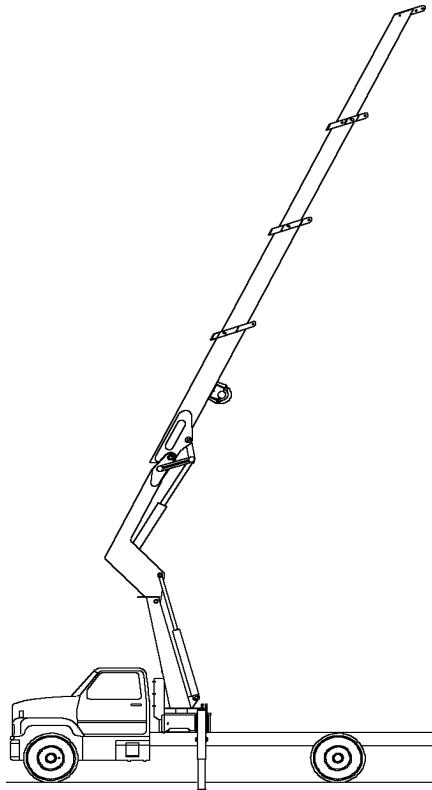




15000 Series Crane & Model 21100 (Metric Version)

Volume 2 - PARTS AND SPECIFICATIONS

Section 1	SPECIFICATIONS-15000 SERIES
Section 1A.	SPECIFICATIONS-21100 CRANE
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 99900939

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

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

NOTE

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

CAUTION

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

WARNING

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

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

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

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NOTES



15000 SERIES CRANE SPECIFICATIONS

GENERAL SPECIFICATIONS

	1H	2H	2H1M
*CRANE RATING (ANSI B30.22)	153,510 ft-lbs	152,130 ft-lbs	149,360 ft-lbs
*MAXIMUM CRANE RATING	154,000 ft-lbs	152,600 ft-lbs	149,800 ft-lbs
HORIZONTAL REACH from centerline of rotation	25'-5"	33'-2"	41'-2"
HYDRAULIC EXTENSION	87"	174"	174"
MANUAL EXTENSION	NA	NA	96"
VERTICAL REACH from mounting surface	34'-5"	41'-7"	48'-10"
VERTICAL REACH from ground / 40" frame ht.	37'-9"	44'-11"	52'-2"
BASE CRANE WEIGHT	6100 lbs	6550 lbs	6800 lbs
OUTRIGGER SPAN (standard)	16'-2"	16'-2"	16'-2"
OUTRIGGER SPAN (optional)	20'-8"	20'-8"	20'-8"
OUTRIGGER PADS	12" x 12"	12" x 12"	12" x 12"
CRANE STORAGE HEIGHT from mounting surface	9'-1"	9'-5"	9'-5"
CRANE STORAGE HEIGHT from ground / 40" frame ht.	12'-5"	12'-9"	12'-9"
**MOUNTING SPACE REQUIRED	43"	43"	43"
ROTATIONAL TORQUE	19450 ft-lbs	19450 ft-lbs	19450 ft-lbs
OPTIMUM PUMP CAPACITY	17 U.S. GPM	17 U.S. GPM	17 U.S. GPM
SYSTEM OPERATING PRESSURE	4000 PSI	4000 PSI	4000 PSI
OIL RESERVOIR CAPACITY	40 U.S. Gallons	40 U.S. Gallons	40 U.S. Gallons
HOOK APPROACH - HORIZONTAL from centerline of rotation	3"	3"	3"
HOOK APPROACH - VERTICAL from mounting surface	7'-8"	7'-2"	7'-2"
***HORIZONTAL CTR OF GRAVITY from centerline of rotation	2-1/2"	2-1/2"	2-1/2"
***VERTICAL CTR OF GRAVITY from mounting surface	32"	32-1/2"	33"

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

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

** Allow an additional 2' between the cab and crane base for swing clearance.

*** Crane in stowed position.

PERFORMANCE CHARACTERISTICS

ROTATION:	450°	60 seconds
INNER BOOM ELEVATION:	-75° to +64°	Up=23 / Down=15 seconds
OUTER BOOM ARTICULATION:	150°	Up=22 / Down=20 seconds
TELESCOPIC EXTENSION CYLINDER:		
1st Stage	87" Extend	14 seconds
2nd Stage	87" Extend	18 seconds
1st & 2nd Stage Retract	14'-6"	24 seconds (simultaneous)
VERTICAL OUTRIGGER STROKE:	24"	Up=3 / Down=4 seconds
POWER OUT OUTRIGGER:	49"	Extend=5 / Return=8 seconds

POWER SOURCE

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

CYLINDER HOLDING VALVES

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

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

ROTATION SYSTEM

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

HYDRAULIC SYSTEM

The hydraulic system is a load sense, pressure compensated hydraulic system requiring 17 GPM optimum oil flow at 4000 PSI. The main control valve is a nine-spool, stack type valve, eight of which are used for the standard crane and one is plugged, but easily adaptable to an additional optional feature. Dual operational handles for the standard crane functions are located at both sides of the crane for convenient operation with the outrigger functions operated from their respective side. The hydraulic system includes the hydraulic reservoir, pump, nine-section control valve, return line filter, suction strainer located inside the reservoir, and all hoses and fittings. The hydraulic pump, which is supplied, requires the following conditions:

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

CAPACITY ALERT SYSTEM

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

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

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

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

CAPACITY CHART-15000

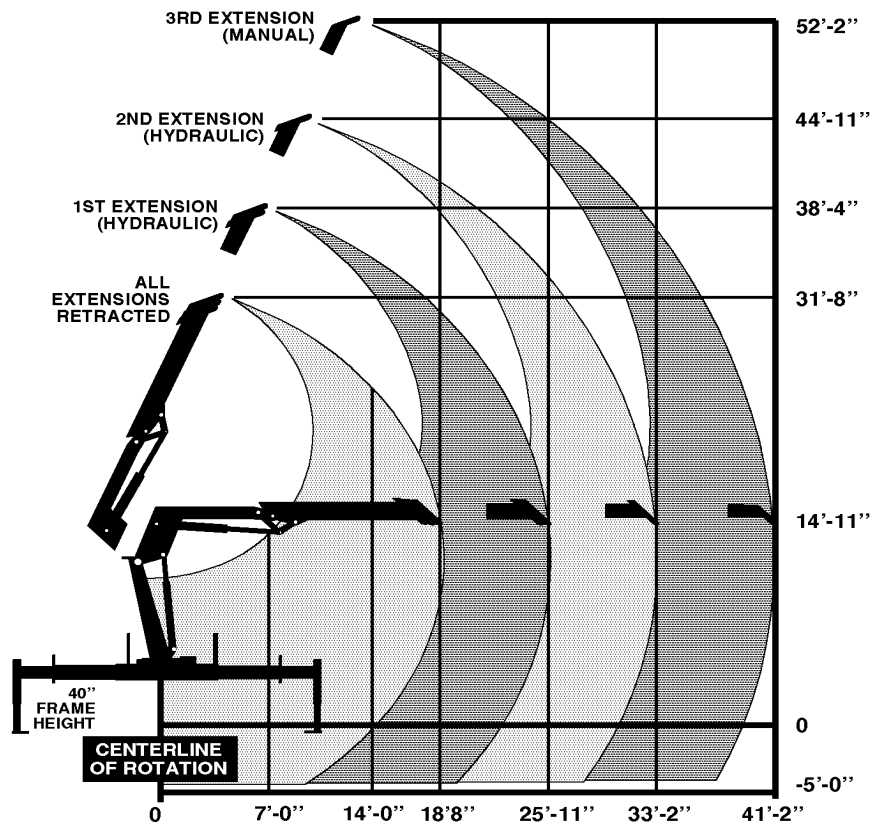
IOWA MOLD TOOLING CO., INC. • BOX 189 • GARNER • IA • 50438 • 515-923-3711
 Capacities through geometric range are limited to those shown in horizontal position.



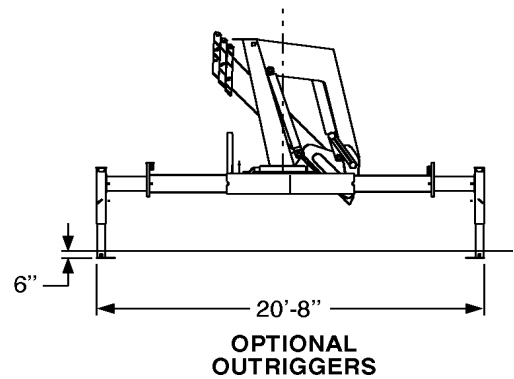
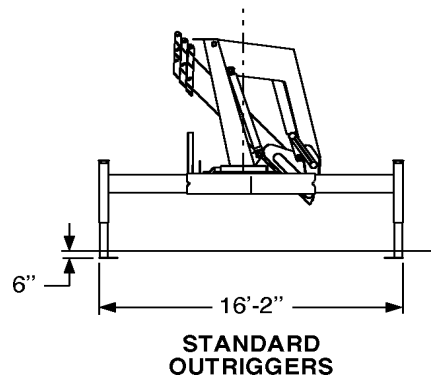
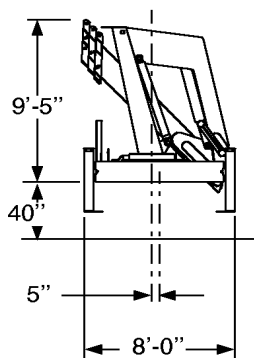
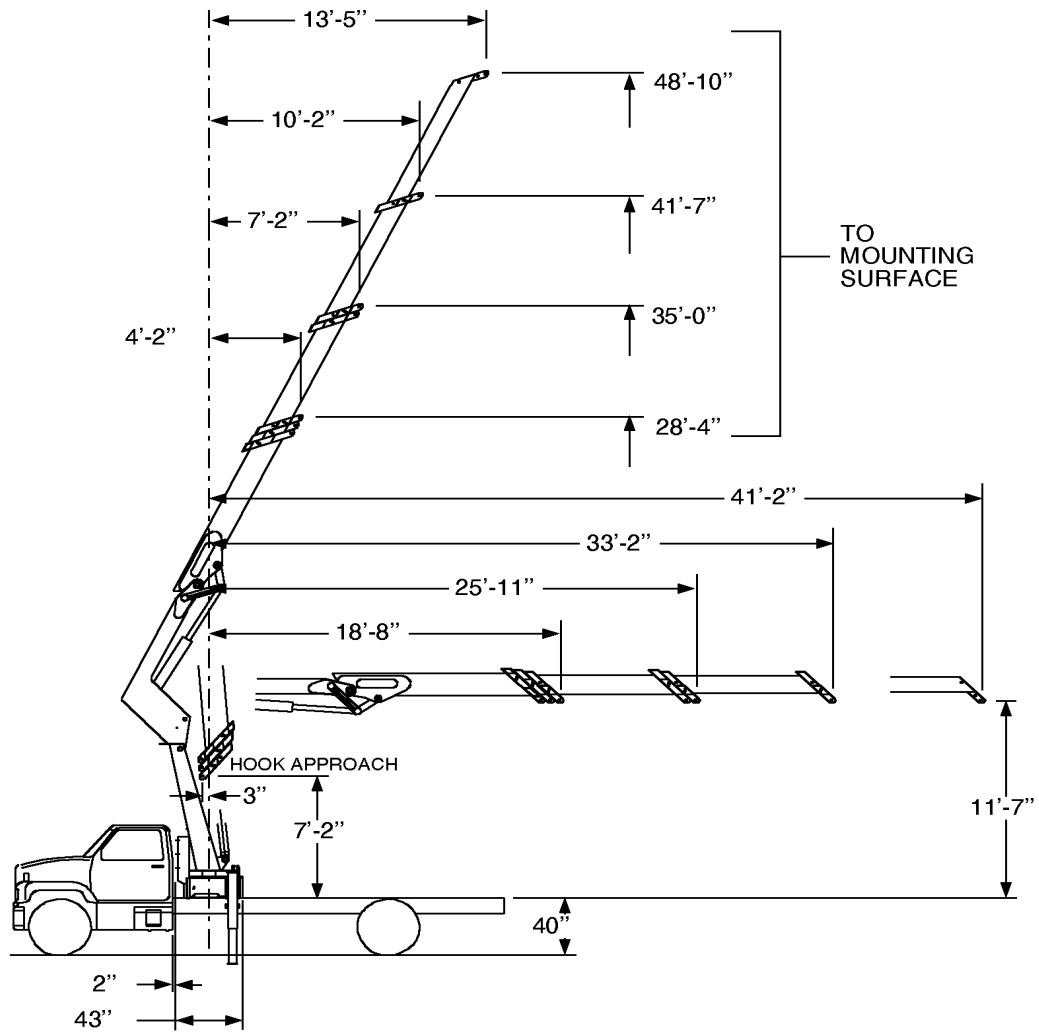
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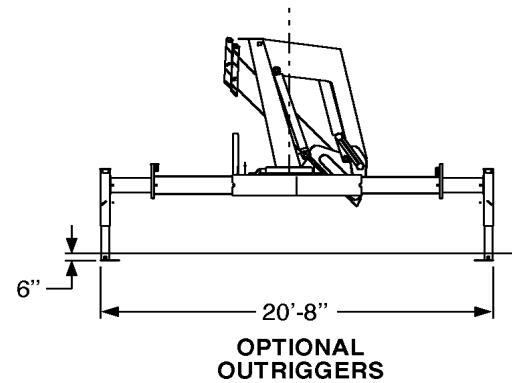
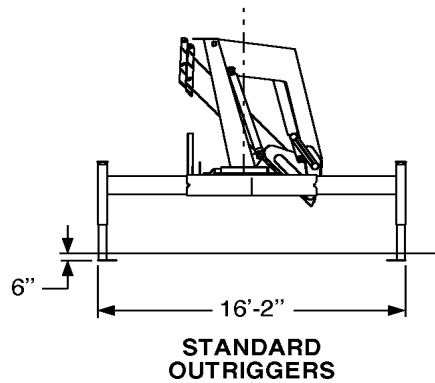
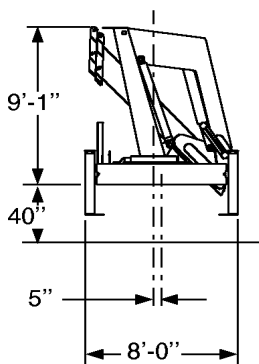
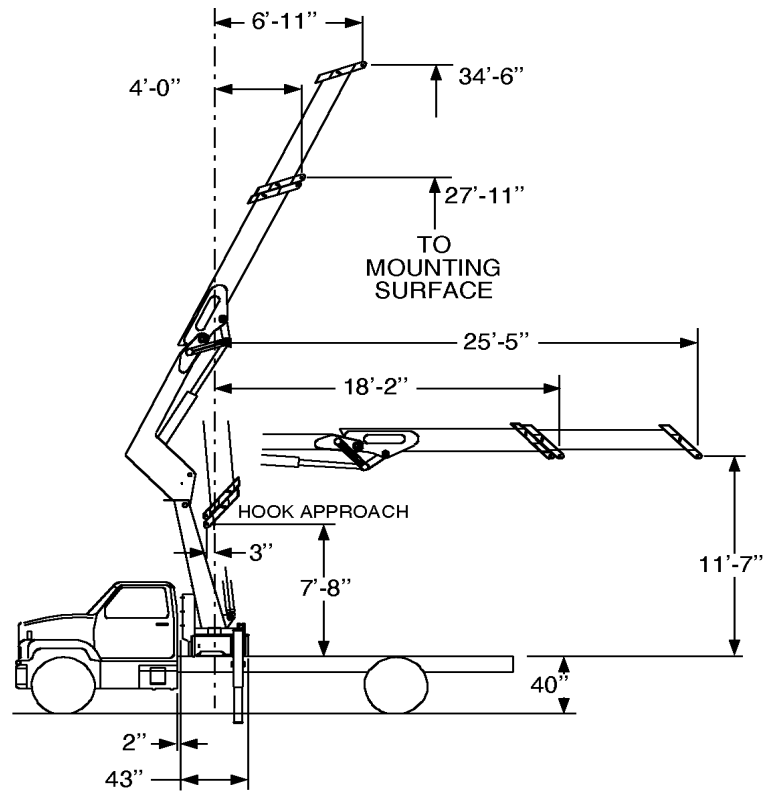
Series Crane

- Loads shown are based on crane structural or hydraulic capability. Before lift is made, stability must be checked per SAE J765A.
- Working loads will be limited to those shown. Deduct the weight of load handling devices. Deduct 700 LBS for boom mounted winch.
- Winch lifting capacity is limited to those shown - Maximum 5000 LBS for 1-part line.



		ALL EXTENSIONS RETRACTED			1ST EXTENSION (HYDRAULIC)	2ND EXTENSION (HYDRAULIC)	3RD EXTENSION (MANUAL)
2H1M	20000	10700	8000	5600	4150	3300 LBS	
2H	20000	10900	8150	5750	4300 LBS		
1H	20000	11000	8450	6000 LBS			
2H & 2H1M- 0	7'-0"	14'-0"	18'-8"	25'-11"	33'-2"	41'-2"	
1H- 0	7'-0"	14'-0"	18'-2"	25'-5"			

GEOMETRIC CONFIGURATION-15000-2H & 2H1M

GEOMETRIC CONFIGURATION-15000-1H

MINIMUM CHASSIS SPECIFICATIONS FOR STANDARD 15000 (2H) SERIES CRANE

Crane Mount	Behind Cab	Behind Cab	Rear Mount
Crane Working Area	180° (over bed area)	360°	360°
Chassis Style	Conventional Cab	Conventional Cab	Conventional Cab
Front Axle Rating (GVW)	12,000 lbs	14,000 lbs	12,000 lbs
Rear Axle Rating (GVW)	Single Axle 21,000 lbs	Tandem Axle 34,000 lbs	Tandem Axle 34,000 lbs
Wheelbase	See Figure A	See Figure B	See Figure C
Cab-to-axle	138"	120"	144"
Outrigger Width Required	20'-8"	16'-2"	20'-8"
RBM	1,749,000 in-lbs	2,376,000 in-lbs	2,794,000 in-lbs
Frame Section Modulus	15.9in ³	21.6in ³	25.4in ³
Frame Yield Strength	110,000 psi	110,000 psi	110,000 psi

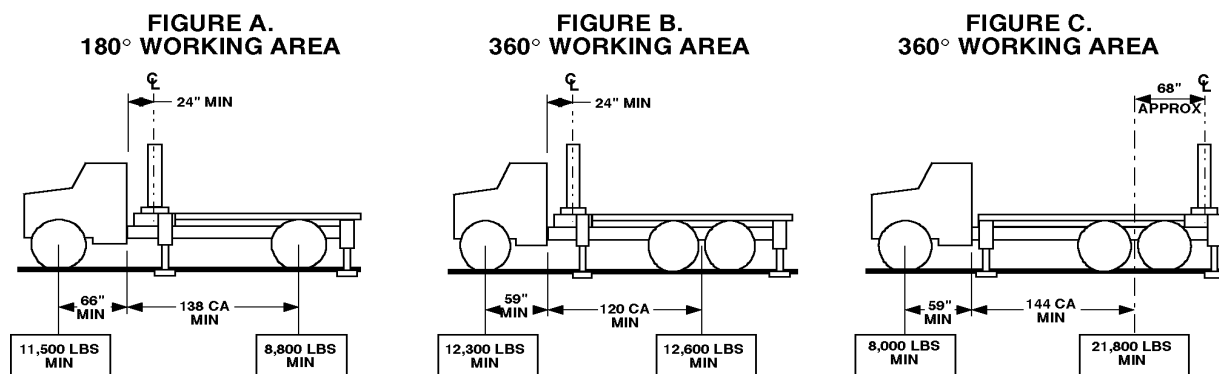
Minimum Finished Unit Weight To Maintain Vehicle Stability

Front Axle	* 11,500 lbs	** 12,300 lbs	*** 8,000 lbs
Rear Axle	* 8,800 lbs	** 12,600 lbs	*** 21,800 lbs
Total Finished Unit Weight	20,300 lbs	24,900 lbs	29,800 lbs

* Allows lifting full capacity loads in a 180° arc around the rear of vehicle from outrigger to outrigger, when the crane is installed immediately behind the cab. If lifting is to be done over the front of the vehicle, front auxiliary outrigger is recommended or additional counter-weight added to the body is required until vehicle is stable.

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

*** Allows lifting full capacity load in a 360° arc when the crane is installed behind the rear axles. It is recommended that the chassis body incorporate a torsion box attached to the crane to minimize the torsional flex of the frame.



NOTES:

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

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NOTES



MODEL 21100 CRANE SPECIFICATIONS

GENERAL SPECIFICATIONS

	21100 - 1H 21 ton-meters	21100 - 2H 21 ton-meters	21100 - 2H1M 21 ton-meters
CRANE RATING			
HORIZONTAL REACH from centerline of rotation	7.75m	10.11m	12.55m
HYDRAULIC EXTENSION	221cm	442cm	442cm
MANUAL EXTENSION	NA	NA	244cm
VERTICAL REACH from mounting surface	10.51m	12.67m	14.88m
VERTICAL REACH from ground /102cm frame ht.	11.53m	13.69m	15.90m
**BASE CRANE WEIGHT	2350 kg	2550 kg	2660 kg
OUTRIGGER SPAN (standard)	4.93m	4.93m	4.93m
OUTRIGGER SPAN (optional)	6.30m	6.30m	6.30m
OUTRIGGER PADS	30 x 30cm	30 x 30cm	30 x 30cm
CRANE STORAGE HEIGHT from mounting surface	2.76m	2.87m	2.87m
CRANE STORAGE HEIGHT from ground / 102cm frame ht.	3.78m	3.89m	3.89m
*MOUNTING SPACE REQUIRED	109cm	109cm	109cm
ROTATIONAL TORQUE	2690 kg-m	2690 kg-m	2690 kg-m
OPTIMUM PUMP CAPACITY	64 liters/min	64 liters/min	64 liters/min
SYSTEM OPERATING PRESSURE	276 bar	276 bar	276 bar
OIL RESERVOIR CAPACITY	151 liters	151 liters	151 liters
HOOK APPROACH - HORIZONTAL from centerline of rotation	8cm	8cm	8cm
HOOK APPROACH - VERTICAL from mounting surface	2.34m	2.18m	2.18m
***HORIZONTAL CTR OF GRAVITY from centerline of rotation	6cm	6cm	6cm
***VERTICAL CTR OF GRAVITY from mounting surface	81cm	83cm	84cm

* Allow an additional 5cm between the cab and crane base for swing clearance.

** Without outriggers, hydraulic oil reservoir and mounting accessories.

*** Crane in stowed position.

PERFORMANCE CHARACTERISTICS

ROTATION:	450°/7.85 rad	60 seconds
INNER BOOM ELEVATION:	-1.31 to +1.12 rad	Up=23 / Down=15 seconds
OUTER BOOM ARTICULATION:	2.62 rad	Up=22 / Down=20 seconds
TELESCOPIC EXTENSION CYLINDER:		
1st Stage	221cm Extend	14 seconds
2nd Stage	221cm Extend	18 seconds
1st & 2nd Stage Retract	442cm	24 seconds (simultaneous)
VERTICAL OUTRIGGER STROKE:	61cm	Up=3 / Down=4 seconds
POWER OUT OUTRIGGER:	125cm	Extend=5 / Return=8 seconds

POWER SOURCE

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

CYLINDER HOLDING VALVES

The holding sides of all standard cylinders are equipped with integral-mounted holding or counter-balance valves to prevent sudden cylinder collapse in case of hose or other hydraulic failure. The outrigger cylinders have positive, pilot-operated holding valves that open only on command. The inner, outer and extension cylinders have pilot-operated counter balance valves on both the extend and retract sides. The counter-balance valve serves several functions. First, it is a holding valve. Secondly, it is so constructed that it will control the lowering function and allow that motion to be feathered while under load. Finally, if a hose breaks, the only oil loss will be that in the hose.

ROTATION SYSTEM

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

HYDRAULIC SYSTEM

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

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

CAPACITY ALERT SYSTEM

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

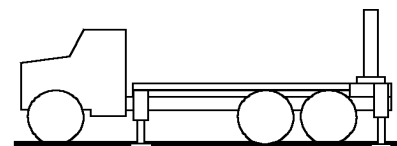
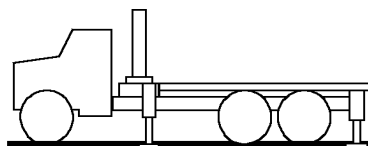
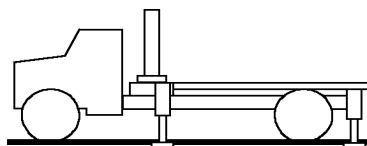
If an operator attempts to lift a load which exceeds the rated capacity of the crane, the system will prevent the operator from raising or lowering the inner boom, raising or lowering the outer boom, extending the telescoping booms, or hoisting with an optional winch.

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

SELECTED WEIGHT OF ANCILLARY EQUIPMENT

OUTRIGGERS-4.83m	375 kg
OUTRIGGERS-6.30m	562 kg
HYDRAULIC OIL RESERVOIR	42 kg

NOTE: For optimum stability, auxiliary outriggers are strongly recommended.



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

CAPACITY CHART-MODEL 21100 CRANE

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CAPACITY CHART-21100

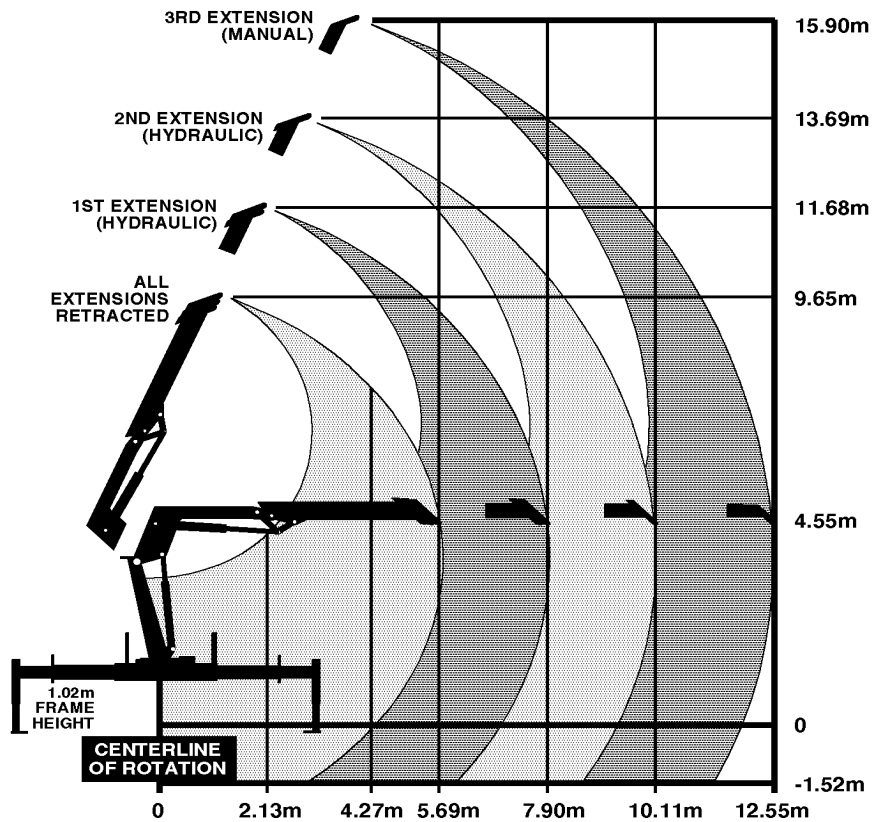
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Capacities through geometric range are limited to those shown in horizontal position.



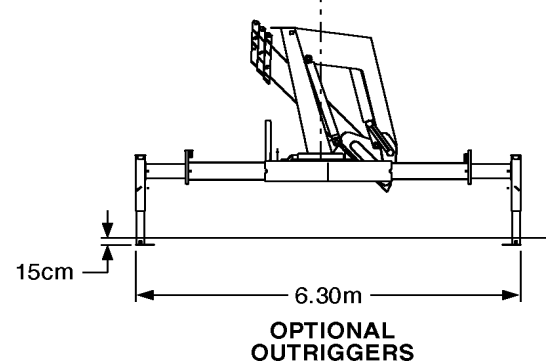
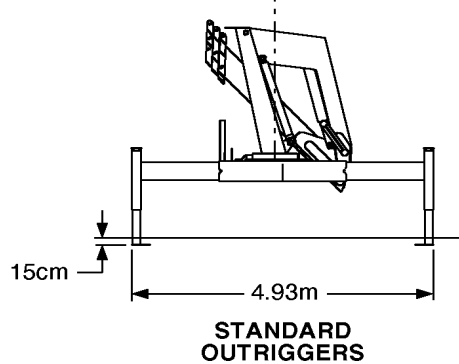
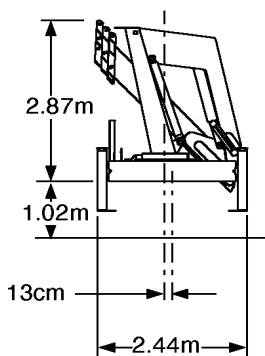
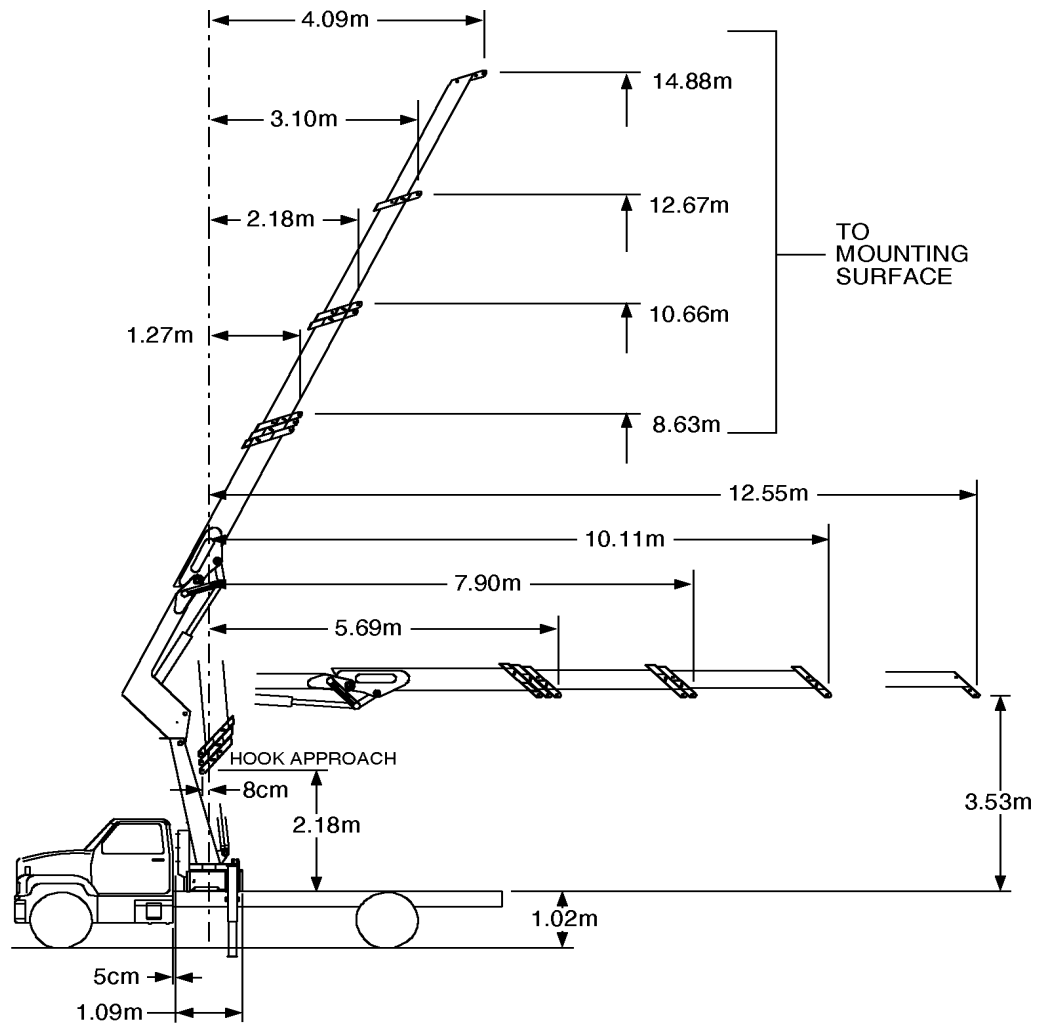
MODEL 21100

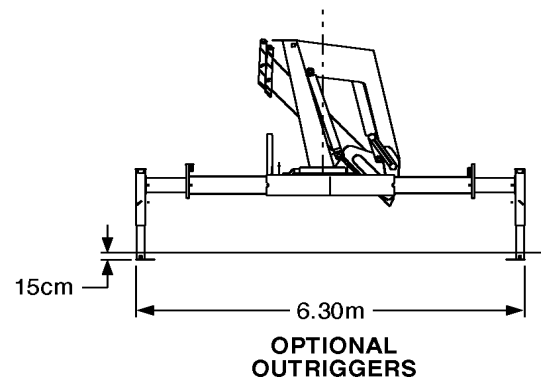
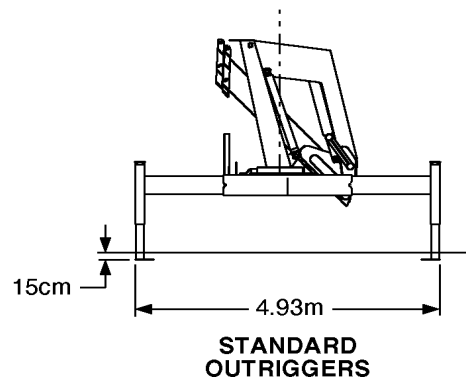
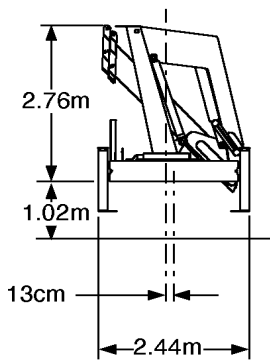
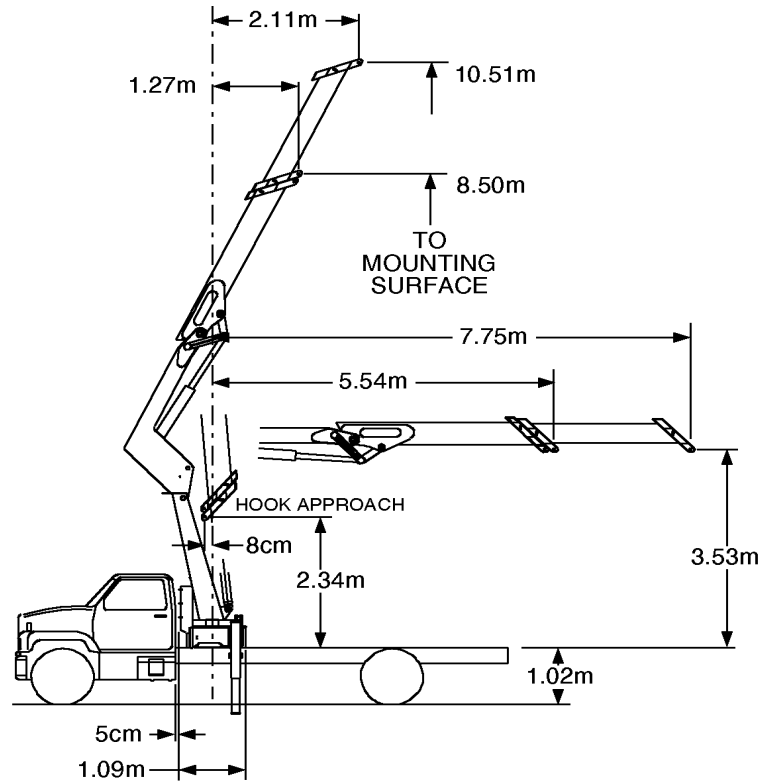
- Loads shown are based on crane structural or hydraulic capability. Before lift is made, stability must be checked per SAE J765A.
- Working loads will be limited to those shown. Deduct the weight of load handling devices. Deduct 318 KG for boom mounted winch.
- Winch lifting capacity is limited to those shown - Maximum 2270 KG for 1-part line.



	ALL EXTENSIONS RETRACTED	1ST EXTENSION (HYDRAULIC)	2ND EXTENSION (HYDRAULIC)	3RD EXTENSION (MANUAL)
2H1M	9070	4855	3630	2540
2H	9070	4945	3700	2610
1H	9070	4990	3835	2720 KG
2H & 2H1M-	0	2.13m	4.27m	5.69m
1H-	0	2.13m	4.27m	5.54m
			7.90m	10.11m
				12.55m

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GEOMETRIC CONFIGURATION-21100-2H & 2H1M

GEOMETRIC CONFIGURATION-21100-1H



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SECTION 2. 15000/21100 CRANE REFERENCE

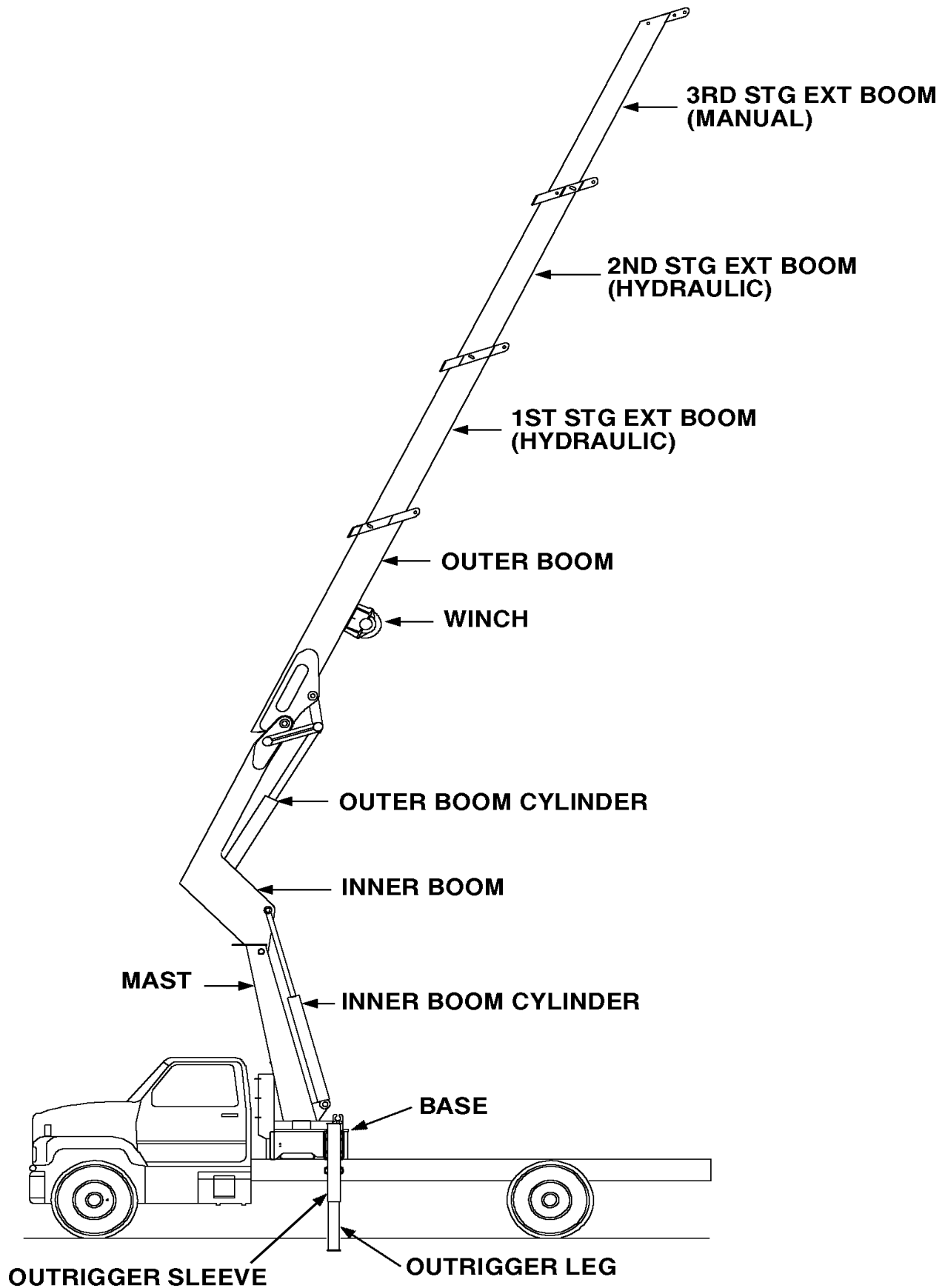
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SERVICE	32

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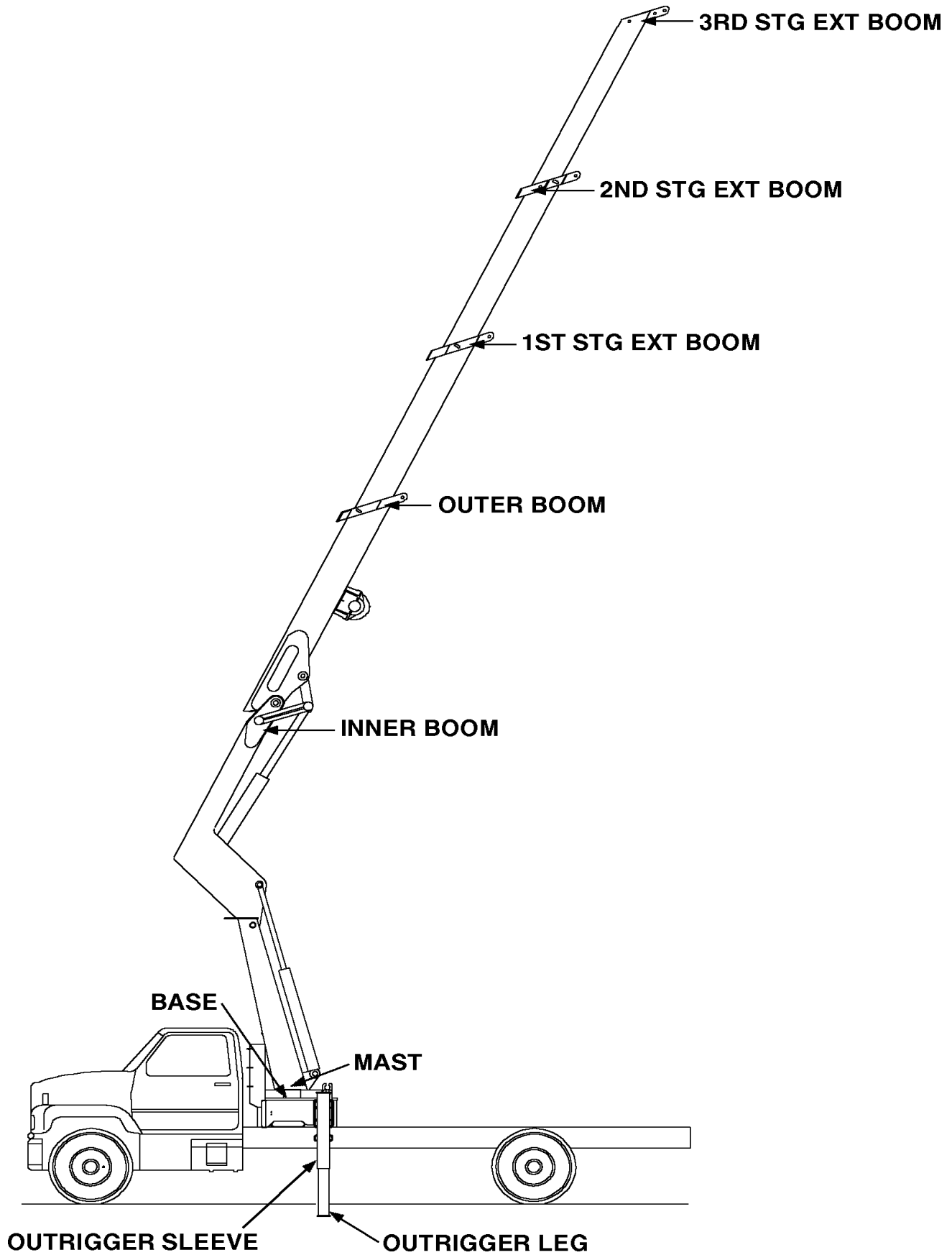
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NOTES

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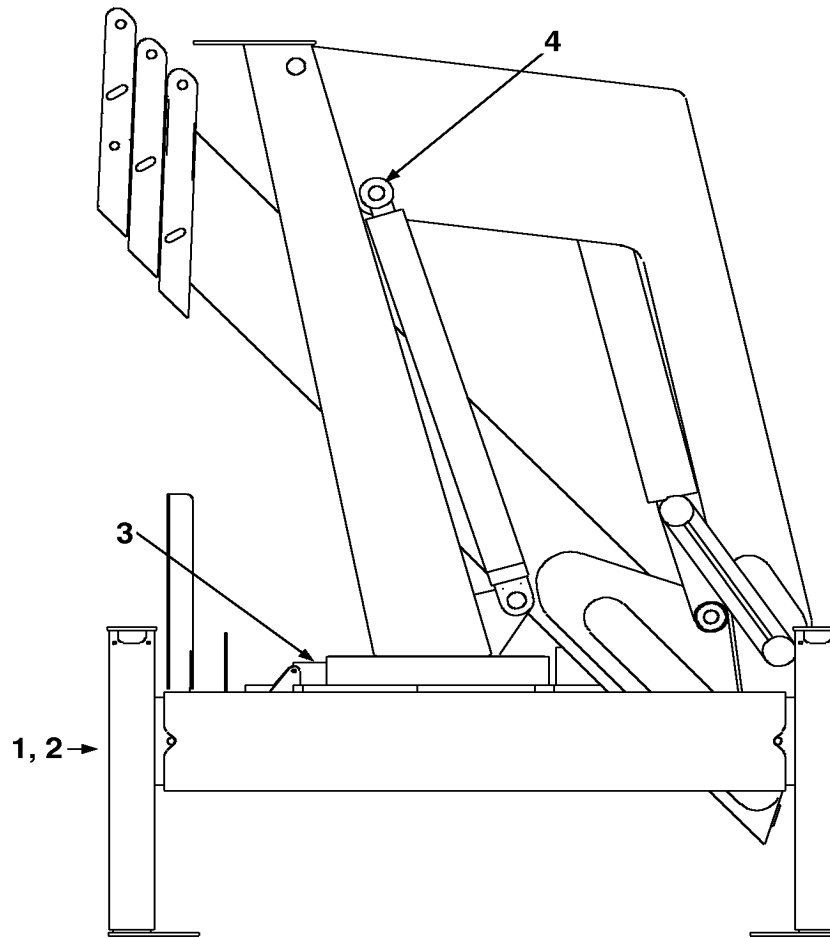
MAJOR CRANE ASSEMBLIES



WELDMENT PART NUMBER LOCATIONS



GREASE ZERK LOCATIONS & LUBRICANT REQUIREMENTS



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

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

RECOMMENDED SPARE PARTS LIST

1 YEAR SUPPLY

15000/21100 CRANE

FOR MANUAL: 99900939

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.

PAGE	ITEM	PART NO	DESCRIPTION	QTY	
3-2	BASE & 16' OUTRIGGER ASSEMBLY (41710040)				
	13	71056074	DRIVE GEAR	1	
	17	76391497	GASKET	1	
	18	60020123	THRUST WASHER	1	
	19	76391498	GASKET	1	
	34	73054538	VALVE	2	
	37	70055167	BEARING	1	
	41	71056072	INTERMEDIATE GEAR	1	
	42	71056073	PINION GEAR	1	
	43	71056374	BRAKE	1	
	60	72063115	WASHER 7/8 FLAT HARD	23	
	67	72601609	CAP SCR 7/8-9X4-1/4 HH GR8	23	
	70	73051478	HYDRAULIC MOTOR	1	
	73	60030240	WEAR PAD	1	
	74	60030230	WEAR PAD	1	
	75	60030239	WEAR PAD	1	
	76	60020120	BUSHING	1	
	77	60020121	BUSHING	1	
	78	60020122	BUSHING	1	
	79	60020124	BUSHING	1	
3-5	80	7Q072017	O-RING	3	
	BASE & 21' OUTRIGGER ASSEMBLY (41709801)				
	18	60020123	THRUST WASHER	1	
	19	60030204	WEAR PAD	1	
	20	60030205	WEAR PAD	1	
	37	70055167	BEARING	1	
	41	71056072	INTERMEDIATE GEAR	1	
	42	71056073	PINION GEAR	1	
	43	71056374	HYDRAULIC BRAKE	1	
	60	72063115	WASHER 7/8 FLAT HARD	23	
	67	72601609	CAP SCR 7/8-9X4-1/4 HH GR8	23	
	70	73051478	HYDRAULIC MOTOR	1	
	73	60030240	WEAR PAD	1	
	74	60030230	WEAR PAD	1	
	75	60030239	WEAR PAD	1	
	76	60020120	BUSHING	1	
	77	60020121	BUSHING	1	
	78	60020122	BUSHING	1	
	79	60020124	BUSHING	1	
	3-8	80	7Q072017	O-RING	3
81		73054538	VALVE	2	
84		71056074	DRIVE GEAR	1	
85		76391497	GASKET	1	
86		76391498	GASKET	1	
MAST ASSEMBLY (41709874)					
7		72063116	WASHER 3/4 FLAT HARD	14	
8		72601629	CAP SCR 3/4-10X4 HH GR8	14	
9		70034283	BEARING	2	
INNER BOOM ASSEMBLY (41709875)					
13		70034284	BEARING	8	
14		70143838	SPHERICAL BUSHING	2	
OUTER BOOM ASSEMBLY (41710476)					
18		70034283	BEARING	6	
19		70034284	BEARING	2	
3-11		SWIVEL HOOK ASSEMBLY 7-TON (51710187)			
2		70731813	SWIVEL HOOK W/LATCH 7-TON	1	
3-12		EXTENSION BOOM ASSEMBLY - 1H (41710349)			
SEE PAGE 3-29 FOR WEAR PADS & SHIMS					

RECOMMENDED SPARE PARTS LIST (CON'T)

PAGE	ITEM	PART NO	DESCRIPTION	QTY
3-13	EXTENSION BOOM ASSEMBLY - 2H (41710350)			
SEE PAGE 3-29 FOR WEAR PADS & SHIMS				
3-14	EXTENSION BOOM ASSEMBLY - 2H/1M (41710351)			
SEE PAGE 3-29 FOR WEAR PADS & SHIMS				
3-15	INSTALLATION KIT - REAR MOUNT (93709811)			
	13	73051616	PUMP	1
	17	73052084	RETURN FILTER 10-MIC	6
		73052006	FILTER ELEMENT 10-MIC	
3-21	RESERVOIR ASSEMBLY - 27 GALLON (70732776)			
	13	70733180	STRAINER 30GPM 100MESH	2
3-22	1ST STAGE EXTENSION CYLINDER (3B085920)			
	6	9B085920	SEAL KIT	1
	18	73054807	COUNTERBALANCE VALVE	2
	19	73054919	VELOCITY FUSE-SLIP IN 25GPM	2
3-23	2ND STAGE EXTENSION CYLINDER (3B095920)			
	6	9B095920	SEAL KIT	1
	19	73054919	VELOCITY FUSE-SLIP IN 25GPM	2
3-24	EXTENSION CYLINDER-1H (3B225940)			
	6	9B095920	SEAL KIT	1
	19	73054807	VALVE	2
3-25	INNER BOOM CYLINDER (3C112920)			
	4	70143838	BALL BUSHING	2
	8	9B112920	SEAL KIT	2
	19	73054810	COUNTERBALANCE VALVE	4
3-26	OUTER BOOM CYLINDER (3C124920)			
	4	70034283	BEARING	4
	7	9B124920	SEAL KIT	1
	19	73054810	COUNTERBALANCE VALVE	2
3-27	POWER OUT OUTRIGGER CYLINDER (3B055920)			
	5	9B055920	SEAL KIT	2
3-28	POWER DOWN OUTRIGGER CYLINDER (3B070920)			
	6	9B070920	SEAL KIT	2
	20	73054794	VALVE-DOUBLE PILOT OPERATED	2

INSTALLATION

GENERAL

The 15000 Series Crane/Model 21100 may be installed behind the cab or as a rear mount (rear of truck bed). In both locations, the crane is secured to the truck frame. Truck capacity and mounting position will affect crane capacity and working area. Also affected is the required outrigger width. See MINIMUM CHASSIS SPECIFICATIONS in Section 1 for relationships of crane, truck and capacity.

CRANE MOUNTING

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

2. Install the truck frame support so that the tie-down studs pass through the supports (See figure). Cut the support to the inside dimensions of the truck frame. Allow about 1/16" (1.6mm) extra. Grind the end of the support to fit inside the frame channel. Use a hammer to drive it into position if necessary.

3. Allow sufficient clearance between the cab and crane base. Position the crane on the chassis per the applicable installation drawing, centering the mounting slots over the truck frame rails. While holding crane with hoist, start mounting hardware per figure. Note position of support weldments on truck frame. Hand tighten nuts. Observe underside of crane base. No clearance between base and frame is allowed.

4. Torque the 1 1/4"-7 UNC Grade 5 mounting hardware to 840 ft-lbs (116 kg-m). When torquing the mounting hardware the following precautions must be followed:

A. Never use lock washers.

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

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

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

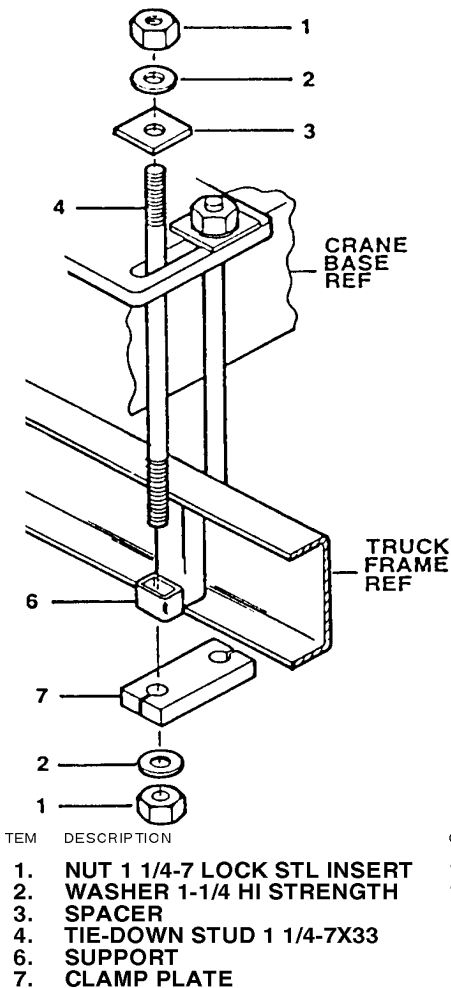
E. Touch-up paint around mounting anchor plates.

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

CAUTION

Do not attempt to apply the same torque to the tie rod and self-locking nuts as shown in the Torque Data Chart. Do not exceed 840 ft. lbs. (116 kg-m). Exceeding this torque value could damage either the chassis or crane base.

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



CRANE INSTALLATION

HYDRAULIC INSTALLATION

The hydraulic power required to run the crane is 17 GPM at 4000 PSI (64 LPM at 276 bar).

1. Install hydraulic pump on vehicle. Pour a small quantity of hydraulic fluid into top port of pump.
2. Connect 3/4" diameter hydraulic hose from the "P" port of the chassis pump to "P" port of the control valve.
3. Connect 1" diameter hydraulic hose from the "R" port of the control valve to adapter on the inlet side of the return filter.

Return filter element rating is 10-micron and is satisfactory for average atmospheric conditions. For dusty atmospheres, a 5- micron filter element is recommended. Return filter is equipped with a bypass feature to prevent blockage of hydraulic system. In case of replacement, the replacement filter housing should be similarly equipped.

4. On outlet side of return filter, use nipple to connect gate valve. Use adapters to connect 1" diameter hose between gate valve and reservoir.
5. Use 1/4" adapter to connect 1/4" diameter return hose between control valve and pump (pressure compensator parts).
6. Connect 1/2" return hose between pump case drain port and reservoir using elbow adapter at pump and straight adapter at reservoir.
7. Connect 1-1/4" suction hose between pump and reservoir using adapter, barbed nipples, reducer and hose clamps.
8. Use hose clamps to secure hoses to chassis every 2 to 3 feet (60 to 90 cm) and additional clamps as required.
9. Fill reservoir with hydraulic fluid above normal fluid level. Temporarily loosen the hydraulic suction line at pump to fill the hose. Re-tighten suction line. Crane hydraulic system is now complete.

NOTE

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

INITIAL CRANE RUN-IN PROCEDURE

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

NOTE

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

2. Set throttle stops according to engine RPM and PTO ratio to get approximately 2000 RPM pump shaft speed. Check to see that you are getting the correct oil flow of 17 GPM at 4000 PSI (64 LPM at 276 bar).
3. When all cylinders have been operated through complete cycles, stow crane and place the outriggers in the up position. The oil level should be visible on the sight gauge.
4. Lift and stability test must now be performed on the unit (see Stability Check). Winch and boom tests should be conducted to ensure proper performance.
5. After testing is complete, the mounting bolts and all cable clamp bolts should be retorqued to specification.
6. Upon completion, overall height of crane/vehicle combination must be measured and the results posted inside of cab to inform driver of overall height.

STABILITY CHECK

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

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

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

- _____ Front axle (FA) weight
- _____ Rear axle (RA) weight
- _____ Total gross weight = FA + RA
- _____ Measure the wheel base of the truck from the center of the rear bogie to the center of the front axle.
- _____ Measure the distance from the centerline of the rear bogie to the centerline of crane rotation.

NOTE

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

1. The crane/unit should be positioned in an area free from overhead obstructions to allow performance of the entire stability test without repositioning. Check the capacity chart for areas of reduced capacity and position vehicle accordingly.
2. Anytime the task requires setup in the vicinity of energized powerlines, a qualified signal person shall be assigned at a vantage point where he can accurately monitor the distance from the equipment to the powerlines and give warning before approaching the minimum safe distance. If the stability test requires any portion of the crane or its optional equipment to operate at less than the minimum required safe distance, the appropriate electric utility shall be notified to de-energize the powerline before any work is performed with the crane.
4. The vehicle shall be located on a firm and level surface that will provide adequate support for the outrigger loading. Use caution when setting up near overhanging banks or excavations.
5. Set the auxiliary (parking) brake.
6. Depress the clutch pedal. Shift the transmission into neutral and engage the PTO.
7. Operate the throttle control to achieve the proper engine speed.
8. While standing at the crane streetside control station, extend the outrigger beams outward from crane/unit to maximum horizontal position.
9. While standing at the streetside control station, lower the streetside outrigger. Extend the outrigger jack cylinders until firm ground contact is made. On soft ground, use cribbing to prevent sinking. Repeat this process on curbside outrigger system at the curbside control station.

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

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

12. While standing at the crane control station, position the crane into the proper working position.

NOTE

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

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

NOTE

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

GENERAL STABILITY TESTING PROCEDURE

- Determine appropriate reach and weight to be used for testing. For example at the 33'-2" (10.11m) horizontal reach position, the weight would be calculated as follows:
 $4150 \text{ lb} - 700 \text{ lb (winch wt deduction)} = 3450 \text{ lb}$
 $\text{Stability test weight} = 3450 \text{ lb} \times 1.18 = 4070 \text{ lb approx.}$
 $1882 \text{ kg} - 317 \text{ kg (winch wt deduction)} = 1565 \text{ kg}$
 $\text{Stability test weight} = 1565 \text{ kg} \times 1.18 = 1847 \text{ kg approx.}$
- Position weight toward the rear of the chassis on the ground in an appropriate position.
- Properly unstow the crane into working position.
- Knuckle the booms to connect the boom tip hook to the weight with the extensions retracted.
- Position the inner and outer booms such that when the weight is extended with the extension booms, it will still clear the ground slightly.
- Rotate crane toward rear of chassis.
- Extend the extension booms until they are fully extended.
- Rotate crane in direction opposite the operator to determine if unit is completely stable or which areas of rotation the unit is unstable to derate appropriately.

NOTE

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

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

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

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

17. After stability testing is completed, pick an appropriate capacity load and rotate from outrigger to outrigger around the rear of the truck 10 times. Does the crane/unit function properly?

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

NOTE

When retorquing mounting bolts stay clear for safety purposes.

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

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

COMMENTS:

DATE:

SER. NO. OF CRANE TESTED:

SER. NO. OF TRUCK CHASSIS:

TEST PERSONNEL:

TEST LOCATION:

HYDRAULIC PUMP

The pressure-compensated hydraulic pump supplies hydraulic fluid under pressure to the directional control valve. The pumping rate and outlet pressure vary in response to a signal pressure from the control valve. This signal pressure varies according to the number of functions being operated and the extent of operator movement of the control lever. The hydraulic pump is set to provide up to a maximum of 17 GPM at 4000 PSI (64 LPM at 276 bar) outlet pressure. Return flow is routed directly back to the hydraulic reservoir.

OUTRIGGERS

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

The optional 21' (6.4m) span outriggers have manual sections that can be power extended. After extending the main outrigger beam and pulling a pin in the manual section, the link tube will hold the manual section while the main beam is being retracted. This repositions the manual section in relationship with the power section. The pin is then re-installed for extending to the full optional outrigger span. The sequence is reversed for retraction.

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

ROTATION

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

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

INNER BOOM

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

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

OUTER BOOM

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

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

EXTENSION BOOMS

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

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

CRANE CONTROLS

MANUAL SHIFT CONTROL

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

AIR SHIFT CONTROL

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

ELECTRIC SHIFT CONTROL

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

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

PARKING BRAKE

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

NOTE

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

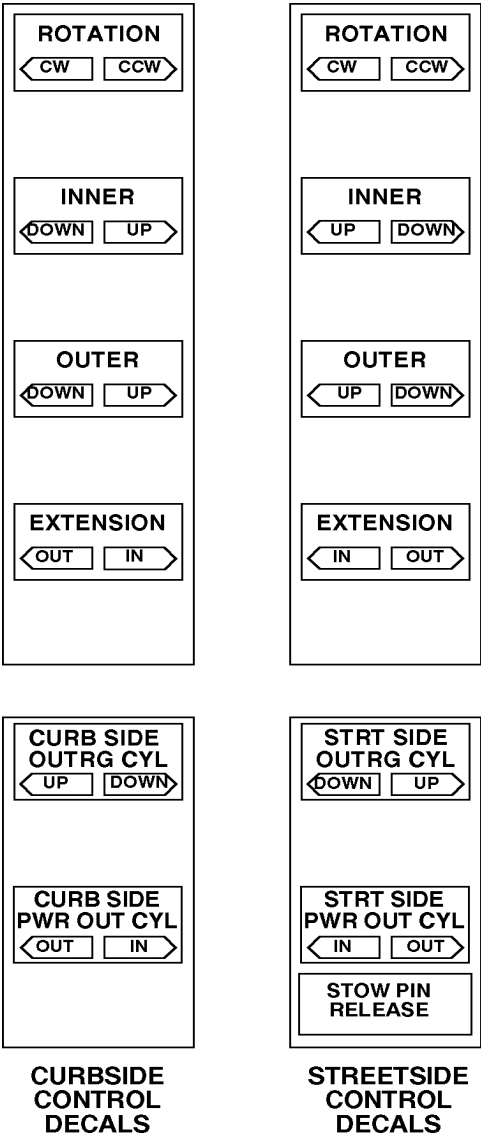
CRANE CONTROL STATIONS

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

NOTE

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

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



CONTROL DECALS

VALVEBANK

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

ROTATION

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

INNER BOOM

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

OUTER BOOM

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

EXTENSION

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

OUTRIGGER CYLINDER

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

POWER OUT CYLINDER

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

OTHER CRANE CONTROLS**THROTTLE** (required on vehicle)

PULL the manual throttle to accelerate the truck engine speed, PUSH the manual throttle to return to idle speed. Increasing truck engine speed increases operating speed.

HORN (recommended on vehicle)

Operate horn button to warn fellow workers on site of pending movement of crane.

PRESSURE GAUGE (recommended on vehicle)

Operate pressure gauge while booming up or down at end of stroke to determine system pressure.

CAPACITY CHART (furnished with crane)

This chart shows capacities of crane at various operating areas, and precautions to observe while operating crane.

CRANE SET-UP

Work site preparation is extremely important to a safe work environment. Plan your lifts carefully, taking into account the presence of powerlines, bystanders, overhead obstructions, and solid surface support. See the Operator's Crane Safety Manual for additional information.

1. Determine the weight of the load to be lifted. Refer to the crane's capacity chart, making certain that all lifts are performed within the rated capacity of the crane. Position the carrier vehicle with these capacities in mind and avoid any overhead obstructions which can impair the lift.

WARNING

THE PRESENCE OF ANY ELECTRICALLY CHARGED POWERLINES MUST BE AVOIDED. READ AND UNDERSTAND VOLUME 1, CRANE OPERATION NEAR POWERLINES, BEFORE ATTEMPTING ANY CRANE OPERATIONS NEAR POWERLINES.

2. Position the carrier vehicle in such a manner that it is impossible for the crane, in its fully extended position, to come into contact with electrically charged lines or apparatus. A distance of 10 feet (3.05m) is absolutely the closest that any portion of the crane, loadline or load can be to electrical lines carrying up to 50,000 Volts. A minimum of 12 inches (31cm) must be added to that distance for every additional 30,000 Volts or less.

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

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

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

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

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

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

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

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

8. Pull quick release pin and swing the streetside operator control platform outward to deployed position. Replace the pin. While standing on the operator control platform, operate the outrigger control levers for the outrigger on that side of the crane.

	NORMAL VOLTAGE kV (Phase to Phase)	MINIMUM REQUIRED CLEARANCE Feet (meters)
OPERATION NEAR HIGH VOLTAGE POWERLINES	From 0 to 50 From 50 to 200 From 200 to 350 From 350 to 500 From 500 to 750 From 750 to 1000	10 (3.05) 15 (4.58) 20 (6.10) 25 (7.62) 35 (10.67) 45 (13.72)
OPERATION IN TRANSIT WITH NO LOAD AND BOOM OR MAST LOWERED	From 0 to 0.75 From 0.75 to 50 From 50 to 345 From 345 to 750 From 750 to 1000	4 (1.22) 6 (1.83) 10 (3.05) 16 (4.88) 20 (6.10)

REQUIRED CLEARANCES OF CRANES FROM ELECTRICAL TRANSMISSION LINES

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

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

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

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

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

WARNING

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

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

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

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

NOTE

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

WARNING

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

PRECAUTIONS

1. Avoid holding tools or other items in hand that could make accidental contact with a powerline or ground while standing on a platform.
2. Avoid placing materials on the platforms or leaning materials against the platforms.
3. Avoid having more than one person on a platform at a time.

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

1. The operator is advised to remain on the crane platform and attempt to maneuver the crane away from the electrical power source.
2. Alternatively, and barring any other circumstances, the operator might be advised to consider staying on the crane platform until the electrical power can be shut off by other personnel.
3. If the above options are not possible and dismounting from the crane/vehicle is necessary while it is in contact with live electric powerlines, the operator may be advised to jump clear of the crane onto dry ground. In such cases, DO NOT hold on to any part of the crane and/or platform while dismounting.

OPERATING PROCEDURES

EQUIPMENT FAMILIARIZATION

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

EQUIPMENT CHECKS

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

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

NOTE

SEE VEHICLE MANUAL FOR VEHICLE CHECKS.

WORK SITE POSITION

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

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

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

BEFORE LEAVING CAB

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

CRANE DEPLOYMENT

CAUTION

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

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

CAUTION

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

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

CAUTION

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

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

CAUTION

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

BEFORE MAKING THE LIFT

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

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

3. Check the operating area for electrical powerlines.

READING AND UNDERSTANDING THE CAPACITY CHART

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

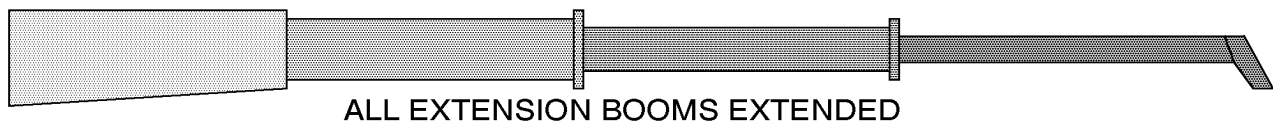
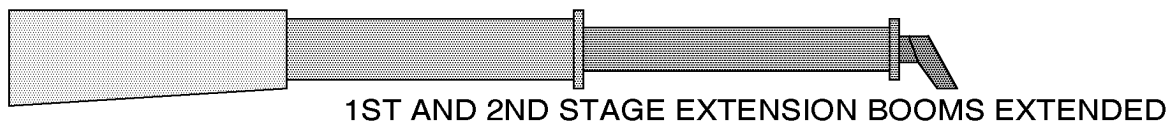
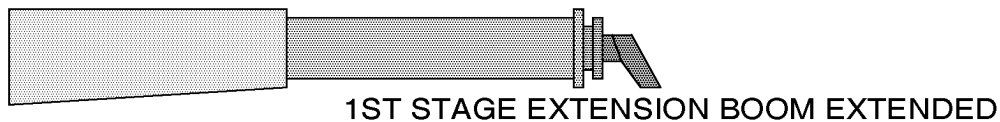
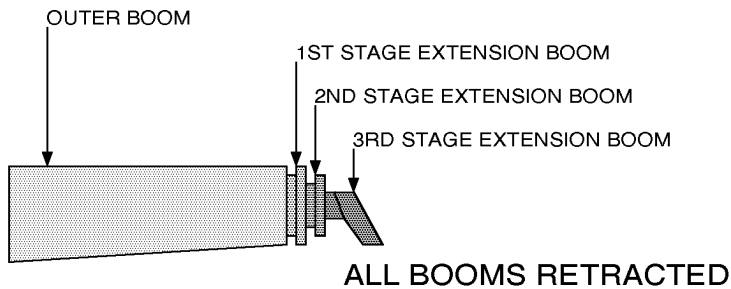
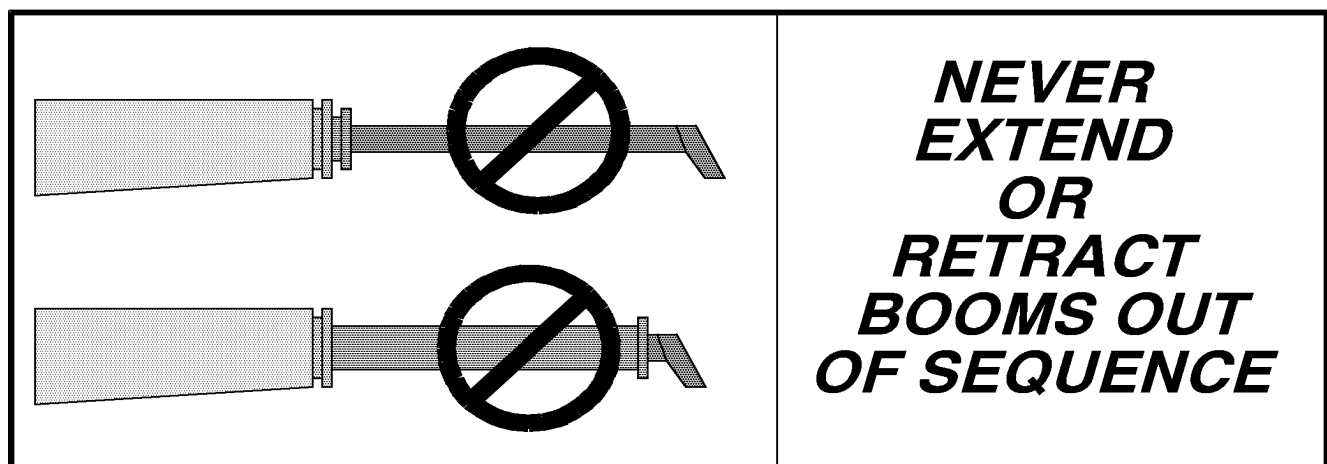
Overloading a crane can cause many types of failure depending on the configuration and working position of the crane, i.e. structural damage to almost any part of the crane, winch or cable failure and tipping over of the unit.

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

EXTENSION BOOM SEQUENCE

Extension booms are to always be extended in their proper sequence, largest to smallest. NEVER extend booms out of sequence.

Extension booms are to always be retracted in their proper sequence, smallest to largest. NEVER retract booms out of sequence.

**PROPER EXTENSION BOOM DEPLOYMENT****IMPROPER EXTENSION BOOM DEPLOYMENT**

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

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

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

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

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

1. Determine the weight of the load and load handling equipment.
2. Determine the radius from centerline of crane rotation to position of load.

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

LIFTING THE LOAD

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

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

CAPACITY SHUT DOWN/ OVERSTRESS SYSTEM

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

OPERATION IN ADVERSE CONDITIONS

OPERATION IN DUSTY AND SANDY AREAS

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

1. All lubricants and lubricating equipment must be kept clean. Service breathers and air cleaners frequently to remove accumulated sand and dust. Lubricate more frequently to keep a supply of clean lubricant in the moving parts. Clean all lubrication fittings thoroughly before attaching the grease gun.
2. Keep the fuel tank filler cap tight to prevent sand or dust from entering the fuel tank. Service fuel filters frequently to keep them free of sand and dust.
3. Keep the hydraulic oil reservoir filler caps tight to prevent sand and dust from entering the hydraulic systems. Service the hydraulic oil filters frequently to keep the system free of sand and dust.
4. Use wood blocking or mats under the outrigger pads when operating in sand. See that the carrier vehicle does not shift during operation.
5. Before performing service on the crane such as replacing hoses, thoroughly clean hose connections and surrounding area. Failure to do so will allow sand particles into the hydraulic system which will ruin the pump, holding valves, valvebank and cylinders, leading to costly repairs.

OPERATION IN HIGH HUMIDITY OR SALT AIR CONDITIONS

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

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

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

OPERATION AT HIGH ALTITUDES

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

COLD WEATHER OPERATION

For cold weather operation with temperatures of -25°F (-32°C) or lower, the following procedures must be followed:

1. Start the truck and run at manufacturer's recommended idle speed for proper warm up.
2. After a time period of approximately 45 minutes of truck warm up time, depress the clutch pedal. Shift the transmission into neutral and engage the PTO.
3. At engine idle, release clutch pedal slowly until full engagement of PTO is realized.
4. With the PTO fully engaged and the truck engine running at idle speed, let the hydraulic system oil circulate.

CAUTION

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

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

CAUTION

FOR CRANE OPERATION IN TEMPERATURES BELOW -25°F (-32°C) HYDRAULIC OIL CONFORMING TO MIL-L-46167 MUST BE USED IN THE CRANE HYDRAULIC SYSTEM.

CAUTION

FOR WINCH OPERATION IN TEMPERATURES BELOW -25°F (-32°C) THE LUBRICATION OIL IN THE WINCH GEARBOX MUST BE CHANGED TO LUBRICATING OIL CONFORMING TO MIL-L-2105C, GRADE 75W (GO-75).

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

- a. Slowly extend horizontal outrigger cylinders out approximately 6 inches and retract, extend out again approximately on half stroke and retract, and then extend full stroke.
- b. Follow this procedure on crane deployment, and extend cylinders.
- c. When completed, begin crane swing operation by rotating slowly approximately one eighth revolution one way, return to previous position and rotate in opposite direction. Do this several times, then rotate 90° (1.57 Rad.) and return.
- d. If equipped with a winch, begin winch operation by slowly opening the control valve allowing several revolutions in one direction. Then reverse the control valve and operate several revolutions in the opposite direction. Repeat several times allowing longer operation intervals.

CAUTION

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

NOTE

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

PREPARATION FOR ROAD TRAVEL

1. Operate ROTATION control lever into the swing storage position.
 2. Operate EXTENSION boom control lever IN to completely retract telescoping boom sections.
 3. Operate INNER boom control lever UP to raise inner boom to maximum.
 4. Operate OUTER boom control lever DOWN to lower outer boom to maximum.
 5. Operate INNER boom control lever DOWN to lower inner boom to maximum.
 6. Operate OUTER boom control lever UP until boom is positioned against storage pads.
 7. Operate OUTRIGGER CYLINDER control lever UP to maximum.
 8. Operate POWER OUT CYLINDER control lever IN to maximum.
- For optional 21' span outriggers, pin link tube between manual section and the base. Pull the pin holding manual outrigger section to power outrigger section. Operate POWER OUT CYLINDER control lever OUT to align holes on the side of power outrigger section with holes on side of the manual section nearest vertical cylinder. Insert pin in aligned holes. Remove link tube. Operate POWER OUT CYLINDER control lever IN to maximum.
9. Repeat steps 6 and 7 on opposite side.
 10. Position and lock operator platforms in travel position - both sides.
 11. Disengage PTO.
 12. Store wheel chocks and cribbing.
 13. Disengage parking brake before moving vehicle.
 14. When travelling on the road, check all underpasses to be sure there is sufficient clearance for the unit.

SAFE VEHICLE TRANSPORT

1. Before transporting:
 - a. Be sure that outriggers are stowed properly.
 - b. Secure the loadline hook. Do not by any method, over tension the hook stow hardware or damage could result.
 - c. Secure boom properly.
 - d. Secure all loose items to the truck bed.
 - e. Disengage the PTO.
 - f. Release parking brake.
2. Do not travel with load on hook.
3. Be sure that tires are properly inflated.
4. Make sure that there is enough overhead clearance before entering any underpass.
5. Do not allow any persons to ride on the equipment when it is being transported.
6. A signal person may be required when moving or backing unit in areas where visibility is limited.

INSTALLATION OF VARIABLE DISPLACEMENT PUMP

GENERAL

A. Check direction of rotation of pump to insure that it is correct for the application. Refer to Figure 1.

The direction of rotation can be determined by looking at the rear of the pump (opposite end from the shaft) where the pressure port and the suction port can be seen. The pressure port is stamped with the letter "B" and is the smaller of the two. On a right hand rotation pump, the pressure port is to the right when viewed from the rear. On a left hand rotation pump, it is to the left.

NOTE

A RIGHT HAND ROTATION PUMP IS ONE THAT MUST BE ROTATED CLOCKWISE WHEN VIEWED FROM THE SHAFT END. A LEFT HAND ROTATION PUMP IS ONE THAT MUST BE ROTATED COUNTER-CLOCKWISE WHEN VIEWED FROM THE SHAFT END.

B. Check direction of rotation of the PTO output shaft that will drive the pump.

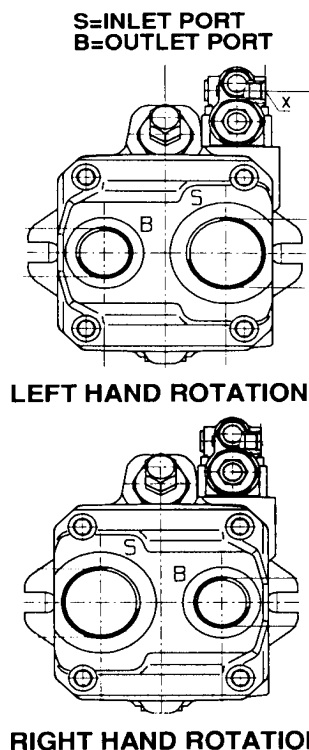


FIGURE 1. PUMP ROTATION

INSTALLATION AND HOSE CONNECTIONS

A. Install pump on vehicle so that one of the case drain ports "L" or "L1" is on top. See Figure 2.

B. Fill the pump case with hydraulic oil.

CAUTION

DO NOT RUN THIS PUMP WITHOUT OIL IN THE CASE OR SERIOUS MECHANICAL FAILURE WILL RESULT.

C. Connect case drain to tank. Use a 1/2" (13mm) I.D. (min.) hose. Route this hose in such a manner that the oil in the hose must travel higher than the top of the pump before it is returned to tank. Doing so prevents the case from draining itself into the tank.

NOTE

THE MAXIMUM PERMISSIBLE CASE DRAIN PRESSURE IS 7 PSI (0.48 bar) HIGHER THAN THE PUMP INLET PRESSURE.

D. Install pump pressure and suction lines. Suction line should be connected to the same side of the tank as the suction strainer. Return lines must be connected back to tank through the return filter.

CAUTION

DO NOT CONNECT PUMP INLET LINE THROUGH THE 25 MICRON RETURN FILTER, BECAUSE THIS WILL CAVITATE THE PUMP.

E. Connect the load sense line. See Figure 2.

F. Connect a 5000 PSI (345 bar) pressure gauge to check the pressure between the pump pressure port and the valvebank.

G. Check hydraulic oil level in the tank.

H. Check to insure that oil shut off valve, between the oil reservoir and the pump inlet, is open. Check that the oil shut off valve, between the oil return line and the reservoir, is also open.

PRELIMINARY PRESSURE ADJUSTMENT (BEFORE START-UP)

A. Remove the cap over the main pressure adjustment. See Figure 2.

B. Loosen the lock nut and turn the socket head set screw counter-clockwise to reduce the maximum pressure to its minimum. (Pumps are normally shipped with this pressure adjustment set to its minimum but should be checked.) See Figure 2.

NOTE

SETTING THE PUMP TO ITS MINIMUM PRESSURE IS DONE TO ALLOW THE PUMP TO BE STARTED AT MINIMUM PRESSURE AND TO INSURE PROPER LUBRICATION PRIOR TO BEING OPERATED UNDER LOAD.

C. Remove the cap over the stand-by pressure/flow control adjustment - smaller of the two caps located above the main pressure adjustment. See Figure 2.

D. Loosen the locknut and turn the socket head set screw all the way clockwise to its maximum adjustment.

PUMP STARTUP

A. Start pump slowly at first (truck low engine idle) and check for unusual noises and leaks.

B. Increase pump speed to its recommended operating speed.

C. Adjust to maximum pressure. With all valves of the valvebank in neutral and the pump dead headed, slowly turn the main pressure adjustment clockwise to increase the pressure to the specified amount (check the pressure on the gauge while doing so) tighten the lock nut on the pressure adjusting screw and reinstall the cap. See Figure 2.

D. Once the maximum pressure has been set (C above) the stand-by pressure needs to be decreased to approximately 300 to 400 PSI. To accomplish this, turn the stand-by pressure/flow control adjustment counter-clockwise until the pressure gauge reading decreases to 300-400 PSI (20.7 - 27.6 bar). Tighten the locknut and reinstall the cap.

E. Make a final pressure check to insure that the maximum and stand-by pressure settings are correct.

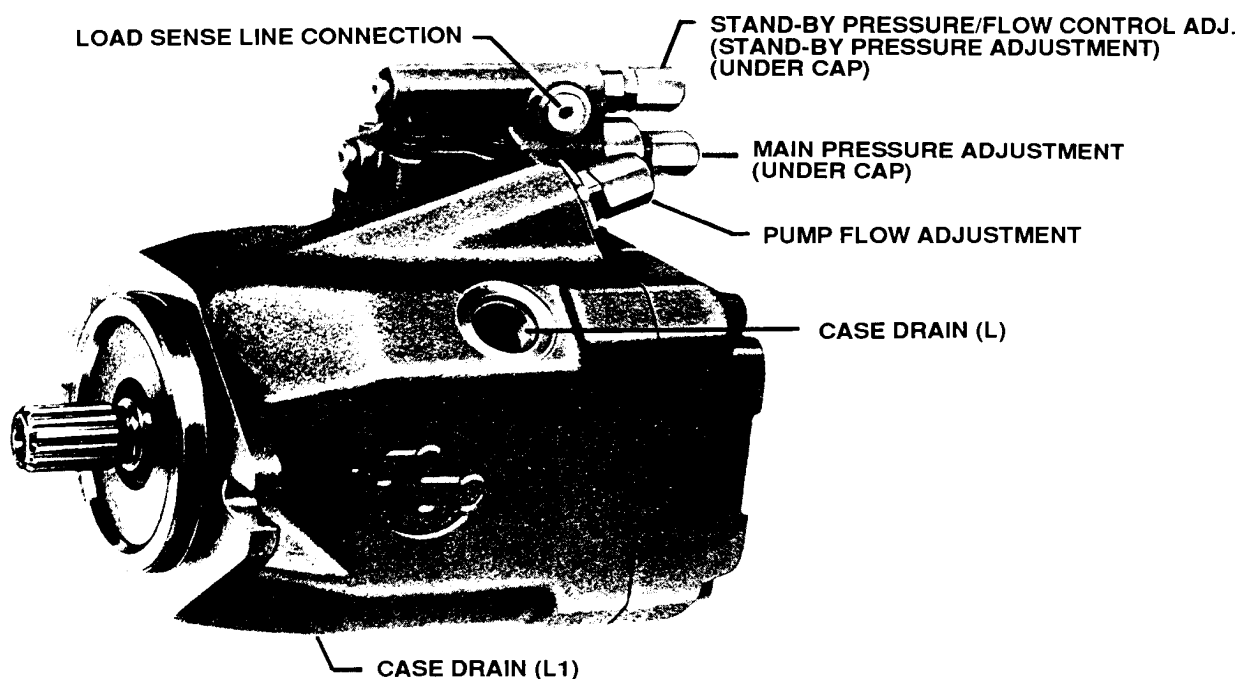


FIGURE 2. PORTS AND ADJUSTMENTS

EXISTING INSTALLATION PRESSURE CHECK AND ADJUSTMENT

- A. Install a pressure gauge on the pump pressure line.
- B. Extend a hydraulic cylinder until it bottoms out.
- C. To adjust maximum pump pressure, hold valve shifted and read maximum pump pressure. To increase the pressure, turn the maximum pressure adjustment clockwise. To decrease, turn it counter-clockwise. See Figure 2.
- D. To adjust the stand-by pressure, return all valves to neutral and read the pressure gauge. To increase or decrease this pressure, turn the stand-by pressure/flow control clockwise (to increase) or counter-clockwise (to decrease). See Figure 2.

FLOW OUTPUT ADJUSTMENT

Some pumps are equipped with a mechanical flow limiter. See Figure 3.

To decrease pump flow, remove the cap, loosen the locknut and turn the adjusting screw clockwise. To increase flow, turn the adjusting screw counter-clockwise.

NOTE

BY TURNING THE ADJUSTING SCREW CLOCKWISE, THE SWASHPLATE ANGLE AND THE PUMP DISPLACEMENT ARE DECREASED.

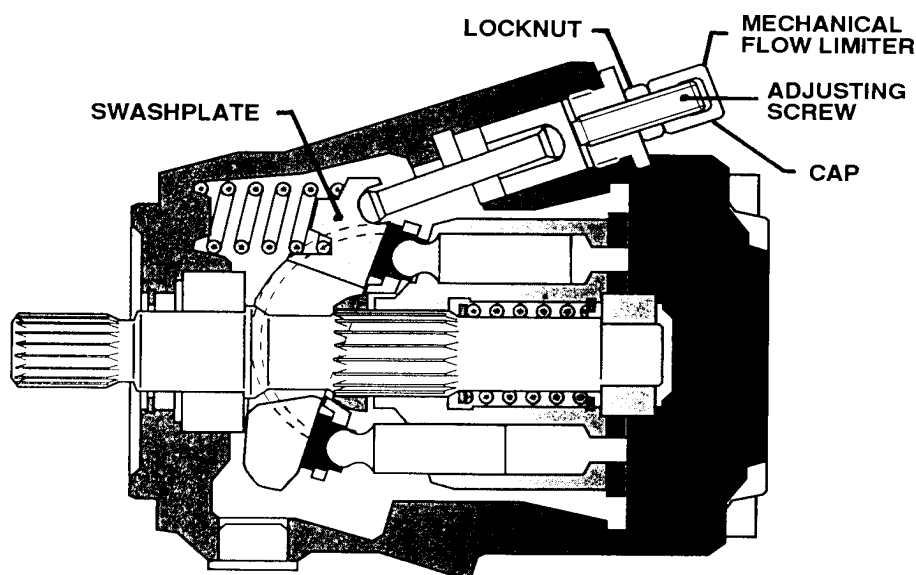


FIGURE 3. MECHANICAL FLOW LIMITER

MAINTENANCE

MAINTENANCE

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

INSPECTION

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

The inspections are separated into the following frequency classifications:

DAILY INSPECTIONS

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

WEEKLY INSPECTIONS

These items should be visually inspected weekly by the operator.

MONTHLY INSPECTIONS

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

PERIODIC INSPECTION

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

DAILY INSPECTIONS

Check the following items:

1. Engine oil level
2. Hydraulic oil level.
3. Radiator coolant level.

4. Loose parts or damage to structures or welds.
 5. Operation of lights, safety equipment and gauges.
 6. Condition of tires and suspension.
 7. Lubrication of points required by Lubrication Chart.
 8. Evidence of oil leaks from hoses or gearbox.
 9. Controls including throttle for malfunctions or mis-alignment.
 10. Truck parking brake operation.
 11. Boom sequencing to insure that largest boom section extends first and retracts last.
 12. All securing hardware such as cotter pins, snap rings, hairpins, and pin keepers for proper installations.
 13. All safety covers for proper installation.
- WEEKLY INSPECTIONS**
- Check the following items:
1. Battery water level.
 2. Tire pressure.
 3. Lubrication of points required by Lubrication Chart.
 4. Boom lift and outrigger holding valves for proper operation.
 5. Proper tightness of mounting bolts during first month of operation of new machine and then monthly thereafter.

MONTHLY INSPECTIONS

Check the following items:

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

3. Load hook for cracks or having more than 15% from normal throat opening or 10° (.17 Rad.) twist.
4. Main frame mounting bolts for proper torque (See Torque Data Chart).
5. Rotation system mounting bolts for proper torque.
6. All structural members (boom, mast, base, and outriggers) for bends, cracks or broken members.
7. All welds for breaks or cracks.
8. All pins for proper installation.
9. All control decals, safety decals and capacity charts for legibility and attachment.

PERIODIC INSPECTIONS

Check the following items:

1. All items listed under DAILY, WEEKLY and MONTHLY INSPECTIONS.
2. Loose bolts and fasteners in all areas.
3. All pins, bearings, shafts, and gears for wear, cracks or distortion to include all pivot, outriggers, pins and bearings.
4. Hydraulic systems for proper operating pressures.
5. Cylinders for damaged rods, dented barrels, drift from oil leaking by piston, leaks at rod seals, welds or holding valves.
6. PTO driveline system for proper alignment, lubrication and tightness.
7. Hydraulic hoses and tubing for evidence of damage such as blistering, crushing or abrasion.
8. Stability of unit throughout working area. Check stability procedure in Installation Section.
9. All electrical wires and connections for worn, cut, or deteriorated insulation and bare wire. Replace or repair wires as required.

ADJUSTMENTS AND REPAIRS

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

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

FUNCTIONAL OPERATING MECHANISMS

SAFETY DEVICES

CONTROL SYSTEMS

POWER PLANTS

BRAKING SYSTEMS

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

LUBRICATION

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

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

LUBRICANTS

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

CHASSIS GREASE

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

EXTREME PRESSURE MULTIPURPOSE GEAR LUBRICANT (EPGL)

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

SAE VISCOSITY NUMBER	MINIMUM AMBIENT TEMPERATURE - °F (°C)
75W	-40 (-40)
80W	-15 (-26)
85W	0 (-18)
90	+20 (-7)
140	+40 (+5)
25	+50 (+10)

OPEN GEAR LUBRICANT

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

CHASSIS GREASE - LOW TEMP

This special grease for low temperatures remains plastic at -60°F (-50°C) with melting point of 280°F (138°C). It is a heavy duty extreme pressure type lubricant (Lubriplate Low Temp or equal).

HYDRAULIC OIL

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

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

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

1. Viscosity
2. Anti-wear additives.

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

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

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

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

The following oil viscosity characteristics are recommended:

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

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

SAE VISCOSITY	TEMPERATURE - °F (C°)
5W	-10 TO 180 (-23 TO 82)
10W	+10 TO 180 (-12 TO 82)
10W-30	+10 TO 210 (-12 TO 99)

ARCTIC CONDITIONS BELOW -25°F (-32°C)

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

1. Engine oil meeting the requirements of MIL-L-46167 are satisfactory for arctic conditions and should be used if operating in temperatures below -25°F (-32°C).
2. Gear oil in the winch must be changed to oil conforming to MIL-L-2105C, Grade 75W (GO-75) for operation in temperatures below -25°F (-32°C).

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

ANTI-WEAR ADDITIVES

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

LUBRICATION POINTS

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

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

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

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

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

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

HYDRAULIC OIL DETERIORATION

Contamination of the hydraulic oil by solvents, water, dust or other abrasives will result in premature breakdown of oil's antifoam, lubrication, anti-rust and viscosity properties. Prolonged exposure to water or high operating temperatures above 180°F (82°C) will cause an increase in the oxidation rate, producing varnish forming materials and sludge in the oil.

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

1. Place oil sample in a clean glass.
2. Smell oil to detect a burnt or rancid odor.
3. Examine the oil for a cloudy or dark color.
4. Allow the sample to stand for several minutes and inspect it for water which will settle to the bottom. Water can result from a leak in the system or condensation due to temperature extremes.

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

HYDRAULIC SYSTEM PURGING

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

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

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

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

CAUTION

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

1. Locate the unit in an area which provides solid, level footing and space to accommodate the full operating range of the crane.
2. Stabilize the unit with the outriggers. Move the crane to either side of the truck and extend the inner, outer and extension cylinders.
3. Disengage the PTO, drain the hydraulic oil reservoir, remove the suction line filter and drain all hoses. Disconnect the pressure hose from the pump, drain and reassemble. Replace the suction line filter element and reassemble the system.

NOTE

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

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

NOTE

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

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

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

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

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

PURGING AIR FROM THE SYSTEM

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

HYDRAULIC COMPONENTS

SYSTEM RELIEF PRESSURE

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

1. Start the truck engine, depress the clutch pedal, shift the transmission into neutral and engage the PTO. Allow the system to idle until it is warmed up.
2. Raise the main boom until the cylinder(s) are fully extended. Continue to hold the valve open and read the pressure on the pressure gauge. A reading of less than normal should be corrected.

CYLINDER HOLDING CAPABILITIES

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

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

FILTER ELEMENT REPLACEMENT

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

HYDRAULIC FILTER

To change filter cartridges:

1. Kill the engine.

NOTE

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

2. Replace the cartridge with a new one ensuring proper rubber seal seating and tightening as much as possible with both hands.
3. Open the gate valve, engage the PTO and test the system for leaks.

MAINTENANCE AND SERVICE - LONG TERM STORAGE

HYDRAULIC SYSTEM

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

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

CORROSION CONTROL

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

SERVICE

GENERAL

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

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

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

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

NOTE

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

CLEANLINESS

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

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

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

HYDRAULIC SYSTEMS

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

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

Disassemble and assemble hydraulic components on a clean surface.

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

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

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

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

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

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

FASTENERS AND TORQUE VALUES

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

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

The torque tables are provided for reference when performing maintenance.

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

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

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

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

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

NOTE

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

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

LABEL PARTS WHEN DISASSEMBLING

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

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

BOOM WEAR PADS

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

1. When the pads wear such that the boom sections rub on boom sections, with the result of metal scraping and the removal of paint on the boom sections.
2. With the boom sections extended in the horizontal position, any noticeable droop of the boom sections would indicate the need for wear pad replacement.

To replace front wear pads, proceed as follows:

1. Retract all extension boom sections.
2. Operate OUTER BOOM and INNER BOOM control levers such that the outer boom is horizontal and at a comfortable working height.
3. Extend the required extension boom section sufficiently to allow access to front wearpads.

Manual sections may be extended as follows:

- a. Extend a hydraulic section.
- b. Secure outermost extension boom to a fixed object.
- c. Remove the pin that secures the manual section.
- d. Retract the hydraulic extension boom as required.

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

NOTE

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

To replace rear boom wear pads proceed as follows:

1. Retract all EXTENSION BOOMS.
2. Operate OUTER BOOM and INNER BOOM control levers such that the outer boom is horizontal and at a comfortable working height.
3. For hydraulic extension boom sections, remove cylinder rod pin by loosening set screw in end of rod eye and prying out the pin. Identify and remove hydraulic lines that supply the next telescoping section.
4. Cap or plug all open hydraulic fittings.
5. Position hoist for pulling boom section out of boom.
6. Using hoist, begin pulling disconnected sections from crane. When partially pulled out, remove top front stop block or wear pad by removing cap screws and sliding item out.
7. Lift boom end with hoist just sufficient to relieve pressure on bottom stop block or wear pad. Remove cap screws and slide block or pad out.
8. Re-position hoist for lifting boom sections. Use 2 fabric slings of adequate capacity. Use hoist to lift and remove extended boom section from crane. Position boom section on a firm work support while replacing rear wear pads.
9. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.
10. Start the crane and slowly cycle the boom in and out with no load to purge air from the system.
11. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

PIN AND BEARING INSPECTION AND INSTALLATION**PIN INSPECTION**

1. Remove the protective covering from pins and inspect each pin for nicks, gouges or deep, wide scratches. A small nick or gouge up to 1/8"(3.18mm) diameter can be repaired by dressing the edges of the imperfection with a file so that no metal protrudes above the circular surface of the pin.
2. A circular scratch of up to 1/16" (1.59mm) wide or deep can be repaired in the same manner as described above.
3. A lengthwise scratch on the pin of up to 1/32" (.79mm) wide or deep can be repaired as above.
4. Pins with defects larger than those listed in 1, 2 and 3 above, should be replaced.

PIN BEARING INSPECTION

The pin bearings (used at boom joints) furnished with this machine are made of a tough epoxy impregnated wound glass backing shell with a thin inner layer of filament wound bearing material. The outer bearing material should be visually checked for imperfections. Bearings with cracks or gouges larger than 1/4" (6.35mm) diameter on the outside diameter should be replaced.

TRUNNION INSPECTION

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

INSTALLATION

1. Bearings are to be installed as shown.
2. The bearings should be started in their respective bores by rotating the bearing while applying inward pressure with the hand. Once the bearing has been started squarely into its bore, it can be driven to its full counterbored depth by tapping with a rubber mallet. The head diameter of the mallet should exceed the outside diameter of the bearing to ensure that the bearing is not damaged during assembly.
3. If the bearing appears to be loose in the bore (if it can be pushed in with hand pressure alone), it is permissible to tighten the bearing by centerpunching the bore diameter in approximately 50 places around and throughout the 2" (51mm) deep bored area. Centerpunching will raise the metal around the edge of the punch mark and this raised metal will hold the bearing firmly in place during machine operation.
4. After all bearings have been installed and before attempting to assemble the machine, insert the 2" (51mm) pins through both bearings in each end of the lift cylinders and through the boom pivot bearings to ensure alignment and fit are correct. Pins should slide freely through the leading hole and start in the opposite hole. If a pin starts to bind through the leading hole, do not force the pin any further to avoid damaging the pin surface finish. Remove the pin and clean any corrosion or burrs out of the holes with a round file or emery cloth. A heavy hammer is allowed for pin replacement as long as pin bearing material is not removed while driving pin.

TURNTABLE GEAR - REMOVAL AND REPLACEMENT

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

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

1. Retract all extension booms.

2. Operate OUTER BOOM and INNER BOOM control levers to position outer boom in a vertical position with boom point as low as possible.
3. Position 2 fabric slings around boom and cinch on opposite sides of boom center of gravity. Hook slings on hoist and raise hoist to tension the slings.
4. Identify and remove hose connections between crane base and boom. Cap or plug all open hydraulic fittings.
5. With boom fully supported in position by hoist, remove bolts securing mast to turntable gear.
6. Disconnect lubrication line at turntable gear.
7. Remove cap screws that secure turntable gear to crane base.
8. Remove turntable gear from crane base.
9. Thoroughly clean the top of the crane base and bottom of the new turntable gear bearing. The mating surfaces must be clean and dry - no oil or grease.
10. Install the new gear bearing using new bolts and hardened flat washers. Hand tighten only.

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

NOTE

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

Remove yellow paint and check gear backlash with a feeler gauge. Clearance between pinion gear and turntable gear bearing teeth should be 0.006" to 0.009" (.152 to .229mm). Shift the turntable gear around to adjust the backlash.

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

CAUTION

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

12. Reverse procedure for reassembly. Use new cap screws and hardened washers when attaching mast to turntable gear. Torque mounting bolts to 320 ft-lbs(44 kg-m).

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

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

PINION AND DRIVE GEAR BUSHINGS - REMOVAL AND REPLACEMENT

To remove the pinion gear and bushings:

1. Rotate the crane mast until the notch on the mast base plate is positioned over the pinion gear.
2. Remove the pinion gear cover.
3. Locate and remove the retaining ring on the bottom of the pinion gear under the base.
4. Lift the pinion gear up and out of the intermediate gear. Slide the intermediate gear out of the way.

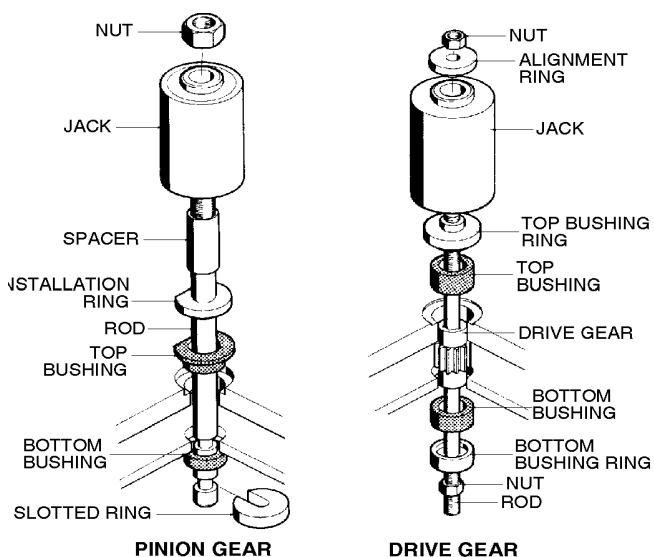


FIGURE 1. BUSHING REMOVAL

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

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

NOTE

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

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

REMOVAL AND REPLACEMENT OF OUTRIGGER ARMS

For standard 16' (4.88m) span outriggers:

1. Extend horizontal outrigger cylinder to maximum.
2. Disconnect rod end of horizontal cylinder from outrigger.
3. Retract horizontal cylinder.
4. Disconnect hydraulic hoses from vertical outrigger cylinder and beam. Cap or plug all open hydraulic fittings.

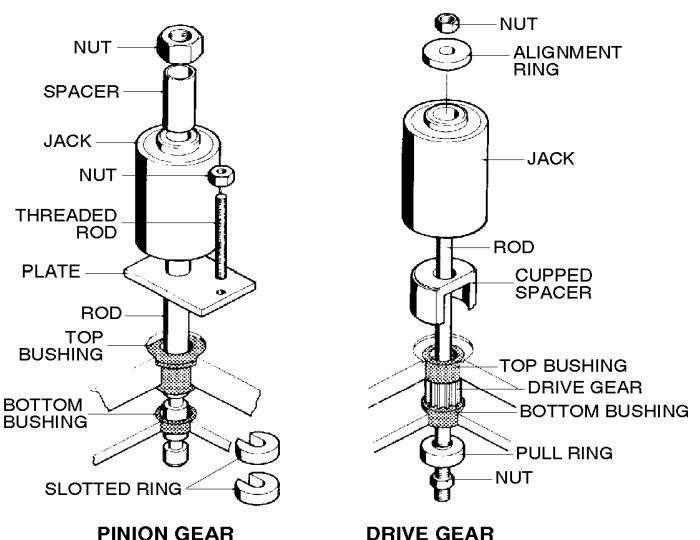


FIGURE 2. BUSHING INSTALLATION

5. Position 2 fabric slings around outrigger beam and use hoist to lift and pull out the outrigger beam assembly. Position the beam assembly on a firm work support.
6. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.
7. Start the crane and slowly cycle the vertical outrigger cylinder down and up with no load to purge air from the system.
8. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

For optional 21' (6.40m) span outriggers:

1. Extend horizontal outrigger cylinder to maximum.
2. Position link tube between manual section and base.
3. Pull out the pin through the side of the manual section.
4. Retract the horizontal cylinder.
5. Disconnect hydraulic hoses from vertical outrigger cylinder and beam. Cap or plug all open hydraulic fittings.
6. Position 2 fabric slings around outrigger beam and use hoist to lift and pull out the outrigger beam assembly. Position the beam assembly on a firm work support.
7. Extend the horizontal cylinder.
8. Disconnect rod end of horizontal cylinder from outrigger.
9. Retract horizontal cylinder.
10. Position 2 fabric slings around outrigger beam and use hoist to lift and pull out the outrigger beam. Position the beam on a firm work support.
11. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.

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

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

VERTICAL OUTRIGGER CYLINDERS - REMOVAL AND REPLACEMENT

1. Remove horizontal outrigger beam assembly as described above. For optional 21' (6.4m) span outriggers, it is not necessary to remove the powered outrigger section (lines 7-9 above).

2. Position outrigger beam assembly on side.

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

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

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

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

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

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

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

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

HORIZONTAL OUTRIGGER CYLINDERS - REMOVAL AND REPLACEMENT

1. Remove hydraulic hoses from horizontal outrigger cylinder.

2. Remove retaining hardware on both ends of cylinder.
3. Slide cylinder out of support bracket and remove from base. Position cylinder on a firm work support.
4. Reverse procedure for re-assembly.
5. Start the crane and slowly cycle the horizontal outrigger cylinder out and in with no load to purge air from the system.
6. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

REMOVAL AND REPLACEMENT OF OPERATOR CONTROL VALVE

1. Remove cotter pins and clevis pins which secure control rods to valve sections.
2. Identify all hoses and position at the control valve first and then remove the hoses from the valve. Cap or plug all open hydraulic fittings.
3. Position a fabric sling around the valve to prepare for lifting. Hook the sling onto a hoist. Raise hoist to tension the sling. Remove hardware securing valve to crane base. Position valve on a firm work support.
4. Reverse procedure for re-assembly. DO NOT induce any distortion in valve body when mounting it. Use shims under mounting pads if necessary to prevent distortion. Torque threaded fasteners per Torque Data Chart. Observe hose identification when re-connecting hoses to valve.
5. Start the crane and slowly cycle all cylinders out and in with no load to purge air from the system.
6. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

EXTENSION CYLINDERS -REMOVAL

1. Retract all extension booms, both hydraulic and manual operated.
2. Position the outer boom below horizontal with outer boom cylinder extended, so as to have the end of the last extension boom approximately 2 feet (61 cm) above the ground. See Figure 3.
3. Secure the end of the last extension to a suitable place on the boom, such as the outer boom linkage - rod end side - with a "come along", to keep extension booms retracted during removal of extension cylinders. See Figure 4.
4. Disconnect those hoses connected to the cylinder(s).
5. Remove pin at rod end, by removing the set screw holding the pin, located at the end of the rod.
6. When the rod pin has been removed, extend the boom by providing slack in the "come along" chain and letting the boom slide out approximately 1 foot.
7. Remove counterbalance valve. Unscrew slowly to allow buildup hydraulic pressure, if any, to bleed off.
8. Secure cylinder with a lifting strap to an overhead hoist to prevent the cylinder from falling during removal of the mounting bolts.
9. Remove the four 1/2" bolts holding the cylinder flange to the boom.

NOTE

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

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

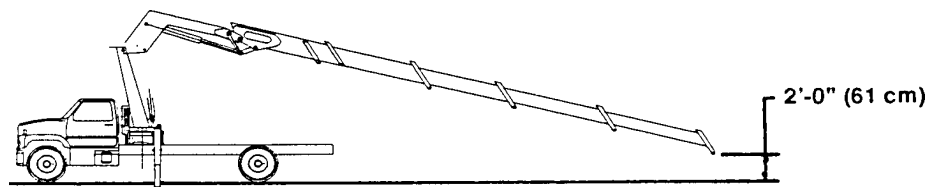


FIGURE 3. CRANE POSITION

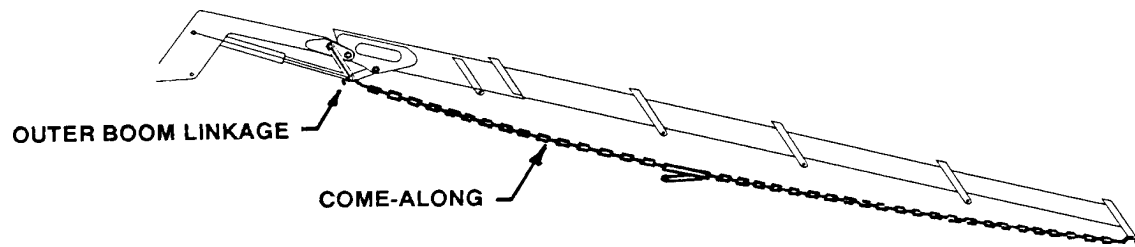


FIGURE 4. SECURING BOOMS

EXTENSION CYLINDERS - REINSTALLATION

NOTE

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

1. Secure the end of the last extension boom to the outer boom linkage to prevent the extension booms from sliding outward during reinstallation. Secure extension booms so they are approximately 1 foot (30 cm) from their fully retracted position. Use a “come along” to permit extending or retracting the extensions during reassembly.
2. Position the outer boom below horizontal (outer boom cylinder extended), so as to have the end of the last extension approximately 2 feet (61 cm) above the ground.
3. Remove the counterbalance valve.
4. Lift the cylinder with the overhead hoist and position it in place on the boom. Reinstall the four 1/2" bolts holding the cylinder flange to the boom. Reinstall the shims that are provided to level the cylinder with the boom and the other cylinder in the same locations as they were used at disassembly.
5. Retract the appropriate boom extension by means of the “come along” and reinstall the cylinder pin and its retaining set screw located at the end of the rod.
6. Reconnect the hoses. Reinstall the counterbalance valve.

OUTER BOOM - REMOVAL AND REPLACEMENT

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

3. Position 2 fabric slings of adequate size around opposite ends of the outer boom assembly. Slings must not pinch hydraulic hoses. Position hoist to lift on slings and lift up to tension the slings.
4. Identify and disconnect hydraulic hoses from rear of outer boom assembly. Cap or plug all open hydraulic fittings.
5. Remove pin retaining bolt through hoist pin of outer boom base section.
6. With the aid of a heavy sledge hammer and a pin driving tool, drive the boom hoist pin from the base section of outer boom. Allow link to hang down.
7. Remove pin retaining bolt through pivot pin of outer boom base section. With aid of a heavy sledge hammer and a pin driving tool, drive the boom hoist pin from the base section of the outer boom. Hoist outer boom onto a firm work support.
8. Reverse procedure for reassembly. Torque threaded fasteners per Torque Data Chart.
9. Start the crane and slowly cycle the boom in and out with no load to purge air from the system.
10. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

OUTER CYLINDER - REMOVAL AND REPLACEMENT

1. Retract all sections of the outer boom.
2. Operate OUTER BOOM and INNER BOOM control levers to position outer boom as low as possible and supported at both ends. Outer boom hoist cylinder must be positioned to allow it to swing to vertical position when end rod is removed.
3. Identify and remove hose connections at outer boom hoist cylinder. Cap or plug all open hydraulic fittings.
4. Position 1 long sling of adequate capacity around outer boom hoist cylinder and cinch it near rod end. Hook sling on hoist and raise hoist to tension the sling.

5. Remove pin retaining bolt and keeper on rod end.
6. With the aid of a heavy sledge hammer and a pin driving tool, drive the rod end pin from the cylinder and linkage. Allow cylinder to hang down.
7. Re-position the sling toward piston end of cylinder. Cinch sling such that sling will support cylinder in vertical position.
8. Remove pin retaining bolt and keeper on piston end.
9. With aid of a heavy sledge hammer and a pin driving tool, drive the piston end pin from the cylinder and inner boom. An assistant will be required to hold the cylinder straight vertically while driving out the pin.
10. Position cylinder on a firm work support.
11. Reverse procedure for re-assembly. Torque threaded fasteners per Torque Data Chart.
12. Start the crane and slowly cycle boom hoist cylinder out and in with no load to purge air from the system.
13. After the air has been purged from the system, check reservoir oil level and top off if necessary.

INNER CYLINDER -REMOVAL AND REPLACEMENT

1. Retract all sections of the outer boom.
2. Operate OUTER BOOM and INNER BOOM control levers to position inner boom as low as possible and support the outer boom at both ends.
3. Identify and remove hose connections at inner boom hoist cylinders. Cap or plug all open hydraulic fittings.
4. Position a fabric sling of adequate capacity around one inner boom cylinder and cinch sling near rod end such that sling will lift cylinder in vertical position. Hook sling on hoist and raise hoist to tension the sling.
5. Remove retaining bolt from rod end of cylinder. Use pry bar to remove pin from inner cylinder.

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

Repeat steps 4, 5 and 6 for opposite side.

7. Reverse procedure for reassembly. Torque threaded fasteners per Torque Data Chart.
8. Start the crane and slowly cycle inner boom hoist cylinder out and in with no load to purge air from the system.
9. After the air has been purged from the system, check the reservoir oil level and top off if necessary.

INNER BOOM -REMOVAL AND REPLACEMENT

1. Remove outer boom as per 7-15.
2. Operate OUTER BOOM hoist control lever to retract the cylinder. If desired, remove outer boom hoist cylinder from inner boom as described previously.
3. Operate INNER BOOM control lever to lower the inner boom point to firm contact on ground. A block between the boom and ground is desirable.
4. Identify and disconnect hydraulic hoses running between outer boom and inner boom. Cap or plug all open hydraulic fittings.
5. Disconnect rod ends of inner boom hoist cylinders. Position a block for cylinders to rest against. Be careful not to pinch or pull hydraulic hoses.
6. Position 2 fabric slings of adequate capacity around inner boom and cinch slings on opposite sides of center of gravity. Hook slings on hoist and raise hoist to tension the sling.
7. Remove cap screw and retainer from inner boom pivot pin. With aid of a heavy sledge hammer and pin driving tool, remove the inner boom and lay down on a firm work support.

MAST - REMOVAL AND REPLACEMENT

1. Remove outer boom as described previously.
2. Retract OUTER BOOM hoist cylinder. Operate INNER BOOM control lever to lower the inner boom point to firm contact on ground. A block between the boom and ground is desirable.
3. Identify and disconnect hydraulic hoses running between lower boom and mast. Cap or plug all open hydraulic fittings.
4. Remove inner boom hoist cylinders.
5. Position 2 fabric slings of adequate capacity around outer boom and cinch slings on opposite sides of center of gravity. Hook slings on hoist and raise hoist to tension the sling.
6. Remove retaining bolt and keeper plate from pivot end of inner boom. With aid of a heavy sledge hammer and pin diving tool, remove the inner boom pivot pin. Remove inner boom and lay on a firm work support.
7. Remove the cap screws that secure the mast to the turntable bearing.
8. Reverse procedure for assembly. Torque threaded fasteners per Torque Data Chart and Turntable Bearing Fastener Sequence in Reference Section.
9. Start the crane and slowly cycle all boom cylinders out and in with no load to purge air from the system.
10. After the air is purged from the system, check the reservoir oil level and top off if necessary.

ROTATION MOTOR, COUNTERBALANCE VALVE AND BRAKE - REMOVAL AND REPLACEMENT

1. Shut down hydraulic system to ensure there is no pressure in the system.
2. Remove the two input/output hoses and three drain hoses connected to the counterbalance valve.

3. Remove the four counterbalance valve mounting bolts, being careful to cover parts with clean rags to prevent contamination.
4. Remove the two hydraulic motor mounting cap screws and carefully remove the motor.
5. For removal of the hydraulic brake, remove the two cap screws (longest ones in the mounting flange) and remove the brake assembly.
6. Installation is the reverse of the steps above. Be sure the mounting bolts for all three items are torqued to the correct specification.

CAUTION

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

EMERGENCY STOP FUNCTION

All crane functions can be disabled by striking one of the “emergency stop” palm buttons clearly identified on the unit. The “emergency stop” buttons open the electrical circuit to a solenoid operated cartridge valve in the inlet section of the main crane control valve. This cartridge valve instantly vents the load sense signal, and causes a shuttle valve in the inlet section to block pump flow into the valve.

For safety reasons, the emergency stop solenoid requires power for normal crane operation, and power is removed to disable all crane functions. This is important to remember when trouble shooting. If none of the crane functions will operate, but the emergency stop switch(s) are not activated, there is either an open circuit, or the coil is burned out.

CAPACITY SHUT DOWN/OVERSTRESS SYSTEM

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

MODE OF OPERATION

The capacity shut down system, by means of a normally closed pressure switch, will sense an overload condition when induced hydraulic pressure at the base end of the inner lift cylinders exceeds 4200 psi (290 bar). In overstress the pressure switch opens the electrical circuit to the appropriate solenoid in the main control valve overstress manifold (See Figure 5) disabling winch “up”, inner lift “down”, extension “out”, and outer lift “up” and “down”.

Some systems are equipped with an electrical outer boom position sensing system. If this system is incorporated, and the outer boom is above horizontal when overstress is experienced, the outer boom “down” function is disabled to prevent an increase in load moment. Conversely, if the outer boom is below horizontal when overstress is experienced, the outer boom “up” function is disabled. The outer boom position sensing system is active when the outer boom is approximately 5° (.09 rad) above or below horizontal.

The solenoid operated cartridge valves in the main control valve overstress manifold are identified as E1, E2, and E3. The functions they control are identified below.

- E2N - Inner lift “down”, extension “out”, winch “up”
- E1N - Outer lift “down”
- E3N - Outer lift “up”

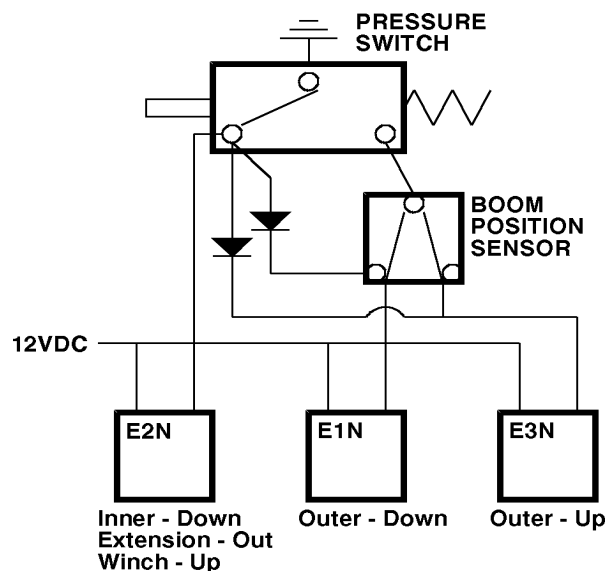
For safety purposes, the solenoids require power for normal crane operation. The capacity shut down/overstress system causes the power to be removed to disable those functions that increase load moment. This is important to remember when trouble shooting. If the crane functions that are controlled by the capacity shut down system are inoperable, but the crane is clearly not in an overcapacity condition, the electrical circuit to solenoid cartridge valves E1N, E2N, or E3N is either open, or a coil is burned out.

CONDITION	POSSIBLE CAUSE	POSSIBLE SOLUTION
Crane in overload all the time	No power to solenoids E1N, E2N, and/or E3N	Check power to coils. If power is present at the coil, replace the coil or cartridge.
No overstress	Pressure switch on inner lift cylinder malfunctioning or set too high	Check to see if the pressure switch activates at 4200 psi (290 bar) inner lift pressure. Remember, the pressure switch is normally closed, and opens the circuit to E1N, E2N, E3N at 4200 psi.

FIGURE 6. TROUBLESHOOTING - OVERSTRESS SYSTEM

ANTI-TWO BLOCK (CRANE EQUIPPED WITH WINCH)

The anti-two block circuit disables the same functions as the capacity shut down/overstress system. It is accomplished in the overstress manifold in the main control valve by removing power from the solenoid operated cartridge valve E1N, E2N, and E3N. Inner lift “down”, outer lift “up” or “down”, extension “out”, and winch “up”, will be disabled until the load is lowered to correct the two block condition.



**FIGURE 5.
OVERSTRESS WITH
BOOM POSITION SENSOR SWITCH**

CHECKING CONTROL BOX CIRCUIT

(Electrical boom position sensing circuit)

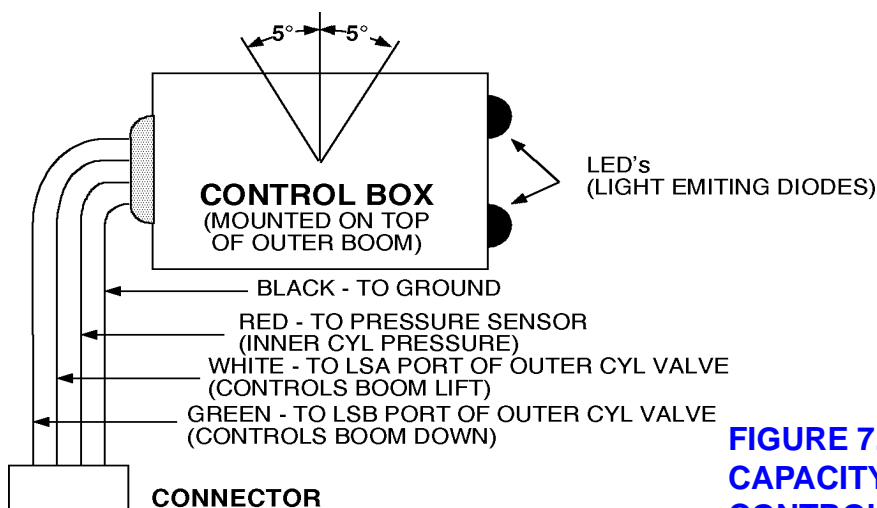
See Figure 7 for reference.

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

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

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

When the box is rotated to simulate the boom 5° (.09 rad) or more below horizontal position or more, there should be 12-volts between the green wire and the ground. Lower LED only will be "ON".



**FIGURE 7.
CAPACITY SHUT DOWN SYSTEM
CONTROL BOX WIRING**

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

FIGURE 8. TROUBLE DIAGNOSIS

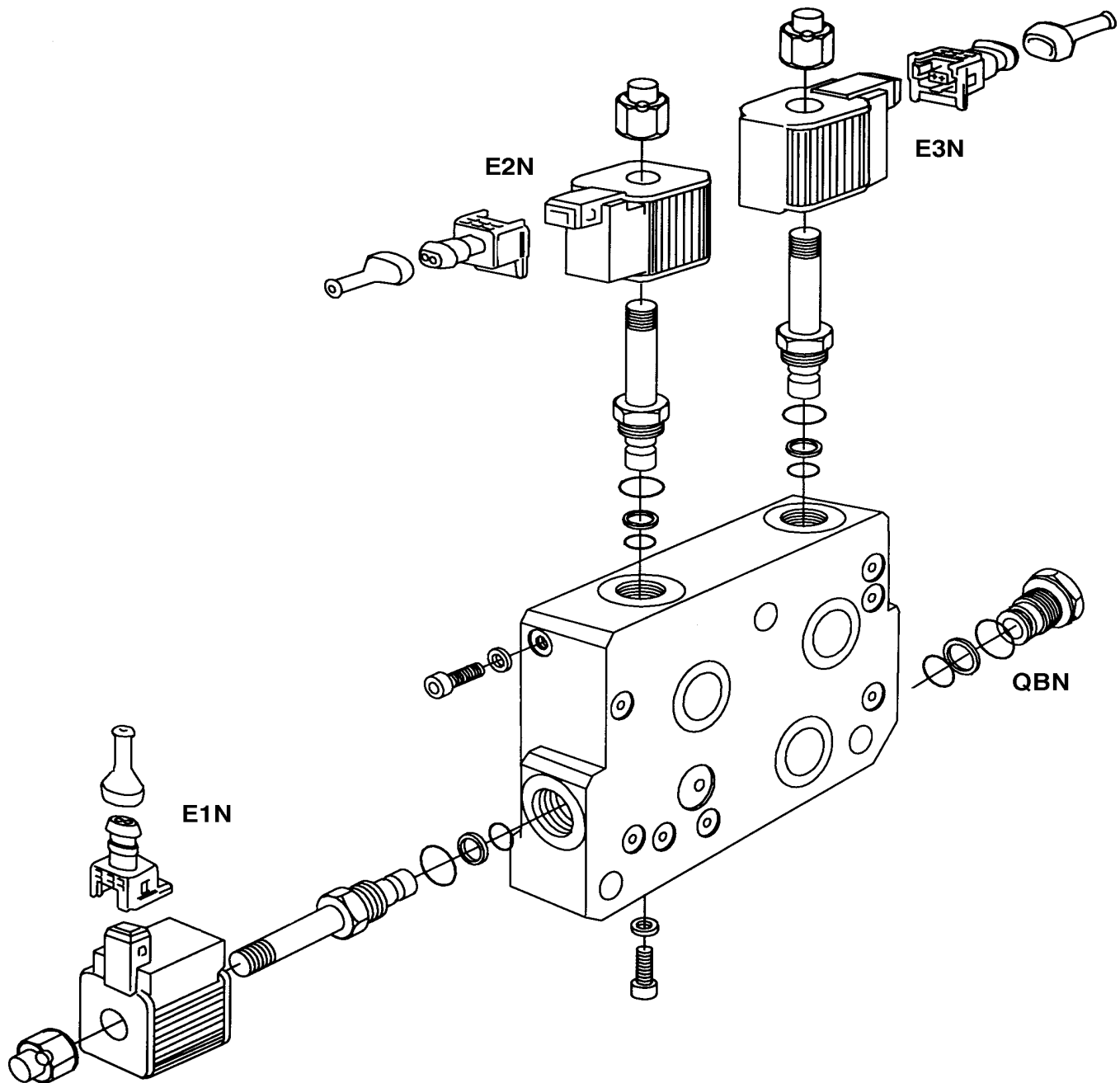


FIGURE 9. OVERSTRESS COMPONENT LOCATIONS

SECTION 3. REPLACEMENT PARTS 15000/21100 CRANE

PARTS INFORMATION	3
BASE & 16' (4.9m) OUTRIGGER ASM (41710040-1)	4
BASE & 16' (4.9m) OUTRIGGER ASM (41710040-2)	5
BASE & 16' (4.9m) OUTRIGGER ASM (41710040-3)	6
BASE & 21'(6.4m) OUTRIGGER ASM (41709801-1)	7
BASE & 21'(6.4m) OUTRIGGER ASM (41709801-2)	8
BASE & 21'(6.4m) OUTRIGGER ASM (41709801-3)	9
MAST ASM (41709874)	10
INNER BOOM ASM (41709875)	11
OUTER BOOM ASM (41710476)	12
SWIVEL HOOK ASM 7-TON (51710187)	13
EXTENSION BOOM ASM-1H (41710349)	14
EXTENSION BOOM ASM-2H (41710350)	15
EXTENSION BOOM ASM-2H/1M (41710351)	16
INSTALLATION KIT-REAR MOUNT (93709811-1)	17
INSTALLATION KIT-REAR MOUNT (93709811-2)	18
DECAL KIT-15000 (95710361-1)	19
DECAL KIT-15000 (95710361-2)	20
DECAL KIT-21100 (95711918-1)	21
DECAL KIT-21100 (95711918-2)	22
RESERVOIR ASM-40 GALLON (70732776)	23
1ST STG EXT CYLINDER (3B085920)	24
2ND STG EXT CYLINDER (3B095920)	25
EXT CYLINDER-1H (3B225940)	26
INNER BOOM CYLINDER (3C112920)	27
OUTER BOOM CYLINDER (3C124920)	28
PWR OUT OUTRIGGER CYLINDER (3B055920)	29
PWR DN OUTRIGGER CYLINDER (3B070920)	30
EXT BOOM WEAR PAD & SHIM REPLACEMENT CHART	31
AUX OUTRIGGER KIT-REAR MT-PO/PD-LOAD SENSE (31712754-1)	32
AUX OUTRIGGER KIT-REAR MT-pO/PD-LOAD SENSE (31712754-2)	33
AUX OUTRIGGER KIT-FRONT MT-PO/PD-LOAD SENSE (31712755-1)	34
AUX OUTRIGGER KIT-FRONT MT-PO/PD-LOAD SENSE (31712755-2)	35
CYLINDER-PWR DN (3B020860)	36
CYLINDER-PWR OUT (3B148860)	37
CYLINDER-PWR DN (3B208940)	38
WINCH KIT-2H1M MNL CTRLS (31711878-1)	39
WINCH KIT-2H1M MNL CTRLS (31711878-2)	40
WINCH KIT-2H1M MNL CTRLS (31711878-3)	41
ANTI TWO-BLOCKING SYSTEM (70732874)	42

(Continued On Next Page)

REPLACEMENT PARTS 15000/21100 CRANE (CON'T)

HYDRAULIC KIT-VOAC (91712847)	43
VALVEBANK ASM-9 SECT VOAC MNL (51712793)	44
VALVEBANK-9 SECT MNL (73732967)	45
VALVEBANK ASM-9 SECT VOAC RADIO RMT (51712919)	46
VALVEBANK-9 SECT RADIO RMT (73733013-1)	47
VALVEBANK-9 SECT RADIO RMT (73733013-2)	48
CTRL KIT-9F MNL VOAC (90712790-1)	49
CTRL KIT-9F MNL VOAC (90712790-2)	50
CABLE ASM-JIC BOX (51712855)	51
CABLE ASM-JIC BOX RADIO RMT (HETRONICS) (51712880)	52
CTRL KIT-9F RMT VOAC (90713043-1)	53
CTRL KIT-9F RMT VOAC (90713043-2)	54

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 such as winches and remote controls, refer to the appropriate service manual.


WARNING

DO NOT ATTEMPT TO REPAIR ANY COMPONENT WITHOUT READING THE INFORMATION CONTAINED IN THE REPAIR SECTION 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
Product Support Fax: 515-923-2424

		IOWA MOLD TOOLING CO., INC. BOX 189, GARNER, IA 50438-0189
MODEL NUMBER		
SERIAL NUMBER		
MFG DATE		
		70029119

SERIAL NUMBER PLACARD

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.

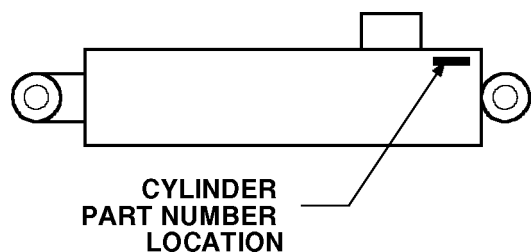
WELDMENT IDENTIFICATION

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.



CYLINDER PART NUMBER LOCATION

**BASE & 16' (4.9M) OUTRIGGER ASM
(41710040-1)**

ITEM	PART NO.	DESCRIPTION	QTY
1.	72060004	CAP SCR 1/4-20X1 HHGR5	2
2.	72060091	CAP SCR 1/2-13X1 HHGR5	8
3.	72060098	CAP SCR 1/2-13X3-1/2 HHGR5	2
4.	72062080	NUT 1/2-13 LOCK	8
5.	72062103	NUT 3/8-16 LOCK	8
6.	53000704	GREASE EXTENSION 34"	1
7.	60104977	PIN	2
8.	52709190	OUTRIGGER LEG	2
9.	52709776	BASE (INCL:13 & 76-79)	1
10.	53000701	GREASE EXTENSION 14"	1
11.	52710237	OUTRIGGER ARM - RH	1
12.	52710236	OUTRIGGER ARM - LH	1
13.	71056074	DRIVE GEAR (PART OF 9)	1REF
14.	52709922	PLATFORM	1
15.	52712664	BOOM STOW PIVOT	1
16.	60102201	PIN	1
17.	76391497	GASKET (PART OF 43)	1REF
18.	60020123	THRUST WASHER	1
19.	76391498	GASKET (PART OF 43)	1REF
20.	72601026	SCR 3/8-16X1/2 FH SOC	2
21.	60105874	PIN RETAINER PLATE 2"	4
22.	60105964	PINION SUPPORT PLATE	1
23.	60106032	STUD 1/2-13X2	2
24.	60010844	GREASE PLATE	1
25.	60118700	SPACER PLATE	1
26.	60114015	SPACER PLATE	1
27.	60114037	COVER	1
28.	60114041	WEAR PAD SHIM 1/4	AR
29.	60114042	WEAR PAD SHIM 7GA	AR
30.	60114043	WEAR PAD SHIM 10GA	AR
31.	60114257	SLEEVE	2
32.	60114417	WEAR PAD SHIM 16GA	AR
33.	60118744	DECAL MOUNTING PLATE	1
34.	73054538	VALVE (PART OF 40)	2REF
35.	60114940	CHAIN 1/8X9	2
37.	70055167	BEARING	1
38.	70141075	HOOK	2
39.	72060046	CAP SCR 3/8-16X1 HHGR5	2
40.	70731795	VALVEPAC (INCL:34 & 80)	1
41.	71056072	INTERMEDIATE GEAR	1
42.	71056073	PINION GEAR	1
43.	71056374	HYD BRAKE (INCL:17 & 19)	1
44.	71143520	SLIDE 450°	1
45.	71732054	QUICK RELEASE PIN	2
46.	72053281	STREET ELBOW 1/8NPT 90°	1
47.	72053301	COUPLING 1/8NPT	2
48.	72053508	ZERK 1/8NPT	3
49.	72060092	CAP SCR 1/2-13X1-1/4 HHGR5	8
50.	72060047	CAP SCR 3/8-16X1-1/4 HHGR5	2
51.	72060099	CAP SCR 1/2-13X4 HHGR5	2
52.	72063004	WASHER 7/16 WRT	2
53.	72601447	CAP SCR 3/8-16X6-1/2 HHGR5	4
54.	72063132	WASHER 1/2 FLAT	12
55.	72060093	CAP SCR 1/2-13X1-1/2 HHGR5	2
56.	72063186	WASHER 3/8 FLAT	4
57.	72063039	MACH BUSHING 2X10GA	1

58.	72063049	WASHER 1/4 LOCK	2
59.	72063053	WASHER 1/2 LOCK	2
60.	72063115	WASHER 7/8 FLAT HARD	23
61.	72066095	RETAINING RING 2" EXT STD	1
62.	72066132	RETAINING RING 1-1/2 HD	6
65.	72601037	CAP SCR 9/16-12X4-1/2 HHGR8	2
66.	72601144	CAP SCR 9/16-12X2 HHGR8	4
67.	72601609	CAP SCR 7/8-9X4-1/4 HHGR8	23
68.	3B055920	POWER OUT CYLINDER	2
69.	3B070920	POWER DOWN CYLINDER	2
70.	73051478	HYDRAULIC MOTOR	1
71.	72063117	WASHER 9/16 FLAT HARD GR8	6
72.	72060757	CAP SCR 3/8-16X2-1/2 SH	3
73.	60030240	WEAR PAD	1
74.	60030230	WEAR PAD	1
75.	60030239	WEAR PAD	1
76.	60020120	BUSHING (PART OF 9)	1REF
77.	60020121	BUSHING (PART OF 9)	1REF
78.	60020122	BUSHING (PART OF 9)	1REF
79.	60020124	BUSHING (PART OF 9)	1REF
80.	7Q072017	O-RING (PART OF 40)	3REF
81.	72060101	CAP SCR 1/2-13X5 HHGR5	2
82.	60106742	SPACER	4
83.	52712682	PLATFORM	1
84.	60118701	SHIM-SPACER PLATE	AR
85.	60118702	SHIM-SPACER PLATE	AR
86.	60118703	SHIM-SPACER PLATE	AR
87.	60118704	SHIM-SPACER PLATE	AR

WARNING

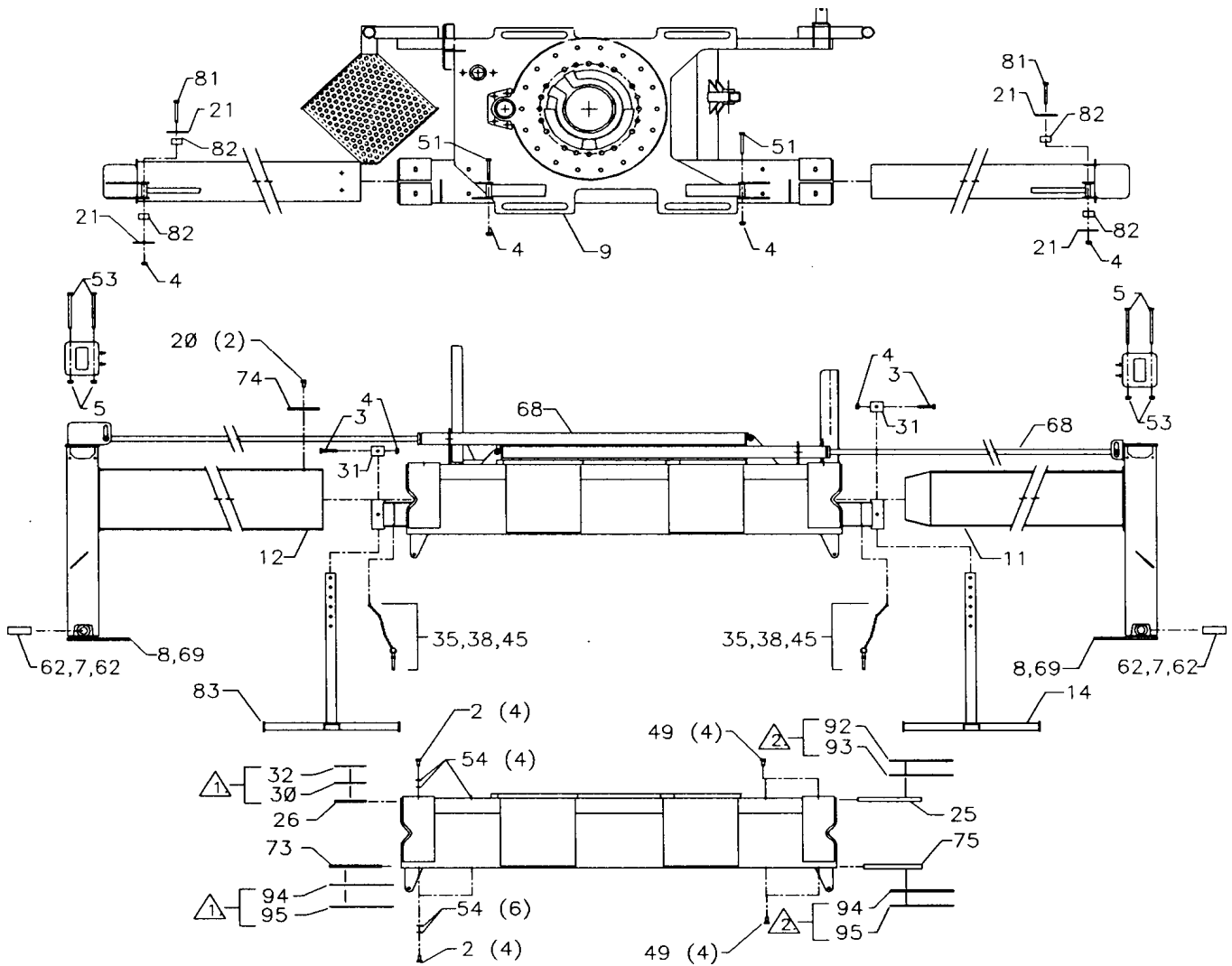
ANYTIME A GEAR-BEARING BOLT IS REMOVED, IT MUST BE REPLACED WITH A NEW BOLT OF THE IDENTICAL GRADE AND SIZE. FAILURE TO REPLACE GEAR-BEARING BOLTS MAY RESULT IN BOLT FAILURE DUE TO METAL FATIGUE, CAUSING SERIOUS INJURY OR DEATH.

CAUTION

BEFORE TIGHTENING TURNTABLE BEARING BOLTS, REFER TO THE TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE AND TORQUE DATA CHART IN THE REFERENCE SECTION.

SEE FOLLOWING PAGES FOR DRAWING

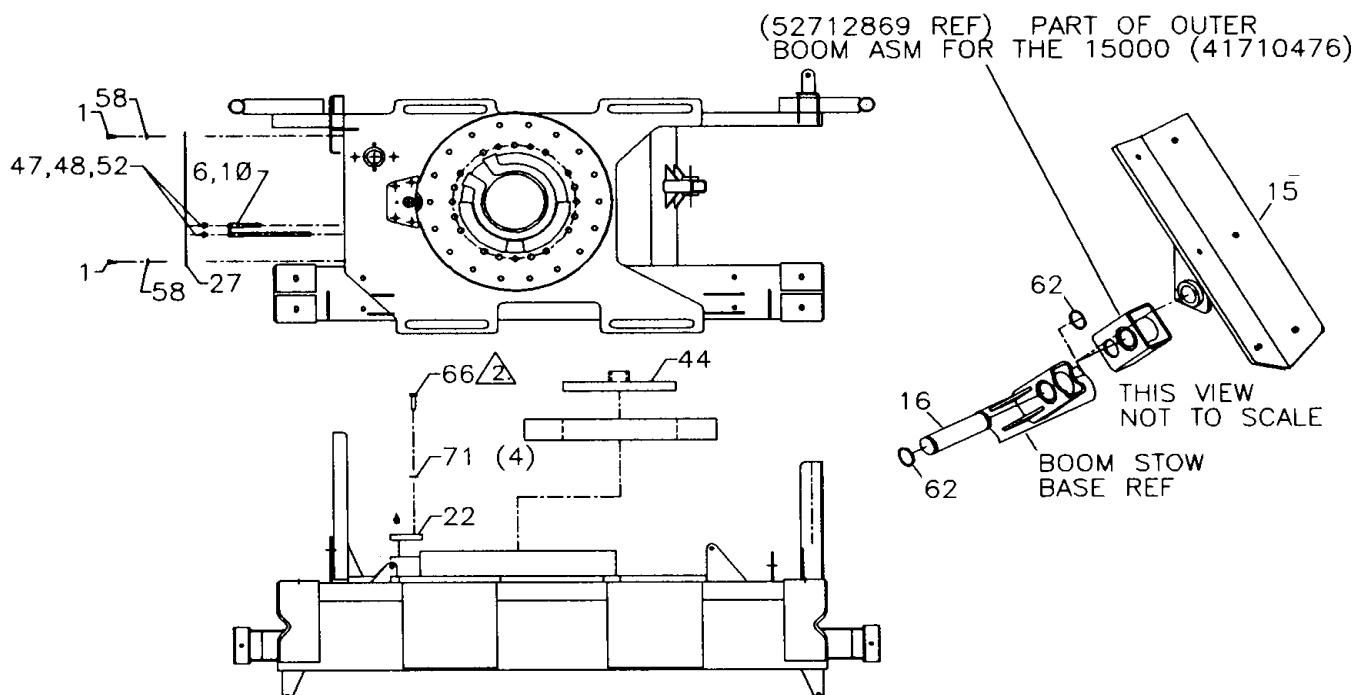
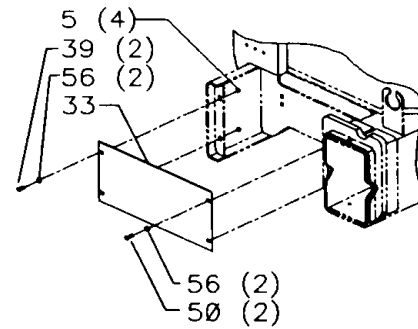
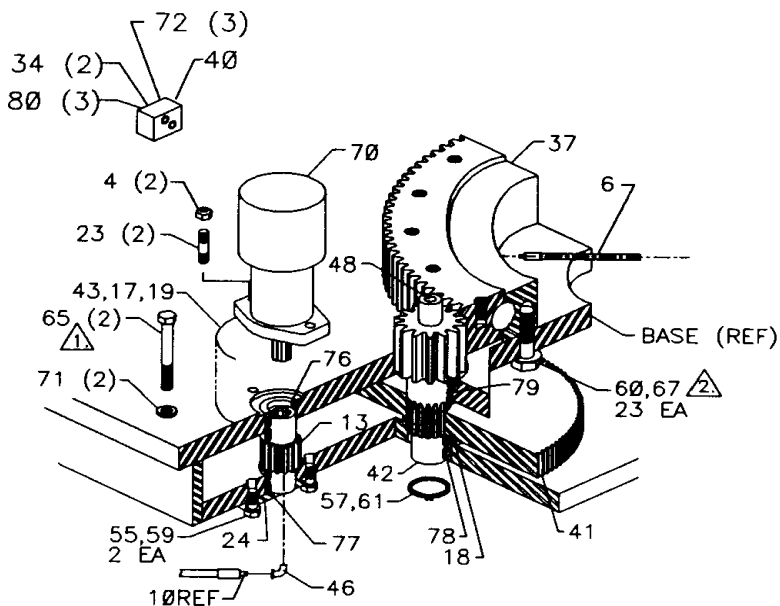
BASE & 16' (4.9M) OUTRIGGER ASM (41710040-2)



NOTES:

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

BASE & 16' (4.9M) OUTRIGGER ASM (41710040-3)



NOTES:

1. TORQUE ITEM 67 TO 515 FT-LBS (71.2 kg-m).
2. TORQUE ITEM 65 & 66 TO 130 FT-LBS (18.0 kg-m).
3. INSTALL TURNABLE GEAR BEARING WITH A MINIMUM GEAR BACKLASH OF 0.008" TO 0.013" (.203 TO .330mm), MEASURED BETWEEN SWING PINION AND TURNABLE GEAR BEARING TEETH WITH YELLOW PAINT.
4. SEE TURNABLE BEARING FASTENER TIGHTENING SEQUENCE AND TORQUE DATA CHART IN REFERENCE SECTION BEFORE TORQUEING TURNABLE BOLTS.

**BASE & 21'(6.4M) OUTRIGGER ASM
(41709801-1)**

ITEM	PART NO.	DESCRIPTION	QTY
1.	72060004	CAP SCR 1/4-20X1 HHGR5	2
2.	72060091	CAP SCR 1/2-13X1 HHGR5	6
3.	72060098	CAP SCR 1/2-13X3-1/2 HHGR5	2
4.	72062080	NUT 1/2-13 LOCK	8
5.	72062103	NUT 3/8-16 LOCK	8
6.	72066141	HAIR PIN 1/16	4
7.	60104977	PIN	2
8.	52709190	OUTRIGGER LEG	2
9.	52709776	BASE (INCL:76-79 & 84)	1
10.	52709779	OUTRIGGER LEG - MNL OUT	2
11.	52709782	OUTRIGGER ARM - RH PO	1
12.	52709783	OUTRIGGER ARM - LH PO	1
13.	52709786	PIN	2
14.	52709922	PLATFORM	1
15.	52712664	BOOM STOW PIVOT	1
16.	60102201	PIN	1
17.	52710218	PIN	4
18.	60020123	THRUST WASHER	1
19.	60030204	WEAR PAD	1
20.	60030205	WEAR PAD	1
21.	60105874	PIN RETAINER PLATE 2"	4
22.	60105964	PINION SUPPORT PLATE	1
23.	60106032	STUD 1/2-13X2	2
24.	60010844	GREASE PLATE	1
25.	60118700	SPACER PLATE	1
26.	60114015	SPACER PLATE	1
27.	60114037	COVER	1
30.	60114043	WEAR PAD SHIM 10GA	AR
31.	60114257	SLEEVE	2
32.	60114417	WEAR PAD SHIM 16GA	AR
33.	60118744	DECAL MOUNTING PLATE	1
34.	60114923	LINK TUBE	2
35.	60114940	CHAIN 1/8X9	2
37.	70055167	BEARING	1
38.	70141075	HOOK	2
39.	72060046	CAP SCR 3/8-16X1 HHGR5	2
40.	70731795	VALVEPAC (INCL:80 & 81)	1
41.	71056072	INTERMEDIATE GEAR	1
42.	71056073	PINION GEAR	1
43.	71056374	HYD BRAKE (INCL:85 & 86)	1
44.	71143520	SLIDE 450°	1
45.	71732054	QUICK RELEASE PIN	2
46.	72053281	STREET ELBOW 1/8NPT 90°	1
47.	72053301	COUPLING 1/8NPT	2
48.	72053508	ZERK 1/8NPT	3
49.	72060092	CAP SCR 1/2-13X1-1/4 HHGR5	6
50.	72060047	CAP SCR 3/8-16X1-1/4 HHGR5	2
51.	72060099	CAP SCR 1/2-13X4 HHGR5	2
52.	72063004	WASHER 7/16 WRT	2
53.	72601447	CAP SCR 3/8-16X6-1/2 HHGR5	4
54.	72063132	WASHER 1/2 FLAT	12
55.	72060093	CAP SCR 1/2-13X1-1/2 HHGR5	2
56.	72063186	WASHER 3/8 FLAT	4
57.	72063039	MACH BUSHING 2X10GA	1
58.	72063049	WASHER 1/4 LOCK	2
59.	72063053	WASHER 1/2 LOCK	2
60.	72063115	WASHER 7/8 FLAT HARD	23
61.	72066095	RETAINING RING 2" EXT STD	1

62.	72066132	RETAINING RING 1-1/2 HD	8
63.	70034417	CLAMP	4
64.	70144819	COVER PLATE	4
65.	72601037	CAP SCR 9/16-12X4-1/2 HHGR8	2
66.	72601144	CAP SCR 9/16-12X2 HHGR8	4
67.	72601609	CAP SCR 7/8-9X4-1/4 HHGR8	23
68.	3B055920	POWER OUT CYLINDER	2
69.	3B070920	POWER DOWN CYLINDER	2
70.	73051478	HYDRAULIC MOTOR	1
71.	72063117	WASHER 9/16 FLAT HARD GR8	6
72.	72060757	CAP SCR 3/8-16X2-1/2 SH	3
73.	60030240	WEAR PAD	1
74.	60030230	WEAR PAD	1
75.	60030239	WEAR PAD	1
76.	60020120	BUSHING (PART OF 9)	1REF
77.	60020121	BUSHING (PART OF 9)	1REF
78.	60020122	BUSHING (PART OF 9)	1REF
79.	60020124	BUSHING (PART OF 9)	1REF
80.	7Q072017	O-RING (PART OF 40)	3REF
81.	73054538	VALVE (PART OF 40)	2REF
82.	53000704	GREASE EXTENSION 34"	1
83.	53000701	GREASE EXTENSION 14"	1
84.	71056074	DRIVE GEAR (PART OF 9)	1REF
85.	76391497	GASKET (PART OF 43)	1REF
86.	76391498	GASKET (PART OF 43)	1REF
87.	72601026	SCREW 3/8-16X1/2 FH SOC	2
88.	72066145	HAIR PIN .19	2
89.	72060101	CAP SCR 1/2-13X5 HHGR5	2
90.	60106742	SPACER	4
91.	52712682	PLATFORM	1
92.	60118701	SHIM-SPACER PLATE	AR
93.	60118702	SHIM-SPACER PLATE	AR
94.	60118703	SHIM-SPACER PLATE	AR
95.	60118704	SHIM-SPACER PLATE	AR
96.	72060031	CAP SCR 5/16-18X2-1/2 HHGR5	2
97.	72062109	NUT 5/16-18 LOCK	4
98.	89392434	WEATHERSTRIP	23"
99.	70058960	CONNECTOR 1/4 THREADED	4
100.	89058004	CHAIN 24 LINKS	2
101.	89393036	SLEEVE	2
102.	72060037	CAP SCR 5/16-18X4 HHGR5	2

WARNING

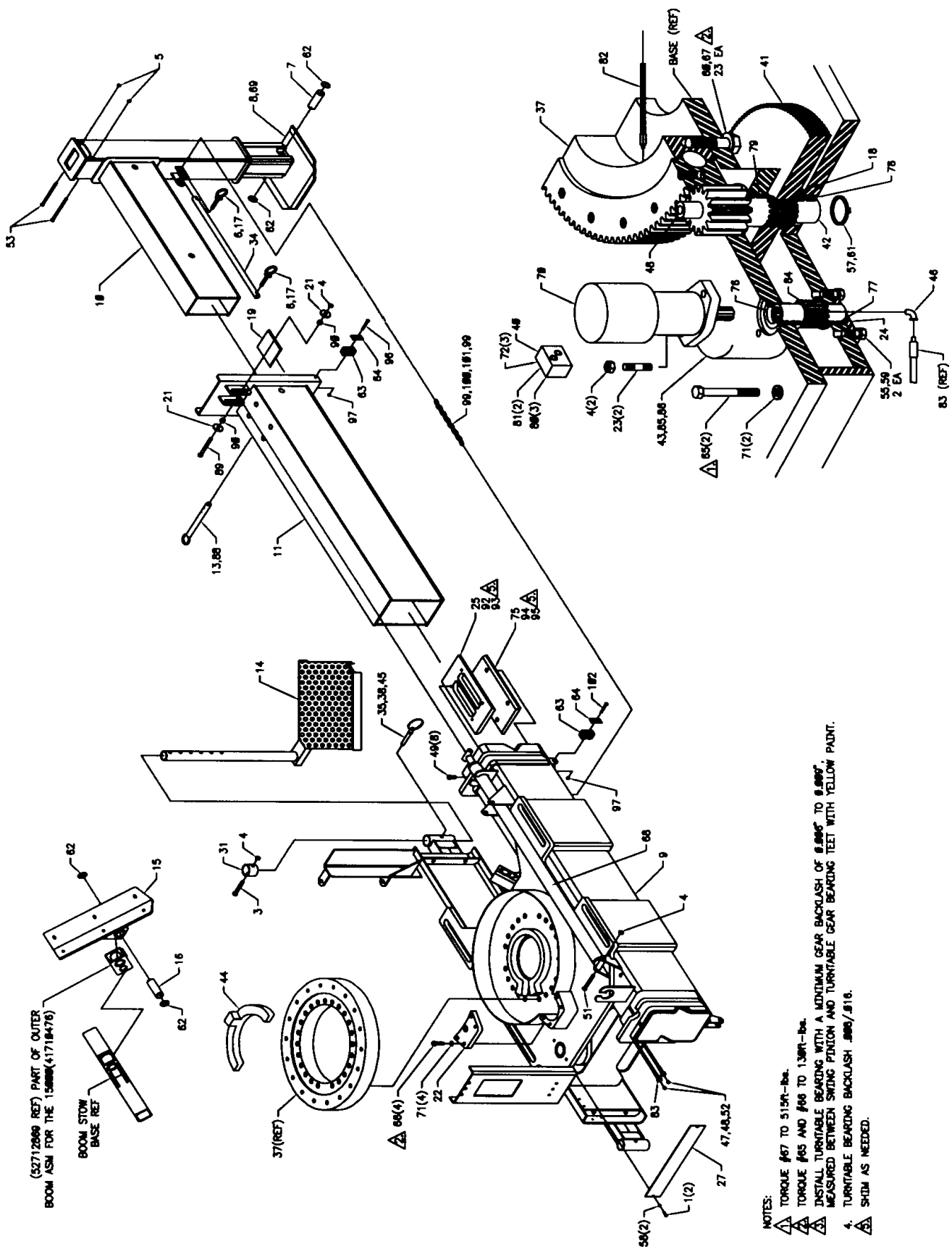
ANYTIME A GEAR-BEARING BOLT IS REMOVED, IT MUST BE REPLACED WITH A NEW BOLT OF THE IDENTICAL GRADE AND SIZE. FAILURE TO REPLACE GEAR-BEARING BOLTS MAY RESULT IN BOLT FAILURE DUE TO METAL FATIGUE, CAUSING SERIOUS INJURY OR DEATH.

CAUTION

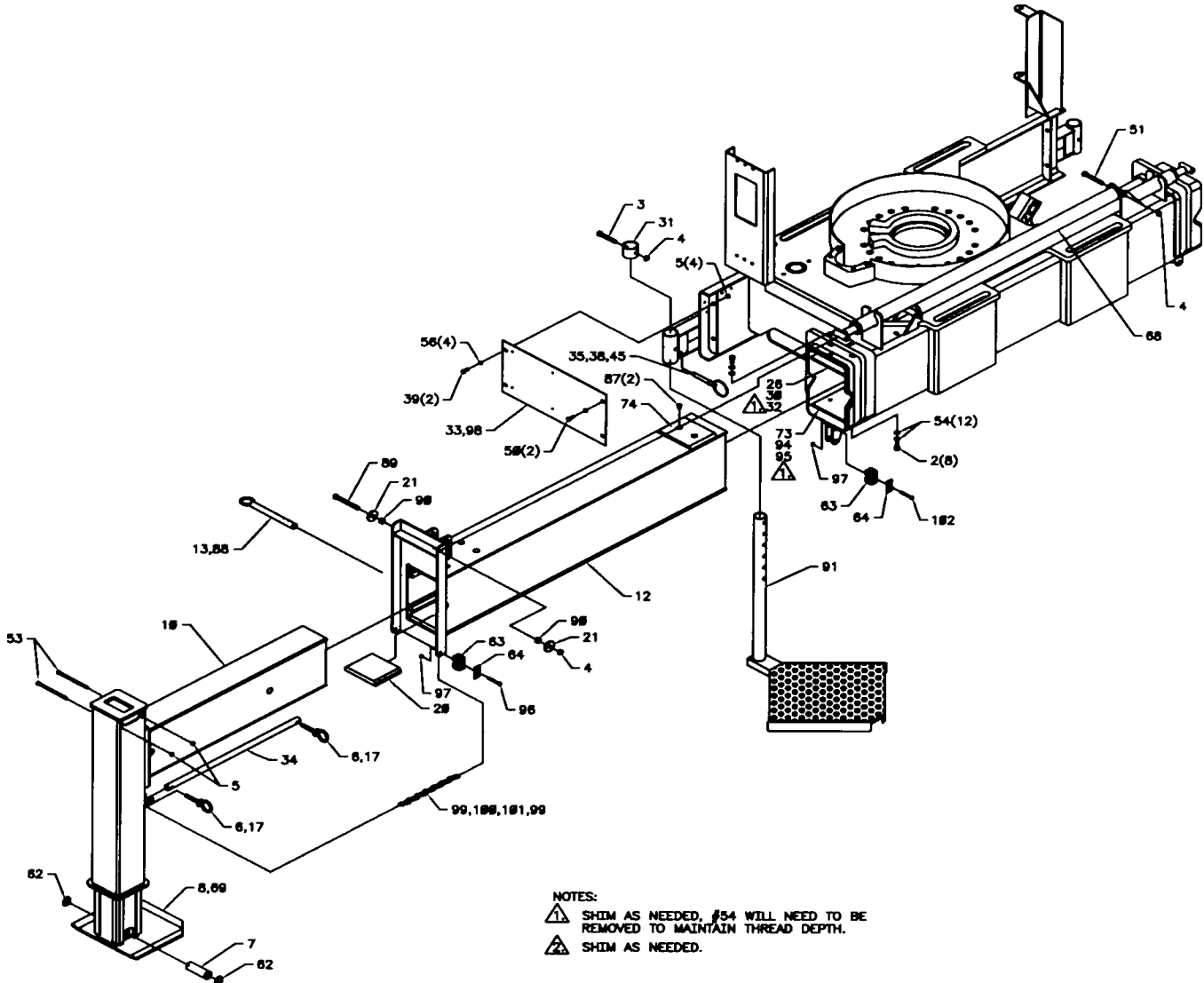
BEFORE TIGHTENING TURNTABLE BEARING BOLTS, REFER TO THE TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE AND TORQUE DATA CHART IN THE REFERENCE SECTION.

SEE FOLLOWING PAGES FOR DRAWING

BASE & 21'(6.4M) OUTRIGGER ASM (41709801-2)



BASE & 21'(6.4M) OUTRIGGER ASM (41709801-3)



NOTES:

1. TORQUE ITEM 67 TO 515 FT-LBS (71.2 kg-m).
2. TORQUE ITEM 65 & 66 TO 130 FT-LBS (18.0 kg-m).
3. INSTALL TURNABLE GEAR BEARING WITH A MINIMUM GEAR BACKLASH OF 0.008" TO 0.013" (.203 TO .330mm), MEASURED BETWEEN SWING PINION AND TURNABLE GEAR BEARING TEETH WITH YELLOW PAINT.
4. SEE TURNABLE BEARING FASTENER TIGHTENING SEQUENCE AND TORQUE DATA CHART IN REFERENCE SECTION BEFORE TORQUEING TURNABLE BOLTS.

MAST ASM (41709874)

ITEM	PART NO.	DESCRIPTION	QTY
1.	52709871	MAST (INCL: 9)	1
2.	70034402	TWIN CLAMP	4
3.	70143829	COVER PLATE	4
4.	72060027	CAP SCR 5/16-18X1-1/2 HH	4
5.	70029119	SERIAL NUMBER PLACARD	1
6.	72661216	GRIPNAIL 1/8	2
7.	72063116	WASHER 3/4 FLAT HARD	14
8.	72601629	CAP SCR 3/4-10X4 HH GR8	14

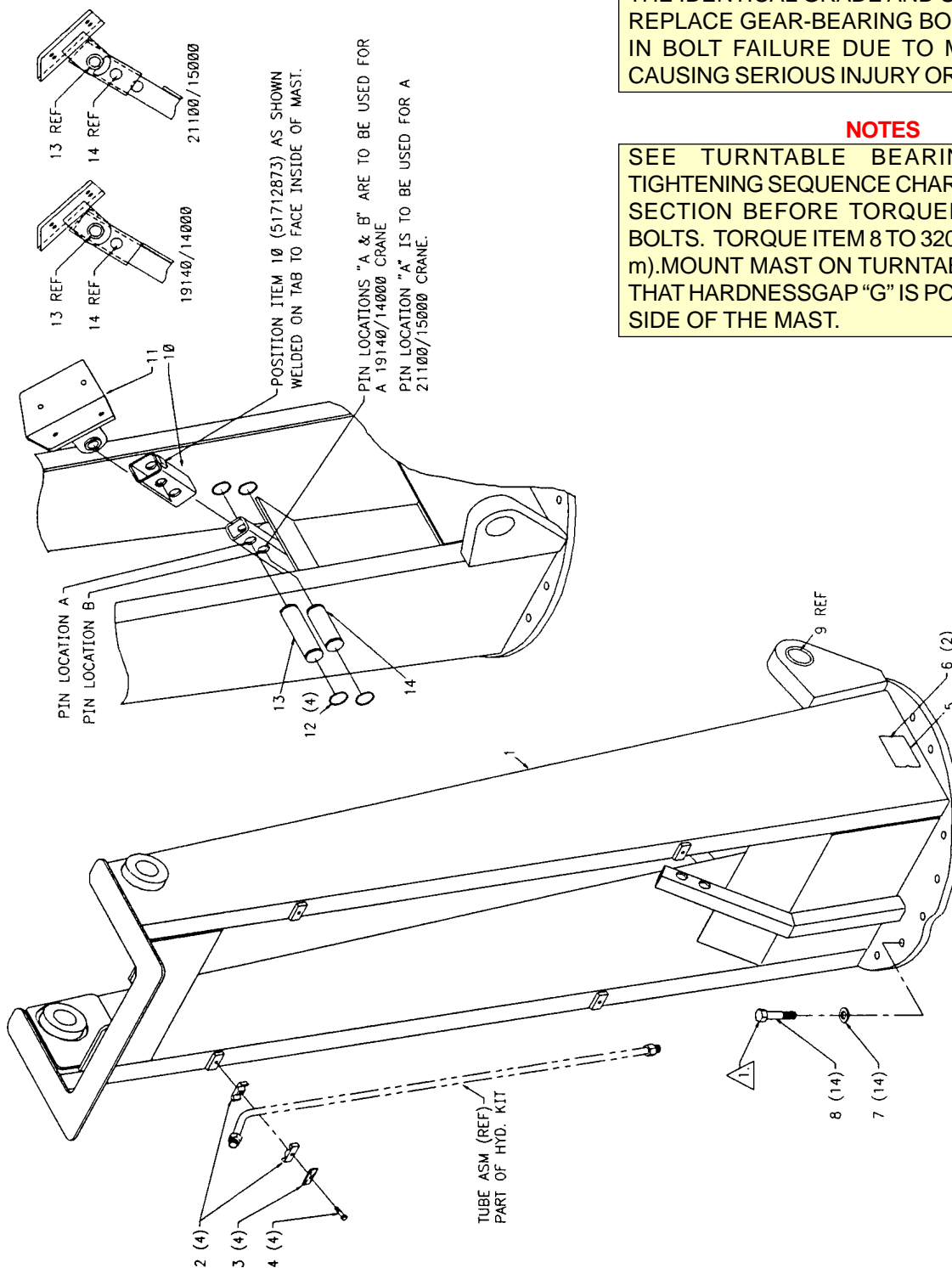
9.	70034283	BEARING (PART OF 1)	2REF
10.	52712873	BOOM STOW SUPPORT	1
11.	52712874	PIVOT	1
12.	72066125	RETAINING RING 1" EXT HD	4
13.	60102099	PIN	1
14.	60101907	PIN	1

WARNING

ANYTIME A GEAR-BEARING BOLT IS REMOVED, IT MUST BE REPLACED WITH A NEW BOLT OF THE 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

SEE TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE CHART IN REFERENCE SECTION BEFORE TORQUEING TURNTABLE BOLTS. TORQUE ITEM 8 TO 320 FT-LBS (44.25 kg-m). MOUNT MAST ON TURNTABLE BEARING SO THAT HARDNESS GAP "G" IS POSITIONED AT THE SIDE OF THE MAST.

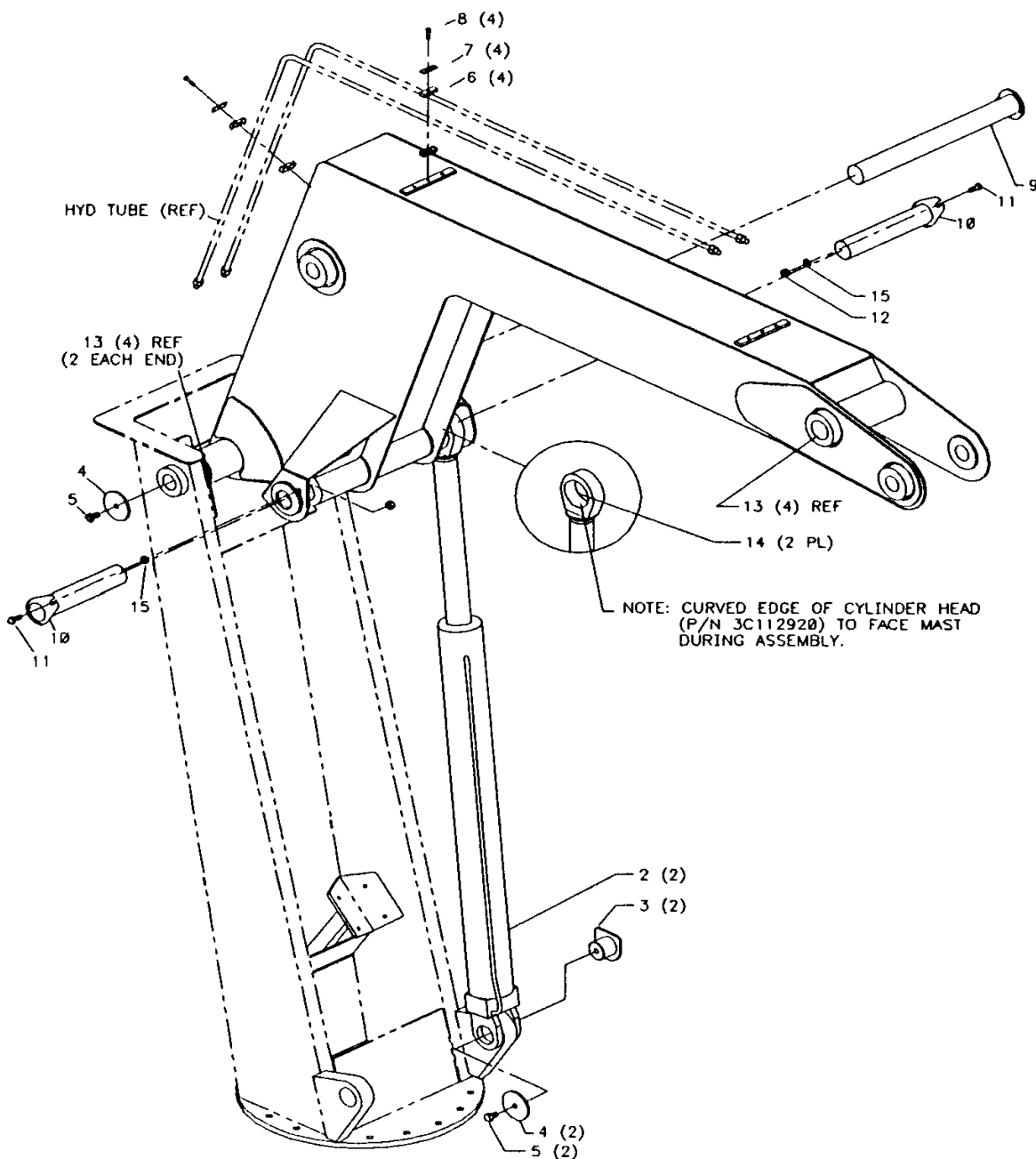


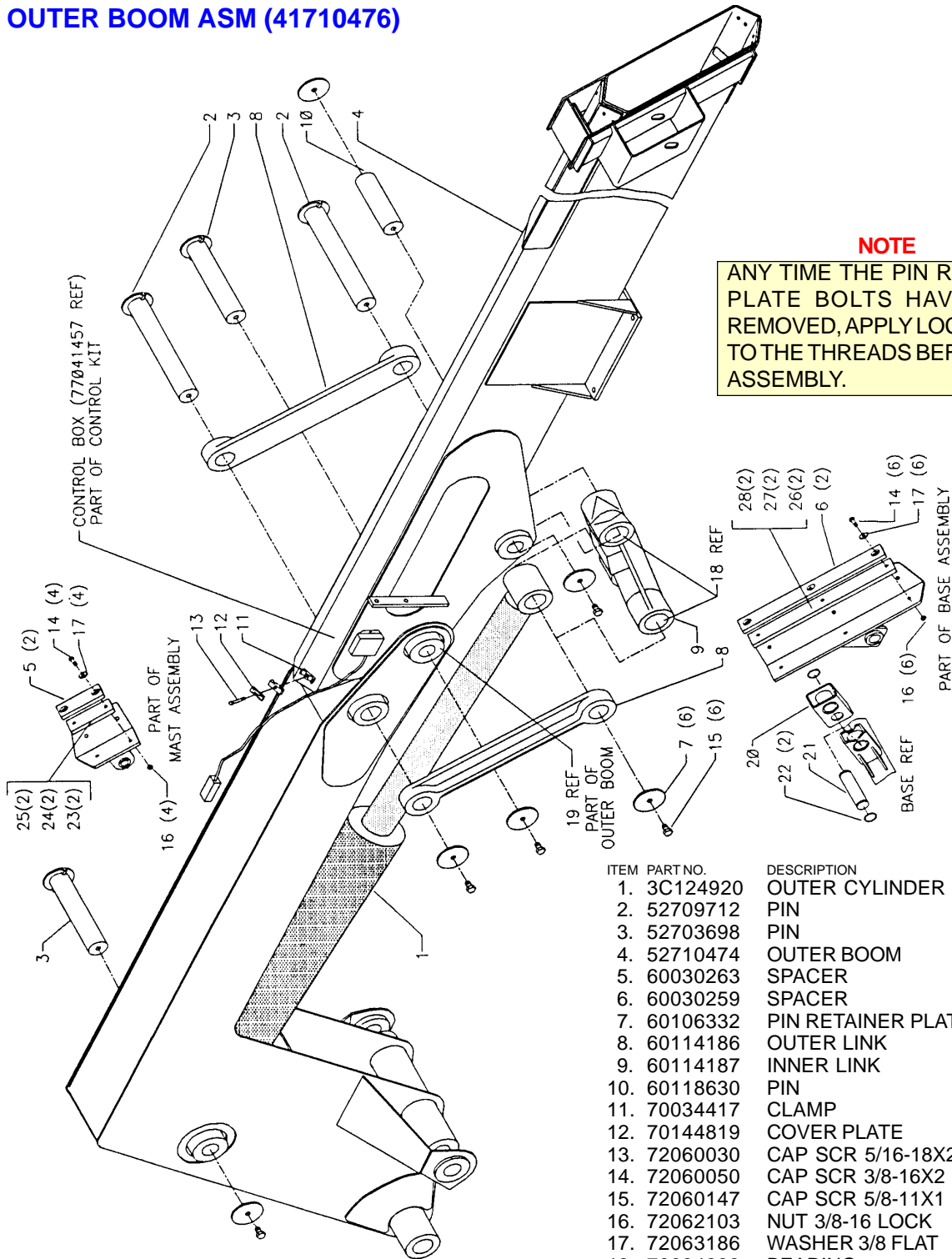
INNER BOOM ASM (41709875)

ITEM	PART NO.	DESCRIPTION	QTY
1.	52709872	INNER BOOM (INCL: 13)	1
2.	3C112920	INNER CYLINDER (INCL:14)	2
3.	52709885	PIN	2
4.	60106332	PIN RETAINER PLATE 4"	3
5.	72060147	CAP SCR 5/8-11X1 HH GR5	3
6.	70034402	TWIN CLAMP	4
7.	70143829	COVER PLATE	4
8.	72060733	CAP SCR 5/16-18X1-1/4 SH	4
9.	52709887	PIN	1
10.	52710613	PIN	2
11.	72060093	CAP SCR 1/2-13X1-1/2 HHGR5	2
12.	72062080	NUT 1/2-13 LOCK	2
13.	70034284	BEARING (PART OF 1)	8REF
14.	70143838	SPHERICAL BUSH (PART OF 2)	2REF
15.	60112063	SPACER	2

NOTE

Anytime the pin retainer plate bolts have been removed, apply Loctite 262 to the threads before reassembly.



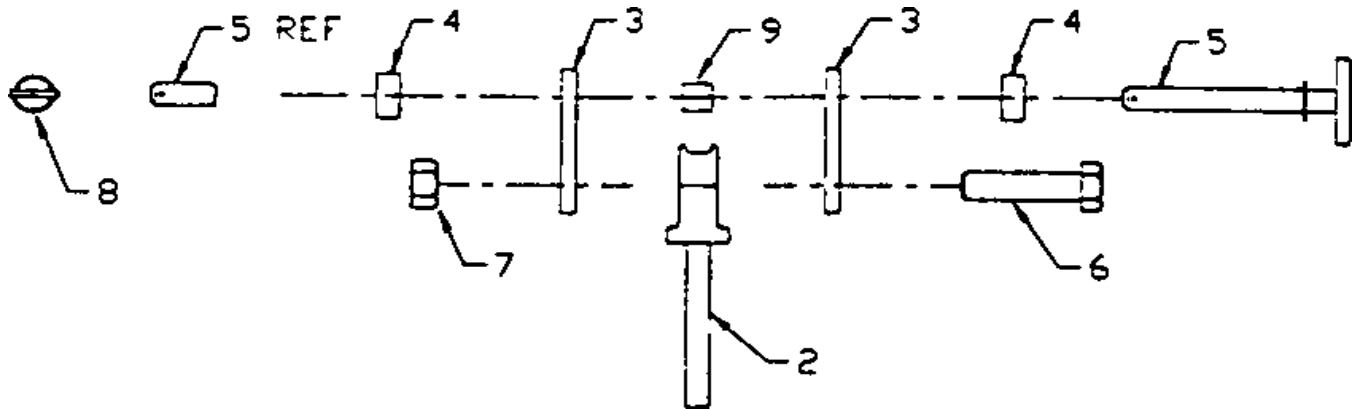
OUTER BOOM ASM (41710476)**NOTE**

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

ITEM	PART NO.	DESCRIPTION	QTY
1.	3C124920	OUTER CYLINDER	1
2.	52709712	PIN	2
3.	52703698	PIN	2
4.	52710474	OUTER BOOM	1
5.	60030263	SPACER	2
6.	60030259	SPACER	2
7.	60106332	PIN RETAINER PLATE 4"	6
8.	60114186	OUTER LINK	2
9.	60114187	INNER LINK	1
10.	60118630	PIN	1
11.	70034417	CLAMP	1
12.	70144819	COVER PLATE	1
13.	72060030	CAP SCR 5/16-18X2-1/4 HHGR5	1
14.	72060050	CAP SCR 3/8-16X2 HHGR5	10
15.	72060147	CAP SCR 5/8-11X1 HHGR5	6
16.	72062103	NUT 3/8-16 LOCK	10
17.	72063186	WASHER 3/8 FLAT	10
18.	70034283	BEARING	6REF
19.	70034284	BEARING	2REF
20.	52712869	BOOM SUPPORT	1
21.	60010830	PIN	1
22.	72066132	RETAINING RING 1-1/2 EXT HD	2
23.	60119325	SPACER 1/8X5-5/8 ORIGINAL	2AR
24.	60119321	SPACER 1/4X5-5/8	2AR
25.	60119320	SPACER 1/2X5-5/8	2AR
26.	60119324	SPACER 1/8X19-5/8 ORIGINAL	2AR
27.	60119323	SPACER 1/4X19-5/8	2AR
28.	60119322	SPACER 1/2X19-5/8	2AR

SWIVEL HOOK ASM 7-TON (51710187)

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



EXTENSION BOOM ASM-1H (41710349)

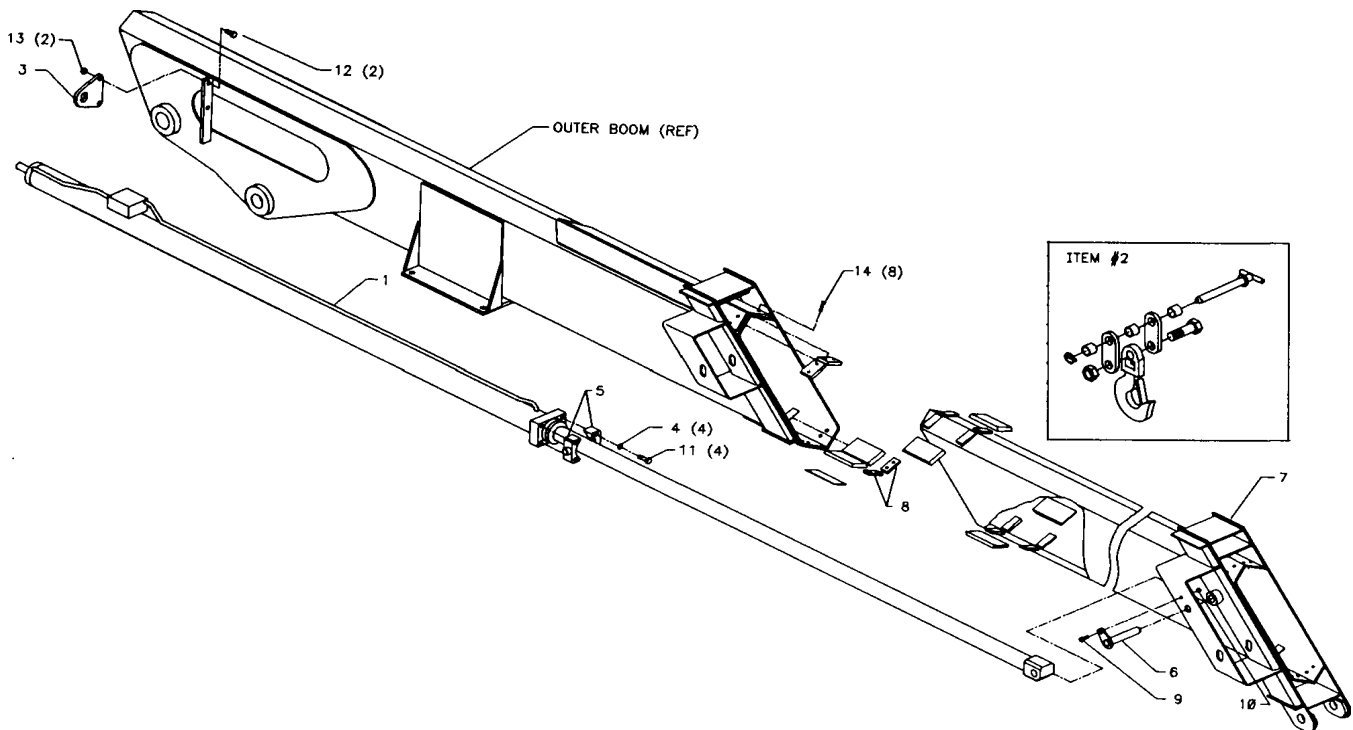
ITEM	PART NO.	DESCRIPTION	QTY
1.	3B225940	CYLINDER	1
2.	51710187	HOOK ASM 7-TON	1
3.	60118483	SUPPORT	1
4.	72063132	WASHER 1/2 HARD	4
5.	70145139	CYLINDER MOUNTING	2
6.	52712586	PIN	1
7.	52712638	1ST STG EXT BOOM	1
8.	60114320	WEAR PAD RETAINER	2
9.	72060046	CAP SCR 3/8-16X1 HH	1
10.	72062103	NUT 3/8-16 LOCK	1
11.	72601369	CAP SCR 1/2-13X3 HHGR8	4
12.	72060095	CAP SCR 1/2-13X2 HHGR5	2
13.	72062080	NUT 1/2-13 LOCK	2
14.	72060291	CAP SCR 5/16-24X3/4 HH	8

NOTE

REPLACEMENT WEAR PADS AND SHIMS ARE DESCRIBED IN FIGURE D-29.

NOTE

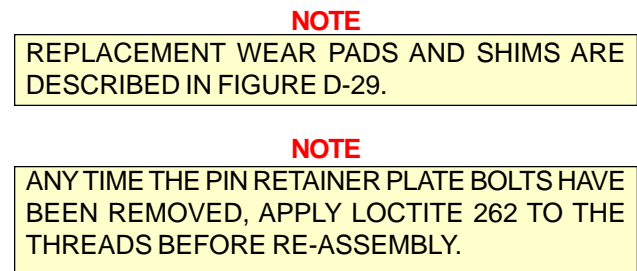
ANY TIME THE PIN RETAINER PLATE BOLTS HAVE BEEN REMOVED, APPLY LOCTITE 262 TO THE THREADS BEFORE RE-ASSEMBLY.

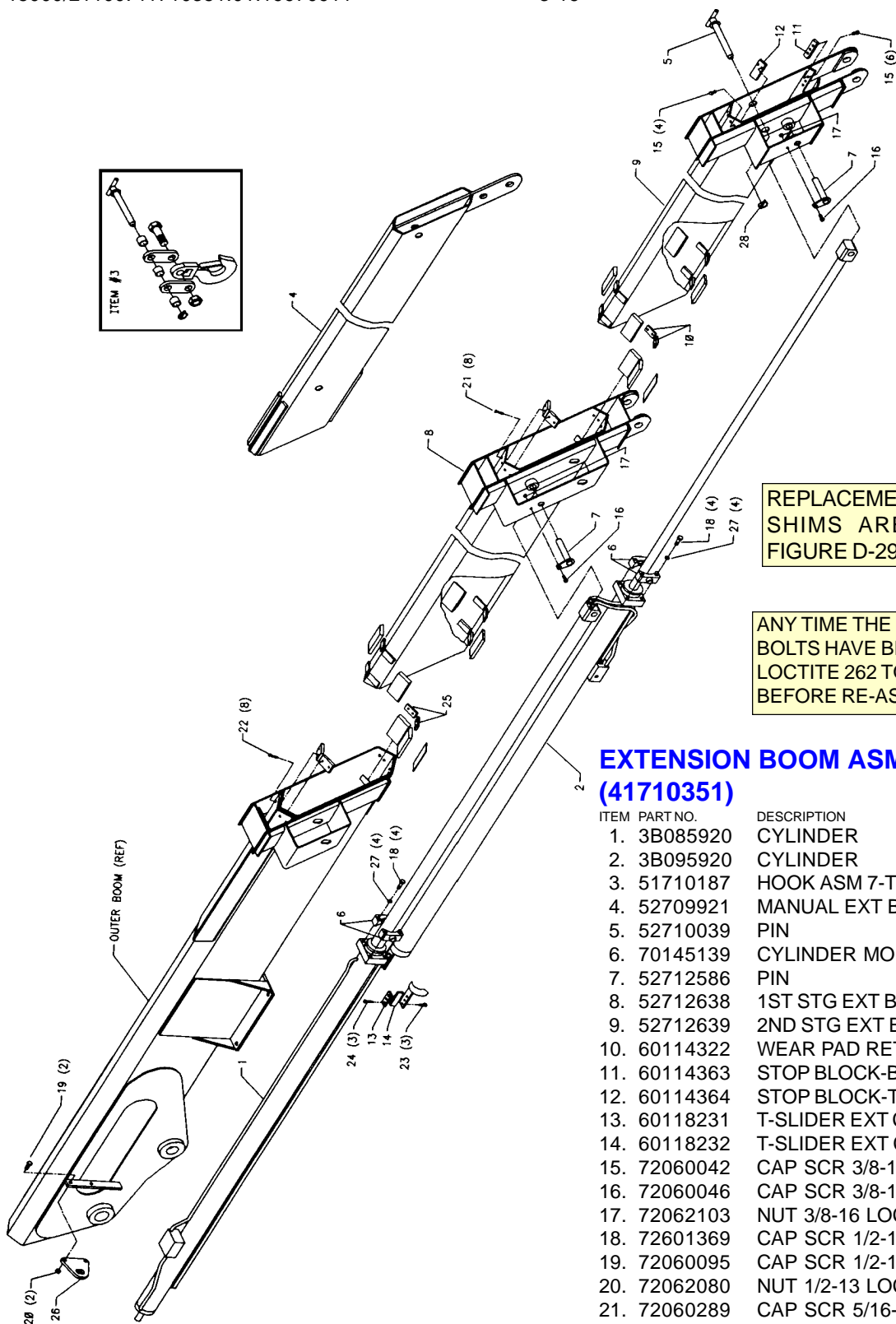


EXTENSION BOOM ASM-2H (41710350)

12.	60114320	WEAR PAD RETAINER	2
13.	60118231	T-SLIDER EXT CYL-HORIZ	1
14.	60118232	T-SLIDER EXT CYL-VERT	1
15.	72060225	CAP SCR 5/16-18X1 HH	3
16.	72060046	CAP SCR 3/8-16X1 HH	2
17.	72062103	NUT 3/8-16 LOCK	2
18.	72601369	CAP SCR 1/2-13X3 HHGR8	8
19.	72060095	CAP SCR 1/2-13X2 HHGR5	2
20.	72062080	NUT 1/2-13 LOCK	2
21.	72060289	CAP SCR 5/16-24X1/2 HH	8
22.	72060291	CAP SCR 5/16-24X3/4 HH	8

12.	60114320	WEAR PAD RETAINER	2
13.	60118231	T-SLIDER EXT CYL-HORIZ	1
14.	60118232	T-SLIDER EXT CYL-VERT	1
15.	72060225	CAP SCR 5/16-18X1 HH	3
16.	72060046	CAP SCR 3/8-16X1 HH	2
17.	72062103	NUT 3/8-16 LOCK	2
18.	72601369	CAP SCR 1/2-13X3 HHGR8	8
19.	72060095	CAP SCR 1/2-13X2 HHGR5	2
20.	72062080	NUT 1/2-13 LOCK	2
21.	72060289	CAP SCR 5/16-24X1/2 HH	8
22.	72060291	CAP SCR 5/16-24X3/4 HH	8



**NOTE**

REPLACEMENT WEAR PADS AND SHIMS ARE DESCRIBED IN FIGURE D-29.

NOTE

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

EXTENSION BOOM ASM-2H/1M (41710351)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B085920	CYLINDER	1
2.	3B095920	CYLINDER	1
3.	51710187	HOOK ASM 7-TON	1
4.	52709921	MANUAL EXT BOOM	1
5.	52710039	PIN	1
6.	70145139	CYLINDER MOUNTING	4
7.	52712586	PIN	2
8.	52712638	1ST STG EXT BOOM	1
9.	52712639	2ND STG EXT BOOM	1
10.	60114322	WEAR PAD RETAINER	2
11.	60114363	STOP BLOCK-BOTTOM	2
12.	60114364	STOP BLOCK-TOP	2
13.	60118231	T-SLIDER EXT CYL-HORIZ	1
14.	60118232	T-SLIDER EXT CYL-VERT	1
15.	72060042	CAP SCR 3/8-16X1/2 HH	10
16.	72060046	CAP SCR 3/8-16X1 HH	2
17.	72062103	NUT 3/8-16 LOCK	2
18.	72601369	CAP SCR 1/2-13X3 HHGR8	8
19.	72060095	CAP SCR 1/2-13X2 HHGR5	2
20.	72062080	NUT 1/2-13 LOCK	2
21.	72060289	CAP SCR 5/16-24X1/2 HH	8
22.	72060291	CAP SCR 5/16-24X3/4 HH	8
23.	72060225	CAP SCR 5/16-18X1 HH	3
24.	72601597	CAP SCR 5/16-18X1 FLTHD	3
25.	60114320	WEAR PAD RETAINER	2
26.	60118483	SUPPORT-1ST STG CYL	1
27.	72063132	WASHER 1/2 HARD	8
28.	72661367	QUICK PIN	1

**INSTALLATION KIT-REAR MOUNT
(93709811-1)**

ITEM	PART NO.	DESCRIPTION	QTY
1.	72060986	CAP SCR 1/2-13X2-3/4 HH GR5	12
2.	72062080	NUT 1/2-13 LOCK	12
3.	52706660	SUPPORT	4
4.	52711003	RESERVOIR MTG BRACKET LH	1
5.	52711004	RESERVOIR MTG BRACKET RH	1
6.	72063001	WASHER 1/4 WRT	2
7.	60010665	CLAMP PLATE	4
8.	60108621	TIE-DOWN STUD 1 1/4-7X33	8
9.	60112505	BAR	2
10.	70732776	RESERVOIR ASM	1
11.	72062142	NUT 1 1/4-7 LOCK STL INSERT	16
12.	72063067	WASHER 1-1/4 HI STR	16
13.	73051616	PUMP	1
14.	51710458	HOSE ASM 1X48	1
15.	51710459	HOSE ASM 1X205	1
16.	72533231	ADAPTER 3/4MPT #16MFACE	1
17.	73052084	FILTER 10MIC 1-1/4FPT	1
18.	72060003	CAP SCR 1/4-20X7/8 HH GR5	2
19.	60103870	FILTER MTG BRACKET	1
20.	72060047	CAP SCR 3/8-16X1-1/4 HH GR5	1
21.	72053211	PIPE NIPPLE 1-1/4NPT X CLOSE	1
22.	73054130	GATE VALVE 1-1/4NPT	1
23.	51710454	HOSE ASM 1/4X312	1
24.	72533163	ELBOW #6MSTR #6MFACE 90°	1
25.	72532854	ADAPTER #24MSTR 1NPT	1

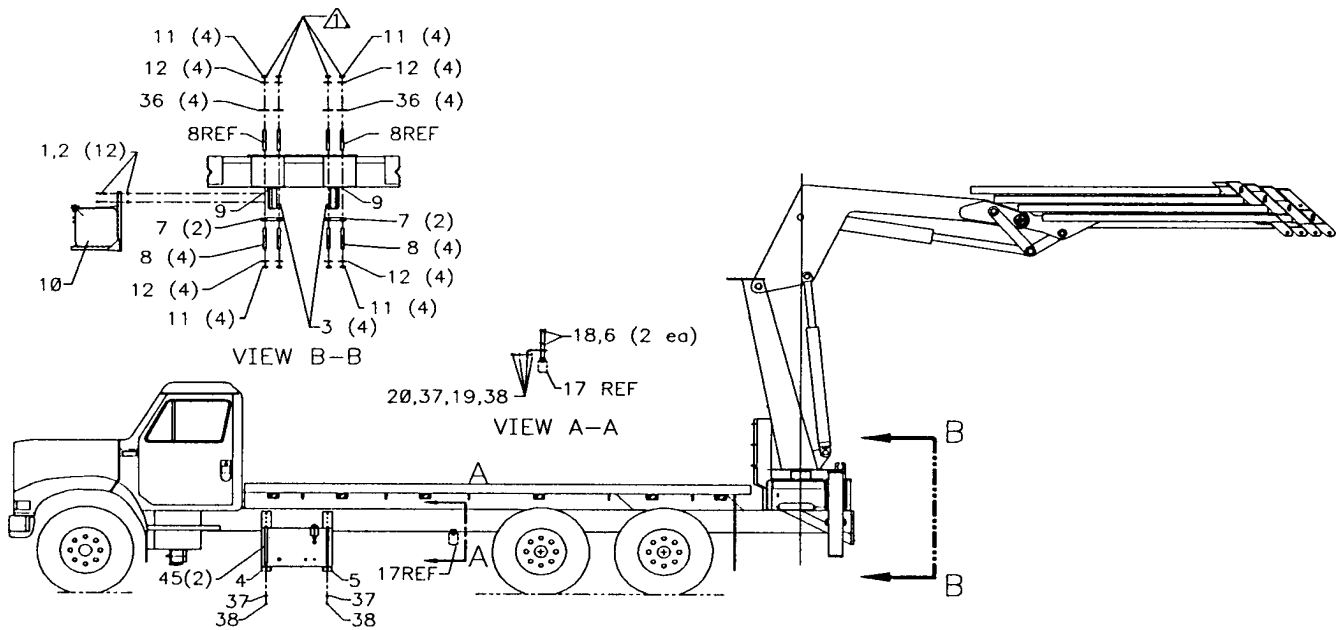
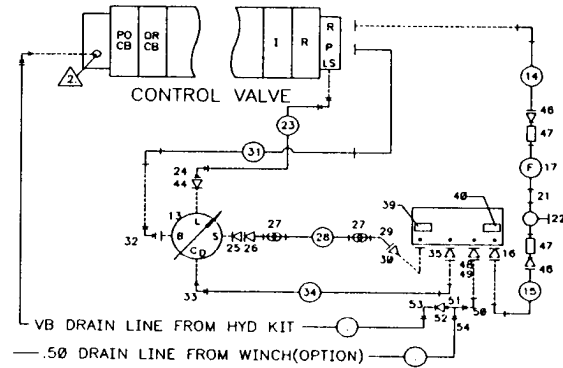
26.	72532833	BARB NIPPLE 1NPT 1-1/4HOSE	1
27.	72066516	HOSE CLAMP 1-1/4 2-BOLT	2
28.	60035679	HOSE 1-1/4 100R4 X 96	1
29.	72531196	BARB NIPPLE 1-1/4NPT 1-1/4 45°	1
30.	72531838	REDUCER BUSHING 1-1/2X1-1/4	1
31.	51394048	HOSE ASM 3/4X350 #12 #12	1
32.	72533168	ELBOW #16MSTR #12MFACE 90°	1
33.	72533230	ELBOW #8MSTR #10MFACE 90°	1
34.	51710455	HOSE ASM 1/2X115	1
35.	72533233	ADAPTER 3/8MPT #8MFACE	1
36.	M60113334	SPACER	8
37.	72063003	WASHER 3/8 WRT	3
38.	72062103	NUT 3/8-16 LOCK	3
39.	70392108	DECAL-SUCTION LINE	1
40.	70392109	DECAL-RETURN LINE	1
44.	72532722	ADAPTER #10MSTR #6FSTR	1
45.	70144238	STRAP-HYD RESERVOIR 40"	2
46.	72533188	ADAPTER 1MPT #15MFACE	2
47.	72531837	REDUCER BUSHING 1 1/4-1NPT	2
48.	72532672	BULKHEAD UNION 3/4JIC	1
49.	72531708	BULKHEAD NUT 3/4JIC	1
50.	72532658	ELBOW #8MJIC #8FJIC SWVL	1
51.	72532657	TEE 3/4JIC SWVL NUT RUN	1
52.	72532665	ADAPTER #4MJIC #8FJIC	1
53.	72532690	ELBOW #4MJIC #4FJIC SWVL	1
54.	72532675	CAP 3/4JIC	1

NOTE:

1. TORQUE ITEM 11 TO 840 FT-LBS (116 KG-M).
2. PORT "TP" (VB DRAIN) MUST BE PORTED TO TANK BEFORE OPERATION OF VALVEBANK.

SEE NEXT PAGE FOR DRAWING

INSTALLATION KIT-REAR MOUNT (93709811-2)



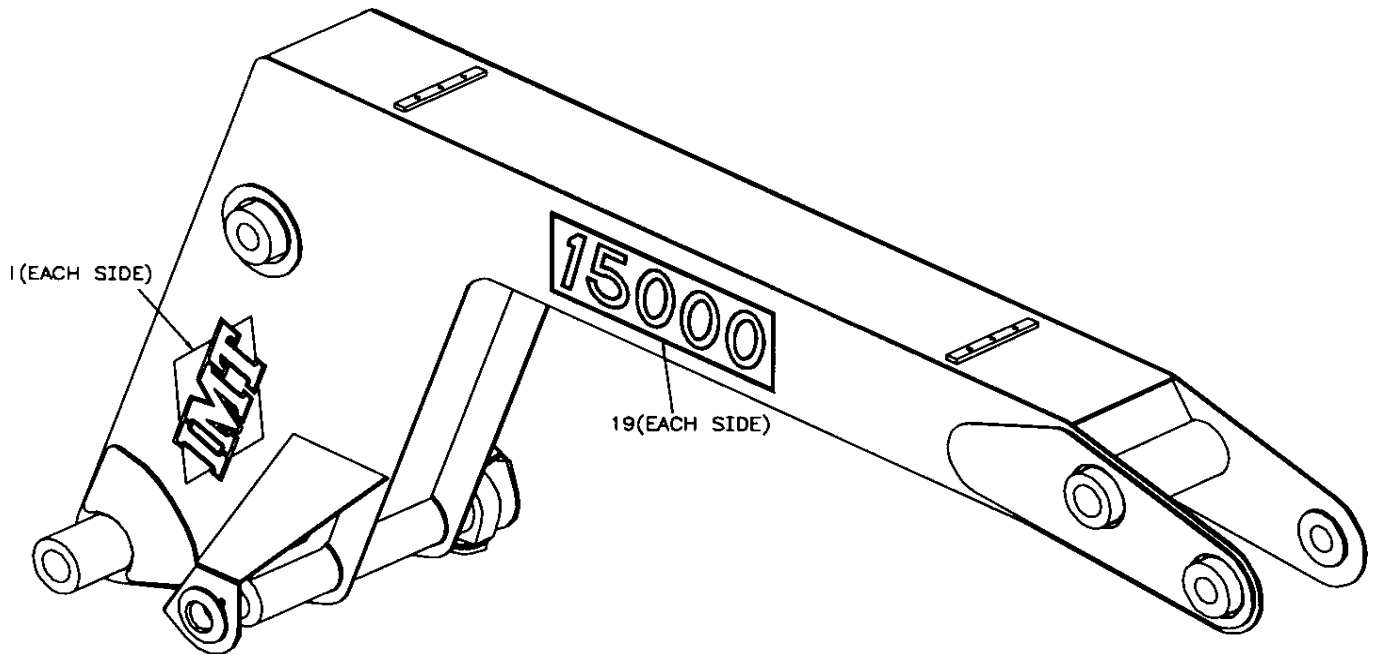
SEE PREVIOUS PAGE FOR PARTS

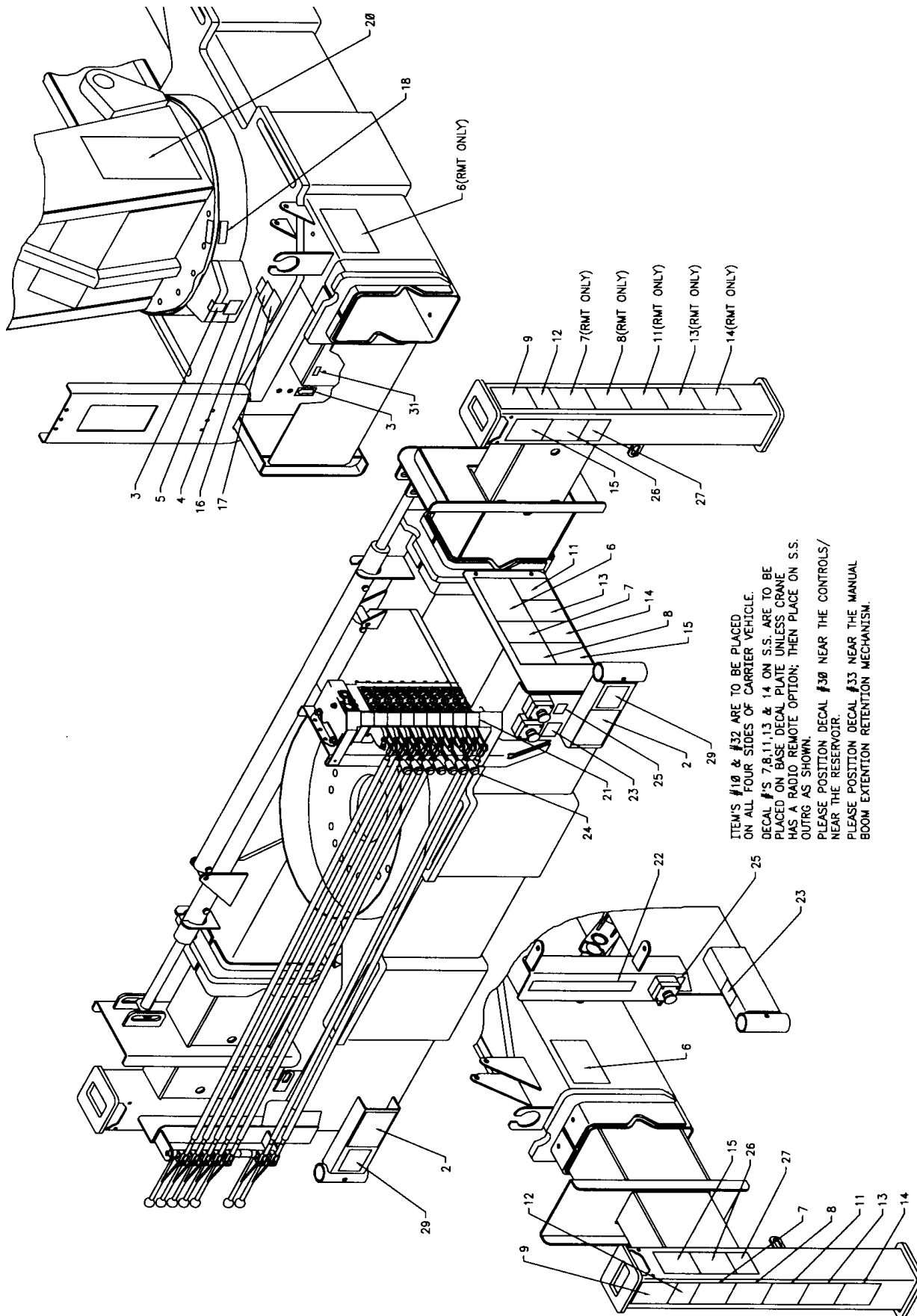
DECAL KIT-15000 (95710361-1)

ITEM	PART NO.	DESCRIPTION	QTY
1.	70029252	DECAL-IMT DIAMOND	2
2.	70391583	DECAL-SETUP/STOW INSTR	2
3.	70391612	DECAL-GREASE WKLY LEFT	2
4.	70392213	DECAL-DO NO WASH/WAX	1
5.	70392524	DECAL-ROTATE/GREASE	1
6.	70392813	DECAL-DGR ELECTROCUTION	2
7.	70392814	DECAL-DANGER OPERATOR	2
8.	70392815	DECAL-DANGER OPERATION	2
9.	70392864	DECAL-DGR OUTRG STD CLR	2
10.	70392865	DECAL-DGR ELECTROCUTION	4
11.	70392866	DECAL-DANGER OPER COND	2
12.	70392867	DECAL-DGR OUTRG MOVING	2
13.	70392888	DECAL-DGR OPER RESTRICT	2
14.	70392890	DECAL-DGR STOW/UNFOLD	2
15.	70392891	DECAL-DANGER DRIVELINE	2
16.	70392982	DECAL-CONTACT IMT	1
17.	71039134	DECAL-CAUTION OIL LEVEL	1
18.	71392365	DECAL-ROTATION ALIGNMENT	1

19.	71393445	DECAL-15000 SERIES IDENT	2
20.	71393558	CAPACITY PLACARD 2H&2H1M	2
21.	71394075	DECAL-CTRL SS	1
22.	71394076	DECAL-CTRL CS	1
23.	71394077	DECAL-CAUTION STOW LH OR	2
24.	71394079	DECAL-CTRL CIRCLES	1
25.	71394096	DECAL-EMERGENCY STOP	2
26.	70392861	DECAL-DANGER 2 BLOCKING	2REF
27.	70392863	DECAL-DANGER HOIST PERS	2
28.	71394078	DECAL-2 BLOCK WIRING	2REF
29.	70394093	DECAL-INSTR BM MTD WINCH	2REF
30.	70394189	DECAL-RECOMMEND HYD OIL	1
31.	70394146	DECAL-CAPA ALERT RESET SW	1
32.	70392868	DECAL-DGR CR LOADLINE	4
33.	70394443	DECAL-DGR FREEFALL BOOM	1REF

SEE FOLLOWING PAGE FOR DRAWING



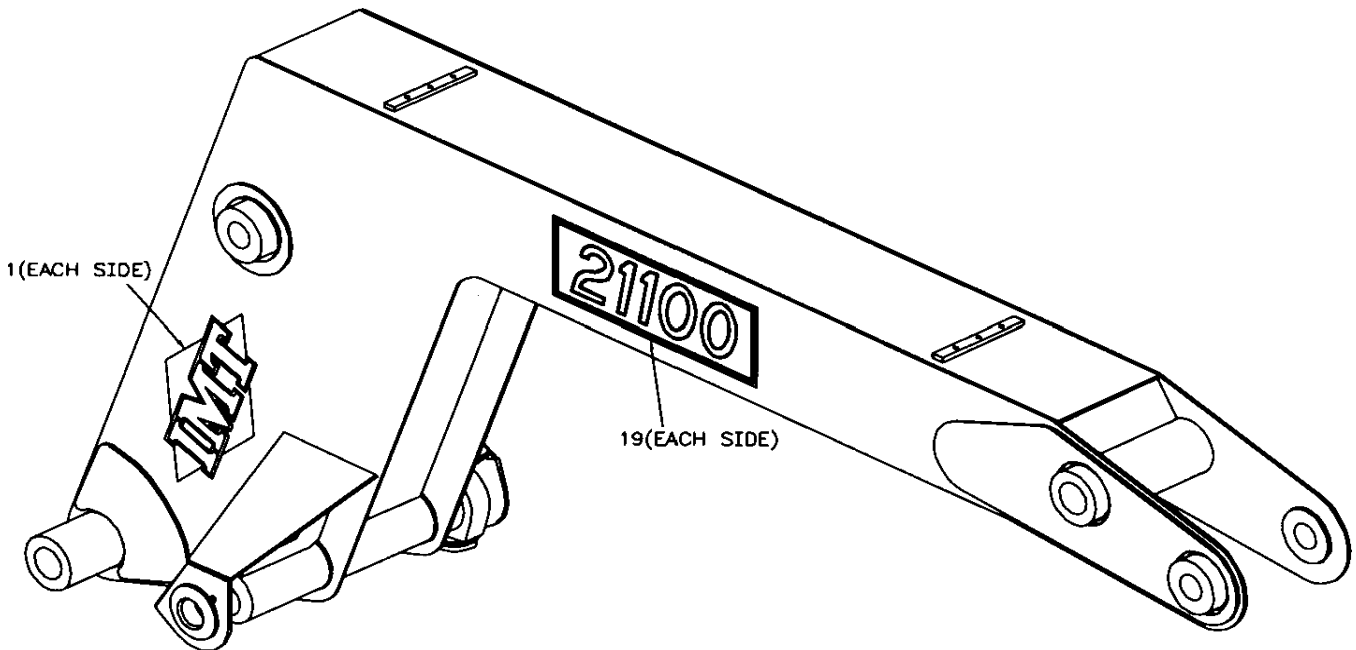
DECAL KIT-15000 (95710361-2)

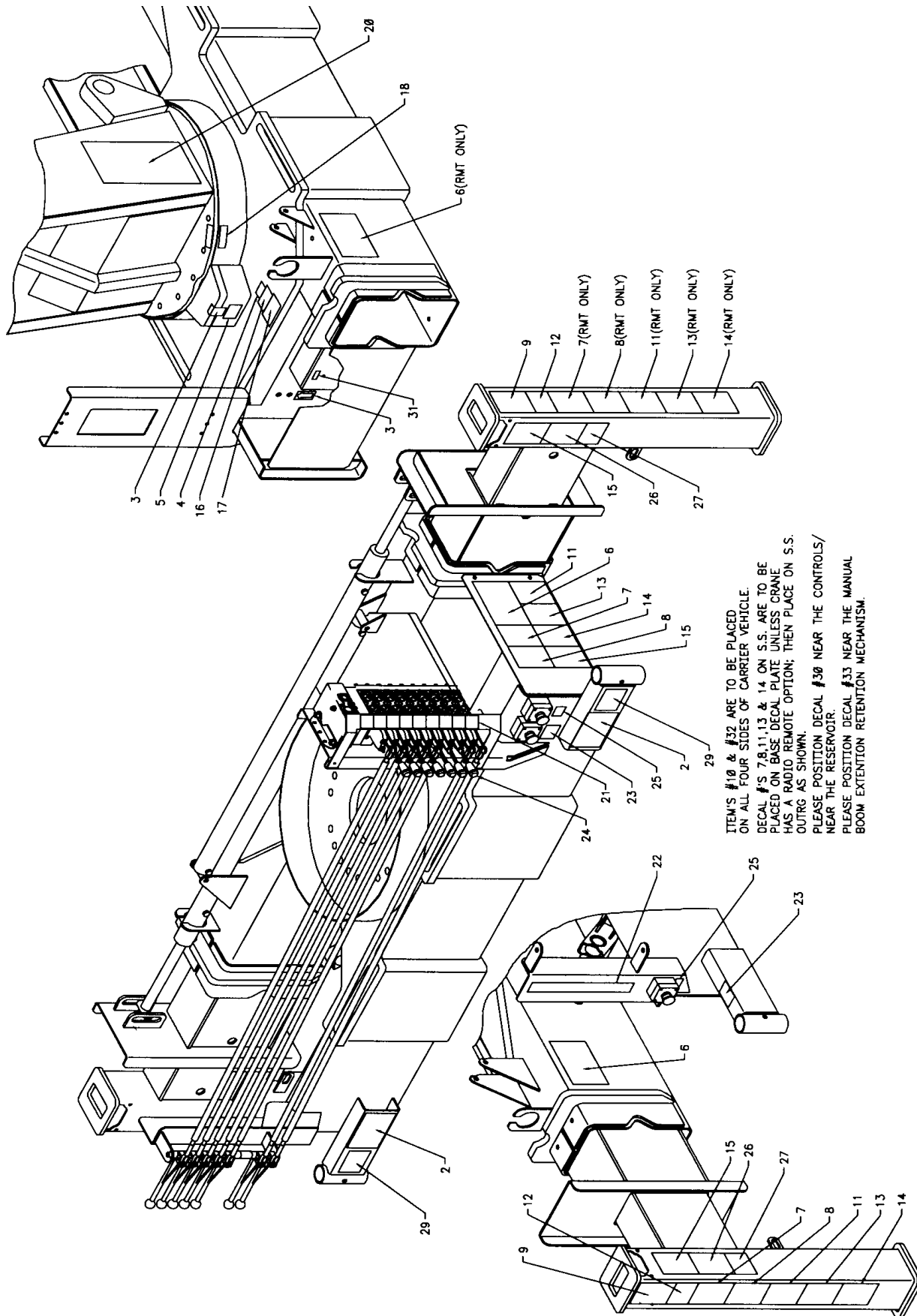
DECAL KIT-21100 (95711918-1)

ITEM	PART NO.	DESCRIPTION	QTY
1.	70029252	DECAL-IMT DIAMOND	2
2.	70391583	DECAL-SETUP/STOW INSTR.	2
3.	70391612	DECAL-GREASE WKLY LEFT	2
4.	70392213	DECAL-DO NO WASH/WAX	1
5.	70392524	DECAL-ROTATE/GREASE	1
6.	70392813	DECAL-DGR ELECTROCUTION	2
7.	70392814	DECAL-DANGER OPERATOR	2
8.	70392815	DECAL-DANGER OPERATION	2
9.	70392864	DECAL-DGR OUTRG STD CLR	2
10.	70392865	DECAL-DGR ELECTROCUTION	4
11.	70392866	DECAL-DANGER OPER COND	2
12.	70392867	DECAL-DGR OUTRG MOVING	2
13.	70392888	DECAL-DANGER OPER REST	2
14.	70392890	DECAL-DGR STOW/UNFOLD	4
15.	70392891	DECAL-DANGER DRIVELINE	2
16.	70392982	DECAL-CONTACT IMT	1
17.	71039134	DECAL-CAUTION OIL LEVEL	1
18.	71392365	DECAL-ROTATION ALIGNMENT	1
19.	71393796	DECAL-21100 IDENTIFICATION	2

20.	71393771	CAPACITY PLACARD	2
21.	71394075	DECAL-CONTROL STREETSIDE	1
22.	71394076	DECAL-CONTROL CURBSIDE	1
23.	71394077	DECAL-CAUTION STOW LH OR	2
24.	71394079	DECAL-CONTROL CIRCLES	1
25.	71394096	DECAL-EMERGENCY STOP	2
26.	70392861	DECAL-DANGER 2 BLOCKING	2REF
27.	70392863	DECAL-DANGER HOIST PERS	2
28.	71394078	DECAL-DGR 2 BLOCK WIRING	2REF
29.	70394093	DECAL-INSTR BOOM MTD WN	2REF
30.	70394189	DECAL-RECOMMEND HYD OIL	1
31.	70394146	DECAL-CAPA ALERT RESET SW	1
32.	70392868	DECAL-DGR CR LOADLINE	4
33.	70394443	DECAL-DGR FREEFALL BOOM	1REF

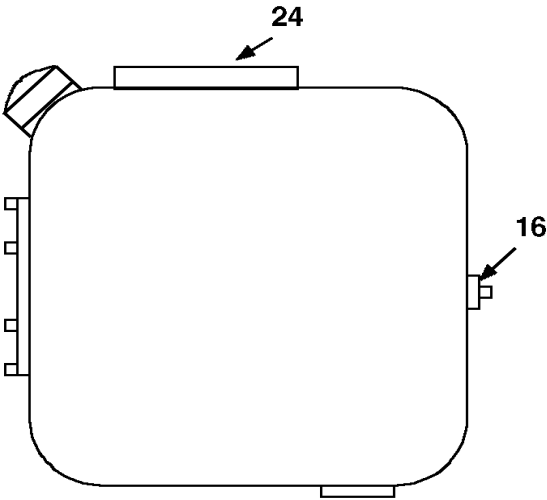
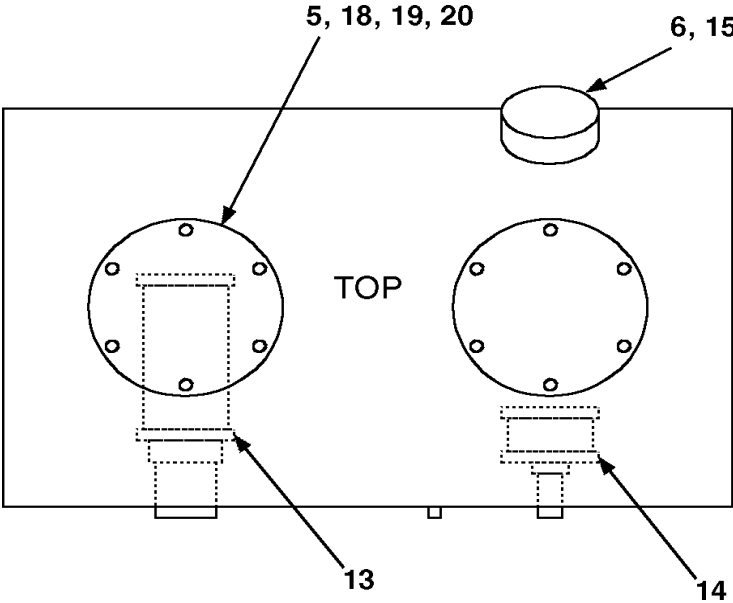
SEE FOLLOWING PAGE FOR DRAWING



DECAL KIT-21100 (95711918-2)

RESERVOIR ASM-40 GALLON
(70732776)

ITEM	IMT PART NO.	DESCRIPTION	QTY
5.	70144163	COVER	2
6.	70733181	FILL CAP BREATHER 10-MIC	1
13.	70733180	STRAINER 1-1/2NPT 30GPM	
		100MESH	1
14.	70034410	DIFFUSER 3/4NPT 33GPM	1
15.	70732792	FILL SCREEN 30X30 MESH	1
16.	73052001	PLUG 3/4NPTF SQHD MAGN	1
18.	72062000	NUT 1/4-20 HEX	12
19.	72063001	WASHER 1/4 WRT	12
20.	76393565	O-RING 6 ID X 6-1/2 OD	2
24.	70733182	SIGHT/TEMP GAUGE	1



1ST STG EXT CYLINDER (3B085920)

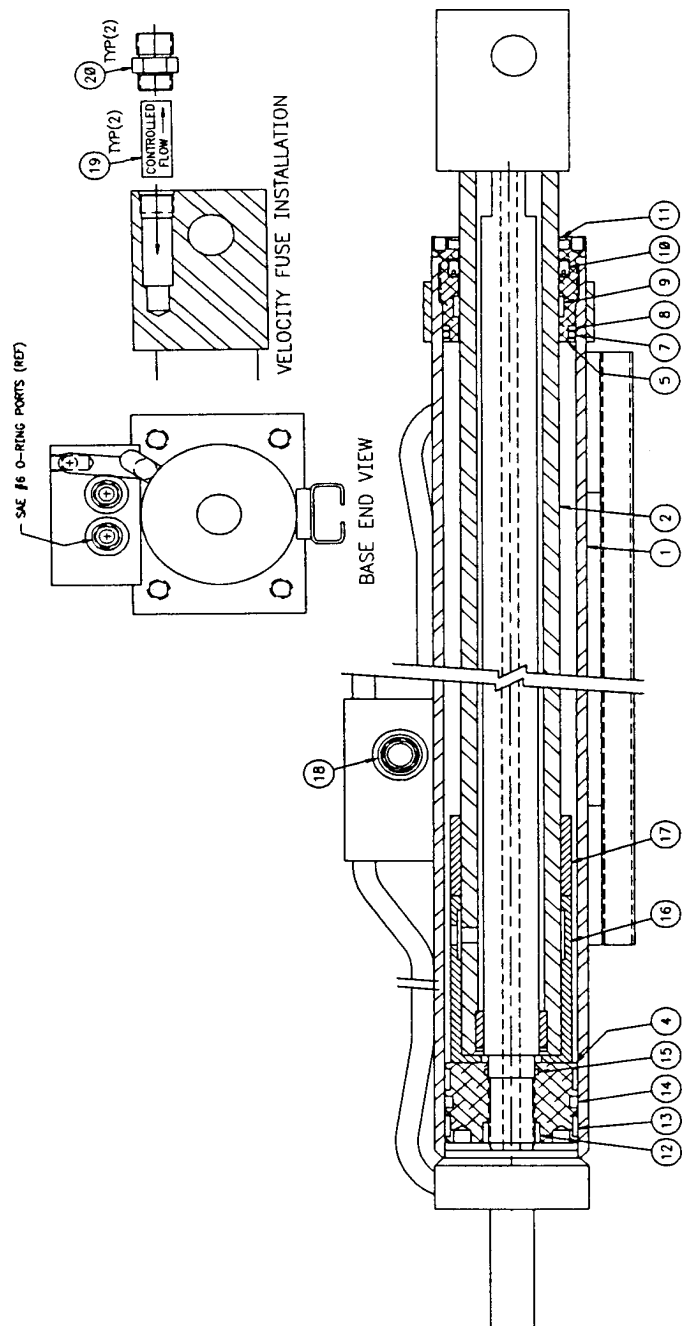
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B085920	CASE ASM (INCL:3)	1
2.	4H085920	ROD ASM (INCL:3)	1
3.	7PNPXT02	PLUG 1/8NPT (PART OF 1 & 2)	5REF
4.	6I302106	PISTON	1
5.	6H302225	HEAD	1
6.	9B085920	SEAL KIT (INCL:7-15)	1
7.	7Q072334	O-RING (PART OF 6)	1REF
8.	7Q10P334	BACKUP RING (PART OF 6)	1REF
9.	7T2N4025	WEAR RING-ROD (PART OF 6)	1REF
10.	7R546022	U-CUP SEAL (PART OF 6)	1REF
11.	7R14P022	ROD WIPER	1REF
12.	7T61N106	LOCK RING (PART OF 6)	1REF
13.	7T2N4030	WEAR RING-PSTN (PART OF 6)	2REF
14.	7T66P300	PISTON SEAL (PART OF 6)	1REF
15.	7Q072121	O-RING (PART OF 6)	1REF
16.	6C128950	STOP TUBE WLDMT	1
17.	6C086920	STOP TUBE	1
18.	73054807	VALVE	2
19.	73054919	VELOCITY FUSE-SLIP IN 25GPM	2
20.	72533475	ADAPTER #6MFACE #8MSTR	2

NOTES

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

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

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



2ND STG EXT CYLINDER (3B095920)

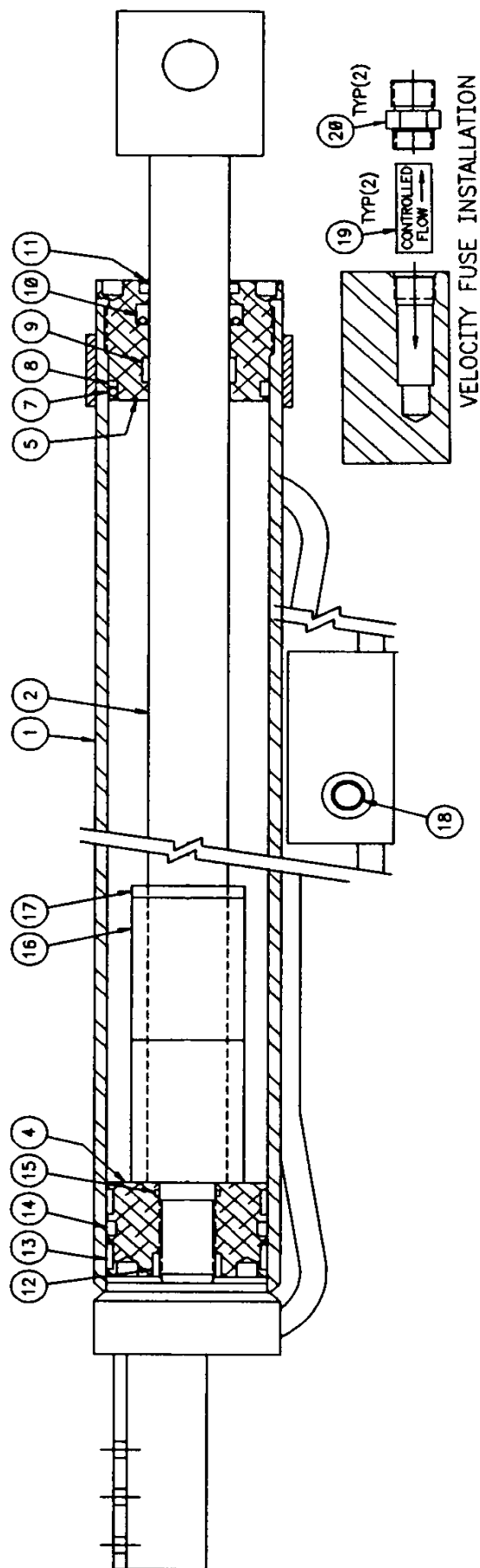
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B095920	CASE ASM (INCL:3)	1
2.	4G095920	ROD ASM	1
4.	6I302106	PISTON	1
5.	6H030015	HEAD	1
6.	9B095920	SEAL KIT (INCL:7-15)	1
7.	7Q072334	O-RING (PART OF 6)	1REF
8.	7Q10P334	BACKUP RING (PART OF 6)	1REF
9.	7T2N8015	WEAR RING-ROD (PART OF 6)	1REF
10.	7R546015	U-CUP SEAL (PART OF 6)	1REF
11.	7R14P015	ROD WIPER (PART OF 6)	1REF
12.	7T61N106	LOCK RING (PART OF 6)	1REF
13.	7T2N4030	WEAR RING-PSTN (PART OF 6)	2REF
14.	7T66P300	PISTON SEAL (PART OF 6)	1REF
15.	7Q072121	O-RING (PART OF 6)	1REF
16.	6C300015	STOP TUBE	2
17.	6A025015	WAFFER LOCK (PART OF 6)	1REF
18.	72532140	PLUG #6MSTR HH	1
19.	73054919	VELOCITY FUSE-SLIP IN 25GPM	2
20.	72533475	ADAPTER #6MFACE #8MSTR	2

NOTES

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

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

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



EXT CYLINDER-1H (3B225940)

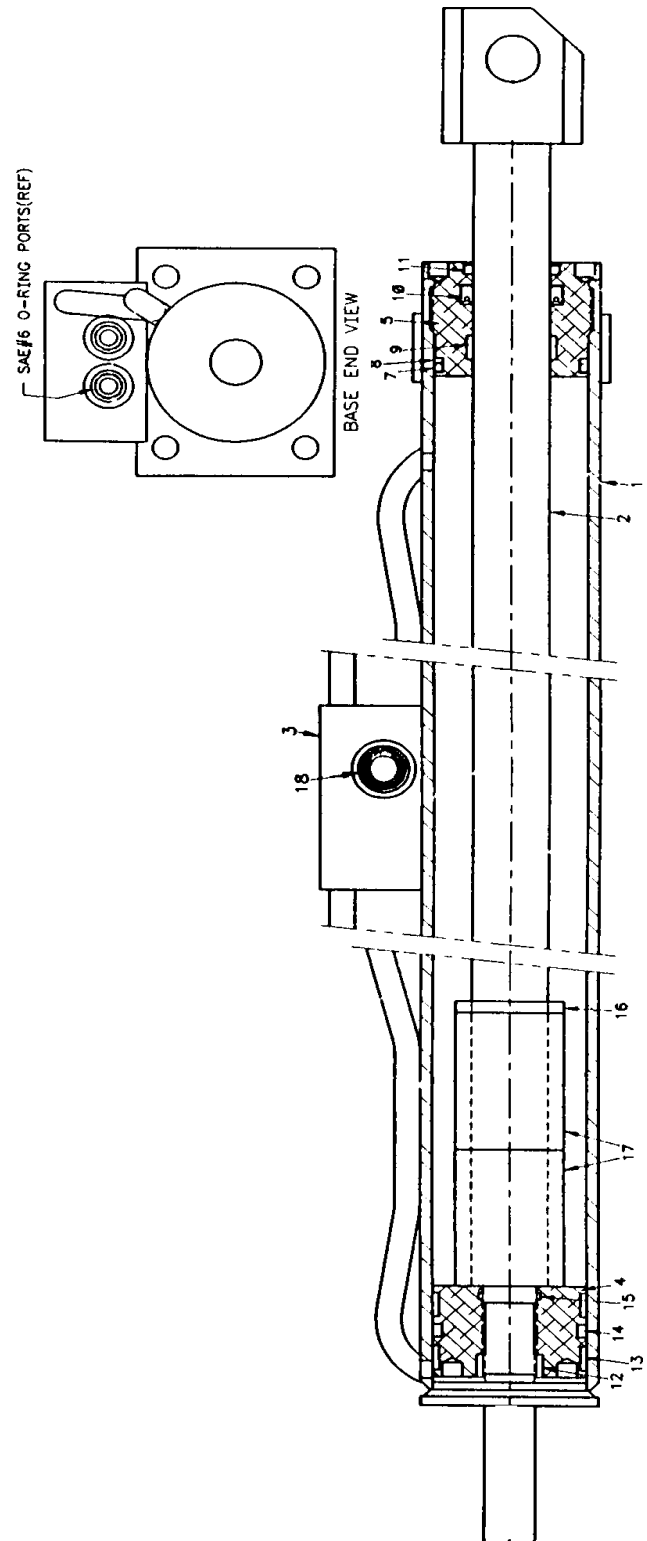
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B225940	CASE ASM (INCL:3)	1
2.	4G095920	ROD ASM	1
3.	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	2REF
4.	6I302106	PISTON	1
5.	6H030015	HEAD	1
6.	9B095920	SEAL KIT (INCL:7-16)	1
7.	7Q072334	O-RING (PART OF 6)	1REF
8.	7Q10P334	BACKUP RING (PART OF 6)	1REF
9.	7T2N8015	WEAR RING-ROD (PART OF 6)	1REF
10.	7R546015	U-CUP SEAL (PART OF 6)	1REF
11.	7R14P015	ROD WIPER (PART OF 6)	1REF
12.	7T61N106	LOCK RING (PART OF 6)	1REF
13.	7T2N4030	WEAR RING-PSTN (PART OF 6)	2REF
14.	7T66P300	PISTON SEAL (PART OF 6)	1REF
15.	7Q072121	O-RING (PART OF 6)	1REF
16.	6A025015	WAFER LOCK (PART OF 6)	1REF
17.	6C300015	STOP TUBE 3"	2
18.	73054807	VALVE	2

NOTES

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

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

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



INNER BOOM CYLINDER (3C112920)

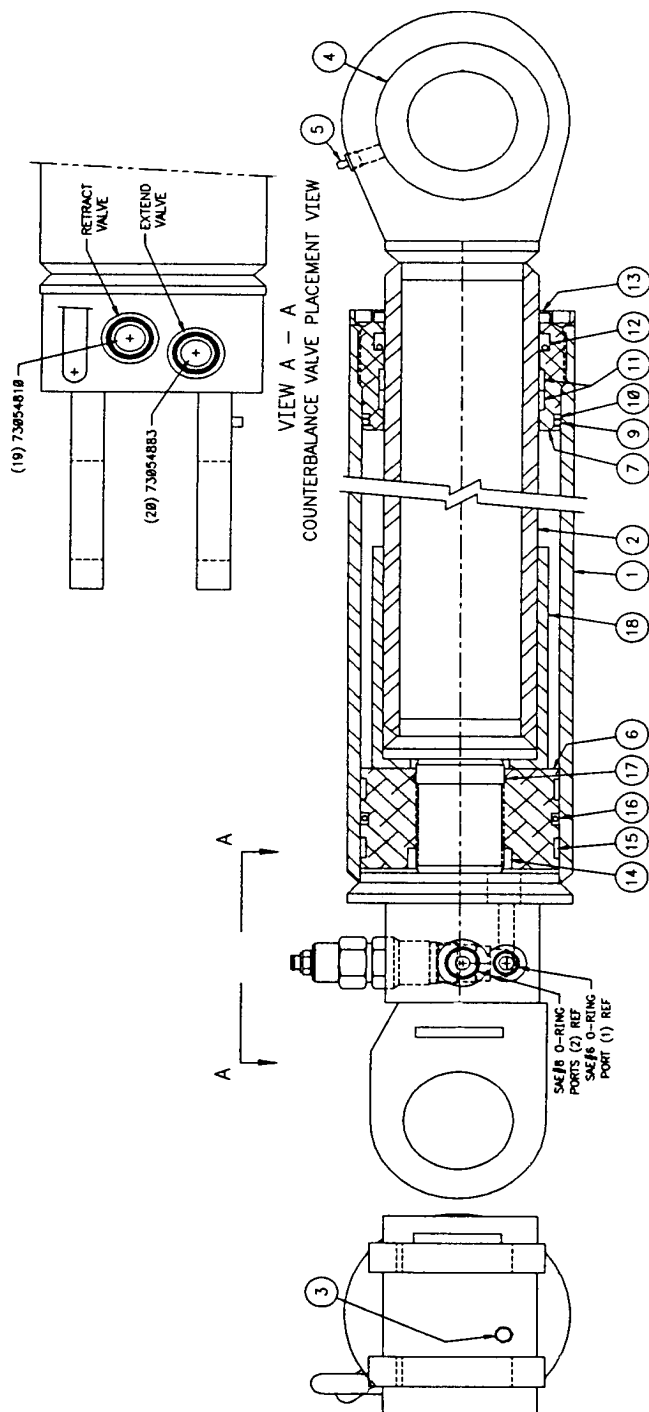
ITEM	PART NO.	DESCRIPTION	QTY
1.	4C112920	CASE ASM (INCL:3)	1
2.	4H112920	ROD ASM (INCL:4,5)	1
3.	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	2REF
4.	70143838	BALL BUSHING (PART OF 2)	1REF
5.	72053508	ZERK 1/8NPT (PART OF 2)	1REF
6.	6I452200	PISTON	1
7.	6H045035	HEAD	1
8.	9B112920	SEAL KIT (INCL:9-17)	1
9.	7Q072346	O-RING (PART OF 8)	1REF
10.	7Q10P346	BACKUP RING (PART OF 8)	1REF
11.	7T2N4037	WEAR RING (PART OF 8)	2REF
12.	7R546035	U-CUP SEAL (PART OF 8)	1REF
13.	7R14P035	ROD WIPER (PART OF 8)	1REF
14.	7T61N200	LOCK RING (PART OF 8)	1REF
15.	7T2N4045	WEAR RING (PART OF 8)	2REF
16.	7T66P450	PISTON SEAL (PART OF 8)	1REF
17.	7Q072033	O-RING (PART OF 8)	1REF
18.	6C112920	STOP TUBE	1
19.	73054810	COUNTERBALANCE VALVE	1
20.	73054883	COUNTERBALANCE VALVE	1

NOTES

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

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

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



OUTER BOOM CYLINDER (3C124920)

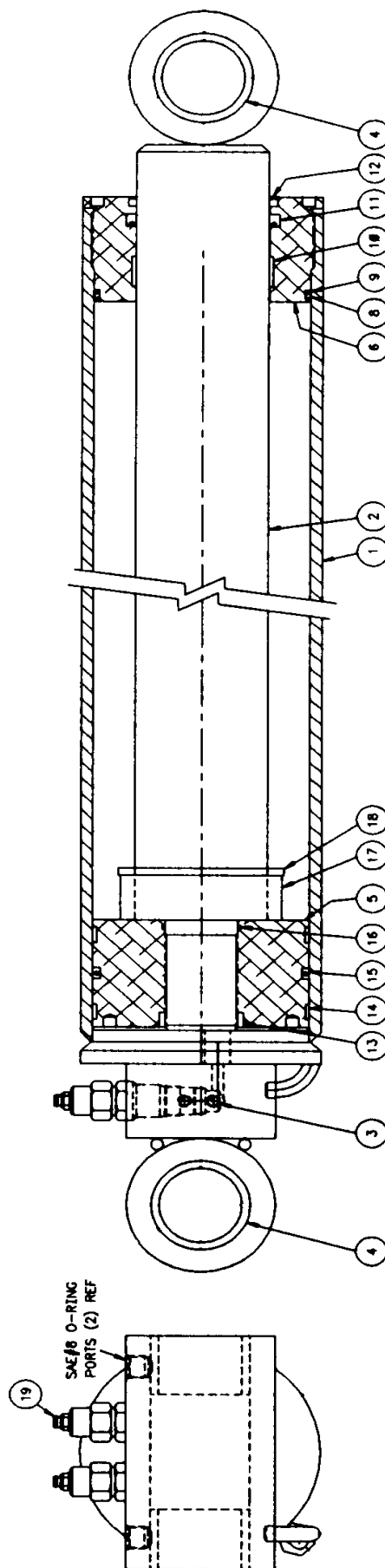
ITEM	PART NO.	DESCRIPTION	QTY
1.	4C124920	CASE ASM (INCL:3&4)	1
2.	4G124920	ROD ASM (INCL:4)	1
3.	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	4REF
4.	70034283	BEARING (PART OF 2)	1REF
5.	6I654219	PISTON	1
6.	6H654400	HEAD	1
7.	9B124920	SEAL KIT (INCL:8-16,18)	1
8.	7Q072361	O-RING (PART OF 8)	1REF
9.	7Q10P361	BACKUP RING (PART OF 7)	1REF
10.	7T2N8042	WEAR RING (PART OF 7)	1REF
11.	7R546040	U-CUP SEAL (PART OF 7)	1REF
12.	7R14P040	ROD WIPER (PART OF 7)	1REF
13.	7T61N218	LOCK RING (PART OF 7)	1REF
14.	7T2N4065	WEAR RING (PART OF 7)	2REF
15.	7T66P650	PISTON SEAL (PART OF 7)	1REF
16.	7Q072139	O-RING (PART OF 7)	1REF
17.	6C150040	STOP TUBE	1
18.	6A025040	WAFER LOCK (PART OF 7)	1REF
19.	73054810	COUNTERBALANCE VALVE	2

NOTES

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

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

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



PWR OUT OUTRIGGER CYLINDER (3B055920)

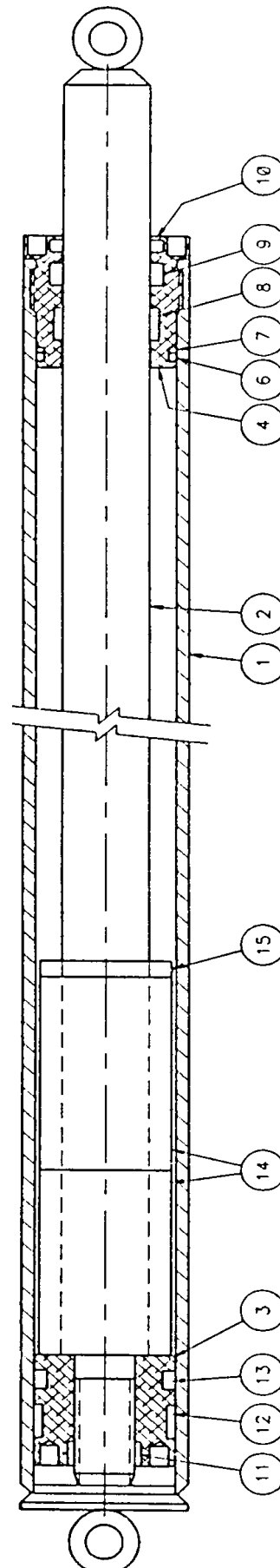
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B055920	CASE ASM	1
2.	4G055920	ROD ASM	1
3.	6I201088	PISTON	1
4.	6H020012	HEAD	1
5.	9B055920	SEAL KIT (INCL:6-13,15)	1
6.	7Q072224	O-RING (PART OF 5)	1REF
7.	7Q10P224	BACKUP RING (PART OF 5)	1REF
8.	7T2N8012	WEAR RING (PART OF 5)	1REF
9.	7R546125	U-CUP SEAL (PART OF 5)	1REF
10.	7R14P012	ROD WIPER (PART OF 5)	1REF
11.	7T61N087	LOCK RING (PART OF 5)	1REF
12.	7T2N4020	WEAR RING (PART OF 5)	1REF
13.	7T66P200	PISTON SEAL (PART OF 5)	1REF
14.	6C300012	STOP TUBE	2
15.	6A025012	WAFER LOCK (PART OF 5)	1REF

NOTES

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

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

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



PWR DN OUTRIGGER CYLINDER (3B070920)

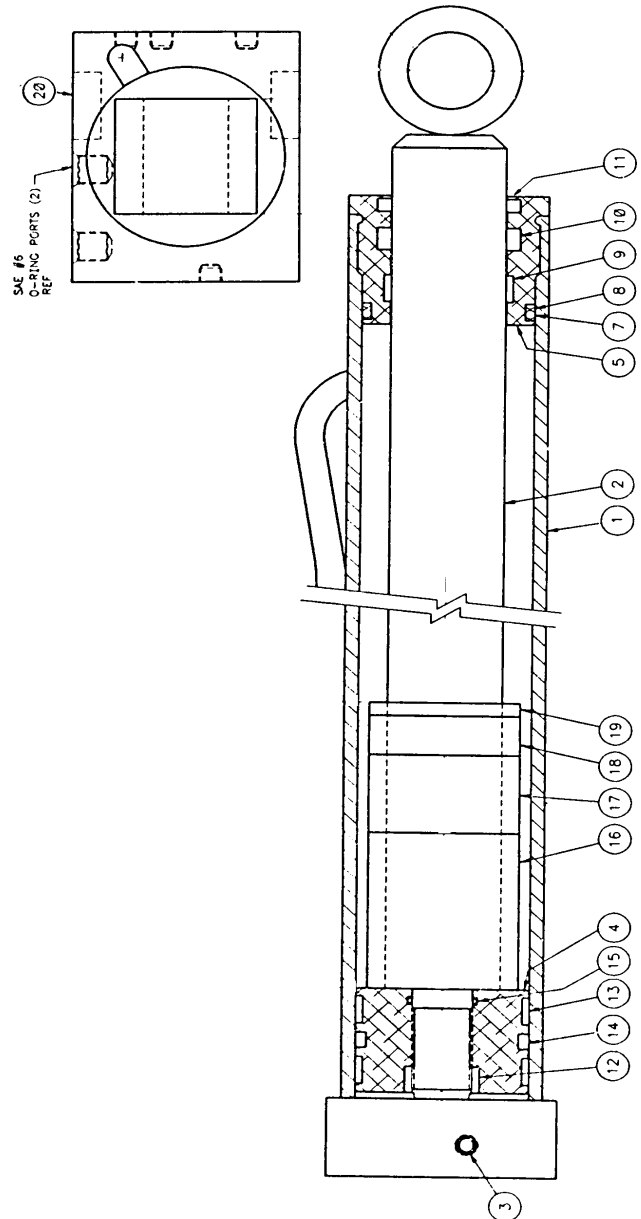
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B070920	CASE ASM (INCL:3)	1
2.	4G070920	ROD ASM	1
3.	7PNPXT02	PLUG 1/8NPT (PART OF 1)	4REF
4.	6I302106	PISTON	1
5.	6H030020	HEAD	1
6.	9B070920	SEAL KIT (INCL:7-15,19)	1
7.	7Q072334	O-RING (PART OF 6)	1REF
8.	7Q10P334	BACKUP RING (PART OF 6)	1REF
9.	7T2N4022	WEAR RING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

NOTES

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

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

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



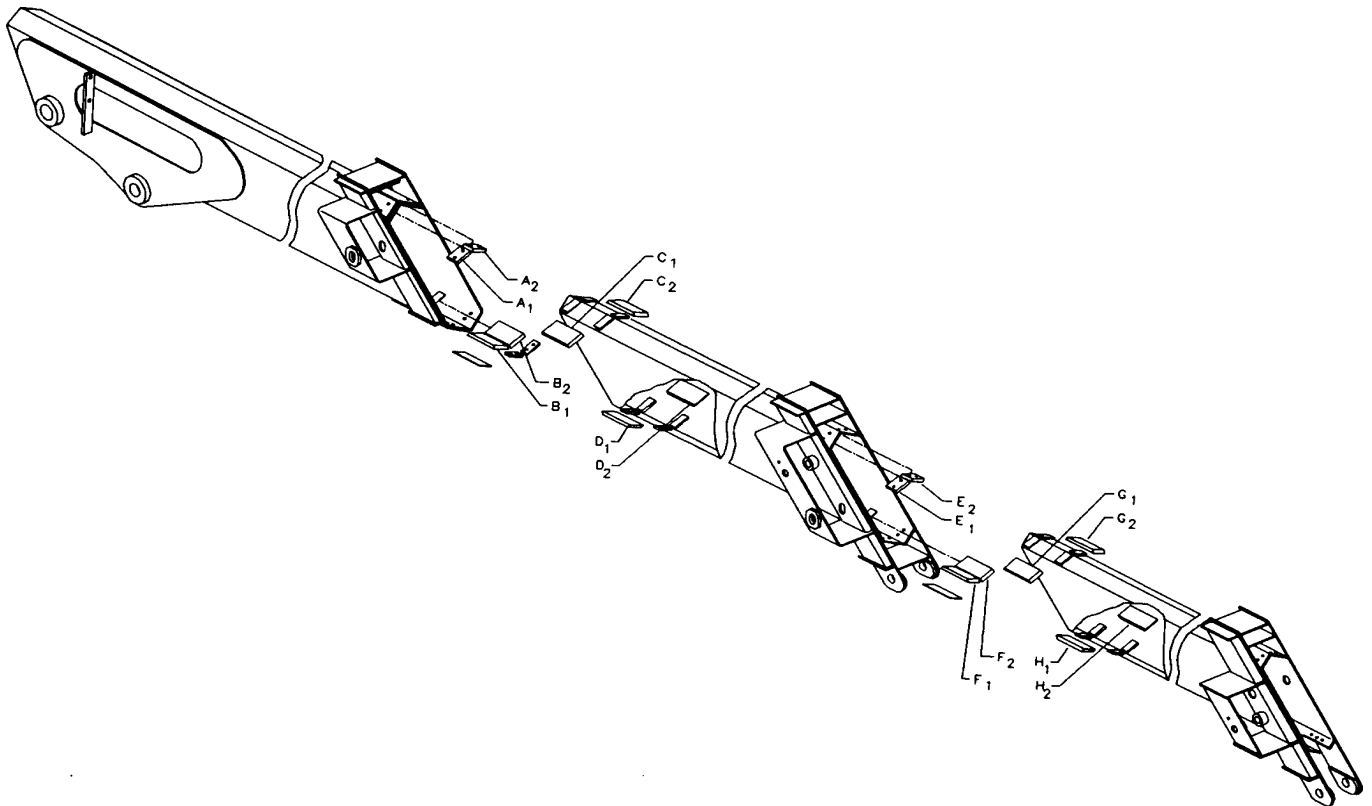
EXT BOOM WEAR PAD & SHIM REPLACEMENT CHART

A1	*60030214	WEAR PAD-NYL.50X2X2.75	AR
	60030277	WEAR PAD-NYL.44X2X2.75	AR
	60118265	SHIM-WEAR PAD12GAX2X2.75	AR
	60118558	SHIM-WEAR PAD16GAX2X2.75	AR
	60118266	SHIM-WEAR PAD13GAX2X2.75	AR
A2	*60030214	WEAR PAD-NYL.50X2X2.75	AR
	60030277	WEAR PAD-NYL.44X2X2.75	AR
	60118265	SHIM-WEAR PAD12GAX2X2.75	AR
	60118558	SHIM-WEAR PAD16GAX2X2.75	AR
	60118266	SHIM-WEAR PAD13GAX2X2.75	AR
B1	*60030218	WEAR PAD-BV NYL.50X2.88X5.50	AR
	60030280	WEAR PAD-BV NYL.44X2.88X5.50	AR
	60030268	WEAR PAD-BV NYL.38X2.88X5.50	AR
	*60114332	SHIM-WEAR PAD16GAX2.50X5.14	AR
B2	*60030218	WEAR PAD-BV NYL.50X2.88X5.50	AR
	60030280	WEAR PAD-BV NYL.44X2.88X5.50	AR
	60030268	WEAR PAD-BV NYL.38X2.88X5.50	AR
	*60114332	SHIM-WEAR PAD6GAX2.50X5.14	AR
C1	*60030236	WEAR PAD-BV NYL.62X2.88X5.50	AR
	60030278	WEAR PAD-BV NYL.56X2.88X5.50	AR
	60030218	WEAR PAD-BV NYL.50X2.88X5.50	AR
C2	*60030236	WEAR PAD-BV NYL.62X2.88X5.50	AR
	60030278	WEAR PAD-BV NYL.56X2.88X5.50	AR
	60030218	WEAR PAD-BV NYL.50X2.88X5.50	AR
D1	*60030268	WEAR PAD-BV NYL.38X2.88X5.50	AR
D2	*60030268	WEAR PAD-BV NYL.38X2.88X5.50	AR

E1	*60030217	WEAR PAD-NYL.50X2.00X2.25	AR
	60030271	WEAR PAD-NYL.44X2.00X2.25	AR
	60118559	SHIM-WEAR PAD16GAX2.00X2.25	AR
	60118561	SHIM-WEAR PAD12GAX2.00X2.25	AR
E2	*60030217	WEAR PAD-NYL.50X2.00X2.25	AR
	60030271	WEAR PAD-NYL.44X2.00X2.25	AR
	60118559	SHIM-WEAR PAD16GAX2.00X2.25	AR
	60118561	SHIM-WEAR PAD12GAX2.00X2.25	AR
F1	*60030224	WEAR PAD-BV NYL.50X2.41X5.50	AR
	60030279	WEAR PAD-BV NYL.44X2.41X5.50	AR
	60030267	WEAR PAD-BV NYL.38X2.41X5.50	AR
	*60114333	SHIM-WEAR PAD 16GAX2.12X5.14	AR
F2	*60030224	WEAR PAD-BV NYL.50X2.41X5.50	AR
	60030279	WEAR PAD-BV NYL.44X2.41X5.50	AR
	60030267	WEAR PAD-BV NYL.38X2.41X5.50	AR
	*60114333	SHIM-WEAR PAD16GAX2.12X5.14	AR
G1	*60030227	WEAR PAD-BV NYL.62X2.41X5.50	AR
	60030281	WEAR PAD-BV NYL.56X2.41X5.50	AR
	60030224	WEAR PAD-BV NYL.50X2.41X5.50	AR
G2	*60030237	WEAR PAD-BV NYL.62X2.41X5.50	AR
	60030281	WEAR PAD-BV NYL.56X2.41X5.50	AR
	60030224	WEAR PAD-BV NYL.50X2.41X5.50	AR
H1	*60030267	WEAR PAD-BV NYL.38X2.41X5.50	AR
H2	*60030267	WEAR PAD-BV NYL.38X2.41X5.50	AR

NOTE

* INDICATES STANDARD COMPONENT. YOUR UNIT MAY VARY. SEE DOCUMENTATION WHICH ACCOMPANIED YOUR CRANE.

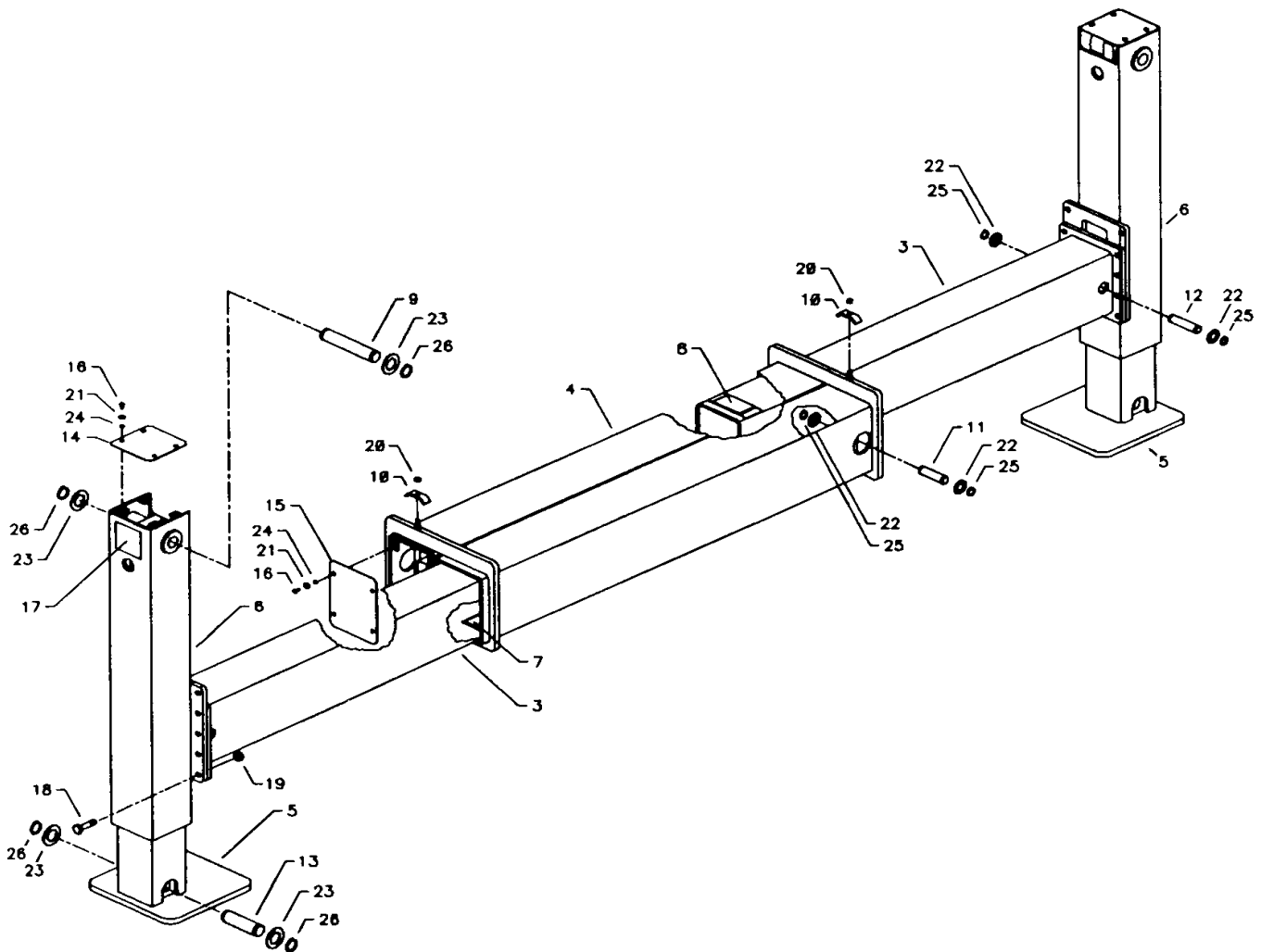


AUX OUTRIGGER KIT-REAR MT-PO/PD- LOAD SENSE (31712754-1)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B020860	POWER DOWN CYLINDER	2
2.	3B148860	POWER OUT CYLINDER	2
3.	52706375	ARM	2
4.	52706385	ARM HOUSING	1
5.	52706388	LEG	2
6.	52706396	LEG HOUSING	2
7.	60030067	WEAR PAD	2
8.	60030293	WEAR PAD	2
9.	60105321	PIN	2
10.	60107648	HOSE CLAMP	2
11.	60109500	PIN	2
12.	60109501	PIN	2
13.	60109593	PIN	2

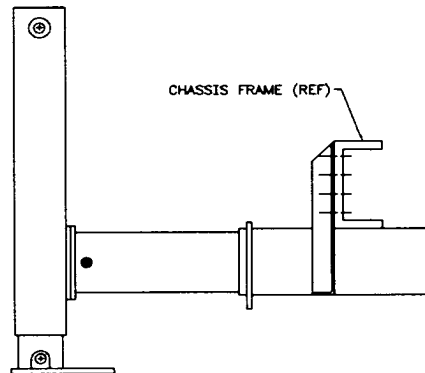
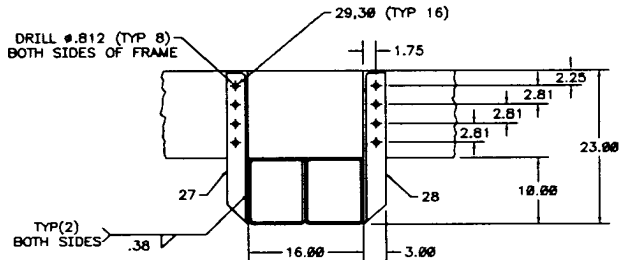
14.	60109594	COVER-HOUSING	2
15.	60109595	COVER-ARM HOUSING	2
16.	72060002	CAP SCR 1/4-20X3/4 HHGR5	16
17.	70392864	DECAL-DGR STAND CLEAR	2
18.	72060816	CAP SCR 5/8-11X2-1/2 SH	16
19.	72062091	NUT 5/8-11 LOCK	16
20.	72062103	NUT 3/8-16 LOCK	2
21.	72063001	WASHER 1/4 WRT	16
22.	72063034	MACH BUSHING 1X10GA NR	8
23.	72063037	MACH BUSHING 1-1/2X10GA NR	8
24.	72063049	WASHER 1/4 LOCK	16
25.	72066125	RETAINING RING 1 EXT HD	8
26.	72066132	RETAINING RING 1-1/2 EXT HD	8

SEE FOLLOWING PAGE FOR DRAWING

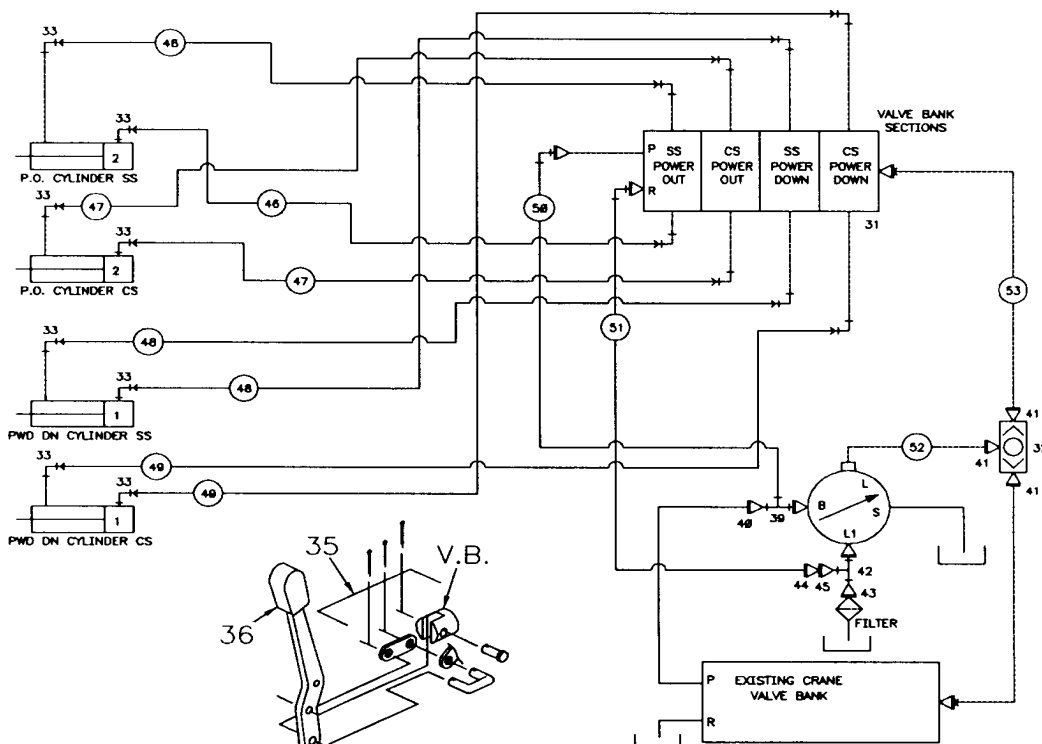


AUX OUTRIGGER KIT-REAR MT-PO/PD- LOAD SENSE (31712754-2)

ITEM	PART NO.	DESCRIPTION	QTY
27.	60109606	MTG ANGLE REAR	2
28.	60109687	MTG ANGLE FRONT	2
29.	72060186	CAP SCR 3/4-10X2-1/2 HHGR5	16
30.	72062114	NUT 3/4-10 LOCK	16



ITEM	PART NO.	DESCRIPTION	QTY
31.	51710778	VALVEBANK 4-SECT	1
32.	73054785	SHUTTLE VALVE	1
33.	72053763	ELBOW #8MSTR #8MJIC	8
35.	94731839	LINK & PIN KIT	4
36.	73014848	HANDLE	4
39.	72532657	TEE #8JIC RUN	1
40.	72533437	ADAPTER #8MFACE #8FJIC	1
41.	72532353	ADAPTER #6MSTR #4MJIC	3
42.	72053615	TEE 1-1/4NPT	1
43.	72053211	PIPE NIPPLE 1-1/4NPT X CLOSE	1
44.	72053677	ADAPTER 1MPT #12MJIC	1
45.	72531837	REDUCER BUSHING 1 1/4-1NPT	1
46.	51706440	HOSE ASM 1/2X68 FF	2
47.	51706441	HOSE ASM 1/2X117 FF	2
48.	51706465	HOSE ASM 1/2X98 FF	2
49.	51706439	HOSE ASM 1/2X165 FF	2
50.	51706043	HOSE ASM 1/2X345 FF	1
51.	51711685	HOSE ASM 3/4X360 FF	1
52.	51706152	HOSE ASM 1/4X36 FF	1
53.	51719205	HOSE ASM 1/4X340 FF	1
56.	70392867	DECAL-DGR OUTRG MOVING	1
57.	71392257	DECAL-PWR DN CTRL	1
58.	71393885	DECAL-PWR OUT CTRL	1

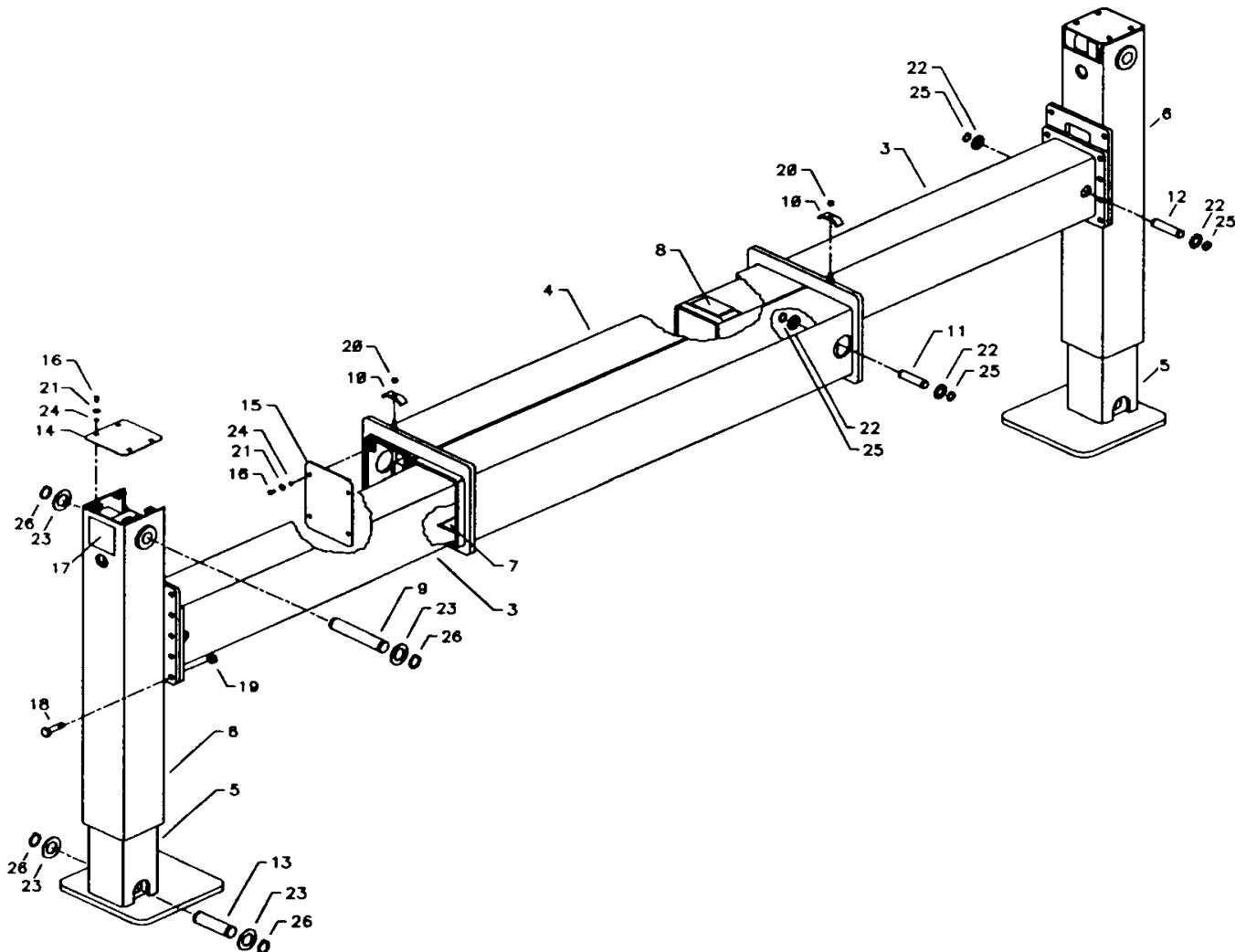


AUX OUTRIGGER KIT-FRONT MT-PO/PD- LOAD SENSE (31712755-1)

ITEM	PART NO.	DESCRIPTION	QTY
1.	3B208940	POWER DOWN CYLINDER	2
2.	3B148860	POWER OUT CYLINDER	2
3.	52706375	ARM	2
4.	52706385	ARM HOUSING	1
5.	52712512	LEG	2
6.	52712511	LEG HOUSING	2
7.	60030067	WEAR PAD	2
8.	60030293	WEAR PAD	2
9.	60105321	PIN	2
10.	60107648	HOSE CLAMP	2
11.	60109500	PIN	2
12.	60109501	PIN	2
13.	60109593	PIN	2
14.	60109594	COVER-HOUSING	2

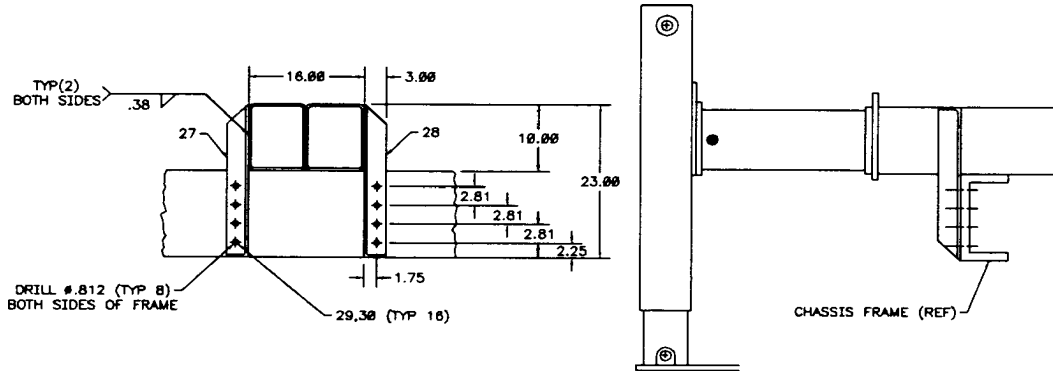
15.	60109595	COVER-ARM HOUSING	2
16.	72060002	CAP SCR 1/4-20X3/4 HHGR5	16
17.	70392864	DECAL-DGR STAND CLEAR	2
18.	72060816	CAP SCR 5/8-11X2-1/2 SH	16
19.	72062091	NUT 5/8-11 LOCK	16
20.	72062103	NUT 3/8-16 LOCK	2
21.	72063001	WASHER 1/4 WRT	16
22.	72063034	MACH BUSHING 1X10GA NR	8
23.	72063037	MACH BUSHING 1-1/2X10GA NR	8
24.	72063049	WASHER 1/4 LOCK	16
25.	72066125	RETAINING RING 1 EXT HD	8
26.	72066132	RETAINING RING 1-1/2 EXT HD	8

SEE FOLLOWING PAGE FOR DRAWING

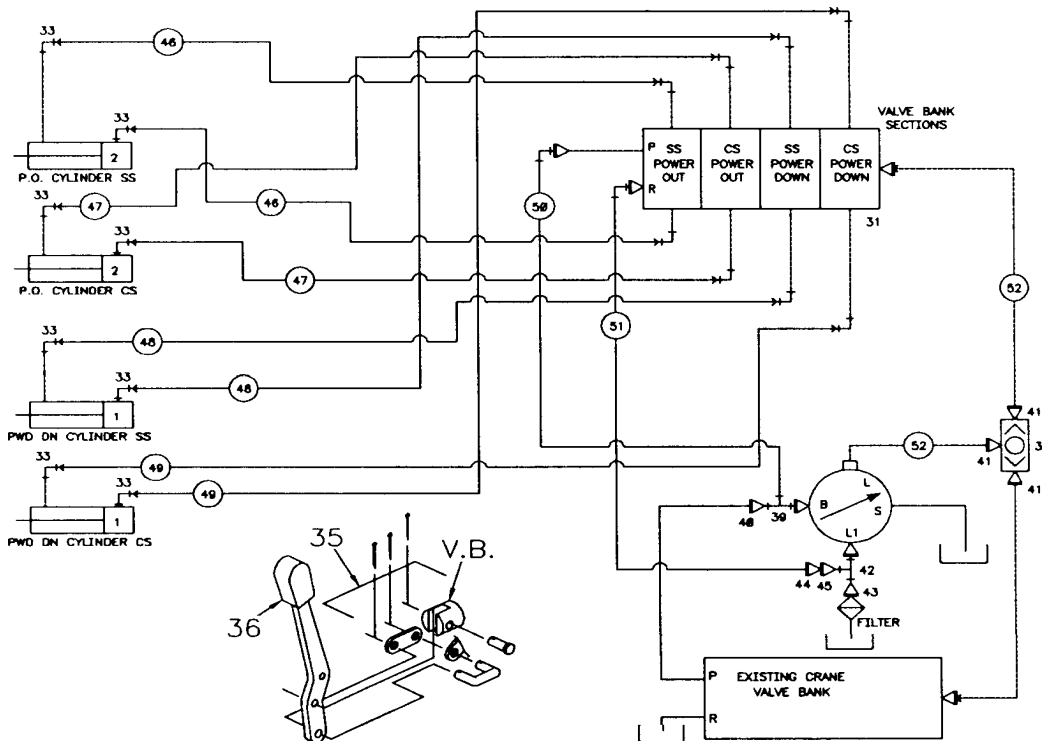


AUX OUTRIGGER KIT-FRONT MT-PO/PD- LOAD SENSE (31712755-2)

ITEM	PART NO.	DESCRIPTION	QTY
27.	60109606	MTG ANGLE REAR	2
28.	60109687	MTG ANGLE FRONT	2
29.	72060186	CAP SCR 3/4-10X2-1/2 HHGR5	16
30.	72062114	NUT 3/4-10 LOCK	16



ITEM	PART NO.	DESCRIPTION	QTY		
31.	51710778	VALVEBANK 4-SECT	1	45.	72531837 REDUCER BUSHING 1 1/4-1NPT 1
32.	73054785	SHUTTLE VALVE	1	46.	51706440 HOSE ASM 1/2X68 FF 2
33.	72053763	ELBOW #8MSTR #8MJIC	8	47.	51706441 HOSE ASM 1/2X117 FF 2
35.	94731839	LINK & PIN KIT	4	48.	51706465 HOSE ASM 1/2X98 FF 2
36.	73014848	HANDLE	4	49.	51706439 HOSE ASM 1/2X165 FF 2
39.	72532657	TEE #8JIC RUN	1	50.	51707807 HOSE ASM 1/2X105 FF 1
40.	72533437	ADAPTER #8MFACE #8FJIC	1	51.	51700700 HOSE ASM 3/4X60 FF 1
41.	72532353	ADAPTER #6MSTR #4MJIC	3	52.	51706152 HOSE ASM 1/4X36 FF 2
42.	72053615	TEE 1-1/4NPT	1	56.	70392867 DECAL-DGR OUTRG MOVING 1
43.	72053211	PIPE NIPPLE 1-1/4NPT X CLOSE	1	57.	71392257 DECAL-PWR DN CTRL 1
44.	72053677	ADAPTER 1MPT #12MJIC	1	58.	71393885 DECAL-PWR OUT CTRL 1



CYLINDER-PWR DN (3B020860)

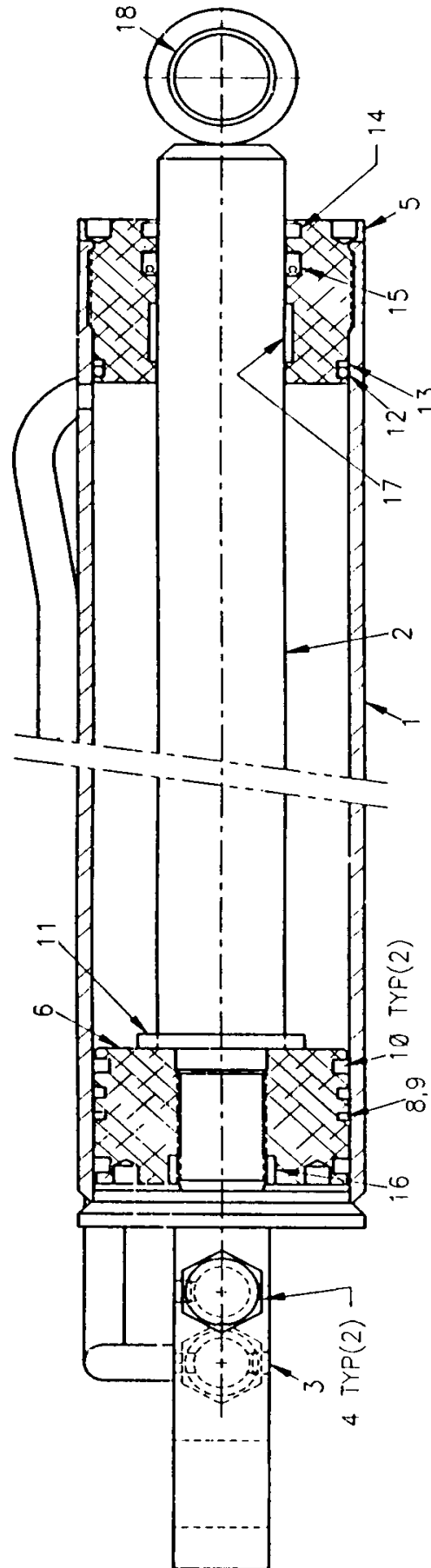
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B020860	CASE ASM (INCL:3)	1
2.	4G020860	ROD ASM (INCL:18)	1
3.	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	2REF
4.	73054304	COUNTERBALANCE VLV 10GPM	2
5.	6H040020	HEAD	1
6.	6I040143	PISTON	1
7.	9C161623	SEAL KIT (INCL:8-17)	1
8.	7Q072153	O-RING (PART OF 7)	1REF
9.	7T66P040	PISTON SEAL (PART OF 7)	1REF
10.	7T65I040	PISTON RING (PART OF 7)	2REF
11.	6A025020	WAFER LOCK (PART OF 7)	1REF
12.	7Q072342	O-RING (PART OF 7)	1REF
13.	7Q10P342	BACKUP RING (PART OF 7)	1REF
14.	7R14P020	ROD WIPER (PART OF 7)	1REF
15.	7R546020	U-CUP (PART OF 7)	1REF
16.	7T61N143	LOCK RING (PART OF 7)	1REF
17.	7T2N8022	ROD WEAR RING (PART OF 7)	1REF
18.	7BF81215	BUSHING (PART OF 2)	2REF

NOTE

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

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

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



CYLINDER-PWR OUT (3B148860)

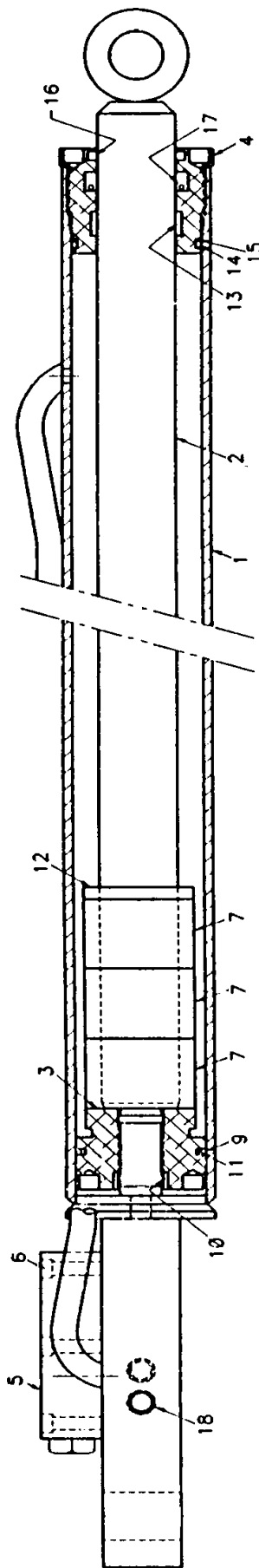
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B148860	CASE ASM (INCL:18)	1
2.	4G148860	ROD ASM	1
3.	6I025087	PISTON	1
4.	6H025015	HEAD	1
5.	73054004	CHECK VALVE	1
6.	72060708	CAP SCR 1/4-20X1-1/4 SH	6
7.	6C150015	STOP TUBE	3
8.	9B101214	SEAL KIT (INCL:9-17)	1
9.	7T66P025	PISTON SEAL (PART OF 8)	1REF
10.	7T61N087	LOCK RING (PART OF 8)	1REF
11.	7Q072137	O-RING (PART OF 8)	1REF
12.	6A025015	WAFFER LOCK (PART OF 8)	1REF
13.	7T2N8015	ROD WEAR RING (PART OF 8)	1REF
14.	7Q072228	O-RING (PART OF 8)	1REF
15.	7Q10P228	BACKUP RING (PART OF 8)	1REF
16.	7R14P015	ROD WIPER (PART OF 8)	1REF
17.	7R546015	U-CUP SEAL (PART OF 8)	1REF
18.	7PNPXT02	PIPE PLUG 1/8NPT (PART OF 1)	2REF

NOTE

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

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

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



CYLINDER-PWR DN (3B208940)

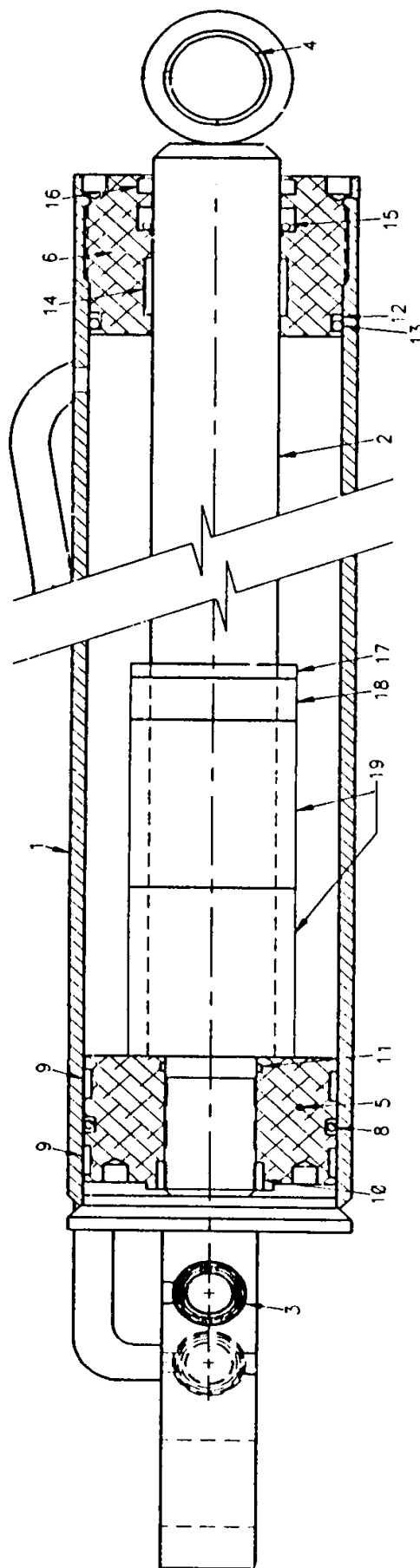
ITEM	PART NO.	DESCRIPTION	QTY
1.	4B208940	CASE ASM	1
2.	4G208940	ROD ASM	1
3.	73054304	COUNTERBALANCE VLV 10GPM 2	
4.	7BF81215	BUSHING (PART OF 2)	2REF
5.	6I402144	PISTON	1
6.	6H040020	HEAD	1
7.	9B015930	SEAL KIT (INCL:8-17)	1
8.	7T66P400	PISTON SEAL (PART OF 7)	1REF
9.	7T2N4040	ROD WEAR RING (PART OF 7)	2REF
10.	7T61N143	LOCK RING (PART OF 7)	1REF
11.	7Q072127	O-RING (PART OF 7)	1REF
12.	7Q10P342	BACKUP RING (PART OF 7)	1REF
13.	7Q072342	O-RING (PART OF 7)	1REF
14.	7T2N8022	ROD WEAR RING (PART OF 7)	1REF
15.	7R546020	U-CUP (PART OF 7)	1REF
16.	7R14P020	ROD WIPER (PART OF 7)	1REF
17.	6A025020	WAFFER LOCK (PART OF 7)	1REF
18.	6C075020	STOP TUBE 3/4"	1
19.	6C300020	STOP TUBE 3"	2

NOTE

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

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

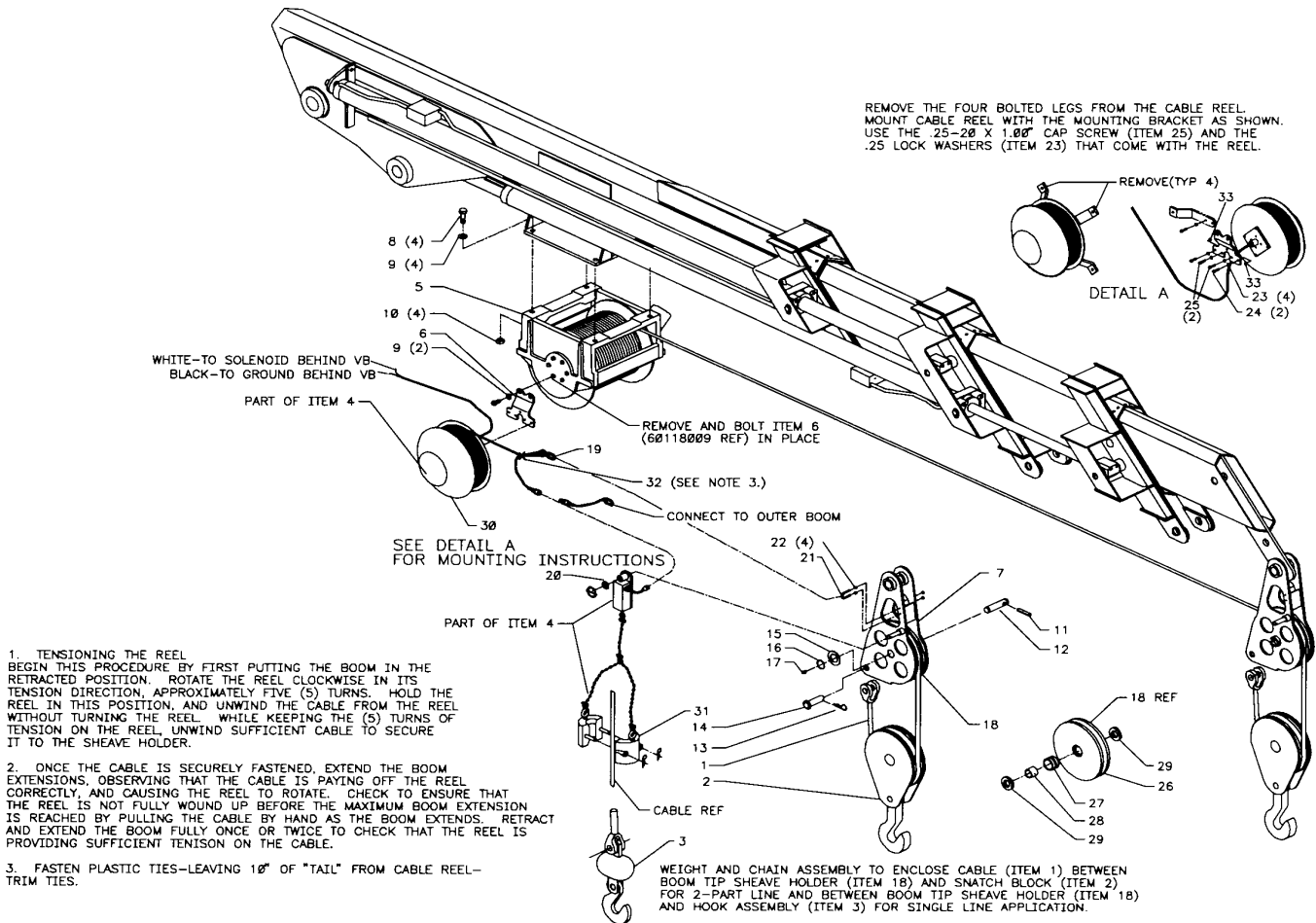
APPLY "NEVER-SEEZ" REGULAR GRADE ANTI-SEIZE AND LUBRICATING COMPOUND TO CYLINDER HEAD AND CASE THREADS.



WINCH KIT-2H1M MNL CTRLS **(31711878-1)**

ITEM	PART NO.	DESCRIPTION	QTY
1.	51711894	CABLE 1/2 W/SOCKET	1
2.	70732860	SNATCH BLOCK	1
3.	70732861	HOOK ASM 3-TON	1
4.	70732874	ANTI 2-BLOCK SYSTEM (INCL:23,25,30,31)	1
5.	71570037	WINCH 6100# W/MOTOR	1
6.	60118009	REEL MOUNTING BRACKET	1
7.	52711861	SHEAVE HOLDER	1
8.	72601368	CAP SCR 1/2-13X2-1/2 HHGR8	4
9.	72063132	WASHER 1/2 FLAT	6
10.	72062080	NUT 1/2-13 LOCK	4
11.	72661155	GROOVE PIN 1/2X2	1
12.	60117667	PIN	1
13.	72066145	HAIR PIN 3/16	1
14.	52070851	PIN	1
15.	72063035	MACH BUSHING 1-1/4X10GA	1

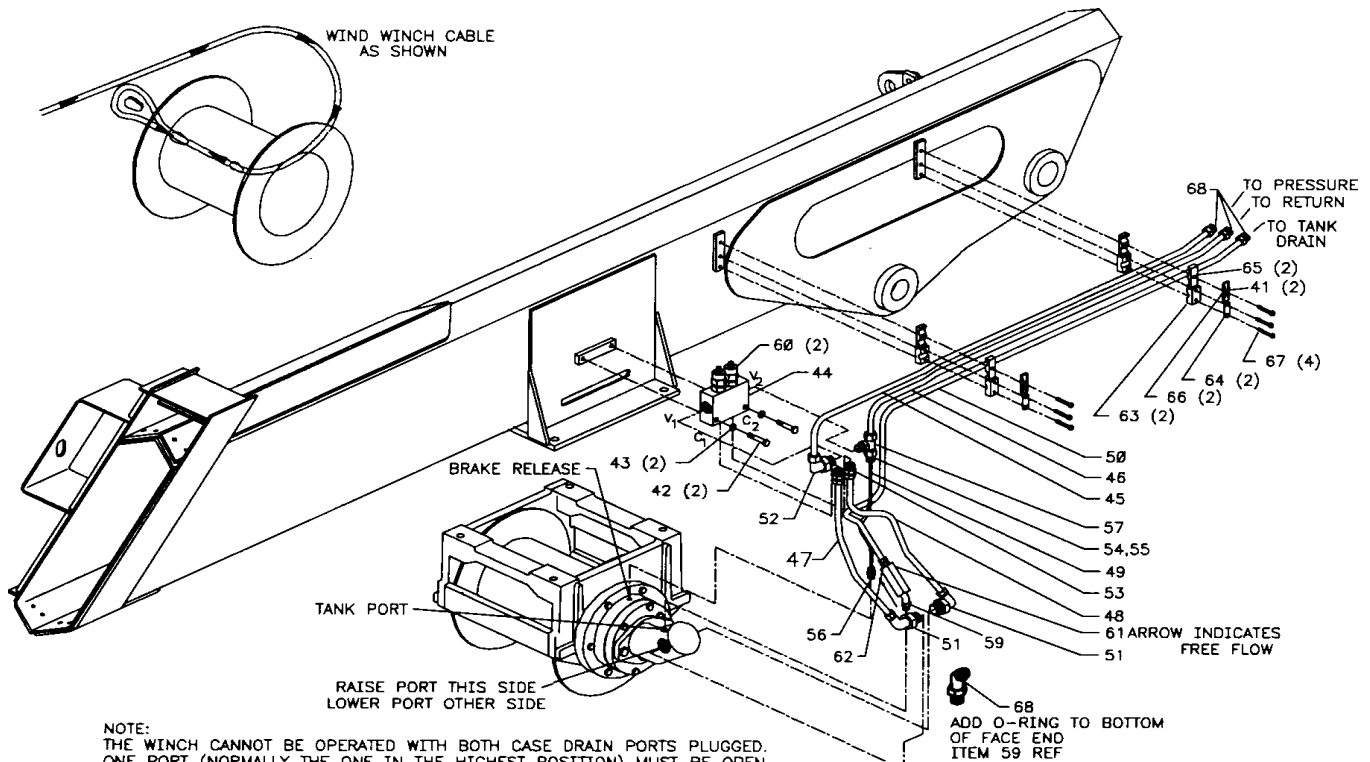
16.	72066129	RETAINING RING 1-1/4 HD	1
17.	72053508	ZERK 1/8NPT	1
18.	51711869	SHEAVE ASM (INCL:26-29)	1
19.	70058959	CHAIN CONNECTOR 3/16	1
20.	72063119	WASHER 5/8 FLAT	1
21.	72066913	U-BOLT 1/4-20X1-1/4 IL X 3/4 IW	1
22.	72062000	NUT 1/4-20 HEX	4
23.	72063049	WASHER 1/4 LOCK (PART OF 4)	4REF
24.	72060005	CAP SCR 1/4-20X1-1/4 HHGR5	2
25.	72060004	CAP SCR 1/4-20X1 HHGR5 (PART OF 4)	2REF
26.	60030252	SHEAVE (PART OF 18)	1REF
27.	70055024	BEARING (PART OF 18)	1REF
28.	70055025	RACE-INNER (PART OF 18)	1REF
29.	60020232	BUSHING (PART OF 18)	2REF
30.	70732998	CABLE REEL (PART OF 4)	1REF
31.	70732999	CHAIN/WEIGHT (PART OF 4)	1REF
32.	70034060	TIE 8"	2
33.	72062104	NUT 1/4-20 LOCK	2



WINCH KIT-2H1M MNL CTRLS **(31711878-2)**

ITEM	PART NO.	DESCRIPTION	QTY
41.	72060007	CAP SCR 1/4-20X1-3/4 HH	4
42.	72060050	CAP SCR 3/8-16X2 HH	2
43.	72063051	WASHER 3/8 LOCK	2
44.	70144927	VALVE BODY-C'BAL	1
45.	70144933	TUBE ASM-PORT V1	1
46.	70144934	TUBE ASM-PORT V2	1
47.	70144936	TUBE ASM-PORT C1	1
48.	70144937	TUBE ASM-PORTC2	1
49.	70144938	TUBE ASM-PORT C2 DRAIN	1
50.	70144939	TUBE ASM-DRAIN	1
51.	72533156	ELBOW #12MSTR #8MFACE 90°	2
52.	72533162	ELBOW #8MSTR #8MFACE 45°	1
53.	72533166	ADAPTER #8MFACE #8MSTR	2

54.	72533170	NUT FACE SEAL/STEEL TUBE	1
55.	72533297	REDUCER #8#4	1
56.	72533376	ADAPTER #4MFACE #4MSTR	1
57.	72533377	TEE #8MSTR BRANCH	1
58.	72533396	CONNECTOR #6MSTR SWVL	1
59.	72533397	ELBOW #6MSTR #4MFACE 45°	1
60.	73054810	C'BAL VALVE	2
61.	73054855	CHECK VALVE 9/16 IN-LINE	1
62.	72533423	ADAPTER #8MFACE #6MSTR	1
63.	72661435	TUBE CLAMP 1/2 SGL	2
64.	70144910	COVER PLATE	2
65.	70034432	TUBE CLAMP 1/2 TWIN	2
66.	70143829	COVER PLATE	2
67.	72060006	CAP SCR 1/4-20X1-1/2 HH	2
68.	7Q072014	O-RING	4

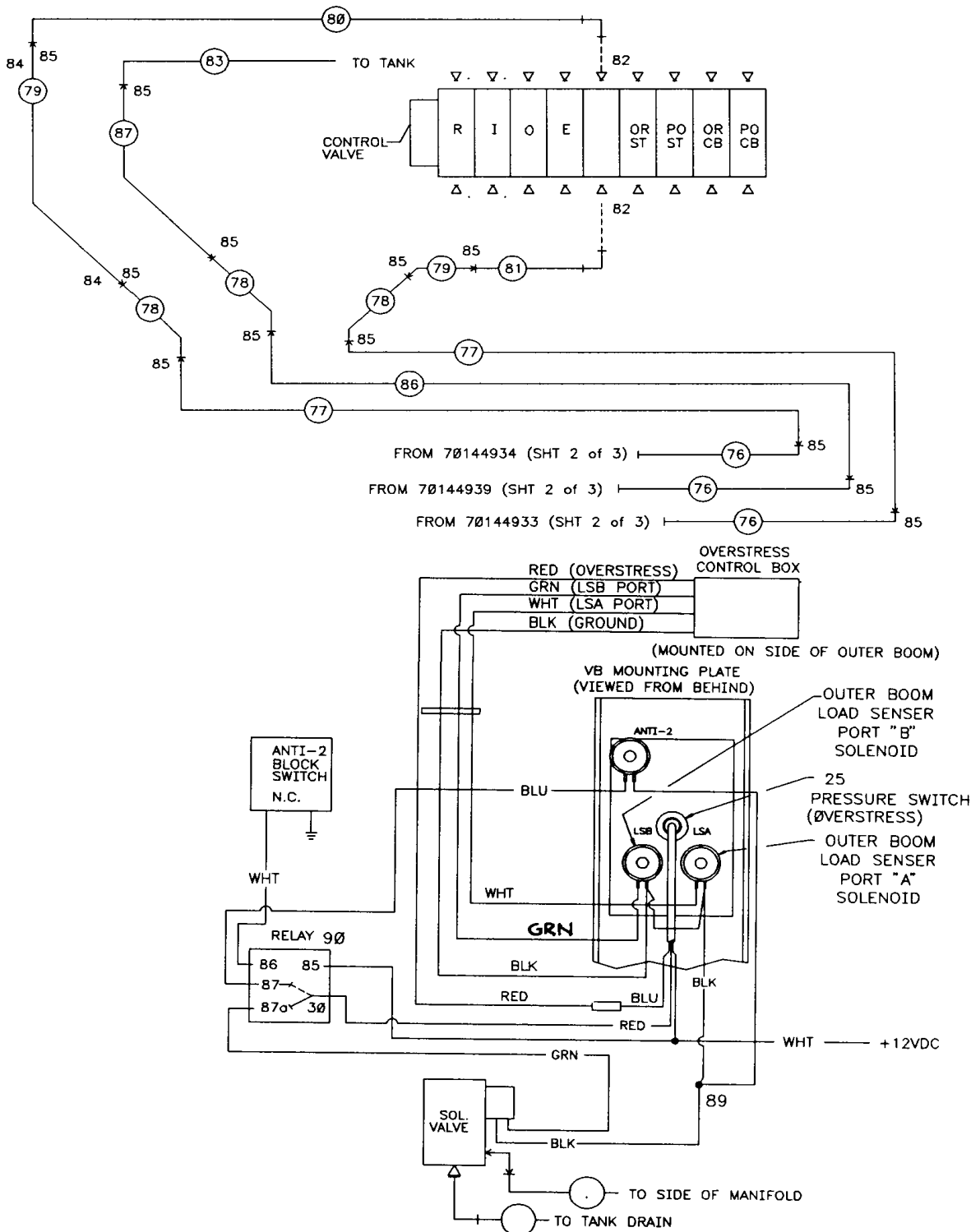


NOTE:
THE WINCH CANNOT BE OPERATED WITH BOTH CASE DRAIN PORTS PLUGGED. ONE PORT (NORMALLY THE ONE IN THE HIGHEST POSITION) MUST BE OPEN TO TANK SO THAT THE MOTOR CASE WILL REMAIN FULL AT ALL TIMES. THE MOTOR SHOULD BE FILLED PRIOR TO OPERATION.

THE WINCH BRAKE CAN BE RELEASED BY PRESSURIZING THE BOTTOM PORT. THE AUXILIARY PRESSURE SOURCE USED TO RELEASE THE BRAKE SHOULD PROVIDE AT LEAST 500 psi. SINCE THE CB VALVE AND THE BRAKE MUST BE BOTH RELEASED TO LOWER THE LOAD, CAUTION SHOULD BE EXERCISED WHEN USING THIS RELEASE METHOD DUE TO THE PROBABILITY OF SUDDEN LOAD RELEASE. THE HIGH EFFICIENCY PISTON MOTOR MAY NOT PROVIDE SUFFICIENT BACKPRESSURE TO THE THE LOAD'S DESCENT.

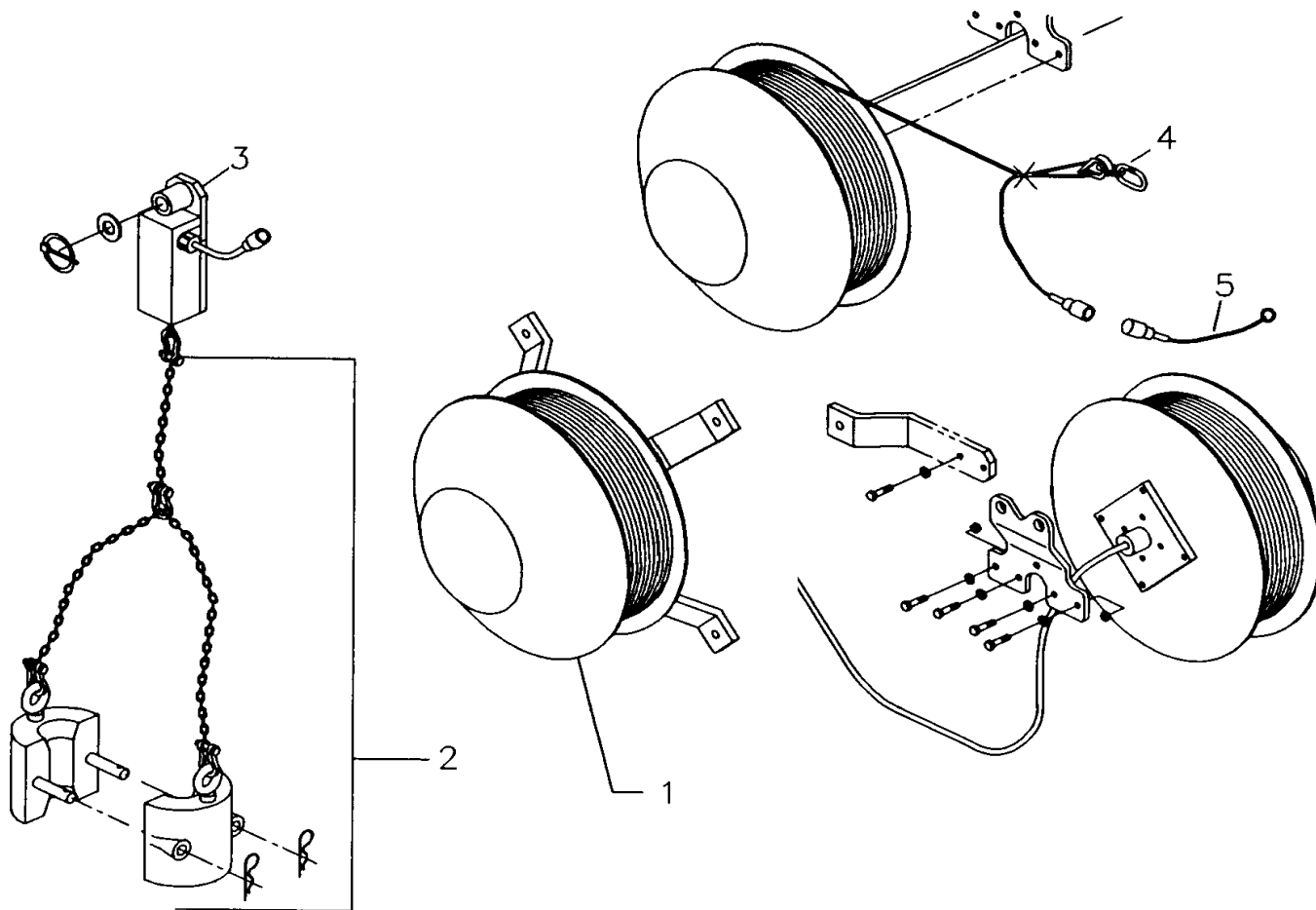
WINCH KIT-2H1M MNL CTRLS **(31711878-3)**

ITEM	PART NO.	DESCRIPTION	QTY				
76.	51712709	HOSE ASM WX 1/2X58	3	82.	72533187	ADAPTER #10MFACE #8MSTR	2
77.	70143956	TUBE ASM-INNER LONG	2	83.	51712744	HOSE ASM WF 1/2X360	1
78.	51710339	HOSE ASM BBBB 1/2X43	3	84.	70034422	TUBE CLAMP 5/8 TWIN	2
79.	70143957	TUBE ASM-MAST SHORT	2	85.	7Q072014	O-RING	12
80.	51710907	HOSE ASM BBY 1/2X114	1	86.	70145141	TUBE ASM-INNER SHORT	1
81.	51710334	HOSE ASM BBX 1/2X114	1	87.	70145142	TUBE ASM-MAST LONG	1
				88.	77040186	TERM 1/4TAB FSLPON 16-14GA	6
				89.	77040319	TERMINAL RING 16-14GA	1
				90.	77041251	RELAY	1



**ANTI TWO-BLOCKING SYSTEM
(70732874)**

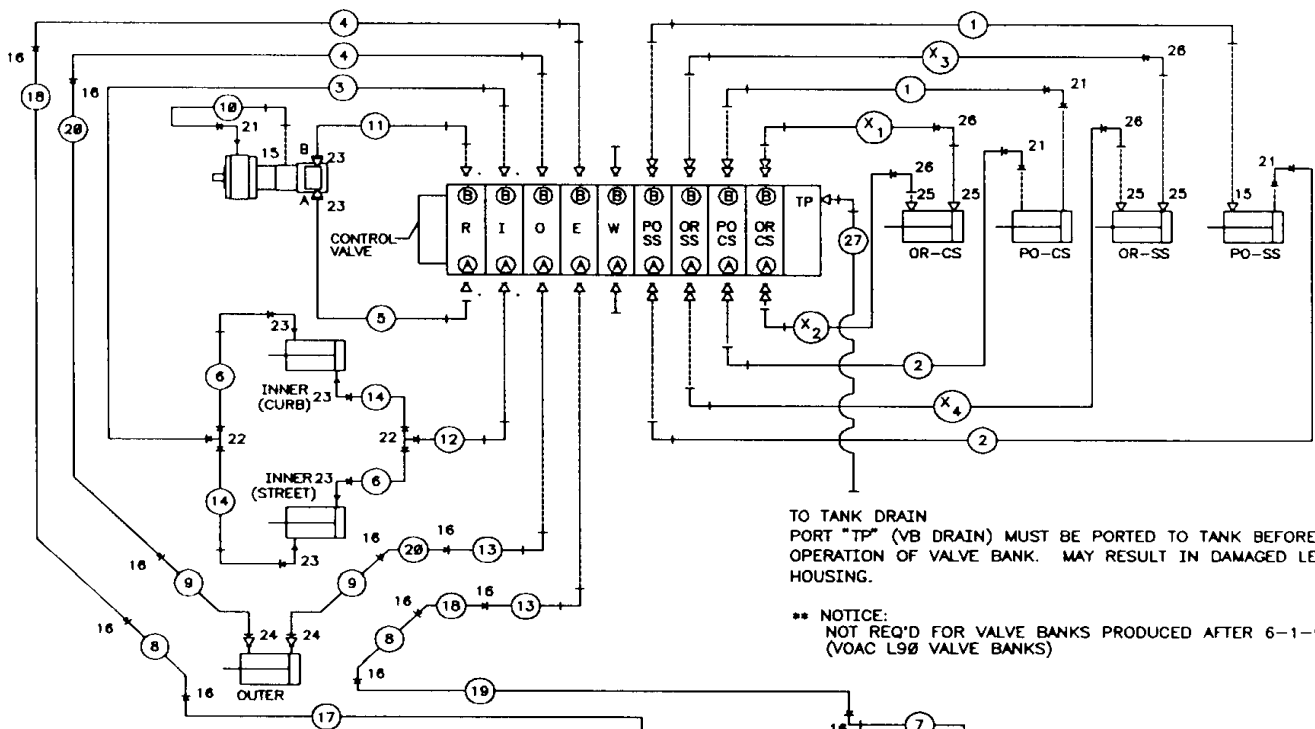
ITEM	PART NO.	DESCRIPTION	QTY
1.	70732998	REEL-CABLE	1
2.	70732999	CHAIN/WEIGHT ASM	1
3.	70733051	SWITCH ASM	1
4.	70733052	ANCHOR ASM	1
5.	70733053	PLUG-DUMMY	1



HYDRAULIC KIT-VOAC (91712847)

ITEM	PART NO.	DESCRIPTION	QTY
1.	51394489	HOSE ASM 1/4X42 #4#4 WX	*2REF
2.	51394490	HOSE ASM 1/4X105.75 #4#4WY*2REF	
3.	51394491	HOSE ASM 1/2X91 #8#8 BBX	*1REF
4.	51394492	HOSE ASM 1/2X117 #8#8 BBX	*2REF
5.	51394493	HOSE ASM 1/2X39 #8#8 WY	*1REF
6.	51394494	HOSE ASM 1/2X29 #8#8 BBY	*2REF
7.	51394495	HOSE ASM 1/2X80 #6#8 WX	*2REF
8.	51394496	HOSE ASM 1/2X46 #8#8 BBBB	*2REF
9.	51394497	HOSE ASM 1/2X81 #8#8 BBBB	*2REF
10.	51394498	HOSE ASM 1/4X12.75 #4#4 BBX*1REF	
11.	51394499	HOSE ASM 1/2X42 #8#8 WX	*1REF
12.	51394500	HOSE ASM 1/2X91 #8#8 BBY	*1REF
13.	51394501	HOSE ASM 1/2X117 #8#8 BBY	*2REF
14.	51394502	HOSE ASM 1/2X25 #8#8 WY	*2REF
15.	72533376	ADAPTER #4MFACE #4MSTR	2

16.	7Q072014	O-RING	12
17.	70143956	HYD TUBE ASM 5/8 INNER LONG	1
18.	70143957	HYD TUBE ASM 5/8 MAST SHORT	2
19.	70145141	HYD TUBE ASM 5/8 INNER SHORT	1
20.	70145142	HYD TUBE ASM 5/8 MAST LONG	2
21.	72533158	ELBOW #4MSTR #4MFACE 90°	4
22.	72533160	TEE-UNION #8MFACE	2
23.	72533162	ELBOW #8MSTR #8MFACE 90°	6
24.	72533166	ADAPTER #8MFACE #8MSTR	2
25.	72533186	ADAPTER #6MFACE #6MSTR	2
26.	72533294	ELBOW #6MSTR #6FSTR SWVL	4
27.	51713008	HOSE ASM 1/2X312	1REF
NOT REQ'D FOR VB PRODUCED AFTER 6-1-97			
28.	72533475	ADAPTER #6MFACE #8MSTR	4
29.	51394503	HOSE ASM 3/8X25 #6#6 BBX	*2REF
30.	51713920	HOSE KIT (INCL: *)	1

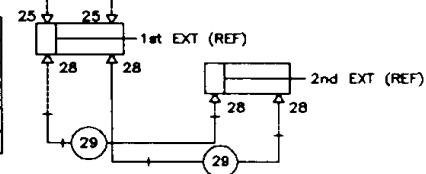


• 16' OUTRIGGER P.D.'S HOSES (PART OF 16 FT OUTRG SPAN FEATURE AND OPTIONS BILL OF MATERIAL.)

X	PART No.	DESCRIPTION	QTY
X ₁	51394504	HOSE ASM-WX .38X 163.00 (6-6) (PART OF X5)	1 REF
X ₂	51394505	HOSE ASM-WY .38X 163.00 (6-6) (PART OF X5)	1 REF
X ₃	51394506	HOSE ASM-WX .38X 113.00 (6-6) (PART OF X5)	1 REF
X ₄	51394507	HOSE ASM-WY .38X 113.00 (6-6) (PART OF X5)	1 REF
X ₅	51713921	HOSE KIT - 15000 16' OUTRG (INCL. ITEMS X1-X4)	1 REF
#	PART No.	DESCRIPTION	QTY

• 21' OUTRIGGER P.D.'S HOSES (PART OF 21 FT OUTRG SPAN FEATURE AND OPTION BILL OF MATERIAL.)

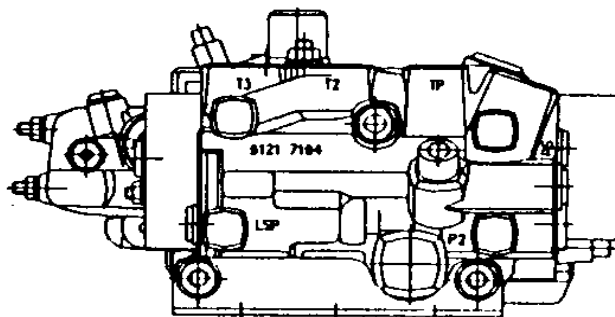
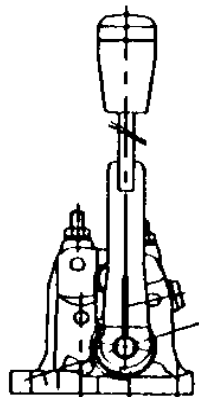
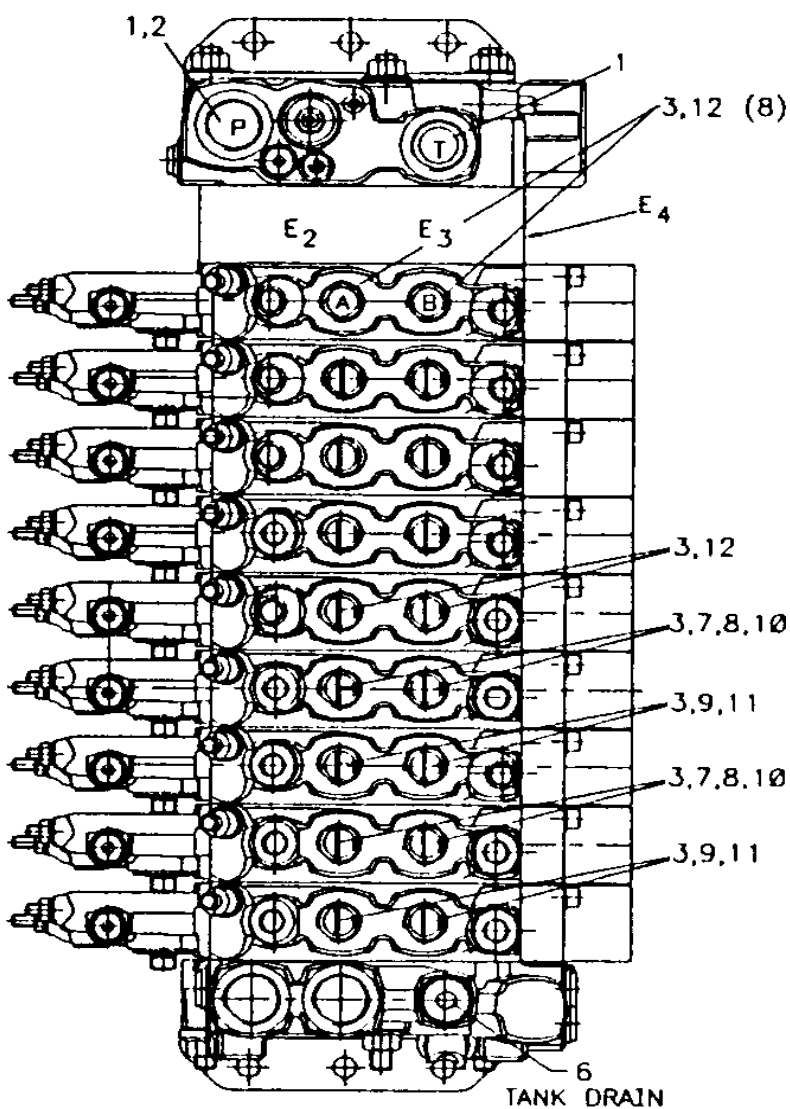
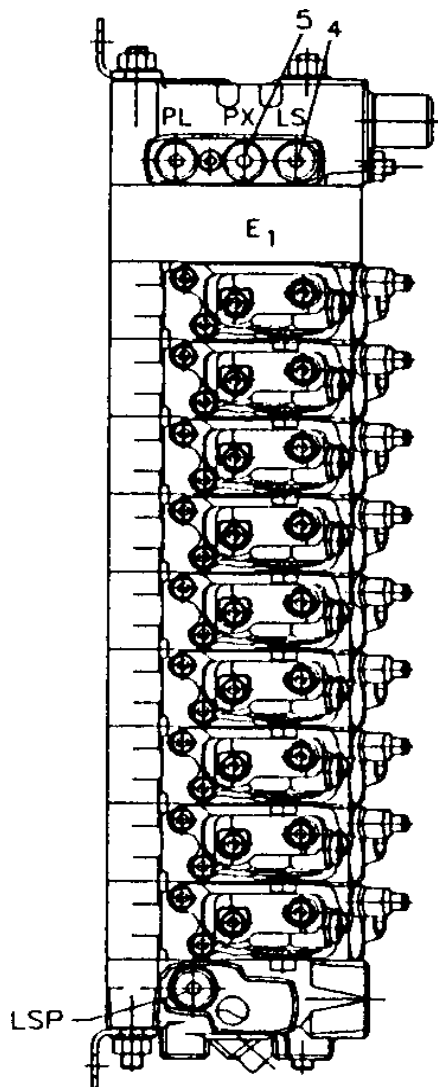
X	PART No.	DESCRIPTION	QTY
X ₁	51394508	HOSE ASM-WX .38X 180.00 (6-6) (PART OF X5)	1 REF
X ₂	51394509	HOSE ASM-WY .38X 180.00 (6-6) (PART OF X5)	1 REF
X ₃	51394510	HOSE ASM-WX .38X 132.00 (6-6) (PART OF X5)	1 REF
X ₄	51394511	HOSE ASM-WY .38X 132.00 (6-6) (PART OF X5)	1 REF
X ₅	51713922	HOSE KIT - 15000 21' OUTRG (INCL. ITEMS X1-X4)	1 REF
#	PART No.	DESCRIPTION	QTY



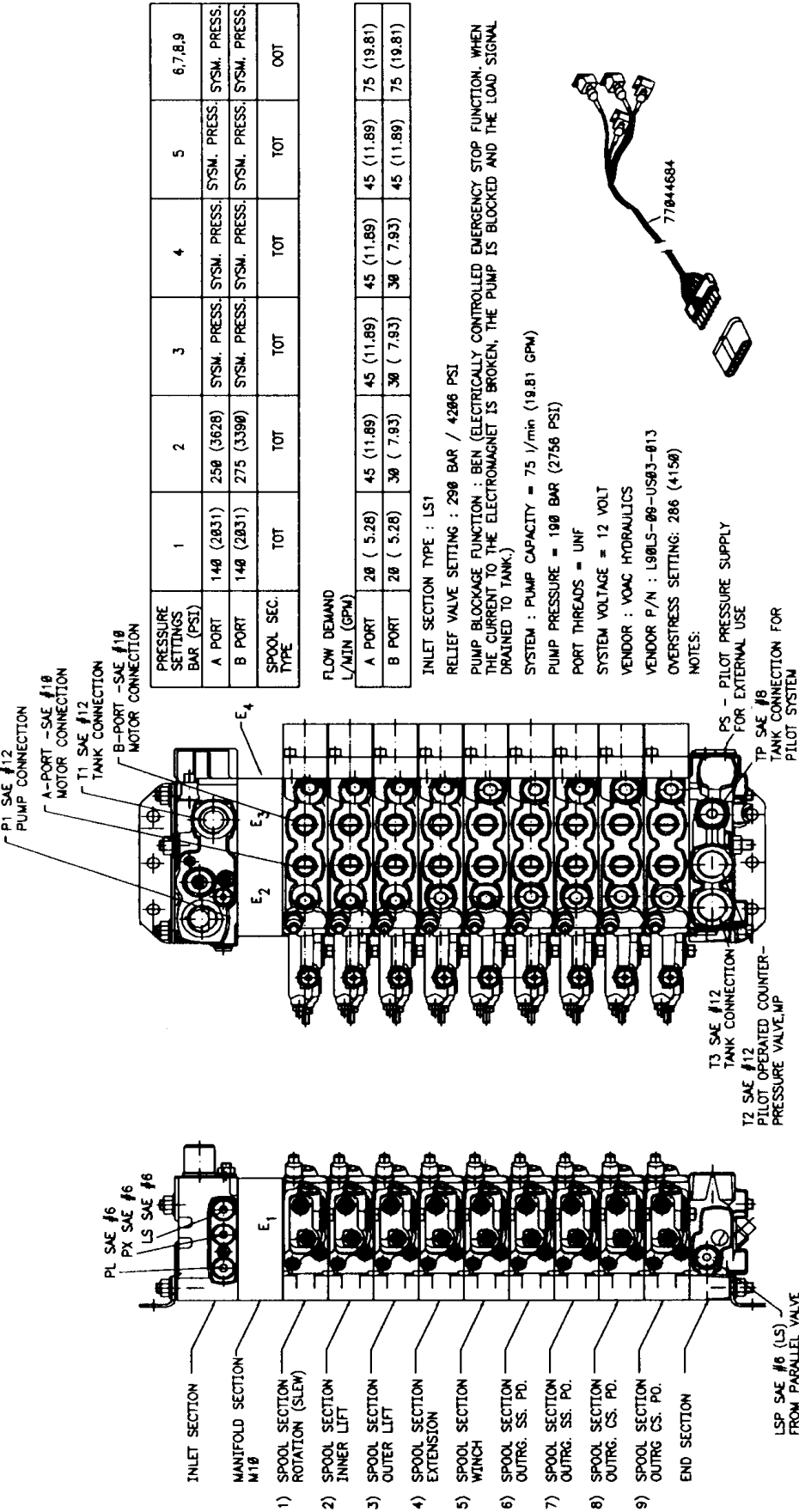
VALVEBANK ASM-9 SECT VOAC MNL **(51712793)**

ITEM	PART NO.	DESCRIPTION	QTY
1.	72533420	ADAPTER #12MFACE #12MSTR	2
2.	72533428	ELBOW #12MSTR #12FSTR 90° SW	1
3.	72533187	ADAPTER #8MFACE #10MSTR	18
4.	72533163	ELBOW #6MSTR #6MFACE 90°	1
5.	72533451	DIAG NIPPLE 9/16-18 W/CAP	1

6.	72053763	ELBOW #8MSTR #8MJIC	1
7.	72533170	NUT-FACE SEAL/STL TUBE	4
8.	72533297	REDUCER-TBE END W/O NUT #8#4	4
9.	72533318	REDUCER-TBE END W/NUT#8#6	4
10.	72533433	CAP #4FACE	4REF
11.	72533175	CAP #6FACE	4REF
12.	72533176	CAP-#8FACE	10REF
13.	73732967	VALVEBANK-9 SECTION	1



VALVEBANK-9 SECT MNL (73732967)



1	2	3	4	5	6,7,8,9
140 (2831)	250 (3628)				
140 (2831)	275 (3390)				
TOT	TOT	TOT	TOT	TOT	OOT

FLOW DEMAND
L/MIN (GPM)

A PORT	20 (5.26)	45 (11.89)	45 (11.89)	45 (11.89)	45 (11.89)	75 (19.81)
B PORT	20 (5.26)	30 (7.93)	30 (7.93)	30 (7.93)	45 (11.89)	75 (19.81)

INLET SECTION TYPE : LS1

RELIEF VALVE SETTING : 290 BAR / 4206 PSI

PUMP BLOCKAGE FUNCTION : BEN (ELECTRICALLY CONTROLLED EMERGENCY STOP FUNCTION, WHEN THE CURRENT TO THE ELECTROMAGNET IS BROKEN, THE PUMP IS BLOCKED AND THE LOAD SIGNAL DRAINED TO TANK).

SYSTEM : PUMP CAPACITY = 75 l/min (19.81 GPM)

PUMP PRESSURE = 190 BAR (2756 PSI)

PORT THREADS = UNF

SYSTEM VOLTAGE = 12 VOLT

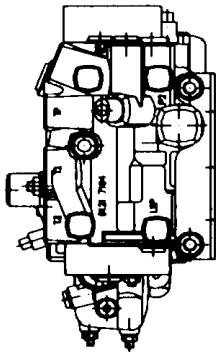
VENDOR : VOAC HYDRAULICS

VENDOR P/N : L90LS-09-US93-013

OVERSTRESS SETTING: 286 (4150)

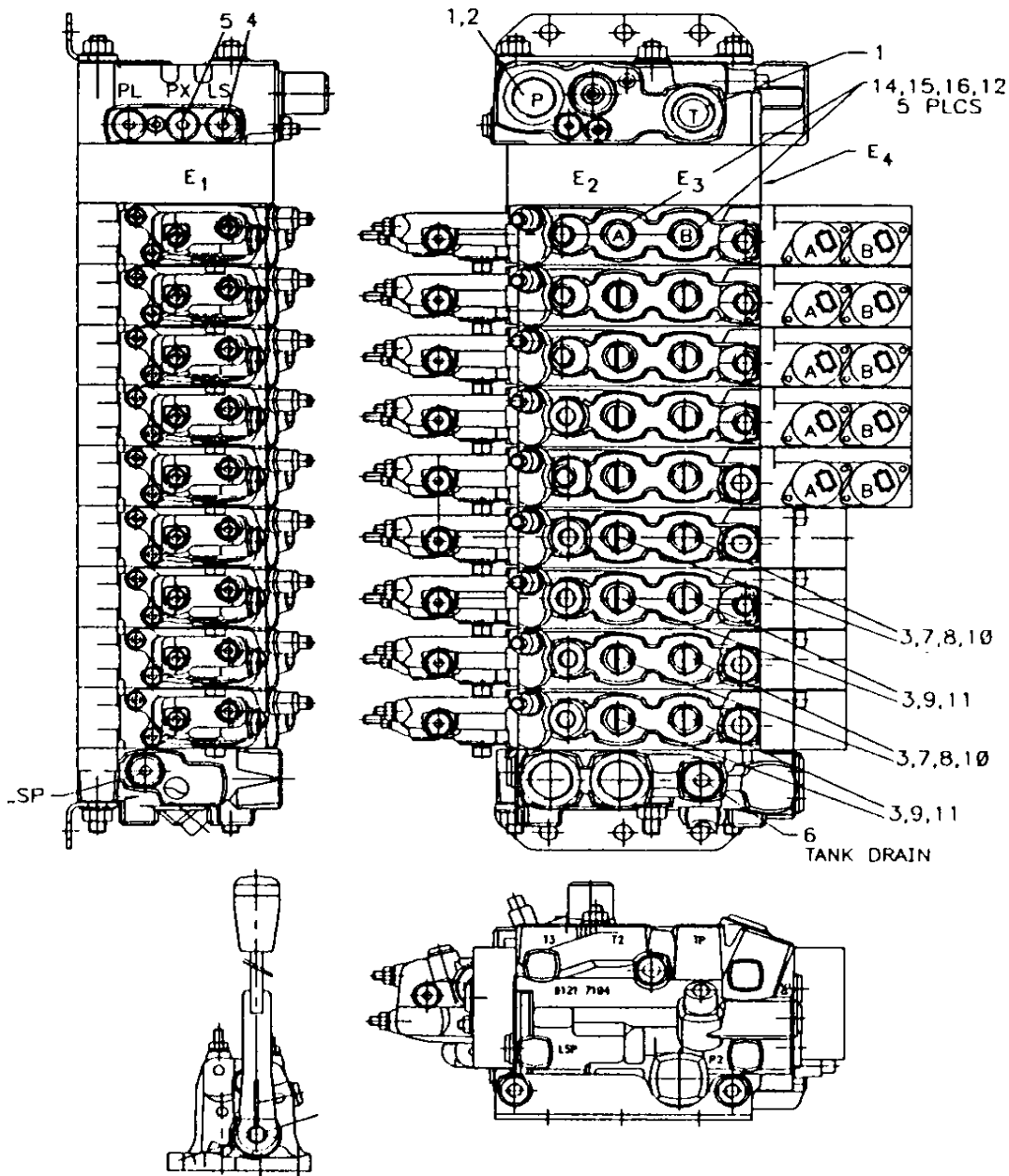
NOTES:

TP	END SECTION	SAE # 8 (.75-16)
PX, LS, PL	INLET SECTION	SAE # 6 (.50-18)
A, B	SPOOL SECTION	SAE #10 (.88-14)
T2, T3	END SECTION	SAE #12 (1.06-12)
T1	INLET SECTION	SAE #12 (1.06-12)
P1	INLET SECTION	SAE #12 (1.06-12)
CONNECTIONS		THREAD SIZE

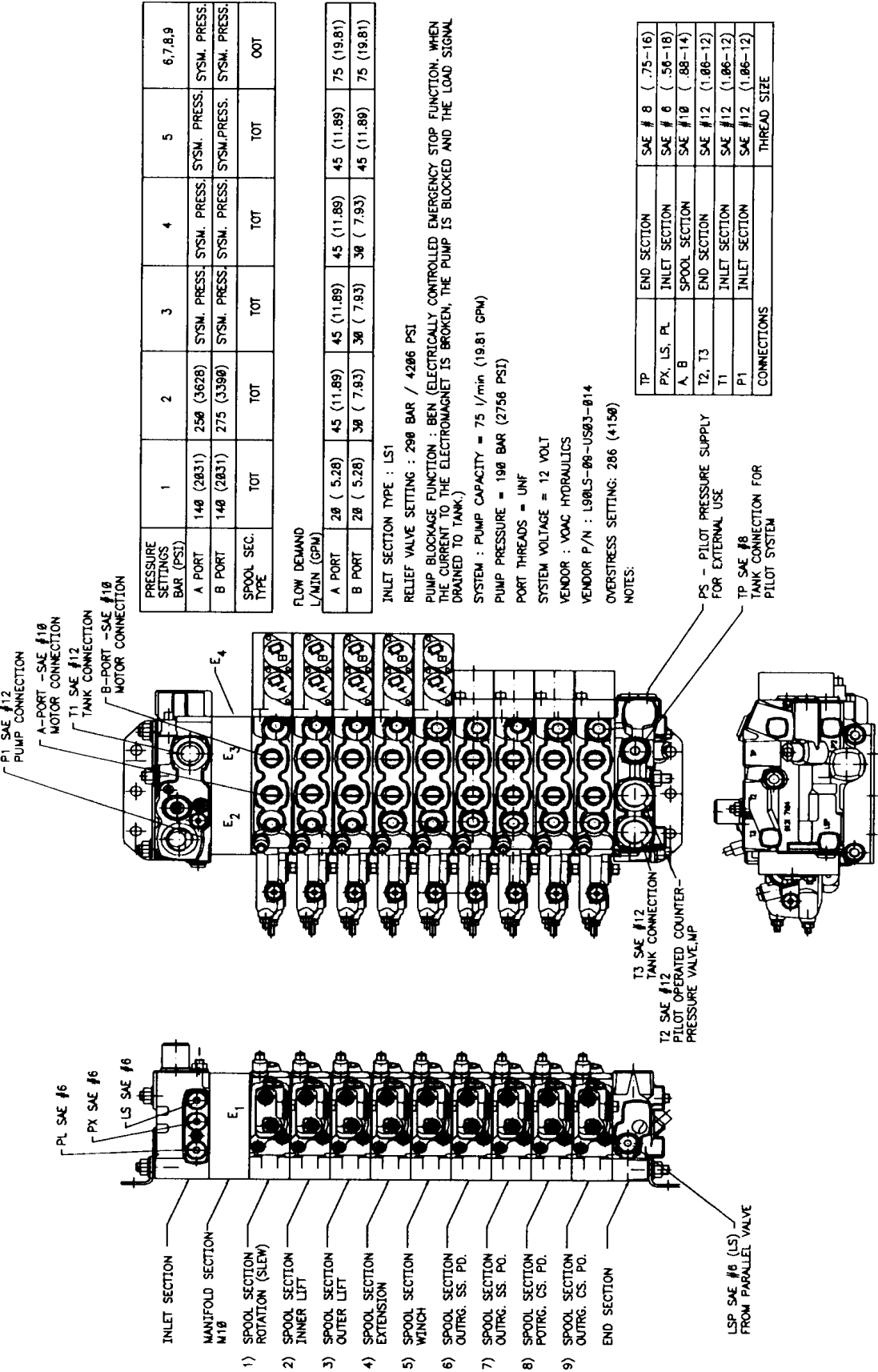


VALVEBANK ASM-9 SECT VOAC RADIO **RMT (51712919)**

ITEM	PART NO.	DESCRIPTION	QTY
1.	72533420	ADAPTER #12MFACE #12MSTR	2
2.	72533428	ELBOW #12MSTR #12FSTR 90° SW	1
3.	72533187	ADAPTER #8MFACE #10MSTR	8
4.	72533163	ELBOW #6MSTR #6MFACE 90°	1
5.	72533451	DIAG NIPPLE 9/16-18 W/CAP	1
6.	72053763	ELBOW #8MSTR #8MJIC	1
7.	72533170	NUT-FACE SEAL/STL TUBE	4
8.	72533297	REDUCER-TBE END W/O NUT #8#4	4
9.	72533318	REDUCER-TBE END W/NUT #8#6	4
10.	72533433	CAP #4FACE	4REF
11.	72533175	CAP #6FACE	4REF
12.	72533176	CAP-#8FACE	10REF
13.	73733013	VALVEBANK-9 SECTION	1
14.	72533462	CONNECTOR #10MSTR LONG	10
15.	72533463	NUT-FACE SEAL	10
16.	72533464	REDUCER-TUBE END #10#8	10



VALVEBANK-9 SECT RADIO RMT
(73733013-1)



PRESSURE SETTINGS BAR (PSI)	1	2	3	4	5	6,7,8,9
A PORT	140 (2031)	250 (3628)	SYSM. PRESS.	SYSM. PRESS.	SYSM. PRESS.	SYSM. PRESS.
B PORT	140 (2031)	275 (3990)	SYSM. PRESS.	SYSM. PRESS.	SYSM. PRESS.	SYSM. PRESS.
SPOOL SEC. TYPE	TOT	TOT	TOT	TOT	TOT	OOT

FLOW DEMAND
L/MIN (GPM)

A PORT	20 (5.28)	45 (11.89)	45 (11.89)	45 (11.89)	45 (11.89)	75 (19.81)
B PORT	20 (5.28)	30 (7.93)	30 (7.93)	30 (7.93)	45 (11.89)	75 (19.81)

INLET SECTION TYPE : LS1

RELIEF VALVE SETTING : 290 BAR / 4206 PSI

PUMP BLOCKAGE FUNCTION : BEN (ELECTRICALLY CONTROLLED EMERGENCY STOP FUNCTION, WHEN THE CURRENT TO THE ELECTROMAGNET IS BROKEN, THE PUMP IS BLOCKED AND THE LOAD SIGNAL DRAINED TO TANK.)

SYSTEM : PUMP CAPACITY = 75 l/min (19.81 GPM)

PUMP PRESSURE = 190 BAR (2758 PSI)

PORT THREADS = UNF

SYSTEM VOLTAGE = 12 VOLT

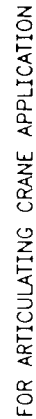
VENDOR : VOAC HYDRAULICS

VENDOR P/N : L90LS-00-US03-014

OVERSTRESS SETTING: 286 (4150)

NOTES:

TP	END SECTION	SAE # 8 (.75-16)
PX, LS, PL	INLET SECTION	SAE # 6 (.50-18)
A, B	SPOOL SECTION	SAE #10 (.88-14)
T2, T3	END SECTION	SAE #12 (1.06-12)
T1	INLET SECTION	SAE #12 (1.06-12)
P1	INLET SECTION	SAE #12 (1.06-12)
CONNECTIONS		THREAD SIZE

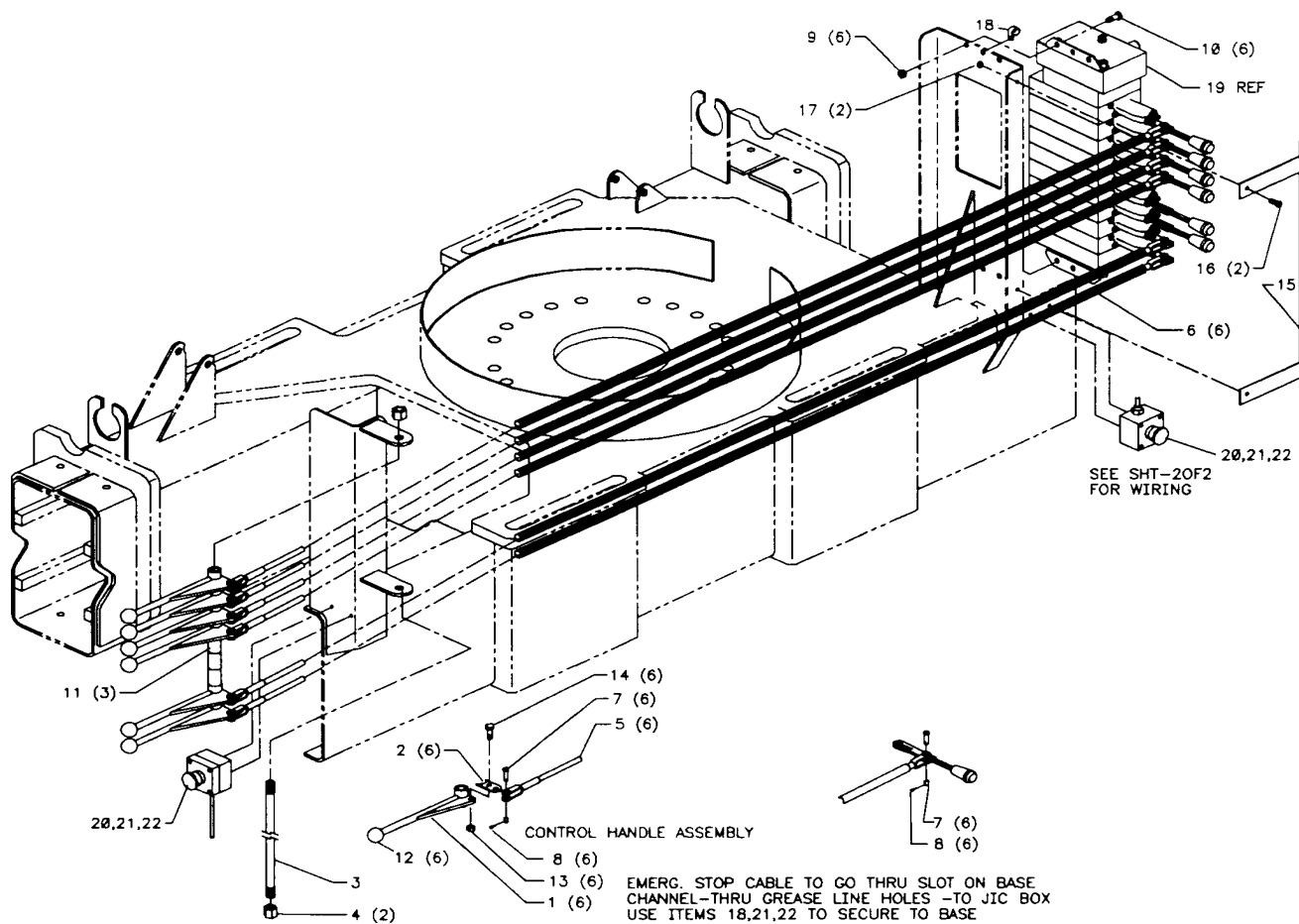


BOSCH CONNECTORS (12) -
SEE LABEL CHART

CTRL KIT-9F MNL VOAC (90712790-1)

ITEM	PART NO.	DESCRIPTION	QTY
1.	60118722	CONTROL HANDLE	6
2.	60118721	TAB	6
3.	60114751	ROD	1
4.	72062091	NUT 5/8-11 LOCK	2
5.	52704745	CONTROL ROD M	6
6.	52710140	CONTROL ROD	6
7.	72066338	CLEVIS PIN 5/16X1	6
8.	72066168	COTTER PIN 3/32X3/4	6
9.	72062103	NUT 3/8-16 LOCK	2
10.	72060046	CAP SCR 3/8-16X1 HHGR5	6
11.	60030282	SPACER	3

12.	71394087	KNOB 1" 1/2-13	6
13.	72062109	NUT 5/16-18 LOCK	6
14.	72060023	CAP SCR 5/16-18X3/4 HHGR5	6
15.	60118667	MOUNTING BRACKET	1
16.	72060002	CAP SCR 1/4-20X3/4 HHGR5	2
17.	72062104	NUT 1/4-20 LOCK	2
18.	72661312	CLAMP 1/2 LOOP	4
19.	51712793	VB ASM	REF
20.	77041486	SWITCH-EM STOP	2
21.	72060683	CAP SCR #10-24X7/8	4
22.	72062106	NUT #10-24 LOCK	4

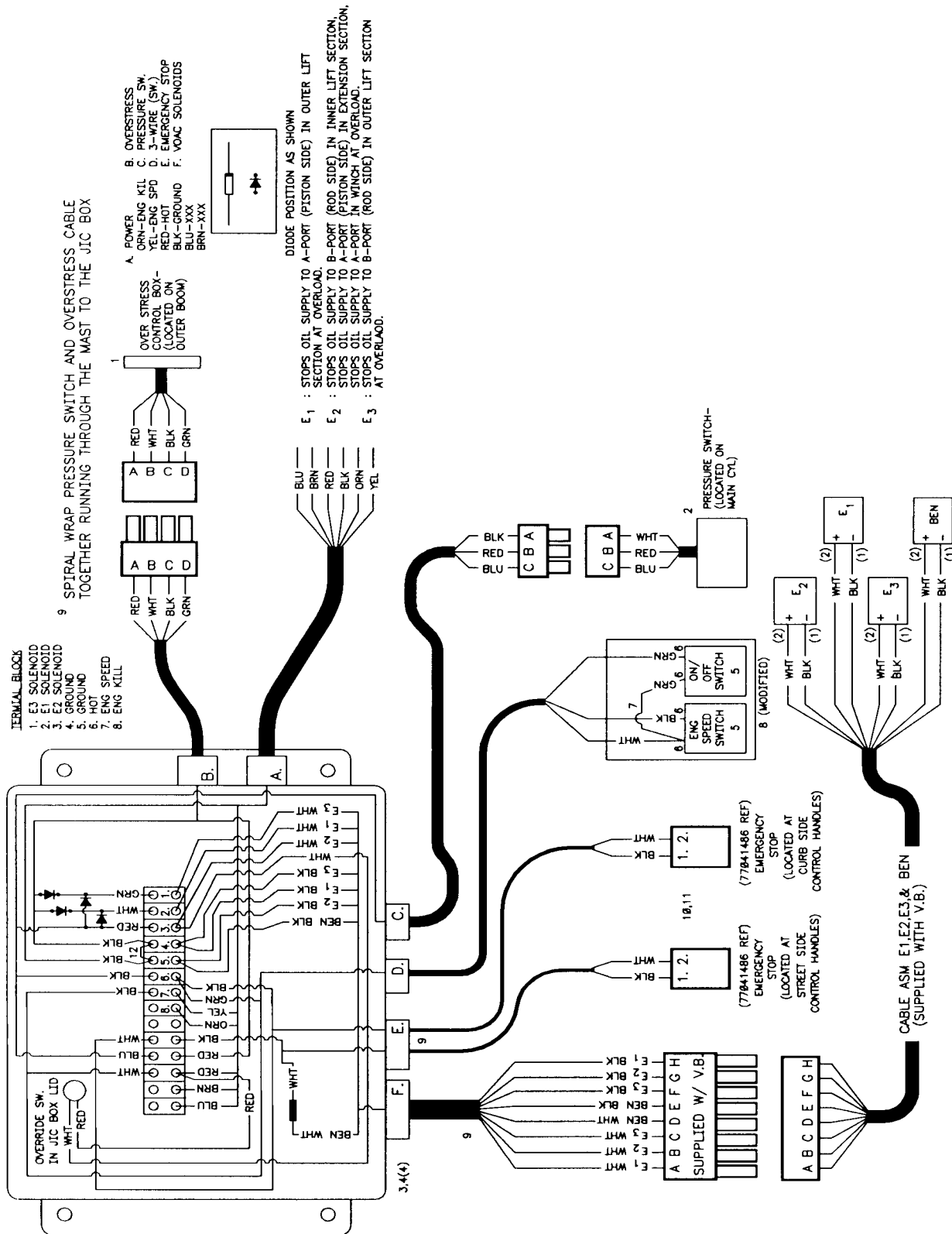


CTRL KIT-9F MNL VOAC (90712790-2)

6.	77040186	TERM 1/4FSLPON 16-14GA
7.	89044395	WIRE 16GA GRN
8.	70393257	DECAL-JIC BOX
9.	89034048	SPIRAL WRAP
10.	72060683	CAP SCR #10-24X7/8
11.	72062106	NUT #10-24 LOCK

4
3"
1
40FT
3
3

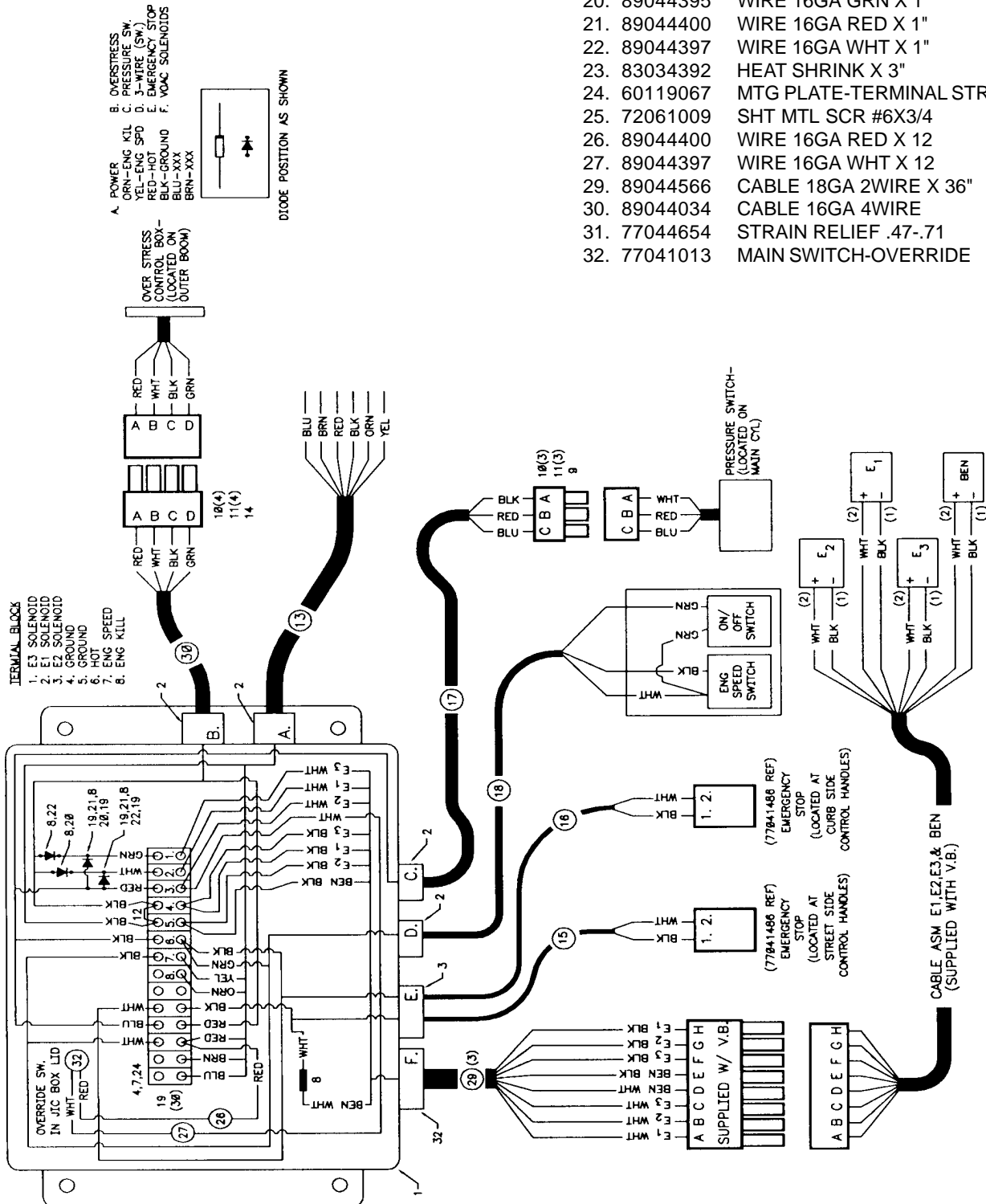
ITEM	PART NO.	DESCRIPTION	QTY.
1.	77041457	CONTRL BOX	1
2.	51712856	CABLE ASM	1
3.	51712855	CABLE ASM	1
4.	72060002	CAP SCR 1/4-20X3/4 HHGR5	4
5.	77041345	SWITCH	2



CABLE ASM-JIC BOX (51712855)

ITEM	PART NO.	DESCRIPTION	QTY
1.	60120224	JIC BOX	1
2.	77044671	STRAIN RELIEF .24-.47	4
3.	77044653	STRAIN RELIEF .39-.55	1
4.	77044309	TERM BLOCK 14-CONTACT	1
6.	77040048	BUTT CONNECTOR 16-14GA	1
7.	72060668	CAP SCR #10-32X1/2 SH	4
8.	77044556	DIODE 2.2AMP 274V	4
9.	77044557	CONNECTOR 3-WAY	1

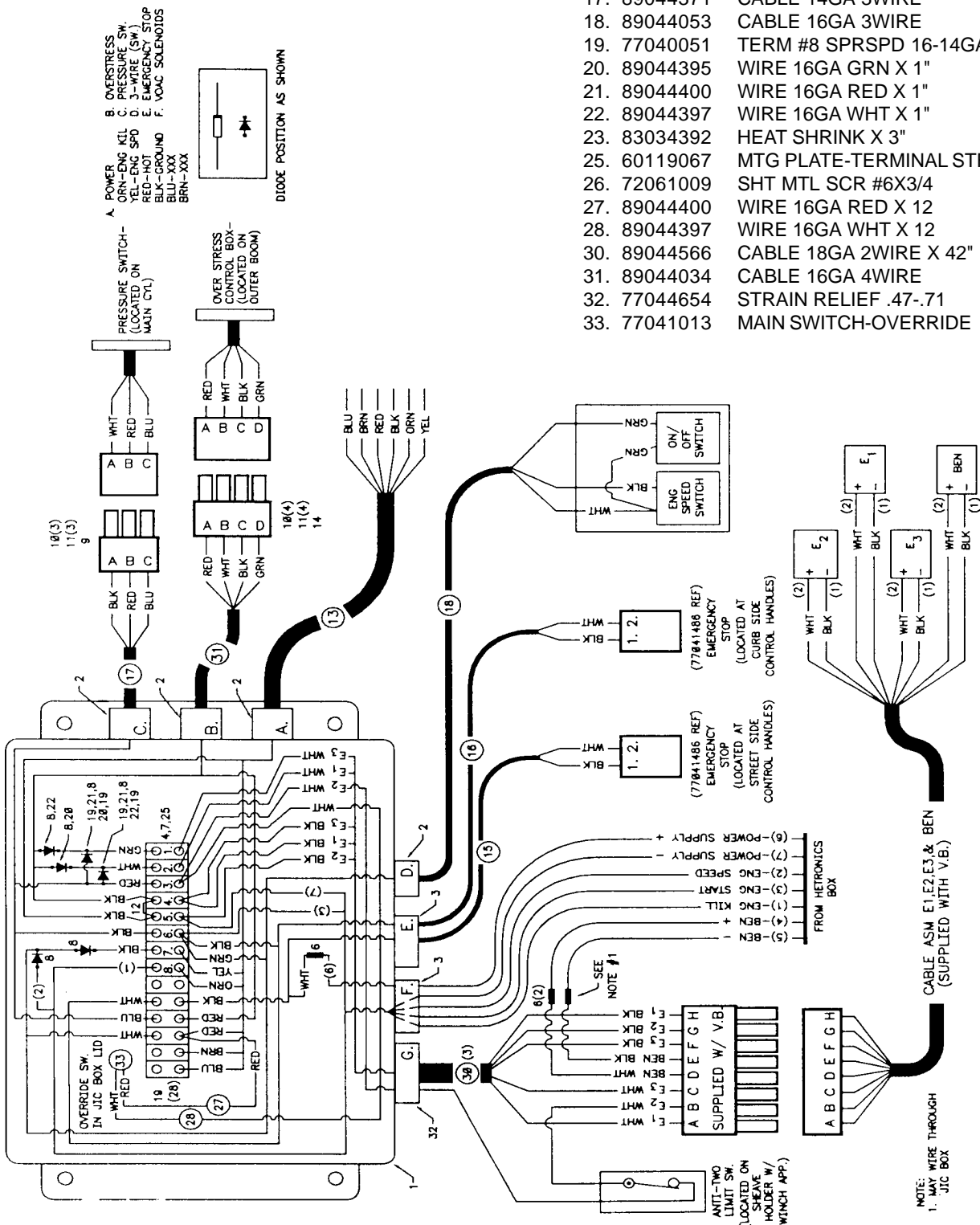
10.	70394069	SEAL-CONNECTOR	7
11.	77044550	TERMINAL PIN	7
12.	77040130	JUMPER BAR	1
13.	89044354	CABLE 14GA 6WIRE	33FT
14.	77044549	CONNECTOR 4-WAY	1
15.	89044566	CABLE 18GA 2WIRE	3FT
16.	89044566	CABLE 18GA 2WIRE	8FT
17.	89044371	CABLE 14GA 3WIRE	9FT
18.	89044053	CABLE 16GA 3WIRE	3FT
19.	77040051	TERM #8 SPRSPD 16-14GA	30
20.	89044395	WIRE 16GA GRN X 1"	2
21.	89044400	WIRE 16GA RED X 1"	2
22.	89044397	WIRE 16GA WHT X 1"	2
23.	83034392	HEAT SHRINK X 3"	4
24.	60119067	MTG PLATE-TERMINAL STRIP	1
25.	72061009	SHT MTL SCR #6X3/4	4
26.	89044400	WIRE 16GA RED X 12	1
27.	89044397	WIRE 16GA WHT X 12	1
29.	89044566	CABLE 18GA 2WIRE X 36"	3
30.	89044034	CABLE 16GA 4WIRE	30FT
31.	77044654	STRAIN RELIEF .47-.71	1
32.	77041013	MAIN SWITCH-OVERRIDE	1



CABLE ASM-JIC BOX RADIO RMT (HETRONICS) (51712880)

ITEM	PART NO.	DESCRIPTION	QTY
1.	60120413	JIC BOX	1
2.	77044671	STRAIN RELIEF .24-.47	4
3.	77044653	STRAIN RELIEF .39-.55	2
4.	77044309	TERM BLOCK 14-CONTACT	1
6.	77040048	BUTT CONNECTOR 16-14GA	3
7.	72060668	CAP SCR #10-32X1/2 SH	4

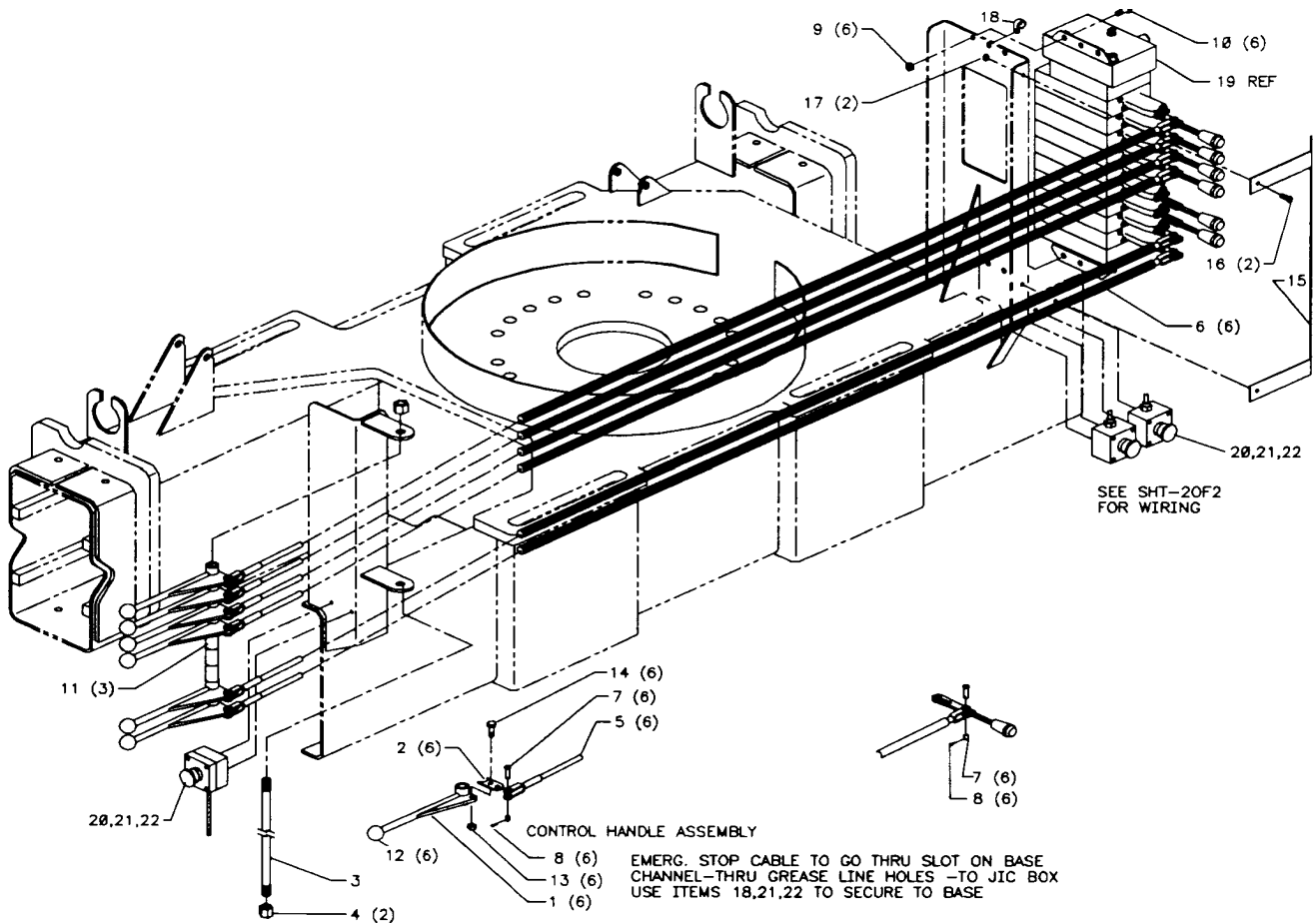
8.	77044556	DIODE 2.2AMP 274V	6
9.	77044557	CONNECTOR 3-WAY	1
10.	70394069	SEAL-CONNECTOR	7
11.	77044550	TERMINAL PIN	7
12.	77040130	JUMPER BAR	1
13.	89044354	CABLE 14GA 6WIRE	33FT
14.	77044549	CONNECTOR 4-WAY	1
15.	89044566	CABLE 18GA 2WIRE	3FT
16.	89044566	CABLE 18GA 2WIRE	8FT
17.	89044371	CABLE 14GA 3WIRE	9FT
18.	89044053	CABLE 16GA 3WIRE	4FT
19.	77040051	TERM #8 SPRSPD 16-14GA	30
20.	89044395	WIRE 16GA GRN X 1"	2
21.	89044400	WIRE 16GA RED X 1"	2
22.	89044397	WIRE 16GA WHT X 1"	2
23.	83034392	HEAT SHRINK X 3"	4
25.	60119067	MTG PLATE-TERMINAL STRIP	1
26.	72061009	SHT MTL SCR #6X3/4	4
27.	89044400	WIRE 16GA RED X 12	1
28.	89044397	WIRE 16GA WHT X 12	1
30.	89044566	CABLE 18GA 2WIRE X 42"	3
31.	89044034	CABLE 16GA 4WIRE	30FT
32.	77044654	STRAIN RELIEF .47-.71	1
33.	77041013	MAIN SWITCH-OVERRIDE	1



CTRL KIT-9F RMT VOAC (90713043-1)

ITEM	PART NO.	DESCRIPTION	QTY
1.	60118722	CONTROL HANDLE	6
2.	60118721	TAB	6
3.	60114751	ROD	1
4.	72062091	NUT 5/8-11 LOCK	2
5.	52704745	CONTROL ROD M	6
6.	52710140	CONTROL ROD	6
7.	72066338	CLEVIS PIN 5/16X1	12
8.	72066168	COTTER PIN 3/32X3/4	12
9.	72062103	NUT 3/8-16 LOCK	6
10.	72060046	CAP SCR 3/8-16X1 HHGR5	6
11.	60030282	SPACER	3
12.	71394087	KNOB 1" 1/2-13	6

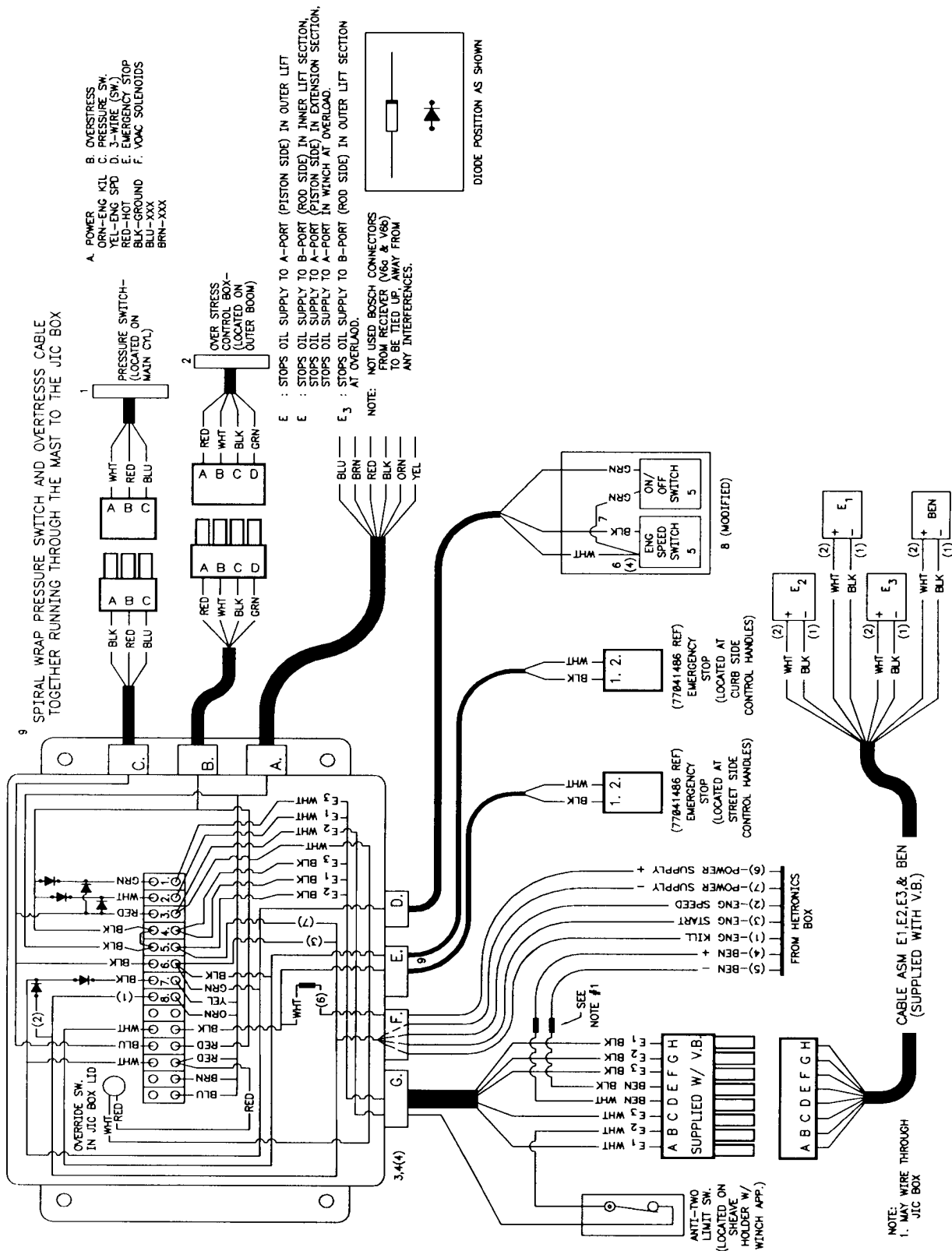
13.	72062109	NUT 5/16-18 LOCK	6
14.	72060023	CAP SCR 5/16-18X3/4 HHGR5	6
15.	60118667	MOUNTING BRACKET	1
16.	72060002	CAP SCR 1/4-20X3/4 HHGR5	2
17.	72062104	NUT 1/4-20 LOCK	2
18.	72661312	CLAMP 1/2 LOOP	4
19.	51712793	VB ASM	REF
20.	77041486	SWITCH-EM STOP	2
21.	72060683	CAP SCR #10-24X7/8	6
22.	72062106	NUT #10-24 LOCK	6



CTRL KIT-9F RMT VOAC (90713043-2)

ITEM	PART NO.	DESCRIPTION	QTY
1.	77041457	CONTRL BOX	1
2.	51712856	CABLE ASM	1
3.	51712880	CABLE ASM	1
4.	72060002	CAP SCR 1/4-20X3/4 HHGR5	4

5.	77041345	SWITCH	2
6.	77040186	TERM 1/4FSLPON 16-14GA	4
7.	89044395	WIRE 16GA GRN	3"
8.	70393257	DECAL-JIC BOX	1
9.	89034048	SPIRAL WRAP	40FT
10.	72060683	CAP SCR #10-24X7/8	3
11.	72062106	NUT #10-24 LOCK	3



SECTION 4. GENERAL REFERENCE

INSPECTION CHECKLIST 3

WIRE ROPE INSPECTION 7

HOOK INSPECTION 7

HOLDING VALVE INSPECTION 8

ANTI-TWO BLOCKING DEVICE INSPECTION 8

TORQUE DATA CHART-DOMESTIC 9

TORQUE DATA CHART-METRIC 10

TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE 11

TURNTABLE BEARING INSPECTION FOR REPLACEMENT 12

LIMITED WARRANTY 14

[illegible]

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

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

REV: 6-2-99

TYPE OF INSPECTION**NOTES:**

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

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

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

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

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

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

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

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

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

FREQUENCY	ITEM	KEY	✓ = SATISFACTORY ✗ = DEFICIENCY (must be corrected prior to operation)	R = RECOMMENDATION (should be considered for corrective action) NA= NOT APPLICABLE	STATUS ✓ , ✗ R, NA
			INSPECTION DESCRIPTION		
D	1	Labels	All load charts, safety & warning labels, & control labels are present and legible.		
D	2		Check all safety devices for proper operation.		
D	3	Controls	Control mechanisms for proper operation of all functions, leaks & cracks.		
D	4	Station	Control and operator's station for dirt, contamination by lubricants, & foreign materials.		
D	5	Hyd System	Hydraulic system (hoses, tubes & fittings) for leakage & proper oil level.		
D	6	Hook	Presence & proper operation of hook safety latches.		
D	7	Rope	Proper reeving of wire rope on sheaves & winch drum.		
D	8	Pins	Proper engagement of all connecting pins & pin retaining devices.		
D	9	General	Overall observation of crane for damaged or missing parts, cracked welds & presence of safety covers.		
D	10	Operation	During operation, observe crane for abnormal performance, unusual wear (loose pins, wire rope damage, etc.). 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)	R = RECOMMENDATION (should be considered for corrective action) NA = NOT APPLICABLE	STATUS
			INSPECTION DESCRIPTION		✓, ✗, 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. Check tightness of mounting bolts.		
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		

3

FREQUENCY	ITEM	KEY	✓ = SATISFACTORY ✗ = DEFICIENCY (must be corrected prior to operation)	R = RECOMMENDATION (should be considered for corrective action) NA= NOT APPLICABLE	STATUS ✓ , ✗ , R, NA
			INSPECTION DESCRIPTION		
Q	70	Pumps, PTO's & Motors	Pumps, PTO's & motors for loose bolts/fasteners, leaks, noise, vibration, loss of performance, heating & excess pressure.		
	71		● Winch motor(s)		
	72		● Rotation motor(s)		
	73		● Other		
Q	74	Valves	Hydraulic valves for cracks, spool return to neutral, sticking spools, proper relief valve setting, relief valve failure.		
	75		● Main control valve		
	76		● Load holding valve(s)		
	77		● Outrigger or auxiliary control valve(s)		
	78		● Other		
	79		● Other		
Q	80	Cylinders	Hydraulic cylinders for drifting, rod seal leakage & leakage at welds. 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 (cont)

4

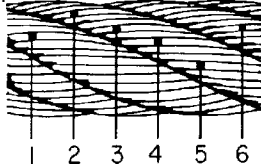
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If additional space is required, reproduce this page and attach to this report.

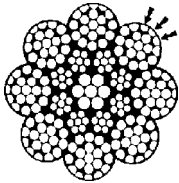
WIRE ROPE INSPECTION

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

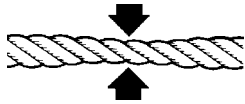
- A. Corrosion can be cause for replacement. Any development of corrosion must be noted and monitored closely.
- B. When there are either 3 broken wires in one strand or a total of six broken wires in all strands in any one rope lay.



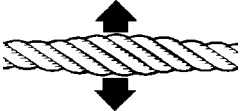
- C. When flat spots on the outer wires appear and those outside wires are less than 2/3 the thickness of the unworn outer wire.



- 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

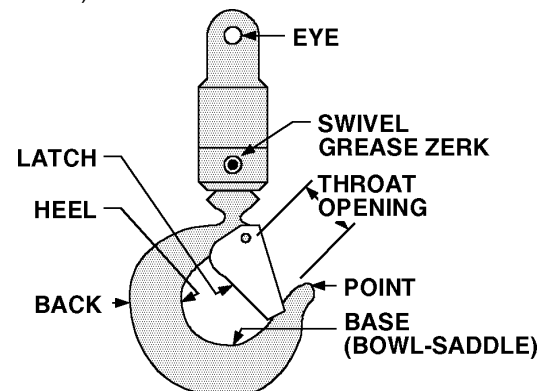
Repair of cracks, nicks, and gouges shall be carried out by a designated person by grinding longitudinally, following the contour of the hook, provided that no dimension is reduced more than 10% of its original value. (Or as recommended by the manufacturer) (A qualified person may authorize continued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

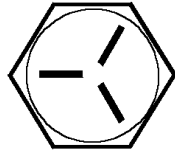

The anti two block system should be checked daily as follows:

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.

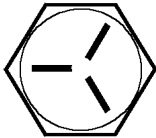

1. Bolt manufacturer's particular specifications should be consulted when provided.
2. Flat washers of equal strength must be used.
3. All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.
4. Torque values specified are for bolts with residual oils or no special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

WARNING

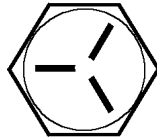

Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing.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

TORQUE DATA CHART - DOMESTIC

FINE THREAD BOLTS

SIZE (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)
5/16-24	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-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.

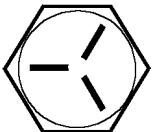

1. Bolt manufacturer's particular specifications should be consulted when provided.
2. Flat washers of equal strength must be used.
3. All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.
4. Torque values specified are for bolts with residual oils or no special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

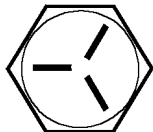

Anytime a gear-bearing bolt is removed, it must be replaced with a new bolt of the identical grade and size. Once a bolt has been torqued to 75% of its proof load and then removed, the torque coefficient may no longer be the same as when the bolt was new thus giving indeterminate clamp loads after torquing.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

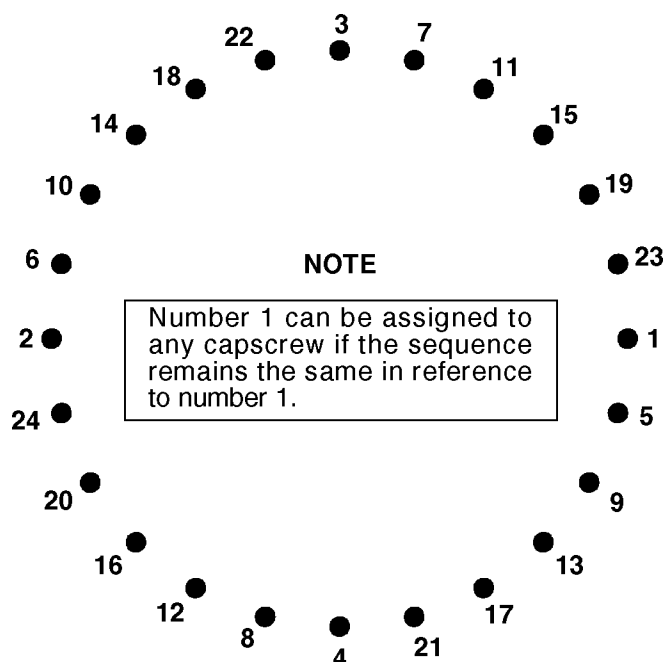
1. Bolt manufacturer's particular specifications should be consulted when provided.
2. Flat washers of equal strength must be used.
3. All torque measurements are given in kilogram-meters.
4. Torque values specified are for bolts with residual oils or no special lubricants applied. If special lubricants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

WARNING

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

TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE

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



TIGHTENING PROCEDURE:

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

TURNTABLE BEARING INSPECTION FOR REPLACEMENT

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

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

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

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

TEST PROCEDURE

STEP 1.

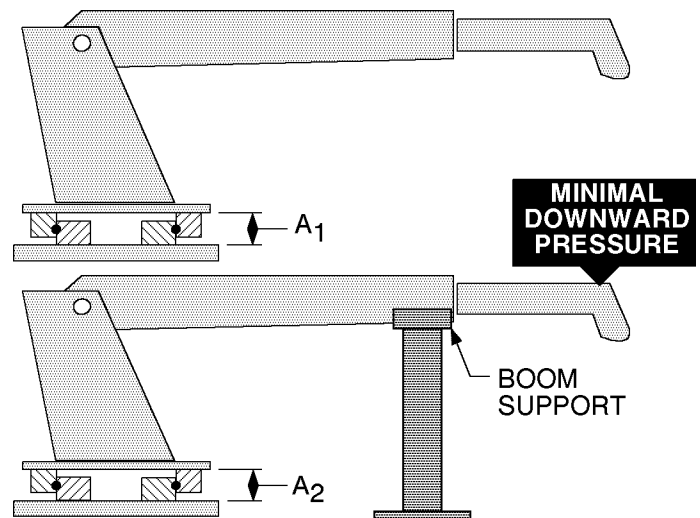
With the crane horizontal and fully extended, measure between the top and bottom mounting surfaces of the turntable bearing (A_1), using a dial indicator for accuracy.

STEP 2.

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

STEP 3.

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



COMPARISON CHART - MODEL TO MEASURED TILT DIMENSION

NOTE THE FIGURES LISTED IN THIS CHART ARE SERVICE GUIDELINES AND DO NOT, IN THEMSELVES, REQUIRE THAT THE BEARING BE INSPECTED. IF THERE IS REASON TO SUSPECT AN EXCESS OF BEARING WEAR AND THE MEASURED TILT DIMENSION EXCEEDS THE DIMENSION LISTED, REMOVE THE BEARING FOR INSPECTION.	IMT CRANE, LOADER OR TIREHAND MODEL	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. (A₁-A₂)	.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:

☐ 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 occurrence.

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

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