



A72A

OWNERS MANUAL

Manual No. 999967

Rev. 9/2/2003

Serial No. _____

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Auto Crane Warranty Registration

Fax Transmission

To: Warranty Department Fax: (918) 834-5979
 From: _____ Date: _____
 Re: Product Registration Pages: _____

End User Information: (Required for Warranty Activation)

Name: _____ Phone: _____
 Address: _____
 City: _____ State: _____ Zip: _____
 Contact: _____ E-mail Address: _____

Distributor Information: (Required for Warranty Activation)

Name: _____
 Address: _____
 City: _____ State: _____ Zip: _____
 Contact: _____ E-mail Address: _____

Product Information: (Required for Warranty Activation)

Model No.: _____ Serial No.: _____
 Date Product Delivered: _____ Date Processed:* _____
 VIN # _____ * For Auto Crane use only

ONE REGISTRATION FORM PER UNIT (CRANE OR BODY)

Registration form must be mailed or faxed within 15 days of customer installation.

Mail to:
 Warranty Department
 Auto Crane Company
 P.O. Box 581510
 Tulsa, OK 74158-0697

WARNINGS

WARNING! Federal law (49 cfr part 571) requires that the Final Stage Manufacturer of a vehicle certify that the vehicle complies with all applicable federal regulations. Any modifications performed on the vehicle prior to the final state are also considered intermediate stage manufacturing and must be certified as to compliance. The installer of this crane and body is considered one of the manufacturers of the vehicle. As such a manufacturer, the installer is responsible for compliance with all applicable federal and state regulations, and is required to certify that the vehicle is in compliance.

WARNING! It is the further responsibility of the installer to comply with the OSHA Truck Crane Stability Requirements as specified by 29 CFR part 1910.180 (C) (1).

WARNING! NEVER OPERATE THE CRANE NEAR ELECTRICAL POWER LINES!

Death or serious injury will result from boom, line, or load contacting electric lines. Do not use crane within 10 feet (3.05m) of electric power lines carrying up to 50,000 volts. One foot additional clearance is required for every additional 30,000 volts or less. **SEE DANGER DECAL (P/N 040529)** in this Owner's Manual.

WARNING! NEVER.....

- ◆ **EXCEED** load chart capacities (centerline of rotation to hoist hook).
- ◆ Un-reel last 5 wraps of cable from drum!
- ◆ Wrap cable around load!
- ◆ Attempt to lift or drag a load from the side! The boom can fail far below its rated capacity.
- ◆ Weld, modify, or use unauthorized components on any Auto Crane unit! This will void any warranty or liability. Also failure of the crane may result.
- ◆ Place a chain link on the tip of the hook and try to lift a load!
- ◆ Use a sling bar or anything larger than the hook throat that could prevent the hook latch from closing, thus negating the safety feature!
- ◆ Hold on any pendant Select Switch that will cause unsafe operating conditions!

WARNING! In using a hook with latch, **ALWAYS** make sure that the hook throat is closed before lifting a load! Proper attention and common sense applied to the use of the hoist hook and various slings will prevent possible damage to material being hoisted and may prevent injury to personnel.

WARNING! Failure to correctly plumb and wire crane can cause inadvertent operation and damage to crane and/or personnel!

WARNING! Auto Crane Company remote controlled cranes are not designed or intended to be used for any applications involving the lifting or moving of personnel.

WARNING! ALWAYS operate the crane in compliance with the load capacity chart. **DO NOT USE** the overload shutdown device to determine maximum rated loads, if the crane is equipped with this type of device.

READ THIS PAGE

CRANE EQUIPMENT REGISTRATION FORM
RETAIN WITH MANUAL
INSTALLER TO FILL OUT AT TIME OF INSTALLATION

DISTRIBUTOR

Invoice no. _____

CUSTOMER

Date: _____

CHASSIS

Make _____

Model No. _____

Serial No. _____

Year _____

CRANE:

Make _____

Model No. _____

Serial No. _____

ENGINE

Make _____

Cylinder No. _____

Carburetor Type _____

WINCH MOTOR

Make _____

Model No. _____

TRANSMISSION

Make _____

Model No. _____

Transfer Case _____

WINCH GEAR BOX

Make _____

Model No. _____

Serial No. _____

GOVERNOR

Make _____

Type _____

Model No. _____

HYDRAULIC PUMP

Make _____

Model No. _____

Serial No. _____

POWER TAKE OFF

Make _____

Model No. _____

Serial No. _____

SPECIAL EQUIPMENT

Make _____

Model No. _____

Serial No. _____

BODY

Make _____

Model No. _____

Specification No. _____

Serial No. _____

SAFETY DECAL SECTION

DECALS R7/96

PART NO.: 040517
DECAL: STAY CLEAR OF BOOM
FUNCTION: To inform the operator of the hazard of proximity or contact with the crane boom during operation.
USED ON: All cranes
QUANTITY: 4
PLACEMENT: Both sides of outer and manual booms

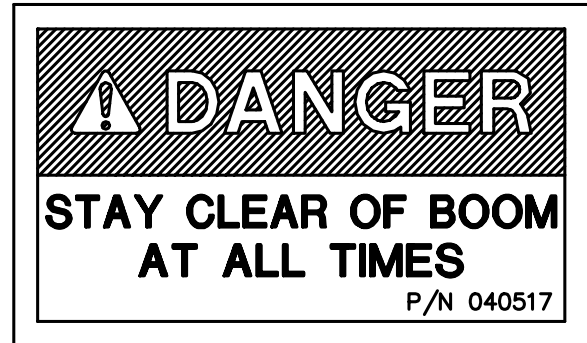


FIG. SD-1.

PART NO.: 040518
DECAL: STAY CLEAR OF LOAD
FUNCTION: To inform the operator of the hazard of proximity or contact with the crane load during operation.
USED ON: All cranes
QUANTITY: 1
PLACEMENT: Hoist hook

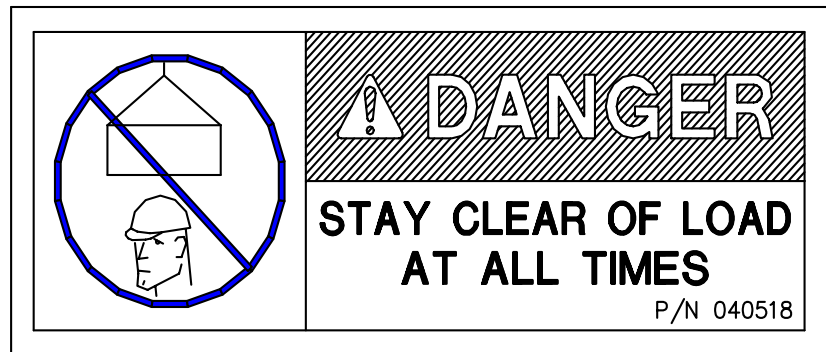


FIG. SD-2.

PART NO.: 040519
DECAL: SCISSORS POINT
FUNCTION: To inform the operator of possible danger at scissors point on crane.

USED ON: Articulated Cranes
QUANTITY: 2
PLACEMENT: Lift cylinder

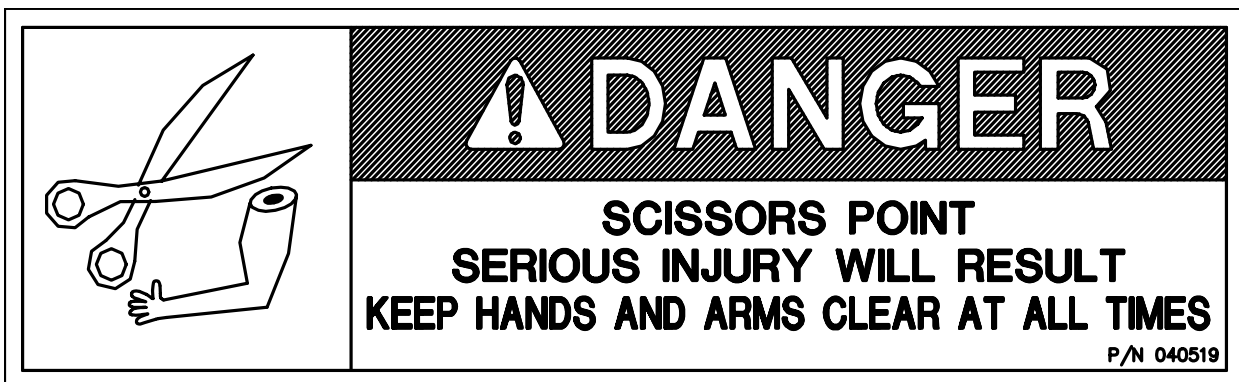


FIG. SD-3.

SAFETY DECAL SECTION

DECALS R7/96

PART NO.: 040529
DECAL: ELECTROCUTION HAZARD
FUNCTION: To inform the operator of the hazard involved with contacting electrical power lines with crane boom.
USED ON: Articulated Cranes
QUANTITY: 2
PLACEMENT: Both control handle plates

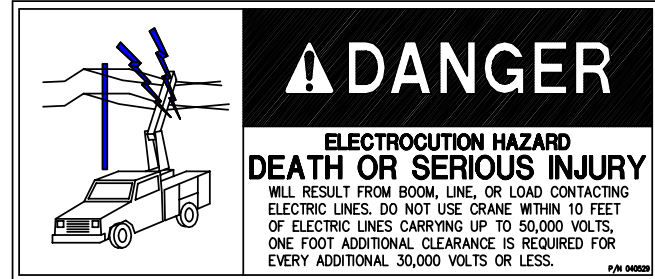


FIG. SD-4.

PART NO.: 040579
DECAL: OPERATION INSTRUCTIONS
FUNCTION: To inform the operator of the proper procedure to follow for safe operation of the crane.
USED ON: All Cranes
QUANTITY: 2
PLACEMENT: Both control handle plates

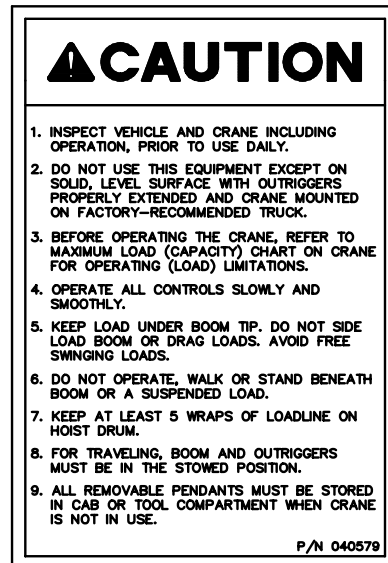


FIG. SD-5.

PART NO.: 040580
DECAL: OPERATOR TRAINING
FUNCTION: To inform the operator of the need to receive proper training before using the crane.
USED ON: All Cranes
QUANTITY: 2
PLACEMENT: Both control handle plates

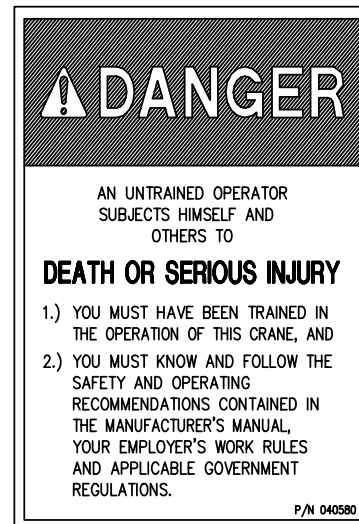


FIG. SD-6.

SAFETY DECAL SECTION

DECALS R7/96

PART NO.: 040581
DECAL: STAND CLEAR
FUNCTION: To inform operator of danger associated with outriggers
USED ON: Outrigger
QUANTITY: 2
PLACEMENT: On outrigger pad, one per side

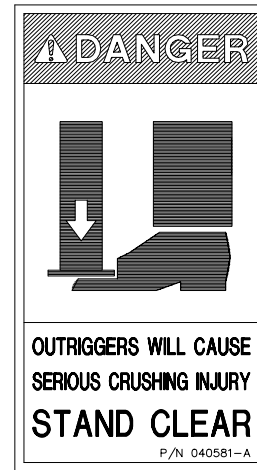


FIG. SD-10.

PART NO.: 040630
DECAL: STAY CLEAR OF LOAD
FUNCTION: To inform the operator of the hazard of proximity or contact with the crane load during operation.
USED ON: All cranes
QUANTITY: 2
PLACEMENT: Both sides of lifting hook

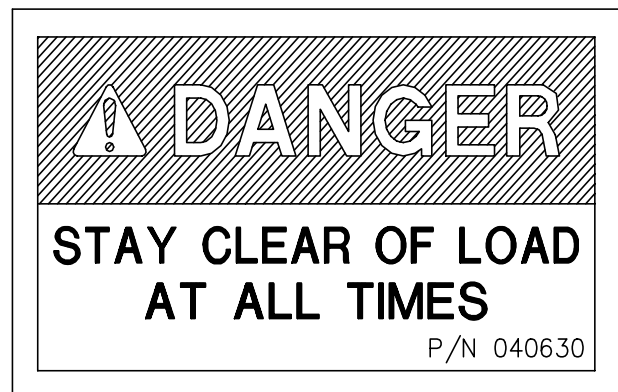


FIG. SD-8.

PART NO.: 373028
DECAL: HYDRAULIC REQUIREMENTS
A-72A
FUNCTION: To inform the operator of the required hydraulic requirements for proper operation of the crane.
USED ON: A-72A
QUANTITY: 1
PLACEMENT: Hydraulic reservoir

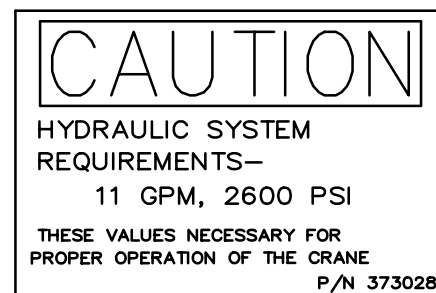


FIG. SD-9.

SAFETY DECAL SECTION

DECALS R7/96

PART NO.: 367239
DECAL: ARTICULATED CRANE STORAGE
FUNCTION: To inform the operator of the proper method to unstore and store the crane.
USED ON: All Articulated Cranes
QUANTITY: 2
PLACEMENT: Both control handle plates

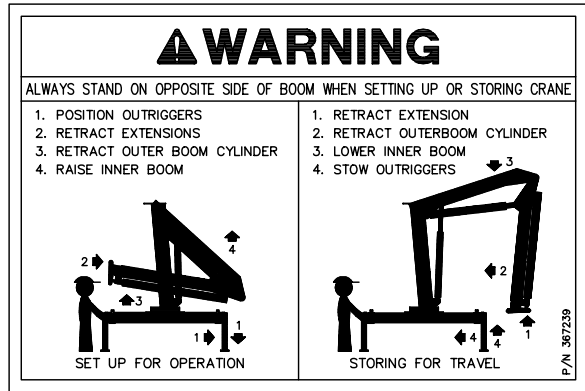


FIG. SD-10.

PART NUMBER: 367241
DECAL: ELECTROCUTION HAZARD
FUNCTION: To inform operator of the hazard involved with contacting electrical power lines with crane boom.
USED ON: All articulating cranes
QUANTITY: 2
PLACEMENT: Both control handle plates

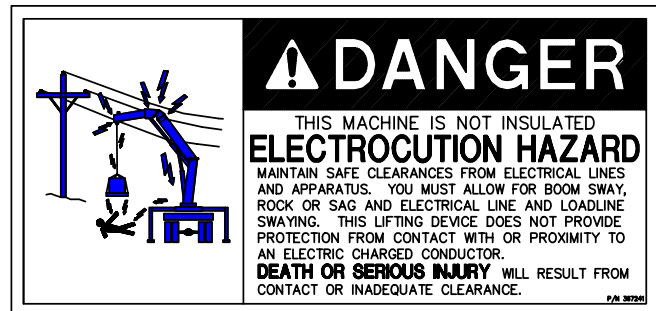


FIG. SD-11.

PART NUMBER: 367244
DECAL: HYDRAULIC FLUID
FUNCTION: To inform operator to check fluid level and check for leaks/damage.
USED ON: All articulating
QUANTITY: 1
PLACEMENT: Hydraulic reservoir

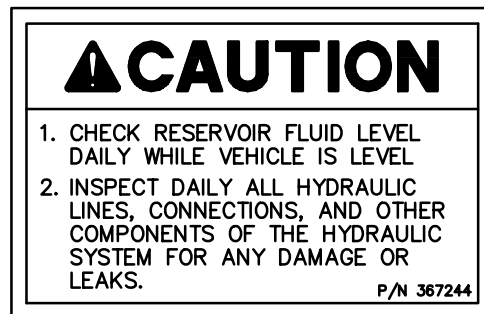


FIG. SD-12.

SAFETY DECAL SECTION

DECALS R7/96

PART NUMBER: 367246
DECAL: NEVER RIDE ON HOOK
FUNCTION: Inform operator of hazards of riding load
USED ON: All articulating cranes
QUANTITY: 2
PLACEMENT: Both control handle plates

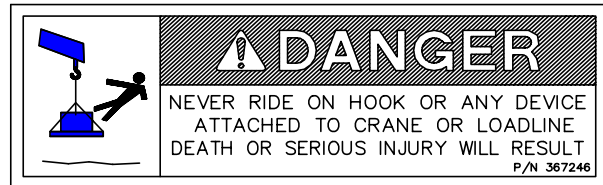


FIG. SD-13.

PART NO.: 367251
DECAL: STAY CLEAR OF BOOM
FUNCTION: To inform the operator of the hazard of proximity or contact with the crane boom during operation.
USED ON: All articulated cranes.
QUANTITY: 4
PLACEMENT: Both sides of first and second stage booms.

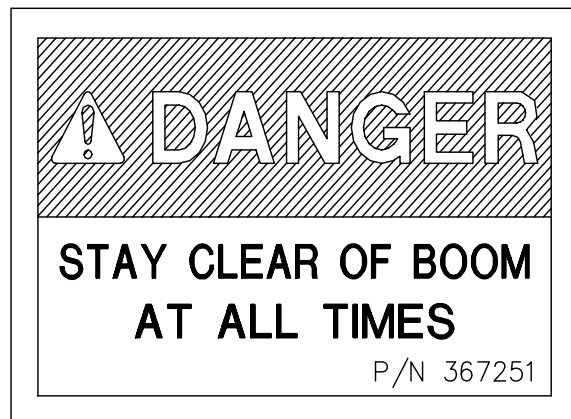


FIG. SD-14.

PART NO.: 367307
DECAL: DANGER, TWO- BLOCK (4000 pound capacity)
FUNCTION: To inform operator of the hazard of two-blocking the crane.
USED ON: All Articulated Cranes
QUANTITY: 2
PLACEMENT: Both sides of outer boom

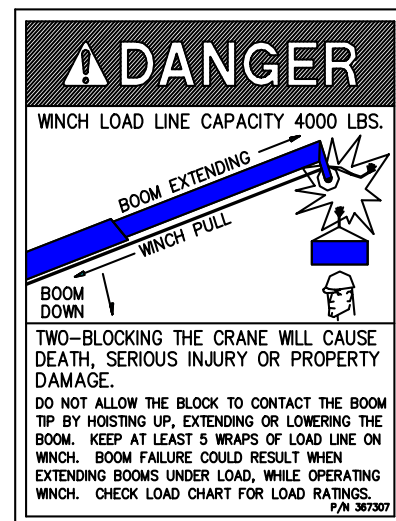


FIG. SD-15.

SAFETY DECAL SECTION

DECALS R7/96

PART NO.: 759016
DECAL: EXTEND OUTRIGGERS
FUNCTION: To inform operator that the outriggers must be extended and pinned in place before operating the crane.
USED ON: All articulated Cranes
QUANTITY: 2
PLACEMENT: Both ends of outrigger tube



FIG. SD-16.

PART NO.: 759017
DECAL: STAND CLEAR
FUNCTION: Inform operator to stand clear of outriggers
USED ON: All articulating cranes
QUANTITY: 2
PLACEMENT: Top of both outrigger legs



FIG. SD-17.

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INTRODUCTION

A-72A SERIES

Auto Crane products are designed to provide many years of safe, trouble-free, dependable service when properly used and maintained.

To assist you in obtaining the best service from your crane and to avoid untimely crane and/or vehicle failure, this manual provides the following operating and service instructions. It is **specifically recommended** that all operating and service personnel consider this manual as mandatory material for reading and study before operating or servicing Auto crane products. It is **highly recommended** that crane owners, equipment managers and supervisors also read this manual.

Auto Crane has incorporated several safety features in the A-72A series cranes for your protection. The choice of materials and the design of the electrical system minimizes weight and lengthens durability. Holding valves prevent the load from dropping if a hose should fail. A **10u filter** in the return line of the hydraulic system removes dirt and grit that may cause erratic operation. The reservoir has a **15u air filter** in the filler cap. The pump has a **100 mesh strainer** in the suction line.

For your convenience the overall dimensions of the A-72A series crane are on the General Dimension Drawing.

Remember, the crane adds weight to the vehicle. Adding weight may change the driving and riding characteristics of the vehicle unless the appropriate overload spring(s) are installed on the truck. The payload of the vehicle is reduced by the weight of the crane. The operator should exercise care when loading the vehicle. Distributing the payload on the vehicle evenly will greatly improve the driving and riding characteristics of the vehicle. **A minimum G.V.W. of 26,000 lbs. is recommended for mounting the A-72A series cranes.**

Auto Crane Company issues a limited warranty certificate with each unit sold. See last page for warranty

It has always been Auto Crane Company policy to handle all warranty claims we receive as promptly as possible. If a warranty claim involves discrepant material or workmanship, Auto Crane will take immediate corrective action. It is understandable that Auto Crane company cannot assume responsibility of liability when it is obvious that our products have been abused, mis-used, overloaded or otherwise damaged by inexperienced persons trying to operate the equipment without reading the manual.

Auto Crane will not assume responsibility or liability for any modifications or changes made to unit, or installation of component parts done without authorization.

Auto Crane maintains a strong distributor network and a knowledgeable Customer Service Department. In most cases, an equipment problem is solved via phone conversation with our customer service department. The customer service department also has the ability to bring a local distributor, a regional sales manager, or a factory serviceman into the solution of an equipment problem. If, through no fault of Auto crane company, it is necessary to send an experienced factory serviceman on a field service call, the rates stated in the Auto Crane Distributor's Flat Rate Manual will apply.

Auto Crane Company's extensive Research and Development Program allow our customers to use the best equipment on the market. Our Engineering Staff and our knowledgeable sales people, are always available to our customers in solving crane and winch-type application problems. When in doubt, call the Auto Crane factory.

DISTRIBUTOR ASSISTANCE:

Should you require any assistance not given in this manual, we recommend that you consult your nearest Auto Crane Distributor. Our distributors sell authorized parts and have service departments that can solve almost any needed repair.

NOTE: THIS MANUAL SHOULD REMAIN WITH THE CRANE AT ALL TIMES.

This manual does not cover all maintenance, operating, or repair instructions pertinent to all possible situations. If you require additional information, please contact the **Auto Crane Company** at the following telephone number: **(918) 836-0463**. The information contained in the manual is in effect at the time of this printing. Auto Crane Company reserves the right to update this material without notice or obligation.

GENERAL DESCRIPTION

The Auto Crane A-72A knuckle boom is an all hydraulic crane in the 72,000 ft-lb rating class. It is suitable for both hook and attachment service.

The A-72A comes in the following variations:

A-72A two stage hydraulic extension with a horizontal reach of 26'-3" (8.0m) with "cross mounted" controls located on each side of crane.

A-72A two stage hydraulic extension with one self storing manual boom with a horizontal reach of 32'-10" (9.9m) with "cross mounted" controls located on each side of crane.

The main components of the crane are:

1. Outriggers
2. Crane Base Assembly
3. Rotation System
4. Control Valve
5. Pedestal Assembly
6. Inner Boom
7. Lift Cylinder
8. Outer Boom
9. Outer Boom Cylinder
10. Telescoping Boom Section(s) and Extension Cylinder
11. Manual Boom
12. Reservoir

OUTRIGGERS

The outriggers are extended manually, (on sealed roller bearings) in the horizontal direction and are raised and lowered hydraulically. (Optional hydraulic in-out). Outriggers are operated by two sections from the main control valve. Outrigger cylinders have mounted directly to them a dual pilot operated check valve which will close if a hose break occurs, preventing any uncontrolled movement of outrigger cylinder and to prevent an outrigger cylinder from drifting down once they have been stowed. Outrigger span is 12'-7" (3.8m) extended. Once outriggers are extended or retracted to their maximum or minimum span they are locked by a spring loaded hand operated catch. Outriggers should always be extended to their maximum out position before

operating crane. Outrigger leg assembly weight is 360 lbs (163 kg) each.

CRANE BASE ASSEMBLY

The crane base is an all welded structure which consists of mounting brackets to mount crane to truck frame, outrigger cross tube, base plate to mount rotation bearing, mounting plate for hydraulic control valve and handles. Base assembly weight is 610 lbs (277 kg).

ROTATION SYSTEM

Rotation system consists of two main components, a shear ball rotation bearing and planetary swing drive powered by a high torque low speed rotation motor. Rotation motor has mounted directly to it a dual counterbalance motor control valve. Swing drive has a spring applied hydraulically released brake. Both the motor control valve and the brake lock the rotation system in place in the event of a hose failure or loss of hydraulic power. Crane has 370 degrees of rotation with a 10 degree overlap which is adjustable in 10 places from the front of the truck to the rear of truck. The centerline of rotation of the crane is at the longitudinal centerline of truck frame. All components of the rotation system are serviceable without removal of base assembly from truck frame. Crane rotation output torque is 9500 foot pounds.

CONTROL VALVE

Eight section spool valve, mobile stack type control valve with dual controls. Six sections used for crane functions and outriggers with two remaining sections available for options. Control valve has adjustable inlet relief valve set at 2600 psi, with built in load check valves on all sections except rotation section. Load check valves keep the load from dropping while the control valve spool is being shifted and until the inlet pressure is equal to or slightly greater than the pressure developed by the load. At the time the load check will open and the movement of the load can be controlled by the control valve spool. Rotation section has dual work port relief valve non-adjustable set at 1500 psi.

GENERAL DESCRIPTION

Work port relief valves limit the maximum pressure in each work port. Each rotation work port has a restrictor installed to limit flow to the rotation motor. Each restrictor is constructed to limit flow in one direction while allowing free flow in the opposite direction. Control valve assembly weight is 100 lbs (45.4 kg) for the manual valve, 135 lbs (61.2 kg) for the proportional control valve.

PEDESTAL ASSEMBLY

The pedestal assembly is an all welded structure consisting of a base plate used to mount two vertical columns which the inner boom is hinged to and the outer boom swings along side. All pivot points use replaceable self lubricating bushings. Pedestal assembly weight is 500 lbs (227 kg).

INNER BOOM

Inner boom assembly is an all welded structure consisting of an inner boom pivot which is hinged to the pedestal, outer boom pivot and a pivot for the base of the outer boom cylinder. Inner boom elevation -58 degrees to +72 degrees. Inner boom is raised and lowered by a single double acting hydraulic cylinder. All pivot points use replaceable self lubricating bushings. Inner boom assembly weight is 400 lbs (181 kg).

LIFT CYLINDER

The inner boom is actuated by a single double acting lift cylinder which has a bore of 6" and a stroke of 37 3/4". Lift cylinder has mounted directly to it a vented 10:1 single counterbalance valve. Both the rod and the base ends of cylinders accept a 2" diameter pin with the rod eye having a replaceable self-lubricating bushing. The replaceable bushing for the base pin is located with pedestal assembly. Lift cylinder weight is 280 lbs (127 kg).

OUTER BOOM & OUTER BOOM CYLINDER

Outer boom assembly is an all welded structure which is hinged to one end of the inner boom assembly and is actuated by a 6" bore, 35 5/8" stroke cylinder. Outer boom will articulate through an arc of 146.4 degrees. Outer boom houses the telescoping boom extension section(s) which are controlled by a two stage extension cylinder. The outer boom which is offset to clear the pedestal includes a knuckle assembly which is hinged to the inner boom assembly. All pivot points use replaceable self-lubricating bushings. Outer boom assembly weight is 370 lbs (168 kg). Outer boom cylinder weight is 290 lbs (132 kg).

TELESCOPING BOOM SECTION(S) & EXTENSION CYLINDER

Two stage telescoping boom sections are inserted one inside another and then into outer boom assembly. Telescoping boom sections are actuated by a two stage extension cylinder which has two bores of 4 1/2" and 2 1/2" with each section having a stroke of 71". Extension cylinder weight is 320 lbs (145 kg).

MANUAL BOOM (OPTIONAL)

The manual boom is a one piece self storing boom section which is installed into the last hydraulic telescoping boom extension. It is pinned into place for both storage and extension. Manual boom weight is 140 lbs (63.5 kg).

RESERVOIR

Reservoir capacity is 19 gallons (71.9L) minimum with 100 mesh suction strainer mounted in reservoir, two sight level indicators, a baffle to reduce oil splash, filler tube, and 15u filler tube breather cap assembly. Reservoir weight is 100 lbs (45.4 kg).

--- IMPORTANT ---

SAFETY TIPS AND PRECAUTIONS

1. Make certain the vehicle meets minimum chassis requirements. (These requirements do not guarantee unit stability).
2. Make certain the crane is installed per factory specifications. Contact your local distributor or the Auto Crane factory if any questions arise.
3. Keep the vehicle in a level position while loading or unloading.
4. Always set the emergency brake before beginning operation.
5. Always use outriggers from vehicle to the ground during crane operation. Insure that they are firmly positioned on solid footings Stand clear of outriggers while they are being extended.
6. All load ratings are based on crane capacity, NOT unit stability.
7. Always comply with load chart capacities, (centerline of rotation to hook).
8. Keep objects and personnel clear of crane path during operation.
9. No unqualified or unauthorized person shall be allowed to operate the crane.
10. Visual inspections should be made each day to determine that the crane is in good condition before it is used.
11. Tests should be conducted at the beginning of each shift to determine that the operating systems are in good working order.
12. Remember in lifting a heavy load, the weight can create enough tipping moment to overturn the vehicle.
13. Oil gears as required.
14. Allow truck engine to warm up before operating crane.
15. Hydraulic hoses need to be inspected frequently for signs of deterioration, and replaced as required.
16. An important item which the operator should consider and use is the hook. It should be checked at least every thirty days for distortions or cracks.
17. Always store outriggers before road travel.
18. Always store crane into the figure-4 position for transportation.
19. Remember the overall height of the unit for garage door clearance or when moving under objects with low overhead clearance.
20. Do not stop the load sharply in midair so that it swings like a pendulum. Meter the controls to avoid this situation.
21. Do not wrap the wire rope around sharp objects when using winch.
22. Do not take your eyes off of a moving load. Look in the direction you are moving.
23. Keep dirt and grit out of moving parts by keeping a clean crane. Make sure machine is free of excess oil, grease, mud and rubbish, thus reducing accidents and fire hazards.
24. Stop all operations when cleaning, adjusting or lubricating the machine.
25. Never swing a load over people.
26. Observe operating area obstructions or power lines that might be a hazard.
27. If any outrigger, when extended, rests on a curb or other object that prevents it from extending to its maximum distance; consider the shortened bearing or fulcrum point and reduce the maximum load accordingly.
28. When an outrigger will not reach the ground due to holes or grades, it must be blocked up to provide level and firm support for the truck.
29. When working in soft earth, use wide pads under outrigger feet to prevent sinking.
30. Locate the truck at the work site for the best stability possible.
31. If a hydraulic break occurs, leave the area of the break and do not attempt to stop the break by hand as the hydraulic oil may be hot and under high pressure which can cause serious injury. shut the system down as soon as possible.
32. If crane is equipped with an optional winch, DO NOT extend boom without reeling off line at the same time when using winch. Do pull load block up against the

WARNING!

This crane is not intended for use in lifting or moving persons. Any such use shall be considered to be improper and the seller shall not be responsible for any claims arising there from. This sale is made with the express understanding that there is no warranty that the goods shall be fit for the purpose of lifting or moving persons or other improper use and there is no implied warranty or responsibility for such purposes.

--- IMPORTANT ---

SAFETY TIPS AND PRECAUTIONS

- boom tip. Do not allow personnel to ride on loadline, hook, load, or any other device attached to winch line.
33. When a new cable is installed, operate first with a light load to let the cable adjust itself.
 34. Control lever operation should be slow and smooth in order to meter oil flow for safe operation.
 35. Crane boom length should be kept as short as possible for maximum lifting capacity and greater safety. longer booms require additional care in accelerating and decelerating the swing motion, and thus slow down the working cycle and tend to reduce production.
 36. Keep the load directly and vertically under the boom point at all times. Crane booms are designed primarily to handle vertical loads, not side lifts.
 37. Be sure all loads are securely attached before lifting.
 38. Do not lift personnel with any wire rope attachment or hook. There is no implied warranty or responsibility for such purposes.
 39. Disengage power takeoff (PTO) before moving truck.
 40. Always walk around vehicle before moving.
 41. Never use crane for towing or pulling load sideways
 42. Never drive with a load suspended from crane.
 43. Know the weight of your rigging and load to avoid overloading the crane.
 44. Deduct the weight of the load handling equipment from the load rating to determine how much weight can be lifted.
 45. Do not push down on anything with boom extensions, lift or outer boom function.
 46. Auto Crane Company remote controlled cranes are not designed or intended to be used for any application involving the lifting or moving of personnel
 47. **.WARNING: NEVER OPERATE THE CRANE NEAR ELECTRICAL POWER LINES.** Auto Crane Company recommends that the crane never be any closer to a power line (including telephone lines) than 10 feet at any point.
 48. **.WARNING: Never place a chain link on the tip of the hook and try to lift a load with the hoist.**
 49. **.WARNING: Never use a sling bar or anything larger than the hook throat which could prevent the safety latch from closing, thus negating the safety feature.**
 50. **.WARNING: In using a safety hook, ALWAYS insure that the hook throat is closed before lifting a load. Proper attention and common sense applied to the use of the hook and various slings will prevent possible damage to material being hoisted and may prevent injury to personnel.**
 51. **.WARNING: Never weld, modify, or use unauthorized components on any Auto Crane unit. This will void any warranty or liability. Also, failure of the crane may result.**
 52. **.WARNING: Never unreel last 5 wraps of cable from drum.**
 53. **.WARNING: Never attempt to lift or drag a load from the side; the boom can fail far below its rated capacity.**

MOUNTING and INSTALLATION A-72A

1. Vehicle should meet minimum GVW rating of 26,000 lbs. (11,794 kg) with a front axle rating of 9,000 lbs. (4,082 kg.) rear axle rating 17,000 lbs. (7,711 kg.) wheel base 189-190 in. (4.8m), cab to axle 119-120 in. (3.0m), frame section modulus 20 cubic inches (328 cc), frame resistance to bending 1,000,000 in-lbs. (112,984 nm), dual rear wheels and tires, engine tachometer and throttle control, and front and rear springs to match axle ratings. **NOTE minimum chassis requirements do not insure stability. Actual stability ratings can only be determined from initial start-up and testing per SAE J765.**
2. Make sure frame is clear of all obstructions in the area where the crane is to be mounted.
3. Distance required between back of cab and front of flatbed or body:
 - a) **Standard crane: 33 1/2" (85 cm).**
 - b) **Crane with power out outriggers: 34" (86.4 cm).**
 - c) **Crane with optional winch: 37 3/4" (96 cm).**
 - d) **Crane with optional hose reel: 38 3/4" (98.5cm).**
 - e) **Crane with optional electric reel: 39 3/4" (101 cm).**
4. To install A-72A knuckleboom safely; make sure work area and truck frame are ready to mount crane.
5. Maximum A-72A weight is:
 - a) **4,000 lbs. (1815 kg.) with two stage extension cylinder.**
 - b) **4,140 lbs. (1878 kg.) with two stage extension cylinder and manual boom.**
6. To lift A-72A use a sling or chain to around the lifting eye on the inner boom. Move the truck into position and lower the crane into position. Make sure that the wear plate (800265-007) is mounted in between the crane base and the top of truck frame.

NOTE: Never weld on truck frame.
7. Install frame spacer (800096-010) -4 required on the inside of truck frame. Spacer may have to be cut to length to fit tightly inside truck frame flanges. Spacer is to protect truck frame from being damaged once mounting bolts have been torqued.
8. Weld the four 1" x 2" x 3" tabs (800299-007) on the end of wear plates (800265-007), flush with the crane base. Wear plates may need to be cut to length for proper fit. The tabs are to keep the crane base in position.
9. Install tie bolts (367182) as shown in diagram AW-481. On installations where clearance of the tie bolts is a problem, the 1" hex nuts may be welded directly to the 1" tie bolts.
10. Mounting tie bolts and nuts should be torqued to 225 ft-lbs. (305 NM). The torque should be rechecked after initial installation testing is performed, after first 10 hours of operation, and once a year thereafter.

Optional: Use four u-bolts (3/8" min.) through truck frame to hold tie bolts in place, along with 16 pieces of 3/8" x 1 1/2" lg. keystock tack welded to the top and bottom mounting pads in order to keep the nuts from rotating loose.

MOUNTING and INSTALLATION A-72A

11. Suction - pressure - return hoses and fittings are not furnished with this crane. These items are normally calculated (length) at installation.

- A. **Suction hose from pump to reservoir:** Hose size: -20 (SAE 100 R4) at desired length. fittings: one hose adapter, -16 JIC female swivel fitting (pump end). One -16 90 degree adapter (reservoir end). Four hose clamps -20 (two each end).
- B. **Pressure hose from pump to control valve inlet:** Hose size: -12 (SAE 100 R2 type AT) at desired length. Fittings: two -12 JIC female swivel fittings.
- C. **Return hose from crane to reservoir:** Hose size: -12 (SEA 100 R2 TYPE AT) at desired length. Fittings: two -12 JIC female swivel fittings.

NOTE: If no pressure is received at reservoir, alternate hose connections at pump.

12. Install PTO following PTO manufacturer's installation instructions. it is recommended

that PTO mounting bolts be safely wired to prevent bolts from becoming loose. Always check to make sure that there is no transmission oil leaking around the PTO mounting

NOTE: After installation of the pump/PTO and the reservoir is complete, connect the pressure and return lines together. Circulate the hydraulic oil for thirty minutes to trap any contaminants in the system before hooking the pressure and return lines to the crane. Be sure to check filters after purging the system.

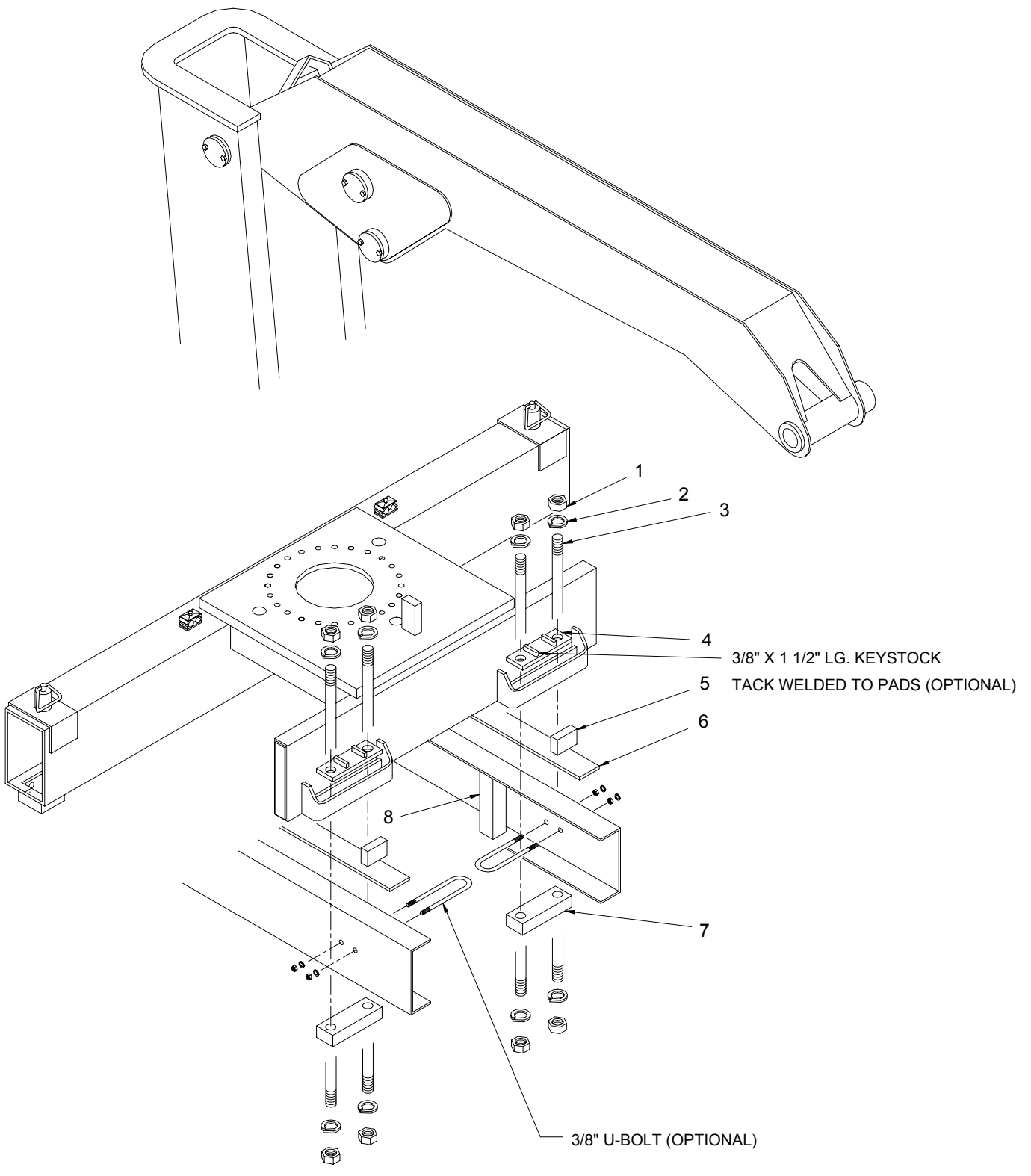
13. Crane operation requires 11 GPM (42 litre/min.) at 2600 PSI (183 kg/cm²).

14. Pump speed 1,160 RPM, ref. pump 367215, 2.46 in³/rev. (40.3 cm³/rev) will provide 11 GPM (42 LPM).

15. To insure proper crane operation and crane performance, the vehicle shall be equipped with an engine speed control and tachometer.

16. Always store the crane in the figure-4 position when not in operation.

CRANE INSTALLATION A-72A SERIES



***CRANE INSTALLATION
A-72A SERIES***

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	16	367183	NUT
2	16	022300	LOCKWASHER
3	8	367182	BOLT
4	4	368087	TOP MOUNTING PAD
5	4	800299-007	END TAB
6	2	800265-007	WEAR PLATE
7	4	368088	BOTTOM MOUNTING PAD
8	4	800096-010	FRAME SPACER

STABILITY CHECK

Once crane has been mounted, the unit must be checked for stability in accordance with ANSI/SAE J765. Unit must be stable with an 85% tipping factor (i.e., when lifting capacity load the unit is at 85% of tipping or less).

1 Set up and test on firm level ground.

2 Chock rear wheels, engage emergency brake, place gear selector in neutral. Press clutch and PTO knob in gear, release clutch and set throttle control to proper engine speed. Always use outriggers from the crane to the ground. Be sure outriggers are in firm contact with ground and are adequately positioned with unit level side to side.

3 To stability check the crane assemble a load 118% of the capacity at the longest hydraulic reach, start with boom extension(s) retracted and boom(s) horizontal, raise load 6"-8" inches off ground. Slowly extend the hydraulic extension until the load reaches full extension. Once full hydraulic extension is reached the assembled load shall be rotated either 180 or 360 degrees around vehicle

depending upon stability area required.

4 Unit is considered stable when the assembled load moment acting to overturn the unit is equal to the maximum moment of the unit available to resist overturning. If unit is not stable, counter weighting will have to be added to bring the unit into a stable condition. A decal must be added to define areas of full stability if the unit is not 360° stable.

5 Minimum chassis requirements do not ensure stability. Actual stability ratings can only be determined from initial start-up and testing to determine stability. If adding counter weight to the vehicle, it is most effective when added as close to the crane as possible. After adding counter weight, the unit must be checked again for stability to ensure the added counter weight is adequate.

6 Some cranes are equipped with an overload protection system. It may be necessary to temporarily re-adjust overload to allow for stability testing. Remember to always keep assembled load 6-8 inches off ground.

OPERATION OF UNIT

- 1 Make sure all crane operating personnel have thoroughly read and understood the information contained in this manual. Crane to be operated by qualified personnel only.**
- 2 A routine daily inspection of the crane should be mandatory before each operating day. Any defects should be corrected immediately and before operating the crane.**
- 3 At a job site the vehicle should be positioned so that the crane can adequately reach the load within the rated capacity (centerline of rotation to hook) of the crane. Job site should be checked for any hazards which might create an unsafe situation for the operator; such as any overhead electrical lines, underground electrical lines, any electrical source (s), soft or uneven ground, and any unauthorized personnel who might enter the job site. When cross grade parking is necessary, restrict the load to compensate for the increased tipping risk of the vehicle.**
- 4 Keep vehicle as level as possible during operation.**
- 5 Chock rear wheels, engage emergency brake, place gear selector in neutral, press clutch and PTO knob in gear, release clutch and set throttle control to proper engine speed. Extend outriggers to their maximum out position. Always use outriggers from the crane to the ground. Be sure outriggers are in firm contact with the ground and are adequately positioned.**
- 6 When unstowing knuckleboom crane, first begin by retracting outer boom cylinder, which raises the outer boom up in the ramp and purges any air out of the outer boom cylinder. Extend lift cylinder to raise inner boom. Once inner boom is clear of the base, crane can be rotated into a work ready position. Always raise inner boom up before rotating.**
- 7 Always observe safe and practical operating practices to avoid possible accidents. Refer to safety tips and precautions.**
- 8 After completing lifting operations, return the booms to the figure-4 position for travel. When stowing, begin by retracting the extension cylinder. Retract outer boom cylinder. Rotate crane into position by aligning up the rotation arrows on the rotation bearing and base plate. Retract lift cylinder to lower inner boom into the figure-4 position. Always stand on the opposite side of the inner boom when stowing and unstowing.**
- 9 Return outriggers to the stowed position. Make sure they are pinned in place for travel.**
- 10 Check job site for any tools or equipment not stored. Store all wheel chocks.**
- 11 Press clutch and disengage PTO. Release throttle control and emergency brake.**
- 12 Report any unusual occurrence during crane operation that may indicate required maintenance or repair.**

WARNING: DO NOT EXCEED ENGINE SPEED NECESSARY TO MEET PUMP RPM REQUIREMENT; POSSIBLE DAMAGE MAY RESULT.

QUALIFICATIONS FOR AND CONDUCT OF OPERATORS AND OPERATING PRACTICES

OPERATORS

- 1 Crane operation shall be limited to personnel with the following minimum qualifications:
 - A. designated persons
 - B. trainees under the direct supervision of a designated person
 - C. maintenance and test personnel (when it is necessary in the performance of their duties)
 - D. inspectors (crane).
- 2 No one other than the personnel specified above shall enter the operating area of a crane with the exception of persons such as oilers, supervisors, and those specified persons authorized by supervisors whose duties require them to do so and then only in the performance of their duties and with the knowledge of the operator or other persons.

QUALIFICATIONS FOR OPERATORS

- 3 Operators shall be required by the employer to pass a practical operating examination. Qualifications shall be limited to the specific type of equipment for which examined.
- 4 Operators and operator trainees shall meet the following physical qualifications:
 - A. Vision of at least 20/30 snellen in one eye and 20/50 in the other, with or without corrective lenses.
 - B. Ability to distinguish colors, regardless of position, if colors differentiation is required for operation.
 - C. Adequate hearing with or without hearing aid for the specific operation.
- 5 Evidence of physical defects or emotional instability which render a hazard to operator or others, which in the opinion of the examiner could interfere with the operator's performance may be sufficient cause for disqualification. In such cases, specialized clinical or medical judgment and tests may be required.
- 6 Evidence that the operator is subject to seizures or loss of physical control shall be sufficient reason for disqualification. Specialized medical tests may be required to determine these conditions.
- 7 Operators and operator trainees should have normal depth perception, coordination, and no tendencies to dizziness or similar undesirable characteristics.

- 8 In addition to the above listed requirements, the operator shall:
 - A. Demonstrate the ability to comprehend and interpret all labels, operator's manuals, safety codes and other information pertinent to correct crane operations.
 - B. Possess knowledge of emergency procedures and implementation of same.
 - C. Demonstrate to the employer the ability to operate the specific type of equipment.
 - D. Be familiar with the applicable safety regulations.
 - E. Understand responsibility for maintenance requirements of crane.
 - F. Be thoroughly familiar with the crane and its control functions.
 - G. Understand the operating procedures as outlined by the manufacturer.

CONDUCT OF OPERATORS

- 9 The operator shall not engage in any practice which will divert his attention while actually operating the crane.
- 10 Each operator shall be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall consult with the supervisor before handling the loads.
- 11 The operator should not leave a suspended load unattended unless specific precautions have been instituted and are in place.
- 12 If there is a warning sign on the switch or engine starting controls, the operator shall not close the switch or start the engine until the warning sign has been removed by the appointed person.
- 13 Before closing the switch or starting the engine, the operator shall see that all controls are in the "OFF" or neutral position and all personnel are in the clear.
- 14 If power fails during operation, the operator shall:
 - A. move power controls to the "OFF" or neutral position.
 - B. land the suspended load and boom, if practical.
- 15 The operator shall be familiar with the equipment and its proper care. If adjustments or repairs are necessary, the operator shall report the same

QUALIFICATIONS FOR AND CONDUCT OF OPERATORS AND OPERATING PRACTICES

promptly to the appointed person, and shall also notify the next operator.

16 All controls shall be tested by the operator at the start of each shift. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.

17 Stabilizers shall be visible to the operator while extending or setting unless operator is assisted by a signal person.

OPERATING PRACTICES

HANDLING THE LOAD

18 Size of load

- A. No crane shall be loaded beyond the rated load except for test purposes.
- B. The load to be lifted is to be within the rated load of the crane and its existing configuration.
- C. When loads which are not accurately known are to be lifted, the person responsible for the job shall ascertain that the weight of the load does not exceed the crane rated load at the radius at which the load is to be lifted.

19 Attaching the load

- A. The load shall be attached to the hook by means of slings or other devices of sufficient capacity.
- B. Hoist rope shall not be wrapped around the load.

20 Moving the load

- A. The operator shall determine that:
- B. The crane is level and, where necessary, the vehicle/carrier is blocked properly.
- C. The load is well secured and balanced in the sling or lifting device before it is lifted more than a few inches.
- D. Means are provided to hold the vehicle stationary while operating the crane.
- E. Before starting to lift, the hook shall be brought over the load in such a manner as to minimize swinging.
- F. During lifting care shall be taken that:
 - 1. there is no sudden acceleration or deceleration of the moving load.
 - 2. load, boom or other parts of the crane do not contact any obstruction.
- G. Cranes shall not be used for dragging loads sideways.

H. This standard recognizes that articulating boom cranes are designed and intended for handling materials. They do not meet personnel lift or elevator requirements. Therefore, no lifting, lowering, swinging or traveling shall be done while a person is on the hook or load. Hook attached suspended work platforms (baskets) shall not be used with cranes covered by this standard. Work platforms attached to the boom must be approved by crane manufacturer.

I. The operator should avoid carrying loads over people.

J. When the crane is so equipped, the stabilizers shall be fully extended and set. Blocking under stabilizers shall meet the requirements as follows:

- 1. strong enough to prevent crushing.
- 2. of such thickness, width and length as to completely support the stabilizer pad.

K. Firm footing under all tires, or individual stabilizer pads should be level. Where such a footing is not otherwise supplied, it should be provided by timbers, cribbing, or other structural members to distribute the load so as to not exceed allowable bearing capacity or the underlying material.

L. In transit, the boom shall be carried in stowed position.

M. When rotating the crane, sudden starts and stops shall be avoided. rotational speed shall be such that the load does not swing out beyond the radius at which it can be controlled.

N. The crane shall not be transported with a load on the hook unless recommended by the manufacturer.

O. No person should be permitted to stand or pass under a suspended load.

21 Stowing procedure. Follow the manufacturer's procedure and sequence when stowing and un-stowing the crane.

MISCELLANEOUS

OPERATING NEAR ELECTRICAL POWER LINES

22 Cranes shall be operated so that no part of the crane or load enters into the danger zone shown in figure 1.

QUALIFICATIONS FOR AND CONDUCT OF OPERATORS AND OPERATING PRACTICES

EXCEPTIONS

- A. The danger zone may be entered after confirmation by an appointed person that the electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work; or
- B. The danger zone may be entered if insulating

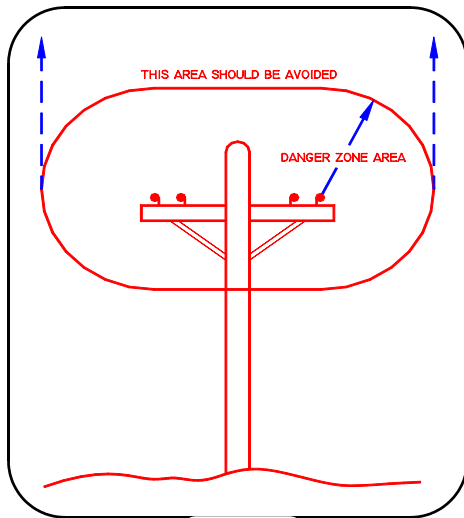


FIG. 1

barriers (not a part of nor an attachment to the crane) have been erected to prevent physical contact with the lines.

- 23 For lines rated 50 kV or below, minimum clearance between the lines and any part of the crane or load (including handling appendages) shall be 10 ft. (3 m). For higher voltages, see Table 1.
- 24 Caution shall be exercised when working near overhead lines, because they can move horizontally or vertically due to wind, moving the danger zone to new positions.
- 25 In transit with no load and boom lowered the clearance shall be specified in table 1.
- 26 A qualified signalperson shall be assigned to observe the clearance and give warning before approaching the above limits.
 - A. Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities verify that it is not and energized line.

- B. Exceptions to this procedure, if approved by the owner of the electrical lines, may be granted by the administrative authority if alternate procedure provides equivalent protection and is set forth in writing.
- C. Durable signs shall be installed at the operator's station and of the outside of the crane, warning that electrocution or serious bodily injury may occur unless a minimum clearance of 10 ft. (3 m) is maintained between the crane or the load being handled and energized power lines. Greater clearances are required because of higher voltage as stated in above. These signs shall be revised but not removed when local jurisdiction requires greater clearances.

TABLE 1

normal voltage, kV (phase to phase)	minimum required clearance	
	ft	(m)
<u>when operating near high voltage power lines</u>		
over to 50	10	(3.05)
over 50 to 200	15	(4.6)
over 200 to 350	20	(6.1)
over 350 to 500	25	(7.62)
over 500 to 750	35	(10.67)
over 750 to 1000	45	(13.72)
<u>while in transit with no load and boom lowered</u>		
over to 0.75	4	(1.22)
over 0.75 to 50	6	(1.83)
over 50 to 345	10	(3.83)
over 345 to 750	16	(4.87)
over 750 to 1000	20	(6.1)

INSPECTION, TESTING AND MAINTENANCE

GENERAL

INSPECTION CLASSIFICATION

- 1 Initial inspection. Prior to initial use, all new, altered, modified or extensively repaired cranes shall be inspected by a designated person to insure compliance with provisions of this standard.
- 2 Regular inspection. Inspection procedure for cranes in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as "frequent" and "periodic" with respective intervals between inspections as defined below.

A. frequent inspection - daily to monthly intervals.

B. periodic inspection - one to twelve intervals, or as specifically recommended by the manufacturer.

FREQUENT INSPECTION

- 3 Inspection shall be performed by designated personnel.
 - A. control mechanisms for maladjustment interfering with proper operation - daily, when used;
 - B. control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter;
 - C. safety devices for malfunction;
 - D. all hydraulic hoses, particularly those which flex in normal operation of crane functions, should be visually inspected once every working day, when used;
 - E. hooks and latches for deformation, chemical damage, cracks, and wear. Refer to ANSI/ASME B30.10;

F. rope reeving for compliance with crane manufacturer's specifications, if optional winch is used;

G. electrical apparatus for malfunctioning, signs of excessive deterioration, dirt and moisture accumulation;

H. hydraulic system for proper oil level and leaks daily;

I. tires for recommended inflation pressure, cuts and loose wheel nuts;

J. connecting pins and locking device for wear and damage;

PERIODIC INSPECTION

4 Deformed, cracked or corroded members in the crane structure and carrier;

5 Loose bolts, particularly mounting bolts;

6 Cracked or worn sheaves and drums;

7 Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and devices;

8 Excessive wear on brake and clutch system parts and lining;

9 Crane hooks inspected for cracks;

10 Travel steering, braking, and locking devices, for malfunction;

11 Excessively worn or damaged tires;

12 Hydraulic and pneumatic hose, fittings, and tubing inspection;

A. evidence of leakage at the surface of the flexible hose or its junction with metal and coupling;

B. blistering, or abnormal deformation to the outer covering of the hydraulic or pneumatic hose;

- C. leakage at threaded or clamped joints that cannot be eliminated by normal tightening or recommended procedures;
- D. evidence of excessive abrasion or scrubbing on the outer surface of a hose, rigid tube, or fitting. Means shall be taken to eliminate the interference of elements in contact or otherwise protect the components.

13 Hydraulic and pneumatic pumps and motors inspection

- A. loose bolts or fasteners;
- B. leaks at joints between sections;
- C. shaft seal leaks;
- D. unusual noises or vibrations;
- E. loss of operating speed;
- F. excessive heating of the fluid;
- G. loss of pressure.

14 Hydraulic and pneumatic valves inspection

- A. cracks in valve housing;
- B. improper return of spool to neutral position;
- C. leaks at spools or joints;
- D. sticking spools;
- E. failure of relief valves to attain or maintain correct pressure setting;
- F. relief valve pressure shall be checked as specified by the manufacturers.

15 Hydraulic and pneumatic cylinders inspection

- A. drifting caused by fluid leaking across piston;
- B. rod seals leaking
- C. leaks at welding joints
- D. scored, nicked, or dented cylinder rods;
- E. damaged case (barrel);
- F. loose or deformed rod eyes or connecting joints.

- 16 Hydraulic filters.** Evidence of rubber particles on the filter elements may indicate hose, "O" ring, or other rubber component deterioration. Metal chips or pieces on the filter may denote failure in pumps, motors, or cylinders. Further checking will be necessary to determine origin of the problem before corrective action can be taken.

- 17 Labels** are to be in place and legible.

CRANES NOT IN REGULAR USE

- 18** A crane which has been idle for a period of over one month or more, but not less than six months, shall be given an inspection conforming with the initial-regular- frequent inspections.

- 19** A crane which has been idle for a period of over six months shall be given a complete inspection conforming with the initial-regular-frequent inspection requirements.

INSPECTION RECORDS

- 20** Dated records for periodic inspection should be made on critical items such as brakes, crane hooks, rope, hydraulic and pneumatic cylinders, and hydraulic and pneumatic relief pressure valves. Records should be kept available to an appointed person.

OPERATIONAL TESTS

- 21** Prior to initial use, all new, altered, modified, or extensively repaired cranes shall be tested for compliance with the operational requirements of this section, including functions such as the following:

- A. load lifting and lowering mechanisms;
- B. boom lifting and lowering mechanisms;
- C. boom extension and retraction mechanisms;
- D. swing mechanisms;
- E. safety devices;
- F. operating controls comply with appropriate function labels.

Operational crane test results shall be made available to an appointed person.

RATED TEST LOAD

Prior to initial use, altered, modified, or extensively repaired cranes shall be load tested by or under the direction of an appointed person.

22 Test loads shall not exceed 110% of the manufacturer's load ratings.

23 Written reports shall be maintained showing test procedures and confirming the adequacy of repairs.

MAINTENANCE

PREVENTIVE MAINTENANCE

24 Before adjustment and repairs are started on a crane, the following precautions shall be taken as applicable:

- A. crane placed where it will cause the least interference with other equipment or operations;
- B. all controls at the "off" position;
- C. starting means rendered inoperative;
- D. boom lowered to the ground if possible or otherwise secured against dropping;
- E. relieve hydraulic oil pressure from all hydraulic circuits before loosening or removing hydraulic components.

25 Warning or "OUT OF ORDER" signs shall be placed on the crane controls.

26 After adjustments and repairs have been made, the crane shall not be returned to service until all guards have been reinstalled, trapped air removed from hydraulic system (if required), safety devices reactivated, and maintenance equipment removed.

ADJUSTMENTS AND REPAIRS

27 Any hazardous conditions disclosed by the inspection requirements shall be corrected before operation of crane is resumed, Adjustments and

repairs shall be done only by designated personnel.

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

- A. functional operating mechanism;
- B. safety devices;
- C. control systems;

29 Repairs or replacements shall be provided as needed for operation.

The following are examples:

- A. critical parts of functional operating mechanisms which are cracked, broken, corroded, bent, or excessively worn;
- B. critical parts of the crane structure which are cracked, bent, broken, or excessively corroded;
- C. crane hooks showing cracks, damage, or corrosion shall be taken out of service. Repairs by welding are not recommended.

30 Instructions shall be provided by the manufacturer for the removal of air from hydraulic circuits.

LUBRICATION

All moving parts of the crane, for which lubrication is specified, should be regularly lubricated per the manufacturer's recommendations and procedures.

ROPE INSPECTION

31 Frequent Inspection

- A. All running ropes in service should be visually inspected once each working day. A visual inspection shall consist of observation of all rope which can be in use during the days operations. These visual observations should be considered with discovering gross damage such as listed below, which may be an immediate hazard;
 - 1. distortion of the rope such as kinking, crushing, un-stranding, birdcaging, main strand displacement, or core protrusion.

Loss of rope diameter in a short length or unevenness of outer strands should be replaced;

2. general corrosion;
 3. broken or cut strands;
 4. number, distribution and type of visible broken wires. When such damage is discovered, the rope shall either be removed from service or given as inspection.
- B. Care shall be taken when inspecting sections of rapid deterioration such as flange points, crossover points, and repetitive pickup points on drums.

32 Periodic inspection

- A. the inspection frequency shall be determined by a qualified person and shall be based on such factors as:
1. expected rope life as determined by experience on the particular installation or similar installations;
 2. severity of environment;
 3. percentage of capacity lifts;
 4. frequency rates of operation;
 5. exposure to shock loads;

Inspection need not be at equal calendar intervals and should be more frequent as the rope approaches the end of its service life. This inspection shall be made at least annually.

- B. Periodic inspection shall be performed by a designated person. This inspection shall cover the entire length of the rope. Only the surface wires need be inspected. No attempt should be made to open the rope. Any deterioration results in appreciable loss of original strength, such as described below, shall be noted and determination made as to whether use of the rope would constitute a hazard: points listed above reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires; severely corroded, cracked, bent, worn or improperly applied connections;

C. Care shall be taken when inspecting sections subject to rapid deterioration such as the following:

1. sections in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited;
2. sections of the rope at or near terminal ends where corroded or broken wires may protrude.

ROPE REPLACEMENT

33 No precise rules can be given for determination of the exact time for replacement of rope, since many variable factors are involved.

Continued use in this respect depends upon good judgement by a designated person in evaluating remaining strength in a used rope after allowance for deterioration disclosed by inspection. Continued rope operation depends upon this remaining strength.

34 Conditions such as the following shall be reason for questioning continued use of the rope or increasing the frequency of inspection:

- A. in running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay;
- B. one outer wire broken at the contact point with the core of the rope structure and protrudes or loops out of the rope structure. Additional inspection of this section is required.
- C. wear of one third of the original diameter of the outside individual wire.
- D. kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure.
- E. evidence of any heat damage from any cause.
- F. reduction from nominal diameter of more than 1/64 in. (0.4mm) for diameters up to and including 5/16 in. (8 mm), 1/32 in. (0.8 mm) for diameter 3/8 in. (9.5 mm) to and including 1/2 in. (13 mm), 3/64 in. (1.2 mm) for diameter 9/16 in. (14.5 mm) to and including 3/4 in. (19 mm). 1/16 in. (1.6 mm) for diameter 7/8 in. (22 mm) to and including

1 1/8 in. (29 mm), 3/32 in. (2.4 mm) for diameters 1 1/4 in. (32 mm) to and including 1 1/2 in. (38 mm).

G. In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

H. Replacement rope shall have a strength rating at least as great as the original rope furnished or recommended by the crane manufacturer. Any deviation from the original size, grade, or construction shall be specified by a rope manufacturer, or a qualified person.

35 Rope not in regular use: all rope which has been idle for a period of a month or more due to shutdown or storage of a crane on which it is installed, shall be given and inspection in accordance with above information before it is placed in service. This inspection shall be for all types of deterioration and shall be performed by a qualified person.

36 Inspection records

A. frequent inspection- no records required

B. periodic inspections- in order to establish data as a basis for judging the proper time for replacement, a dated report condition at each periodic inspection should be kept on file. This report shall cover points of deterioration listed above.

ROPE MAINTENANCE

37 Rope should be stored to prevent damage or deterioration.

38 Unreeling or uncoiling of rope shall be done as recommended by the rope manufacturer and with care to avoid kinking or inducing twist.

39 Before cutting a rope, seizing shall be placed on each side of the place where the rope is to be cut to prevent unlaying of the strands. On pre-formed rope, one seizing on each side of the cut is required. On non-preformed ropes of 7/8 in. (22 mm) diameter or smaller, two seizings on each side of the cut are required, and for non-preformed rope 1 in. (25 mm) diameter or larger, three seizings on each side of the cut are required.

40 During installation care should be exercised to avoid dragging of the rope in the dirt or around objects which will scrape, nick crush or induce sharp bends in it.

41 Rope should be maintained in a well-lubricated condition. It is important that lubricant applied as a part of a maintenance program shall be compatible with the original lubricant and to this end the rope manufacturer should be consulted. Lubricant applied shall be the type which does not hinder visual inspection. Those sections of rope which are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope. The object of rope lubrication is to reduce internal friction and to prevent corrosion.

42 When an operating rope shows greater wear or well defined localized areas than on the remainder of the rope, rope life can be extended in cases where a section at the worn end, and thus shifting the wear to different areas of the rope.

NOTES

LUBRICATION

ROTATION BEARING RACE

- 1 Lubricate bearing race at the outer race grease zerks.
- 2 Listed in the chart below are several lubricants which are acceptable for both rust inhibiting and extreme pressure characteristics:
 - A. Lubricate the inner race daily if crane is used on a daily basis or weekly with normal use.
 - B. Lubricate the inner race every 30 days if the crane is used intermittently.
 - C. Rotate the bearing through two or more rotations during lubrication process.

NOTE:Regular periodic lubrication is the most effective way to increase the life and service ability of the rotation bearing. Most bearings are used outdoors and under conditions likely to produce internal condensation.

GEAR

- 3 The chart below lists several lubricants for the gear. It is recommended that the teeth be lubricated with a small amount of grease every 8 hours if the crane is used daily, or weekly with normal use. The grease is purged from the teeth by the very nature of being exposed to the elements. Therefore close attention to gear lubricant will provide a longer tooth life. Grease the rotation bearing gear teeth and the pinion with a spray lubricant.
- 4 Backlash between rotation bearing and swing drive pinion to be set at .006 min. - .008 avg. - .010 max. Set backlash of the swing drive pinion and the rotation

	MOBILE	TEXACO	SUNOCO	PURE	SOHIO
RACE	Mobil Plex EP 2	MARFAC MP 2	Prestige 742 EP	Poco HT EP 2	Sohitran EP1
GEAR	Mobilcote-S	Crater Compound	407 Compound B	Poco Gearshield	Sohitac 1

bearing at the high point of the rotation bearing gear teeth; Identified by a yellow paint mark on the high tooth of bearing. Adjust backlash by using eccentric ring to move swing drive pinion into tolerance with rotation bearing gear. Backlash may be measured by inserting a 10-12 inch long piece of solder in between the swing drive pinion and the rotation bearing gear and rotating the crane around to crush solder between the rotation bearing gear and the swing drive pinion. Then measure the flat places along the solder with a micrometer. Care should be taken when inserting

solder in between pinion and gear and rotating crane due to the presence of a finger trap.

SWING DRIVE LUBRICATION SELECTION

- 5 Lubricant specification: MIL-L2105C or API-GL-5
- 6 Below -10 degrees F (-23 degrees C) use 75W-10 to 100 degrees F (37.8 degrees C) use 80W-90 +100 degrees F use 85W-140
- 7 Swing drive lubricant should be serviced:
 - A. AFTER FIRST 100 HOURS OF OPERATION; DRAIN AND FLUSH SWING DRIVE. FLUSH SWING DRIVE USING 5W OIL.
 - B. After first 100 hours drain and flush every six months (normal operation).
 - C. Check fluid level weekly (normal operation).
 - D. Drain and flush swing drive lubricant anytime there are any indications of lubricant deterioration:
 1. dark color or cloudy appearance
 2. a rancid or burnt odor
 3. foreign particles or other visible contaminants
 4. a loss of viscosity
 5. presence of water in lubricant

8 SWING DRIVE CAPACITY, 3 quarts (2.8L)

OUTRIGGER SLIDE LUBRICATION

- 9 lubricate outrigger slides at grease zerks located on base with a lithium based grease.
 - A. Lubricate outrigger bearings every 45 days or as required to keep outrigger slides working smoothly.

HANDLE LINKAGE

- 10 Lubricate linkage using a silicon spray or light weight oil (sae 10w) monthly or as required to keep linkage operating smoothly.

BOOM EXTENSIONS

- 11 Lubricate top and bottom full length of boom extensions with an EP grease monthly or as required for smooth operation.

LUBRICATION & MAINTENANCE SCHEDULE

A72A CRANE

SERVICE PERFORMED	DAY	WEEKLY	3 MOS	6 MOS	YEAR	NOTES
LOAD HOOK	X					INSPECT HOOK & LATCH FOR DEFORMATION, CRACKS, & CORROSION
CABLE DRUM	X					MAKE SURE CABLE IS WOUND EVENLY ON DRUM
HOIST CABLE	X					CHECK FOR FLATTENING, KINKS, & BROKEN STRANDS, SEE MANUAL
HYD. HOSES	X					VISUAL INSPECTION
HYD. FLUID	X					CHECK FLUID LEVEL
MOUNTING BOLTS		X				CHECK-TORQUE TO 225 FT-LBS (DRY) AS REQUIRED
ROTATION RING GEAR		X				LUBE WITH MOBILETAC LL, OR LUBRIPLATE P/N 15263, OR EQUAL
SHEAVE BEARINGS		X				SEALED BEARING, REPLACE IF ROUGH OR LOOSE
ALL OTHER BOLTS		X				CHECK-TIGHTEN AS REQUIRED
BOOM PIVOTS		X				GREASE WITH MOBILPLEX EP-2 OR EQUIVALENT @ ZERKS
BOOM CYLINDER		X				CHECK AROUND CYLINDER ROD FOR EXCESS FLUID LEAKAGE
BOOM CYLINDER PINS		X				GREASE WITH MOBILPLEX EP-2 OR EQUIVALENT @ ZERKS
EXTENSION DETENT PIN		X				LUBE DETENT SPRING & BALL W/ WD-40
RETURN LINE FILTER			X			REPLACE ELEMENT
HI-PRES. FILTER			X			CLEAN AFTER FIRST WEEK, THEN EVERY 3 MONTHS (OPT EQUIP)
ROTATION BEARING			X			GREASE WITH MOBILPLEX EP-2 OR EQUIVALENT @ ZERKS
ROTATION BEARING BOLTS			X			CHECK TORQUE TO 180 FT-LBS (DRY) AS REQUIRED

LUBRICATION & MAINTENANCE SCHEDULE

A72A CRANE

SERVICE PERFORMED	DAY	WEEKLY	3 MOS	6 MOS	YEAR	NOTES
ROTATION GEAR BOX			X			CHECK TORQUE TO 150 FT-LBS (DRY) AS REQUIRED
ROTATION GEAR BOX				X		EP GEAR LUBE SAE 140
HOIST GEARBOX				X		WORM GEAR-EP GEAR LUBE SAE 80-90
HYDRAULIC FLUID					X	DRAIN, FLUSH, AND REFILL WITH DTE 13, OR EQUIVALENT
BOOM SLIDE PADS	PADS GREASED WHEN REPLACED					
FOR ADDITIONAL INFORMATION SEE:	1) OWNER'S MANUAL 2) OSHA SECTION 1910.180 3) ANSI B30.5-1989					

CAUTION: Routine maintenance insures trouble-free operation and protects your investment. All warranties are void if maintenance is neglected.

NOTES:

1. Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.
2. Once a bolt has been torqued to its rated capacity and then removed; the bolt should be replaced with a new one.
3. Auto Crane Company recommends that this crane be serviced per "Crane Inspection Log" P/N 999978. These logs should be filled in at the intervals noted and kept as a permanent record. Additional copies are available from your local distributor.

NOTES

OIL SELECTION

ALL WEATHER OILS

MOBIL DTE 13
MOBIL DTE 15
TEXACO URSA SUPER 3 SEA 10W
GULF XHD 10W/30
TEXACO RONDO HDAZ-32
ESSO UNIVIS J 26

WARM WEATHER OILS

MOBILE DELVAC 1210
TEXACO URSATEX 10W/30
ESSO NUTO H 32
MOBIL DELVAC SPECIAL 10W/30
UNIVERSAL TRACTOR FLUID

COLD WEATHER OILS

MOBIL DTE 11
CONOCO DN 600
ESSO UNIVIS J 13

CAUTION

Do not add kerosene or other "thinners" to hydraulic oil. These fluids will cause swelling and rapid deterioration of "o" rings and other seals in the hydraulic system.

The reservoir of the crane contains approximately 19-25 gals. (72-95 liters) of hydraulic oil, depending on the model. Oil level should be maintained at the full mark shown on the sight gauge with all cylinders in the retracted or stowed position.

If there is any question regarding the condition of the hydraulic oil, drain some of the oil from the bottom of the reservoir into a glass container and inspect for the following indications of deterioration:

- 1 Dark color or cloudy appearance
- 2 A rancid or burned odor
- 3 Foreign particles or other contaminants
- 4 A loss of viscosity
- 5 A separation of water or other fluids from the oil

If the sample checked exhibits any of the above characteristics, an oil change is recommended as outlined previously.

HYDRAULIC OIL

Hydraulic oil is the "LIFEBLOOD" of the crane. Proper selection and care is important to provide the most efficient operation and the longest life from each of the hydraulic components in the crane. Hydraulic oil not only transmits the energy required operate the machine from the pump to the various cylinders and motors, but also provides for lubrication and cooling of the components. It is often said that oil does not wear out and can be left in a crane indefinitely, providing the filters are changed regularly. Good filtration does prolong the life of hydraulic oil, but its lubrication characteristics are diminished as it becomes diluted by condensation, acids and other non-filterables which form during normal use of the crane.

It is recommended that the hydraulic reservoir be drained and refilled with new oil after each 500 hours of operation. In climates that have a wide variation of operating temperature, it is recommended that oil of the appropriate weight be used for cold and warm weather operation.

In the event that the hydraulic system becomes contaminated with metallic particles due to a motor, pump or other component failure, the following should be immediately to prevent failure to the crane:

- 1 Drain the oil reservoir completely.
- 2 Fill the reservoir 1/2 full with clean hydraulic oil to flush the contaminated oil from the cylinders and hydraulic lines of the system.

NOTE: Operate each function to the full open and closed position several times.

- 3 Operate the system at a slow RPM to prevent cavitation of the pump.
- 4 Drain the reservoir completely again.
- 5 Change the return and suction filters
- 6 Refill the reservoir to the full line on the sight glass.
- 7 Allow the new oil to circulate through the system for several minutes before operating the unit.
- 8 Change the return line filter again after approximately 25 hours of operation.

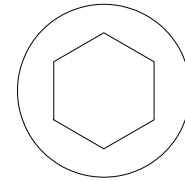
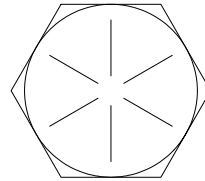
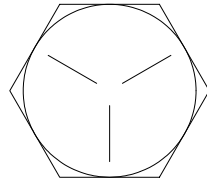
COARSE THREAD BOLT TORQUE RATING CHART FOR AUTO CRANE ASSEMBLIES

BOLT GRADE

SAE GRADE 5

SAE GRADE 8

**SOCKET HEAD
CAP SCREW**



BOLT SIZE	GRADE 5		GRADE 8		SOCKET HEAD CAP SCREW	
	IN/LB	FT/LB	IN/LB	FT/LB	IN/LB	FT/LB
UNC						
3/8-16	276	23	420	35	420	35
7/16-14	420	35	660	55	720	60
1/2-13	660	55	960	80	1,080	90
9/16-12	960	80	1,320	110	1,560	130
5/8-11	1,320	110	2,040	170	2,160	180
3/4-10	2,400	200	3,360	280	3,840	320
7/8-9	3,600	300	5,520	460	6,240	520
1-8	5,280	440	8,160	680	9,240	770
1 1/8-7	7,200	600	11,520	960	13,200	1,100
1 1/4-7	10,080	840	16,320	1,300	18,600	1,550
1 3/8-6	13,200	1,100	21,360	1,780	24,360	2,030
1 1/2-6	17,520	1,460	28,320	2,360	32,280	2,690

NOTE: All torque values listed above are based on plated and/or lightly lubricated threads. Once a bolt has been torqued to its rated capacity and then removed, it should be replaced with a new one.

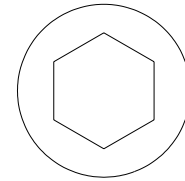
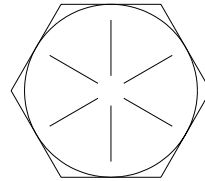
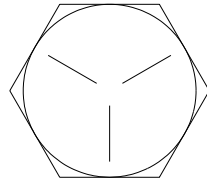
FINE THREAD BOLT TORQUE RATING CHART FOR AUTO CRANE ASSEMBLIES

BOLT GRADE

SAE GRADE 5

SAE GRADE 8

**SOCKET HEAD
CAP SCREW**



BOLT SIZE	GRADE 5		GRADE 8		SOCKET HEAD CAP SCREW	
	IN/LB	FT/LB	IN/LB	FT/LB	IN/LB	FT/LB
<i>UNF</i>						
3/8-24	312	26	444	37	430	35
7/16-20	492	41	696	58	680	56
1/2-20	768	64	1,080	90	1,030	85
9/16-18	1,092	91	1,548	129	1,480	123
5/8-18	1,536	128	2,160	180	2,000	166
3/4-16	2,676	223	3,780	315	3,600	300
7/8-14	4,260	355	6,012	501	5,700	475
1-12	6,348	529	8,952	746	8,300	691
1-14	6,492	541	9,168	764	-	-
1 1/8-12	8,016	668	12,996	1,083	12,500	1,041
1 1/4-12	11,160	930	18,108	1,509	17,000	1,416
1 3/8-12	15,048	1,254	24,408	2,034	22,000	1,833
1 1/2-12	19,740	1,645	32,016	2,668	29,500	2,458

NOTE: All torque values listed above are based on plated and/or lightly lubricated threads. Once a bolt has been torqued to its rated capacity and then removed, it should be replaced with a new one.

TROUBLESHOOTING A-72A

CAUTION: Never check for hydraulic leaks by feeling around hoses, fittings, or any other components. High pressure oil can be injected through the skin causing severe injury, or death.

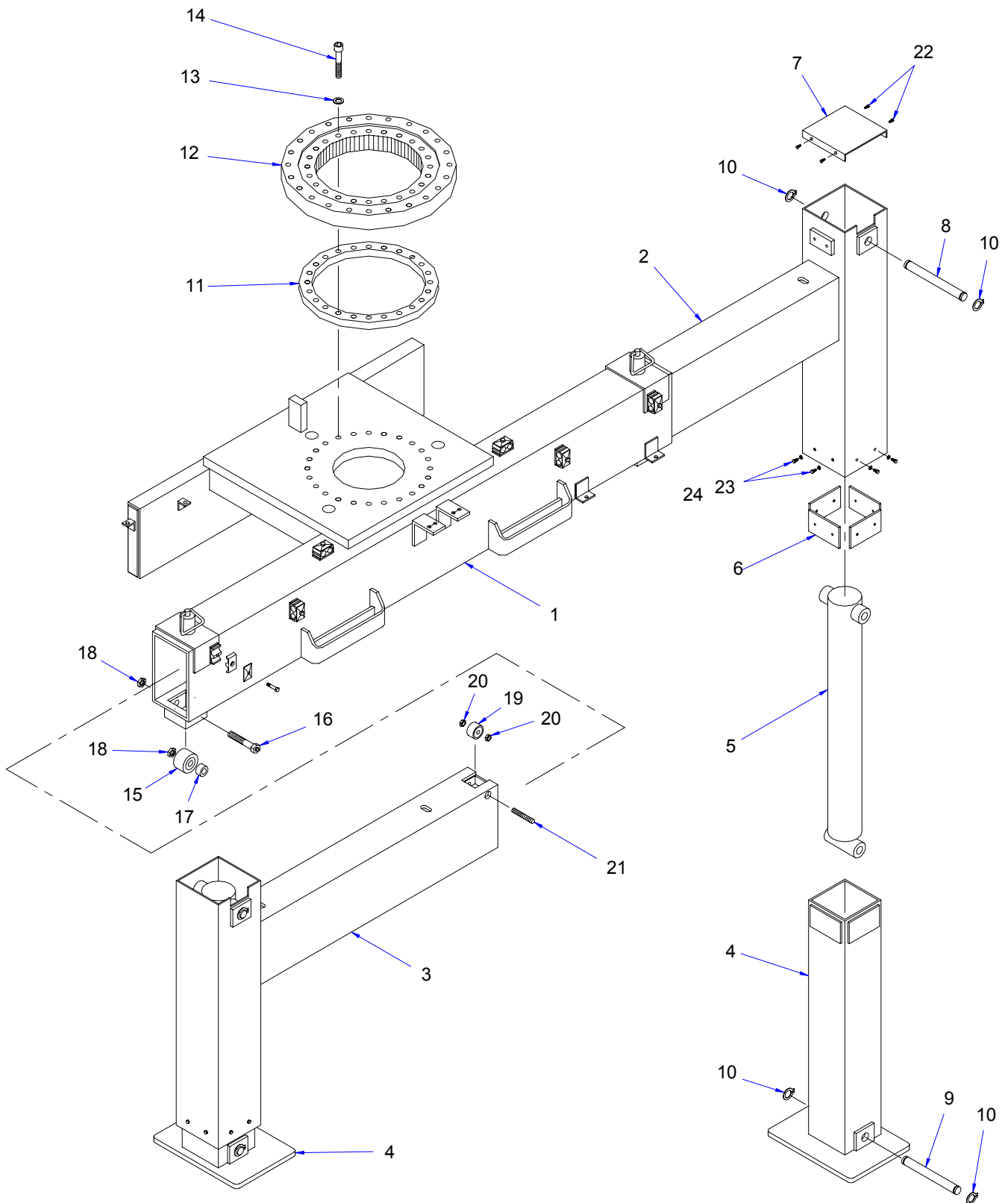
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Crane won't move	Load too heavy	Check load chart.
	PTO not engaged	Engage PTO.
	Low fluid level	Check and fill as required.
	Suction line blocked	Remove hose and clear blockage.
	Pressure line blocked	Remove hose and clear blockage.
	Bad pump	Check flow and pressure to crane. Note: A bad pump will have some flow but the flow will drop off as pressure increases.
	Main relief valve setting too low or not working properly	Check and adjust.
Poor crane performance	Pump speed	Check PTO ratio, pump size, and engine speed for proper oil flow. Check oil flow with flow meter installed in pressure line.
	Low fluid level	Check and fill.
	Main relief valve setting	Check and adjust.
	Worn pump, motor, or cylinder	Replace bad part.
	Blocked filters	Check suction and return filters.
	Hydraulic oil temperature too cold	Circulate oil to warm.
	Pressure or suction lines blocked	Check lines, clean and repair.
Noise	Load too heavy	Check load chart.
	Pump area	Circulate oil to warm, check suction line, fill reservoir.
	Cylinders	Check for damage to cylinders.
Cylinder drift	Rotation	Check rotation bearing, lubricate bearing.
	Overload	Remove overload
	Holding valve relief set too low	Replace as required.
	Damaged cylinder	Repair.
	Dirt in holding or check valve	Cycle under no load to reset, clean and/or replace.
	Air in hydraulic system or entrapped in cylinder	Cycle cylinder to remove air.
----- WINCH OPTION -----		
Winch will not lift or hold load	Overload	Remove load.
	Worn motor	Replace motor.
	Loose brake	Adjust and/or repair brake.
Winch gear box excessive heat	Fluid level	Check and fill as required.
	Duty cycles too high	Reduce cycle time or speed of winch.

TROUBLESHOOTING A-72A OPTIONAL REMOTE CONTROL SYSTEM

CAUTION: Never check for hydraulic leaks by feeling around hoses, fittings, or any other components. High pressure oil can be injected through the skin causing severe injury, or death.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
crane operates full speed "no trigger control"	proportional valve's manual override screwed in trigger potentiometer voltage too high	unscrew manual override adjust trigger voltage to .4-.6 volts when trigger is released, and/or replace
crane will not operate with remote pendant	no power fuse blown amplifier not adjusted properly trigger potentiometer voltage output not changing power relay not operating correctly	check voltage at terminal #14 check wiring, replace 8 amp fuse check amplifier setup and output check trigger voltage output check relay wiring
crane operation is erratic	power build-up solenoid wiring loose trigger potentiometer voltage erratic wiring connections at terminal strip, pendant, and receptacles	check wiring at power build-up solenoid check voltage output for smooth, consistant change as trigger is pulled check wiring connection, replace if required
two functions operate at the same time	wiring-wires shorted together at terminal strip, pendant head, or receptacles hydraulic contamination in solenoid cartridge	check wiring, replace wiring harness if required remove and clean cartridge, clean hydraulic system

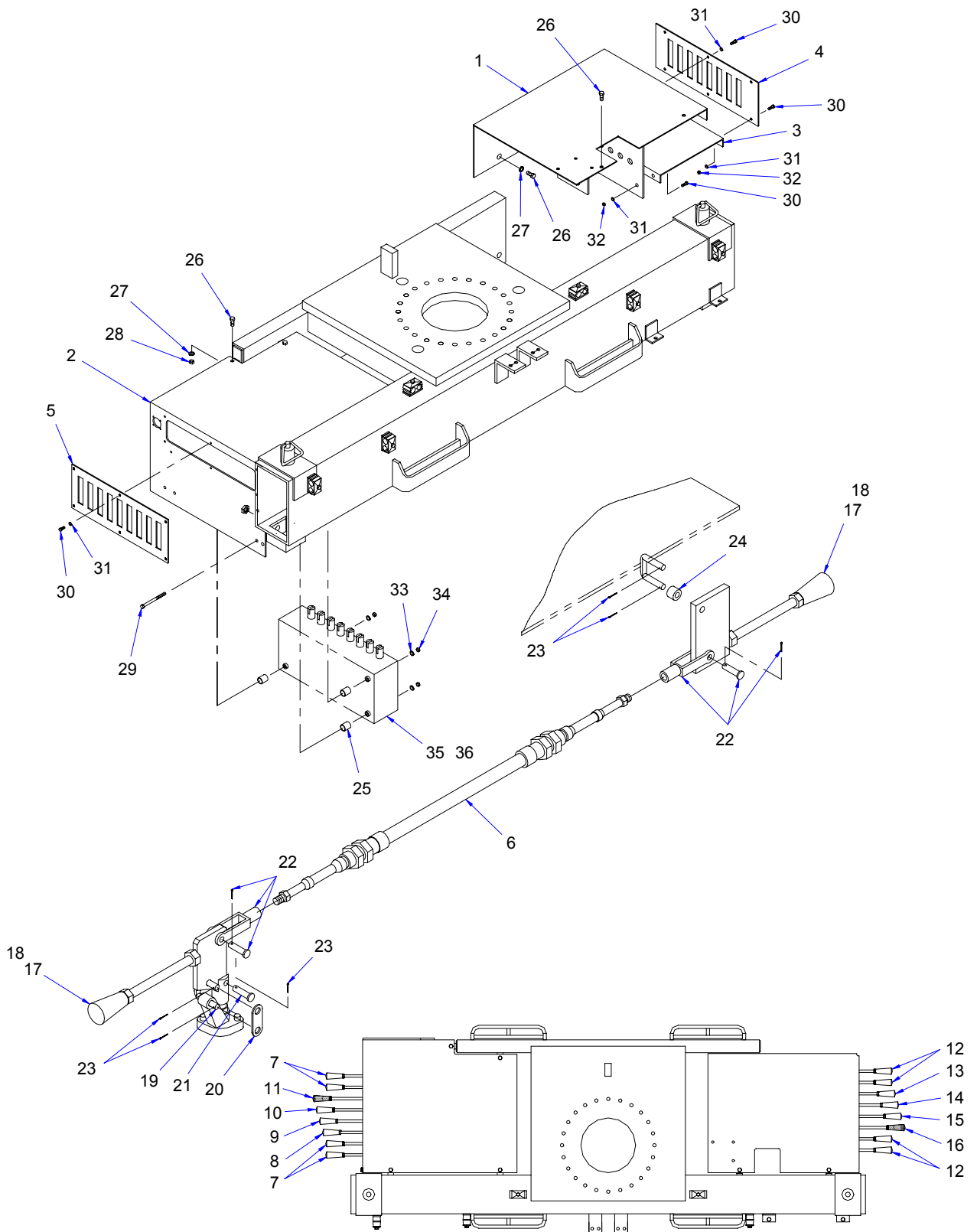
BASE/OUTRIGGER ASSEMBLY A72A SERIES



BASE/OUTRIGGER ASSEMBLY A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373060	BASE, WELDMENT
2	1	373068	OUTRIGGER WELDMENT
3	1	373067	OUTRIGGER WELDMENT
4	2	373074	LEG, INNER WELDMENT
5	2	373042	HYDRAULIC CYLINDER, (OUTRIGGER DOWN)
6	8	373104	SPACER, OUTER LEG
7	2	369331	COVER, OUTRIGGER
8	2	373209	PIN, OUTRIGGER (UPPER)
9	2	373210	PIN, OUTRIGGER (LOWER)
10	8	360122	RING, RETAINING 1"
11	1	373079	SPACER, INNER RACE
12	1	373031	ROTATION BEARING
13	24	023902	WASHER, FLAT 5/8 HARDENED
14	24	373078	SCREW, SOC. HD. 5/8-NC X 4" LG.
15	2	366197	ROLLER BEARING, 2 1/2" O.D.
16	2	373077	BOLT WITH GREASE ZERK, 3/4-NC X 4
17	2	800456-003	TUBING, 1 5/16 O.D. X 1/4 WALL X 3/4 LONG
18	4	373076	NUT, HEX-JAM 3/4-NC
19	2	240234	ROLLER BEARING, 1 3/4 O.D.
20	4	372219	NUT, HEX-JAM 1/2-NC
21	2	372218	SCREW, SET 1/2-NC X 3 LONG
22	8	370470	SCREW, THREAD- CUT #10-24
23	16	005901	SCREW, HEX HD. 1/4-NC X 1/2 LONG
24	16	020200	WASHER, SPLIT LOCK 1/4

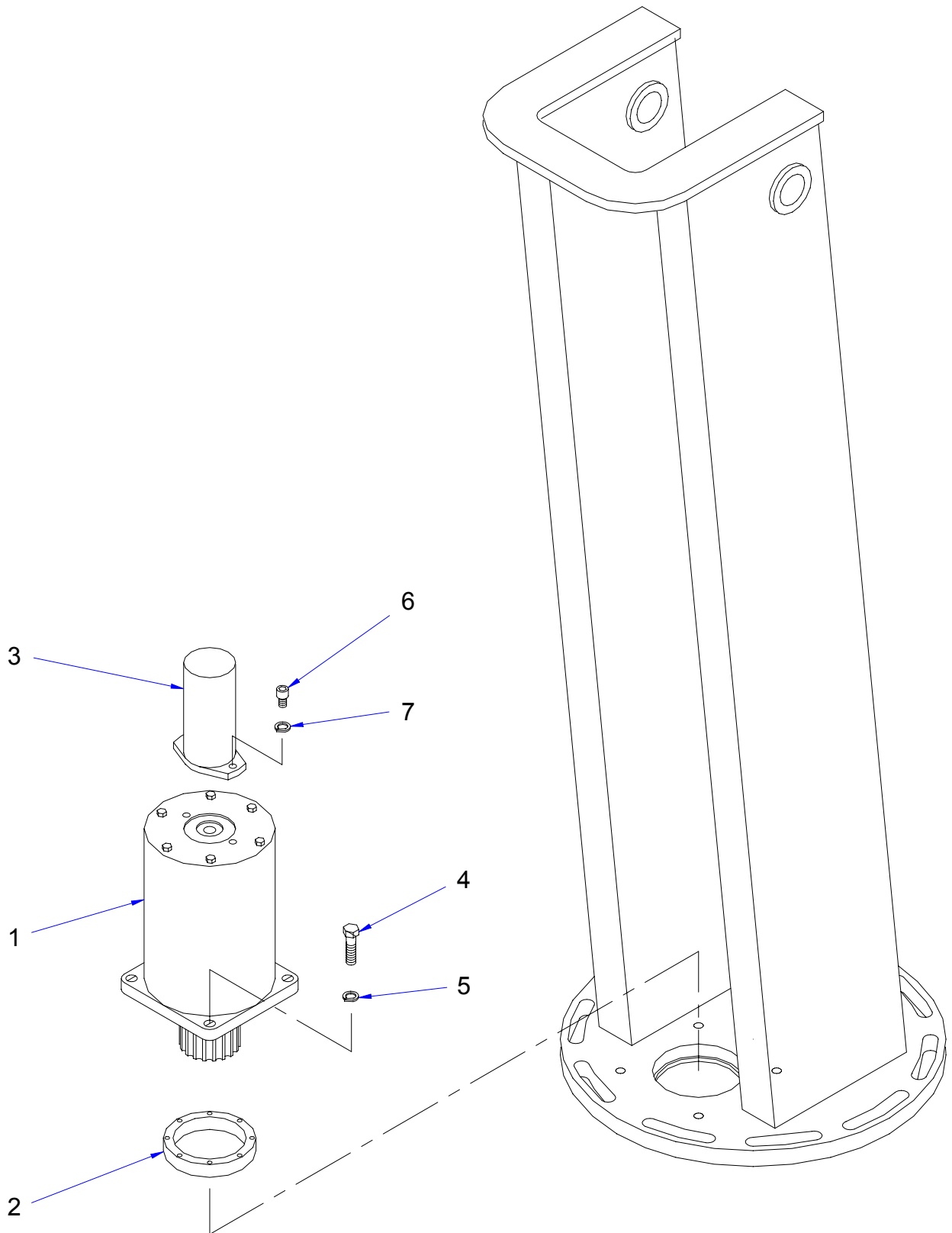
CONTROL HANDLE ASSEMBLY A72A SERIES



CONTROL HANDLE ASSEMBLY A72A SERIES

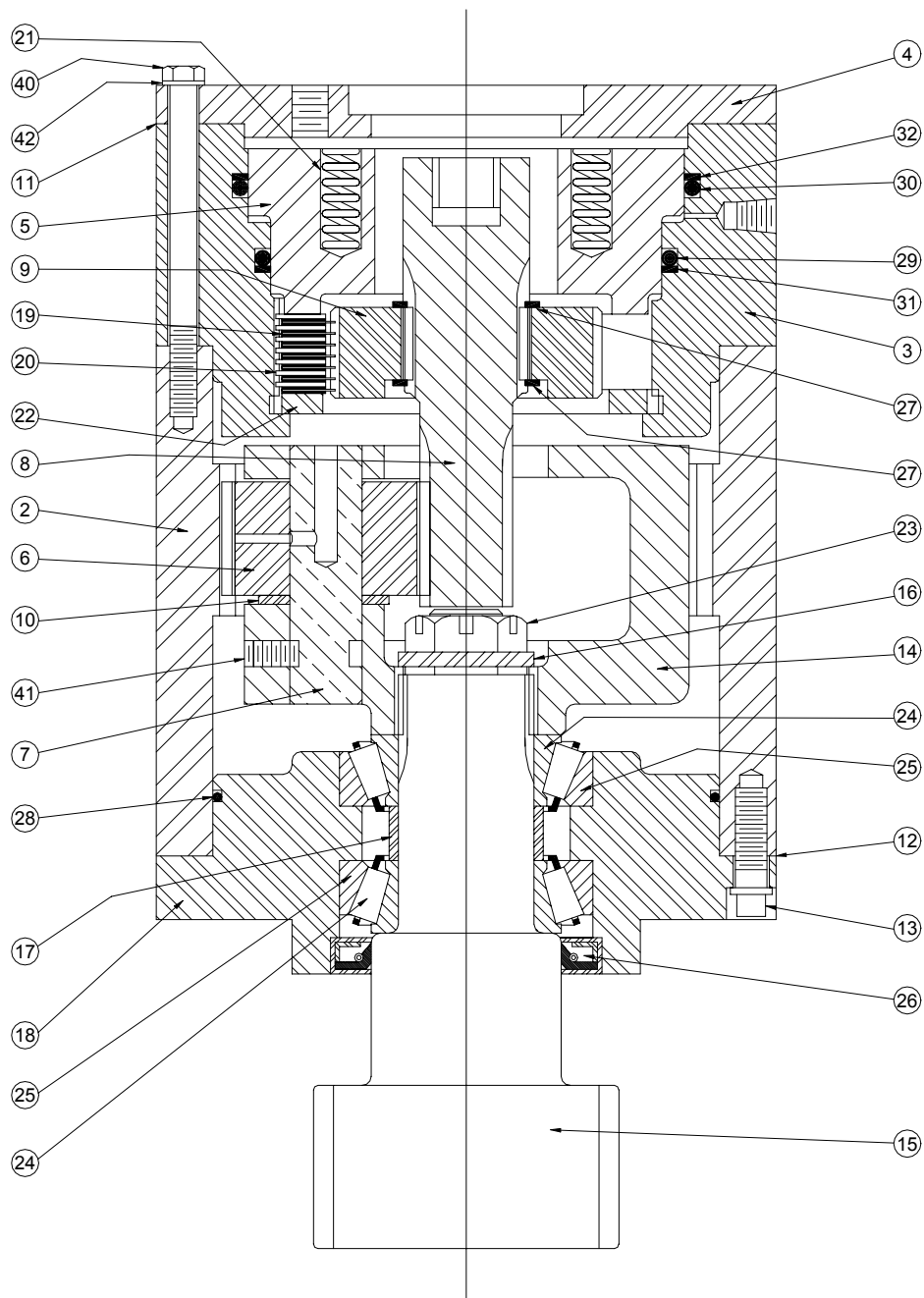
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372184	PLATE, HANDLE WELDMENT
2	1	372185	PLATE, MOUNTING WELDMENT
3	1	372191	PLATE, BOTTOM CONTROL
4	1	372291	GUARD, HANDLES
5	1	372290	GUARD, VALVE HANDLES
6	8	372254	CONTROL CABLE
7	4	372264	HANDLE, CONTROL (4 1/2")
8	1	372265	HANDLE, CONTROL (5")
9	1	372266	HANDLE, CONTROL (5 1/2")
10	1	372267	HANDLE, CONTROL (6")
11	1	372268	HANDLE, CONTROL (6 1/2")
12	4	372270	HANDLE, (4 1/2")
13	1	372271	HANDLE, (5")
14	1	372272	HANDLE, (5 1/2")
15	1	372273	HANDLE, (6")
16	1	372274	HANDLE, (6 1/2")
17	14	372252	KNOB, BLACK
18	2	372253	KNOB, RED
19	8	372256	LINK
20	8	372257	LINK PLATE
21	8	372251	PIN
22	16	372255	CLEVIS ASSEMBLY
23	32	372258	PIN, COTTER
24	8	372259	SPACER, NYLON
25	3	372193	SPACER, CONTROL VALVE
26	9	008701	SCREW, HX HD 3/8-NC X 1
27	9	021100	WASHER, SP LK 3/8
28	8	330372	NUT, HX 3/8-NC
29	3	811056	SCREW, HX HD 5/16-NC X 4
30	15	005500	SCREW, HX HD 1/4-NC X 3/4
31	15	020200	WASHER, SP LK 1/4
32	6	015900	NUT, HX 1/4-NC
33	3	020601	WASHER, SP LK 5/16
34	3	016500	NUT, HX 5/16-NC
35	REF.	372010	MANUAL CONTROL VALVE
36	REF.	367302	PROPORTIONAL CONTROL VALVE

ROTATION ASSEMBLY A72A SERIES



SWING DRIVE

P/N: 373044



NOT SHOWN

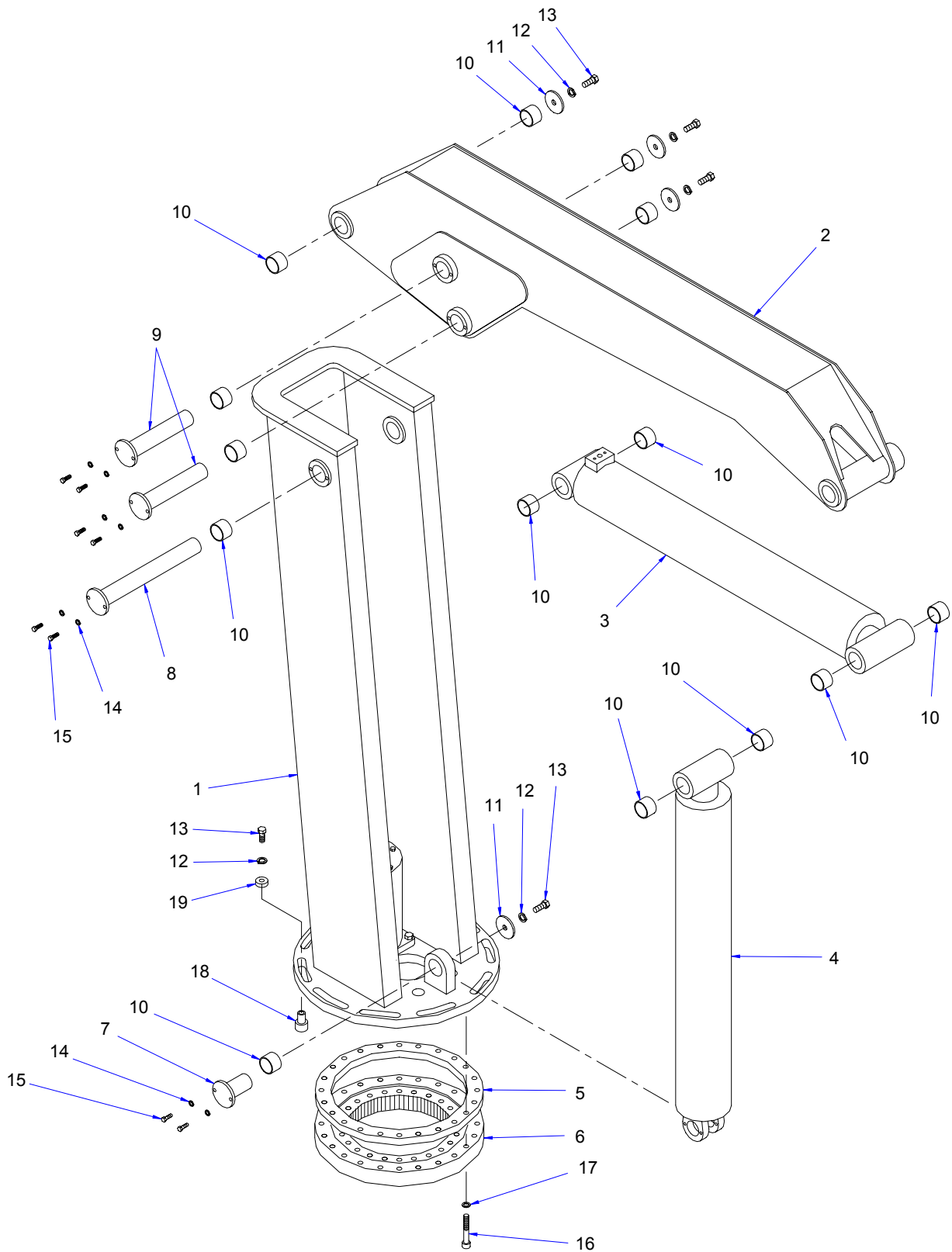
- ① MOTOR GASKET
- ③③ BUSHING
- ③④ VENT PLUG
- ③⑤ PLUG
- ③⑥ DOWELL PIN
- ③⑦ COTTER KEY
- ③⑧ DRIVE SCREW
- ③⑨ DRIVE PLATE

SWING DRIVE

P/N: 373044

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	368024-001	GASKET, HYD. MOTOR (1/32)
2	1	368024-002	HOUSING
3	1	368024-003	CYLINDER, BRAKE
4	1	368024-004	COVER, A2 PILOT
5	1	368024-005	PISTON, BRAKE
6	3	368024-006	GEAR, PLANET
7	3	368024-007	SHAFT, PLANET GEAR
8	1	368024-008	GEAR, INPUT
9	1	368024-009	DRIVER, BRAKE
10	3	368024-010	BEARING, THRUST
11	2	368024-011	GASKET
12	1	368024-012	GASKET
13	5	368024-013	CAPSCREW, FERRY 7/16-NC X 1 1/4
14	1	368024-014	CARRIER, PLANET
15	1	373044-015	SHAFT, OUTPUT
16	1	368024-016	WASHER, SPACER
17	1	368024-017	SPACER, BEARING
18	1	368024-018	BASE
19	7	368024-019	DISC, FRICTION
20	7	368024-020	DISC, BRAKE
21	14	368024-021	SPRING, BRAKE
22	1	368024-022	PLATE, BACK-UP
23	1	368024-023	NUT, CASTELL
24	2	368024-024	BEARING, CONE
25	2	368024-025	BEARING, CUP
26	1	368024-026	SEAL
27	2	368024-027	SNAP RING
28	1	368024-028	O-RING
29	1	368024-029	O-RING
30	1	368024-030	O-RING
31	1	368024-031	RING, BACK-UP
32	1	368024-032	RING, BACK-UP
33	1	368024-033	BUSHING, RED 1/2-1/8 NPT
34	1	368024-034	PLUG, VENT
35	1	368024-035	PLUG, STR, THD
36	2	368024-036	PIN, DOWELL 1/2 X 1 1/4
37	1	368024-037	KEY, COTTER 1/8 X 1 1/2
38	2	368024-038	DRIVE SCREW
39	1	368024-039	LABEL PLATE
40	6	368024-040	CAPSCREW, HX 3/8-NC X 4 1/2 G5
41	3	368024-041	SETSCREW, SOC. 5/16-NC X 1/2
42	6	368024-042	LOCKWASHER, 3/8

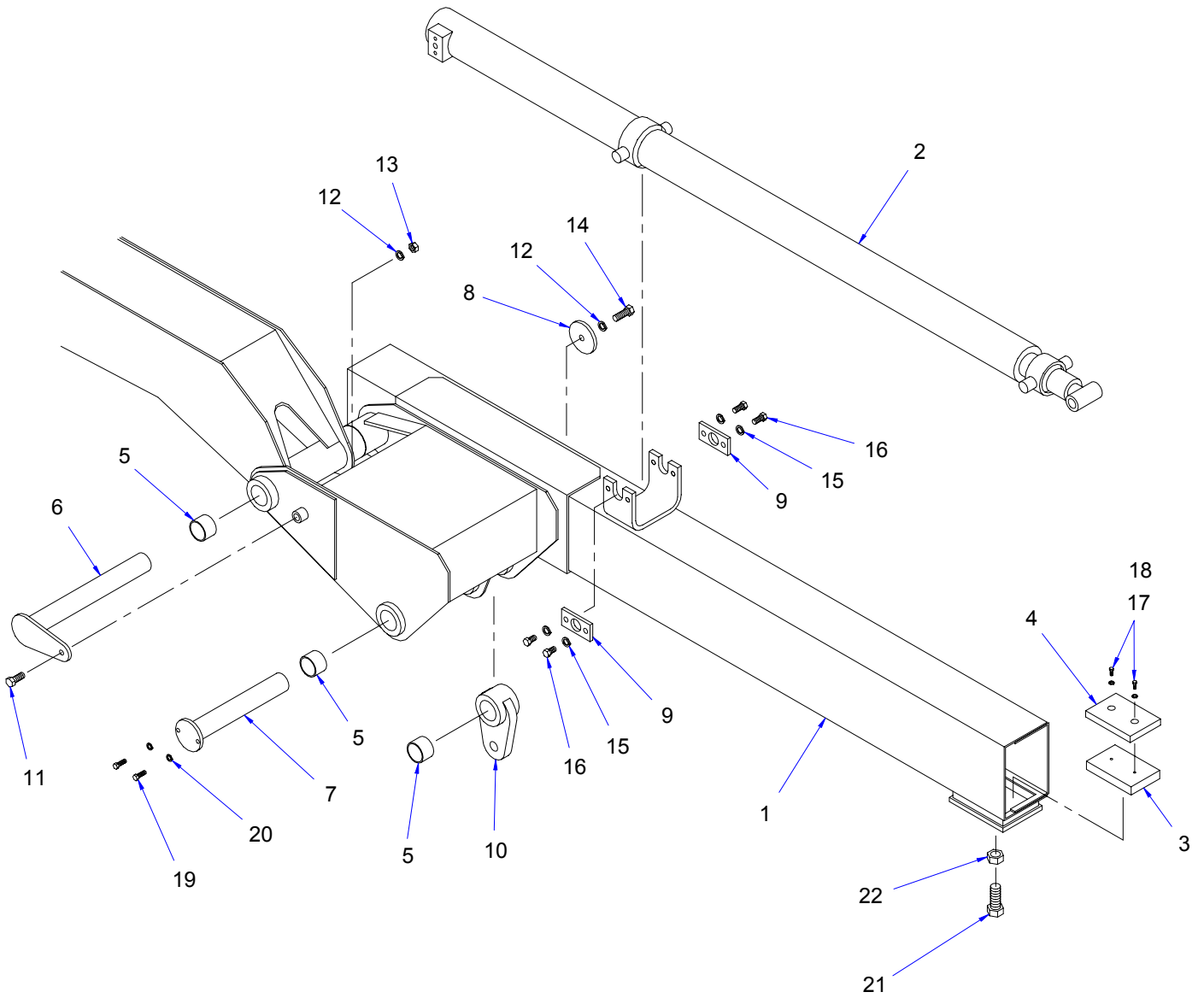
PEDESTAL/INNER BOOM ASSEMBLY A72A SERIES



PEDESTAL/INNER BOOM ASSEMBLY A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373081	PEDESTAL, MACHINE
2	1	373090	INNER BOOM MACHINE
3	1	373034	HYDRAULIC CYLINDER, OUTER BOOM
4	1	373032	HYDRAULIC CYLINDER, LIFT
5	1	373080	RING SPACER (OUTER RACE)
6	1	373031	ROTATION BEARING
7	1	367071	PIN, LIFT CYLINDER
8	1	373201	PIN
9	2	373203	PIN
10	15	367149	BUSHING
11	4	367049	WASHER, PIN
12	5	023800	WASHER, SP LK 5/8
13	5	013508	SCREW, HX HD 5/8-NC X 1 1/2 G5
14	8	021100	WASHER, SP LK 3/8
15	8	008702	SCREW, HX HD 3/8-NC X 1 1/4
16	24	373078	SCREW, SOC HD 5/8-NC X 4
17	24	023902	WASHER, FLAT 5/8 HARDENED
18	1	373086	PIN, SLID STOP
19	1	373087	WASHER, SLIDE STOP

OUTER BOOM ASSEMBLY A72A SERIES

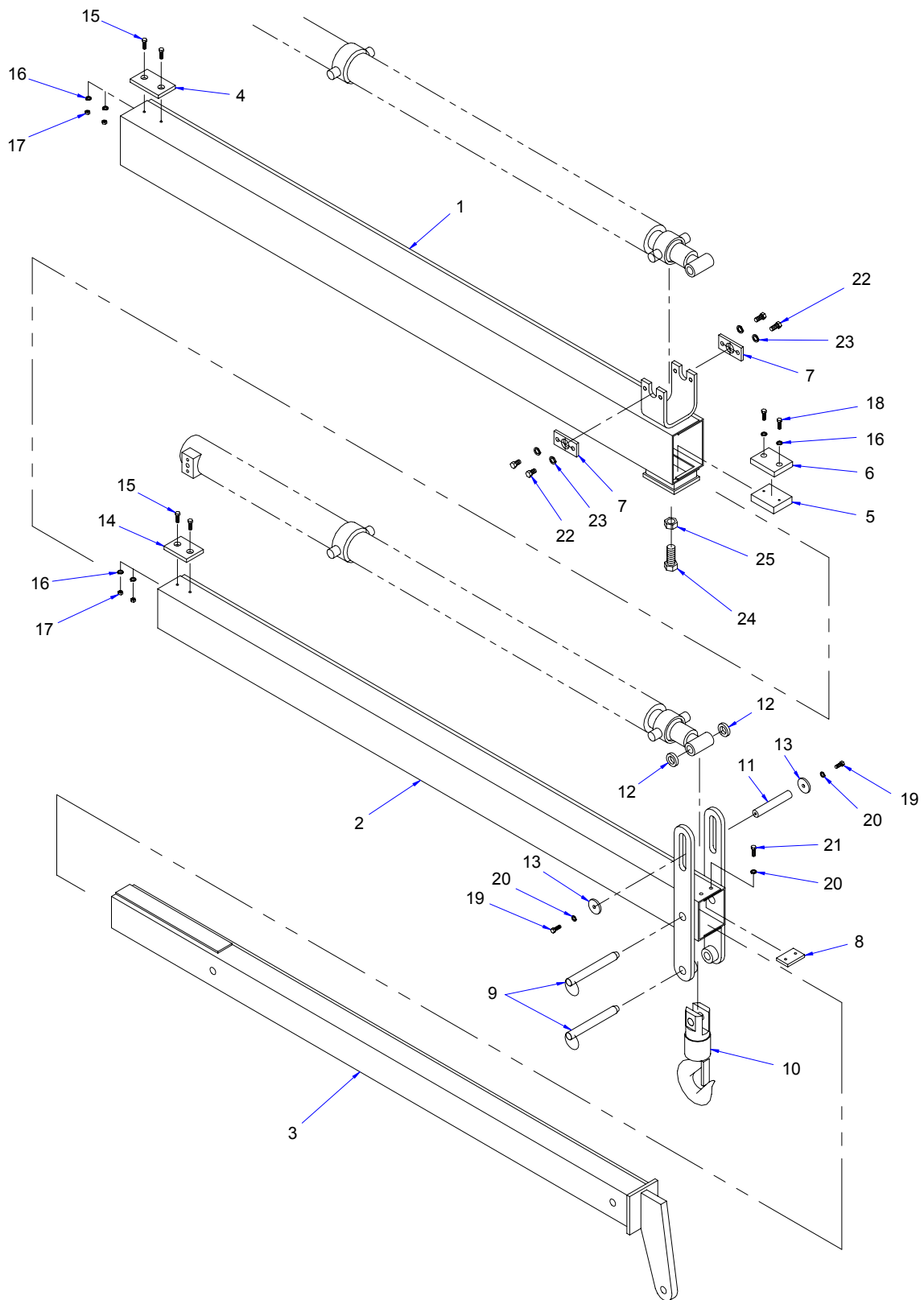


OUTER BOOM ASSEMBLY

A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373171	OUTER BOOM WELDMENT
2	1	373038	2-STAGE EXTENSION CYLINDER
3	1	373115	PLATE, SLIDE PAD
4	1	373116	PAD, SLIDE
5	6	367149	BUSHING
6	1	373205	PIN, WELDMENT
7	1	373207	PIN, WELDMENT
8	1	367049	WASHER, PIN
9	2	367052	CAP, TRUNNION
10	1	372199	LIFTING LUG
11	1	012502	SCREW, HXHD 5/8-NC X 2 1/4 G5
12	2	023800	WASHER, SP LK 5/8
13	1	018301	NUT, HX 5/8-NC
14	1	013508	SCREW, HX HD 5/8-NC X 1 1/2 G5
15	4	021500	WASHER, SP LK 1/2
16	4	010202	SCREW, HX HD 1/2-NC X 1
17	2	005500	SCREW, HX HD 1/4-NC X 3/4
18	2	020200	WASHER, SP LK 1/4
19	2	008702	SCREW, HX HD 3/8-NC X 1 1/4
20	2	021100	WASHER, SP LK 3/8
21	1	015101	SCREW, HX HD 1-NC X 2
22	1	372169	NUT, HEX-JAM 1-NC

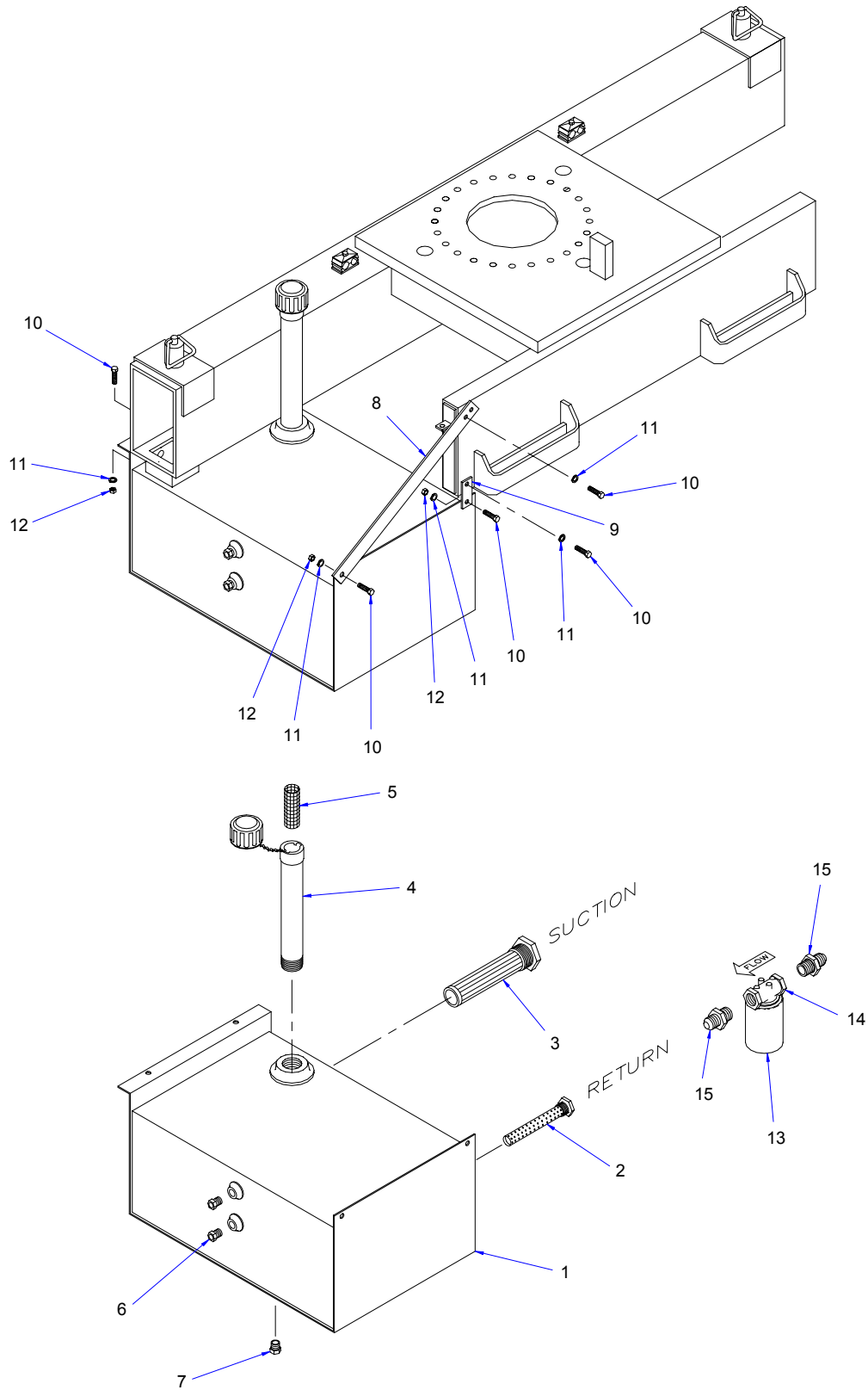
EXTENSION BOOM ASSEMBLY A72A SERIES



EXTENSION BOOM ASSEMBLY A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373180	BOOM, 1st STAGE
2	1	373187	BOOM, 2nd STAGE
3	1	373195	BOOM, MANUAL
4	1	373222	PAD, SLIDE 1st STAGE
5	1	373136	PLATE, SLIDE PAD
6	1	373137	PAD, SLIDE 1st STAGE
7	2	367052	CAP, TRUNNION
8	1	373192	BOOM STOP
9	2	373213	PIN ASSEMBLY WITH LANYARD
10	1	480366	HOOK SWIVEL
11	1	373212	PIN, 2nd STAGE EXTENSION
12	2	800133-003	TUBING, 1 3/4 O.D. X 5/16 WALL X 3/8 LONG
13	2	367106	WASHER, 2nd STAGE EXTENSION
14	1	373223	PAD, SLIDE 2nd STAGE
15	4	005604	SCREW, HX HD 1/4-NC X 1
16	6	020200	WASHER, SP LK 1/4
17	4	015900	NUT, HX 1/4-NC
18	2	005500	SCREW, HX HD 1/4-NC X 3/4
19	2	008701	SCREW, HX HD 3/8-NC X 1
20	4	021100	WASHER, SP LK 3/8
21	2	008400	SCREW, HX HD 3/8-NC X 3/4
22	4	010202	SCREW, HX HD 1/2-NC X 1" LG. G5
23	4	021500	WASHER, SP LK 1/2
24	1	015101	SCREW, HX HD 1-NC X 2
25	1	372169	NUT, HX-JAM 1-NC

RESERVOIR ASSEMBLY A72A SERIES



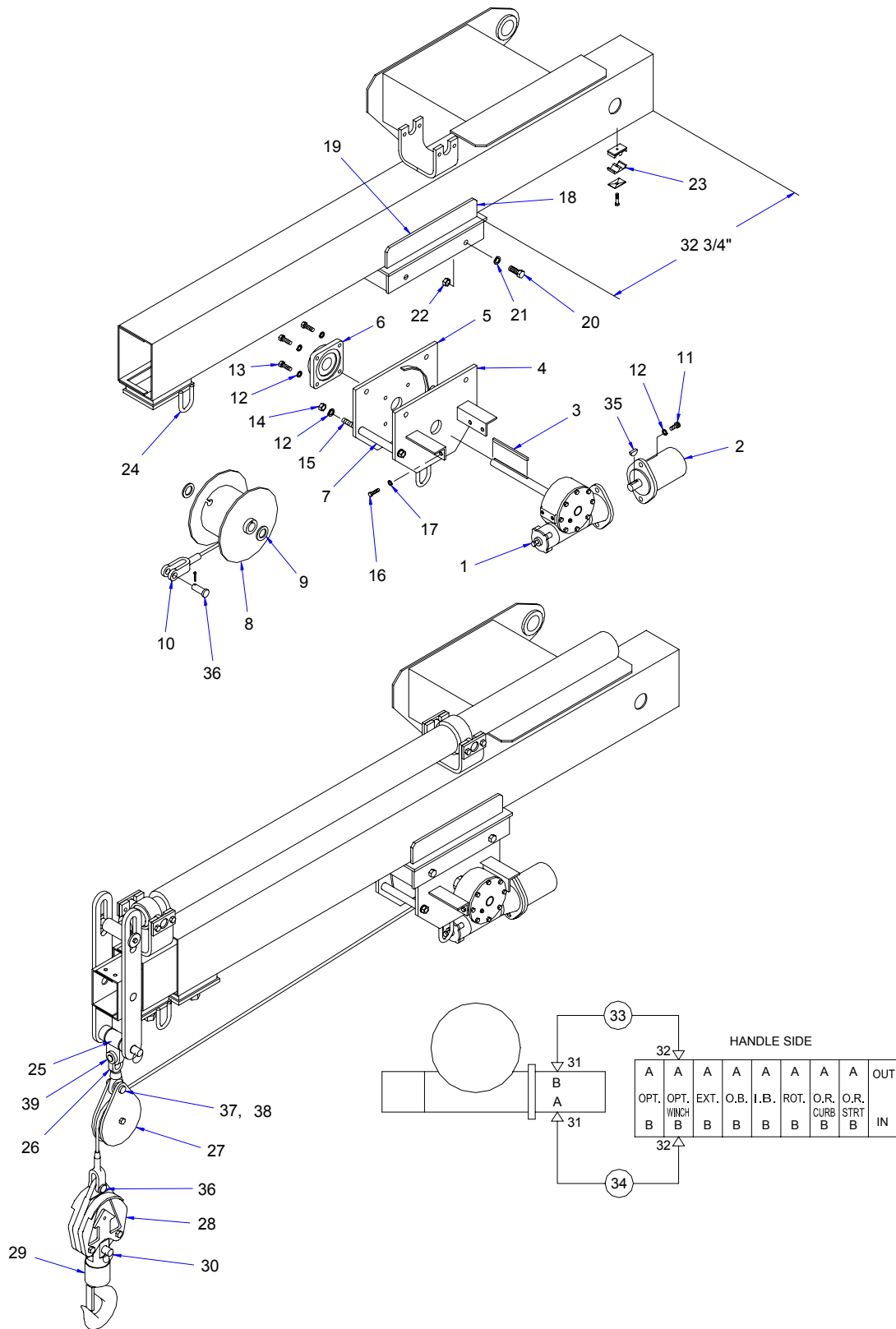
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RESERVOIR ASSEMBLY

A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373217	RESERVOIR WELDMENT
2	1	750708	STRAINER DIFFUSER
3	1	750707	STRAINER SUCTION
4	1	372207	FILLER NECK ASSEMBLY
5	1	367170	SCREEN, INLET
6	2	360150	SIGHT PLUG
7	1	750477	PLUG, PIPE
8	1	372204	HANGER, RESERVOIR (LONG)
9	1	372205	HANGER, RESERVOIR (SHORT)
10	6	008701	SCREW, HXHD 3/8-NC X 1
11	6	021100	WASHER, SP LK 3/8
12	4	330372	NUT, HX 3/8-NC
13	1	360277	SPIN-ON FILTER, (10 MICRON)
14	1	367209	FILTER HEAD
15	2	367210	ADAPTER, STR. -16 ORM / -12 JIC

WINCH ASSEMBLY A72A SERIES

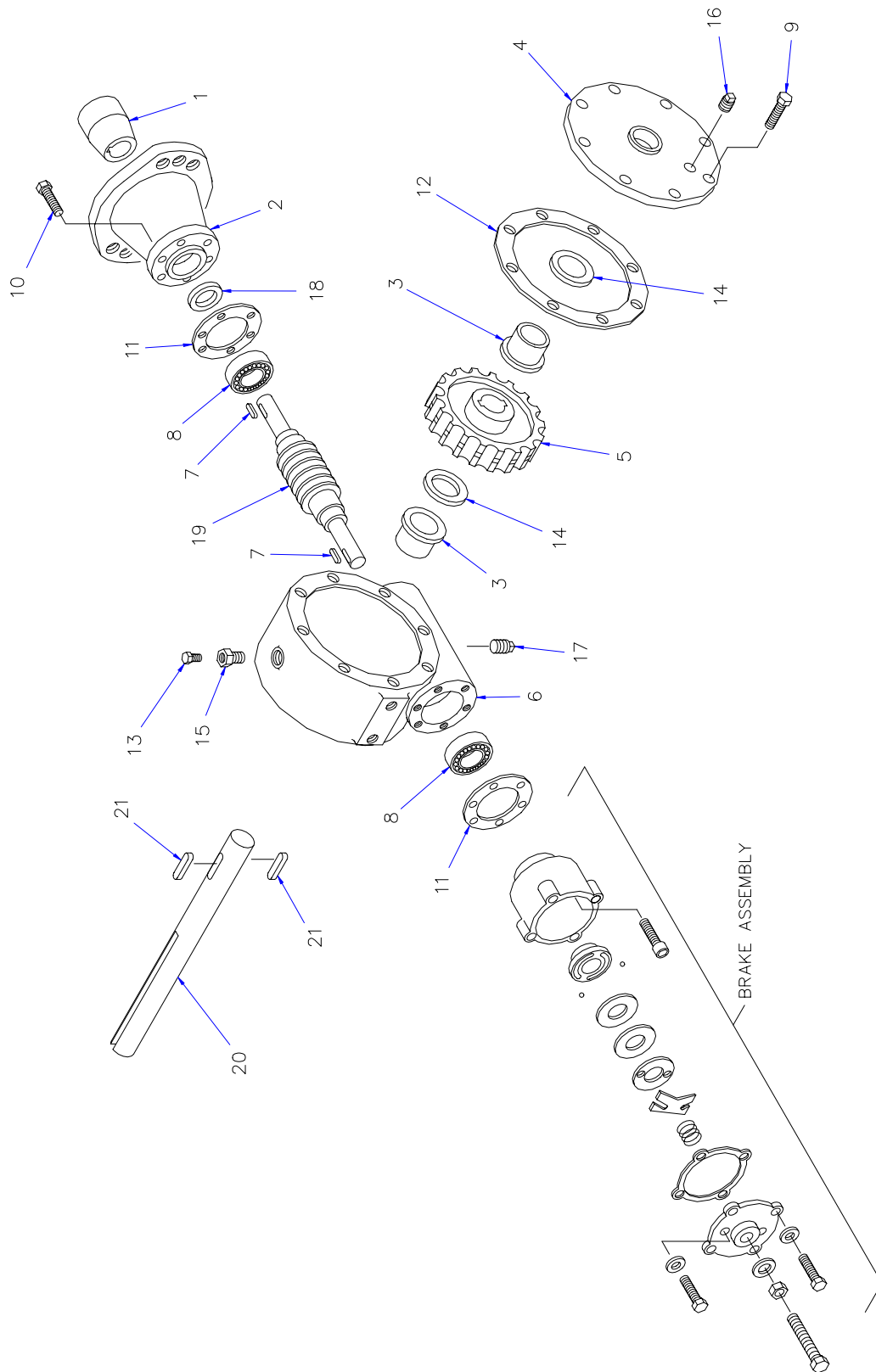


WINCH ASSEMBLY

A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	367403	ACTUATOR
2	1	367407	HYDRAULIC MOTOR
3	1	372234	KEY, SQUARE 1/2 X 4
4	1	372228	SIDEPLATE WELDMENT (WINCH SIDE)
5	1	372230	SIDEPLATE WELDMENT (BEARING SIDE)
6	1	367402	BEARING, 4-BOLT FLANGE
7	2	480069	SPACER TUBE
8	1	367399	DRUM
9	2	367404	SPACER
10	1	367313	CABLE ASSEMBLY
11	2	368119	SCREW, SOC. HD 1/2-NC X 1 1/4 LG.
12	10	021500	WASHER, SP-LK 1/2
13	4	010201	SCREW, 1/2-NC X 1 1/2 G5
14	4	017701	NUT, HX 1/2-NC
15	2	480070	SPACER ROD
16	4	367406	SCREW, HX HD 7/16-NC X 1
17	4	750223	WASHER, SP-LK 7/16
18	1	372235	BOX, ACTUATOR WELDMENT
19	2	372236	HANGER, ACTUATOR
20	4	012198	SCREW, HX HD 5/8-NC X 1 3/4 G8
21	4	023800	WASHER, SP-LK 5/8
22	4	018301	NUT, 5/8-NC
23	1	368142	HOSE CLAMP
24	1	230400	HOIST CABLE HOOK
25	1	368175	ADAPTER, BLOCK
26	1	367306	SWIVEL, SHEAVE BLOCK
27	1	368177	SNATCH BLOCK ASSEMBLY
28	1	368178	OVERHAUL ASSEMBLY
29	1	480366	HOOK SWIVEL
30	1	330009	POSITION PIN
31	2	372041	ADAPTER, STR. -10 O-RING / -8 JIC
32	2	372195	SWIVEL, -10 O-RING / -8 JIC
33	1	812306-285	HOSE ASSEMBLY
34	1	812309-285	HOSE ASSEMBLY
35	1	367407-001	KEY, WOODRUFF
36	1	367313-003	PIN
37	1	360607	PIN
38	1	360124	HITCH PIN
39	1	367306-001	PIN

WINCH ASSEMBLY A72A SERIES



WINCH ASSEMBLY

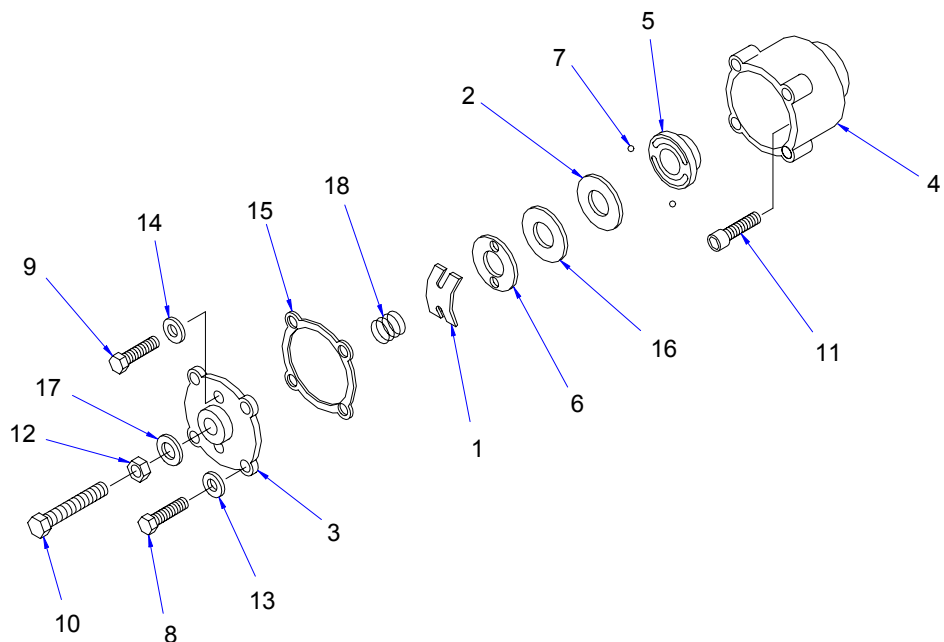
A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION	
1	1	367449	COUPLING ASSEMBLY	324212
2	1	367450	ADAPTER	300043
3	2	367451	BUSHING	308048
4	1	367452	COVER	328010
5	1	367453	GEAR R.H.	334016
6	1	367454	HOUSING, GEAR	338010
7	2	367455	KEY, RD. END	342051
8	2	367456	BALL BEARING	402044
9	8	367457	CAPSCREW, 5/16-NC X 3/4	414140
10	6	367458	CAPSCREW, 5/16-NC X 1 1/4	414138
11	2	367459	GASKET	442182
12	1	367460	GASKET	442183
13	1	367461	FITTING, RELIEF	456008
14	2	367462	QUAD RING	462003
15	1	367463	REDUCER	468002
16	1	367464	PLUG, PIPE	468010
17	1	367465	PLUG, PIPE	468011
18	1	367466	OIL SEAL	486067
19	1	367474	WORM, R.H.	368057
20	1	367487	SHAFT, OUTPUT	357160
21	2	367488	KEY	342120

WINCH BRAKE ASSEMBLY

A72A SERIES

1. Winch has right hand worm and gear, and spools under the drum, use number two slots for brake balls.
2. Install brake hub on winch worm with key.
3. Assemble balls in cam using hard grease to hold balls in place.
4. Install cam and balls, fitting balls in number two slots on hub.
5. Install brake disc.
6. Install retainer.
7. Install flat spring in brake housing cover (arch down).
8. Install brake housing cover, fitting pins in the slots of spring and holes in retainer.
9. Test brake by shifting winch to UP then DOWN to see if brake is working in proper rotation. If not, remove brake and locate brake balls in opposite set of slots.
10. Adjust to suit by tightening or loosening screw on outside of cover. When proper adjustment is obtained, secure screw with jam nut.



WINCH BRAKE ASSEMBLY

A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION	
1	1	367467	SPRING, FLAT	306036
2	1	367468	CAM PLATE	314003
3	1	367469	COVER	328057
4	1	367470	HOUSING, BRAKE	338038
5	1	367471	HUB	340024
6	1	367473	RETAINER PLATE	352020
7	2	367475	BALL	400007
8	4	367476	CAPSCREW, 5/16-18NC X 1 G5	414111
9	2	367477	CAPSCREW, 3/8-24NF X 1 G5	414398
10	1	367478	CAPSCREW, 1/2-20NF X 1 3/4 G5	414603
11	6	367479	CAPSCREW, 5/16-18NF X 1 SOC. HD	414865
12	1	367480	NUT, JAM 1/2-20NF HX	418067
13	4	367481	LOCKWASHER, 5/16	418163
14	2	367482	WASHER, FLAT 3/8 ALUM.	418184
15	1	367483	GASKET	442190
16	1	367484	THRUST PLATE	474004
17	1	367485	THREAD SEAL	486076
18	1	367486	SPRING	494010

HOIST OPERATION

Hoist and cranes lifting capacity are different. Hoist capacity is 4000 lbs. (1815 kgs). Cranes lifting capacity is determined by the boom position and length (refer to crane load chart). In many cases the hoist can pull a greater weight than the crane can withstand. Therefore, the weight of the load and loadline attachments must not exceed the lesser of the two capacities.

- 1) Make sure this manual has been thoroughly read by all crane operating personnel and supervisors.
- 2) Follow all knuckleboom operating instructions to unstow crane.
- 3) Do not operate boom extension(s) until enough hoist cable has been unwound from hoist drum in order to maintain

clearance between the boom tip and the traveling block.

- 4) Hoist down to detach hook from dead-man.
- 5) Always maintain clearance between the boom tip and traveling block when extending boom(s) by paying out hoist line to prevent two-blocking.
- 6) Always observe safe and practical operation procedures to avoid possible accidents. Refer to **"CRANE SAFETY TIPS AND PRECAUTIONS"**.
- 7) After completing lifting operations, retract all boom extensions, attach hoist hook to dead-man, (see fig.2 below) hoist up to remove slack from load line. To stow crane follow all knuckleboom operating instructions.

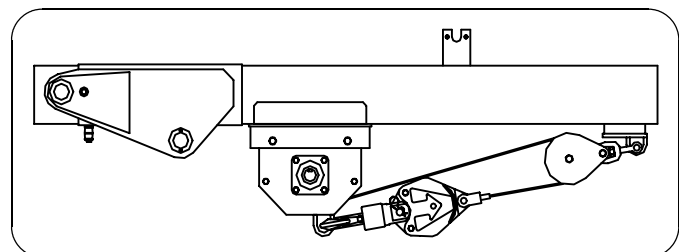
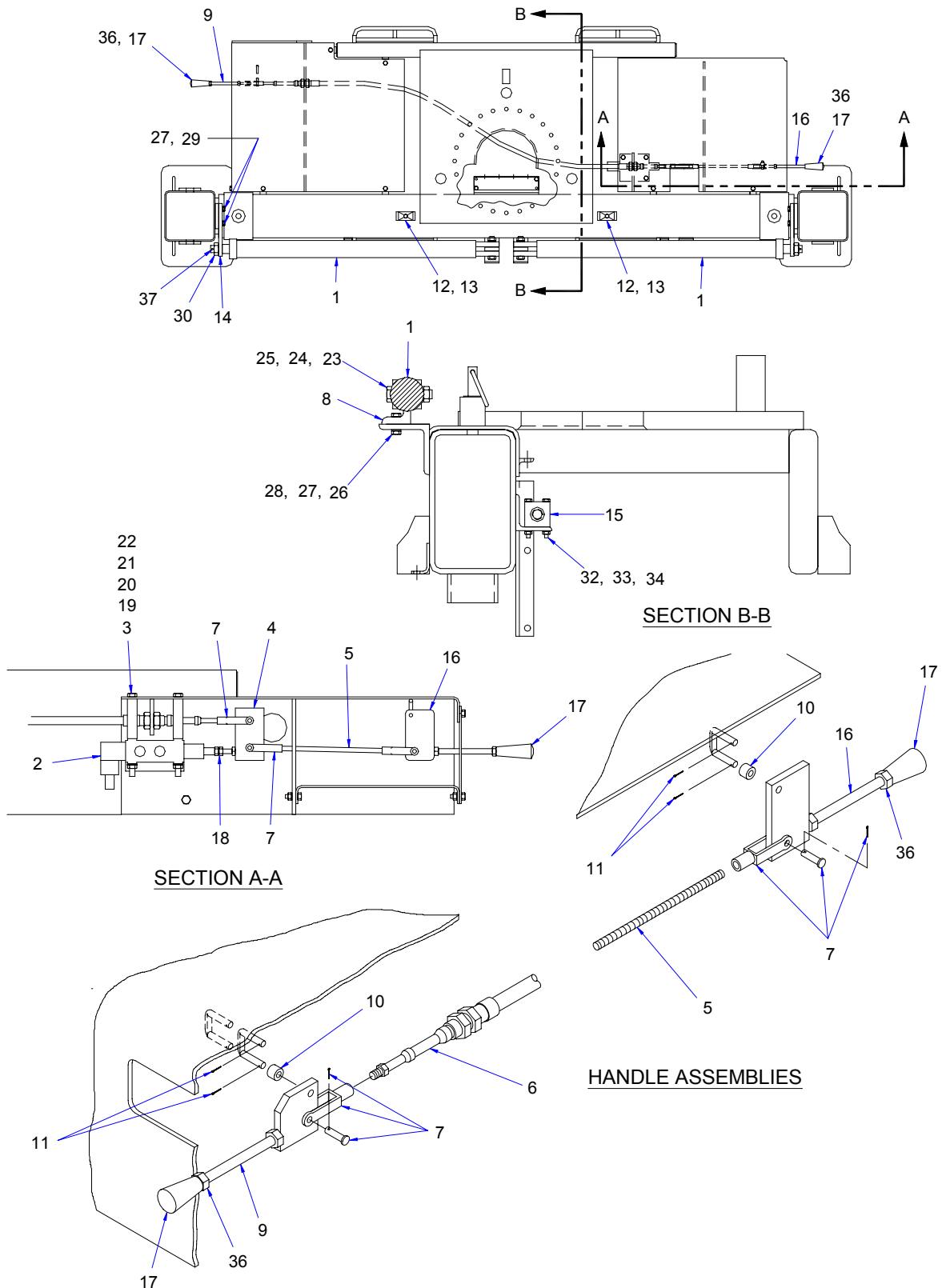


fig. 2
TWO-BLOCK STORAGE CONFIGURATION

SAFETY TIPS AND PRECAUTIONS OPTIONAL HOIST

- 1 Hoist capacity 4000 lbs (1815 kgs).**
- 2 Payout hoist loadline before or during boom extension to avoid two-blocking.**
- 3 Do not lift personnel with any wire rope attachment or hook.**
- 4 Never unreel last 5 wraps of hoist cable from drum.**
- 5 Check the hoist brake for proper operation before handling the load.**
- 6 Do not drag loads with hoist or boom.**
- 7 Always wind loadline under tension to assist proper spooling.**
- 8 Never attempt to lift loads which are not loose and free, i.e. frozen down material or poles out of ground.**
- 9 Know hoist and cranes lifting capacities before attempting to lift load. The weight of the load and loadline attachments must not exceed the lesser of the two capacities.**
- 10 Never use the two-block storage hook(s) to lift a load.**

POWER OUT OUTRIGGERS A72A SERIES

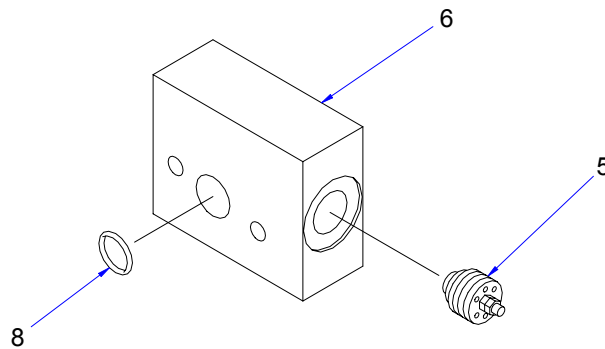
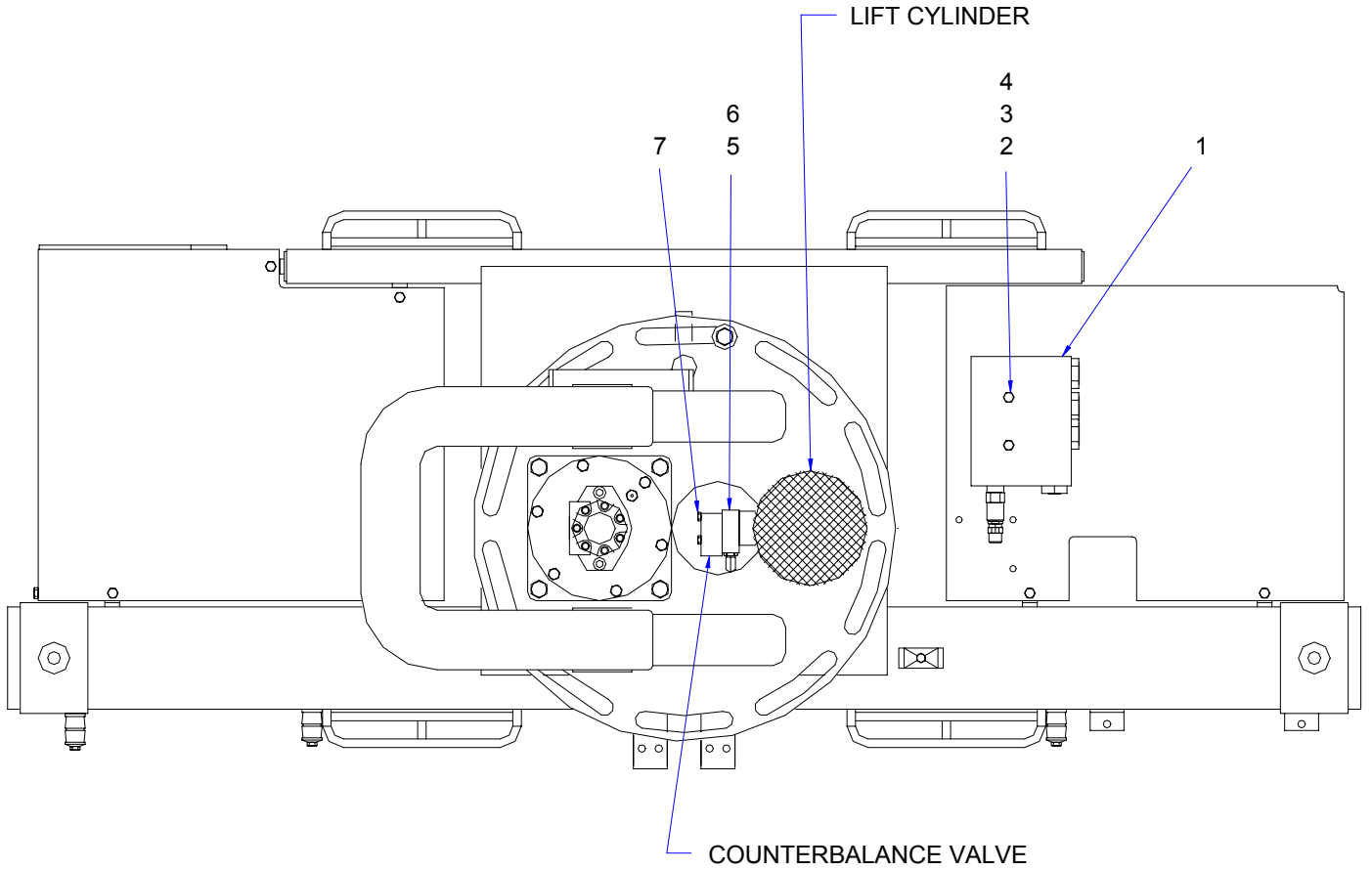


POWER OUT OUTRIGGERS

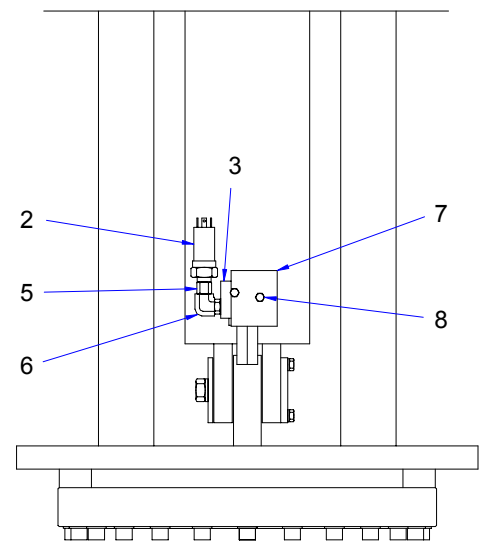
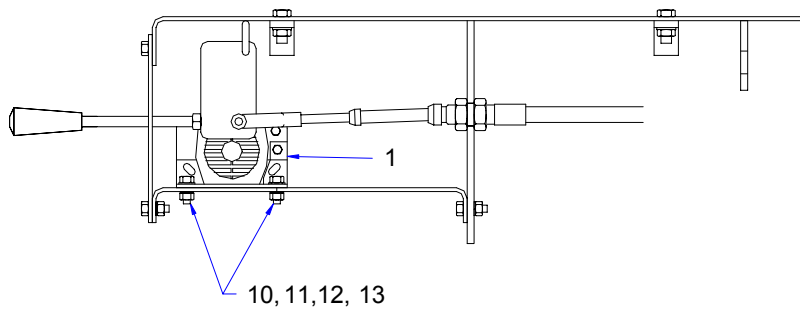
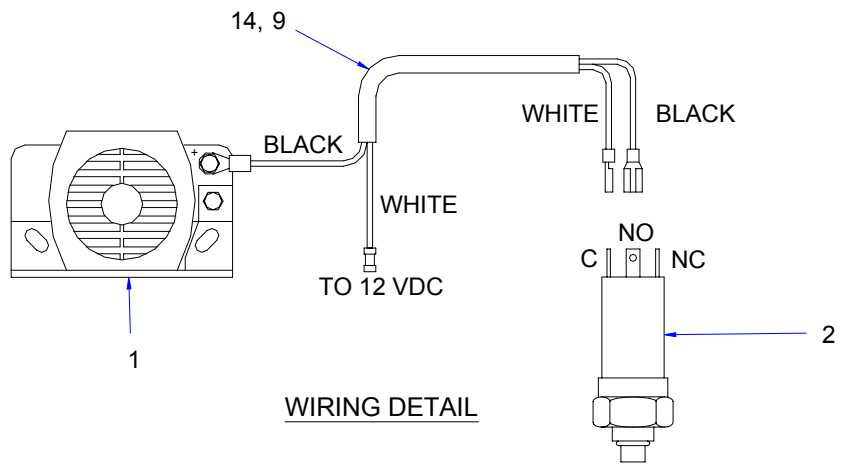
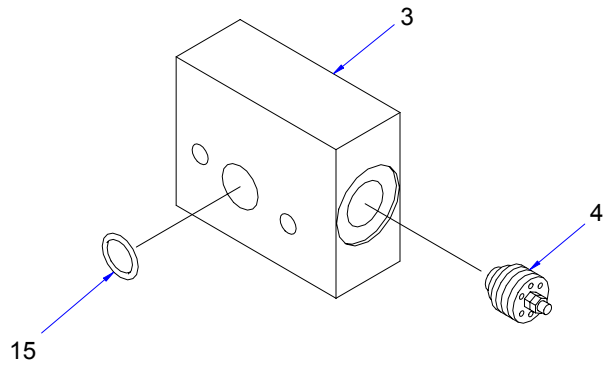
A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	2	373040	CYLINDER, POWER OUT OUTRIGGER
2	1	372311	5-WAY DIRECTIONAL VALVE
3	3	372306	SPACER, 5-WAY VALVE
4	1	372302	LINK PLATE WELDMENT
5	1	800513-001	ROD, ALL THREAD 5/16-24 X 8 1/2 LG.
6	1	372312	PUSH-PULL CABLE
7	4	372255	CLEVIS ASSEMBLY
8	2	372315	BRACKET, OUTRIGGER
9	1	372304	HANDLE, 5-WAY VALVE
10	1	372259	SPACER, NYLON
11	2	372258	PIN, COTTER
12	2	368142	CLAMP ASSEMBLY
13	2	372043	STACKING BOLT, 5/16-NC
14	2	372317	BRACKET, OUTRIGGER ROD END
15	1	372305	HEADER MANIFOLD
16	1	372270	HANDLE, (4 1/2")
17	2	372252	KNOB, BLACK
18	2	372308	NUT, HEX M8
19	3	008000	SCREW, HX HD 5/16-NC X 6
20	6	020901	WASHER, FLAT 5/16
21	3	020600	WASHER, SP-LK 5/16
22	3	016500	NUT, HX 5/16-NC
23	2	013505	SCREW, HX HD 5/8-NF X 2 3/4
24	2	023800	WASHER SP LK 5/8
25	2	018302	NUT, HX 5/8-NC
26	4	330394	SCREW, HX HD 3/8-NC X 1 1/2
27	8	021100	WASHER, SP LK 3/8
28	4	330372	NUT, HX 3/8-NC
29	4	008701	SCREW, HX HD 3/8-NC X 1
30	2	372169	NUT, HX-JAM 1-NC
31	-	-	-
32	2	006700	SCREW, HX HD 1/4-NC X 2 1/2
33	2	020200	WASHER, SP LK 1/4
34	2	015900	NUT, HX 1/4-NC
35	2	372321	DECAL, 5-WAY VALVE FUNCTION
36	2	330372	NUT, HX 3/8-NC
37	2	360124	PIN, HITCH

OVERLOAD ASSEMBLY A72A SERIES



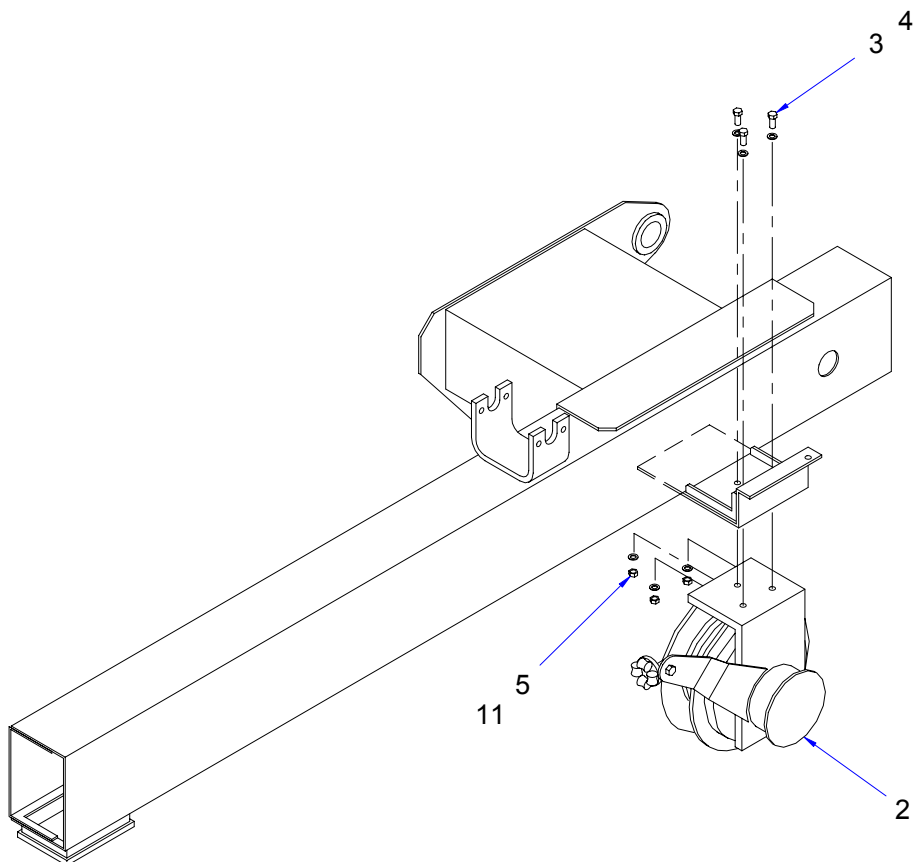
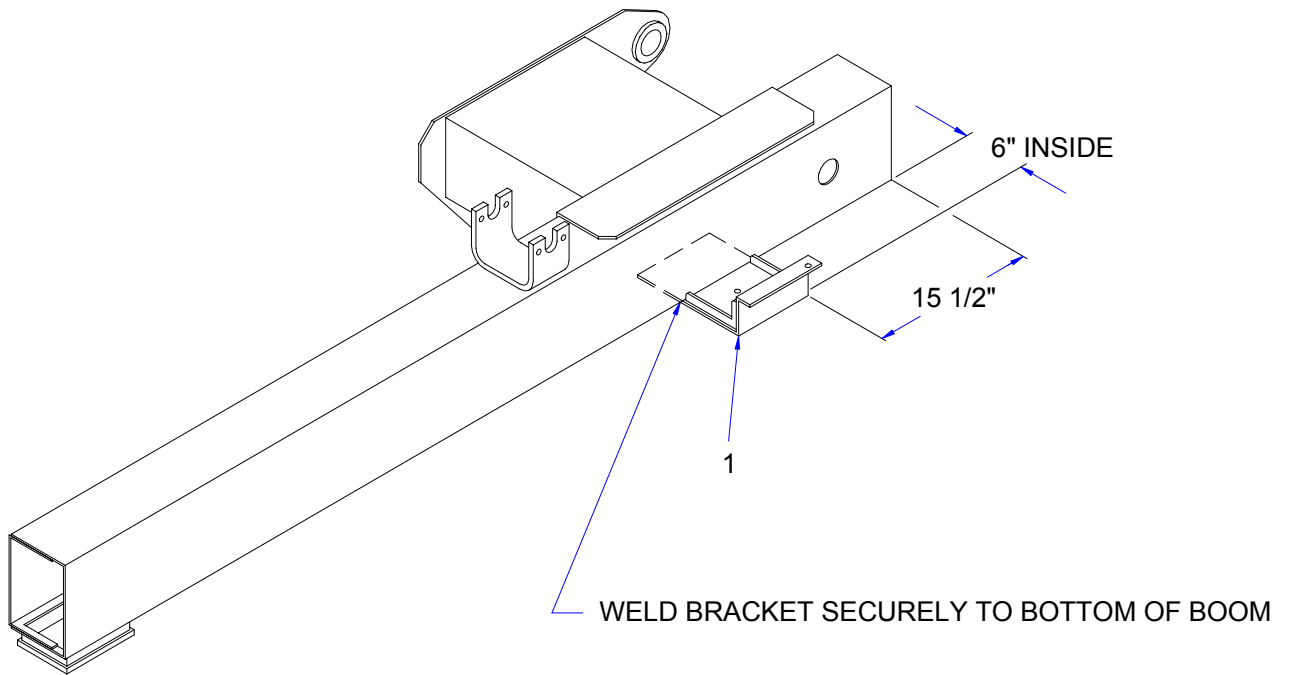
HORN ALERT A72A SERIES



HORN ALERT A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	750733	HORN ALERT
2	1	369610	PRESSURE SWITCH
3	1	368985	VALVE, SENSE MANIFOLD
4	1	368987	VELOCITY FUSE
5	1	369611	ADAPTER, STR. -6 OR(M) / -4 OR(F)
6	1	372054	ELL, 90° -6 OR(M) / -6 OR(F)
7	1	367122	COUNTERBALANCE VALVE
8	2	006700	SCREW, HX HD 1/4-NC X 2 1/2
9	1	372380	WIRE ASSEMBLY, HORN ALERT
10	2	005401	SCREW, HX HD 1/4-NC X 5/8
11	2	015900	NUT, HX 1/4-NC
12	2	020300	WASHER FLAT 1/4
13	2	020200	WASHER, SP LK 1/4
14	6'	750736	LOOM
15	1	368985-001	O-RING SEAL

ELECTRIC REEL A72A SERIES



ELECTRIC REEL A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372246	HOSEREEL BRACKET
2	1	368993	CABLE REEL
3	3	008701	SCREW, HX HD 3/8-NC X 1
4	3	021200	WASHER, FLAT 3/8 SAE
5	3	330372	NUT, HX 3/8-NC
6	3	001102	TERMINAL
7	1	367309	CORD CONNECTOR 3/4-NPT HUB
8	1	367317	LOCKING PLUG ASSEMBLY
9	1	367311	LOCKING CONNECTOR BODY
10	1	800628-005	30 FT. 16/3 CONDUCTOR
11	3	021100	WASHER, SP LK 3/8

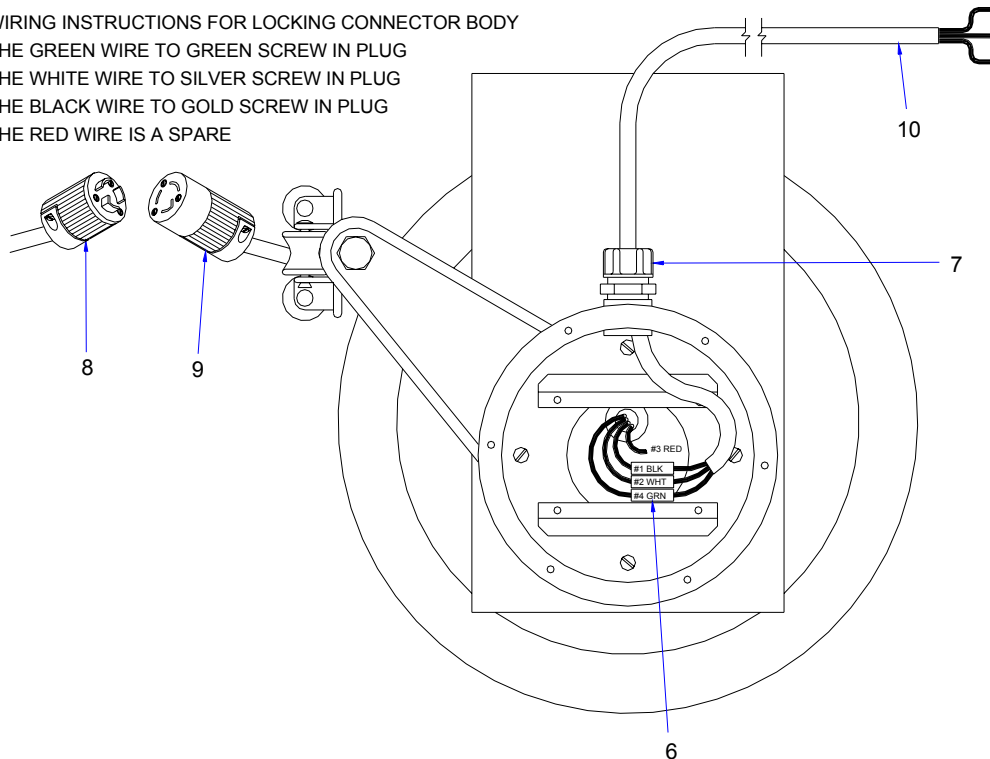
WIRING INSTRUCTIONS:

USE WIRES #1, #2, #4, FROM HOSE REEL
WIRE #3, IS A SPARE WIRE

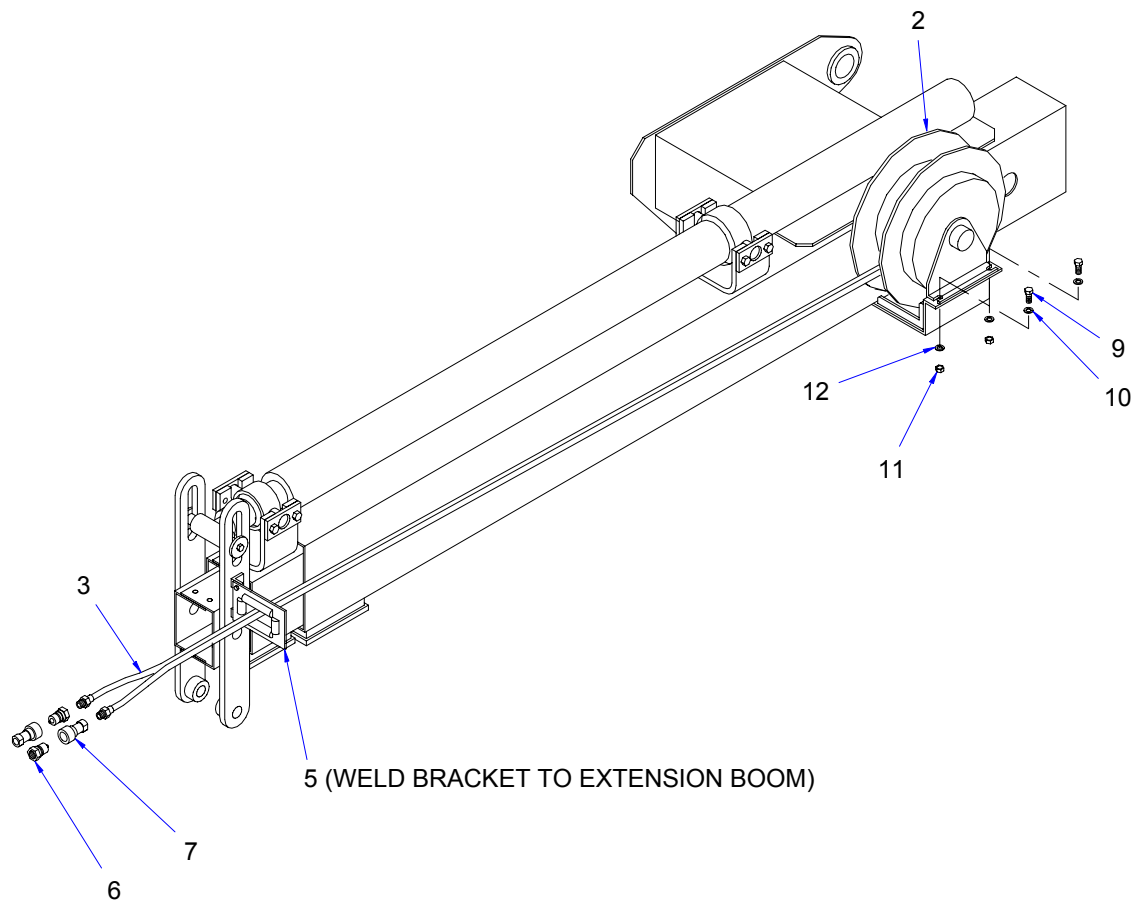
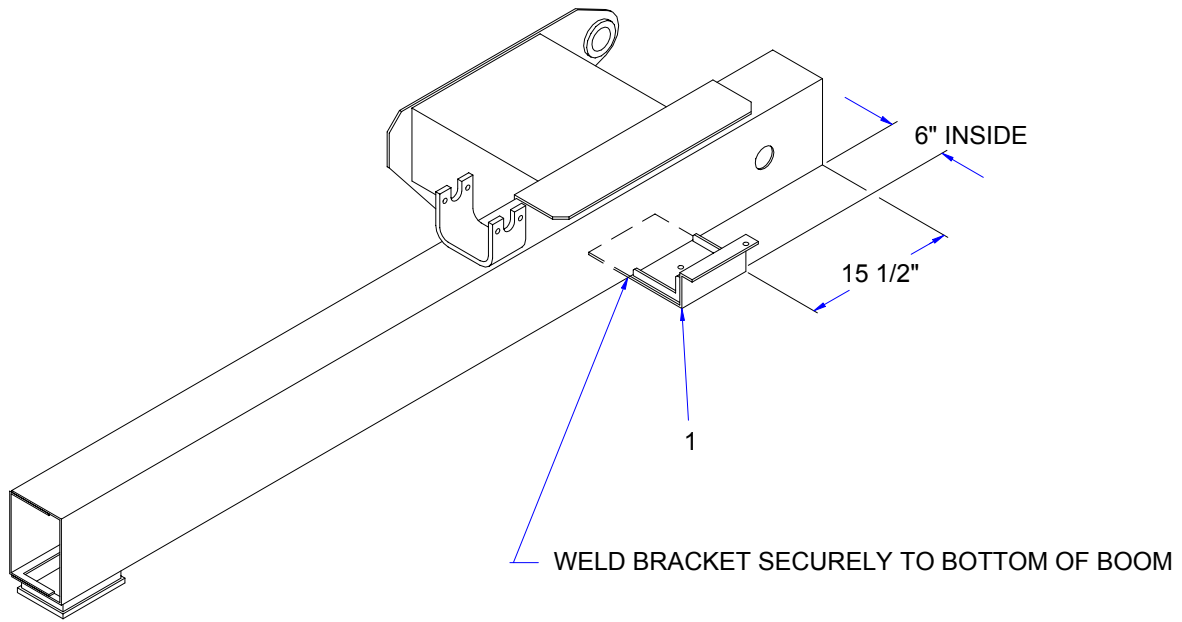
USING 30' ELECTRIC CABLE ITEM #10 CONNECT
THE GREEN WIRE TO WIRE #4 IN REEL
THE WHITE WIRE TO WIRE #2 IN REEL
THE BLACK WIRE TO WIRE #1 IN REEL

WIRING INSTRUCTIONS FOR LOCKING CONNECTOR BODY

THE GREEN WIRE TO GREEN SCREW IN PLUG
THE WHITE WIRE TO SILVER SCREW IN PLUG
THE BLACK WIRE TO GOLD SCREW IN PLUG
THE RED WIRE IS A SPARE

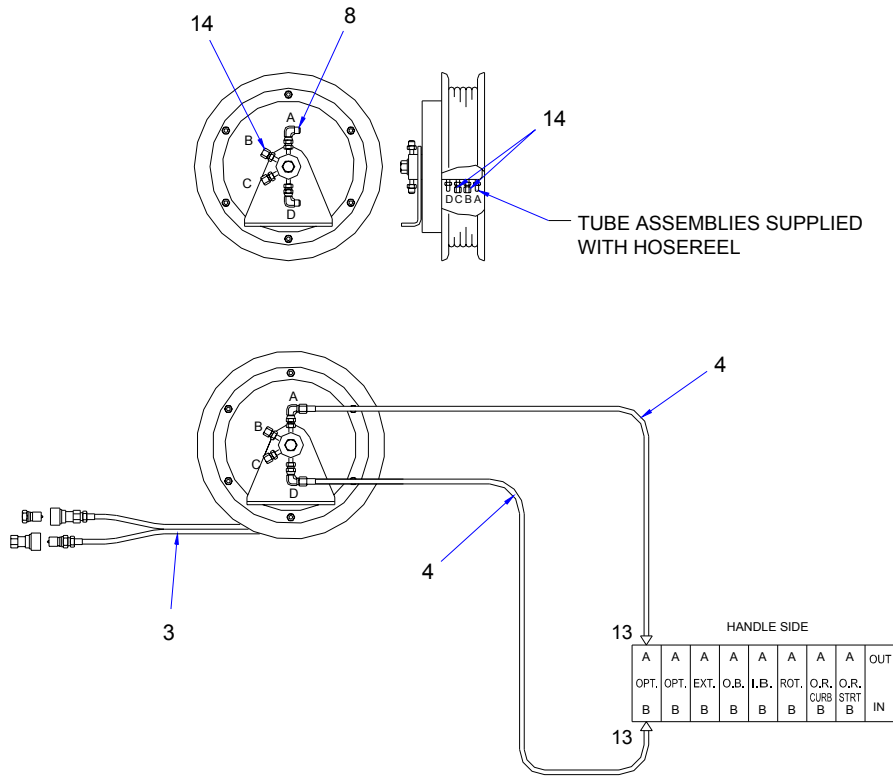


DUAL HOSE REEL A72A SERIES

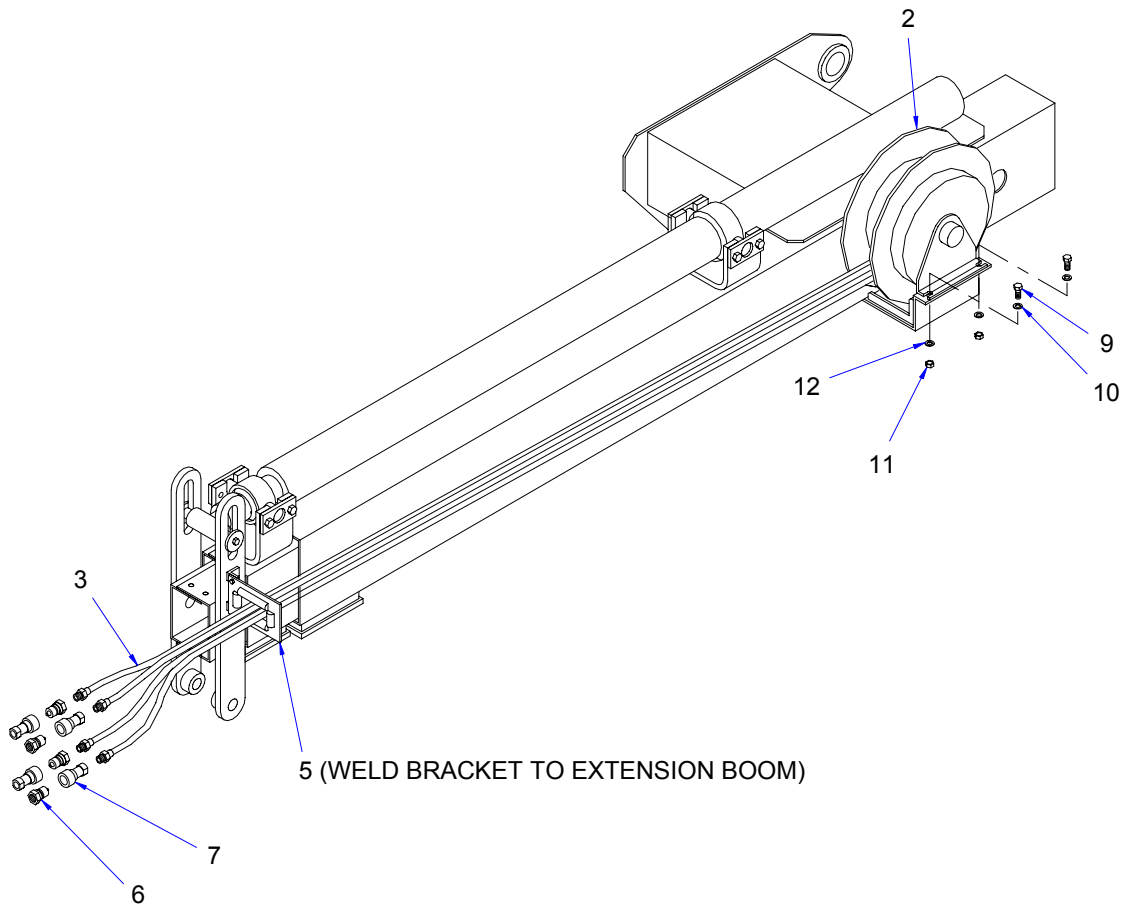
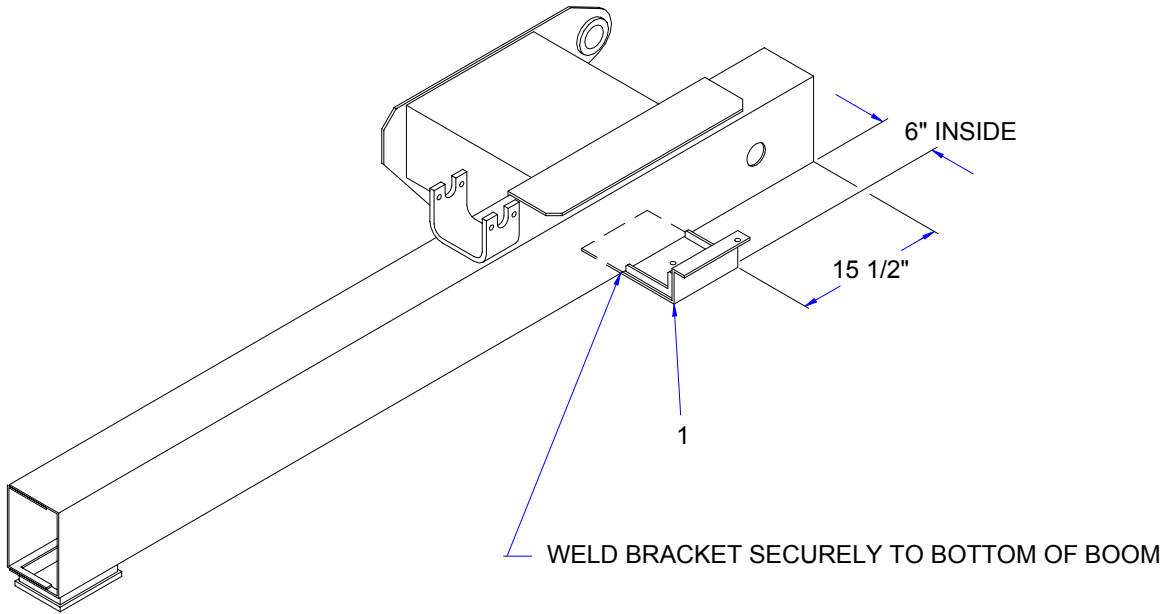


DUAL HOSE REEL A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372246	BRACKET, HOSEREEL
2	1	368992	HOSEREEL
3	1	368195	HOSE ASSEMBLY, 5/16 TWIN 231" LONG
4	1	372053	HOSE ASSEMBLY, 5/16 TWIN 271" LONG
5	1	368202	HOSEREEL GUIDE ASSEMBLY
6	2	368197	NIPPLE, QUICK DISCONNECT, 3/8-NPT
7	2	368196	COUPLER, QUICK-DICCONNECT
8	2	372052	ELL, 90° -5 JIC / -5 JIC FEMALE SWIVEL
9	2	008701	SCREW, HX HD 3/8-NC X 1
10	2	021200	WASHER, FLAT 3/8
11	2	330372	NUT, HX 3/8-NC
12	2	021100	WASHER, SP LK 3/8
13	2	202755	ADAPTER, STR. -10 O-RING / -6 JIC
14	4	368214	CAP, -5 JIC

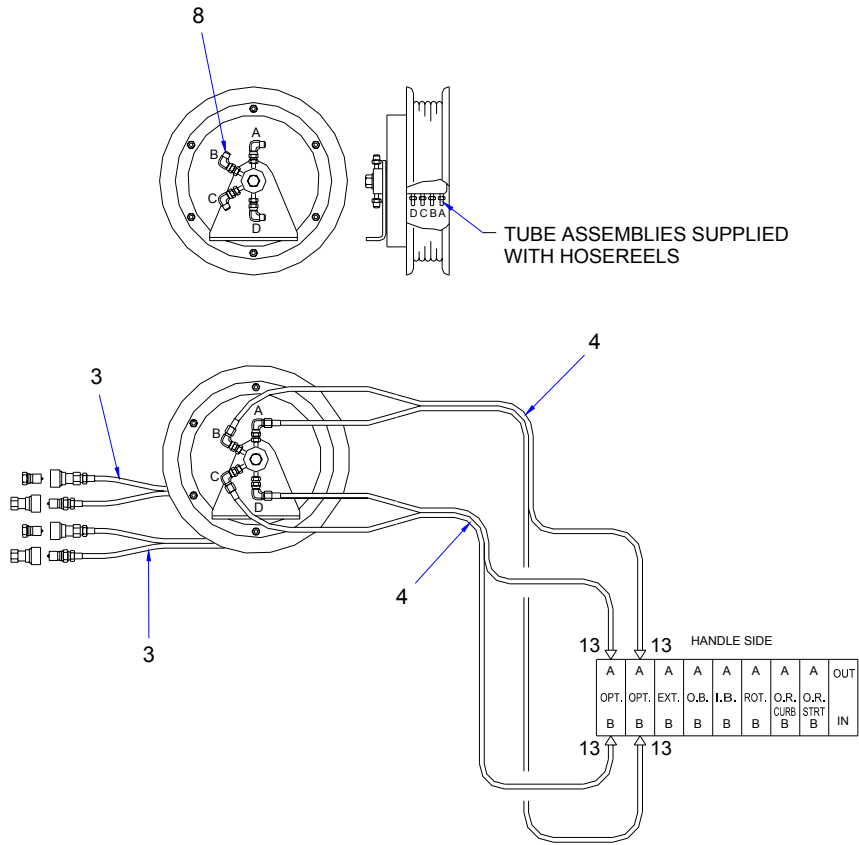


QUAD HOSE REEL A72A SERIES



QUAD HOSE REEL A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372246	BRACKET, HOSEREEL
2	1	368992	HOSEREEL
3	2	368195	HOSE ASSEMBLY, 5/16 TWIN 231" LONG
4	2	372053	HOSE ASSEMBLY, 5/16 TWIN 271" LONG
5	1	368202	HOSEREEL GUIDE ASSEMBLY
6	2	368197	NIPPLE, QUICK DISCONNECT, 3/8-NPT
7	2	368196	COUPLER, QUICK-DICCONNECT
8	4	372052	ELL, 90° -5 JIC / -5 JIC FEMALE SWIVEL
9	2	008701	SCREW, HX HD 3/8-NC X 1
10	2	021200	WASHER, FLAT 3/8
11	2	330372	NUT, HX 3/8-NC
12	2	021100	WASHER, SP LK 3/8
13	4	202755	ADAPTER, STR. -10 O-RING / -6 JIC



KNUCKLEBOOM PROPORTIONAL SYSTEM

"HOW IT WORKS"

- 1 System consists of a pressure compensated proportional flow control valve with inlet relief, directional solenoid control valve, proportional amplifier, and a hand held pendant.**
- 2 System has two operational modes; (1) manual control (2) pendant control.**

position, allowing pendant control of crane functions only. When pendant on-off switch is turned on, power is applied to the directional solenoid control valves power build-up section, proportional amplifier, proportional flow control valve, and power relay. The power relay, (when powered up) deactivates switching relays thus allowing pendant control of crane functions only. In this mode,

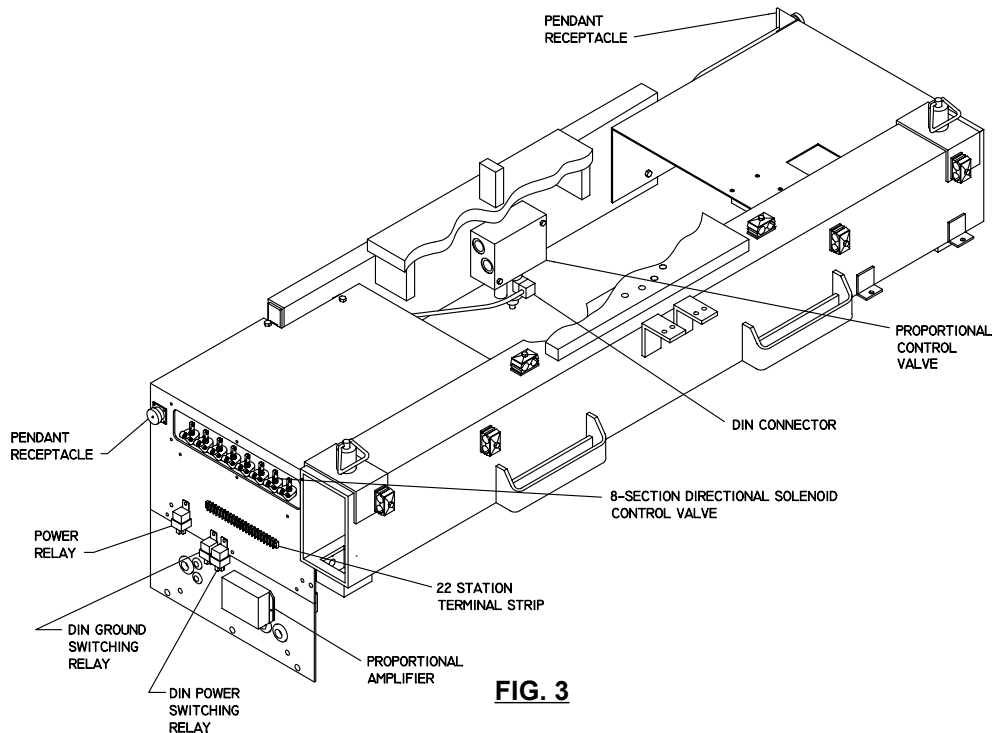


FIG. 3

- 3 Manual control is obtained when the pendant is not plugged into the system or if pendant is plugged into system and the on-off power switch is in the off position, allowing manual control of directional solenoid control valve. In this mode, the switching relays turn the proportional flow control valve full on allowing all hydraulic flow and pressure to be directed to the directional solenoid control valve.**
- 4 Pendant control is obtained when the pendant is plugged into the system and the pendant on-off power switch is in the on**

hydraulic flow and pressure will flow from the pump through the proportional flow control valve directly to tank (minimum crane speed) until pendant trigger is pulled. Pulling trigger increases voltage to the amplifier that regulates the proportional flow control valve thus diverting less hydraulic flow and pressure to tank and directing more flow and pressure to the directional solenoid control valve (maximum crane speed).

- 5 The proportional flow control valve varies the speed of the crane proportionally by the**

KNUCKLEBOOM PROPORTIONAL SYSTEM

"HOW IT WORKS"

amount of current sent to its coil by the proportional amplifier. With no current applied to the coil (trigger released), the proportional flow control valve is turned off. This directs full flow and pressure to tank (minimum crane speed). With maximum current applied to the coil (trigger pulled), the proportional flow control valve is turned full on. This directs full flow and pressure to crane (maximum crane speed).

- 6 The directional solenoid control valve is an eight section valve with manual and on-off solenoid controlled valve sections, a power build-up section, and inlet relief valve. The manual sections control outriggers and some option functions. The solenoid controlled actuator assembly contains two 3-way normally closed solenoid operated valves and a pilot operated piston coupled directly to the control valve spool. When a solenoid is energized, the solenoid valve opens and pilot pressure from the power build-up section is applied to one side of the piston causing the spool to shift from its neutral position. When both solenoids are de-energized, both sides of the piston are open to exhaust and the spool is spring returned to the neutral position. An externally adjustable needle valve (adjustable fitting) controls the spool's rate of travel to the power positions by restricting the rate the spool will travel when the solenoid is activated. Adjusting the needle valve clockwise (in) will decrease exhaust pilot flow. The power build-up section installed in the last work section of the control valve is necessary to provide a pilot source of 2 to 4 gpm at 300 psi to actuate the control valve spools. The inlet relief valve sets system pressure (2600 psi).
- 7 The digital control pulse width modulator proportional amplifier controls the proportional flow control valve which regulates the speed of the crane. The amplifier takes an input command voltage from pendant trigger and produces a linear current output which is pulse width modulated, to the proportional flow control valve's coil. The output is capable of driving 10 amps. maximum while maintaining minimal heat build-up. The pulse width modulation along with an integrated "Dither" circuit providing high efficiency and stability. The "Dither" is an oscillating movement of the valve that lessens the tendency of the valve to "stick" when commanded to move, thus providing smooth valve operation.
- 8 The pendant is a hand held control station with 40 feet of cable which will allow an operator to control the crane's movement and speed remotely. The pendant consists of four 3-position momentary switches which control the crane's movement, two 3-position momentary switches which control auxiliary equipment, one 3-position momentary switch which controls engine start-stop, one 2-position maintained on-off switch which controls power to system, one potentiometer (trigger) which is used to vary the control voltage to the amplifier when the trigger is pulled. The pendant switches control which crane function is activated and the trigger will control crane speed. Always select crane function first then pull trigger to get the desired crane speed.
- 9 DIN ground switching relay, switches the ground control of the proportional flow control valve from the amplifier to ground depending on the mode of operation. In the manual mode the relay is activated which provides ground to the DIN connector. While in the pendant mode the relay is deactivated, which allows the amplifier's out-put to control the proportional flow control valve.

KNUCKLEBOOM PROPORTIONAL SYSTEM

"HOW IT WORKS"

Note: The amplifier sinks ground for the proportional flow control valve.

10 DIN power switching relay, switches the power source of the proportional flow control valve. In the manual mode relay is activated which provides 12 VDC from terminal #14 to the proportional flow control valve's DIN connector. While in the pendant mode relay is deactivated which provides 12 VDC from the power relay to the proportional flow control valve's DIN connector. In both manual and pendant modes the DIN connector is always powered when the master switch is on (12 VDC nominal, at terminal #14).

11 Power relay is activated by the pendant on-off switch. In the manual mode, power relay is deactivated which activates both DIN switching relays. While in the pendant mode the power relay is activated which powers up the power build up section, proportional amplifier and proportional flow control valve's DIN connector.

12 To manually override the proportional flow control valve, screw in (clockwise) the manual override located on the coil at proportional flow control valve (see figure 4). This will allow full flow and pressure to the directional solenoid control valve

(maximum crane speed). **Note:** screwing manual override in half way allows half flow and pressure to tank and half flow and pressure to crane (half crane speed). manual override should only be used when there is a problem with proportional amplifier, switching relays, and or 12 VDC source.

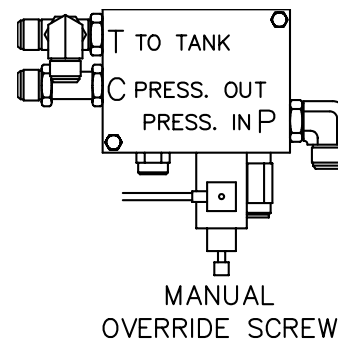


FIG. 4

13 Master control switch mounted in truck cab controls the power to proportional system. Master switch should be a two position maintained on-off switch. When master switch is on, 12 VDC is applied to terminal #14, turning proportional system on, while in the off position the proportional system is turned off. **Note:** master switch should be connected to a circuit which is hot only when truck ignition is in the on position.

HYDRAULIC AND ELECTRICAL HOOKUPS

HYDRAULIC

- 1 Pressure hose from pump to proportional flow control valve inlet specifications. Hose size: -12(SAE 100R2 TYPE AT) at desired length. Hose end fittings: -12 JIC female swivel, both ends. Connect pressure hose at proportional flow control valve only.
- 2 Return hose from directional solenoid control valve to return filter and return filter to reservoir. Hose size: -12 (SAE 100R2 TYPE AT) at desired length. Hose end fittings: -12 JIC female swivel, both ends. Connect return hose at either the directional solenoid valve or the proportional flow control valve return ports.

ELECTRICAL

- 1 Connect chassis ground wire (black wire of 16/2 conductor power cable) to chassis. This will provide the ground for the knuckleboom proportional system.
- 2 Connect power wire (white wire of 16/2 conductor power cable) to a master switch mounted in truck cab. Master switch should be a two position maintained on-off switch, which is connected to an electrical circuit that is hot only when the truck ignition key is in the on position.

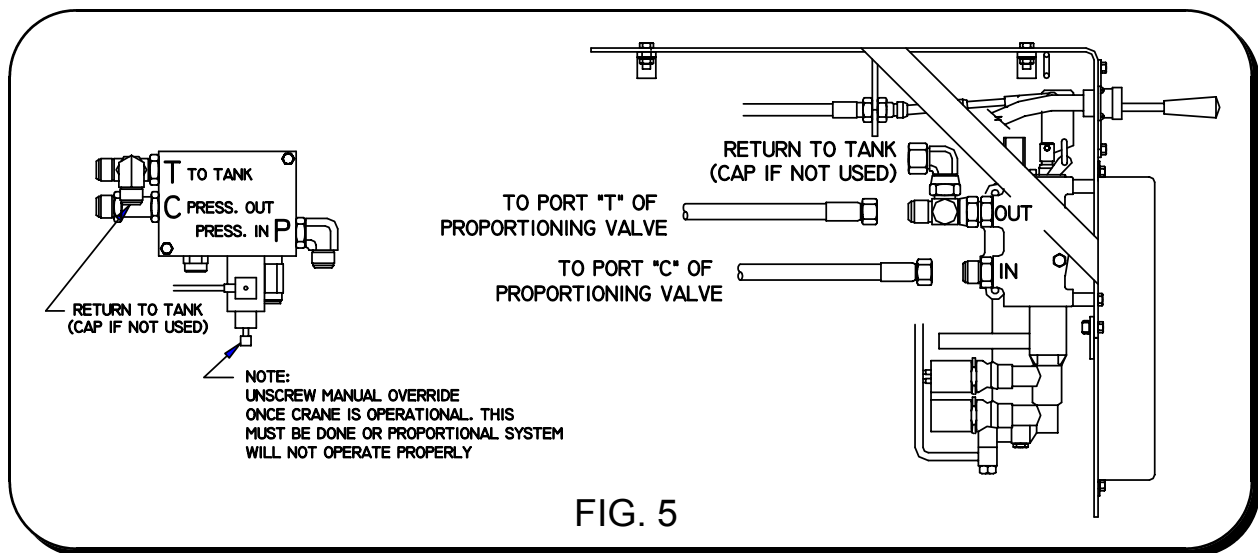


FIG. 5

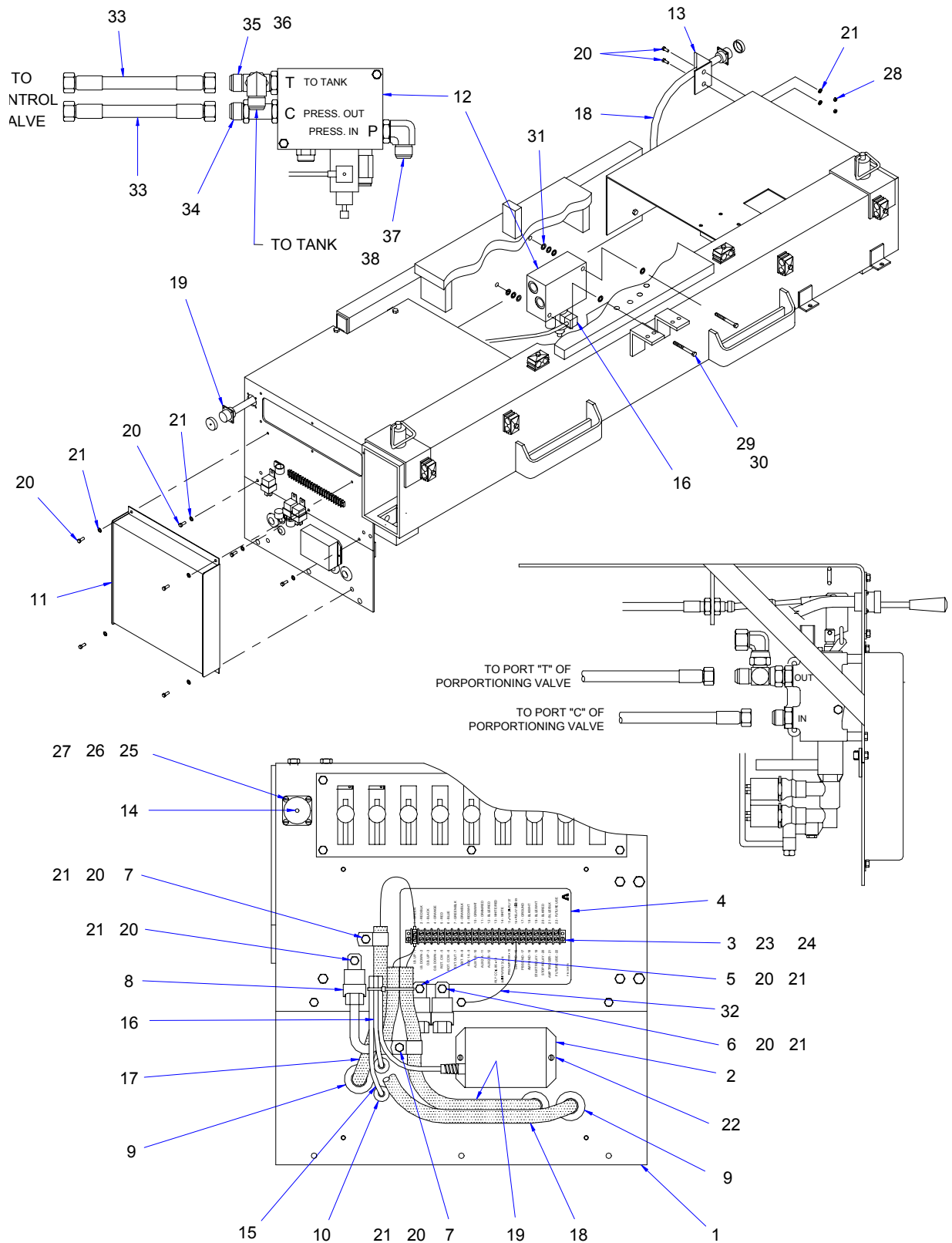
NOTES

OPERATION OF KNUCKLEBOOM WITH PROPORTIONAL REMOTE CONTROL

- 1 Make sure all crane operating personnel have thoroughly read and understood the information contained in this manual. Crane to be operated by qualified personnel only.
- 2 A routine daily inspection of the crane should be mandatory before each operating day. Any defects should be corrected immediately before operating the crane.
- 3 At a job site the vehicle should be positioned so that the crane can adequately reach the load within the rated capacity (centerline of rotation to hook). Job site should be checked for any hazards which might create an unsafe situation for the operator; such as any overhead electrical lines, underground electrical lines, any electrical source(s), soft or uneven ground, and any unauthorized personnel who might enter the job site. When cross grade parking is necessary, restrict the load to compensate for the increased tipping risk of the vehicle.
- 4 Keep vehicle as level as possible during operation.
- 5 Chock rear wheels, engage emergency brake, place gear selector into neutral, press clutch and PTO knob in gear, release clutch and set throttle control to proper engine speed.

WARNING: DO NOT EXCEED ENGINE SPEED NECESSARY TO MEET PUMP RPM REQUIREMENT (see hydraulic section) POSSIBLE DAMAGE MAY RESULT.
- 6 System has two operational modes:
 - A. Manual control: In the manual mode, the pendant is either not plugged into system or is plugged in with on-off power switch in the off position. The operator will have manual control of all crane functions, outriggers, and auxiliary valve sections.
 - B. Pendant control. In the pendant mode, the pendant is plugged into the system with the on-off power switch in the on position. The operator will have control of all crane functions and auxiliary valve section.
- 7 Using crane in the manual mode set outriggers. Always use outriggers from crane to the ground.
 - 8 Plug pendant into one of the receptacles located on either side of the crane base and turn pendant power switch to the on position. To operate pendant properly always select the crane function you want to use (i.e. inner boom up) first with the pendant trigger released and then pull pendant trigger to get the desired crane speed.
 - 9 Un-stowing knuckleboom; first begin by retracting outer boom cylinder which raises the outer boom up in the ramp and purges any air out of the outer boom cylinder, extend lift cylinder to raise inner boom. Once inner boom is clear of the base then knuckleboom can be rotated into a work ready position. Always raise inner boom up before rotating.
 - 10 Always observe safe and practical operation to avoid possible accidents. Refer to safety tips and precautions.
 - 11 After completing lifting operations return the knuckleboom into figure four position for travel. When stowing, begin by:
 - A. Retracting the extension cylinder.
 - B. Retracting outer boom cylinder.
 - C. Rotating crane into position by aligning the rotation arrows up on the rotation bearing and base plate.
 - D. Retract lift cylinder to lower inner boom into figure four position.
 - E. Extend outer boom cylinder, which lowers the outer boom assembly into ramp.Always stand on opposite side of inner boom when stowing or unstowing.
 - 12 Turn pendant power switch to the off position; this returns the crane to the manual mode.
 - 13 Return outriggers to stowed position. Make sure they are pinned in place (if required) for travel.
 - 14 Remove and store pendant in proper location. Never leave pendant plugged into system when not in use.
 - 15 Check job site for any tools or equipment not stored. Store all wheel chocks.
 - 16 Press clutch and disengage PTO. Release throttle control, and emergency brake.
 - 17 Report any unusual occurrence during crane operation that may indicate required maintenance or repair.

PROPORTIONAL ASSEMBLY A72A SERIES

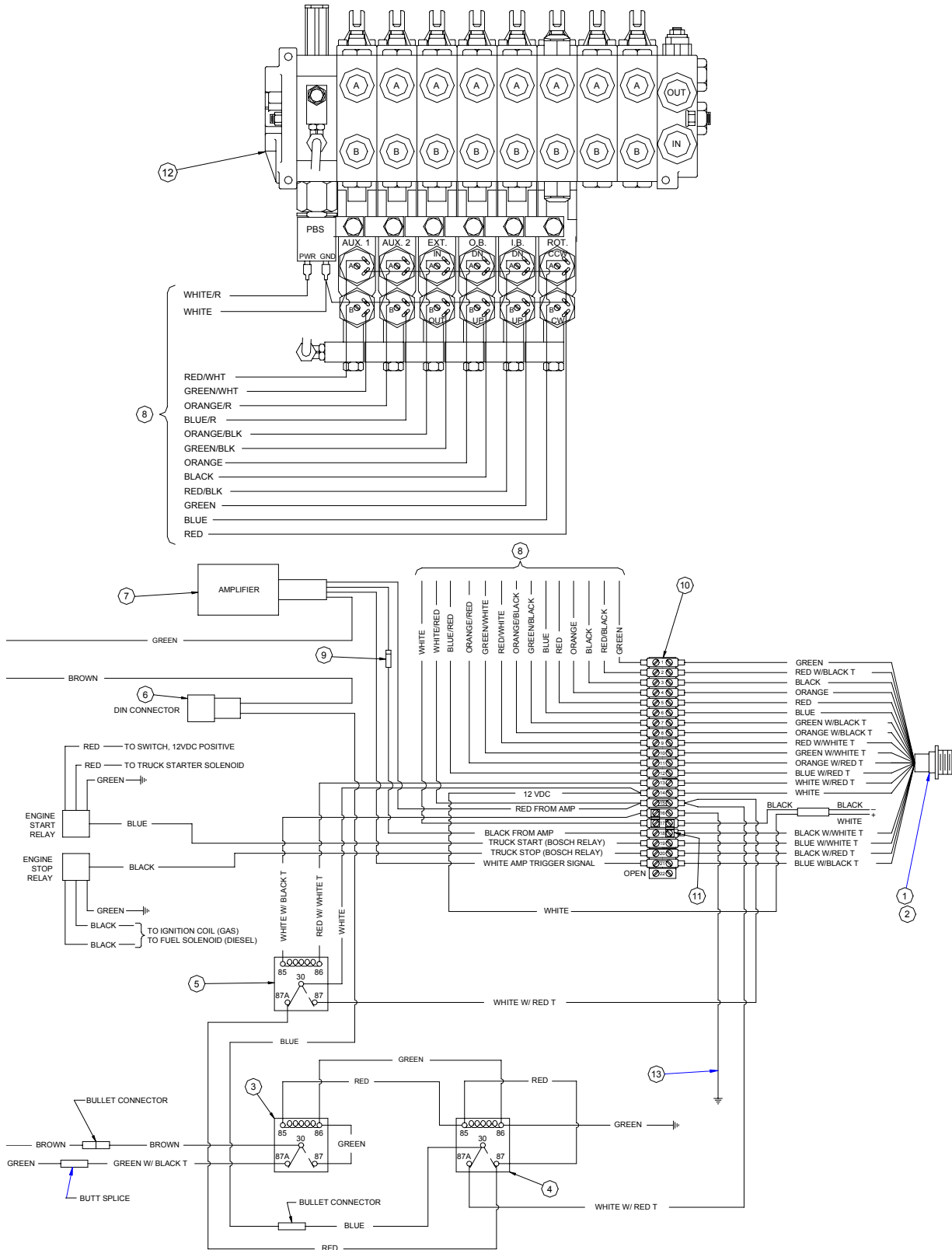


PROPORTIONAL ASSEMBLY

A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372281	PROPORTIONAL PLATE WELDMENT
2	1	372294	PROPORTIONAL AMPLIFIER ASSEMBLY
3	1	480494	22 STATION TERMINAL BLOCK
4	1	369176	DECAL, TERMINAL BLOCK
5	1	372287	RELAY ASSEMBLY
6	1	372288	RELAY ASSEMBLY
7	3	480024	CABLE CLAMP
8	1	372292	RELAY, POWER ASSEMBLY
9	3	370186	GROMMET
10	2	750734	GROMMET
11	1	372284	COVER, PROPORTIONAL
12	1	372040	PROPORTIONING VALVE
13	1	369171	BRACKET
14	2	480547	CAP, RECEPTACLE
15	1	372295	WIRE ASSEMBLY (POWER)
16	1	372293	DIN CONNECTOR ASSEMBLY
17	1	372296	WIRING HARNESS (SOLENOIDS)
18	1	372297	RECEPTACLE ASSEMBLY (CURB)
19	1	372298	RECEPTACLE ASSEMBLY (STREET)
20	14	005500	SCREW, HX HD 1/4-NC X 3/4
21	14	020200	WASHER, SP LK 1/4
22	2	001302	SCREW, RD HD #8-NC X 1/2
23	2	000603	SCREW, RD HD #6-NC X 1/2
24	2.	019600	WASHER, SP LK #6
25	8	001205	SCREW, RD HD #8-NC X 7/8
26	8	015500	NUT, #8-NC
27	10	019700	WASHER, SP LK #8
28	2	016300	NUT, HX LK 1/4-NC
29	2	811023	SCREW, HX HD 3/8-NC X 4
30	2	021100	WASHER, SP LK 3/8
31	6	021200	WASHER, FLAT SAE 3/8
32	1	372289	WIRE ASSEMBLY, GROUND
33	2	812411-028	HOSE ASSEMBLY
34	1	750469	ADAPTER, X-LONG -12 OR(M) / -12 JIC
35	1	750421	TEE, -12 OR(M) / -12 JIC
36	1	367283	ELL, 90° -12 JIC SWIVEL / -12 JIC
37	1	750418	ELL, 90° -12 OR(M) / -12 JIC
38	1	750419	CAP, NUT -12 JIC
39	4	634401	TIE WRAP

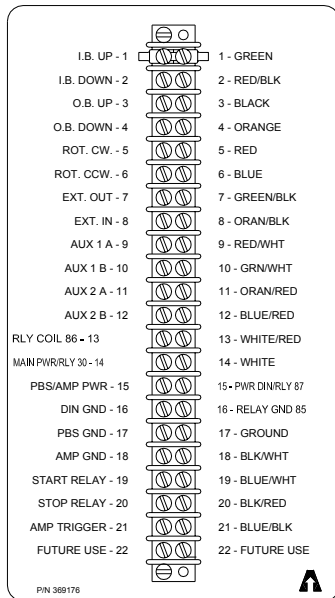
PROPORTIONAL WIRING DIAGRAM A72A SERIES



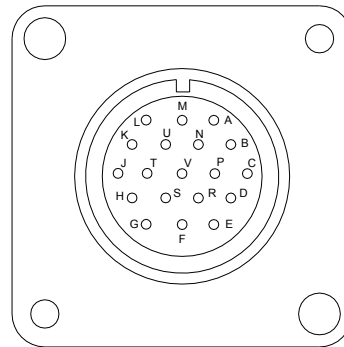
PROPORTIONAL WIRING DIAGRAM

A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372297	RECEPTACLE ASSEMBLY, (CURB)
2	1	372298	RECEPTACLE ASSEMBLY, (STREET)
3	1	372287	RELAY ASSEMBLY, GROUND SWITCHING
4	1	372288	RELAY ASSEMBLY, POWER SWITCHING
5	1	372292	RELAY, POWER ASSEMBLY
6	1	372293	DIN CONNECTOR ASSEMBLY
7	1	372294	AMPLIFIER ASSEMBLY
8	1	372296	WIRING HARNESS (SOLENOIDS)
9	1	369300-100	FUSE, 8 AMP
10	1	480494	TERMINAL BLOCK 22 STATION
11	2	636600	JUMPER
12	1	367302	PROPORTIONAL CONTROL VALVE
13	1	372289	WIRE ASSEMBLY, GROUND



22 STATION TERMINAL BLOCK

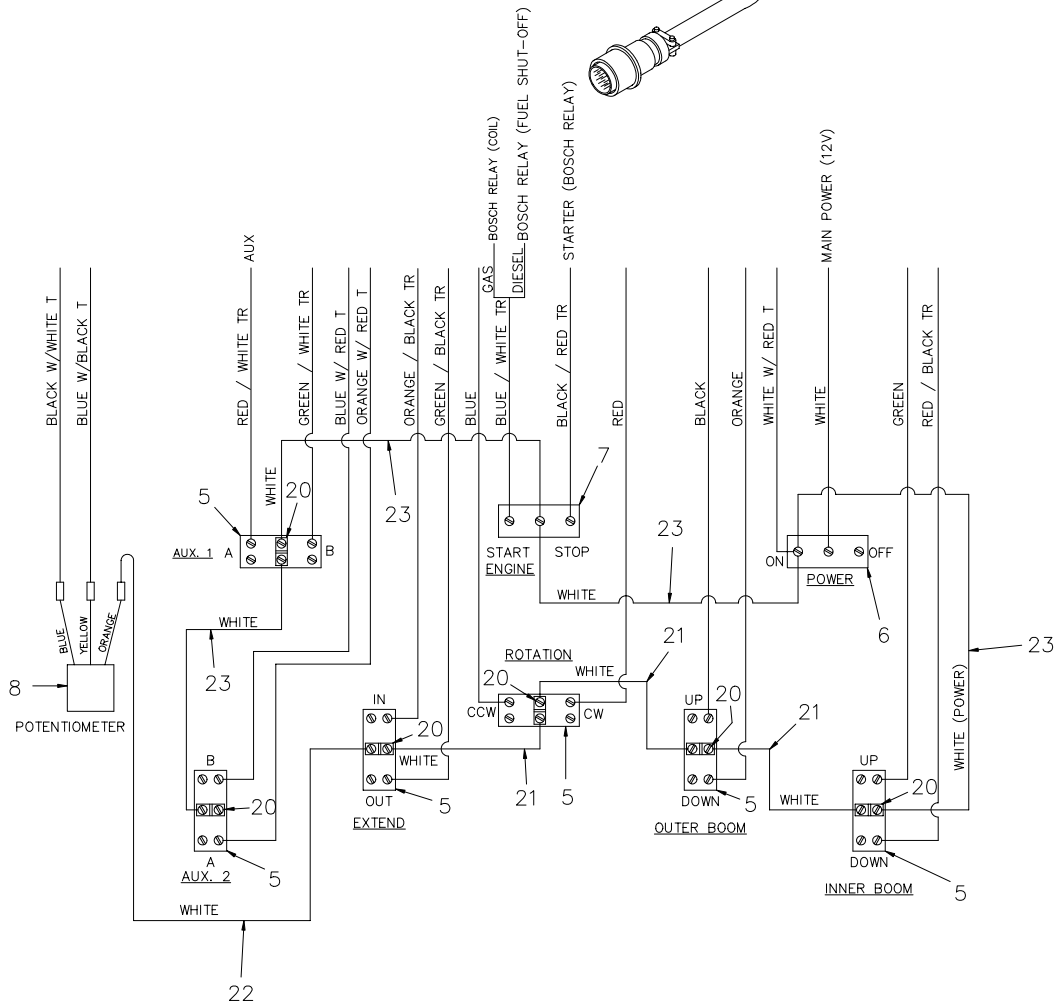
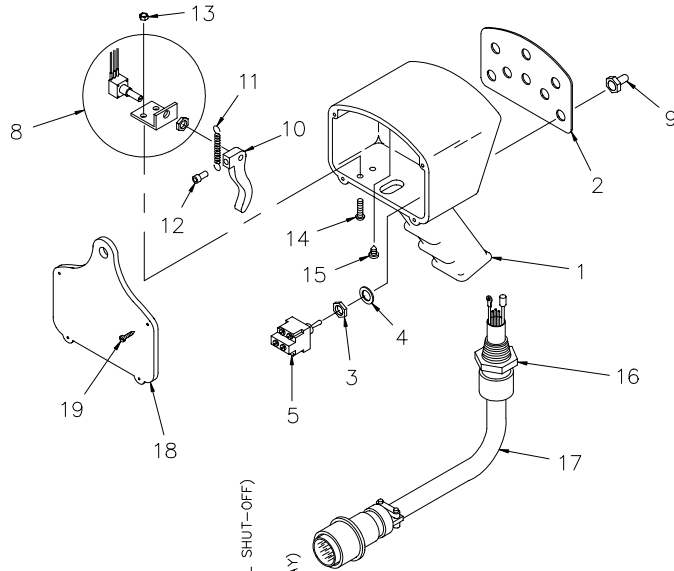


WIRING GUIDE, RECEPTACLE ASSEMBLY

A-RED	L-WHITE
B-GREEN	M-BLUE W/BLACK T
C-ORANGE	N-BLACK W/WHITE T
D-RED W/WHITE T	P-GREEN W/WHITE T
E-BLACK	R-BLUE W/WHITE T
F-RED W/BLACK T	S-BLACK W/RED T
G-BLUE	T-WHITE W/RED T
H-ORANGE W/BLACK T	U-ORANGE W/RED T
J-GREEN W/BLACK T	V-BLUE W/RED T
K-WHITE W/BLACK T	

PROPORTIONAL PENDANT

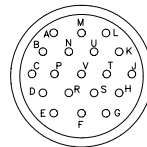
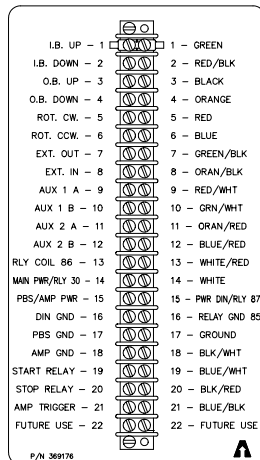
P/N 372286



PROPORTIONAL PENDANT

P/N 372286

ITEM	QTY	P/N	DESCRIPTION
1	1	480501	PROPORTIONAL PENDANT
2	1	368186	PROPORTIONAL PENDANT DECAL
3	8	REF	NUT
4	8	REF	WASHER
5	6	634200	DPDT TOGGLE SWITCH
6	1	750090	ON/OFF TOGGLE SWITCH
7	1	622000	SPDT TOGGLE SWITCH
8	1	480507	POTENTIOMETER ASSEMBLY
9	8	640300	TOGGLE BOOT
10	1	480506	TRIGGER
11	1	480523	TRIGGER RETURN SPRING
12	1	480517	SOCKET HEAD SCREW #10-32 NF x 5/8
13	2	015801	HEX LOCK NUT #10-24 NC
14	2	002607	SCREW #10-24 NC x 3/4
15	1	005003	PAN HEAD SCREW #8 x 3/8
16	1	480567	CONNECTOR
17	1	480514	PENDANT CABLE
18	1	480504	BACK PLATE HOUSING
19	4	480516	ROUND HEAD SCREW #6 x 3/4
20	6	636600	JUMPER
21	3	660302	WHITE CONDUCTOR ASSEMBLY
22	1	480524	WHITE CONDUCTOR ASSEMBLY
23	1	480526	WHITE CONDUCTOR ASSEMBLY



WIRING GUIDE, RECEPTACLE ASSEMBLY

A-RED	L-WHITE
B-GREEN	M-BLUE W/BLACK T
C-ORANGE	N-BLACK W/WHITE T
D-RED W/WHITE T	P-GREEN W/WHITE T
E-BLACK	R-BLUE W/WHITE T
F-RED W/BLACK T	S-BLACK W/RED T
G-BLUE	T-WHITE W/RED T
H-ORANGE W/BLACK T	U-ORANGE W/RED T
J-GREEN W/BLACK T	V-BLUE W/RED T
K-WHITE W/BLACK T	

22 STATION TERMINAL BLOCK

KNUCKLEBOOM PROPORTIONAL PENDANT TRIGGER POTENTIOMETER SETUP PROCEDURE

- 1 Position the truck with crane in a safe work area. Using hand levers on the control valve, extend outriggers out and down, unfold booms, rotate crane until booms are directly over bed of truck.
- 2 Remove amplifier terminal block cover located on the base of crane.
- 3 Plug pendant into one of the receptacles located on either side of crane.
- 4 Turn power on.
- 5 Check the output voltage of the pendant trigger potentiometer with trigger pulled, voltage output should be 3.0 to 9.0 volts on terminal #21. Check with trigger released, voltage output should be 0.4 to 0.6 volts on terminal #21. If trigger potentiometer output falls in the voltage range specified no other adjustment to the pendant trigger potentiometer is required. If trigger potentiometer output does not fall within the voltage ranges specified continue with setup procedure.
- 6 Remove four (4) screws which hold pendant back plate on, and remove back plate.
- 7 Make sure potentiometer's mounting nut is tight.
- 8 Loosen (do not remove) the 5/32" allen head cap screw that locks the trigger in place.

- 9 With trigger released, turn the potentiometer shaft full counterclockwise with a screwdriver, then slowly turn shaft clockwise to achieve 0.4 to 0.6 volts on terminal #21.

NOTE: CARE SHOULD BE TAKEN WHEN HANDLING THE POTENTIOMETER ASSEMBLY TO KEEP FROM BREAKING THE WIRES AT THEIR ATTACHMENT POINTS.

Tighten the allen head screw using a 5/32" allen wrench (DO NOT OVER TIGHTEN). This screw need only be set firmly against potentiometer shaft. Trigger damage will result from over tightening. Retest voltage on terminal #21.

- 10 Fully pull trigger and verify that there is 3.0 to 9.0 on terminal #21.
- 11 Slowly pull trigger through a full cycle (fully released to fully pulled) to verify consistent smooth voltage change at terminal #21. Replace potentiometer assembly if voltage change is not smooth.
- 12 Replace pendant and amplifier-terminal block covers.
- 13 Stow crane, turn power "OFF", unplug and store pendant.

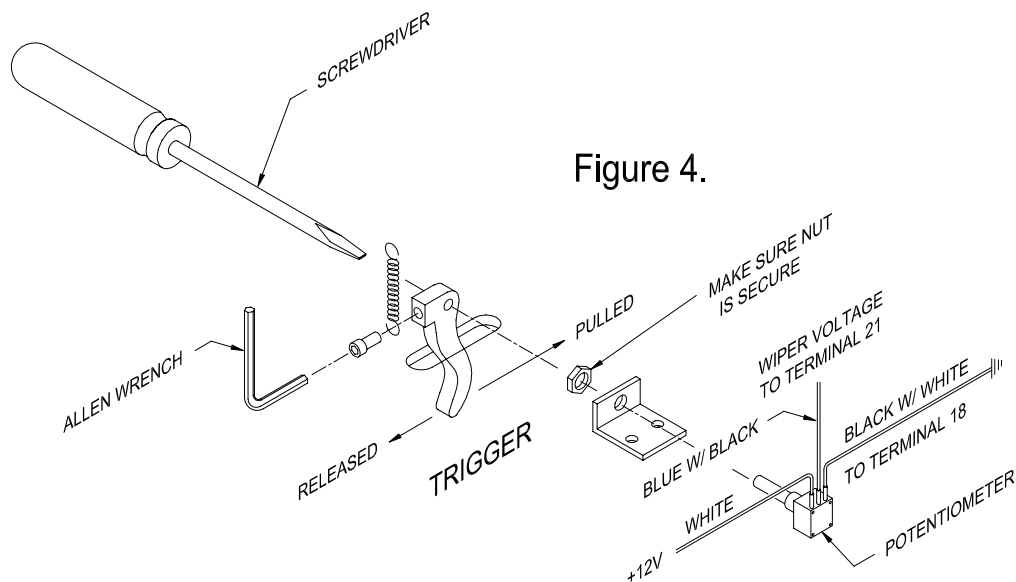


Figure 4.

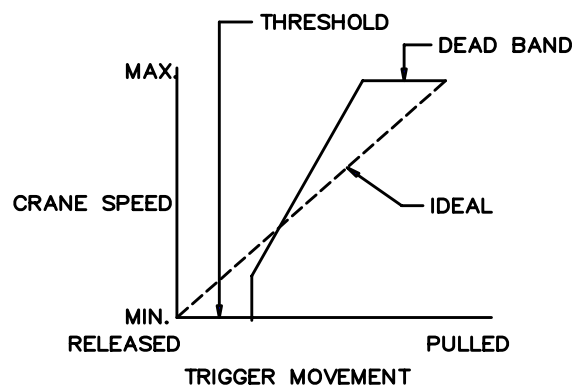
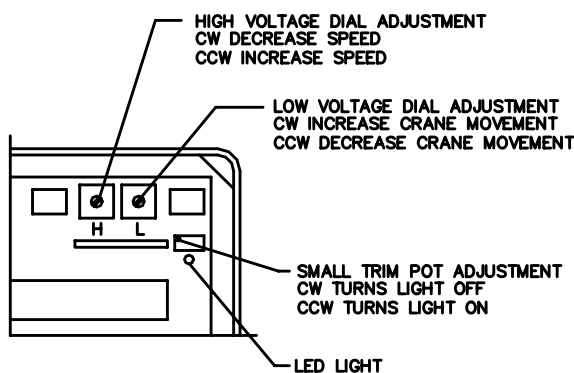
KNUCKLEBOOM AMPLIFIER SETUP

PROCEDURE

- 1 Position the truck with crane in a safe work area. Using hand levers on the control valve, extend outriggers out and down, unfold booms, rotate crane until booms are directly over bed of truck.
- 2 Remove amplifier terminal cover screws and lift off cover.
- 3 Plug pendant into one of the receptacles located on either side of the crane base and turn power on. With pendant trigger pulled; adjust the small trim pot located next to the red L.E.D. light until light just turns off, then turn trim pot back until light just comes on. The light should stay on during full trigger movement. Clockwise rotation of trim pot will turn light off. Counter-clockwise rotation will turn light on. This procedure "tunes" the amplifier to the trigger potentiometer.
- 4 Set the low voltage dial, activate any one crane function (rotate uses the least amount of pressure) with trigger released. Turn the low voltage dial (ref. figure 7, dial marked "L" on circuit board) until there is no movement of that function. With crane level and no load on booms, check rotation, inner boom down, outer boom down, and extend out functions for any movement. Note; in the pendant mode with trigger released there should also be no crane movement when a control valve hand lever is activated. If there is movement, adjust amplifiers

low voltage dial until there is no movement. The "0" and the "F" on the dial are opposite ends of the low voltage dial. Turning dial clockwise direction increases movement while counter-clockwise direction stops movement. This procedure adjusts the "threshold" speed for the trigger in the released position.

- 5 Set the high voltage dial with inner and outer booms horizontal, boom sections retracted. Activate inner boom up function with trigger pulled back to maximum position. While watching boom up speed, turn the high voltage dial (ref. figure 7, marked with "H" on circuit board) until there is a noticeable decrease in speed, then back-up one or two clicks as desired. The "0" and the "F" on the dial are opposite ends of the high voltage dial. Turning dial clockwise direction decreases speed while counterclockwise direction increased speed. "0" is the maximum speed setting and "F" is the most reduced speed setting. This procedure adjusts the trigger "dead band" at the fully pulled position.
- 6 The proportional amplifier's high and low voltage dials should not be set on "F". Setting both high and low voltage dials on 4 as a good starting point.
- 7 Stow crane, replace covers, turn power off, unplug and store pendant.



TROUBLE SHOOTING PROPORTIONAL CONTROL SYSTEM

HAND HELD PENDANT ASSEMBLY

1. With ignition key in the "ON" position, hand held pendant assembly plugged into system, and pendant power on-off switch in the "ON" position;
 - A. Check pendant trigger signal voltage at terminal #21. Voltage should be 3.0 to 9.0 volts when pendant trigger is pulled, 0.4 to 0.6 volts when pendant trigger is released.
 - B. Test trigger potentiometer output voltage at terminal #21 for consistent smooth voltage change when trigger is pulled. NOTE: for A and B reference pendant trigger potentiometer setup procedure.
2. Check pendant trigger for damage which may have occurred from over tightening of set screw.
3. Verify all wiring to pendant switches is correct and that there are no loose connections.

PROPORTIONAL FLOW CONTROL VALVE

1. Check voltage at terminals #13, #14, #15.
 - A. Terminal #13 voltage should be 12 VDC nominal when pendant is plugged into system and the on-off power switch is turned to the "ON" position.
 - B. Terminal #14 voltage should be 12 VDC nominal when master switch is in the "ON" position.
 - C. Terminal #15 voltage should be 12 VDC nominal when there is 12 VDC at terminals #13 and #14.
2. With 12 VDC nominal applied to terminal #15, disconnect brown wire from DIN connector (ground brown wire) to shift proportional valve full on.
3. Measure proportional flow control valve's coil resistance; turn ignition key and master switch to the "OFF" position to remove power from proportional system. Disconnect brown and blue wire bullet connectors from proportional flow control valves coil. Measure resistance between brown and blue bullet connectors. Coil resistance should be 4.5-5.5 ohms. If resistance is outside that range, replace coil.

4. To check hydraulic flow to crane:

- A. Engage PTO-pump, turn manual override clockwise to divert pressure and flow to directional control valve. Crane should operate manually.
- B. Place flow meter in the tank line from the proportional flow control valve. Measure flow with pendant plugged in and system turned on, trigger released. Flow to tank should be 9-13 gpm, depending on model of crane. As trigger is pulled, flow should smoothly decrease to 0 gpm.

1

5. Measure voltage drop across proportional flow control valve's coil. Voltage may be measured using a digital volt-ohm meter set to volts. Check voltage between terminal #15 and the bullet connector, with the pendant plugged in and turned on. The bullet connector is the connector on the brown wire of the DIN connector from proportional flow control valve's coil. **IMPORTANT:** Bullet connector must remain connected when taking voltage readings. Voltage drop should be 12 VDC nominal with pendant trigger pulled to less than 1 VDC nominal with pendant trigger released. Note: to register these readings system must be turned on, (i.e., with red L.E.D. light on). The settings of the amplifier's high and low voltage dials affects both the 12 VDC and 1 VDC nominal voltage readings across the coil of the proportional flow control valve. Normally, both the high and low voltage dials are adjusted to 4.

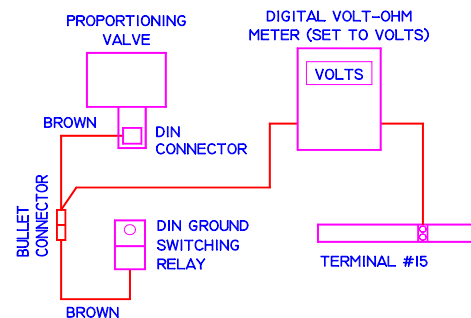


FIG. 8

TROUBLE SHOOTING PROPORTIONAL CONTROL SYSTEM

PROPORTIONAL AMPLIFIER

1. With ignition key in the on position and hand held pendant assembly plugged into system and pendant power on-off switch in the "ON" position;

- A. Check amplifier input voltage at terminal #15. Voltage should be 12 VDC nominal.
- B. Check pendant trigger signal voltage at terminal #21; voltage should be 0.4 to 0.6 volts when trigger is released. Reference pendant trigger potentiometer setup procedure.
- C. Check to make sure L.E.D. light, which is next to small trim pot is on. If light is not on, adjust proportional amplifier (reference knuckleboom amplifier setup procedure).

2. Check ground at terminals #16, #17, #18.
3. Check in line fuse from proportional amplifier to terminal #18.
4. Make sure bullet connectors leading from the DIN ground switching relay assembly to proportional flow control valve and amplifier are connected.
5. The proportional amplifier's high and low voltage dials should not both be set on "F".

6. Check voltage output of the proportional amplifier. Voltage may be measured using a digital volt-ohm meter set to volts (see figure 9). Check voltage between ground and the amplifier's output butt connector. The butt connector is located between the DIN ground switching relay assembly's green/black wire and the amplifier's green output wire. Voltage outputs should be 12 VDC nominal with pendant trigger released, down to 3 VDC nominal with pendant trigger pulled. To register these readings, system must be turned on, pendant trigger potentiometer voltage must be correct and amplifier must be turned on with red L.E.D. light lit. The setting of the amplifier's high and low voltage dials affects both the 12 VDC and 3 VDC nominal readings. Amplifier's high voltage dial affects 3 VDC nominal reading, (trigger pulled) while low voltage dial affects 12 VDC nominal reading (trigger released).

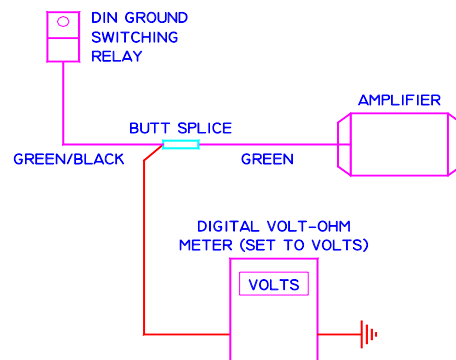


FIG.9

FM PROPORTIONAL GENERAL INFORMATION

The Auto Crane FM proportional control system consists of a transmitter and receiver unit. The system operates on the 5 RF channels in accordance with FCC subpart D-low power communications devices, part 15.117. Use of this device is subject to the provisions of FCC part 15.103. A license is not required to operate this system.

address information to enable it to "talk" to its associated receiver. This address information is set at the factory so no two devices will be the same. There can be over 20,000 units in the same vicinity without any cross activation. Each unit's address code has been preset at the factory. It is advised not to change codes without first consulting the factory. The transmitter is powered by a disposable 9 volt

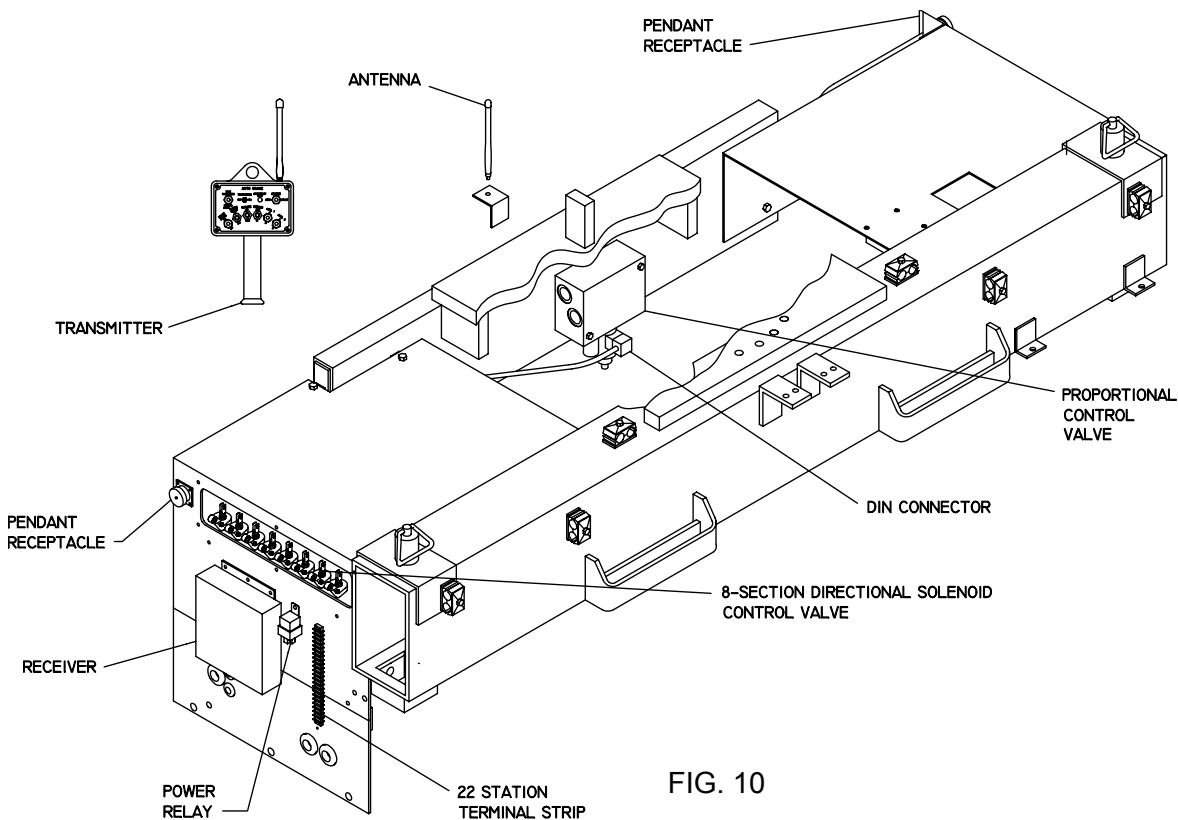


FIG. 10

TRANSMITTER

The transmitter generates a RF signal which is FM modulated. The modulation is a 120 bit data stream with start and stop bits, information concerning the selected switch being activated and a specialized algorithm developed to ensure the validity of the transmission. Also transmitted are

battery. Use of a Ni-Cad battery is not recommended because the operating time is greatly reduced. To install the 9 volt battery, remove the battery cover on the rear of the transmitter. Removal of the battery cover is easily achieved by releasing the latch clip. Care should be taken not to use excessive force to prevent damage to the cover. Insert

FM PROPORTIONAL GENERAL INFORMATION

the battery making sure the polarity of the terminals are correct.

RECEIVER

Receiver receives a the signal transmitted by the transmitter, decodes the data stream and checks for validity of the address and the start and stop bits of the received data. If this is correct, a proprietary software algorithm is performed to accept or reject the information to be passed on to the outputs. If for any reason this test fails, no output will be allowed to function. Once this test has passed, the appropriate output will be activated.

RECEIVER CONNECTOR INSTRUCTIONS

Insert a small straight blade screwdriver into the square hole of the desired pin. Prying towards the face (lid) of the receiver, insert or remove the appropriate wire directly below screwdriver. Release the screwdriver and the connection is complete. strip all wires to be inserted into the 20 pin connector to a length of 3/8" to 1/2" long. Wires should be tinned for ease of installation. There are three (3) inputs to the receiver; BNC connector Positive D.C. current Negative ground The unit derives power from a 12 vdc nominal power source that is negative ground. First hook up power inputs to receiver. It is required to install a power switch for the receiver in series (in-line) with the D.C. power system (battery).

INITIALIZING UNIT

When initially using the radio remote control system, turn power on the receiver first. This allows power to the micro processor and awaits for a special code from the transmitter to activate a relay to make power available to

the output driver circuit. When the transmitter is turned on, it will transmit a special code for 10 seconds to instruct the receiver to initialize. This will happen only if the transmitter is not transmitting a function such as a switch being activated. During this initial 10 seconds a function may be activated once the receiver has been initialized. The initialization is instantaneous so operator will not have any delay in operation. If the transmitter is "out of range" or a function is activated when the transmitter is turned on, the receiver will not be initialized. Once the receiver has been initialized, the unit will be allowed to operate.

EMERGENCY KILL FUNCTION

Each transmitter is equipped with an emergency kill switch located near the antenna which when activated will "shut down" the receiver and stop truck engine. This must be activated while transmitter power is in the "on" position. This special code will be transmitted for a period of 10 seconds. when the receiver receives this special code, the power to the output driver circuit will be de-activated. To resume operation, the transmitter must again send the special code to re-activate the receiver. To achieve this, turn transmitter power off and back on. The transmitter will again go through its routine to initialize the receiver please instruct your operators how to use the "emergency kill" and insist that they operate this feature to become familiar with the operation.

ADDRESS CODES

Each transmitter and receiver's address code are unique and preset at factory. We advise that the codes not be changed without first consulting the factory. There are two features in our system that the end user can change to

NOTES

FM PROPORTIONAL GENERAL INFORMATION

meet their growing needs. On the receiver board there are two banks of eight dip switches, (refer to fig. 11). Bank "A" controls outputs 1 thru 8. Bank "B" controls outputs 9 thru 16. When switches are in the off position

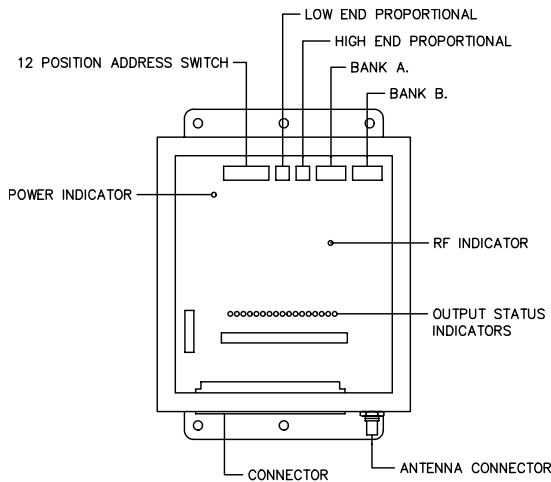


Fig. 11

these outputs will be momentary. Note: momentary switches require constant pressure on transmitter switch to operate each output. If the receiver utilizes standard software, and any switches are in the "ON" position the outputs will be latched. Latch does not require operator to maintain pressure on the transmitter switch to operate, i.e. common ON/OFF function such as turning lights ON and OFF. To change these switches you must remove the receiver enclosure lid. Since receiver is a proportional unit, there are two (2) hex switches which are labeled Low End proportional and High End Proportional. On this style of unit, master control output will be a pulse width modulated (PWM) signal. The Proportional Low End Switch sets the PWM output to the proportional value's low end setting, (see fig.11). The Proportional High End Switch sets the PWM output to the proportional valve's high end setting, (see fig. 11). The independent proportional low

and high end settings match the potentiometer travel with the proportional valve's working voltages.

Care should be taken in installing the receiver's antenna. When mounting antenna, keep in mind that the unit comes standard with ten feet of antenna cable. If driving an electric over hydraulic pump or any type of electric motor, mount the antenna away from the motor since they may emit spurious interference. This will reduce the possibility of electrical interference. For best operation, pick a location that has good visibility and a ground plane with a diameter that is at least twice the height of the antenna. Note; it is important that any excess antenna cable not be wrapped in loops. The connector on the end of the cable will hook up to the antenna connector on receiver.

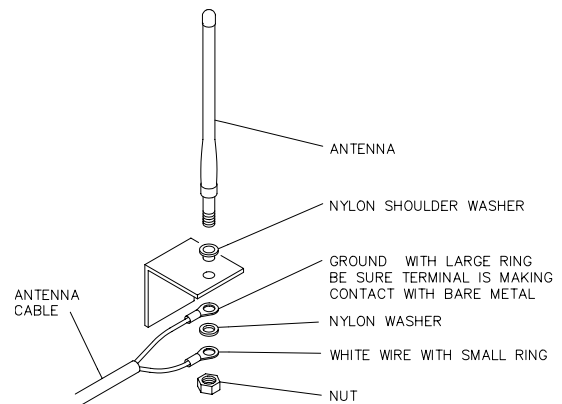


Fig. 12

FM PROPORTIONAL SYSTEM

HOW IT WORKS

MASTER SWITCH

Master control switch mounted in truck cab is a lighted three position, (ON-OFF-ON), maintained single pole double throw switch with five terminals. Master control switch should be connected to a truck circuit which will supply 12 vdc nominal only when truck ignition is in the ON position. When master switch is flipped into the manual mode

of the crane proportionally by the amount of current sent to its coil by the receiver. With no current applied to its coil (transmitter trigger released), the proportional flow control valve is turned off. This directs full flow and pressure to tank (minimum crane speed). With maximum current applied to its coil (transmitter trigger pulled), the proportional flow control valve is turned full "ON". This directs full flow and pressure to crane

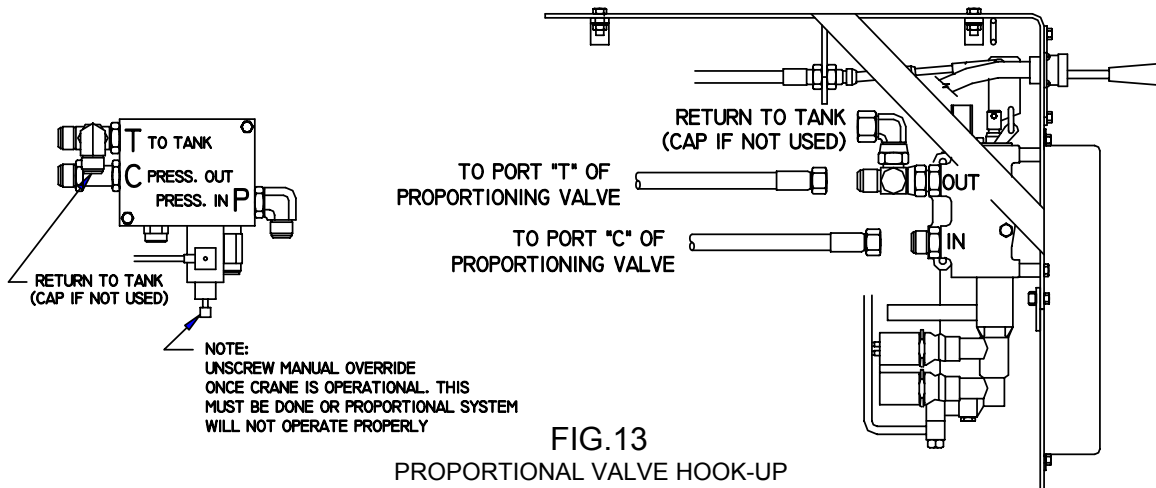


FIG. 13
PROPORTIONAL VALVE HOOK-UP

position, 12 vdc will be supplied to #18 terminal on terminal strip which turns proportional valve full on thus allowing manual control of crane. With master switch flipped into the FM mode position, the power relay is activated which turns both the receiver and the power built-up section "ON".

PROPORTIONAL VALVE

Pressure compensated proportional flow control valve with inlet relief, varies the speed

(maximum crane speed). Note; in order to get a master control output signal from the receiver, both a transmitter output and the transmitter trigger must be activated simultaneously. Simply pulling trigger without activating a transmitter output will not get a master control output signal. Always select a transmitter output you want to use (i.e. inner boom up) first with transmitter trigger released and then pull transmitter trigger to get desired master control output (crane speed). The receiver's master control output "sources" the proportional flow control valve's coil.

FM PROPORTIONAL SYSTEM

HOW IT WORKS

TRANSMITTER

Transmitter is a hand held controller which controls the speed and functions of crane using transmitted radio frequencies. This allows the operator to have complete control of crane at an optimum distance from load being lifted. The transmitter controls inner boom, outer boom, extension, rotation,

auxiliary 1, auxiliary 2, start-stop, fast/slow idle-manual mode, emergency stop, and master control output signal. The transmitter output switches control which crane function is activated while pulling trigger increases the master control output signal which increases speed of crane.

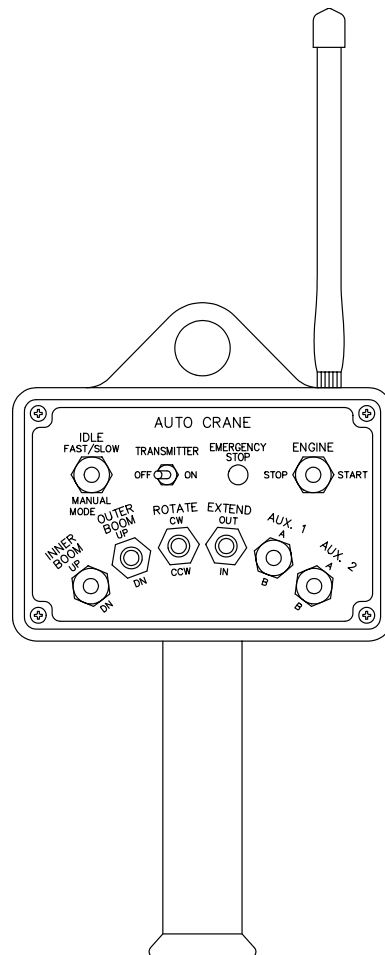


FIG. 14
FM TRANSMITTER

OPERATION OF KNUCKLEBOOM WITH FM PROPORTIONAL REMOTE CONTROL

- 1 Make sure all crane operating personnel have thoroughly read and understood the information contained in this manual. Crane to be operated by qualified personnel only.
- 2 A routine daily inspection of the crane should be mandatory before each operating day. Any defect should be corrected immediately before operating the crane.
- 3 At a job site the vehicle should be positioned so that the crane can be adequately reach the load within the rated capacity (centerline of rotation to hook). Job site should be checked for any hazards which might create an unsafe situation for the operator such as overhead electrical lines, underground electrical lines, any electrical sources, soft or uneven ground, and any unauthorized personnel who might enter the job site. When cross grade parking is necessary, restrict the load to compensate for the increased tipping risk of the vehicle.
- 4 Keep vehicle as level as possible during operation.
- 5 Chock rear wheels, engage emergency brake, place gear selector into neutral, press clutch and PTO knob in gear, release clutch and set throttle control to proper engine speed.

WARNING: DO NOT EXCEED ENGINE SPEED NECESSARY TO MEET PUMP RPM REQUIREMENT, POSSIBLE DAMAGE MAY RESULT.

- 6 System has two operational modes: 1.) manual control 2.) FM control. In the

manual mode operator will have manual control of all crane functions, outriggers, and auxiliary valve sections. While in the FM mode, operator will have control of crane functions only. There are two ways an operator may select to operate crane in the manual mode; First, move master control switch in cab into the manual mode position. Second, move master control switch into the FM mode position, turn transmitter power on and activate transmitter manual mode switch. NOTE; While in this mode the operator will have manual control of crane until any transmitter output function is activated which will automatically switch transmitter from manual control to FM control. To operate crane in the FM mode move master control switch into the FM mode position, turn transmitter power on, the operator will have control of crane transmitter only. The hand held transmitter will operate all crane functions except outriggers.

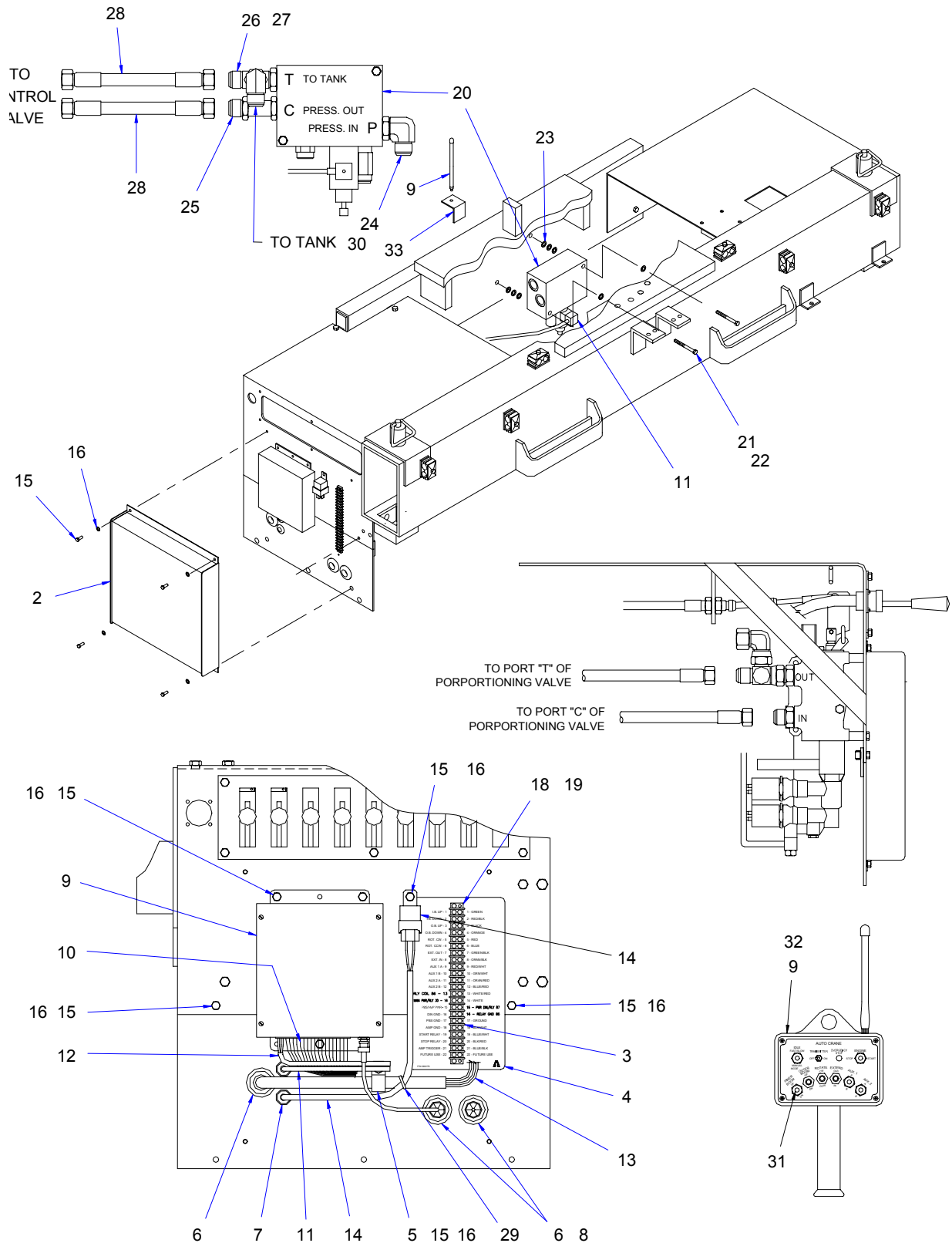
- 7 Begin by selecting FM mode master control switch, turn transmitter power on, activate the manual mode switch on the transmitter, this will allow manual control of crane to set outriggers. Always use outriggers from crane to the ground. Be sure outriggers are in firm contact with ground and are adequately positioned. Once outriggers have been properly set, the operator may continue to operate the crane in the manual mode or may choose to operate crane in the FM mode. To switch crane to FM mode the operator may de-activate transmitter manual mode switch or activate any transmitter output function. To operate FM transmitter properly always select the crane function you want to use (i.e. inner boom up) first with the

OPERATION OF KNUCKLEBOOM WITH FM PROPORTIONAL REMOTE CONTROL

transmitter trigger released and then pull transmitter trigger to get desired crane speed.

- 8 When unstowing knuckleboom crane, first begin by retracting outer boom cylinder, which raises the outer boom up in the ramp and purges any air out of the outer boom cylinder. Extend lift cylinder to raise inner boom. Once inner boom is clear of the base, the crane can be rotated into a work ready position. Always raise inner boom up before rotating.
- 9 Always observe safe and practical operating practices to avoid possible accidents. Refer to "SAFETY TIPS AND PRECAUTIONS".
- 10 After completing lifting operations, return the booms to the figure 4 position for travel. When stowing, begin by retracting the extension cylinder. Retract outer boom cylinder. Rotate crane into position by aligning up the rotation arrows on the rotation bearing and base plate. Retract lift cylinder to lower inner boom into the figure 4 position. Always stand on the opposite side of the inner boom when stowing and unstowing.
- 11 Once the crane has been properly stowed, return FM system to manual mode and return out outriggers to the stowed position. Make sure outriggers are pinned in place (if required) for travel.
- 12 Turn both the transmitter power switch, and the master control switch (in cab) to the "OFF" position. Never leave transmitter on, and always store transmitter in proper place when not in use.
- 13 Check job site for any tools or equipment not stored. Store all wheel chocks.
- 14 Press clutch and disengage PTO. Release throttle control and emergency brake.
- 15 report any unusual occurrence during crane operation that may indicate required maintenance or repair.

FM PROPORTIONAL ASSEMBLY A72A SERIES

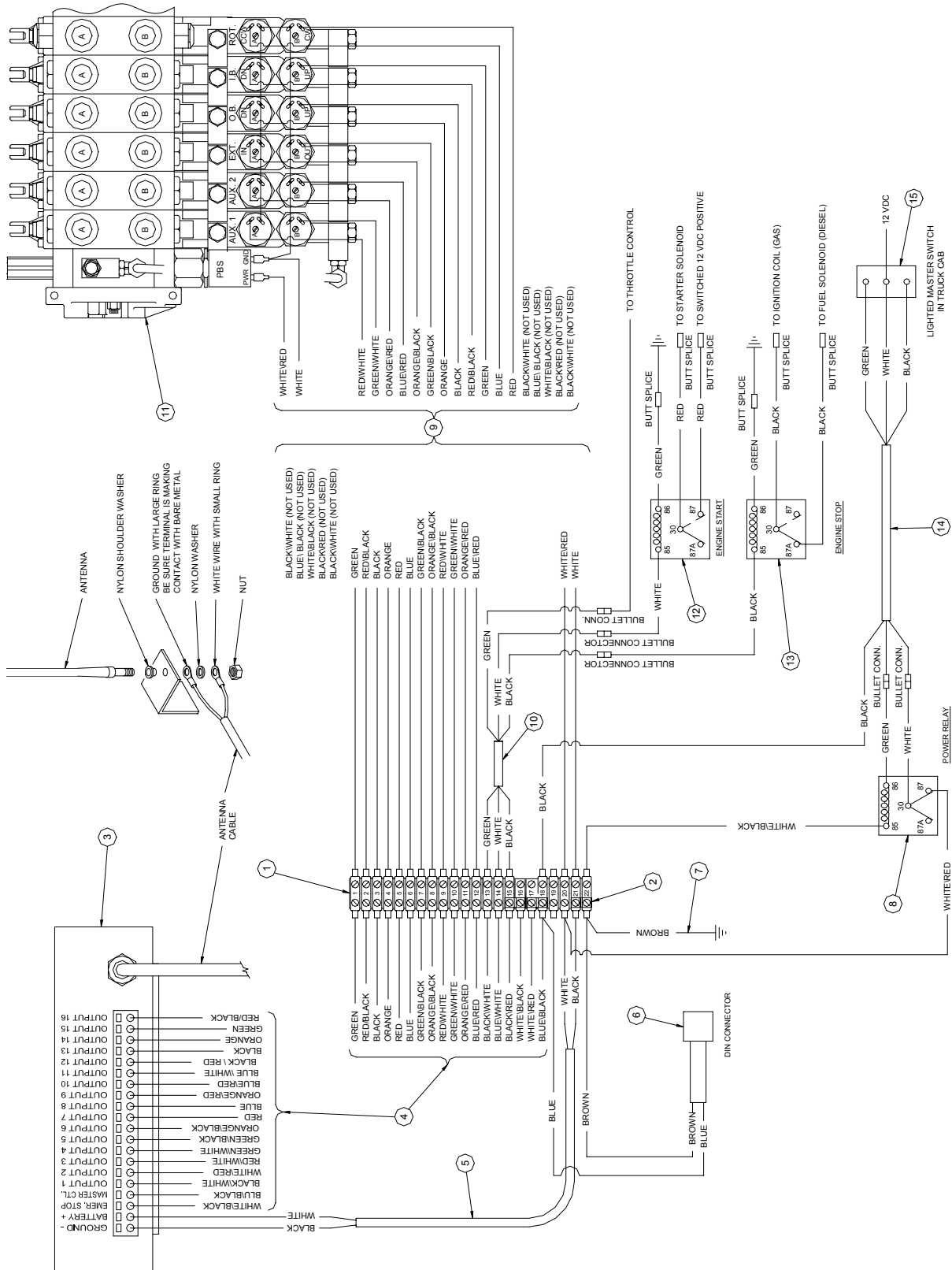


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FM PROPORTIONAL ASSEMBLY A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372281	PROPORTIONAL PLATE WELDMENT
2	1	372284	COVER, PROPORTIONAL WELDMENT
3	1	480494	22 STATION TERMINAL BLOCK
4	1	369176	DECAL, TERMINAL BLOCK
5	1	480024	CABLE CLAMP
6	3	370186	GROMMET
7	2	750734	GROMMET
8	2	372367	BUSHING, HEYCO
9	1	372372	FM TRANSMITTER / RECEIVER SET
10	1	372365	WIRING HARNESS RECEIVER
11	1	372364	DIN CONNECTOR ASSEMBLY, FM
12	1	372363	WIRING HARNESS, FM RECEIVER POWER
13	1	372296	WIRING HARNESS, SOLENOIDS
14	1	372360	RELAY ASSEMBLY, FM POWER
15	11	005500	SCREW, HX HD 1/4-NC X 3/4
16	11	020200	WASHER, SP LK 1/4
17	4	020400	WASHER, FLAT 1/4
18	2	000603	SCREW, RD HD #6-NC X 1/2
19	2	019600	WASHER, SP LK #6
20	1	372040	PROPORTIONING VALVE
21	2	811023	SCREW, HX HD 3/8-NC X 4
22	2	021100	WASHER, SP LK 3/8
23	6	021200	WASHER, FLAT 3/8
24	1	750418	ELL, 90° -12 OR(M) / -12 JIC
25	1	750469	ADAPTER, STR. X-LONG -12 OR(M) / -12 JIC
26	1	750421	TEE, -12 OR(M) / -12 JIC
27	1	367283	ELL, 90° -12 JIC / -12 JIC
28	2	812411-028	HOSE ASSEMBLY
29	4	634401	TIE WRAP
30	1	750419	CAP, NUT -12 JIC
31	8	640300	BOOT, TOGGLE
32	1	480605	BATTERY, 9V
33	1	372371	BRACKET ANTENNA

FM PROPORTIONAL WIRING DIAGRAM A72A SERIES



FM PROPORTIONAL WIRING DIAGRAM A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	480494	22 STATION TERMINAL BLOCK
2	3	636600	JUMPER
3	1	372372	FM TRANSMITTER / RECEIVER SET
4	1	372365	WIRING HARNESS, RECEIVER
5	1	372363	WIRING HARNESS, FM RECEIVER POWER
6	1	372364	DIN CONNECTOR ASSEMBLY
7	1	372361	WIRE ASSEMBLY, FM GROUND
8	1	372360	RELAY ASSEMBLY, FM GROUND
9	1	372296	WIRING HARNESS, (SOLENOIDS)
10	1	372370	WIRING HARNESS, START/STOP SPLICE
11	1	367302	6-FUNCTION PROPORTIONAL CONTROL VALVE
12	1	372368	RELAY ASSEMBLY, ENGINE START
13	1	372369	RELAY ASSEMBLY, ENGINE STOP
14	1	372362	WIRING HARNESS, FM MASTER SWITCH
15	1	372366	SWITCH, MASTER

FM PROPORTIONAL CONTROL SYSTEM

TROUBLESHOOTING

GENERAL

Whenever there is a problem with the system begin by first checking the fuse in the receiver and then checking all wiring and connectors. Look for dead shorts in wiring and connections, or run a new cable from the outputs of the receiver directly to solenoids and then try radio system. maximum 12 to 15 amp fuse in receiver.

TRANSMITTING RANGE DROPS OR INTERMITTENT MOVEMENT OCCURS WHEN ACTIVATING A FUNCTION

- 1 **Make sure the 9 volt battery in the transmitter is good.**
- 2 **Be sure the antenna is free of vertical metal obstruction.**
- 3 **Any excess antenna cable should not be coiled together.**
- 4 **Check antenna cable connector at the receiver. Be certain the antenna is properly installed and that there is nothing touching the bare portion of wires at the antenna connection.**

IF UNIT FAILS COMPLETELY OR IF ONLY ONE OR TWO OUTPUTS ARE NOT WORKING

- 1 **Remove cover on the receiver and refer to fig. 9.**
- 2 **With power to the receiver, the power indicator LED will be on. Turn transmitter power on. At this time the receiver's RF indicator LED will be on for 10 seconds and the sound of the power relay engaging will be heard. Anytime after transmitter power is on a**

function may be activated. To verify that the power relay is engaged and that the transmitter is transmitting, activate the emergency stop on the transmitter. This will disable the power relay and the transmitter will transmit for 10 seconds. The RF and power indicator LED's will be on. To reset the receiver and transmitter, turn the transmitter power off and back on. At this time the receiver's RF indicator LED will be on for 10 seconds and the power relay will engage.

- 3 **When a function is activated on the transmitter, three LEDs are "ON" in the receiver. RF indicator LED.**
- 4 **Output status indicator LED (function activated).**
- 5 **Master control LED. (the power indicator LED is always on.**
- 6 **With power relay engaged, check each function by activating each toggle switch. Make sure each of the receiver's output status indicator LEDs turn on.**

POWER RELAY DOES NOT ENGAGE

Address codes may not match. Compare the 12 position address switches in both transmitter and receiver. If they both match and still the power relay doesn't engage set all 12 of the dip switches to the off position in both the receiver and the transmitter. At this point if the radio controller works or not, call the factory to either be assign a new address code or to have the radio controller shipped back to the factory for repair.

FM PROPORTIONAL CONTROL SYSTEM

TROUBLESHOOTING

AFTER FACEPLATE HAS BEEN REMOVED FROM THE TRANSMITTER AND REINSTALLED, UNIT DOES NOT OPERATE PROPERLY

- 1 Remove faceplate from transmitter. Make sure that leads to each lead screw on toggles are secure and will not be at an angle where it would be touching anything when replacing the faceplate.**
- 2 Disconnect wiring harness from PC board and then reconnect the same way. Be sure that no wires are loose at connector and that connector is secure on connector pins. The wiring harness should be positioned between toggle housings or in a location so as not to become pinched upon reassembly.**

EXAMPLE TO FOLLOW ON EXISTING EQUIPMENT

- 1 Activate a function on the transmitter that will not cause a hazardous situation. At this time the receiver's RF indicator LED and the appropriate Output Status Indicator LED will be on. If the function activated does not occur, check the following:**
 - A. Be sure that the appropriate orange connector pin matches the Output Status Indicator LED. There should be 12 vdc to that output. If there is power to the output, then the wiring and hydraulic system should be checked.**
 - B. If the appropriate Output Status Indicator LED is turned on and there is no power to the orange connector pin, consult the factory.**

NOTES

FM PROPORTIONAL PROCEDURE SETTING HIGH & LOW END

- 1 Position the truck with crane in a safe work area. Using hand levers on the control valve, extend outriggers out and down, unfold booms, rotate crane until booms are directly over bed of truck.
- 2 Set the low voltage dial, activate any one crane function (rotate uses the least amount of pressure) with trigger released. Turn the low voltage dial (ref. figure 15, dial marked "L" on circuit board) until there is no movement of that function. With crane level and no load on booms, check rotation, inner boom down, outer boom down, and extend out functions for any movement. Note; in the pendant mode with trigger released there should also be no crane movement when a control valve hand lever is activated. If there is movement, adjust amplifiers low voltage dial until there is no movement. The "0" and the "F" on the dial are opposite ends of the low voltage dial. Turning dial clockwise direction increases movement while counter-clockwise direction stops movement.

This procedure adjusts the "threshold" speed for the trigger in the released position.

- 3 Set the high voltage dial with inner and outer booms horizontal, boom sections retracted. Activate inner boom up function with trigger pulled back to maximum position. While watching boom up speed, turn the high voltage dial (ref. figure 15) until there is a noticeable decrease in speed, then back-up one or two clicks as desired. The "0" and the "F" on the dial are opposite ends of the high voltage dial. Turning dial clockwise direction decreases speed while counterclockwise direction increased speed. "0" is the maximum speed setting and "F" is the most reduced speed setting. This procedure adjusts the trigger "dead band" at the fully pulled position.
- 4 Both HIGH & LOW voltage dials should not be set on "F". Setting both high and low voltage dials on 4 as a good starting point.
- 5 Stow crane, replace cover, turn power off.

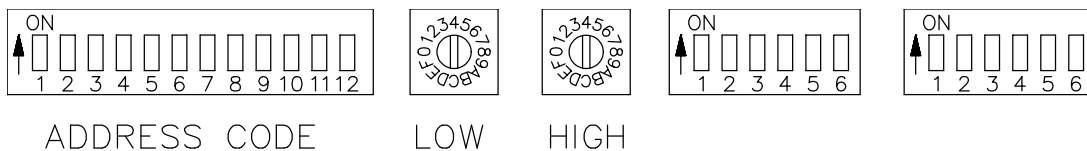
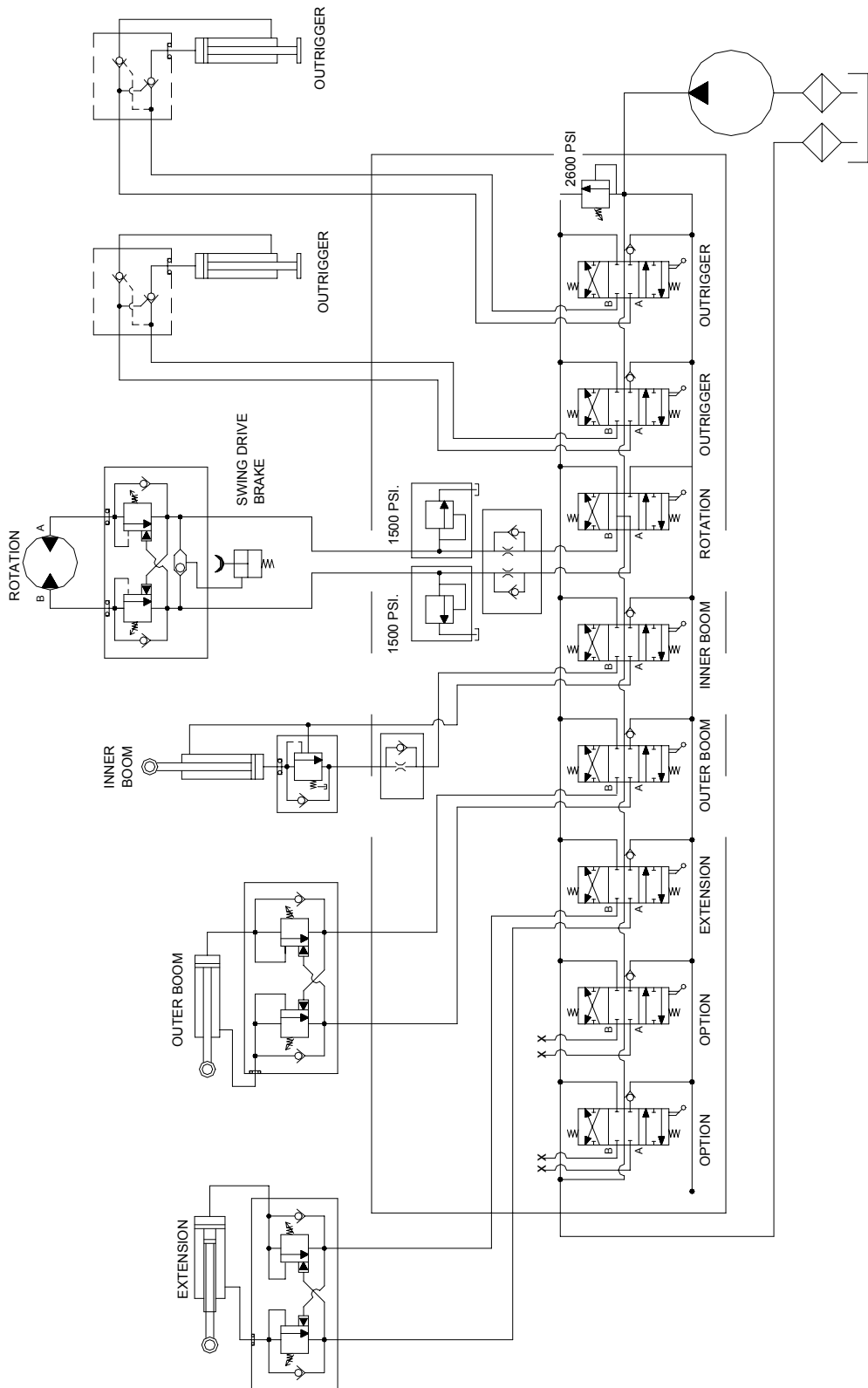
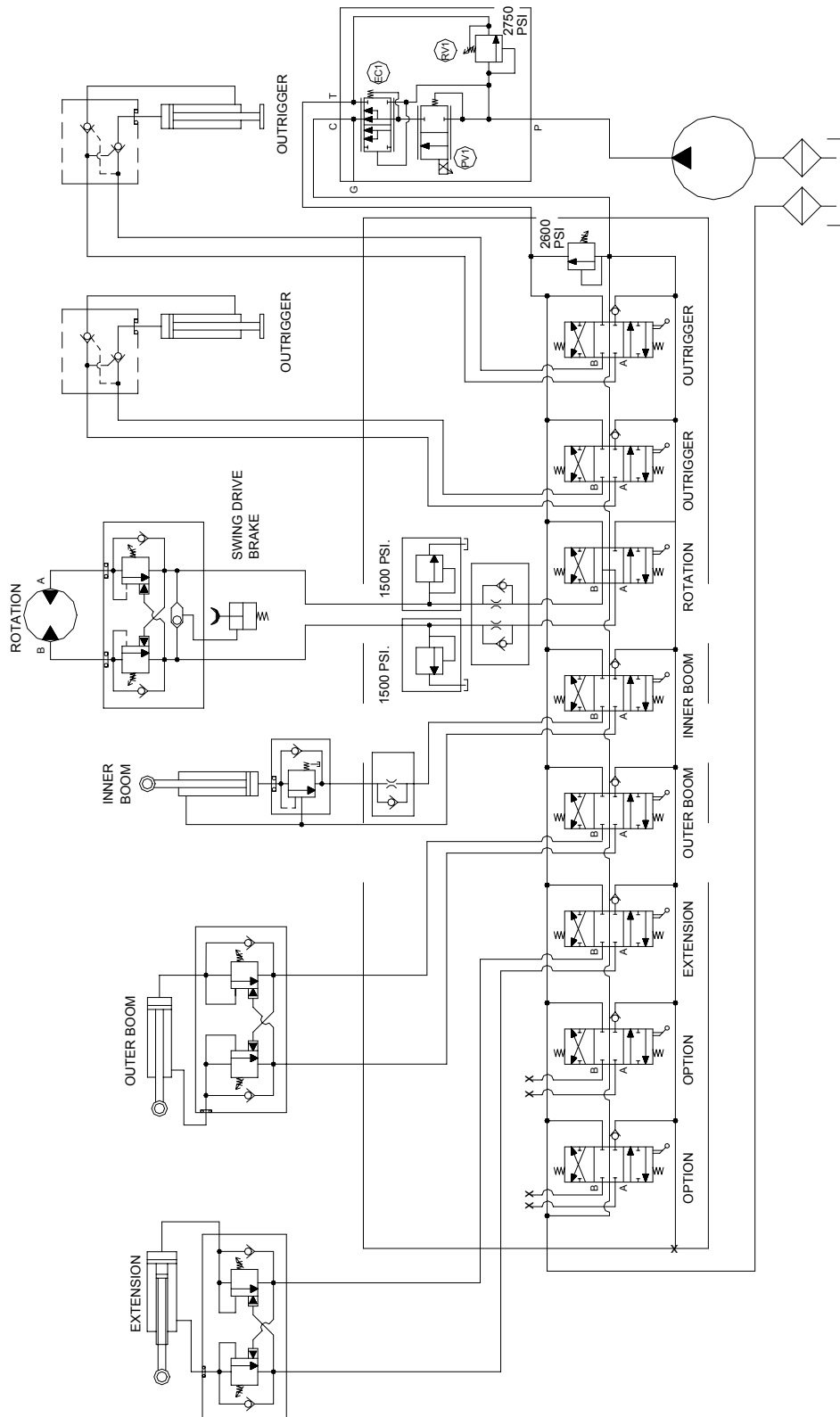


FIG. 15

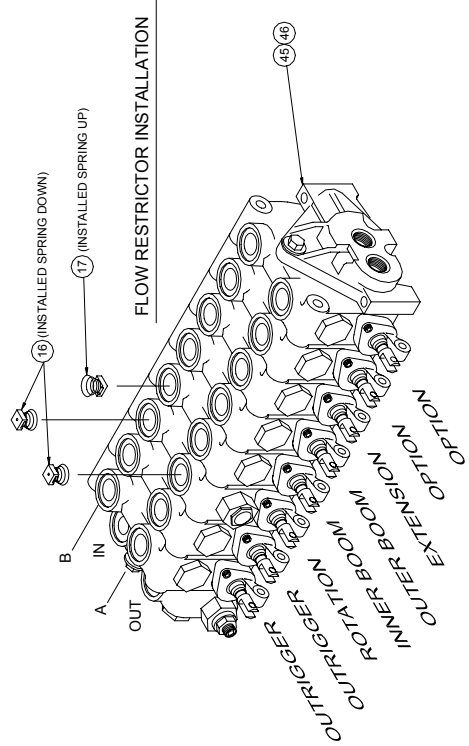
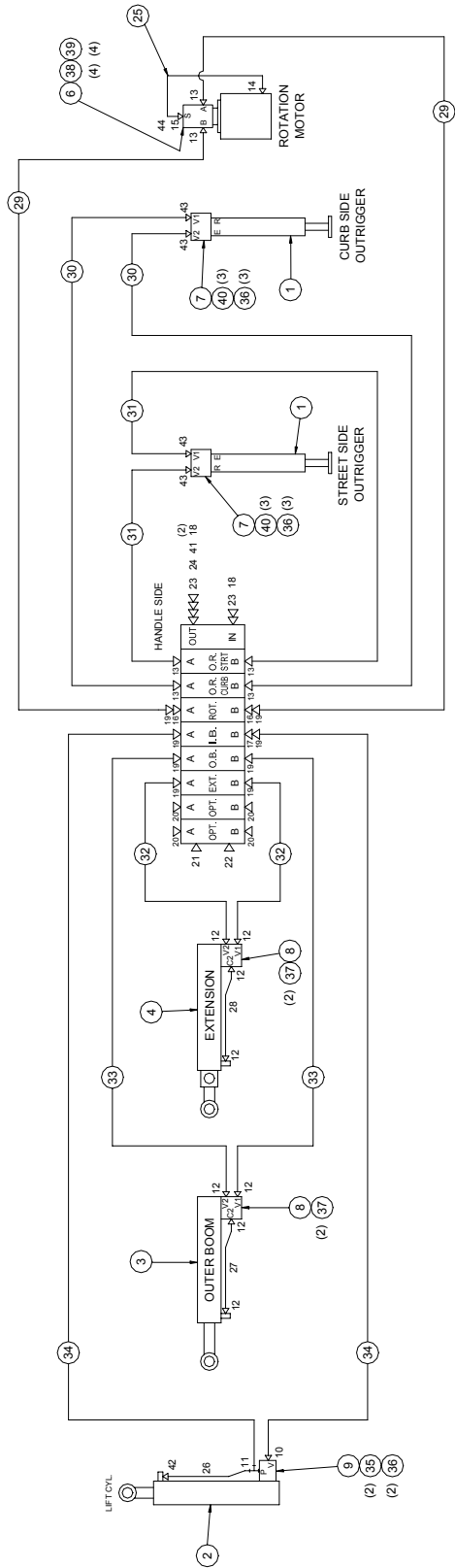
HYDRAULIC SCHEMATIC A72A SERIES



HYDRAULIC SCHEMATIC A72A SERIES



HYDRAULIC ASSEMBLY A72A SERIES

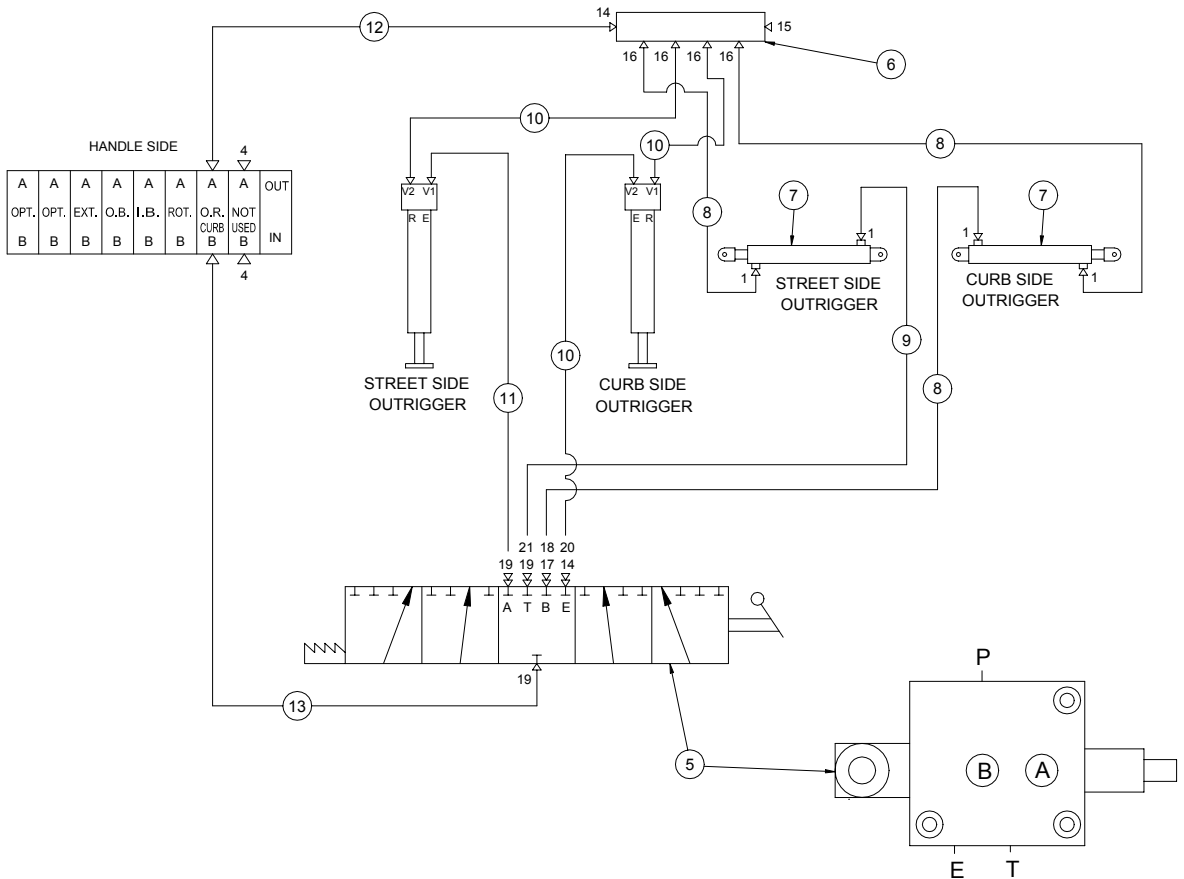


HYDRAULIC ASSEMBLY

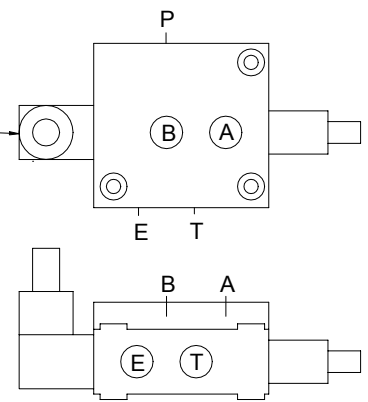
A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	2	373042	OUTRIGGER CYLINDER
2	1	373032	LIFT CYLINDER
3	1	373034	OUTER BOOM CYLINDER
4	1	373038	2-STAGE EXTENSION CYLINDER
5	-	-	-
6	1	367124	COUNTERBALANCE VALVE (ROTATION)
7	2	372066	LOCKING VALVE (OUTRIGGER)
8	2	367121	COUNTERBALANCE VALVE (O.B. AND EXT.)
9	1	367122	COUNTERBALANCE VALVE (LIFT CYLINDER)
10	1	200876	ADAPTER, STR. -6 OR(M) / -6 JIC(M)
11	1	200877	TEE, -6 OR(M) / -6 JIC RUN
12	8	367145	ADAPTER, STR. -8 OR(M) / -8 JIC(M)
13	6	202755	ADAPTER, STR. -10 OR(M) / -6 JIC(M)
14	1	367140	ELL, 90° -4 OR(M) / -6 JIC(M)
15	1	367144	ADAPTER, STR. -4 OR(M) / -6 JIC(M)
16	2	372039	FLOW RESTRICTOR .047
17	1	367226	FLOW RESTRICTOR .120
18	3	750419	CAP, -12 JIC
19	8	372195	SWIVEL, -10 O-RING / -8 JIC
20	4	330072	PLUG, -10 OR(M)
21	1	367204	PLUG, -14 OR(M)
22	1	750478	PLUG, -12 OR(M)
23	2	750420	ADAPTER, STR. -12 OR(M) / -12 JIC(M)
24	1	750472	TEE, -12 FEM. SWIVEL NUT / -12 JIC
25	1	373048	HOSE ASSEMBLY (SWING DRIVE)
26	1	373049	TUBE ASSEMBLY (LIFT CYLINDER)
27	1	373050	TUBE ASSEMBLY (OUTER BOOM)
28	1	372262	TUBE ASSEMBLY (EXTENSION CYLINDER)
29	2	812210-072	HOSE ASSEMBLY, (ROTATION)
30	2	812206-145	HOSE ASSEMBLY, (OUTRIGGER CURB SIDE)
31	2	812206-108	HOSE ASSEMBLY, (OUTRIGGER STREET SIDE)
32	2	812309-225	HOSE ASSEMBLY, (EXTENSION)
33	2	812303-152	HOSE ASSEMBLY, (OUTER BOOM)
34	2	812210-061	HOSE ASSEMBLY, (LIFT CYLINDER)
35	2	005804	SCREW, HX HD 1/4-NC X 1 1/2
36	8	020200	WASHER, SP LK 1/4
37	4	367164	SCREW, SOC HD 3/8-NC X 2 3/4
38	4	367163	SCREW, SOC HD 5/16-NC X 2 1/4
39	4	020601	WASHER, SP LK 5/16
40	6	005810	SCREW, HX HD 1/4-NC X 1 3/4
41	1	367283	ELL, 90° -12 JIC FEM SWIVEL / -12 JIC
42	1	202756	ADAPTER, STR. -8 OR(M) / -6 JIC(M)
43	4	373047	ADAPTER, STR. LONG -6 O-RING / -6 JIC
44	1	480194	ELL, 90° -6 swivel / -6 JIC
45	1	372010	CONTROL VALVE (MANUAL)
46	1	367302	CONTROL VALVE (PROPORTIONAL)

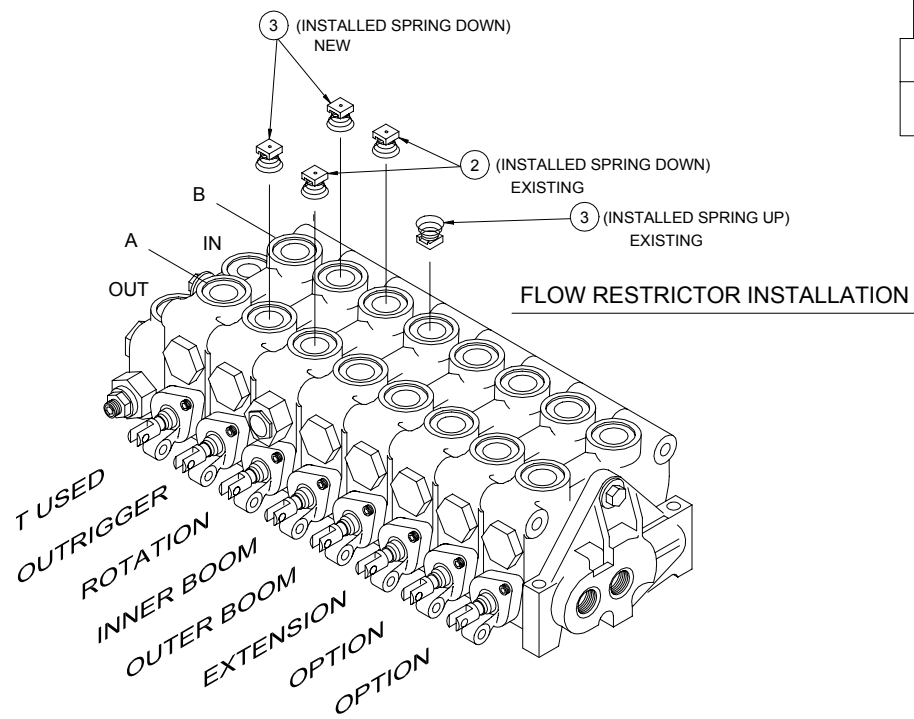
HYDRAULIC ASSEMBLY, POWER OUT OUTRIGGER - A72A SERIES



HANDLE SIDE									
A	A	A	A	A	A	A	A	OUT	
OPT.	OPT.	EXT.	O.B.	I.B.	ROT.	O.R.	NOT USED	IN	
B	B	B	B	B	B	CURB	USED		
						B	B		



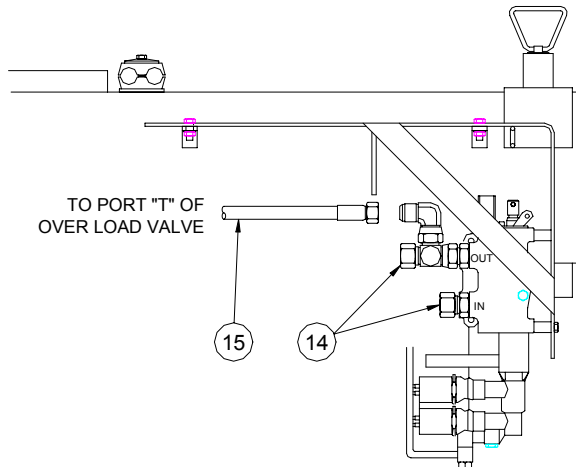
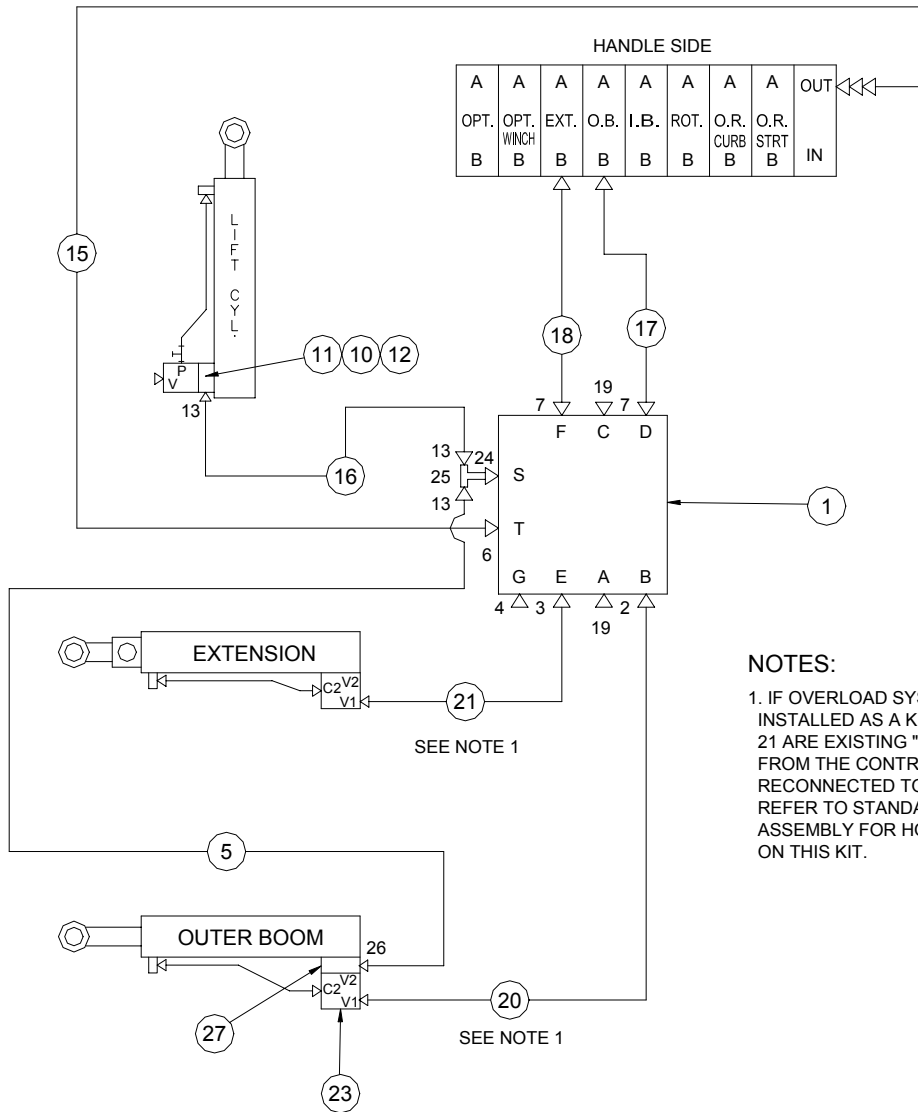
5-WAY DIVERTER VALVE



HYDRAULIC ASSEMBLY, POWER OUT OUTRIGGER - A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	4	200876	ADAPTER, STR. -6 OR(M) / -6 JIC(M)
2	2	372039	FLOW RESTRICTOR. .047
3	2	367226	FLOW RESTRICTOR, .120
4	2	330072	PLUG, -10 O-RING
5	1	372311	5-WAY DIVERTER VALVE
6	1	372305	HEADER, MANIFOLD
7	2	373040	CYLINDER, POWER OUT OUTRIGGER
8	3	480206	HOSE ASSEMBLY
9	1	812203-050	HOSE ASSEMBLY
10	3	812206-108	HOSE ASSEMBLY
11	1	812206-118	HOSE ASSEMBLY
12	1	812203-040	HOSE ASSEMBLY
13	1	812203-056	HOSE ASSEMBLY
14	2	202756	ADAPTER, STR. -8 OR(M) / -6 JIC(M)
15	1	367162	PLUG, -8
16	4	241175	ELL, 90° -6 OR(M) / -6 JIC(M)
17	1	367220	ELL, 90° -8 OR(M) / -6 NPT(FEMALE)
18	1	360042	ADAPTER, STR. -6 NPT / -6 JIC
19	3	330272	ELL, 90° -8 OR(M) / -6 JIC(M)
20	1	480194	ELL, 90° -6 SWIVEL / -6 JIC
21	1	330647	ELL, 45° -6 SWIVEL / -6 JIC

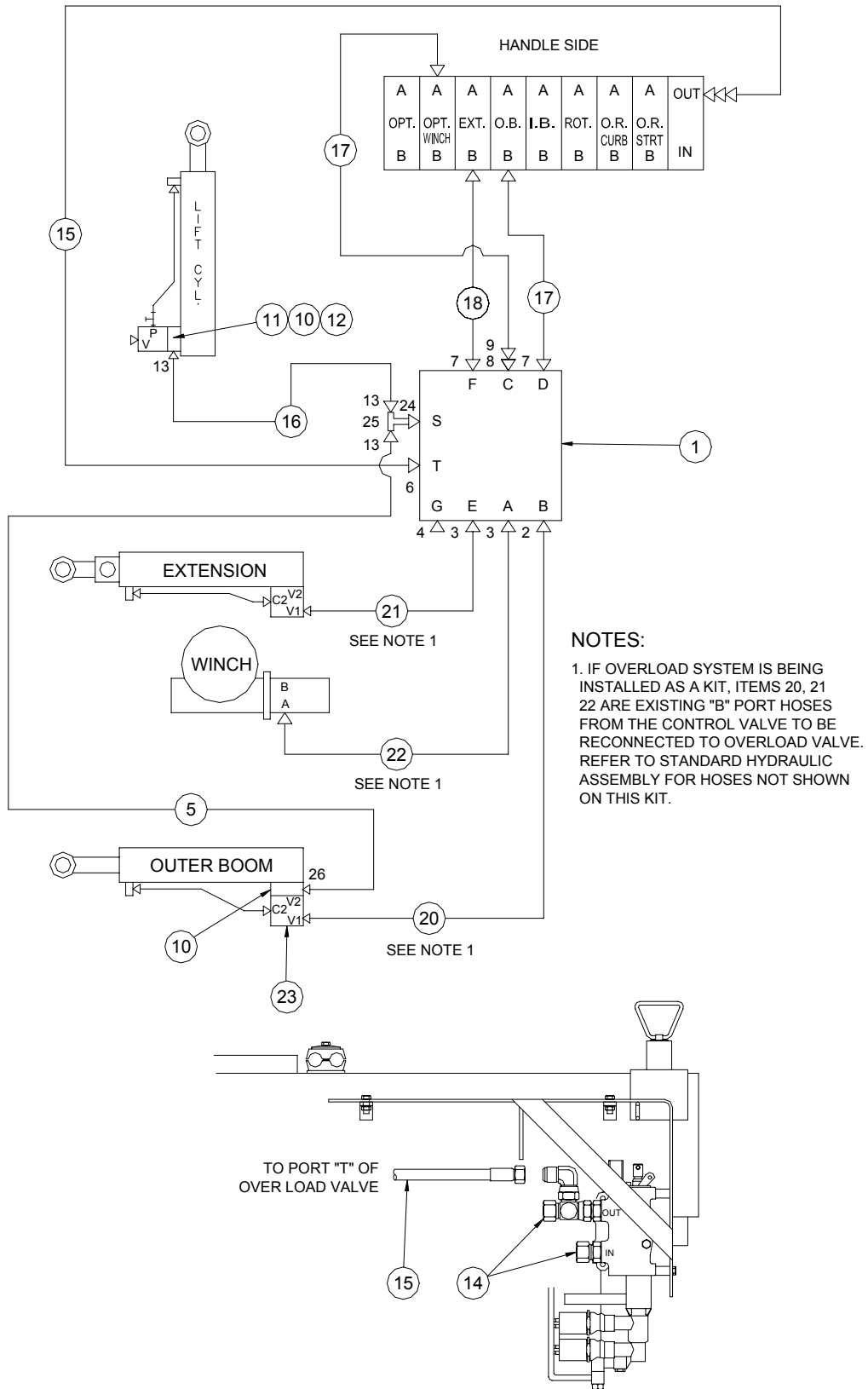
HYDRAULIC ASSEMBLY, 2-FUNCTION OVERLOAD - A72A SERIES



HYDRAULIC ASSEMBLY, 2-FUNCTION OVERLOAD - A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	367285	OVERLOAD VALVE
2	1	372042	ELL, 90° X-LONG -10 OR(M)
3	1	372044	ELL, 90° -10 OR(M) /-8 JIC(M)
4	1	000211	PLUG, HOL HX -4 ORM
5	1	812003-152	HOSE ASSEMBLY (O.B. SENSE)
6	1	372046	ELL, 45° -12 OR(M) / -12 JIC(M)
7	2	372041	ADAPTER, STR -10 OR(M) / -8 JIC
8	-	-	-
9	-	-	-
10	2	368987	VELOCITY FUSE
11	1	368985	SENSE MANIFOLD
12	2	006700	SCREW, HX HD 1/4-NC X 2 1/2
13	3	759137	ELL, 90° -6 OR(M) / -4 JIC(M)
14	2	750419	CAP, -12 JIC
15	1	812411-051	HOSE ASSEMBLY, (RETURN)
16	1	812003-047	HOSE ASSEMBLY, (SENSE)
17	1	812306-057	HOSE ASSEMBLY, (OUTER BOOM OPTION)
18	1	812309-057	HOSE ASSEMBLY, (EXTENSION)
19	2	330072	PLUG, HX HD -10 O-RING
20	1	812303-152	HOSE ASSEMBLY, OUTER BOOM (SEE NOTE 1)
21	1	812309-225	HOSE ASSEMBLY, EXT. (SEE NOTE 1)
22	-	-	-
23	2	373054	SCREW, SOC HD 3/8-NC X 3 3/4
24	1	373053	UNION, STR. -6 OR(M) / -6 OR(M)
25	1	373052	SHUTTLE VALVE
26	1	759138	ADAPTER, STR. -6 OR(M) / -4 JIC
27	1	373051	SENSE MANIFOLD

HYDRAULIC ASSEMBLY, 3-FUNCTION OVERLOAD - A72A SERIES

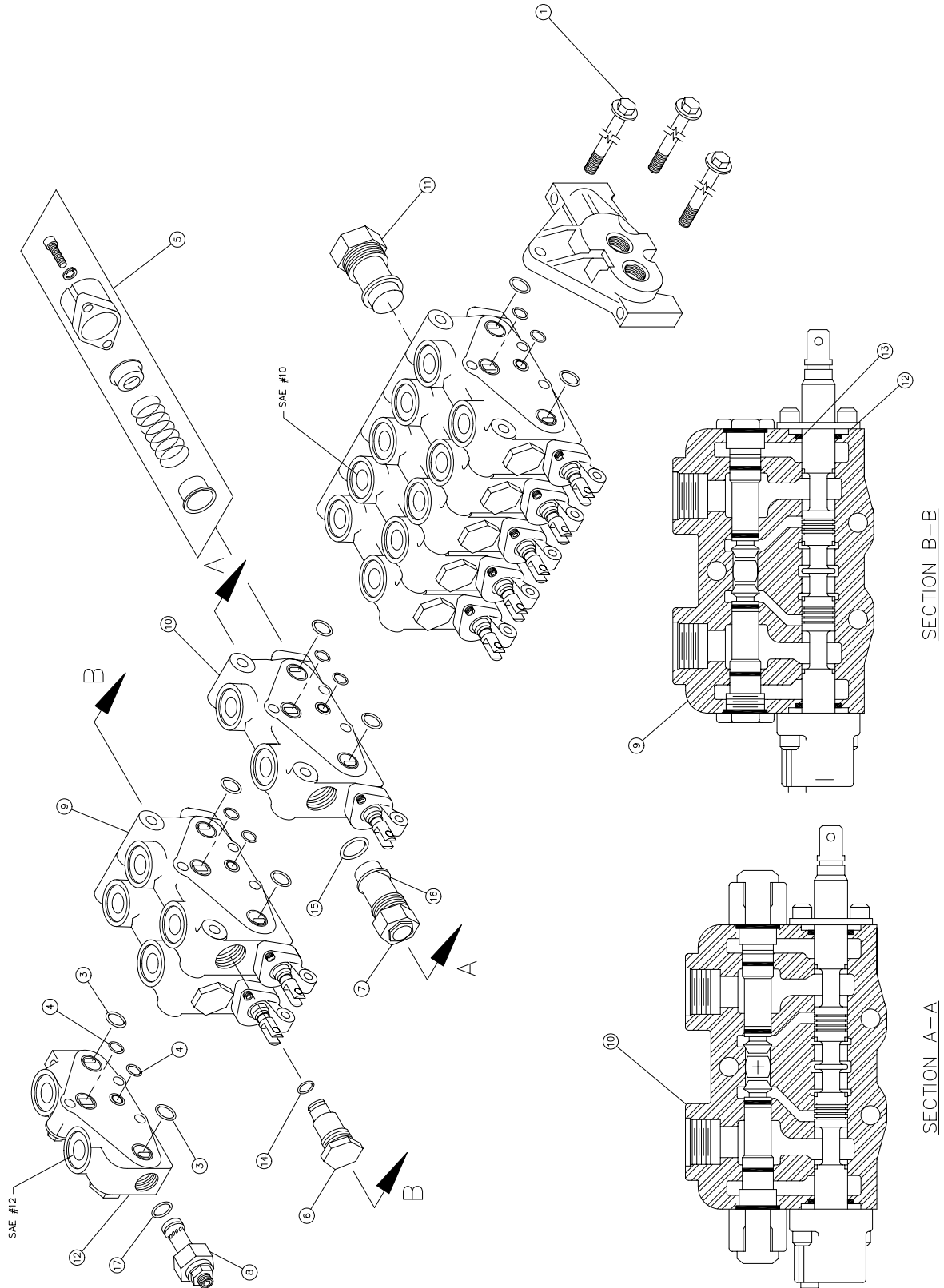


HYDRAULIC ASSEMBLY, 3-FUNCTION OVERLOAD - A72A SERIES

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	367285	OVERLOAD VALVE
2	1	372042	ELL, 90° X-LONG -10 OR(M)
3	2	372044	ELL, 90° -10 OR(M) / -8 JIC(M)
4	1	000211	PLUG, HOL HX -4 ORM
5	1	812003-152	HOSE ASSEMBLY (O.B. SENSE)
6	1	372046	ELL, 45° -12 OR(M) / -12 JIC(M)
7	2	372041	ADAPTER, STR -10 OR(M) / -8 JIC
8	1	330274	ADAPTER, STR. 10 OR(M) / -8 OR(F)
9	1	367145	ADAPTR, STR. -8 OR(M) / -8 JIC(M)
10	2	368987	VELOCITY FUSE
11	1	368985	SENSE MANIFOLD
12	2	006700	SCREW, HX HD 1/4-NC X 2 1/2
13	3	759137	ELL, 90° -6 OR(M) / -4 JIC(M)
14	2	750419	CAP, -12 JIC
15	1	812411-051	HOSE ASSEMBLY, (RETURN)
16	1	812003-047	HOSE ASSEMBLY, (SENSE)
17	2	812306-057	HOSE ASSEMBLY, (OUTER BOOM OPTION)
18	1	812309-057	HOSE ASSEMBLY, (EXTENSION)
19	-	-	-
20	1	812303-152	HOSE ASSEMBLY, OUTER BOOM (SEE NOTE 1)
21	1	812309-225	HOSE ASSEMBLY, EXT. (SEE NOTE 1)
22	1	812309-285	HOSE ASSEMBLY, (WINCH)
23	2	373054	SCREW, SOC HD 3/8-NC X 3 3/4
24	1	373053	UNION, STR. -6 OR(M) / -6 OR(M)
25	1	373052	SHUTTLE VALVE
26	1	759138	ADAPTER, STR. -6 OR(M) / -4 JIC
27	1	373051	SENSE MANIFOLD

CONTROL VALVE

P/N 372010



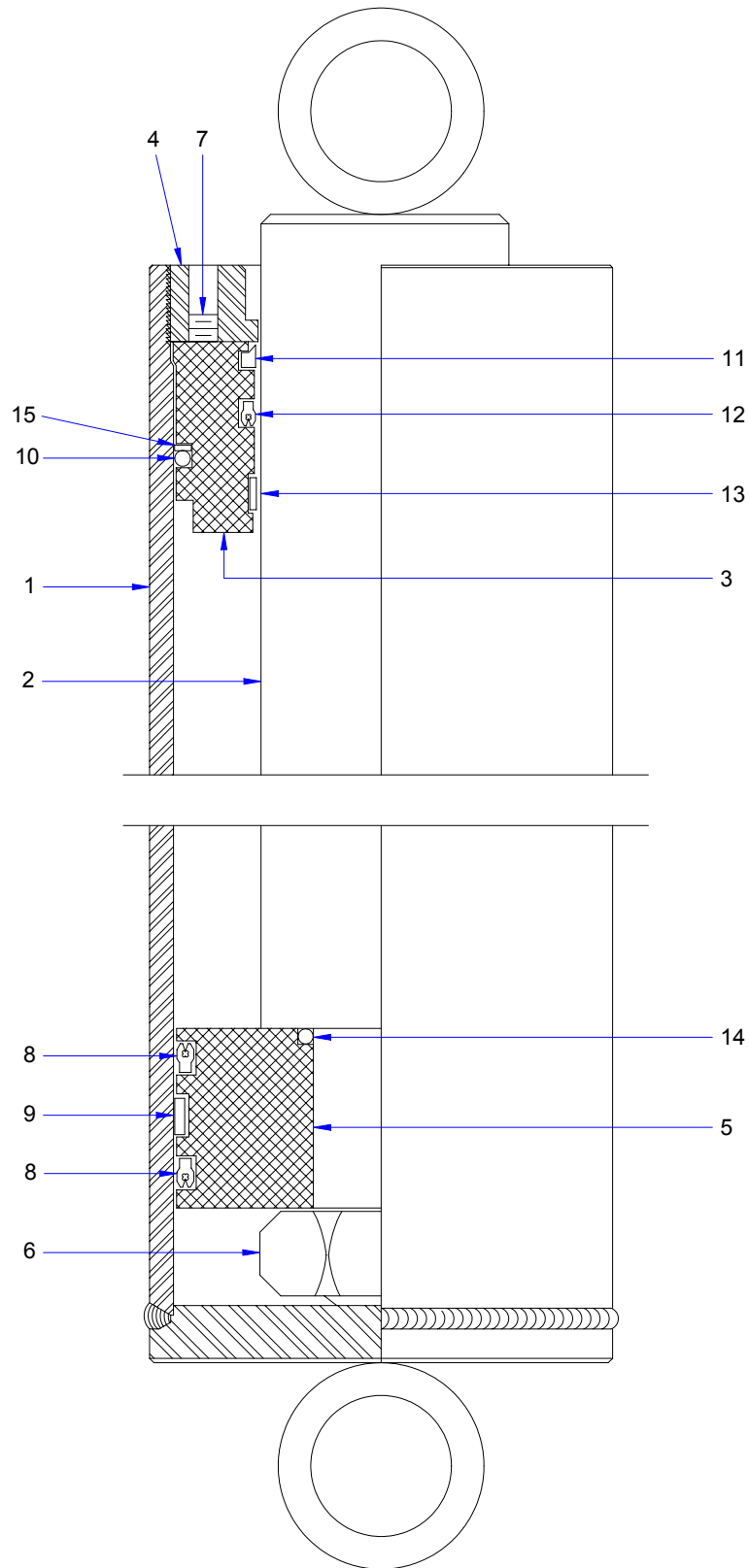
CONTROL VALVE

P/N 372010

<u>Item</u>	<u>Quantity</u>	<u>Part Number</u>	<u>Description</u>
1	1	367024-001	Stud Kit
2	1	367024-002	Inlet Cover
3	18	367024-003	Large Return O-Ring
4	18	367024-004	Small Pressure O-Ring
5	8	367024-005	Standard Positioner
6	14	367024-006	Load Check Plug
7	2	367024-007	Work Port Relief
8	1	367024-008	Inlet Relief Valve
9	7	367024-009	4-Way 3 Position Valve Section Cylinder
10	1	367024-0010	4-Way 3 Position Valve Section
11	1	369222	Work Port Relief 2200 psi
12	16	367024-0012	Washer Spool Retainer Plate
13	16	367024-0013	Seal & Washer Spool
14	14	367024-0014	Load Plug Seal Kit
15	2	367024-0015	Port Relief Seal Kit
16	2	367024-0016	Port Relief Service Kit
17	2	367024-0017	Inlet Relief Seal Kit

OUTER BOOM CYLINDER

P/N: 373034



OUTER BOOM CYLINDER

P/N: 373034

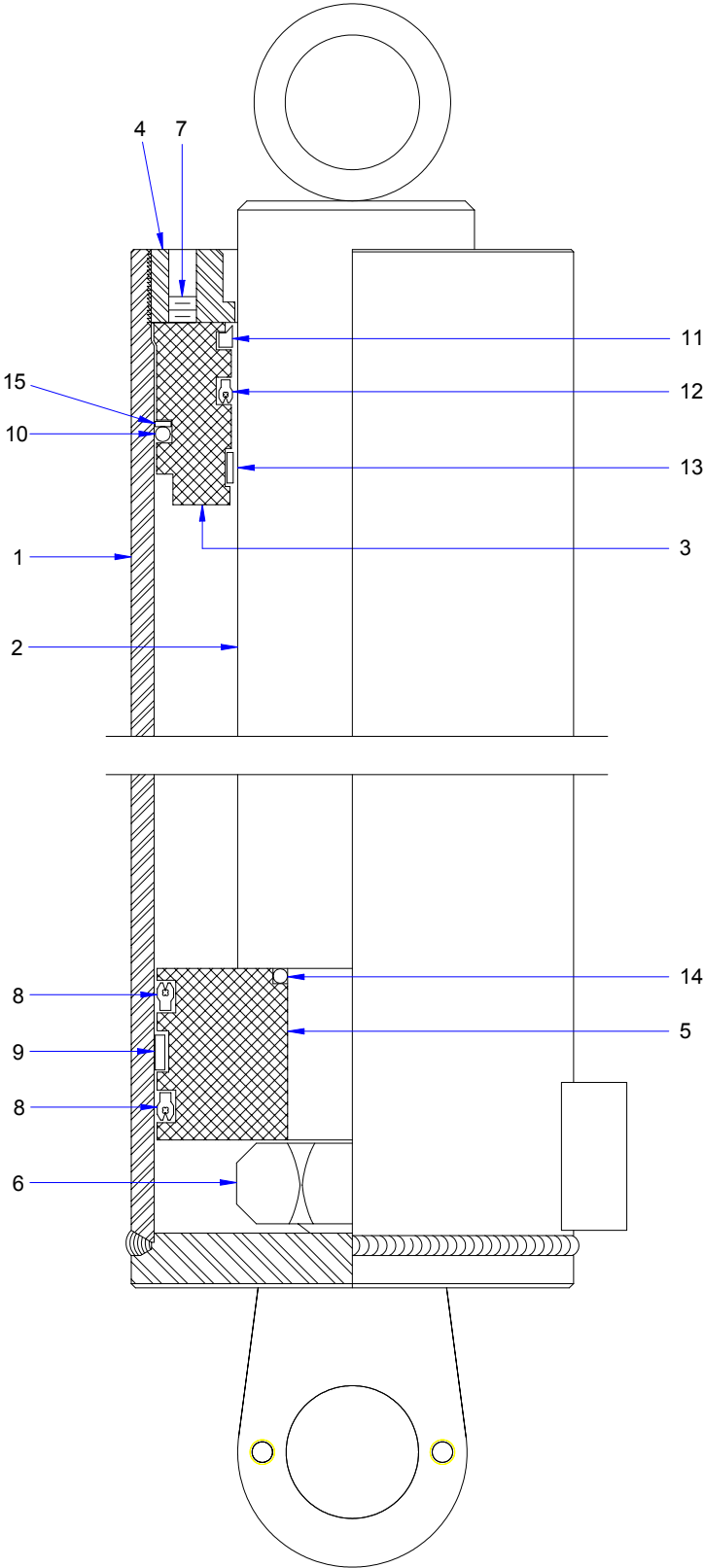
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373034-001	BARREL
2	1	373034-002	ROD
3	1	373034-003	HEAD GLAND
4	1	373034-004	HEAD GLAND NUT
5	1	373034-005	PISTON
6	1	373034-006	PISTON NUT
7	1	373034-007	SET SCREW
8	2	SEE NOTE 1	LOADED U-CUP 6" O.D. X 5 1/2" I.D. X .39 THICK
9	1	SEE NOTE 1	WEAR RING SPLIT, 6" O.D. X 5 3/4" I.D. X .50 THICK
10	1	SEE NOTE 1	O-RING, 6 1/8" O.D. X 5 5/8" I.D. X .275 THICK
11	1	SEE NOTE 1	WIPER SEAL, 4" O.D. X 3 1/2" I.D. X .39 THICK
12	1	SEE NOTE 1	LOADED U-CUP, 4" O.D. X 3 1/2" I.D. X .39 THICK
13	1	SEE NOTE 1	WEAR RING SPLIT, 3 3/4" O.D. X 3 7/16" I.D. X .5 THICK
14	1	SEE NOTE 1	O-RING, 2 3/8" O.D. X 2" I.D. X .215 THICK
15	1	SEE NOTE 1	BACK-UP RING, 6" O.D. X 5 1/2" I.D. X .11 THICK

NOTES:

1. THIS ITEM IS PART OF SEAL KIT 373035.

LIFT CYLINDER

P/N: 373032



LIFT CYLINDER

P/N: 373032

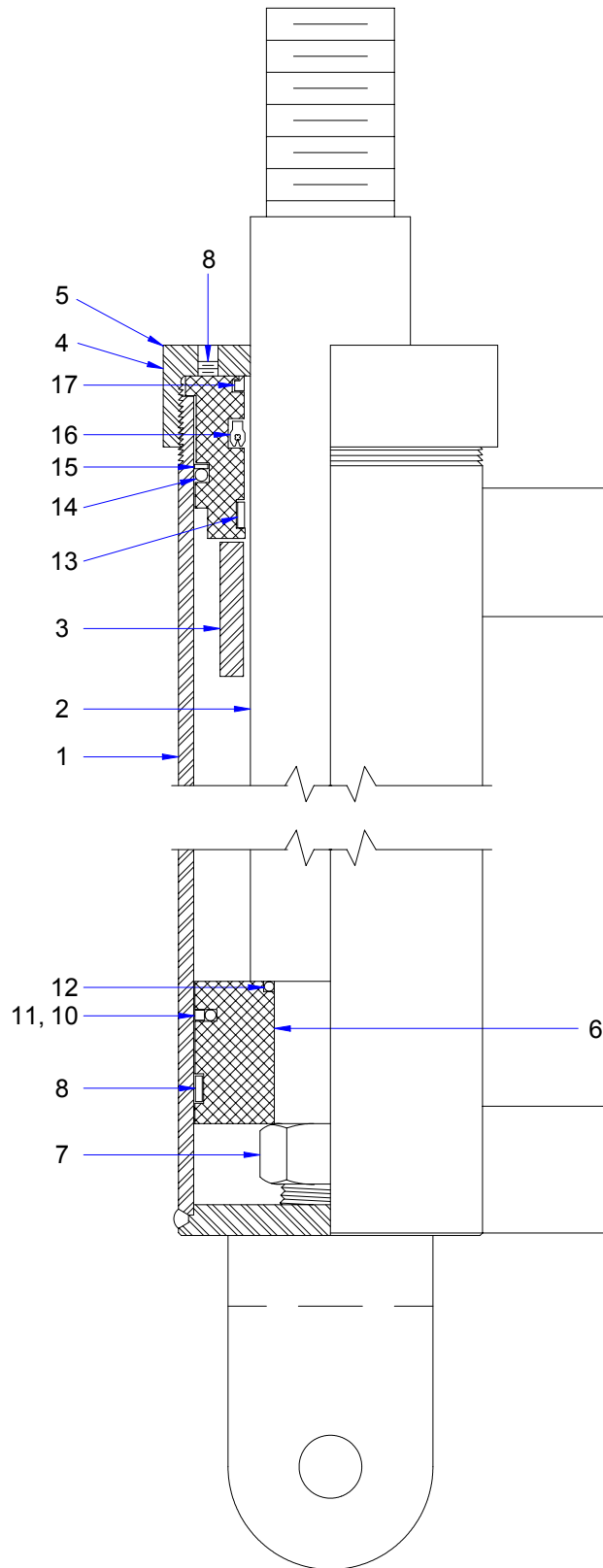
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373034-001	BARREL
2	1	373034-002	ROD
3	1	373034-003	HEAD GLAND
4	1	373034-004	HEAD GLAND NUT
5	1	373034-005	PISTON
6	1	373034-006	PISTON NUT
7	1	373034-007	SET SCREW
8	2	SEE NOTE 1	LOADED U-CUP 6" O.D. X 5 1/2" I.D. X .39 THICK
9	1	SEE NOTE 1	WEAR RING SPLIT, 6" O.D. X 5 3/4" I.D. X .50 THICK
10	1	SEE NOTE 1	O-RING, 6 1/8" O.D. X 5 5/8" I.D. X .275 THICK
11	1	SEE NOTE 1	WIPER SEAL, 4" O.D. X 3 1/2" I.D. X .39 THICK
12	1	SEE NOTE 1	LOADED U-CUP, 4" O.D. X 3 1/2" I.D. X .39 THICK
13	1	SEE NOTE 1	WEAR RING SPLIT, 3 3/4" O.D. X 3 7/16" I.D. X .5 THICK
14	1	SEE NOTE 1	O-RING, 2 3/8" O.D. X 2" I.D. X .215 THICK
15	1	SEE NOTE 1	BACK-UP RING, 6" O.D. X 5 1/2" X .11 THICK

NOTES:

1. THIS ITEM IS PART OF SEAL KIT 373035

OUTRIGGER CYLINDER

P/N: 373040



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OUTRIGGER CYLINDER

P/N: 373040

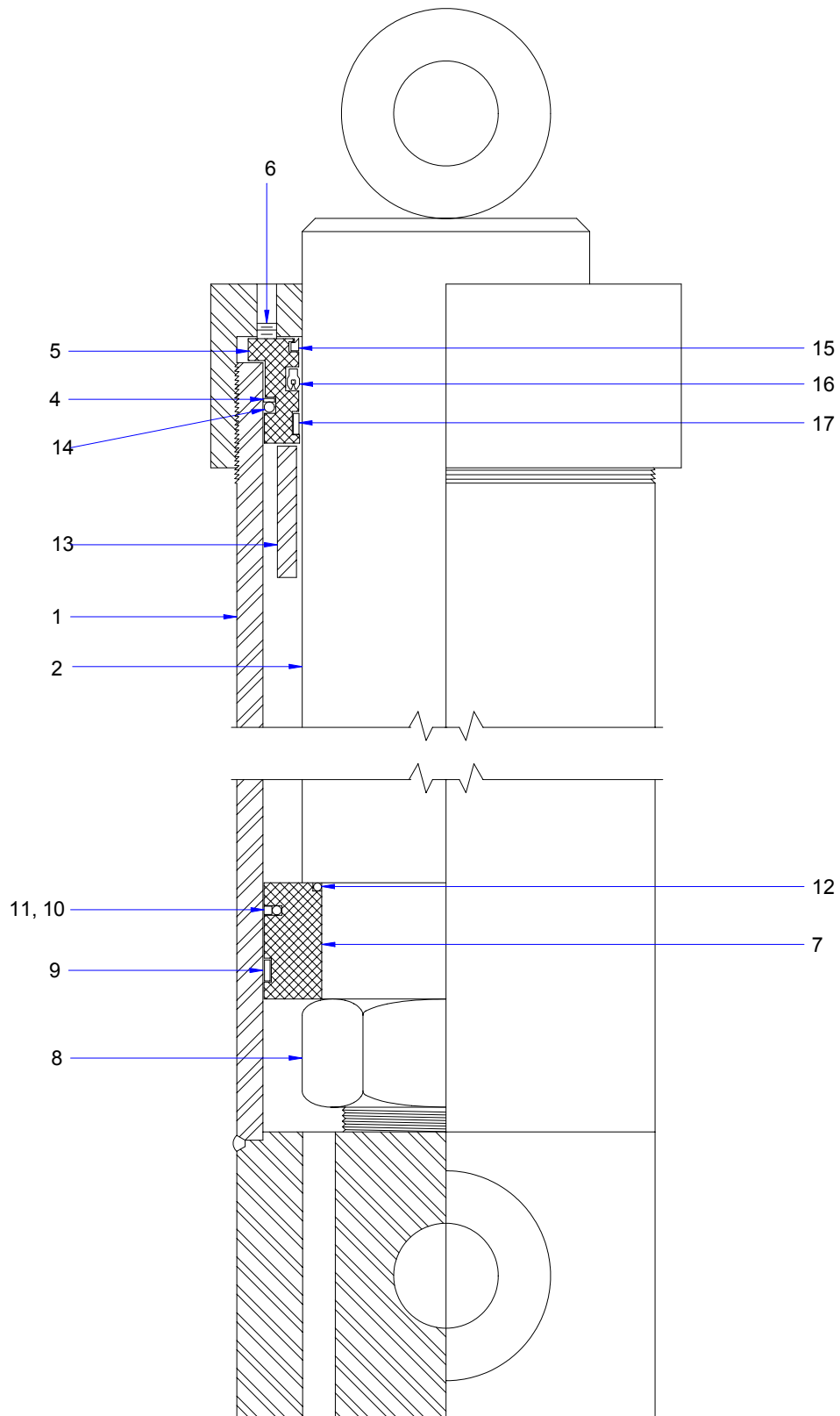
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373040-001	BARREL
2	1	373040-002	ROD
3	1	373040-003	2" SPACER
4	1	373040-004	HEAD GLAND
5	1	373040-005	CAP
6	1	373040-006	PISTON
7	1	373040-007	PISTON NUT
8	1	373040-008	SET SCREW
9	1	SEE NOTE 1	WEAR RING SPLIT, 2" O.D. X .5 WIDE X .13 THICK
10	1	SEE NOTE 1	O-RING, 1 3/4" O.D. X 1/8" THICK
11	1	SEE NOTE 1	SLIP RING, 2" O.D. X 1/8" SQUARE
12	1	SEE NOTE 1	O-RING, 7/8" O.D. X .07 THICK
13	1	SEE NOTE 1	WEAR RING SPLIT, 1 1/2" O.D. X 1/8" WIDE X 3/16" THICK
14	1	SEE NOTE 1	O-RING, 2" O.D. X .22 THICK
15	1	SEE NOTE 1	BACK-UP RING, 2" O.D. X .18 WIDE X .08 THICK
16	1	SEE NOTE 1	LOADED U-CUP, 1 1/2" O.D. X 1 1/4" I.D. X 1/4" SQUARE
17	1	SEE NOTE 1	WIPER SEAL, 1 5/8" O.D. X 1 1/4" I.D. X .30 THICK

NOTE:

1. THIS ITEM IS PART OF SEAL KIT 330602.

OUTRIGGER CYLINDER

P/N: 373042



OUTRIGGER CYLINDER

P/N: 373042

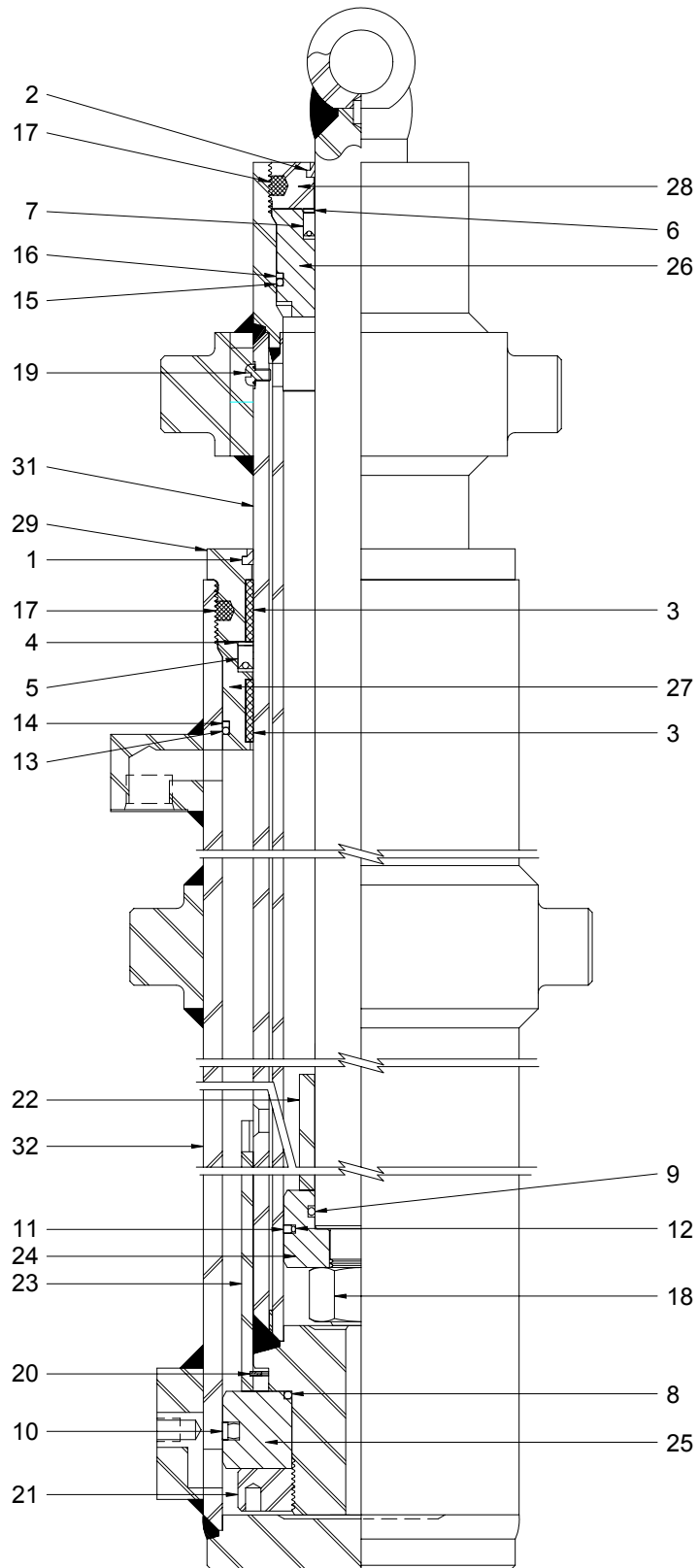
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	373042-001	BARREL
2	1	373042-002	ROD
3	1	373042-003	SPACER, 1 1/4"
4	1	373042-004	HEAD GLAND
5	1	373042-005	CAP
6	1	373042-006	SET SCREW
7	1	373042-007	PISTON
8	1	373042-008	PISTON NUT
9	1	SEE NOTE 1	WEAR RING SPLIT, 3 1/2" O.D. X 3 1/4" I.D. X 1/2" THICK
10	1	SEE NOTE 1	O-RING, 3 3/16" O.D. X 3" I.D. X 1/8" THICK
11	1	SEE NOTE 1	SLIP RING, 3 1/2" O.D. X 3 1/4" I.D. X 1/8" SQUARE
12	1	SEE NOTE 1	O-RING, 2 3/8" O.D. X 1 7/8" I.D. X 1/4" THICK
13	1	SEE NOTE 1	O-RING, 3 1/2" O.D. X 3 1/4" I.D. X .140 THICK
14	1	SEE NOTE 1	BACK-UP RING, 3 1/2" O.D. X 3 1/4" X 1/16" THICK
15	1	SEE NOTE 1	WIPER SEAL, 3 1/4" O.D. X 2 3/4" I.D. X 3/8" THICK
16	1	SEE NOTE 1	LOADED U-CUP, 3 1/4" O.D. X 2 3/4" I.D. X 3/8" THICK
17	1	SEE NOTE 1	WEAR RING SPLIT, 3" O.D. X 2 3/4" I.D. X 1/8" THICK

NOTES:

1. THIS ITEM IS PART OF SEAL KIT 368228.

EXTENSION CYLINDER

P/N: 373038



9-12.0.0

EXTENSION CYLINDER

P/N: 373038

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	SEE NOTE 1	WIPER, 3 15/16" X 3 1/2" X .20 THICK
2	1	SEE NOTE 1	WIPER, 1 7/8" O.D. X 1 1/2" I.D. X .145 THICK
3	2	SEE NOTE 1	WEAR RING, 3 11/16" O.D. X 3 7/16" I.D. X 1" THICK
4	1	SEE NOTE 1	BACK-UP, 4" O.D. X 3 1/2" I.D. X .07 THICK
5	1	SEE NOTE 1	U-RING, 4 1/16" O.D. X 3 1/2" X .38 THICK
6	1	SEE NOTE 1	BACK-UP, 1 7/8" O.D. X 1 1/2" I.D. X .07 THICK
7	1	SEE NOTE 1	U-RING, 1 15/16" O.D. X 1 1/2" I.D. X .38 THICK
8	1	SEE NOTE 1	O-RING, 2 9/16" O.D. X 2 1/4" I.D. X .140 THICK
9	1	SEE NOTE 1	O-RING, 1 3/4" O.D. X 1 1/2" I.D. X .140 THICK
10	1	SEE NOTE 1	TEFLON RING ASS'Y, 4 1/2" O.D. X 4 5/16" I.D. X .30 THICK
11	1	SEE NOTE 1	TEFLON RING, 2 1/2" O.D. X 2 1/4" I.D. X .125 SQUARE
12	1	SEE NOTE 1	O-RING, 2 1/4" O.D. X 2 1/16" I.D. X .110 THICK
13	1	SEE NOTE 1	O-RING, 4 3/8" O.D. X 4 1/4" I.D. X .140 THICK
14	1	SEE NOTE 1	BACK-UP, 4 7/16" O.D. X 4 1/4" I.D. X .06 THICK
15	1	SEE NOTE 1	O-RING, 2 3/4" O.D. X 2 1/2" I.D. X .140 THICK
16	1	SEE NOTE 1	BACK-UP, 2 3/4" O.D. X 2 1/2" I.D. X .06 THICK
17	2	SEE NOTE 1	NYLON PLUG
18	1	373038-001	NUT
19	1	373038-002	SCREW ASSEMBLY
20	1	373038-003	RETAINING RING
21	1	373038-004	NUT
22	1	373038-005	SPACER
23	1	373038-006	SPACER
24	1	373038-007	PISTON
25	1	373038-008	PISTON
26	1	373038-009	BEARING
27	1	373038-010	BEARING
28	1	373038-011	RETAINER
29	1	373038-012	RETAINER
30	1	373038-013	ROD ASSEMBLY
31	1	373038-014	ROD TUBE ASSEMBLY
32	1	373038-015	TUBE ASSEMBLY

NOTE:

1. PART OF SEAL KIT 367247

CYLINDER SEAL REPLACEMENT

1 REMOVE CYLINDER FROM CRANE

- A. disconnect shaft end of cylinder from the crane.
- B. retract cylinder rod with oil from hydraulic system until about 12"-14" of rod is extended. The barrel must be filled with oil to prevent a compressed air chamber being formed which could result in injury at time of disassembly.
- C. remove cylinder from crane and place on supports.
- D. place an oil pan under the cylinder head gland and return port.

2 REMOVE RETURN TUBE FROM CYLINDER

DANGER: there could be trapped pressure in the cylinder, unscrew return tube fitting slowly and carefully to relieve any trapped pressure.

3 REMOVE HEAD GLAND

- A. unscrew head gland nut setscrew and head gland nut from cylinder.
- B. attach a porta-power hand pump or a hydraulic line from crane circuit valve to the return port on cylinder.
- C. operate hand pump or crane circuit valve to force the head gland assembly out of the cylinder.

WARNING! Never use compressed air to force head gland assembly out of cylinder. Personal injury could result as well as damage to cylinder components.

D. use great care when removing head gland assembly from cylinder, *do not pry out with a screwdriver.*

E. once head gland assembly is out of cylinder move the assembly carefully to rod eye taking care not to damage rod assembly.

4 RELIEVE CYLINDER PRESSURE

Since it is possible to trap pressure in cylinders equipped with dual counterbalance valves (outer boom, extension, and outrigger up-down cylinders), do not attempt to remove counterbalance valve without first making sure that all trapped pressure is relieved. This can be done by adjusting the extend counterbalance cartridge so that it's holding pressure is zero.

A. loosen the jam nut on cartridge. The extend cartridge is located next to the return tube fitting on counterbalance valve.

B. the trapped pressure can now be relieved by turning the valve stem in until it is firmly seated.

Note: it is very important that a record is kept of the number of turns the valve is turned in and upon completion of service, return the valve stem to its original position and tighten jam nut. This is required for the counterbalance valve to have the proper factory set holding pressure.

5 REMOVE COUNTERBALANCE VALVE

A. remove counterbalance valve from cylinder

CYLINDER SEAL REPLACEMENT

6 REMOVE ROD/PISTON ASSEMBLY

- A. remove the rod and piston assembly by hand. great care should be used when handling rod assembly to prevent damage to the assembly.

7 DISASSEMBLE PISTON ASSEMBLY

- A. remove piston nut.
- B. remove piston.
- C. remove head gland.

Note "loctite" is used during original assembly to secure nut to rod. If necessary, heat nut to 400-500 degrees to remove nut. If heat is required for removal, replace nut and any other damaged parts.

8 CLEAN AND INSPECT PARTS

- A. Clean and inspect cylinder barrel, rod assembly, head gland assembly, piston assembly, and all other cylinder components for damage.

9 REPLACE SEALS

- A. remove all old cylinder seals and replace with new seals from seal kit.
- B. it is highly recommended that all seals be replaced any time the cylinder is disassembled.

10 ASSEMBLE PISTON/ROD ASSEMBLY

- A. apply water resistant grease to inner diameter of head gland and install on rod.
- B. install piston assembly.
- C. apply "loctite #271" to rod threads.
- D. install piston nut; torque to 300-350 ft-lbs for all 2"-12 nuts, 165 ft-lbs for all 3/4"-16 nuts.

- E. use a cold chisel to pin threads in 2-3 places around nut.

11 INSTALL ROD ASSEMBLY

- A. apply water resistant grease to the outside diameter of piston and inner diameter of head gland during installation.
- B. apply "never seez" or equivalent between head gland and barrel when assembling.

Great care should be used when installing rod assembly into barrel of cylinder to prevent nicking piston seals. Damaging the edges of seals is likely to cause premature seal failure.

- C. install head gland nut once head gland assembly is in place. Tighten head gland nut and secure with setscrew if required.

12 INSTALL COUNTERBALANCE VALVE

- A. install counterbalance valve in its original position.
- B. install return tube on cylinder.

13 INSTALL CYLINDER

- A. install cylinder on the crane and pin in place
- B. test cylinder by extending and retracting cylinder to its full length and holding in place while air is purged.
- C. check for leaks.
- D. re-tighten head gland nut once cylinder has been purged of air.

NOTES

IMPORTANT!

SAFETY TIPS AND PRECAUTIONS FOR WORKING WITH HYDRAULIC CYLINDERS

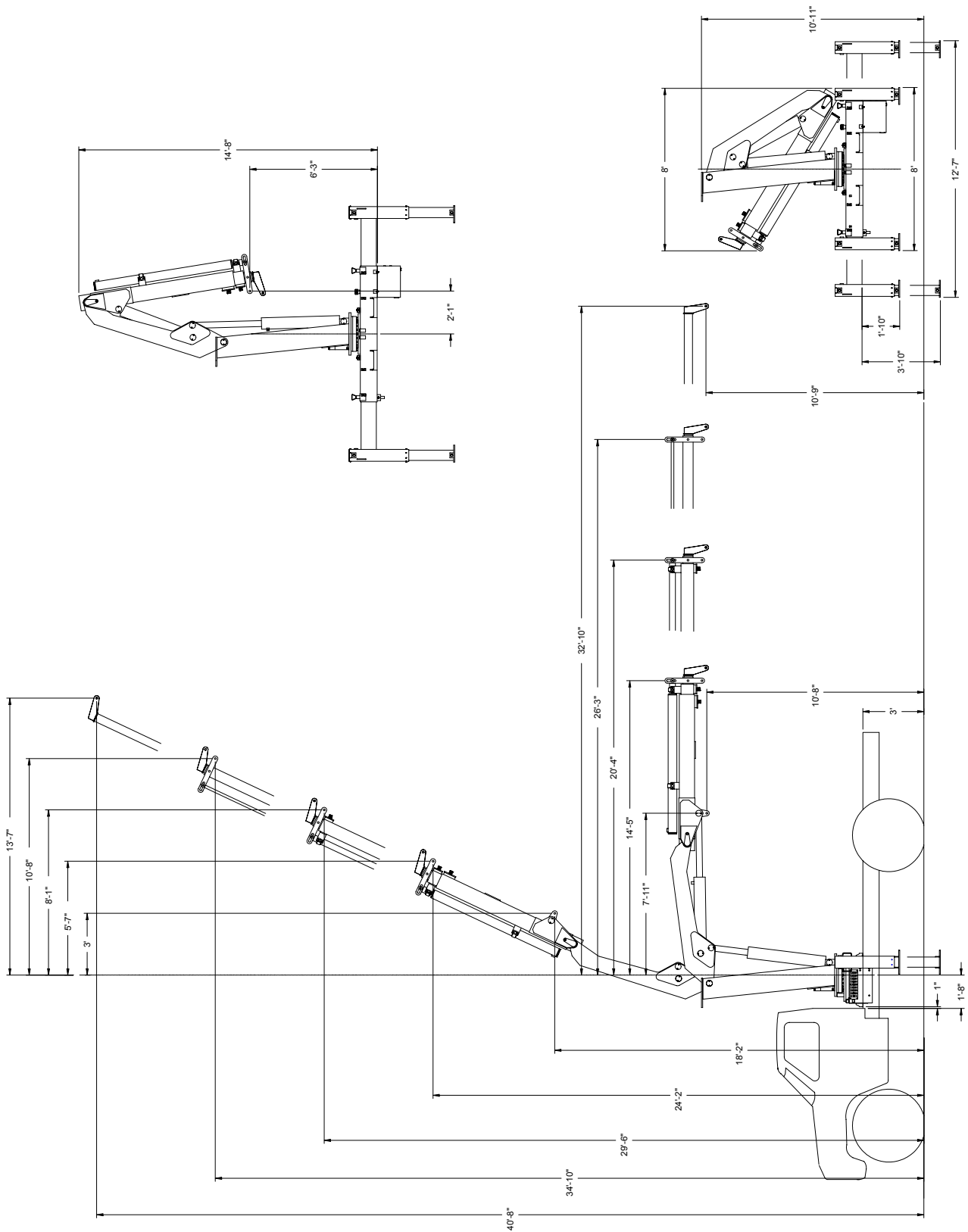
- 1 WARNING: never use compressed air to assist in removing the rod or head gland assembly. The use of compressed air may result in propelling the assembly out of the cylinder and may cause serious injury or death.**
- 2 If solvent is used to clean the internal cylinder components, all traces of solvent must be removed. Any residual solvent will damage seals. The use of solvents should be done in a well ventilated area.**
- 3 Once cylinder has been disassembled and thoroughly cleaned, reassemble in a clean environment, i.e. one that is free of dust and dirt.**
- 4 DO not clamp cylinder in a vise, it may damage cylinder.**
- 5 DO not clamp the machined or plated surface of the rod assembly in vise, damage to the rod assembly will result.**
- 6 DO replace all seals once cylinder has been disassembled. This will ensure proper operation of cylinder and reduce future downtime.**
- 7 Use great care when installing rod assembly into cylinder. Damage to seals may result in premature failure of seals.**
- 8 DO replace any worn or damaged cylinder components.**
- 9 It is possible to trap pressure in cylinders equipped with dual counterbalance valves (outer boom, extension and outrigger up-down). Dual counterbalance valves lock both the extend and retract sides of the cylinder piston. Do NOT attempt to remove counterbalance valve without first assuring that all possible trapped pressure is relieved.**
- 10 Apply "loctite #271" to rod assembly threads, apply grease to the outside diameter of piston and inner diameter of head gland. Use "never-seez" or equivalent between head gland and barrel when assembling cylinder.**

DECAL LAYOUT A72A SERIES

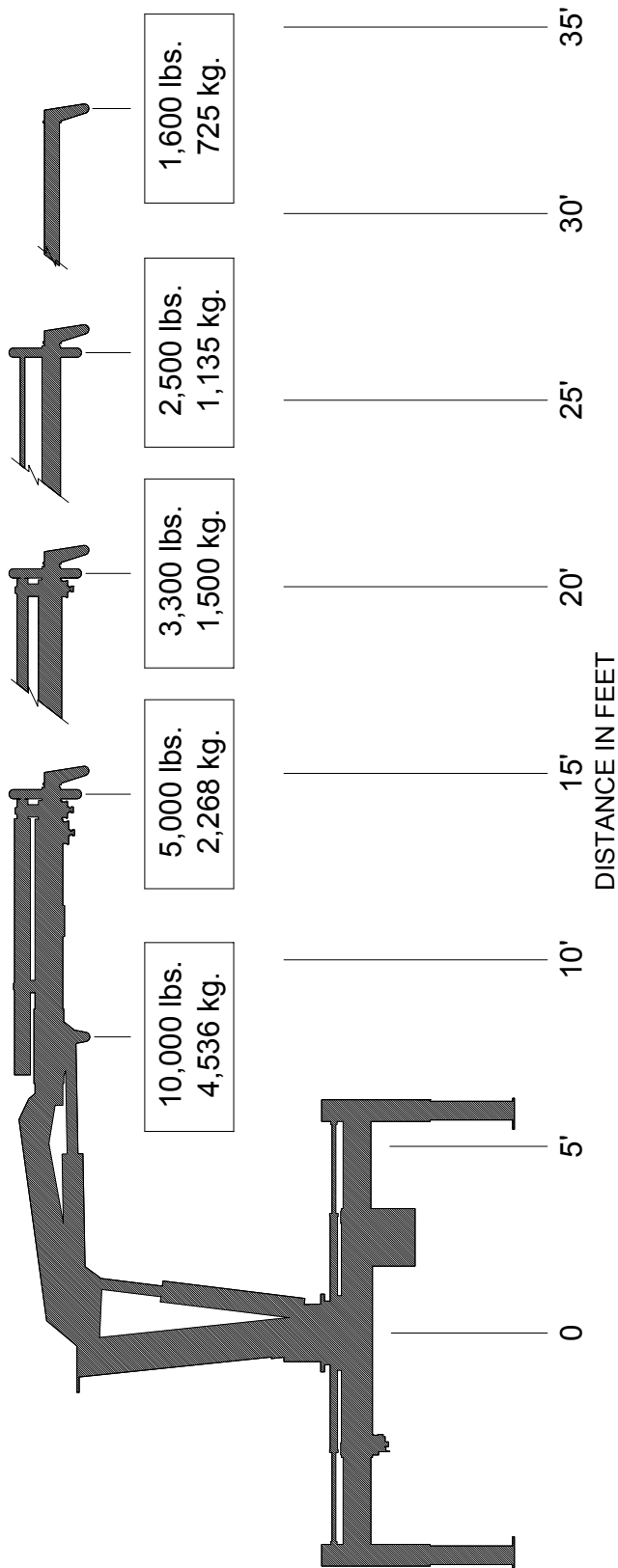
ITEM	QTY.	PART NO.	DESCRIPTION
1	2	372320	DECAL, CONTROL HANDLE
2	2	040579	DECAL, CAUTION
3	2	367250	DECAL, STOWING
4	2	367246	DECAL, DANGER LOADLINE
5	4	367241	DECAL, DANGER
6	2	040529	DECAL, DANGER
7	2	367239	DECAL, STOWING
8	2	040580	DECAL, DANGER
9	2	759016	DECAL, DANGER OUTRIGGERS
10	2	040581	DECAL, DANGER CRUSHING
11	2	759017	DECAL, CAUTION
12	4	367242	DECAL, ARROW
13	4	040517	DECAL, DANGER STAY CLEAR
14	4	367251	DECAL, DANGER STAY CLEAR
15	2	040630	DECAL, DANGER STAY CLEAR
16	1	367244	DECAL, HYD. FLUID LEVEL
17	1	367243	DECAL, GREASE
18	2	040519	DECAL, DANGER SCISSORS POINT
19	2	373027	DECAL, A-72A
20	2	368110	DECAL, AUTO CRANE
21	2	373026	LOAD CHART
22	2	368111	DECAL, AUTO CRANE
23	2	367307	DECAL, WINCH WARNING
24	2	372322	DECAL, WINCH FUNCTION
25	2	040518	DECAL, DANGER STAY CLEAR
26	2	372321	DECAL, 5-WAY VALVE FUNCTION
27	1	373028	CAUTION, 11 GPM 2600 PSI

373025 STANDARD DECAL KIT
373025-001 WINCH DECAL KIT
373025-002 POWER OUT OUTRIGGER DECAL KIT

GENERAL DIMENSIONS A72A SERIES



LOAD CHART A72A SERIES



CAUTION!

1. DO NOT OPERATE CRANE UNTIL OUTRIGGER LEGS HAVE BEEN EXTENDED WITH POSITIVE CONTACT ON FIRM SURFACE AND WHEN CRANE IS MOUNTED AS SPECIFIED BY MANUFACTURER.
2. LOADS SHOWN ARE BASED ON STRUCTURAL OR HYDRAULIC CAPABILITY.
3. BEFORE LIFT IS MADE, STABILITY MUST BE CHECKED PER SAE J765A.
4. WORKING LOADS WILL BE LIMITED TO THOSE SHOWN.
5. DEDUCT THE WEIGHT OF LOAD HANDLING DEVICES.
6. WINCH LIFTING CAPACITY IS LIMITED TO THOSE SHOWN. MAXIMUM 4,000 LBS. SINGLE LINE.



P.O. Box 580697 * Tulsa, OK 74158-0697
4707 N. Mingo Rd. * Phone (918) 836-0463

LIMITED WARRANTY 2 YEAR PARTS AND LABOR

Auto Crane will warranty to the consumer for a period of (2) years parts and labor from the date of purchase. Each new Auto Crane unit they sell will be free under normal use and service from defects in material and workmanship. Date of purchase will be honored as the date indicated on the Bill of Sale, which must accompany the Warranty Registration and be on file with Auto Crane. Absent a valid Warranty Registration and appropriate documentation, the original date of manufacture, as indicated by the serial number on the product, will be used to determine the effective date of the 2 year warranty.

The obligation of Auto Crane under this warranty is limited to the replacement or repair of parts that appear to the manufacturer after review and/or inspection to be defective and paid flat rate labor for replacing defective parts. This warranty does not obligate Auto Crane to bear the travel time charges in connection with the replacement or repair of defective parts. Responsibility for customer's claims arising from misapplication, abuse, misuse or alteration of equipment or parts lies with the distributor or user and no warranty obligation is assumed in these circumstances by Auto Crane.

Auto Crane will in no event be liable for any consequential damages or contingent liabilities arising out of the failure of any Auto Crane Product or parts to operate properly.

Auto Crane makes no warranty in respect to component accessories, it being subject to the warranties of their respective manufacturers.

If field service, at the request of the distributor, is rendered and fault is found not to be with Auto Crane's product, the distributor shall pay the time and expense of the field representative.

Claims for service labor or other expenses that have incurred by the buyer without approval or authorization or Auto Crane will not be accepted.

When applying for warranty, claims may be handled by contacting your nearest authorized Auto Crane Distributor. All claims are to be filed in writing on an Auto Crane Warranty Claim Form.

AUTO CRANE COMPANY IS UNDER NO OLIGATION TO EXTEND THIS WARRANTY TO ANY CUSTOMER FOR WHICH AN AUTO CRANE DELIVERY REPORT FORM HAS NOT BEEN COMPLETED AND ON FILE WITH AUTO CRANE COMPANY

