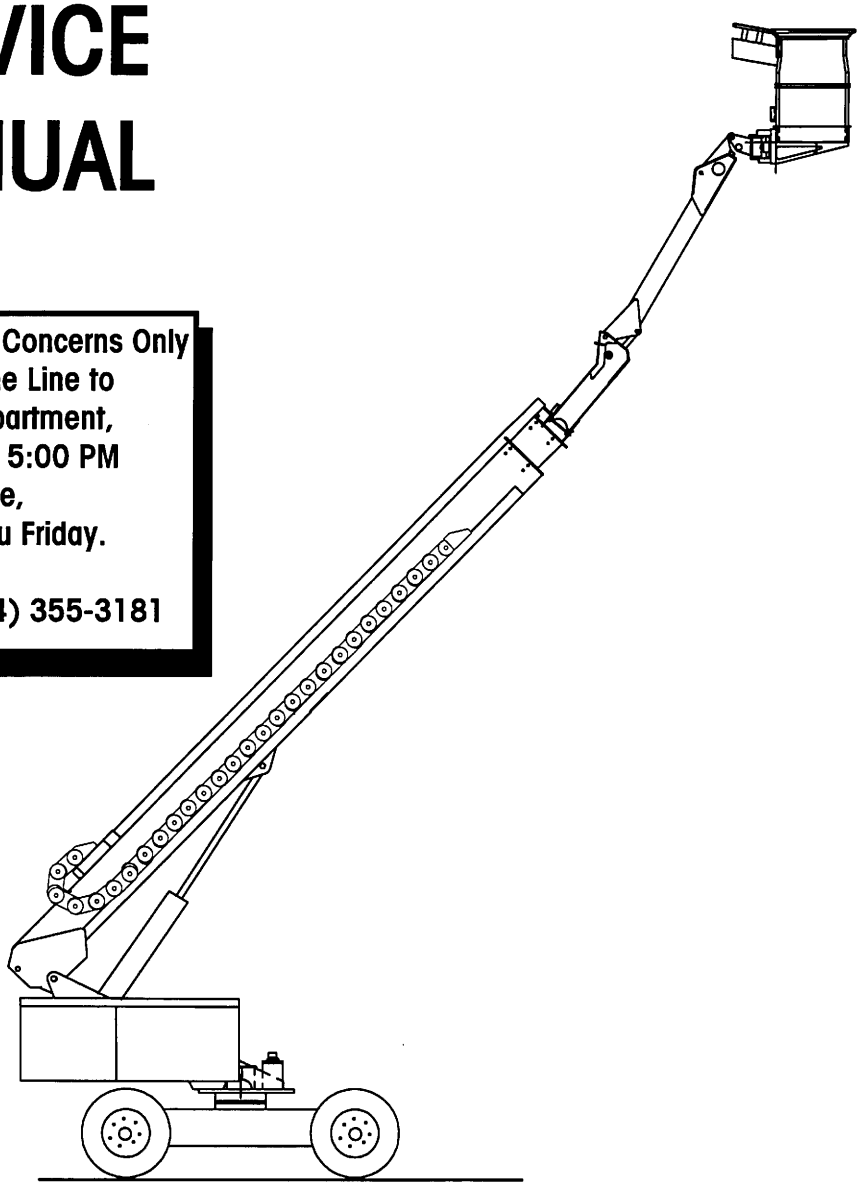
# RP 66 "Reach Plus"

**Featuring "Electro-Proportional" Control System**

# SERVICE MANUAL

**For Service Concerns Only**
**Direct Phone Line to Service Department, 8:00 AM to 5:00 PM Central Time, Monday thru Friday.**

**Phone (414) 355-3181**



**Part No. 89-165307 • Initial Issue dated May, 1995 •**

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**Appendix**

# INTRODUCTION

This Service Manual is designed to provide you with the instructions needed to properly maintain the SIMON AERIALS INC. RP66 Aerial Platform with full hydraulic controls. When used in conjunction with the Operators and Parts manuals (provided separately) this Service Manual will assist you in making necessary adjustments or repairs.

Simon Aerials Mobile Platforms are designed and built to provide many years of safe, dependable service. To obtain full benefits from your RP66, always follow the proper operating and maintenance procedures. Only trained, authorized personnel should be allowed to operate or service this machine. Service personnel should read and study the Operators, Service and Parts Manuals in order to gain a thorough understanding of the unit prior to making any repairs. Exercise all necessary safety precautions when performing maintenance not covered in this manual.

To help you recognize important safety information, we have identified warnings and instructions that directly impact on safety with the following signals:

**⚠ DANGER**

**"DANGER" INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY. THIS SIGNAL WORD IS TO BE APPLIED TO THE MOST EXTREME SITUATIONS.**

**⚠WARNING**

**"WARNING" INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.**

**⚠ CAUTION**

**"Caution" indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices which could lead to property-damage-only accidents.**

Service personnel and machine operators must understand and comply with all warnings and instructional decals on the body of the machine, and at the ground controls and platform control console.

**⚠ DANGER**

**MODIFICATIONS OF THIS MACHINE FROM THE ORIGINAL DESIGN AND SPECIFICATION WITHOUT WRITTEN PERMISSION FROM SIMON ARE STRICTLY FORBIDDEN. A MODIFICATION MAY COMPROMISE THE SAFETY OF THE MACHINE, SUBJECTING USERS TO SERIOUS INJURY OR DEATH. ANY SUCH MODIFICATION WILL VOID ANY REMAINING WARRANTY.**

Simon reserves the right to change, improve, modify or expand features of its equipment at any time. Specifications, models or equipment are subject to change without notice, and without incurring any obligations to change, improve, modify or expand features of previously delivered equipment.

Any procedures not found within this manual must be evaluated by the individual to assure himself that they are "proper and safe", because all possible procedures cannot be covered.

All Simon manuals are periodically updated to reflect changes that occur in the equipment. Please contact the factory with any questions you may have regarding your machine, or the availability of more recent manuals.

# MACHINE SPECIFICATIONS

| | |
|---|---|
| Working Height | **72 Ft /** 21.95 M |
| Platform Height | **66 Ft /** 20.12 M |
| Horizontal Reach (Boom Angle 0°) | **60 Ft /** 18.29 M |
| Platform Capacity (Unrestricted) | **500 Lbs. /** 225 Kg |
| Platform Size | **30 In. x 60 In. x 42 In. /** .76 M x 1.52 M x 1.07 M |
| Stowed Length (STOW-*N*-GO™ Position) | **22 Ft 1 In. /** 6.73 M |
| Stowed Height | **8 Ft 10 In. /** 2.69 M |
| Machine Width | **8 Ft. 0 In. /** 2.44 M |
| Wheelbase | **8 Ft 0 In. /** 2.44 M |
| Ground Clearance | **10.7 In. /** 27.2 cm |
| Gross Weight (Approx.) (Note 1) | **28,000 Lbs. /** 12,700 Kg |
| Maximum Travel Speed: | |
| Boom Stowed (Note 1) | **2.5 MPH /** 4.0 KPH |
| Boom Extended or Elevated | **0.5 MPH /** 0.8 KPH |
| Outside Turning Radius | **16 Ft 10 In. /** 5.13 M |
| Gradeability (On Hard Surface) (Note 1) | **15° /** 27% |
| Platform Rotation | **180°** |
| Superstructure Rotation | **360° continuous, either direction** |
| Tire Size | **15-19.5 (14 Ply)** |
| Tire Pressure (not applicable to foam filled tires) | **105 PSI /** 7.24 Bar / 7.38 Kg/cm$^2$ |
| Maximum Hydraulic Pressure | **3000 PSI /** 206 Bar / 210 Kg/cm$^2$ |
| Hydraulic Tank Capacity | **35 Gal. /** 132.5 Liters |
| Fuel Capacity: | |
| Gas or Diesel | **35 Gal. /** 132.5 Liters |
| Propane | **30 Lbs. /** 14 Kg |
| Swing Bearing Bolt Torque | **320 Ft Lbs. /** 434 Nm / 44.2 Kg-m |
| Wheel Lug Nut Torque (Drive and Steer Axles) | **220 Ft Lbs. /** 298 Nm / 30.4 Kg-m |
| Drive Hub Bolt Torque | **170 Ft Lbs. /** 231 Nm / 23.5 Kg-m |
| Electrical System | **Two 12 Volt DC Batteries** |

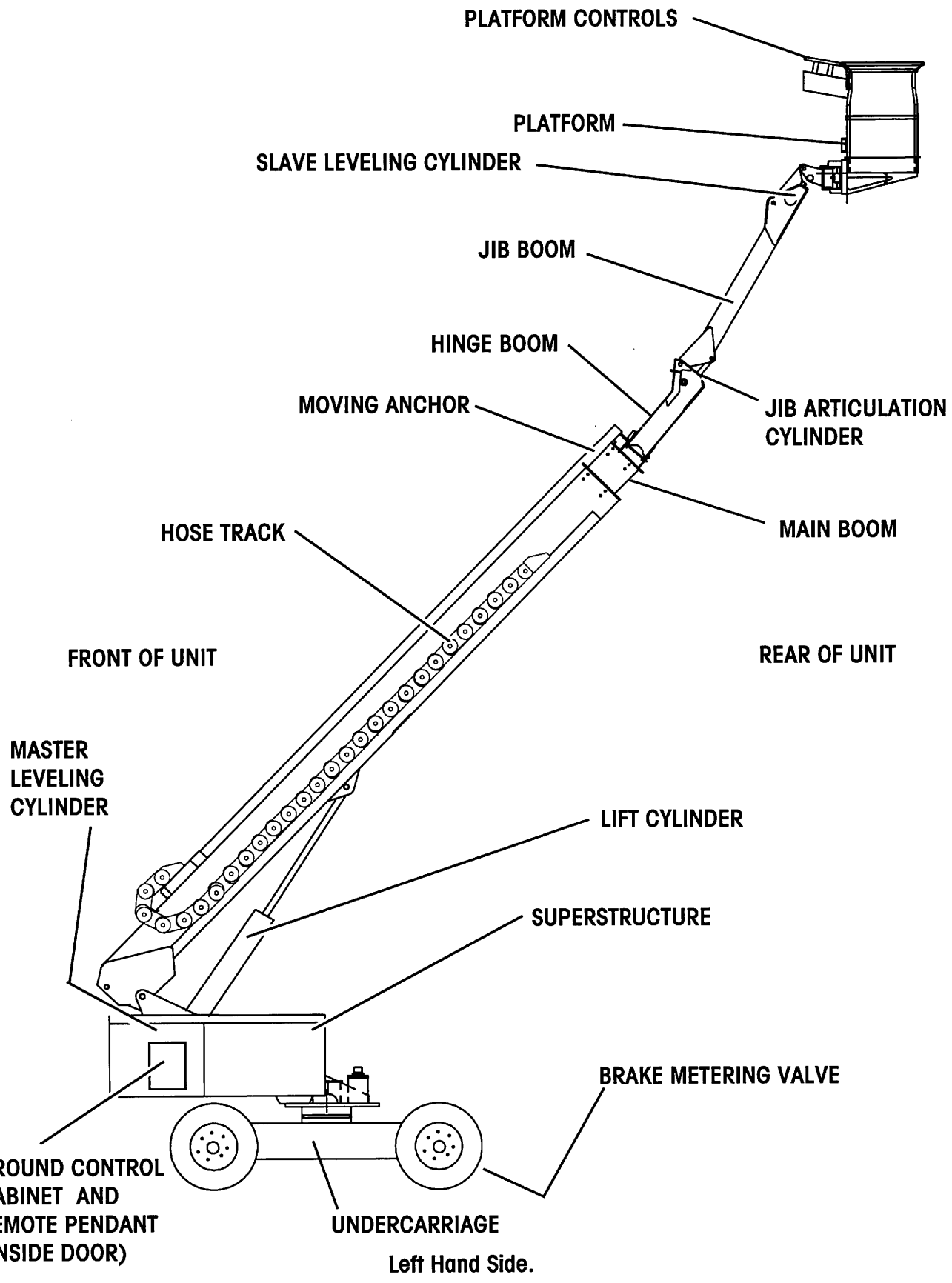
Engine Availability:

Standard: Wisconsin W41770, 35 HP (26.1 Kw), Air Cooled, Gasoline

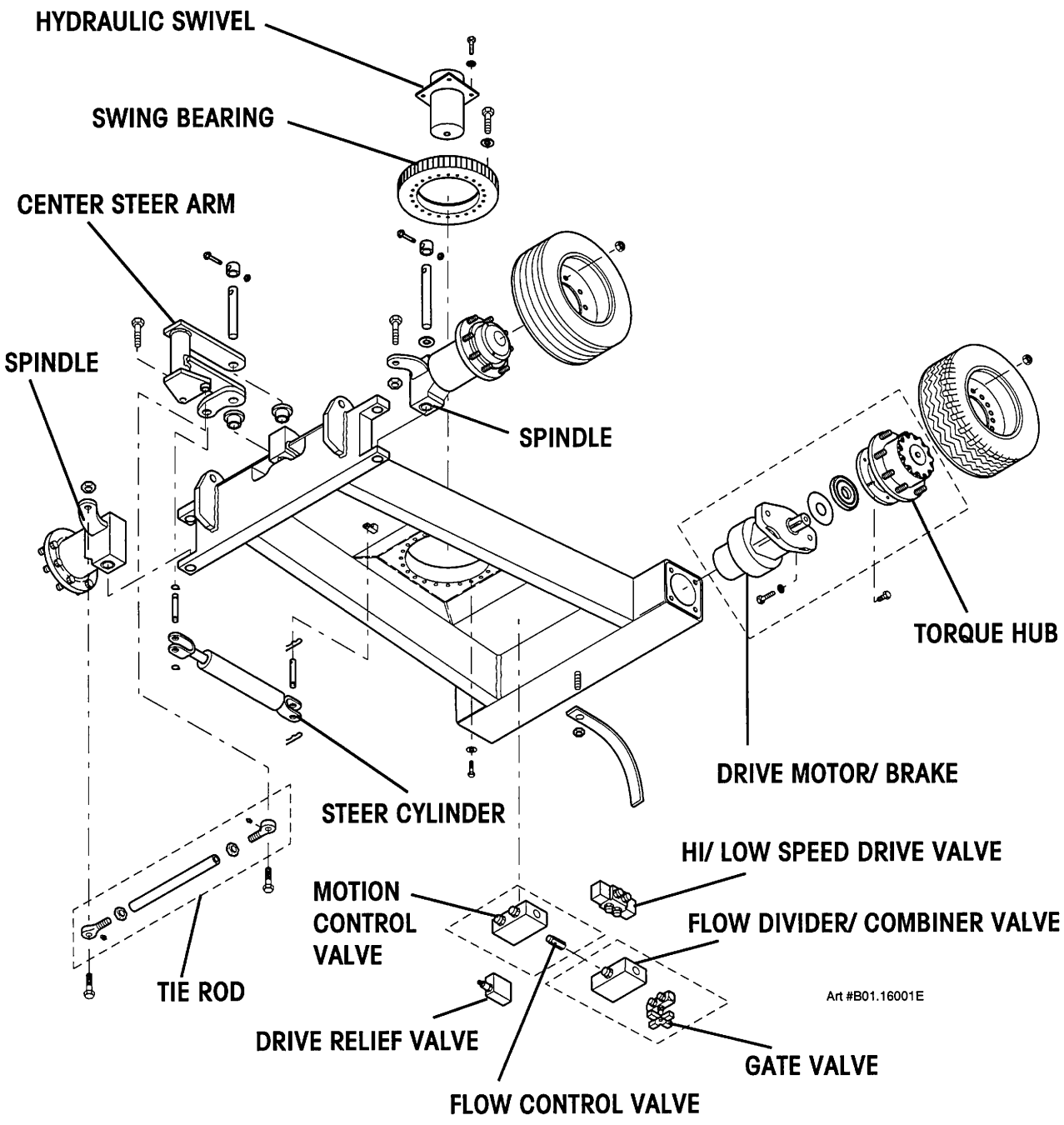
Optional: Wisconsin W41770, 35 HP (26.1 Kw), Air Cooled, Dual Fuel
Wisconsin V-465, 65 HP (48.5 Kw), Air Cooled, Gasoline or Dual Fuel **(Std. 4WD)**
Ford LSG 423, 63 HP (47.0 Kw), Liquid Cooled, Gasoline or Dual Fuel
Deutz F3L 1011, 42 HP (31.3 Kw), Air Cooled, Diesel Fuel
Deutz F4L 1011, 56 HP (41.7 Kw), Air Cooled, Diesel Fuel
Detroit Diesel/ Perkins 104.22, 50 HP (37.3 Kw), Liquid Cooled, Diesel Fuel
Isuzu C-240, 56 HP (41.7 Kw), Liquid Cooled, Diesel Fuel

**Note 1:** Weight and performance shown represent typical units, and should be used as a general guideline only. Many variables between machines can lead to significant differences in these factors. Accurate figures, when necessary for a particular application, can best be determined by testing of the specific unit.

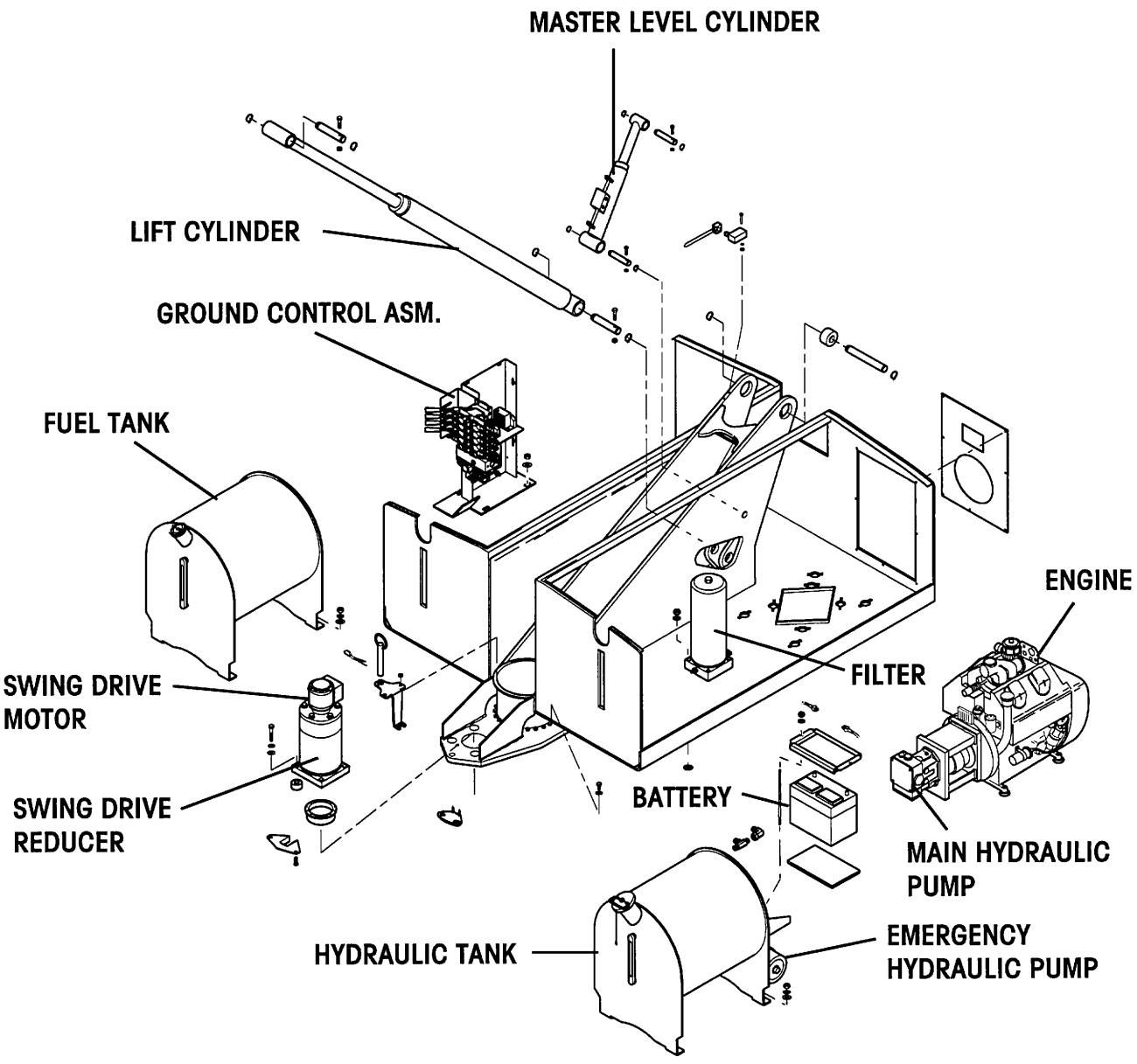
# MACHINE COMPONENT LOCATOR



# UNDERCARRIAGE COMPONENT LOCATOR

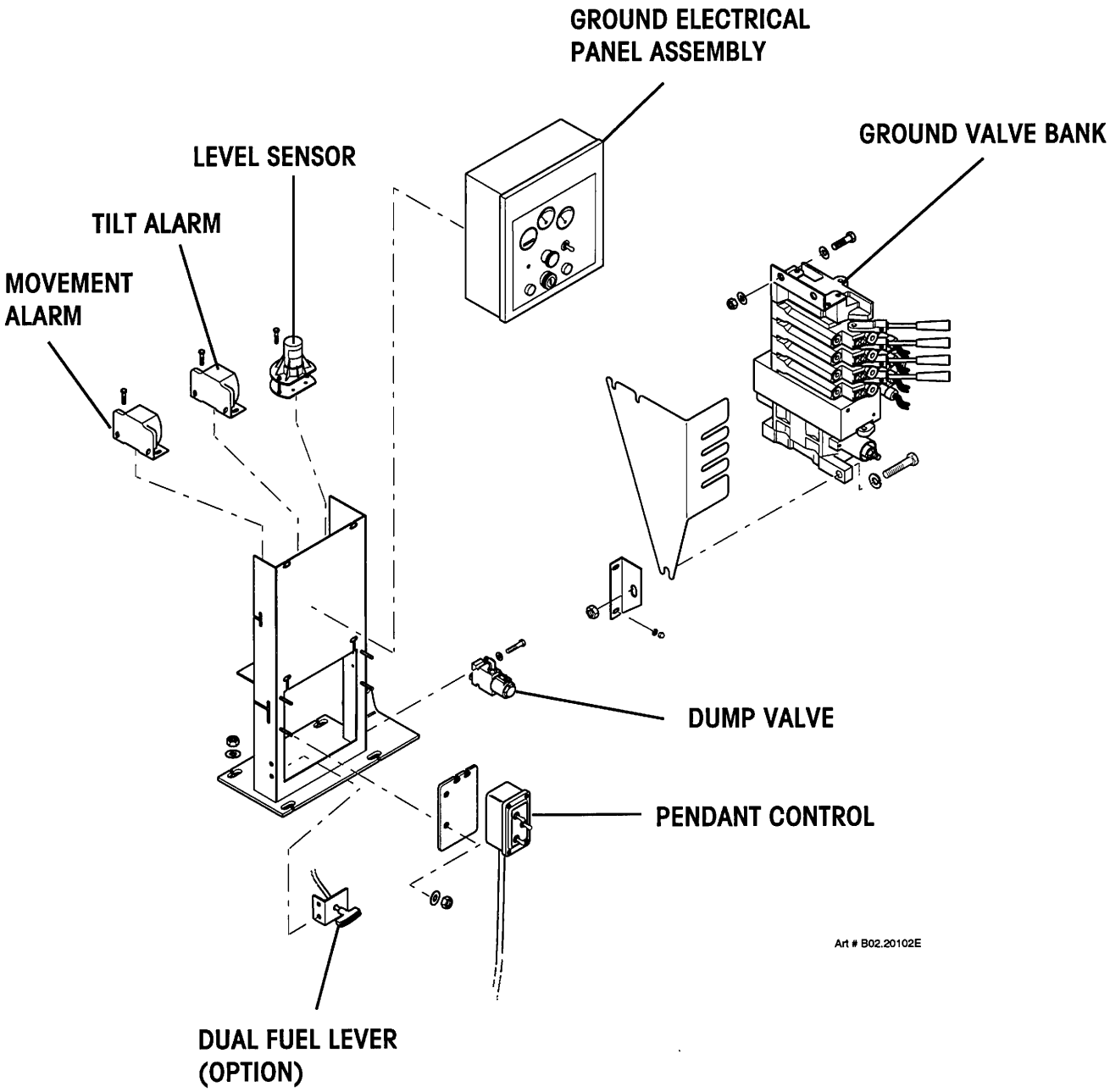


# SUPERSTRUCTURE COMPONENT LOCATOR

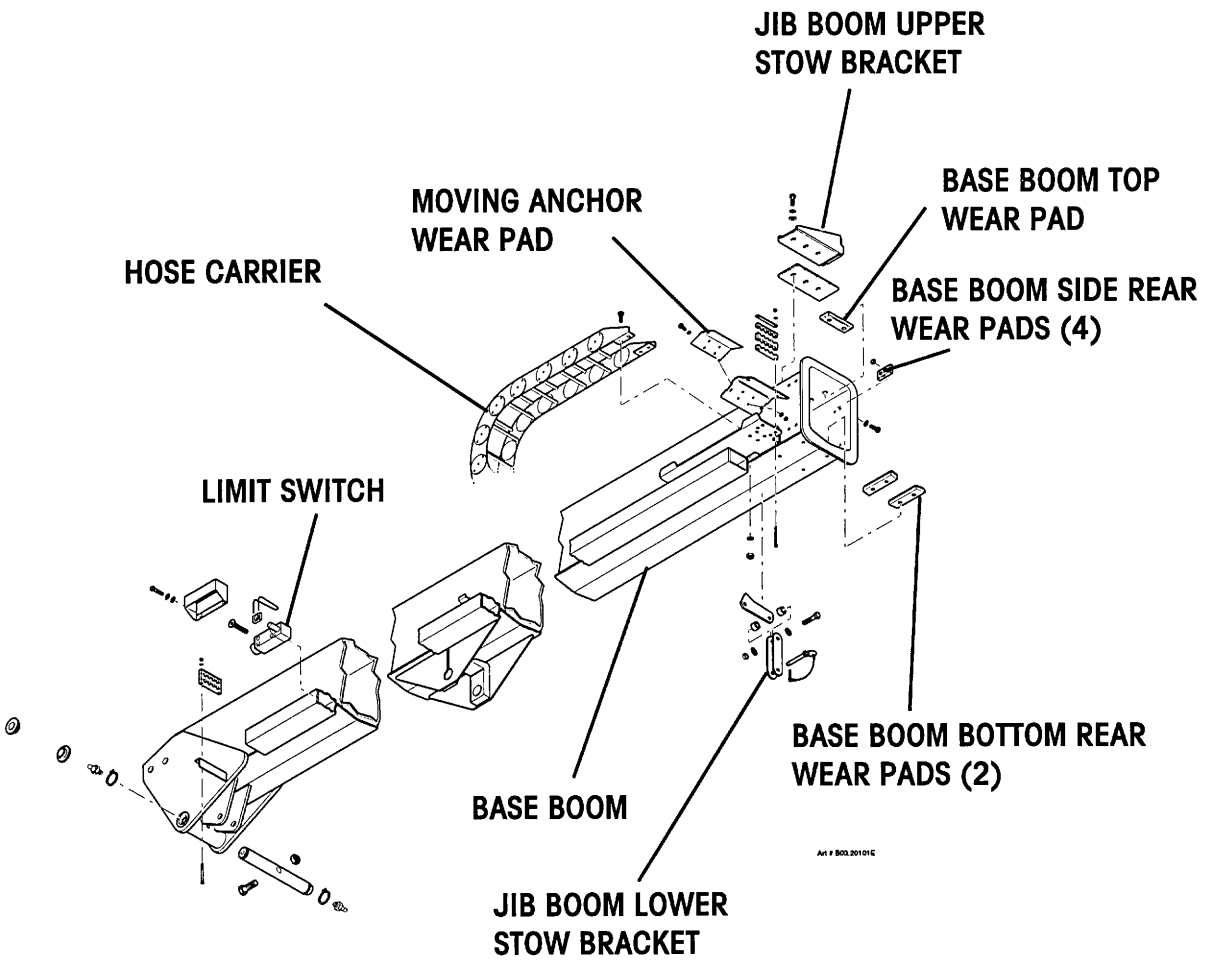



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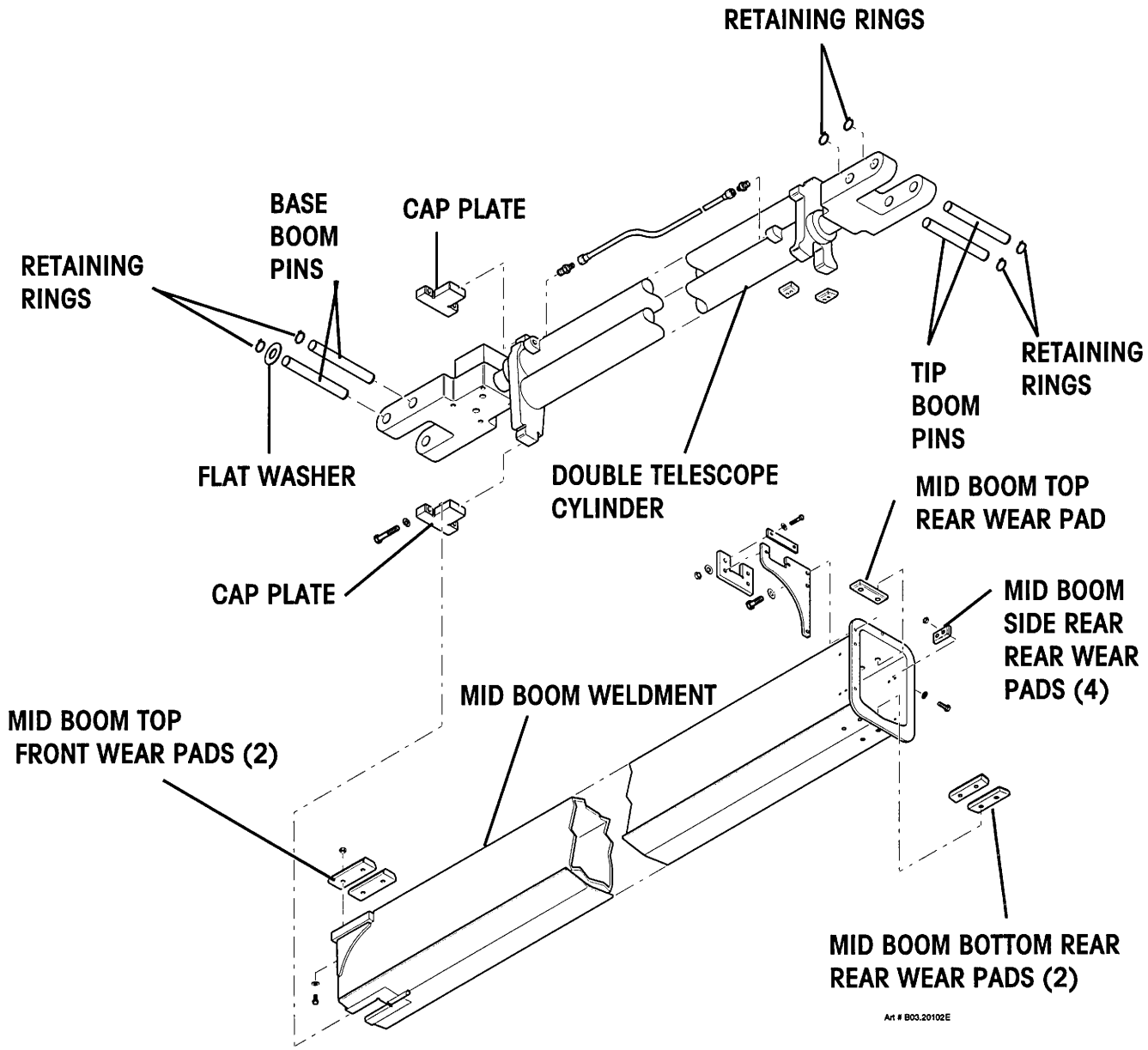
# SUPERSTRUCTURE COMPONENT LOCATOR



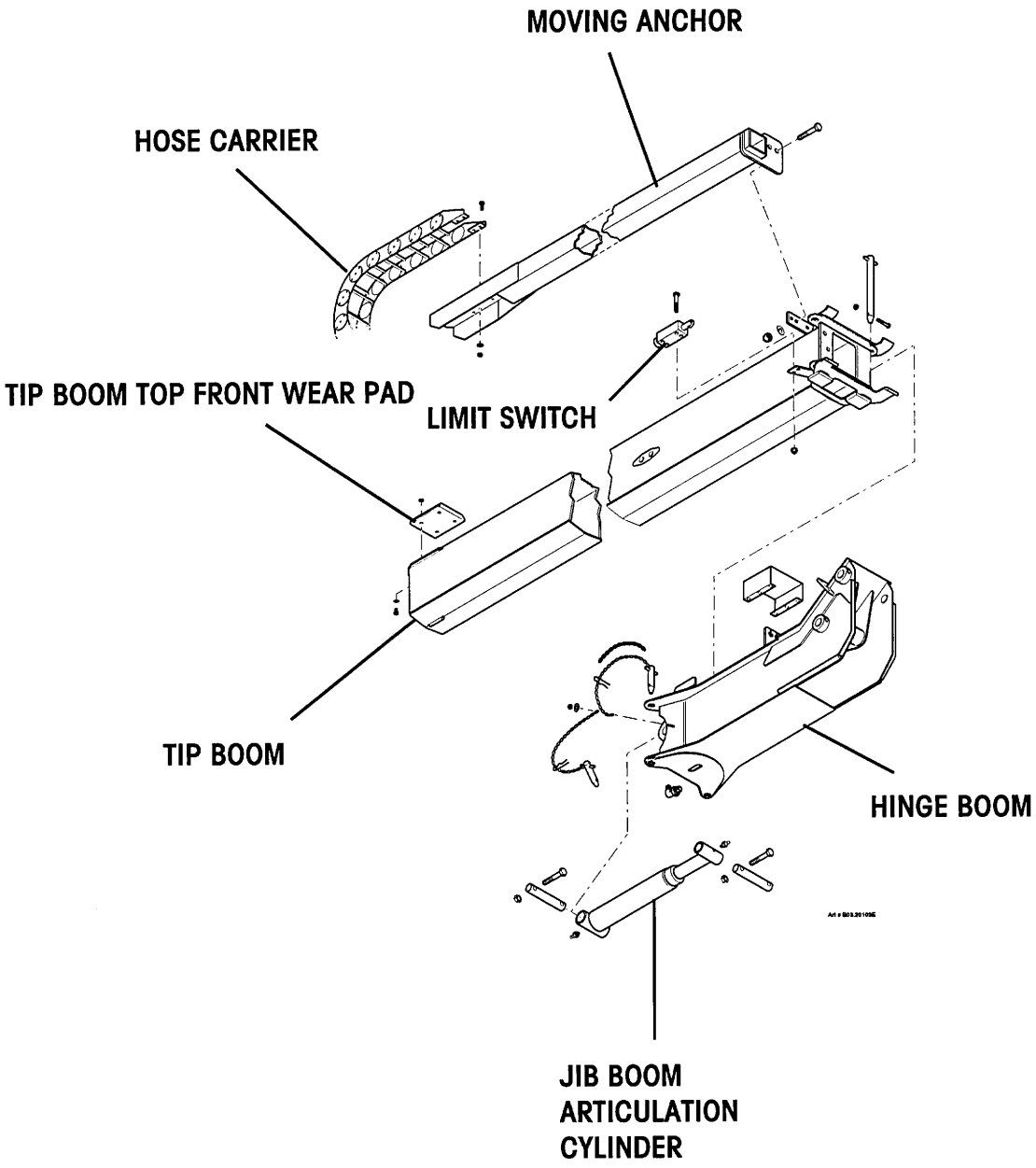
# BASE BOOM COMPONENT LOCATOR



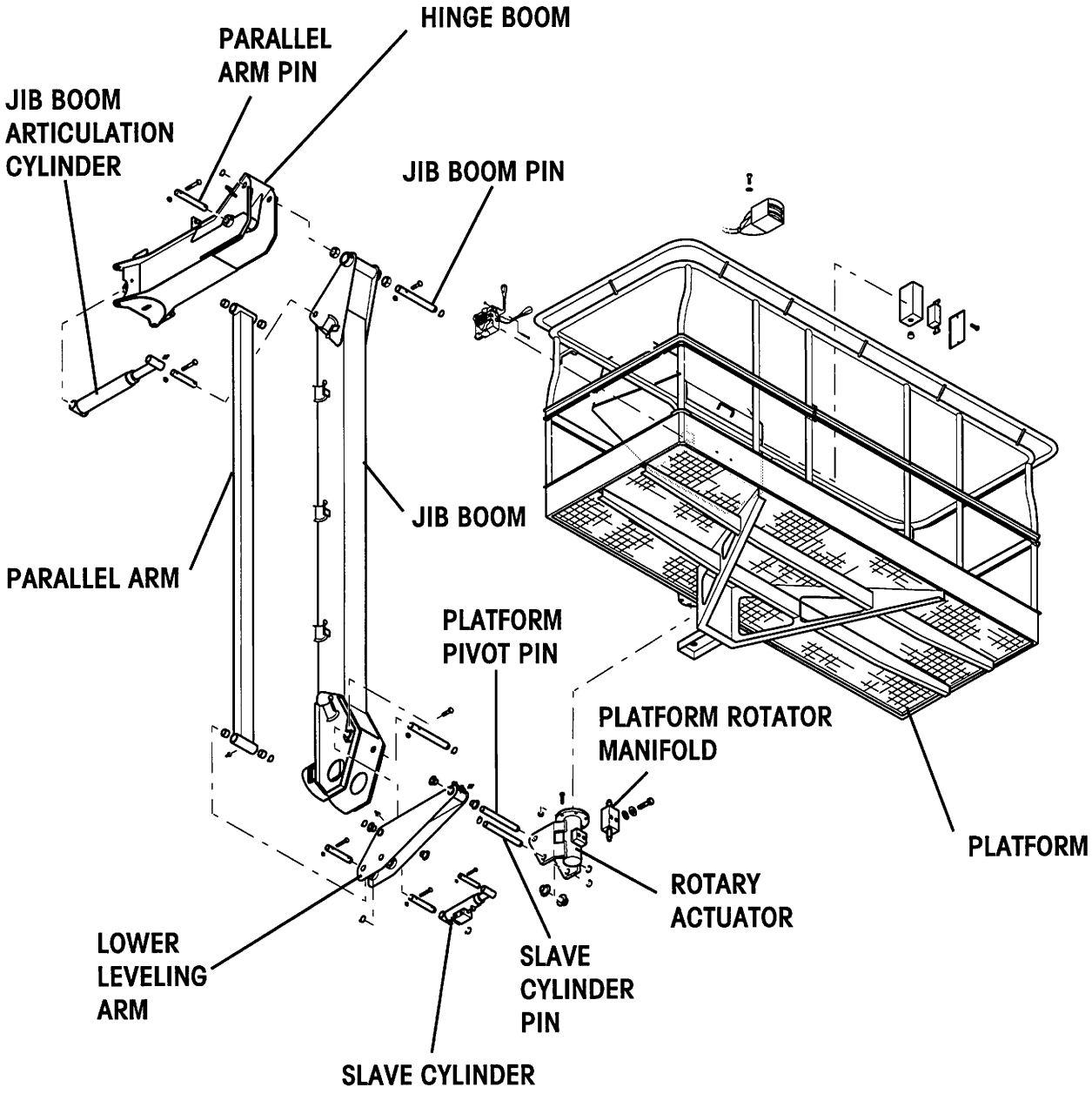
# MID BOOM COMPONENT LOCATOR



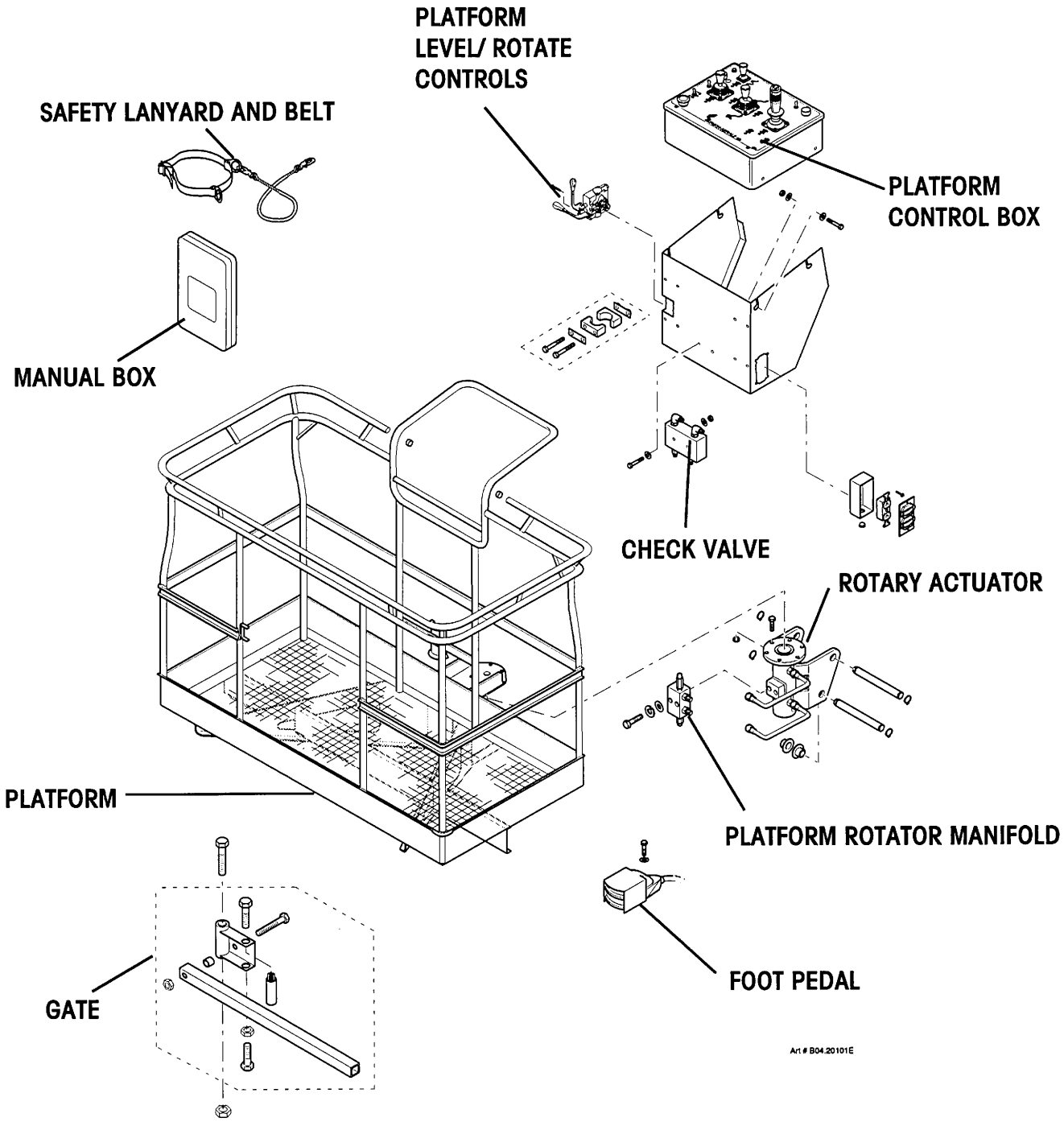
# TIP BOOM COMPONENT LOCATOR



# JIB BOOM COMPONENT LOCATOR



# PLATFORM COMPONENT LOCATOR



# LUBRICATION CHART

| NO. | ITEM | SPECIFICATION AND QUANTITY | FREQUENCY OF LUBRICATION |
|---|---|---|---|
| 1. | Hydraulic reservoir | Mobil DTE-13M to "Full" mark with all cylinders retracted. | Check level & condition each shift. Analyze 6 months or 500 hours.*†. Change yearly or 1000 hours.*† |
| 2. | High pressure filter | Filter element. | Change 6 months or 500 hours.*† |
| 3. | Swing bearing (standard open style) | Lithium N.L.G.I. #2 EP. Purge old grease. | Weekly or every 25 hours.*† |
| 4. | Swing bearing gear teeth (standard open style) | Dry moly lube spray. | Every six (6) months or 500 hours.*† |
| 5. | "Oil bath" style swing bearing (optional) | SAE 80 W 90 | Check monthly or every 100 hours.*† Change if contaminated. |
| 6. | Swing drive gear box | Fill to plug. SAE 140 EP or N.L.G.I. #00 EP oil. | Check monthly or every 100 hrs.*†, Change every two (2) years or 2,000 hours.* |
| 7. | Boom pivot pins and Cylinder pins | Lithium N.L.G.I. #2 EP. Purge old grease. | Monthly or every 100 hours.*† |
| 8. | Wheel bearings | Lithium N.L.G.I. #2 EP. Clean and repack. | Change every six (6) months or 500 hours.*† |
| 9. | Steering spindles | Lithium N.L.G.I. #2 EP. Purge old grease. | Monthly or every 100 hours.*† |
| 10. | Steering linkage | Lithium N.L.G.I. #2 EP. Purge old grease. | Monthly or every 100 hours.*† |
| 11. | Steering tie rod ends | Lithium N.L.G.I. #2 EP. Purge old grease. | Monthly or every 100 hours.*† |
| 12. | Drive wheel power hubs | SAE 80 W 90, SAE 90 or SAE 85-140, half full. | Change after first 50 hours., then Check monthly or every 100 hrs.*†, Change yearly or 1,000 hours.*† |
| 13. | Boom wear pads | Silicone spray. | Monthly or every 100 hours.*† |

* Whichever occurs first.

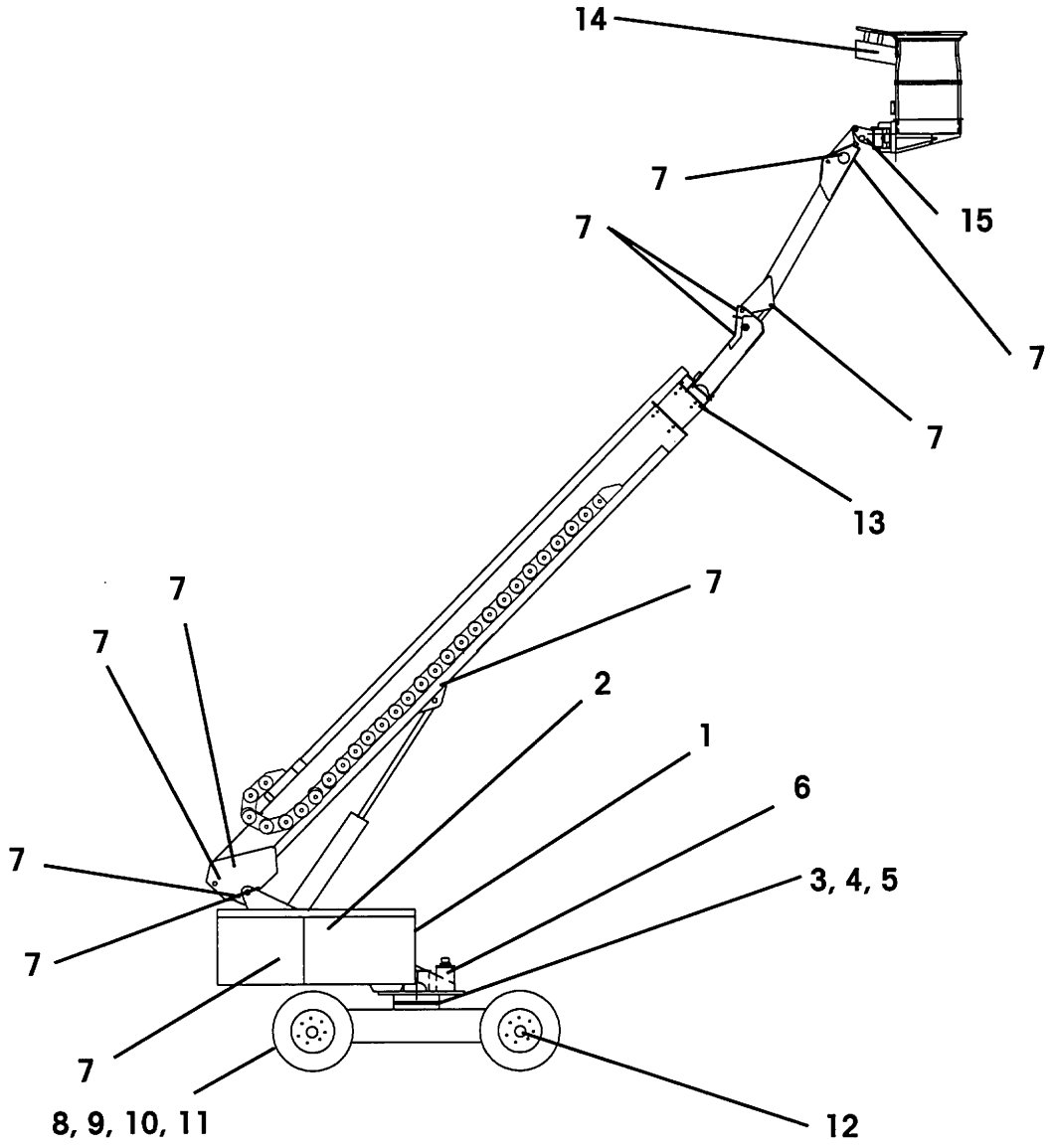
† Different requirements for harsh environment applications. See check lists.

# LUBRICATION CHART

| NO. | ITEM | SPECIFICATION AND QUANTITY | FREQUENCY OF LUBRICATION |
|---|---|---|---|
| 14. | Platform level and rotate handle pivot pins | WD 40 Spray or equivalent penetrating oil. | Monthly or every 100 hours.* |
| 15. | Valve spool linkage | WD 40 Spray or equivalent penetrating oil. | Monthly or every 100 hours.* |
| 16. | Platform rotate mechanism | Hydraulic fluid. | Yearly or every 1,000 hours.* |

* Whichever occurs first.

† Different requirements for harsh environment applications. See check lists.



# SECTION 1: TRANSPORTATION AND EMERGENCY PROCEDURES

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# TRANSPORTING THE UNIT

## TOWING PROCEDURES

### WITHOUT OPTIONAL TOWING PACKAGE:

- If optional towing package is not installed, refer to "UNPOWERED EMERGENCY MOVEMENT" in this section.

### WITH OPTIONAL TOWING PACKAGE:

- Securely attach the RP 66 to a tow vehicle with the tow bar provided.
- Disengage torque hubs:

**⚠WARNING**

**WHENEVER DISENGAGING THE DRIVE TORQUE HUBS OR BEFORE DISCONNECTION FROM TOWING VEHICLE, ENSURE THAT THE UNIT CANNOT ROLL.**

**Type 1:** remove the plate in the center of the torque hub, turn the plate so that the boss faces in, then reinstall the plate.

**Type 2:** remove the large hex cap in the center of the torque hub, push in and turn screw slot in the center of the torque hub to line up with the "TOW" mark on the hub, then rein stall the cap.

- Pull steer wander control valve, located near the ground controls, to allow steering wheels to track behind tow vehicle.

The tow vehicle must have sufficient braking capability in order to safely stop itself as well as the RP 66. Tow speed shall not exceed 3 MPH (4.8 KPH).

## TRUCK OR TRAILER TRANSPORT, BOOM IN STOW-*N*-GO™ MODE

**⚠WARNING**

**ALWAYS ATTACH THE UNIT TO A WINCH WHEN LOADING OR UNLOADING FROM A TRUCK OR TRAILER. CONNECT WINCH CABLE TO THE TIE DOWN LUGS ON THE UNDERCARRIAGE.**

**UNASSISTED LOADING OR UNLOADING OF ANY MOBILE PLATFORM IS NOT RECOMMENDED.**

**With boom in operational mode:**

1. Enter the platform, and start the engine using the platform controls. Select the "OPERATING" engine speed.

2. Raise the boom to allow greater ground clearance so that the platform will clear any obstacles as the machine goes up the loading ramp.

3. Using a winch, carefully drive the unit onto the truck or trailer.

4. Lock the superstructure to the undercarriage by installing the lock pin provided.

**⚠ CAUTION**

**With boom lock pins out of "Operational Mode" position (see illustration), do not place any load in the platform.**

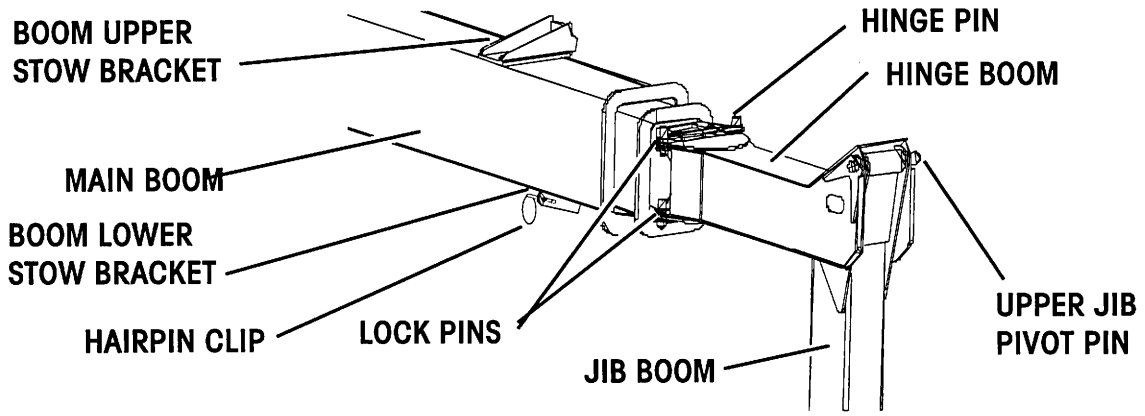
**With boom fastened in "STOW-*N*-GO™ Storage mode" position (see illustration), do not operate main boom telescope or jib boom controls.**

5. To place the boom in the Stow-*N*-Go™ position:

   a. With platform controls, position main boom at 0° (horizontal) and fully retracted, and position jib boom so it is 45° down from main boom.

   b. Rotate the platform 90°, so it is on the right side of the boom.

   c. Lower main boom so that the jib boom just rests on the truck or trailer bed.




**Stow-*N*-Go™ Operational Mode.**

## TRUCK OR TRAILER TRANSPORT, BOOM IN STOW-*N*-GO™ MODE (CONTINUED)

d. Exit the platform. Clean the hinge pin of foreign material to allow ease of jib swing. Lubricate with dry moly if necessary.

e. Remove the two lock pins from the hinge boom Stow-*N*-Go™ connection.

   If lock pins do not readily come out, lower main boom (from ground controls) so that slight pressure is applied to the jib boom by contact with the truck or trailer bed. Tap the lock pins out with a hammer.

f. From ground control, raise main boom to horizontal and position jib boom down completely.

g. Swing platform and jib boom assembly to side position until upper jib pivot pin is inserted in the boom upper stow bracket. Store lock pins removed in step "e" in hinge boom holes.

   If pivot pin does not line up with upper stow bracket, use ground controls to extend or retract the main boom as required.

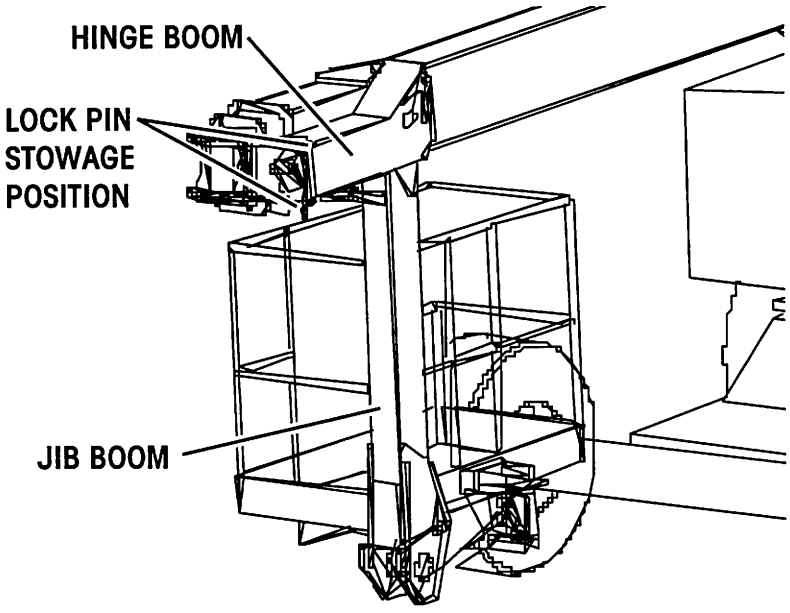
h. Remove lock pin from the lower stow bracket, swing it into transport position and secure it in place with the hairpin clip.

i. Lower main boom so that jib rests on truck or trailer bed.

**⚠ CAUTION**

**The jib boom should not be raised or the main boom telescoped, once the unit is in the STOW-*N*-GO™ position.**

**To avoid damaging the unit, the platform MUST NOT be tied to the trailer bed in any way and should only REST on the bed.**




**Stow-*N*-Go™ Storage Mode.**

## TRUCK OR TRAILER TRANSPORT, BOOM IN STOW-*N*-GO™ MODE (CONTINUED)

6. The negative battery cables should be disconnected for long distance transport. It is recommended that the fuel and hydraulic tank valves be closed as well.

7. Tie down locations are located on all four corners of the undercarriage, and at the base of the jib boom. Use one (1) 1/2 inch, "Grade 7" chain from each of the tie down lugs, and run the chains as shown in the diagram below.

   Ratchet type load binders are recommended. If using lever type load binders, wire or strap them shut, or wrap chains around them to prevent opening.

## TRUCK OR TRAILER TRANSPORT, BOOM IN CONVENTIONAL MODE

**⚠WARNING**

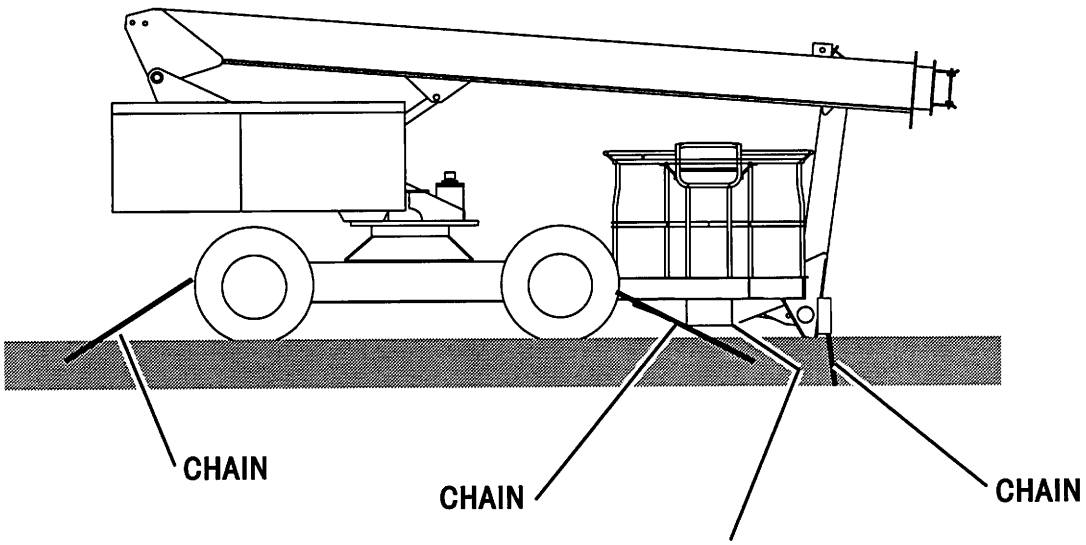
**ALWAYS ATTACH THE UNIT TO A WINCH WHEN LOADING OR UNLOADING FROM A TRUCK OR TRAILER. CONNECT WINCH CABLE TO THE TIE DOWN LUGS ON THE UNDERCARRIAGE.**

**UNASSISTED LOADING OR UNLOADING OF ANY MOBILE PLATFORM IS NOT RECOMMENDED.**

**With boom in operational mode:**

1. Enter the platform, and start the engine using the platform controls. Select the "OPERATING" engine speed.

2. Raise the boom to allow greater ground clearance so that the platform will clear any obstacles as the machine goes up the loading ramp.




**Stow-*N*-Go™ Mode Tie Down of Unit (Recommended Method).**

## TRUCK OR TRAILER TRANSPORT, BOOM IN CONVENTIONAL MODE (CONTINUED)

3. Using a winch, carefully drive the unit onto the truck or trailer.

4. Lock the superstructure to the undercarriage by installing the lock pin provided.

5. If placing the boom in the Stow-*N*-Go™ position is not desired, ensure that the main boom is fully retracted. Next, the jib boom tip should rest on the truck or trailer bed. Then, use the platform level lever to **rest** the platform base on the bed of the truck or trailer, but **do not** apply pressure onto bed.

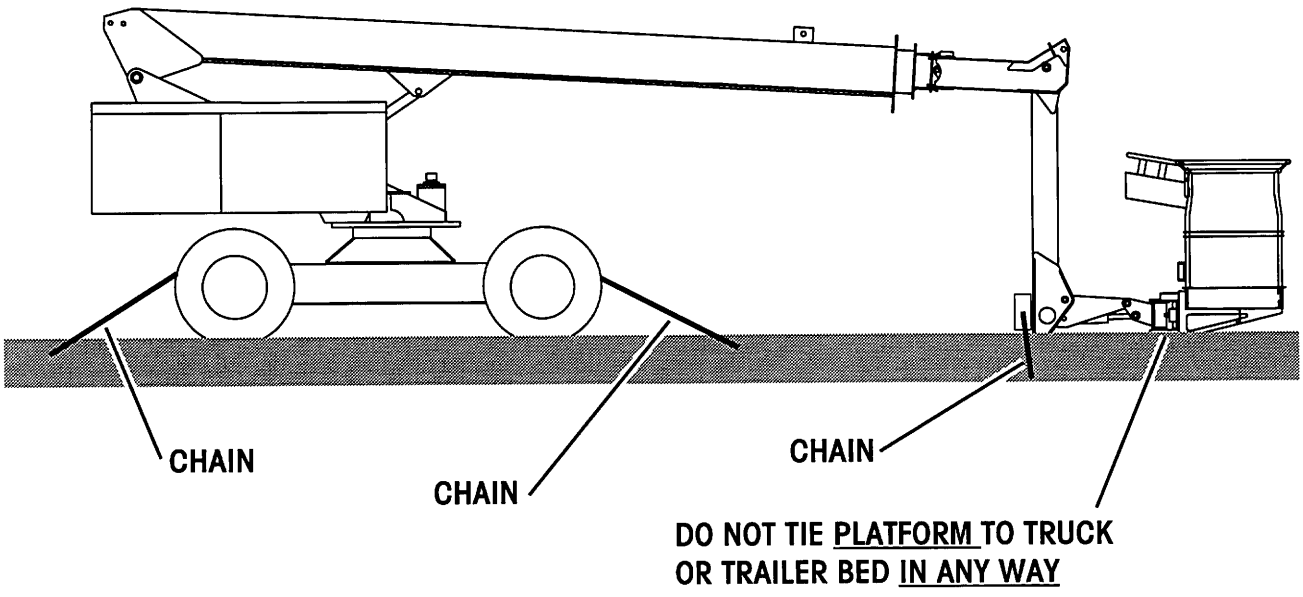
**⚠ CAUTION**

**To avoid damaging the unit, the platform MUST NOT be tied to the trailer bed in any way and should only REST on the bed.**

6. The negative battery cables should be disconnected for long distance transport. It is recommended that the fuel and hydraulic tank valves be closed as well.

7. Tie down locations are located on all four corners of the undercarriage and at the base of the jib boom. Use four (4) 1/2 inch, "Grade 7" chains from each of the tie down lugs, and run the chains as shown in the diagram on the facing page.

   Ratchet type load binders are recommended. If using lever type load binders, wire or strap them shut, or wrap chains around them to prevent opening.




**Conventional Mode Tie Down of Unit (Recommended Method).**

# UNLOADING PROCEDURES

**⚠WARNING**

**TO AVOID SERIOUS PERSONAL INJURY OR DEATH, ENSURE THAT THE MACHINE IS IN "LOW" DRIVE SPEED WHILE UNLOADING FROM A TRUCK OR TRAILER.**

1. Inspect the outside of the unit for damage (including the underside). Inspect all hoses, boom sections and cables for chafing or shipping damage. Confirm that all wheel lug nuts and swing bearing bolts are tight (refer to specifications).

2. Remove the pin that locks the superstructure to the undercarriage near the swing bearing. Stow the lock pin in the location provided nearby.

3. Unlock and open both side compartments. Inspect all fuel, electrical and hydraulic connections for damage and security.

4. Connect battery cables to batteries if required. Check electrolyte level.

5. Open the fuel tank valve and check fuel level.

6. Check engine oil level, and add as required per engine manufacturer's recommendations.

7. Check fluid level at the sight gauge on the hydraulic tank, and add fluid as required (see Lubrication Chart). Check that shutoff valves on the hydraulic tank are open.

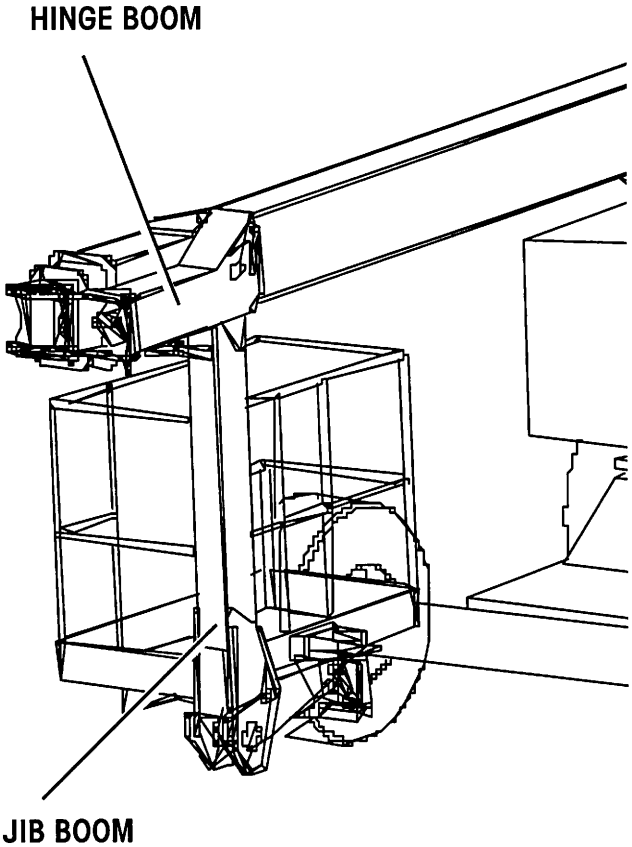
8. Close side compartment covers.

9. Attach the unit to a winch for the unloading procedure.

**⚠WARNING**

**ALWAYS USE A WINCH TO ASSIST LOADING OR UNLOADING THE UNIT FROM A TRUCK OR TRAILER. CONNECT WINCH CABLE TO THE TIE DOWN LUGS ON THE UNDERCARRIAGE. UNASSISTED LOADING OR UNLOADING OF ANY MOBILE PLATFORM IS NOT RECOMMENDED.**

**READ AND UNDERSTAND ALL SAFETY, CONTROL AND OPERATING INFORMATION FOUND ON THE MACHINE AND IN THIS MANUAL BEFORE OPERATING THE UNIT.**




STOW-*N*-GO™ Storage Mode.

## UNLOADING PROCEDURES (CONTINUED)

10. Start engine, using the ground controls.

**NOTE:** Refer to Start-up Procedures and Operator Controls Descriptions in the Operator's Manual.

Select the "LOW" engine speed and allow the engine to slow to idle speed.

11. Remove tie downs from the base of the jib boom ONLY.

**⚠WARNING**

**WITH BOOM OUT OF "OPERATIONAL MODE" POSITION, DO NOT PLACE ANY LOAD IN THE PLATFORM.**

**NOTE:** If boom is in STOW-*N*-GO™ storage mode (see illustration):

a. Platform controls are disabled until the hinge boom is secured to main boom with upper and lower lock pins. From ground controls, raise boom to horizontal. Disconnect lower stow bracket from jib boom and return bracket and hairpin clip to stowed position.

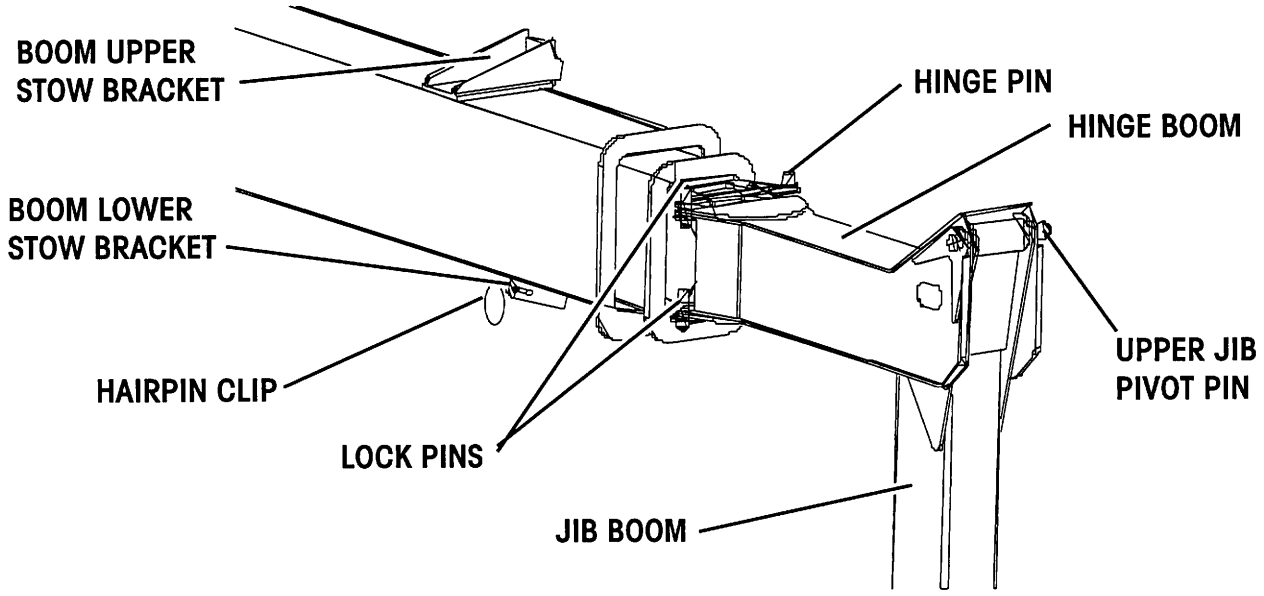
b. Swing platform around so that the hinge boom aligns with the main boom (see "Operational Mode" illustration).

c. Position jib out at approximately 45° to main boom and lower main boom so jib is slightly raised above bed of truck or trailer.

d. Remove boom lock pins from stowed position, align hinge and main boom holes and insert boom lock pins to secure hinge boom to main boom.

If hinge and main boom holes do not line up, slightly lower main boom onto truck or trailer bed to apply pressure on jib boom.

e. Secure hinge boom to main boom with both boom lock pins and hairpin clips (attached).




**STOW-*N*-GO™ Operational Mode.**

## UNLOADING PROCEDURES (CONTINUED)

12. Turn engine off.

13. Remove remaining machine tie downs. Remove wheel chocks, if used.

14. Turn the key switch to "PLATFORM CONTROLS".

15. Enter the platform, and restart the engine using the platform controls. Select the "OPERATING" engine speed, and test all platform functions.

16. Raise the boom so that the platform will clear any obstacles as the machine is driven down the loading ramp.

17. Carefully drive the unit off the truck or trailer with the assistance of a winch. The brakes are automatically released for driving, and will automatically apply when the unit stops.

18. Before placing the unit into service, all operators must read and understand the contents of this Operator's Manual.

# EMERGENCY SYSTEM AND PROCEDURES

**⚠ DANGER**

**IF THE UNIT FAILS WHILE THE OPERATOR'S PLATFORM IS RAISED OR EXTENDED, DO NOT ATTEMPT TO CLIMB DOWN THE BOOM ASSEMBLY. SERIOUS INJURY MAY RESULT.**

## EMERGENCY ELECTRICAL PUMP

The RP66 Mobile Platform has a battery powered emergency pump. This pump can be activated from the operator's platform or ground control station to briefly operate the machine when the unit has lost engine power.

- Turn and hold the pump switch on the ground control console to "EMERGENCY; or

  press and hold the emergency pump button on the platform control console.

- Select the proper function as desired to fit the situation.

To prevent the battery from completely discharging and the emergency pump from overheating, release the emergency pump switch to allow a 30 second rest period after every 30 seconds of operation. Once the unit has been safely positioned, correct the cause of the failure before returning the unit to service.

## UNPOWERED EMERGENCY MOVEMENT

- Every attempt should be made to restore primary power to the unit before using this procedure.

**⚠ DANGER**

**THIS PROCEDURE REQUIRES RELEASING THE VEHICLE BRAKES, WHICH RESULTS IN NO MEANS TO STOP THE UNIT'S TRAVEL. SIMON RECOMMENDS USING THIS PROCEDURE ONLY IN CASES OF EMERGENCY, AND ONLY A SHORT DISTANCE.**

**BE AWARE OF UNIT RUNAWAY ON SLOPING SURFACES. MOVEMENT SPEED SHALL NOT EXCEED 1 M.P.H. (1.6 K.P.H.).**

- Secure the unit with chains or ropes.

  The RP66 is equipped with tie down lugs (front and rear) that can be used for towing the unit. The chains or ropes must be of sufficient capacity to move the unit.

- Block wheels.

- Disconnect both front torque hubs by removing the plate in the center of the torque hub, turning the plate so that the boss faces in, then reinstalling the plate.

- Release brakes.

  There is a hand pump located to the left of the ground control mounting bracket. Close the valve under the pump plunger by turning it to the right (clockwise) and operate hand pump. Continue to pump until high resistance is felt in the pump plunger. At this point, wheel brakes will be released.

  After unblocking the wheels, the unit will be ready to be moved; however, there is no provision for steering the vehicle.

## UNPOWERED EMERGENCY MOVEMENT (CONTINUED)

- After primary power has been restored to the vehicle, fully open the needle valve under the hand pump plunger to engage wheel brakes.
- Engage both front torque hubs by removing the plate in the center of the torque hub, turning the plate so that the boss faces out, then reinstalling the plate.
- The machine is now ready for normal operation.

## EMERGENCY LOWERING

It is not possible for us to foresee every emergency situation that could arise during operation of this machine. Information on the following pages describes three typical emergency situations, and lists appropriate actions that can be taken.

When faced with an emergency, above all please remember:

- Stay calm.
- Think through the situation before operating the machine.
- Get help if necessary.

**SITUATION: Platform elevated, operator not incapacitated, but unit will not respond to platform controls.**

**POSSIBLE CONDITION:**

- One or more functions not operating correctly.
- Unit movement from unselected control lever.
- Unit function will not stop unless power is switched off.

**CORRECTIVE ACTION**

1. Remove foot from foot pedal.
2. Push the red "Emergency Stop" Button.
3. Evaluate the nature of the failure. Return to the ground, using the emergency pump and lowering procedure (see "Emergency Pump").
4. If unable to return to the ground using the platform controls and the emergency pump, contact an experienced operator to lower the machine with the emergency pump using the ground controls (see "Emergency Pump").

**⚠ DANGER**

**DO NOT TRY TO CLIMB DOWN THE BOOM.**

**HAVE AN EXPERIENCED OPERATOR USE THE EMERGENCY PUMP TO SAFELY LOWER THE PLATFORM.**

5. **Report the incident to your supervisor immediately.**

**SITUATION: Unit elevated, with operator incapacitated at platform controls.**

**⚠ DANGER**

**DO NOT TOUCH UNIT !!!**

**DETERMINE THE CAUSE OF THE PROBLEM BEFORE YOU TOUCH THE MACHINE.**

**CORRECTIVE ACTION**

1. Check for contact with power lines.
2. Have someone summon first aid or rescue squad.
3. Attempt to talk to operator before taking any rescue measures.
4. **Check to see if the operator is in a pinned position, or would be endangered if platform is moved, before attempting emergency lowering procedure.**
5. After establishing that the machine is not in contact with live power lines, lower the platform using the emergency lowering procedure (see "Emergency Pump", earlier in this section).
6. Render first aid to the operator.
7. **Report the incident to your supervisor immediately.**

**IMPORTANT: Any incident involving personal injury must be immediately reported to the local Simon Aerials Distributorship as well as to Simon Aerials Inc.**

**SITUATION: Platform in contact with live power lines and operator incapacitated.**

**⚠ DANGER**

**DO NOT TOUCH UNIT !!!!**

**ELECTROCUTION HAZARD!!!**

**CORRECTIVE ACTION**

1. Contact authorized personnel to disconnect power supply touching unit.
2. Have someone summon first aid or rescue squad.
3. If operator is unconscious, check to see if he is in a pinned position, or would be endangered if platform is moved.
4. **AFTER POWER IS CUT,** use the emergency lowering procedure to bring platform with operator to a safe location to render first aid (see "Emergency Pump").
5. **Report the incident to your supervisor immediately.**

**IMPORTANT: Any incident involving personal injury must be immediately reported to the local Simon Aerials Distributorship as well as to Simon Aerials Inc.**

# SECTION 2:
# HYDRAULIC SYSTEM

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# HYDRAULIC FLUID

## HANDLING PRECAUTIONS

**⚠WARNING**

**PERSONS IN REGULAR CONTACT WITH MINERAL-BASED HYDRAULIC FLUID NEED TO BE AWARE OF THE IMPORTANCE OF THOROUGH HYGIENE, AND THE PROPER METHODS FOR HANDLING MINERAL OILS IN ORDER TO AVOID POTENTIAL HAZARDS TO HEALTH.**

If mineral-based hydraulic fluid is SPLASHED INTO THE EYES, it must be WASHED OUT THOROUGHLY using abundant quantities of water. If irritation persists, medical advice should be sought.

Mineral oils act as solvents on the natural oils in the skin. FREQUENT AND PROLONGED SKIN CONTACT CAN CAUSE DERMATITIS OR SEVERE IRRITATION. Mineral-based hydraulic fluids normally present no health hazard when used properly. Protective clothing and proper washing facilities should be provided or be accessible.

**⚠WARNING**

**HYDRAULIC FLUID UNDER PRESSURE CAN PENETRATE AND BURN THE SKIN, DAMAGE EYES, AND MAY CAUSE SERIOUS INJURY, BLINDNESS, AND EVEN DEATH.**

**FLUID LEAKS UNDER PRESSURE MAY NOT ALWAYS BE VISIBLE.**

**IF MINERAL-BASED HYDRAULIC FLUID HAS PENETRATED THE SKIN, IT MUST BE MEDICALLY TREATED, BY A DOCTOR FAMILIAR WITH THIS TYPE OF INJURY, WITHIN A FEW HOURS.**

## FLUID RECOMMENDATIONS

We strongly recommend the use of MOBIL DTE-13M HYDRAULIC FLUID. An EQUIVALENT substitute can be used if absolutely necessary. Mineral-based hydraulic fluids produced by different companies will USUALLY mix with each other satisfactorily, but this IS NOT RECOMMENDED. When in doubt, consult your supplier.

MOBIL DTE-13M has proven to be suitable for use in all climates. For continued operation in temperatures below 32° F (0° C), use of MOBIL DTE-11M is satisfactory. For operation in tropical climates, the use of MOBIL DTE-15M is allowable

## FLUID CONTAMINATION CHECKS

Use the following as a guide to determine when analysis of the hydraulic fluid is necessary.

- Any time the hydraulic pump is replaced.
- If fluid discoloration is noticed in the hydraulic reservoir sight tube.
- If, after the first 50 hours of operation, the hydraulic filter elements are plugged.
- Any time the hydraulic filter elements show signs of metal content.
- Once every six months, under normal operating conditions.
- Every 3 months, in extremely dusty or dirty operating conditions.

The hydraulic fluid analysis must be done by a qualified laboratory. To insure that you receive accurate recommendations about the fluid being analyzed, always provide the following information with the test sample.

- Type of hydraulic fluid. (See Lubrication Chart)
- Model and serial number of unit from which sample was taken.
- Purpose of analysis: i.e. pump failure, discoloration, etc.
- Type of analysis: i.e. complete to show additive breakdown, acid buildup, viscosity, type and percent of contaminants. Comparison to new fluid and recommendations.

Comply with contamination analysis and recommendations to achieve a clean, contamination free hydraulic system.

Following the above guide will prevent premature failure of pumps, cylinder seals and drive motors, and unnecessary down time.

If system flushing and replacement of fluid is recommended, refer to the flushing procedure.

## SYSTEM FLUSHING PROCEDURE

**⚠WARNING**

**BLOCK THE WHEELS OF THE MACHINE TO PREVENT UNEXPECTED MOVEMENT OF THE MACHINE.**

1. With BOOM DOWN AND FULLY RETRACTED (in stowed position), drain hydraulic fluid from hydraulic tank into a clean, empty container. Use an oil filter cart so the fluid may be reused if analysis is good.
2. When the hydraulic tank is empty, remove suction hose to pump, emergency pump hose, telescope retract return hose, vent (return) hose for telescope cylinder, manifold return hose, drive hose from pump with the tee for motor drain.
3. Remove all hoses between pump and high pressure filter.
4. Flush the hoses with clean hydraulic fluid.
5. Remove hydraulic fluid filter, and flush the filter body and attaching hoses. Discard old filter element and replace.
6. With hoses removed from the hydraulic tank, flush out the tank.
7. Reinstall all the hoses removed in the previous steps EXCEPT the return lines to tank. Temporarily tie hoses together and position these hoses so that they will drain into a clean container.
8. If the hydraulic fluid removed from the reservoir is good, pump it (through a filter cart) back into the tank. If fluid is not usable, dispose of it and fill the hydraulic tank with filtered, fresh hydraulic fluid (refer to Lubrication Chart).
9. Open the suction line valve to allow fluid to flow to the hydraulic pump.
10. Loosen hose fittings at pump to allow pump to flood with hydraulic fluid. Tighten pump fittings.
11. Turn main power key switch to the "Ground" position.
12. Press "Engine Start" button to start engine.
13. Activate pump selector toggle switch on remote control pendant and hold at "Main" to activate engine powered pump.

**⚠ CAUTION**

**Use care when operating functions as return hydraulic fluid is now being returned to container provided.**

14. Cycle all cylinder functions to flush the hydraulic components of the hydraulic fluid. This will remove old fluid from the hydraulic system as the cylinder is cycled to its maximum limits.

**⚠ CAUTION**

**Monitor the hydraulic reservoir fluid level when cycling the unit's functions. Add fluid as necessary to replace that being discharged to container through system return line. This fluid may be returned to the reservoir through a filter cart, if the fluid analysis shows that it is good.**

Three cycles of ALL hydraulic cylinder functions should remove old hydraulic fluid.

15. Disconnect the return hoses for the drive motors. Tie the hoses together and let them drain into a clean container.

**⚠ CAUTION**

**ALWAYS BLOCK THE WHEELS before you raise the machine.**

16. For four wheel drive units, jack the front end of the unit so the front drive wheels are off the ground.

17. Activate pump selector toggle switch on remote control pendant and hold at "Main" to activate engine powered pump.

18. Activate the drive switch on remote control pendant to flush the drive circuit hydraulic components of the hydraulic fluid.

19. Activate the steer toggle switch on remote control pendant to flush the steer cylinder of the hydraulic fluid.

20. When the above procedures have been completed, re-connect system return hose to tank.

21. Fill hydraulic tank to full mark on sight gauge.

22. Operate all functions to their full extreme positions to ensure proper operation.

23. Check for leaks and correct as necessary. Unit is now ready to be placed back in operation.

# HYDRAULIC SYSTEM COMPONENTS

Following is a description of the Electro-Proportional Circuit and the major components of the hydraulic system.

## ELECTRO-PROPORTIONAL CIRCUIT

With no function activated, hydraulic fluid flows from the hydraulic reservoir to the pump, to the high pressure filter, then to the valve bank assembly. When the operator moves a control lever, this initiates the electrical signal to the proper solenoid of the valve bank. The fluid flow is metered by the platform controller. The fluid is then directed to the appropriate function and then back to the hydraulic reservoir.

## HYDRAULIC PUMPS

There are two pumps on the machine; the main hydraulic pump and the emergency pump.

### MAIN HYDRAULIC PUMP (TYPE 1)
(EARLIER VERSIONS)

The main hydraulic pump is a variable displacement pressure compensated radial piston pump.

Hydraulic fluid enters through the inlet ports. A common inlet gallery provides fluid to all eight inlet valves in the housing. Pistons radially surround an eccentric cam. The cam moves a bearing race upon which the pistons ride. Behind each piston is a spring which holds the piston against the bearing race.

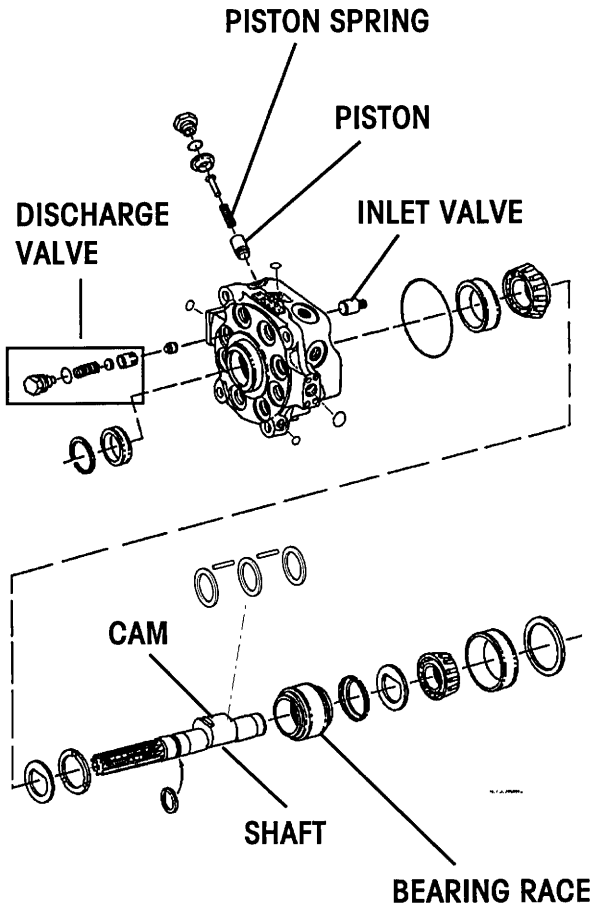
As the pump shaft rotates low hydraulic pressure develops in the piston spring area during downward stroke of the piston. This low pressure allows the inlet valve to open filling the piston cavity with hydraulic fluid. The inlet valve closes at the end of the intake stroke of the piston.

High pressure is developed as the race pushes the piston outward. As pressure increases a discharge valve opens allowing the fluid to pass into the outlet gallery.

At the end of the stroke, the discharge valve closes. All discharge valves share a common outlet gallery in the pump housing.

An orifice is located between the crankcase and the inlet gallery. Any fluid flow past the pistons is routed through the orifice to the inlet gallery. This flow allows for cooling and lubrication.

Pressure compensated pumps are designed to provide "on demand" high pressure fluid regardless of flow requirements up to the maximum pump output.




**Main Hydraulic Pump.**

The pressure compensator regulates fluid pressure into the pump crankcase. Increased pressure in the crankcase overcomes the piston spring pressure and hold the pistons away from the race, thereby destroking the pump.

High pressure is developed as the race pushes the piston outward. As pressure increases a discharge valve opens allowing the fluid to pass into the outlet gallery.

At the end of the stroke, the discharge valve closes. All discharge valves share a common outlet gallery in the pump housing.

An orifice is located between the crankcase and the inlet gallery. Any fluid leakage past the pistons is routed through the orifice to the inlet gallery. This flow allows for cooling and lubrication.

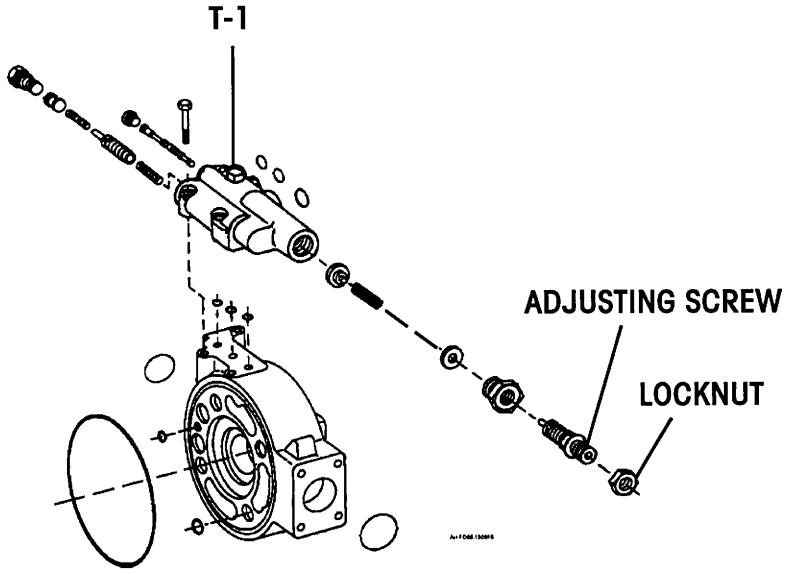
## TYPE ONE (1) PUMP ADJUSTMENT

**⚠WARNING**

**ESCAPING FLUID UNDER PRESSURE CAN PENETRATE THE SKIN CAUSING SERIOUS INJURY. RELIEVE PRESSURE BEFORE DISCONNECTING HYDRAULIC LINES. KEEP HANDS AND BODY AWAY FROM PINHOLES AND NOZZLES WHICH EJECT FLUIDS UNDER HIGH PRESSURE. USE A PIECE OF CARDBOARD OR PAPER TO SEARCH FOR LEAKS. DO NOT USE YOUR HAND.**

**IF MINERAL-BASED HYDRAULIC FLUID HAS PENETRATED THE SKIN, IT MUST BE MEDICALLY TREATED, WITHIN A FEW HOURS, BY A DOCTOR FAMILIAR WITH THIS TYPE OF INJURY.**

**NOTE:** Refer to "Machine Specifications" to determine maximum system pressure for your unit.




**Main Hydraulic Pump Control Adjustment.**

To adjust the system pressure:

- Install a 14 mm adapter to the high pressure test port (T-1) and connect a 5000 psi (345 Bar/ 352 Kg/cm$^2$) gauge.
- Locate the adjusting screw on the side of the main pump adapter plate.
- Loosen the locknut and while viewing the pressure gauge, set system pressure to value specified in the "Machine Specifications".
    - Turn the adjusting screw out to decrease pressure, in to increase pressure.
- After system pressure has been set, tighten the lock nut.

**⚠ CAUTION**

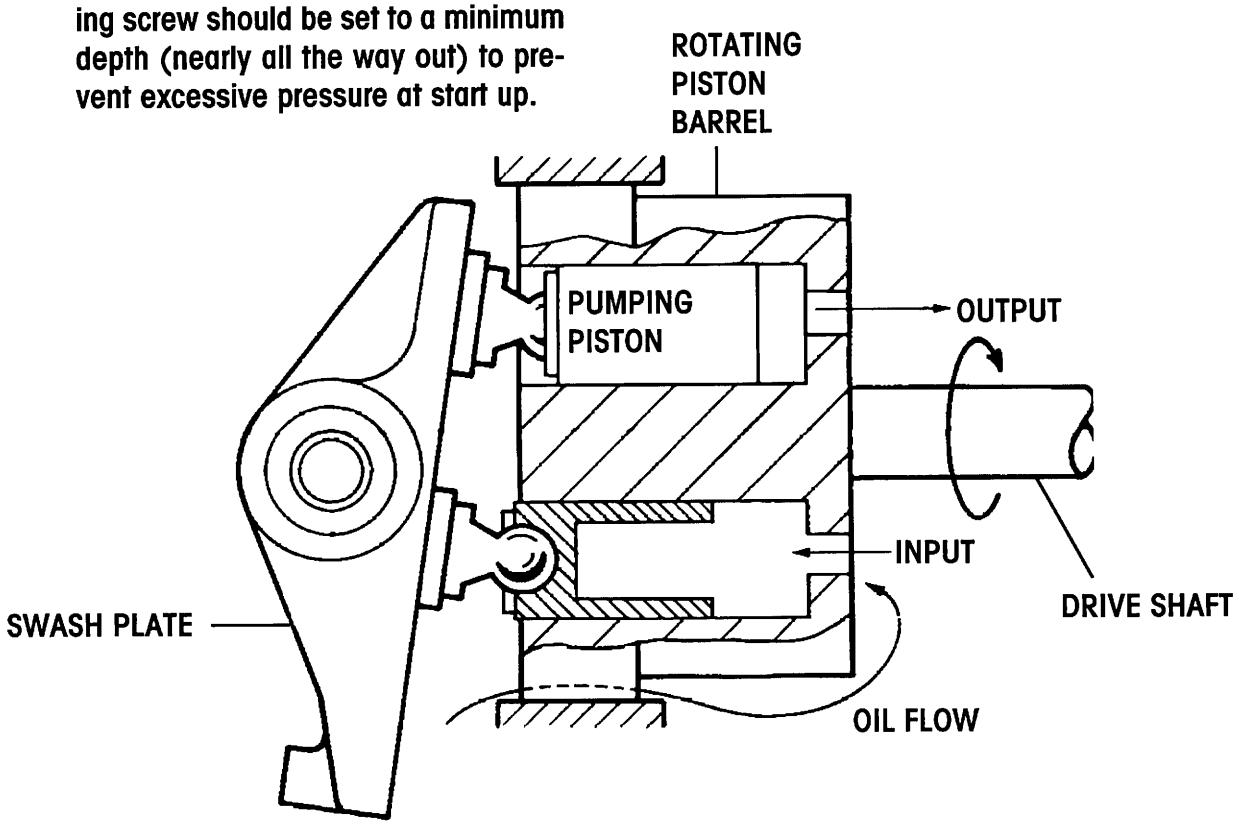
**When first starting a unit where the pump setting is unknown, the adjusting screw should be set to a minimum depth (nearly all the way out) to prevent excessive pressure at start up.**

## MAIN HYDRAULIC PUMP (TYPE 2)
(LATER VERSIONS)

All control is achieved by the proper positioning of the swash plate. This is achieved by a servo piston acting on one end of the swash plate working against the combined effect of the off-setting forces of the pistons and centering spring on the other end. The control spool acts as a metering valve which varies the pressure behind the servo piston.

The amount of flow produced by the piston pump is dependent upon the length of stroke of the pumping pistons (see Pumping Action figure). This length of stroke, in turn, is determined by the position of the swash plate. Maximum flow is achieved at an angle of 17°.

The rotating piston barrel, driven by the prime mover, moves the pistons in a circular path and the



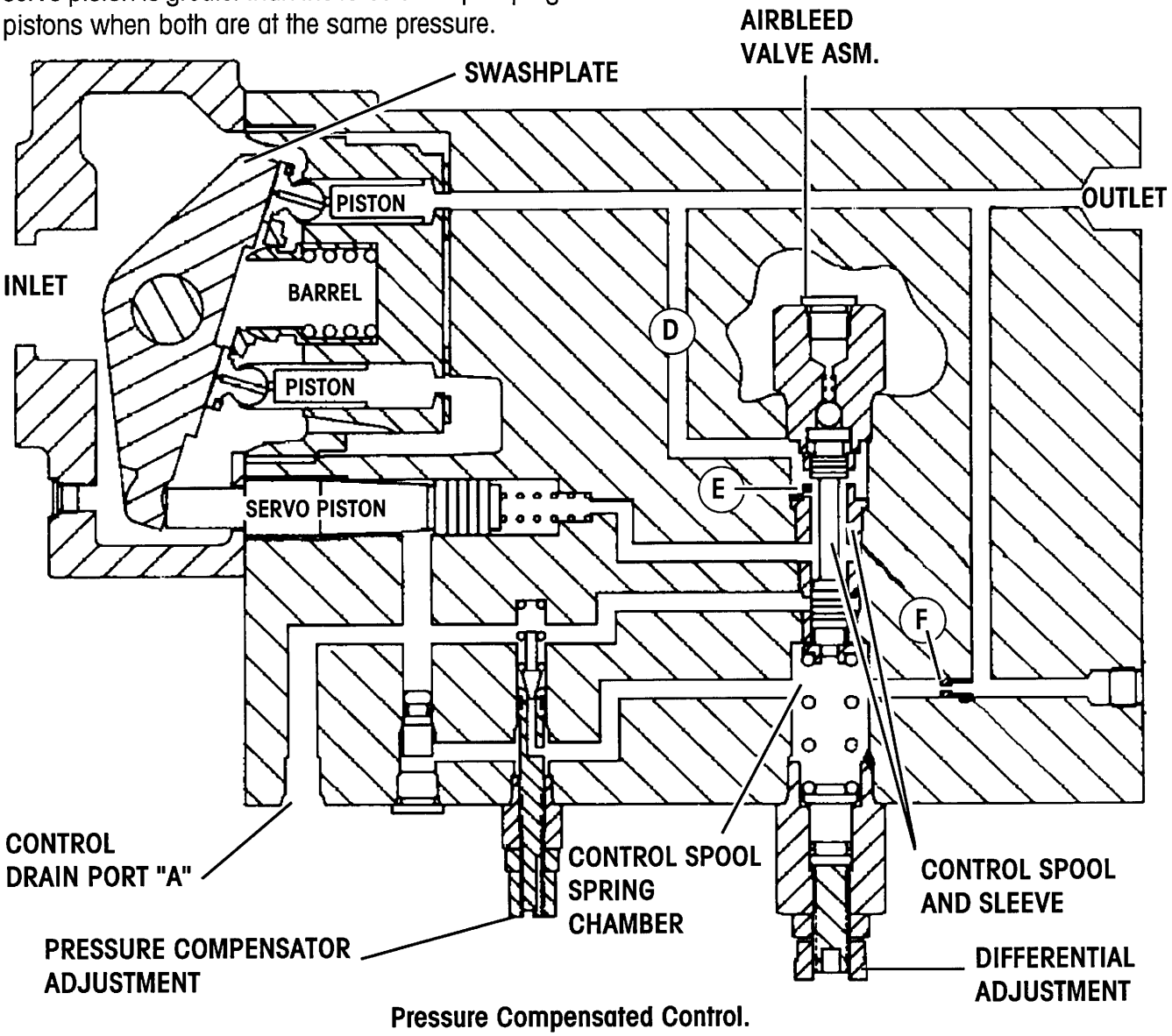

**Pumping Action.**

piston slippers are supported hydrostatically against the face of the swash plate. When the swash plate is in a vertical position, perpendicular to the centerline of the piston barrel, there is no piston stroke and consequently no fluid displacement. When the swash plate is positioned at an angle, the pistons are forced in and out of the barrel and fluid displacement takes place. The greater the angle of the swash plate, the greater the piston stroke.

Swash plate angle controls the output flow of the pump (see Pressure Compensated Control figure). Swash plate angle is controlled by the force generated against the swash plate by the pumping pistons and by the force of the servo piston. The force of the servo piston is greater than the force of the pumping pistons when both are at the same pressure.

By means of internal porting, pressure is connected from the output port to the servo piston via orifice "E", and to the control spool via passage "D". Also, pressure is applied to the control spool chamber through orifice "F". As long as the pressures at both ends of the control spool remain equal, the spool will remain offset to the right, due to the added force of the spring.

When pressure reaches the setting of the compensator control, the dart leaves its seat causing the pressure in the spool chamber to be reduced. The spool now moves downward causing pressure in the servo piston cavity to vent via port "A". The reduced pressure at the servo piston allows the




Pressure Compensated Control.

servo piston to move to the right. This movement reduces the angle of the swash plate and thereby reduces the pumps output flow.

As pump pressure on the control spool drops below pressure and spring force in the spool chamber, the control spool moves upward to maintain an equilibrium on both sides of the spool. If pump pressure falls below compensator control setting, the control spool moves up, bringing the pump to maximum displacement.

### TYPE TWO (2) PUMP ADJUSTMENT

**⚠WARNING**

**ESCAPING FLUID UNDER PRESSURE CAN PENETRATE THE SKIN CAUSING SERIOUS INJURY. RELIEVE PRESSURE BEFORE DISCONNECTING HYDRAULIC LINES. KEEP HANDS AND BODY AWAY FROM PINHOLES AND NOZZLES WHICH EJECT FLUIDS UNDER HIGH PRESSURE. USE A PIECE OF CARDBOARD OR PAPER TO SEARCH FOR LEAKS. DO NOT USE YOUR HAND.**

**IF MINERAL-BASED HYDRAULIC FLUID HAS PENETRATED THE SKIN, IT MUST BE MEDICALLY TREATED, WITHIN A FEW HOURS, BY A DOCTOR FAMILIAR WITH THIS TYPE OF INJURY.**

Differential pressure will not normally change through the life of the pump. If this control has been tampered with, a close approximation of the correct setting can be made by the following method.

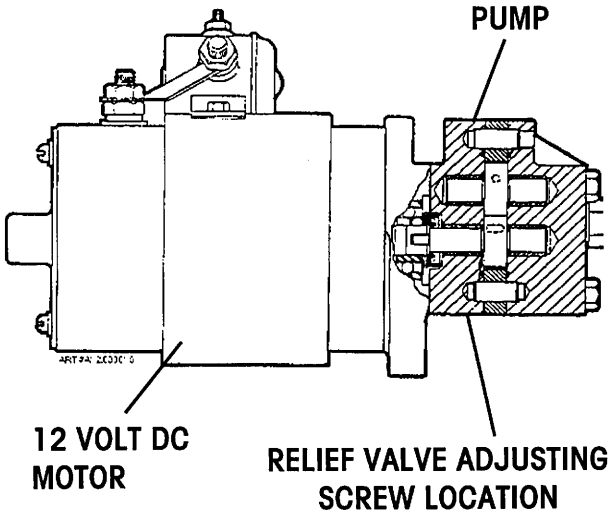
1. Install a 0-3000 PSI (0-207 Bar) gauge in the port named "Outlet" (see Pressure Compensated Control figure).
2. Deadhead the pump (no flow).
3. Back the pressure compensator adjustment out (full counterclockwise).
4. Turn the differential adjustment knob until 400-425 PSI (28-29 Bar) is reached.

## EMERGENCY PUMP

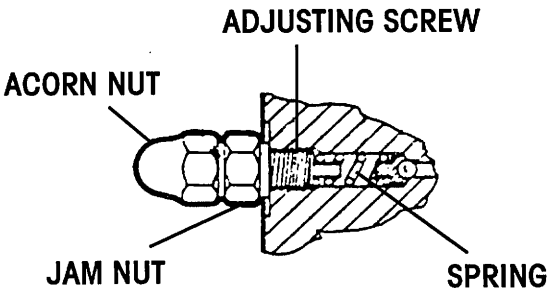
An emergency pump is driven by an electric DC motor. This pump delivers hydraulic fluid, under pressure, to the valve bank assembly. The electric motor is of a non continuous type and may fail prematurely if used excessively.

### EMERGENCY PUMP ADJUSTMENT

Emergency pump pressure setting adjustment screw is located on the side of the pump. To adjust the pressure on the pump, remove the cap and turn the adjusting screw in to increase pressure. To decrease pressure, turn the adjusting screw out. Pressure setting should read 3000 PSI (207 Bar/ 211 kg/cm$^2$)




**Emergency Pump.**




**Emergency Pump Adjustment.**

## GROUND VALVE BANK ASSEMBLY

The ground valve bank assembly of electrohydraulic valves are designed for direct and remote directional and proportional flow control. The spools of the main valve are hydraulically piloted by a solenoid, which uses pulse-width modulated excitation to provide proportional control.

### INLET SECTION

Installed in each inlet section is a 25 micron stainless steel wire cloth pilot supply filter. Also standard is a pressure reducing valve designed to provide fluid to each pilot stage with the required pressure supply.

Pressure compensation is accomplished at the pump. Therefore, the inlet section acts primarily as a manifold to inlet the main hydraulic fluid supply and to outlet the tank line to reservior.

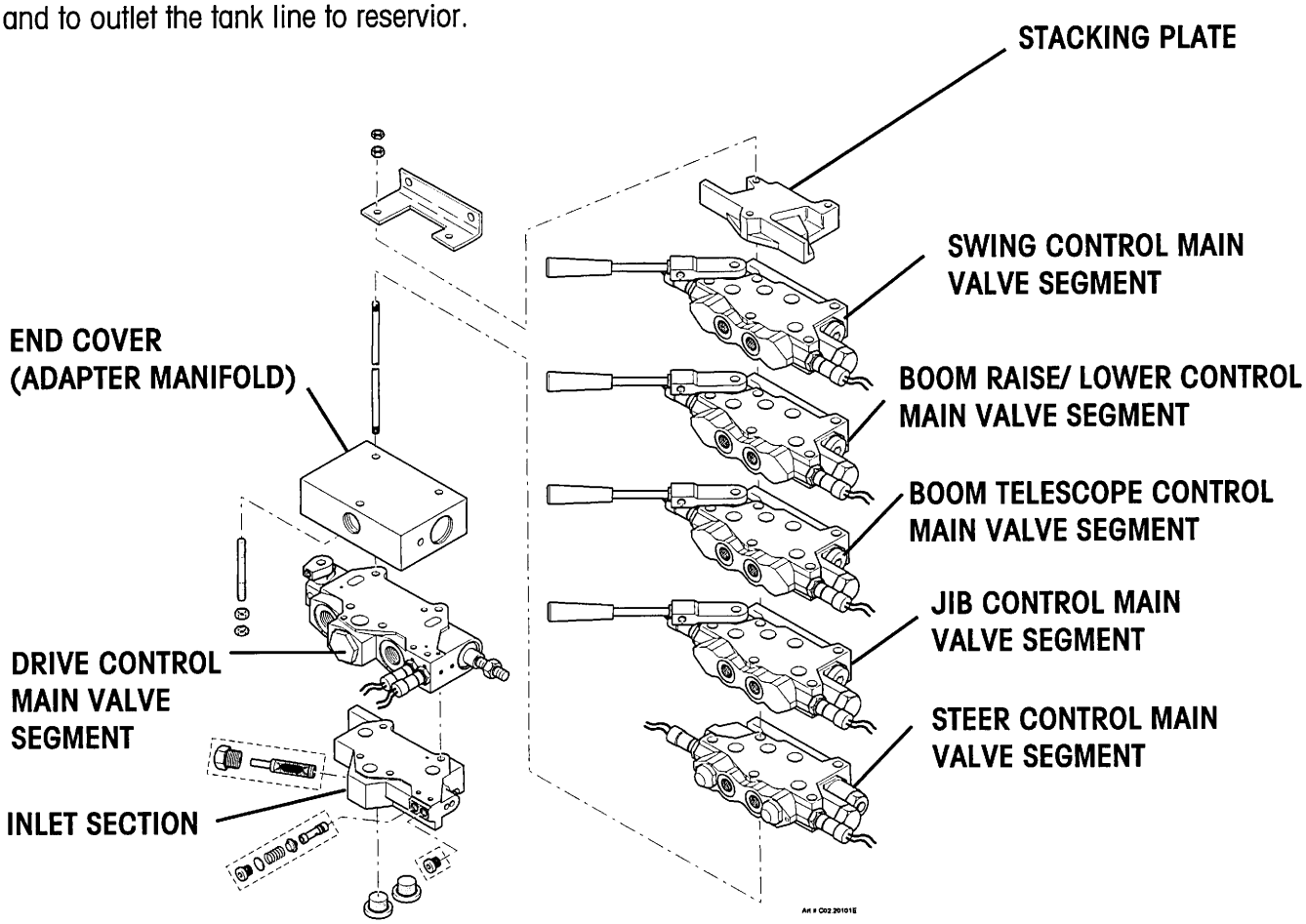
### END COVER (ADAPTER MANIFOLD)

The end cover section is essentially a manifold connecting the two separate tank flow passages and serves to complete the sectional valve stacking.

### MAIN VALVE SEGMENT

There are two types of main valve segments. The bottom valve segment is for the drive function. The five top valve segments are for the swing, lift, jib, telescope and steer functions.

The spool in the main valve segment is a 4-way, 3-position closed center. Motion stops in the neutral position, where the pressure is blocked.




**Ground Valve Bank Assembly.**

## OPERATION

This control valve is a normally closed, spring-biased, solenoid-actuated, high speed, digital valve. It consists of a removable, replaceable cartridge assembly specifically matched with a separate orifice plate and "O"-ring seal. To generate a proportional control pressure, the coil inside the solenoid is energized 33 times per second with a pulse-width modulated electrical signal. The resulting control pressure is directly proportional to the duty cycle, or percent of "ON" time per cycle of this electrical excitation. Fluid exiting the cartridge is restricted by a fixed orifice plate; the resulting back pressure is proportional to the operator-regulated duty cycle. This pressurized fluid is then routed within the main valve segment to the end of the main spool to furnish the control pressure to shift the main spool to the flow required.

## MAINTENANCE

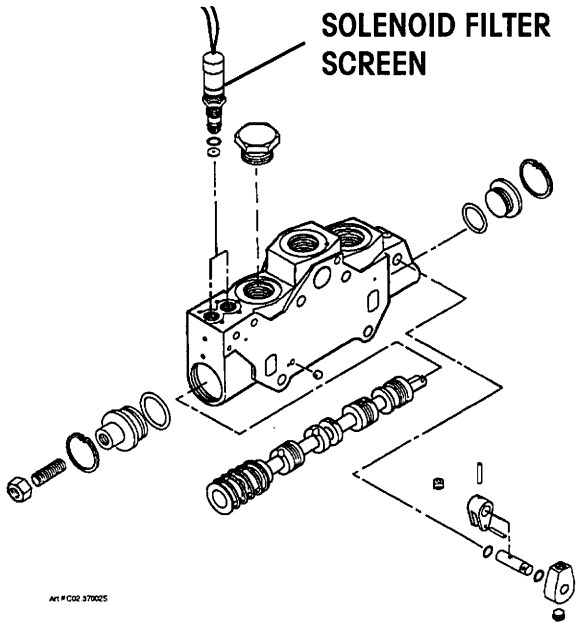
### Hydraulic Circuit Line Check

Inspect hydraulic lines and connections for signs of looseness or obstruction.

Tighten loose fittings and correct any crimped hoses:

- From pump through pressure filter to valve stack.
- Lines between valve stack and reservior.
- All hoses to the cylinders.
- Tie-downs of hoses.

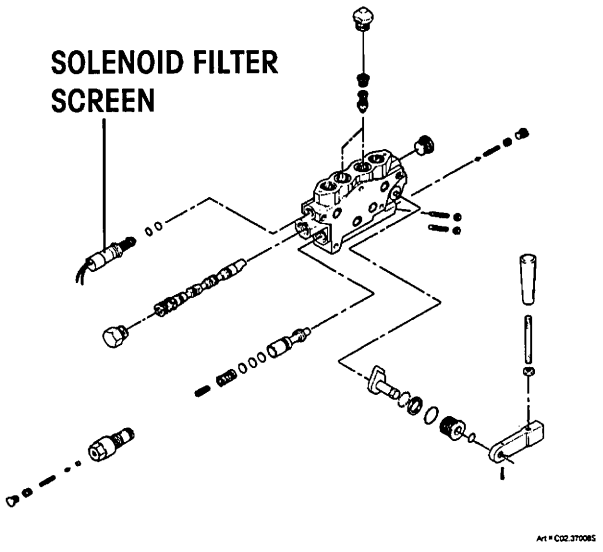
**NOTE:** Entrapped air in the hydraulic lines is common upon start-up and may result in temporary irregular motion. However, if after a reasonable operating period this condition persists, hydraulic lines should be bled to remove entrapped air and carefully inspected for leaks, starting with pump suction line.




**Drive Main Valve Segment.**

### Main Valve Segment

The main valve segment contains one filter element which requires maintenance. Remove and clean trapped contaminants using compressed air from the inside out. Replace damaged filter elements.




**Telescope, Steer, Boom and Swing Main Valve Segment.**

## VALVES

**NOTE:** Refer to "Machine Specifications" to determine maximum system pressure for your MP.

### DRIVE RELIEF VALVE

The drive relief valve is located between the outlet of one drive motor and the inlet to the other drive motor. When the drive motors are in series (high speed drive) the valve will relieve any pressure spikes when driving and steering. In other words, this valve prevents the motors from cavitating or seeing pressure greater than 3000 PSI (207 Bar). The drive relief valve is factory set at 3,000 PSI (207 Bar) and requires no adjustments.

### DRIVE VALVE ASSEMBLY

#### Hi/ Low Speed Drive Valve

The hi/ low speed drive valve is a series parallel valve located on the undercarriage and used to control the fluid flow for travel speed. The valve is factory set and requires no adjustment.

#### Flow Divider Valve Assembly

The flow divider valve assembly consists of two valves: a flow divider/ combiner valve and a gate (globe) valve, which is located on the undercarriage and is in the drive circuit.

The Flow Divider/ Combiner Valve equally divides or combines hydraulic flow from the drive valve depending on direction of travel, insuring that the drive motors will have equal torque and speed.

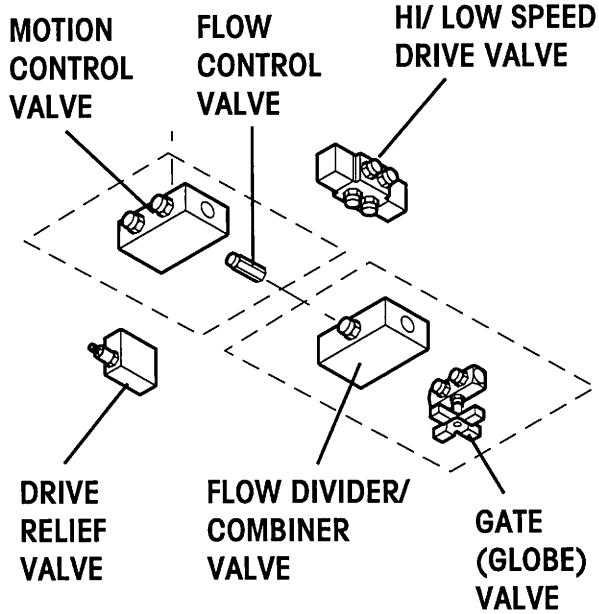
The Gate (globe) Valve allows hydraulic fluid to transfer from one drive motor to the other. When making turns the outside tire turns faster and requires more hydraulic fluid flow. Since the flow divider gives each motor equal flow the globe valve will allow the transfer of hydraulic fluid from the inside wheel to the outside wheel and prevent tire scrubbing on hard surfaces. For good performance in most conditions, the setting should be 1-1/2 turns open from the closed position.

#### Motion Control Valve Assembly

The motion control valve assembly consists of two valves: a motion control valve and a flow control valve. This valve assembly, which is in the drive circuit, is located on the undercarriage on the other end of the drive valve assembly from the flow divider valve assembly.

The Motion Control Valve restrains return flow from the drive motors to prevent cavitation and the drive motors from running ahead of pump flow. Also located in the motion control valve manifold is a shuttle valve which provides hydraulic pressure to release the drive motor brakes in either forward or reverse. This valve set-up controls speed decending a grade preventing unit runaway.

The Flow Control Valve meters the hydraulic fluid flow released from the spring applied hydraulically released brake assemblies for a smooth braking action. The valve setting is 2 to 3 turns from the closed position.



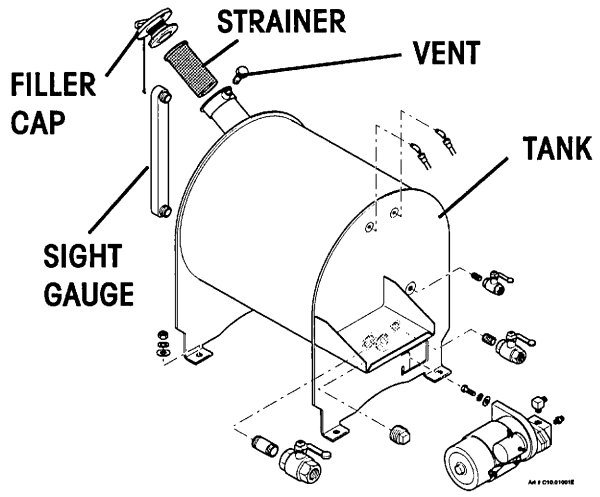

**Drive Valve Assembly.**

## HYDRAULIC FLUID RESERVOIR

The hydraulic fluid reservoir consists of the tank, a sight gauge, a filler cap with filter, a strainer, a vent, one valve for suction line, valves for return lines and a valve for the emergency pump suction line.

### HYDRAULIC RESERVOIR MAINTENANCE

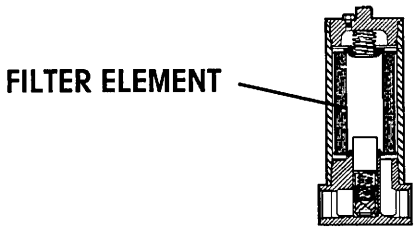
Check tank for signs of leakage. Inspect tank securing bolts for tightness. Clean cap filter by flushing with clean water and dry thoroughly.




**Hydraulic Fluid Reservoir.**

## HIGH PRESSURE FILTER

The hydraulic high pressure filter is a non-bypassing filter. This filter allows maximum fluid flow as long as the filter element is free of contaminants. When the filter is clogged, it shuts down the hydraulic flow but will not crush the filter element due to a differential pressure limiting valve. The build-up of pressure across the filter will affect system performance and act as an indication of a clogged filter.



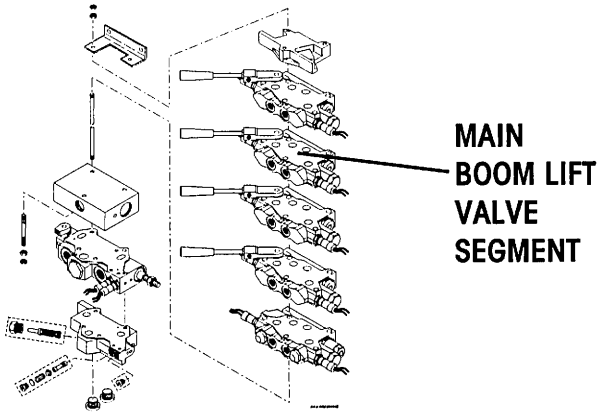

**High Pressure Filter.**

## MAIN BOOM LIFT SYSTEM

The main boom lift system consists of a hydraulic valve segment on the ground valve bank, a flow control valve, a lift cylinder with a counterbalance (holding) valve, and control levers on the platform console and at the ground control bank.

### BOOM LIFT VALVE SEGMENT

When the boom control lever on the platform control is activated, an electrical signal is transmitted to the valve cartridge in the boom lift (hoist) valve segment. This allows hydraulic fluid at the correct pressure to be sent to the proper end of the lift cylinder to raise or lower the boom. When the boom control lever at the ground control is activated, the valve spool is physically moved.




**Ground Valve Bank Assembly.**

### FLOW CONTROL VALVE

The flow control valve, located at the "boom up" outlet on the boom lift (hoist) valve segment, controls boom down speed. The flow control valve allows full hydraulic fluid flow for the boom up function. For the boom down function, the flow control valve meters the hydraulic fluid flow, thus allowing a smooth descent.

#### Flow Control Valve Adjustment

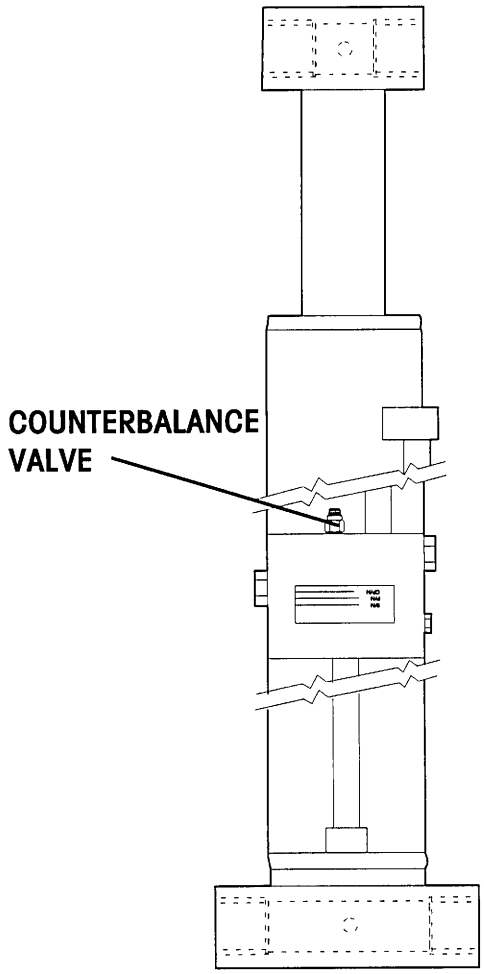
If boom bounces while descending, adjust the valve clockwise until the boom descends smoothly.

### LIFT CYLINDER

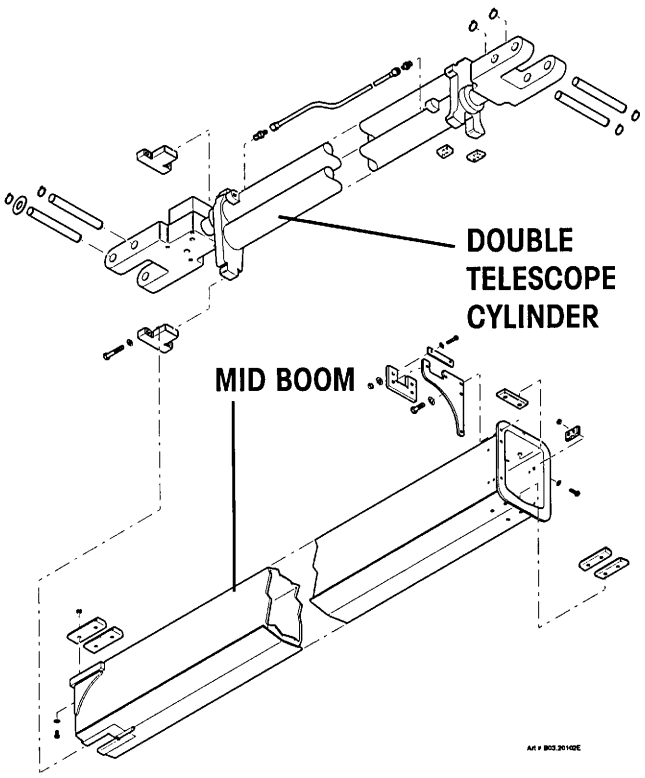
The boom lift function is controlled by a double acting cylinder. The cylinder contains a counterbalance (holding) valve, which will prevent unintended movement of the cylinder should a hose or fitting develop a leak. When the boom is lowered, fluid flows to the rod end cylinder port and to the counterbalance valve, opening this valve and allowing fluid in the base end of the cylinder to flow back to the hydraulic reservoir. When the boom section is raised, fluid flows to the base end cylinder port through a check valve.

## BOOM TELESCOPE (EXTEND) SYSTEM

The boom telescope system consists of a hydraulic valve segment on the ground valve bank, a pressure relief valve, a double telescope cylinder with two counterbalance (holding) valves, and control levers on the platform console and the ground control valve bank.



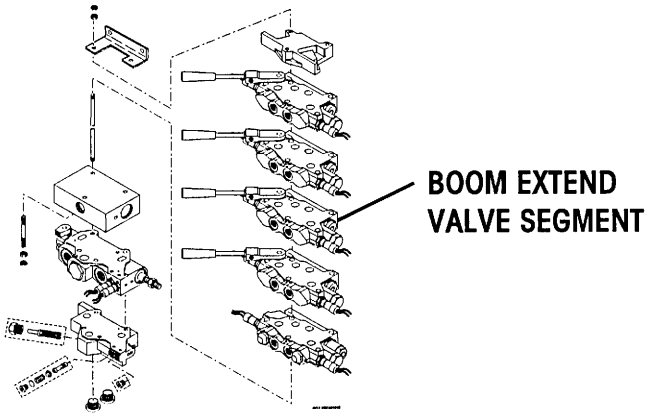

Lift Cylinder.




Boom Telescope System Components.

## BOOM EXTEND VALVE SEGMENT

When the boom telescope control lever on the platform control is activated, an electrical signal is transmitted to the valve cartridge in the boom telescope (extend) valve segment. This allows hydraulic fluid at the correct pressure to be sent to the proper end of the telescope cylinder to extend or retract the boom. When the boom extend control lever at the ground control is activated, the valve spool is physically moved.




**Ground Valve Bank Assembly.**

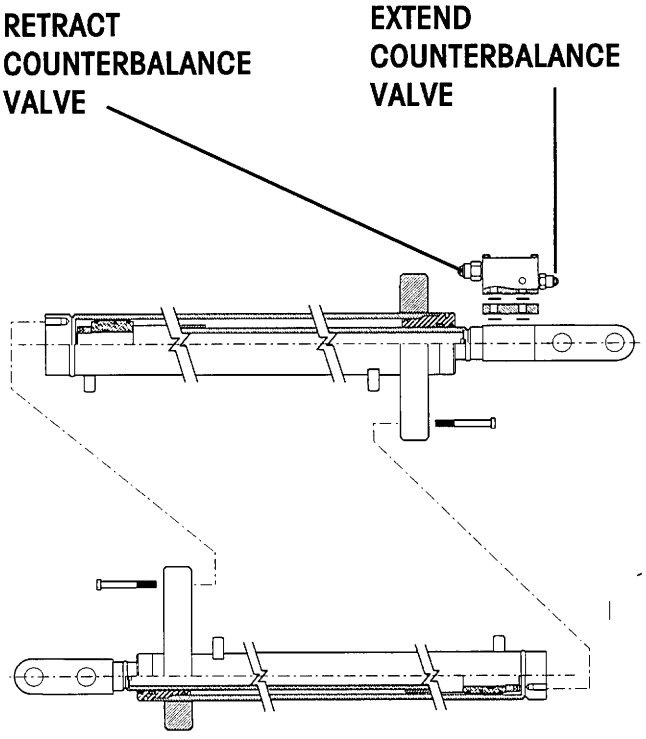
## PRESSURE RELIEF VALVE

The pressure relief valve limits the pressure on the base end of the cylinder to 1800 PSI (124 Bar/ 126.5 Kg/cm$^2$) to prevent the cylinder rod from buckling. The pressure relief valve is factory set at 1800 PSI (124 Bar/ 126.5 Kg/cm$^2$) and needs no adjustment.

## TELESCOPE (EXTEND) CYLINDER

The telescope cylinders control the extending and retracting of the boom. The telescope function is controlled by two double acting cylinders. The lower cylinder contains two counterbalance (holding) valves, which prevent unintended movement of the cylinders should a hose or fitting develop a leak. When the boom is extended, fluid flows to the base end cylinder ports and to the extend counterbalance valve, opening this valve and allowing fluid in the rod end of the cylinders to flow back to the reservoir. When the boom is retracted, fluid flows to the rod end cylinder ports and to the retract counterbalance valve, opening this valve and allowing fluid in the base end of the cylinders to flow back to the reservoir.

The mid boom telescope cylinder rod end is attached to the base boom. Both cylinder housings are attached to the mid boom. The tip boom telescope cylinder rod end is attached to the tip boom.



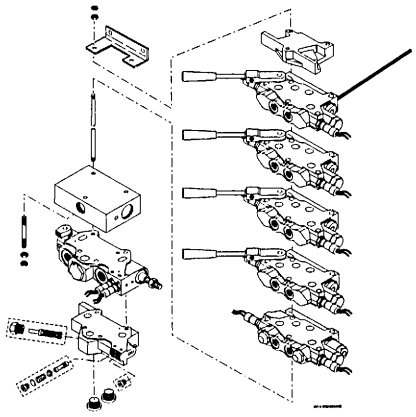

**Telescope (Extend) Cylinder.**

## SUPERSTRUCTURE SWING SYSTEM

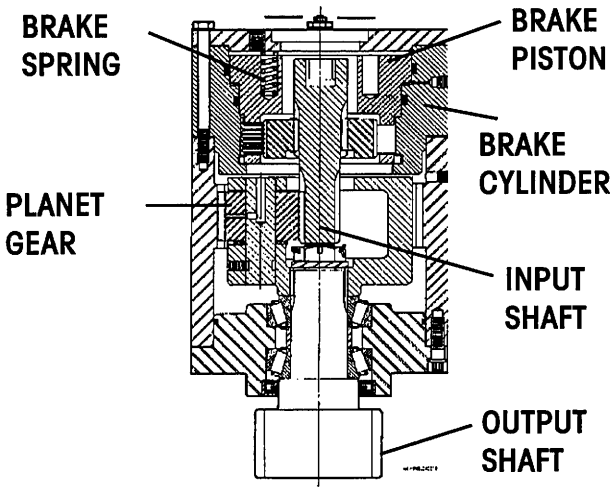
The superstructure swing system consists of a hydraulic valve segment on the ground valve bank, swing drive/ reducer assembly, hydraulic motor, an intregal brake assembly, and control levers on the platform console and ground control bank.

### SWING VALVE SEGMENT

When the swing control lever on the platform control is activated, an electrical signal is transmitted to the valve cartridge in the swing valve segment. This allows hydraulic fluid at the correct pressure to be sent to the swing drive motor. When the superstructure swing control lever at the ground control is activated, the valve spool is physically moved.




**Ground Valve Bank.**




**Planetary Gear Type Swing Reducer with Integral Brake.**

### SWING DRIVE MOTOR/ REDUCER ASSEMBLY

The planetary gear swing reducer allows the motor output to be reduced to a fractional speed and greatly increasing torque. This allows the superstructure to rotate at a slow controlled speed when fluid power is applied to the swing drive motor.

The inregral brake assembly, part of the reducer, is spring applied and hydraulically released at a pressure of approximately 250 PSI (17 Bar/ 17.6 Kg/ $cm^2$). Hydraulic fluid flow is transferred through a directional control valve which directs fluid flow to the swing motor to provide clockwise or counterclockwise superstructure rotation.

### Swing Reducer/ Motor Assembly Adjustment

To adjust the swing reducer/ motor assembly, the eccentric bushing located under the reducer must be turned. Remove the eccentric lock plate that holds the eccentric bushing in place. The eccentric lock plate is located on the superstructure in front of the swing reducer.

Next loosen the mounting bolts and turn the eccentric bushing with a screwdriver.

> **NOTE:** Adjust so the swing reducer pinion gear mates to the large swing bearing gear with zero backlash and no preload. Excessive backlash will lead to jerky or erratic rotation and possible breakage of gear teeth. Excessive preload will lead to premature wear and possible breakage of gear teeth.

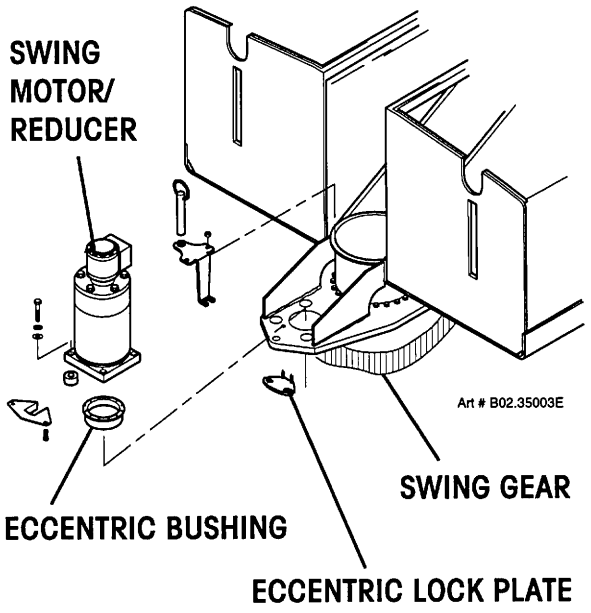
Replace the eccentric lock plate and torque the mounting bolts (see "Machine Specification").

### SWING SYSTEM MAINTENANCE

Lubricate the swing bearing monthly (see Lubrication Chart).

Check the fluid level in the swing drive gear box every other month (see Lubrication Chart).

Change the fluid in the swing drive gear box every two years (see Lubrication Chart).



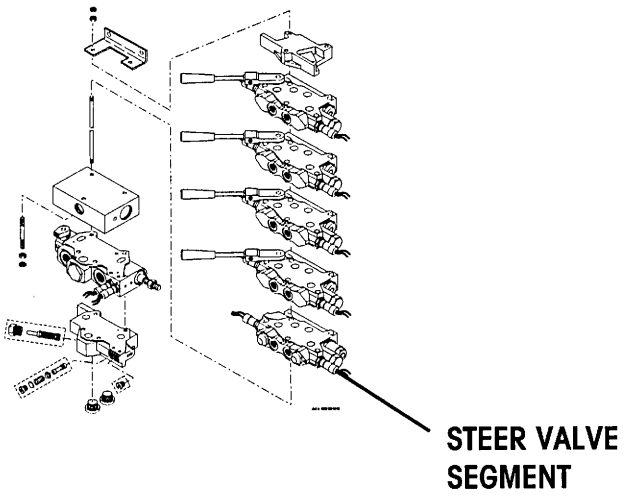

**Swing Reducer Adjustment.**

## STEER SYSTEM

The steering system consists of a steer valve segment, hydraulic swivel, a steer cylinder, a steer toggle switch on the pendant control and a steer rocker switch on the drive lever at the platform control console.

### STEER VALVE SEGMENT

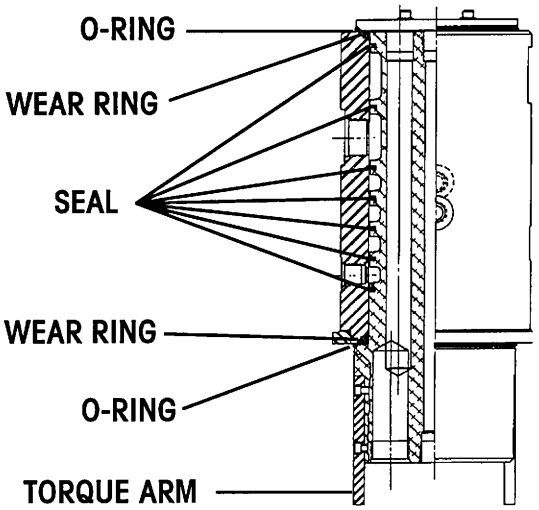
When the steer control rocker switch on the platform control or the steer control toggle switch on the control pendant, is activated an electrical signal is transmitted to the valve cartridge in the steer segment. This allows hydraulic fluid to be sent to the steer cylinder.




**Ground Valve Bank.**

### HYDRAULIC SWIVEL

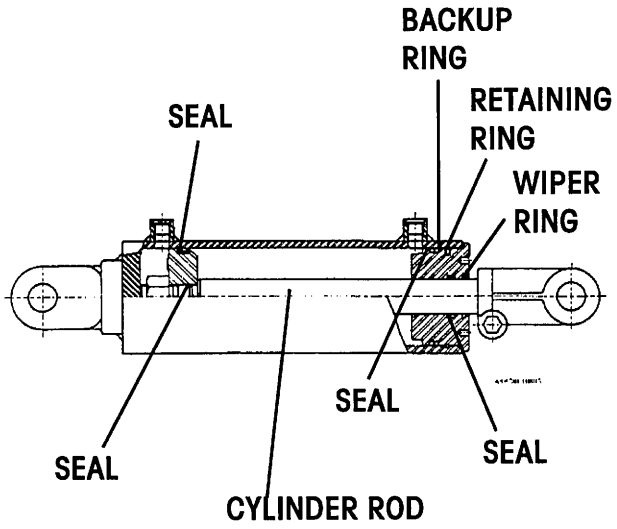
The hydraulic swivel allows passage of hydraulic fluid from the steer valve segment in the superstructure to the steer cylinder in the undercarraige and back. The swivel allows for 360° of continuous superstructure rotation in either direction.




**Hydraulic Swivel.**

### STEER CYLINDER

The cylinder is double acting and is directly connected to the steering linkage assembly. This cylinder powers all steering movements.




**Steer Cylinder.**

### STEER DISCONNECT KNOB (OPTION)

The steer disconnect knob must be pushed in to engage the steer system. Pull the steer disconnect knob out before towing to disengage steer system.

### STEER SYSTEM MAINTENANCE

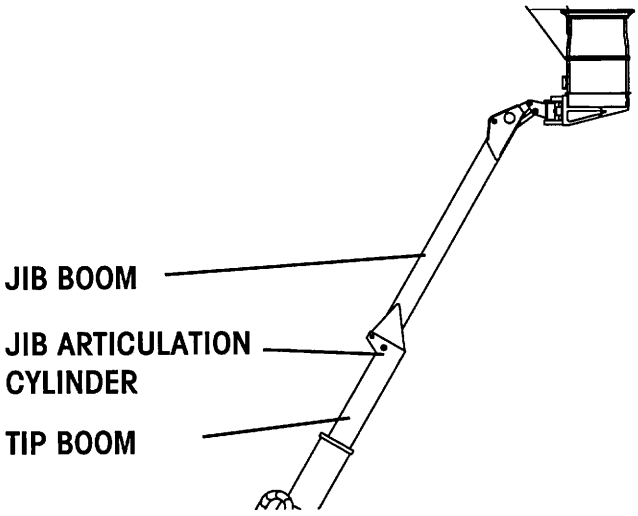
Check all pins on steering linkage and steer cylinder for excessive play, and ensure that all clips are in place and secure.

Lubricate tie rod as required (see Lubrication Chart).

Check cylinder and hoses for hydraulic fluid leakage and security.

## JIB BOOM SYSTEM

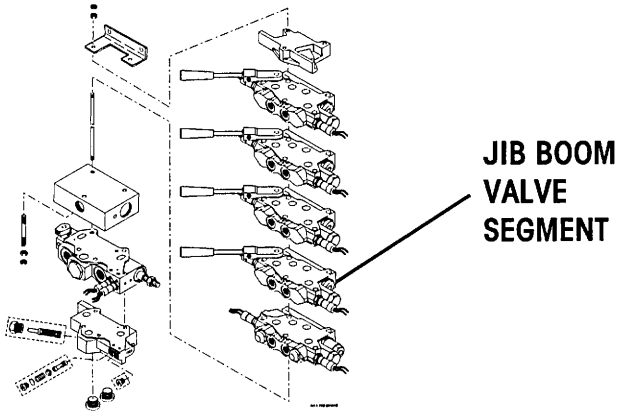
The jib boom system consists of a hydraulic valve segment on the ground valve bank, a cylinder with a counterbalance (holding) valve, and control levers on the platform console and ground control valve bank.




**Jib Boom System Components.**

### JIB BOOM VALVE SEGMENT

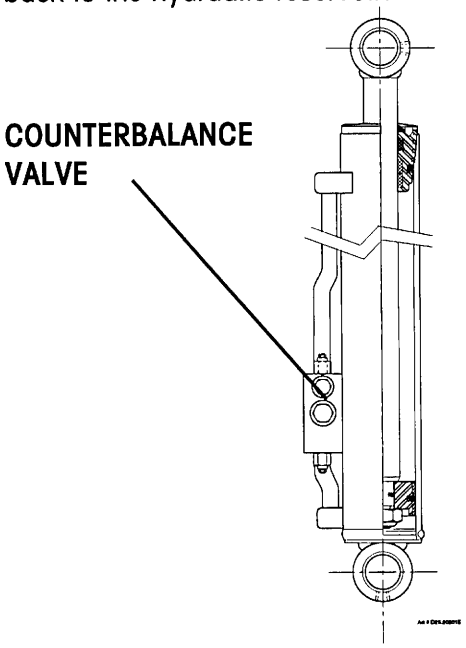
When the jib boom control lever on the platform control is activated, an electrical signal is transmitted to the valve cartridge in the jib boom valve segment. This allows hydraulic fluid at the selected flow to be sent to the proper end of the cylinder to raise or lower the jib boom. When the jib boom control lever at the ground control is activated, the valve spool is physically moved.




**Ground Valve Bank Assembly.**

### JIB CYLINDER

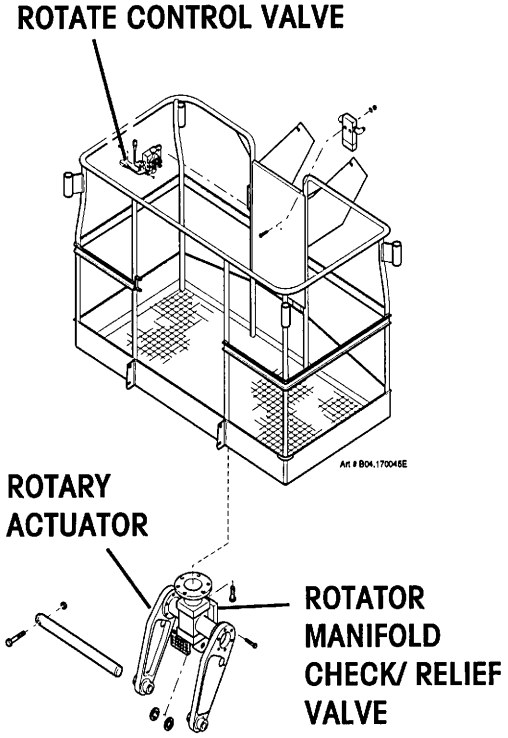
The jib boom function is controlled by a double acting cylinder. The cylinder contains a counterbalance (holding) valve, which will prevent unintended movement of the cylinder should a hose or fitting develop a leak. When the jib boom is lowered, fluid flows to the rod end cylinder port and to the counterbalance valve, opening this valve and allowing fluid in the base end of the cylinder to flow back to the hydraulic reservoir. When the jib boom section is raised, fluid flows to the base end cylinder port and to the counterbalance valve, opening this valve and allowing fluid in the rod end of the cylinder to flow back to the hydraulic reservoir.




**Jib Lift Cylinder.**

## PLATFORM ROTATE SYSTEM

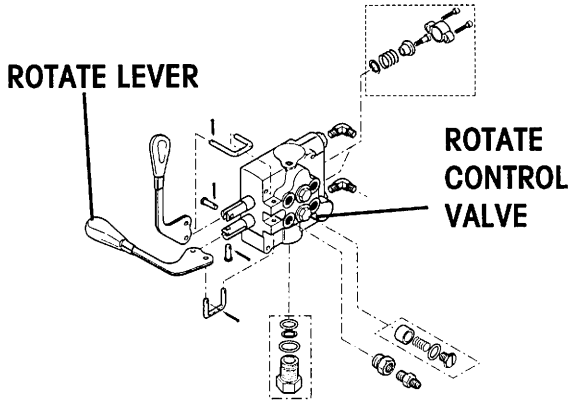
The platform rotate system consists of a platform rotate control valve, a double pilot operated check valve, a rotary actuator and a platform rotator manifold. The platform rotate system can only be operated from the platform control console.




**Platform Rotate System Components.**

### ROTATE CONTROL VALVE

This valve is a three position, four way valve which is manually operated. This control valve directs fluid flow to the platform rotate functions.



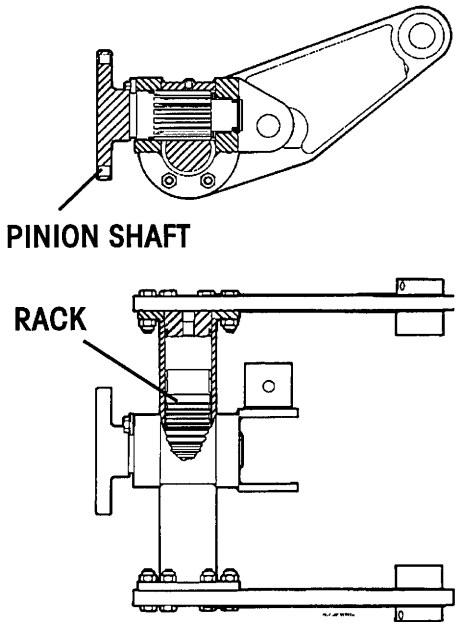

**Rotate Control Valve.**

### ROTATOR MANIFOLD CHECK/ RELIEF VALVE

This check/ relief valve acts as a locking component for the rotary actuator and prevents the platform from rotating except when the rotate circuit is activated. When the platform rotate circuit is activated, partial flow is piloted over to the return side to unseat the check valve and thus unlock the rotary actuator.

### ROTARY ACTUATOR

The rotary actuator is a rack and pinion type. Hydraulic fluid enters the actuator from either side depending on the control valve direction and moves the rack, causing the pinion shaft to rotate.




**Rotary Actuator.**

#### Rotary Actuator Maintenance

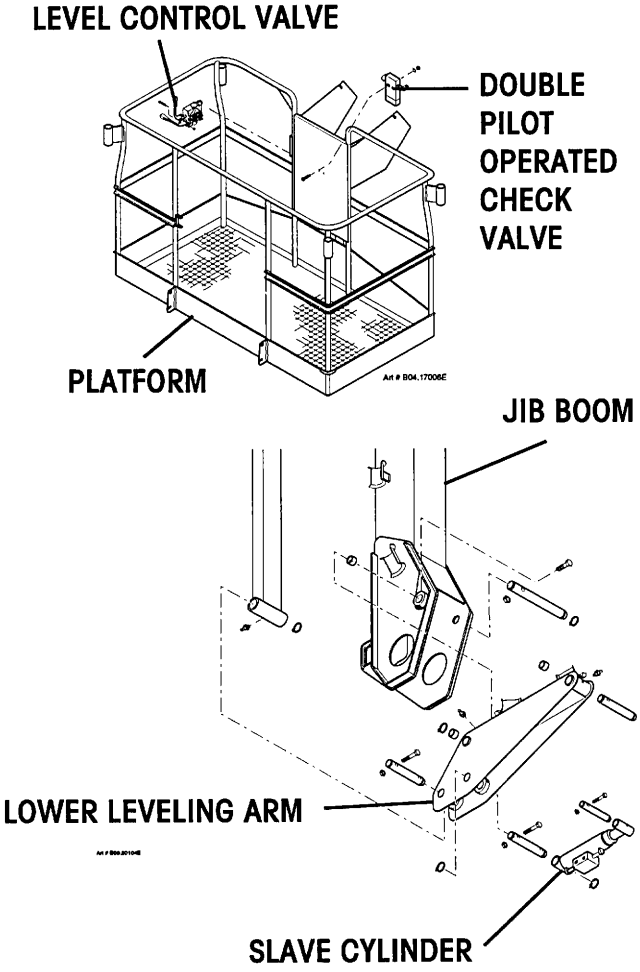
Change the hydraulic fluid once every year (see Lubrication Chart).

### PLATFORM ROTATOR MANIFOLD

The platform rotator manifold is mounted as an integral part of the rotary actuator. The platform rotator manifold acts as a pressure relief valve to prevent damage to the rotary actuator.

## PLATFORM LEVEL SYSTEM

The platform level system consists of a level control valve, slave leveling cylinder with a counterbalance (holding) valve, master leveling cylinder, double pilot operated check valve and two relief valves.



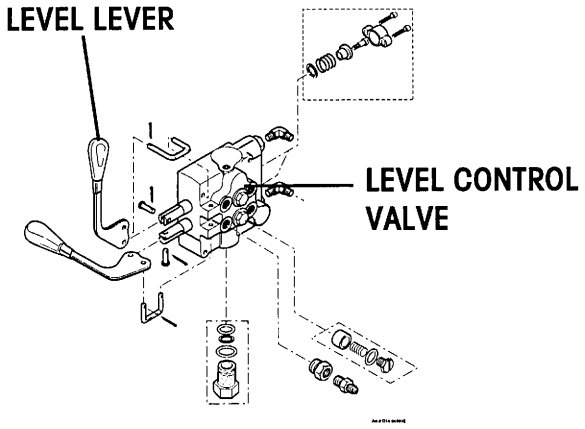

**Platform LevelSystem Components.**

The platform leveling system automatically keeps the platform level, using a master/ slave cylinder arrangement. As the main boom is raised or lowered, fluid is forced from one cylinder to the other in a closed loop, which keeps the platform parallel to the ground in any boom position. Due to slight internal leakage, fluid may at times need to be added to the leveling circuit through the platform level control valve.

The platform level system is only controlled from the platform.

### LEVEL CONTROL VALVE

This valve is a three position, four way valve which is manually operated. This control valve directs fluid flow to the level functions.



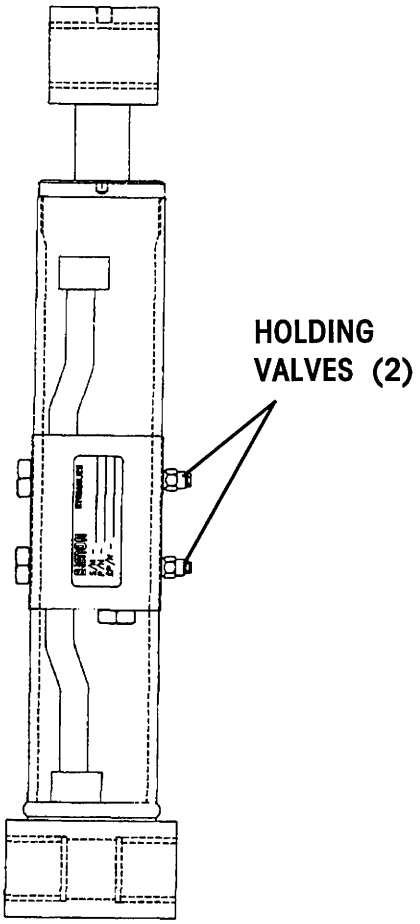

**Level Control Valve.**

### DOUBLE PILOT OPERATED CHECK VALVE

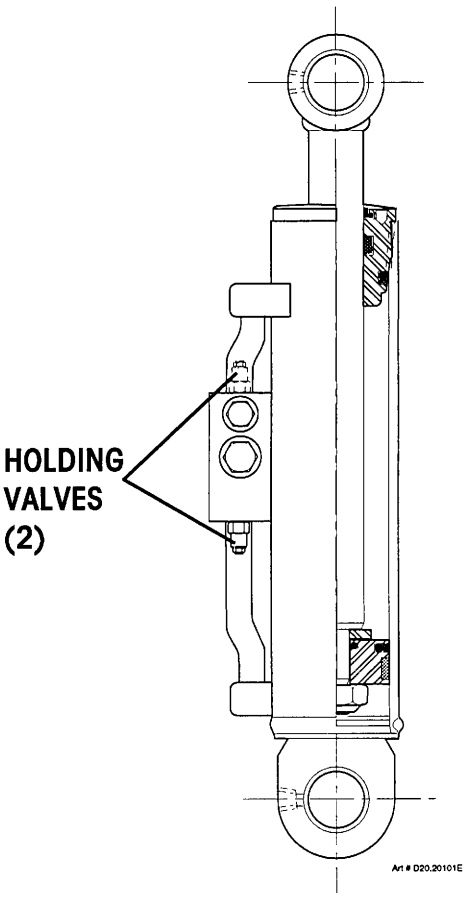
The double pilot operated check valve acts as a locking component for the leveling function and prevents the cylinders from drifting.

## MASTER LEVEL CYLINDER

The master level cylinder is a double acting cylinder located between the upper frame of the superstructure and the boom. Whenever the boom is raised or lowered, the master cylinder is forced to extend or retract. The fluid displacement from the master level cylinder is in turn sent up the boom to the slave level cylinder. This forces the slave level cylinder to move the same distance as the master level cylinder.




**Master Level Cylinder.**




**Slave Level Cylinder.**

## SLAVE LEVEL CYLINDER

The slave leveling cylinder is a double acting cylinder located between the lower leveling arm and the platform. This cylinder controls the position of the platform relative to the main boom.

The slave leveling cylinder contains two holding valves. The holding valves prevent platform movement in the event of hose failure.

## RELIEF VALVES

The relief valves are factory set at 3000 PSI (207 Bar/ 211 Kg/cm$^2$) and prevent high pressure spikes in the leveling circuit that could result in component damage. High pressure spikes can occur when the platform is manually controlled for leveling, which causes the slave level cylinder to bottom out before the master level cylinder stops moving as the boom is lowered.

# SECTION 3:
# DRIVE SYSTEM

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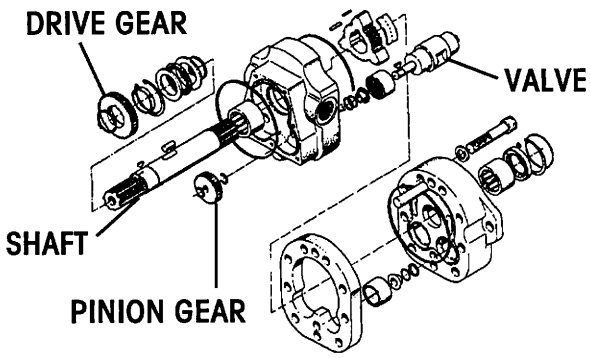
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# DRIVE SYSTEM COMPONENTS

The RP is propelled by two hydraulic drive motors with integral brake assemblies. The drive circuit consists of the two hydraulic drive motor/ brake assemblies, the drive valve segment, a selector valve, the drive valve assembly, a drive relief valve, a brake metering valve, a toggle switch on the pendant control and a platform drive control lever (joystick).

## DRIVE MOTOR AND BRAKE ASSEMBLY

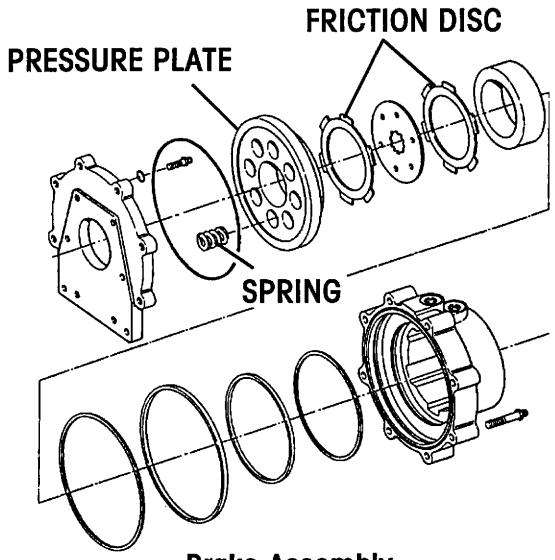
The drive motor is keyed to a shaft which in turn is splined on both ends. One end of the splined shaft is used for the brake while the other end is inserted into the gear reducer assembly.




**Motor Assembly.**

The brake assembly is a disc type brake. It is a wetted disc which is spring applied with hydraulic release.

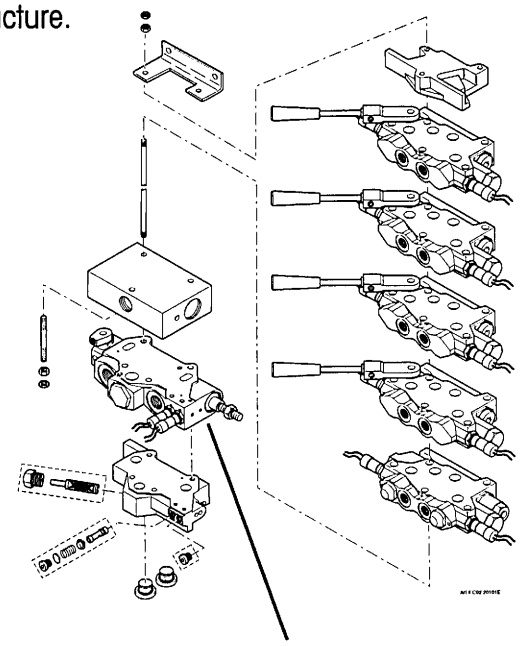
> **NOTE:** Internal leakage in the motor is passed through the brake disc and back to the main hydraulic reservior through the two case drain lines thereby cooling the brake and preventing brake disc wear.




**Brake Assembly.**

## DRIVE VALVE SEGMENT

When the drive control lever on the platform control or the propel control toggle switch on the control pendant is activated, an electrical signal is transmitted to the valve cartridge in the drive valve segment. This allows hydraulic fluid at the correct pressure to be sent to the drive circuit. The drive valve segment is part of the ground valve bank and is located on the superstructure.



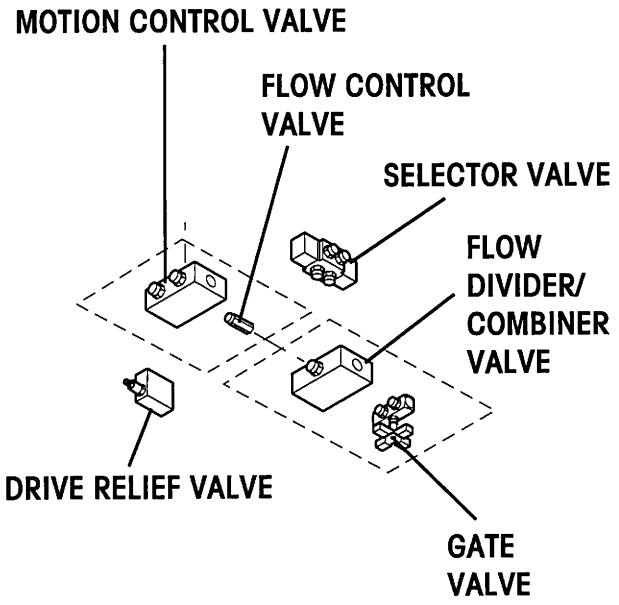

**Ground Valve Bank.**

## DRIVE VALVE ASSEMBLY

The drive valve assembly consists of the selector valve, motion control valve assembly and flow divider valve assembly. The drive valve assembly is mounted on a plate located on the undercarriage.

### SELECTOR VALVE

The selector valve used in the drive system allows for a pilot pressure to shift the directional control spool changing the drive system flow from series flow to parallel flow. This then allows the unit to go from low speed to high speed drive.




**Drive Valve Assembly.**

### MOTION CONTROL VALVE ASSEMBLY

The motion control valve assembly consists of two valves: a motion control valve and a flow control valve, which is mounted on the top of the motion control valve.

#### Motion Control Valve

This valve shuttles hydraulic fluid flow to the integral brake assemblies and produces a back pressure in the drive system using two counterbalance valves to prevent uncontrolled movement.

#### Flow Control Valve

The flow control valve meters the hydraulic fluid flow released from the spring applied brake assemblies; therefore, giving a smooth braking action.

The proper flow control valve adjustment is 2 to 3 turns from the closed position. This position allows the operator a smooth braking function.

### FLOW DIVIDER VALVE ASSEMBLY

The flow divider valve assembly consists of two valves: a flow divider/ combiner valve and a gate (globe) valve, which is mounted on the the flow divider/ combiner valve.

#### Flow Divider/ Combiner Valve

This valve divides output of pump equally to each drive motor when in parallel mode. In a turning situation, hydraulic fluid will force the internal spools to flow fluid to the outboard driving wheel.

#### Gate (Globe) Valve

This valve allows hydraulic fluid to pass from one drive wheel to the other when the unit is in a turn (differential action).

The gate (globe) valve can be adjusted as to the amount of fluid allowed to pass but the correct setting should be 1-1/2 turns open from the closed position. In this position the motors will load slightly and allow a metered flow of hydraulic fluid to pass to the outboard driving wheel.

## DRIVE RELIEF VALVE

The drive relief valve is located on the underside of the undercarriage, on the side wall. This valve is factory set at 3000 PSI (207 Bar, 211 Kg/cm$^2$) and requires no adjustments. This valve assures that the drive system will receive only this pressure while in the drive mode.

## BRAKE METERING VALVE

The brake metering valve meters the hydraulic fluid flow released from the spring applied brake assemblies; therefore, giving a smooth braking action.

### BRAKE METERING VALVE ADJUSTMENT

The valve is set at the wide open position for shipment and should be reset at 1-1/2 turns from the closed position. This position allows the operator a smooth braking function.

## TOGGLE SWITCH ON THE PENDANT CONTROL

To operate the drive function from the ground, use the "Drive" toggle switch on the pendant control. See "Section 4: Electrical System" for switch replacement.

## PLATFORM CONTROL HANDLE (JOYSTICK)

To operate the drive function from the platform, use the platform control handle. See "Section 3: Electrical System" for control handle adjustment or replacement.

# SECTION 4:
# ELECTRICAL SYSTEM

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# ELECTRICAL SYSTEM

The following section is a description of maintenance for the major components of an RP electrical system.

## BATTERIES

One 12 volt battery supplies the electrical power required to operate the electro-proportional controls and the second 12 volt battery supplies electrical power to the emergency pump.

### BATTERY MAINTENANCE (IN USE)

Check battery and surrounding area for signs of damage or corrosion.

Check battery terminals for:

- **Corrosion**. Regularly clean connections and apply a non-metallic grease or protective spray to retard corrosion.
- **Loose connections.** Be sure all cable connections are tight, and that good contact is made to terminals.
- **Broken or frayed cables.** Be sure all cable connections are good, and that no loose or broken wires are exposed. Replace as needed.

Check battery electrolyte level. Replenish the electrolyte, if necessary. Remove vent caps before filling, and USE ONLY DISTILLED WATER. Fill all cells to the proper level. Do not overfill. Fill to level indicator (or 1/2 inch over the top of the separators if there is no level indicator). Fill after charging to prevent overflow of acid due to expansion. Do not use a hose to add water to batteries.

Allowing the electrolyte level to drop below the top of the separators will lead to shortened battery life. Excessive water usage can indicate that a battery has been overcharged, has been subjected to excessively high temperatures, or is nearing the end of its service life.

Keep battery clean. Wash the top of the battery, making sure all vent caps are in place. Do not allow cleaning water or other foreign matter to enter the cells. Use a solution of bicarbonate of soda and water to wash the battery if there is an accumulation of acid.

### BATTERY PREVENTIVE MAINTENANCE

Once a month, after the battery has been charged, spot check the specific gravity of two or more cells. A fully charged battery should indicate 1.28 specific gravity. If low readings are noted, check the following:

- Check terminals for corrosion, loose connections and broken or frayed cables.
- Check all cells with a hydrometer for variation in specific gravity. A variation of 0.03 points or more between cells is cause for concern. Mark the low cells.

Recheck specific gravity of all cells after recharging.

### BATTERY REPLACEMENT

To remove the battery, follow these procedures:

**⚠WARNING**

**BEFORE REMOVING BATTERY FROM THE UNIT, TURN OFF THE IGNITION SWITCH. THERE SHOULD BE NO POWER TO THE MACHINE.**

**⚠ CAUTION**

**Always disconnect the negative battery cables first.**

Remove bolts holding battery to superstructure.

Lift the battery from the superstructure. Put the battery to the side and dispose of properly.

**⚠ CAUTION**

**Always connect the positive battery cable first.**

To install the battery, lift and position it on superstructure. Secure battery in position with wing nuts and battery hold downs. Connect battery cables.

## MOVEMENT ALARM

The movement alarm is activated as soon as the platform console drive controller or drive toggle switch on the pendant control is moved off the center "Neutral" position.

**⚠WARNING**

**THE MOVEMENT ALARM IS PROVIDED FOR YOUR PROTECTION, AND PROTECTION OF PERSONS WORKING IN IMMEDIATE AREA. DISABLING THIS IMPORTANT SAFETY DEVICE MAY RESULT IN DEATH OR SERIOUS INJURY.**

The movement alarm is located behind the ground control cabinet on a support weldment. To replace it, remove the movement alarm from the weldment and disconnect the wires.

## TILT ALARM

The tilt alarm gives an audible warning when the machine is five degrees or more out of level. It is located in the platform control cabinet. To replace the tilt alarm, remove it from the platform control box and disconnect the wires.

### TILT ALARM TEST

The alarm can be tested by manually tipping the alarm sensor. This "Push-to-Test" feature enables tilt alarm to be tested without losing its adjustment.

Individually push down on each of the three fastened corners of the tilt alarm.

There should be enough travel to cause alarm to sound as each corner is pressed (approximately a three second delay). The boom must be raised above horizontal or extended beyond limit switch.

If the alarm does not sound, the flange nuts have been tightened too far. Loosen the nut on the 90° corner and repeat this test procedure.

### TILT ALARM ADJUSTMENT

The tilt alarm can be adjusted. Before attempting to adjust the alarm, park the machine on a flat, level surface.

Level the base of the alarm by tightening each of the three flange nuts to take up approximately one half of its spring's travel. During the remainder of the adjustment procedure, DO NOT ADJUST THE NUT ON THE 90° CORNER.

Check to be sure the electrical connections are correct. Slowly tighten the nut on one of the two corners ADJACENT to the 90° corner until the light-emitting diode (LED) just turns on, indicating that the circuit is closed. Note the position of the nut.

Loosen the nut (LED will go out), carefully counting the number and fraction of turns until the LED lights up again. Divide that number by two and tighten the nut by this number of turns.

Adjust the nut on the OTHER corner adjacent to the 90° corner in the same manner. The alarm is now level, to the degree of accuracy determined by the nut adjustments and the surface on which the machine is sitting. Test the tilt alarm for proper function.

## RELAYS

There are relays located in the ground control cabinet. (Refer to the schematic at the end of this manual for relay functions and interconnect.)

## CIRCUIT BREAKERS

There is one 20 amp circuit breaker mounted on the face of the ground control cabinet.

If the 20 amp circuit breaker is tripped, re-set it by pushing in the button. If the breaker trips again, the cause of the high current draw must be corrected prior to further operation.

## LIMIT SWITCHES

There are limit switches for the boom telescope, and boom hoist functions. The boom telescope limit switch is located on the lower right side of the base boom. The boom hoist limit switch is located on the center post of the superstructure. Unless the boom hoist and telescope limit switches are closed as shown on the unit electrical schematic at the end of this manual, the unit will only be able to travel at creep speed.

## EMERGENCY PUMP

There is an emergency pump mounted at the base of the hydraulic tank. It is activated when the Emergency Pump push button on the platform control console is pressed or the pump toggle is pressed to EMERGENCY on the remote control pendant. When either push button is pressed and held, the emergency pump circuit is energized, allowing hydraulic functions (drive or steer functions) should the main motor powered hydraulic pump be disabled.

## EMERGENCY STOP BUTTON

There is an emergency stop button on the ground control box and in the platform console.

When the emergency stop buttons are pressed, all functions stop immediately and the wheel brakes are automatically applied.

To replace the emergency stop button, open the ground control box or platform console to gain access for button removal. Remove the appropriate button mounting screws and wires.

## PENDANT SWITCH REMOVAL

To replace a pendant switch or button, remove the four pendant cover screws to gain access for button removal. Remove the appropriate button mounting screws and wires.

## GROUND CONTROL CABINET SWITCH REMOVAL

To replace a ground control switch or button, disengage the ground control cover retaining screws to gain access for switch or button removal. Remove the appropriate button mounting screws and wires.

## PLATFORM CONSOLE SWITCH REMOVAL

To replace a platform switch or button, remove the two platform console screws and swing the console up on its hinges, to gain access for button removal. Remove the appropriate switch or button mounting screws and wires.

## DRIVE/ STEER CONTROLLER

Forward or backward travel of the unit is operated by a "single axis" lever on the platform control console. Flipping the switch on top of the lever steers the unit to the left or right.

The degree of lever motion required to begin travel, and the degree of lever motion required to achieve maximum speed are individually adjusted.

On the Drive Card, located at the bottom of the telescope lever assembly, there is a separate adjustment for "Lo Threshold" (Deadband), which determines when motion starts as the control is moved from the "Neutral" position. There is another separate adjustment that determines the degree of control movement corresponding to the maximum hydraulic valve opening, "Hi Threshold" (Max. Output).

To adjust for Lo Threshold (Deadband) or Hi Threshold (Max. Output) on the Drive Card:

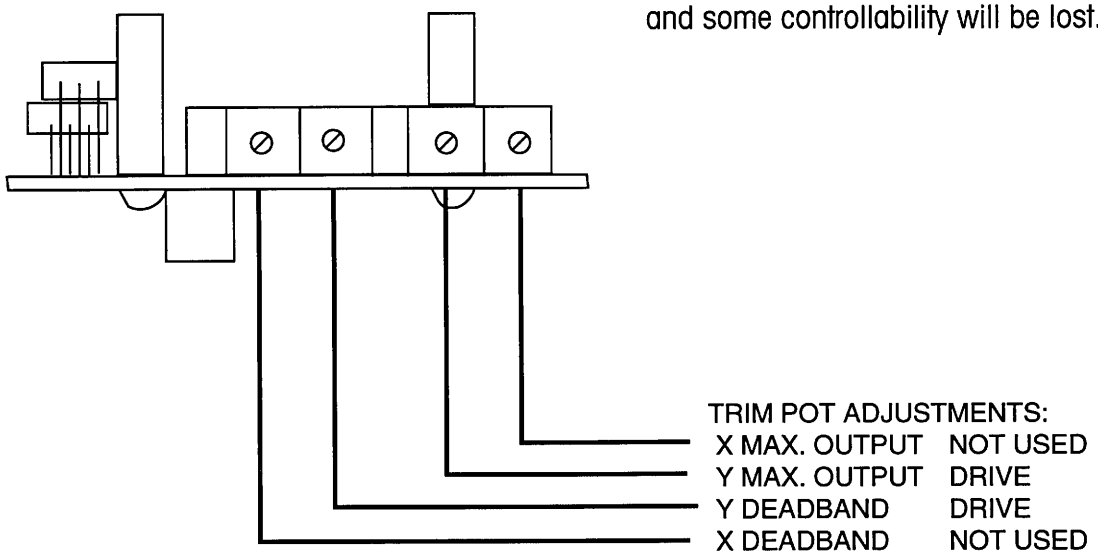
1. Turn appropriate Lo Threshold (Deadband) potentiometer fully counter-clockwise.

2. Push control lever forward until a proximity switch inside the control clicks.

3. Turn the Lo Threshold (Deadband) potentiometer clockwise to permit first flow (first movement).

4. Push control lever fully forward.

5. Turn the Hi Threshold (Max. Output) potentiometer to just permit maximum flow. If turned too high, full flow will occur at a lesser control angle and some controllability will be lost.




**Drive Trim Pots.**

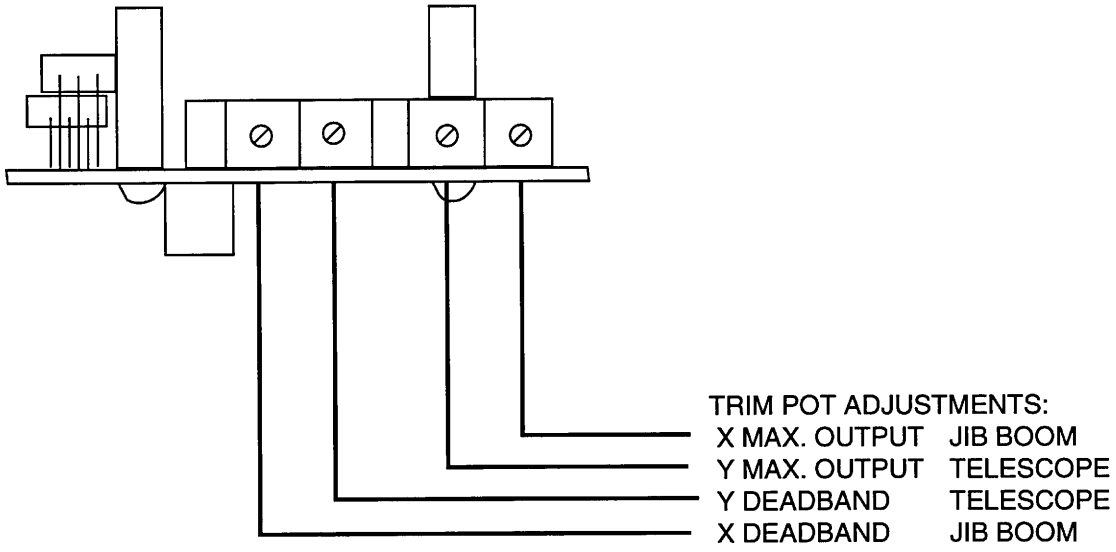
## JIB BOOM/ TELESCOPE CONTROLLER

Telescoping of the boom and jib boom functions are controlled by a "single axis" lever on the platform control console. Backward and forward movement of the telescope lever controls the extending and retracting functions of the boom. Backward and forward movement of the jib lever controls the raising and lowering functions of the jib boom.

On the telescope card, located at the bottom of the lever assembly, there is a separate adjustment for "Lo Threshold" (Deadband), which determines whenmotion starts as the control is moved from the "Neutral" position. There is another separate adjustment that determines the degree of control movement corresponding to the maximum hydraulic valve opening, "Hi Threshold" (Max. Output).

To adjust for Lo Threshold (Deadband) or Hi Threshold (Max. Output) on the Drive Card:

1. Turn appropriate Lo Threshold (Deadband) potentiometer fully counter-clockwise.
2. Push control lever forward until a proximity switch inside the control clicks.
3. Turn the appropriate Lo Threshold (Deadband) potentiometer clockwise to permit first flow (first movement).
4. Push control lever fully forward.
5. Turn the Hi Threshold (Max. Output) potentiometer to just permit maximum flow. If turned too high, full flow will occur at a lesser control angle and some controllability will be lost.




**Jib Boom and Telescope Trim Pots.**

## BOOM/ SWING CONTROLLER

On the boom/ swing controller, there is a Driver Card with a total of four adjustment potentiometers. Each function has two (2) adjustments: "Threshold" and "Maximum Gain". Threshold (Deadband) is the position of the controller lever when a function motion starts. Maximum Gain (Max. Output) is the position of the controller lever when a function motion is at maximum speed.

To adjust for Threshold (Deadband):

1. Turn appropriate Threshold (Deadband) potentiometer fully counterclockwise.

2. Move control lever in appropriate direction from neutral position until a proximity switch inside the control clicks.

3. Turn the appropriate Threshold (Deadband) potentiometer clockwise to permit first flow (first movement).

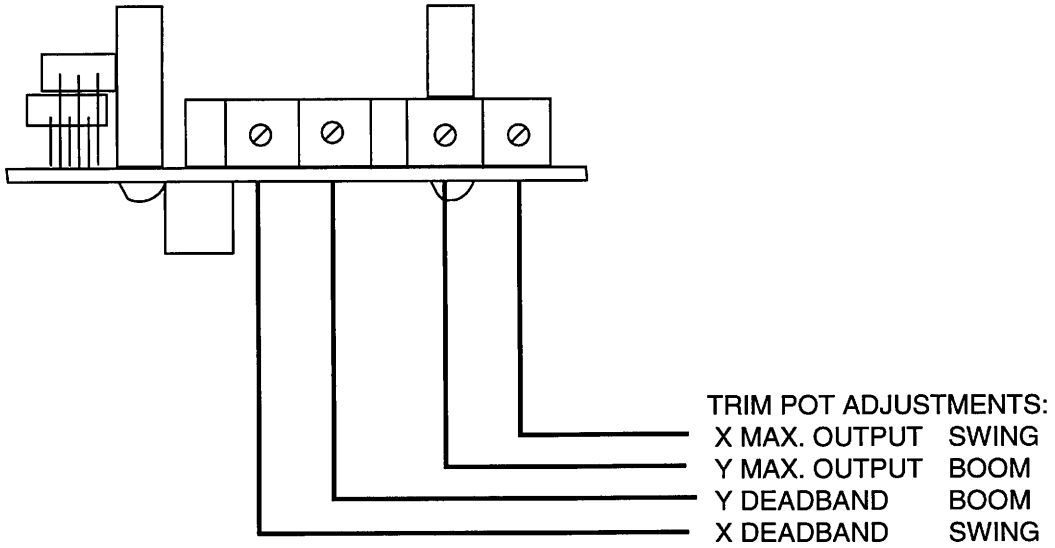
To adjust for Maximum Gain (Max. Output):

1. Move control lever fully in appropriate direction.

2. Turn the appropriate Maximum Gain (Max. Output) potentiometer to just permit function maximum speed.

**⚠ CAUTION**

**If turned too high, full flow will occur at a lesser control angle and some controllability will be lost.**




**Boom and Swing Trim Pots.**

# SECTION 5:
# MECHANICAL COMPONENTS

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# MECHANICAL COMPONENTS

Following is a description of the major mechanical components of the RP.

## TIRES

Tires used are calcium filled or the optional foam filled. Inspect tires for cuts, sidewall damage or abnormal wear. Any tire faults MUST BE CORRECTED before further machine operation.

### CHANGING TIRES

**⚠WARNING**

**CALCIUM FILLED AND/OR FOAM FILLED TIRES ARE EXTREMELY HEAVY. CARE MUST BE TAKEN TO AVOID PERSONAL INJURY.**

When a tire change is necessary, follow these steps:

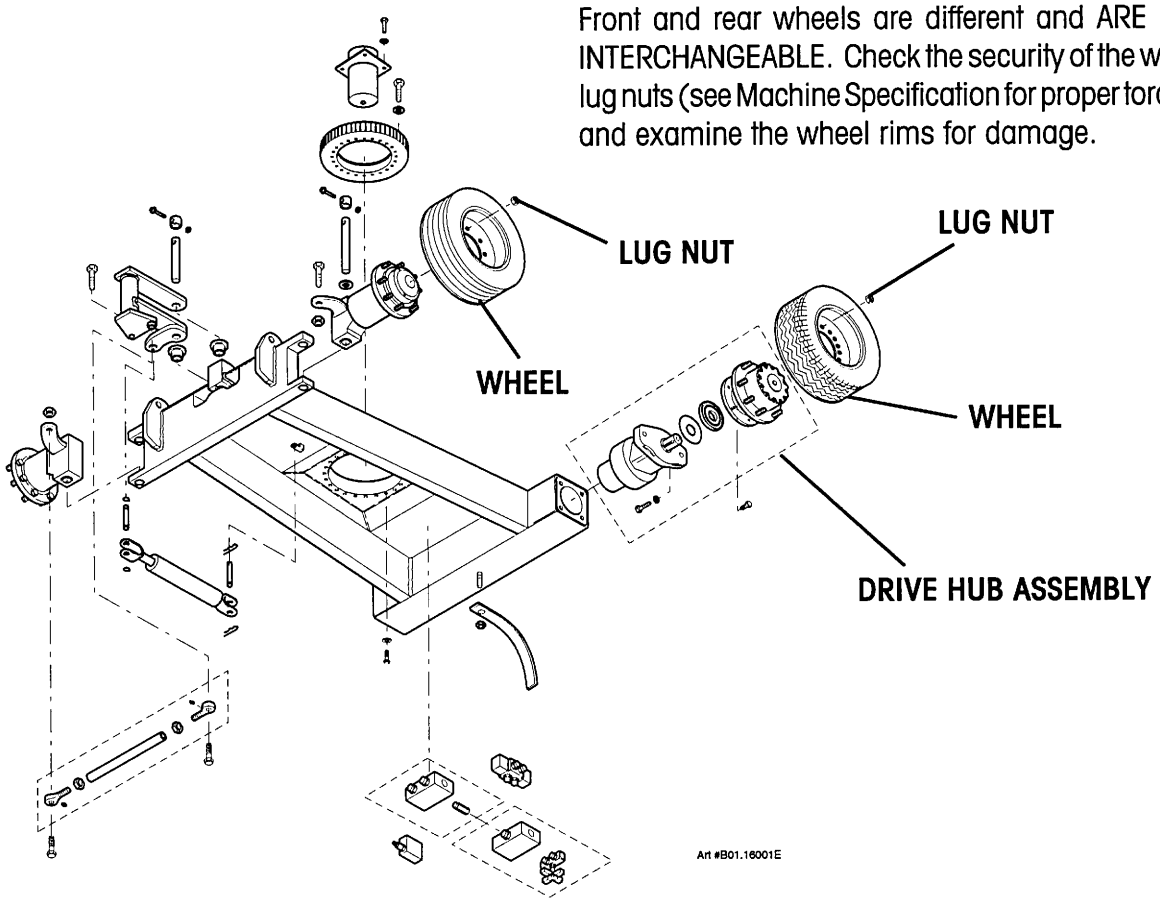
**⚠ CAUTION**

**ALWAYS BLOCK THE WHEELS before you raise the machine.**

- Loosen and remove lug nuts, and pull off the wheel assembly and tire.
- Replace the tire and reinstall.
- Fasten lug nuts and tighten to proper torque (see Machine Specifications).
- Lower the machine and remove the blocks.

## WHEELS AND LUG NUTS

Front and rear wheels are different and ARE NOT INTERCHANGEABLE. Check the security of the wheel lug nuts (see Machine Specification for proper torque) and examine the wheel rims for damage.




**Wheel Assembly and Drive Hub Assembly Location.**

## DRIVE HUB ASSEMBLY

Drive hub assembly consists of a hydraulic motor and torque hub.

- To remove drive hub assembly:

1. Block the steer wheels and raise the machine at the drive end.

**⚠WARNING**

**CALCIUM FILLED AND/OR FOAM FILLED TIRES ARE EXTREMELY HEAVY. CARE MUST BE TAKEN TO AVOID PERSONAL INJURY.**

2. Remove tire and wheel assembly:
    1. Loosen and remove the lug nuts.
    2. Pull off the tire and wheel assembly.

**⚠ CAUTION**

**Plug all open hydraulic fittings to prevent contamination by dirt or other foreign objects.**

3. Disconnect hoses to the drive hub assembly. At this point remove the hose carrier from the axle tube assembly and lay aside the hoses and hose carrier.
4. Loosen and remove eight capscrews and flat washers on the drive hub assembly.
5. Slide off hydraulic motor and toque hub as one unit.

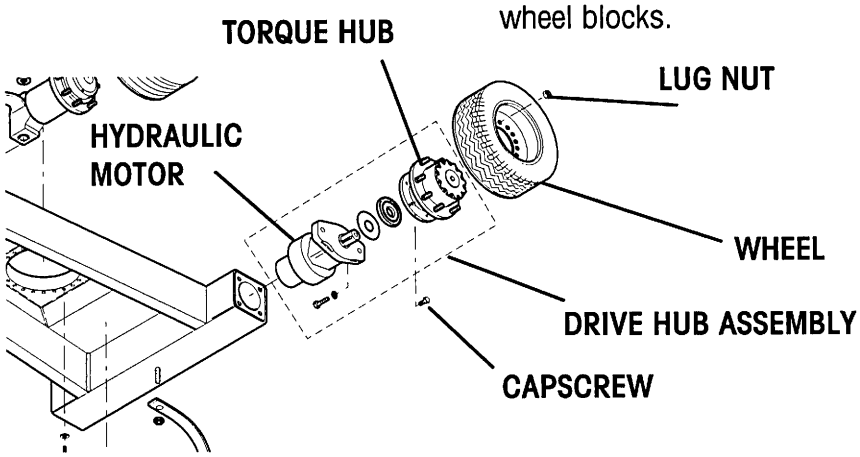
- Install drive hub assembly:

1. Align the drive hub assembly (hydraulic motor and torque hub) with the axle tube assembly.
2. Install and torque the eight capscrews with flat washers.
3. Connect hydraulic hoses to the drive hub assembly and install hose carrier to the axle tube assembly.

**⚠WARNING**

**CALCIUM FILLED AND/OR FOAM FILLED TIRES ARE EXTREMELY HEAVY. CARE MUST BE TAKEN TO AVOID PERSONAL INJURY.**

4. Install tire and wheel assembly:
    1. Position tire and wheel assembly.
    2. Install and torque lug nuts.
5. Lower the machine and remove the steer wheel blocks.




**Undercarriage With Tire and Wheel Assembly, Torque Hub and Drive Motor.**

## STEER CYLINDER PINS

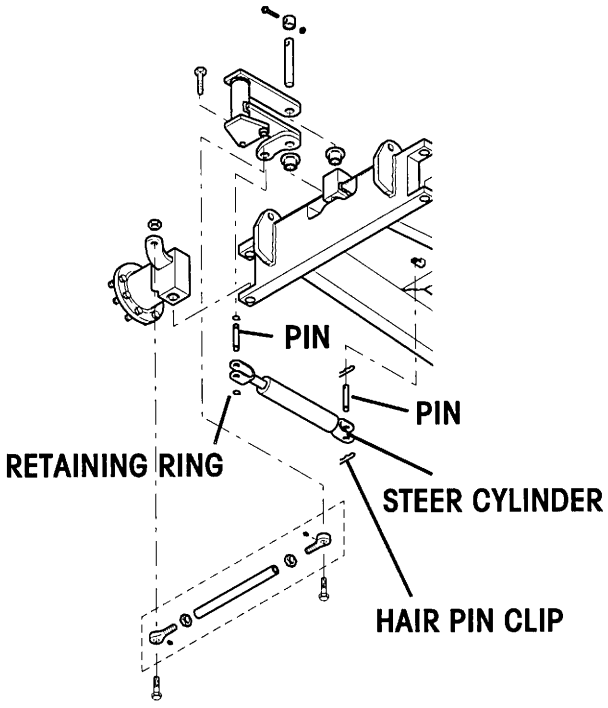
Check all pins for wear. If pin rotates, check for a missing retaining ring. If wear is detected, the pin must be replaced.

### ROD END CYLINDER PIN REPLACEMENT

1. Remove retaining rings.
2. Remove the pin.
3. Install new pin and retaining rings.
4. Apply grease to pin.

### BASE END CYLINDER PIN REPLACEMENT

1. Remove hair pin clips.
2. Remove the pin.
3. Install new pin and hair pin clips.
4. Apply grease to pin.



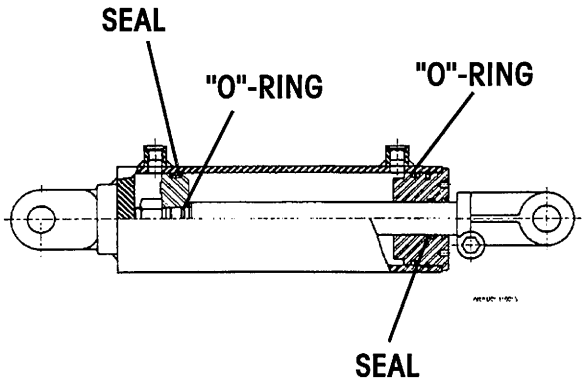

**Steer Cylinder and Tie Rod Assembly.**

## STEER CYLINDER

The steer cylinder is of the double acting type. Check the cylinder for hydraulic fluid leaks.

### STEER CYLINDER SEAL REPLACEMENT

1. Disconnect the hydraulic hoses.
2. Remove the steer cylinder pin.
3. Remove the cylinder.




**Steer Cylinder.**

4. Clean the end of the cylinder.
5. Loosen the end cap and withdraw it over the piston rod.

**⚠ CAUTION**

**Take care not to damage the rod surface and guard against dirt entering the system.**

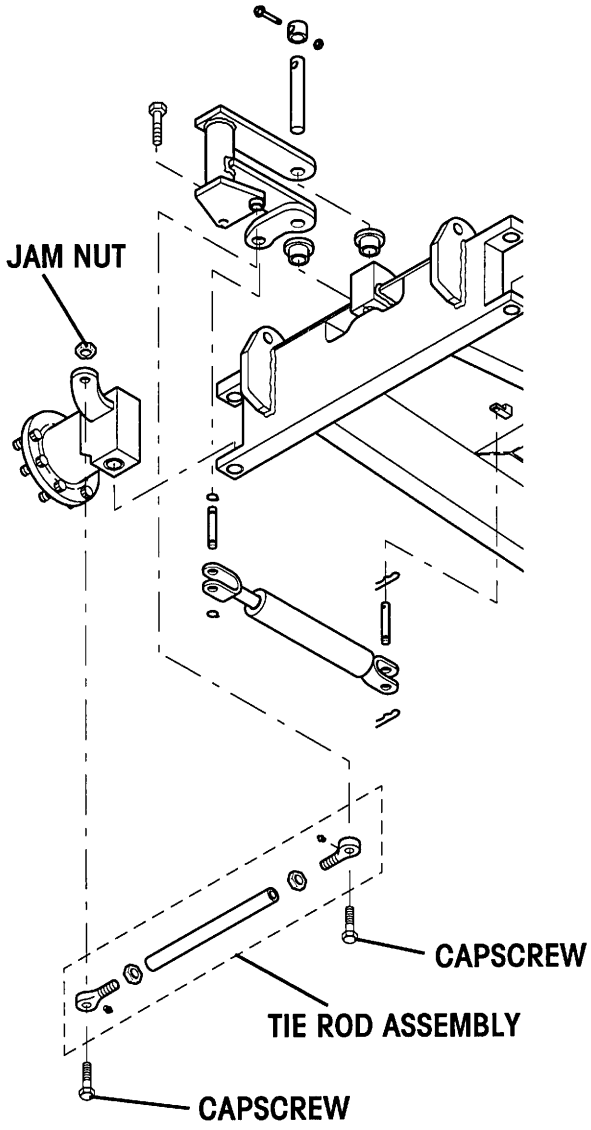
6. Remove the rod and piston assembly.
7. Replace the seals and "o"-rings.
8. Install the rod and piston assembly.
9. Install and tighten the end cap.
10. Connect the hydraulic hoses.

## TIE ROD ASSEMBLY

Check for a bent or broken tie rod. Replace if bent or broken.

### TIE ROD ASSEMBLY REPLACEMENT

1. Remove capscrews and jam nuts at both ends.
2. Remove tie rod assembly.
3. Install new tie rod assembly and attach it with the capscrews and jam nuts.

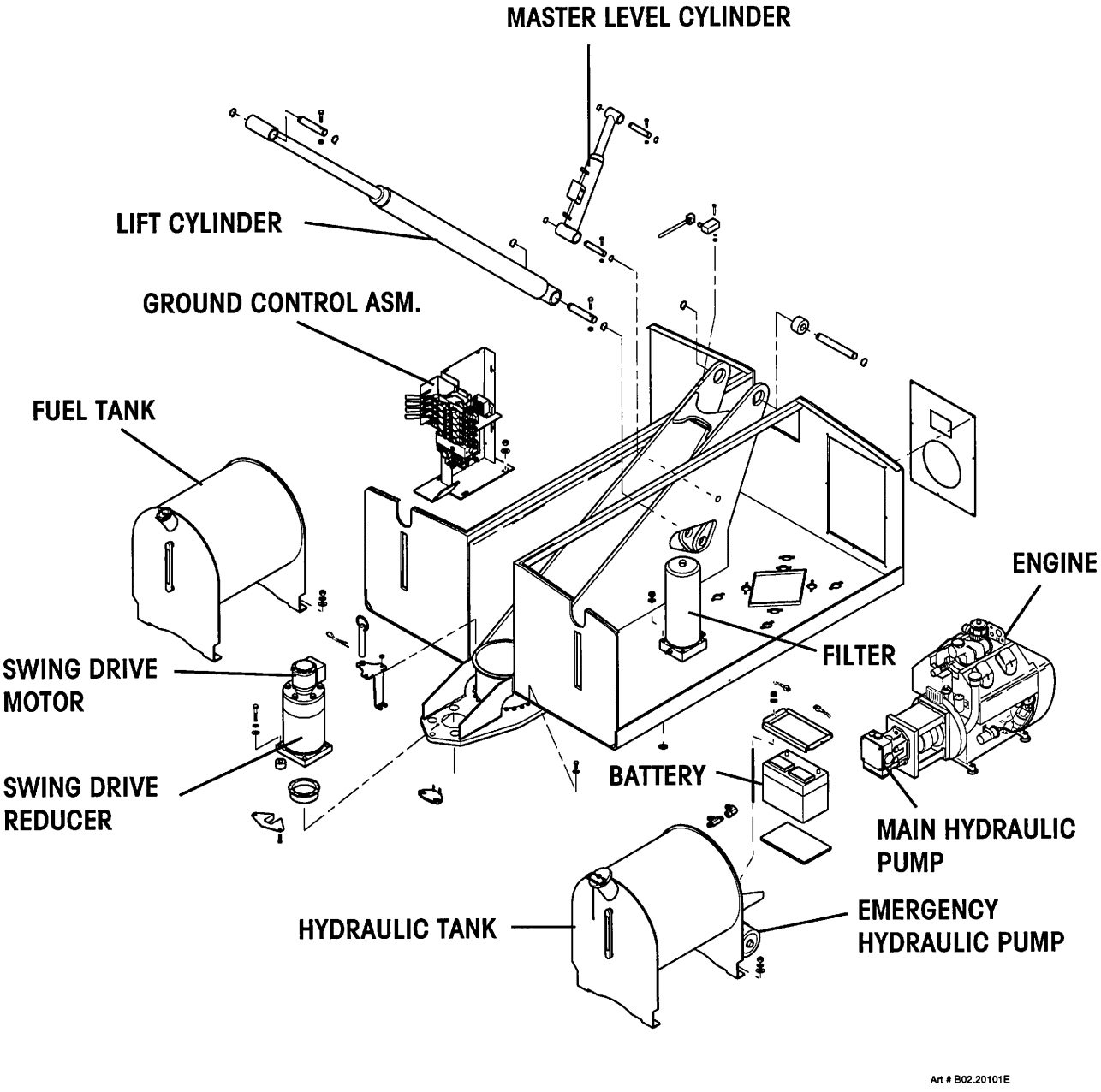



**Steer Cylinder and Tie Rod Assembly.**

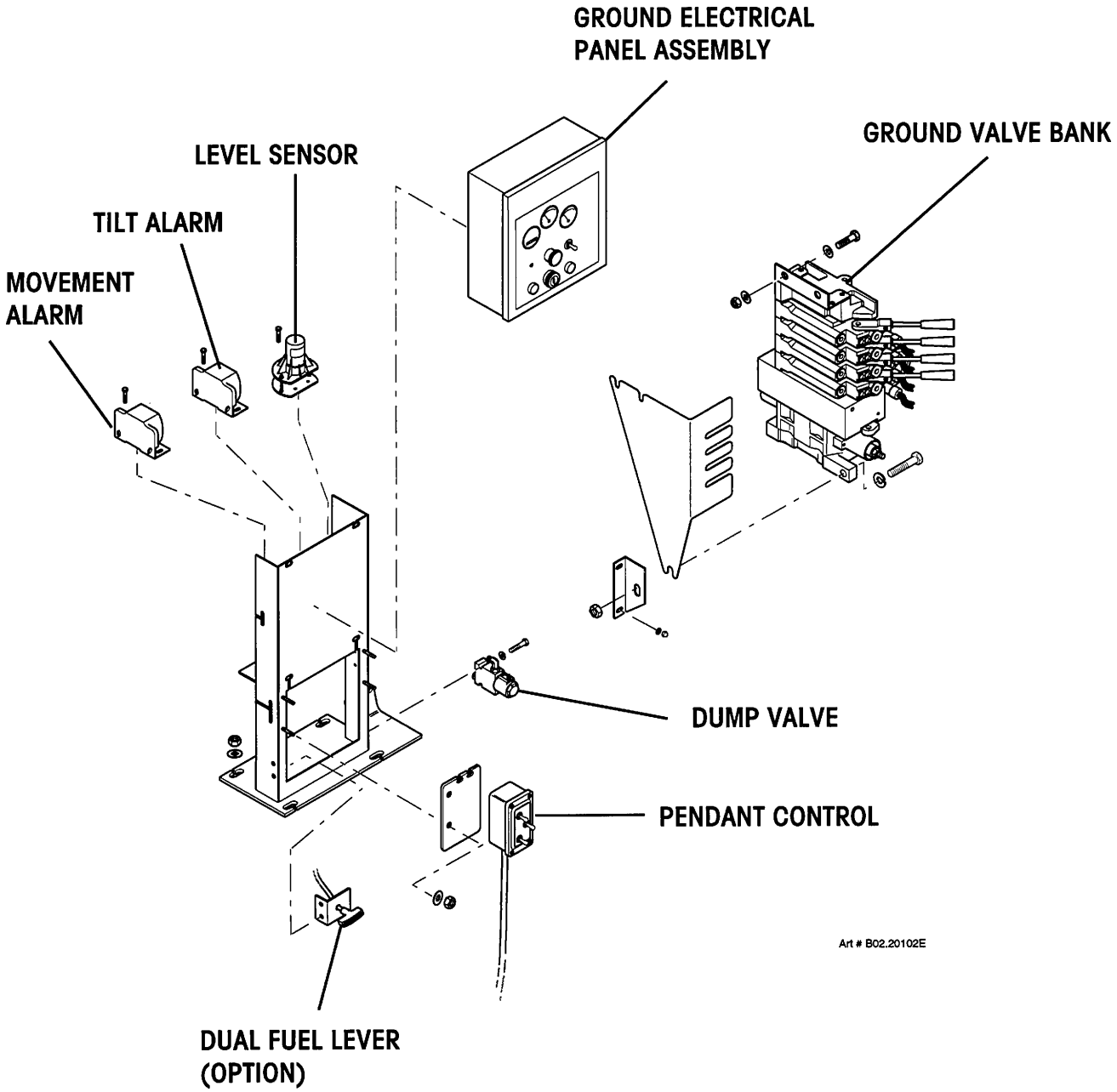
## SUPERSTRUCTURE

The superstucture consists of two compartments; one is the engine compartment and the other is the hydraulic compartment.

Steam clean the superstructure once a year, and inspect all welds and brackets. Check for cylinder pins that turn in their mountings, which will indicate sheared pin lock bolts.




**Components Found on the Superstructure.**




Ground Control Assembly Components.

## PLATFORM

Steam clean the platform and inspect all welds and brackets. Check all the hydraulic and electrical components.

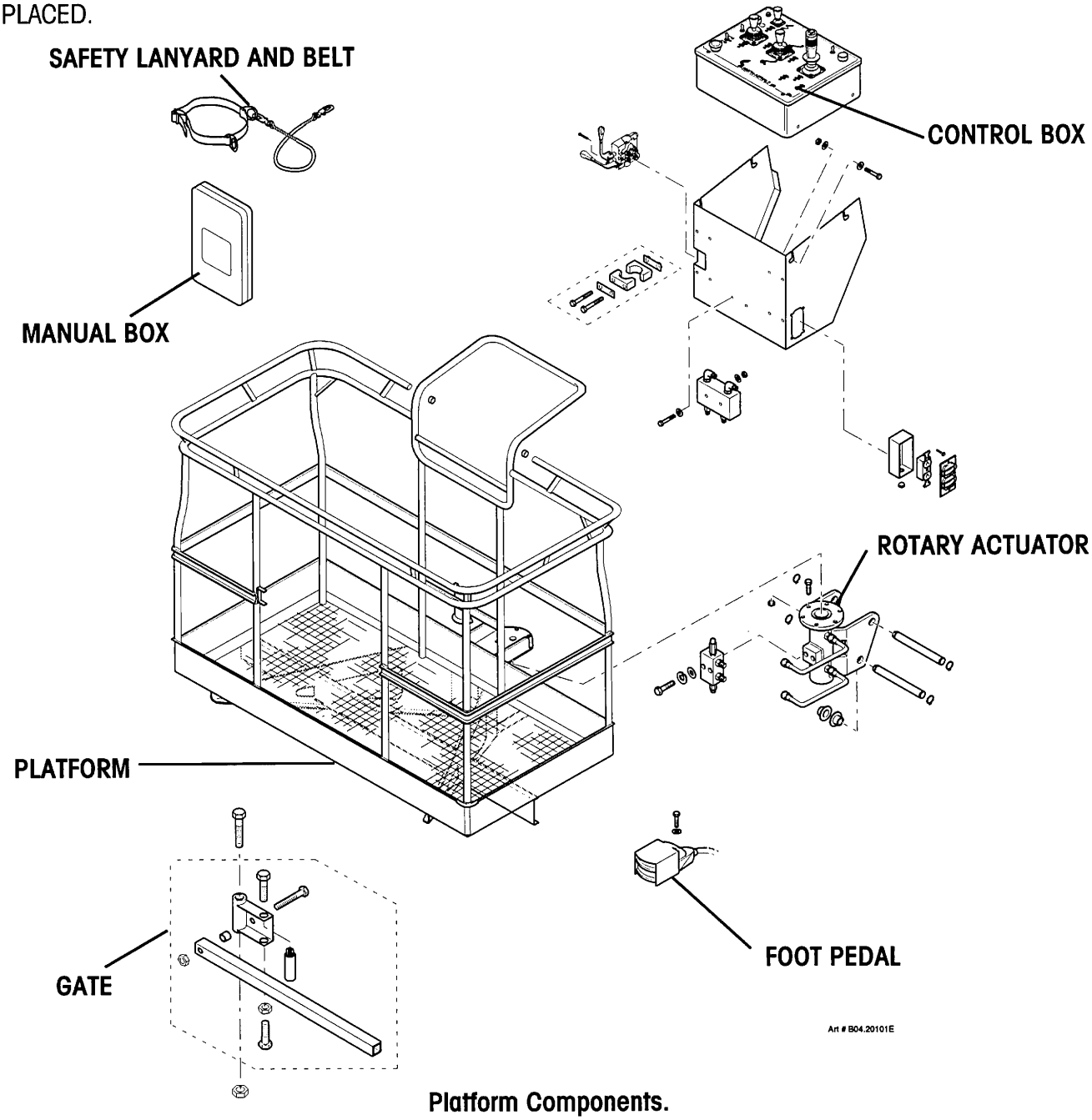
## HOSES AND CABLES

Inspect all hoses and electrical cables for security and damage. Check for leaks at fittings. ANY DAMAGED HOSES OR CABLES SHOULD BE REPLACED.

Cables and hoses should be examined for rubbing and chafing, especially in the swing bearing area and the hose track area.

## MISCELLANEOUS EQUIPMENT

Check all miscellaneous equipment mounted on the machine for secure attachment. Check for evidence of oil or hydraulic fluid leakage.




**Platform Components.**

## BOOM

Clean the boom once a year and inspect along the boom structure, especially all welds and brackets.

### BOOM PIVOT PIN AND BUSHING REPLACEMENT

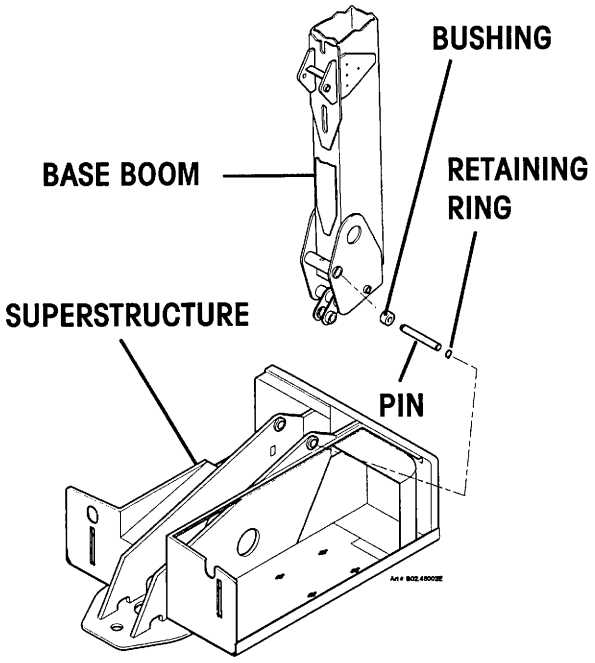
**IMPORTANT: It is NECESSARY TO MAINTAIN THE CORRECT ALIGNMENT between the boom and pylon weldment during this operation. Any relative movement will make fitting of the pin more difficult.**

**⚠WARNING**

**THE BOOM WILL FALL IF NOT SUPPORTED WHEN THE PIVOT PIN IS REMOVED.**

1. SUPPORT THE BOOM securely (on a boom stand or similar rigid platform).

2. Remove the retaining rings, capscrew and locknut, and drive out the boom pivot pin, taking care not to damage the inner bore, bushings, sleeve bearings or thrust bearings.




**Boom Pin and Bushing.**

3. Check bushings, sleeve bearings and thrust bearings and replace if necessary.

4. Install new pivot pin.

5. Install capscrew, locknut and retaining rings.

6. Apply grease to pin through the grease fitting.

### WEAR PADS

Wear to boom sections is prevented by the installation of wear pads at several points along the boom length. The wear pads should be checked for wear approximately every six months. Fully retract the boom, and check the gap between the wear pad and the boom section.

Wear pads are located at the top front of the tip boom and at the top front of the mid boom, and at the top, bottom and side rear of the mid boom, and at the top, bottom and side rear of the base boom. There is also a moving anchor wear pad mounted on a weldment located on the side of the base boom.

**⚠ CAUTION**

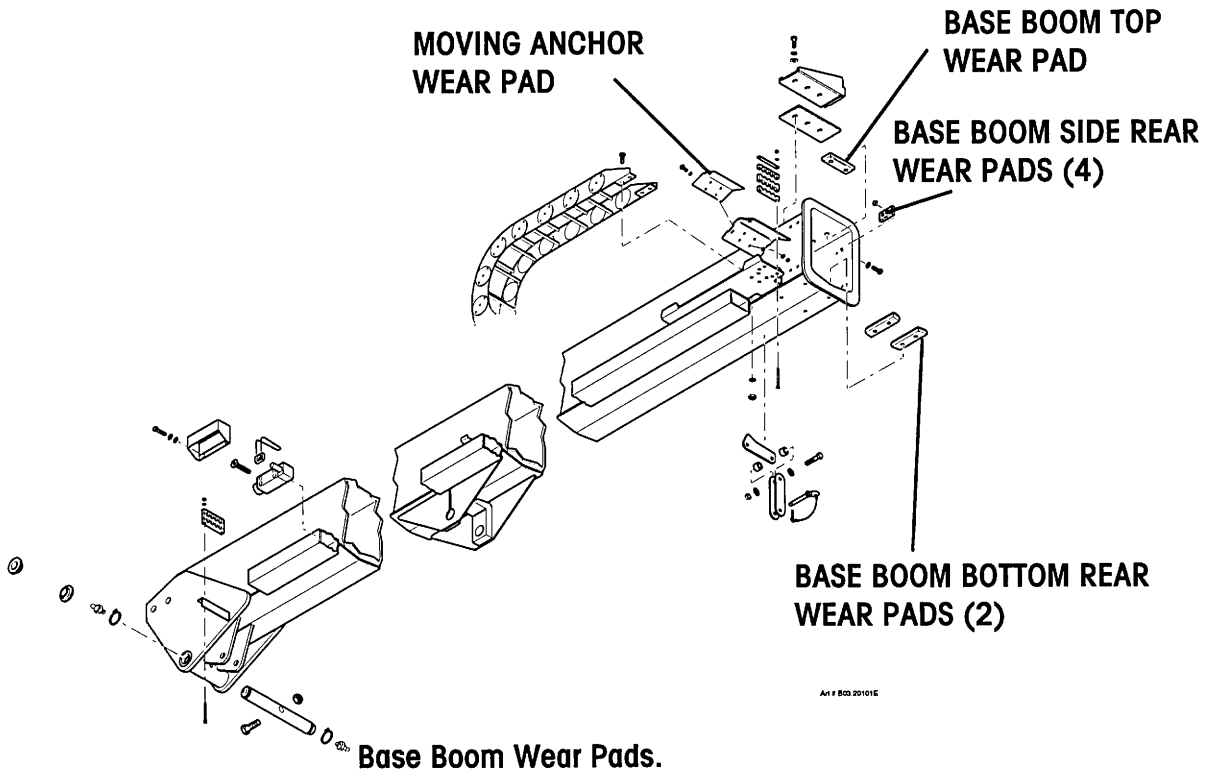
**If a pad wears to approximately 3/8" (9.5 mm) thick, it should be replaced or shimmed. Generally, only the bottom pad at the upper end and the top pad at the lower end of the boom will show wear.**

### Base Boom Wear Pad Replacement

1. Fully retract and lower the boom.
2. Remove the capscrews, lockwashers and jam nuts holding the top and side wear pads.
3. Slide out the top and side wear pads.
4. Use a crane to hold the mid and tip boom section off the bottom wear pad.
5. Remove the capscrews, lockwashers and jam nuts holding the bottom wear pad.
6. Remove the bottom wear pad.
7. Install new bottom wear pad with capscrews, lockwashers and nuts.
8. Rest the mid and tip boom section on the new bottom wear pad.
9. Install new base boom top and side wear pads.
10. Install capscrews, lockwashers and jam nuts.

### Moving Anchor Wear Pad Replacement

1. Fully retract and lower the boom.
2. Remove the capscrews, flat washers and locknuts holding moving anchor wear pad.
3. Remove wear pad.
4. Install new wear pad.
5. Install capscrews, flat washers and locknuts.



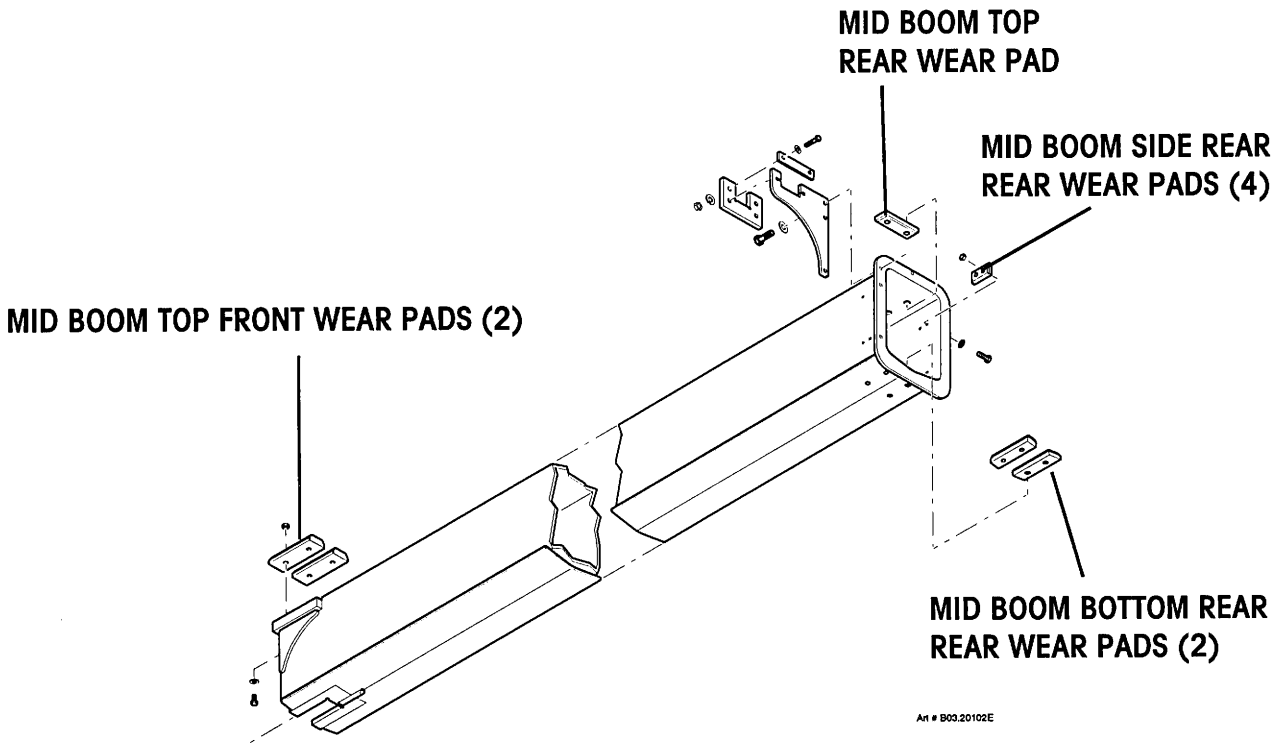

Base Boom Wear Pads.

### Mid Boom Top Front Wear Pad Replacement

1. Fully retract the boom and support the boom in the horizontal position.
2. Remove the telescope cylinder pin retaining rings and flat washers.
3. Remove telescope cylinder pin and lower the end of the telescope cylinder.
4. Access can now be gained to the mid boom top front wear pad retaining bolts, lockwashers and nuts.
5. Remove bolts, washers and nuts; wear pad will easily fall out.
6. Install new wear pad with bolts, lockwashers and nuts.
7. Raise cylinder and install cylinder pin, retaining rings and flat washers.

### Mid Boom Rear Wear Pads Replacement

1. Fully retract and lower the boom.
2. Remove the capscrews, lockwashers and jam nuts holding the top and side wear pads.
3. Slide out the top and side wear pads.
4. Use a crane to hold the tip boom section off the bottom wear pad.

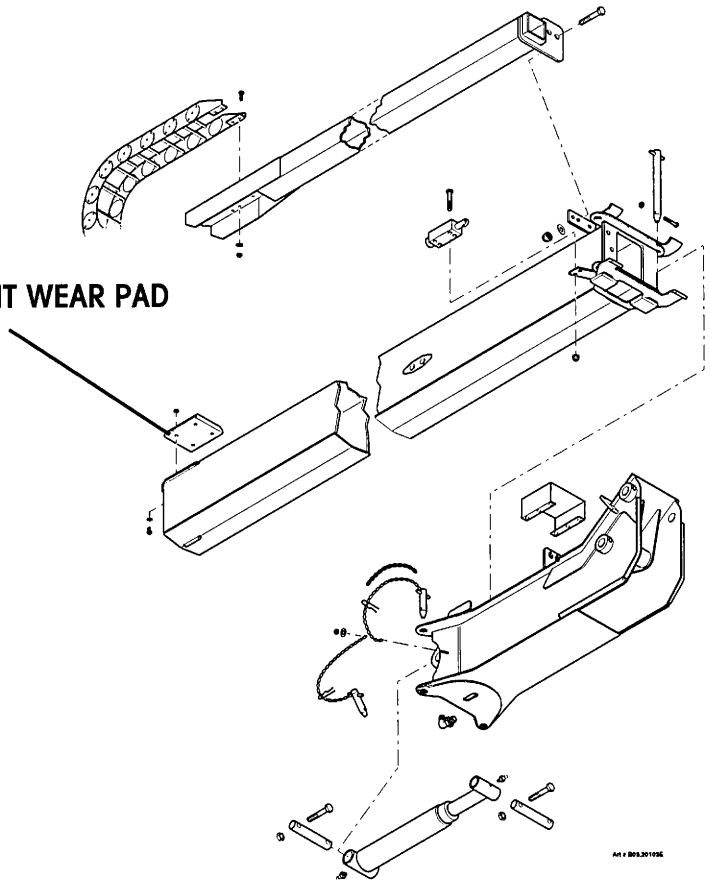



**Mid Boom Wear Pad.**

5. Remove the capscrews, lockwashers and jam nuts holding the bottom wear pad.
6. Remove the bottom wear pad.
7. Install new bottom wear pad with capscrews, lockwashers and nuts.
8. Rest the tip boom section on the new bottom wear pad.
9. Install new base boom top and side wear pads.
10. Install capscrews, lockwashers and jam nuts

**Tip Boom Top Front Wear Pad Replacement**

1. Fully extend the boom and support the boom in the horizontal position.
2. Remove bolts, washers and nuts; wear pad will easily fall out.
3. Install new wear pad with bolts, lockwashers and nuts.




**Tip Boom Wear Pad.**

## BOOM LIFT CYLINDER

The boom lift cylinder is of the double acting type. During operation, the cylinder should not leak, but a slight dampness at the rod seal is acceptable. The pins should be checked for wear. Check the pin capscrew for tightness. The cylinder and holding valve should be inspected for fluid leakage, damage and security.

### LIFT CYLINDER PIVOT PIN REPLACEMENT

**⚠ CAUTION**

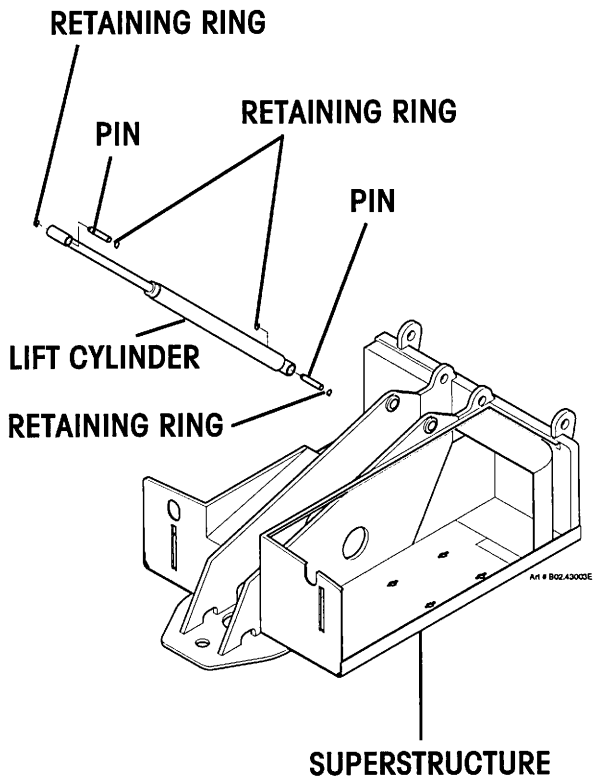
**Support the boom any time maintenance is required on the boom or boom cylinders.**

1. Support the boom securely (on a boom stand or similar rigid platform).
2. Operate the boom lift control to release hydraulic pressure and remove any load on the lift cylinder.
3. Remove the retaining rings.
4. Remove the capscrews and nuts.

**⚠ CAUTION**

**The cylinder will fall if not supported when the pivot pin is removed.**

5. SUPPORT THE LIFT CYLINDER and remove the pin.
6. Install new pin, capscrews, nuts and retaining rings.
7. Apply grease to pin through grease fitting.




**Lift Cylinder Pivot Pin.**

## LIFT CYLINDER SEAL REPLACEMENT (ON MACHINE)

**⚠ CAUTION**

**Support the boom any time maintenance is required on the boom or boom cylinders.**

1. Support the boom securely in the horizontal position (on a boom stand or similar rigid platform).
2. Operate the boom lift control to release hydraulic pressure and remove any load in the lift cylinder circuit.
3. Clean the cylinder, and loosen the cylinder end cap by several turns.

**⚠ CAUTION**

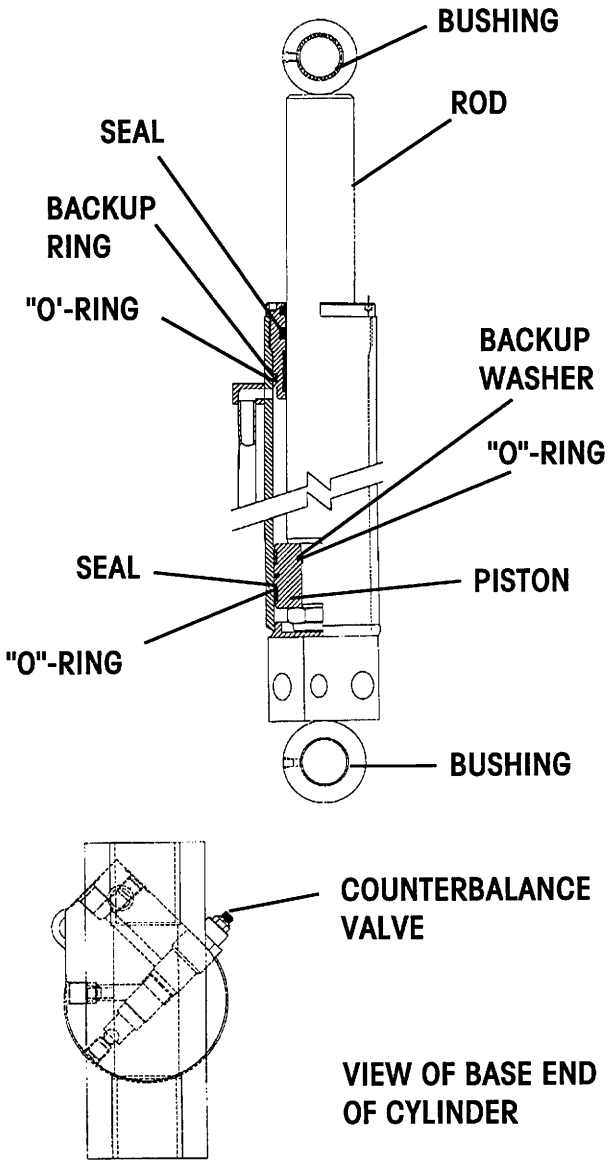
**The cylinder barrel will fall if not supported when the pivot pin is removed.**

4. Remove the rod end pivot pin, and support the cylinder barrel.
5. Loosen the end cap completely, and withdraw it carefully over the piston rod.

**⚠ CAUTION**

**Take care not to damage the rod surface and guard against dirt entering the system.**

6. Remove the rod and piston assembly.
7. Replace the "O"-rings, seals and backup rings.
8. Reassemble the lift cylinder, again AVOIDING DIRT AND ROD DAMAGE.
9. Tighten the end cap.
10. Install rod end pin.




**Lift Cylinder.**

## BENCH REPLACEMENT OF LIFT CYLINDER SEALS

The lift cylinder can also be removed from the machine for seal replacement.

1. Operate boom lift to horizontal position.

**⚠ CAUTION**

**Support the boom any time maintenance is required on the boom or boom cylinders.**

2. SUPPORT THE BOOM (on a boom stand or similar rigid platform) at the horizontal position.

3. Disconnect the hydraulic hoses from the cylinder.

**⚠ CAUTION**

**The cylinder will fall if not supported when the rod end pin is removed.**

4. Support the cylinder with a crane.

5. Remove the rod end cylinder pin.

6. With the cylinder supported, remove the base end cylinder pin.

7. Move the cylinder to a bench for examination.

8. Extend the cylinder, and examine the protruding rod for score marks and damage.

9. Clean the holding valve and examine for signs of leakage.

10. Clean the end of the cylinder.

11. Loosen the end cap, and withdraw it carefully over the piston rod.

**⚠ CAUTION**

**Take care not to damage the rod surface and guard against dirt entering the system.**

12. Remove the rod and piston assembly.

**NOTE:** It is recommended that the backup rings be replaced when seals are changed.

13. Replace the seals and backup rings and reassemble the cylinder, AVOIDING DIRT AND ROD DAMAGE.

14. Tighten the end cap.

15. Install the base end of the cylinder on the machine.

16. Connect all the hydraulic hoses.

17. Extend the lift cylinder and install the rod end to the boom.

18. Remove cylinder support.

19. Remove boom support.

20. BLEED THE SYSTEM after reinstalling the cylinder.

## COUNTERBALANCE VALVE INSPECTION

1. Place rated load in platform, raise the boom to the horizontal position, extend the boom to full side reach and stop the engine.

2. If the cylinder subsequently begins to move, the counterbalance valve is faulty and the cartridge should be replaced.

**⚠ DANGER**

**BOOM MUST BE SUPPORTED WHEN CHANGING THE COUNTERBALANCE VALVE. CYLINDER WILL RETRACT WHEN CARTRIDGE IS REMOVED.**

**NOTE:** The counterbalance valve is pre-set at the factory and is not field adjustable.

## JIB BOOM REMOVAL

**⚠ CAUTION**

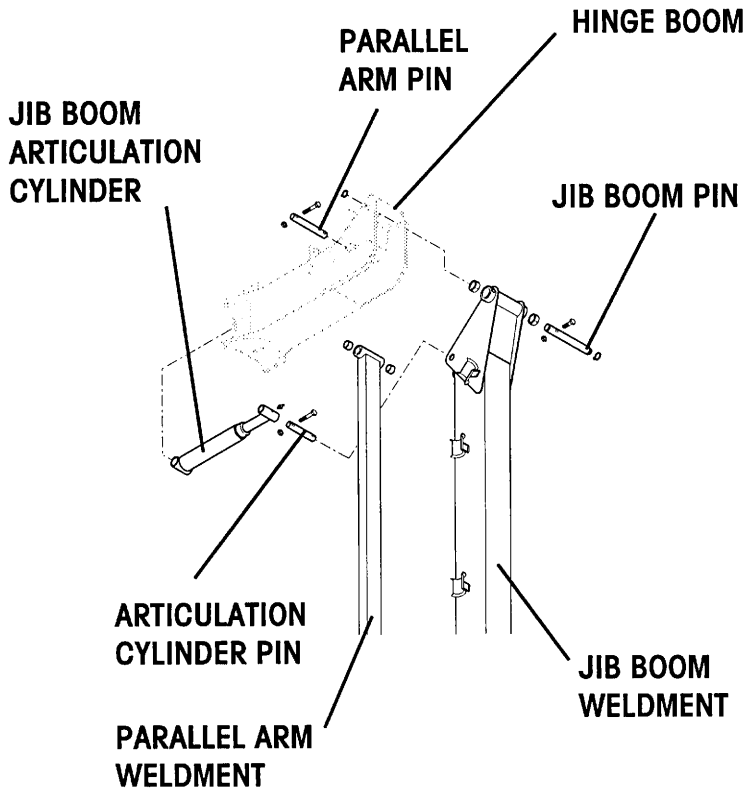
**Plug all open hydraulic fittings to prevent contamination by dirt or other foreign objects.**

1. Raise jib boom and support the platform.
2. Disconnect all electrical cables and hydraulic hoses at the platform and from the jib boom. **Note the connection of cables and hoses for ease of proper assembly.**
3. Remove articulation cylinder pin.
4. Remove parallel arm pin to free upper parallel arm weldment.
5. Remove upper jib boom pin to free jib boom weldment.

## JIB BOOM INSTALLATION

To install jib boom and platform.

1. Attach jib boom weldment to tip boom with jib boom pin.
2. Attach parallel arm weldment to tip boom with parallel arm pin.
3. Attach jib boom articulation cylinder to jib boom weldment with articulation cylinder pin.
4. Ensure that all pin securing devices are in place.
5. Connect all electrical cables and hydraulic hoses at the platform and to the jib boom.




**Jib Boom Assembly.**

## BOOM TELESCOPE CYLINDER

The function of the telescope cylinder is to extend and retract the upper boom segment to allow positioning of the work platform. The double acting cylinder must be removed from the machine before a thorough inspection can be accomplished.

### TELESCOPE CYLINDER REMOVAL

1. Elevate the boom to the horizontal position.

**⚠ CAUTION**

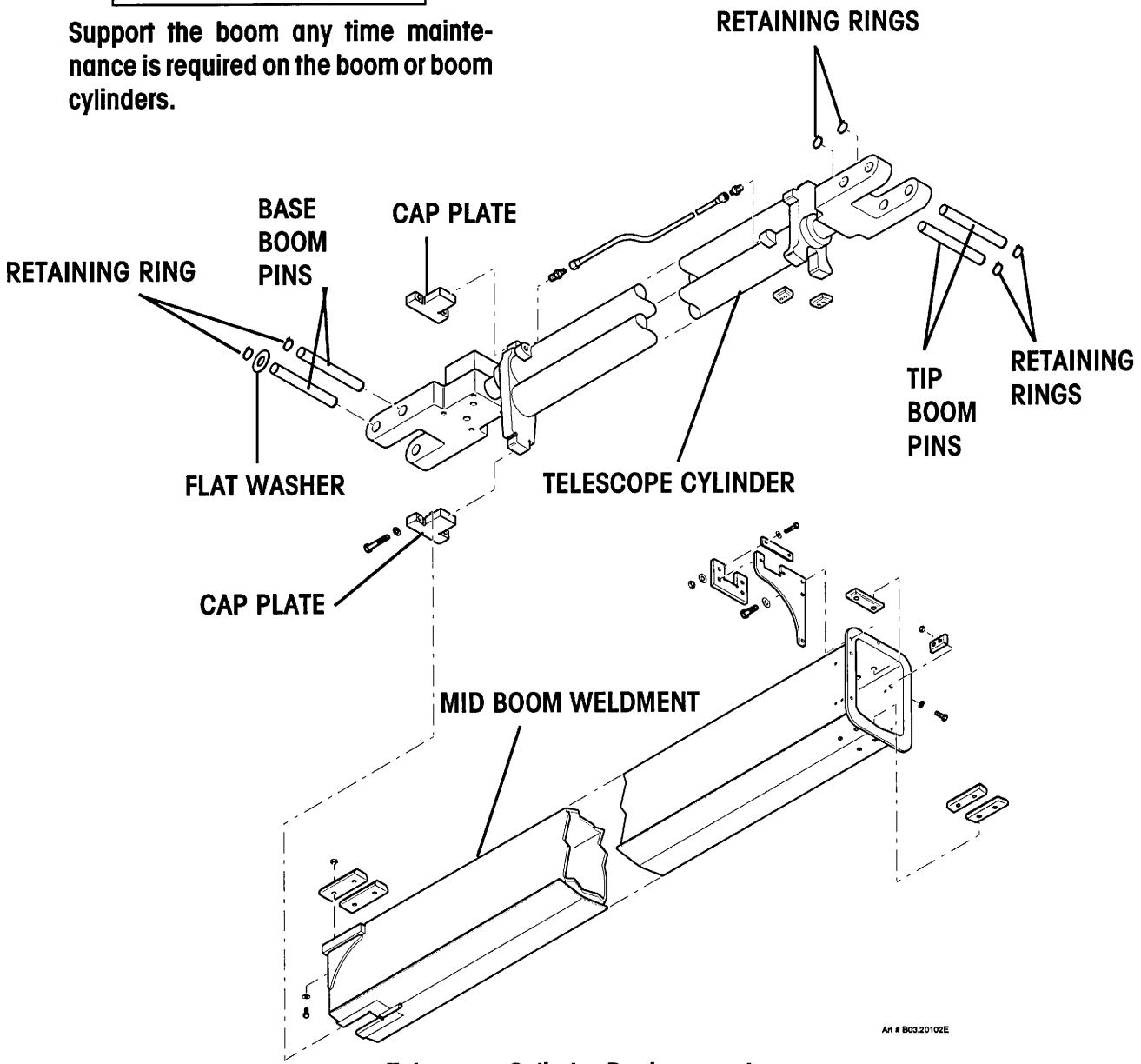
**Support the boom any time maintenance is required on the boom or boom cylinders.**

2. Extend the boom until the telescope cylinder rod end mounting pins on the tip boom are exposed.

3. SUPPORT THE EXTENDED TIP BOOM (on a boom stand or similar rigid platform).

4. Remove retaining clips and the two pins at the rod end of the telescope cylinder to the tip boom.

5. Close the hydraulic valves and disconnect the hydraulic hoses from the telescope cylinder.




**Telescope Cylinder Replacement.**

6. Remove the retaining rings, flat washers and pins from the boom base end of the cylinder.

7. Remove the two boom cap plates that secure the telescope cylinder to the mid boom.

8. Using a crane, withdraw the cylinder from the back end of the boom.

## TELESCOPE CYLINDER SEAL REPLACEMENT

1. Remove the end cap from the cylinder.

**⚠ CAUTION**

**Take care not to damage the rod surface and guard against dirt entering the system.**

2. Pull the cap and rod straight out of the cylinder barrel.

3. Remove the nut from the end of the rod.

4. Slip off the piston.

5. Examine the rod and seals for signs of damage or wear.

6. Remove the old seals and backup rings. Refer to Illustrated Parts Catalog.

7. Install new seals and backup rings. Refer to Illustrated Parts Catalog.

## TELESCOPE CYLINDER INSTALLATION

**⚠ CAUTION**

**Support the boom any time maintenance is required on the boom or boom cylinders.**

1. SUPPORT THE EXTENDED TIP BOOM (on a boom stand or similar rigid platform) IN THE HORIZONTAL POSITION.

2. Connect the hydraulic hoses to the telescope cylinder and open hydraulic lines.

3. Cycle the telescope cylinder several times to BLEED THE SYSTEM.

4. Measure the distance from base boom pin holes to tip boom pin holes, and extend the telescope cylinder that distance.

5. Using a crane, slide the telescope cylinder into the boom and align the rod end mounting holes with the holes in the tip boom.

6. Install the two pins and retaining rings holding the rod end of the telescope cylinder to the tip boom.

7. Install the pin, flatwashers and retaining rings in the base end of the cylinder.

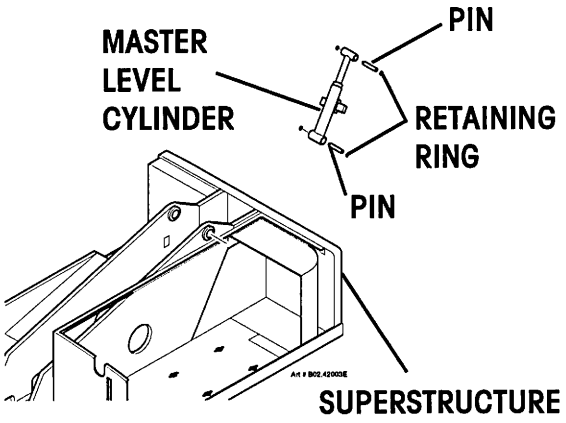
8. Install the two boom cap plates that secure the telescope cylinder to the mid boom.

## COUNTERBALANCE VALVE INSPECTION

1. Place rated load in the platform, hoist the boom to full elevation and extend the telescope cylinder, then stop the engine.

2. If the telescope cylinder subsequently begins to move, the counterbalance valve is faulty and the cartridge should be replaced.

**NOTE:** The counterbalance valve is pre-set at the factory and is not adjustable.




**Master Cylinder Pin Replacement.**

## PLATFORM LEVEL CYLINDERS

The platform level system automatically keeps the platform level, using a master/ slave cylinder arrangement. Whenever the boom is raised or lowered, the master cylinder is forced to move. The fluid displacement from the master cylinder is in turn sent up the boom to the slave cylinder. This forces the slave cylinder to move the same distance as the master cylinder, which keeps the platform parallel to the ground in any boom position.

The platform level cylinders (master and slave) are of the double acting type. The pivot pins should be checked for wear. Check the pivot pin locking bolts for tightness. The cylinders should be inspected for fluid leakage, damage and security. The seals should be replaced whenever the cylinder is serviced.

### PLATFORM LEVEL CYLINDER PIN REPLACEMENT

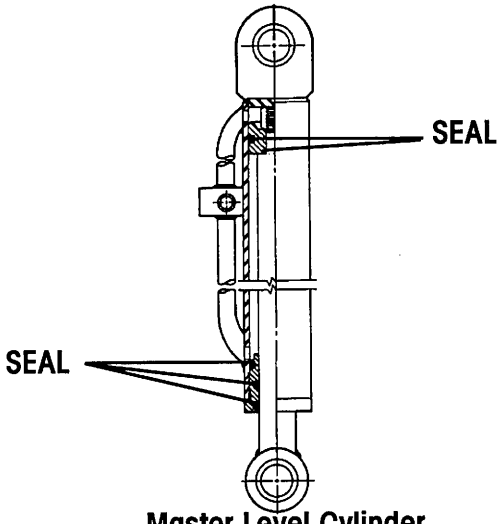
SUPPORT THE PLATFORM to remove the load on both master and slave leveling cylinders. Remove the retaining ring, the pin locking bolts and nuts, and remove the pin.

Install new pin, locking bolts and nuts (lubricate bolts before installation) and retaining ring. Apply grease to pin.

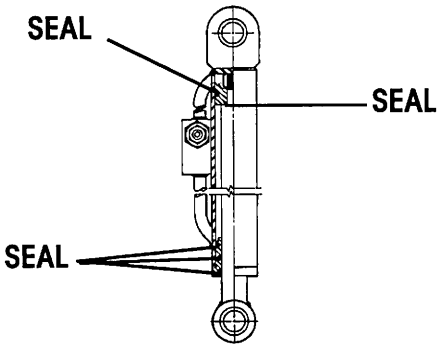
### LEVEL CYLINDER SEAL REPLACEMENT

Lower the main boom. SUPPORT THE PLATFORM to remove the load on both master and slave leveling cylinders. Remove the lock collar and pin. Slave cylinder seals can be replaced on the machine. Master cylinder must be removed for seal replacement.

Clean the end of the cylinder. Unscrew the end cap and pull the cap and rod straight out of the cylinder barrel. TAKE CARE NOT TO DAMAGE THE ROD SURFACE, AND GUARD AGAINST DIRT ENTERING THE SYSTEM. Remove the split pin and nut from the end of the rod. Slip off the collar. Examine the rod and seals for signs of damage or wear. Remove the old seals and install a new seal kit.




**Master Level Cylinder.**




**Slave Level Cylinder.**

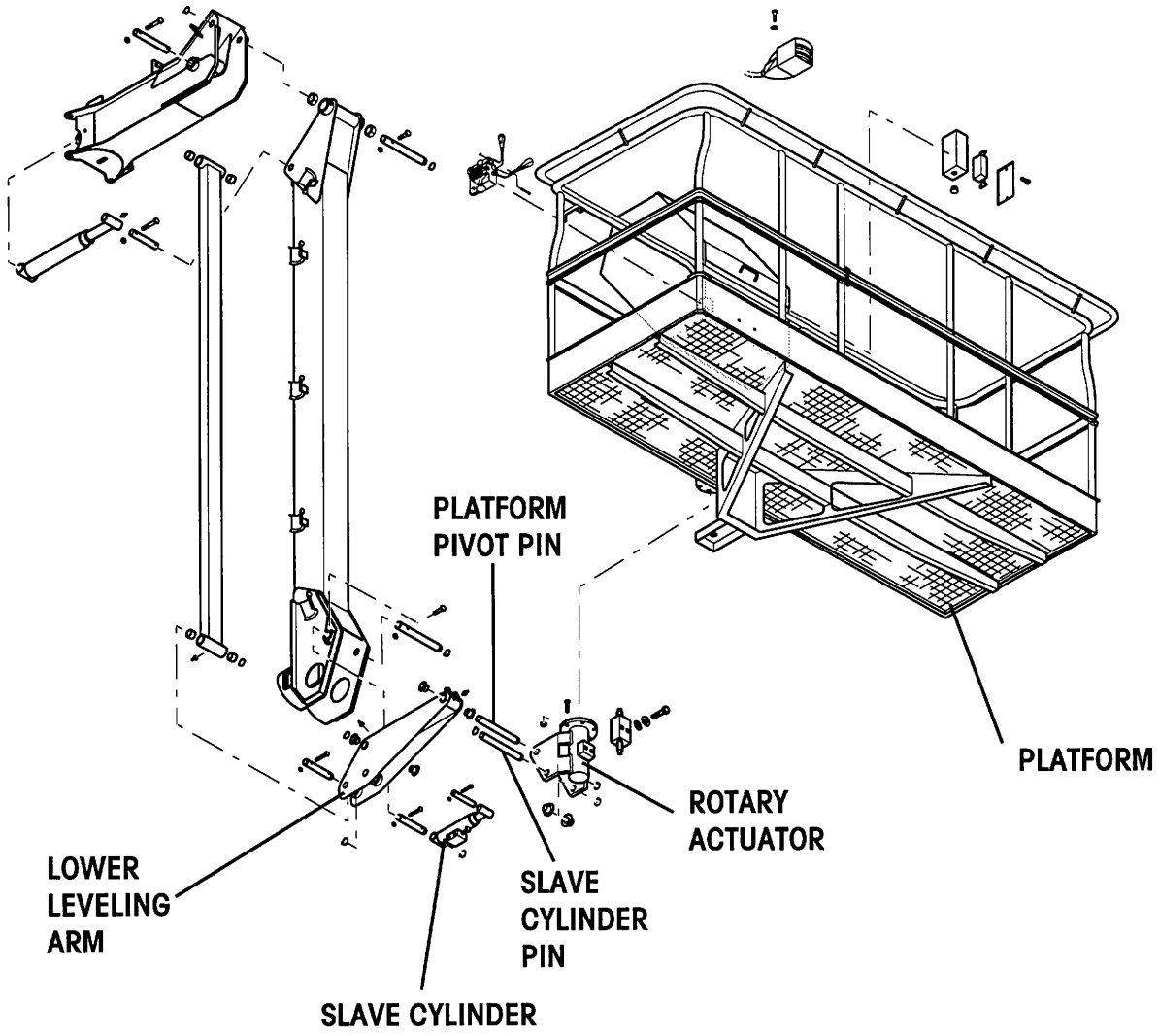
## PLATFORM LEVELING PROCEDURE

After a platform level cylinder has been repaired or replaced, or if the platform does not remain level with the raising and lowering of the boom, the platform leveling circuit may need to be bled.

With the platform near ground, operate the platform level control to move the platform fully backward and forward. Perform procedure five (5) times in order to expel any air from the system.

**⚠ CAUTION**

**CARE MUST BE TAKEN WHEN OPERATING LEVEL CONTROL. AIR IN CYLINDERS CAN CAUSE UNCONTROLLED PLATFORM MOTION.**




**Platform/ Jib Components.**

## BLEEDING THE PLATFORM LEVELING CIRCUIT

After a platform level cylinder has been repaired or replaced, or if the platform does not remain level with the raising and lowering of the boom, the platform leveling circuit may need to be bled.

> **NOTE:** Assistance is required in order to perform the bleeding procedure. One person is needed to operate the platform level control, while the second person bleeds the system.

1. With boom retracted, check the hydraulic fluid level in the tank.

> **⚠WARNING**
>
> **HYDRAULIC FLUID WILL BE FORCIBLY EJECTED FROM B AND C FITTINGS (LABELED). LOOSEN NIPPLE SLOWLY.**

2. Slightly loosen the B and C hose fittings (labeled) at the base of the master leveling cylinder.

3. With the platform near ground, operate the platform level control to move the platform fully backward and forward. Perform procedure five (5) times in order to expel any air from the system.

> **⚠WARNING**
>
> **CARE MUST BE TAKEN WHEN OPERATING LEVEL CONTROL. AIR IN CYLINDERS CAN CAUSE UNCONTROLLED PLATFORM MOTION.**

4. Tighten the B and C hose fittings (labeled) and top off the hydraulic tank.

5. Repeat the procedure as required until all air is expelled.

6. After bleeding the leveling circuit, raise boom to full elevation and then fully lower boom to ensure that platform remains level.

7. Check platform level control lever for proper operation.

# SECTION 6:
# MAINTENANCE

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Semi-Annual Operational Checklist ..... 6-13

# MAINTENANCE

The Simon RP66 is designed to require a minimum amount of maintenance. However, it is essential that the specified services be performed at the indicated intervals, and that the instructions contained in this manual are followed to ensure safety and reliability.

**⚠ DANGER**

**DEATH OR SERIOUS INJURY MAY RESULT IF MACHINE IS OPERATED IN AN UNSAFE CONDITION. DO NOT OPERATE ANY MACHINE IF IN UNSAFE OPERATING CONDITION.**

## GENERAL MAINTENANCE TIPS

- ALWAYS clean the surrounding area before opening hydraulic components.
- Never open a hydraulic system when there are contaminants in the air.
- Never leave components or hoses open. They must be protected from contamination (including rain) at all times.
- Use only recommended lubricants (see Lubrication Chart in this manual). Improper lubricants or incompatible lubricants may be as harmful as no lubrication.
- Watch for makeshift "fixes", which can jeapordize safety as well as lead to more costly repairs.
- Any work platform found not to be in safe operating condition should be removed from service until repaired. All repairs should be made by authorized personnel in conformance with the manufacturer's operating, maintenance, and repair manuals.

### FIRST THREE MONTHS OF OPERATION

As with any new machine, minor fluid leaks may occur until the various hydraulic components and pipe fittings are fully seated.

It is particularly important that, for the first three months of operation, all hydraulic components, hoses and pipe fittings be checked regularly for leaks and tightness, and corrective action taken as required.

The hydraulic pump, electric motor, cylinders and pressure valves are self-lubricating.

### ROUTINE SERVICING

**NOTE:** The following recommendations are based on advice of our component suppliers, and the requirements of various safety regulations. They should be followed with discretion based on factors such as amount and type of machine usage, environmental conditions, and local safety regulations.

**IMPORTANT:** Make certain that the unit is inspected per the operational checklists at the end of this section.

## SHIFT SERVICE

### Hydraulic System

Before checking the hydraulic fluid level, ensure that the machine booms are stowed in the traveling position, and the machine is standing on level ground. Fluid level must be to full mark on sight gauge, located on the side of tank. Refer to Lubrication Chart for correct grade of hydraulic fluid. Ensure that the filler cap is secure to prevent entry of water or other impurities into the tank.

### Tire Condition

Check that the tires are not damaged.

### Platform Rails and Safety Gate

Check security of platform and safety gate.

### Steering

Check the steer cylinder for fluid leakage. Inspect steering linkage for signs of wear.

### Batteries

Check the electrolyte level in battery cells. Replenish with distilled water, if necessary.

### Pivot Pins

Examine all pivot pins on booms and cylinders to ensure that they are positively secured in position.

### Test All Machine Systems

Test the operation of the drive assembly, including drive motor and steering. Test the operation of all machine boom functions.

### Checklist

Perform all items on the Shift Checklist found later in this section.

## WEEKLY SERVICE

### Hinge Boom

Lubricate the hinge boom and lock pins. Check electrical connections at hinge boom for tightness and corrosion.

### Swing Bearing and Drive Pinion Gear

Lubricate standard open swing bearing and drive pinion gear, and check optional oil bath swing bearing case.

### Checklist

Perform all items on the Weekly Checklist found later in this section.

## MONTHLY SERVICE

### Hydraulic System

Pressurize the hydraulic circuit and inspect the system for any signs of leakage, particularly at flexible hoses, connections and hydraulic components. Check hydraulic fluid color. If the hydraulic fluid does not appear clear amber, but has a cloudy appearance, it is usually an indication that water is present. A dark brown color, accompanied by a strong "burnt" smell, indicates that the fluid has overheated. If either condition occurs, a complete hydraulic fluid and filter change will be necessary.

The cause of hydraulic fluid deterioration should be investigated and rectified. Have fluid analyzed by a qualified laboratory.

### Chassis Bolts

Check all bolts for signs of looseness. Refer to individual items in the Monthly Checklist.

### Cylinders

Check all cylinders for hydraulic fluid leakage.

### Pivot Pins and Grease Fittings

Lubricate all pivot pins and grease fittings.

### Platform Mounting

Check that platform weldments and platform frame members are in good condition.

### Checklist

Perform all items on the Monthly Checklist found later in this section.

## SEMI-ANNUAL SERVICE

### Boom Cylinders

Fully retract, then extend the boom lift cylinder. At each extreme position, check that there is no movement between cylinder rod and bearing housing, or between cylinder cap and tube. Fully retract, then extend the boom telescope cylinder. At each extreme position, check that there is no movement of the cylinder pin.

### High Pressure Filter

Change the high pressure filter element.

In severe use applications, more frequent filter changes will be necessary.

### Checklist

Perform all items on the Semi-Annual Checklist found later in this section.

## ANNUAL SERVICE

> **NOTE:** Machine Annual Inspection Report Forms are available from Simon.

### Flexible Hoses

Inspect all hoses over their complete length. Replace any hoses showing looseness or corrosion at the end fittings. Replace hoses with cracking, blistering or excessive wear of outer protective covering.

### Hydraulic Fluid

If the hydraulic system has been properly maintained, the fluid should only need to be changed once each year. This, of course, will depend on machine application, amount of use, temperature, atmospheric conditions and other factors.

### Hydraulic Fluid Tank

Carefully check the condition of the fluid inside the tank to ensure that it flows easily and is of clear, amber color. In cases of gross contamination, it will be necessary to completely drain and refill the entire hydraulic system.

Place a suitable waste oil container under the drain tap, or attach a suitable hose from the drain tap to the container. Open the drain tap, and completely drain the fluid from the tank. Clean or replace the suction hose, and close the drain tap. Refill the tank to the correct level.

### Structural Examination

A thorough examination of the machine should be carried out for signs of corrosion, misalignment, material fractures, and other damage. Particular attention should be given to the condition of welded joints.

## FOUR YEAR INTERVAL SERVICE

### Pivot Pins and Bearings

Remove the pivot pins for examination. Check the pivot pin bearings with the pivot pins removed. Replace with the correct type of pins and bearings, as necessary.

# SHIFT OPERATIONAL CHECKLIST

**All checks must be completed before operation of the unit.**

**These checklists can be copied as needed to aid in performing these inspections.**

**DATE:** _____ **INSPECTED BY:** _____

**MODEL NUMBER:** _____ **SERIAL NUMBER:** _____

## GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   **Keep your Simon machine clean!!**

## ⚠WARNING

**THIS CHECKLIST MUST BE USED AT DAILY INTERVALS OR AFTER EVERY 6 TO 8 HOURS OF USE, WHICHEVER IS SOONER. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.**

| INITIAL | DESCRIPTION |
|---|---|
| _____ | 1. Perform a visual inspection of all machine components, i.e. missing parts, torn or loose hoses, hydraulic fluid leaks, torn or disconnected wires, improper or makeshift repairs, etc. Open both compartment doors to inspect components inside. |
| _____ | 2. Inspect the entire machine for signs of damage, broken welds, and loose bolts. |
| _____ | 3. Check hydraulic system for leaks, examine hoses for signs of excessive wear, chafing or twisting. Adjust the hoses and/ or replace them if necessary. |
| _____ | 4. Check engine oil and fuel levels. |
| _____ | 5. Check engine coolant level (liquid cooled engine only). |

**Continued on following page . . .**

# SHIFT OPERATIONAL CHECKLIST (CONTINUED)

| INITIAL | DESCRIPTION |
|---|---|
| _____ | 6. Check battery electrolyte level. Check battery terminals for tight connections and cleanliness. |
| _____ | 7. Check hydraulic fluid level. The level should be at the line marked on the sight gauge with the unit in stowed position. Inspect condition of hydraulic fluid in the reservoir. Fluid should be a clear amber color. |
| _____ | 8. Check that all shutoff valves on hydraulic tank are open (parallel to flow). |
| _____ | 9. Check tires for cracks or other damage, and proper inflation pressure (see Specifications). |
| _____ | 10. Check if wheel lug nuts are tight. |
| _____ | 11. Check hose carrier to verify that it is not bent or sagging. |
| _____ | 12. Inspect safety belt connections, and check for worn areas on the belts. |
| _____ | 13. Inspect the work platform and boom structure for signs of damage and broken welds. Check gate latch for damage. |
| _____ | 14. Check pivot pins and STOW-*N*-GO™ hinge and lock pins for security. |
| _____ | 15. Check that no attempt had been made to override the drive interlock system by a previous operator. |
| _____ | 16. Check that all warning and instructional labels are legible and secure. |
| _____ | 17. Start engine. Check that hydraulic pressure is as stated in the machine specifications. |
| _____ | 18. Check that the tilt alarm is working properly. |
| _____ | 19. When all pre-inspection checks have been completed, test the ground controls for proper operation. |
| _____ | 20. Check emergency pump for operation and that pressure is as stated in the specifications. |

**Continued on following page . . .**

# SHIFT OPERATIONAL CHECKLIST (CONTINUED)

| INITIAL | DESCRIPTION |
|---|---|
| _____ | 21. Check platform controls for proper operation. |
| _____ | 22. With the platform raised, check for the smooth operation of creep speed drive. |
| _____ | 23. Follow engine daily service requirements. Refer to the Engine Maintenance Manual supplied with your machine. |

## ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

**NOTE:** Do not lubricate wear pads in dusty or sandblast environments. There are boots and guards available to extend unit life in these applications. Consult Simon Aerials Service Department.

| INITIAL | DESCRIPTION |
|---|---|
| _____ | • Inspect cylinder boots, valve spool boots, etc., for cuts or other damage after every eight (8) hours of service. Repair or replace if necessary. |
| _____ | • Check hydraulic system for leakage after every eight (8) hours of operation. |
| _____ | • Lubricate "Standard, open style" swing bearing. |
| _____ | • Follow engine severe usage service requirements. Refer to the Engine Maintenance Manual supplied with your machine. |

# WEEKLY OPERATIONAL CHECKLIST

**All checks must be completed before operation of the unit.**

**DATE:** _____ **INSPECTED BY:** _____

**MODEL NUMBER:** _____ **SERIAL NUMBER:** _____

**These checklists can be copied as needed to aid in performing these inspections.**

## GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   **Keep your Simon machine clean!!**

## ⚠WARNING

**THIS CHECKLIST MUST BE USED AT WEEKLY INTERVALS OR EVERY 25 HOURS, WHICHEVER OCCURS FIRST. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.**

| INITIAL | DESCRIPTION |
|---|---|
| _____ | 1. Perform all checks listed on shift operational checklist. |
| _____ | 2. Check wheel lug nuts for proper torque (see Specifications). |
| _____ | 3. Check electrical connections at the hinge boom for tightness and corrosion. Check hydraulic connections for leaks, corrosion and wear. |
| _____ | 4. Lubricate swing bearing and drive pinion gear. |
| _____ | 5. Apply lubricant to standard open swing bearing and drive pinion gear (see Lubrication Chart).<br><br>Check lubricant in optional oil bath swing bearing case, if so equipped, for proper level, and check for dirt or metal contamination (see Lubrication Chart). |
| _____ | 6. Lubricate the hinge boom hinge and lock pins. |

**Continued on following page . . .**

# WEEKLY OPERATIONAL CHECKLIST (CONTINUED)

## ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

**NOTE:** Do not lubricate wear pads in dusty or sandblast environments. There are boots and guards available to extend unit life in these applications. Consult Simon Aerials Service Department.

| INITIAL | DESCRIPTION |
|---|---|
| _____ | • Lubricate all grease fittings. |
| _____ | • Lubricate steering spindles, linkage and tie rod ends. |
| _____ | • Check oil level in "Oil Bath" swing bearing, and drive power hubs. |
| _____ | • Clean and repack wheel bearings |
| _____ | • Follow engine severe usage service requirements. Refer to the Engine Maintenance Manual supplied with your machine. |

# MONTHLY OPERATIONAL CHECKLIST

**All checks must be completed before operation of the unit.**

**DATE:** _____ **INSPECTED BY:** _____

**MODEL NUMBER:** _____ **SERIAL NUMBER:** _____

**These checklists can be copied as needed to aid in performing these inspections.**

## GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   **Keep your Simon machine clean!!**

## ⚠WARNING

**THIS CHECKLIST MUST BE USED AT MONTHLY INTERVALS OR EVERY 100 HOURS, WHICHEVER OCCURS FIRST. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.**

| INITIAL | DESCRIPTION |
|---|---|
| _____ | 1. Perform all checks listed on Shift and Weekly Operational Checklists. |
| _____ | 2. Lubricate all grease fittings (see Lubrication Chart). |
| _____ | 3. Lubricate all hydraulic valve spool linkages. |
| _____ | 4. Check hose and electrical wire condition at the hinge boom to jib boom joint area, the jib boom to lower leveling arm joint area, and the lower leveling arm to platform joint area. |
| _____ | 5. Lubricate steering spindles, linkage and tie rod ends. |
| _____ | 6. Check protective rubber cover around hoses at moving anchor, tip boom, boom hose passages, and at swing bearing. |
| _____ | 7. Check boom hose carrier for sag and other damage. If damaged, repair the cause of damage, i.e. hoses too tight, breaking cross braces and worn, cracked or abraded hoses. |
| _____ | 8. Check torque of swing bearing bolts (see "Machine Specifications"). |

**Continued on following page . . .**

# MONTHLY OPERATIONAL CHECKLIST (CONTINUED)

| INITIAL | DESCRIPTION |
|---|---|
| _____ | 9. Check adjustment and security of swing drive. There should be a slight amount of backlash between the turntable and undercarriage when properly adjusted. Check torque of mounting bolts (see "Machine Specifications"). |
| _____ | 10. Check oil level in swing drive gear box (see Lubrication Chart). |
| _____ | 11. Check oil level in power hubs (see Lubrication Chart). |
| _____ | 12. Check that tires are not leaning in or out. |
| _____ | 13. Check that wheel spindles turn freely, with no end play. |
| _____ | 14. Check drive wheel power hub mounting bolt torque (see "Machine Specifications"). |
| _____ | 15. Check that neither the main boom nor jib boom drift with a full load, no hydraulic pressure (engine off) and the control valves in the "BOOM DOWN" position. |
| _____ | 16. Check to make sure boom sections are not dented or bent. |
| _____ | 17. Check that all adjustable flow valves are locked. Check settings if any are not locked. |
| _____ | 18. Check fuel shutoff rack for proper operation. Loosen lever arm and lubricate with WD-40 or equivalent. |
| _____ | 19. Follow engine monthly service requirements. Refer to the Engine Maintenance Manual supplied with your machine. |

## ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

### EVERY 90 DAYS

| INITIAL | DESCRIPTION |
|---|---|
| _____ | • Have hydraulic fluid sample analyzed at a test laboratory. Comply with test results and recommendations to ensure long, trouble-free operation. |
| _____ | • Replace high pressure filter element. |
| _____ | • Follow engine severe usage service requirements. Refer to the Engine Maintenance Manual supplied with your machine. |

# SEMI-ANNUAL OPERATIONAL CHECKLIST

**All checks must be completed before operation of the unit.**

**DATE:** _____ **INSPECTED BY:** _____

**MODEL NUMBER:** _____ **SERIAL NUMBER:** _____

**These checklists can be copied as needed to aid in performing these inspections.**

## GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   **Keep your Simon machine clean!!**

## ⚠WARNING

**THIS CHECKLIST MUST BE USED AT SIX MONTH INTERVALS OR EVERY 500 HOURS, WHICHEVER IS SOONER. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.**

| INITIAL | DESCRIPTION |
|---|---|
| _____ | 1. Perform all checks listed on Shift, Weekly and Monthly operational checklists. |
| _____ | 2. Have hydraulic fluid sample analyzed at a test laboratory. Comply with test results and recommendations to ensure long, trouble free operation.<br><br>**NOTE:** If hydraulic fluid has been regularly maintained, it should only require changing once every year, depending on maintenance, temperature, application, duty cycle, and atmospheric conditions. |
| _____ | 3. Inspect the entire machine for signs of structural damage and broken welds, and worn or damaged components. Replace as necessary. |
| _____ | 4. Clean and lubricate all electrical switches with an electrical contact cleaner and ensure that the switches operate freely in all positions. |
| _____ | 5. Check the electrical mounting and hardware connections for security. |
| _____ | 6. Replace high pressure filter elements. |

**Continued on following page . . .**

# SEMI-ANNUAL OPERATIONAL CHECKLIST (CONTINUED)

| INITIAL | DESCRIPTION |
|---|---|
| _____ | 7. Clean and lubricate the standard open swing bearing gear teeth with dry moly lube spray (not required for oil bath swing bearing). |
| _____ | 8. Repack front wheel bearings. |
| _____ | 9. Check that engine RPM is as stated in the specifications. |
| _____ | 10. Follow engine semi-annual service requirements. Refer to the Engine Maintenance Manual supplied with your machine. |

**EVERY YEAR**

| | |
|---|---|
| _____ | 11. Drain and replace fluid from hydraulic reservoir. Drain and replace fluid from drive wheel power hubs. If badly contaminated, it may be necessary to disassemble and inspect components. |

**EVERY TWO YEARS**

| | |
|---|---|
| _____ | 12. Drain and replace fluid from swing drive. If badly contaminated, it may be necessary to disassemble and inspect components. |

## ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

**EVERY SIX MONTHS**

| | |
|---|---|
| _____ | • Drain and replace fluid from hydraulic reservoir, and oil from swing drive gear box and drive wheel power hubs. |
| _____ | • Follow engine severe duty service requirements. Refer to the Engine Maintenance Manual supplied with your machine. |

# SECTION 7:
# TROUBLESHOOTING

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# GENERAL TROUBLESHOOTING TIPS

Before investigating a malfunction, check the following items:

- The Main Power Key Switch should be in the "GROUND" or "PLATFORM" position.
- The Foot Pedal Switch is pressed and held for platform console operation.
- Pump Selector Switch is pressed and held for ground control operation.
- Check that battery connections are secure and battery is fully charged.
- Check that the Emergency Stop Button(s) are released.
- Check that the hydraulic reservoir ball valves are open.
- Check that hydraulic fluid is at the correct level.

Common Causes of Hydraulic System Malfunctions:

- Mixing incompatible hydraulic fluids, destroying the additives and causing varnish build up resulting in sticking valves.
- Water in the hydraulic fluid due to a damp climate and loss of reservoir pressurization.
- Improper viscosity hydraulic fluid; too high in a cold climate, too low in a warm climate.

  **NOTE:** Mobil DTE-13M is recommended as a general purpose fluid suitable for all but the most extreme environmental conditions.

- Fuel in the hydraulic fluid, which lowers the viscosity and lubricity of the fluid.

# TROUBLESHOOTING CHART

| Problem | Probable Cause | Solution |
|---|---|---|
| • Excessive heat causing excessive wear on seals and metal parts due to lowered hydraulic fluid viscosity. Symptoms to watch for are: pump case turns brown, hydraulic fluid darkens and premature pump failure. | • Excessive water in the hydraulic fluid. | • Drain, flush and refill hydraulic system. |
| | • Improper oil viscosity. | • Drain, flush and refill hydraulic system with the correct fluid. |
| | • Improper lubrication and hydraulic fluid. | • Drain and flush hydraulic system. |
| | • Pump cam bearing failure. | • Rebuild pump as required. |
| | • Foot pedal blocked to the "ON" position. | • Unblock foot pedal. |
| • Water in hydraulic fluid. Symptoms to watch for are: pitting and etching of pump pistons and pump piston cam wear causing heat build up and premature pump failure. | • Damp climate. | • Drain and flush hydraulic system. |
| | • Hydraulic fitting or port open to contaminants. | • Drain and flush hydraulic system. Replace worn pump components. |
| | • Reservoir not pressurized. | • Check pressure. Check reservoir for leaks. |
| • Varnish, the dark brownish residue left from oxidation of hydraulic fluids. Symptoms to watch for are: pistons, spools and moving parts with close tolerances tend to stick and hang up. | • Mixing of incompatible fluids or poor quality fluids. | • Drain and flush hydraulic system, then fill with recommended hydraulic fluid. |
| | • Excessive heating of the fluids. | • Drain and flush hydraulic system, then fill with recommended hydraulic fluid. |
| • Poor lubrication, parts break through lubricant causing metal to metal contact. Symptoms to watch for are: heads of pump pistons worn and excessive heat build up. | • Hydraulic fluid viscosity low. | • Drain and flush hydraulic system, then fill with recommended hydraulic fluid. |
| | • Improper or poor grade hydraulic fluid or lubricant without anti-wear additives. | • Drain and flush hydraulic system, then fill with recommended hydraulic fluid. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Cavitation, a gaseous condition within the fluid stream where the pressure is reduced to the vapor pressure of the fluid. The higher the system pressure the more violent the reaction will be. Symptoms to watch for are: pitting and etching of pump pistons. | • Low reservoir fluid level. | • Add hydraulic fluid. |
| | • Air leaks in suction line. | • Repair any suction hose leaks. |
| | • Improper hydraulic fluid. | • Have fluid analyzed regularly and drain and flush hydraulic system, then fill with recommended hydraulic fluid. |
| | • Vaporization of water. | • Have fluid analyzed regularly and drain and flush hydraulic system, then fill with recommended hydraulic fluid. |
| | • Hydraulic fluid system has not been warmed before using full system pressure. | • Warm up system before using full system pressure. |
| | • Pump speed too high. | • Ensure reservoir pressurization is operating properly and adjust engine speed. |
| • Boom track cross braces breaking. | • Hoses skiving in the boom trac. | • Check hydraulic pressure and adjust if necessary. |
| | • System pressure too high, causing boom hoses to shrink more than normal. | • Check hydraulic pressure and adjust if necessary. |
| | • Hoses too tight in the track. | • Adjust hose tension. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Boom track sagging. | • Track pin holes stretched usually caused by a damaged "I" beam support.<br>• Overhead guard is damaged. If the guard is damaged, the track could get caught and could also tear off the moving anchor.<br>• Improper lubrication and cleaning. | • Check "I" beam support and replace if necessary.<br>• Replace overhead guard and any other items damaged due to a damaged guard.<br>• Follow proper lubrication and cleaning procedures. |
| • Engine won't crank. | • Starter motor relay.<br>• Starter motor interlock relay.<br>• Oil pressure switch stuck in open position.<br>• Power relay.<br>• Ground/ platform switch.<br>• Ground/ platform ignition switch.<br>• Engine failure.<br>• Footswitch blocked | • A breakdown in any one of these components will cause the engine not to crank. Trace the available voltage to starter motor relay. Replace the faulty component(s).<br>• Unblock footswitch. |
| • Throttle actuator doesn't work. | • Throttle high speed relay.<br>• An actuator failure.<br>• Throttle timer relay. | • A breakdown in any one of these components will cause the actuator not to function. Trace the available voltage to the throttle solenoid. Replace the faulty component(s). |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Movement alarm will not sound. | • Broken wire or connection in the horn circuit.<br>• Horn or horn relay is faulty. | • Trace the available voltage to the horn.<br>• A breakdown in any one of these components will cause the alarm not to function. Replace the faulty component(s). |
| • Lift cylinder drifts down. | • Counterbalance valve cartridge dirty or faulty.<br>• Cylinder packing is damaged. | • Clean, repair or replace the counterbalance valve.<br>• Replace cylinder packing. |
| • No hydraulic pump output | • Water in hydraulic fluid.<br>• Improper oil viscosity.<br>• Faulty pump stroke valve.<br>• Hydraulic fittings loose or ports open.<br>• Pump cam bearing failure.<br>• Broken pump drive shaft.<br>• Compensator valve malfunction.<br>• Fluid leaks. | • Drain and flush hydraulic system.<br>• Use correct fluid. See Lubrication Chart.<br>• Check solenoid operation.<br>• Close ports and tighten fittings. Drain and flush hydraulic system.<br>• Replace pump.<br>• Check for broken pump drive shaft and replace if broken.<br>• Check for improper compensator adjustment and correct adjustment or replace valve.<br>• Check for circuit leakage and fluid at pump inlet. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Low hydraulic pump output. | • Low pressure. | • Check and adjust for correct pressure if necessary. |
| | • Component failure. | • Check for compensator valve, seat, spring or packing failure and replace if damaged. |
| | | • Check for worn or scored pistons and bores; replace if damaged. |
| | | • Check for broken discharge valve or spring; replace if damaged. |
| | | • Check for restricted inlet or insufficient inlet fluid. |
| • Hydraulic functions slow. | • Low hydraulic pump pressure. | • Check and adjust for correct pressure if necessary. |
| | • Hydraulic high pressure filter. | • Check for plugged hydraulic high pressure filter; replace filter element. |
| | • Pump component failure. | • Check for compensator valve, seat, spring or packing failure and replace if damaged. |
| | • Plugged orifice in pump. | • Clean orifice. |
| | • Valve spool not completely shifting. | • Check/ clean valve spool. |
| • Slow hydraulic pump response. | • High pressure filter. | • Check for plugged high pressure filter. |
| • Excessive hydraulic pump pressure. | • Improper compensator adjustment. | • Adjust compensator valve and replace if necessary. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Function chatter. | • Hydraulic fluid low. | • Check for sufficient inlet fluid and add fluid. |
| | • Hydraulic tank not pressurized. | • Check hydraulic tank cap. |
| | • Broken pump components. | • Check for sticking pump pistons; replace if necessary.<br>• Check for broken discharge valve or spring; replace if necessary.<br>• Check for broken inlet valve; replace if necessary.<br>• Check for charge system leakage.<br>• Check for pump suction air leak. |
| • Hydraulic pump and fluid line vibration. | • Component failure. | • Check for broken discharge valve or spring; replace if damaged.<br>• Check for leaking or broken inlet valve; replace if damaged. |
| • Hydraulic pump shaft seal failure. | • High pressure. | • Check for overpressurized seal drain line; reduce pressure and replace seal.<br>• Check for plugged case drain line. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Hydraulic pump noise or squeal. | • Low pressure. | • Check for low deadhead pressure and adjust for correct pressure. |
| | • Component failure. | • Check for compensator valve, seat, spring or packing failure and replace if damaged. |
| | | • Check for leaking inlet valve; replace if damaged. |
| | | • Check for air leak at inlet connections. |
| | | • Check for insufficient inlet fluid (cavitation). |
| • All hydraulic functions inoperable. | • Low fluid in reservoir. | • Fill to proper level. |
| | • Hydraulic pump compensator out of adjustment. | • Adjust or repair |
| | • Hydraulic pump defective. | • Repair or replace. |
| | • Faulty stroke valve. | • Repair or replace. |
| • Telescope, swing, or lift functions don't operate using ground control. | • Pendant toggle switches have no voltage. | • Check voltage available to the toggle switches. |
| | • Valve is stuck. | • Manually engage spool. |
| | • Defective counterbalance valve. | • Check counterbalance valve; replace if damaged. |
| | • Faulty coils | • Check coils for operation. |
| • Boom drifts down without lever actuated with power on or off. | • Defective counterbalance valve. | • Check counterbalance valve; replace if damaged. |
| | • Bad cylinder packing. | • Check for leaking cylinder and repack, as required. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Boom drifts down without lever activation but with power on; does not drift down with power off. | • Mechanical failure. | • Check that ground and platform boom control levers return to their neutral position. |
| • Drive function does not operate from ground. | • No voltage at toggle switch.<br>• Bad coil. | • Check voltage available to the toggle switches.<br>• Check coil for operation. |
| • No steer function from ground. | • Steer toggle switch is bad.<br>• Steer valve or valve coil.<br>• Faulty steer cylinder. | • Check voltage available to the toggle switch.<br>• Check valve engaging.<br>• Possibly plugged steer ports or damaged cylinder packing. Inspect, repair or replace steer cylinder. |
| • No drive function. | • Faulty valve coil or driver card.<br>• No hydraulic fluid flow available to the drive motors.<br>• Drive motors are damaged.<br>• Drive valve spool is stuck.<br>• Broken wire to drive coil. | • Check coil for operation. Adjust/ replace driver card.<br>• Test for available fluid flow at the drive motors.<br>• Inspect, repair or replace.<br>• Manually engage and check for proper operation. Replace if faulty.<br>• Check wire continuity. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • No lift function from platform. | • Mechanical failure. | • Check that ground and platform boom control levers return to their neutral position. |
| | • Lift spool valve stuck. | • Manually engage lift (hoist) spool and check for operation. |
| | • Defective counterbalance valve. | • Check counterbalance valve for foreign material or internal damage; replace if damaged. |
| | • Faulty cylinder. | • Plugged lines, cylinder ports or damaged cylinder packings. Inspect, repair or replace cylinder. |
| | • Pump not coming on stroke. | • Check pump stroke circuit. |
| | • Faulty valve coil or driver card. | • Check coil for operation. Adjust/ replace driver card. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • No extend or retract function from platform. | • Spool valve stuck. | • Manually engage spool and check for proper operation. Replace if faulty. |
| | • Mechanical failure. | • Check that ground and platform boom control levers return to neutral position. |
| | • Pressure reducing valve possibly leaking to tank. | • Inspect, clean and retest. Replace if faulty. |
| | • Defective counterbalance valve. | • Check counterbalance valve for foreign material or internal damage; replace if damaged. |
| | • High pressure filter dirty. | • Check for a dirty high pressure filter; replace if dirty. |
| | • Faulty valve coil or driver card. | • Check coil for operation. Adjust/ replace driver card. |
| • No swing function from platform. | • Spool valve stuck. | • Manually engage swing spool and check for proper operation. Replace if faulty. |
| | • Faulty valve coil or driver card. | • Check coil for operation. Adjust/ replace driver card. |
| • Swing motor will not run in either direction. | • Mechanical malfunction. | • Check for an obstruction between the pinion gear and swing bearing; remove the obstruction. |
| | | • Swing gearbox worm gear is broken; replace it. |
| | | • Swing motor shaft is broken or seized; replace the swing motor. |
| | • Counterbalance failure. | • Check for operation. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Swing worm gear failure. | • Excessive side loading of boom. | • Check for excessive side loading of boom; correct the situation and replace rotation bearing if teeth damaged. |
| | • Unit throttling not being used, causing instant on and off of the swing motor. | • Check that the foot pedal is depressed before the lever is activated. |
| • Platform will not react to platform rotate control movement. | • Double pilot operated check valve (relief valve). | • Install valve correctly. Check the valve cartridge and replace if necessary. |
| | • Valve spool leakage. | • Check for internal leakage of the valve spool; replace. |
| | • Mechanical malfunction. | • If platform rotates only in one direction, check for physical constraints or foreign material restricting platform rotation; remove foreign material. |
| | • Plugged valve orifice. | • Clean orifice. |
| • Platform rotate selector valve body cracked or blown body seal. | • Excessive system pressure. | • Check that there is no back pressure on the return port. Check that inlet and return hoses are connected. |
| | • Blocked hoses. | • Check for blocked or partially blocked return hoses. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Platform does not level properly (platform drifting). | • Damaged parts. | • Check for damaged parts such as bent pins or elongated pin holes; replace damaged parts. May need to replace slave cylinder. |
| | • Defective counterbalance valve. | • Check counterbalance valve for foreign material or internal damage; replace if damaged. |
| | • Defective double pilot operated check valve. | • Repair or replace as necessary. |
| • Platform level selector valve body cracked or blown body seal. | • Excessive system pressure. | • Check that there is no back pressure on the return port. Check that inlet and return hoses are connected. |
| | • Blocked hoses. | • Check for blocked or partially blocked return hoses. |
| • Unit will not steer; all other functions operate. | • Steer cylinder may not be mechanically connected to steering linkage. | • Check for disconnected, binding or damaged steering linkage; connect or replace steering linkage as necessary. |
| | • Steering directional control valve. | • The steering directional control valve may not be shifting. The valve spools may be stuck. Remove valve and inspect, clean, repair or replace as needed. |
| | • Faulty steer coils. | • Check steer coils. |
| | • Faulty steer switch. | • Check steer switch. |
| | • Faulty cylinder packing. | • Replace packing. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Steer selector valve body cracked or blown body seal. | • Excessive system pressure. | • Check that there is no back pressure on the return port. Check that inlet and return hoses are connected. |
| | • Blocked hoses. | • Check for blocked or partially blocked return hoses. |
| • Wheel drive motor failure. | • Contaminated hydraulic fluid. | • Check for contamination of hydraulic fluid; drain, flush system and replace with the correct grade of hydraulic fluid. |
| | • Wheel drive motor component failure. | • Replace the motor. If one motor failed, internal loose or broken pieces will eventually flow into the opposite motor causing that motor to fail; unless lines are properly cleaned. Drain, flush system and replace hydraulic fluid after replacing broken component. |
| | • Wheel bearing failure. | • Check for proper installation of wheel bearing. |
| | • Machine has been towed with drive motor engaged. | • Do not tow the machine if not equipped with the tow package. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • Low speed drive valve inoperative in low speed drive mode only. | • Faulty switch. | • Check switch continuity. |
| • Unit will not go into high speed drive with boom retracted and lowered. | • High pressure filter dirty.<br>• Boom limit switches faulty or broken limit switch arm.<br>• Faulty switch. | • Replace filter element.<br>• Check wiring or replace switches.<br>• Check switch continuity. |

# TROUBLESHOOTING CHART (CONTINUED)

| Problem | Probable Cause | Solution |
|---|---|---|
| • No jib function. | 1. Loose wires on Y-axis driver board.<br>2. Driver board out of adjustment or faulty board.<br>3. Jib spool valve stack.<br>4. Holding valves not operating properly.<br>5. Faulty cylinder. | 1. Tighten Y-axis wires on driver board.<br>2. Adjust driver board to specifications or replace faulty board.<br>3. Manually engage jib spool and check for operation.<br>4. Remove, clean, inspect, replace and test unit operation.<br>5. Possibly plugged lines, cylinder ports or damaged cylinder packings. Inspect, repair or replace cylinder. |
| • Jib cylinder drifts down. | 1. Holding valve cartridge dirty or faulty.<br>2. Cylinder packing is damaged. | 1. Clean, repair or replace the holding valve.<br>2. Replace cylinder packing. |

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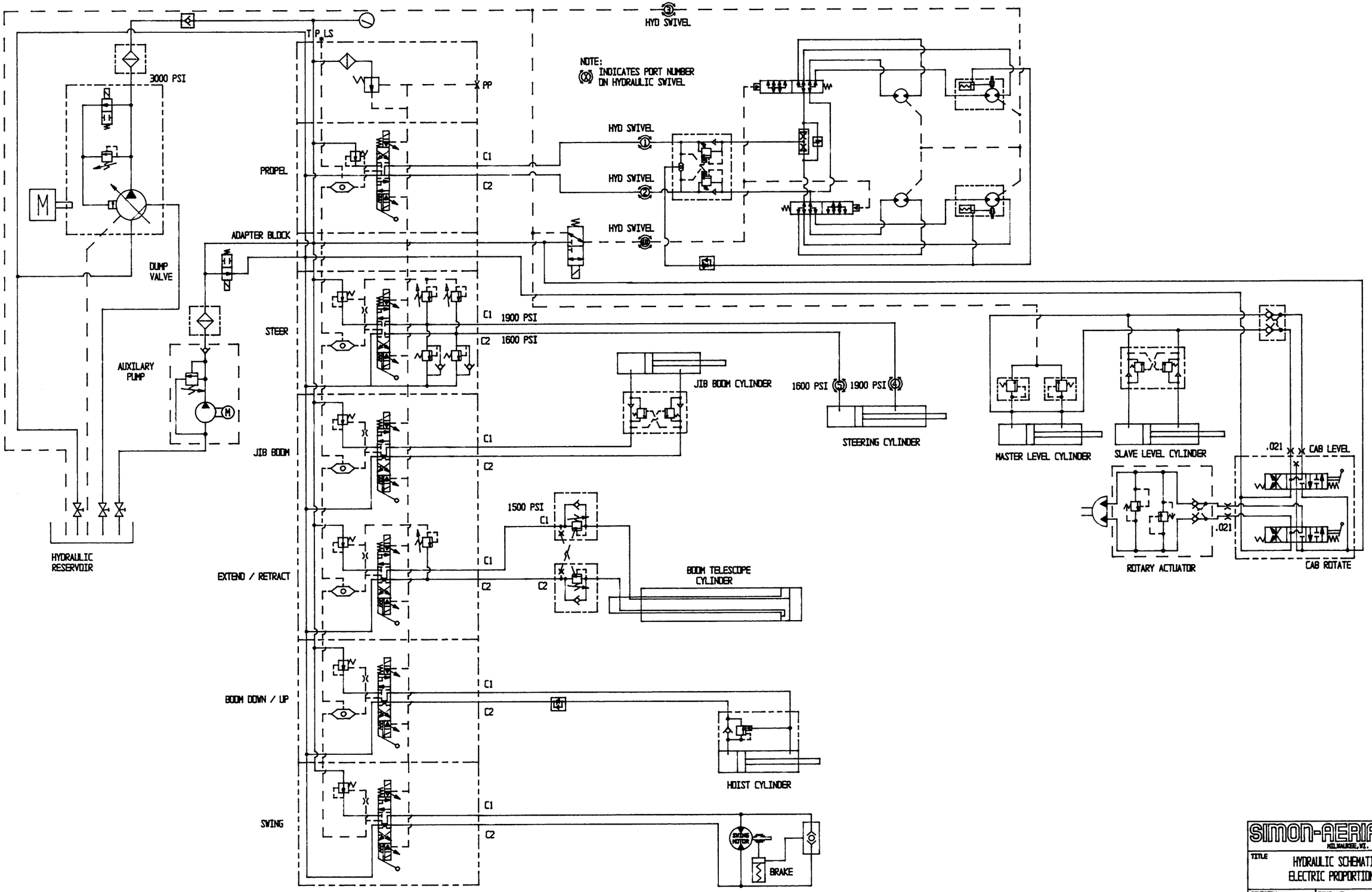
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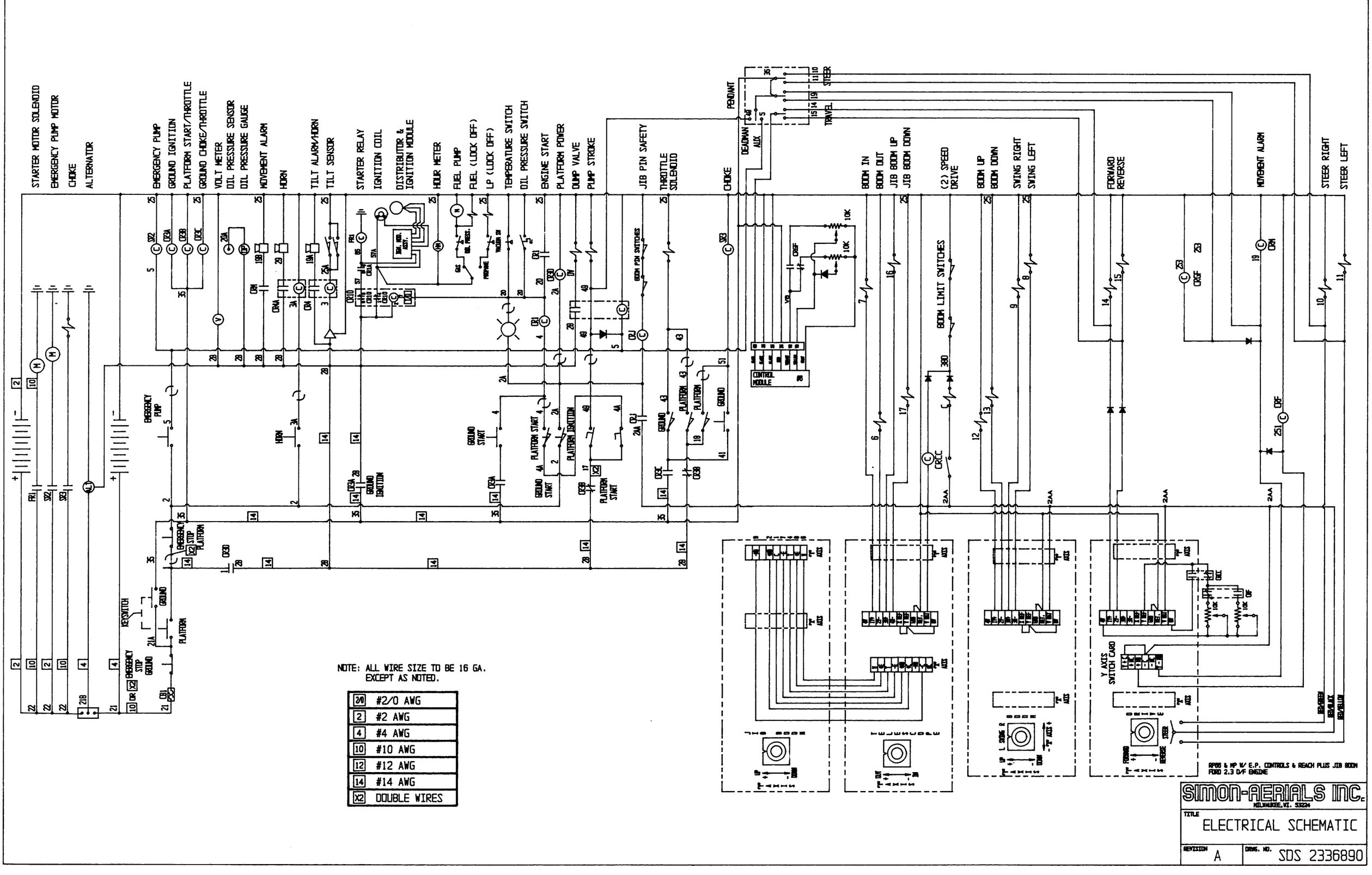



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ELECTRIC PROPORTIONAL

REVISION:

DRWG. NO. SDS 2319990




NOTE: ALL WIRE SIZE TO BE 16 GA.
EXCEPT AS NOTED.

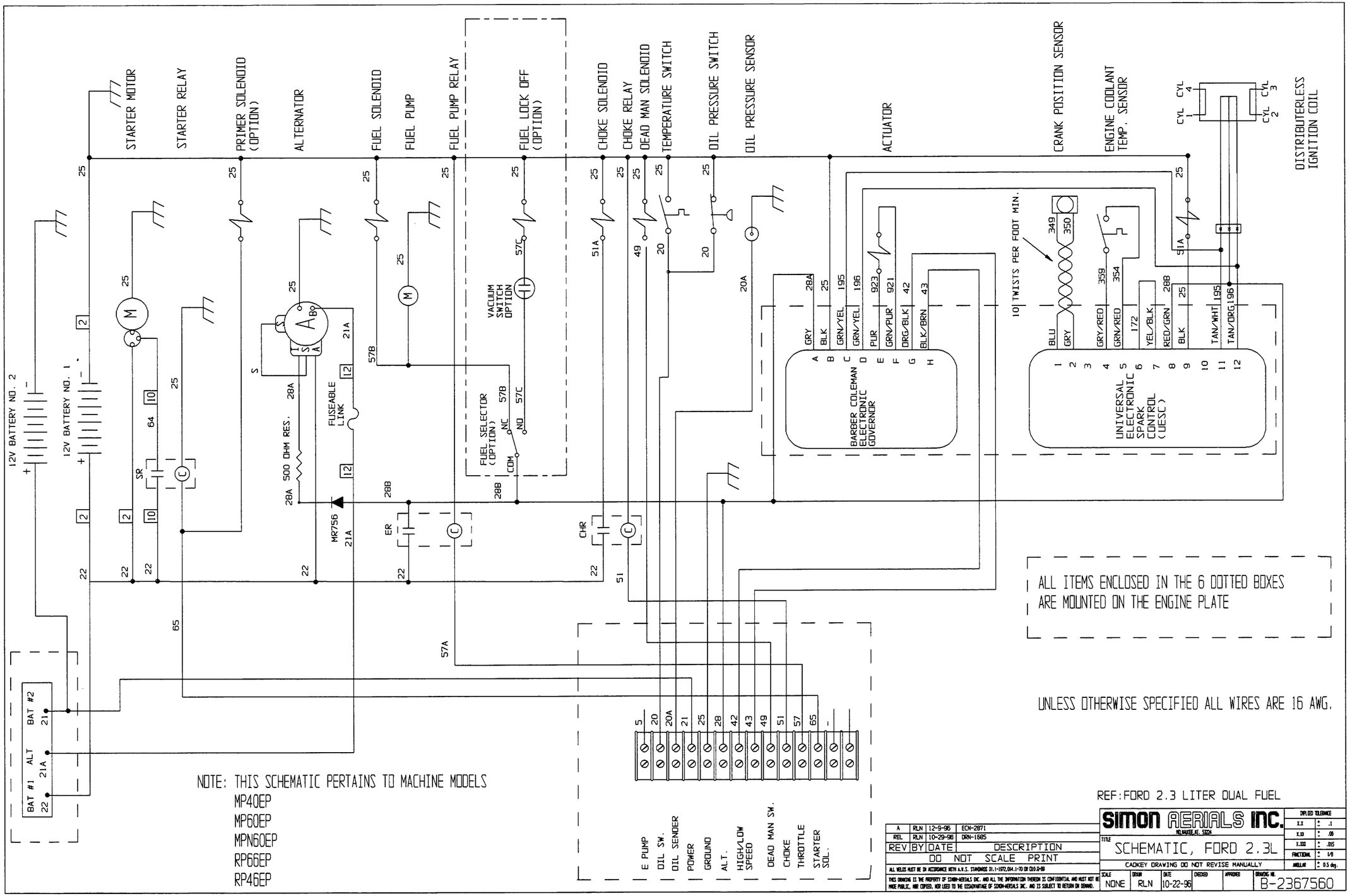
| | |
|---|---|
| 20 | #2/0 AWG |
| 2 | #2 AWG |
| 4 | #4 AWG |
| 10 | #10 AWG |
| 12 | #12 AWG |
| 14 | #14 AWG |
| X2 | DOUBLE WIRES |

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REVISION: A

DRWG. NO.: SDS 2336890




| REV | BY | DATE | DESCRIPTION |
|---|---|---|---|
| A | RLN | 12-9-96 | ECN-2871 |
| REL | RLN | 10-29-96 | DRN-1685 |

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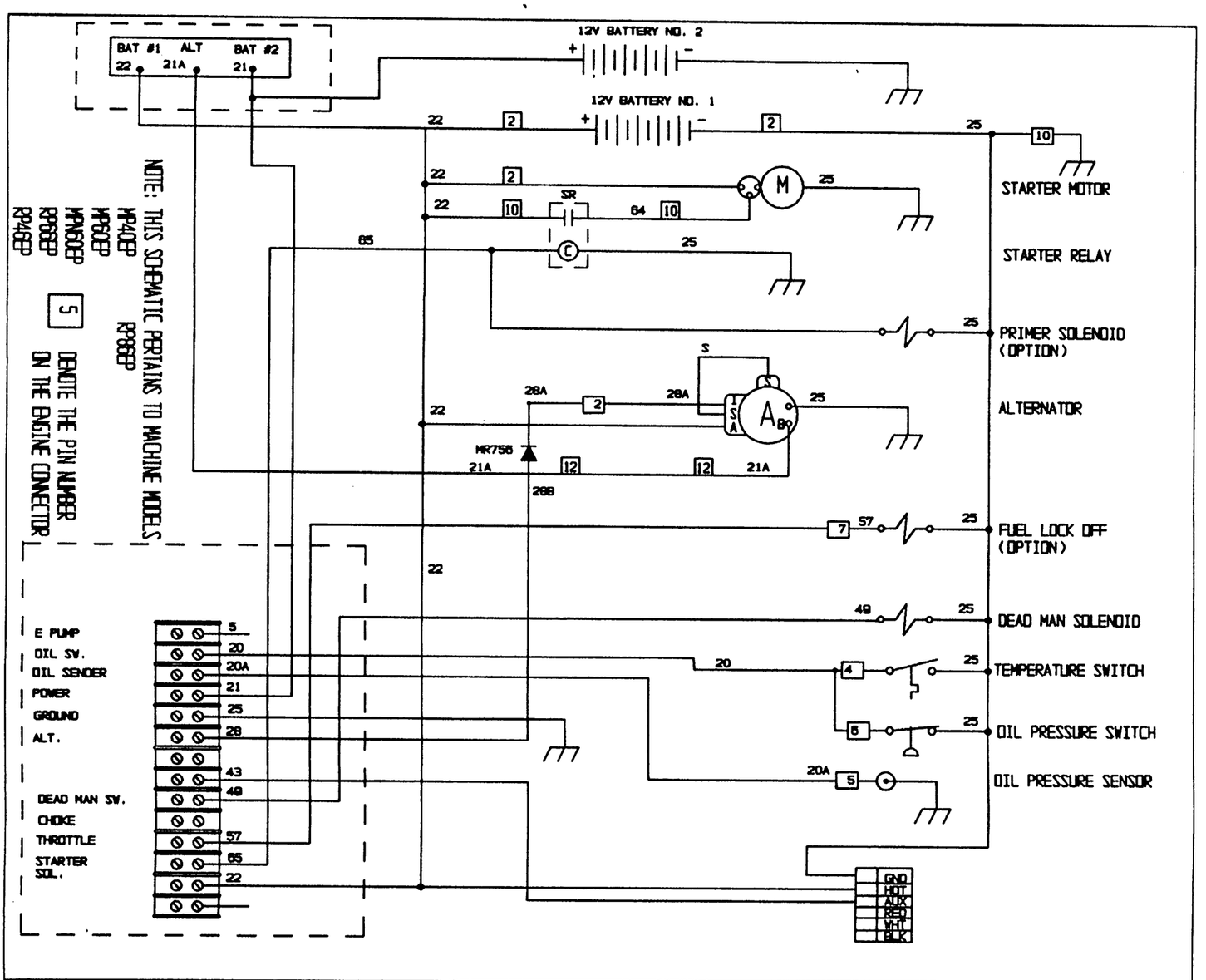
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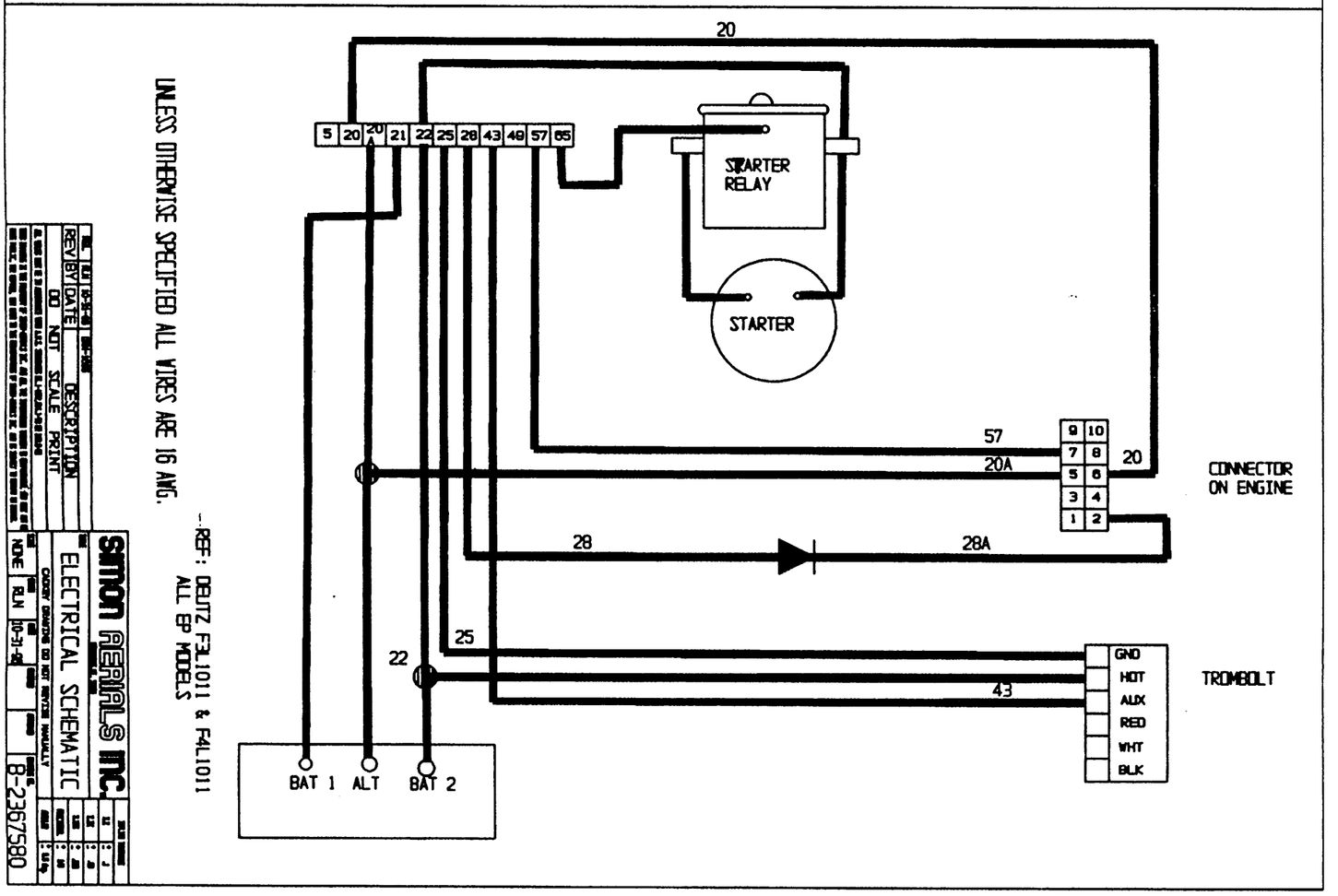
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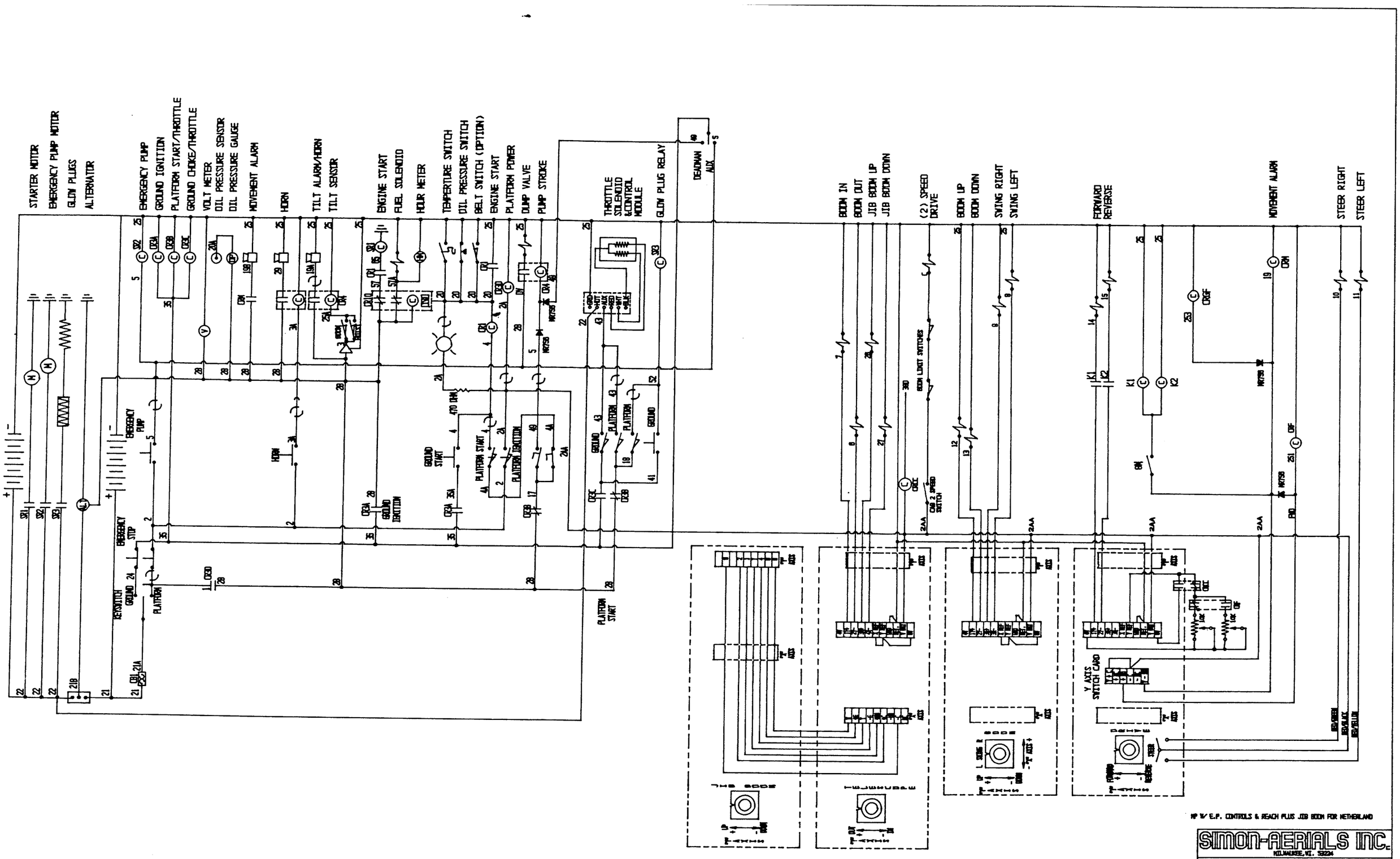
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| NONE | RLN | 10-22-96 | | | B-2367560 |

| UNLESS TOLERANCE | |
|---|---|
| X.X | ± .1 |
| X.XX | ± .03 |
| X.XXX | ± .015 |
| FRACTIONAL | ± 1/8 |
| ANGULAR | ± 0.5 deg. |


12V BATTERY NO. 2
BAT #1 ALT BAT #2
22 21A 21
12V BATTERY NO. 1
STARTER MOTOR
STARTER RELAY
PRIMER SOLENOID (OPTION)
ALTERNATOR
FUEL LOCK OFF (OPTION)
DEAD MAN SOLENOID
TEMPERATURE SWITCH
OIL PRESSURE SWITCH
OIL PRESSURE SENSOR
MR756
E PUMP
OIL SW.
OIL SENDER
POWER
GROUND
ALT.
DEAD MAN SW.
CHOKE
THROTTLE
STARTER SOL.
GND
HOT
AUX
RED
WHT
BLK
NOTE: THIS SCHEMATIC PERTAINS TO MACHINE MODELS
RP40EP
RP50EP
RP60EP
RP66EP
RP86EP
DENOTE THE PIN NUMBER ON THE ENGINE CONNECTOR


UNLESS OTHERWISE SPECIFIED ALL WIRES ARE 16 AWG.
- REF: DEUTZ F3L1011 & F4L1011 ALL EP MODELS
STARTER RELAY
STARTER
CONNECTOR ON ENGINE
TROMBOLT
BAT 1 ALT BAT 2
GND
HOT
AUX
RED
WHT
BLK
ELECTRICAL SCHEMATIC
SIMON AERIALS INC.
B-2367580



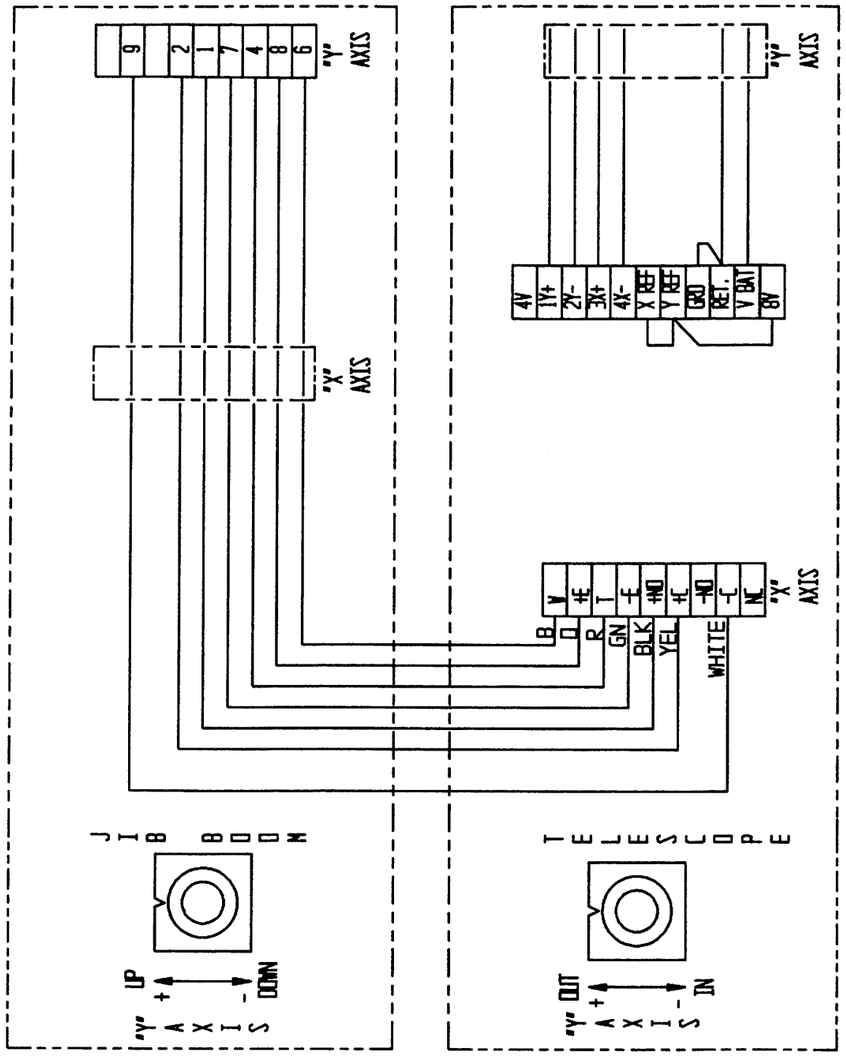

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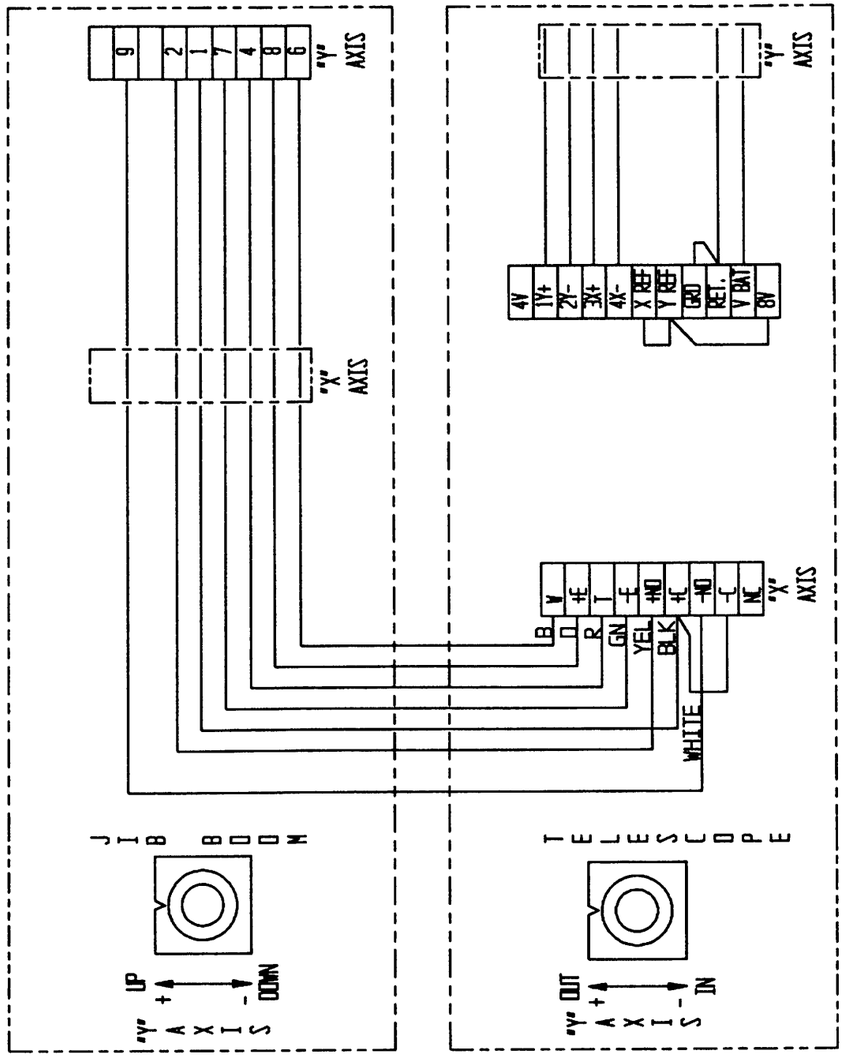
TITLE
ELECTRICAL SCHEMATIC

REVISION

DWG. NO.
D-2356870




CURRENT WIRING




NEW WIRING

THIS WIRING CHANGE MUST BE DONE WITH EXTEND/RETRACT JOYSTICK REPLACEMENT

REF: RP46, RP66, RP120

WIRING CHANGES ARE AS FOLLOWS:

1. MOVE YEL WIRE TO NO+
2. MOVE BLK WIRE TO C+
3. MOVE WHITE WIRE TO NO-
4. ADD JUMPER FROM C+ TO C-

| REL | JTS | 12/16/96 | ECN-02878 |
|---|---|---|---|
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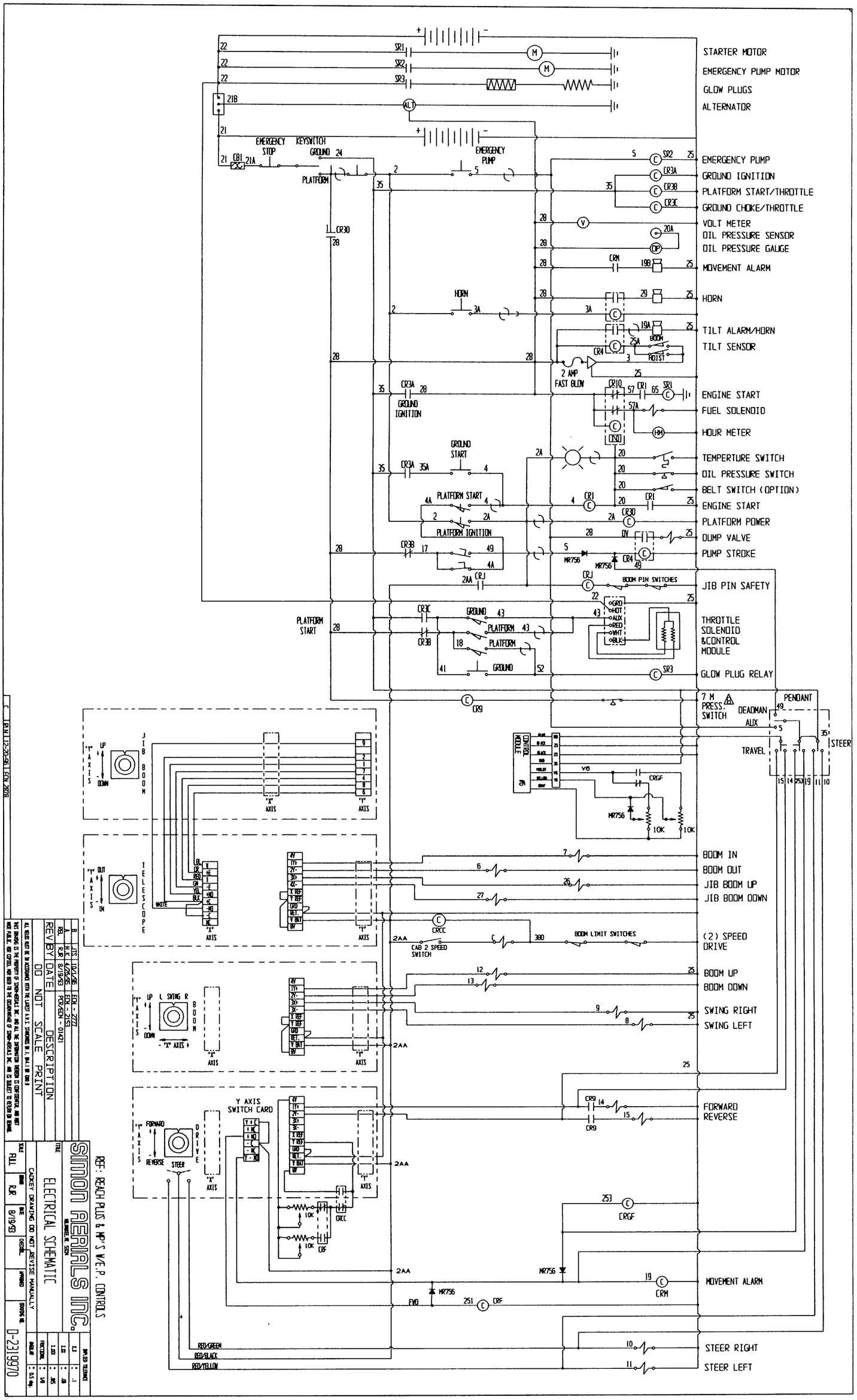
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| IMPLIED TOLERANCE | |
|---|---|
| X.X | ± .1 |
| X.XX | ± .06 |
| X.XXX | ± .015 |
| FRACTIONAL | ± 1/8 |
| ANGULAR | ± 0.5 deg. |




REF: REACH PLUS & HP'S W.E.P. CONTROLS

SIMON AERIALS INC.

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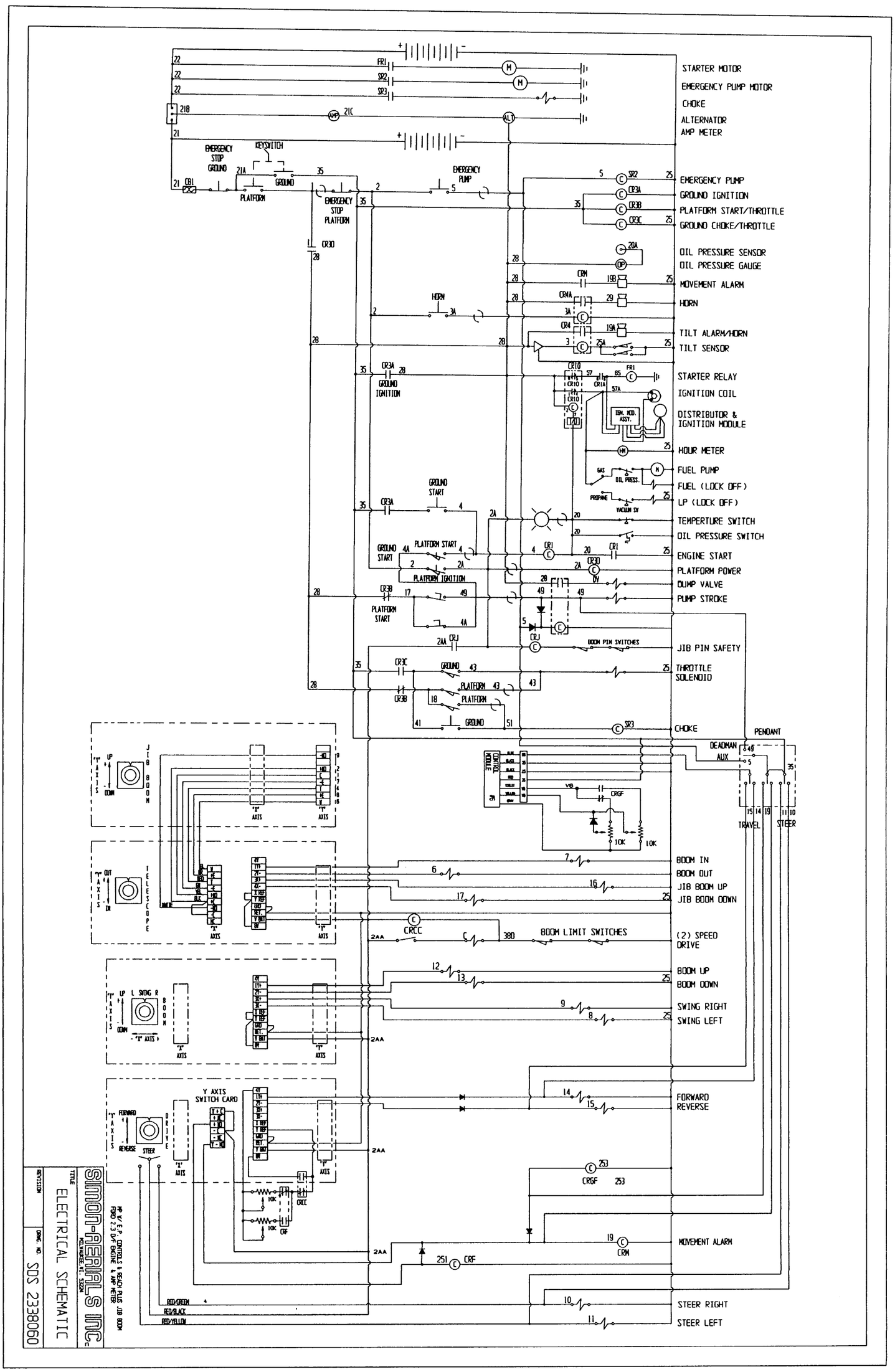
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|---|---|---|---|
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| A | H.K. | 4/28/95 | ECN - 2153 |
| REL | R.P. | 8/19/93 | PRO-ECN - 01421 |

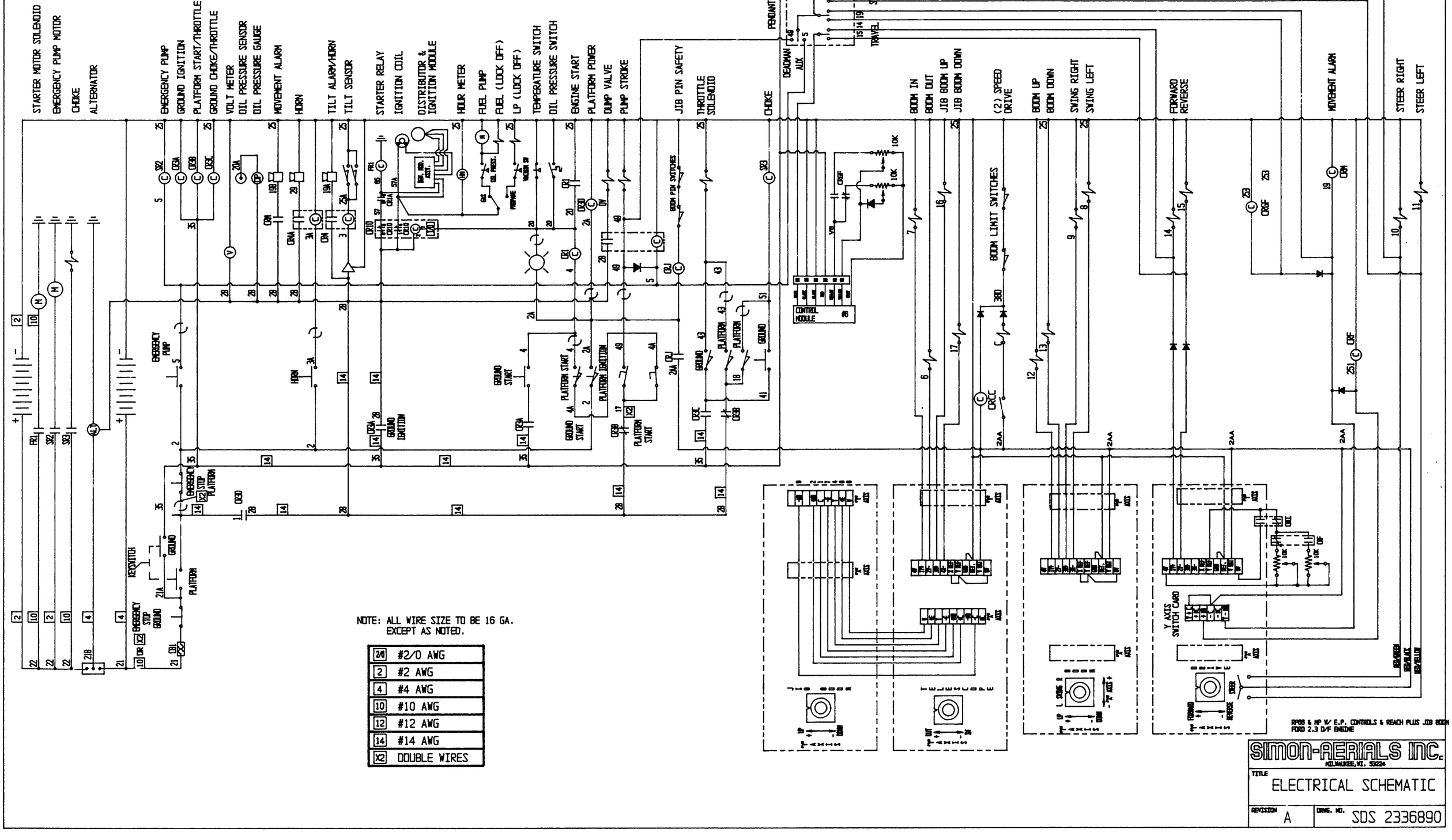
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SCALE: FULL | DRAWN: R.P. | DATE: 8/19/93 | MODEL | APPROVED | SERVICE NO.

0-2319970

DRAWING TOLERANCE: .X ± .1 | .XX ± .03 | .XXX ± .005 | ANGLE ± 0.5°


STARTER MOTOR
EMERGENCY PUMP MOTOR
CHOKE
ALTERNATOR
AMP METER
EMERGENCY PUMP
GROUND IGNITION
PLATFORM START/THROTTLE
GROUND CHOKE/THROTTLE
OIL PRESSURE SENSOR
OIL PRESSURE GAUGE
MOVEMENT ALARM
HORN
TILT ALARM/HORN
TILT SENSOR
STARTER RELAY
IGNITION COIL
DISTRIBUTOR & IGNITION MODULE
HOUR METER
FUEL PUMP
FUEL (LOCK OFF)
LP (LOCK OFF)
TEMPERTURE SWITCH
OIL PRESSURE SWITCH
ENGINE START
PLATFORM POWER
DUMP VALVE
PUMP STROKE
JIB PIN SAFETY
THROTTLE SOLENOID
CHOKE
PENDANT
DEADMAN
AUX
TRAVEL
STEER
BOOM IN
BOOM OUT
JIB BOOM UP
JIB BOOM DOWN
(2) SPEED DRIVE
BOOM UP
BOOM DOWN
SWING RIGHT
SWING LEFT
FORWARD
REVERSE
MOVEMENT ALARM
STEER RIGHT
STEER LEFT
BOOM LIMIT SWITCHES
Y AXIS SWITCH CARD
RED/GREEN
RED/BLACK
RED/YELLOW
SIMON-AERIALS INC.
MILWAUKEE, WI. 53224
TITLE
ELECTRICAL SCHEMATIC
DRWG. NO.
SDS 2338060
REVISION
HP W.E.P. CONTROLS & BELOW PLUS JIB BOOM
FORD 2.3 DI-F ENGINE & AMP METER




NOTE: ALL WIRE SIZE TO BE 16 GA.
EXCEPT AS NOTED.

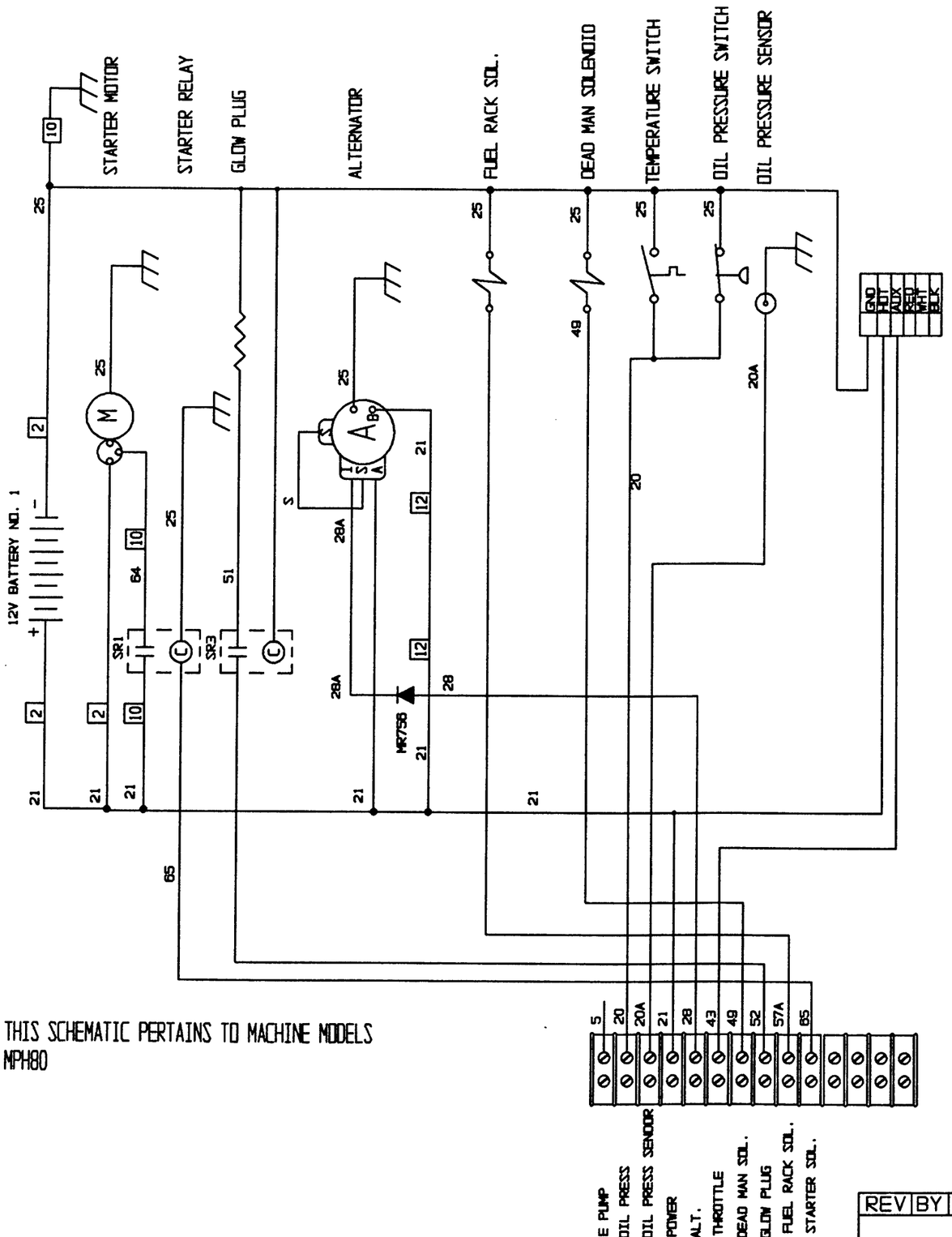
| | |
|---|---|
| 2/0 | #2/0 AWG |
| 2 | #2 AWG |
| 4 | #4 AWG |
| 10 | #10 AWG |
| 12 | #12 AWG |
| 14 | #14 AWG |
| X2 | DOUBLE WIRES |

SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE: ELECTRICAL SCHEMATIC

REVISION: A

DRWG. NO.: SDS 2336890




NOTE: THIS SCHEMATIC PERTAINS TO MACHINE MODELS
MPH80

| REV | BY | DATE | DESCRIPTION |
|---|---|---|---|
| A | RLN | 2-5-97 | ECN-2981 |
| REL | RLN | 1-2-97 | ECN-2910 |

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|---|---|---|---|---|---|
| NONE | RLN | 1-2-97 | | | B-2370400 |

| APPLIED TOLERANCE | |
|---|---|
| X.X | ± .1 |
| X.XX | ± .05 |
| X.XXX | ± .015 |
| FRACTIONAL | ± 1/8 |
| ANGULAR | ± 0.5 deg. |

# PLATFORM BOX

PLATFORM BOARD

P1 DESIGNATES RIGHT 9 PIN CONNECTOR H010-9-10P
P2 DESIGNATES LEFT 9 PIN CONNECTOR H010-9-9SP

P1,J SPARE

# GROUND BOX

GROUND CONTROLLER BOARD

OIL PRESSURE GAUGE
VOLT METER
HOUR METER

GROUND CONTROL PANEL LIGHTS

CHOKE/GLOW PLUG
GROUND THROTTLE
START
KEYSWITCH PLATFORM
GROUND

20 AMP. CIR. BREAKER
20 AMP. AUTO RESET CIR. BREAKER/RELAY

+12 VDC FROM BAT. (7)
+12 VDC TO B. STOP LT.
+12 VDC FROM B STOP ZT
+12 VDC TO CONT.
+12 VDC FROM PLAT. (@ 37)
+12 VDC FROM PLAT. (@ 38)
+12 VDC TO PLAT. (@ 41)
+12 VDC TO PLAT. (@ 42)

+12VDC/SYSTEM
+12VDC/ODO-3
+12VDC/ODO-7
+12VDC/ODO-11
+12VDC/ODO-12
+12VDC/ODO-15
+12VDC/PWR-2
+12VDC/PWR-5

RS-232 TX
RS-232 RX

+12 VDC
GROUND ENGINE ON
+12VDC TO GAUGES
DATA TRANSMIT
DATA RECEIVE
GROUND START
GROUND THROTTLE
GROUND BOOM IN
GROUND BOOM OUT
GROUND BOOM UP
GROUND BOOM DOWN
GROUND SWING LEFT
GROUND SWING RIGHT
GROUND STEER LEFT
GROUND STEER RIGHT
GROUND DRIVE REV.
GROUND DRIVE FWD.
GROUND JIB UP
GROUND JIB DOWN
GROUND BOOM L. PUMP
BOOM LIMIT SWITCHES
SPARE
SPARE
CHASSIS TILT SENSOR
OIL/TEMP SWITCH
ENGINE OIL PRESSURE
GROUND
GROUND
GROUND
GROUND
STARTER RELAY
EMERGENCY PUMP
CHOKE/GLOW PLUG
LIGHTS
PUMP STROKE
SPARE
PUMP STROKE RELAY
ENGINE ON
HIGH SPEED THROTTLE
SPARE THROTTLE
MOVEMENT ALARM
HORN
HIGH SPEED DRIVE
AXLE ENABLE
STEER RIGHT
STEER LEFT
PLAT. ROTATE RIGHT
PLAT. ROTATE LEFT
PLAT. LEVEL UP
PLAT. LEVEL DOWN
DRIVE FORWARD
DRIVE REVERSE
BOOM UP
BOOM DOWN
SWING RIGHT
SWING LEFT
BOOM RETRACT
BOOM EXTENDED
JIB UP
JIB DOWN
SPARE
SPARE
STEER SELECT VALVE

2K 8W 1/2W

# NOTE: UNLESS OTHERWISE SPECIFIED: ALL DIODE ARE: MR756

ELECTRICAL SLIP RING SYMBOL

ALL SWITCHES AND CONTACTS SHOWN WITH THE MACHINE IN THE STOWED POSITION

NUMBERS IN ( ) INDICATES COLOR CODE

| ITEM | QTY | PART NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | 03753100 | MATING PLUG H010-9-09S, P2 ON RIGHT |
| 2 | 1 | 03753200 | MATING PLUG H010-9-09S, P1 ON LEFT |
| 3 | 88 | 03425100 | SOCKET (AWG-20-22-24) |
| 4 | 23' | 03555100 | (3): 4 COND. CABLE TO BOOM LIMIT SWITCH |
| 5 | 23' | 03555200 | (2): 4 COND. CABLE TO TILT SENSOR AND HORN/ENT ALARM |
| 6 | 23' | 03555700 | (2): 4 COND. SHIELD CABLE TO ELECTRICAL SLIP RING AND UNDER CARRIAGE |
| 7 | 23' | 03555300 | (4): 4 COND. SHIELD CABLE TO PLATFORM |
| 8 | 23' | 03555400 | (5): 10 COND. TO PLATFORM |
| 9 | 23' | 03555500 | (6): 10 COND. CABLE TO ENGINE |
| 10 | 23' | 03555600 | (7): 24 COND. CABLE TO VALVES, etc. |
| 11 | 23' | 03555800 | (8): 4 COND. TO OPTIONAL FLASHER LIGHT |
| 12 | 23' | 03555900 | (9): 4 COND. CABLE TO PLATFORM TILT SWITCH |
| 13 | 23' | 03555000 | (10): 2 COND. CABLE TO OPTIONAL SENSOR RING LIMIT SWITCH |
| 14 | 23' | 03555200 | (11): 2 COND. CABLE TO OPTIONAL SENSOR RING LIMIT SWITCH |

OPTIONAL GENERATOR PACKAGE

110 VAC GEN.
VL-125 VOLTAGE LIMITER (OPTION)
CM-11 CONTROL PANEL

STARTER MOTOR
STARTER MOTOR SOLENOID
EMERGENCY PUMP MOTOR
EMERGENCY PUMP
CHOKE/GLOW PLUG
HEAD/TAIL LIGHTS (OPTION)
ALTERNATOR
FUEL SOLENOID
TEMPERATURE SWITCH
OIL PRESSURE SWITCH
BELT SWITCH (OPTION)
OIL PRESSURE SENSOR

EMERGENCY STOP
PENDANT
EMERGENCY PUMP
BEACON
TELESCOPE
HOIST SWING STEER DRIVE

BOOM LIMIT SWITCHES

TILT SENSOR

PUMP STROKE
BEACON LIGHTS (OPTION)
HIGH SPEED THROTTLE SOLENOID & CONTROL MODULE

MOVEMENT ALARM
HORN
MR756

HIGH SPEED DRIVE VALVE 1
HIGH SPEED DRIVE VALVE 2
HIGH SPEED DRIVE VALVE 3 (OPTION)
STEER RIGHT
STEER LEFT
PLAT. ROTATE RIGHT
PLAT. ROTATE LEFT
PLAT. LEVEL UP
PLAT. LEVEL DOWN
DRIVE FORWARD
DRIVE REVERSE
BOOM UP
BOOM DOWN
SWING RIGHT
SWING LEFT
BOOM RETRACT
BOOM EXTENDED
JIB UP (OPTION)
JIB DOWN (OPTION)

STARTER MOTOR
STARTER RELAY
PREHEAT SOLENOID (OPTION)
ALTERNATOR
FUEL SOLENOID
FUEL PUMP
FUEL PUMP RELAY
FUEL LOCK OFF SOLENOID
CHOKE RELAY
TEMPERATURE SWITCH
OIL PRESSURE SWITCH
OIL PRESSURE SENSOR
ACTUATOR
CRANK POSITION SENSOR
ENGINE COOLANT TEMP. SENSOR
DISTRIBUTORLESS IGNITION COIL

FORD WITH BARBER COLMAN ELECTRONIC COVERNORS CONTROL

UNDER CARRIAGE WIRING

HIGH SPEED DRIVE VALVE 1
HIGH SPEED DRIVE VALVE 2
HIGH SPEED DRIVE VALVE 3 (OPTION)

BOOM SWITCHES WIRING

BOOM EXTEND
BOOM LIFT

REF: MP40, MP60, RP46, RP66 WITH ISUZU OR DEUTZ DIESEL

| REV | BY | DATE | DESCRIPTION |
|---|---|---|---|
| A | H.K. | 02-21-07 | ECN-3026 |
| REL | H.K. | 10-07-06 | DRN-1411 |
| B | H.K. | 04-05-07 | ECN-3158 |

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SIMON AERIALS INC.
KLAMATH, OR.

UNLESS OTHERWISE SPECIFIED
X.X ± .1
X.XX ± .03
X.XXX ± .010
FRACTIONAL ± 1/8
ANGULAR ± 0.5 deg.

TITLE: ELECTRICAL SCHEMATIC

CADKEY DRAWING DO NOT REVISE MANUALLY

| SCALE | DRAWN | DATE | CHECKED | APPROVED | DRAWING NO. |
|---|---|---|---|---|---|
| .75 | H.K. | 10-07-06 | | | E-2367020 |