

OWNERS MANUAL

3203 P/PR/PRX

REVISION 2/2000

PART NO. 999947

SERIAL NO. _____

AUTO CRANE COMPANY

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<http://www.autocrane.com>

!! DISTRIBUTORS !!

**PROTECT YOUR CUSTOMER'S WARRANTY!
SUBMIT DELIVERY REPORT WITHIN 15 DAYS.**

Mail to: Auto Crane Company
P.O. Box 580697
Tulsa, OK 74158-0697

Or Fax to: 918/834-5979

Protect your customers warranty - Submit within 15 days from delivery date.



AUTO CRANE COMPANY

**DISTRIBUTOR
DELIVERY REPORT**

DISTRIBUTOR _____		OWNER _____	
ADDRESS _____		CITY/STATE _____	
CITY/STATE/ZIP _____		BUSINESS _____	
MODEL #	SERIAL #	DATE DELIVERED	UNIT DESTINATION

IMPORTANT: ATTACH SIGNED COPY OF CUSTOMER INVOICE / DELIVERY RECEIPT

AC-109 REPORT AUTHORIZED BY: _____

*** REGISTER ONE UNIT ONLY PER CARD ***

WARNINGS - READ THIS PAGE!

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 stage are also considered intermediate stage manufacturing and must be certified as to compliance. The installer of this crane and body is considered one of the manufacturers of the vehicle. As such a manufacturer, the installer is responsible for compliance with all applicable federal and state regulations, and is required to certify that the vehicle is in compliance.

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

WARNING! NEVER OPERATE THE CRANE NEAR ELECTRICAL POWER LINES! Death or serious injury will result from boom, line, or load contacting electric lines. Do not use crane within 10 feet (3.05m) of electric power lines carrying up to 50,000 volts. One foot additional clearance is required for every additional 30,000 volts or less.

WARNING! NEVER

- v **EXCEED** load chart capacities (centerline of rotation to hoist hook).
- v un-reel last 5 wraps of cable from drum!
- v wrap cable around load!
- v attempt to lift or drag a load from the side! The boom can fail far below its rated capacity.
- v 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.
- v place a chain link on the tip of the hook and try to lift a load!
- v use a sling bar or anything larger than the hook throat that could prevent the hook latch from closing, thus negating the safety feature!
- v 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 your crane is equipped with this type of device.

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INTRODUCTION

3203P/PR/PRX 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 **3203P/PR/PRX 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 **3.5:1 safety factor**. Holding valves prevent the load from dropping if a hose should fail. The reservoir has a 40 μ 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 **3203P/PR/PRX Series** cranes are on the General Dimension Drawing. Maximum turning radius is shown at the outside edge of the guard (PR/PRX models) and the outside point of the hoist actuator (P model).

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 8,000 lbs. with two rear jacklegs (or outriggers) is recommended for mounting the 3203P/PR/PRX crane.**

The **3203P/PR/PRX** crane is attached directly to your 12 volt truck electrical system. The performance of your new crane depends on the truck electrical system. The use of the low maintenance battery is not recommended for use on any Auto Crane product. The recommended alternator and battery that will give the longest life with the most useful duty cycle is a 60 amp. alternator with a 120 minute reserve capacity, deep cycle battery. These specifications should be considered minimum.

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 SPECIFICATIONS

3203P/PR/PRX

Dimensions

Width: [PR/PRX] 24 in (.61 m)
[P] 23.25 (.59 m)

Height: [PR/PRX] 27.25 in (.69 m)
[P] 31.13 in (.79 m)

Length: 8 ft 6 in (2.59 m) [boom(s) stored]

Weight: P 7-11 470 lbs (213 kg)
P 7-11-15 530 lbs (240 kg)
PR 7-11 520 lbs (236 kg)
PR 7-11-15 550 lbs (250 kg)
PRX 7-11 630 lbs (286 kg)
PRX 7-11-15 630 lbs (286 kg)
[Add 5 lbs (2.5 kg) for cable length of 75 feet (23 m)]

Capacity

10,000 ft lbs (1.4 ton/m)

[ft lbs = horizontal distance from centerline of rotation to free hanging weight (feet) x amount of weight (pounds)]

LIFTING CAPACITIES			
ft	lbs	ft	lbs
3	3,200	10	1,000
4	2,500	11	900
5	2,000	12	830
6	1,670	13	770
7	1,500	14	710
8	1,250	15	660
9	1,100		

Reach

Second boom will reach 7 ft to 11 ft
Third boom will reach from 11 ft to 15 ft

Cable

62 ft (18.9 m) of 7/32" diameter aircraft quality cable is standard (75 ft optional). This cable has a single line breaking strength of 5,600 lbs (2,540 kg).

Chassis Requirements

8,800 lbs (3,992 kg) GVWR minimum

Hydraulic System

Pressure: 2100 psi (1,448 kPa) relief setting
Flow: 0.7 to 9.1 gpm (2.65 to 9.1 lpm)
[output depends on psi]

Filtration: Suction line strainer 100 mesh
Reservoir filler cap air filter 40u

Reservoir Capacity: 6 quarts (5.7 l)

Oil type: 10w Hydraulic Oil
[Mobile DTE 13, Sun 2015, Dextron II]

Hoist Motor: 2.2 cid geroter

Rotation Motor: 11.3 cid geroter

Electrical System

Hoist Motor: 12 volt DC series wound

Pump Motor: 12 volt DC closed-coupled

Electrical System Requirements

Alternator: 60 amp (minimum)

Battery: 100 minute reserve capacity
(minimum) Maintenance type

--- IMPORTANT ---

OPERATING PRACTICES & WARNINGS

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 as level a position as possible while loading or unloading.
4. **ALWAYS** set the vehicle emergency brake before beginning crane operations.
5. **ALWAYS** use outriggers from vehicle to the ground during crane operation. Make sure they are firmly positioned on solid footings.
6. All load ratings are based on crane capacity, **NOT** truck/crane stability.
7. Keep objects and personnel clear of crane path during operation.
8. Keep hoist cable pulled tight at all times.
9. **REMEMBER**, in lifting a heavy load, the weight can create enough tipping momentum to overturn the vehicle.
10. **ALWAYS** keep load as close to ground as possible.
11. Oil gears as required.
12. Periodic adjustment of hoist worm brake may be required (see automatic safety brake drawing in this manual).
13. Hydraulic hoses need to be inspected frequently for signs of deterioration, and be replaced as required.
14. The hoist hook is an important item that an operator should consider and use properly. It should be checked on a daily basis for distortion or cracks.
15. **ALWAYS** store outriggers before road travel.
16. **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.
17. **WARNING! NEVER EXCEED** load chart capacities (centerline of rotation to hoist hook).
18. **WARNING! NEVER** un-reel last 5 wraps of cable from drum!
19. **WARNING! NEVER** wrap cable around load!
20. **WARNING! NEVER** attempt to lift or drag a load from the side! The boom can fail far below its rated capacity.
21. **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.
22. **WARNING! NEVER** place a chain link on the tip of the hook and try to lift a load!
23. **WARNING! NEVER** use a sling bar or anything larger than the hook throat that could prevent the hook latch from closing, thus negating the safety feature!
24. **WARNING!** In using a hook with latch, **ALWAYS** insure 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.
25. **WARNING! NEVER** hold any pendant Select Switch on that will cause unsafe operating conditions!

WARNING!

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

--- IMPORTANT --- OPERATION OF UNIT

26. Make sure this manual has been thoroughly read by all crane operating personnel and supervisors.
27. A routine inspection of the crane should be mandatory before each operating day. Any defects should be corrected immediately.
28. 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).
29. Keep the vehicle as level as possible during operation.
30. 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.
31. 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**.
32. 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.
33. Always boom up before rotating so the boom will clear the required boom support.
34. When extending the boom, always maintain clearance between the boom crown and the traveling block or hoist hook.
35. Always observe safe and practical operation to avoid possible accidents. Refer to Safety Tips and Precautions.
36. After completing lifting operations, return the boom to stowed position on the boom support. Avoid unneeded pressure on the boom support.
37. Store pendant control on proper location (in cab or on crane).
38. Return outriggers to stowed position. Make sure they are pinned in place or jacklegs are returned to compartment.
39. Check work area for any tools or equipment not stored.
40. Release throttle control, depress clutch and disengage PTO. Deactivate any crane power switches.
41. Report any unusual occurrence during crane operation that may indicate required maintenance or repair.
42. **NEVER** use two cranes to support a load too large for either crane.
43. 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.

For manual outriggers:

1. Pull lock pins to release jack leg or drop down outrigger and move to outermost lock position.
2. Make sure lock pins are reinstalled properly.
3. Lower outrigger pad to firm ground and adjust foot to take out slack.
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.

QUALIFICATIONS FOR AND CONDUCT OF OPERATORS AND OPERATING PRACTICES

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 be brought over the load in such a manner as to minimize swinging.

F. During lifting care shall be taken that:

- 1. **there is no sudden acceleration or deceleration of the moving load.**
- 2. **load, boom or other parts of the crane do not contact any obstruction.**

G. Cranes shall not be used for dragging loads sideways.

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

I. The operator should avoid carrying loads over people.

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

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

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

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

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

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

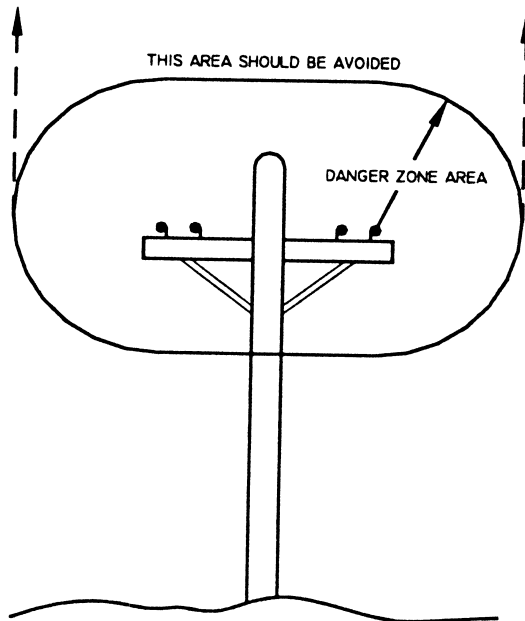
O. No person should be permitted to stand or pass under a suspended load.

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

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 exercised when working near overhead lines, because they can move horizontally or vertically due to wind, moving the danger zone to new positions.

25 In transit with no load and boom lowered the clearance shall be specified in Table 1.

26 A qualified signalperson shall be assigned to observe the clearance and give warning before approaching the above limits.

- A. Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities verify that it is not 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)
<u>when operating near high voltage power lines</u>			
over	to 50	10	(3.05)
over	50 to 200	15	(4.6)
over	200 to 350	20	(6.1)
over	350 to 500	25	(7.62)
over	500 to 750	35	(10.67)
over	750 to 1000	45	(13.72)
<u>while in transit with no load and boom lowered</u>			
over	to 0.75	4	(1.22)
over	0.75 to 50	6	(1.83)
over	50 to 345	10	(3.83)
over	345 to 750	16	(4.87)
over	750 to 1000	20	(6.1)

INSPECTION, TESTING AND MAINTENANCE

GENERAL

INSPECTION CLASSIFICATION

27 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.

28 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

29 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

30 Deformed, cracked or corroded members in the crane structure and carrier.

31 Loose bolts, particularly mounting bolts.

32 Cracked or worn sheaves and drums.

33 Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and devices.

34 Excessive wear on brake and clutch system parts and lining.

35 Crane hooks inspected for cracks.

36 Travel steering, braking, and locking devices, for malfunction.

37 Excessively worn or damaged tires.

38 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

INSPECTION, TESTING AND MAINTENANCE

GENERAL

elements in contact or otherwise protect the components

necessary to determine origin of the problem before corrective action can be taken.

39 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

40 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

41 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

42 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

43 Labels are to be in place and legible.

CRANES NOT IN REGULAR USE

44 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.

45 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

46 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

47 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

INSPECTION, TESTING AND MAINTENANCE

GENERAL

tested by or under the direction of an appointed person.

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

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

MAINTENANCE

PREVENTIVE MAINTENANCE

50 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

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

52 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

53 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.

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

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

55 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

56 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

57 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**

INSPECTION, TESTING AND MAINTENANCE

GENERAL

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.

58 Periodic inspection

A. The inspection frequency shall be determined by a qualified person and shall be based on such factors as:

1. expected rope life as determined by experience on the particular installation or similar installations
2. severity of environment
3. percentage of capacity lifts
4. frequency rates of operation
5. exposure to shock loads

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

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

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

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

ROPE REPLACEMENT

59 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.

60 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)

INSPECTION, TESTING AND MAINTENANCE

GENERAL

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.

61 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 an 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.

62 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

63 Rope should be stored to prevent damage or deterioration.

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

65 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.

66 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.

67 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.

68 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.

LIFE OF WIRE LINE

So many variable factors can cause the deterioration of wire line cable that it is not possible to determine a definite life expectancy. Some of these factors are:

- 1. Load being handled.**
- 2. Corrosive conditions.**
- 3. Maintenance of the unit.**
 - A. Keep the sheaves turning freely
 - B. Maintain tension on cable to insure proper spooling
 - C. Avoid kinks in cable
 - D. Avoid abrasive action and contact with sharp corners
- 4. Frequency of use.**

Auto Crane units, up to 2,400 pound ratings, use 3/16 inch diameter galvanized pre-formed 7 x 19 aircraft cable. This cable has a working strength, when new, of 4,200 pounds. It is recommended when 1,200 pound loads are exceeded to use a two part line with a traveling block. This will ensure a 3.5 to 1 safety factor when the cable is new.

Keeping the above factor of safety in mind and knowing the kind of loads that will be handled, the user can determine by inspection of the cable as to when it should be replaced.

Items to look for while inspecting the cables are:

- 1. Broken strands.**
- 2. Kinks and flattened sections.**
- 3. Corrosion and abrasion.**

WIRE LINE LUBRICATION

Lubrication of the wire line serves two important purposes: (1) helps to prevent corrosion; (2) lubricates the cable strands to reduce wear due to flexing and abrasion caused by contact with the sheaves, rollers, and cable on the drum.

PREPARATION:

Remove rust and foreign matter with a wire brush and wipe clean. Be sure cable is dry.

APPLICATION:

Method 1: A light weight motor oil may be used by dipping a brush into the lubricant and applying. In some cases, a rag or piece of sheepskin is dipped in the lubricant and used to swab the lubricant on to the rope.

Method 2: A heavier lubricant such as a grease gun lubricant may be used by applying with hands while wearing leather gloves. (Leather gloves are preferred to canvas because of greater protection and less penetration of the grease)

MAINTENANCE OF BATTERIES

Maintenance of Auto Crane unit batteries differs very little from the generally prescribed maintenance of any lead acid battery. All batteries must be kept *properly charged, properly filled with water, and relatively clean.*

Keep Properly Charged

Many things affect the proper charge to a battery, such as:

- 1 Regulator settings
- 2 Proper tightness of belts on the alternator or generator
- 3 Good, clean connections of all cables and wires at the following places:
 - A. Battery
 - B. Regulator
 - C. Starting motor
 - D. Alternator or generator
 - E. Ground connections (most important)

It is of extreme importance to keep the battery as fully charged as possible without overcharging, especially when vehicles are left outside for extended periods in extremely cold climates. A battery *can* freeze. Freezing points for various specific gravities of acid are as follows:

Specific Gravity (Corrected to 80°F)	Freezing Temp. Degrees F.
1.280	-90°F
1.250	-62°F
1.200	-16°F
1.150	5°F
1.100	19°F

As shown, a half-charged battery (about 1.200 specific gravity) cannot stand for any length of time at 20°F or it will freeze.

The *main reason* for keeping the battery as fully charged as possible without over-charging is to ensure that power is available even though the vehicle has been standing for some time.

Keep Properly Filled with Water

The battery should *always* be properly filled with water. If the electrolyte level is allowed to fall below the top of the plates, the results become threefold:

- 1 The exposed portion of the plate will become sulfated.
- 2 The portion of the plate exposed is not usable.
- 3 That portion of the acid remaining becomes more concentrated and may cause more rapid deterioration of the remaining parts of the battery.

Keep A Relatively Clean Battery

The battery should be kept clean. Batteries filled with acid and which are not in use self-discharge to a limited degree because of the nature of the materials within the battery. If dirt is allowed to collect on the top of the battery (and this dirt absorbs moisture) and electrical path can be set up between the various terminals of the battery and the ground. Once such a path has been established, the self-discharge of the battery is accelerated. This also accelerates corrosion of the battery cables at the terminals.

Periodic Maintenance is Needed

A definite program of periodic maintenance of all batteries should be conducted on a regular basis. Periodic maintenance includes:

- 1 Checking belts for tightness on the charging equipment
- 2 Checking battery electrolyte levels
- 3 Checking cables for good connections
- 4 Cleaning where corrosion is apparent

When corrosion is cleaned off, the cable terminals and battery terminals should be coated with a light coating of petroleum jelly before they are replaced. When terminals are cleaned, the top of the battery should be cleaned with a mild solution of soda water.

MAINTENANCE OF BATTERIES

Low Maintenance Batteries (Maintenance Free)

Low maintenance batteries should not be used on Auto Cranes or trucks equipped with Auto Cranes. The batteries are not designed for "deep" discharge.

Testing Your Battery

If the condition of the battery is in question, it should be removed from the vehicle, taken to the shop, and allowed to reach room temperature. It should then be recharged until specific gravity readings taken at one-half hour intervals. If the specific gravity readings are fairly uniform, the battery should be checked with a high rate tester. Use the tester in accordance with the manufacturer's instructions. The high rate tester is the best method to test a questionable battery.

If, after charging, it is noted that the specific gravity reading of one cell is 30 points less than any of the other cells, it may be assumed that the cell is bad and that the battery should be replaced. If all cells are uniform but not up to full charge, a low rate of charge

should be attempted for an extended time. This usually will recover a badly sulfated battery.

Replacing a Battery

If it is necessary to replace a battery, and a dry charge battery is used, the following procedure applies:

- 1 Fill the battery with electrolyte of the proper specific gravity.
- 2 Place the battery on charge according to the manufacturer's instructions.

It is essential that the second step above be followed to ensure that the battery going on the vehicle is fully charged.

It is also very important that the battery hold-downs be checked periodically to ensure that the batteries are properly positioned to avoid vibration problems, breakage of cables or terminals. Care must be taken to avoid cracking or breaking containers or covers by tightening hold-down fixtures excessively. They also must not be so loose that breakage results from a hold-down that is too loose.

SAFETY DECAL SECTION

PART NO.: 040517
DECAL: STAY CLEAR OF BOOM
FUNCTION: To inform the operator of the hazard of proximity or contact with the crane boom during operation.
QUANTITY: 2
PLACEMENT: Both sides of crown



FIG. SD-1.

PART NO.: 040518
DECAL: STAY CLEAR OF LOAD
FUNCTION: To inform the operator of the hazard of proximity or contact with the crane load during operation.
QUANTITY: 2
PLACEMENT: Both sides of crown plate



FIG. SD-2.

PART NO.: 040519
DECAL: SCISSORS POINT
FUNCTION: To inform the operator of possible danger at scissors point on crane.
QUANTITY: 1
PLACEMENT: Both sides of lift cylinder

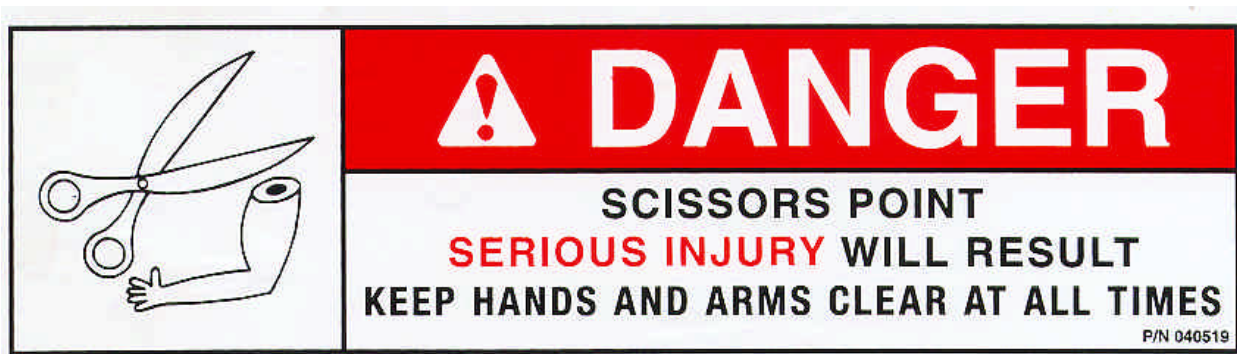


FIG. SD-3.

SAFETY DECAL SECTION

PART NO.: 040529 QUANTITY: 2
DECAL: ELECTROCUTION HAZARD PLACEMENT: Both sides of end of lower boom
FUNCTION: To inform the operator of the hazard involved with contacting electrical power lines with crane boom.

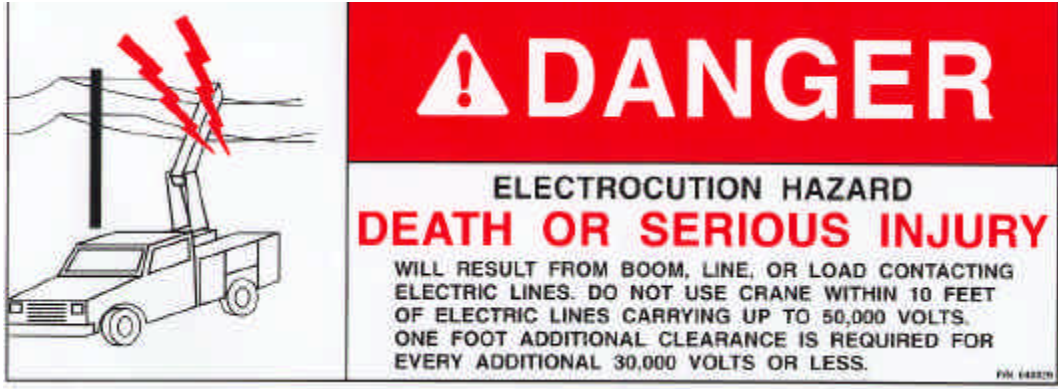


FIG. SD-4.

PART NO.: 040579
DECAL: OPERATION INSTRUCTIONS
FUNCTION: To inform the operator of the proper procedure to follow for safe operation of the crane.
QUANTITY: 1
PLACEMENT: Left Sideplate

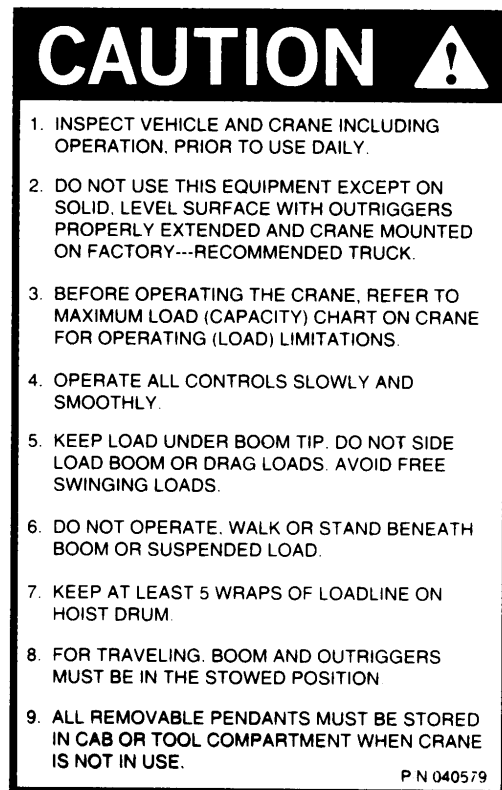


FIG. SD-5.

SAFETY DECAL SECTION

PART NO.: 040580
DECAL: OPERATOR TRAINING
FUNCTION: To inform the operator of the need to receive proper training before using the crane.
QUANTITY: 1
PLACEMENT: Left Sideplate

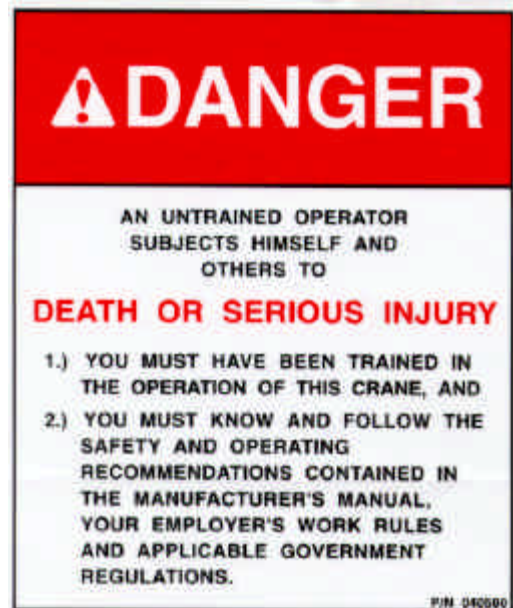


FIG. SD-7.

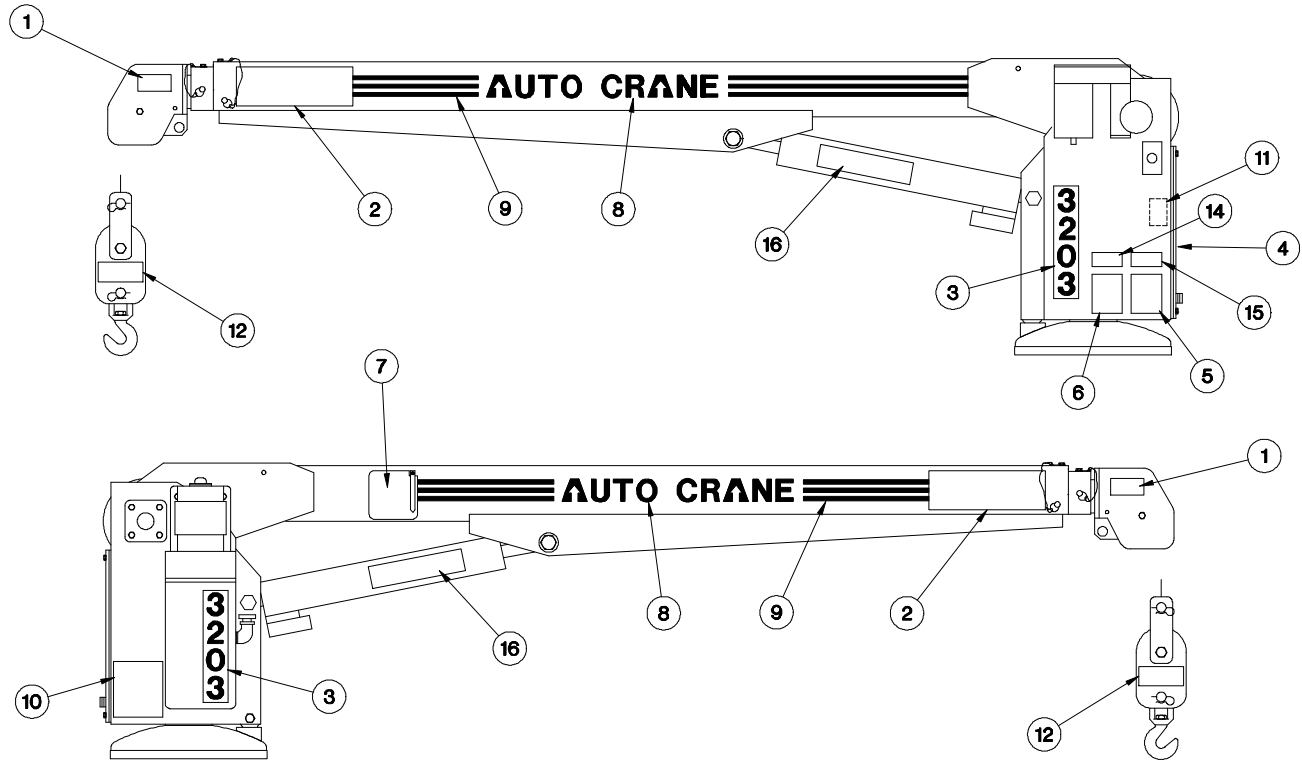
PART NO.: 040587
DECAL: LOAD SENSOR
FUNCTION: To inform the operator that the load sensor is pre-set and that tampering with the sensor may cause potentially hazardous situation.
QUANTITY: 1
PLACEMENT: On the lift cylinder near the load sensor



FIG. SD-8.

DECAL DRAWING

3203P/PR/PRX



ITEM	QTY	P/N	DESCRIPTION
1	2	040517	DANGER "STAY CLEAR OF BOOM" DECAL
2	2	040529	DANGER "ELECTROCUTION HAZARD" DECAL
3	2	320317	3203 DECAL
4	1	040622	A/C LOGO DECAL
5	1	040579	CAUTION "INSPECT VEHICLE..." DECAL
6	1	040580	DANGER "AN UNTRAINED OPERATOR..." DECAL
7	1	320318	ANGLE INDICATOR DECAL
8	2	040624	3M AUTO CRANE DECAL
9	6.5 FT	040620	3M STRIPING DECAL
10	1	320321	3203 LOAD CHART DECAL
11	1	040552	RELAY DECAL
12	2	040518	DANGER "STAY CLEAR OF LOAD" DECAL
13	1	999948	INSTALLATION CHECKLIST CARD (<i>not shown</i>)
14	1	330622	SERIAL NUMBER DECAL
15	1	040587	WARNING "LOAD SENSOR PRE-SET" DECAL
16	2	040519	DANGER "SCISSORS POINT" DECAL

LUBRICATION & MAINTENANCE SCHEDULE 3203P/PR/PRX

SERVICE PERFORMED	DAY	WEEK	MONTH	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
MOUNTING BOLTS		X				CHECK-TORQUE TO 85 FT-LBS (DRY) AS REQUIRED
MOTOR CONNECTION		X				CHECK TERMINALS FOR TIGHT CONNECTIONS
SHEAVE BEARINGS		X				SEALED BEARING, REPLACE IF ROUGH OR LOOSE
ALL OTHER BOLTS		X				CHECK-TIGHTEN AS REQUIRED
BOOM CYLINDER		X				CHECK AROUND CYLINDER ROD FOR EXCESS FLUID LEAKAGE
BOOM CYLINDER PINS		X				GREASE WITH MOBILPLEX EP-2 OR EQUIVALENT @ ZERKS
EXTENSION CYLINDER		X				CHECK AROUND CYLINDER ROD FOR EXCESS FLUID LEAKAGE
BOOM PIVOT		X				GREASE WITH MOBILPLEX EP-2 OR EQUIVALENT @ ZERKS
EXT. CYLINDER BOLTS		X				CHECK TIGHTNESS
BATTERY CONNECTIONS		X				CHECK FOR CORROSION & TIGHT CONNECTIONS. CLEAN & COAT AS REQUIRED
ROTATION GEAR		X				WATER PROOF BEARING GREASE OR DRY MOLYLUBE IF DUSTY
EXT. CYLINDER BOLTS			X			GREASE WITH MOBILPLEX EP-2 OR EQUIVALENT
SAFETY DECALS			X			INSPECT AND REPLACE AS NEEDED
POWER CABLE			X			CHECK INSULATION FOR DAMAGE OR DETERIORATION
ROTATION WORM BEARINGS				X		GREASE WITH MOBILPLEX EP-2 OR EQUIVALENT @ ZERKS
HOIST GEARBOX				X		WORM GEAR-EP GEAR LUBE SAE 80-90, SPUR GEAR SAE 30 OIL

LUBRICATION & MAINTENANCE SCHEDULE 3203P/PR/PRX

SERVICE PERFORMED	DAY	WEEK	MONTH	6 MOS	YEAR	NOTES
HYDRAULIC FLUID					X	DRAIN, FLUSH, & REFILL WITH MOBIL DTE 13, OR EQUIVALENT
ROTATION BEARINGS	SEALED BEARING-NO MAINTENANCE REQUIRED					
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

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

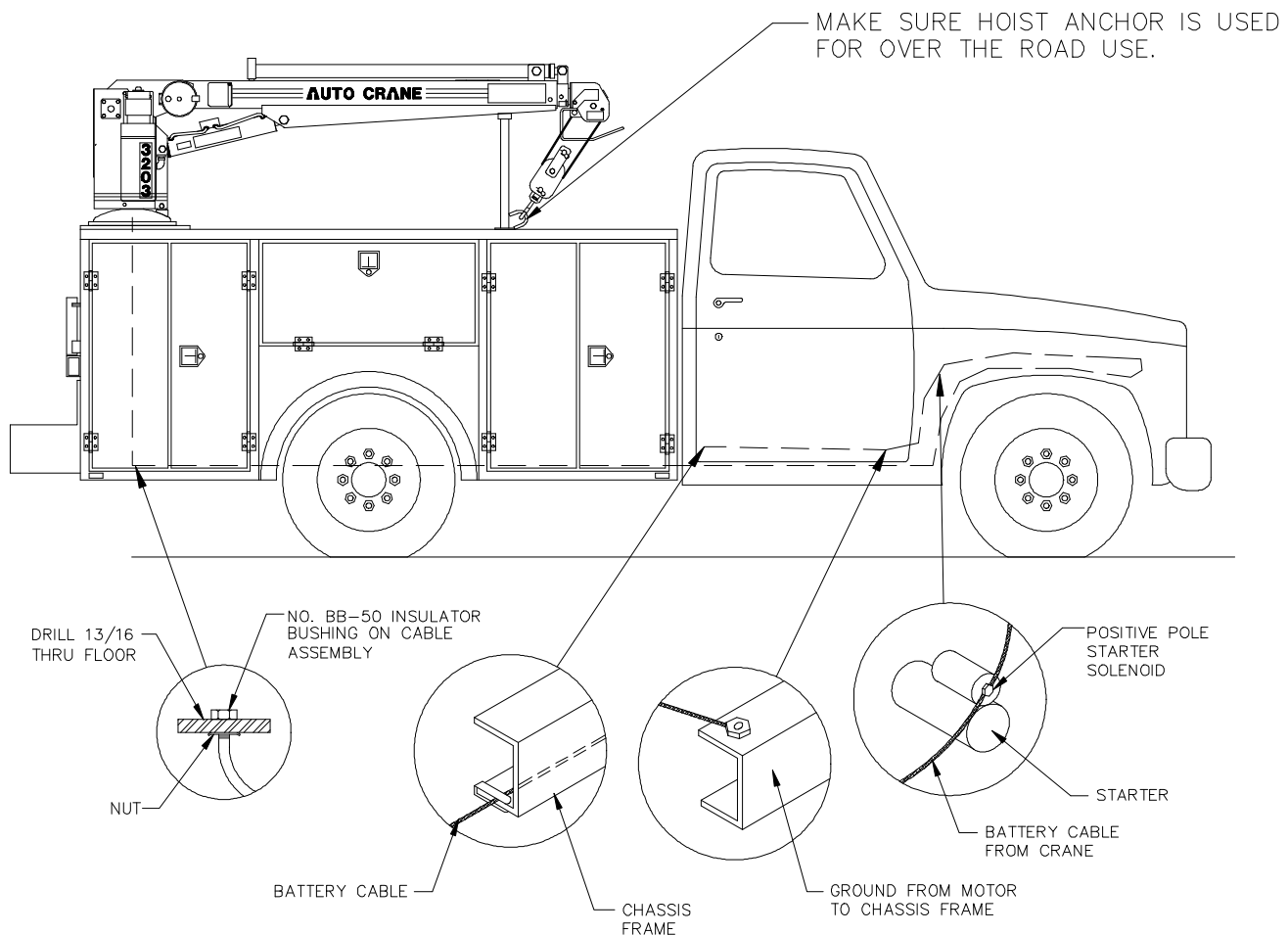
NOTES:

- { Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.
- { Once a bolt has been torqued to its rated capacity and then removed; the bolt should be replaced with a new one.
- { 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.

ASSEMBLY & INSTALLATION INSTRUCTIONS

3203P/PR/PRX

NOTE: For mounting bolt hole pattern - see page 5-1.0.0.

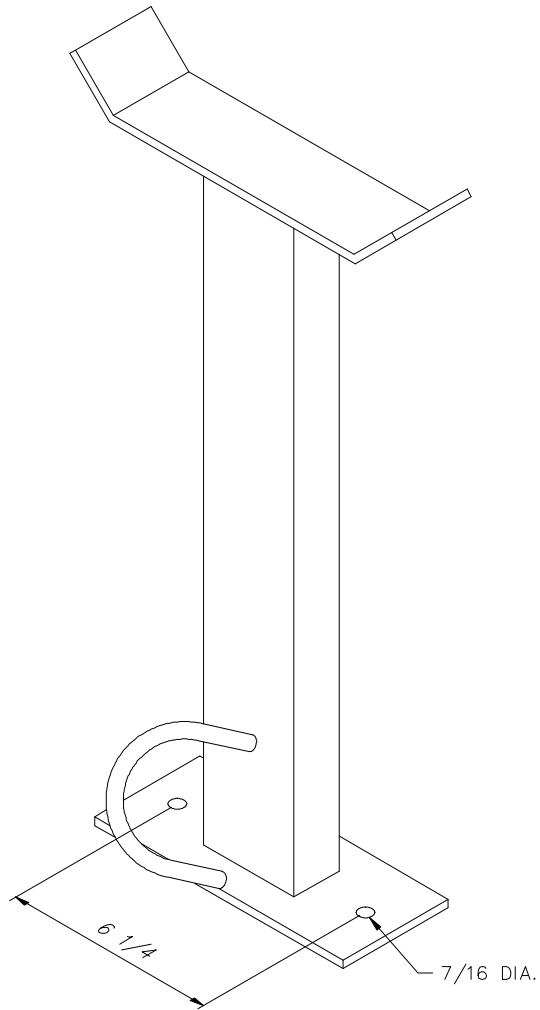


INSTALLATION - BATTERY CABLE

1. Drill 13/16" hole in floor. Install bushing, which is connected to cable, so it fits hole snug.
2. Run cable to positive battery terminal. Connect black cable to negative battery terminal or suitable chassis ground point. Locate cables so that they will be protected. Avoid sharp edges. Use the No. 083800 frame clips provided to hold cables securely in place.
3. If the battery is grounded to the engine it may be necessary to add an additional ground cable from the engine to the chassis frame to obtain maximum power at crane

SUGGESTED BOOM SUPPORT

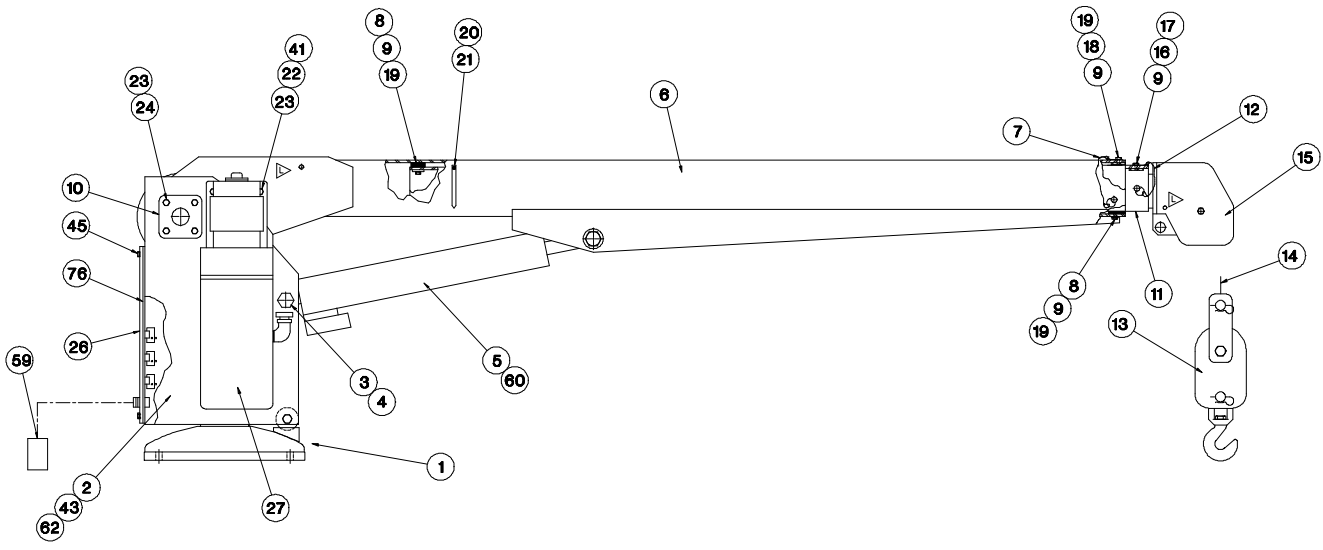
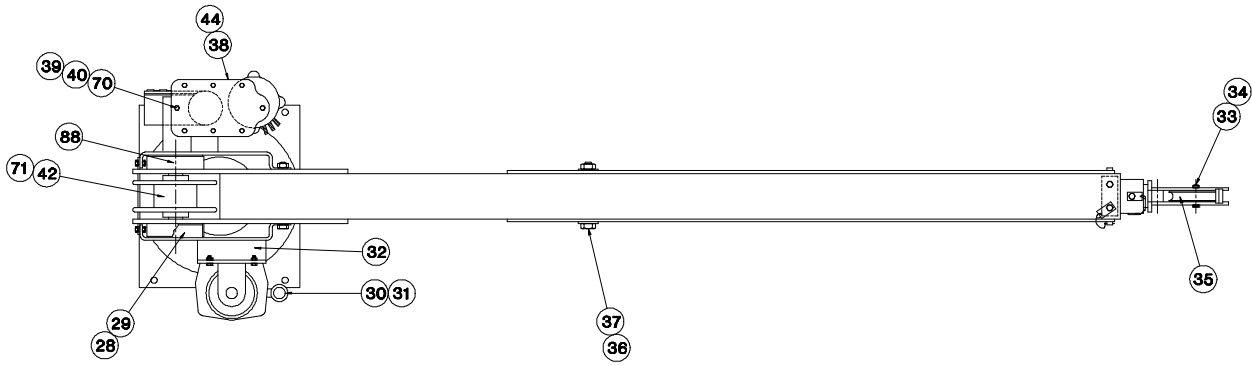
P/N 725045



**Suggested Boom Support
Auto Crane P/N 725045**

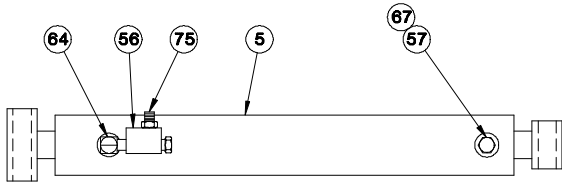
GENERAL ASSEMBLY

P/N 320301 - 3203P 7-11-15

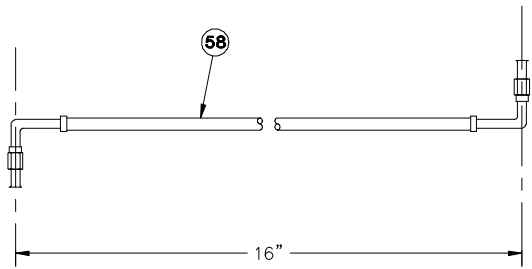


GENERAL ASSEMBLY

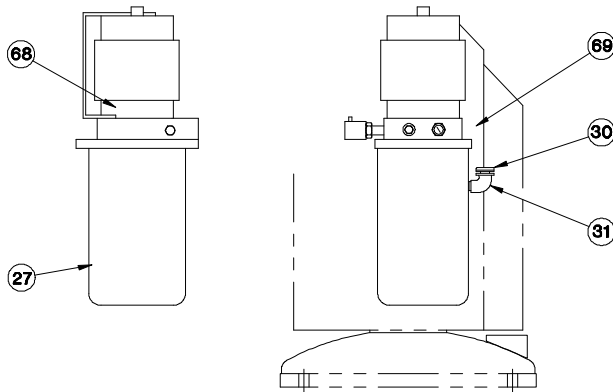
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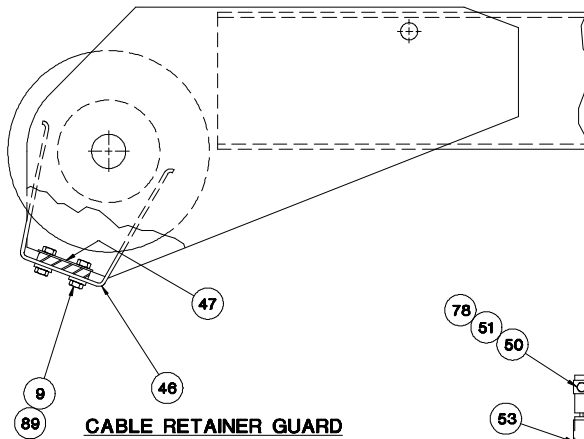
BOOM CYLINDER



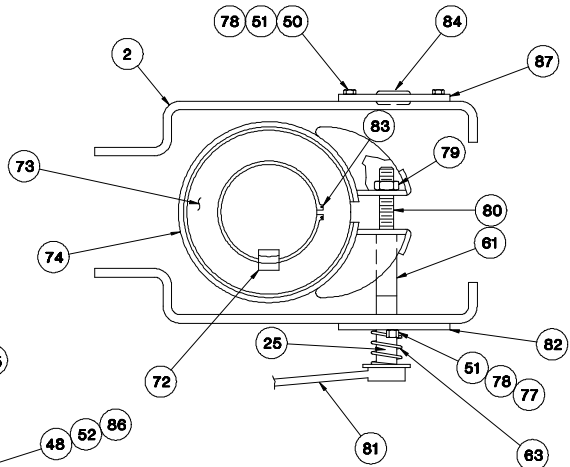
**HOSE
320465**



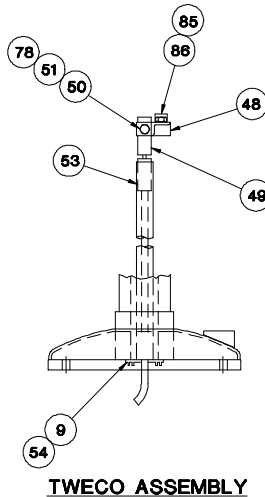
PUMP & RESERVOIR



CABLE RETAINER GUARD



BRAKE ASSEMBLY



TWECO ASSEMBLY

GENERAL ASSEMBLY

P/N 320301 - 3203P 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320710	PEDESTAL
2	1	320428	SIDE PLATE / HOUSING
3	1	018600	HALF LOCK NUT 3/4 NF
4	1	014304	CAPSCREW 3/4 NF x 6 GR 5
5	1	320320	BOOM CYLINDER
6	1	320432	LOWER WELDMENT BOOM
7	1	320328	LONG POSITION PIN
8	2	480036	NYLATRON BOOM PAD
9	11	020200	SPLIT LOCK WASHER 1/4
10	1	320368	REARING RETAINER
11	1	320449	MANUAL MID BOOM
12	1	370002	PIN ASSEMBLY w/ LANYARD
13	1	REF	TRAVELING BLOCK (320433)
14	62 FT	320338	CABLE HOIST
15	1	320423	MANUAL BOOM
16	1	320415	MANUAL BOOM RETAINER
17	1	005501	CAPSCREW 1/4-28 NF x 3/4
18	1	320391	MANUAL MID BOOM RETAINER
19	6	005406	CAPSCREW 1/4-28 NF x 1/2
20	1	320453	ANGLE INDICATOR
21	1	016300	HEX LOCK NUT 1/4 NC
22	3	008400	CAPSCREW 3/8-16 NC x 3/4 GR 8
23	11	021100	SPLIT LOCK WASHER 3/8
24	8	330394	CAPSCREW 3/8-16 NC x 1 1/2
25	1	320506	SPACER
26	1	680055	RELAY PANEL ASSEMBLY
27	1	320335	HYDRAULIC PUMP & RESERVOIR
28	2	400500	BOOM PIVOT BEARING
29	2	320411	BOOM PIVOT
30	1	200545	BREATHER CAP
31	1	200547	90° STREET ELBOW 3/8 NPT
32	1	-	PUMP BRACKET
33	1	012200	CAPSCREW 5/8-18 NF x 1 3/4 GR 5
34	1	019100	HALF LOCK NUT 5/8 NF
35	1	227401	SHEAVE ASSEMBLY (REF BEARING ONLY #200100)
36	1	330185	CAPSCREW 1 NF x 5 1/2 GR 5
37	1	019106	HALF LOCK NUT 1 NF
38	1	320324	ACTUATOR ASSEMBLY

GENERAL ASSEMBLY

P/N 320301 - 3203P 7-11-15

ITEM	QTY	P/N	DESCRIPTION
39	4	007807	CAPSCREW 5/16-18 NC x 3/4
40	4	020600	SPLIT LOCK WASHER 5/16
41	3	330372	HEX NUT 3/8 NC
42	1	320379	DRUM
43	2	320330	SEALED BALL BEARING
44	45	REF	SQUARE KEY 1/4 x 2 3/4 (340523)
45	4	002620	SELF TAPPING CAPSCREW 5/16 NC x 7/8
46	1	320442	CABLE RETAINER GUARD
47	1	320448	BACK UP RETAINER
48	1	320515	UPPER TWECO BRACKET
49	1	REF	MALE TRECO CONNECTOR
50	4	011510	CAPSCREW 1/2-13 NC x 1 1/4
51	6	021500	SPLIT LOCK WASHER 1/2
52	1	320372	UPPER TWECO CLAMP
53	1	320488	POWER CABLE ASSEMBLY
54	2	005401	CAPSCREW 1/4-20 NC x 5/8
55	1	320343	FLOW REGULATOR
56	1	301103	VELOCITY FUSE
57	1	330584	BREATHER FILTER
58	1	320465	HOSE ASSEMBLY
59	1	REF	PENDANT
60	1	REF	SEAL KIT
61	1	320508	SPACER
62	1	320332	RETAINING RING BEARING
63	1	320509	COMPRESSION SPRING
64	1	320370	90° ELBOW -6 ORB/3/8 MALE NPT
65	1	320342	90° ELBOW -6 ORB/-6 JIC
66	1	320344	TEE -6 ORB/ -6 ORP FEM-RUN/ -6 ORM (M)
67	1	320340	ADAPTER -6 ORB/3/8 NPT (FEM)
68	1	320560	LOAD SENSOR
69	1	083803	HOSE CLAMP -6
70	1	320464	ACTUATOR BRACKET
71	2	330468	SPLIT LOCK COLLAR
72	1	340602	SQUARE KEY 3/4 x 1 1/2
73	1	320459	BRAKE DRUM
74	1	320502	BRAKE BAND ASSEMBLY
75	1	330636	MALE NIPPLE 3/8 NPT
76	2	800084	SPACER BAR x 15 IN LONG

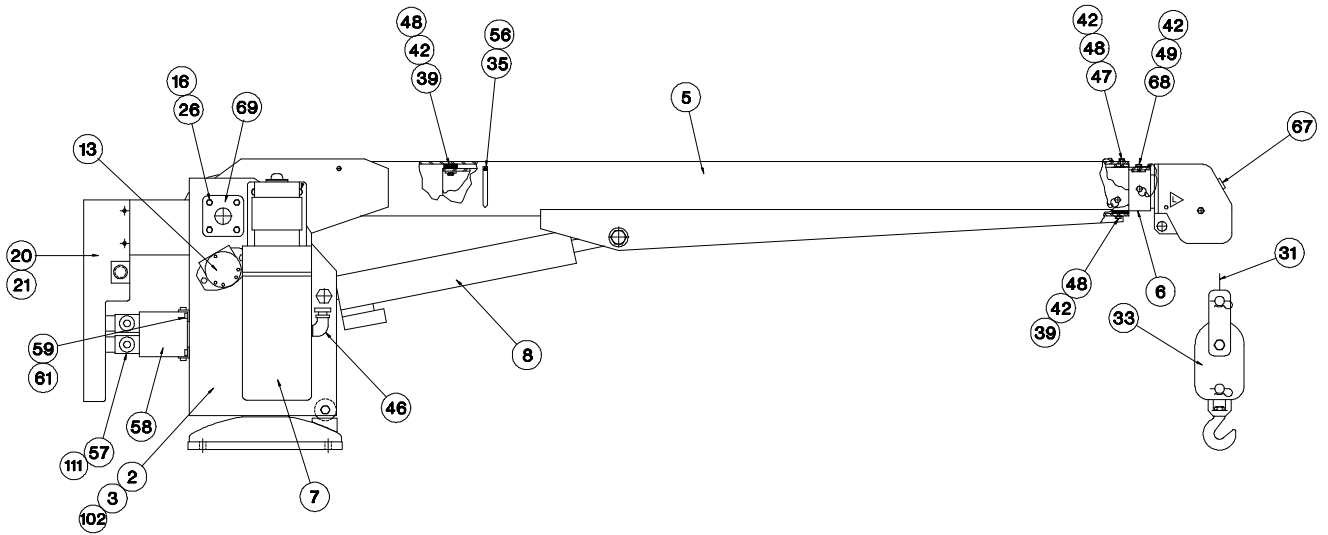
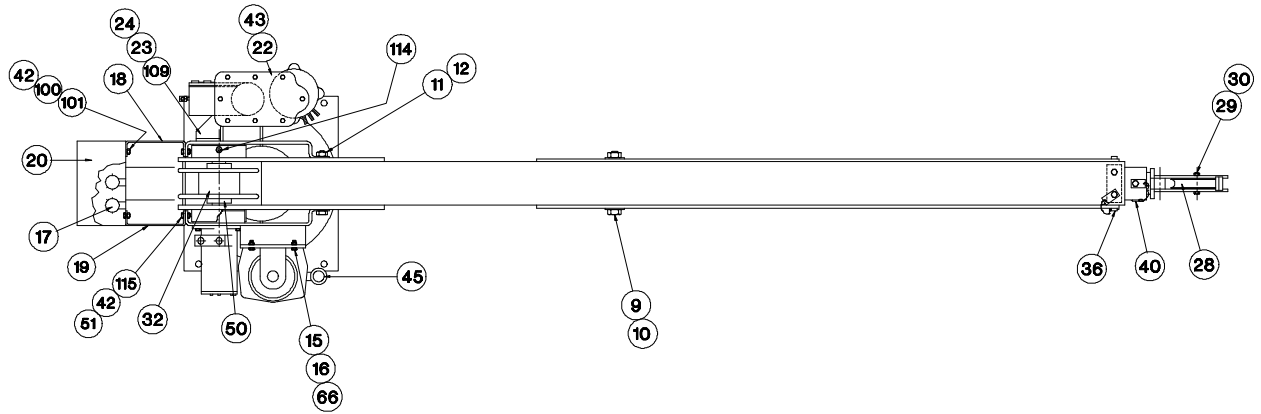
GENERAL ASSEMBLY

P/N 320301 - 3203P 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
77	2	012197	CAPSCREW 1/2 NC x 1 1/2
78	6	017701	HEX NUT 1/2 NC
79	1	018302	HEX NUT 5/8 NF
80	1	013502	CAPSCREW 5/8 NF
81	1	320507	BRAKE WRENCH
82	1	320495	BRAKE GUIDE PLATE
83	1	320333	SNAP RING
84	1	750282	GROMMET
85	1	000115	CLIP
86	3	320371	THREAD CUTTING SCREW #10-24 NC x 3/4
87	1	320369	COVER PLATE
88	2	239000	GREASE ZERK
89	6	015900	NUT 1/4-20 NC

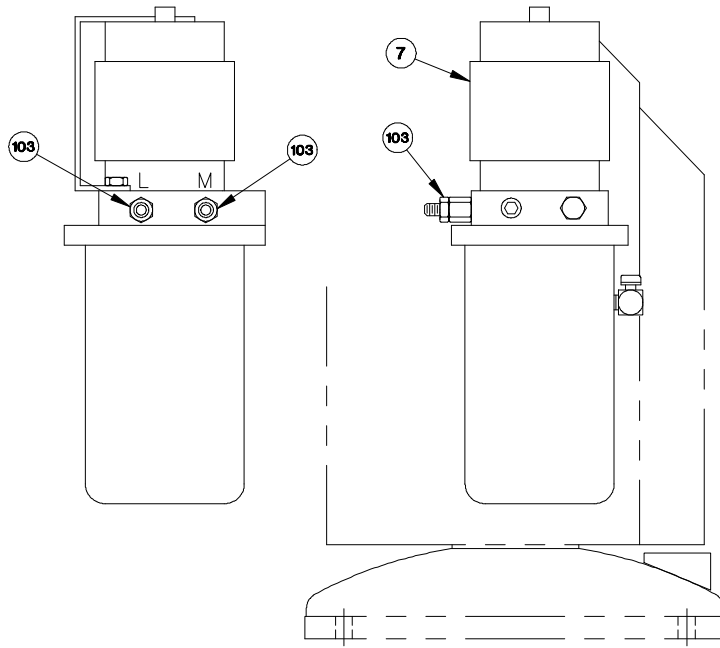
GENERAL ASSEMBLY

P/N 320303 - 3203PR 7-11-15

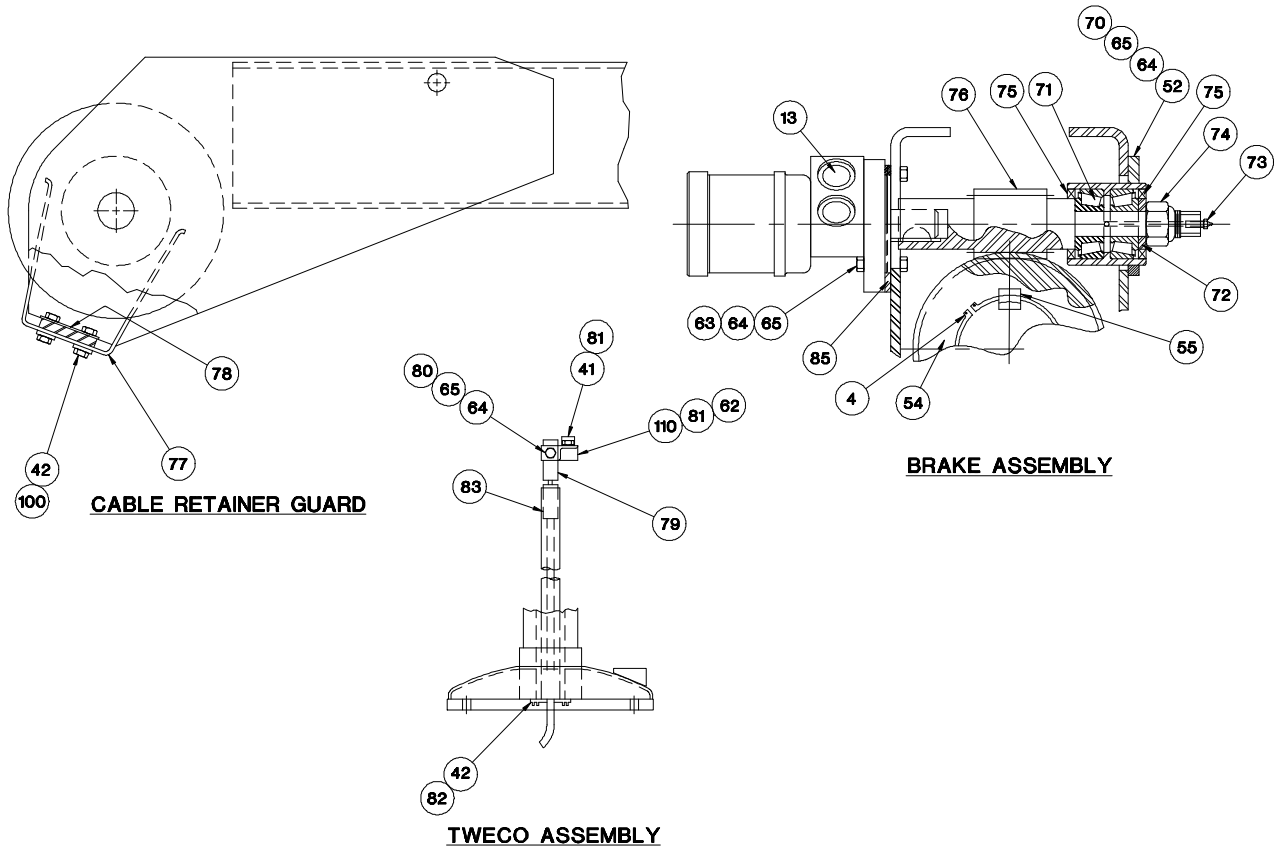


GENERAL ASSEMBLY

P/N 320303 - 3203PR 7-11-15



PUMP & RESERVOIR



CABLE RETAINER GUARD

BRAKE ASSEMBLY

TWECO ASSEMBLY

GENERAL ASSEMBLY

P/N 320303 - 3203PR 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320710	PEDESTAL
2	1	320428	SIDE PLATE / HOUSING
3	2	320330	SEALED BALL BEARING
4	1	320333	SNAP RING
5	1	320432	LOWER WELDMENT BOOM
6	1	320449	MANUAL MID BOOM
7	1	320336	HYDRAULIC PUMP & RESERVOIR
8	1	320325	HYDRAULIC LIFT CYLINDER
9	1	019106	HALF LOCK NUT 1
10	1	330185	CAPSCREW 1 x 5 1/2 NC
11	1	014304	CAPSCREW 3/4 x 6 NC
12	1	018600	HALF LOCK HEX NUT 3/4
13	1	480027	HYDRAULIC ROTATION MOTOR
14	1	REF	PUMP BRACKET
15	3	008400	CAPSCREW 3/8 x 3/4 NC GR 8
16	11	021100	SPLIT LOCK WASHER 3/8 ZP
17	1	680054	RELAY PANEL ASSEMBLY
18	1	320395	LEFT RELAY PANEL BRACKET
19	1	320396	RIGHT RELAY PANEL BRACKET
20	1	320431	COVER
21	4	002605	SELF TAPPING CAPSCREW #12 x 1/2
22	1	320324	ACTUATOR ASSEMBLY
23	4	007807	CAPSCREW 5/16-18 NC x 3/4 NC
24	4	020600	SPLIT LOCK WASHER 5/16
25	2	320411	BOOM PIVOT
26	8	330394	CAPSCREW 3/8-16 x 1 1/2
27	2	400500	BOOM PIVOT BEARING
28	1	227401	SHEAVE ASSEMBLY (REF BEARING ONLY #200100)
29	1	012200	CAPSCREW 5/8 x 1 3/4 NF
30	1	018100	HALF LOCK NUT 5/8 NF
31	62 FT	320338	HOIST CABLE
32	1	320379	DRUM
33	1	REF	TRAVELING BLOCK (320433) furnished in SHIP KIT #680061)
34	1	REF	PENDANT CONTROL (680064)
35	1	320453	ANGLE INDICATOR
36	1	320328	POSITION PIN
37	1	320444	DECAL KIT
38	2	330072	HEX HEAD PLUG -10 ORB

GENERAL ASSEMBLY

P/N 320303 - 3203PR 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
39	2	480036	PAD
40	1	370002	PIN ASSEMBLY w/ LANYARD
41	1	000115	CLIP
42	17	020200	SPLIT LOCK WASHER 1/4
43	1	REF	SQUARE KEY 1/4 x 2 3/4 (340523)
44	2	005810	CAPSCREW 1/4-20 NC x 1 3/4
45	1	REF	BREATHER CAP (200545) <i>included with item 7</i>
46	1	REF	90° STRAIGHT ELBOW 3/8 NPT (200547)
47	1	320391	BOOM RETAINER
48	6	005406	CAPSCREW 1/4-28 x 1/2
49	1	005501	CAPSCREW 1/4-28 x 3/4
50	2	330468	SPLIT LOCK COLLAR
51	4	005604	CAPSCREW 1/4 x 1 NC
52	2	010201	CAPSCREW 1/2 x 1 1/2 NC
53	2	239000	ZERK
54	1	320334	WORM GEAR
55	1	340602	GEAR KEY
56	1	016300	HEX LOCK NUT 1/4 NC
57	2	300204	DIRECTIONAL VALVE ASSEMBLY
58	1	330306	MANIFOLD SERIES
59	1	320392	TOP VALVE BANK BRACKET
60	1	320393	BOTTOM VALVE BANK BRACKET
61	8	002614	CAPSCREW 5/16 NC x 5/8
62	1	320515	UPPER TWECO BRACKET
63	2	011603	CAPSCREW 1/2 NC x 1 3/4
64	4	021500	SPLIT LOCK WASHER 1/2
65	6	017701	HEX NUT 1/2 NC
66	3	330372	HEX NUT 3/8 NC
67	1	320423	MANUAL BOOM
68	1	320415	BOOM RETAINER
69	1	320368	BEARING RETAINER
70	1	330472	HOUSING w/ CUPS
71	2	330485	CONE BEARING
72	1	330483	SPACER
73	1	239300	GREASE ZERK #1610-8
74	1	019000	NUT 7/8-14
75	2	330486	OIL SEAL
76	1	330420	TURNER SHAFT

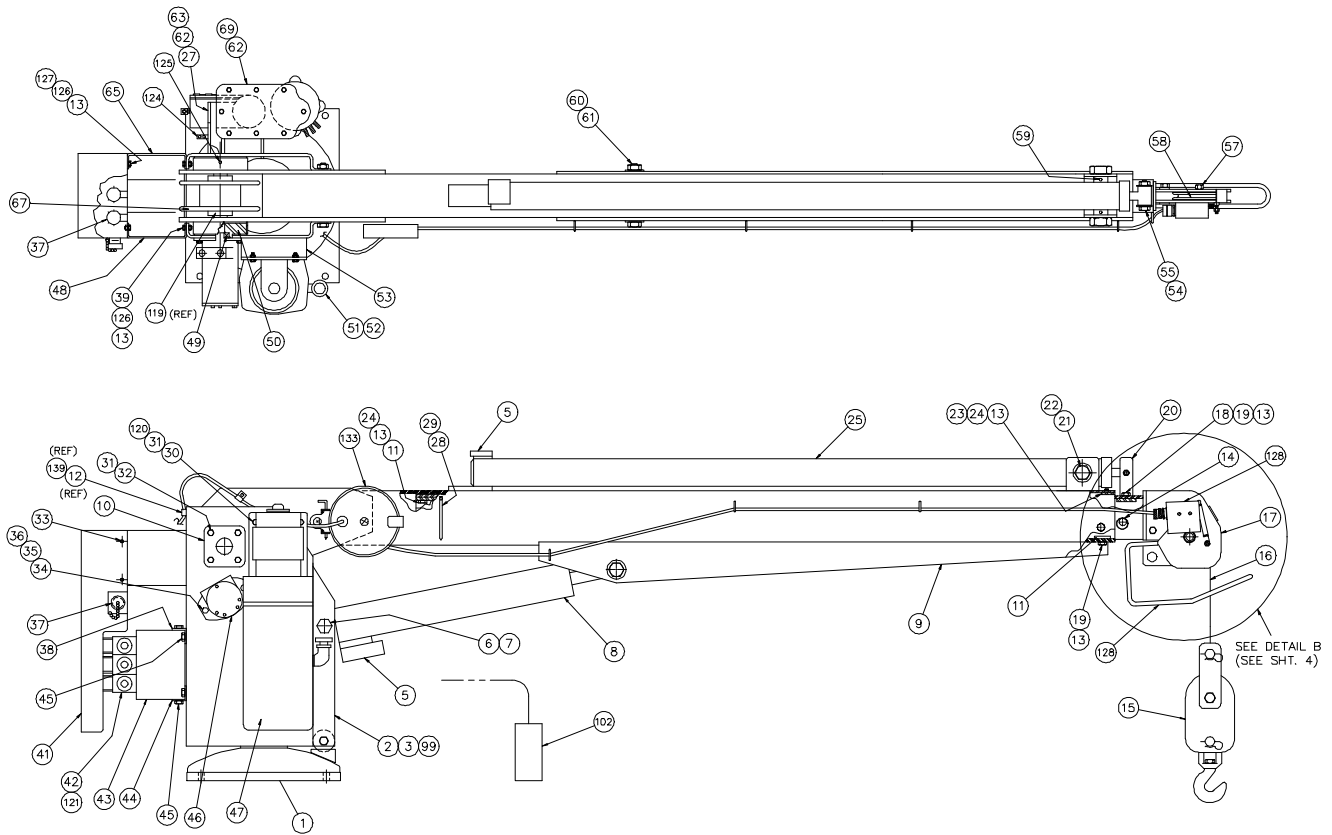
GENERAL ASSEMBLY

P/N 320303 - 3203PR 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
77	1	320442	CABLE RETAINER GUARD
78	1	320448	CABLE RETAINER BACKUP
79	1	330258	MALE TWECO CONNECTOR
80	2	011510	CAPSCREW 1/2 x 1 1/4 NC
81	3	320371	THREAD CUTTING SCREW #10-24 NC x 3/4 NC
82	2	005401	CAPSCREW 1/4-20 x 5/8 NC
83	1	320488	POWER CABLE ASSEMBLY
84	1	320469	BOOM CYLINDER HYDRAULIC TUBE ASSEMBLY
85	1	330484	SPACER
86	1	320407	HYDRAULIC TUBE ASSEMBLY
87	1	320408-001	HYDRAULIC TUBE ASSEMBLY
88	1	320409	HYDRAULIC TUBE ASSEMBLY
89	1	320410	HYDRAULIC TUBE ASSEMBLY
90	1	320491	HYDRAULIC TUBE ASSEMBLY
91	1	320490	HYDRAULIC TUBE ASSEMBLY
92	2	320467	HYDRAULIC TUBE ASSEMBLY
93	1	330058	REDUCER 7/8-14/-6 ORP
94	1	320472	LOAD SENSOR
95	1	330412	COUNTER BALANCE VALVE
96	1	330274	REDUCER -10 ORB/-8 ORP
97	1	241168	TEE -6 ORB (M) RUN/-6 JIC (FEM) RUN/-6 JIC (M)
98	1	241175	90° ELBOW -6 ORB/-6 JIC
99	2	241170	BULKHEAD FITTING
100	8	015900	NUT 1/4-20 NC
101	2	005500	SCREW 1/4-20 x 3/4 NC
102	1	320332	BEARING RETAINING RING
103	3	200876	ADAPTER -6 ORB/-6 JIC
104	1	320350	45° ELBOW (1/2 NPTM/-6 JIC
105	1	202759	90° ELBOW (1/2 NPTM/-6 JIC)
106	3	330272	90° ELBOW -8 ORB/-6 JIC
107	2	202756	ADAPTER
108	2	480194	90° ELBOW -6 SWIVEL/-6 JIC
109	1	320464	ACTUATOR BRACKET
110	1	320372	UPPER TWECO BRACKET

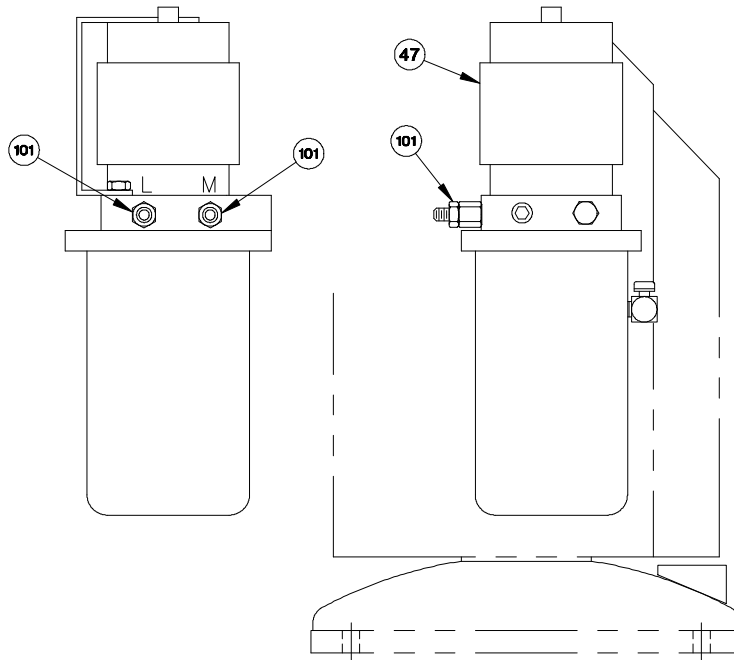
GENERAL ASSEMBLY

P/N 320304 - 3203PRX 7-11-15

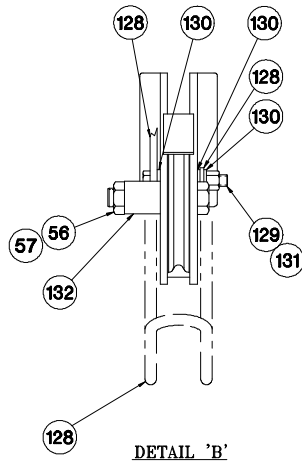


GENERAL ASSEMBLY

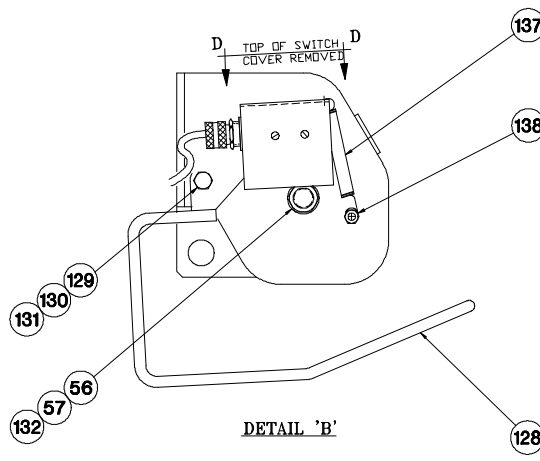
P/N 320304 - 3203PRX 7-11-15



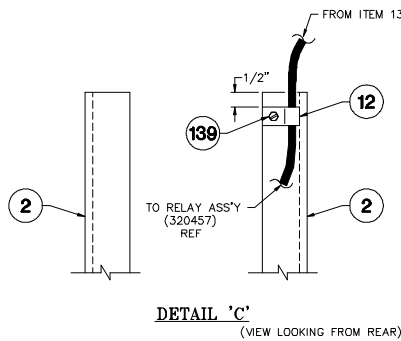
PUMP & RESERVOIR



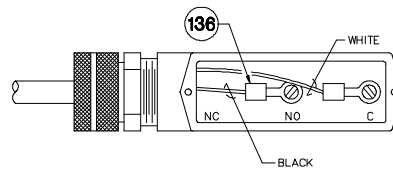
DETAIL 'B'
ROTATED 90°
SWITCH REMOVED FOR CLARITY



DETAIL 'B'



DETAIL 'C'
(VIEW LOOKING FROM REAR)



VIEW D-D
(CONN. INSIDE LIMIT SWITCH)
SCALE: NONE

GENERAL ASSEMBLY

P/N 320304 - 3203PRX 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320710	PEDESTAL
2	1	320428	SIDE PLATE / HOUSING
3	2	320330	SEALED BALL BEARING
4	1	320333	SNAP RING
5	2	330412	COUNTERBALANCE VALVE
6	1	018600	HALF LOCK NUT 3/4 NF
7	1	014304	CAPSCREW 3/4 x 6 NC
8	1	320325	HYDRAULIC LIFT CYLINDER
9	1	320420	LOWER BOOM
10	1	320368	BEARING RETAINER
11	2	480036	NYLATRON BOOM PAD
12	2	000115	CLIP
13	23	020200	SPLIT LOCK WASHER 1/4
14	1	370002	PIN ASSEMBLY w/ LANYARD
15	1	REF	TRAVELING BLOCK
16	62 FT	320338	HOIST CABLE
17	1	320423-001	MANUAL BOOM w/ CROWN
18	1	320415	MANUAL BOOM RETAINER
19	3	005501	CAPSCREW 1/4-28 NF x 3/4
20	1	320421	MID BOOM
21	2	015017	CAPSCREW 1-8 NC x 1 1/8
22	2	022502	FLAT WASHER 1
23	1	320391	MID BOOM RETAINER
24	4	005406	CAPSCREW 1/4-28 NF x 1/2
25	1	202711	EXTENSION CYLINDER
26	2	005401	CAPSCREW 1/4-20 x 5/8
27	1	320464	ACTUATOR BRACKET
28	1	320453	ANGLE INDICATOR
29	1+2	016300	HEX LOCK NUT 1/4-20 NC
30	3	008400	CAPSCREW 3/8-16 NC x 3/4 GR 8
31	12	021100	SPLIT LOCK WASHER 3/8
32	8	330394	CAPSCREW 3/8-16 x 1 1/2
33	4	002605	SELF TAPPING CAPSCREW #12 x 1/2
34	2	011603	CAPSCREW 1/2-13 x 1 3/4
35	4	021500	SPLIT LOCK WASHER 1/2
36	6	017701	HEX NUT 1/2-13 NC
37	1	320457-200	RELAY PANEL ASSEMBLY
38	1	320392	TOP VALVE BANK

GENERAL ASSEMBLY

P/N 320304 - 3203PRX 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
39	4	005604	CAPSCREW 1/4-20 NC x 1
40	-	-	-
41	1	320431	COVER
42	3	300204	DIRECTIONAL VALVE ASSEMBLY
43	1	202710	MANIFOLD-SERIES
44	1	320393	BOTTOM MANIFOLD BRACKET
45	8	002614	SELF TAPPING CAPSCREW 5/16 NC x 5/8
46	1	480027	HYDRAULIC ROTATION MOTOR
47	1	320336	HYDRAULIC PUMP & RESERVOIR
48	1	320396	RIGHT RELAY PANEL BRACKET
49	2	400500	BOOM PIVOT BEARING
50	2	320411	BOOM PIVOT
51	1	REF	BREATHER CAP 200545 (furnished with item 47)
52	1	REF	STRAIGHT 90° ELBOW 3/8 NPT 200547 (furnished with item 47)
53	1	REF	PUMP BRACKET
54	1	330057	CAPSCREW 1-8 NC x 4
55	1	019105	HEX NUT 1-8 NC
56	1	012701	CAPSCREW 5/8-18 NF x 3
57	1	018100	HALF LOCK NUT 5/8-18 NF
58	1	227401	SHEAVE ASSEMBLY (ref bearing only #200100)
59	2	002905	SET SCREW
60	1	330185	CAPSCREW 1 NF x 5 1/2
61	1	019106	HALF LOCK NUT 1
62	1	320324	ACTUATOR ASSEMBLY
63	4	007807	CAPSCREW 5/16-18 NC x 1 3/4
64	4	020600	SPLIT LOCK WASHER 5/16
65	1	320395	LEFT RELAY PANEL BRACKET
66	2	330072	HEX HEAD PLUG -10 ORB
67	1	320379	DRUM
68	1	340602	SQUARE KEY 3/4
69	1	340523	SQUARE KEY 1/4
70	1	330484	SPACER
71	1	330420	WORM SHAFT
72	2	330486	OIL SEAL
73	2	330485	CONE BEARING
74	1	3302472	HOUSING w/ CUPS
75	1	019000	HEX NUT 7/8-14 NF
76	1	239300	GREASE ZERK

GENERAL ASSEMBLY

P/N 320304 - 3203PRX 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
77	1	330483	SPACER
78	1	320334	WORM GEAR
79	1	320442	CABLE RETAINER GUARD
80	1	320448	BACK-UP RETAINER
81	1	320372	UPPER TWECO CLAMP
82	1	320488	POWER CABLE ASSEMBLY
83	2	011510	CAPSCREW 1/2-13 NC x 1 1/4
84	1	320515	UPPER TWECO BRACKET
85	1	330258	MALE TWECO CONNECTOR
86	4	005810	CAPSCREW 1/4-20 NC x 1 3/4
87	1	330275	HYDRAULIC TUBE ASSEMBLY
88	1	320469	HYDRAULIC TUBE ASSEMBLY
89	1	320407	HYDRAULIC TUBE ASSEMBLY
90	1	320408-001	HYDRAULIC TUBE ASSEMBLY
91	1	320409	HYDRAULIC TUBE ASSEMBLY
92	1	320410	HYDRAULIC TUBE ASSEMBLY
93	2	320489	HYDRAULIC TUBE ASSEMBLY
94	1	320491	HYDRAULIC TUBE ASSEMBLY
95	1	320490	HYDRAULIC TUBE ASSEMBLY
96	-	-	-
97	2	320467	HYDRAULIC TUBE ASSEMBLY
98	1	320466	HYDRAULIC HOSE ASSEMBLY (EXT. OUT)
99	1	320332	BEARING RETAINING RING
100	1	320445	DECAL DRAWING
101	4	200876	HYDRAULIC FITTING-ADAPTER
102	1	REF	PENDANT (680067)
103	1	320473	HYDRAULIC HOSE ASSEMBLY (EXT. OUT)
104	4	241170	BULKHEAD UNION
105	-	-	-
106	2	241168	SPECIAL TEE -6 ORB/-6 JIC-MALE
107	-	-	-
108	-	-	-
109	1	320350	45° ELBOW -1/2 NPTM/-6 JIC
110	1	202759	90° ELBOW -1/2 NPTM/-6 JIC
111	3	330272	90° ELBOW -8 NPTM/-6 JIC
112	2	480194	90° ELBOW -6 SWIVEL/-6 JIC
113	2	241175	90° ELBOW -6 ORB/-6 JIC

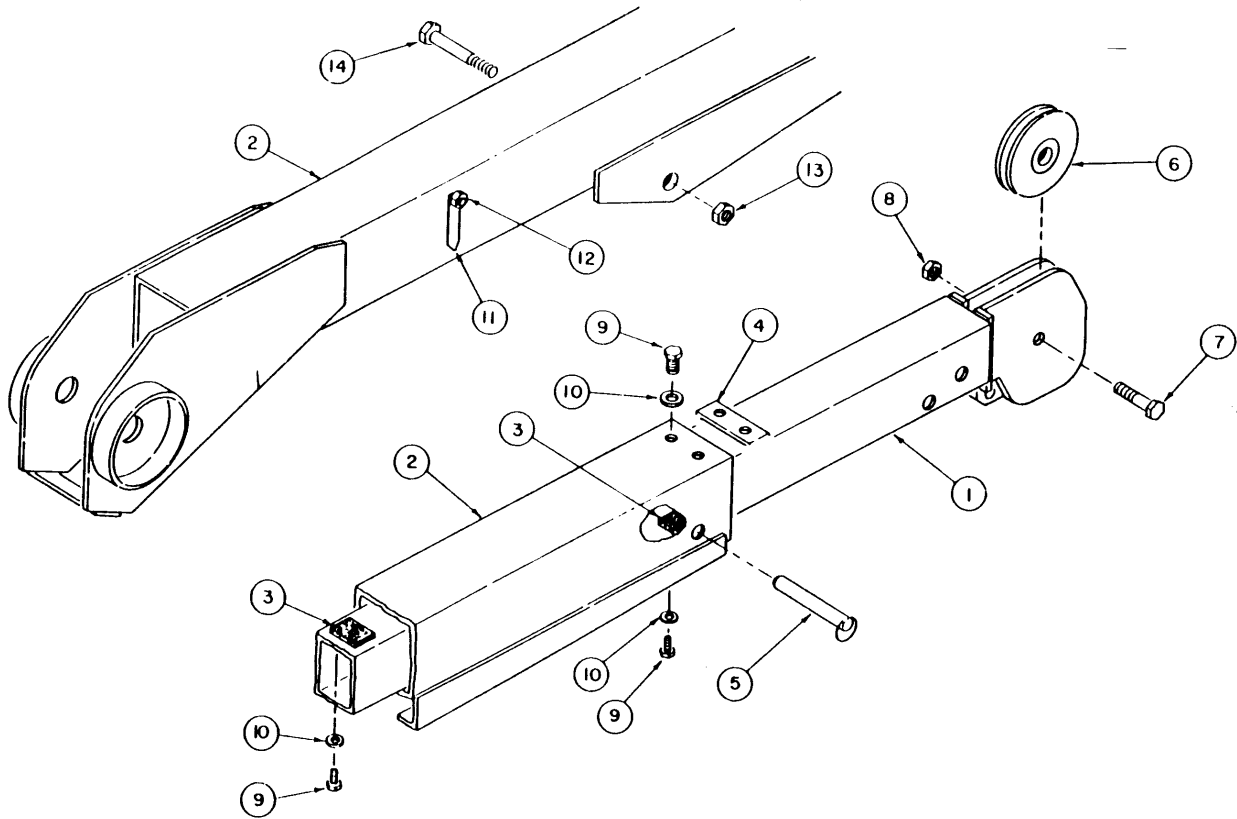
GENERAL ASSEMBLY

P/N 320304 - 3203PRX 7-11-15

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
114	1	330274	REDUCER -10 ORB/-8 ORP
115	4	202756	ADAPTER 3/4 ORB/ 9/16 37° JIC
116	1	330058	REDUCER -10 ORB/-6 ORP
117	1	320472	LOAD SENSOR
118	2	010201	CAPSCREW 1/2 NC x 1 1/2
119	2	330468	SPLIT LOCK COLLAR
120	3	320372	HEX NUT 3/8 NC
121	1	320480	SOLENOID VALVE ASSEMBLY WIRING DIAGRAM
122	3	320371	THREAD CUTTING SCREW #10-24 x 3/4
123	1	680058	SHIP KIT
124	1	320483	HYDRAULIC TUBING BRACKET
125	2	239000	DRIVE ZERK
126	10	015900	NUT 1/4-20
127	4	005500	SCREW 1/4-20 x 3/4
128	1	320556	BAIL / SWITCH ASSEMBLY
129	1	009104	CAPSCREW 3/8 NF x 2 1/2
130	3	021200	FLAT SAE WASHER 3/8
131	1	017400	HEX LOCK NUT 3/8 NF
132	1	340295	ROUND TUBING 1 1/16 x .188W x 1 3/16
133	1	320521	CABLE REEL
134	-	-	-
135	1	000302	WIRE TERMINAL (BUTT SPLICE) 2RB14
136	2	000101	HYDRAULIC HOSE ASSEMBLY (EXT. OUT)
137	1	320554	RETURN SPRING
138	2	016300	HEX LOCK NUT 1/4 NC
139	1	330038	#10 SELF DRILLING & THREADING HEX HEAD SLOT 3/4

GENERAL ASSEMBLY

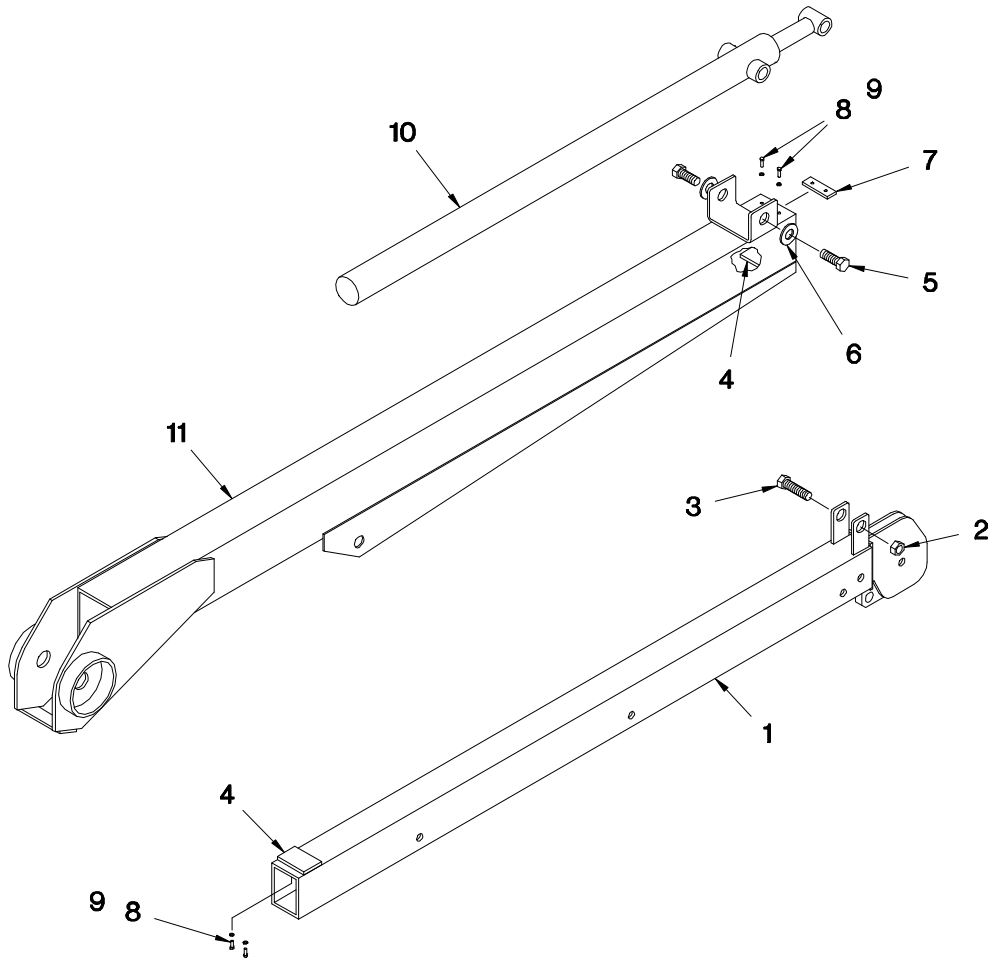
P/N 320300/302 - 3203P/PR 7-11



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320422	MANUAL BOOM w/ CROWN
2	1	320432	LOWER BOOM
3	2	480036	NYLATRON PAD
4	1	320391	BOOM RETAINER
5	1	320328	POSITION PIN
6	1	227401	SHEAVE ASSEMBLY (REF BEARING ONLY #200100)
7	1	012200	CAPSCREW 5/8 x 1 3/4 NF
8	1	018100	HEX NUT 1/4 x 3/4 NF
9	6	005406	CAPSCREW 1/4 x 1/2 NF
10	6	020200	SPLIT LOCK WASHER 1/4
11	1	320453	ANGLE INDICATOR
12	1	016300	HEX NUT 1/4 NC
13	1	019106	HALF LOCK NUT 1
14	1	330185	CAPSCREW 1 x 5 1/2 NC

GENERAL ASSEMBLY

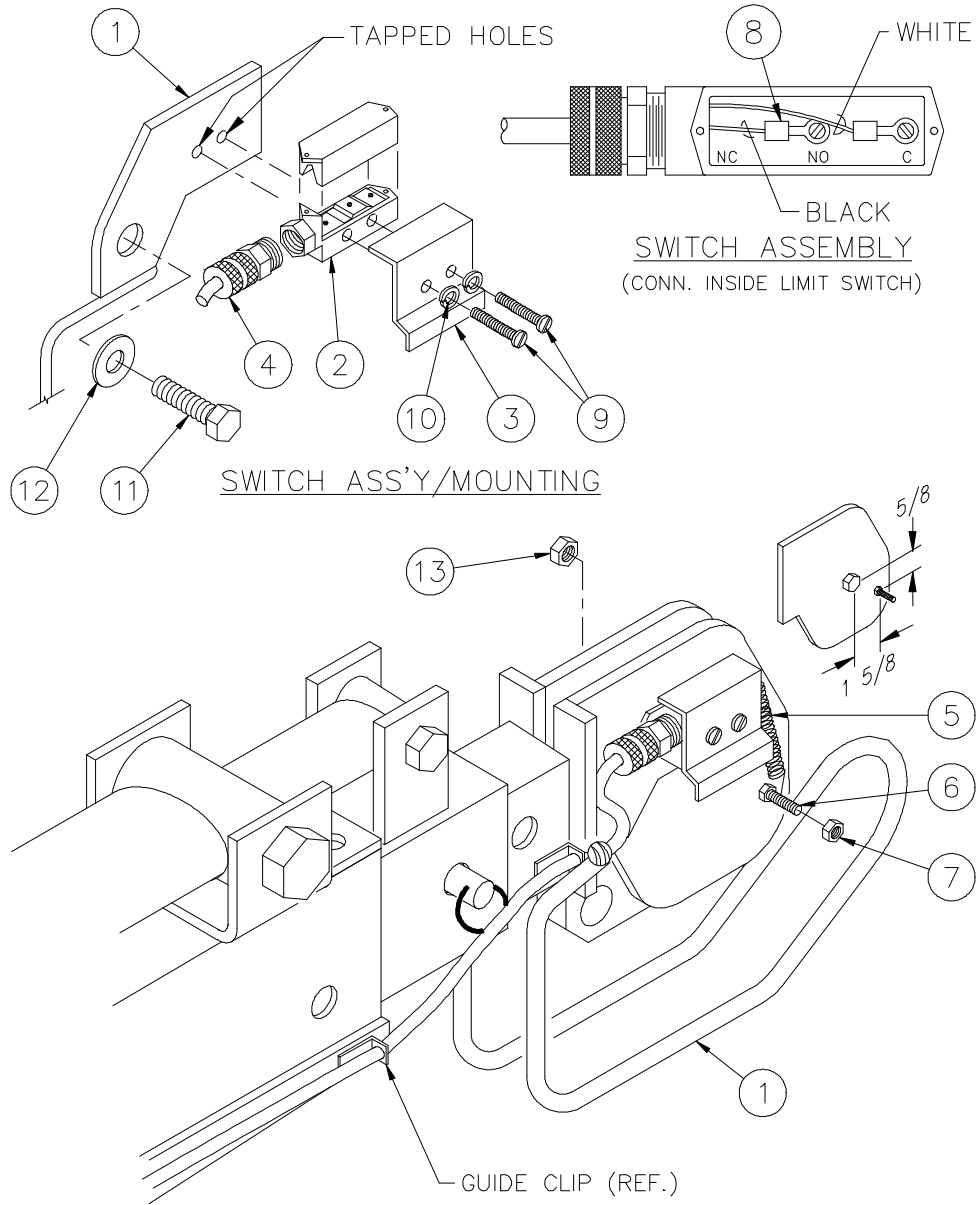
P/N 320308 - 3203PRX 7-11



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320517	BOOM
2	1	019105	HEX NUT 1-8 NC
3	1	330057	CAPSCREW 1 x 4 NC
4	2	480036	NYLATRON BOOM PAD
5	2	015017	CAPSCREW 1 x 1 1/8
6	2	022502	FLAT WASHER 1
7	1	320391	BOOM RETAINER
8	4	020200	SPLIT LOCK WASHER 1/4
9	4	005406	CAPSCREW 1/4 x 1/2 NF
10	1	202711	EXTENSION CYLINDER
11	1	320420	LOWER BOOM

2-BLOCK ASSEMBLY

3203PRX & 3203H SERIES

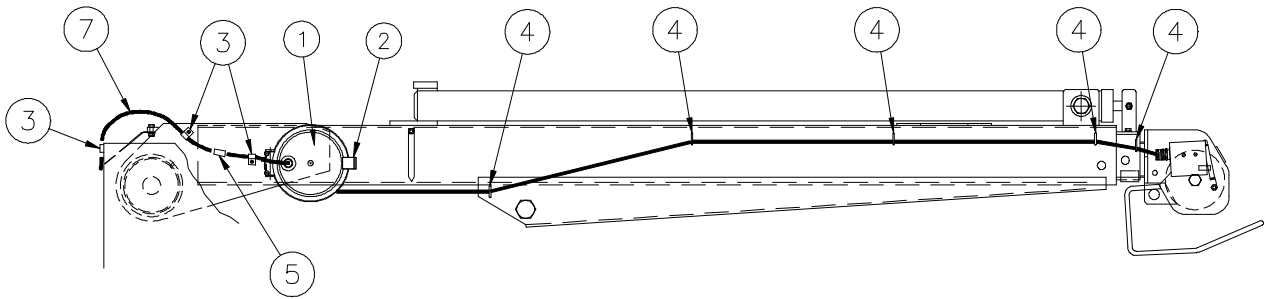


2-BLOCK ASSEMBLY
3203PRX & 3203H SERIES

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320546	BAIL WELDMENT
2	1	646900	LOAD SENSOR SWITCH
3	1	320550	SWITCH COVER
4	1	642918	STRAIGHT CORD CONNECTOR
5	1	320554	RETURN SPRING
6	1	005604	HEX HD SCREW 1/4-20NC x 1
7	1	016300	HEX LOCK NUT 1/4-20NC
8	2	000101	WR-14-16 TERMINAL
9	2	002602	RD HD SCREW #6-32NC x 1 1/4
10	2	019600	LOCK WASHER #6
11	1	009104	HEX HD SCREW 3/8-24NF x 2 1/2
12	1	021200	FLAT WASHER SAE 3/8
13	1	017400	HEX LOCK NUT 3/8-24NF

2-BLOCK REEL INSTALLATION

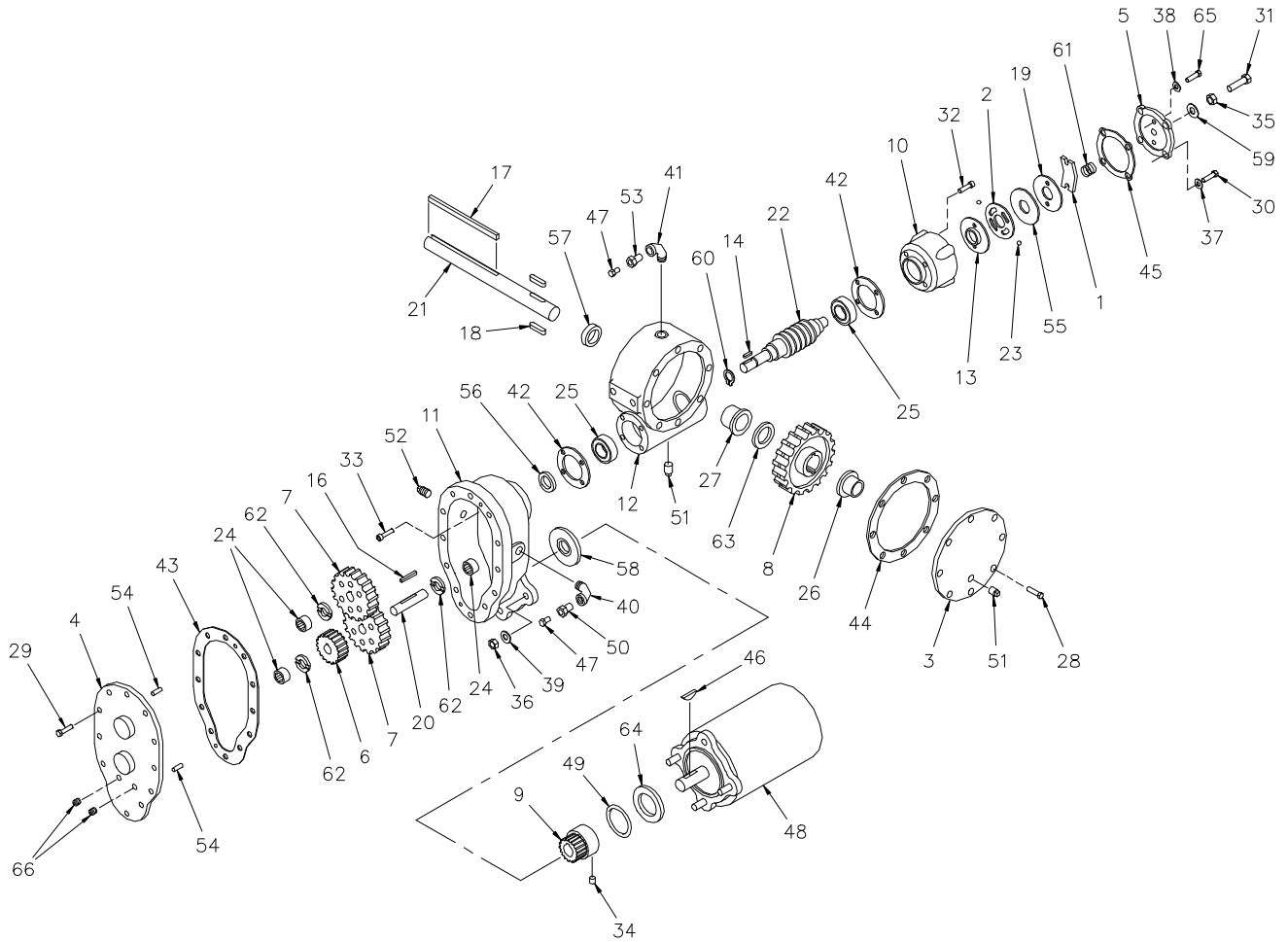
3203PRX



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320521	CABLE REEL
2	1	320551	REEL MOUNT BRACKET
3	3	000115	#15 JIFFY CLIP
4	5	320570	D-RING
5	2	000302	BUTT SPLICE WIRE TERMINAL
6	1	000300	WIRE TERMINAL
7	3 FT	800626	16GA 2 CONDUCTOR CABLE 300V TYPE SJO BLACK

HOIST ACTUATOR ASSEMBLY

P/N 320324



HOIST ACTUATOR ASSEMBLY

P/N 320324

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	360637	FLAT SPRING
2	1	360331	CAM PLATE
3	1	300041	GEAR HOUSING COVER
4	1	300042	SPUR GEAR HOUSING COVER
5	1	360450	BRAKE COVER
6	1	300043	IDLER GEAR
7	2	300044	SPUR GEAR
8	1	300045	WORM R.H. GEAR
9	1	300046	PINION GEAR
10	1	360336	BRAKE HOUSING
11	1	300047	SPUR GEAR HOUSING
12	1	300048	GEAR HOUSING
13	1	360339	BRAKE HUB
14	1	300049	KEY 3/16 SQ x 1/2 LG
15	-	-	-
16	1	300050	KEY 3/16 SQ x 1 9/16 LG
17	1	341561	KEY 1/4 SQ x 2 3/4 LG
18	2	300052	KEY RD 5/16 x 5/16 x 15/16 LG
19	1	360342	RETAINER PLATE
20	1	300053	SPUR GEAR SHAFT
21	1	320323	OUTPUT SHAFT
22	1	320312	RIGHT HAND WORM GEAR
23	2	360345	BALL
24	3	300056	NEEDLE BEARING
25	2	300057	BALL BEARING
26	1	300058	BUSHING
27	1	300059	BUSHING
28	10	320313	CAPSCREW 1/4-20 NC x 3/4 LG NYLOCK
29	12	005500	CAPSCREW 1/4-20 NC x 3/4 LG
30	4	005604	CAPSCREW 1/4-20 NC x 1 LG
31	1	320311	CAPSCREW 3/8 x 1 1/2 LG ALL THREAD
32	4	320310	CAPSCREW 1/4-20 NC x 1 LG
33	4	300060	SOCKET HEAD SCREW 1/4-20 NC x 3/4 LG LOC-WEL
34	1	300061	SETSCREW 1/4-20 NC x 5/16 LG LOC-WEL
35	1	360353	HEX JAM NUT 3/8-16 NC
36	3	071012	HEX NUT 3/8-24 NF
37	4	360354	SPLIT LOCK WASHER 1/4 MED SECT
38	2	360455	FLAT WASHER 1/4 ALUM

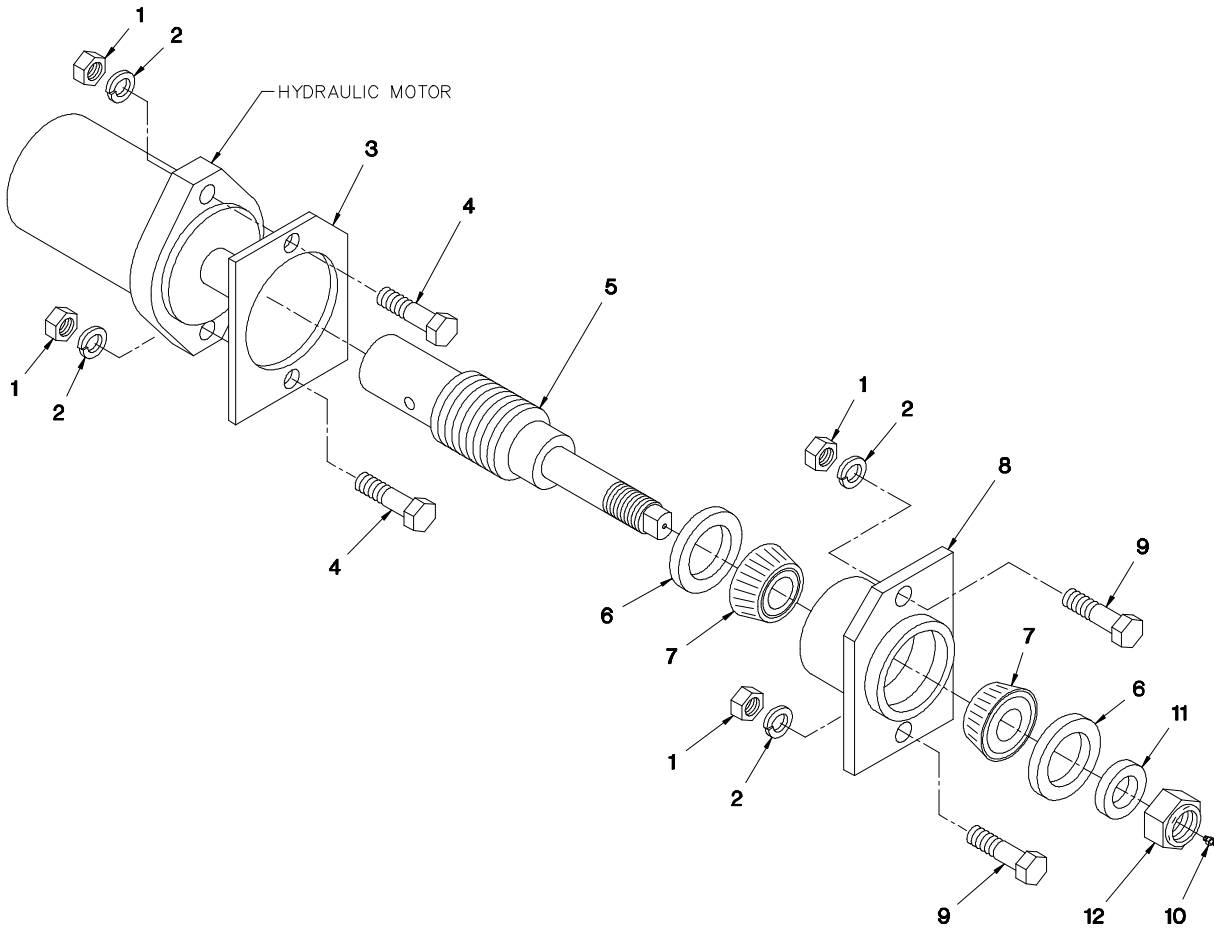
HOIST ACTUATOR ASSEMBLY

P/N 320324

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
39	3	021100	SPLIT LOCK WASHER 3/8
40	1	320314	90° ELBOW 3/8-18 NPT BOTH ENDS
41	1	320315	90° ELBOW 1/4-18 NPT BOTH ENDS
42	2	300062	GASKET BEARING
43	1	300063	SPUR GEAR HOUSING GASKET
44	1	300064	GEAR HOUSING COVER GASKET
45	1	360359	BRAKE COVER GASKET
46	1	300065	WOODRUFF KEY
47	2	300066	RELIEF FITTING
48	1	300067	12V MOTOR
49	1	300068	O-RING 1 OD x 1/8 THICK
50	1	300069	REDUCER -6 NPT / -2 NPT
51	2	300070	PLUG PIPE -4 NPT SQ HD
52	1	300073	PLUG PIPE -6 NPT HEX SOC HEADLESS
53	1	300074	REDUCER -4 NPT / -2 NPT
54	2	300075	DOWEL PIN
55	2	360364	THRUST PLATE
56	1	300076	OIL SEAL 3/4 ID x 1 1/4 OD x 1/4 THICK
57	1	300077	OIL SEAL 1 1/4 ID x 1 3/4 OD x 1/4 THICK
58	1	300078	OIL SEAL 1 1/2 ID x 2 1/4 OD x 5/16 THICK
59	1	360371	THREAD SEAL
60	1	300079	SNAP RING
61	1	360368	SPRING
62	3	300080	THRUST WASHER
63	1	300081	THRUST WASHER
64	1	300082	FIBER WASHER
65	2	360456	SCREW 1/4-20 NC x 1 LG ALL THREAD
66	2	320382	PIPE PLUG

TURNER ASSEMBLY (HYDRAULIC)

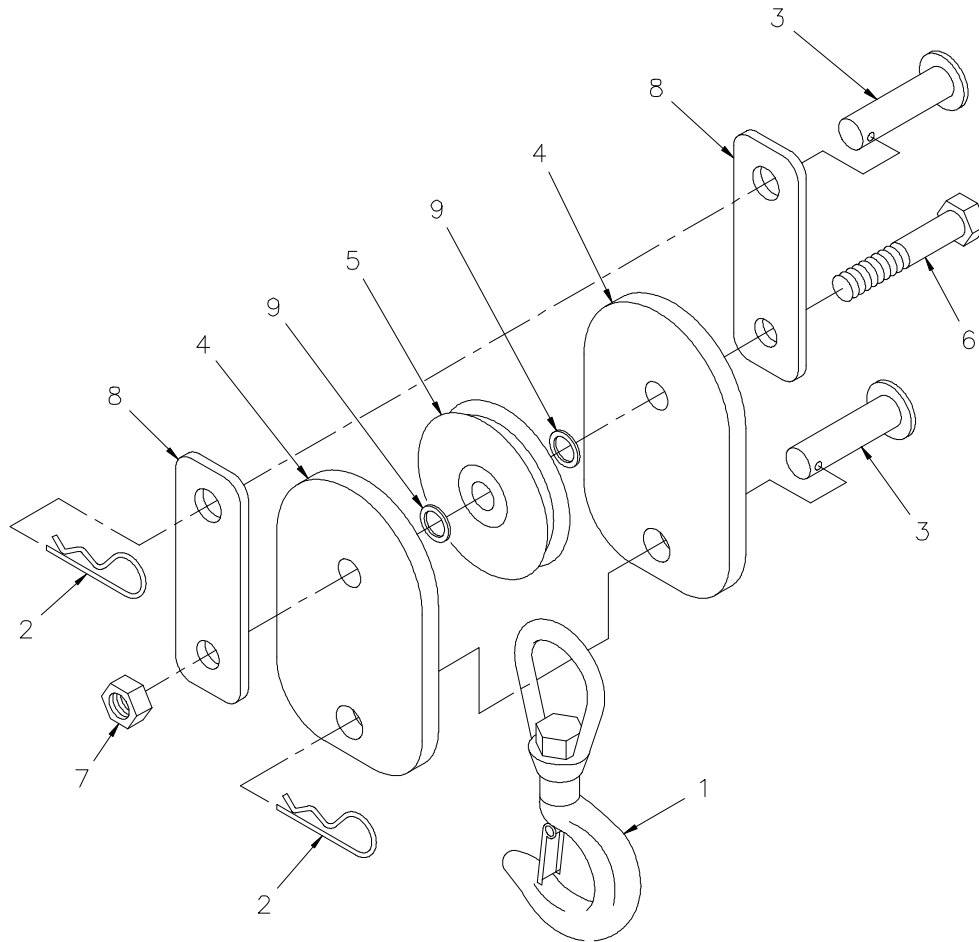
3203P/PR/PRX



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	4	017701	HEX NUT 1/2-13NC
2	4	021500	LOCK WASHER 1/2
3	1	330484	SPACER
4	2	011603	CAPSCREW 1/2-13NC x 1 3/4
5	1	330420	SHAFT ASSEMBLY
6	2	330486	OIL SEAL
7	2	330485	BEARING
8	1	330472	HOUSING
9	2	010201	CAPSCREW 1/2-13NC x 1 1/2
10	1	239300	GREASE ZERK
11	1	330483	SPACER
12	1	019000	HEX LOCK NUT 7/8-14NF

TRAVELING BLOCK ASSEMBLY

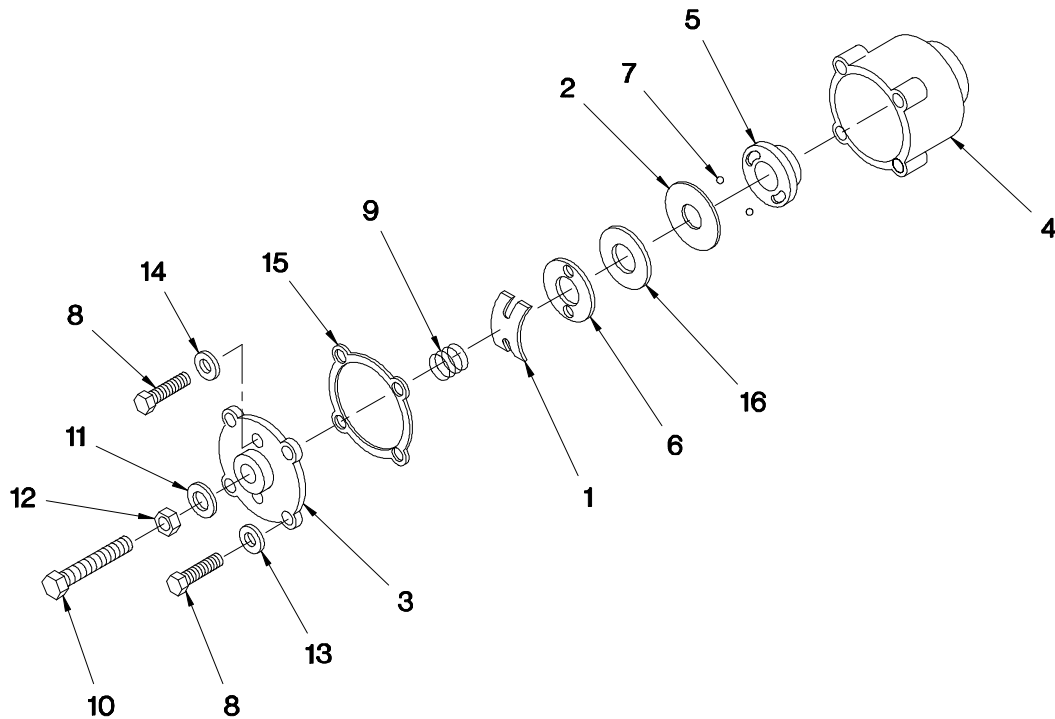
P/N 320433



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	100309	SWIVEL HOOK
2	2	360124	HITCH PIN
3	2	320434	BLOCK PIN
4	2	320403	TRAVELING BLOCK
5	1	200909	SHEAVE ASSEMBLY w/ BEARING
6	1	013512	HEX HD SCREW 5/8 NC x 3 1/2
7	1	018200	HEX HALF LOCK NUT 5/8 NC
8	2	320404	BLOCK
9	2	330100	FLAT WASHER

NOTE: STANDARD 62' CABLE ASSEMBLY MAY BE ORDERED USING P/N 320338.
OPTIONAL 75' CABLE ASSEMBLY MAY BE ORDERED USING P/N 320339.

AUTOMATIC SAFETY BRAKE ASSEMBLY (OIL COOLED) HOIST



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	360367	FLAT SPRING
2	1	360331	CAM PLATE
3	1	360450	HOUSING COVER
4	1	360336	BRAKE HOUSING
5	1	360339	BRAKE HUB
6	1	360342	RETAINER PLATE
7	2	360345	BRAKE BALL
8	6	360453	CAPSCREW 1/4 NC x 1
9	1	360368	COIL SPRING
10	1	360456	CAPSCREW 3/8 NC x 1 1/2
11	1	360371	THREAD SEAL
12	1	360353	JAM NUT 3/8 NC
13	4	360465	THREAD SEAL
14	2	360455	WASHER FLAT 1/4 ALUM
15	1	360359	GASKET
16	1	360364	THRUST PLATE

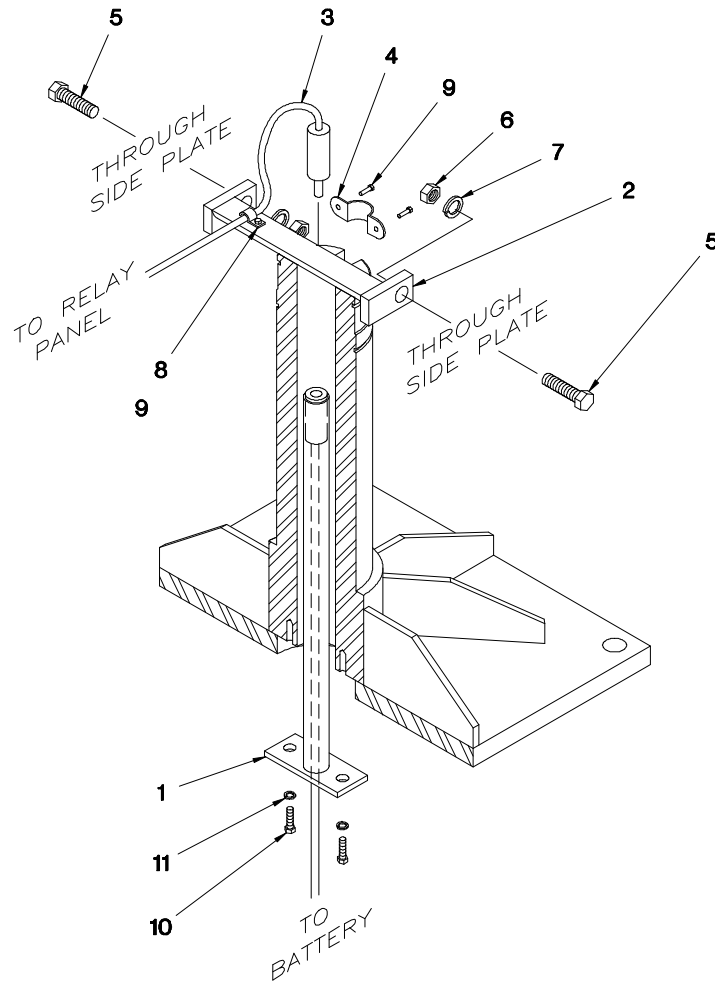
AUTOMATIC SAFETY BRAKE ASSEMBLY

(OIL COOLED) HOIST

ASSEMBLY INSTRUCTIONS:

1. Winch has right hand worm and gear. Cable spools over drum. Use number one slots for brake balls(7) in cam plate(2).
2. Install brake hub(5) through brake housing(4) on winch worm with key.
3. Assemble balls(7) in cam plate(2) using hard grease to hold balls in place.
4. Place cam plate(2) on brake hub(5), matching its holes with the balls.
5. Install thrust plate(16).
6. Thread capscrew(10) with jam nut (12) and thread seal (11) through housing cover(3).
7. Place gasket(15) on housing cover(3).
8. Install coil spring(9) on capscrew(10).
9. Install flat spring(1) on capscrew(10).
10. Secure retainer plate(6) and flat spring(1) to housing cover(3) using capscrews(8) and washers(14).
11. Using capscrews(8) and thread seals(13) attach housing cover(3) to brake housing(4).
12. Test brake by shifting winch to UP then DOWN to see if brake is working in proper rotation. If not, remove housing cover(3) and locate brake balls(7) in opposite set of slots of cam plate(2).
13. Adjust to suit by tightening or loosening capscrew(10) on outside of housing cover(3). When proper adjustment is obtained, secure capscrew(10) with jam nut(12).

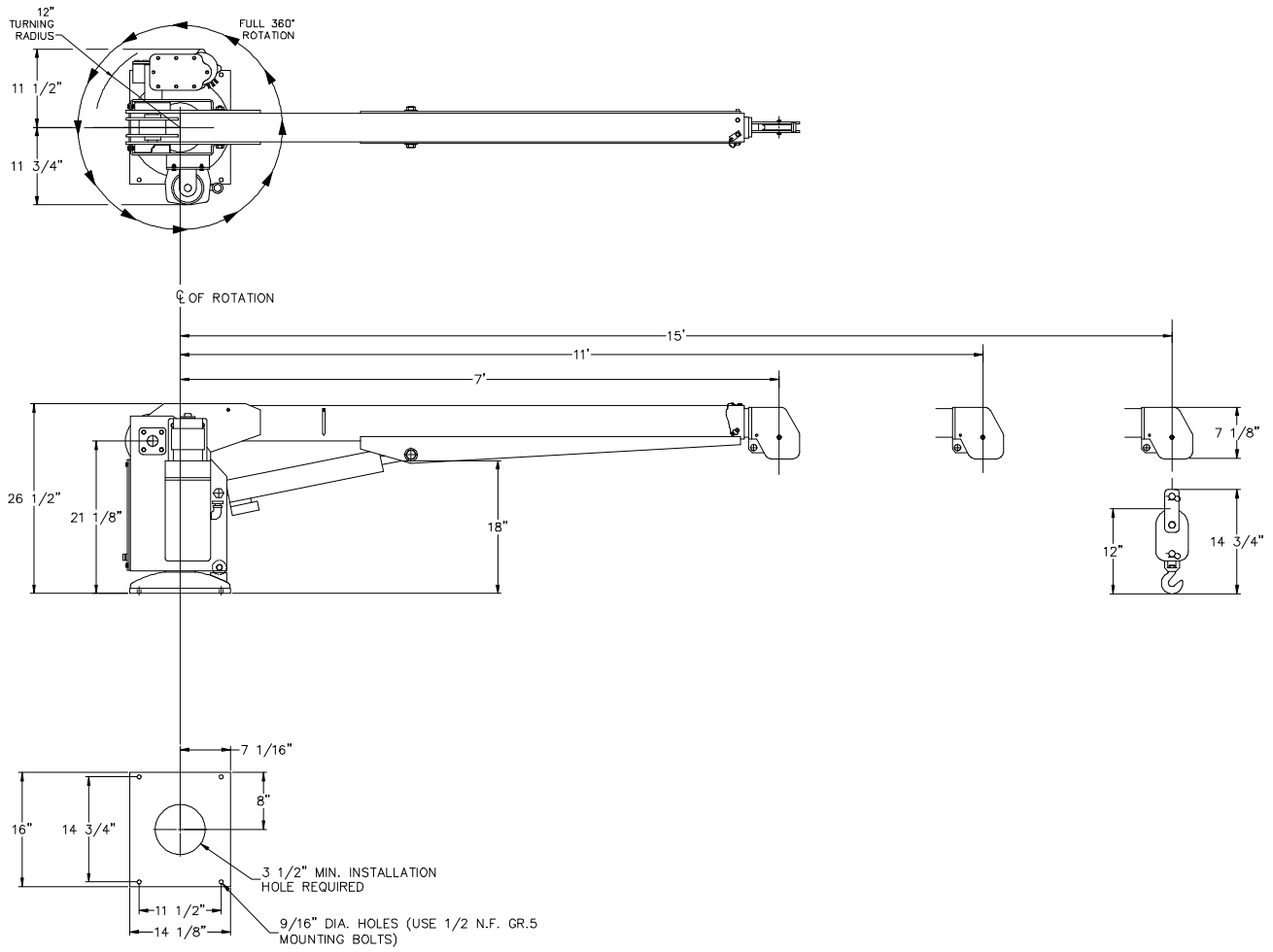
TWECO ASSEMBLY



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320488	POWER CABLE ASSEMBLY
2	1	320515	UPPER TWECO BRACKET
3	1	330258	TWECO POWER CONNECTOR
4	1	320372	UPPER TWECO CLAMP
5	2	011510	CAPSCREW 1/2 NC x 1 1/4
6	2	017701	HEX NUT 1/2 NC
7	2	021500	SPLIT LOCK WASHER 1/2
8	1	000115	CLIP
9	3	320371	SELF-TAP SCREW 1/4 NC x 5/8
10	2	005401	CAPSCREW 1/4 NC x 5/8
11	2	020200	SPLIT LOCK WASHER 1/4

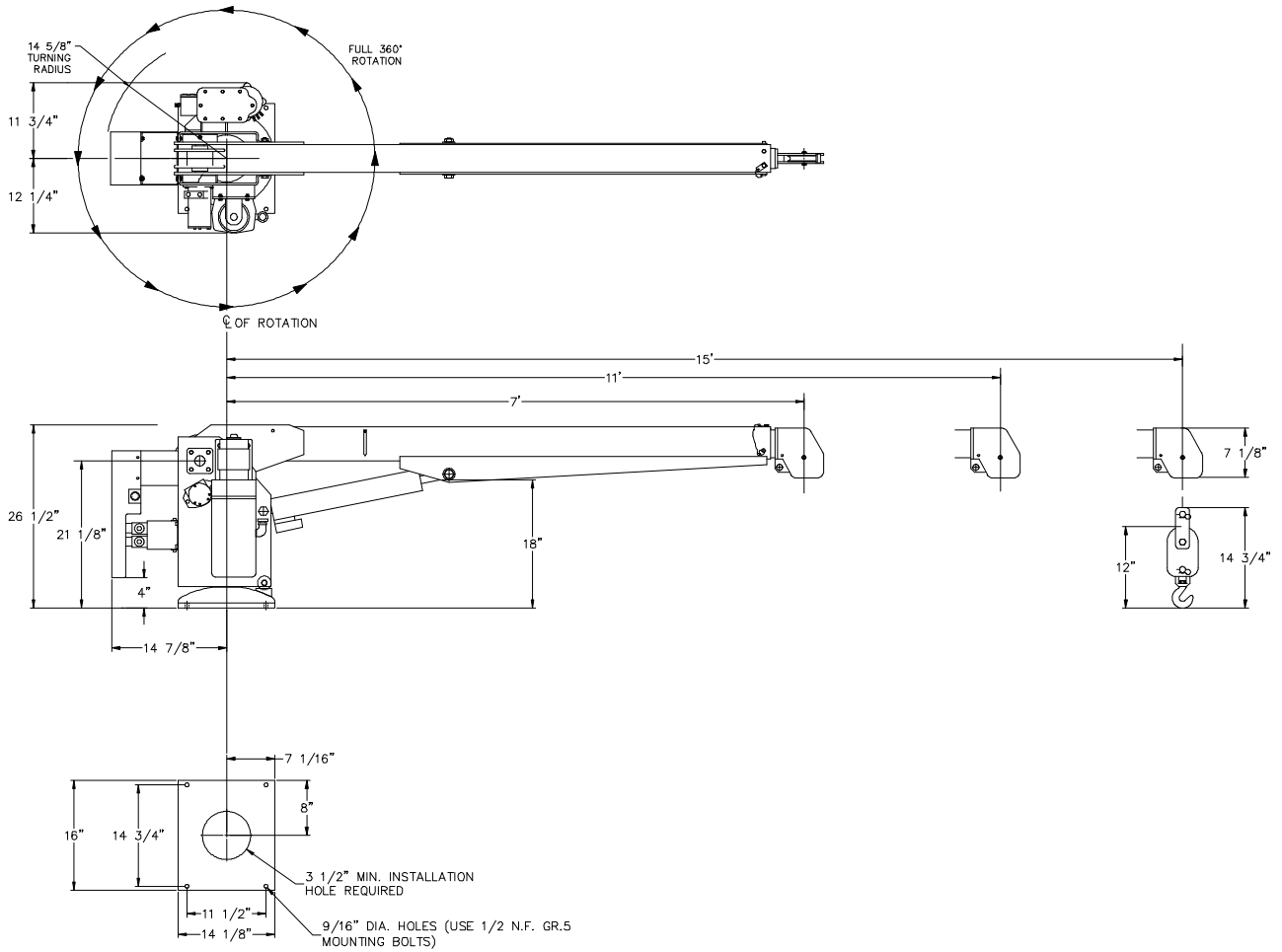
GENERAL DIMENSIONS

3203P



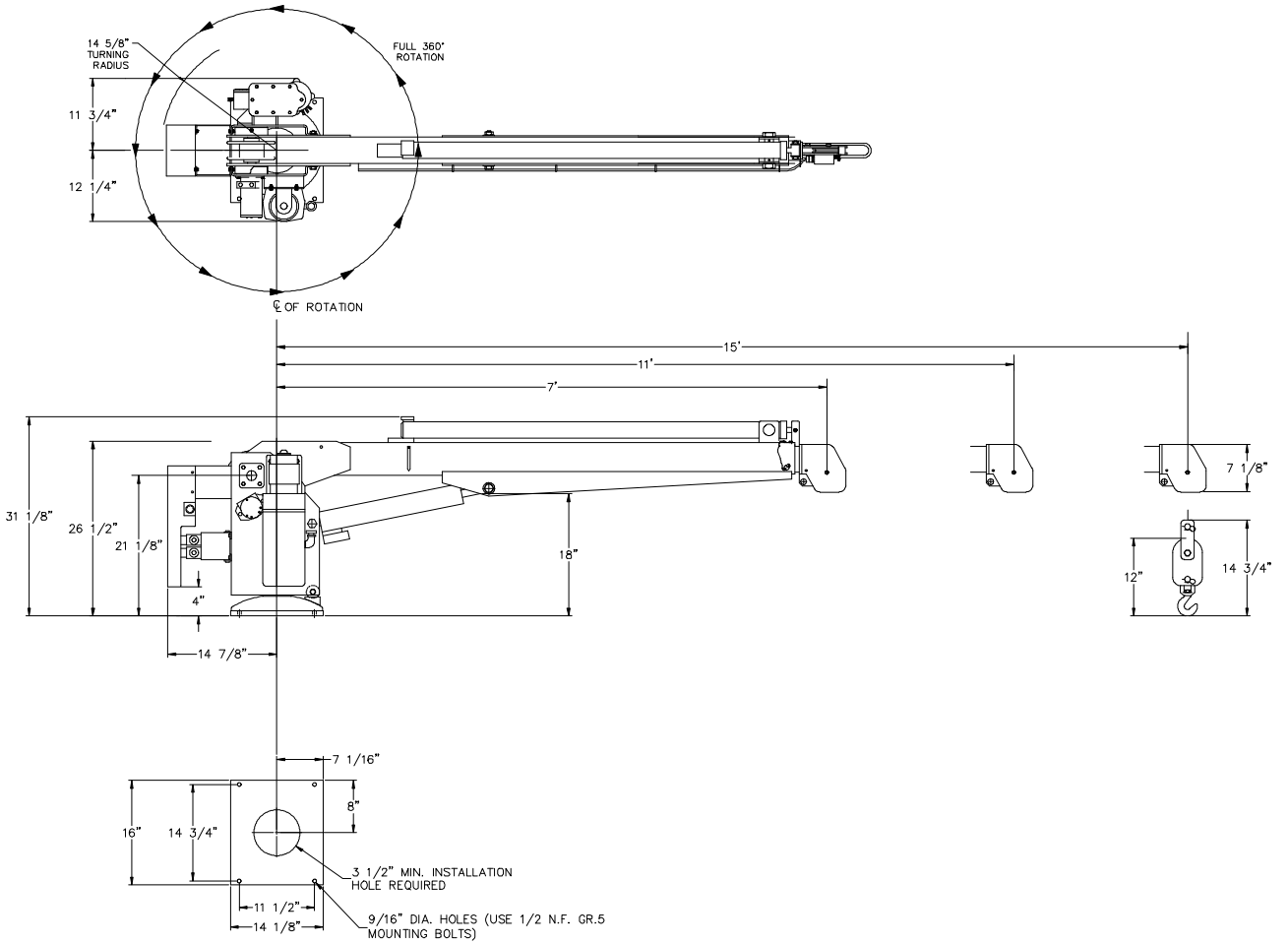
GENERAL DIMENSIONS

3203PR



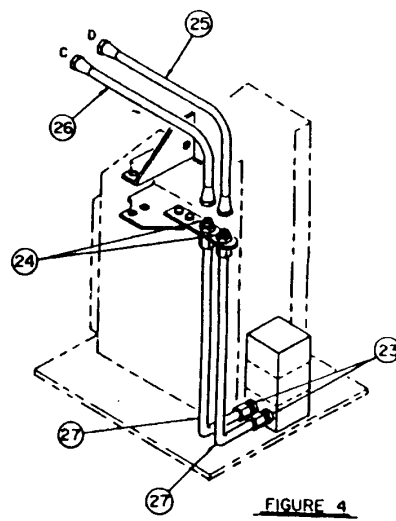
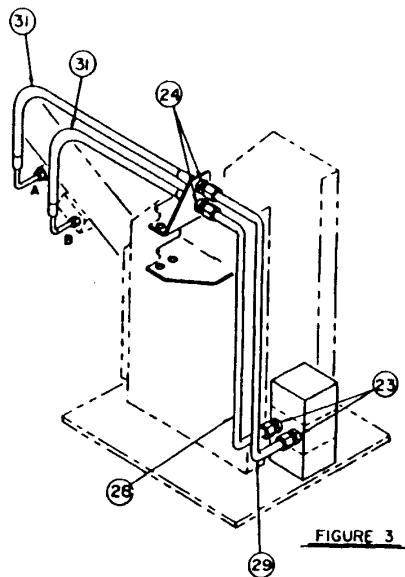
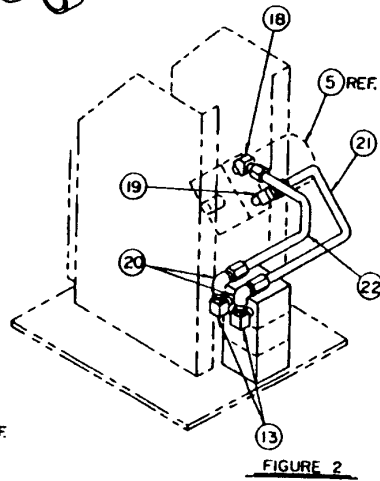
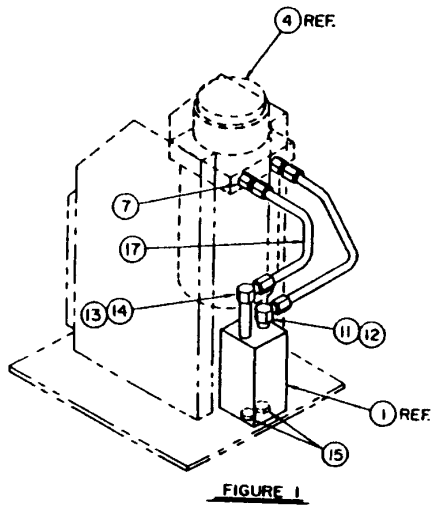
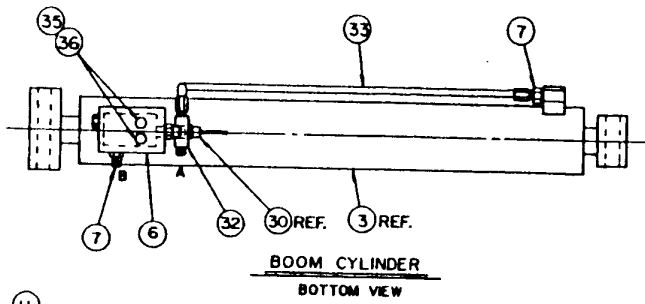
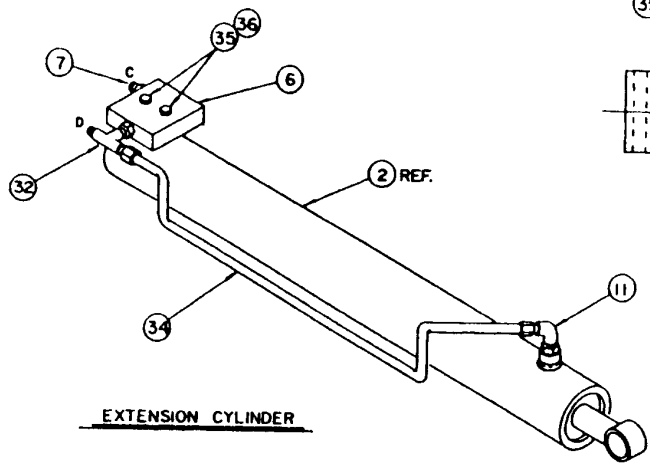
GENERAL DIMENSIONS

3203PRX



HYDRAULIC ASSEMBLY

3203PRX



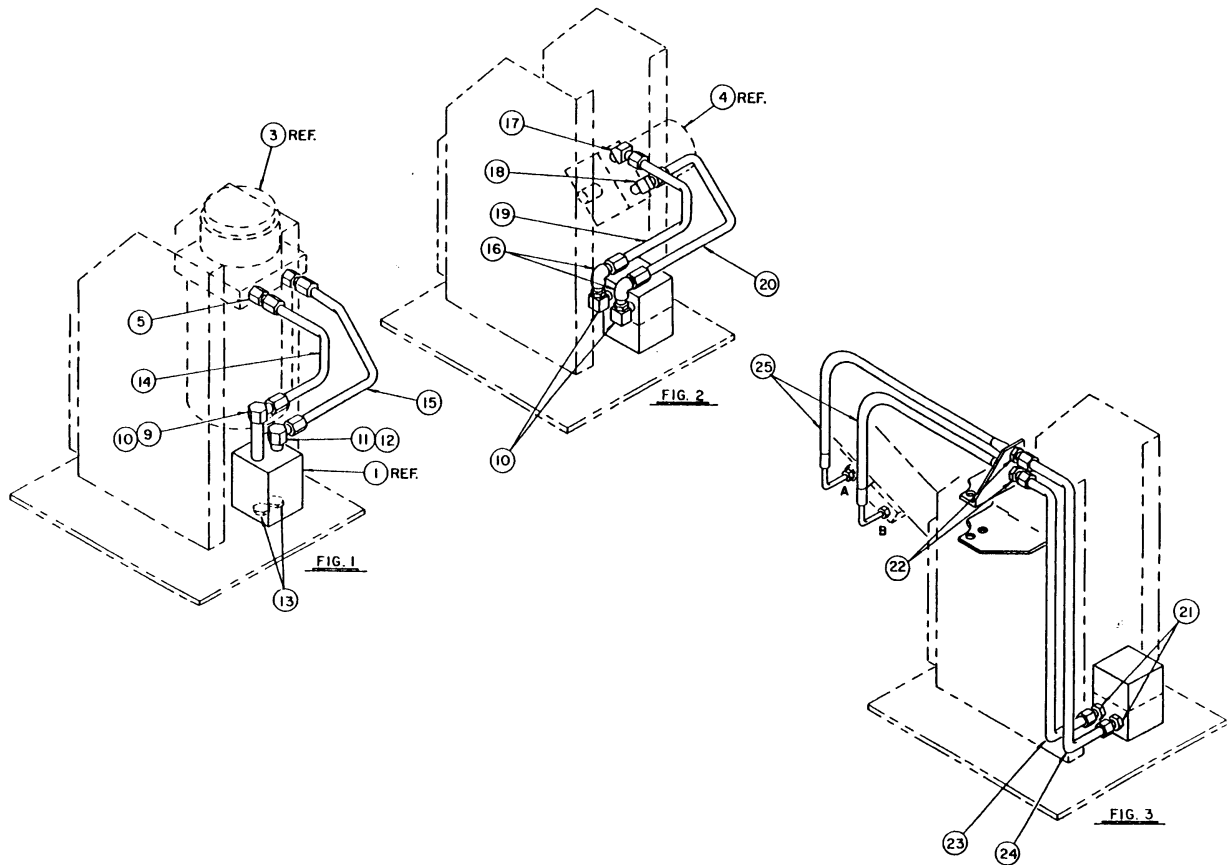
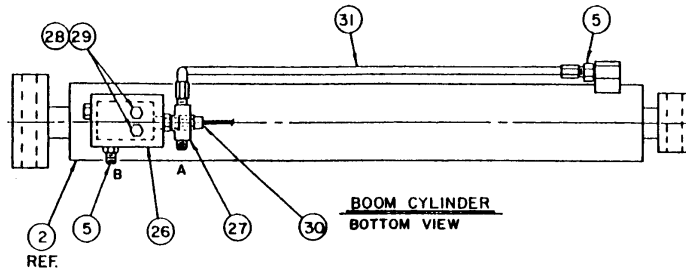
HYDRAULIC ASSEMBLY

3203PRX

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	202710	MANIFOLD (REF)
2	1	202711	EXTENSION CYLINDER (REF)
3	1	320325	BOOM CYLINDER (REF)
4	1	320336	HYDRAULIC PUMP & RESERVOIR (REF)
5	1	480027	HYDRAULIC ROTATION MOTOR (REF)
6	2	330412	COUNTERBALANCE VALVE
7	4	200876	ADAPTER -6 ORB/-6 JIC
8	-	-	-
9	-	-	-
10	-	-	-
11	2	241175	90° ELBOW -6 ORB/-6 JIC
12	1	330058	REDUCER -10 ORB/-6 ORP
13	3	330272	90° ELBOW -8 ORB/-6 JIC
14	1	330274	REDUCER -10 ORB/-8 ORP
15	2	330072	HEX HEAD PLUG -10 ORB
16	1	320408-001	HYDRAULIC TUBE ASSEMBLY
17	1	320409	HYDRAULIC TUBE ASSEMBLY
18	1	320350	45° ELBOW -8 NPTM/-6 JIC
19	1	202759	90° ELBOW -8 NPTM/-6 JIC
20	2	480194	90° ELBOW -6 SWIVEL/-6 JIC
21	1	320407	HYDRAULIC TUBE ASSEMBLY
22	1	320410	HYDRAULIC TUBE ASSEMBLY
23	4	202756	ADAPTER -8 ORB/-6 JIC
24	4	241170	BULKHEAD UNION
25	1	320473	HYDRAULIC TUBE ASSEMBLY
26	1	320466	HYDRAULIC TUBE ASSEMBLY
27	1	320489	HYDRAULIC TUBE ASSEMBLY
28	1	320490	HYDRAULIC TUBE ASSEMBLY
29	1	320491	HYDRAULIC TUBE ASSEMBLY
30	1	320472	LOAD SENSOR ASSEMBLY
31	2	320467	HYDRAULIC HOSE ASSEMBLY
32	2	241168	TEE -6 ORB/-6 JIC RUN
33	1	320469	HYDRAULIC TUBE ASSEMBLY
34	1	330275	HYDRAULIC TUBE ASSEMBLY
35	4	020200	SPLIT LOCK WASHER 1/4
36	4	005810	CAPSCREW 1/4-20 NC x 1 3/4

HYDRAULIC ASSEMBLY

3203PR



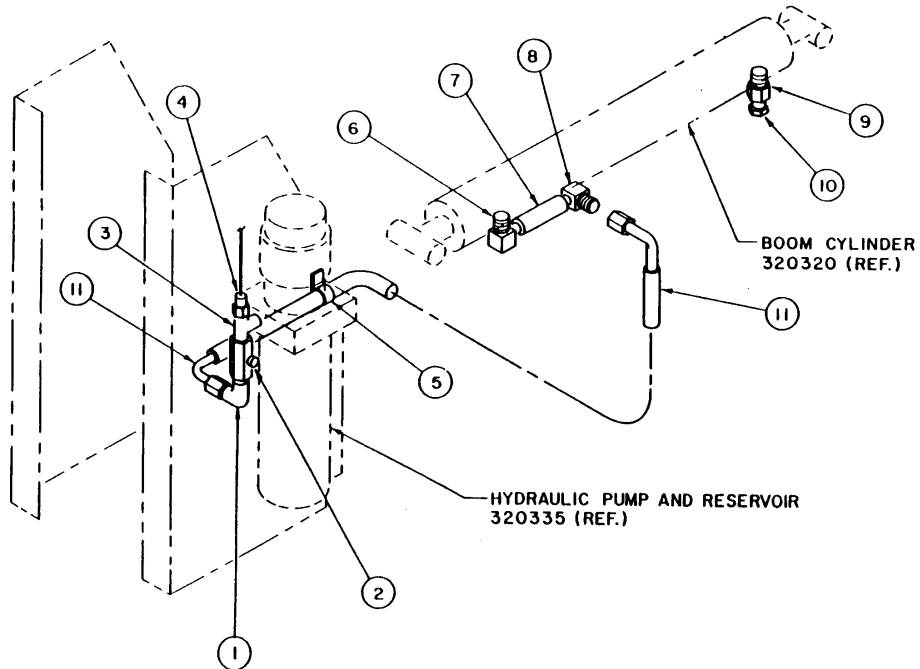
HYDRAULIC ASSEMBLY

3203PR

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	202710	MANIFOLD (REF)
2	1	320352	BOOM CYLINDER (REF)
3	1	320336	HYDRAULIC PUMP & RESERVOIR (REF)
4	1	480027	HYDRAULIC ROTATION MOTOR (REF)
5	3	200876	ADAPTER -6 ORB/-6 JIC
6	-	-	-
7	-	-	-
8	-	-	-
9	1	330274	REDUCER -10 ORB/-8 ORP
10	3	330272	90° ELBOW -8 ORB/-6 JIC
11	1	330058	REDUCER -10 ORB/-6 ORP
12	2	241175	90° ELBOW -6 ORB/-6 JIC
13	2	330072	HEX HEAD PLUG -10 ORB
14	1	320409	HYDRAULIC TUBE ASSEMBLY
15	1	320408-001	HYDRAULIC TUBE ASSEMBLY
16	2	480194	90° ELBOW -6 SWIVEL/-6 JIC
17	1	320350	45° ELBOW -8 NPTM/-6 JIC
18	1	202759	90° ELBOW -8 NPTM/-6 JIC
19	1	320410	HYDRAULIC TUBE ASSEMBLY
20	1	320407	HYDRAULIC TUBE ASSEMBLY
21	2	202756	ADAPTER -8 ORB/-6 JIC
22	2	241170	BULKHEAD UNION
23	1	320490	HYDRAULIC TUBE ASSEMBLY
24	1	320491	HYDRAULIC TUBE ASSEMBLY
25	2	320467	HYDRAULIC HOSE ASSEMBLY
26	1	330412	COUNTERBALANCE VALVE
27	1	241168	TEE -6 ORB/-6 JIC RUN
28	2	005810	CAPSCREW 1/4-20 NC x 1 3/4
29	2	020200	SPLIT LOCK WASHER 1/4
30	1	320472	LOAD SENSOR ASSEMBLY
31	1	320469	HYDRAULIC TUBE ASSEMBLY

HYDRAULIC ASSEMBLY

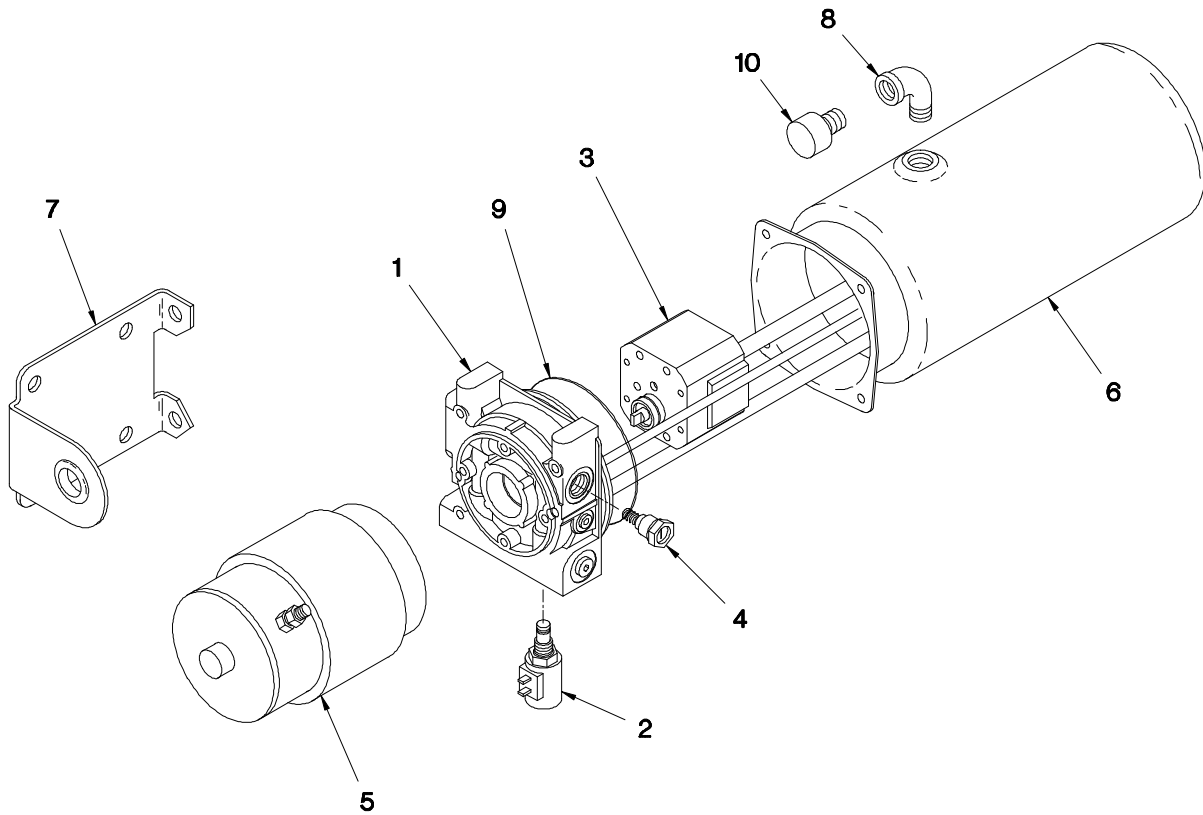
3203P



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	241175	90° ELBOW -6 SWIVEL/-6 JIC
2	1	320343	FLOW REGULATOR
3	1	340344	TEE
4	1	320560	LOAD SENSOR
5	1	083803	HOSE CLAMP -6
6	1	320370	90° ELBOW -6 ORB/-6 NPTM
7	1	301103	VELOCITY FUSE
8	1	330596	90° ELBOW -6 NPTF/-6 JIC
9	1	320340	ADAPTER -6 ORB
10	1	330584	BREATHER FILTER
11	1	320465	HOSE ASSEMBLY

HYDRAULIC PUMP & RESERVOIR

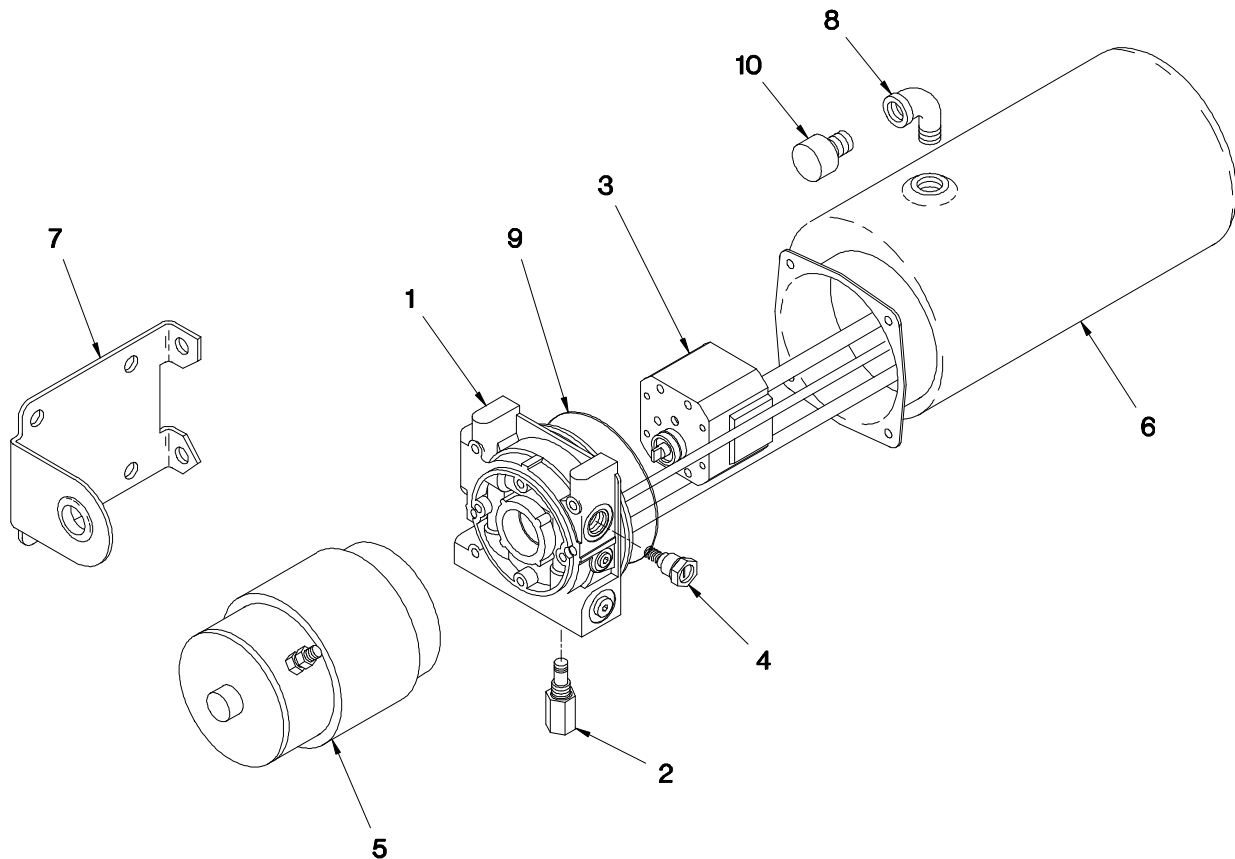
P/N 320335



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320335-001	ADAPTER KIT
2	1	320335-002	RELEASE VALVE KIT
3	1	320335-003	PUMP KIT
4	1	320335-004	RELIEF VALVE KIT
5	1	320335-005	MOTOR
6	1	320335-006	RESERVOIR KIT
7	1	320335-007	MOUNTING BRACKET KIT
8	1	320335-008	ELBOW FITTING
9	1	320335-010	O-RING
10	1	200545	BREATHER CAP

HYDRAULIC PUMP & RESERVOIR

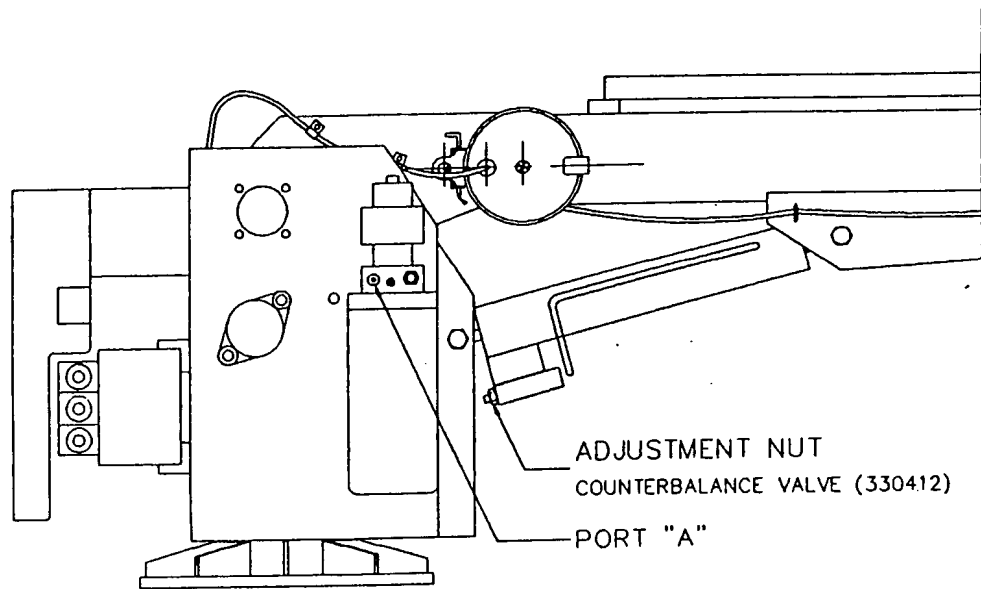
P/N 320336



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	320336-005	ADAPTER KIT
2	1	320336-002	RETURN PORT PLUG KIT
3	1	320335-003	PUMP KIT
4	1	320336-003	RELIEF VALVE KIT
5	1	320335-005	MOTOR
6	1	320336-006	RESERVOIR KIT
7	1	320335-007	MOUNTING BRACKET KIT
8	1	320335-008	ELBOW FITTING
9	1	320335-010	O-RING
10	1	200545	BREATHER CAP

COUNTERBALANCE VALVE SETTING

3203 SERIES



CAUTION:
IF COUNTERBALANCE VALVE IS REPLACED, THE CORRECT PRESSURE SETTING MUST BE MADE BEFORE CRANE IS IN SAFE WORKING CONDITION.

IMPORTANT

No load must be on crane boom and booms must not be extended during gauge installation and removal procedure.

Valve Setting

To set counterbalance valve (330412), remove plug (5/16" Allen wrench) from port "A" of hydraulic pump. Install a pressure gauge of 2500 psi capacity minimum into the port (-6 O-ring port).

After installed, boom up until boom cylinder is fully elevated. Next, boom down in small increments while reading pressure gauge. Loosen nut on end of valve and adjust 3/16" Allen screw and then re-tighten nut. Proceed again until pressure reading is a constant 1000 psi. If valve is not set and boom reaches the full down position, boom up and keep trying.

Remove gauge and replace plug when adjustment is complete.

Note: 3203 PRX extendible boom cylinder (202711) requires no adjustment to counter balance valve if replaced.

TROUBLESHOOTING GUIDE

3203 PRX

1 CRANE FAILS TO OPERATE (ALL FUNCTIONS)

A. Check power to crane - 12v to ground at upper left power terminal of pump relay

1. If ok go to B.
2. If not check continuity back to battery at Tweco and battery connections.

B. If there is power at pump relay (left side) and no functions are operable the most likely cause is in the control circuits (pendant or receptacle).

1. Verify by touching jumper from hot side of pump relay to left side control terminal (small) on pump relay. Pump should run but crane should not move unless a valve is stuck open. Also test by jumping from hot side of pump relay to left side control terminal of hoist down relay. hoist should operate down.

C. If previous tests are ok, then remove pendant and check at receptacle on crane with jumper and test light.

1. Check for voltage from pin "D" of socket to ground.
 - i. If not successful, then receptacle assembly is bad.
 - ii. If ok, jumper from "D" to "F" (hoist down), or "D" to "J" (pump). Other functions can be checked also by probing receptacle with jumper. See P/N 680065 pg 7-6.0.0. Hydraulic functions require that pump and valve are both activated.

D. If receptacle tests are ok, then fault is in pendant hot wire. Either a break in the wire or it is not attached inside of the pendant (goes

to center terminal of rotation switch from pin "D").

2 HOIST UP, BOOM DOWN, & EXTEND (OUT) DON'T OPERATE BUT ALL OTHER FUNCTIONS OPERATE. PUMP RUNS WHEN BOOM DOWN AND EXTEND FUNCTIONS ARE TRIED. THESE FUNCTIONS ARE TIED INTO THE ANTI-TWO BLOCK AND CRANE OVERLOAD SENSOR SYSTEMS. THE CRANE IS SHUT DOWN WHEN THE SENSORS OPEN THE GROUND CIRCUIT FROM THE FUNCTIONS.

A. Check two-block bail and switch at end of boom to verify they move freely. Switch should make audible click when operated. Try operating crane while pulling cord out of cord reel to check for possible bad spots in cord reel slip rings.

B. Check load sensor pressure switch - locate timing relay on lower right hand corner of relay panel. Disconnect wire coming from pressure switch at terminal #6 of timing relay. If crane operates replace pressure switch.

WARNING: BE SURE BOOM IS SUPPORTED BEFORE REMOVING SWITCH OR BOOM WILL FALL.

C. If previous test fails, then test timing relay by removing wire from terminal #1 of timing relay. If successful, clean the area around terminals 6 and 7 and recheck. If test still fails, replace timing relay.

D. Test drop out relay - pull orange wire from terminal #1 on the timing relay. If crane operates, ground orange wire to verify drop

TROUBLESHOOTING GUIDE

3203 PRX

out relay is working, then reattach to terminal #1. If crane still does not operate, pull socket off relay. Find where wire from cord reel feeds into relay socket. Jumper from this terminal of socket to ground. If crane operates, replace relay. If crane still does not operate, then check continuity through cord reel and two-block switch.

3 HOIST FAILS TO OPERATE IN EITHER DIRECTION BUT ALL HYDRAULIC FUNCTIONS OPERATE.

A. Listen for relay click for hoist up and hoist down. If relay doesn't click check for voltage at left side control terminal (small) when function is selected, if no voltage then use procedure for checking receptacle and pendant given in 1.C.

B. Check terminal A2 of hoist motor for power when operating either hoist up or hoist down. If there is voltage but motor does not try to run or get hot then motor is bad. If motor tries to run or gets hot then voltage reading at A2 will be less than 12 volts and motor may be dirty or have oil in it from failed oil seal.

C. If there is no power at A2 only on hoist up, then put test light across bottom power terminals of hoist down relay. If light comes on when hoist up is picked, then hoist down relay is bad. If test light doesn't light, put light across upper power terminals of hoist up relay and pick hoist up. If light comes on, replace hoist up relay.

D. If there is no power at A2 only on hoist down then put test light across bottom power terminals of hoist up relay. If light comes on when hoist down is picked, then hoist up relay is bad. If test light doesn't light, put light across upper power terminals of hoist down relay

and pick hoist down. If light comes on, replace hoist down relay.

NOTE: THERE ARE OTHER WAYS TO TEST FOR CIRCUIT CONTINUITY SUCH AS USING VOLT METER OR TEST LIGHT AND FOLLOWING CIRCUIT THROUGH BY TESTING AT EACH POINT FOR VOLTAGE TO GROUND.

4 ALL HYDRAULIC FUNCTIONS INOPERABLE.

A. Pump does not run, pump relay does not click. Jumper from upper left power terminal of pump relay to left side relay control terminal. If relay doesn't click, replace relay. If relay clicks and pump runs, check receptacle and pendant. (see 1.C.)

B. If relay clicks but pump doesn't run, check for voltage at pump motor terminal. If no voltage replace pump relay. If voltage is present, pump motor is bad or pump is locked. If pump is locked motor will get hot and voltage at motor terminal will be much lower than 12 volts.

5 PUMP RUNS BUT SINGLE HYDRAULIC FUNCTION DOESN'T WORK.

A. Select inoperable function with pendant switch and push manual override of valve in question-if function works use procedure 1.C. to check receptacle and pendant. If receptacle checks out and function can not be run by using jumper at receptacle, then valve or harness may be bad. Check for 12 volt at valve junction box. If no voltage present-check for loose wire at back of receptacle or terminal strip.

B. If voltage is present at valve, then valve may be bad. This can be checked by swapping

TROUBLESHOOTING GUIDE

3203 PRX

valve positions on manifold but leaving wiring attached. If trouble moves with valve, then valve is bad.

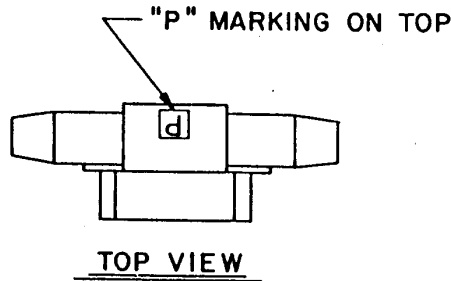
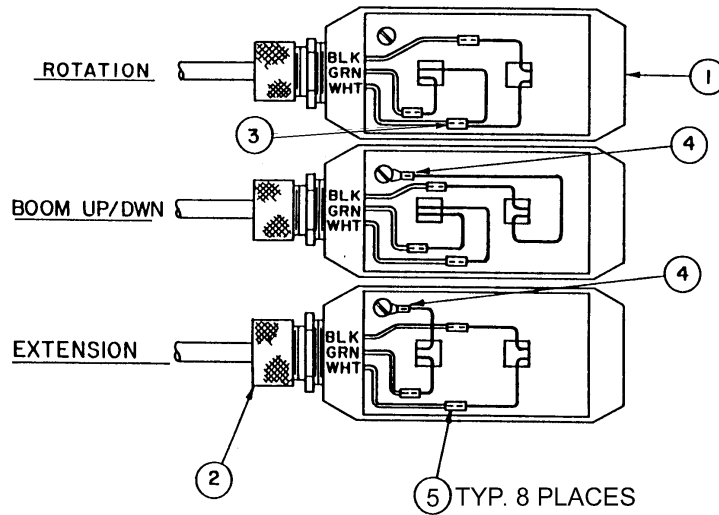
C. If boom retract or boom down functions don't work, then check for low hydraulic pressure at pump. These two functions have the highest pressure requirements for an unloaded crane because they must overcome the set pressures of the counter balance valves.

D. If hydraulic functions are more intermittent when cylinders are extended, then check hydraulic fluid level.

E. Boom locks up and won't come down when fully raised. This is caused by too high pump pressure which causes overload system to activate. Set relief pressure at 2100 psi. Unlock boom by disconnecting wire from terminal #6 of timing relay. Reconnect wire after boom is moved. If pressure is correct and problem continues, then replace overload pressure switch.

SOLENOID VALVES WIRING DIAGRAM

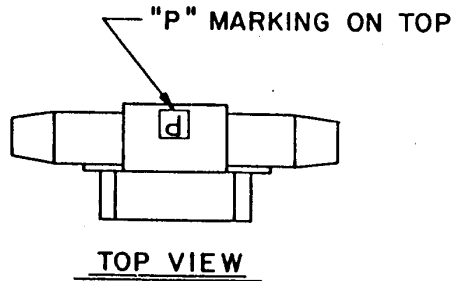
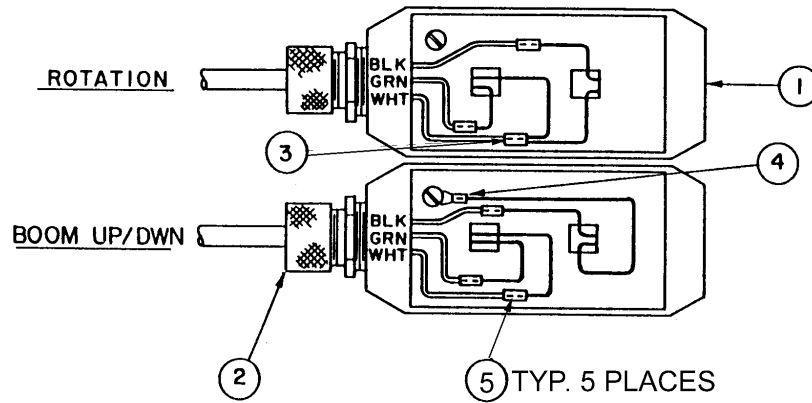
P/N 320480 - 3203PRX



ITEM	QTY	P/N	DESCRIPTION
1	-	REF	SOLENOID VALVE 300204
2	3	642908	CORD CONNECTOR
3	1	001102	WIRE TERMINAL 2RC-10
4	2	000300	WIRE TERMINAL
5	8	000302	WIRE TERMINAL 2R814

SOLENOID VALVES WIRING DIAGRAM

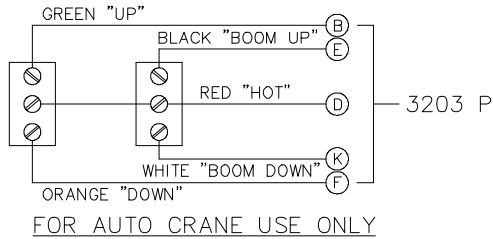
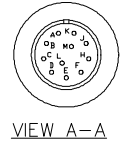
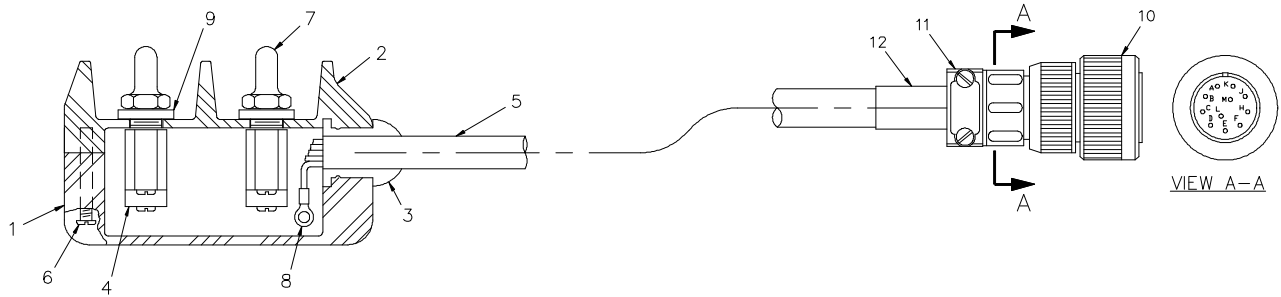
P/N 320481 - 3203PR



<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	-	REF	SOLENOID VALVE 300204
2	2	642908	CORD CONNECTOR
3	1	001102	WIRE TERMINAL 2RC-10
4	1	000300	WIRE TERMINAL
5	5	000302	WIRE TERMINAL 2R814

PENDANT ASSEMBLY

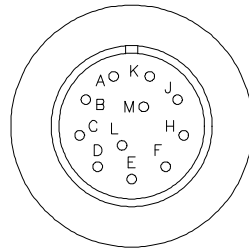
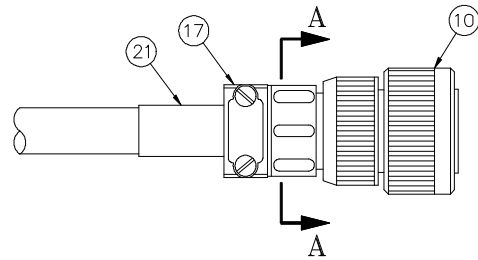
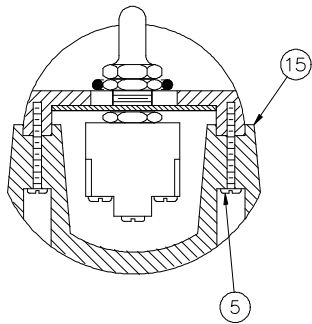
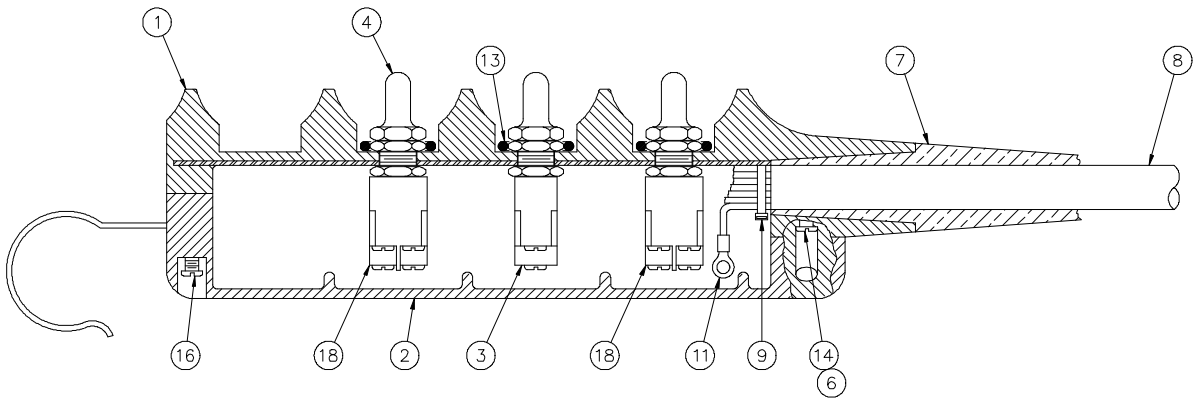
P/N 680068 - 3203P



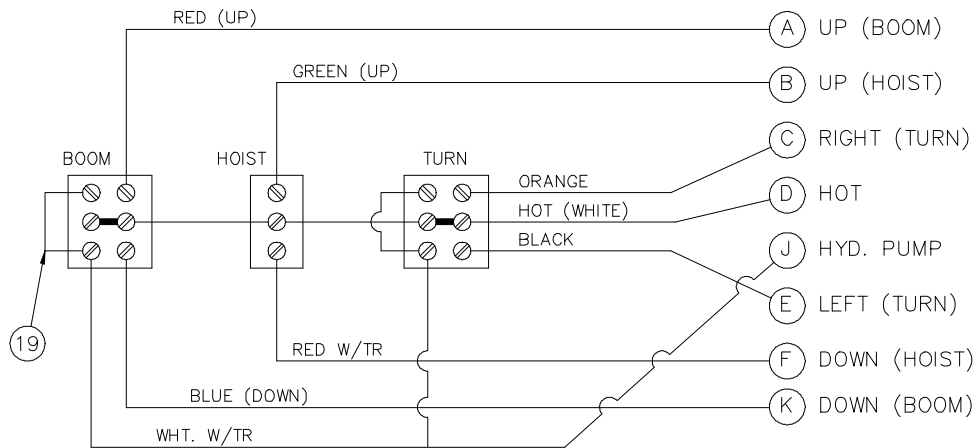
ITEM	QTY	P/N	DESCRIPTION
1	1	370130	PENDANT BOX
2	1	370131	PENDANT COVER
3	1	370132	PENDANT HOUSING GASKET
4	2	622000	TOGGLE SWITCH
5	17'	800629	CONDUCTOR CABLE
6	4	001207	RECESSED CROSS PAN HD SCREW #8 x1"
7	2	640302	BOOT
8	7	000101	TERMINAL RING
9	2	370135	PINION GEAR
10	1	320563	11 PIN BAYONET PLUG
11	1	480515	CABLE CLAMP
12	6"	490243	HEAT SHRINK TUBING

PENDANT ASSEMBLY

P/N 680064 - 3203PR



VIEW A-A



VIEW FROM BOTTOM

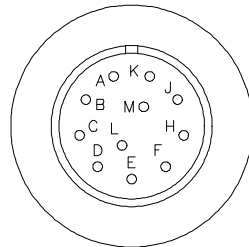
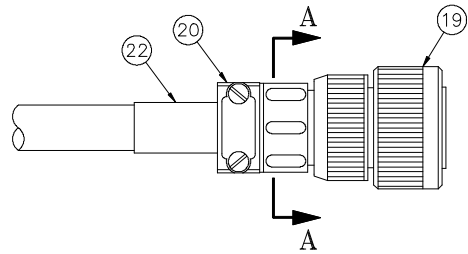
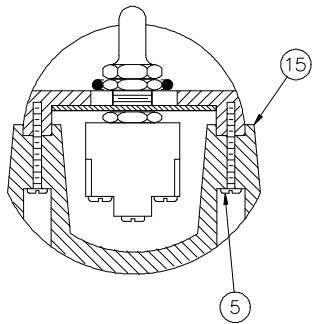
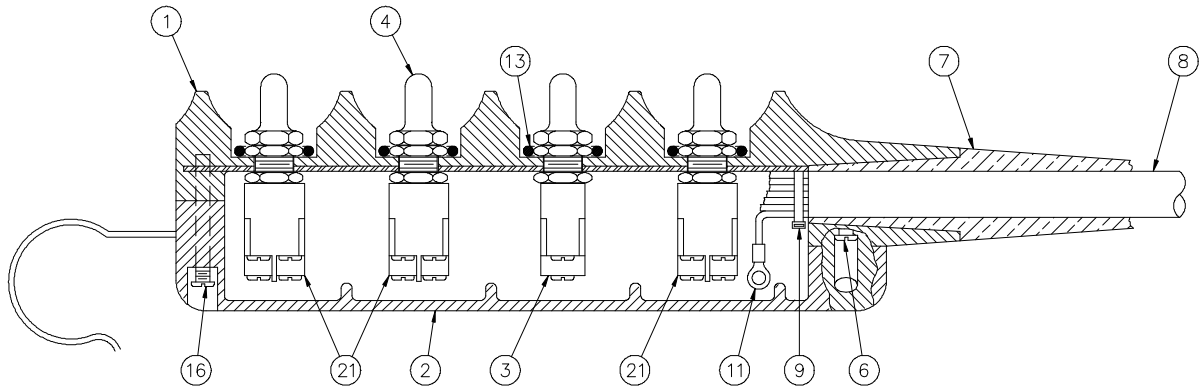
PENDANT ASSEMBLY

P/N 680064 - 3203PR

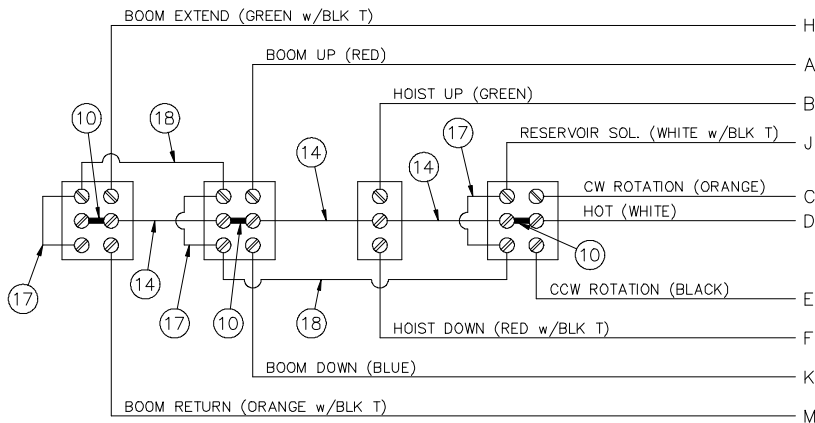
<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	631602	PENDANT HOUSING
2	1	631700	BOTTOM COVER
3	1	622000	TOGGLE SWITCH
4	3	640300	BOOT-TOGGLE SWITCH
5	10	001004	PAN HEAD SCREW #6 x 3/4
6	2	005101	PAN HEAD SCREW #8 x 1 1/4
7	1	633801	CABLE ADAPTER
8	18 FT	800630	CONDUCTOR CABLE
9	2	634401	TY-RAP CABLE TIE
10	1	320563	11 PIN BAYONET PLUG
11	15	000101	TERMINALS T & B
12	-	-	-
13	3	642100	O-RING
14	1	019700	SPLIT LOCK WASHER #8 PLATED
15	1.750	800580	3/4" WIDE OKONITE RUBBER TAPE
16	1	004700	PAN HEAD SCREW #8 x 1 1/2
17	1	480515	CABLE CLAMP
18	2	634200	TOGGLE SWITCH
19	2	636600	JUMPER BAR
20	.250	800592	WHITE 16GA x 3 IN WIRE
21	6"	490243	TUBING HEAT SHRINK

PENDANT ASSEMBLY

P/N 680065 - 3203PRX



VIEW A-A



VIEW FROM BOTTOM

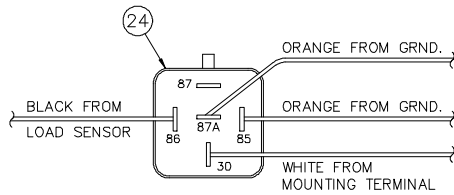
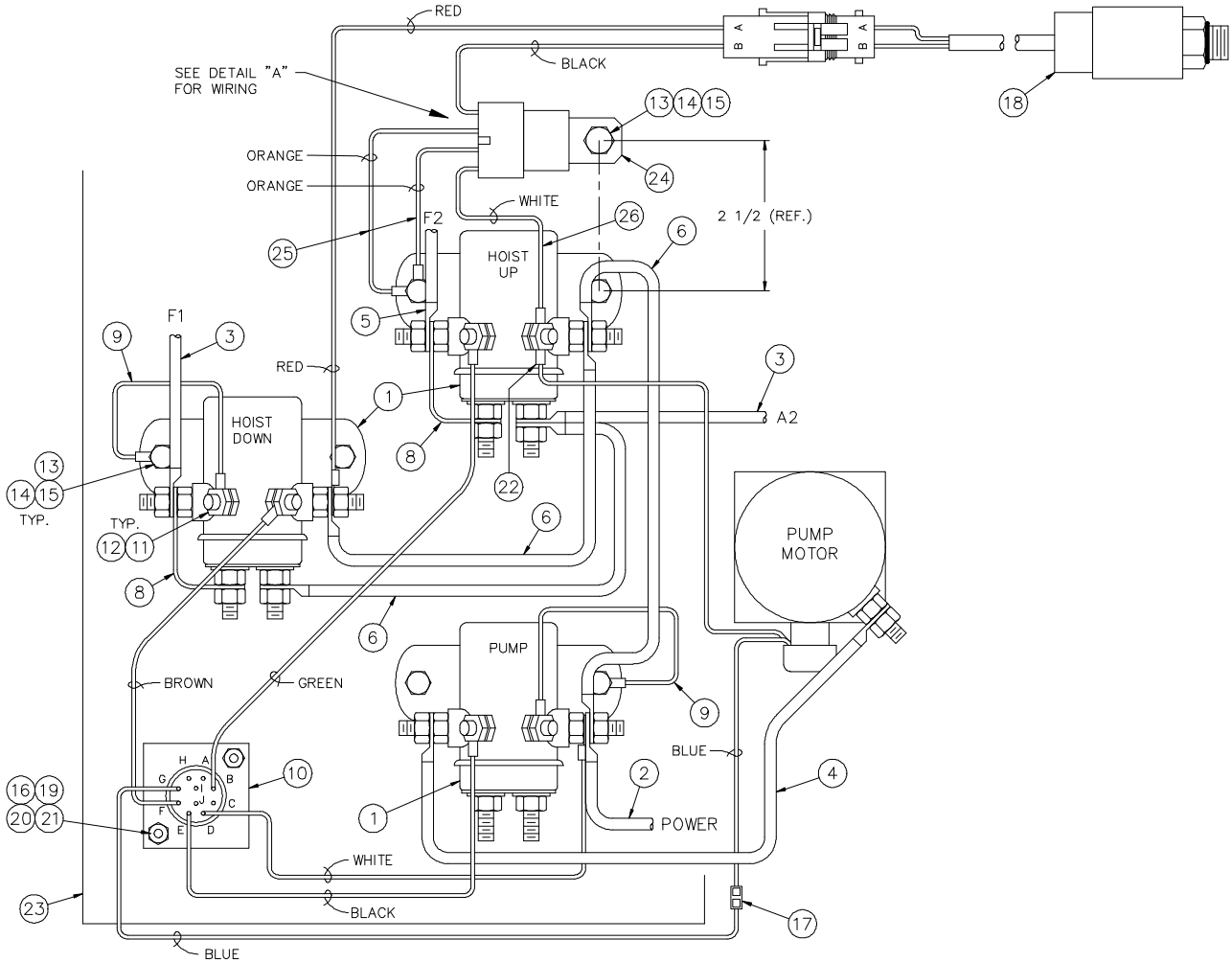
PENDANT ASSEMBLY

P/N 680065 - 3203PRX

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	1	631601	PENDANT HOUSING
2	1	631700	BOTTOM COVER
3	1	622000	TOGGLE SWITCH
4	4	640300	BOOT-TOGGLE SWITCH
5	10	001004	PAN HEAD SCREW #6 x 3/4
6	2	005101	PAN HEAD SCREW #8 x 1 1/4
7	1	633801	CABLE ADAPTER
8	18 FT	800632	CONDUCTOR CABLE
9	2	634401	TY-RAP CABLE TIE
10	3	636600	JUMPER
11	24	000101	TERMINALS T & B
12	-	-	-
13	4	642100	O-RING
14	1	800592	WHITE 16GA 600V 1C WIRE
15	1.750	800580	3/4" WIDE OKONITE RUBBER TAPE
16	1	004700	PAN HEAD SCREW #8 x 1 1/2
17	3	622346	CONDUCTOR ASSEMBLY 2 1/8
18	2	622347	CONDUCTOR ASSEMBLY 3 1/8
19	1	320563	11 PIN BAYONET PLUG
20	1	480515	CABLE CLAMP
21	3	634200	TOGGLE SWITCH
22	6"	490243	TUBING HEAT SHRINK

RELAY ASSEMBLY

P/N 680055 - 3203P



DETAIL "A"

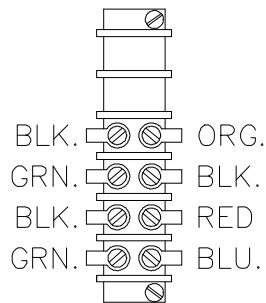
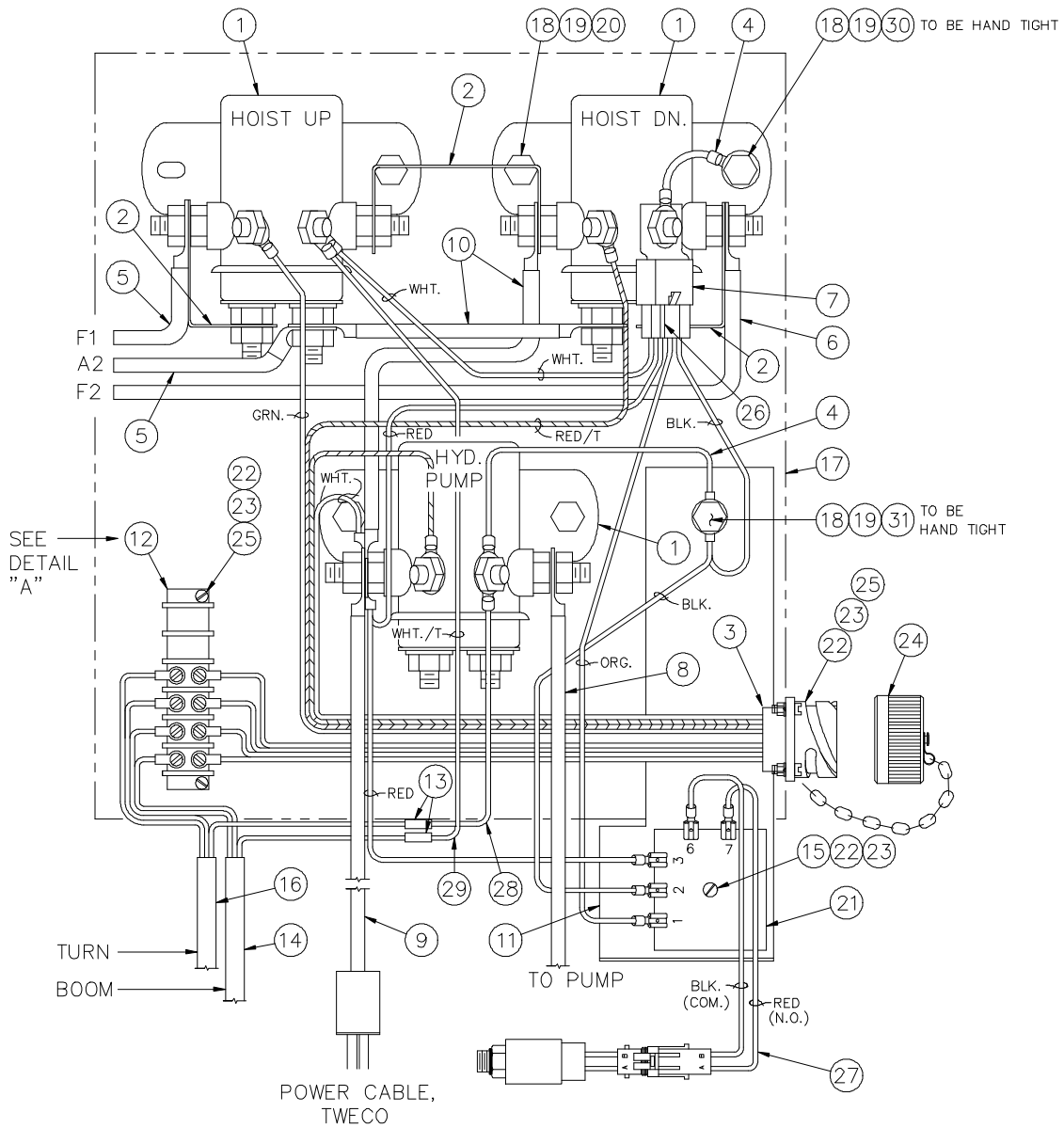
RELAY ASSEMBLY

P/N 680055 - 3203P

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	3	200182	RELAY
2	1	REF	POWER CABLE (TWECO MALE) 330258
3	2	622323	CONDUCTOR
4	1	622327	CONDUCTOR
5	1	622325	CONDUCTOR
6	3	600304	CONDUCTOR
7	-	-	-
8	2	658300	CONDUCTOR
9	2	659904	CONDUCTOR
10	1	680057	3203P RECEPTACLE ASSEMBLY
11	6	015600	HEX NUT #10-32 NF
12	6	020001	WASHER #10
13	7	020200	SPLIT LOCK WASHER 1/4
14	7	015900	HEX NUT 1/4-20 NC
15	7	005901	CAPSCREW 1/4-20 NC x 1/2
16	1	320564	RECEPTACLE CAP
17	1	000302	TERMINAL RB-14-10 (REF)
18	1	320560	LOAD SENSOR ASSEMBLY (REF)
19	2	019600	LOCK WASHER #6
20	2	015400	HEX NUT #6-32 NC
21	2	000404	ROUND HEAD SCREW #6-32 x 5/8
22	1	000300	TERMINAL RB-14-10
23	1	680056	3203P RELAY PANEL
24	1	320355	BOSCH DROP OUT RELAY
25	1	320558	CONDUCTOR
26	1	320559	CONDUCTOR

RELAY ASSEMBLY

P/N 680054 - 3203PR



DETAIL "A"

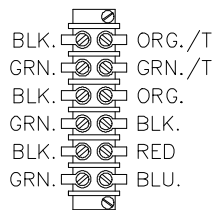
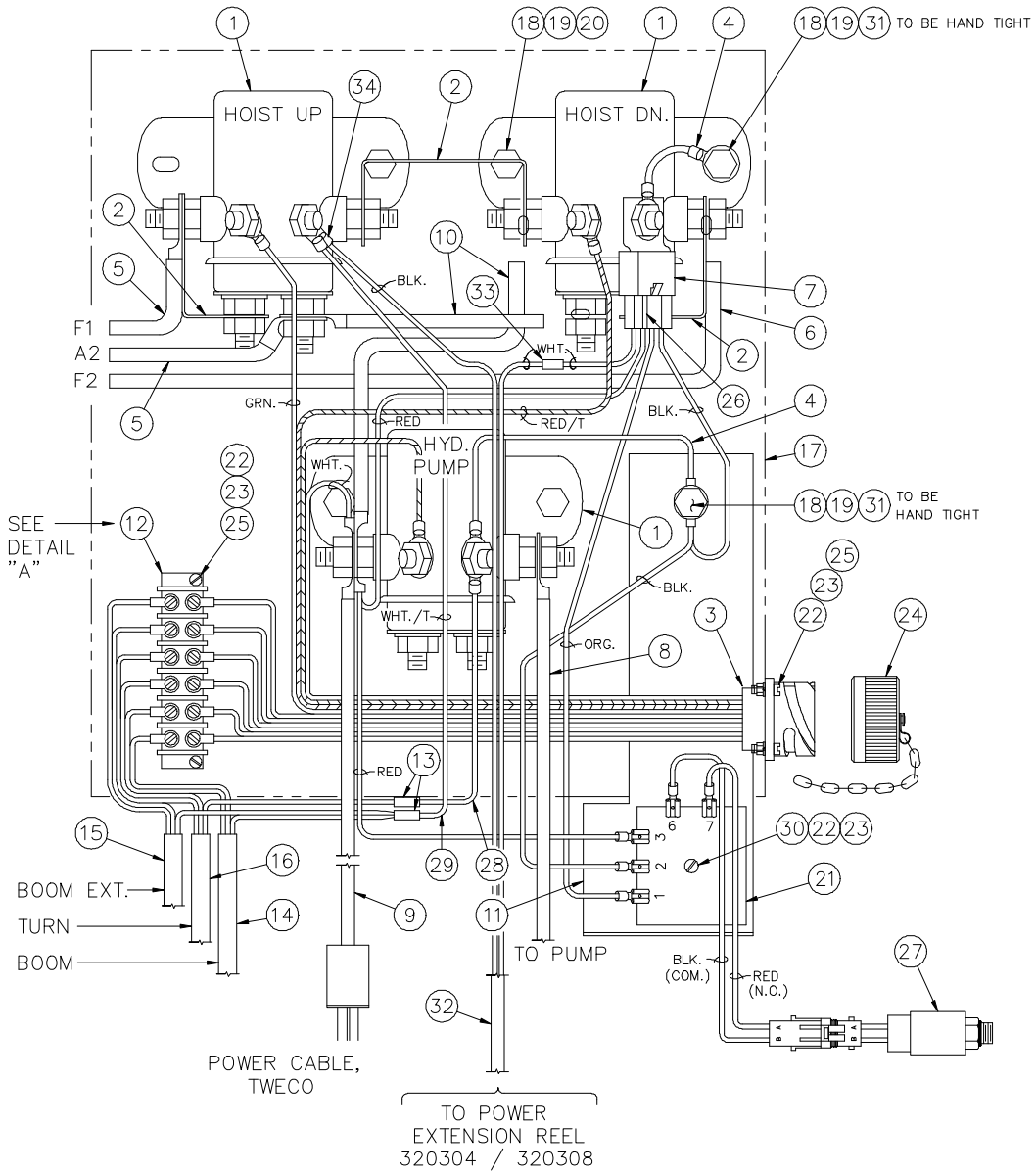
RELAY ASSEMBLY

P/N 680054 - 3203PR

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	3	200182	RELAY
2	3	658300	CONDUCTOR
3	1	680118	RECEPTACLE ASSEMBLY
4	2	659904	CONDUCTOR
5	2	622323	CONDUCTOR
6	1	622324	CONDUCTOR
7	1	320355	DROP OUT RELAY
8	1	330257	CONDUCTOR
9	1	330258	TWECO CONNECTOR ASSEMBLY (REF)
10	2	600304	CONDUCTOR
11	1	320479	RELAY PANEL PLATE
12	1	635203	TERMINAL BOARD
13	2	001102	TERMINAL WIRE SPLICE
14	1	330261	CONDUCTOR ASSEMBLY-16" BOOM
15	1	002602	CAPSCREW #6-32 x 1 1/2
16	1	330259	CONDUCTOR ASSEMBLY-14" TURN
17	1	330249-200	RELAY PANEL BRACKET
18	6	015900	NUT 1/4-20
19	6	020200	SPLIT LOCK WASHER 1/4
20	4	005901	CAPSCREW 1/4-20 x 1/2
21	1	320351	SOLID STATE TIMING RELAY
22	5	015400	HEX NUT #6-32
23	5	019600	SPLIT LOCK WASHER #6
24	1	320564	RECEPTICAL CAP
25	4	000404	CAPSCREW #6-32 x 5/8
26	1	320358	DROP OUT RELAY PLUG
27	1	320472	LOAD SENSOR ASSEMBLY (REF)
28	1	320365	CONDUCTOR
29	1	320366	CONDUCTOR
30	2	005500	CAPSCREW 1/4-20 x 3/4

RELAY ASSEMBLY

P/N 320457-200 - 3203PRX



REF. HOOK UP
FOR ITEM 12

DETAIL "A"

RELAY ASSEMBLY

P/N 320457-200 - 3203PRX

<u>ITEM</u>	<u>QTY</u>	<u>P/N</u>	<u>DESCRIPTION</u>
1	3	200182	RELAY
2	3	658300	CONDUCTOR
3	1	330256-200	RECEPTACLE ASSEMBLY
4	2	659904	CONDUCTOR
5	2	622323	CONDUCTOR
6	1	622324	CONDUCTOR
7	1	320355	DROP OUT RELAY
8	1	330257	CONDUCTOR
9	1	330258	TWECO CONNECTOR ASSEMBLY (REF)
10	2	600304	CONDUCTOR
11	1	320479	RELAY PANEL PLATE
12	1	635203	TERMINAL BOARD
13	2	001102	TERMINAL WIRE SPLICE
14	1	330261	CONDUCTOR ASSEMBLY-16" BOOM
15	1	002602	CAPSCREW #6-32 x 1 1/2
16	1	330259	CONDUCTOR ASSEMBLY-14" TURN
17	1	330249-200	RELAY PANEL BRACKET
18	6	015900	NUT 1/4-20
19	6	020200	SPLIT LOCK WASHER 1/4
20	4	005901	CAPSCREW 1/4-20 x 1/2
21	1	320351	SOLID STATE TIMING RELAY
22	5	015400	HEX NUT #6-32
23	5	019600	SPLIT LOCK WASHER #6
24	1	320564	RECEPTICAL CAP
25	4	000404	CAPSCREW #6-32 x 5/8
26	1	320358	DROP OUT RELAY PLUG
27	1	320472	LOAD SENSOR ASSEMBLY (REF)
28	1	320365	CONDUCTOR
29	1	320366	CONDUCTOR
30	1	002602	CAPSCREW #6-32 x 1 1/2
31	2	005500	CAPSCREW 1/4-20 x 3/4
32	3 FT	800626	#16 AWG 2/C, 300V TYPE SJO 90°C
33	1	000302	WIRE TERMINAL (BUTT SPLICE) 2RB14
34	1	000300	WIRE TERMINAL RB14-10

RELAY CHECKING PROCEDURE

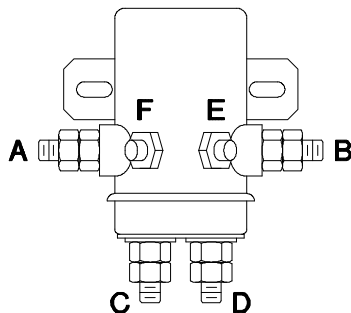
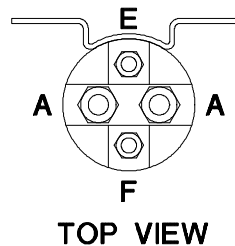
NOTE:

The following procedure is performed with relays completely disconnected from all wires on motor circuits and ground wires. These circuits can give you false readings sometimes.

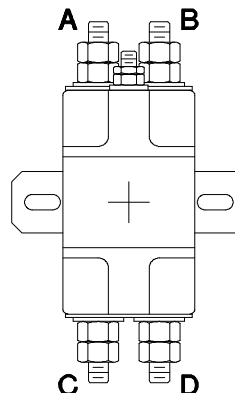
HOW TO CHECK RELAY:

Checking a relay on this or any Auto Crane product is done in the same way, but there may be a difference in physical appearance of the relay. Shown below are two types of relays used by Auto Crane. Our relays are normally closed across the bottom posts C & D and normally open across the A & B posts. When activated, they will open across C & D and close across A & B. To activate these relays, use 12V positive (+) and 12V negative (-) wires and place them on posts F & E. You may place 12V+ on post F or E as long as you place

12V- on the remaining post F & E. Using an ohm meter or test light, check across posts A & B. You should get an ohm reading or your test light should be on when you have the relay activated. With the relay still activated, check across posts C & D. You should have no ohm reading or test light at this point with relay activated. At this point, disconnect 12V+ and 12V- from posts F & E. This should let relay return to its normal position. Using your ohm meter or test light again, check the relay across posts A & B. If relay is working correctly, you should have no reading at all. Then check across posts C & D. You should have an ohm reading or test light should be on. If you get the above results, relay is okay. If you get any variation in the above explanation on the relay you are checking, check the relay again. If it still shows a difference, the relay is bad and should be replaced.



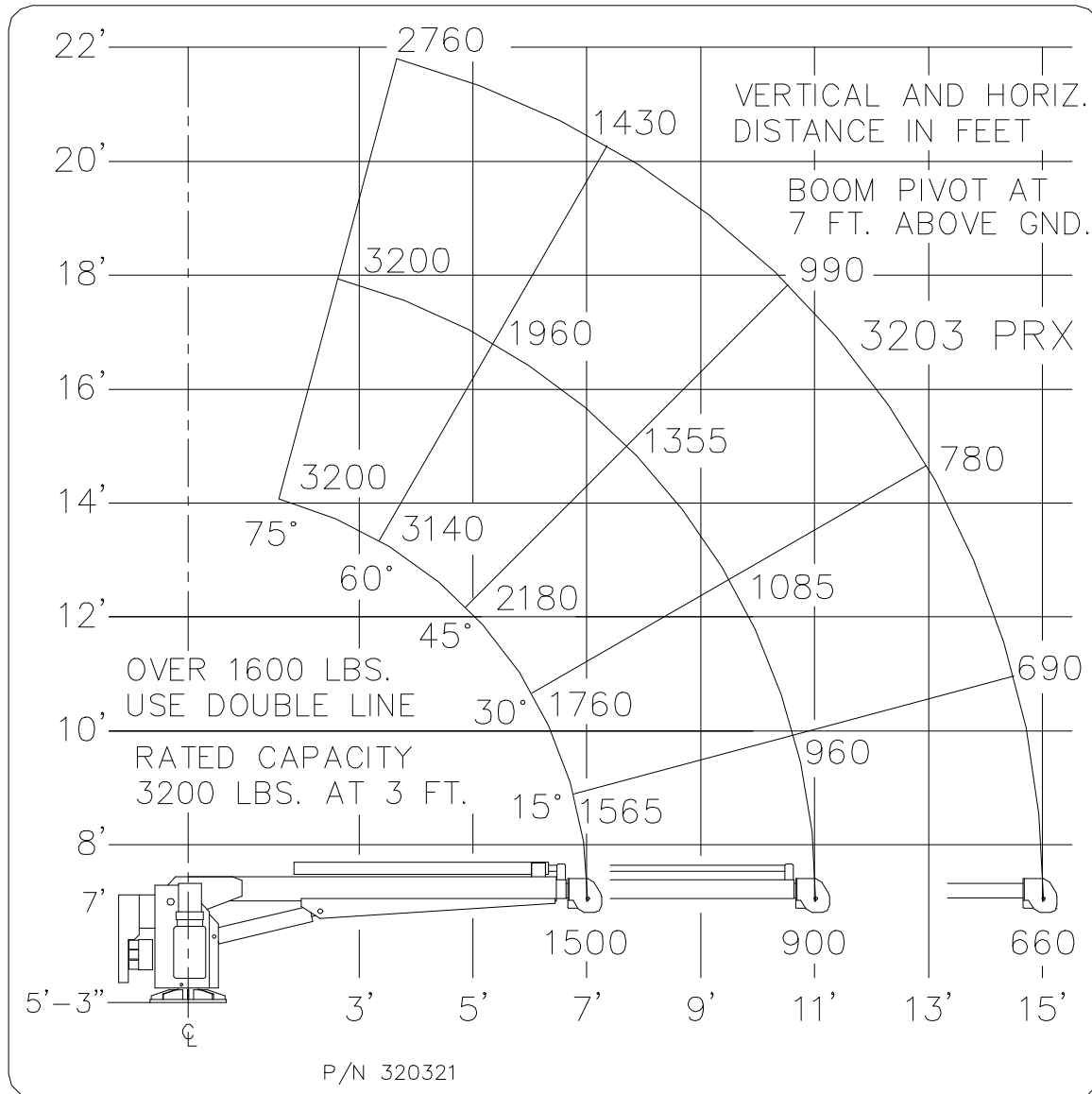
RELAY TYPE A



RELAY TYPE B

LOAD CHART

3203P/PR/PRX





AUTO CRANE COMPANY

P. O. BOX 581510 • TULSA, OKLAHOMA 74158

Limited Warranty

Auto Crane will warranty to consumer for a period of twelve months from date of purchase that each new Auto Crane product it sells will be free under normal use and service, from defects in material and workmanship. Date of purchase will be honored as either date of purchase by distributor or his date of sale of the product as substantiated by Distributor Delivery Report.

Obligation of Auto Crane under this warranty is limited to replacement or repair of parts that appear to manufacturer after review and / or inspection to be defective. This warranty does not obligate Auto Crane to bear the cost of labor or transportation 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 the 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, same being subject to the warranties of their respective manufacturers.

If field service, at the request of buyer, is rendered and fault is found not to be with Auto Crane's product, the buyer shall pay the time and expense of the field representative. Claims for service labor or other expenses that have been incurred by the buyer without approval or authorization of Auto Crane will not be accepted.

AUTO CRANE COMPANY IS UNDER NO OBLIGATION TO EXTEND THIS WARRANTY TO ANY CUSTOMER FOR WHICH AN AUTO CRANE WARRANTY REGISTRATION CARD HAS NOT BEEN COMPLETED AND MAILED TO AUTO CRANE COMPANY WITHIN FIFTEEN (15) DAYS AFTER DATE OF PURCHASE.