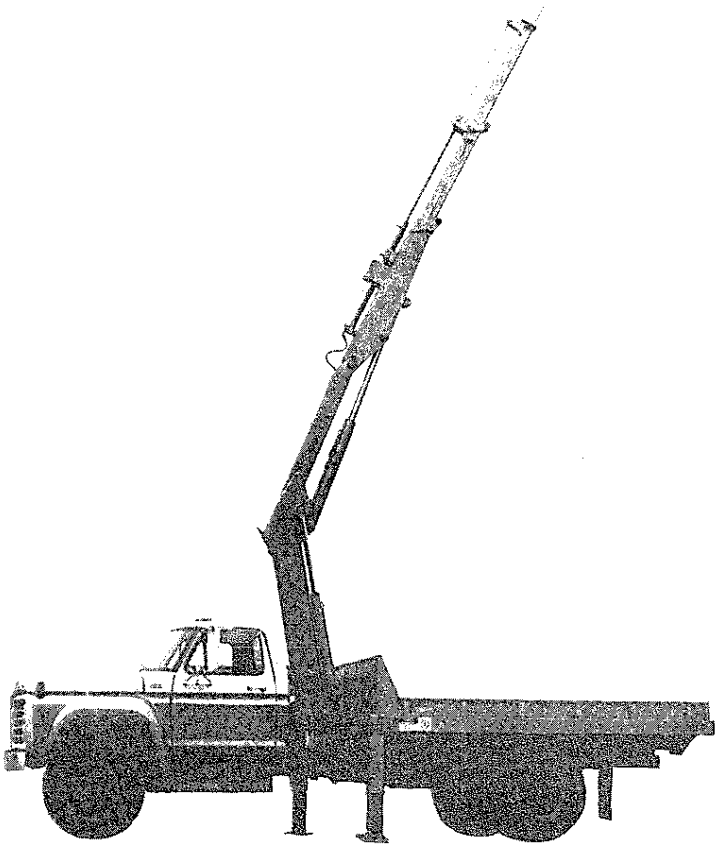
IMT
525 CRANE



IOWA MOLD TOOLING CO., INC.

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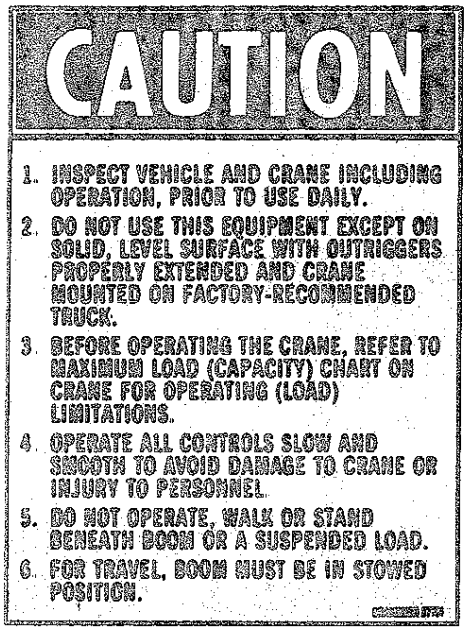
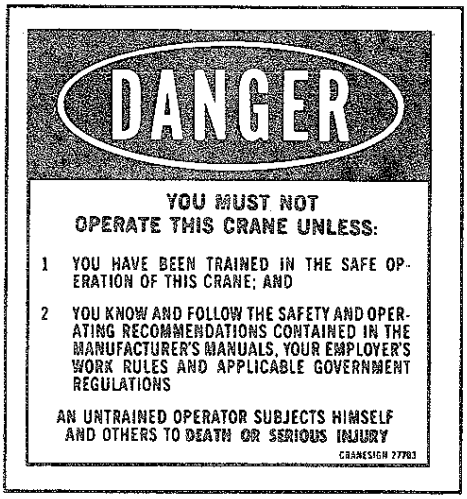
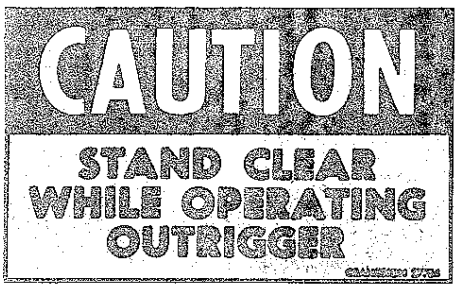


Cranesign No. 27701 lists operating practices which contribute to the proper operation of cranes. One is recommended for each control station to be applied in line-of-sight visibility of crane operator. Approx. size: 4-1/8 in. x 5-1/2 in.

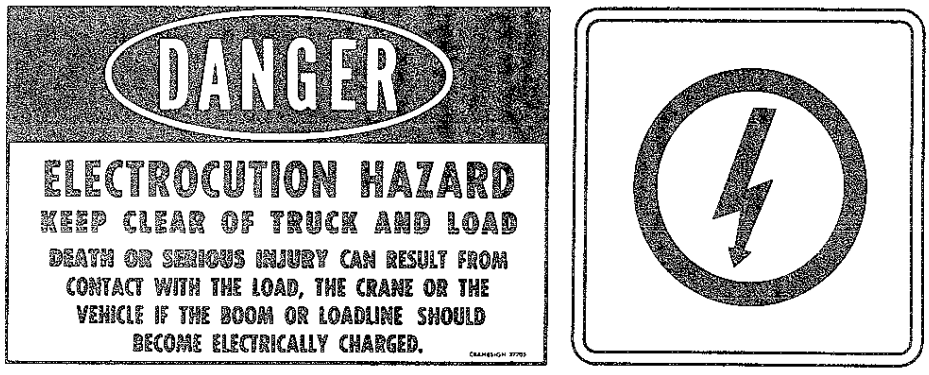


Cranesign No. 27703 warns that a crane should be operated only by trained experienced personnel having complete knowledge of information in equipment's manuals and all applicable work rules. One is recommended for each control station to be applied in line-of-sight visibility of crane operator. Approx. size: 4-5/8 in. x 4-3/4 in.

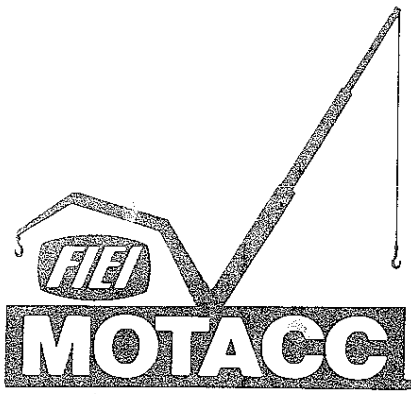
Cranesign No. 27702 emphasizes danger of electrocution present when operating a crane near charged electrical conductors. One is recommended for each control station to be applied in line-of-sight visibility of crane operator. Approx. size: 4-1/2 in. x 6-1/4 in.



Cranesign No. 27704 cautions personnel in vicinity of crane to stay away from the outriggers while they are being operated. One is recommended for each outrigger and applied on outrigger where readily visible by anyone nearby. Approx. size: 2-1/2 in. x 4 in.



Cranesign No. 27705 displays the international symbol for electricity and warns of danger from an electrically charged vehicle, crane or load. Four are recommended (one for each side and one for each end of vehicle) to be applied in locations which are readily visible to ground personnel. Approx. size: 5-1/4 in. x 13-1/4 in.



MFRS. OF TELESCOPING AND ARTICULATING CRANES COUNCIL

A Council of the Farm and Industrial Equipment Institute
410 North Michigan Avenue Chicago, Illinois 60611 Telephone: 312/321-1470

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SECTION 9. APPENDIX

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SECTION 1. GENERAL

1-1. INTRODUCTION

This manual is provided to acquaint you with the operation of your IMTCO truck mounted articulating, hydraulic crane and supply you with the information necessary for proper equipment maintenance.

Three means are used throughout this manual to gain the attention of operating and service personnel. They are NOTES, CAUTIONS, and WARNINGS and are defined as follows:

NOTES

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

CAUTIONS

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

WARNINGS

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

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

1-2. ORDERING INFORMATION

When placing orders or requesting assistance, refer to the information below.

TO BE COMPLETED BY DEALER

Chassis Information:

Make _____ Model: _____ Serial No.: _____

Transmission Model: _____ Serial No.: _____

PTO Ratio: _____ Make: _____

Crane and Pump Information:

Serial No.: _____ Model: _____ Selector Valve: _____

Pump Make: _____ Model: _____ Serial No.: _____

Accessories and Options: _____

_____

SECTION 2. OPERATION

2-1. CRANE IDENTIFICATION

Every IMTCO crane has an identification placard (Figure B-1) attached to its mast assembly. When ordering parts, communicating warranty information or referring to the unit in correspondence always include the assigned serial and model numbers. All inquiries should be addressed to Iowa Mold Tooling Co., Inc.; Garner, Iowa; 50438 or telephone (515) 923-2827.

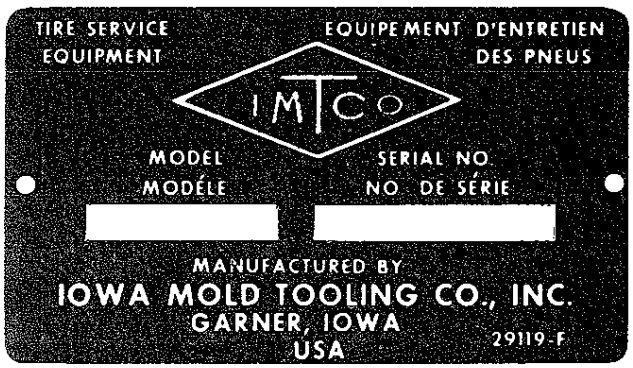


Figure B-1. Identification Placard

2-2. CONTROL INFORMATION

2-2-1. Vehicle Controls

POWER TAKE-OFF MANUAL SHIFT CONTROL - Transmission mounted, manual PTO's are usually installed with the shifting control knob located near the steering column. To **engage** the PTO, the knob is pulled **out**. To **disengage** the PTO, the knob is pushed **in**

NOTE

In order to shift the PTO in either direction the truck transmission must be in neutral and the clutch pedal depressed.

CAUTION

Power Take-Off should always be disengaged before driving the vehicle.

HAND BRAKE - Securely set the hand brake prior to unit operation.

2-2-2. Unit Controls

The unit is equipped with dual control stations, one at each side of the vehicle. All controls have placards which indicate operating direction for the crane function desired. A hand throttle control is located at the driver's side only and provides engine speed control.

MAIN BOOM—Push lever to lower and pull lever to raise
SECONDARY BOOM—Push lever to lower and pull lever to raise.
EXTENSION BOOM—Push lever to extend and pull lever to retract.
ROTATION—Push lever for clockwise rotation and pull lever for counterclockwise rotation.
STABILIZERS—Push lever to extend and pull lever to retract.
HAND THROTTLE—Rotate knob counterclockwise to increase engine speed and clockwise or push to lower engine speed to idle.

CAUTION

Prior to operating the crane, stabilizers must be extended and lowered to firm footing. The main boom must be raised to allow adequate clearance before any other crane function can be initiated.

2-3. OPERATION

The IMTCO 525 crane is relatively simple to operate. However, prior to any work at job sites, the operator should thoroughly familiarize himself with the control operations, load limitations, prescribed operating procedures and safety precautions applicable to the unit. In addition, simulated job operations should be performed by the operator before putting the unit to a work task. The operator's understanding of emergency measure execution is essential; he should be prepared to take remedial action at any time.

2-3-1. Safety Factors

Three important factors in the safe operation of the unit are: a competent operator, mechanical soundness of the unit and absolute assurance that the unit is not loaded to exceed its maximum specified capacities. The safety precautions contained in this section should be read carefully and observed at all times during unit operation.

2-3-1-1. Load Limits

The IMTCO 525 crane is designed to give satisfactory service if operated within maximum allowable load specifications stated on the unit's capacity placard. The placard should be studied before lifting operations are carried out. Overloading may result in potentially serious safety hazards and shortened service life of the unit—exceeding the stated load limit for a given radius can cause tipping or structural failure.

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

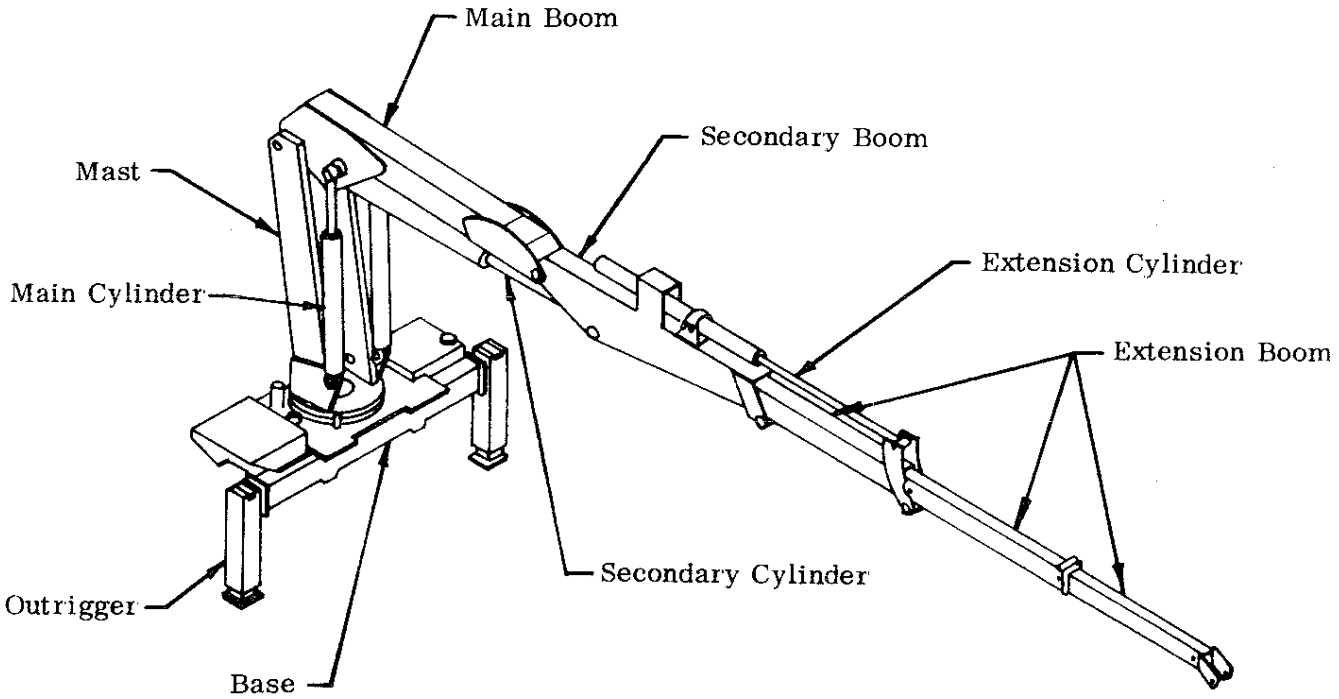


Figure B-2. 525 Crane Group

2-3-1-2. Equipment Inspection

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

STRUCTURAL SOUNDNESS—Inspect the unit for damaged members and loose nuts or bolts.

HYDRAULIC OIL SUPPLY—Check oil level in hydraulic reservoir and fill.

LEAKAGE—Examine all visible hydraulic hoses for frays and blisters. Look for signs of lubricating or hydraulic oil leakage.

CONTROLS—Make short test for proper control operation.

REPAIRS—Before putting the unit into service, correct all observed defects and malfunctions.

This equipment check should be performed before every operation and as a periodic preventive maintenance procedure.

2-3-1-3. Work Station Positioning

The best location for the working unit is on firm, level and dry pavement or ground close to the job. Overhead obstructions on the work side of the unit should be avoided as much as possible.

Wheel chocks should be used when parking unit on a slope. If parking on a curbed roadway, turn front wheels toward curb when parked with the front of truck downgrade, and away from curb with rear of truck downgrade. At the work site, the vehicle should be parked with the grade. When cross-grade parking is necessary, restricted operation will be required to compensate for increased tipping risk.

2-3-1-4. 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 crane have been erected to prevent physical contact with the lines, cranes 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 of the crane or load shall be 10 feet.

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

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

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.

2-3-2. Beginning Operation

1 Choose a unit operating location with two factors considered: vehicle position should permit, if possible, total task performance without repositioning and the terrain should be firm, dry and level for proper stabilization throughout the operation.

2 Securely set the truck hand brake and set any auxiliary device, if supplied. Adjacent to curbing, turn front wheels to further secure the vehicle. Wheel chocks should be firmly placed.

3 Shift truck into neutral, keep clutch depressed if transmission is mechanical and pull out the power take-off knob to engage the system.

4 Accelerate engine to proper operating speed using the hand throttle control.

5 Allow the system to idle at operating speed with all controls at neutral until the hydraulic system reaches operating temperature. Hydraulic reservoir should be warm to the touch.

6 Outriggers should be extended until firm ground contact is made. Do not hold controls open to point of jacking action. When stabilizing the unit on soft ground, bearing pads should be used to retard sinking and provide blocks to ensure firm contact when operating on sloping terrain.

WARNING

DO NOT operate crane until the vehicle is firmly stabilized.

7 Several precautions should be taken in actuating the hydraulic controls on the unit. Before actual work begins, put each control through one complete test cycle. To prevent shock loading, no control operation should begin with a full open position. Sudden stops and starts stresses equipment unduly and can shorten equipment life. When maximum speed is desired, controls should be actuated slowly and acceleration achieved smoothly.

2-3-2-1. Engine Speed Regulation

The speed of the hydraulic pump dictates the speed of the operating unit. In order for the unit to function at speeds stated in the specifications, the pump must operate at optimum speed.

To determine the engine speed required for operation, the pump requirement - optimum - is divided by engine to PTO ratio of the truck. When the engine to PTO ratio is not known, this information may be obtained from a local IMTCO dealer or distributor or Iowa Mold Tooling Co., Inc. direct. To find the ratio, it will be necessary to know the PTO and transmission model numbers as well as the make, model and year of the truck. When this information is obtained, compute the proper engine speed as shown in the following examples:

Efficient operation of the unit is dependent upon proper pump speed. When operation is too slow always check the pump speed when diagnosing the cause. An electric tachometer with accurate calibration may be used to check engine speed.

TABLE B-1. ENGINE SPEED REGULATION

Pump Model	Recommended PTO Ratio	Engine Speed
13GPM	70-100%	$\frac{\text{Optimum Speed (1500 RPM)}}{100\%} = 1500 \text{ RPM}$
17GPM	60-70%	$\frac{\text{Optimum Speed (1100 RPM)}}{70\%} = 1575 \text{ RPM}$
24GPM	40-60%	$\frac{\text{Optimum Speed (800 RPM)}}{60\%} = 1350 \text{ RPM}$

Any pump can be used that will supply 9 GPM optimum flow at 2350 PSI.

The formula used to determine the proper engine speed is as follows:

$$\frac{\text{Optimum Pump Speed (RPM)}}{\text{Engine to PTO Ratio (\%)}} = \text{Required Engine Speed (RPM)}$$

2-3-2-2. Load Lifting

Capacity placards are located on unit mainframe near the operator stations. The structural capacities and permissible radii of operation stated on these placards should be carefully studied and strictly adhered to during equipment operation. All indicated placard loads include weight added by optional equipment (rotors, winches, etc.) and consideration must be given to this weight in load assessment.

NOTE

Capacity placards are intentionally located near the operator to assure ready reference in determining when a load can or cannot be handled.

Load limit information given on the capacity chart is formulated on 85% of tipping.

It is implicit in all load ratings that the following conditions have been met:

1. The unit has been correctly installed on a factory approved truck.
2. A satisfactory stability test has been performed.
3. The intended operation is to be carried out on level solid footing with proper outrigger placement.

It should be understood that each stated capacity is directly related to the radius of a given operation. The radius is measured from center of rotation to load line on the horizontal plane.

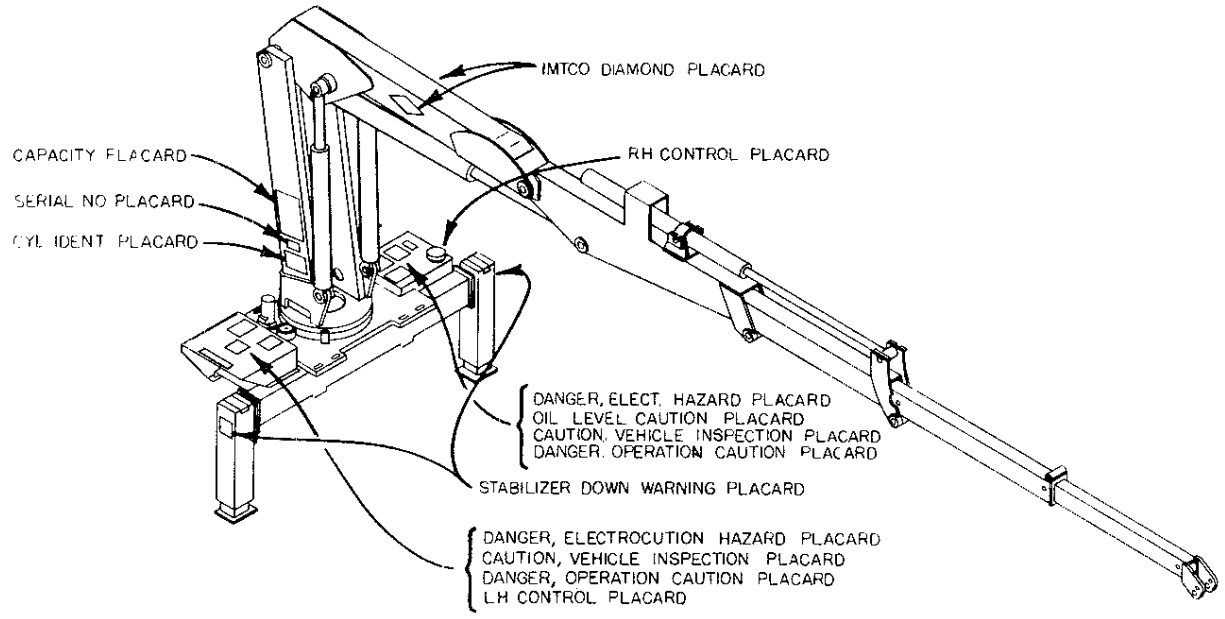


Figure B-3. Placard Placement

2-3-2-3. Stability Ratings

Capacity ratings project unit stability to no more than 85% of tipping provided:

1. The vehicle on which the unit is mounted complies with factory specifications.
2. Factory installation instructions are followed when unit is mounted on vehicle.
3. Counter weight sufficient to supplement vehicle weight has been installed and meets factory requirements.
4. Tire inflation pressures meet requirements stipulated in "TIRE INFLATION TABLE" in the appendix.
5. The outriggers are in use, making proper contact with firm, level footing.

The LOAD CAPACITY CHART ratings depend upon compliance with the curb weights coupled with truck size. Adherence to minimum chassis specifications and/or requirements is necessary to maintain safe stabilization.

WARNING

The minimum curb weights shown do not ensure the unit will be stable. Actual stability ratings will be obtained from the initial start-up and testing procedures.

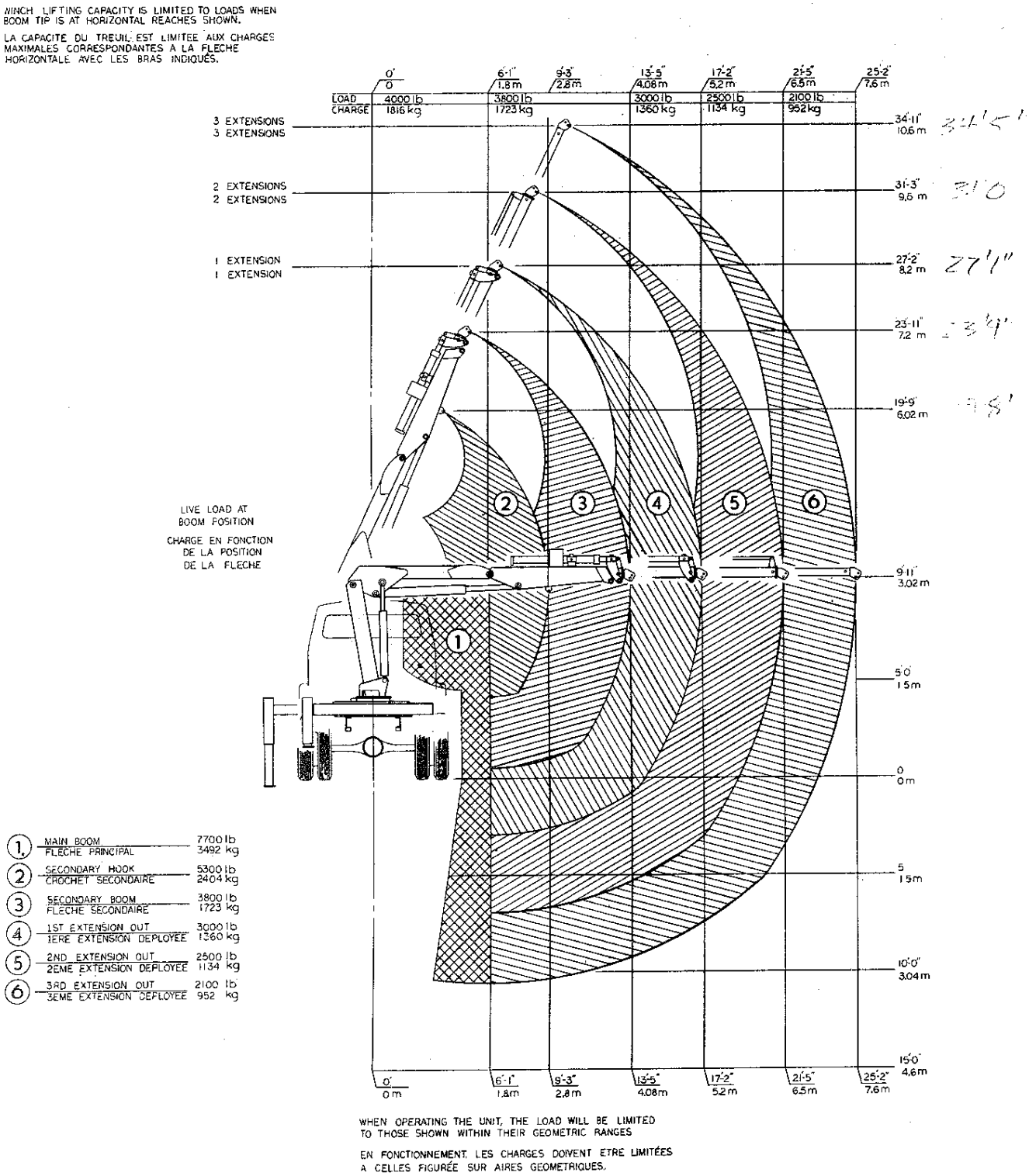


Figure B-4. Load Capacity Chart

2-3-2-4. Conventional Cab

Stability rating for an IMTCO 525 crane mounted on a conventional chassis with 175" (444.5 cm) wheel base and 102" (259 cm) cab-to-axle dimension is shown below. These specifications will provide the full 360° rotation stability based upon 85% tipping factor without capacity chart restrictions. Required axle weights are as follows:

TABLE B-2. AXLE WEIGHTS

Front Axle	(2903 kgs) 6,400 lbs
Rear Axle	(3039 kgs) 6,700 lbs
Total	(5942 kgs) 13,100 lbs

2-3-3. Operation Shutdown

Proper shutdown procedure is as follows:

1. Stow the crane in folded position, boom end resting in cavity on the multipurpose cover on the base.
2. Retract the outriggers
3. Disengage throttle control
4. Disengage PTO prior to travel

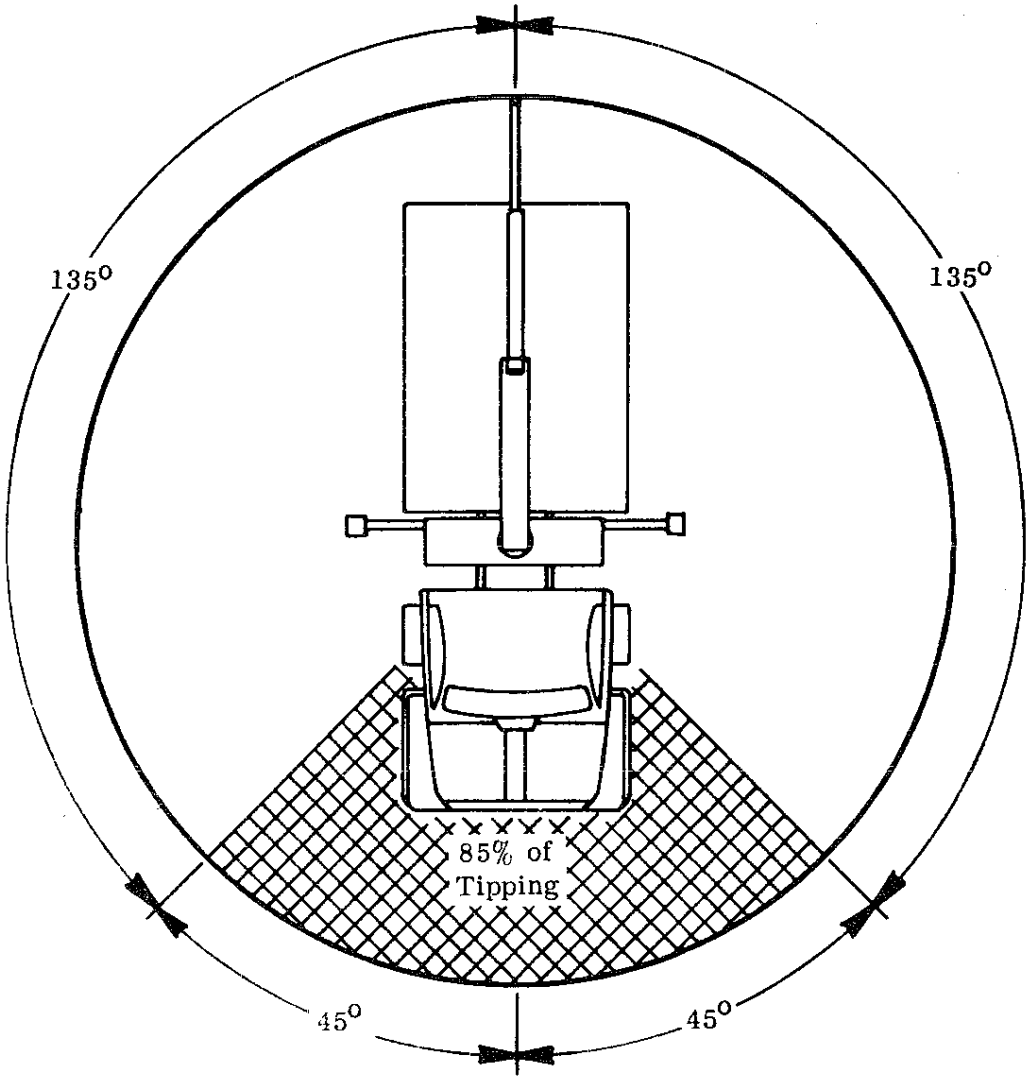


Figure B-5. Stability Chart

SECTION 3. SPECIFICATIONS

3-1. GENERAL

REACH (From Centerline Rotation)	(7.67 m)	25'-2"
EXTENSION	(114.3 cm/129.5 cm/114.3 cm)	45"/51"/45"
LIFTING HEIGHT	(10.80 m)	35'-5"
WEIGHT OF CRANE	(1,542.0 kg)	3400#
OUTRIGGER SPAN	(3.30 m)	10'-10"
OPTIMUM PUMP CAPACITY	(34.1 liters/min)	9 US Gal/Min
OIL RESERVOIR CAPACITY	(64.4 liters)	17 US Gal
MOUNTING SPACE REQUIRED	(73.7 cm)	*29"
STORAGE HEIGHT	(3.30 m)	*10'-10½"

*(Based on 39" (99.1 cm) truck frame height & allowing 4" (10.2 cm) clearance behind trucks cab.)

3-2. PERFORMANCE CHARACTERISTICS

ROTATION (355°) (6.19 Rad.)	30 Sec.
MAIN BOOM ELEVATION (-47° to +70°) (-.82 Rad. to +1.22 Rad.)	20 Sec.
SECONDARY BOOM ELEVATION (125°) (2.18 Rad.)	16 Sec.
EXTENSION (45") (114.3 cm)	14 Sec.
OUTRIGGER EXTENSION	8 Sec.

3-3. LIFTING CAPACITY (From Centerline Rotation)

(1.60 m)	5'-3"	3946 kg	8700 lbs
(2.82 m)	9'-3"	2404 kg	5300 lbs
(4.09 m)	13'-5"	1724 kg	3800 lbs
(5.23 m)	17'-2"	1361 kg	3000 lbs
(6.53 m)	21'-5"	1134 kg	2500 lbs
(7.67 m)	25'-2"	953 kg	2100 lbs

3-4. HYDRAULIC SYSTEM

Open centered, full pressure system that requires 9 GPM (34.2 liters/min) optimum oil flow @ 2,350 psi (161.7 kg/sq. cm). Six spool stack type control valve with dual operational handles located at both sides for convenient operation. System includes hydraulic oil reservoir, suction line filter, pump, control valve, return line filter.

3-5. CYLINDER HOLDING VALVES

The holding sides of all cylinders are equipped with integral mounted holding and/or counter balance valves to prevent sudden cylinder collapse in case of hose or other hydraulic failure. The extension and outriggers have positive pilot operated valves that will open only upon command.

The secondary and main boom cylinders have pilot operated counter-balance valves. The counter-balance 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. Third, it tends to serve as an overload protection device in that the hydraulic pressure in the cylinder will be relieved when one boom load over powers the other. Finally, if a hose breaks the only oil loss will be that in the hose only.

3-6. POWER SOURCE

Integral mounted hydraulic pump and PTO application. Other standard power sources may be utilized.

3-7. CYLINDERS

MAIN	(8.9 cm)	3½"	Bore	(81.3 cm)	32" Stroke
SECONDARY	(11.4 cm)	4½"	Bore	(93.0 cm)	36-5/8" Stroke
EXTENSION	(10.2 cm)	4"	Bore	(114.3 cm)	45" Stroke
OUTRIGGERS	(6.3 cm)	2½"	Bore	(53.3 cm)	21" Stroke

3-8. ROTATION SYSTEM

Turntable bearing powered with a high torque hydraulic motor through a ring and pinion type spur gear train.

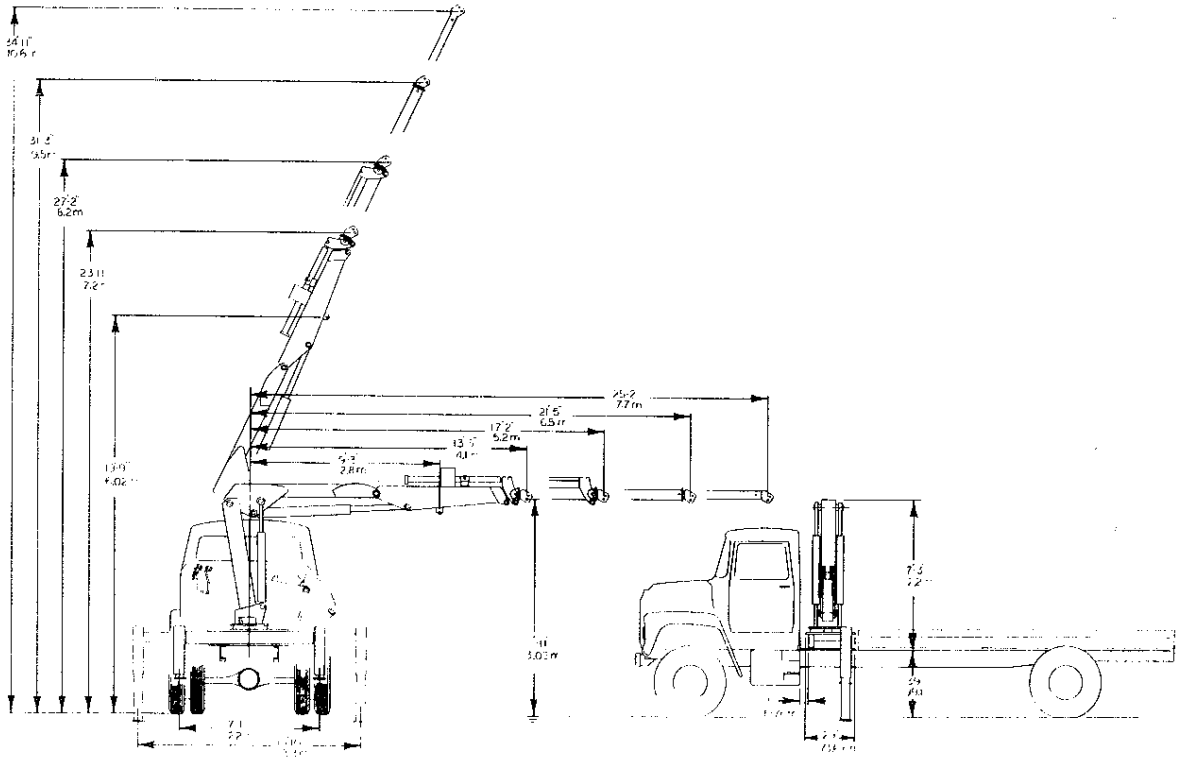


Figure C-1. Geometric Configuration

3-9. MINIMUM CHASSIS SPECIFICATIONS

Body Style	Conventional Cab		Tilt Cab	
Wheel Base	(419.1 cm - 444 5 cm)	165" - 175"	(342.9 cm)	135"
Cab to Axle	(259.1 cm)	102"	(274.3 cm)	108"
Frame Section Modulus	(314.7 cc)	19.2 cu. in.	(314.7 cc)	19.2 cu. in.
R B M	(9,681 kg-m)	840,000 in. lbs.	(9,681 kg-m)	840,000 in. lbs
Front Axle	(3,175.2 kg)	7,000 lbs.	(3,175.2 kg)	7,000 lbs.
Rear Axle	(6,804 kg)	15,000 lbs.	(6,804 kg)	15,000 lbs
Transmission	4 speed		4 speed	

In addition to these specifications, heavy duty electrical and cooling systems and dual rear wheels are required. It is recommended that the vehicle be equipped with an electric tachometer, auxiliary brake lock, power steering and a five speed, in lieu of four speed, transmission

SECTION 4. OPTIONAL EQUIPMENT

4-1. INTRODUCTION

Table D-1 lists the standard and optional equipment available for the IMTCO 525 crane. It lists the assembly number and the page for the parts breakdown drawing for that particular assembly.

TABLE D-1. STANDARD AND OPTIONAL EQUIPMENT

DESCRIPTION	ASSEMBLY NUMBER	PAGE NUMBER
STANDARD EQUIPMENT		
Base	41701250	6-2
Mast	41701968	6-3
Main Boom	41701969	6-4
Secondary Boom	41701970	6-7
Power-down Outriggers	90702006	6-9
OPTIONAL EQUIPMENT		
Manual Pull-out Extension Boom	41701971	6-12
Power-out Extension Boom	31702094	6-14
Manual Hydraulic Controls	91701972	6-16
Remote Hydraulic Controls	91701989	6-20
Manual and Remote Hydraulic Controls	91702042	6-24
4000# Winch	31904000	6-27
*Manual Winch Controls	91701752	6-27
*Remote Winch Controls	91701753	6-30
*Manual and Remote Winch Controls	91701754	6-24
*Rope and Hook Kit	91701755	6-27
Continuous Rotation Kit	91701756	6-31
370° Rotation Kit	90701757	6-34
Auxilliary Lighting Kit	90701759	6-37
Power-out Outriggers	91702177	6-35

*Used only when the winch option 31904000 is used.

4-2. REMOTE CONTROL

Remote control is an available option on IMTCO 525 cranes. This feature provides remote control for all crane functions: MAIN, SECONDARY, EXTENSION, ROTATION, WINCH (optional), POWER SWITCH, AND EMERGENCY STOP. Refer to the PARTS section for the hydraulic schematic and replacement parts and the REPAIR section for the electrical wiring diagram.

4-3. WINCH

A hydraulic winch which provides 4000 lbs (8800 kgs) bare drum pull may be mounted to the underside of the secondary boom. Refer to the REPAIR section for the remote control option wiring diagram and the PARTS section for the parts list.

4-4. POWER OUT OUTRIGGERS

Power down and out outriggers are shown in the PARTS section. These should be factory installed

4-5. HAND THROTTLE

Available with the manual or remote control unit. Counter clockwise adjustment of the knob slowly increases engine RPM to the desired level; clockwise rotation reduces engine speed. Deactivation is accomplished by depressing the button in the center of the knob

4-6. BEARING REMOVAL TOOL

This tool aids in the removal of the pinion and drive gear bearings. It's use is demonstrated in paragraph 7-2-2

4-7. 370° ROTATION KIT

This option provides an additional 15° of rotation over the standard crane. Refer to the PARTS section for replacement parts information

4-8. LIGHT KIT

Provides auxiliary lighting for working in low-light conditions. It is mounted to the secondary boom. Refer to the PARTS section for replacement parts.

4-9. MANUAL AND REMOTE CONTROL

Gives the operator the option of either manual or remote control. Provides a back-up system.

SECTION 5. PERIODIC MAINTENANCE

5-1. GENERAL

Proper maintenance on a regular schedule is essential to keep your unit operating at peak efficiency. This section outlines required maintenance information and service intervals. Personnel responsible for care of the unit should familiarize themselves with the frequency and type of lubrication and maintenance operations to be performed.

5-2. LUBRICATION

Maintaining the proper lubrication schedule will vary with climatic conditions and use frequency. The lubrication table (Table E-1) is intended to serve as a schedule for a normal work load and moderate weather variance. Periods of heavy use would shorten service intervals.

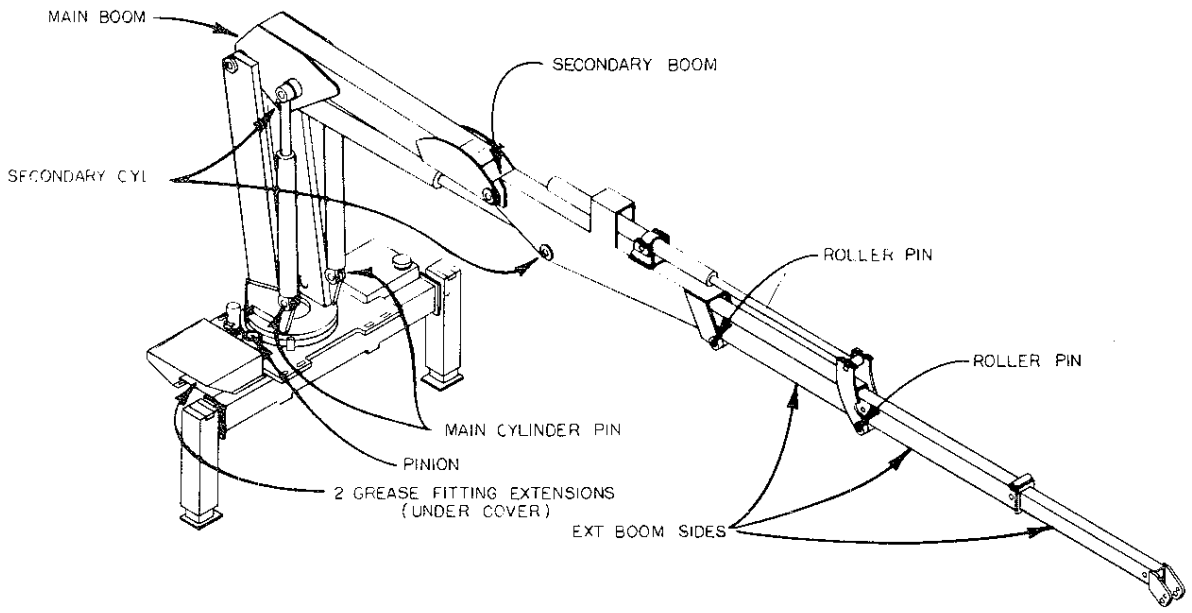


Figure E-1. Lubrication Points

TABLE E-1. LUBRICATION INFORMATION			
APPLICATION POINT	LUBRICATION PRODUCT	APPLICATION MEANS	INTERVAL
TURN TABLE BEARING	Shell Alvania 2EP or Shell Retinax "A" or Equivalent	Hand Grease Gun or Pneumatic Pressure Gun	Monthly
MAIN CYLINDER			
MAIN & SECONDARY BOOM PINS			
EXTENSION BOOM ROLLERS			
SECONDARY CYLINDER			
ROTATION PINION & MOTOR DRIVE GEARS			
POWER TAKE-OFF OR TRANSMISSION	EP 90 Gear Oil	Fill to Check Plug	Monthly

5-3. HYDRAULIC SYSTEM

OIL SELECTION Minimum viscosity specifications for hydraulic oil to be used in the IMTCO 525 crane are given in table E 2 Any major oil company can supply products which meet these requirements

Oils selected by user for this class of equipment in addition to meeting viscosity requirements should have the following additives

1 Antifoam inhibitors
2 Antioxidant inhibitors
3 Rust resistant additives
4 Antiwear additives

OIL SPECIFICATIONS: Table E 2 provides oil specifications for a full range of operating temperatures encountered in the temperate zones Arctic conditions present special requirements which are not within the scope of the table and must be given special consideration and individual analysis. Consult your oil supplier for the proper fluid for working under these severe conditions. In addition electric hydraulic oil reservoir heaters are available to improve operation at extremely low temperatures.

5-3-1. Hydraulic Oil Deterioration

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

Periodically a sample of the 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

In addition the oil should be changed in the reservoir and complete system after 800 hours of operation (or every six months which ever occurs first) and after pump or other major hydraulic component failure

5-3-2. Hydraulic System Purging

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

During purging, new oil is supplied to the pump suction line via the reservoir and old oil is drained from the reservoir return line.

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

TABLE E-2. HYDRAULIC OIL SPECIFICATIONS				
Ambient temperature range	0-90	Below 32	32-90	Above 90
Max Pour Point, ° F	-30	-25 +	+10	+10
Max Viscosity, SSU @ 0° F	4000	4000		
Min Viscosity SSU @ 100° F	140-195	100-130	150-200	200-315
Min Viscosity SSU @ 210° F	48	41 43	43	47
Min Viscosity Index	139	90	90	90

CAUTION

DO NOT allow reservoir to drop below 1/3 capacity during purging

1. Locate the unit in an area which provides solid, level footing and space to accomodate the full range of the crane.

2. Extend the outriggers out and down to full stroke and extend the crane to maximum horizontal position on either side. Kill the engine.

3. Disengage the PTO, drain the hydraulic oil reservoir, remove suction line filter and drain all hoses. Disconnect pressure hoses from the pump, drain and reassemble. Replace the suction line filter cartridge (paragraph 5-3-3-1) and reassemble.

NOTE

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

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 truck engine and engage PTO. Rotate the crane 90° of travel horizontally, retract extension boom, elevate main boom and lower secondary boom to the lowest position.

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

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

8 Check oil level and add oil to "full" mark.

5-3-3. Hydraulic Components

5-3-3-1. Filter Service

This unit contains a 25-micron suction line filter and a 10-micron return line filter for removal of contaminating particles. To avoid residue accumulation in the reservoir and to protect hydraulic system components - valves, pump, cylinders, etc. - they must be replaced after 50 hours of new-unit operation and every 200 hours thereafter. In addition, the filters should be replaced 50 hours after the repair of a major hydraulic component.

To change filter cartridges:

1. Kill the engine.

2 Replace the cartridge with a new one ensuring proper rubber seal seating and tightening as much as possible with both hands.

3 Start the engine, engage the PTO and test the system for leaks.

5-3-3-2. Locking Holding Valve

The extension and outrigger cylinders are equipped with a locking holding valve (Figure E-4). Its purpose is to prevent damage or injury from the crane descending too quickly in the event of a hydraulic hose or other downstream 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 serviceable. If it does "creep", continue through this test procedure.

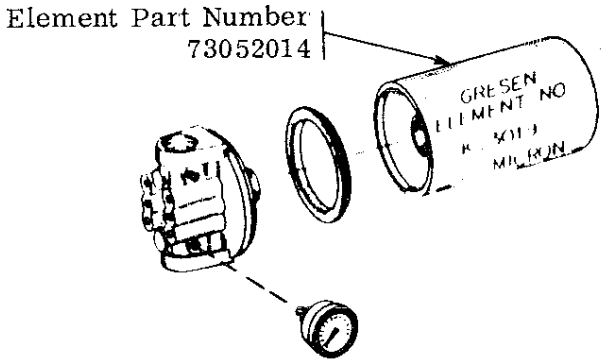


Figure E-2. Suction Line Filter

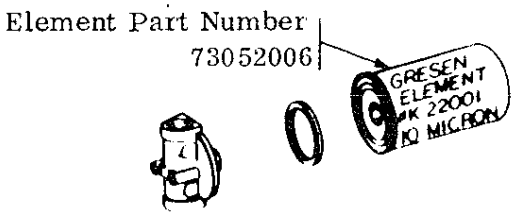


Figure E-3. Return Line Filter

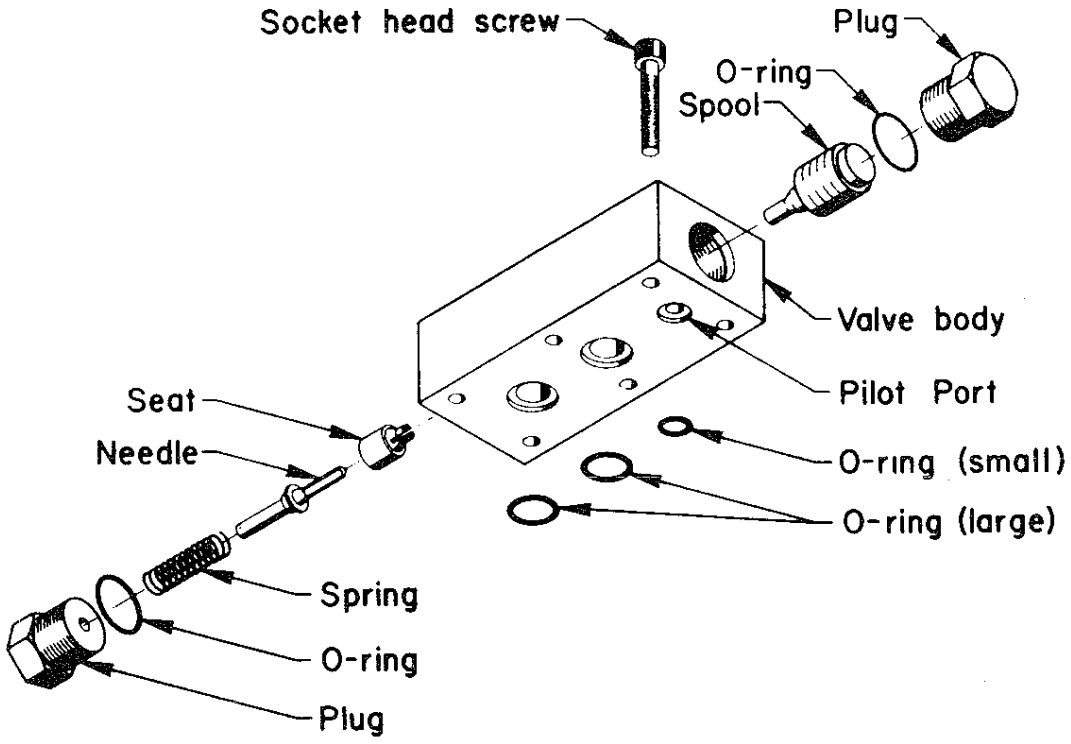


Figure E-4. Locking Holding Valve

2 Place the crane in a fully supported position, either by completely retracting the cylinder until it bottoms out or with an overhead crane or other lifting device.

NOTE

Be prepared for reasonable oil drainage from the affected cylinder.

3. Remove the six (6) allen head screws

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

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

6 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 7 or replace the valve

7 The valve may be disassembled 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 for the o-rings in a container of clean solvent

CAUTION

Solvents 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 6.

NOTE

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

8. Evenly tighten the allen head mounting bolts

9. Activate the system and check for leaks

NOTE

If the valve appears to be functioning properly, hydraulic fluid is probably bypassing the piston, allowing the piston to creep. This indicates the need for new piston rings (refer to paragraph 7-1-1-2 for cylinder disassembly).

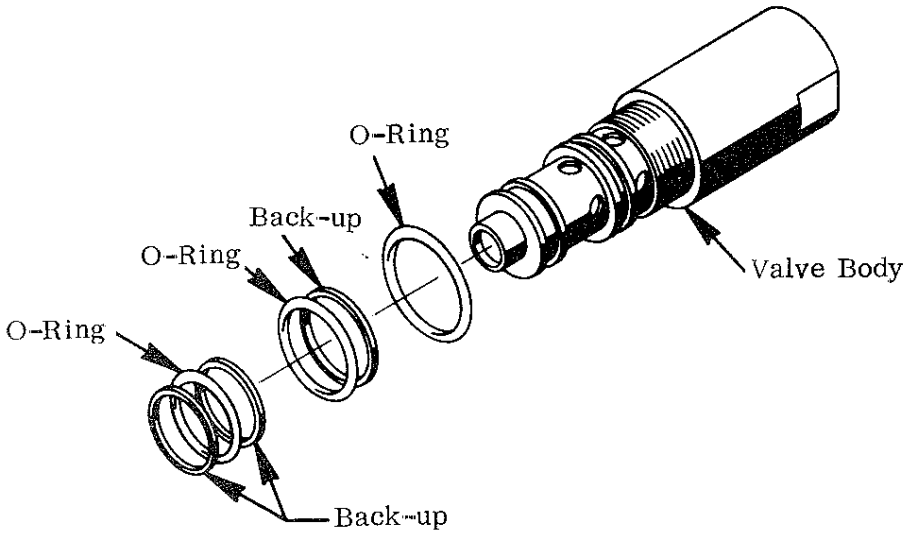


Figure E-5. Counter Balance Holding Valve

5-3-3-3. Counter Balance Holding Valve

The counter balance holding valve (Figure E-5) can be checked for holding capabilities by following the procedure outlined in paragraph 5-3-3-2, step 1. It serves as a holding valve in the event of hydraulic component failure and also functions as a metering valve which allows a feathered motion when lower while under load

This valve should be checked for holding characteristics and, if faulty, replaced. It is not field repairable or field adjustable

5-3-3-4. Valve Port Orifices

A valve port orifice (Figure E-6) may be installed on the cylinder base side of the control valve. The purpose of the orifice is to slow descent of the crane under a load. Back pressure is maintained to prevent erratic holding valve action. It is mounted with the slot side of the plate located upward in the control valve. Orifice size is usually 1/16" to 3/32" and is used for main, secondary and extension cylinders.

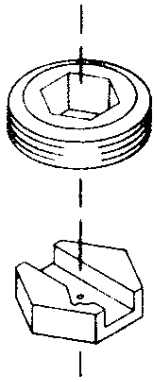


Figure E-6. Valve Port Orifice

1 Engage the PTO and set engine speed at a rate required to provide 9 gallons per minute (refer to paragraph 2-3-2-1 Engine Speed Regulation)

2 Read the pressure on the gauge located at the main control valve

3 If low, shut off the engine and remove the relief valve plug (figure E-7) Install one 0.010 inch shim which will provide a 125 psi increase

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

5 If the 125 psi increase is achieved, add shims to bring the pressure up to the 2350 psi minimum

5-3-3-6. Power Beyond Plug

Hydraulic power for an auxilliary function can be obtained by insertion of a power beyond adapter (Figure E-8). Install the adapter making certain that the two gasket seals are in place or function pressure will be lost Install a high pressure hose to the auxilliary function control valve Order part number 73073023

5-3-3-5. Relief Valve Adjustment

The relief valve is provided to prevent the user from placing too much strain on the hydraulic components. The hydraulic system of the 525 crane is set to operate at 2350 to 2400 psi with an optimum flow rate of 9 gallons per minute If unit operating pressure is below the requirement, the following procedure is recommended:

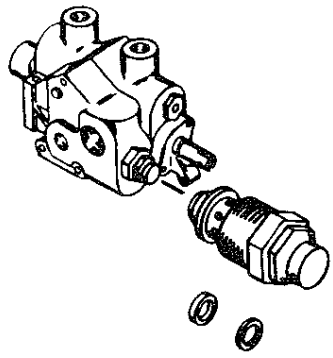


Figure E-7. Relief Valve

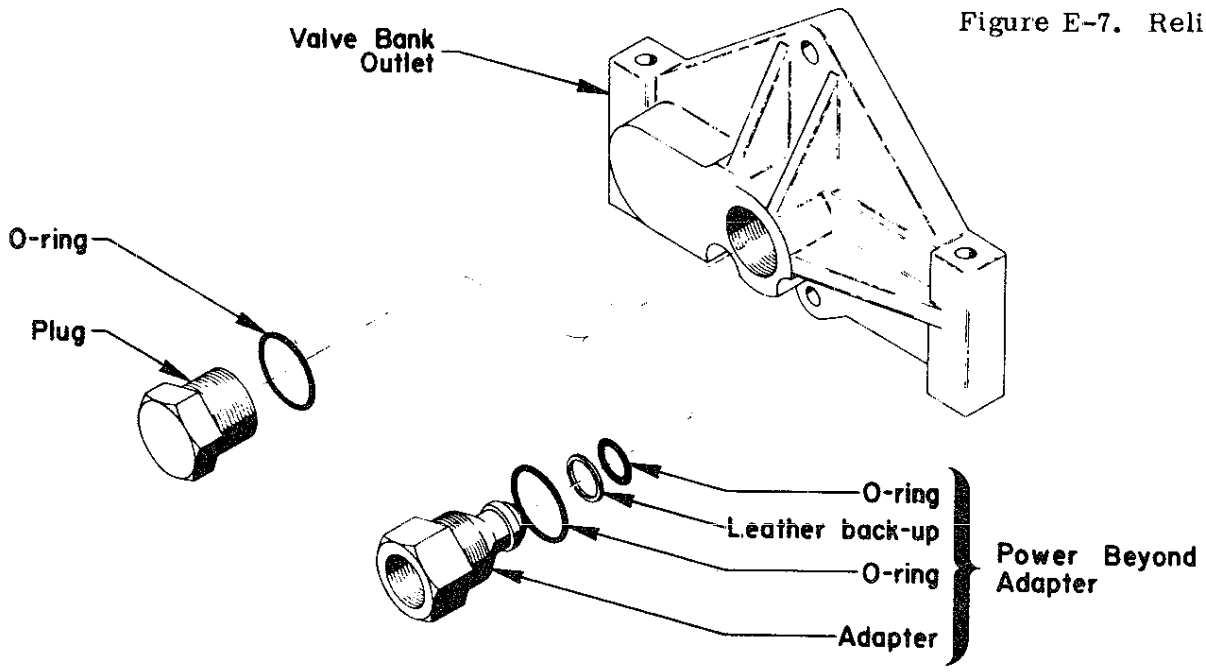


Figure E-8. Power Beyond Plug

5-4. PREVENTIVE MAINTENANCE

The following inspection check list is designed to assist you in keeping the vehicle and crane unit in safe operating condition. Items which apply to the unit should be checked before unit operation and the carrying vehicle should be inspected before moving the equipment.

CAUTION

Failure to comply with these instructions may result in excessive wear and premature failure of the unit resulting in expensive repairs and down-time.

TABLE E-3. INSPECTION CHECK LIST

ITEM	DESCRIPTION	FREQUENCY		
		Daily	Weekly	Monthly
VEHICLE CHECK LIST				
Battery	Inspect for correct fluid level. In hot, dry weather increase inspection frequency.		■	■
Engine Oil	Check for proper level. Make sure oil level on dip stick is above "add" mark	■		
Brakes (Service and Parking)	Operate both systems to assure positive, efficient functioning.	■		
Radiator	Inspect coolant level. Check for antifreeze protection in cold weather.	■		
Safety Equipment Warning Signals and Lights	Inspect all devices and lights for proper operation.	■		
Suspension	Check for broken or weak springs.	■		
Tires and Wheels	Inspect tires for bruises, cuts and proper inflation. Check for loose wheel stud nuts, bent wheels and mud lumps or stones between dual wheels.	■		
UNIT CHECK LIST				
Walk Around Inspection	Visually inspect unit on all sides for hydraulic leaks, loose parts and obvious damage to external structural members.	■		
Cylinders	Check securing pins on cylinders and booms for proper installation. Check for proper installation of bolts securing outrigger cylinders			■
Hydraulic Hoses and Fittings	Inspect hose surfaces and metal end coupling junctions for oil leakage. Check outer hose coverings for blistering, excessive wear or flattening	■		
Hydraulic Reservoir	With all cylinders retracted, check fluid level in reservoir	■		
Load Hook	Check load hook for proper installation. Inspect hook twist exceeding 10° from normal opening. Check for throat opening spread exceeding 15 percent of normal.	■		
Mounting Bolts	Inspect and check torque. Refer to the Torque Data Table in the Appendix for the torque values for a particular grade and size of bolt.			■
Rotation System	Check for excessive back lash (play) in horizontal rotation stops. Normal variation at the mast location is not to exceed 1/8 - 3/16 inch. Check gear mesh and bolt torque of turntable bearing		■	
Oil Leaks	Inspect all valves and cylinders for signs of leakage.			■

TABLE E-3. INSPECTION CHECK LIST (cont.)				
UNIT CHECK LIST (cont.)				
ITEM	DESCRIPTION	FREQUENCY		
		Daily	Weekly	Monthly
Power Take-off	Check for sufficient transmission lubrication. Check security of mounting bolts, leakage, and correct alignment		■	
Structural Damage	Inspect all structural members for broken welds or fatigue cracks. Check booms for structural defects such as bends, weld cracks or dents			■
Holding Valve	Conduct a holding test with loaded boom to assure proper operation of holding valve		■	

5-4-1. Regular Inspection

Every three months or more often when equipment is subjected to heavy use, the following inspections should be performed in addition to the preceding routine Inspection Check List.

5-4-1-1 Main and Secondary Booms

1 Check structural defect evidenced in weld cracks, dents or bends.

2 Check boom rollers for wear.

3 Check main and secondary boom cylinder pins for proper installation and worn pivot pin bushings.

5-4-1-2. Mainframe

1 Check control valve and all other fittings for oil leaks and tightness.

2 Check all roll pins and lock rings on main pin assemblies for proper installation.

3 Check torque on all unit mounting bolts to range of 600 - 660 ft. lbs.

4 Check for loose bolts, fatigue cracks or corroded structural members.

5-4-1-3. Mast and Rotation System

1 Check mast housing for cracks.

2 Check for proper rotation function by making several start-stop operations. Maximum allowable free-play at mast front should be 1/8" to 3/16".

3 Check for proper gear mesh in turntable bearing. Check motor and gear mounting bolts for tightness.

5-4-1-4. Hydraulic System

1 Cylinders

A Check rods for damage such as scarring, nicks, dents and rust on out of service units.

B Check for leaks at weld joints and rod seals. Check for drift indicating leakage around piston.

C Check cylinder barrel for dents.

2 Hydraulic Pump

A. Check for leaks at shaft seal and suction joints.

B Check for drop in operating speed.

C Check hydraulic oil for excessive heating.

D Check bolts and fasteners for tightness and note unusual vibration or noise.

3. Hydraulic Control Valves

A. Check spools for sticking and failure to return to a neutral position.

Inspect for leaks at joints and spools.

B. Inspect valve housing for cracks.

C Make sure relief valve reaches correct pressure setting.

5-4-1-5. Underdrive and Pump

1 Inspect for proper transmission gear to PTO engagement.

2 When supplied, inspect drive line U-joints for securing cap tightness and adequate lubrication.

3. Check mounting bolts on pump and PTO for tightness.

SECTION 6. PARTS

6-1. CYLINDER IDENTIFICATION

Every IMTCO 525 crane has a cylinder identification tag as shown in Figure F-1 attached to the mast assembly.

To ensure proper replacement part procurement, it is necessary to specify a complete number/letter sequence for any part request. Part numbers may be cross checked by comparing the stamped identification of cylinder base porting blocks with corresponding placard cylinder identification.

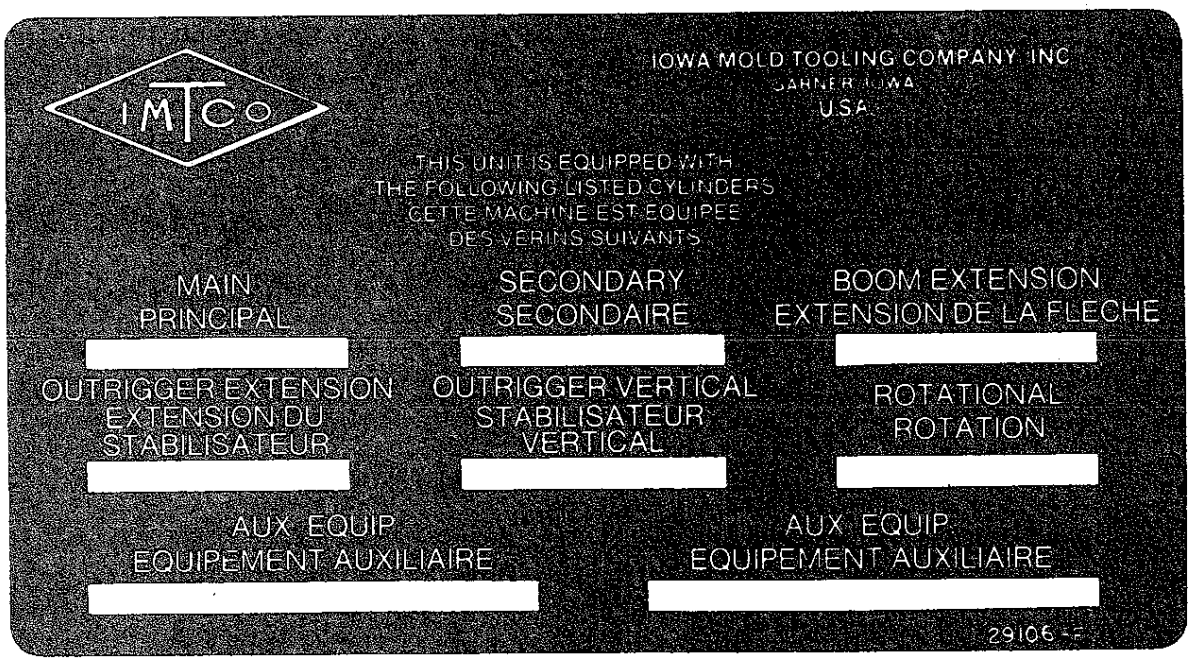


Figure F-1. Cylinder ID Placard

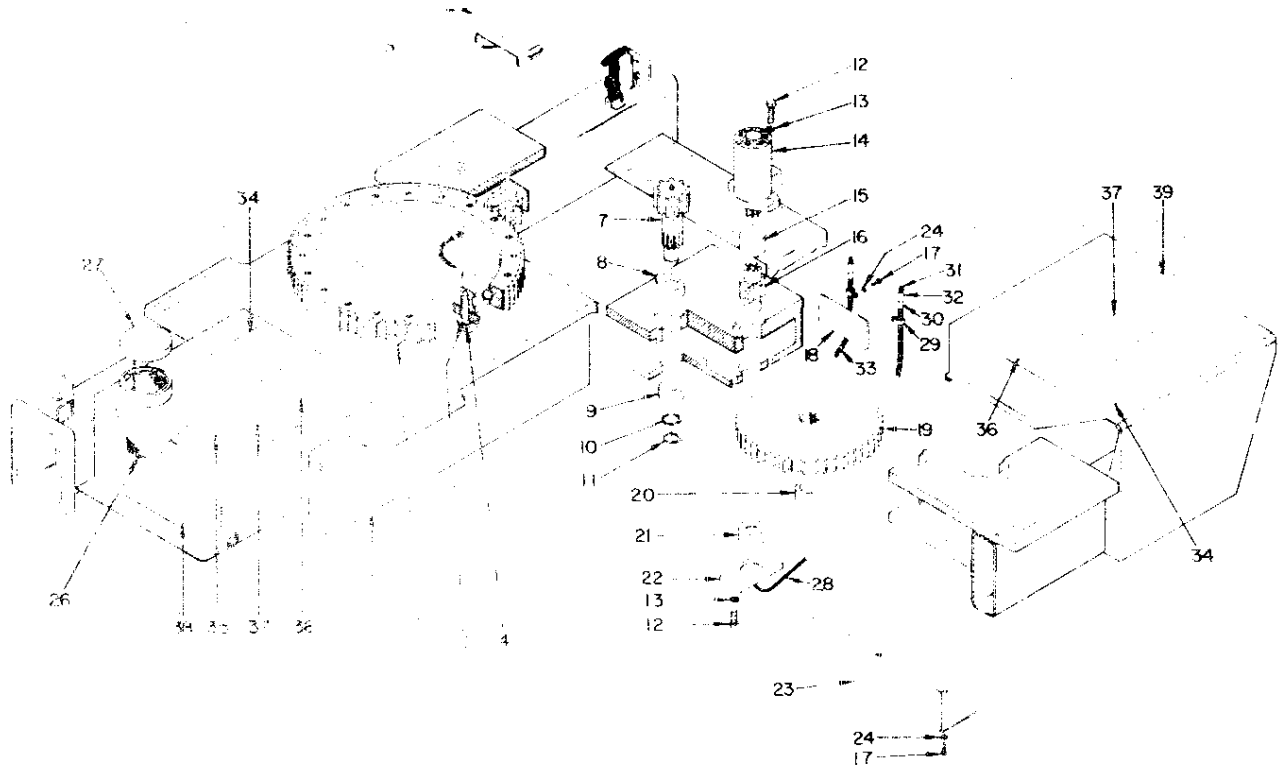


Figure F-2. Base (Part Number 417Q1250)

Item No.	Part No.	Description	Qty
1.	52701251	BASE	1
2.	71056001	GEAR-BEARING, turntable	1
3.	72066127	WASHER, spring; 5/8 Del Lok	20
4.	72060151	BOLT, hex hd; 5/8-11 x 2 grade 8	20
5.	60010235	COVER, pinion gear	1
6.	72060833	BOLT, self-tap; 5/16-18 x 3/4	2
7.	71056010	GEAR, pinion	1
8.	60020114	BUSHING	1
9.	60020081	BUSHING	1
10.	72063085	BUSHING, [illegible]	1
11.	72066084	RING, retaining	1
12.	72060092	BOLT; 1/2-13 x 1-1/4	4
13.	72063053	LOCK WASHER, 1/2	4
14.	73051001	MOTOR, hydraulic	1
15.	60020115	BUSHING	1
16.	71056011	GEAR, drive	1
17.	72060002	BOLT; 1/4-20 x 3/4	4
18.	60102767	PLATE, inspection	1
19.	71056012	GEAR, intermediate	1
20.	60010843	SPACER	1
21.	60020116	BUSHING	1
22.	60010844	PLATE	1
23.	60102769	GUARD	1
24.	72063049	LOCK WASHER; 1/4"	2
25.	72053244	PLUG, pipe; 1/8" npt	1
26.	73024133	SCREEN, fill	1
27.	73014671	CAP, fill	1
28.	73073132	EXTENSION, grease fitting	1
29.	60034246	CLAMP, nylon	2
30.	72053301	COUPLING, pipe; 1/8" npt	2
31.	72053508	ZERK; 1/8" npt	3
32.	72531826	BUSHING, red.; 1/4" npt(m) x 1/8" npt(f)	1
33.	73073133	EXTENSION, grease fitting	1
34.	70391391	PLACARD, electrocution hazard	2
35.	71039134	PLACARD, oil level	1
36.	70391390	PLACARD, vehicle inspection	2
37.	70391392	PLACARD, operation	2
38.	71039127	PLACARD, control, RH	1
39.	71039126	PLACARD, control, LH	1

Item No.	Part No.	Description	Qty
1.	52701937	MAST	1
2.	71056001	GEAR-BEARING, turntable	Ref.
3.	72066427	WASHER, spring; 5/8" Del Lok	18
4.	72060151	BOLT; 5/8-11 x 2" grade 8	18
5.	72060858	SCREW, set, half dog	2
6.	72063053	LOCK WASHER; 1/2"	4
7.	72060091	BOLT; 1/2-13 x 1"	4
8.	52701986	SADDLE	1
9.	71029106	PLACARD, cylinder ID	1
10.	71029115	PLACARD, serial no.	1
11.	71029170	PLACARD, capacity	2
12.	60104539	COVER, gear	1

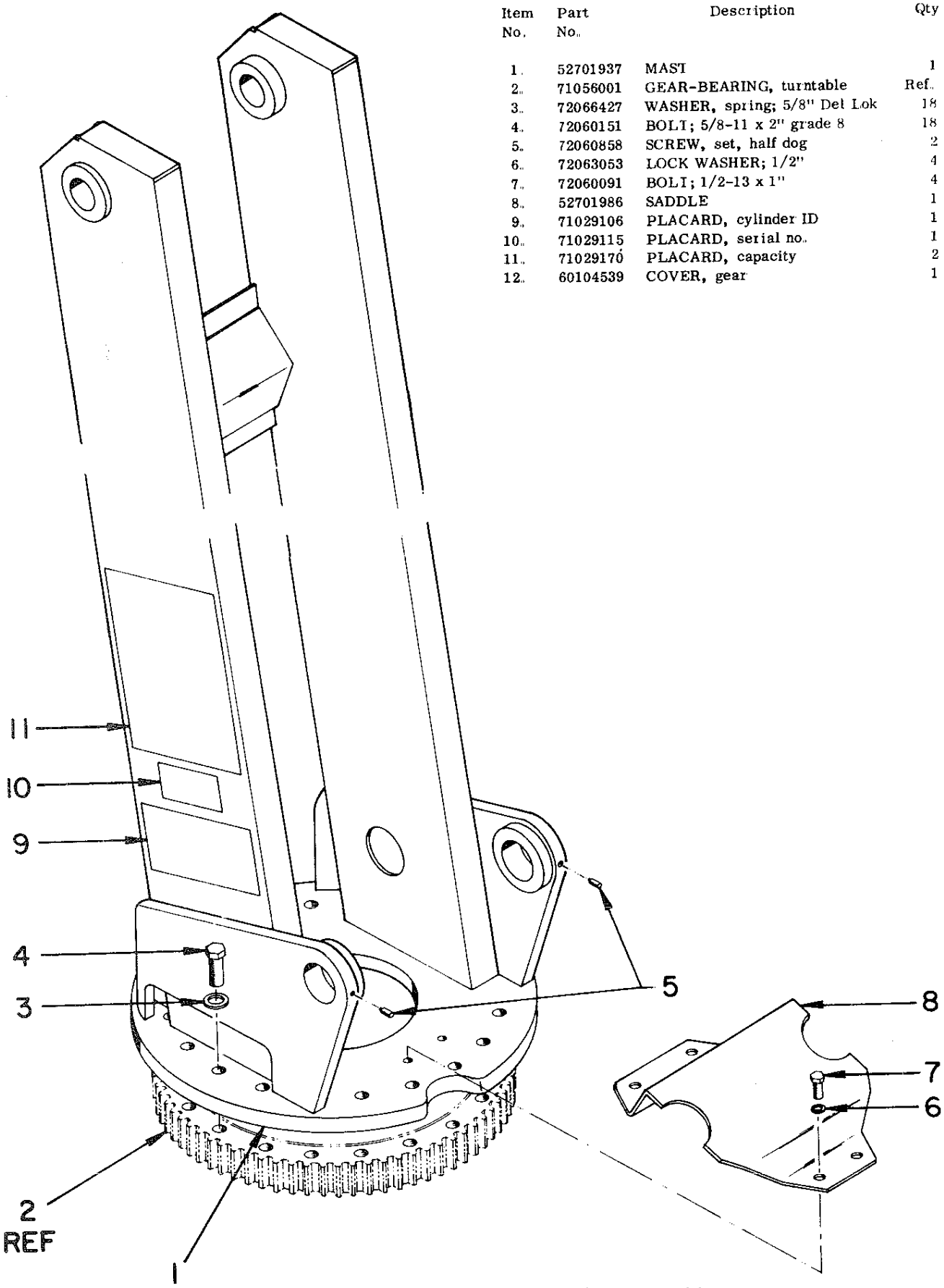


Figure F-3. Mast (Part Number 41701968)

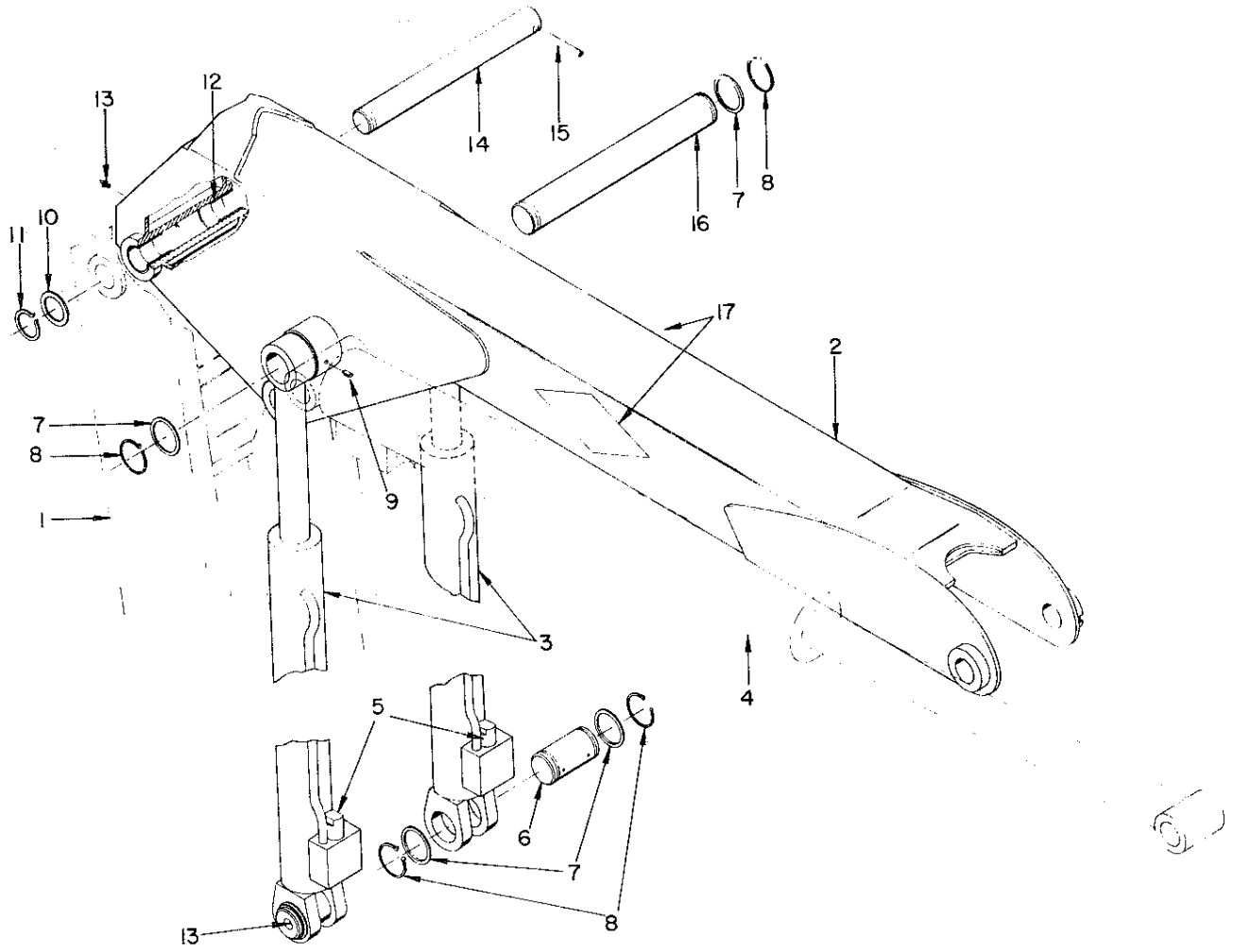


Figure F-4. Main Boom (Part Number 41701969)

Item No.	Part No.	Description	Qty
1.	52701973	MAST	Ref.
2.	52701978	BOOM, main	1
3.	3B222710	CYLINDER, main	2
4.	3C226710	CYLINDER, secondary	Ref.
5.	73054242	VALVE, counter balance	Ref.
6.	60102275	PIN, main cylinder to mast	2
7.	72063040	BUSHING, machy; 2-1/2" x 10 ga.	6
8.	72066103	RING, retaining	6
9.	72060858	SCREW, set, half dog	2
10.	72063039	BUSHING, machy; 2" x 10 ga.	1
11.	72066136	RING, retaining	1
12.	3B181520	BUSHING	4
13.	72053508	ZERK; 1/8" npt	3
14.	60103869	PIN, hinge, main boom to mast	1
15.	72066316	PIN, spring	1
16.	60103865	PIN, main cylinder rod end	1
17.	71029251	PLACARD, IMICO diamond	2

Item No.	Part No.	Description	Qty
1.	7BF81025	BUSHING	4
2.	4G222710	ROD	1
3.	7R14P022	*WIPER, rod	1
4.	7R546022	*SEAL, rod, dynamic	1
5.	6H035022	HEAD	1
6.	7Q10P338	*BACK-UP, static	1
7.	7Q072338	*O-RING, static	1
8.	6A025022	*WAFER LOK	1
9.	6C075022	TUBE, stop	1
10.	6C150022	TUBE, stop	1
11.	7I65I035	*RING, piston	2
12.	6I035125	PISTON	1
13.	7Q072151	*O-RING, companion	1
14.	7T66P035	*SEAL, piston, dynamic	1
15.	7T61N125	*SEAL, lock ring	1
16.	4B222710	CASE, cylinder	1
17.	73054242	VALVE, counter balance	1

*Part of seal kit (Part Number 9C141820).

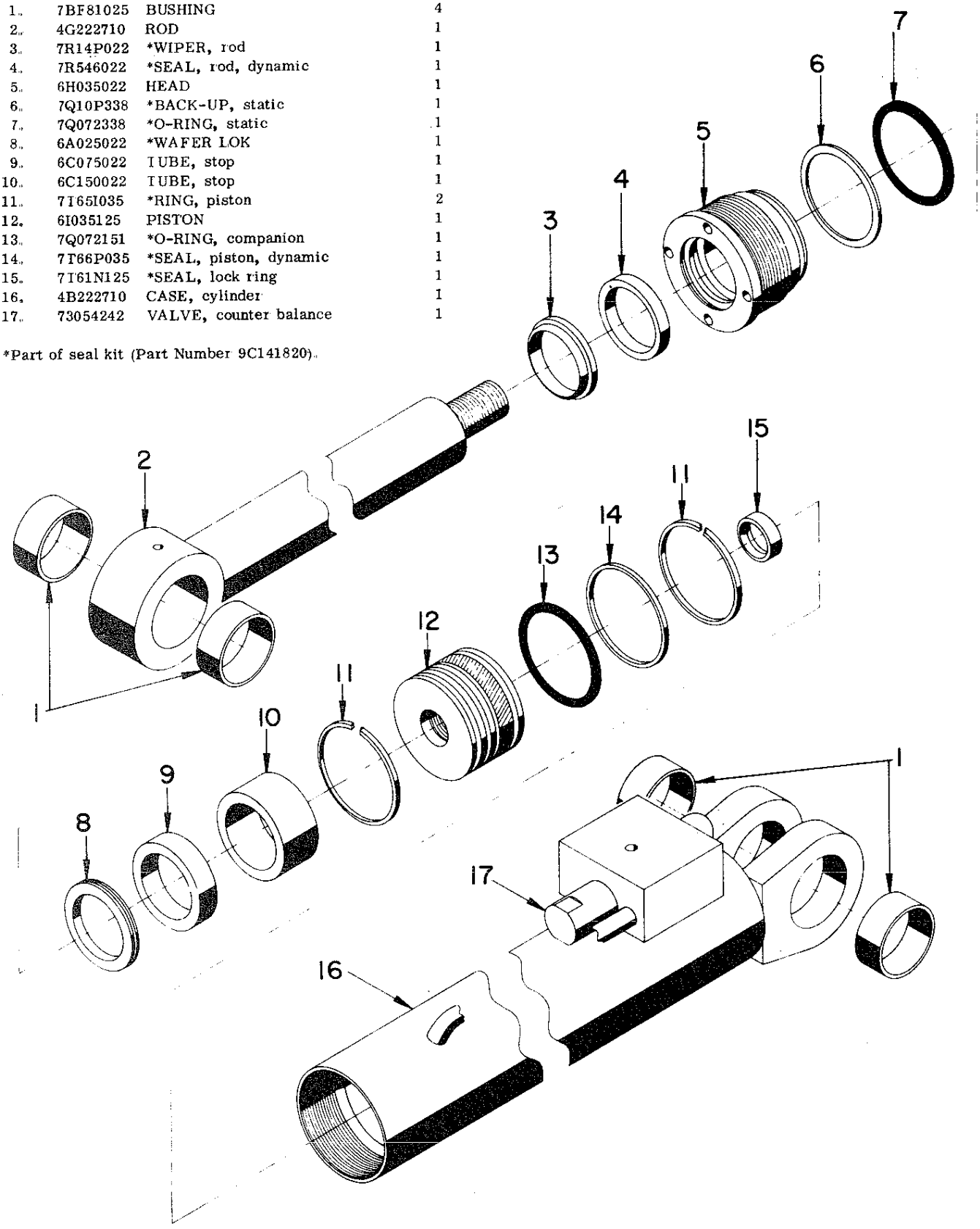


Figure F-5. Main Cylinder (Part Number 3B222710)

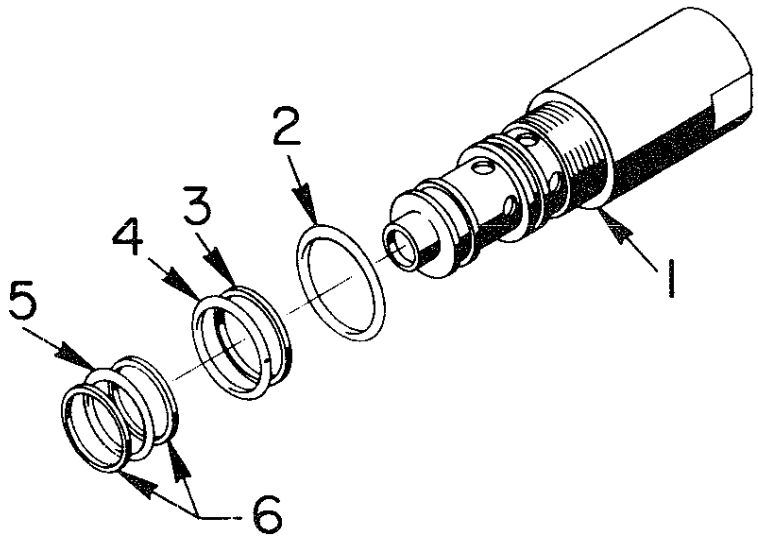


Figure F-6. Holding Valve (Part Number 73054242)

Item No.	Part No.	Description	Qty
1.	--	BODY, valve (not a replacement part)	1
2.	7Q072215	O-RING	1
3.	7Q10P021	RING, back-up	1
4.	7Q072021	O-RING	1
5.	7Q072020	O-RING	1
6.	7Q10P020	RING, back-up	1

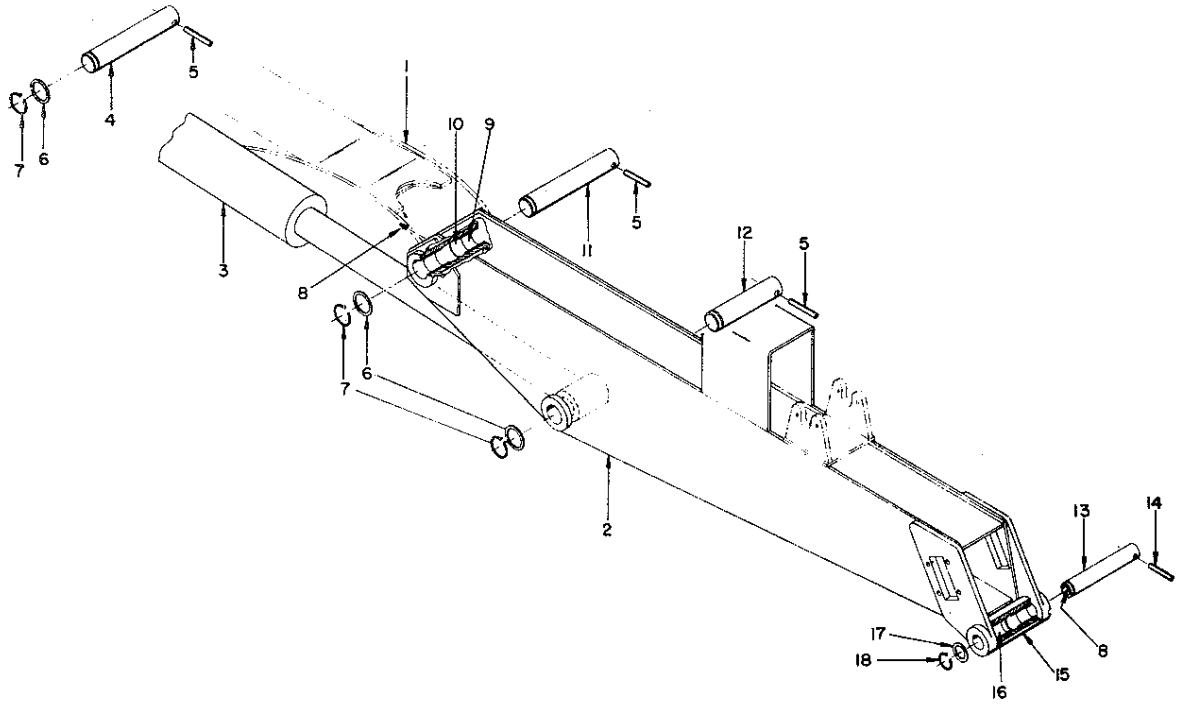


Figure F-7. Secondary Boom (Part Number 41701970)

Item No.	Part No.	Description	Qty
1.	52701978	BOOM, main	Ref.
2.	52701979	BOOM, secondary	1
3.	3C226710	CYLINDER, secondary	1
4.	60102319	PIN, seconday cylinder to main boom	1
5.	72066316	PIN, spring; 1/2" x 3-1/2"	3
6.	72063039	BUSHING, machy; 2" x 10 ga.	3
7.	72066136	RING, retaining	3
8.	72053508	ZERK; 1/8" npt	2
9.	7BF81520	BUSHING	2
10.	7BF82020	BUSHING	2
11.	60102321	PIN, hinge, main boom to secondary	1
12.	60102324	PIN, seconday boom to cylinder	1
13.	60102647	PIN, roller	1
14.	72066315	PIN, spring; 1/2" x 3"	1
15.	60102322	ROLLER	1
16.	7BF81215	BUSHING	4
17.	72063037	BUSHING, machy	1
18.	72066132	RING, retaining	1

Item No	Part No.	Description	Qty
1.	7B182020	BUSHING	4
2.	4G226710	ROD	1
3.	7R14P030	*WIPER, rod	1
4.	7R546030	*SEAL, rod, dynamic	1
5.	6H045030	HEAD	1
6.	7Q10P346	*BACK-UP, static	1
7.	7Q072345	*O-RING, static	1
8.	6A025030	*WATER LOK	1
9.	6C075030	TUBE, stop	1
10.	6C300030	TUBE, stop	1
11.	7165I045	*RING, piston	2
12.	6I045143	PISTON	1
13.	7Q072155	*O-RING, companion	1
14.	7T56P045	*SEAL, piston, dynamic	1
15.	7T61N143	*SEAL, lock ring	1
16.	4C226710	CASE, cylinder	1
17.	73054242	VALVE, counter balance	1

*Part of seal kit (Part Number 9C182423).

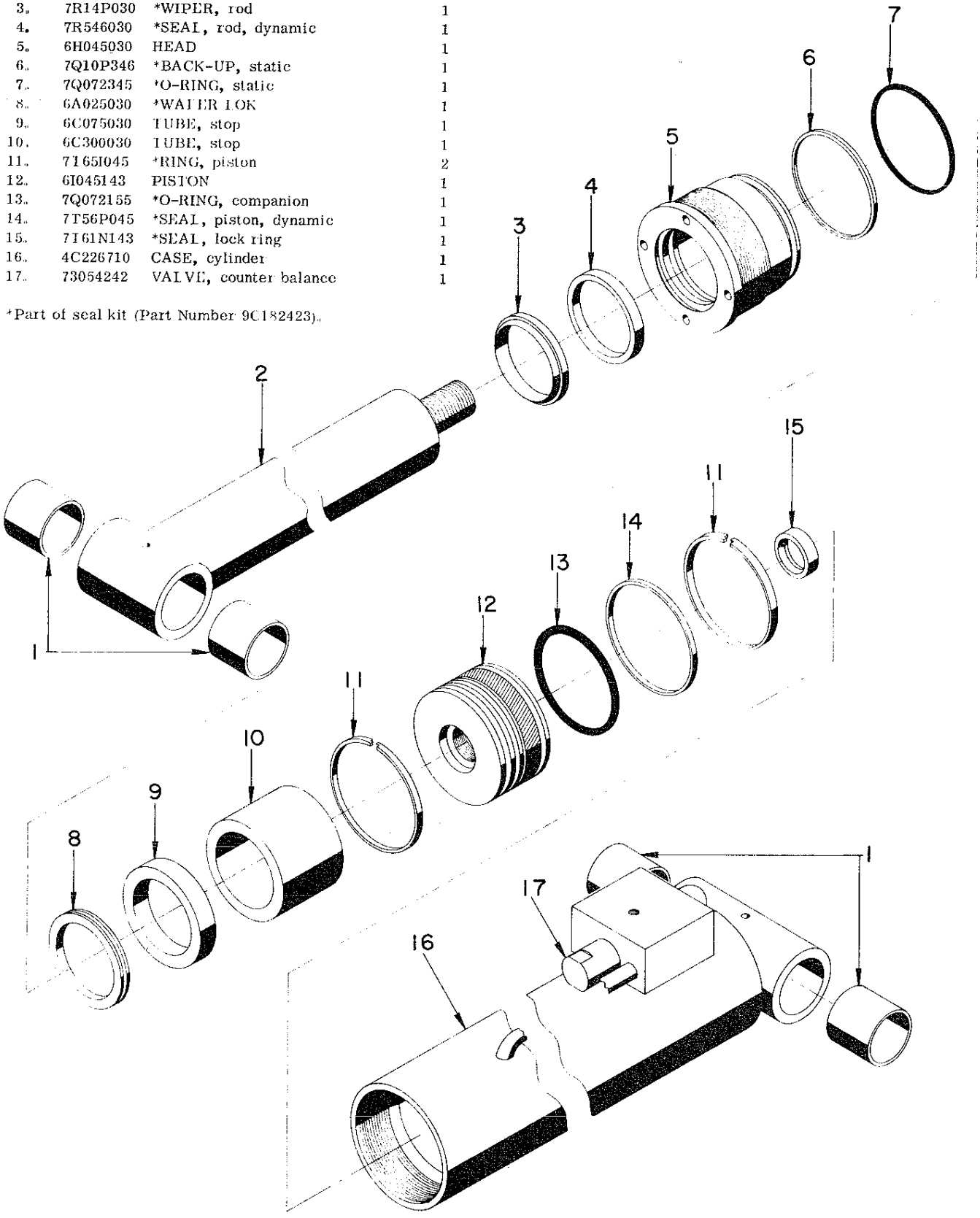


Figure F-8. Secondary Cylinder (Part Number 3C226710)

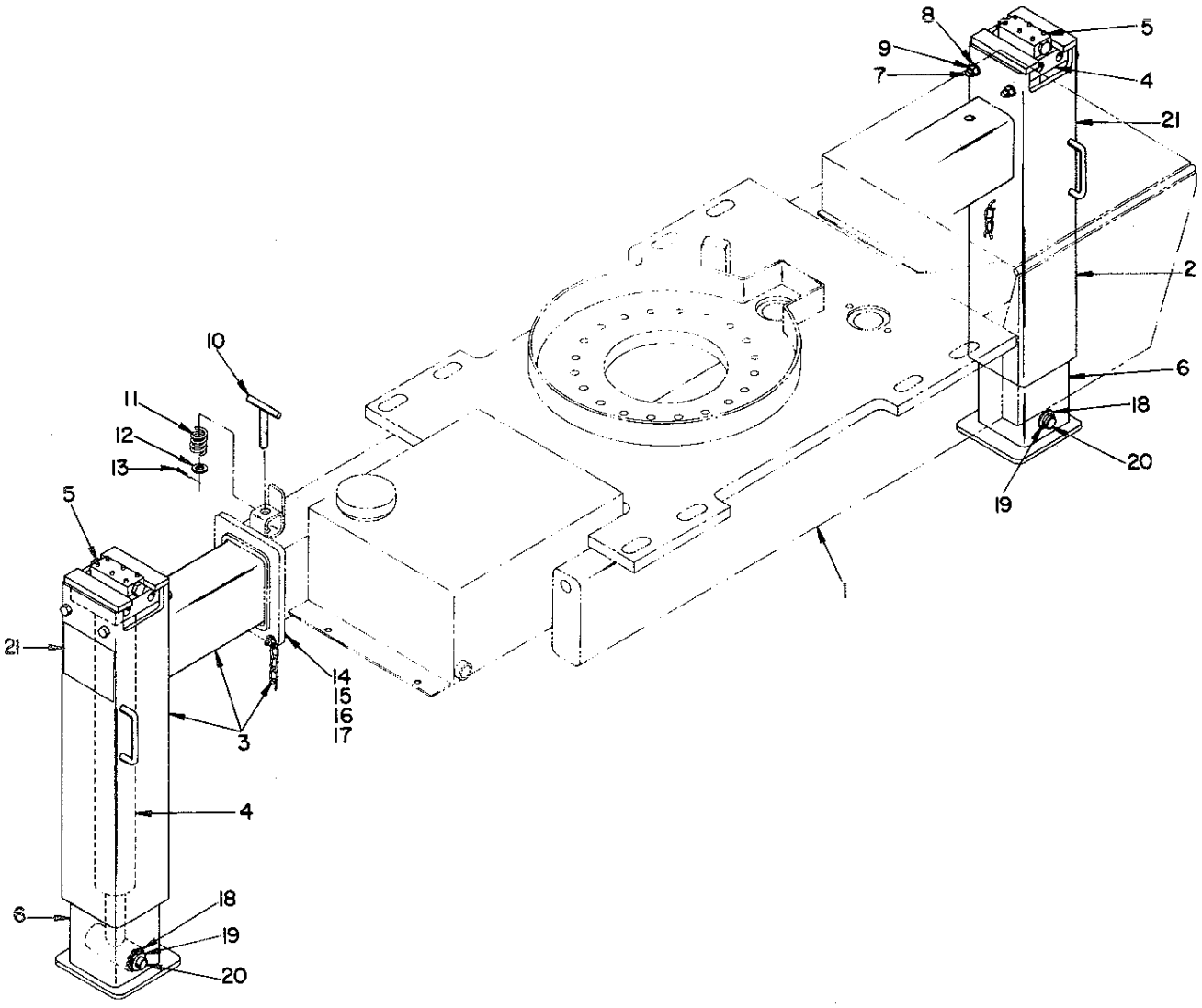
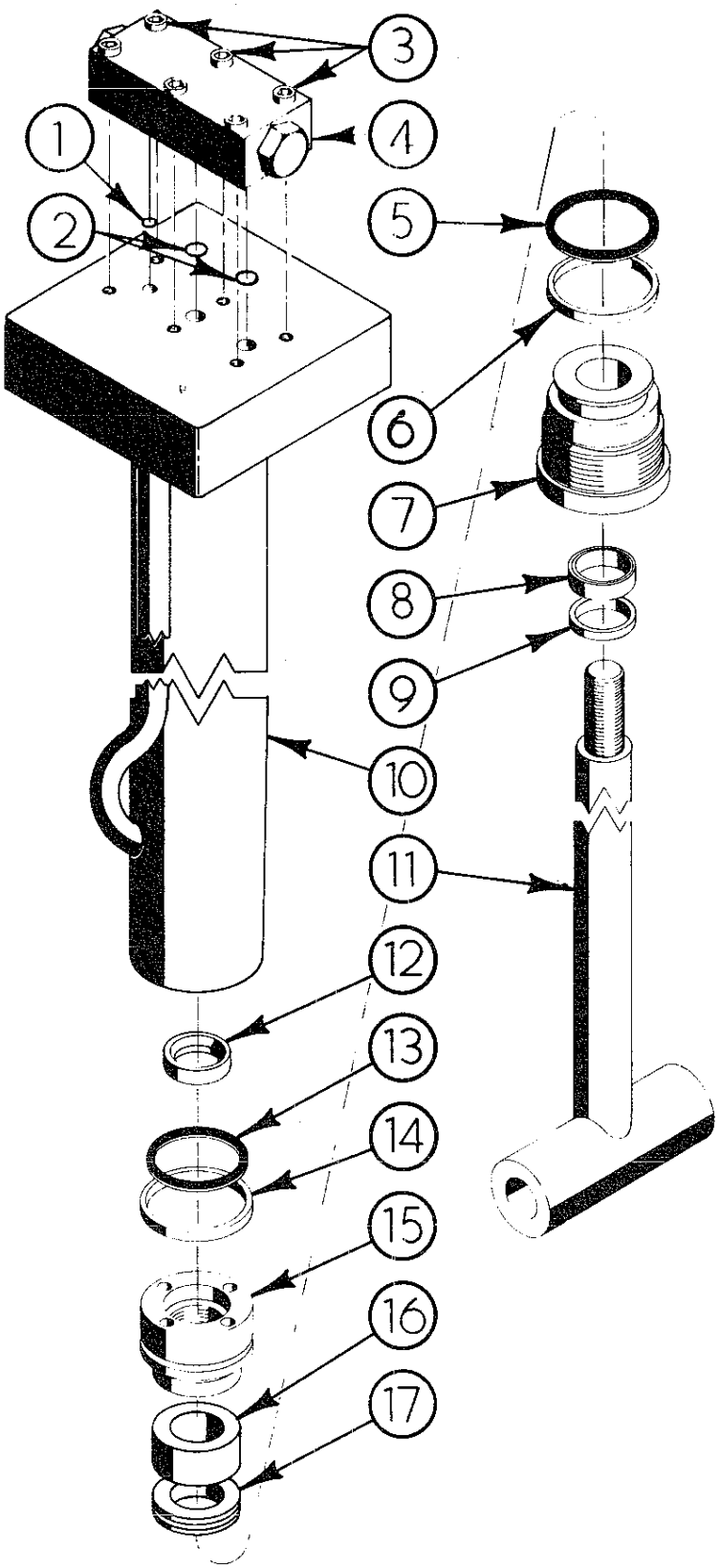


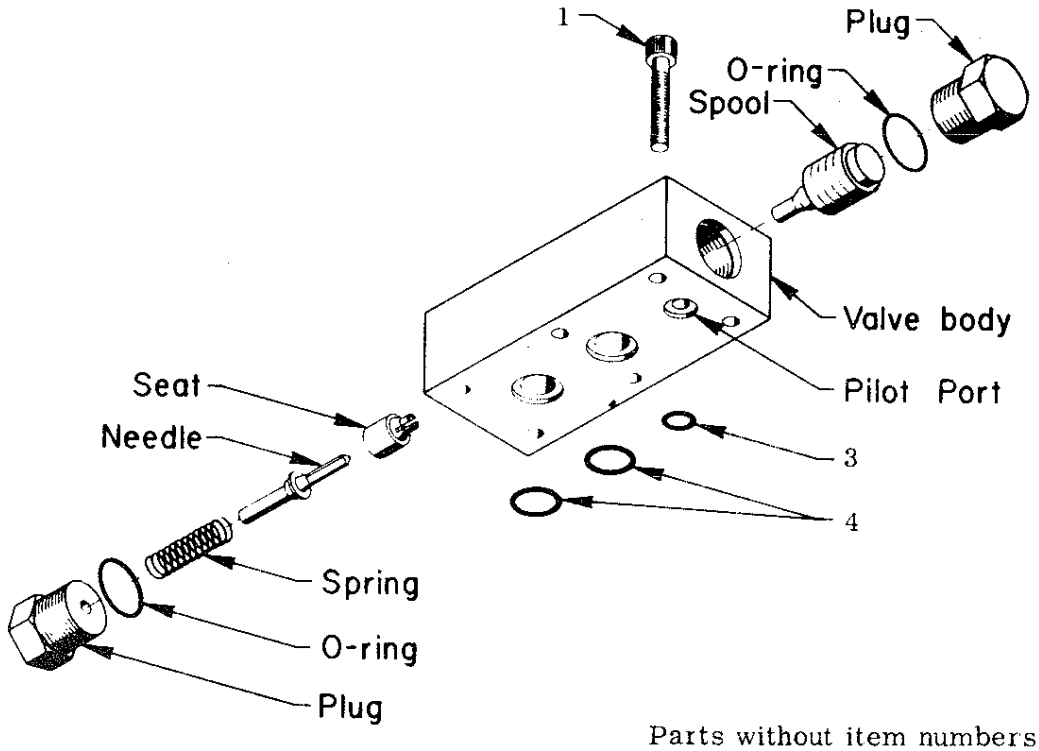
Figure F-9. Power-down Outrigger (Part Number 90702006)

Item No.	Part No.	Description	Qty
1.	52701251	BASE	Ref.
2.	52702007	ARM, outrigger, LH	1
3.	52702008	ARM, outrigger, RH	1
4.	3B084710	CYLINDER, outrigger	2
5.	73054004	VALVE, safety locking	2
6.	52701140	LEG, outrigger	2
7.	72060105	BOLT; 1/2-13 x 7"	4
8.	72063053	LOCK WASHER; 1/2"	4
9.	72062004	NUT; 1/2-13	4
10.	52070138	PIN, lock	2
11.	60010351	SPRING	2
12.	72063007	WASHER; 5/8" wrt	2
13.	72066185	PIN, cotter; 5/32" x 1"	2
14.	72060047	BOLT; 3/8-16 x 1-1/4"	2
15.	72063003	WASHER; 3/8" wrt	2
16.	72063051	LOCK WASHER; 3/8"	2
17.	72062002	NUT; 3/8-16	2
18.	72066125	RING, retaining	4
19.	72063034	BUSHING, machy; 1" x 10 ga.	4
20.	60102522	PIN, cylinder to leg	2
21.	71039129	PLACARD, stabilizer down	2



Item No	Description	Part No.	Qty
1.	O-RING	7Q072015	1
2.	O-RING	7Q072113	
3.	SCREWS, retaining; 1/4-20 x 1-1/2 soc hd	72060709	6
4.	VALVE, safety lock	73051001	1
5.	O-RING, static	7Q072228	1
6.	BACK-UP, static	7Q10P228	1
7.	HEAD	6H025015	1
8.	ROD SEAL, dynamic	7R516015	1
9.	ROD WIPER	7R14P015	1
10.	CASE, cylinder	4B084710	1
11.	ROD	4G084710	1
12.	SEAL, lock ring	7T61N087	1
13	O-RING, companion	7Q072137	1
14	PISTON SEAL, dynamic	7T66P025	1
15	PISTON	6J025087	1
16.	TUBE, stop	6C075015	1
17.	WATER-LOCK	6A025015	1
18.	SEAL KIT (includes items 5, 6, 8, 9, 13, and 14) must be purchased separately	9C101214	

Figure F-10. Power-down Outrigger Cylinder (Part Number 3B084710)



Parts without item numbers are considered non-replaceable. Order item number 2.

Figure F-11. Safety Locking Valve (Part Number 73054004)

Item No.	Part No.	Description	Qty
1.	72060709	SCREW, soc. hd.; 1/4-20 x 1-1/4"	6
2.	73054004	VALVE, safety locking	1
3.	7Q072012	O-RING; small	1
4.	7Q072113	O-RING; large	2

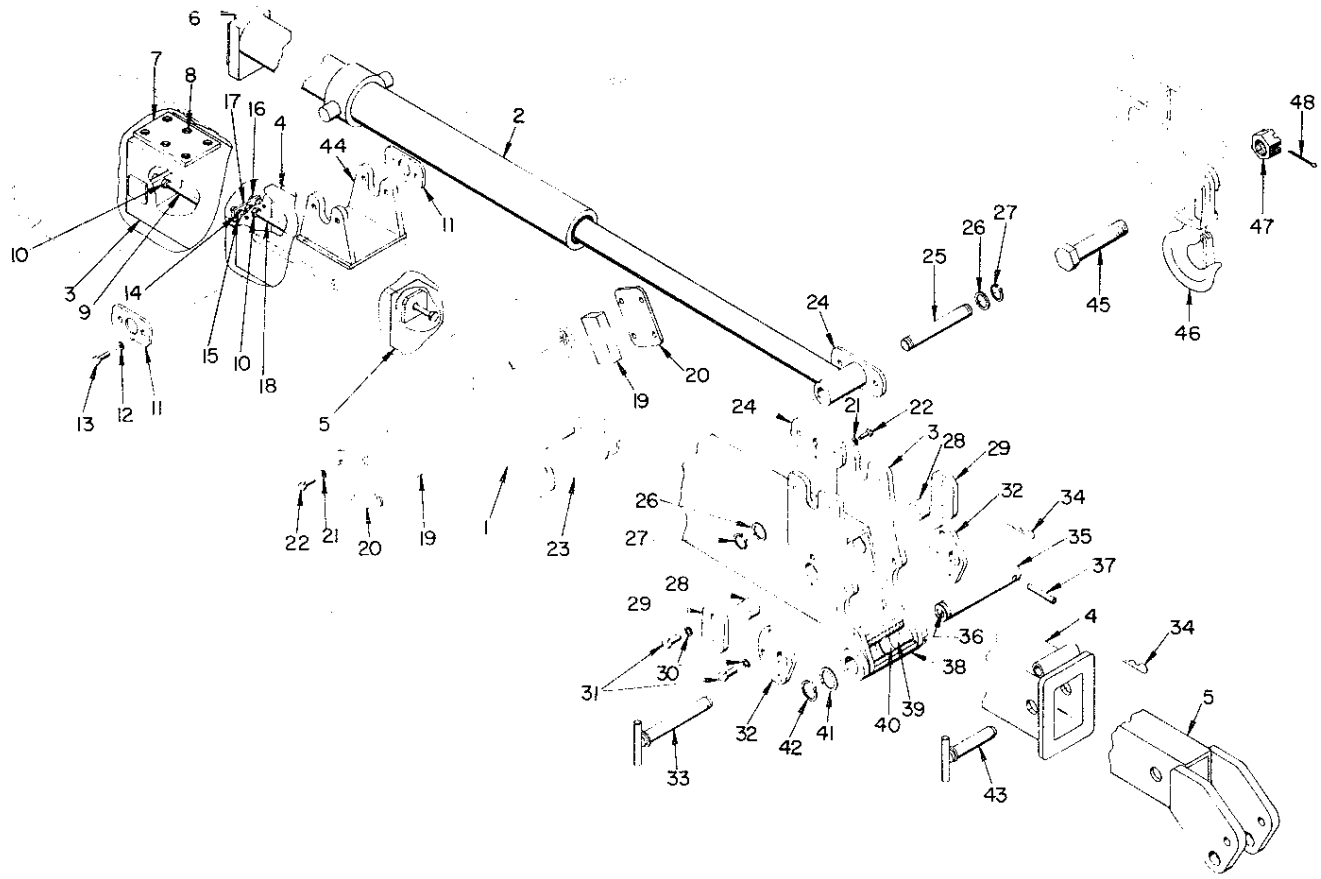


Figure F-12. Extension Boom - Manual Pull-out (Part Number 41701971)

Item No.	Part No.	Description	Qty
1.	52701979	BOOM, secondary	Ref.
2.	3B048610	CYLINDER, extension	1
3.	52701980	BOOM, extension, 1st stage	1
4.	52701981	BOOM, extension, 2nd stage	1
5.	52701982	STINGER	1
6.	73054004	VALVE, safety locking	Ref.
7.	60030021	BAR, rub, 1st stage ext.	1
8.	72060972	SCREW, rub bar	9
9.	60102656	STUD, 1st/2nd stage ext.	1
10.	72062004	NUT; 1/2-13	6
11.	60102341	PLATE, lock	2
12.	72063050	LOCK WASHER; 5/16"	4
13.	72060026	BOLT; 5/16-18 x 1-1/4"	4
14.	60010264	SPACER	2
15.	72063051	LOCK WASHER; 3/8"	2
16.	72060047	BOLT; 3/8-16 x 1-1/4"	2
17.	60010263	PLATE	1
18.	60102655	STUD, 2nd/3rd stage extension	1
19.	60030006	PAD, rub	2
20.	60102654	PLATE, retainer	2
21.	72063051	LOCK WASHER; 3/8"	12
22.	72060046	BOLT; 3/8-16 x 1"	12
23.	60102322	ROLLER, support, secondary	Ref.
24.	60103436	PLATE, lock, cylinder rod end	2
25.	60101874	PIN, extension cylinder rod end	1
26.	72063034	BUSHING, machy; 1" x 10 ga.	2
27.	72066125	RING, retaining	2
28.	60030007	PAD, rub	2
29.	60102649	PLATE, lock	2
30.	72063053	LOCK WASHER; 1/2"	10
31.	72060091	BOLT; 1/2-13 x 1"	10
32.	60102669	PLATE, pin mtg.	2
33.	52070635	PIN, extension boom; long	1
34.	72066145	HAIR PIN; 3/16"	2
35.	60102329	PIN, support roller	1
36.	72053508	ZERK; 1/8" npt	1
37.	72066315	PIN, spring	1
38.	60102294	ROLLER, support, 1st stage ext.	1
39.	7BF81015	BUSHING	2
40.	7BF81215	BUSHING	2
41.	72063037	BUSHING, machy; 1-1/2" x 10 ga.	1
42.	72066132	RING, retaining	1
43.	52701059	PIN, extension boom; short	1
44.	52701983	MOUNTING, cylinder, secondary boom (see drawing for location)	1

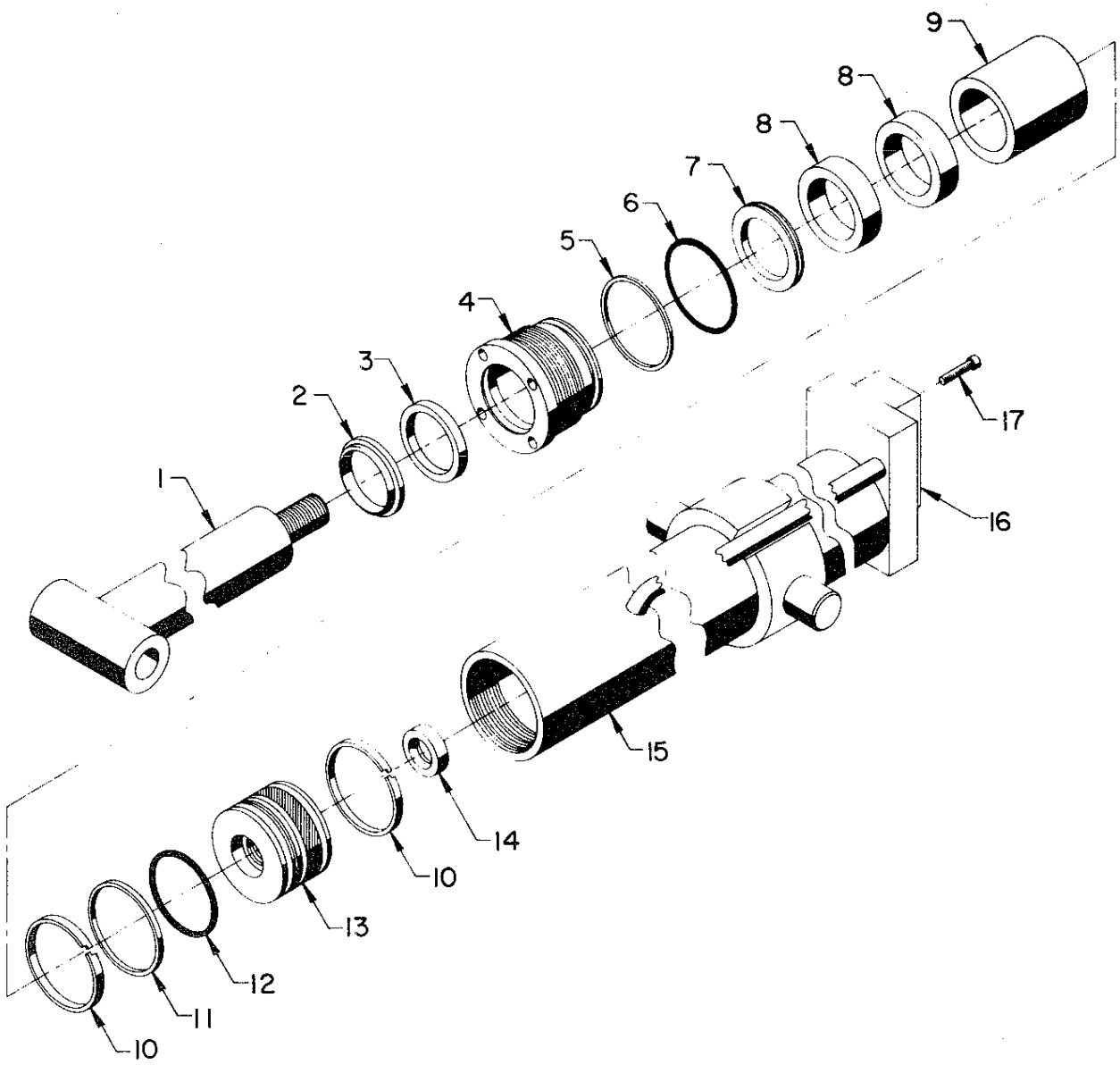


Figure F-13. Extension Cylinder (Part Number 3B048610)

Item No.	Part No.	Description	Qty
1.	4G048610	ROD	1
2.	7R14P020	*WIPER, rod, dynamic	1
3.	7R546020	*SEAL, rod, dynamic	1
4.	6H030020	HEAD	1
5.	7Q10P334	*RING, back-up	1
6.	7Q072334	*O-RING, companion	1
7.	6A025020	*WAFER LOK	1
8.	6C075020	TUBE, stop	2
9.	6C300020	TUBE, stop	1
10.	7T65I030	*RING, piston	2
11.	7T66P030	*SEAL, piston, dynamic	1
12.	7Q072145	*O-RING, companion	1
13.	6I030106	PISTON	1
14.	7T61N106	*SEAL, lock ring	1
15.	4B048610	CASE, cylinder	1
16.	73054004	VALVE, safety lock	1
17.	72060709	SCREW, soc. hd.; 1/4-20 x 1-1/4"	6
18.	9C121617	SEAL KIT (not shown - must be purchased separately)	

*Part of seal kit - item 18.

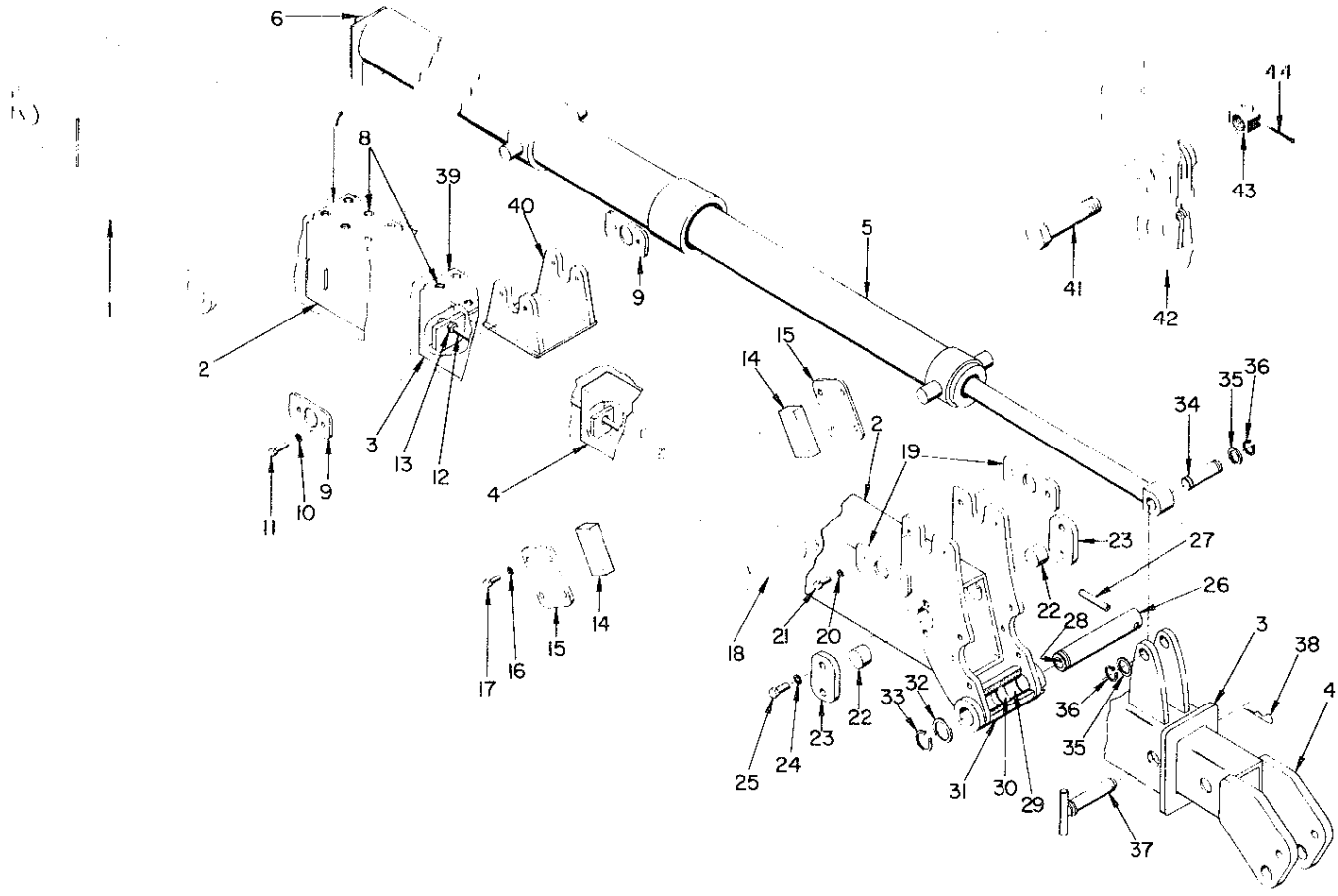


Figure F-14. Extension Boom - Hydraulic Power-out (Part Number 31702094)

Item No.	Part No.	Description	Qty
1.	52701979	BOOM, secondary	Ref.
2.	52701980	BOOM, extension, 1st stage	1
3.	52702096	BOOM, extension, 2nd stage	1
4.	52702097	STINGER	1
5.	3K271513	CYLINDER, extension, telescopic	1
6.	73054004	VALVE, safety locking	Ref.
7.	60030021	BAR, rub	1
8.	72060972	SCREW, rub bars	13
9.	60102341	PLATE, lock	2
10.	72063050	LOCK WASHER; 5/16"	4
11.	72060026	BOLT; 5/16-18 x 1-1/4"	4
12.	60102655	STUD	1
13.	72062004	NUT; 1/2-13	3
14.	60030006	PAD, rub	2
15.	60102654	PLATE, retainer	2
16.	72063051	LOCK WASHER; 3/8"	4
17.	72060046	BOLT; 3/8-16 x 1"	8
18.	60102322	ROLLER, secondary	Ref.
19.	60102278	PLATE, lock	2
20.	72063051	LOCK WASHER; 3/8"	4
21.	72060046	BOLT; 3/8-16 x 1"	4
22.	60030007	PAD, rub	2
23.	60102649	PLATE, retainer	2
24.	72063053	LOCK WASHER; 1/2"	4
25.	72060091	BOLT; 1/2-13 x 1"	4
26.	60102329	PIN, support roller	1
27.	72066315	PIN, spring; 1/2" x 2-1/2"	1
28.	72053508	ZERK; 1/8" npt	1
29.	7BF81015	BUSHING	2
30.	7BF81215	BUSHING	2
31.	60102294	ROLLER, support, 1st stage ext.	1
32.	72063037	BUSHING, machy; 1-1/2" x 10 ga.	1
33.	72066132	RING, retaining	1
34.	60102281	PIN, extension cylinder rod end	1
35.	72063034	BUSHING, machy; 1" x 10 ga.	2
36.	72066125	RING, retaining	2
37.	52701059	PIN, extension boom	1
38.	72066145	HAIR PIN; 3/16"	1
39.	60030030	BAR, rub, 2nd stage ext.	1
40.	52702135	MOUNTING, cylinder (see drawing for location)	1

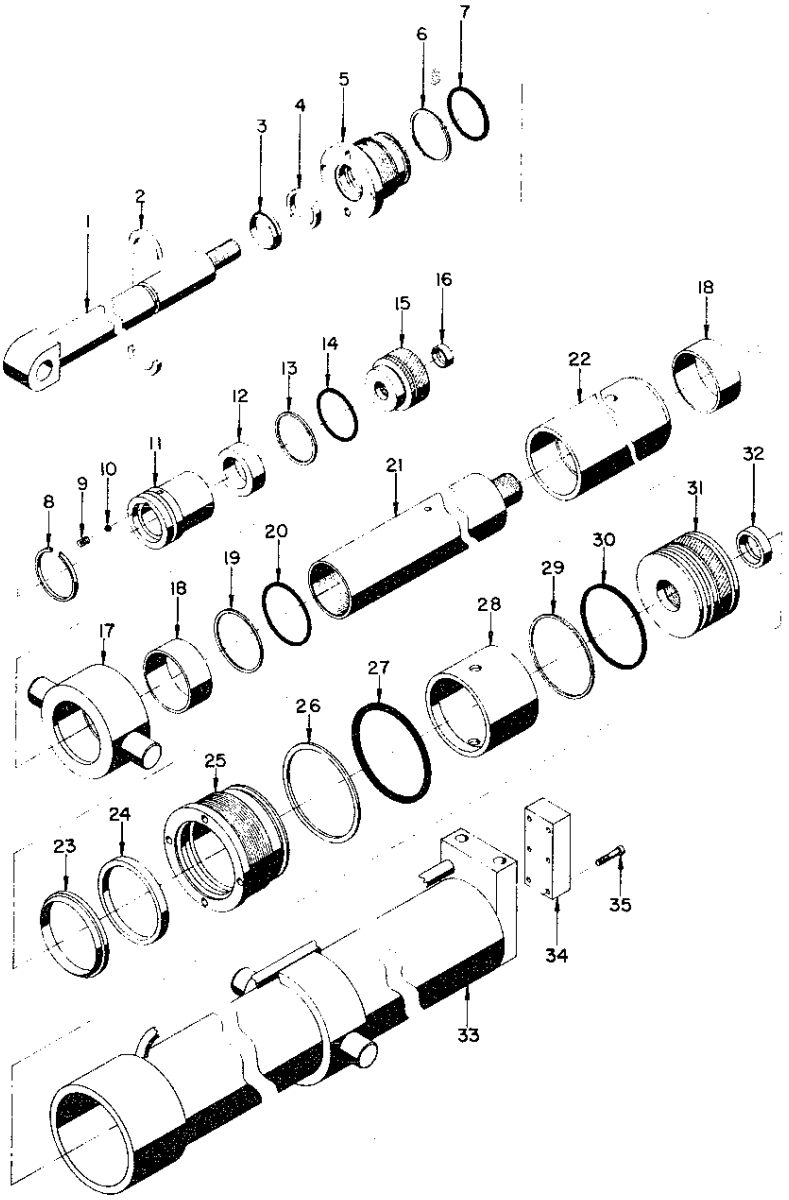
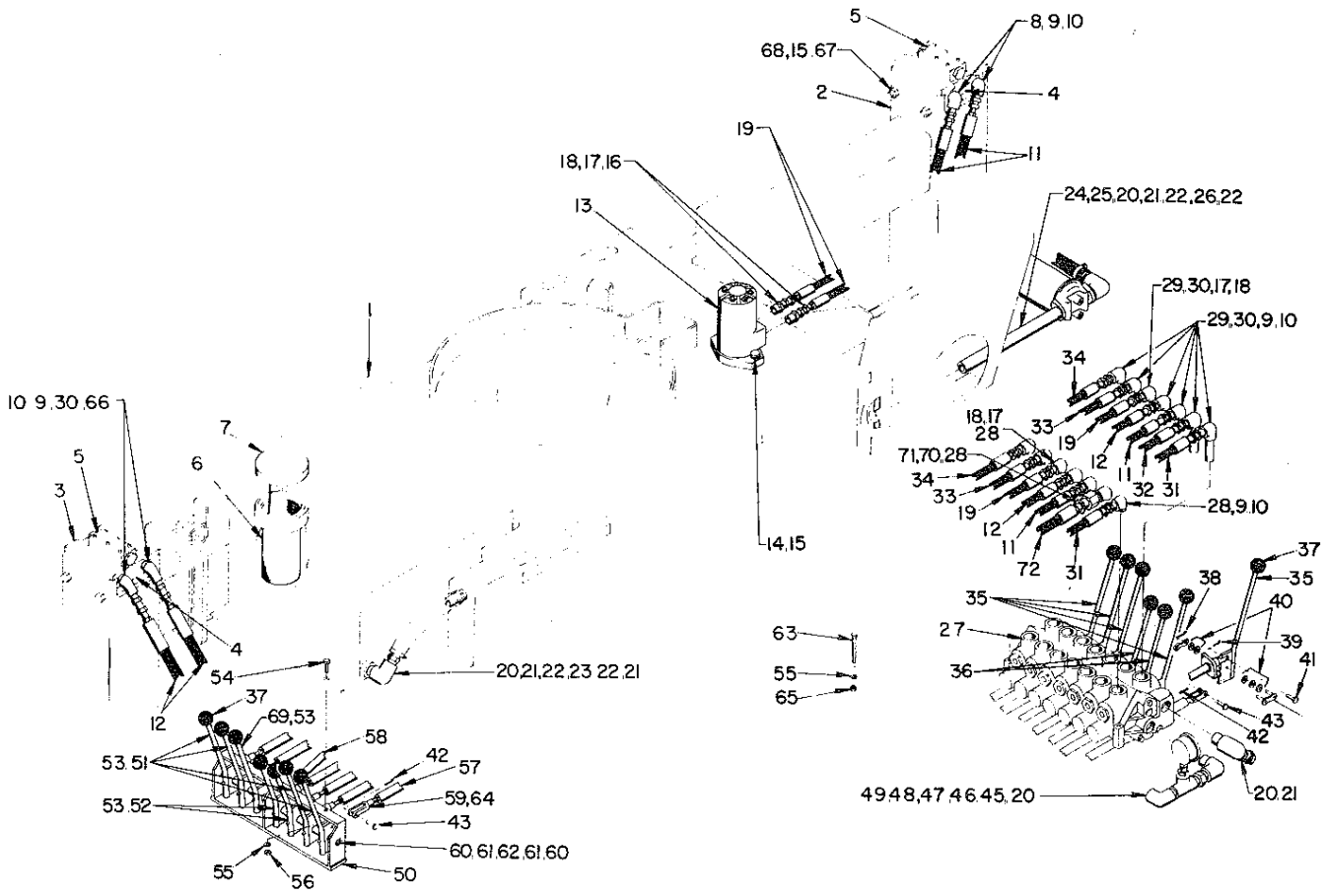


Figure F-15. Extension Cylinder - Telescoping (Part Number 3K271513)

Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	4G271510	ROD	1	19.	7Q10P233	BACK-UP, static	1
2.	7D271513	LOCK, tube	1	20.	7Q072233	O-RING, static	1
3.	7R14P015	WIPER, rod	1	21.	4H271510	ROD	1
4.	7R546015	SEAL, rod, dynamic	1	22.	6J271510	SLEEVE, rod	1
5.	6H271510	HEAD	1	23.	7R14P035	WIPER, rod	1
6.	7Q10P228	BACK-UP, static	1	24.	7R546035	SEAL, rod, dynamic	1
7.	7Q072228	O-RING, static	1	25.	6H271520	HEAD	1
8.	7I65K025	RING, piston	1	26.	7Q10P346	BACK-UP, static	1
9.	7W271513	SPRING	1	27.	7Q072346	O-RING, static	1
10.	7VB27151	BALL; 5/32" dia.	1	28.	6C271510	TUBE, stop	1
11.	6C271513	TUBE, stop	1	29.	7I66P040	SEAL, piston, dynamic	1
12.	6C075015	TUBE, stop	1	30.	7Q072153	O-RING, companion	1
13.	7I66P025	SEAL, piston, dynamic	1	31.	6I040143	PISTON	1
14.	7Q072137	O-RING, companion	1	32.	7T61N143	SEAL, lock ring	1
15.	6I025078	PISTON	1	33.	4K271512	CASE	1
16.	7I61N087	SEAL, lock ring	1	34.	73054004	VALVE, safety locking	1
17.	5FG27152	RING, rod mounting	1	35.	72060709	SCREW, soc. hd.; 1/4-20 x 1-1/4"	6
18.	6M271510	RING, adapter	2				



Parts List on Page 6-17

Figure F-16. Manual Hydraulic Controls - Sheet 1 (Part Number 91701972)

Item No.	Part No.	Description	Qty
1.	52701251	BASE	Ref.
2.	52702007	ARM, outrigger, LH	Ref.
3.	52702008	ARM, outrigger, RH	Ref.
4.	3B084710	CYLINDER, outrigger	Ref.
5.	73054004	VALVE, safety locking	Ref.
6.	73024133	SCREEN, fill	Ref.
7.	73014671	CAP, fill	Ref.
8.	72053563	ELBOW, street, 45°; 3/8" npt	2
9.	72053642	SWIVEL, pipe; 3/8" npt (m x f)	14
10.	72531151	SWEDGE; 3/8"	14
11.	60035244	HOSE; 3/8" x 72" (LH outrigger)	2
12.	60035246	HOSE; 3/8" x 120" (RH outrigger)	2
13.	73051004	MOTOR, hydraulic	Ref.
14.	72060092	SCREW, cap; 1/2-13 x 1-1/4"	Ref.
15.	72063053	LOCK WASHER; 1/2"	Ref.
16.	72531823	BUSHING, red.; 1/2" npt(m) x 3/8" npt(f)	2
17.	72053537	SWIVEL; 3/8" npt(m) x 1/2" npt(f)	4
18.	72531142	SWEDGE; 1/4"	4
19.	60035309	HOSE; 1/4" x 72"	2
20.	72053556	ELBOW, street, 90°; 3/4" npt	3
21.	72531547	NIPPLE, barbed; 1/2" npt x 3/4"	4
22.	72066000	CLAMP, hose; #12	4
23.	60035285	HOSE; 3/4" x 6-3/4"	1
24.	72053148	NIPPLE; 3/4" x 2"	1
25.	73052000	FILTER, return	1
26.	60035286	HOSE; 3/4" x 18"	1
27.	73073011	VALVE BANK; 6-spool	1
27A.	73073013	VALVE BANK; 7-spool	Ref.
28.	72531132	ELBOW, street, 90°; 3/8" npt	6
29.	72053051	NIPPLE; 3/8" npt x 2"	6
30.	72531100	ELBOW, 90°; 3/8" npt	8
31.	60035289	HOSE; 3/8" x 282"	Ref.
32.	60035188	HOSE; 3/8" x 240"	1
33.	60035336	HOSE; 3/8" x 132"	2
34.	60035119	HOSE; 3/8" x 54"	2
35.	52701254	LEVER, valve; long	4
36.	52070167	LEVER, valve; short	2
37.	71039096	KNOB, plastic; 1-1/2" dia.	12
38.	72066064	PIN, cotter; 1/16" x 1-1/2"	Ref.
39.	72066336	PIN, cotter; 5/64" x 1/2"	6
40.	72063001	WASHER, wrt; 1/4"	30
41.	72066337	PIN; 1/4" x 7/8"	6
42.	72066168	PIN, cotter; 3/32" x 3/4"	12
43.	72066338	PIN, clevis	12
44.	71058003	LINK, connecting	6
45.	72053726	NIPPLE; 3/4" npt x 1/2" npt	1
46.	72053612	TEE; 1/2" npt	1
47.	72531830	BUSHING, red.; 1/2" npt(m) x 1/4" npt(f)	1
48.	73054003	GAUGE, pressure; 0-5000 PSI	1
49.	72531133	ELBOW, street, 90°; 1/2" npt	1
50.	52701247	VALVE BANK, dummy	1
51.	52701253	LEVER, control; long	3
52.	52070162	LEVER, control; short	2
53.	72053506	ZERK; 3/16" press fit	6
54.	72060023	SCREW, cap; 5/16-18 x 3/4"	2
55.	72063050	LOCK WASHER; 5/16"	5
56.	72062001	NUT; 5/16-18	2
57.	52702016	LINK, control, female end	5
58.	52702017	LINK, bent, female end	1
59.	72062003	NUT; 7/16-14	6
60.	72066185	PIN, cotter; 5/32" x 1"	2
61.	72063002	WASHER, wrt; 5/16"	2
62.	60010860	ROD, dummy valve bank	1
63.	72060301	SCREW, cap; 5/16-24 x 3"	3
64.	52702018	LINK, control, male end	6
65.	72062036	NUT; 5/16-24	3
66.	72053723	NIPPLE; 3/8" npt	2
67.	72060105	SCREW, cap; 1/2-13 x 7"	Ref.
68.	72062004	NUT; 1/2-13	Ref.
69.	52701252	LEVER, slewing	1
70.	72053732	ADAPTER, red.; 1/2" npt(f) x 3/8" npt(m)	1
71.	72531185	SWEDGE; 1/2"	1
72.	60035218	HOSE; 1/2" x 240"	1

Parts Drawing on Page 6-16

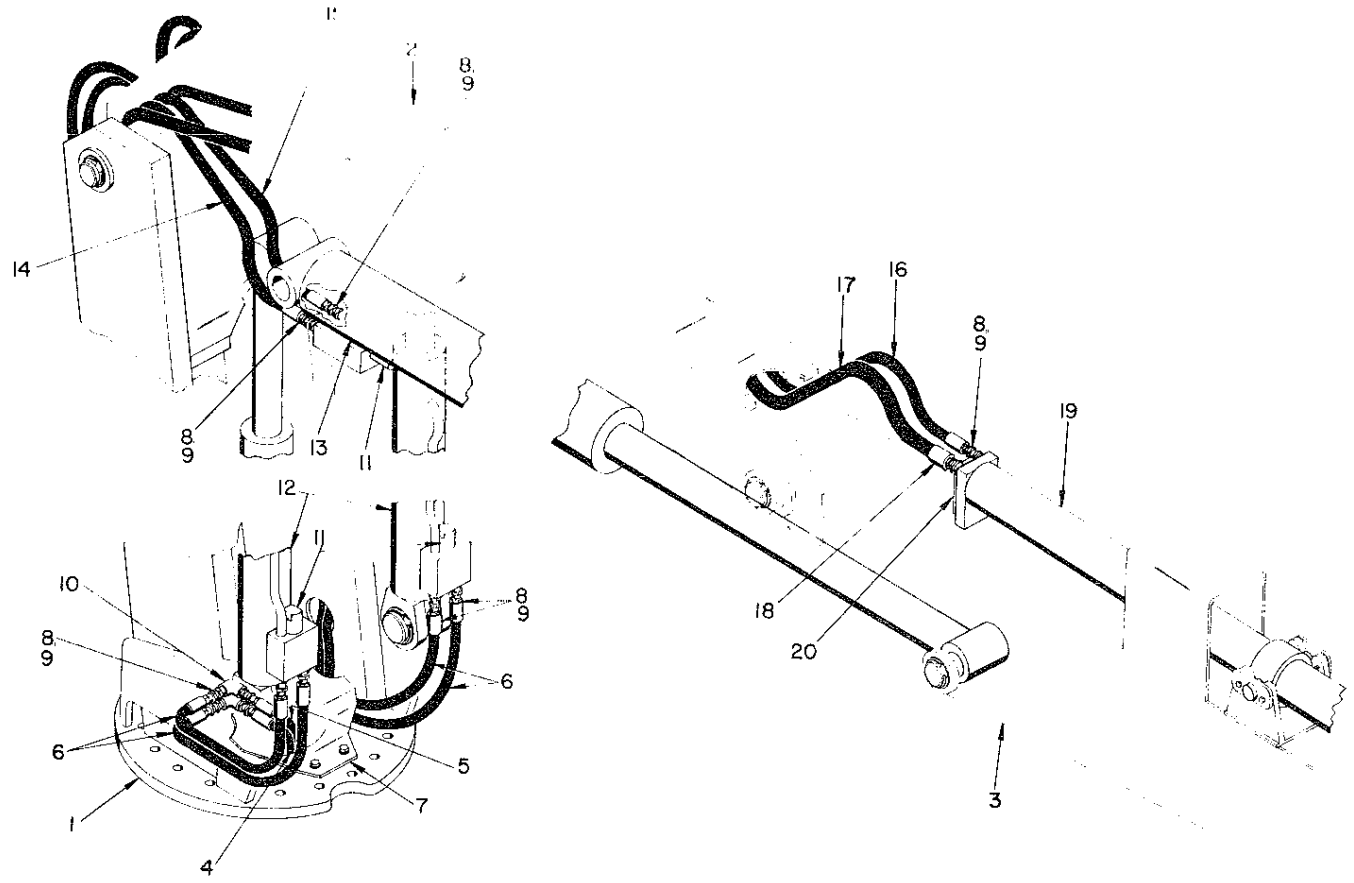


Figure F-16. Manual Hydraulic Controls - Sheet 2 (Part Number 91701972)

Item No.	Part No.	Description	Qty
1.	52701973	MASI	Ref.
2.	52701978	BOOM, main	Ref.
3.	52701979	BOOM, secondary	Ref.
4.	60035119	HOSE; 3/8"	Ref.
5.	60035119	HOSE; 3/8"	Ref.
6.	60035120	HOSE; 3/8" x 22"	4
7.	52701986	SADDLE	Ref.
8.	72053642	SWIVEL; 3/8" npt(m x f)	13
9.	72531151	SWEDGE; 3/8"	13
10.	72053611	TEE; 3/8"	2
11.	73054242	VALVE, counter balance	Ref.
12.	3B222710	CYLINDER, main	Ref.
13.	3C226710	CYLINDER, secondary	Ref.
14.	60035224	HOSE; 3/8"	Ref.
15.	60035224	HOSE; 3/8"	Ref.
16.	60035218	HOSE; 1/2"	Ref.
17.	60035188	HOSE; 3/8"	Ref.
18.	72531185	SWEDGE, swivel; 1/2"	1
19.	3B048610	CYLINDER, extension	Ref.
	3K271513	CYLINDER, extension, telescopic	Ref.
20.	73054004	VALVE, safety locking	Ref.

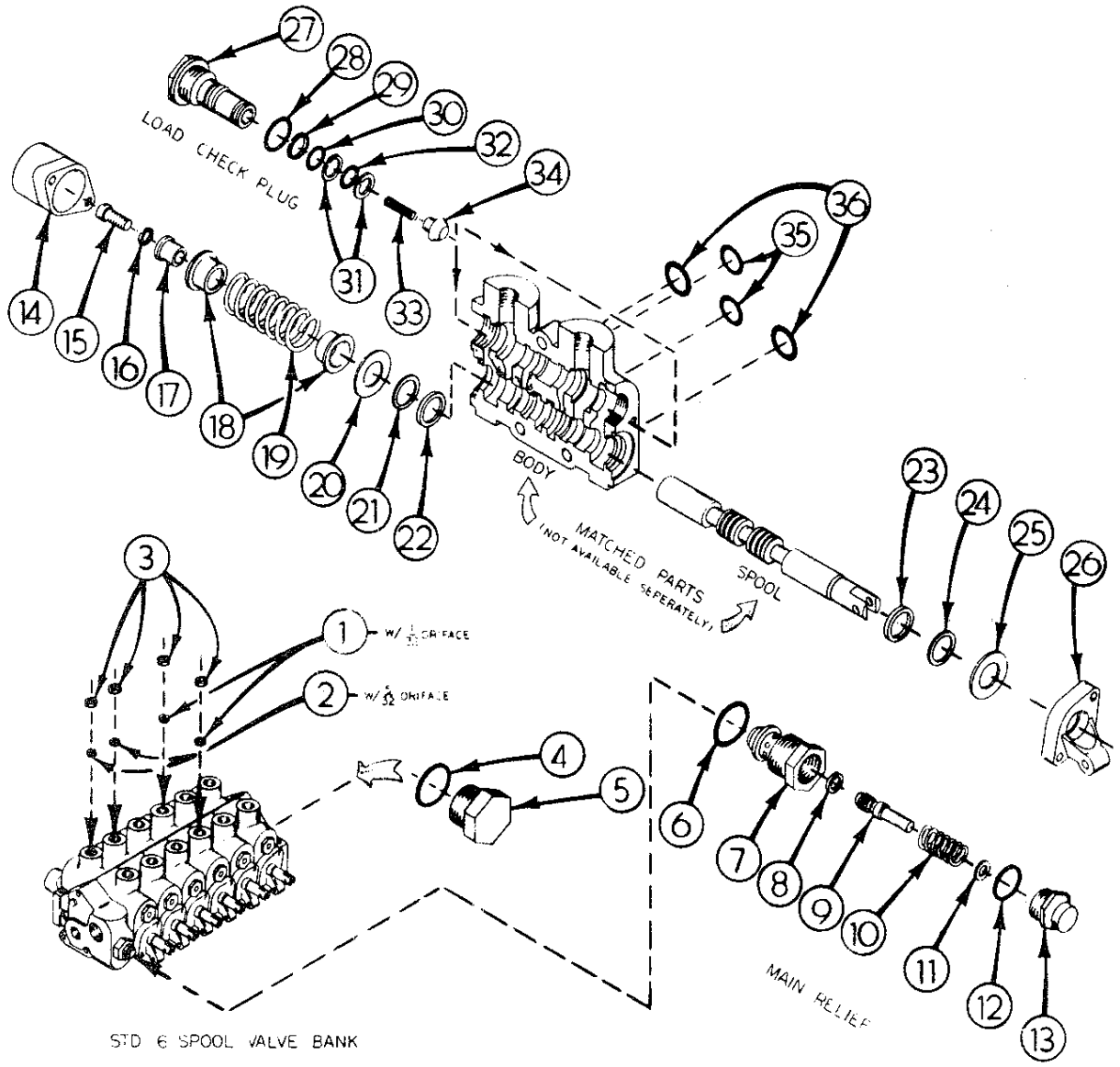


Figure F-17. Manual Control Valve (Part Number 73054009)

Item No.	Part No.	Description
1.	73014691	*ORIFICE; 1/32"
2.	73014693	*ORIFICE8 5/32"
3.	73014692	*RETAINER, orifice
4.	76039083	O-RING
5.	73014593	PLUG, outlet conversion
6.	76039082	O-RING
7.	73029056	BODY
8.	73034020	RING, piston
9.	73014617	POPPEI, relief
10.	73014588	SPRING; 2200-3000 PSI crack
11.	73014618	SHIM; .040"
	73014619	SHIM; .020"
	73014620	SHIM; .010"
12.	76039070	O-RING
13.	73024101	CAP, relief
14.	73029051	BONNEI
15.	72060831	SCREW; 5/16-18 x 3/4"
16.	72063055	LOCK WASHER; 5/8"
17.	73014597	COLLAR, spool
18.	73014606	COLLAR, spring
19.	73014589	SPRING, return
20.	73014591	RETAINER, plate washer
21.	73034022	WASHER, back-up
22.	76039087	SEAL, spool
23.	76039087	SEAL, spool
24.	73034022	WASHER, back-up
25.	73014591	RETAINER, plate washer
26.	73029053	BRACKET, die-cast
27.	73029047	PLUG, lift check
28.	76039070	O-RING
29.	73014616	WASHER, back-up, outer
30.	76039071	O-RING, outer
31.	73034019	WASHER, back-up, inner
32.	76039072	O-RING
33.	73014587	SPRING, lift check
34.	73014602	POPPET, lift check
35.	7Q072019	O-RING
36.	7Q072021	O-RING

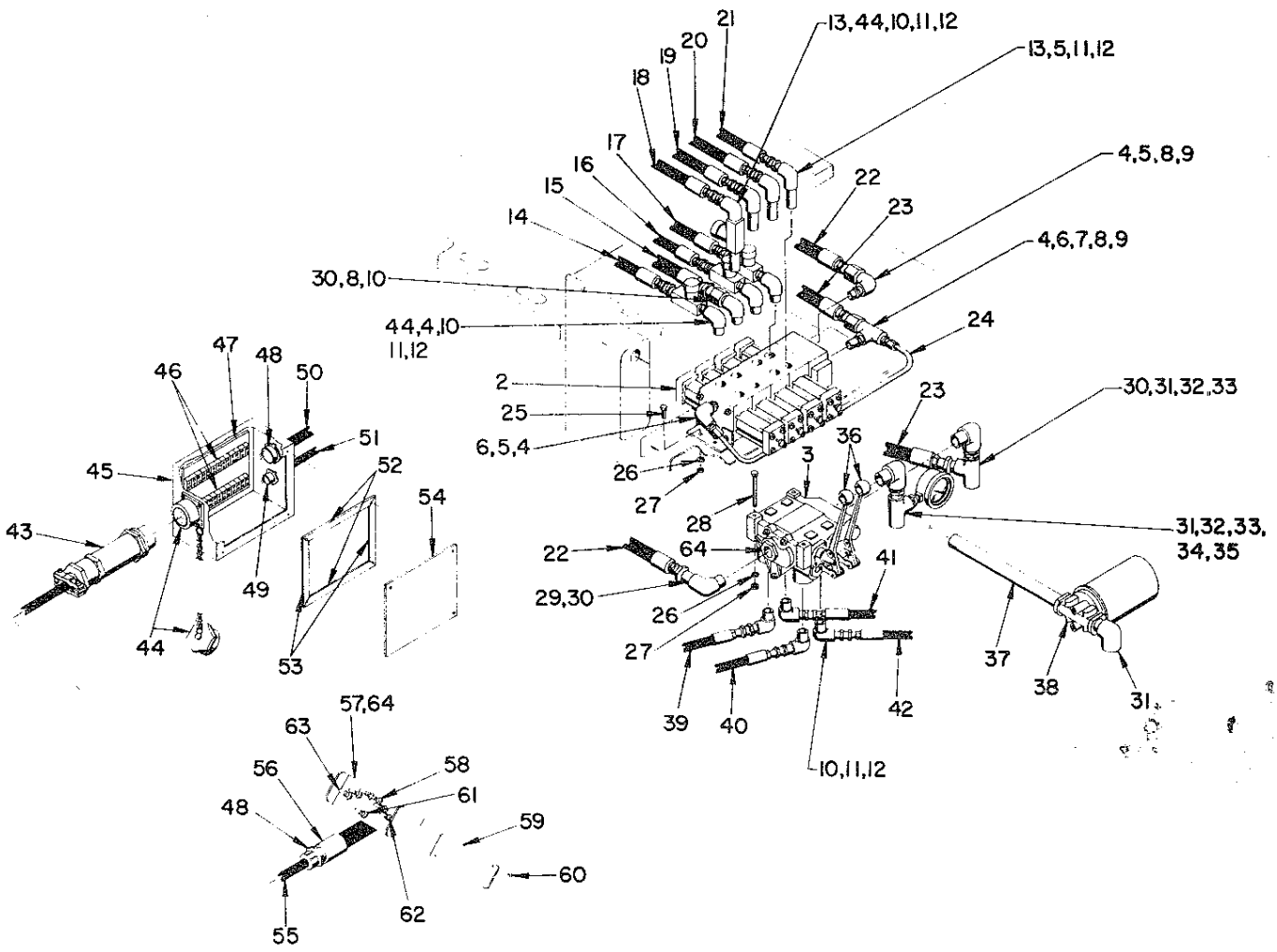
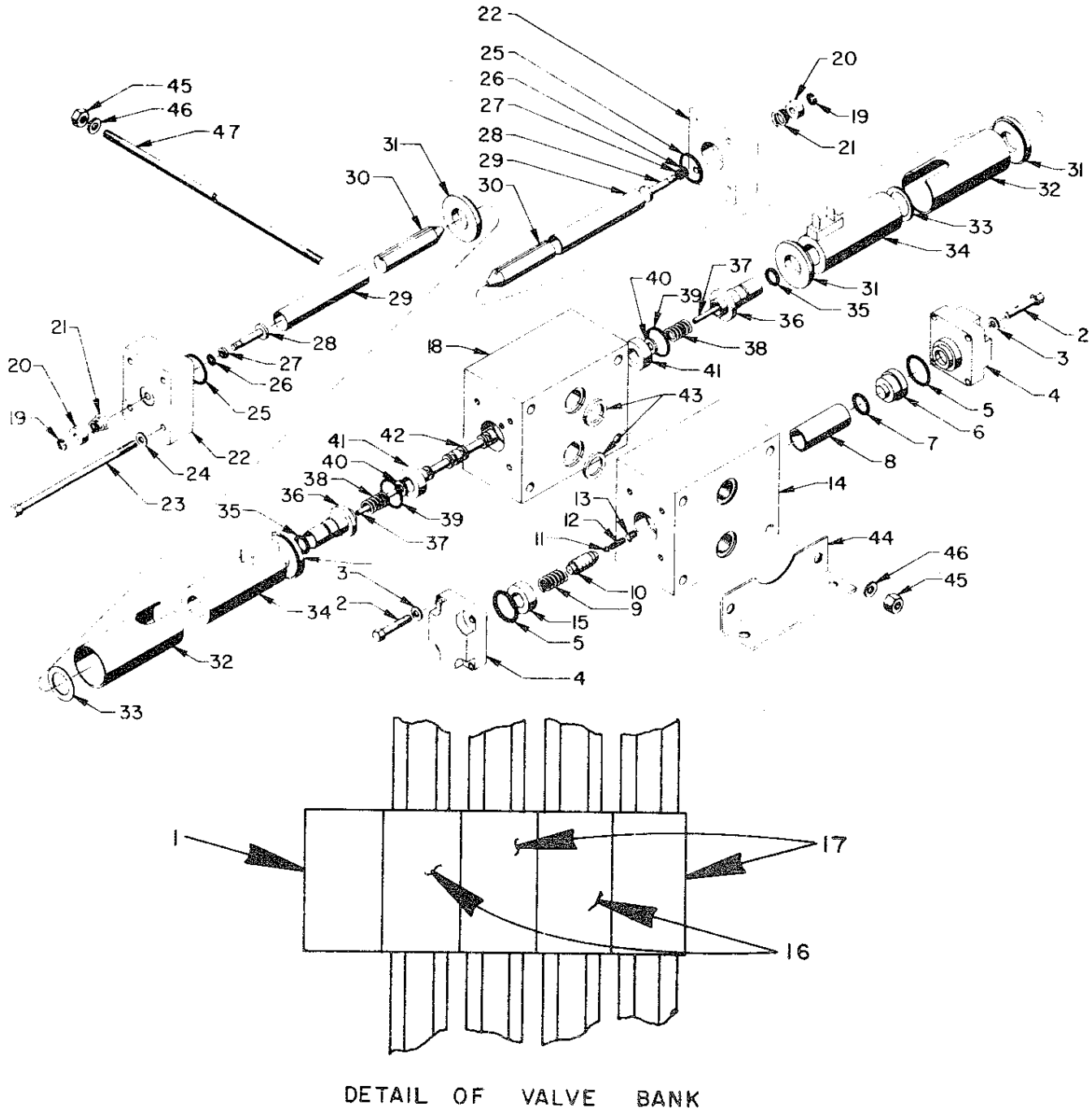


Figure F-18. Remote Hydraulic Controls (Part Number 91701989)

Item No.	Part No.	Description	Qty
1.	52701251	BASE	Ref.
2.	73073094	VALVE BANK; 1-spool	1
3.	73073034	VALVE BANK; 2-spool	1
4.	72053723	NIPPLE; 3/8" npt	8
5.	72531100	ELBOW, 90°; 3/8" npt	5
6.	72053516	CONNECTOR, male; 3/8"	2
7.	72053611	TEE; 3/8" npt	1
8.	72531823	ADAPTER, red.; 1/2" npt(f) x 3/8" npt(m)	1
9.	72531161	SWEDGE; 1/2"	2
10.	72531132	ELBOW, street, 90°; 3/8 npt	9
11.	72053642	SWIVEL; 3/8" npt(m x f)	11
12.	72531151	SWEDGE; 3/8"	11
13.	72053051	NIPPLE; 3/8" npt x 2"	4
14.	60035309	HOSE; 1/4" x 72"	1
15.	60035218	HOSE; 1/2" x 240"	1
16.	60035224	HOSE; 3/8" x 132"	1
17.	60035119	HOSE; 3/8" x 54"	1
18.	60035309	HOSE; 1/4" x 72"	1
19.	60035188	HOSE; 3/8" x 240"	1
20.	60035224	HOSE; 3/8" x 132"	1
21.	60035119	HOSE; 3/8" x 54"	1
22.	60035293	HOSE; 1/2" x 18"	1
23.	60035294	HOSE; 1/2" x 24"	1
24.	60102671	PIPE, hydraulic	1
25.	72066026	BOLT; 5/16-18 x 1-1/4"	4
26.	72063050	LOCK WASHER; 5/16"	7
27.	72062001	NUT; 5/16-18	7
28.	72060033	BOLT; 5/16-18 x 3"	3
29.	72531133	ELBOW, street, 90°; 1/2" npt	1
30.	72531185	SWEDGE, swivel; 1/2"	3
31.	72053556	ELBOW, street, 90°; 3/4" npt	3
32.	72053726	NIPPLE; 3/4" npt x 1/2" npt	2
33.	72053612	TEE; 1/2" npt	2
34.	72531830	BUSHING, red.; 1/2" npt(m) x 1/4" npt(f)	1
35.	73054003	GAUGE, pressure; 0-5000 PSI	1
36.	73029097	LEVER, valve	2
37.	72053148	NIPPLE; 3/4" npt x 12"	1
38.	73052000	FILTER, return	1
39.	60035246	HOSE; 3/8" x 120"	1
40.	60035246	HOSE; 3/8" x 120"	1
41.	60035287	HOSE; 3/8" x 66"	1
42.	60035287	HOSE; 3/8" x 66"	1
43.	77044041	PLUG, male	1
44.	73054139	VALVE, color flow; 3/8" npt	4
45.	52070681	ENCLOSURE, electrical	1
46.	77044027	STRIP, terminal	2
47.	60035003	MOUNTING, terminal strip	1
48.	72044017	CONNECTOR, strain relief; 1"	2
49.	77044096	CONNECTOR, strain relief; 1/2"	1
50.	60044025	CABLE, wire; 10'	1
51.	89044039	CABLE; #14 - 3 wire	AR
52.	60035292	SEAL, enclosure cover	2
53.	60035291	SEAL, enclosure cover	2
54.	60101424	COVER, enclosure	1
55.	60044042	CABLE; 16-wire x 35'	1
56.	72053306	COUPLING, pipe; 1" npt	1
57.	52070674	HANDLE, remote control	1
58.	77041006	SWITCH, toggle, double-throw	4
59.	60101416	COVER, remote handle	1
60.	72061003	SCREW, #6 x 1/2"	10
61.	77041005	SWITCH, momentary contact	1
62.	77041006	SWITCH, toggle, double-throw	Ref.
63.	77041004	SWITCH, toggle, single-throw	1
64.	73073023	ADAPTER, power beyond	1

Parts Drawing on Page 6-20



DETAIL OF VALVE BANK

Parts List on Page 6-23

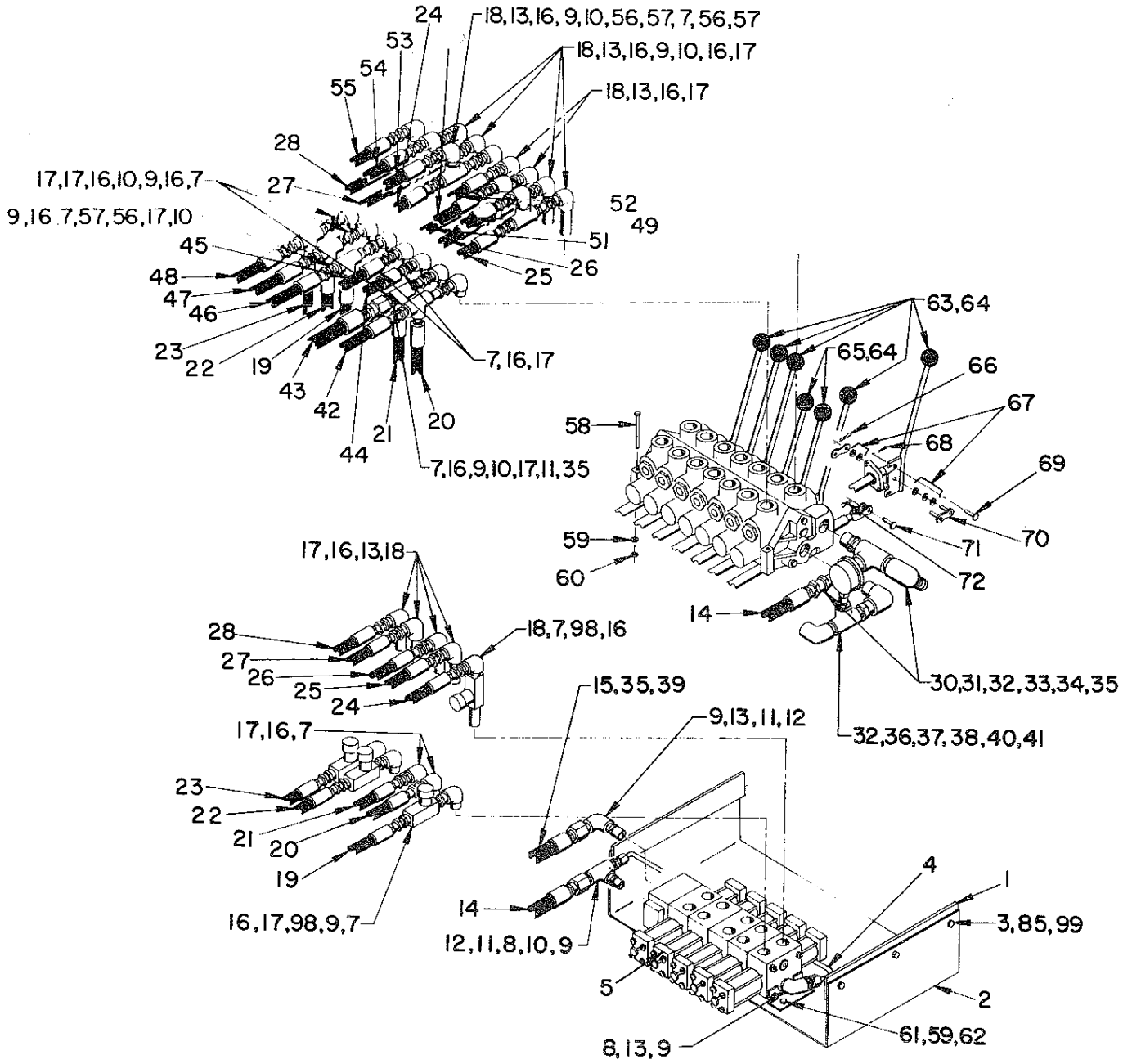
Figure F-19. Solenoid Control Valve - 12 vdc

Item No.	Part No.	Description	Qty
1.	73054311	Manifold w/relief valve (includes item 2 thru 15)	1
2.	72060004	BOLT, hex hd.; 1/4-20 x 1"	8
3.	72063049	LOCK WASHER; 1/4"	8
4.	71141720	PLATE	2
5.	7Q092210	O-RING	2
6.	71141721	STOP	1
7.	7Q072015	O-RING	1
8.	71141722	SEAT, valve	1
	71141732	WIRE, orifice	1
9.	71141723	SPRING	1
10.	71141724	VALVE	1
11.	**	NEEDLE (part of item 10)	1
12.	**	SPRING (part of item 10)	1
13.	**	SCREW, retaining (part of item 10)	1
14.	71141725	BLOCK	1
15.	71141726	WASHER	1
16.	73054312	VALVE, solenoid (includes item 18-42).	
17.	73054313	VALVE, solenoid (includes item 18 thru 42)	2
18.	**	BLOCK	1*
19.	**	RING, retaining (part of item 22)	2*
20.	**	SPACER (part of item 22)	2*
21.	**	SPRING (part of item 22)	2*
22.	73054338	MANUAL RELEASE assy	2*
23.	72060016	BOLT; 1/4-20 x 4"	8*
24.	72063049	LOCK WASHER; 1/4"	8*
25.	7Q072115	O-RING	2*
26.	7Q072010	O-RING (part of item 22)	2*
27.	**	GUIDE (part of item 22)	2*
28.	**	PISTON (part of item 22)	2*
29.	**	SLEEVE (part of item 22)	2*
30.	**	BODY (part of item 22)	2*
31.	**	PLATE, end (part of item 22)	2*
32.	71141728	SHELL	2*
33.	71141727	WASHER, spring	2*
34.	77041090	COIL; 12 VDC	2*
35.	7Q072014	O-RING (part of item 22)	2*
36.	71141730	TUBE	2*
37.	**	NEEDLE (part of item 22)	2*
38.	71141731	SPRING	2*
39.	7Q092210	O-RING	2*
40.	71141729	RING	2*
41.	**	SPACER (part of item 22)	2*
42.	71141733	SPOOL	1*
43.	70034200	RING, teflon	8
44.	71141734	BRACKET	2
45.	72062001	NUT, hex; 5/16-18	8
46.	72063050	LOCK WASHER; 5/16"	8
47.	71141735	ROD, tie	4

*Quantity per valve section.

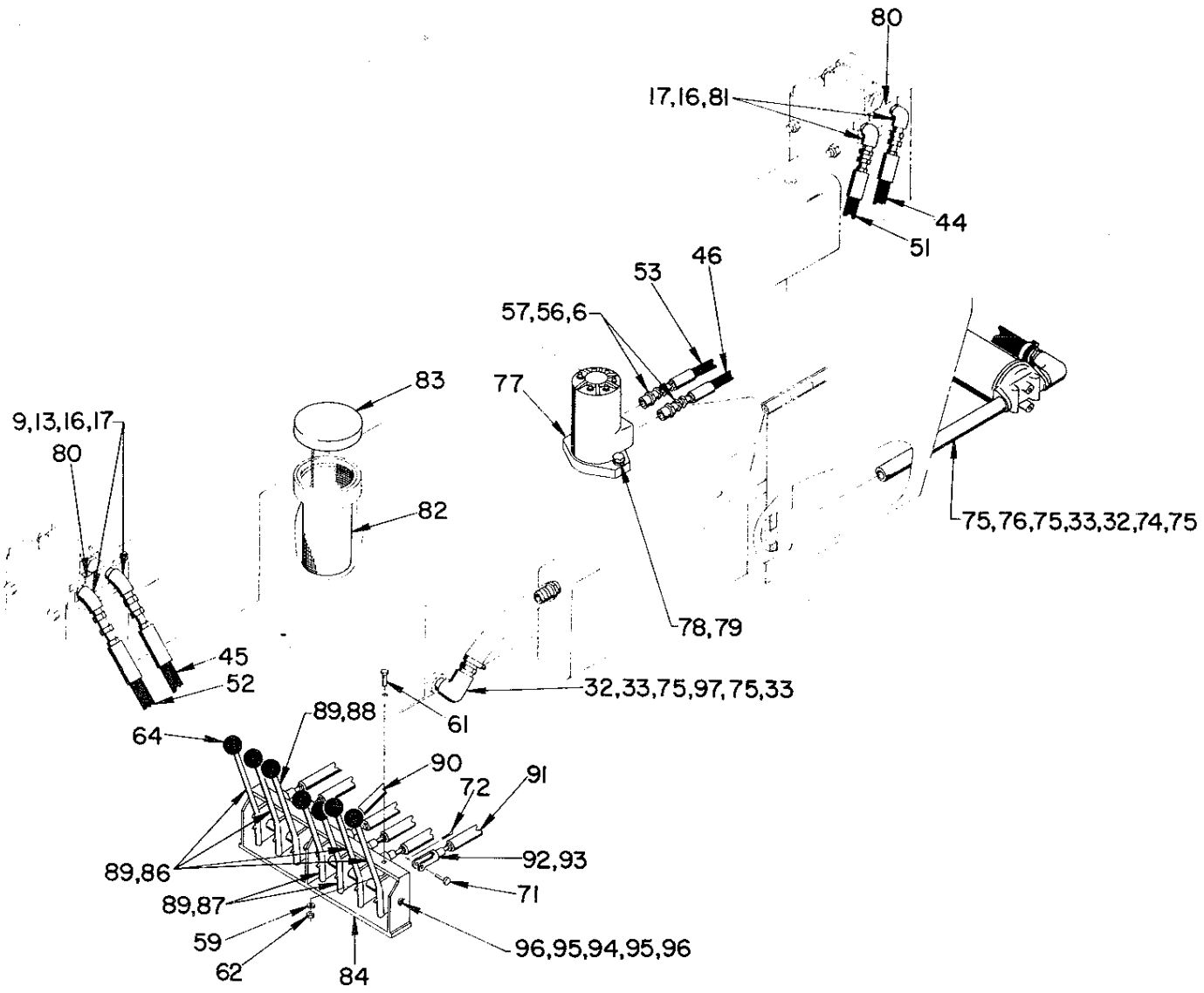
**Not a replacement part. Order the entire valve section.

Parts Drawing on Page 6-22



Parts List on Page 6-26

Figure F-20. Manual and Remote Hydraulic Controls - Sheet 1 (Part Number 91702042)



Parts List on Page 6-26

Figure F-20. Manual and Remote Hydraulic Controls - Sheet 2 (Part Number 91702042)

Item No.	Part No.	Description	Qty
1.	60103085	PLATE, mtg. (welded to base)	2
2.	60103086	BRACKET, valve bank	1
3.	72060002	SCREW; 1/4-20 x 3/4"	6
4.	60102671	TUBE, hydraulic; 4-spool (not shown)	1
	60103621	TUBE, hydraulic; 5-spool	Ref.
5.	73073094	VALVE BANK; 4-spool	1
	73073095	VALVE BANK; 5-spool	Ref.
6.	72531823	BUSHING, red.; 1/2" npt(m) x 3/8" npt(f)	2
7.	72531132	ELBOW, street, 90°; 3/8" npt	15
8.	72053516	CONNECTOR, male; 3/8" npt	2
9.	72053723	NIPPLE; 3/8" npt	16
10.	72053611	TEE; 3/8" npt	9
11.	72053732	ADAPTER; 3/8" npt(m) x 1/2" npt(f)	3
12.	72531161	SWEDGE; 1/2"	2
13.	72531100	ELBOW, 90°; 3/8" npt	13
14.	60035202	HOSE; 1/2" x 36"	1
15.	60035294	HOSE; 1/2" x 24"	1
16.	72053642	SWIVEL, pipe; 3/8" npt(m x f)	26
17.	72531151	SWEDGE; 3/8"	34
18.	72053051	NIPPLE; 3/8" npt x 2"	10
19.	60035120	HOSE; 3/8" x 19"	1
20.	60035120	HOSE; 3/8" x 19"	Ref.
21.	60035120	HOSE; 3/8" x 19"	1
22.	60035120	HOSE; 3/8" x 19"	1
23.	60035120	HOSE; 3/8" x 19"	1
24.	60035120	HOSE; 3/8" x 19"	1
25.	60035120	HOSE; 3/8" x 19"	Ref.
26.	60035120	HOSE; 3/8" x 19"	1
27.	60035120	HOSE; 3/8" x 19"	1
28.	60035120	HOSE; 3/8" x 19"	1
29.	73073011	VALVE BANK; 6-spool (not shown)	1
	73073013	VALVE BANK; 7-spool	Ref.
30.	72053558	NIPPLE; 3/4" npt	1
31.	72053555	TEE; 3/4" npt	1
32.	72053556	ELBOW, street, 90°; 3/4" npt	1
33.	72531547	NIPPLE, barbed	4
34.	72531833	BUSHING, red.; 3/4" npt(m) x 1/2" npt(f)	1
35.	72531185	SWEDGE; 1/2"	2
36.	72053726	NIPPLE; 3/4" npt(m) x 1/2" npt(m)	1
37.	72053612	TEE; 1/2" npt	1
38.	72531830	BUSHING, red.; 1/2" npt(m) x 1/4" npt(f)	1
39.	73073023	ADAPTER, power beyond (not shown)	1
40.	72531133	ELBOW, street, 90°; 1/2" npt	1
41.	73054003	GAUGE, pressure; 0-5000 PSI	1
42.	60035289	HOSE; 3/8" x 282"	Ref.
43.	60035218	HOSE; 1/2" x 240"	1
44.	60035244	HOSE; 3/8" x 72"	1
45.	60035246	HOSE; 3/8" x 120"	1
46.	60035309	HOSE; 1/4" x 72"	1
47.	60035336	HOSE; 3/8" x 132'	1
48.	60035119	HOSE; 3/8" x 54"	1
49.	60035289	HOSE; 3/8" x 282"	Ref.
50.	60035188	HOSE; 3/8" x 240"	1
51.	60035244	HOSE; 3/8" x 72"	1
52.	60035246	HOSE; 3/8" x 120"	1
53.	60035309	HOSE; 1/4" x 72"	1
54.	60035336	HOSE; 3/8" x 132"	1
55.	60035119	HOSE; 3/8" x 54"	1
56.	72053537	SWIVEL; 3/8" npt(m) x 1/4" npt(f)	4
57.	72531142	SWEDGE; 1/4"	4
58.	72060301	SCREW; 5/16-24 x 3"	3
59.	72063050	LOCK WASHER; 5/16"	9
60.	72062036	NUT; 5/16-24	3
61.	72060023	SCREW; 5/16-18 x 3/4"	6
62.	72062001	NUT; 5/16-18	6
63.	52701254	LEVER, valve; long	4
64.	71039096	KNOB, plastic; 1-1/2" dia.	12
65.	52070167	LEVER, valve; short	2
66.	72066164	PIN, cotter; 1/16" x 1-1/2"	Ref.
67.	72063001	WASHER; 1/4" wrt	30
68.	72066336	PIN, cotter; 5/64" x 1/2"	6
69.	72066337	PIN; 1/4" x 7/8"	6
70.	71058003	LINK, connecting	6
71.	72066338	PIN, clevis	12
72.	72066168	PIN, cotter; 3/32" x 3/4"	12
73.	72053148	NIPPLE; 3/4" npt x 12"	1
74.	73052000	FILTER, return	1
75.	72066000	CLAMP, hose; #12	4
76.	60035286	HOSE; 3/4" x 18"	1
77.	73051004	MOTOR, hydraulic	Ref.
78.	72063053	LOCK WASHER; 1/2"	Ref.
79.	72060092	SCREW; 1/2-13 x 1-1/4"	Ref.
80.	3B084710	CYLINDER, outrigger	Ref.
81.	72053563	ELBOW, street, 45°; 3/8" npt	2
82.	73024133	SCREEN, fill	Ref.
83.	73014671	CAP, fill	Ref.
84.	52701247	VALVE BANK, dummy	1
85.	72063049	LOCK WASHER; 1/4"	6
86.	52701253	LEVER, control; long	3
87.	52070162	LEVER, control; short	2
88.	52701252	LEVER, slewing	1
89.	72053506	ZERK; 3/16" press fit	6
90.	52702017	LINK, bent	1
91.	52702016	LINK, control, female end	5
92.	52702018	LINK, control, male end	6
93.	72062003	NUT; 7/16-14	6
94.	60010860	ROD, dummy valve bank	1
95.	72063002	WASHER	2
96	72066185	PIN, cotter; 5/32" x 1"	2
97.	60035285	HOSE; 3/4" x 6-3/4"	1
98.	73054139	FLOW CONTROL; 3/8"	2
		with winch	3
99.	72062000	NUT; 1/4-20	6

Parts Drawing on Page 6-24 and 6-25

Parts List on Page 6-28

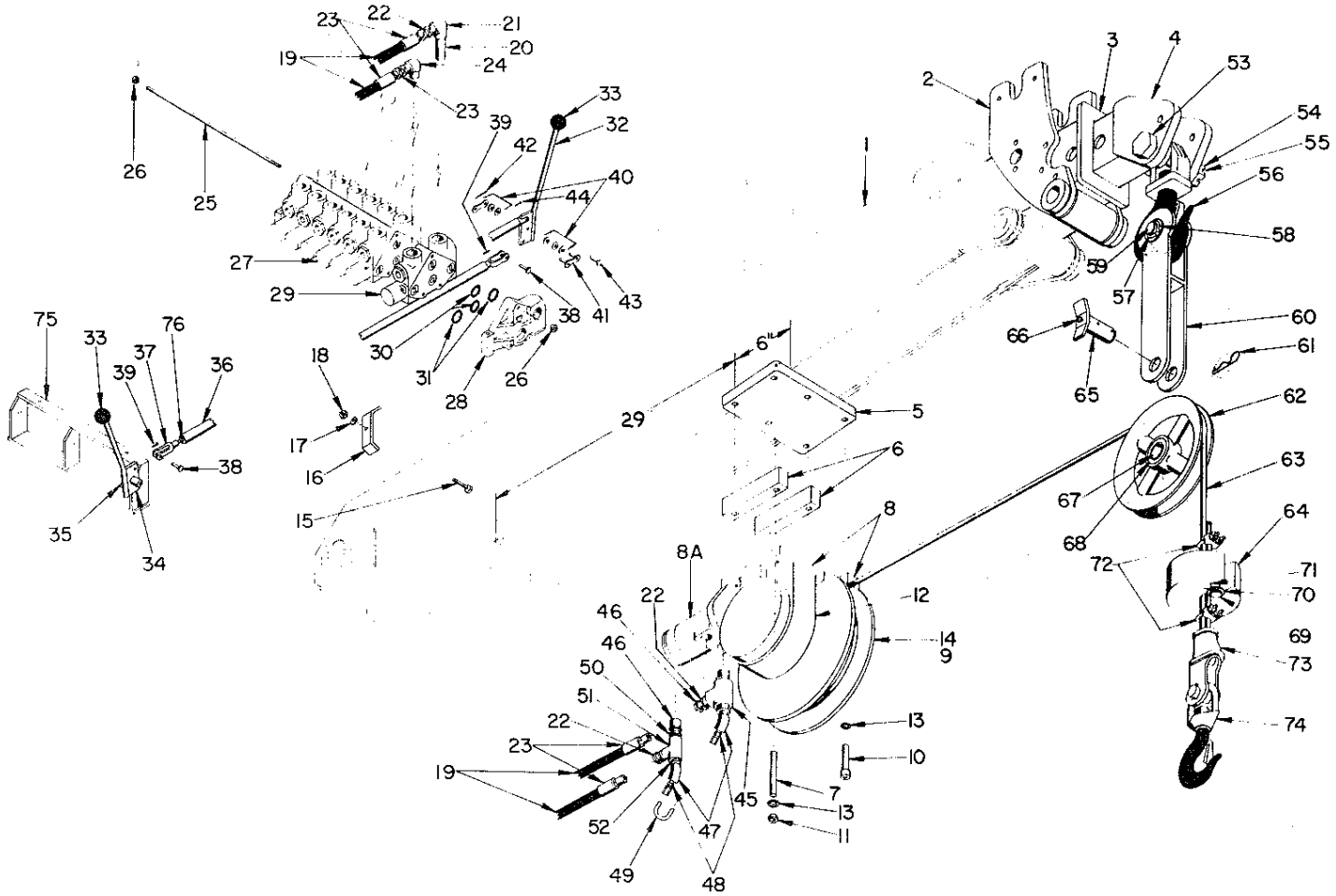


Figure F-21. 4000# Winch, Rope and Hook Kit and Manual Controls (Part Number 31904000, 91701752 & 90701755)

Item No.	Part No.	Description	Qty
	31904000	WINCH (includes indented items below)	1
1.	52701979	BOOM, secondary	Ref.
5.	60010383	PLATE, mounting	1
6.	60010868	-SPACER	2
7	60010869	-STUD	1
8.	71057003	-WINCH w/motor; 4000#	1
8A.	73051020	-MOTOR, hydraulic	Ref.
9.	72060596	-SCREW, set; 1/2-13 x 3/4"	1
10.	72060797	-SCREW, soc. hd.; 1/2-13 x 2-1/2"	2
11.	72062004	-NUT; 1/2-13	4
12.	72063036	-BUSHING, machy; 1-1/2" x 14 ga.	1
13.	72063053	-LOCK WASHER; 1/2"	6
14.	52070302	-DRUM, winch	1
	91701752	Manual Hydraulic Parts Kit (includes indented items below)	1
15.	72060047	-SCREW; 3/8-16 x 1-1/4	1
16.	60010118	-CLAMP, hose	1
17.	72063051	-LOCK WASHER; 3/8"	1
18.	72062002	-NUT; 3/8-16	1
19.	60035289	-HOSE; 3/8" x 282"	2
20	72053051	-NIPPLE, pipe; 3/8" npt	1
21.	72531100	-ELBOW, 90°; 3/8" npt	1
22.	72053642	-SWIVEL, pipe; 3/8" npt(m x f)	4
23.	72531151	-SWEDGE; 3/8"	4
24.	72531132	-ELBOW, street, 90°; 3/8" npt	1
25.	60014596	-STUD, valve bank	3
26.	72062077	-NUT	Ref.
27.	73073011	-VALVE BANK; 6-spool	Ref.
28.	73014603	-COVER, valve, LH	Ref.
29.	73054009	-VALVE SECTION	1
30.	7Q072019	-O-RING; small	2
31.	7Q072021	-O-RING; large	2
32.	52701254	-LEVER, valve	1
33.	71039096	-KNOB, plastic; 1-1/2" dia.	2
34.	52701253	-LEVER, control	1
35.	72053506	-ZERK; 3/16" press fit	1
36.	52702016	-LINK, control	1
37.	52702018	-LINK, control, male	1
38.	72066338	-PIN, clevis	2
39.	72066168	-PIN, cotter; 3/32" x 3/4	2
40.	72063001	-WASHER; 1/4" wrt	5
41.	71058003	-LINK, connecting	1
42.	72066164	-PIN, cotter; 1/16 - 1-1/2	1
43.	72066337	-PIN	1
44.	72066330	-PIN, clevis	1
45.	73051000	-CHECK VALVE, pilot operated	1
46.	72531829	-BUSHING, red.; 1/2" npt(m) x 3/8" npt(f)	2
47.	72053563	-ELBOW, street, 45°; 1/4" npt	2
48.	72053545	-CONNECTOR, male; 1/4" npt	2
49.	60101420	-U TUBE	1
50.	72053723	-NIPPLE; 3/8" npt	1
51.	72053611	-TEE; 3/8" npt	1
52.	72532138	-BUSHING, red.; 3/8" npt(m) x 1/4" npt(f)	1
75.	52701247	-WELDMENT, dummy valve bank	Ref.
76.	72062003	-NUT; 7/16-14	1
77.	71039168	-PLACARD, control, RH (not shown)	1
78.	71039169	-PLACARD, control, LH (not shown)	1
	90701755	Rope and Hook Kit (includes indented items below)	1
1.	52701979	-BOOM, secondary	Ref.
2.	52701980	-BOOM, 1st stage extension	Ref.
3.	52701981	-BOOM, 2nd stage extension	Ref.
4.	52701982	-STINGER	Ref.
53	60102663	-BOLT, hook	Ref.
54.	72062082	-NUT, hook bolt	Ref.
55.	72066197	-PIN, cotter; 3/16" x 2-1/2"	Ref.
56.	52701716	-HOOK	Ref.
57.	72066129	-RING, retainer	2
58.	72063035	-BUSHING; 1-1/4" x 10 ga.	2
59.	60103162	-PIN, yoke to hook	1
60.	52701137	-YOKE, sheave	1
61.	72066145	-PIN, hair; 3/16"	1
62.	60101504	-SHEAVE	1
63.	60103165	-ROPE, wire; 3/8" dia. x 55' lg.	1
64.	60011219	-WEIGHT, down-haul	1
65.	52070705	-PIN, sheave	1
66.	72053508	-ZERK; 3/8" npt	1
67.	70055025	-BEARING, inner race	1
68.	70055021	-BEARING, roller	1
69.	52070851	-PIN	1
70.	72063034	-BUSHING, machy; 1" x 10 ga.	1
71.	72066197	-PIN, cotter; 3/16 x 2-1/2"	1
72.	70058033	-CLAMP, cable	2
73.	70058015	-SOCKET, wedge	1
74.	70073079	-HOOK, swivel; 3-ton	1

Parts Drawing on Page 6-27

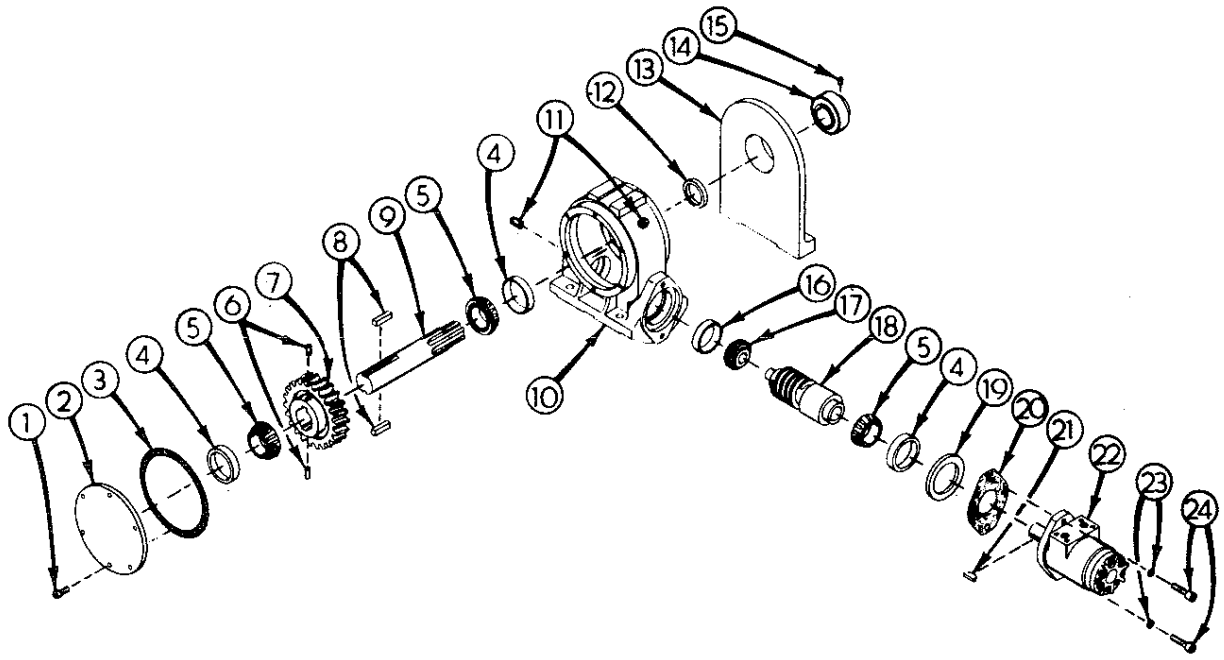


Figure F-22. 4000# Winch with Motor (Part Number 71057003)

Item No.	Part No.	Description	Qty
1.	72060731	SCREW, soc. hd.; 5/16-18 x 3/4"	6
2.	70014724	COVER, gear case	1
3.	70039262	GASKET, cover, red; .002"	*
	70039263	GASKET, cover, blue; .005"	*
	70039263	GASKET, cover, brown; .010"	*
4.	70055031	CUP, bearing; #LM29710	3
5.	70055032	CONE, bearing; #LM29749	3
6.	72060908	SCREW, set, soc. hd.; 3/8-16 x 3/4"	2
7.	70056066	GEAR, worm, bronze; 27:1 ratio	1
8.	70014725	KEY; 3/8 in^2 x 1-7/16"	2
9.	70014726	SHAFT	1
10.	70014727	CASE, gear	1
11.	72053413	PLUG, pipe; 3/8" npt	2
12.	70039268	SEAL, oil	1
13.	70014728	HOUSING, end	1
14.	70055035	BEARING, Sealmaster; SL23	1
15.	72060907	SCREW, set; 5/16-24 x 1/4"	Ref.
16.	70055033	CUP, bearing; #21212	1
17.	70055034	BEARING, cone; #21075	1
18.	70056067	SHAFT, worm	1
19.	70014729	SPACER	*
20.	70039265	GASKET, motor, red; .002"	*
	70039266	GASKET, motor, blue; .005"	*
	70039267	GASKET, motor, brown; .010	*
21.	72066283	KEY, Woodruff; 1/4" x 1"	1
22.	73051020	MOTOR, Char-Lynn; D5G	1
23.	72063052	LOCK WASHER; 7/16"	2
24.	72060775	SCREW, soc. hd.; 7/16-14 x 1-1/2"	2

*As required.

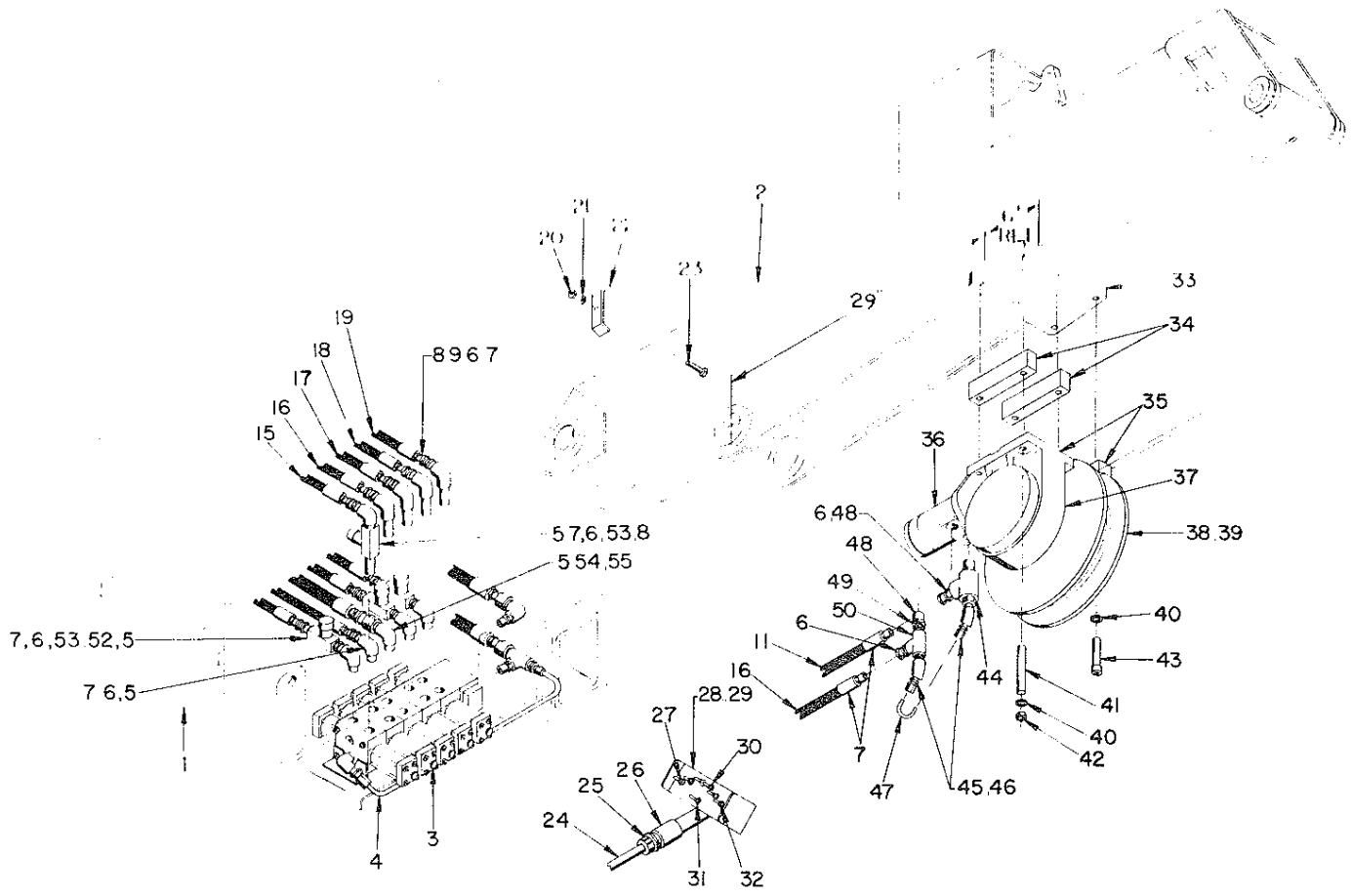


Figure F-23. 4000# Winch with Remote Controls (Part Number 31904000 & 91701753)

Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1.	52701251	BASE	Ref.	30.	77041006	SWITCH, toggle, double-throw	Ref.
2.	52701979	BOOM, secondary	Ref.	31.	77041005	SWITCH, momentary contact	Ref.
3.	73073095	VALVE BANK; 5-spool	1	32.	77041006	SWITCH, toggle, double-throw	1
4.	60103308	TUBE, hydraulic; 5-spool	1	33.	60010383	PLATE, mtg.	Ref.
5.	72531132	ELBOW, street, 90°; 3/8" npt	1	34.	60010868	SPACER	Ref.
6.	72053642	SWIVEL; 3/8" npt(m x f)	4	35.	71057003	WINCH w/motor	Ref.
7.	72531151	SWEDGE; 3/8"	4	36.	73051020	MOTOR/ hydraulic (part of winch)	Ref.
8.	72053051	NIPPLE; 3/8" npt x 2"	1	37.	72063036	BUSHING, machy	Ref.
9.	72531100	ELBOW, 90°; 3/8" npt	1	38.	52070302	DRUM, winch	Ref.
10.	60035309	HOSE; 1/4" x 72"	Ref.	39.	72060596	SCREW, set	Ref.
11.	60035188	HOSE; 3/8"	1	40.	72063053	LOCK WASHER	Ref.
12.	60035218	HOSE; 1/2" x 240"	Ref.	41.	60010869	STUD	Ref.
13.	60035224	HOSE; 3/8" x 132"	Ref.	42.	72062004	NUT	Ref.
14.	60035120	HOSE; 3/8" x 22"	Ref.	43.	72060797	SCREW, soc. hd.	Ref.
15.	60035309	HOSE; 1/4" x 72"	Ref.	44.	73054006	CHECK VALVE, pilot operated	1
16.	60035188	HOSE; 3/8" x 240"	1	45.	72053563	ELBOW, street, 45°; 1/4" npt	2
17.	60035188	HOSE; 3/8" x 240"	Ref.	46.	72053545	CONNECTOR, male; 1/4"	2
18.	60035224	HOSE; 3/8" x 132"	Ref.	47.	60101420	"U" TUBE	1
19.	60035120	HOSE; 3/8" x 22"	Ref.	48.	72531829	BUSHING, red.; 1/2" npt(m) x 3/8" npt(f)	2
20.	72062002	NUT; 3/8-16	1	49.	72053723	NIPPLE; 3/8" npt	1
21.	72063051	LOCK WASHER; 3/8"	1	50.	72053611	TEE; 3/8" npt	1
22.	60010118	CLAMP, hose	1	51.	72532138	BUSHING, red.; 3/8" npt(m) x 1/4" npt(f)	1
23.	72060045	SCREW; 3/8-16 x 1-1/2"	1	52.	72053723	NIPPLE; 3/8" npt	Ref.
24.	60044042	CABLE	Ref.	53.	73054139	VALVE, color flow; 3/8"	Ref.
25.	77044017	CONNECTOR, strain relief	Ref.	54.	72053732	ADAPTER, red.; 1/2" npt(f) x 3/8" npt(m)	Ref.
26.	72063306	COUPLING, pipe	Ref.	55.	72531185	SWIVEL, hose; 1/2"	Ref.
27.	77041004	SWITCH, toggle, single-throw	Ref.				
28.	52070674	HANDLE, remote control	Ref.				
29.	71039170	PLACARD, remote control	Ref.				

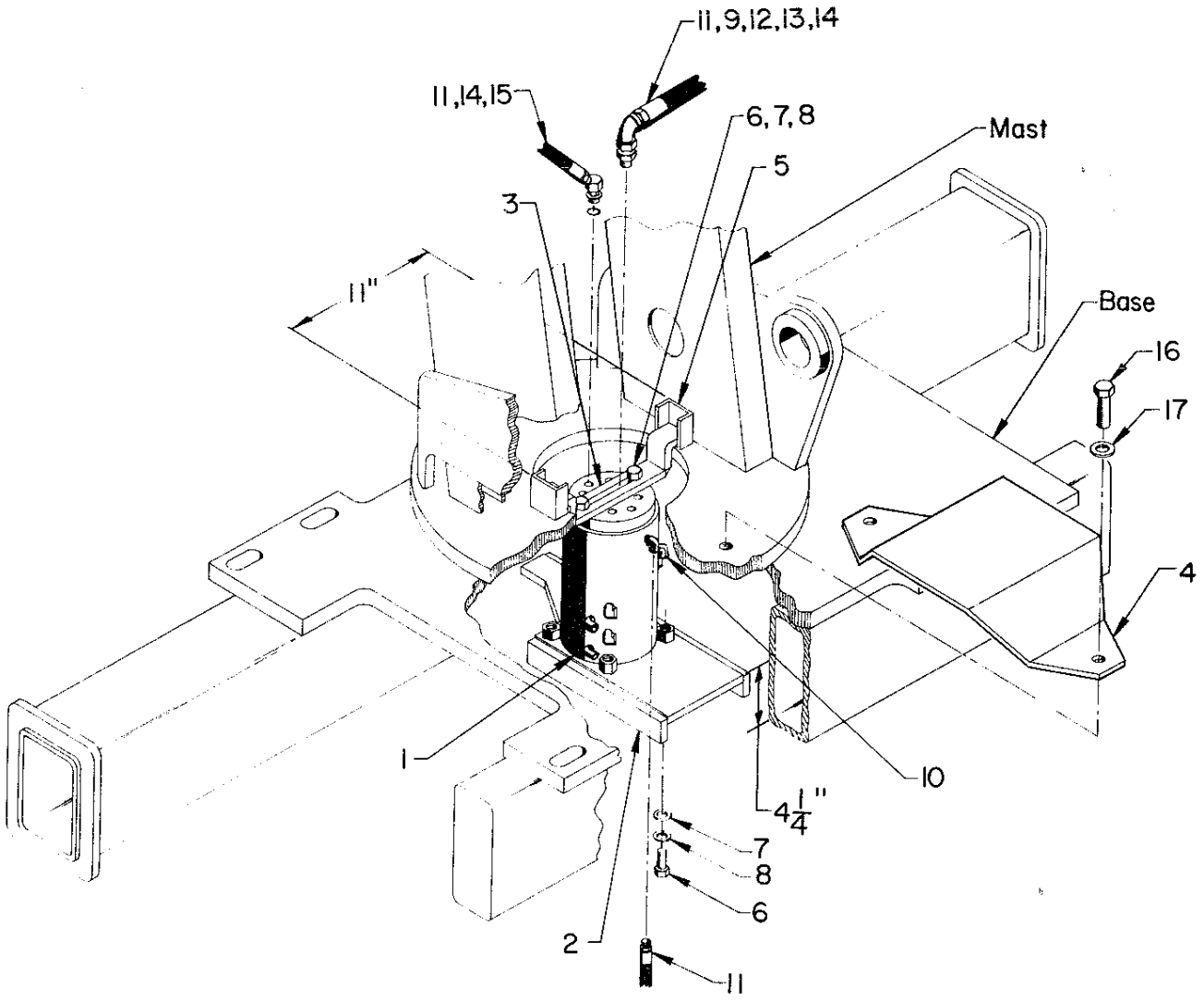


Figure F-24. Continuous Rotation Kit (Part Number 91701756)

Item No.	Part No.	Description	Qty
1.	3R061610	MANIFOLD, rotation	1
2.	52070849	BRACKET, mounting, manifold	1
3.	52701604	BAR, tie	1
4.	60101833	SHIELD	1
5.	60101843	CHANNEL	2
6.	72060063	BOLT, 7/16-14 x 1-1/4"	6
7.	72063004	WASHER; 7/16"	6
8.	72063052	LOCK WASHER; 7/16"	6
9.	72053642	SWIVEL; 3/8" npt (m x f)	2
10	72531132	ELBOW, street, 90°; 3/8" npt	8
11.	72531151	SWEDGE; 3/8"	16
12.	72531123	ELBOW, street, 45°; 3/8" npt	2
13.	72053788	ADAPTER w/o-ring; 3/8"	2
14.	7Q072014	O-RING	16
15.	72053632	ADAPTER, elbow, 45°; 3/8"	2
16.	72060151	BOLT; 5/8-11 x 2"	Ref.
17.	72066427	LOCK WASHER; Del Lok; 5/8"	Ref.

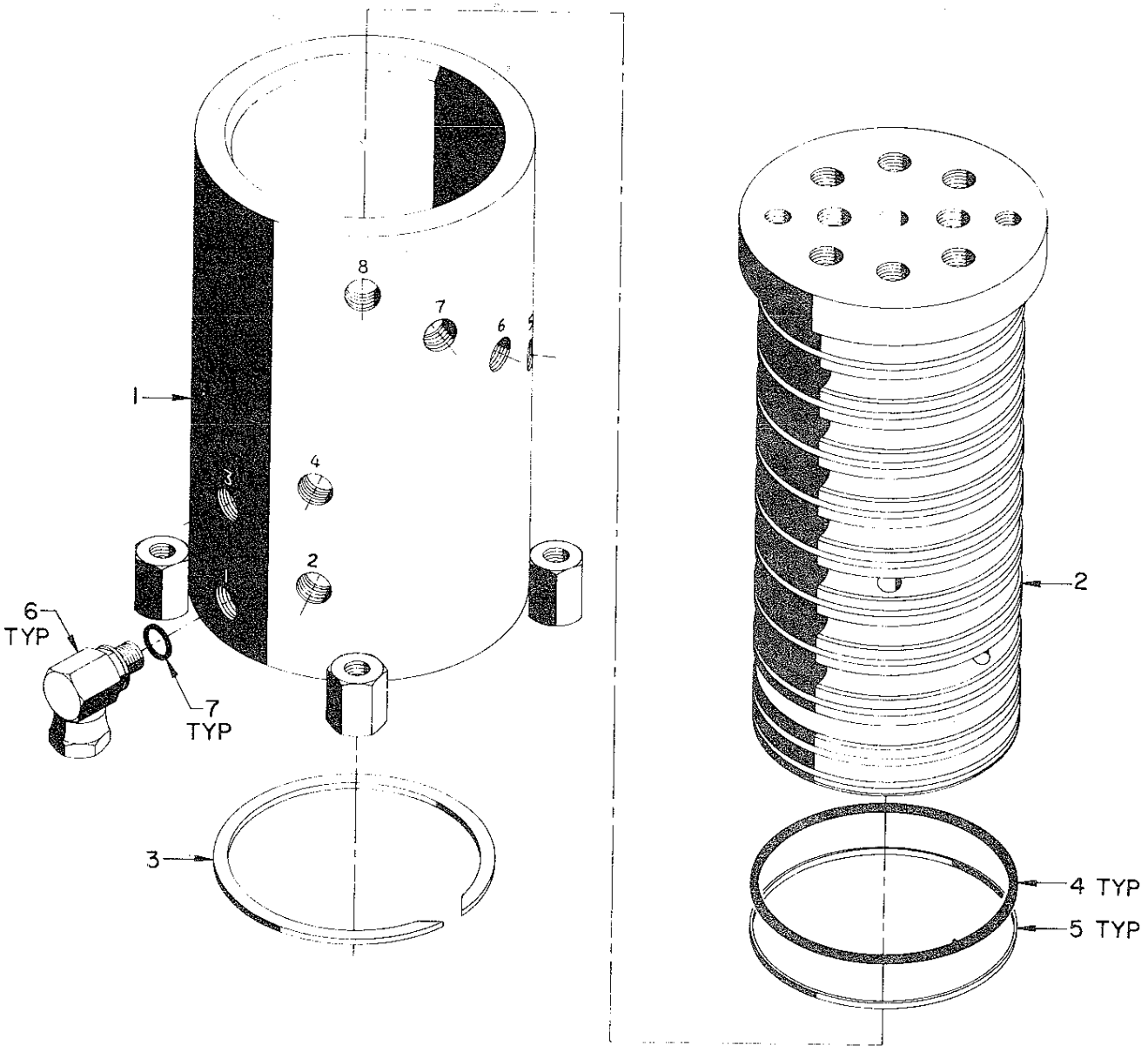


Figure F-25. Continuous Rotation Manifold (Part Number 3R061610)

Item No.	Part No.	Description	Qty
1	4R061610	CASE	1
2	6R061610	SPOOL	1
3	72066116	RING, retaining, external; 4-1/2"	1
4	7Q072155	O-RING	9
5	7T66G045	SEAL	9
6	72532152	ELBOW, street, 90°; 3/8'	8
7	7Q072014	O-RING	8

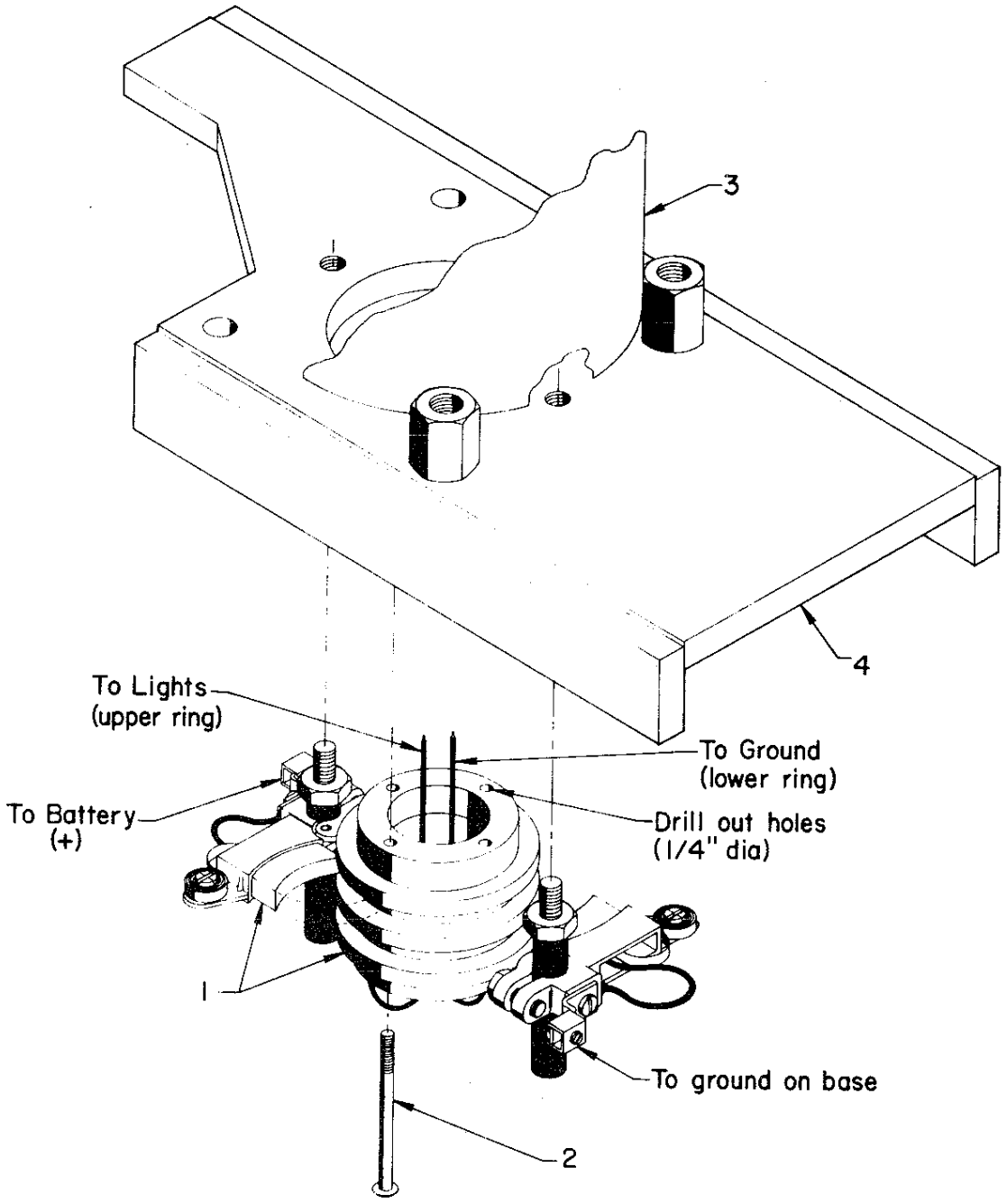


Figure F-26. Continuous Rotation Electrical Collector Ring

Item No.	Part No.	Description	Qty
1.	77041010	RING, collector	1
2.	72060655	SCREW; 1/4-20 x 3-1/2"	4
3.	3R061610	MANIFOLD, continuous rotator	Ref.
4.	52070849	PLATE, manifold mounting	Ref.

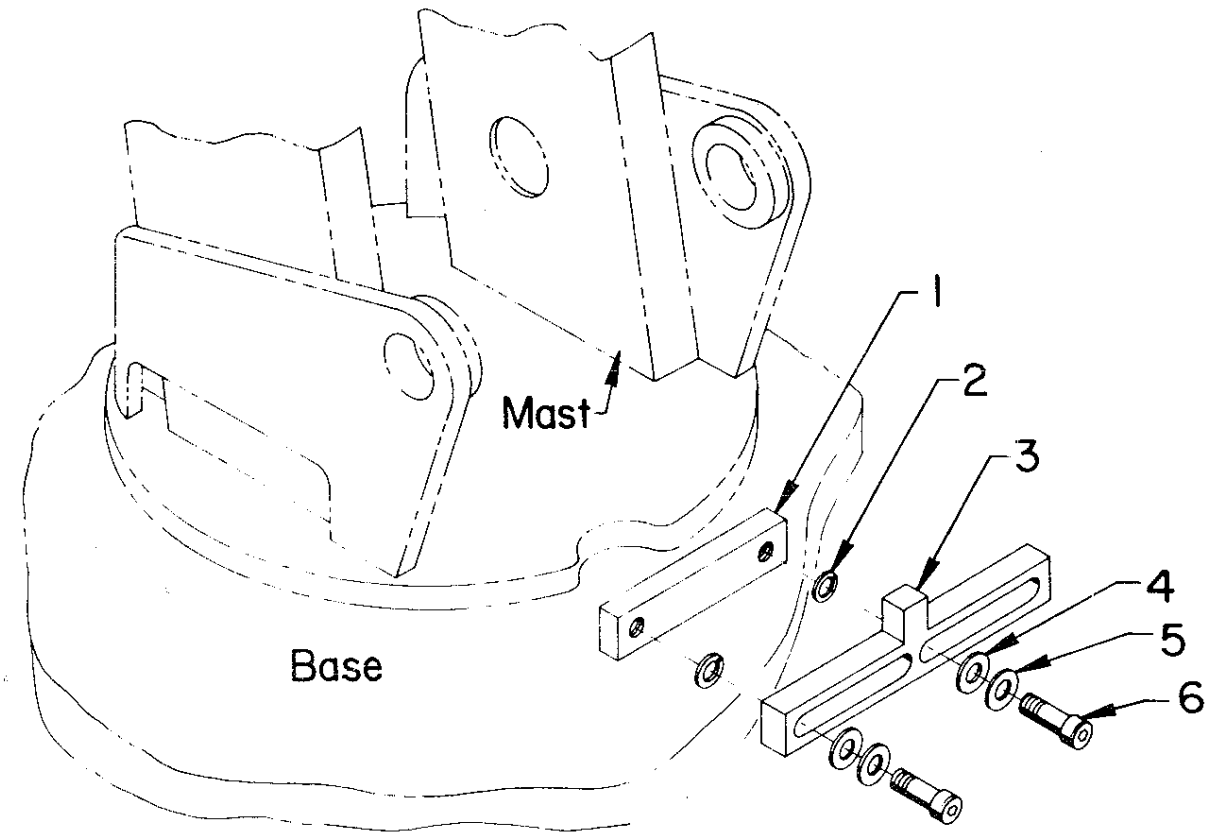


Figure F-27. 370° Rotation Kit (Part Number 90701757)

Item No.	Part No.	Description	Qty
1.	60104457	BAR, stop block mtg (welded to base)	1
2.	72063055	LOCK WASHER; 5/8"	2
3.	60011618	STOP BLOCK, sliding	1
4.	72063029	BUSHING, machy; 3/4" x 12 ga.	2
5.	72063030	BUSHING, machy; 3/4" x 10 ga.	2
6.	72060534	BOLT, shoulder; 3/4" x 1-1/2"	2

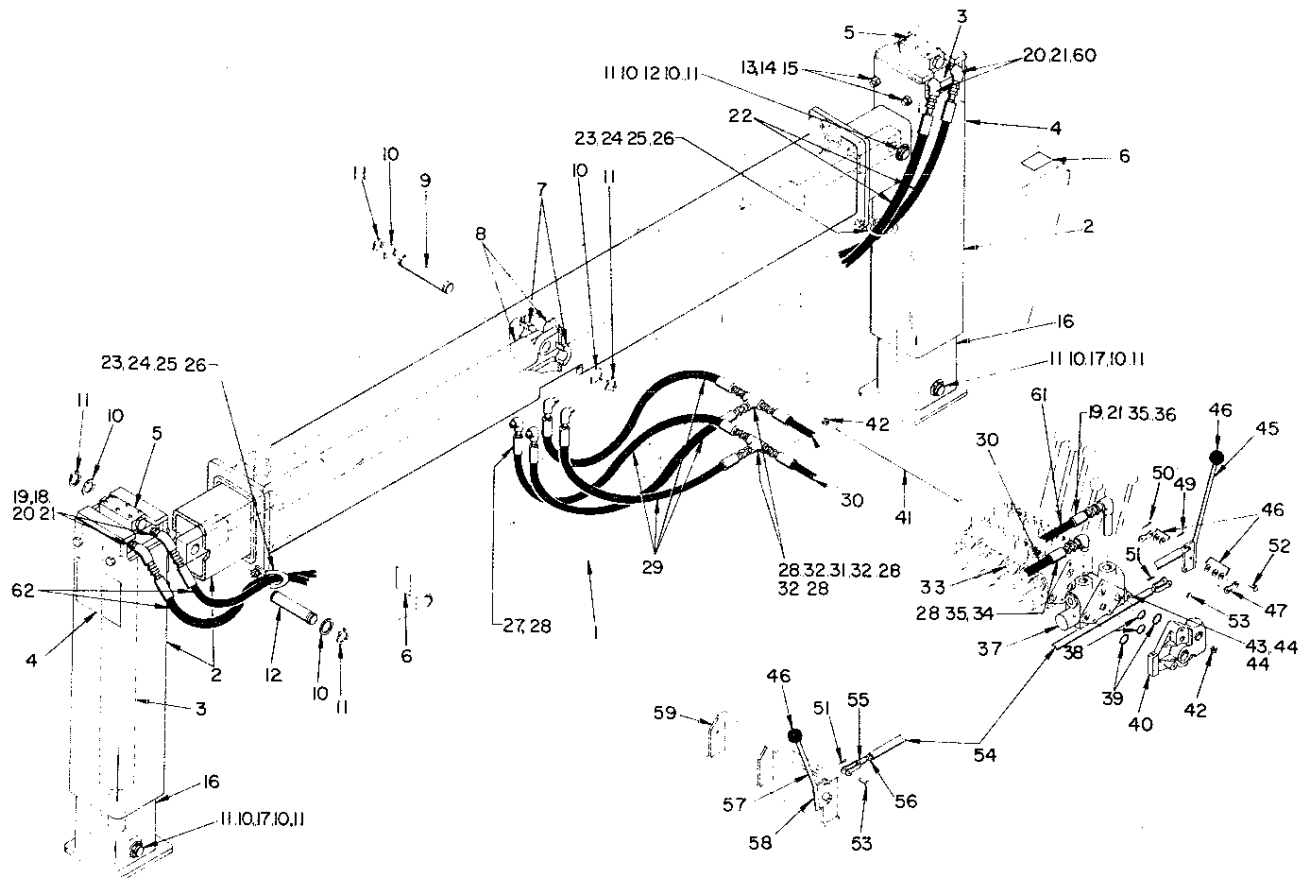


Figure F-28. Power-out Outriggers (Part Number 91702177)

Item No.	Part No.	Description	Qty
1.	52701251	BASE	Ref.
2.	52702178	ARM, outrigger	2
3.	3B084710	CYLINDER, power down	2
4.	71039129	PLACARD, stabilizer down	2
5.	73054004	VALVE, safety locking	Ref.
6.	71039162	PLACARD, stabilizer in and out	2
7.	60010397	SLEEVE, rear base tube	2
8.	3B210520	CYLINDER, power out	2
9.	60010469	PIN	1
10.	72063034	BUSHING, machy; 1" x 10 ga.	10
11.	72066125	RING, retaining	10
12.	60101906	PIN	2
13.	72060105	BOLT; 1/2-13 x 7"	4
14.	72063053	LOCK WASHER; 1/2"	4
15.	72062004	NUT; 1/2-13	4
16.	52701140	LEG, outrigger	2
17.	60102522	PIN	2
18.	72053723	NIPPLE; 3/8" npt	Ref.
19.	72531100	ELBOW, 90°; 3/8" npt	1
20.	72053642	SWIVEL, pipe; 3/8" npt(m x f)	Ref.
21.	72531151	SWEDGE; 3/8"	Ref.
22.	60035287	HOSE, LH outrigger; 3/8" x 66"	Ref.
23.	52070140	HOLDER, hose	2
24.	72060050	BOLT; 3/8-16 x 2"	2
25.	72063051	LOCK WASHER; 3/8"	2
26.	72062002	NUT; 3/8-16	2
27.	72531131	ELBOW, street, 90°; 1/4" npt	4
28.	72531142	SWEDGE; 1/4"	12
29.	60035131	HOSE; 1/4" x 12"	4
30.	60035345	HOSE; 1/4" x 20"	1
31.	72053610	TEE; 1/4" npt	2
32.	72053640	SWIVEL, pipe; 1/4" npt(m x f)	6
33.	73073011	VALVE BANK, 4-way; 6-spool	Ref.
34.	72531132	ELBOW, street, 90°; 3/8" npt	1
35.	72053537	SWIVEL, pipe; 3/8" npt(m) x 1.4" npt(f)	2
36.	72053051	NIPPLE; 3/8" npt x 2"	1
37.	73054009	VALVE SECTION, 4-way	1
38.	7Q072019	O-RING, small	2
39.	7Q072021	O-RING; large	2
40.	73014612	COVER, valve bank, LH	Ref.
41.	60014596	STUD, valve bank; 7-spool	3
42.	72062002	NUT	Ref.
43.	73029053	BRACKET, lever, valve section	1
44.	72060831	SCREW	2
45.	52701254	LEVER, valve; long	1
46.	71039096	KNOB, plastic; 1-1/2" dia.	2
47.	71058003	LINK, connecting	1
48.	72063001	WASHER, wrt; 1/4"	5
49.	72066336	PIN, cotter; 5/64" x 1/2"	1
50.	72066164	PIN, cotter; 1/16 x 1-1/2"	1
51.	72066168	PIN, cotter; 3/32" x 3/4"	2
52.	72066337	PIN; 1/4" x 7/8"	1
53.	72066338	PIN, clevis	2
54.	52702016	LINK, control, female end	1
55.	52702018	LINK, control, male end	1
56.	72062003	NUT; 7/16-14	1
57.	52701253	LEVER, control; long	1
58.	72053506	AERK, press fit; 3/16"	1
59.	52701247	VALVE BANK, dummy; 7-spool	Ref.
60.	72053563	ELBOW, street, 45°; 3/8" npt	Ref.
61.	60035371	HOSE; 1/4" x 23"	1
62.	60035246	HOSE, RH outrigger; 3/8" x 120"	Ref.

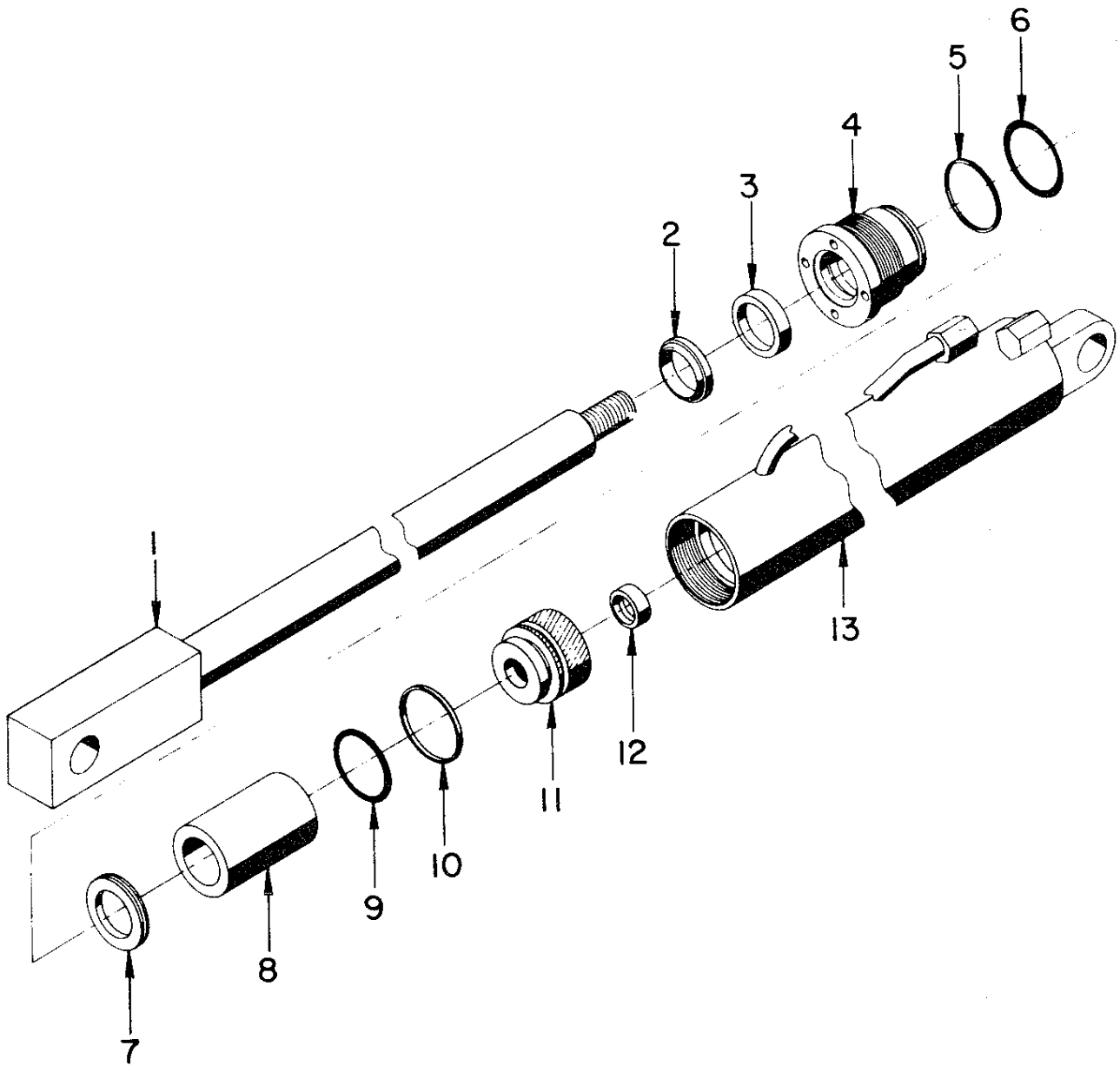


Figure F-29. Power-out Outrigger Cylinder (Part Number 3B210520)

Item No.	Part No.	Description	Qty
1.	4G210520	ROD	1
2.	7R14P012	*WIPER, rod	1
3.	7R535012	*SEAL, rod, dynamic	1
4.	6H020012	HEAD	1
5.	7Q10P224	*BACK-UP, static	1
6.	7Q072224	*O-RING, static	1
7.	6A025012	*WAFER LOK	1
8.	6C300012	TUBE, stop	1
9.	7Q072129	*O-RING, companion	1
10.	7T66P020	*SEAL, piston, dynamic	1
11.	6I020075	PISTON	1
12.	7T61N075	*SEAL, lock ring	1
13.	4B210520	CASE, cylinder	1

*Part of Seal Kit (Part Number 9C081012).

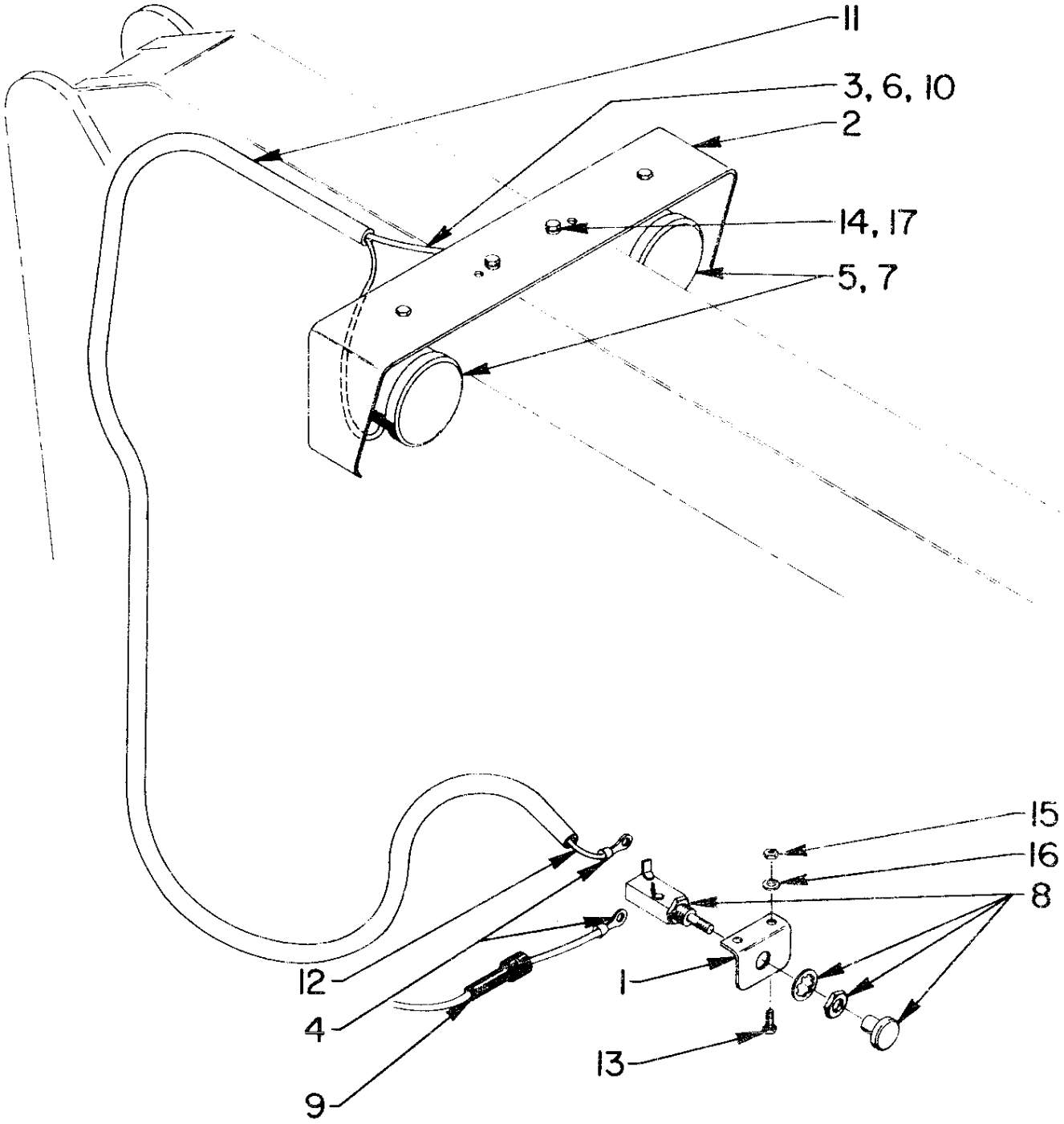
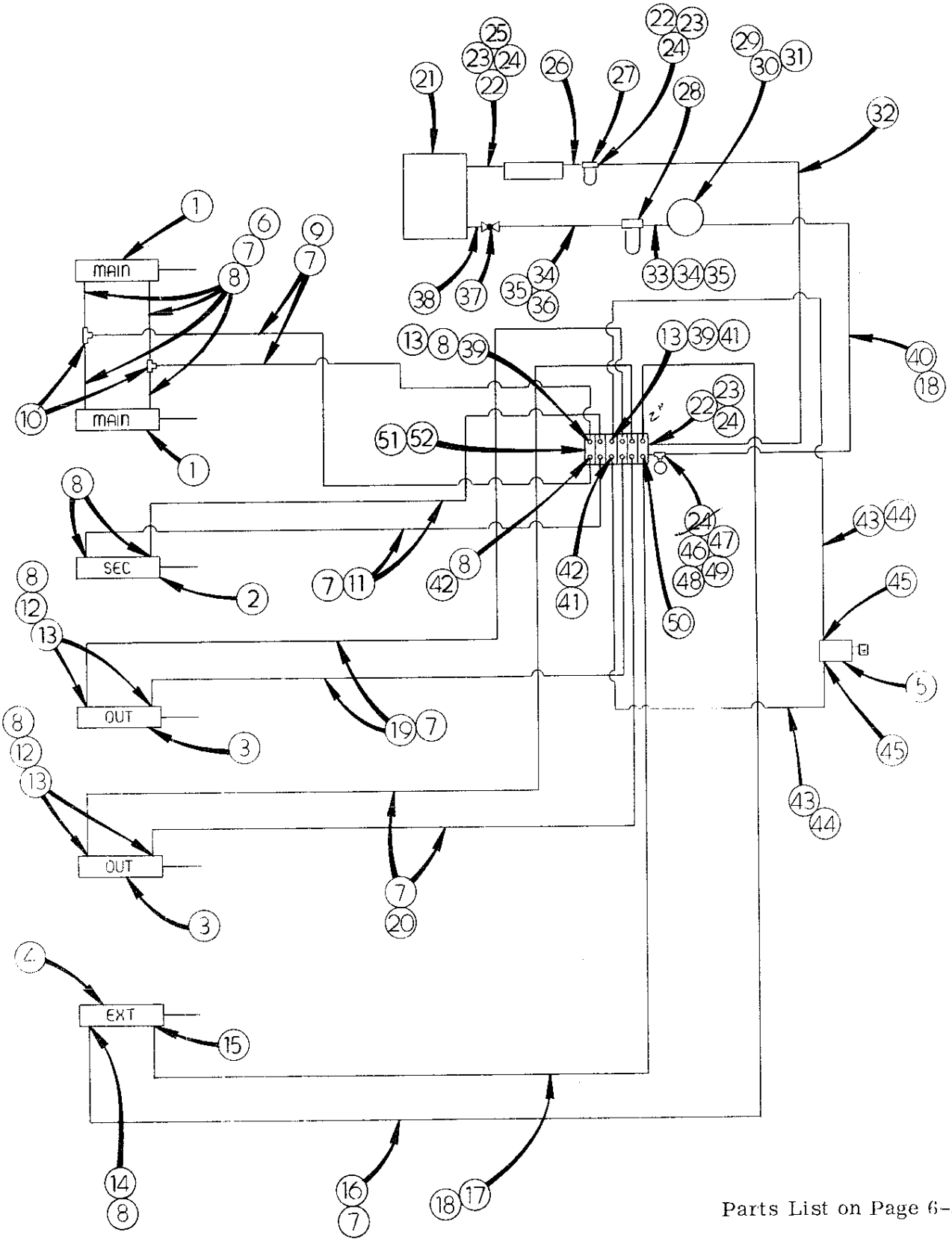


Figure F-30. Auxilliary Light Option Kit (Part Number 90701759)

Item No.	Part No	Description	Qty	Item No.	Part No.	Description	Qty
1.	60103535	BRACKET, switch	1	10.	89041001	WIRE; 14 ga. x 5'	1
2.	60103691	GUARD, light	1	11.	60044052	LOOM; 12'	1
3.	89034048	WRAP, spiral; 10'	2	12.	60044053	WIRE; 14	1
4.	77040000	EYE, terminal end	2	13.	72060000	BOLT; 1/4-20 x 1/2	2
5.	77040034	LIGHT, seal beam	2	14.	72060016	BOLT; 3/8-16 x 1'	2
6.	77040048	SPLICE, butt	2	15.	72062000	NUT; 1/4-20	2
7.	77040089	HOUSING, light	2	16.	72063049	LOCK WASHER; 1/4" std	2
8.	77041015	SWITCH, push/pull	1	17.	72063051	LOCK WASHER; 3/8" std	2
9.	77041056	FUSE, in-line; 20 amp	1				



Parts List on Page 6-39

Figure F-31. Manual Hydraulic Schematic

Item No.	Part No.	Description	Qty
1.	3B222710	CYLINDER, main	2
2.	3C226710	CYLINDER, secondary	1
3.	3B084710	CYLINDER, outrigger	2
4.	3B048610	CYLINDER, extension, manual	1
	3K271513	CYLINDER, extension, telescopic	1
5.	73051004	MOTOR, hydraulic	1
6.	60035396	HOSE, single-braid; 3/8" ID x 20'	4
7.	72531151	FITTING, hose; 3/8	26
8.	72053642	SWIVEL; 3/8	21
9.	60035397	HOSE, single-braid; 3/8" ID x 42'	2
10.	72053611	TEE; 3/8 npt	2
11.	60035398	HOSE, single-braid; 3/8" ID x 144'	2
12.	72053723	NIPPLE; 3/8 npt	4
13.	72531100	ELBOW, 90°; 3/8 npt	10
14.	72053171	ELBOW, street, 45°; 3/8' npt	1
15.	72053172	ELBOW, street, 45°; 1/2" npt	1
16.	60035399	HOSE, single-braid; 3/8" ID x 234"	1
17.	60035400	HOSE, single-braid; 1/2" ID x 234'	1
18.	72531185	FITTING, hose, swivel; 1/2"	4
19.	60035401	HOSE, single-braid; 3/8" ID x 104'	2
20.	60035287	HOSE, single-braid; 3/8' ID x 66"	2
21.	52701511	RESERVOIR, hydraulic oil	1
22.	72053458	NIPPLE, barbed; 3/4'	4
23.	72066000	CLAMP, hose; #12	4
24.	72053556	ELBOW, street, 90°; 3/4" npt	4
25.	60035285	HOSE, red Ortac; 3/4" x 6-3/4"	1
26.	72053148	NIPPLE; 3/4" npt x 12"	1
27.	73052000	FILTER, return	1

Item No.	Part No.	Description	Qty
28.	73052007	FILTER, suction	1
29.	73051XXX	PUMP, hydraulic	1
30.	72053XXX	ADAPTER w/o-ring; large	1
31.	72053XXX	ADAPTER w/o-ring; small	1
32.	60035286	HOSE, red Ortac; 3/4" ID x 18	2
33.	60035XXX	HOSE; 1-1/4 ID (cut to length)	1
34.	72531550	NIPPLE, barbed; 1-1/4'	1
35.	72066516	CLAMP, hose	4
36.	60035XXX	HOSE; 1-1/4" ID (cut to length)	
37.	73054130	VALVE, gate; 1-1/4'	
38.	72053211	NIPPLE, close; 1-1/4" npt	1
39.	72053051	NIPPLE; 3/8" npt x 2'	6
40.	60035XXX	HOSE, double-braid; 1/2" ID	1
41.	72053537	ADAPTER, swivel; 3/8" npt(m) x 1/4' npt(f)	2
42.	72531132	ELBOW, street, 90°; 3/8" npt	6
43.	60035345	HOSE, single-braid; 1/4" ID x 20"	2
44.	72531142	FITTING, hose; 1/4" npt	4
45.	72532138	BUSHING, red.; 3/8' npt(m) x 1/4" npt(f)	2
46.	72053612	TEE; 1/2" npt	1
47.	72531830	BUSHING, red.; 1/2" npt(m) x 1/4" npt(f)	1
48.	73054003	GAUGE, pressure; 5000 PSI	1
49.	72053726	NIPPLE, red.; 1/2" npt x 3/4' npt	1
50.	72053732	ADAPTER; 1/2" npt(f) x 3/8" npt(m)	1
51.	73073011	VALVE BANK; 6-spool	1
52.	73024101	CAP, relief, brass	1

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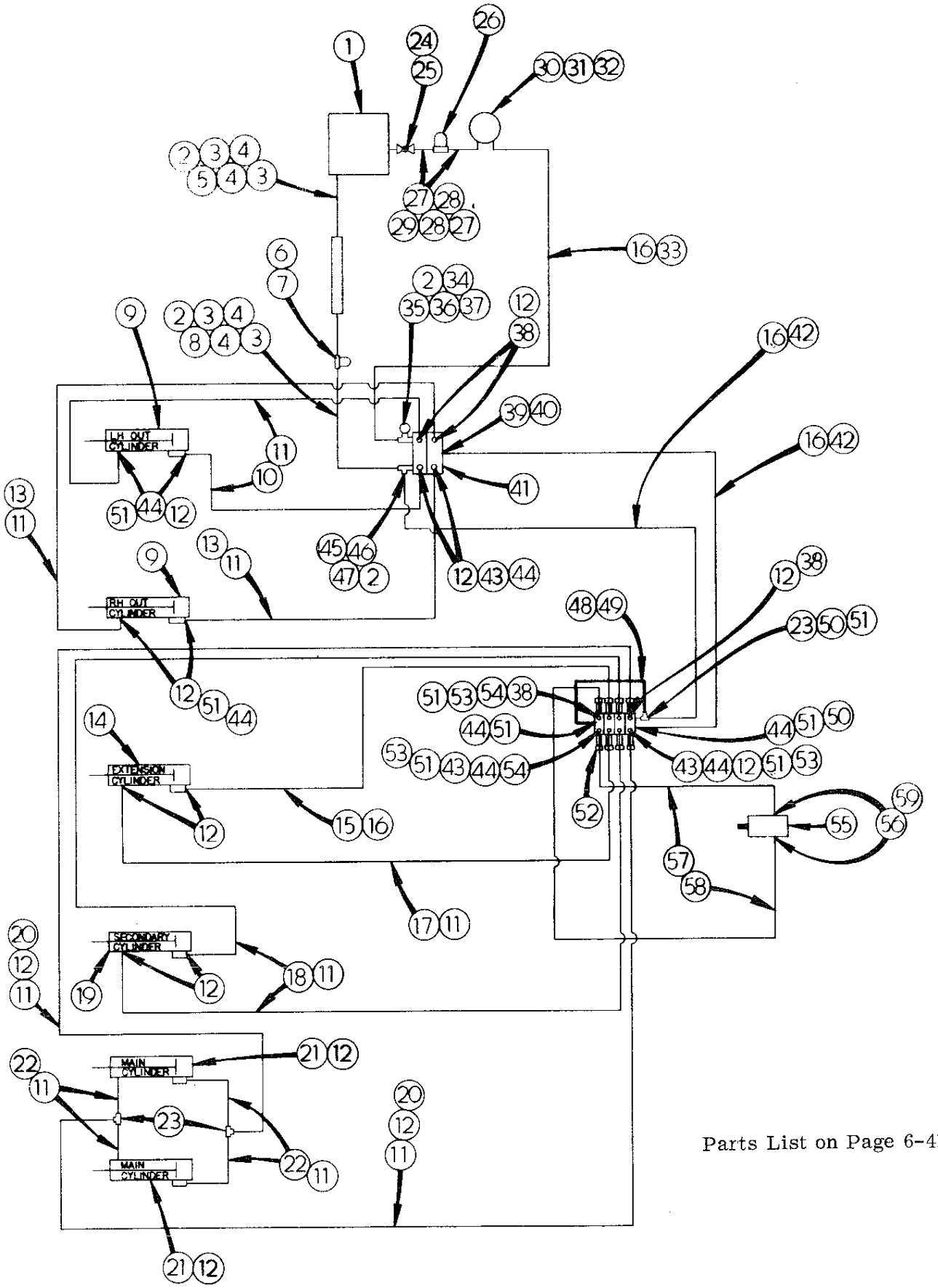
Parts Drawing on Page 6-38

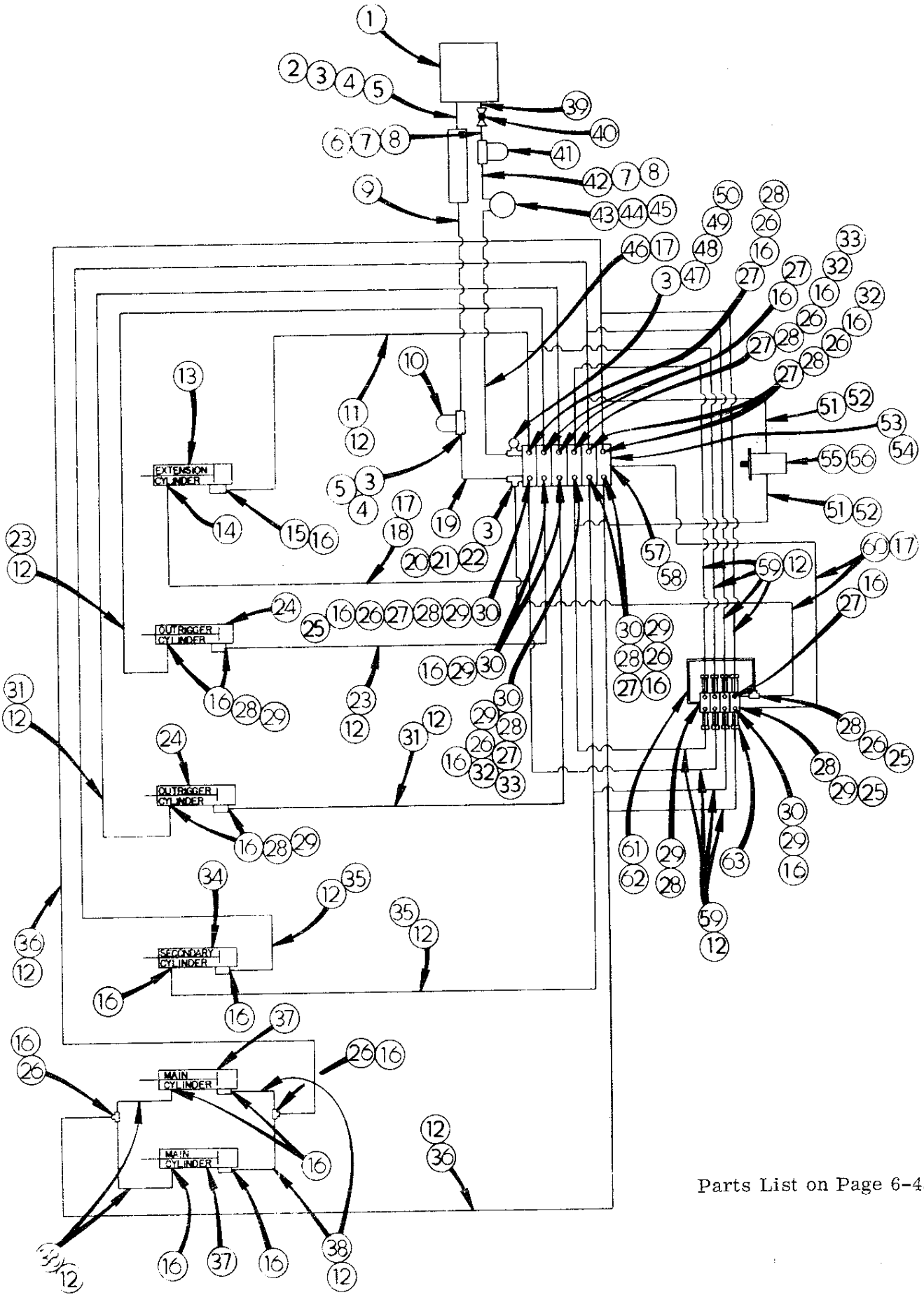


Parts List on Page 6-41

Figure F-32. Remote Hydraulic Schematic

Item No.	Part No.	Description	Qty
1.	52701511	RESERVOIR, hydraulic oil	1
2.	72053556	ELBOW, street, 90°; 3/4" npt	4
3.	72053458	NIPPLE, barbed; 3/4	4
4.	72066000	CLAMP, hose; #12	4
5.	60035285	HOSE, red Ortac; 3/4" ID x 6-3/4"	1
6.	72053148	NIPPLE; 3/4" npt x 12"	1
7.	73052000	FILTER, return	1
8.	60035286	HOSE, red Ortac; 3/4" ID x 18"	1
9.	3B084710	CYLINDER, outrigger	2
10.	60035287	HOSE, single-braid; 3/8" ID x 66"	2
11.	72531151	FITTING, hose; 3/8"	26
12.	72053642	SWIVEL; 3/8" npt	23
13.	60035401	HOSE, single-braid; 3/8" ID x 104"	2
14.	3K271513	CYLINDER, extension, telescopic	1
	3B048610	CYLINDER, extension, manual	1
15.	60035400	HOSE, double-braid; 1/2" ID x 234"	1
16.	72531185	FITTING, hose, swivel; 1/2"	8
17.	60035399	HOSE, single-braid; 3/8" ID x 234"	1
18.	60035398	HOSE, single-braid; 3/8" ID x 144"	2
19.	3C226710	CYLINDER, secondary	1
20.	60035397	HOSE, single-braid; 3/8" ID x 42"	2
21.	3B222710	CYLINDER, main	2
22.	60035396	HOSE, single-braid; 3/8" ID x 20"	4
23.	72053611	TEE; 3/8" npt	3
24.	73054130	VALVE, gate; 1-1/4"	1
25.	72053211	NIPPLE, close; 1-1/4" npt	1
26.	73052007	FILTER, suction	1
27.	72531550	NIPPLE, barbed; 1-1/4"	4
28.	72066516	CLAMP, hose	4
29.	60035XXX	HOSE; 1-1/4" (cut to length)	2
30.	73051XXX	PUMP, hydraulic	1
31.	72053XXX	ADAPTER w/o-ring; small	1
32.	72053XXX	ADAPTER w/o-ring; large	1
33.	60035XXX	HOSE, double-braid; 1/2" ID (cut to length)	1
34.	72053726	NIPPLE, red.; 3/4" npt x 1/2" npt	1
35.	72053612	TEE; 1/2" npt	1
36.	72531830	BUSHING, red.; 1/2" npt(m) x 1/4" npt(f)	1
37.	73054003	GAUGE, pressure; 5000 PSI	1
38.	72531132	ELBOW, street; 3/8" npt	6
39.	73073023	ADAPTER, power beyond	1
40.	72531133	ELBOW, street, 90°; 1/2" npt	1
41.	73073034	VALVE BANK; 2-spool	1
42.	60035293	HOSE, double-braid; 1/2" ID x 18"	2
43.	72053051	NIPPLE; 3/8" npt x 2"	6
44.	72531100	ELBOW, 90°; 3/8" npt	12
45.	72053141	NIPPLE, close; 3/4" npt	1
46.	72053555	TEE; 3/4" npt	1
47.	72531833	BUSHING, red.; 3/4" npt(m) x 1/2" npt(f)	1
48.	72053516	FITTING, Ferulok; 3/8"	2
49.	60102671	TUBE, hydraulic	1
50.	72053732	ADAPTER; 1/2" npt(f) x 3/8" npt(m)	2
51.	72053723	NIPPLE; 3/8" npt	11
52.	73073094	VALVE BANK, 12 VDC; 4-spool	1
53.	73054139	VALVE, color flow	4
54.	72053537	ADAPTER, swivel; 3/8" npt(m) x 1/4" npt(f)	2
55.	73051004	MOTOR, hydraulic	1
56.	72053640	SWIVEL; 1/4"	2
57.	60035345	HOSE, single-braid; 1/4" ID x 20"	2
58.	72531142	FITTING, hose; 1/4"	4
59.	72532138	BUSHING, red.; 3/8" npt(m) x 1/4" npt(f)	2

Parts Drawing on Page 6-40



Parts List on Page 6-43

Figure F-33. Manual and Remote Hydraulic Schematic

Item No.	Part No.	Description	Qty
1.	52701511	RESERVOIR, hydraulic oil	1
2.	60035285	HOSE, red Ortac; 3/4" ID x 6-3/4" lg	1
3.	72053556	ELBOW, street, 90°; 3/4" npt	4
4.	72066000	CLAMP, hose; #12	4
5.	72053458	NIPPLE, barbed; 3/4" npt	4
6.	60035XXX	HOSE; 1-1/4" ID (Cut to length)	1
7.	72066516	CLAMP, hose	4
8.	72531550	NIPPLE, barbed; 1-1/4"	4
9.	72053148	NIPPLE; 3/4" npt x 12"	1
10.	73052000	FILTER, return	1
11.	60035399	HOSE, single-braid; 3/8" x 234"	1
12.	72531151	FITTING, hose; 3/8"	42
13.	3K271513	CYLINDER, extension, telescopic	1
	3B084610	CYLINDER, extension, manual	1
14.	72053172	ELBOW, street, 45°; 1/2" npt	1
15.	72053171	ELBOW, street, 45°; 3/8" npt	1
16.	72053642	SWIVEL; 3/8"	38
17.	72531185	FITTING, hose, swivel; 1/2"	8
18.	60035400	HOSE, double-braid; 1/2" ID x 234"	1
19.	60035286	HOSE, red Ortac; 3/4" ID x 18"	1
20.	72531833	BUSHING, red.; 3/4" npt(m) x 1/2" npt(f)	1
21.	72053555	TEE; 3/4" npt	1
22.	72053141	NIPPLE, close; 3/4" npt	1
23.	60035287	HOSE, single-braid; 3/8" ID x 66"	2
24.	3B084710	CYLINDER, outrigger	2
25.	72053732	ADAPTER; 3/8" npt(m) x 1/2" npt(f)	3
26.	72053611	TEE; 3/8" npt	11
27.	72531132	ELBOW, street, 90°; 3/8" npt	18
28.	72053723	NIPPLE; 3/8" npt	19
29.	72531100	ELBOW; 3/8" npt	15
30.	72053071	NIPPLE; 3/8" npt x 2"	10
31.	60035401	HOSE, single-braid; 3/8" ID x 104"	2
32.	73054139	VALVE, color flow; 3/8"	4
33.	72053537	ADAPTER, swivel; 3/8" npt(m) x 1/4" npt(f)	2
34.	3C226710	CYLINDER, secondary	1
35.	60035398	HOSE, single-braid; 3/8" ID x 144"	2
36.	60035397	HOSE, single-braid; 3/8" ID x 12"	2
37.	3B222710	CYLINDER, main	2
38.	60035396	HOSE, single-braid; 3/8" ID x 20"	4
39.	72053211	NIPPLE, close; 1-1/4" npt	1
40.	73054130	VALVE, gate; 1-1/4"	1
41.	73052012	FILTER, suction	1
42.	60035XXX	HOSE; 1-1/4" ID (cut to length)	1
43.	73051XXX	PUMP, hydraulic	1
44.	72053XXX	ADAPTER w/o-ring; large	1
45.	72053XXX	ADAPTER w/o-ring; small	1
46.	60035XXX	HOSE, double-braid; 1/2" ID	1
47.	72053612	TEE; 1/2" npt	1
48.	72531830	BUSHING, red.; 1/2" npt(m) x 1/4" npt(f)	1
49.	73054003	GAUGE, pressure; 5000PSI	1
50.	72053726	NIPPLE, red.; 3/1" npt x 1/2" npt	1
51.	60035345	HOSE, single-braid; 1/4" ID x 20"	2
52.	72531142	FITTING, hose; 1/4"	1
53.	73073011	VALVE BANK; 6-spool, manual	1
54.	73024101	CAP, relief, brass	1
55.	73051004	MOTOR, hydraulic	1
56.	72532138	BUSHING, red.; 3/8" npt(m) x 1/4" npt(f)	2
57.	72531133	ELBOW, street, 90°; 1/2" npt	1
58.	73073023	ADAPTER, power beyond	1
59.	60035182	HOSE, single-braid; 3/8" ID x 14"	8
60.	60035293	HOSE, double-braid; 1/2" ID x 18"	2
61.	72053516	FITTING, Ferulok; 3/8"	2
62.	60102671	TUBE, hydraulic	1
63.	73073094	VALVE BANK, 12 VDC; 4-spool	1

Parts Drawing on Page 6-42

This section includes disassembly, repair and assembly instructions for many of the components on the IMTCO **525** crane.

7-1. 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 completely 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 erratic bumpy 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.

7-1-1. Cylinders

The main and secondary cylinders are of the same type; therefore, the same disassembly and repair instructions apply to both. Check the PARTS section for specific information. The following list of tools will be a definite asset in the disassembly and repair of all IMTCO cylinders:

1 Spanner wrench - IMTCO Part Number 3Y140510. Fits all IMTCO cylinders

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 installation

7-1-1-1. Cylinder Removal

1 Support the crane with the mast and boom at a 90° angle and the secondary and extension booms fully extended

2 Kill the engine

3 Relieve the internal hydraulic pressure (cycle the controls a few times.)

4 Disconnect the hydraulic hoses from the cylinder

WARNING

Get help when removing the cylinder. Avoid dropping the cylinder and causing an injury or damaging the cylinder.

5 Remove the rod end pin.

A Remove the retainer and bushing.

B Hold the cylinder up and drive out the rod end pin.

6 Remove the butt end pin in the same manner as the rod end pin

7 Carefully lower the cylinder.

7-1-1-2. Cylinder Disassembly

CAUTION

If solvent is used to clean the internal cylinder components, all traces of solvent must be removed. Any residual 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 a repair kit. The small additional expense may save you expensive equipment down-time in the future. Refer to the PARTS section for seal kit part numbers

1 Thoroughly wash the exterior of the cylinder case

NOTE

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

2. Remove the six allen head screws and lift off the holding valve

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)

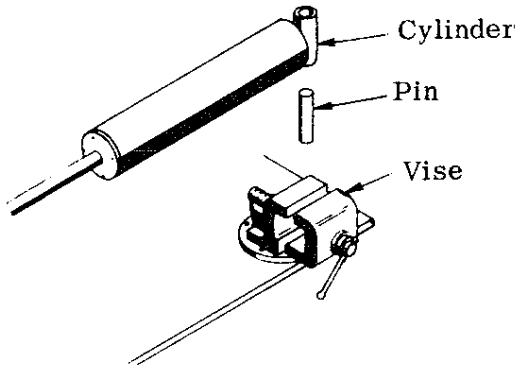


Figure G-1. Securing Cylinder

CAUTION

Do not clamp the cylinder in a vise. It may damage the cylinder

4. Unscrew the head (No. 4, Figure G-2) in a counter-clockwise 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 (No. 8, Figure G-2) from the rod with a spanner in the same manner as the head

CAUTION

Do not clamp the machined surface of the rod in a vise. Damage to the rod will result

7. Remove the wafer-lock (No. 13) and the stop tubes (No. 7) from the rod. The wafer-lock was crushed to secure it and will have to be broken to remove it.

CAUTION

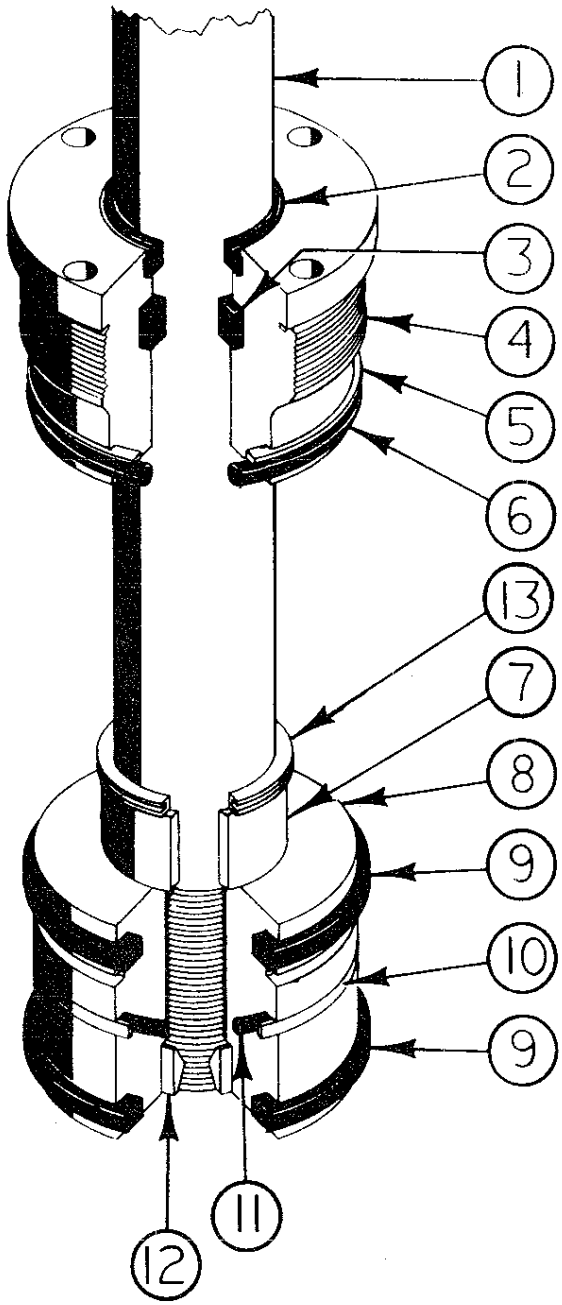
Make certain that the rod isn't damaged during removal of the wafer lock.

8. Slide the head (No. 4) 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. Further equipment down-time will occur to remedy this problem.



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 Layout

NOTE

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

10 Work a slack section into the head seal static o-ring (No. 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.

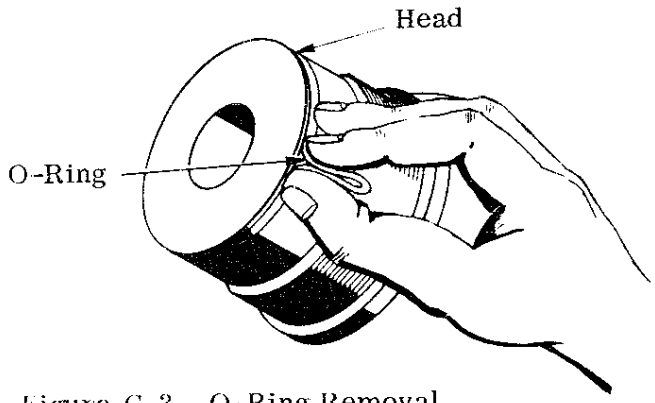


Figure G-3. O-Ring Removal

11. Pinch the lip of the rod wiper (No. 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 (No. 3) with the ice pick. Pry it out of the groove and push it on through the head (Figure G-4).

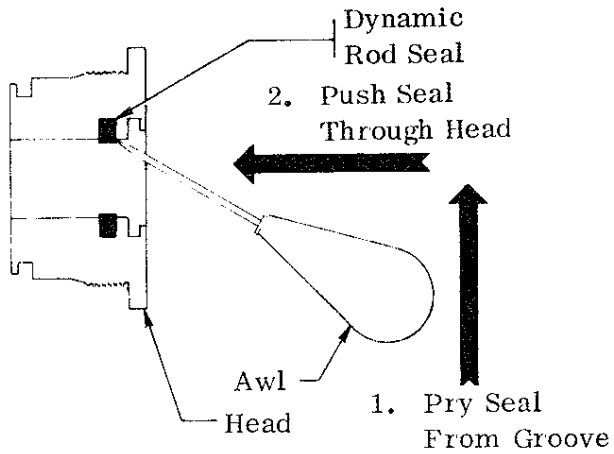


Figure G-4. Dynamic Rod Seal Removal

13. Spread the piston rings (No. 9), slip them over the land and off the end of the piston nearest to the ring.

14. Carefully lift the dynamic piston seal (No. 10) out of the groove with a thin blade such as a putty knife blade. 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 (No. 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.

7-1-1-3. Cylinder Assembly

CAUTION

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

1. Install the companion o-ring (No. 11, Figure G-2). Make certain it is free of twists.

2. Slide the piston seal (No. 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 it from the bottom of the piston — you may stretch the seal and render it useless.

3. Slide the piston rings (No. 9) over the lands and allow them to snap into the grooves.

4. Carefully press the lock ring (No. 12) into position.

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

6 Position the head with the rod wiper pocket up. Grasp the dynamic rod seal (No. 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 pliar.

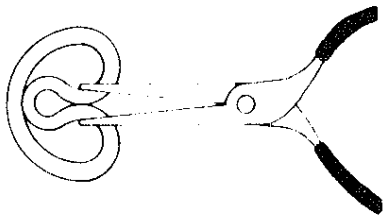


Figure G-5. Rod Seal Installation

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 (No. 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 (No. 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 (No. 13) and stop tubes (No. 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 (No. 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. Impact the wrench three times with a heavy plastic hammer while maintaining the 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 of 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 of the top of the cylinder case.

17 Slide the piston into the cylinder. With a rotating motion, work the o-ring (No. 6) and the back-up (No. 5) past the threads and hand tighten the cylinder head.

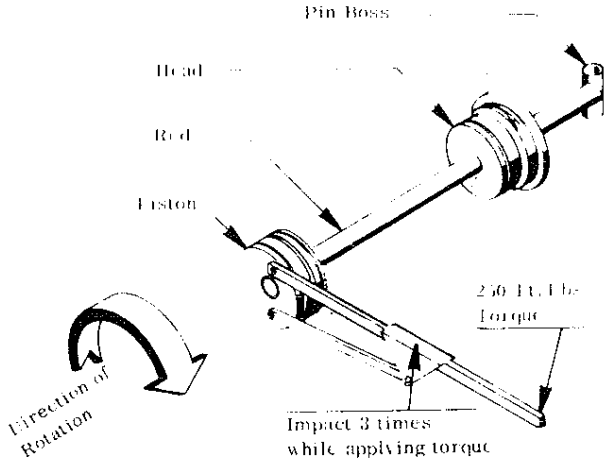


Figure G-6. Piston/Rod Assembly

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 condition and properly positioned

7-1-1-4. Cylinder Installation

1 Raise the cylinder until one of the pin bosses lines up with its hole on the crane boom. Drive a pin through the pin boss.

2 Raise the other end of the cylinder until it lines up and insert the pin

3 Install the bushings and retaining rings.

4. Connect the hydraulic hoses.

5. Start the engine and engage the PTO

6 Cycle the controls until the crane operates smoothly. This will evacuate the air in the system

7 Check for hydraulic leaks and repair if necessary

7-1-2 Non-repairable Components

The following components are considered to be non repairable and must be replaced if defective

1 Hydraulic rotation motor

2 Spool valves

3 Hydraulic pump

7-2 BEARINGS

7-2-1 Turntable Gear Bearing

1 Raise the secondary boom to a 90° angle relative to the mast Support the crane in this position

WARNING

If you use a hoist to support the crane make certain that the hoist is capable of lifting the crane (3450 lbs 1565 kg).

2 With power off cycle the controls a few times to relieve internal hydraulic pressure

3 Disconnect the hydraulic hoses at the spool valves Mark the hoses to identify their location on the spool valves for later assembly

4 With crane in a fully supported position remove the twenty bolts around the base of the mast

5 Carefully lift the crane while simultaneously feeding the hydraulic hoses through the base Set the crane aside where it won t be damaged

CAUTION

Do not lift the crane too quickly or damage to the hoses may result

6 The turntable gear bearing is now exposed Turn the base upside down after unbolting it from the truck frame

CAUTION

Hydraulic hoses from the PTO must be disconnected before attempting to turn the base upside down

7 Disconnect the lubrication line from the gear bearing

8 Remove the eighteen bolts fastening the turntable gear bearings to the base Support the gear during this operation to make certain the gear doesn't fall out

9 Replace the gear-bearing and assemble the crane the reverse of disassembly

NOTE

A new gear bearing is available from Iowa Mold Tooling Co. Inc 500 Highway 18 West Garner; Iowa; 50438 Attn Customer Service Be sure and specify model number and serial number of crane

10 Torque all of the gear bearing bolts to the proper torque value (180 ft/lbs 24 89 kg/m)

11 Start the unit and slowly cycle all of the controls to evacuate air trapped in the hydraulic system Simultaneously check for hydraulic leaks

7-2-2. Pinion Gear and Drive Gear Bushings

1 Remove the pinion gear cover or the drive motor depending on which bushing is to be replaced

2 Install the optional bearing removal tool as shown (Figure G 7) Apply power to pull the bushings upward

3 To install the bushings, assemble the unit as shown (Figure G 8) and apply power to press the bushings into position

NOTE

Hydraulic power can be supplied to the bearing removal tool by two different means a simple hydraulic hand pump or an air over-hydraulic intensifier pump.

4 If the hydraulic motor was removed (drive gear bushing replacement) the hydraulic system must be cycled to evacuate trapped air

7-2-3. Cylinder Pin Bushings

1 Remove the cylinder (refer to paragraph 7 1 1 Cylinders)

2 Remove the boom hinge pins in the same manner as the cylinder pins

3 Press the bushings out of the hole with a hydraulic press and install new bushings

4 Assemble the crane the reverse of disassembly

7-2-4. Boom Hinge Pins and Bushings

Follow the same procedure listed in paragraph 7-2-3 in this section

7-3. TROUBLESHOOTING

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

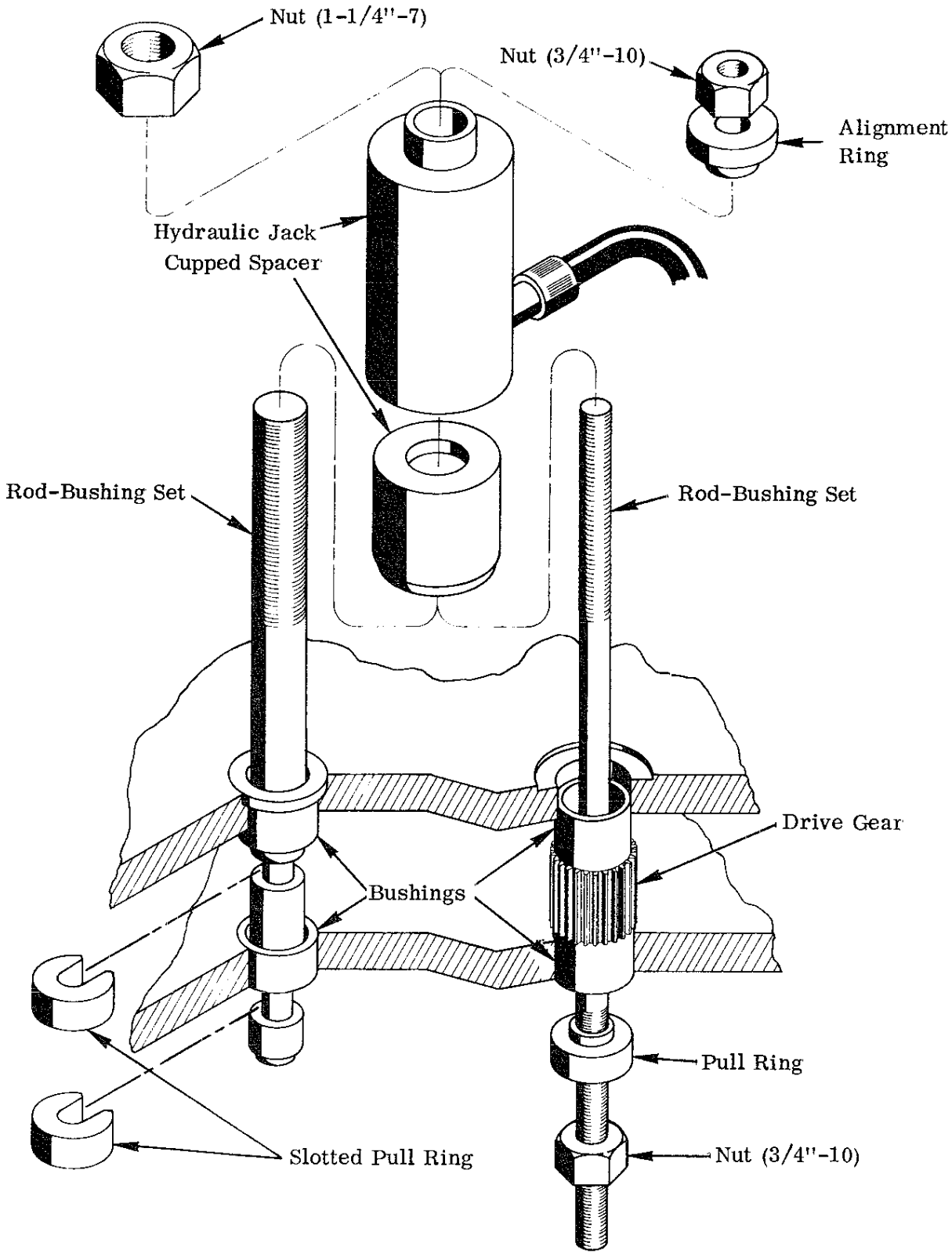


Figure G-7. Bearing Removal

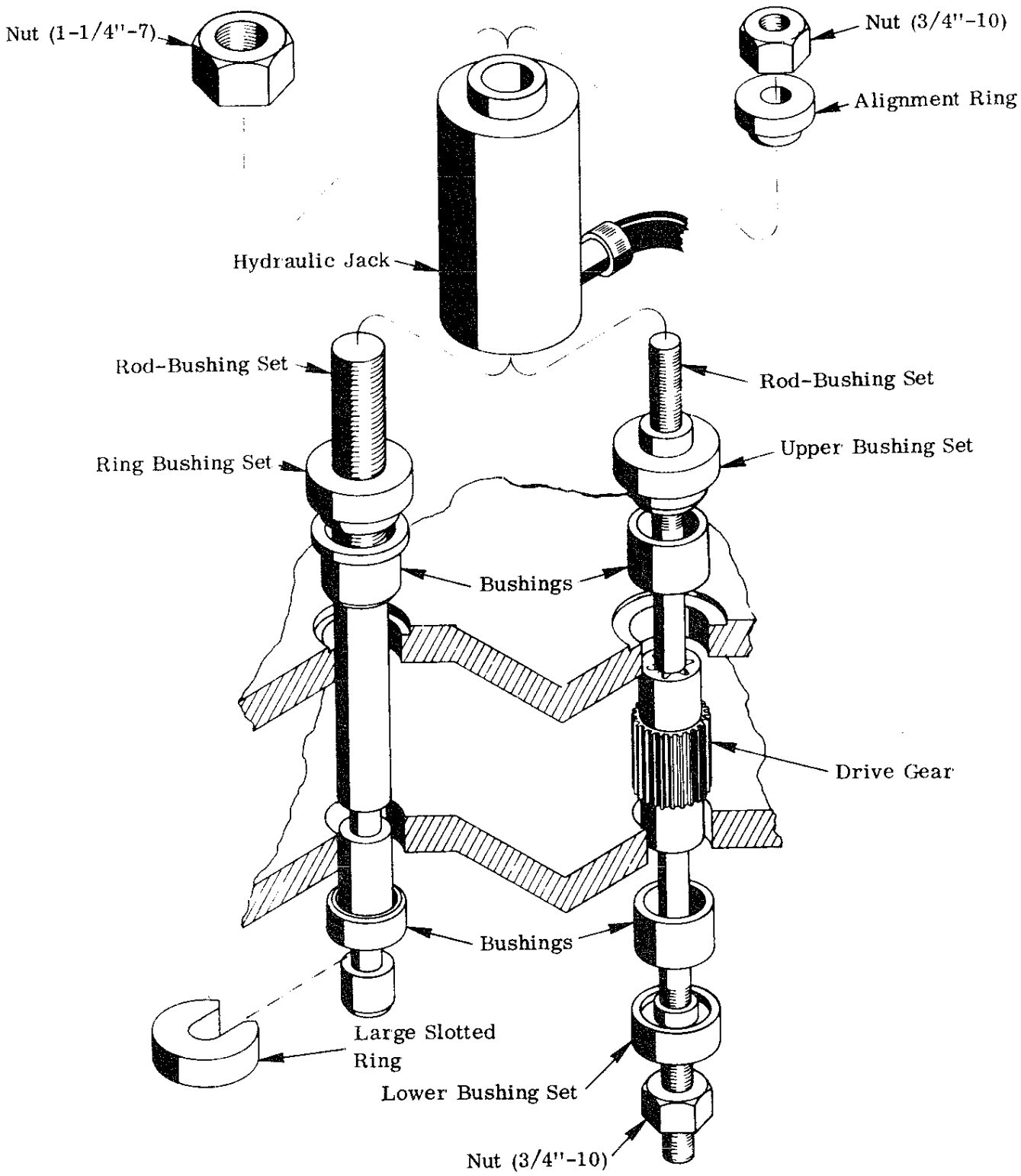


Figure G-8. Bearing Installation

TABLE G-1. TROUBLESHOOTING CHART	
MALFUNCTION	**POSSIBLE DEFECT**
Controls fail to respond	1. Standard unit A The PTO is not engaged B Hydraulic oil supply is low. C Hydraulic pressure line is ruptured D Hydraulic pump is faulty. E Relief valve is set incorrectly 2. Remote control unit A Remote control unit is not connected. B Hydraulic oil supply is low C Hydraulic pressure line is ruptured. D. Hydraulic pump is faulty E 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 Filters are dirty 7. Valve spools are inoperative. 8 Obstruction has occurred in boom holding valve
Boom drifts when loaded and controls neutralized	1 Hydraulic oil is bypassing at piston seal 2 Main, secondary or extension 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 has occurred 4 Suction line filter is clogged and requires replacement. 5 Bypass settings on relief valve are too low 6 Relief valve is damaged 7 Valve closure is obstructed due to particle accummulation

TABLE G-1. TROUBLESHOOTING CHART (cont.)	
MALFUNCTION	**POSSIBLE DEFECT**
Outriggers fail to retract	1. Control valve spool is inoperative. 2. Cylinder or check valve is defective. 3. Hydraulic lines are restricted or ruptured.
Outriggers yield or drift	1. Hydraulic lines are ruptured. 2. Internal bypass is occurring in cylinders.
Boom jumps or bounces when lowered under load	1. Check cylinder base side port of control valve and install orifice (see Section 5, Valve Port orifice).

7-4. HYDRAULIC SCHEMATIC

The hydraulic schematic for the IMTCO 525 crane is shown in the PARTS section.

7-5. ELECTRICAL SCHEMATIC

Shown below is the electrical wiring diagram for the remote control option. Also included is the winch option which should be ignored if not applicable.

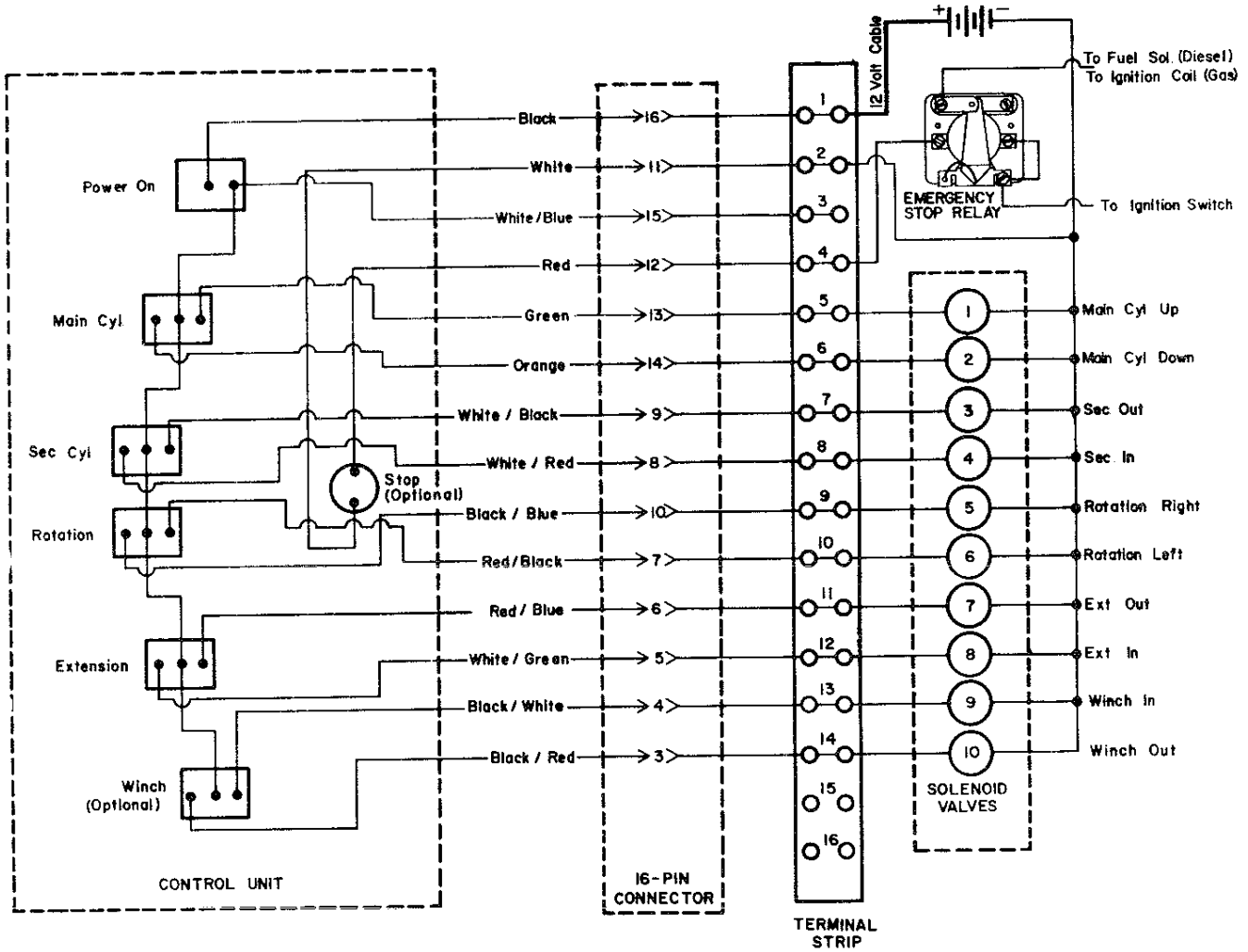


Figure G-9. Wiring Diagram

SECTION 8. INSTALLATION

8-1. GENERAL

These instructions are intended as a guide to assist you with your particular installation. Obviously, we cannot cover every make, model and year of truck manufactured world wide, so these instructions will provide only general information. Use this section for what it was intended - a guide.

8-2. CHASSIS PREPARATION

1. Inspect the carrier vehicle to assure compliance with the requirements listed in paragraph 3-9, MINIMUM CHASSIS SPECIFICATIONS.

2. Chassis frame must be clear of all obstructions immediately behind the cab for a distance of 29" (73.7 cm). Space will be available for gas tanks, etc. after crane is installed.

3 Install the PTO according to the manufacturer's instructions (refer to paragraph 8-3-3 or 8-3-4)

4 Install the pump. Ensure that correct pump rotation is employed and tighten the pump mounting bolts (Figure H-4).

5. Replace the transmission grease and check for leaks.

6 Install the suction line filter below the top of the frame and within 48" of the pump (Figure H-2). Locate it in such a way as to make it easily accessible for service.

7 If rivets protrude through the top of the frame flange, install a ¼" x 4" (0.64 cm x 10.2 cm) flat bar strip on top of frame flange to provide a flat mounting surface. Tack weld along the edge of the frame.

WARNING

Do not weld across the frame. This can seriously damage a frame and render it structurally unsound.

8. Spray paint all unpainted surfaces.

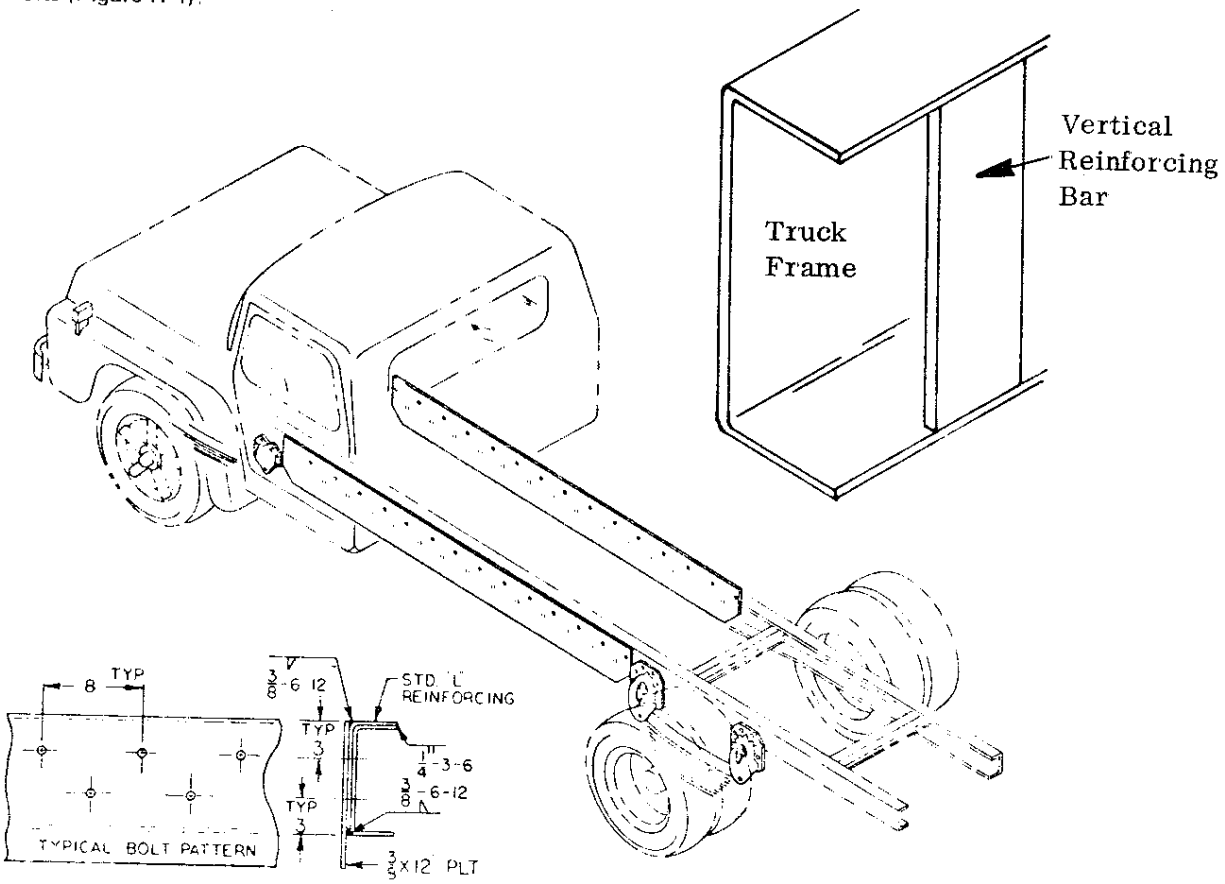


Figure H-1. Frame Reinforcement

8-2-1. Frame Reinforcement

If chassis frame does not meet minimum section modulus or RBM requirements, it must be fishplated

NOTE

Use the same type of materials as in the truck frame

1 Strip frame of all steps tanks, etc which are attached between the front of the rear-spring hanger and the back of the front-spring hanger.

2 Clamp 3/8" x 12" plate to both sides from a point immediately behind the front-spring hanger and directly ahead of the rear-spring hanger. Use heavy-duty C-clamps to secure the plates tight against the frame.

3 Where possible, drill and reinstall the original bolts.

4. Weld fishplate to "L" reinforcing angles (Figure H-1)

WARNING

Do not weld on high tensile frames. The heat generated by welding can cause structural damage to the truck frame resulting in a frame failure. Bolt fishplate utilizing pattern in Figure H-1 Use 3/8-8 NC Grade 6 or 8 bolts, hardened washers both sides and self-locking nuts. Torque according to Torque Data Table in the Appendix.

5. Reinforce frame flange by tack welding four 3/8" x 4" (0.95 cm x 10 2 cm) flat bar strips vertically as shown in Figure H-2. The front pair should be centered 4" (10.2 cm) behind the cab and another pair centered 26" (66 cm) behind those. These bars will prevent frame flange collapse

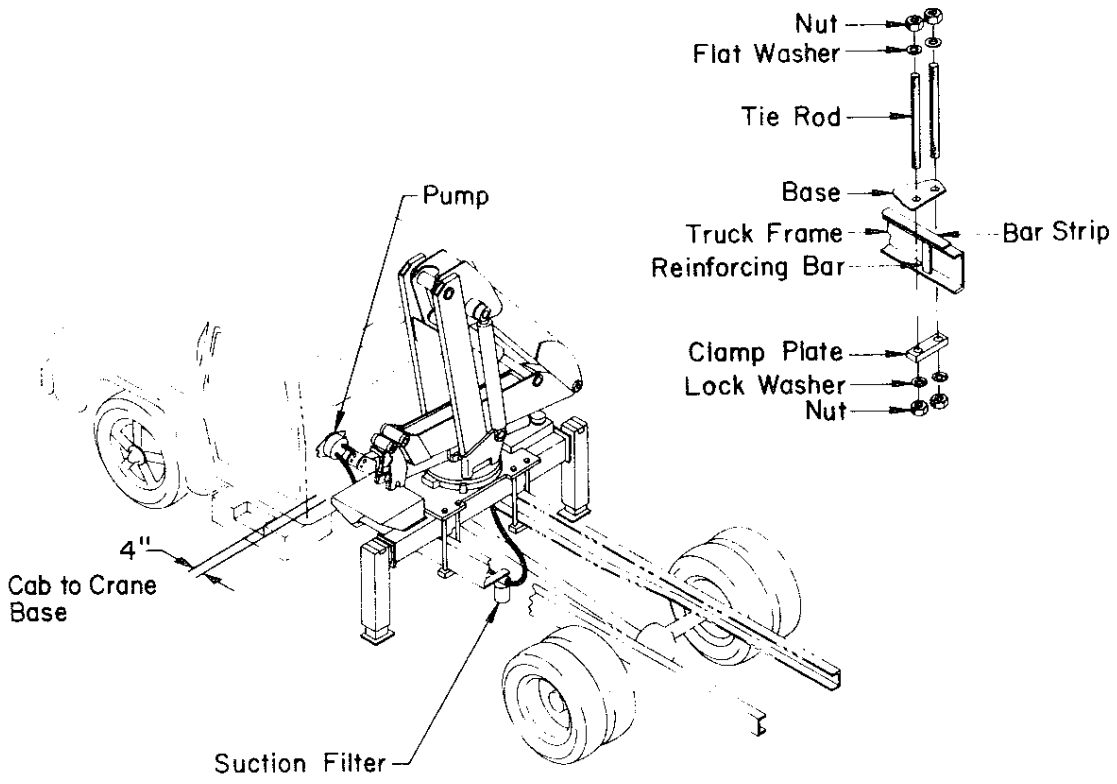


Figure H-2. Crane Installation

8-3. INSTALLATION OF CRANE ASSEMBLY

1 Use a lifting device capable of lifting the weight of the crane - 3400 lbs (1542 kgs). Attach the lifting hook to lift bracket welded to top of main boom. Lift crane, move chassis under crane and lower crane into desired position. Check for front to rear alignment.

2 Install mounting bolts clip bars, lock washers and nuts to secure crane base to chassis (Figure H-2). Torque mounting bolts to 660 ft. lbs. (91.27 kg-m).

8-3-1. Hydraulic Connections

Install the hydraulic connections as follows:

1 Install the 1¼" ID suction hose, barbed nipples (2) and hose clamps (2) between the reservoir and the suction filter (Figure H-2). Cut hose to suit.

2 Install the 1¼" ID suction hose, barbed nipples (2) and hose clamps (2) between the filter and pump.

3 Install the ½" ID pressure hose and swivel hose fittings (2) between the pump and valve bank.

NOTE

All fittings should be properly treated with a good sealant material and adequately tightened to prevent leaks.

4 Fill reservoir with oil. See Table E-2, Oil Specifications.

5 Check the unit for leaks.

6 Start engine, engage PTO and charge system with oil.

7 Check oil reservoir and refill as necessary.

8 Test unit according to Structural and Stability Test form in the Appendix.

9 At the conclusion of test procedures, re-inspect, check for leaks and completely check all lubrication points (refer to Figure E-1 and Table E-1).

10 Make all final adjustments and corrections.

11 Paint unit as required.

12 Ensure all placards are in place (refer to Figure B-2).

13 Install "Electrocution" placards (Figure H-3).

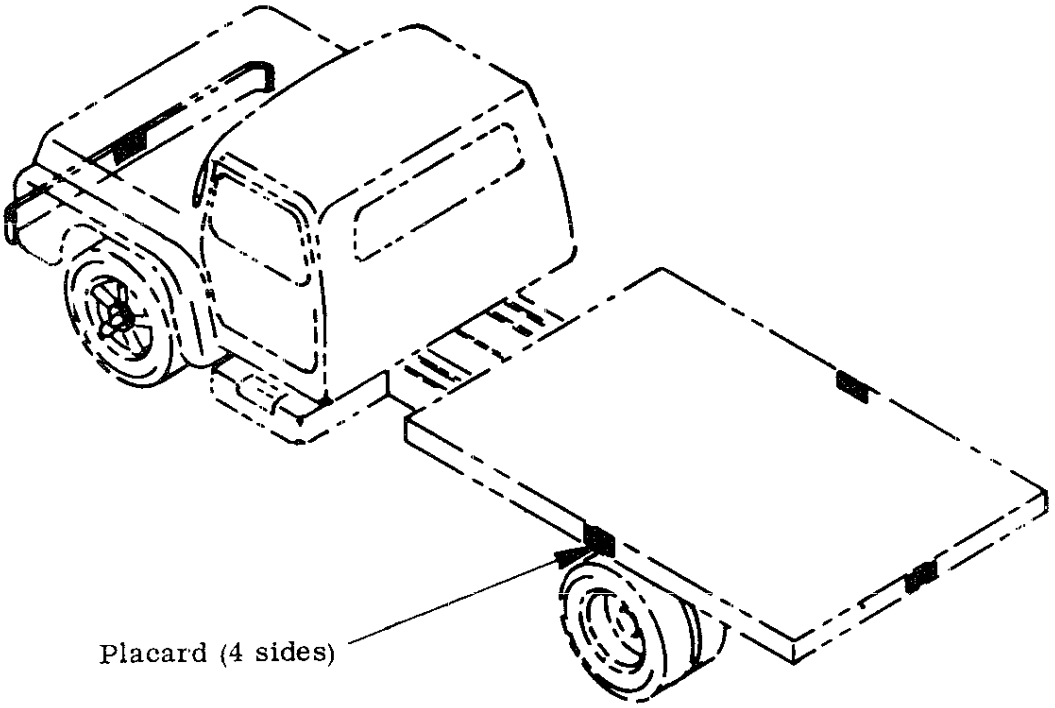


Figure H-3. Electrocution Placards

8-3-2. Optional Winch Installation

The winch option is usually completely installed at the factory. If so, no additional work is necessary. However, if the winch is to be added to an in-service unit, the kit will consist of those parts shown in the parts breakdown drawing in the PARTS section and is installed as follows:

1. Weld the winch bracket to the underside of the secondary boom, positioned as shown in the parts drawing.

2. Screw the four studs into the winch mounting bracket. Slide the winch assembly over the studs and bolt it to the bracket.

3. Install the hook and rope kit on the tip of the extension boom.

4. Install the hydraulic control valve and hydraulic components. Route the hoses through the mast and up to the winch. Make the necessary connections.

NOTE

All fittings should be properly treated with a good thread sealant to stop leaks.

5. Start the engine and engage the PTO.

6. Run the winch cable in and out a few times to purge the air in the lines.

7. Check the reservoir and refill if necessary

8-3-3. Power Take-Off Installation

Power take-off manufacturers provide specific installation instructions on their products. These instructions should be followed when installing a PTO. The following steps are a guide in this application.

1. If the vehicle is new, drain the transmission oil into a clean container for reuse. If the vehicle is used, dispose of the oil.

2. Temporarily install the PTO with the proper gaskets and only two studs. Snug the PTO down and check the backlash for a maximum allowance of 1/32" to 1/16". If the backlash exceeds this amount, remove gaskets and check backlash again until it is correct.

NOTE

It may be necessary to remove and modify the exhaust pipe to provide adequate clearance for the PTO

3. Remove PTO and apply Permatex to gaskets. If the holes for the studs are tapped through, apply Permatex to the studs and tighten them down. Make certain the studs do not interfere with transmission gears.

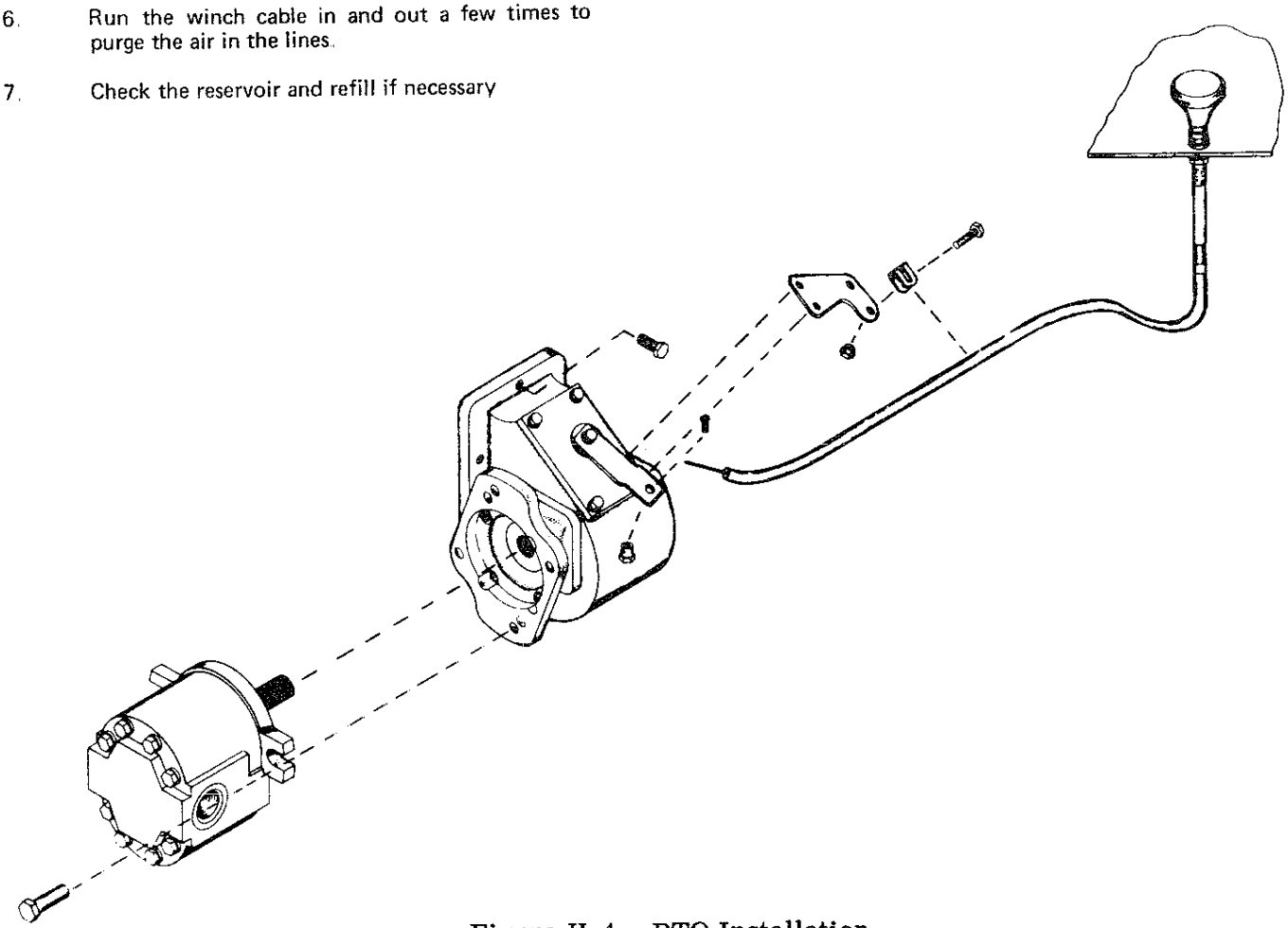


Figure H-4. PTO Installation

CAUTION

Avoid contact of Permatex with automatic transmission fluid.

4. Install PTO and gaskets. Tighten nuts to 30–35 ft. lbs. (4.14–4.84 kg-m) for a 6 bolt PTO, 45–50 ft. lbs. (6.22–6.91 kg-m) for 8 bolt PTO's. Recheck backlash.

5. Install shifter cable to suit conditions. Always allow a slight overshift on lever or knob to ensure PTO is fully engaged.

CAUTION

Avoid sharp bends in the shifter cable. All bends should have a minimum 6" radius. Tighter bends will cause difficult operation of the shifter knob.

6. Replace transmission oil. If PTO is below oil level, an additional quantity of oil will be required.

7. Start engine, engage PTO and allow it to run for 5–10 minutes. Check for leaks, unusual noise and proper operation.

8. Retorque mounting bolts.

NOTE

The application shown is the one normally used by IMTCO. If a driveline is used, refer to paragraph 8-3-4.

8-3-4. Driveline Power Application

The pump can be driven as shown below as an optional method to the one given in paragraph 8-3-3. The following steps are a guide in this application.

1. Install the PTO (refer to paragraph 8-3-3).

2. Loosely bolt the pump mounting bracket to the adjustable bracket.

3. Bolt the adjustable bracket to the frame at a point that will not exceed 48" (122 cm) from the PTO and will not cause a joint angle greater than 8°.

4. Check pump rotation and install pump, pump end yoke and PTO end yoke.

5. Size, cut and weld the driveline to the necessary length. Ensure driveline balance. Allow 1" (2.54 cm) extra for PTO end yoke.

6. Install driveline, lock set screws and lubricate u-joints.

7. Ensure all mounting bolts are tight.

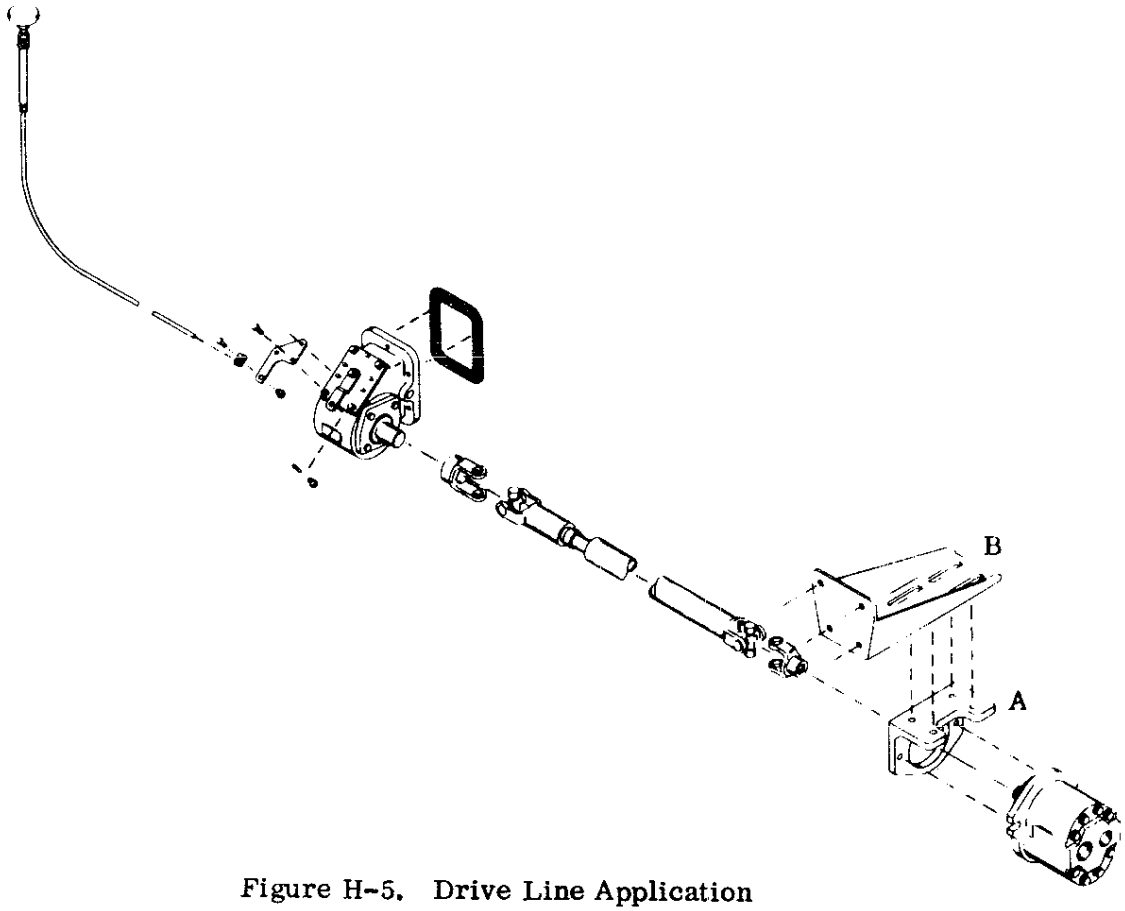


Figure H-5. Drive Line Application

SECTION 9. APPENDIX

Definite tire inflation pressures are established for each tire size depending upon the load imposed on the tires. For greater stability, riding comfort and prolonged tire life, tires should be inflated for the loads carried. The "Load and Inflation Table" shown below, indicates the proper inflation pressures.

TABLE I-1. TIRE LOAD AND INFLATION PRESSURE

SINGLE TIRES FOR TRUCKS IN HIGHWAY SERVICE

Tire Size	Load Range	TIRE LOAD LIMITS AT VARIOUS INFLATION PRESSURES										
		50	55	60	65	70	75	80	85	90	95	
7.00-20	D	2100	2260	2390	2530	2670	2790					
7.00-20	E	2100	2260	2390	2530	2670	2920	3030	3150			
7.50-20	D	2360	2530	2680	2840	2990	3140					
7.50-20	E	2360	2530	2680	2840	2990	3140	3270	3410	3530		
8.25-20	E	2800	3010	3190	3370	3560	3730	3890	4050			
8.25-20	F	2800	3010	3190	3370	3560	3730	3890	4050	4210	4350	4500
9.00-20	E		3560	3770	4000	4210	4410	4610				
9.00-20	F		3560	3770	4000	4210	4410	4610	4790	4970	5150	
10.00-20	F			4290	4530	4770	4990	5220	5430			
10.00-20	G			4290	4530	4770	4990	5220	5430	5640	5840	6040
11.00-20	F			4670	4940	5200	5450	5690	5920			
11.00-20	G			4670	4940	5200	5450	5690	5920	6140	6370	6590
11.00-22	F			4960	5240	5520	5790	6040	6290			
11.00-22	G			4960	5240	5520	5790	6040	6290	6530	6770	7000

DUAL TIRES FOR TRUCKS IN HIGHWAY SERVICE

Tire Size	Load Range	TIRE LOAD LIMITS AT VARIOUS INFLATION PRESSURES										
		40	45	50	55	60	65	70	75	80	85	90
7.00-20	D	1840	1980	2100	2220	2340	2450					
7.00-20	E	1840	1980	2100	2220	2340	2450	2560	2660	2760		
7.50-20	D	2070	2220	2350	2490	2620	2750					
7.50-20	E	2070	2220	2350	2490	2620	2750	2870	2990	3100		
8.25-20	E	2460	2640	2800	2960	3120	3270	3410	3550			
8.25-20	F	2460	2640	2800	2960	3120	3270	3410	3550	3690	3820	3950
9.00-20	E		3120	3310	3510	3690	3870	4040				
9.00-20	F		3120	3310	3510	3690	3870	4040	4200	4360	5420	
10.00-20	F			3760	3970	4180	4380	4580	4760			
10.00-20	G			3760	3970	4180	4380	4580	4760	4950	5120	5300
11.00-20	F			4100	4330	4560	4780	4990	5190			
11.00-20	G			4100	4330	4560	4780	4990	5190	5390	5590	5780
11.00-22	F			4350	4600	4840	5080	5300	5520			
11.00-22	G			4350	4600	4840	5080	5300	5520	5730	5940	6140

Tire and Rim Association Standard Tire Loads at Various Inflation Pressures. Load range letters and corresponding ply rating (D=8 ply, E=10 ply, F=12 ply and G=14 ply).

TABLE I-2. TORQUE DATA

Grade Bolt	SAE GRADE 1 OR 2	SAE GRADE 5	SAE GRADE 6	SAE GRADE 8
Marking				
Definition	Indeterminate Quality	Minimum Commercial Quality	Medium Commercial Quality	Best Commercial Quality
Material	Low Carbon Steel	Medium Carbon Steel Tempered	Medium Carbon Steel Q & T	Med. Carbon Alloy Steel Q & T
Min. Tensile Strength	64,000 psi (44,998,400 kgs/sq m)	105,000 psi (73,835,500 kgs/sq m)	133,000 psi (93,512,300 kgs/sq m)	150,000 psi (105,465,000 kgs/sq m)

Bolt Size		RECOMMENDED TORQUE VALUES							
Frac.	mm	Ft. lbs.	kg-m	Ft. lbs.	kg-m	Ft. lbs	kg-m	Ft. lbs.	kg-m
1/1"	6.35	5	.69	7	.96	10	1.38	10.5	1.45
5/16	7.92	9	1.24	14	1.93	19	2.62	11	3.04
3/8	9.52	15	2.07	25	3.45	34	4.7	37	5.11
7/16	11.09	21	3.31	60	8.29	55	7.6	60	8.29
1/2	12.7	37	5.11	60	8.29	85	11.75	92	12.72
9/16	11.27	53	7.32	88	12.17	120	16.59	132	18.25
5/8	15.87	71	10.23	120	16.59	167	23	180	24.89
3/4	19.05	120	16.59	200	27.66	280	38.72	296	40.93
7/8	22.22	190	26.27	302	41.76	440	60.85	473	65.41
1	25.4	282	39	466	64.45	660	91.27	714	98.74

In using the torque data in the chart above, the following rules should be observed:

1. Manufacturer's particular specifications should be consulted when provided.

2. When multiple tapered tooth (shakeproof) are employed, the torque should be increased by 20%.

3. All torque measurements are given in foot-pounds.

4. The information in the chart is pertinent to lightly lubricated coarse and fine thread fasteners.

5. To convert measurement to inch-pounds, multiply by 12.

STRUCTURAL AND STABILITY TEST FORM

CHASSIS INFORMATION

Make_____ Model_____ Serial No._____

W/B_____ C/A_____ Transmission_____

GAWR-FRT_____ GAWR-REAR_____ GVWR_____

PTO Model_____ PTO %_____

Pump Model_____ Pump Rotation_____

Unit Model_____ Unit Serial No._____

Order No._____ Date_____

Prior to placing unit into service, the following tests must be performed:

INSPECTION AND TEST CHECK

1. Power Take-Off shifting cable for efficient operation.
2. PTO mounting bolts.
3. Transmission grease.
4. Underdrive hoses for breaks.
5. Routing of hoses - no kinks, muffler or tailpipe contact.
6. All pins and retainer parts.
7. Mounting bolts for tightness.
8. Lubricate all necessary lube points - check chart.
9. Fill oil reservoir.
10. Shut-off valve open.

OPERATING TEST

1. Slowly operate unit through all motions. Check hoses, cylinders, and all structural parts for proper operation.
2. Check placards to ensure correctness.
3. With full rated load - 3800# (1723 kg) @ 13'-5" (4.08m) - and booms at 30° above norizontal position, check holding valves. Shut engine off and open control valves, one at a time, starting with secondary down, main down and extension out. No function drift should occur.
4. Restart engine and retract the extension boom five times for proper operation.
5. Raise and lower secondary boom five times.
6. Raise and lower main boom five times.
7. Check stability by lowering the rated load - 3800# (1723 kg) at 13'-5" (4.08 m) to a low practical position. Rotate crane

very slowly while constantly observing vehicle wheels for contact with ground.

a. Note % rated stability.

b. Position of stability (355° or portion thereof).

8. If unit is stable, rotate complete cycle five times.

9. Time the unit function for speed. Record and compare with the times shown in ( ) below:

Extension	(14 Sec.)
Main	(20 Sec.)
Secondary	(16 Sec.)
Rotation	(30 Sec.)

10. Give the unit a final inspection, note and correct deficiencies.

Dealer or Installation Agent

I have tested this unit as described above and hereby release it for service.

Date_____ S/N_____

Name_____

Signed_____

LIMITED WARRANTY

Products manufactured by Iowa Mold Tooling Co., Inc. 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, for a period of ninety (90) days 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 90-day warranty period and is reported within fourteen (14) days of its occurrence.

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 or of any other obligations on the part of IMT. Warranty claims must be submitted and shall be processed in accordance with IMT's established warranty claim procedure. In no event will IMT be liable for business interruptions, loss of sales and/or profits, personal injury, costs of delay or for any other special, indirect, incidental or consequential losses, costs or damages.

One manual is provided with each piece of new equipment and additional manuals may be obtained at a nominal price.

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