Model 1836A TIREHAND

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Introduction - Read Carefully!

This manual is provided to assist you in ordering parts, operating, and maintaining your IMT equipment. It contains information such as specifications, parts lists, capacities, and parts identification.

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

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

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.

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Section 1. SPECIFICATIONS

Tire Size Capacity	18.00 x 25 - 40.00 x 57	
Weight Capacity	11,400 lbs.	(5,182 kg)
Clamping Span (between sutds)	62 - 140"	(160 - 385 cm)
Hand Axial Rotation	360 deg. continuous	(6.283 rad. continuous)
Body Rotation	350 deg	(6.108 rad)
Weight of Tirehand	7,200 lbs.	(3,273 kg)
Pump Output (maximum)	6 U.S. gallons/minute @ 2500 PSI	(22.7 liters/minute @ 182.7 kg/cm^2
Clamping Safety Lock	Holding valves on clamping side	
Hydraulics	Five (5) function control	
Counterweight	As required for stability	
Controls	Cab mounted	
Rotation System	Spur gear drive	

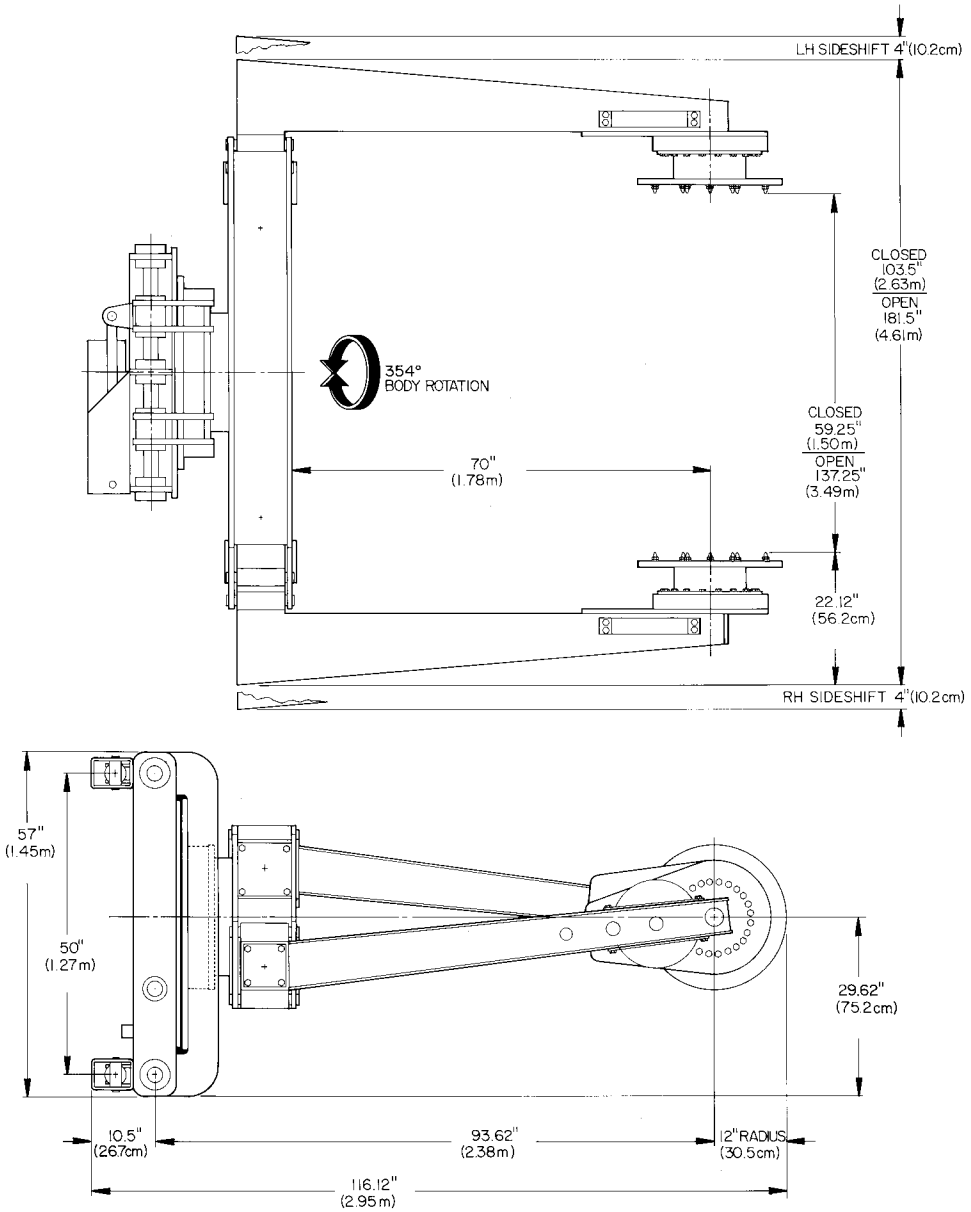


Figure A-1. Geometric Configuration (TH 1836A)

Section 2. INSTALLATION

2-1. GENERAL

Each installation of the IMT Tirehand may differ slightly. Therefore, this section contains only general information, and should be used as a reference for your particular installation. Carefully read and understand this section before attempting to install the Tirehand.

2-2. VALVE BANK INSTALLATION

Carefully examine the interior of the cab of the carrier vehicle to determine the best possible location for the valvebank, or valvebank remote control box. Consider the following:

1. Ease of operation.
2. Ease of installation.
3. Possible interference with other controls in the vicinity.

After selecting the best location for the valve bank, fabricate a mounting bracket, if necessary. Whether the valve, or control box, is mounted directly to the existing panel, or mounted using a fabricated bracket, it must be held rigidly and be accessible to the hydraulic hoses, or electrical cables. Complete the installation.

2-3. TIREHAND INSTALLATION

The Tirehand may be installed on any loader, or forklift, having sufficient lifting capacity and stability. The Tirehand is usually equipped wih a base, unless specified by the customer. The function of the base is to interface the Tirehand with a particular carrier vehicle. The base is mounted, by use of pins, to the carrier vehicle thereby providing the means for installing the Tirehand sub-base. The sub-base is mounted to the base through side shift shafts, riding on linear bushings. Remember that each installation may vary.

1. Install the Tirehand to the carrier vehicle, as described above.
2. Check all lubrication points for adequate lubrication.
3. Operate the carrier vehicle to check for unobstructed vertical movement. Determine whether stop blocks may be required in order to prevent the Tirehand from coming in contact with the carrier vehicle. Install stop blocks if necessary, to prevent damage to the Tirehand and/or carrier vehicle.

2-4. HYDRAULIC INSTALLATION

It may become necessary to cut a hole in the cab in order to provide for routing the hydraulic hoses from the Tirehand to the control valve. Connect the hydraulic hoses, using Figure B-1. for reference.

2-5. TESTING

Raise the Tirehand to provide adequate clearance for operating all Tirehand functions. Operate all Tirehand functions and check for leaks.

WARNING

Stay clear of all pinch points while operating this unit. Failure to comply may cause serious injury or death.

NOTE

If the operation of the Tirehand functions appears erratic, it may be necessary to eliminate air from the system.

Test the unit at rated capacity, and note any points of instability. Add counterweights if needed.

If the carrier vehicle is articulating, make certain that steering of the vehicle is not hindered by the routing of the hydraulic hoses. Check for any possible point where hoses may be subjected to excessive wear.

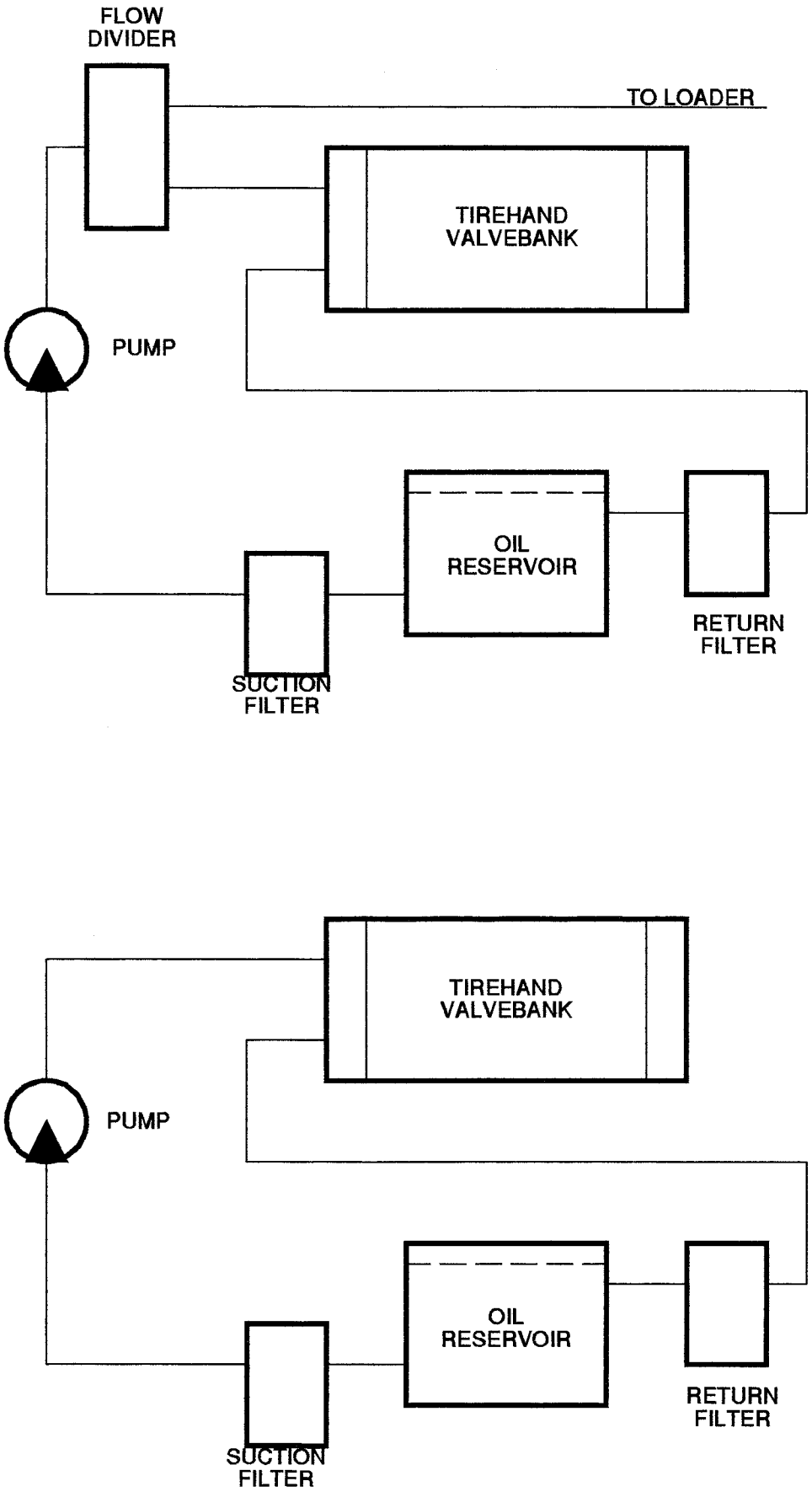


Figure B-1. Typical Hydraulic Installation

Section 3. OPERATION

3-1. GENERAL

Every Tirehand has an identification placard (Figure C-1.) fastened to the unit between the clamping arms. When ordering parts, communicating warranty information, or referring to the unit in any way, always include the assigned model and serial numbers. All inquiries should be directed to Iowa Mold Tooling Co., Inc., 500 Hwy 18 West, Garner, Iowa 50438.

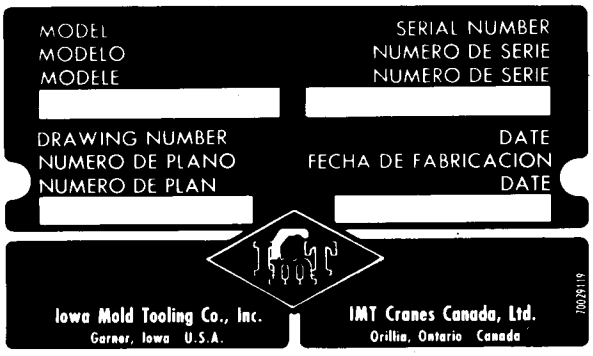


Figure C-1. Serial Number Placard

3-2. SAFETY FACTORS

There are three important factors involved in the safe operation of this unit. They are:

1. The operator must have the competence to know the machine and how to safely control it.
2. The Tirehand must be in good mechanical condition.
3. The unit must never be loaded to exceed the maximum rated capacity.

The safety precautions presented in this section should be read and observed at all times during operation.

3-2-1. LOAD LIMITS

The Tirehand is designed to be operated within specific maximum allowable load limits, as noted in Section 1. of this manual. Overloading will result in potentially serious safety hazards and shortened service life of the unit. Exceeding the rated capacity of the Tirehand will cause instability and possible structural failure.

Warranty of this unit will be void on any part determined to have been misused due to overloading, improper operation, or lack of maintenance. No warranty, written, verbal, or implied, other than the published IMT new machinery and equipment warranty will be valid with this unit.

3-2-2. EQUIPMENT INSPECTION

Before operating this unit, always perform the safety checks listed below. They are vital to the detection of equipment malfunction and damage, which may be potential safety hazards.

Structural Soundness - Inspect the unit for damaged, or loose fasteners.

Hydraulic Oil Supply - Check the oil level in the reservoir, and fill if needed.

Controls - Make a short test for proper control operation.

Repairs - Correct all defects or malfunctions before putting the unit into service.

This equipment inspection should be performed before each work task and as a periodic preventative maintainance check.

3-2-3. WORK STATION POSITIONING

A firm, level, and dry surface is the best location from which to operate this equipment. Overhead obstructions should be avoided.

Care should be used to make certain that all personnel are clear of the work area, before the operation begins.

At job sites where the terrain is graded or unfirm, the operation of the Tirehand should be restricted to compensate for instability.

WARNING

The operator should be alert, at all times, for the presence of personnel in the work area. Operations must be suspended until the work area is cleared.

3-3. OPERATOR TRAINING

The Tirehand is designed for operator simplicity. Prior to operating this unit, the operator must become thoroughly familiar with control functions, operating procedures, and safety precautions. In addition, the operator must be prepared to take any remedial action needed in an emergency situation.

3-4. CONTROLS

The controls for the Tirehand, as well as the carrier vehicle, are located in the cab. They should be positioned within easy reach, near the operator station.

3-4-1. VEHICLE CONTROLS

The vehicle is equipped with controls which allow the operator to raise, lower, and tilt the Tirehand.

3-4-2. TIREHAND CONTROLS

The controls for the Tirehand are located in the cab of the carrier vehicle. Their function and operation is as follows:

Clamp - Push the lever to clamp the tire and pull to release.

WARNING

Attempting to use the clamping action of the Tirehand to seat the bead of the tire is a hazardous practice, and should not be attempted.

Side shift -Push the lever for right movement, and pull for left movement.

Rotation - Push the lever for clockwise rotation, and pull for counterclockwise rotation.

Axial - Push the lever to rotate the pads forward, and pull the lever to rotate the pads backward.

NOTE

Direction of pad rotation is as seen from the operator's station with the "TOP" decal pointing up. Rotating the Tirehand 180 degrees (3.14 rad.) will cause the pads to rotate in a direction that is opposite to that shown on the control decal.

3-5. TASK PERFORMANCE

Prior to operating this unit, become thoroughly familiar with the operating requirements and restrictions. To begin operation:

1. Manuever the vehicle into a position which provides proper orientation of the Tirehand to the tire, with the boom at the proper elevation.

2. Position the opened hand to properly grasp the tire.

WARNING

Make certain that personnel are clear before continuing the operation.

3. Advance the carrier vehicle, manipulate the controls to perform the desired function, and grasp the tire.

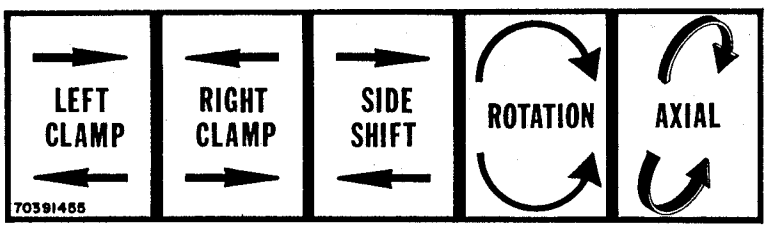


Figure C-2. Control Decal

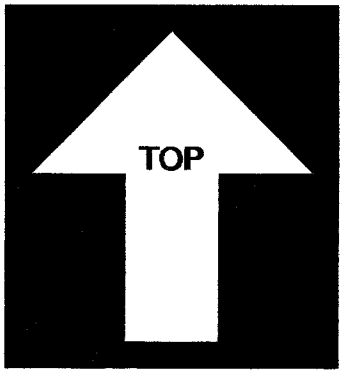


Figure C-3. "TOP" Decal

3-6. POWER LINE PROXIMITY

Except where the electrical distribution and transmission lines have been de-energized and visibly grounded at point of work, or where insulating barriers not a part of or an attachment to the unit have been erected to prevent physical contact with the lines, unit shall be operated proximate to, under, over, by or near power lines only in accordance with the following:

1. For lines rated 50 kV or below, minimum clearance between the lines and any part or the unit or load shall be ten (10) feet (3.05m).

2. For lines rated over 50 kV, minimum clearance between the lines and any part of the unit or load shall be ten (10) feet plus 0.4 inch (3.05m plus 1 cm) for each 1 kV over 50 kV, or use twice the length of the insulator but never less than ten (10) feet (3.05m).

3. In transit with no load and boom lowered, the clearance shall be a minimum of four (4) feet (1.22m)

4. It is recommended that a person be designated to observe the clearance and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.

In addition to the above mentioned safety measures, the operator must take into account sag, sway and deflection factors, in allowing for proper clearances.

ALWAYS use this unit for removing, transporting, replacing and storage stacking of tires specified.

ALWAYS use this unit as a tire handling device ONLY.

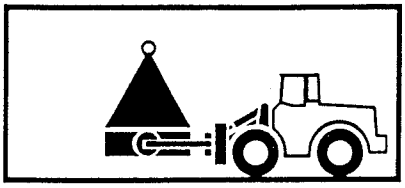
ALWAYS keep load in position low to ground and backward (upward) tilted when transporting to ensure maximum vehicle stability.

ALWAYS travel and operate at reasonable speeds.

ALWAYS transport tires with arms rotated in a plane parallel (horizontal) to the ground.

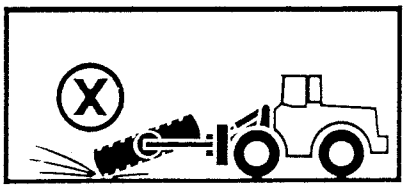
ALWAYS check the security of clamping action when rotating a load to a position perpendicular to the ground.

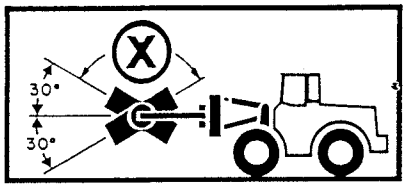
Figure C-4. Operating Requirements



NEVER attempt to handle tires filled with ballast. Stability or structural failure may result if the limit is exceeded.

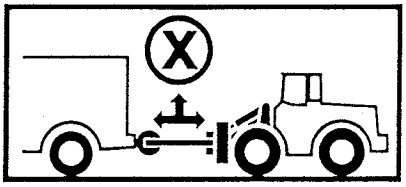
NEVER drag the tire - the unit is designed to lift and carry.

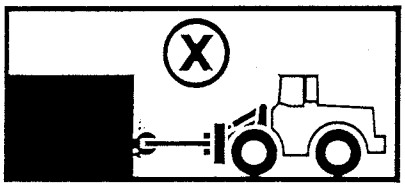




NEVER transport a tire rotated more than 30° off the horizontal plane. FOR EXAMPLE: Do not transport in a verticle plane.

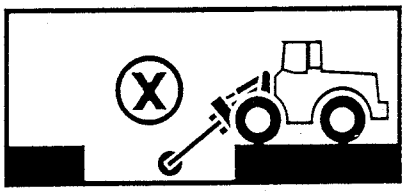
NEVER use the unit for any jacking, pushing, pulling or dragging operation involving an object or another vehicle.

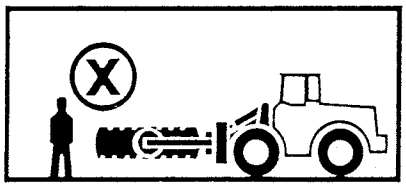




NEVER impact-load or hammer-push with the unit.

NEVER operate hand below ground level.





NEVER operate the unit while any auxiliary personnel are proximate to the job site, especially when the unit is carrying a tire.

NEVER clamp an uninflated tire and then inflate. Damage or injury WILL result.

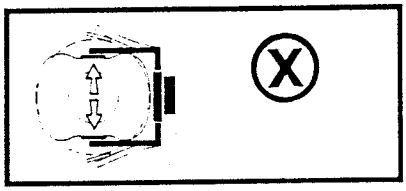


Figure C-5. Operating Restrictions

Section 4. MAINTENANCE

4-1. GENERAL

Regularly scheduled maintenance is essential to keeping the Tirehand operating efficiently. This section contains information important to the proper maintenance procedures and necessary service intervals. Personnel responsible for the maintenance of this unit should become familiar with the frequency and the type of maintainance needed, and perform these tasks at the recommended intervals

4-2. LUBRICATION

Maintaining the proper lubrication schedule will vary with climatic conditions and frequency of use. The lubrication chart is intended to serve as a schedule for a normal work load, and moderate weather conditions. Periods of heavy use will shorten service intervals.

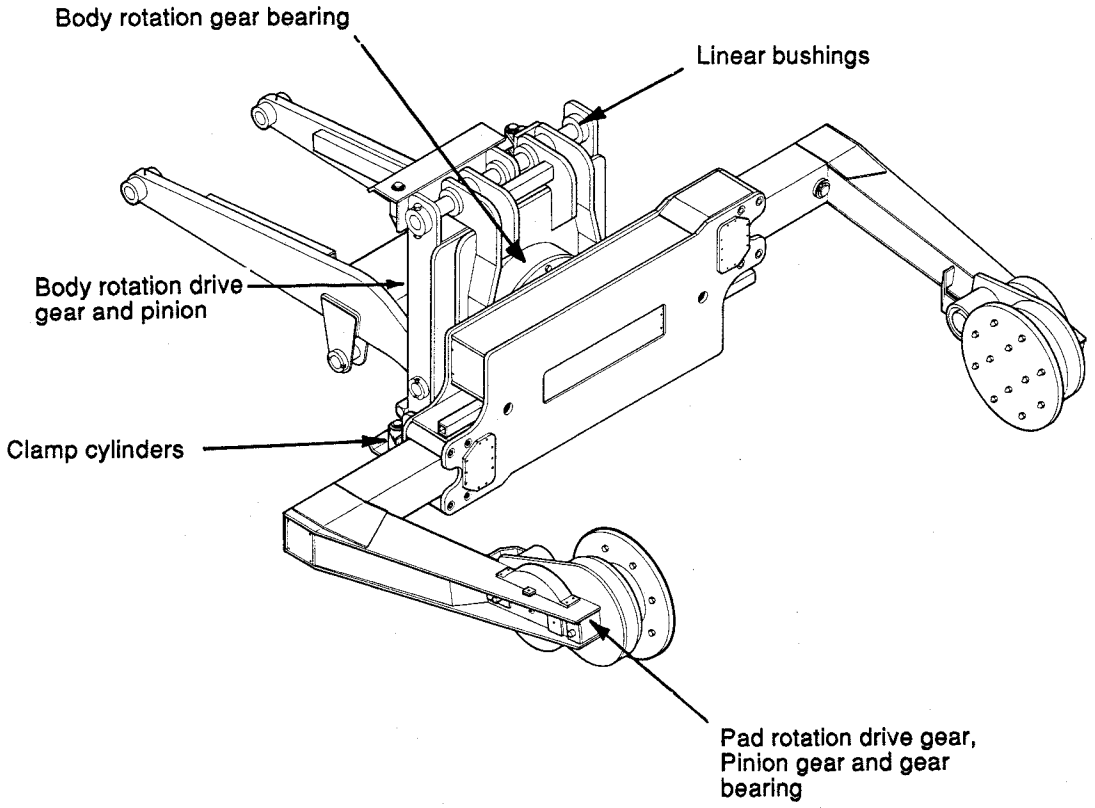


Figure D-1. Lubrication Points

TABLE D-1. LUBRICATION CHART

APPLICATION POINT	LUBRICATION	APPLICATION	INTERVAL
Carrier Pivot Boom Points	Shell Alvania 2EP	Hand Grease Gun	Weekly
Linear Bushings	or Shell Retinax "A"	or Pneumatic	
Hinge Pins	or Equivalent	Pressure Gun	
Claw Gear-Bearings			
Claw Drive Gears			
Claw Pinion Gears			
Clamp Cylinders			
Body Gear-Bearing			
Body Drive Gear			
Body Pinion Gear			

4-3. HYDRAULIC SYSTEM

4-3-1. HYDRAULIC FLUID SELECTION

Minimum viscosity specifications for hydraulic oil to be used in the Tirehand are indicated in Table D-2. Any major oil company can supply products which meet these requirements.

Oils selected for this equipment, in addition to meeting the viscosity requirements, should have the following additive properties.

1. Antifoam inhibitors
2. Antioxident inhibitors
3. Rust resistant additives
4. Antiwear additives

4-3-2. HYDRAULIC FLUID SPECIFICATIONS

Table D-2. contains oil specifications for a full range of operating temperatures. Arctic conditions present special requirements which are not in the scope of this chart, and must be analyzed individually. Consult your oil supplier for the proper hydraulic oil to be used under these severe conditions. Electric reservoir heaters are available to improve operation at extremely low temperatures.

4-3-3. HYDRAULIC FLUID DETERIORATION

Contamination of the hydraulic oil by solvents, water, dust or other abrasives will cause deterioration of the oil. Sustained presence of these impurities will result in the premature breakdown of the additive properties, and reduce the viscosity index. Introduction of water to the system, or operating at high temperatures (above 180 degrees F), will result in an increase in the oil oxidation rate. Oxidation produces varnish-forming materials and sludge in the oil. Operating the system for any prolonged period, with contaminated or broken down oil, will increase component wear, causing significantly reduced service life. Periodically, draw an oil sample, and check for oil quality.

1. Place the sample in a clean glass container.
2. Smell the oil to detect rancid or burnt odor.
3. Visually examine the oil for a dark, or cloudy, color.
4. Allow the sample to stand for several minutes. Inspect the sample for water, which will settle to the bottom of the glass, if present. Water can result from a leak in the system, or condensation from temperature extremes.

TABLE D-2. HYDRAULIC FLUID SPECIFICATIONS

Ambient Temperature Range, deg. F	0-90	Below 32	32-90	Above 90
Min. Pour Point, deg. F	-30	-25	+10	+10
Min. Viscosity, SSU @ 0 deg. F	4,000	4,000	- - -	- - -
Min. Viscosity, SSU @ 100 deg. F	140-190	100-130	150-200	200-315
Min. Viscosity, SSU @ 210 deg. F	48	41	43	47
Minimum Viscosity Index	139	90	90	90

When any of these conditions are observed, the system should be purged and filled with new oil. The oil in the complete system, including the reservoir, should be changed:

1. After every 800 hours of operation, or every six months, whichever occurs first.
2. After pump, or other major component failure.

4-3-4. HYDRAULIC SYSTEM PURGING

Purging the hydraulic system requires a new oil sufficient to completely refill the reservoir, hoses, cylinders, and to allow for some loss during this operation. To reduce oil loss during this process, operate the vehicle engine at reduced speed. In purging, new oil is supplied to the pump, and used oil is discharged from the return line. Two operators will be required during this procedure, one to operate the controls, and one to regulate the engine speed.

CAUTION

Do not allow the reservoir to drop below 1/3 capacity during this operation.

Purging is accomplished as follows:

1. Locate the unit in an area that provides solid, level footing, and space to accomodate the full operating range of the unit. Shift the vehicle into neutral.

2. Raise the boom approximately 5 feet above ground level. Operate the side shift function fully in one direction.

3. With the Tirehand right side up, rotate it so that it is 30 degrees off horizontal. Extend the clamping arms to full stroke.

4. Kill the engine, drain the hydraulic reservoir and remove the suction and pressure hoses. Drain and reassemble.

NOTE

The method of waste oil disposal is left to the discretion of the service personnel.

5. Disconnerct the return line and direct it into a waste container. Plug the return line port on the reservoir, and fill with clean 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.

6. Start the engine and engage the pump if necessary. With the return directed into the waste container, retract the clamp arms, rotate the pads, and operate the side shift full stroke. Rotate the Tirehand back to the horizontal position. Stop the engine.

7. Reconnect the return line to the reservoir, and change the return filter. All components of the Tirehand are now purged.

8. Check the reservoir oil level, and add oil if necessary.

NOTE

This section covered the purging of the Tirehand. The carrier vehicle's hydraulic system should be covered in the manufacturer's service manual.

4-3-5. PURGING TRAPPED AIR

Air may be introduced into the system, either through a leak in the system, or due to disconnecting a hydraulic component for servicing. Air in the system will cause erratic operation, and must be corrected.

To purge air from the system, extend and retract the affected cylinder several times. At the end of the stroke, hold the valve open for a few seconds. Repeat this procedure several times, until operation is smooth and continuous.

4-3-6. FILTER ELEMENT REPLACEMENT

NOTE

Some carrier vehicles may not be equipped with a suction and return line filter. These instructions apply to those vehicles which require IMT installed filters. If the vehicle has suction and return line filters, refer to the manufacturer's instructions.

TABLE D-3. PREVENTATIVE MAINTAINANCE CHECKLIST

Item	Description	Frequency
Walk around	Inspect for loose or damaged parts, and oil leaks	Daily
Cylinders	Check securing pins and attached members.	Monthly
Hoses/fittings	Check for leaks, bulges, flattening, and excessively worn areas.	Daily
Rotation system	Check for backlash in excess of 1/8 to 3/16 inch.	Weekly
Structural damage	Check all for broken welds, cracks, dents, and metal fatigue cracks.	Monthly
Counter balance	Conduct a test to ensure proper holding properties.	Weekly
Reservoir	Check fluid level with all cylinders retracted.	Daily
Oil leaks	Inspect all hydraulic components for signs of leakage.	Monthly

The hydraulic filters must be serviced regularly, to avoid accumulation of contaminants in the reservoir, or throughout the system. They must be changed after the initial 50 hours of operation, and every 200 hours thereafter. To change filter elements:

1. Close the gate valve and remove the filter element.
2. Install the new element, making certain that the rubber seal is in place.
3. Open the gate valve and check for leaks.

CAUTION

Pump failure will occur if the gate valve is not reopened before operation.

4-4. PREVENTATIVE MAINTAINANCE

The preventative maintainance checklist (Table D-3.) is designed to assist in keeping the Tirehand in peak operating condition. The information in this section refers to the Tirehand only. Consult the manufacturers service guide for information on the carrier vehicle.

4-5. REGULAR INSPECTION

Every three months, or more often when the equipment is subjected to heavy use, the following inspections should be performed in addition to the preventative maintainance checklist.

4-5-1. TIREHAND ARM ASSEMBLIES

1. Check for structural defects such as weld cracks, dents, or bends.
2. Check cylinder holding valves.
3. Check cylinders for leaks.
4. Check both internal and external clamping arm bearings for wear and lubrication.
5. Check operating timing. Both clamping arms should function together at the same rate of motion.

4-5-2. AXIAL PAD ROTATION

1. Check for structural defects.
2. Check motors for leaks.
3. Check disc bearings located on support shafts.
4. Check all pins, and their retainers.

4-5-3. HYDRAULIC SYSTEM

4-5-3-1. CYLINDERS

1. Check rods for damage, such as scarring, and check for rust on out of service units.
2. Check for weld joint and seal leaks.
3. Check for drift, indicating possible leakage around the piston.
4. Check cylinder case for cracks and dents.

4-5-3-2. HYDRAULIC PUMP

1. Check for leaks at shaft seal and section joints.
2. Check for drop in operating speed.
3. Check system operating pressure.

4-5-3-3. HYDRAULIC CONTROL VALVES

1. Check for leaks at section joints and spools.
2. Check for ease of spool movement.
3. Check all relief valve settings

4-5-3-4. OIL RESERVOIR AND HOSES.

1. Check filters for clogged elements.
2. Check oil level in the reservoir.
3. Check all hoses for damage.

4-5-4. CARRIER BOOM AND CYLINDERS

1. Check for structural defects, such as dents, bends, and weld cracks.
2. Check all pins and their retainers.
3. Check cylinder rods for damage, and check for leaks.

4-5-5. SIDE SHIFT ASSEMBLY.

1. Check cylinders for leaks and damage.
2. Check linear bushings for damage and lubrication.
3. Check for structural defects.
4. Check cylinder retaining pins.

4-5-6. ROTATION ASSEMBLY

1. Check gear box for proper rigidity and bolt torque.
2. Check turntable bolt torque.
3. Check for pinion gear/gear bearing backlash.

Section 5. PARTS

5-1. GENERAL

This section contains the exploded parts drawings, with accompanying parts lists, for the assemblies used in the manufacture of the Tirehand. These drawing are intended to assist in ordering parts and repairing the unit.

5-2. CYLINDER IDENTIFICATION

To be certain that proper replacement are received, it is necessary to specify the correct letter/number sequence for any parts request. The number stamped on the cylinder case must be used when ordering cylinder parts.

5-3. WELDMENT IDENTIFICATION

Each of the major weldments bears a stamped part number. Anytime that a major weldment is replaced, it is necessary to specify the complete part number stamped on that weldment. The locations of the part numbers are as shown in Figure E-2.

5-4. ORDERING REPAIR PARTS

When ordering replacement parts:

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

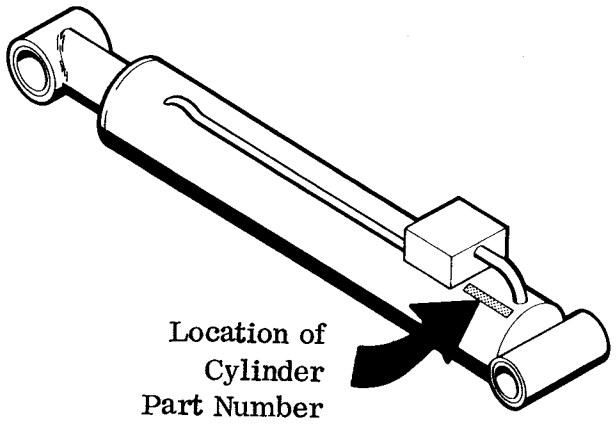


Figure E-1. Cylinder Part Number Location

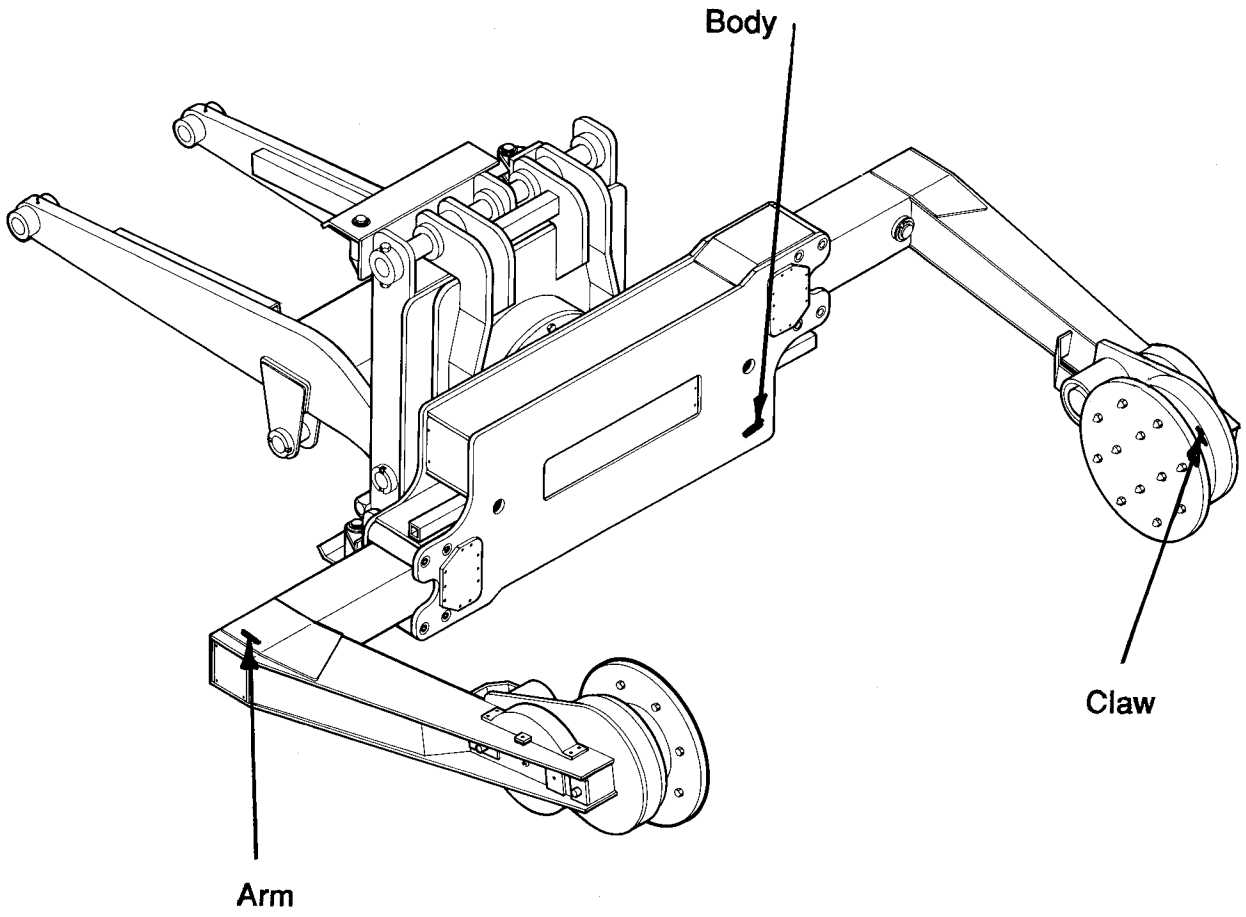


Figure E-2. Weldment Part Number Locations

NOTE: Reference only. Actual base configurations vary with each application.

BASE ASSEMBLIES (REFERENCE)	
A-66 FORD	30702555
966 CAT	30702813

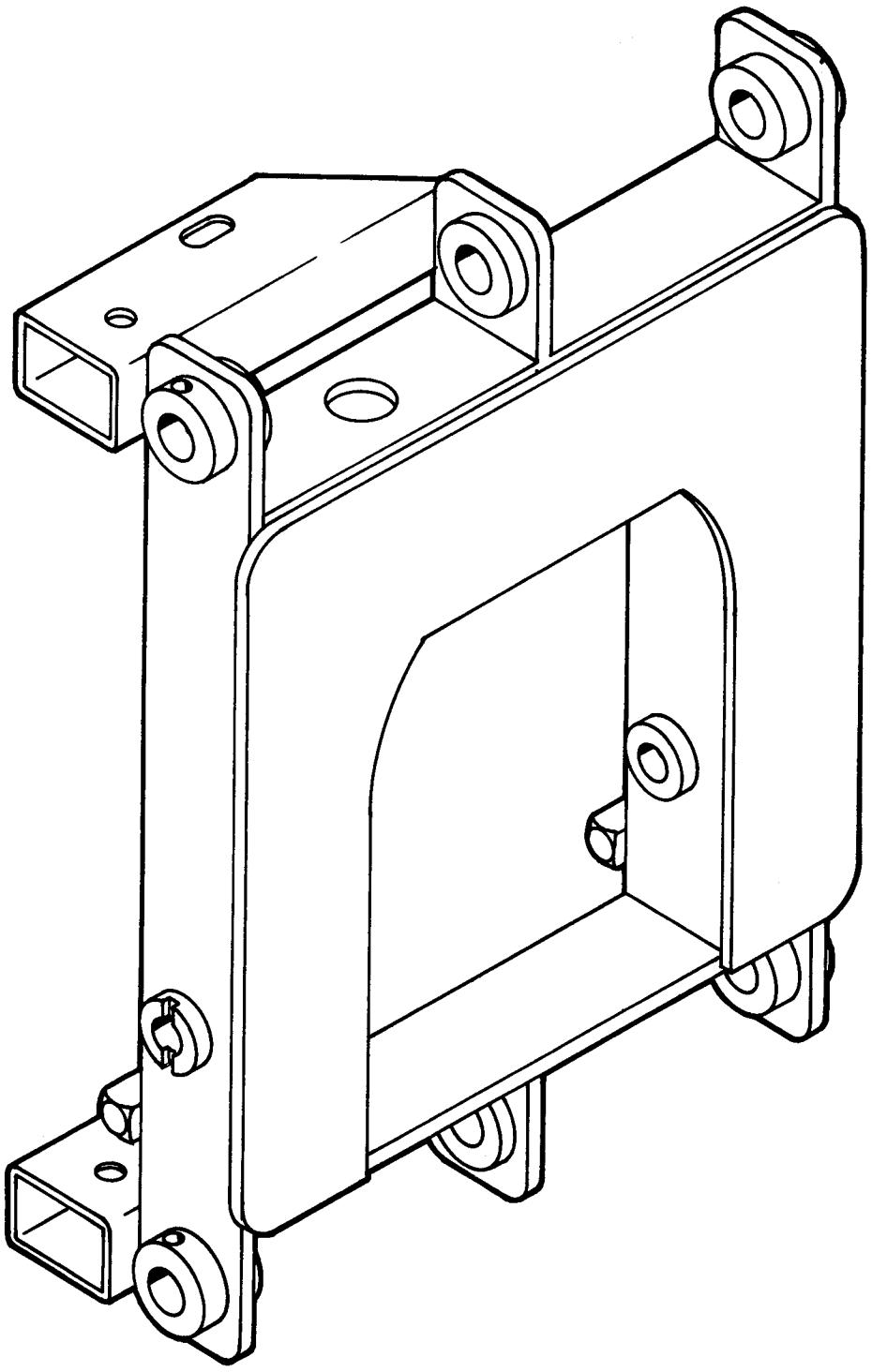
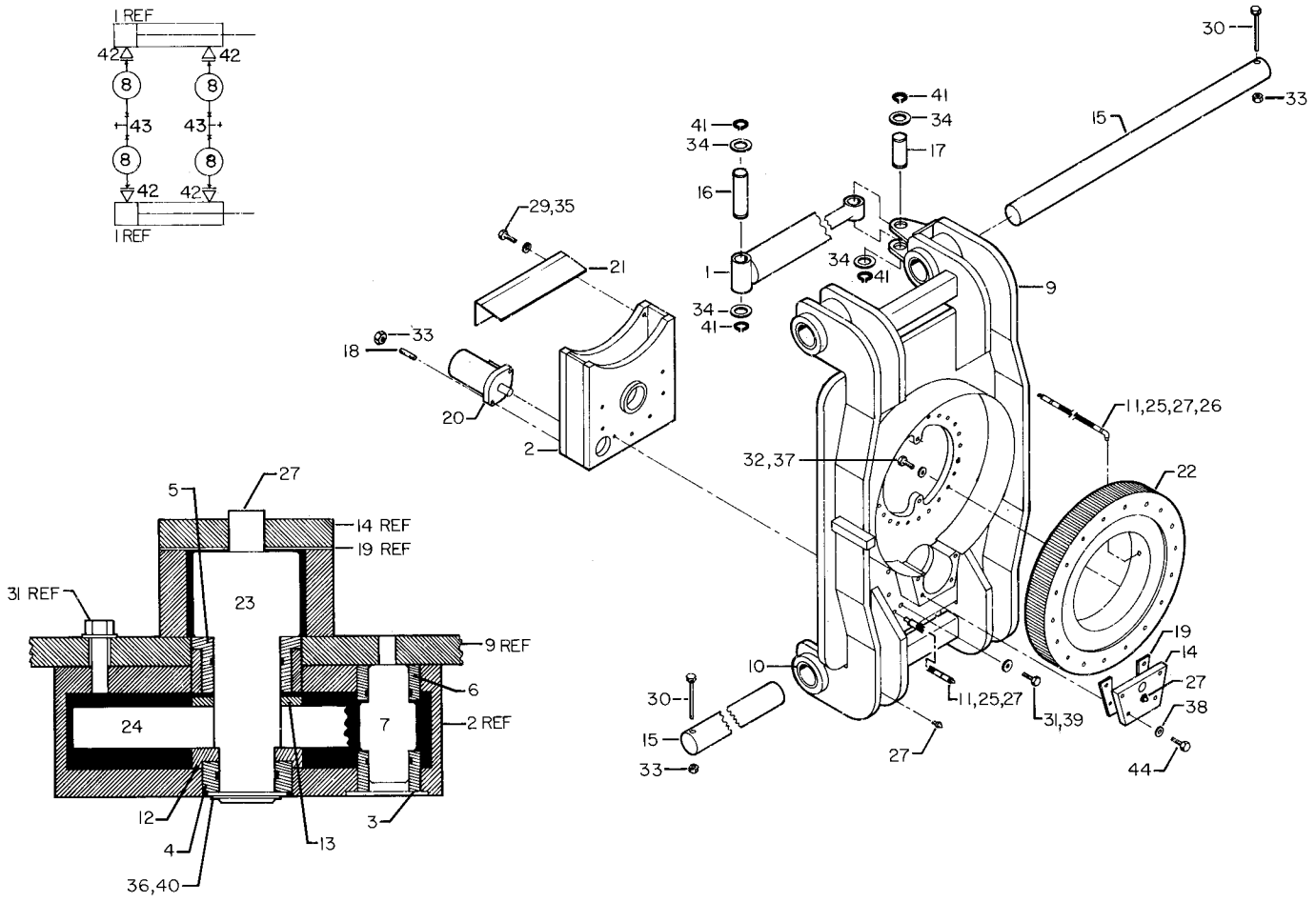


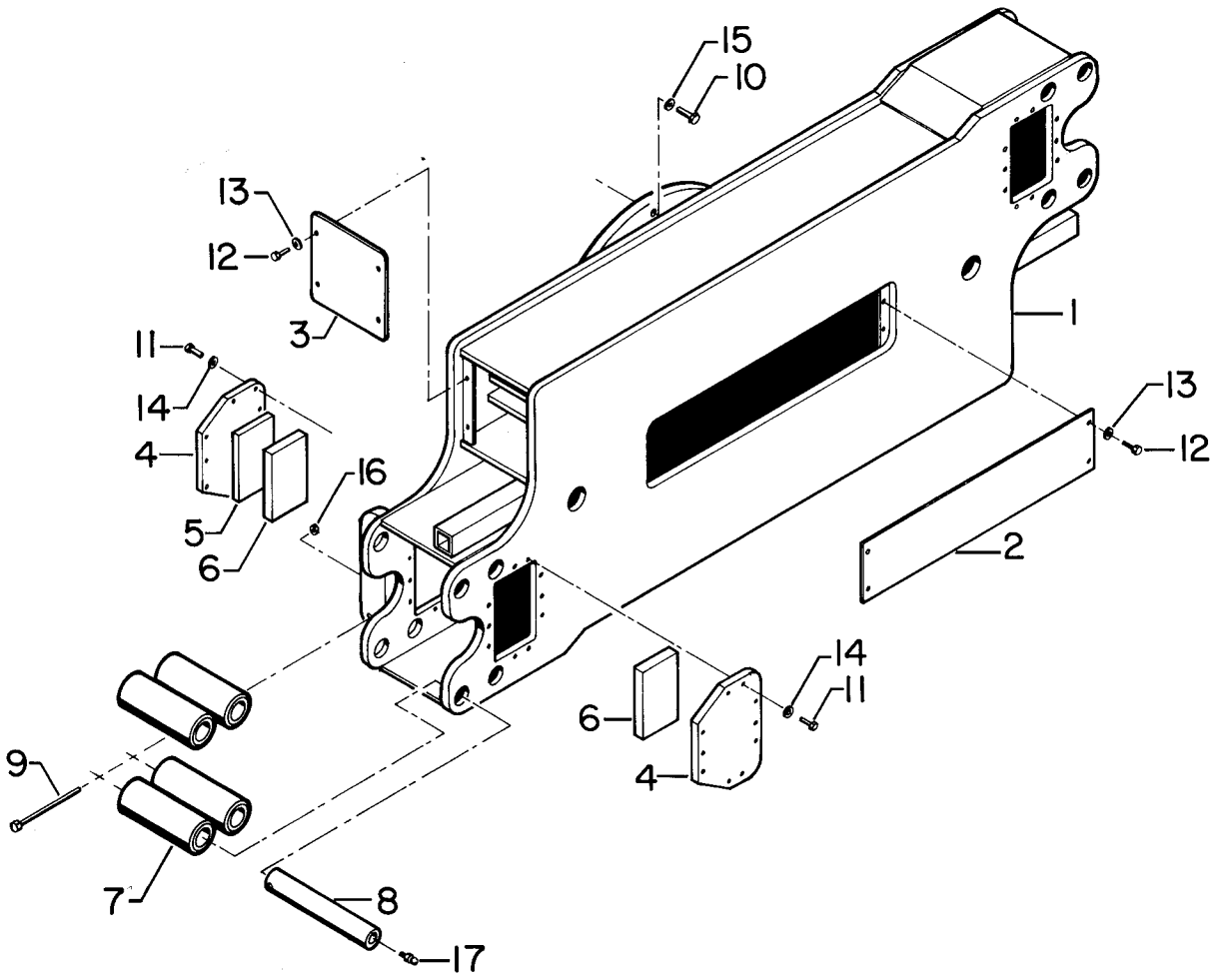
Figure E-3. Base Assembly



ITEM	PART NO.	DESCRIPTION	QTY
1.	3B205511	CYLINDER	2
2.	51703568	GEAR BOX (INCL. 3-7)	1
3.	60020173	BUSHING (PART OF 2)	1REF
4.	60020174	BUSHING (PART OF 2)	1REF
5.	60020176	BUSHING (PART OF 2)	1REF
6.	60020177	BUSHING (PART OF 2)	1REF
7.	71056011	DRIVE GEAR (PART OF 2)	1REF
8.	51703771	HOSE ASSEMBLY, 1/4ID X 29	4
9.	52703475	SUB-BASE (INCL. 10)	1
10.	60020203	BUSHING (PART OF 9)	8REF
11.	53000703	HOSE, GREASE EXTENSION	2
12.	60020172	WASHER, THRUST	1
13.	60020175	WASHER, THRUST	1
14.	60020178	PLATE, SUPPORT	1
15.	60102160	SHAFT, LINEAR	2
16.	60102201	PIN, 1 1/2 X 5 15/16	2
17.	60102202	PIN, 1 1/2 X 3 15/16	2
18.	60106032	STUD, 1/2 X 2	2
19.	60106035	SPACER, PINION SUPPORT	1
20.	73051384	MOTOR, HYDRAULIC	1
21.	60106043	GUARD, SPUR, GEAR	1
22.	71056273	GEAR, TURNTABLE BEARING	1

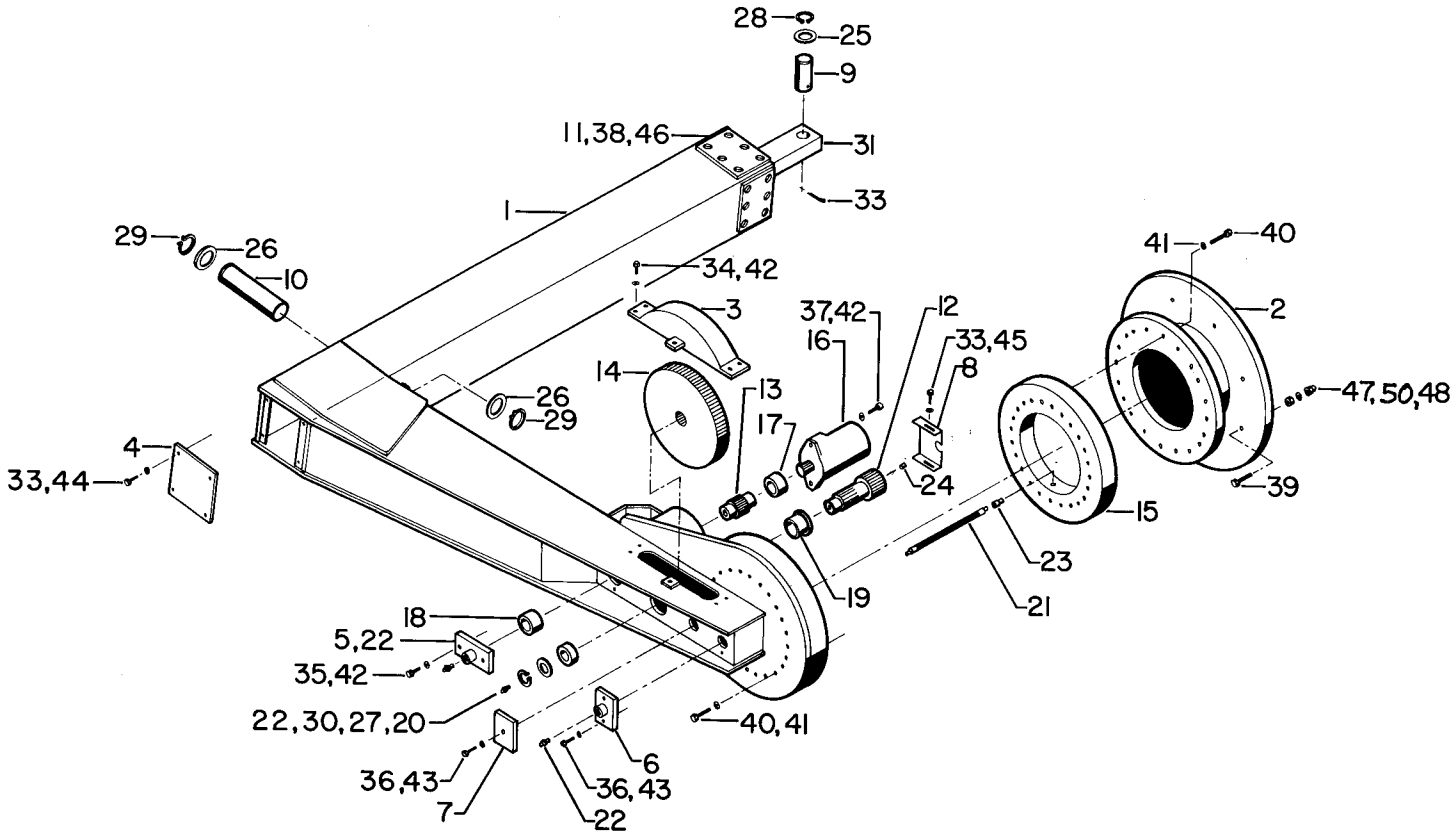
ITEM	PART NO.	DESCRIPTION	QTY
23.	71056073	GEAR, PINION	1
24.	71056264	GEAR, INTERMEDIATE	1
25.	72053301	COUPLING, 1/8	2
26.	72053321	ELBOW, 1/8, 90 DEGREE	1
27.	72053508	ZERK, 1/8 NPT	8
29.	72060089	CAP SCREW, 1/2 X 3/4 GR5	2
30.	72060103	CAP SCREW, 1/2 X 6 GR5	2
31.	72060151	CAP SCREW, 5/8 X 2 GR8	7
32.	72601148	CAP SCREW, 7/8-9X3 HHGR8	23
33.	72062080	NUT, SELF LOCKING, 1/2	4
34.	72063037	BUSHING, 1 1/2 X 10 GA.	8
35.	72063053	WASHER. LOCK, 1/2	2
36.	72063039	BUSHING, 2 X 10 GA. NR	1
37.	72063115	WASHER, FLAT, 7/8 HARD	23
38.	72063117	WASHER, FLAT, 9/16 GR8	4
39.	72063119	WASHER, FLAT, 5/8 GR8	7
40.	72066095	RING, RETAINING, 2	1
41.	72066132	RING, RETAINING, 1 1/2	8
42.	72532351	ADAPTER, 7/16MSTR 7/16JIC	4
43.	72532768	TEE, 7/16 JIC 1/4 TUBE (M)	2
44.	72601144	CAP SCREW, 9/16 X 2 GR8	4

Figure E-4. SUB BASE ASSEMBLY (40703474)



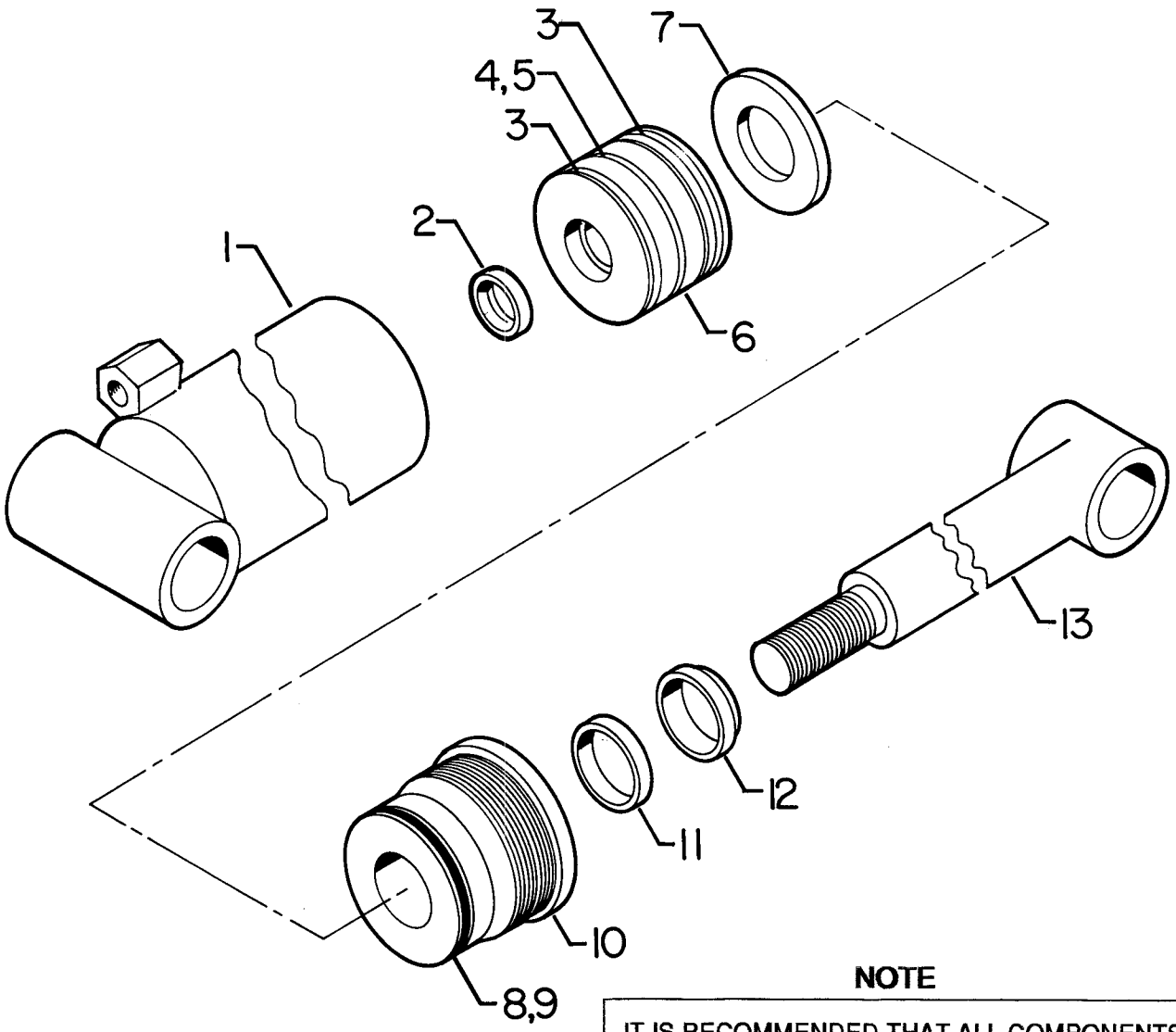
Item No.	Part No.	Description	Qty
1.	52702550	Body	1
2.	60105160	Cover	1
3.	60102175	Cover	2
4.	60105159	Cover	4
5.	60105161	Spacer	2
6.	60020160	Pad, Wear	4
7.	60020159	Roller	8
8.	60105158	Pin, Roller/body	8
9.	72060105	Cap screw, 1/2 x 7 gr5	4
10.	72060440	Cap screw, 3/4 x 2 gr8	18
11.	72060117	Cap screw, 1/2 x 1 1/2 gr8	40
12.	72060833	Cap screw, 5/16 x 3/4	12
13.	72063050	Washer, Lock 5/16	12
14.	72063053	Washer, Lock 1/2	40
15.	72063116	Washer, Flat, 3/4 gr8	8
16.	72062080	Nut, Lock, 1/2	4
17.	72053508	Zerk, Grease, 1/8 npt	8

Figure E-5. Body Assembly (Part Number 40702551)



Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	52702558	Arm (incl. 13, 17-20)	2ref	26.	72063039	Bushing, 2 x 10 ga.	4ref
2.	52709319	Claw	2ref	27.	72063035	Bushing, 1 1/4 x 10 ga.	2ref
3.	52702743	Gaurd, Gear	4ref	28.	72066132	Ring, Retaining	2ref
4.	60102082	Cover, Arm	2ref	29.	72066136	Ring, Retaining	4ref
5.	52702797	Plate, Grease	2ref	30.	72066129	Ring, Retaining	2ref
6.	52702796	Plate, Grease	2ref	31.	3B308413	Cylinder	2ref
7.	60105494	Plate, Arm cover	2ref	32.	72066194	Pin, Cotter	2ref
8.	60104763	Cover, Pinion gear	2ref	33.	72060833	Screw, Self tap., 5/16 x 3/4	12ref
9.	60102096	Pin, 1 1/2 x 3 15/16	2ref	34.	72060091	Cap screw, 1/2 x 1 gr5	20ref
10.	60102097	Pin, 2 x 9 3/8	2ref	35.	72060092	Cap screw, 1/2 x 1 1/4 gr5	4ref
11.	60020161	Pad, Wear	8ref	36.	72060046	Cap screw, 3/8 x 1 gr5	6ref
12.	71056010	Gear, Pinion	2ref	37.	72060784	Cap screw, 1/2 x 1 1/4	4ref
13.	71056011	Gear, Drive (part of 1)	2ref	38.	72601000	Bolt, Stove, 1/2 x 1 1/2	48ref
14.	71056012	Gear, Intermediate	2ref	39.	72060208	Cap scr 3/4-10 x 2-1/2 hhgr8	24ref
15.	71056062	Gear, Turntable bearing	2ref	40.	72060151	Cap screw, 5/8 x 2 gr8	78ref
16.	73051662	Motor, Hydraulic	2ref	41.	72063119	Washer, Flat, 5/8 gr8	78ref
17.	60020115	Bushing (part of 1)	2ref	42.	72063053	Washer, Lock, 1/2	28ref
18.	60020100	Bushing (part of 1)	2ref	43.	72063051	Washer, Lock, 3/8	6ref
19.	60020114	Bushing (part of 1)	2ref	44.	72063050	Washer, Lock, 5/16	8ref
20.	60020081	Bushing (part of 1)	2ref	45.	72063002	Washer, 5/16	4ref
21.	53000703	Extension, Grease, 20	2ref	46.	72062080	Nut, Self lock, 1/2	48ref
22.	72053508	Zerk	6ref	47.	72062042	Nut, 3/4-10 hex	24ref
23.	72531826	Bushing, Reducer, 1/4-1/8	2ref	48.	72062079	Nut, Acorn, 1/2	24ref
24.	72053240	Plug	2ref	49.	40702552	Arm (incl. 1-48,50)	2
25.	72063037	Bushing, 1 1/2 x 10 ga.	2ref	50.	72063056	Washer 3/4 lock	24ref

Figure E-6. Clamp Assembly (Part Number 40703197)



BORE	3.00"
STROKE	8.00"
CTR-CTR CL	24.25"
ROD DIA	1.50"
PIN DIA	1.50"

NOTE

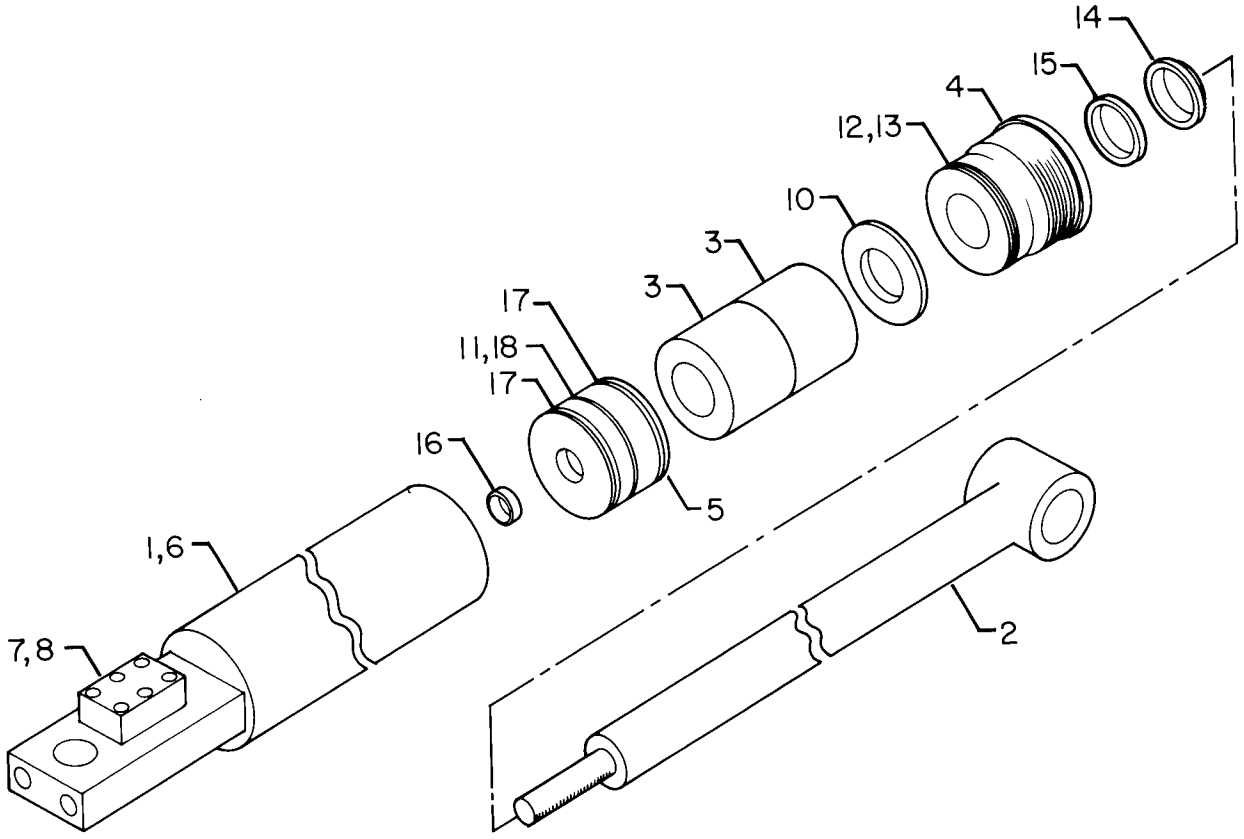
IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

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

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

Item No.	Part No.	Description	Qty
1.	4B205511	Case	1
2.	7T61N106	Ring, Lock (part of 14)	1ref
3.	7T65I030	Ring, Piston (part of 14)	2ref
4.	7Q072145	O-ring (part of 14)	1ref
5.	7T66P030	Seal, Piston (part of 14)	1ref
6.	6I030106	Piston	1
7.	6A025015	Wafer lock (part of 14)	1ref
8.	7Q072334	O-ring (part of 14)	1ref
9.	7Q10P334	Ring, Back-up (part of 14)	1ref
10.	6H030015	Head	1
11.	7R546015	Seal, Rod (part of 14)	1ref
12.	7R14P015	Wiper, Rod (part of 14)	1ref
13.	4G205510	Rod	1
14.	9C121217	Seal Kit (incl:2-5,7-9,11 & 12)	1

Figure E-7. Side Shift Cylinder (Part Number 3B205511)



BORE	4.00"
STROKE	39.00"
CTR-CTR CL	61.38"
ROD DIA	2.00"
PIN DIA	1.50/2.00

NOTE

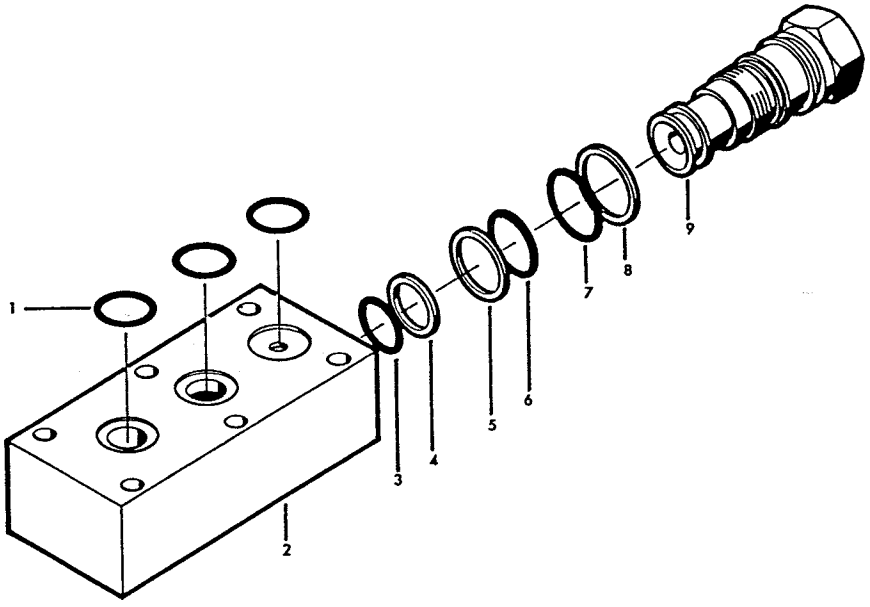
IT IS RECOMMENDED THAT ALL COMPONENTS OF THE SEAL KIT BE REPLACED WHENEVER THE CYLINDER IS DISASSEMBLED. THIS WILL REDUCE FUTURE DOWNTIME.

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

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

Item No.	Part No.	Description	Qty
1.	4B308411	Case	1
2.	4G308410	Rod	1
3.	6C300020	Tube, Stop	2
4.	6H040020	Head	1
5.	6I040143	Piston	1
6.	7PNPXT02	Plug	3
7.	72060708	Cap screw, 1/4 x 1 1/4 SH	6
8.	73054004	Valve, Holding	1
9.	9C161623	Kit, Seal (incl. 10-18)	1
10.	6A025020	Wafer lock (part of 9	1ref
11.	7Q072153	O-ring (part of 9)	1ref
12.	7Q072342	O-ring (part of 9)	1ref
13.	7Q10P342	Ring, Back-up (part of 9)	1ref
14.	7R14P020	Wiper, Rod (part of 9)	1ref
15.	7R546020	Seal (part of 9)	1ref
16.	7T61N143	Ring, Lock (part of 9)	1ref
17.	7T65I040	Ring, Piston (part of 9)	2ref
18.	7T66P040	Seal, Piston (part of 9)	1ref

Figure E-8. Clamp Cylinder (Part Number 3B308413)



ITEM NO.	PART NO.	DESCRIPTION	QTY
1.	7Q072014	O-RING	3 REF
2.		VALVE BLOCK (Order item 10)	REF
3.	7Q072015	O-RING	1 REF
4.	7Q10P015	BACK-UP RING	1 REF
5.	7Q10P017	BACK-UP RING	1 REF
6.	7Q072017	O-RING	1 REF
7.	7Q072018	O-RING	1 REF
8.	7Q10P018	BACK-UP RING	1 REF
9.		VALVE BODY (Order Item 10)	REF
10.	73054004	COMPLETE VALVE (Incl: 1-9)	1

Figure E-9. Locking / Holding Valve (Part Number 73054004)

Section 6. INSTALLATION INSTRUCTIONS

6-1. GENERAL

This section contains information related to the installation of the 1836A Tirehand to specific loaders. It is intended to be used only as a supplement to the other sections in this manual. Remember, installations may vary from one particular case to another.

6-2. INSTALLATION PROCEDURE CATERPILLAR 950B, 966D, 966E

WARNING

IMT strongly recommends that the loader be equipped with the full logging counterweight, ballasted rear tires (23.5 x 25, 24 PR L-3), and flow control valves on the main cylinders.

To install the IMT model 1836A Tirehand, procede as follows:

Mount the Tirehand to the carrier vehicle arms, using the three pins provided.

Remove the oil fill plate. Install the hydraulic pump and adapter plate loosely (Figure F-1.).

Install the new oil fill plate.

Drain the hydraulic oil reservoir into a clean container. Save the oil for later use.

Remove the bulkhead plate from the bottom of the oil reservoir, and replace it with the manifold block as shown in Figure F-2.

Install the adapter fittings, and the suction line filter on the inlet of the pump (Figures F-3 and F-4). It may be necessary to remove the pump in order to provide ample work space to secure the filter and fittings. The use of thread sealer, and adequate tightening will be necessary to prevent leaks.
Using the fittings provided, install the suction line between the oil reservoir and the suction line filter. Take care that the flow of oil through the filter is correct (Figure F-3).

Secure the pump and adapter plate, and reinstall them on the carrier vehicle. The use of Loctite, or a similiar product, is recommended.

Install the return line between the control valve and the hydraulic oil reservoir with necessary adapter fittings (Figures F-2 and F-3).

Check all new hoses and component parts to be certain that adequate clearance has been provided. Take care to ensure that the operation of the carrier vehicles steering system and arms will not interfere with the new parts.

Locate and secure the control box to the carrier vehicle immediately to the right of the instrument gauges.

Cut an opening adequate to allow passage of the power and control cable. This opening should be located directly below the control box.

Route the control cable from the control box to the hydraulic control valve, making certain that clearance has been provided for all functions to operate freely. Connect the cable.

Route the power cable from the control box to the batteries. The red wire should be connected to +12 volts, and the black to the ground terminal on the battery. Special caution should be used not to connect the power cable to both batteries, as the result will be +24 volts.

CAUTION

Connecting the controls for this unit to more than +12 vdc will cause damage to electrical components.

Fill the hydraulic oil reservoir.

Start the carrier vehicle's engine and operate all hydraulic functions several times in order to purge any trapped air from the system. The vehicle's steering system should also be operated during this procedure.

With the engine running, check all hoses and adapter fittings for leaks, and repair if necessary. Recheck all hoses and cables for adequate clearance.

Check the oil level in the reservoir, and fill if necessary.

Test operate all functions at full rated capacity.

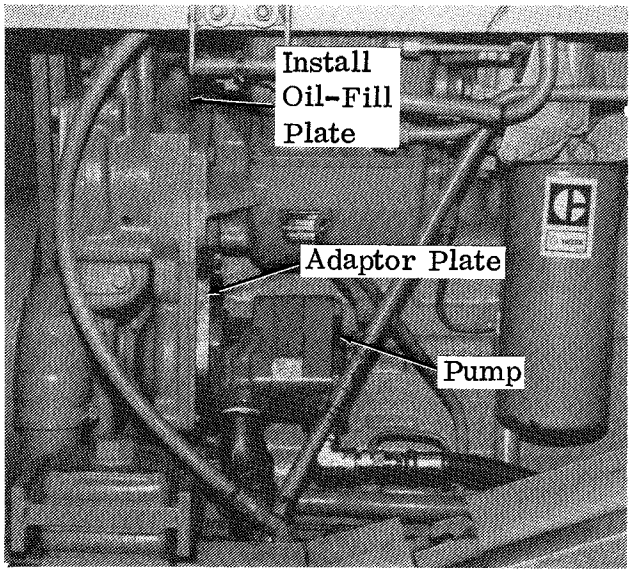


Figure F-1.

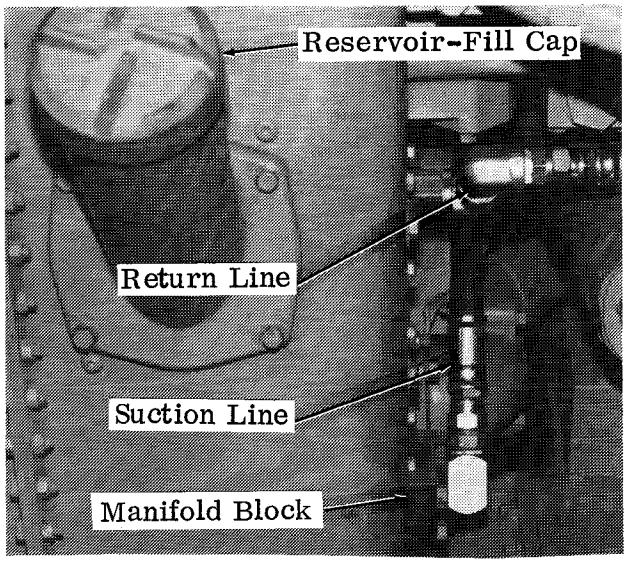


Figure F-2.

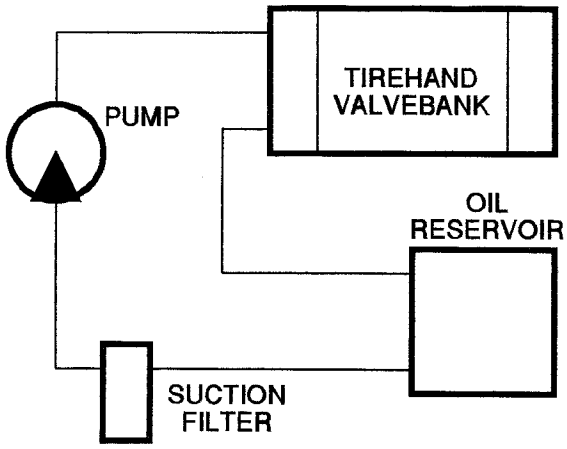


Figure F-3.

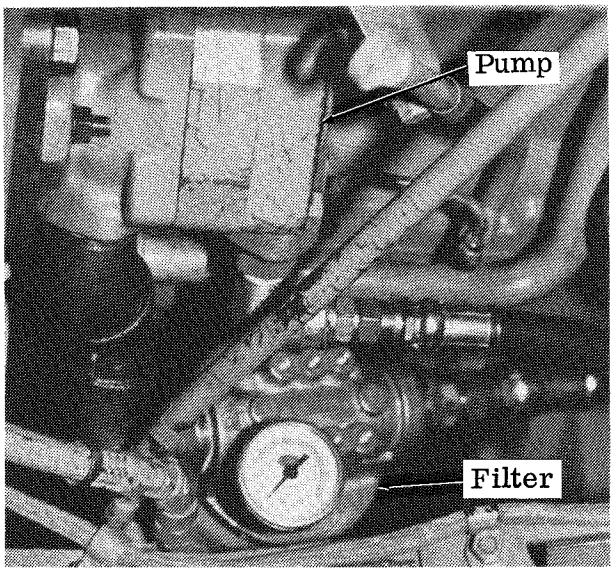


Figure F-4.

6-3. INSTALLATION PROCEDURE VME L160

Connect the Tirehand to the carrier vehicle arms.

The hydraulic quick disconnect couplers which provide the quick attach system on the vehicle should be disconnected and reattached to the hoses on the Tirehand.

The remote control box is to be located in the cab of the carrier vehicle. It should be positioned immediately in front of the vehicle's control lever station.

Cut a 2" opening in the floor of the cab to allow passage of the remote control cable and the power cable. The hole should be located directly below the position where the control box will be located. Cut the opening.

NOTE

It will be necessary to use a hole grommet, or in some way protect the electrical wiring from being cut by sharp edges.

Route a single wire power cable from the remote control box, in the cab, to the vehicle's battery. Take care to route the wire along the frame in order to offer the most protection.
Route the remote control cable from the control box, in the cab, to the control valves. Route this cable along the loader arms to the end of the boom, taking care to position it so that it is protected from normal loader operation.

Mount the remote control box in a position immediately in front of the control lever station.

Connect the amphenol connector on the remote control cable, to the connector on the Tirehand.

Connect the power cable to the positive 12 vdc on the battery. Special caution should be taken not to connect to both batteries, as the result will be +24vdc.

CAUTION

Connecting more than +12vdc to this equipment will cause damage to electrical components.

Connect the power cable to the control box.

Install all decals and control placards in appropriate positions. Take care that decals and placards are easily visible.

To operate a Tirehand function, engage the appropriate switch on the control box, and operate the quick attach lever for correct movement. Operate all functions several times to check for continuous and precise operation.

Check all wiring and hose routing to ensure that adequate clearance has been provided, and that normal operation of the vehicle will not cause excessive abrasion or wear.

Test operate the unit at full rated capacity.

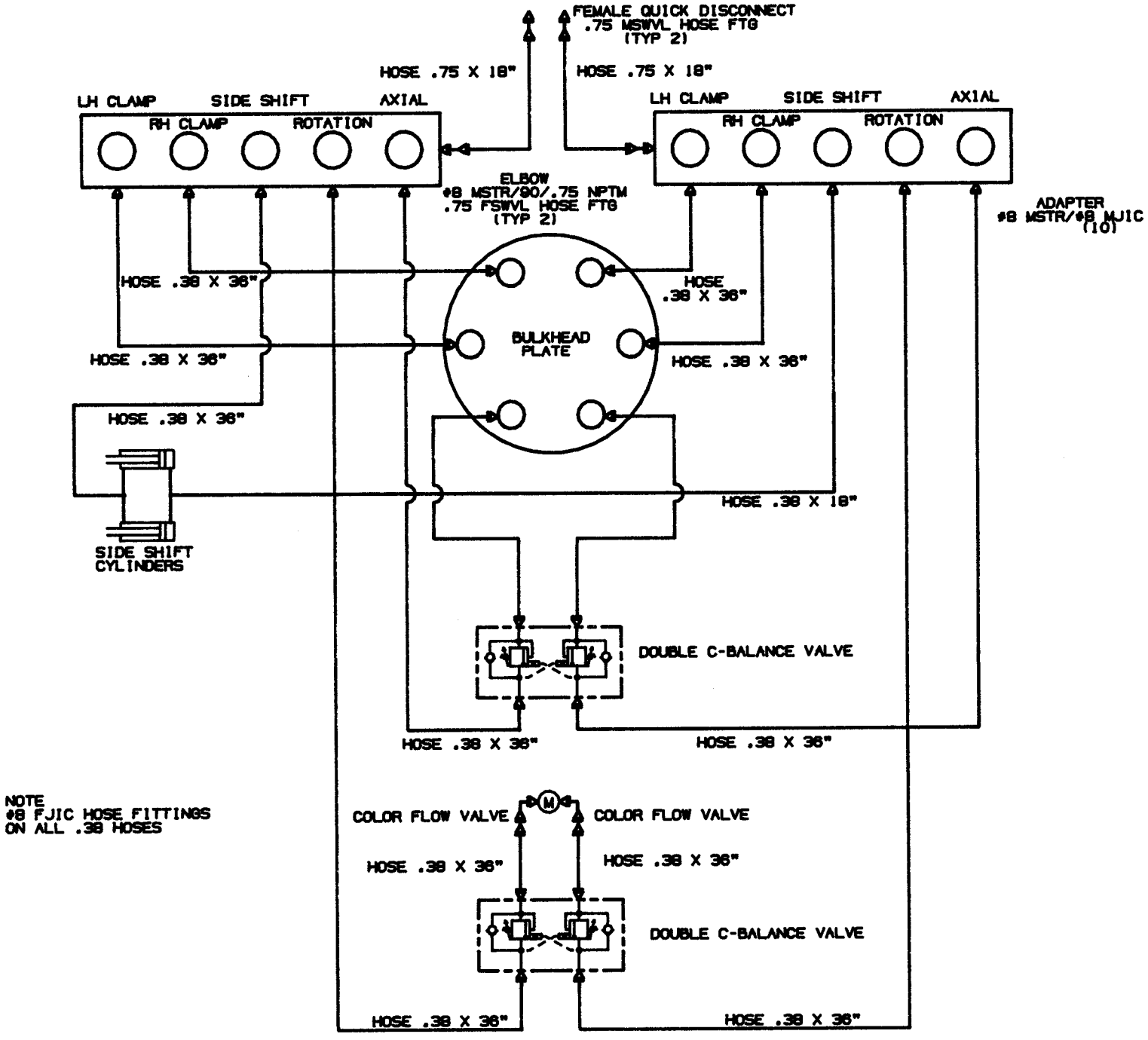


Figure F-5. VME L160 Hydraulics

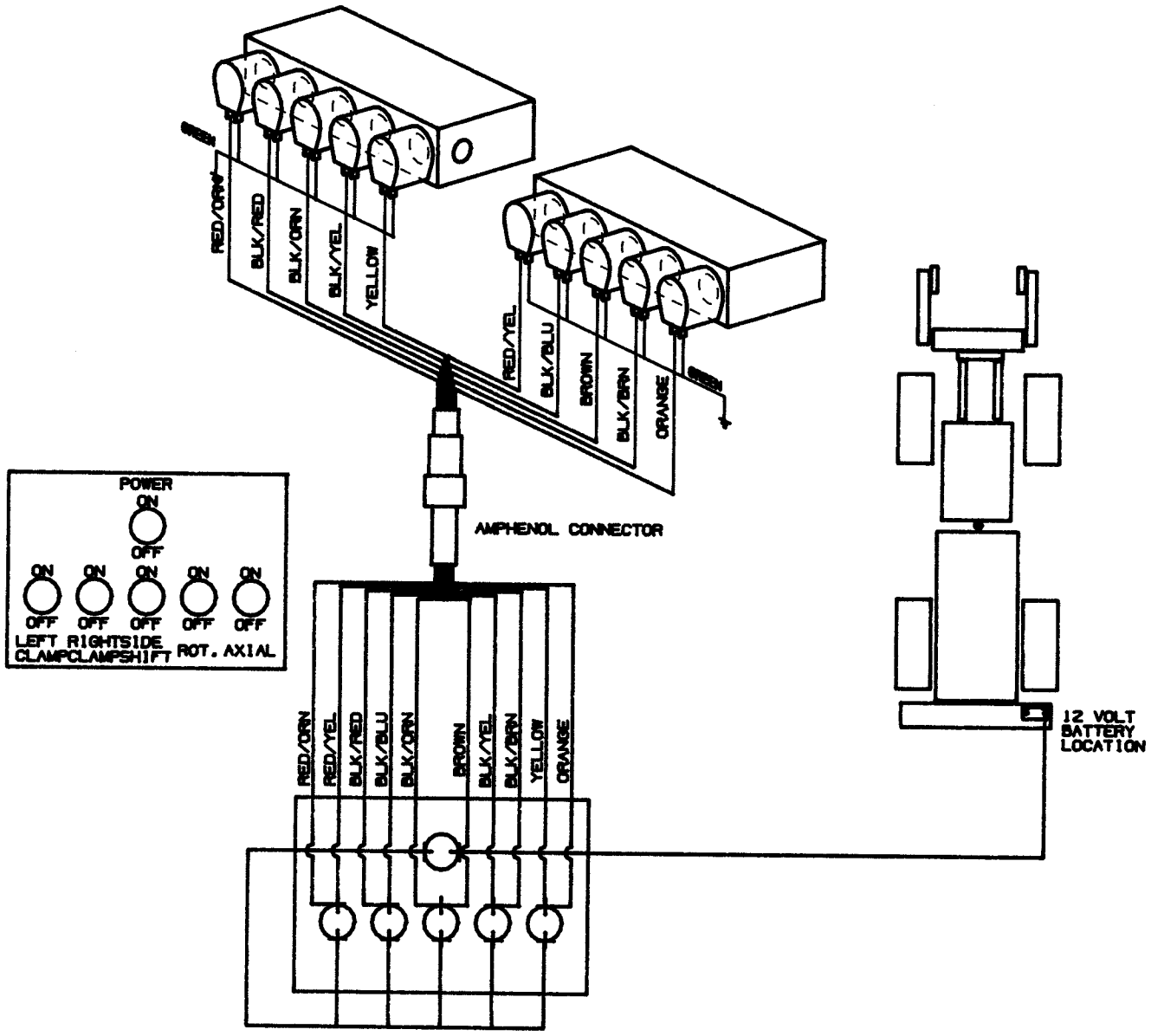


Figure F-6. VME L160 Controls

Section 7. REPAIR

7-1. GENERAL

This section describes disassembly, repair and assembly of many of the components used on the Tirehand. Some information prsented here may not be applicable to your model of Tirehand.

7-2. HYDRAULIC SYSTEM

Certain procedures involving the hydraulic system require special consideration for proper functioning and service life of the unit. These steps are to be taken whenever a hydraulic component is disconnected.

1. ALWAYS relieve internal hydraulic pressure before proceeding with the repair.

2. NEVER allow foreign matter - dirt, water, metal particles, etc. - to enter the hydraulic system through the open connection. Seal the connection as tightly as possible. If dirt does get in, a filter change is required after about 50 hours of operation.

3. ALWAYS cycle all of the controls after completing a repair. This will eliminate air that is trapped in the cylinders, hoses, spool valves, etc. and avoid bumpy, erratic behavior during actual working conditions.

4. ALWAYS check for hydraulic leaks after a repair. A high pressure leak is hazardous and must be repaired before putting the unit to work.

7-2-1. CYLINDERS

All of the cylinders used on the Tirehand are of the same basic type; therefore, the same disassembly and repair instructions apply. Check the PARTS section for specific information. The following list of tools will be a definite asset in the disassembly and repair of all IMT cylinders.

1. SPANNER WRENCH - IMT Part Number 3Y140510.

2. NEEDLE-NOSE PLIERS - For removal and replacement of seals.

3. ICE PICK or SHARP AWL - For removal and replacement of seals.

4. PLASTIC HAMMER - Used with the spanner wrench for head and piston assembly.

7-2-1-1. CLAMP CYLINDER REMOVAL AND INSTALLATION

1. Rotate the Tirehand until the affected cylinder is on top and the arms are parallel to the floor.

2. Extend the affected cylinder full stroke.

NOTE

> On those units with a single clamp cylinder control valve, both cylinders will extend.

3. Shut off the carrier vehicle's engine. Relieve internal hydraulic pressure by cycling the controls.

4. Remove the end cover from the body (refer to the appropriate body drawing) and disconnect the hydraulic hoses at the cylinder port block. Cap the hydraulic hoses.

5. Support the clamp arm with a lifting device capable of supporting the arm. Take up the slack in the lifting device.

WARNING

> Make certain that the chain or cable used on the lifting device is unable to slip. Also support the pad end of the arm so that it will not rotate the arm.

6. Remove the trunnions.

7. Remove the retaining ring and machinery bushing from the base cylinder pin. Drive out the pin.

8. Disconnect the axial rotation hoses at the motor). Cap the lines and plug the motor ports.

9. With the lifting device assisting, work the arm out of the body.

10. Remove the retaining ring and machinery bushing from the cylinder rod end, drive out the pin and slide the cylinder out of the arm.

11. Disassemble and repair the cylinder as necessary (Paragraph 7-2-1-3 and 7-2-1-4).

To install the cylinder arm:

1. Slide the cylinder into the arm until the rod end of the cylinder lines up with the hole on the arm. Drive the rod-end pin into the hole and install the machinery bushing and retaining ring.

2. Lift the arm with a lifting device capable of supporting the arm. Slide the end of the arm into the body and work it in as far as possible.

WARNING

Make certain that the lifting device will not allow the arm to slide or rotate while lifting.

3. Line up the cylinder base-end pin boss with the hole in the arm. Drive the pin in and install the retaining ring and machinery bushing.

NOTE

It may be necessary to connect the hydraulic hoses to the cylinder's port block in order to extend and retract the base end of the cylinder to make it line up.

4. Connect the hydraulic hoses to both the clamp cylinder and axial rotation motor.

5. Install the trunnions and end cover.

6. Start the engine, cycle the CLAMP and AXIAL controls through at least five (5) cycles to purge any air that may be trapped in the system. Check for leaks.

7. Check the hydraulic fluid level with all cylinders retracted. Fill if necessary.

8. Test the unit with a simulated job operation before proceeding to the job site.

7-2-1-2. SIDE SHIFT CYLINDER REMOVAL AND INSTALLATION

Cylinder removal is accomplished as follows:

1. Rotate the Tirehand so that the affected cylinder is at the top.

2. Disconnect the hydraulic hoses from the cylinder port block. Cap the hoses.

3. Remove the retaining rings and bushings from the rod end and base end of the cylinder. Drive out the pins.

4. Disassemble and repair the cylinder (refer to Paragraphs 7-2-1-3 and 7-2-1-4).

To install the cylinder:

1. Line up the cylinder base-end pin boss with the holes in the base. Drive in the pin and install the machinery bushing and retaining ring.

2. Connect the hydraulic hoses to the cylinder port block.

3. Extend and retract the cylinder until the rod-end pin boss lines up with the holes in the sub-base. Drive in the pin and install the machinery bushing and retaining ring.

4. Extend and retract the cylinder through five (5) complete cycles to purge air that may be trapped in the system. Check for leaks.

5. Check the hydraulic reservoir fluid level with all cylinders retracted. Fill if necessary.

6. Conduct a simulated job operation before proceeding to the job site.

7-2-1-3. CYLINDER DISASSEMBLY

CAUTION

If solvent is used to clean the internal cylinder components, all traces of solvent must be removed. Any residue will damage the seals.

WARNING

DO NOT use compressed air to assist in withdrawing the piston/rod assembly. The use of compressed air may result in propelling the piston/rod assembly out of the cylinder and may cause serious injury or death.

NOTE

If the cylinder is being repaired due to a worn seal, we recommend replacing all components found in the seal kit. The small additional expense may save expensive equipment down-time in the near future. Refer to the PARTS section for seal kit numbers.

1. Thoroughly wash the exterior of the cylinder case.

NOTE

After the case has been washed, proceed with disassembly in a clean environment, one that is free of dust and dirt.

2. Remove the six (6) allen head screws and lift off the holding valve. Check the holding valve for proper operation (refer to Paragraph 7-2-2, Step 4 through Step 6).

3. Place the cylinder on a flat surface near a vise. Slip a pin through the pin boss and clamp the pin in a vise (Figure G-1).

CAUTION

DO NOT clamp the cylinder in a vise. It may damage the cylinder case.

4. Unscrew the head (Item 4, Figure G-2) in a counterclockwise direction with the spanner wrench. Withdraw the head from the cylinder case.

5. Secure the rod pin boss in the same manner as the cylinder pin boss (Figure G-1).

6. Unscrew the piston (Item 8, Figure G-2) from the rod with the spanner wrench in the same manner as the head (Step 4).

CAUTION

DO NOT clamp the machined surface of the rod in a vise. Damage to the rod will result.

7. Remove the wafer lock (Item 13) and the stop tubes (Item 7) from the rod (item 1). The wafer lock was crushed to secure it and will have to be broken to remove it.

CAUTION

Make certain the rod is not damaged during removal of the wafer lock.

8. Slide the head off the rod.

9. Inspect the cylinder interior and the rod for dents, nicks, scratches, etc. and replace if necessary.

CAUTION

Failure to replace a damaged rod or cylinder may result in leaks and poor performance that will have to be repaired.

NOTE

Further work should be done in a warm environment (70°F or warmer). This makes the seals more pliable and easier to work with.

10. Work a slack section into the head seal static o-ring Iitem 6) and pick it up out of the groove (Figure G-3). Lift the static back-up out of its groove with the needle-nose pliers.

11. Pinch the lip of the rod wiper (Item 2) with the needle-nose pliers and pull it out of the head.

12. Position the head with the top of the head up and puncture the dynamic rod seal (item 3) with the ice pick. Pry it out of the groove and push it on through the head (Figure G-4).

13. Spread the piston rings (item 9) and slide them over the land and off the end of the piston nearest to the ring.

14. Carefully lift the dynamic piston seal (item 10) out of the groove with a thin blade such as a putty knife. Take care not to nick the edges of the groove. Twist and break the seal.

CAUTION

Damaging the edges of the groove is likely to cause premature seal failure.

15. Prick the companion o-ring with a pin or needle and lift it out of the groove. Roll it off the end of the piston.

16. Pry the lock ring (item 12) from its seat in the bottom of the piston.

17. Clean the piston, head, rod and cylinder. Dress any nicks and gouges in the head and piston that may have occurred during disassembly.

7-2-1-4. CYLINDER ASSEMBLY

CAUTION

Use all of the seals in the seal kit. It may save expensive down-time in the future.

1. Install the companion o-ring (item 11). Make certain it is free of twists.

2. Slide the piston seal (item 10) carefully into position.

CAUTION

Work the piston seal carefully into position from the top of the piston using the assembly groove. DO NOT attempt to install it from the bottom of the piston. You may stretch the seal and render it useless.

3. Slide the piston rings (item 9) over the lands and allow them to snap into position.

4. Carefully press the lock ring (item 12) into position.

5. Install the static back-up (item 5) and the o-ring (item 6). Make certain that there are no twists.

6. Position the head with the rod wiper pocket up. Grasp the dynamic rod seal (item 3) with the needle-nose pliers (Figure G-5).

CAUTION

DO NOT apply too much pressure to the rod seal or you may cut it with the needle-nose pliers.

7. Insert the dynamic rod seal into the head and allow it to snap into position. Use your fingers to help it if necessary.

8. Install the rod wiper (item 2).

9. Generously lubricate the inside diameter of the head with a non-fibrous bearing grease such as Lubriplate.

10. Carefully slide the head onto the rod. Make certain that the rod wiper (item 2) does not catch on the rod when it is first started. Slide the head all of the way onto the rod and up to the pin boss.

11. Slide the wafer lock (item 13) and stop tubes (item 7 - if applicable) onto the rod.

12. Lubricate the entire threaded area of the rod and the inside diameter of the piston with non-fibrous bearing grease.

13. Secure the rod as shown in Figure G-1 and screw the piston onto the rod by hand. You should be able to get the piston almost all the way onto the rod before using the spanner wrench.

CAUTION

Check to make certain that the lock ring (item 12) stays in position. It must remain in position or leaks may occur resulting in poor performance.

14. Torque the piston onto the rod at 250 ft-lbs of torque (Figure G-6).

15. Generously lubricate the outside diameter of both the head and piston with non-fibrous bearing grease. Also lubricate the threads and beveled area at the top of the cylinder case.

16. With a side-to-side or up-and-down motion, work the piston into the cylinder and past the threads and beveled area at the top of the cylinder case.

17. Slide the piston into the cylinder. With a rotating motion, work the o-ring (item 6) and the back-up (item 5) past the threads and hand tighten the cylinder head.

18. Secure the cylinder (Figure G-1) and torque the head in the same manner as the piston (step 14, Figure G-6).

19. Install the holding valves and their o-rings. Make certain that the o-rings are in good position and properly positioned.

7-2-2. LOCKING HOLDING VALVES

The cylinders are equipped with locking holding valves (Figure G-7). Its function is to prevent damage or injury from the crane descending in the event of a hydraulic hose or other down-stream 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. Extend the cylinder in question and kill the engine. Check to see if the cylinder "creeps". If not, the valve is servicable. If it does "creep", continue through this procedure.

WARNING

These instructions apply only to the Tirehand and not to the carrier vehicle's cylinders. For information on the carrier vehicle, refer to the manufacturer's instructions.

NOTE

Be prepared for reasonable oil drainage from the affected cylinder.

2. Remove the six (6) allen head screws securing the valve to the cylinder.

3. Lift the holding valve away from the cylinder. Be careful not to loosen the o-ring seals and introduce dirt into the cylinder base.

4. Check the smallest port for a dirt plug and clean it out if necessary (pilot port).

5. Carefully test actuate the valve needle with a small screwdriver through the center port. If the needle is free, reinstall the valve. If not, proceed with step 6 or replace the valve.

6. The valve may be assembled and cleaned as follows:

A. Unscrew the plugs from both ends of the valve body and remove the spring, needle, seat and spool. The o-rings will come out with the plugs.

B. Immerse all of the parts except the o-rings in a container of clean solvent.

CAUTION

Solvent may be corrosive to o-rings and damage them.

C. Thoroughly clean the components and then rinse them in clean solvent. Blow the parts dry with compressed air.

D. Reassemble the valve and repeat step 5.

7. Install the valve and evenly tighten the six (6) allen head mounting screws.

NOTE

Take care that the o-ring seals are properly placed and are dirt free. Also be sure that the small pilot port is properly located over the small o-ring seal and port.

8. Activate the system and check for leaks.

NOTE

If the valve appears to be functioning properly and the cylinder still "creeps", hydraulic fluid is probably bypassing the piston rings. This indicates the need for new rings (refer to Paragraph 7-2-1.)

7-2-3. HYDRAULIC PUMP

Most carrier vehicles do not require the addition of a hydraulic pump. However, some vehicles use a pump with a capacity too small to power the Tirehand. In these cases, a Vicker's V210-6 pump is used. The pump capacity is 6 GPM (22.7 liters/min.) with an operating pressure of 2300 PSI (161.7 kg/cm^2) maximum at 1600 RPM. Figure G-8 shows the rotation direction indicated by the arrow on the cartridge body.

The only field repair that may be done on this pump is the replacement of the cartridge which may be obtained from your local Vickers supplier or from IMT. To replace the cartridge:

1. Remove the four (4) bolts at the rear of the pump.

2. Remove the defective cartridge and install a new cartridge. Make certain that the arrow points in the same direction as the old cartridge.

3. Install the bolts and torque to 35 in-lbs(0.4 kg/m).

7-2-4. HYDRAULIC MOTORS

Two hydraulic motors are used on the standard Tirehand: one for the Tirehand rotation and the other for axial (pad) rotation. These motors are not considered field-repairable and should be replaced if defective.

7-2-4-1. TIREHAND ROTATION MOTOR REMOVAL AND REPLACEMENT

To remove rotation motor:

1. Disconnect and cap the hydraulic hoses.

2. Remove the four motor mounting bolts.

3. Remove the cushion block and hose fittings from the old motor.

To install the new motor:

1. Install the cushion block and hose fittings from the old motor. Do not use the old o-rings, they should be replaced.

2. Position the motor on the gear reducer, install the four mounting bolts and torque them to the proper value (See Torque Table).

3. Connect the hoses.

4. Start the engine, rotate the Tirehand five (5) times in both directions and check for leaks.

5. With all cylinders retracted, check the fluid level in the reservoir and fill if necessary.

7-2-4-2. AXIAL ROTATION MOTOR REMOVAL AND INSTALLATION

To remove the motor:

1. Disconnect and cap the hoses.

2. Remove the mounting bolts and lift out the motor.

Install the motor as follows:

1. Bolt the motor in place. Torque the bolts to the proper torque value (See Torque Table).

2. Connect the hoses.

3. Start the engine and rotate the pads five (5) times in both directions. Check for leaks.

4. With all cylinders retracted, check the fluid level in the reservoir and fill if necessary.

7-2-5. RELIEF VALVE ADJUSTMENT

The hydraulic system is designed to operate at a pressure requirement of 2300-2400 PSI with an optimum oil flow of 6 GPM. If the unit pressure is less than 2350, the unit relief valve may require adjustment or replacement.

The following procedure is recommended for relief valve adjustment:

1. Start the vehicle and engage the pump.

2. With the vehicle transmission in neutral, operate any function full stroke and, with function lever still engaged at end of stroke, read the pressure on the gauge at the control valve. It should read between 2350-2400 PSI.

3. If the pressure reading is low, shut off the engine and remove the relief valve plug (Figure G-9). Install one 0.010" shim which will provide a 125 PSI increase.

4. Reinstall the relief valve plug and start the engine. If the pressure has not increased by 125 PSI, the malfunction indicates pump slippage.

5. If the 125 PSI increase is achieved, add shims as necessary to bring the pressure up to the required 2350 PSI minimum.

7-3. BEARINGS

This paragraph covers the removal and installation of turntable gear-bearings and bushings.

7-3-1. TURNTABLE GEAR-BEARING

To remove the Tirehand rotation gear-bearing:

1. Disconnect and cap the hydraulic hoses from the rotation manifold. Number the hoses for ease of reassembly (manifold port numbers are stamped in the top of the manifold).

2. Support the clamp arms with an overhead lifting device capable of supporting the weight of the unit. Take up the slack in the lifting device.

WARNING

The lifting device must be fastened to the Tirehand in such a manner that will prevent shifting of the load due to slippage.

3. Remove the eighteen (18) bolts that secure the body to the gear-bearing. Slowly work the hoses out of the rotation adapter while simultaneously withdrawing the body. Set the body carefully to one side.

4. Disconnect the grease fitting extension from the turntable gear-bearing.

5. Remove the twenty-four (24) gear-bearing mounting bolts and remove the gear bearing.

To install the gear-bearing:

1. Position the gear-bearing and torque the twenty-four (24) mounting bolts (see Torque Table).

2. Install the grease fitting extension.

3. Carefully position the body and clamp arms until the holes in the body line up with the holes in the gear-bearing. Install the mounting bolts and torque to the proper value (see Torque Table).

4. Connect the hydraulic hoses to the rotation manifold.

5. Start the engine and cycle all of the Tirehand controls at least five (5) times in both directions to purge the air in the system.

6. Check the system for leaks and repair any that are found.

7. With all cylinders retracted, check the fluid level in the reservoir and fill if necessary.

7-3-1-2. AXIAL ROTATION GEAR-BEARING

To remove the axial rotation gear-bearing:

1. Remove the eighteen (18) pad mounting bolts.

2. Disconnect the grease fitting extension.

3. Remove the twenty-one (21) gear-bearing mounting bolts and remove the bearing.

To install the bearing:

1. Position the bearing so that the holes align with those in the arm. The grease fitting extension port must be toward the pinion gear. Install and torque the mounting bolts (see Torque Table).

2. Install the grease fitting extension.

3. Position the pad over the gear-bearing, install and torque the mounting bolts (see Torque Table).

7-3-2. BUSHING REMOVAL AND INSTALLATION

To replace a bushing:

1. Remove the weldment containing the bushing.

2. Position the bushing removal tool as shown in Figure G-10 and extract the bushing.

3. To install the bushing, assemble the tool as shown in Figure G-11 and press the bushing in.

7-4. AXIAL CYLINDER REMOVAL AND INSTALLATION

To remove the axial cylinder:

1. Remove the retaining ring and machinery bushing on the rod end of the cylinder. Drive out the pin and rotate the pad out of the way.

2. Disconnect the hydraulic hoses from the cylinder port block.

3. Remove the retaining ring and machinery bushing from the base end of the cylinder. Drive out the pin and remove the cylinder.

4. Make needed repairs (see 7-2-1.).

To install the axial cylinder:

1. Slide the cylinder into position until the base-end pin boss lines up with the holes on the arm. Drive in the pin and install the machinery bushing and retaining ring.

2. Connect the hoses to the cylinder port block.

3. Rotate the pad until the rod-end pin boss lines up with the hole on the pad. Drive in the pin and install the machinery bushing and retaining ring.

4. Extend and retract the cylinder through five full cycles to purge air that may be trapped in the system.

5. Check the hydraulic fluid level with all cylinders retracted. Fill if necessary.

6. Conduct a simulated job operation before proceeding to the job site.

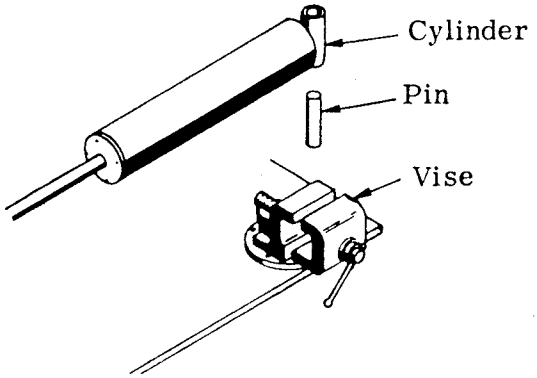


Figure G-1. Securing Cylinder

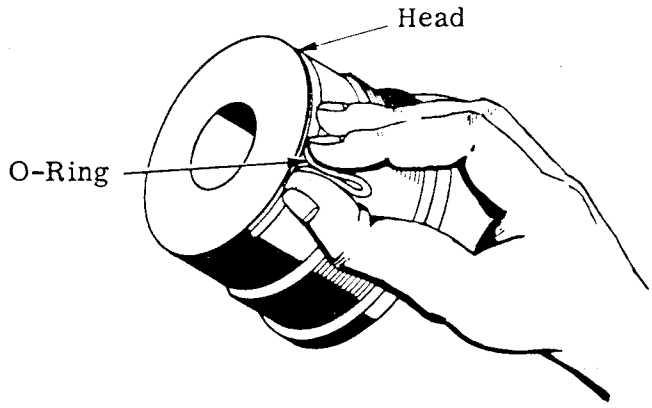


Figure G-3. O-ring Removal

1. ROD
2. WIPER
3. DYNAMIC ROD SEAL
4. HEAD
5. STATIC BACK-UP
6. STATIC O-RING
7. STOP TUBE
8. PISTON
9. PISTON RINGS
10. DYNAMIC PISTON SEAL
11. COMPANION O-RING
12. LOCK RING
13. WAFER LOCK

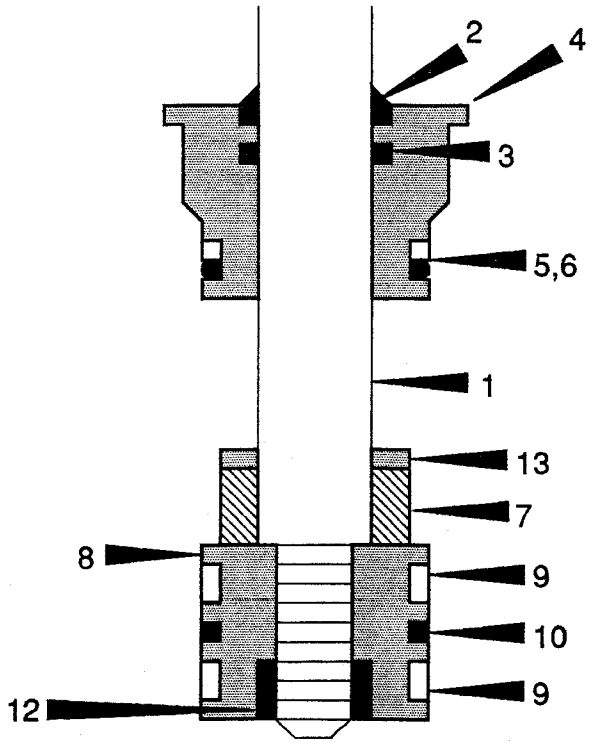


Figure G-2. Cylinder Components

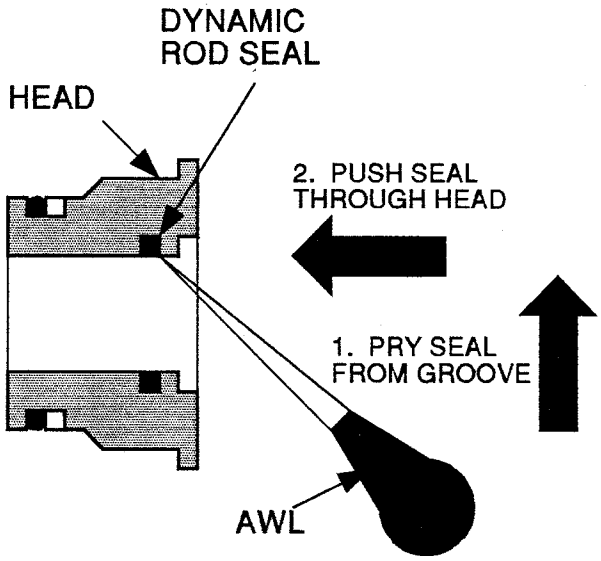


Figure G-4. Dynamic Rod Seal Removal

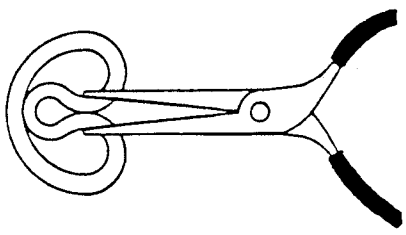


Figure G-5. Rod Seal Installation

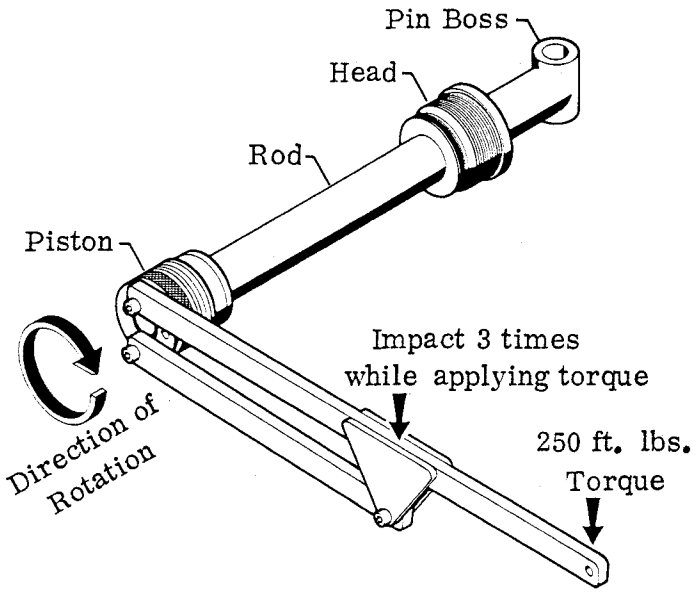


Figure G-6. Piston/Rod Assembly

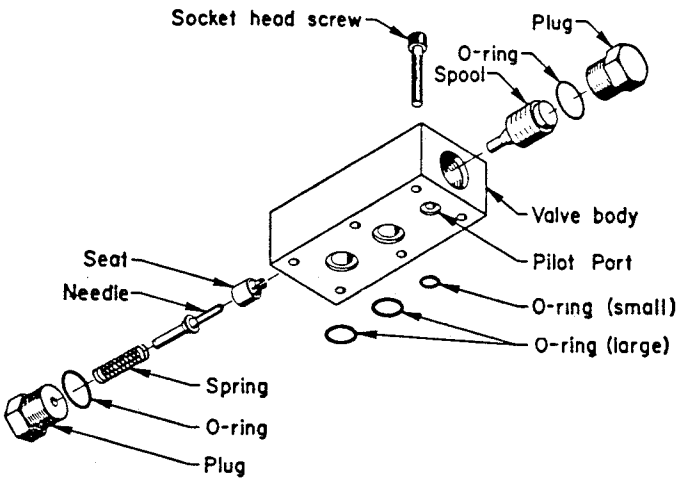


Figure G-7. Locking Holding Valve

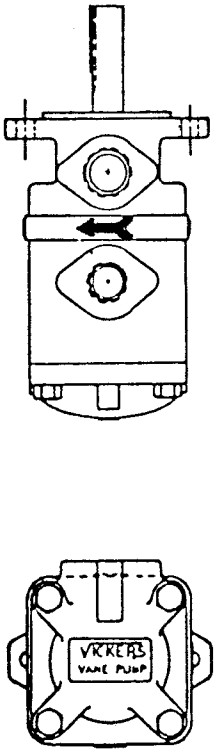


Figure G-8. Hydraulic Pump

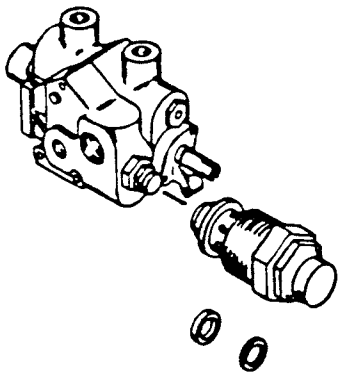
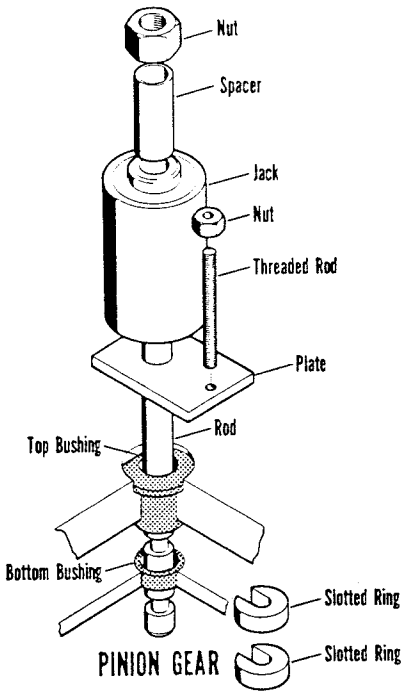


Figure G-9. Relief Valve Adjustment



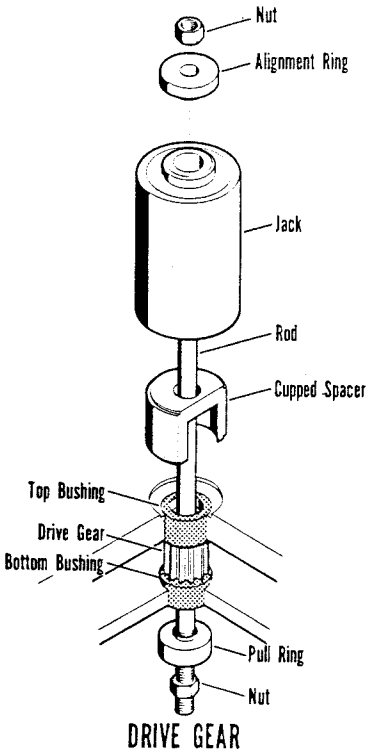
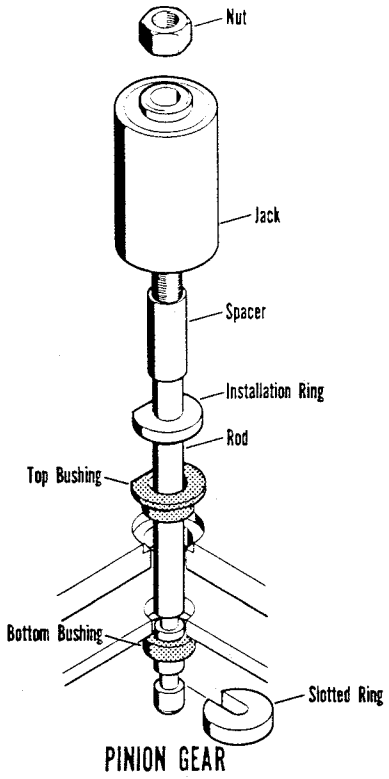


Figure G-10. Bushing Removal



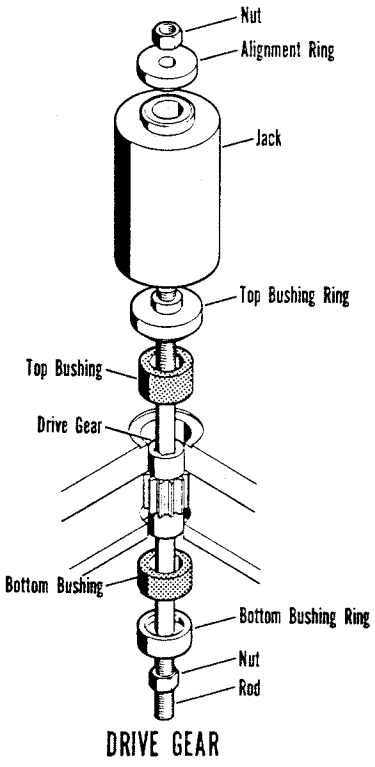


Figure G-11. Bushing Installation

7-4. TROUBLESHOOTING

Table G-1 is intended for use as a quick reference in diagnosing on-the-job malfunctions. Care has been taken to list the most likely possible causes in order of probable occurence.

Table G-1. Troubleshooting

SYMPTOM	PROBABLE CAUSE
Controls fail to respond	1. Pump not engaged - if supplied with electric clutch. 2. Hydraulic oil supply is low. 3. Hydraulic pressure line is ruptured. 4. Suction line shut-off valve is obstructed. 5. Hydraulic pump is faulty. 6. Relief valve is set incorrectly.
Operation slow down	1. Hydraulic oil supply is low. 2. Hydraulic pump is operating at a reduced speed. 3. Relief valve is set too low. 4. Pump or cylinder is worn. 5. Pump is slipping due to excessive oil temperature. This is a factor which will increase with worn components. 6. Filter is dirty. 7. Valve spools are inoperative. 8. Obstructed cylinder holding valve.
Rotation control slowed or erratic	1. Internal port orifices are clogged. 2. Rotation gears are locked or damaged.
Arms and pads drift when loaded and controls neutralized	1. Hydraulic oil is bypassing at piston rings. 2. Cylinder holding valves are defective or contaminated.
Unusual noise in operation	1. Cavitation is occurring due to low hydraulic oil supply. 2. Loading is excessive. 3. Restriction or collapse of suction line. 4. Bypass settings on relief valve are too low. 5. Relief valve is damaged. 6. Valve closure is obstructed due to particle accumulation.
Side step chatter or slow	1. Bearings need lubrication. 2. Mechanical damage to bracket. 3. Lower cylinder damaged.
Arm chatter or noise	1. Arms need both internal and external lubrication. 2. Bearing damaged.

TORQUE DATA CHART

FINE THREAD BOLTS

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

COARSE THREAD BOLTS

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

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

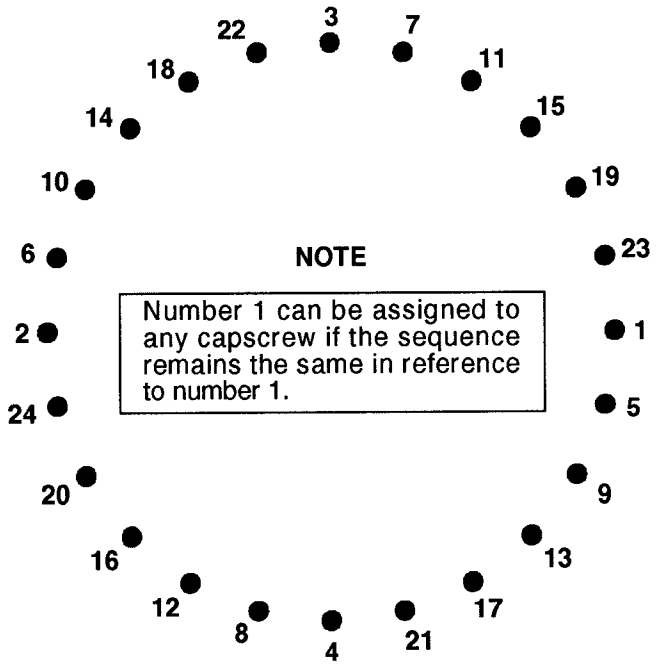
1. **Bolt manufacturer's particular specifications should be consulted when provided.**
2. **Flat washers of equal strength must be used.**
3. **All torque measurements are given in foot-pounds. To convert to inch-pounds, multiply by 12.**
4. **Torque values specified are for bolts with residual oils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

WARNING

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

Figure G-12. TORQUE DATA CHART

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



TIGHTENING PROCEDURE:

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

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

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

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

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

Figure G-13. TURNTABLE BEARING FASTENER TIGHTENING SEQUENCE

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

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

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

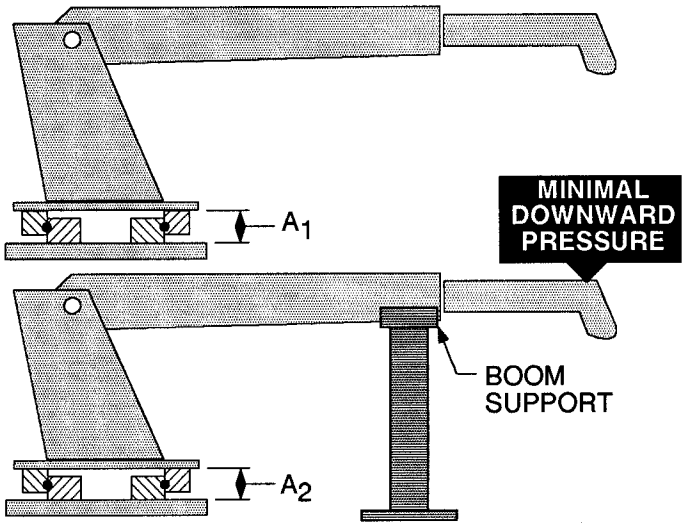
Periodic readings indicating a steady increase in TILT may be an indicator of bearing wear. Note that a bearing found to have no raceway cracks or other structural irregularities should be reassembled and returned to service.

TEST PROCEDURE

STEP 1.
With the crane horizontal and fully extended, measure between the top and bottom mounting surfaces of the turntable bearing (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	IMT CRANE OR TIREHAND MODEL				
THE FIGURES LISTED IN THIS CHART ARE SERVICE GUIDELINES AND DO NOT, IN THEMSELVES, REQUIRE THAT THE BEARING BE INSPECTED. IF THERE IS REASON TO SUSPECT AN EXCESS OF BEARING WEAR AND THE MEASURED TILT DIMENSION EXCEEDS THE DIMENSION LISTED, REMOVE THE BEARING FOR INSPECTION.		814 1007 1014 2010 215 2015 2109 2815 3016 315A 320H 3515 3617 3625 421 425 5016 TH7 BODY ROT'N TH1449A BODY ROT'N TH15A CLAMP TH1836A CLAMP TH2551 CLAMP TH2557 CLAMP TH2557A CLAMP	4817 4825 516 525 5826 6014 6425 725 7020 7025 8025 8031 TH10 BODY ROT'N TH12 BODY ROT'N	32018 32030 HAWK-H1150 HAWK-H1150TL HAWK-H4961	9616 9825 9831 10020 10025 1216 1325 1331 13031 13034 13426 14018 14048 14126 15033 1725 18026 20017 HAWK-H1200 TH1836 BODY ROT'N TH1836A BODY ROT'N TH2551 BODY ROT'N TH2557 BODY ROT'N TH2557A BODY ROT'N
	BALL DIA. (REF)	.875" (22mm)	1.00" (25mm)	1.18" - 1.25" (30 - 32mm)	1.75" (44mm)
	TILT DIM. (A_1 - A_2)	**.060" (1.524mm)**	**.070" (1.778mm)**	**.075" (1.905mm)**	**.090" (2.286mm)**

Figure G-14. TURNTABLE BEARING INSPECTION FOR REPLACEMENT

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 TH1836A	MANUAL PART NO. 99900289-8/90
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 occurence.

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

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

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

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

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

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

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

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

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

Effective January, 1985

IOWA MOLD TOOLING CO., INC.
BOX 189, GARNER, IA 50438-0189
TEL: 515-923-3711
PRODUCT SUPPORT FAX: 515-923-3674