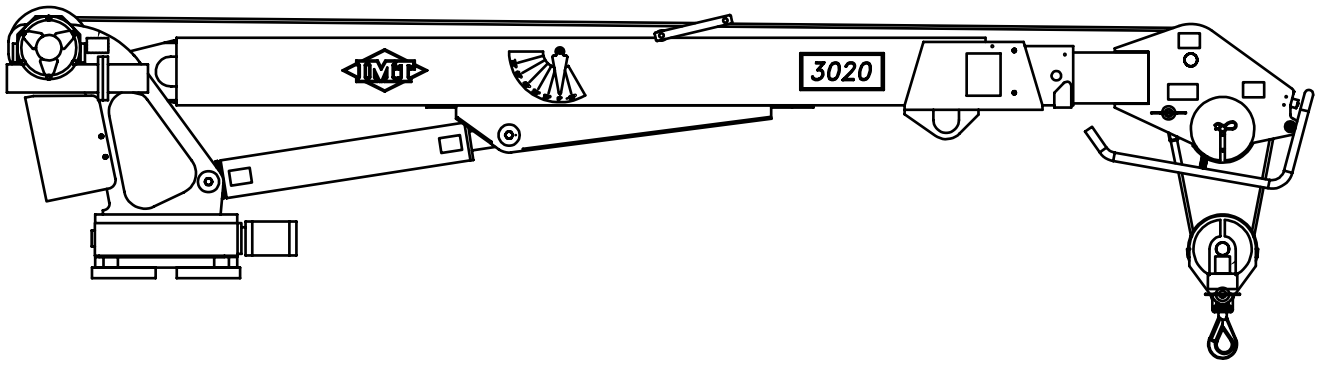
00003020:99901196: 20100621

Model 3020 Crane

Volume 2 - PARTS AND SPECIFICATIONS

Section 1 CRANE SPECIFICATIONS
Section 2 CRANE REFERENCE
Section 3 REPLACEMENT PARTS
Section 4 GENERAL REFERENCE

Manual Effective through 2007



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MANUAL PART NO: 99901196

00003020:99901196: --------

REVISIONS LIST

DATE	LOCATION	DESCRIPTION OF CHANGE
20000922	3-17	ECN 8504-51713182-ADD PIN O SOL PWR / DELETE AUTO TRANS NOTE
20001206	3-45	ECN9000-51705983-ADD 7Q072114 O-RINGS
	3-46	ECN9000-51705984-ADD 7Q072114 O-RINGS
20010115	3-25&26	ECN8648-93713878-MOVE MTG HRDWR FROM -1 TO -2 & ADD SPACER
	3-28&29	93714152-MOVE MTG HRDWR FROM -1 TO -2 & ADD SPACER
20010206	2-05&06	CORRECT SPARE PARTS LIST
20010403	2-07	ADDED SCREW & WASHER TO INSTALLATION INSTRUCTIONS
20010418	3-10	NEW ROD ASM. 52716610
20010523	3-32	CHG #12 QTY 10 WAS 6
20010614	3-14	REVISED DRAWING - DELETED P2.15 AND J2.15 NOTE
20010720	3-19, 20, 21, 22, 23, 24	REMOVED DRAWINGS 91713816-1, 91713816-2, 91713816-3, 91713816-4, 73733057-1, 73733057-2 & REPLACED WITH DRAWINGS 91715637-1, 91715637-2, 91715637-3, 73733395, 73733394
20011009	3-11	ECN 8787- DRAWING CHANGES TO 31714921
20011120	3-2, 39-43	ECN 8709 - CAST IRON CYLINDER HEAD
20011120	4-14	ECN 8780 - WARRANTY
20011210	3-9,11,12,13,33,52	ECN 8789 - NEW LOW PROF BOOM TIP DESIGN
20011212	3-57	ECN 8827 - NEW CHASSIS WIRING HARNESS
20020418	3- 26-32	ECN 8860 - ADDED 93715267 INSTALLATION KIT, REMOVED 93713878 AND 93714152
	2-7	(PAGES 27-32)
20020506	3-28	ECN 8914 - CHANGED BOOM SUPPORT HARDWARE
20020513	3-9-12	ECN 8754 - ADDED NEW CYLINDERS (EXT & LOWER) TO PARTS SECTION, REMOVED
	2-5	OUTDATED ASSEMBLIES TO REVISIONS SECTION, UPDATED SPARE PARTS LIST
20020628	3-27	UPDATED 51707798 WITH RESERVOIR WELDMENT 52714432 PARTS
20020715	1-3	NEW IMT LOGO
	1-5,6,2-1,3,4,18-24, 3-45	ECN 8948 - LOW PROFILE BOOM TIP CHANGES, INCLUDING CAPACITY PLACARD
20020905	3-40	ECN 8993 - VALVE BANK CHANGE
20021118	3-18	ECN 9059 - ADDED LOCKING COLLAR TO WINCH KIT
20031017	3-23,24	ECN 9211 - CHANGES TO 70733394 CABLE ASM
	3-35,41	ECN 9265 - REV. E 31710966 (NEW VB), ADDED 51714813 VB ASM
20070220	COVER	UPDATED WITH OSHKOSH INFORMATION.
20081110		REPLACED WITH MANUAL 99904521.
20100621	3-19,22	ECN 11134 - UPDATED 73733395 VALVE WITH 73734494

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.

MANUAL EFFECTIVITY

The model 3020 manual 99901196 is effective for model 3020 cranes produced through 2007, with crane serial numbers beginning with the sequence “3020...”. However, some 3020 cranes which have serial numbers which indicate they were produced prior to the design change but they include the new design. Cranes with the following serial numbers were built with the new design, and include the parts in manual 99904521:

Crane Serial Number:
3020071001
3020071002
3020071006
3020071007
3020071008
3020081002
3020081004
3020081006
3020081007
3020081008
3020081009
3020081010
3020081011
3020081012
3020081013
3020081014
3020081016

SECTION 1. MODEL 3020 CRANE SPECIFICATIONS

NOTES

MODEL 3020 CRANE SPECIFICATIONS

GENERAL SPECIFICATIONS

CRANE RATING	30,000 ft-lbs 4.15 ton-meters
REACH - from centerline of rotation	20'-0" 6.10m
HYDRAULIC EXTENSION	60" 152.4cm
MANUAL EXTENSION	48" 121.9cm
LIFTING HEIGHT - from base of crane	21'-6" 6.55m
WEIGHT OF CRANE	1400 lbs 635 kgs
OUTRIGGER SPAN (required option) **crane side from centerline of chassis**	83" 210.8cm
STORAGE HEIGHT - crane only	30" 76.2cm
MOUNTING SPACE REQUIRED	20" x 21" (crane base) 50.8cm x 53.3cm
TIE-DOWN BOLT PATTERN	14-3/4" x 14-3/4" 37.5cm x 37.5cm on center
HORIZONTAL CENTER OF GRAVITY - **from centerline of rotation**	36" 91.4cm
VERTICAL CENTER OF GRAVITY - **from bottom of crane base**	19" 48.3cm
OPTIMUM PUMP CAPACITY	10 U.S. Gallons/minute 37.85 liters/minute
SYSTEM PRESSURE	2500 psi 172 bar
ROTATIONAL TORQUE	4500 ft-lbs 0.62 ton-meters

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PERFORMANCE CHARACTERISTICS

ROTATION: 400° (6.98 Rad.)	33.0 seconds
LOWER BOOM ELEVATION: -5° to +80° (-0.09 Rad. to +1.40 Rad.)	8.5 seconds
EXTENSION CYLINDER: 60" (152.4cm)	9.5 seconds

CYLINDERS

	BORE	STROKE
LOWER BOOM CYLINDER	4" (10.2cm)	21-5/8" (54.9cm)
EXTENSION BOOM CYLINDER	2-1/2" (6.4cm)	60" (152.4cm)

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 2500 PSI (37.85 liters/min. at 172 bar).

ROTATION SYSTEM

Turntable bearing with external worm gear powered with 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 holding valve to prevent sudden cylinder collapse in the event of a hose breakage.

The extend side of the lower boom cylinder is equipped with a 10 GPM 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 38:1 worm gear. The line speed of 25.0 ft/minute (7.62m/min), under no load, is achieved at an optimum oil flow of 10 GPM (37.85 liters/min) and one-part line. Maximum single line lifting capacity of the winch is 3000 lbs (1361 kg). Maximum two-part line lifting capacity of the winch is 6000 lbs (2722 kg). The winch is equipped with 85 ft (25.9m), 3/8" (9.5mm), 6X25 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 is 18.6:1 for the drum and 18:1 for the snatch 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.

HYDRAULIC SYSTEM

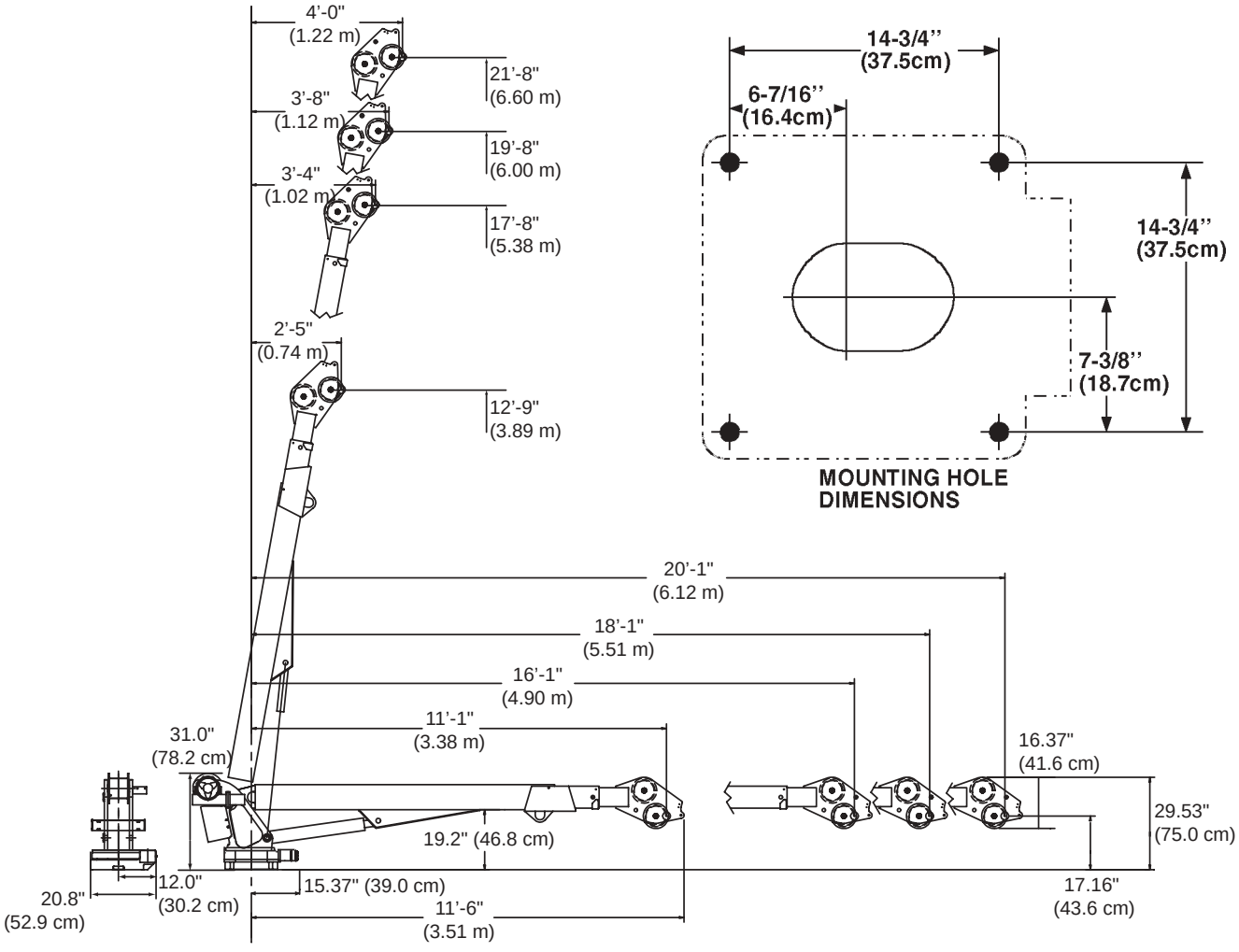
The hydraulic system is an open center, full pressure system requiring maximum flow of 10 GPM (37.85 liters/min.) at 2500 psi (172 bar). It is equipped with a four section, electric remote, stack type control valve with a 30 ft. (9.14 m) control cable. The system includes a separate hydraulic oil reservoir, suction line filter, and return line filter.

MINIMUM CHASSIS SPECIFICATIONS

BODY STYLE	Conventional Cab	Conventional Cab
WHEEL BASE	154"	391cm
CAB TO AXLE	84"	213cm
FRAME SECTION MODULUS	10 cubic inches	163.9cc
RBM	360,000 in-lbs	4149 kg-meter
FRONT AXLE RATING	5000 lbs	2268 kg
REAR AXLE RATING	9500 lbs	4309 kg
GROSS VEHICLE RATING	14.500 lbs	6577 kg
TRANSMISSION	4 speed	4 speed

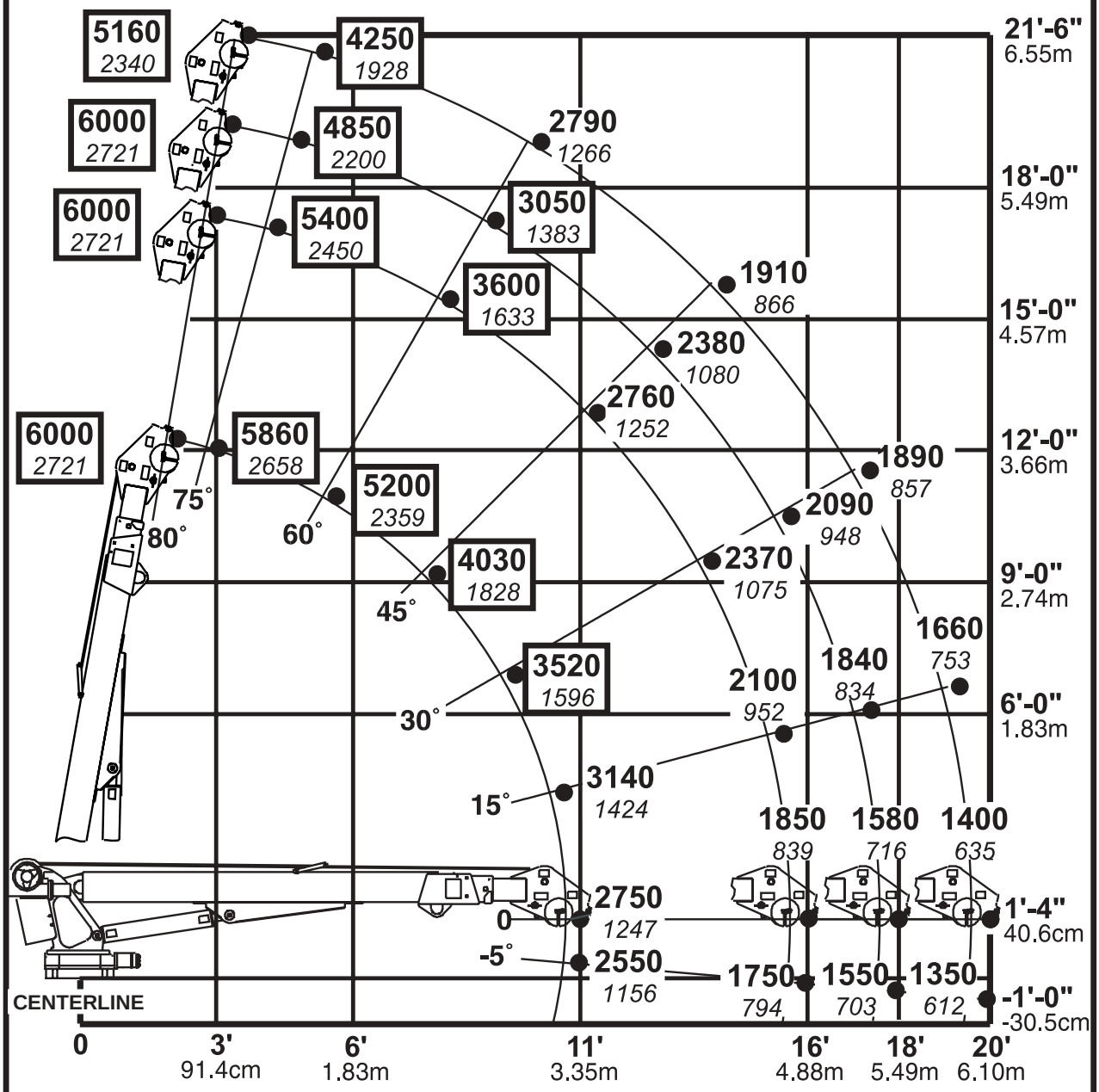
In addition to these specifications, heavy duty electrical and cooling systems are required. It is recommended that the vehicle be equipped with an engine tachometer, auxiliary brake lock, and power steering.

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



GEOMETRIC CONFIGURATION

3020 CAPACITY CHART



REACH IN FEET / METERS
CAPACITY IN POUNDS / KILOGRAMS

Maximum 1-part line capacity is 3000 lb (1361 kg). 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.

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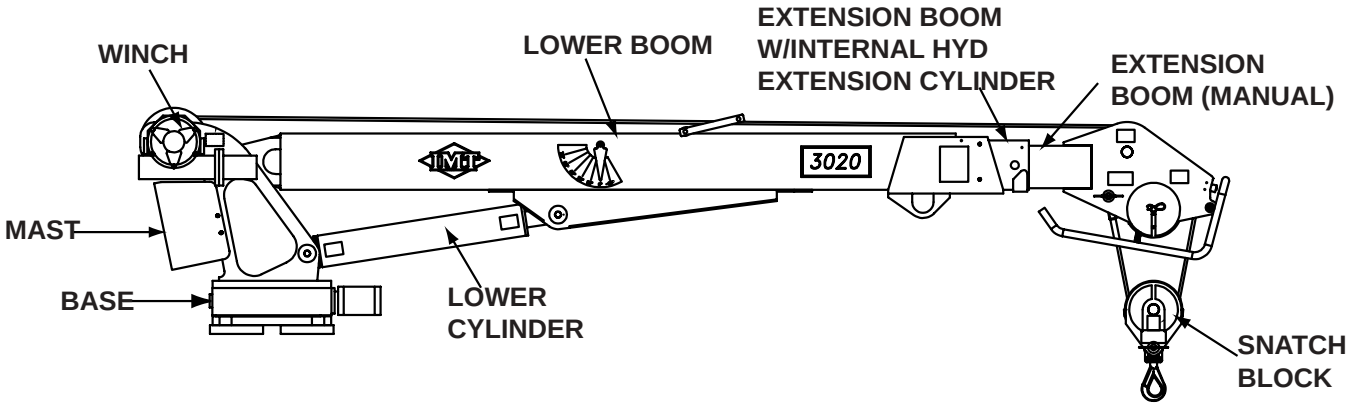
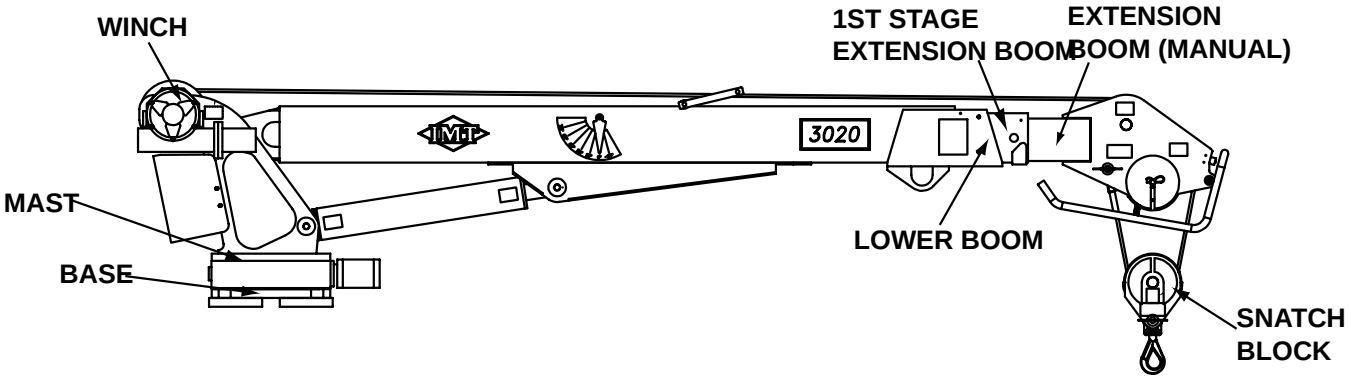
SECTION 2. MODEL 3020 CRANE REFERENCE

NOTES

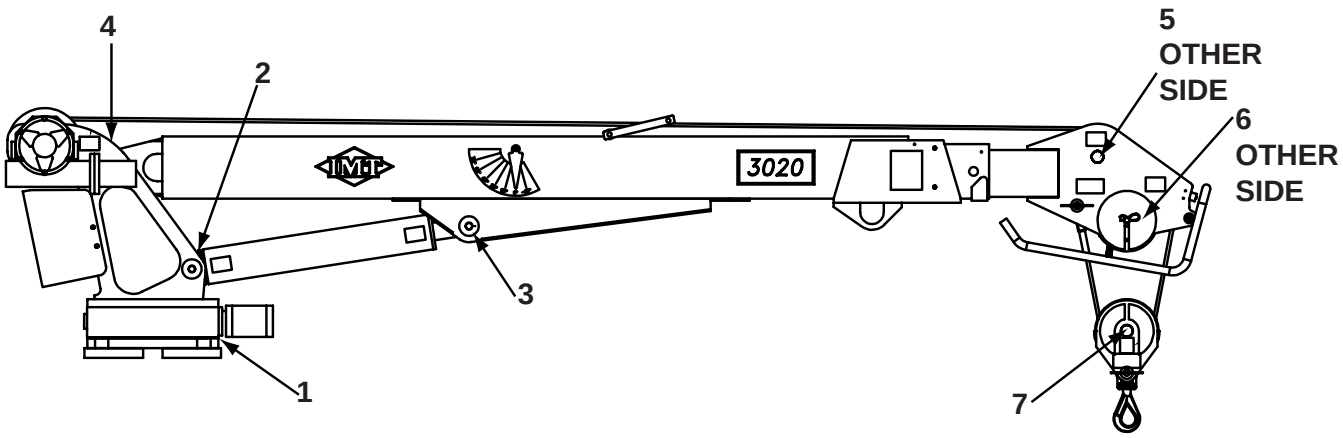


MAJOR CRANE ASSEMBLIES



WELDMENT PART NUMBER LOCATIONS

GREASE ZERK LOCATIONS & LUBRICANT REQUIREMENTS



ITEM	LOCATION DESCRIPTION	LUBRICANT	FREQUENCY
1.	GEAR ROTATOR GREASE EXTENSION *ROTATE CRANE WHILE GREASING	SHELL ALVANIA 2EP	WEEKLY
2.	LOWER CYLINDER BASE		
3.	LOWER CYLINDER ROD	OR	
4.	MAST/LOWER BOOM HINGE PIN		
5.	UPPER SHEAVE PIN	SHELL RETINAX “A”	
6.	LOWER SHEAVE PIN		
7.	SNATCH BLOCK SHEAVE PIN		

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

RECOMMENDED SPARE PARTS LIST

1 YEAR SUPPLY
MODEL 3020 TELESCOPING CRANE
FOR MANUAL: 99901196

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 DESIGNATION	ITEM NO.	PART NO.	DESCRIPTION	QTY	CODE	SHELF LIFE (MO)	ORDER QTY
41714695.01.20000210	**BASE ASSEMBLY**						
	2	73051919	HYDRAULIC MOTOR	1	C	N/A	
41717138.01.20011130	**LOWER BOOM ASSEMBLY**						
	1	3B212010	LOWER CYLINDER	1	C	N/A	
	3	60120124	WEAR PAD	4	W	N/A	
	4	72060293	CAP SCR 5/16-24X1 HHGR5	8	W	N/A	
3B212010.01.20020513	**LOWER CYLINDER**						
	8	9D161823	SEAL KIT	1	W	N/A	
	23	73540057	COUNTERBALANCE VALVE	1	C	N/A	
41717133.01.20011130	**EXTENSION BOOM ASSEMBLY**						
	1	3B210013	EXTENSION CYLINDER	1	C	N/A	
	4	60030189	WEAR PAD	1	W	N/A	
	6	60030134	SHEAVE	2	W	N/A	
3B210013.01.20020513	**EXTENSION CYLINDER**						
	6	73054999	COUNTERBALANCE VALVE	1	C	N/A	
	9	9D101220	SEAL KIT	1	W	N/A	
31714921.01.19980812	**WINCH/CABLE/HOOK KIT**						
	3	73051905	HYDRAULIC MOTOR	1	C	N/A	
	9	70580143	CABLE ASM 3/8 IWRC XIP X 85FT	1	W	N/A	
	15	51713168	CORD REEL	1	C	N/A	
	20	77041291	SWITCH	1	C	N/A	
	23	52709413	CABLE STOP	1	W	N/A	
	28	60030108	ROLLER-CABLE GUIDE	1	W	N/A	
	38	60030134	SHEAVE	1	W	N/A	
	39	71073035	HOOK	1	W	N/A	
71057936.01.19970808	**WINCH ASSEMBLY**						
	5	76393174	O-RING	1	W	N/A	
	7	76393173	OIL SEAL	1	W	N/A	
	15	70055202	BALL BEARING	2	W	N/A	
	20	70732542	BRAKE KIT	1	W	N/A	
	21	76393171	GASKET	2	W	N/A	
51713182.01.19970829	**PROPORTIONAL REMOTE HANDLE ASSEMBLY**						
		51713182	PROP REMOTE HANDLE ASM	1	W	N/A	
	11	70394183	TRIGGER ASM	1	C	N/A	
	16	77040371	TOGGLE SWITCH SPST	1	C	N/A	
	17	77040372	TOGGLE SWITCH SPDT	2	C	N/A	
	18	77040373	TOGGLE SWITCH SPST	1	C	N/A	
51713199.01.19970808	**CABLE ASSEMBLY 14GA 6WIRE X 35'**						
		51713199	CABLE ASM	1	W	N/A	
73733057.01.19970825	**VALVEBANK**						
	3	73054934	PROPORTIONAL SOLENOID	1	C	N/A	
	5	73054936	SOLENOID VALVE	1	W	N/A	
	17	77044595	VALVE DRIVER	1	C	N/A	
93713878.01.20010115	**INSTALLATION KIT**						
	REF	73052006	FILTER ELEMENT 10MIC	2	P	N/A	
71056543.01.20000210	**GEAR ROTATOR**						
	2	70395074	O-RING	1	W	N/A	
	3	70395076	SEAL	1	W	N/A	
	4	70145786	SNAP RING	1	W	N/A	
	5	70055271	BRG-CONE	2	W	N/A	
	6	70055281	BRG-CUP	2	W	N/A	
	7	70145501	BRG RETAINER	1	W	N/A	
	8	70056550	WORM	1	W	N/A	
	12	73145506	SHIM .005	2	W	N/A	
	13	73145505	SHIM .015	2	W	N/A	
	14	73145504	SHIM .030	2	W	N/A	
	15	76395075	GASKET	1	W	N/A	

NOTES

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.

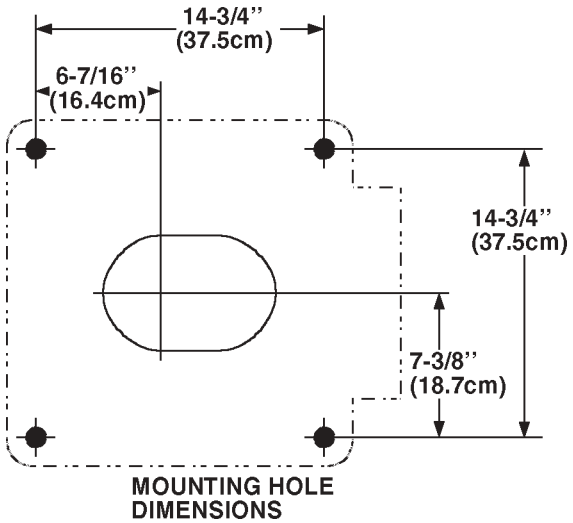
CRANE INSTALLATION

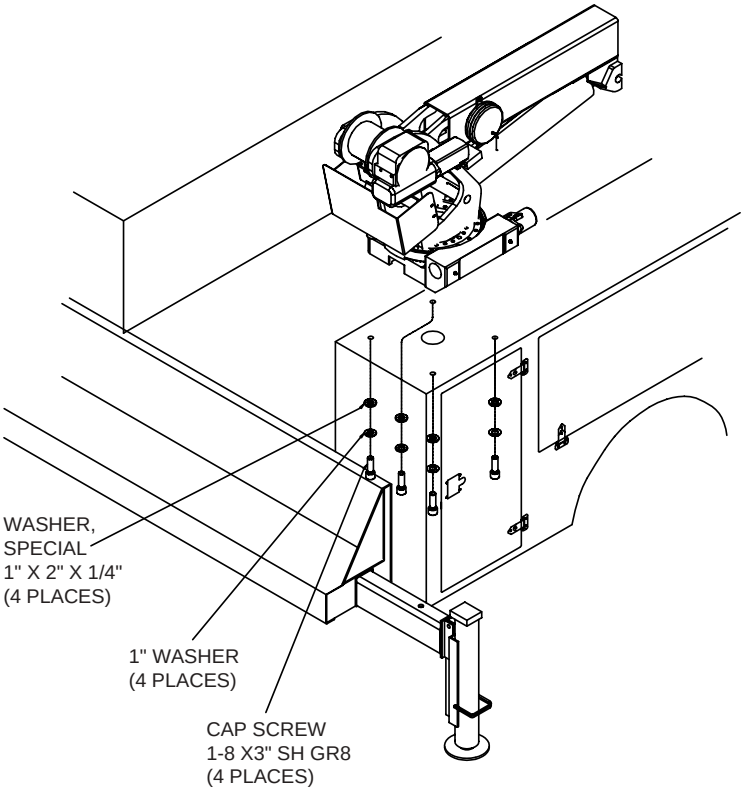
In addition to meeting Minimum Chassis Specifications in Section 1, there must be sufficient room for mounting the crane and the platform must be strong enough to support the crane and rated load. Install the 3020 crane only on an IMT designed and approved truck body. The body must be designed to sustain 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:

1. Use a lifting device capable of lifting the weight of the crane, 1,400 lbs (635 kg). 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 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).





CRANE INSTALLATION

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.

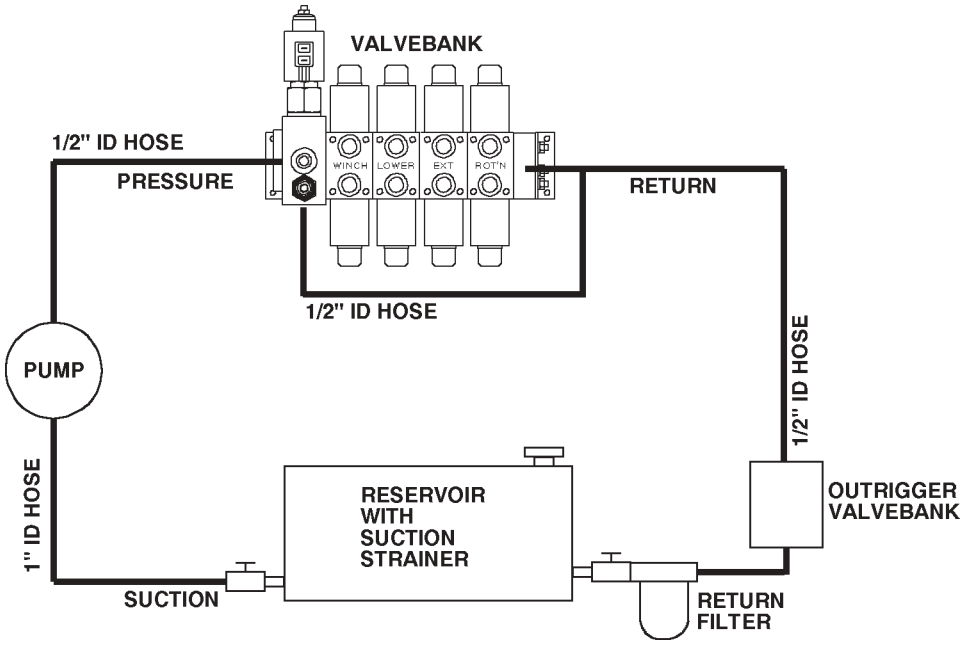
1. Plumb the hydraulic components as shown in the applicable installation kit in the parts section. Make certain all fittings are securely tightened and that hoses are free of possible chafing or contact with hot or sharp edges which could cause damage.

2. 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

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 2500 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

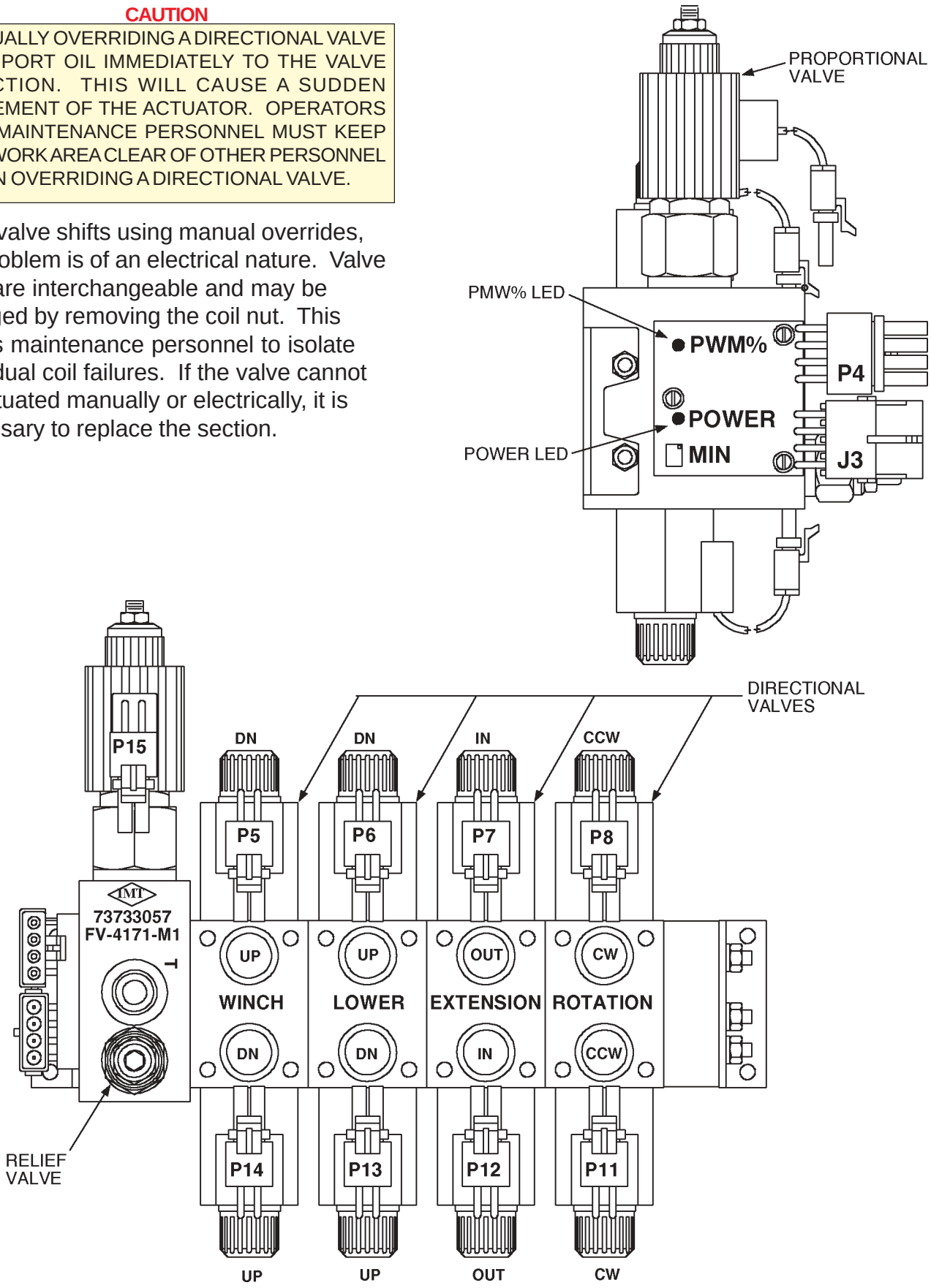
The directional valves (4) control the direction of the crane functions. When one of the solenoids is energized, it shifts the valve spool. This allows oil to flow out one of the valve ports. If a function does not work, a directional valve may be to blame.

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

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.



VALVEBANK

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.

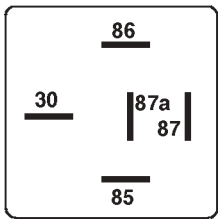


FIGURE 1. BOTTOM VIEW OF RELAY

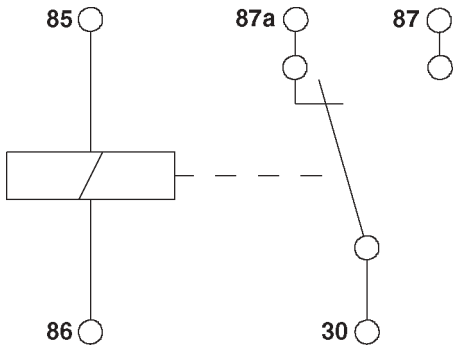


FIGURE 2. INTERNAL WIRING

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.

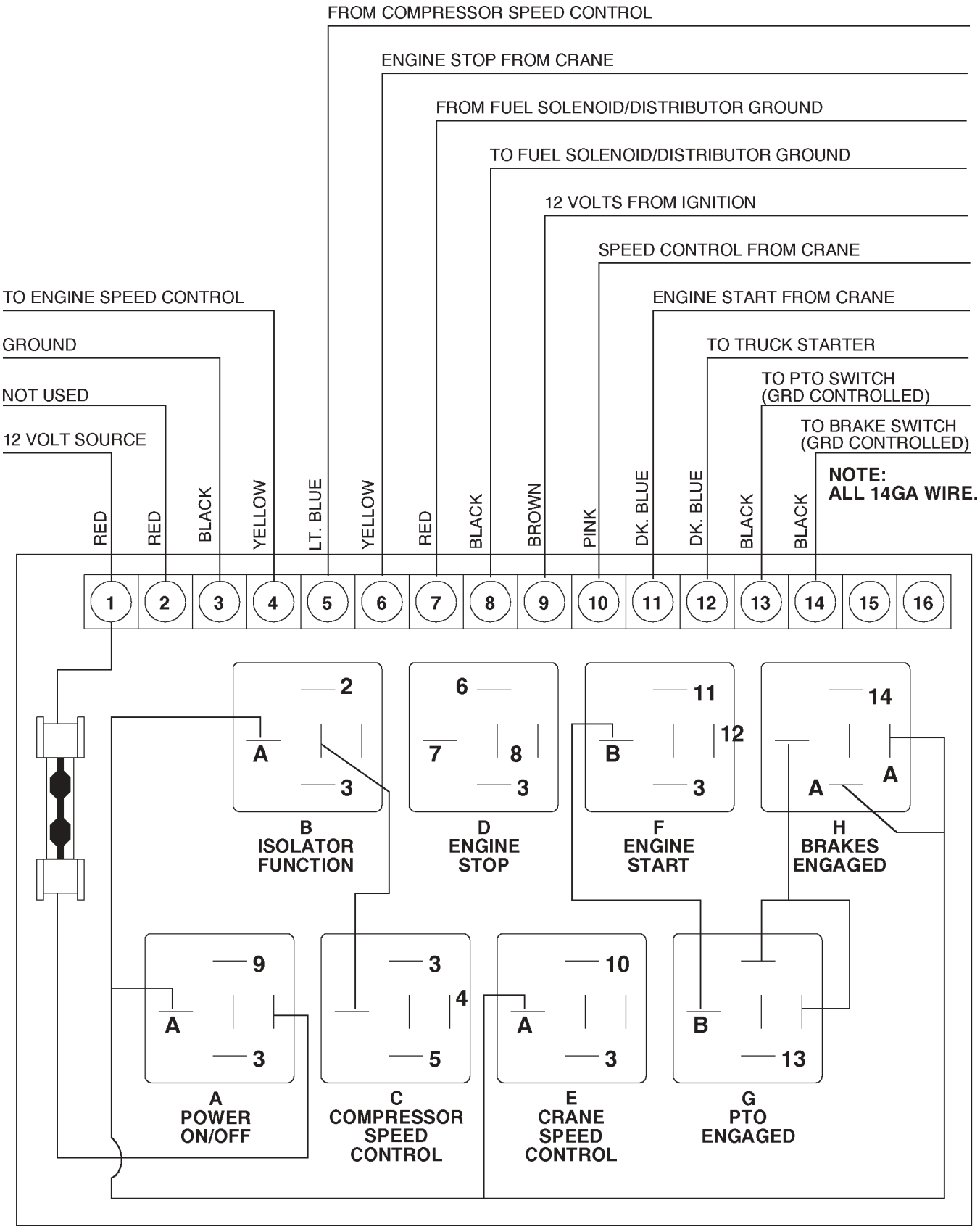


FIGURE 3. RELAY BOARD - COMPONENTS & WIRING

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”.

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.

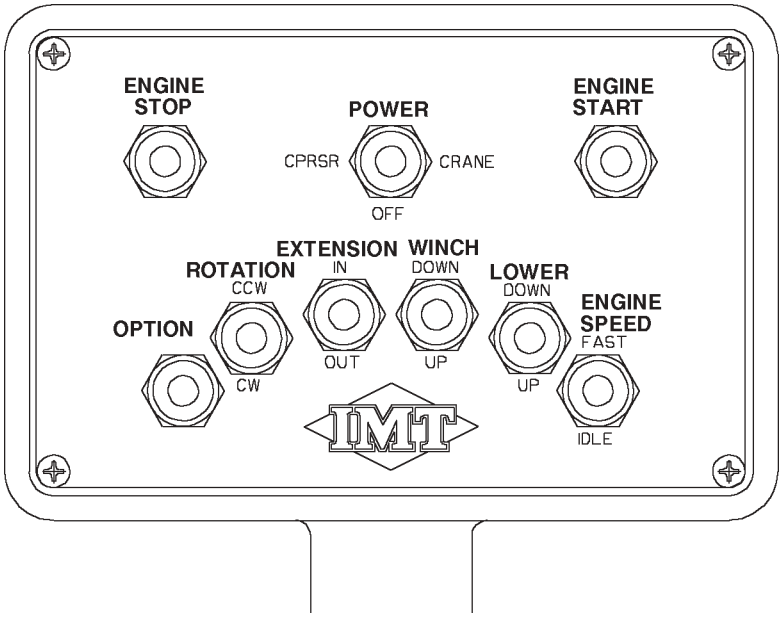


FIGURE 4. REMOTE CONTROL HANDLE

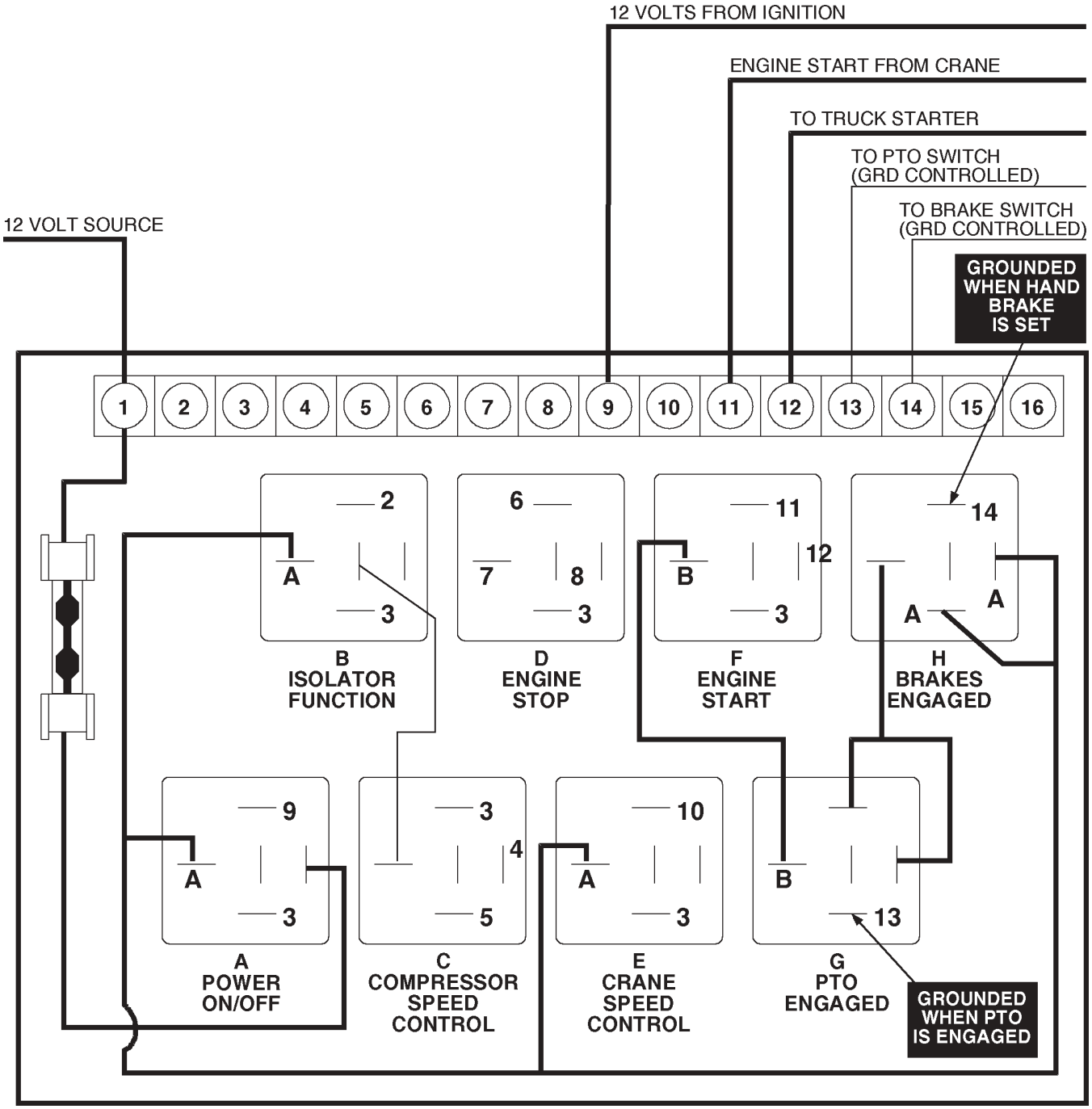


FIGURE 5. REMOTE STARTING OF VEHICLE - IGNITION "ON"

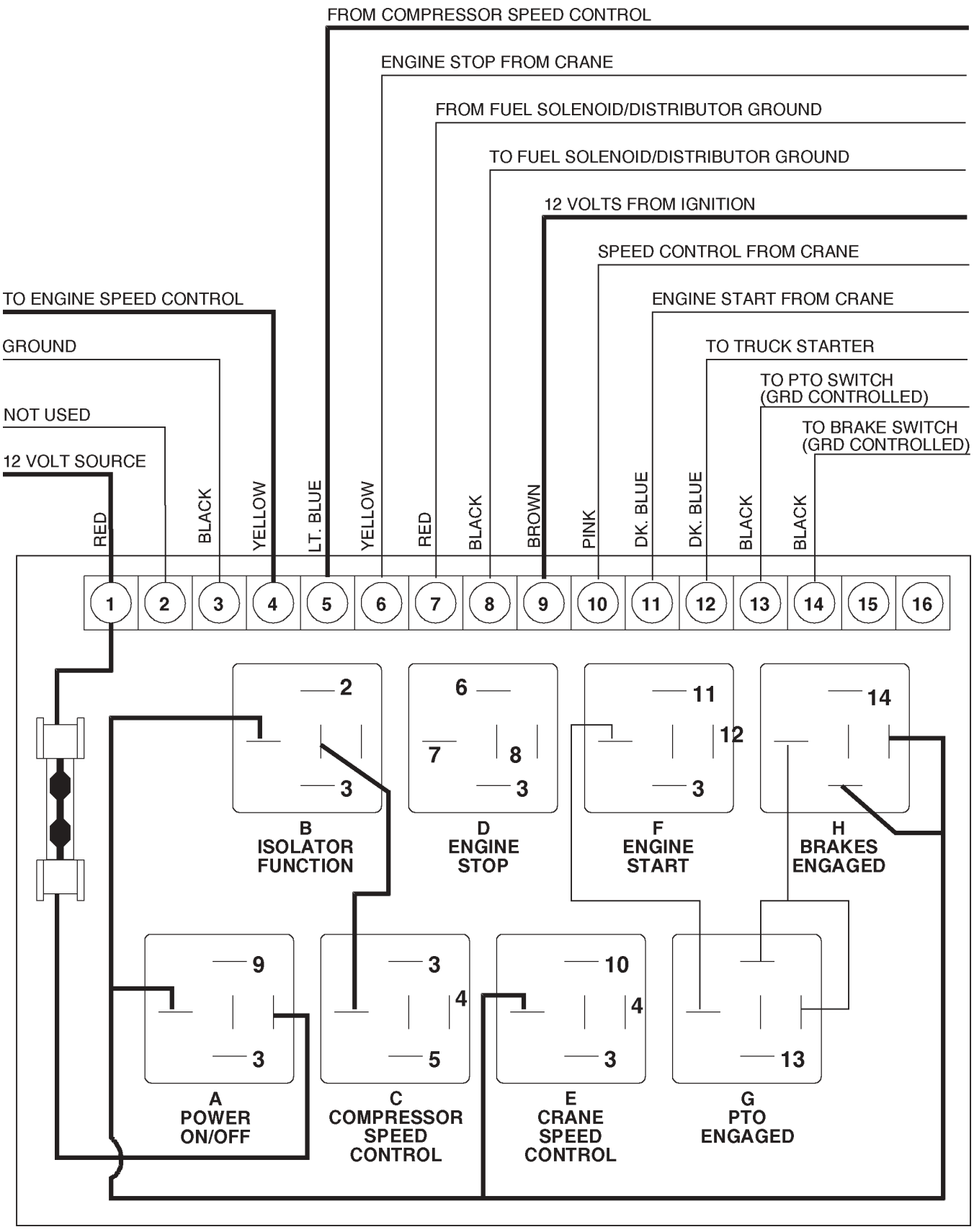


FIGURE 6. SPEED CONTROL - COMPRESSOR ONLY

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 GROUND
8	TO FUEL SOLENOID / DISTRIBUTOR GROUND
9	12-VOLT FROM IGNITION
10	SPEED CONTROL FROM CRANE
11	ENGINE START FROM CRANE
12	TO TRUCK STARTER
13	TO PTO SWITCH, CONTROLLED
14	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

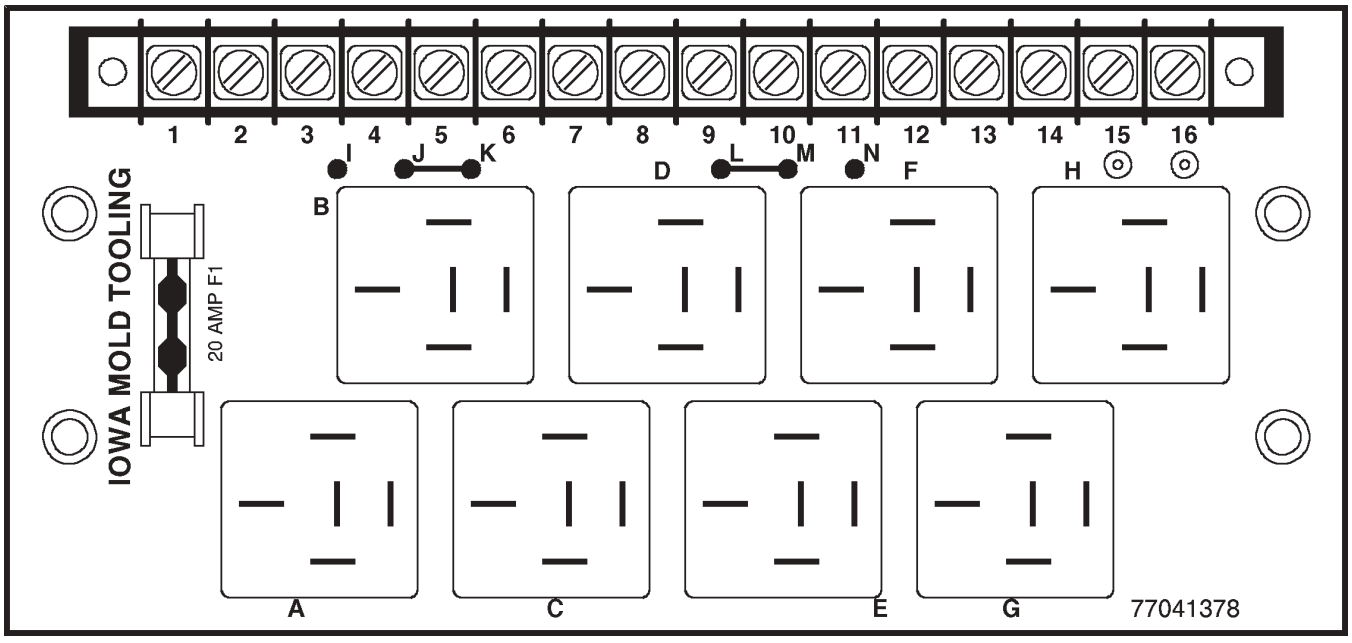


FIGURE 7. RELAY BOARD (77041378) WIRING INSTRUCTIONS

WINCH TROUBLESHOOTING

POSSIBLE CAUSE	PROBABLE CURE
WINCH WON'T LIFT HEAVY LOADS	
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 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.
WINCH WON'T HOLD LOAD	
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
WINCH RUNS TOO SLOW	
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
WINCH WILL NOT RUN UNDER NO LOAD (RELIEF VALVE OPENS WITHOUT WINCH TURNING)	
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.

ANTI TWO-BLOCKING DEVICE

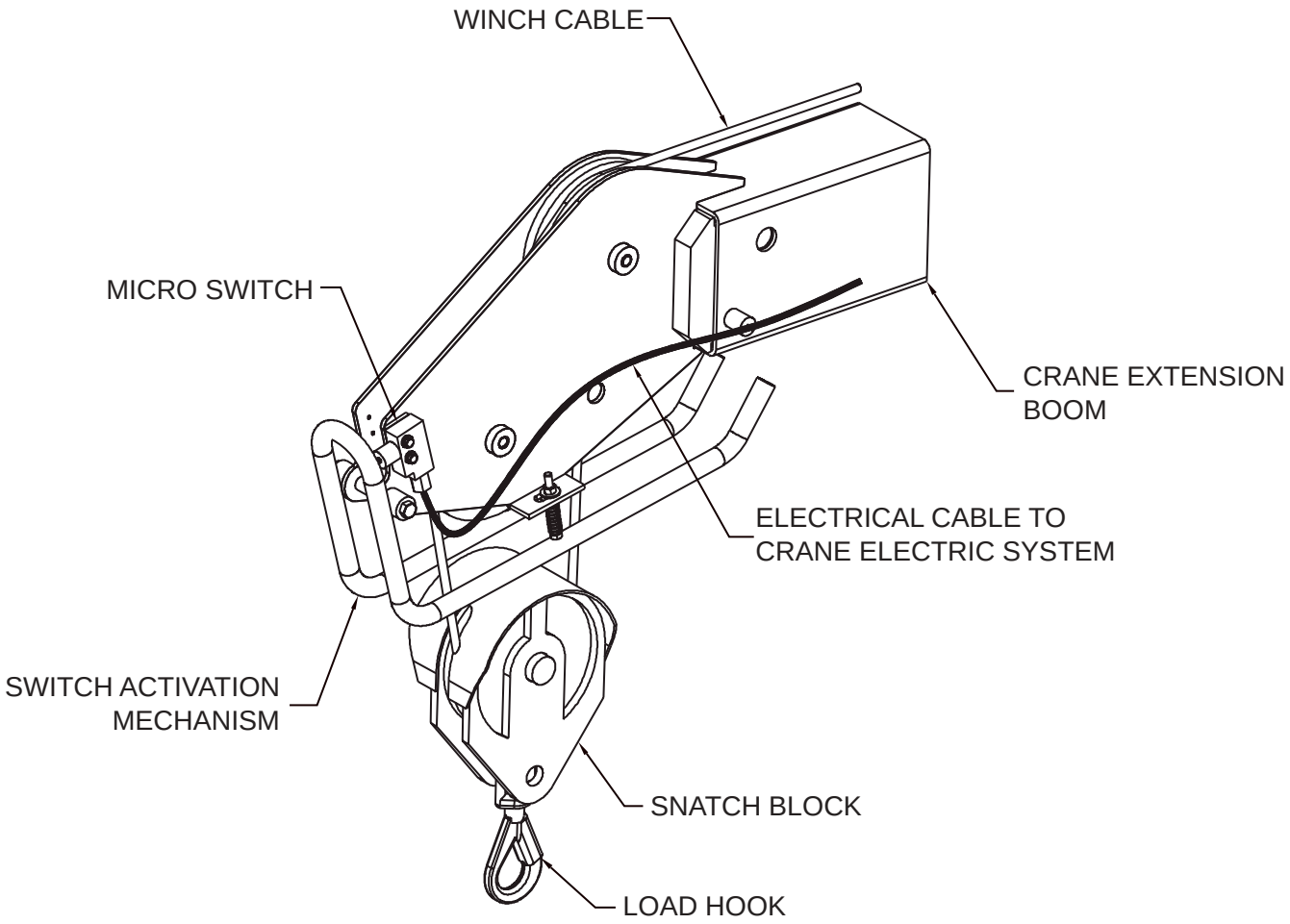
IMT telescoping cranes using a winch are equipped with an Anti Two-Blocking Device which is designed to provide a method of sensing an approaching Two-Blocking situation and prevent the crane from entering that situation. It is the operator's responsibility to avoid Two-Blocking and not to rely on this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

By keeping the system clean and the microswitch in operating condition, the system should function properly.

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

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/ ¼” PIPE THRD		QTY 1
-1/4 PIPE-#6 JIC ADAPTER	(ref) PARKER PART# 0203-4-6	QTY 1

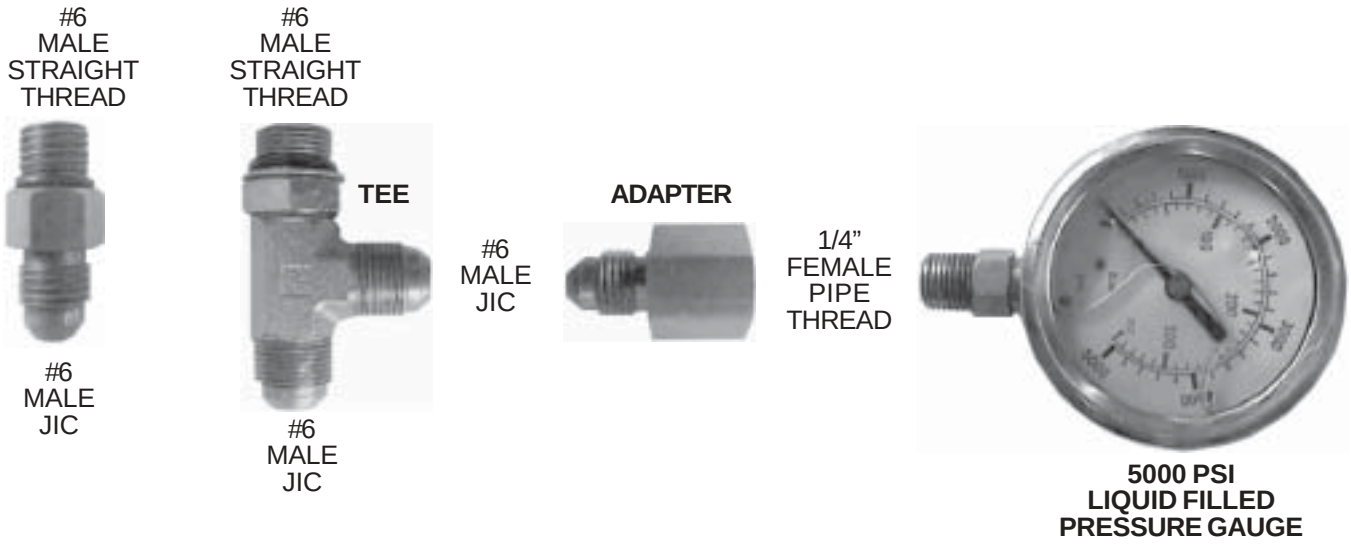
16” HOSE ASSEMBLY (3/8”OR ¼” HOSE W/ #6 FEM. JIC FITTINGS & T-FITTING)

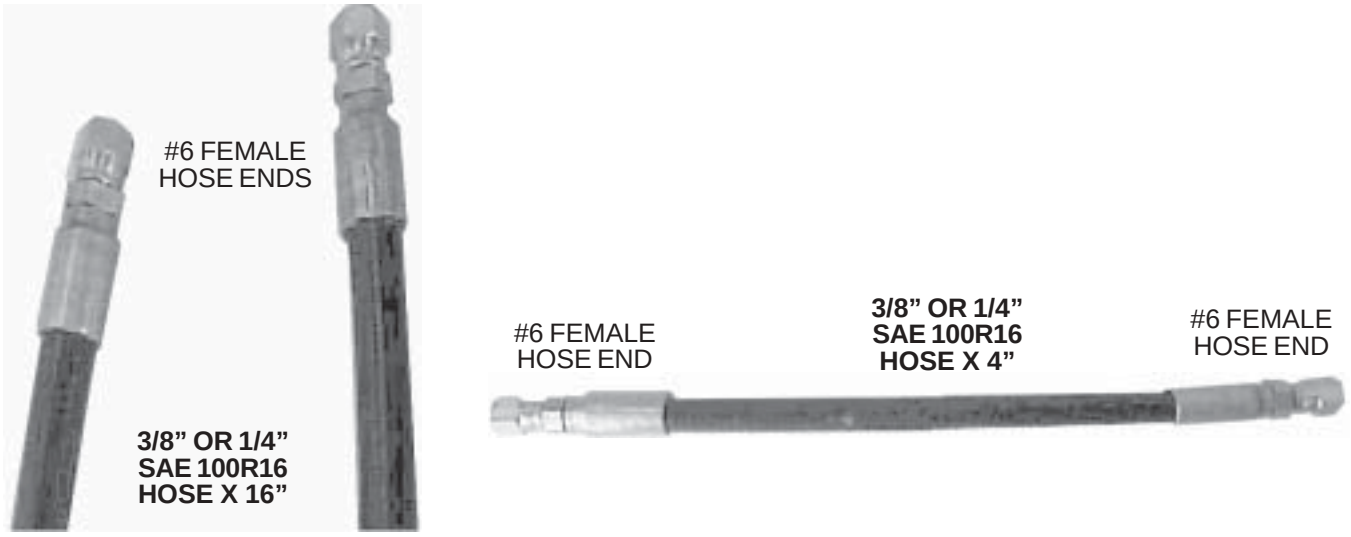
-TEE FITTING	(ref) PARKER PART# 653T-6-6	QTY 1
-#6 FJIC FITTING	(ref) PARKER PART# 10643-66	QTY 2
-3/8” SAE 100R16 HOSE	(ref) PARKER PART# 431-6	QTY 16”

4” HOSE ASSEMBLY (3/8” OR ¼” 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





TEST PROCEDURE

A. Position Crane Boom

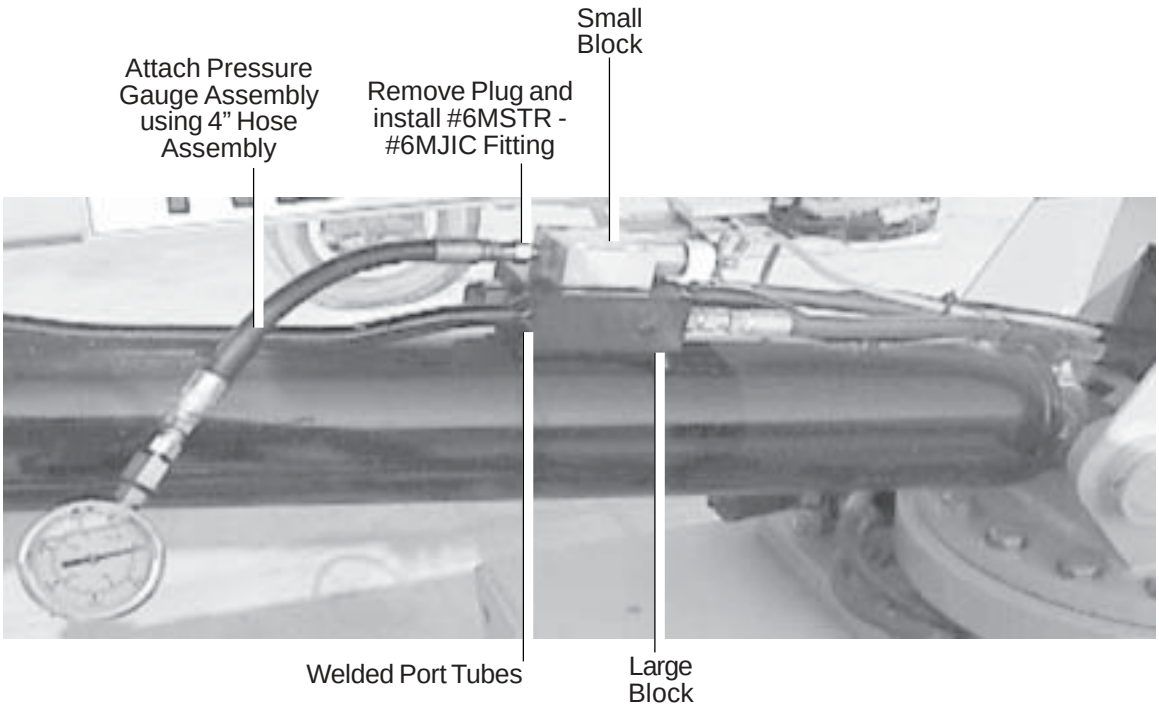
1. Back the truck up to an immovable object to which the crane hook can be securely fastened. The boom tip must be directly over the immovable object when the crane is rotated to the rear of the truck, with the extension extended one foot.
2. Engage the parking brake and PTO.
3. Properly position all 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.

B. Attach Pressure Gage (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.

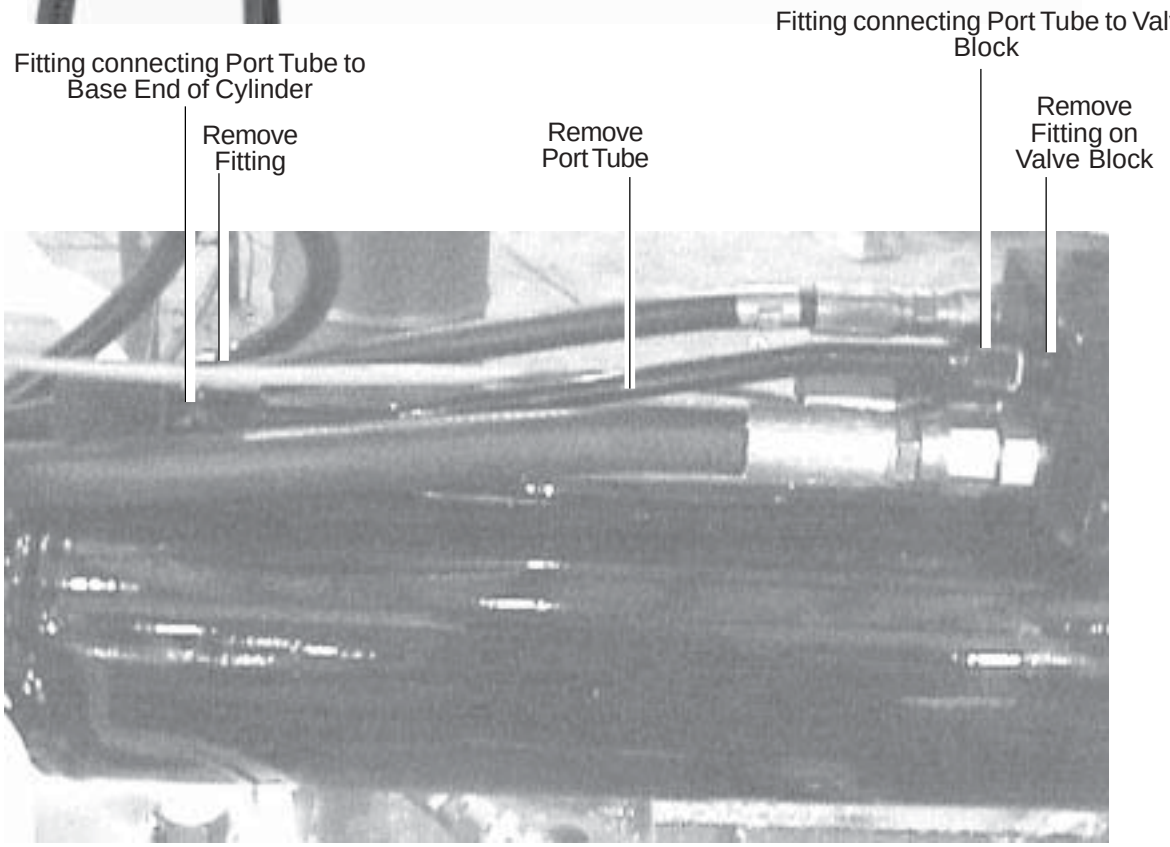
1. **Procedure 1** (Large valve block with smaller block attached – port tubes welded)
   a. BE AWARE OF TRAPPED PRESSURE BEHIND THE PLUG IN THIS STEP!! PRESSURIZED OIL MAY CAUSE SERIOUS INJURY!! Slowly remove #6 hex plug on the end of the smaller block on the lower boom cylinder.
   b. Install #6 MJIC 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



2. **Procedure 2** (Large valve block only – port tubes removable)
   a. Remove bolts that attach the valve block to the cylinder
   b. 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).
   c. Turn off fitting connecting port tube to valve block.
   d. 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.
   e. Remove fitting from valve block.
   f. Install 16” hose assembly with T-fitting (refer below) between block on lower boom cylinder and base end of lower boom cylinder.
   g. Attach pressure gage assembly to T-fitting using 4” hose assembly (refer to figure below).
   h. Be sure to tighten all fittings securely.

16” HOSE ASSEMBLY WITH T-FITTING & 4” HOSE ASSEMBLY



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

	FUNCTIONS SHUT DOWN BY ELLS			
IMT CRANE MODEL	**WINCH UP**	**EXTENSION OUT**	**LOWER DOWN**	**MAX. TEST GAGE PRESSURE ALLOWED**
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
3820	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.

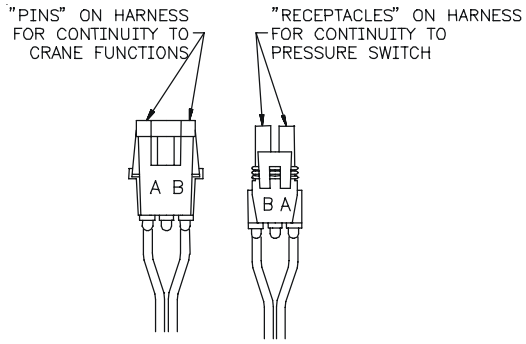
ELLS TROUBLESHOOTING PROCEDURE

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 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.

SECTION 3. MODEL 3020 REPLACEMENT PARTS

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 reprsentative.

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
Product Support Fax: 641-923-2424

CYLINDER IDENTIFICATION

To insure that the proper cylinder replacement parts are recieved, 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.

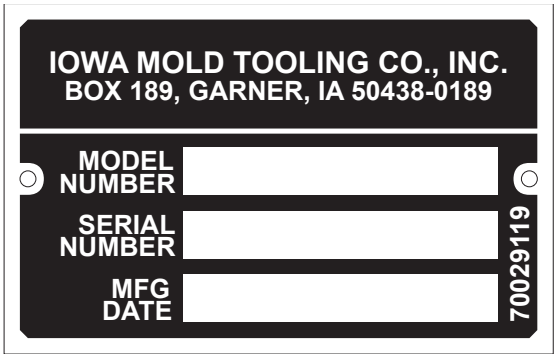
WELDMENT IDENTIFICATION

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.

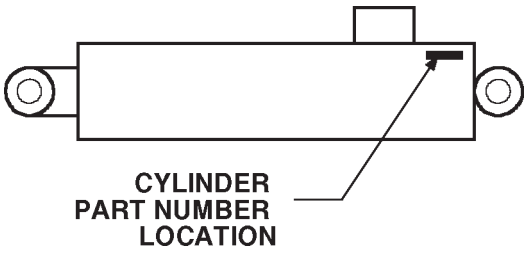
ORDERING REPAIR PARTS

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.



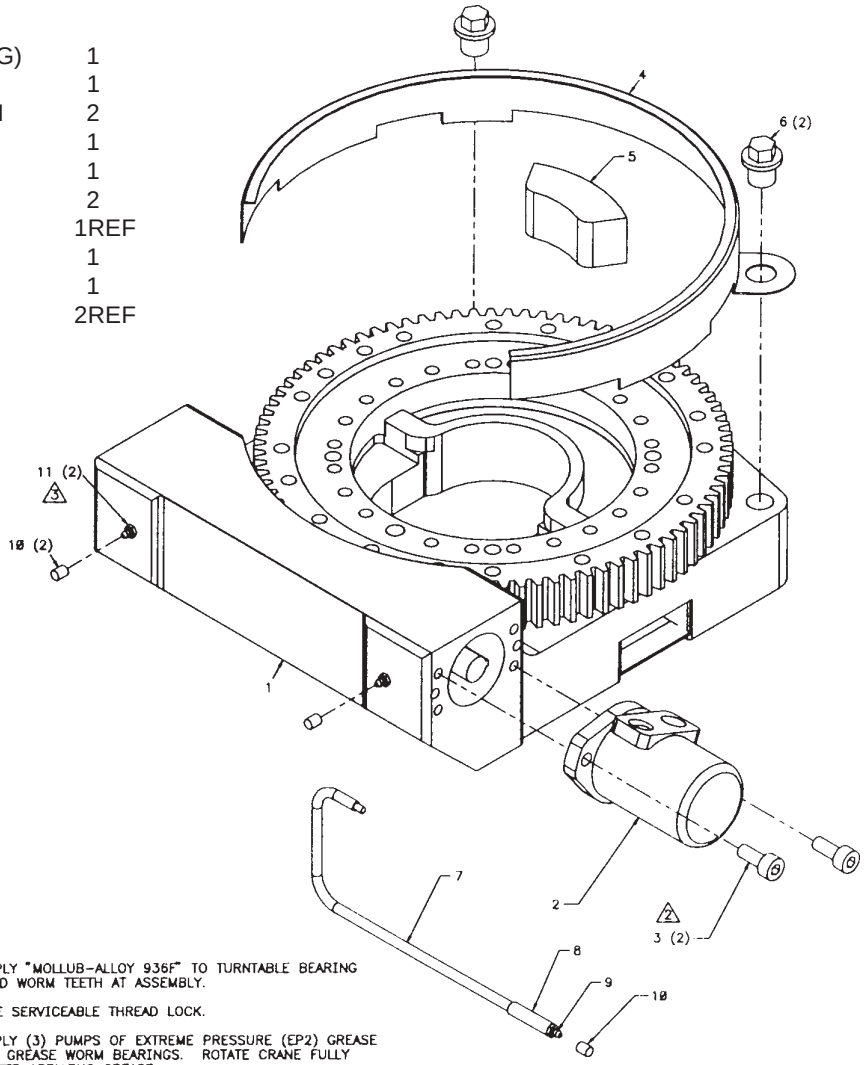
SERIAL NUMBER PLACARD



CYLINDER PART NUMBER LOCATION

BASE ASM (41714695)

1.	71056543	GEAR ROTATOR(SEE DWG)	1
2.	73051919	HYDRAULIC MOTOR	1
3.	72060794	CAP SCR 1/2-13X1-1/4 SH	2
4.	60120192	GEAR GUARD	1
5.	60120138	SLIDE	1
6.	70029595	PLUG 1-8	2
7.	51395121	HOSE	1REF
8.	72053301	COUPLING 1/8NPT	1
9.	72053508	ZERK 1/8NPT	1
10.	72533605	ZERK(PART OF 1)	2REF



NOTES:
1. APPLY "MOLLUB-ALLOY 936F" TO TURNTABLE BEARING AND WORM TEETH AT ASSEMBLY.
2. USE SERVICEABLE THREAD LOCK.
3. APPLY (3) PUMPS OF EXTREME PRESSURE (EP2) GREASE TO GREASE WORM BEARINGS. ROTATE CRANE FULLY AFTER APPLYING GREASE.

GEAR ROTATOR (71056543)

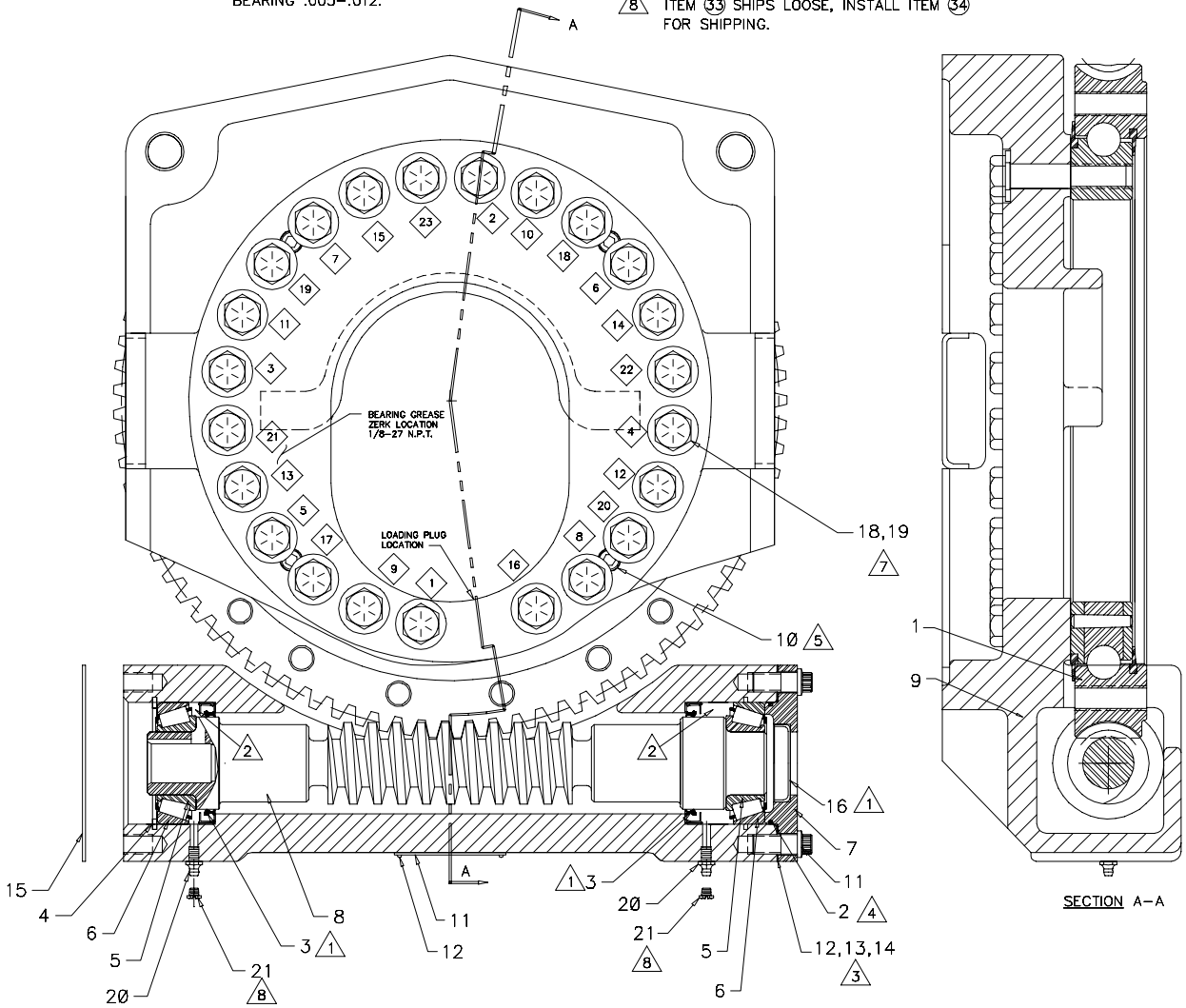
1.	70056527	ROTATION BEARING	1
2.	70395074	O-RING	1
3.	70395076	SEAL	2
4.	70145786	SNAP RING	1
5.	70055271	BEARING-CONE	2
6.	70055281	BEARING-CUP	2
7.	70145501	BEARING RETAINER	1
8.	70056550	WORM	1
9.	70145787	HOUSING	1
10.	72601734	CAP SCR 3/8-16X1-1/4 SH	4
11.	72601733	CAP SCR 1/2-13X1-1/4 FERRY	4
12.	73145506	SHIM .005THK	2
13.	73145505	SHIM .015THK	2
14.	73145504	SHIM .030THK	2
15.	76395075	GASKET	1
16.	72533604	PLUG	1
17.	72661504	PIN 3/8X1	2
18.	72601751	CAP SCR 5/8-11X2-3/4 HHGR8	23
19.	72063219	WASHER 5/8 FLAT HARD	23
20.	72533605	ZERK	2
21.	72533439	VENT PLUG	2

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.

ASSEMBLY NOTES:

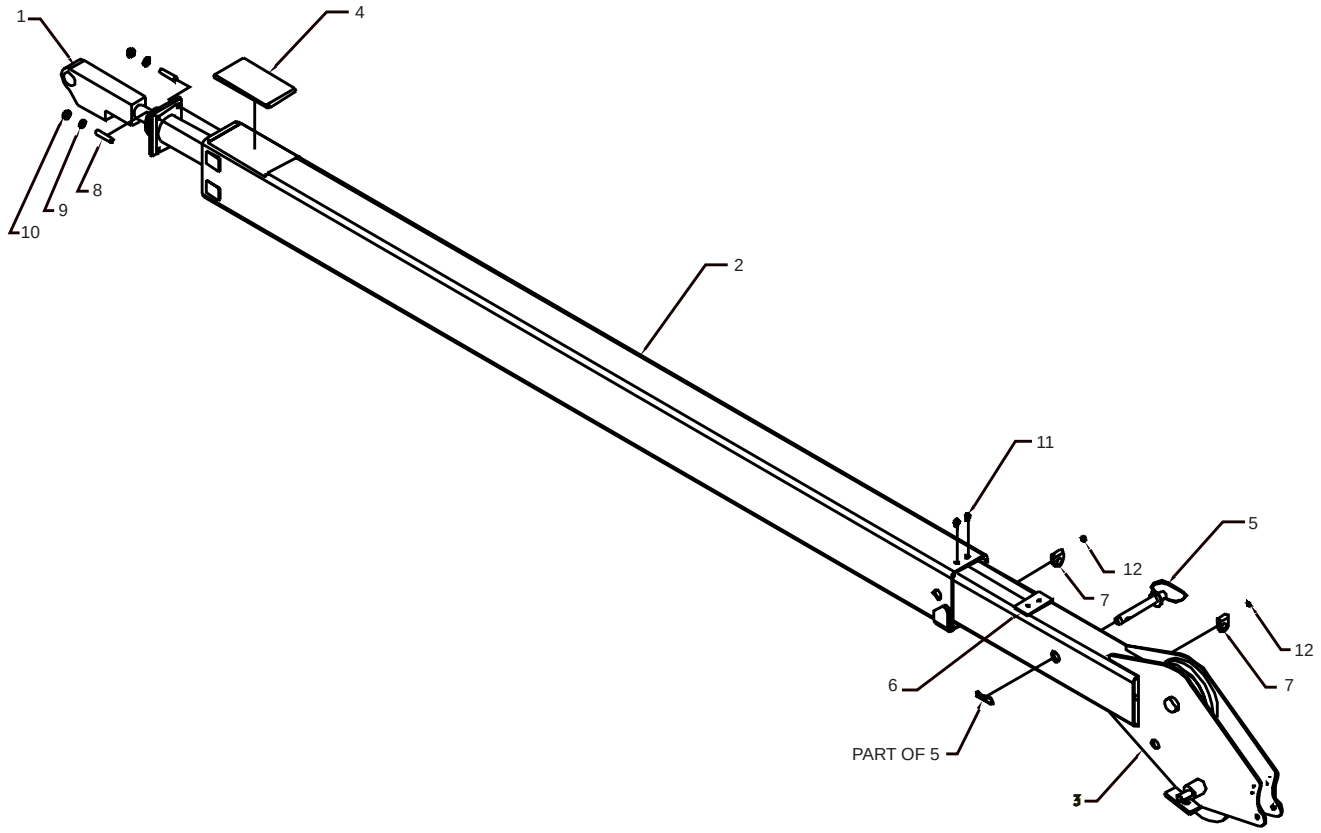
1. INSTALL SEALS (3) AND (21) WITH LOCTITE PLASTIC GASKET (54931) ON O.D. LUBRICATE SEAL SURFACE BEFORE ASSEMBLY.
2. PACK CAVITIES WITH EPO GREASE.
3. SHIM TO OBTAIN .000/.004 END PLAY ON WORM SHAFT.
4. LUBRICATE O'RING (2) WITH WORM GEAR OIL BEFORE INSTALLING.
5. INSTALL BOLTS (14) WITH LOCTITE 242.
6. SET BACKLASH BETWEEN WORM AND ROTATION BEARING .005–.012.
7. TIGHTEN 5/8–11UNC GRADE 8 MOUNTING BOLTS AS FOLLOWS:
   1. TIGHTENING MUST BE PROGRESSIVE AND AT 180 DEGREE INTERVALS.
      FIRST INTERVAL IS AT 70 FT. LBS.
      SECOND INTERVAL IS AT 140 FT. LBS.
      THIRD INTERVAL IS AT 210 FT. LBS.
   2. TIGHTEN BOLTS IN ORDER SHOW IN ◇.
   3. DO NOT USE LOCTITE ON MOUNTING BOLTS.
8. ITEM (33) SHIPS LOOSE, INSTALL ITEM (34) FOR SHIPPING.



EFFECTIVE 1/1/2002

LOW PROFILE EXTENSION BOOM ASM. (41717133)

1.	3B210013	CYLINDER	1
2.	52717136	BOOM EXTENSION WELDMT.	1
3.	52717062	WELDMT. 2ND EXT. BOOM	1
4.	60030189	WEAR PAD	1
5.	73733171	LOCK PIN 1X6 W/HAIRPIN	1
6.	60121174	STROKE STOP	1
7.	70034381	SUPPORT	2
8.	72601757	STUD 1/2-13X2.00	4
9.	72063005	WASHER 1/2 FLAT	4
10.	72062080	NUT 1/2-13 HEX NYLOC ZINC	4
11.	72601750	CAP SCR 3/8-16X1/2 SOC BTNHD	2
12.	72062104	NUT 1/4-20 HEX NYLOC ZINC	2



EXTENSION CYLINDER (3B210013)

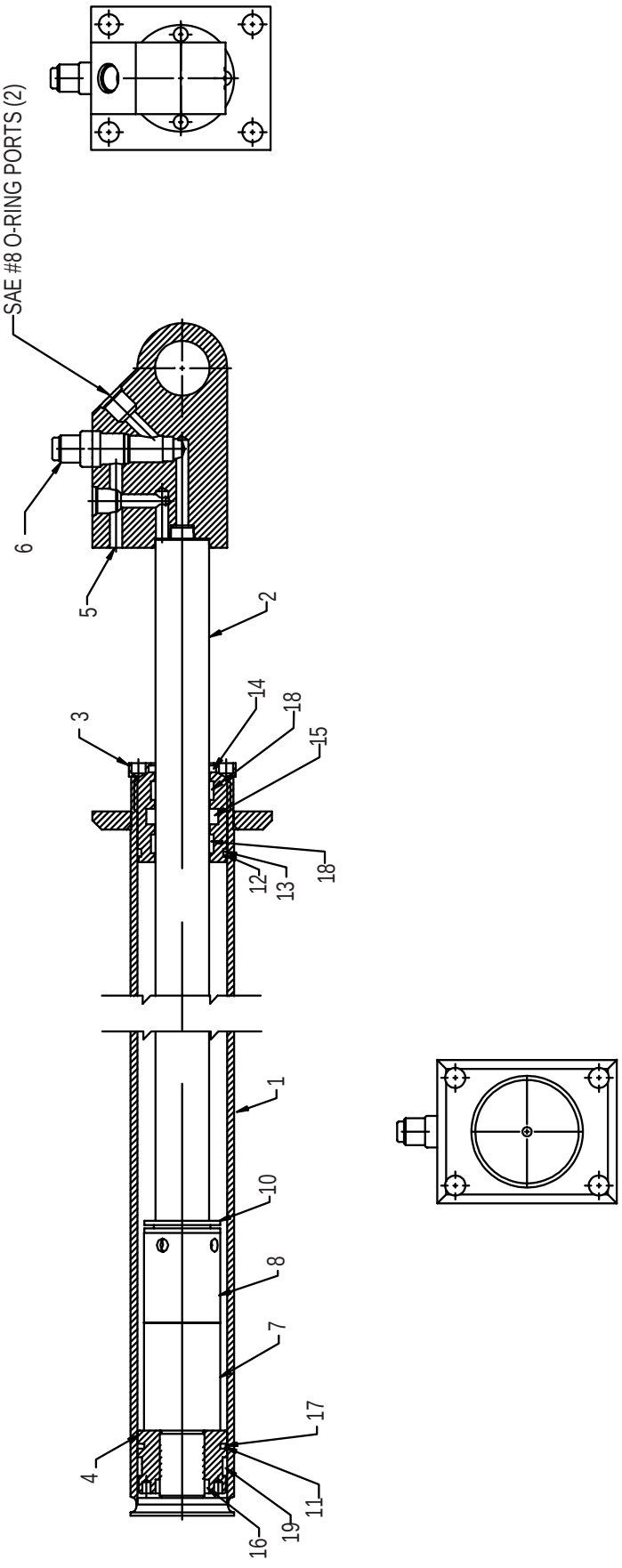
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B210013	CASE ASM	1
2.	52717006	ROD ASM - 1.50 x 81.50L (INC.5)	1
3.	6HD25015	HEAD	1
4.	6ID25125	PISTON	1
5.	7PNPXT02	PIPE PLUG 1/8 NPT (PART OF 2)	1REF
6.	73054999	C-BAL VALVE	1
7.	6C300015	STOP TUBE 3"	1
8.	6C210013	STOP TUBE 3"	1
9.	9D101220	SEAL KIT (INCL:10-19)	1
10.	6A025015	WAFER LOCK (PART OF 9)	1REF
11.	7Q072137	O-RING (PART OF 9)	1REF
12.	7Q072228	O-RING (PART OF 9)	1REF
13.	7Q10P228	BACKUP RING (PART OF 9)	1REF
14.	7R14P015	ROD WIPER (PART OF 9)	1REF
15.	7R546015	U-CUP SEAL (PART OF 9)	1REF
16.	7T61N125	LOCK RING, 1/8 NYLON (P/O 9)	1REF
17.	7T66P025	PISTON SEAL (PART OF 9)	1REF
18.	7T2NX417	WEAR RING (PART OF 9)	1REF
19.	7T2N4025	WEAR RING (PART OF 9)	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 THREADS. KEEP AWAY FROM ALL SEALS.



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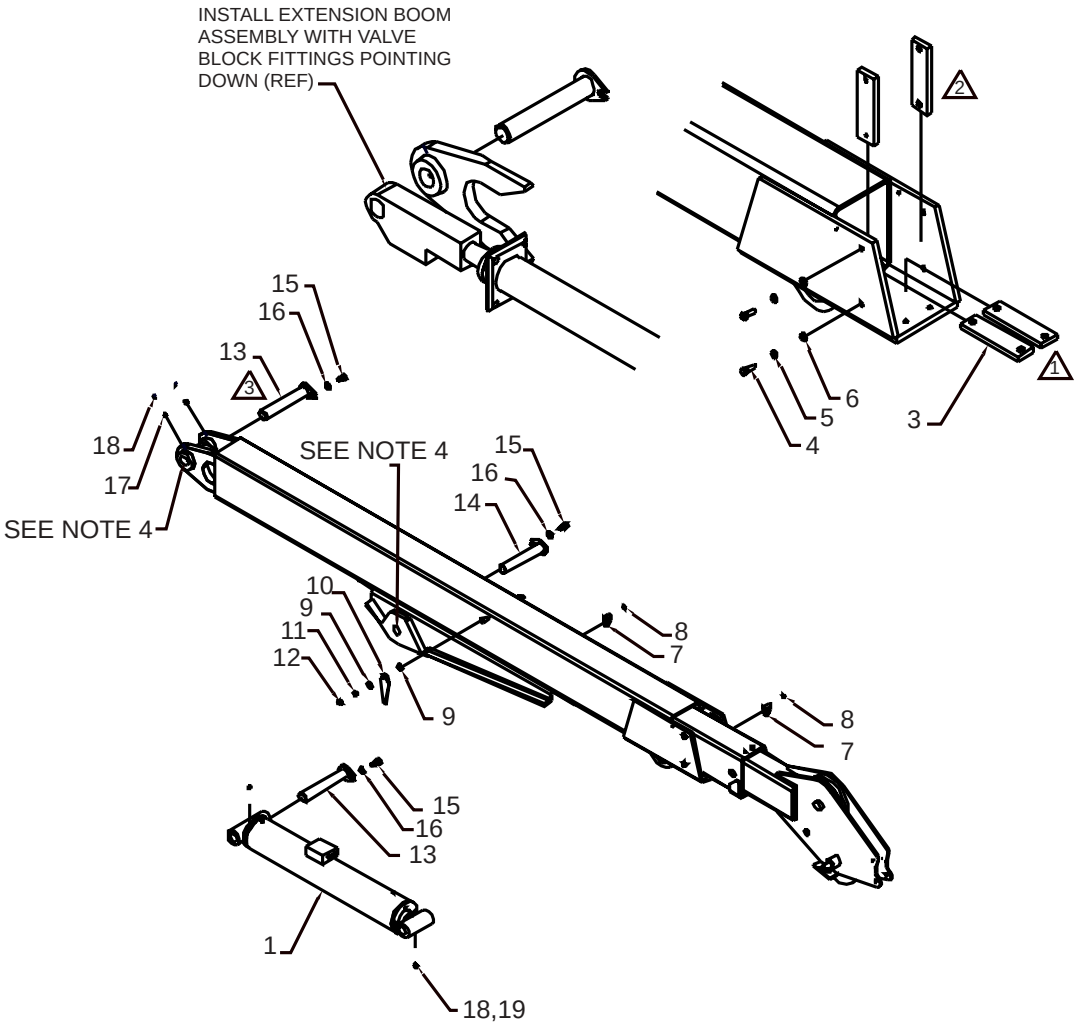
LOW PROFILE LOWER BOOM ASM. - FROM 1/1/02 (41717138)

1.	3B212010	CYLINDER	1
2.	52717135	BOOM EXTENSION WELDMT.	1
3.	60120124	WEAR PAD	4
4.	72060293	CAP SCR 5/16-24X1.00 HHGR5Z	8
5.	72063050	WASHER 5/16 LOCK	8
6.	72063002	WASHER 5/16 FLAT	8
7.	70034381	SUPPORT	2
8.	72062104	NUT 1/4-20 HEX NYLOC ZINC	2

3-8

9.	72063005	WASHER 1/2 FLAT	4
10.	60105544	PLATE-ANGLE PLASTIC	2
11.	72063003	WASHER 3/8 FLAT	2
12.	72062103	NUT 3/8-16 HEX NYLOC ZINC	2
13.	52714976	PIN TYPE II 1.5X9.31	2
14.	52715266	PIN TYPE II 1.4X8.31	1
15.	72060793	CAP SCR 1/2-13X1.00	3
16.	72063053	WASHER 1/2 LOCK	3
17.	72053508	ZERK NPT 1/8	2
18.	70034382	GREASE CAP	4
19.	72053507	ZERK STR THD .25-28	2REF

EFFECTIVE 1/1/02



NOTES:

1. MOUNT THE BOTTOM TWO WEAR PADS BEFORE INSERTING THE MANUAL EXTENSION ASSEMBLY.

2. THE TWO SIDE WEAR PADS WILL BE INSERTED AFTER THE MANUAL EXTENSION IS INSTALLED.

3. PIN (ITEM #13) MUST GO THRU THE LOWER BOOM ASSEMBLY AND THE MANUAL EXTENSION ASSEMBLY. THE VALVE BLOCK FITTINGS MUST BE POINTED DOWN.

4. APPLY NEVER SEEZ TO COLLAR ID.

5. APPLY NEVER SEEZ TO PIN. DO NOT EXCEED WIDTH OF THE BOOM COLLARS.

LOWER CYLINDER (3B212010)

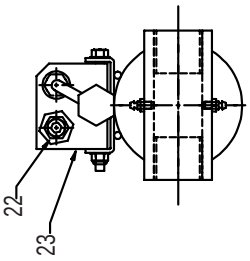
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B210010	CASE ASM (PT OF 27,INCL 6.7)	1REF
2.	4G245980	ROD ASM (INCL. 6,7)	1REF
3.	6HD40022	HEAD (PART OF 27)	1REF
4.	6ID40143	PISTON (PART OF 27)	1REF
5.	6C150022	STOP TUBE (PART OF 27)	1REF
6.	72053507	ZERK STR THD .25 - .28 (PART OF 1,2)	2REF
7.	7BF81215	BUSHING (PART OF 1,2)	6REF
8.	9D161823	SEAL KIT (PART OF 27,INC 9-18)	1REF
9.	6A025022	WAFER LOCK (PART OF 8)	1REF
10.	7R14P022	ROD WIPER (PART OF 8)	1REF
11.	7R546022	U-CUP SEAL (PART OF 8)	1REF
12.	7Q072153	O-RING (PART OF 8)	1REF
13.	7Q072342	O-RING (PART OF 8)	1REF
14.	7Q10P342	BACKUP RING (PART OF 8)	1REF
15.	7T61N143	LOCK RING (PART OF 8)	1REF
16.	7T66P040	PISON SEAL (PART OF 8)	1REF
17.	7T2NX625	WEAR RING (PART OF 8)	2REF
18.	7T2N4040	WEAR RING (PART OF 8)	2REF
19.	72533186	ADPTR #6MFACE #6MSTR	4
20.	70145864	TUBE ASM	2
21.	77041552	PRESS SWITCH (PART OF 23)	1REF
22.	73540052	VALVE-C-BAL (PART OF 23)	1REF
23.	73540057	VALVE-CBAL (INCL. 21,22)	1
24.	72062109	NUT 5/16-18 HEX NYLOC ZINC	2
25.	72063002	WASHER 5/16 FLAT	4
26.	72060037	CAP SCR 5/16-18 X 4.00 HHGR5	2
27.	3B210010A	CYLINDER (INCL. 1-5,8)	1

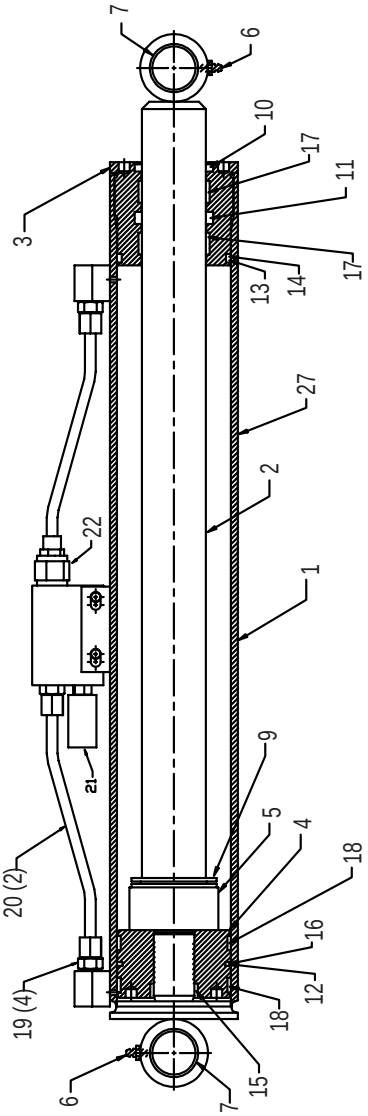
NOTE

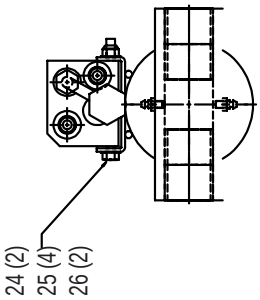
IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

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 THREADS. KEEP AWAY FROM ALL SEALS.





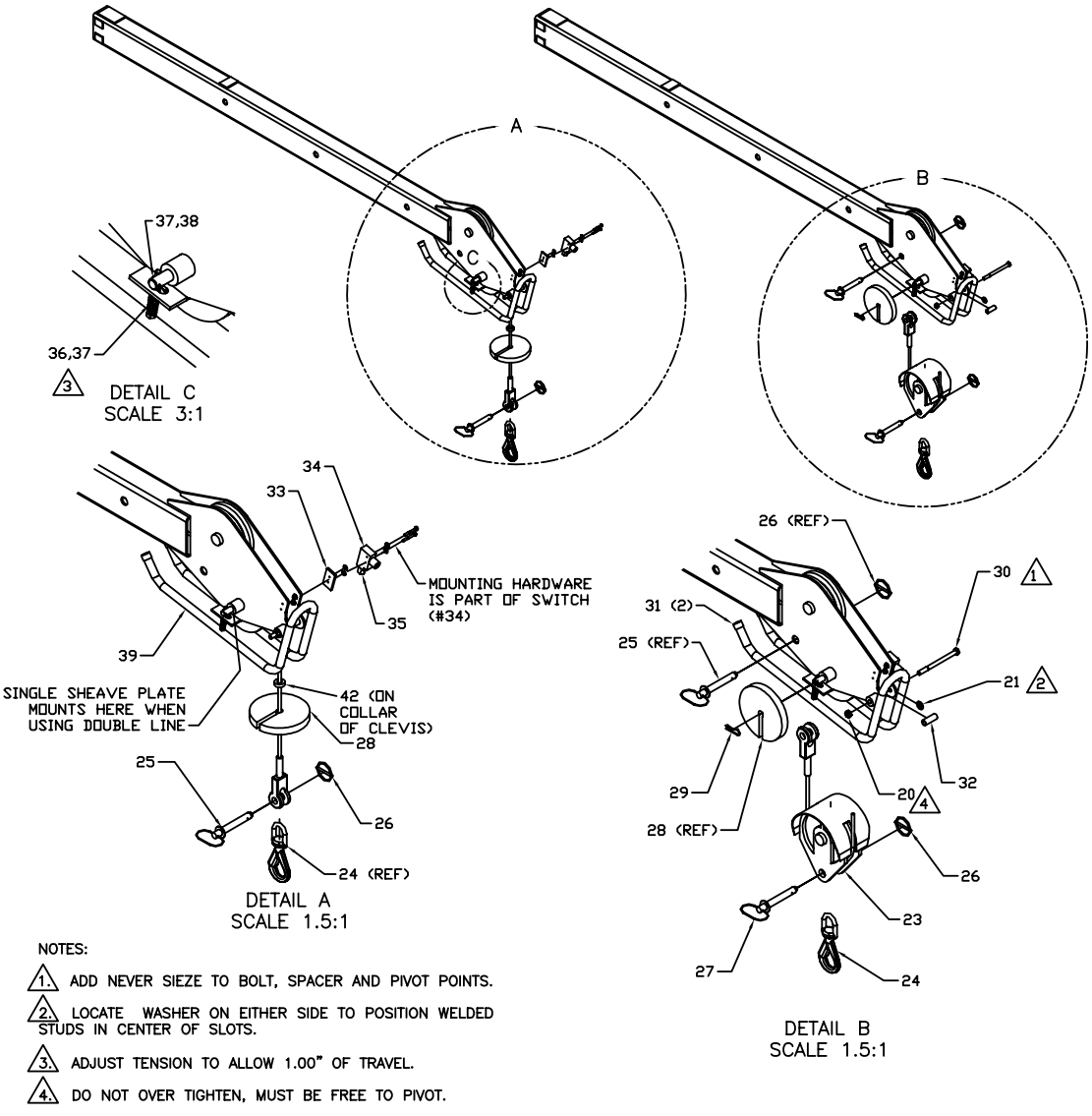


WINCH/CABLE/HOOK KIT (31717067-1)

EFFECTIVE 1/1/2002

1.	51713808	WINCH DRUM	1
2.	71057936	WINCH	1
3.	73051905	MOTOR	1
4.	72060774	CAP SCR 7/16-14X1.25 SH PL	2
5.	72601499	CAP SCR 9/16-12X1.25 HHGR5Z	4
6.	72063054	WASHER 9/16 LOCK	4
7.	70055185	FLANGE BEARING	1
8.	72060596	SCR SCR 1/2-13X.75	1
9.	70580143	CABLE ASM 3/8 6X25	1
10.	72060046	CAP SCR 3/8-16X1.00 HHGR5Z	4
11.	72063051	WASHER 3/8 LOCK	4
12.	72060000	CAP SCR 1/4-20x1/2 HHGR5Z	2
13.	72063049	WASHER 1/4 LOCK	2
14.	72063001	WASHER 1/4 FLAT	2
15.	51713168	CORD REEL ASM	1
16.	70029119	SERIAL NO. PLACARD	1
17.	72066340	POP RIVET 1/8X.375 GRIP	2
18.	60105538	CABLE GUIDE STUD	1
19.	60030108	CABLE GUIDE ROLLER	1
20.	72062080	NUT 1/2-13 HEX NYLOC ZINC	5
21.	72063005	WASHER 1/2 FLAT	5
22.	60105540	CABLE GUIDE SIDE BAR	2
23.	52715836	GUARD WELDMENT	1
24.	71073035	SWIVEL HOOK W/LATCH	1
25.	72661514	LOCK PIN W/HANDLE	1
26.	72661543	QUICK PIN	2
27.	73733171	LOCK PIN 1X6 W/HAIRPIN	1
28.	60122358	PLATE-SINGLE SHEAVE	1
29.	72066145	HAIR PIN 3/16	1
30.	72060104	CAP SCR 1/2-13 X 6.5 HH GR5 Z	1
31.	70396121	CAP-PLASTIC 1.00 X .68 HT	2
32.	60122329	SPACER-1/2 BLK PIPE X 2.0	1
33.	60122311	SPACER	1
34.	77041459	LIMIT SWITCH	1
35.	77044468	CONNECTOR 1/2 STR RLF	1
36.	70146096	SPRING 5/8 X 2.5 X 14GA	2
37.	72063003	WASHER 3/8 FLAT	4
38.	72062103	NUT 3/8-16 HEX NYLOC ZINC	2
39.	52715833	GUARD	1
40.	72053508	ZERK 1/8 NPT	2
41.	70034382	GREASE CAP	2
42.	70149785	COLLAR, LOCK (EFF 11/02)	1

CONTINUED ON NEXT PAGE



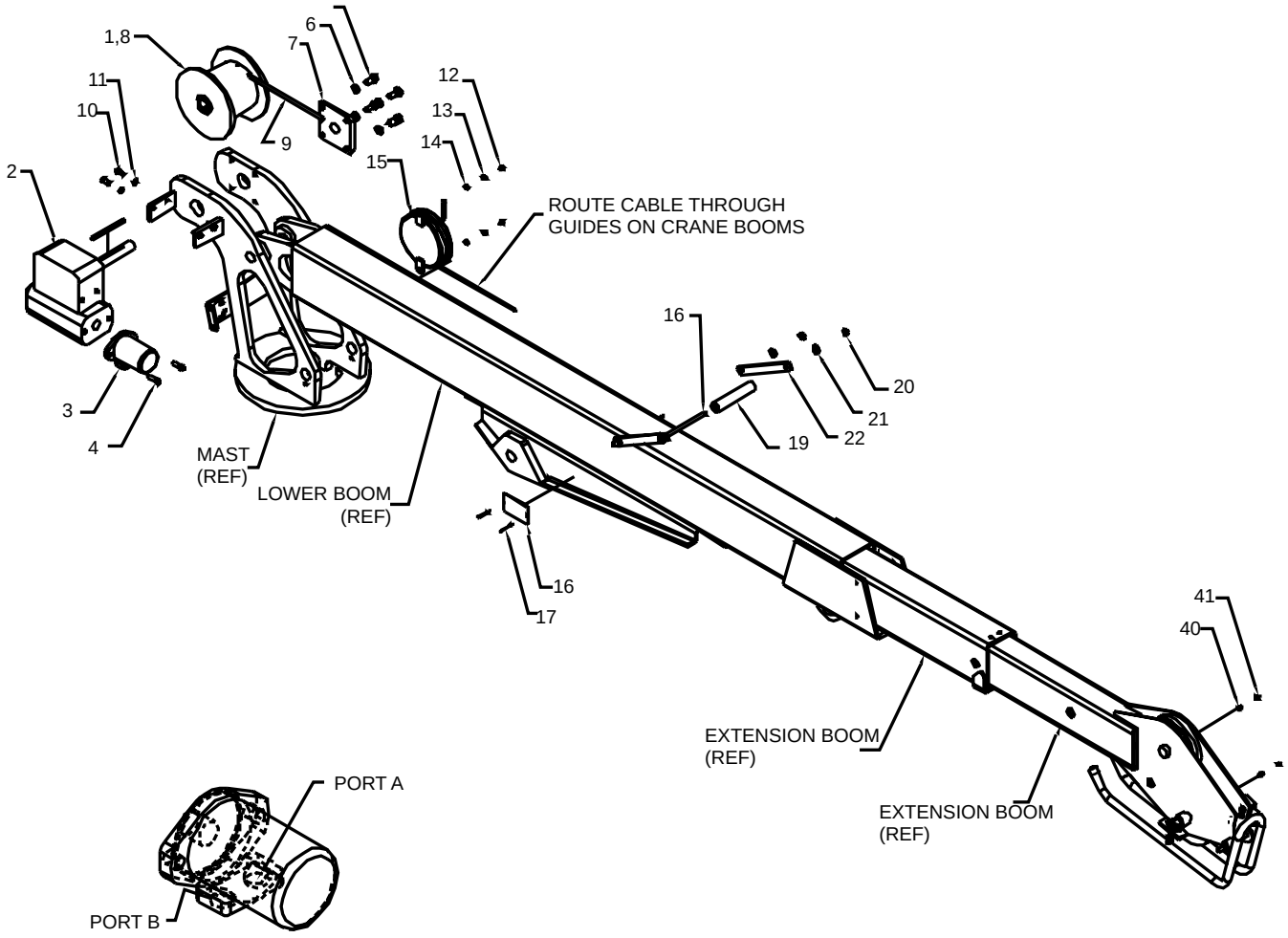
NOTES:

1. ADD NEVER SIEZE TO BOLT, SPACER AND PIVOT POINTS.
2. LOCATE WASHER ON EITHER SIDE TO POSITION WELDED STUDS IN CENTER OF SLOTS.
3. ADJUST TENSION TO ALLOW 1.00" OF TRAVEL.
4. DO NOT OVER TIGHTEN, MUST BE FREE TO PIVOT.

WINCH/CABLE/HOOK KIT (31717067-2)

EFFECTIVE 1/1/2002

PARTS LIST ON PREVIOUS PAGE

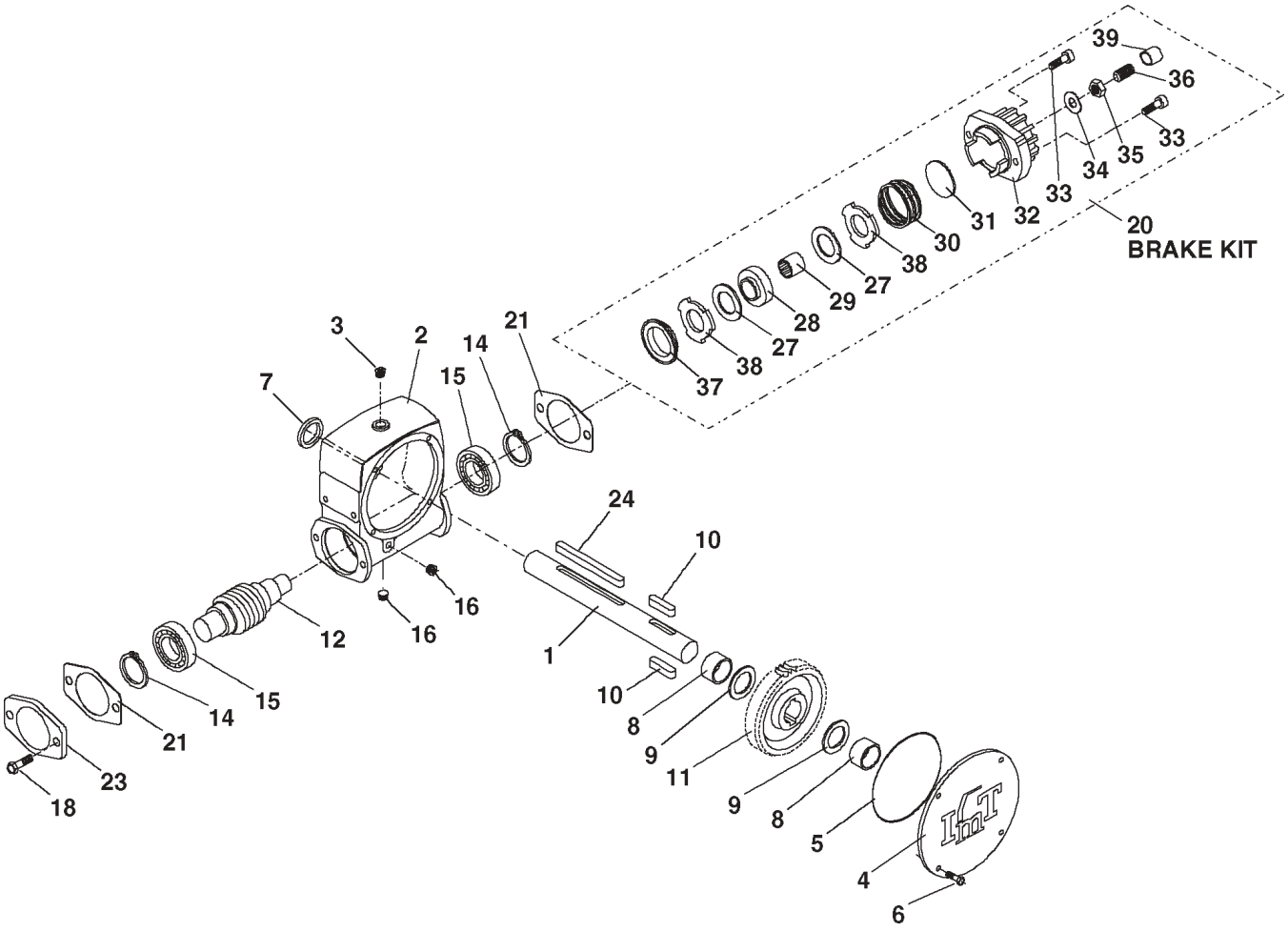


WINCH (71057936)

ITEM	PART NO.	DESCRIPTION	QTY
1.	70143673	SHAFT-OUTPUT	1
2.	70143672	HOUSING	1
3.	70048142	BUSHING & BRTHER KIT 3/8NPT	1
4.	70145277	COVER	1
5.	76393174	O-RING	1
6.	72601568	CAP SCREW	4
7.	76393173	OIL SEAL	1
8.	70143670	BUSHING	2
9.	70143669	WASHER	2
10.	70143668	KEY	2
11.	70056428	GEAR-SR	1
12.	70056427	WORM-SR	1
14.	72661348	RETAINING RING	2
15.	70055202	BALL BEARING	2
16.	70143865	PIPE PLUG	2
18.	72601567	CAP SCREW	2
20.	70732542	BRAKE KIT (INCL:27-38)	1
21.	76393171	GASKET	2
23.	—	PROTECTOR (DISCARD)	1REF
24.	70143658	KEY	1
27.	70143664	*FRICTION DISC	2REF
28.	70143665	*BRAKE HUB	1REF
29.	70143662	*CAM CLUTCH	1REF
30.	70143661	*SPRING	1REF
31.	70143660	*THRUST WASHER	1REF
32.	70143666	*BRAKE HOUSING	1REF
33.	72601565	*CAP SCREW-SOC HD	2REF
34.	76393172	*WASHER-SEAL	1REF
35.	72601722	*LOCKNUT-SEAL	1REF
36.	72601723	*SET SCREW	1REF
37.	70143659	*BRAKE SPACER	1REF
38.	70143663	*STATOR PLATE	2REF
39.	70034440	*CAP-PLASTIC	1REF

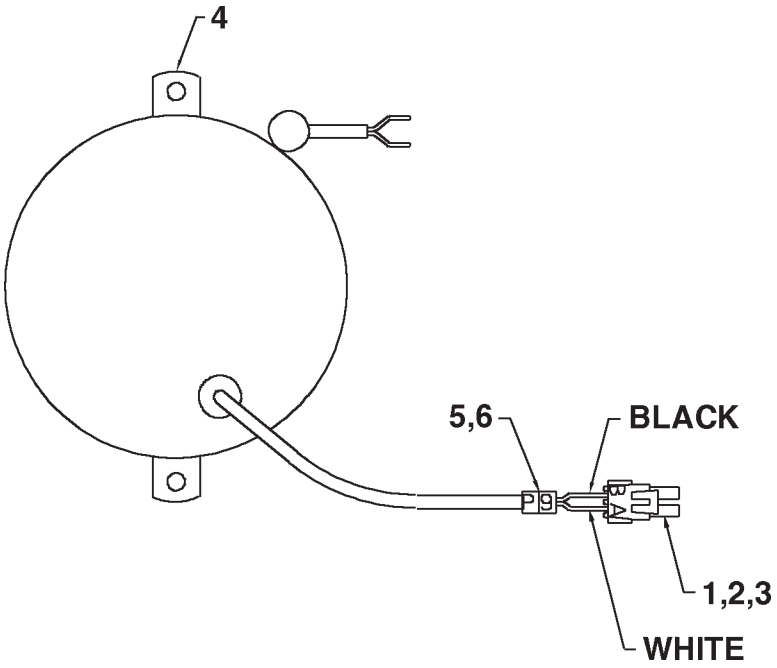
* PART OF ITEM 20.

GEAR RATIO: 38:1
OUTPUT TORQUE: 19800 IN-LBS
MAX INPUT TORQUE: 983 IN-LBS
MAX INPUT SPEED: 400 RPM
INSTALLED WEIGHT: 41 LBS
LUBRICATION: EP 140 (1 US PINT)
ULTIMATE OUTPUT TORQUE: 39600 IN-LBS



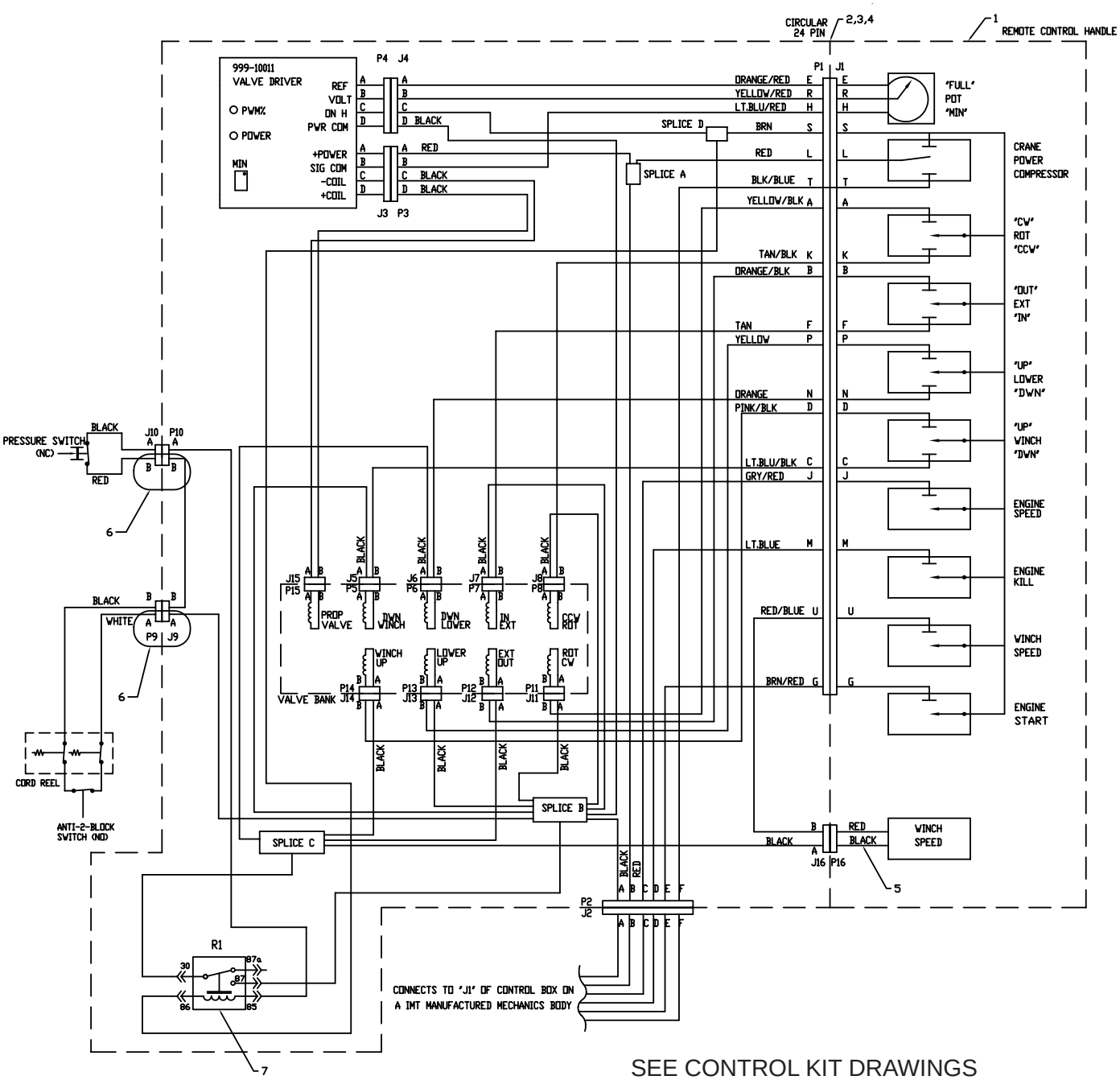
CORD REEL ASM (51713168)

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



ELECTRICAL SCHEMATIC, PROP REMOTE CONTROL (99900855)

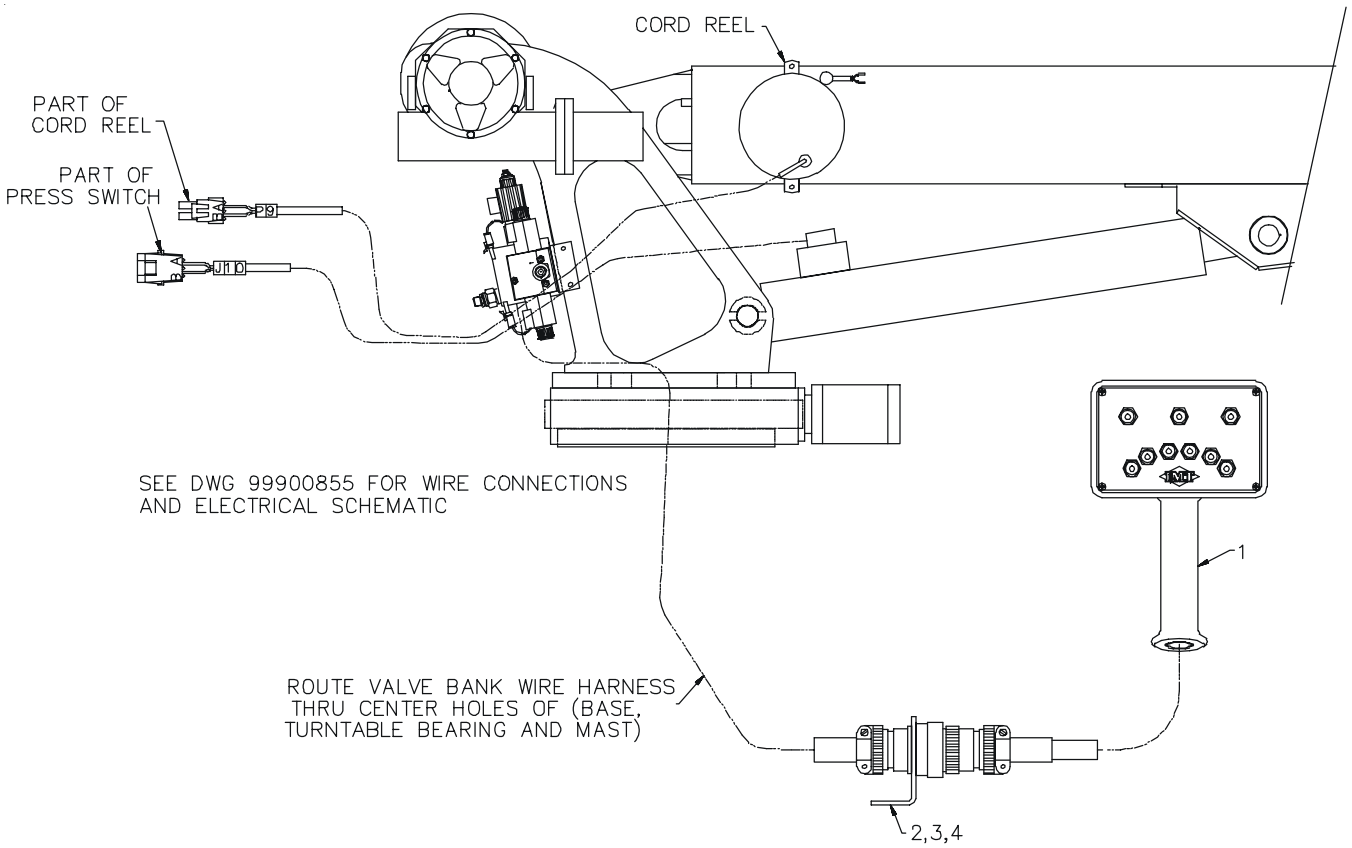
1.	51713182	HANDLE ASM	1
2.	60119299	BRACKET	1
3.	77044645	NUT-DEUTSCH CONNECTOR	1
4.	77044646	LOCK WASHER -DTSCH CONN	1
5.	51713343	CABLE ASM 14GA/2 WIRE	1
6.	70034439	LOCK WIRE LEAD SEAL 8”	2
7.	77041597	HARNESS, DUAL-PRESS.	1



SEE CONTROL KIT DRAWINGS FOR WIRE ROUTINGS.

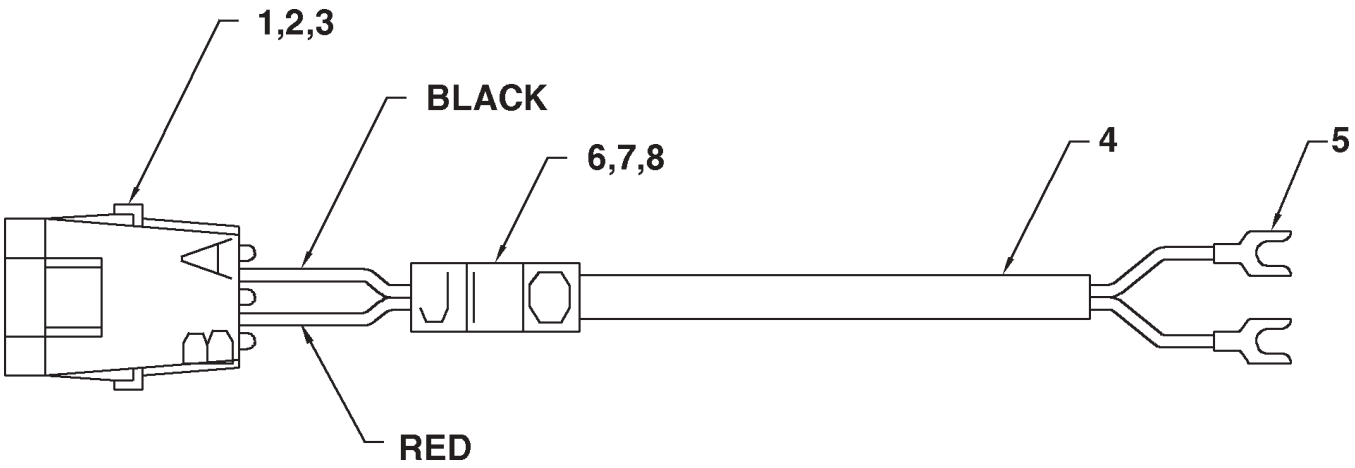
WIRE ROUTING (90714602)PROP'L RMT CTRL

SEE PREVIOUS PAGE FOR PARTS LIST



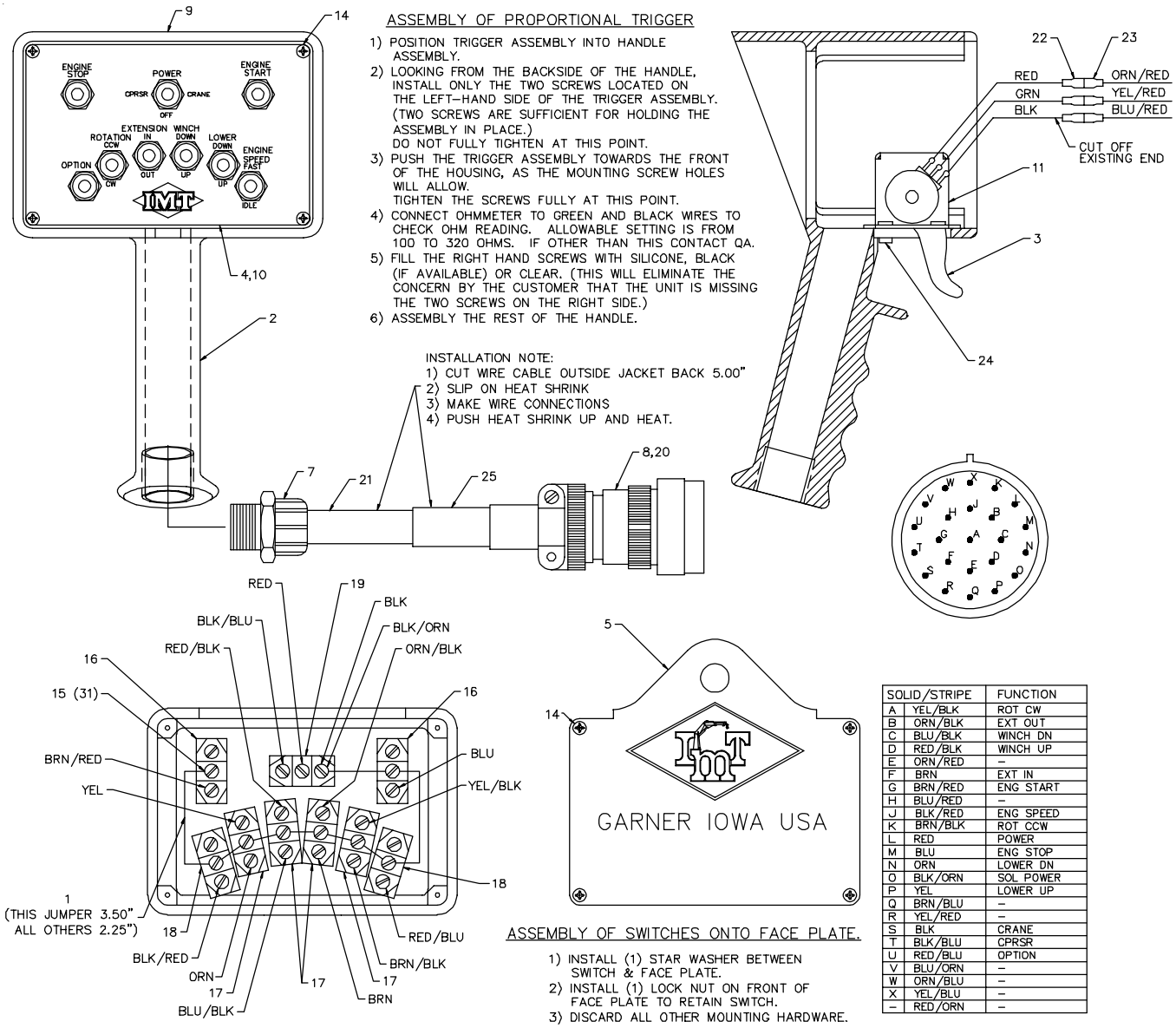
CABLE ASM 14GA 2WIRE X 30" (51713167)

ITEM	PART NO.	DESCRIPTION	QTY
1.	77044573	SHROUD CONNECTOR	1
2.	77044550	TERMINAL PIN	2
3.	70394069	CABLE SEAL	2
4.	89044188	CABLE	1
5.	77040051	TERMINAL-SPRSPADE	2
6.	77041492	WIRE MARKER PA2-J-YEL	1
7.	77041490	WIRE MARKER PA2-1-YEL	1
8.	77041489	WIRE MARKER PA2-0-YEL	1



PROP'L RMT HANDLE ASM (51713182)

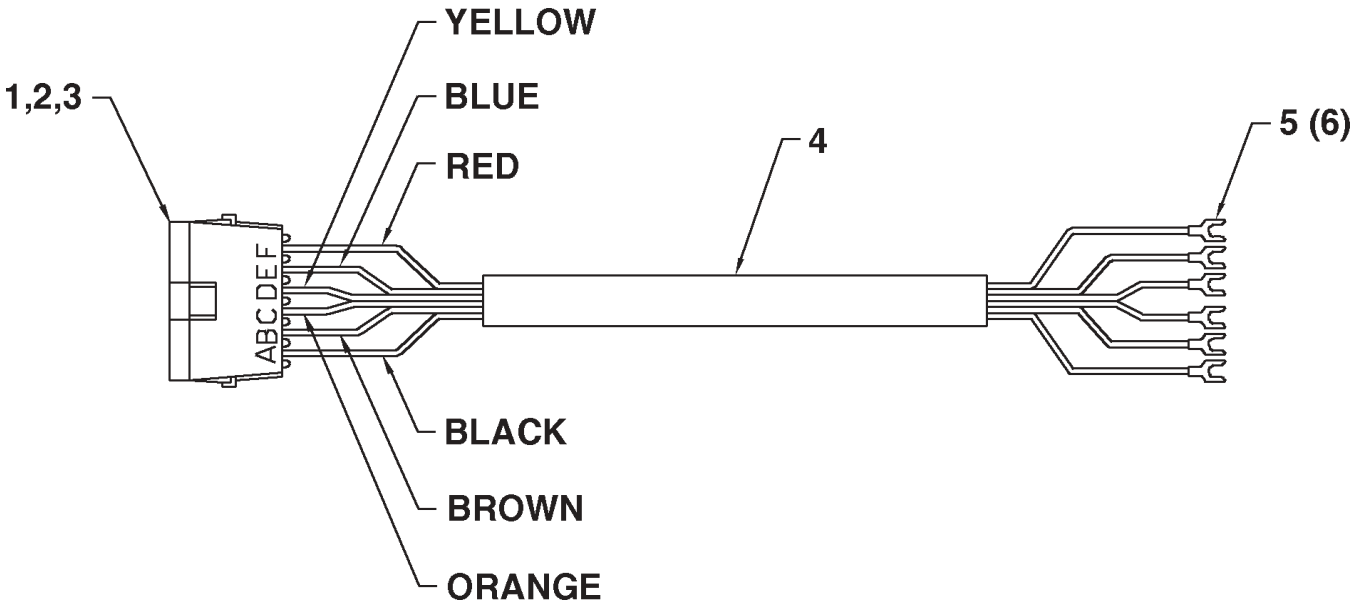
1.	89044214	WIRE 18GA GRN	1.61FT
2.	60119335	CONTROL HANDLE	1
3.	60111141	TRIGGER (PART OF 11)	1REF
4.	60119277	COVER	1
5.	70034306	BACK COVER	1
7.	77044196	STRAIN RELIEF 3/4	1
8.	77044621	PIN	23
9.	70394447	DECAL-DGR RC ELECTRO SM	1
10.	70394142	DECAL-CTRL	1
11.	70394183	TRIGGER ASM (INCL:3)	1
14.	72061009	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



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	–

CABLE ASM 14GA 6WIRE X 35' (51713199)

ITEM	PART NO.	DESCRIPTION	QTY
1.	77044575	SHROUD CONNECTOR	1
2.	77044576	TERMINAL	6
3.	77044578	CABLE SEAL	6
4.	89044354	CABLE	1
5.	77040051	TERMINAL-SPRSPADE	6

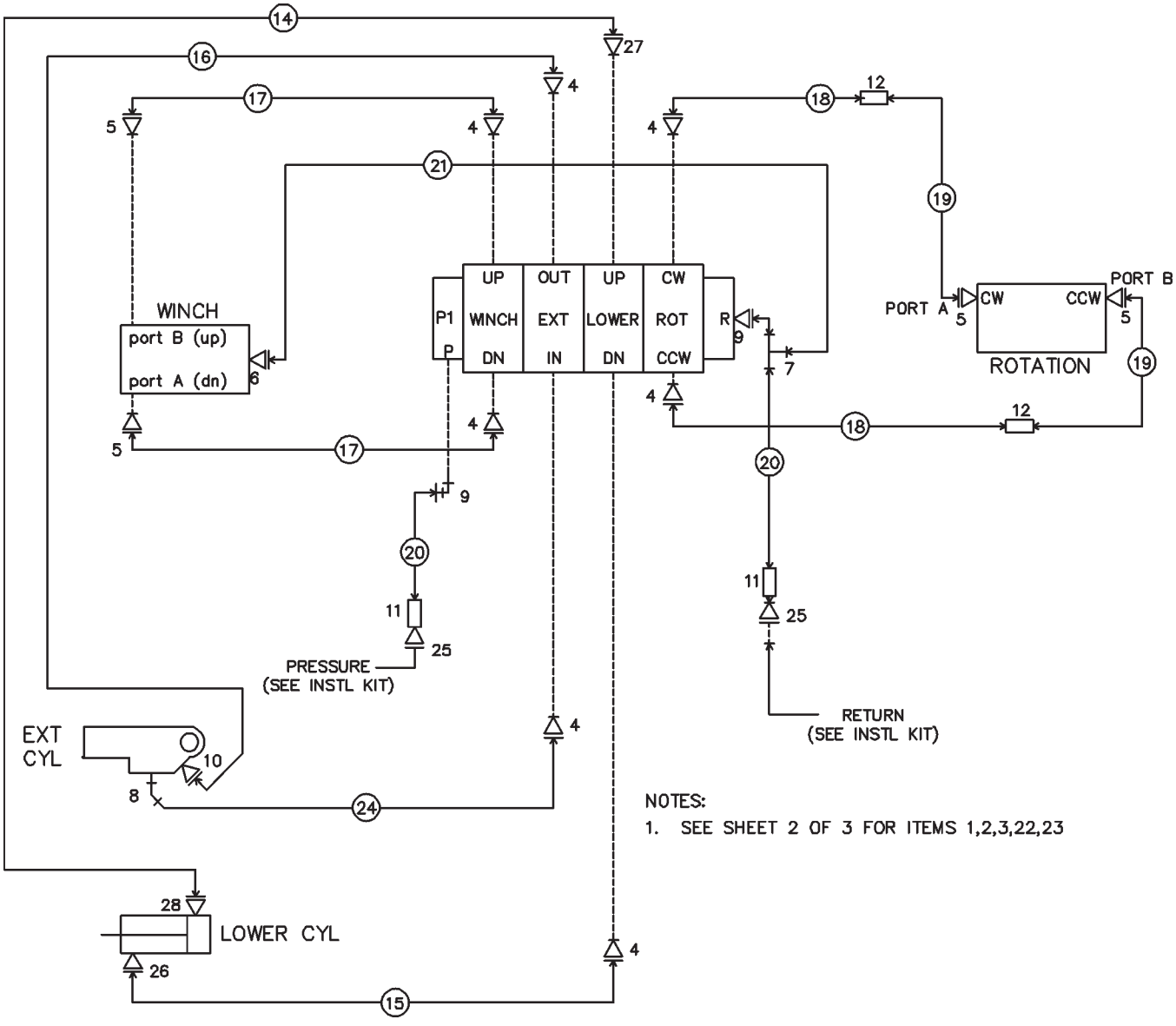


HYD KIT (91715637-1)

1.	72060005	CAP SCR 1/4-20X1-1/4 HHGR5	4
2.	72062104	NUT 1/4-20 LOCK	4
3.	73734494	VALVEBANK (INCL:4,9,27,28) (WAS 73733395)	1
4.	72533425	ADAPTER #4MFACE #8MSTR	7REF
5.	72533296	ADAPTER #6MFACE #10MSTR	4REF
6.	72533376	ADAPTER #4MFACE #4MSTR	1REF
7.	72533413	TEE #8 SWVLNUTRUN	1REF
8.	72533417	ELBOW #8MSTR #6MFACE 45°	1REF
9.	72533162	ELBOW #8MSTR #8MFACE 90°	2REF
10.	72533533	ADAPTER #4MFACE #8MSTR	1REF
11.	72533538	SWIVEL #8#8 FACE	2REF
12.	72533540	SWIVEL #4#4 FACE	2REF
13.	51714927	HOSE/ADAPTER KIT (INCL:5-8,10,14,14-21,24,25)	1

CONTINUED ON FOLLOWING PAGE

14.	51395181	HOSE BBX .50X37.5 #8#8	1REF
15.	51394701	HOSE BBX .25X33.5 #4#4	1REF
16.	51394702	HOSE BBX.25X43 #4#4	1REF
17.	51394703	HOSE YX .25X18.5 #4#6	2REF
18.	51394705	HOSE BBX .25X31 #4#4	2REF
19.	51395147	HOSE BBX .25X19.5 #4#6	2REF
20.	51394707	HOSE BBX .50X24 #8#8	2REF
21.	51394710	HOSE WX .25X15 #8#4	1REF
22.	60350073	SLEEVE	1
23.	70394558	TIE 8"	1
24.	51394718	HOSE BBX .25X43 #6#4	1REF
25.	72533612	ADAPTER #8FFACE #8MJIC	2REF
26.	72533337	ADAPTER #4MFACE #6MSTR	1REF
27.	72533166	ADAPTER #8MFACE #8MSTR	1REF
28.	72533423	ADAPTER #8MFACE #6MSTR	1REF



NOTES:

1. SEE SHEET 2 OF 3 FOR ITEMS 1,2,3,22,23

HYD KIT (91715637-2)

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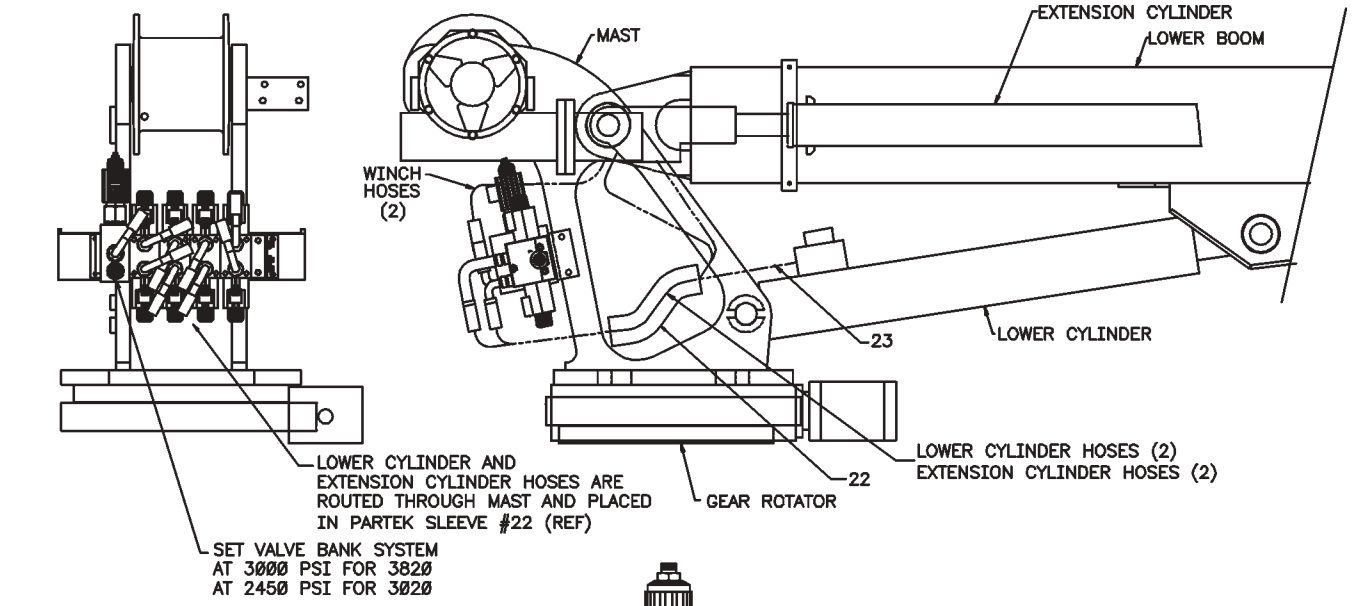
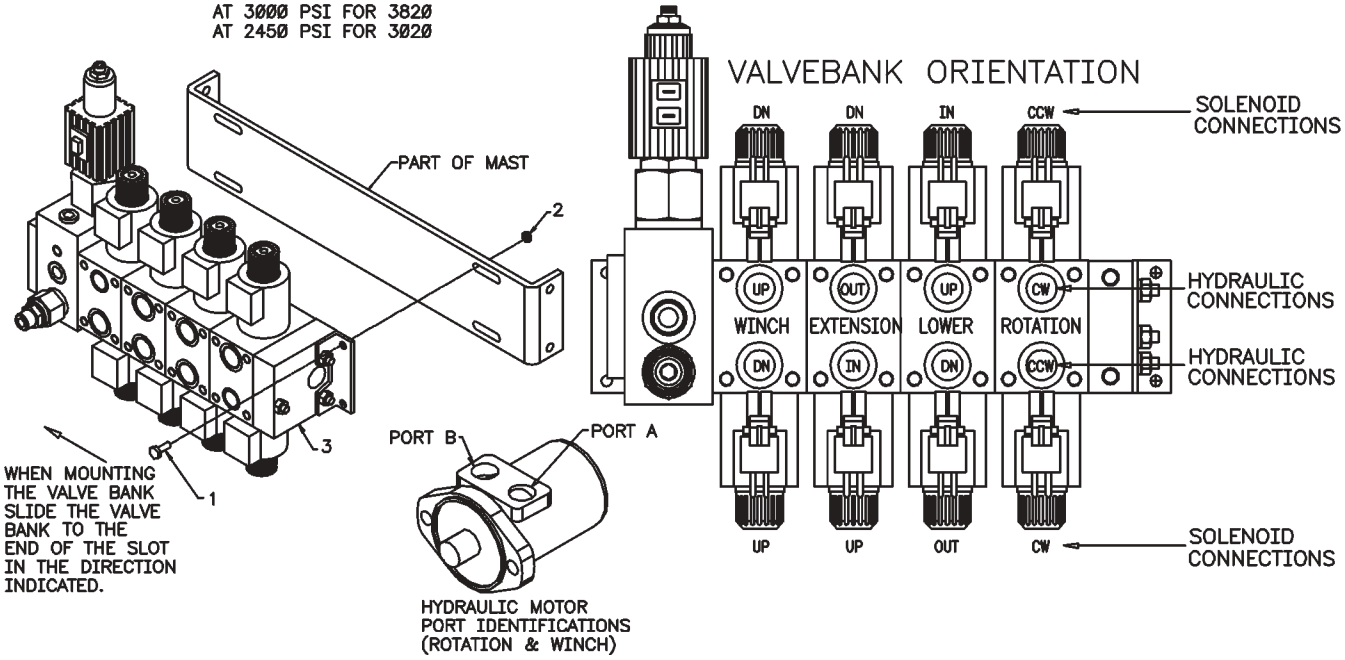
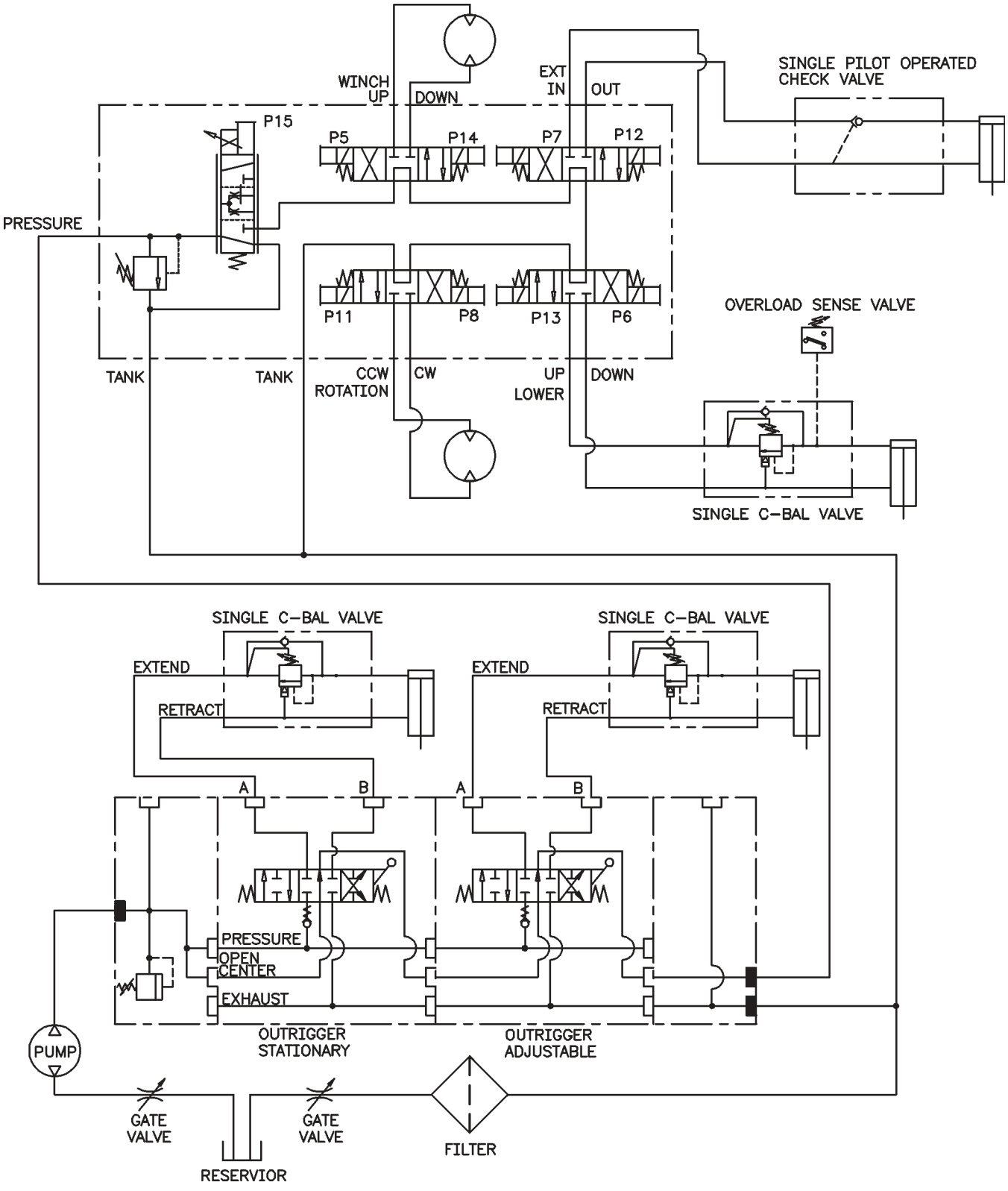


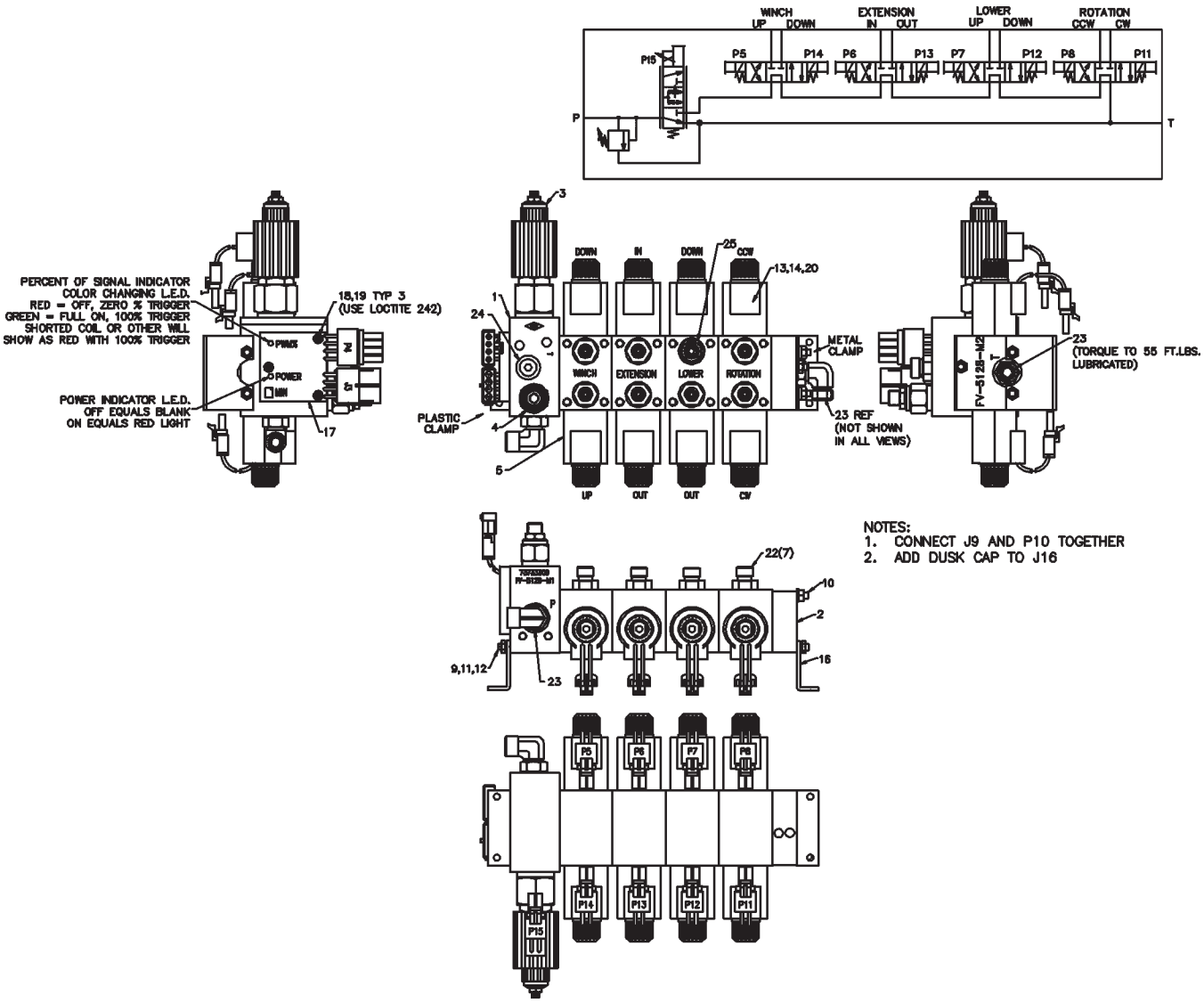


HYD KIT (91715637-3)



VALVEBANK (73733395)

1.	73540028	INLET BLOCK	1
2.	73540027	END CAP	1
3.	73054934	FLOW CTRL VALVE	1
	77041556	PROPL VALVE-COIL ONLY	REF
4.	73054935	RELIEF VALVE	1
5.	91722649	VALVE SECT (WAS 73540044)	4
	or 91722723		
	91722709	COIL KIT-SOLENOID (WAS 77041518)	REF
6.	7Q072013	O-RING	10
7.	72533477	PLUG 7/16STR HOLHEX	1
8.	70145829	EXPANDER PLUG	4
9.	60119363	THRD'D ROD 1/4-20X12-1/2	2
10.	60119364	THRD'D ROD 1/4-20X10-9/16	1
11.	72062000	NUT 1/4-20 HEX	5
12.	72063047	WASHER #10 LOCK	5
13.	77044574	CONNECTOR 2-WAY	9
14.	77044550	TERMINAL-F	18
15.	70394069	CABLE SEAL	2
16.	70145830	MTG BRKT	2
17.	77044595	VALVE DRIVER	1
18.	72601704	MACH SCR #6-32X3/4 RDHD	3
19.	72061705	WASHER #6 WRT	3
20.	77044594	CABLE SEAL	16
21.	70733394	CABLE ASM	1
22.	72533425	ADAPTER #4MFACE #8MSTR	7
23.	72533162	ELBOW #8MSTR #8MFACE 90°	2
24.	72533603	PLUG 9/16STR HOLHEX	1
25.	72533166	ADAPTER #8MFACE #8MSTR	1



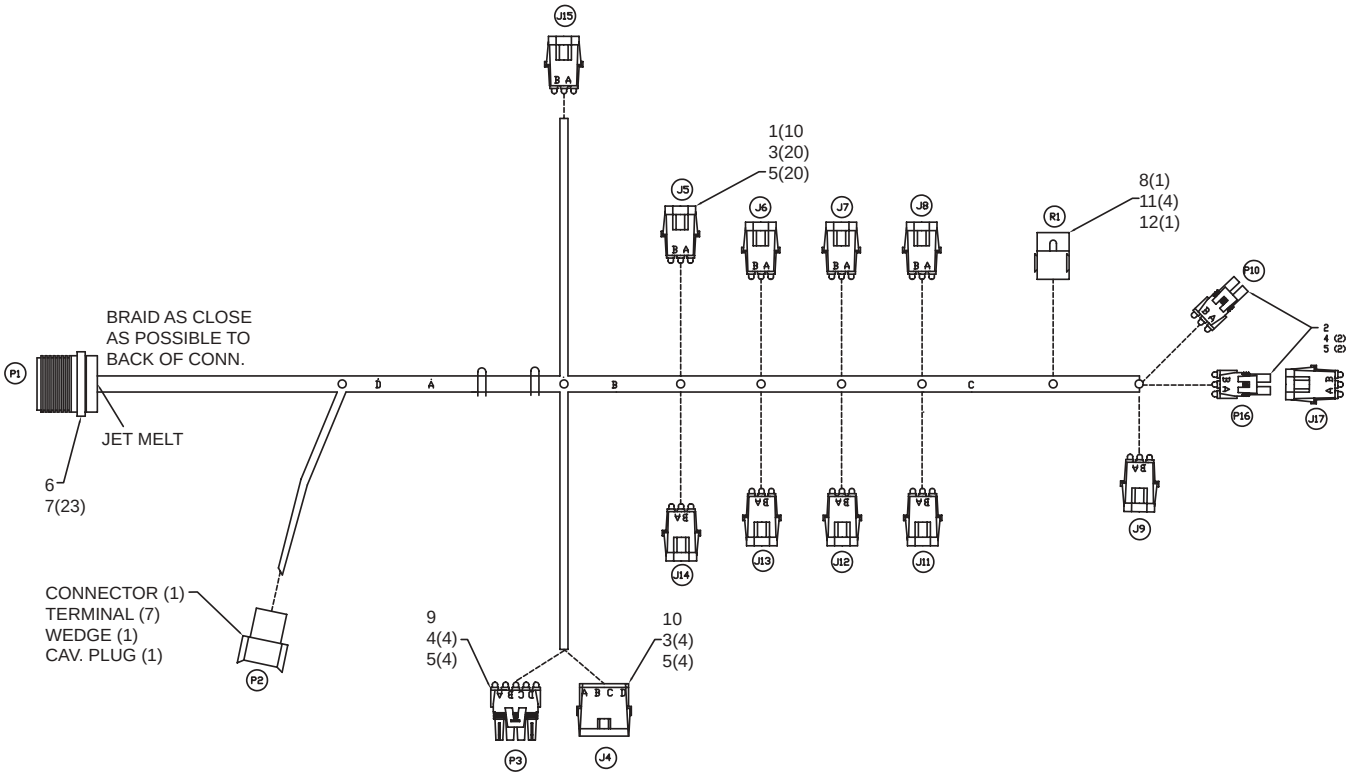
VALVEBANK PARTS (73734494)

73054934	FLOW CONTROL VALVE	1
77041556	FLOW CONTROL VALVE, COIL ONLY	REF
73054935	RELIEF VALVE	1
73540375	SOLENOID VALVE SECTION	4
90744198	COIL KIT, SOLENOID VALVE	REF

CABLE ASM (70733394-1)

CONTINUED ON NEXT PAGE

1.	77044573	SHROUD CONN 2-CONT	10REF
2.	77044574	TOWER CONN 2-CONT	2REF
3.	77044576	TERMINAL-MALE 20-18GA	24REF
4.	77044577	TERMINAL-FEMALE 20-18GA	8REF
5.	77044578	CABLE SEAL GRN 20-18GA	32REF
6.	77044620	CONN RCPT	1REF
7.	77044580	SOCKETS	23REF
8.		SOCKET, RELAY	1REF
9.	77044623	TOWER CONN	1REF
10.	77044624	SHROUD, CONN	1REF
11.		TERMINAL	4REF



CABLE ASM (70733394-2)

LOCATOR CODE: P1 | DEUTSCH: HD34-24-23SN059
TERM: 0462-201-16141 | **SEAL:** - | CAVITY PLUG: 114017

CAVITY	COLOR	GA.	PRINT LABEL	TO	CON-SPLC	CAVITY
A	WHT	18	ROT 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	ROT 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 O 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 ON 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 | DEUTSCH: DT04-8PA
TERM: 1062-16-0122 | **SEAL:** W8P | CAVITY PLUG: 114017

CAVITY	COLOR	GA.	PRINT LABEL	TO	CON-SPLC	CAVITY
1	WHT	16	P1 O 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 | PACKARD: 12015797
TERM: 12089188 | **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 | PACKARD: 12010974
TERM: 12089040 | **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 ON H	TO	SPL D	-
D	WHT	16	J4D PWR COM	TO	SPL B	-

LOCATOR CODE: J5 | PACKARD: 12010973
TERM: 12089040 | **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 | PACKARD: 12010973
TERM: 12089040 | **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 | PACKARD: 12010973
TERM: 12089040 | **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 | PACKARD: 12010973
TERM: 12089040 | **SEAL:** 12015323

CAVITY	COLOR	GA.	PRINT LABEL	TO	CON-SPLC	CAVITY
A	WHT	16	ROT J8A	TO	SPL B	-
B	WHT	18	ROT J8B	TO	P1	K

LOCATOR CODE: J9 | PACKARD: 12010973
TERM: 12089040 | **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 | PACKARD: 12015792
TERM: 12089188 | **SEAL:** 12015323

CAVITY	COLOR	GA.	PRINT LABEL	TO	CON-SPLC	CAVITY
A	WHT	16	OPSI P10A	TO	R1	85
B	WHT	16	P10B & J9B	TO	J9	B

LOCATOR CODE: J11 | PACKARD: 12010973
TERM: 12089040 | **SEAL:** 12015323

CAVITY	COLOR	GA.	PRINT LABEL	TO	CON-SPLC	CAVITY
A	WHT	16	ROT J11A	TO	SPL B	-
B	WHT	18	ROT J11B	TO	P1	A

LOCATOR CODE: J12 | PACKARD: 12010973
TERM: 12089040 | **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 | PACKARD: 12010973
TERM: 12089040 | **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 | PACKARD: 12010973
TERM: 12089040 | **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 | PACKARD: 12010973
TERM: 12089040 | **SEAL:** 12015323

CAVITY	COLOR	GA.	PRINT LABEL	TO	CON-SPLC	CAVITY
A	WHT	16	PRPVLV (-)	TO	P3	C
B	WHT	16	PRPLVL (+)	TO	P3	D

LOCATOR CODE: P16 | PACKARD: 12015792
TERM: 12089188 | **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 | PACKARD: 12010973
TERM: - | **PLUG:** 12010300

CAVITY	COLOR	GA.	PRINT LABEL	TO	CON-SPLC	CAVITY
A	-	-	-	TO	P16	-
B	-	-	-	TO	P16	-

LOCATOR CODE: - | SPLICE A

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: - | SPLICE B

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	ROT J11A	TO	J11	A
-	WHT	16	LOWER J12A	TO	J12	A
-	WHT	16	EXT J6A	TO	J6	A
-	WHT	16	ROT J8A	TO	J8	A
-	WHT	16	ATB J9A	TO	J9	A

LOCATOR CODE: - | SPLICE C

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: - | SPLICE D

CAVITY	COLOR	GA.	PRINT LABEL	TO	CON-SPLC	CAVITY
-	WHT	18	P1S ON H	TO	P1	S
-	WHT	16	RELAY PWR (+)	TO	R1	86
-	WHT	18	J4C ON H	TO	J4	C

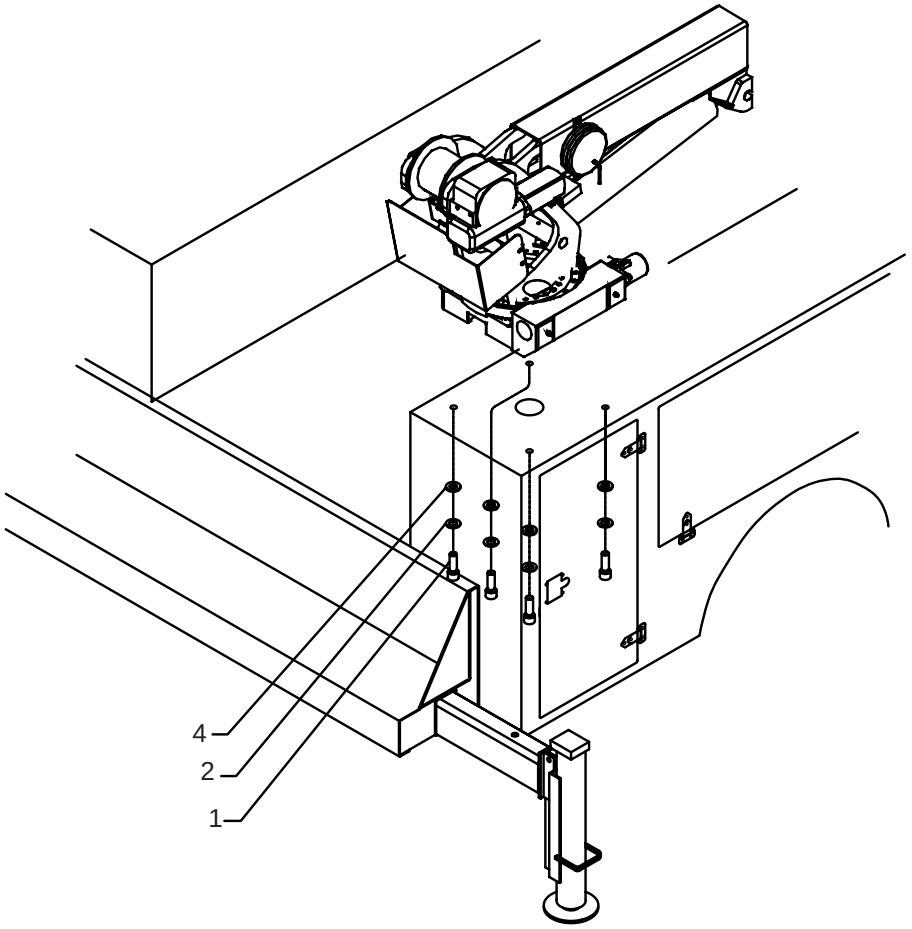
LOCATOR CODE: R1 | RELAY SOCKET: PACKARD 12065685, 12052834
TERM: 12066614 | RELAY: HELLA 87411 (SEALED)

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	OPSI P10A	TO	P10	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

INSTALLATION KIT (93715267)

1.	72601748	CAP SCR 1-8X3 SHGR8	4
2.	72063066	WASHER 1 FLAT	4
3.	73052091	RETURN FILTER 10MIC	1
	73052006	FILTER ELEMENT 10MIC	REF
4.	60123848	WASHER, SPECIAL 1X2X1/4	4



TORQUE ITEM #1 TO 680 FOOT POUNDS

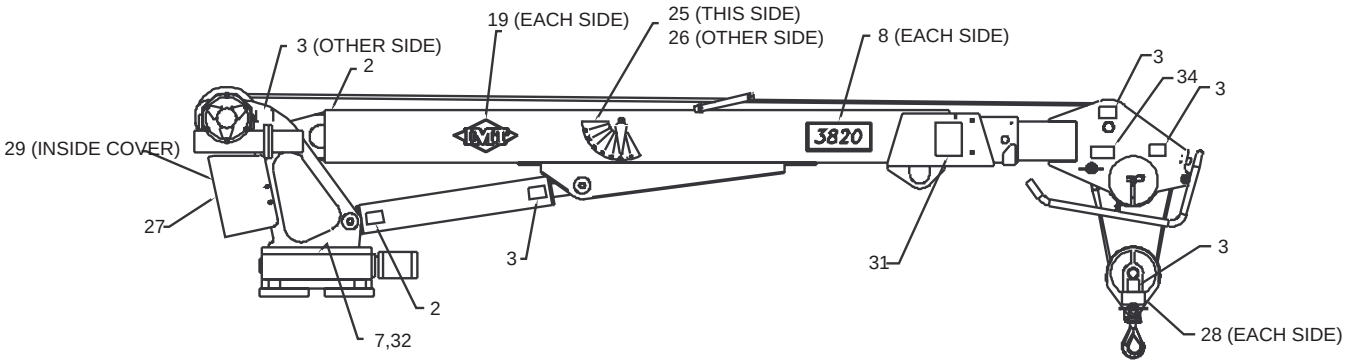
NOTES:

1: THE 3.00" BOLTS THAT ARE 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 THE 3.00" SUPPLIED ARE REQUIRED, THEY MUST BE 1.00-8 GRADE 8 AND BE OF 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 INSURE A MINIMUM OF 1.50" THREAD ENGAGEMENT.

DECAL KIT (95717150)

1.	70391598	DECAL-WARNING OUTRIGGER	2
2.	70391612	DECAL-GREASE WKLY LH	2
3.	70391613	DECAL-GREASE WKLY RH	5
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.	70394965	DECAL-3020 IDENTIFICATION	2
9.	70394444	DECAL-DANGER ELECTRO	1
10.	70392814	DECAL-DANGER OP 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 STAND CLEAR	2
15.	70394445	DECAL-DANGER ELEC HZD LG	4
16.	70392866	DECAL-DGR OPER COND	1
17.	70392867	DECAL-DANGER OR MOVING	1
18.	70392868	DECAL-DANGER LOADLINE	4
19.	70392887	DECAL-IMT DIAMOND	2
20.	70392888	DECAL-DANGER OP RESTRICT	1
21.	70394446	DECAL-DANGER RC ELECT LG	1
22.	70392891	DECAL-DANGER DRIVELINE	1
23.	70392982	DECAL-SERVICE&REPAIR	1
24.	71039134	DECAL-CAUTION OIL LEVEL	1
25.	71391522	DECAL-ANGLE INDICATOR RH	1
26.	71391523	DECAL-ANGLE INDICATOR LH	1
27.	70396251	CAPACITY PLACARD	2
28.	71394081	DECAL-LOAD BLK RTG 3.0 TONS	2
29.	70394166	DECAL-INSTR MNL OP	1
30.	70394189	DECAL-OIL FILL REC	1
31.	70394443	DECAL-DGR FALLING BOOM	1
32.	70392399	DECAL-LUBE WORM	1
33.	70395670	DECAL-CAUT. DOWNHAUL WT	1

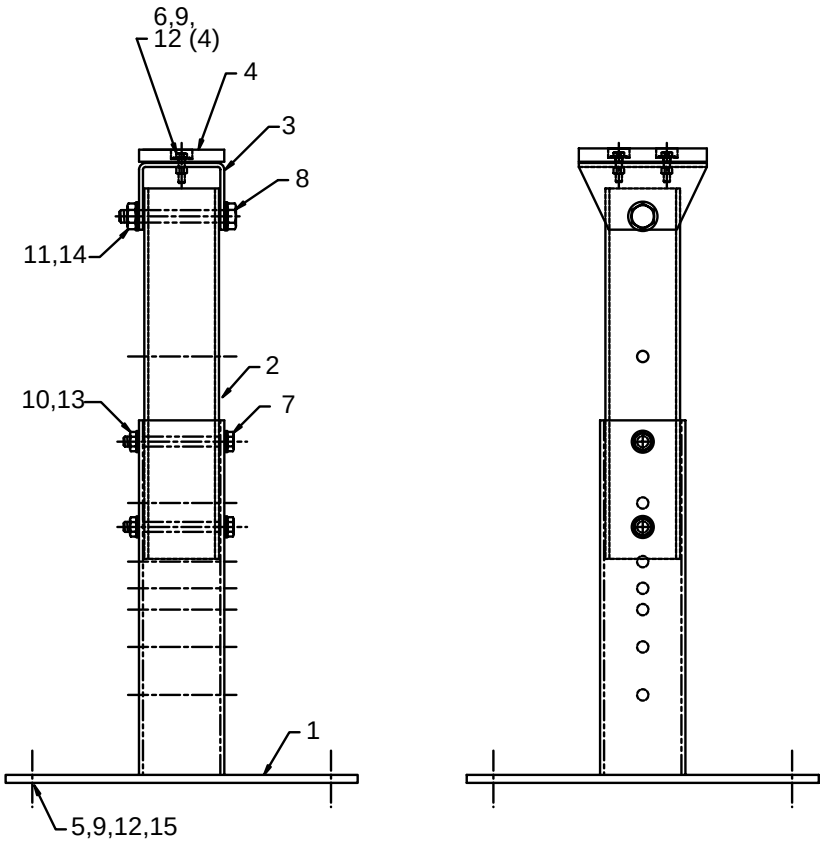
EFFECTIVE 1/1/02



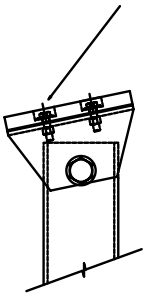
DECAL PLACEMENT	
ITEM NO.	LOCATION
6,9,10,11,12, 13,16,17,20, 21,23,24,27	AT OR NEAR RMT CTRL STORAGE POINT.
1,14	ONE ON EACH OUTRIGGER.
15,18	ONE ON EACH SIDE OF CARRIER VEHICLE.
5	ON RESERVOIR AT RETURN LINE.
4	ON RESERVOIR AT SUCTION LINE.
30	AT OR NEAR THE HYDRAULIC RESERVOIR.
22	AT OR NEAR THE DRIVELINE.

BOOM SUPPORT ASM-3816/DOM1 (51714181)

ITEM	PART NO.	DESCRIPTION	QTY
1.	52708159	PEDESTAL	1
2.	60121853	TUBE	1
3.	60120516	SADDLE	1
4.	60030306	WEAR PAD	1
5.	72060048	CAP SCR 3/8-16X1-1/2 HHGR5	4
6.	72060049	CAP SCR 3/8-16X1-3/4 HHGR5	2
7.	72060101	CAP SCR 1/2-13X5 HHGR5	2
8.	72601671	CAP SCR 3/4-10X5-1/2 HHGR5	1
9.	72062103	NUT 3/8-16 LOCK	6
10.	72062080	NUT 1/2-13 LOCK	2
11.	72062114	NUT 3/4-10 LOCK	1
12.	72063003	WASHER 3/8 WRT	12
13.	72063005	WASHER 1/2 WRT	4
14.	72063008	WASHER 3/4 WRT	2
15.	76392821	WASHER-BONDED PLTD	4
16.	51716384	HARDWARE KIT (INCL. 5-15)	1

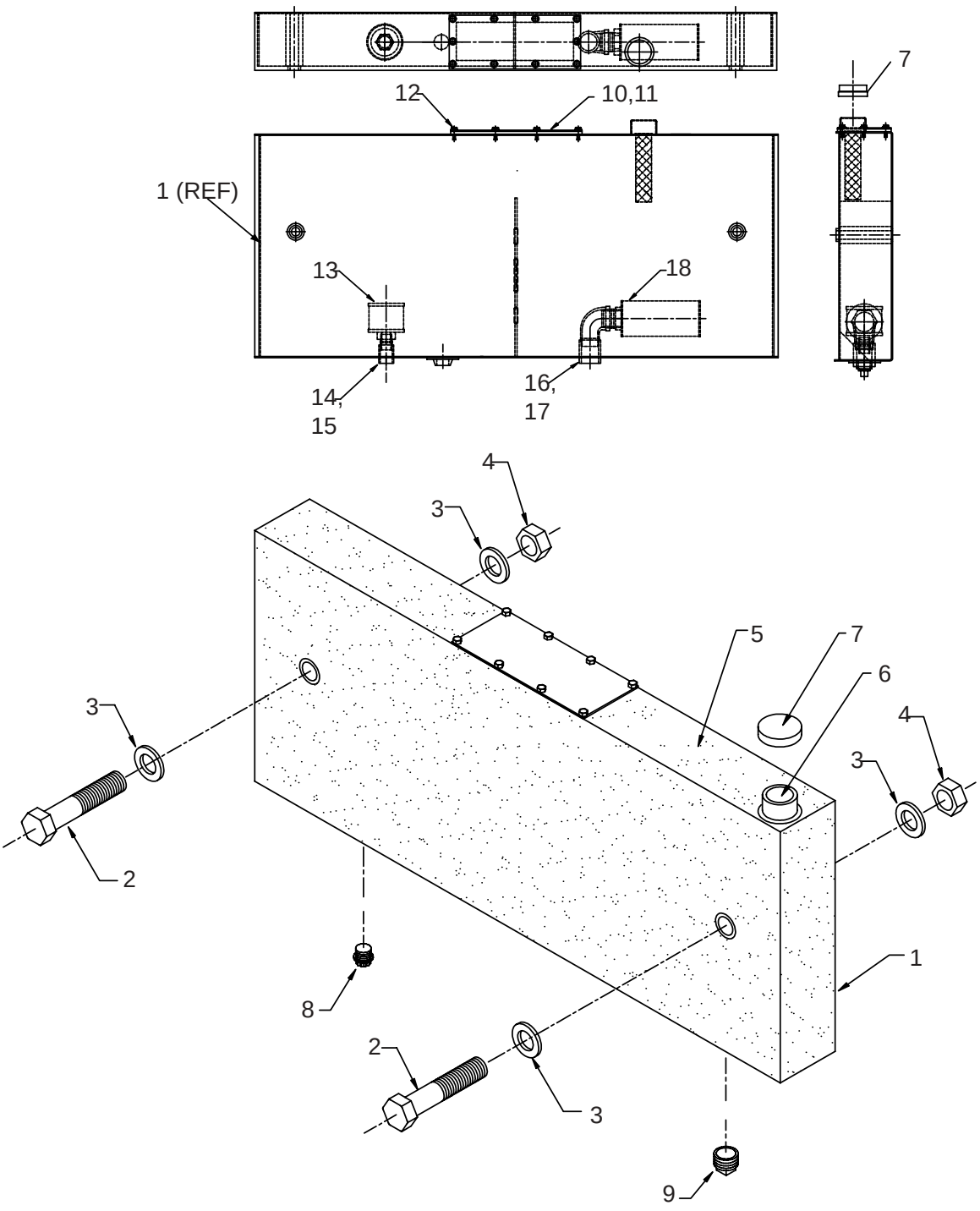


THE 1-3/4" CAPSCREW SHALL SERVE AS A STOP FOR THE SADDLE WHILE ROTATING SIDE TO SIDE.



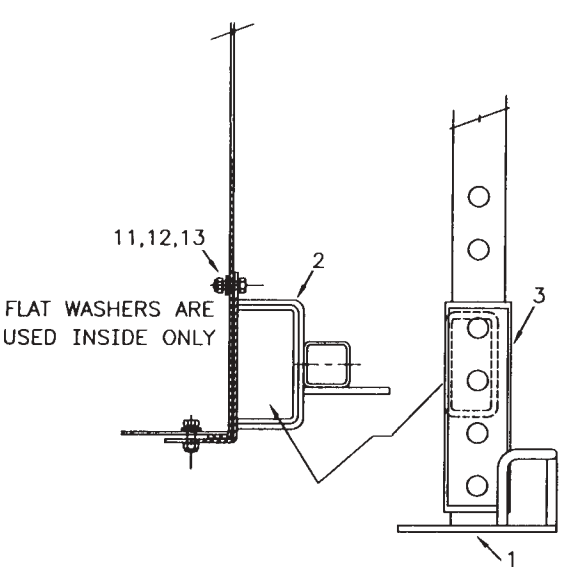
OPTION-RESERVOIR 18 GAL-BULKHEAD (51707798)

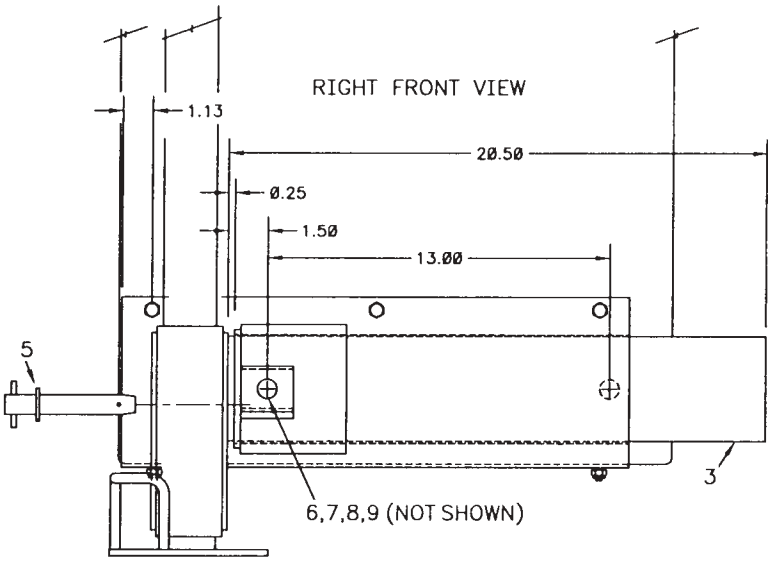
1.	52711432	RESERVOIR WELDMENT	1
2.	72060104	CAP SCR 1/2-13X6-1/2 HHGR5	2
3.	72063005	WASHER 1/2 WRT	8
4.	72062080	NUT 1/2-13 LOCK	2
5.	70394189	DECAL-OIL RECOMMENDED	1
6.	70142482	FILL NECK STRAINER	1
7.	70142483	FILL CAP	1
8.	70393233	PLUG 3/4NPT	1
9.	72601004	PLUG 1-1/4NPT SQHD	1
10.	60119158	COVER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



OUTRIGGER KIT-RH FRONT PULLOUT (51714110)

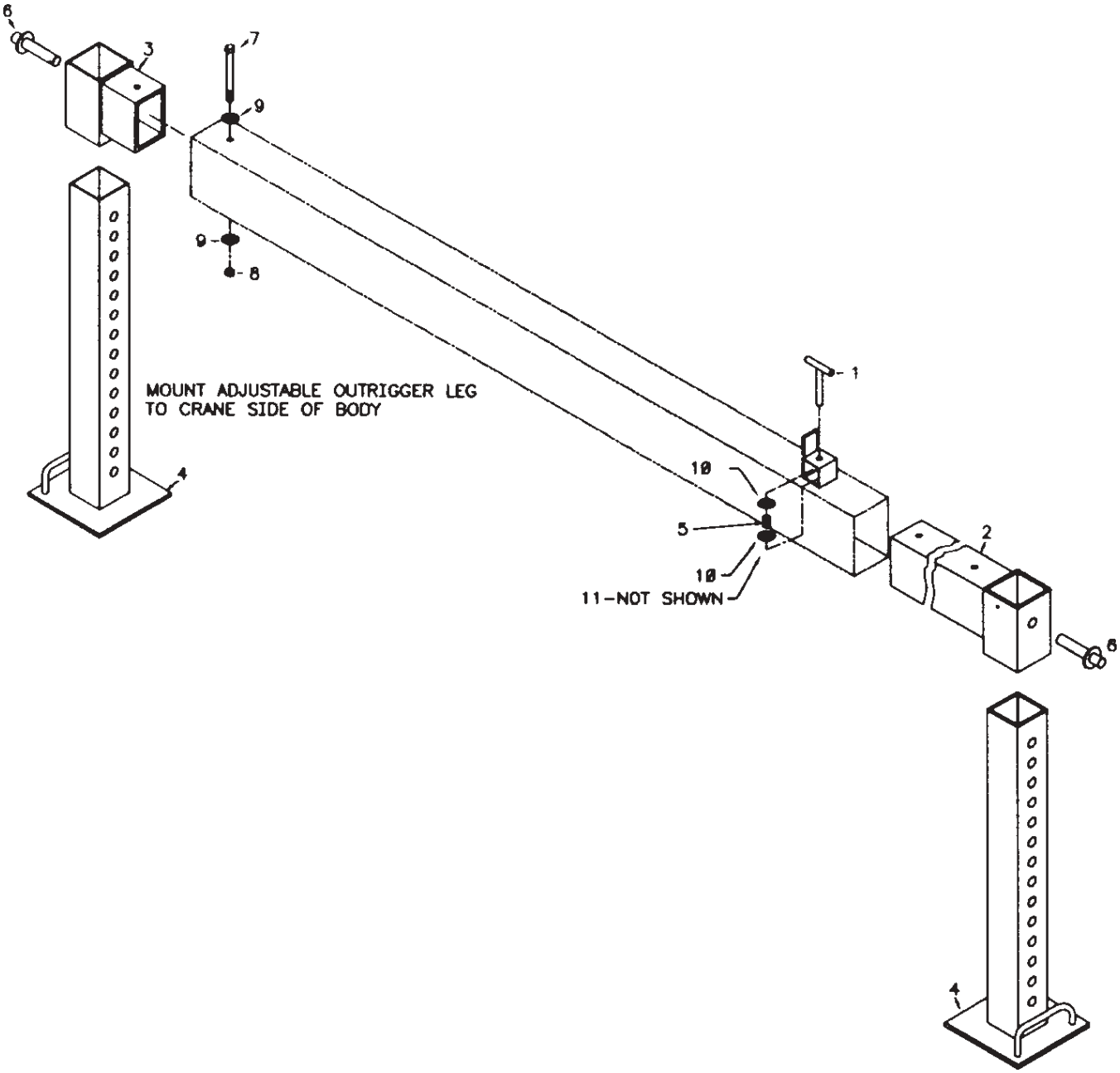
ITEM	PART NO.	DESCRIPTION	QTY
1.	52714182	LEG	1
2.	52714135	HOUSING	1
3.	52714136	ARM	1
5.	71731372	PIN 3/4X3 QUICK RELEASE	1
6.	52070138	T-PIN	1
7.	60010351	SPRING	1
8.	72066185	COTTER PIN .16X1	1
9.	72063027	WASHER 5/8 WRT	2
11.	72060046	CAP SCR 3/8-16X1 HHGR5	5
12.	72062103	NUT 3/8-16 LOCK	5
13.	72063003	WASHER 3/8 WRT	5





OPTION-OUTRIGGER KIT-MO/MD-6X4 (51704772)

ITEM	PART NO.	DESCRIPTION	QTY
1.	52070138	T-PIN	1
2.	52703351	ADJUSTABLE ARM	1
3.	52703352	STATIONARY ARM	1
4.	52703353	LEG	2
5.	60010351	SPRING	1
6.	71731361	QUICK RELEASE PIN 3/4	2
7.	72060105	CAP SCR 1/2-13X7 HHGR5	1
8.	72062080	NUT 1/2-13 LOCK	1
9.	72063005	WASHER 1/2 WRT	2
10.	72063027	MACH BUSHING 5/8	2
11.	72066185	COTTER PIN 1/16X1	1



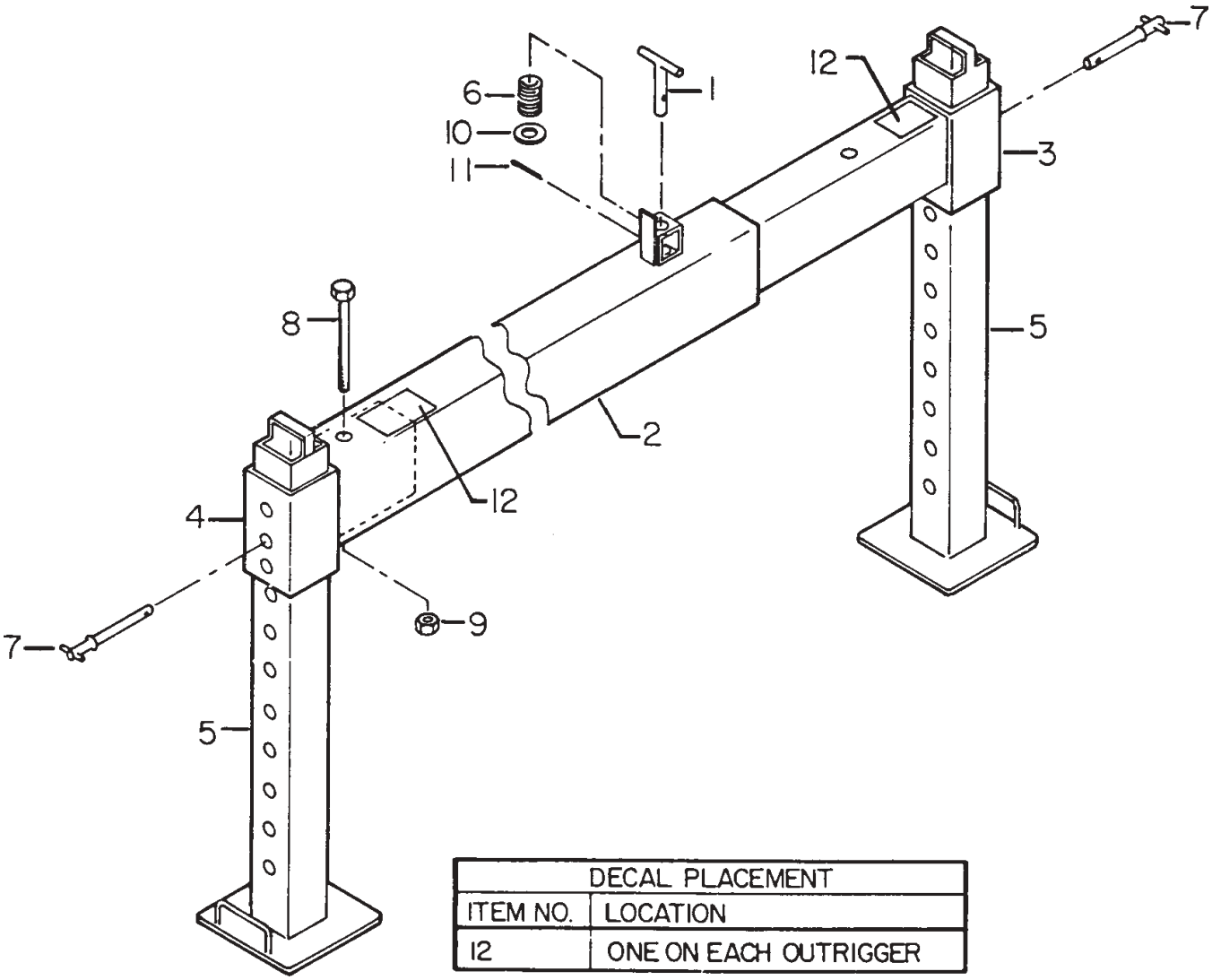
OPTION-AUX OUTRIGGERS-MO/MD-6X4 (31703350)

(Non-IMT Mechanic Service Body Application)

ITEM	PART NO.	DESCRIPTION	QTY
1.	52070138	T-PIN	1
2.	52703334	TUBE	1
3.	52703351	ARM	1
4.	52703352	STATIONARY HOUSING	1
5.	52703353	LEG	2
6.	60010351	SPRING	1
7.	71731361	QUICK RELEASE PIN	2
8.	72060105	CAP SCR 1/2-13X7 HH GR5	1
9.	72062080	NUT 1/2-13 LOCK	1
10.	72063007	WASHER 5/8 WRT	1
11.	72066185	COTTER PIN .06X1	1
12.	70392864	DECAL-DANGER STD CLR	2

INSTALLATION NOTE

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



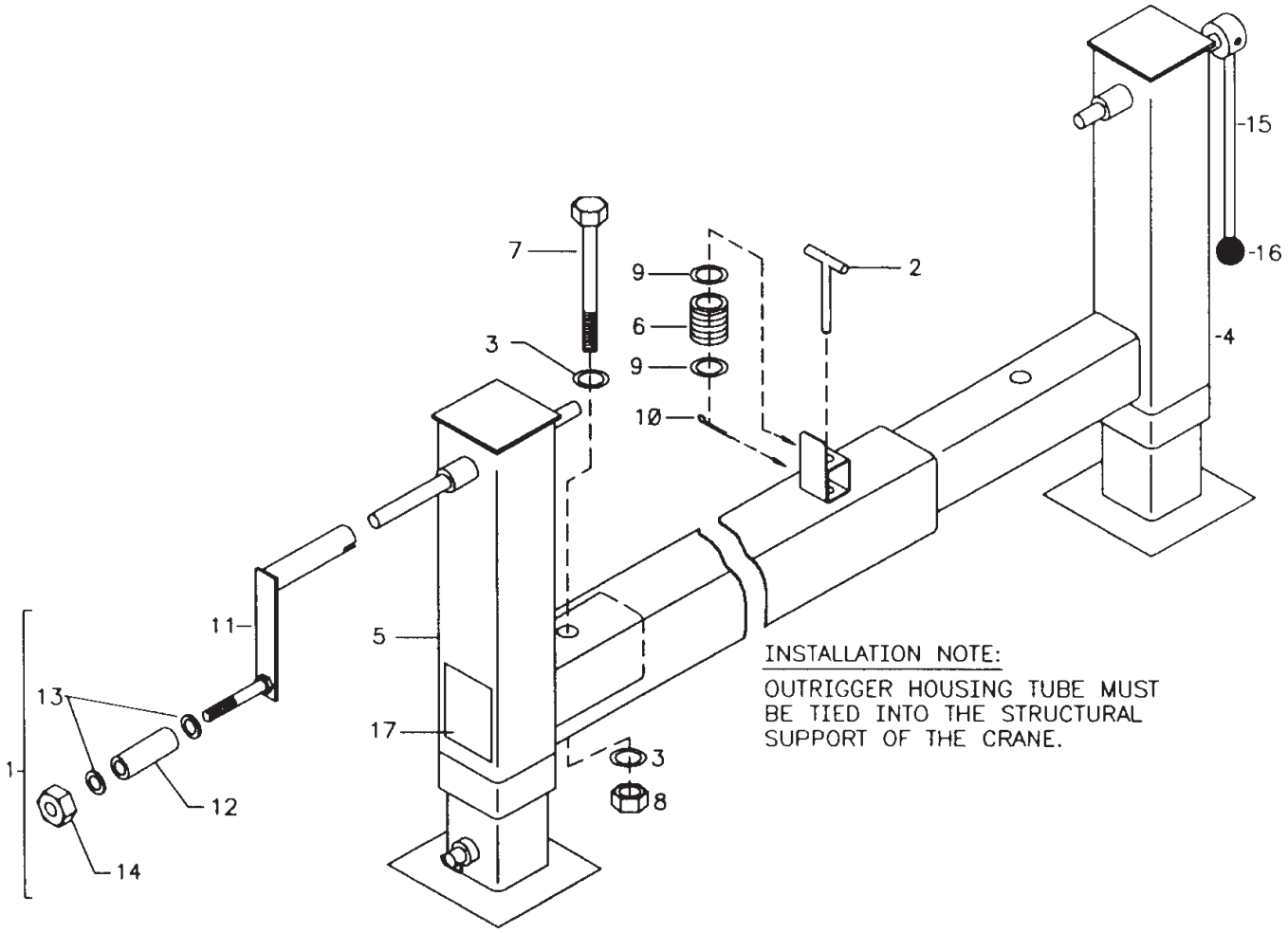
DECAL PLACEMENT	
ITEM NO.	LOCATION
12	ONE ON EACH OUTRIGGER

OPTION-OUTRIGGER KIT-MO/CRANK DN-6X4 (51704773)

NOTE

PLACE ONE ITEM 17 ON EACH OUTRIGGER.

ITEM	PART NO.	DESCRIPTION	QTY
1.	51705040	CRANK ASM (INCL:11-14)	1
2.	52070138	T-PIN	1
3.	72063005	WASHER 1/2 WRT	2
4.	52703355	PULL-OUT OUTRIGGER	1
5.	52703356	STATIONARY OUTRIGGER	1
6.	60010351	SPRING	1
7.	72060105	CAP SCR 1/2-13X7 HHGR5	1
8.	72062080	NUT 1/2-13 LOCK	1
9.	72063027	MACH BUSHING 5/8	2
10.	72066185	COTTER PIN 1/16X1	1
11.	52705039	CRANK WLDMT (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 1-1/2 BLACK	1
17.	70392864	DECAL-DANGER STD CLR	2



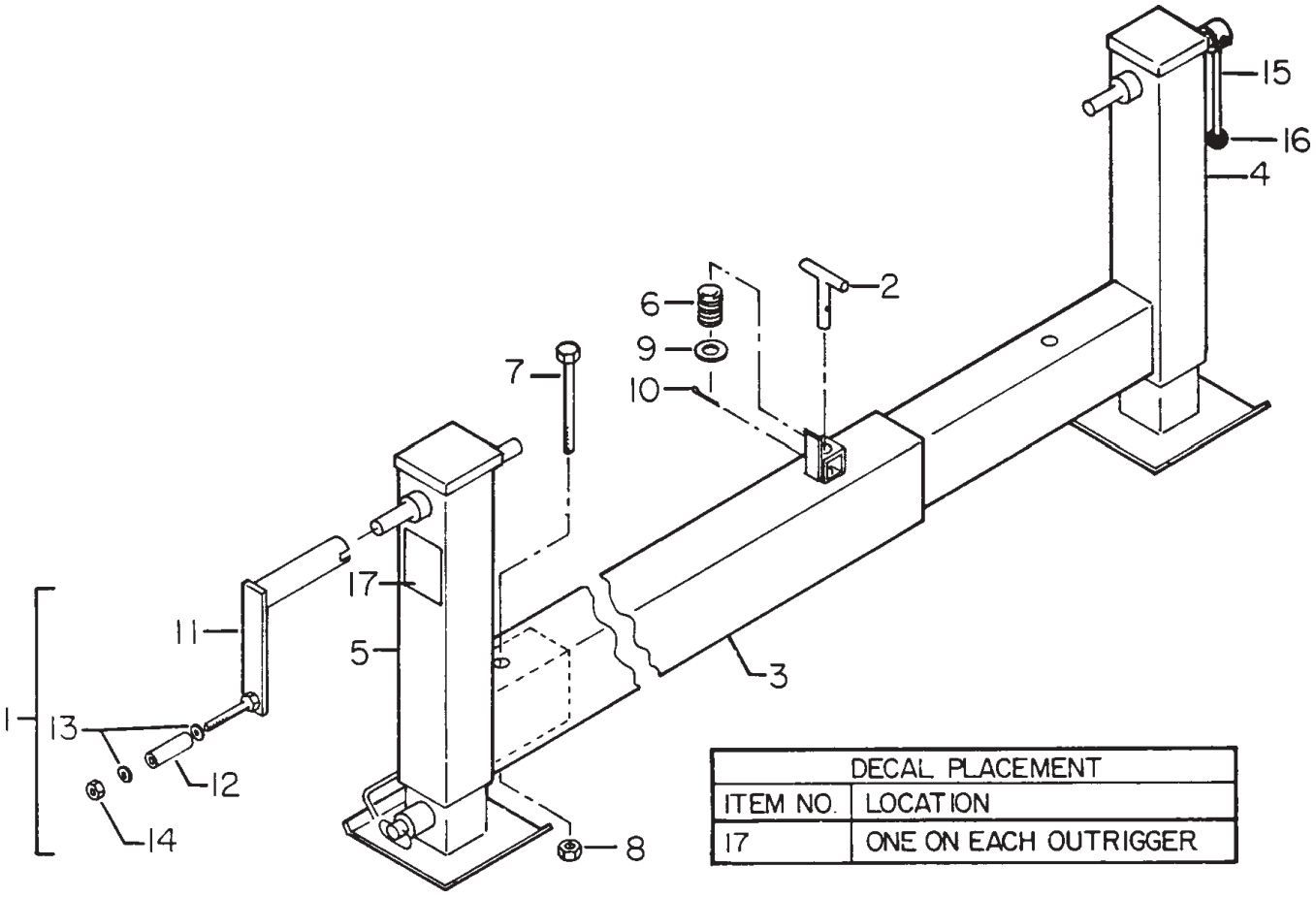
OPTION-AUX OUTRIGGERS-MO/CRANK DN-6X4 (31703354)

(Non-IMT Mechanic Service Body Application)

INSTALLATION NOTE

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

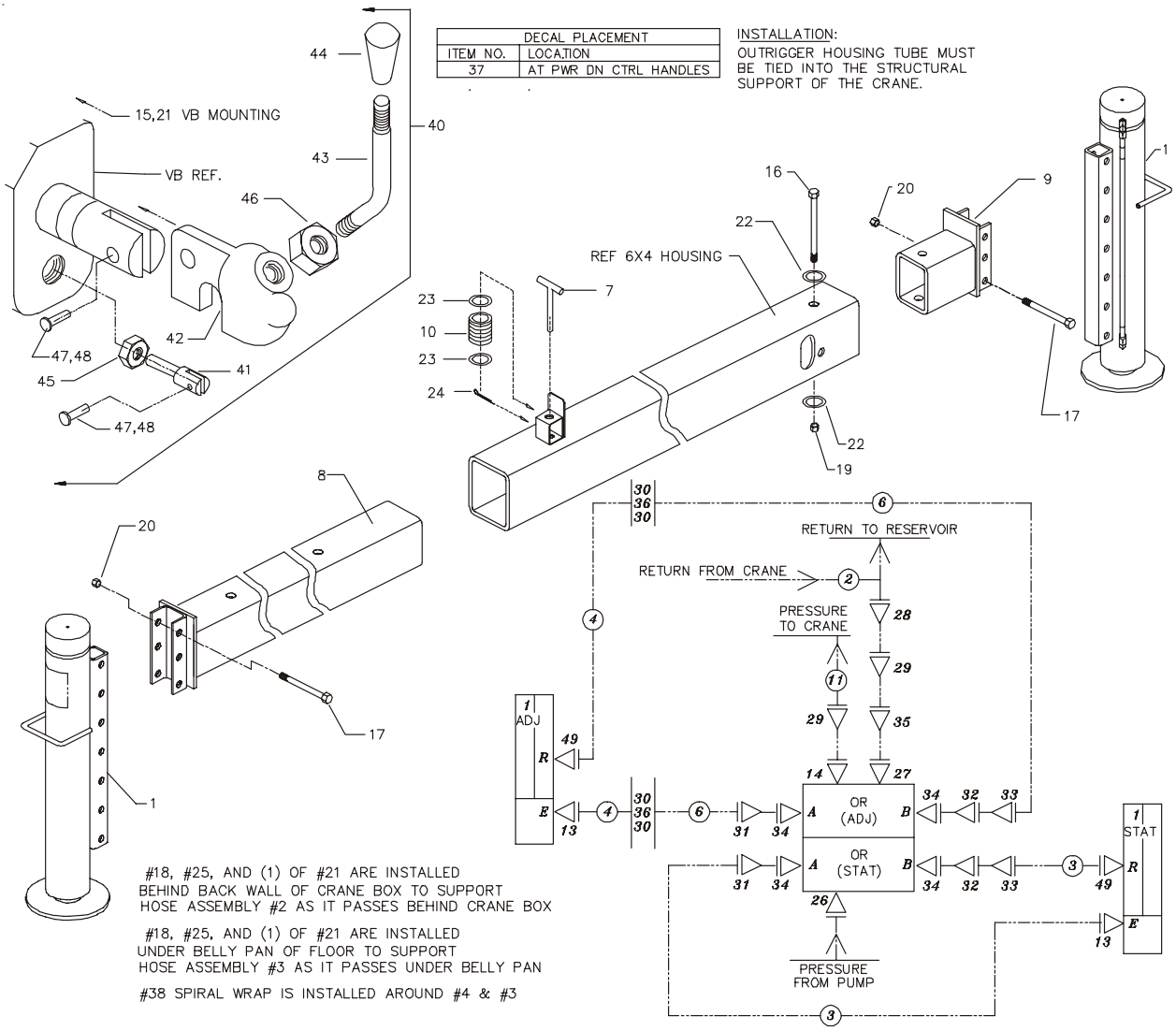
ITEM	PART NO.	DESCRIPTION	QTY
1.	51705040	CRANK ASM (INCL:11-14)	1
2.	52070138	T-PIN	1
3.	52703334	TUBE WELDMENT	1
4.	52703355	PULL-OUT OUTRIGGER	1
5.	52703356	STATIONARY OUTRIGGER	1
6.	60010351	SPRING	1
7.	72060105	CAP SCR 1/2-13X7 HHGR5	1
8.	72062080	NUT 1/2-13 LOCK	1
9.	72063007	WASHER 5/8 WRT	1
10.	72066185	COTTER PIN 1/16X1	1
11.	52705039	CRANK WLDMT (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 1-1/2 BLACK	1
17.	70392864	DECAL-DANGER STD CLR	2



DECAL PLACEMENT	
ITEM NO.	LOCATION
17	ONE ON EACH OUTRIGGER

OPTION-OUTRIGGER KIT-MO/PD-6X4 (31705760)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B205010	PWR DN CYLINDER	2
2.	51394917	HOSE 1/2X137 8F8F (PART OF 12)	1REF
3.	51394693	HOSE 1/4X130-1/2 4F4F (PART 12)	2REF
4.	51394115	HOSE 1/4X59 4F4F (PART OF 12)	2REF
5.	51705983	VALVEBANK 2-SECT (INCL:40)	1
6.	51394691	HOSE 1/4X38-1/2 4F4F(PART 12)	2REF
7.	52070138	T-PIN	1
8.	52705725	ADJUSTABLE ARM	1
9.	52705726	STATIONARY ARM	1
10.	60010351	SPRING	1
11.	51394402	HOSE 3/8X141 8F8F (PART OF 12)	1REF
12.	51714499	HOSE KIT (INCL: 2,3,4,6,11)	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.	72061760	CAP SCR 1/2-13X7 HHGR8	1
17.	72060155	CAP SCR 5/8-11X3-1/2 HHGR5	4
18.	72060833	SCR 5/16-18X3/4 THRDCTG (SEE 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	MACH BUSHING 5/8X14GA	2
24.	72066185	COTTER PIN .16X1	1
25.	72066582	CLAMP (SEE NOTE)	2
26.	72532358	ADPTR #8MSTR #8MJIC	1
27.	72532365	ADPTR #10MSTR #12MJIC	1
28.	72532657	TEE-SWVL NUT RUN 3/4JIC	1
29.	72532658	ELBOW #8MJIC #8FJIC SWVL	2
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.	72532972	ADPTR #8MJIC #12FJIC	1
36.	72533024	UNION BULKHEAD	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(INCL:41-48,PART OF 5)	2REF
41.	70142648	LEVER PIVOT(PART OF 40)	2REF
42.	70142650	LEVER SUPPORT (PART OF 40)	2REF
43.	70142651	CTRL LEVER (PART OF 40)	2REF
44.	71392269	KNOB (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 .06X1 (PART OF 40)	4REF
48.	72661204	CLEVIS PIN (PART OF 40)	4REF
49.	72533567	ELBOW #4MSTR #4MJIC XLG	2



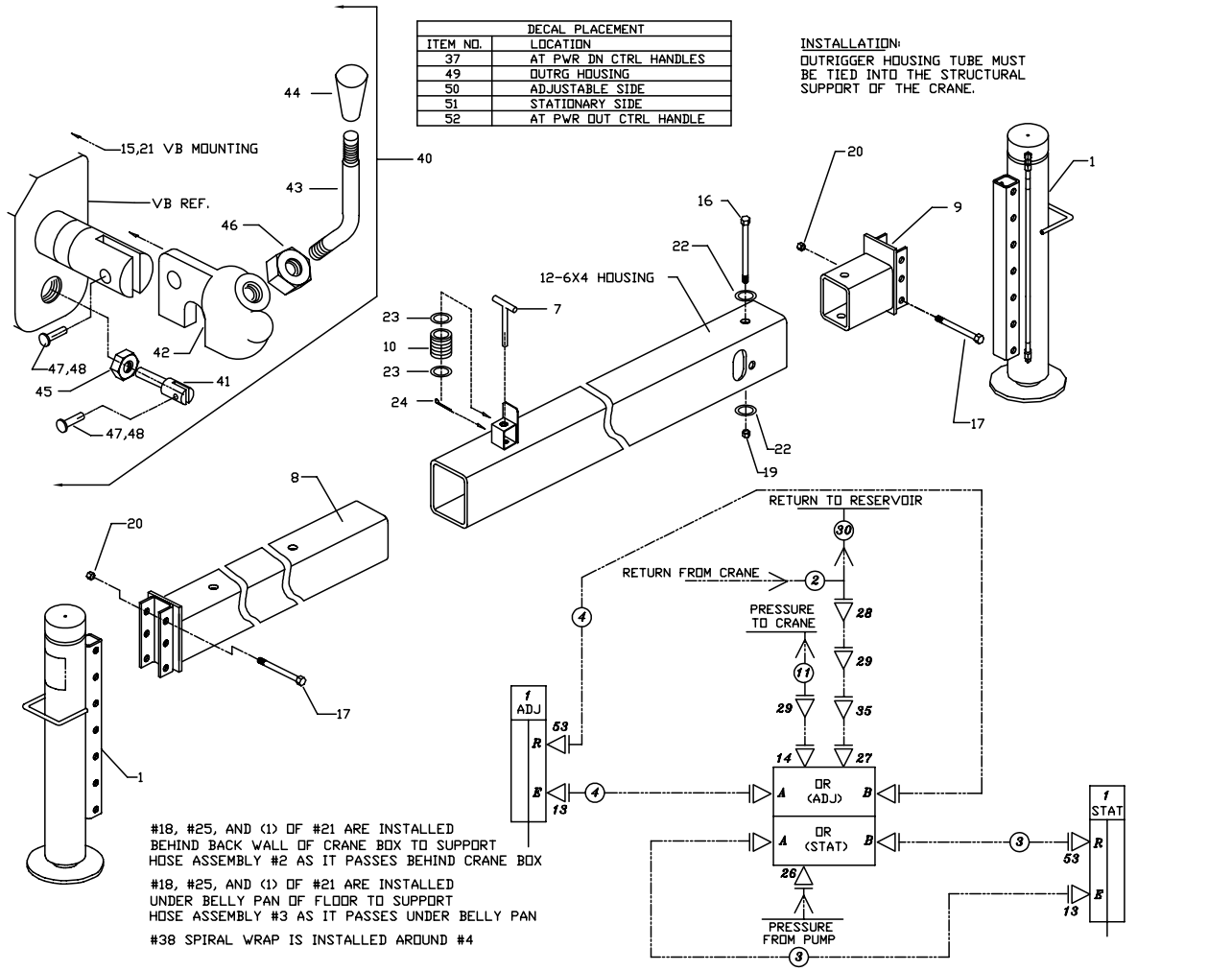
OPTION-AUX OUTRIGGERS-MO/PD-6X4 (31710966) (EFF 9-03 - USES VALVEBANK 51714813)

(Non-IMT Mechanic Service Body Application)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B205010	PWR DN CYLINDER	2
2.	51395431	HOSE ASM 1/2X98 FJ	1
3.	51395552	HOSE ASM 1/4X135 FJ	2
4.	51396280	HOSE ASM 1/4X96 FJ	2
5.	51714813	VALVEBANK 2-SECT (INCL:40)	1
7.	52070138	PIN WELDMENT	1
8.	52705725	ADJUSTABLE ARM	1
9.	52705726	STATIONARY ARM	1
10.	60010351	SPRING	1
11.	51396184	HOSE ASM 1/2X159 FF	1
12.	52703334	HOUSING, OUTRIGGER	1
13.	72053758	ELBOW #4MSTR #4MJIC 90°	2
14.	72053764	ELBOW #10MSTR #8MJIC 90°	1
15.	72060025	CAP SCR 5/16-18X1 HHGR5Z	3
16.	72601760	CAP SCR 1/2-13X7 HHGR8	1
17.	72060155	CAP SCR 5/8-11X3-1/2 HHGR5	4
18.	72060833	SCR-THD CUT 5/16-18X3/4 HWH	2
19.	72062080	NUT 1/5-13 NYLOC	1
20.	72062091	NUT 5/8-11 HEX NYLOC	4
21.	72063002	WASHER 5/16 FLAT	5
22.	72063005	WASHER 1/2 FLAT	2
23.	72063027	MACHY BUSHING 5/8X14 GA NR	2
24.	72066185	COTTER PIN .16X1	1
25.	72066582	CLAMP UMP20	2
26.	72532358	ADPTR #8MSTR #8MJIC	1
27.	72532365	ADPTR #10 MSTR #12MJIC	1
28.	72532657	TEE, SWIVEL NUT RUN JIC 3/4	1
29.	72532658	ELBOW #8MJIC #8FJIC SW	2
30.	51396282	JOSE-FF 3/4X51 OAL (12-12)	1
35.	72532972	ADPTR #8MJIC #12FJIC	1
37.	76391511	DECAL-UP & DN STAB R&L	1
38.	89034049	SPIRAL WRAP, BLACK	4’
39.	99900644	MANUAL, AUX. OUTRIGGERS	1
40.	51731580	HANDLE ASM (INCL 34-41)	2REF
41.	70142648	PIVOT-LEVER	2REF
42.	70142650	LEVER SPT	2REF
43.	70142651	LEVER, CONTROL HANDLE	2REF
44.	71392269	KNOB, CTRL HNDL	2REF
45.	72062021	NUT 5/16-18 HEX JAM	2REF
46.	72062024	NUT 1/2-13 HEX JAM	2REF
47.	72066162	COTTER PIN	4REF
48.	72661204	CLEVIS PIN	4REF
49.	70392864	DECAL, DANGER OR	2
50.	70392867	DECAL, DANGER MOV OR	1
51.	71392257	DECAL, OR PD SS	1
52.	71392277	DECAL, OR PO	1
53.	72533567	ELBOW #4MSTR #4MJIC XLG	2

INSTALLATION NOTE

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



OPTION-AUX OUTRIGGERS-MO/PD-6X4 (31710966) (THRU 9-03 - USES VALVEBANK 51705983)

(Non-IMT Mechanic Service Body Application)

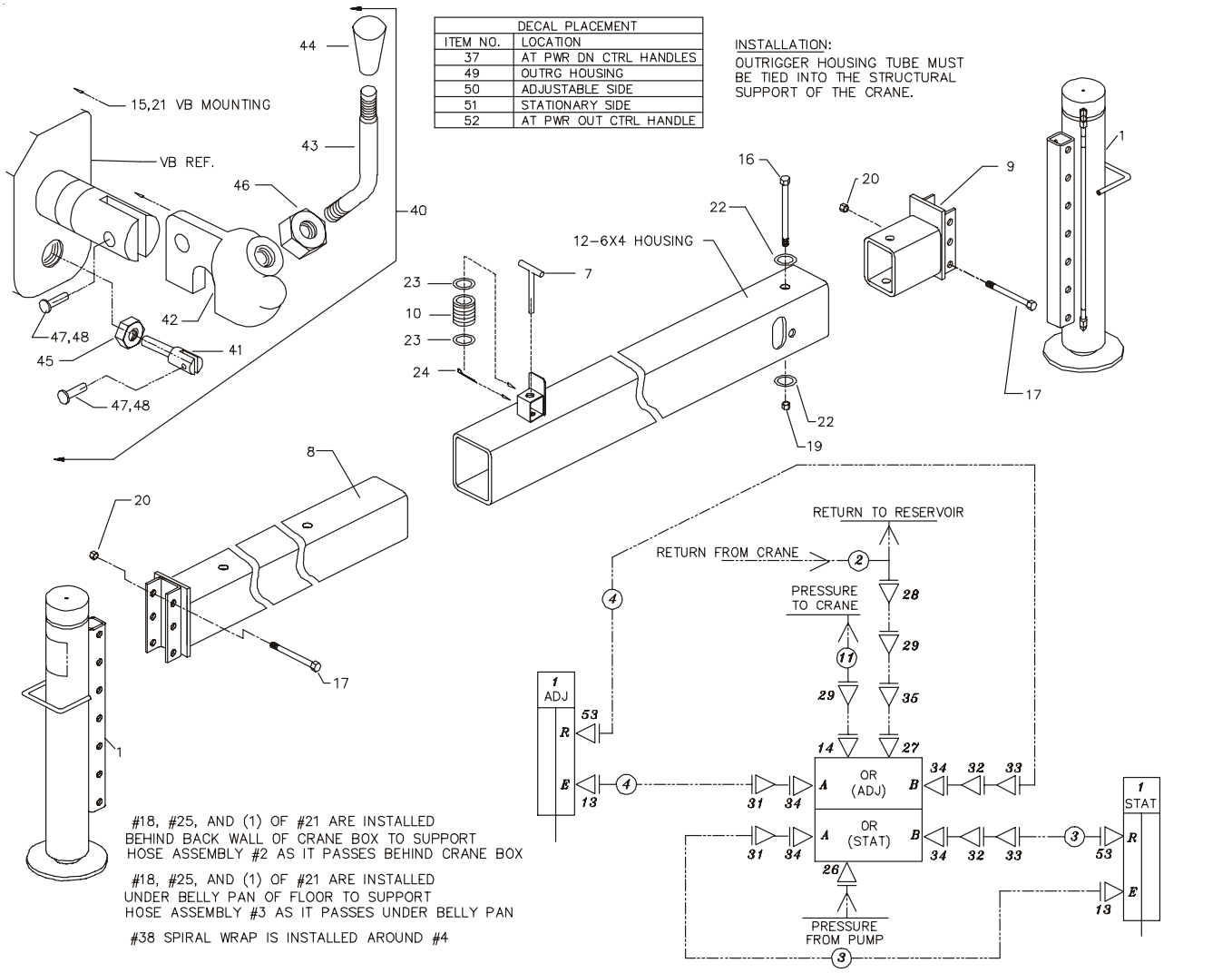
ITEM	PART NO.	DESCRIPTION	QTY
1.	3B205010	PWR DN CYLINDER	2
2.	51703596	HOSE ASM 1/4X120 FF	2
3.	51705191	HOSE ASM 1/4X96	2
4.	51705377	HOSE ASM 3/8X48 FF	1
5.	51705983	VALVEBANK 2-SECT (INCL:42)	1
6.	52070138	T-PIN	1
7.	52705725	ADJUSTABLE ARM	1
8.	52705726	STATIONARY ARM	1
9.	52703334	HOUSING	1
10.	60010351	SPRING	1
11.	72532358	ADAPTER #8MSTR #8MJIC	1
12.	72532365	ADAPTER #10MSTR #12MJIC	1
13.	72053758	ELBOW #4MSTR #4MJIC 90°	4
14.	72532699	ELBOW #6MSTR #4MJIC 90°	2
16.	72061760	CAP SCR 1/2-13X7 HHGR8	1
17.	72060155	CAP SCR 5/8-11X3-1/2 HHGR5	6
18.	72062080	NUT 1/2-13 LOCK	1
19.	72062091	NUT 5/8-11 LOCK	6
22.	72063007	WASHER 5/8 WRT	1
23.	72066185	COTTER PIN .16X1	1
25.	72532722	ADAPTER #10MSTR #6FSTR	4
28.	72532700	ELBOW #6MSTR #6MJIC XLG 90°	2
29.	72532707	ADAPTER #4MJIC #6FJIC	2
30.	72053764	ELBOW #10MSTR #8MJIC 90°	1
31.	70392864	DECAL-DANGER STAND CLEAR	2
32.	70392867	DECAL-DANGER MOVING	1
33.	71392257	DECAL-PWR DN SS	1
34.	70142648	LEVER PIVOT (PART OF 42)	2REF
35.	70142650	LEVER SUPPORT (PART OF 42)	2REF
36.	70142651	CTRL LEVER (PART OF 42)	2REF
37.	71392269	KNOB (PART OF 42)	2REF
38.	72062021	NUT 5/16-18 HEX JAM (PART OF 42)	2REF
39.	72062024	NUT 1/2-13 HEX JAM (PART OF 42)	2REF
40.	72066162	COTTER PIN .06X1 (PART OF 42)	4REF
41.	72661204	CLEVIS PIN (PART OF 42)	4REF
42.	51731580	HANDLE ASM (INCL:34-41,PART OF 5)	2REF
43.	70392864	DECAL-DANGER STD CLR	2

INSTALLATION NOTE

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

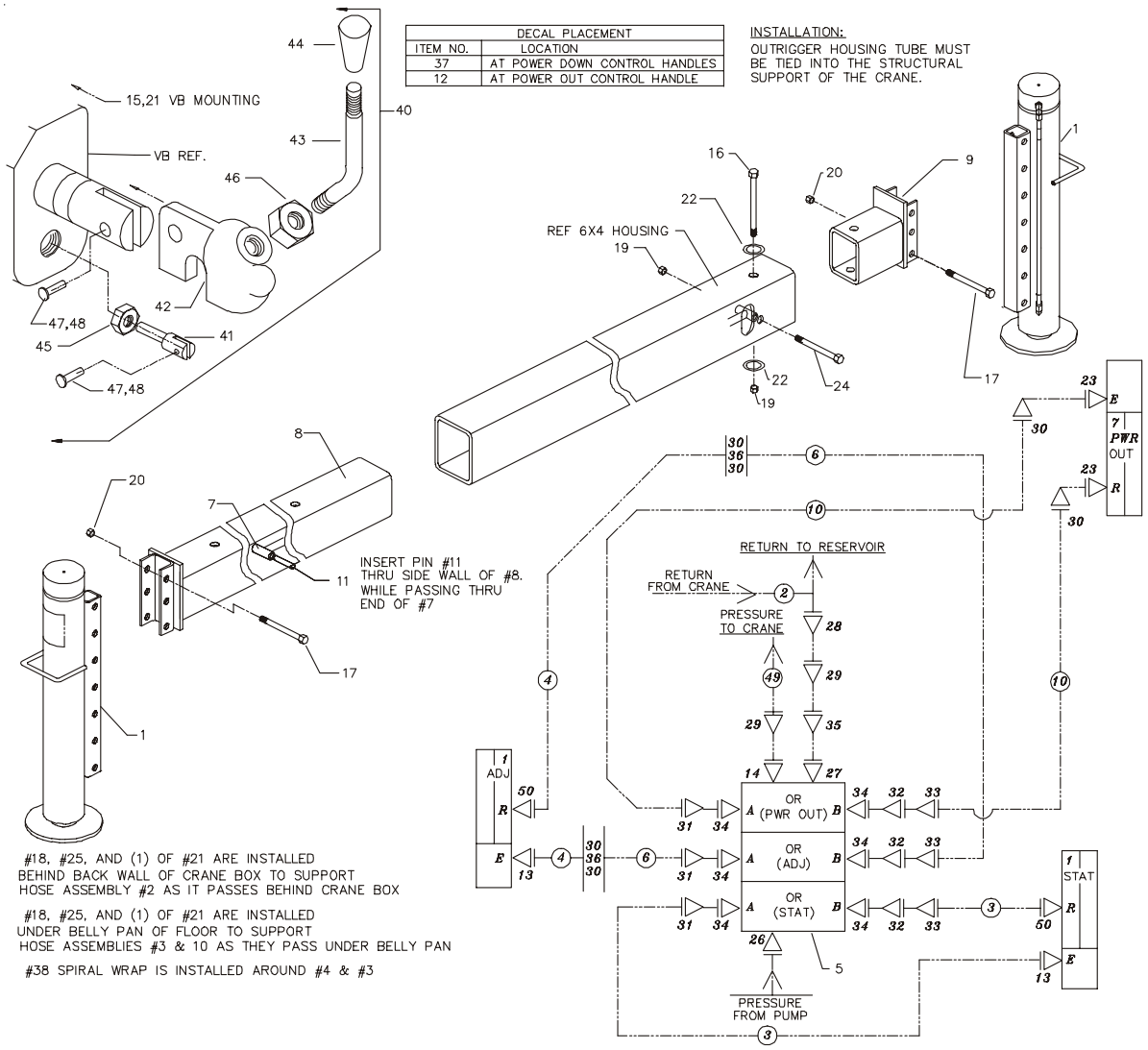
DECAL PLACEMENT	
ITEM NO.	LOCATION
37	AT PWR DN CTRL HANDLES
49	OUTRG HOUSING
50	ADJUSTABLE SIDE
51	STATIONARY SIDE
52	AT PWR OUT CTRL HANDLE

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



OPTION-OUTRIGGER KIT-PO/PD-6X4 (31706425)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B205010	CYLINDER-PWR DN	2
2.	51703871	HOSE ASM 1/2X134 FF	1
3.	51705364	HOSE ASM 1/4X128 FF	2
4.	51705365	HOSE ASM 1/4X56 FF	2
5.	51705984	VALVEBANK 3-SECT (PART OF40)	1
6.	51706152	HOSE ASM 1/4X36 FF	2
7.	3B142860	CYLINDER-PWR OUT	1
8.	52705725	ARM-ADJUSTABLE	1
9.	52705726	ARM-STATIONARY	1
10.	51707597	HOSE ASM 1/4X105 FF	2
11.	72661473	PIN	1
12.	71392277	DECAL-PWR OUT	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.	72061760	CAP SCR 1/2-13X7 HHGR8	1
17.	72060155	CAP SCR 5/8-11X3-1/2 HHGR5	4
18.	72060833	SCR 5/16-18X3/4 THRDCTG (SEE 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.	72060101	CAP SCR 1/2-13X5 HHGR5	1
25.	72066582	CLAMP (SEE NOTE)	2
26.	72532358	ADAPTER #8MSTR #8MJIC	1
27.	72532365	ADAPTER #10MSTR #12MJIC	1
28.	72532657	TEE 3/4JIC SWVLNUTRUN	1
29.	72532658	ELBOW #8MJIC #8FJIC SW	2
30.	72532690	ELBOW #4MJIC #4FJIC SW	6
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.	72532972	ADAPTER #8MJIC #12FJIC	1
36.	72533024	UNION-BULKHD #4JIC	2
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	KOB (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	CLEVIS PIN (PART OF 40)	4REF
49.	51703604	HOSE ASM 3/8X138 FF	1
50.	72533567	ELBOW #4MSTR #4MJIC XLG	2



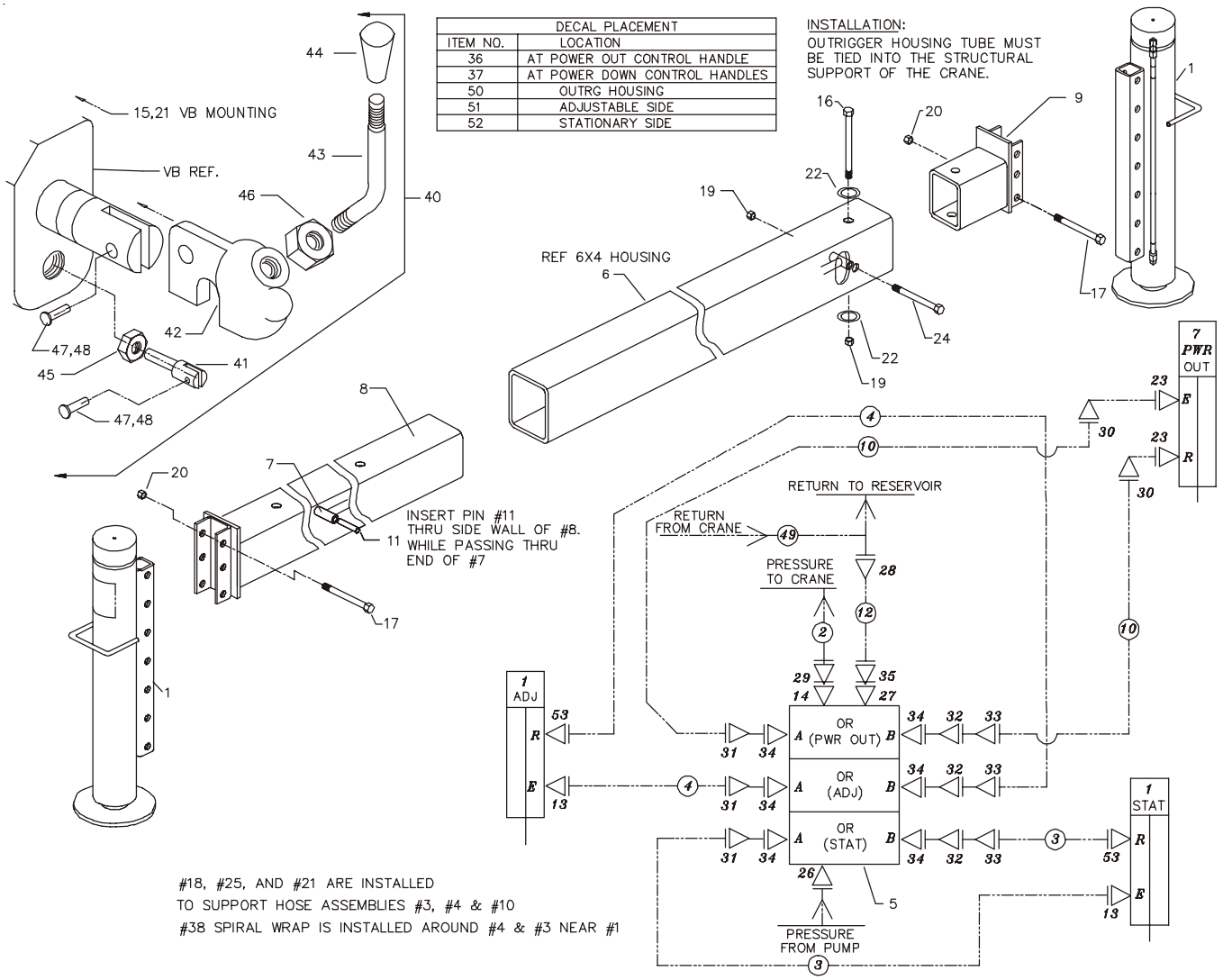
OPTION-AUX OUTRIGGERS-PO/PD-6X4 (31710967)

(Non-IMT Mechanic Service Body Application)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B205010	PWR DN CYLINDER	2
2.	51706893	HOSE ASM 1/4X90	4
3.	51705191	HOSE ASM 1/4X96	2
4.	51703939	HOSE ASM 3/8X48	1
5.	51705984	VB 3-SECTW/PWR BYND	1
6.	51704576	HOSE ASM 3/4X72	1
7.	52705725	ADJUSTABLE ARM	1
8.	52705726	STATIONARY ARM	1
9.	51703334	HOUSING	1
10.	60107648	HOSE CLAMP	1
12.	72053764	ELBOW #10MSTR #8MJIC 90°	1
13.	72053758	ELBOW #4MSTR #4MJIC 90°	4
14.	72532699	ELBOW #6MSTR #4MJIC 90°	3
16.	72061760	CAP SCR 1/2-13X7 HHGR8	1
17.	72060155	CAP SCR 5/8-11X3-1/2 HHGR5	6
18.	72062080	NUT 1/2-13 LOCK	1
19.	72062091	NUT 5/8-11 LOCK	6
20.	72060030	CAP SCR 5/16-18X2-1/4 HHGR5	1
21.	72062109	NUT 5/16-18 LOCK	1
22.	72532358	ADAPTER #8MSTR #8MJIC	1
23.	72532365	ADAPTER #10MSTR #12MJIC	1
25.	72532722	ADAPTER #10MSTR #6FSTR	6
28.	72532700	ELBOW #6MSTR #6MJIC XLG 90°	3
29.	72532707	ADAPTER #4MJIC #6FJIC	3
30.	70392864	DECAL-DANGER STD CLR	2
31.	70392867	DECAL-DANGER OR. MOVING	1
33.	72060102	CAP SCR 1/2-13X5-1/2 HHGR5	1
34.	72062080	NUT 1/2-13 LOCK	1
35.	3B142860	PWR OUT CYLINDER	1
36.	52706424	PIN	1
37.	72532690	ELBOW #4FJIC #4MJIC	2
38.	72532351	ADAPTER #4MSTR #4MJIC	2
39.	71392277	DECAL-PWR OUT	1
40.	71392257	DECAL-PWR DN	1
41.	70142648	LEVER PIVOT (PART OF 49)	3REF
42.	70142650	LEVER SUPPORT (PART OF 49)	3REF
43.	70142651	CONTROL LEVER (PART OF 49)	3REF
44.	71392269	KNOB (PART OF 49)	3REF
45.	72062021	NUT 5/16-18 HEX JAM (PART OF 49)	3REF
46.	72062024	NUT 1/2-13 HEX JAM (PART OF 49)	3REF
47.	72066162	COTTER PIN (PART OF 49)	6REF
48.	72661204	CLEVIS PIN (PART OF 49)	6REF
49.	51731580	HANDLE ASM (INCL:41-48,PART OF 5)	3REF

INSTALLATION NOTE

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



CYLINDER (3B205010)

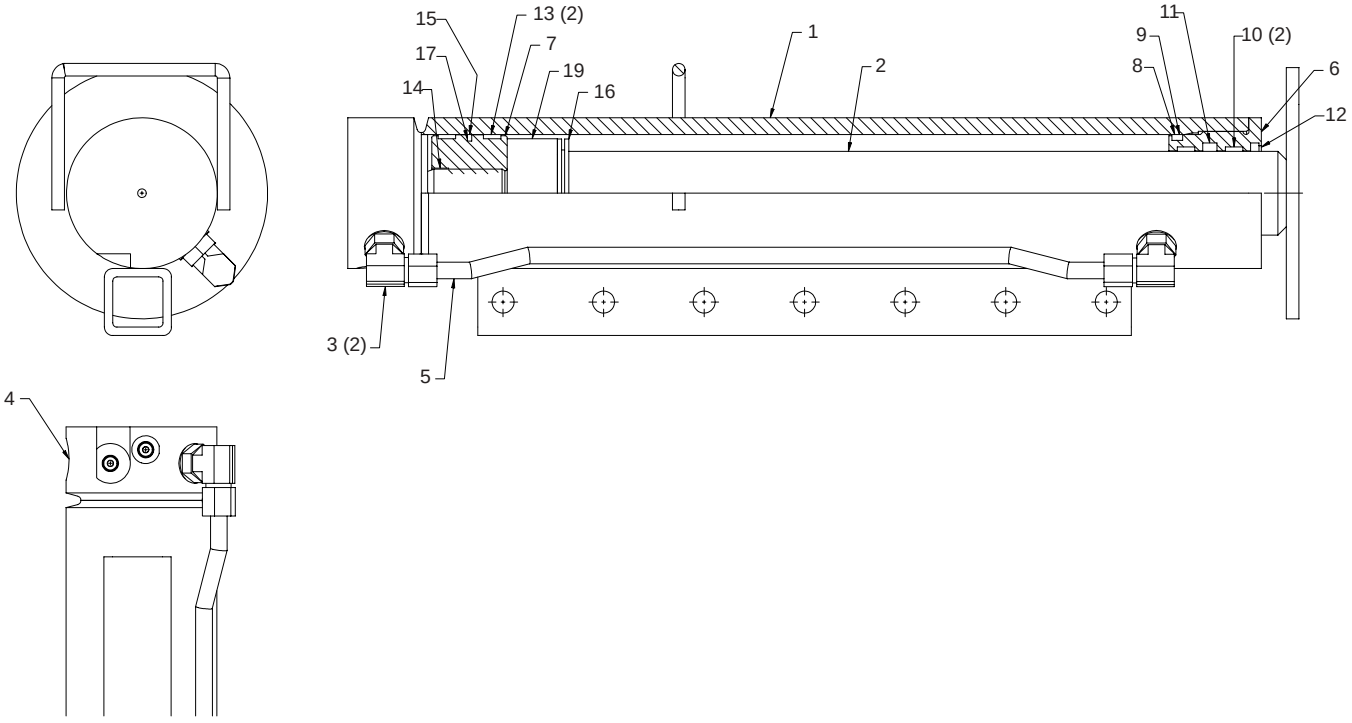
1.	4B205010	CASE ASY	1
2.	4G048870	ROD ASY	1
3.	72053763	ELL #8MSTR #8MJIC 90°	1
4.	73054681	CHECK VALVE	1
5.	5P288970	PORT TUBE	1
6	6HD35025	HEAD	1
7.	6ID35125	PISTON	1
8.	7Q072338	O-RING	1REF
9.	7Q10P338	BACKUP RING	1REF
10.	7T2NX427	WEAR RING	2REF
11.	7R546025	U-CUP SEAL	1REF
12.	7R14P025	ROD WIPER	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 “NEVER-SEEZ” REGULAR GRADE ANTI-SIEZE AND LUBRICATING COMPOUND TO CYLINDER HEAD ONLY. KEEP AWAY FROM SEALS.

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



CYLINDER-PWR OUT (3B142860)

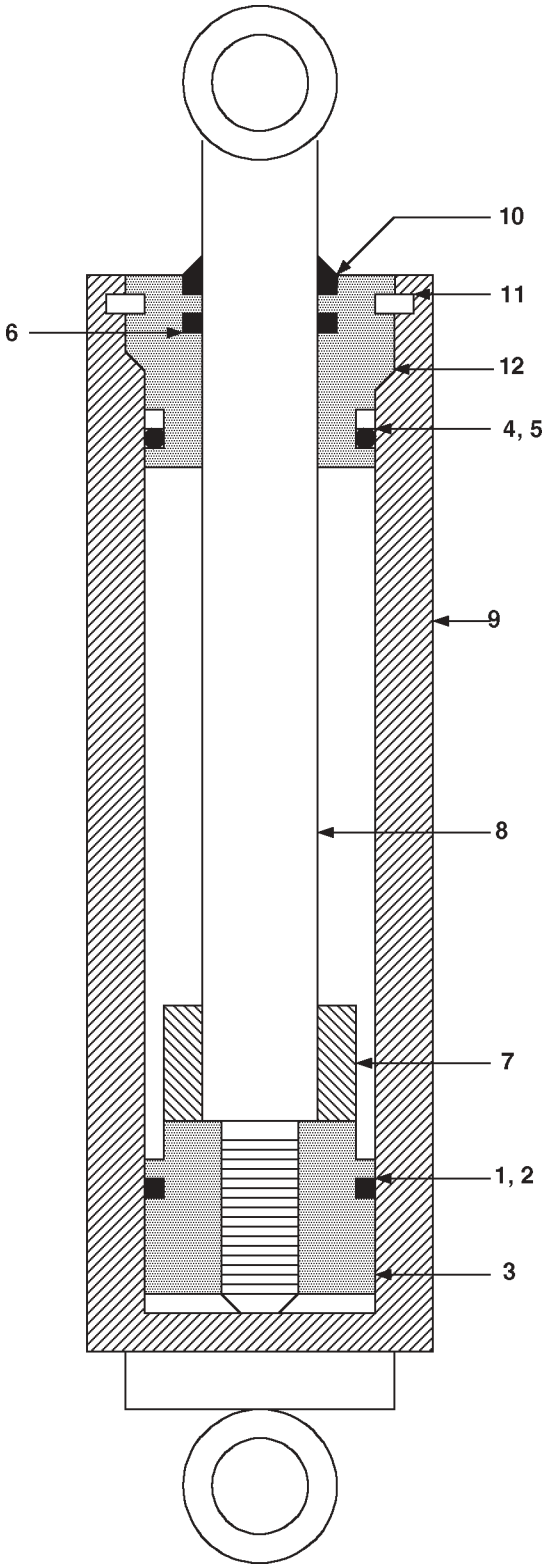
ITEM	PART NO.	DESCRIPTION	QTY
1.	7Q072021	O-RING (PART OF 13)	1REF
2.	7T66P012	PISTON SEAL (PART OF 13)	1REF
3.	6I012050	PISTON	1
4.	7Q072214	O-RING (PART OF 13)	1REF
5.	7Q10P214	BACK-UP RING (PART OF 13)	1REF
6.	7R100750	ROD SEAL (PART OF 13)	1REF
7.	6C125007	STOP TUBE	1
8.	4G142860	ROD ASM	1
9.	4B142860	CASE ASM	1
10.	7R13P007	ROD WIPER (PART OF 13)	1REF
11.	72066029	RETAINING RING	1
12.	6H012007	HEAD	1
13.	9B050608	SEAL KIT (INCL:1,2,4-6,10)	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.



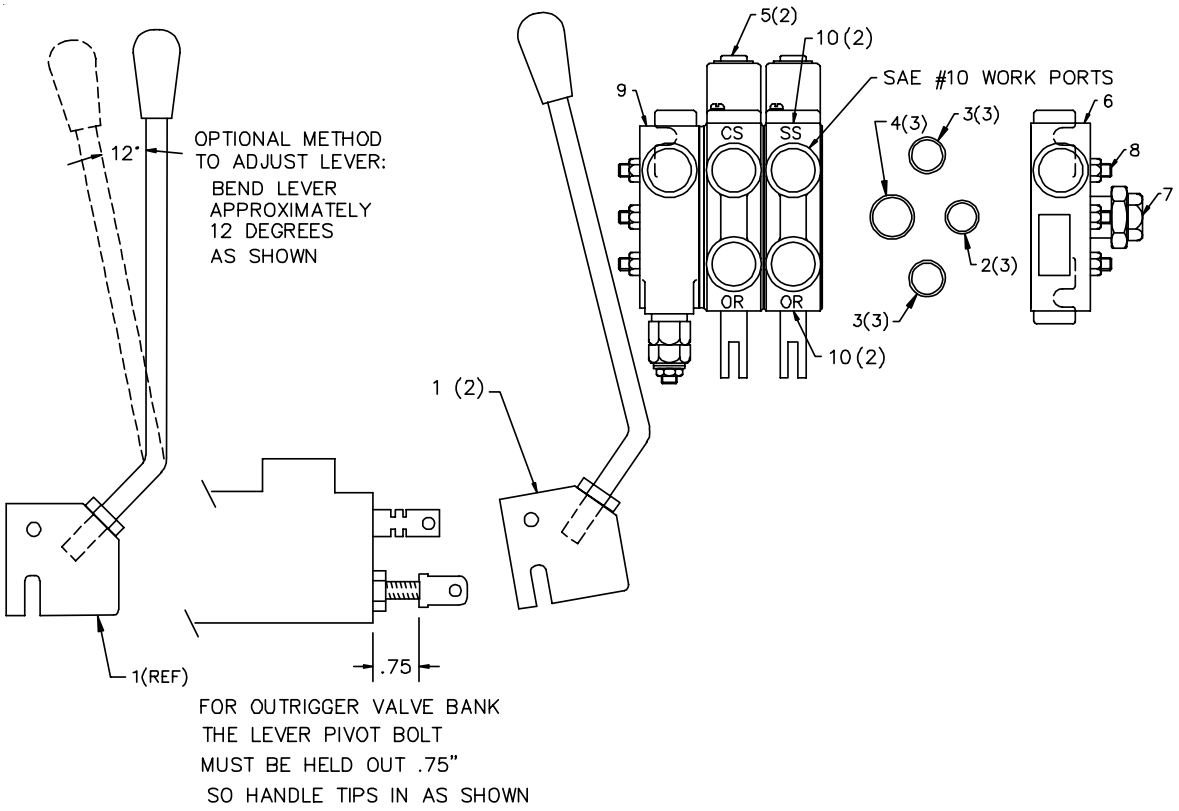
VALVEBANK ASM-2 SECTION (51705983)

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:

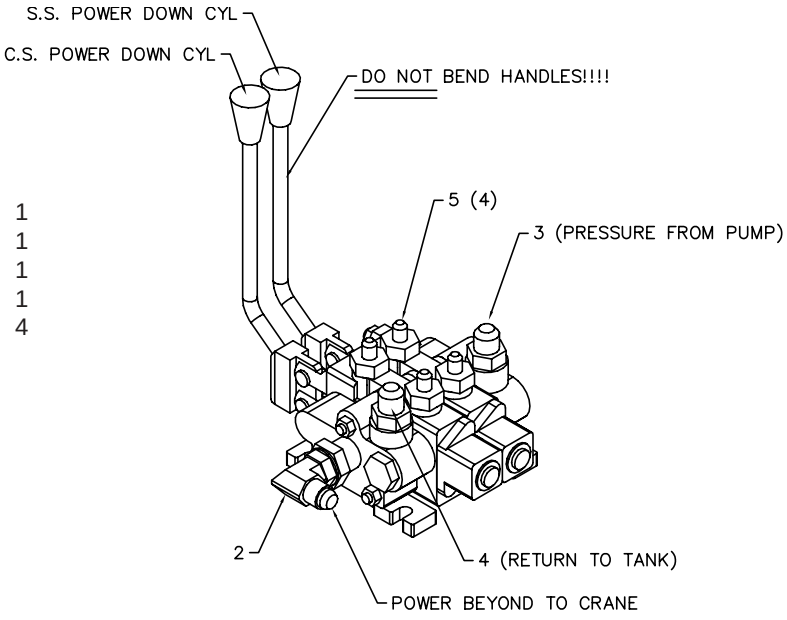
1.	73540073	LEVER ASM	2
2.	7Q072017	O-RING SM	3
3.	7Q072018	O-RING MED	6
4.	7Q072021	O-RING LG	3
5.	73540074	VALVE SECTION 4-WAY	2
6.	73540075	END COVER RH	1
7.	73540076	POWER BEYOND ADAPTER	1
8.	73540078	TIE ROD KIT (2 SECT)	1
9.	73540077	END COVER-LH	1
10.	7Q072114	O-RING	4



51714813.01.REV A 20031017

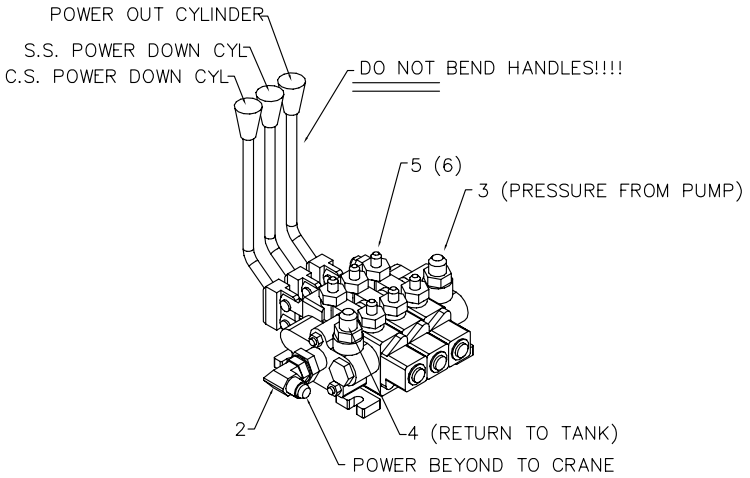
VALVEBANK ASM-2 SECTION (51714813)

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



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

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



CAP FITTINGS PRIOR TO SHIPPING AND HANDLING

51705984.01.20001206

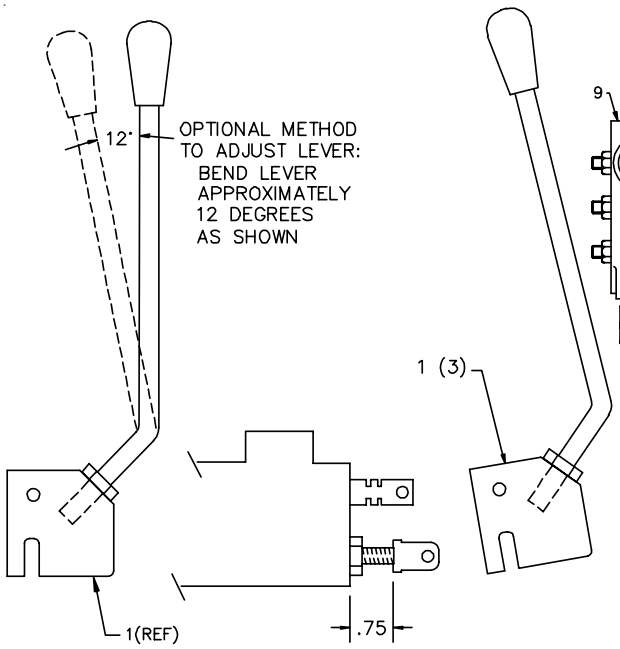
VALVEBANK ASM-3 SECTION (51705984)

EFFECTIVE PREVIOUS TO 1-1-00:

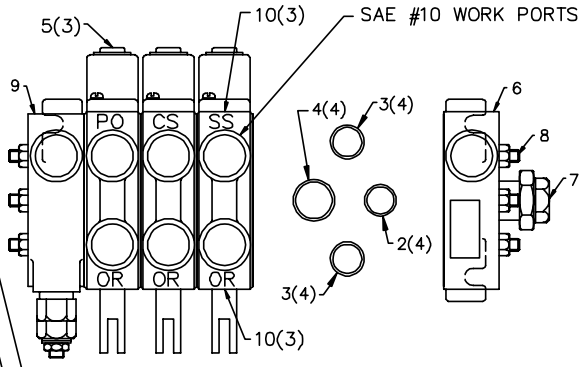
1.	51731580	HANDLE ASM (NOT SHOWN)	3
2.	7Q072017	O-RING SM	4
3.	7Q072018	O-RING MED	8
4.	7Q072021	O-RING LG	4
5.	73054490	TANDEM VALVE SECTION	3
6.	73540010	END COVER RH	1
7.	73731763	POWER BEYOND ADAPTER	1
8.	94731764	TIE ROD KIT	1
9.	73054488	END COVER LH	1
10.	7Q072114	O-RING	6

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

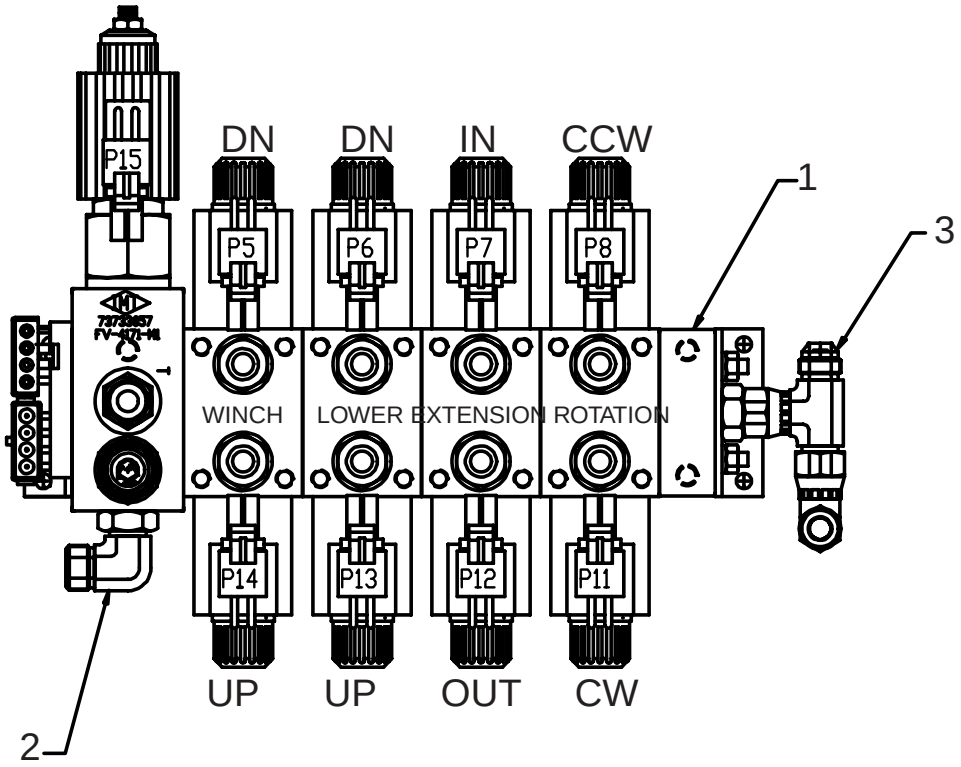


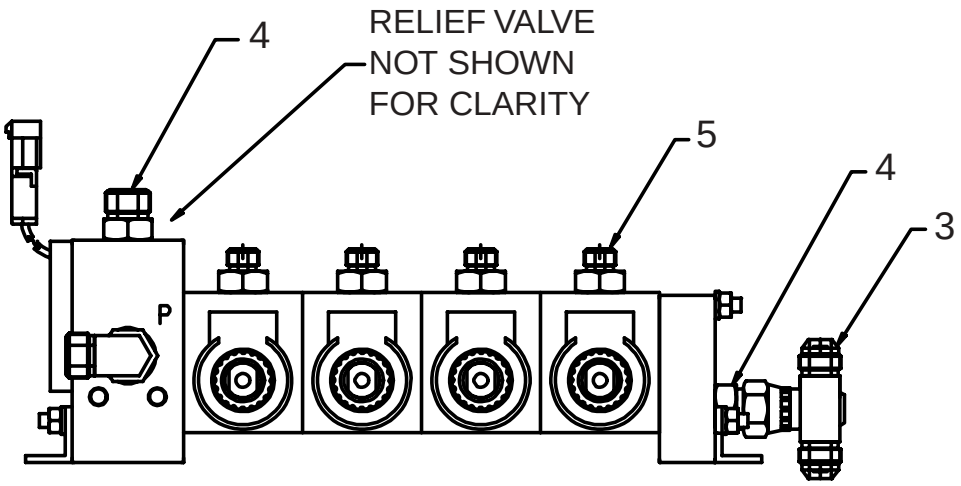
FOR OUTRIGGER VALVE BANK
THE LEVER PIVOT BOLT
MUST BE HELD OUT .75"
SO HANDLE TIPS IN AS SHOWN



VALVEBANK ASM (51714381)

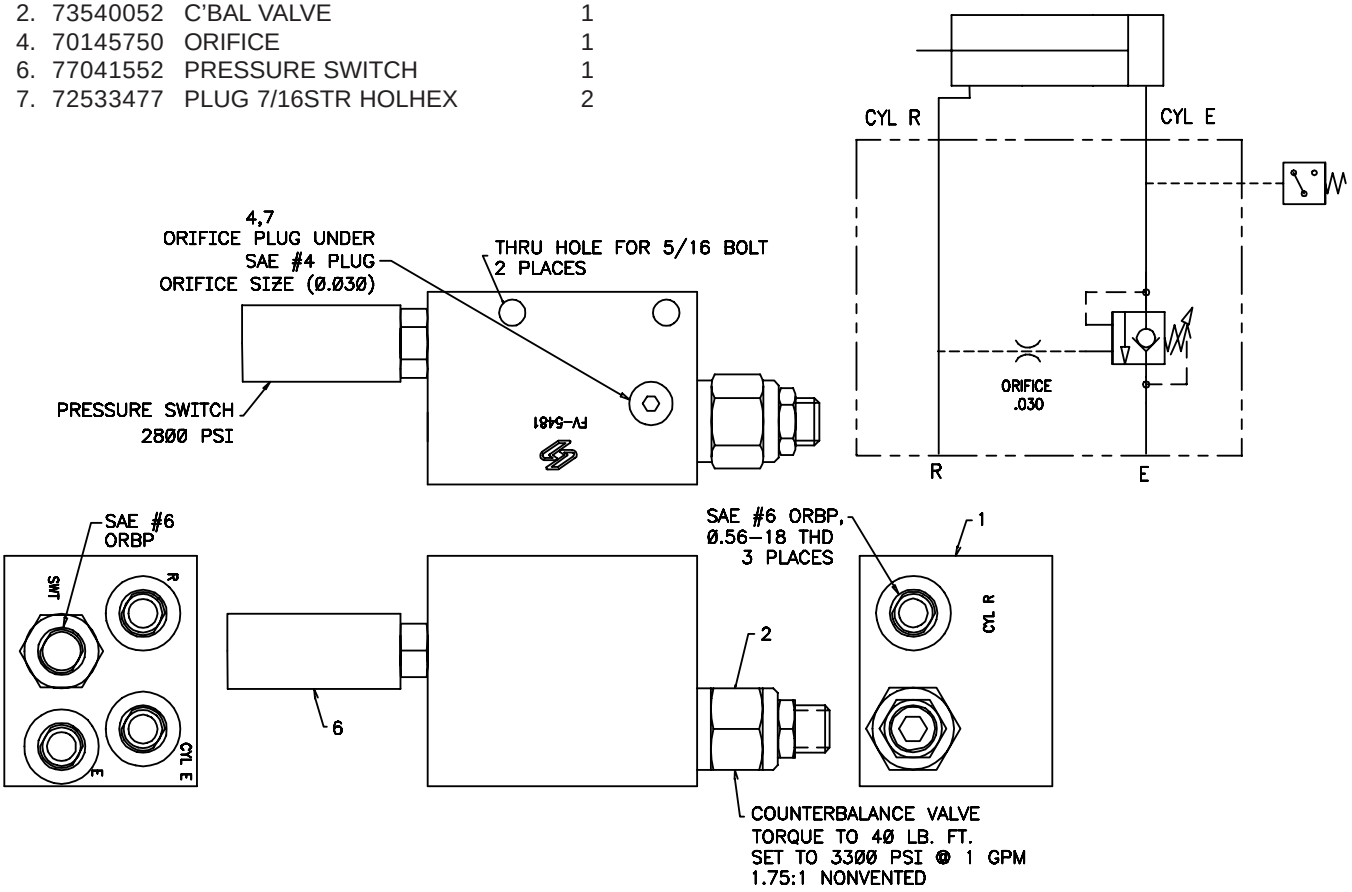
ITEM	PART NO.	DESCRIPTION	QTY
1.	73733057	VB (SEE DWG)	1
2.	72533162	ELBOW #8MSTR #8MFACE 90°	1
3.	72533410	TEE #8FACE SWVLNUTRUN	2
4.	72533166	ADAPTER #8MFACE #8MSTR	2
5.	72533425	ADAPTER #4MFACE #8MSTR	8





COUNTERBALANCE VALVE ASM (73540057)

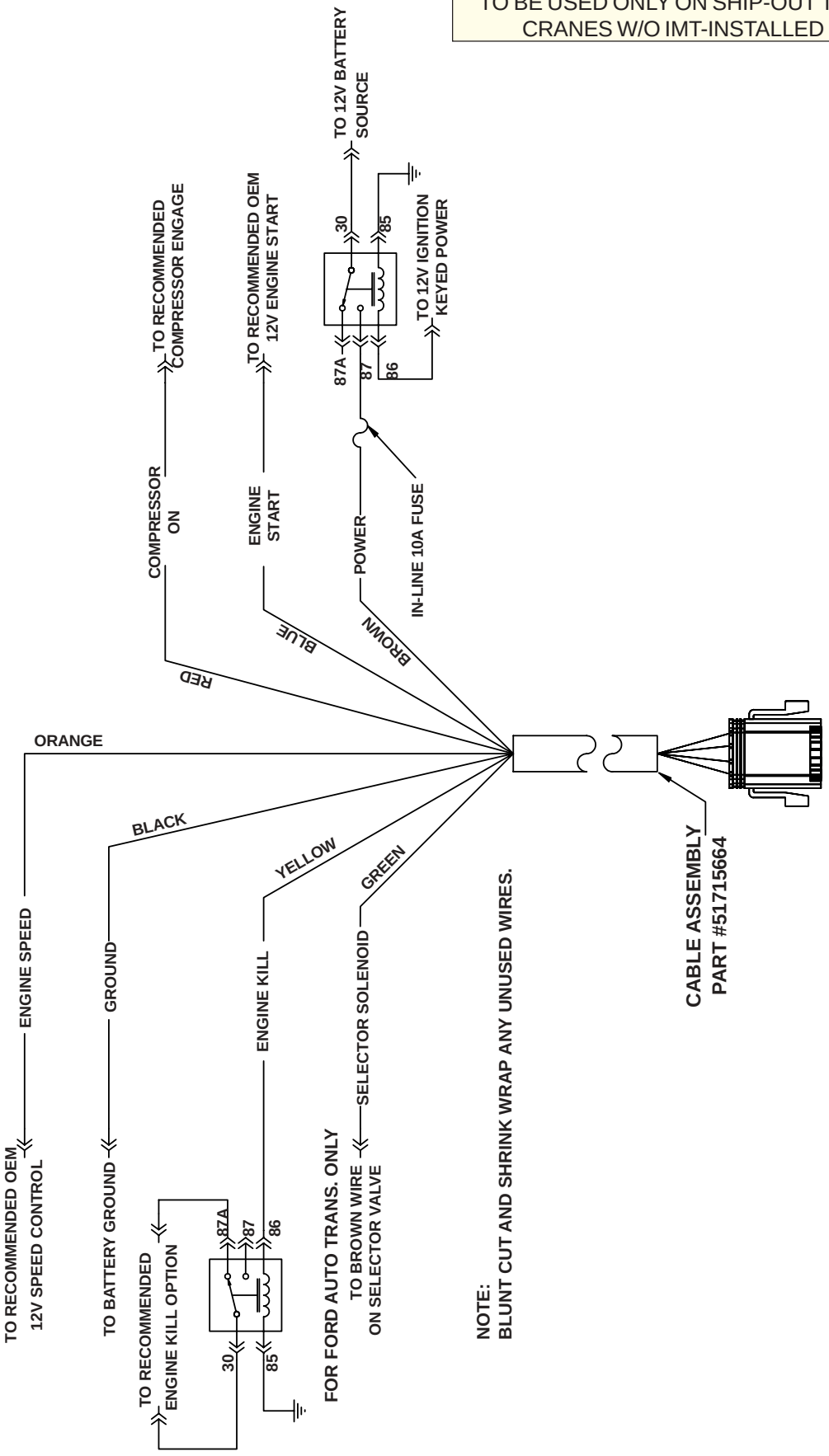
1.	73540051	C'BAL VALVE	1
2.	73540052	C'BAL VALVE	1
4.	70145750	ORIFICE	1
6.	77041552	PRESSURE SWITCH	1
7.	72533477	PLUG 7/16STR HOLHEX	2



CHASSIS WIRING HARNESS (99903340)

NOTE:

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



SECTION 4. GENERAL REFERENCE

NOTES

NOTICE

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

Inspection Checklist

CRANES

1

REV: 6-18-99

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

TYPE OF INSPECTION

NOTES:
Daily and monthly inspections are to be performed by a "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 (✘) 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.

✔ = SATISFACTORY
✘ = DEFICIENCY (must be corrected prior to operation)
R = RECOMMENDATION (should be considered for corrective action)
NA = NOT APPLICABLE

FREQUENCY	ITEM	KEY	INSPECTION DESCRIPTION	STATUS ✔ , ✘ *R, NA*
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.). 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	

Inspection Checklist — CRANES — 2

✔ = SATISFACTORY
✘ = DEFICIENCY (must be corrected prior to operation)
R = RECOMMENDATION (should be considered for corrective action)
NA = NOT APPLICABLE

FREQUENCY	ITEM	KEY	INSPECTION DESCRIPTION	STATUS ✔ , ✘ R, NA
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	

Inspection Checklist — CRANES — 3

✔ = SATISFACTORY
✘ = DEFICIENCY (must be corrected prior to operation)
R = RECOMMENDATION (should be considered for corrective action)
NA = NOT APPLICABLE

FREQUENCY	ITEM	KEY	INSPECTION DESCRIPTION	STATUS ✔, ✘ R, NA
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. 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

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

GUIDELINES

A. A deficiency (✘) may constitute a hazard. ✘ 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 (✘) listed must be followed by the corresponding corrective action taken (**CA**).*

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

✘, R, CA	ITEM #	EXPLANATION	DATE CORRECTED

Deficiency / Recommendation / Corrective Action Report (cont) 4

✘, R, CA	ITEM #	EXPLANATION	DATE CORRECTED

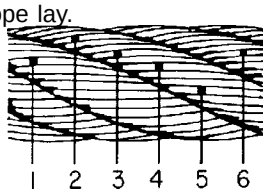
If additional space is required, reproduce this page and attach to this report.

WIRE ROPE INSPECTION

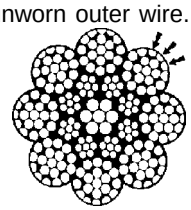
Wire rope with any of the deficiencies shown below shall be removed and replaced immediately.

A. Corrosion can be cause for replacement. Any development of corrosion must be noted and monitored closely.

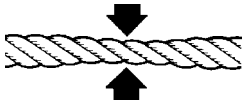
B. When there are either 3 broken wires in one strand or a total of six broken wires in all strands in any one rope lay.



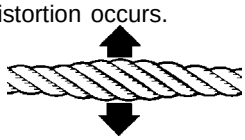
C. When flat spots on the outer wires appear and those outside wires are less than 2/3 the thickness of the unworn outer wire.



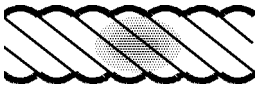
D. When there is a decrease of diameter indicating a core failure.



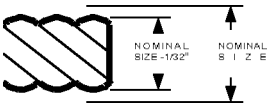
E. When kinking, crushing, birdcaging or other distortion occurs.



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.)

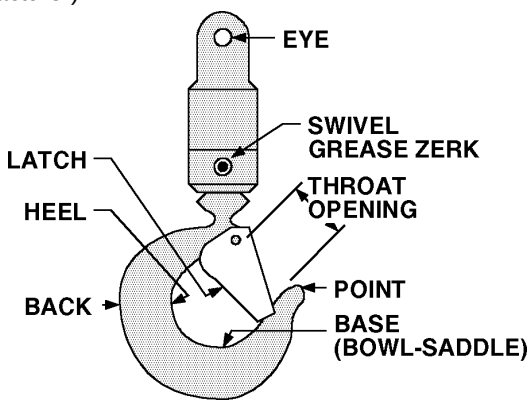
D. LATCH

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)



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

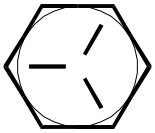
2. Examine cord for damage, cuts or breaks. Grasp cord and pull to check operation of cord reel. The cord should retract on reel when released.

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 (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
		 SAE J429 GRADE 5		 SAE J429 GRADE 8	
		PLAIN (FT-LBS)	PLATED (FT-LBS)	PLAIN (FT-LBS)	PLATED (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.

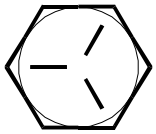
1. Bolt manufacturer’s particular specifications should be consulted when provided.
2. Flat washers of equal strength must be used.
3. All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.
4. Torque values specified are for bolts with residual oils or no special 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

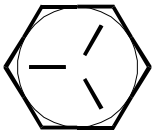
Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing.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

TORQUE DATA CHART - DOMESTIC

FINE THREAD BOLTS

SIZE (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
		 SAE J429 GRADE 5		 SAE J429 GRADE 8	
		PLAIN (FT-LBS)	PLATED (FT-LBS)	PLAIN (FT-LBS)	PLATED (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 (DIA-TPI)	BOLT DIA (INCHES)	TIGHTENING TORQUE			
		 SAE J429 GRADE 5		 SAE J429 GRADE 8	
		PLAIN (FT-LBS)	PLATED (FT-LBS)	PLAIN (FT-LBS)	PLATED (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.

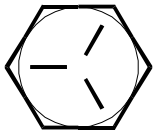
5. Torque values for socket-head capscrews are the same as for Grade 8 capscrews.

WARNING

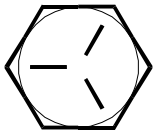
Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing.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

TORQUE DATA CHART - METRIC

FINE THREAD BOLTS

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

COARSE THREAD BOLTS

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

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

1. Bolt manufacturer's particular specifications should be consulted when provided.

2. Flat washers of equal strength must be used.

3. All torque measurements are given in kilogram-meters.

4. Torque values specified are for bolts with residual oils or no special lubricants applied. If special lubricants of high stress ability, such as Never-Seez compound graphite and oil, molybdenum disulphite, collodial copper or white lead are applied, multiply the torque values in the charts by the factor .90. The use of Loctite does not affect the torque values listed above.

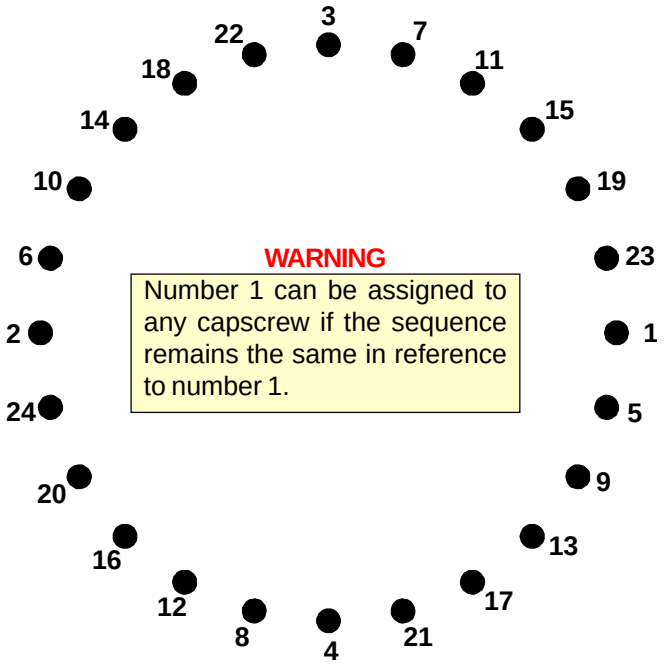
5. Torque values for socket-head capscrews are the same as for Grade 8 capscrews.

WARNING

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

TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE

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



TIGHTENING PROCEDURE:

1. Refer to the Torque Data Chart to determine the proper torque value to apply to the size of capscrew used.

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

3. Torque all capscrews to approximately 40% of the specified torque value, by following the sequence.
   (EXAMPLE: .40 x 265 FT-LBS = 106 FT-LBS)
   (EXAMPLE-METRIC: .40 x 36 KG-M = 14.4 KG-M)

4. Repeat Step 3, but torqueing all capscrews to 75% of the specified torque value. Continue to follow the tightening sequence.
   (EXAMPLE: .75 x 265 FT-LBS = 199 FT-LBS)
   (EXAMPLE-METRIC: .75 x 36 KG-M = 27 KG-M)

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

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 bearings internal clearance once mounted on a crane.

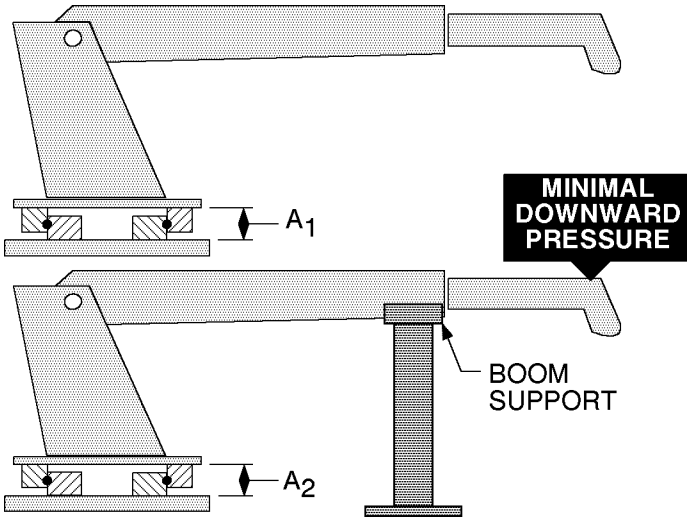
Periodic readings indicating a steady increase in TILT may be an indicator of bearing wear. Note that a bearing found to have no raceway cracks or other structural irregularities should be reassembled and returned to service.

TEST PROCEDURE

STEP 1.
With the crane horizontal and fully extended, measure between the top and bottom mounting surfaces of the turntable bearing (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

NOTE	IMT CRANE, LOADER OR TIREHAND MODEL				
THE FIGURES LISTED IN THIS CHART ARE SERVICE GUIDELINES AND DO NOT, IN THEMSELVES, REQUIRE THAT THE BEARING BE INSPECTED. IF THERE IS REASON TO SUSPECT AN EXCESS OF BEARING WEAR AND THE MEASURED TILT DIMENSION EXCEEDS THE DIMENSION LISTED, REMOVE THE BEARING FOR INSPECTION.		1007 1014 1014A 1015 2015/2020 2109 3000 3816/3820 3016/3020 421/425 4300 5016/5020 6016/6020 TH7 BODY ROT'N TH1449 BODY ROT'N TH15B CLAMP TH2551B CLAMP TH2557A CLAMP	5200 5200R 5217 5800 7020 7025 7200 7415 9000 TH10 BODY ROT'N TH14 BODY ROT'N	16000 32018 32030 T30 T40	9800 12916 13031 13034 14000 15000 18000 20017 H1200 H1200RR T50 TH2551B BODY ROT'N TH2557B BODY ROT'N TH2557A BODY ROT'N
	BALL DIA. (REF)	.875" (22mm)	1.00" (25mm)	1.18"-1.25" (30-32mm)	1.75" (44mm)
	TILT DIM. (A_1-A_2)	**.060" (1.524mm)**	**.070" (1.778mm)**	**.075" (1.905mm)**	**.090" (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.

MANUAL CHANGE REQUEST

DATE	PRODUCT MANUAL	MANUAL PART NO.
SUBMITTED BY		
COMPANY		
ADDRESS		
CITY, STATE, ZIP		
TELEPHONE		

☐ ERROR FOUND

LOCATION OF ERROR (page no.): _____

DESCRIPTION OF ERROR: _____

☐ ERROR FOUND

DESCRIPTION OF ADDITION: _____

REASON FOR ADDITION: _____

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