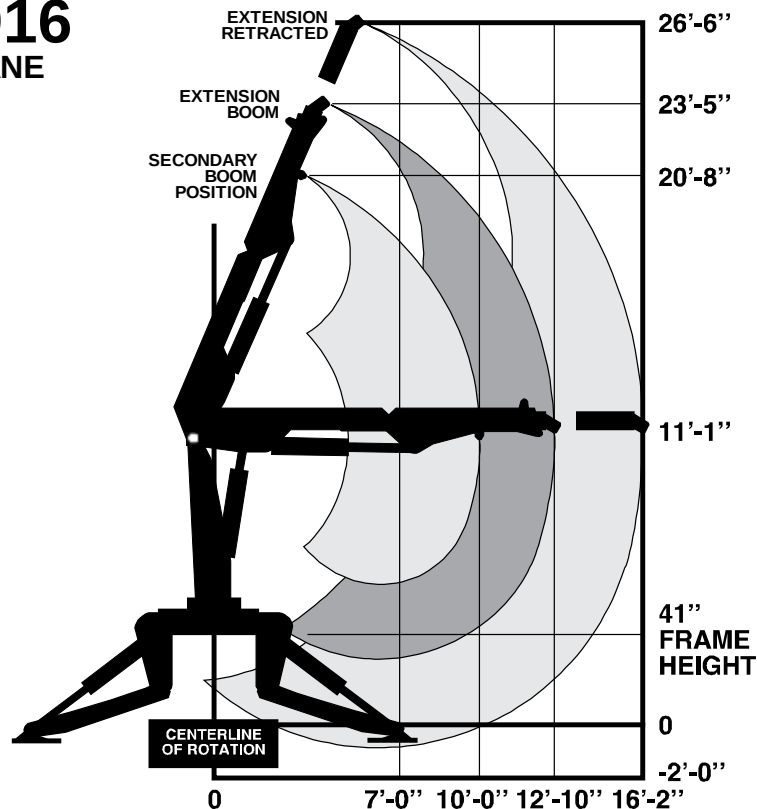
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Capacities through geometric range are limited to those shown in horizontal position.



## MODEL 12916 CRANE

- Loads shown are based on crane structural or hydraulic capability. Before lift is made, stability must be checked per SAE J765A.
- Working loads will be limited to those shown. Deduct the weight of load handling devices.
- Winch lifting capacity is limited to those shown - Maximum 4000 LBS for 1-part line.



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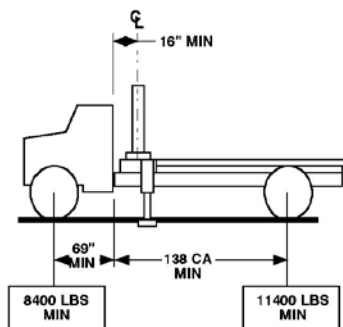


## Minimum Chassis Specifications for 12916 Crane

|                                                               |                           |
|---------------------------------------------------------------|---------------------------|
| CRANE MOUNT                                                   | Behind Cab                |
| CRANE WORKING AREA                                            | 360°                      |
| CHASSIS STYLE                                                 | Conventional Cab          |
| FRONT AXLE RATING (GAWR)                                      | 12,000 lbs                |
| REAR AXLE RATING (GAWR)                                       | Single Axle<br>21,000 lbs |
| WHEELBASE                                                     | 207"                      |
| CAB-TO-AXLE                                                   | 138"                      |
| OUTRIGGER WIDTH REQUIRED                                      | 15'-0"                    |
| RBM                                                           | 1,664,000 in-lbs          |
| Frame Selection Modules                                       | 26 cubic inches           |
| Frame Yield Strength                                          | 50,000 psi                |
| MINIMUM FINISHED UNIT WEIGHT TO<br>MAINTAIN VEHICLE STABILITY |                           |
| Front Axle                                                    | * 8,400 lbs               |
| Rear Axle                                                     | *11,400 lbs               |
| Total Finished Unit Weight                                    | 19,800 lbs                |

\*Allows lifting full capacity load in a 360° arc when crane is installed immediately behind the cab. Great care should be taken when swinging the load from rear of vehicle to front of vehicle since the front axle springs will compress, thus affecting the levelness of the vehicle.

**FIGURE A.  
360° WORKING AREA**



### NOTES:

- 1 GAWR means Gross Axle Weight Rating and is dependent on all components of the vehicle such as axles, tires, wheels, springs, brakes, steering and frame strength meeting the manufacturer's recommendations. Always specify GAWR when purchasing a truck.
- 2 Minimum axle requirements may increase with use of diesel engines, longer wheelbase or service bodies. Contact the factory for further information.
- 3 Weight distribution calculations are required to determine final axle loading.
- 4 All chassis and crane combinations must be stability tested to ensure stability per ANSI B30.22.



CHAPTER 3

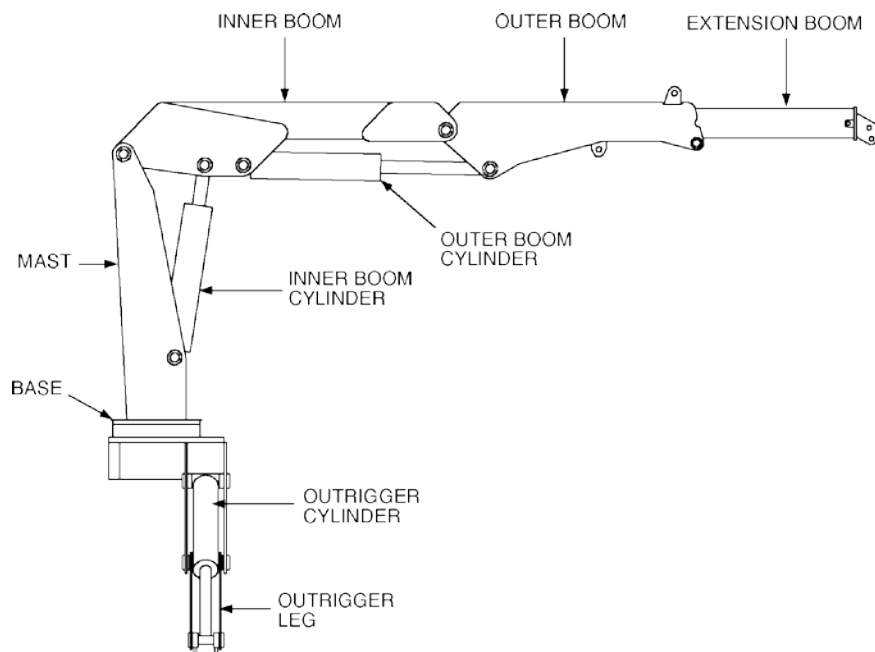
# Reference

## In This Chapter

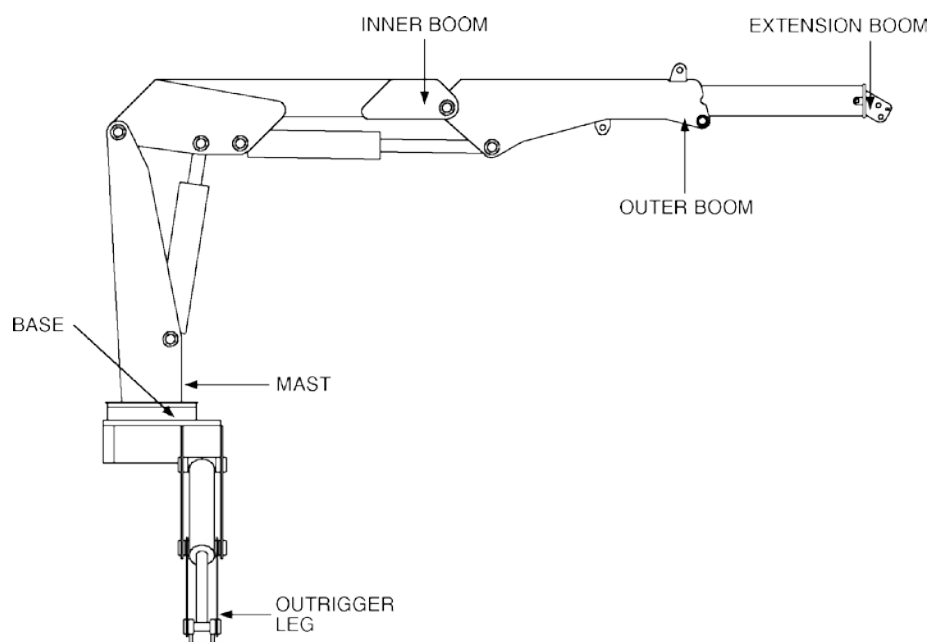
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## Major Crane Assemblies

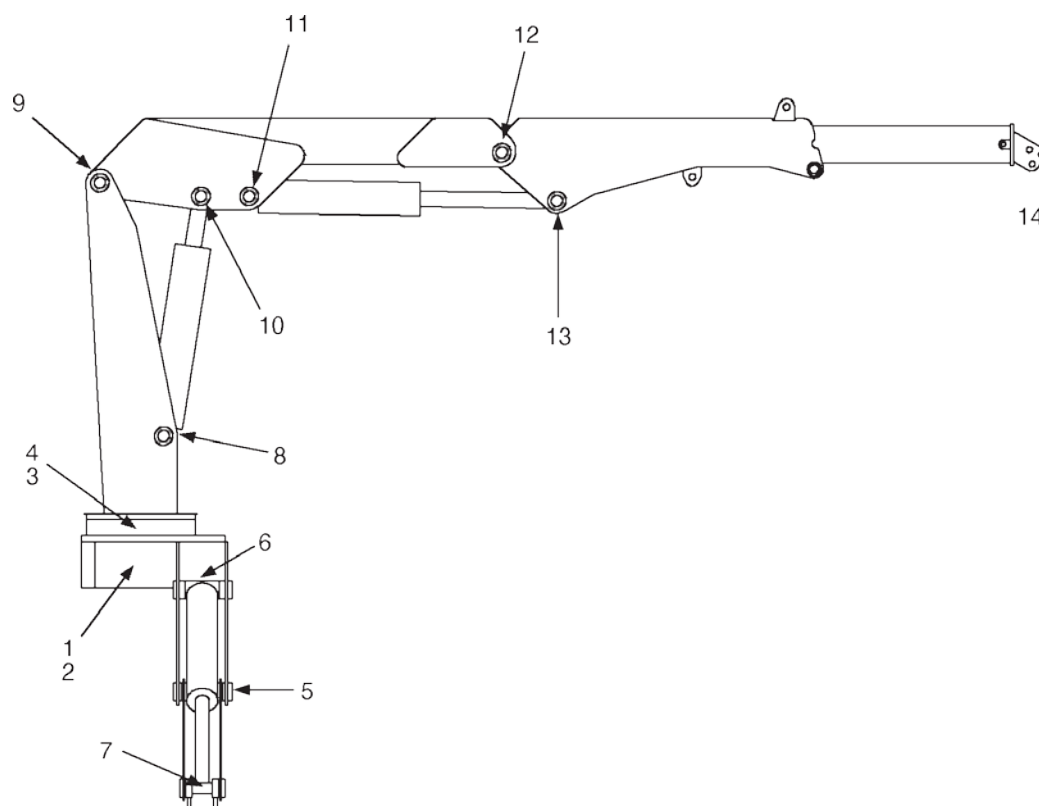


## Weldment Part Number Locations





## Grease Zerk Locations & Lubricant Requirements



| ITEM | LOCATION DESCRIPTION                    | LUBRICANT                                            | FREQUENCY |
|------|-----------------------------------------|------------------------------------------------------|-----------|
| 1.   | TURNTABLE/BEARING GREASE EXTENSION      | SHELL ALVANIA 2EP<br><br>OR<br><br>SHELL RETINAX "A" | WEEKLY    |
| 2.   | *ROTATE CRANE WHILE GREASING DRIVE GEAR |                                                      |           |
| 3.   | GREASE EXTENSION PINION                 |                                                      |           |
| 4.   | GEAR                                    |                                                      |           |
| 5.   | PINION COVER                            |                                                      |           |
| 6.   | BASE/STABILIZER LEG HINGE               |                                                      |           |
| 7.   | PIN STABILIZER CYLINDER                 |                                                      |           |
| 8.   | BASE STABILIZER CYLINDER                |                                                      |           |
| 9.   | ROD INNER CYLINDER BASE                 |                                                      |           |
| 10.  | MAST/INNER BOOM HINGE                   |                                                      |           |
| 11.  | PIN INNER CYLINDER ROD                  |                                                      |           |
| 12.  | PIN OUTER CYLINDER BASE                 |                                                      |           |
| 13.  | INNER BOOM/OUTER BOOM HINGE             |                                                      |           |
| 14.  | PIN OUTER CYLINDER ROD                  |                                                      |           |
|      | ANY TIREHAND ATTACHMENT                 |                                                      |           |

**NOTE:** All application points must be greased weekly under normal workloads and moderate weather conditions. Under severe operating conditions, lubrication should be performed more frequently. See Volume 1; Operation, Maintenance and Repair for additional lubrication requirements.



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# Installation

## GENERAL

This section contains specific instructions for the installation of your crane. Prior to installing the crane and hydraulic components, make sure the chassis is ready to receive the crane (refer to Volume 1, Installation).

## 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 the balance and reposition crane until mounting surface is level.
2. Install the truck frame support so that the tie-down studs pass through the supports (Figure below). Cut the support to the inside dimensions of the truck frame. Allow about 1/16" extra. Grind the end of the support to fit inside the frame channel. Use a hammer to drive it into position if necessary.
3. Allow sufficient clearance between the cab and crane base, at least 3" (7.6cm). 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. Note position of support weldments on truck frame. Hand-tighten nuts. Observe underside of crane base. No clearance between base and frame is allowed.
4. Torque the 1 1/4"-7 UNC Grade 5 mounting hardware to 840 ft-lbs (116 kg-m). When torqueing 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 colloidal 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.

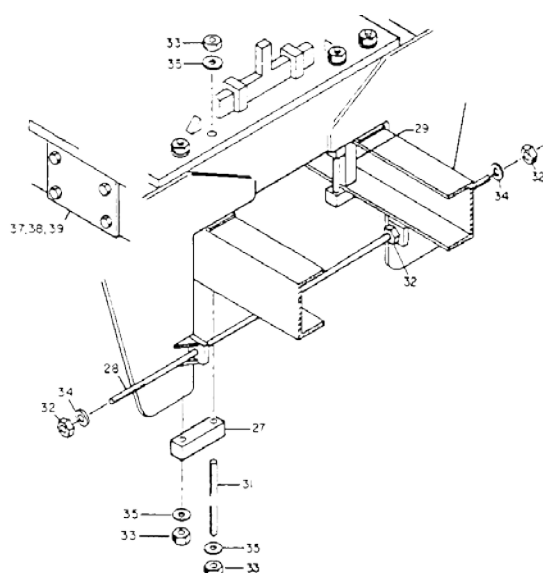
### CAUTION

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 840 ft-lb (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.



5. Install the tie-plate (Figure C-1) on the truck chassis. Drill four holes using the plate as a template and install the bolts and lock nuts. Torque the bolts to 200 ft-lbs (28 kg-m). Weld the tie-plate to the crane base with 3/8" continuous fillet weld.
6. Install the two tension bars with nuts and washers as shown. Tighten the outside nuts first to about 200 ft-lbs (28 kg-m) to preload the tension bar. Then tighten the inner nuts to 466 ft-lbs (65 kg-m).
7. Touch up paint on crane and chassis as necessary.



| ITEM | DESCRIPTION   | ITEM | DESCRIPTION |
|------|---------------|------|-------------|
| 27.  | CLAMP BLOCK   | 33.  | LOCK NUT    |
| 28.  | TENSION BAR   | 34.  | LOCK WASHER |
| 29.  | FRAME SUPPORT | 35.  | WASHER      |
| 31.  | TIE-DOWN STUD | 37.  | TIE-PLATE   |
| 32.  | NUT           | 38.  | CAP SCREW   |
|      |               | 39.  | LOCK NUT    |

### CRANE INSTALLATION

#### HYDRAULIC INSTALLATION

To install the hydraulic hoses, fittings, etc.:

1. Plumb the suction line filter as shown in Figure below.
2. Install the suction hose between the suction line filter and the pump inlet. Tighten the hose clamps.
3. Install the pressure hose between the pump outlet and the inlet port on the valvebank.
4. Install the return line between the reservoir return line filter and valvebank (if applicable).
5. Fill the hydraulic oil reservoir.

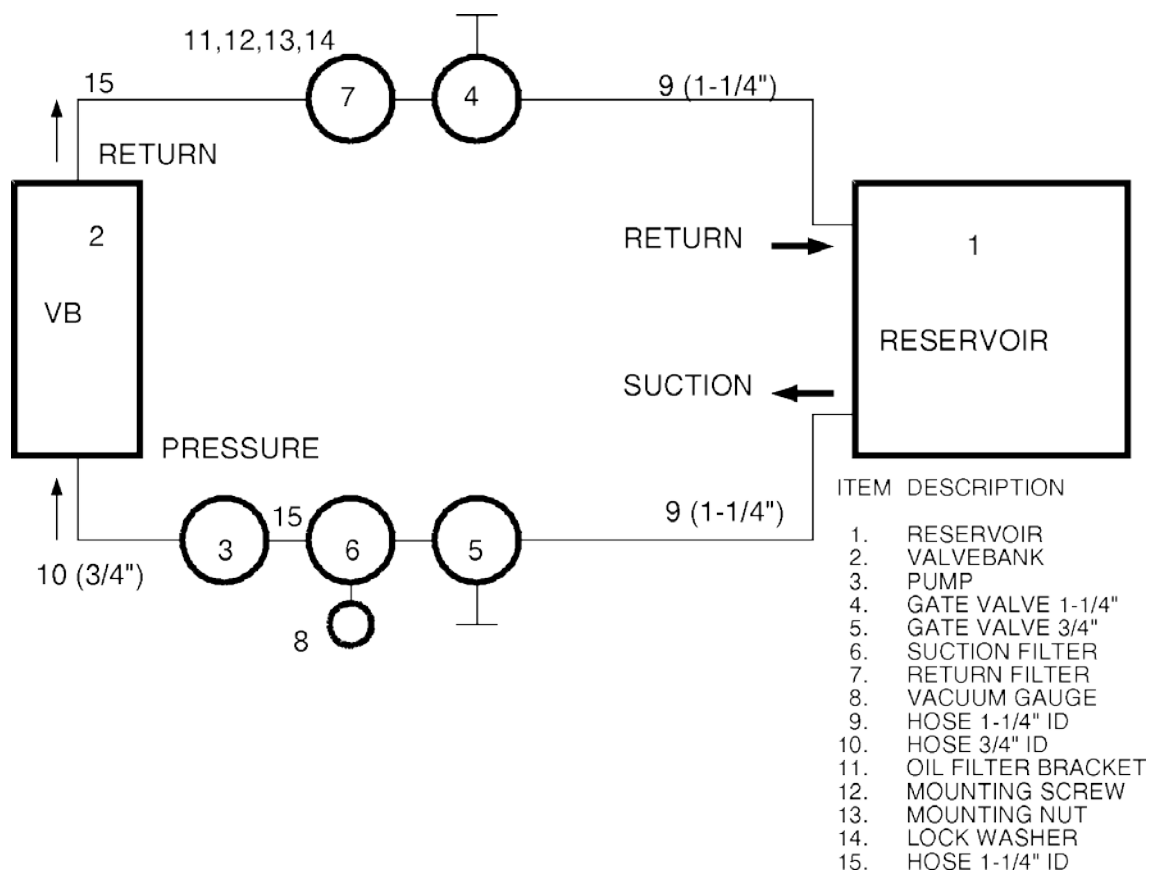


6. Open the gate valve at the suction-line filter.

**CAUTION**

Failure to open the gate valve will result in a dry running pump which may damage the pump.

7. Open the return gate valve.
8. Start the vehicle's engine and engage the PTO. Allow the system to run for about five minutes and then check the vacuum gauge on the suction-line filter (it should read 8" mercury or less). If the vacuum reading is too high, check to make certain that the gate valve is opened completely. If the valve is fully opened, check for a collapsed or restricted suction line.
9. Cycle all hydraulic functions. Check for leaks, and refill the reservoir if necessary.



HYDRAULIC INSTALLATION



## CHAPTER 4

# Parts

### In This Chapter

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| Parts Information .....                             | 20 |
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## Parts Information

### GENERAL

This section contains the exploded parts drawings, with accompanying parts lists, for the assemblies used on this crane. These drawings are intended to be used in conjunction with the instructions found in the REPAIR section in Volume 1. 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 repair section. Pay particular attention to statements marked Warning, Caution or Note in that section. Failure to comply with these instructions may result in damage to the equipment, personal injury or death.

### CRANE IDENTIFICATION

Every IMT crane has an identification placard (see figure). This placard is attached to the inner boom, mast, or crane base. When ordering parts, communicating warranty information, or referring to the unit in correspondence, always include the serial number and model numbers. Address all inquiries to your authorized IMT distributor or to:

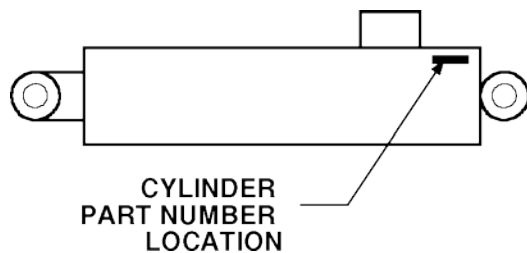
Iowa Mold Tooling Co., Inc.  
Box 189, Garner, IA 50438-0189  
Telephone: 641-923-3711  
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|                                                               |  |
|---------------------------------------------------------------|--|
| IOWA MOLD TOOLING CO., INC.<br>BOX 189, GARNER, IA 50438-0189 |  |
| MODEL<br>NUMBER                                               |  |
| SERIAL<br>NUMBER                                              |  |
| MFG<br>DATE                                                   |  |

70028118

### CYLINDER IDENTIFICATION

To insure proper replacement parts are received, it is necessary to specify the complete number/letter sequence for any part requested. Part numbers may be cross checked by comparing the stamped identification on the cylinder case (See figure) against the information contained in the service manual. You must include the part number stamped on the cylinder case when ordering parts.



### WELDMENT IDENTIFICATION

Each of the major weldments – base, mast, inner boom, outer boom, extension boom and stabilizer 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. The locations of the part numbers are shown in Chapter 2.

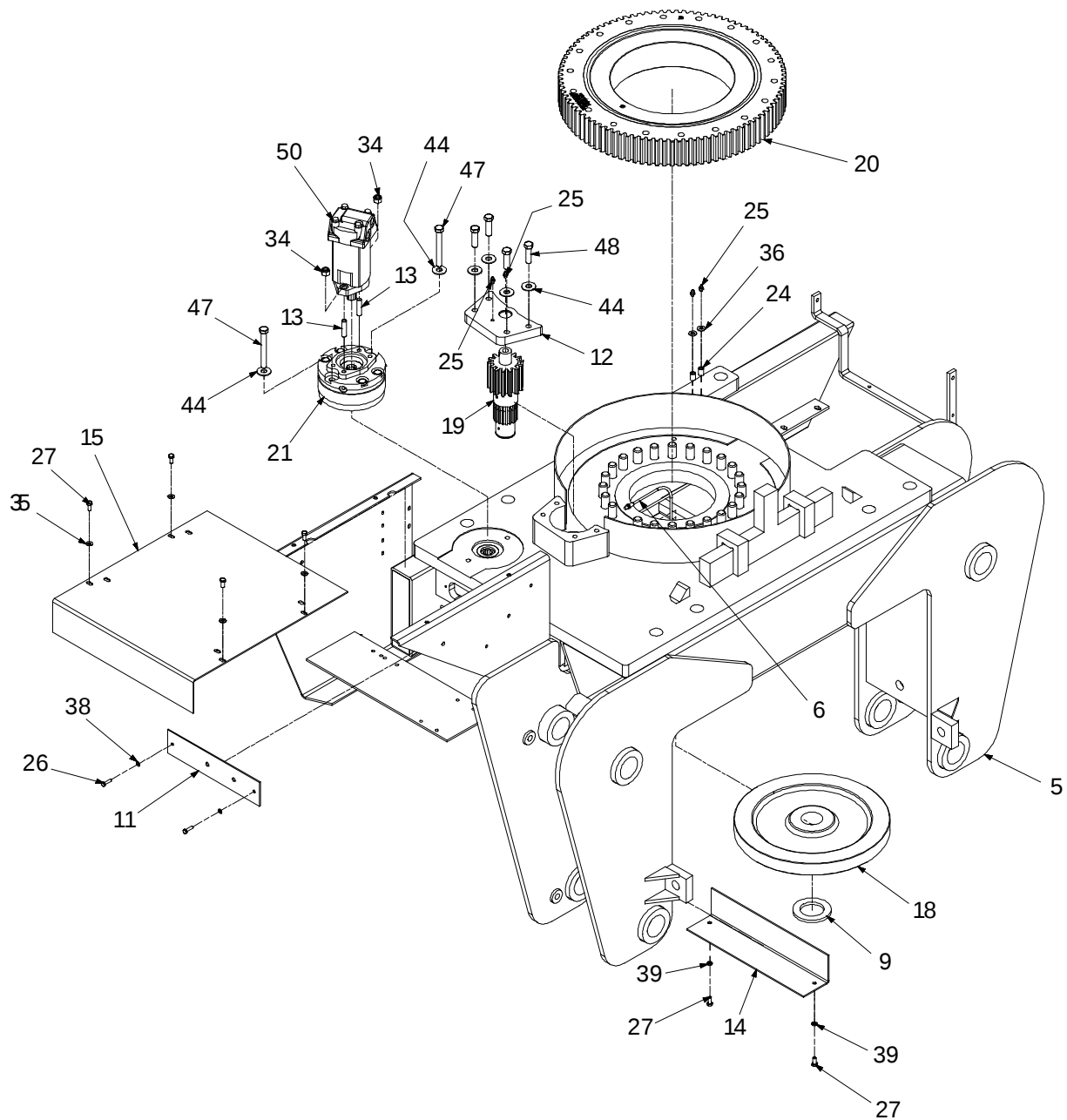
### ORDERING REPAIR PARTS

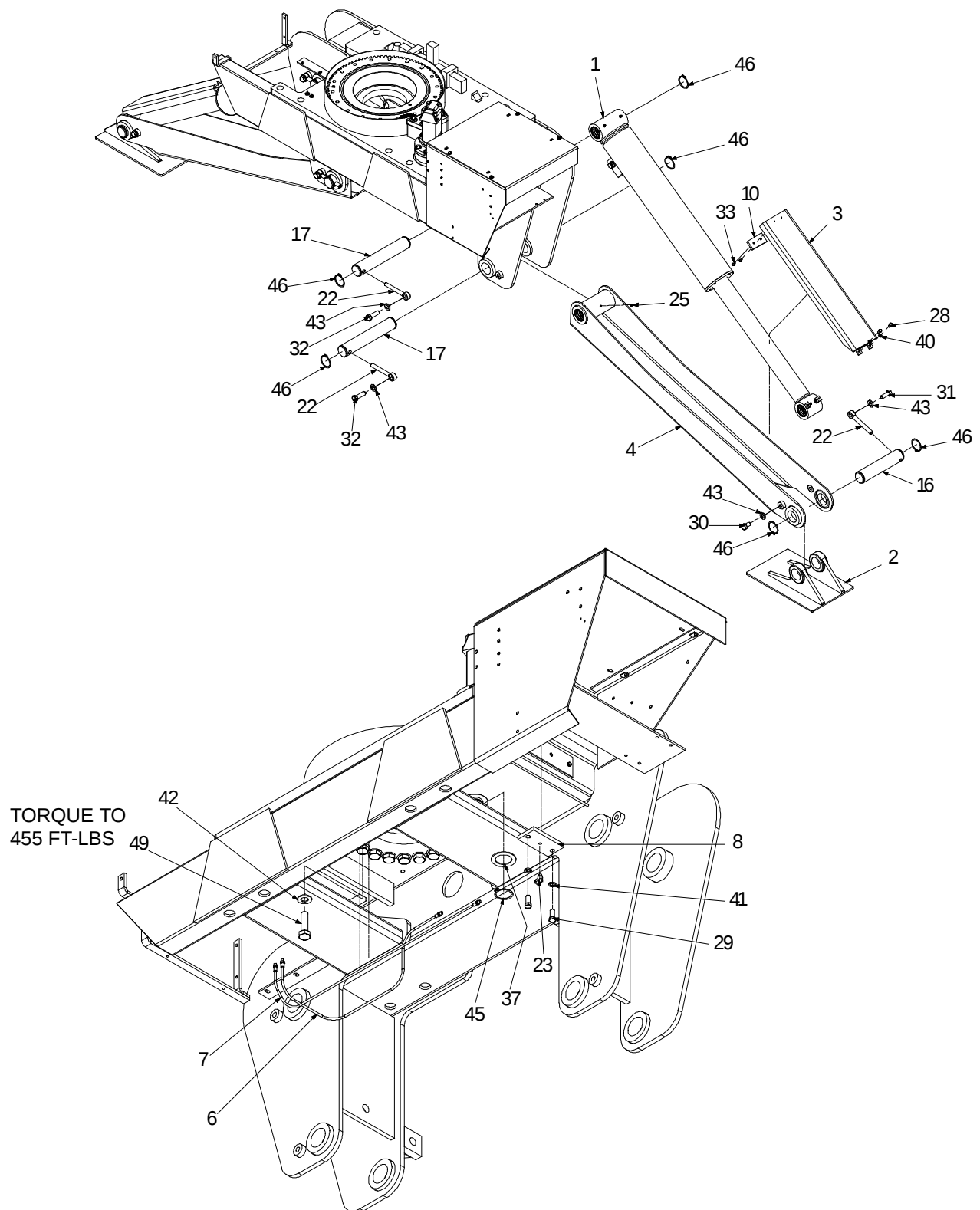
When ordering replacement parts:

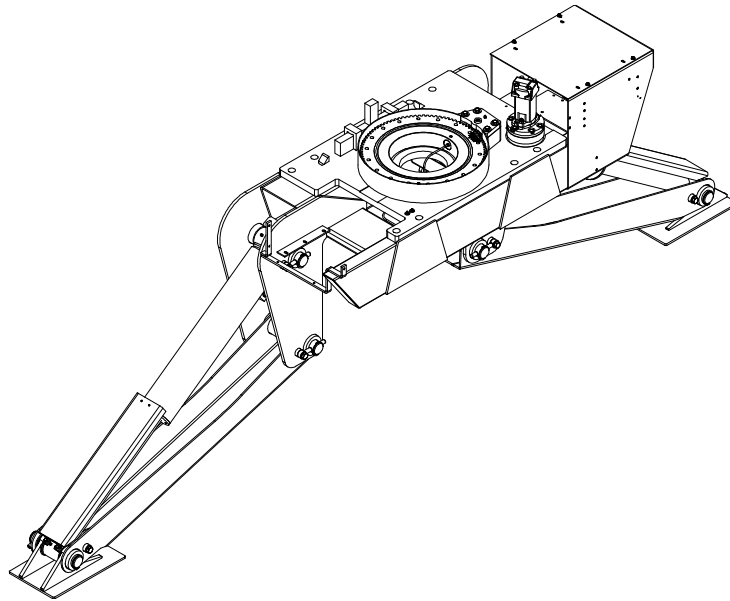
- 1 Give the model number of the unit.
- 2 Give the serial number of the unit.
- 3 Specify the complete part number. When ordering cylinder parts, or one of the main weldments, always give the stamped part number.
- 4 Give a complete description of the part.
- 5 Specify the quantity required.



## Base & Out Assembly (40725982)





**NOTE:**

- 1 APPLY LUBRICANT TO THE EXTERNAL TEETH OF THE TURNTABLE BEARING AND PINION GEAR.
- 2 TURNTABLE BEARING BACKLASH – 0.008/0.013.

**40725982 PARTS LIST**

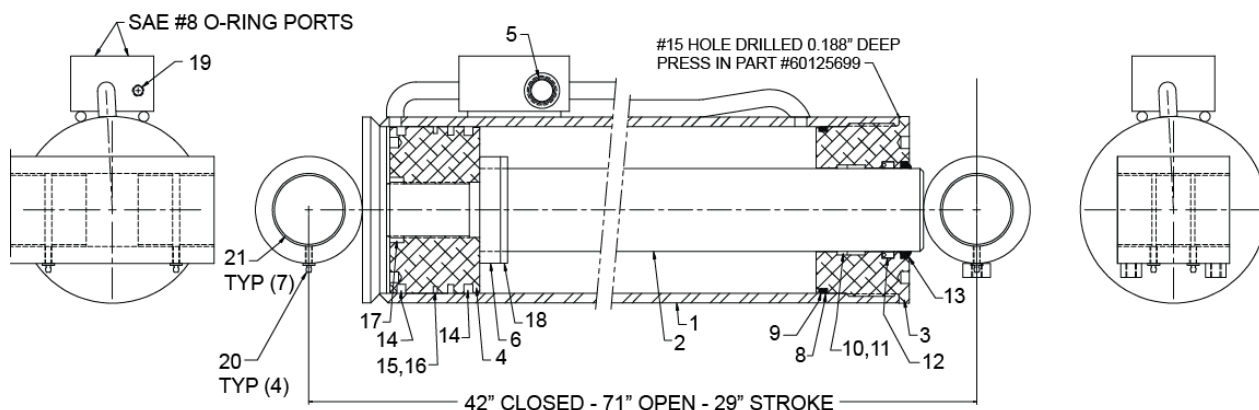
| ITEM | PART #   | DESCRIPTION                            | KIT | QUANTITY |
|------|----------|----------------------------------------|-----|----------|
| 1.   | 3C283801 | CYL-6.0/3.0 29.25S 42.12CC C           |     | 2        |
| 2.   | 52701412 | OUTRG PAD-MACH (CAST EARS) 12916 20017 |     | 2        |
| 3.   | 52706739 | GUARD-OUTRG CYL ROD 1216               |     | 2        |
| 4.   | 52725863 | WLDMT-FOLD DOWN STAB LEG 12916         |     | 2        |
| 5.   | 52725971 | WLDMT-BASE 12916                       |     | 1        |
| 6.   | 53000710 | GREASE EXT-38.00 OAL 36.00 HOSE        |     | 1        |
| 7.   | 53000713 | GREASE EXT-38.00 OAL 36.00 HOSE        |     | 1        |
| 8.   | 60010844 | GREASE PLATE-DRIVE GEAR                |     | 1        |
| 9.   | 60020123 | THRUST WASH-BRZ 2.50X4.00X.31          |     | 1        |
| 10.  | 60030176 | WEAR PAD-B2 UHMW .50X2.00X4.00         |     | 2        |
| 11.  | 60103367 | INSPECTION PLATE COVER                 |     | 1        |
| 12.  | 60105964 | SUPPORT PLT-PINION                     |     | 1        |
| 13.  | 60106032 | STUD .50-13X1.75                       | 51  | 2        |
| 14.  | 60106193 | PLANETARY GEAR COVER                   |     | 1        |
| 15.  | 60118802 | VALVE BANK COVER – TOP PLATE           |     | 1        |
| 16.  | 60141680 | PIN-TYPE PP 2.50X 11.75 (10.03)        |     | 2        |
| 17.  | 60141681 | PIN-TYPE PP 2.50X 14.50 (12.78)        |     | 4        |
| 18.  | 71056072 | GEAR-INTMD 301-10051-1                 |     | 1        |
| 19.  | 71056073 | GEAR-PINION 301-10052-1                |     | 1        |
| 20.  | 71056273 | BEARING-ROTATION                       |     | 1        |
| 21.  | 71056623 | BRAKE-HYD SWING DRIVE                  |     | 1        |
| 22.  | 71415017 | KEEPER-PIN .75                         |     | 6        |
| 23.  | 72053281 | ELBOW-STREET BLK .12X90 DEG            |     | 1        |
| 24.  | 72053301 | COUPLING-GLV .12 SCH 40                |     | 2        |



| 40725982 PARTS LIST |          |                                 |     |          |
|---------------------|----------|---------------------------------|-----|----------|
| ITEM                | PART #   | DESCRIPTION                     | KIT | QUANTITY |
| 25.                 | 72053508 | ZERK-NPT .12                    | 51  | 6        |
| 26.                 | 72060004 | CAP SCREW .25-20X 1.00 HH GR5 Z | 51  | 2        |
| 27.                 | 72060023 | CAP SCREW .31-18X .75 HH GR5 Z  | 51  | 6        |
| 28.                 | 72060044 | CAP SCREW .38-16X .75 HH GR5 Z  | 51  | 4        |
| 29.                 | 72060092 | CAP SCREW .50-13X 1.25 HH GR5 Z | 51  | 2        |
| 30.                 | 72060182 | CAP SCREW .75-10X 1.25 HH GR5 Z | 51  | 2        |
| 31.                 | 72060185 | CAP SCREW .75-10X 2.00 HH GR5 Z | 51  | 2        |
| 32.                 | 72060186 | CAP SCREW .75-10X 2.50 HH GR5 Z | 51  | 4        |
| 33.                 | 72060836 | SCR-MACH .25-20X .75FLH         | 51  | 4        |
| 34.                 | 72062080 | NUT .50-13 HEX NYLOCK           | 51  | 2        |
| 35.                 | 72063002 | WASHER .31 FLAT                 | 51  | 4        |
| 36.                 | 72063003 | WASHER .38 FLAT                 | 51  | 2        |
| 37.                 | 72063039 | MACHY BUSHING 2.00X10 GA NR     | 51  | 1        |
| 38.                 | 72063049 | WASHER .25 LOCK                 | 51  | 2        |
| 39.                 | 72063050 | WASHER .31 LOCK                 | 51  | 2        |
| 40.                 | 72063051 | WASHER .38 LOCK                 | 51  | 4        |
| 41.                 | 72063053 | WASHER .50 LOCK                 | 51  | 2        |
| 42.                 | 72063115 | WASHER .88 FLAT ASTM F436       | 51  | 23       |
| 43.                 | 72063116 | WASHER .75 N FLAT H ASTM F436Z  | 51  | 8        |
| 44.                 | 72063117 | WASHER .56 FLAT ASTM F436       | 51  | 6        |
| 45.                 | 72066095 | RETAINING RING-EXT 2.00 STD     | 51  | 1        |
| 46.                 | 72066103 | RETAINING RING-EXT 2.50 STD     |     | 12       |
| 47.                 | 72601037 | CAP SCR .56-12X 4.50 HH GR8 Z   | 51  | 2        |
| 48.                 | 72601144 | CAP SCR .56-12X 2.00 HH GR8 Z   | 51  | 4        |
| 49.                 | 72601148 | CAP SCR .88-9X 3.00 HH GR8 Z    | 51  | 23       |
| 50.                 | 73051223 | MOTOR-HYD C104-1021 NO DANFOSS  |     | 1        |
| 51.                 | 91725992 | KIT-HRDW BASE 12916             |     | 1        |
| NEW 20140421        |          |                                 |     |          |



## Stabilizer Cylinder (3C283801)



### NOTE:

- 1 IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.
- 2 APPLY "LUBRIPLATE #630.2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON AND HEAD GLANDS, LOCK RING AND ROD THREADS BEFORE ASSEMBLY.
- 3 APPLY "NEVER-SEEZ" OR EQUIVALENT BETWEEN THE HEAD AND THE CASE WHEN ASSEMBLING THE CYLINDER. KEEP AWAY FROM ALL SEALS.

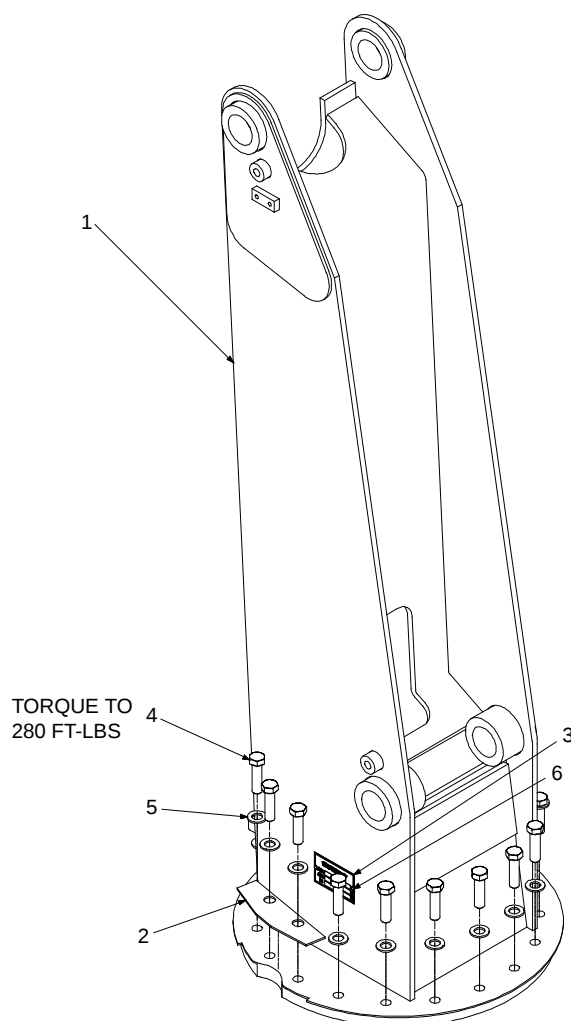
### 3C283801 PARTS LIST

| ITEM | PART #   | DESCRIPTION                                      | KIT | QTY  |
|------|----------|--------------------------------------------------|-----|------|
| 1.   | 4C283801 | CASE ASSEMBLY – 6.03B X 39.31L                   |     | 1    |
| 2.   | 4G283800 | ROD ASSEMBLY 3.00X39.31L 2.00S                   |     | 1    |
| 3.   | 6H060030 | HEAD – 6.03B X 3.00R                             |     | 1    |
| 4.   | 6I060200 | PISTON – 6.00B C 2.00S                           |     | 1    |
| 5.   | 73054304 | VALVE – CBAL 10GPM                               |     | 2    |
| 6.   | 6C075030 | STOP TUBE – 3.00R X .75L                         |     | 1    |
| 7.   | 9C242432 | SEAL KIT – IMT 6.00B 3.00R 2.00S                 |     | 1REF |
| 8.   | 7Q10P358 | BACKUP RING – 5.62 ID X 6.00 OD                  | 7   | 1    |
| 9.   | 7Q072358 | O RING – 5.62 X 6.00 X .19 70                    | 7   | 1    |
| 10.  | 7T2N4032 | WEAR RING – ROD 3.00 ID X .50W                   | 7   | 1    |
| 11.  | 7T2N8032 | WEAR RING – ROD 3.00 ID X .50W                   | 7   | 1    |
| 12.  | 7R546030 | U CUP SEAL – 3.00 X 3.50 X .38                   | 7   | 1    |
| 13.  | 7R14P030 | ROD WIPER – TYPE D 3.00                          | 7   | 1    |
| 14.  | 7T65I060 | PISTON RING – 6.00                               | 7   | 2    |
| 15.  | 7Q072253 | O RING – 5.38 X 5.62 X .12 70                    | 7   | 1    |
| 16.  | 7T66P060 | PISTON SEAL – DYN 6.00                           | 7   | 1    |
| 17.  | 7T61N200 | LOCK RING – NYLON 2.00"                          | 7   | 1    |
| 18.  | 60138277 | STOP TUBE – 3.00R X .25L                         | 7   | 1    |
| 19.  | 7PNPXT02 | PIPE PLUG .125NPT (PART OF 1)                    |     | 4REF |
| 20.  | 72053507 | ZERK - .25-28 (PART OF 1 & 2)                    |     | 4REF |
| 21.  | 7BF81225 | BUSHING – STL 2.50 PIN X 1.25 LG (PART OF 1 & 2) |     | 7REF |
| 22.  | 60125699 | PIN – LOCK TUBE 0.19 OD X 0.065 WALL             |     | 1    |

REV E 20131209



## Mast Assembly (40725983)

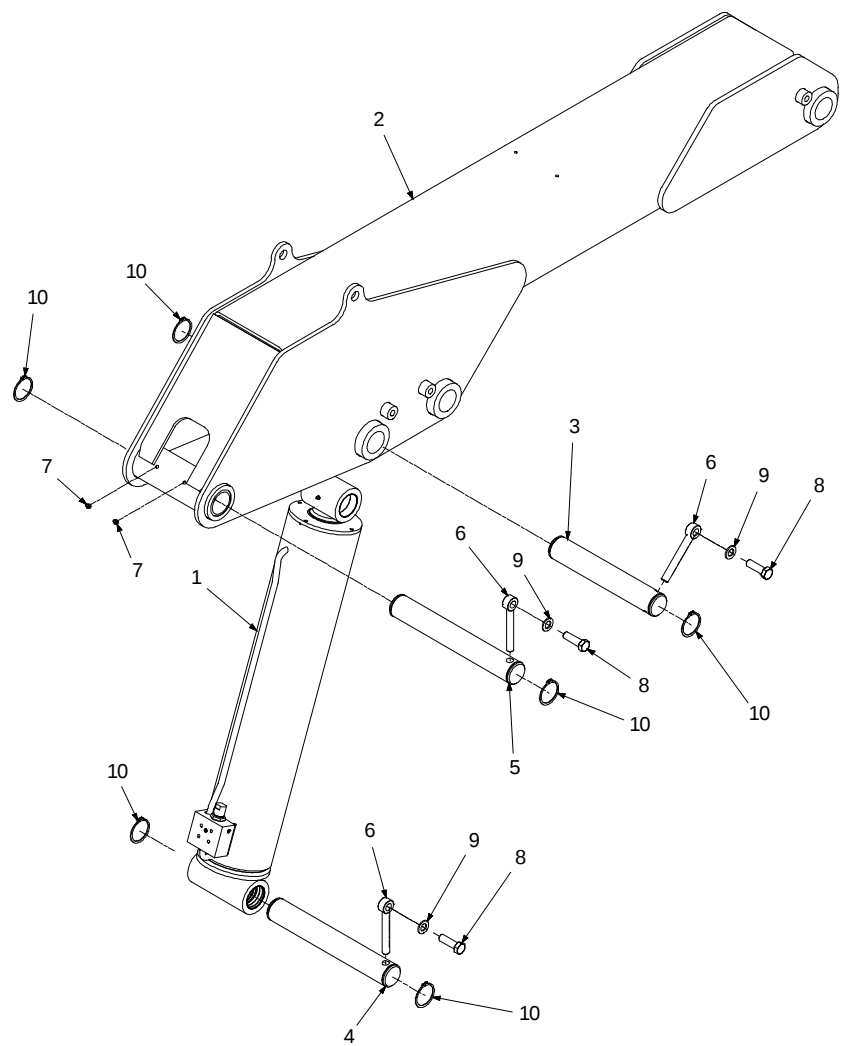


### 40725983 PARTS LIST

| ITEM         | PART #   | DESCRIPTION                    | KIT | QTY |
|--------------|----------|--------------------------------|-----|-----|
| 1.           | 52725866 | WLDMT-MAST 12916               |     | 1   |
| 2.           | 60104247 | COVER-PINION GEAR              |     | 1   |
| 3.           | 70029119 | PLACARD-SERIAL NUMBER          |     | 1   |
| 4.           | 72060209 | CAP SCREW .75-10X2.75 HH GR8 Z | 7   | 18  |
| 5.           | 72063116 | WASHER .75 N FLAT H ASTM F436Z | 7   | 18  |
| 6.           | 72661638 | TACK-METAL                     |     | 2   |
| 7.           | 91725991 | KIT-HRDW 12916 MAST            |     | 1   |
| NEW 20140421 |          |                                |     |     |



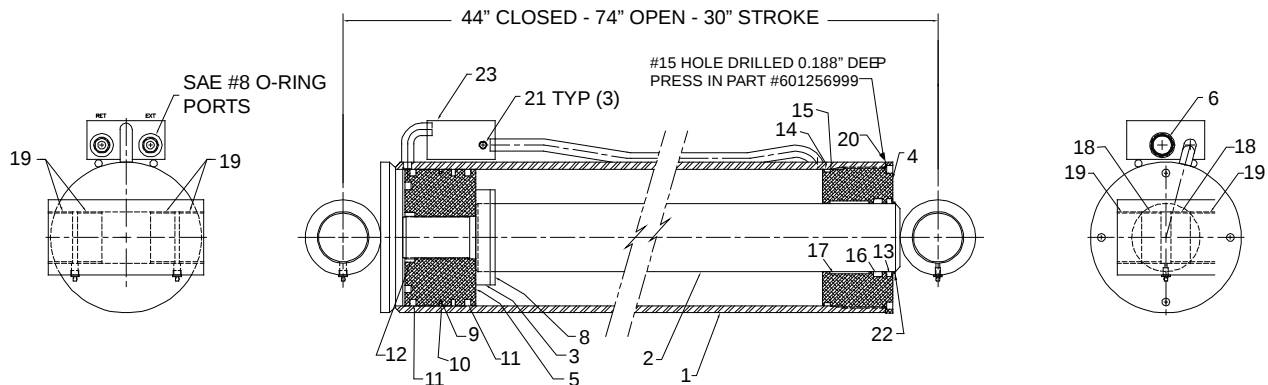
## Inner Boom Assembly (40725984)



| 40725984 PARTS LIST |          |                                 |     |     |
|---------------------|----------|---------------------------------|-----|-----|
| ITEM                | PART #   | DESCRIPTION                     | KIT | QTY |
| 1.                  | 3C194614 | CYL-7.0/3.5 30.25S 44.00CC C    |     | 1   |
| 2.                  | 52725867 | WLDMT-INNER BOOM 12916          |     | 1   |
| 3.                  | 60142110 | PIN-TYPE PP 2.50X 15.00 (13.28) |     | 1   |
| 4.                  | 60142111 | PIN-TYPE PP 2.50X 17.25 (15.53) |     | 1   |
| 5.                  | 60142112 | PIN-TYPE PP 2.50X 17.50 (15.78) |     | 1   |
| 6.                  | 71415017 | KEEPER-PIN .75                  |     | 3   |
| 7.                  | 72053508 | ZERK-NPT .12                    | 11  | 2   |
| 8.                  | 72060186 | CAP SCREW .75-10X 2.50 HH GR5 Z | 11  | 3   |
| 9.                  | 72063116 | WASHER .75 N FLAT H ASTM F436Z  | 11  | 3   |
| 10.                 | 72066103 | RETAINING RING-EXT 2.50 STD     |     | 6   |
| 11.                 | 91725990 | KIT-HRDW 12916 BOOMS            |     | 1   |
| NEW 20140421        |          |                                 |     |     |



## Inner Cylinder (3C194614)

**NOTE:**

- 1 IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.
- 2 APPLY "LUBRIPLATE #630.2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON AND HEAD GLANDS, LOCK RING AND ROD THREADS BEFORE ASSEMBLY.
- 3 APPLY "NEVER-SEEZ" OR EQUIVALENT BETWEEN THE HEAD AND THE CASE WHEN ASSEMBLING THE CYLINDER. KEEP AWAY FROM ALL SEALS.

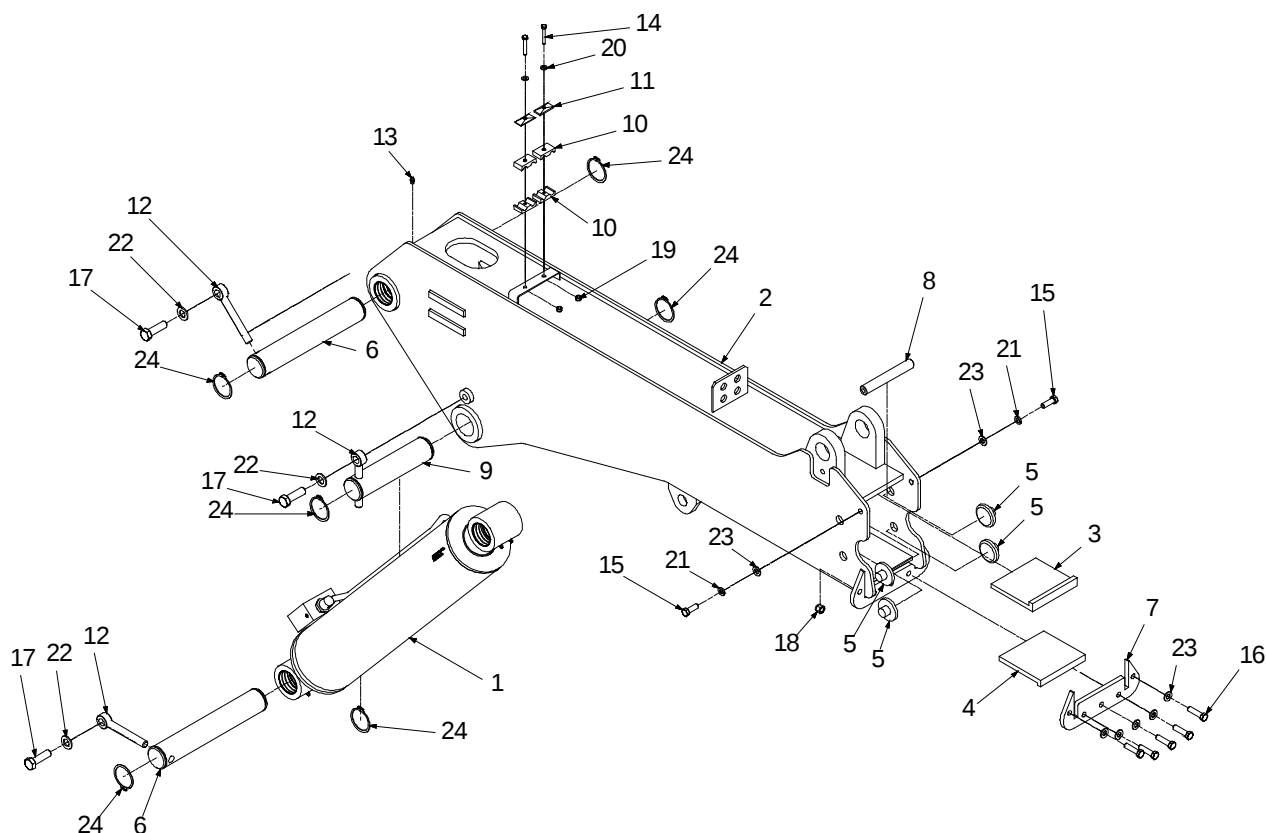
**3C194614 PARTS LIST**

| ITEM | PART #    | DESCRIPTION                                       | KIT | QTY  |
|------|-----------|---------------------------------------------------|-----|------|
| 1.   | 4C194611  | CASE ASM – 7.014 BORE X 39.38 LG (INCL: 19 & 21)  |     | 1    |
| 2.   | 4G194610  | ROD ASM – 3.50 X 40.94 X 2.19S (INCL: 18 & 19)    |     | 1    |
| 3.   | 6C075035  | STOP TUBE – 3.50 ROD X .75 LG                     |     | 1    |
| 4.   | 6HX70035  | HEAD – 7.04 BORE X 3.50 ROD                       |     | 1    |
| 5.   | 6I070218  | PISTON – 7.04 BORE X 2.19 STGR                    |     | 1    |
| 6.   | 73054242  | VALVE – CBAL 25 GPM (5:1)                         |     | 1    |
| 7.   | 9C282835  | SEAL KIT – IMT 7.00B 3.50R 2.19S (INCL: 8-17, 20) |     | 1    |
| 8.   | 60138278  | STOP TUBE – 3.50 ROD X 0.25 LONG                  | 7   | 1REF |
| 9.   | 7Q072259  | O-RING 6.25 X 6.50 X .12                          | 7   | 1REF |
| 10.  | 7T66P070  | PISTON SEAL-DYNAMIC 7.00"                         | 7   | 1REF |
| 11.  | 7T651070  | PISTON RING – 7.00 HYD CYL                        | 7   | 2REF |
| 12.  | 7T61N218  | LOCK RING – NYLON 2.19"                           | 7   | 1REF |
| 13.  | 7R14P035  | ROD WIPER – TYPE D 3.50 ROD                       | 7   | 1REF |
| 14.  | 7Q072363  | O-RING – 6.50 X 6.88 X .19                        | 7   | 1REF |
| 15.  | 7Q10P363  | BACKUP RING – 6.50 ID X 6.88 OD                   | 7   | 1REF |
| 16.  | 7R546035  | U-CUP LOADED 3.50 X 4.00 X .38 "B"                | 7   | 1REF |
| 17.  | 7T2N2X37  | WEAR RING – ROD 3.50 ID X 2.00 W                  | 7   | 1REF |
| 18.  | 7BF81025  | BUSHING 2.50 PIN 2.00 LONG (PART OF 2)            |     | 2REF |
| 19.  | 7BF81225  | BUSHING 2.50 PIN 1.25 LONG (PART OF 1 & 2)        |     | 6REF |
| 20.  | 60125699  | PIN – LOCK TUBE 0.19 OD X 0.065 WALL              | 7   | 1REF |
| 21.  | 7PNPXT02  | PLUG – PIPE SOC HD TAPED .12 (PART OF 1)          |     | 3REF |
| 22.  | A31-7-153 | PAINT MASK                                        |     | 1    |
| 23.  | 5V152611  | VALVE BLK-SGL GPM .75 16SAE (PART OF 1)           |     | 1    |

REV B 20120319



## Outer Boom Assembly (40725985)

**NOTE:**

- 1** ANYTIME THE PIN RETAINER PLATE BOLTS HAVE BEEN REMOVED, APPLY LOCTITE 262 TO THE THREADS BEFORE REASSEMBLY.

**40725985 PARTS LIST**

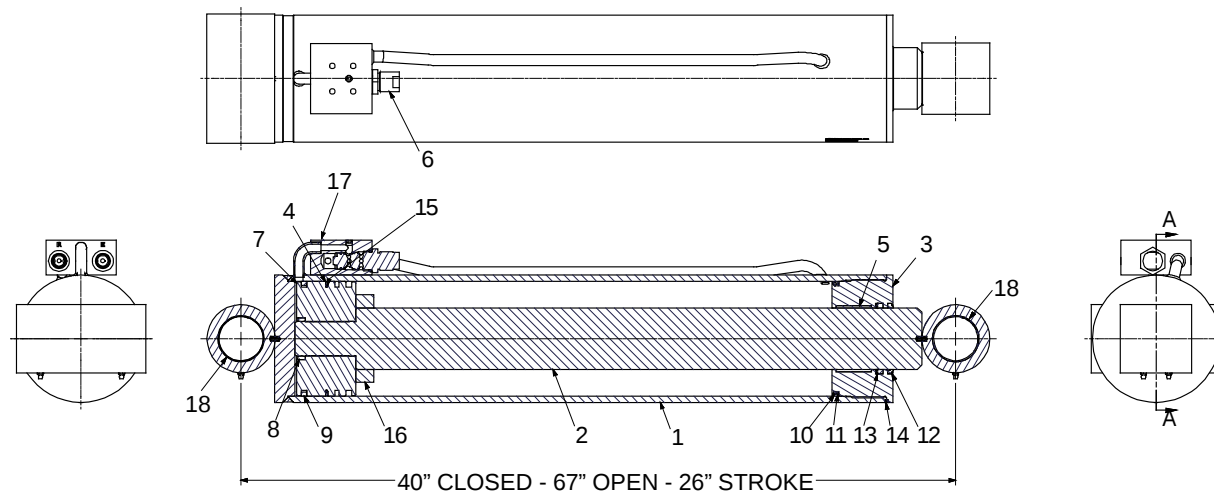
| ITEM | PART #   | DESCRIPTION                           | KIT | QTY |
|------|----------|---------------------------------------|-----|-----|
| 1.   | 3C195613 | CYL-6.5/3.5 26.25S 40.75CC C          |     | 1   |
| 2.   | 52725945 | WLDMT-OUTER BOOM 12916                |     | 1   |
| 3.   | 60030501 | WEAR PAD-RC 0.50 X 6.00 X 6.50        |     | 1   |
| 4.   | 60030502 | WEAR PAD-RC 0.50 X 6.00 X 6.50        |     | 1   |
| 5.   | 60122985 | WEAR PAD-RND 0.44 X 2.50 X 1.00 X .75 |     | 4   |
| 6.   | 60142110 | PIN-TYPE PP 2.50 X 15.00 (13.28)      |     | 2   |
| 7.   | 60142317 | CAP-WEAR PAD 12916                    |     | 1   |
| 8.   | 60142318 | PIN-TYPE H 1.00 X 6.94                |     | 1   |
| 9.   | 90142340 | PIN-TYPE PP 2.50 X 10.75 (9.03)       |     | 1   |
| 10.  | 70034402 | CLAMP-TWIN TUBE .62 OD                |     | 2   |
| 11.  | 70143829 | COVER PLT-PAR29 CPT2                  |     | 2   |
| 12.  | 71415017 | KEEPER-PIN .75                        |     | 3   |
| 13.  | 72053508 | ZERK-NPT .12                          | 25  | 1   |
| 14.  | 72060029 | CAP SCREW .31-18 X 2.00 HH GR5 Z      | 25  | 2   |



| 40725985 PARTS LIST |          |                                  |     |     |
|---------------------|----------|----------------------------------|-----|-----|
| ITEM                | PART #   | DESCRIPTION                      | KIT | QTY |
| 15.                 | 72060093 | CAP SCREW .50-13 X 1.50 HH GR5 Z | 25  | 2   |
| 16.                 | 72060095 | CAP SCREW .50-13 X 2.00 HH GR5 Z | 25  | 5   |
| 17.                 | 72060186 | CAP SCREW .75-10 X 2.50 HH GR5 Z | 25  | 3   |
| 18.                 | 72062080 | NUT .50-13 HEX NYLOCK            | 25  | 5   |
| 19.                 | 72062109 | NUT .31-18 HEX NYLOCK            | 25  | 2   |
| 20.                 | 72063002 | WASHER .31 FLAT                  | 25  | 2   |
| 21.                 | 72063053 | WASHER .50 LOCK                  | 25  | 2   |
| 22.                 | 72063116 | WASHER .75 N FLAT H ASTM F436Z   | 25  | 3   |
| 23.                 | 72063132 | WASHER .50 FLAT ASTM F436        | 25  | 7   |
| 24.                 | 72066103 | RETAINING RING-EXT 2.50 STD      |     | 6   |
| 25.                 | 91725990 | KIT-HRDW 12916 BOOMS             |     | 1   |
| NEW 20140421        |          |                                  |     |     |



## Outer Cylinder (3C195613)



### NOTE:

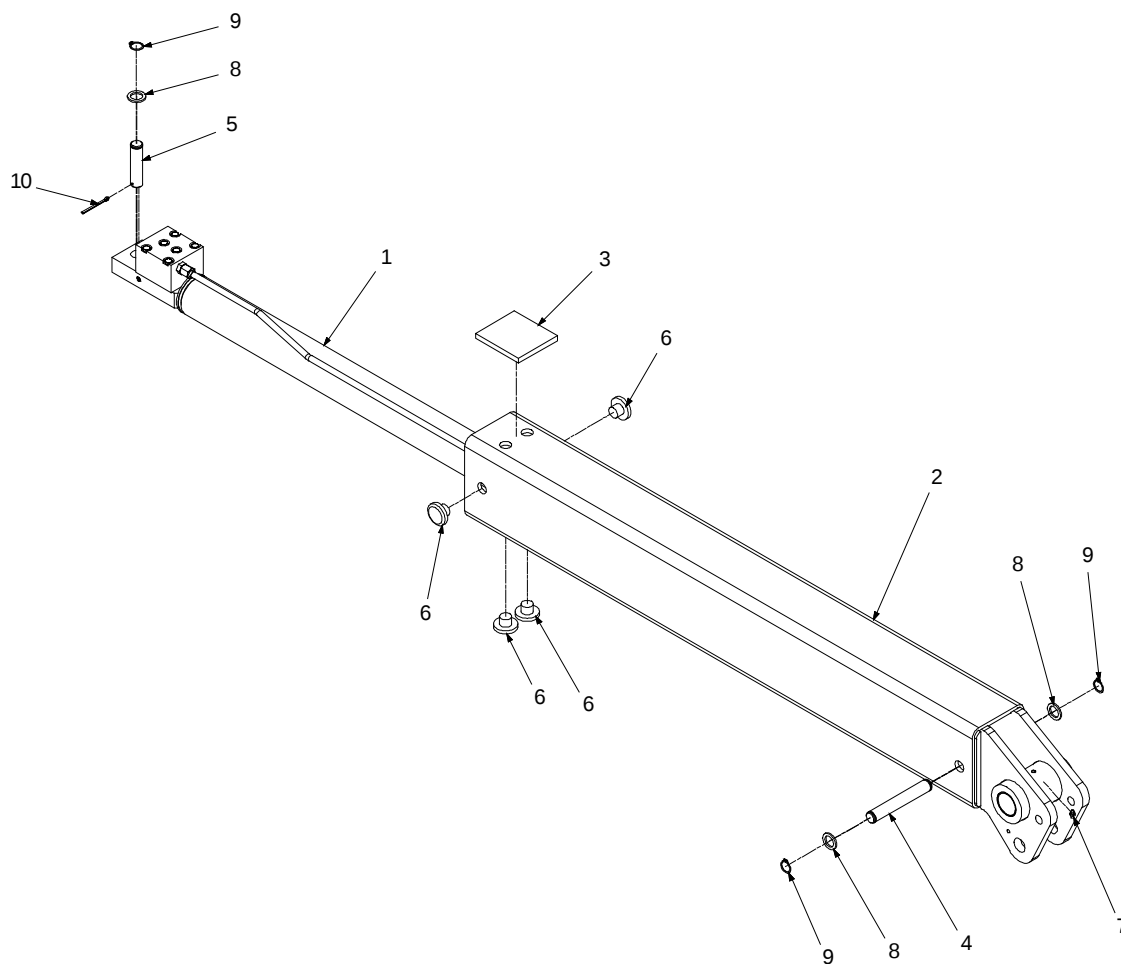
- 1 IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.
- 2 APPLY "LUBRIPLATE #630.2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON AND HEAD GLANDS, LOCK RING AND ROD THREADS BEFORE ASSEMBLY.
- 3 APPLY "NEVER-SEEZ" OR EQUIVALENT BETWEEN THE HEAD AND THE CASE WHEN ASSEMBLING THE CYLINDER. KEEP AWAY FROM ALL SEALS.

| 3C195613 PARTS LIST |          |                                            |     |      |
|---------------------|----------|--------------------------------------------|-----|------|
| ITEM                | PART #   | DESCRIPTION                                | KIT | QTY  |
| 1.                  | 4C195611 | CASE ASM-6.50 BORE X 36.81 LG              |     | 1    |
| 2.                  | 4G195611 | ROD ASM-3.50 DIA X 37.69 LG 2.00 S 2.50    |     | 1    |
| 3.                  | 6H065035 | HEAD-6.50 BORE X 3.50 ROD                  |     | 1    |
| 4.                  | 7T66P065 | PISTON SEAL-DYNAMIC 6.00in                 | 19  | 1    |
| 5.                  | 7T2N2X37 | WEAR RING-ROD 3.50 ID X 2.00W              | 19  | 1    |
| 6.                  | 73054242 | VALVE-CBAL 25GPM (5:1)                     |     | 1    |
| 7.                  | 6I065200 | PISTON-6.50 BORE X 2.00 STGR               |     | 1    |
| 8.                  | 7T61N200 | LOCK RING-NYLON 2.00in                     | 19  | 1    |
| 9.                  | 7T65I065 | PISTON RING 6.00 HYD CYL                   | 19  | 1    |
| 10.                 | 7Q072361 | ORING 6.00 X 6.38 X .19 70                 | 19  | 1    |
| 11.                 | 7Q10P361 | BACKUP RING-6.00 ID X 6.38 OD              | 19  | 1    |
| 12.                 | 7R14P035 | ROD WIPER-TYPE D 3.50 ROD                  | 19  | 1    |
| 13.                 | 7R546035 | U-CUP LOADED 3.50X4.00X.38B                | 19  | 1    |
| 14.                 | 60125699 | PIN-LOCK TUBE 0.19 OD X 0.065 WALL         |     | 1    |
| 15.                 | 7Q072257 | ORING 5.88 X 6.12 X .12 70                 | 19  | 1    |
| 16.                 | 6C100035 | STOP TUBE - 3.50 ROD X 1.00 LONG           | 19  | 1    |
| 17.                 | 5V152611 | VALVE BLK-SGL 25 GPM .75 16SAE (PART OF 1) |     | 1    |
| 18.                 | 7BF81225 | BUSHING 2.50 PIN 1.25 LONG (PART OF 1 & 2) |     | 7    |
| 19.                 | 9C262832 | SEAL KIT-IMT 6.50B 3.50R 2.00S             |     | 1REF |

REV D 20131007



## Extension Boom Assembly (40725986)



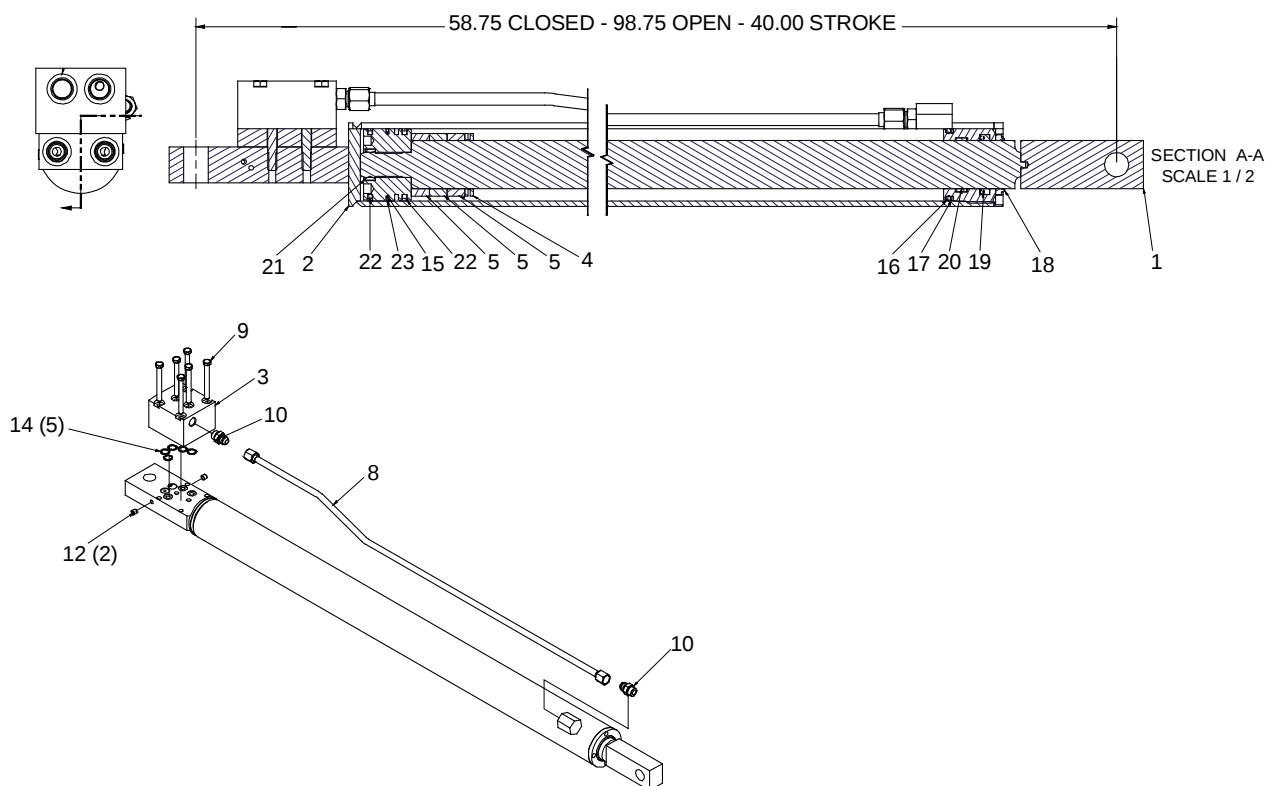
### 40725986 PARTS LIST

| ITEM | PART #   | DESCRIPTION                     | KIT | QTY |
|------|----------|---------------------------------|-----|-----|
| 1.   | 51718065 | CYL-3.0/2.0 40.00S 58.75CC C    |     | 1   |
| 2.   | 52725876 | BOOM EXT WLDMT 12916            |     | 1   |
| 3.   | 60030499 | WEAR PAD-RC 0.50X4.50X5.00      |     | 1   |
| 4.   | 60101874 | PIN-TYPE A 1.00X6.75 (6.31)     |     | 1   |
| 5.   | 60101905 | PIN-TYPE B 1.00X4.12 (3.62)     |     | 1   |
| 6.   | 60123777 | WEAR PAD-RND 0.44X2.00X1.00X.75 |     | 4   |
| 7.   | 72053508 | ZERK-NPT .12                    | 11  | 1   |
| 8.   | 72063034 | MACHY BUSHING 1.00X10 GA NR     | 11  | 3   |
| 9.   | 72066125 | RETAINING RING-EXT 1.00 HD      | 11  | 3   |
| 10.  | 72066197 | COTTER PIN .19X2.50             | 11  | 1   |
| 11.  | 91725990 | KIT-HRDW 12916 BOOMS            |     | 1   |

NEW 20140421



## Extension Cylinder (51718065)



### NOTE:

- 1 ITEM #14 IS PLACED BETWEEN #2 AND #3.
- 2 USE SERVICEABLE LOCTITE ON ITEM #9.
- 3 IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.
- 4 APPLY "LUBRIPLATE #630.2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON AND HEAD GLANDS, LOCK RING AND ROD THREADS BEFORE ASSEMBLY.
- 5 APPLY "NEVER-SEEZ" OR EQUIVALENT BETWEEN THE HEAD AND THE CASE WHEN ASSEMBLING THE CYLINDER. KEEP AWAY FROM ALL SEALS.

### 51718065 PARTS LIST

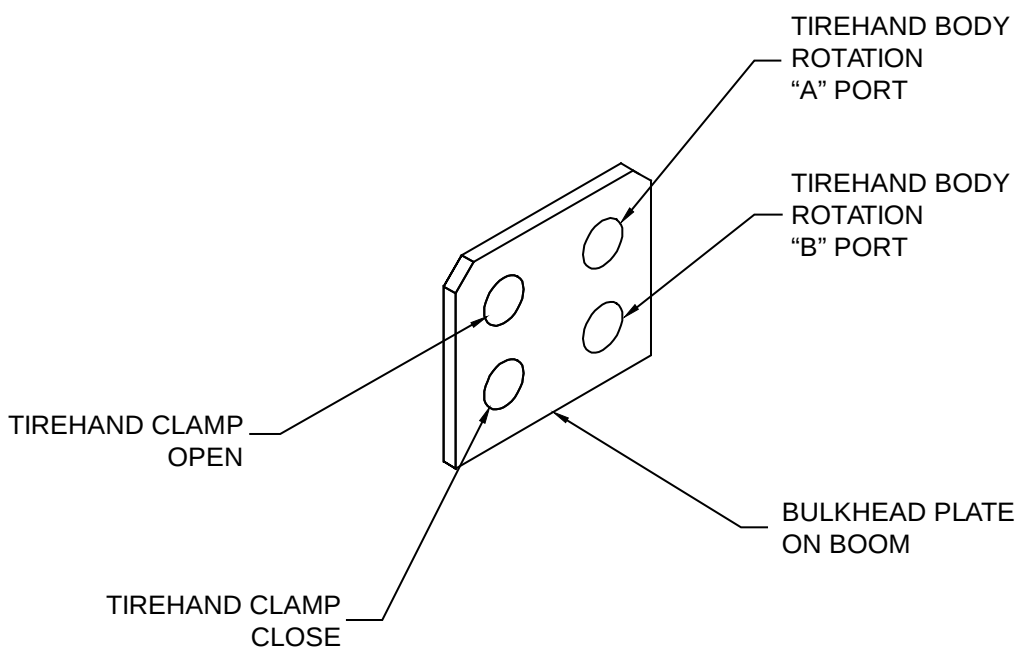
| ITEM | PART #   | DESCRIPTION                             | KIT | QTY |
|------|----------|-----------------------------------------|-----|-----|
| 1.   | 4G116510 | ROD ASM-2.00 DIA X 51.88 LG 1.06 S 1.00 |     | 1   |
| 2.   | 52718045 | CASE ASSEMBLY 3.02 BORE X 53.63L        |     | 1   |
| 3.   | 60125126 | HOLDING VALVE 2.75 X 3.75 X 4.13        |     | 1   |
| 4.   | 6A025020 | WAFER LOCK IMT 2.00                     | 24  | 1   |
| 5.   | 6C075020 | STOP TUBE - 2.00 ROD X .75 LONG         |     | 3   |
| 8.   | 70149900 | PORT TUBE - .50 OD X 42.44 LONG         |     | 1   |
| 9.   | 72060055 | CAP SCREW .38-16X 3.50 HH GR5 Z         |     | 6   |
| 10.  | 72532358 | ADAPTER-M STR/, JIC 8 8                 |     | 2   |
| 11.  | 73540052 | VALVE-CBAL 1.75:1 3300 PSI ADJ          |     | 2   |
| 12.  | 7PNPXT02 | PLUG-PIPE SOC HD TAPED .12              | 24  | 2   |



| 51718065 PARTS LIST |          |                                    |     |     |
|---------------------|----------|------------------------------------|-----|-----|
| ITEM                | PART #   | DESCRIPTION                        | KIT | QTY |
| 14.                 | 7Q072016 | O RING .62X .75X .06 70            | 24  | 5   |
| 15.                 | 7Q072145 | O RING 2.56 X 2.75 X .09 70        | 24  | 1   |
| 16.                 | 7Q072334 | O RING 2.62 X 3.00 X .19 70        | 24  | 1   |
| 17.                 | 7Q10P334 | BACKUP RING – 2.62 ID X 3.00 OD    | 24  | 1   |
| 18.                 | 7R14P020 | ROD WIPER-TYPE D 2.00 ROD          | 24  | 1   |
| 19.                 | 7R546020 | U-CUP LOADED 2.00 X 2.50 X .38 "B" | 24  | 1   |
| 20.                 | 7T2N4022 | WEAR RING-ROD 2.00 ID X .50W       | 24  | 1   |
| 21.                 | 7T61N106 | LOCK RING NYLON 1.06"              | 24  | 1   |
| 22.                 | 7T65I030 | PISTON RING-3.00 HYD CYL           | 24  | 2   |
| 23.                 | 7T66P030 | PISTON SEAL-DYNAMIC 3.00in         |     | 1   |
| 24.                 | 9C121617 | SEAL KIT-IMT 3.00B 2.00R 1.06S     |     | 1   |
| 25.                 | 6H030020 | HEAD-3.00 BORE X 2.00 ROD          |     | 1   |
| 26.                 | 6I030106 | PISTON-3.00 BORE X 1.06 STGR       |     | 1   |



## Hydraulic Diagram, Radio Remote (99905792)



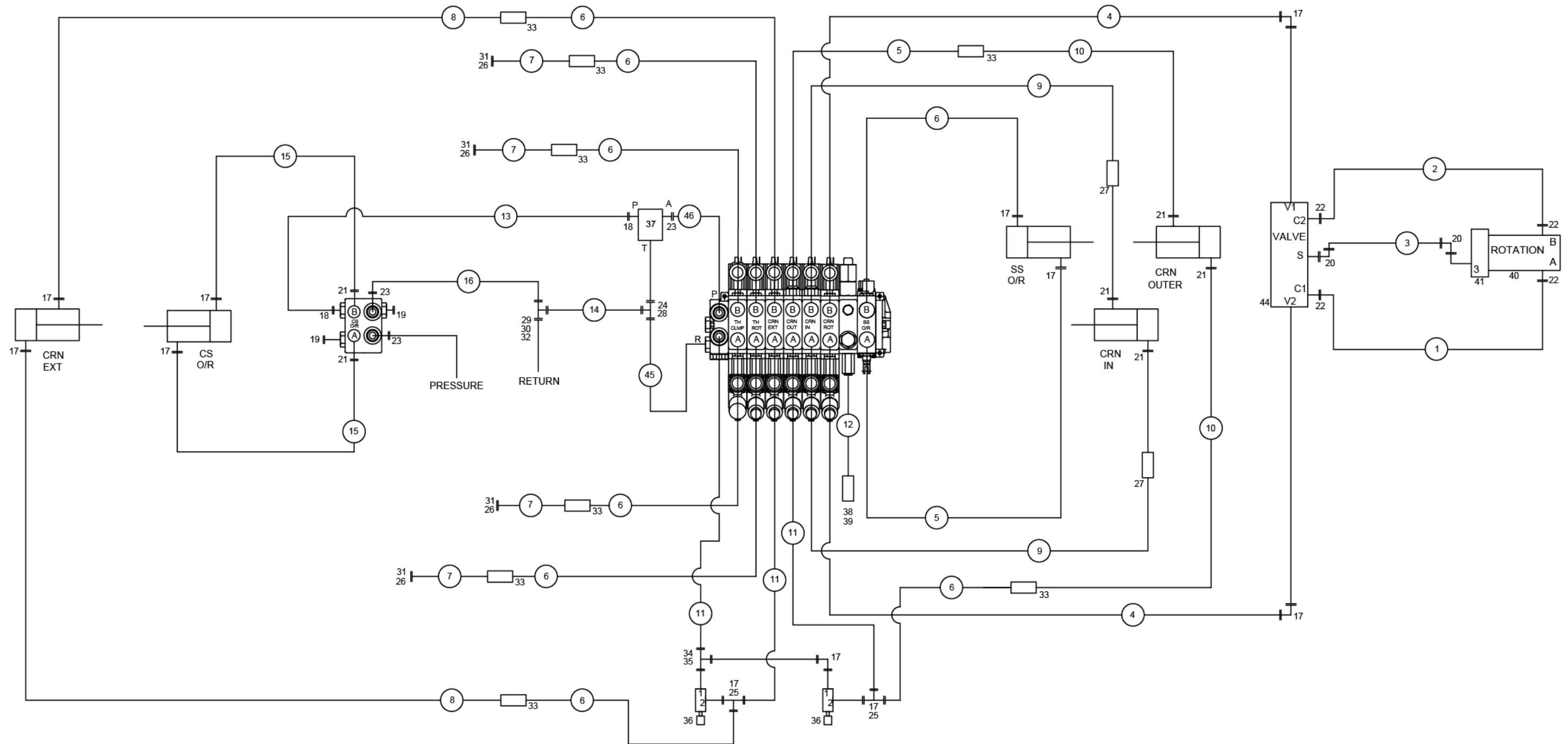
### 99905792 PARTS LIST

| ITEM | PART #   | DESCRIPTION                         | QUANTITY |
|------|----------|-------------------------------------|----------|
| 1.   | 51395200 | HOSE-FJ .38 X 12.00 (8-8) 100R17    | 1        |
| 2.   | 51395201 | HOSE-FF .38 X 15.00 (8-8) 100R17    | 1        |
| 3.   | 51395237 | HOSE-FJ .25 X 10.50 (4-4) 100R17    | 1        |
| 4.   | 51395238 | HOSE-FF .38 X 16.00 (8-8) 100R17    | 1        |
| 5.   | 51395239 | HOSE-FF .38 X 83.00 (8-8) 100R17    | 2        |
| 6.   | 51395240 | HOSE-FF .38 X 67.00 (8-8) 100R17    | 8        |
| 7.   | 51395241 | HOSE-FF .38 X 195.00 (8-8) 100R17   | 4        |
| 8.   | 51395242 | HOSE-FF .38 X 158.00 (8-8) 100R17   | 2        |
| 9.   | 51395303 | HOSE-FF .25 X 70.00 (8-8) 100R17    | 2        |
| 10.  | 51395304 | HOSE-FF .38 X 93.00 (8-8) 100R17    | 2        |
| 11.  | 51395645 | HOSE-FJ .50 X 16.00 (8-8) 100R17    | 3        |
| 12.  | 51395887 | HOSE-FJ .38 X 17.50 (6-6) 100R17    | 1        |
| 13.  | 51396284 | HOSE-FZ .75 X 80.00 (12-12) 100R17  | 1        |
| 14.  | 51396460 | HOSE-FF 1.00 X 42.00 (16-16) 100R17 | 1        |
| 15.  | 51397416 | HOSE-FJ .38 X 100.00 (8-8) 100R17   | 2        |
| 16.  | 51399584 | HOSE-FJ .75 X 44.00 (12-12) 100R17  | 1        |
| 17.  | 72053763 | ELBOW-M STR/90/M JIC 8 8            | 11       |
| 18.  | 72053767 | ELBOW-M STR/90 M JIC 12 12          | 3        |
| 19.  | 72532136 | PLUG-STR HEX HD STL 13 (1.06 THD)   | 2        |
| 20.  | 72532351 | ADPTR-M STR/M JIC 4 4               | 2        |
| 21.  | 72532358 | ADPTR-M STR/M JIC 8 8               | 6        |
| 22.  | 72532359 | ADPTR-M STR/M JIC 10 8              | 4        |



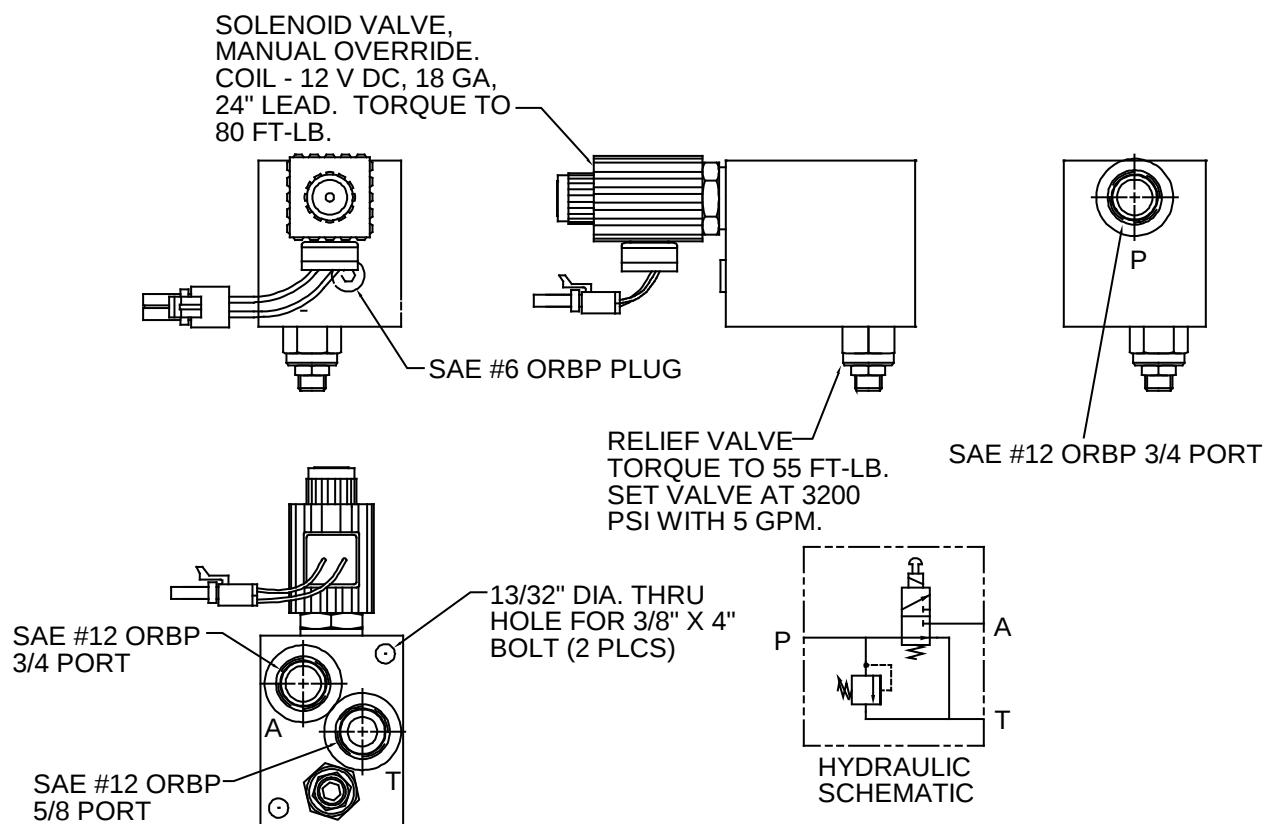
| 99905792 PARTS LIST |          |                                      |          |
|---------------------|----------|--------------------------------------|----------|
| ITEM                | PART #   | DESCRIPTION                          | QUANTITY |
| 23.                 | 72532366 | ADPTR-M STR/M JIC 12 12              | 2        |
| 24.                 | 72532369 | ADPTR-M STR/M JIC 12 16              | 1        |
| 25.                 | 72532657 | TEE-SWVL NUT RUN JIC 8               | 2        |
| 26.                 | 72532675 | CAP-JIC STL 8 (.75 THD)              | 6        |
| 27.                 | 72532980 | SWIVEL-M JIC/F JIC 8 8 IN-LINE       | 2        |
| 28.                 | 72533000 | TEE-SWVL NUT RUN JIC 16              | 1        |
| 29.                 | 72533028 | ADPTR-M JIC/F JIC 12 16              | 1        |
| 30.                 | 72533029 | NUT-JIC STL 16 (1.31 THD)            | 1        |
| 31.                 | 72533373 | UNION-BULKHEAD JIC 8 (3/4-16)        | 6        |
| 32.                 | 72533558 | TEE-UNION JIC 16                     | 1        |
| 33.                 | 72533566 | SWIVEL-M JIC/M JIC 8 8 IN-LINE       | 10       |
| 34.                 | 72533597 | TEE-STL JIC/STR/JIC 8 8 8 BRANCH     | 1        |
| 35.                 | 72534371 | UNION-F JIC/SWIVEL/F JIC 8 8         | 1        |
| 36.                 | VARIES   | VALVE-SOL NO 2-WAY OVERLOAD FASTONS  | 2        |
| 37.                 | VARIES   | VALVE ASM-RELIEF/SOL HYD SHUTD       | 1        |
| 38.                 | 70733498 | ACCUMULATOR-14K160TH                 | 1        |
| 39.                 | 72066507 | CLAMP-EXHAUST U 2.25                 | 1        |
| 40.                 | 73051223 | MOTOR-HYD C104-1021 NO DANFOSS       | 1        |
| 41.                 | 71056623 | BRAKE-HYD SWING DRIVE                | 1        |
| 42.                 | VARIES   | VALVE BANK-8 SECT                    | 1        |
| 43.                 | 51715128 | VB ASM-1SEC V20 W/PB CS OR 12916 RAD | 1        |
| 44.                 | 73054370 | VALVE-CBAL SUN01 CBEA-LAN-YHK        | 1        |
| 45.                 | 51399602 | HOSE-FF 1.00 X 21.00 (16-16) 100R17  | 1        |
| 46.                 | 51706534 | HOSE-FF .75 X 22.00 (12-12) 100R16   | 1        |
| NEW 20140410        |          |                                      |          |

## Hydraulic Diagram, Radio Remote (99905792)





## Relief Valve Assembly, 12V Radio (73055278)



### REFERENCE PARTS FOR SERVICE:

Coil - 77040456

## Relief Valve Assembly, 24V Radio (73055298)

Reference drawing 73055278.

### REFERENCE PARTS FOR SERVICE:

Coil - 77040447

## Solenoid Dump Valves

### 12V Solenoid Dump Valves

12V Normally Open Solenoid Valve - 73054980

Replacement Coil - 77041456

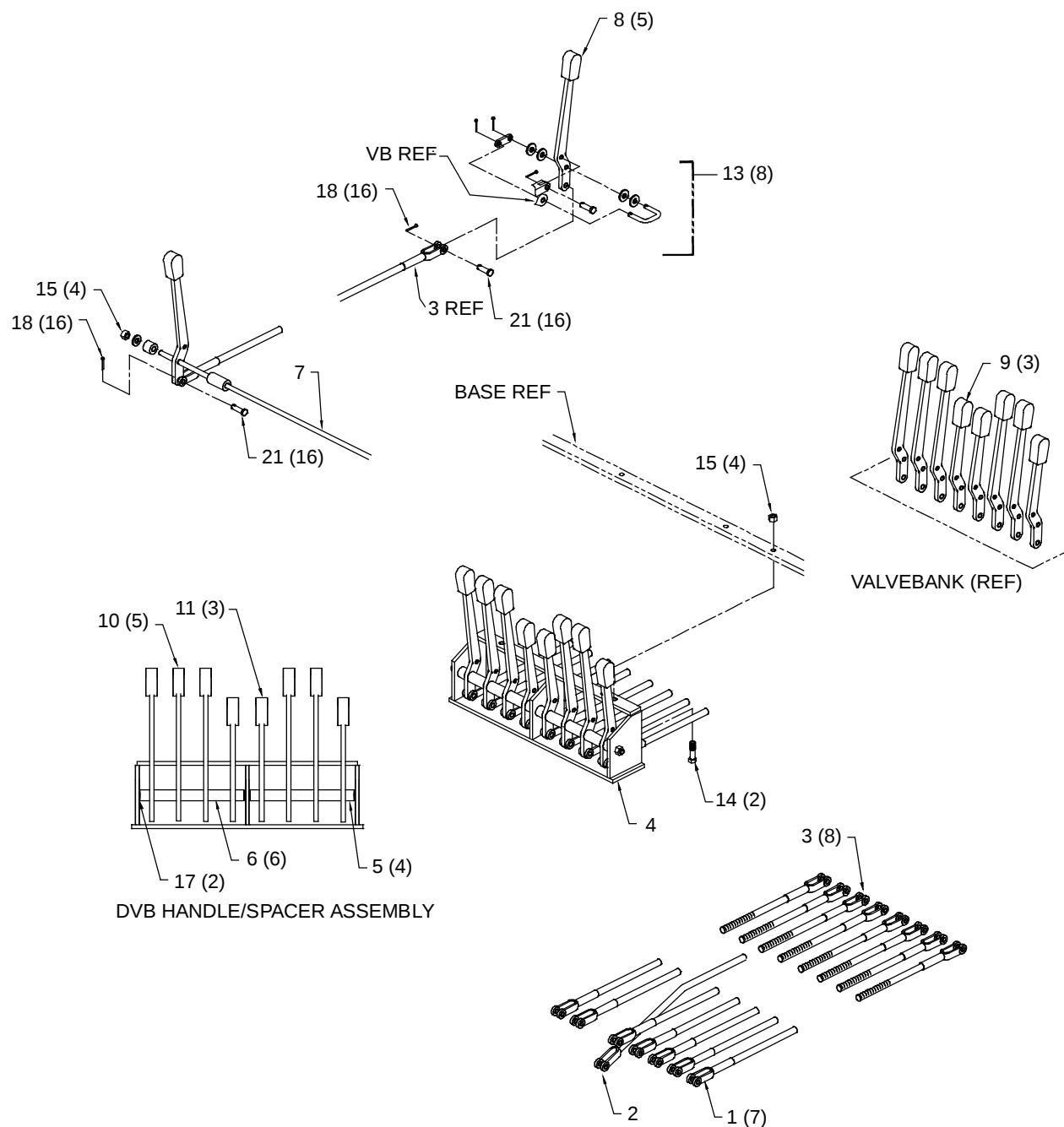
### 24V Solenoid Dump Valves

24V Normally Open Solenoid Valve - 73540142

Replacement Coil - 77040463



## Control Kit – Manual 8 Function (90704441)



### NOTE:

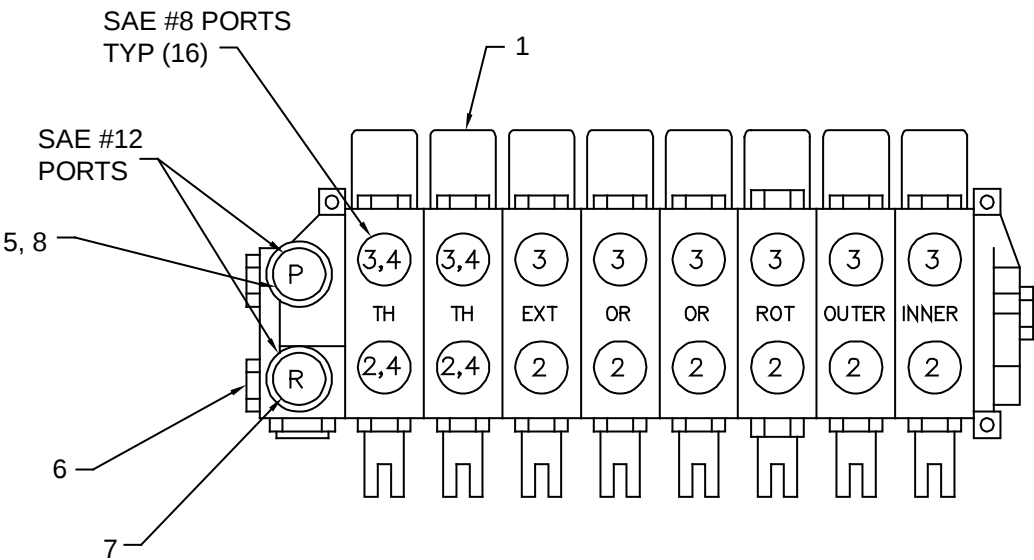
1 ITEMS 22 AND 23 REMOVED FROM VIEW FOR CLARITY.



| 90704441 PARTS LIST |          |                               |          |
|---------------------|----------|-------------------------------|----------|
| ITEM                | PART #   | DESCRIPTION                   | QUANTITY |
| 1.                  | 52702016 | CONTROL ROD - FEMALE          | 7        |
| 2.                  | 52702017 | CONTROL ROD – BENT FEMALE     | 1        |
| 3.                  | 52702018 | CONTROL ROD – MALE            | 8        |
| 4.                  | 52702777 | DUMMY VALVEBANK               | 1        |
| 5.                  | 60030045 | SPACER .63                    | 4        |
| 6.                  | 60030046 | SPACER 1.50                   | 6        |
| 7.                  | 60105503 | ROD, DUMMY VB                 | 1        |
| 8.                  | 70141982 | CONTROL HANDLE – LONG (VB)    | 5        |
| 9.                  | 70141983 | CONTROL HANDLE – SHORT (VB)   | 3        |
| 10.                 | 70141984 | CONTROL HANDLE – LONG (DBV)   | 5        |
| 11.                 | 70141985 | CONTROL HANDLE – SHORT (DVB)  | 3        |
| 13.                 | 94731839 | LINK & PIN KIT                | 8        |
| 14.                 | 72060026 | CAP SCR .31-18X 1.25 HH GR5 Z | 2        |
| 15.                 | 72062109 | NUT .31-18 HEX NYLOC          | 4        |
| 17.                 | 72063002 | WASHER WRT .31                | 2        |
| 18.                 | 72066168 | PIN, COTTER .09 X .75 PLAIN   | 16       |
| 21.                 | 72066338 | PIN, CLEVIS .31 X 1.00 PLAIN  | 16       |
| 22.                 | 52713782 | HANDLE-HYD SHUTDOWN UNIVERSAL | 4        |
| 23.                 | 60120092 | TUBE-RD .75IDX 1.000DX 15.50  | 2        |
| REV E 20130415      |          |                               |          |



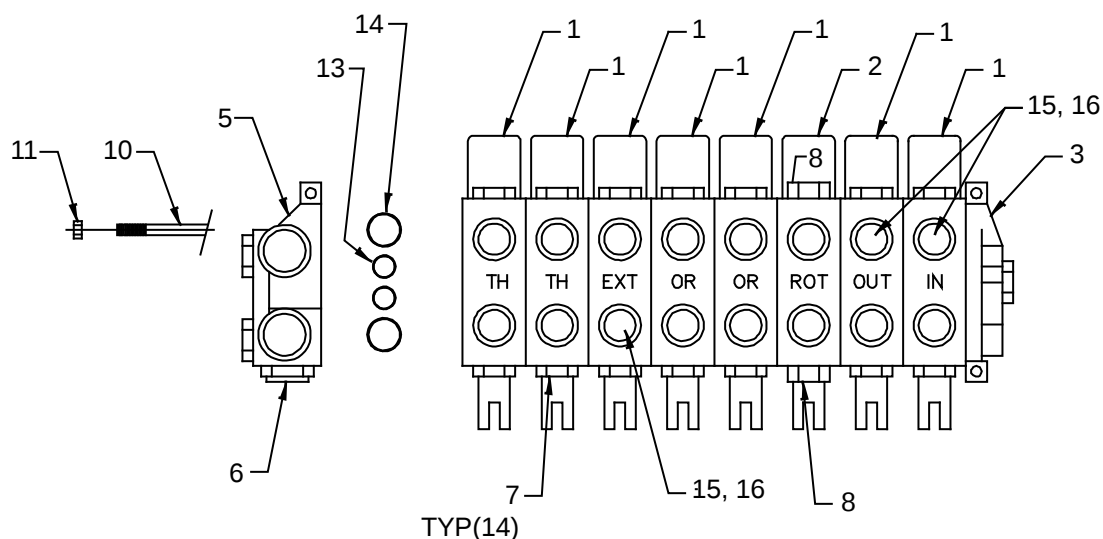
# Valvebank Assembly – 8 Section (51706642)



| 51706642 PARTS LIST |          |                                |          |
|---------------------|----------|--------------------------------|----------|
| ITEM                | PART #   | DESCRIPTION                    | QUANTITY |
| 1.                  | 51706643 | VB-8SEC V20 1216               | 1        |
| 2.                  | 72532666 | ELBOW-M STR/M JIC XLG #8 #8    | 8        |
| 3.                  | 72053763 | ELBOW-M STR/90/M JIC #8 #8     | 8        |
| 4.                  | 72532675 | CAP-JIC STL .75 THD            | 4        |
| 5.                  | 60107995 | ELBOW-PRESSURE GAUGE MODIFIED  | 1        |
| 6.                  | 72053767 | ELBOW-M STR/90/M JIC #12 #12   | 1        |
| 7.                  | 72532369 | ADPTR-M STR/M JIC 12 16        | 1        |
| 8.                  | 73054435 | GAUGE-PRESS LIQ FILLED 5000PSI | 1        |
| REV F 20021122      |          |                                |          |



## Valvebank Assembly – 8 Section (51706643)



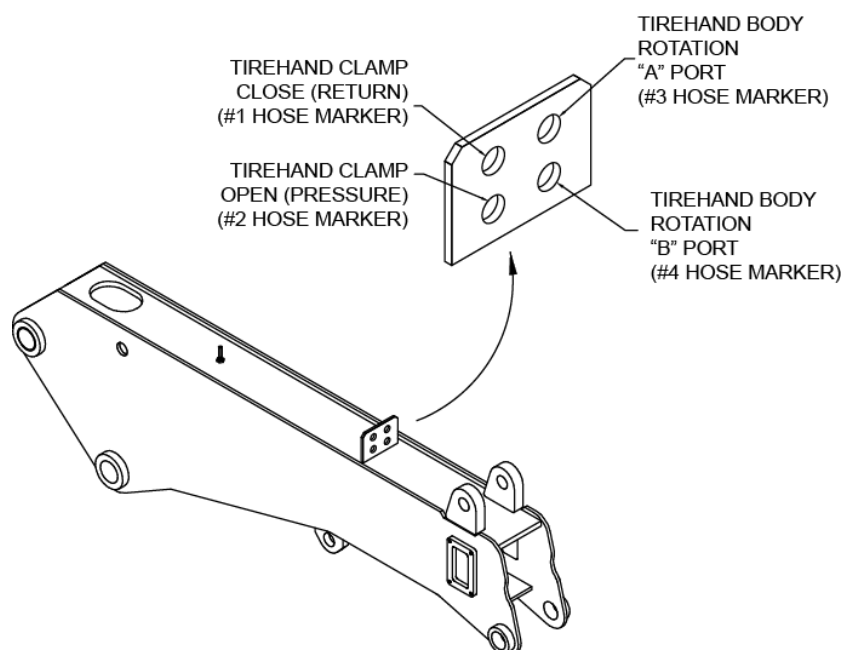
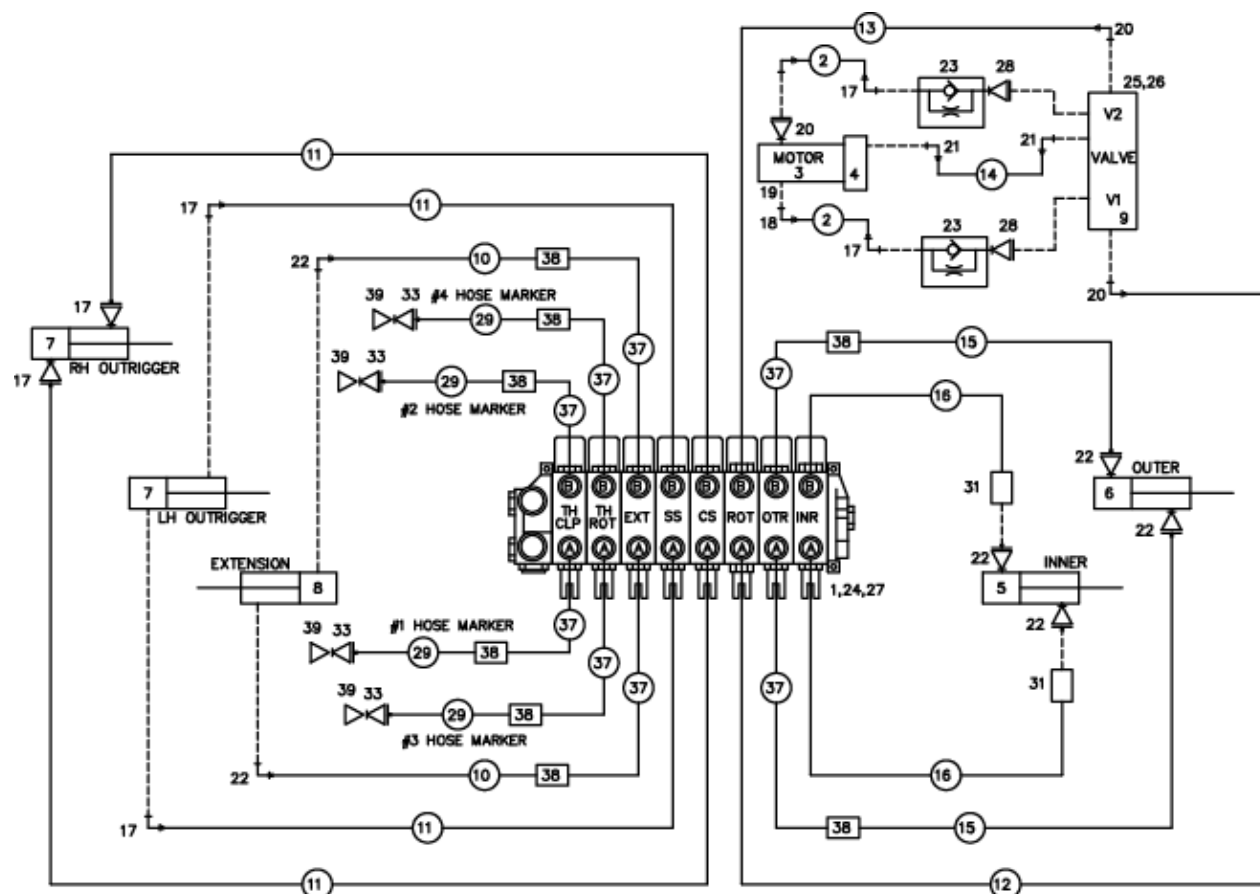
### 51706643 PARTS LIST

| ITEM | PART #   | DESCRIPTION                                 | QUANTITY |
|------|----------|---------------------------------------------|----------|
| 1.   | 73054432 | VALVE SECTION V20 4 WAY SAE #8              | 7        |
| 2.   | 73054452 | VALVE SECTION V20 4 WAY W/BX SAE #8         | 1        |
| 3.   | 73731241 | END COVER – RH V20 VALVE W/CONVERSION PLUG  | 1        |
| 5.   | 73731424 | END COVER – LH V20 VALVE (2300 PSI)         | 1        |
| 6.   | 73054673 | RELIEF VALVE – 2300 PSI (RP51A) (PART OF 5) | 1REF     |
| 7.   | 73054010 | LOAD CHECK PLUG ASM – V20                   | 14       |
| 8.   | 73054007 | RELIEF – RC NON ADJ (1800 PSI)              | 2        |
| 10.  | 73014596 | STUD – VALVE BANK .38 X 15.25 LG            | 3        |
| 11.  | 72062037 | NUT - .38-24 HEX                            | 6        |
| 12.  | 51393494 | O-RING KIT (SERVICE PART)                   | REF      |
| 13.  | 7Q072117 | O-RING .81 X 1.00 X .09                     | 18       |
| 14.  | 7Q072119 | O-RING .94 X 1.12 X .09                     | 18       |
| 15.  | 70142402 | ORIFICE PLATE (10817-125)                   | 3        |
| 16.  | 70142403 | SPRING – ORIFICE (10821-001)                | 3        |

REV B 19950418



## Hydraulic Kit – 6 Section (91703946)

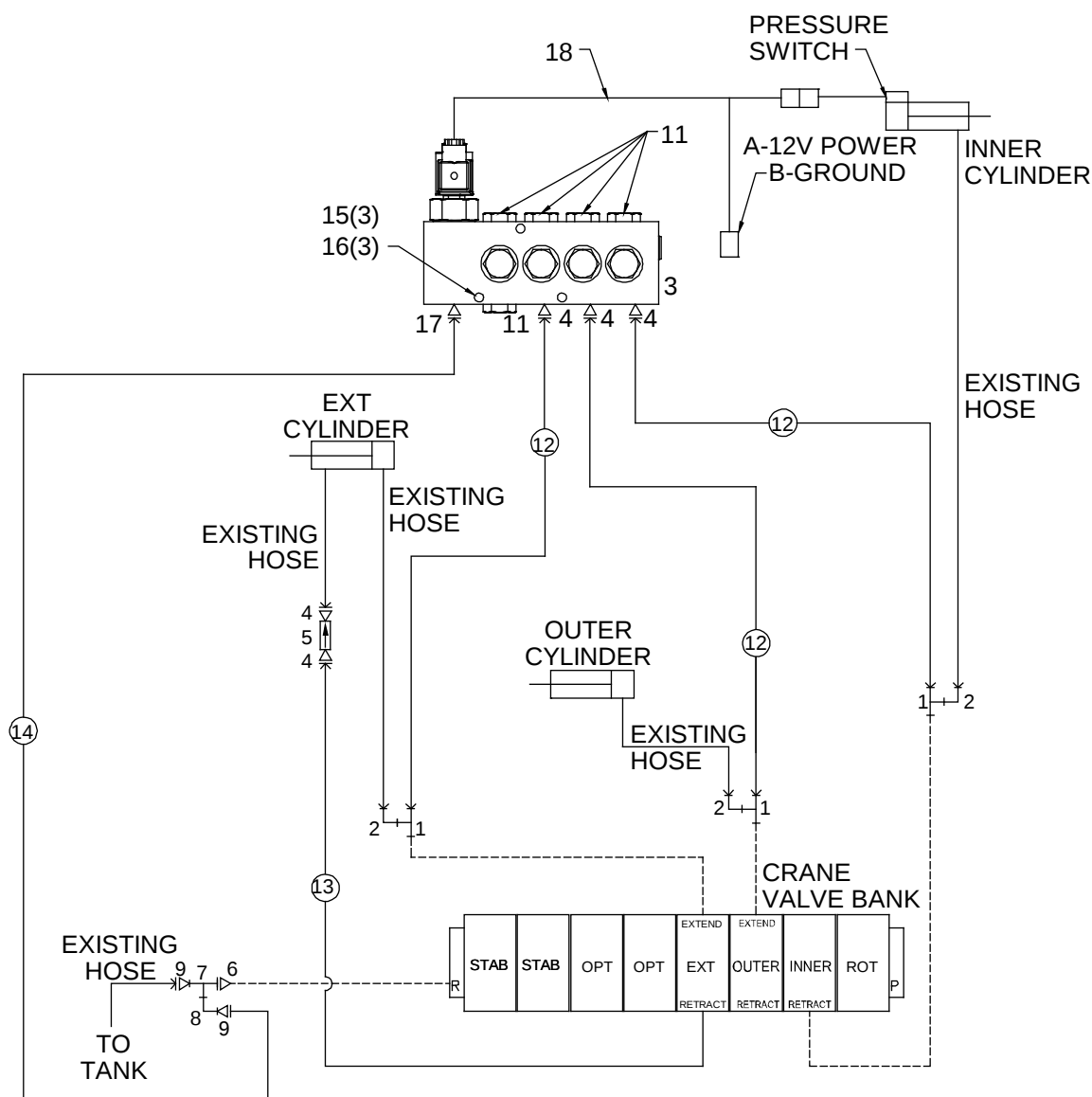


**NOTE:****1** FOR HYDRAULIC OVERLOAD, SEE ASSEMBLY 51717130.**91703946 PARTS LIST**

| ITEM           | PART #   | DESCRIPTION                    | KIT | QUANTITY |
|----------------|----------|--------------------------------|-----|----------|
| 1.             |          | VALVEBANK – 8 SEC              |     | REF      |
| 2.             | 51395200 | HOSE ASM-FF .38X 12.00 (8-8)   | 30  | 2REF     |
| 3.             |          | MOTOR                          |     | REF      |
| 4.             |          | BRAKE                          |     | REF      |
| 5.             |          | CYLINDER-INNER                 |     | REF      |
| 6.             |          | CYLINDER-OUTER                 |     | REF      |
| 7.             |          | CYLINDER-OUTRIGGER             |     | REF      |
| 8.             |          | CYLINDER-EXTENSION             |     | REF      |
| 9.             | 73054370 | VALVE-CBAL SUN01 CBEA-LAN-YHK  |     | 1        |
| 10.            | 51395242 | HOSE ASM-FF .38X 158.00 (8-8)  | 30  | 2REF     |
| 11.            | 51395239 | HOSE ASM-FF .38X 83.00 (8-8)   | 30  | 4REF     |
| 12.            | 51395201 | HOSE ASM-FF .38X 15.00 (8-8)   | 30  | 1REF     |
| 13.            | 51395238 | HOSE ASM-FF .38X 16.00 (8-8)   | 30  | 1REF     |
| 14.            | 51395237 | HOSE ASM-FF .25X 10.50 (4-4)   | 30  | 1REF     |
| 15.            | 51395304 | HOSE ASM-FF .38X 93.00 (8-8)   | 30  | 2REF     |
| 16.            | 51395303 | HOSE ASM-FF .38X 70.00 (8-8)   | 30  | 2REF     |
| 17.            | 72053763 | ELBOW-M STR/90/M JIC #8 #8     |     | 6        |
| 18.            | 72532666 | ELBOW-M STR/M JIC XLF #8 #8    |     | 1        |
| 19.            | 72531206 | ADPTR-M STR/F STR #10 #8       |     | 1        |
| 20.            | 72053764 | ELBOW-M STR/90/M JIC #10 #8    |     | 3        |
| 21.            | 72053758 | ELBOW-M STR/90/M JIC #4 #4     |     | 2        |
| 22.            | 72532358 | ADPTR-M STR/M JIC #8 #8        |     | 6        |
| 23.            | 73054921 | VALVE-FLOW CONTROL PC          |     | 2        |
| 24.            | 72060033 | CAP SCR .31-18X 3.00 HH GR5 Z  |     | 3        |
| 25.            | 72060051 | CAP SCR .38-16X 2.25 HH GR5 Z  |     | 2        |
| 26.            | 72062103 | NUT .38-16 HEX NYLOC ZINC      |     | 2        |
| 27.            | 72062109 | NUT .31-18 HEX NYLOC ZINC      |     | 3        |
| 28.            | 72532728 | UNION-M STR/M STR .75 .75      |     | 2        |
| 29.            | 51395241 | HOSE ASM-FF .38X 195.00 (8-8)  | 30  | 4REF     |
| 30.            | 51713944 | HOSE KIT-12916 CRANE           |     | 1        |
| 31.            | 72532980 | ADPTR-PR SW IN-LINE JIC .75X16 |     | 4        |
| 33.            | 72533373 | UNION-BULKHEAD 37 DEG JIC .75  |     | 4        |
| 37.            | 51395240 | HOSE-FF .38 X 67.00 OAL (8-8)  |     | 8        |
| 38.            | 72533566 | SWIVEL-MJIC/MJIC #8 INLINE     |     | 8        |
| 39.            | 72532675 | CAP-JIC STL .75 THD            |     | 4        |
| REV H 20111118 |          |                                |     |          |



## Hydraulic Overload Kit, 3-Function (51717130)



### NOTES:

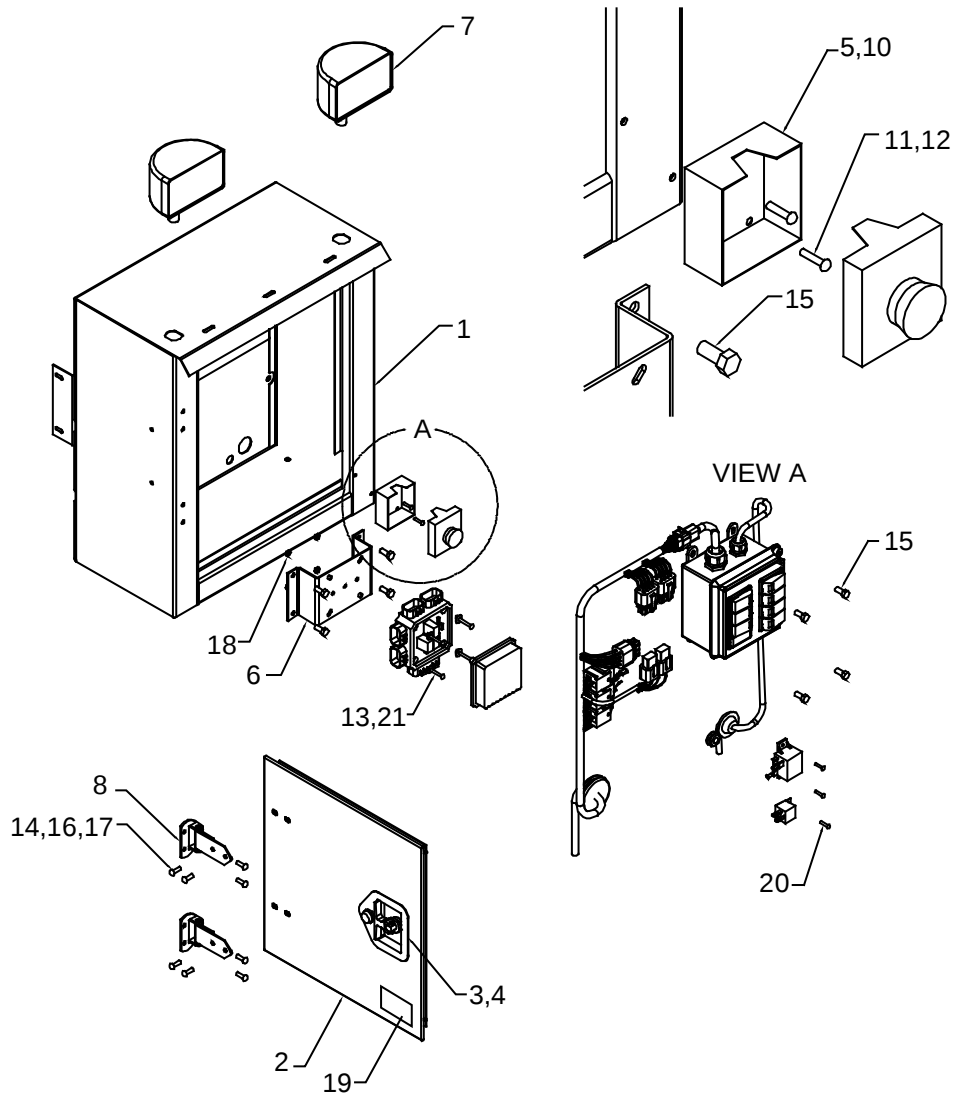
- 1 THE OVERLOAD SYSTEM FUNCTIONS SUCH THAT WHEN THE INNER CYLINDERS ARE OVERLOADED, THE PRESSURE SWITCH WILL ACTIVATE THE SOLENOID DUMP VALVE(S), THUS DUMPING OIL TO "TANK" AND PREVENTING THE OUTER CYLINDER EXTEND, EXTENSION CYLINDER EXTEND, OR WINCH UP FUNCTIONS.
- 2 IN AN OVERLOAD CONDITION, INNER BOOM RETRACT, OUTER BOOM EXTEND, EXTENSION CYLINDER EXTEND, AND WINCH UP FUNCTIONS ARE SHUT DOWN.
- 3 INSTALL A RELIEF VALVE (73054426 - 700 PSI) IN THE EXTEND LINE OF THE EXTENSION CYLINDER SO THE CYLINDER WILL NOT EXTEND WHEN THE DUMP SYSTEM IS ACTIVATED.
- 4 USE HYDRAULIC OVERLOAD KIT IN CONJUNCTION WITH THE ELECTRIC CAPACITY ALERT KIT.



| 51717130 PARTS LIST |          |                             |          |
|---------------------|----------|-----------------------------|----------|
| ITEM                | PART #   | DESCRIPTION                 | QUANTITY |
| 1.                  | 72532657 | TEE #8JIC SWVL NUT RUN      | 3        |
| 2.                  | 72532658 | ELBOW #8MJIC #8FJIC         | 3        |
| 3.                  | 73540463 | VALVE BLOCK ASM             | 1        |
|                     | 77441576 | COIL FOR 73540463           | 1        |
| 4.                  | 72532358 | ADAPTER #8MSTR #8MJIC       | 5        |
| 5.                  | 73054426 | VALVE-ADJ RELIEF            | 1        |
| 6.                  | 72053676 | ADAPTER 3/4MPT #12MJIC      | 1        |
| 7.                  | 72532950 | TEE-SWIVEL NUT RUN JIC#12   | 1        |
| 8.                  | 72532696 | ELBOW-#12MJIC #12FJIC SW    | 1        |
| 9.                  | 72532972 | ADPTR-#8MJIC#12FJIC         | 2        |
| 11.                 | 72532141 | PLUG STR HEX HD STL 3/4 THD | 4        |
| 12.                 | 51703863 | HOSE ASM-FF 3/8 X 14        | 3        |
| 13.                 | 51706239 | HOSE ASM-FF 1/2 X 5         | 1        |
| 14.                 | 51704914 | HOSE ASM-FF 3/8 X 60        | 1        |
| 15.                 | 72060034 | CAP SCR 5/16-18 X 3.25 HH   | 3        |
| 16.                 | 72062109 | NUT 5/16-18 HEX NYLOC ZINC  | 3        |
| 17.                 | 72532360 | ADPTR-#12MSTR #8MJIC        | 1        |
| 18.                 | 77441025 | HARNESS-OVERLOAD            | 1        |
| REV. B 20111221     |          |                             |          |



## Electrical Control Cabinet (41718269-12V, 41718425-24V)



### NOTES:

- 1 INSTALL WEATHERSTRIP (ITEM #9) AROUND DOOR OPENING.
- 2 INSTALL DUAL-LOCK FASTENER (ITEM #19) INSIDE LEFT SIDE WALL OF CABINET. USE ITEM #19 TO MOUNT RADIO REMOTE CONTROL CHARGER. (USE 2 STRIPS ON CABINET WALL AND 2 STRIPS ON CHARGER).

### 41718269/41718425 PARTS LIST

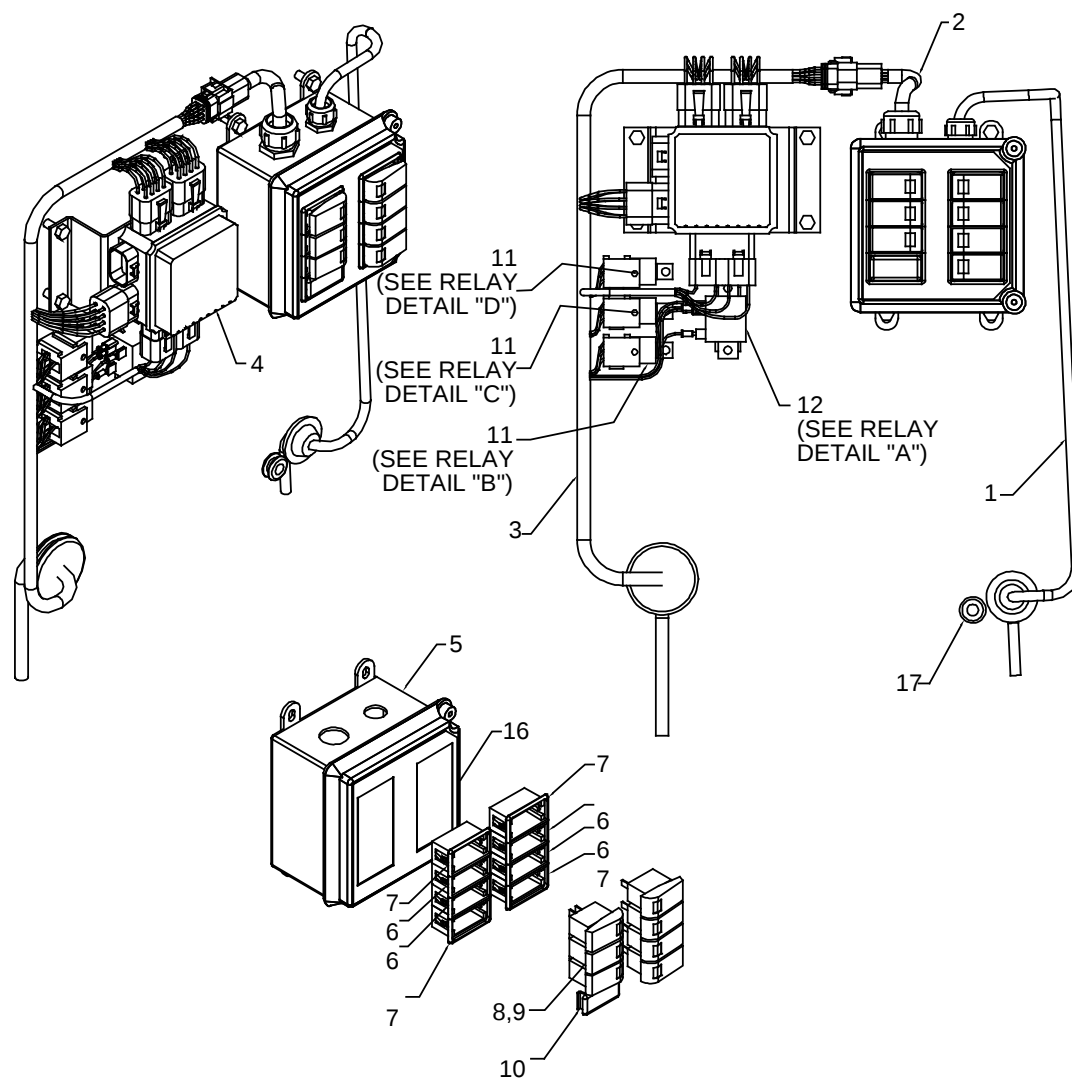
| ITEM | PART #   | DESCRIPTION                        | DETAILS | QUANTITY |
|------|----------|------------------------------------|---------|----------|
| 1.   | 41721887 | CABINET WELDMENT<br>(WAS 52715880) |         | 1        |
| 2.   | 52713707 | DOOR WELDMENT                      |         | 1        |
| 3.   | 72661470 | LATCH ASSEMBLY, 1-PT               |         | 1        |
| 4.   | 76393253 | GASKET, LATCH WITH STUDS           |         | 1        |
| 5.   | 77041486 | SWITCH, E-STOP                     |         | 1        |



| 41718269/41718425 PARTS LIST |          |                                     |                              |          |
|------------------------------|----------|-------------------------------------|------------------------------|----------|
| ITEM                         | PART #   | DESCRIPTION                         | DETAILS                      | QUANTITY |
| 6.                           | 60121574 | BRACKET, FUSE/RELAY BOX             |                              | 1        |
| 7.                           | 77040424 | LIGHT, WORK LAMP                    | 12V                          | 2        |
|                              | 77040572 | LIGHT, WORK LAMP                    | 24V                          | 2        |
| 8.                           | 72661383 | HINGE                               | SS 10-GA                     | 2        |
| 9.                           | 89393637 | WEATHERSTRIP                        | 1/2X1/2 TRIMLOC              | 5.5'     |
| 10.                          | 77044468 | CONNECTOR                           | 1/2" STR REL .12-.25         | 1        |
| 11.                          | 72601725 | SCREW-MACHINE                       | 6-32 1/2 ROUND HEAD PHILLIPS | 2        |
| 12.                          | 72601726 | NUT                                 | 6-32 HEX NYLOC               | 2        |
| 13.                          | 72060643 | SCREW-MACHINE                       | 10-24 X 1.50 RDH SST         | 4        |
| 14.                          | 72601652 | SCREW-MACHINE                       | 1/4-20X3/4 TRHTORXSS         | 8        |
| 15.                          | 72061004 | SCR-SHEET METAL                     | 14X3/4 SLT HEXZ              | 8        |
| 16.                          | 72062194 | NUT                                 | SS 1/4-20 NYLOC              | 6        |
| 17.                          | 72062264 | NUT                                 | 1/4-20 WELD TP2120           | 2        |
| 18.                          | 72062053 | NUT                                 | 10-24 HEX ZINC               | 4        |
| 19.                          | 70396515 | DECAL-WARNING-NO STORE IN E-CABINET |                              | 1        |
| 20.                          | 72060835 | SCREW-SELF TAPPING                  | 8-18 3/4 HHZINC              | 5        |
| 21.                          | 72063166 | WASHER                              | SS 1/4 WRT 18-8 5/8 OD       | 4        |
| REV. C 20080903              |          |                                     |                              |          |

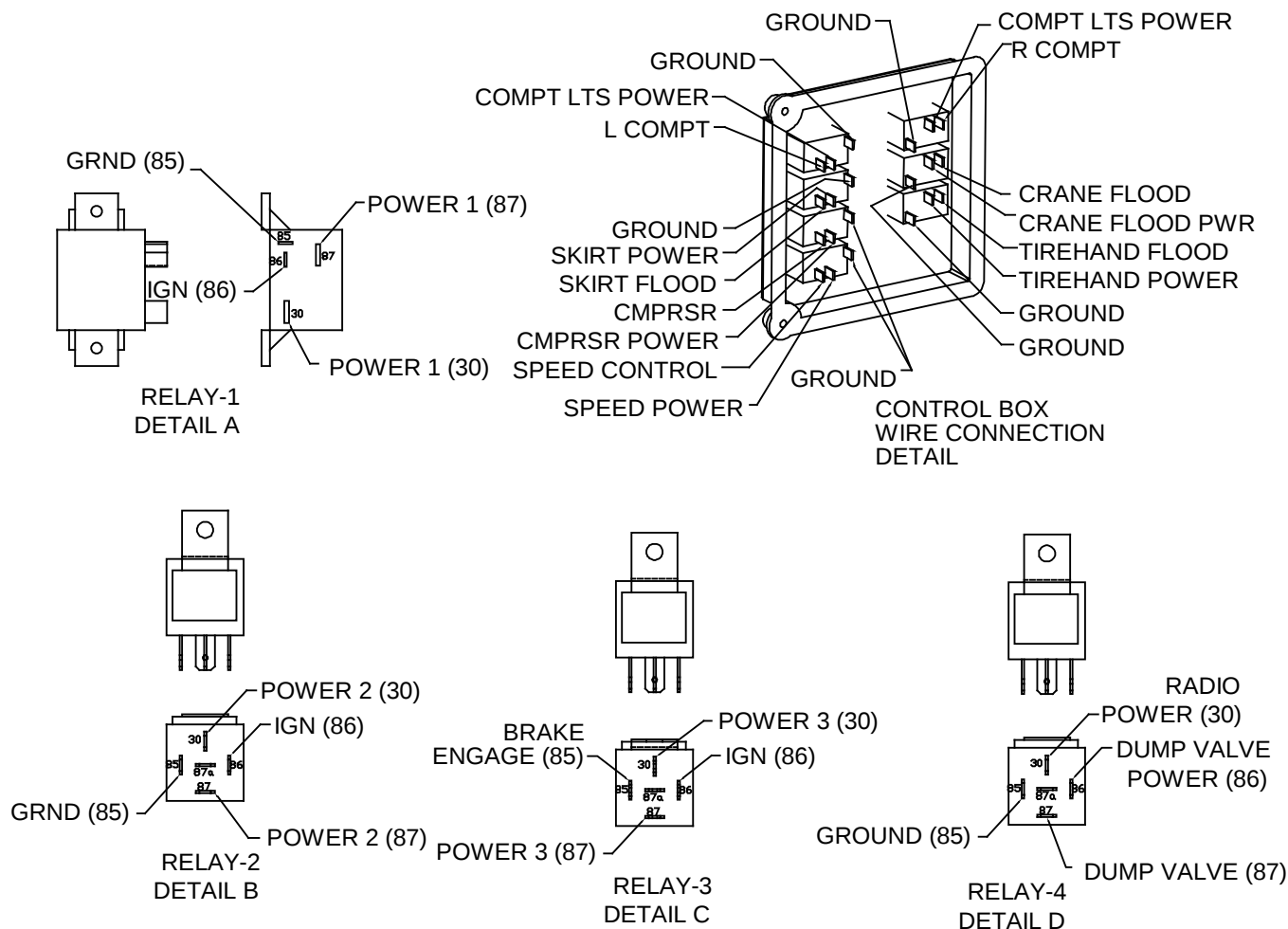


## Electrical Control Box Assembly (41718269-12V, 41718425-24V)



**NOTE:**

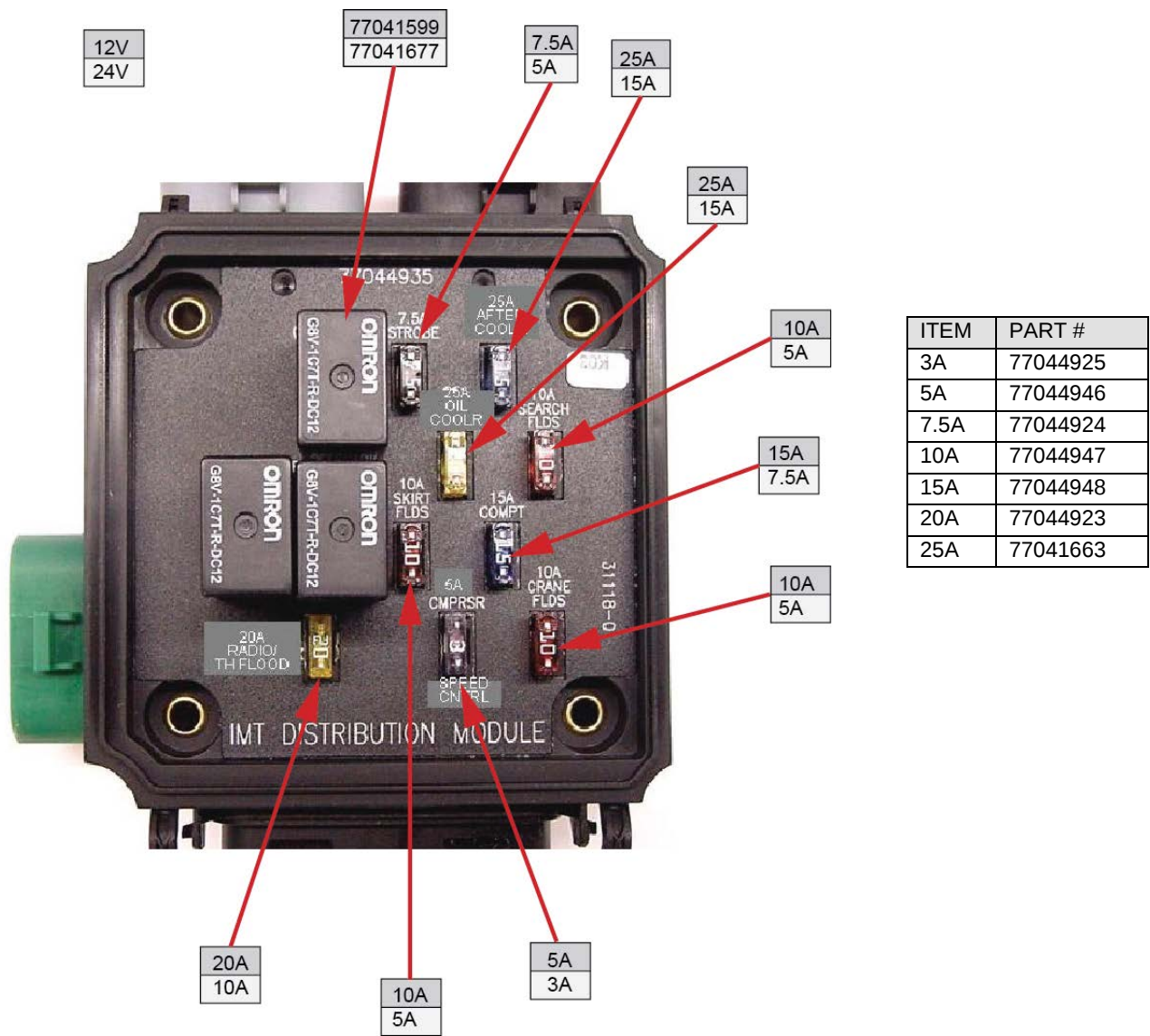
**1** FOR COMPLETE WIRING CONNECTIONS, SEE WIRING SCHEMATIC.

**41718269/41718425 DRAWING****41718269/41718425 PARTS LIST**

| ITEM | PART #   | DESCRIPTION                | DETAILS                        | QUANTITY |
|------|----------|----------------------------|--------------------------------|----------|
| 1.   | 77044919 | HARNESS, SWITCH BOX OUT    |                                | 1        |
| 2.   | 77441086 | HARNESS, SWITCH BOX IN     |                                | 1        |
| 3.   | 77441085 | HARNESS, CRANE POWER       |                                | 1        |
| 4.   | 77044935 | FUSE/RELAY BOX             |                                | 1        |
| 5.   | 77044797 | SWITCH BOX                 |                                | 1        |
| 6.   | 77041504 | SWITCH, ROCKER MTG PAN MID |                                | 4        |
| 7.   | 77041502 | SWITCH, ROCKER MTG PAN END |                                | 4        |
| 8.   | 77041500 | SWITCH, ROCKER BODY        | 12V                            | 7        |
|      | 77041672 | SWITCH, ROCKER BODY        | 24V                            | 7        |
| 9.   | 77041499 | SWITCH, ROCKER RED ACT.    |                                | 7        |
| 10.  | 77041571 | SWITCH, ROCKER PLUG        |                                | 1        |
| 11.  | 77041251 | RELAY                      | 40 AMP (12V)                   | 3        |
|      | 77041674 | RELAY                      | 20 AMP (24V)                   |          |
| 12.  | 77040391 | RELAY                      | 12V DC 75 AMP (12V)            | 1        |
|      | 77040455 | RELAY                      | 24V DC 50 AMP (24V)            | 1        |
| 13.  | 77044573 | CONNECTOR                  | PACKARD MALE 2-WAY WEATHERPACK | 1        |

| 41718269/41718425 PARTS LIST |          |                         |                           |          |
|------------------------------|----------|-------------------------|---------------------------|----------|
| ITEM                         | PART #   | DESCRIPTION             | DETAILS                   | QUANTITY |
| 14.                          | 77044552 | TERMINAL                | MALE 18-20 GA WEATHERPACK | 2        |
| 15.                          | 70394069 | SEAL, CABLE CONNECTOR   |                           | 2        |
| 16.                          | 70395669 | DECAL, OTR LIGHT SWITCH |                           | 1        |
| 17.                          | 76391200 | RUBBER GROMMET          | 9/16                      | 1        |
| 18.                          | 77041599 | RELAY                   | 12V DC                    | 3REF     |
|                              | 77041677 | RELAY                   | 24V DC                    | 3REF     |

# Relay Fuse Box, 12V & 24V (77044935)





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## Radio Remote

Radio Remote Kit 458 Frequency – 73733481

Radio Remote Kit 434 Frequency – 73733890

### REFERENCE PARTS FOR SERVICE:

#### **Transmitter - 70146274**

458 Frequency - 57149

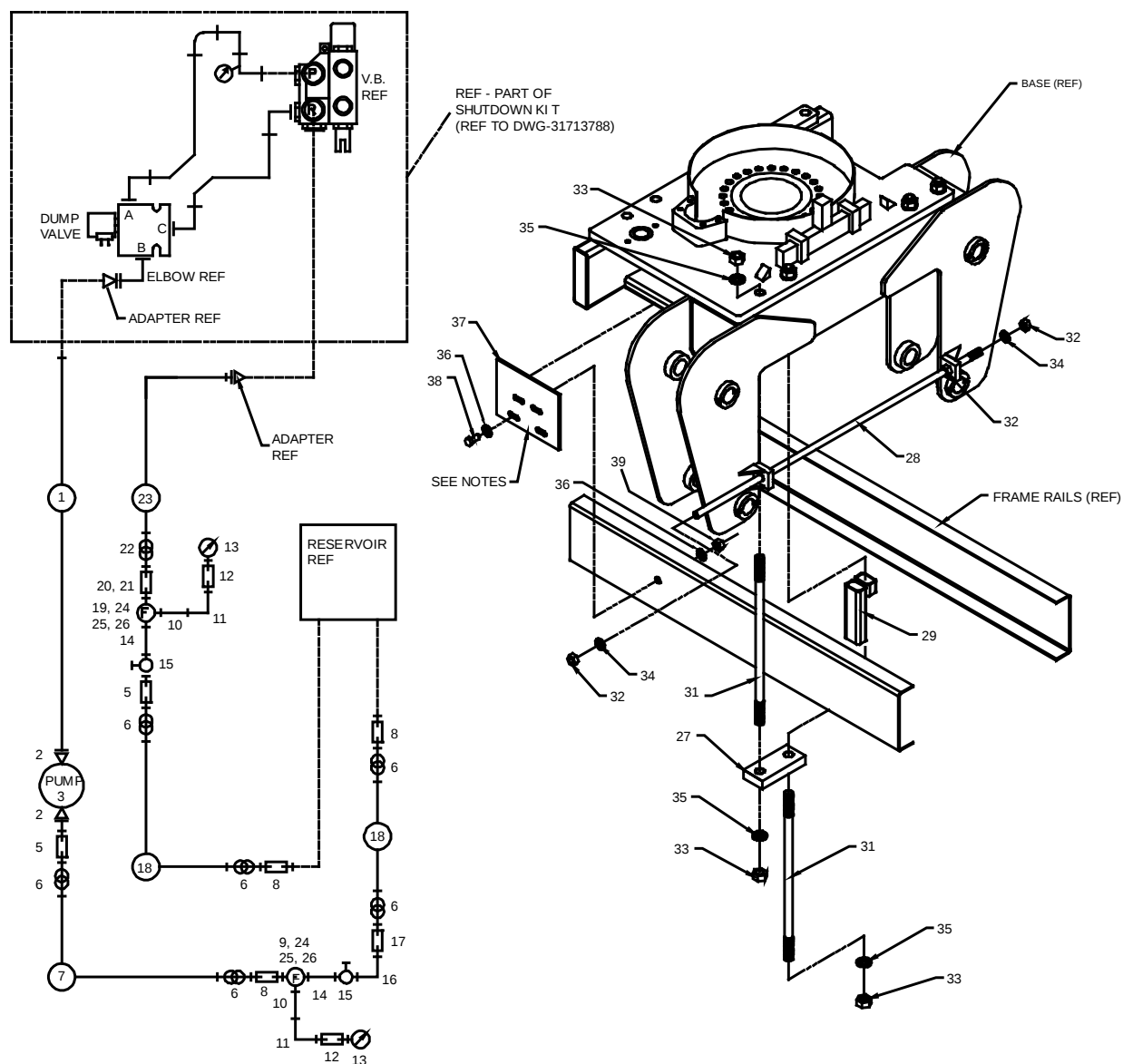
434 Frequency - 70734224

#### **Receiver - 70146275**

458 Frequency - 57129

434 Frequency - 70734225

## Installation Kit-Manual Controls (93708876)



**NOTE:**

- 1 WELD ITEM 37 SHEAR PLATE TO BASE APPROXIMATELY AS SHOWN, WITH.38 BUTT WELD.  
2 DRILL 0.812 HOLES AS REQUIRED TO BOLT ITEM 37 SHEAR PLATE TO FRAME RAILS.  
3 NOT ALL PARTS ARE SHOWN FOR CLARITY.

## 93708876 PARTS LIST

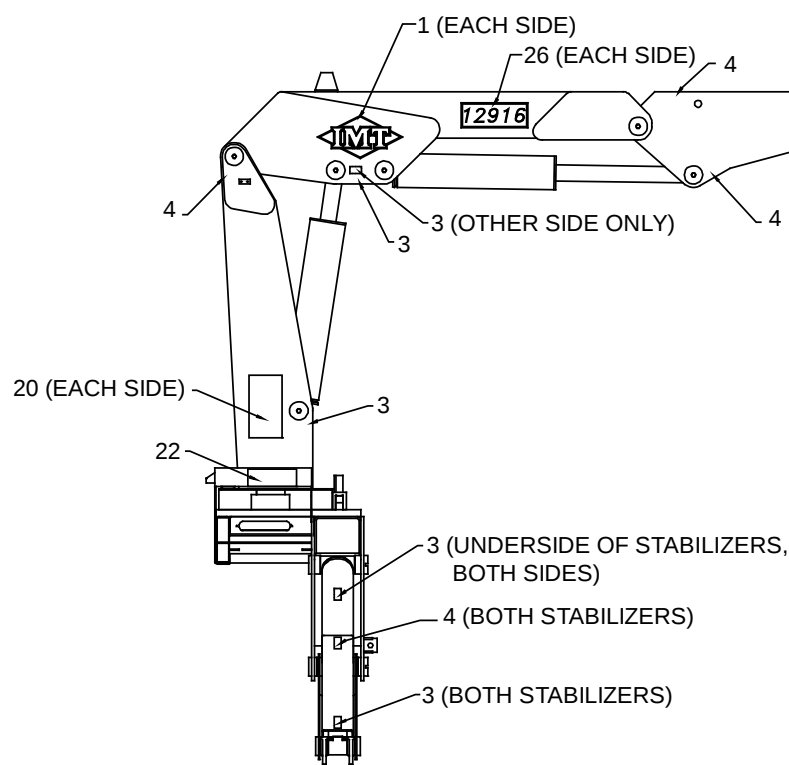
| ITEM | PART #   | DESCRIPTION                | QTY  |
|------|----------|----------------------------|------|
| 1.   | 51703703 | HOSE ASM-TYPE FF .50X72.00 | 1    |
| 2.   |          | ADAPTER-PUMP               | 2REF |
| 3.   |          | PUMP                       | 1REF |
| 5.   | 72532346 | NIPPLE-BARB 90° 1.25 1.25  | 2    |



| 93708876 PARTS LIST |          |                                  |     |
|---------------------|----------|----------------------------------|-----|
| ITEM                | PART #   | DESCRIPTION                      | QTY |
| 6.                  | 72661642 | CLAMP – T-BOLT 1.75              | 6   |
| 7.                  | 60035829 | HOSE-1.25 100R4 X 48.00          | 1   |
| 8.                  | 72531550 | NIPPLE-BARB STL 1.25MPT 1.25     | 3   |
| 9.                  | 73052012 | FILTER-HYD SUC-100 MESH W/GAGE   | 1   |
| 10.                 | 72053002 | NIPPLE-PIPE BLK .12X 2.00        | 2   |
| 11.                 | 72053281 | ELBOW-STREET BLK .12X90          | 2   |
| 12.                 | 72053301 | COUPLING-BLK .12                 | 2   |
| 13.                 | 70048031 | GAUGE-VACUUM GV10                | 2   |
| 14.                 | 72053211 | NIPPLE-PIPE BLK 1.25 CLOSE       | 2   |
| 15.                 | 73054130 | VALVE-GATE 1.25 BRASS            | 2   |
| 16.                 | 72053287 | ELBOW-STREET BLK 1.25X90DEG      | 1   |
| 17.                 | 72531196 | NIPPLE-BARB 45 DEG 1.25 1.25     | 1   |
| 18.                 | 60035598 | HOSE-1.25 100R4 X 72.00          | 2   |
| 19.                 | 73052091 | FILTER-HYD RET 10MIC 1.25 NPTF   | 1   |
| 20.                 | 72532345 | NIPPLE-BARB 90 DEG 1.00 1.00     | 1   |
| 21.                 | 72053377 | REDUCER BUSH-BLK 1.25-1.00       | 1   |
| 22.                 | 72066515 | CLAMP-HOSE 1.00 2-BOLT           | 1   |
| 23.                 | 51396428 | HOSE-J 1.00X 50 AOL (16)         | 1   |
| 24.                 | 60103870 | BRACKET-OIL FILTER               | 2   |
| 25.                 | 72060025 | CAP SCREW .31-18X 1.00 HH GR5 Z  | 4   |
| 26.                 | 72062109 | NUT .31-18 HEX NYLOC NZINC       | 4   |
| 27.                 | 60010665 | CLAMP PLATE-1.50X4.00 9.00       | 4   |
| 28.                 | 60103204 | STUD-TIE DOWN 1.00X44.00         | 1   |
| 29.                 | 52716527 | SUPPORT-WLDMT TRUCK FRAME 10.75  | 4   |
| 31.                 | 71014847 | STUD-TIE DOWN 1.25X28.50         | 8   |
| 32.                 | 72062009 | NUT 1.00-8 HEX ZINC              | 4   |
| 33.                 | 72062142 | NUT 1.25-7 HEX LOCK GR5          | 16  |
| 34.                 | 72063058 | WASHER 1.00 LOCK ZINC            | 2   |
| 35.                 | 72063067 | WASHER 1.25 HI STR ZINC          | 16  |
| 36.                 | 72063119 | WASHER .62 N FLAT H ASTM F436Z   | 16  |
| 37.                 | 60105107 | SHEAR PLATE .38X10.00X13.00      | 2   |
| 38.                 | 72060931 | CAP SCREW .62-11 X 2.75 HH GR8 Z | 8   |
| 39.                 | 72062091 | NUT .62-11 HEX NYLOC ZINC        | 8   |

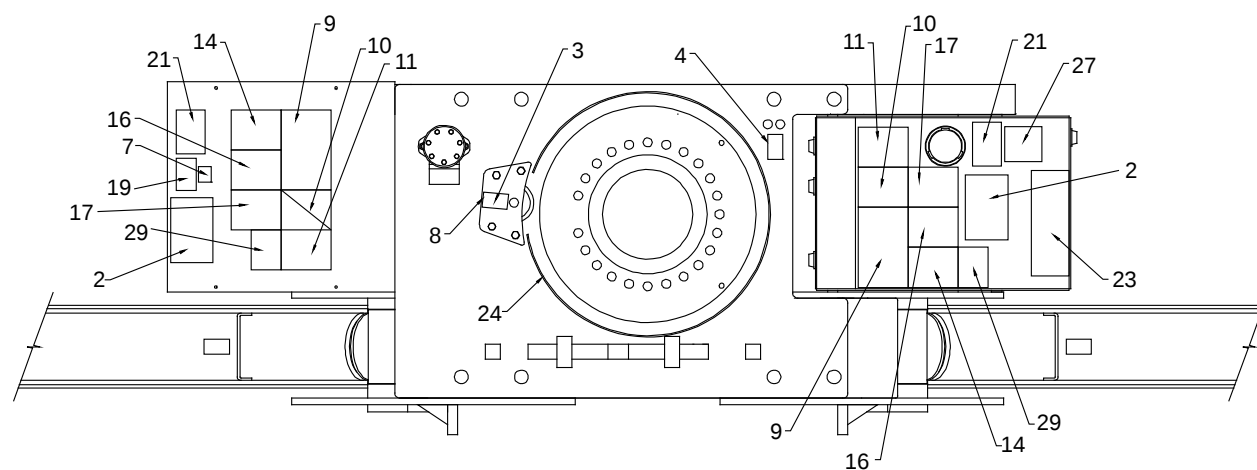


## Decal Kit (95712299)



### DECAL PLACEMENT

|        |                                                  |
|--------|--------------------------------------------------|
| 13, 28 | ONE ON EACH SIDE OF CARRIER VEHICLE              |
| 25     | AT OR NEAR THE NORMAL OPERATING STATIONS         |
| 6      | ON RESERVOIR AT RETURN LINE                      |
| 5      | ON RESERVOIR AT SUCTION LINE                     |
| 12, 15 | ONE ON THE UNDERSIDE OF EACH STABILIZER NEAR PAD |
| 18     | AT OR NEAR THE DRIVELINE                         |
| 30     | PLACE UNDER SERIAL TAG                           |
| 31     | ON FRONT SIDE OF BASE                            |

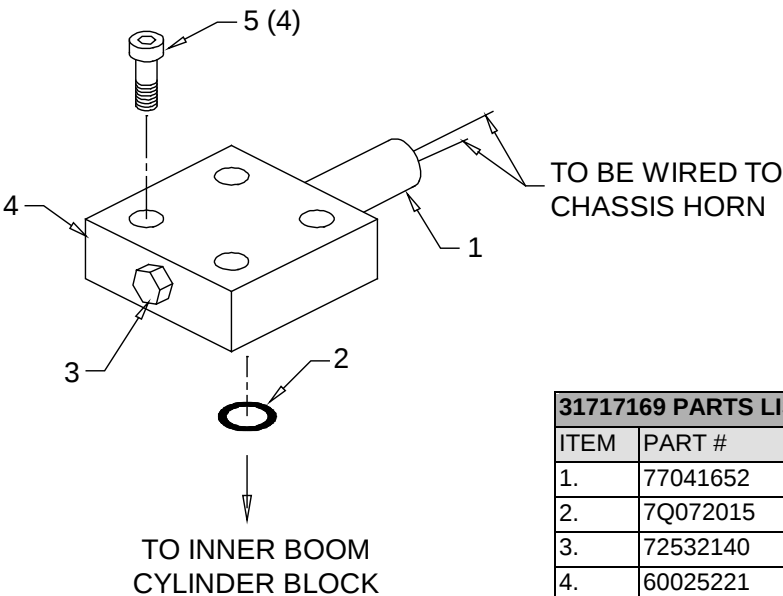




| 95712299 PARTS LIST |          |                                  |     |
|---------------------|----------|----------------------------------|-----|
| ITEM                | PART #   | DESCRIPTION                      | QTY |
| 1.                  | 70029252 | PLACARD-IMT DIAMOND 9.25X18.50   | 2   |
| 2.                  | 70391583 | DECAL-SET UP/STOW INSTRUCTIONS   | 2   |
| 3.                  | 70391612 | DECAL-GREASE WEEKLY (LEFT)       | 8   |
| 4.                  | 70391613 | DECAL-GREASE WEEKLY (RIGHT)      | 6   |
| 5.                  | 70392108 | DECAL-SUCTION LINE               | 1   |
| 6.                  | 70392109 | DECAL-RETURN LINE                | 1   |
| 7.                  | 70392213 | DECAL-CAUTION DON'T WASH/WAX     | 1   |
| 8.                  | 70392524 | DECAL-ROTATE CRANE WHILE GREASE  | 1   |
| 9.                  | 70392813 | DECAL-DANGER ELECTROCUTION       | 2   |
| 10.                 | 70392814 | DECAL-DANGER OPERATOR TRAINING   | 2   |
| 11.                 | 70392815 | DECAL-DANGER OPERATION           | 2   |
| 12.                 | 70392864 | DECAL-DANGER STAND CLEAR         | 2   |
| 13.                 | 70392865 | DECAL-DANGER ELEC HAZARD (LARGE) | 4   |
| 14.                 | 70392866 | DECAL-DANGER OPER CONDITIONS     | 2   |
| 16.                 | 70392888 | DECAL-DANGER OPER RESTRICTIONS   | 2   |
| 17.                 | 70392890 | DECAL-DANGER TOWING/UNFOLDING    | 2   |
| 18.                 | 70392891 | DECAL-DANGER DRIVELINE           | 2   |
| 19.                 | 70392982 | DECAL-SERVICE & REPAIR (GARNER)  | 1   |
| 20.                 | 71393869 | PLACARD-CAPACITY 12916           | 2   |
| 21.                 | 71039134 | DECAL-CAUTION OIL LEVEL          | 2   |
| 22.                 | 70395030 | DECAL-CONTROL SS 7415-12916-425  | 1   |
| 23.                 | 70395031 | DECAL-CONTROL CS 7415-12916-425  | 1   |
| 24.                 | 71392365 | DECAL-ALIGNMENT CRANE ROTATION   | 1   |
| 25.                 | 70392889 | DECAL-DANGER RC ELECROCTN LG     | 2   |
| 26.                 | 71393867 | DECAL-12916 IDENTIFICATION       | 2   |
| 27.                 | 70394189 | PLACARD-MOBIL OIL RESERVOIR      | 1   |
| 28.                 | 70392868 | DECAL-DANGER CR LOADLINE (TRK)   | 4   |
| 29.                 | 70392863 | DECAL-DANGER HOISTING PERSONNEL  | 2   |
| 30.                 | 70395323 | DECAL-ASME/ANSI B30.22           | 1   |
| 31.                 | 72042097 | LEVEL INDICATOR                  | 2   |
| REV E 20120110      |          |                                  |     |

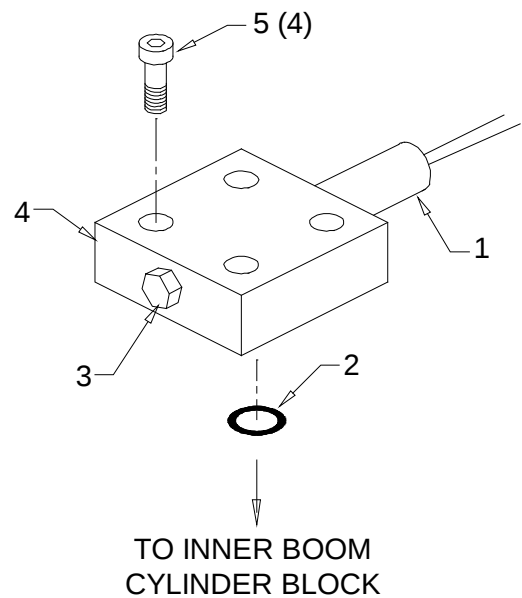


## Capacity Alert Kit – 2800 PSI (31717169)



| 31717169 PARTS LIST |          |                          |     |
|---------------------|----------|--------------------------|-----|
| ITEM                | PART #   | DESCRIPTION              | QTY |
| 1.                  | 77041652 | PRESSURE SWITCH          | 1   |
| 2.                  | 7Q072015 | O-RING                   | 1   |
| 3.                  | 72532140 | PLUG-9/16 STR HH         | 1   |
| 4.                  | 60025221 | MANIFOLD                 | 1   |
| 5.                  | 72060731 | CAP SCREW 5/16-18 X ¾ SH | 4   |
| REV A 20020702      |          |                          |     |

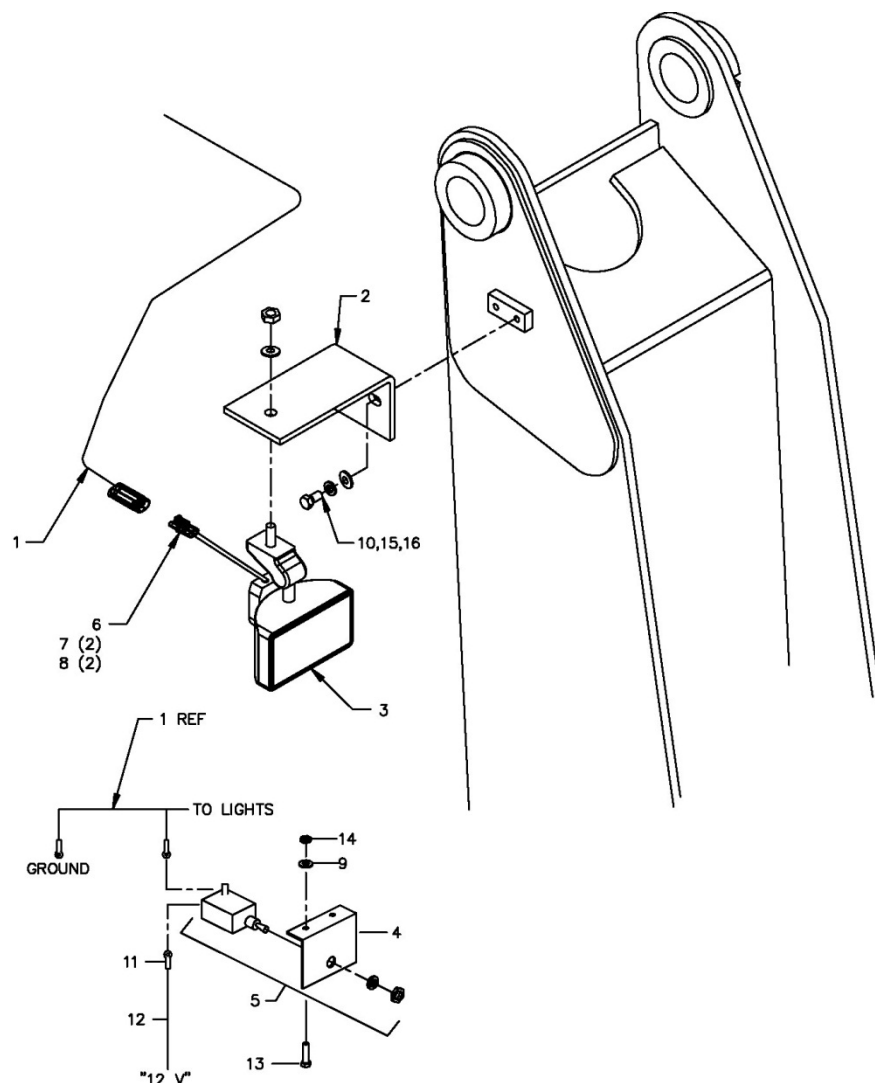
## Capacity Shutdown Kit – 2800 PSI (31717514)



| 31717514 PARTS LIST |          |                          |     |
|---------------------|----------|--------------------------|-----|
| ITEM                | PART #   | DESCRIPTION              | QTY |
| 1.                  | 77041543 | PRESSURE SWITCH          | 1   |
| 2.                  | 7Q072015 | O-RING                   | 1   |
| 3.                  | 72532140 | PLUG-STR HEX HS STL 9/16 | 1   |
| 4.                  | 60025221 | MANIFOLD                 | 1   |
| 5.                  | 72060731 | CAP SCR 5/16-18 X ¾ SH Z | 4   |
| REV A 20020702      |          |                          |     |



## Light Kit – Crane Mast Mounted (51717977)



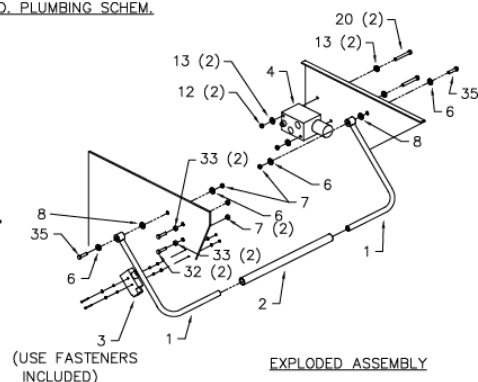
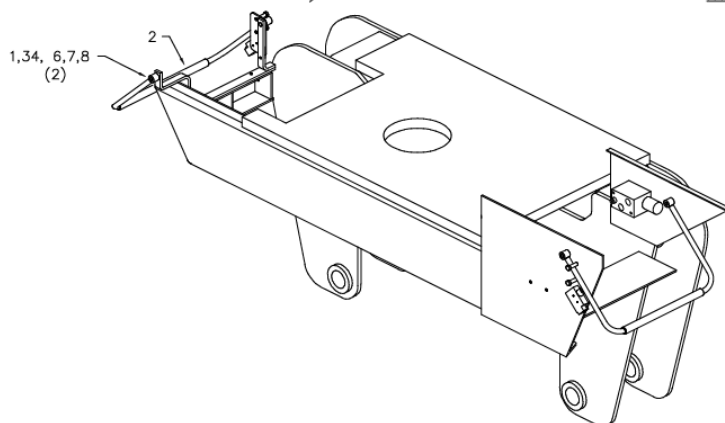
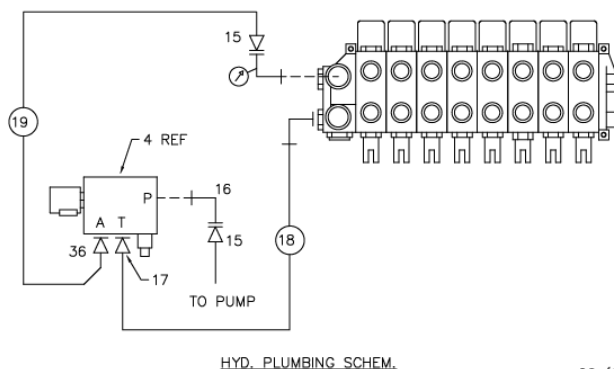
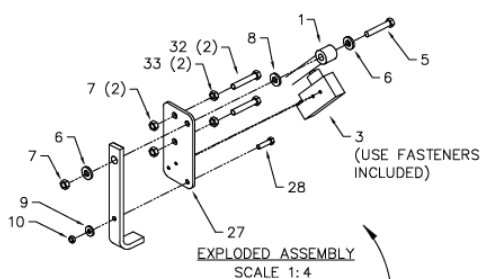
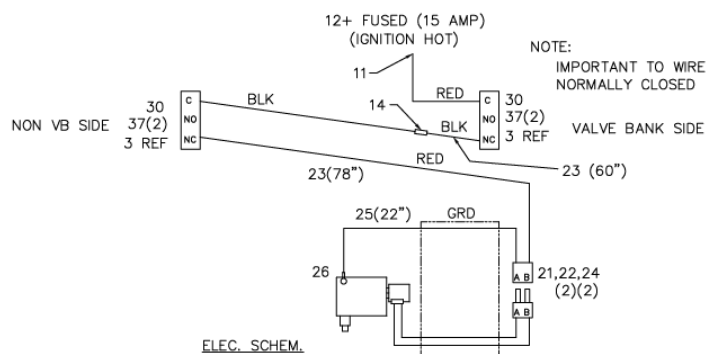
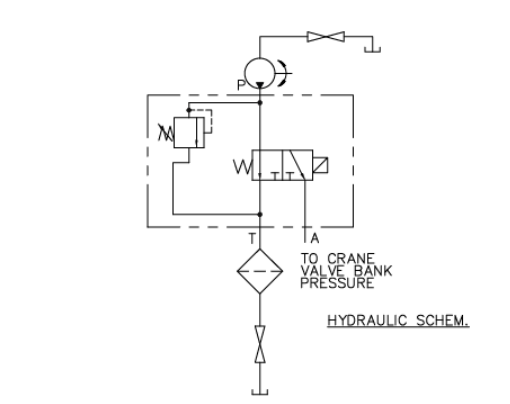
| 51717977 PARTS LIST |          |                                        |     |
|---------------------|----------|----------------------------------------|-----|
| ITEM                | PART #   | DESCRIPTION                            | QTY |
| 1.                  | 51717219 | CABLE ASM-FLOOD LIGHTS-ARTICULATING    | 1   |
| 2.                  | 60113428 | LIGHT BRACKET                          | 2   |
| 3.                  | 77040424 | FLOODLIGHT-COMPOSITE WORK LAMP-TOP MTG | 2   |
| 4.                  | 60103535 | SWITCH BRACKET-1HOLE                   | 1   |
| 5.                  | 77041345 | TOGGLE SWITCH                          | 1   |
| 6.                  | 77044574 | CONN-PKRD F 2-WAY WEATPK               | 2   |
| 7.                  | 77044550 | TERM-FEMALE18-20                       | 4   |
| 8.                  | 70394069 | SEAL CABLE CONNECTOR                   | 4   |
| 9.                  | 72063049 | WASHER .25 LOCK ZINC                   | 2   |
| 10.                 | 72060044 | CAP SCREW .38-16X .75 HH GR5 Z         | 4   |
| 11.                 | 77040000 | TERMINAL, RING 1 #10 STUD 16-14 GA     | 1   |



| 51717977 PARTS LIST |          |                                 |     |
|---------------------|----------|---------------------------------|-----|
| ITEM                | PART #   | DESCRIPTION                     | QTY |
| 12.                 | 89044274 | WIRE-BLACK STRD TYPE GPT        | 36" |
| 13.                 | 72060000 | CAP SCREW .25-20 X .50 HH GR5 Z | 2   |
| 14.                 | 72062000 | NUT .25-20 HEX ZINC             | 2   |
| 15.                 | 72063051 | WASHER .38 LOCK ZINC            | 4   |
| 16.                 | 72063003 | WASHER .38 W FLAT               | 4   |
| REV A 20070327      |          |                                 |     |



## Hydraulic Shutdown Kit (31713788)



### 31713788 PARTS LIST

| ITEM | PART #   | DESCRIPTION                      | QTY |
|------|----------|----------------------------------|-----|
| 1.   | 52713782 | HANDLE - SHUTDOWN                | A/R |
| 2.   | 60120092 | TUBE - .75X1.00X15.50            | A/R |
| 3.   | 77041459 | LIMIT SWITCH                     | 2   |
| 4.   | VARIES   | VALVE ASM - RELIEF/SOL HYD SHUTD | 1   |
| 5.   | 72060052 | CAP SCREW - .38-16 X 2.50 HH GR5 | 1   |
| 6.   | 72063003 | WASHER - .38 W FLAT              | 8   |



| 31713788 PARTS LIST |          |                                    |       |
|---------------------|----------|------------------------------------|-------|
| ITEM                | PART #   | DESCRIPTION                        | QTY   |
| 7.                  | 72062103 | NUT .38-16 NYLOC                   | 8     |
| 8.                  | 72063215 | WASHER – BELLEVILLE .38 SS         | 4     |
| 9.                  | 72063001 | WASHER .25 W FLAT                  | 1     |
| 10.                 | 72062104 | NUT - .25-20 NYLOC                 | 4     |
| 11.                 | 77040282 | TERM-PIGBAC FVD 16/14GA .25TAB     | 1     |
| 12.                 | 72062109 | NUT - .31-18 NYLOC                 | 4     |
| 13.                 | 72063002 | WASHER .31 WRT                     | 4     |
| 14.                 | 77040048 | TERM-BUTT CONNECTOR 16-14GA        | 1     |
| 15.                 | 72532972 | ADAPTER – MJIC/FJIC #8 #12         | 2     |
| 16.                 | 72053767 | ELBOW – MSTR/90/MJIC #12 #12       | 1     |
| 17.                 | 72532366 | ADAPTER-M STR/MJIC #12 #12         | 1     |
| 18.                 | 51394919 | HOSE-FF .75X21.00 OAL (12-12)      | 1     |
| 19.                 | 51394882 | HOSE-FI .50X22.00 OAL (8-8)        | 1     |
| 20.                 | 72060038 | CAP SCREW - .31-18X4.50 HH GR5 Z   | 2     |
| 21.                 | 77044573 | CONNECTOR, M 2-WAY WP              | 1     |
| 22.                 | 77044552 | TERMINAL-MALE 18-20GA WP           | 2     |
| 23.                 | 89044188 | CABLE-14AWG DUPLEX AUTO PRIMARY    | 12 FT |
| 24.                 | 70394069 | SEAL-CABLE CONNECTOR WP            | 2     |
| 25.                 | 89044274 | WIRE – 14GA BLK STRD               | 2 FT  |
| 26.                 | 77040052 | TERM-RING .38 STUD 12-10 GA        | 1     |
| 27.                 | 60120438 | BRACKET – LIMIT SWITCH             | 1     |
| 28.                 | 72060004 | CAP SCREW - .25-20 X 1.00 HH GR5   | 1     |
| 30.                 | 77044468 | CONNECTOR - .50 STR RLF .12-.25    | 2     |
| 32.                 | 72060050 | CAP SCREW - .38-16 X 2.25 HH GR5 Z | 1     |
| 33.                 | 72062002 | NUT - .38-16 HEX ZINC              | 4     |
| 34.                 | 72060030 | CAP SCREW .31-18 X 2.25 HH GR5 Z   | 1     |
| 35.                 | 72060031 | CAP SCREW .31-18 X 2.00 HH GR5 Z   | 2     |
| 36.                 | 72532360 | ADAPTER-M STR/M JIC #12 #8         | 1     |
| 37.                 | 77040051 | TERM-SPRSPADE #8 STUD 16-14        | 4     |
| 38.                 | 89034048 | SPIRAL WRAP-CLEAR                  | 3 FT  |
| REV H 20140415      |          |                                    |       |



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## Option – Hook Assembly Kit (40726070)

| 40726070 PARTS LIST |          |                                |     |
|---------------------|----------|--------------------------------|-----|
| ITEM                | PART #   | DESCRIPTION                    | QTY |
| 1.                  | 60142343 | PIN-TYPE NN 1.25 X 5.75        | 1   |
| 2.                  | 71415014 | KEEPER-PIN .38                 | 1   |
| 3.                  | 72063003 | WASHER-FLAT .38 W              | 1   |
| 4.                  | 72060047 | CAP SCR .38-16 X 1.25 HH GR5 Z | 1   |
| 5.                  | 70731813 | HOOK-SWVL 7EH W3214 LCH ASM    | 1   |
| 6.                  | 72661245 | SHACKLE-8.5 TON 1.00 NOM SIZE  | 1   |



## 12916 Recommended Spare Parts List

This parts list is intended to provide the user with a stock of parts sufficient to keep the unit operating with the minimal down-time waiting for parts, but it does not indicate these items will fail within a year. In addition, there may be parts failures not covered by this list. Parts not listed are considered as not being Critical or Normal Wear items during the first year of operations.

| ASSEMBLY DESCRIPTION                          |                             |                       |
|-----------------------------------------------|-----------------------------|-----------------------|
| PART #                                        | SPARE PART DESCRIPTION      | MANUAL PAGE REFERENCE |
| STABILIZER CYLINDER (3C283801)                |                             |                       |
| 73054304                                      | COUNTERBALANCE VALVE        | 26                    |
| 9C242432                                      | SEAL KIT                    | 26                    |
| INNER CYLINDER (3C194614)                     |                             |                       |
| 73054242                                      | VALVE 25GPM                 | 29                    |
| 9C282835                                      | SEAL KIT                    | 29                    |
| OUTER CYLINDER (3C195613)                     |                             |                       |
| 73054242                                      | VALVE 25GPM                 | 32                    |
| 9C262832                                      | SEAL KIT                    | 32                    |
| EXTENSION CYLINDER (51718065)                 |                             |                       |
| 73540052                                      | VALVE                       | 34                    |
| 9C121617                                      | SEAL KIT                    | 34                    |
| RELIEF VALVE ASSEMBLY                         |                             |                       |
| 77040456                                      | COIL FOR 12V RADIO          | 39                    |
| 77040447                                      | COIL FOR 24V RADIO          | 39                    |
| 73054980                                      | 12V DUMP VALVE              | 39                    |
| 77041456                                      | COIL FOR 12V DUMP VALVE     | 39                    |
| 73540142                                      | 24V DUMP VALVE              | 39                    |
| 77040463                                      | COIL FOR 24V DUMP VALVE     | 39                    |
| HYDRAULIC OVERLOAD KIT, 3-FUNCTION (51717130) |                             |                       |
| 77441576                                      | COIL FOR VALVE BLK 73540463 | 46                    |
| ELECTRICAL CONTROL BOX ASSEMBLY               |                             |                       |
| 77041500                                      | SWITCH, ROCKER BODY 12V     | 50                    |
| 77041672                                      | SWITCH, ROCKER BODY 24V     | 50                    |
| 77041499                                      | SWITCH, ROCKER ACTUATOR     | 50                    |
| 77041571                                      | SWITCH, ROCKER PLUG         | 50                    |
| 77041251                                      | RELAY 40 AMP (12V)          | 50                    |
| 77041674                                      | RELAY 20 AMP (24V)          | 50                    |
| 77040391                                      | RELAY 12V DC 75 AMP         | 50                    |
| 77040455                                      | RELAY 24V DC 50 AMP         | 50                    |
| 77041599                                      | RELAY 12V                   | 50                    |
| 77041677                                      | RELAY 24V                   | 50                    |



CHAPTER 5

# General Reference

## In This Chapter

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Turntable Bearing Inspection..... 76  
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Thread Torque Chart (Metric) ..... 79

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## Inspection Checklist

**NOTICE:**

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

|                      |                                    |         |           |        |
|----------------------|------------------------------------|---------|-----------|--------|
| OWNER/COMPANY:       | TYPE OF INSPECTION (circle one):   |         |           |        |
| CONTACT PERSON:      | DAILY                              | MONTHLY | QUARTERLY | ANNUAL |
| CRANE MAKE & MODEL:  | DATE INSPECTED:                    |         |           |        |
| CRANE SERIAL NUMBER: | HOURMETER READING (if applicable): |         |           |        |
| UNIT I.D. NUMBER:    | INSPECTED BY (print):              |         |           |        |
| LOCATION OF UNIT:    | SIGNATURE OF INSPECTOR:            |         |           |        |

**TYPE OF INSPECTION****NOTES:**

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

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

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

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

Before inspecting and operating crane, crane must be set up away from power lines and leveled with stabilizers fully extended.

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

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

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

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

**INSPECTION CHECKLIST STATUS KEY:**

S = Satisfactory

X = Deficient

R = Recommendation  
(Should be considered for corrective action)

(NOTE: If a deficiency is found, an immediate determination must be made as to whether the deficiency constitutes a safety hazard and must be corrected prior to operation.)

NA = Not Applicable

| FREQUENCY | ITEM | KEY              | INSPECTION DESCRIPTION                                                                           | STATUS     |
|-----------|------|------------------|--------------------------------------------------------------------------------------------------|------------|
|           |      |                  |                                                                                                  | (S,R,X,NA) |
| D         | 1    | Labels           | All load charts, safety & warning labels, and control labels are present and legible.            |            |
| D         | 2    | Crane            | Check all safety devices for proper operation.                                                   |            |
| D         | 3    | Controls         | Control mechanisms for proper operation of all functions, leaks and cracks.                      |            |
| D         | 4    | Station          | Control and operator's station for dirt, contamination by lubricants, and foreign material.      |            |
| D         | 5    | Hydraulic System | Hydraulic system (hoses, tubes, fittings) for leakage and proper oil level.                      |            |
| D         | 6    | Hook             | Presence and proper operation of hook safety latches.                                            |            |
| D         | 7    | Wire Rope        | Inspect for apparent deficiencies per applicable requirements and manufacturer's specifications. |            |



| FREQUENCY | ITEM | KEY                                                    | INSPECTION DESCRIPTION                                                                                                                                                                                   | STATUS<br>(S,R,X,NA) |
|-----------|------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| D         | 8    | Pins                                                   | Proper engagement of all connecting pins and pin retaining devices.                                                                                                                                      |                      |
| D         | 9    | General                                                | Overall observation of crane for damaged or missing parts, cracked welds, and presence of safety covers.                                                                                                 |                      |
| D         | 10   | Operation                                              | During operation, observe crane for abnormal performance, unusual wear (loose pins, wire rope damage, etc.). If observed, discontinue use and determine cause and severity of hazard.                    |                      |
| D         | 11   | Remote Ctrl                                            | Operate remote control devices to check for proper operation.                                                                                                                                            |                      |
| D         | 12   | Electrical                                             | Operate all lights, alarms, etc. to check for proper operation.                                                                                                                                          |                      |
| D         | 13   | Anti-Two-Block or Two-Block Damage Prevention          | Operate anti two-block or two-block damage prevention device to check for proper operation.                                                                                                              |                      |
| D         | 14   | Tires                                                  | Check tires (when in use) for proper inflation and condition.                                                                                                                                            |                      |
| D         | 15   | Ground Conditions                                      | Check ground conditions around the equipment for proper support, watching for ground settling under and around stabilizers and supporting foundations, ground water accumulation, or similar conditions. |                      |
| D         | 16   | Level                                                  | Check the equipment for level position within the tolerances specified by the equipment manufacturer's recommendations, both before each shift and after each move and setup.                            |                      |
| D         | 17   | Operator cab windows                                   | Check windows for cracks, breaks, or other deficiencies which would hamper the operator's view.                                                                                                          |                      |
| D         | 18   | Rails, rail stops, rail clamps and supporting surfaces | Check rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling.                                                                                                      |                      |
| D         | 19   | Safety devices                                         | Check safety devices and operational aids for proper operation.                                                                                                                                          |                      |
| D         | 20   | Electrical                                             | Check electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.                                                                                 |                      |
| D         | 21   |                                                        | Other                                                                                                                                                                                                    |                      |
| D         | 22   |                                                        | Other                                                                                                                                                                                                    |                      |
| M         | 23   | Daily                                                  | All daily inspection items.                                                                                                                                                                              |                      |
| M         | 24   | Cylinders                                              | Visual inspection of cylinders for leakage at rod, fittings, and welds. Damage to rod and case.                                                                                                          |                      |
| M         | 25   | Valves                                                 | Holding valves for proper operation.                                                                                                                                                                     |                      |
| M         | 26   | Valves                                                 | Control valves for leaks at fittings and between stations.                                                                                                                                               |                      |
| M         | 27   | Valves                                                 | Control valve linkages for wear, smoothness of operation, and tightness of fasteners. Relief valve for proper pressure settings.                                                                         |                      |
| M         | 28   | General                                                | Bent, broken, or significantly rusted/corroded parts.                                                                                                                                                    |                      |
| M         | 29   | Electrical                                             | Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation. Electrical systems for presence of dirt, moisture, and frayed wires.                  |                      |
| M         | 30   | Structure                                              | All structural members for damage.                                                                                                                                                                       |                      |
| M         | 31   | Welds                                                  | All welds for breaks and cracks.                                                                                                                                                                         |                      |
| M         | 32   | Pins                                                   | All pins for proper installation and condition.                                                                                                                                                          |                      |
| M         | 33   | Hardware                                               | All bolts, fasteners and retaining rings for tightness, wear and corrosion.                                                                                                                              |                      |
| M         | 34   | Wear Pads                                              | Presence of wear pads.                                                                                                                                                                                   |                      |
| M         | 35   | Pump & Motor                                           | Hydraulic pumps and motors for leakage at fittings, seals, and between sections. Check tightness of mounting bolts.                                                                                      |                      |



| FREQUENCY | ITEM | KEY            | INSPECTION DESCRIPTION                                                                                                  | STATUS<br>(S,R,X,NA) |
|-----------|------|----------------|-------------------------------------------------------------------------------------------------------------------------|----------------------|
| M         | 36   | PTO            | Transmission/PTO for leakage, abnormal vibration & noise, alignment, and mounting bolt torque.                          |                      |
| M         | 37   | Hyd Fluid      | Quality of hydraulic fluid and presence of water.                                                                       |                      |
| M         | 38   | Hyd Lines      | Hoses & tubes for leakage, abrasion damage, blistering, cracking, deterioration, fitting leakage, and secured properly. |                      |
| M         | 39   | Hook           | Load hook for abnormal throat distance, twist, wear, and cracks.                                                        |                      |
| M         | 40   | Wire Rope      | Condition of load line.                                                                                                 |                      |
| M         | 41   | Manual         | Presence of operator's manual with unit.                                                                                |                      |
| M         | 42   |                | Other                                                                                                                   |                      |
| M         | 43   |                | Other                                                                                                                   |                      |
| Q         | 44   | Daily          | All daily inspection items.                                                                                             |                      |
| Q         | 45   | Monthly        | All monthly inspection items.                                                                                           |                      |
| Q         | 46   | Rotation Sys   | Rotation bearing for proper torque of all mounting bolts.                                                               |                      |
| Q         | 47   | Hardware       | Base mounting bolts for proper torque.                                                                                  |                      |
| Q         | 48   | Structure      | All structural members for deformation, cracks and corrosion.                                                           |                      |
|           | 49   |                | • Base                                                                                                                  |                      |
|           | 50   |                | • Stabilizer beams and legs                                                                                             |                      |
|           | 51   |                | • Mast                                                                                                                  |                      |
|           | 52   |                | • Inner Boom                                                                                                            |                      |
|           | 53   |                | • Outer Boom                                                                                                            |                      |
|           | 54   |                | • Extension(s)                                                                                                          |                      |
|           | 55   |                | • Jib boom                                                                                                              |                      |
|           | 56   |                | • Jib extension(s)                                                                                                      |                      |
|           | 57   |                | • Other                                                                                                                 |                      |
| Q         | 58   | Hardware       | Pins, bearing, shafts, gears, rollers, and locking devices for wear, cracks, corrosion and distortion.                  |                      |
|           | 59   |                | • Rotation bearing(s)                                                                                                   |                      |
|           | 60   |                | • Inner boom pivot pin(s) and retainer(s)                                                                               |                      |
|           | 61   |                | • Outer boom pivot pin(s) and retainer(s)                                                                               |                      |
|           | 62   |                | • Inner boom cylinder pin(s) and retainer(s)                                                                            |                      |
|           | 63   |                | • Outer boom cylinder pin(s) and retainer(s)                                                                            |                      |
|           | 64   |                | • Extension cylinder pin(s) and retainer(s)                                                                             |                      |
|           | 65   |                | • Jib boom pin(s) and retainer(s)                                                                                       |                      |
|           | 66   |                | • Jib cylinder pin(s) and retainer(s)                                                                                   |                      |
|           | 67   |                | • Jib extension cylinder pin(s) and retainer(s)                                                                         |                      |
|           | 68   |                | • Boom tip attachment                                                                                                   |                      |
|           | 69   |                | • Other                                                                                                                 |                      |
| Q         | 70   | Hyd Lines      | Hoses, fittings and tubing for proper routing, leakage, blistering, deformation and excessive abrasion.                 |                      |
|           | 71   |                | • Pressure line(s) from pump to control valve                                                                           |                      |
|           | 72   |                | • Return line(s) from control valve to reservoir                                                                        |                      |
|           | 73   |                | • Suction line(s) from reservoir to pump                                                                                |                      |
|           | 74   |                | • Pressure line(s) from control valve to each function                                                                  |                      |
|           | 75   |                | • Load holding valve pipe(s) and hose(s)                                                                                |                      |
|           | 76   |                | • Other                                                                                                                 |                      |
| Q         | 77   | Pumps & Motors | Pumps and Motors for loose bolts/fasteners, leaks, noise, vibration, loss of performance, heating & excess pressure.    |                      |
|           | 78   |                | • Winch motor(s)                                                                                                        |                      |
|           | 79   |                | • Rotation motor(s)                                                                                                     |                      |
|           | 80   |                | • Other                                                                                                                 |                      |



| FREQUENCY | ITEM | KEY          | INSPECTION DESCRIPTION                                                                                                                                                      | STATUS<br>(S,R,X,NA) |
|-----------|------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Q         | 81   | Valves       | Hydraulic valves for cracks, spool return to neutral, sticking spools, proper relief valve setting, relief valve failure.                                                   |                      |
|           | 82   |              | • Main control valve                                                                                                                                                        |                      |
|           | 83   |              | • Load holding valve(s)                                                                                                                                                     |                      |
|           | 84   |              | • Stabilizer or auxiliary control valve(s)                                                                                                                                  |                      |
|           | 85   |              | • Other                                                                                                                                                                     |                      |
|           | 86   |              | • Other                                                                                                                                                                     |                      |
| Q         | 87   | Cylinders    | Hydraulic cylinders for drifting, rod seal leakage and leakage at welds. Rods for nicks, scores and dents. Case for damage. Case and rod ends for damage and abnormal wear. |                      |
|           | 88   |              | • Stabilizer cylinder(s)                                                                                                                                                    |                      |
|           | 89   |              | • Inner boom cylinder(s)                                                                                                                                                    |                      |
|           | 90   |              | • Outer boom cylinder(s)                                                                                                                                                    |                      |
|           | 91   |              | • Extension cylinder(s)                                                                                                                                                     |                      |
|           | 92   |              | • Rotation cylinder(s)                                                                                                                                                      |                      |
|           | 93   |              | • Jib lift cylinder(s)                                                                                                                                                      |                      |
|           | 94   |              | • Jib extension cylinder(s)                                                                                                                                                 |                      |
|           | 95   |              | • Other                                                                                                                                                                     |                      |
| Q         | 96   | Winch        | Winch, sheaves and drums for damage, abnormal wear, abrasions and other irregularities.                                                                                     |                      |
| Q         | 97   | Hyd Filters  | Hydraulic filters for replacement per maintenance schedule.                                                                                                                 |                      |
| A         | 98   | Daily        | All daily inspection items.                                                                                                                                                 |                      |
| A         | 99   | Monthly      | All monthly inspection items.                                                                                                                                               |                      |
| A         | 100  | Quarterly    | All quarterly inspection items.                                                                                                                                             |                      |
| A         | 101  | Hyd Sys      | Hydraulic fluid change per maintenance schedule.                                                                                                                            |                      |
| A         | 102  | Controls     | Control valve calibration for correct pressure & relief valve settings.                                                                                                     |                      |
| A         | 103  | Valves       | Safety valve calibration for correct pressure & relief valve settings.                                                                                                      |                      |
| A         | 104  | Valves       | Valves for failure to maintain correct settings.                                                                                                                            |                      |
| A         | 105  | Rotation Sys | Rotation drive system for proper backlash clearance & abnormal wear, deformation and cracks.                                                                                |                      |
| A         | 106  | Lubrication  | Gear oil change in rotation drive system per maintenance schedule.                                                                                                          |                      |
| A         | 107  | Hardware     | Check tightness of all fasteners and bolts, using torque specifications on component drawings or torque chart.                                                              |                      |
| A         | 108  | Wear Pads    | Wear pads for excessive wear.                                                                                                                                               |                      |
| A         | 109  | Loadline     | Loadline for proper attachment to drum.                                                                                                                                     |                      |



## Deficiency / Recommendation / Corrective Action Report

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------|
| DATE:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | OWNER: | UNIT I.D. NUMBER: |
| <p><b>GUIDELINES</b></p> <ul style="list-style-type: none"> <li><b>a</b> A deficiency (X) may constitute a hazard. Deficiency must be corrected and/or faulty parts replaced before resuming operation.</li> <li><b>b</b> Recommendations (R) should be considered for corrective actions. Corrective action for a particular recommendation depends on the facts in each situation.</li> <li><b>c</b> Corrective actions (CA), repairs, adjustments, parts replacement, etc. are to be performed by a qualified person in accordance with all manufacturer's recommendations, specifications and requirements.</li> </ul> <p>NOTE: Deficiencies (X) listed must be followed by the corresponding corrective action taken (CA).</p> <p>X = DEFICIENCY      R = RECOMMENDATION      CA = CORRECTIVE ACTION TAKEN</p> |        |                   |

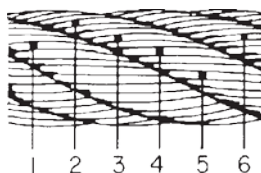
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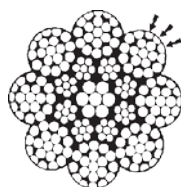
**WIRE ROPE INSPECTION**

Wire rope with any of the deficiencies shown below shall be removed and replaced immediately.

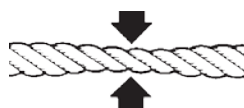
- A. Corrosion can be cause for replacement. Any development of corrosion must be noted and monitored closely.
- B. When there are either 3 broken wires in one strand or a total of six broken wires in all strands in any one rope lay.



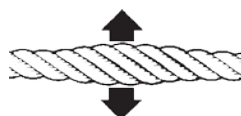
- C. When flat spots on the outer wires appear and those outside wires are less than  $\frac{2}{3}$  the thickness of the unworn outer wire.



- D. When there is a decrease of diameter indicating a core failure.



- E. When kinking, crushing, birdcaging or other distortion occurs.



- F. When there is noticeable heat damage (discoloration) of the rope by any means.



- G. When the diameter is reduced from nominal size by  $\frac{1}{32}$ " or more.



- H. If a broken wire protrudes or loops out from the core of the rope.





## HOOK INSPECTION

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

### A. DISTORTION

#### Bending / Twisting

A bend or twist exceeding  $10^\circ$  from the plane of the unbent hook.

#### Increased Throat Opening

**HOOK WITHOUT LATCH:** An increase in throat opening exceeding 15%. (Or as recommended by the manufacturer)

**HOOK WITH LATCH:** An increase of the dimension between a fully-opened latch and the tip section of the hook exceeding 8%. (Or as recommended by the manufacturer)

### B. WEAR

If wear exceeds 10% of the original sectional dimension. (Or as recommended by the manufacturer)

### C. CRACKS, NICKS, GOUGES

Repair of cracks, nicks, and gouges shall be carried out by a designated person by grinding longitudinally, following the contour of the hook, provided that no dimension is reduced more than 10% of its original value. (Or as recommended by the manufacturer) (A qualified person may authorize continued use if the reduced area is not critical.)

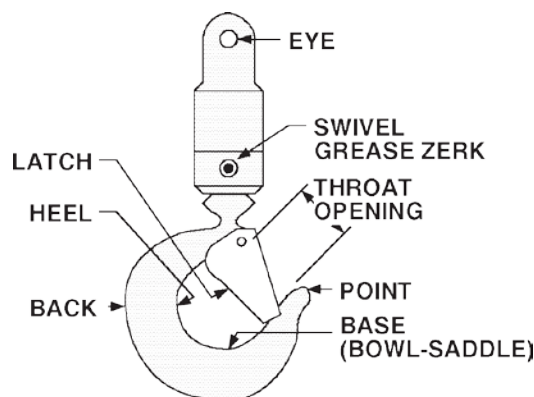
### D. LATCH

#### Engagement, Damage & Malfunction

If a latch becomes inoperative because of wear or deformation, and is required for the service involved, it shall be replaced or repaired before the hook is put back into service. If the latch fails to fully close the throat opening, the hook shall be removed from service or "moused" until repairs are made.

### E. HOOK ATTACHMENTS & SECURING MEANS

If any indication of distortion, wear, cracks, nicks or gouges are present, unless a qualified person authorizes their use. (Or as recommended by the manufacturer)





### **HOLDING VALVE INSPECTION**

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 checked in the following manner:

1. With a full rated load, extend the cylinder in question and kill the engine.
2. Operate the control valve to retract the cylinder. If the cylinder “creeps”, replace the holding valve. If the cylinder does not “creep”, the valve is serviceable.

### **TWO BLOCK PREVENTION DEVICE INSPECTION**

**(See Vol. 1, Operation, Maintenance and Repair for a complete description)**

The two block prevention system halts the “winch-up” and “extension-out” crane functions before the block contacts the sheave. The two block prevention system should be checked daily as follows:

1. Examine flexible rod and weight to insure free unrestricted mechanical operation
2. Examine cord for damage, cuts or breaks. Grasp cord and pull to check operation of cord reel. The cord should retract on reel when released.
3. Start vehicle, engage PT O and slowly winch loadline up until anti-two block weight comes in contact with the hook end of the loadline cable. At the moment the weight is fully supported by the hook end, the winch up function should become non-functioning, because the two-block damage prevention switch will stop further movement.

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

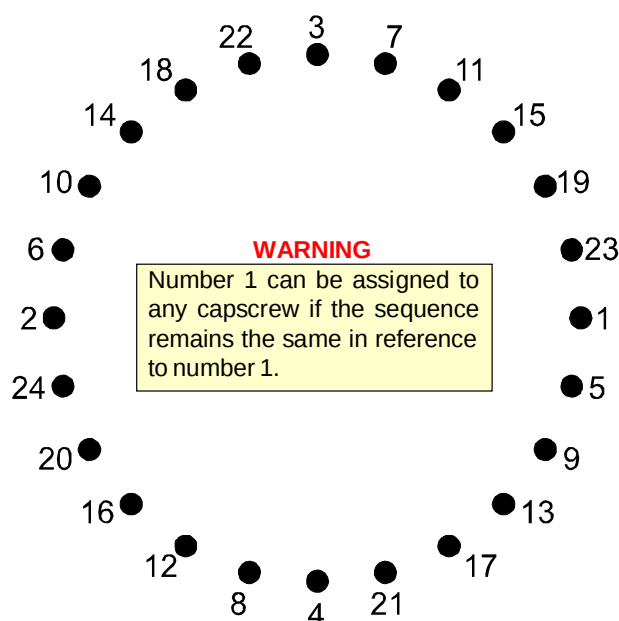
Then, extend the winch cable to relieve the two-block condition, and actuate the boom extend function slowly. Again, once the weight is fully supported by the hook end, the boom extend function should become non-functioning, because the two-block damage prevention switch will stop further movement. If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

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



## Turntable Bearing Thread Tightening Sequence

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



### TIGHTENING PROCEDURE

- 1 Refer to the Torque Data Chart to determine the proper torque value to apply to the size of capscrew used.
- 2 Follow the tightening sequence shown in the diagram. Note that the quantity of capscrews may differ from the diagram, but the sequence must follow the criss-cross pattern as shown in the diagram.
- 3 Torque all capscrews to approximately 40% of the specified torque value, by following the sequence.  
(EXAMPLE: .40 x 265 FT-LB = 106 FT-LB)  
(EXAMPLE-METRIC: .40 x 36 KG-M = 14.4 KG-M)
- 4 Repeat Step 3, but torquing all capscrews to 75% of the specified torque value. Continue to follow the tightening sequence.  
(EXAMPLE: .75 x 265 FT-LB = 199 FT-LB)  
(EXAMPLE-METRIC: .75 x 36 KG-M = 27 KG-M)
- 5 Using the proper sequence, torque all capscrews to the listed torque value as determined from the Torque Data Chart.



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## Turntable Bearing Inspection

Turntable bearings may experience wear. One of the following conditions may indicate turntable bearing wear.

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

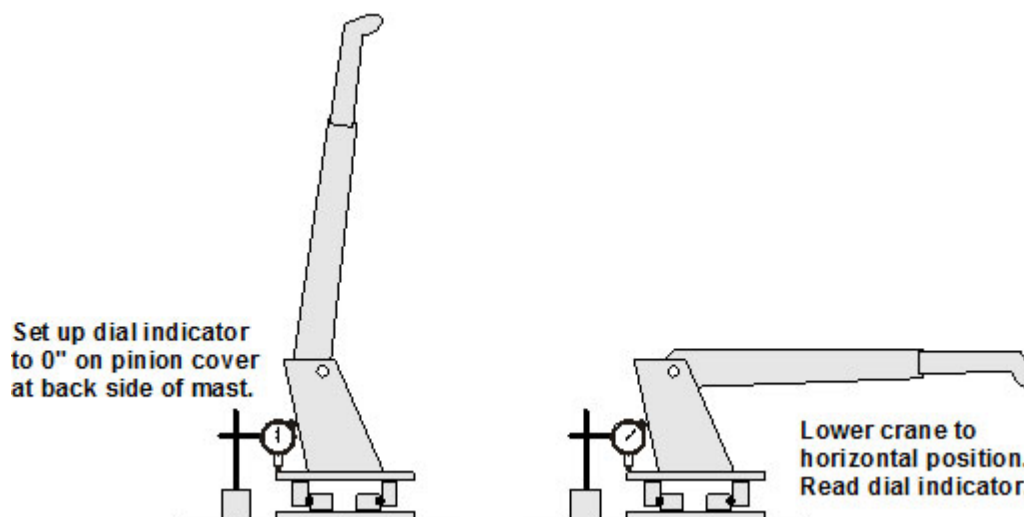
If none of the above conditions exists, the bearing is functioning properly and need not be replaced. But, if one or more of the above conditions exists, inspection may be required. Limits are measured in "TILT" which is dependent on the internal clearances of the bearing. TILT is the most practical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

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### TEST PROCEDURE

1. Place crane in vertical position.
2. Set a dial indicator at 0 on the pinion cover plate at back side of mast.
3. Lower crane to the horizontal position.
4. Check and record the dial indicator change. It should not exceed the tilt measurement noted in the chart below.
5. Return the crane to the vertical position. The dial indicator should return to 0.

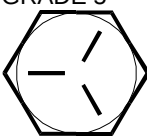
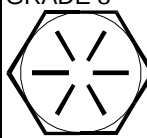


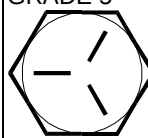


| COMPARISON CHART - MODEL TO MEASURED TILT DIMENSION                                                                                                                                                                                                                                                                      |                                                                    |                                                                                                                                                                                                        |                                                                                                             |                                                |                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div><b>NOTE</b><br/>THE FIGURES LISTED IN THIS CHART ARE SERVICE GUIDELINES AND DO NOT, IN THEMSELVES, REQUIRE THAT THE BEARING BE INSPECTED.</div> <div>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.</div> | <div>IMT<br/>CRANE,<br/>LOADER<br/>OR<br/>TIREHAND<br/>MODEL</div> | 1007<br>1014<br>2015<br>2015GH<br>2109<br>2200<br>3000<br>3016<br>321GH<br>3816<br>425<br>4300<br>5016<br>6016<br>TH7 BODY ROT'N<br>TH1449 BODY ROT'N<br>TH15B CLAMP<br>TH2551B CLAMP<br>TH2557A CLAMP | 5200<br>5200R<br>5217<br>5800<br>7020<br>7025<br>7200<br>7415<br>9000<br>TH10 BODY ROT'N<br>TH14 BODY ROT'N | 16035<br>16042<br>32018<br>32030<br>T30<br>T40 | 9800<br>12916<br>13031<br>13034<br>14000<br>15000<br>18000<br>20017<br>H1200<br>H1200RR<br>T50<br>TH2551B BODY ROT'N<br>TH2557B BODY ROT'N<br>TH2557ABODY ROT'N |
|                                                                                                                                                                                                                                                                                                                          |                                                                    | BALL DIA.<br>(REF)                                                                                                                                                                                     | .875"<br>(22mm)                                                                                             | 1.00"<br>(25mm)                                | 1.18"-1.25"<br>(30-32mm)                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                          | TILT DIM.<br>(A <sub>1</sub> -A <sub>2</sub> )                     | .060"<br>(1.524mm)                                                                                                                                                                                     | .070"<br>(1.778mm)                                                                                          | .075"<br>(1.905mm)                             | .090"<br>(2.286mm)                                                                                                                                              |



## Thread Torque Chart (English)

| FINE THREAD BOLTS (ENGLISH) |           |                                                                                                                     |         |                                                                                                                     |         |
|-----------------------------|-----------|---------------------------------------------------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------|---------|
| SIZE                        | BOLT DIA. | <br>GRADE 5<br>SAE J429<br>GRADE 5 |         | <br>GRADE 8<br>SAE J429<br>GRADE 8 |         |
| (DIA-TPI)                   | (INCHES)  | PLAIN                                                                                                               | PLATED  | PLAIN                                                                                                               | PLATED  |
|                             |           | (FT-LB)                                                                                                             | (FT-LB) | (FT-LB)                                                                                                             | (FT-LB) |
| 5/16-24                     | 0.3125    | 19                                                                                                                  | 14      | 27                                                                                                                  | 20      |
| 3/8-24                      | 0.375     | 35                                                                                                                  | 26      | 49                                                                                                                  | 35      |
| 7/16-20                     | 0.4375    | 55                                                                                                                  | 41      | 78                                                                                                                  | 58      |
| 1/2-20                      | 0.5       | 90                                                                                                                  | 64      | 120                                                                                                                 | 90      |
| 9/16-18                     | 0.5625    | 120                                                                                                                 | 90      | 170                                                                                                                 | 130     |
| 5/8-18                      | 0.625     | 170                                                                                                                 | 130     | 240                                                                                                                 | 180     |
| 3/4-16                      | 0.75      | 300                                                                                                                 | 225     | 420                                                                                                                 | 315     |
| 7/8-11                      | 0.875     | 445                                                                                                                 | 325     | 670                                                                                                                 | 500     |
| 1-12                        | 1         | 645                                                                                                                 | 485     | 995                                                                                                                 | 745     |
| 1 1/8-12                    | 1.125     | 890                                                                                                                 | 670     | 1445                                                                                                                | 1085    |
| 1 1/4-12                    | 1.25      | 1240                                                                                                                | 930     | 2010                                                                                                                | 1510    |
| 1 3/8-12                    | 1.375     | 1675                                                                                                                | 1255    | 2710                                                                                                                | 2035    |
| 1 1/2-12                    | 1.5       | 2195                                                                                                                | 1645    | 3560                                                                                                                | 2670    |

| COARSE THREAD BOLTS (ENGLISH) |           |                                                                                                                       |         |                                                                                                                       |         |
|-------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------|---------|
| SIZE                          | BOLT DIA. | <br>GRADE 5<br>SAE J429<br>GRADE 5 |         | <br>GRADE 8<br>SAE J429<br>GRADE 8 |         |
| (DIA-TPI)                     | (INCHES)  | PLAIN                                                                                                                 | PLATED  | PLAIN                                                                                                                 | PLATED  |
|                               |           | (FT-LB)                                                                                                               | (FT-LB) | (FT-LB)                                                                                                               | (FT-LB) |
| 5/16-18                       | 0.3125    | 17                                                                                                                    | 13      | 25                                                                                                                    | 18      |
| 3/8-16                        | 0.375     | 31                                                                                                                    | 23      | 44                                                                                                                    | 33      |
| 7/16-14                       | 0.4375    | 49                                                                                                                    | 37      | 70                                                                                                                    | 52      |
| 1/2-13                        | 0.5       | 75                                                                                                                    | 57      | 105                                                                                                                   | 80      |
| 9/16-12                       | 0.5625    | 110                                                                                                                   | 82      | 155                                                                                                                   | 115     |
| 5/8-11                        | 0.625     | 150                                                                                                                   | 115     | 220                                                                                                                   | 160     |
| 3/4-10                        | 0.75      | 265                                                                                                                   | 200     | 375                                                                                                                   | 280     |
| 7/8-9                         | 0.875     | 395                                                                                                                   | 295     | 605                                                                                                                   | 455     |
| 1-8                           | 1         | 590                                                                                                                   | 445     | 910                                                                                                                   | 680     |
| 1 1/8-7                       | 1.125     | 795                                                                                                                   | 595     | 1290                                                                                                                  | 965     |
| 1 1/4-7                       | 1.25      | 1120                                                                                                                  | 840     | 1815                                                                                                                  | 1360    |
| 1 3/8-6                       | 1.375     | 1470                                                                                                                  | 1100    | 2380                                                                                                                  | 1780    |
| 1 1/2-6                       | 1.5       | 1950                                                                                                                  | 1460    | 3160                                                                                                                  | 2370    |

### NOTES

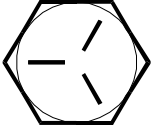
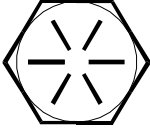
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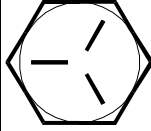
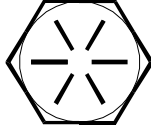
### WARNING

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 torqueing. Failure to replace gear-bearing bolts may result in bolt failure due to metal fatigue causing death or serious injury.



## Thread Torque Chart (Metric)

| FINE THREAD TORQUE CHART (METRIC) |                          |                                                                                                          |                  |                                                                                                          |                  |
|-----------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------|------------------|
| TIGHTENING TORQUE                 |                          |                                                                                                          |                  |                                                                                                          |                  |
| SIZE<br>(DIA-<br>TPI)             | BOLT<br>DIA.<br>(INCHES) | <br>SAE J429<br>GRADE 5 |                  | <br>SAE J429<br>GRADE 8 |                  |
|                                   |                          | PLAIN<br>(KG-M)                                                                                          | PLATED<br>(KG-M) | PLAIN<br>(KG-M)                                                                                          | PLATED<br>(KG-M) |
| 5/16-24                           | 0.3125                   | 3                                                                                                        | 2                | 4                                                                                                        | 3                |
| 3/8-24                            | 0.375                    | 5                                                                                                        | 4                | 7                                                                                                        | 5                |
| 7/16-20                           | 0.4375                   | 8                                                                                                        | 6                | 11                                                                                                       | 8                |
| 1/2-20                            | 0.5                      | 12                                                                                                       | 9                | 17                                                                                                       | 12               |
| 9/16-18                           | 0.5625                   | 17                                                                                                       | 12               | 24                                                                                                       | 18               |
| 5/8-18                            | 0.625                    | 24                                                                                                       | 18               | 33                                                                                                       | 25               |
| 3/4-16                            | 0.75                     | 41                                                                                                       | 31               | 58                                                                                                       | 44               |
| 7/8-11                            | 0.875                    | 62                                                                                                       | 45               | 93                                                                                                       | 69               |
| 1-12                              | 1                        | 89                                                                                                       | 67               | 138                                                                                                      | 103              |
| 1 1/8-12                          | 1.125                    | 123                                                                                                      | 93               | 200                                                                                                      | 150              |
| 1 1/4-12                          | 1.25                     | 171                                                                                                      | 129              | 278                                                                                                      | 209              |
| 1 3/8-12                          | 1.375                    | 232                                                                                                      | 174              | 375                                                                                                      | 281              |
| 1 1/2-12                          | 1.5                      | 304                                                                                                      | 228              | 492                                                                                                      | 369              |

| COARSE THREAD TORQUE CHART (METRIC) |                      |                                                                                                            |                  |                                                                                                            |                  |
|-------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------|------------------|
| TIGHTENING TORQUE                   |                      |                                                                                                            |                  |                                                                                                            |                  |
| SIZE<br>(DIA-<br>TPI)               | BOLT DIA<br>(INCHES) | <br>SAE J429<br>GRADE 5 |                  | <br>SAE J429<br>GRADE 8 |                  |
|                                     |                      | PLAIN<br>(KG-M)                                                                                            | PLATED<br>(KG-M) | PLAIN<br>(KG-M)                                                                                            | PLATED<br>(KG-M) |
| 5/16-18                             | 0.3125               | 2                                                                                                          | 2                | 3                                                                                                          | 2                |
| 3/8-16                              | 0.375                | 4                                                                                                          | 3                | 6                                                                                                          | 5                |
| 7/16-14                             | 0.4375               | 7                                                                                                          | 5                | 10                                                                                                         | 7                |
| 1/2-13                              | 0.5                  | 10                                                                                                         | 8                | 15                                                                                                         | 11               |
| 9/16-12                             | 0.5625               | 15                                                                                                         | 11               | 21                                                                                                         | 16               |
| 5/8-11                              | 0.625                | 21                                                                                                         | 16               | 30                                                                                                         | 22               |
| 3/4-10                              | 0.75                 | 37                                                                                                         | 28               | 52                                                                                                         | 39               |
| 7/8-9                               | 0.875                | 55                                                                                                         | 41               | 84                                                                                                         | 63               |
| 1-8                                 | 1                    | 82                                                                                                         | 62               | 126                                                                                                        | 94               |
| 1 1/8-7                             | 1.125                | 110                                                                                                        | 82               | 178                                                                                                        | 133              |
| 1 1/4-7                             | 1.25                 | 155                                                                                                        | 116              | 251                                                                                                        | 188              |
| 1 3/8-6                             | 1.375                | 203                                                                                                        | 152              | 329                                                                                                        | 246              |
| 1 1/2-6                             | 1.5                  | 270                                                                                                        | 210              | 438                                                                                                        | 328              |

### NOTES

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