A50A
OWNERS MANUAL

Manual No. 999965
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

A50A ARTICULATING CRANE
MOUNTING AND INSTALLATION INSTRUCTIONS REVISION RECORD

Revision Date	Section(s) Or Page(s)	Description of Change
09/02/03	Last page	New 2-year warranty policy to replace 1-year warranty policy

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 on 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

A-50A SERIES - OWNER'S MANUAL

TABLE OF CONTENTS

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

To inform the operator of the hazard of proximity or contact with the crane boom during operation.

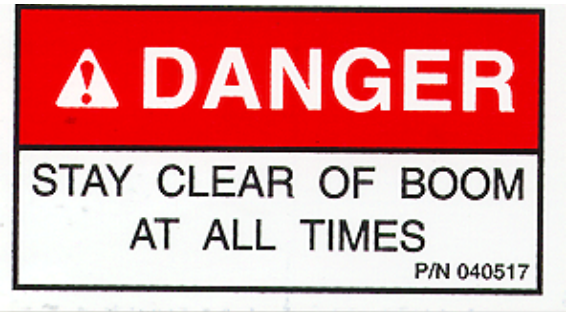
PART NO.: **040517**

DECAL: **STAY CLEAR OF BOOM**

FUNCTION:

QUANTITY: **4**

PLACEMENT: **Both sides of outer and manual booms.**



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.**

QUANTITY: **1**

PLACEMENT: **Hoist hook**

PART NO.: **040519**

DECAL: **SCISSORS POINT**

FUNCTION: **To inform the operator of possible danger at scissors point on crane.**

QUANTITY: **2**

PLACEMENT: **Both sides of lift cylinder**

SAFETY DECAL SECTION

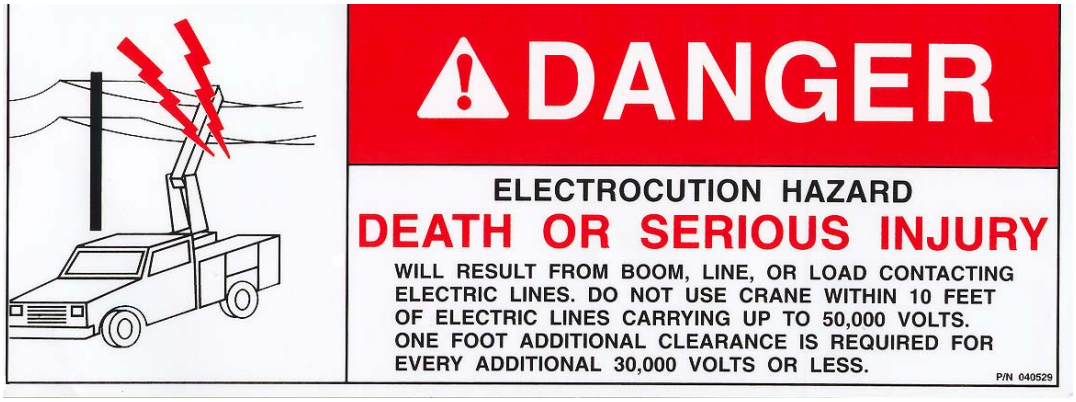
PART NO.: **040529**

DECAL: **ELECTROCUTION HAZARD**

FUNCTION: **To inform the operator of the hazard involved with contacting electrical power lines with crane boom.**

QUANTITY: **2**

PLACEMENT: **Both control handle plates**



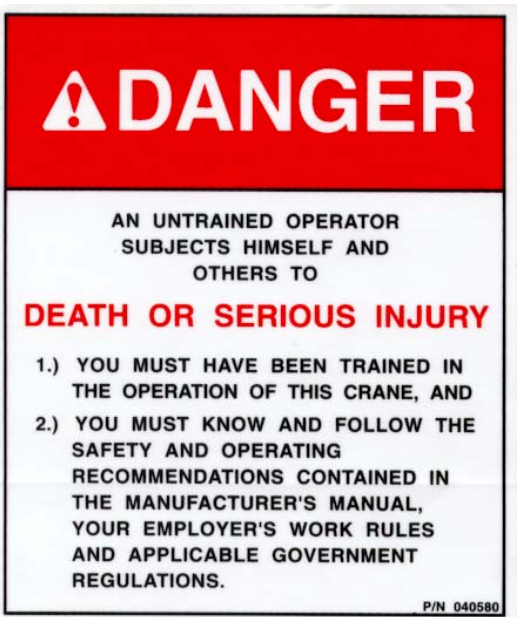
PART NO.: **040580**

DECAL: **OPERATOR TRAINING**

FUNCTION: **To inform the operator of the need to receive proper training before using the crane.**

QUANTITY: **2**

PLACEMENT: **Both control handle plates**



SAFETY DECAL SECTION

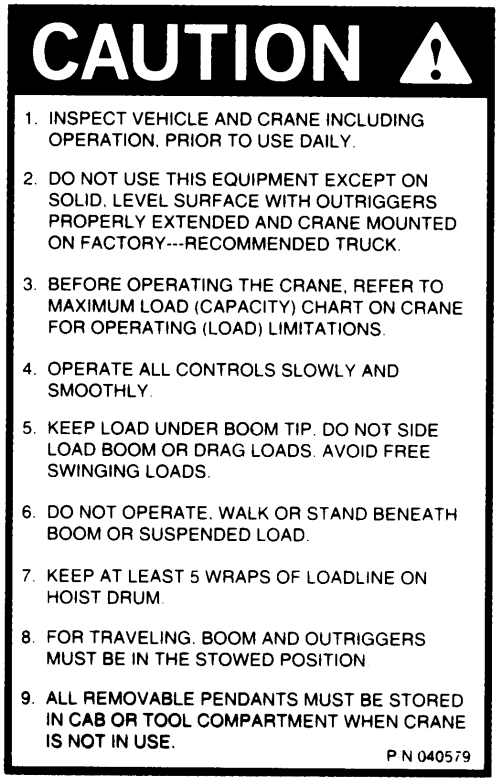
PART NO.: **040579**

DECAL: **OPERATION INSTRUCTIONS**

FUNCTION: **To inform the operator of the proper procedure to follow for safe operation of the crane.**

QUANTITY: **2**

PLACEMENT: **Both control handle plates**



PART NO.: **040581**

DECAL: **STAND CLEAR**

FUNCTION: **To inform the operator of danger associated with outriggers.**

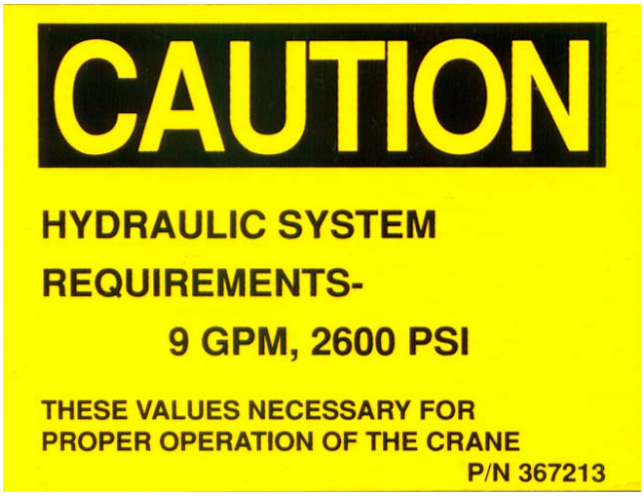
QUANTITY: **2**

PLACEMENT: **On outrigger pad, one per side**

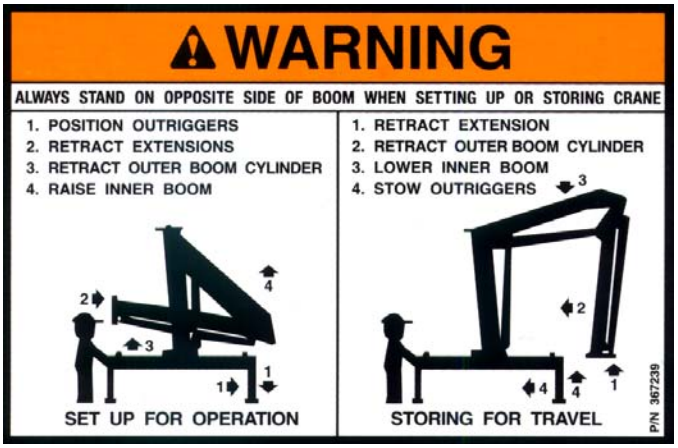
SAFETY DECAL SECTION

PART NO.: **040630**
DECAL: **STAY CLEAR OF LOAD**
FUNCTION: **To inform operator of the hazard of proximity of contact with the crane load during operation.**
QUANTITY: **2**
PLACEMENT: **Both sides of loftinh hook**

PART NO.: **367213**
DECAL: **HYDRAULIC REQUIREMENTS**
FUNCTION: **Inform operator of the required hydraulic requirements for proper operation of the crane.**
QUANTITY: **1**
PLACEMENT: **Both control handle plates**



PART NO.: **367239**
DECAL: **ARTICULATING CRANE STORAGE**
FUNCTION: **To inform operator of the proper method to unstore and store the crane.**
QUANTITY: **2**
PLACEMENT: **Both control handle plates**



SAFETY DECAL SECTION

PART NO.: **367241**

DECAL: **ELECTROCUTION HAZARD**

FUNCTION: **To inform operator of the hazard involved with contacting electrical power lines with crane boom.**

QUANTITY: **2**

PLACEMENT: **Both control handle plates**

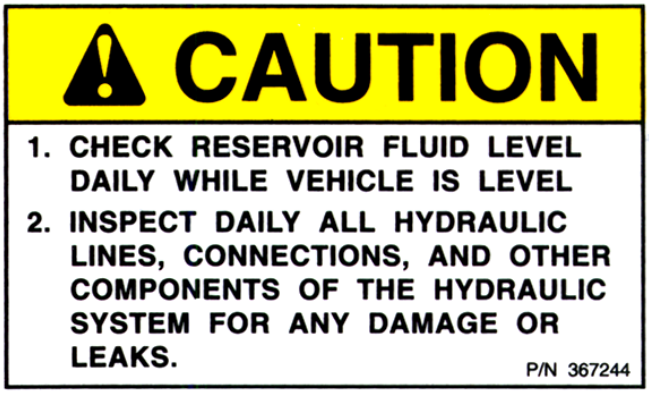
PART NO.: **367244**

DECAL: **HYDRAULIC FLUID**

FUNCTION: **To inform operator to check fluid leveland check for leaks/damage.**

QUANTITY: **1**

PLACEMENT: **Hydraulic reservoir**



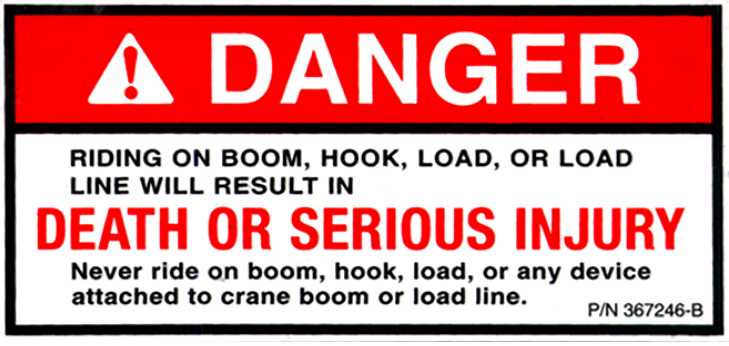
PART NO.: **367246**

DECAL: **NEVER RIDE ON HOOK**

FUNCTION: **Inform operator of hazards of riding load**

QUANTITY: **2**

PLACEMENT: **Both control handle plates**



SAFETY DECAL SECTION

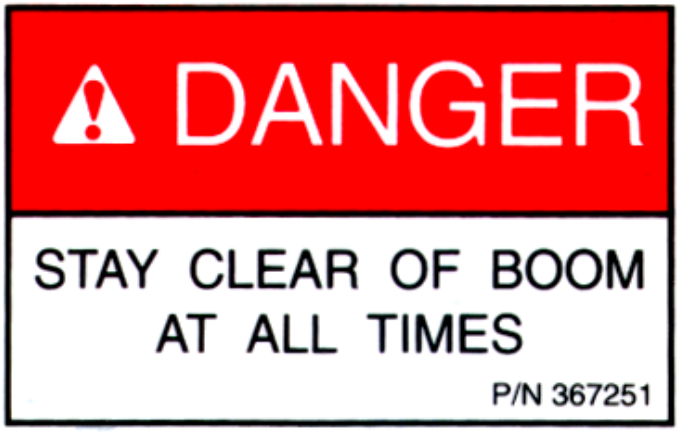
PART NO.: **367251**

DECAL: **STAY CLEAR OF BOOM**

FUNCTION: **To inform the operator of the hazard of proximity or contact with the crane boom during operation.**

QUANTITY: **4**

PLACEMENT: **Both sides of first and second stage booms**



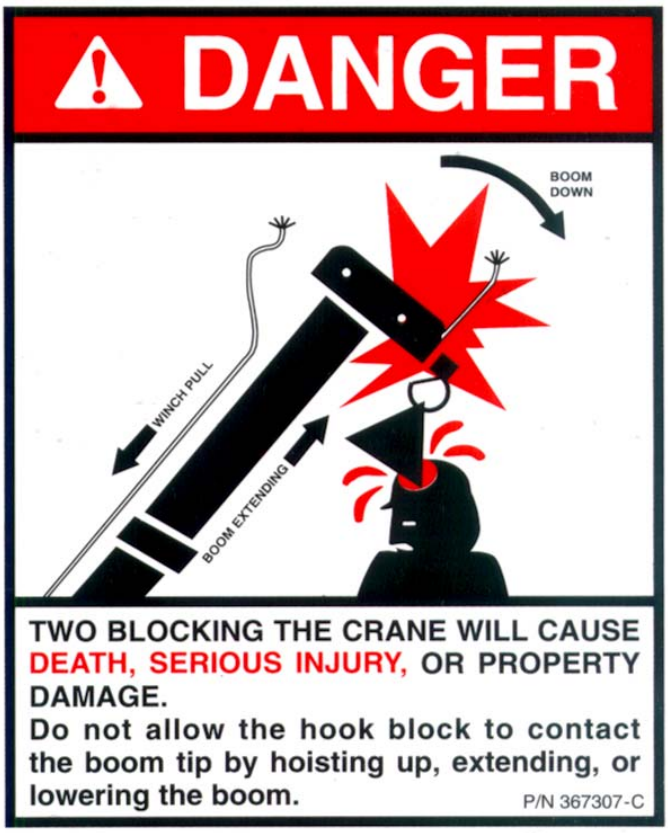
PART NO.: **367307**

DECAL: **DANGER, TWO BLOCK (4000 pound capacity)**

FUNCTION: **To inform operator of the hazard of two blocking the crane.**

QUANTITY: **2**

PLACEMENT: **Both sides of outer boom**



SAFETY DECAL SECTION

PART NO.: **367433**

DECAL: **A MOVING OUTRIGGER**

FUNCTION: **To inform the operator of the danger od prozimity with outrigger and ground contact point.**

QUANTITY: **2**

PLACEMENT: **Top of outrigger leg**

PART NO.: **759016**

DECAL: **EXTEND OUTRIGGERS**

FUNCTION: **Inform operator that the outriggers must be extended and pinned in place before operating the crane.**

QUANTITY: **2**

PLACEMENT: **Both ends of outrigger tube**

NOTES

INTRODUCTION
A-50A 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-50A series cranes for your protection. The choice of materials and the design of the electrical system minimizes weight and lengthens durability. The hydraulic components meet or exceed a **4:1 safety factor**. 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-50A series crane are on the General Dimension Drawing. Maximum turning radius at both the hoist motor and the rotation motor are also on that 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 21,000 lbs. is recommended for mounting the A-50A series cranes.**

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

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-50A knuckle boom is an all hydraulic crane in the 50,000 ft-lb rating class. It is suitable for both hook and attachment service.

The A-50A comes in the following variations:

A-50A two stage hydraulic extension with a horizontal reach of 26'-5" (8.05m) with "cross mounted" controls located on each side of crane.

A-50A two stage hydraulic extension with one self storing manual boom with a horizontal reach of 32'-2" (9.8m) 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' (3.66m) 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.

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.

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 6250 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 1900 psi. Work port relief

valves limit the maximum pressure in each work port. They also prevent pressure build-up in work port when the control valve spool is in neutral. 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.

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.

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 -56 degrees to +67 degrees. Inner boom is raised and lowered by a single double acting hydraulic cylinder.

LIFT CYLINDER

The inner boom is actuated by a single double acting lift cylinder which has a bore of 5" and a stroke of 34". 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.

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 5" bore, 36 1/8" stroke cylinder. Outer boom will articulate through an arc of 150.4 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.

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".

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.

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.

--- 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-50A

1. Vehicle should meet minimum GVW rating of 21,000 lbs. (9,525.5 kg) with a front axle rating of 7,000 lbs. (3,175 kg.) rear axle rating 14,000 lbs. (6,350 kg.) wheel base 167 - 171 in. (4.09 - 4.34m), cab to axle 102 in. (2.59m), frame section modulus 16 in 3 (262.2 cc), frame resistance to bending 820,000 in-lbs. (92,647 nm), dual rear wheels and tires, engine tachometer and throttle control, and front and rear springs to match axle ratings.
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 is 32.5 in. (82.55 cm).
4. To install A-50A knuckleboom safely; make sure work area and truck frame are ready to mount crane.
5. Maximum A-50A weight is:

   a) 3,200 lbs. (1452 kg.) with two stage extension cylinder.
   b) 3,260 lbs. (1479 kg.) with two stage extension cylinder and manual boom.

6. To lift A-50A 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 (340469) is mounted in between the crane base and the top of truck frame.

NOTE: Never weld on truck frame.

7. Install frame spacer (340207) -4 required on the inside of truck frame. Spacer may have to be cut to length to fit tightly inside truck frame flanges.
8. Weld the four 1" x 2" x 3" tabs (340514) on the end of wear plates (340469), 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-410. 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.

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: -16 (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 -16 (two each end).
   B. Pressure hose from pump to control valve inlet: Hose size: -10 (SAE 100 R2 type AT) at desired length. Fittings: two -10 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.

MOUNTING and INSTALLATION A-50A

12. Install PTO following PTO's manufacturers installation instructions. it is recommended that PTO mounting bolts be safely wired to prevent bolts from becoming lose. 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 contaminates in the system before hooking the pressure and return lines to the crane. Be sure to check filters after purging the system.

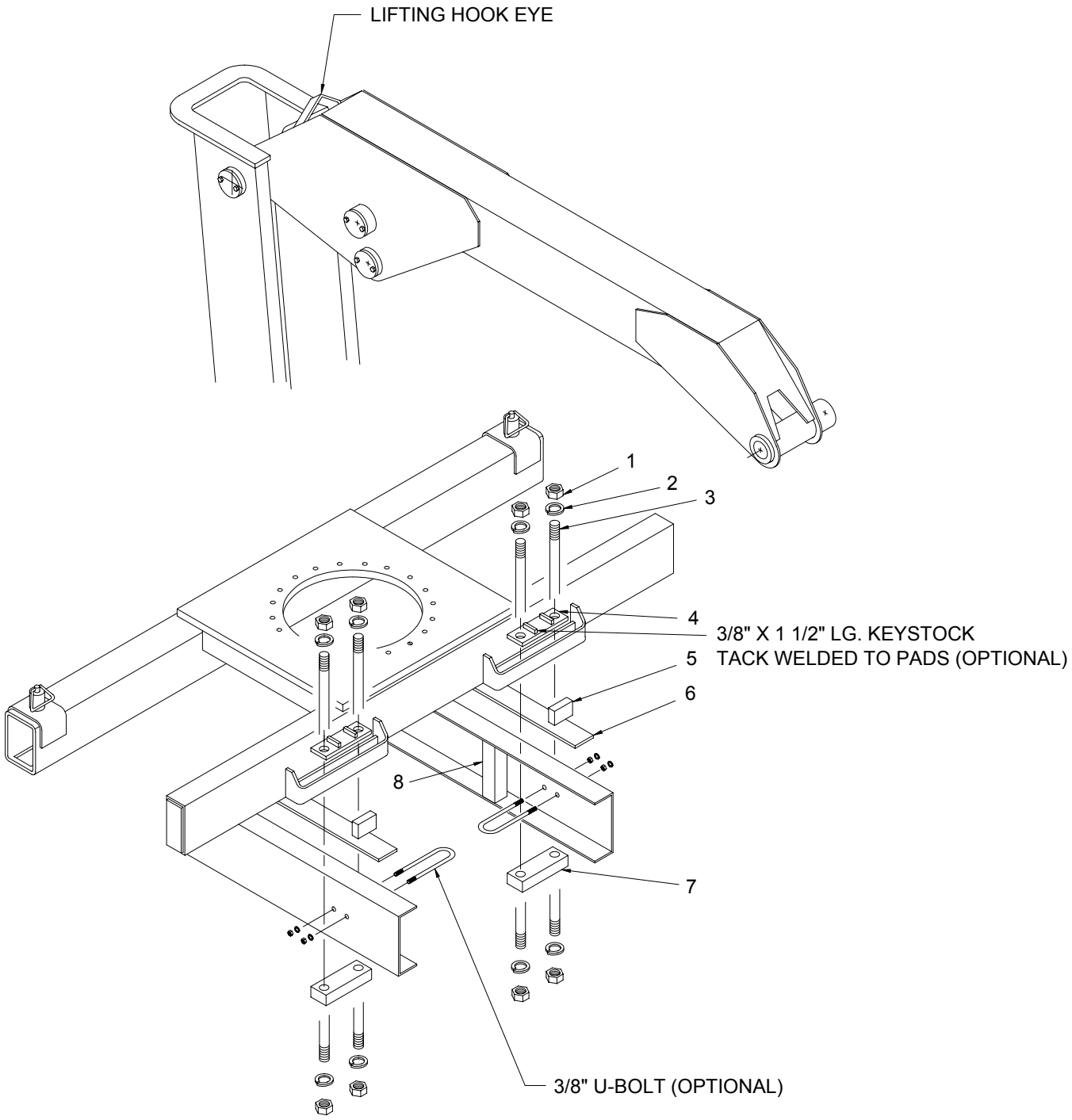
13. Crane operation requires 9 GPM (34 litre/min.) at 2600 PSI (183 kg/cm2).

14. Pump speed 925 RPM, ref. pump 367215, 2.46 in3/rev. (40.3 cm3/rev).

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.

INSTALLATION DIAGRAM
A-50A



INSTALLATION DIAGRAM
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	16	367183	NUT
2	16	022300	LOCKWASHER
3	8	367182	BOLT
4	4	368087	TOP MOUNTING PAD
5	4	340514	END TAB
6	2	340469	WEAR PLATE
7	4	368088	BOTTOM MOUNTING PAD
8	4	340207	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.

--- IMPORTANT ---
OPERATION OF UNIT

1. Make sure this manual has been thoroughly read by all crane operating personnel and supervisors.
2. A routine inspection of the crane should be mandatory before each operating day. Any defects should be corrected immediately.
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 hoist hook).
4. Keep the vehicle as level as possible during operation.
5. For electric cranes, **engage emergency brake** and leave ignition on with transmission in neutral (or in park for automatic transmissions). Activate any crane power switches. For Auto Crane units requiring battery and hydraulic operation, **engage emergency brake,** place gear selector in neutral, press clutch, activate PTO, release clutch and after hydraulic fluid is warm, set throttle control to proper engine speed.
6. Always use outriggers from the truck to the ground. Be sure these are firm and adequately positioned. When rotating, **keep load as low to the ground as possible.**
7. Remove pendant control from cab or storage area. On smaller units, plug pendant into receptacle on crane. On larger units, remove pendant control from guard and unwrap cable from boom. Do not operate crane until cable is unwound completely. On all cranes, detach hook from dead man. Crane is now ready for operation.
8. Always boom up before rotating so the boom will clear the required boom support.
9. When extending the boom, always maintain clearance between the boom crown and the traveling block or hoist hook.
10. Always observe safe and practical operation to avoid possible accidents. Refer to Safety Tips and Precautions.
11. After completing lifting operations, return the boom to stowed position on the boom support. Avoid unneeded pressure on the boom support.
12. Store pendant control on proper location (in cab or on crane).
13. Return outriggers to stowed position. Make sure they are pinned in place or jacklegs are returned to compartment.
14. Check work area for any tools or equipment not stored.
15. Release throttle control, depress clutch and disengage PTO. Deactivate any crane power switches.
16. Report any unusual occurrence during crane operation that may indicate required maintenance or repair.
17. **NEVER** use two cranes to support a load too large for either crane.
18. Spray all electrical equipment with special corrosion resistant coating. This eliminates rust or corrosion due to melting and freezing action of condensation.

OPERATION OF OUTRIGGERS

For hydraulic outriggers:

1. Shift crane/outrigger control valve to "outrigger" position.
2. While operating the outrigger control valves (located on the outrigger cylinders) simultaneously operate the boom-up control switch. This will allow the hydraulic system to build pressure.
3. After outriggers are positioned, return crane/outrigger selector to "crane" position.
4. Crane is now ready to operate.

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

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 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.

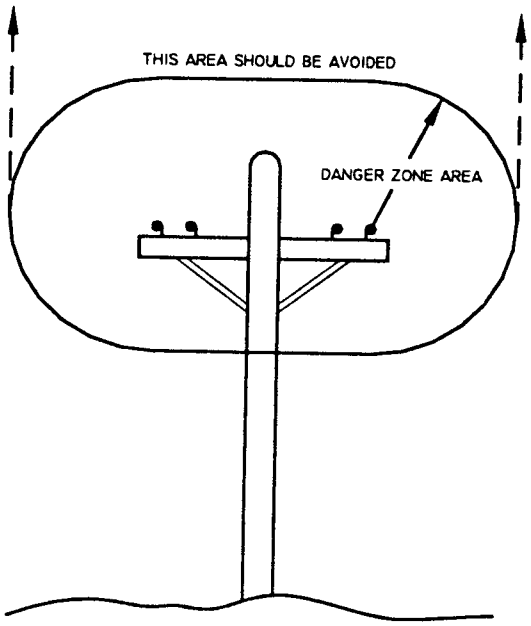
O. No person should be permitted to stand or pass under a suspended load.

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

QUALIFICATIONS FOR AND CONDUCT OF OPERATORS AND OPERATING PRACTICES

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 above.

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 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. (3m). For higher voltages, see Table 1.

24 Caution shall be excercised 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 an energized line.

B. Exceptions to this procedure, if approved by the administrative or regulatory authority if the alternate procedure provides equivalent protection and set forth in writing.

C. Durable signs shall be installed at the operator's station and on the outside of the crane, warning that electrocution or serious bodily injury may occur unless a minimum clearance of 10 ft. (3.0m) between the crane or the load being handled and energized power lines. Greater clearances are required because of higher voltage as stated 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)
when operating near high voltage power lines		
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)
while in transit with no load and boom lowered		
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 or 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

INSPECTION, TESTING AND MAINTENANCE

GENERAL

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.

INSPECTION, TESTING AND MAINTENANCE

GENERAL

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 it's 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 11/8 in. (29 mm), 3/32 in. (2.4 mm) for diameters 11/4 in. (32 mm) to and including 11/2 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.

ROTATION BEARING / SWING DRIVE LUBRICATION

ROTATION BEARING RACE

1 Lubrication bearing race at the grease zerk located on top of pedestal base plate.

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 intenal 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

	MOBILE	TEXACO	SUNOCO	PURE	SOHIO	LUBRIPLATE
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	Gearshield extra heavy #L0152-0631

pinion to be set at .006 min. - .008 avg. - .010 max. Set backlash of the swing drive pinion and the rotation 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

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 done 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.**

LUBRICATION & MAINTENANCE SCHEDULE
A50A 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 CYLIN-DER 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 150 FT-LBS (DRY) AS REQUIRED

LUBRICATION & MAINTENANCE SCHEDULE
A50A CRANE

SERVICE PERFORMED	DAY	WEEKLY	3 MOS	6 MOS	YEAR	NOTES
ROTATION GEAR BOX			X			CHECK TORQUE TO 180 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.

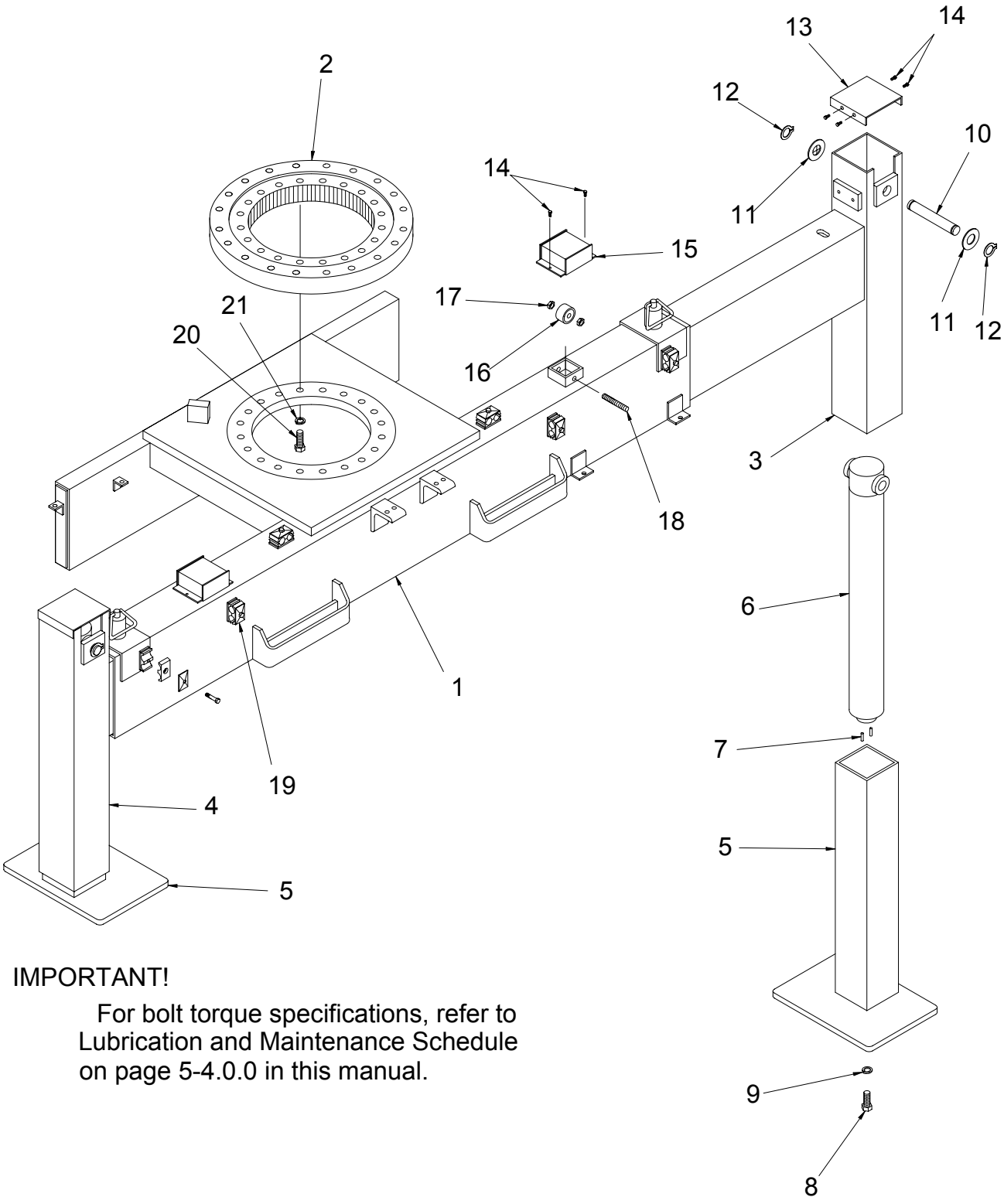
NOTES

TROUBLESHOOTING A-50A

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.
	Load too heavy	Check load chart.
Noise	Pump area	Circulate oil to warm, check suction line, fill reservoir.
	Cylinders	Check for damage to cylinders.
	Rotation	Check rotation bearing, lubricate bearing.
Cylinder drift	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.

BASE / OUTRIGGERS ASSEMBLY
A-50A



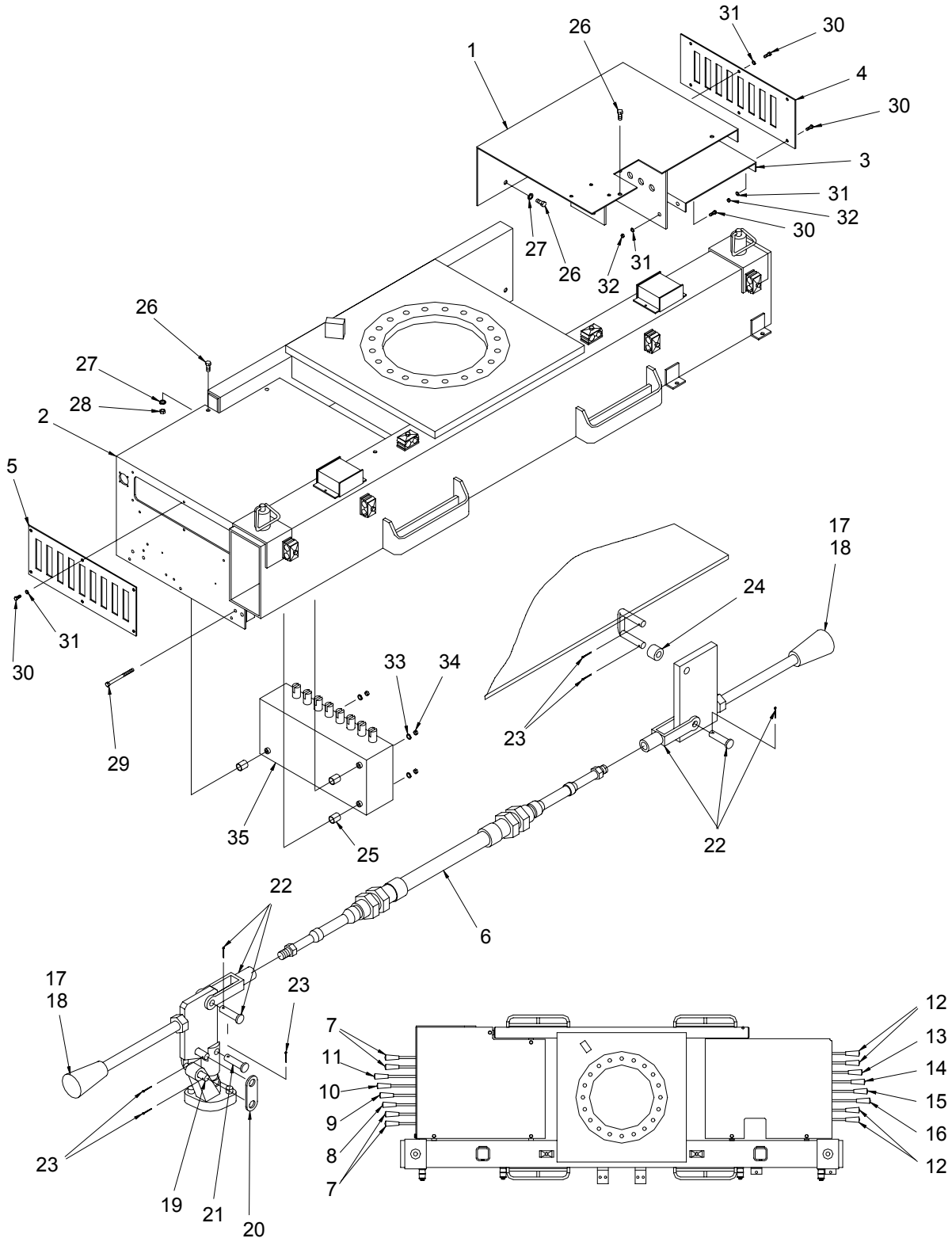
IMPORTANT!

For bolt torque specifications, refer to Lubrication and Maintenance Schedule on page 5-4.0.0 in this manual.

BASE / OUTRIGGERS ASSEMBLY
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	1	372070	BASE WELDMENT
2	1	372064	ROTATION BEARING
3	1	372080	LEG OUTRIGGER (CURB)
4	1	372079	LEG OUTRIGGER (STREET)
5	2	372084	LEG OUTRIGGER
6	2	372060	HYD CYL OUTRIGGER
7	2	330189	PIN ROLL 1/4 X 3/4
8	2	013508	SCREW HX HD 5/8 NC X 1 1/2
9	2	023800	WASHER SP LK 5/8
10	2	372177	PIN OUTRIGGER CYL
11	4	372220	WASHER FL 1
12	4	360122	RING RETAINING 1
13	2	372214	COVER OUTRIGGER
14	12	370470	SCREW THREAD CUT #10-24
15	2	372215	COVER ROLLER
16	4	240234	BEARING NEEDLE
17	8	372219	NUT JAM 1/2 NC
18	4	372218	SCREW SET 1/2 NC X 3
19	6	368142	HOSE CLAMP
20	20	012198	SCREW HX HD 5/8 NC X 1 3/4
21	20	023902	WASHER FL 5/8 HARDENED

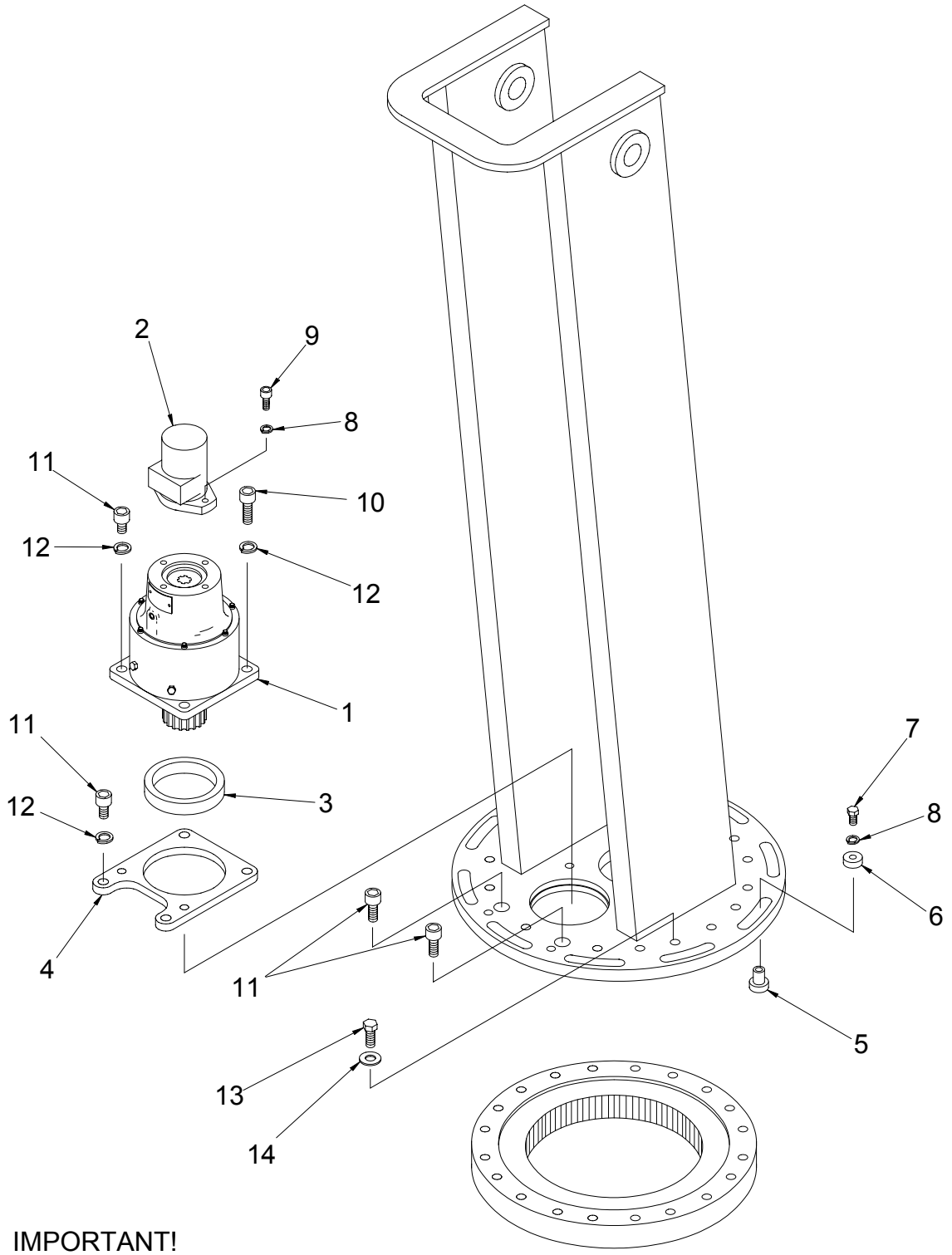
CONTROL HANDLE ASSEMBLY
A-50A



CONTROL HANDLE ASSEMBLY
A-50A

ITEM	QTY	P/N	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	330072	NUT 3/8 NC
29	3	811056	SCREW HX HD 5/16 NC X 4
30	15	005500	CREW HX HD 1/4 NC X 3/4
31	15	020200	WASHER SP LK 1/4
32	6	015900	NUT 1/4 NC
33	3	020601	WASHER SP LK 5/16
34	3	016500	NUT 5/16 NC

ROTATION ASSEMBLY
A-50A



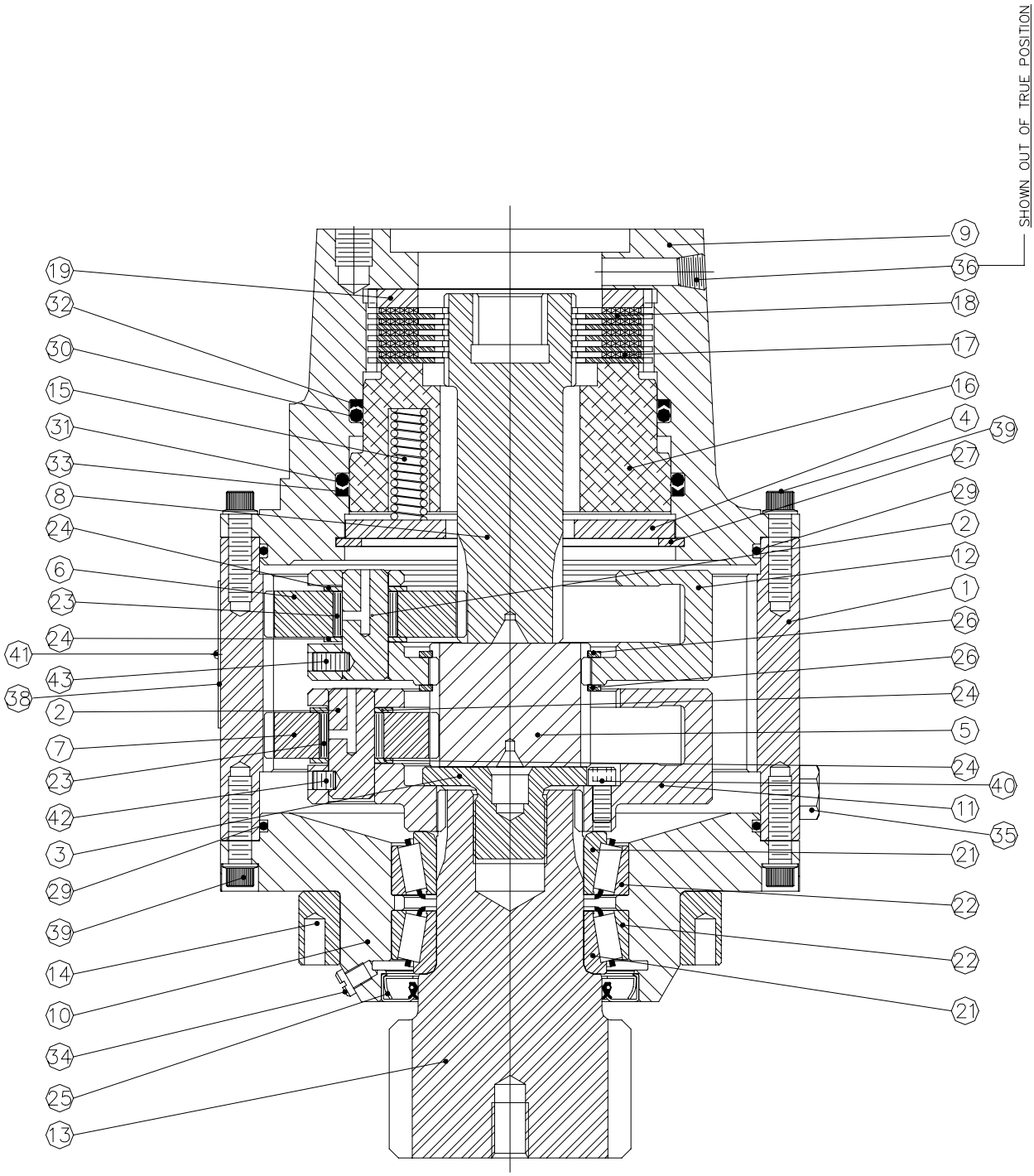
IMPORTANT!

For bolt torque specifications, refer to Lubrication and Maintenance Schedule on page 5-4.0.0 in this manual.

ROTATION ASSEMBLY
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	1	367005	SWING DRIVE
2	1	367158	HYD MOTOR
3	1	367004	ECCENTRIC RING
4	1	372093	SPACER SWING DRIVE
5	1	372111	PIN SLIDE STOP
6	1	372112	WASHER SLIDE STOP
7	1	005604	SCREW HX HD 1/2 NC X 1
8	3	021500	WASHER SP LK 1/2
9	2	367185	SCREW SOC HD 1/2 NC X 1 1/4
10	2	367200	SCREW SOC HD 5/8 NC X 2 1/4
11	6	006205	SCREW SOC HD 5/8 NC X 1 1/4
12	6	023800	WASHER SP LK 5/8
13	18	012198	SCREW HX HD 5/8 NC X 1 3/4
14	18	023902	WASHER FL 5/8 HARDENED

SWING DRIVE
P/N: 367005



SWING DRIVE
P/N: 367005

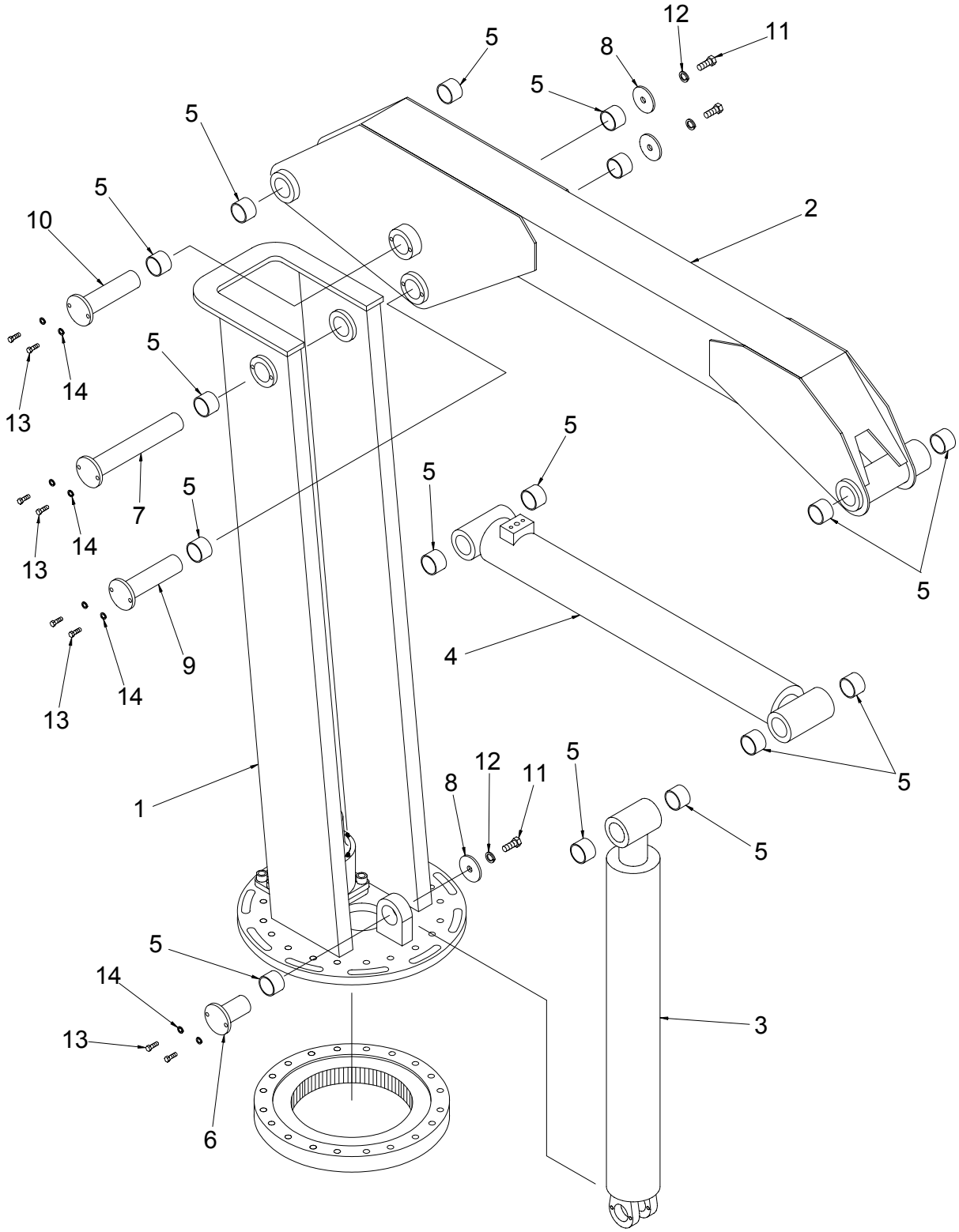
ITEM	QTY	P/N	DESCRIPTION
1	1	372005-001	HOUSING
2	6	372005-002	SHAFT PLANET
3	1	372005-003	BOLT SPECIAL
4	1	372005-004	PLATE SPRING
5	1	372005-005	GEAR OUTPUT SUN
6	3	372005-006	GEAR PLANET
7	3	372005-007	GEAR PLANET
8	1	372005-008	GEAR INPUT
9	1	372005-009	HOUSING BRAKE
10	1	372005-010	BASE
11	1	372005-011	CARRIER SEC PLANET
12	1	372005-012	CARRIER PRI PLANET
13	1	372005-013	SHAFT OUTPUT
14	1	372004	RING ECCENTRIC
15	11	372005-014	SPRING BRAKE
16	1	372005-015	PISTON BRAKE
17	5	372005-016	PLATE BRAKE DRIVING
18	5	372005-017	DISC BRAKE
19	1	372005-018	PLATE BACK-UP
20	2	372005-019	STUD
21	2	372005-020	BEARING CONE
22	2	372005-021	BEARING CUP
23	108	372005-022	ROLLER BEARING
24	12	372005-023	WASHER THR
25	1	372005-024	SEAL
26	2	372005-025	RING SNAP
27	1	372005-026	RING SNAP
28	1	372005-027	GASKET HYD MTR
29	2	372005-028	O-RING
30	1	372005-029	O-RING
31	1	372005-030	O-RING
32	1	372005-031	RING BACK-UP
33	1	372005-032	RING BACK-UP
34	1	372005-033	ZERK ALEMITE
35	3	372005-034	PLUG STR THD
36	1	372005-035	PLUG PIPE 1/8-27
37	1	372005-036	COVER SHIPPING
38	1	372005-037	LABEL PLATE

NOTES

SWING DRIVE
P/N: 367005

ITEM	QTY	P/N	DESCRIPTION
39	14	372005-038	CAPSCREW FERRY 5/16 NC X 1
40	1	372005-039	CAPSCREW SKT 1/4 NC X 1/2
41	2	372005-040	DRIVE SCREW
42	3	372005-041	SETSCREW SKT FP 1/4 NC 1/4
43	3	372005-042	SETSCREW SKT FP 1/4 NC 1/2
44	2	372005-043	NUT 1/2 NF
45	2	372005-044	WASHER LK 1/2

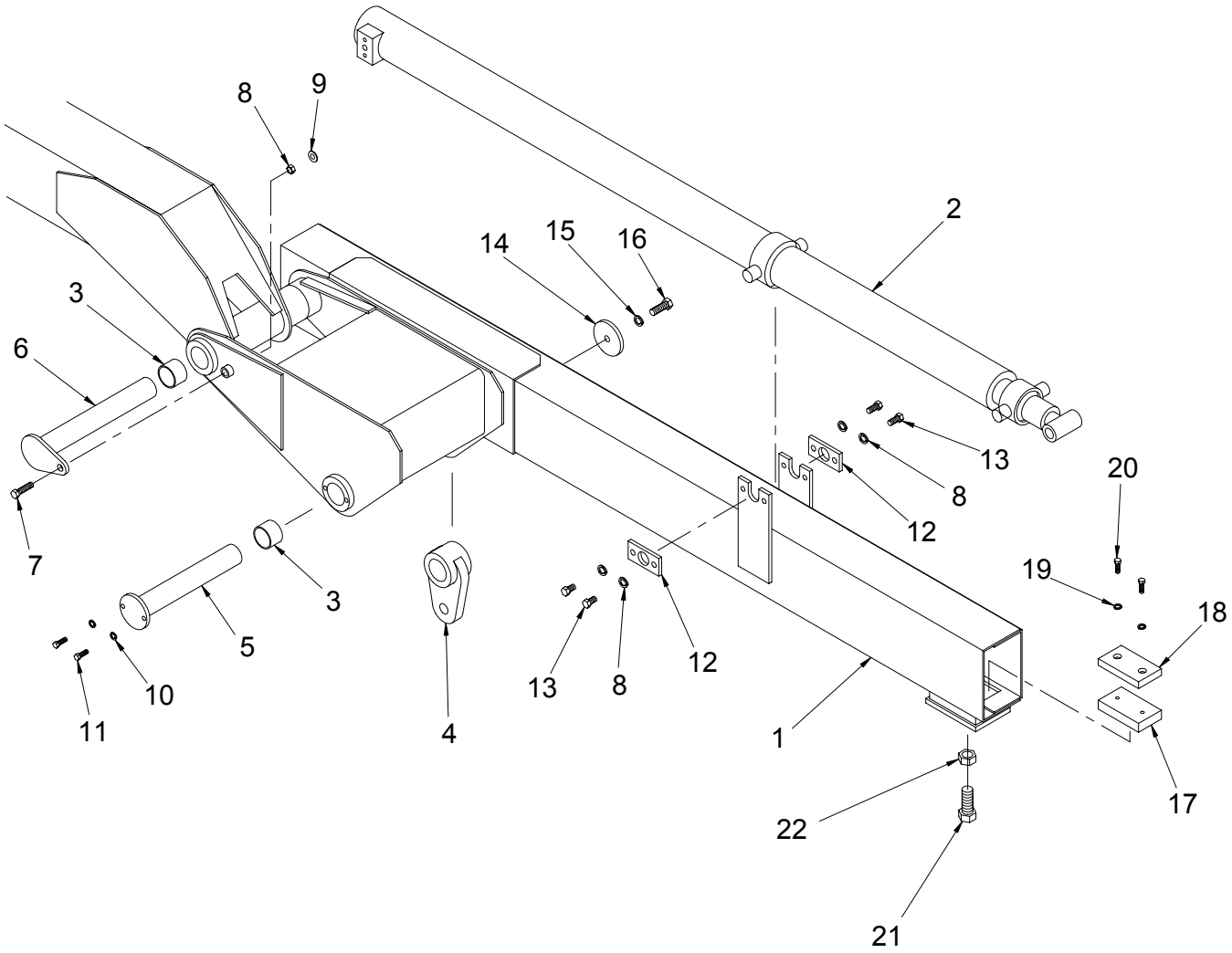
PEDESTAL/INNER BOOM ASSEMBLY
A-50A



PEDESTAL/INNER BOOM ASSEMBLY
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	1	372090	PEDESTAL
2	1	372100	BOOM INNER
3	1	372061	HYD CYL LIFT
4	1	372062	HYD CYL OUTER BOOM
5	19	367149	BUSHING
6	1	367071	PIN LIFT CYL
7	1	372171	PIN INNER BOOM
8	4	367049	WASHER PIN
9	1	367045	PIN
10	1	368127	PIN
11	4	013508	SCREW HX HD 5/8 NC X 1 1/2
12	4	023800	WASHER SP LK 5/8
13	8	008702	SCREW HX HD 3/8 NC X 1 1/4
14	8	021100	WASHER SP LK 3/8

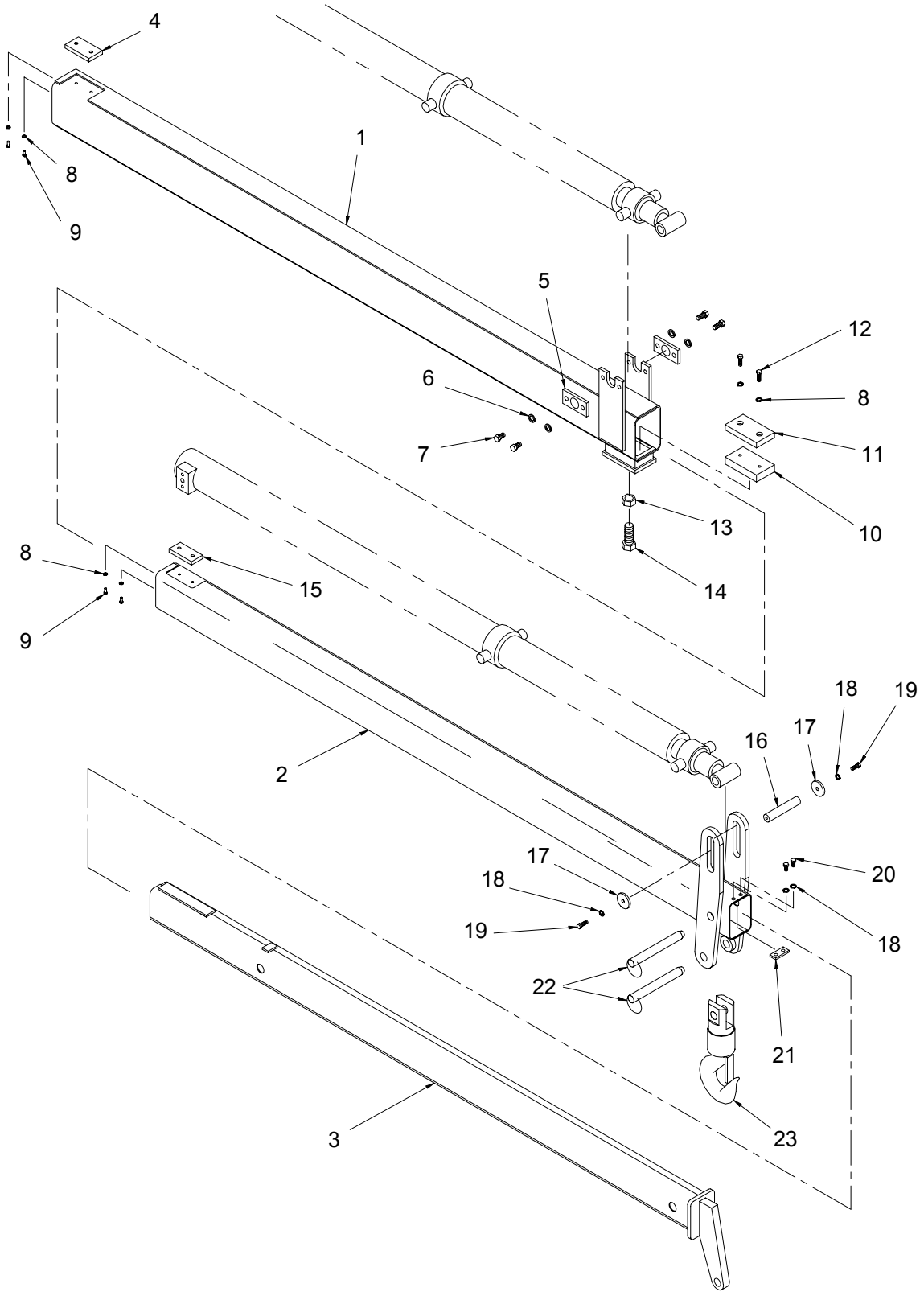
OUTER BOOM ASSEMBLY
A-50A



OUTER BOOM ASSEMBLY
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	1	372115	BOOM OUTER
2	1	372063	EXTENSION CYL 2-STAGE
3	6	367149	BUSHING
4	1	372199	LUG LIFTING
5	1	372173	PIN OUTER BOOM (ROD END)
6	1	372175	PIN OUTER BOOM PIVOT
7	1	480369	SCREW HX HD 1/2 NF X 3
8	5	021500	WASHER SP LK 1/2
9	1	017704	NUT 1/2 NF
10	2	021100	WASHER SP LK 3/8
11	2	008702	SCREW HX HD 3/8 NC X 1 1/4
12	2	367052	CAP TRUNNION
13	4	010202	SCREW HX HD 1/2 NC X 1
14	1	367049	WASHER PIN
15	1	023800	WASHER SP LK 5/8
16	1	013508	SCREW HX HD 5/8 NC X 1 1/2
17	1	372132	PLATE BACKING OUTER BOOM SLIDE PAD
18	1	372133	PAD SLIDE OUTER BOOM
19	2	020200	WASHER SP LK 1/4
20	2	005500	SCREW HX HD 1/4 NC 3/4
21	1	372169	NUT JAM 1 NC
22	1	015101	SCREW HX HD 1 NC X 2

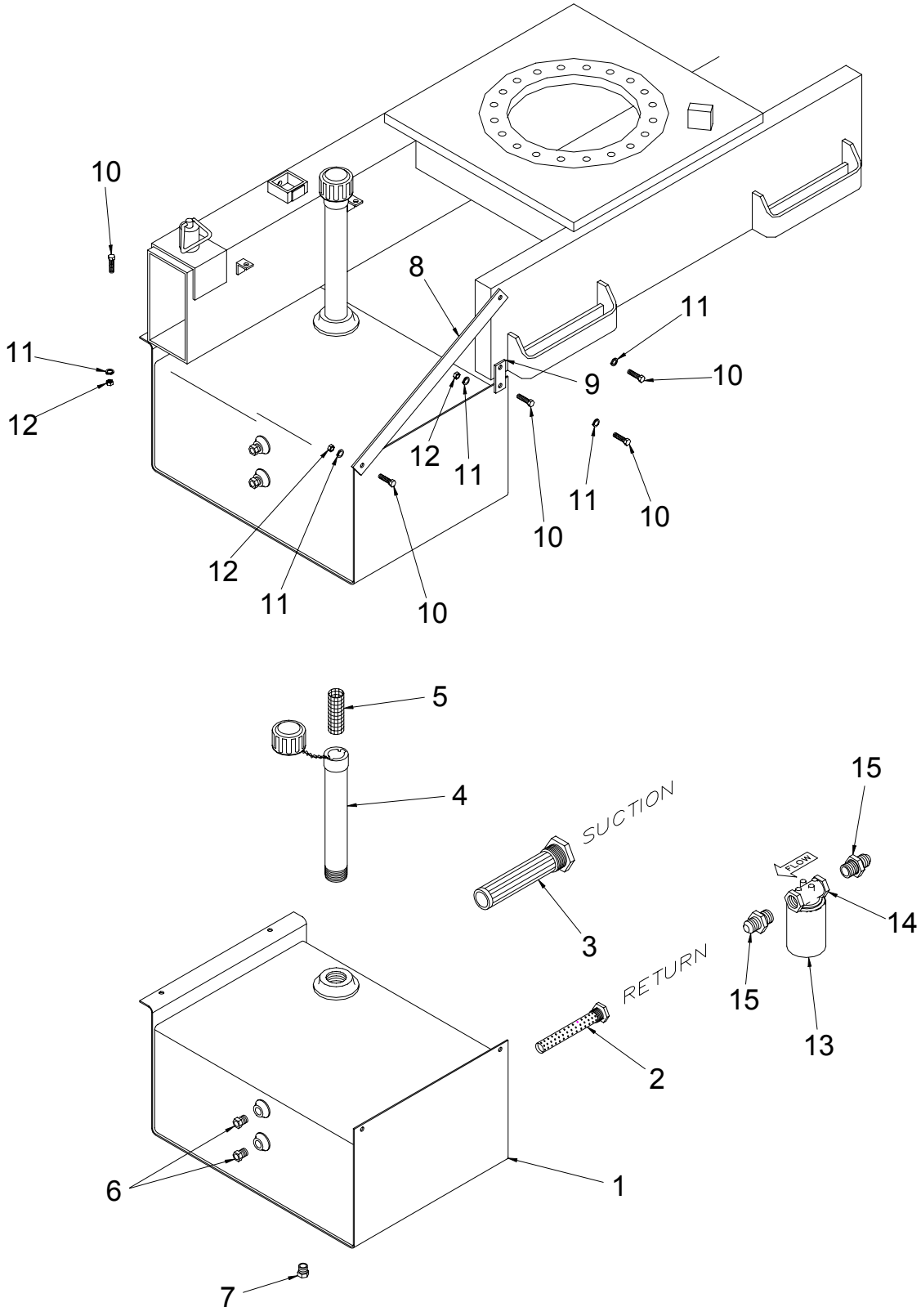
EXTENSION BOOM ASSEMBLY
A-50A



EXTENSION BOOM ASSEMBLY
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	1	372135	BOOM FIRST STAGE
2	1	372150	BOOM SECOND STAGE
3	1	372160	BOOM MANUAL EXTENSION
4	1	372143	PAD SLIDE FIRST STAGE UPPER
5	2	367052	CAP TRUNION
6	4	021500	WASHER SP LK 1/2
7	4	010202	SCREW HX HD 1/2 NC X 1/2
8	6	020200	WASHER SP LK 1/4
9	4	005406	SCREW HX HD 1/4 NF X 1/2
10	1	372141	PLATE BACKING FIRST STAGE SIDE PAD
11	1	372142	PAD SLIDE FIRST STAGE
12	2	005500	SCREW HX HD 1/4 NC X 3/4
13	1	372169	NUT 1 NC
14	1	015101	SCREW HX HD 1 NC X 2
15	1	372155	PAD SLIDE SECOND STAGE
16	1	372176	PIN SECOND STAGE EXTENSION
17	2	367106	WASHER SECOND STAGE EXTENSION
18	4	021100	WASHER SP LK 3/8
19	2	008701	SCREW HX HD 3/8 NC X 1
20	2	008401	SCREW HX HD 3/8 NC X 1/2
21	1	372157	STOP MANUAL BOOM
22	2	372168	PIN
23	1	480366	HOOK SWIVEL

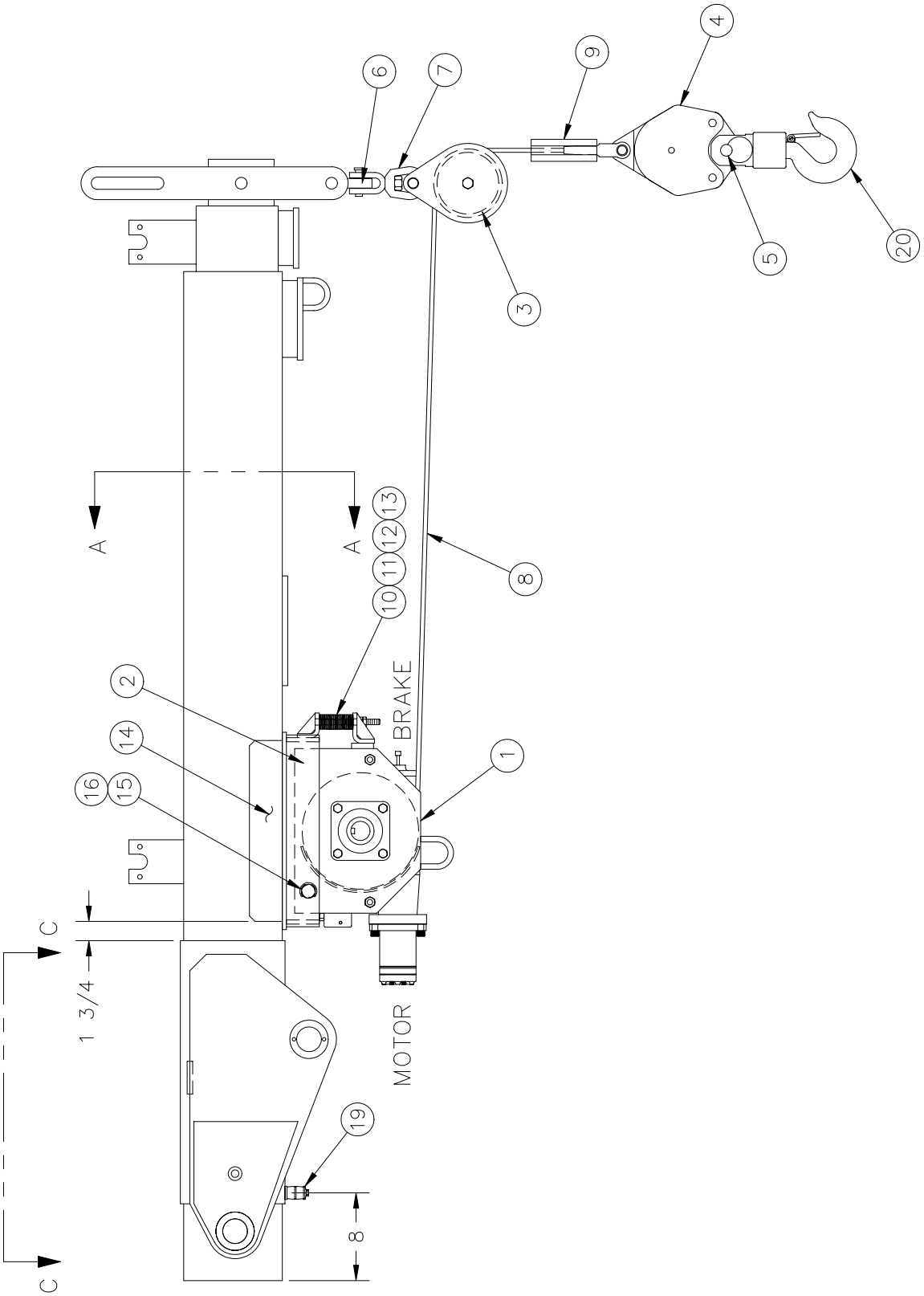
RESERVOIR ASSEMBLY
A-50A



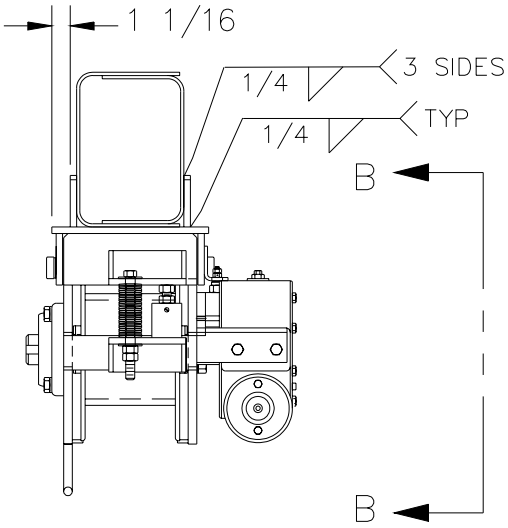
RESERVOIR ASSEMBLY
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	1	372200	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 HX HD 3/8 NC X 1
11	6	021100	WASHER SP LK 3/8
12	4	330372	NUT 3/8 NC
13	1	360277	SPIN ON FILTER (10 MIRCON)
14	1	367209	FILTER HEAD
15	2	367210	ADAPTER -16 ORM/-12 JIC

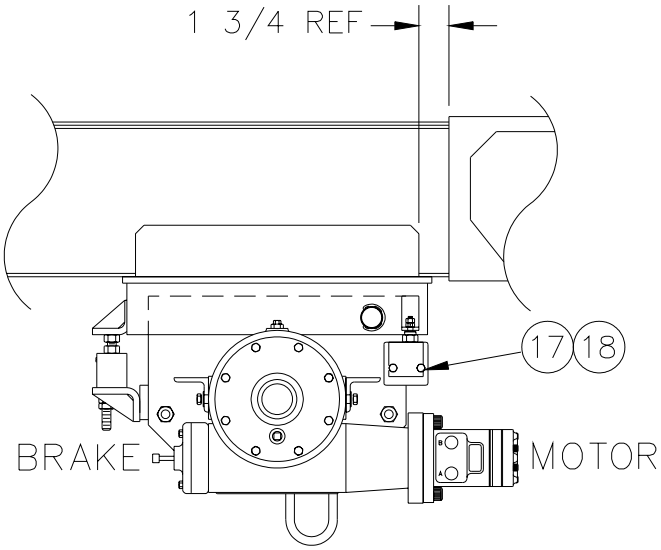
WINCH KIT
P/N 373230



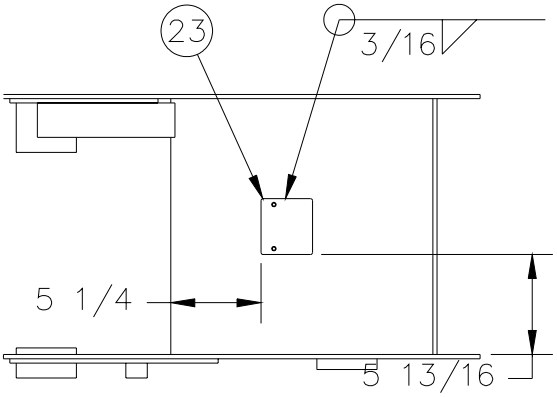
WINCH KIT
P/N 373230



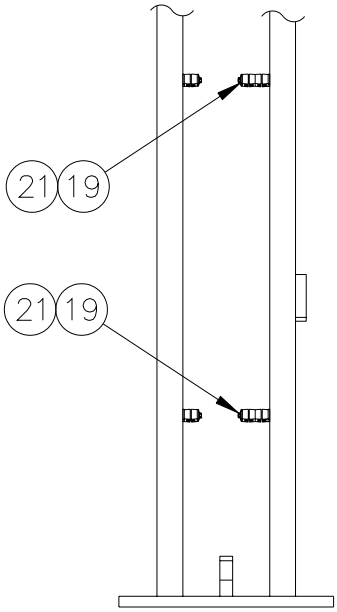
SECTION A–A



VIEW B–B



VIEW C–C



PEDESTAL DETAIL

PEDESTAL FRONT VIEW
SCALE: .5X

WINCH KIT
P/N 373230

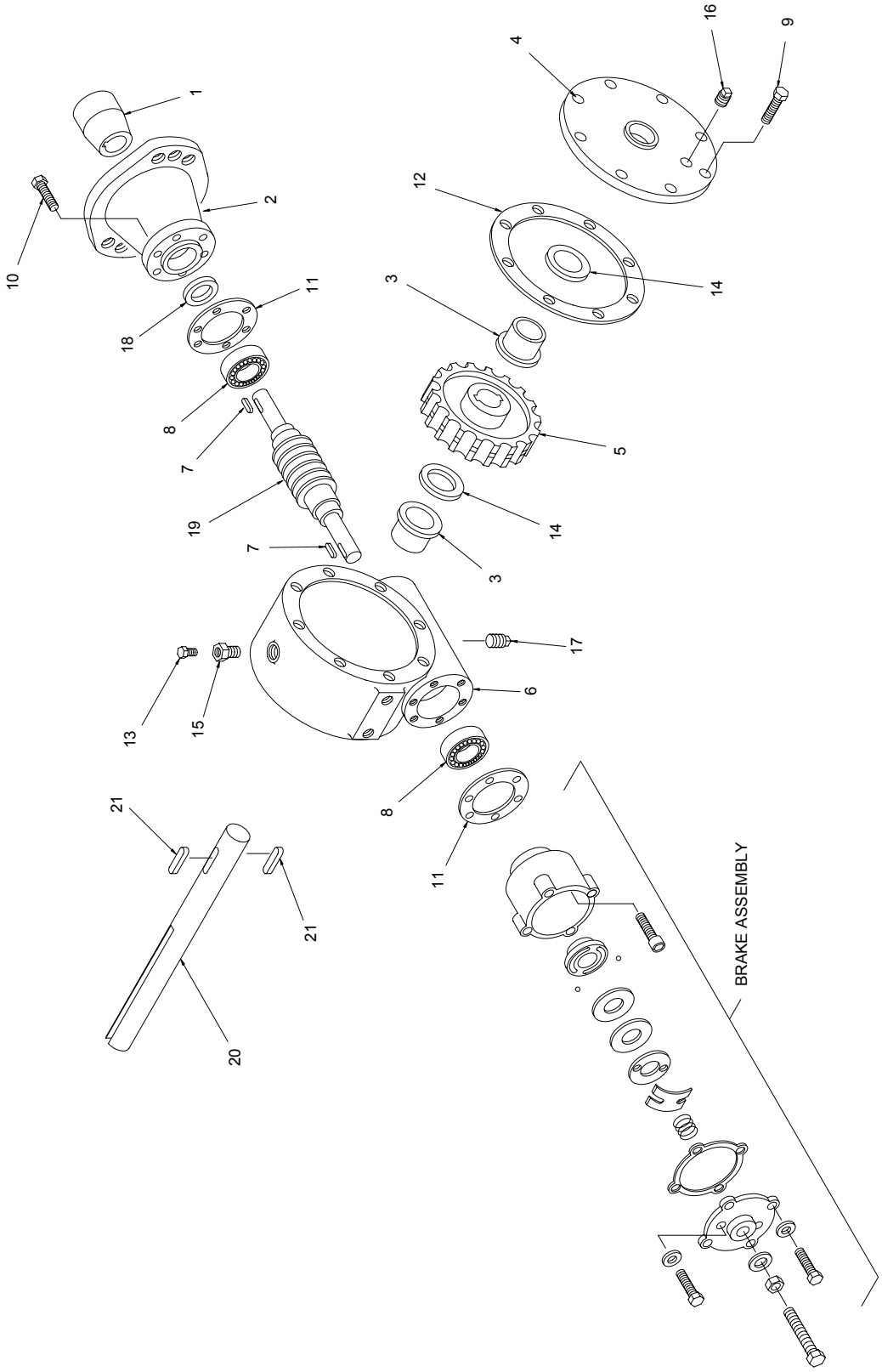
Item	Quantity	Part Number	Description
1	1	373232	Winch Assembly
2	1	373231	Weldment Box
3	1	368177	Snatch Block Assembly
4	1	368178	Overhaul Assembly
5	1	330009	Position Pin
6	1	368175	Adapter Block Weldment
7	1	367306	Sheave Block Swivel
8	1	367313	Winch Cable
9	1	369258	Winch Line Sleeve
10	26	750869	Compression Washer
11	2	021600	Washer ½
12	1	017701	Nut ½ UNC
13	1	011600	Cap Screw ½ UNC x 6
14	2	372236	Hanger Actuator
15	1	369259	Pin
16	2	480029	Retaining Ring
17	4	020300	Washer ¼
18	2	005800	Cap Screw ¼ UNC x 1 ½
19	3	368142	Dual Clamp Assembly ½ Pipe
20	1	480366	6 Ton Swivel Hook
21	2	372043	Stacking Bolt 5/16 UNC
22	1	372219	Jam Nut ½ UNC
23	1	373238	Valve Mounting Pad
24	1	367145	Straight Adapter -8 ORB / -8JIC
25	2	372195	Swivel -10 ORB / -8 JIC
26	2	020200	Lock Washer ¼
27	1	202756	Straight Adapter -8 ORB / -6 JIC
28	1	369216	Vented Spool Type Directional Valve with Logic Element
29	1	369217	Manual Spring Pull to Open Valve MP08-20
30	2	005806	Cap Screw ¼ UNC x2
31	2	015900	Nut ¼ UNC
32	1	241175	90° Elbow -6 ORB / -6 JIC
33	1	330272	90° Elbow -8 ORB / -6 JIC
34	1	369219	Tee Run -8 ORB / -8 JIC
35	1	369226	Reducing Bushing -8 JIC / -6 JIC
36	1	369227	Swivel Branch Tee -8 Swivel / -8 JIC
37	1	750449	Reducing Bushing -12 JIC / -8 JIC
38	1	812303-225	External Hose Assembly
39	1	812309-040	External Hose Assembly
40	1	812306-285	Winch Hose Assembly

WINCH KIT
P/N 373230

Item	Quantity	Part Number	Description
41	1	812309-285	Winch Hose Assembly
42	2	372041	Straight Adapter -10 ORB / -8 JIC
43	2	812209-054	Hydraulic Switch Hose Assembly
44	1	Reference	Control Valve (Manual 372010, Proportional 367302)
45	1	Reference	External Cylinder (373038)
46	2	Reference	External Hose (812309-225 or 812309-250)

ACTUATOR ASSEMBLY

A-50A



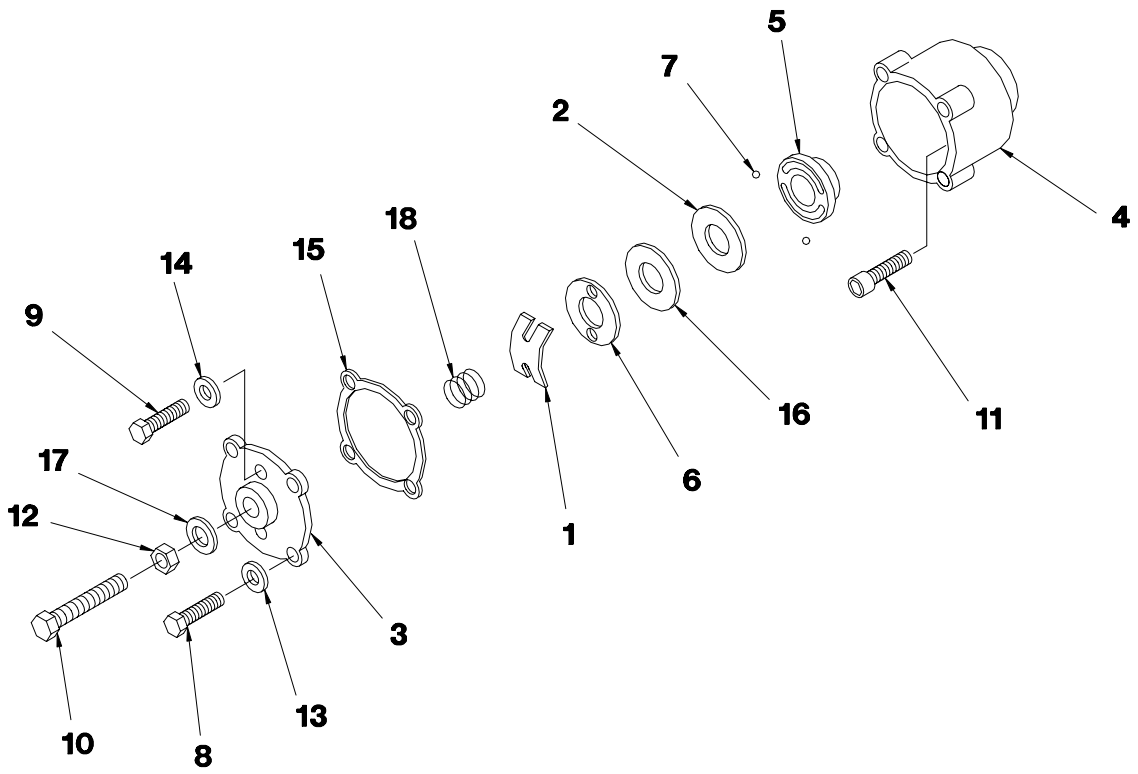
ACTUATOR ASSEMBLY

A-50A

ITEM	QTY	P/N	DESCRIPTION
1	1	367449	COUPLING ASSEMBLY-
2	1	367450	ADAPTER
3	2	367451	BUSHING
4	1	367452	COVER
5	1	367453	GEAR R.H.
6	1	367454	HOUSING-GEAR
7	2	367455	KEY RD END
8	2	367456	BEARING BALL
9	8	367457	SCREW HX 5/16 NC X 3/4
10	6	367458	SCREW HX 5/16 NC X 1 1/4
11	2	367459	GASKET
12	1	367460	GASKET
13	1	367461	FITTING-RELIEF
14	2	367462	QUAD RING
15	1	367463	REDUCER
16	2	367464	PLUG PIPE
17	1	367465	PLUG PIPE
18	1	367466	SEAL-OIL
19	1	367474	WORM R.H.
20	1	367487	SHAFT OUTPUT
21	2	367488	KEY

AUTOMATIC SAFETY BRAKE ASSEMBLY

(OIL COOLED) HOIST



ITEM	QTY	P/N	DESCRIPTION
1	1	367467	FLAT SPRING
2	1	367468	CAM PLATE
3	1	367469	HOUSING COVER
4	1	367470	BRAKE HOUSING
5	1	367471	BRAKE HUB
6	1	367473	RETAINER PLATE
7	2	367475	BRAKE BALL
8	4	367476	CAPSCREW 5/16 NC x 1
9	2	367477	CAPSCREW 3/8 NF X 1
10	1	367478	CAPSCREW 1/2 NC x 1 3/4
11	6	367479	CAPSCREW SOC HD 5/16 NF X 1
12	1	367480	JAM NUT 1/2 NF
13	4	367481	LOCKWASHER 5/16
14	2	367482	WASHER FLAT 3/8 ALUM
15	1	367483	GASKET
16	1	367484	THRUST PLATE
17	1	367485	THREAD SEAL
18	1	367486	SPRING

AUTOMATIC SAFETY BRAKE ASSEMBLY

(OIL COOLED) HOIST

ASSEMBLY INSTRUCTIONS:

1. Winch has right hand worm and gear. Cable spools over drum. Use number two slots for brake balls in cam plate.

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 disk.

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 capscrew on outside of housing cover. When proper adjustment is obtained, secure capscrew(10) with jam nut.

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.

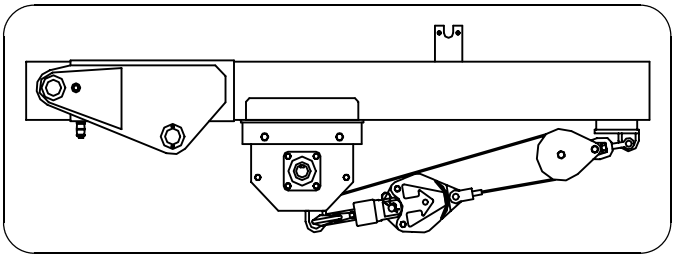


fig. 2
TWO-BLOCK STORAGE CONFIGURATION

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.

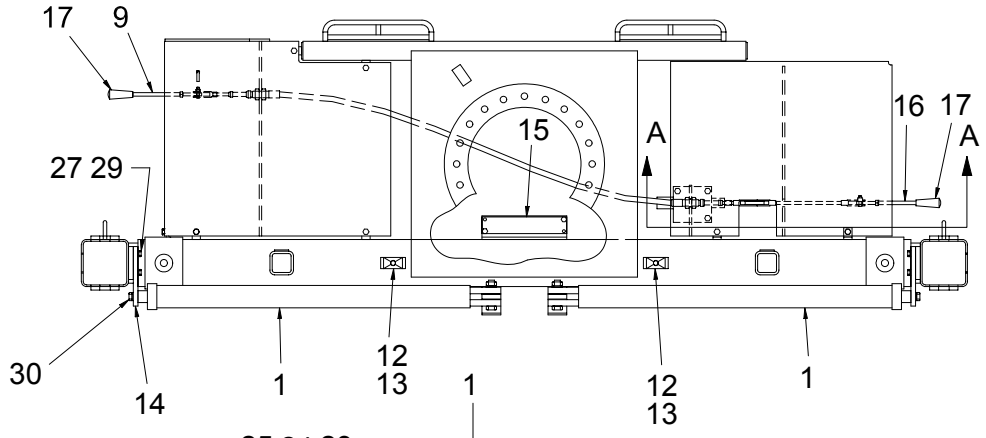
7 Always wind loadline under tension to assist proper spooling.

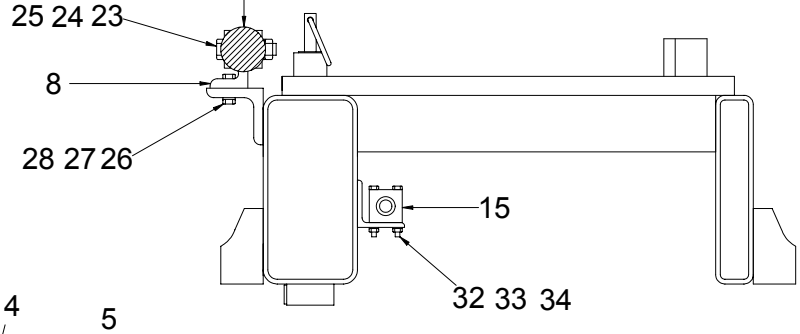
8 Never attempt to lift loads which are not looose and free, i.e. frozen down material or poles out of ground.

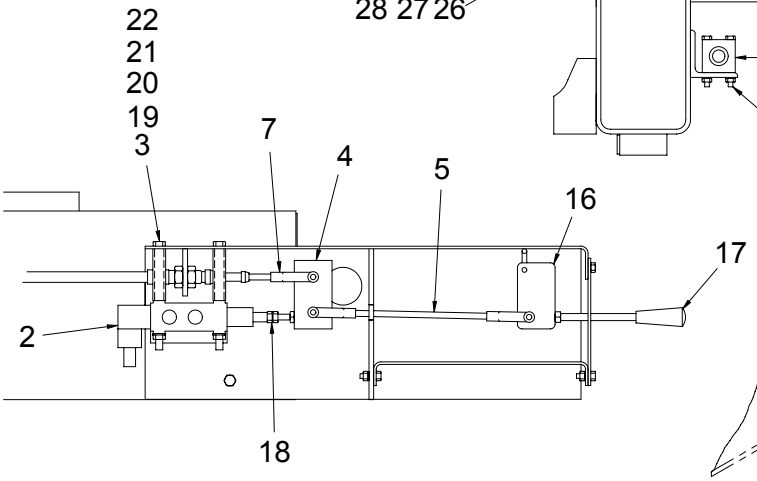
9 Know hoist and cranes lifting capacities before attempting to lift load. The weight of the load and loadline attachments must not exceed the lesser of the two capacities.

10 Never use the two-block storage hook(s) to lift a load.

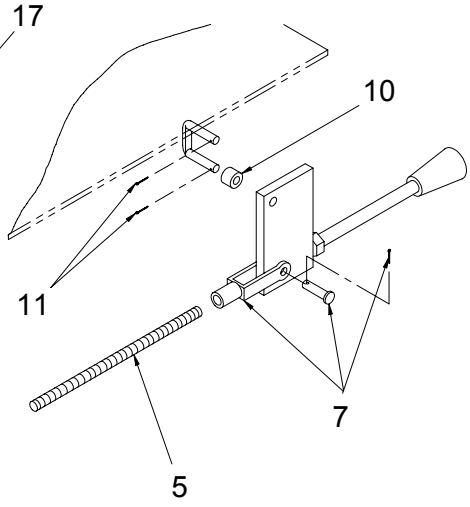
POWER OUTRIGGERS
A-50A

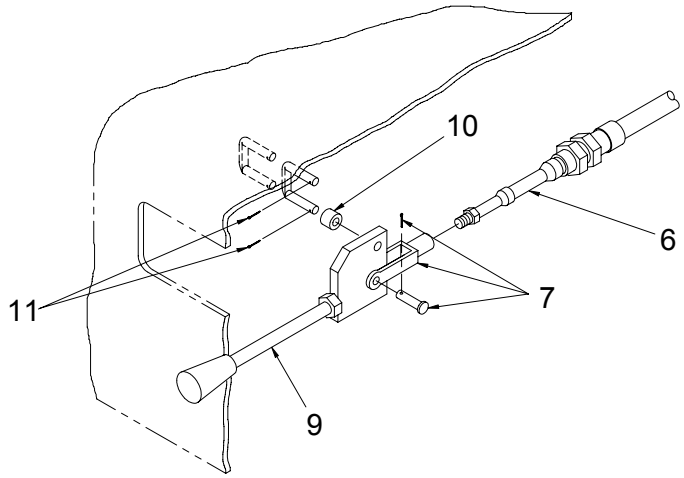






SECTION A-A



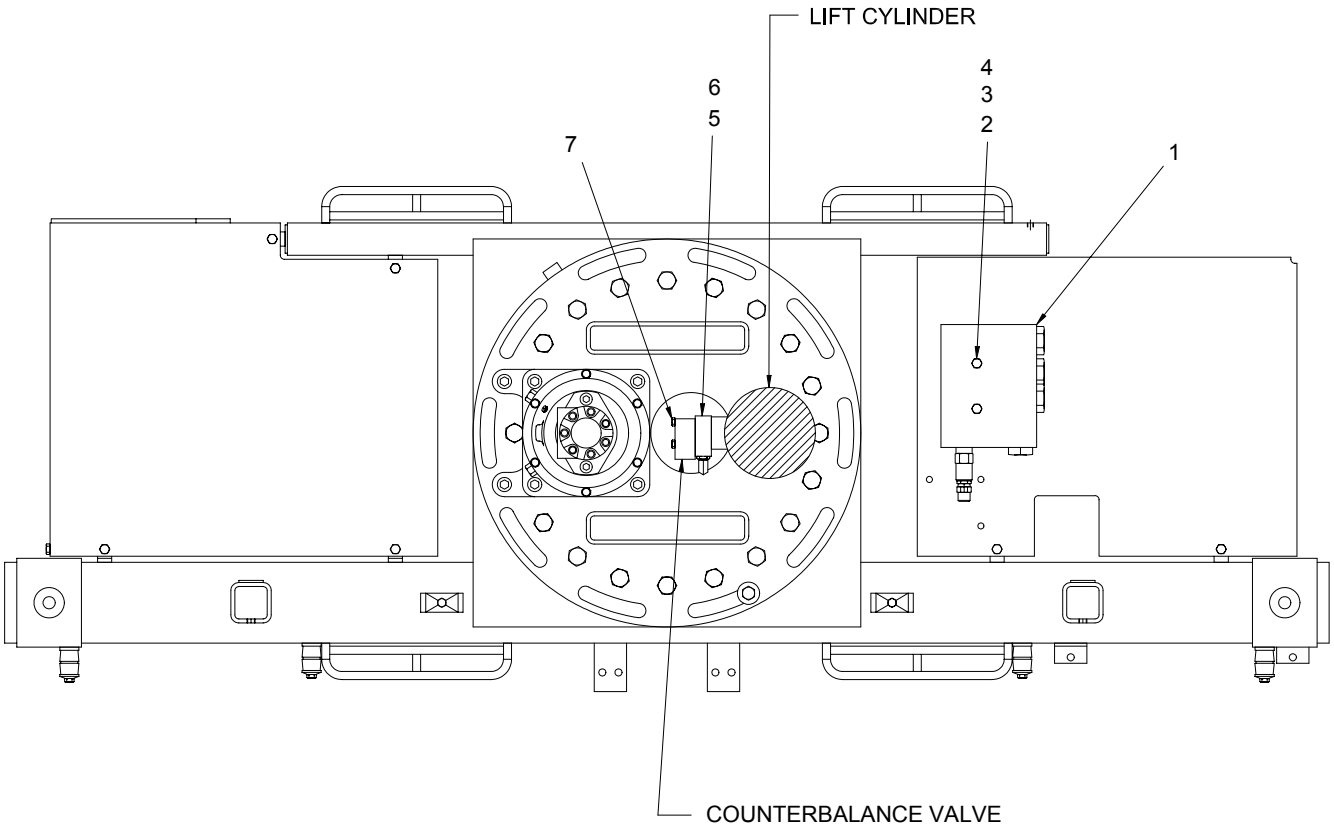


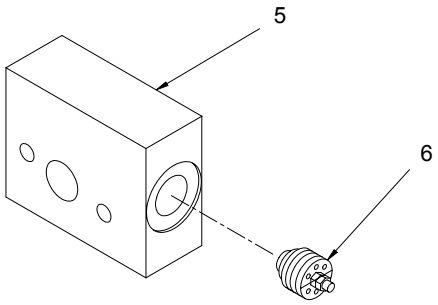
HANDLE ASSEMBLIES

POWER OUTRIGGERS
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	2	372313	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	340614	ROD ALL THREAD 5/16-24 X 8 1/2
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 OUTER ROD END
15	1	372305	HEADER MANIFOLD
16	1	372270	HANDLE (4 1/2)
17	2	372252	KNOB BLACK
18	2	372308	NUT M8
19	3	008800	SCREW HX HD 5/16 NC X 6
20	6	020901	WASHER FL 5/16
21	3	020600	WASHER SP LK 5/16
22	3	016500	NUT 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 5/8 NC
26	4	330094	SCREW HX HD 3/8 NC X 1 1/2
27	8	021100	WASHER SP LK 3/8
28	4	017100	NUT 3/8 NC
29	4	008701	SCREW HX HD 3/8 NC X 1
30	2	011510	SCREW HX HD 1/2NC X 1 1/4
31	2	021500	WASHER SP LK 1/2
32	2	006700	SCREW HX HD 1/4 NC X 2 1/2
33	3	020200	WASHER SP LK 1/4
34	2	015900	NUT 1/4 NC
35	2	372321	DECAL 5-WAY VALVE FUNCTION
36	-	-	-

2 & 3 FUNCTION OVERLOAD
A-50A



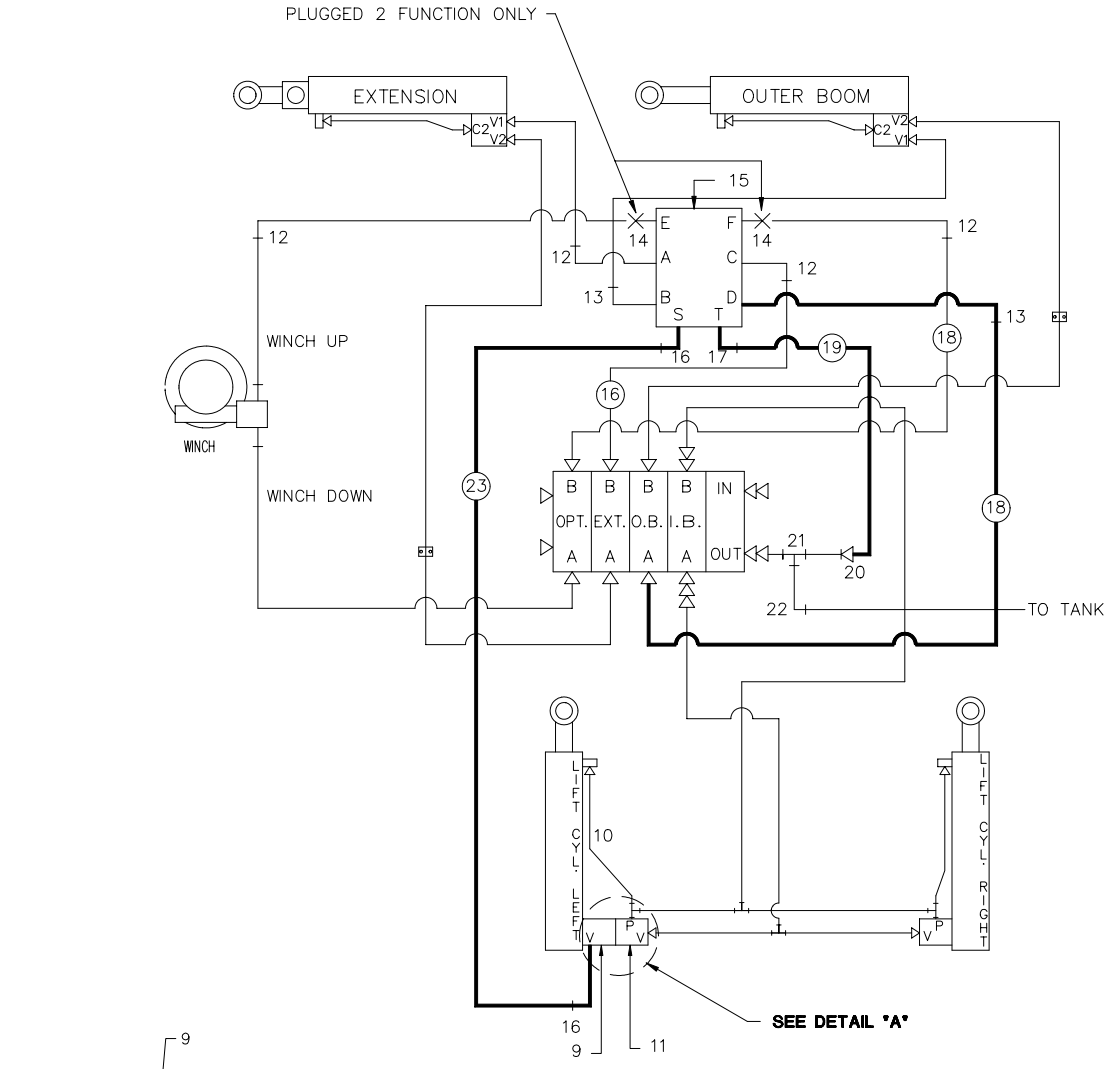


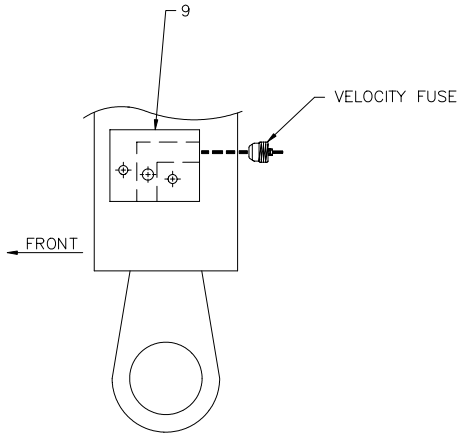
2 & 3 FUNCTION OVERLOAD
A-50A

ITEM	QTY	P/N	DESCRIPTION
1	1	367285	3/2 FUNCTION OVERLOAD
2	2	811052	SCREW HX HD 3/8 NC X 5
3	4	021200	EASHER FL 3/8
4	2	017301	NUT LK 3/8 NC
5	1	368987	VELOCITY FUSE
6	1	368985	MANIFOLD SENSE VALVE
7	2	006700	SCREW HX HD 1/4 NC X 2 1/2

2 & 3 FUNCTION OVERLOAD VALVE KIT A-50A

- OVERLOAD VALVE HYDRAULIC ASSEMBLY -

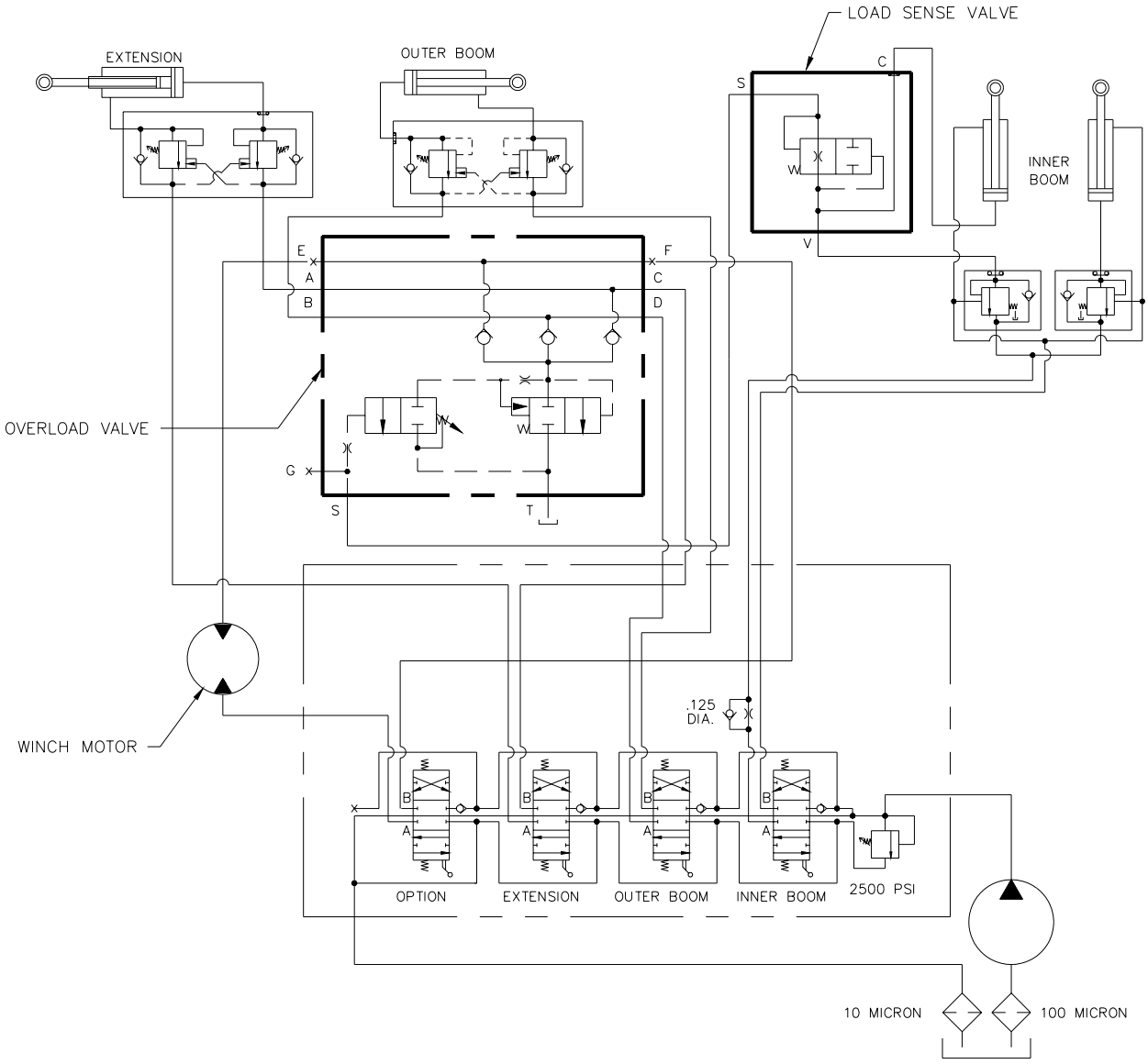




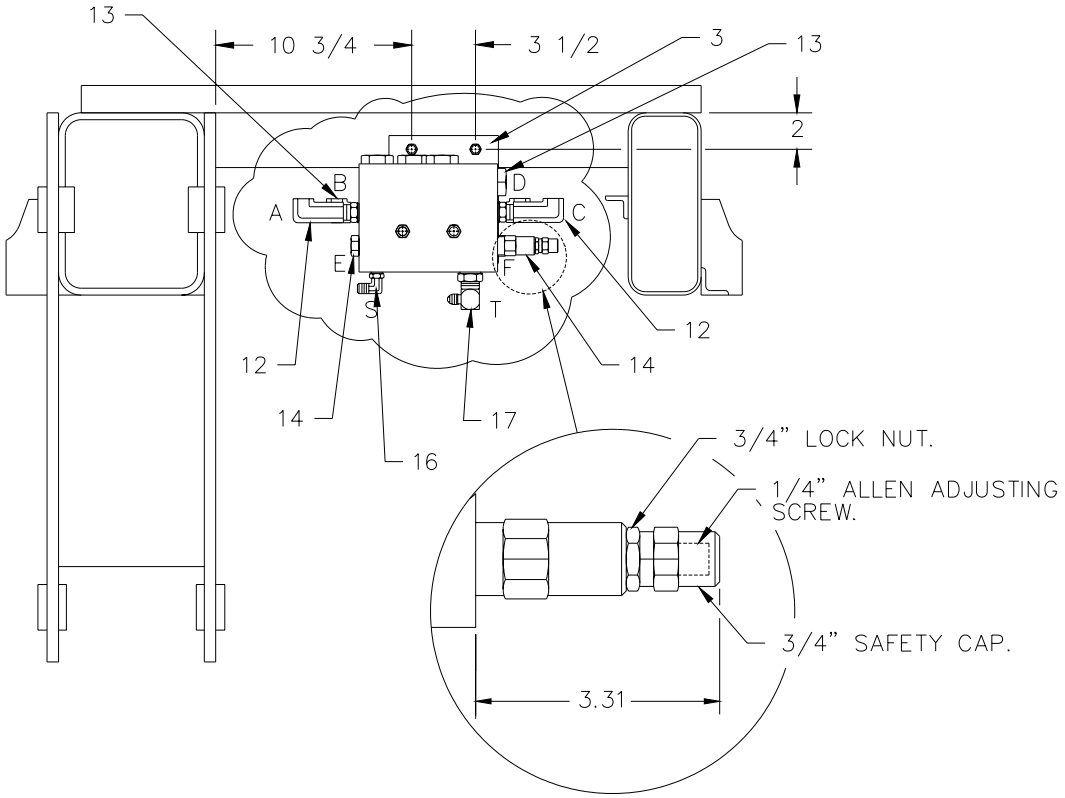
DETAIL "A"

2 & 3 FUNCTION OVERLOAD VALVE KIT A-50A

- HYDRAULIC SCHEMATIC WITH LOAD SENSE VALVE -



2 & 3 FUNCTION OVERLOAD VALVE KIT A-50A



OVERLOAD VALVE FUNCTION CHART	
PORT	**FUNCTION**
A	EXTENSION CYLINDER
B	OUTER BOOM CYLINDER
C	CONTROL VALVE B PORT EXTENSION CYLINDER
D	CONTROL VALVE A PORT OUTER BOOM CYLINDER
E	PLUGGED IF WINCH IS NOT USED
F	PLUGGED IF WINCH IS NOT USED
G	GAGE PORT
S	SENSE PRESSURE LINE
T	TANK

2 & 3 FUNCTION OVERLOAD VALVE KIT A-50A

ITEM	QTY	P/N	DESCRIPTION
1	2	009116	CAPSCREW 1/4-NC x 2
2	2	013850	CAPSCREW 7/16-NC x 5 1/2
3	1	369585	OVERLOAD SENSOR VALVE
4	2	750223	SPLIT LOCK WASHER 7/16
5	2	021600	FLAT WASHER 1/2
6	2	017900	HEX NUT 7/16-NC
7	2	021100	SPLIT LOCK WASHER 3/8
8	2	330372	NUT 3/8-NC
9	1	368986	SENSE VALVE ASSEMBLY
10	1	369149	LIFT CYLINDER TUBE ASSEMBLY W/ SENSE VALVE
11	2	006700	CAPSCREW 1/4 -NC x 2 1/2
12	2	367202	EXTRA LONG ELBOW -10 ORM/-8 NPTF
13	2	367201	90º ELBOW -10 ORM/-8 NPTF
14	2	330072	PLUG -10 ORM
15	1	367285	3 FUNCTION OVERLOAD VALVE
16	2	759137	90º ELBOW -4 JICM/-6 ORM
17	1	367278	90º ELBOW -8 JICM/-12 ORM
18	2	812302-057	HOSE ASSEMBLY
19	1	812303-057	RETURN HOSE ASSEMBLY
20	1	750449	REDUCER -8 JICM/--12 JICF
21	1	750472	SWIVEL TEE -12 JICM/-12 JICF
22	1	367283	90º ELBOW -12 JICM/-12 JICF
23	1	812003-085	SENSE HOSE ASSEMBLY

Mounting

1. Mount Overload Valve (P/N 367285) to pedestal using Mounting Bracket (P/N 369585), capscrews 7/16-NC x 5 1/2, split lock washers 7/16 & flat washers 1/2, hex nuts 7/16-NC.

2. Install o-rings plugs (P/N 367278) into overload valve ports E & F.

3. Install extra-long 90º elbow (P/N 367202) into ports A & C.

4. Install standard 90º elbow (P/N 367278) into port T.

Function

2 & 3 FUNCTION OVERLOAD VALVE KIT A-50A

Overload Valve function is designed to shut off the hydraulic flow to the outer boom and extension cylinders once the sense pressure reaches a preset limit. The sense pressure is the pressure at the base of the lift cylinders. Once the sense pressure is greater than preset limit, the overload valve will divert flow from the outer boom and extension cylinder extend circuits back to the tank. The outer boom and extension cylinder retract circuits are not affected by the overload valve.

Installation

1. Install pressure gage into gage port marked G on overload valve to register overload sense pressure. Gage port is a SAE #04 O-Ring, 7/16-20 UNF.

2. It is very important that the sense line from the Sense Valve Assembly (P/N 368986) to the Overload Valve (P/N 367285) is bled of all entrapped air. To bleed sense line:

    1) Move crane into a safe position with lift cylinders extended approximately 6 inches (no load on crane.

    2) Loosen hose fitting connection on sense port to bleed sense line.

    3) Retract lift cylinders to bleed all the air from sense line.

    4) Care must be taken when bleeding sense line, bleed at a slow controlled rate to prevent the velocity fuse in sense valve assembly from closing.

3. Once sense line has been bled, set overload sense pressure between 2600 - 3000 psi. **Never exceed 3000 psi on overload valve sense pressure or possible crane damage may occur.** To check overload sense pressure, lift pounds required for specific crane with inner and outer boom horizontal, and second stage booms retracted. Observe sense pressure on gage and extend first stage boom out until overload sense pressure is approximately 2900 psi. At 2900 psi if booms continues to extend and sense pressure must be adjusted.

4. To set sense pressure:

    1) Remove safety cap using 3/4” wrench.

    2) Loosen safety lock nut using 3/4” wrench.

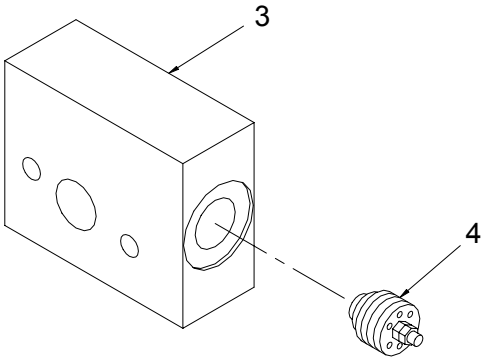
    3) Unscrew adjusting screw on overload valve using 1/4” Allen wrench until booms will not extend any further. Check pressure setting by retracting and extending extension cylinder until overload valve stops extension at the distance per chart below.

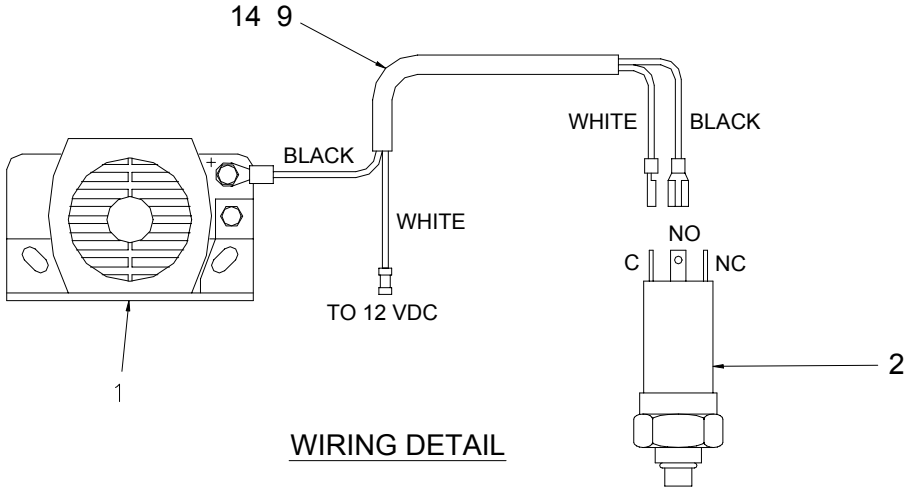
2 & 3 FUNCTION OVERLOAD VALVE KIT A-50A

MODEL	1st & 2nd STAGE BOOMS RETRACTED LOAD @ APPROX. 15' (LBS)	1st STAGE BOOM EXTENDED 2nd STAGE BOOM RETRACTED LOAD @ APPROX. 20.5' (LBS)
A-50A	3,000	2,100
A-72A	4,000	3,000
A-95	6,000	4,000
A-125	7,000	5,000

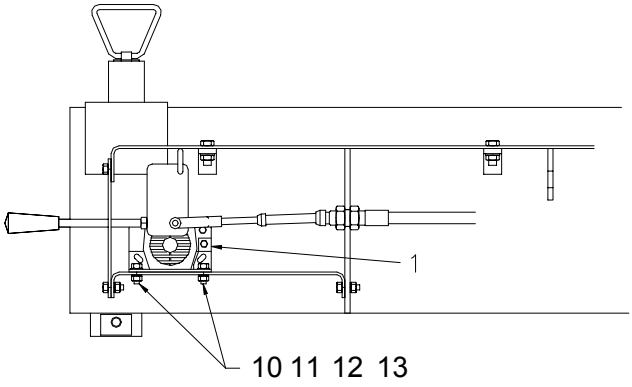
INNER & OUTER BOOMS HORIZONTAL AND NO MANUAL BOOM(S).

KIT HORN ALERT
AW-439

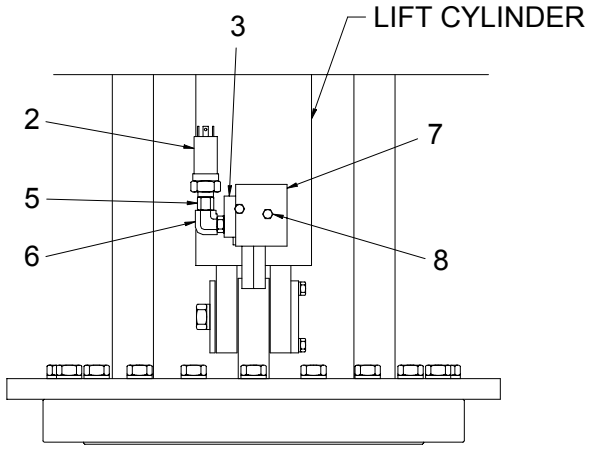




WIRING DETAIL



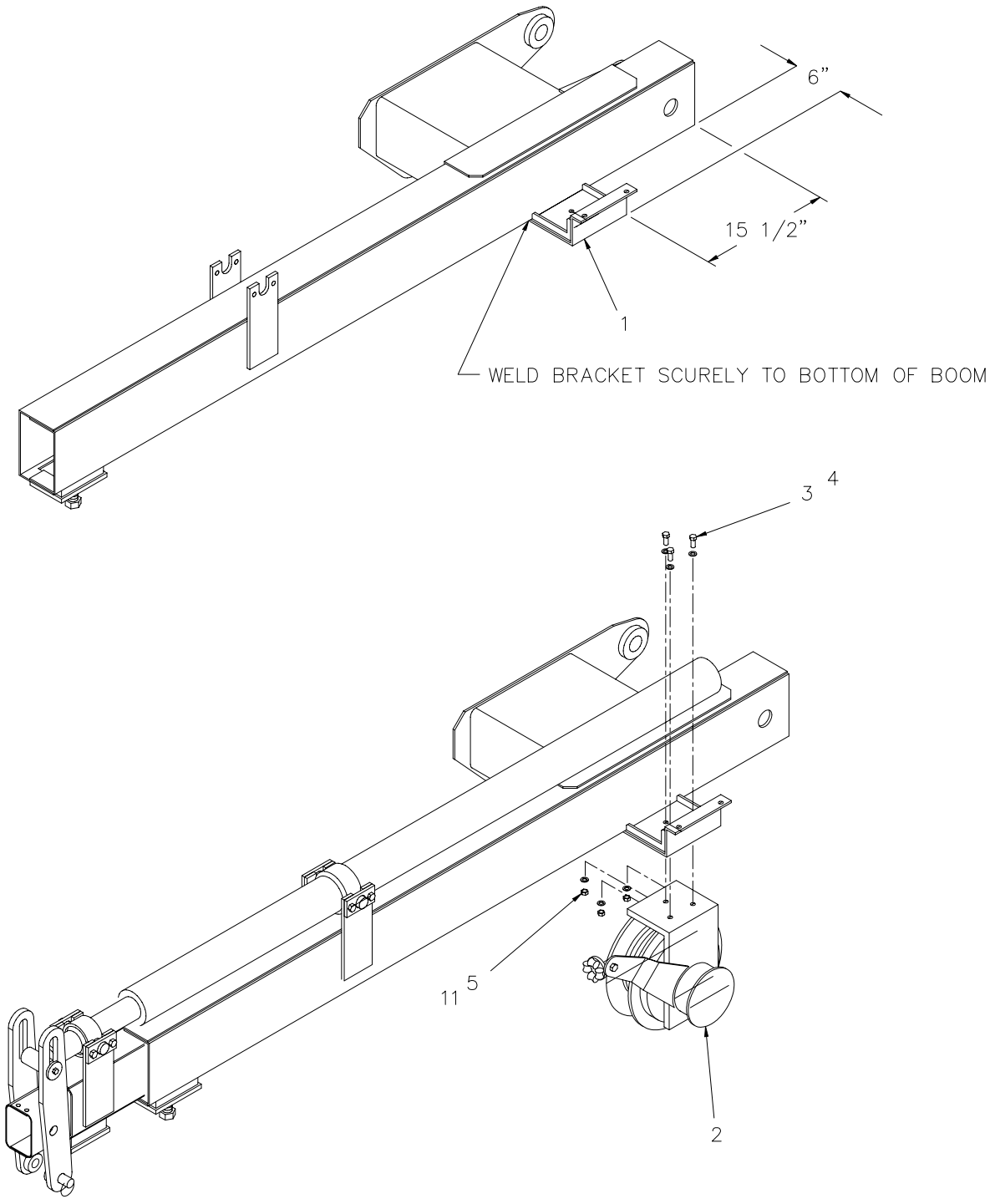
HORN MOUNTING DETAIL



PRESSURE SWITCH DETAIL

KIT HORN ALERT
AW-439

ITEM	QTY	P/N	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 ORM/-4 ORF
6	1	372054	ELL 90 DEG -6 ORM/-6 ORF
7	1	REF	C.B. VALVE (LIFT) (367122)
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 1/4 NC
12	2	020300	WASHER FL 1/4
13	2	020200	WASHER SP LK 1/4
14	6 FT	750736	LOOM



AW–444
ELECTRIC REEL

AW-444
ELECTRIC REEL

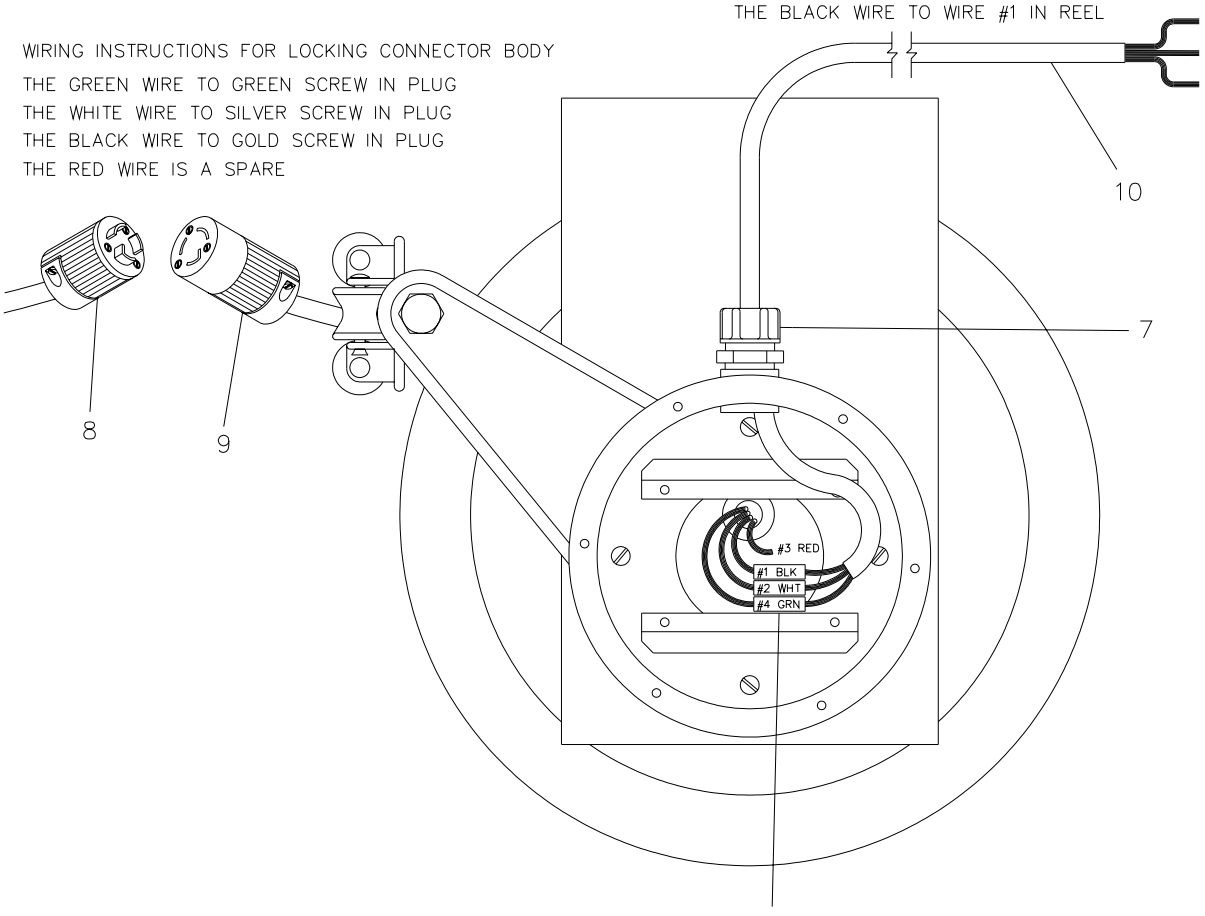
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372246	BRACKET, HOSEREEL
2	1	368993	CABLE REEL
3	3	008701	SCREW, HX HD 3/8-NC X 1
4	3	021200	WASHER, FLAT 3/8 SAE
5	3	330372	NUT, HX 3/8-NC
6	3	001102	TERMINAL
7	1	367309	CORD CONNECTOR 3/4 NPT HUB
8	1	367317	LOCKING PLUG ASSEMBLY
9	1	367311	LOCKING CONNECTOR BODY
10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

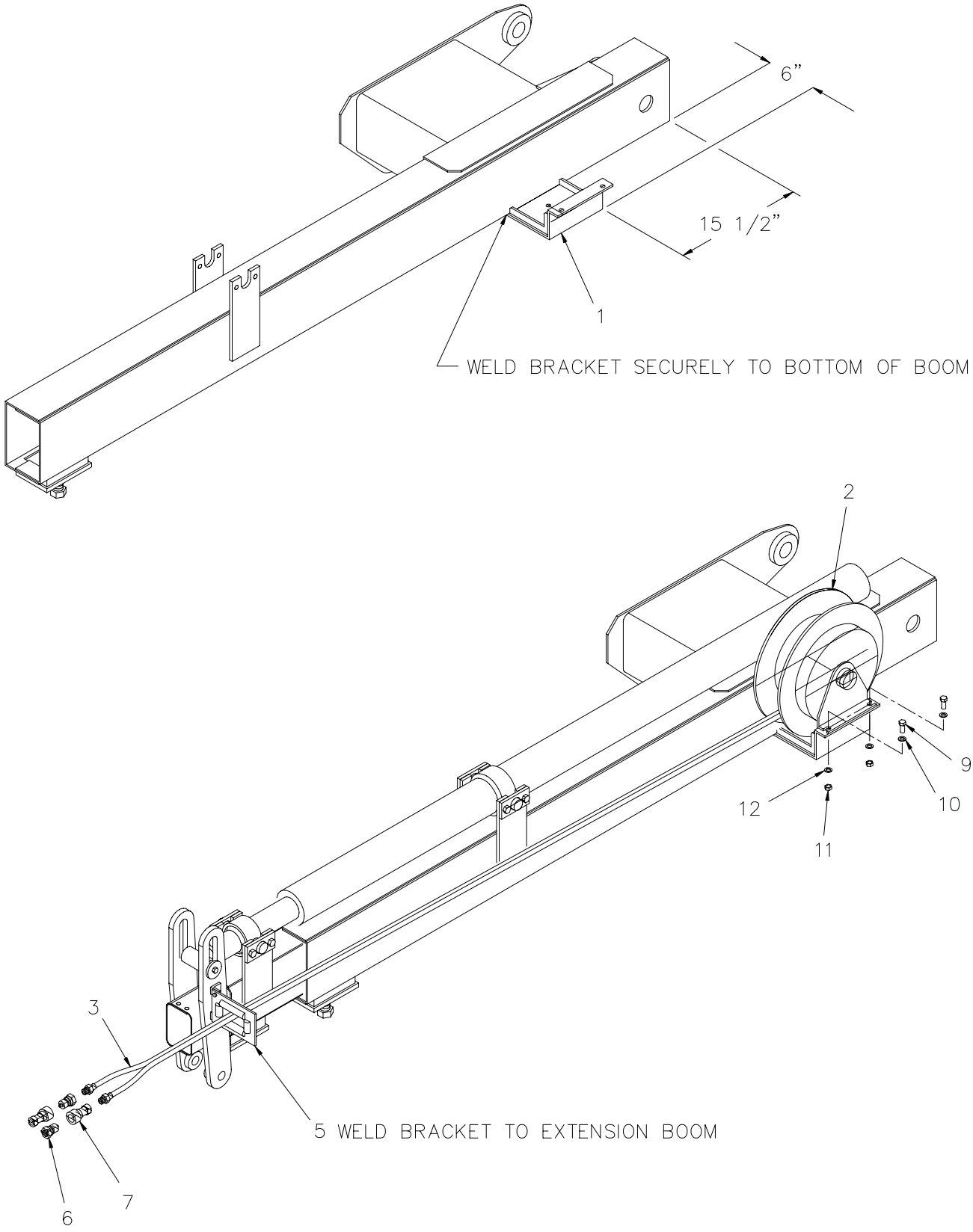
WIRING INSTRUCTIONS:
USE WIRES #1, #2, #4, FROM HOSE REEL
WIRE #3, IS A SPARE WIRE

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

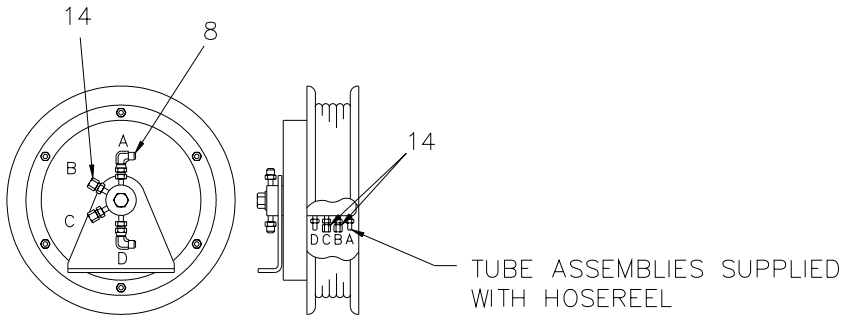


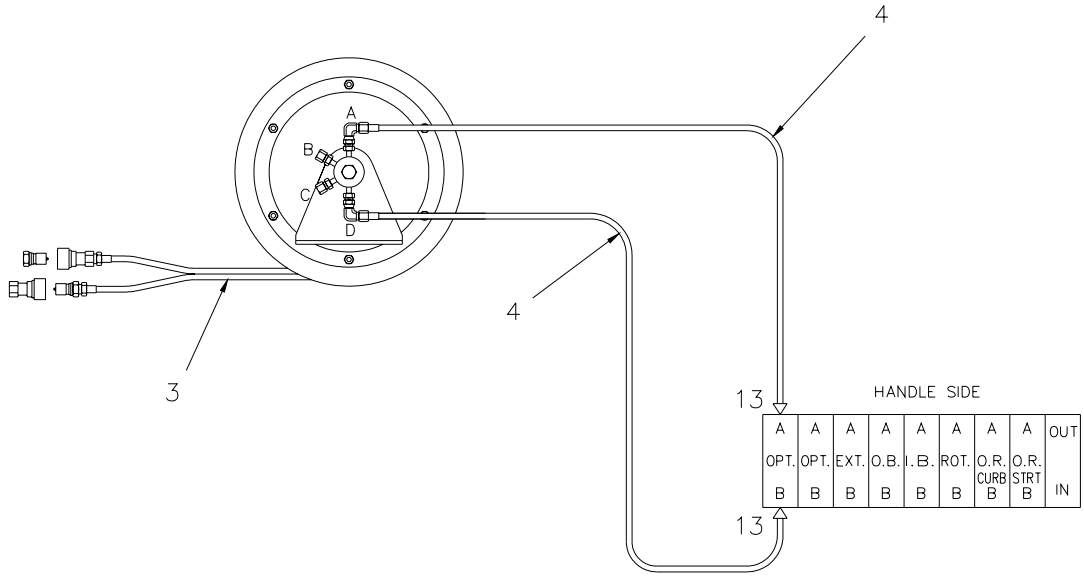


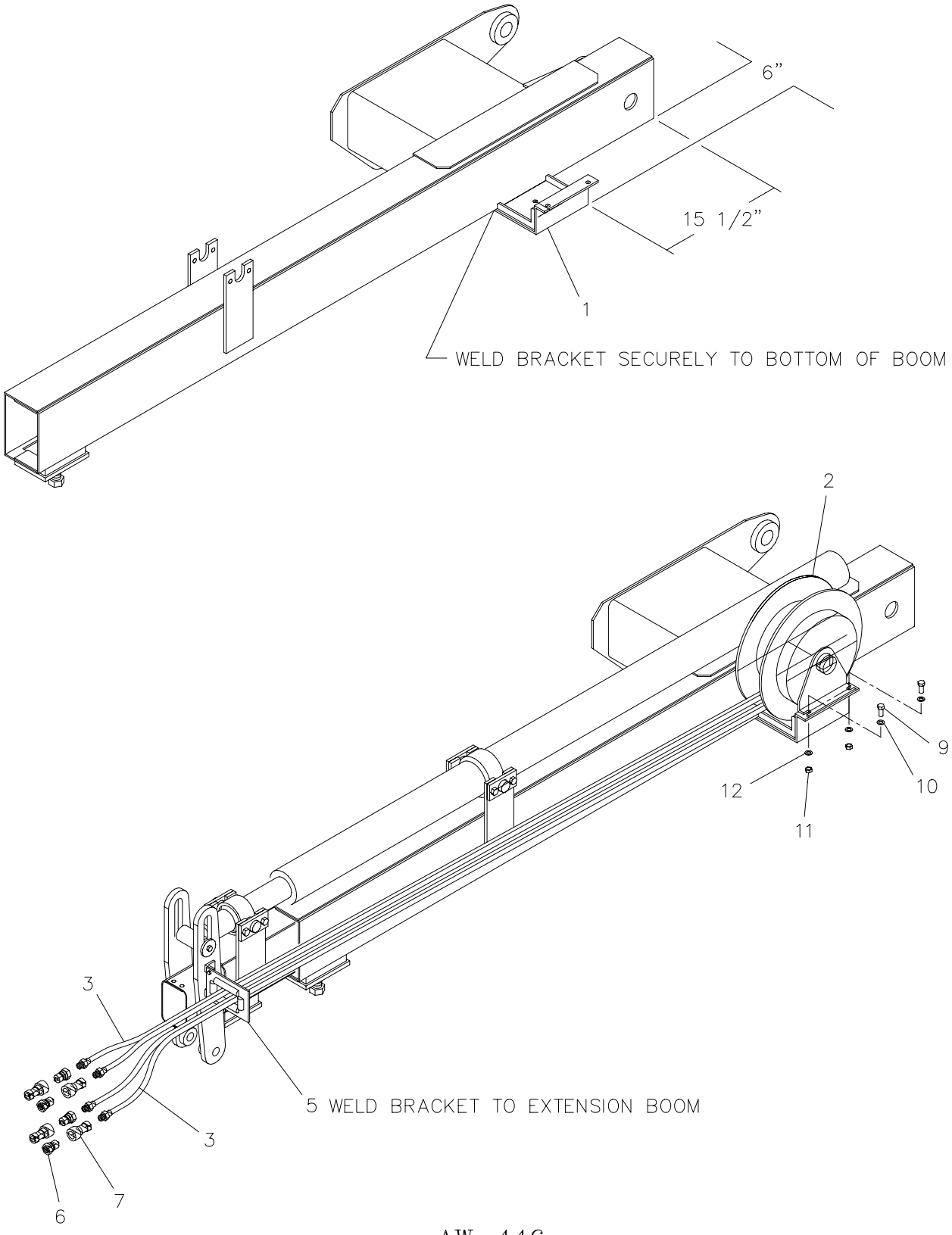
AW–445
DUAL HOSEREEL KIT

AW–445
DUAL HOSEREEL KIT

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372246	BRACKET, HOSEREEL
2	1	368992	HOSEREEL
3	1	368195	HOSEREEL 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–DISCONNECT
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



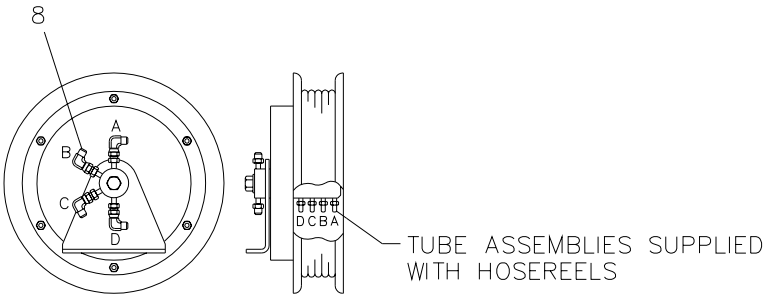


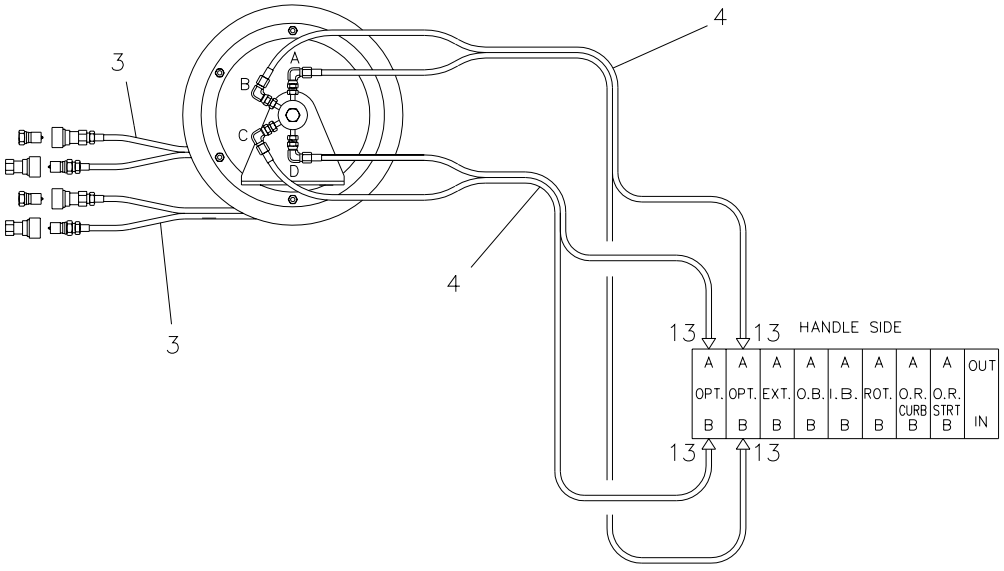


AW–446
QUAD HOSEREEL KIT

AW–446
QUAD HOSEREEL KIT

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372246	BRACKET, HOSEREEL
2	1	368992	HOSEREEL
3	2	368195	HOSEREEL ASSEMBLY, 5/16 TWIN 231" LONG
4	2	372053	HOSE ASSEMBLY, 5/16 TWIN 271" LONG
5	1	368202	HOSEREEL GUIDE ASSEMBLY
6	4	368197	NIPPLE, QUICK–DISCONNECT 3/8–NPT
7	4	368196	COUPLER, QUICK–DISCONNECT
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.

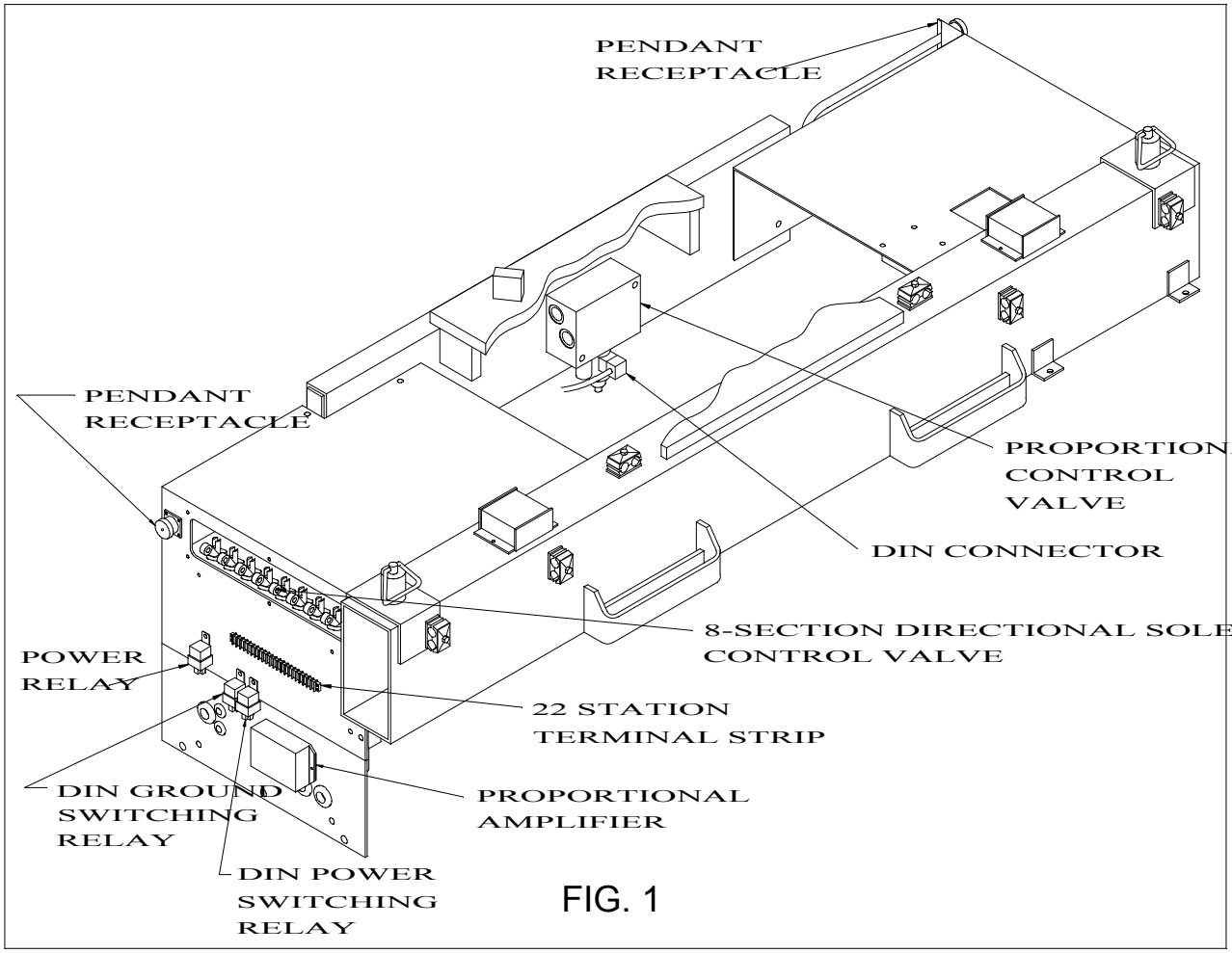


FIG. 1

2 System has two operational modes; (1) manual control (2) pendant control.

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 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, 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 regulated 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 amount of current sent to it's 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 typically control outriggers and some optional functions. The solenoid sections only control crane functions. The power build-up section provides hydraulic pressure to the solenoid valve sections to actuate the control valve spool(s). 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

KNUCKLEBOOM PROPORTIONAL SYSTEM "HOW IT WORKS"

out-put to control the proportional flow control valve. 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. 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.

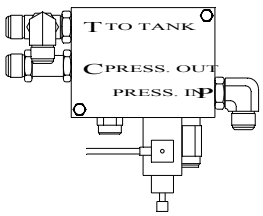


FIG. 2

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: -10 (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.**

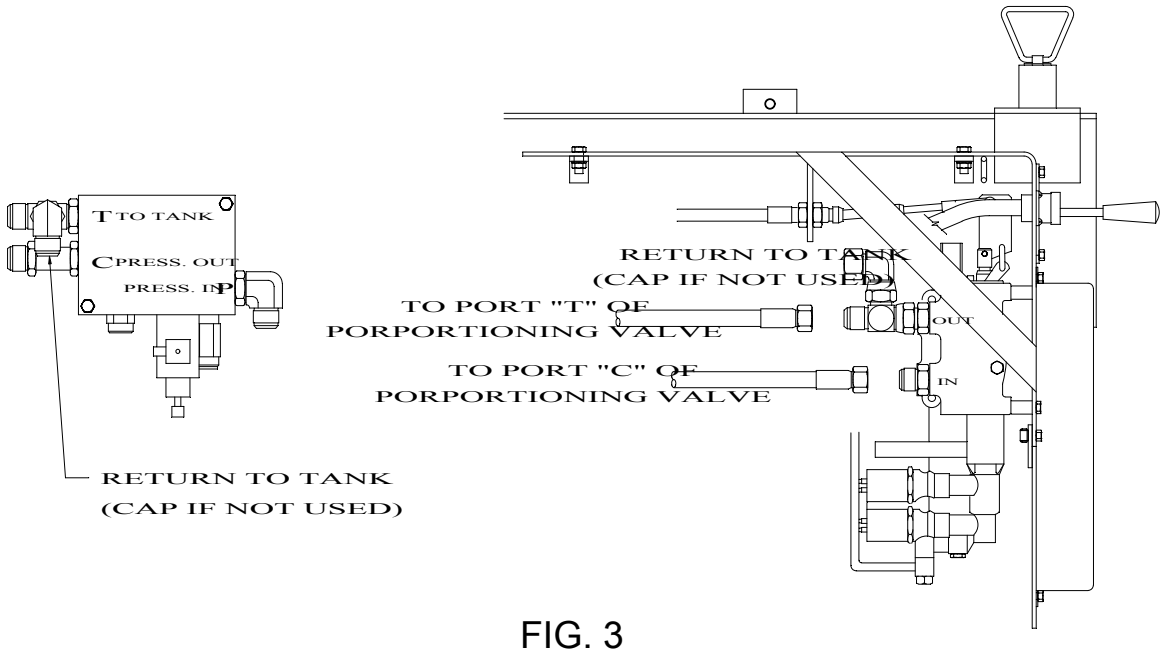


FIG. 3

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 he 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. Be sure outriggers are in firm contact with ground and are adequately positioned.

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 knuckle-boom 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.

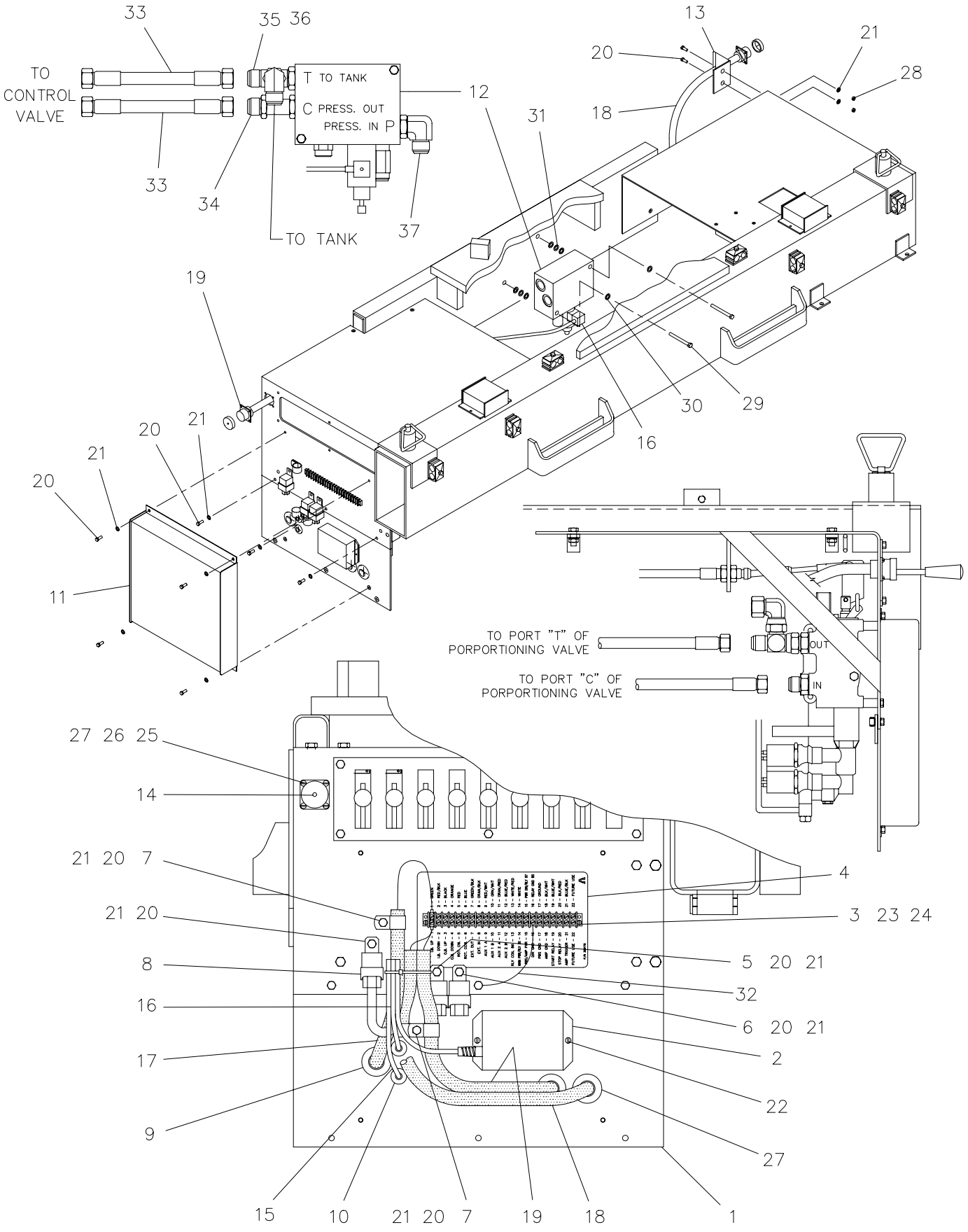
13 Return outriggers to stowed position. Make sure they are pinned in place (if required) for travel.

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.

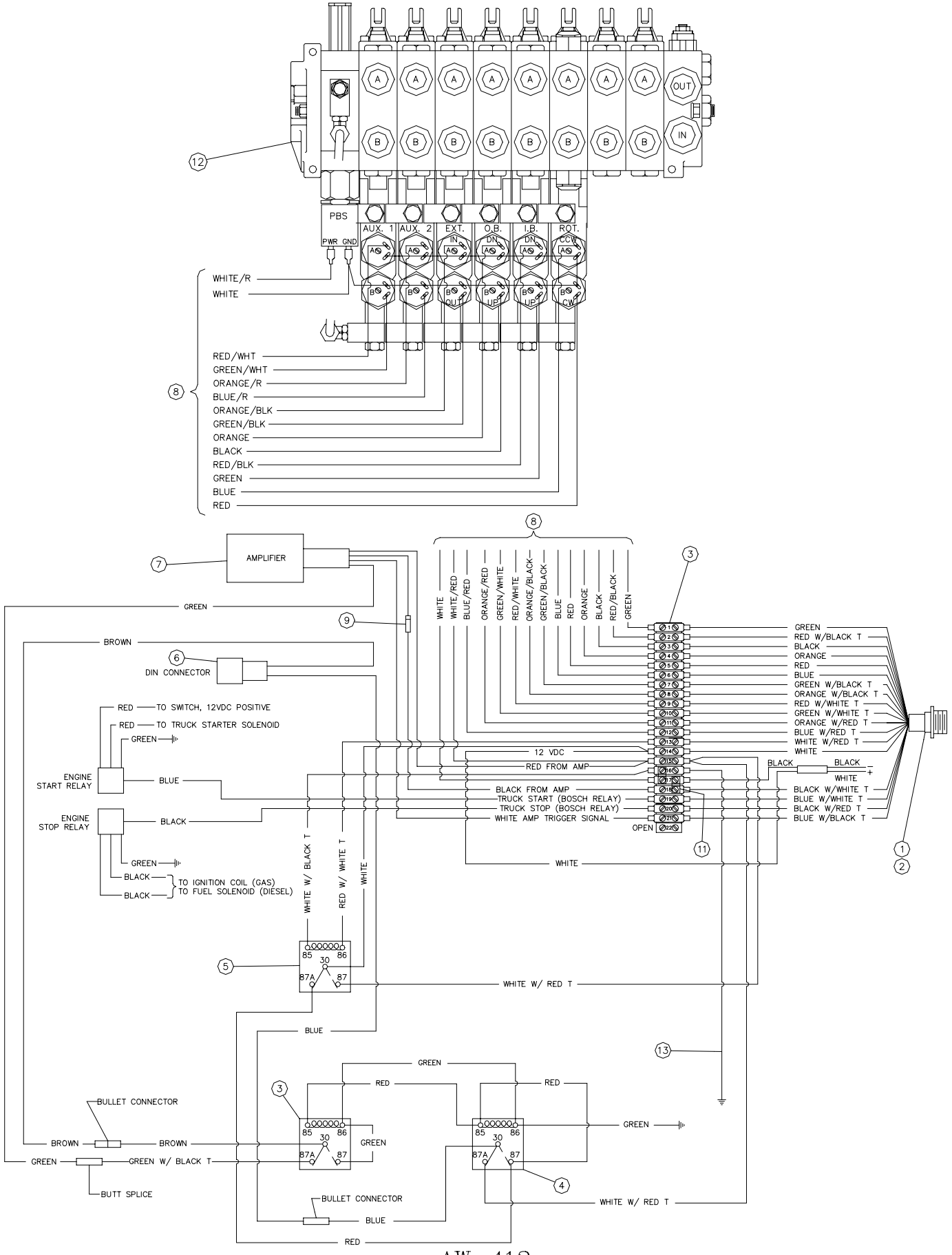
17 Report any unusual occurrence during crane operation that may indicate required maintenance or repair.



AW−411
PROPORTIONAL ASSEMBLY

AW-411
PROPORTIONAL ASSEMBLY

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372281	PLATE, PROPORTIONAL WELDMENT
2	1	372294	PROPORTIONAL AMPLIFIER ASSEMBLY
3	1	480494	TERMINAL BLOCK, 22 STATION
4	1	369176	DECAL, TERMINAL BLOCK
5	1	372287	RELAY ASSEMBLY
6	1	372288	RELAY ASSEMBLY
7	3	480024	CLAMP, CABLE
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	366097	CAP, RECEPTACLE
15	1	372295	WIRE ASSEMBLY (POWER)
16	1	372293	DIN CONNECTOR ASSEMBLY
17	1	372296	WIRING HARNESS, (SOLENOIDS)
18	1	680011	RECEPTACLE ASSEMBLY (CURB)
19	1	680012	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 1/4
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, HX #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	020601	WASHER, SP LK 5/16
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 ORM / -12 JIC
35	1	750421	TEE, -12 ORM / -12 JIC
36	1	367283	ELL, 90° -12 JIC SWIVEL / -12 JIC
37	1	750418	ELL, 90° -12 ORM / -12 JIC



AW−412
WIRING DIAGRAM, PROPORTIONAL
8−5.0.0

R 9/94

AW-412
WIRING DIAGRAM, PROPORTIONAL

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	680011	RECEPTACLE ASSEMBLY (CURB)
2	1	680012	RECEPTACLE ASSEMBLY (STREET)
3	1	372287	RELAY ASSEMBLY
4	1	372288	RELAY ASSEMBLY
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	369300-1	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

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.**

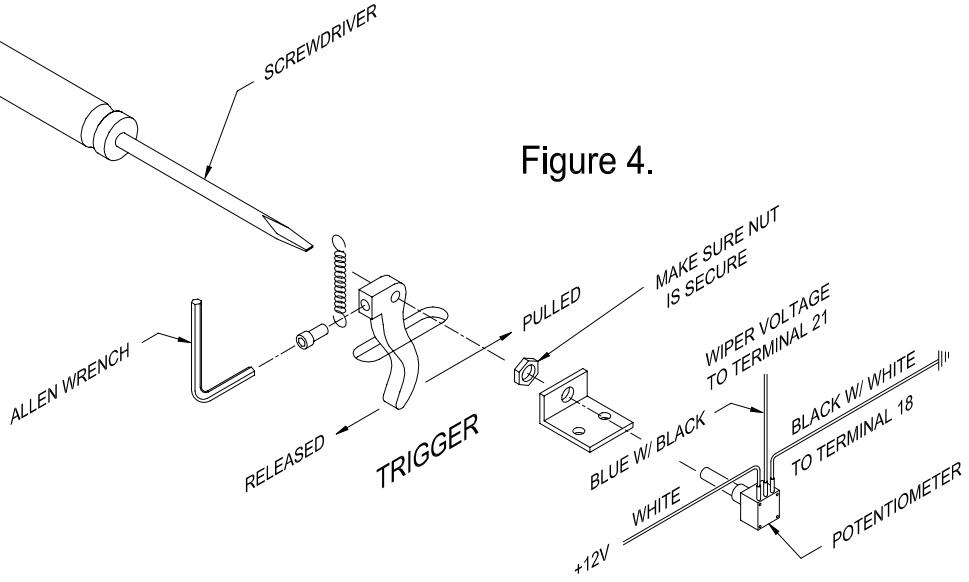


Figure 4.

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.**

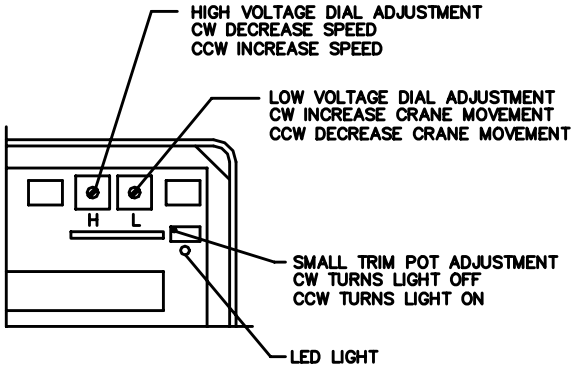
3 **Plug pendant into one of the receptacles located on either side of the crane base and turn power on. With pendant trigger pulled; adjust the small trim pot located next to the red L.E.D. light until light just turns off, then turn trim pot back until light just comes on. The light should stay on 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.**

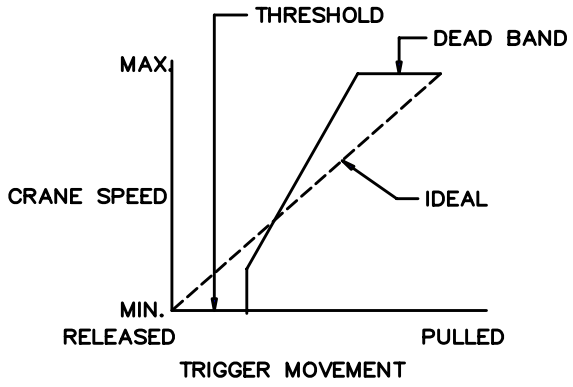
4 **Set the low voltage dial, activate any one crane function (rotate uses the least amount of pressure) with trigger released. Turn the low voltage dial (ref. figure 7, dial marked "L" on circuit board) until there is no movement of that function. With crane level and no load on booms, check rotation, 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. figure7, 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.**





Amplifier Setup

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.**

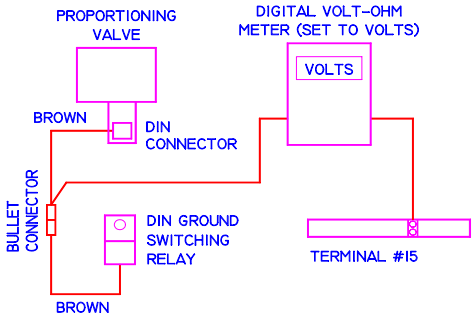


FIG. 8

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).**

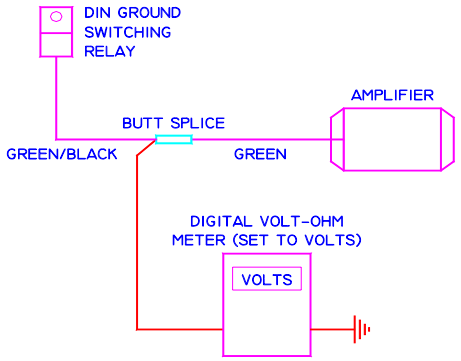


FIG.9

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 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

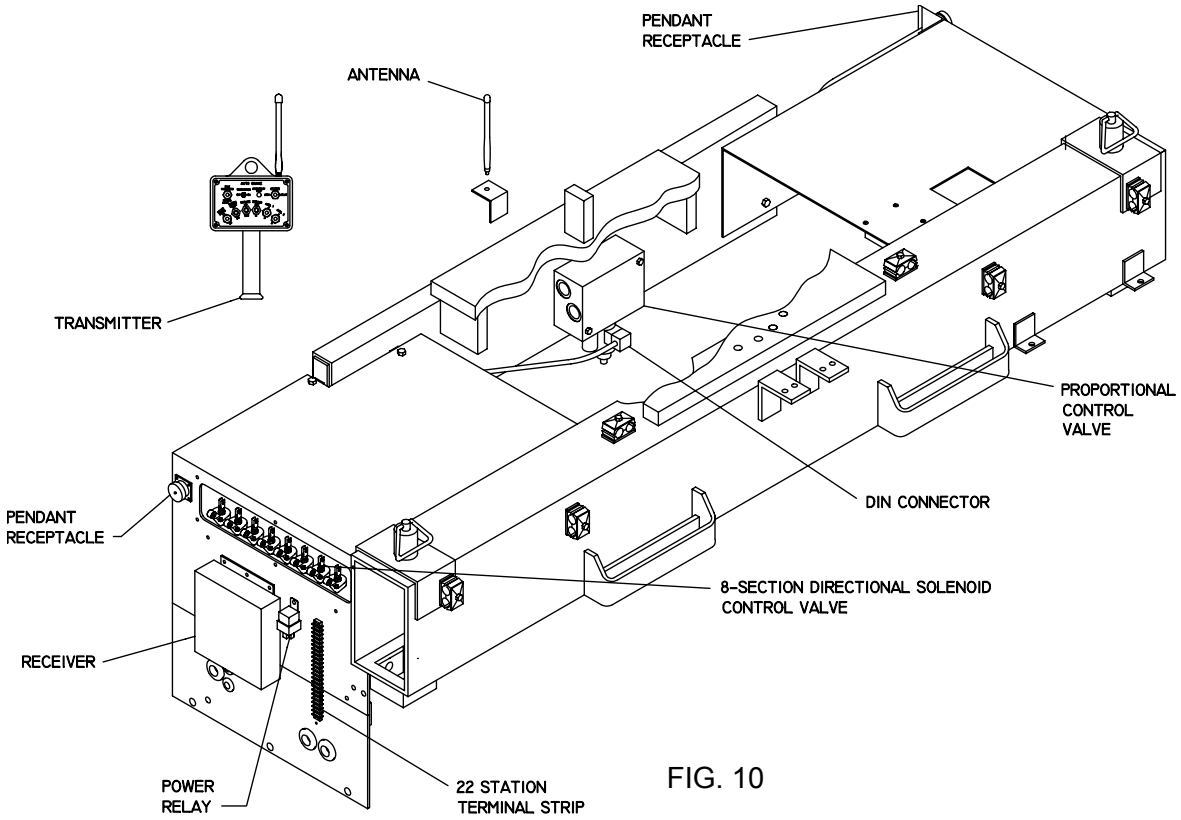


FIG. 10

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

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 meet their growing needs. On the receiver

FM PROPORTIONAL GENERAL INFORMATION

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 these outputs will be momentary. Note:

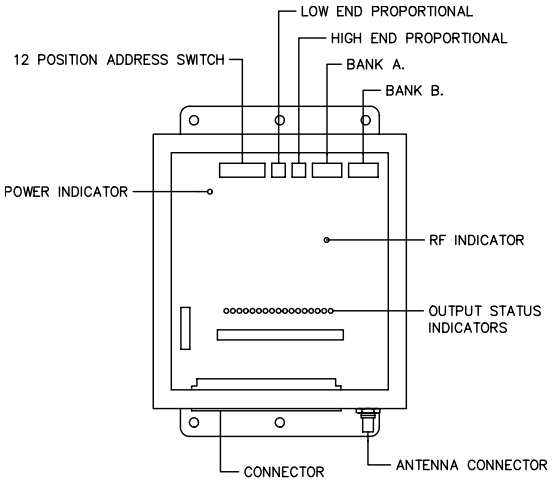


Fig. 11

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.

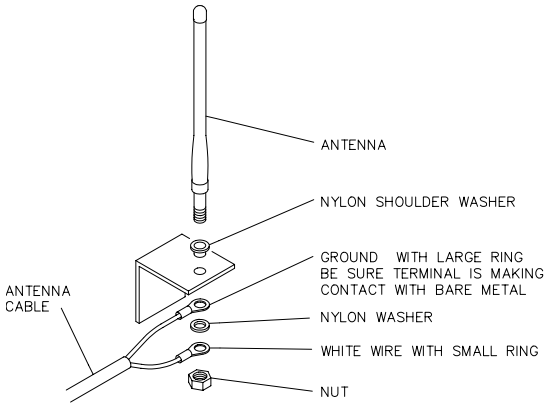


Fig. 12

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 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".

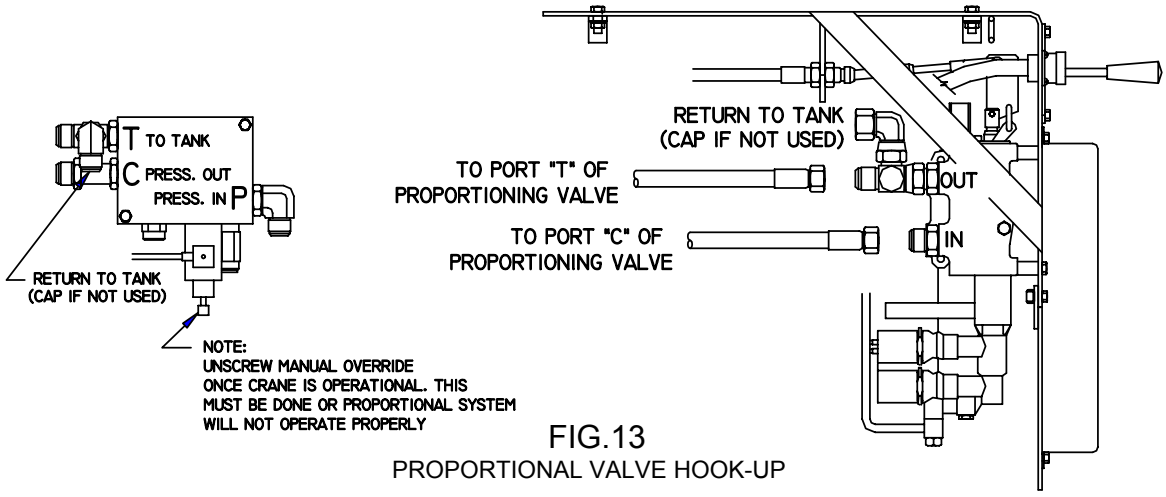


FIG.13
PROPORTIONAL VALVE HOOK-UP

PROPORTIONAL VALVE

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

NOTES

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 form 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.

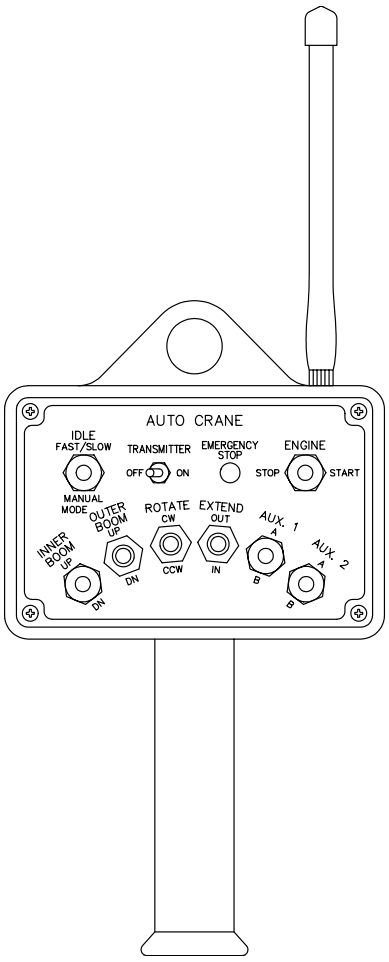


FIG. 14
FM TRANSMITTER

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.

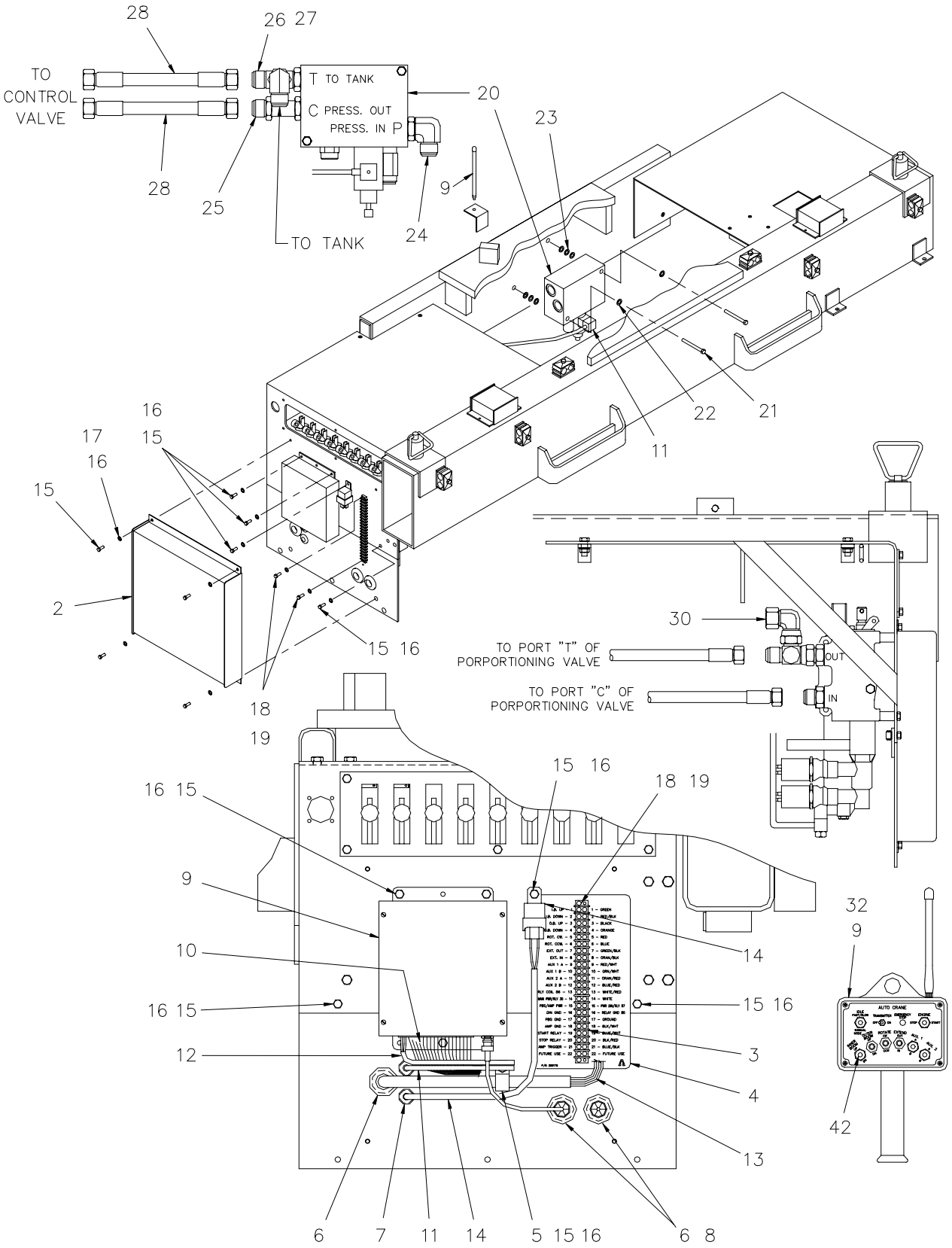
11 Once the crane has been properly stowed, return FM system to manual mode and return out outriggers to the stowed position. Make sure outriggers are pinned in place (if required) for travel.

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.

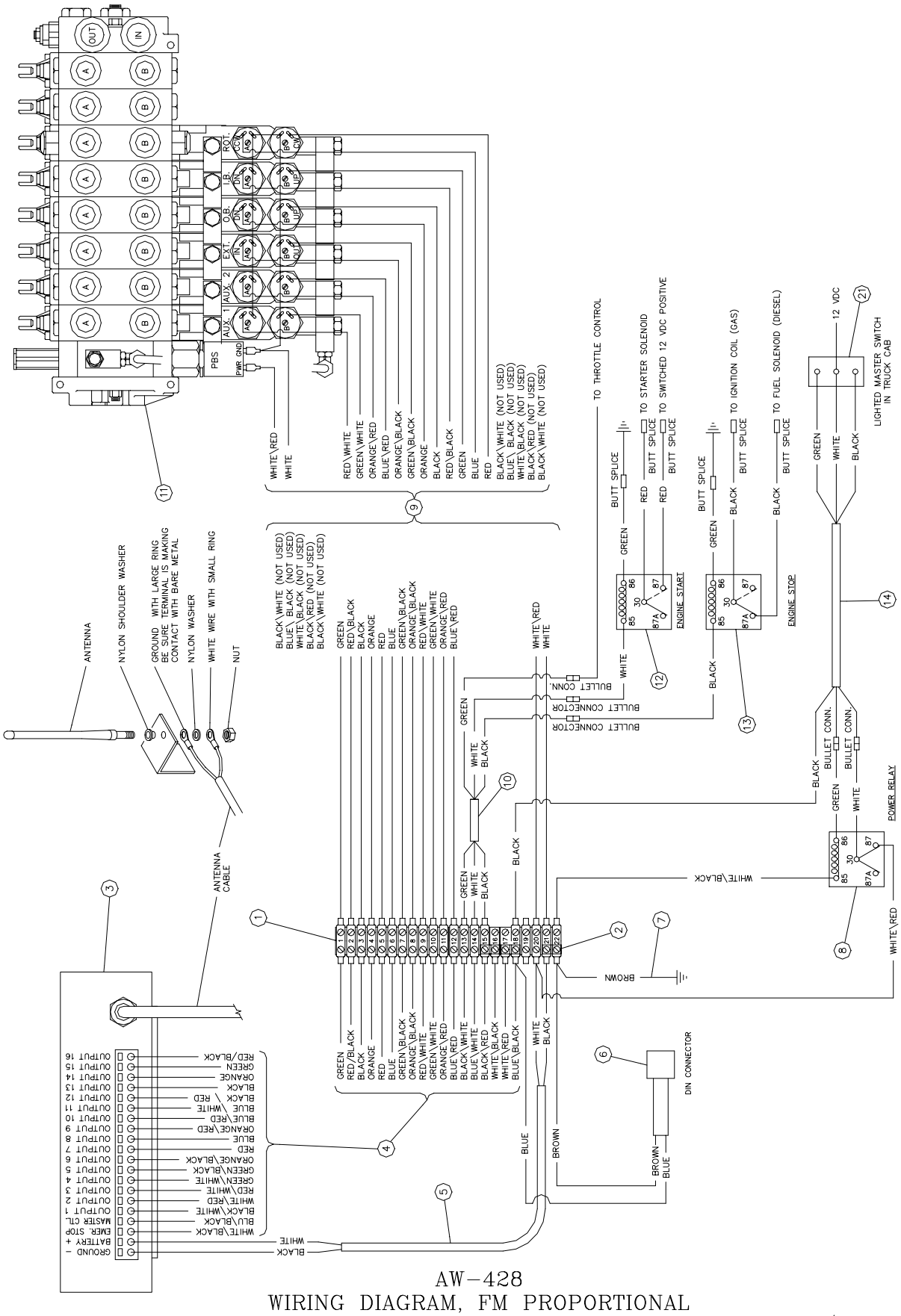
15 report any unusual occurrence during crane operation that may indicate required maintenance or repair.



AW–427
FM PROPORTIONAL ASSEMBLY

AW-427
FM PROPORTIONAL ASSEMBLY

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	372281	PLATE, PROPORTIONAL WELDMENT
2	1	372281	COVER, PROPORTIONAL WELDMENT
3	1	480494	TERMINAL BLOCK 22 STATION
4	1	369176	DECAL, TERMINAL BLOCK
5	1	480024	CLAMP, CABLE
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, SOLENOID
14	1	372360	RELAY ASSEMBLY, FM POWER
15	11	005500	SCREW, HX HD 1/4-NC X 3/4
16	11	002200	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 ORM / -12 JIC
25	1	750469	ADAPTER, STR. X-LONG -12 ORM / -12 JIC
26	1	750421	TEE, -12 ORM / -12 JIC
27	1	367283	ELL, 90° -12 JIC / -12 JIC
28	2	812411-028	HOSE ASSEMBLY
29	1	000211	PLUG, -4 O-RING
30	1	750419	CAP, NUT -12 JIC
31	8	640300	BOOT, TOGGLE
32	1	480605	BATTERY, 9V



AW-428
WIRING DIAGRAM, FM PROPORTIONAL

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AW-428
WIRING DIAGRAM, FM PROPORTIONAL

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	480494	TERMINAL BLOCK 22 STATION
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 POWER
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 rely 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 rely 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.

AFTER FACEPLATE HAS BEEN REMOVED FROM THE TRANSMITTER AND

FM PROPORTIONAL CONTROL SYSTEM TROUBLESHOOTING

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, the n 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.**

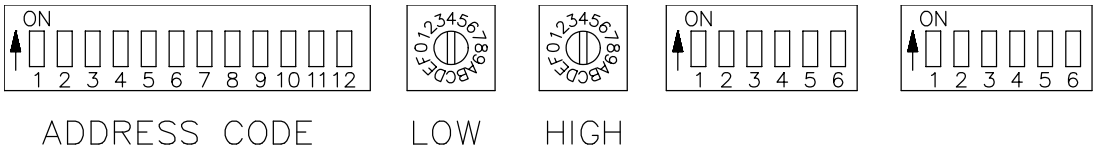
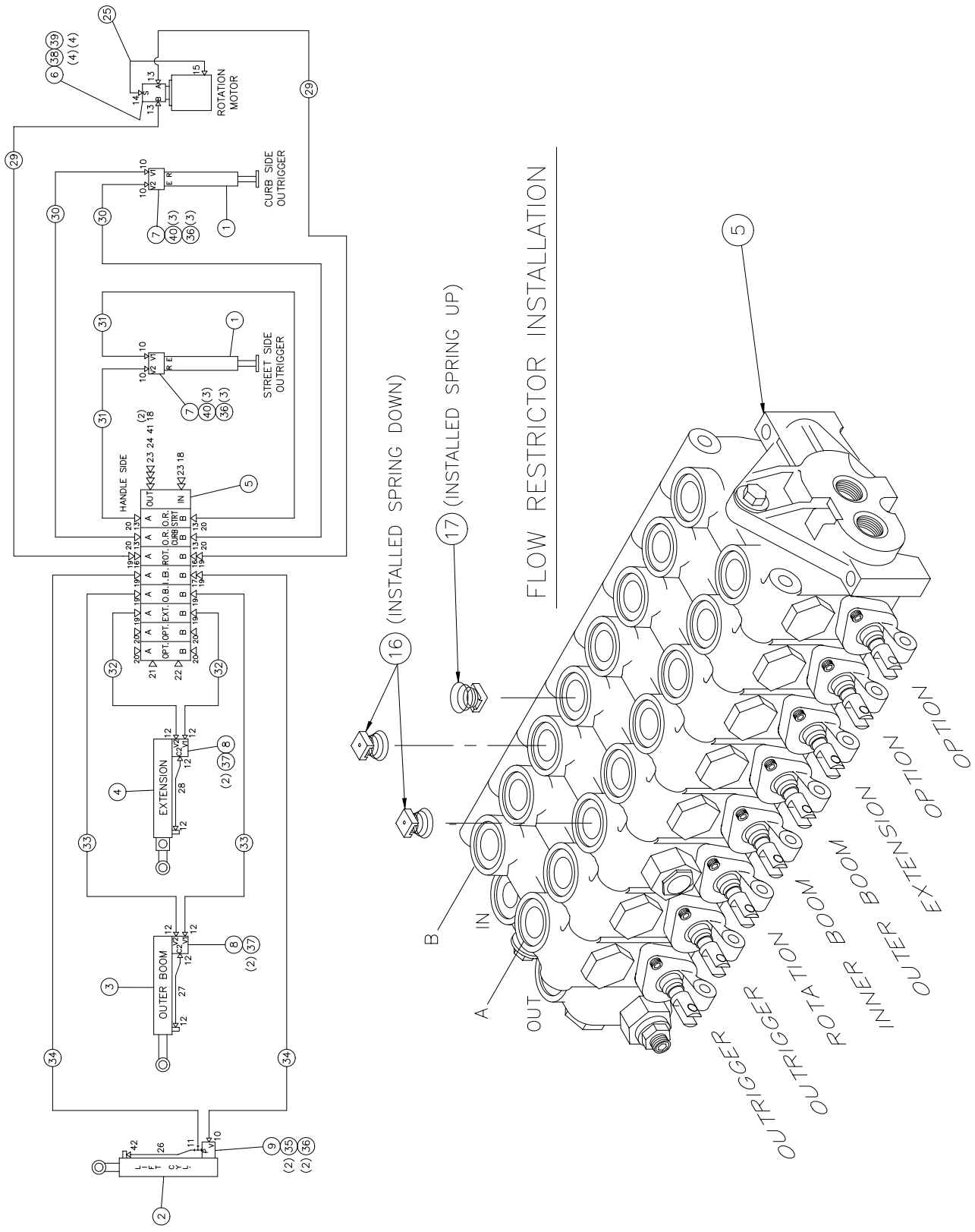


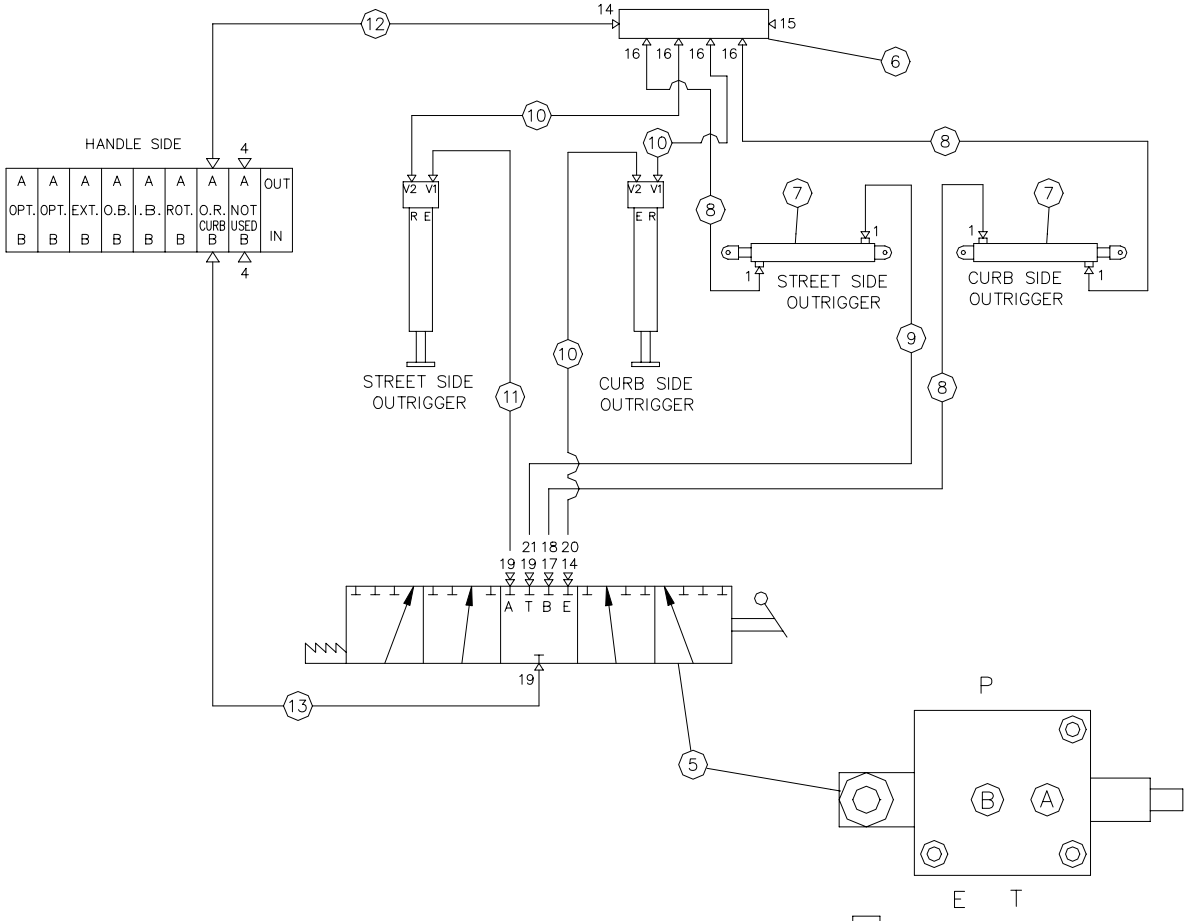
FIG. 15

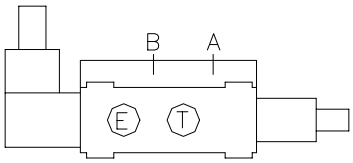
HYDRAULIC ASSEMBLY



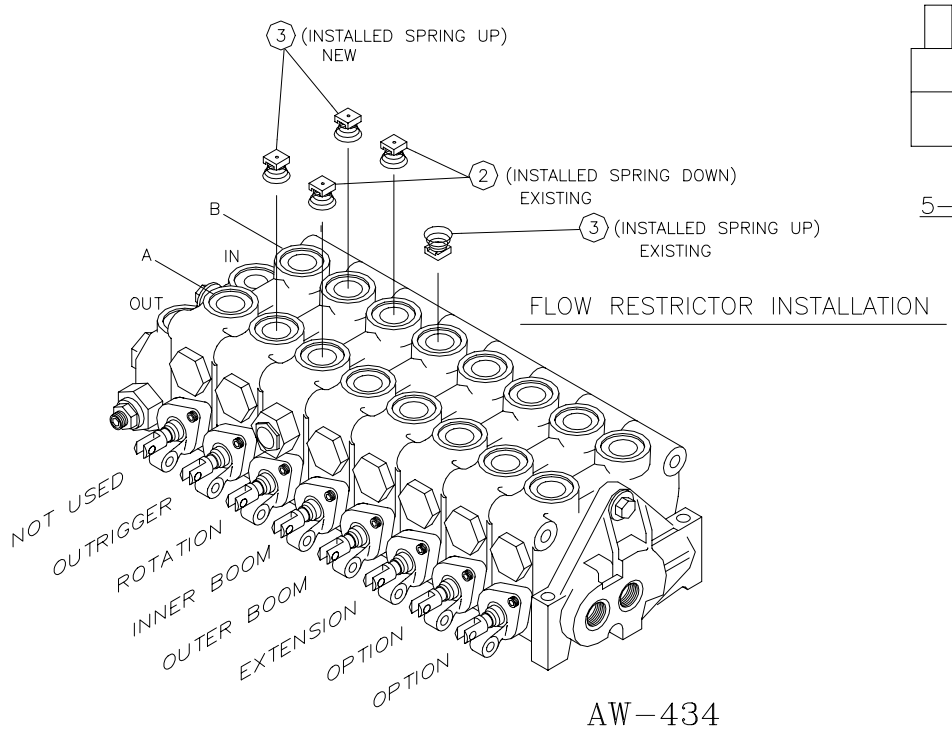
HYDRAULIC ASSEMBLY

Item	Quantity	Part Number	Description
1	2	372060	Outrigger Cylinder
2	1	372061	Lift Cylinder
3	1	372062	Outer Boom Cylinder
4	1	372063	Extension Cylinder
5	1	REFERENCE	Control Valve (372010 Manual) (367302 Proportional)
6	1	367124	Rotation Counterbalance Valve
7	2	372066	Outrigger Locking Valve
8	2	367121	Outer Boom & Extension Counterbalance Valve
9	1	367122	Lift Counterbalance Valve
10	6	200876	Straight Adapter -6 OR(M) / -6 JIC(M)
11	1	200877	Tee -6OR(M) / -6 JIC RUN
12	8	367145	Straight Adapter -8 OR(M) / -8 JIC(M)
13	6	202755	Straight Adapter -10 OR(M) / -6 JIC(M)
14	1	367140	90° Elbow -4 OR(M) / -6 JIC(M)
15	1	367144	Straight Adapter -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	Straight Adapter -12 OR(M) / -12 JIC(M)
24	1	750472	Tee -12 (F) Swivel Nut / -12 JIC
25	1	367166	Swing DriveTube Assembly
26	1	372196	Lift Cylinder Tube Assembly
27	1	372263	Outer Boom Tube Assembly
28	1	372262	Extension Cylinder Tube Assembly
29	2	812210-068	Rotation Hose Assembly
30	2	812206-145	Curbside Outrigger Hose Assembly
31	2	812206-108	Streetside Outrigger Hose Assembly
32	2	812309-225	Extension Hose Assembly
33	2	812303-152	Outer Boom Hose Assembly
34	2	812210-061	Lift Cylinder Hose Assembly
35	2	005804	Cap Screw ¼ UNC x 1 ½
36	8	020200	Lock Washer ¼ UNC
37	4	367164	Socket Head Screw 3/8 UNC x 2 3/4
38	4	367163	Socket Head Screw 5/16 UNC x 2 ¼
39	4	020601	Lock Washer 5/16
40	6	005810	Cap Screw ¼ UNC x 1 ¾
41	1	367283	90° Elbow -12 JIC (F) Swivel / -12 JIC
42	1	202756	Straight Adapter -8 0R(M) / -6 JIC(M)





5-WAY DIVERTER VALVE



FLOW RESTRICTOR INSTALLATION

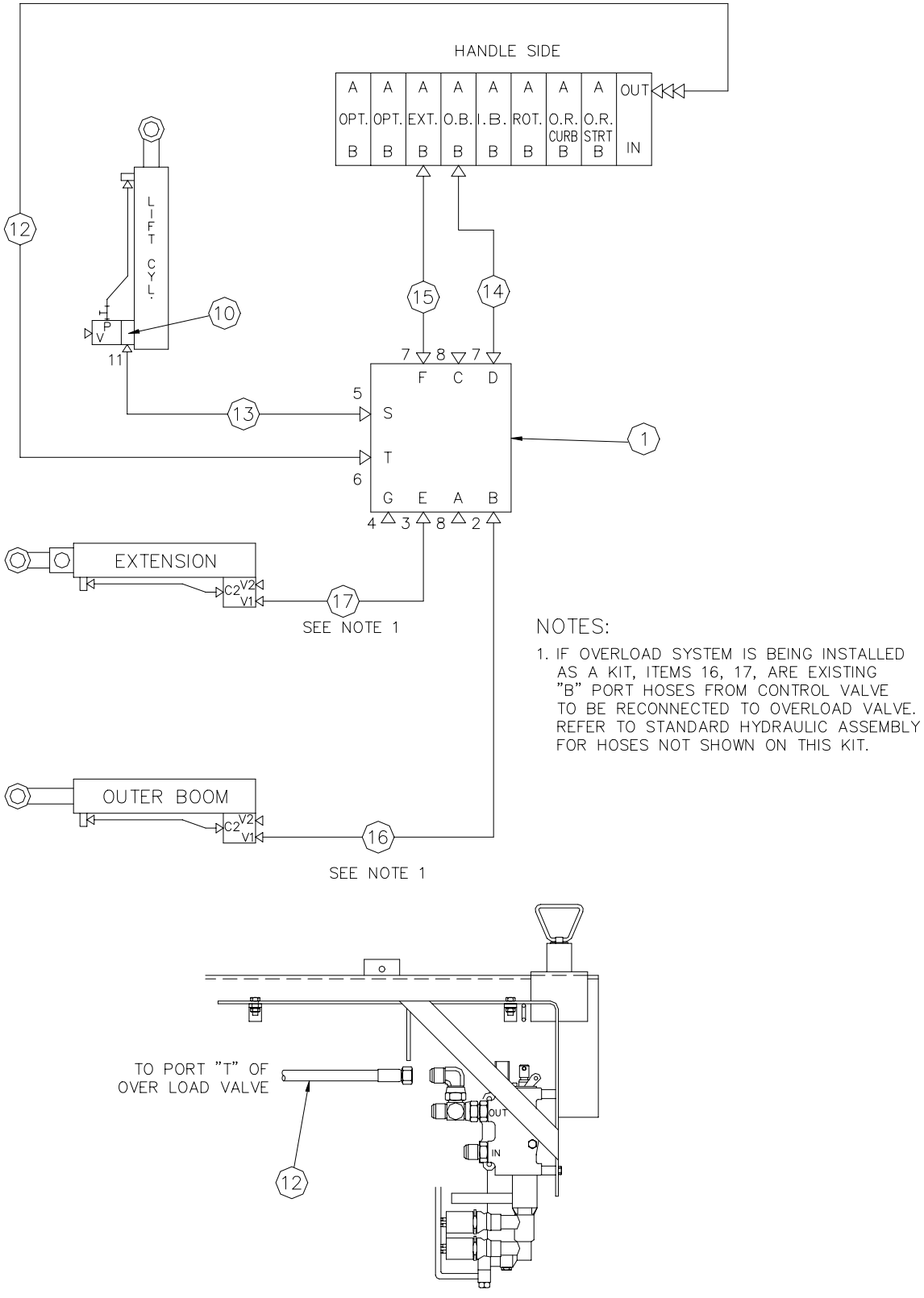
AW-434
HYDRAULIC ASSEMBLY
POWER OUT OUTRIGGERS

AW-434
HYD. ASSEMBLY POWER OUT OUTRIGGERS

ITEM	QTY.	PART NO.	DESCRIPTION
1	4	200876	ADAPTER, STR. -6 O-RING (MALE) / -6 JIC (MALE)
2	2	372039	FLOW RESTRICTOR, .047 ORIFACE
3	2	367226	FLOW RESTRICTOR, .120 ORIFACE
4	2	330072	PLUG, -10 O-RING
5	1	372311	5-WAY DIVERTER VALVE
6	1	372305	HEADER, MANIFOLD
7	2	372313	CYLINDER, POWER OUT OUTRIGGER
8	3	480206	HOSE ASSEMBLY
9	1	812203-050	HOSE ASSEMBLY
10	3	812206-108	HOSE ASSEMBLY (SEE NOTE 1)
11	1	812206-118	HOSE ASSEMBLY
12	1	812203-040	HOSE ASSEMBLY
13	1	812203-056	HOSE ASSEMBLY
14	2	202756	ADAPTER, STR. -8 O-RING (MALE) / -6 JIC (MALE)
15	1	367162	PLUG, -8
16	4	241175	ELL, 90° -6 O-RING (MALE) / -6 JIC (MALE)
17	1	367220	ELL, 90° -8 O-RING (MALE) / -6 NPT (FEMALE)
18	1	360042	ADAPTER, STR. -6 NPT / -6 JIC
19	3	330272	ELL, 90° -8 O-RING (MALE) / -6 JIC (MALE)
20	1	480194	ELL, 90° -6 SWIVEL / -6 JIC
21	1	330647	ELL, 45° -6 SWIVEL / -6 JIC

NOTES:

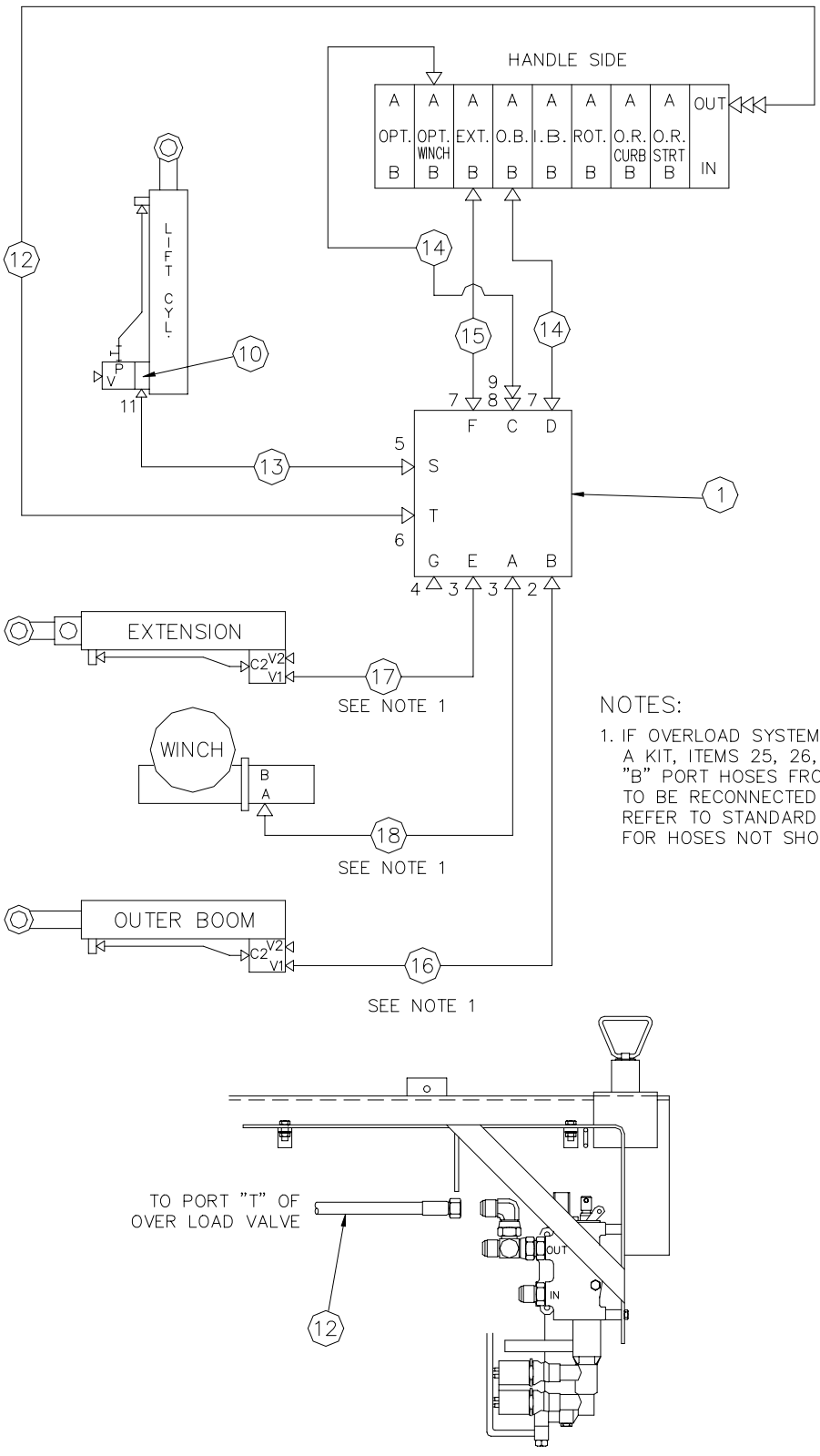
1. ONE 812206-108 HOSE COMES WITH POWER OUTRIGGER KIT, 2 ARE EXISTING HOSES (SEE AW-372030 ITEM 31).



AW–436
HYDRAULIC ASSEMBLY, 2 FUNCTION OVERLOAD

AW-436
HYDRAULIC ASSEMBLY, 2 FUNCTION OVERLOAD

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	367285	2/3 FUNCTION OVERLOAD VALVE
2	1	372042	ELL, 90° X-LONG -10 ORM / -8 JIC
3	1	372044	ELL, 90° -10 ORM / -8JICM
4	1	000211	PLUG, -4 ORM
5	1	372045	ELL, 45° -6 ORM / -4 JIC
6	1	372046	ELL, 45° -12 ORM / -12 JICM
7	2	372041	ADAPTER, STR. -10 ORM / -8 JIC
8	2	330072	PLUG, -10 O-RING
9	-	-	-
10	1	368985	MANIFOLD, SENSE
11	1	759137	ELL, 90° -6 ORM / -4 JIC
12	1	812411-051	HOSE ASSEMBLY, (RETURN)
13	1	812003-047	HOSE ASSEMBLY, (SENSE)
14	1	812306-057	HOSE ASSEMBLY, (OUTER BOOM, OPTION)
15	1	812309-057	HOSE ASSEMBLY, (EXTENSION)
16	1	812303-152	HOSE ASSEMBLY, OUTER BOOM (SEE NOTE 1)
17	1	812309-225	HOSE ASSEMBLY, EXT. (SEE NOTE 1)



NOTES:

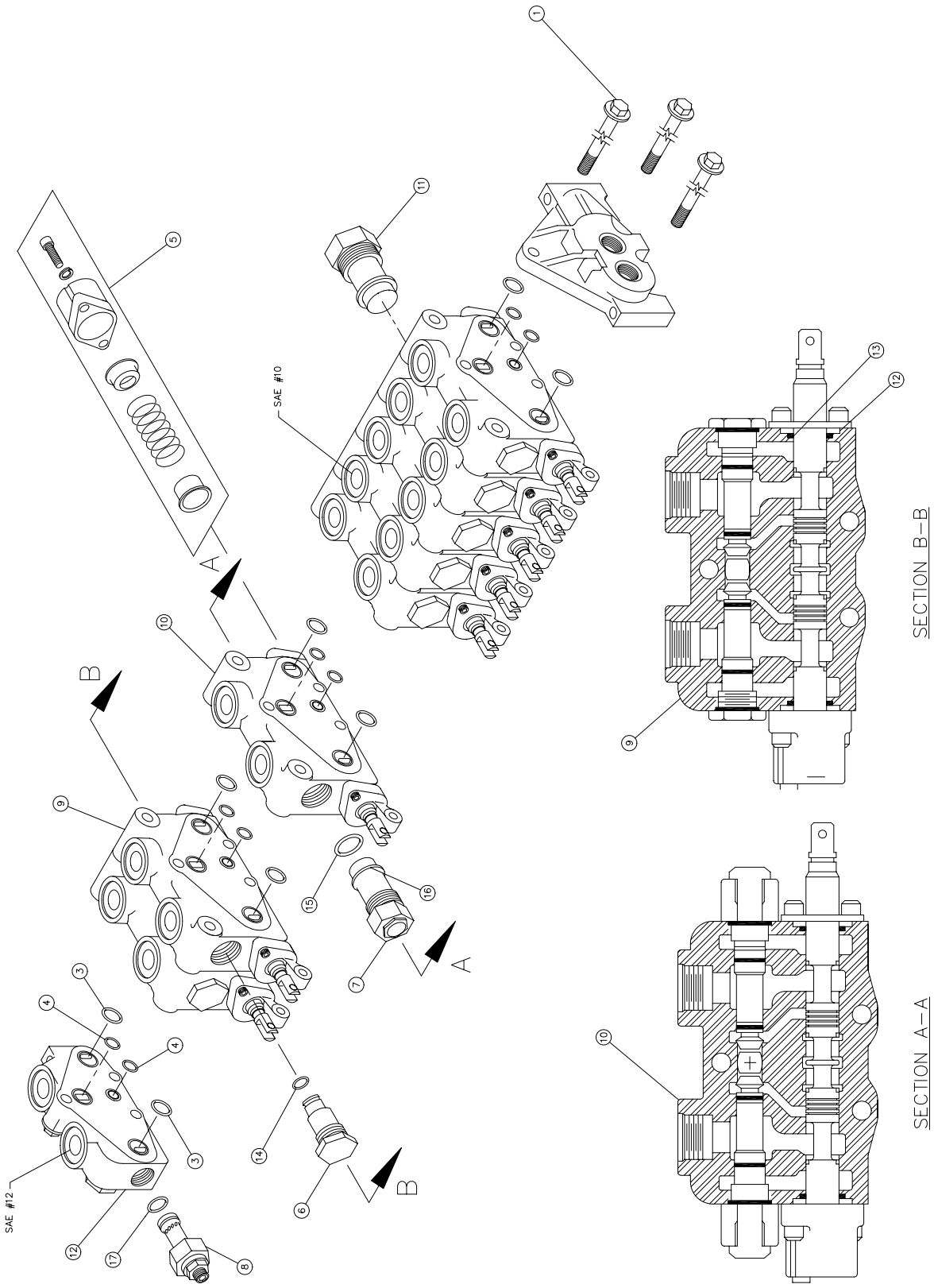
1. IF OVERLOAD SYSTEM IS BEING INSTALLED AS A KIT, ITEMS 25, 26, 27, & 28 ARE EXISTING "B" PORT HOSES FROM CONTROL VALVE TO BE RECONNECTED TO OVERLOAD VALVE. REFER TO STANDARD HYDRAULIC ASSEMBLY FOR HOSES NOT SHOWN ON THIS KIT.

AW-437
HYDRAULIC ASSEMBLY, 3 FUNCTION OVERLOAD

AW-437
HYDRAULIC ASSEMBLY, 3 FUNCTION OVERLOAD

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	367285	2/3 FUNCTION OVERLOAD VALVE
2	1	372042	ELL, 90° X-LONG -10 ORM / -8 JIC
3	2	372044	ELL, 90° -10 ORM / -8JICM
4	1	000211	PLUG, -4 ORM
5	1	372045	ELL, 45° -6 ORM / -4 JIC
6	1	372046	ELL, 45° -12 ORM / -12 JICM
7	2	372041	ADAPTER, STR. -10 ORM / -8 JIC
8	1	330274	ADAPTER, STR. -10 ORM / 08 ORF
9	1	367145	ADAPTER, -8 ORM / -8 JIC
10	1	368985	MANIFOLD, SENSE
11	1	759137	ELL, 90° -6 ORM / -4 JIC
12	1	812411-051	HOSE ASSEMBLY, (RETURN)
13	1	812003-047	HOSE ASSEMBLY, (SENSE)
14	2	812306-057	HOSE ASSEMBLY, (OUTER BOOM, OPTION)
15	1	812309-057	HOSE ASSEMBLY, (EXTENSION)
16	1	812303-152	HOSE ASSEMBLY, OUTER BOOM (SEE NOTE 1)
17	1	812309-225	HOSE ASSEMBLY, EXT. (SEE NOTE 1)
18	1	812309-265	HOSE ASSEMBLY, WINCH (SEE NOTE 1)
19	1	812309-040	HOSE WINCH ASSEMBLY

CONTROL VALVE
P/N 372010

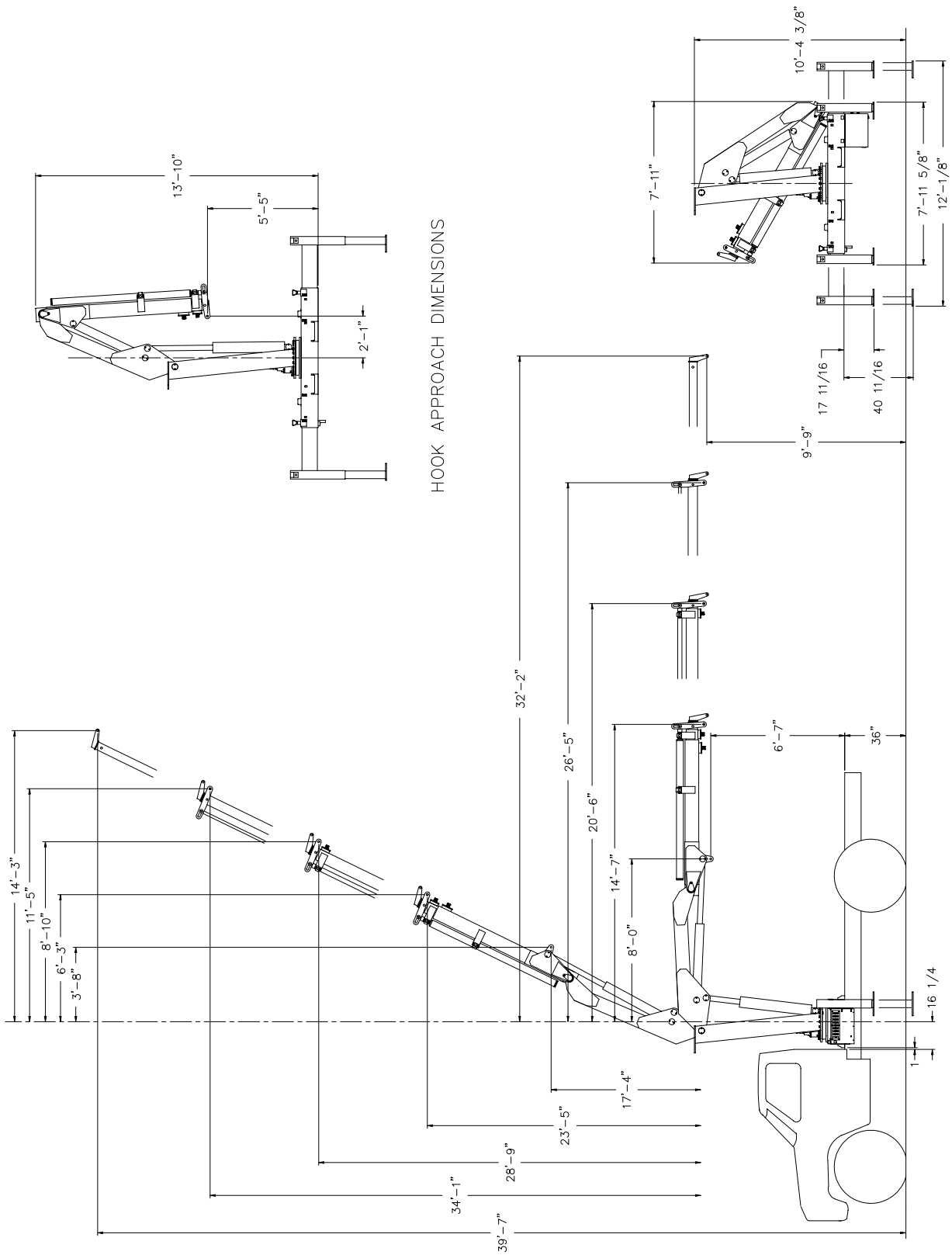


CONTROL VALVE
P/N 372010

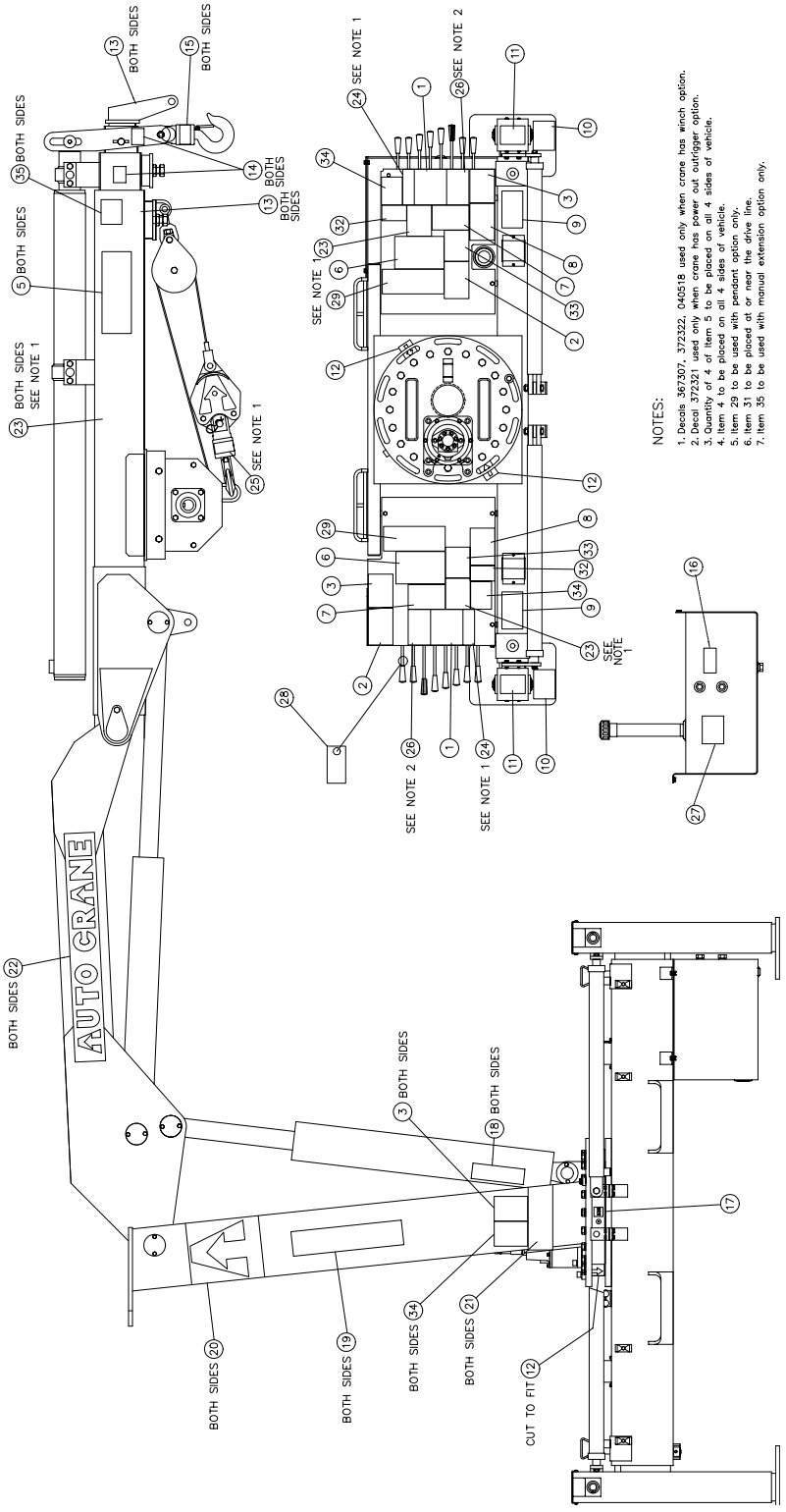
Item	Quantity	Part Number	Description
1	1	367024-001	Stud Kit
2	1	367024-002	Inlet Cover
3	18	367024-003	Large Return O-Ring
4	18	367024-004	Small Pressure O-Ring
5	8	367024-005	Standard Positioner
6	14	367024-006	Load Check Plug
7	2	367024-007	Work Port Relief
8	1	367024-008	Inlet Relief Valve
9	7	367024-009	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

NOTES

GENERAL DIMENSIONS
A-50A



DECAL LAYOUT
A-50A



DECAL LAYOUT
A-50A

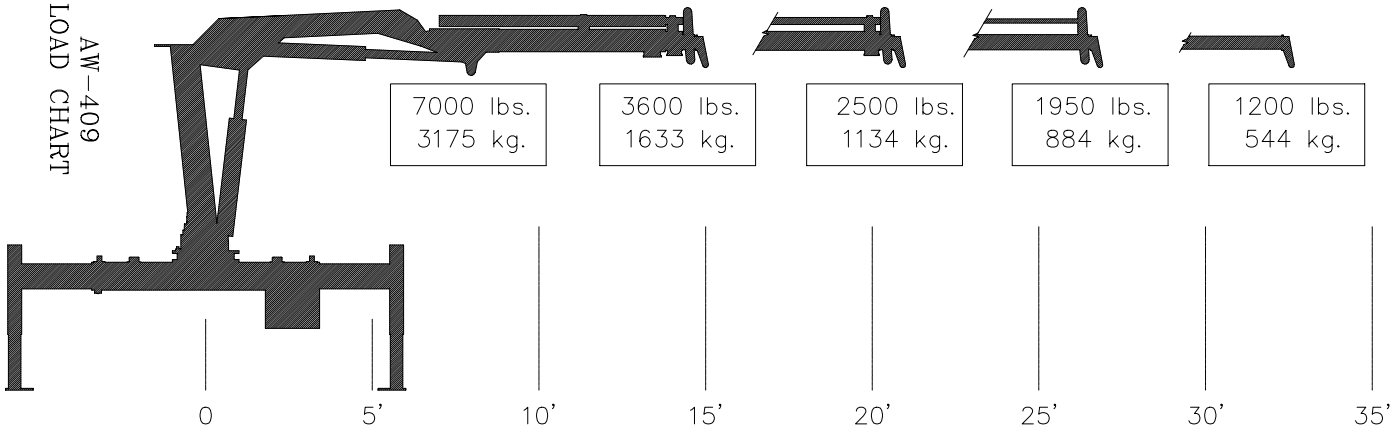
Item	Quantity	Part Number	Description
1	2	372320	Decal Control Handle
2	2	040579	Decal Danger “Inspect Vehicle...“
3	4	367250	Decal Danger “Stowing & Unfolding“
4	4	367246	Decal Danger “Load Line“
5	6	367241	Decal Danger “Electrocution Hazard“
6	2	367432	Decal Danger “Electrocution Hazard“
7	2	367239	Decal Danger “Setting Up/Stowing“
8	2	040580	Decal Danger “An Untrained Operator...“
9	2	759016	Decal Danger “Outriggers“
10	2	040581	Decal Danger “Serious Crushing Injury“
11	2	367433	Decal Danger “A Moving Outrigger...“
12	4	367242	Decal Arrow
13	4	040517	Decal Danger “Stay Clear of Boom“
14	4	367251	Decal Danger “Stay Clear of Boom“
15	2	040630	Decal Danger “Stay Clear of Load“
16	1	367244	Decal Danger “Hydraulic Fluid Level“
17	1	367243	Decal Danger “Grease“
18	2	040519	Decal Danger “Scissors Point“
19	2	372323	Decal A-50A
20	2	368110	Decal 3M Logo
21	2	372324	Load Chart A-50A
22	2	368111	Decal 3M “Auto Crane”
23	4	367307 See Note	Decal Danger “Winch Warning“ (See 372224)
24	2	372322 See Note	Decal Winch Function (See 372224)
25	1	040518 See Note	Decal Danger “Stay Clear—Load“ (See 372224)
26	2	372321 See Note	Decal 5 Way Valve Function (See 372330)
27	1	367213	Decal Caution “9 GPM”
28	1	999984	Installation Checklist
29	2	REFERENCE	Decal Danger “Electrocution Hazard“ (367421)
30	2	367423	Decal Danger “Rotating Drive Line“
31	2	367424	Decal Danger “Hoisting Personnel“
32	2	367425	Decal Danger “Failure to Obey—Inspection“
33	4	367426	Decal Danger “Failure to Obey—Load Charts“
34	2	367427	Decal Danger “Free Falling Manual Booms“

NOTES

LOAD CHART
A-50A

NOTES:

1. LOADS SHOWN ARE BASED ON STRUCTURAL OR HYDRAULIC CAPABILITY.
2. BEFORE LIFT IS MADE , STABILITY MUST BE CHECKED PER SAE J765A.
3. WORKING LOADS WILL BE LIMITED TO THOSE SHOWN.
4. DEDUCT THE WEIGHT OF LOAD HANDLING DEVICES.
5. 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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