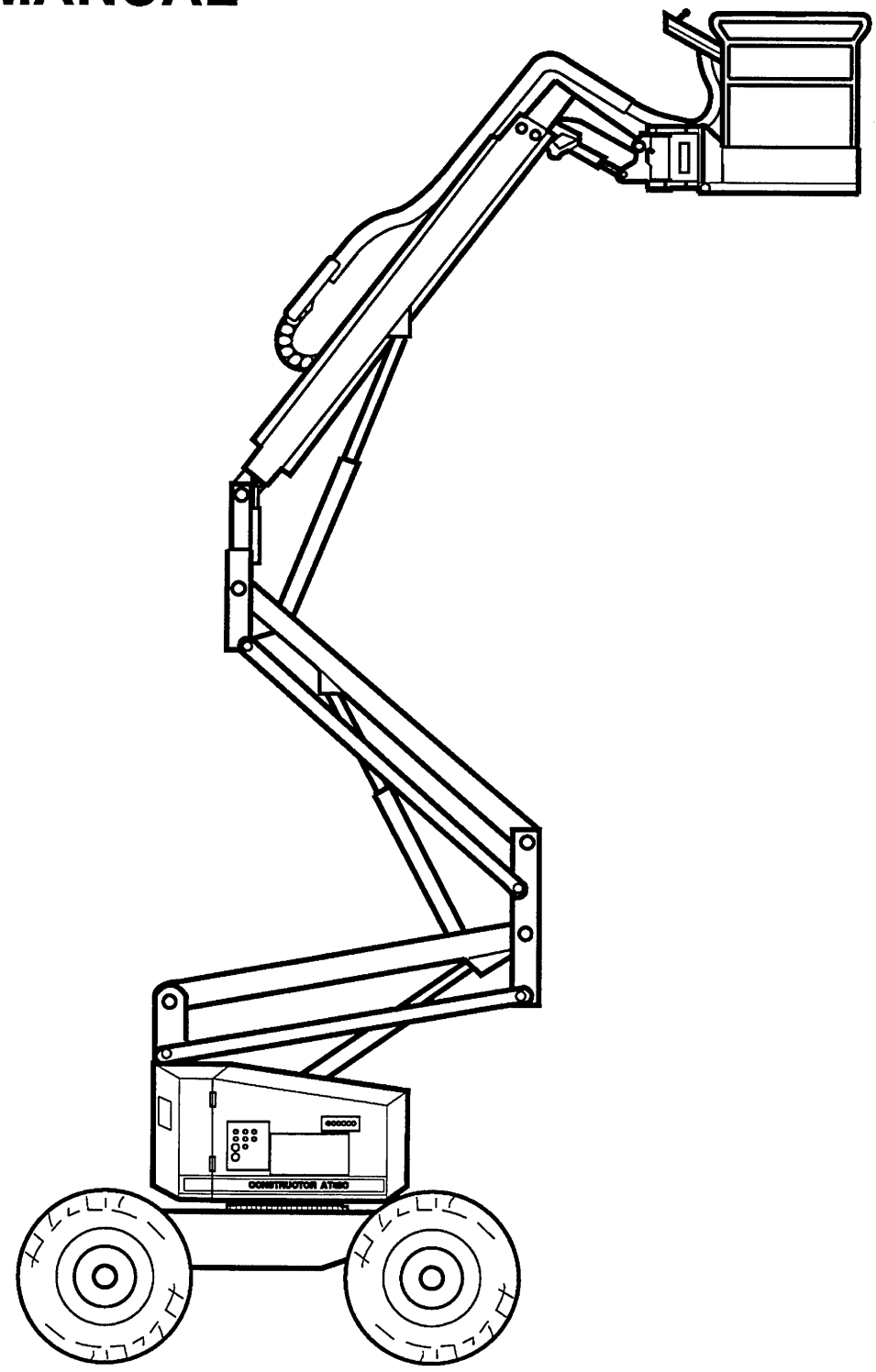
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CONSTRUCTOR
AT40C

89-444007

SIMON

SERVICE MANUAL



REVISION B

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INTRODUCTION

THE PURPOSE OF THIS MANUAL IS TO PROVIDE YOU WITH THE PROPER INSTRUCTIONS TO MAINTAIN THE SIMON AERIAL MOBILE PLATFORM. WHEN USED IN CONJUNCTION WITH THE OPERATORS, PARTS AND COMPONENT REPAIR MANUALS (PROVIDED SEPARATELY) THIS MANUAL WILL ASSIST IN MAKING ADJUSTMENTS OR REPAIRS AS NECESSARY.

ALL SIMON AERIAL MOBILE PLATFORMS ARE DESIGNED AND BUILT TO PROVIDE THE END USER WITH MANY YEARS OF SAFE, DEPENDABLE SERVICE. TO OBTAIN FULL BENEFITS FROM THIS MACHINE, 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 COMPONENT REPAIR MANUALS TO GAIN A THOROUGH UNDERSTANDING OF THE MACHINE PRIOR TO UNDERTAKING ANY REPAIRS.

SERVICE PERSONNEL AND MACHINE OPERATORS MUST UNDERSTAND AND COMPLY WITH ALL WARNING AND INSTRUCTIONAL DECALS ON THE BODY OF THE MACHINE AND CONTROL STATIONS.

MODIFICATIONS OF THIS MACHINE FROM THE ORIGINAL DESIGN ARE STRICTLY FORBIDDEN WITHOUT WRITTEN PERMISSION FROM SIMON AERIALS INC.

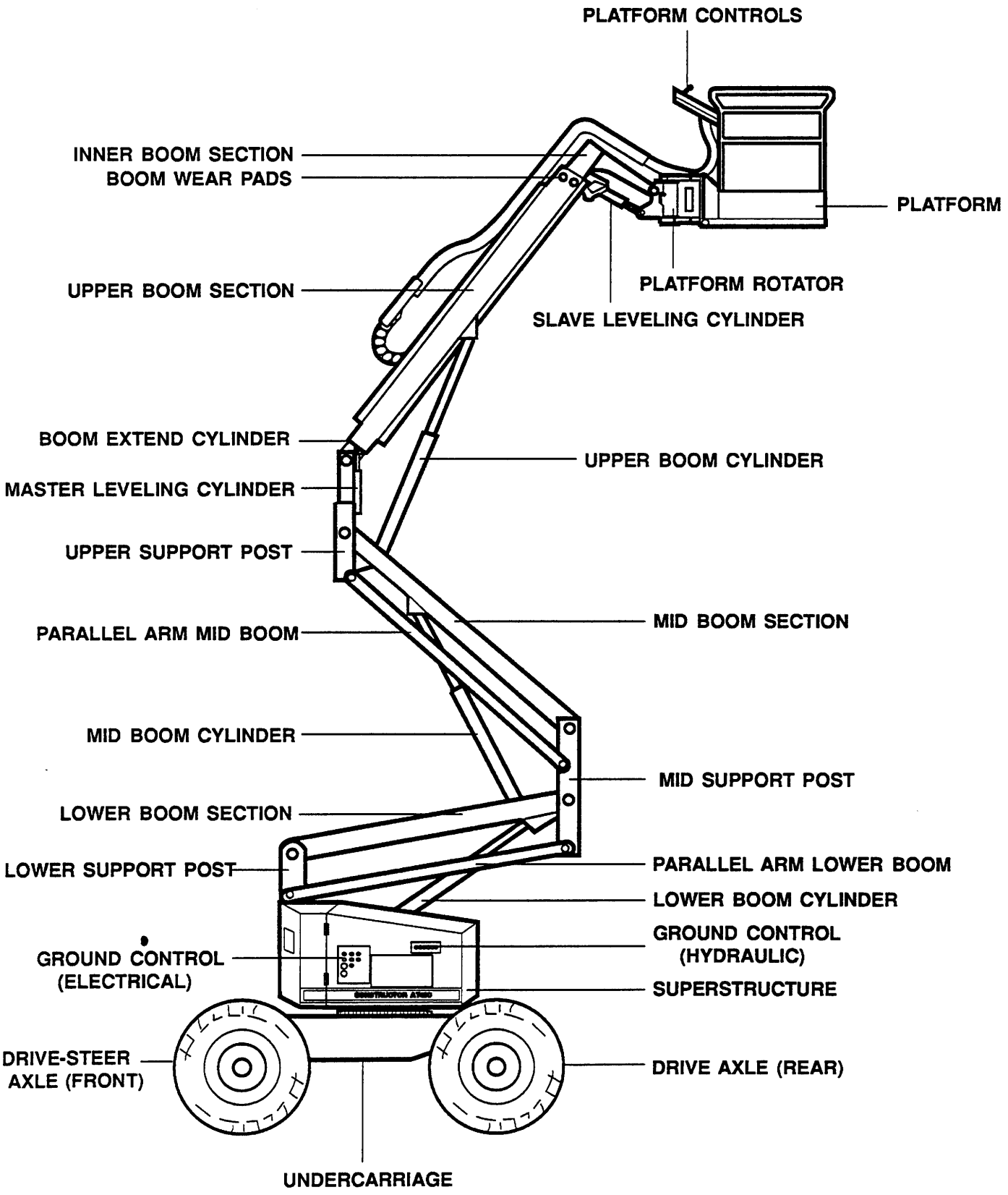
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SIMON AERIALS MANUALS ARE PERIODICALLY UPDATED TO REFLECT CHANGES THAT OCCURRED BETWEEN PRINTINGS. IT IS THEREFORE SUGGESTED THAT YOU CONTACT THE FACTORY FOR INFORMATION REGARDING THE LATEST CHANGES WHICH MAY AFFECT YOUR MACHINE.

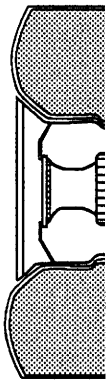
MACHINE SPECIFICATIONS
CONSTRUCTOR AT40C

WORKING HEIGHT	47 FT 6 IN. / 14.48 M
PLATFORM HEIGHT	41 FT 6 IN. / 12.65 M
HORIZONTAL OUTREACH	24 FT 6 IN. / 7.47 M
PLATFORM CAPACITY (UNRESTRICTED)	500LBS. / 227 KG
PLATFORM DIMENSIONS	60 IN. x 30 IN. / 1.52 M x .76 M
STOWED LENGTH	17 FT 3 IN. / 5.26 M
STOWED HEIGHT	7 FT 7 IN. / 2.31 M
WIDTH	7 FT 4 IN. /2.23 M
WHEELBASE	6 FT 3 IN. / 1.91 M
OUTSIDE TURNING RADIUS	16 FT / 4.87 M
INSIDE TURNING RADIUS	7 FT 3 IN. / 2.21 M
TRAVEL SPEED-STOWED	6 MPH / 9.6 KPH
TRAVEL SPEED-ELEVATED	0.5 MPH / 0.8 KPH
GROUND CLEARANCE	12 IN. / .31 M
GROSS WEIGHT	13,800 LBS / 6.169 KG
GRADEABILITY	15 °
PLATFORM ROTATION	180°
TIRES	15 / 38.5 - 16.5 LT
TIRE PRESSURE	55 PSI
HYDROSTATIC DRIVE SYSTEM OPERATING PRESSURE	4300 PSI / 297 BARS
HYDRAULIC DRIVE CONTROL PRESSURE	525 PSI / 37 BARS
HYDRAULIC LIFT OPERATING PRESSURE	2500 PSI / 178 BARS
SWING BEARING TORQUE (S/N 5000 TO 5087)	130 FT LBS.
SWING BEARING TORQUE (S/N 5088 AND UP)	220 FT LBS.
WHEEL LUG TORQUE	120 FT LBS.
SUPERSTRUCTURE ROTATION	360° NON-CONTINUOUS
POWER SYSTEM ELECTRIC	12 VOLT BATTERY
ENGINE OPTIONS	
ONAN (GAS/DUAL FUEL)	24 HP, 3600 RPM
PERKINS (DIESEL)	23.5 HP, 3600 RPM
LOMBARDINI (DIESEL)	23 HP, 3000 RPM
DEUTZ (DIESEL)	35 HP, 3000RPM

PRIMARY MACHINE COMPONENTS



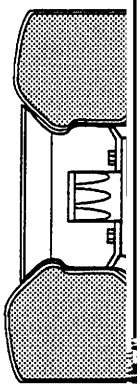
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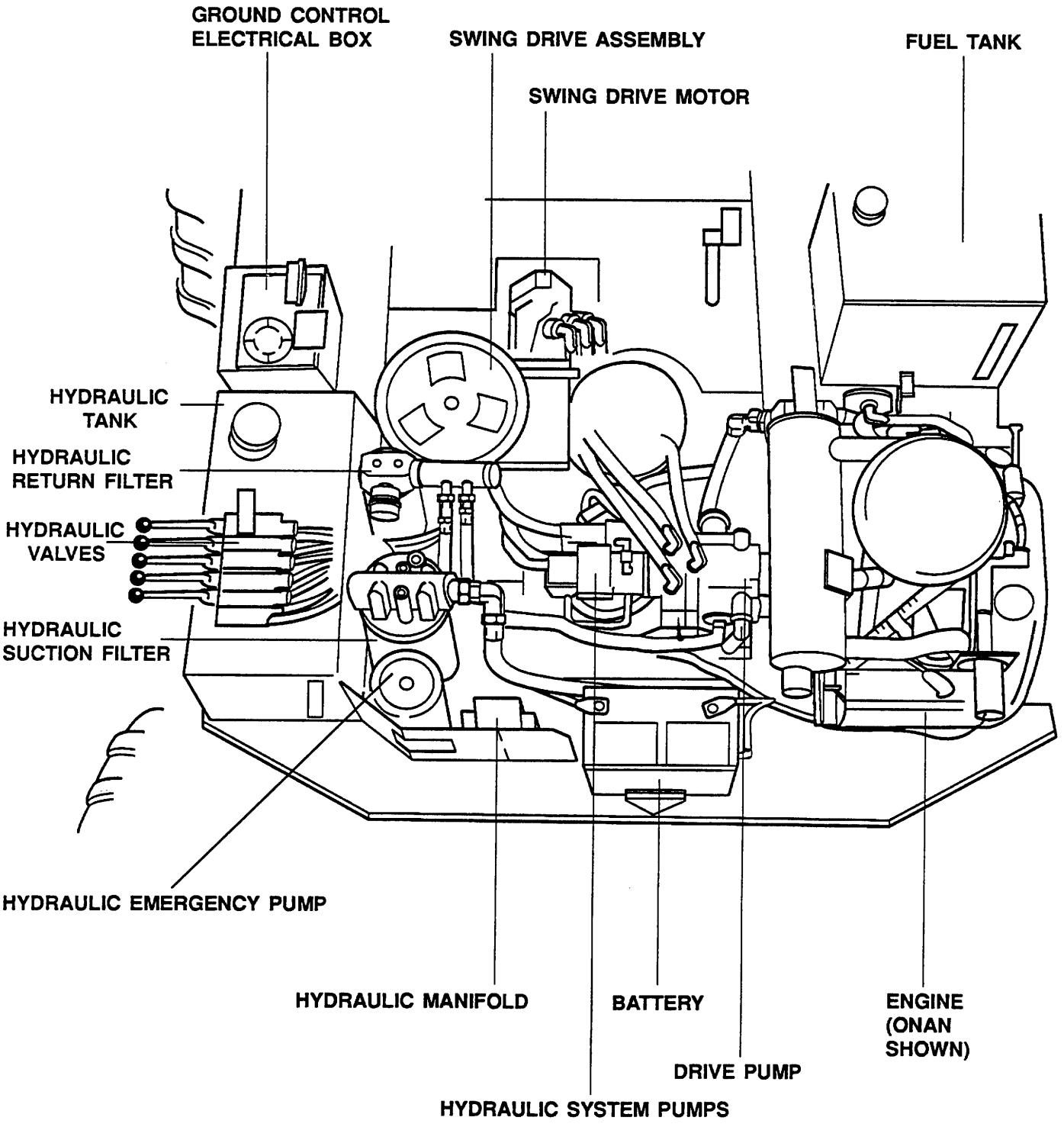
STEER CYLIND

REAR DRIVE

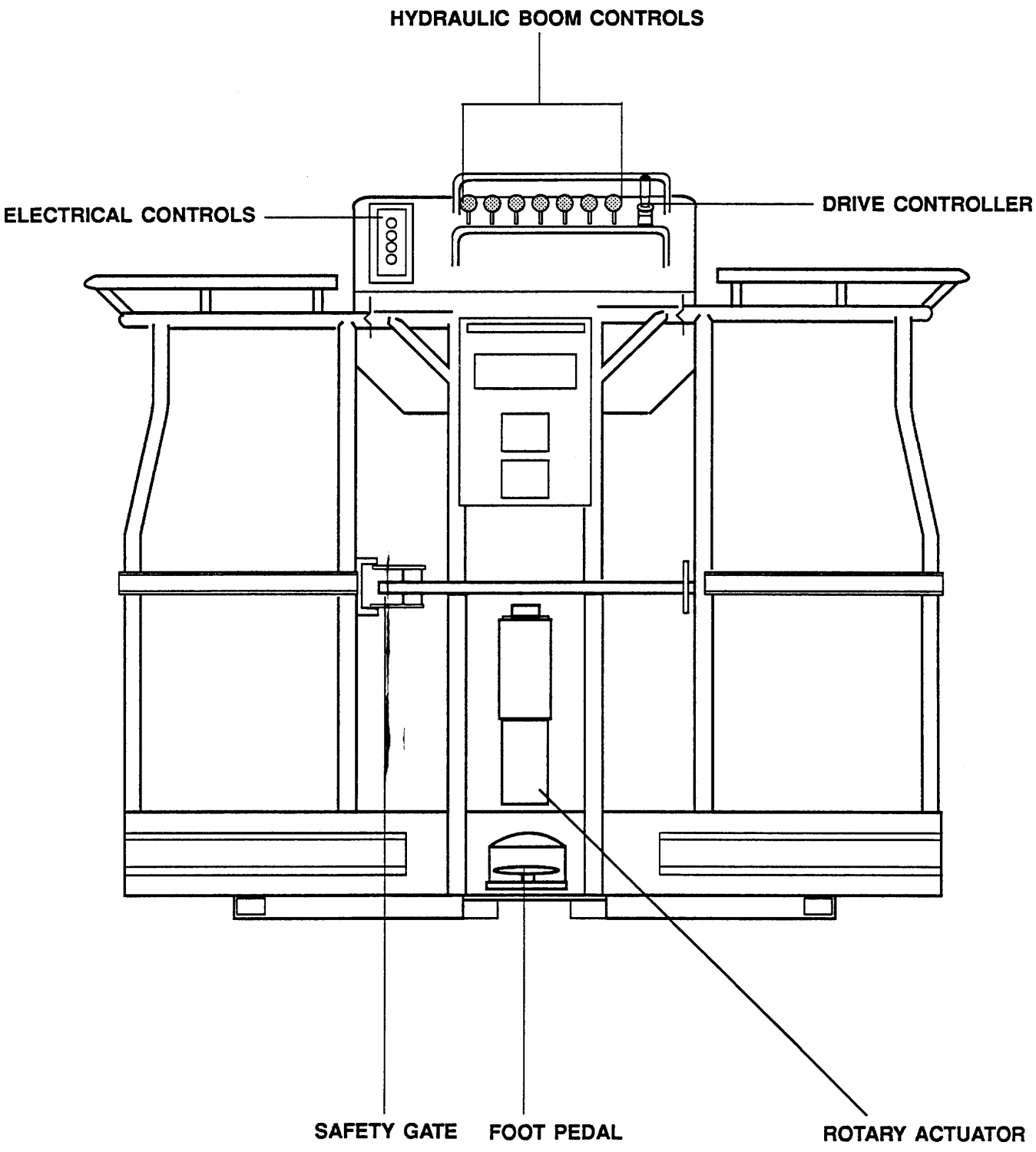
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SUPERSTRUCTURE COMPONENT LOCATOR



PLATFORM COMPONENT LOCATOR



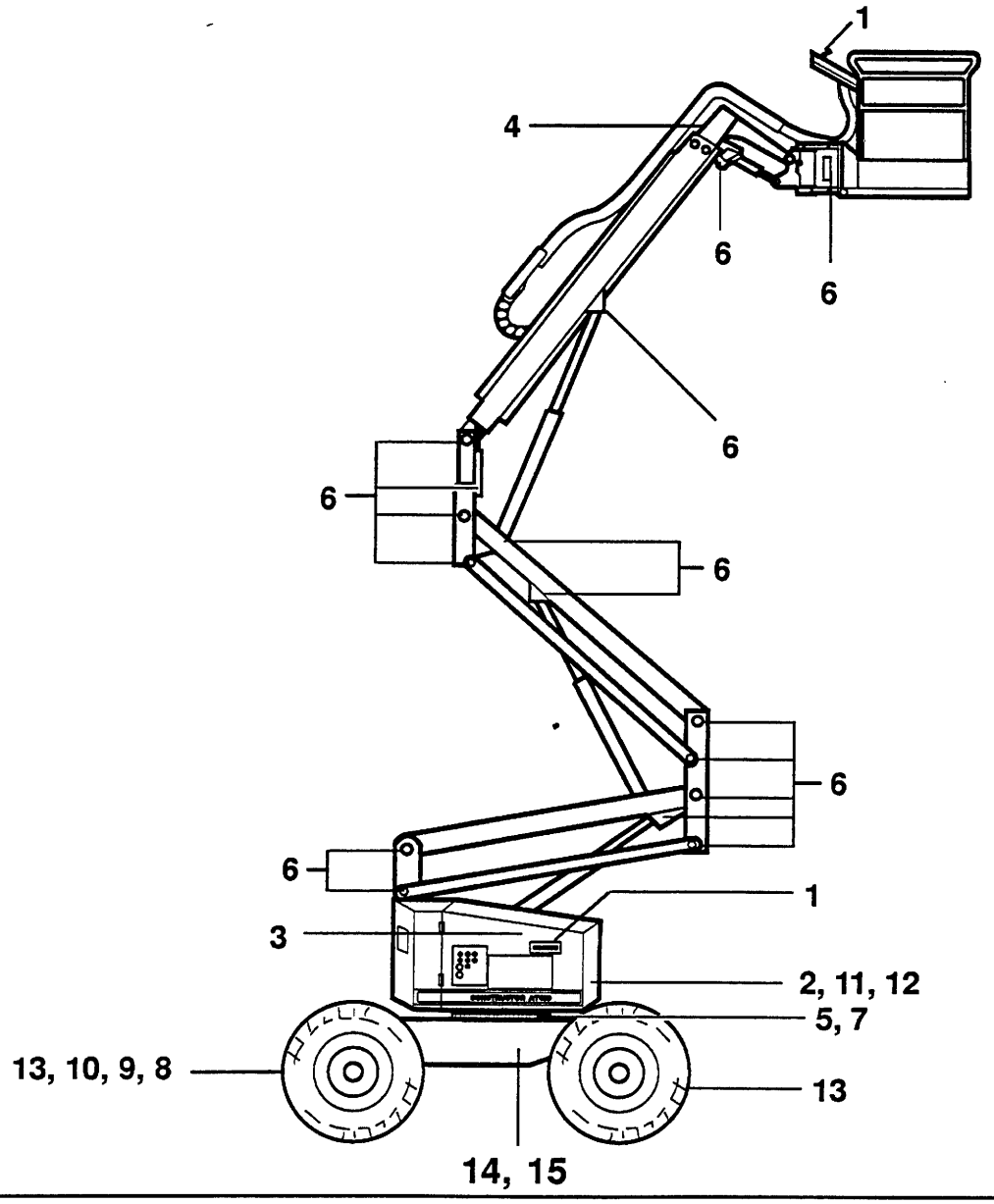
LUBRICATION CHART

NO. ON DIAGRAM	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
1	CONTROL VALVE HANDLES PIVOT PINS	WD 40 SPRAY	MONTHLY OR EVERY 100 HRS.*
2	HYDRAULIC RESERVOIR	MOBIL DTE-15 TO FULL MARK W / ALL CYLINDERS RETRACTED	CHECK DAILY ANALYZE EVERY 6 MONTHS CHANGE YEARLY
3	HYDRAULIC FILTERS	FILTER ELEMENTS	CHANGE EVERY 6 MONTHS
4	BOOM SLIDE PADS	SILICON SPRAY	MONTHLY OR EVERY 100 HRS.*
5	SWING BEARING	LUBRI PLATE 630-2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
6	PIVOT PINS	EP N.L.G.I. #2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
7	SWING BEARING GEAR TEETH	EP N.L.G.I. #2 GREASE OR DRI-LUBE	EVERY 6 MONTHS OR 500 HRS.*
8	STEERING SPINDLES	EP N.L.G.I. #2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
9	STEERING HUB BEARINGS	LUBRI PLATE 630-2 CLEAN AND REPACK	YEARLY OR EVERY 1,000 HRS.*
10	STEERING LINKAGE	EP N.L.G.I. #2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
11	SWING DRIVE GEAR BOX TOP BEARING	EP N.L.G.I. #2 PURGE OLD GREASE	CHECK BI-MONTHLY OR EVERY 200 HRS.* CHANGE EVERY 2 YEARS OR 2,000 HRS.*
12	SWING DRIVE GEAR BOX	N.L.G.I. #00 EP GREASE FILL TO PLUG	CHECK BI-MONTHLY OR EVERY 200 HRS.* CHANGE EVERY 2 YEARS OR 2,000 HRS.*

* WHICHEVER OCCURS FIRST.

LUBRICATION CHART

NO. ON DIAGRAM	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
13	DIFFERENTIAL	EP - 90W TO FILL PLUG	CHECK MONTHLY CHANGE YEARLY
14	PLANETARY GEARBOX	FP - 90W TO FILL PLUG	CHECK MONTHLY CHANGE YEARLY
15	TRANSFER CASE	AUTO TRANSMISSION FLUID TYPE F TO FILL PLUG	CHECK MONTHLY CHANGE YEARLY



HYDRAULIC FLUID RECOMMENDATION AND MAINTENANCE

CONTAMINATION CHECKS

A. Comply with contamination analysis and recommendations. Use the following as a guide to determine when to analyze the fluid and what is necessary to achieve a clean contamination free hydraulic system.

1. Any time the engine driven hydraulic pump is replaced.

2. If fluid discoloration is noticed in the hydraulic reservoir sight tube.

3. If after the first 50 hours of operation, the hydraulic filter elements are plugged.

4. Any time the hydraulic filter elements show signs of metal content.

5. If valve spools at either operators' stations have continuous sticking problems which can not be corrected by lubrication.

6. Have hydraulic oil analyzed every six (6) months under normal operating conditions.

B. Following the above guide will prevent premature component failure including pumps, cylinder seals, and drive motors. Therefore it will prevent unnecessary unit down time.

C. The hydraulic oil analysis must be done by a qualified laboratory. To insure they provide you with accurate recommendations about the oil being analyzed, provide the following information with the oil sample.

1. Type of oil. (See lubrication chart)

2. Model and Serial Number of unit having oil analyzed.

3. Purpose of analysis, i.e. pump failure, discolored, etc.

4. Type of analysis, i.e. Complete to show additive breakdown, acid buildup, viscosity, type and percent of contaminants. Comparison to new oil and recommendations.

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

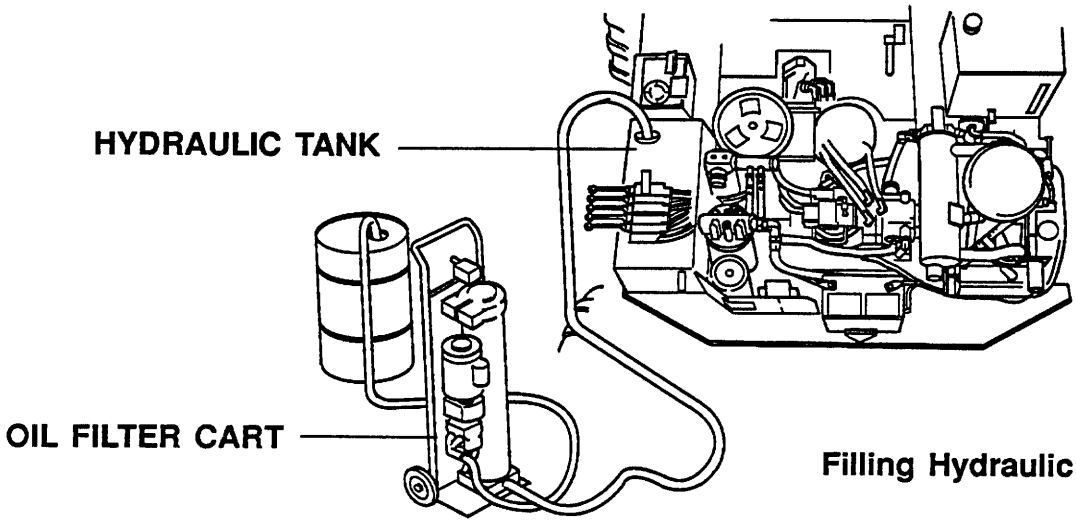
HYDRAULIC SYSTEM FLUSHING PROCEDURE

A. With the boom down and fully retracted (stowed position), drain main hydraulic tank into a clean container. This can be done with an oil filter cart so the oil may be reused if analysis of oil is good.

B. When the hydraulic tank is empty, remove hydraulic hoses between the tank and pump (suction hoses). Remove hoses between pump and main valve bank also. These hoses should be flushed out when removed. The hydraulic oil filters should also be removed and the filter bodies and attaching hoses flushed out. Discard old filter elements and replace with new elements. Drain main lines from pump to motor of drive circuit and drain pump case and motor case. Connect all drive circuit hoses.

C. With the hoses removed from the hydraulic tank, open the tank bottom drain and flush out the tank. When this is completed, all the hoses removed in the previous steps should be properly installed except the system return to tank hose. This hose should be lengthened to drain into a clean empty container (55 gal.).

D. If the hydraulic oil previously removed from the hydraulic tank is good, it can now be pumped (through a filter cart) back into the hydraulic tank. If it is not usable, fill hydraulic tank with new filtered oil.



Filling Hydraulic Tank.

E. Make sure the suction line valves are opened to allow oil to flow to the hydraulic pump. Loosen hose fittings at pump to allow pump to flood with oil. Tighten pump fittings after pump is flooded. Fill drive pump case with filtered oil.

F. Start engine and bring pump on stroke with power switch.

⚠ CAUTION

Shut engine down if charge pump pressure is not 150 PSI within 15 seconds. Check for proper priming, pump case full of oil, lines to pump full of oil and that relief valve in pump is working properly.

With charge pump pressure at approximately 150 PSI, let the engine run at low idle for five minutes and watch charge pump pressure while proceeding with the following step.

NOTE

Use care when starting and running the engine as return oil is now being returned to container provided in step C. This is to remove old oil from the rest of the hydraulic system as each function is cycled to its maximum limits.

⚠ CAUTION

Monitor the hydraulic tank level when cycling the unit functions, adding oil as necessary to replace oil being discharged to container at system return line. This oil may be returned to hydraulic tank through a filter cart, depending upon the results of an oil analysis.

G. Three (3) cycles of all hydraulic cylinder functions should remove enough old oil from the unit to be safe when returning the unit to service.

NOTE

The drive motors are rotated and flushed by raising the wheels off the ground.

With the wheels blocked off of the ground and the engine off, remove one of the two hoses from the drive motor. Direct both the hose and another "jumper" hose into a pan to catch the return oil. Start the engine and operate only long enough to purge oil from both hoses. Reconnect the drive hose to the motor.

H. When the above procedures have been completed, re-connect all hoses including system return to tank hose. Fill the hydraulic tank to full mark on sight gauge.

I. Operate all functions to their full extreme positions insuring that all functions operate as intended.

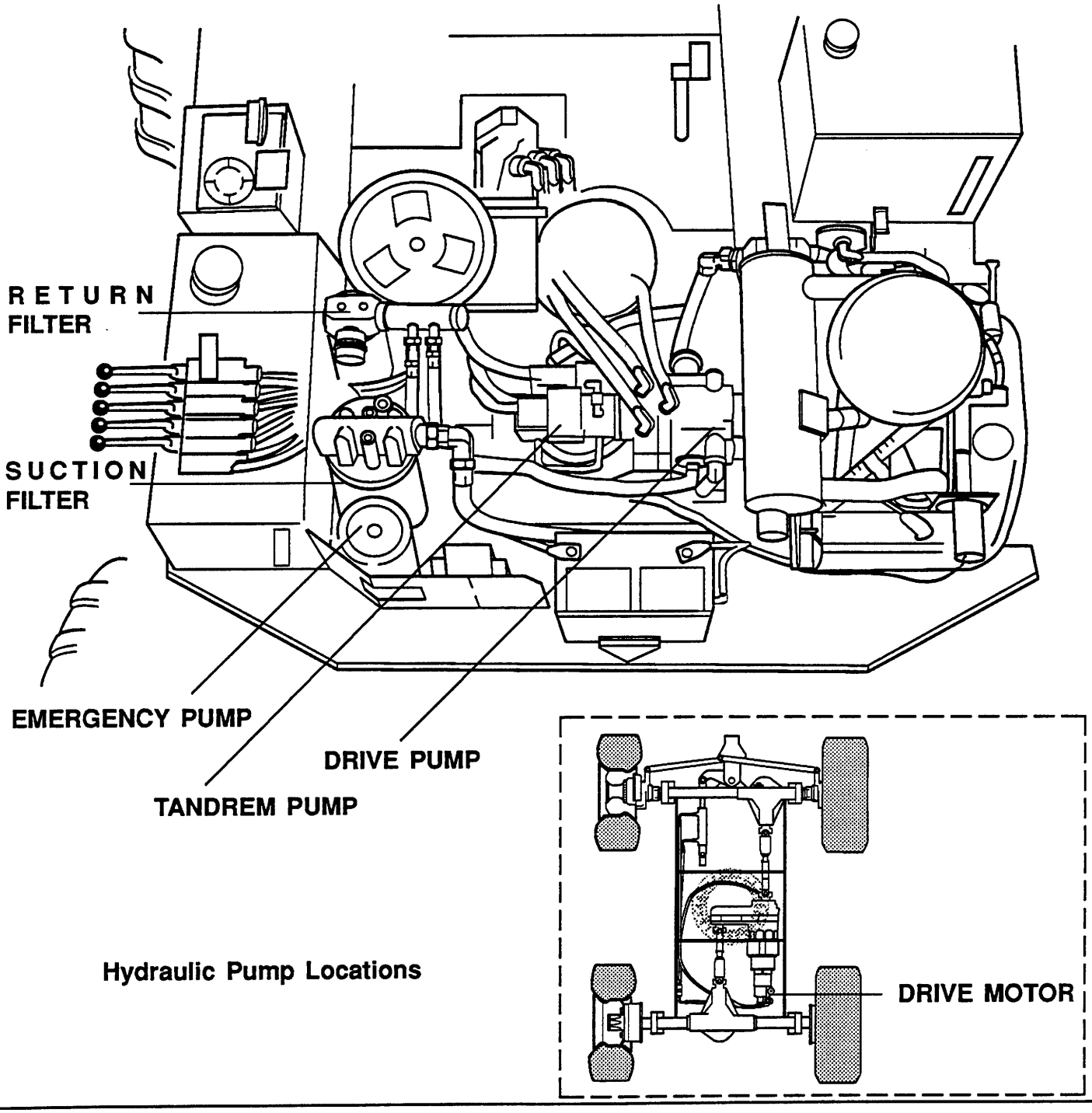
J. Check for oil leaks and correct if necessary. Unit is now ready to be placed back in operation.

HYDRAULIC SYSTEM

The hydraulic system is discussed by components or sub-systems.

HYDRAULIC PUMPS

The engine driven hydraulic pumps used to operate the various machine functions are located as shown below:



Hydraulic Pump Locations

A. Drive Pump

1. The hydrostatic pump is a variable displacement axial piston pump connected in a closed loop circuit to a two speed axial piston motor. This pump is driven by the engine and provides oil flow to the drive motor when the pump's control shaft is moved in one direction or the other. The pump control shaft is what determines the direction of oil flow to the motor for forward or reverse travel. The pump also contains a built in charge pump. The charge pump provides oil at 150 PSI to the pump/motor "closed loop" circuit. This is done to replenish any oil loss due to internal leakage and prevent pump cavitation. The drive pump pressure is limited by a cross port relief valve. Since the pump/motor circuit is a closed loop either hose can be pressurized, depending on drive direction. Both drive hoses are protected by use of a cross port relief valve.

B. Drive Motor

1. A two speed axial piston motor is mounted to the drive train located in the undercarriage of the machine. This motor is driven by oil flow provided from the engine mounted drive pump. The direction of rotation and speed of this motor depends on the flow from the pump. Drive system pressure is determined by the load being moved.

C. Main System and Drive Control Pumps

This is a tandem pump mounted on the end of the drive hydrostatic pump. It consists of two gear pumps coupled together end to end.

1. One of these pumps is used to provide oil to operate all the machine functions except the drive and drive controller. This pump supplies oil to the system manifold block which has a relief valve set at 2500 PSI to operate the functions as called for by the operator when the lift system power switch is activated.

2. The other pump is used to provide oil to operate the drive controller and brake on the machine. This pump also supplies oil to the system manifold block where a relief valve set at 525 PSI is located. When the foot pedal is depressed, oil is directed to the operators drive controller and to the spring applied, hydraulically released brake as the drive controller is moved.

D. Emergency Pump

This is a 12 volt electric pump which is used to provide oil flow to operate all boom functions if the engine fails. The pump has a built in 2500 PSI relief valve and is tied into the control valve bank at the ground. To operate the emergency pump, the operator turns the emergency pump switch and chooses the boom function desired. This system can be operated from the ground or platform control station. The emergency pump should only be used under emergency conditions to safely lower the operator's platform to the ground.

E. Filters

The hydraulic system contains two hydraulic filters. The larger one is in the charge pump inlet line. It is a 25 micron non-bypassing filter which should be changed regularly to insure system reliability. The small 25 micron filter has a 25 PSI bypass and should also be changed regularly to insure reliability. All the return oil from the lift system passes through this filter.

HYDRAULIC SYSTEM MANIFOLD

The hydraulic system manifold block, located on the hydraulic tank subassembly, is what controls oil flow for the lift, drive controller and brake functions of the machine.

A. The manifold block contains ports which can be identified by letters or numbers stamped into the block. Hydraulic oil flow from both of the engine mounted tandem pumps is directed to the manifold and dispersed for use.

1. **Port marked "FP".** Hydraulic oil from the larger gear pump enters at this port. Oil is allowed to flow through the manifold, steering control valves and power switch solenoid valve (normally open), back to tank. When a lift function is called for, the lift power switch solenoid valve closes causing the oil flow to leave the manifold by the port marked "F" where it enters the control valve banks to operate lift functions. The lift power switch solenoid is in the manifold port marked number "S3".

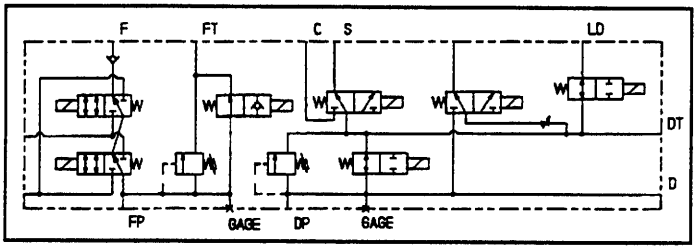
2. **Valve "R1".** This port contains the lift function and steering relief valve, which is set at 2500 PSI. Its purpose, as with any hydraulic system relief valve, is to prevent component damage and/or over pressurization of the machines components.

3. **Gauge ports "SA-SB".** These ports are used to direct oil flow from the two electrically controlled steering valves mounted in the manifold block to the steering cylinders blank end or rod end ports to steer left or right. The steering valves are mounted in the manifold ports numbered S1 and S2.

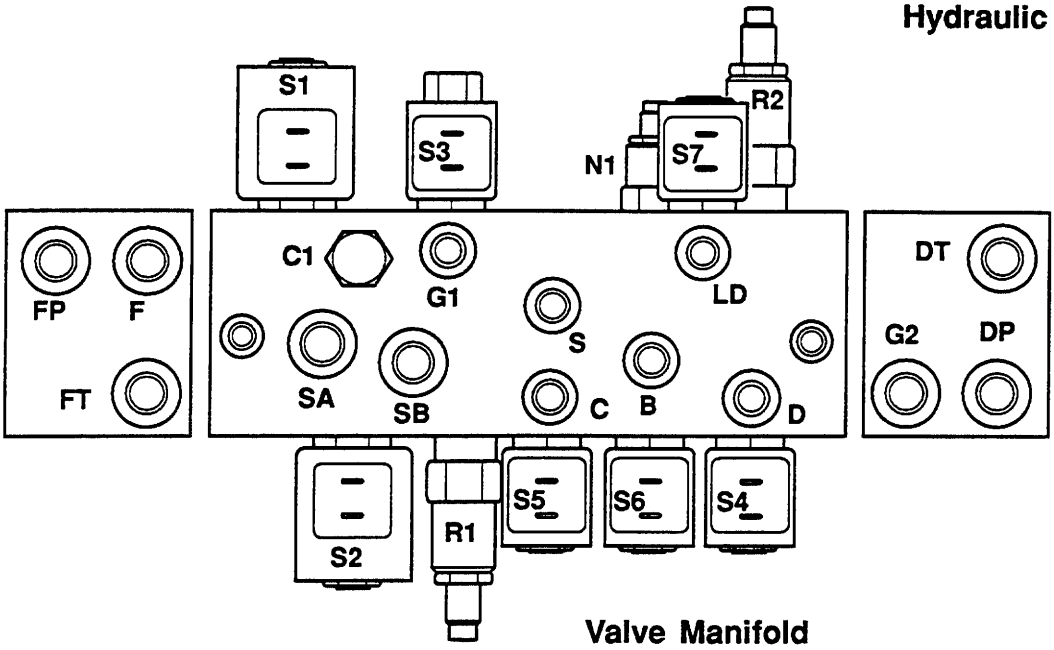
4. **Port marked "DP".** Hydraulic oil from the smaller gear pump enters at this port. Oil is allowed to flow through the manifold drive power switch solenoid valve (normally open) back to tank. When the drive function (operators platform only) is operated, the drive solenoid valve closes causing oil to flow to the port marked "D", where it flows up the boom to the operator's drive controller valve. The drive power switch solenoid valve is in port marked S4 of the manifold.

5. **Valve "S6".** This is the solenoid valve which controls oil flow to the brake. Whenever the drive function is operated, this valve opens to allow oil flow to release the brake.

6. **Valve "N1".** This is an adjustable needle valve in the brake line. It allows a free flow of oil to release the brake and controlled oil flow when the brake is engaged to prevent sudden stops. Oil flow leaves the manifold through Port "B" for the brake function.



Hydraulic Schematic



Valve Manifold

7. Valve "R2". This is where the drive control relief valve is located. This relief is set at 525 PSI to prevent component damage or over pressuring the drive/brake control system. Check at Port "G2".

8. Valve "C1". This port contains a check valve which isolates emergency pump flow from main system pump flow, directing emergency pump flow to the ground and platform valve banks rather than into the manifold.

9. Port marked "LD". This port allows oil flow from the actuator cylinder (stroke cylinder) to return to the tank. It provides for low speed drive when the boom is raised. Control valve is indicated as"S7".

10. Ports marked "G1" and "G2". These ports are plugged for use with gauges during manifold relief adjustments. See items 2 and 7.

11. Port marked "S". This port provides pressure to shift hydraulic drive motor to high speed. Normally motor is in low speed drive. Control valve is indicated as "S5".

12. Port marked "C". This port provides the oil pressure from the hydrostatic charge pump to the drive motor for high/low gear shift.

13. Ports marked "FT" and "DT". These ports are used to direct oil flow back to the tank.

Routine Service Checks

Check lift power switch control solenoid at manifold block (refer to "S3").

1. Turn on main power key switch. Use a volt meter to check for power at the power switch solenoid when ground power switch is turned on. Electrical power must be evident at solenoid coil. If 10.5 volts or more are measured at the coil, the valve should operate unless the coil is open. This can be checked using an ohmmeter across the coil leads. You should measure at least 6 ohms on a good coil. It is possible that the problem, if electrical, may be traced back to a bad switch or loose wire in the ground control cabinet or foot pedal power switch in the platform.

Check Drive Solenoid Valve at Manifold Block (refer to "S4").

1. Turn on main power key switch. Switch ground platform switch to platform. Connect a volt meter between wire #MN3 and wire #X3 on drive solenoid. Turn the platform ignition switch to the on position. Press foot pedal on platform and power should be available at wire #MN3 of drive solenoid. If 10.5 volts or more is measured, check valve coil using an ohm meter. The coil should have at least 6 ohms resistance.

2. The drive solenoid valve may have to be removed from the manifold to check for contamination which may be causing it to stick.

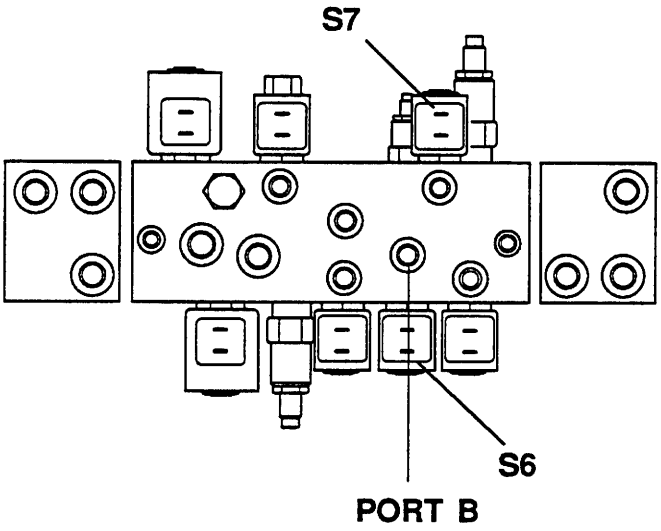
Check Steering Control Valve and Valve Solenoids at Manifold Block (refer to "S1 & S2".

1. Turn on main power key switch. Switch ground platform switch to platform. Use volt meter to check for power at both steering valve solenoids. When you push the steering switch on the drive control handle you should have power at one solenoid for steer right and power at the other solenoid for steer left. If 10.5 volts or more is measured at both coils, check the coils using a ohm meter. The coils resistance should read at least 6 ohms.

Check brake solenoid valve at manifold block (refer to "S6").

1. Turn on main power key switch. Switch ground platform switch to platform position. Connect a volt meter between wire #MN3 and wire #C3 on brake solenoid. Enter platform and start engine. Press foot pedal, and slowly move drive controller forward. The volt meter should indicate power to brake solenoid valve. It may also be necessary to install a

pressure gauge in port "B" of the manifold to see if the brake is being pressurized when the brake solenoid valve is turned on. The pressure gauge should read 525 PSI, the same as the drive controller system pressure. If the volt meter reads 10.5 volts or more and the pressure is not 525 PSI, it is possible the solenoid valve coil is bad. This coil should be checked using an ohm meter. The coil should measure at least 6 ohms resistance.



Check Brake Pressure at Port B

2. The brake solenoid valve may have to be removed from the manifold to check for contamination causing it to stick.

3. The neutral sense switch may also keep the circuit open to the brake solenoid. If, however, the movement alarm sounds when trying to drive the machine, the switch should be functioning and the problem is in the brake solenoid valve.

Check low speed drive valve at manifold block (refer to "S7").

1. The low speed drive solenoid valve is controlled by the boom limit switches. When the boom is in its stowed position, this valve is turned on. With engine running, foot pedal pressed and drive controller moved forward, a volt meter would indicate 10.5 volts when connected between wire #MN3 and wire #R3 at the solenoid. When the boom is raised off the limit switches, power to the solenoid should shut off. The solenoid coil should also be checked using an ohm meter to confirm a reading of at least 6 ohms.

Possible Failure Points

1a. A bad boom limit switch.

1b. The low speed drive solenoid coil is open.

1c. The low speed drive valve is sticking.

NOTE

The low speed drive solenoid valve is designed to fail to a "low speed" position. This is to prevent high speed travel when the boom is raised or if a component fails.

HYDRAULIC OIL TANK

The oil tank includes a filler cap, a return line defuser, a suction filter and return filter.

BOOM LIFT SYSTEM

When the operator engages the power switch at ground or foot pedal at platform, oil flow is sent from the manifold block to the hydraulic control valve banks (ground and platform).

1. The boom sections lower, middle and upper are then controlled by moving the control lever in the desired direction up or down. This offers proportional boom control as the speed of boom function selected will move in response to the amount of control lever throw.

2. Each boom function lift cylinder is a double acting cylinder. Each cylinder contains a counter balance valve. The counter balance valve is the safety valve which prevents the cylinder from retracting should a hose or fitting develop a leak at the base end of the cylinder.

When lowering of a boom section is required oil flow is directed to the rod end cylinder port and to the counter balance valve to provide a pilot pressure opening this valve allowing oil in the base end of the cylinder to flow back to tank.

BOOM LIFT SYSTEM TROUBLESHOOTING

PROBLEM:

1. Boom functions will not lift from ground or platform control station.

CHECKS:

A. Check boom functions from ground station with engine shut off using emergency pump system.

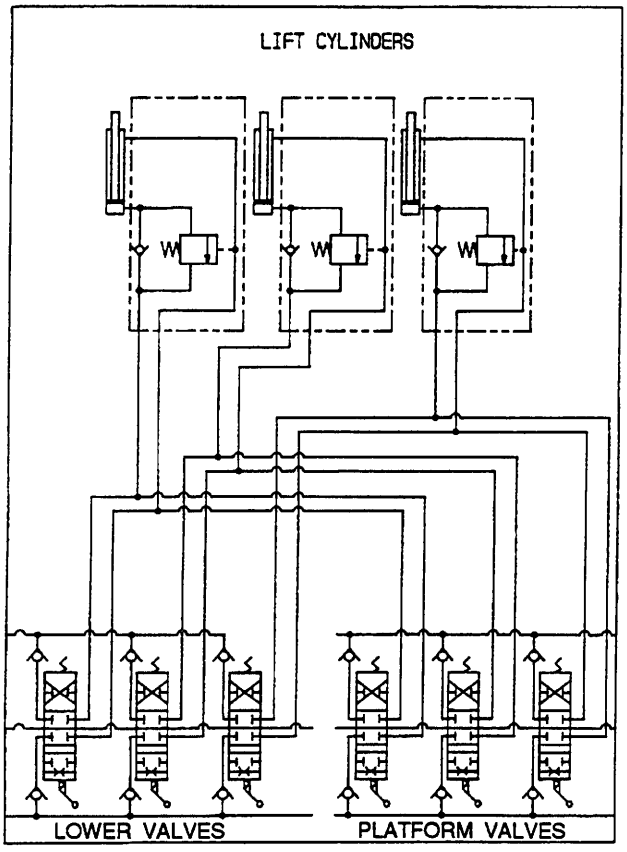
PROBABLE CAUSE:

1. If all three boom sections can be raised and lowered, the control valve bank should be operating correctly.

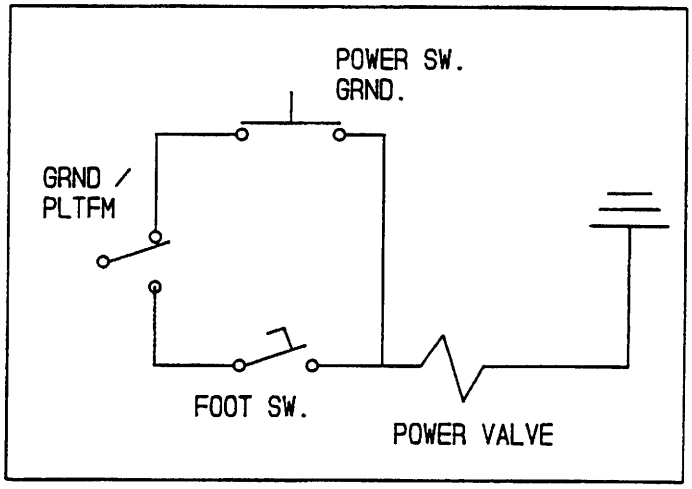
2. If any boom function fails to operate using the emergency pump, the problem may be in the valve bank or cylinder. To confirm this, switch to platform control and check the boom function which failed to operate from the ground valve at platform control still using the emergency pump system.

3. If any boom function fails to operate using the emergency pump system, the problem may be due to a defective holding valve. Replace holding valve.

4. If all boom functions operate using the emergency pump system, it will be necessary to investigate the hydraulic system and/or electrical control system ahead of the control valve banks.



Hydraulic Schematic



Electrical Schematic

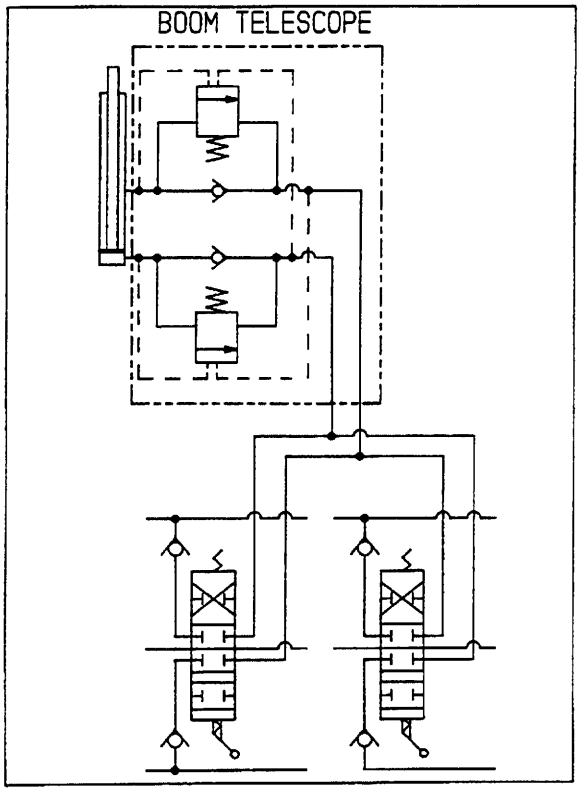
BOOM EXTEND SYSTEM

When the power switch at the ground or foot pedal at platform is engaged, oil flow is sent from the manifold block to the hydraulic control valve banks (ground and platform).

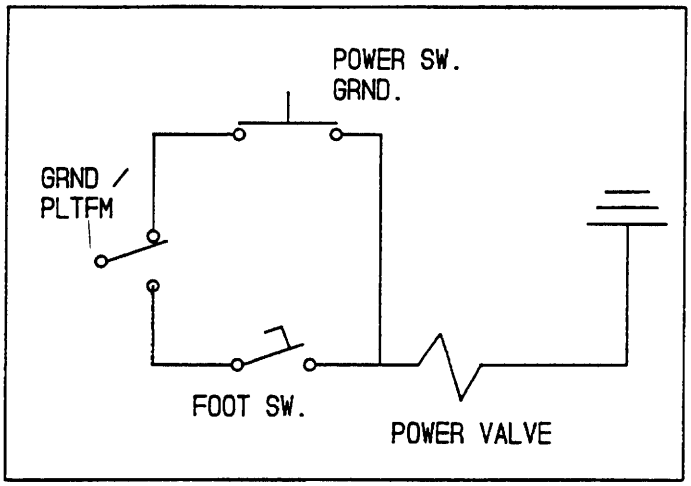
1. The boom extend cylinder is controlled by moving the extend control lever in the desired direction in or out. This offers proportional extend control as the speed of extend or retract will be in response to the amount of control lever throw.

2. The boom extend cylinder is a double acting cylinder. This cylinder contains two pilot operated valves located at the base end of the cylinder. These valves prevent the extend cylinder from moving in or out in the event of a hose or fitting failure. The only time cylinder movement should occur is when the control valve is moved to the extend or retract position.

3. When extending the boom, oil flow is directed to the base end of the extend cylinder with pilot pressure opening the rod end valve. When the rod end valve is opened, oil is allowed to flow out of the rod end and back to tank as flow is put into the base end of the cylinder. The same thing happens when the extend cylinder is retracted. Oil flow to the rod end of the cylinder opens the base end valve allowing oil out of the base end while oil is added to the rod end. This prevents the extend cylinder from extending or retracting unless called for by a control valve.



Hydraulic Schematic



Electrical Schematic

EXTEND SYSTEM TROUBLESHOOTING

PROBLEM:

1. Boom will not extend from ground or platform control station.

CHECKS:

A. Check extend function from ground station with engine off using emergency pump system.

PROBABLE CAUSE:

1. If boom will extend and retract slightly, the control valve bank should be operating correctly.

2. If the tip boom fails to extend or retract using emergency pump, the problem may be in the valve bank or cylinder. To confirm this, switch to platform control and check extend function at platform control, still using the emergency pump.

3. If boom extend function fails to operate using the emergency pump, the problem may be due to a defective holding valve or worn cylinder rod packing. Replace holding valve to check it before disassembling cylinder for inspection.

4. If the boom extends and retracts using the emergency pump, it will be necessary to investigate the hydraulic system manifold and or electrical control system.

SWING SYSTEM

When the power switch (ground control) or foot pedal (platform) is engaged, oil flows from the manifold block to the hydraulic control valve banks (ground and platform).

1. The swing is then controlled by moving the swing control valve lever for the desired direction, left or right. This offers proportional swing control as speed of swing is determined by the amount of control lever throw. Pressure relief is determined by the main relief valve.

2. The hydraulic swing motor drives a swing gear box to rotate the superstructure. This is a gear motor and allows direction change by reversing the flow of oil for left or right swing.

3. The superstructure can swing 360 degrees non-continuous and has a mechanical stop to prevent over-travel.

4. The swing gear box has a pinion gear which drives the superstructure around the swing bearing gear mounted to the undercarriage.

SWING SYSTEM TROUBLESHOOTING

PROBLEM:

Swing motor will not run in either direction using engine powered pump.

CHECKS:

A. Shut down engine and try swing motor using emergency pump. If swing functions with emergency pump, check lift system power switch valve at manifold.

PROBABLE CAUSE:

1. The mechanical swing stop is preventing rotation in one direction.

SOLUTION:

Operate swing function in the opposite direction.

2. Swing pinion shaft is broken.

SOLUTION:

Remove and disassemble worm drive swing reducer and replace pinion shaft.

3. Hydraulic swing motor shaft is broken or siezed.

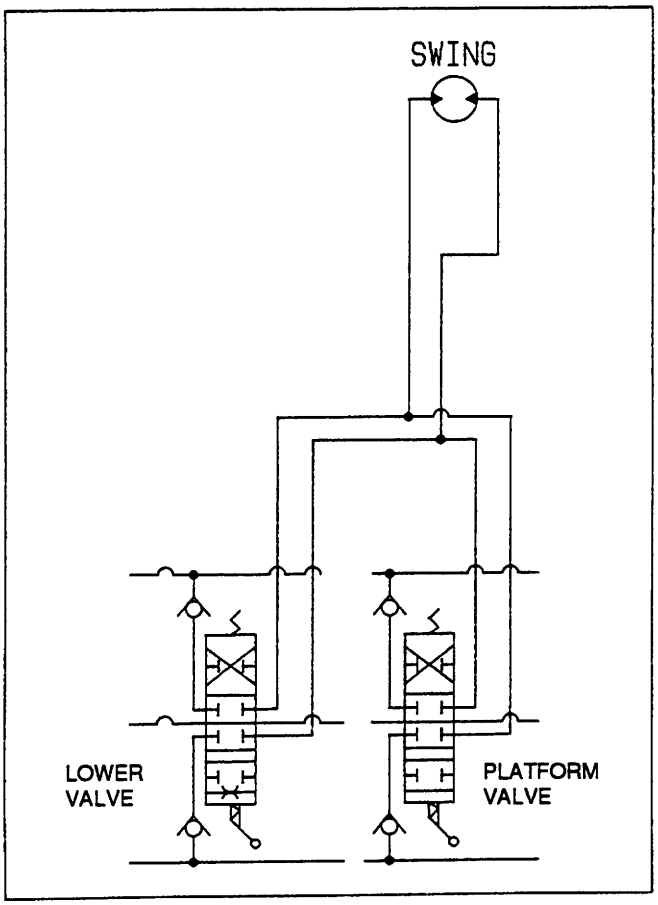
SOLUTION:

Remove and replace swing motor.

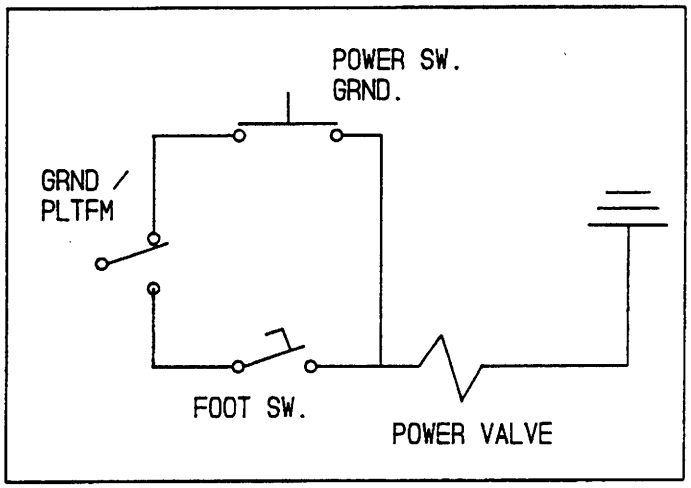
4. Swing motor pinion key to gear box sheared off.

SOLUTION:

Removed and replace key.



Hydraulic Schematic



Electrical Schematic

VEHICLE STEER SYSTEM

The steering circuit is controlled by two solenoid operated directional control valves mounted in the hydraulic manifold block. The steering cylinder's blank end is attached to the undercarriage while the rod end is connected to the steering axle linkage. The relief for this system is in the manifold block and operates off of lift system pressure of 2500 PSI.

STEER SYSTEM TROUBLESHOOTING

PROBLEM:

Steering system will not operate; all other lift functions work.

CHECKS:

Steering cylinder not mechanically connected to steering linkage.

PROBABLE CAUSE:

Check for disconnected or damaged steering linkage.

CHECKS:

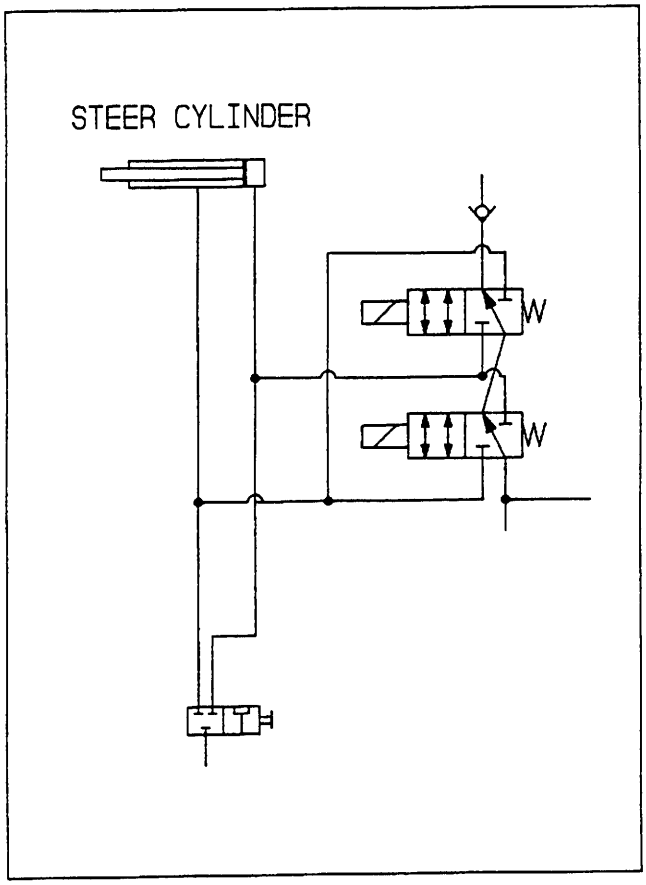
Steering solenoid valve not shifting. Valve spool is stuck, solenoid not being energized or open wires in steer circuit.

PROBABLE CAUSE:

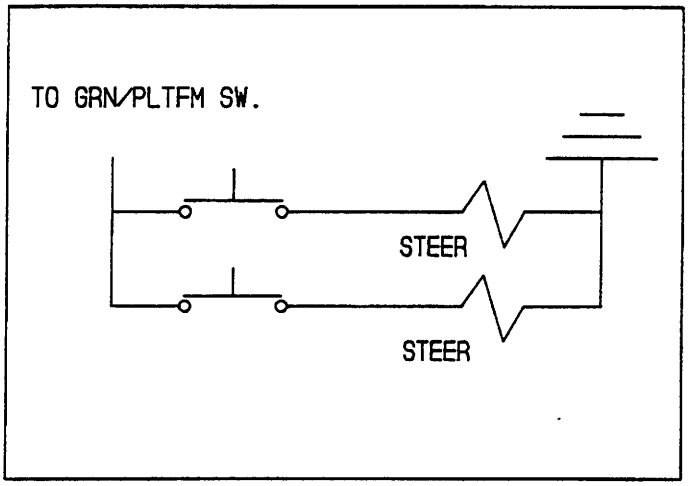
Locate steering valve on manifold. Check to see if the solenoids, located on these valves, are being energized. If power is available at the solenoid, either the solenoid is defective or valve spool is obstructed. Remove valve, inspect, clean, repair or replace. If solenoids are not being energized, check for continuity in the circuit to the steering control switch on drive handle.

NOTE

Check steering tow release valve for proper position (Tow package option only).



Hydraulic Schematic



Electrical Schematic

PLATFORM LEVELING CIRCUIT

The platform circuit is designed to automatically keep the platform level by using a master/slave cylinder system. As the upper boom is raised, oil is forced from the rod end of the master cylinder to the rod end of the slave cylinder in a closed loop.

The platform leveling circuit is controlled only from the platform control panel. To raise or lower the platform, the platform controls must first be energized by switching the selector switch to platform controls. With the foot switch depressed, you can now level the platform by moving the platform level control lever in the direction and speed desired.

The leveling circuit is equipped with two holding valves (mounted on the slave cylinder) which maintain platform position should there be hose or fitting damage. The holding valves prevent the slave cylinder from unintended travel through the use of a pilot operated counter balance valve which is opened only after receiving pilot pressure from the control valve or master cylinder.

PLATFORM LEVELING CIRCUIT TROUBLESHOOTING

PROBLEM:

Platform Leaks Down

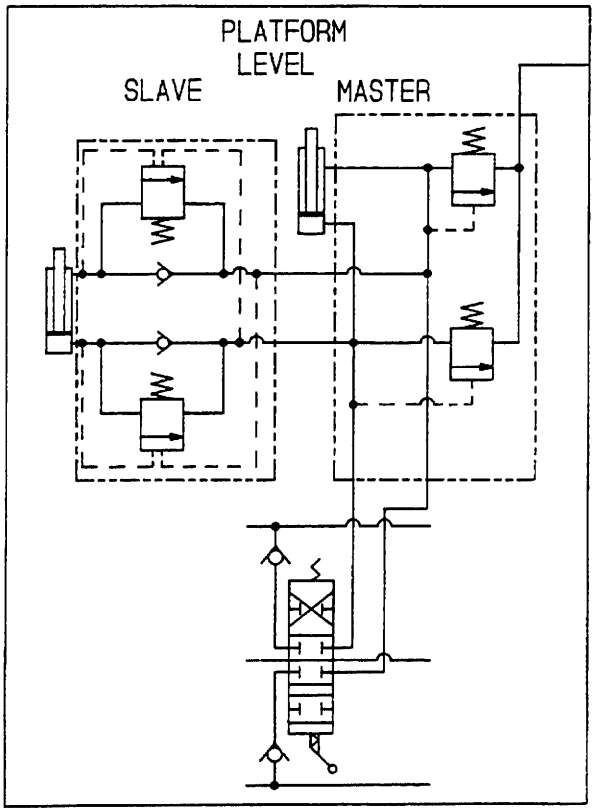
CHECKS:

1. Remove lines from the slave cylinder's blank end holding valve to control valve.

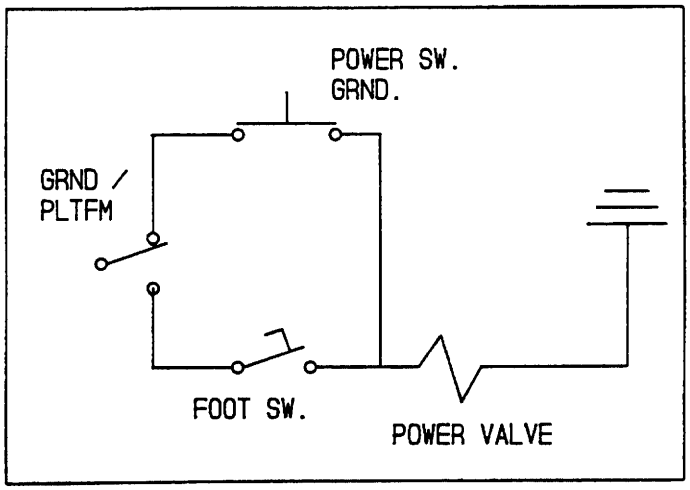
PROBABLE CAUSE:

a. If platform drifts down and oil flows from holding valve, remove holding valve and inspect it for damage or dirt. This valve must be replaced.

b. If platform drifts down but no oil flows from holding valve, problem is internal of the slave cylinder.



Hydraulic Schematic



Electrical Schematic

PLATFORM ROTATE CIRCUIT

The platform rotate circuit consists of a rotary actuator locked in position by a double acting pilot-operated check valve. The platform rotate circuit is controlled only from the platform control panel.

To operate the platform rotate circuit, first energize the platform controls (selector switch). With the foot pedal depressed, you can now rotate the platform by moving the control lever to the direction and speed desired.

PLATFORM ROTATE CIRCUIT TROUBLESHOOTING

PROBLEM:

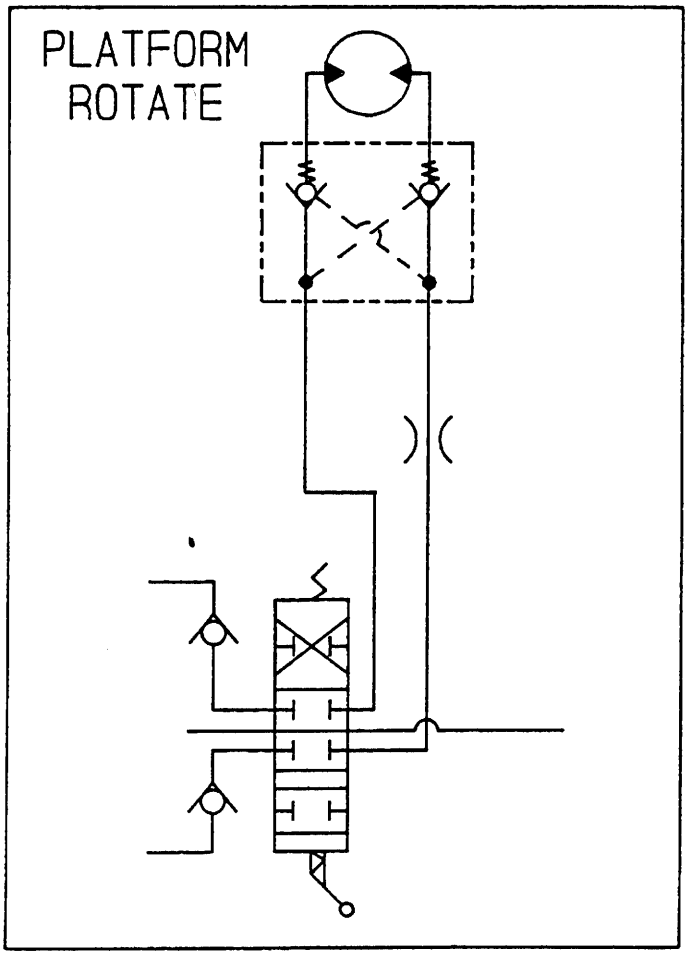
Platform rotator will not react to control lever movement.

CHECKS:

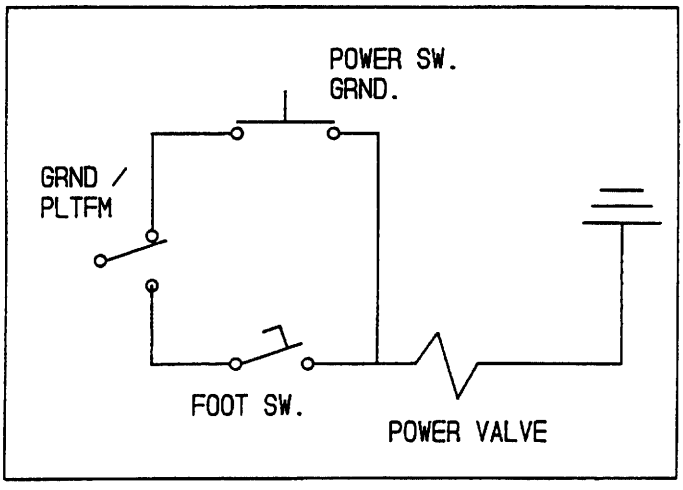
1. Look for physical constraints or foreign material restricting platform rotation.

2. Check pressure on each side of rotator to confirm control valve is working correctly.

3. Check the fixed orifice in the hydraulic lines between the platform control valve and rotary actuator to ensure flow.



Hydraulic Schematic



Electrical Schematic

VEHICLE DRIVE SYSTEM

The drive system consists of a Hydrostatic Transmission, Brake/Gear Reducer, Transfer Case, Drive Axles and Suction Filter. Each will be discussed individually.

A. HYDROSTATIC TRANSMISSION

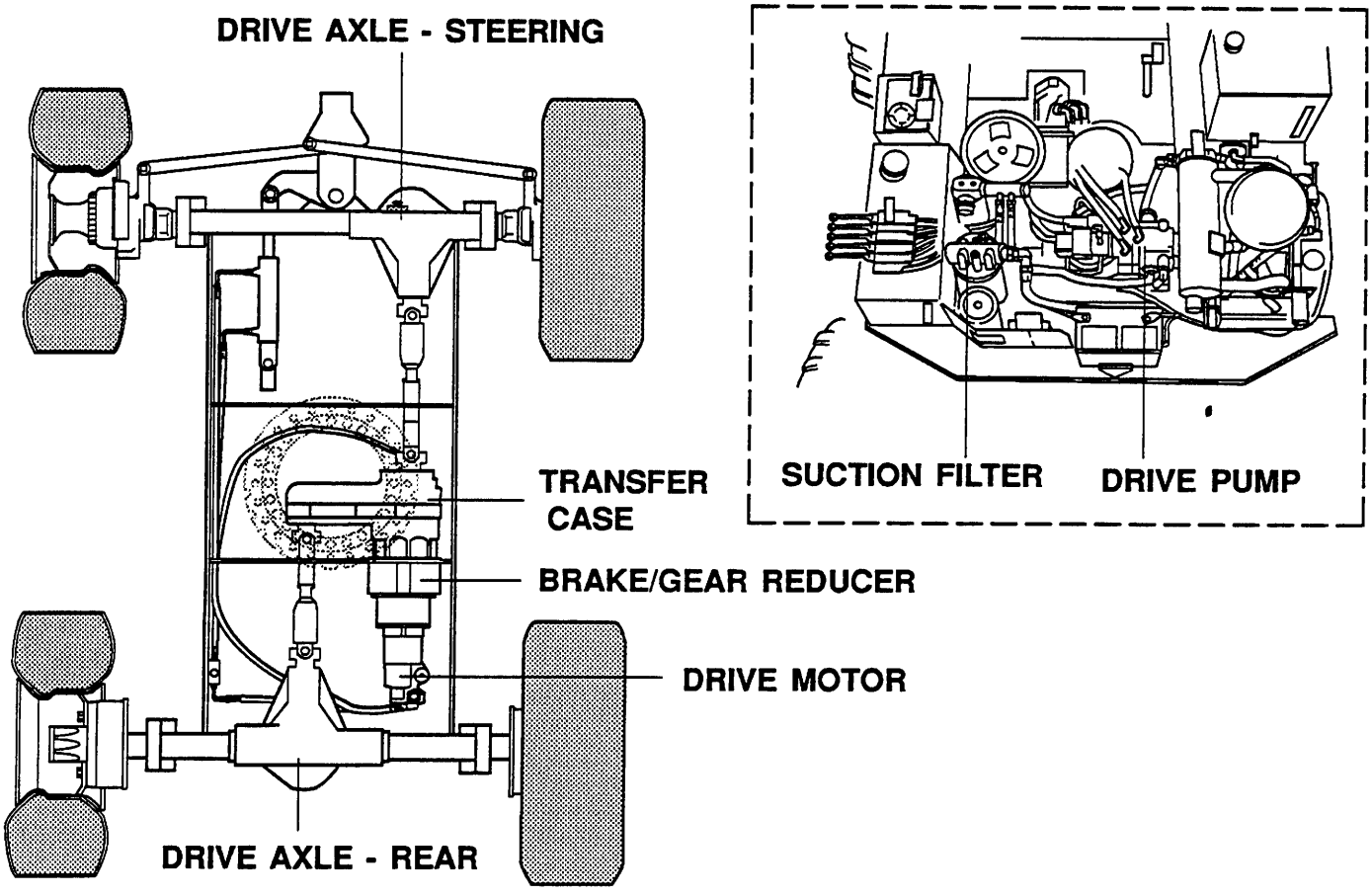
The hydrostatic transmission consists of a variable displacement pump connected by hydraulic lines to a two speed motor. The pump shaft rotates in one direction while the motor shaft rotates in either direction.

1. Drive Pump

The hydrostatic pump, driven by the engine, is a variable displacement axial piston pump. The pump contains seven pistons mounted in the cylinder block. As the cylinder block rotates, these pistons are forced in and out of their bores by the angle of the "swashplate" which is controlled by an external cylinder. When the "swashplate" is in the center (neutral position), there is no oil flow out of the pump. When the pump control lever is moved off of center in one direction, oil will be forced out of the pump in one direction. When the control lever is reversed, oil flow will be forced out of the pump in the other direction. This provides the machine forward or reverse travel.

2. Drive Motor

The other half of the hydrostatic transmission consists of a two speed motor. This motor is coupled to the drive train and as oil flow supplied by the pump enters one port or the other the motor shaft will rotate in one direction or the other. Inside the motor, system pressure against the piston causes it to slide down the inclined face of the "swashplate" resulting in output rotation. The two motor speeds are



VEHICLE DRIVE SYSTEM COMPONENTS

provided by having two different "swashplate" angles. The motor is normally in low speed. High speed is achieved when hydraulic pressure is sent from a valve on the manifold block to the drive motor shifting the "swashplate" to a reduced angle resulting in higher shaft rotation speed.

The pilot pressure for the high speed shift originates at the drive system charge pump. The oil is then directed to the drive motor shifting unit through a 2-way valve which is mounted on the valve manifold bank. This system is preset and operates at approximately 150 - 225 PSI.

The drive system contains a cross port relief valve to prevent over pressurization. The relief valves (located on the undercarriage) are set at 4300 PSI but the system will only develop the required pressure to move the machine.

B. BRAKE/GEAR REDUCER

The brake and gear reducer are a combined unit. The brake is spring applied with hydraulic release. When the vehicle is driven, the brake is pressurized causing it to release. The brake will only release when the operator has his foot on the platform foot pedal and the drive controller is moved off of its center neutral position. If at any time during normal operation, the operator moves the drive controller to neutral or releases the foot pedal, the brake will engage causing the machine to stop traveling. The brake engagement time is determined by the needle valve setting in the manifold brake circuit. This brake also functions as a parking brake. The hydrostatic drive system provides the primary braking system.

The gear reduction is a single stage planetary gear reducer which contains a sun gear and a set of planet or satellite gears mounted to a carrier. The reason for the gear reduction is to reduce the drive motor RPM's and develop the required torque for the transfer case input.

C. TRANSFER CASE

The transfer case equally distributes the motor torque to both the front and rear drive axles. The transfer case is locked into "4 Low" to supply the correct gear ratio for machine operation and trackability. If for any reason the transfer case is replaced, it is very important to confirm that it is locked into "4 Low".

D. DRIVE AXLE - REAR

1. The rear drive axle assembly is a standard truck axle with a hypoid gear set consisting of a ring gear and an overhung drive pinion supported by two opposed tapered roller bearings. Pinion bearing preload is maintained by a pinion nut and selective shims assuring seating of the inner and outer bearings. The axle housing assembly consists of a cast center section with two steel tube assemblies and stamped rear cover. Use RTV E7TZ 19562-a (Ford) or equivalent as a cover gasket if removal becomes necessary. If removal or adjustment of the internal gears becomes necessary, it is suggested a Ford truck shop manual FPS-12107-88A be obtained.

E. DRIVE AXLE - STEERING

1. The front or steering drive axle is a standard truck axle. Identification numbers are stamped on a metal tag attached to the differential assembly. Manual locking hubs are standard.

2. The pointer on the hub center bar must point to the notch under the word LOCK on the hub lock cap. The only time the hub center bar should be in the FREE position is when the unit is being towed.

3. If the clutch teeth do not engage when the knob is turned back to the lock position. The clutch teeth are butted and a slight movement of the wheel in either direction will complete the lock.

F. SUCTION FILTER

1. It is important that only clean oil enters the hydrostatic transmission system; therefore, a 25 micron (nominal rating) filter is used in the charge pump inlet line. This filter is non-by-passing and must be changed regularly (at least every six months) to insure system reliability.

DRIVE SYSTEM CONTROL CIRCUIT

A. DRIVE PUMP ACTUATOR (STROKE) CYLINDER

1. The drive "swashplate" (which varies pump direction and flow) is controlled by an actuating cylinder. This spring-centered cylinder is controlled by the directional control valve (platform drive valve) at pressures up to 525 PSI. When the boom is raised, the cylinder's center port is opened to tank through a low speed drive solenoid valve, restricting the cylinder's stroke, thus restricting machine speed.

B. DRIVE CONTROL VALVE

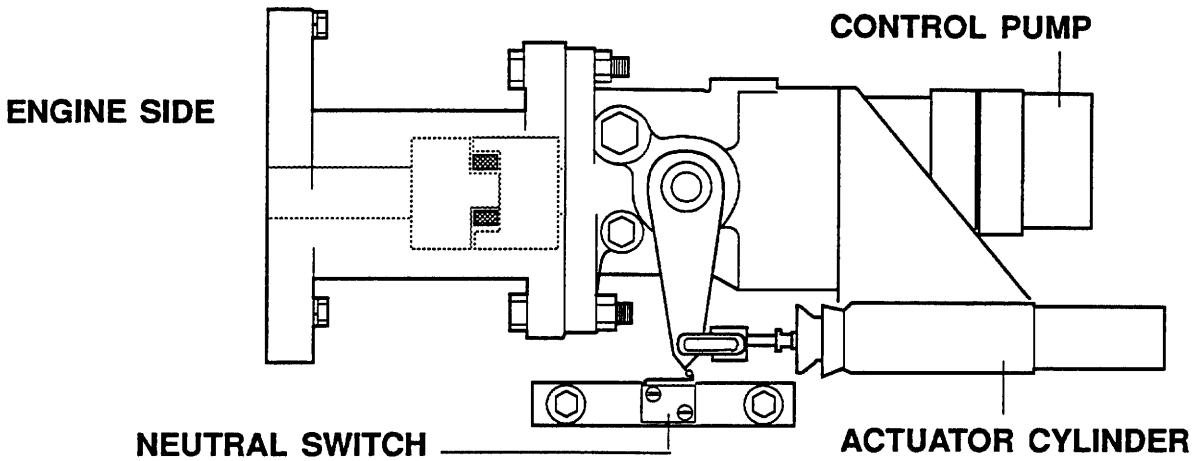
1. The drive control valve is a spring-centered, variable flow, two-way pressure compensated valve. There is no hydraulic pressure going to the stroke cylinder until the power switch is depressed and the drive control handle is moved in the desired direction. When the cylinder is forced to one side, the hydraulic oil from the other side of the cylinder travels back through the drive valve and to the lines leading to reservoir. When the handle is moved to the center position, both lines from the cylinder drain to the tank, allowing the drive pump to destroke and return to neutral.

C. DRIVE SYSTEM CONTROL PUMP

1. The drive control pump (tandem) is mounted farthest from the engine. This gear pump delivers a constant 525 PSI to the drive control valve and the brake control system whenever the foot pedal is depressed. The pressure is set by placing a pressure gauge on the drive control pump and adjusting the pressure relief valve which is mounted on the hydraulic manifold while the foot pedal is depressed. To adjust the pressure relief valve, loosen the nut on the valve, adjust the valve until the pressure on the pressure gauge reads 525 PSI, hold the pressure there and tighten the nut. Remove the pressure gauge.

D. NEUTRAL SWITCH

1. The neutral switch is depressed when the stroke arm is in the neutral position. With the power switch depressed and the stroke arm off of the neutral switch, the brakes are released and movement alarm sounds.



DRIVE SYSTEM CONTROL COMPONENTS

DRIVE SYSTEM TROUBLESHOOTING

PROBLEM:

Machine won't drive either direction.

PROBABLE CAUSE:

a. Connecting link from between drive pump and stroke cylinder is missing.

b. Brakes aren't releasing due to faulty neutral switch or brake valve not shifting.

c. Broken or missing arm on neutral switch.

PROBLEM:

Machine only drives in one direction.

PROBABLE CAUSE:

a. Drive valve not working correctly, check pressure in each direction.

b. Spring centering bolt came loose from actuator cylinder.

c. Actuator cylinder piston is loose.

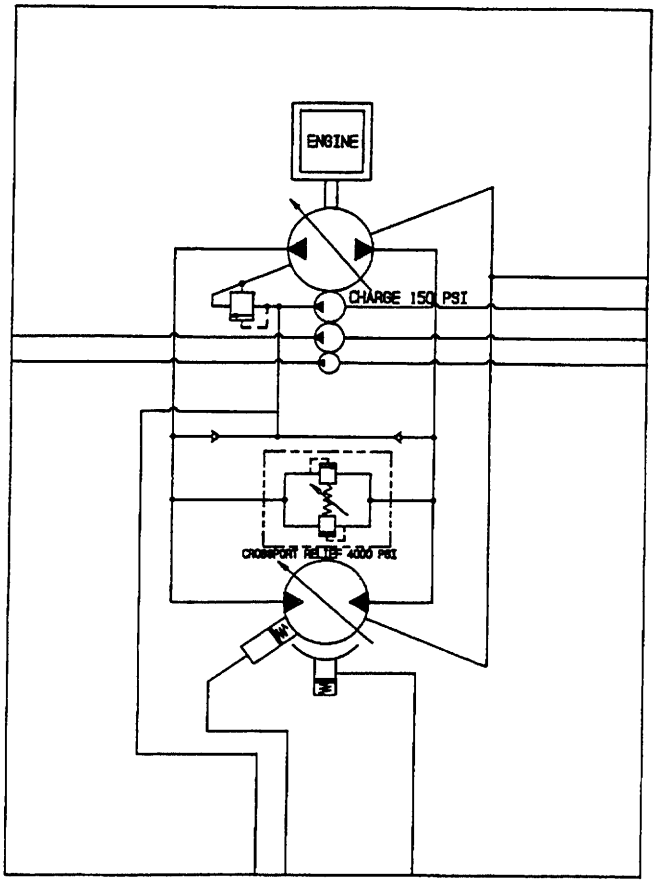
PROBLEM:

Hydrostatic pump seems to be dragging while in neutral.

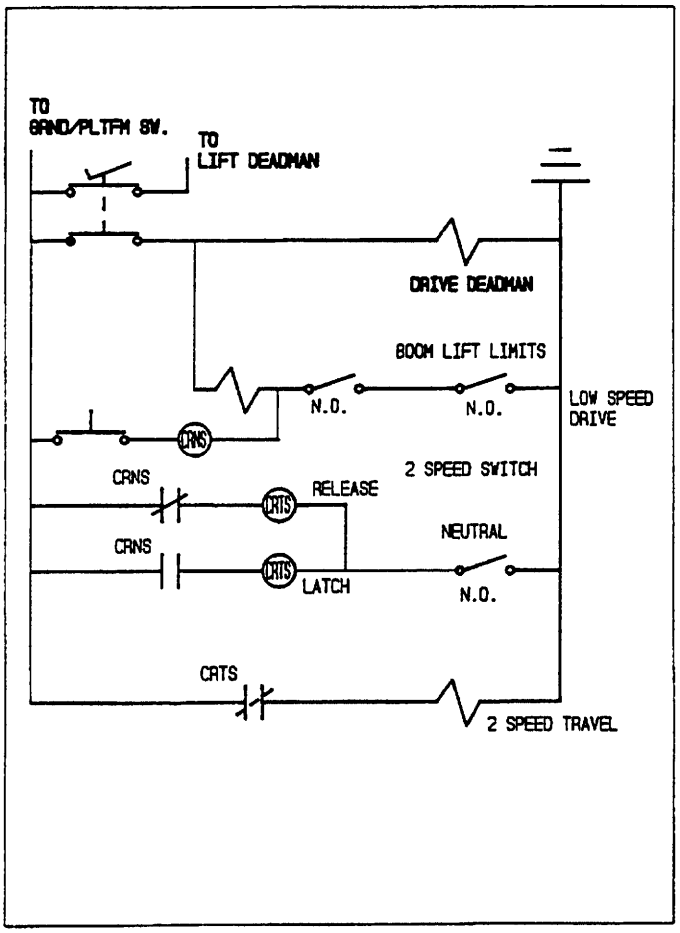
PROBABLE CAUSE:

a. Stroke arm not in proper adjustment.

b. Drive controller is contaminated.



Hydraulic Schematic



Electrical Schematic

PROBLEM:

Movement alarm beeps while machine is in neutral.

PROBABLE CAUSE:

a. Neutral switch out of adjustment.

PROBLEM:

Machine jerky when starting.

PROBABLE CAUSE:

a. Inspect control linkage for proper adjustment.

b. Neutral switch out of adjustment.

c. Inspect charge check valves in hydrostatic pump.

PROBLEM:

Loss of power.

CHECKS:

a. Check drive control system for proper actuator stroking (should operate up to 525 PSI).

b. Check hydrostatic pump charge pressure (should be between 70-225 PSI).

PROBABLE CAUSE:

1. If pump charge pressure is low, inspect suction filter and lines for restrictions.

2. Inspect charge pump.

CHECKS:

c. Check drive system pressure (should be between 1000-4300 PSI when moving).

PROBABLE CAUSE:

1. If system pressure is low, charge check valves in pump.

2. Adjust cross port relief valve.

3. Replace cross port relief valve.

PUMP STROKE CYLINDER ADJUSTMENT

NOTE

Adjustments must be made with machine running, wheels in the air, and lower boom supported.

⚠ CAUTION

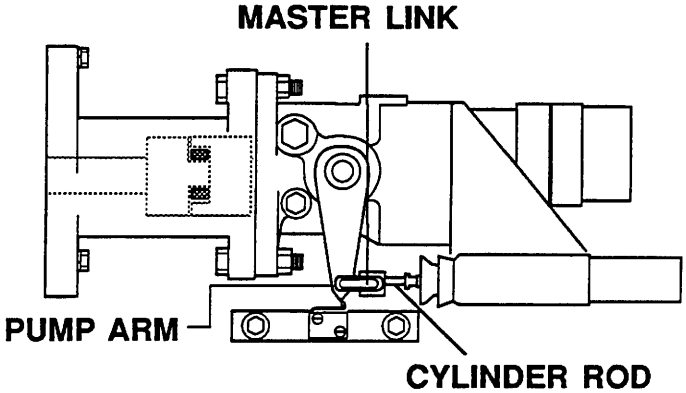
AVOID ROTATING WHEELS - EXERCISE EXTREME CAUTION.

1. Bleed any air from the cylinder or supply lines by cycling the drive handle with the machine in creep speed (boom up).

2. Remove the master link which connects the cylinder rod to the pump arm.

3. With the machine running and the drive handle in neutral, loosen the stop nut and adjust the rod end so you can slide the master link in position with ease.

4. Install the master link and retainer. Lock the rod end in position with the lock nut.



PUMP STROKE CYLINDER

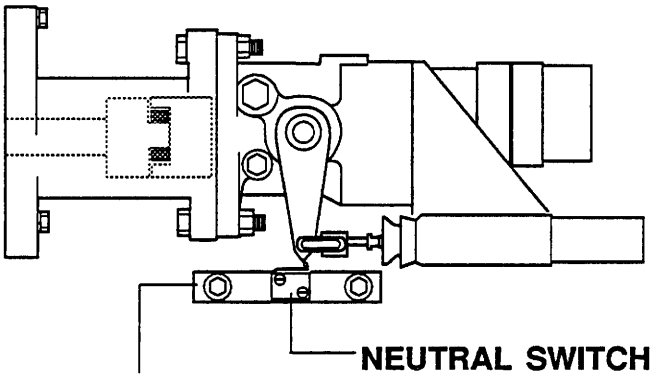
NEUTRAL SWITCH ADJUSTMENT

NOTE

This adjustment is done following the stroke cylinder adjustment with the machine still running, wheels in the air, lower boom supported and foot pedal depressed.

1. Loosen the two mounting block bolts.

2. Hold the mounting block so the stroke arm is just depressing the neutral switch and tighten the two mounting block bolts. The stroke arm must be carefully centered over the neutral switch roller. The motion alarm may be used as an indication of switch engagement.



NEUTRAL SWITCH

INSTALLING THE ACTUATOR CYLINDER CENTERING SPRING BOLT

NOTE

This procedure is used to adjust the centering spring on the stroke control cylinder. It should only be followed if the adjustment is found to be incorrect. This bolt is installed with lock tite and should not be tampered with unless absolutely required.

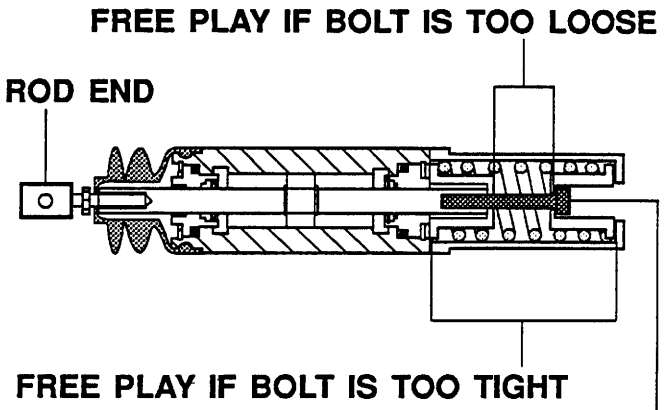
Bolt used is a 6 mm x 45 mm metric thread socket head capscrew.

1. Check threads for internal damage.

2. Install the cylinder end cap.

3. Put a couple of drops of 271 " lock tite" on the bolt threads.

4. Turn in the bolt until the rod end has no free play. If the bolt is in too far, the spring will be loose in the end cap.

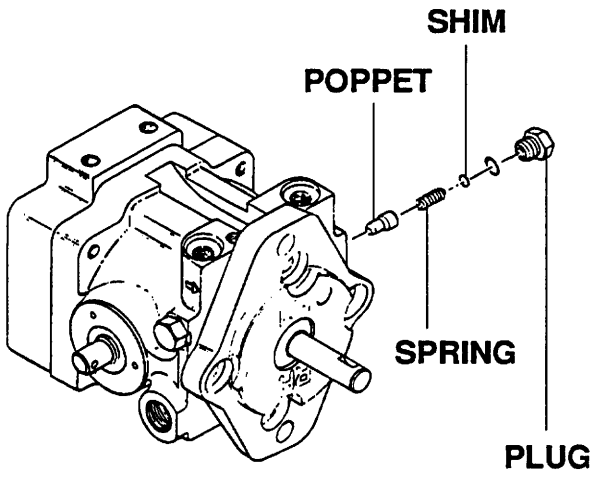


ACTUATOR CYLINDER

INSPECTING CHARGE RELIEF VALVE

Remove plug, then slide the spring and poppet out of the housing. Do not alter the shims or interchange parts with another valve. Inspect the poppet and seat in housing for damage and remove any foreign material in the valve area. Replace parts as required and install into housing bore.

LIP SEAL REPLACEMENT



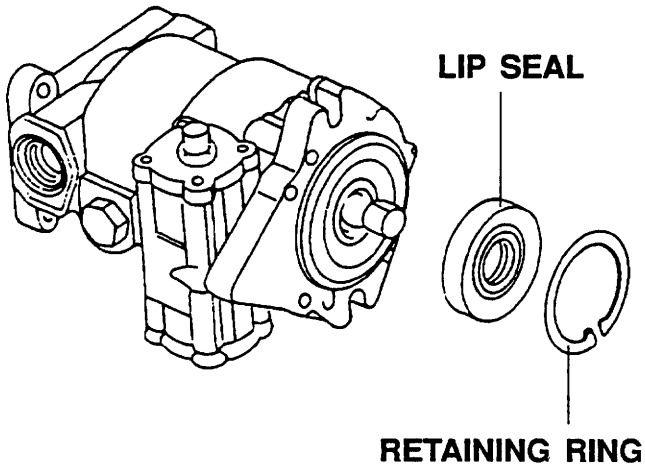
CHARGE RELIEF VALVE

Lip type seals are used throughout the transmission. These seals can be replaced without disassembling of the transmission; however, replacement of either the input or output seal requires removal of the transmission from the machine.

1. Pry the seal carefully out of the housing bore, using care not to distort the housing or damage the bore or the shaft. Once removed, the seal is not re-usable.

2. Prior to installing the new seal, polish the shaft extension, wrap it in thin plastic and lubricate with hydraulic oil to insure that the seal is not damaged during assembly. Slide the seal over the shaft and press it into the housing bore.

3. In the case of trunnion shaft seals, it is necessary that the retaining rings and washers be removed before removing the seals. The washer should be replaced if it is noticeably bent or distorted.



LIP SEAL

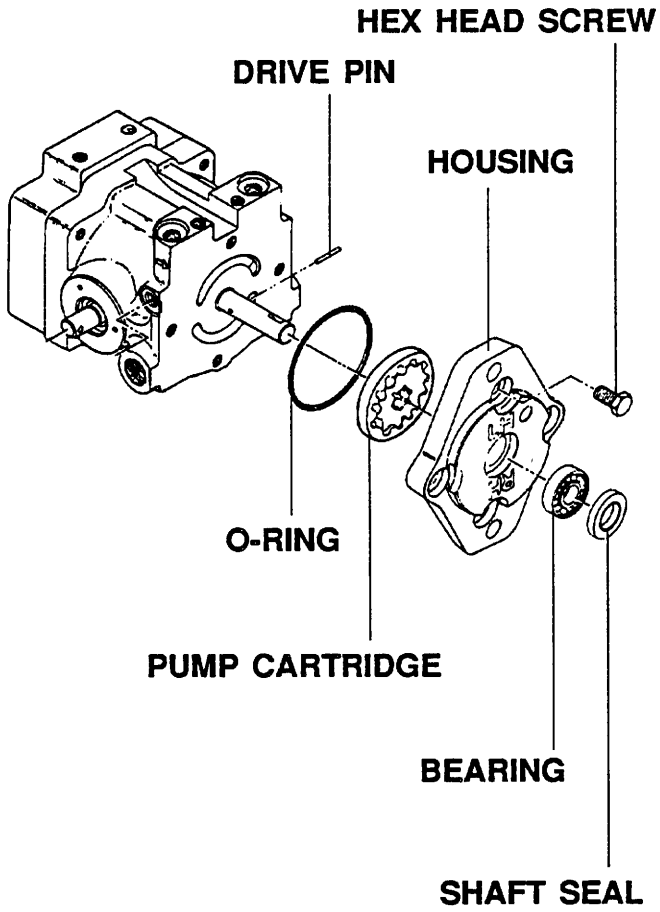
CHARGE PUMP REMOVAL AND INSTALLATION

1. Note the orientation of the charge pump housing to adjacent housing and either scribe a line or make punch marks to insure proper location. Clean shaft extension to remove all sharp edges, burrs and abrasive residue to prevent shaft seal damage.

2. Remove hex head screws and slide the housing assembly over shaft holding the charge pump (gerotor) cartridge and remove drive pin. Remove shaft seal and bearing from housing only if replacement is necessary.

3. Examine the wear surfaces of pump cartridge for excessive scratching or heavy wear patterns. Replace both parts of this cartridge if necessary. Do not replace or interchange individual parts within the cartridge. The drive pin should always be replaced. Visually inspect bearing, O-ring, and shaft seal and replace as required.

4. Coat both sides of pump cartridge and housing face with hydraulic oil. Install drive pin into hole in shaft, then slide pump cartridge into place. Wrap the shaft extension with plastic and then coat with hydraulic oil to prevent damage to shaft seal. Place O-ring into housing assembly, then slide assembly into position over shaft. Line up location marks, then insert and torque screws.



DRIVE PUMP INITIAL START UP PROCEDURE

1. Prior to installing the transmission, inspect for damage during shipping and handling. Make certain all circuit components are clean prior to installing and filling with fluid.

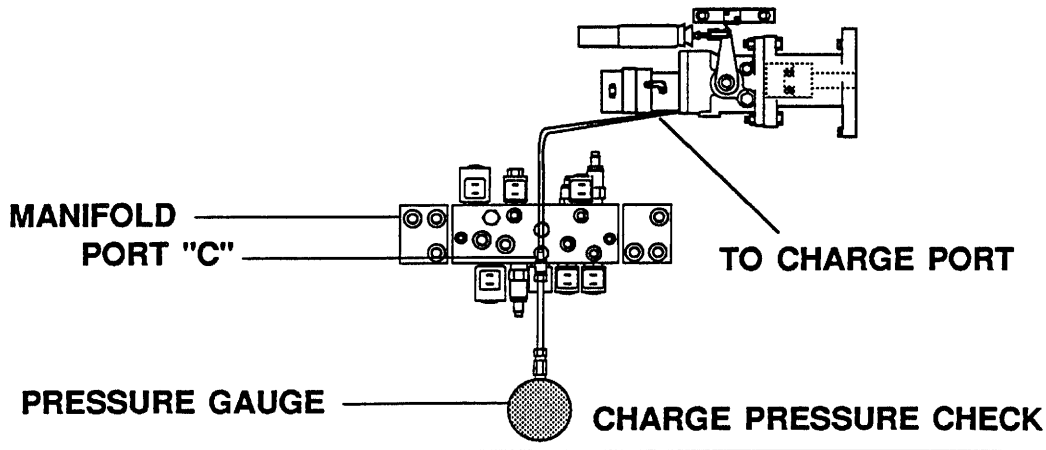
2. Fill the reservoir with recommended hydraulic fluid which should be passed through a 25 micron (nominal) filter prior to entering the reservoir.

3. The inlet line leading from the reservoir to the pump housing on the transmission must be filled prior to start up. If gravity feed does not fill up this line, it must be filled manually. Check inlet line for properly tightened fittings and be certain it is free of restrictions.

4. Place the control lever in neutral. **The control lever must be in neutral during initial start up.** Major transmission damage could result from control movement prior to system charge.

5. Remove the plug from the charge pressure port and slowly turn the input shaft (hand cranking is recommended) until fluid flows from this port.

6. Install a pressure gauge (1000 PSI) in the tee in charge port "C" (which has a line to the charge pump) in the manifold with a short section of hose and a snubber needle valve to dampen pulsations. Charge pressure should read 70-225 PSI at startup.



7. Start the engine and run at the lowest possible RPM until normal charge pressure has been established.

8. Once the proper charge pressure has been established, increase the speed to full RPM. If charge pressure is not maintained (it may increase but not decrease), shut down the system and determine the cause.

9. Slowly move the control handle forward and reverse. Run system at full input and output speeds in both directions and observe charge pressure.

10. Operate system for at least fifteen (15) minutes then shut down and replace inlet filter. Remove gauge and plug port. Check fluid level in reservoir.

11. Transmission is ready for operation.

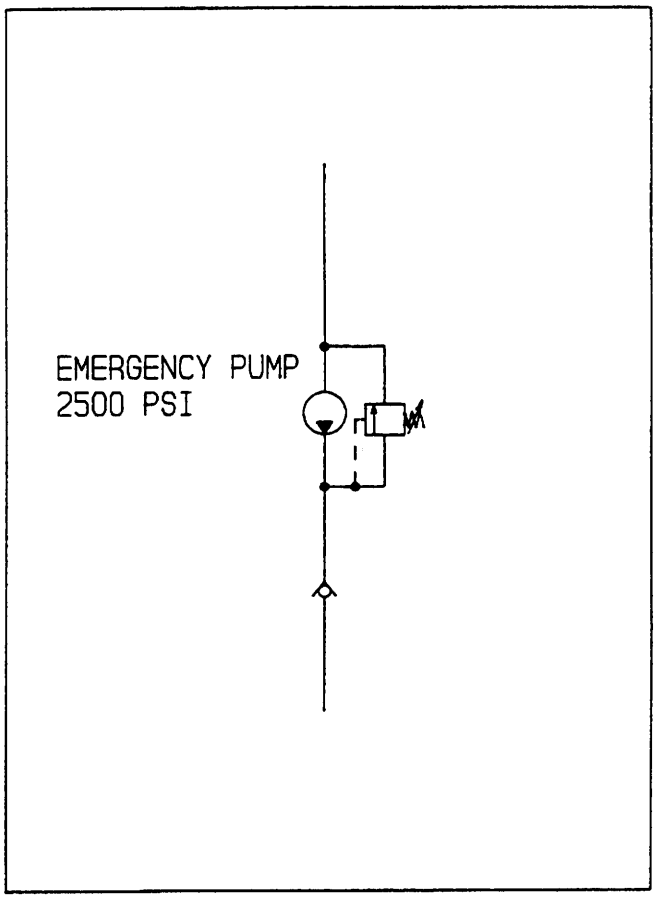
EMERGENCY SYSTEM AND PROCEDURES

WARNING

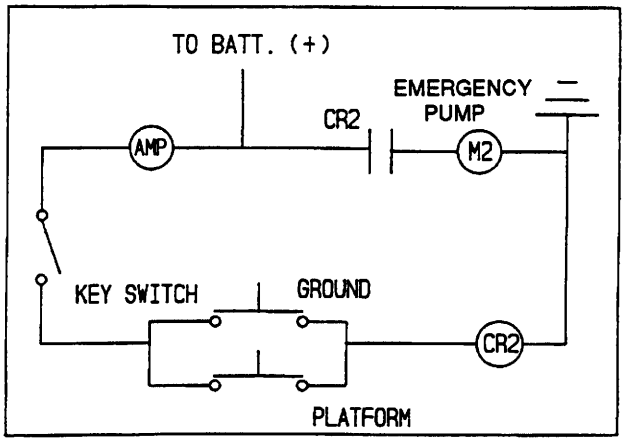
IF THE ENGINE FAILS WHILE THE OPERATOR'S PLATFORM IS RAISED AND/OR EXTENDED, DO NOT ATTEMPT TO CLIMB DOWN THE BOOM ASSEMBLY. SERIOUS INJURY MAY RESULT.

EMERGENCY ELECTRIC PUMP

Each Constructor has an emergency pump which can be operated from the operators platform or at the ground control station. To safely return the platform to the ground position, the operator simply turns and holds the emergency pump switch to the on position and operates the boom control levers to lower each boom section.



Hydraulic Schematic



Electrical Schematic

EMERGENCY DRIVE FUNCTION

The emergency pump will not provide control or operation of the drive or steering functions. Should it be necessary to move or steer the unit, you must do the following:

NOTE

Unit must be blocked or attached to the tow vehicle prior to the following steps.

1. Remove drive shaft from rear axle.

2. On front axle, turn steering wheel hub release knobs in center of wheel hubs to free position. Remove steering cylinder rod end pin from steering linkage, allowing steering wheels to track tow vehicle.

OPTIONAL TOWING PACKAGE

Disengage steering wheel drive hubs by turning knob in center of wheel hub. Pull lever provided to disengage rear drive axle and pull control valve to allow steering wheels to track tow vehicle.

EMERGENCY SITUATION AND LOWERING

SITUATION:

Platform elevated, operator in good health but unit will not respond to platform controls.



DO NOT TRY TO CLIMB DOWN THE BOOM. HAVE AN EXPERIENCED OPERATOR USE THE EMERGENCY PUMP TO SAFELY LOWER THE PLATFORM AND REPORT THE INCIDENT TO YOUR SUPERVISOR IMMEDIATELY.

POSSIBLE CONDITION:

1. One or more functions out of control.

2. Movement from unselected control lever.

3. Function will not stop unless power is switched off.

CORRECTIVE ACTION:

1. Remove foot from foot pedal.

2. Turn off platform power switch immediately.

3. Evaluate the nature of the failure, return to the ground if possible. If the condition will not allow you to return to the ground, contact an experienced operator to lower the machine using the emergency pump and lowering procedure.

4. 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. Have someone summon first aid or rescue squad to render "First-Aid" to the operator.

2. Attempt to talk to operator before taking any rescue measures.

3. Check, if possible, to see if operator is in a pinned position before attempting emergency lowering procedure.

4. Lower the platform using the emergency lowering procedure after establishing that the machine is not in contact with live power lines.

EMERGENCY SITUATION AND LOWERING CONTINUED

SITUATION:

Platform in contact with live power lines - operator incapacitated.

WARNING

DANGER!!! DO NOT TOUCH UNIT!!!!

CORRECTIVE ACTION:

1. Contact local power company 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. Use the emergency lowering procedure to bring platform with operator to a safe location to render "First-Aid".

NOTE

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

ELECTRICAL SYSTEM

The electrical system is discussed by components or sub-systems.

12 VOLT BATTERY

One 12 volt battery supplies the electrical current required to operate the electrical circuit. The battery is located on the superstructure.

A. Battery Replacement.

1. To remove the battery, follow these procedures:

a. Be sure all power is shut off to the machine.

WARNING

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

b. Disconnect the battery cables.

CAUTION

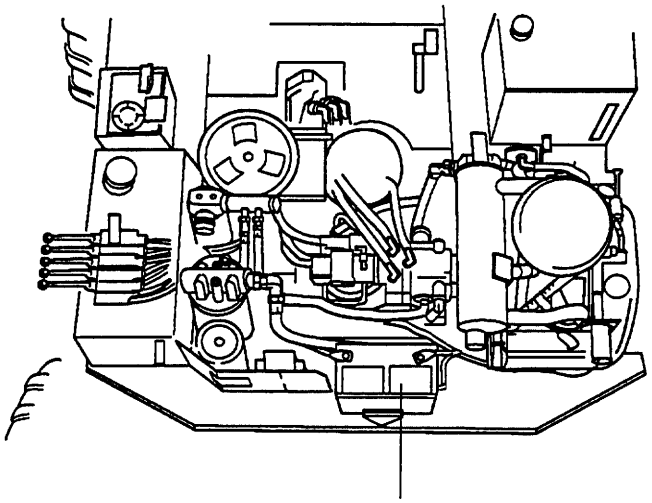
ALWAYS DISCONNECT THE NEGATIVE BATTERY CABLE FIRST.

c. Loosen the bolt holding the battery hold down bracket.

d. Slide out the battery.

2. To install the battery, follow these procedures:

a. Position the battery.



BATTERY

BATTERY LOCATION

b. Tighten the bolt holding the battery hold down bracket.

c. Connect the battery cables.

CAUTION

ALWAYS CONNECT AND TIGHTEN THE POSITIVE BATTERY CABLE FIRST.

B. Battery Maintenance.

1. Check batteries and mounting frame for signs of damage.

2. Check battery terminals for the following:

a. Corrosion - If any exists, clean connections and apply a non-metallic grease or protective spray to retard further corrosion.

b. Loose Connection - Be sure all connections are tight and that good contact is made between terminals.

c. Broken or Frayed Cables - Be sure all cable connections are good and that no loose or broken wires are exposed. Replace any which look suspicious.

3. Check battery electrolyte level. Replenish the electrolyte, if necessary.

a. Using distilled water.

b. Remove vent caps and add water.

c. Fill all cells to the proper level. Do not overfill cells. Fill to level indicator or 1/2 inch over the top of the separators if there is no level indicator. Do not use a hose to add water to the battery.

WARNING

NEVER ADD ADDITIONAL ACID TO THE BATTERY.

d. Excessive water usage indicates the presence of any one or all of the following conditions which should be checked.

1. Overcharging.

2. High temperature operation.

3. Nearing end of service life.

e. Do not allow the electrolyte level to drop below the top of the separators since this will lead to shortened battery life.

4. Keep batteries clean.

a. Wash the tops of the batteries making sure the vent caps are in place. Do not allow water or other foreign matter to enter the cells.

b. Use a solution of bicarbonate of soda and water to wash batteries if there is an accumulation of acid.

C. Battery Troubleshooting.

1. Check terminal connections for corrosion, loose connections and broken or frayed cables.

2. If terminal connections appear to be in good condition, check all cells with a hydrometer for variation in specific gravity among cells. A variation of 0.030 points or more between cells of a battery is cause for concern. Mark the low cells.

3. Recharge the battery as recommended by the manufacturer.

4. Read all specific gravities again after recharge. Be sure that the battery is fully charged at gravities between 1.250 and 1.280. If cells vary by 0.030 points or more, it is an indication of possible trouble within that battery. Replace battery.

EMERGENCY STOP BUTTONS

Two Emergency Stop Buttons (one at the ground panel and one at the platform panel) act as power "On/Off" switches. Both switches must be "On" to operate the machine. When either of the buttons is depressed, all functions stop immediately and the brake is automatically applied.

When troubleshooting the electrical circuit and there is a problem with the Emergency Stop Button, check the wiring to the button. If the wiring is correct, replace the Emergency Stop Button.

FOOT PEDAL

The foot pedal is a double-pole double-throw switch which must be fully depressed before any machine operation can be carried out from the platform. When the foot pedal is released, the electric supply to the lift solenoid valve and the drive function solenoid valve is terminated and all machine functions stop. The foot pedal is located on the platform floor.

When troubleshooting the electrical circuit and hydraulics for the platform, check that the foot pedal is depressed. Check the wiring for the foot pedal. If there is a problem with the foot pedal circuit and the wiring is correct, replace the foot pedal.

TILT ALARM

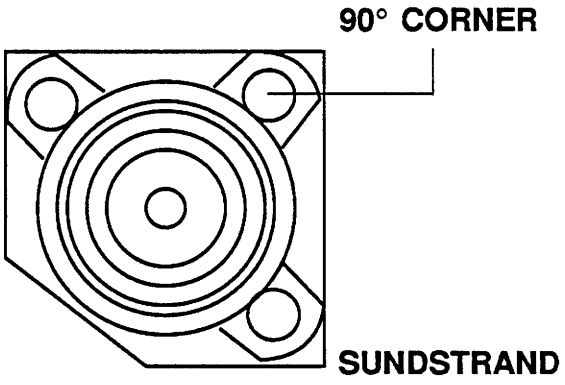
The Tilt Alarm gives an audible warning when the machine is five (5) degrees or more out of level.

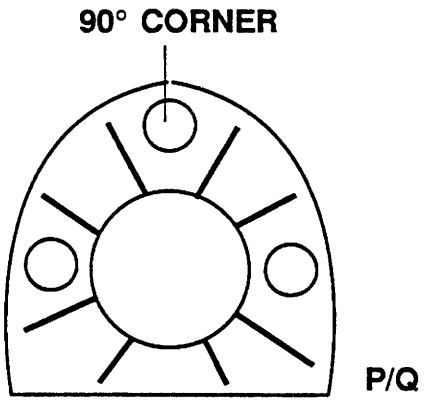
If the Tilt Alarm is not functioning, check the wiring and if correct, replace the alarm.

Tilt Alarm adjustment procedure:

1. Park the vehicle on a flat surface. Be sure it is as level as possible, with tires filled to rated pressure.

2. Level the base of the alarm by tightening the three (3) flange nuts. Each nut should be tightened through approximately one half of its spring's travel. During the remainder of the procedure do not adjust the nut on the 90 degree corner.





TILT ALARM 90° CORNER

3. With the electrical connections complete, slowly tighten the nut on one of the two corners adjacent to the 90 degree corner until the circuit is closed. The LED (Light Emitting Diode) on the underside of the housing will turn on.

4. Note the angular position of the socket. Loosen the nut, counting the number of turns until the circuit is closed again (LED on).

5. Divide this number in half. Tighten the nut by this many turns. The line determined by this nut and the nut on the 90 degree corner is now parallel to the ground.

6. Repeat steps 3 through 5 for the remaining nut. The alarm is now level.

7. Individually push down on one corner at a time; there should be enough travel to cause the alarm to trip. If the alarm does not trip in all three tests, the flange nuts have been tightened too far. Loosen the nut on the 90 degree corner and repeat steps 3 through 6. This push-to-test feature enables the operator to test the alarm without losing the alarm adjustment.

MOVEMENT ALARM

The Movement Alarm is activated as soon as the machine is in the drive mode.

If the Movement Alarm is not functioning, check the wiring and if correct, replace the alarm.

RELAYS

There are eight (8) relays identified by function (refer to electrical schematic):

1. Tilt Sensor and Tilt Horn
2. Ignition (Source Relay)
3. Time Delay (Starter Cutout)
4. Travel Speed - CRTS (Latch Relay) - Shift
5. Shift Sense
6. High Throttle
7. Engine Start
8. Emergency Pump

CIRCUIT BREAKER

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

MECHANICAL

Mechanical maintenance procedures for the Constructor is discussed by systems and components.

TIRES

The standard tires are pneumatic 38.5 - 16.5 LT 8 Ply with 55 PSI pressure. Check tires for correct pressure, cuts or other worn areas. Any tire faults must be corrected before further machine operation.

There is an option for foam filled tires. Check tires for any significant sidewall or visible damage.

A. Change Tires

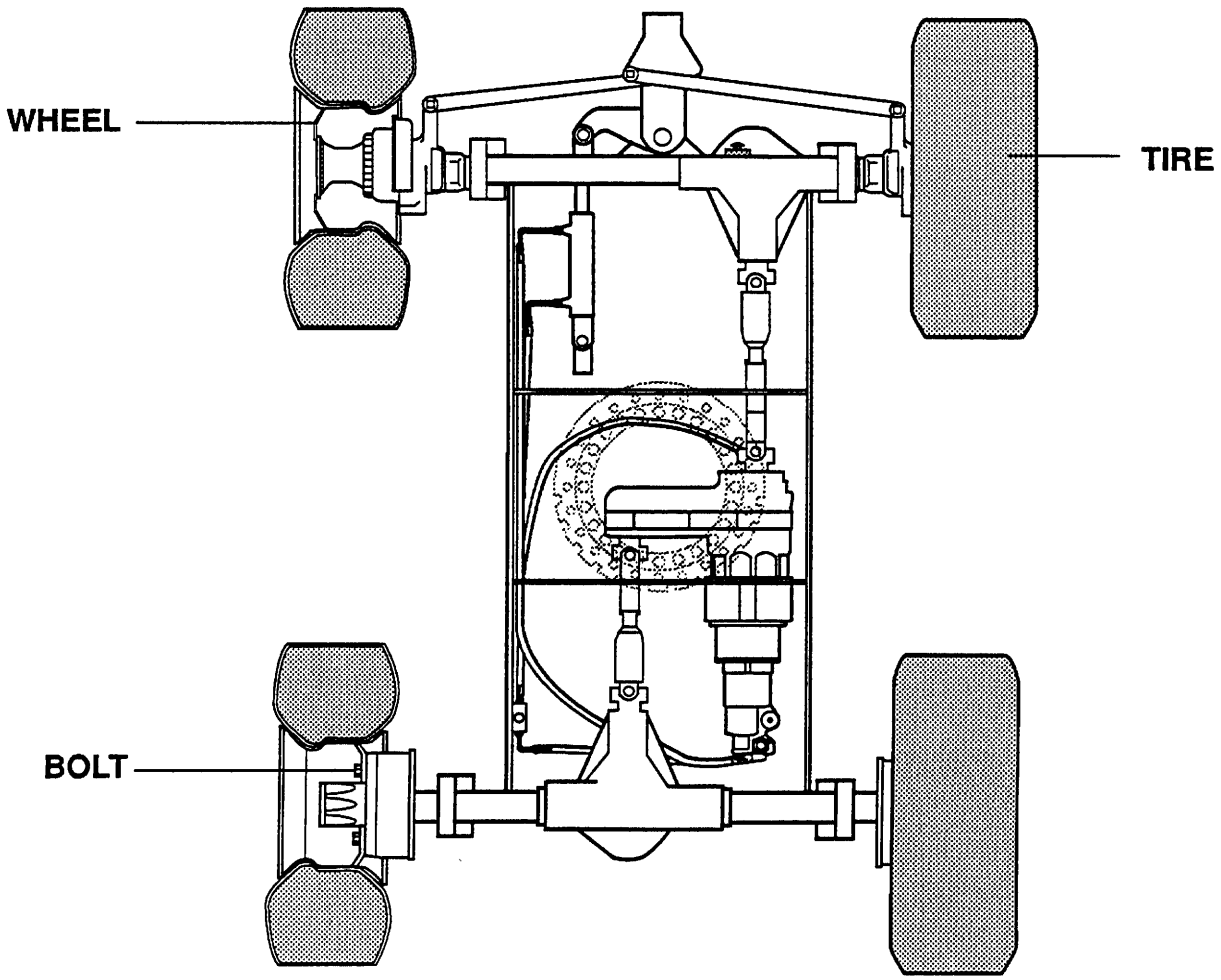
When a tire change is necessary, remember to block the machine before you jack-up the machine. Loosen and remove the nuts. Pull the wheel and tire off and replace the tire. Install the nuts and torque (120 ft. lbs.) Lower the machine and remove the blocks.

⚠ CAUTION

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

WHEELS AND BOLTS

Check the security of the wheel nuts (120 ft. lbs. torque) and examine the rims for damage.



TIRES AND WHEELS

DRIVE ASSEMBLY

A. Axles

Check the mounting bolts for tightness and the differential for oil leaks. Oil should be level with the filler hole. Top off with EP-90W oil, if necessary.

B. Drive Motor

Check the Drive Motor for security. Check the hoses for security and signs of chafing.

C. Drive Shaft and Coupling

Check the drive shaft securing bolts for tightness. Check the drive shaft for cracks and damage.

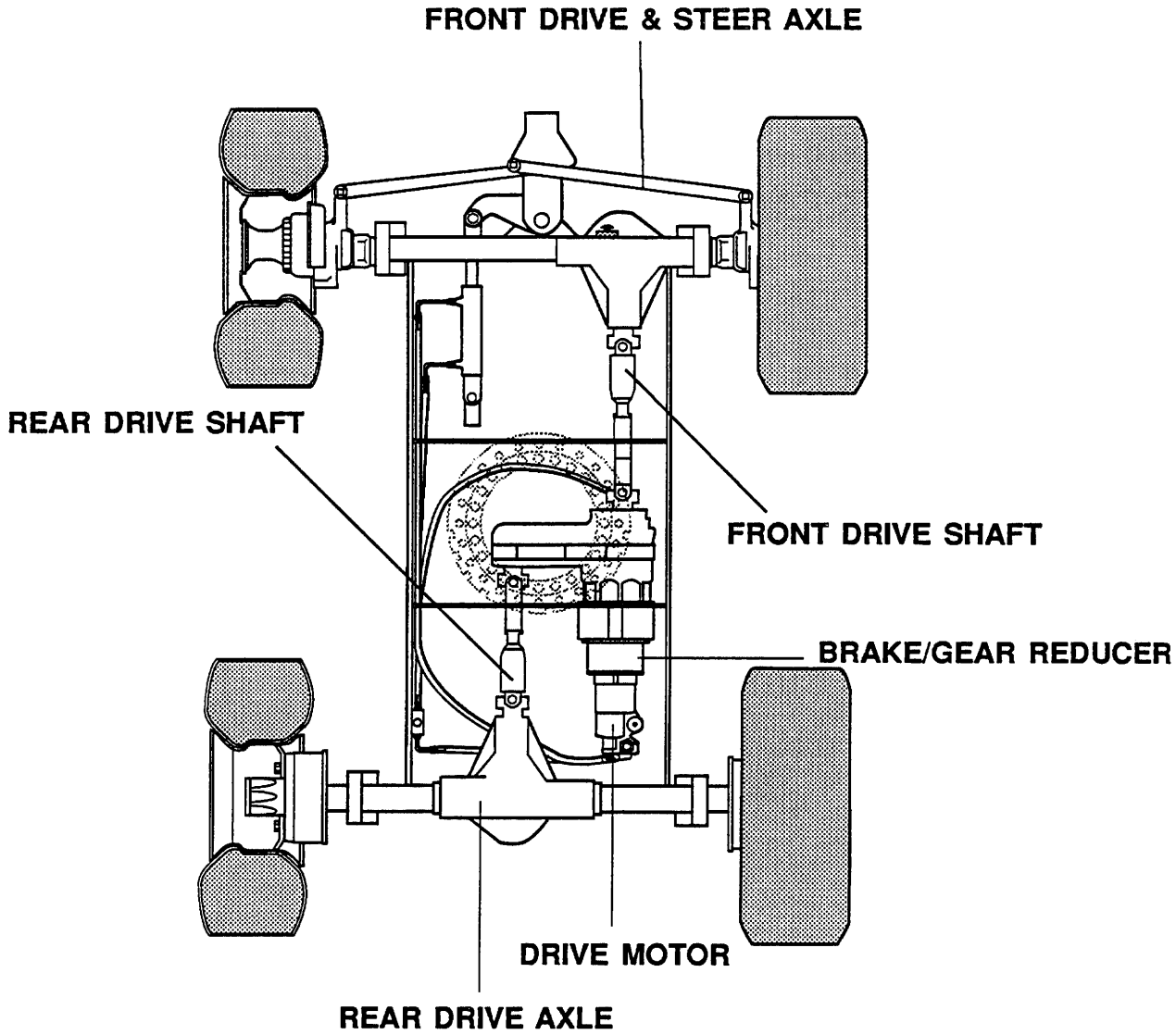
1. Drive Shaft Removal.

    a. Loosen four (4) nuts.

    b. Remove two (2) 'U-bolts'.

    c. Slide drive shaft away.

    d. Repeat the procedure for the opposite end.



DRIVE ASSEMBLY

2. Drive Shaft Installation.

a. Position the drive shaft. The two U-joints must be positioned "in phase".

b. Align drive shaft.

c. Install two (2) 'U-bolts' and four (4) nuts.

d. Tighten four (4) nuts.

e. Repeat the procedure for the opposite end.

D. Brake/Gear Reducer

The brake and gear reducer is one unit.

1. Gear Reducer.

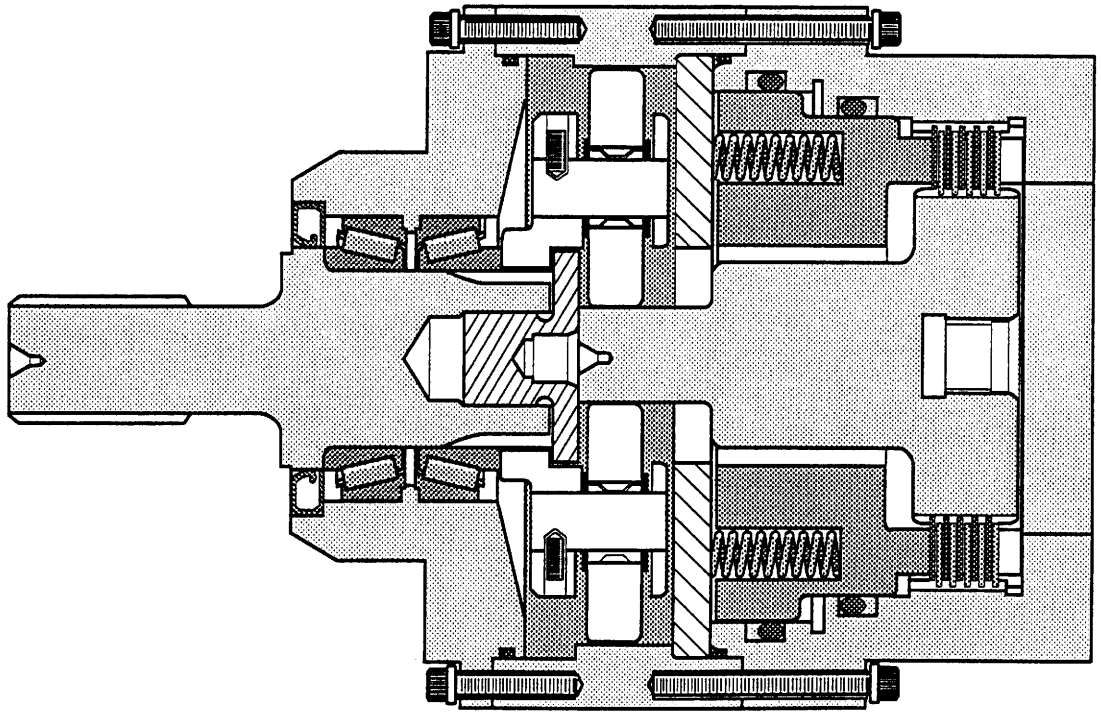
The planetary gear reducer is located next to the transfer case separated by the steel mounting wall. Check the gear reducer for security and oil leakage. Check the gearbox oil level. Top off with EP 90W oil, if necessary.

2. Brake.

The brake is located between the drive motor and the gear reducer in the gear reducer housing. System checks include damaged gaskets, clogged breather plugs and worn out discs. The brake is operated at 525 PSI but for maintenance and disc alignment, it can be released using pressure as low as 150 PSI.

⚠ WARNING

AFTER SERVICING AND/OR BRAKE REPLACEMENT, TEST THE BRAKES AND BLEED THE BRAKELINE.



BRAKE/GEAR REDUCER

STEERING ASSEMBLY

Check all pins for excess play and ensure that all circlips are in place and secure. Lubricate linkage, if necessary.

1. Steering Cylinder.

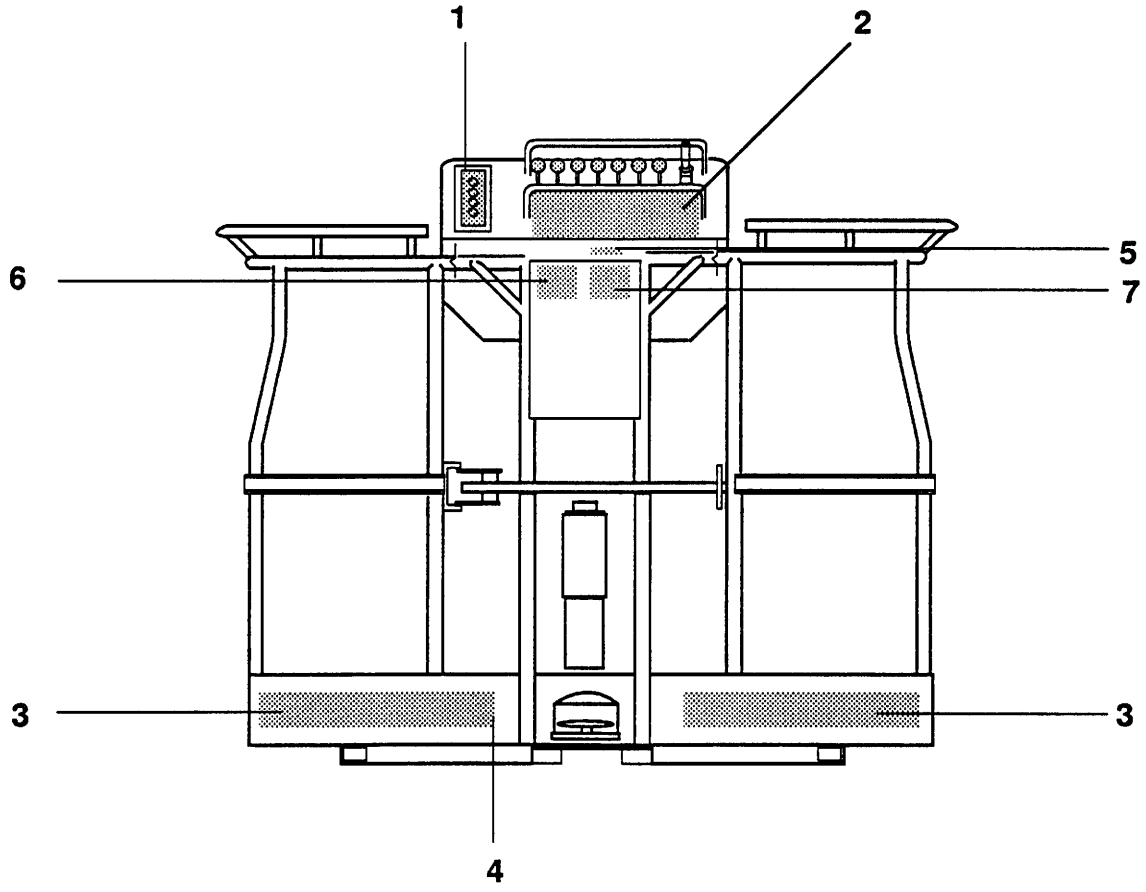
Check pins for excess play. Check cylinder and hoses for oil leakage and security.

CHASSIS AND PEDESTAL LABELS

Ensure that all labels and instructional decals are readable and secure. Refer to Parts Catalog for proper part number when ordering.

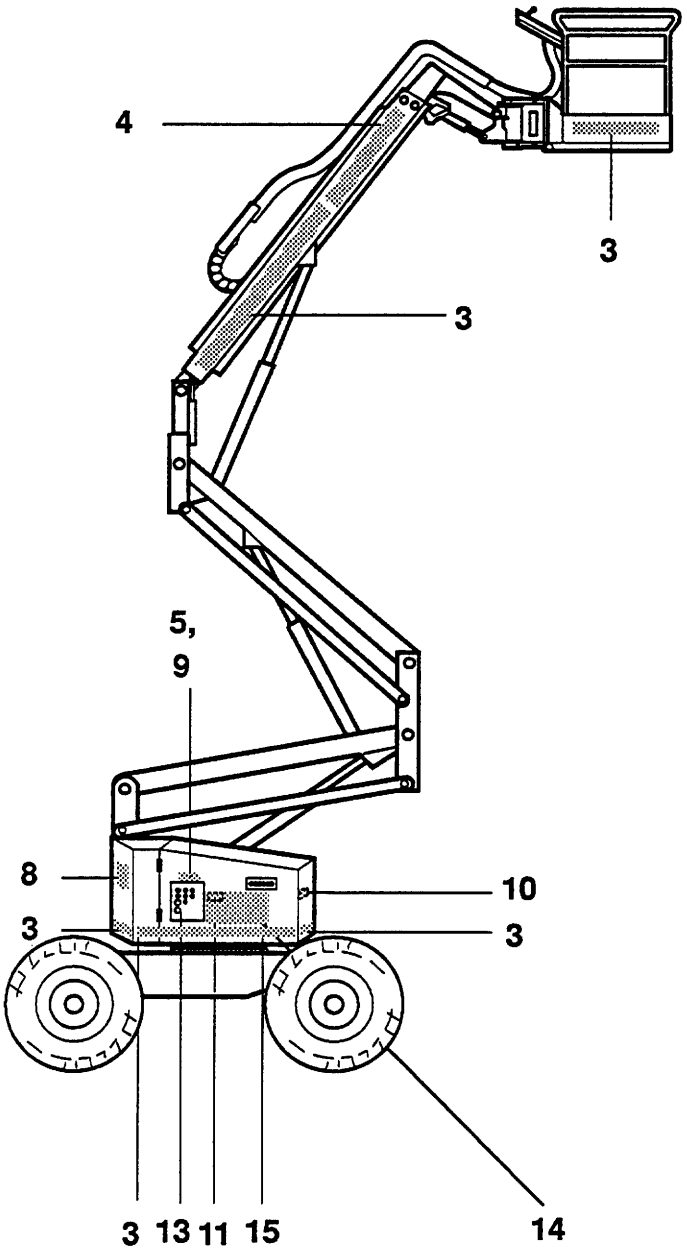
Index for decal location:

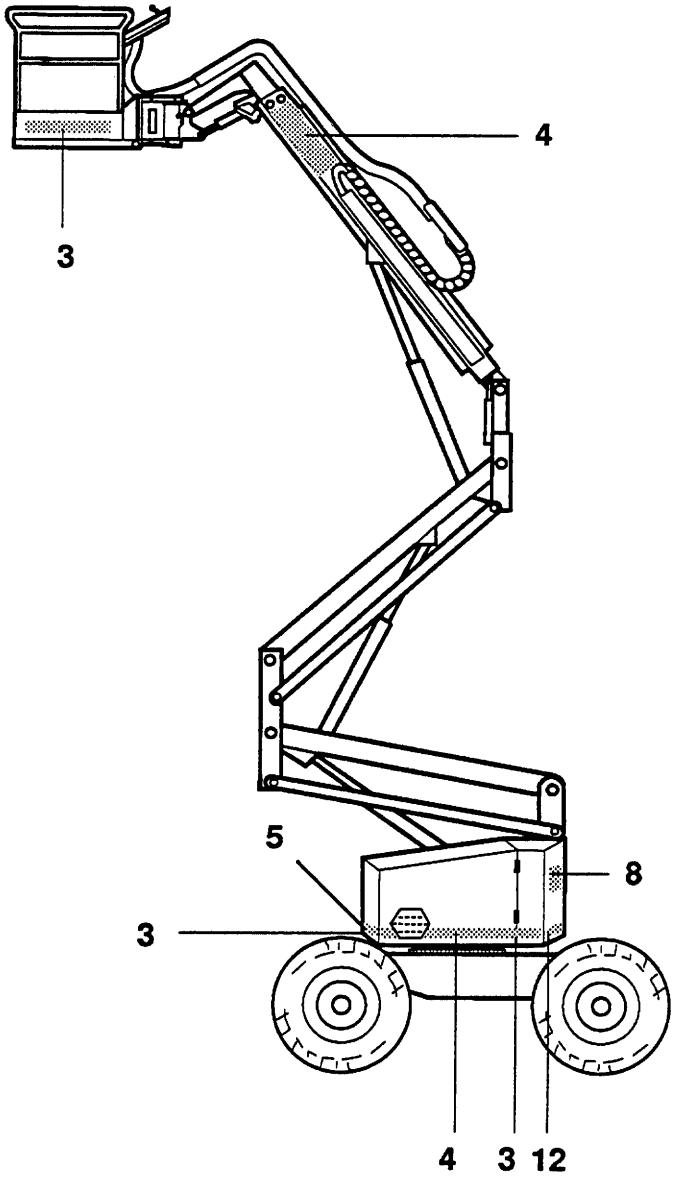
1 - Cab Control Panel Decal
2 - Cab Decal
3 - Stripping
4 - Simon Decal
5 - Disengage Lockpin Decal
6 - Beware Potential Hazard Decal
7 - Danger Electrocution Hazard Decal
8 - Danger Electrocution Hazard Decal Large
9 - 500 LBS Payload Capacity Decal
10 - Hydraulic Fluid Level Check Decal
11 - Caution For Hydraulic Fluid Use Decal
12 - AT40C Decal
13 - Ground Electrical Box Decal
14 - Ground Control Operating Instructions
15 - Constructor



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CHASSIS HOSES

The chassis hoses should be examined for rubbing and chafing, especially in the area of the rotation center.

BATTERY AND BATTERY MOUNTING

Check battery and mounting frame for signs of damage. Check battery terminals for corrosion. Check battery electrolyte level and top off if necessary.

MANIFOLD ASSEMBLY

Operate the unit and check the security of block and solenoids. Check the security and condition of hoses, cables and wire connections.

HYDRAULIC OIL TANK

Check tank for security. Check tank for leakage.

MINOR EQUIPMENT MOUNTING

Check all minor equipment for security. Check for oil leakage. Check all cables for security and damage.

PEDESTAL/SUPERSTRUCTURE HOSES/CABLES

Inspect all hoses and cables for security and damage. Check for leaks at fittings. Any damaged hoses or cables should be replaced.

PIN BUSHINGS

Check all bushings for wear. Elevate the booms and check each pin in turn for rotation or movement. If wear is detected, the bushing may need to be replaced.

Install bushing in boom prior to installation of boom in machine.

PIN REPLACEMENT

Check all pins for wear. Elevate the boom and observe each pin individually. The pins should be retained in the column and should not rotate. If any pins rotate, check that pin locking bolts have not been sheared.

1. To Fit New Boom Pins.

a. Support the boom and upper structure securely (on a boom stand or similar rigid platform).

b. Remove the retaining pin.

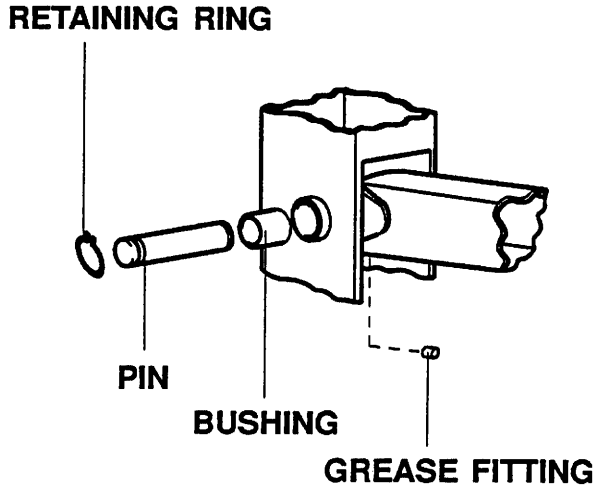
c. Drive out the boom pin. Ensure that no damage occurs to the inside bore.

d. Check bushing and replace if necessary. Fit new pin and retaining ring.

e. Apply grease to pins.

⚠ CAUTION

It is important to maintain the correct alignment between the boom and side plates during this operation - any misalignment between the two parts will make pin fitting more difficult.



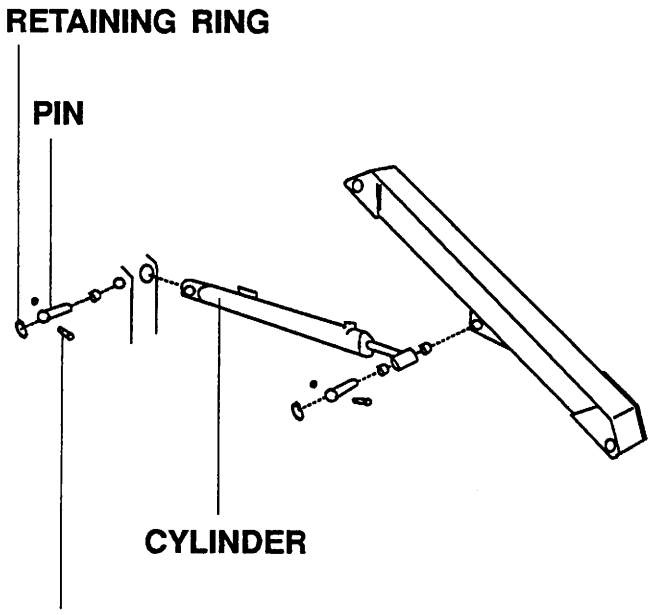
BOOM PIN REPLACEMENT

2. Pivot Pins - Lift Cylinder.

a. Support the boom. Release oil pressure to ensure there is no load on the pins.

b. Remove the pin locking bolts, support the cylinder and remove the pin.

c. Fit new pin and pin locking bolts. Lubricate bolts before fitting and apply grease to pin.



CYLINDER PIN REPLACEMENT

3. Pivot Pins - Self-Leveling.

a. Support the platform, cylinder and release oil pressure to ensure there is no load on the pins.

b. Remove the pin locking bolts and remove the pin.

c. Fit new pin and pin locking bolts. Lubricate bolts before fitting.

d. Apply grease to pin.

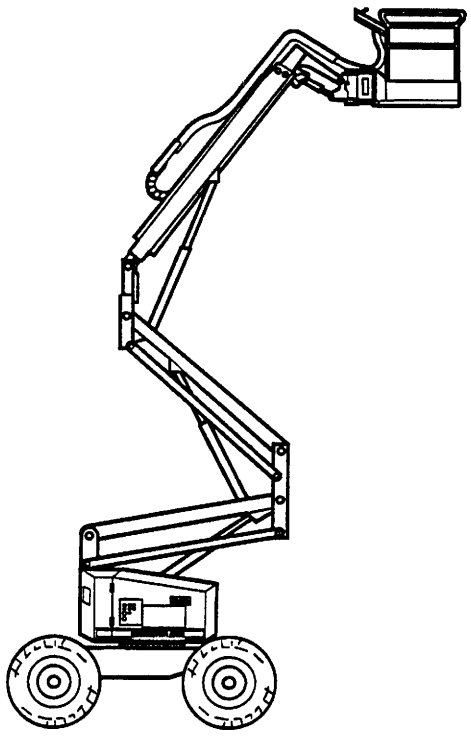
4. Pivot Pins - Extend (Telescope) Boom.

Remove the pin locking bolts, support the cylinder and remove the pin. When changing the rod pin, it may be necessary to telescope out to reveal the pin location.

SUPERSTRUCTURE

a. Steam clean the superstructure and inspect all welds and brackets.

b. Check for pins turning in their mounting (this will indicate sheared pin lock bolts).



SUPERSTRUCTURE UNIT

EXTEND (TELESCOPE) CYLINDER

The extend cylinder is a double-acting type and must be removed from the machine before any thorough check can be carried out.

1. To Remove the Cylinder.

a. Remove the pins and hoses. Extend tip boom to access rod end pin for removal.

b. Elevate the extend boom to the horizontal position. Care must be taken to prevent the tip boom from sliding out without the constraint of the extend cylinder. Secure the tip boom in position.

c. Withdraw the cylinder backwards out of the tip boom.

2. To Replace the Seals.

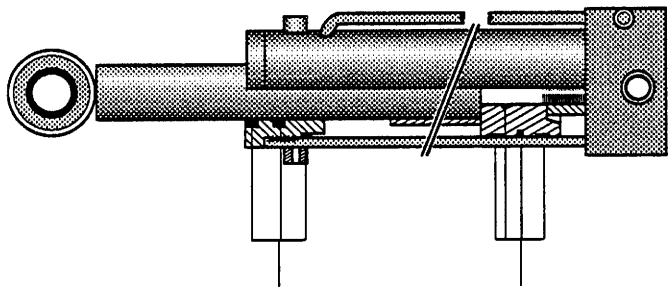
a. Remove the end cap from the cylinder. Pull the cap and rod straight out of the cylinder barrel.

b. Remove the split-pin and nut from the end of the rod. Slip off the collar.

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

d. Remove the seals and fit a new set.

e. Reassemble cylinder.



EXTEND CYLINDER

3. To Install the Cylinder.

a. With the upper boom in the horizontal position, slide the cylinder into the tip boom.

b. Install the pins and hoses.

BOOM SLIDE PADS

The nylon slide pads should be checked for wear, as follows:

Telescope in and check the gap at the top of the tip boom, between the inner and the outer, at the rear of the extend boom.

Telescope out and check the same gap at the bottom of the tip boom, at the front of the base.

⚠ CAUTION

Normal gap is 1/32 " each side. The pads will require replacement if 1/8 to 1/4" is worn off. Generally, only the bottom pad in the base section and the top pad in the tip section will require replacement.

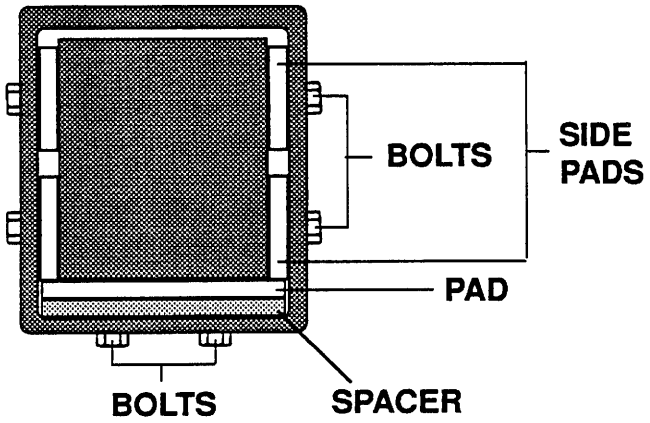
1. To Replace the Front Slide Pads.

a. Loosen the bolts to the lower front pad spacer and pad. Remove the pad. (You will have to support the tip section to remove the load from the lower pad.)

b. Replace the pad by hammering into place. Bolt pad and spacer back into position.

c. Repeat this procedure for the other pads if replacement is required.

d. Remove support of tip section.



FRONT SLIDE PADS

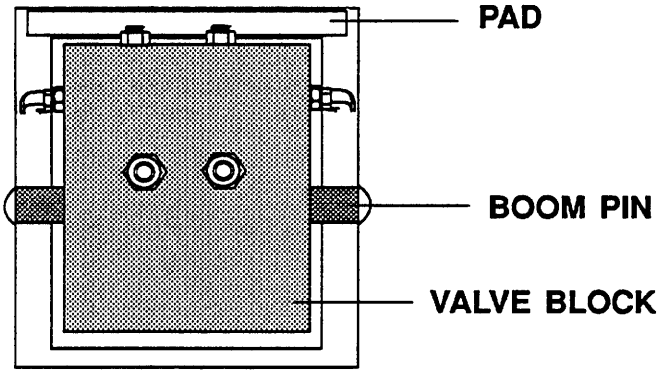
2. To Replace the Rear Slide Pads.

a. Fully retract tip boom. Remove rear extend cylinder pins and extend cylinder out of rear boom.

b. Access can now be gained to rear upper pad. Remove bolts and remove pad to rear of boom.

c. Replace pad and bolts.

d. Retract cylinder and install extend cylinder pin.



REAR SLIDE PAD

LIFT CYLINDERS

The lift cylinders are of the double-acting type. During operation, the cylinder seals should not leak, although a slight dampness from out of the rod seal is acceptable. The pivot pins should be checked for wear and the pivot locking bolts checked for security. The cylinder and holding valve should be inspected and checked for oil leakage, damage and security.

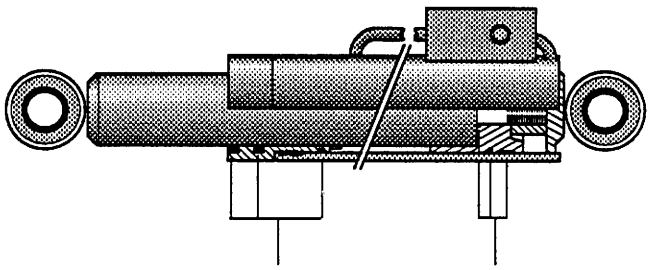
1. To Replace Cylinder Seals.

a. Support the boom and release the cylinder pressure.

b. Clean the cylinder end and loosen the cylinder end cap. Loosen the end cap by several turns.

c. Remove the rod end pin and support the cylinder barrel. Loosen the end cap and withdraw it carefully over the piston rod. Ensure that no dirt enters the system. Remove the rod/piston assembly.

d. Replace the seals and reassemble the lift cylinder. Care should be taken during this procedure to ensure that no damage occurs to the rod surface. Tighten the end cap.



LIFT CYLINDER

2. To Replace Cylinder Seals On The Bench.

The cylinder can be removed from the machine and the seals changed on the bench.

NOTE

It is recommended that the bearing ring be replaced when seals are changed. Examine the rod for scoremarks and damage. This is most easily achieved by extending the cylinder and examining the protruding rod.

3. To Check Holding Valves.

Stop the motor and activate the control levers a few times to dissipate residual pressure. If the cylinder begins to move, the valve is faulty and the cartridge should be replaced.

a. Clean the holding valves and examine for signs of leakage.

b. Check for holding efficiency, by extending the cylinder and selecting descent, via the spool valves, at either platform or ground with the engine off.

NOTE

The holding valve is pre-set at the factory and must be replaced if found to be faulty.

LEVELING CYLINDER

The leveling cylinders (master and slave) are of the double-acting type with seals on the piston and the gland. It is recommended that the seals should be replaced whenever the cylinder is serviced.

1. To Fit New Seals.

a. Lower all boom sections and support the platform. Remove the pins. Remove the cylinders from the machine.

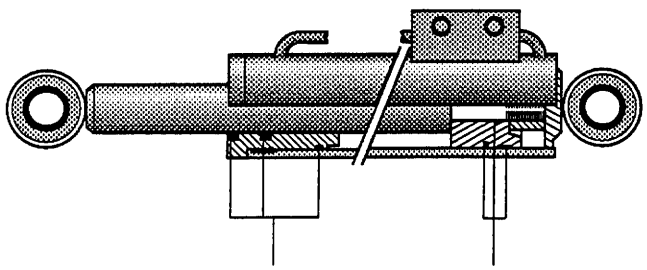
b. Remove the end cap from the cylinder. Pull the cap and rod straight out of the cylinder barrel.

c. Remove the split-pin and nut from the end of the rod. Slip off the piston.

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

e. Remove the seals and fit a new set.

f. Reassemble cylinder.



HEAD GLAND SEALS **PISTON SEALS**

LEVELING CYLINDERS

2. Procedure For Platform Leveling and Bleeding Leveling System.

If a cylinder has been replaced or the platform is not level, the following procedure should be followed:

⚠ WARNING

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

a. Check the hydraulic oil level with the machine in the retracted position.

b. Operate the machine from the platform. Start the engine and operate the platform leveling circuit full cycle, stop to stop, with platform near ground level.

c. Raise upper boom to full elevation and then fully lower boom.

d. Operate the platform leveling circuit full cycle, stop to stop.

e. Raise upper boom through full cycle and check platform leveling operation.

TOWING PACKAGE (OPTIONAL)

Connect the machine to the tow vehicle. Disengage steering wheel drive hubs by turning knob in center of wheel hub to free. Pull lever provided to disengage rear drive axle and pull control valve to allow steering wheels to track tow vehicle.

TROUBLESHOOTING

Before investigating a malfunction, check the following items:

1. The ignition is switched to 'On'.

2. Both 'Emergency Stop' buttons are out for operation. Twist to release the 'Emergency Stop' button.

3. The ground control selector switch is set to the correct position, Ground or Platform.

4. When operating from the platform, the foot pedal must be depressed to operate any function from the platform. When operating from the ground, the power switch must be held on to operate any function. However, the engine should be started without a depressed footpedal or power switch operation.

5. 12 volt battery connections are secure and the battery has sufficient charge.

6. Fuel level correct.

7. Engine operates.

8. Hydraulic oil is at the correct level.

9. 20 amp circuit breaker is not tripped.

PROBLEM: ENGINE OPERATES BUT NO HYDRAULIC POWER TO THE FUNCTIONS.

1. Check tank valves for correct position.

2. Check hydraulic filters.

3. Check for hydraulic oil leak.

4. Check oil level.

5. Examine pump assembly for mechanical defect.

6. Check pressure relief valve for correct pressure setting (pressure should be 2500 PSI).

7. Check pump for defects.

PROBLEM: SLOW LIFT FUNCTION OPERATION.

1. Check that the safe working load is not exceeded (Platform Safe Working Load 500 lbs. rated capacity).

2. Check pressure relief valve for correct pressure setting (2500 PSI).

3. Check that the hydraulic system has correct grade of oil.

4. Check engine for correct engine speed.

5. Check electrical circuit for bad or loose connections.

6. Check pins and bushings for grease and proper fit.

7. Check needle valve operation.

PROBLEM: BOOMS WILL NOT LOWER.

1. Check for mechanical restrictions.

2. Check pressure relief valve for correct setting (2500 PSI) and pressure in function circuit.

3. Check engine for correct engine speed.

4. Check for hydraulic oil leak.

5. Check holding valves for defects or sticking.

6. Check directional spools for proper movement.

PROBLEM: TELESCOPE BOOM WILL NOT OPERATE.

1. Check pressure relief valve for correct pressure setting (2500 PSI).

2. Check for mechanical restrictions.

3. Check telescope boom assembly for possible damage or for obstruction between the inner/outer boom assembly.

4. Check telescope boom for lubrication. Lubricate with silicon spray.

5. Check holding valves for proper operation.

PROBLEM: MACHINE WILL NOT SWING.

1. Check for obstruction in swing drive gear mesh.

2. Check hydraulic swing motor and gearbox for operation.

3. Check if the unit is swung to extreme (against stops).

PROBLEM: MACHINE WILL NOT STEER OR STEERING SLUGGISH.

1. Check relief valve for correct pressure (2500 PSI).

2. Check steer valve and solenoid for correct operation.

3. Check steer cylinder for leaking seals.

4. Check for loose or damaged steering linkage.

5. Check joystick electrical connections or broken wires.

6. Check axle king pins for proper lubrication.

PROBLEM: DRIVE WILL NOT OPERATE PROPERLY.

1. Check tank valves.

2. Inspect suction filter and lines for restrictions.

3. Check drive control system for proper actuator stroking pressure (525 PSI) and proper stroke action.

4. Check hydrostatic pump charge pressure (70-225 PSI).

5. Check drive system pressure (1000-4300 PSI depending upon the load).

6. Check engine speed.

7. Check hydraulic brake release pressure (70 - 225 PSI).

8. Check neutral switch adjustment - drive pump.

9. Check motor shift pressure.

10. Check limit switches for proper operation.

PROBLEM: NO FAST DRIVE.

1. Check control linkage and actuator.

2. Check hydrostatic pump.

3. Check neutral switch for proper adjustment.

4. Check drive system pressure (1000-4300 PSI depending upon the load).

5. Check drive pilot pressure (525 PSI).

6. Check limit switches for correct operation.

7. Refer to "Drive will not operate properly".

PROBLEM: FAST DRIVE WITH UPPER STAGE ELEVATED.

1. Check limit switch for correct operation.

2. Check low speed valve at manifold.

3. Refer to "Drive will not operate properly".

PROBLEM: NO "EMERGENCY STOP" FACILITY.

1. Check that the "Emergency Stop" button is operating correctly.

MAINTENANCE SCHEDULE

The Constructor is designed to require a minimum amount of maintenance. It is essential that the specified servicing and maintenance instructions are followed to ensure safety and reliability.

NOTE

The following recommendations are based on the advice of suppliers and the requirements of various safety regulations. They should be applied with discretion, depending on such factors as the amount of use and type of work, environmental conditions, local safety regulation, etc.

The hydraulic pumps, cylinders and control valves are self-lubricating internally. The superstructure slewing ring is greased packed and should be greased monthly. The pivot pin bearings require lubrication once every month. For engine maintenance, consult the accompanying engine manual for service and maintenance instructions.

NOTE

During the warranty period, minor oil leaks may occur until the various hydraulic components and pipe fittings are "seated". It is particularly important that inspection of all hydraulic components, hoses and pipe fittings for oil leaks, etc., should form part of the weekly service for the first three months of operational use and corrective action taken as required. Minor oil leaks are not considered under warranty.

HYDRAULIC OIL

We recommend Mobile DTE hydraulic oil (refer to Lubrication Chart).

⚠ WARNING

ALL PERSONS IN REGULAR CONTACT WITH MINERAL OILS SHOULD BE NOTIFIED OF THE NEED FOR THOROUGH HYGIENE AND THE CORRECT METHOD FOR HANDLING OILS TO AVOID POTENTIAL HAZARDS TO HEALTH.

Mineral oils act as solvents on the natural oil in the skin and frequent and prolonged skin contact can cause dermatitis or severe irritation. Normally, mineral hydraulic oils present no health hazard when used intelligently and it is recommended that protective clothing and proper washing facilities should be provided or be accessible.

If oil is splashed into the eyes, it must be washed out thoroughly using large quantities of water. If irritation persists, medical advice should be sought.

PIVOT PINS AND BEARINGS

All pivot points are equipped with a grease zerk for occasional lubrication. For normal working conditions, the pins would be lubricated every 100 machine hours.

In tropical climates or adverse conditions, pins and bearings may require more frequent lubrication.

ROUTINE SERVICING

1. Daily Routine Servicing.

a. Hydraulic System.

Before checking the oil level, ensure that the machine booms are stowed in the traveling position and the machine is standing on level ground. The oil level must be approximately one (1) inch below the top of the oil level gauge. Refer to the Lubrication Chart for the correct grade of oil if the reservoir requires additional oil.

After checking the oil level, ensure that the oil filler cap is secure to prevent entry of water or other impurities into the tank.

Check system operating pressure, it should indicate 2500 PSI. Turn the engine on and with \boom in the stowed position, operate the boom lower control lever - check the pressure gauge.

Check the pressure gauge on the filter assembly to see if it is indicating the element needs to be changed.

Check emergency pump pressure, it should indicate 2500 PSI. Turn the engine off and activate the emergency pump button, check the pressure gauge while operating the boom lower control lever.

b. Tire Condition.

Check that the machine tires are in good condition. Check tire pressure (55 PSI).

c. Wheel Lug Nuts.

Check the proper torque for wheel lug nuts is 120 ft. lbs.

d. Platform Door Lock.

Check the security of the platform door.

e. Battery.

Check battery terminals for corrosion and security.

f. Hose Track.

Check hose track to verify it is not bent or sagging.

g. Engine.

Check engine oil and fuel level. Check the engine manual for service.

e. Pivot Pins.

Check all pivot pins for security.

2. Weekly Routine Servicing.

a. Control Valves.

Control valves must be checked for correct operation. Check that the control valve handles automatically return to the center (neutral) position.

b. Hydraulic System.

Pressurize the hydraulic circuit and inspect the system for any signs of oil leakage, particularly at flexible hoses, connections and hydraulic components.

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

c. Steering.

Check the steering cylinder for oil leakage and the linkage for signs of wear.

d. Battery.

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

3. Monthly Routine Servicing.

a. Hydraulic System.

Allow the machine to stand overnight, or for at least eight (8) hours, without operating the pump. This will allow water and any other impurities to separate out of the oil and settle to the bottom of the tank. Drain off impurities.

Check hydraulic oil color; it should be clear amber.

Check for any leaks in the system. Check hoses for wear.

Check emergency pump (refer to daily routine servicing).

b. Chassis and Boom Structure.

Check all bolts for signs of looseness.

Inspect all welds.

c. Tires.

Check tires for cracks and damaged areas.

d. Wheel Lug Nuts.

Check torque on wheel lug nuts; it should be 120 ft. lbs.

e. Axle.

Torque bolts on axle mounting blocks to 285 ft. lbs. Check lubrication.

f. Hose Track.

Check boom catrack for any damage.

g. Swing Gear Teeth.

Remove any dirt from between the gear teeth and lubricate.

NOTE

If solvents or a high-pressure washer are used for cleaning, grease the swing gear teeth, pinion and bearing.

h. Swing Gearbox Oil Lubrication.

Grease the top bearing through the fitting located on top of the box. 2 - 3 shots should be enough. Gearbox is lubricated with an EP-00 grease. Inspect level plug and fill through case vent located on top of gearbox.

i. Swing Bearing.

Check torque of swing bearing bolts. The correct torque is 220 ft. lbs. for machines with S/N #5088 and up. The correct torque is 130 ft. lbs. for machines with S/N #5000 to 5087.

j. Swing Drive.

Check adjustment and mounting security. Correct torque of mounting bolts is 80 ft. lbs.

k. Lubrication.

Lubricate all pivot pins throughout the machine with EP N.L.G.I. #2 grease.

Lubricate all grease fittings.

Clean and lubricate all valve spool linkage with WD-40.

l. Pivot Pins Security.

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

m. Transfer Case.

Check lubricant level. Add automatic transmission fluid Type F to fill plug.

n. Planetary Drive.

Check oil level. Top off with EP 90 grade oil.

o. Drive.

Check low speed drive.

Drive control pressure is 525 PSI.

Maximum hydrostatic drive system operating pressure is 4300 PSI.

p. Engine.

Check the engine manual for service.

4. Semi-Annual Routine Servicing.

a. Hydraulic System.

Have hydraulic oil sample analyzed in a test laboratory.

Change both suction and return filter elements.

Lubricate all hydraulic valve spool linkages.

b. Machine Structure.

Inspect entire machine for damage and condition of welds.

Check torque on upper frame, swing bearing and winch drive mounting bolts.

c. Electrical System.

Check electrical mounting and hardware for loose connections. Check for worn or broken wires.

Clean and lubricate all push button switches with an electrical contact cleaner and ensure that the switches have no sticky positions.

d. Platform Leveling Cylinders.

Examine both leveling cylinders, particularly at the pivot points, for any sign of wear or damage. Ensure that the pin retainers are secure.

Check cylinders and hose fittings for leaks.

e. Boom Lift Cylinders.

Hydraulically test cylinders at fully retracted and extended positions and check that there is no movement between rod and bearing housing, or between cap and tube.

Check all cylinders for oil leakage.

f. Axle.

Drain and replace the oil. Use EP 90 oil.

g. Swing Drive.

Drain and replace lubricant. If badly contaminated, disassemble and inspect components.

h. Transfer Case.

Drain and replace lubricant. If badly contaminated, disassemble and inspect components.

i. Planetary Drive.

Drain and replace oil.

j. Test All Machine Systems.

Test the following systems:

1. Drive assembly, including drive shaft, axle, couplings and gearbox. Check operating speeds.

2. Swing bearing and swing gearbox.

3. Platform rotator.

4. All machine functions.

5. Check emergency power system.

k. Engine.

Check engine RPM (low speed/high speed).

Engine tune-up.

Check the engine manual for service.

5. Yearly Routine Servicing.

a. Swing Bearings.

Grease the swing bearing by rotating the turntable, as grease is applied. Purge bearing.

b. Hydraulic Oil.

Providing the hydraulic oil has been regularly maintained, you should only be required to change the oil once every year; but this is dependent on maintenance, amount of use, application, temperature, atmospheric conditions and other factors.

If the oil has a cloudy appearance, this indicates that water is present. If the oil has changed from clear amber to dark brown, accompanied by a strong "burnt" smell, this indicates overheating of the oil. The cause should be investigated and rectified. The presence of either condition requires a complete oil change. Have hydraulic oil analyzed in a test laboratory.

c. Hydraulic Oil Tank.

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

1. To Refill The Tank Only.

a. Ensure that the oil temperature is sufficiently high to allow the oil to flow freely.

b. Place a suitable container under the drain.

c. Remove the drain plug and drain off all the oil from the tank.

d. Remove the tank top plate for internal inspection and cleaning.

e. Clean the suction hose and plug the drain.

f. Replace the cover plate, replace the o-ring if necessary, and refill the reservoir to the correct level.

2. Hydraulic Oil.

Approximately five (5) gallons of Mobil DTE15 hydraulic oil.

For entire system flush refer to Hydraulic System Flushing Procedure page 10.

d. Structural Examination.

A thorough examination of the complete machine should be carried out for any signs of damage, corrosion, misalignment, material fractures, etc. Check for bad weld joints.

e. Platform Mounting.

Check that all mounting bolts are secure and frame members have no cracks.

f. Engine.

Check the engine manual for service.

Check all pump mount bolts.

g. Flexible Hoses.

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

6. Four Year Servicing.

a. Pivot Pins.

Examine all pivot pins.

b. Bearings.

Examine all bearings.

NOTE

The following Routine Checklists are included for your reference.

DAILY OPERATIONAL CHECKLIST

All checks must be completed before operation of the Simon Constructor.

DATE_____ **INSPECTED BY**_____

MODEL NUMBER_____ **SERIAL NUMBER**_____

GENERAL INFORMATION

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

INSPECTION & MAINTENANCE LIST

THIS CHECKLIST MUST BE USED AT THE INTERVALS INDICATED, 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	
_____	1. Check unit for any prior shift or transportation damage, i.e. missing parts, torn or loose hoses, hydraulic oil leaks, torn or disconnected wires, flat or damaged tires etc. The doors on both sides can be opened to view hidden components.
_____	2. Check engine fluid levels and fuel tank levels.
_____	3. Check hydraulic oil level with all cylinders retracted.
_____	4. Check that hydraulic pressure is as stated on the data plate.
_____	5. Check if wheel lug nuts are torqued correctly.
_____	6. Check tires for damage and proper inflation pressure (55PSI).
_____	7. Check hose track to verify that it is not bent or sagging.
_____	8. Check platform and gate latch for damage.

DAILY OPERATIONAL CHECKLIST

INITIAL

_____ 9. Check safety belt connection.

_____ 10. Check battery terminals for tightness of connection and cleanliness.

_____ 11. Check emergency pump for operation and that pressure is as stated on data plate.

_____ 12. Check pressure gauge on filter assembly. Replace element if gauge reads 20 PSI or higher. We recommend replacing both suction and return filter elements at the same time.

_____ 13. Check that no attempt had been made to override the drive interlock system by a previous operator.

_____ 14. Check warning and operating instruction decals for legibility.

_____ 15. If all pre-inspection checks have been completed, the operator is ready to test the Simon Constructor's ground control station for proper operation.

_____ 16. Check platform controls for proper operation.

_____ 17. With the platform raised, check for smooth operation of low speed drive.

_____ 18. For engine maintenance schedule, refer to your copy of the maintenance manual supplied by the manufacturer of your particular engine.

_____ 19. Inspect the work platform for structural damage and condition of welds.

MONTHLY OPERATIONAL CHECKLIST

DATE _____ **INSPECTED BY** _____

MODEL NUMBER _____ **SERIAL NUMBER** _____

GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Report all discrepancies to your supervisor.
3. A dirty machine can not be properly inspected. Keep your Simon Constructor clean.

INSPECTION & MAINTENANCE LIST

THIS CHECKLIST MUST BE USED AT THE INTERVALS INDICATED, 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

_____ 1. Perform all checks listed on daily operational checklist.

_____ 2. Lubricate all grease fittings (including drive shafts).

_____ 3. Inspect condition of hydraulic fluid in the reservoir. Oil should have a clear amber color.

_____ 4. Check hydraulic system for leaks, examine hoses for signs of excessive wear, chaffing or twisting. Replace worn hoses if necessary.

_____ 5. Inspect the work platform and boom structure for damage and condition of welds.

_____ 6. Check the low speed drive to ensure it is within specified limits.

_____ 7. Check emergency descent system.

_____ 8. Check all decals for legibility.

_____ 9. Clean and lubricate all valve spool linkages with WD-40.

MONTHLY OPERATIONAL CHECKLIST

INITIAL

_____ 10. Check pin joints and retaining bolts for security.

_____ 11. Check tires for cracks and damaged areas.

_____ 12. Check wheel lugs nuts for tightness (120 ft. lbs. torque).

_____ 13. Check for unit damage, broken welds, improper or quick fixes, (i.e. wired parts, improper parts).

_____ 14. Torque bolts (8) on axle mounting blocks to 285 ft. lbs..

_____ 15. Check for rubber wrap around hoses at moving anchor and tip boom.

_____ 16. Check boom catrac for sag and other damage; if damaged, repair the cause of damage, i.e. hoses too tight, breaking cross braces and skiving hoses.

_____ 17. Check torque of swing bearing bolts. The correct torque is 220 ft. lbs. for machine S/N #5088 and above. The correct torque is 130 ft. lbs. for machine S/N #5000 to 5087.

_____ 18. Check adjustment and security of swing drive. Correct torque of mounting bolts is 80 ft/lbs.
There should be a slight amount of backlash between the turntable and undercarriage when properly adjusted.

_____ 19. Check lubricant level in swing drive, it should be half filled.

_____ 20. Check oil level in both axles and transfer case.
(Refer to Lubrication Chart)

SEMI - ANNUAL CHECKLIST

DATE _____ **INSPECTED BY** _____

MODEL NUMBER _____ **SERIAL NUMBER** _____

GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Report all discrepancies to your supervisor.
3. A dirty machine can not be properly inspected. Keep your Simon Constructor clean.

INSPECTION & MAINTENANCE LIST

THIS CHECKLIST MUST BE USED AT THE INTERVALS INDICATED, 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

_____ 1. Have fluid sample analyzed in a test laboratory. Follow the recommendations of test results.

If fluid has been regularly maintained, it should only require an oil change once every year. This depends on maintenance, temperature, application, amount of use, and atmospheric condition.

_____ 2. Inspect the entire machine for damage and condition of welds.

_____ 3. Check operating speeds to ensure they are within specified limits.

_____ 4. Check emergency power system.

_____ 5. Check all decals for legibility.

_____ 6. Clean and lubricate all push button switches with an electrical contact cleaner and ensure that the switches have no sticky moments.

SEMI - ANNUAL CHECKLIST

INITIAL

_____ 7. Check the electrical mounting and hardware connections for security.

_____ 8. Check that engine RPM is as stated on data plate.

_____ 9. Change both suction and return filter elements

_____ 10. Check tightness of upper frame, swing bearing and swing drive mounting bolts. (Refer to monthly service for torque values.)

_____ 11. Drain and replace fluid from swing drive, axles, planetary drive and transfer case. If badly contaminated, it may be necessary to disassemble and inspect components. (Refer to Lubrication Chart for proper lubricants.)

_____ 12. Inspect entire machine for worn or damaged components. Replace as necessary.

_____ 13. Tune-up engine following the Engine Manufacturer's Manual.

_____ 14. Lubricate all hydraulic valve spool linkages.

ADDITIONAL MAINTENANCE REQUIREMENTS FOR EXTREMELY DUSTY OR SANDBLAST APPLICATIONS

INITIAL

DAILY

_____ • Inspect cylinder boots, controller boots, etc., for cuts or other damage after every 8 hours of service. Repair or replace if necessary.

_____ • Check hydraulic system for leakage every 8 hours of operation.

WEEKLY

_____ • Inspect condition of hydraulic fluid weekly. Oil should have a clear amber color.

_____ • Lubricate all grease fittings.

_____ • Check all decals for legibility.

_____ • Apply Moly-Kote 321 R bonded lubricant to swing drive pinion gear.

90 DAYS

_____ • Change hydraulic filter elements.

_____ • Change engine oil and filter.

SIX MONTHS

_____ • Have hydraulic fluid analyzed on a six month basis. Follow recommendations of test result.

_____ • Drain and replace fluid from swing drive, axles,planetary drive and transfer case.

_____ • Replace fuel filter.

MAINTENANCE CHART

NOTE

This Maintenance Chart is only to be used as a reminder of the detailed instructions given in this manual. All detailed servicing instructions must be implemented.

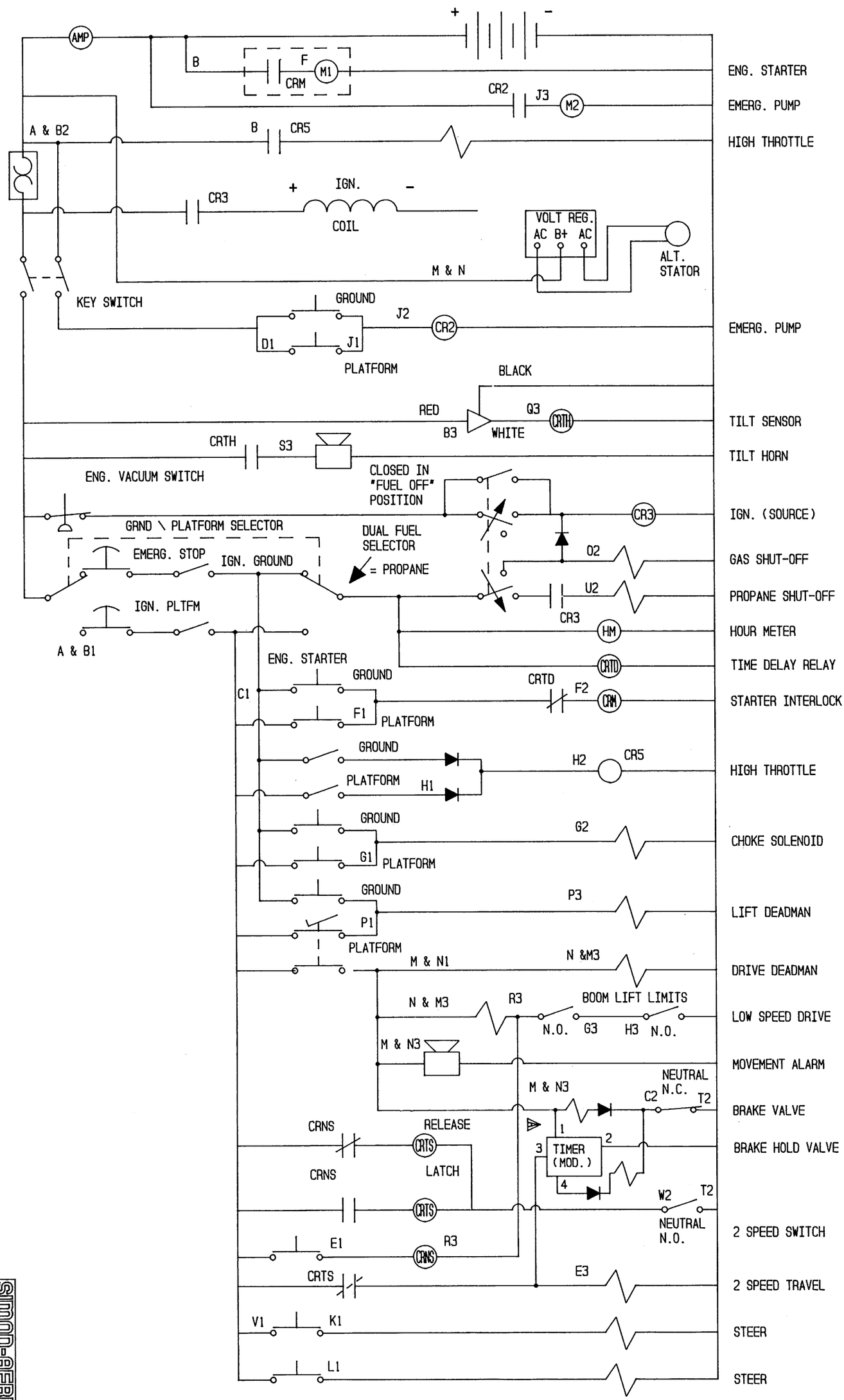
Maintenance Item	Daily	Weekly	Monthly	Semi-Annual	Annual	4 Year
Check hydraulic oil level	X					
Check hydraulic pressure	X					
Check pressure gauge on filter assembly	X					
Check emergency pump operation	X					
Check engine oil level	X					
Check fuel level	X					
Check battery terminals	X					
Check tire condition	X					
Check tire pressure	X					
Check wheel lug nuts	X					
Check hose track	X					
Check platform door latch	X					
Engine coolant level	X					
Inspect hydraulic system		X				
Check control valves		X				
Check steering system		X				
Check battery electrolyte		X				
Check pivot pin security	X	X				
Check tires	X	X	X			
Check oil contamination			X			
Check hydraulic system	X	X	X			
Check low speed drive	X	X	X			
Check gearbox oil			X			

MAINTENANCE CHART

Maintenance Item	Daily	Weekly	Monthly	Semi-Annual	Annual	4 Year
Check platform & boom structure	X	X	X			
Check for tangled hoses			X			
Check unit for broken welds	X	X	X			
Check emergency descent system	X	X	X			
Check chassis bolts			X			
Check wheel lug nuts	X	X	X			
Check torque on swing bearing bolts			X			
Check catrac			X			
Torque bolts on axle mounting blocks			X			
Lubricate all grease fittings			X			
Clean & lubricate valve controls			X			
Grease swing gear teeth			X			
Check swing gearbox oil level			X			
Check axles & transfer case oil level			X			
Lubricate pivot pins			X			
Check boom/cylinder pins			X			
Check platform leveling	X	X	X	X		
Check engine RPM				X		
Replace fuel filter				X		
Engine tune-up				X		
Check boom gland nuts				X		
Replace swing drive, axles & transfer case fluid				X		

MAINTENANCE CHART

Maintenance Item	Daily	Weekly	Monthly	Semi-Annual	Annual	4 Year
Replace suction & return filter element				X		
Test all machine systems	X	X	X	X		
Clean & lubricate push button switches				X		
Check electrical system				X		
Check operating speeds				X		
Check emergency power system	X	X	X	X		
Lubricate hydraulic valve control linkages				X		
Check swing bearing & swing drive mounting bolts				X		
Analyze hydraulic oil				X		
Check machine structure	X	X	X	X		
Check platform structure	X	X	X	X		
Check platform mountings				X		
Check pivots for wear					X	
Check boom pivot pins					X	
Check hoses for wear					X	
Change hydraulic oil					X	
Grease swing bearings					X	
Examine pivot pins						X
Examine bearings						X

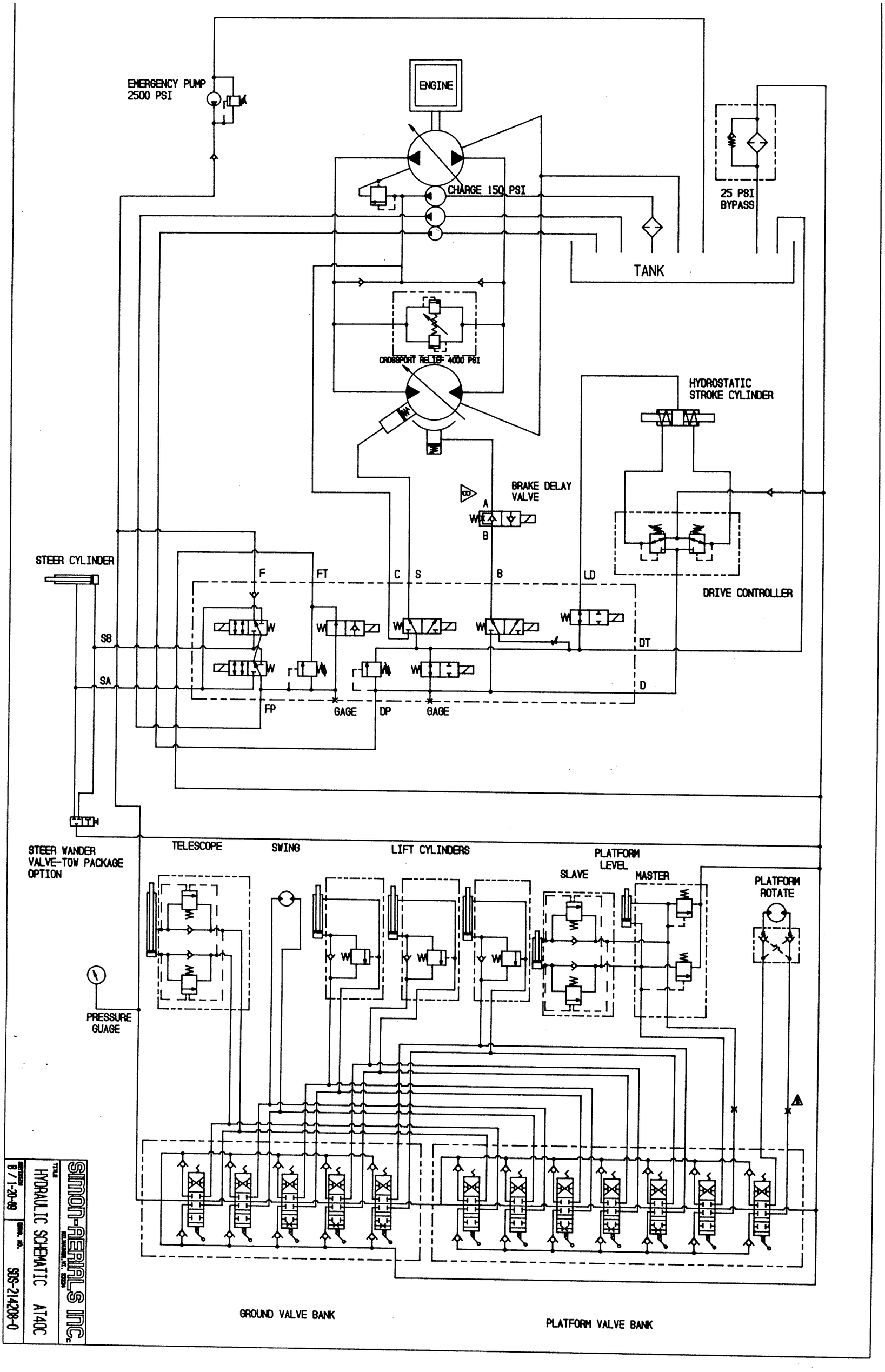


SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

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DUAL FUEL -ONAN AT40C

REVISION: A / 1-23-89

DRWG. NO.: SDS-214178-0

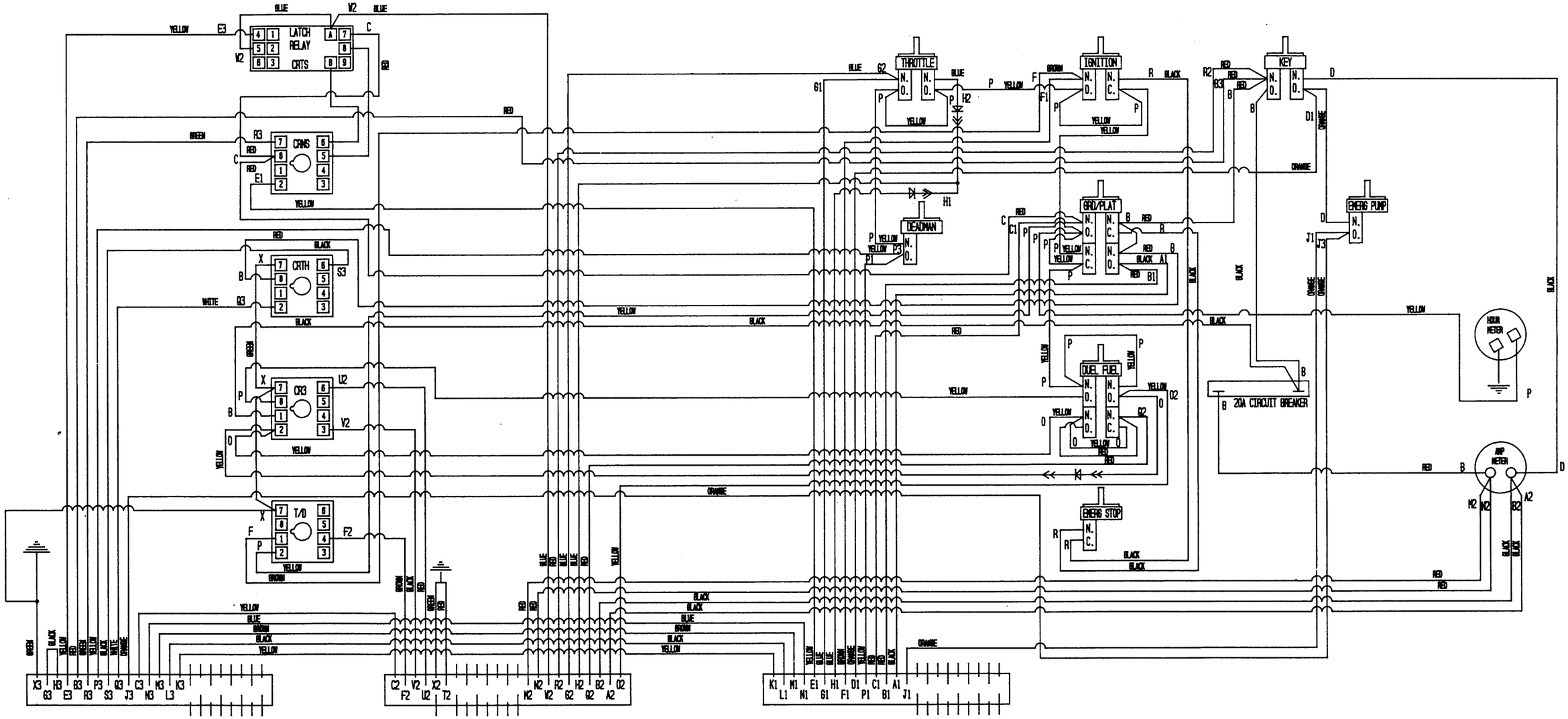


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HYDRAULIC SCHEMATIC AT40C

SDS-214208-D

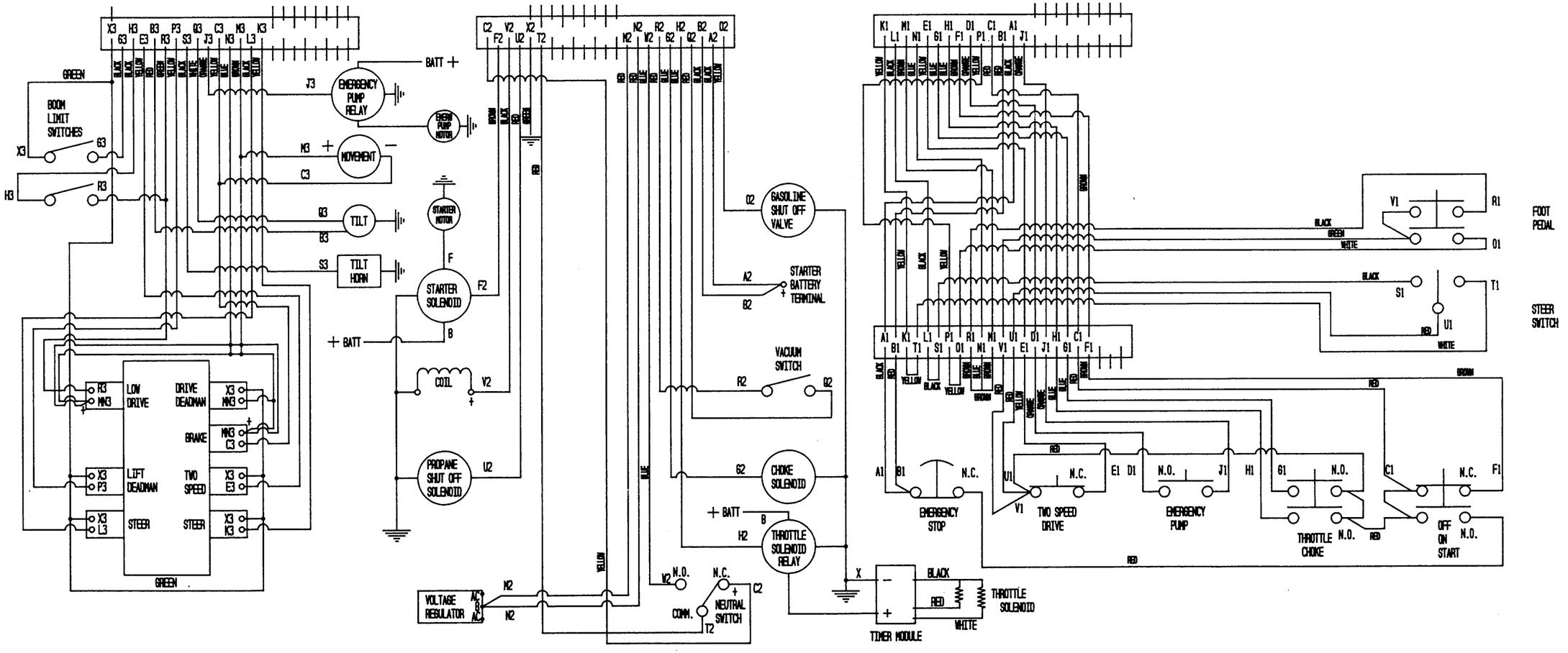
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PAGE 1 OF 2

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TITLE	
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