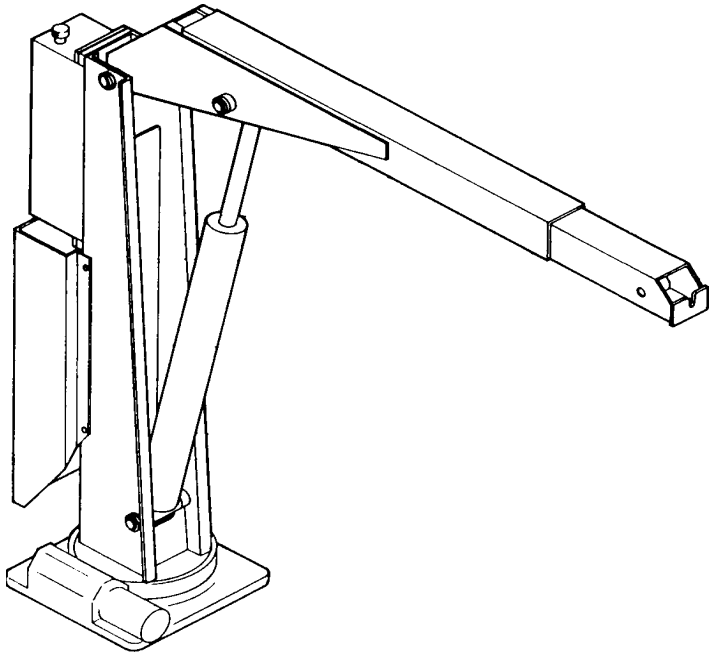
00002109:99900263: 19960628

Model 2109 Crane

Volume 2 - PARTS AND SPECIFICATIONS

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



IOWA MOLD TOOLING CO., INC.
BOX 189, GARNER, IA 50438-0189
TEL: 515-923-3711
TECHNICAL SUPPORT FAX: 515-923-2424

MANUAL PART NUMBER 99900263

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 truck-mounted articulating 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 B30.22-1987
ARTICULATING BOOM CRANES
The American Society of Mechanical Engineers
United Engineering Center
345 East 47th Street
New York, NY 10017

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

NOTE

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

CAUTION

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

WARNING

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

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.

SECTION 1. 2109 CRANE SPECIFICATIONS

NOTES

2109 CRANE SPECIFICATIONS

GENERAL SPECIFICATIONS

Crane Rating	21,000 ft-lbs (3.2 ton-meters)
Reach (from centerline of rotation)	9'-0" (2.74m)
Hydraulic Extension	40" (1.02m)
Lifting Height from base of crane	14'-11" (4.55m)
Crane Weight	930 lbs (422 kg)
Mounting Space Required for crane base	17" x 17-3/4" (43.2cm x 45.1cm)
Tie-Down Bolt Pattern (center to center)	14-3/4" x 14-3/4" (37.5cm x 37.5cm)
Vertical Center of Gravity (from base & stored)	34" (86.4cm)
Horizontal Center of Gravity (from centerline of rotation & stored)	2-1/4" (5.7cm)
Optimum Pump Capacity (electric, single stage)	1-1/2 U.S. GPM (5.7 liters/min)
Oil Reservoir Capacity	3 U.S. gallons (11.4 liters)
Design Factor (Pins and Hydraulics)	4/1

LIFTING CAPACITY (FROM CENTERLINE OF ROTATION)

5'-8" (1.73m)	3700 lbs (1678 kg)
9'-0" (2.74m)	2300 lbs (1043 kg)

PERFORMANCE CHARACTERISTICS

Rotation:	400° (6.98 Rad.)	*90 seconds
Lower Boom Elevation:	-90° to +60° (-1.57 Rad. to +1.05 Rad.)	*80 seconds
Extension Boom:	40" (101.6cm)	*25 seconds

* Times are based on a 1-1/2 GPM (5.7 liters/minute) optimum oil flow.

CYLINDERS

	BORE	**STROKE**
Lower Boom Cylinder	4" (10.2cm)	31-1/2" (80cm)
Extension Boom Cylinder	2" (5.1cm)	40" (101.6cm)

POWER SOURCE

Power is supplied to the electric motor by a solenoid connected to the 12 VDC truck battery. The chassis must be equipped with a 4000 watt Delco Freedom battery (or equivalent) connected in parallel to the chassis' standard heavy-duty battery. The chassis must also be equipped with a heavy-duty alternator (63 amp for GM vehicles and 60 amp for Ford vehicles).

CYLINDER HOLDING VALVES

The base end (extend side) of the lower cylinder is equipped with an integral-mounted counter-balance valve to prevent sudden cylinder collapse in case of a hose or other hydraulic failure.

The counter-balance valve serves several functions. First, it is a holding valve. Secondly, it is so constructed that it will control the lowering function and allow that motion to be feathered while under load. Finally, if a hose breaks, the only oil loss will be that in the hose.

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ROTATION SYSTEM

Turntable bearing with external worm gear powered with a high-torque hydraulic motor through a self-locking worm. Total gear reduction is 63 to 1.

ELECTRO-HYDRAULIC SYSTEM

Open-centered, full-pressure system that requires 1-1/2 GPM (5.7 liters/minute) optimum oil flow at 2350 PSI (162 bar). The control valvebank is a 3-spool, stack-type, 12 VDC valvebank. The system includes a 3-gallon (11.4 liter) hydraulic oil reservoir, a 100-mesh suction-line strainer, a hydraulic pump driven by a heavy-duty electric motor and all necessary hoses and fittings.

CONTROLS

Remote control with 15-foot (4.57m) control cable.

MINIMUM CHASSIS SPECIFICATIONS

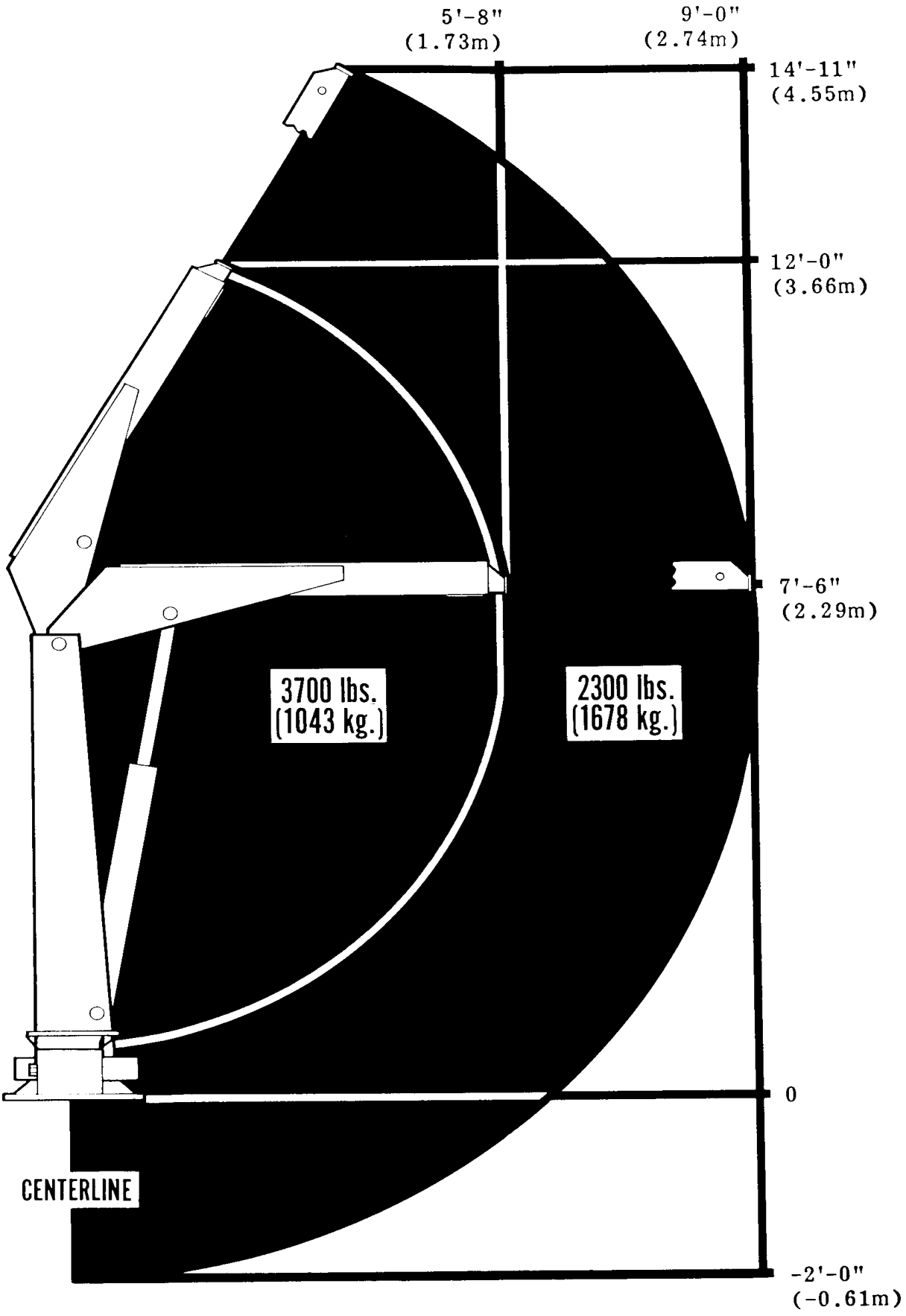
Body Style	Conventional Cab	Conventional Cab
Wheelbase	137'' to 161''	(348cm to 409cm)
Cab-to-axle	60'' to 84''	(152cm to 213cm)
* Frame Section Modulus	9.1 in^3	(149cc)
* RBM	327,600 in-lbs	(3774 kg-m)
Front Axle Rating	4000 lbs	(1814 kg)
Rear Axle Rating	7500 lbs	(3402 kg)

* Based on 36,000 PSI yield frame material (A-36).

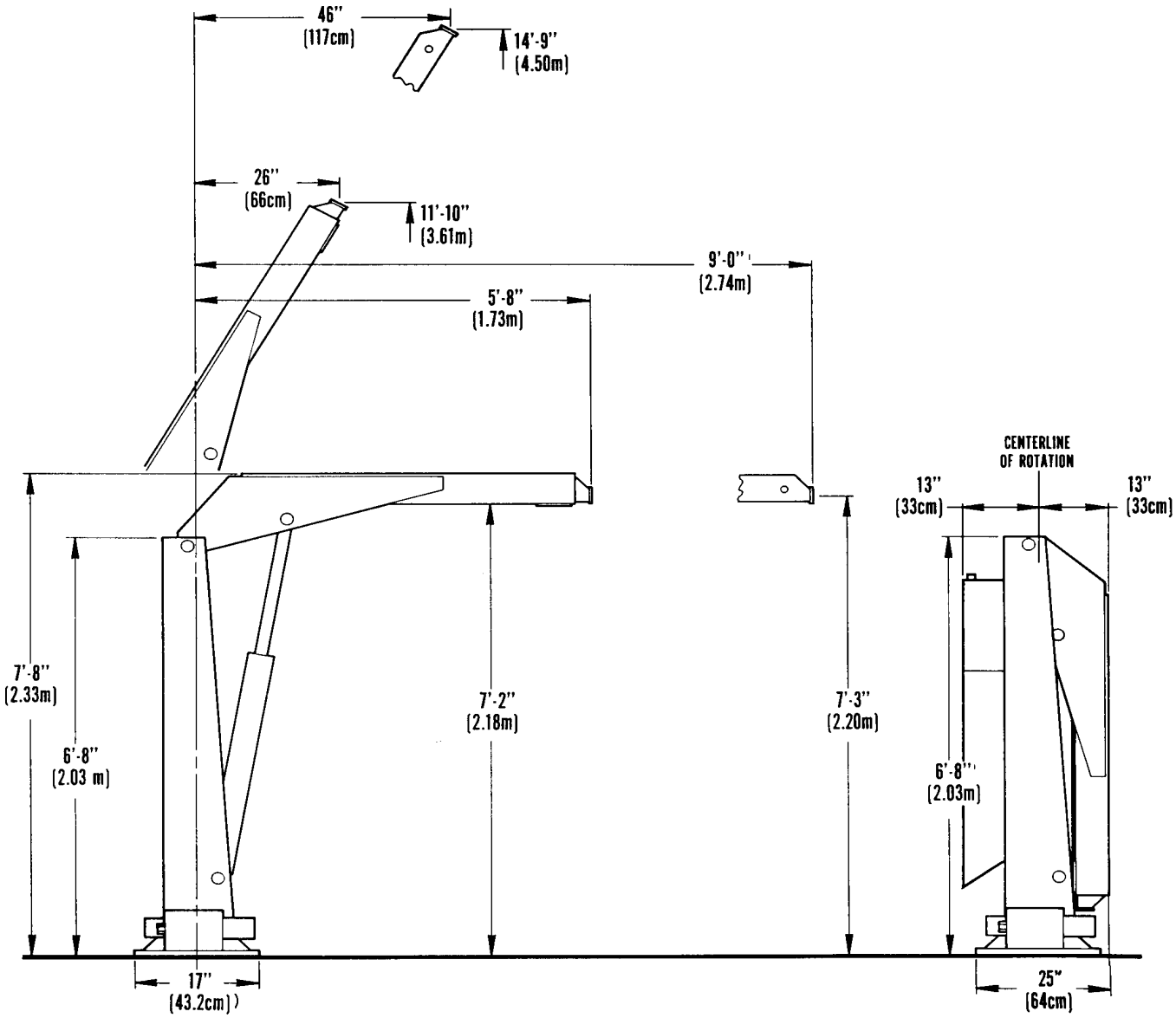
In addition to these specifications, a heavy-duty battery and alternator are required. It is recomended that the vehicle have power steering and dual rear wheels.

IMT reserves the right to change specifications without notice.

CAPACITY CHART

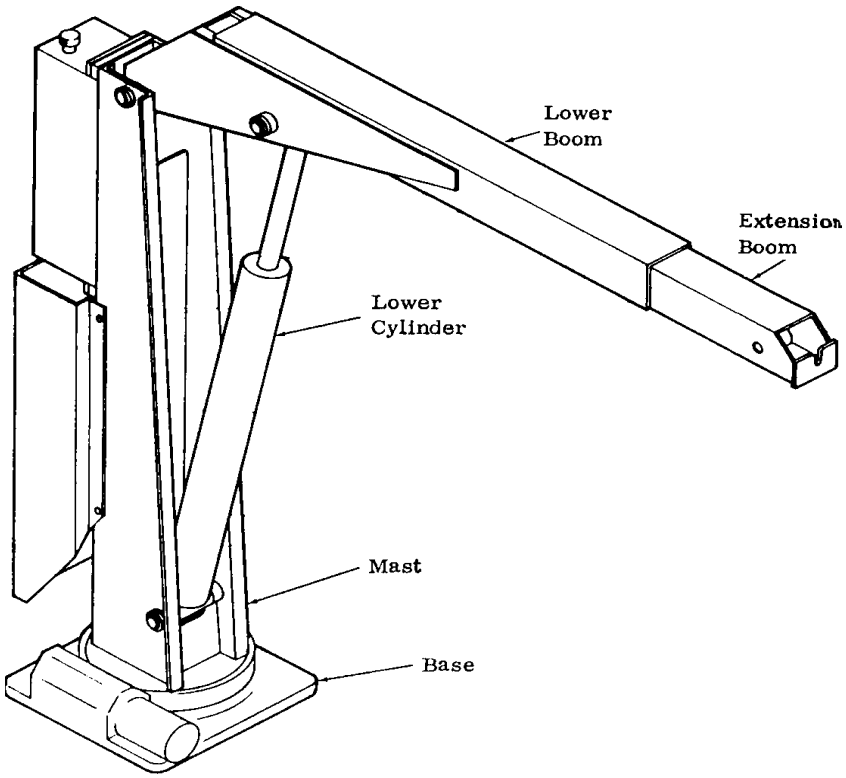


GEOMETRIC CONFIGURATION

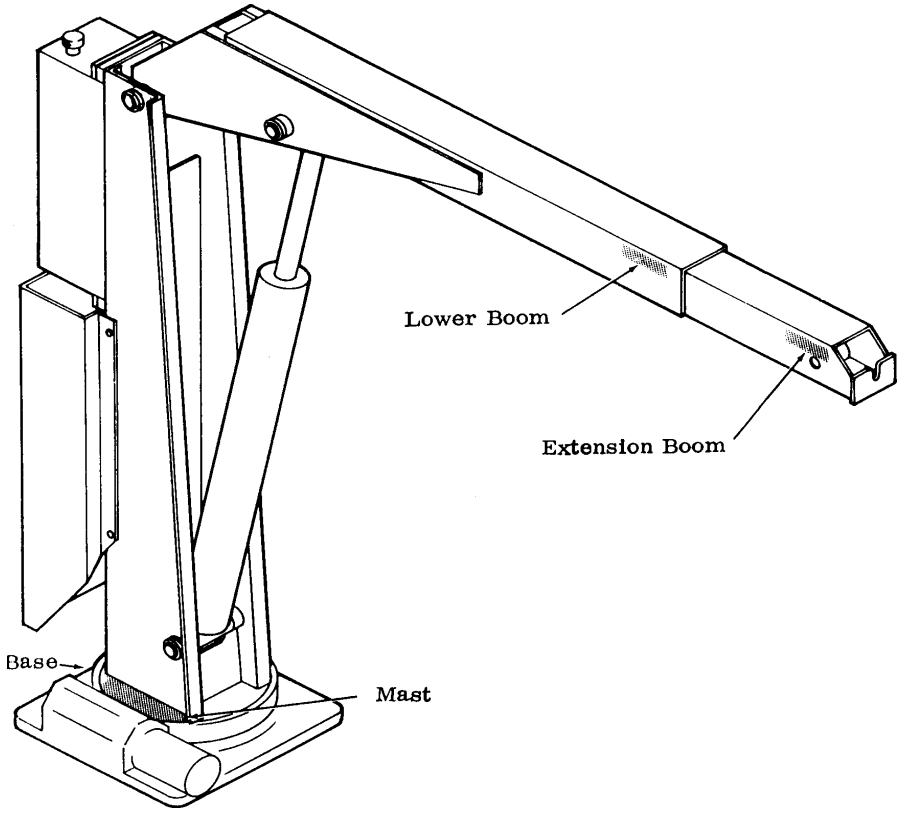


SECTION 2. 2109 CRANE REFERENCE

NOTES

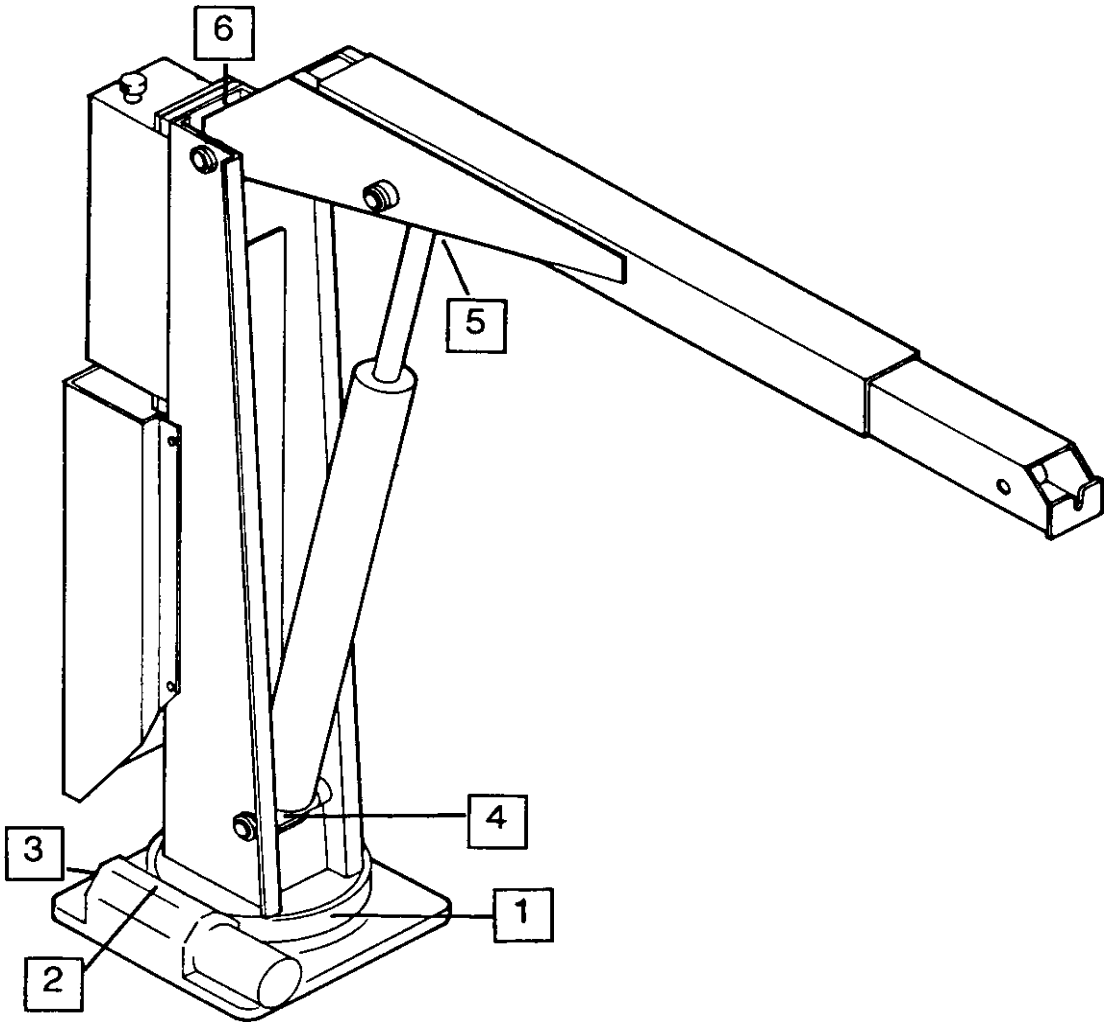


MAJOR CRANE ASSEMBLIES



WELDMENT PART NUMBER LOCATIONS

GREASE ZERK LOCATIONS & LUBRICANT REQUIREMENTS



ITEM	LOCATION DESCRIPTION	LUBRICANT	FREQUENCY
1. 2. 3. 4. 5. 6.	TURNTABLE/BEARING GREASE EXTENSION *ROTATE CRANE WHILE GREASING WORM GEAR COVER WORM GEAR END LOWER CYLINDER BASE LOWER CYLINDER ROD MAST/LOWER BOOM HINGE PIN	SHELL ALVANIA 2EP OR SHELL RETINAX “A”	WEEKLY

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

RECOMMENDED SPARE PARTS LIST

1 YEAR SUPPLY
2109 CRANE
FOR MANUAL: 99900263

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
41704555.01.19960628	**BASE ASM**						
	4	60030116	THRUST BEARING	2	W		
	7	70055147	BEARING	1	W		
	8	70055148	BEARING	1	W		
	9	70056307	WORM GEAR	1	C		
	10	71056308	TURNTABLE BEARING	1	W		
	18	72062251	NUT	1	W		
	19	72062162	NUT	15	W		
	21	72063161	WASHER	3	W		
	24	72063117	WASHER	15	W		
	27	72601313	CAP SCR	15	W		
	28	73051482	MOTOR	1	C		
41705323.01.19910517	**MAST ASM**						
	14	72063117	WASHER	12	W		
	16	72601144	CAP SCR	12	W		
41705324.01.19910517	**LOWER BOOM ASM**						
	3	7BF81215	BUSHING	2	W		
	4	60030007	WEAR PAD	2	W		
	5	60030145	WEAR PAD	1	W		
3B202840.01.19931230	**LOWER BOOM CYLINDER**						
	6	73054304	VALVE 10 GPM	1	C		
	7	9C162023	SEAL KIT	1	W		
	18	7BF81015	BUSHING	8	W		
41705325.01.19910517	**EXTENSION BOOM ASM**						
	4	60030081	WEAR PAD	1	W		
	6	70058066	CHAIN/HOOK ASM	1	W		
3B201840.01.19931013	**EXTENSION CYLINDER**						
	7	9B081012	SEAL KIT	1	W		
90705328.01.19920409	**CONTROL KIT-3 FUNCTION/POWER UNIT**						
	13	77041237	SOLENOID 12V 150A	1	W		
51705329.01.19910830	**REMOTE HANDLE ASSEMBLY-3 FUNCTION**						
	11	77041345	TOGGLE SWITCH ST	1	W		
	12	77041346	TOGGLE SWITCH DT	3	W		
93705327.01.19920409	**INSTALLATION KIT**						
	17	77041237	SOLENOID 12V 150AMP	1	W		

(BLANK)

INSTALLATION

GENERAL INSTALLATION

NOTE

These intructions apply only to IMT metal and fiberglass bodies.

1. Inspect the carrier vehicle for compliance with the MINIMUM CHASSIS SPECIFICATIONS listed in Section 1-SPECIFICATIONS.

2. Locate the center point of the crane support 15-1/4" from the side wall of the body and 18" from the rear edge of the body. For right side mount, center point to be 16-1/2" from side wall and 18-7/8" from rear edge of body.

3. Cut a 6-1/2" x 4-1/2" rectangular hole centered on the point located in step 2. The 4-1/2" dimension must be parallel with the side wall of the body.

CAUTION

Before cutting the hole, make certain it will not interfere with the body frame members. Do not cut any frame members when cutting the hole.

The fiberglass body deck consists of fiberglass impregnated expanded metal. Use a metal cutting blade in the saw.

4. Insert the crane support in the hole and weld the crane support to the deck. Drill the four mounting holes.

NOTE

The "diamond plate" deck on the fiberglass body appears to be metal. It is, in fact, fiberglass and will be damaged by attempting to weld the crane support to the deck. Use the crane support as a template and drill the four mounting holes.

5. Position the support plate in the hole and install the crane on top of the plate. Use a lifting device capable of lifting the weight of the crane, 930 lbs (422 kg). Install three bolts through the top of the crane base, through the deck and into the crane support bottom plate. Install the washers and nuts. Note that the bottom support plate must span two deck channels. Install the fourth bolt with washer and nut from the bottom side.

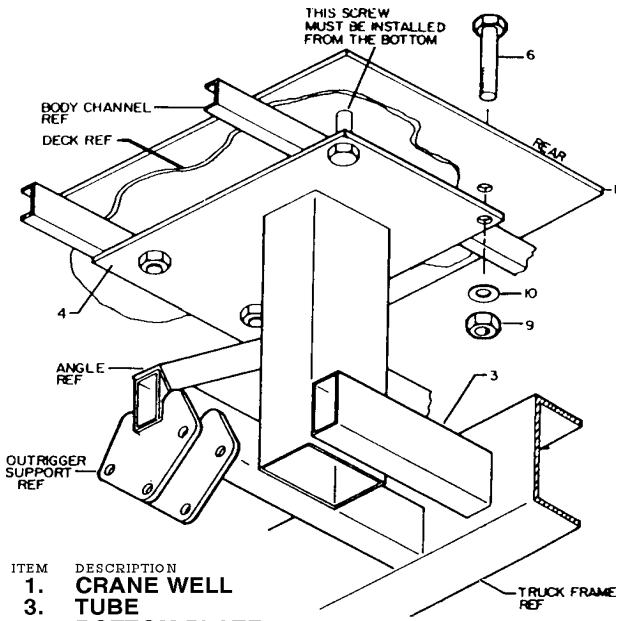
6. Weld the 4" x 2" x 1/4" wall support tube to the truck frame and rear side of the crane support tube. Weld outrigger tube to chassis and front of crane support tube. Weld angle from bottom support plate to outrigger tube.

NOTE

If optional outrigger support tube is not ordered, use a 4" x 2" x 1/4" wall tube (customer supplied). All welding must be done by an AWS qualified welder.

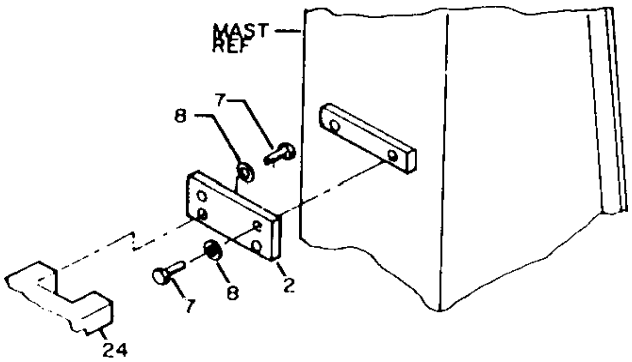
7. Spray paint all unpainted surfaces.

8. Feed the battery cable up through the support tube and base and connect it to the power unit solenoid. Connect the other end to the underhood solenoid which is connected to the positive (+) side of the battery.



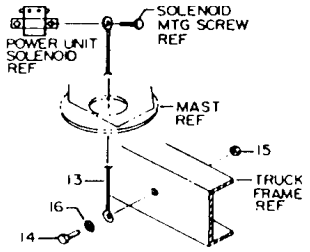
ITEM	DESCRIPTION
1.	CRANE WELL
3.	TUBE
4.	BOTTOM PLATE
6.	CAP SCR 3/4-10X5
9.	NUT 3/4-10 LOCK
10.	WASHER 3/4 LOCK

BODY PREPARATION



ITEM	DESCRIPTION
2.	POWER UNIT MOUNTING BAR
7.	CAP SCR 3/8-16X7/8 HH
8.	WASHER 3/8 LOCK
24.	POWER UNIT

POWER UNIT INSTALLATION

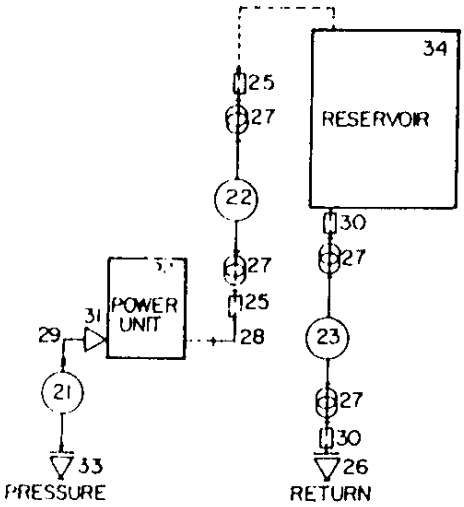


NOTE

The ground wire must be used in this installation. Failure to use a ground wire may result in arcing between the worm and worm gear or an inadequate ground between the two gears.

ITEM	DESCRIPTION
13.	CABLE #2 X 72
14.	CAP SCR 3/8-16X1 HH
15.	NUT 3/8-16 LOCK
16.	WASHER 3/8 STAR

GROUND WIRE INSTALLATION



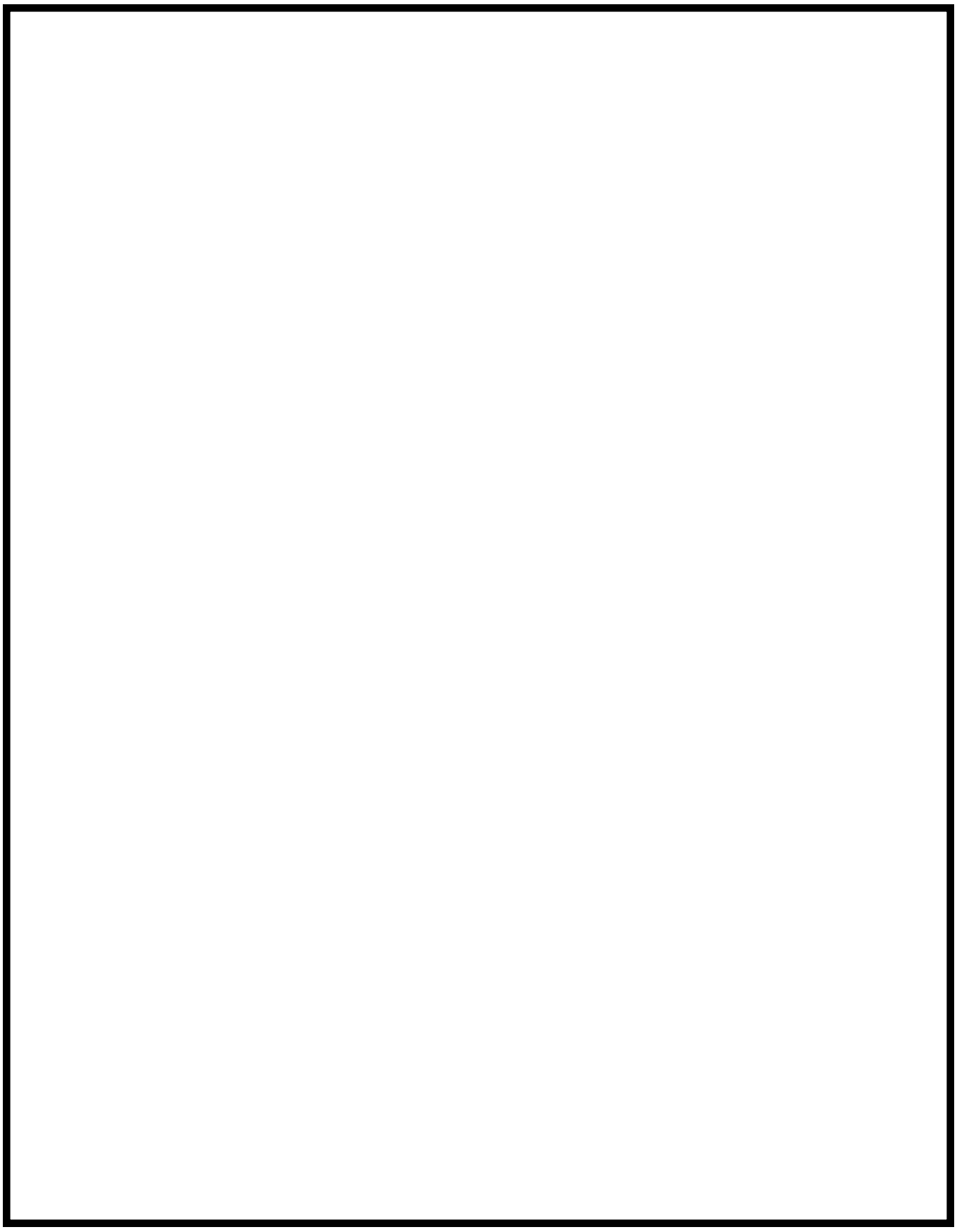
ITEM	DESCRIPTION
21.	HOSE ASM 1/4 X 5-1/4
22.	HOSE 1/2 X 16-1/2
23.	HOSE 1/2 X 25-1/2
24.	POWER UNIT
25.	BARBED NIPPLE 1/2
26.	SWIVEL ADAPTER
27.	HOSE CLAMP 3/4
28.	STREET ELBOW 1/2NPT 90°
29.	STREET ELBOW 90°
30.	BARBED NIPPLE
31.	REDUCER BUSHING
33.	ADAPTER
34.	RESERVOIR

NOTE

Refer to the parts list for complete descriptions and part numbers.

HYDRAULIC INSTALLATION

SECTION 3. REPLACEMENT PARTS 2109 CRANE



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.

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 (see figure) attached to the mast. When ordering parts, communicating warranty information, or referring to the unit in correspondence, always include the serial number and model numbers. All inquiries should be addressed to:

Iowa Mold Tooling Co., Inc.
Box 189, Garner, IA 50438-0189
Telephone: 515-923-3711
Technical Support Fax: 515-923-2424

CYLINDER IDENTIFICATION

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

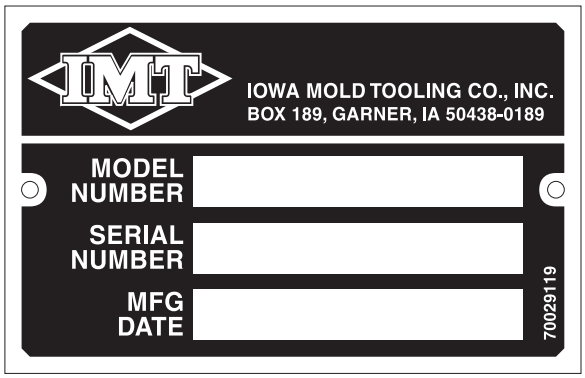
WELDMENT IDENTIFICATION

Each of the major weldments - base, mast, inner boom, outer boom, extension boom and outrigger weldments bear a stamped part number. Any time a major weldment is replaced, you must specify the complete part number as stamped on the weldment. The locations of the part numbers are shown in Section 2.

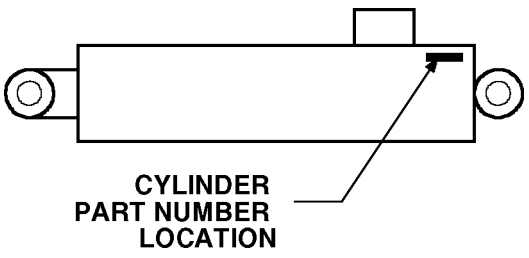
ORDERING REPAIR PARTS

When ordering replacement parts:

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



SERIAL NUMBER PLACARD



CYLINDER PART NUMBER LOCATION

BASE ASM (41704555)

ITEM	PART NO.	DESCRIPTION	QTY
1.	51704551	BASE	1
2.	52704604	GUARD	1
3.	60030086	TUBING 1/4 X 6	1
4.	60030116	THRUST BEARING	2
5.	60107543	SUPPORT PLATE	1
6.	60107617	COVER	1
7.	70055147	BEARING	1
8.	70055148	BEARING	1
9.	70056307	WORM GEAR	1
10.	71056308	TURNTABLE BEARING	1
11.	71142535	SLIDE 400°	1
12.	72053301	COUPLING 1/8NPT	1
13.	72063050	WASHER 5/16 LOCK	2
14.	72053508	ZERK 1/8NPT	2
15.	72060000	CAP SCR 1/4-20X1/2 HHGR5	4
17.	72060023	CAP SCR 5/16-18X3/4 HHGR5	2
18.	72062251	NUT 7/8-9 LOCK 2-PC GR8	1
19.	72062162	NUT 9/16-12 HEX GR8	15
21.	72063161	WASHER 1-1/8 FLAT	3
22.	72063049	WASHER 1/4 LOCK	4
24.	72063117	WASHER 9/16 FLAT HARD GR8	15
25.	72531731	ADAPTER 1/8POLY-FLO 1/4	1
26.	72531746	ELBOW 1/8MPT 1/4POLYFLO 90°	1
27.	72601313	CAP SCR 9/16-12X3-1/2 HHGR8	15
28.	73051482	MOTOR	1
29.	72601486	CAP SCR 1/2-13X1-3/4 SH	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.

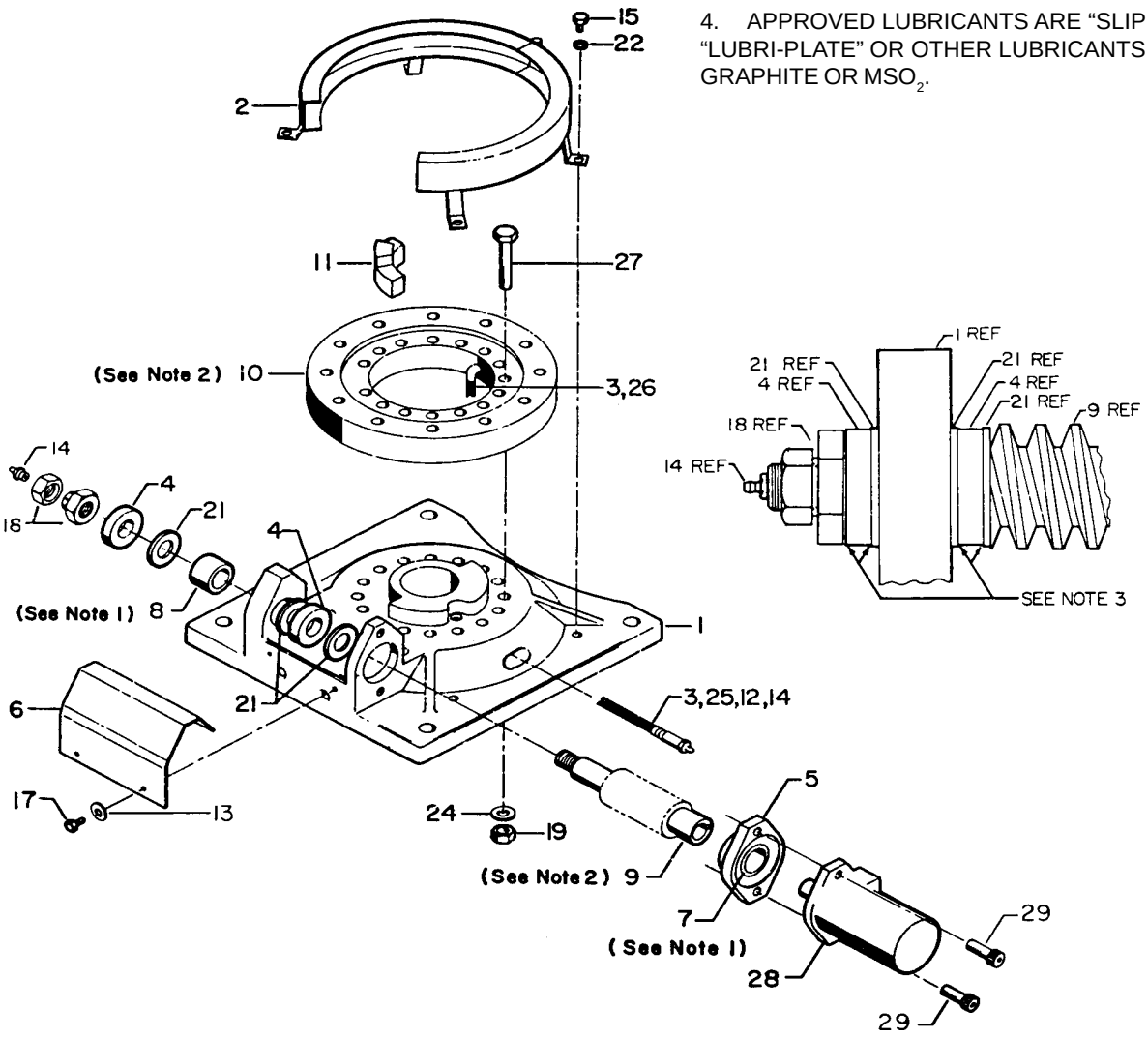
NOTES:

1. BEARINGS MUST BE PACKED WITH GREASE AT ASSEMBLY.

2. APPLY “MOLUB-ALLOY 936” TO TURNTABLE BEARING AND WORM GEAR TEETH AT ASSEMBLY.

3. INITIAL LUBRICATION OF BOTH SIDES OF THRUST BEARING IS REQUIRED AT TIME OF INSTALLATION. SEE NOTE 4 FOR APPROVED LUBRICANTS.

4. APPROVED LUBRICANTS ARE “SLIP PLATE”, “LUBRI-PLATE” OR OTHER LUBRICANTS CONTAINING GRAPHITE OR MSO_2.

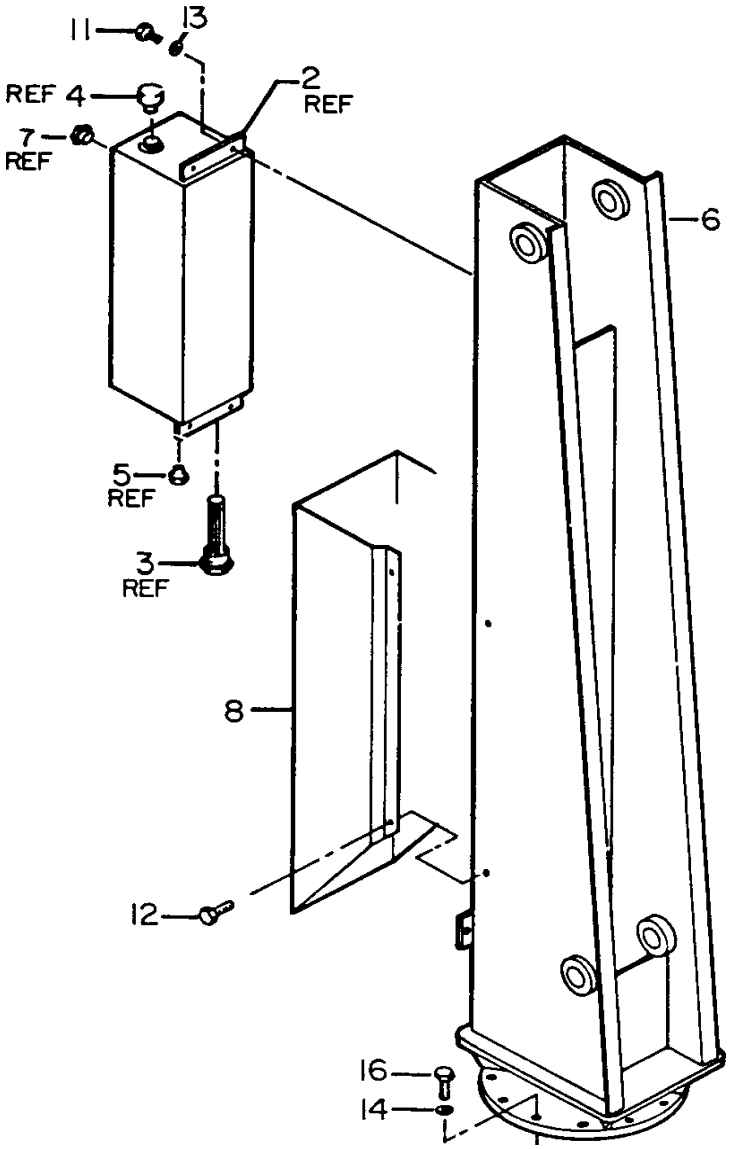


MAST ASM (41705323)

ITEM	PART NO.	DESCRIPTION	QTY
1.	51705236	RESERVOIR ASM (INCL:2-5,7)	1
2.	52705153	RESERVOIR (PART OF 1)	1REF
3.	70142779	STRAINER (PART OF 1)	1REF
4.	70392298	BREATHER (PART OF 1)	1REF
5.	72532660	PIPE PLUG 3/8NPT (PART OF 1)	1REF
6.	52705316	MAST	1
7.	72532261	SIGHT GAUGE 3/4 (PART OF 1)	1REF
8.	60108359	PWR UNIT COVER	1
9.	70029119	SERIAL NO. PLACARD (NS)	1
11.	72060021	CAP SCR 5/16-18X1/2 HH GR5	4
12.	72060857	SCR 5/16-18X5/8 HH SLFTPG	4
13.	72063050	WASHER 5/16 LOCK	4
14.	72063117	WASHER 9/16 FLAT GR8	12
15.	72661216	GRIPNAIL (NOT SHOWN)	2
16.	72601144	CAP SCR 9/16-12X2 HH GR8	12

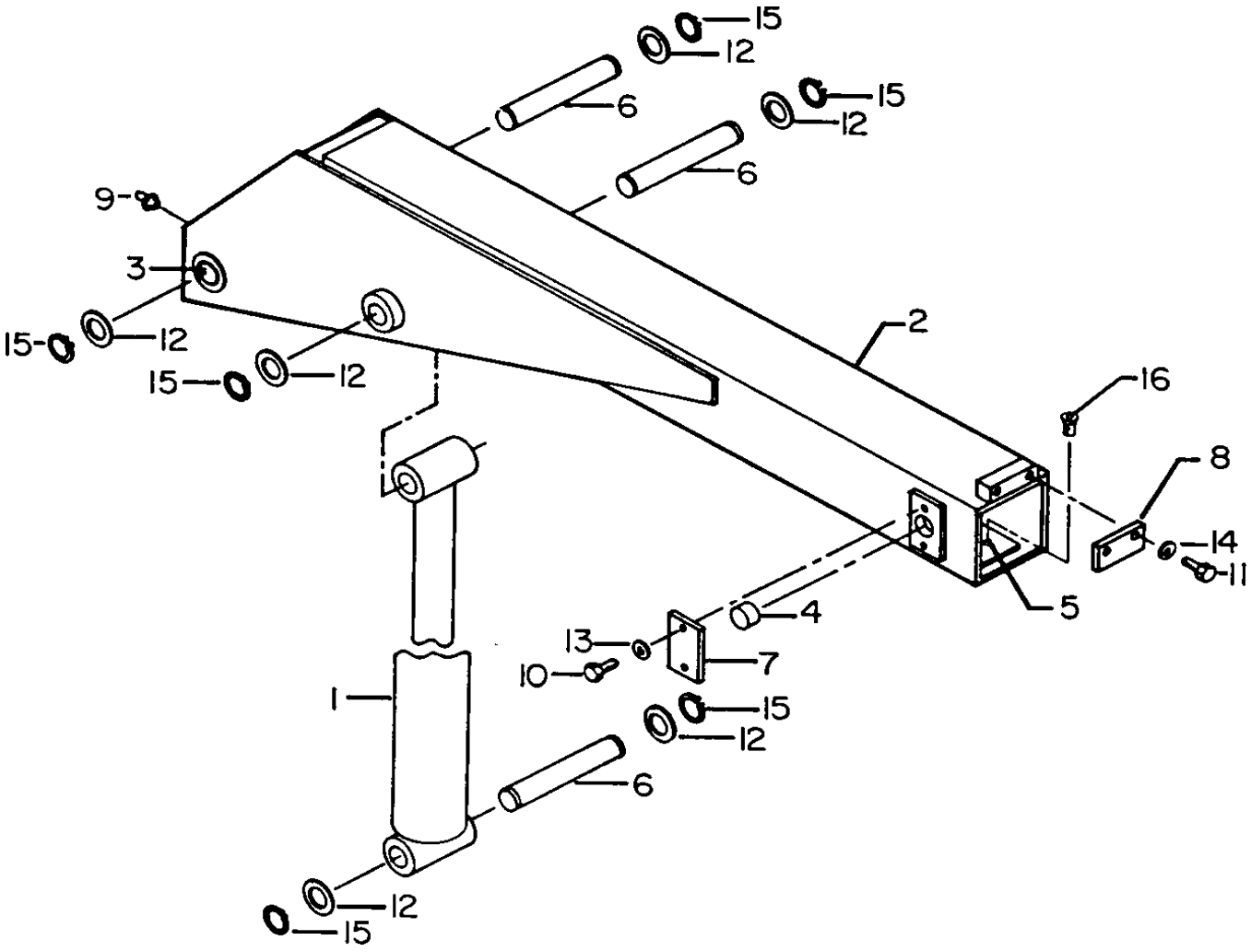
WARNING

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.



LOWER BOOM ASM (41705324)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B202840	LOWER CYLINDER	1
2.	52705317	LOWER BOOM (INCL: 3)	1
3.	7BF81215	BUSHING (PART OF 2)	2REF
4.	60030007	WEAR PAD	2
5.	60030145	WEAR PAD	1
6.	60101051	PIN	3
7.	60107550	LOCK PLATE	2
8.	60108352	SPACE	1
9.	72053508	ZERK 1/8NPT	1
10.	72060042	CAP SCR 3/8-16X1/2 HH GR5	4
11.	72060093	CAP SCR 1/2-13X1-1/2 HH GR5	2
12.	72063037	MACH BUSHING 1-1/2X10GA NR	6
13.	72063051	WASHER 3/8 LOCK	4
14.	72063053	WASHER 1/2 LOCK	2
15.	72066132	RETAING RING 1-1/2 EXT HD	6
16.	72060915	CAP SCR 3/8-16X1 FLHDSOC	2



LOWER BOOM CYLINDER (3B202840)

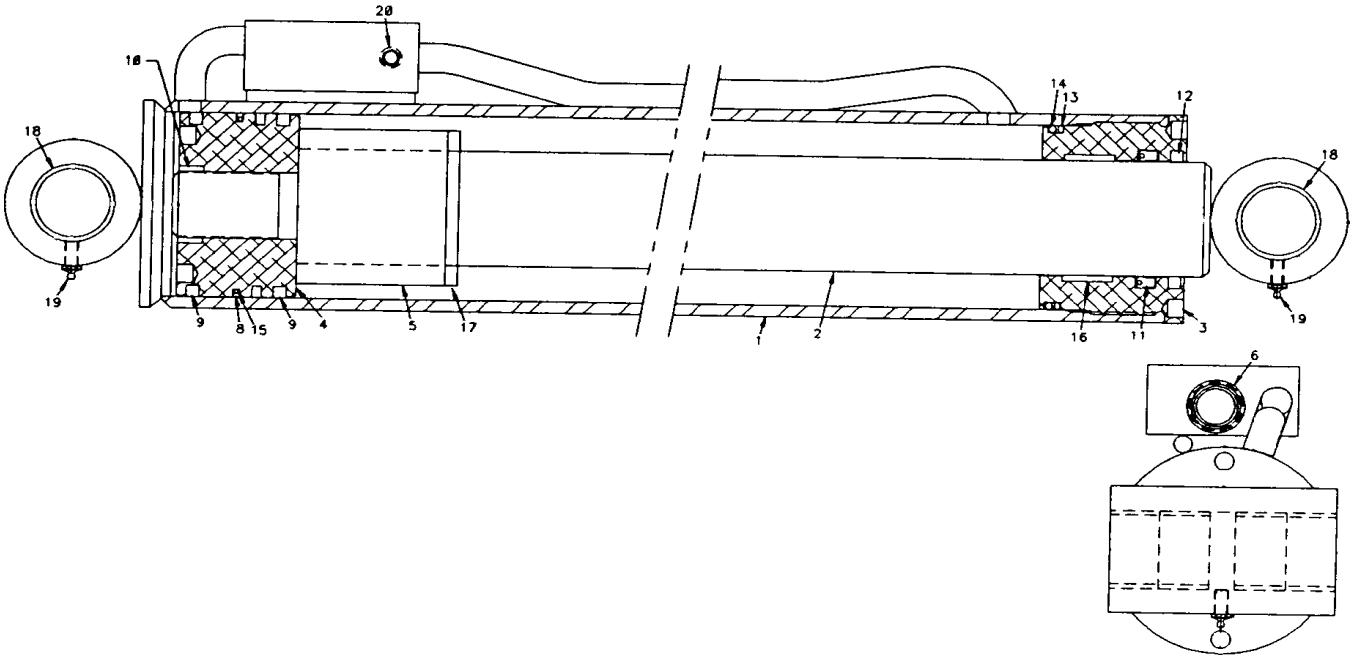
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B202840	CASE ASM (INCL:18-20)	1
2.	4G202840	ROD ASM (INCL: 18&19)	1
3.	6H040025	HEAD	1
4.	6I040143	PISTON	1
5.	6C300025	STOP TUBE	1
6.	73054304	VALVE 10GPM	1
7.	9C162023	SEAL KIT (INCL: 8-17)	1
8.	7T66P040	PISTON SEAL (PART OF 7)	1REF
9.	7T65I040	PISTONG RING (PART OF 7)	2REF
10.	7T61N143	LOCK RING SEAL (PART OF 7)	1REF
11.	7R546025	ROD SEAL (PART OF 7)	1REF
12.	7R14P025	ROD WIPER (PART OF 7)	1REF
13.	7Q10P342	BACK-UP RING (PART OF 7)	1REF
14.	7Q072342	O-RING (PART OF 7)	1REF
15.	7Q072153	O-RING (PART OF 7)	1REF
16.	7T2N8027	WEAR RING (PART OF 7)	1REF
17.	6A025025	WAFER LOCK (PART OF 7)	1REF
18.	7BF81015	BUSHING (PART OF 1&2)	8REF
19.	72053507	ZERK 1/4-28 (PART OF 1&2)	2REF
20.	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	3REF

NOTE

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

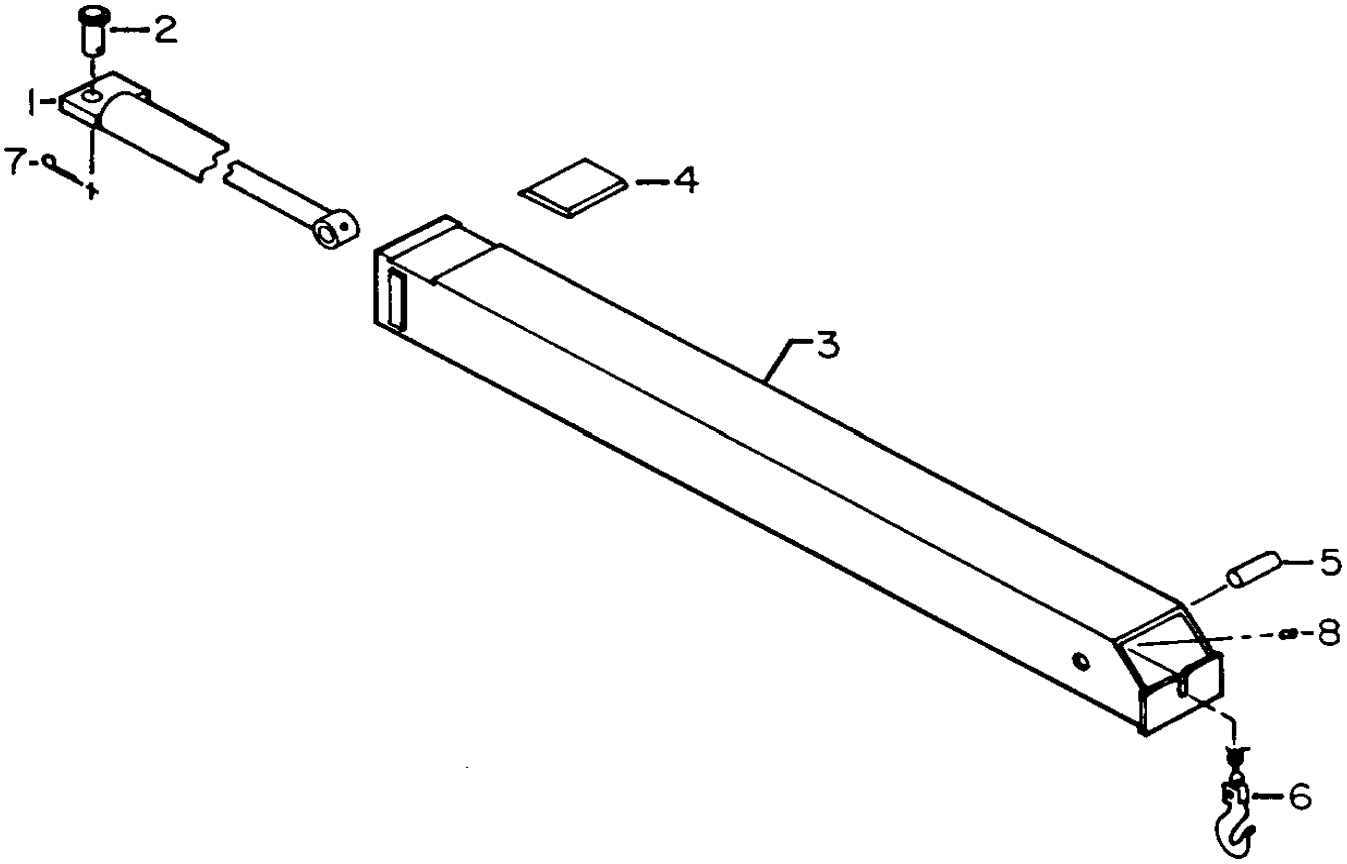
APPLY “LUBRIPLATE #630-2” MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON AND HEAD GLANDS, LOCK RING AND ROD THREADS BEFORE ASSEMBLY.

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



EXTENSION BOOM ASM (41705325)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B201840	EXT CYLINDER (INCL: 8)	1
2.	52070319	PIN	1
3.	52705318	EXTENSION BOOM	1
4.	60030081	WEAR PAD	1
5.	60108145	PIN	1
6.	70058066	CHAIN ASM	1
7.	72066181	COTTER PIN 1/8 X 2	1
8.	72060578	SET SCR 3/8-16X3/8 SH (PART OF 1)	1REF



EXTENSION CYLINDER (3B201840)

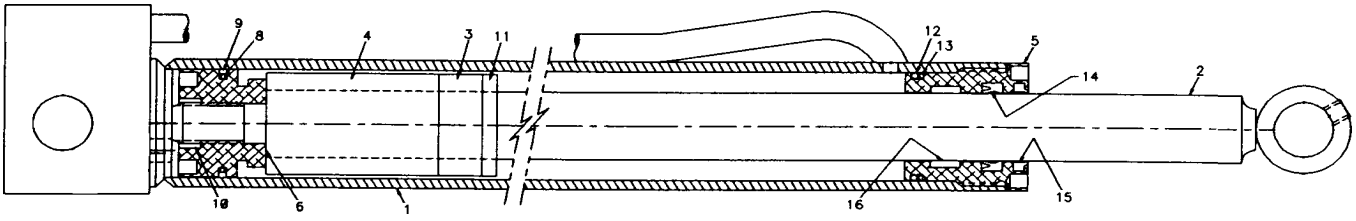
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B059511	CASE ASM	1
2.	4G201840	ROD ASM	1
3.	6C075012	STOP TUBE .75"	1
4.	6C300012	STOP TUBE 3"	1
5.	6H020012	HEAD	1
6.	6I020075	PISTON	1
7.	9B081012	SEAL KIT (INCL:8-16)	1
8.	7Q072129	O-RING (PART OF 7)	1REF
9.	7T66P020	PISTON SEAL (PART OF 7)	1REF
10.	7T61N075	LOCK RING (PART OF 7)	1REF
11.	6A025012	WAFER LOCK (PART OF 7)	1REF
12.	7Q072224	O-RING (PART OF 7)	1REF
13.	7Q10P224	BACKUP RING (PART OF 7)	1REF
14.	7R546012	U-CUP (PART OF 7)	1REF
15.	7R14P012	ROD WIPER (PART OF 7)	1REF
16.	7T2N8012	WEAR RING-ROD (PART OF 7)	1REF

NOTE

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

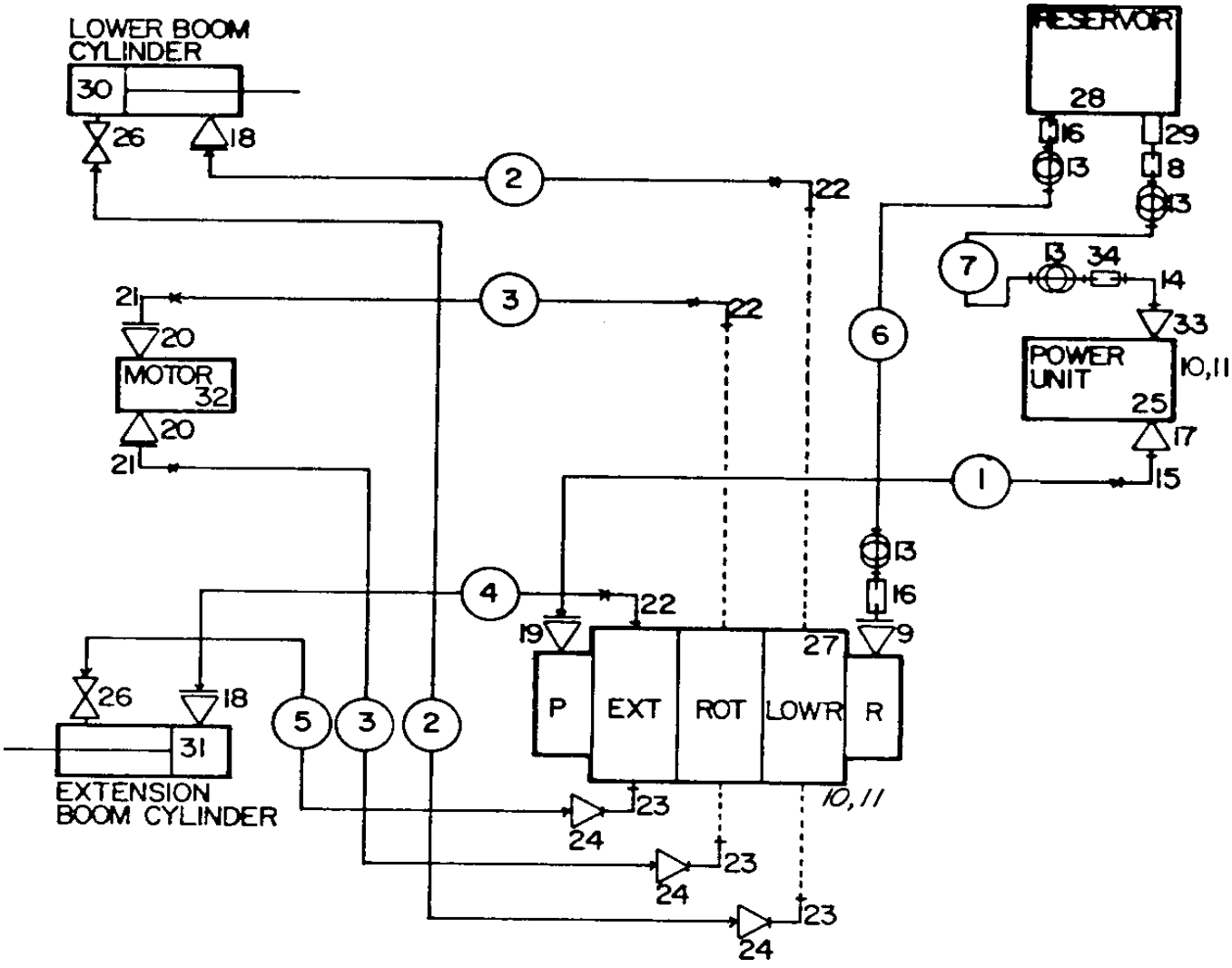
APPLY “LUBRIPLATE #630-2” MEDIUM HEAVY, MULTI-PURPOSE LUBRICANT OR EQUIVALENT TO ALL PISTON AND HEAD GLANDS, LOCK RING AND ROD THREADS BEFORE ASSEMBLY.

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



HYDRAULIC KIT- 3 SECT-PWR UNIT (91705326)

ITEM	PART NO.	DESCRIPTION	QTY
1.	51706031	HOSE ASM 1/4 X 4-3/4	1
2.	51705263	HOSE ASM 1/4 X 34	2
3.	51705320	HOSE ASM 1/4 X 52	2
4.	51705321	HOSE ASM 1/4 X 80	1
5.	51705322	HOSE ASM 1/4 X 81	1
6.	60035809	HOSE 1/2 100R2 X 24-1/2	1
7.	60035699	HOSE 1/2 100R2 X 16	1
8.	72053457	BARB NIPPLE 1/2MPT 1/2HOSE	1
9.	72532795	ADAPTER 9/16MSTR 3/8FPT	1
10.	72060044	CAP SCR 3/8-16X3/4 HH GR5	6
11.	72063051	WASHER 3/8 LOCK	6
13.	72066004	HOSE CLAMP 1/2-1-1/8 SAE#10	4
14.	72531132	STREET ELBOW 3/8 90°	1
15.	72531412	ELBOW 1/4MPT 7/16MJIC 90°	1
16.	72531543	BARB NIPPLE 3/8MPT 1/2HOSE	2
17.	72532138	REDUCER BUSHING 3/8-1/4NPT	1
18.	72532351	ADAPTER 7/16MSTR 7/16MJIC	2
19.	72532353	ADAPTER 9/16MSTR 7/16MJIC	1
20.	72532722	ADAPTER 7/8MSTR 9/16FSTR	2
21.	72532985	ELBOW 9/16MSTR 7/16MJIC 45°	2
22.	72532699	ELBOW 9/16MSTR 7/16MJIC 90°	3
23.	7253700	ELBOW 9/16MSTR9/16MJIC XLG	3
24.	72532707	RED. BUSH 7/16MJIC9/16FJIC	3
25.	73051399	POWER UNIT	1
26.	73054487	FLOW RESTRICTOR	2
27.	73073039	VALVEBANK 3 SECT	1
28.		RESERVOIR	1REF
29.		SUCTION STRAINER	1REF
30.		LOWER BOOM CYLINDER	1REF
31.		EXTENSION BOOM CYLINDER	1REF
32.		ROTATION MOTOR	1REF
33.	72531829	REDUCER BUSHING 1/2-3/8NPT	1
34.	72531543	BARB NIPPLE 3/8MPT 1/2HOSE	1



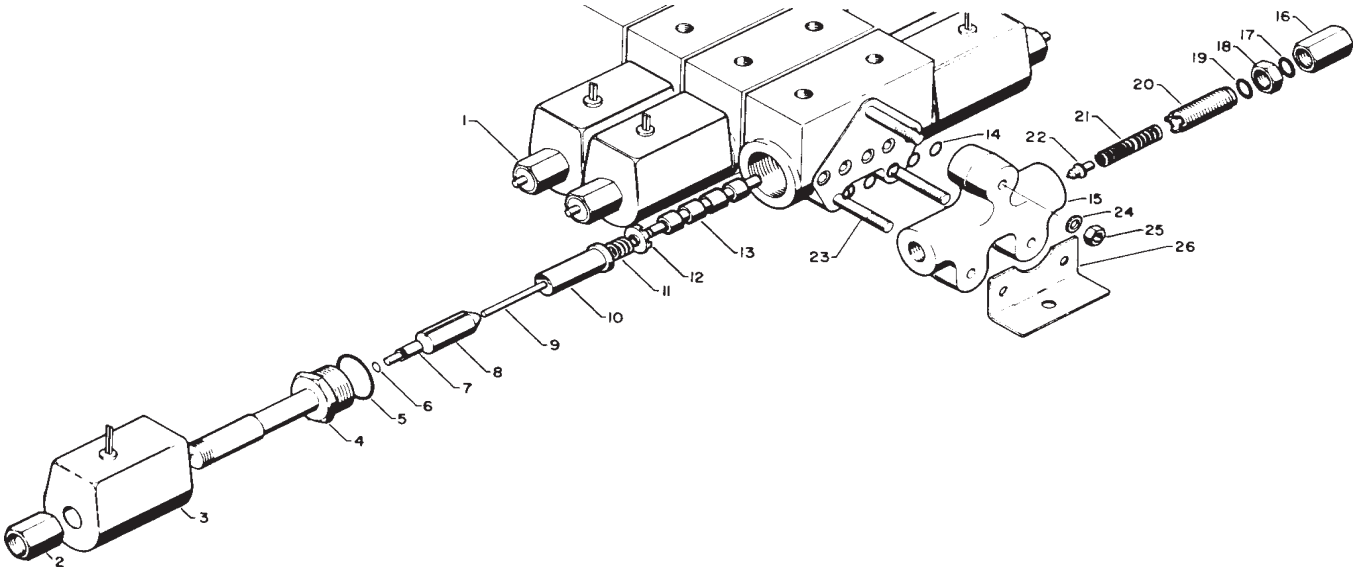
VALVEBANK 3-SPOOL (73073039)

ITEM	PART NO.	DESCRIPTION	QTY
1.	73054077	VALVE SECTION 12VDC	3
2.	73014950	NUT	2**
3.	77041016	COIL 12VDC	2**
4.	73014958	TUBE	2**
5.	7Q072113	O-RING	2**
6.	7Q072008	O-RING	2**
7.	73014957	BUTTON	2**
8.	73014956	PLUNGER	2**
9.	73014954	PIN	2**
10.	73014955	PLUG	2**
11.	73014953	SPRING	2**
12.	73014952	SPRING RETAINER	2**
13.	REF	SPOOL & BODY	1**
	PART OF 73054077		
14.	7Q072012	O-RING	5**
15.	73014948	INLET (INCL: 1-6)	1
16.	*	RELIEF VALVE ADJ CAP	REF
17.	*	O-RING	REF
18.	*	JAM NUT	REF
19.	*	O-RING	REF
20.	*	ADJ ROD	REF
21.	*	SPRING	REF
22.	*	NEEDLE	REF
23.	73014960	STUD	3
24.	72063002	WASHER 5/16 WRT	6
25.	72062001	NUT 5/16-18	6
26.	73014959	BRACKET	2

* Not available separately - order item 15.

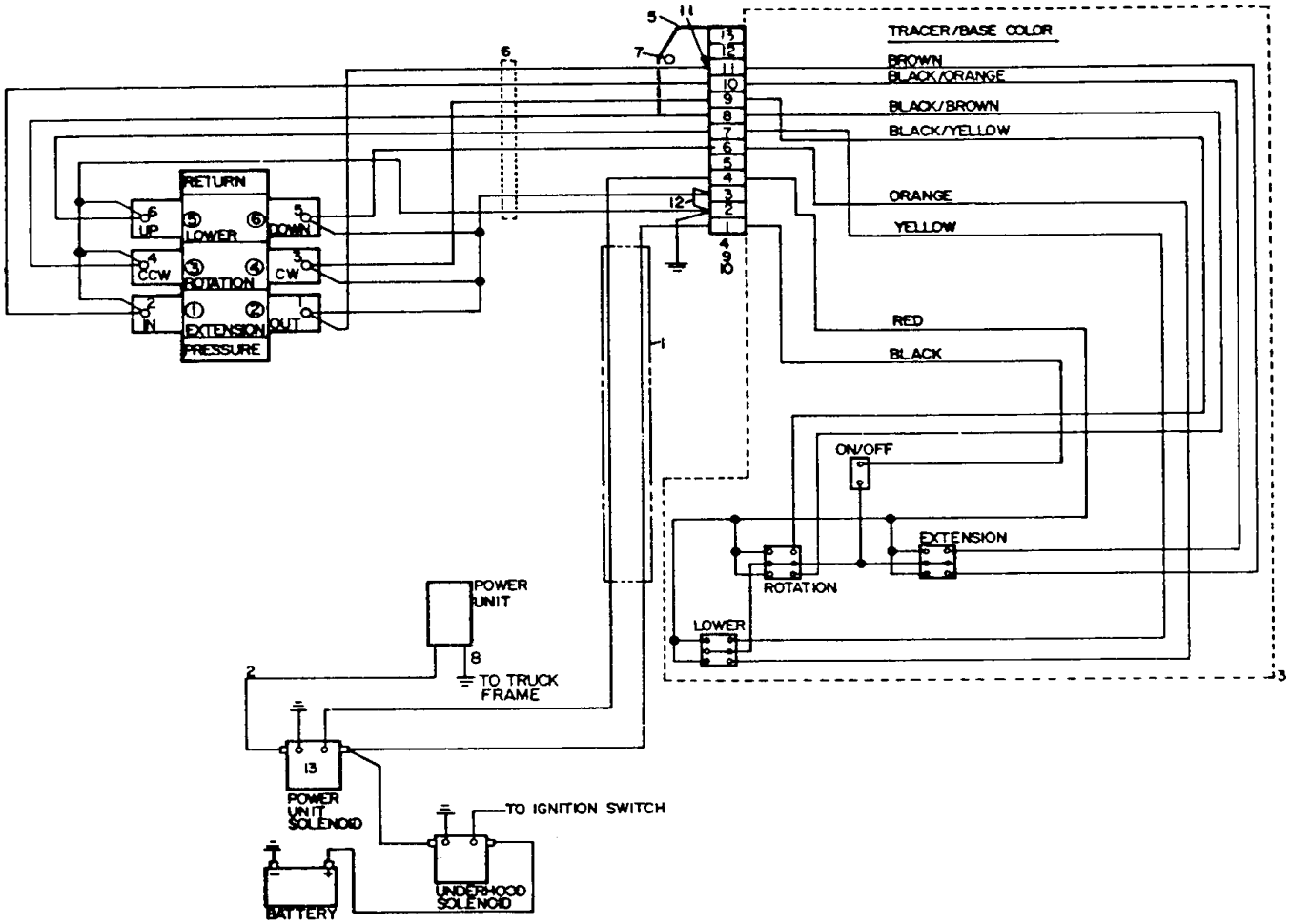
** Quantity per valve section.

94014962 TUBE KIT INCLUDES ITEMS 4-10



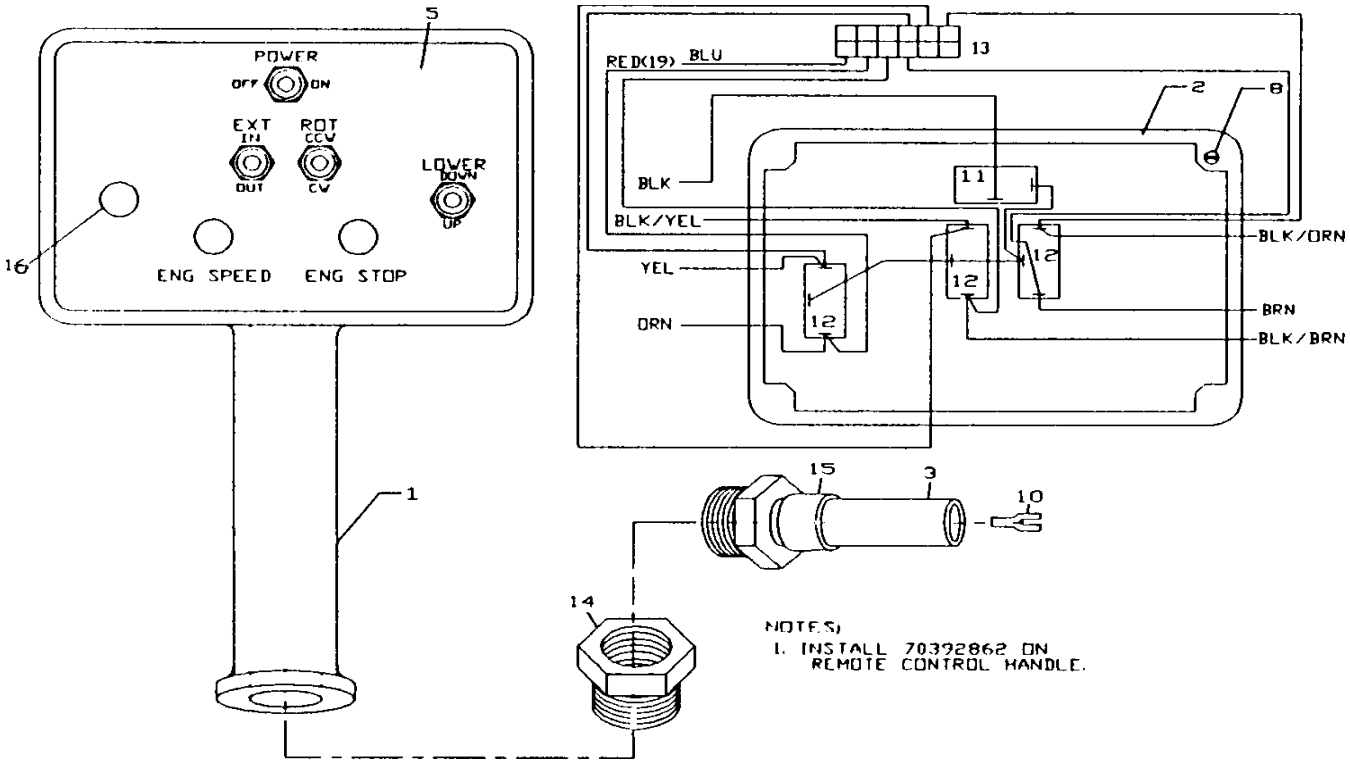
CONTROL KIT-PWR UNIT 3F (90705328)

ITEM	PART NO.	DESCRIPTION	QTY
1.	51705206	CABLE ASM 14GA 2WIRE X 24	1
2.	51705208	CABLE ASM #1WIRE X 9	1
3.	51705329	HANDLE ASM	1
4.	77044309	TERMINAL STRIP	1
5.	60105825	TERMINAL BLOCK MTG BOARD	1
6.	70034060	TIE 6-3/4	4
7.	72060002	CAP SCR 1/4-20X3/4 HH GR5	2
8.	51705388	CABLE ASM #1WIRE X 72	REF
9.	72061009	SHT MTL SCR #6X3/4 PH	2
10.	72066525	HOSE CLAMP 3/4	1
11.	77040051	TERMINAL #8 SPRSPD 16-14GA	8
12.	77040130	JUMPER BAR	1
13.	77041237	SOLENOID 12V 150A	1



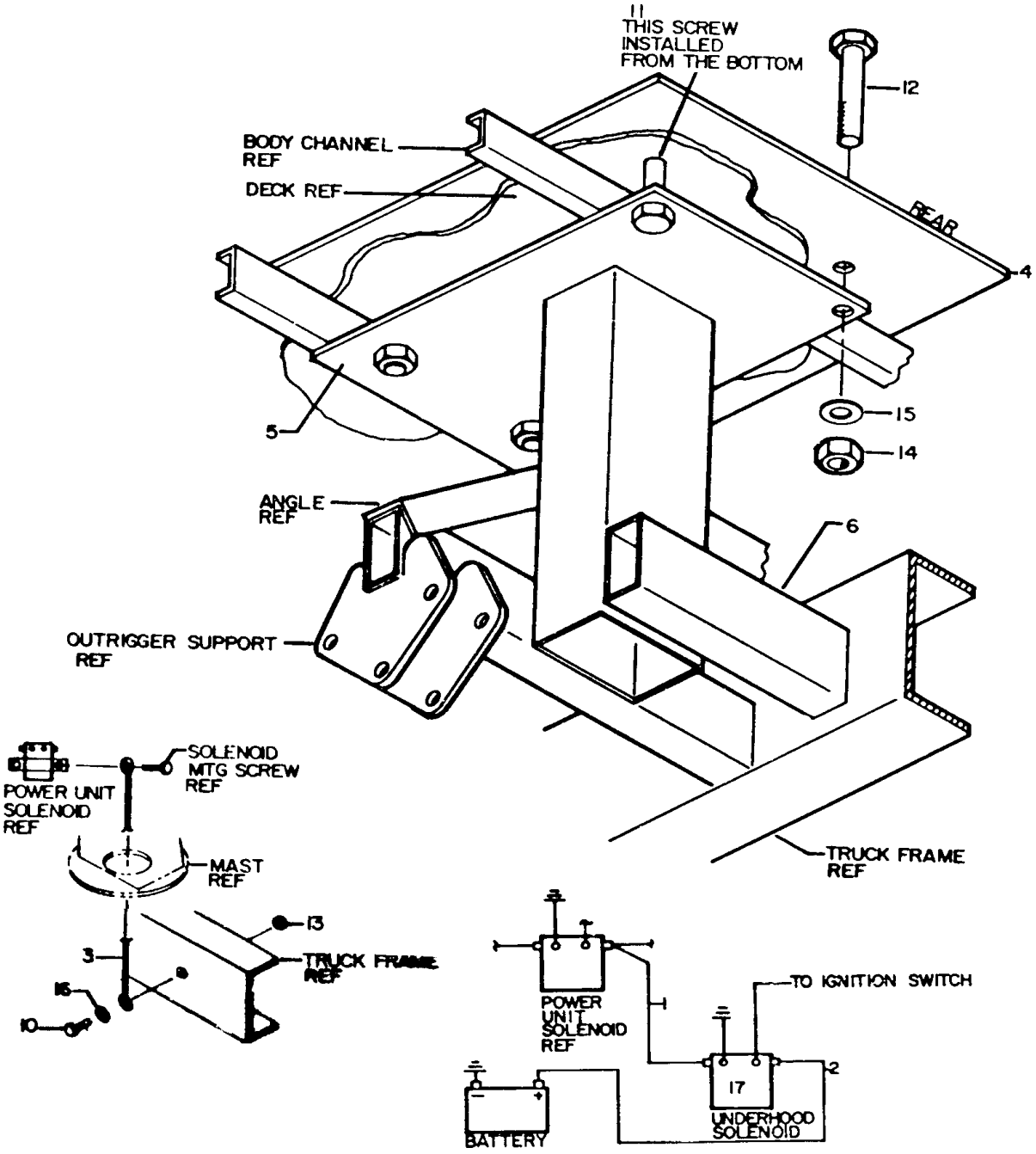
REMOTE HANDLE ASM 3F (51705329)

ITEM	PART NO.	DESCRIPTION	QTY
1.	60111140	REMOTE HANDLE ASM	1
2.	70034306	BACK	1
3.	89044136	CABLE 18GA/12WIRE X 300	1
4.	89044214	WIRE 18GA GRN	1.00'
5.	70393261	DECAL-REMOTE CONTROL	1
6.	70392862	DECAL-DANGER RC ELECTRO	1
7.	70029119	SERIAL NO. PLACARD	1
8.	72061009	SHT MTL SCR #6X3/4 PH	4
9.	72066340	RIVET 1/8	2
10.	77040051	TERM #8 SPGSPD 16-14GA	12
11.	77041345	TOGGLE SWITCH ST	1
12.	77041346	TOGGLE SWITCH DT	3
13.	77041407	DIODE BOARD	1
14.	72531833	REDUCER BUSHING 3/4 1/2NPT	1
15.	77044096	CABLE GRIP	1
16.	70392785	PLUG 1/2	3
17.	77040186	TERM 1/4 FSLPON 16-14GA	11
18.	77040047	TERM 1/4 MSLPON 16-14GA	1



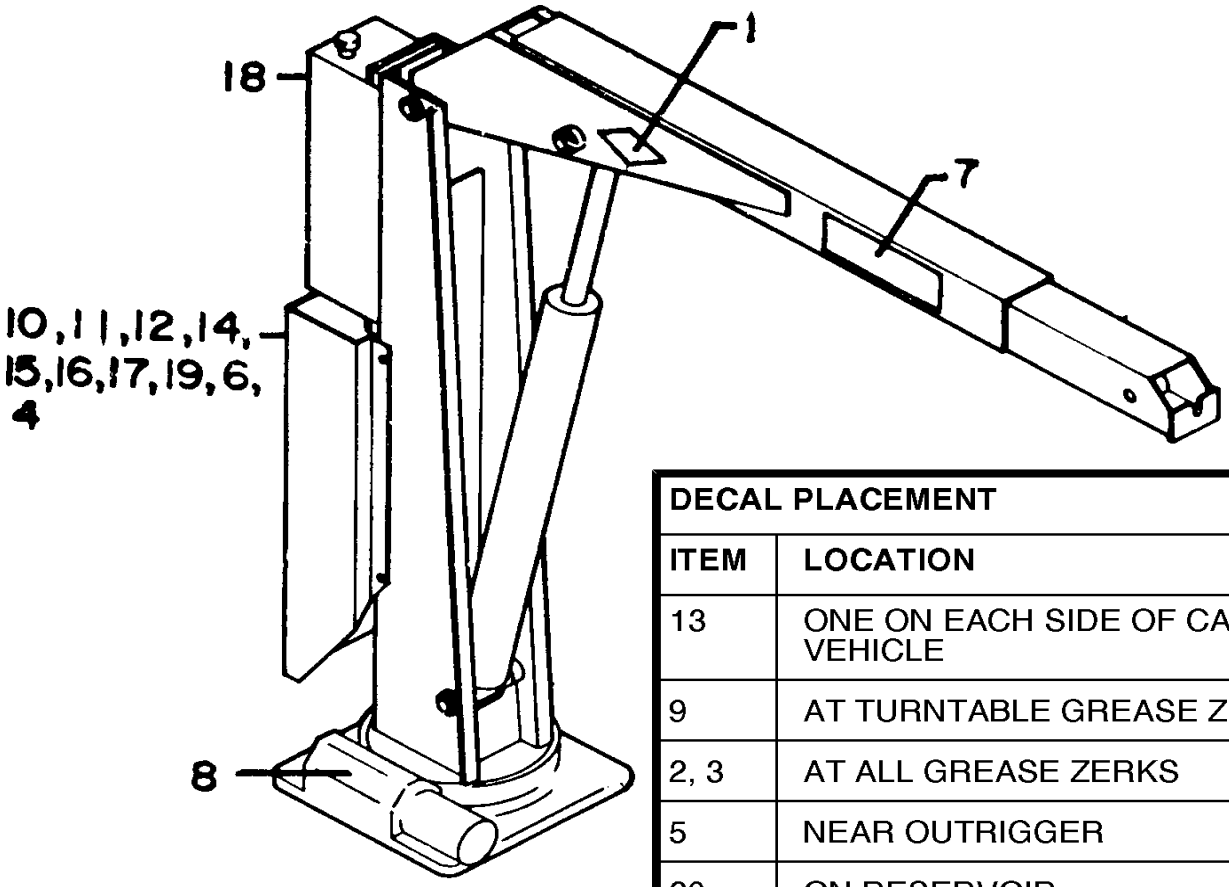
INSTALLATION KIT (93705327)

ITEM	PART NO.	DESCRIPTION	QTY
1.	51701516	BATTERY CABLE 20'	1
2.	51704784	CABLE ASM #2WIRE X 6	1
3.	51705388	CABLE ASM #2WIRE X 72	1
4.	52705330	CRANE SUPPORT	1
5.	60108370	BOTTOM PLATE	1
6.	60108373	TUBE	1
10.	72060046	CAP SCR 3/8-16X1 HH GR5	1
11.	72060194	CAP SCR 3/4-10X6-1/2 HH GR5	1
12.	72060195	CAP SCR 3/4-10X7 HH GR5	3
13.	72062103	NUT 3/8-16 LOCK	1
14.	72062140	NUT 3/4-10 LOCK STL INSERT	4
15.	72063008	WASHER 3/4 WRT	4
16.	72063073	WASHER 3/8 STAR	1
17.	77041237	SOLENOID 12V 150A	1



DECAL KIT (95708903)

ITEM	PART NO.	DESCRIPTION	QTY
1.	70029251	IMT DIAMOND	2
2.	70391612	DECAL-GREASE WKLY LH	2
3.	70391613	DECAL-GREASE WKLY RH	3
4.	70392890	DECAL-DGR STOW/UNFOLD	1
5.	70392864	DECAL-DANGER OR STD CLR	1
6.	70392213	DECAL-CAUTION WASH/WAX	1
7.	70392363	DECAL-2109 IDENT	2
8.	70392399	DECAL-LUBE WORM	1
9.	70392524	DECAL-ROTATE/GREASE	1
10.	70392813	DECAL-DANGER ELECTRO	1
11.	70392814	DECAL-DGR OPER TRAINING	1
12.	70392815	DECAL-DANGER OPERATION	1
13.	70392865	DECAL-DANGER ELEC HZD LG	4
14.	70392866	DECAL-DANGER OPER COND	1
15.	70392888	DECAL-DGR OPER RESTRICT	1
16.	70392889	DECAL-DGR RC ELECTRO LG	1
17.	70392982	DECAL-CONTACT IMT	1
18.	71039134	DECAL-CAUTION OIL LEVEL	1
19.	71392364	CAPACITY PLACARD 2109	1
20.	70394189	DECAL-RECOMMEND HYD OIL	1

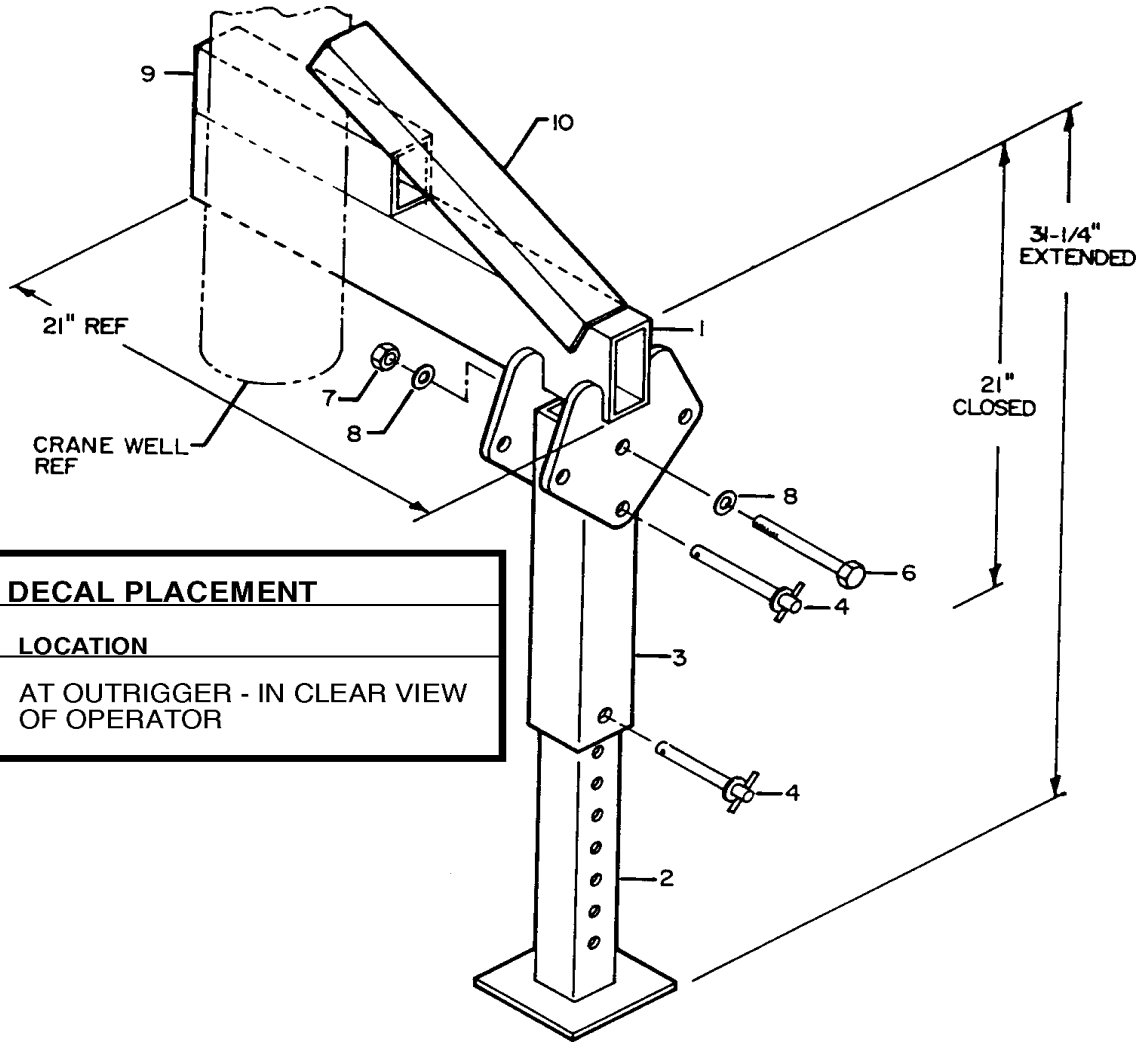


DECAL PLACEMENT	
ITEM	**LOCATION**
13	ONE ON EACH SIDE OF CARRIER VEHICLE
9	AT TURNTABLE GREASE ZERK
2, 3	AT ALL GREASE ZERKS
5	NEAR OUTRIGGER
20	ON RESERVOIR

OPTION-MNL OUTRIGGER KIT (90701596)

ITEM	PART NO.	DESCRIPTION	QTY
1.	52701717	SUPPORT	1
2.	52701718	LEG	1
3.	60103578	HOUSING	1
4.	71731461	QUICK RELEASE PIN	2
5.	70392864	DECAL-DANGER OR STD CL	1
6.	72060100	CAP SCR 1/2-13X4-1/2 HH GR5	1
7.	72062080	NUT 1/2-13 LOCK	1
8.	72063005	WASHER 1/2 WRT	2
9.	60107651	TUBE 3X2X3/16X14	1
10.	60108334	ANGLE 2-1/2X2X3/16X14	1

NOTE: POSITION ITEM 10 AFTER THE CRANE IS POSITIONED.



DECAL PLACEMENT	
ITEM NO.	**LOCATION**
5	AT OUTRIGGER - IN CLEAR VIEW OF OPERATOR

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

FREQUENCY	ITEM	KEY	✔ = SATISFACTORY ✘ = DEFICIENCY (must be corrected prior to operation) INSPECTION DESCRIPTION	***R*** = RECOMMENDATION (should be considered for corrective action) ***NA*** = NOT APPLICABLE	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

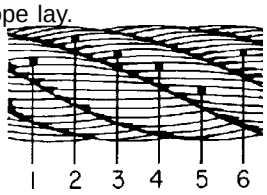
If additional space is required, reproduce this page and attach to this report.

WIRE ROPE INSPECTION

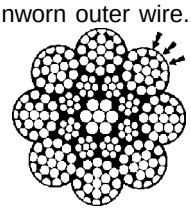
Wire rope with any of the deficiencies shown below shall be removed and replaced immediately.

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

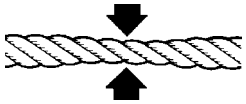
B. When there are either 3 broken wires in one strand or a total of six broken wires in all strands in any one rope lay.



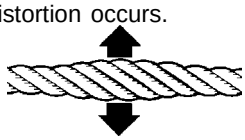
C. When flat spots on the outer wires appear and those outside wires are less than 2/3 the thickness of the unworn outer wire.



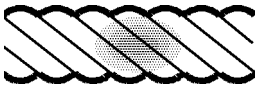
D. When there is a decrease of diameter indicating a core failure.



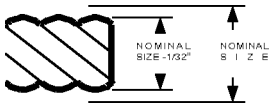
E. When kinking, crushing, birdcaging or other distortion occurs.



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.)

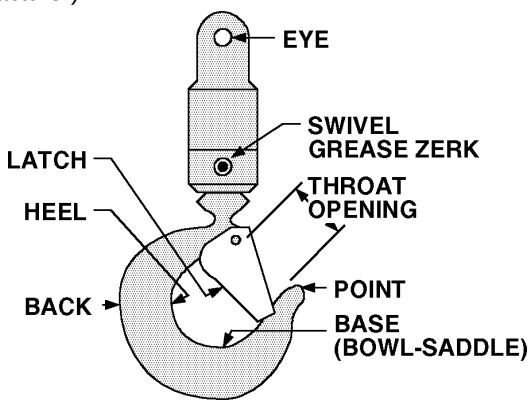
D. LATCH

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

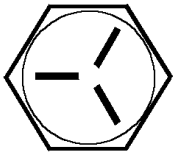
2. Examine cord for damage, cuts or breaks. Grasp cord and pull to check operation of cord reel. The cord should retract on reel when released.

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

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

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

2. Flat washers of equal strength must be used.

3. All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.

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

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

WARNING

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

TORQUE DATA CHART - DOMESTIC

FINE THREAD BOLTS

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

COARSE THREAD BOLTS

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

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

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

2. Flat washers of equal strength must be used.

3. All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.

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

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

WARNING

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

TORQUE DATA CHART - METRIC

FINE THREAD BOLTS

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

COARSE THREAD BOLTS

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

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

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

2. Flat washers of equal strength must be used.

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

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

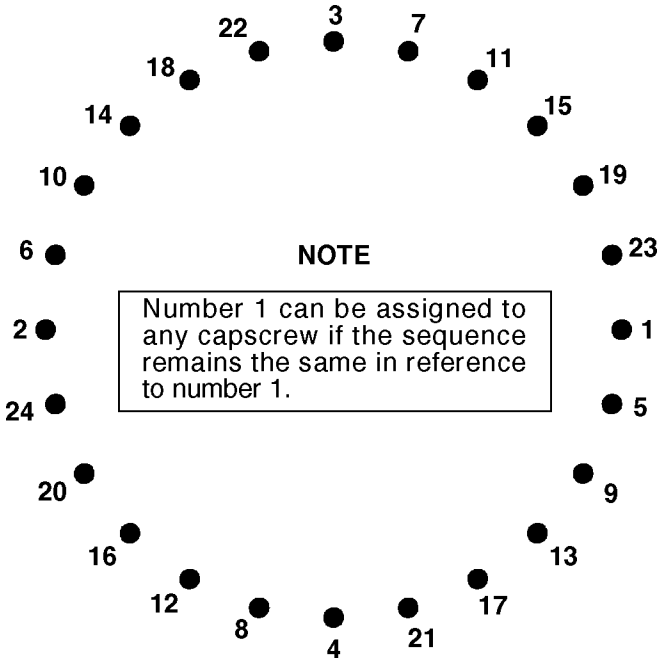
5. Torque values for socket-head capscrews are the same as for Grade 8 capscrews.

WARNING

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

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.

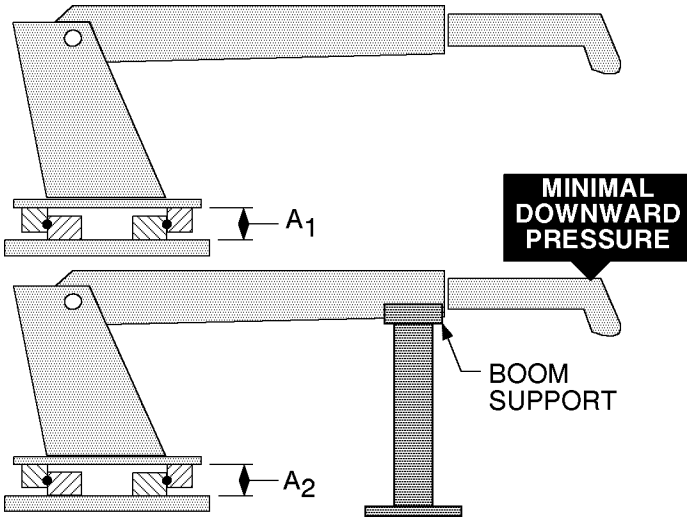
Periodic readings indicating a steady increase in TILT may be an indicator of bearing wear. Note that a bearing found to have no raceway cracks or other structural irregularities should be reassembled and returned to service.

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 2015 2020 2109 3000 3016 3816 3020 425 4300 5016 6016 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)**

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: _____

_____

_____

_____

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_____

☐ REQUEST FOR ADDITION TO MANUAL

DESCRIPTION OF ADDITION: _____

_____

_____

_____

REASON FOR ADDITION: _____

_____

_____

_____

MAIL TO: IOWA MOLD TOOLING Co., Inc.
Box 189,
Garner IA 50438-0189
ATTN: Technical Publications

LIMITED WARRANTY

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

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

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

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

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

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

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

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

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

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

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

REPRESENTATIONS EXCLUDED - IMT products are subject to no expressed, implied or statutory warranty other than herein set forth, and no agent, representative or distributor of the manufacturer has any authority to alter the terms of this warranty in any way whatsoever or to make any representations or promises, express or implied, as to the quality or performance of IMT products other than those set forth above.

CHANGE IN DESIGN - IMT reserves the right to make changes in design or improvements upon its products without imposing any obligation upon itself to install the same upon its products theretofore manufactured.

Effective January, 1985

IOWA MOLD TOOLING CO., INC.
BOX 189, GARNER, IA 50438-0189
TEL: 515-923-3711
TECHNICAL SUPPORT FAX: 515-923-2424