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# *Model 6020 Crane*

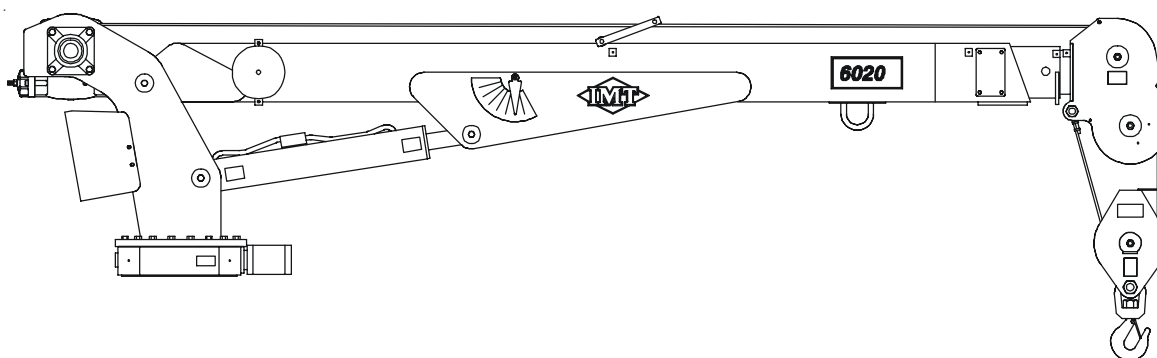
## **Volume 2 - PARTS AND SPECIFICATIONS**

**Section 1 CRANE SPECIFICATIONS**

**Section 2 CRANE REFERENCE**

**Section 3 REPLACEMENT PARTS**

**Section 4 GENERAL REFERENCE**



**IOWA MOLD TOOLING CO., INC.**

BOX 189, GARNER, IA 50438-0189

TEL: 641-923-3711

MANUAL PART NUMBER 99901220

Iowa Mold Tooling Co., Inc. is an Oshkosh Truck Corporation company.



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**REVISIONS LIST**

| DATE     | LOCATION           | DESCRIPTION OF CHANGE                                            |
|----------|--------------------|------------------------------------------------------------------|
| 20000811 | 3-52               | ECN 9000:70733394-ADD APPLICATION NOTE                           |
| 20000922 | 3-17               | ECN 8504-51713182-ADD PIN O SOL PWR / DEL NOTE FOR AUTO TRANS    |
| 20001206 | 3-34               | ECN9000-51705983-ADD 7Q072114 O-RINGS                            |
|          | 3-35               | ECN9000-51705984-ADD 7Q072114 O-RINGS                            |
| 20010115 | 3-18               | ECN8648-93715067-REVISE MTG HRDWR & ADD SPACER                   |
| 20010206 | 2-05               | CORRECT SPARE PARTS LIST                                         |
| 20010403 | 2-06               | UPDATED INSTALLATION KIT DRAWING                                 |
| 20010720 | 3-43, 51           | ECN # 8723 - #5 73540044 WAS 73054936                            |
| 20010726 | 3-44,45, 38, 39    | ECN # 8733 - REVISED DRAWINGS                                    |
| 20011126 | 3-24-28, 30,32     | ECN 8709 - CAST IRON HEAD & PISTON ON OUTRIGGER DN CYLINDER      |
| 20011126 | 4-1,14             | ECN 8780 - WARRANTY                                              |
| 20011217 | 3-53               | RMV BATTERY HOUSING FROM 70733354-1                              |
|          | 3-55               | ECN 8827 - NEW CHASSIS WIRING HARNESS INSTALLATION               |
| 20020204 | 3-29               | ECN 8726 - ITEM 8 NOW HEX                                        |
| 20020311 | 2-6, 3-18          | ECN 8860 - CHANGES TO INSTALLATION KIT                           |
| 20020514 | 3-5                | CORRECTED ITEM 3, SEAL, PART NUMBER. WAS 76395168. NOW 70395076. |
|          | 3-56,57            | ADDED 99900855 AND 09713879 TO SPARE PARTS MANUAL.               |
| 20020711 | 3-21               | ADDED WELDMENT SPARE PARTS TO 18-GAL RESERVOIR ASM (51707798)    |
| 20020906 | 3-24, 35           | ECN 8993 - NEW VALVEBANK 51714812                                |
|          | 3-32               | CHANGE TO 3B205010 ITEM 13 - NOW 7T2N4035                        |
| 20021024 | 3-53               | ECN 9036 - CHANGED CHARGER ON 73733354                           |
| 20021118 | 3-36               | ECN 8733 - CHANGED RAD RMT BACKUP                                |
| 20030916 | 3-38               | 51716912 BACKUP HANDSET - ADDED NOTE TO UNPLUG RADIO REMOTE      |
|          | 3-44               | 73733383 - VALVEBANK - ADDED PLASTIC NUT PART NO.                |
|          | 3-45-47, 54,55, 60 | ECN 9211 - UPDATES TO CABLE ASM, 99900855 ELEC. SCHEM.           |
| 20031020 | 3-26, 35           | ECN 9265 - CHANGE TO O/R 31712740, NEW VB 51714813               |
| 20040323 | 3-44,51            | ECN 9397 - HYDRAULIC KIT CHANGES, 91715652-3 AND 91715633-3      |
| 20040827 | 3-37,44-50         | ECN 9524 - NEW RADIO REMOTE, UPDATES TO HYD AND CONTROL KITS.    |
| 20040920 | 3-30               | ECN 9569 - 31718953 REPLACED 31712733                            |
| 20050712 | 3-6                | ECN 9774 - REMOVED THREAD LOCK FROM #3 ON 41715305               |
|          | 3-22               | ECN 9776 - REMOVED HOOK HOLDER FROM 51706910 RESERVOIR           |
| 20051020 | 3-37               | ECN 9931 - ADDED 2-SPEED WINCH SWITCH TO 90718833                |
| 20060112 | 3-4                | ECN 9942 - CHANGE MOOR FROM 73051919 TO 73511070                 |



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## 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.

It is the user's responsibility to maintain and operate this unit in a manner that will result in the safest working conditions possible.

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

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

ANSI/ASME B30.5  
MOBILE and LOCOMOTIVE CRANES  
The American Society of Mechanical Engineers  
United Engineering Center  
345 East 47th Street  
New York, NY 10017

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

### NOTE

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

### CAUTION

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

### WARNING

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

Treat this equipment with respect and service it regularly. These two things can add up to a safer working environment.

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



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## NOTES

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# SECTION 1. MODEL 6020 CRANE SPECIFICATIONS

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**NOTES**

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## MODEL 6020 CRANE SPECIFICATIONS

### GENERAL SPECIFICATIONS

|                                                                                  |                                           |
|----------------------------------------------------------------------------------|-------------------------------------------|
| <b>CRANE RATING</b>                                                              | 60,000 ft-lbs (8.4 ton-meters)            |
| <b>REACH</b> - from centerline of rotation                                       | 20'-0" (6.10m)                            |
| <b>HYDRAULIC EXTENSION</b>                                                       | 60" (152.4cm)                             |
| <b>MANUAL EXTENSION</b>                                                          | 48" (121.9cm)                             |
| <b>LIFTING HEIGHT</b> - from base of crane                                       | 22'-1" (6.73m)                            |
| <b>WEIGHT OF CRANE</b>                                                           | 1825 lbs (828 kg)                         |
| <b>OUTRIGGER SPAN</b> (required option)<br>crane side from centerline of chassis | 90" (228.6cm)                             |
| opposite crane side from centerline of chassis                                   | 48" (121.9cm)                             |
| <b>STORAGE HEIGHT</b> - crane only                                               | 37" (94cm)                                |
| <b>MOUNTING SPACE REQUIRED</b> (crane base)                                      | 20" x 21" (50.8cm x 53.3cm)               |
| <b>TIE-DOWN BOLT PATTERN</b>                                                     | See Mounting Hole Pattern Drawing         |
| <b>HORIZONTAL CENTER OF GRAVITY</b> -<br>from centerline of rotation             | 34.5" (87.6cm)                            |
| <b>VERTICAL CENTER OF GRAVITY</b> -<br>from bottom of crane base                 | 21.5" (54.6cm)                            |
| <b>OPTIMUM PUMP CAPACITY</b>                                                     | 10 U.S. Gallons/minute (38 liters/minute) |
| <b>SYSTEM PRESSURE</b>                                                           | 3000 PSI (207 bar)                        |
| <b>ROTATIONAL TORQUE</b>                                                         | 9000 ft-lbs (1245 kg-m)                   |



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### PERFORMANCE CHARACTERISTICS

|                       |                                         |            |
|-----------------------|-----------------------------------------|------------|
| ROTATION:             | 400° (6.98 Rad.)                        | 33 seconds |
| LOWER BOOM ELEVATION: | -10° to +80° (-0.17 Rad. to +1.40 Rad.) | 11 seconds |
| EXTENSION CYLINDER:   | 60" (152.4cm)                           | 8 seconds  |

### POWER SOURCE

Integral-mounted hydraulic pump and PTO application. Other standard power sources may be used - minimum power required is 23.5 horsepower based on 10 GPM at 3000 PSI (38 liters/min. at 207 bar).

### ROTATION SYSTEM

Turntable bearing powered by a high-torque hydraulic motor through a self-locking worm. Total gear reduction is 85 to 1.

### CYLINDER HOLDING VALVES

The base end of the extension cylinder is equipped with a pilot operated locking holding valve to prevent sudden cylinder collapse in the event of a hose breakage or other hydraulic component failure.

The extend side of the lower boom cylinder is equipped with a counter balance valve. The counter balance valve serves several functions. First, it is a holding valve. Secondly, it is designed to control the speed at which the lowering function operates, and allows that motion to be metered under load. Finally, it prevents the loss of an excess amount of oil in the event of a hose failure. Only the oil in the hose, at the time of the failure, will be lost.

### EXCESSIVE LOAD LIMIT SYSTEM (ELLS)

Overloading of the crane is limited by the ELLS. This is done by disarming the crane functions which make possible the application of greater than allowable stress to the crane structure and components. Functions controlled by the ELLS are winch up, extension out and lower boom down. To relieve the situation, the operator may set the load down (winch down) or retract the extension boom (extension in).

### WINCH

The winch is powered by means of a hydraulic motor driving a 27:1 worm gear arrangement with a mechanical brake. Maximum single line lifting capacity of the winch, achieved on the second layer of wire rope, is 5500 lbs. (2495 kg.). Maximum two-part line winch capacity is 10,400 lbs. (4717 kgs). The winch is equipped with 100 ft. (30.5 m) 7/16 in. (1.1 cm) 6 x 25 FW PRF RRL IWRC XIPS wire rope. Nylon sheaves are located at the tip of the extension boom. The ratio of winch drum and sheave pitch diameter to wire rope diameter is 18.7:1 for the winch drum and 18:1 for the load block and boom tip sheave. An anti-two block device is included to prevent the lower block or hook assembly from coming in contact with the boom sheave assembly.

### SINGLE LINE SPEED

1st Layer - 25 ft/min  
2nd Layer - 27 ft/min  
3rd Layer - 30 ft/min

### HYDRAULIC SYSTEM

The hydraulic system is an open center, full pressure system requiring maximum flow of 10 GPM (38 liters/min.) at 3000 psi (207 bar). It is equipped with a four section, electric remote, stack type control valve with a 30 ft. (9.14 m) control cable. The system includes a separate hydraulic oil reservoir, suction line filter, return line filter and control valve.





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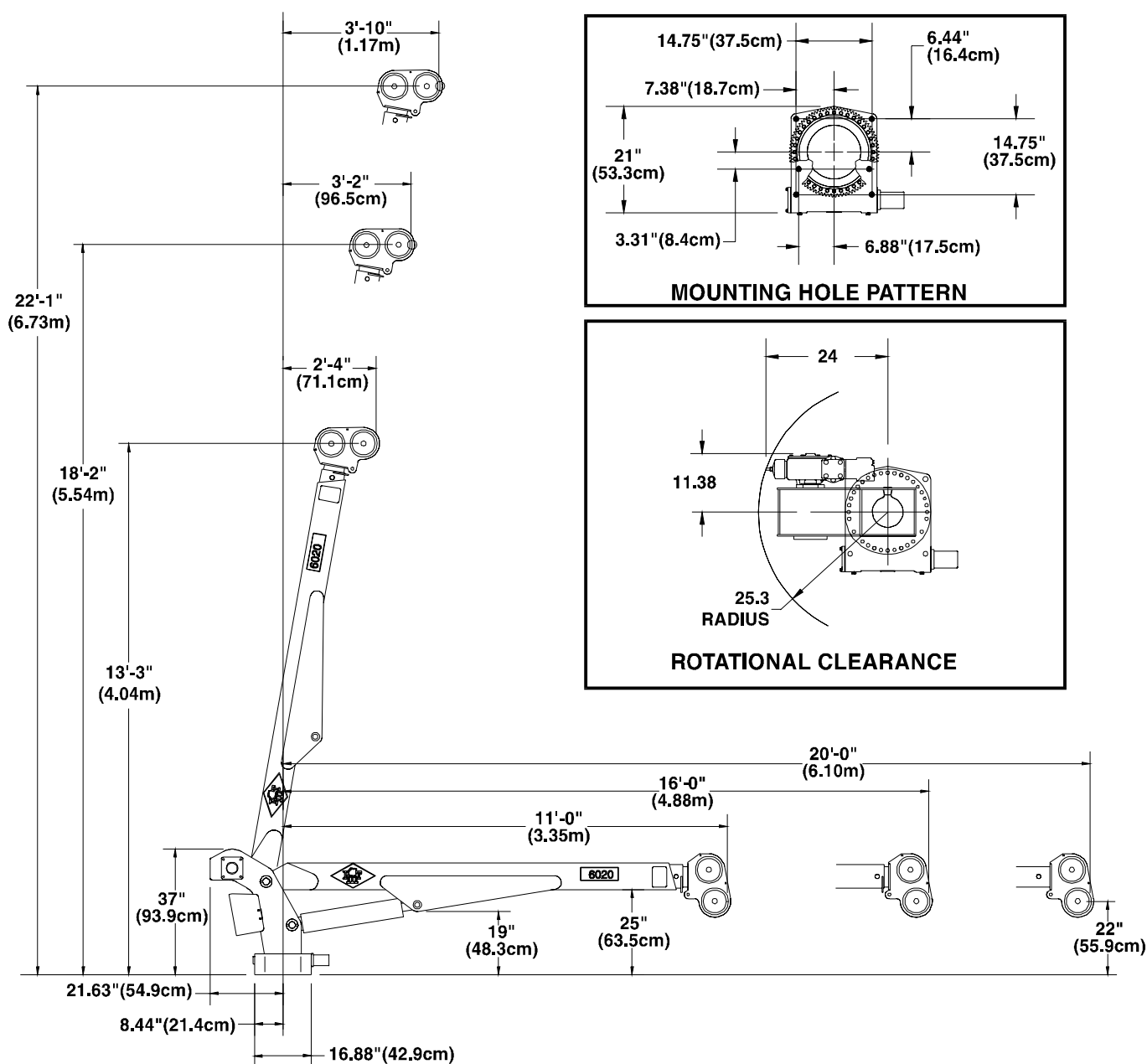
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## MINIMUM CHASSIS SPECIFICATIONS

|                       |                  |                  |
|-----------------------|------------------|------------------|
| BODY STYLE            | Conventional Cab | Conventional Cab |
| WHEEL BASE            | 154"             | 391cm            |
| CAB TO AXLE           | 84"              | 213cm            |
| FRAME SECTION MODULUS | 12 cubic inches  | 196.7cc          |
| RBM                   | 600,000 in-lbs   | 6913 kg-meter    |
| FRONT AXLE RATING     | 7000 lbs         | 3175 kg          |
| REAR AXLE RATING      | 17500 lbs        | 7938 kg          |
| GROSS VEHICLE RATING  | 24500 lbs        | 11113 kg         |
| TRANSMISSION          | 5 speed          | 5 speed          |

In addition to these specifications, heavy duty electrical and cooling systems are required. It is recommended that the vehicle be equipped with an engine tachometer, auxiliary brake lock, and power steering.

**IMT reserves the right to change specifications or design without notice.**



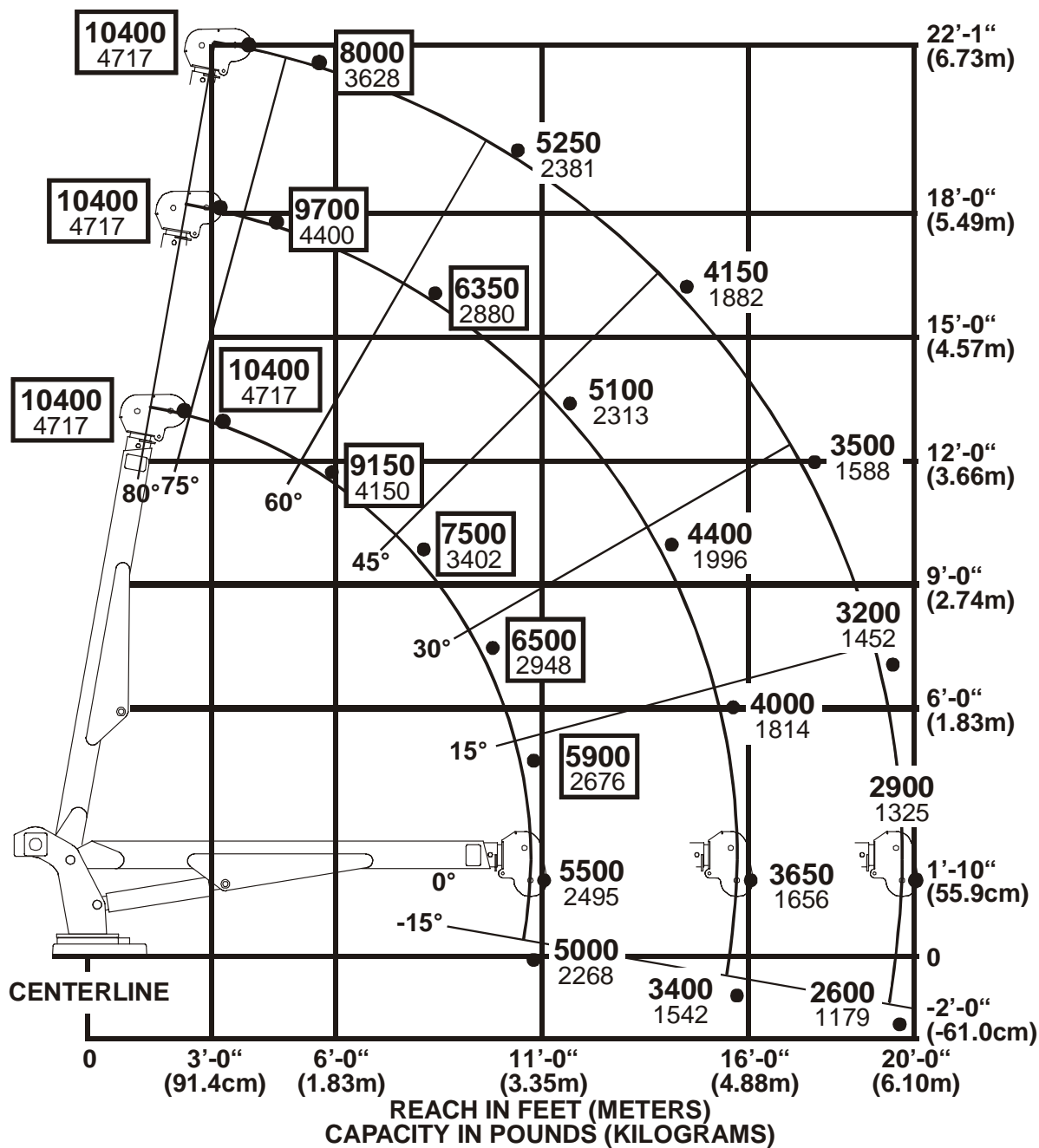
## GEOMETRIC CONFIGURATION



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# 6020 CAPACITY CHART



Maximum 1-part line capacity is 5500 lbs (2495 kgs).  
For greater loads, use 2-part line.

Weight of load handling devices are part of the load lifted and must be deducted from the capacity.



**IOWA MOLD TOOLING CO., INC.**

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70395099



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## SECTION 2. MODEL 6020 CRANE REFERENCE

|                                                         |    |
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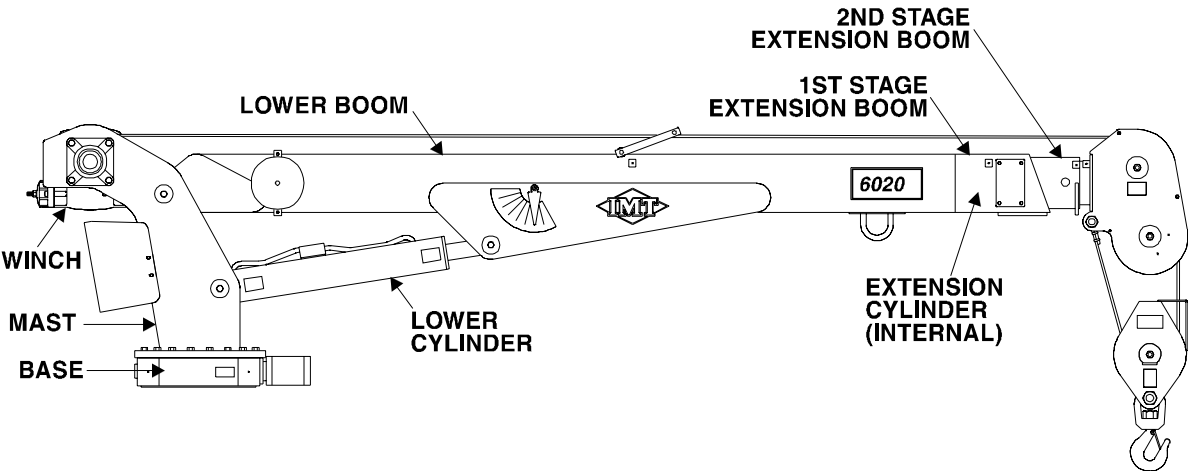
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**NOTES**

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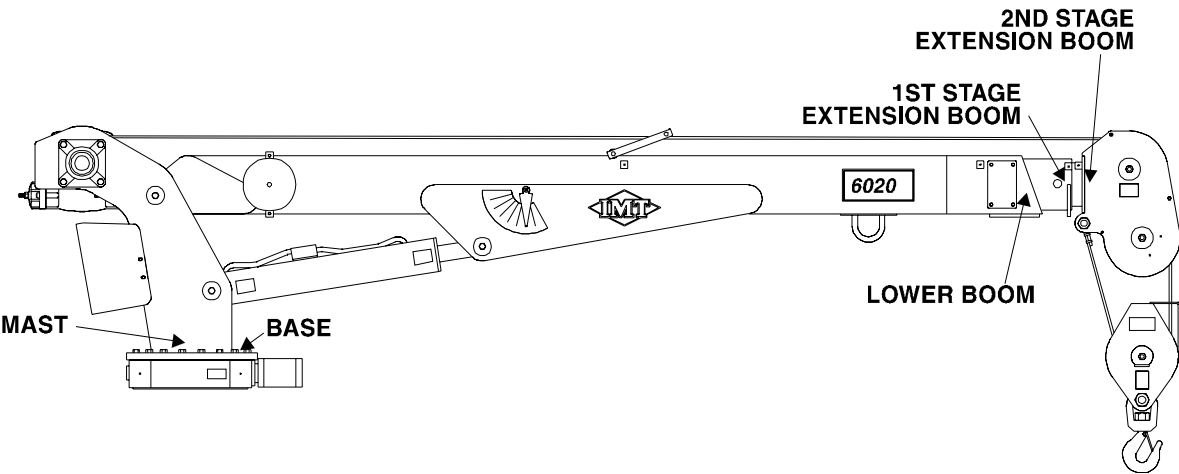


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**MAJOR CRANE ASSEMBLIES**



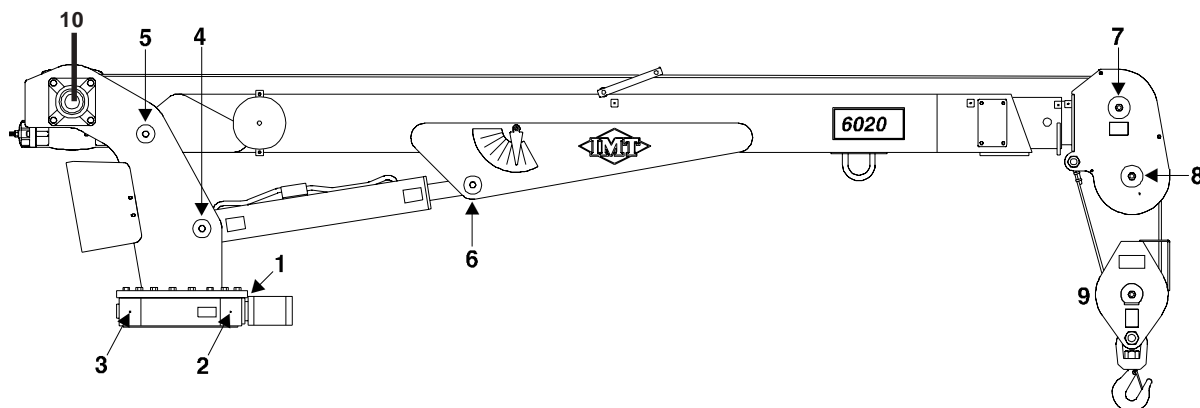
**WELDMENT PART NUMBER LOCATIONS**



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## GREASE ZERK LOCATIONS & LUBRICANT REQUIREMENTS



| ITEM                                          | LOCATION DESCRIPTION                                                                                                                                                                                                      | LUBRICANT                                            | FREQUENCY      |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------|
| 1.<br>4.<br>5.<br>6.<br>7.<br>8.<br>9.<br>10. | TURNTABLE/BEARING GREASE EXTENSION<br>*ROTATE CRANE WHILE GREASING<br>LOWER CYLINDER BASE<br>MAST/LOWER BOOM HINGE PIN<br>LOWER CYLINDER ROD<br>UPPER SHEAVE PIN<br>LOWER SHEAVE PIN<br>SNATCH BLOCK PIN<br>WINCH BEARING | SHELL ALVANIA 2EP<br><br>OR<br><br>SHELL RETINAX "A" | WEEKLY         |
| 2.<br>3.                                      | WORM GEAR (FWD)*<br>WORM GEAR (REAR)*<br>* Apply 3 "pumps" the rotate crane fully                                                                                                                                         | EXTREME PRESSURE<br>EP2 GREASE                       | EVERY 3 MONTHS |

NOTE: All application points except 2 & 3 must be greased weekly under normal work loads 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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**RECOMMENDED SPARE PARTS LIST****1 YEAR SUPPLY****MODEL 6020 TELESCOPING CRANE****FOR MANUAL: 99901220**

This spare parts list does not necessarily indicate that the items can be expected to fail in the course of a year. It 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. 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 and you need to contact the distributor or manufacturer for availability.

| ASSEMBLY<br>DESIGNATION | ITEM NO.                                | PART NO. | DESCRIPTION               | QTY | CODE | SHELF<br>LIFE<br>(MO) | ORDER<br>QTY |
|-------------------------|-----------------------------------------|----------|---------------------------|-----|------|-----------------------|--------------|
| 41715069.01.19990104    | <b>BASE ASM</b>                         |          |                           |     |      |                       |              |
|                         | 2                                       | 73051919 | HYD MOTOR                 | 1   | C    |                       |              |
| 71056551.01.19990104    | <b>GEAR ROTATOR</b>                     |          |                           |     |      |                       |              |
|                         | 2                                       | 70395074 | O-RING                    | 1   | W    |                       |              |
|                         | 3                                       | 76395168 | SEAL                      | 2   | W    |                       |              |
|                         | 4                                       | 70145846 | SNAP RING                 | 1   | W    |                       |              |
|                         | 5                                       | 70055271 | BRG-CONE                  | 2   | W    |                       |              |
|                         | 6                                       | 70055281 | BRG-CUP                   | 2   | W    |                       |              |
|                         | 7                                       | 70145501 | BRG RETAINER              | 1   | W    |                       |              |
|                         | 8                                       | 70056550 | WORM                      | 1   | C    |                       |              |
|                         | 15                                      | 73145506 | SHIM .005                 | 2   | W    |                       |              |
|                         | 16                                      | 73145505 | SHIM .015                 | 2   | W    |                       |              |
|                         | 17                                      | 73145504 | SHIM .030                 | 2   | W    |                       |              |
|                         | 18                                      | 76039295 | GASKET                    | 1   | W    |                       |              |
| 41712180.01.19990104    | <b>LOWER BOOM ASM</b>                   |          |                           |     |      |                       |              |
|                         | 5                                       | 7BF81520 | BUSHING                   | 4   | W    |                       |              |
|                         | 6                                       | 60030015 | WEAR PAD                  | 2   | W    |                       |              |
|                         | 7                                       | 60030139 | WEAR PAD                  | 1   | W    |                       |              |
| 3C126990.01.19991216    | <b>LOWER BOOM CYLINDER</b>              |          |                           |     |      |                       |              |
|                         | 3                                       | 7BF81520 | BUSHING                   | 6   | W    |                       |              |
|                         | 6                                       | 6I503181 | PISTON                    | 1   | W    |                       |              |
|                         | 7                                       | 6H050025 | HEAD                      | 1   | W    |                       |              |
|                         | 8                                       | 9B043920 | SEAL KIT                  | 1   | W    |                       |              |
|                         | 21                                      | 73540035 | C'BAL VALVE               | 1   | W    |                       |              |
| 41707663.01.19990104    | <b>EXTENSION BOOM ASM</b>               |          |                           |     |      |                       |              |
|                         | 5                                       | 60030189 | WEAR PAD                  | 1   | W    |                       |              |
| 3B309820.01.19990104    | <b>EXTENSION BOOM CYLINDER</b>          |          |                           |     |      |                       |              |
|                         | 4                                       | 6H025015 | HEAD                      | 1   | W    |                       |              |
|                         | 5                                       | 6IX02512 | PISTON                    | 1   | W    |                       |              |
|                         | 9                                       | 73054900 | HOLDING VALVE             | 1   | C    |                       |              |
|                         | 10                                      | 9B101220 | SEAL KIT                  | 1   | W    |                       |              |
| 41709440.01.19990104    | <b>EXTENSION BOOM W/FLIP SHEAVE</b>     |          |                           |     |      |                       |              |
|                         | 5                                       | 60030189 | WEAR PAD                  | 1   | W    |                       |              |
| 73054900.01.19990104    | <b>LOCKING HOLDING VALVE</b>            |          |                           |     |      |                       |              |
|                         | 2                                       | 73054999 | C'BALANCE VALVE           | 1   | C    |                       |              |
|                         | 3                                       | 7Q072112 | O-RING                    | 3   | W    |                       |              |
| 41712179.01.19990104    | <b>WINCH/CABLE/HOOK KIT</b>             |          |                           |     |      |                       |              |
|                         | 6                                       | 60030255 | SHEAVE                    | 3   | W    |                       |              |
|                         | 12                                      | 70055117 | FLANGE BEARING            | 1   | W    |                       |              |
|                         | 16                                      | 70732882 | HOOK                      | 1   | C    |                       |              |
|                         | 42                                      | 51713168 | CORD REEL                 | 1   | W    |                       |              |
| 31712207.01.19990104    | <b>WINCH/CABLE/HOOK KIT-FLIP SHEAVE</b> |          |                           |     |      |                       |              |
|                         | 6                                       | 60030255 | SHEAVE                    | 3   | W    |                       |              |
|                         | 12                                      | 70055117 | FLANGE BEARING            | 1   | W    |                       |              |
|                         | 16                                      | 70732882 | HOOK                      | 1   | C    |                       |              |
|                         | 42                                      | 51713168 | CORD REEL                 | 1   | W    |                       |              |
| 70570198.01.19990104    | <b>WINCH</b>                            |          |                           |     |      |                       |              |
|                         | 11                                      | 76393419 | OIL SEAL                  | 1   | W    |                       |              |
|                         | 12                                      | 70143948 | BUSHING                   | 1   | W    |                       |              |
|                         | 13                                      | 70143949 | BUSHING                   | 1   | W    |                       |              |
|                         | 17                                      | 76393420 | O-RING                    | 1   | W    |                       |              |
|                         | 23                                      | 76394300 | GASKET                    | 1   | W    |                       |              |
|                         | 25                                      | 76393171 | GASKET                    | 1   | W    |                       |              |
| 51713182.01.19990104    | <b>PROPORTIONAL REMOTE HANDLE ASM</b>   |          |                           |     |      |                       |              |
|                         | 16                                      | 77040371 | TOGGLE SWITCH SPST        | 2   | W    |                       |              |
|                         | 17                                      | 77040372 | TOGGLE SWITCH SPDT        | 4   | W    |                       |              |
|                         | 18                                      | 77040373 | TOGGLE SWITCH SPST        | 2   | W    |                       |              |
|                         | 19                                      | 77040374 | TOGGLE SWITCH SPDT        | 1   | W    |                       |              |
|                         | REF                                     | 73052006 | ELEMENT-RET. FILTER 10MIC | 6   | P    |                       |              |



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## INSTALLATION

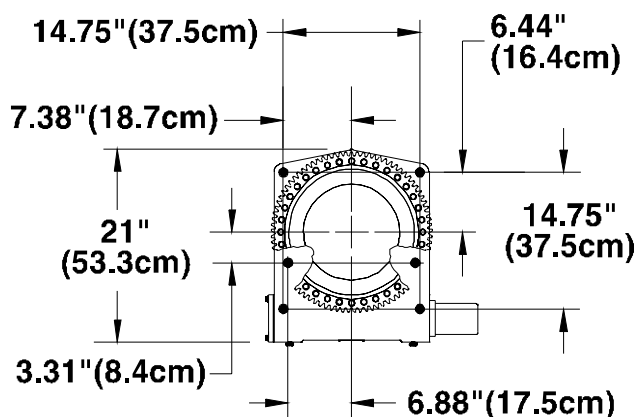
### GENERAL

This section contains instructions for the installation of your crane. Prior to installing the crane and hydraulic components, make sure that the chassis is ready to receive the crane (refer to Section 5, Volume 1). Reinforce the chassis frame, as necessary, and install the PTO and pump.

Each installation may vary in components used. It is important to use hoses of proper length, pumps of correct size, and PTO's of adequate speed. Study the applicable installation kit in the parts section before attempting any installation.

### CRANE INSTALLATION

In addition to meeting Minimum Chassis Specifications in Section 1, there must be sufficient room for mounting the crane and the platform must be strong enough to support the crane and rated load. Install the crane only on an IMT designed and approved truck body. The body must be designed to sustain the forces imposed by the crane when lifting the full rated load. In addition, an IMT designed body is designed to take full advantage of the standard reservoir placement. This reservoir is installed in the cargo area of the body. Before attempting to install the crane, the body must be installed. To install the crane:



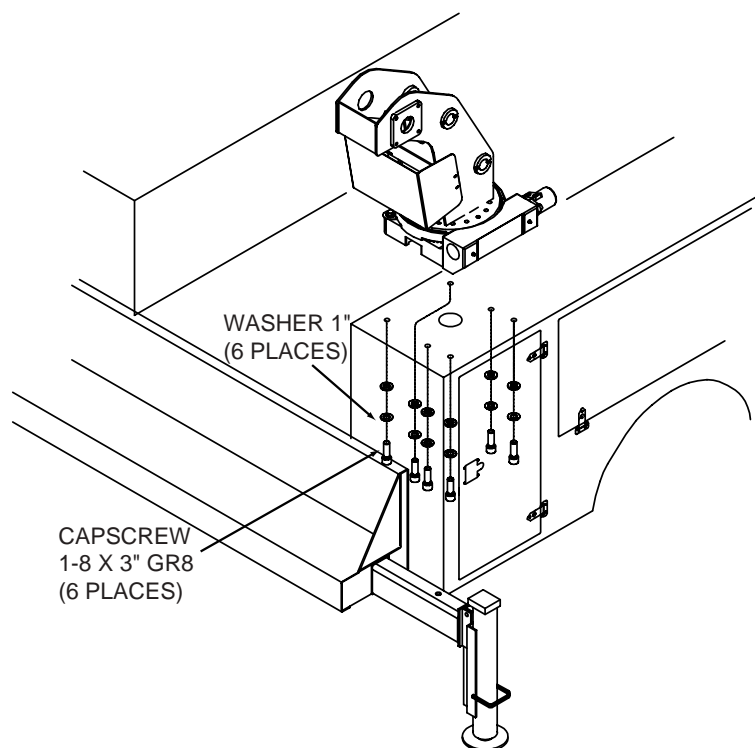
MOUNTING HOLE PATTERN

1. Use a lifting device capable of lifting the weight of the crane. See Specifications Section for crane weight. Attach fabric slings to the crane lower boom, centered approximately 18 inches from the mast hinge. Make certain the crane is well balanced on the slings by slowly lifting approximately 6" off the ground. Lift the crane, apply a bead of waterproof compound, such as silicon based caulk, to the bottom of the base. Move the chassis under the crane and lower the crane into the desired position.

2. Install the 1-8x3" mounting cap screws (use Permanent Thread Lock) and 1" washers to secure the crane base to the truck body (see Figure below). Torque the cap screws to 680 ft-lbs (94 kg-m).

#### CAUTION

The 3" bolts supplied for use on bodies with a crane box top plate thickness of 7/8-1" only. Determine the crane box top plate thickness prior to mounting. If different length bolts are required, they must be 1-8, grade 8, zinc coated of the proper length. Failure to use proper length bolts may cause the bolts under the worm housing to bottom out before torquing. Insure a minimum of 1-1/2" thread engagement.



### CRANE INSTALLATION





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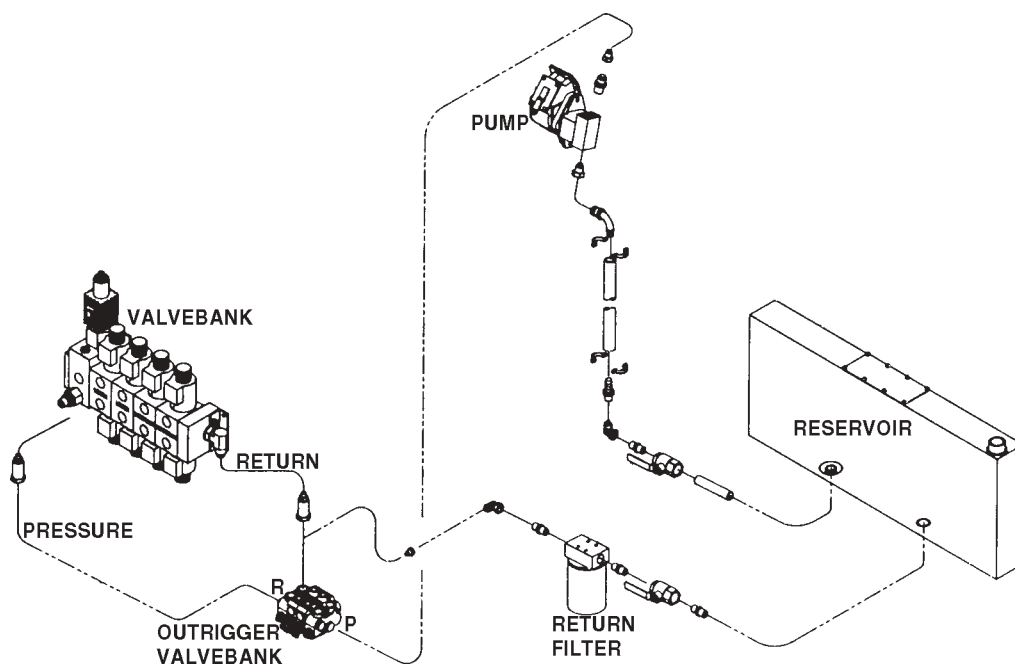
## HYDRAULIC INSTALLATION

Before installation, familiarize yourself with the installation kit drawing in the parts section for specific hydraulic components used. The figure below is used to show major components and general hose routings only.

1. Plumb the hydraulic components as shown in the applicable installation kit in the parts section. Make certain all fittings are securely tightened and that hoses are free of possible chafing or contact with hot or sharp edges which could cause damage.

2-7

2. Refer to Volume 1 for hydraulic oil specifications. Fill the hydraulic reservoir.
3. Check all connections for leaks.
4. Start the vehicle engine and test each crane function individually. Conduct a visual inspection to make certain that there are no leaks and that everything is operating properly.
5. Check oil level in the reservoir and add oil if necessary.



HYDRAULIC INSTALLATION



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2-8

## CONTROL VALVE TROUBLESHOOTING

### GENERAL

This section describes the operating characteristics of the main control valvebank used on this model of crane. It also provides troubleshooting information which applies to this valvebank. See figure on following page for reference.

### ELECTRICAL-AMP DRIVER

#### POWER LED

The Power LED illuminates red while power is being applied to the valve amplifier. If the LED is not illuminated, no power is being applied to the valve amplifier.

If the Power LED does not function as described, inspect input wiring and repair or replace as necessary. When input power is applied, the LED should illuminate.

#### PMW% LED

The PMW% LED indicates the condition of the output current flowing to the proportional valve. The LED will change colors from, red to yellow to green. The change of colors indicates the variance of current flowing to the proportional valve. Red indicates minimum current and green indicates maximum current. This represents the flow condition going from low flow (red) to maximum flow (green), thus varying the speed of crane functions.

If the LED stays red, as the speed control trigger is activated, a dead short is present in the circuit. This could be the result of a wiring problem, shorted out proportional coil, etc. Inspect the wiring and replace the proportional coil, if required.

#### MIN POTENTIOMETER

The Min adjustment pot will be used to set the minimum amount of movement of an individual function at the valvebank when the corresponding function switch at the handset is depressed. To adjust, set engine at high speed control setting. Depress the "Rotation" function switch at the handset. Adjust the Min pot at the AMP driver card clockwise until crane begins to rotate or counterclockwise until motion begins to stop. No other electrical adjustments are required to properly operate the crane.

### HYDRAULICS-VALVEBANK

#### RELIEF VALVE

The relief valve limits the maximum system pressure. Pressure limits the amount of torque or force an actuator will see. This pressure is preset to 3000 psi at 10 gpm. If the relief valve should fail, it would likely stick open. This would prevent system pressure from developing and cause a lack of torque/force at the actuator. The relief valve can be changed easily by screwing it out and replacing with a new one.

#### PROPORTIONAL VALVE

The proportional valve varies the oil flow to the individual crane functions. Doing so dictates the speed of the crane functions. As the electrical current increases to the valve, by using the trigger on the control handle, more oil is ported downstream to the crane function. If the valve coil burns out, the operator would be unable to vary the flow to the crane functions. If the valve spool becomes stuck, the operator would be unable to vary the downstream flow. If speed control is the problem, it is likely an indication of a proportional valve problem. It is necessary to verify that current is flowing to the coil correctly, and that it is not an electrical problem.

The proportional valve can also be operated manually for test purposes. The valve stem can be screwed in manually to port oil downstream. Doing so will manually position the valve spool and hold it in the manually commanded position.

#### DIRECTIONAL VALVES

The directional valves (4) control the direction of the crane functions. When one of the solenoids is energized, it shifts the valve spool. This allows oil to flow out one of the valve ports. If a function does not work, a directional valve may be to blame.

These valves have a standard manual override. You may manually shift the valve by pushing the pin, located in the middle of the solenoid.



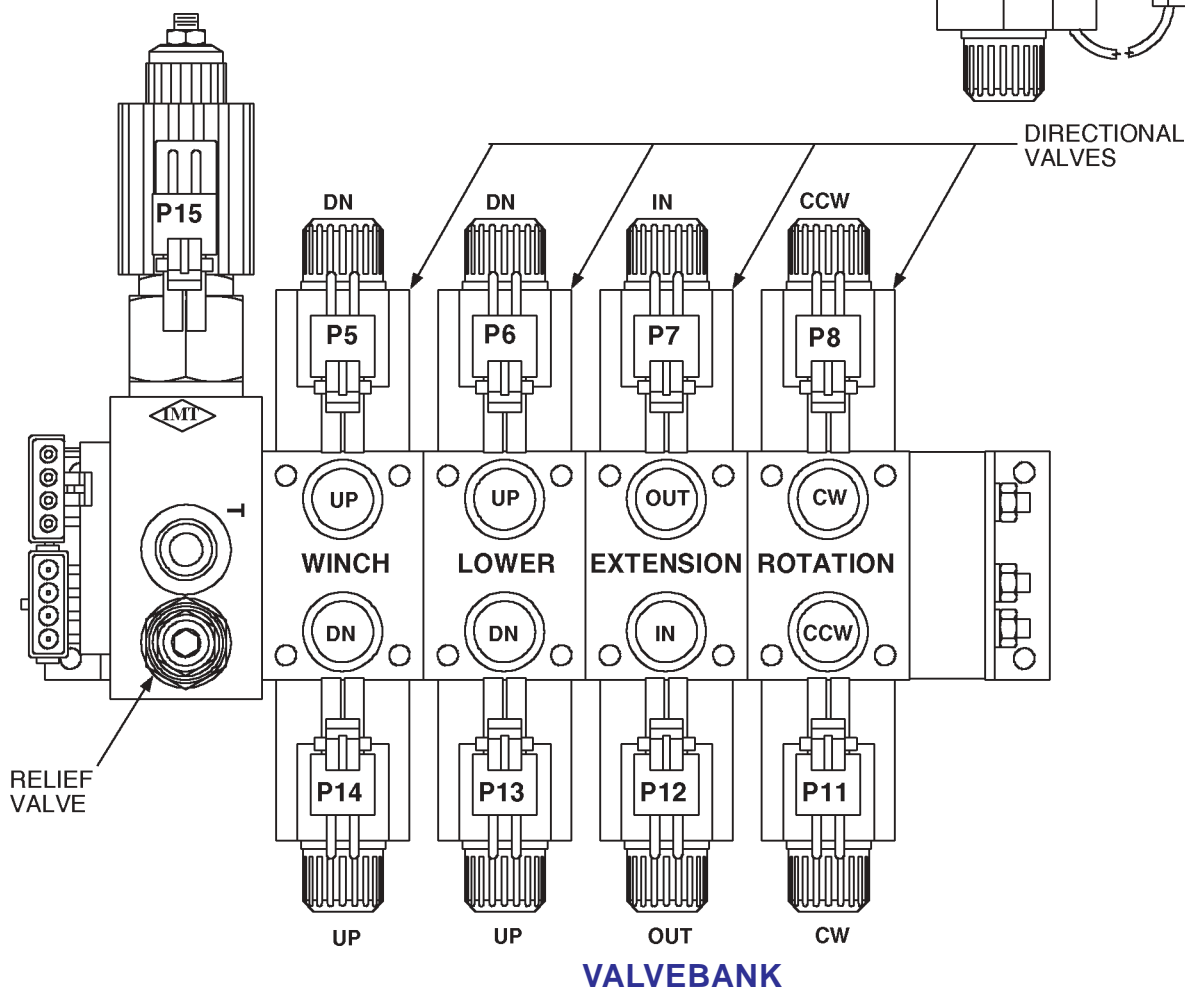
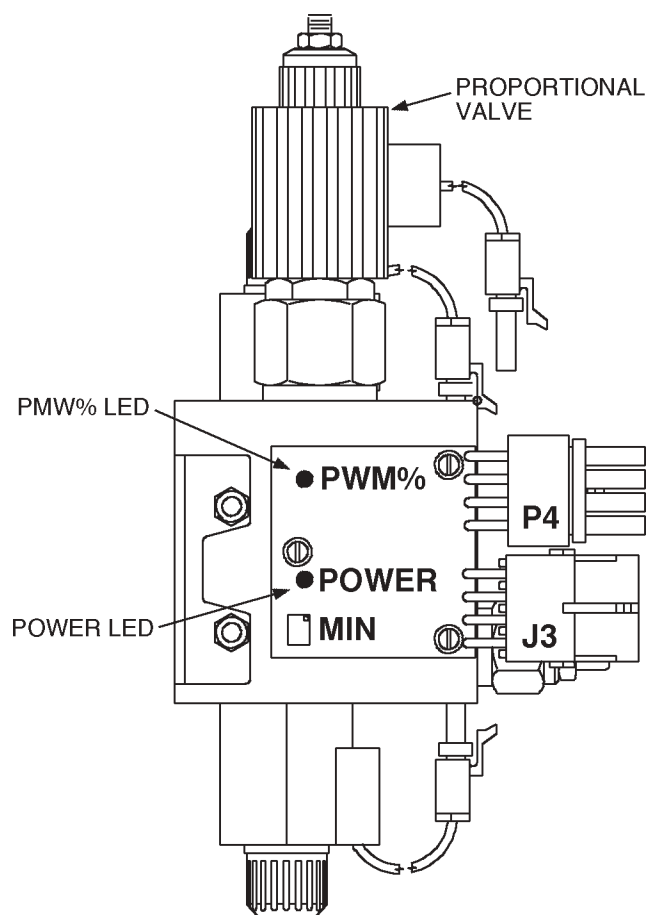
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2-9

**CAUTION**

MANUALLY OVERRIDING A DIRECTIONAL VALVE WILL PORT OIL IMMEDIATELY TO THE VALVE FUNCTION. THIS WILL CAUSE A SUDDEN MOVEMENT OF THE ACTUATOR. OPERATORS AND MAINTENANCE PERSONNEL MUST KEEP THE WORK AREA CLEAR OF OTHER PERSONNEL WHEN OVERRIDING A DIRECTIONAL VALVE.

If the valve shifts using manual overrides, the problem is of an electrical nature. Valve coils are interchangeable and may be changed by removing the coil nut. This allows maintenance personnel to isolate individual coil failures. If the valve cannot be actuated manually or electrically, it is necessary to replace the section.





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## RELAY BOARD OPERATION

### INTRODUCTION

To understand how the relay board operates, it is necessary to understand how the individual relays function.

The Bosch relay (part number 77041251) is a normally open relay between terminals 30 and 87 and normally closed between terminals 30 and 87a. Terminals 85 and 86 energize the relay through the coil. See Figure 1 and 2.

Figure 3 shows the relay board with eight relays identified with the letters "A" through "G" and by their basic function. Example: Relay "A" is the "Power ON/OFF" relay, "C" is the "Compressor Speed Control", etc. The small numbers shown on the individual terminals of the relay indicate where that terminal is connected through the circuit board, to the terminal bar. Example: Relay "A" top terminal (#9) is connected to terminal 9 of the terminal bar. The terminal bar is provided with 16 individual terminals of which the last two (15 and 16) are not used. Wires connected to the terminal bar have been identified according to their function in the circuit. The number of terminals used vary with each application. Solid lines between relay terminals indicate existing wiring connections, through the circuit board.

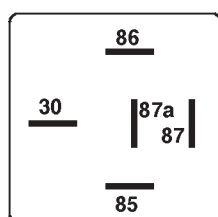


FIGURE 1. BOTTOM VIEW OF RELAY

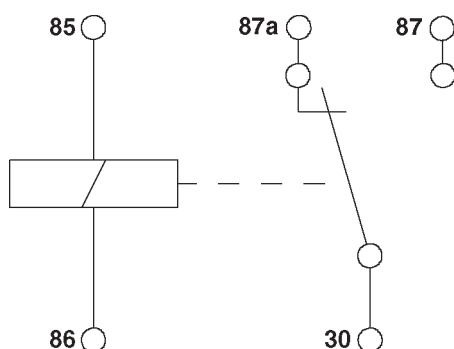


FIGURE 2. INTERNAL WIRING

The relay board is primarily used on vehicles with remote controlled cranes and remote control cranes and compressors. The circuitry prevents remote starting of the truck engine unless the brakes are applied and the PTO is engaged. It also isolates the crane speed control from the compressor speed control.

### OPERATION

#### IGNITION "ON"

When the ignition switch of the vehicle is turned "ON", terminal 9 of the terminal bar is "HOT". The coil of relay "A" is energized and voltage from terminal 1 of the terminal bar becomes present at terminals "A" of relays "A", "B", "E" and "H". See Figure 3.

#### REMOTE STARTING THE VEHICLE

The vehicle can be remotely started from the remote control handle by toggling the "Crane-OFF-Compressor" switch to the "Crane" position.

To start the vehicle, the engine start switch at the handle must be depressed. When this is accomplished, terminal 11 of the terminal block becomes "HOT". See Figure 5.

The truck starter is energized when terminals 11 and 12 of the terminal bar are connected through the relay board. When terminal 11 is "HOT", the coil in relay "F" is energized connecting relay terminal 12 and "B" on relays "F" and "G". If terminal 14 of relay "H" and terminal 13 of relay "G" are grounded (brakes and PTO engaged) terminals "B" of relays "F" and "G" are "HOT". Since terminal "B" of relay "F" is "HOT", the truck starter solenoid is activated. Energized circuits are shown as bold in Figure 5.

#### REMOTE ENGINE STOP

When the engine stop button is depressed on the remote control handle, voltage is applied to terminal 6 of the terminal block and of relay "D". The coil in relay "D" is energized and the ground of the fuel solenoid/distributor coil is interrupted because current can no longer flow from terminal 7 to 8. Relay "D" is normally closed between terminals 7 and 8. See Figure 3.



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2-11

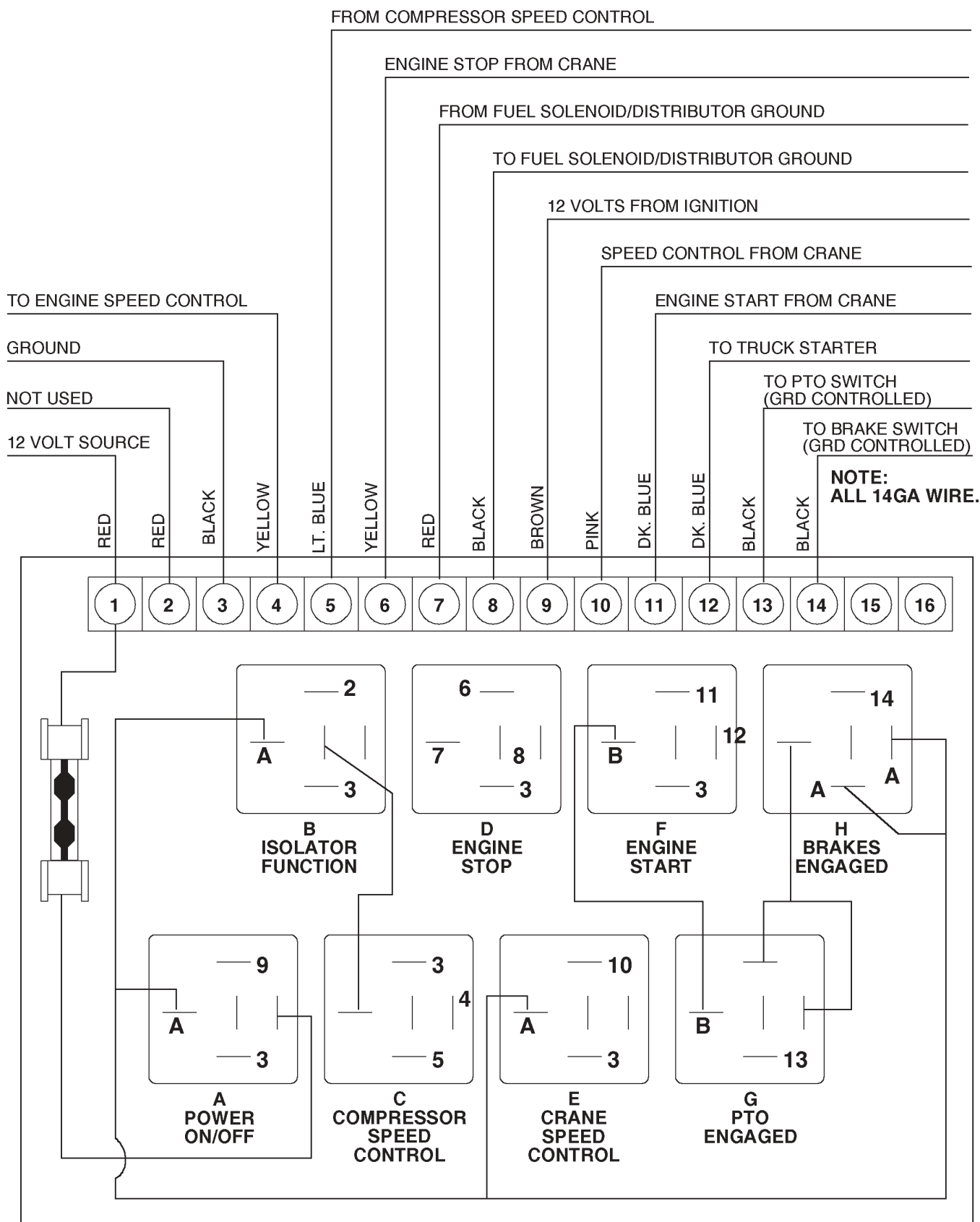


FIGURE 3. RELAY BOARD - COMPONENTS & WIRING



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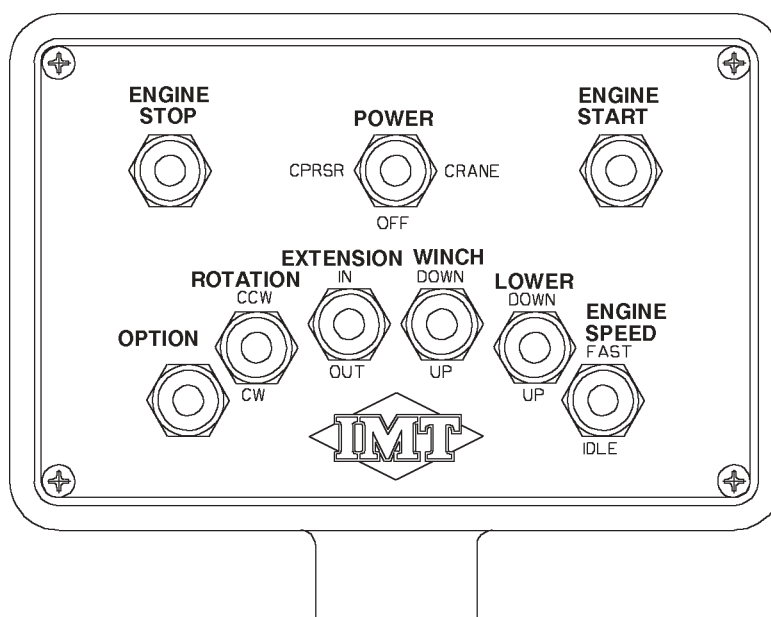
**REMOTE ENGINE SPEED (FROM CRANE)**

Engine speed can be controlled from the remote control handle. When the engine speed switch is activated, voltage is applied at terminal 10 of relay "E". The coil of relay "E" is energized and current is allowed to flow to the signal input of the speed control currently installed. The speed of the engine will remain higher as long as the engine speed switch in the remote control handle is allowed to remain in the same position. If this switch is returned to its original position, the engine speed control coil will be de-energized through relay "E".

2-12

Compressor operation will begin when the "Compressor-OFF-Crane" switch on the handset is toggled to the "Compressor" position. At that time, the power from the handset will provide power to the pressure switch on the compressor. When the pressure switch signals a need for more air pressure, the switch will trip and provide a signal to terminal 5 of the relay board.

Relay "C" energizes the coil in the relay, connecting terminal 4 to terminal "C" of the relay which is "HOT" from relay "B". Reference Figure 6 showing circuits energized (in bold) when engine speed is increased by the compressor. This will provide a "HOT" signal at terminal 4 which then provides a 12-volt signal to input of the speed control currently installed.

**FIGURE 4. REMOTE CONTROL HANDLE**



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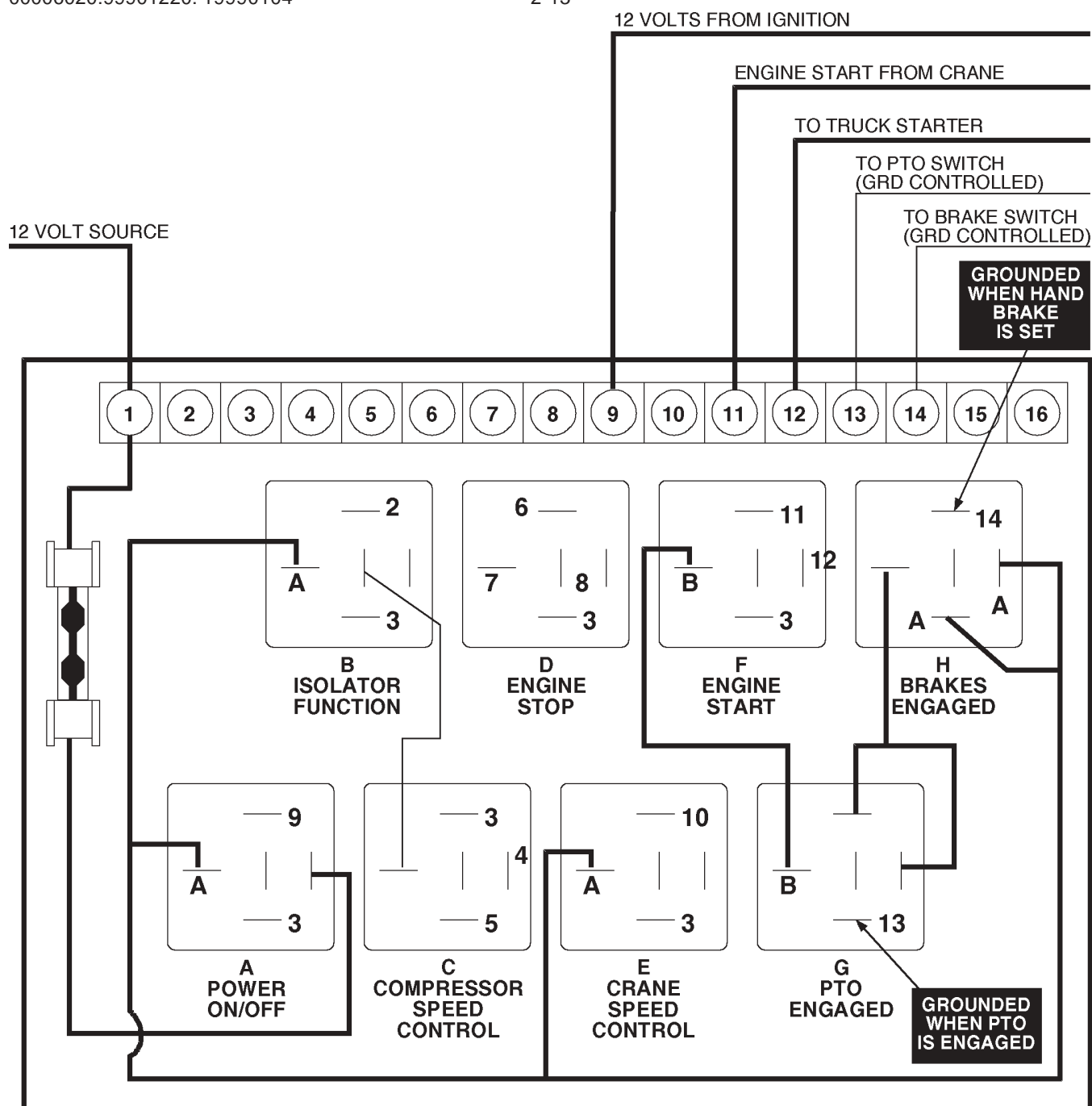
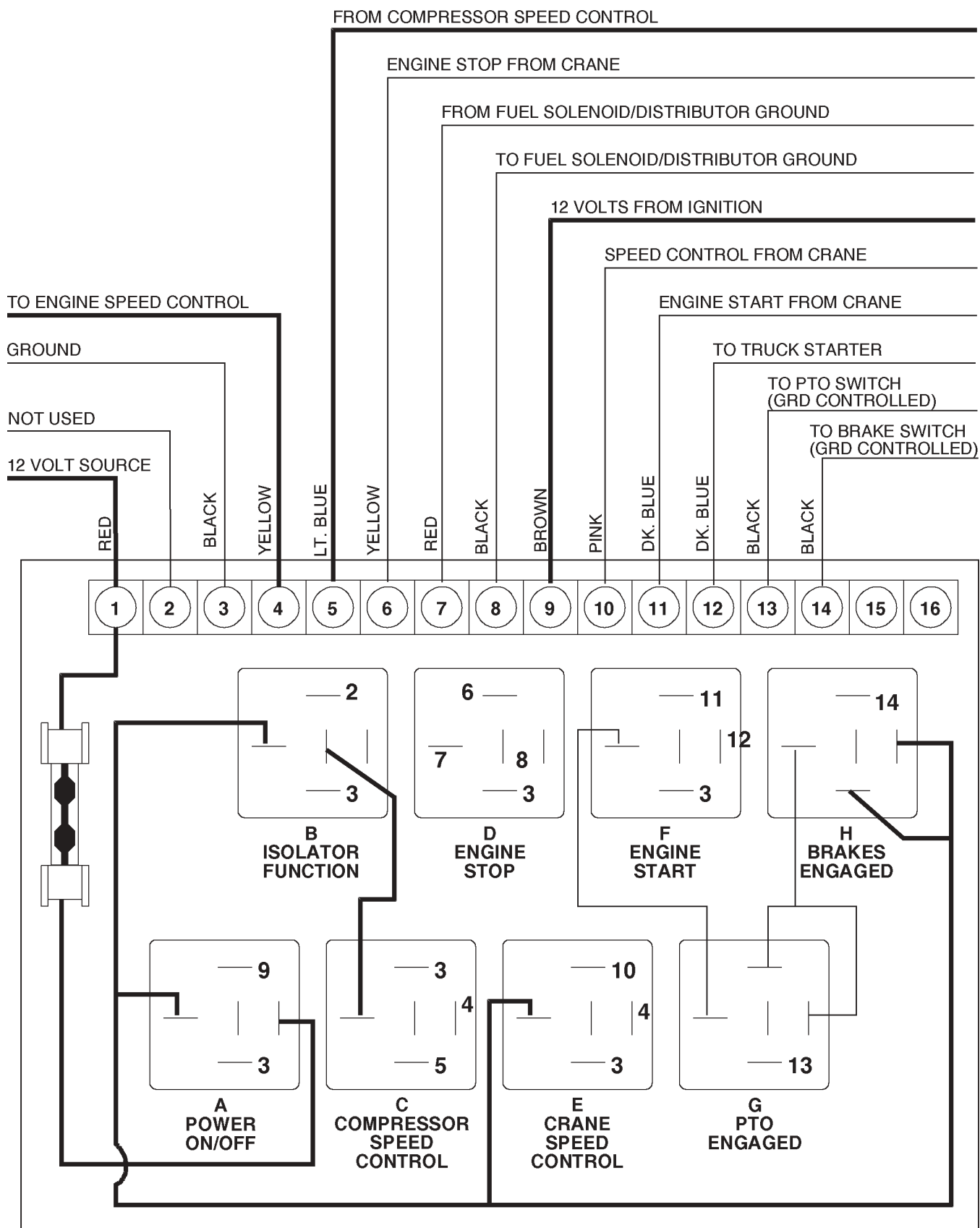


FIGURE 5. REMOTE STARTING OF VEHICLE - IGNITION "ON"



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2-14



**FIGURE 6. SPEED CONTROL - COMPRESSOR ONLY**





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**INSTALLATION**

1. Locate an area in the engine compartment that will both provide some protection against damage and accessibility for wiring.

2. Provide adequate space between the mounting surface and the back of the circuit board in order to prevent electrical contact. Failure to do so will cause erratic operation and/or circuit board failure.

3. Connect control wiring as indicated in Wiring Chart.

4. Jumper wires connections:

4-1. Jumper wires must connect J to K, and L to M for 12 volts excited systems. Remove the connecting wires between I to J and M to N.

4-2. Jumper wires must connect I to J, and M to N for ground excited systems\*. Remove the connecting wires between J to K and L to M.

**WARNING**

Failure to remove the extra connecting wire will cause the relay board to fail. Check jumper wire connections of relay board being replaced. (Most relay boards are wired as stated in item 4-1.)

**\* NOTES**

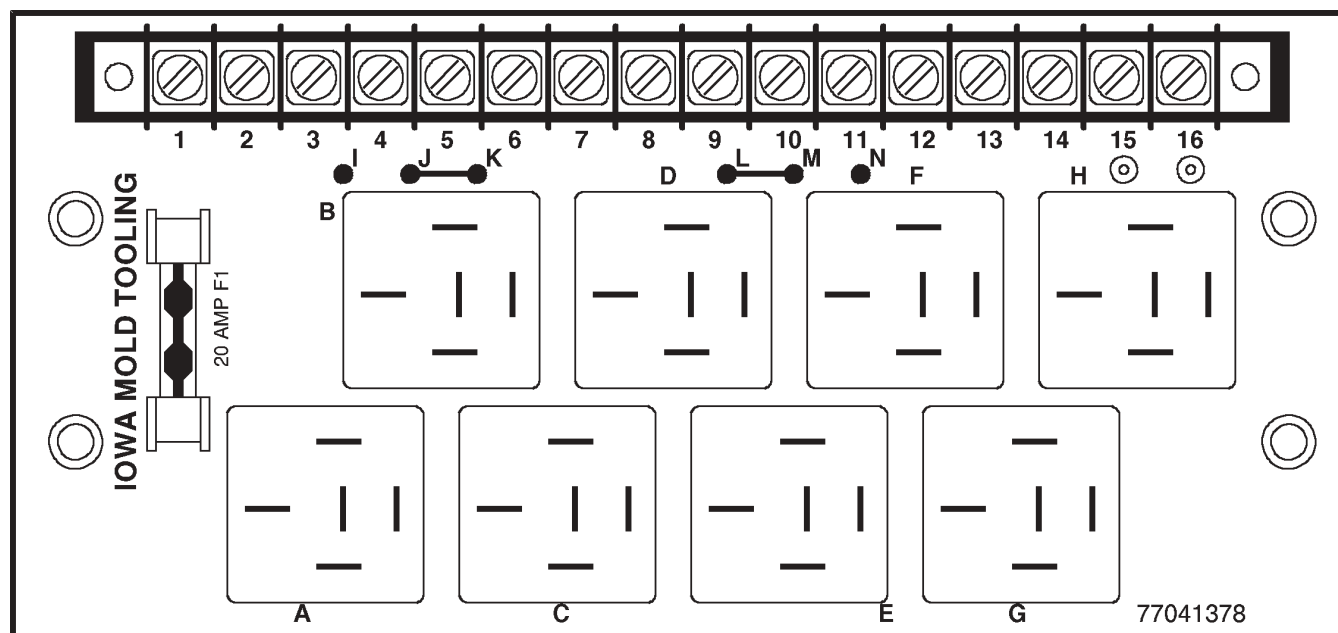
Circuits that could be ground excited are 6 - 10 & 11.  
Quick Check: (Before connecting wires to circuit board)  
Activate the engine stop switch from the crane. If terminal 6 is hot, wire per 4-1. If not, wire per 4-2.

**WIRING CHART**

| TERM | WIRING CONNECTION                |
|------|----------------------------------|
| 1    | 12-VOLT                          |
| 2    | NC                               |
| 3    | GROUND                           |
| 4    | TO SPEED CONTROL                 |
| 5    | SPEED CONTROL FROM COMPRESSOR    |
| 6    | ENGINE STOP FROM CRANE           |
| 7    | FROM FUEL SOLENOID / DISTRIBUTOR |
| 8    | GROUND                           |
| 9    | TO FUEL SOLENOID / DISTRIBUTOR   |
| 10   | GROUND                           |
| 11   | 12-VOLT FROM IGNITION            |
| 12   | SPEED CONTROL FROM CRANE         |
| 13   | ENGINE START FROM CRANE          |
| 14   | TO TRUCK STARTER                 |
| 15   | TO PTO SWITCH, CONTROLLED        |
| 16   | TO BRAKE SWITCH, CONTROLLED      |
| 15   | NC                               |
| 16   | NC                               |

**RELAY FUNCTION**

|   |                           |
|---|---------------------------|
| A | ON / OFF, POWER           |
| B | ISOLATION, SPEED CONTROL  |
| C | COMPRESSOR, SPEED CONTROL |
| D | ENGINE STOP               |
| E | CRANE SPEED CONTROL       |
| F | ENGINE START              |
| G | PTO SWITCH                |
| H | BRAKE SWITCH, CONTROLLED  |

**FIGURE 7. RELAY BOARD (77041378) WIRING INSTRUCTIONS**



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## FLIP-UP BOOM SHEAVE

### GENERAL

This section contains information regarding the operation of the Flip-up boom sheave which is an available option on the 6020 Crane. Refer to following figure for parts reference.

### SINGLE-PART LINE OPERATION

To position the crane for single-line operation:

1. Disconnect the cable wedge socket (item 14) from the boom tip dead end link (item 51) by removing the other pin and keeper (items 53 and 35).
2. Remove the link by removing the other pin and keeper (items 53 and 35) and rotate the flip sheave weldment (item 52) to the horizontal position and insert one of the retaining pins and keepers (items 53 and 35) through the lower hole in the boom tip
3. Remove the two-part line snatch block (item 4) by removing the sheave (item 6) which is held in place by the pin (item 3), retainer plate (item 11) and wing bolt (item 50).
4. After the cable is freed from the snatch block, reassemble the sheave and snatch block. Store the snatch block assembly (items 3, 4 and 6) and the dead end link (item 51) in the chassis cab or a body compartment, if available.
5. Locate the 3-ton hook (item 55) which is stored separately on the chassis. Connect the hook to the cable wedge socket using the pin and keeper (items 53 and 35).

The crane should now be in position for single-part line operation. Note that no change in mounting of the anti two-blocking system is required.

### TWO-PART LINE OPERATION

To position the crane for two-part line operation:

1. Disconnect the 3-ton hook (item 55) from the cable wedge socket (item 14) by removal of the pin and keeper (items 53 and 35). Store the hook in the chassis cab or a body compartment if available.
2. Locate the two-part line snatch block assembly (items 3, 4, 6 & 16) and cable dead end link (item 51) which are stored separately on the chassis.
3. Remove the pin and keeper (items 53 and 35) from the boom tip and rotate the flip sheave weldment (item 52) to the vertical position. Position the dead end link (item 51) in position with the sheave weldment (item 52) and insert the pin and keeper (items 53 and 35).
4. Disassemble the snatch block assembly (items 3, 4, 6 & 16) and string the cable through and reassemble the snatch block. Connect the cable wedge socket (item 14) to the dead end link (item 51) by using the other pin and keeper (items 53 and 35).

The crane should now be in position for two-part line operation. Note that no changes in mounting of the anti two-blocking system is required.

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**WINCH TROUBLESHOOTING**

| POSSIBLE CAUSE                                                                     | PROBABLE CURE                                                                                             |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>WINCH WON'T LIFT HEAVY LOADS</b>                                                |                                                                                                           |
| TOO MUCH LOAD                                                                      | RIG TO REDUCE LOADING ON WINCH                                                                            |
| LOW OR NO GEARBOX OIL                                                              | CHECK OIL LEVEL AND ADD PROPER OIL IF NECESSARY                                                           |
| MOTOR INLET PRESSURE LESS THAN SPECIFICATIONS WITH LOAD STALLED                    | TEST HYDRAULIC PUMP<br>CHECK MAIN RELIEF - SHOULD BE 3000 PSI                                             |
| MOTOR OUTLET PRESSURE TOO HIGH WITH LOAD STALLED                                   | FIND AND REMOVE SOURCE OF RESTRICTION                                                                     |
| BRAKE SHOULD ENGAGE IN PAYOUT DIRECTION ONLY                                       | RUN WINCH WITH NO LOAD IN BOTH DIRECTIONS. SYSTEM PRESSURE SHOULD BE SLIGHTLY HIGHER IN PAYOUT DIRECTION. |
| CHECK FLOW TO WINCH MOTOR WITH WINCH UNDER LOAD                                    | TEST PUMP IF NOT TO SPECIFICATIONS                                                                        |
| CHECK END PLAY IN WORM                                                             | IF GREATER THAN 0.030", INSPECT WORM BEARINGS FOR WEAR. REPLACE IF NECESSARY.                             |
| <b>WINCH WON'T HOLD LOAD</b>                                                       |                                                                                                           |
| BRAKE MAY NEED ADJUSTMENT                                                          | TURN ADJUSTING SCREW CLOCKWISE 1/4 TURN AT A TIME AND TEST WINCH AGAIN                                    |
| BRAKE DISKS MAY BE WORN                                                            | INSPECT AND REPLACE IF NECESSARY. ADJUST AND RETEST                                                       |
| CAM CLUTCH IN BRAKE MAY BE INSTALLED INCORRECTLY                                   | REVERSE CLUTCH AND RETEST                                                                                 |
| JOURNAL ON WORM WHERE CAM CLUTCH RUNS MAY BE GALLED OR WORN                        | INSPECT AND REPLACE WORM IF NECESSARY                                                                     |
| <b>WINCH RUNS TOO SLOW</b>                                                         |                                                                                                           |
| SYSTEM MAY HAVE LOW FLOW                                                           | INSTALL FLOW METER IN SYSTEM AND TEST UNDER LOAD. IF FLOW IS BELOW SPECIFICATIONS, INSPECT PUMP.          |
| MOTOR WORN OUT                                                                     | REPLACE MOTOR                                                                                             |
| <b>WINCH WILL NOT RUN UNDER NO LOAD (RELIEF VALVE OPENS WITHOUT WINCH TURNING)</b> |                                                                                                           |
| MOTOR SEIZED UP                                                                    | REMOVE MOTOR FROM WINCH AND TEST IF OPERABLE. IF NOT, REPLACE MOTOR.                                      |
| WORM AND GEAR SET DAMAGED                                                          | REPAIR GEARBOX                                                                                            |

See Section 3 for parts drawing.



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## ANTI TWO-BLOCKING DEVICE

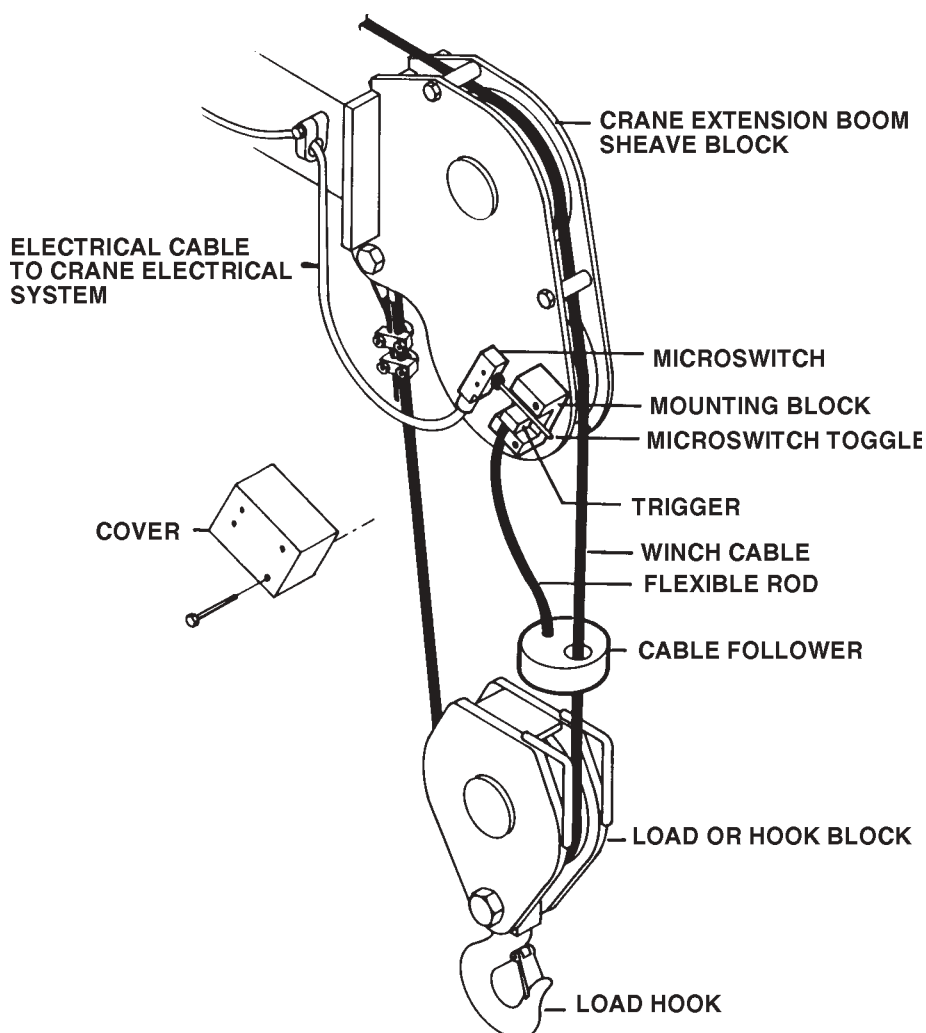
IMT telescoping cranes using a winch are equipped with an Anti Two-Blocking Device which is designed to provide a method of sensing an approaching Two-Blocking situation and prevent the crane from entering that situation. It is the operator's responsibility to avoid Two-Blocking and not to rely on this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

Keeping the system clean and the microswitch in operating condition, the system should function properly. The flexible rod should also be checked for unusual distortion.

### NOTE

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

Three means are available to relieve a two-blocking condition. The load may be lowered to the ground, the extension boom may be retracted, or the lower boom may be raised, thus reducing the reach of the crane.

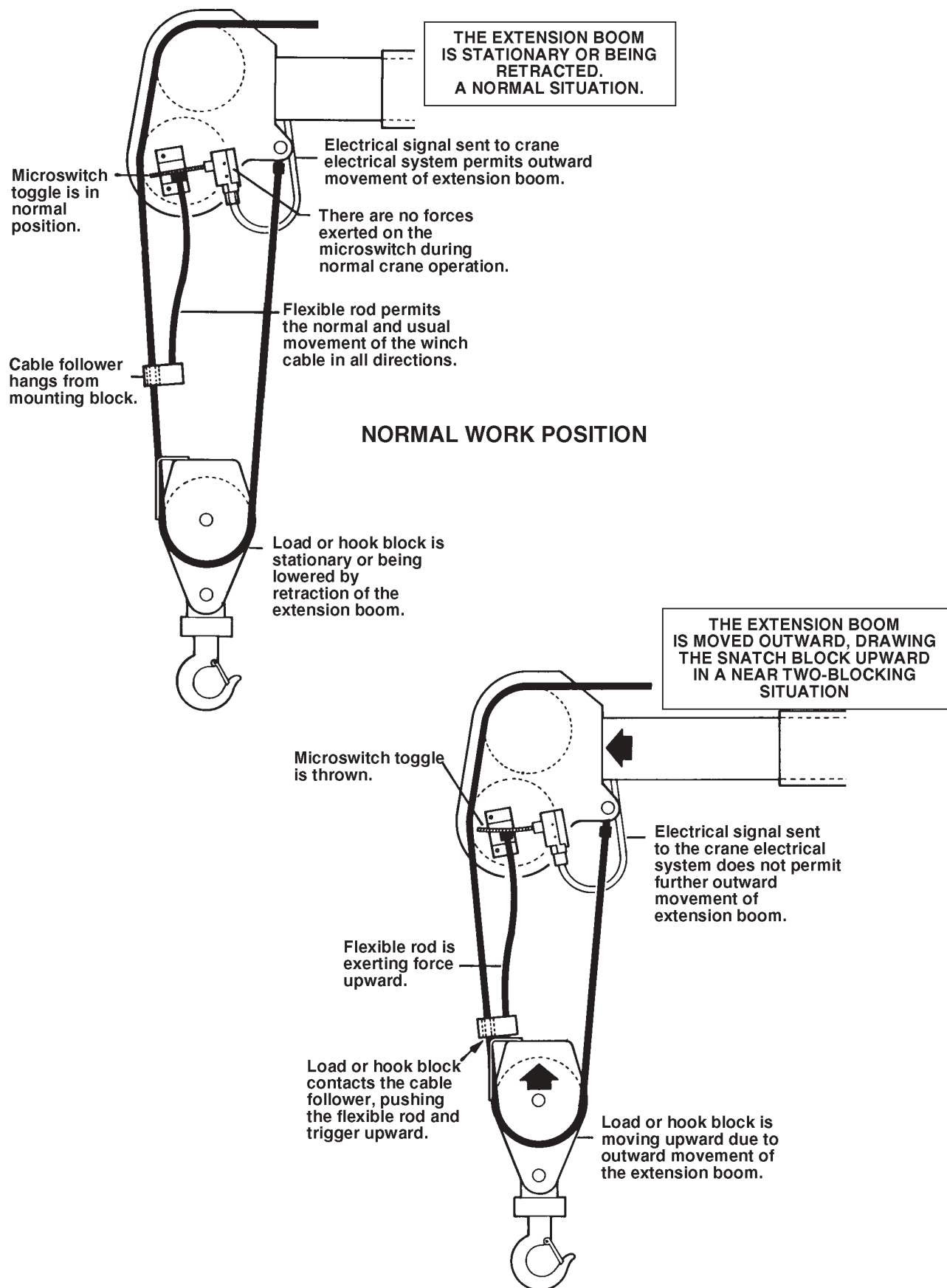


## ANTI TWO-BLOCKING DEVICE COMPONENTS



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### APPROACHING TWO-BLOCKING SITUATION



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## Excessive Load Limit System (ELLS) TEST PROCEDURE

This procedure is to be used for testing the Excessive Load Limit System (ELLS) used on the IMT Telescoping Crane models. Following this test procedure will ensure the system is currently operable and will not allow the crane to be excessively overloaded.

The purpose of the ELLS is to prohibit the excessive overloading of the crane. It does this by disarming the functions that make it possible for the operator to apply greater than allowable stress to the crane structure and components. The functions which are involved in the ELLS may vary for each crane model (Refer to TABLE 1 for which functions are shut down by the ELLS on each crane).

The load rating of the crane is determined by the pressure induced in the lower boom cylinder. The ELLS senses the pressure in the base end of the lower boom cylinder with a normally closed pressure switch located on the valve block on the top of the cylinder. When the pressure in the base end of the cylinder exceeds the setting of the pressure switch for that particular crane, the pressure switch opens and breaks the ground connection for the solenoids that shift the valve spool on the appropriate functions. Once the ground connection is disengaged, the solenoids that shift the valve spools for the appropriate functions can not be activated using the remote control handle. Only those functions that will not increase the load moment of the crane structure and components will be operable (i.e.- winch down, extension in, lower boom up, rotation). The operator is able to use "WINCH DOWN" to set the weight down to relieve the crane and "EXTENSION IN" to bring the load in for a shorter load radius. Either of these two functions will decrease the load moment of the crane structure and components, thus decreasing the pressure in the main cylinder.

### ITEMS REQUIRED TO TEST THE CRANE ELLS (SEE PHOTOS NEXT PAGE)

#### **PRESSURE GAGE ASSEMBLY (GAGE & PIPE-JIC ADAPTER)**

|                                                         |       |
|---------------------------------------------------------|-------|
| -5000 PSI LIQUID FILLED PRESSURE GAGE W/ 1/4" PIPE THRD | QTY 1 |
| -1/4 PIPE-#6 JIC ADAPTER (ref) PARKER PART# 0203-4-6    | QTY 1 |

#### **16" HOSE ASSEMBLY (3/8" OR 1/4" HOSE W/ #6 FEM. JIC FITTINGS & T-FITTING)**

|                                                |         |
|------------------------------------------------|---------|
| -TEE FITTING (ref) PARKER PART# 653T-6-6       | QTY 1   |
| -#6 FJIC FITTING (ref) PARKER PART# 10643-66   | QTY 2   |
| -3/8" SAE 100R16 HOSE (ref) PARKER PART# 431-6 | QTY 16" |

#### **4" HOSE ASSEMBLY (3/8" OR 1/4" HOSE W/ #6 FEM. JIC FITTINGS)**

|                                                   |        |
|---------------------------------------------------|--------|
| -#6 FJIC FITTING (ref) PARKER PART# 10643-66      | QTY 2  |
| -3/8" SAE 100R16 HOSE (ref) PARKER PART# 10643-66 | QTY 4" |

#### **#6 STR-#6 MALE JIC FITTING**

|                             |       |
|-----------------------------|-------|
| (ref) PARKER PART# 0503-6-6 | QTY 2 |
|-----------------------------|-------|





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#6  
MALE  
STRAIGHT  
THREAD



#6  
MALE  
JIC

#6  
MALE  
STRAIGHT  
THREAD



TEE

#6  
MALE  
JIC

ADAPTER

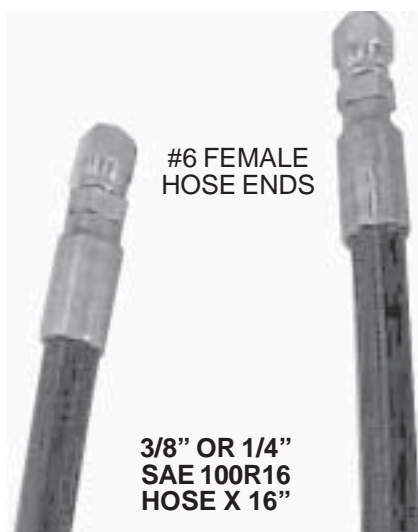


#6  
MALE  
JIC

1/4"  
FEMALE  
PIPE  
THREAD



5000 PSI  
LIQUID FILLED  
PRESSURE GAUGE



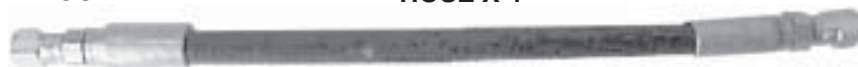
#6 FEMALE  
HOSE ENDS

3/8" OR 1/4"  
SAE 100R16  
HOSE X 16"

#6 FEMALE  
HOSE END

3/8" OR 1/4"  
SAE 100R16  
HOSE X 4"

#6 FEMALE  
HOSE END



## TEST PROCEDURE

### A. Position Crane Boom

1. Back the truck up to an immovable object to which the crane hook can be securely fastened. The boom tip must be directly over the immovable object when the crane is rotated to the rear of the truck, with the extension extended one foot.
2. Engage the parking brake and PTO.
3. Properly position all outriggers.
4. Rotate crane so it is pointing directly off the rear of the truck. (Most stable position)
5. Extend extension boom one foot.
6. Check to assure that the boom tip is positioned directly over the immovable object to which the crane hook can be securely attached.
7. Lower the lower boom until the lower boom cylinder is fully retracted and bottoms out.
8. After the boom is bottomed out, hold the "LOWER BOOM DOWN" function for two seconds to make sure cylinder is bottomed out.
9. Disengage PTO and turn off the engine in the truck.
10. Turn the truck ignition back on after the engine is stopped. BE AWARE OF TRAPPED PRESSURE BEHIND THE PLUG IN THIS STEP!! PRESSURIZED OIL MAY CAUSE SERIOUS INJURY!!
11. Trigger the function for the main boom up and down a few times to relieve trapped pressure in cylinder.





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**B. Attach Pressure Gauge (Procedure used depends on cylinder block used on crane.)**

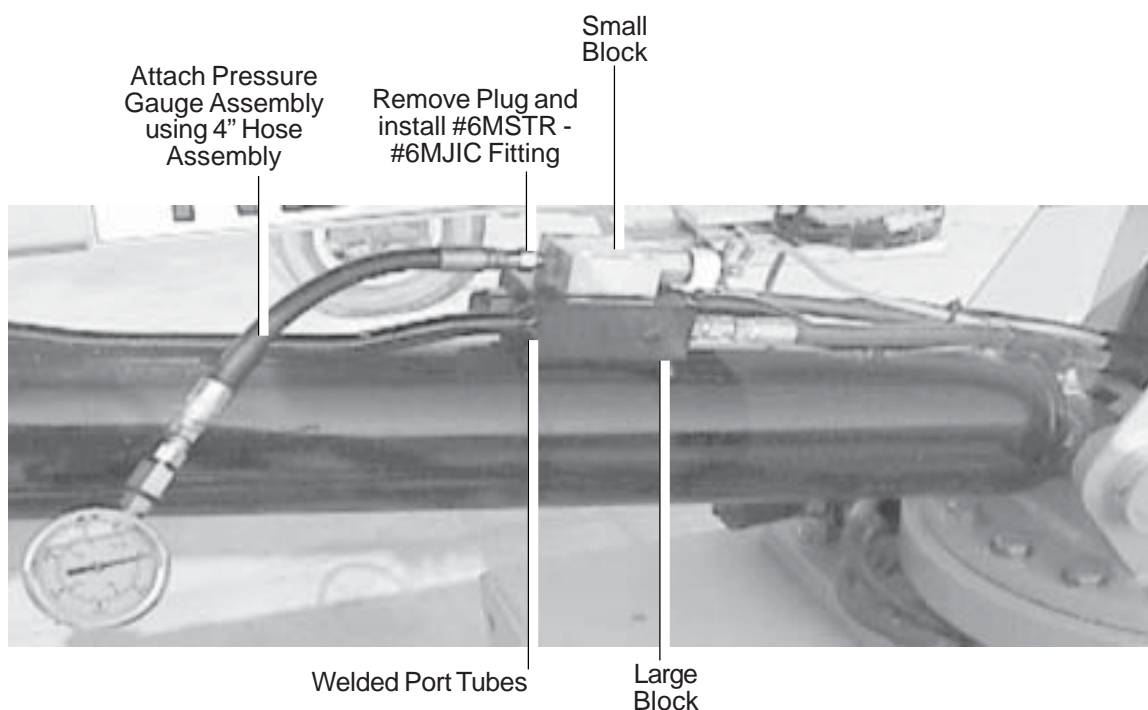
-Use Procedure 1 for cranes featuring a large valve block with a smaller block attached and the port tubes welded directly to the valve block and cylinder.

-Use Procedure 2 for cranes with only one valve block and the port tubes are removable by use of fittings on the valve block and on the cylinder.

**1. Procedure 1** (Large valve block with smaller block attached – port tubes welded)

- a. BE AWARE OF TRAPPED PRESSURE BEHIND THE PLUG IN THIS STEP!! PRESSURIZED OIL MAY CAUSE SERIOUS INJURY!! Slowly remove #6 hex plug on the end of the smaller block on the lower boom cylinder.
- b. Install #6 MJIC fitting into the port that the plug was removed from.
- c. Attach 5000 PSI liquid-filled pressure gage assembly using 4" hose assembly.
- d. Be sure to tighten all fittings securely.

**PRESSURE GAGE ASSEMBLY & 4" HOSE ASSEMBLY**





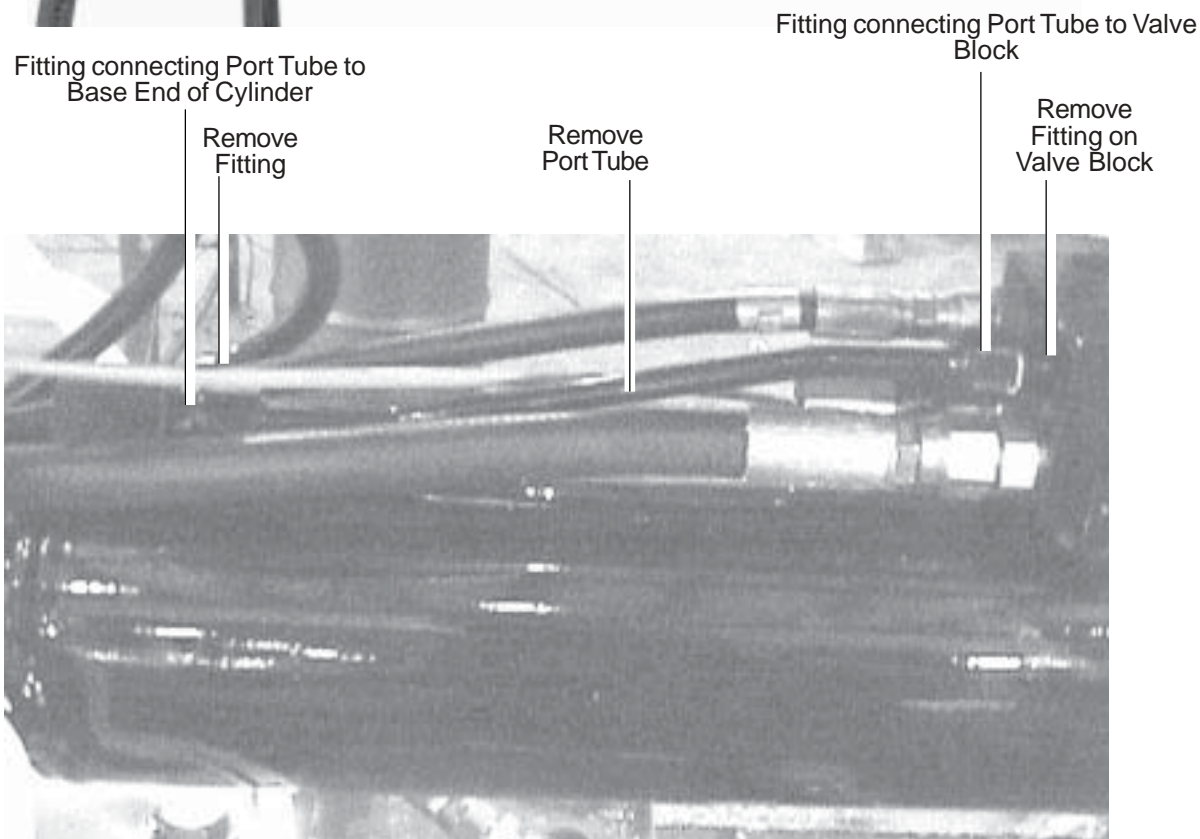
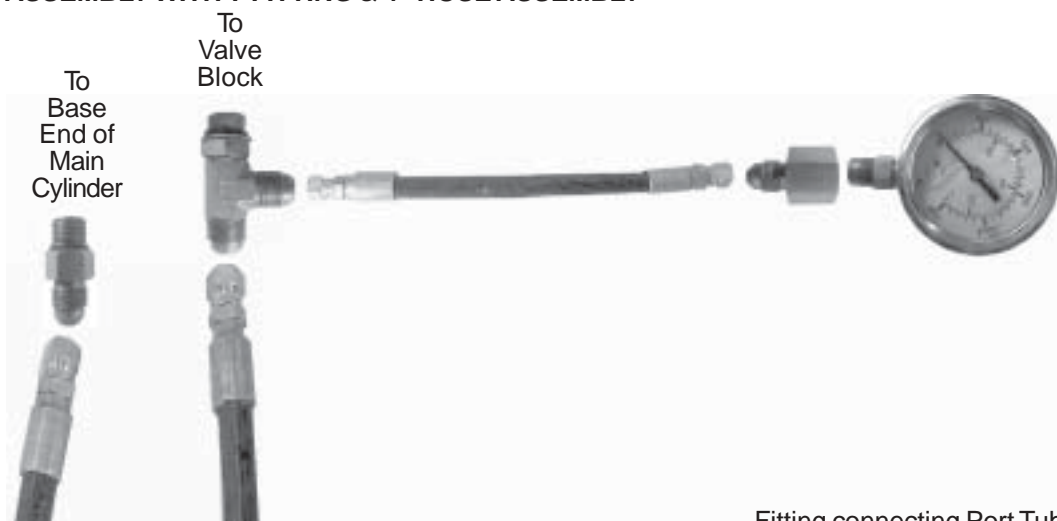
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**2. Procedure 2** (Large valve block only – port tubes removable)

- Remove bolts that attach the valve block to the cylinder
- BE AWARE OF TRAPPED PRESSURE BEHIND THE PLUG IN THIS STEP!! PRESSURIZED OIL MAY CAUSE SERIOUS INJURY!!** Turn off fitting connecting port tube to base end of cylinder (end closest to crane base).
- Turn off fitting connecting port tube to valve block.
- Carefully remove port tube that runs from the valve block on the lower boom cylinder to the base end of the lower boom cylinder, being sure not to damage fittings.
- Remove fitting from valve block.
- Install 16" hose assembly with T-fitting (refer below) between block on lower boom cylinder and base end of lower boom cylinder.
- Attach pressure gage assembly to T-fitting using 4" hose assembly (refer to figure below).
- Be sure to tighten all fittings securely.

**16" HOSE ASSEMBLY WITH T-FITTING & 4" HOSE ASSEMBLY**





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**C. Test System**

1. Start truck engine.
2. Raise boom up until boom cylinder is fully extended, then lower boom until cylinder is fully retracted to remove air that may have been introduced while installing the gage.
3. Raise boom to 15 degrees above horizontal and securely fasten crane hook to immovable object using a double line attachment.
4. Use the winch up function to take slack out of cable.
5. Refer to TABLE 1 for maximum pressure at which ELLS system should shut down appropriate functions for the particular crane model being tested.
6. While monitoring the pressure gage, use the winch up function to slowly apply down force on end of boom. If the pressure on the gage exceeds the maximum pressure for that particular crane and the ELLS has not shut down the appropriate functions, the ELLS is not working. Do not go any higher.
7. If the system is operating properly, the function should stop working before the gage reaches maximum pressure.
8. While the pressure gage still reads the pressure at which the ELLS shut down the appropriate functions, test the other functions that should be shut down by the ELLS (TABLE 1).
9. If the appropriate functions are not operational, the ELLS system is working
10. If any of the functions in Table 1 are still operational, the ELLS system is not working.
11. Refer to the TROUBLE SHOOTING PROCEDURE (page 6) for instructions to determine the problem with the ELLS.

**TABLE 1**

| IMT<br>CRANE<br>MODEL | FUNCTIONS SHUT DOWN BY ELLS |                  |               | MAX. TEST<br>GAGE<br>PRESSURE<br>ALLOWED |
|-----------------------|-----------------------------|------------------|---------------|------------------------------------------|
|                       | WINCH<br>UP                 | EXTENSION<br>OUT | LOWER<br>DOWN |                                          |
| 1014                  | X                           | X                | X*            | 2600                                     |
| 1014A                 | X                           | X                | X             | 3000                                     |
| 2015                  | X                           | X                | X*            | 3000                                     |
| 2020                  | X                           | X                | X             | 3000                                     |
| 3016                  | X                           | X                | X             | 3000                                     |
| 3020                  | X                           | X                | X             | 3300                                     |
| 3816                  | X                           | X                | X             | 3500                                     |
| 5016                  | X                           | X                | X             | 3500                                     |
| 5020                  | X                           | X                | X             | 3500                                     |
| 6016                  | X                           | X                | X             | 3500                                     |
| 6020                  | X                           | X                | X             | 3500                                     |
| 7020                  | X                           | X                | X             | 3200                                     |
| 7025                  | X                           | X                | X             | 3200                                     |
| 315A                  | X                           | X                | N/A*          | 3200                                     |

\* NOTE: Cranes before July 1996 do not have "LOWER BOOM DOWN" function tied into the Excessive Load Limit System.



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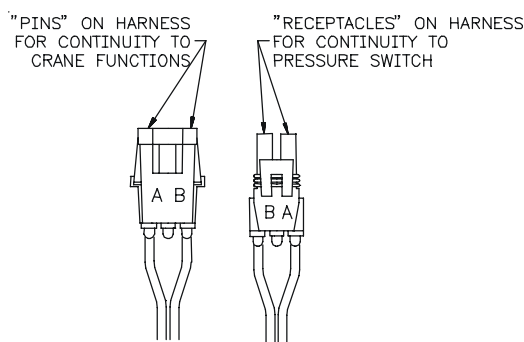
## ELLS TROUBLESHOOTING PROCEDURE

Each function (winch up, winch down, extension in, etc.) is actuated by a solenoid that shifts the valve spool to perform the particular function. The solenoids are located on the valve bank. Each solenoid has two wires protruding with a connector on the end that is plugged into a connector on the wire harness for the crane. There are two wires, one wire is black (ground) and the other wire is colored. The “ground receptacle” is the receptacle that the black wire connects to.

### A. Find which solenoid actuates which function

-When a solenoid is actuated, it becomes magnetic. By using a piece of steel to find which solenoid is magnetic, (steel ruler, paper clip, etc.) the solenoids can be matched with which function it controls. It will not be a real strong magnetic pull, but will be detectable with a small piece of metal.

1. Be sure the truck ignition is on, the parking brake is engaged, and power is “on” to the crane. The PTO does not need to be engaged.
2. Activate “LOWER UP” on the remote control handle and use the piece of steel to find which solenoid is magnetic (being actuated).
3. When the correct solenoid is found, unplug the connector protruding from the solenoid.
4. Activate “WINCH UP” on the remote control handle and use the piece of steel to find which solenoid is magnetic (being actuated).
5. When the correct solenoid is found, unplug the connector protruding from the solenoid.
6. Unplug the connector protruding from the pressure switch (Some models may have wire terminals instead of a connection. Detach the wires from the pressure switch.)



7. Using a multi-meter, check continuity (setting on multi-meter that “beeps” if two wires are connected) between the ground receptacle on the connector that plugs into the connector on the “LOWER UP” solenoid and the ground receptacle on the connector that plugs into the connector on the “WINCH UP” solenoid. They should not be continuous. If they are, the harness is the problem, which needs to be either repaired or replaced.
8. Reconnect the pressure switch.
9. Repeat steps 4-8 for each of the functions shut down by the ELLS. Instead of using “WINCH UP”, use the appropriate function and find the controlling solenoid and check for continuity with ground receptacle on the connector that plugs into the connector on the “LOWER UP” solenoid.
10. Activate “WINCH UP” on the remote control handle and use the piece of steel to find which solenoid is magnetic (being actuated).
11. When the correct solenoid is found, unplug the connector protruding from the solenoid.
12. Unplug the connector protruding from the pressure switch (Some models may have wire terminals instead of a connection. In this case, detach the wires and use the ground wire that attaches to the pressure switch for the next step.)
13. Using a multi-meter, check continuity between the ground receptacle on the connector that plugs into connector on the pressure switch and the ground receptacle on the connector that plugs into the connector on the “WINCH UP” solenoid. They should be continuous. If they are not, there is a problem with the harness, which either needs to be repaired or replaced.
14. Reconnect the pressure switch.
15. Repeat steps 10-14 for each of the functions shut down by the ELLS. Instead of using “WINCH UP”, use the appropriate function and find the corresponding solenoid. Each one should be continuous with the ground receptacle on the connector that plugs into the connector on the pressure switch.
16. If there is no problem found with the harness, the pressure switch is the problem and it will need to be replaced.



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**SECTION 3. MODEL 6020 REPLACEMENT PARTS**

|                                                                            |    |
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| OPTION-OUTRIGGER KIT-MO/PD-7x5 (31712732) .....                            | 28 |
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**SECTION 3. MODEL 6020 REPLACEMENT PARTS,  
CONTINUED**

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## PARTS INFORMATION

### GENERAL

This section contains the exploded parts drawings and 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, refer to the appropriate manual, or consult your IMT sales representative.


#### WARNING

DO NOT ATTEMPT TO REPAIR ANY COMPONENT WITHOUT READING THE INFORMATION CONTAINED IN THE REPAIR SECTION IN VOLUME 1. 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 attached to the mast or to one of the booms in a prominent location. When ordering parts, communicating warranty information, or referring to the unit in correspondence, always include the serial number and model number. All inquiries should be directed to:

Iowa Mold Tooling Co., Inc.  
Box 189, Garner, IA 50438-0189  
Telephone: 641-923-3711  
Technical Support Fax: 641-923-2424

|                                                                                                                                                          |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  <b>IOWA MOLD TOOLING CO., INC.</b><br>BOX 189, GARNER, IA 50438-0189 |  |
| MODEL NUMBER                                                                                                                                             |  |
| SERIAL NUMBER                                                                                                                                            |  |
| MFG DATE                                                                                                                                                 |  |
| 70029119                                                                                                                                                 |  |

**SERIAL NUMBER PLACARD**

### CYLINDER IDENTIFICATION

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

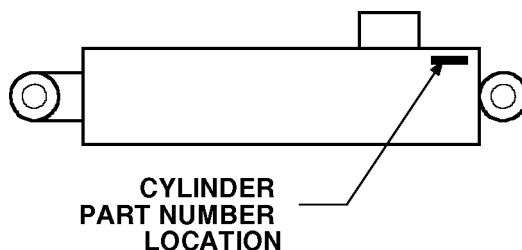
### WELDMENT IDENTIFICATION

Each of the major weldments, base, mast, lower boom, extension boom, and outriggers, have a part number stamped on them. Any time one of the weldments is to be replaced, it is necessary to specify the complete part number as stamped on that weldment. The location of the part numbers are shown Section 2.

### ORDERING REPAIR PARTS

When ordering replacement parts it is important to follow the steps as outlined below.

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.



**CYLINDER PART NUMBER LOCATION**



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## BASE ASM (41715069)

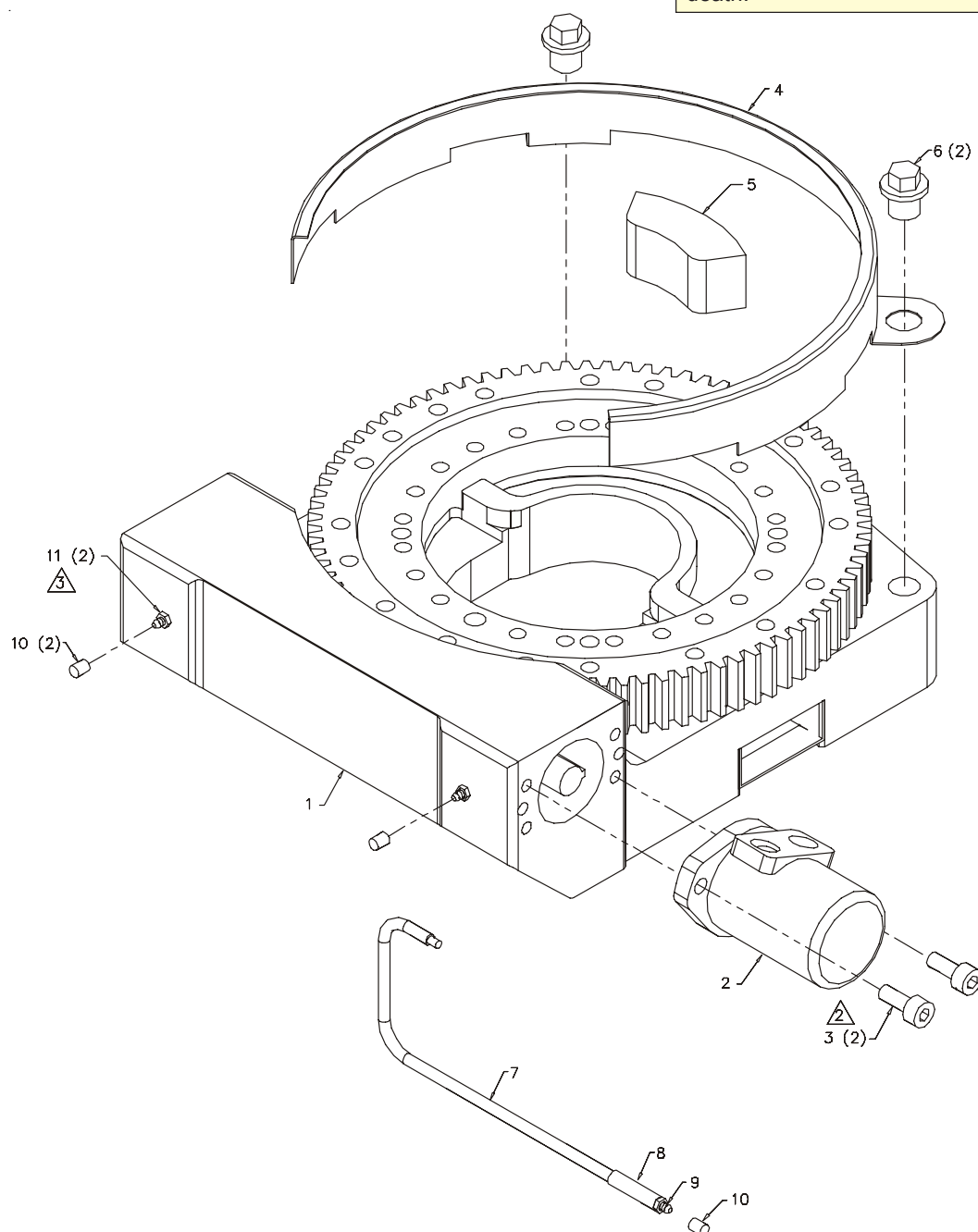
| ITEM | PART NO. | DESCRIPTION              | QTY  |
|------|----------|--------------------------|------|
| 1.   | 71056551 | GEAR ROTATOR (INCL:11)   | 1    |
| 2.   | 73511070 | HYD MOTOR (WAS 73051919) | 1    |
| 3.   | 72060794 | CAP SCR 1/2-13X1-1/4 SH  | 2    |
| 4.   | 60120192 | GEAR GUARD               | 1    |
| 5.   | 60120138 | SLIDE-ROT'N STOP         | 1    |
| 6.   | 70029595 | PLUG 1-8                 | 2    |
| 7.   | 51395121 | HOSE-AA .13X13.5 #2#2    | 1REF |
| 8.   | 72053301 | COUPLING 1/8NPT BLK      | 1    |
| 9.   | 72053508 | ZERK 1/8NPT              | 1    |
| 10.  | 70034382 | GREASE CAP               | 3    |
| 11.  | 72533605 | ZERK (PART OF 1)         | 2REF |

### NOTES

1. APPLY "MOLUB-ALLOY 936F" TO TURNABLE BEARING AND WORM TEETH AT ASSEMBLY.
2. USE SERVICEABLE THREAD LOCKER.
3. APPLY THREE PUMPS OF EXTREME PRESSURE (EP2) GREASE TO WORM BEARINGS. ROTATE CRANE FULLY AFTER APPLICATION OF GREASE.

### WARNING

Any time the gear-bearing bolts have been removed, they must be replaced with new bolts of identical grade and size. Failure to replace gear-bearing bolts may result in bolt failure due to metal fatigue causing serious injury or death.







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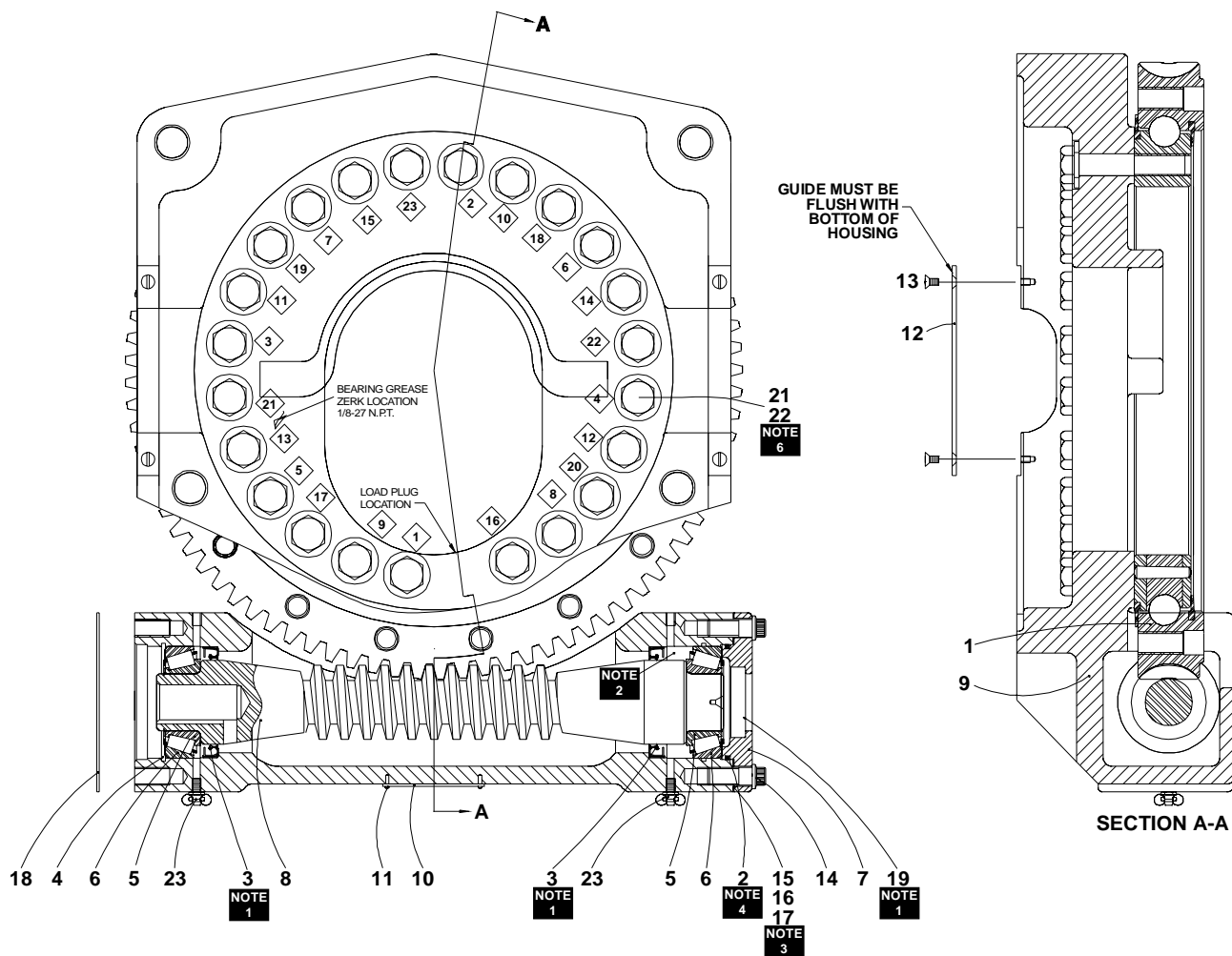
**GEAR ROTATOR (71056551)**

| ITEM | PART NO. | DESCRIPTION                 | QTY |
|------|----------|-----------------------------|-----|
| 1.   | 70056552 | SRB                         | 1   |
| 2.   | 70395074 | O-RING                      | 1   |
| 3.   | 70395076 | SEAL                        | 2   |
| 4.   | 70145846 | SNAP RING                   | 1   |
| 5.   | 70055271 | BEARING-CONE                | 2   |
| 6.   | 70055281 | BEARING-CUP                 | 2   |
| 7.   | 70145501 | BEARING RETAINER            | 1   |
| 8.   | 70056550 | WORM                        | 1   |
| 9.   | 70145849 | HOUSING                     | 1   |
| 10.  | 70145847 | LABEL PLATE                 | 1   |
| 11.  | 70142375 | DRIVE SCREW                 | 2   |
| 12.  | 70145848 | HOSE GUIDE                  | 1   |
| 13.  | 72601754 | SCR #10-24X3/8 SLTFH        | 4   |
| 14.  | 72601733 | CAP SCR 1/2-13X1-1/4 FERRY1 | 4   |
| 15.  | 73145506 | SHIM-.005                   | 2   |
| 16.  | 73145505 | SHIM-.015                   | 2   |
| 17.  | 73145504 | SHIM-.030                   | 2   |
| 18.  | 76039295 | GASKET                      | 1   |
| 19.  | 72533604 | PLUG                        | 1   |
| 20.  | 72661504 | DOWEL PIN 3/8X1             | 2   |
| 21.  | 72601751 | CAP SCR 5/8-11X2-3/4 HHGR8  | 23  |
| 22.  | 72063219 | WASHER 5/8 HARD             | 23  |
| 23.  | 72533605 | ZERK                        | 2   |

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**ASSEMBLY NOTES**

1. INSTALL SEALS 3 & 19 USING LOCTITE PLASTIC GASKET (54931) ON O.D. LUBRICATE SEAL SURFACE BEFORE ASSEMBLY.
2. PACK CAVITIES WITH EPO GREASE.
3. SHIM TO OBTAIN .000-.004 END PLAY ON WORM SHAFT.
4. LUBRICATE O-RING 2 WITH WORM GEAR OIL BEFORE INSTALLING.
5. SET BACKLASH BETWEEN WORM & ROTATION BEARING AT .005-.012".
6. TIGHTEN 5/8-11, GR8 MOUNTING BOLTS AS FOLLOWS:
  - A. TIGHTENING MUST BE PROGRESSIVE AND AT 180° INTERVALS.  
FIRST INTERVAL IS AT 70 FT-LBS.  
SECOND INTERVAL IS AT 140 FT-LBS.  
THIRD INTERVAL IS AT 210 FT-LBS.
  - B. TIGHTEN BOLTS IN ORDER AS SHOWN IN DIAMONDS.
  - C. DO NOT USE LOCTITE ON MOUNTING BOLTS.
7. ITEM 23 SHIPS LOOSE.





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### MAST ASM (41715305)

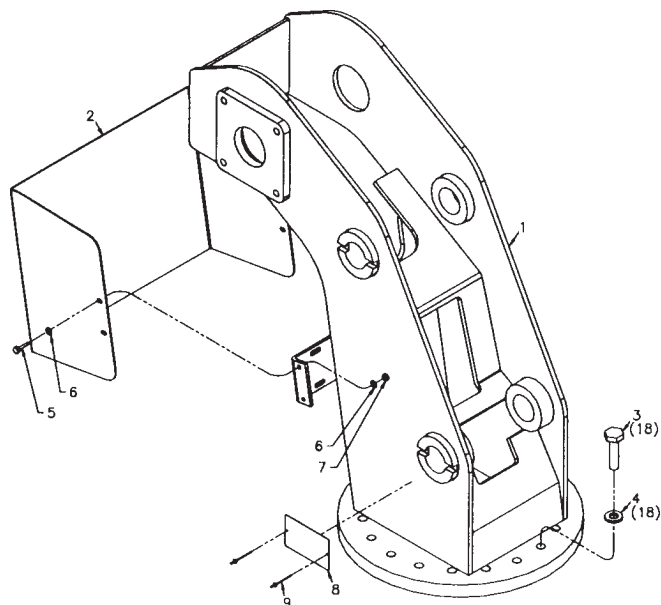
| ITEM | PART NO. | DESCRIPTION                | QTY |
|------|----------|----------------------------|-----|
| 1.   | 52715304 | MAST                       | 1   |
| 2.   | 60119127 | COVER-VB                   | 1   |
| 3.   | 72601482 | CAP SCR 5/8-11X2-1/2 HHGR8 | 18  |
| 4.   | 72063119 | WASHER 5/8 FLAT HARD       | 18  |
| 5.   | 72060004 | CAP SCR 1/4-20X1 HHGR5     | 4   |
| 6.   | 72063001 | WASHER 1/4 WRT             | 8   |
| 7.   | 72062104 | NUT 1/4-20 HEX LOCK        | 4   |
| 8.   | 70029119 | SERIAL NO. PLACARD         | 1   |
| 9.   | 72066340 | RIVET 1/8X3/8GRIP POP      | 2   |

#### WARNING

Anytime the gear-bearing bolts have been removed, they must be replaced with new bolts of identical grade and size. failure to replace gear-bearing bolts may result in bolt failure due to metal fatigue, causing serious injury or death.

Note: Do not use thread lock on item #3.

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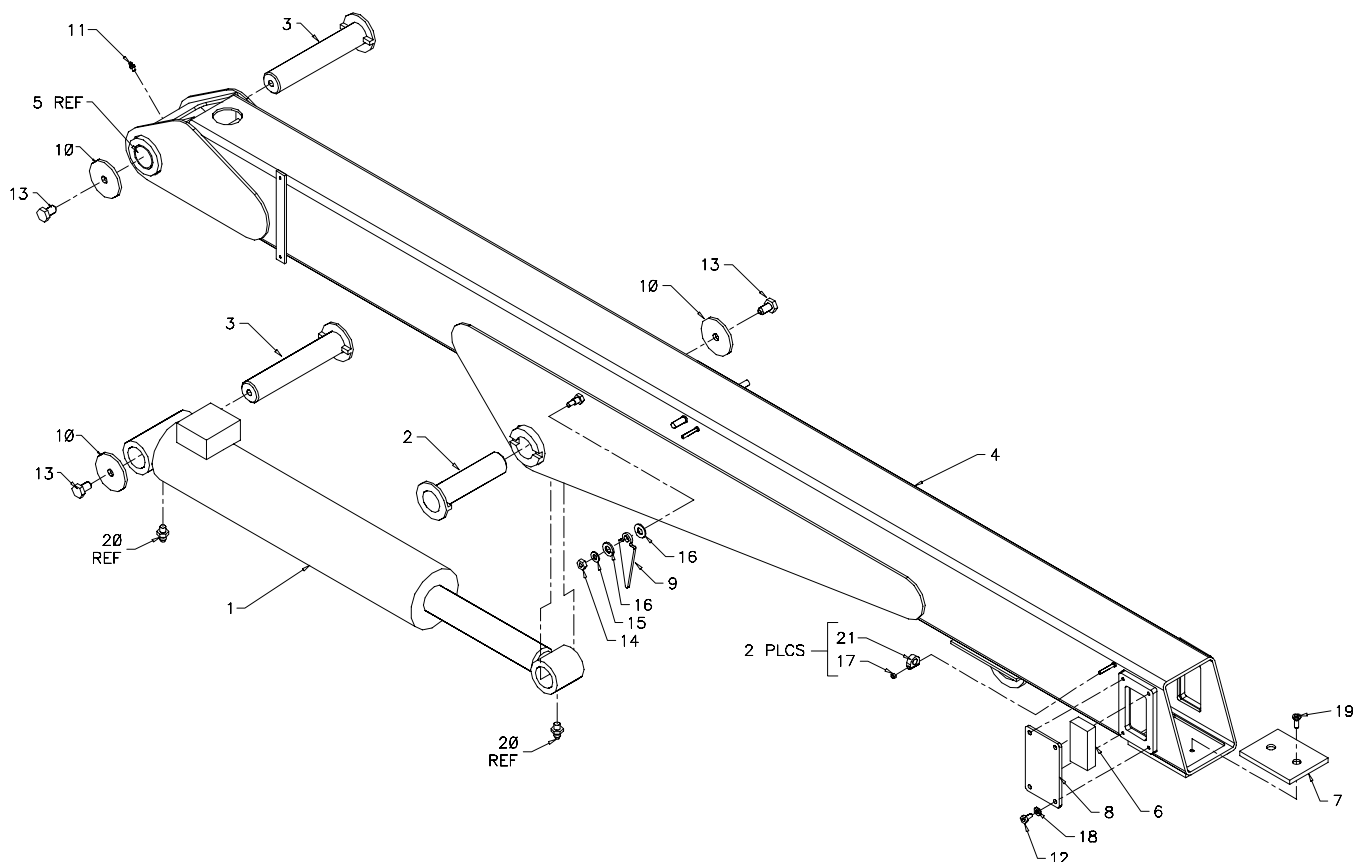
3-7

### LOWER BOOM ASM (41712180)

|     |          |                             |      |
|-----|----------|-----------------------------|------|
| 1.  | 3C126990 | CYLINDER (INCL. 20)         | 1    |
| 2.  | 52703748 | PIN                         | 1    |
| 3.  | 52703747 | PIN                         | 2    |
| 4.  | 52712159 | LOWER BOOM (INCL: 5)        | 1    |
| 5.  | 7BF81520 | BUSHING (PART OF 4)         | 4REF |
| 6.  | 60030015 | WEAR PAD                    | 2    |
| 7.  | 60030139 | WEAR PAD                    | 1    |
| 8.  | 60103463 | RETAINER PLATE              | 2    |
| 9.  | 60105544 | ANGLE INDICATOR             | 2    |
| 10. | 60106331 | PIN RETAINER PLATE-3-1/2"   | 3    |
| 11. | 72053508 | GREASE ZERK 1/8 NPT         | 1    |
| 12. | 72060023 | CAP SCR 5/16-18X3/4 HHGR5   | 8    |
| 13. | 72060147 | CAP SCR 5/8-11X1 HHGR5      | 3    |
| 14. | 72062103 | NUT 3/8-16 LOCK             | 2    |
| 15. | 72063003 | WASHER 3/8 WRT              | 2    |
| 16. | 72063005 | WASHER 1/2 WRT              | 4    |
| 17. | 72062104 | NUT 1/4-20 LOCK             | 2    |
| 18. | 72063050 | WASHER 5/16 LOCK            | 8    |
| 19. | 72601043 | CAP SCR 3/8-16X3/4 FLH SOC  | 2    |
| 20. | 72053507 | GREASE ZERK 1/4-28 (PART 1) | 2REF |
| 21. | 70034381 | CORD GUIDE                  | 2    |

#### NOTE

Any time the pin retainer plate bolts have been removed, apply serviceable thread locker to the threads before reassembly.





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**LOWER BOOM CYLINDER (3C126990)**

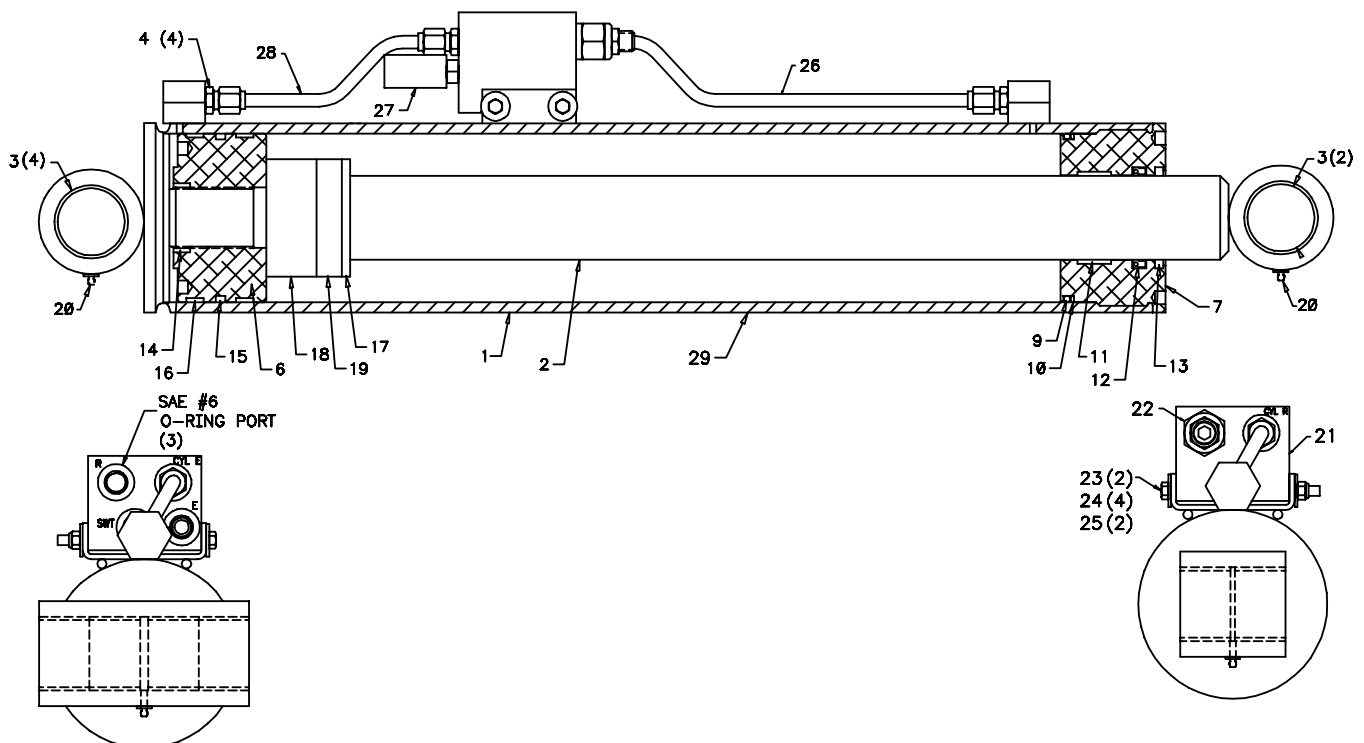
|     |          |                             |      |
|-----|----------|-----------------------------|------|
| 1.  | 4C126990 | CASE ASM (INCL: 3,4,20)     | 1REF |
| 2.  | 4G038940 | ROD ASM (INCL: 3,20)        | 1REF |
| 3.  | 7BF81520 | BUSHING (PART OF 1 & 2)     | 6REF |
| 4.  | 72533186 | ADAPTER #6MFACE #6MSTR      | 4    |
| 6.  | 6I503181 | PISTON                      | 1REF |
| 7.  | 6H050025 | HEAD                        | 1REF |
| 8.  | 9B043920 | SEAL KIT (INCL: 9-17)       | 1REF |
| 9.  | 7Q072350 | O-RING (PART OF 8)          | 1REF |
| 10. | 7Q10P350 | BACKUP RING (PART OF 8)     | 1REF |
| 11. | 7T2N8027 | WEAR RING (PART OF 8)       | 1REF |
| 12. | 7R546025 | U-CUP (PART OF 8)           | 1REF |
| 13. | 7R14P025 | ROD WIPER (PART OF 8)       | 1REF |
| 14. | 7T61N181 | LOCK RING (PART OF 8)       | 1REF |
| 15. | 7T66P500 | PISTON SEAL (PART OF 8)     | 1REF |
| 16. | 7T2N4050 | WEAR RING (PART OF 8)       | 2REF |
| 17. | 6A025025 | WAFFER LOCK (PART OF 8)     | 1REF |
| 18. | 6C150025 | STOP TUBE                   | 1REF |
| 19. | 6C075025 | STOP TUBE                   | 1REF |
| 20. | 72053507 | GREASE ZERK (PART OF 1 & 2) | 2REF |
| 21. | 73540035 | C'BAL VALVE (INCL:22,27)    | 1REF |
| 22. | 73540052 | C'BAL VALVE (PART OF 21)    | 1REF |
|     | 73540039 | C'BAL VALVE BEFORE 2-15-00  | 1REF |
| 23. | 72060037 | CAP SCR 5/16-18X4 HHGR5     | 2    |
| 24. | 72063002 | WASHER 5/16 WRT             | 4    |
| 25. | 72062109 | NUT 5/16-18 LOCK            | 2    |
| 26. | 70145927 | TUBE ASM                    | 1    |
| 27. | 77041561 | PR. SWITCH (PART OF 21)     | 1REF |
| 28. | 70145753 | TUBE ASM                    | 1    |
| 29. | 3C126990 | CYLINDER                    | 1    |

**NOTE**

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

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

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO CYLINDER HEAD AND CASE THREADS.





00006020: 41707663.01.19990104

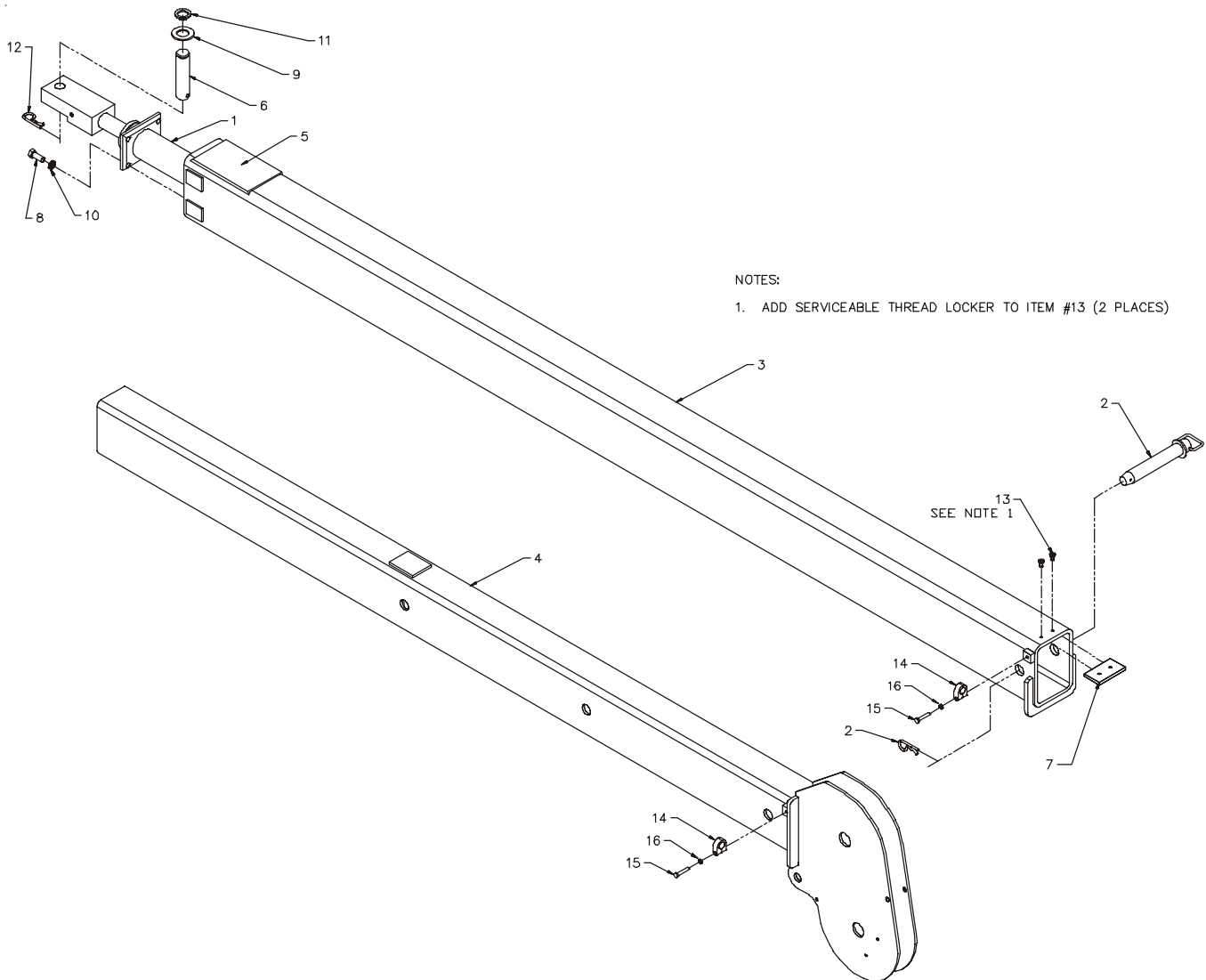
### EXT BOOM ASM (41707663)

| ITEM | PART NO. | DESCRIPTION                | QTY |
|------|----------|----------------------------|-----|
| 1.   | 3B309820 | EXTENSION CYLINDER         | 1   |
| 2.   | 73733171 | PIN 1X6 LOCK W/HAIRPIN     | 1   |
| 3.   | 52707723 | 1ST STAGE EXT BOOM         | 1   |
| 4.   | 52707724 | 2ND STAGE EXT BOOM         | 1   |
| 5.   | 60030189 | WEAR PAD                   | 1   |
| 6.   | 60101905 | PIN                        | 1   |
| 7.   | 60121447 | STROKE STOP                | 1   |
| 8.   | 72060092 | CAP SCR 1/2-13X1-1/4 HHGR5 | 4   |
| 9.   | 72063034 | MACH BUSHING 1X10GA        | 1   |
| 10.  | 72063053 | WASHER 1/2 LOCK            | 4   |
| 11.  | 72066125 | RETAINING RING 1 HD EXT    | 1   |
| 12.  | 72066145 | HAIR PIN .19               | 1   |
| 13.  | 72601750 | CAP SCR 3/8-16X1/2BHDSOC   | 2   |
| 14.  | 70034381 | CORD GUIDE                 | 2   |
| 15.  | 72060006 | CAP SCR 1/4-20X1-1/2 HHGR5 | 2   |
| 16.  | 72063049 | WASHER 1/4 LOCK            | 2   |

3-9

#### NOTE

CORD GUIDE (70034381) SHOULD BE INSTALLED WITH GUIDE HOLE UP.





00006020: 3B309820.01.19990104

3-10

**EXT BOOM CYLINDER (3B309820)**

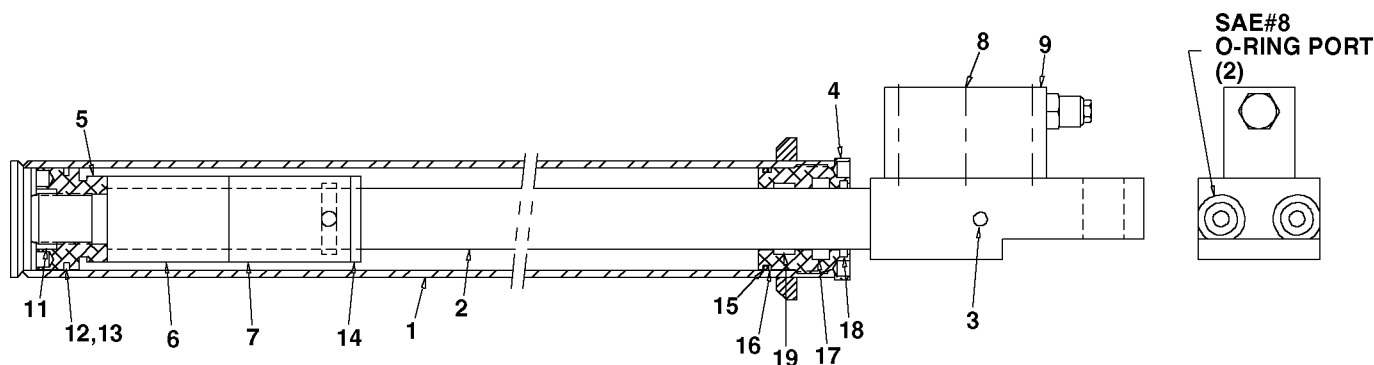
| ITEM | PART NO. | DESCRIPTION                  | QTY  |
|------|----------|------------------------------|------|
| 1.   | 4B309820 | CASE (INCL:3)                | 1    |
| 2.   | 4H309820 | ROD (INCL:)                  | 1    |
| 3.   | 7PNPXT02 | PLUG (PART OF 1)             | 3REF |
| 4.   | 6H025015 | HEAD                         | 1    |
| 5.   | 6IX02512 | PISTON                       | 1    |
| 6.   | 6C300015 | STOP TUBE                    | 1    |
| 7.   | 6C309820 | STOP TUBE                    | 1    |
| 8.   | 72060713 | CAP SCR 1/4-20X2-1/2 SH      | 6    |
| 9.   | 73054900 | HOLDING VALVE                | 1    |
| 10.  | 9B101220 | SEAL KIT (INCL: 11-19)       | 1    |
| 11.  | 7T61N125 | LOCK RING SEAL (PART OF 10)  | 1REF |
| 12.  | 7T66P025 | PISTON SEAL (PART OF 10)     | 1REF |
| 13.  | 7Q072137 | O-RING (PART OF 10)          | 1REF |
| 14.  | 6A025015 | WAFFER LOCK RING(PART OF 10) | 1REF |
| 15.  | 7Q072228 | O-RING (PART OF 10)          | 1REF |
| 16.  | 7Q10P228 | BACK-UP RING (PART OF 10)    | 1REF |
| 17.  | 7R546015 | ROD SEAL (PART OF 10)        | 1REF |
| 18.  | 7R14P015 | ROD WIPER (PART OF 10)       | 1REF |
| 19.  | 7T2N8015 | WEAR RING (PART OF 10)       | 1REF |

**NOTE**

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

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

APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO CYLINDER HEAD AND CASE THREADS.



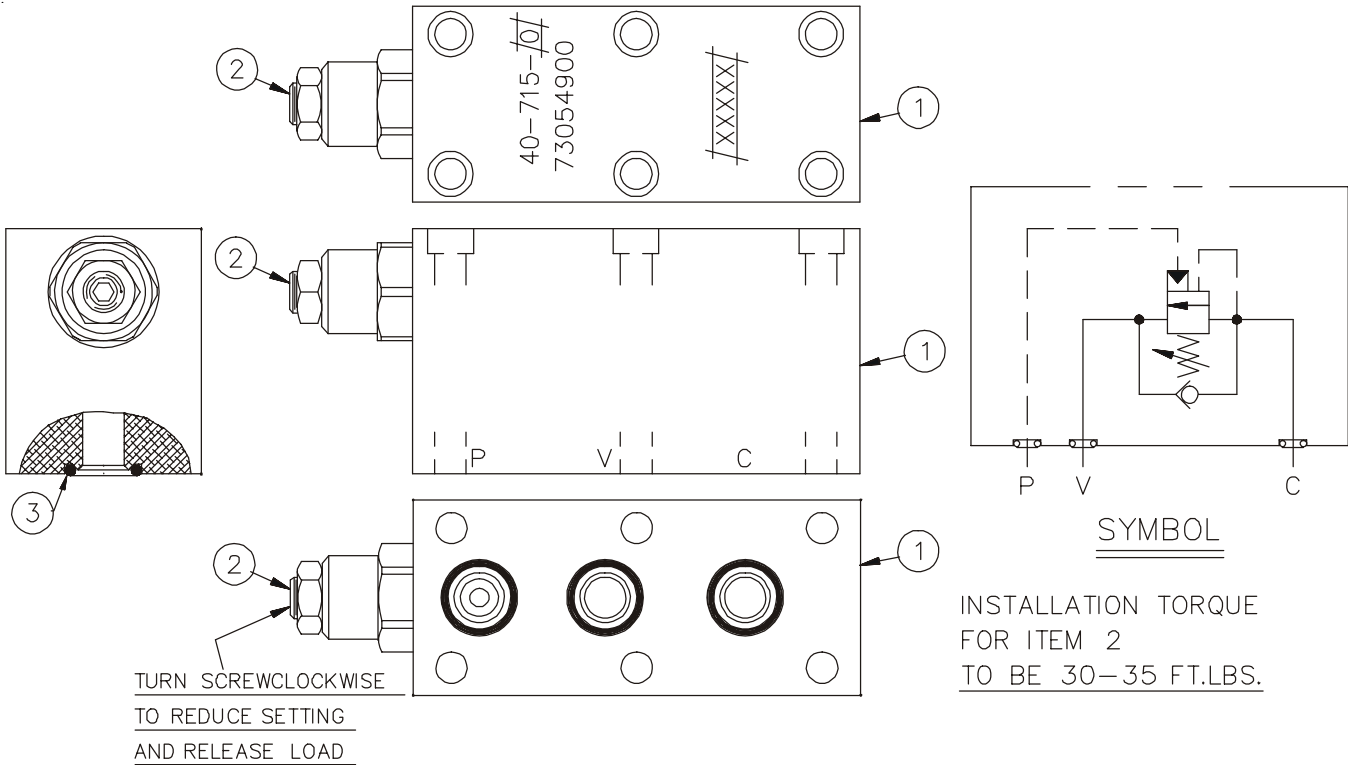


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3-11

**LOCKING/HOLDING VALVE (73054900)**

| ITEM | PART NO. | DESCRIPTION          | QTY |
|------|----------|----------------------|-----|
| 1.   | 5V245940 | VALVE BODY           | 1   |
| 2.   | 73054999 | COUNTERBALANCE VALVE | 1   |
| 3.   | 7Q072112 | O-RING               | 3   |

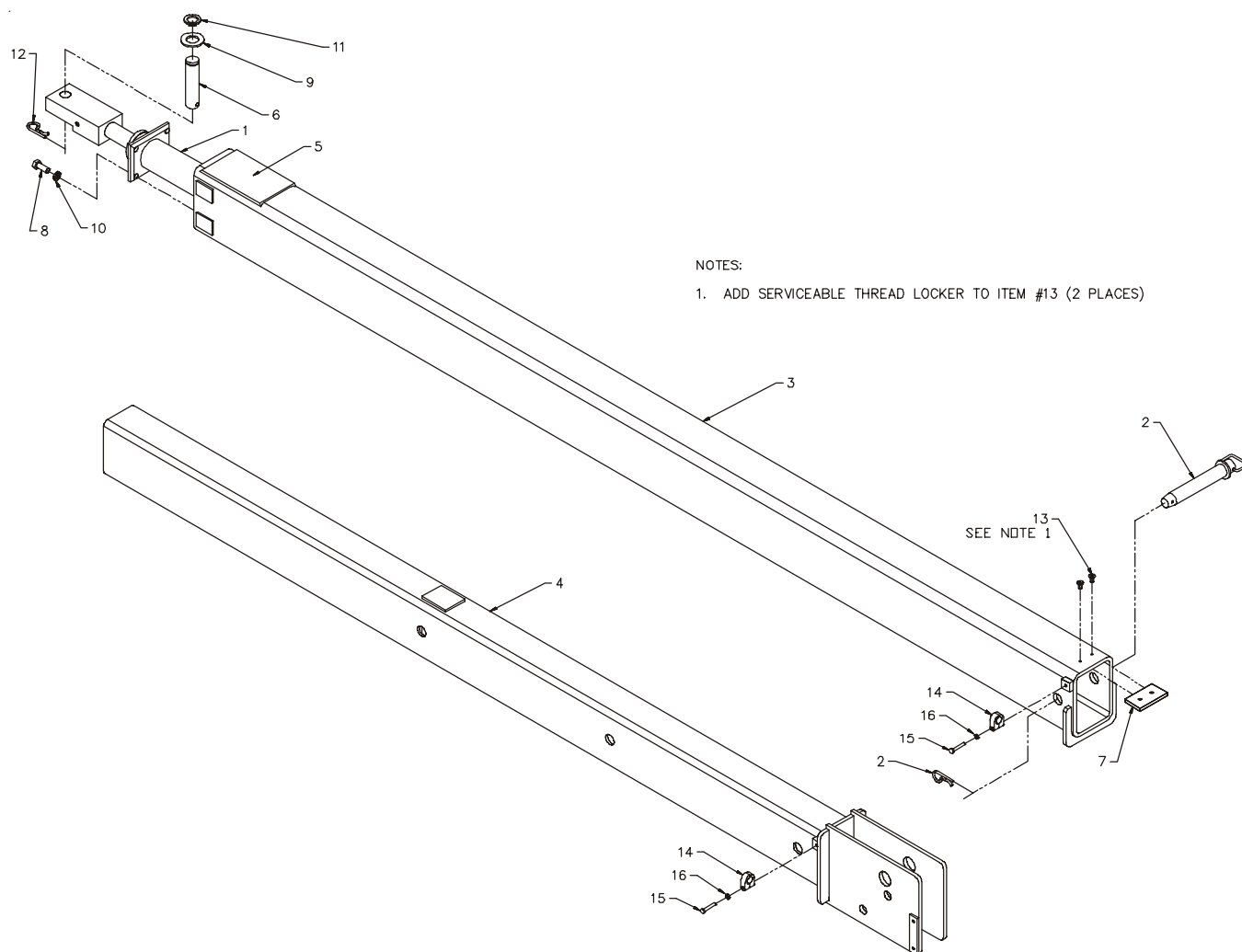


3-12

### NOTE

CORD GUIDE (70034381) SHOULD BE INSTALLED WITH GUIDE HOLE UP.

| ITEM | PART NO. | DESCRIPTION                | QTY |
|------|----------|----------------------------|-----|
| 1.   | 3B309820 | EXTENSION CYLINDER         | 1   |
| 2.   | 73733171 | PIN 1X6 LOCK W/HAIRPIN     | 1   |
| 3.   | 52707723 | 1ST STAGE EXT BOOM         | 1   |
| 4.   | 52709456 | 2ND STAGE EXT BOOM         | 1   |
| 5.   | 60030189 | WEAR PAD                   | 1   |
| 6.   | 60101905 | PIN                        | 1   |
| 7.   | 60121447 | STROKE STOP                | 1   |
| 8.   | 72060092 | CAP SCR 1/2-13X1-1/4 HHGR5 | 4   |
| 9.   | 72063034 | MACH BUSHING 1 X 10GA      | 1   |
| 10.  | 72063053 | WASHER 1/2 LOCK            | 4   |
| 11.  | 72066125 | RETAINING RING 1 HD EXT    | 1   |
| 12.  | 72066145 | HAIR PIN .19               | 1   |
| 13.  | 72601750 | CAP SCR 3/8-16X1/2 BHDSOC  | 2   |
| 14.  | 70034381 | CORD GUIDE                 | 2   |
| 15.  | 72060006 | CAP SCR 1/4-20X1-1/2 HHGR5 | 2   |
| 16.  | 72063049 | WASHER 1/4 LOCK            | 2   |



NOTES:

1. ADD SERVICEABLE THREAD LOCKER TO ITEM #13 (2 PLACES)





00006020: 41712179.01.19990104

3-13

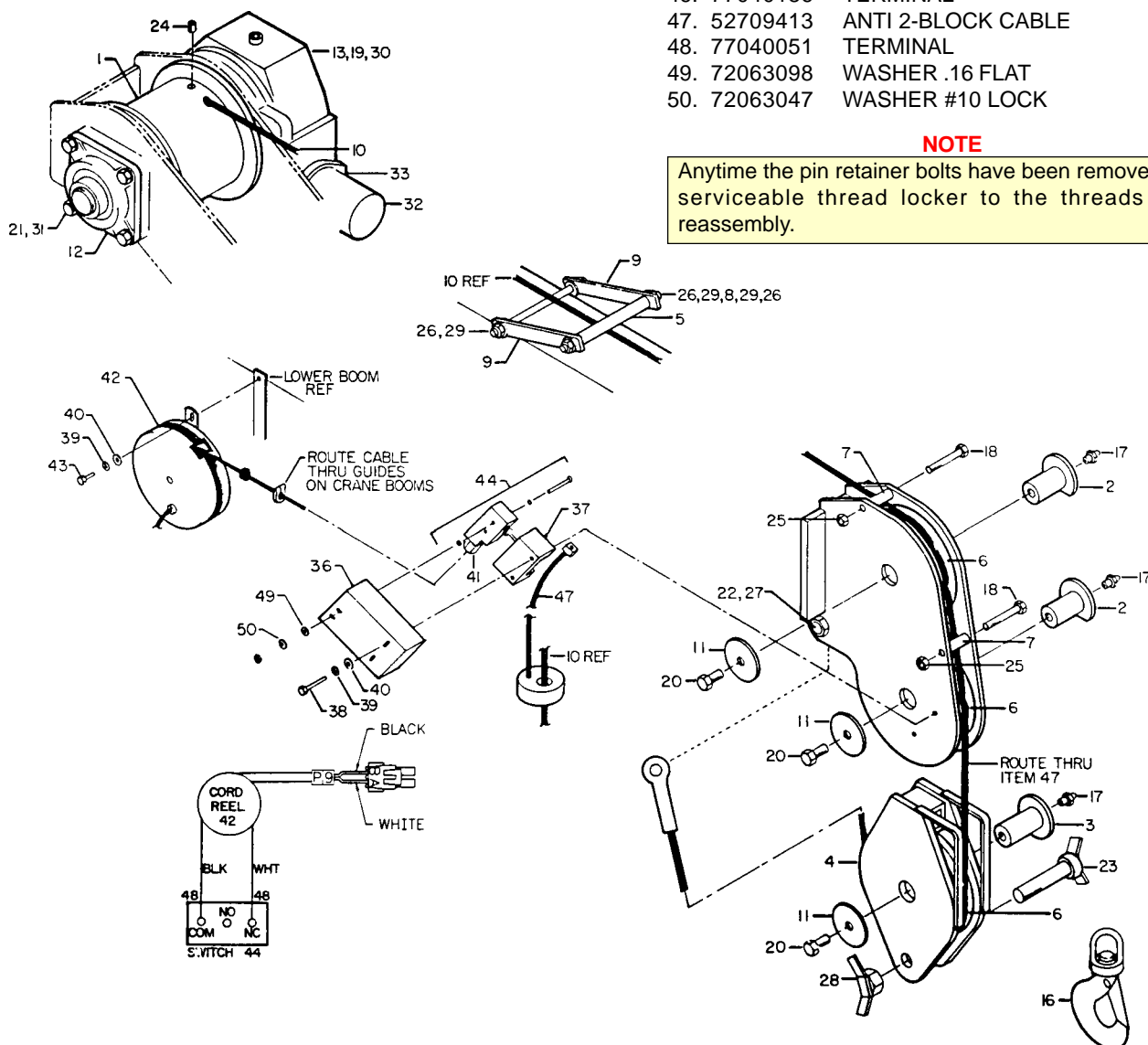
**WINCH/CABLE/HOOK KIT (41712179)**

| ITEM | PART NO. | DESCRIPTION                | QTY |
|------|----------|----------------------------|-----|
| 1.   | 52712162 | WINCH DRUM                 | 1   |
| 2.   | 52707730 | PIN                        | 2   |
| 3.   | 52707731 | PIN                        | 1   |
| 4.   | 52707735 | SNATCH BLOCK               | 1   |
| 5.   | 60030108 | ROLLER - CABLE GUIDE       | 1   |
| 6.   | 60030255 | SHEAVE                     | 3   |
| 7.   | 60102596 | SPACER                     | 2   |
| 8.   | 60105538 | STUD- CABLE GUIDE          | 1   |
| 9.   | 60105540 | CABLE GUIDE SIDE BAR       | 2   |
| 10.  | 70580089 | CABLE 7/16 x 100' IWRC-XIP | 1   |
| 11.  | 60109337 | PIN RETAINER PLATE 3"      | 3   |
| 12.  | 70055117 | BEARING, FLANGE            | 1   |
| 13.  | 70570198 | WINCH                      | 1   |
| 16.  | 70732882 | HOOK-SWVL POS LOCK 5.9TON  | 1   |
| 17.  | 72053508 | ZERK 1/8 NPT               | 3   |
| 18.  | 72060893 | CAP SCR 3/8-16X3-1/4 HHGR5 | 2   |
| 19.  | 72060921 | CAP SCR 1/2-13X3-3/4 HHGR5 | 4   |
| 20.  | 72060147 | CAP SCR 5/8-11X1 HHGR5     | 3   |
| 21.  | 72060148 | CAP SCR 5/8-11X1-1/4 HHGR5 | 4   |

|     |          |                             |   |
|-----|----------|-----------------------------|---|
| 22. | 72060217 | CAP SCR 7/8-9X4 HHGR5       | 1 |
| 23. | 52712181 | PIN                         | 1 |
| 24. | 72060596 | SET SCREW 1/2-13X3/4 SH     | 1 |
| 25. | 72062103 | NUT 3/8-16 LOCK             | 2 |
| 26. | 72062080 | NUT 1/2-13 LOCK             | 4 |
| 27. | 72062120 | NUT 7/8-9 LOCK              | 1 |
| 28. | 52712183 | RETAINER 3/4-10 HEX         | 1 |
| 29. | 72063005 | WASHER 1/2 WRT              | 4 |
| 30. | 72063053 | WASHER 1/2 LOCK             | 4 |
| 31. | 72063055 | WASHER 5/8 LOCK             | 4 |
| 32. | 73051513 | HYDRAULIC MOTOR             | 1 |
| 33. | 72060064 | CAP SCR 7/16-14X1-1/2 HHGR5 | 2 |
| 36. | 60113593 | COVER                       | 1 |
| 37. | 60113594 | MOUNTING BLOCK              | 1 |
| 38. | 72060008 | CAP SCR 1/4-20X2 HHGR5      | 2 |
| 39. | 72063049 | WASHER 1/4 LOCK             | 4 |
| 40. | 72063001 | WASHER 1/4 FLAT             | 4 |
| 41. | 77044468 | STRAIN RELIEF               | 1 |
| 42. | 51713168 | CORD REEL                   | 1 |
| 43. | 72060000 | CAP SCR 1/4-20X1/2 HHGR5    | 2 |
| 44. | 77041291 | SWITCH                      | 1 |
| 45. | 77040047 | TERMINAL                    | 1 |
| 46. | 77040186 | TERMINAL                    | 1 |
| 47. | 52709413 | ANTI 2-BLOCK CABLE          | 1 |
| 48. | 77040051 | TERMINAL                    | 2 |
| 49. | 72063098 | WASHER .16 FLAT             | 2 |
| 50. | 72063047 | WASHER #10 LOCK             | 2 |

**NOTE**

Anytime the pin retainer bolts have been removed, apply serviceable thread locker to the threads before reassembly.





00006020: 31712207.01.19990104

**WINCH/CABLE/HOOK KIT W/ FLIP SHEAVE (31712207)**

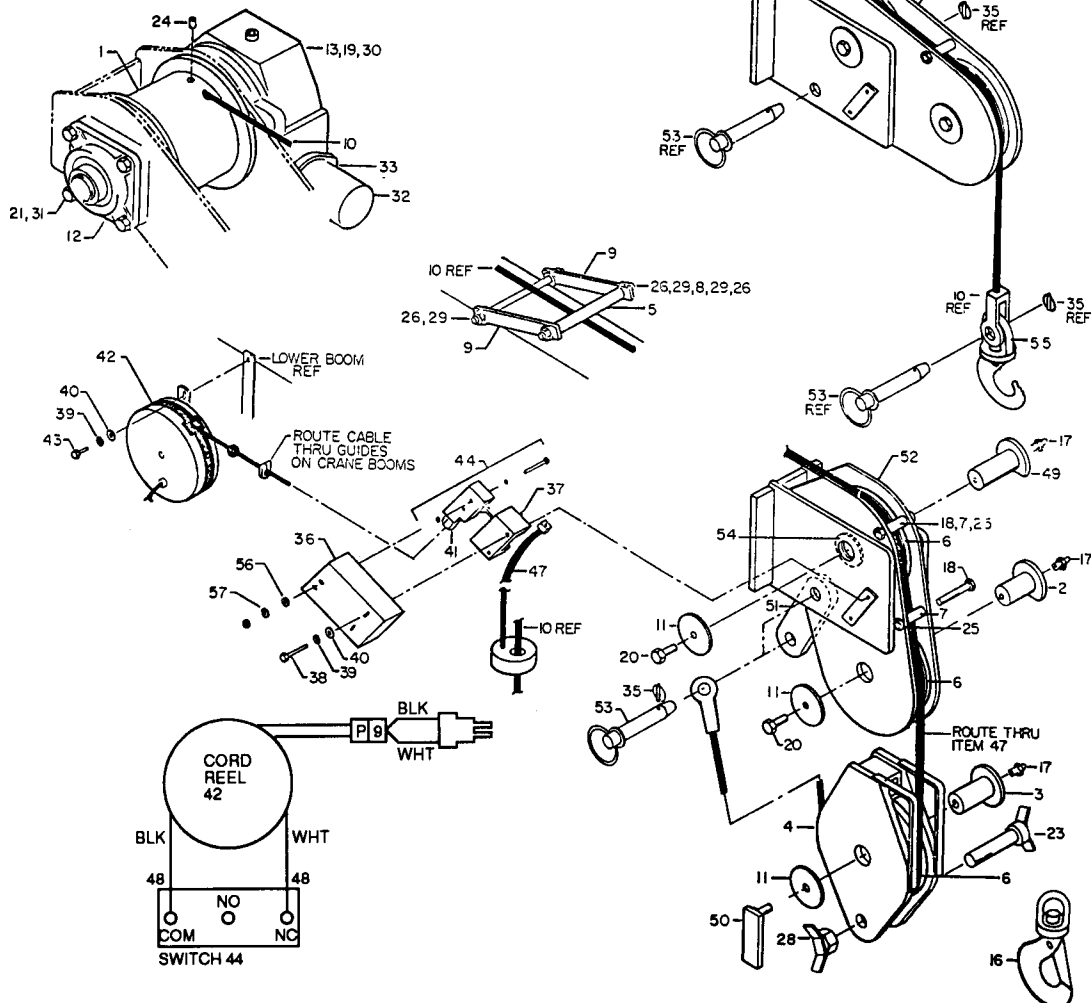
| ITEM | PART NO. | DESCRIPTION                 | QTY |
|------|----------|-----------------------------|-----|
| 1.   | 52712162 | WINCH DRUM                  | 1   |
| 2.   | 52707730 | PIN                         | 1   |
| 3.   | 52707731 | PIN                         | 1   |
| 4.   | 52707735 | SNATCH BLOCK                | 1   |
| 5.   | 60030108 | ROLLER - CABLE GUIDE        | 1   |
| 6.   | 60030255 | SHEAVE                      | 3   |
| 7.   | 60102596 | SPACER                      | 2   |
| 8.   | 60105538 | STUD- CABLE GUIDE           | 1   |
| 9.   | 60105540 | CABLE GUIDE SIDE BAR        | 2   |
| 10.  | 70580089 | CABLE 7/16 x 100' IWRC-XIP  | 1   |
| 11.  | 60109337 | PIN RETAINER PLATE 3"       | 3   |
| 12.  | 70055117 | BEARING, FLANGE             | 1   |
| 13.  | 70570198 | WINCH                       | 1   |
| 16.  | 70732882 | HOOK-SW/L POS LOCK 5.9TON   | 1   |
| 17.  | 72053508 | ZERK 1/8 NPT                | 3   |
| 18.  | 72060893 | CAP SCR 3/8-16X3-1/4 HHGR5  | 2   |
| 19.  | 72060921 | CAP SCR 1/2-13X3-3/4 HHGR5  | 4   |
| 20.  | 72060147 | CAP SCR 5/8-11X1 HHGR5      | 2   |
| 21.  | 72060148 | CAP SCR 5/8-11X1-1/4 HHGR5  | 4   |
| 23.  | 52712181 | PIN                         | 1   |
| 24.  | 72060596 | SET SCREW 1/2-13X3/4 SH     | 1   |
| 25.  | 72062103 | NUT 3/8-16 LOCK             | 2   |
| 26.  | 72062080 | NUT 1/2-13 LOCK             | 4   |
| 28.  | 52712183 | RETAINER 3/4-10 HEX         | 1   |
| 29.  | 72063005 | WASHER 1/2 WRT              | 4   |
| 30.  | 72063053 | WASHER 1/2 LOCK             | 4   |
| 31.  | 72063055 | WASHER 5/8 LOCK             | 4   |
| 32.  | 73051513 | HYDRAULIC MOTOR             | 1   |
| 33.  | 72060064 | CAP SCR 7/16-14X1-1/2 HHGR5 | 2   |

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|     |          |                          |     |
|-----|----------|--------------------------|-----|
| 35. | 72661367 | PIN-QUICK                | 2   |
| 36. | 60113593 | COVER                    | 1   |
| 37. | 60113594 | MOUNTING BLOCK           | 1   |
| 38. | 72060008 | CAP SCR 1/4-20X2 HHGR5   | 2   |
| 39. | 72063049 | WASHER 1/4 LOCK          | 4   |
| 40. | 72063001 | WASHER 1/4 FLAT          | 4   |
| 41. | 77044468 | STRAIN RELIEF            | 1   |
| 42. | 51713168 | CORD REEL                | 1   |
| 43. | 72060000 | CAP SCR 1/4-20X1/2 HHGR5 | 2   |
| 44. | 77041291 | SWITCH                   | 1   |
| 45. | 77040047 | TERMINAL                 | 1   |
| 46. | 77040186 | TERMINAL                 | 1   |
| 47. | 52709413 | ANTI 2-BLOCK CABLE       | 1   |
| 48. | 77040051 | TERMINAL                 | 2   |
| 49. | 52709438 | PIN                      | 1   |
| 50. | 52709458 | WING BOLT                | 1   |
| 51. | 60113679 | LINK                     | 1   |
| 52. | 52709455 | FLIP SHEAVE              | 1   |
| 53. | 72661365 | PIN W/HANDLE             | 2   |
| 54. | 72063037 | MACH BUSHING 1-1/2 10GA  | 2   |
| 55. | 71073920 | HOOK-3 TON SWIVEL        | 1   |
|     | 70074000 | SAFETY LATCH             | REF |
| 56. | 72063098 | WASHER .16 FLAT          | 2   |
| 57. | 72063047 | WASHER #10 LOCK          | 2   |

**NOTE**

Anytime the pin retainer bolts have been removed, apply serviceable thread locker to the threads before reassembly.





00006020: 70570198.01.19990104

3-15

**WINCH (70570198)**

| ITEM | PART NO. | DESCRIPTION            | QTY |
|------|----------|------------------------|-----|
| 1.   | 72601568 | CAP SCREW              | 8   |
| 2.   | 70143945 | RETAINING RING         | 1   |
| 3.   | 70055220 | BALL BEARING           | 2   |
| 4.   | 72661403 | RETAINING RING         | 2   |
| 5.   | 70056522 | WORM-SR                | 1   |
| 6.   | 70143865 | PIPE PLUG              | 2   |
| 7.   | 70143946 | THRUST WASHER          | 1   |
| 8.   | 70145384 | OUTPUT SHAFT           | 1   |
| 9.   | 72601567 | CAP SCREW              | 2   |
| 10.  | 70733135 | BRAKE KIT (INCL:32-45) | 1   |
| 11.  | 76393419 | OIL SEAL               | 1   |
| 12.  | 70143948 | BUSHING                | 1   |
| 13.  | 70143949 | BUSHING                | 1   |
| 14.  | 70056521 | WORM GEAR-SR           | 1   |
| 15.  | 70048156 | BREATHER               | 1   |
| 16.  | 70143950 | HOUSING                | 1   |
| 17.  | 76393420 | O-RING                 | 1   |
| 18.  | 70143951 | COVER                  | 1   |
| 19.  | 70029559 | TAG-NAMEPLATE          | 1   |
| 22.  | 70143952 | WASHER                 | 1   |
| 23.  | 76394300 | GASKET                 | 1   |
| 24.  | 70143861 | PIPE BUSHING           | 1   |
| 25.  | 76393171 | GASKET                 | 1   |
| 26.  | —        | PROTECTOR (DISCARD)    | REF |

|                    |          |                |      |
|--------------------|----------|----------------|------|
| 30.                | 70145383 | SPACER         | 1    |
| 31.                | 70145382 | KEY            | 1    |
| 32.                | 70145381 | *STATOR PLATE  | 3REF |
| 33.                | 70145380 | *FRICTION DISC | 2REF |
| 34.                | 70145379 | *BRAKE HUB     | 1REF |
| 35.                | 70143662 | *CAM CLUTCH    | 1REF |
| 36.                | 70145377 | *WASHER        | 1REF |
| 37.                | 72063188 | *LOCKWASHER    | 1REF |
| 38.                | 72601724 | *CAP SCREW     | 1REF |
| 39.                | 70145376 | *BRAKE SPRING  | 1REF |
| 40.                | 70143660 | *THRUST WASHER | 1REF |
| 41.                | 70143666 | *BRAKE HOUSING | 1REF |
| 42.                | 72601721 | *CAP SCREW     | 2REF |
| 43.                | 76393172 | *WASHER-SEAL   | 1REF |
| 44.                | 72601722 | *LOCKNUT-SEAL  | 1REF |
| 45.                | 72601723 | *SET SCREW     | 8REF |
| * PART OF ITEM 10. |          |                |      |

GEAR RATIO: 27:1

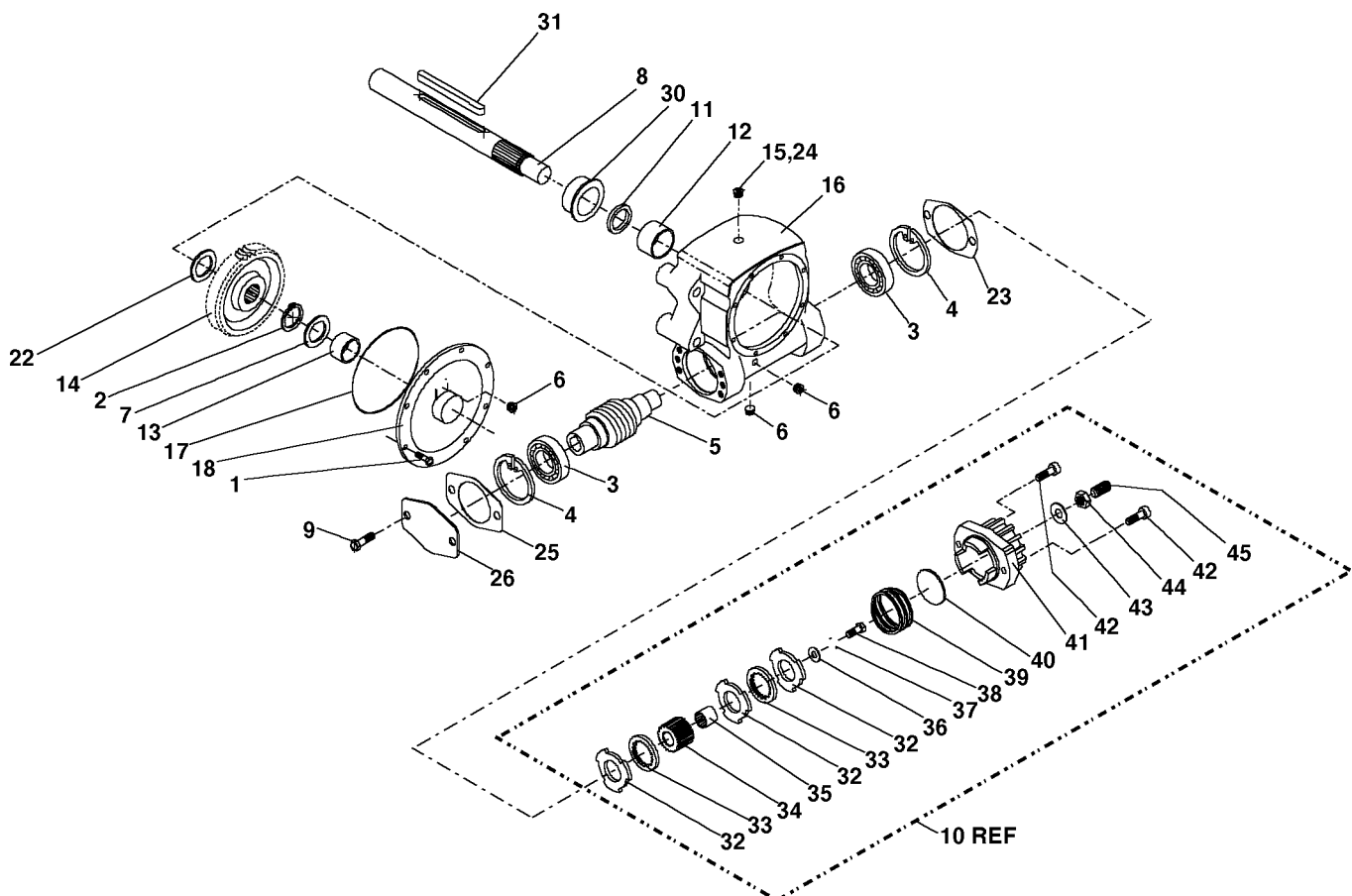
OUTPUT TORQUE: 27328 IN-LBS

MAX INPUT TORQUE: 2249 IN-LBS

MAX INPUT SPEED: 316 RPM

INSTALLED WEIGHT: 62 LBS

LUBRICATION: EP 140



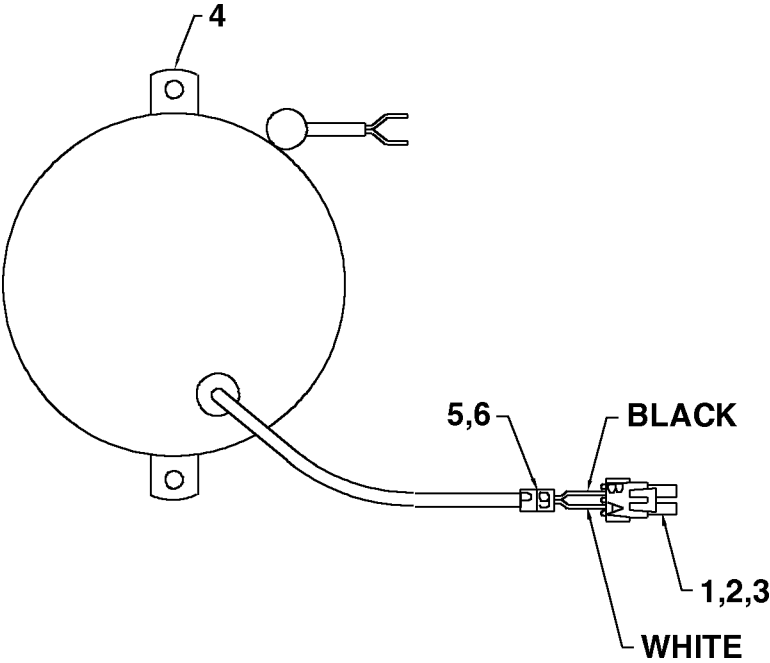


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3-16

**CORD REEL ASM (51713168)**

| ITEM | PART NO. | DESCRIPTION           | QTY |
|------|----------|-----------------------|-----|
| 1.   | 77044574 | TOWER CONNECTOR       | 1   |
| 2.   | 77044552 | PIN 18-20GA           | 2   |
| 3.   | 70394069 | CABLE SEAL            | 2   |
| 4.   | 70732193 | CORD REEL             | 1   |
| 5.   | 77041493 | WIRE MARKER-PA2-P-YEL | 1   |
| 6.   | 77041491 | WIRE MARKER-PA2-9-YEL | 1   |





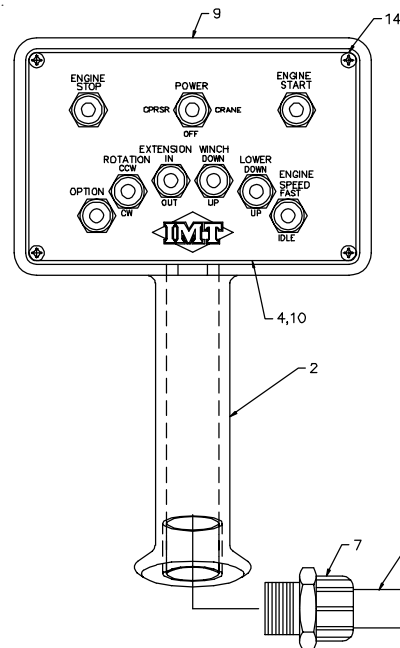
00006020: 51713182.01.20000922

3-17

**PROP'L RMT HANDLE ASM (51713182)**

|     |          |                         |        |
|-----|----------|-------------------------|--------|
| 1.  | 89044214 | WIRE 18GA GRN           | 1.61FT |
| 2.  | 60119335 | CONTROL HANDLE          | 1      |
| 3.  | 60111141 | TRIGGER (PART OF 11)    | 1REF   |
| 4.  | 60119277 | COVER                   | 1      |
| 5.  | 70034306 | BACK COVER              | 1      |
| 7.  | 77044196 | STRAIN RELIEF 3/4       | 1      |
| 8.  | 77044621 | PIN                     | 23     |
| 9.  | 70394447 | DECAL-DGR RC ELECTRO SM | 1      |
| 10. | 70394142 | DECAL-CTRL              | 1      |
| 11. | 70394183 | TRIGGER ASM (INCL:3)    | 1      |

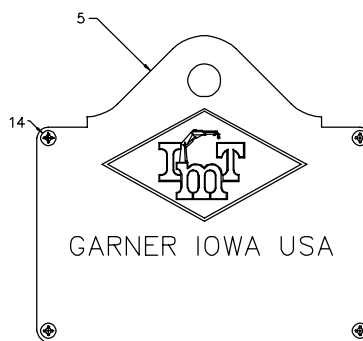
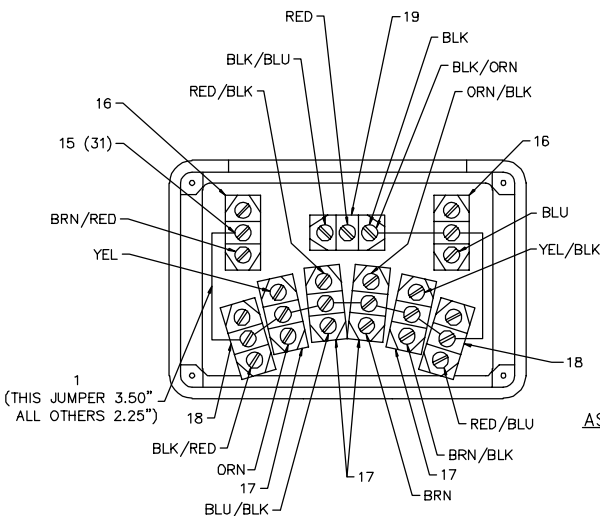
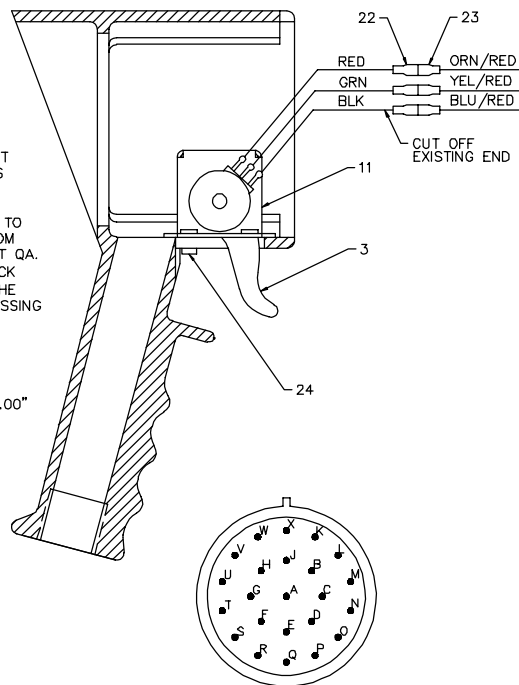
|     |          |                          |      |
|-----|----------|--------------------------|------|
| 14. | 72061009 | SHT MTL SCR #6X3/4 PH    | 8    |
| 15. | 77040051 | TERM-SPRSPD #8 16-14GA   | 31   |
| 16. | 77040371 | TOGGLE SWITCH SPST       | 2    |
| 17. | 77040372 | TOGGLE SWITCH SPDT       | 4    |
| 18. | 77040373 | TOGGLE SWITCH SPST       | 2    |
| 19. | 77040374 | TOGGLE SWITCH SPDT       | 1    |
| 20. | 77044579 | CONNECTOR                | 1    |
| 21. | 89044100 | CABLE 18GA 24WIRE        | 30FT |
| 22. | 77040147 | TERM-FSLPON 1/4TAB 22-18 | 3    |
| 23. | 77040047 | TERM-MSLPON 1/4TAB 16-14 | 3    |
| 24. | 72060602 | MACH SCR #6-32X3/8 RDHD  | 4    |
| 25. | 70145495 | TUBING-HEAT SHRINK       | .5FT |

**ASSEMBLY OF PROPORTIONAL TRIGGER**

- 1) POSITION TRIGGER ASSEMBLY INTO HANDLE ASSEMBLY.
- 2) LOOKING FROM THE BACKSIDE OF THE HANDLE, INSTALL ONLY THE TWO SCREWS LOCATED ON THE LEFT-HAND SIDE OF THE TRIGGER ASSEMBLY. (TWO SCREWS ARE SUFFICIENT FOR HOLDING THE ASSEMBLY IN PLACE.) DO NOT FULLY TIGHTEN AT THIS POINT.
- 3) PUSH THE TRIGGER ASSEMBLY TOWARDS THE FRONT OF THE HOUSING, AS THE MOUNTING SCREW HOLES WILL ALLOW. TIGHTEN THE SCREWS FULLY AT THIS POINT.
- 4) CONNECT OHMMETER TO GREEN AND BLACK WIRES TO CHECK OHM READING. ALLOWABLE SETTING IS FROM 100 TO 320 OHMS. IF OTHER THAN THIS CONTACT QA.
- 5) FILL THE RIGHT HAND SCREWS WITH SILICONE, BLACK (IF AVAILABLE) OR CLEAR. (THIS WILL ELIMINATE THE CONCERN BY THE CUSTOMER THAT THE UNIT IS MISSING THE TWO SCREWS ON THE RIGHT SIDE.)
- 6) ASSEMBLY THE REST OF THE HANDLE.

**INSTALLATION NOTE:**

- 1) CUT WIRE CABLE OUTSIDE JACKET BACK 5.00"
- 2) SLIP ON HEAT SHRINK
- 3) MAKE WIRE CONNECTIONS
- 4) PUSH HEAT SHRINK UP AND HEAT.

**ASSEMBLY OF SWITCHES ONTO FACE PLATE.**

- 1) INSTALL (1) STAR WASHER BETWEEN SWITCH & FACE PLATE.
- 2) INSTALL (1) LOCK NUT ON FRONT OF FACE PLATE TO RETAIN SWITCH.
- 3) DISCARD ALL OTHER MOUNTING HARDWARE.

| SOLID/STRIPE | FUNCTION  |
|--------------|-----------|
| A YEL/BLK    | ROT CW    |
| B ORN/BLK    | EXT OUT   |
| C BLU/BLK    | WINCH DN  |
| D RED/BLK    | WINCH UP  |
| E ORN/RED    | -         |
| F BRN        | EXT IN    |
| G BRN/RED    | ENG START |
| H BLU/RED    | -         |
| J BLK/RED    | ENG SPEED |
| K BRN/BLK    | ROT CCW   |
| L RED        | POWER     |
| M BLU        | ENG STOP  |
| N ORN        | LOWER DN  |
| O BLK/ORN    | SOL POWER |
| P YEL        | LOWER UP  |
| Q BRN/BLU    | -         |
| R YEL/RED    | -         |
| S BLK        | CRANE     |
| T BLK/BLU    | CPRSR     |
| U RED/BLU    | OPTION    |
| V BLU/ORN    | -         |
| W ORN/BLU    | -         |
| X YEL/BLU    | -         |
| - RED/ORN    | -         |

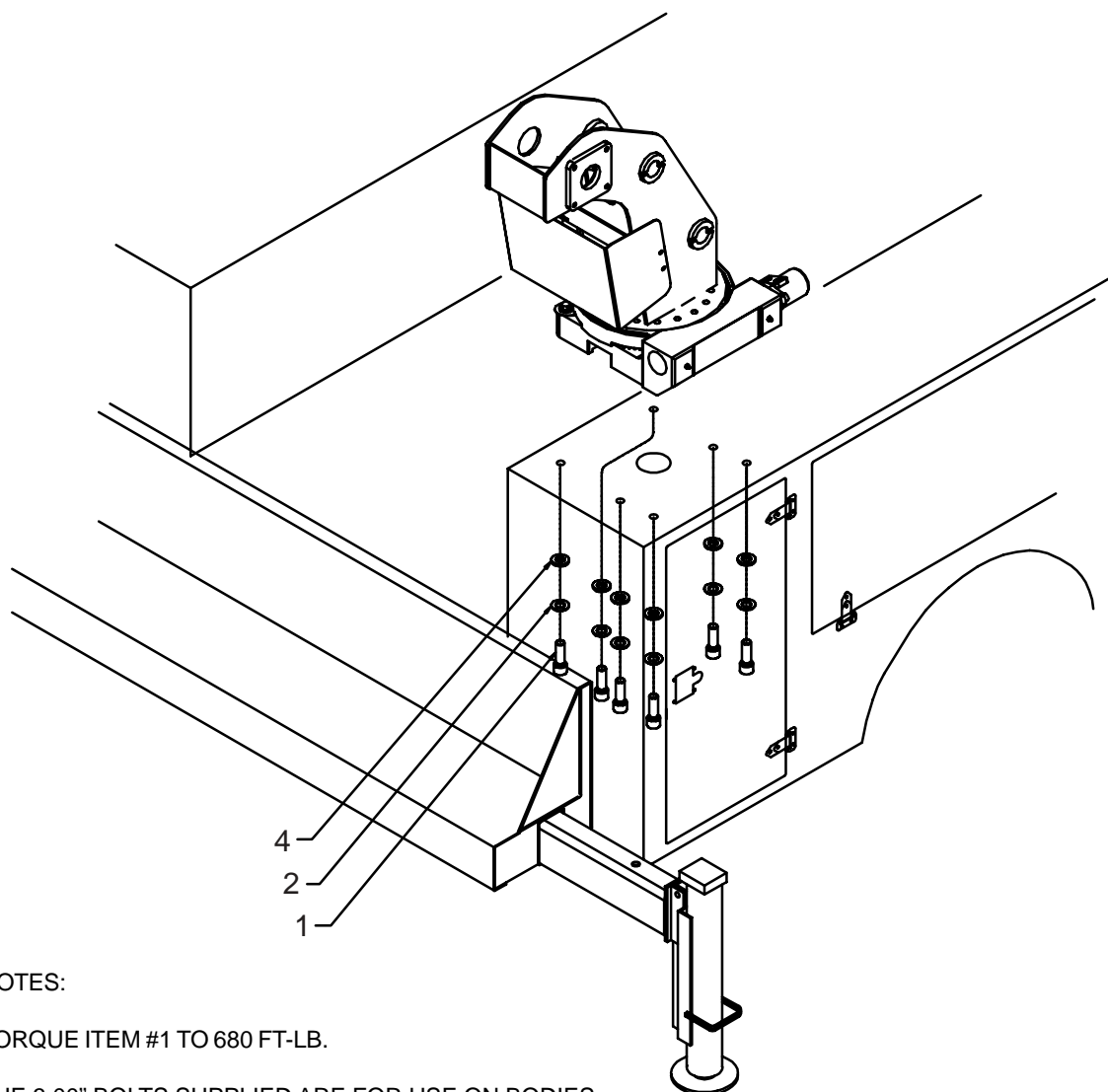


00006020: 93715067.01.20020311

3-18

### INSTALLATION KIT (93715067)

|    |          |                                    |    |
|----|----------|------------------------------------|----|
| 1. | 72601748 | CAP SCR 1-8X3 SHGR8                | 6  |
| 2. | 72063066 | WASHER 1" HI-STRGTH                | 12 |
| 3. | 73052091 | RETURN FILTER 10MIC<br>(NOT SHOWN) | 1  |
| 4. | 60123848 | WASHER-SPECIAL 1.0X2.0X1/4         | 6  |



#### NOTES:

TORQUE ITEM #1 TO 680 FT-LB.

THE 3.00" BOLTS SUPPLIED ARE FOR USE ON BODIES WITH A CRANE BOX TOP PLATE THICKNESS OF 0.88 - 1.00" **ONLY!** ON SHIP-OUT CRANES, DETERMINE THE CRANE BOX TOP PLATE THICKNESS PRIOR TO MOUNTING THE CRANE. IF BOLTS OTHER THAN THE 3.00" SUPPLIED ARE REQUIRED, THEY MUST BE 1.00-8 GRADE 8 AND BE THE APPROPRIATE LENGTH.

FAILURE TO USE PROPER LENGTH BOLT MAY CAUSE THE CAP SCREWS UNDER THE WORM HOUSING TO BOTTOM OUT BEFORE BEING TORQUED. DURING TORQUEING, CHECK TO SEE THAT THE BOLTS GET TORQUED AND THAT THEY DO NOT BOTTOM OUT ON THE WORM HOUSING.

SIZE CAPSCREWS TO ENSURE A MINIMUM OF 1.50" THREAD ENGAGEMENT.



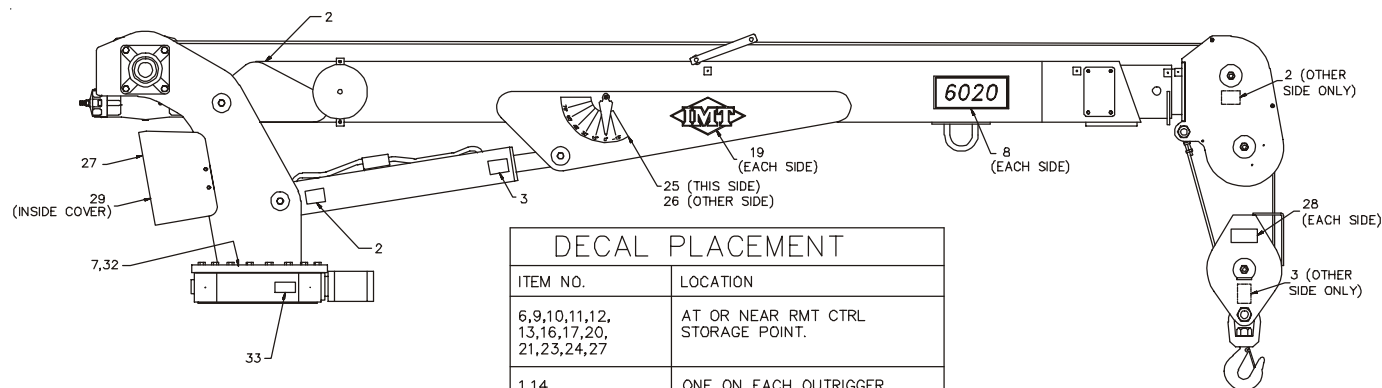
00006020: 95715068.01.20000516

3-19

### DECAL KIT (95715068)

|     |          |                           |   |
|-----|----------|---------------------------|---|
| 1.  | 70391598 | DECAL-WARNING OUTRIGGER   | 2 |
| 2.  | 70391612 | DECAL-GREASE WEEKLY LH    | 3 |
| 3.  | 70391613 | DECAL-GREASE WEEKLY RH    | 2 |
| 4.  | 70392108 | DECAL-SUCTION LINE        | 1 |
| 5.  | 70392109 | DECAL-RETURN LINE         | 1 |
| 6.  | 70392213 | DECAL-CAUTION WASH/WAX    | 1 |
| 7.  | 70392524 | DECAL-ROTATE/GREASE       | 1 |
| 8.  | 70395100 | DECAL-6020 IDENTIFICATION | 2 |
| 9.  | 70394444 | DECAL-DGR ELECTROCUTION   | 1 |
| 10. | 70392814 | DECAL-DANGER TRAINING     | 1 |
| 11. | 70392815 | DECAL-DANGER OPERATION    | 1 |
| 12. | 70392861 | DECAL-DANGER 2-BLOCKING   | 1 |
| 13. | 70392863 | DECAL-DANGER HOIST PERS   | 1 |
| 14. | 70392864 | DECAL-DGR OR STAND CLEAR  | 2 |
| 15. | 70394445 | DECAL-DGR ELECTROCUTION   | 4 |
| 16. | 70392866 | DECAL-DANGER OPER COND    | 1 |
| 17. | 70392867 | DECAL-DANGER OR MOVING    | 1 |

|     |          |                          |   |
|-----|----------|--------------------------|---|
| 18. | 70392868 | DECAL-DANGER LOADLINE    | 4 |
| 19. | 70029251 | DECAL-IMT DIAMOND        | 2 |
| 20. | 70392888 | DECAL-DANGER RESTRICTION | 1 |
| 21. | 70394446 | DECAL-DANGER RC ELECTRO  | 1 |
| 22. | 70392891 | DECAL-DANGER DRIVELINE   | 1 |
| 23. | 70392982 | DECAL-CONTACT IMT        | 1 |
| 24. | 71039134 | DECAL-CAUTION OIL LEVEL  | 1 |
| 25. | 71391522 | DECAL-ANGLE CHART RH     | 1 |
| 26. | 71391523 | DECAL-ANGLE CHART LH     | 1 |
| 27. | 70395099 | CAPACITY CHART           | 2 |
| 28. | 70393860 | DECAL-LOAD BLOCK RATING  | 2 |
| 29. | 70394166 | DECAL-MANUAL OPERATION   | 1 |
| 30. | 70394189 | DECAL-RECOMMEND HYD OIL  | 1 |
| 31. | 70394443 | DECAL-DGR FREEFALL BOOM  | 1 |
| 32. | 70392399 | DECAL-LUBE WORM          | 1 |
| 33. | 70395090 | DECAL-GREASE WORM DR     | 1 |
| 34. | 70395324 | DECAL-ASME/ANSI B30.5    | 1 |



| DECAL PLACEMENT                      |                                                     |
|--------------------------------------|-----------------------------------------------------|
| ITEM NO.                             | LOCATION                                            |
| 6,9,10,11,12,13,16,17,20,21,23,24,27 | AT OR NEAR RMT CTRL STORAGE POINT.                  |
| 1,14                                 | ONE ON EACH OUTRIGGER.                              |
| 15,18                                | ONE ON EACH SIDE OF CARRIER VEHICLE.                |
| 5                                    | ON RESERVOIR AT RETURN LINE.                        |
| 4                                    | ON RESERVOIR SUCTION LINE.                          |
| 30                                   | AT OR NEAR THE HYDRAULIC RESERVOIR.                 |
| 22                                   | AT OR NEAR THE DRIVELINE.                           |
| 31                                   | AT OR NEAR THE MANUAL BOOM EXT. RETENTION MECHANISM |
| 34                                   | PLACE UNDER SERIAL TAG                              |



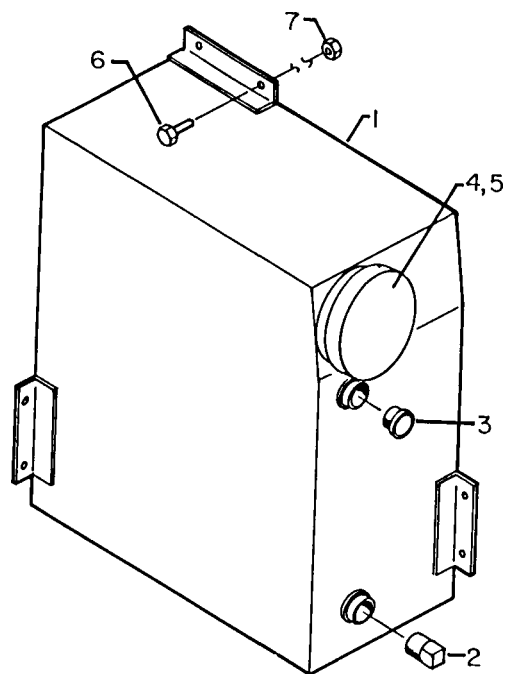
00006020: 51709256.01.19990104

**OPTION-RESERVOIR (51709256)**

**FOR SHIPOUT APPLICATIONS ONLY**

| ITEM                             | PART NO. | DESCRIPTION                | QTY |
|----------------------------------|----------|----------------------------|-----|
| 1.                               | 52703440 | RESERVOIR, 12 GAL.         | 1   |
| 2.                               | 72053415 | PLUG, 3/4 NPT              | 1   |
| 3.                               | 72532261 | PLUG, SIGHT GAUGE, 3/4 NPT | 1   |
| 4.                               | 73014671 | CAP, FILL                  | 1   |
| 5.                               | 73141276 | SCREEN, FILL NECK          | 1   |
| 6.                               | 72060046 | CAP SCREW, 3/8 X 1 GR5     | 6   |
| 7.                               | 72062103 | NUT, SELF LOCKING, 3/8     | 6   |
| 8.                               | 73052012 | SUCTION FILTER             | 1*  |
| 9.                               | 72053211 | PIPE NIPPLE                | 1*  |
| * ITEMS 8 & 9 ARE SHIPPED LOOSE. |          |                            |     |

3-20





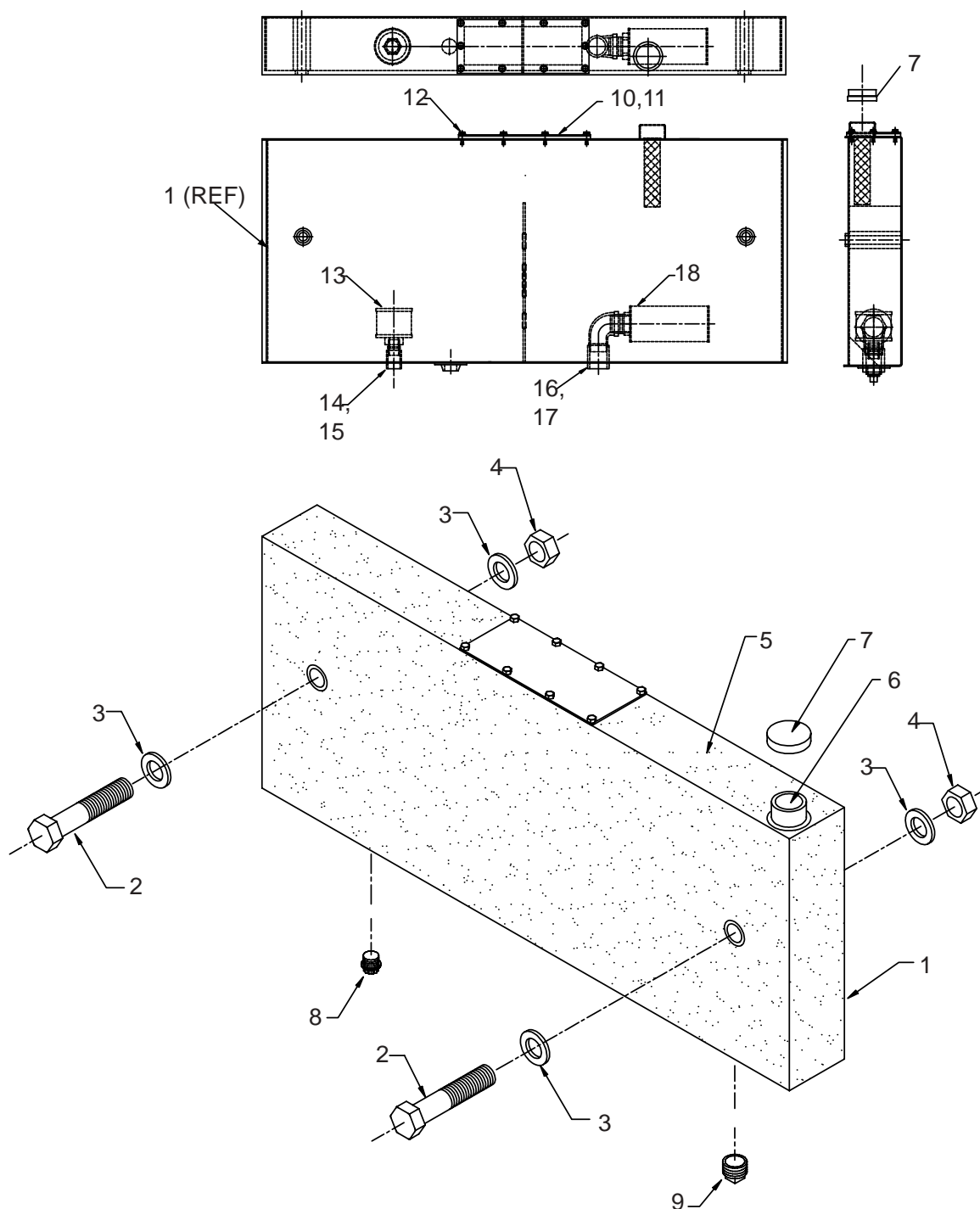


00006020: 51707798.01.20020711

3-21

**OPTION-RESERVOIR 18 GAL-BULKHEAD  
(51707798)**

|             |                            |   |              |                               |    |
|-------------|----------------------------|---|--------------|-------------------------------|----|
| 1. 52711432 | RESERVOIR WELDMENT         | 1 | 9. 72601004  | PLUG 1-1/4NPT SQHD            | 1  |
| 2. 72060104 | CAP SCR 1/2-13X6-1/2 HHGR5 | 2 | 10. 60119158 | COVER PLATE                   | 1  |
| 3. 72063005 | WASHER 1/2 WRT             | 8 | 11. 76394152 | GASKET 1/4X4.63X11.63 60 DUR. | 1  |
| 4. 72062080 | NUT 1/2-13 LOCK            | 2 | 12. 72061151 | SCR, SELF-TAP W/SEAL 1/4X1.00 | 10 |
| 5. 70394189 | DECAL-OIL RECOMMENDED      | 1 | 13. 70733058 | DIFFUSER 33 GPM               | 1  |
| 6. 70142482 | FILL NECK STRAINER         | 1 | 14. 70394754 | PLUG, PLASTIC 3/4 NPT         | 1  |
| 7. 70142483 | FILL CAP                   | 1 | 15. 72053305 | COUPLING 3/4 STL              | 1  |
| 8. 70393233 | PLUG 3/4NPT                | 1 | 16. 70394753 | PLUG, PLASTIC 1-1/4 NPT       | 1  |
|             |                            |   | 17. 72053307 | COUPLING, 1-1/4 STL           | 1  |
|             |                            |   | 18. 70733059 | STRAINER 20 GPM BYPASS        | 1  |



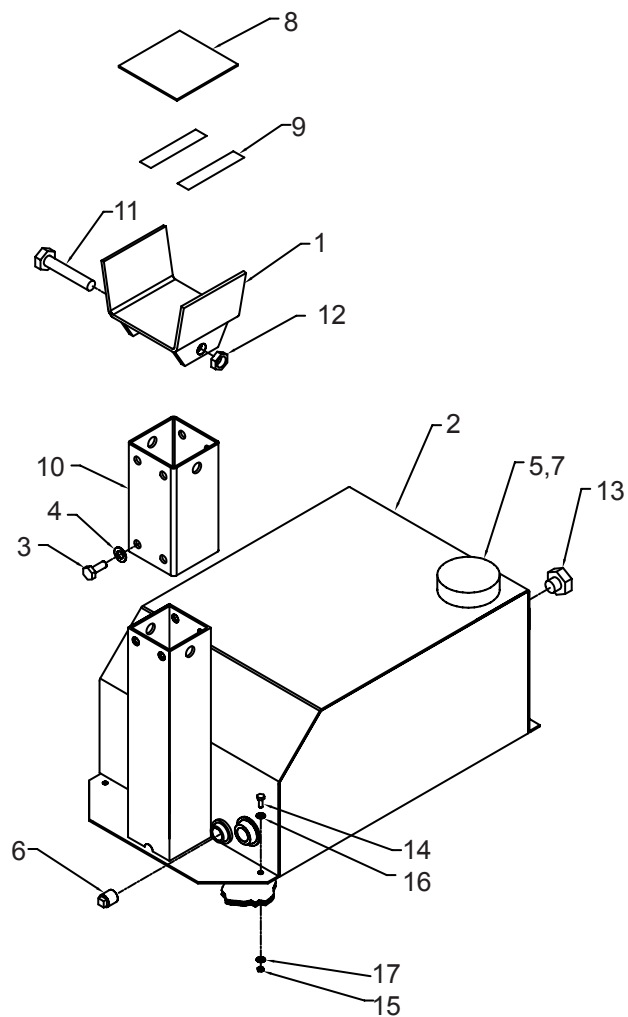


00006020: 51706910.01.REV. C 20050712

3-22

**OPTION-BOOM SUPPORT/RESERVOIR  
20 GAL (51706910)**

| ITEM | PART NO. | DESCRIPTION                | QTY |
|------|----------|----------------------------|-----|
| 1.   | 52705061 | SADDLE                     | 1   |
| 2.   | 52706909 | RESERVOIR, 20 GAL.         | 1   |
| 3.   | 72060092 | CAP SCREW, 1/2 X 1 1/4 GR5 | 4   |
| 4.   | 72063053 | WASHER, LOCK, 1/2          | 4   |
| 5.   | 73014671 | CAP, FILL                  | 1   |
| 6.   | 73052001 | PLUG, MAGNETIC, 3/4 NPT    | 1   |
| 7.   | 73141276 | SCREEN, FILL NECK          | 1   |
| 8.   | 60030162 | PAD, WEAR                  | 1   |
| 9.   | 70086054 | TAPE                       | 12" |
| 10.  | 60109252 | TUBE, SADDLE               | 1   |
| 11.  | 72060195 | CAP SCREW, 3/4 X 7 GR5     | 1   |
| 12.  | 72062114 | NUT, SELF LOCKING, 3/4     | 1   |
| 13.  | 72532261 | PLUG, SIGHT GAUGE, 3/4     | 1   |
| 14.  | 72060046 | CAP SCREW, 3/8 X 1 GR5     | 4   |
| 15.  | 72062103 | NUT, SELF LOCKING, 3/8     | 4   |
| 16.  | 72063003 | WASHER, FLAT, 3/8          | 4   |
| 17.  | 76392821 | SEAL, THREAD, 3/8          | 4   |
| 18.  | 73052012 | SUCTION FILTER             | 1   |
| 19.  | 72053211 | PIPE NIPPLE                | 1   |
| 20.  | 70394189 | PLACARD-MOBILOIL           | 1   |



NOTE: ITEMS #18 AND 19 ARE SHIPPED  
LOOSE WITH CRANE INSTALLATION KIT.

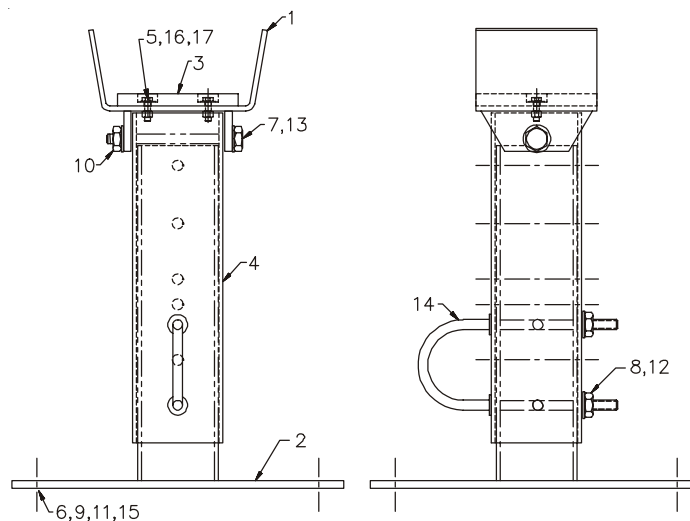


00006020: 51708161.01.19990104

**OPTION-BOOM SUPPORT (51708161)**

| ITEM | PART NO. | DESCRIPTION                | QTY |
|------|----------|----------------------------|-----|
| 1.   | 52712318 | SADDLE                     | 1   |
| 2.   | 52708159 | PEDESTAL                   | 1   |
| 3.   | 60030294 | WEAR PAD                   | 1   |
| 4.   | 60112040 | TUBE                       | 1   |
| 5.   | 72060025 | CAP SCR 5/16-18X1 HHGR5    | 2   |
| 6.   | 72060047 | CAP SCR 3/8-16X1-1/4 HHGR5 | 4   |
| 7.   | 72060195 | CAP SCR 3/4-10X7 HHGR5     | 1   |
| 8.   | 72062080 | NUT 1/2-13 LOCK            | 2   |
| 9.   | 72062103 | NUT 3/8-16 LOCK            | 4   |
| 10.  | 72062114 | NUT 3/4-10 LOCK            | 1   |
| 11.  | 72063003 | WASHER 3/8 WRT             | 4   |
| 12.  | 72063005 | WASHER 1/2 WRT             | 2   |
| 13.  | 72063008 | WASHER 3/4 WRT             | 2   |
| 14.  | 52708158 | U-BOLT                     | 1   |
| 15.  | 76392821 | WASHER 3/8 BONDED          | 4   |
| 16.  | 72063001 | WASHER 1/4 WRT             | 2   |
| 17.  | 72062109 | NUT 5/16-18 LOCK           | 2   |

3-23





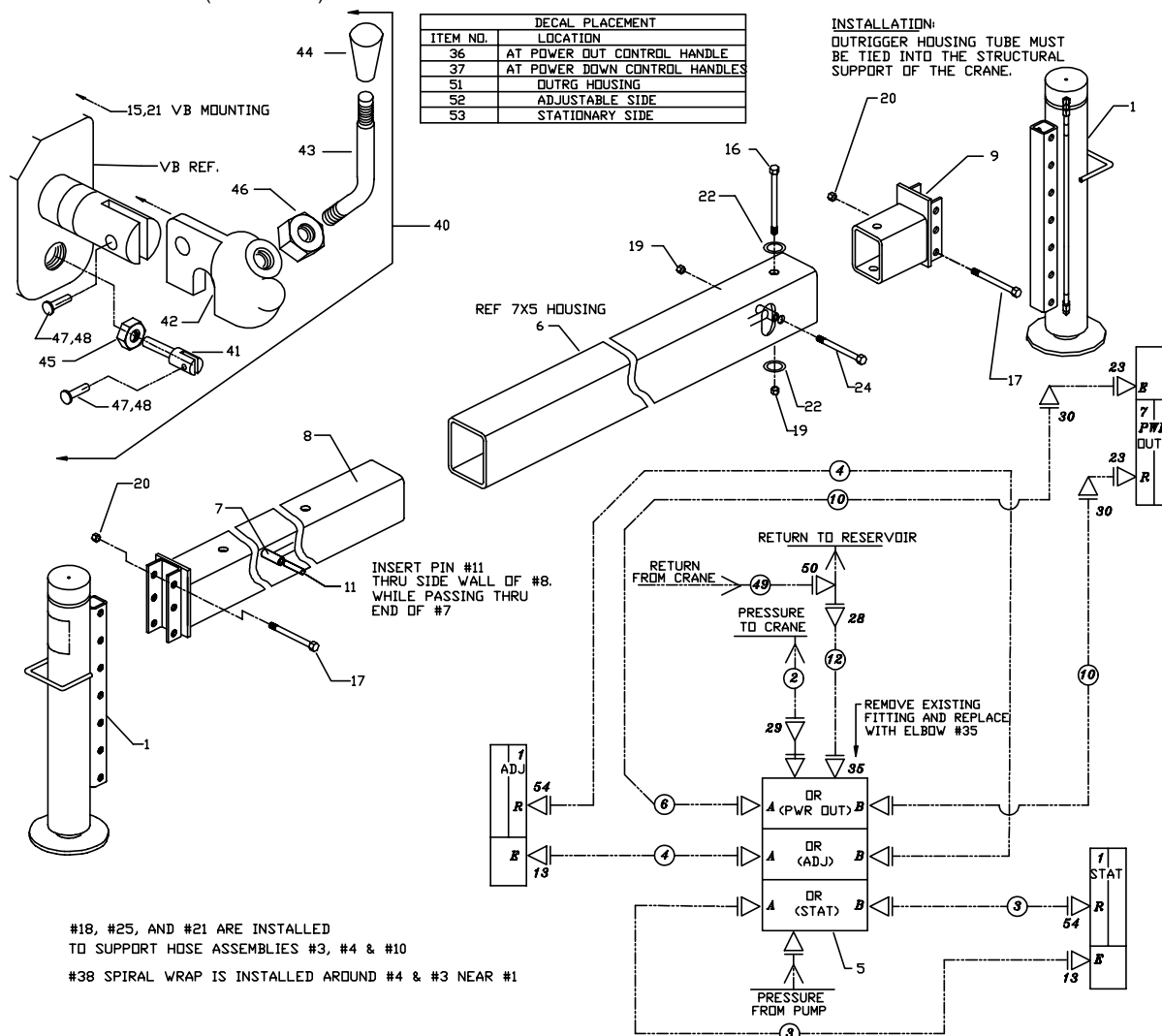
00006020: 31712739.01.20020905

3-24

**OPTION-AUX OUTRIGGERS-PO/PD-7X5  
(31712739)****(Non-IMT Mechanic Service Body Application)**

| ITEM | PART NO. | DESCRIPTION                  | QTY  |
|------|----------|------------------------------|------|
| 1.   | 3B205010 | CYLINDER                     | 2    |
| 2.   | 51396184 | HOSE ASM 1/2X159 FF          | 1REF |
| 3.   | 51395164 | HOSE ASM 1/4X135 FJ          | 2REF |
| 4.   | 51396280 | HOSE ASM 1/4X96 FF           | 2REF |
| 5.   | 51714812 | VALVE BANK (INCL: 40)        | 1    |
| 6.   | 60118680 | TUBE                         | 1    |
| 7.   | 3B142860 | POWER OUT CYLINDER           | 1    |
| 8.   | 52712735 | ARM-ADJUSTABLE               | 1    |
| 9.   | 52712736 | ARM-STATIONARY               | 1    |
| 10.  | 51396281 | HOSE ASM 1/4X107 FJ          | 2REF |
| 11.  | 72661472 | PIN-SPRING 1/2X4             | 1    |
| 12.  | 51396282 | HOSE ASM 3/4X51 FF           | 1REF |
| 13.  | 72053758 | ELBOW #4MSTR #4MJIC 90°      | 2    |
| 15.  | 72060025 | CAP SCR 5/16-18X1 HHGR5      | 3    |
| 16.  | 72060107 | CAP SCR 1/2-13X8 HHGR5       | 1    |
| 17.  | 72060155 | CAP SCR 5/8-11X3-1/2 HHGR5   | 4    |
| 18.  | 72060833 | SCR-5/16-18X3/4THRDCTG(NOTE) | 2    |
| 19.  | 72062080 | NUT 1/2-13 HEX NYLOCK        | 2    |
| 20.  | 72062091 | NUT 5/8-11 HEX NYLOCK        | 4    |
| 21.  | 72063002 | WASHER 5/16W FLAT            | 5    |
| 22.  | 72063005 | WASHER 1/2W FLAT             | 2    |
| 23.  | 72532351 | ADPTR #4MSTR #4MJIC          | 4    |
| 24.  | 72601297 | CAP SCR 1/2-13X5-3/4 HHGR5   | 1    |
| 25.  | 72066582 | CLAMP (SEE NOTE)             | 2    |

|     |          |                                          |      |
|-----|----------|------------------------------------------|------|
| 28. | 72531205 | TEE-MALE JIC 3/4-16 1/2 TUBE             | 1    |
| 29. | 72532658 | ELBOW #8MJIC #8FJIC SW                   | 1    |
| 30. | 72532690 | ELBOW #4MJIC #4FJIC SW                   | 2    |
| 35. | 72533623 | ELBOW #8MSTR #12MJIC 90°                 | 1    |
| 36. | 71392277 | DECAL-OUTRG POWER OUT                    | 1    |
| 37. | 76391511 | DECAL-UP & DOWN STAB. R&L                | 1    |
| 38. | 89034049 | SPIRAL WRAP-BLK (SEE NOTE)               | 4'   |
| 39. | 99900644 | MANUAL-AUX OUTRG                         | 1    |
| 40. | 51731580 | HANDLE ASM<br>(INCLS: 34-41) (PART OF 5) | 2REF |
| 41. | 70142648 | PIVOT LEVER (PART OF 40)                 | 2REF |
| 42. | 70142650 | LEVER SUPPORT (PART OF 40)               | 2REF |
| 43. | 70142651 | LEVER-CTRL HDL (PART OF 40)              | 2REF |
| 44. | 71392269 | KNOB-CTRL HDL (PART OF 40)               | 2REF |
| 45. | 72062021 | NUT 5/16-18 HEX (PART OF 40)             | 2REF |
| 46. | 72062024 | NUT 1/2-13 HEX (PART OF 40)              | 2REF |
| 47. | 72066162 | COTTER PIN (PART OF 40)                  | 4REF |
| 48. | 72661204 | PIN-CLEVIS (PART OF 40)                  | 4REF |
| 49. | 51395431 | HOSE ASM 1/2X96 FF                       | 1REF |
| 50. | 72532972 | ADPTR #8MJIC #12FJIC                     | 1    |
| 51. | 70392864 | DECAL-DGR OUTRG STD CLR                  | 2    |
| 52. | 70392867 | DECAL-DGR OUTRG (MOVING)                 | 1    |
| 53. | 71392257 | DECAL-OUTRG PWR DWN SS                   | 1    |
| 54. | 72533567 | ELBOW #4MSTR #4MJIC XLG                  | 2    |
| 55. | 51717834 | HOSE KIT OR PO/PD (7X5 AUX KIT)          | 1    |





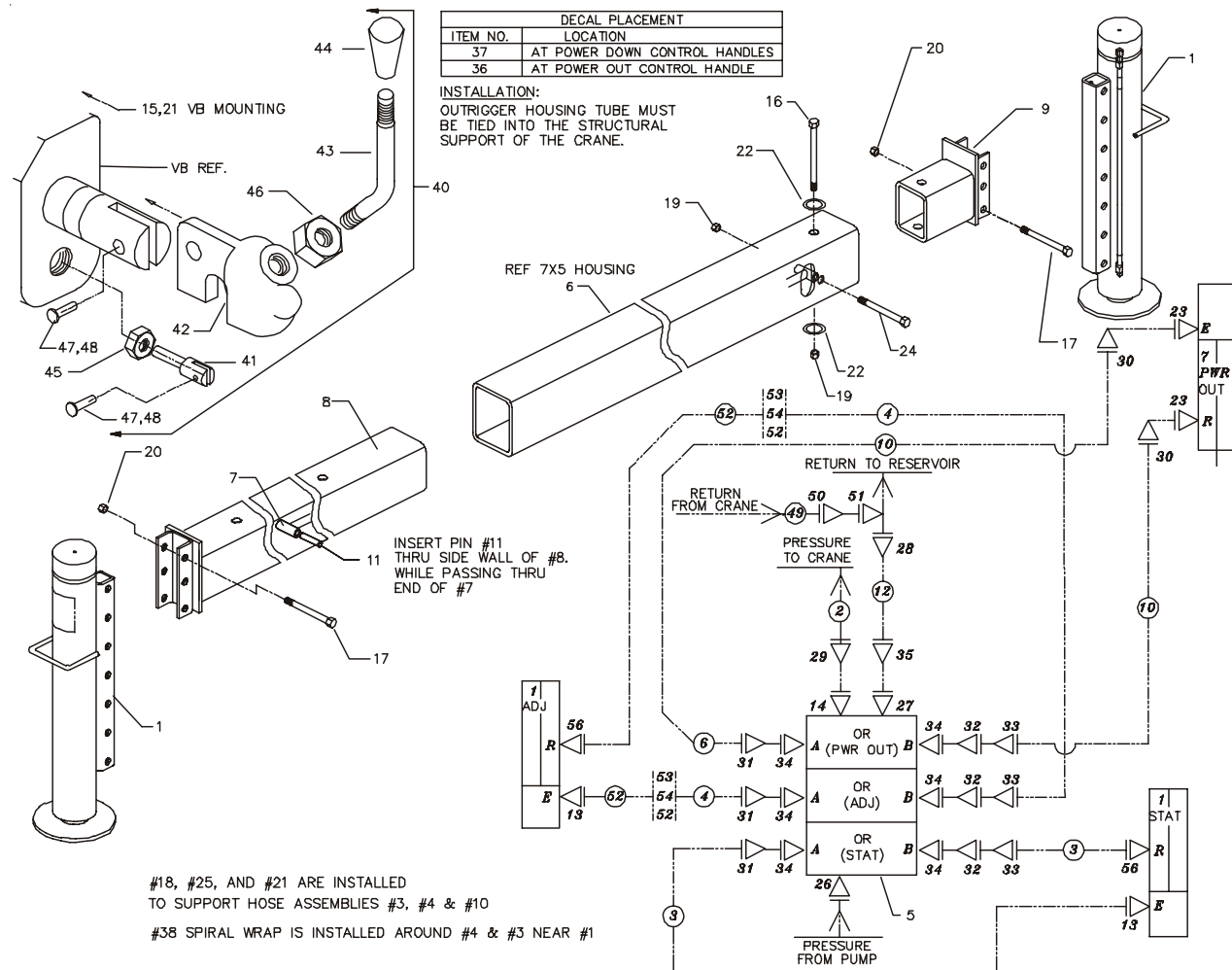
00006020: 31712731.01.20011126

**OPTION-OUTRIGGER KIT-PO/PD-7X5  
(31712731)**

| ITEM | PART NO. | DESCRIPTION                      | QTY  |
|------|----------|----------------------------------|------|
| 1.   | 3B205010 | CYLINDER                         | 2    |
| 2.   | 51394690 | HOSE 1/2X153 8F8F (PART OF 55)   | 1REF |
| 3.   | 51394693 | HOSE 1/4X130-1/2 4F4F (PART 55)  | 2REF |
| 4.   | 51394691 | HOSE 1/4X38-1/2 4F4F(PART OF 55) | 2REF |
| 5.   | 51705984 | VALVEBANK 3-SECT (INCL:40)       | 1    |
| 6.   | 60118680 | TUBE                             | 1REF |
| 7.   | 3B142860 | CYLINDER-PWR OUT                 | 1    |
| 8.   | 52712735 | ARM-ADJUSTABLE                   | 1    |
| 9.   | 52712736 | ARM-STATIONARY                   | 1    |
| 10.  | 51394914 | HOSE 1/4X108 4F4F (PART OF 55)   | 2REF |
| 11.  | 72661472 | PIN                              | 1    |
| 12.  | 51394915 | HOSE 3/4X48 12F12F (PART OF 55)  | 1REF |
| 13.  | 72053758 | ELBOW #4MSTR #4MJIC 90°          | 2    |
| 14.  | 72053764 | ELBOW #10MSTR #8MJIC 90°         | 1    |
| 15.  | 72060025 | CAP SCR 5/16-18X1 HHGR5          | 3    |
| 16.  | 72060107 | CAP SCR 1/2-13X8 HHGR5           | 1    |
| 17.  | 72060155 | CAP SCR 5/8-11X3-1/2 HHGR5       | 4    |
| 18.  | 72060833 | SCR 5/16-18X3/4 THRDCTG (NOTE)   | 2    |
| 19.  | 72062080 | NUT 1/2-13 LOCK                  | 2    |
| 20.  | 72062091 | NUT 5/8-11 LOCK                  | 4    |
| 21.  | 72063002 | WASHER 5/16 WRT                  | 5    |
| 22.  | 72063005 | WASHER 1/2 WRT                   | 2    |
| 23.  | 72532351 | ADAPTER #4MSTR #4MJIC            | 2    |
| 24.  | 72601297 | CAP SCR 1/2-13X5-3/4 HHGR5       | 1    |
| 25.  | 72066582 | CLAMP (SEE NOTE)                 | 2    |
| 26.  | 72532358 | ADAPTER #8MSTR #8MJIC            | 1    |
| 27.  | 72532365 | ADAPTER #10MSTR #12MJIC          | 1    |

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|     |          |                                                         |      |
|-----|----------|---------------------------------------------------------|------|
| 28. | 72531205 | TEE 3/4MJIC 1/2TUBE                                     | 1    |
| 29. | 72532658 | ELBOW #8MJIC #8FJIC SW                                  | 1    |
| 30. | 72532690 | ELBOW #4MJIC #4FJIC SW                                  | 2    |
| 31. | 72532699 | ELBOW #6MSTR #4MJIC 90°                                 | 3    |
| 32. | 72532700 | ELBOW #6MSTR #6MJIC 90° XLG                             | 3    |
| 33. | 72532707 | ADAPTER #4MJIC #6FJIC                                   | 3    |
| 34. | 72532722 | ADAPTER #10MSTR #6FSTR                                  | 6    |
| 35. | 72532696 | ELBOW #12MJIC #12FJIC SW                                | 1    |
| 36. | 71392277 | DECAL-PWR OUT                                           | 1    |
| 37. | 76391511 | DECAL-STABILIZER                                        | 1    |
| 38. | 89034049 | SPIRAL WRAP (SEE NOTE)                                  | 4    |
| 39. | 99900644 | MANUAL-OUTRIGGER                                        | 1    |
| 40. | 51731580 | HANDLE (INCL:41-48,PART OF 5)                           | 2REF |
| 41. | 70142648 | PIVOT-LEVER (PART OF 40)                                | 2REF |
| 42. | 70142650 | LEVER SUPPORT (PART OF 40)                              | 2REF |
| 43. | 70142651 | LEVER-CTRL (PART OF 40)                                 | 2REF |
| 44. | 71392269 | KNOB (PART OF 40)                                       | 2REF |
| 45. | 72062021 | NUT 5/16-18 HEXJAM (PART OF 40)                         | 2REF |
| 46. | 72062024 | NUT 1/2-13 HEXJAM (PART OF 40)                          | 2REF |
| 47. | 72066162 | COTTER PIN (PART OF 40)                                 | 4REF |
| 48. | 72661204 | CLEVIS PIN (PART OF 40)                                 | 4REF |
| 49. | 51394916 | HOSE 1/2X99 8F8F (PART OF 55)                           | 1REF |
| 50. | 72532972 | ADAPTER #8MJIC #12FJIC                                  | 1    |
| 51. | 72532980 | ADAPTER #8JIC PR SW IN-LINE                             | 1    |
| 52. | 51394115 | HOSE 1/4X59 4F4F (PART OF 55)                           | 2REF |
| 53. | 72532690 | ELBOW #4MJIC #4FJIC SW                                  | 4    |
| 54. | 72533024 | UNION-BULKHD #4JIC                                      | 2    |
| 55. | 51714497 | HOSE KIT-7X5 PO/PD OUTRG KIT (INCLS: 2,3,4,10,12,49,52) | 1    |
| 56. | 72533567 | ELBOW #4MSTR #4MJIC XLG                                 | 2    |



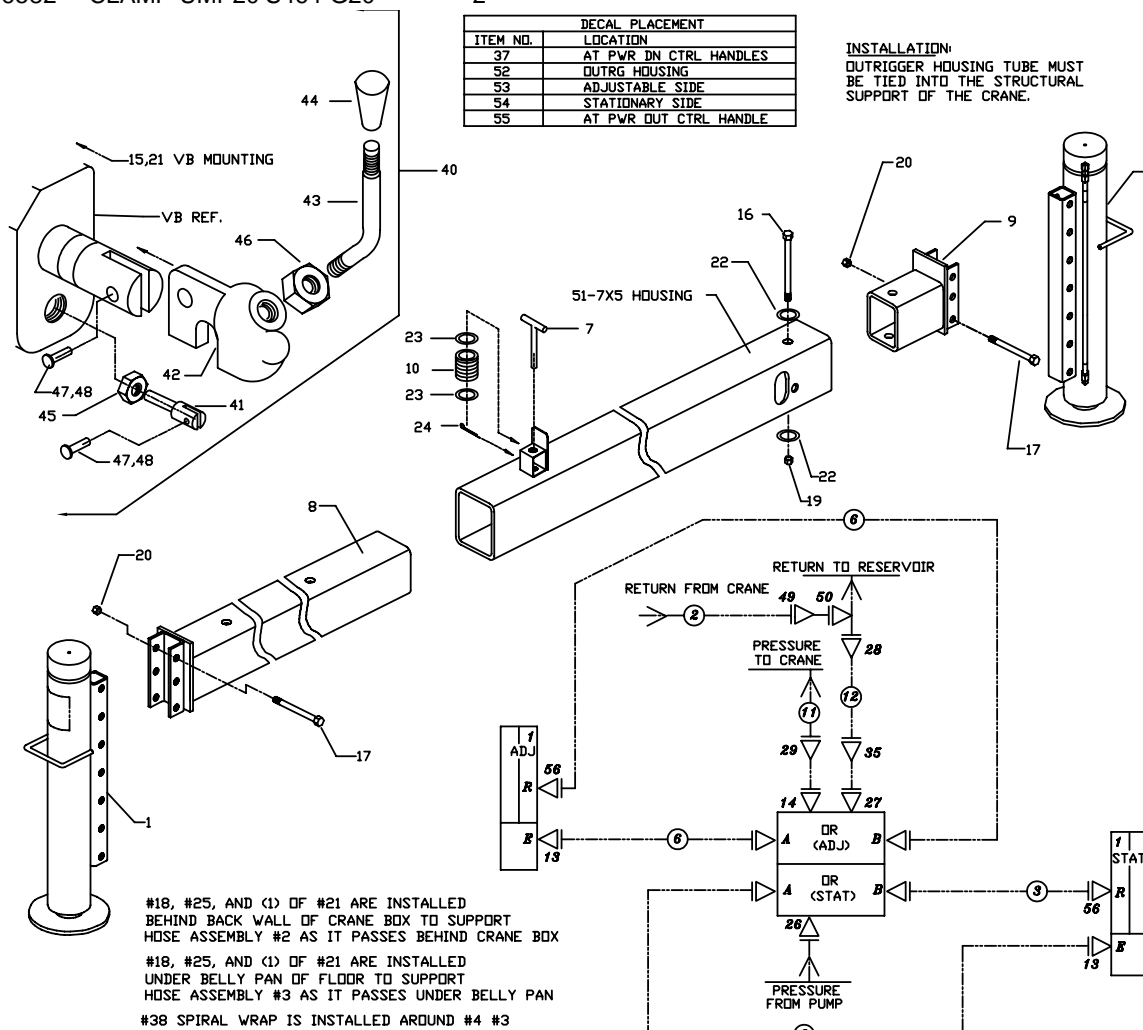


00006020: 31712740.01.REV. E 20031007

3-26

**OPTION-AUX OUTRIGGERS-MO/PD-7X5  
(31712740) (EFF 9-03 - VB 51714813)**

|     |          |                               |   |     |          |                                |      |
|-----|----------|-------------------------------|---|-----|----------|--------------------------------|------|
| 1.  | 3B205010 | CYLINDER                      | 2 | 26. | 72532358 | ADPTR-M STR/M JIC 8 8          | 1    |
| 2.  | 51395431 | HOSE-FF .50X 98.00 OAL( 8- 8) | 1 | 27. | 72532365 | ADPTR-M STR/M JIC 10 12        | 1    |
| 3.  | 51395552 | HOSE-FJ .25X135.00 OAL( 4- 4) | 2 | 28. | 72531205 | TEE-MALE JIC .75-16 .50 TUBE   | 1    |
| 5.  | 51714813 | VBASM                         | 1 | 29. | 72532658 | ELBOW-M JIC/F JIC SW 8 8       | 1    |
| 6.  | 51396280 | HOSE-FJ .25X 96.00 OAL( 4- 4) | 2 | 35. | 72532696 | ELBOW-M JIC/F JIC SW 12 12     | 1    |
| 7.  | 52070138 | PIN-WLDMT - T                 | 1 | 37. | 76391511 | DECAL-UP & DOWN STAB           | 1    |
| 8.  | 52712735 | ARM-OUTRG ADJ PWR DN 7X5      | 1 | 38. | 89034049 | SPIRAL WRAP-BLACK              | 4    |
| 9.  | 52712736 | ARM-OUTRG STAT PWR DN 7X5     | 1 | 39. | 99900644 | MANUAL-AUX OUTRIGGERS          | 1    |
| 10. | 60010351 | SPRING-"T" PIN                | 1 | 40. | 51731580 | HANDLE ASM (INCL. 34-41)       | 2REF |
| 11. | 51396184 | HOSE-FF .50X159.00 OAL( 8- 8) | 1 | 41. | 70142648 | PIVOT-LEVER                    | 2REF |
| 12. | 51396282 | HOSE-FF .75X 51 OAL(12-12)    | 1 | 42. | 70142650 | LEVER SUPPORT                  | 2REF |
| 13. | 72053758 | ELBOW-M STR/90/M JIC 4 4      | 2 | 43. | 70142651 | LEVER-CONTROL HANDLE           | 2REF |
| 14. | 72053764 | ELBOW-M STR/90/M JIC 10 8     | 1 | 44. | 71392269 | KNOB-CONTROL HANDLE            | 2REF |
| 15. | 72060025 | CAP SCR .31-18X 1.00 HHGR5Z   | 3 | 45. | 72062021 | NUT 5/16-18 HEX JAM            | 2REF |
| 16. | 72060107 | CAP SCR .50-13X 8.00 HHGR8Z   | 1 | 46. | 72062024 | NUT 1/2-13 HEX JAM             | 2REF |
| 17. | 72060155 | CAP SCR .62-11X 3.50 HHGR5Z   | 4 | 47. | 72066162 | COTTER PIN                     | 4REF |
| 18. | 72060833 | SCR-THD.CUT .31-18X.75 HWH-1  | 2 | 48. | 72661204 | PIN, CLEVIS                    | 4REF |
| 19. | 72062080 | NUT .50-13 HEX NYLOC ZINC     | 1 | 49. | 72532972 | ADPTR #8MJIC #12FJIC           | 1    |
| 20. | 72062091 | NUT .62-11 HEX NYLOC ZINC     | 4 | 50. | 72532980 | SWIVEL-M JIC/F JIC 8 8 IN-LINE | 1    |
| 21. | 72063002 | WASHER .31 W FLAT             | 5 | 51. | 52712734 | HOUSING-OUTRG AUX 7X5          | 1    |
| 22. | 72063005 | WASHER .50 W FLAT             | 2 | 52. | 70392864 | DECAL-DANGER OUTRG STAND       | 2    |
| 23. | 72063027 | MACHY BUSHING .62X14 GA NR    | 2 | 53. | 70392867 | DECAL-DANGER OUTRG (MOV)       | 1    |
| 24. | 72066185 | COTTER PIN .16X1.00 PLAIN     | 1 | 54. | 71392257 | DECAL-OUTRG POWER DN SS        | 1    |
| 25. | 72066582 | CLAMP-UMP20 S464-G20          | 2 | 56. | 72533567 | ELBOW-M STR/M JIC XLG 4 4      | 2    |







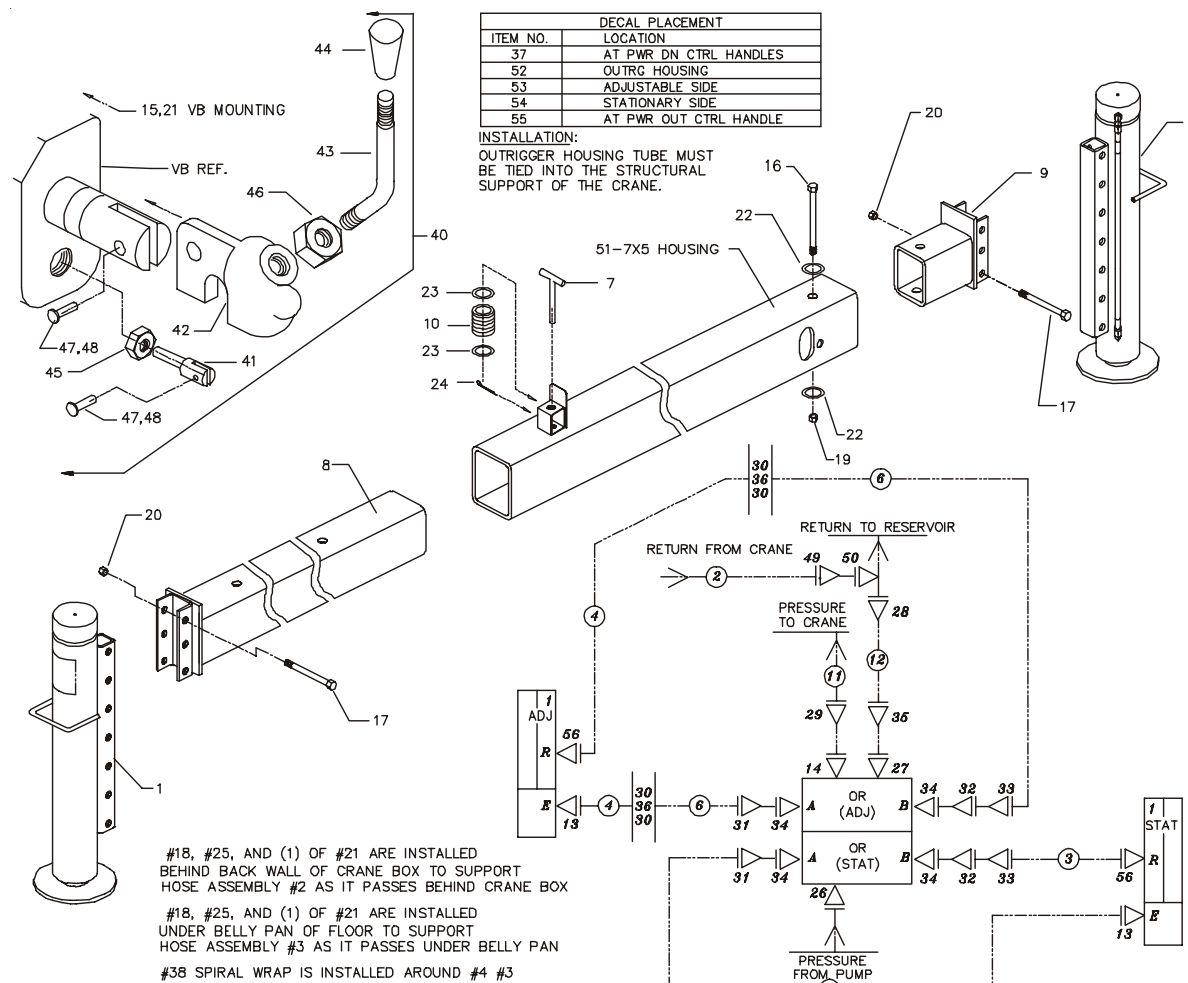
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**OPTION-AUX OUTRIGGERS-MO/PD-7X5  
(31712740) (THRU 9-03 - VB 51705983)****(Non-IMT Mechanic Service Body Application)**

| ITEM | PART NO. | DESCRIPTION                  | QTY |
|------|----------|------------------------------|-----|
| 1.   | 3B205010 | CYLINDER                     | 2   |
| 2.   | 51703939 | HOSE 1/2X96 FF               | 1   |
| 3.   | 51705364 | HOSE 1/4X128 FF              | 2   |
| 4.   | 51705365 | HOSE 1/4X56 FF               | 2   |
| 5.   | 51705983 | VALVEBANK 2-SECT (INCLS: 40) | 1   |
| 6.   | 51706152 | HOSE 1/4X36 FF               | 2   |
| 7.   | 52070138 | T-PIN                        | 1   |
| 8.   | 52712735 | ARM-ADJUSTABLE               | 1   |
| 9.   | 52712736 | ARM-STATIONARY               | 1   |
| 10.  | 60010351 | SPRING                       | 1   |
| 11.  | 51705639 | HOSE 1/2X150 FF              | 1   |
| 12.  | 51703296 | HOSE 3/4X48 FF               | 1   |
| 13.  | 72053758 | ELBOW #4MSTR #4MJIC 90°      | 2   |
| 14.  | 72053764 | ELBOW #10MSTR #8MJIC 90°     | 1   |
| 15.  | 72060025 | CAP SCR 5/16-18X1 HHGR5      | 3   |
| 16.  | 72060107 | CAP SCR 1/2-13X8 HHGR5       | 1   |
| 17.  | 72060155 | CAP SCR 5/8-11X3-1/2 HHGR5   | 4   |
| 18.  | 72060833 | SCR 5/16-18X3/4THRDCTG(NOTE) | 2   |
| 19.  | 72062080 | NUT 1/2-13 LOCK              | 1   |
| 20.  | 72062091 | NUT 5/8-11 LOCK              | 4   |
| 21.  | 72063002 | WASHER 5/16W FLAT            | 5   |
| 22.  | 72063005 | WASHER 1/2W FLAT             | 2   |
| 23.  | 72063027 | BUSHING-MACH                 | 2   |
| 24.  | 72066185 | COTTER PIN 5/32X1            | 1   |
| 25.  | 72066582 | CLAMP (SEE NOTE)             | 2   |
| 26.  | 72532358 | ADPTR #8MSTR #8MJIC          | 1   |

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|     |          |                                        |      |
|-----|----------|----------------------------------------|------|
| 27. | 72532365 | ADPTR #10MSTR #12MJIC                  | 1    |
| 28. | 72531205 | TEE-MJIC 3/4-16 1/2TUBE                | 1    |
| 29. | 72532658 | ELBOW #8MJIC #8FJIC SW                 | 1    |
| 30. | 72532690 | ELBOW #4MJIC #4FJIC SW                 | 4    |
| 31. | 72532699 | ELBOW #6MSTR #4MJIC 90°                | 2    |
| 32. | 72532700 | ELBOW #6MSTR #6MJIC XLG 90°            | 2    |
| 33. | 72532707 | ADPTR #4MJIC #6FJIC                    | 2    |
| 34. | 72532722 | ADPTR #10MSTR #6FSTR                   | 4    |
| 35. | 72532696 | ELBOW #12MJIC #12FJIC SW               | 1    |
| 36. | 72533024 | UNION                                  | 2    |
| 37. | 76391511 | DECAL-UP & DOWN STAB R&L               | 1    |
| 38. | 89034049 | SPIRAL WRAP-BLK (SEE NOTE)             | 4'   |
| 39. | 99900644 | MANUAL-AUX OUTRGS                      | 1    |
| 40. | 51731580 | HANDLE ASM<br>(INCL:34-41) (PART OF 5) | 2REF |
| 41. | 70142648 | LEVER PIVOT (PART OF 40)               | 2REF |
| 42. | 70142650 | LEVER SUPPORT (PART OF 40)             | 2REF |
| 43. | 70142651 | LEVER (PART OF 40)                     | 2REF |
| 44. | 71392269 | KNOB (PART OF 40)                      | 2REF |
| 45. | 72062021 | NUT 5/16-18 JAM (PART OF 40)           | 2REF |
| 46. | 72062024 | NUT 1/2-13 JAM (PART OF 40)            | 2REF |
| 47. | 72066162 | COTTER PIN (PART OF 40)                | 4REF |
| 48. | 72661204 | CLEVIS PIN (PART OF 40)                | 4REF |
| 49. | 72532972 | ADPTR #8MJIC #12FJIC                   | 1    |
| 50. | 72532980 | ADPTR PR SW IN-LINE 3/4JIC             | 1    |
| 51. | 52712734 | OUTRG HSG 7X5                          | 1    |
| 52. | 70392864 | DECAL-DGR STAND CLEAR                  | 2    |
| 53. | 70392867 | DECAL-DGR OUTRG MOVING                 | 1    |
| 54. | 71392257 | DECAL-OUTRG PWR DWN SS                 | 1    |
| 55. | 71392277 | DECAL-OUTRG PWR OUT                    | 1    |
| 56. | 72533567 | ELBOW #4MSTR #4MJIC XLG                | 2    |





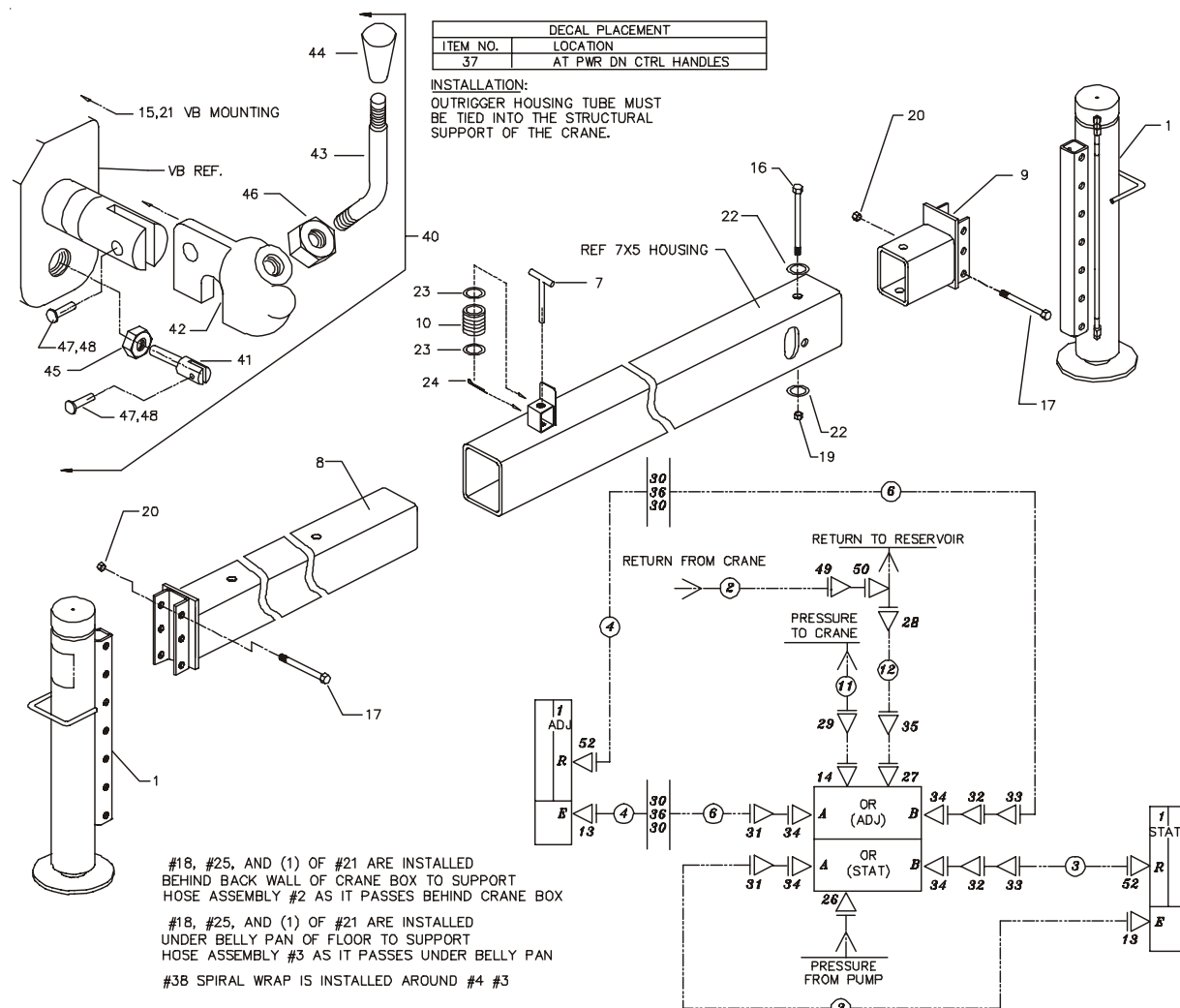
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**OPTION-OUTRIGGER KIT-MO/PD-7X5  
(31712732)**

| ITEM | PART NO. | DESCRIPTION                     | QTY |
|------|----------|---------------------------------|-----|
| 1.   | 3B205010 | CYLINDER                        | 2   |
| 2.   | 51394916 | HOSE 1/2X99 8F8F (PART OF 51)   | 1   |
| 3.   | 51394693 | HOSE 1/4X130-1/2 4F4F (PART 51) | 2   |
| 4.   | 51394115 | HOSE 1/4X59 4F4F (PART OF 51)   | 2   |
| 5.   | 51705983 | VALVEBANK 2-SECT (INCL:40)      | 1   |
| 6.   | 51394691 | HOSE 1/4X38-1/2 4F4F (PART 51)  | 2   |
| 7.   | 52070138 | T-PIN                           | 1   |
| 8.   | 52712735 | ARM-ADJUSTABLE                  | 1   |
| 9.   | 52712736 | ARM-STATIONARY                  | 1   |
| 10.  | 60010351 | SPRING                          | 1   |
| 11.  | 51394690 | HOSE 1/2X153 8F8F (PART OF 51)  | 1   |
| 12.  | 51394689 | HOSE 3/4X51 12F12F (PART OF 51) | 1   |
| 13.  | 72053758 | ELBOW #4MSTR #4MJIC 90°         | 2   |
| 14.  | 72053764 | ELBOW #10MSTR #8MJIC 90°        | 1   |
| 15.  | 72060025 | CAP SCR 5/16-18X1 HHGR5         | 3   |
| 16.  | 72060107 | CAP SCR 1/2-13X8 HHGR5          | 1   |
| 17.  | 72060155 | CAP SCR 5/8-11X3-1/2 HHGR5      | 4   |
| 18.  | 72060833 | SCR-5/16-18X3/4THRDCTG(NOTE)    | 2   |
| 19.  | 72062080 | NUT 1/2-13 LOCK                 | 1   |
| 20.  | 72062091 | NUT 5/8-11 LOCK                 | 4   |
| 21.  | 72063002 | WASHER 5/16W FLAT               | 5   |
| 22.  | 72063005 | WASHER 1/2W FLAT                | 2   |
| 23.  | 72063027 | BUSHING-MACHY 5/8X14GA          | 2   |
| 24.  | 72066185 | COTTER PIN 5/32X1               | 1   |
| 25.  | 72066582 | CLAMP (SEE NOTE)                | 2   |

|     |          |                                       |      |
|-----|----------|---------------------------------------|------|
| 26. | 72532358 | ADAPTER MSTR MJIC                     | 1    |
| 27. | 72532365 | ADPTR #10MSTR #12MJIC                 | 1    |
| 28. | 72531205 | TEE MJIC 3/4-16 1/2TUBE               | 1    |
| 29. | 72532658 | ELBOW #8MJIC #8FJIC SWVL              | 1    |
| 30. | 72532690 | ELBOW #4MJIC #4FJIC SWVL              | 4    |
| 31. | 72532699 | ELBOW #6MSTR #4MJIC 90°               | 2    |
| 32. | 72532700 | ELBOW #6MSTR #6MJIC XLG 90°           | 2    |
| 33. | 72532707 | ADPTR #4MJIC #6FJIC                   | 2    |
| 34. | 72532722 | ADPTR #10MSTR #6FSTR                  | 4    |
| 35. | 72532696 | ELBOW #12MJIC #12FJIC SWVL            | 1    |
| 36. | 72533024 | BULKHEAD UNION #4JIC                  | 2    |
| 37. | 76391511 | DECAL-UP & DWN STAB R&L               | 1    |
| 38. | 89034049 | SPIRAL WRAP-BLK (SEE NOTE)            | 4    |
| 39. | 99900644 | MANUAL-AUX OUTRGS                     | 1    |
| 40. | 51731580 | HANDLE ASM<br>(INCL:34-41)(PART OF 5) | 2REF |
| 41. | 70142648 | LEVER PIVOT (PART OF 40)              | 2REF |
| 42. | 70142650 | LEVER SUPPORT (PART OF 40)            | 2REF |
| 43. | 70142651 | LEVER (PART OF 40)                    | 2REF |
| 44. | 71392269 | KNOB (PART OF 40)                     | 2REF |
| 45. | 72062021 | NUT 5/16-18 JAM (PART OF 40)          | 2REF |
| 46. | 72062024 | NUT 1/2-13 JAM (PART OF 40)           | 2REF |
| 47. | 72066162 | COTTER PIN (PART OF 40)               | 4REF |
| 48. | 72661204 | CLEVIS PIN (PART OF 40)               | 4REF |
| 49. | 72532972 | ADPTR #8MJIC #12FJIC                  | 1    |
| 50. | 72532980 | ADAPTER 3/4JIC IN-LINE PR SW          | 1    |
| 51. | 51714498 | HOSE KIT (INCL: 2,3,4,6,11,12)        | 1    |
| 52. | 72533567 | ELBOW #4MSTR #4MJIC XLG               | 2    |







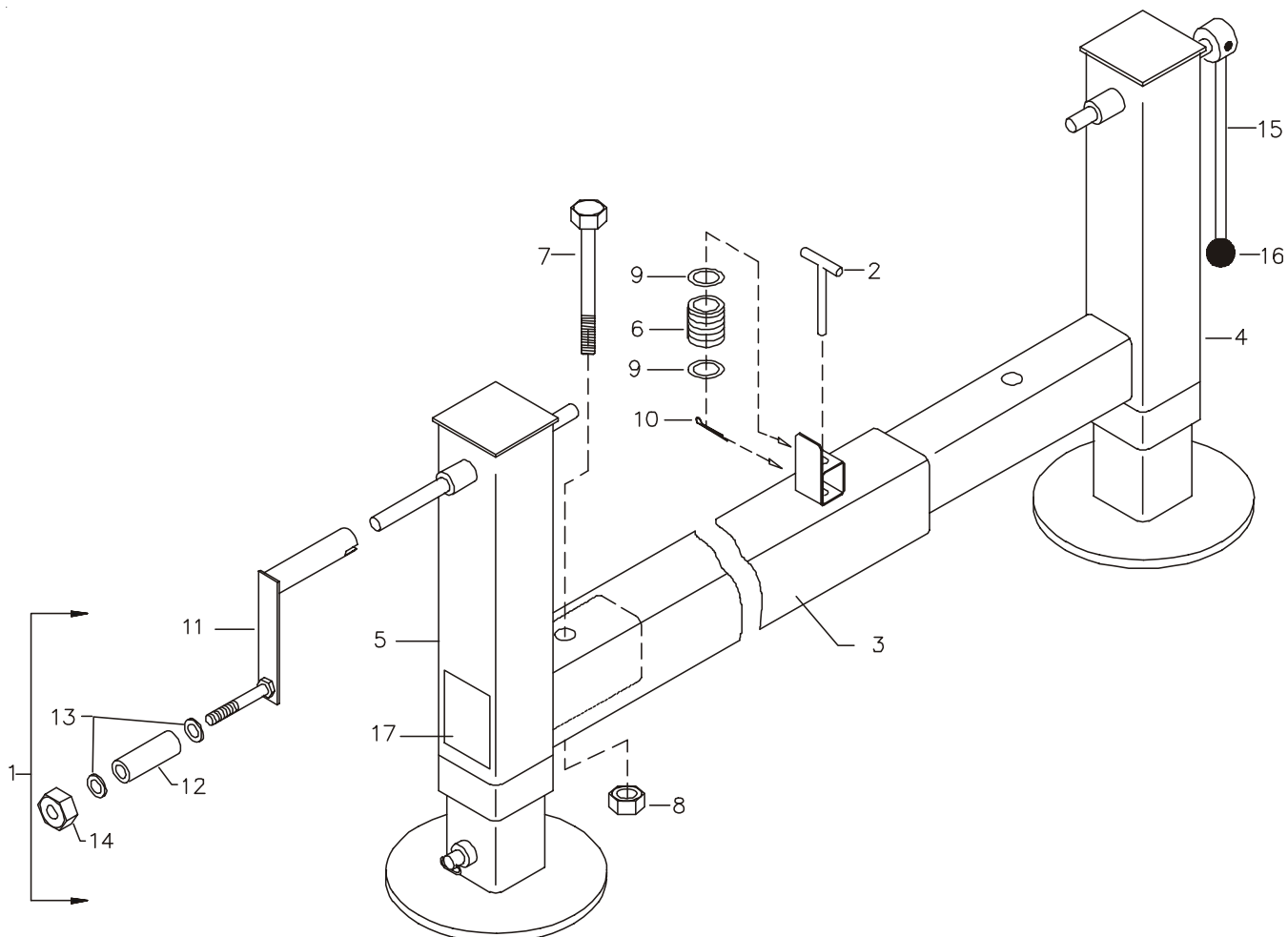
00006020: 31712741.01.19990104

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**OPTION-AUX OUTRIGGERS-MO/CRANK  
DN-7X5 (31712741)**

(Non-IMT Mechanic Service Body Application)

| ITEM | PART NO. | DESCRIPTION                 | QTY  |
|------|----------|-----------------------------|------|
| 1.   | 51705040 | CRANK ASM (INCL:11-14)      | 1    |
| 2.   | 52070138 | T-PIN                       | 1    |
| 3.   | 52712734 | OUTRIGGER HOUSING 7X5       | 1    |
| 4.   | 52712737 | ARM-ADJUSTABLE              | 1    |
| 5.   | 52712738 | ARM-STATIONARY              | 1    |
| 6.   | 60010351 | SPRING                      | 1    |
| 7.   | 72060107 | CAP SCR 1/2-13X8 HHGR5      | 1    |
| 8.   | 72062080 | NUT 1/2-13 LOCK             | 1    |
| 9.   | 72063007 | WASHER 5/8 WRT              | 2    |
| 10.  | 72066185 | COTTER PIN 5/32X1           | 1    |
| 11.  | 52705039 | CRANK (PART OF 1)           | 1REF |
| 12.  | 60030099 | ROLLER (PART OF 1)          | 1REF |
| 13.  | 72063003 | WASHER 3/8 WRT (PART OF 1)  | 2REF |
| 14.  | 72062103 | NUT 3/8-16 LOCK (PART OF 1) | 1REF |
| 15.  | 52703319 | CRANK HANDLE                | 1    |
| 16.  | 71039096 | KNOB                        | 1    |
| 17.  | 70392864 | DECAL-DANGER STAND CLEAR    | 2    |

**INSTALLATION NOTE**OUTRIGGER HOUSING TUBE MUST BE TIED INTO THE  
STRUCTURAL SUPPORT OF THE CRANE.

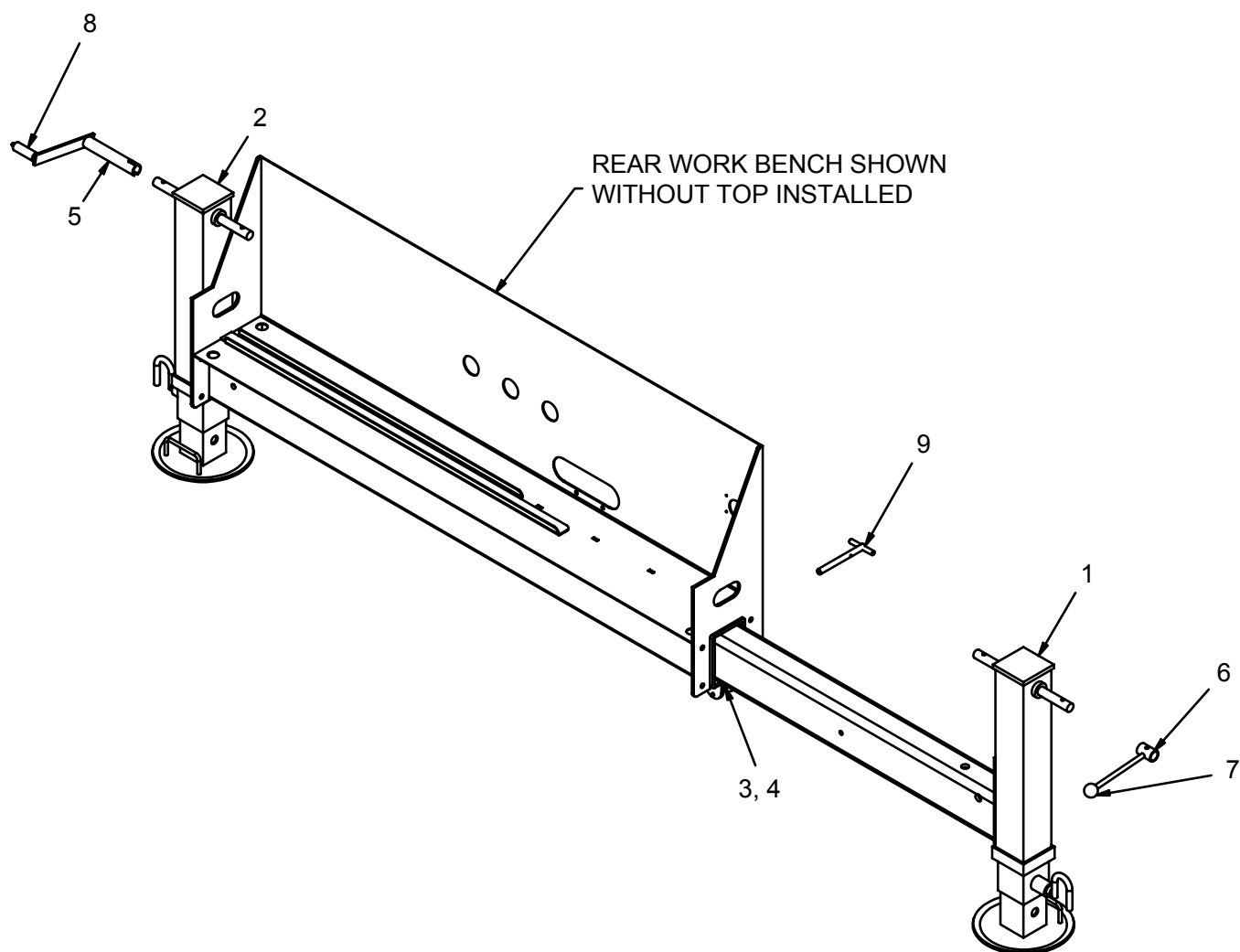


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3-30

**OPTION-OUTRIGGER KIT-MO/CRANK  
DN-7X5 (31718953)**

| ITEM | PART NO. | DESCRIPTION            | QTY |
|------|----------|------------------------|-----|
| 1.   | 52712737 | ARM, OR ADJ MAN CRANK  | 1   |
| 2.   | 5212738  | ARM, OR STAT MAN CRANK | 1   |
| 3.   | 60106314 | PIN                    | 1   |
| 4.   | 60030053 | ROLLER                 | 1   |
| 5.   | 52705039 | CRANK, WELDMENT        | 1   |
| 6.   | 52703319 | CRANK HANDLE, WLDMT    | 1   |
| 7.   | 71039096 | KNOB, CONTROL          | 1   |
| 8.   | 60030099 | ROLLER                 | 1   |
| 9.   | 52718725 | PIN WELDMENT           | 1   |





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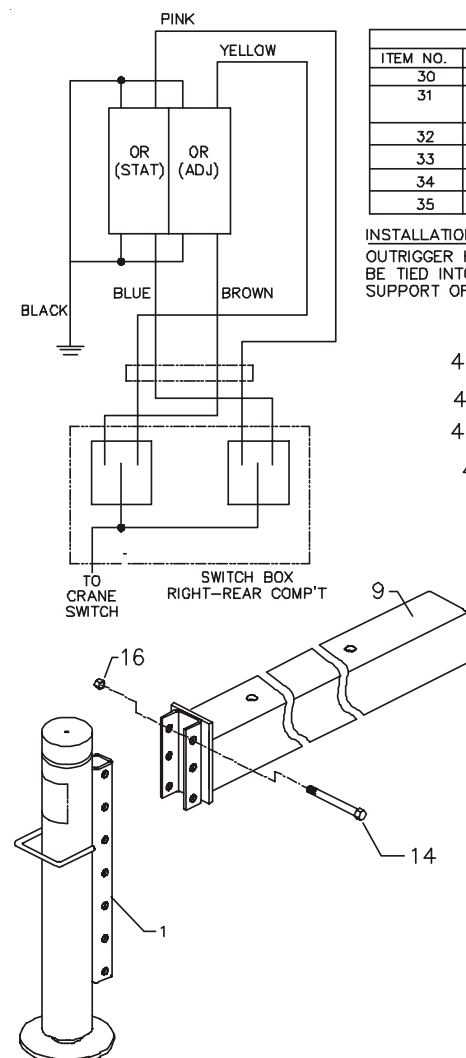
3-31

**OPTION-OUTRIGGER KIT-ELECTRIC PO/  
MD-7X5 (31712886)**

| ITEM | PART NO. | DESCRIPTION                 | QTY |
|------|----------|-----------------------------|-----|
| 1.   | 3B205010 | CYLINDER                    | 2   |
| 2.   | 51710569 | HOSE ASM 1/4X36 FF          | 2   |
| 3.   | 51704024 | HOSE ASM 1/4X54 FF          | 2   |
| 4.   | 51705364 | HOSE ASM 1/4X128 FF         | 2   |
| 5.   | 51703939 | HOSE ASM 1/2X96 FF          | 1   |
| 6.   | 51707005 | HOSE ASM 3/4X39 FF          | 1   |
| 7.   | 73732445 | VALVEBANK 2-SECT 7GPM       | 1   |
| 8.   | 60114313 | GUARD-SWITCH BOX            | 1*  |
| 9.   | 52712735 | ARM-ADJUSTABLE              | 1   |
| 10.  | 52712736 | ARM-STATIONARY              | 1   |
| 11.  |          | OUTRIGGER HOUSING           | REF |
| 12.  | 72532980 | ADAPTER #8JIC IN-LINE PR SW | 1   |
| 13.  | 72060107 | CAP SCR 1/2-13X8 HHGR5      | 1   |
| 14.  | 72060155 | CAP SCR 5/8-11X3-1/2 HHGR5  | 4   |
| 15.  | 72062080 | NUT 1/2-13 LOCK             | 1   |
| 16.  | 72062091 | NUT 5/8-11 LOCK             | 4   |
| 17.  | 72063005 | WASHER 1/2 WRT              | 2   |
| 18.  | 72532695 | TEE #12MJIC 3/4TUBE         | 1   |
| 20.  | 72533024 | UNION #4JIC 37° W/NUT       | 2   |
| 21.  | 72532365 | ADAPTER #10MSTR #12MJIC     | 1   |
| 22.  | 72532722 | ADAPTER #10MSTR #6FSTR      | 4   |
| 23.  | 72532358 | ADAPTER #8MSTR #8MJIC       | 1   |

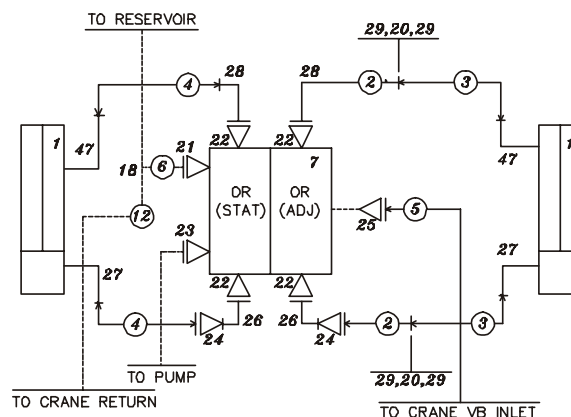
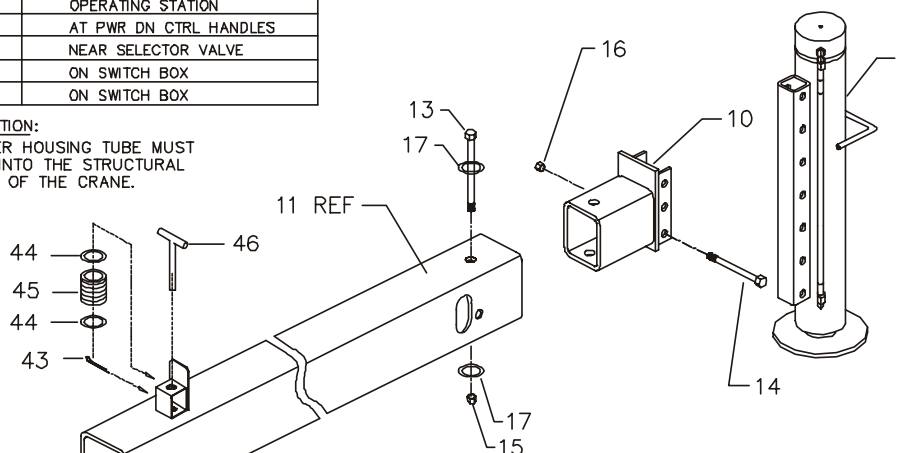
|     |          |                             |    |
|-----|----------|-----------------------------|----|
| 24. | 72532707 | ADAPTER #4MJIC #6MJIC       | 2  |
| 25. | 72053764 | ELBOW #10MSTR #8MJIC 90°    | 1  |
| 26. | 72532700 | ELBOW #6MSTR #6MJIC XLG 90° | 2  |
| 27. | 72053758 | ELBOW #4MSTR #4MJIC 90°     | 2  |
| 28. | 72532699 | ELBOW #6MSTR #4MJIC 90°     | 2  |
| 29. | 72532690 | ELBOW #4MJIC #4FJIC SWVL    | 4  |
| 30. | 70392864 | DECAL-DANGER STAND CLEAR    | 2  |
| 31. | 70392867 | DECAL-DGR OUTRGR MOVING     | 1  |
| 32. | 71392257 | DECAL-CONTROL PD SS         | 1  |
| 33. | 70393467 | DECAL-SELECTOR VALVE        | 1  |
| 34. | 71392971 | DECAL-CTRL LH               | 1  |
| 35. | 71392972 | DECAL-CTRL RH               | 1  |
| 36. | 73054420 | SELECTOR VALVE 24GPM        | 1* |
| 37. | 77040137 | TERMINAL 1/4 FSLPON 12-10GA | 4* |
| 38. | 77040186 | TERMINAL 1/4 FSLPON 16-14GA | 6* |
| 39. | 77041197 | JIC BOX                     | 1* |
| 40. | 77041345 | TOGGLE SWITCH-SGL THROW     | 1* |
| 41. | 77041346 | TOGGLE SWITCH-DBL THROW     | 2* |
| 42. | 89044354 | CABLE-14GA 6WIRE            | 5* |
| 43. | 72066185 | COTTER PIN .16X1            | 1  |
| 44. | 72063027 | MACH BUSHING 5/8            | 2  |
| 45. | 60010351 | SPRING                      | 1  |
| 46. | 52070138 | T-PIN                       | 1  |
| 47. | 72533567 | ELBOW #4MSTR #4MJIC XLG     | 2  |

\* NOT SHOWN



| DECAL PLACEMENT |                                         |
|-----------------|-----------------------------------------|
| ITEM NO.        | LOCATION                                |
| 30              | ONE ON EACH OUTRIGGER                   |
| 31              | AT OR NEAR THE NORMAL OPERATING STATION |
| 32              | AT PWR DN CTRL HANDLES                  |
| 33              | NEAR SELECTOR VALVE                     |
| 34              | ON SWITCH BOX                           |
| 35              | ON SWITCH BOX                           |

INSTALLATION:  
OUTRIGGER HOUSING TUBE MUST  
BE TIED INTO THE STRUCTURAL  
SUPPORT OF THE CRANE.





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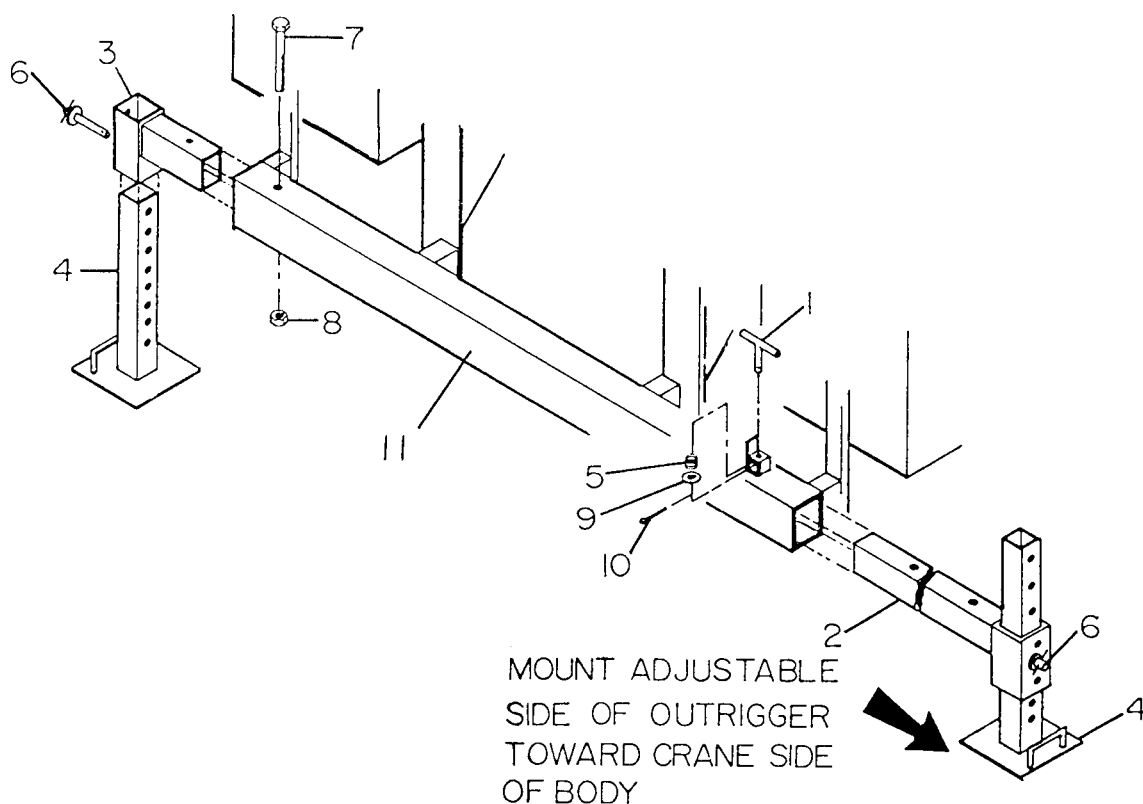
### OPTION-AUX OUTRIGGERS-MO/MD-7X5 (31712902)

(Non-IMT Mechanic Service Body Application)

| ITEM | PART NO. | DESCRIPTION            | QTY |
|------|----------|------------------------|-----|
| 1.   | 52070138 | T-PIN                  | 1   |
| 2.   | 52712889 | ARM-ADJUSTABLE         | 1   |
| 3.   | 52712890 | ARM-STATIONARY         | 1   |
| 4.   | 52703353 | LEG                    | 2   |
| 5.   | 60010351 | SPRING                 | 1   |
| 6.   | 71731361 | T-PIN-QUICK RELEASE    | 2   |
| 7.   | 72060107 | CAP SCR 1/2-13X8 HHGR5 | 1   |
| 8.   | 72062080 | NUT 1/2-13 LOCK        | 1   |
| 9.   | 72063007 | WASHER 5/8 WRT         | 1   |
| 10.  | 72066185 | COTTER PIN 1/16X1      | 1   |
| 11.  | 52712734 | OUTRIGGER HOUSING 7X5  | 1   |

#### INSTALLATION NOTE

OUTRIGGER HOUSING TUBE MUST BE TIED INTO THE STRUCTURAL SUPPORT OF THE CRANE.





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**CYLINDER-PWR DN (3B205010)**

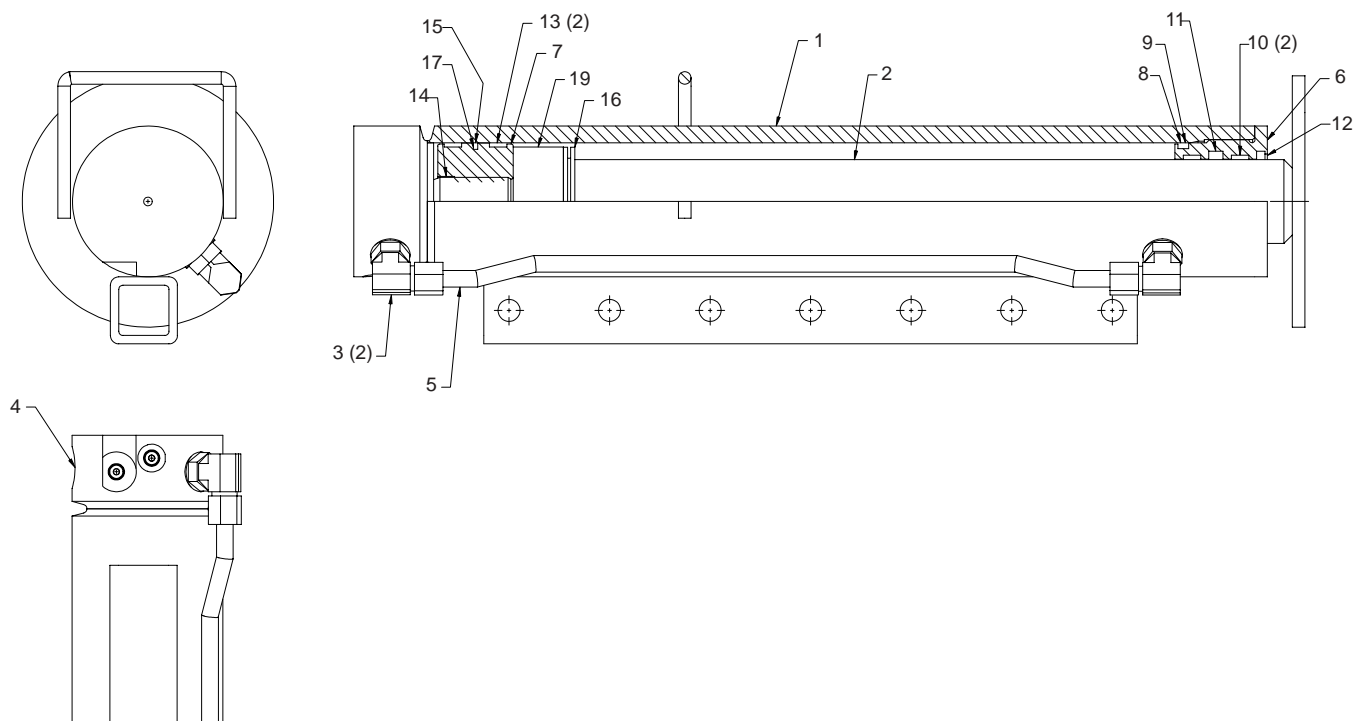
| ITEM | PART NO. | DESCRIPTION           | QTY  |
|------|----------|-----------------------|------|
| 1.   | 4B205010 | CASE ASY              | 1    |
| 2.   | 4G048870 | ROD ASY               | 1    |
| 3.   | 72053763 | ELL #8MSTR #8MJIC 90° | 1    |
| 4.   | 73054681 | CHECK VALVE           | 1    |
| 5.   | 5P288970 | PORT TUBE             | 1    |
| 6.   | 6HD35025 | HEAD                  | 1    |
| 7.   | 6ID35125 | PISTON                | 1    |
| 8.   | 7Q072338 | O-RING                | 1REF |
| 9.   | 7Q10P338 | BACKUP RING           | 1REF |
| 10.  | 7T2NX427 | WEAR RING             | 2REF |
| 11.  | 7R546025 | U-CUP SEAL            | 1REF |
| 12.  | 7R14P025 | ROD WIPER             | 1REF |
| 13.  | 7T2N4035 | PISTON RING           | 2REF |
| 14.  | 7T61N125 | NYLON LOCK RING       | 1REF |
| 15.  | 7T66P035 | PISTON SEAL           | 1REF |
| 16.  | 6A025025 | WAFER LOCK            | 1REF |
| 17.  | 7Q072151 | O-RING                | 1REF |
| 18.  | 9D142020 | SEAL KIT (INCL. 8-17) | 1    |
| 19.  | 6C015025 | STOP TUBE             | 1    |

**NOTE**

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

APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON AND HEAD GLANDS, LOCK RING AND ROD THREADS BEFORE ASSEMBLY.

USE "NEVER-SEEZ" OR EQUIVALENT BETWEEN THE HEAD AND THE CASE WHEN ASSEMBLING THE CYLINDER.





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### CYLINDER-PWR OUT (3B142860)

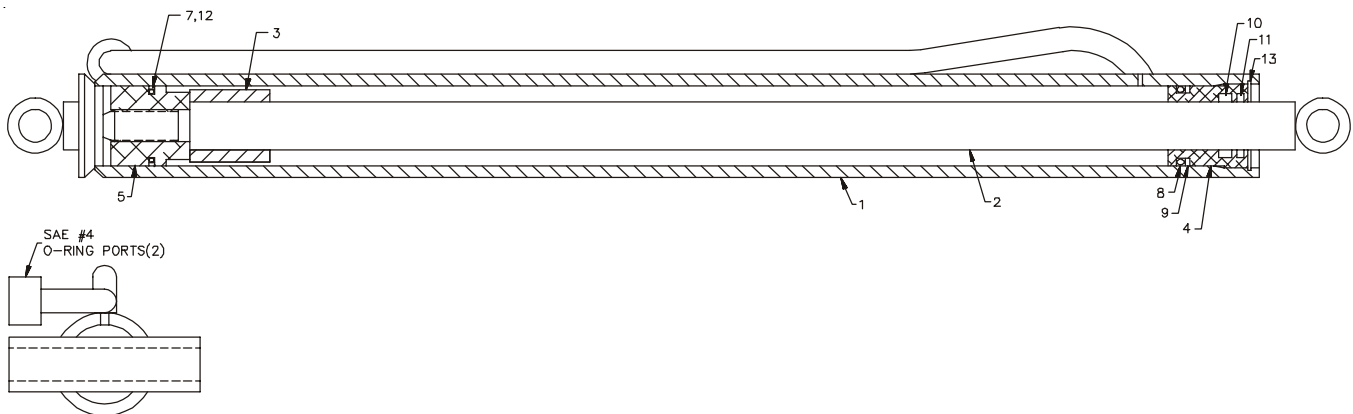
|     |          |                          |      |
|-----|----------|--------------------------|------|
| 1.  | 4B142860 | CASE ASM                 | 1    |
| 2.  | 4G142860 | ROD ASM                  | 1    |
| 3.  | 6C125007 | STOP TUBE                | 1    |
| 4.  | 6H012007 | HEAD                     | 1    |
| 5.  | 6I012050 | PISTON                   | 1    |
| 6.  | 9B050608 | SEAL KIT (INCL:7-13)     | 1    |
| 7.  | 7Q072021 | O-RING (PART OF 6)       | 1REF |
| 8.  | 7Q072214 | O-RING (PART OF 6)       | 1REF |
| 9.  | 7Q10P214 | BACK-UP RING (PART OF 6) | 1REF |
| 10. | 7R100750 | ROD SEAL (PART OF 6)     | 1REF |
| 11. | 7R13P007 | ROD WIPER (PART OF 6)    | 1REF |
| 12. | 7T66P012 | PISTON SEAL (PART OF 6)  | 1REF |
| 13. | 72066029 | RETAINING RING           | 1    |

#### NOTE

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

APPLY "LUBRIPLATE #630-2" MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON AND HEAD GLANDS, LOCK RING AND ROD THREADS BEFORE ASSEMBLY.

USE "NEVER-SEEZ" OR EQUIVALENT BETWEEN THE HEAD AND THE CASE WHEN ASSEMBLING THE CYLINDER. KEEP AWAY FROM ALL SEALS.





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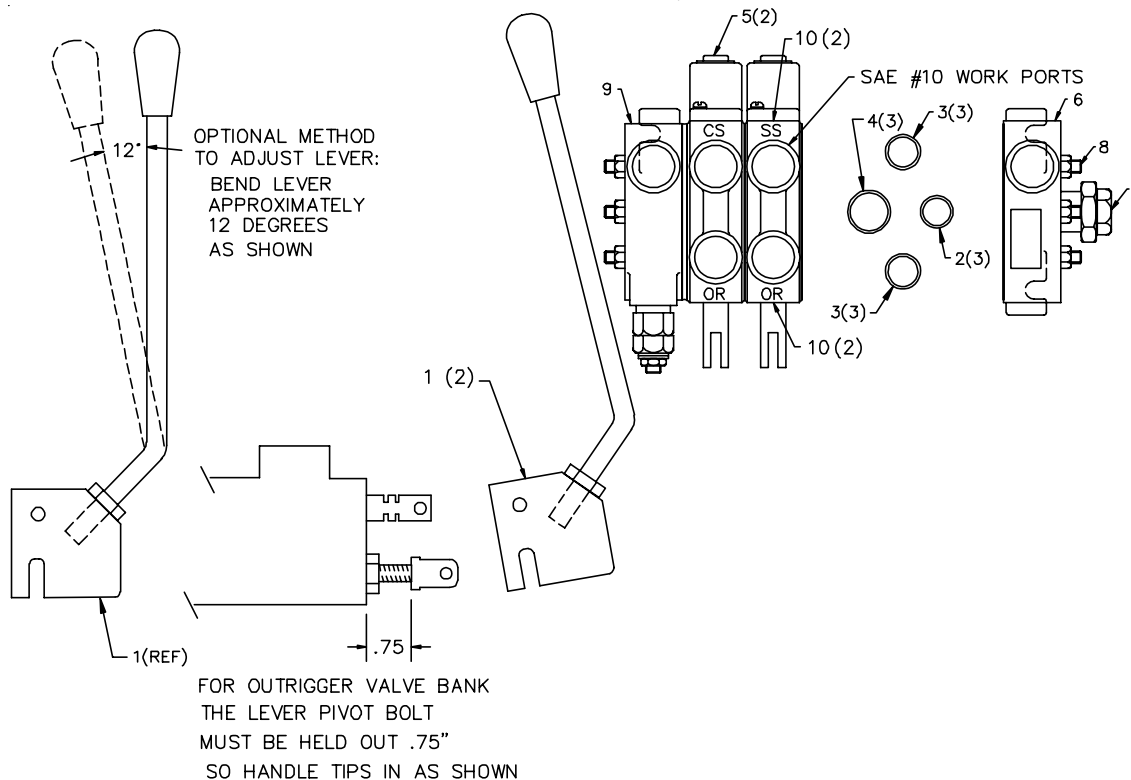
3-35

**VALVEBANK ASM-2 SECTION (51705983)****EFFECTIVE PREVIOUS TO 1-1-00:**

|              |                      |   |
|--------------|----------------------|---|
| 1. 51731580  | LEVER ASM            | 2 |
| 2. 7Q072017  | O-RING SM            | 3 |
| 3. 7Q072018  | O-RING MED           | 6 |
| 4. 7Q072021  | O-RING LG            | 3 |
| 5. 73054490  | TANDEM VALVE SECTION | 2 |
| 6. 73540010  | END COVER RH         | 1 |
| 7. 73731763  | POWER BEYOND ADAPTER | 1 |
| 8. 94731590  | TIE ROD KIT (2 SECT) | 1 |
| 9. 73054488  | END COVER-LH         | 1 |
| 10. 7Q072114 | O-RING               | 4 |

**EFFECTIVE FROM 1-1-00:**

|              |                      |   |
|--------------|----------------------|---|
| 1. 73540073  | LEVER ASM            | 2 |
| 2. 7Q072017  | O-RING SM            | 3 |
| 3. 7Q072018  | O-RING MED           | 6 |
| 4. 7Q072021  | O-RING LG            | 3 |
| 5. 73540074  | VALVE SECTION 4-WAY  | 2 |
| 6. 73540075  | END COVER RH         | 1 |
| 7. 73540076  | POWER BEYOND ADAPTER | 1 |
| 8. 73540078  | TIE ROD KIT (2 SECT) | 1 |
| 9. 73540077  | END COVER-LH         | 1 |
| 10. 7Q072114 | O-RING               | 4 |

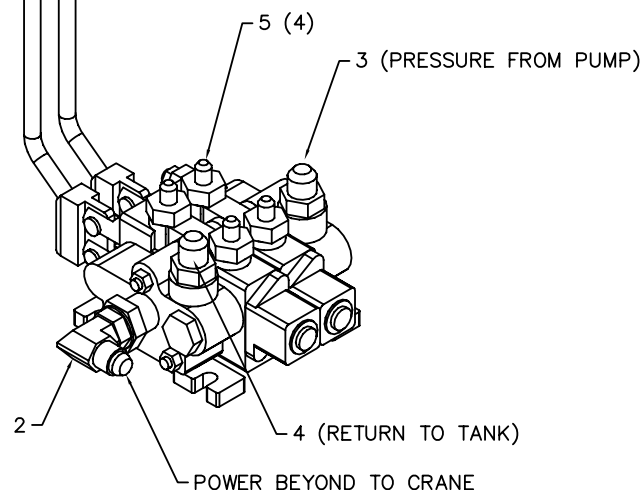


S.S. POWER DOWN CYL  
C.S. POWER DOWN CYL  
**DO NOT BEND HANDLES!!!!**

51714813.01.REV A 20031017

**VALVEBANK ASM-2 SECTION (51714813)**

|             |                         |   |
|-------------|-------------------------|---|
| 1. 51705983 | VALVEBANK, 2 SECTION    | 1 |
| 2. 72053763 | ELBOW #8MSTR #8MJIC 90° | 1 |
| 3. 72532358 | ADPTR #8MSTR #8MJIC     | 1 |
| 4. 72532358 | ADPTR #8MSTR #8MJIC     | 1 |
| 5. 72532792 | ADPTR #8MSTR #4MJIC     | 4 |



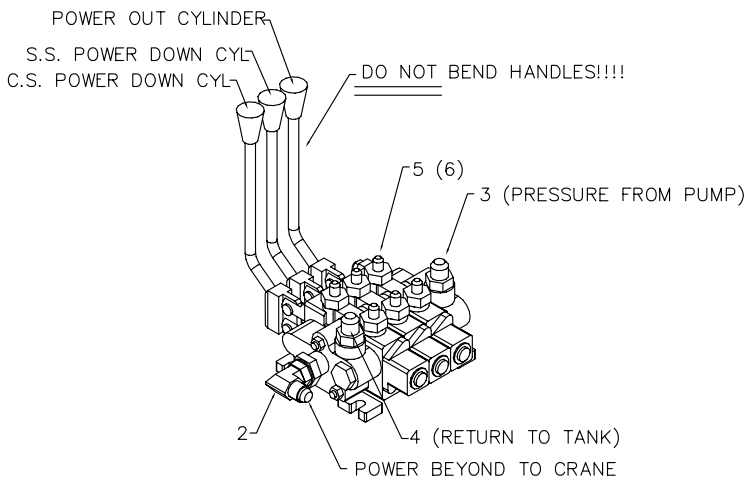


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**VALVEBANK ASM-3 SECTION OR - PO/PD  
(51714812)**

- |    |          |                                                                      |   |
|----|----------|----------------------------------------------------------------------|---|
| 1. | 51705984 | VALVEBANK - 3 SECTION                                                | 1 |
| 2. | 72053763 | ELBOW #8MSTR #8MJIC 90°<br>(WAS 72053764 - ELBOW #10MSTR #8MJIC 90°) | 1 |
| 3. | 72532358 | ADPTR-#8MSTR #8MJIC                                                  | 1 |
| 4. | 72532358 | ADPTR-#8MSTR #8MJIC<br>(WAS 72532359-ADPTR #10MSTR #8MJIC)           | 1 |
| 5. | 72532792 | ADPTR #8MSTR #4MJIC<br>(WAS 72533589-ADPTR #10MSTR #4MJIC)           | 6 |



CAP FITTINGS PRIOR TO SHIPPING AND HANDLING

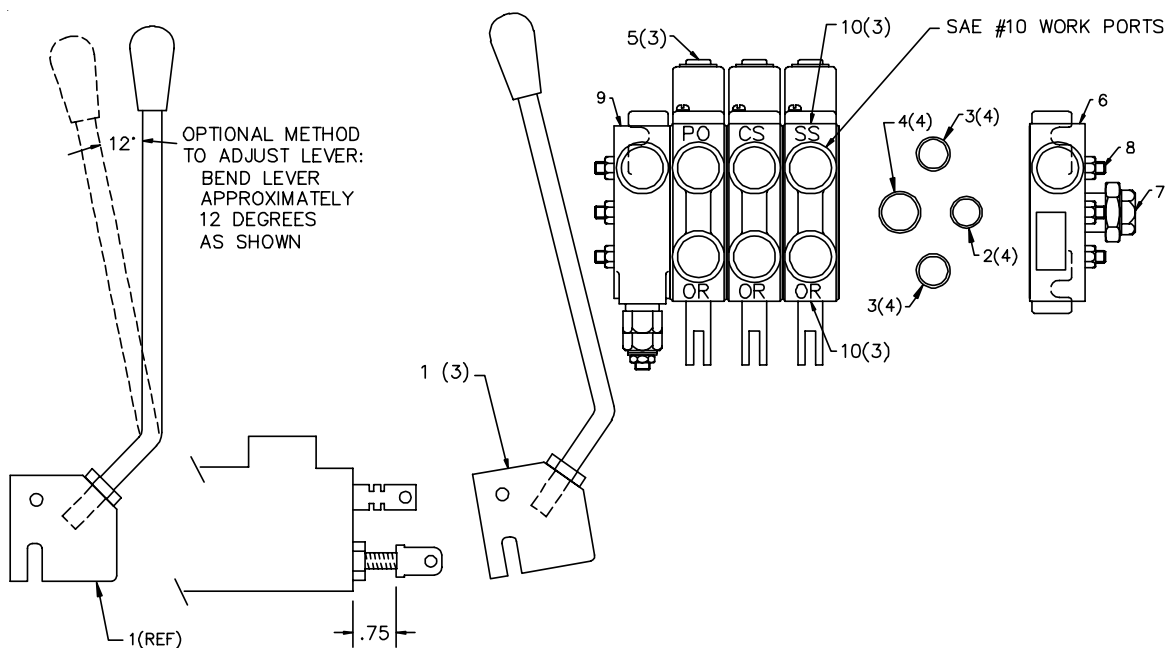
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**VALVEBANK ASM-3 SECTION (51705984)****EFFECTIVE PREVIOUS TO 1-1-00:**

- |     |          |                        |   |
|-----|----------|------------------------|---|
| 1.  | 51731580 | HANDLE ASM (NOT SHOWN) | 3 |
| 2.  | 7Q072017 | O-RING SM              | 4 |
| 3.  | 7Q072018 | O-RING MED             | 8 |
| 4.  | 7Q072021 | O-RING LG              | 4 |
| 5.  | 73054490 | TANDEM VALVE SECTION   | 3 |
| 6.  | 73540010 | END COVER RH           | 1 |
| 7.  | 73731763 | POWER BEYOND ADAPTER   | 1 |
| 8.  | 94731764 | TIE ROD KIT            | 1 |
| 9.  | 73054488 | END COVER LH           | 1 |
| 10. | 7Q072114 | O-RING                 | 6 |

**EFFECTIVE FROM 1-1-00:**

- |     |          |                      |   |
|-----|----------|----------------------|---|
| 1.  | 73540073 | HANDLE ASM           | 3 |
| 2.  | 7Q072017 | O-RING SM            | 4 |
| 3.  | 7Q072018 | O-RING MED           | 8 |
| 4.  | 7Q072021 | O-RING LG            | 4 |
| 5.  | 73540074 | VALVE SECTION        | 3 |
| 6.  | 73540075 | END COVER RH         | 1 |
| 7.  | 73540076 | POWER BEYOND ADAPTER | 1 |
| 8.  | 73540079 | TIE ROD KIT          | 1 |
| 9.  | 73540077 | END COVER LH         | 1 |
| 10. | 7Q072114 | O-RING               | 6 |



FOR OUTRIGGER VALVE BANK  
THE LEVER PIVOT BOLT  
MUST BE HELD OUT .75"  
SO HANDLE TIPS IN AS SHOWN



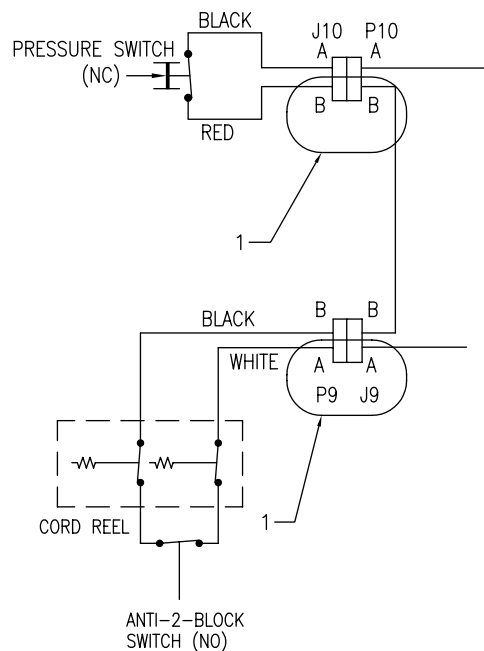
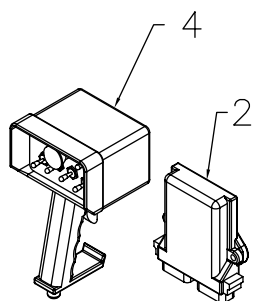
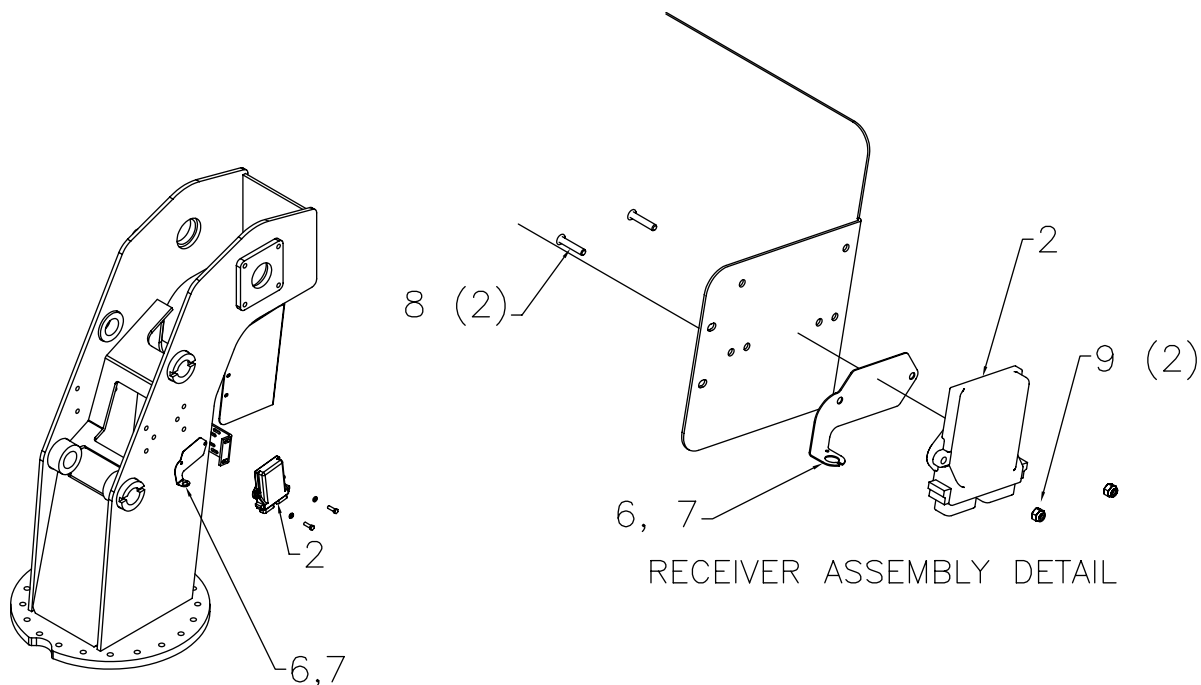


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3-37

**CONTROL KIT-RADIO RMT (90718833)**  
**(EFFECTIVE 8/04)**

|     |          |                                 |   |
|-----|----------|---------------------------------|---|
| 1.  | 70034439 | LOCK WIRE, LEAD SEAL, 8"        | 2 |
| 2.  | 70733921 | RECEIVER, RADIO REMOTE          | 1 |
| 4.  | 70733883 | TRANSMITTER, RADIO REMOTE       | 1 |
| 6.  | 60125959 | BRACKET, TETHER CONNECTOR       | 1 |
| 7.  | 72066340 | RIVET, POPAL. 1/8X3/8 GRIP      | 1 |
| 8.  | 72601846 | CAP SCR, SS 1/4-20 X 1-1/4 HH   | 2 |
| 9.  | 72062194 | NUT, SS 1/4-20 NYLOC            | 2 |
| 10. | 99903628 | INSTRUCTIONAL DWG, RADIO REMOTE | 1 |
| 11. | 93719637 | KIT, SWITCH, 2-SPEED            | 1 |
| 13. | 99903629 | INSTALLATION DWG, RADIO REMOTE  | 1 |





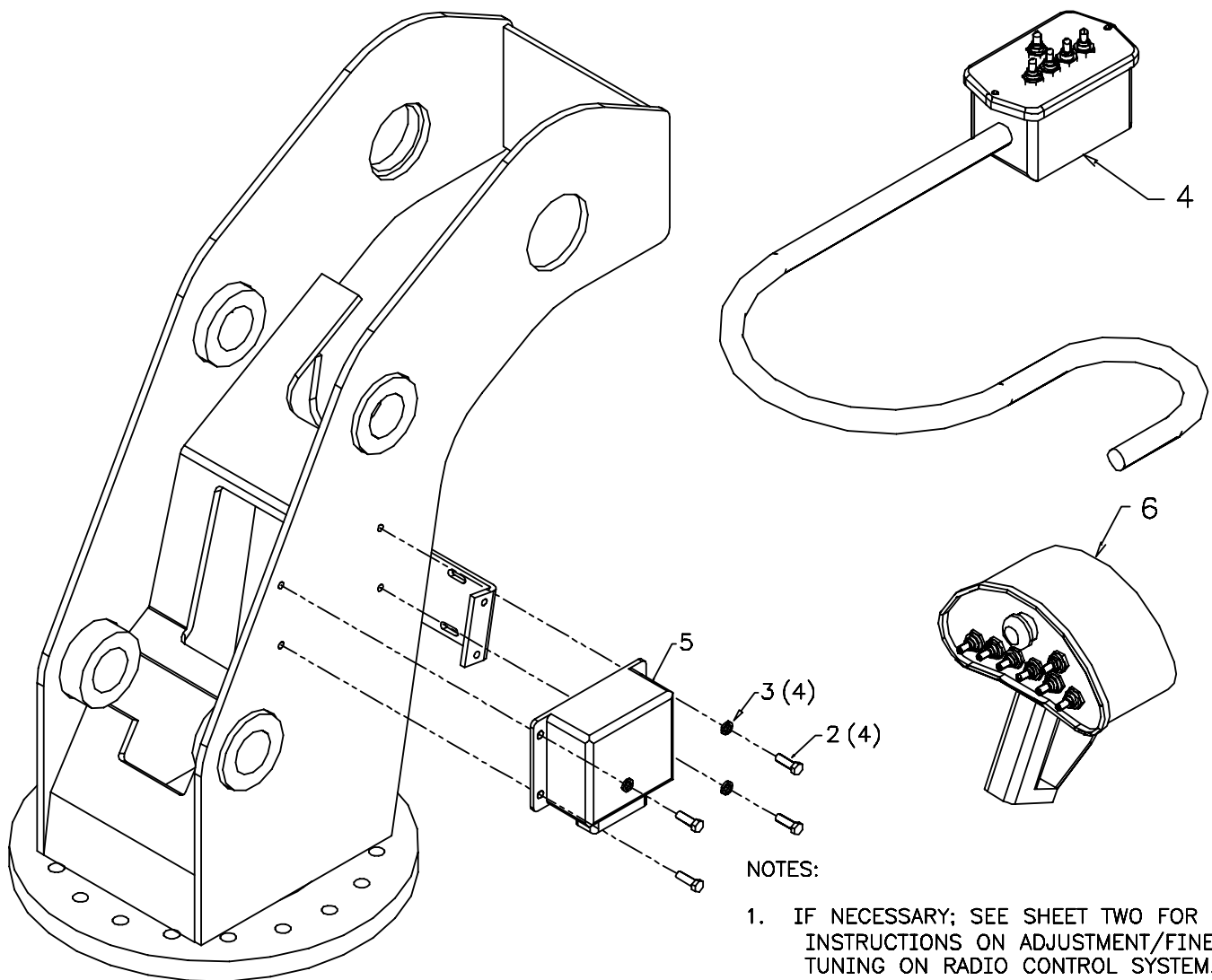
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3-38

**CONTROL KIT-RADIO RMT (90715635-1)  
(THROUGH 7/04)**

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|    |          |                                  |      |
|----|----------|----------------------------------|------|
| 1. | 70733354 | RADIO RMT (INCL:5&6)             | 1    |
| 2. | 72060025 | CAP SCR 5/16-18X1 HHGR5          | 4    |
| 3. | 72063050 | WASHER 5/16 LOCK                 | 4    |
| 4. | 51716912 | HANDLE ASM-RR B-UP (EFF 9/01)    | 1    |
|    | 51715567 | HANDLE ASM-RR BACKUP (THRU 9/01) | 1    |
| 5. | 73733392 | RADIO RMT-RCVR (PART OF 1)       | 1REF |
| 6. | 73733393 | RADIO RMT-XMTR (PART OF 1)       | 1REF |
| 7. | 70034439 | LOCK WIRE LEAD SEAL 8"           | 2    |



NOTES:

1. IF NECESSARY; SEE SHEET TWO FOR INSTRUCTIONS ON ADJUSTMENT/FINE TUNING ON RADIO CONTROL SYSTEM.
2. SEE SCHEMATIC (DRAWING NUMBER 99903131) FOR PLACEMENT OF ITEM NUMBER 7.

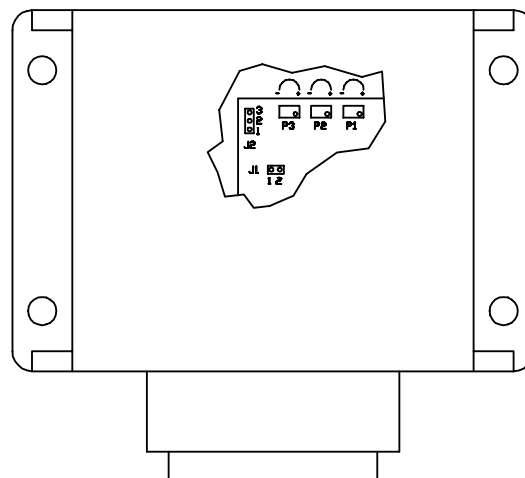
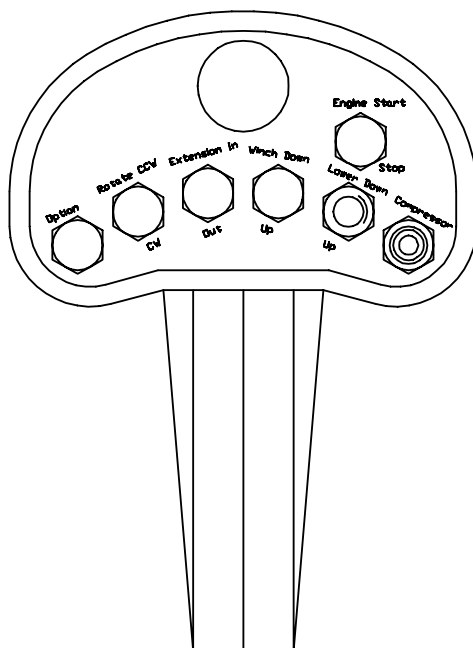


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**CONTROL KIT-RADIO RMT (90715635-2)  
(THROUGH 7/04)**

| CONNECTOR<br>PIN LETTER | IMT<br>ASSIGNED<br>FUNCTION |
|-------------------------|-----------------------------|
| A1                      | ROT CW                      |
| A2                      | EXT OUT                     |
| A3                      | WINCH DN                    |
| A4                      | WINCH UP                    |
| A5                      | PROP VALVE +                |
| A6                      | EXT IN                      |
| A7                      | ENGINE START                |
| A8                      | RADIO GND                   |
| A9                      | SPEED RELAY                 |
| B1                      | NOT USED                    |
| B2                      | ROT CCW                     |
| B3                      | RADIO POWER                 |
| B4                      | KILL RELAY                  |
| B5                      | LOW DN                      |
| B6                      | NOT USED                    |
| B7                      | LOWER UP                    |
| B8                      | NOT USED                    |
| B9                      | NOT USED                    |
| C1                      | PROP VALVE -                |
| C2                      | NOT USED                    |
| C3                      | COMPRESSOR                  |
| C4                      | WINCH 2 SPD                 |
| C5                      | NOT USED                    |
| C6                      | NOT USED                    |
| C7                      | NOT USED                    |
| C8                      | NOT USED                    |
| C9                      | NOT USED                    |



JUMPER CONNECTIONS INSIDE RECEIVER

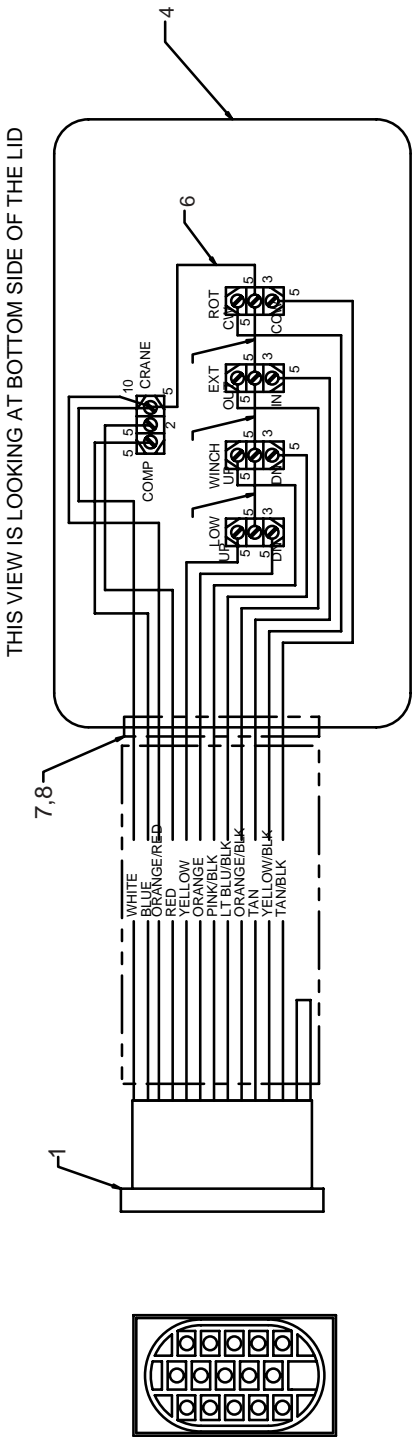
J1: PULSE/DITHER FREQUENCY  
- NO JUMPERJ2: CONTROL RANGE OF OUTPUT CURRENT (ONLY  
CURRENT-CONTROL)  
- PIN 2/3 CONNECTED: 0-2A

- P1: TRIMMING POTENTIOMETER FOR MAXIMUM VALUES. ON TRANSMITTER HANDLE, ENGAGE ROTATION CW OR CCW FUNCTION SWITCH AND PULL TRIGGER FULLY ON. CRANE MAY OR MAY NOT BEGIN TO MOVE AT THIS TIME DUE TO P1 INITIAL SETTING. TURN P1 POTENTIOMETER COUNTERCLOCKWISE UNTIL DESIRED MAXIMUM SPEED IS OBTAINED OR UNTIL SPEED NO LONGER CONTINUES TO INCREASE.
- P2: TRIMMING POTENTIOMETER FOR INITIAL VALUE ADJUSTMENT. ON TRANSMITTER, ENGAGE ROTATION CW OR CCW FUNCTION SWITCH. WITHOUT PULLING TRIGGER, ADJUST P2 COUNTERCLOCKWISE UNTIL CRANE BEGINS TO MOVE. AT THIS TIME, ADJUST P2 CLOCKWISE UNTIL NO MOVEMENT IS DETECTED. SLIGHTLY ENGAGE TRIGGER AND ADJUST P2 TO FINE TUNE.
- P3: TRIMMING POTENTIOMETER TO ADJUST DITHERAMPLITUDE: ADJUST CLOCKWISE OR COUNTERCLOCKWISE FOR SMOOTHNESS OF OPERATION.



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3-40

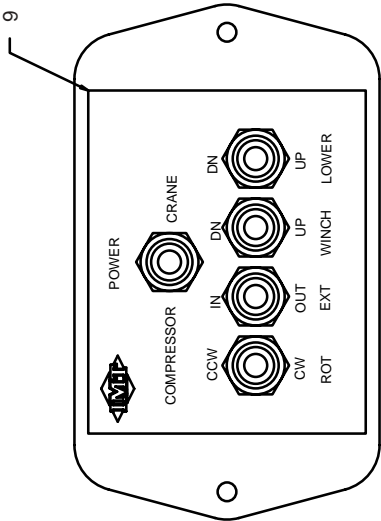


| CAV | COLOR         | FUNCTION               |
|-----|---------------|------------------------|
| A1  | BLACK         | JUMPER TO PIN B1 (GND) |
| A2  | LT BLUE/BLACK | WINCH DOWN             |
| A3  | TAN           | EXT BOOM IN            |
| A4  | ORANGE        | LOWER BOOM DN          |
| A5  | TAN/BLACK     | ROT CCW                |
| B5  | ORANGE/RED    | PROP VALVE (+)         |
| B1  | BLACK         | JUMPER TO PIN A1 (GND) |
| C5  | YELLOW/BLACK  | ROT CW                 |
| C1  | YELLOW        | LOWER BOOM UP          |
| C3  | ORANGE/BLACK  | EXT BOOM OUT           |
| C2  | PINK/BLACK    | WINCH UP               |
| C1  | RED           | MAIN POWER             |
| B2  | WHITE         | SOLENOID POWER         |
| B3  | BLUE          | COMPRESSOR             |

### HANDLE ASM - RADIO REMOTE BACKUP (51716912) (EFF. 9/01)

- |     |          |                                |    |
|-----|----------|--------------------------------|----|
| 1.  | 73733374 | CABLE ASM                      | 1  |
| 2.  | 77041404 | TOGGLE SWITCH, ON-OFF-ON       | 1  |
| 3.  | 77041346 | TOGGLE SWITCH, (ON)-OFF-(ON)   | 4  |
| 4.  | 60121724 | JIC BOX                        | 1  |
| 5.  | 77040186 | TERMINAL-FSLPON 1/4TAB         | 15 |
| 6.  | 60045031 | WIRE-GREEN 4" LONG             | 4  |
| 7.  | 77044018 | CONNECTOR 1/2 STR RLF 3/8-1/21 |    |
| 8.  | 77044201 | NUT-ELEC 1/2                   | 1  |
| 9.  | 70395537 | DECAL-CONTROL                  | 1  |
| 10. | 77040282 | TEM-PIGBAK 16/14 GA 1/4TAB     | 1  |

NOTE: UNPLUG RADIO RECEIVER BEFORE PLUGGING IN BACKUP HANDSET.





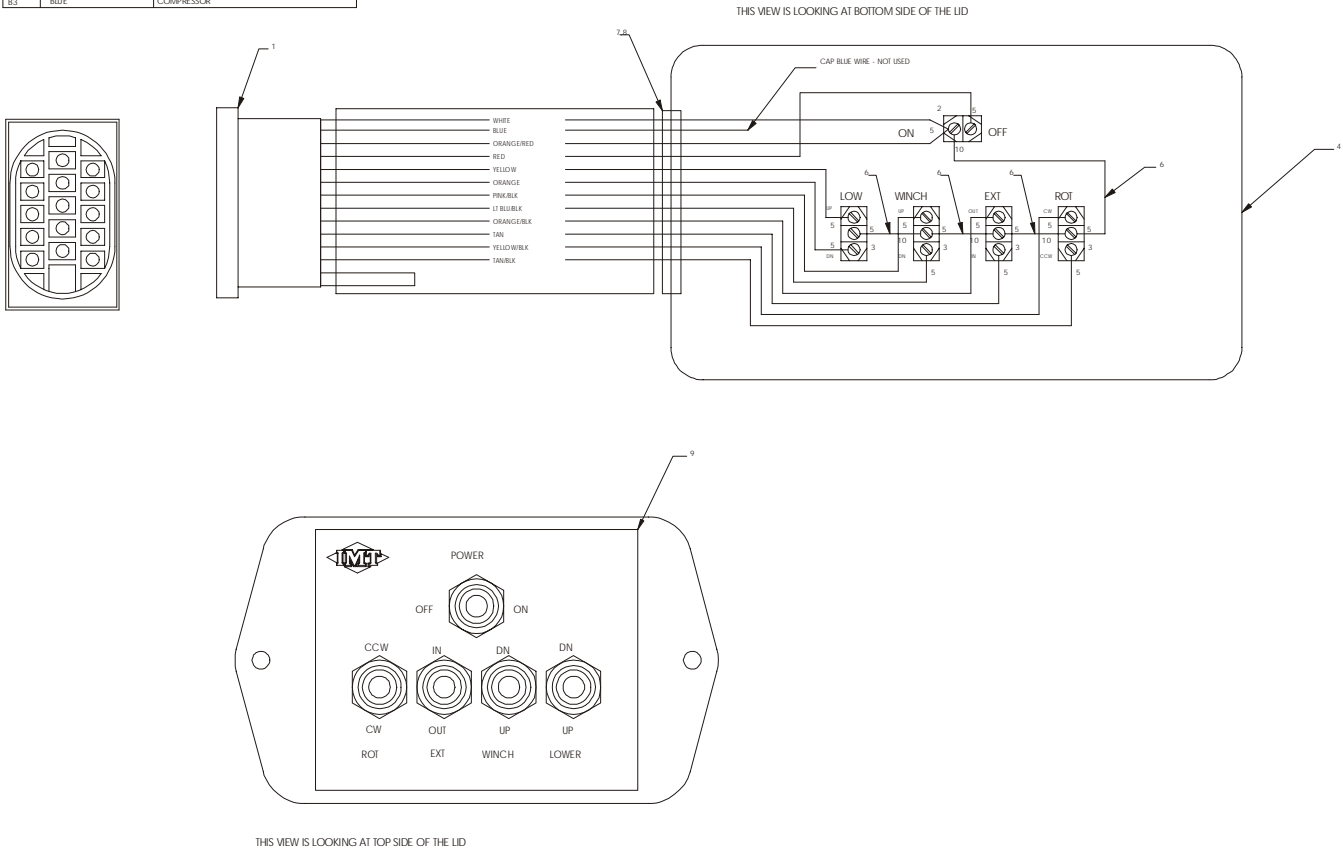
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3-41

**HANDLE ASM-RADIO RMT (51715567)  
(THRU 9/01)**

|     |          |                         |    |
|-----|----------|-------------------------|----|
| 1.  | 73733374 | CABLE ASM               | 1  |
| 2.  | 77041345 | SWITCH-TOGGLE SGL-THRW  | 1  |
| 3.  | 77041346 | SWITCH-TOGGLE DBL-THRW  | 4  |
| 4.  | 60121724 | JIC BOX                 | 1  |
| 5.  | 77040186 | TERMINAL 1/4FSLPON      | 14 |
| 6.  | 60045031 | WIRE 4" GRN             | 4  |
| 7.  | 77044018 | STRAIN RELIEF 1/2       | 1  |
| 8.  | 77044201 | NUT 1/2 ELEC            | 1  |
| 9.  | 70395536 | DECAL-RMT CTRL          | 1  |
| 10. | 77040282 | TERM-1/4 PIGBAC 16-14GA | 4  |

| CAV | COLOR        | FUNCTION               |
|-----|--------------|------------------------|
| A1  | BLACK        | JUMPER TO PIN B1 (GND) |
| A2  | LTBLUE/BLACK | WINCH DOWN             |
| A3  | TAN          | EXT BOOM IN            |
| A4  | ORANGE       | LOWER BOOM DN          |
| A5  | TAN/BLACK    | ROT CCW                |
| B5  | ORANGERED    | PROP VALVE (+)         |
| B1  | BLACK        | JUMPER TO PIN A1 (GND) |
| C5  | YELLOW/BLACK | ROT CW                 |
| C4  | YELLOW       | LOWER BOOM UP          |
| C3  | ORANGE/BLACK | EXT BOOM OUT           |
| C2  | PINK/BLACK   | WINCH UP               |
| C1  | RED          | MAIN POWER             |
| B2  | WHITE        | SOLENOID POWER         |
| B3  | BLUE         | COMPRESSOR             |





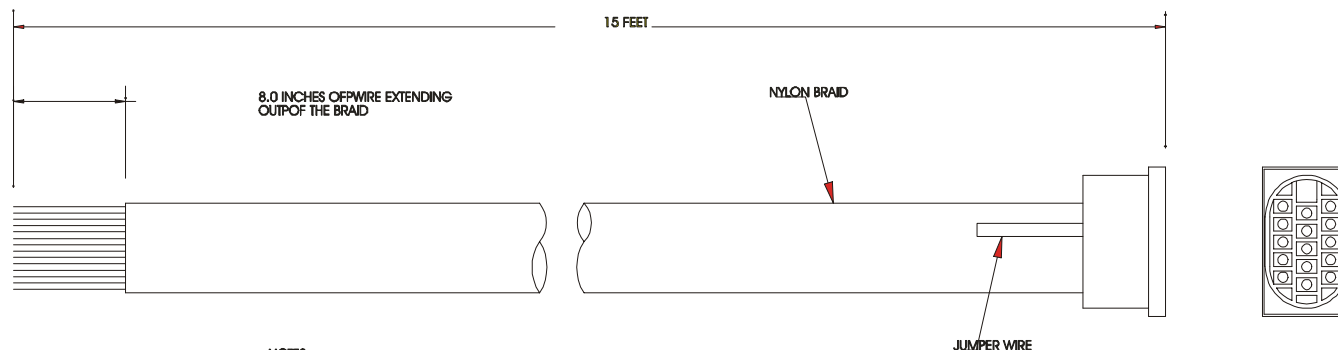
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3-42

**CABLE ASM-RADIO RMT BACKUP (73733374)**

| CAV. | COLOR      | GA. | FUNCTION-TELESCOPIC | LABELING     | FUNCTION-ARTICULATING  |
|------|------------|-----|---------------------|--------------|------------------------|
| *A1  | BLACK      | 16  | RADIO GROUND        | RADIO GND    | JUMPER TO PIN B1 (GND) |
| A2   | LT BLU/BLK | 16  | WINCH DOWN          | WIN DN       | INNER BOOM DOWN        |
| A4   | ORANGE     | 16  | LOWER DOWN          | LOW DN       | OUTER BOOM DOWN        |
| A3   | TAN        | 16  | EXTENSION IN        | EXT IN       | ROT CCW                |
| A5   | TAN/BLK    | 16  | ROTATE CCW          | ROT CCW      | EXT BOOM IN            |
| B5   | ORANGE/RED | 16  | PROP VALVE +        | PROP VALVE + | PROP VALVE (+)         |
| *B1  | BLACK      | 16  | PROP GROUND         | PROP GND     | JUMPER TO PIN A1 (GND) |
| C5   | YELLOW/BLK | 16  | ROTATE CW           | ROT CW       | EXT BOOM OUT           |
| C3   | ORANGE/BLK | 16  | EXTENSION OUT       | EXT OUT      | ROT CW                 |
| C4   | YELLOW     | 16  | LOWER UP            | LOW UP       | OUTER BOOM UP          |
| C2   | PINK/BLACK | 16  | WINCH UP            | WIN UP       | INNER BOOM UP          |
| C1   | RED        | 16  | RADIO POWER         | RAD PWR      | MAIN POWER             |
| B2   | WHITE      | 16  | SOLENOID POWER      | SOL PWR      | SOLENOID POWER         |
| B3   | BLUE       | 16  | COMPRESSOR          | COMP         | COMPRESSOR ON          |

\* CAVITIES A1 AND B1 ARE JUMPED.



## NOTES:

1. BRAID SHOULD BE WITHIN 1" TO THE BACK OF THE RECEPTACLE.
2. ALL WIRE TO BE GXL
3. LABELING SHALL APPEAR ON WIRES EVERY 2" TYPICAL.
4. CONNECTOR: METRI-PACK (12161187)  
TERMINAL: METRI-PACK (12124977)  
CABLE SEALS: METRI-PACK (12015323)  
CAVITY PLUG: METRI-PACK (12010300)

| WIRE SPECIFICATIONS                                                                                                                         |            |              |                      |
|---------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------|----------------------|
| PART #                                                                                                                                      | SIZE (AWG) | # OF STRANDS | INSULATION THICKNESS |
| GXL16                                                                                                                                       | 16         | 19/29        | .023 MILS-NOM.       |
| - HEAT RESISTANCE IN ACCORDANCE WITH SAE J-1128<br>- TEMPERATURE RANGE: -51 C TO +125 C<br>- MEETS FORD SPEC (M11-658) & CHRYSLER (MS-6900) |            |              |                      |



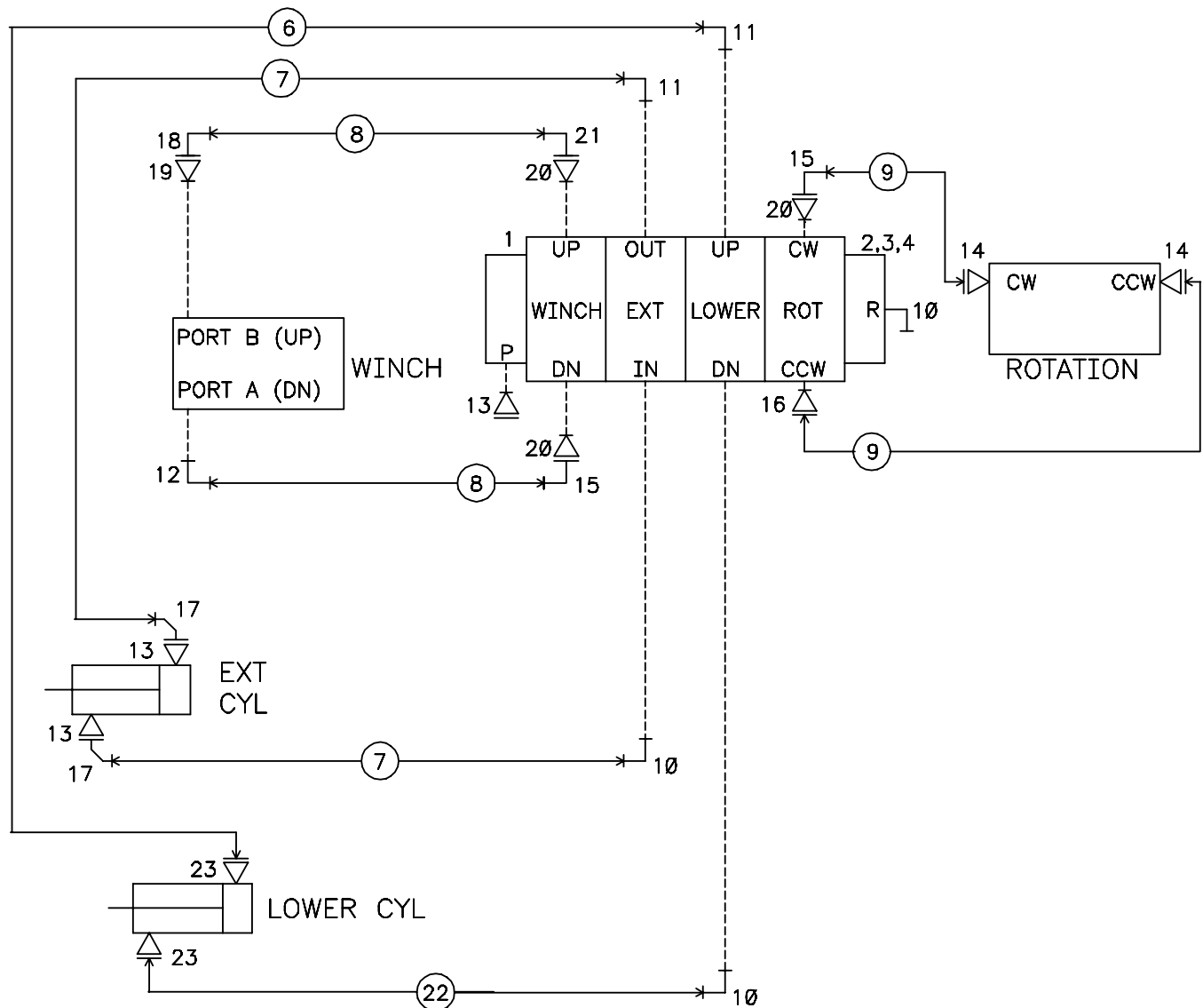
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**HYD KIT-RADIO RMT (91715633-1)**

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|     |                                                              |        |
|-----|--------------------------------------------------------------|--------|
| 1.  | 73733932 VALVEBANK(INCL:10,11,15,16,20,21)<br>(WAS 73733383) | 1      |
| 2.  | 72060005 CAP SCR 1/4-20X1-1/4 HHGR5                          | 4      |
| 3.  | 72062104 NUT 1/4-20 LOCK                                     | 4      |
| 4.  | 72063001 WASHER 1/4 WRT                                      | 4      |
| 5.  | 51715066 HOSE KIT (INCL:6-9,22)                              | 1      |
| 6.  | 51395555 HOSE ASM FF .38X34 #8#8                             | 1REF   |
| 7.  | 51395309 HOSE ASM FF .38X36 #8#8                             | 2REF   |
| 8.  | 51395307 HOSE ASM FF .38X23 #6#8                             | 2REF   |
| 9.  | 51395306 HOSE ASM FJ .25X48 #6#6                             | 2REF   |
| 10. | 72053763 ELBOW #8MSTR #8MJIC 90°                             | 3REF   |
| 11. | 72532666 ELBOW #8MSTR #8MJIC 90°                             | 2REF   |
| 12. | 72053764 ELBOW #10MSTR #8MJIC 90°                            | 1      |
| 13. | 72532358 ADAPTER #8MSTR #8MJIC                               | 2,1REF |
| 14. | 72533613 ADAPTER #10MSTR #6MJIC                              | 2      |
| 15. | 72532700 ELBOW #6MSTR #6MJIC XLG                             | 2REF   |
| 16. | 72053761 ELBOW #8MSTR #6MJIC 90°                             | 2REF   |
| 17. | 72532670 ELBOW #8MJIC #8FJIC 45°                             | 2      |
| 18. | 72532658 ELBOW #8MJIC #8FJIC SWVL                            | 1      |
| 19. | 72532359 ADAPTER #10MSTR #8MJIC                              | 1      |
| 20. | 72533052 ADAPTER #8MSTR #6FSTR                               | 3REF   |
| 21. | 72053760 ELBOW #6MSTR #6MJIC 90°                             | 1REF   |
| 22. | 51395556 HOSE ASM FF .38X32 #8#8                             | 1REF   |
| 23. | 72532357 ADAPTER #6MSTR #8MJIC                               | 2      |



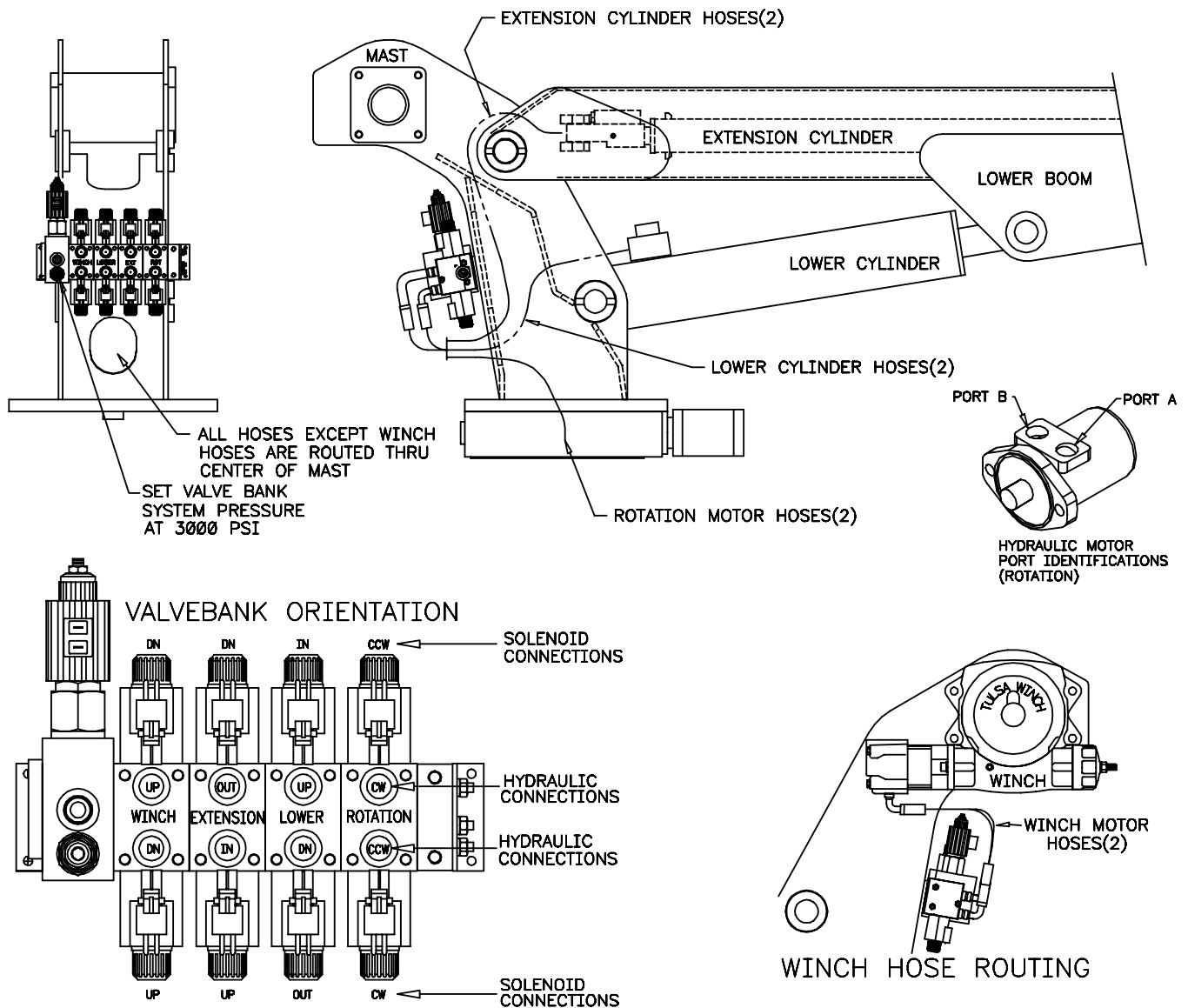


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## HYD KIT-RADIO RMT (91715633-2)

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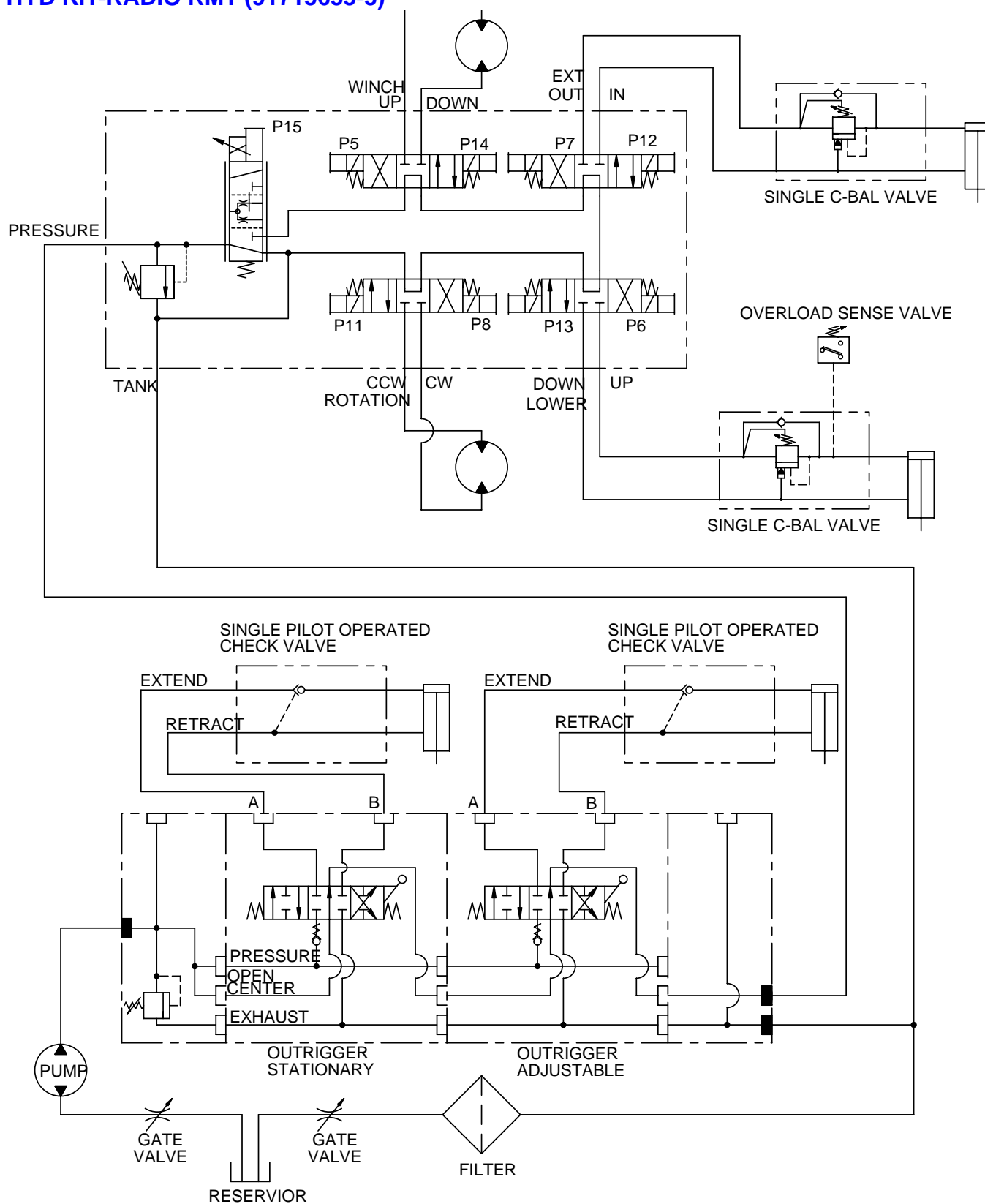




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**HYD KIT-RADIO RMT (91715633-3)**

3-45



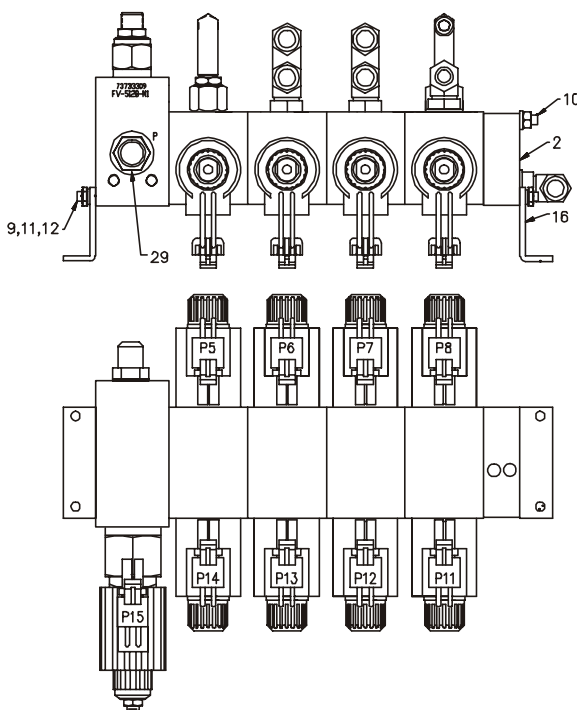
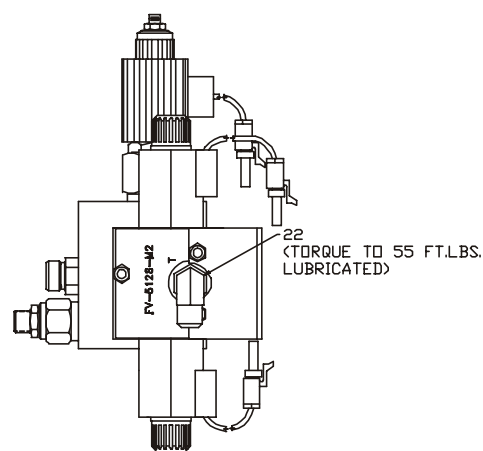
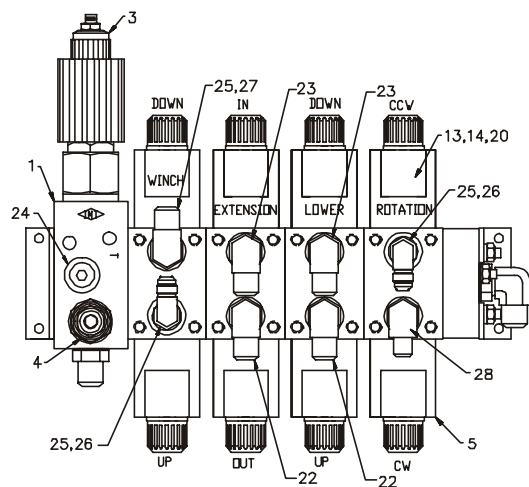
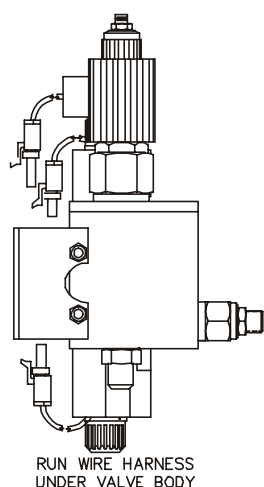
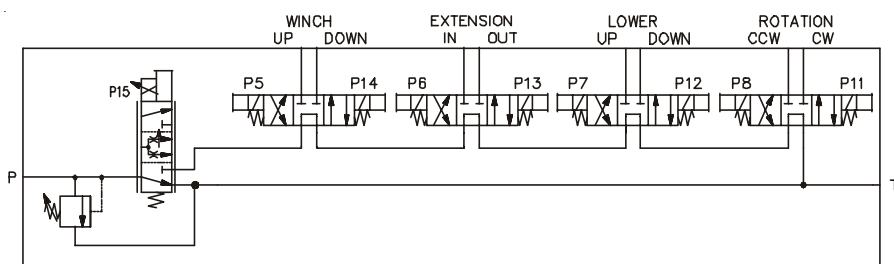


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**VALVEBANK-4 SECTION (73733383)**  
**(THROUGH 8-04)**

|     |          |                       |     |     |          |                                                               |     |
|-----|----------|-----------------------|-----|-----|----------|---------------------------------------------------------------|-----|
| 1.  | 73540028 | BLOCK-INLET           | 1   | 12. | 72063047 | WASHER #10 LOCK                                               | 5   |
| 2.  | 73540027 | END CAP               | 1   | 13. | 77044574 | CONNECTOR                                                     | 9   |
| 3.  | 73054934 | VALVE-PROPL FLOW CTRL | 1   | 14. | 77044550 | TERMINAL-FEM 18-20GA                                          | 18  |
|     | 77041556 | PROPL VALVE-COIL ONLY | REF | 15. | 70394069 | CABLE SEAL                                                    | 2   |
| 4.  | 73054935 | VALVE-RELIEF          | 1   | 16. | 70145830 | MTG BRACKET                                                   | 2   |
| 5.  | 73540044 | VALVE SECTION         | 4   | 20. | 77044594 | CABLE SEAL                                                    | 16  |
|     | 77041518 | COIL-SOLENOID         | REF | 21. | 70733351 | CABLE ASM                                                     | 1   |
| 6.  | 7Q072013 | O-RING                | 10  | 22. | 72053763 | ELBOW #8MSTR #8MJIC 90°                                       | 3   |
| 7.  | 72533477 | PLUG 7/16STR HOLHEX   | 1   | 23. | 72532666 | ELBOW #8MSTR #8MJIC 90°                                       | 2   |
| 8.  | 70145829 | EXPANDER PLUG         | 4   | 24. | 72533603 | PLUG 9/16STR HOLHEX                                           | 1   |
| 9.  | 60119363 | ROD 1/4-20X12-1/2     | 2   | 25. | 72533052 | ADAPTER #8MSTR #6FSTR                                         | 3   |
| 10. | 60119354 | ROD 1/4-20X10-9/16    | 1   | 26. | 72532700 | ELBOW #6MSTR #6MJIC XLG                                       | 2   |
| 11. | 72062000 | NUT 1/4-20 HEX        | 5   | 27. | 72053760 | ELBOW #6MSTR #6MJIC 90°                                       | 1   |
|     |          |                       |     | 28. | 72053761 | ELBOW #8MSTR #6MJIC 90°                                       | 1   |
|     |          |                       |     | 29. | 72532356 | ADAPTER #8MSTR #8MJIC                                         | 1   |
|     |          |                       |     |     | 70733875 | NUT, PLASTIC, WITH O-RING SEAL<br>(FOR USE ON VALVEBANK COIL) | REF |





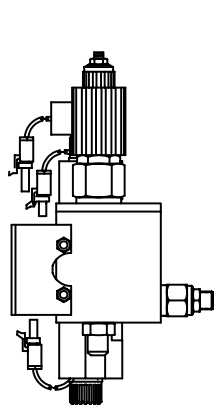
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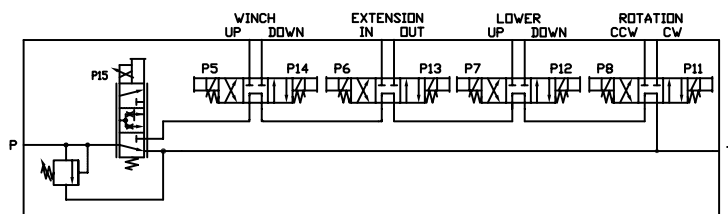
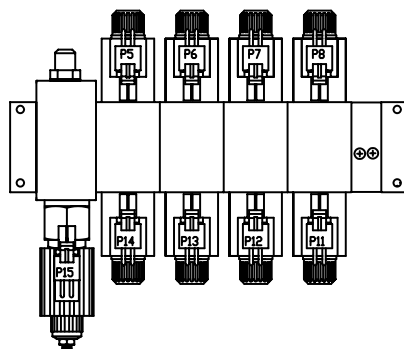
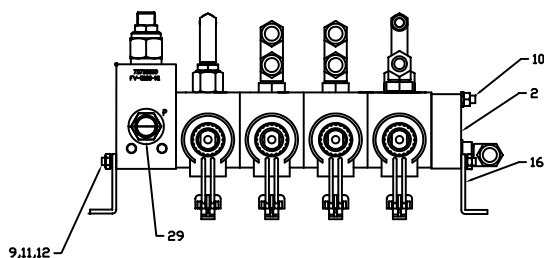
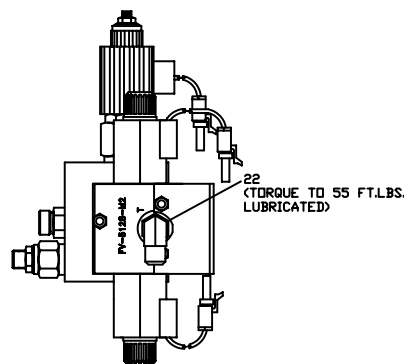
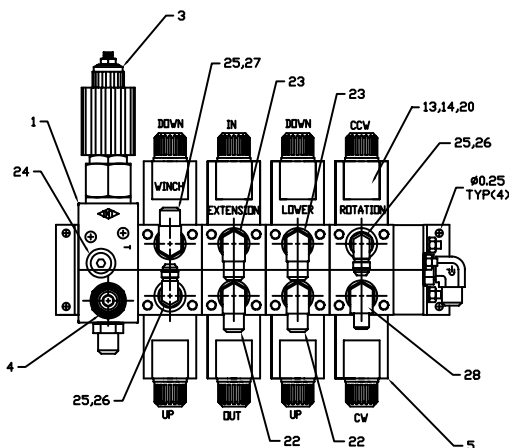
# **VALVEBANK-4 SECTION (73733932)** **(EFFECTIVE 8-04)**

|     |          |                       |     |
|-----|----------|-----------------------|-----|
| 1.  | 73540028 | BLOCK-INLET           | 1   |
| 2.  | 73540027 | ENDCAP                | 1   |
| 3.  | 73054934 | VALVE-PROPL FLOW CTRL | 1   |
|     | 77041556 | PROPL VALVE-COIL ONLY | REF |
| 4.  | 73054935 | VALVE-RELIEF          | 1   |
| 5.  | 73540044 | VALVE SECTION         | 4   |
|     | 77041518 | COIL-SOLENOID         | REF |
| 6.  | 7Q072013 | O-RING                | 10  |
| 7.  | 72533477 | PLUG 7/16STR HOLHEX   | 1   |
| 8.  | 70145829 | EXPANDER PLUG         | 4   |
| 9.  | 60119363 | ROD 1/4-20X12-1/2     | 2   |
| 10. | 60119364 | ROD 1/4-20X10-9/16    | 1   |
| 11. | 72062000 | NUT 1/4-20 HEX        | 5   |

|     |          |                                                               |     |
|-----|----------|---------------------------------------------------------------|-----|
| 12. | 72063047 | WASHER #10 LOCK                                               | 5   |
| 13. | 77044574 | CONNECTOR                                                     | 9   |
| 14. | 77044550 | TERMINAL-FEM 18-20GA                                          | 18  |
| 15. | 70394069 | CABLE SEAL                                                    | 2   |
| 16. | 70145830 | MTG BRACKET                                                   | 2   |
| 20. | 77044594 | CABLE SEAL                                                    | 16  |
| 21. | 77441101 | CABLE ASM                                                     | 1   |
| 22. | 72053763 | ELBOW #8MSTR #8MJIC 90°                                       | 3   |
| 23. | 72532666 | ELBOW #8MSTR #8MJIC 90°                                       | 2   |
| 24. | 72533603 | PLUG 9/16STR HOLHEX                                           | 1   |
| 25. | 72533052 | ADAPTER #8MSTR #6FSTR                                         | 3   |
| 26. | 72532700 | ELBOW #6MSTR #6MJIC XLG                                       | 2   |
| 27. | 72053760 | ELBOW #6MSTR #6MJIC 90°                                       | 1   |
| 28. | 72053761 | ELBOW #8MSTR #6MJIC 90°                                       | 1   |
| 29. | 72532358 | ADAPTER #8MSTR #8MJIC                                         | 1   |
|     | 70733875 | NUT, PLASTIC, WITH O-RING SEAL<br>(FOR USE ON VALVEBANK COIL) | REF |



RUN WIRE HARNESS UNDER VALVE BODY

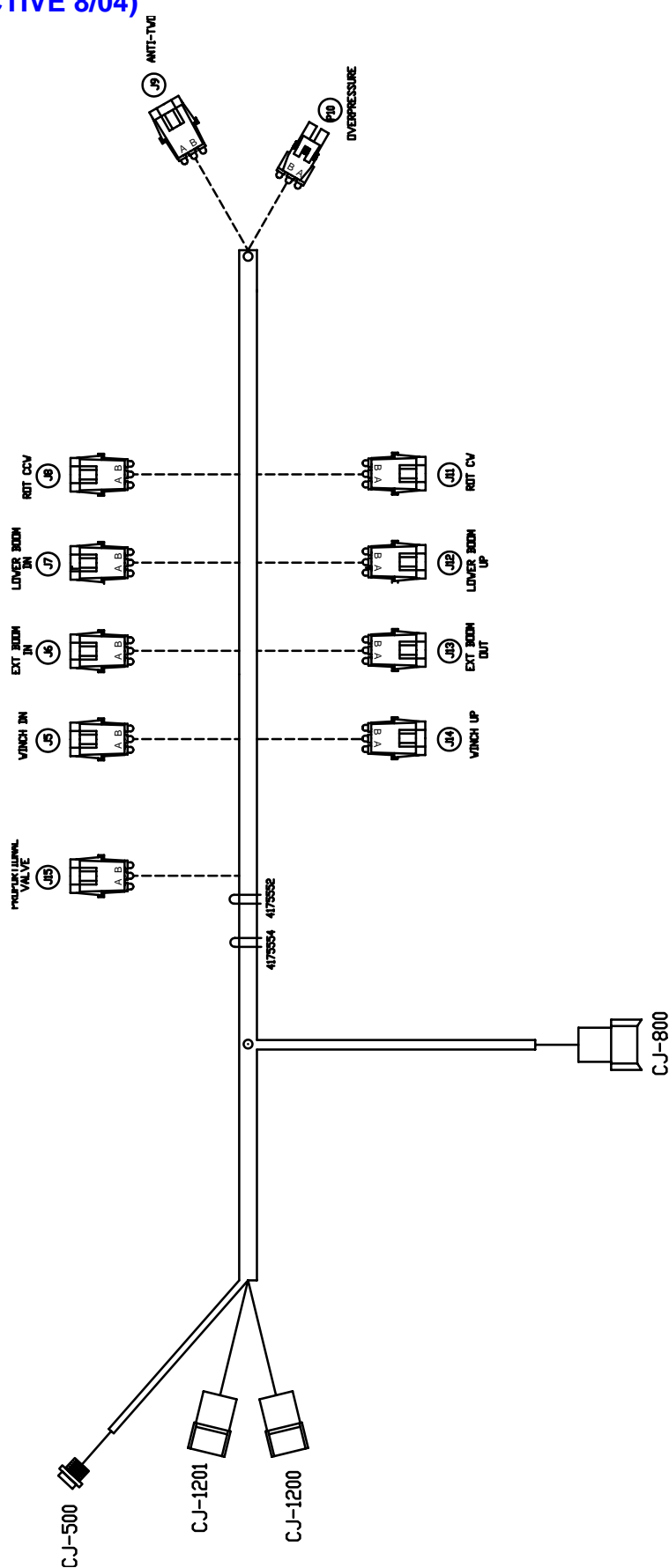




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**WIRING HARNESS, RADIO REMOTE  
(77441101-1) (EFFECTIVE 8/04)**

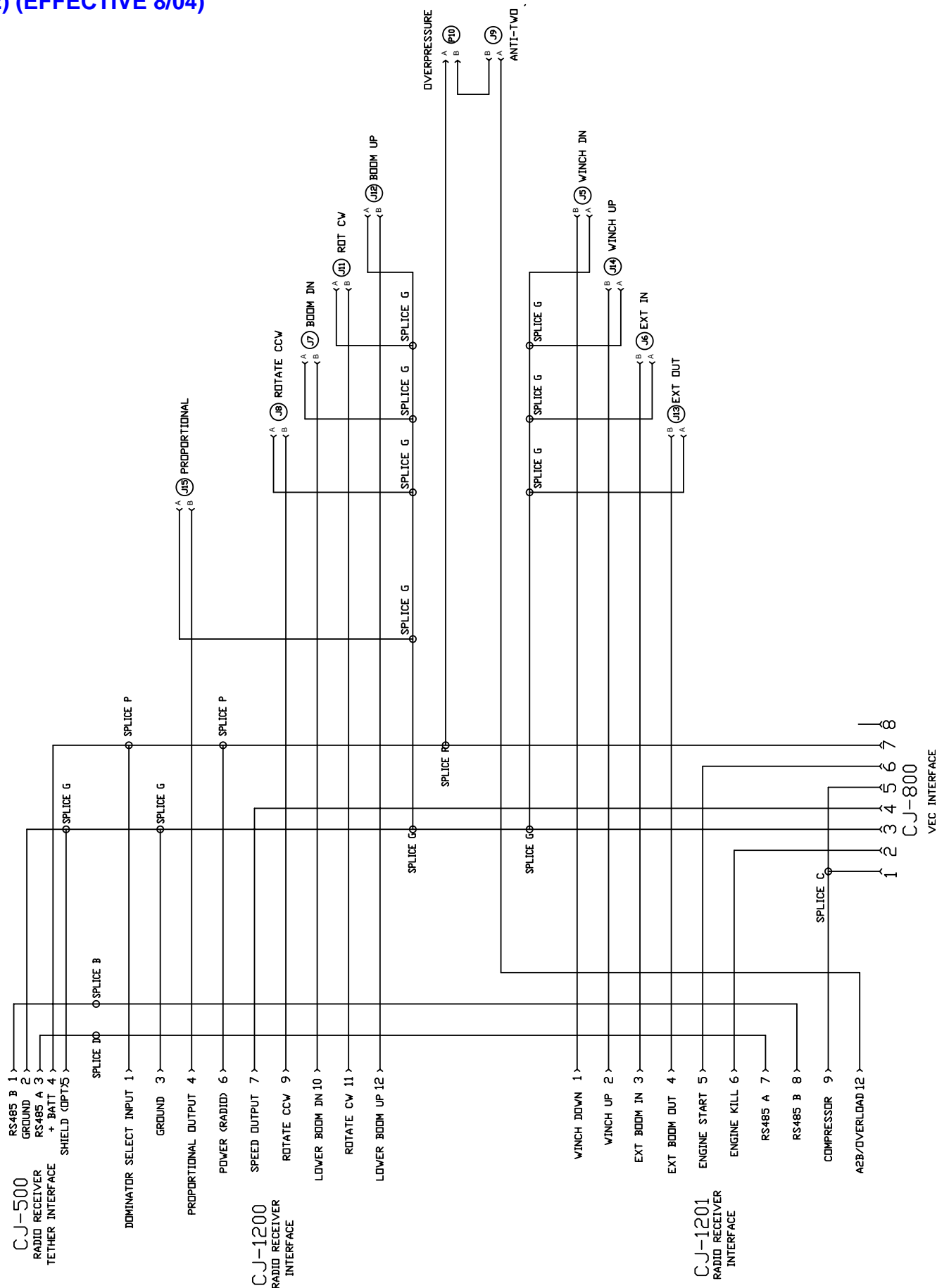




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## SCHEMATIC, RADIO REMOTE (77441101-2) (EFFECTIVE 8/04)





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**CIRCUIT CHART, RADIO REMOTE  
(77441101-3) (EFFECTIVE 8/04)**

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| LOCATOR CODE: CJ-500 |       | BRAD/HARRIS: 8RS400A18A120 |                   |    |          |
|----------------------|-------|----------------------------|-------------------|----|----------|
|                      |       | CAP: 80012 TIE TO HARNESS) |                   |    |          |
| CAVITY               | COLOR | GA.                        | PRINT LABEL       | TO | CON-SPLC |
| 1                    | BRWN  | 22                         | RS485 B           | TO | SPL B    |
| 2                    | BLK   | 22                         | GROUND            | TO | SPL G    |
| 3                    | BLUE  | 22                         | RS485 A           | TO | SPL D    |
| 4                    | WHT   | 22                         | + BATT            | TO | SPL P    |
| 5                    | GREY  | 22                         | SHIELD (OPTIONAL) | TO | SPL G    |

| LOCATOR CODE: CJ-800 |       | DUETSCH DT04-8PA |              |                     |          |
|----------------------|-------|------------------|--------------|---------------------|----------|
| TERM: 1060-16-0122   |       | WEDGE: WBP       |              | CAVITY PLUG: 114017 |          |
| CAVITY               | COLOR | GA.              | PRINT LABEL  | TO                  | CON-SPLC |
| 1                    | WHT   | 16               | COMP PWR     | TO                  | SPL C    |
| 2                    | WHT   | 16               | ENG KILL     | TO                  | CJ-1201  |
| 3                    | WHT   | 16               | GROUND       | TO                  | SPL G    |
| 4                    | WHT   | 16               | SPEED OUTPUT | TO                  | CJ-1200  |
| 5                    | WHT   | 16               | COMP PWR     | TO                  | SPL C    |
| 6                    | WHT   | 16               | ENGINE START | TO                  | CJ-1201  |
| 7                    | WHT   | 16               | POWER        | TO                  | SPL P    |
| 8                    | -     | -                | -            | TO                  | -        |

| LOCATOR CODE: CJ-1200 |       | DEUTSCH: DTM06-12SA |               |                            |          |
|-----------------------|-------|---------------------|---------------|----------------------------|----------|
| TERM: 1062-20-0122    |       | WEDGE: WM12S        |               | CAVITY PLUG: 0413-204-2005 |          |
| CAVITY                | COLOR | GA.                 | PRINT LABEL   | TO                         | CON-SPLC |
| 1                     | WHT   | 16                  | DOM SEL INPUT | TO                         | SPL P    |
| 2                     | -     | -                   | -             | TO                         | -        |
| 3                     | WHT   | 16                  | GROUND        | TO                         | SPL G    |
| 4                     | WHT   | 16                  | PROP VLV PWR  | TO                         | J15      |
| 5                     | -     | -                   | -             | TO                         | -        |
| 6                     | WHT   | 16                  | POWER (RADIO) | TO                         | SPL P    |
| 7                     | WHT   | 16                  | SPEED OUTPUT  | TO                         | CJ-800   |
| 8                     | -     | -                   | -             | TO                         | -        |
| 9                     | WHT   | 16                  | ROTATE CCW    | TO                         | J8       |
| 10                    | WHT   | 16                  | BOOM DN       | TO                         | J7       |
| 11                    | WHT   | 16                  | ROTATE CW     | TO                         | J11      |
| 12                    | WHT   | 16                  | BOOM UP       | TO                         | J12      |

| LOCATOR CODE: CJ-1201 |       | DEUTSCH: DTM06-12SB |              |                            |          |
|-----------------------|-------|---------------------|--------------|----------------------------|----------|
| TERM: 1062-20-0122    |       | WEDGE: WM12S        |              | CAVITY PLUG: 0413-204-2005 |          |
| CAVITY                | COLOR | GA.                 | PRINT LABEL  | TO                         | CON-SPLC |
| 1                     | WHT   | 16                  | WINCH DN     | TO                         | J5       |
| 2                     | WHT   | 16                  | WINCH UP     | TO                         | J14      |
| 3                     | WHT   | 16                  | EXTN         | TO                         | J6       |
| 4                     | WHT   | 16                  | EXT OUT      | TO                         | J13      |
| 5                     | WHT   | 16                  | ENGINE START | TO                         | CJ-800   |
| 6                     | WHT   | 16                  | ENGINE KILL  | TO                         | CJ-800   |
| 7                     | WHT   | 16                  | RS485 A      | TO                         | SPL D    |
| 8                     | WHT   | 16                  | RS485 B      | TO                         | SPL B    |
| 9                     | WHT   | 16                  | COMP PWR     | TO                         | SPL C    |
| 10                    | -     | -                   | -            | TO                         | -        |
| 11                    | -     | -                   | -            | TO                         | -        |
| 12                    | WHT   | 16                  | A2B/OVERLOAD | TO                         | J9       |

| LOCATOR CODE: J5 |       | PACKARD: 12010973 |               |    |          |
|------------------|-------|-------------------|---------------|----|----------|
| TERM: 12124582   |       | SEAL: 12015359    |               |    |          |
| CAVITY           | COLOR | GA.               | PRINT LABEL   | TO | CON-SPLC |
| A                | WHT   | 16                | WINCH DN GRND | TO | SPL G    |
| B                | WHT   | 16                | WINCH DN      | TO | CJ-1201  |

| LOCATOR CODE: J6 |       | PACKARD: 12010973 |             |    |          |
|------------------|-------|-------------------|-------------|----|----------|
| TERM: 12124582   |       | SEAL: 12015359    |             |    |          |
| CAVITY           | COLOR | GA.               | PRINT LABEL | TO | CON-SPLC |
| A                | WHT   | 16                | EXT INGRND  | TO | SPL G    |
| B                | WHT   | 16                | EXTN        | TO | CJ-1201  |

| LOCATOR CODE: J7 |       | PACKARD: 12010973 |              |    |          |
|------------------|-------|-------------------|--------------|----|----------|
| TERM: 12124582   |       | SEAL: 12015359    |              |    |          |
| CAVITY           | COLOR | GA.               | PRINT LABEL  | TO | CON-SPLC |
| A                | WHT   | 16                | BOOM DN GRND | TO | SPL G    |
| B                | WHT   | 16                | BOOM DN      | TO | CJ-1200  |

| LOCATOR CODE: J8 |       | PACKARD: 12010973 |              |    |          |
|------------------|-------|-------------------|--------------|----|----------|
| TERM: 12124582   |       | SEAL: 12015359    |              |    |          |
| CAVITY           | COLOR | GA.               | PRINT LABEL  | TO | CON-SPLC |
| A                | WHT   | 16                | ROT CCW GRND | TO | SPL G    |
| B                | WHT   | 16                | ROTATE CCW   | TO | CJ-1200  |

| LOCATOR CODE: J9 |       | PACKARD: 12010973 |              |    |          |
|------------------|-------|-------------------|--------------|----|----------|
| TERM: 12124582   |       | SEAL: 12015359    |              |    |          |
| CAVITY           | COLOR | GA.               | PRINT LABEL  | TO | CON-SPLC |
| A                | WHT   | 16                | A2B/OVERLOAD | TO | CJ-1201  |
| B                | WHT   | 16                | P10B TO J9B  | TO | P10      |

| LOCATOR CODE: P10 |       | PACKARD: 12015792 |              |    |          |
|-------------------|-------|-------------------|--------------|----|----------|
| TERM: 12124580    |       | SEAL: 12015359    |              |    |          |
| CAVITY            | COLOR | GA.               | PRINT LABEL  | TO | CON-SPLC |
| A                 | WHT   | 16                | OVR PRESS SW | TO | SPL P    |
| B                 | WHT   | 16                | P10B TO J9B  | TO | J9       |

| LOCATOR CODE: J11 |       | PACKARD: 12010973 |             |    |          |
|-------------------|-------|-------------------|-------------|----|----------|
| TERM: 12124582    |       | SEAL: 12015359    |             |    |          |
| CAVITY            | COLOR | GA.               | PRINT LABEL | TO | CON-SPLC |
| A                 | WHT   | 16                | ROT CW GRND | TO | SPL G    |
| B                 | WHT   | 16                | ROTATE CW   | TO | CJ-1200  |

| LOCATOR CODE: J12 |       | PACKARD: 12010973 |              |    |          |
|-------------------|-------|-------------------|--------------|----|----------|
| TERM: 12124582    |       | SEAL: 12015359    |              |    |          |
| CAVITY            | COLOR | GA.               | PRINT LABEL  | TO | CON-SPLC |
| A                 | WHT   | 16                | BOOM UP GRND | TO | SPL G    |
| B                 | WHT   | 16                | BOOM UP      | TO | CJ-1200  |

| LOCATOR CODE: J13 |       | PACKARD: 12010973 |             |    |          |
|-------------------|-------|-------------------|-------------|----|----------|
| TERM: 12124582    |       | SEAL: 12015359    |             |    |          |
| CAVITY            | COLOR | GA.               | PRINT LABEL | TO | CON-SPLC |
| A                 | WHT   | 16                | EX OUT GRND | TO | SPL G    |
| B                 | WHT   | 16                | EX OUT      | TO | CJ-1201  |

| LOCATOR CODE: J14 |       | PACKARD: 12010973 |               |    |          |
|-------------------|-------|-------------------|---------------|----|----------|
| TERM: 12124582    |       | SEAL: 12015359    |               |    |          |
| CAVITY            | COLOR | GA.               | PRINT LABEL   | TO | CON-SPLC |
| A                 | WHT   | 16                | WINCH UP GRND | TO | SPL G    |
| B                 | WHT   | 16                | WINCH UP      | TO | CJ-1201  |

| LOCATOR CODE: J15 |       | PACKARD: 12010973 |               |    |          |
|-------------------|-------|-------------------|---------------|----|----------|
| TERM: 12124582    |       | SEAL: 12015359    |               |    |          |
| CAVITY            | COLOR | GA.               | PRINT LABEL   | TO | CON-SPLC |
| A                 | WHT   | 16                | PROP VLV GRND | TO | SPL G    |
| B                 | WHT   | 16                | PROP VLV PWR  | TO | CJ-1200  |

| LOCATOR CODE: - |       | SPlice B |             |    |          |
|-----------------|-------|----------|-------------|----|----------|
| CAVITY          | COLOR | GA.      | PRINT LABEL | TO | CON-SPLC |
| -               | BRN   | 22       | RS485 B     | TO | CJ-500   |
| -               | WHT   | 16       | RS485 B     | TO | CJ-1201  |

| LOCATOR CODE: - |       | SPlice C |             |    |          |
|-----------------|-------|----------|-------------|----|----------|
| CAVITY          | COLOR | GA.      | PRINT LABEL | TO | CON-SPLC |
| -               | WHT   | 16       | COMP PWR    | TO | CJ-1201  |
| -               | WHT   | 16       | COMP PWR    | TO | CJ-800   |
| -               | WHT   | 16       | COMP PWR    | TO | CJ-800   |

| LOCATOR CODE: - |       | SPlice D |             |    |          |
|-----------------|-------|----------|-------------|----|----------|
| CAVITY          | COLOR | GA.      | PRINT LABEL | TO | CON-SPLC |
| -               | BLUE  | 22       | RS485 A     | TO | CJ-500   |
| -               | WHT   | 16       | RS485 A     | TO | CJ-1201  |

| LOCATOR CODE: - |       | SPlice G |                   |    |          |
|-----------------|-------|----------|-------------------|----|----------|
| CAVITY          | COLOR | GA.      | PRINT LABEL       | TO | CON-SPLC |
| -               | WHT   | 16       | WINCH DN GRND     | TO | J5       |
| -               | WHT   | 16       | EX IN GRND        | TO | J6       |
| -               | WHT   | 16       | BOOM DN GRND      | TO | J7       |
| -               | WHT   | 16       | ROT CCW GRND      | TO | J8       |
| -               | WHT   | 16       | ROT CW GRND       | TO | J11      |
| -               | WHT   | 16       | BOOM UP GRND      | TO | J12      |
| -               | WHT   | 16       | EX OUT GRND       | TO | J13      |
| -               | WHT   | 16       | WINCH UP GRND     | TO | J14      |
| -               | WHT   | 16       | PROP VLV GRND     | TO | J15      |
| -               | WHT   | 16       | GROUND            | TO | CJ-500   |
| -               | WHT   | 22       | SHIELD (OPTIONAL) | TO | CJ-500   |
| -               | WHT   | 16       | GROUND            | TO | CJ-800   |
| -               | WHT   | 16       | GROUND            | TO | CJ-1200  |

| LOCATOR CODE: - |       | SPlice P |               |    |          |
|-----------------|-------|----------|---------------|----|----------|
| CAVITY          | COLOR | GA.      | PRINT LABEL   | TO | CON-SPLC |
| -               | WHT   | 16       | POWER         | TO | CJ-800   |
| -               | WHT   | 16       | POWER (RADIO) | TO | CJ-1200  |
| -               | WHT   | 16       | DOM SEL INPUT | TO | CJ1200   |
| -               | WHT   | 22       | + BATT        | TO | CJ-500   |
| -               | WHT   | 16       | OVR PRESS SW  | TO | P10      |

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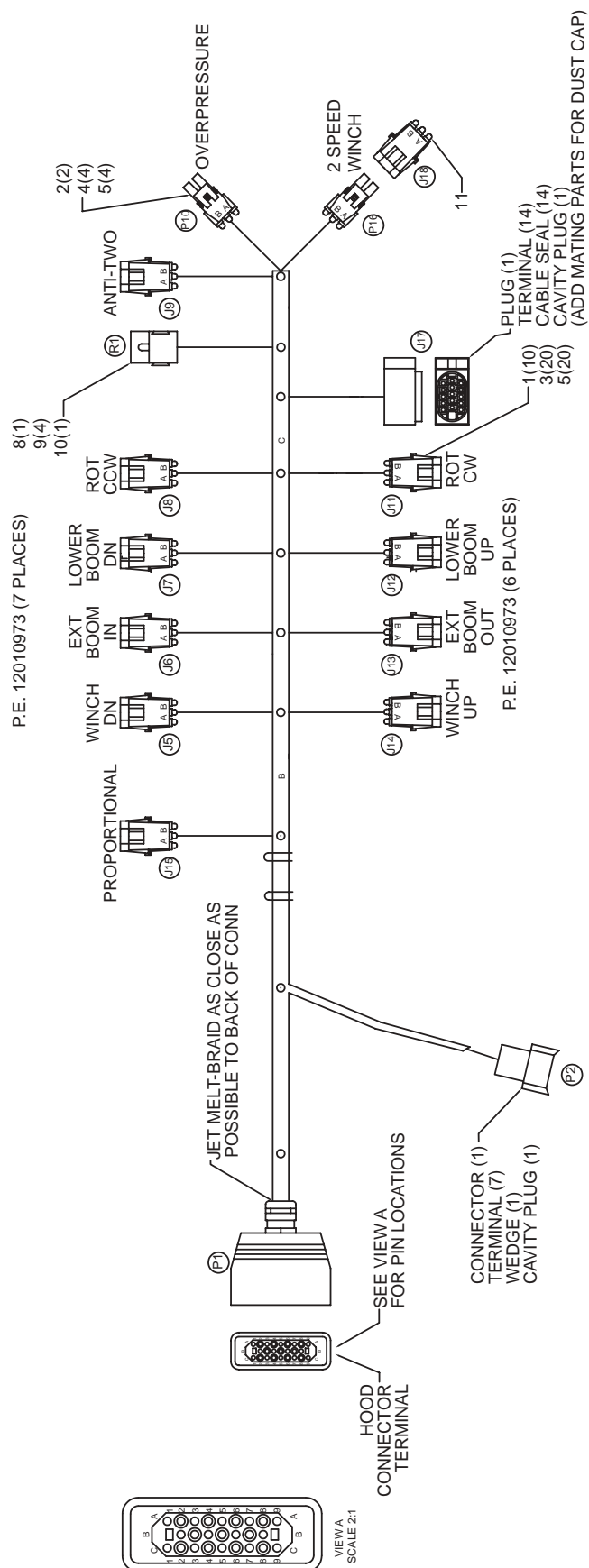
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**CABLE ASM, RADIO REMOTE (70733351-1) (THROUGH 7/04)**

ALL QUANTITIES ARE REFERENCE.

|     |          |                         |    |
|-----|----------|-------------------------|----|
| 1.  | 77044573 | SHROUD CONN 2-CONT      | 10 |
| 2.  | 77044574 | TOWER CONNECTION 2-CONT | 2  |
| 3.  | 77045887 | TERM-MALE 16GA          | 20 |
| 4.  | 77045888 | TERM-FEM 16GA           | 4  |
| 5.  | 77044927 | CABLE SEAL- GRY 16GA    | 25 |
| 6.  | 70145941 | CONN HOLD - 2 AMP       | 1  |
| 7.  | 70145942 | CONN - 2 AMP            | 1  |
| 8.  |          | SOCKET, RELAY           | 1  |
| 9.  |          | TERMINAL                | 4  |
| 10. |          | RELAY                   | 1  |
| 11. |          | PLUG                    | 2  |

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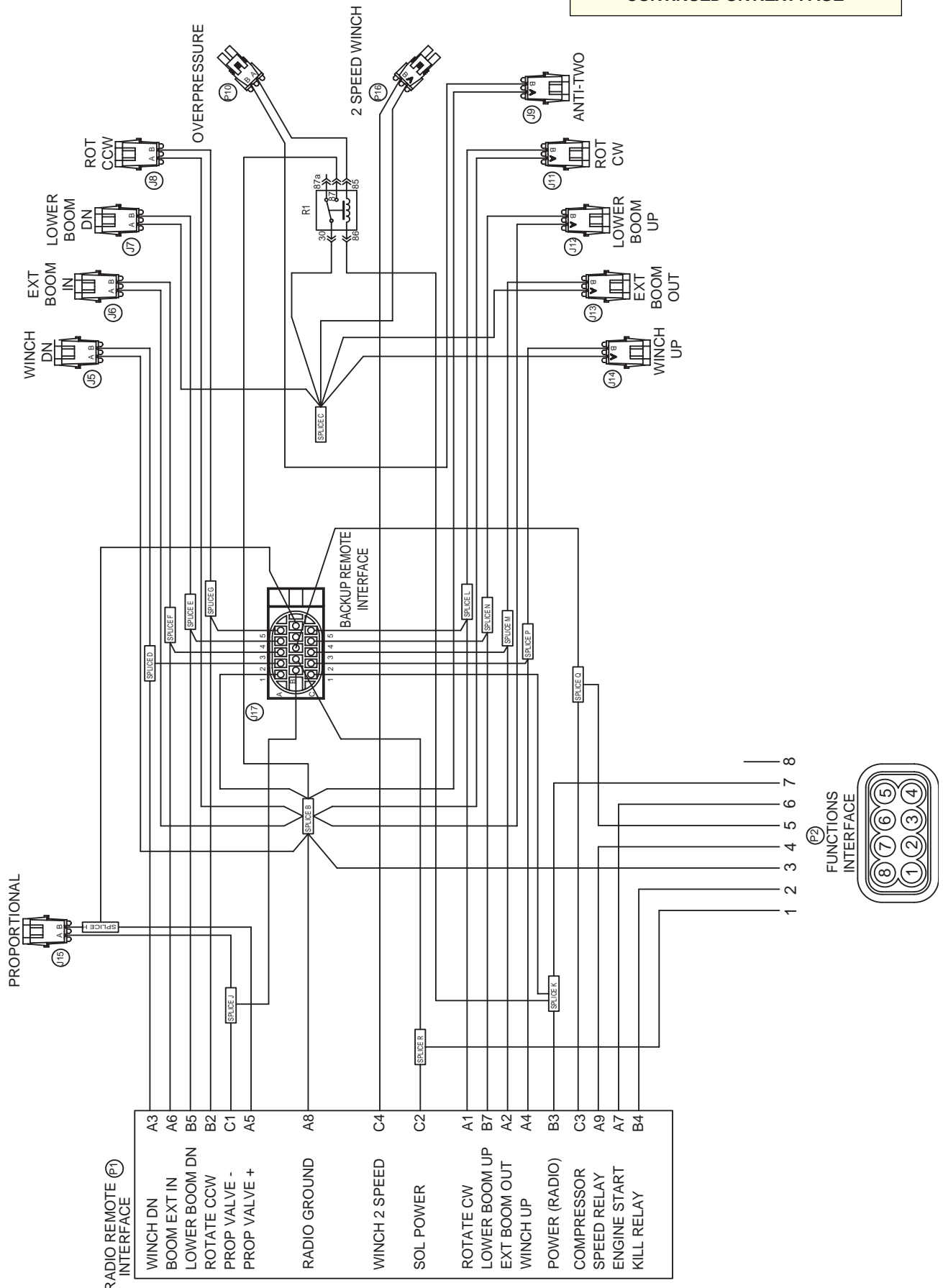


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**CABLE ASM (70733351-2) (THROUGH 7/04)**

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**CABLE ASM (70733351-3) (THROUGH 7/04)****PARTS LIST AND SCHEMATIC ON PREVIOUS PAGES**

| LOCATOR CODE: P1  |       |     |             |              |                   |       |    |             |             | AMP: HOOD: 2-1102137-1 |          |    |             |             |                       |                  |          |             |             |     |    |                  |          |
|-------------------|-------|-----|-------------|--------------|-------------------|-------|----|-------------|-------------|------------------------|----------|----|-------------|-------------|-----------------------|------------------|----------|-------------|-------------|-----|----|------------------|----------|
| TERM: 4-1105051-1 |       |     |             |              | CONN: 2-1103109-3 |       |    |             |             | SEAL: 12015359         |          |    |             |             | CAVITY PLUG: 12010973 |                  |          |             |             |     |    |                  |          |
| CAVITY            | COLOR | GA  | PRINT LABEL | TO CON-SPLC  | CAVITY            | COLOR | GA | PRINT LABEL | TO CON-SPLC | CAVITY                 | COLOR    | GA | PRINT LABEL | TO CON-SPLC | CAVITY                | COLOR            | GA       | PRINT LABEL | TO CON-SPLC |     |    |                  |          |
| -                 | A1    | WHT | 16          | ROT CW J11B  | TO SPL L          | -     | A1 | WHT         | 16          | J9A ANTI-TWO           | TO SPL B | -  | A1          | WHT         | 16                    | J9A ANTI-TWO     | TO SPL B | -           | A1          | WHT | 16 | J9A ANTI-TWO     | TO SPL B |
| -                 | A2    | WHT | 16          | EXT J12B     | TO SPL M          | -     | A2 | WHT         | 16          | P10B TO J8B            | TO P10   | -  | A2          | WHT         | 16                    | P10B TO J8B      | TO P10   | -           | A2          | WHT | 16 | P10B TO J8B      | TO P10   |
| -                 | A3    | WHT | 16          | WIN J6B      | TO SPL D          | -     | A3 | WHT         | 16          | WIN J6B                | TO SPL D | -  | A3          | WHT         | 16                    | J17 EXT IN       | TO SPL F | -           | A3          | WHT | 16 | J17 EXT IN       | TO SPL F |
| -                 | A4    | WHT | 16          | WIN J14B     | TO SPL P          | -     | A4 | WHT         | 16          | WIN J14B               | TO SPL P | -  | A4          | WHT         | 16                    | J17 LOW DN       | TO SPL E | -           | A4          | WHT | 16 | J17 LOW DN       | TO SPL E |
| -                 | A5    | WHT | 16          | PROP VLV (+) | TO SPL H          | -     | A5 | WHT         | 16          | PROP VLV (+)           | TO SPL H | -  | A5          | WHT         | 16                    | J17 ROT CCW      | TO SPL G | -           | A5          | WHT | 16 | J17 ROT CCW      | TO SPL G |
| -                 | A6    | WHT | 16          | EXT J7B      | TO SPL F          | -     | A6 | WHT         | 16          | EXT J7B                | TO SPL F | -  | A6          | WHT         | 16                    | J17 PROP (-)     | TO SPL J | -           | A6          | WHT | 16 | J17 PROP (-)     | TO SPL J |
| -                 | A7    | WHT | 16          | ENG START    | TO P2             | 6     | A7 | WHT         | 16          | ENG START              | TO P2    | 6  | A7          | WHT         | 16                    | J17 SOL PWR      | TO SPL R | -           | A7          | WHT | 16 | J17 SOL PWR      | TO SPL R |
| -                 | A8    | WHT | 16          | RADIO GND    | TO SPL B          | -     | A8 | WHT         | 16          | RADIO GND              | TO SPL B | -  | A8          | WHT         | 16                    | J17 COMP         | TO SPL Q | -           | A8          | WHT | 16 | J17 COMP         | TO SPL Q |
| -                 | A9    | WHT | 16          | ENG SPEED    | TO P2             | 4     | A9 | WHT         | 16          | ENG SPEED              | TO P2    | 4  | A9          | WHT         | 16                    | J17 ROT CW       | TO SPL L | -           | A9          | WHT | 16 | J17 ROT CW       | TO SPL L |
| -                 | B1    | -   | -           | -            | TO -              | -     | B1 | -           | -           | TO -                   | -        | B1 | -           | -           | TO -                  | -                | -        | -           | B1          | -   | -  | TO -             | -        |
| -                 | B2    | WHT | 16          | ROT CCW J8B  | TO SPL G          | -     | B2 | WHT         | 16          | ROT CCW J8B            | TO SPL G | -  | B2          | WHT         | 16                    | J17 PROP VLV (+) | TO SPL H | -           | B2          | WHT | 16 | J17 PROP VLV (+) | TO SPL H |
| -                 | B3    | WHT | 16          | RADIO PWR    | TO SPL K          | -     | B3 | WHT         | 16          | RADIO PWR              | TO SPL K | -  | B3          | WHT         | 16                    | J17 RAD PWR      | TO J17   | -           | B3          | WHT | 16 | J17 RAD PWR      | TO J17   |
| -                 | B4    | WHT | 16          | ENG KILL     | TO P2             | 2     | B4 | WHT         | 16          | ENG KILL               | TO P2    | 2  | B4          | WHT         | 16                    | J17 EXT OUT      | TO SPL M | -           | B4          | WHT | 16 | J17 EXT OUT      | TO SPL M |
| -                 | B5    | WHT | 16          | LOW DN P1 B5 | TO SPL E          | -     | B5 | WHT         | 16          | LOW DN P1 B5           | TO SPL E | -  | B5          | WHT         | 16                    | J17 LOW UP       | TO SPL N | -           | B5          | WHT | 16 | J17 LOW UP       | TO SPL N |
| -                 | B6    | -   | -           | -            | TO -              | -     | B6 | -           | -           | TO -                   | -        | B6 | -           | -           | TO -                  | -                | -        | -           | B6          | -   | -  | TO -             | -        |
| -                 | B7    | WHT | 16          | LOW P1 B7    | TO SPL N          | -     | B7 | WHT         | 16          | LOW P1 B7              | TO SPL N | -  | B7          | WHT         | 16                    | J17 ROT CW       | TO SPL L | -           | B7          | WHT | 16 | J17 ROT CW       | TO SPL L |
| -                 | C1    | WHT | 16          | PROP (-)     | TO SPL J          | -     | C1 | WHT         | 16          | PROP (-)               | TO SPL J | -  | C1          | WHT         | 16                    | J17 RAD PWR      | TO J17   | -           | C1          | WHT | 16 | J17 RAD PWR      | TO J17   |
| -                 | C2    | WHT | 16          | SOL PWR      | TO SPL R          | -     | C2 | WHT         | 16          | SOL PWR                | TO SPL R | -  | C2          | WHT         | 16                    | J17 WINCH UP     | TO SPL P | -           | C2          | WHT | 16 | J17 WINCH UP     | TO SPL P |
| -                 | C3    | WHT | 16          | COMPRESSOR   | TO SPL Q          | -     | C3 | WHT         | 16          | COMPRESSOR             | TO SPL Q | -  | C3          | WHT         | 16                    | J17 ROT CW       | TO J11   | -           | C3          | WHT | 16 | J17 ROT CW       | TO J11   |
| -                 | C4    | WHT | 16          | WINSPO J16B  | TO P16            | B     | C4 | WHT         | 16          | WINSPO J16B            | TO P16   | B  | C4          | WHT         | 16                    | ATB & OPRES GRD  | TO SPL C | -           | C4          | WHT | 16 | ATB & OPRES GRD  | TO SPL C |
| -                 | C5    | -   | -           | -            | TO -              | -     | C5 | -           | -           | TO -                   | -        | C5 | -           | -           | TO -                  | -                | -        | -           | C5          | -   | -  | TO -             | -        |
| -                 | C6    | -   | -           | -            | TO -              | -     | C6 | -           | -           | TO -                   | -        | C6 | -           | -           | TO -                  | -                | -        | -           | C6          | -   | -  | TO -             | -        |
| -                 | C7    | -   | -           | -            | TO -              | -     | C7 | -           | -           | TO -                   | -        | C7 | -           | -           | TO -                  | -                | -        | -           | C7          | -   | -  | TO -             | -        |
| -                 | C8    | -   | -           | -            | TO -              | -     | C8 | -           | -           | TO -                   | -        | C8 | -           | -           | TO -                  | -                | -        | -           | C8          | -   | -  | TO -             | -        |
| -                 | C9    | -   | -           | -            | TO -              | -     | C9 | -           | -           | TO -                   | -        | C9 | -           | -           | TO -                  | -                | -        | -           | C9          | -   | -  | TO -             | -        |

| LOCATOR CODE: P2   |       |     |             |             |            |       |    |             |             | DUETECH D704-8FA |          |    |             |             |                    |             |          |             |             |     |    |             |          |
|--------------------|-------|-----|-------------|-------------|------------|-------|----|-------------|-------------|------------------|----------|----|-------------|-------------|--------------------|-------------|----------|-------------|-------------|-----|----|-------------|----------|
| TERM: 1060-16-0722 |       |     |             |             | WEDGE: W8P |       |    |             |             | SEAL: 12015359   |          |    |             |             | CAVITY PLUG: 14017 |             |          |             |             |     |    |             |          |
| CAVITY             | COLOR | GA  | PRINT LABEL | TO CON-SPLC | CAVITY     | COLOR | GA | PRINT LABEL | TO CON-SPLC | CAVITY           | COLOR    | GA | PRINT LABEL | TO CON-SPLC | CAVITY             | COLOR       | GA       | PRINT LABEL | TO CON-SPLC |     |    |             |          |
| -                  | 1     | WHT | 16          | SOL PWR     | TO SPL R   | -     | 1  | WHT         | 16          | SOL PWR          | TO SPL R | -  | 1           | WHT         | 16                 | SOL PWR     | TO SPL R | -           | 1           | WHT | 16 | SOL PWR     | TO SPL R |
| -                  | 2     | WHT | 16          | ENG KILL    | TO P1      | B4    | 2  | WHT         | 16          | ENG KILL         | TO P1    | B4 | 2           | WHT         | 16                 | ENG KILL    | TO P1    | B4          | 2           | WHT | 16 | ENG KILL    | TO P1    |
| -                  | 3     | WHT | 16          | RADIO GND   | TO SPL B   | -     | 3  | WHT         | 16          | RADIO GND        | TO SPL B | -  | 3           | WHT         | 16                 | RADIO GND   | TO SPL B | -           | 3           | WHT | 16 | RADIO GND   | TO SPL B |
| -                  | 4     | WHT | 16          | ENG SPEED   | TO P1      | A9    | 4  | WHT         | 16          | ENG SPEED        | TO P1    | A9 | 4           | WHT         | 16                 | ENG SPEED   | TO P1    | A9          | 4           | WHT | 16 | ENG SPEED   | TO P1    |
| -                  | 5     | WHT | 16          | COMPRESSOR  | TO SPL Q   | -     | 5  | WHT         | 16          | COMPRESSOR       | TO SPL Q | -  | 5           | WHT         | 16                 | COMPRESSOR  | TO SPL Q | -           | 5           | WHT | 16 | COMPRESSOR  | TO SPL Q |
| -                  | 6     | WHT | 16          | ENG START   | TO P1      | A7    | 6  | WHT         | 16          | ENG START        | TO P1    | A7 | 6           | WHT         | 16                 | ENG START   | TO P1    | A7          | 6           | WHT | 16 | ENG START   | TO P1    |
| -                  | 7     | WHT | 16          | RADIO POWER | TO SPL K   | -     | 7  | WHT         | 16          | RADIO POWER      | TO SPL K | -  | 7           | WHT         | 16                 | RADIO POWER | TO SPL K | -           | 7           | WHT | 16 | RADIO POWER | TO SPL K |
| -                  | 8     | -   | -           | -           | TO -       | -     | 8  | -           | -           | TO -             | -        | 8  | -           | -           | TO -               | -           | -        | -           | 8           | -   | -  | TO -        | -        |

| LOCATOR CODE: J5 |       |     |             |              |                |       |    |             |             | PACKARD: 12010973     |          |    |             |             |        |              |          |             |             |     |    |              |          |
|------------------|-------|-----|-------------|--------------|----------------|-------|----|-------------|-------------|-----------------------|----------|----|-------------|-------------|--------|--------------|----------|-------------|-------------|-----|----|--------------|----------|
| TERM: 12124582   |       |     |             |              | SEAL: 12015359 |       |    |             |             | CAVITY PLUG: 12015359 |          |    |             |             |        |              |          |             |             |     |    |              |          |
| CAVITY           | COLOR | GA  | PRINT LABEL | TO CON-SPLC  | CAVITY         | COLOR | GA | PRINT LABEL | TO CON-SPLC | CAVITY                | COLOR    | GA | PRINT LABEL | TO CON-SPLC | CAVITY | COLOR        | GA       | PRINT LABEL | TO CON-SPLC |     |    |              |          |
| -                | A     | WHT | 16          | J5A WINCH DN | TO SPL B       | -     | A  | WHT         | 16          | J5A WINCH DN          | TO SPL B | -  | A           | WHT         | 16     | J5A WINCH DN | TO SPL B | -           | A           | WHT | 16 | J5A WINCH DN | TO SPL B |
| -                | B     | WHT | 16          | J5B WINCH DN | TO SPL D       | -     | B  | WHT         | 16          | J5B WINCH DN          | TO SPL D | -  | B           | WHT         | 16     | J5B WINCH DN | TO SPL D | -           | B           | WHT | 16 | J5B WINCH DN | TO SPL D |

| LOCATOR CODE: J6 |       |     |             |             |                |       |    |             |             | PACKARD: 12010973     |          |    |             |             |        |            |          |             |             |     |    |            |          |
|------------------|-------|-----|-------------|-------------|----------------|-------|----|-------------|-------------|-----------------------|----------|----|-------------|-------------|--------|------------|----------|-------------|-------------|-----|----|------------|----------|
| TERM: 12124582   |       |     |             |             | SEAL: 12015359 |       |    |             |             | CAVITY PLUG: 12015359 |          |    |             |             |        |            |          |             |             |     |    |            |          |
| CAVITY           | COLOR | GA  | PRINT LABEL | TO CON-SPLC | CAVITY         | COLOR | GA | PRINT LABEL | TO CON-SPLC | CAVITY                | COLOR    | GA | PRINT LABEL | TO CON-SPLC | CAVITY | COLOR      | GA       | PRINT LABEL | TO CON-SPLC |     |    |            |          |
| -                | A     | WHT | 16          | J6A EXT IN  | TO SPL B       | -     | A  | WHT         | 16          | J6A EXT IN            | TO SPL B | -  | A           | WHT         | 16     | J6A EXT IN | TO SPL B | -           | A           | WHT | 16 | J6A EXT IN | TO SPL B |
| -                | B     | WHT | 16          | J6B EXT IN  | TO SPL F       | -     | B  | WHT         | 16          | J6B EXT IN            | TO SPL F | -  | B           | WHT         | 16     | J6B EXT IN | TO SPL F | -           | B           | WHT | 16 | J6B EXT IN | TO SPL F |

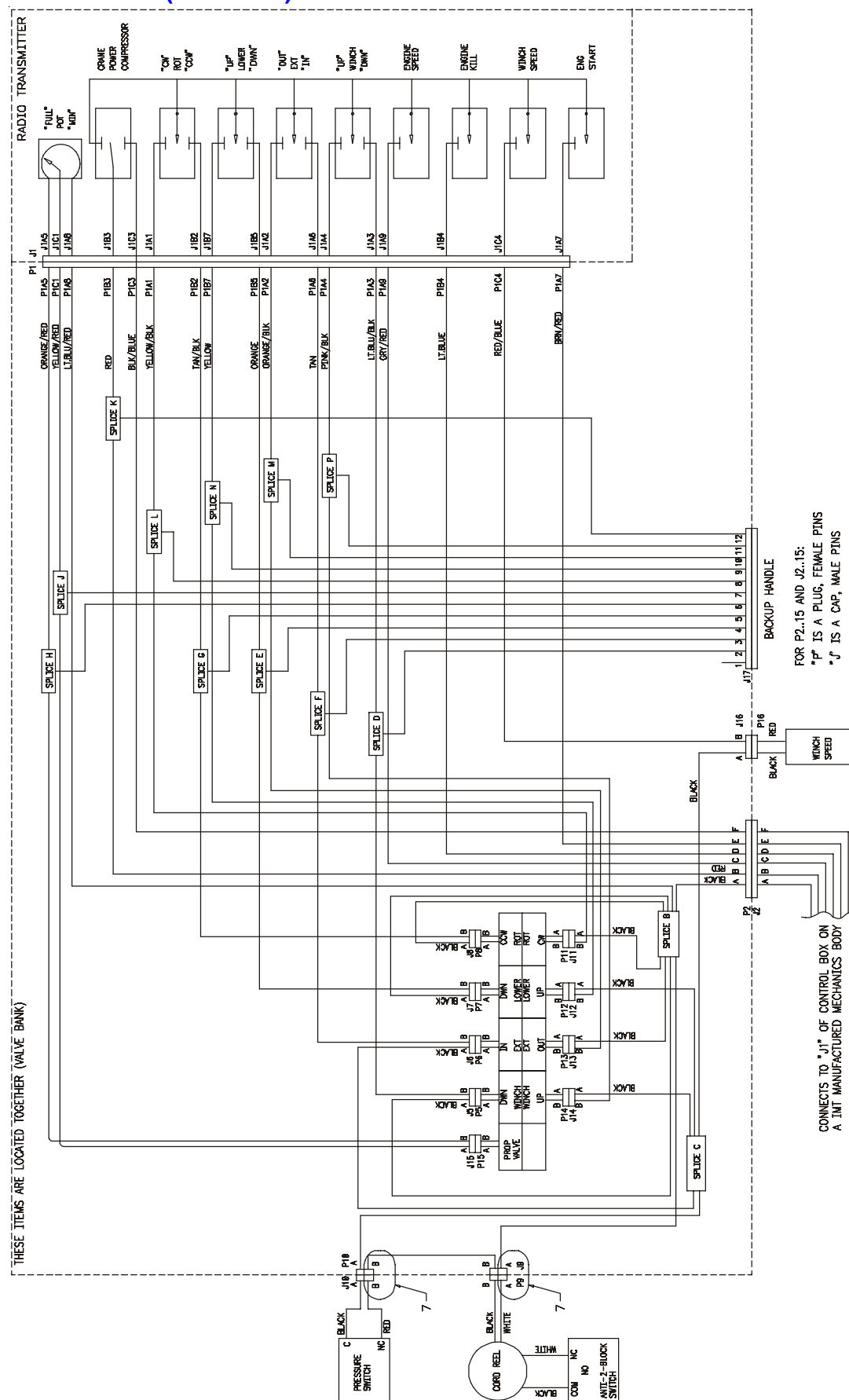
| LOCATOR CODE: J7 |       |     |             |             |                |       |    |             |             | PACKARD: 12010973     |          |    |             |             |        |            |          |             |             |     |    |            |          |
|------------------|-------|-----|-------------|-------------|----------------|-------|----|-------------|-------------|-----------------------|----------|----|-------------|-------------|--------|------------|----------|-------------|-------------|-----|----|------------|----------|
| TERM: 12124582   |       |     |             |             | SEAL: 12015359 |       |    |             |             | CAVITY PLUG: 12015359 |          |    |             |             |        |            |          |             |             |     |    |            |          |
| CAVITY           | COLOR | GA  | PRINT LABEL | TO CON-SPLC | CAVITY         | COLOR | GA | PRINT LABEL | TO CON-SPLC | CAVITY                | COLOR    | GA | PRINT LABEL | TO CON-SPLC | CAVITY | COLOR      | GA       | PRINT LABEL | TO CON-SPLC |     |    |            |          |
| -                | A     | WHT | 16          | J7A LOW DN  | TO SPL C       | -     | A  | WHT         | 16          | J7A LOW DN            | TO SPL C | -  | A           | WHT         | 16     | J7A LOW DN | TO SPL C | -           | A           | WHT | 16 | J7A LOW DN | TO SPL C |
| -                | B     | WHT | 16          | J7B LOW DN  | TO SPL E       | -     | B  | WHT         | 16          | J7B LOW DN            | TO SPL E | -  | B           | WHT         | 16     | J7B LOW DN | TO SPL E | -           | B           | WHT | 16 | J7B LOW DN | TO SPL E |

| LOCATOR CODE: J8 |       |     |             |             |                |       |    |             |             | PACKARD: 12010973     |          |    |             |             |        |             |          |             |             |     |    |             |          |
|------------------|-------|-----|-------------|-------------|----------------|-------|----|-------------|-------------|-----------------------|----------|----|-------------|-------------|--------|-------------|----------|-------------|-------------|-----|----|-------------|----------|
| TERM: 12124582   |       |     |             |             | SEAL: 12015359 |       |    |             |             | CAVITY PLUG: 12015359 |          |    |             |             |        |             |          |             |             |     |    |             |          |
| CAVITY           | COLOR | GA  | PRINT LABEL | TO CON-SPLC | CAVITY         | COLOR | GA | PRINT LABEL | TO CON-SPLC | CAVITY                | COLOR    | GA | PRINT LABEL | TO CON-SPLC | CAVITY | COLOR       | GA       | PRINT LABEL | TO CON-SPLC |     |    |             |          |
| -                | A     | WHT | 16          | J8A ROT CCW | TO SPL B       | -     | A  | WHT         | 16          | J8A ROT CCW           | TO SPL B | -  | A           | WHT         | 16     | J8A ROT CCW | TO SPL B | -           | A           | WHT | 16 | J8A ROT CCW | TO SPL B |
| -                | B     | WHT | 16          | J8B ROT CCW | TO SPL G       | -     | B  | WHT         | 16          | J8B ROT CCW           | TO SPL G | -  | B           | WHT         | 16     | J8B ROT CCW | TO SPL G | -           | B           | WHT | 16 | J8B ROT CCW | TO SPL G |

00006020: 99903131.01.19990927

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**SCHEMATIC (99903131)**



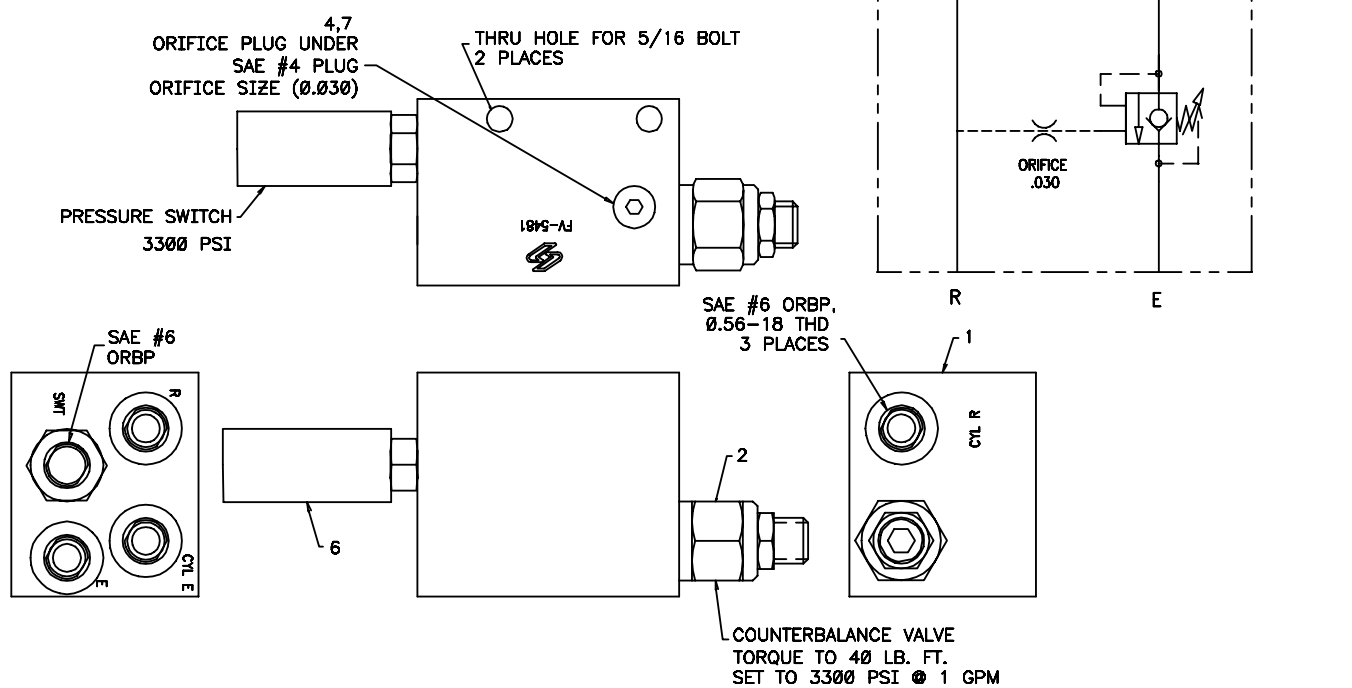


00006020: 73540035.01.19991216

3-55

### COUNTERBALANCE VALVE (73540035)

- |    |          |                     |   |
|----|----------|---------------------|---|
| 1. | 73540051 | C'BAL VALVE BLOCK   | 1 |
| 2. | 73540052 | C'BAL VALVE         | 1 |
| 4. | 70145750 | ORIFICE             | 1 |
| 6. | 77041561 | PRESSURE SWITCH     | 1 |
| 7. | 72533477 | PLUG 7/16STR HOLHEX | 2 |





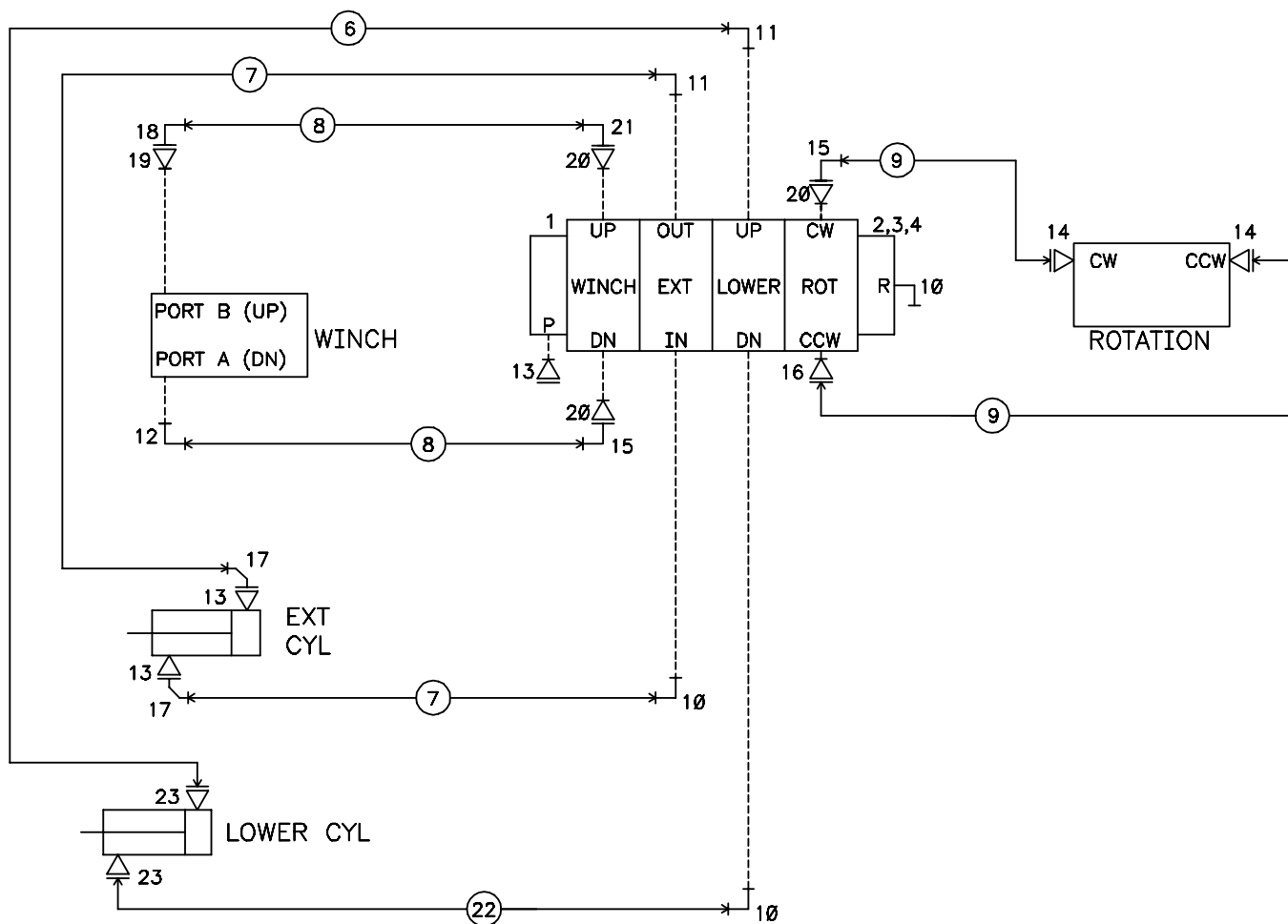
00006020: 91715652.01.20000329

3-56

**HYD KIT (91715652-1)**

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|     |          |                                   |        |
|-----|----------|-----------------------------------|--------|
| 1.  | 73733396 | VALVEBANK(INCL:10,11,15,16,20,21) | 1      |
| 2.  | 72060005 | CAP SCR 1/4-20X1-1/4 HHGR5        | 4      |
| 3.  | 72062104 | NUT 1/4-20 LOCK                   | 4      |
| 4.  | 72063001 | WASHER 1/4 WRT                    | 4      |
| 5.  | 51715639 | HOSE KIT (INCL:6-9,22)            | 1      |
| 6.  | 51395183 | HOSE ASM FF .50X35.5 #8#8         | 1REF   |
| 7.  | 51395309 | HOSE ASM FF .38X36 #8#8           | 2REF   |
| 8.  | 51395307 | HOSE ASM FF .38X23 #6#8           | 2REF   |
| 9.  | 51395306 | HOSE ASM FJ .25X48 #6#6           | 2REF   |
| 10. | 72053763 | ELBOW #8MSTR #8MJIC 90°           | 3REF   |
| 11. | 72532666 | ELBOW #8MSTR #8MJIC 90°           | 2REF   |
| 12. | 72053764 | ELBOW #10MSTR #8MJIC 90°          | 1      |
| 13. | 72532358 | ADAPTER #8MSTR #8MJIC             | 2,1REF |
| 14. | 72533613 | ADAPTER #10MSTR #6MJIC            | 2      |
| 15. | 72532700 | ELBOW #6MSTR #6MJIC XLG           | 2REF   |
| 16. | 72053761 | ELBOW #8MSTR #6MJIC 90°           | 1REF   |
| 17. | 72532670 | ELBOW #8MJIC #8FJIC 45°           | 2      |
| 18. | 72532658 | ELBOW #8MJIC #8FJIC SWVL          | 1      |
| 19. | 72532359 | ADAPTER #10MSTR #8MJIC            | 1      |
| 20. | 72533052 | ADAPTER #8MSTR #6FSTR             | 3REF   |
| 21. | 72053760 | ELBOW #6MSTR #6MJIC 90°           | 1REF   |
| 22. | 51395556 | HOSE ASM FF .38X32 #8#8           | 1REF   |
| 23. | 72532357 | ADAPTER #6MSTR #8MJIC             | 2      |



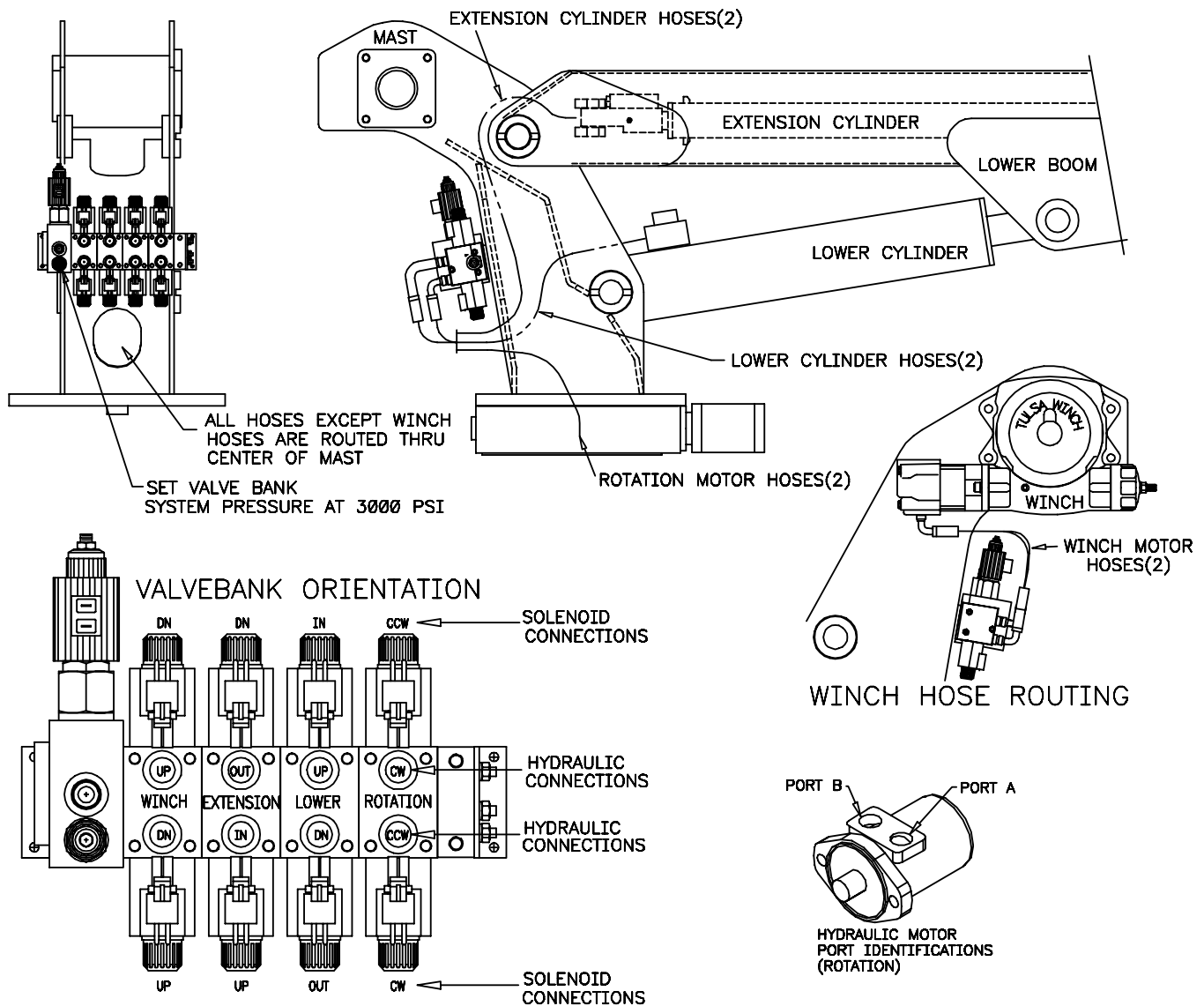


00006020: 91715652.02.20000329

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**HYD KIT (91715652-2)**

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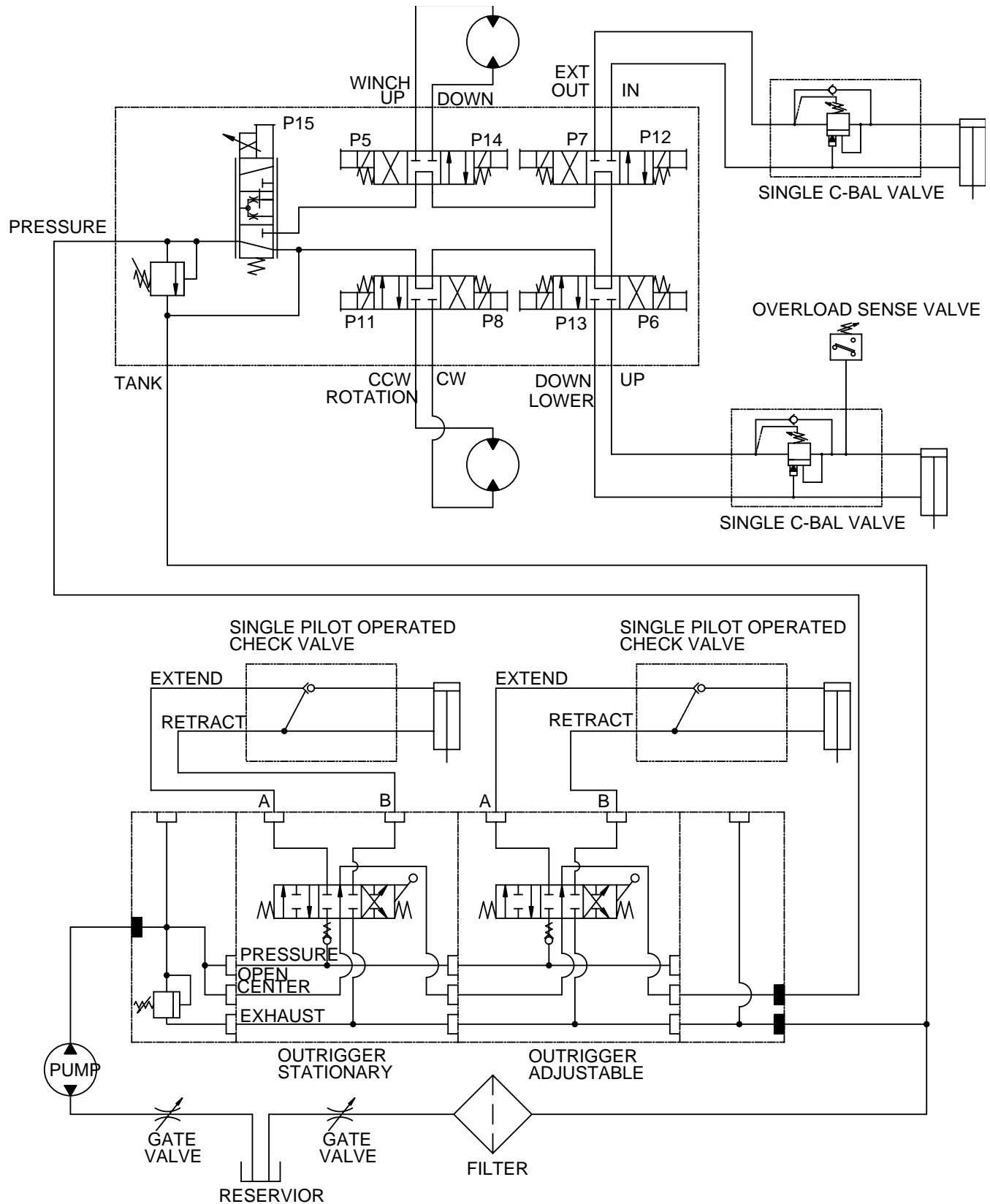




00006020: 91715652.03.REV. A 20040323

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**HYD KIT (91715652-3)**



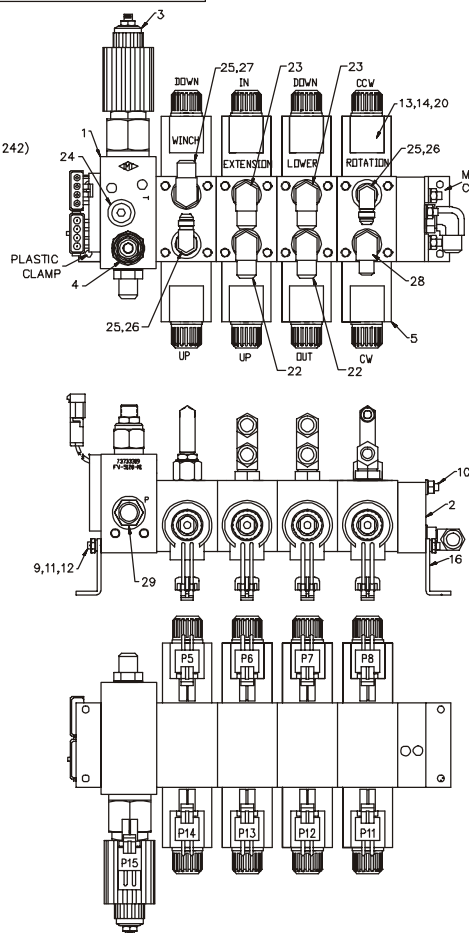
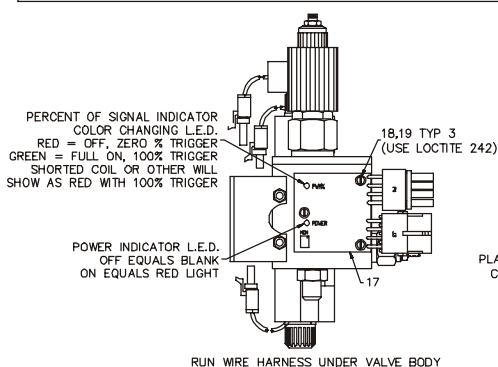
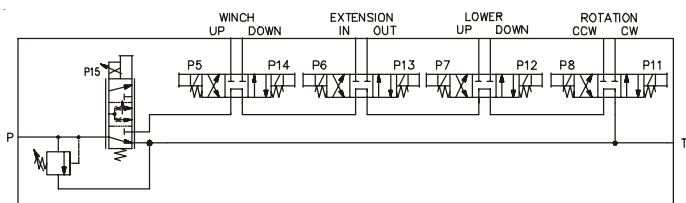


00006020: 73733396.01.20010720

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**VALVEBANK (73733396)**

|     |          |                       |     |     |          |                         |    |
|-----|----------|-----------------------|-----|-----|----------|-------------------------|----|
| 1.  | 73540028 | BLOCK-INLET           | 1   | 14. | 77044550 | TERMINAL-FEM 18-20GA    | 18 |
| 2.  | 73540027 | END CAP               | 1   | 15. | 70394069 | CABLE SEAL              | 2  |
| 3.  | 73054934 | VALVE-PROPL FLOW CTRL | 1   | 16. | 70145830 | MTG BRACKET             | 2  |
|     | 77041556 | PROPL VALVE-COIL ONLY | REF | 17. | 77044595 | VALVE DRIVER            | 1  |
| 4.  | 73054935 | VALVE-RELIEF          | 1   | 18. | 72601704 | MACH SCR #6-32X3/4 RDHD | 3  |
| 5.  | 73540044 | VALVE SECTION         | 4   | 19. | 72061705 | WASHER #6 WRT           | 3  |
|     | 77041518 | COIL-SOLENOID         | REF | 20. | 77044594 | CABLE SEAL              | 16 |
| 6.  | 7Q072013 | O-RING                | 10  | 21. | 70733394 | CABLE ASM               | 1  |
| 7.  | 72533477 | PLUG 7/16STR HOLHEX   | 1   | 22. | 72053763 | ELBOW #8MSTR #8MJIC 90° | 3  |
| 8.  | 70145829 | EXPANDER PLUG         | 4   | 23. | 72532666 | ELBOW #8MSTR #8MJIC 90° | 2  |
| 9.  | 60119363 | ROD 1/4-20X12-1/2     | 2   | 24. | 72533603 | PLUG 9/16STR HOLHEX     | 1  |
| 10. | 60119364 | ROD 1/4-20X10-9/16    | 1   | 25. | 72533052 | ADAPTER #8MSTR #6FSTR   | 3  |
| 11. | 72062000 | NUT 1/4-20 HEX        | 5   | 26. | 72532700 | ELBOW #6MSTR #6MJIC XLG | 2  |
| 12. | 72063047 | WASHER #10 LOCK       | 5   | 27. | 72053760 | ELBOW #6MSTR #6MJIC 90° | 1  |
| 13. | 77044574 | CONNECTOR             | 9   | 28. | 72053761 | ELBOW #8MSTR #6MJIC 90° | 1  |
|     |          |                       |     | 29. | 72532358 | ADAPTER #8MSTR #8MJIC   | 1  |



- NOTES:
1. CONNECT J9 AND P10 TOGETHER
  2. ADD DUSK CAP TO J16



00006020: 70733394.01.REV. E 20030908

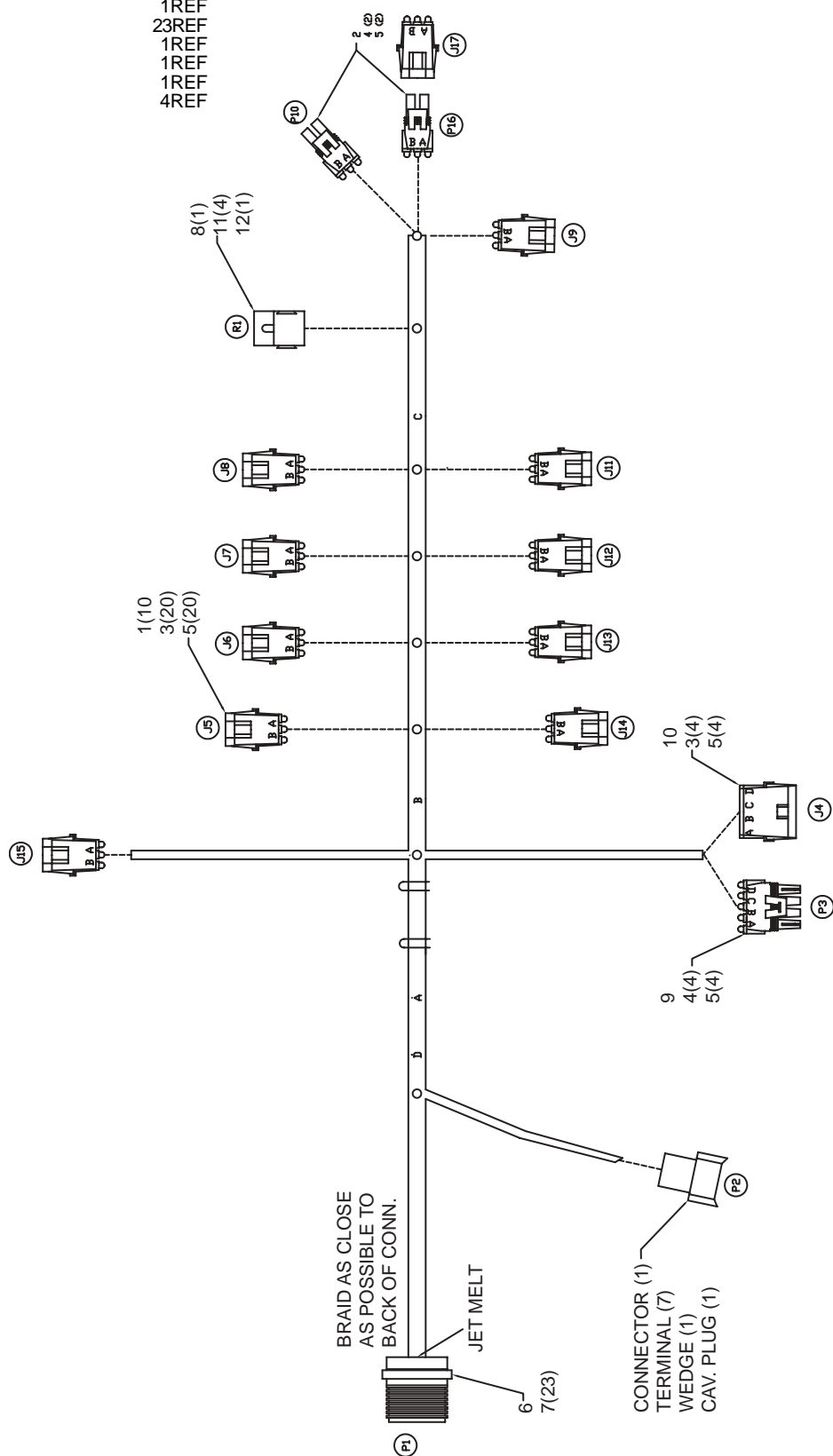
3-60

### CABLE ASM (70733394-1)

1. 77044573 SHROUD CONN 2-CONT
2. 77044574 TOWER CONN 2-CONT
3. 77044576 TERMINAL-MALE 20-18GA
4. 77044577 TERMINAL-FEMALE 20-18GA
5. 77044578 CABLE SEAL GRN 20-18GA
6. 77044620 CONN RCPT
7. 77044580 SOCKETS
8. SOCKET, RELAY
9. 77044623 TOWER CONN
10. 77044624 SHROUD, CONN
11. TERMINAL

- 10REF
- 2REF
- 24REF
- 8REF
- 32REF
- 1REF
- 23REF
- 1REF
- 1REF
- 1REF
- 4REF

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00006020: 70733394.02.REV. E 20030908

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**CABLE ASM (70733394-2)**

| LOCATOR CODE: P1     |       |     |                         |    |          |        |
|----------------------|-------|-----|-------------------------|----|----------|--------|
| TERM# 0462-201-16141 |       |     | DEUTSCH: HD34-24-235059 |    |          |        |
| SEAL# -              |       |     | CAVITY PLUG: 114017     |    |          |        |
| CAVITY               | COLOR | GA. | PRINT LABEL             | TO | CON-SPLC | CAVITY |
| A                    | WHT   | 18  | ROD J11B                | TO | J11      | B      |
| B                    | WHT   | 18  | EXT J13B                | TO | J13      | B      |
| C                    | WHT   | 18  | WINCH J5B               | TO | J5       | B      |
| D                    | WHT   | 18  | WINCH J14B              | TO | J14      | B      |
| E                    | WHT   | 18  | J4A REF                 | TO | J4       | A      |
| F                    | WHT   | 18  | EXT J6B                 | TO | J6       | B      |
| G                    | WHT   | 16  | P2 6 ENG STRT           | TO | P2       | 6      |
| H                    | WHT   | 18  | P3B SIG COMM            | TO | P3       | B      |
| I                    | -     | -   | -                       | TO | -        | -      |
| J                    | WHT   | 18  | P2 4 SPD RLA            | TO | P2       | 4      |
| K                    | WHT   | 18  | ROD J8B                 | TO | J8       | B      |
| L                    | WHT   | 16  | PENDANT PWR (+)         | TO | SPL A    | -      |
| M                    | WHT   | 18  | P2 2 KILL RLA           | TO | P2       | 2      |
| N                    | WHT   | 18  | LOWER J7B               | TO | J7       | B      |
| O                    | WHT   | 16  | P1 0 SOL PWR            | TO | P2       | 1      |
| P                    | WHT   | 18  | LOWER J12B              | TO | J12      | B      |
| Q                    | -     | -   | -                       | TO | -        | -      |
| R                    | WHT   | 18  | J4B VOLTAGE             | TO | J4       | B      |
| S                    | WHT   | 18  | P1S DN H                | TO | SPL D    | -      |
| T                    | WHT   | 16  | P2 5 COMPR              | TO | P2       | 5      |
| U                    | WHT   | 16  | WNSPD P16B              | TO | P16      | B      |
| V                    | -     | -   | -                       | TO | -        | -      |
| W                    | -     | -   | -                       | TO | -        | -      |

| LOCATOR CODE: P2   |       |     |                     |    |          |        |
|--------------------|-------|-----|---------------------|----|----------|--------|
| TERM# 1062-16-0122 |       |     | DEUTSCH: DT04-8PA   |    |          |        |
| SEAL# WBP          |       |     | CAVITY PLUG: 114017 |    |          |        |
| CAVITY             | COLOR | GA. | PRINT LABEL         | TO | CON-SPLC | CAVITY |
| 1                  | WHT   | 16  | P1 0 SOL PWR        | TO | P1       | O      |
| 2                  | WHT   | 18  | P2 2 KILL RLA       | TO | P1       | M      |
| 3                  | WHT   | 16  | P2 3 BAT (-)        | TO | SPL B    | -      |
| 4                  | WHT   | 18  | P2 4 SPD RLA        | TO | P1       | J      |
| 5                  | WHT   | 16  | P2 5 COMPR          | TO | P1       | T      |
| 6                  | WHT   | 16  | P2 6 ENG STRT       | TO | P1       | G      |
| 7                  | WHT   | 16  | P2 7 IGN SOL        | TO | SPL A    | -      |
| 8                  | -     | -   | -                   | TO | -        | -      |

| LOCATOR CODE: P3 |       |     |                   |    |          |        |
|------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089188   |       |     | PACKARD: 12015797 |    |          |        |
| SEAL# 12015323   |       |     |                   |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                | WHT   | 16  | P3A POWER (+)     | TO | SPL A    | -      |
| B                | WHT   | 18  | P3B SIG COMM      | TO | P1       | H      |
| C                | WHT   | 16  | PRPVLV (-)        | TO | J15      | A      |
| D                | WHT   | 16  | PRPVLV (+)        | TO | J15      | B      |

| LOCATOR CODE: J4 |       |     |                   |    |          |        |
|------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040   |       |     | PACKARD: 12010974 |    |          |        |
| SEAL# 12015323   |       |     |                   |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                | WHT   | 18  | J4A REF           | TO | J1       | E      |
| B                | WHT   | 18  | J4B VOLTAGE       | TO | J1       | R      |
| C                | WHT   | 18  | J4C DN H          | TO | SPL D    | -      |
| D                | WHT   | 16  | J4D PWR COM       | TO | SPL B    | -      |

| LOCATOR CODE: J5 |       |     |                   |    |          |        |
|------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040   |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323   |       |     |                   |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                | WHT   | 16  | WINCH J5A         | TO | SPL B    | -      |
| B                | WHT   | 18  | WINCH J5B         | TO | P1       | C      |

| LOCATOR CODE: J6 |       |     |                   |    |          |        |
|------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040   |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323   |       |     |                   |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                | WHT   | 16  | EXT J6A           | TO | SPL B    | -      |
| B                | WHT   | 18  | EXT J6B           | TO | P1       | F      |

| LOCATOR CODE: J7 |       |     |                   |    |          |        |
|------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040   |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323   |       |     |                   |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                | WHT   | 16  | LOWER J7A         | TO | SPL C    | -      |
| B                | WHT   | 18  | LOWER J7B         | TO | P1       | N      |

| LOCATOR CODE: J8 |       |     |                   |    |          |        |
|------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040   |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323   |       |     |                   |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                | WHT   | 16  | ROD J8A           | TO | SPL B    | -      |
| B                | WHT   | 18  | ROD J8B           | TO | P1       | K      |

| LOCATOR CODE: J9 |       |     |                   |    |          |        |
|------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089188   |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323   |       |     |                   |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                | WHT   | 16  | ATB J9A           | TO | SPL B    | -      |
| B                | WHT   | 16  | P10B & P9B        | TO | P10      | B      |

| LOCATOR CODE: P10 |       |     |                   |    |          |        |
|-------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089188    |       |     | PACKARD: 12015792 |    |          |        |
| SEAL# 12015323    |       |     |                   |    |          |        |
| CAVITY            | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                 | WHT   | 16  | DPSI P10A         | TO | R1       | 85     |
| B                 | WHT   | 16  | P10B & J9B        | TO | J9       | B      |

| LOCATOR CODE: J11 |       |     |                   |    |          |        |
|-------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040    |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323    |       |     |                   |    |          |        |
| CAVITY            | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                 | WHT   | 16  | ROD J11A          | TO | SPL B    | -      |
| B                 | WHT   | 18  | ROD J11B          | TO | P1       | A      |

| LOCATOR CODE: J12 |       |     |                   |    |          |        |
|-------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040    |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323    |       |     |                   |    |          |        |
| CAVITY            | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                 | WHT   | 16  | LOWER J12A        | TO | SPL B    | -      |
| B                 | WHT   | 18  | LOWER J12B        | TO | P1       | P      |

| LOCATOR CODE: J13 |       |     |                   |    |          |        |
|-------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040    |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323    |       |     |                   |    |          |        |
| CAVITY            | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                 | WHT   | 16  | EXT J13A          | TO | SPL C    | -      |
| B                 | WHT   | 18  | EXT J13B          | TO | P1       | B      |

| LOCATOR CODE: J14 |       |     |                   |    |          |        |
|-------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040    |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323    |       |     |                   |    |          |        |
| CAVITY            | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                 | WHT   | 16  | WINCH J14A        | TO | SPL C    | -      |
| B                 | WHT   | 18  | WINCH J14B        | TO | P1       | D      |

| LOCATOR CODE: J15 |       |     |                   |    |          |        |
|-------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089040    |       |     | PACKARD: 12010973 |    |          |        |
| SEAL# 12015323    |       |     |                   |    |          |        |
| CAVITY            | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                 | WHT   | 16  | PRPVLV (-)        | TO | P3       | C      |
| B                 | WHT   | 16  | PRPVLV (+)        | TO | P3       | D      |

| LOCATOR CODE: P16 |       |     |                   |    |          |        |
|-------------------|-------|-----|-------------------|----|----------|--------|
| TERM# 12089188    |       |     | PACKARD: 12015792 |    |          |        |
| SEAL# 12015323    |       |     |                   |    |          |        |
| CAVITY            | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                 | WHT   | 16  | WNSPD P16A        | TO | SPL C    | -      |
| B                 | WHT   | 16  | WNSPD P16B        | TO | P1       | U      |

| LOCATOR CODE: J5 |       |     |                   |    |          |        |
|------------------|-------|-----|-------------------|----|----------|--------|
| TERM# -          |       |     | PACKARD: 12010973 |    |          |        |
| PLUG 12010300    |       |     |                   |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL       | TO | CON-SPLC | CAVITY |
| A                | -     | -   | -                 | TO | P16      | -      |
| B                | -     | -   | -                 | TO | P16      | -      |

| LOCATOR CODE: - |       |     |                 |    |          |        |
|-----------------|-------|-----|-----------------|----|----------|--------|
| TERM# -         |       |     | SPLICE A        |    |          |        |
| SEAL# -         |       |     |                 |    |          |        |
| CAVITY          | COLOR | GA. | PRINT LABEL     | TO | CON-SPLC | CAVITY |
| -               | WHT   | 16  | PENDANT PWR (+) | TO | P1       | L      |
| -               | WHT   | 16  | P2 7 IGN SOL    | TO | P2       | 7      |
| -               | WHT   | 16  | P3A POWER (+)   | TO | P3       | A      |

| LOCATOR CODE: - |       |     |              |    |          |        |
|-----------------|-------|-----|--------------|----|----------|--------|
| TERM# -         |       |     | SPLICE B     |    |          |        |
| SEAL# -         |       |     |              |    |          |        |
| CAVITY          | COLOR | GA. | PRINT LABEL  | TO | CON-SPLC | CAVITY |
| -               | WHT   | 16  | WINCH J5A    | TO | J5       | A      |
| -               | WHT   | 16  | RELAY GND    | TO | R1       | 87     |
| -               | WHT   | 16  | P2 3 BAT (-) | TO | P2       | 3      |
| -               | WHT   | 16  | J4D PWR COM  | TO | J4       | D      |
| -               | WHT   | 16  | ROD J11A     | TO | J11      | A      |
| -               | WHT   | 16  | LOWER J12A   | TO | J12      | A      |
| -               | WHT   | 16  | EXT J6A      | TO | J6       | A      |
| -               | WHT   | 16  | ROD J8A      | TO | J8       | A      |
| -               | WHT   | 16  | ATB J9A      | TO | J9       | A      |

| LOCATOR CODE: - |       |     |                 |    |          |        |
|-----------------|-------|-----|-----------------|----|----------|--------|
| TERM# -         |       |     | SPLICE C        |    |          |        |
| SEAL# -         |       |     |                 |    |          |        |
| CAVITY          | COLOR | GA. | PRINT LABEL     | TO | CON-SPLC | CAVITY |
| -               | WHT   | 16  | LOWER J7A       | TO | J7       | A      |
| -               | WHT   | 16  | ATB & OPRES GRD | TO | R1       | 30     |
| -               | WHT   | 16  | EXT J13A        | TO | J13      | A      |
| -               | WHT   | 16  | WINCH J14A      | TO | J14      | A      |
| -               | WHT   | 16  | WNSPD P16A      | TO | P16      | A      |

| LOCATOR CODE: - |       |     |               |    |          |        |
|-----------------|-------|-----|---------------|----|----------|--------|
| TERM# -         |       |     | SPLICE D      |    |          |        |
| SEAL# -         |       |     |               |    |          |        |
| CAVITY          | COLOR | GA. | PRINT LABEL   | TO | CON-SPLC | CAVITY |
| -               | WHT   | 18  | P1S DN H      | TO | P1       | S      |
| -               | WHT   | 16  | RELAY PWR (+) | TO | R1       | 86     |
| -               | WHT   | 18  | J4C DN H      | TO | J4       | C      |

| LOCATOR CODE: R1 |       |     |                                          |    |          |        |
|------------------|-------|-----|------------------------------------------|----|----------|--------|
| TERM# 12066614   |       |     | RELAY SOCKET: PACKARD 12065685, 12052834 |    |          |        |
| SEAL# -          |       |     | RELAY HELLA 87411 (SEALED)               |    |          |        |
| CAVITY           | COLOR | GA. | PRINT LABEL                              | TO | CON-SPLC | CAVITY |
| 30               | WHT   | 16  | ATB & OPRES GRD                          | TO | SPL C    | -      |
| 87               | WHT   | 16  | RELAY GRD                                | TO | SPL B    | -      |
| 87A              | -     | -   | -                                        | TO | -        | -      |
| 86               | WHT   | 16  | RELAY PWR (+)                            | TO | SPL D    | -      |
| 85               | WHT   | 16  | DPSI P10A                                | TO | P10      | A      |

| A            |        | A           |  | A                  |  |
|--------------|--------|-------------|--|--------------------|--|
| LOCATOR CODE | CAVITY | PRINT LABEL |  | 3000 FUNCTION      |  |
| P1           | B      | EXT J13B    |  | INNER BOOM DOWN    |  |
| P1           | C      | WINCH J5A   |  | EXTENSION BOOM IN  |  |
| P1           | D      | WINCH J14B  |  | EXTENSION BOOM OUT |  |
| P1           | F      | EXT J6B     |  | INNER BOOM UP      |  |
| P1           | N      | LOWER J7B   |  | OUTER BOOM UP      |  |
| P1           | P      | LOWER J12B  |  | OUTER BOOM DOWN    |  |
| J5           | A      | WINCH J5B   |  | EXTENSION BOOM IN  |  |
| J5           | B      | WINCH J5B   |  | EXTENSION BOOM IN  |  |
| J6           | A      | EXT J6A     |  | INNER BOOM UP      |  |
| J6           | B      | EXT J6B     |  | INNER BOOM UP      |  |
| J7           | A      | LOWER J7A   |  | OUTER BOOM UP      |  |
| J7           | B      | LOWER J7B   |  | OUTER BOOM UP      |  |
| J12          | A      | LOWER J12A  |  | OUTER BOOM DOWN    |  |
| J12          | B      | LOWER J12B  |  | OUTER BOOM DOWN    |  |
| J13          | A      | EXT J13A    |  | INNER BOOM DOWN    |  |
| J13          | B      | EXT J13B    |  | INNER BOOM DOWN    |  |
| J14          | A      | WINCH J14A  |  | EXTENSION BOOM OUT |  |
| J14          | B      | WINCH J14B  |  | EXTENSION BOOM OUT |  |



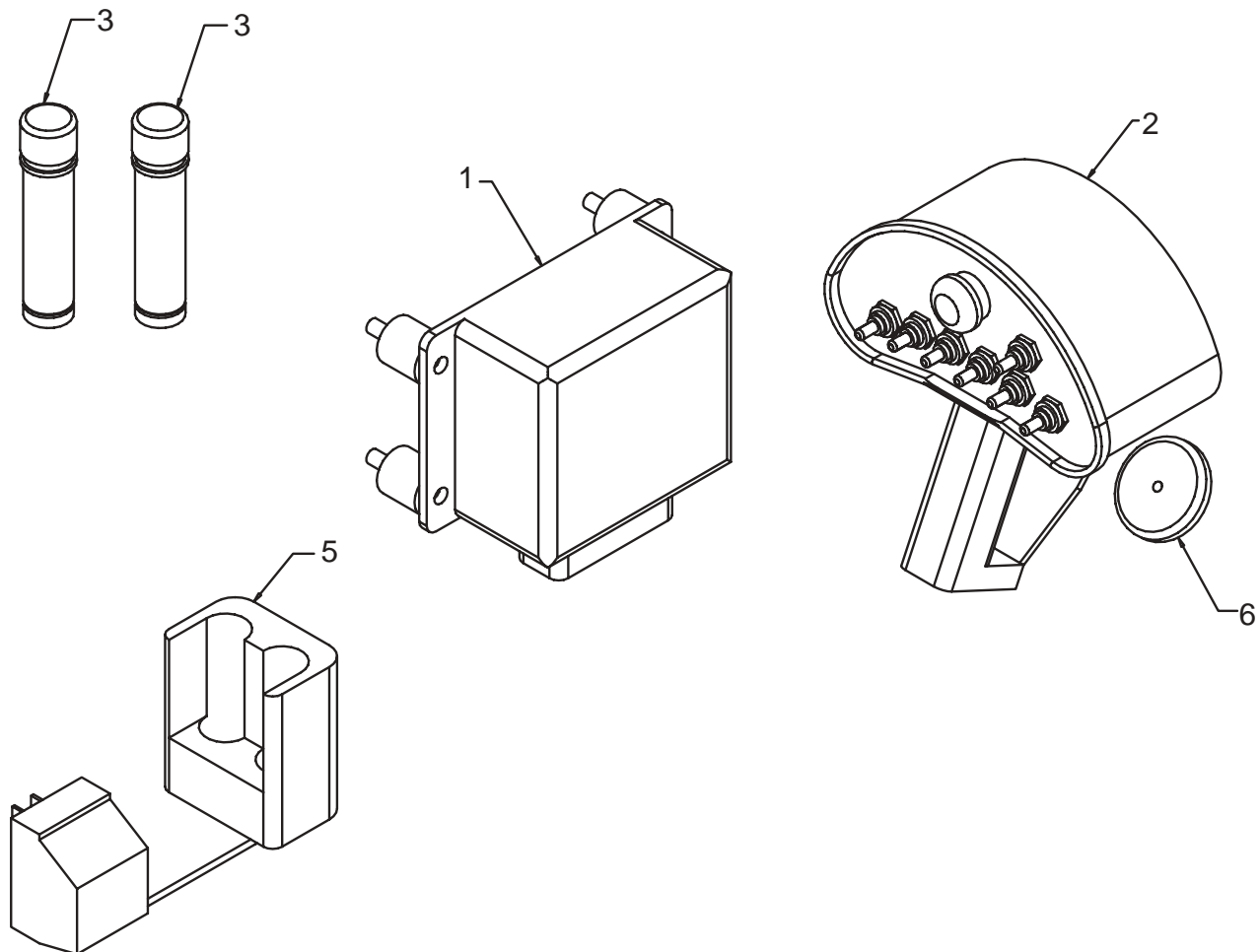
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**RADIO RMT KIT (70733354-1)**

|    |          |                               |   |
|----|----------|-------------------------------|---|
| 1. | 73733392 | RADIO REMOTE RECEIVER         | 1 |
| 2. | 73733393 | TRANSMITTER                   | 1 |
| 3. | 70146100 | BATTERY-VERSAPACK             | 2 |
| 5. | 70146279 | BATTERY CHARGER (EFF 10/02)   | 1 |
|    | 70146102 | BATTER CHARGER (THRU 9/30/02) | 1 |
| 6. | 70146103 | MAGNET                        | 1 |

(NOTE: ITEM #5, 70146279, CAN BE PURCHASED AS PART OF  
KIT 90042094.)



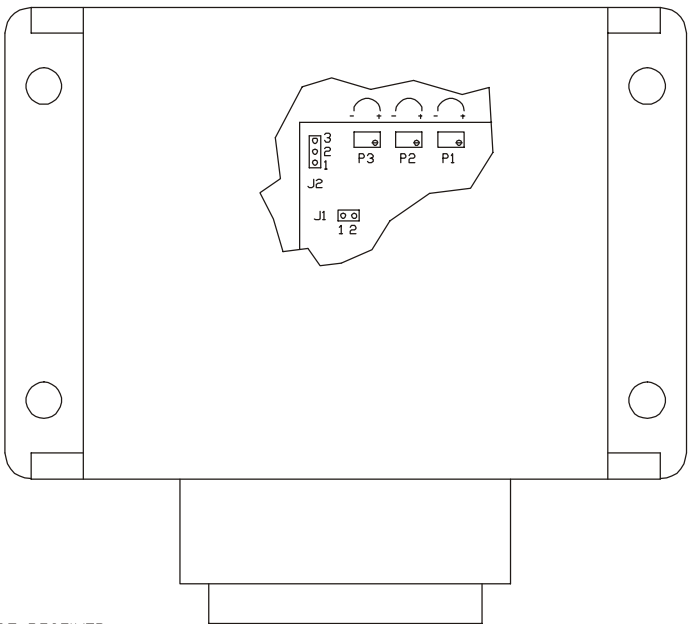
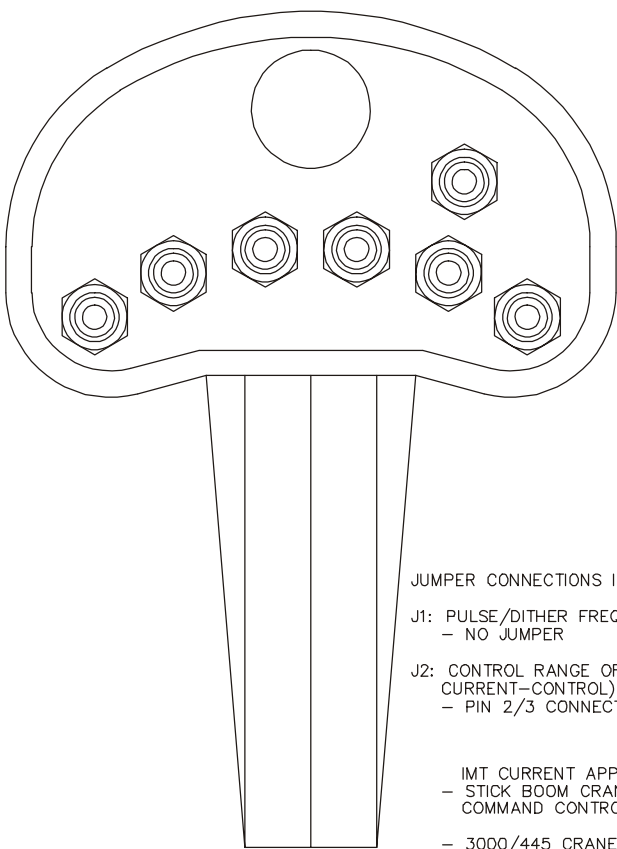


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3-63

**RADIO RMT KIT (70733354-2)**

— ALL SWITCHES ARE MOMENTARY  
UNLATCHED TYPE



JUMPER CONNECTIONS INSIDE RECEIVER

- J1: PULSE/DITHER FREQUENCY  
— NO JUMPER
- J2: CONTROL RANGE OF OUTPUT CURRENT (ONLY  
CURRENT-CONTROL)  
— PIN 2/3 CONNECTED: 0-2A
- IMT CURRENT APPLICATIONS:  
— STICK BOOM CRANES (PIN 2/3 CONNECTED: 0-2A)  
COMMAND CONTROL PROP VALVE (EHPFD-16-N-0-10-12DL)
- 3000/445 CRANES (PIN 2/3 CONNECTED: 0-2A)  
— STERLING PROP VALVE (JP04C-31-50-N-IMT)

| CONNECTOR<br>PIN LETTER | IMT<br>ASSIGNED<br>FUNCTION |
|-------------------------|-----------------------------|
| A1                      | ROT CW                      |
| A2                      | EXT OUT                     |
| A3                      | WINCH DN                    |
| A4                      | WINCH UP                    |
| A5                      | PROP VALVE +                |
| A6                      | EXT IN                      |
| A7                      | ENGINE START                |
| A8                      | RADIO GND                   |
| A9                      | SPEED RELAY                 |
| B1                      | NOT USED                    |
| B2                      | ROT CCW                     |
| B3                      | RADIO POWER                 |
| B4                      | KILL RELAY                  |
| B5                      | LOW DN                      |
| B6                      | NOT USED                    |
| B7                      | LOWER UP                    |
| B8                      | NOT USED                    |
| B9                      | NOT USED                    |
| C1                      | PROP VALVE -                |
| C2                      | NOT USED                    |
| C3                      | COMPRESSOR                  |
| C4                      | WINCH 2 SPD                 |
| C5                      | NOT USED                    |
| C6                      | NOT USED                    |
| C7                      | NOT USED                    |
| C8                      | NOT USED                    |
| C9                      | NOT USED                    |

- P1: TRIMMING POTENTIOMETER FOR MAXIMUM VALUES. ON TRANSMITTER HANDLE, ENGAGE ROTATION CW OR CCW FUNCTION SWITCH AND PULL TRIGGER FULLY ON. CRANE MAY OR MAY NOT BEGIN TO MOVE AT THIS TIME DUE TO P1 INITIAL SETTING. TURN P1 POTENTIOMETER COUNTERCLOCKWISE UNTIL DESIRED MAXIMUM SPEED IS OBTAINED OR UNTIL SPEED NO LONGER CONTINUES TO INCREASE.
- P2: TRIMMING POTENTIOMETER FOR INITIAL VALUE ADJUSTMENT. ON TRANSMITTER, ENGAGE ROTATION CW OR CCW FUNCTION SWITCH. WITHOUT PULLING TRIGGER, ADJUST P2 COUNTERCLOCKWISE UNTIL CRANE BEGINS TO MOVE. AT THIS TIME, ADJUST P2 CLOCKWISE UNTIL NO MOVEMENT IS DETECTED. SLIGHTLY ENGAGE TRIGGER AND ADJUST P2 TO FINE TUNE.
- P3: TRIMMING POTENTIOMETER TO ADJUST DITHERAMPLITUDE: ADJUST CLOCKWISE OR COUNTERCLOCKWISE FOR SMOOTHNESS OF OPERATION.



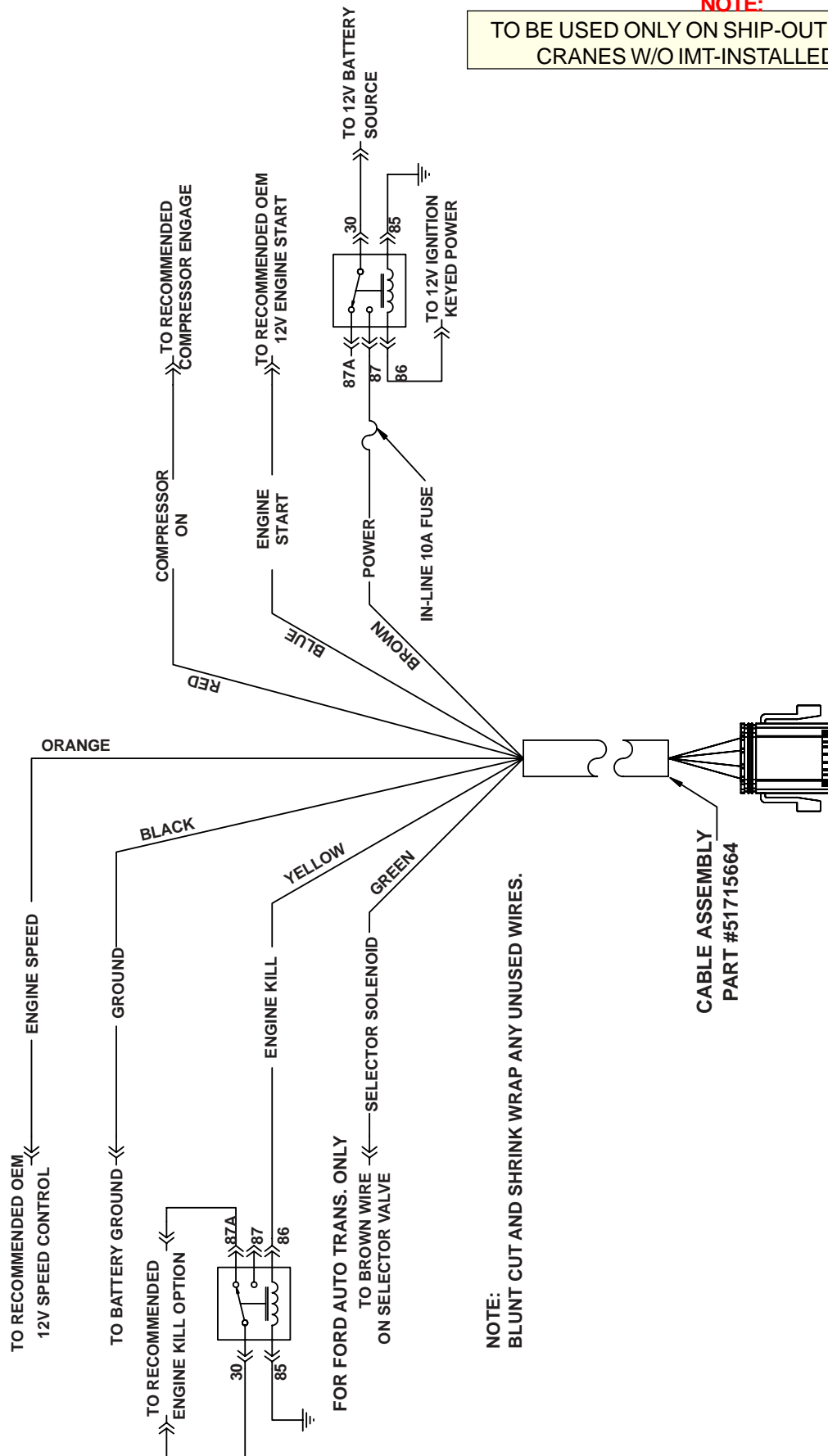
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## CHASSIS WIRING HARNESS (99903340)

### NOTE:

TO BE USED ONLY ON SHIP-OUT TELESCOPIC CRANES W/O IMT-INSTALLED BODIES.

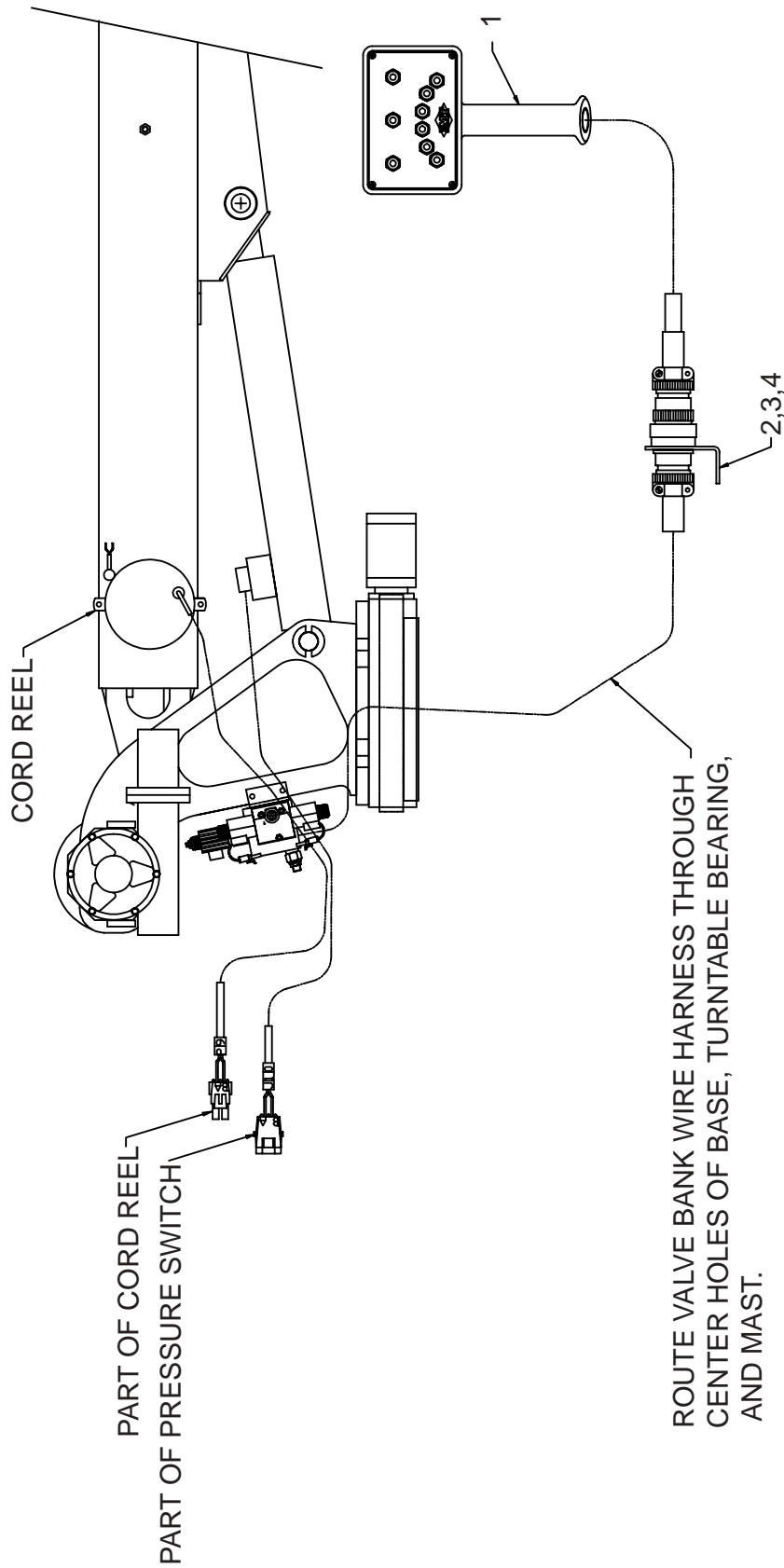




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**WIRE ROUTING, PROP REMOTE CONTROL (90713879)**



SEE 99900855 FOR WIRE CONNECTIONS, ELECTRICAL SCHEMATIC AND PARTS LIST.

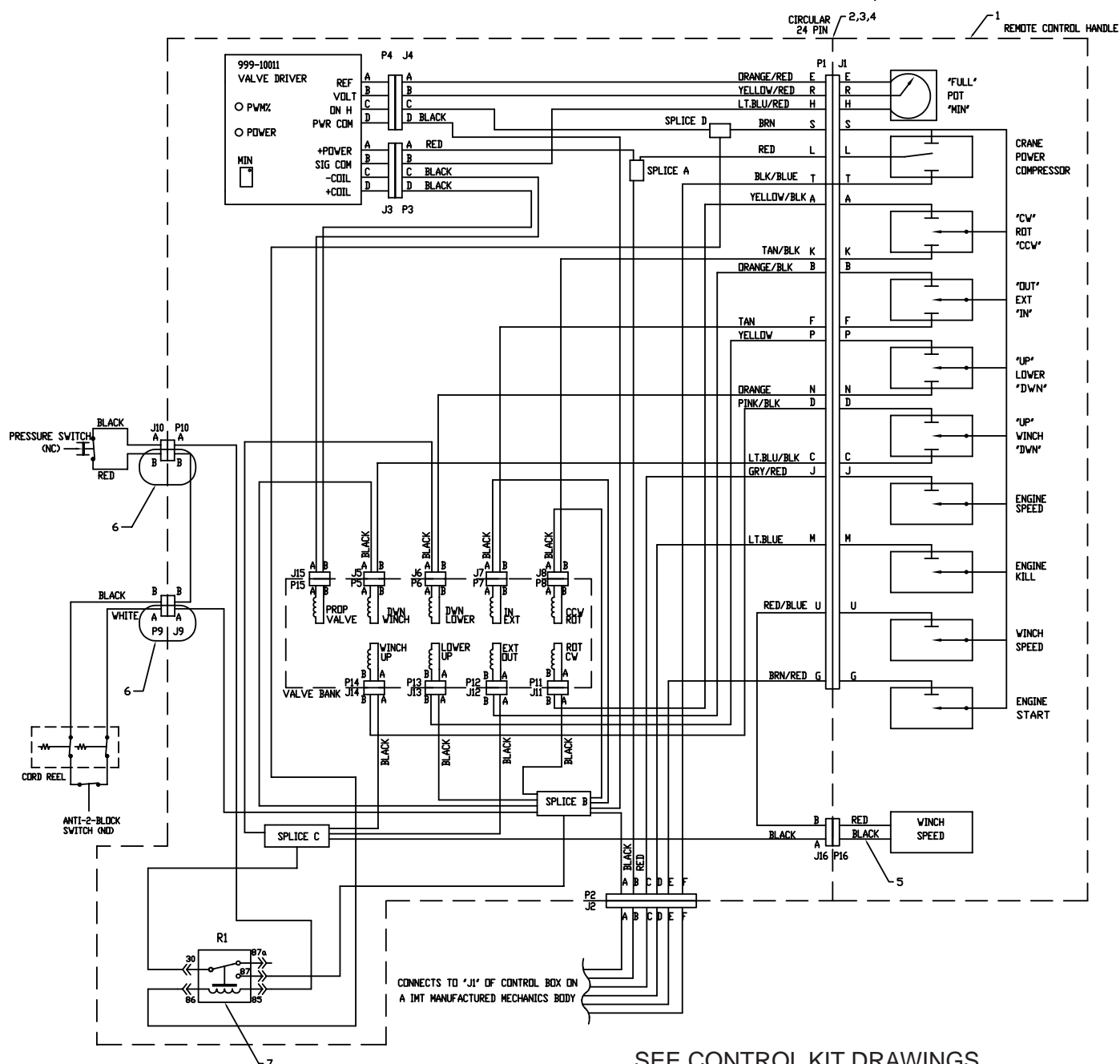


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**ELECTRICAL SCHEMATIC, PROP RE-MOTE CONTROL (99900855)**

|    |          |                         |   |
|----|----------|-------------------------|---|
| 1. | 51713182 | HANDLE ASM              | 1 |
| 2. | 60119299 | BRACKET                 | 1 |
| 3. | 77044645 | NUT-DEUTSCH CONNECTOR   | 1 |
| 4. | 77044646 | LOCK WASHER -DTSCH CONN | 1 |
| 5. | 51713343 | CABLE ASM 14GA/2 WIRE   | 1 |
| 6. | 70034439 | LOCK WIRE LEAD SEAL 8"  | 2 |
| 7. | 77041597 | RELAY                   | 1 |

SEE CONTROL KIT DRAWINGS  
FOR WIRE ROUTINGS.



**SECTION 4. GENERAL REFERENCE**

|                                                             |           |
|-------------------------------------------------------------|-----------|
| <b>INSPECTION CHECKLIST .....</b>                           | <b>3</b>  |
| <b>WIRE ROPE INSPECTION .....</b>                           | <b>7</b>  |
| <b>HOOK INSPECTION .....</b>                                | <b>7</b>  |
| <b>HOLDING VALVE INSPECTION .....</b>                       | <b>8</b>  |
| <b>ANTI-TWO BLOCKING DEVICE INSPECTION .....</b>            | <b>8</b>  |
| <b>TORQUE DATA CHART - DOMESTIC .....</b>                   | <b>9</b>  |
| <b>TORQUE DATA CHART - METRIC .....</b>                     | <b>10</b> |
| <b>TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE .....</b> | <b>11</b> |
| <b>TURNTABLE BEARING INSPECTION FOR REPLACEMENT .....</b>   | <b>12</b> |



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## SECTION 4. GENERAL REFERENCE

## This image shows a full page of blank, lined paper. It features approximately 28 evenly spaced horizontal blue or grey lines across its entire width, typical of notebook paper. There are no margins, text, or other markings present.





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SECTION 4. GENERAL REFERENCE

| NOTICE                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------|
| The user of this form is responsible in determining that these inspections satisfy all applicable regulatory requirements |
| OWNER/COMPANY                                                                                                             |
| CONTACT PERSON                                                                                                            |
| CRANE MAKE & MODEL                                                                                                        |
| CRANE SERIAL NUMBER                                                                                                       |
| UNIT I.D. NUMBER                                                                                                          |
| LOCATION OF UNIT                                                                                                          |

| Inspection Checklist                                 |                                    | 1            |
|------------------------------------------------------|------------------------------------|--------------|
| CRANES                                               |                                    | REV: 6-18-99 |
| TYPE OF INSPECTION (check one)                       |                                    |              |
| <input type="checkbox"/> DAILY (if deficiency found) | <input type="checkbox"/> QUARTERLY |              |
| <input type="checkbox"/> MONTHLY                     | <input type="checkbox"/> ANNUAL    |              |
| DATE INSPECTED                                       |                                    |              |
| HOUR METER READING (if applicable)                   |                                    |              |
| INSPECTED BY (print)                                 |                                    |              |
| SIGNATURE OF INSPECTOR                               |                                    |              |

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

Daily and monthly inspections are to be performed by a "designated" person, who has been selected or assigned by the employer or the employer's representative as being competent to perform specific duties.

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

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 outriggers fully extended.

**DAILY (D):** Before each day of operation, those items designated with a (D) must be inspected. This inspection need not be recorded unless a deficiency (X) is found. If the end user chooses to record all daily inspections and those daily inspections include the monthly inspection requirements, there would be no need for a separate monthly inspection.

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

**QUARTERLY (Q):** Every three to four months or 300 hours of normal operation (which ever comes first) includes all daily and monthly inspection items plus items designated with a (Q). This inspection must be recorded.

**ANNUAL (A):** Each year or 1200 hours of normal operation (which ever comes first) includes all items on this form which encompasses daily, monthly and quarterly inspections plus those items designated by (A). This inspection must be recorded.

| FREQUENCY | ITEM | KEY             | ✓ = SATISFACTORY<br>✗ = DEFICIENCY<br>(must be corrected prior to operation)                                                                                                         | R = RECOMMENDATION<br>(should be considered for corrective action)<br>NA= NOT APPLICABLE | STATUS<br>✓ ,<br>✗ ,<br>R, NA |
|-----------|------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------|
|           |      |                 | INSPECTION DESCRIPTION                                                                                                                                                               |                                                                                          |                               |
| D         | 1    | Labels          | All load charts, safety & warning labels, & control labels are present and legible.                                                                                                  |                                                                                          |                               |
| D         | 2    |                 | Check all safety devices for proper operation.                                                                                                                                       |                                                                                          |                               |
| D         | 3    | Controls        | Control mechanisms for proper operation of all functions, leaks & cracks.                                                                                                            |                                                                                          |                               |
| D         | 4    | Station         | Control and operator's station for dirt, contamination by lubricants, & foreign materials.                                                                                           |                                                                                          |                               |
| D         | 5    | Hyd System      | Hydraulic system (hoses, tubes & fittings) for leakage & proper oil level.                                                                                                           |                                                                                          |                               |
| D         | 6    | Hook            | Presence & proper operation of hook safety latches.                                                                                                                                  |                                                                                          |                               |
| D         | 7    | Rope            | Proper reeving of wire rope on sheaves & winch drum.                                                                                                                                 |                                                                                          |                               |
| D         | 8    | Pins            | Proper engagement of all connecting pins & pin retaining devices.                                                                                                                    |                                                                                          |                               |
| D         | 9    | General         | Overall observation of crane for damaged or missing parts, cracked welds & presence of safety covers.                                                                                |                                                                                          |                               |
| D         | 10   | Operation       | During operation, observe crane for abnormal performance, unusual wear (loose pins, wire rope damage, etc.).<br>If observed, discontinue use & determine cause & severity of hazard. |                                                                                          |                               |
| D         | 11   | Remote Ctrls    | Operate remote control devices to check for proper operation.                                                                                                                        |                                                                                          |                               |
| D         | 12   | Electrical      | Operate all lights, alarms, etc. to check for proper operation.                                                                                                                      |                                                                                          |                               |
| D         | 13   | Anti 2-Blocking | Operate anti 2-blocking device to check for proper operation.                                                                                                                        |                                                                                          |                               |
| D         | 14   |                 | Other                                                                                                                                                                                |                                                                                          |                               |
| D         | 15   |                 | Other                                                                                                                                                                                |                                                                                          |                               |



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SECTION 4. GENERAL REFERENCE

**Inspection Checklist****CRANES****2**

| FREQUENCY | ITEM | KEY          | ✓ = SATISFACTORY<br>✗ = DEFICIENCY<br>(must be corrected prior to operation)                                         | R = RECOMMENDATION<br>(should be considered for corrective action)<br>NA= NOT APPLICABLE | STATUS<br>✓ ,<br>✗ ,<br>R, NA |
|-----------|------|--------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------|
|           |      |              | INSPECTION DESCRIPTION                                                                                               |                                                                                          |                               |
| M         | 16   | Daily        | All daily inspection items.                                                                                          |                                                                                          |                               |
| M         | 17   | Cylinders    | Visual inspection of cylinders for leakage at rod, fittings & welds. Damage to rod & case.                           |                                                                                          |                               |
| M         | 18   | Valves       | Holding valves for proper operation.                                                                                 |                                                                                          |                               |
| M         | 19   | Valves       | Control valve for leaks at fittings & between sections.                                                              |                                                                                          |                               |
| M         | 20   | Valves       | Control valve linkages for wear, smoothness of operation & tightness of fasteners.                                   |                                                                                          |                               |
| M         | 21   | General      | Bent, broken or significantly rusted/corroded parts.                                                                 |                                                                                          |                               |
| M         | 22   | Electrical   | Electrical systems for presence of dirt, moisture & frayed wires.                                                    |                                                                                          |                               |
| M         | 23   | Structure    | All structural members for damage.                                                                                   |                                                                                          |                               |
| M         | 24   | Welds        | All welds for breaks & cracks.                                                                                       |                                                                                          |                               |
| M         | 25   | Pins         | All pins for proper installation & condition.                                                                        |                                                                                          |                               |
| M         | 26   | Hardware     | All bolts, fasteners & retaining rings for tightness, wear & corrosion                                               |                                                                                          |                               |
| M         | 27   | Wear Pads    | Presence of wear pads.                                                                                               |                                                                                          |                               |
| M         | 28   | Pump & Motor | Hydraulic pumps & motors for leakage at fittings, seals & between sections.                                          |                                                                                          |                               |
| M         | 29   | PTO          | Transmission/PTO for leakage, abnormal vibration & noise.                                                            |                                                                                          |                               |
| M         | 30   | Hyd Fluid    | Quality of hydraulic fluid and for presence of water.                                                                |                                                                                          |                               |
| M         | 31   | Hyd Lines    | Hoses & tubes for leakage, abrasion damage, blistering, cracking, deterioration, fitting leakage & secured properly. |                                                                                          |                               |
| M         | 32   | Hook         | Load hook for abnormal throat distance, twist, wear & cracks.                                                        |                                                                                          |                               |
| M         | 33   | Rope         | Condition of load line.                                                                                              |                                                                                          |                               |
| M         | 34   | Manual       | Presence of operator's manuals with unit.                                                                            |                                                                                          |                               |
| M         | 35   |              | Other                                                                                                                |                                                                                          |                               |
| Q         | 36   | Daily        | All daily inspection items.                                                                                          |                                                                                          |                               |
| Q         | 37   | Monthly      | All monthly inspection items.                                                                                        |                                                                                          |                               |
| Q         | 38   |              | Condition of wear pads                                                                                               |                                                                                          |                               |
| Q         | 39   | Rotation Sys | Rotation bearing for proper torque of all accessible mounting bolts.                                                 |                                                                                          |                               |
| Q         | 40   | Hardware     | Base mounting bolts for proper torque.                                                                               |                                                                                          |                               |
| Q         | 41   | Structure    | All structural members for deformation, cracks & corrosion.                                                          |                                                                                          |                               |
|           | 42   |              | ● Base                                                                                                               |                                                                                          |                               |
|           | 43   |              | ● Outrigger beams & legs                                                                                             |                                                                                          |                               |
|           | 44   |              | ● Mast                                                                                                               |                                                                                          |                               |
|           | 45   |              | ● Inner boom                                                                                                         |                                                                                          |                               |
|           | 46   |              | ● Outer boom                                                                                                         |                                                                                          |                               |
|           | 47   |              | ● Extension(s)                                                                                                       |                                                                                          |                               |
|           | 48   |              | ● Jib boom                                                                                                           |                                                                                          |                               |
|           | 49   |              | ● Jib extension(s)                                                                                                   |                                                                                          |                               |
|           | 50   |              | ● Other                                                                                                              |                                                                                          |                               |
| Q         | 51   | Hardware     | Pins, bearings, shafts, gears, rollers, & locking devices for wear, cracks, corrosion & distortion.                  |                                                                                          |                               |
|           | 52   |              | ● Rotation bearing(s)                                                                                                |                                                                                          |                               |
|           | 53   |              | ● Inner boom pivot pin(s) & retainer(s)                                                                              |                                                                                          |                               |
|           | 54   |              | ● Outer boom pivot pin(s) & retainer(s)                                                                              |                                                                                          |                               |
|           | 55   |              | ● Inner boom cylinder pin(s) & retainer(s)                                                                           |                                                                                          |                               |
|           | 56   |              | ● Outer boom cylinder pin(s) & retainer(s)                                                                           |                                                                                          |                               |
|           | 57   |              | ● Extension cylinder pin(s) & retainer(s)                                                                            |                                                                                          |                               |
|           | 58   |              | ● Jib boom pin(s) & retainer(s)                                                                                      |                                                                                          |                               |
|           | 59   |              | ● Jib cylinder pin(s) & retainer(s)                                                                                  |                                                                                          |                               |
|           | 60   |              | ● Jib extension cylinder pin(s) & retainer(s)                                                                        |                                                                                          |                               |
|           | 61   |              | ● Boom tip attachments                                                                                               |                                                                                          |                               |
|           | 62   |              | ● Other                                                                                                              |                                                                                          |                               |
| Q         | 63   | Hyd Lines    | Hoses, fittings & tubing for proper routing, leakage, blistering, deformation & excessive abrasion.                  |                                                                                          |                               |
|           | 64   |              | ● Pressure line(s) from pump to control valve                                                                        |                                                                                          |                               |
|           | 65   |              | ● Return line(s) from control valve to reservoir                                                                     |                                                                                          |                               |
|           | 66   |              | ● Suction line(s) from reservoir to pump                                                                             |                                                                                          |                               |
|           | 67   |              | ● Pressure line(s) from control valve to each function                                                               |                                                                                          |                               |
|           | 68   |              | ● Load holding valve pipe(s) and hose(s)                                                                             |                                                                                          |                               |
|           | 69   |              | ● Other                                                                                                              |                                                                                          |                               |



#### SECTION 4. GENERAL REFERENCE

## 3

| FREQUENCY | ITEM | KEY                   | ✓ = SATISFACTORY<br>✗ = DEFICIENCY<br>(must be corrected prior to operation)                                                                                           | R = RECOMMENDATION<br>(should be considered for corrective action)<br>NA = NOT APPLICABLE | STATUS<br><br>✓ ,<br>✗ ,<br>R, NA |
|-----------|------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------|
|           |      |                       | INSPECTION DESCRIPTION                                                                                                                                                 |                                                                                           |                                   |
| Q         | 70   | Pumps, PTO's & Motors | Pumps, PTO's & motors for loose bolts/fasteners, leaks, noise, vibration, loss of performance, heating & excess pressure.                                              |                                                                                           |                                   |
|           | 71   |                       | ● Winch motor(s)                                                                                                                                                       |                                                                                           |                                   |
|           | 72   |                       | ● Rotation motor(s)                                                                                                                                                    |                                                                                           |                                   |
|           | 73   |                       | ● Other                                                                                                                                                                |                                                                                           |                                   |
| Q         | 74   | Valves                | Hydraulic valves for cracks, spool return to neutral, sticking spools, proper relief valve setting, relief valve failure.                                              |                                                                                           |                                   |
|           | 75   |                       | ● Main control valve                                                                                                                                                   |                                                                                           |                                   |
|           | 76   |                       | ● Load holding valve(s)                                                                                                                                                |                                                                                           |                                   |
|           | 77   |                       | ● Outrigger or auxiliary control valve(s)                                                                                                                              |                                                                                           |                                   |
|           | 78   |                       | ● Other                                                                                                                                                                |                                                                                           |                                   |
|           | 79   |                       | ● Other                                                                                                                                                                |                                                                                           |                                   |
| Q         | 80   | Cylinders             | Hydraulic cylinders for drifting, rod seal leakage & leakage at welds.<br>Rods for nicks, scores & dents. Case for damage. Case & rod ends for damage & abnormal wear. |                                                                                           |                                   |
|           | 81   |                       | ● Outrigger cylinder(s)                                                                                                                                                |                                                                                           |                                   |
|           | 82   |                       | ● Inner boom cylinder(s)                                                                                                                                               |                                                                                           |                                   |
|           | 83   |                       | ● Outer boom cylinder(s)                                                                                                                                               |                                                                                           |                                   |
|           | 84   |                       | ● Extension cylinder(s)                                                                                                                                                |                                                                                           |                                   |
|           | 85   |                       | ● Rotation cylinder(s)                                                                                                                                                 |                                                                                           |                                   |
|           | 86   |                       | ● Jib lift cylinder(s)                                                                                                                                                 |                                                                                           |                                   |
|           | 87   |                       | ● Jib extension cylinder(s)                                                                                                                                            |                                                                                           |                                   |
|           | 88   |                       | ● Other                                                                                                                                                                |                                                                                           |                                   |
| Q         | 89   | Winch                 | Winch, sheaves & drums for damage, abnormal wear, abrasions & other irregularities.                                                                                    |                                                                                           |                                   |
| Q         | 90   | Hyd Filters           | Hydraulic filters for replacement per maintenance schedule.                                                                                                            |                                                                                           |                                   |
| A         | 91   | Daily                 | All daily inspection items.                                                                                                                                            |                                                                                           |                                   |
| A         | 92   | Monthly               | All monthly inspection items.                                                                                                                                          |                                                                                           |                                   |
| A         | 93   | Quarterly             | All quarterly inspection items.                                                                                                                                        |                                                                                           |                                   |
| A         | 94   | Hyd Sys               | Hydraulic fluid change per maintenance schedule.                                                                                                                       |                                                                                           |                                   |
| A         | 95   | Controls              | Control valve calibration for correct pressures & relief valve settings                                                                                                |                                                                                           |                                   |
| A         | 96   | Valves                | Safety valve calibration for correct pressures & relief valve settings.                                                                                                |                                                                                           |                                   |
| A         | 97   | Valves                | Valves for failure to maintain correct settings.                                                                                                                       |                                                                                           |                                   |
| A         | 98   | Rotation Sys          | Rotation drive system for proper backlash clearance & abnormal wear, deformation & cracks.                                                                             |                                                                                           |                                   |
| A         | 99   | Lubrication           | Gear oil change in rotation drive system per maintenance schedule.                                                                                                     |                                                                                           |                                   |
| A         | 100  | Hardware              | Check tightness of all fasteners and bolts.                                                                                                                            |                                                                                           |                                   |
| A         | 101  | Wear Pads             | Wear pads for excessive wear.                                                                                                                                          |                                                                                           |                                   |
| A         | 102  | Loadline              | Loadline for proper attachment to drum.                                                                                                                                |                                                                                           |                                   |

### *Deficiency / Recommendation / Corrective Action Report*

UNIT I.D. NUMBER

## GUIDELINES

- A. A deficiency (**X**) may constitute a hazard. **X** must be corrected and/or faulty parts replaced before resuming operation.
- B. Recommendations (**R**) should be considered for corrective actions. Corrective action for a particular recommendation depends on the facts in each situation.
- C. Corrective actions (**CA**), repairs, adjustments, parts replacement, etc. are to be performed by a qualified person in accordance with all manufacturer's recommendations, specifications and requirements.

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

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

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#### SECTION 4. GENERAL REFERENCE

## 4

*If additional space is required, reproduce this page and attach to this report.*



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SECTION 4. GENERAL REFERENCE

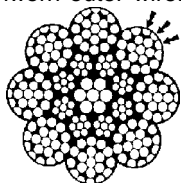
**WIRE ROPE INSPECTION**

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

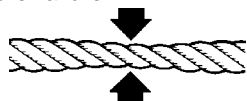
- A. Corrosion can be cause for replacement. Any development of corrosion must be noted and monitored closely.
- B. When there are either 3 broken wires in one strand or a total of six broken wires in all strands in any one rope lay.



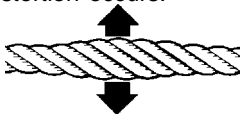
- C. When flat spots on the outer wires appear and those outside wires are less than 2/3 the thickness of the unworn outer wire.



- 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 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° 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**

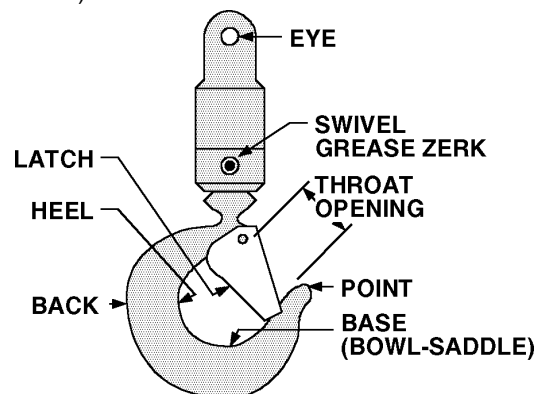
Repair of cracks, nicks, and gouges shall be carried out by a designated person by grinding longitudinally, following the contour of the hook, provided that no dimension is reduced more than 10% of its original value. (Or as recommended by the manufacturer) (A qualified person may authorize continued 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)





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SECTION 4. GENERAL REFERENCE

**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.

**ANTI-TWO BLOCKING DEVICE INSPECTION**

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

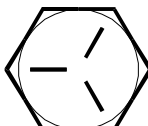

The anti two block system should be checked daily as follows:

1. Examine flexible rod and weight to insure free unrestricted mechanical operation
2. Examine cord for damage, cuts or breaks. Grasp cord and pull to check operation of cord reel. The cord should retract on reel when released.
3. Start vehicle, engage PTO and slowly winch loadline up until anti-two block weight comes in contact with the hook end of the loadline cable. At the moment the weight is fully supported, a marked difference in winch operation should be noted. At this point, the winch up function should become very sluggish or non-functioning and have very little pull capability. Slowly increase truck engine speed while simultaneously actuating the winch up function. The winch characteristics should remain sluggish with little or no tensioning of the cable. If operation other than as described occurs, stop immediately and investigate. Failure to do so will risk damage to the cable or the crane. If all is well at this point, actuate the boom extend function slowly, and gradually increase to full actuation. Once again the function should be sluggish or non-existent with no tightening of the winch cable. If operation other than described occurs, stop immediately and reverse the function.

The final check involves actuating both the winch up and extend functions together and checking for proper operation of the anti two blocking circuit. Once again, start slowly and stop if it appears the cable is being tensioned.

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

**COARSE THREAD BOLTS**

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

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

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

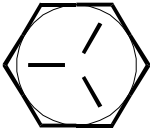
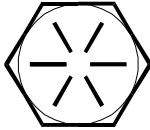
**WARNING**

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

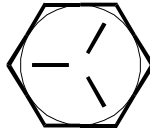
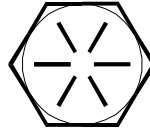


## TORQUE DATA CHART - DOMESTIC

### FINE THREAD BOLTS

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

### COARSE THREAD BOLTS

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

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

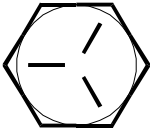
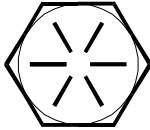
1. Bolt manufacturer's particular specifications should be consulted when provided.
2. Flat washers of equal strength must be used.
3. All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.
4. Torque values specified are for bolts with residual oils or no special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

#### WARNING

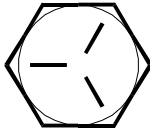
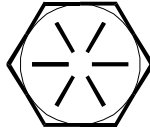
Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing.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



**TORQUE DATA CHART - METRIC****FINE THREAD BOLTS**

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

**COARSE THREAD BOLTS**

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

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

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

**WARNING**

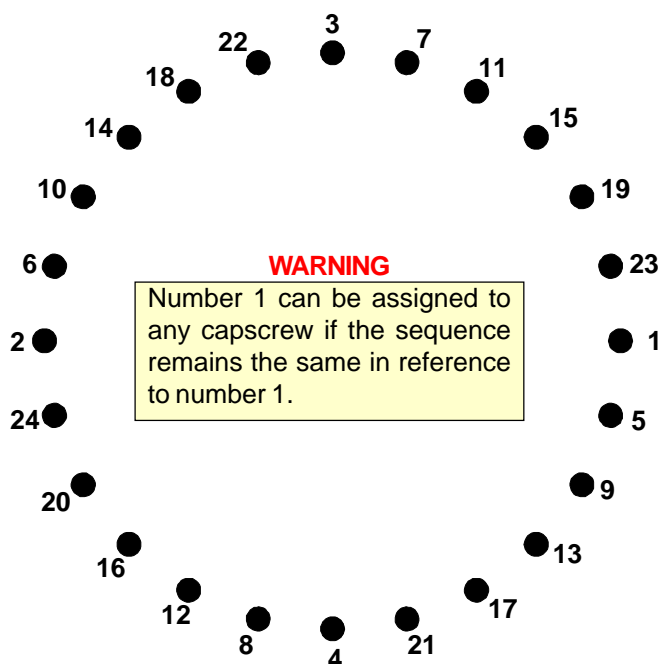
Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing.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





## TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE

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



### TIGHTENING PROCEDURE:

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



## TURNTABLE BEARING INSPECTION FOR REPLACEMENT

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

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

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

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

### TEST PROCEDURE

#### STEP 1.

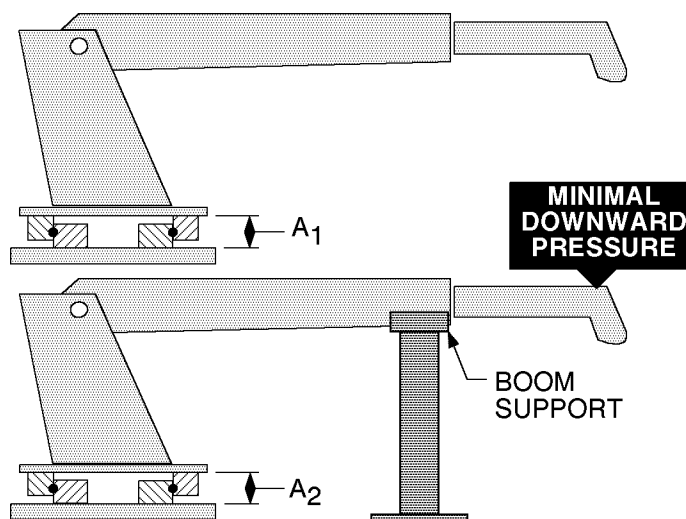
With the crane horizontal and fully extended, measure between the top and bottom mounting surfaces of the turntable bearing (A1), using a dial indicator for accuracy.

#### STEP 2.

Reverse the load by applying minimal downward pressure on the boom while the boom is in the boom support or on a solid surface. Again measure A2.

#### STEP 3.

Subtract A1 from A2 to determine tilt and compare the result with the accompanying chart.



### COMPARISON CHART - MODEL TO MEASURED TILT DIMENSION

|                                                                                                                                                                                                                                                                                                          |                                                                |                                                                                                                                                                                                                           |                                                                                                             |                                       |                                                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NOTE</b><br>THE FIGURES LISTED IN THIS CHART ARE SERVICE GUIDELINES AND DO NOT, IN THEMSELVES, REQUIRE THAT THE BEARING BE INSPECTED.<br><br>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. | <b>IMT<br/>CRANE,<br/>LOADER<br/>OR<br/>TIREHAND<br/>MODEL</b> | 1007<br>1014<br>1014A<br>1015<br>2015/2020<br>2109<br>3000<br>3816/3820<br>3016/3020<br>421/425<br>4300<br>5016/5020<br>6016/6020<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 | 16000<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>TH2557A BODY ROT'N |
|                                                                                                                                                                                                                                                                                                          | <b>BALL DIA.<br/>(REF)</b>                                     | .875"<br>(22mm)                                                                                                                                                                                                           | 1.00"<br>(25mm)                                                                                             | 1.18"-1.25"<br>(30-32mm)              | 1.75"<br>(44mm)                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                          | <b>TILT DIM.<br/>(A<sub>1</sub>-A<sub>2</sub>)</b>             | .060"<br>(1.524mm)                                                                                                                                                                                                        | .070"<br>(1.778mm)                                                                                          | .075"<br>(1.905mm)                    | .090"<br>(2.286mm)                                                                                                                                               |



20000710

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

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|------------------|-------------------|--------------------|
| DATE             | PRODUCT<br>MANUAL | MANUAL<br>PART NO. |
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| ADDRESS          |                   |                    |
| CITY, STATE, ZIP |                   |                    |
| TELEPHONE        |                   |                    |

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LOCATION OF ERROR (page no.): \_\_\_\_\_

DESCRIPTION OF ERROR: \_\_\_\_\_

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☐ ERROR FOUND

DESCRIPTION OF ADDITION: \_\_\_\_\_

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