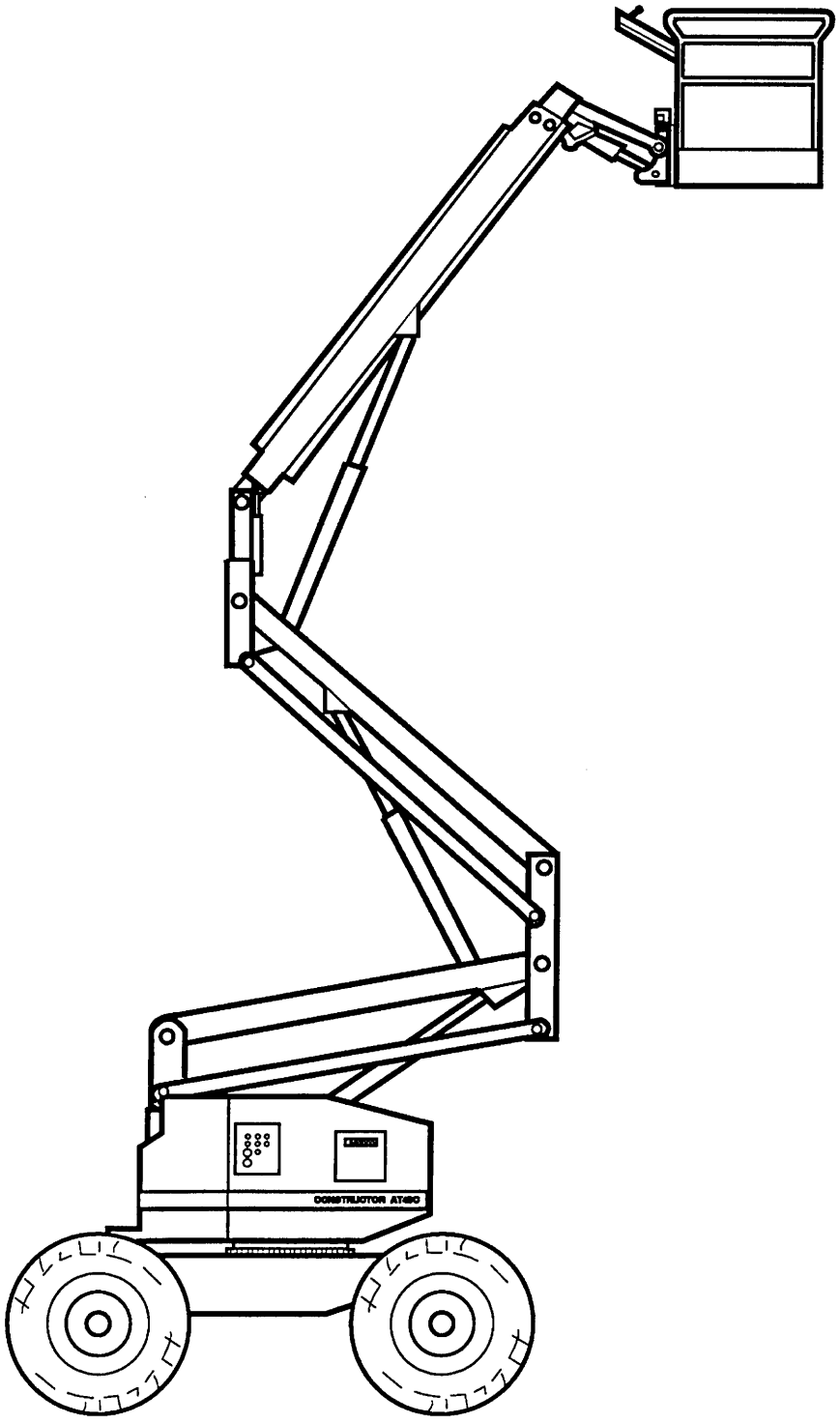
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SIMON

SERVICE MANUAL

MODEL
CONSTRUCTOR AT40C
(Prior to S/N 5000)



PART NO. 89-444007

REVISION A

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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 AND AUTHORIZE 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 WARNINGS AND INSTRUCTION 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.

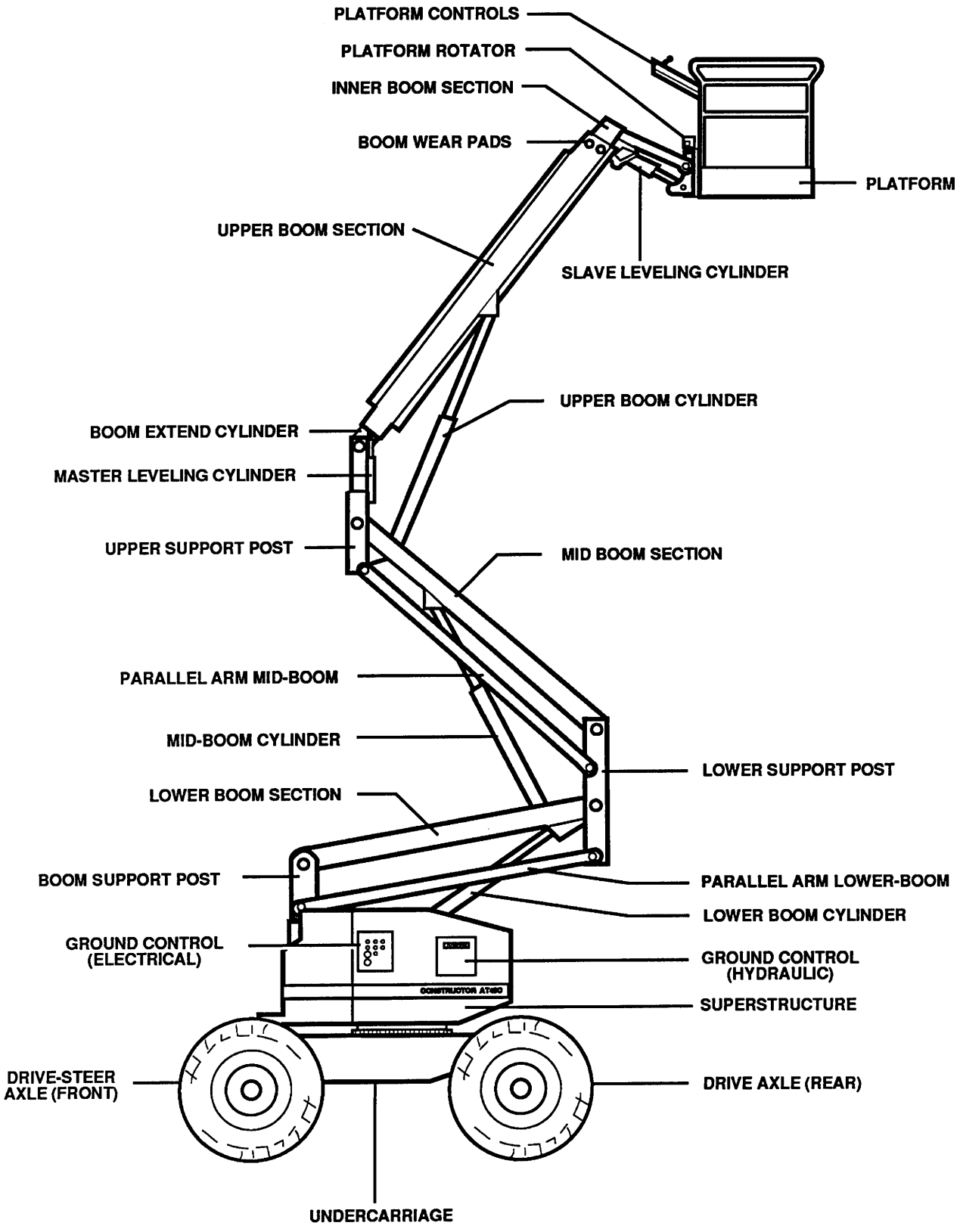
SIMON AERIALS,INC. RESERVES THE RIGHT TO IMPROVE AND/OR EXPAND FEATURES OF ITS EQUIPMENT. THEREFORE, SPECIFICATIONS AND/OR EQUIPMENT IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

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 EFFECT YOUR MACHINE.

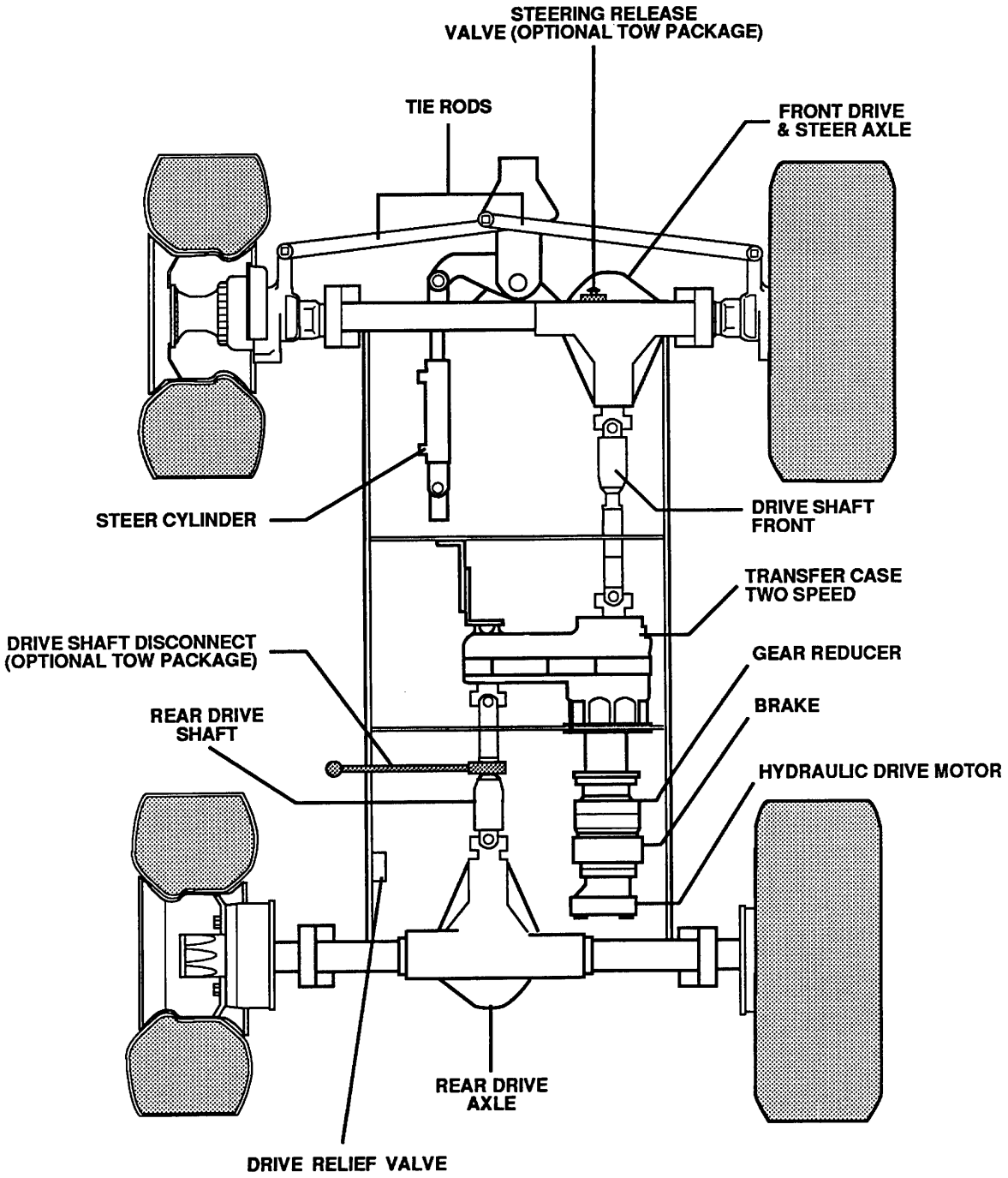
MACHINE SPECIFICATIONS
CONSTRUCTOR AT40C

WORKING HEIGHT	47' / 14.33 M
PLATFORM HEIGHT	41' / 12.50 M
HORIZONTAL OUTREACH	24' / 7.32 M
PLATFORM CAPACITY (UNRESTRICTED)	500LBS. / 227 KG
PLATFORM DIMENSIONS	.60"x30" / 1.52 M x .76 M
STOWED LENGTH	.16' 2" / 4.93 M
STOWED HEIGHT	7' 7 " / 2.31 M
WIDTH	7' 4 "/2.23 M
WHEELBASE	6'3" / 1.91 M
OUTSIDE TURNING RADIUS	16 ' / 4.87 M
INSIDE TURNING RADIUS	7 ' 3" / 2.21 M
TRAVEL SPEED-STOWED	.6 MPH / 9.6 KPH
TRAVEL SPEED-ELEVATED	.1.5 MPH / 2.4 KPH
GROUND CLEARANCE	12 " / .31 M
GROSS WEIGHT	12,500 LBS / 5,670 KG
GRADEABILITY	.. 15 °
PLATFORM ROTATION	.180°
TIRES	15 / 38.5 - 16.5 LT
HYDRAULIC DRIVE SYSTEM OPERATING PRESSURE	4000 PSI / 285 BARS
HYDRAULIC DRIVE CONTROL PRESSURE	525 PSI / 37 BARS
HYDRAULIC LIFT OPERATING PRESSURE	2500 PSI / 178 BARS
SUPERSTRUCTURE ROTATION	360° NON-CONTINUOUS

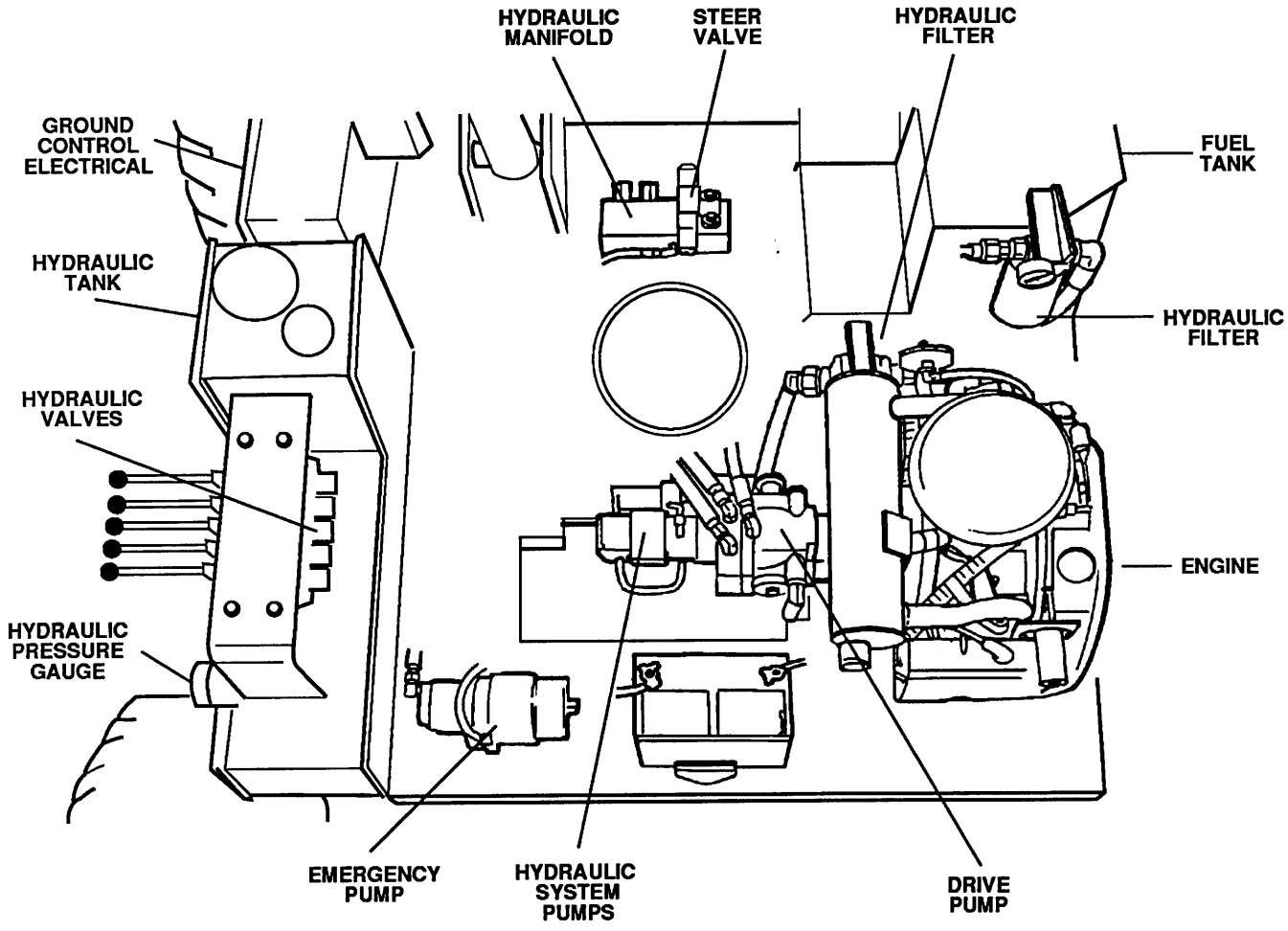
PRIMARY MACHINE COMPONENTS



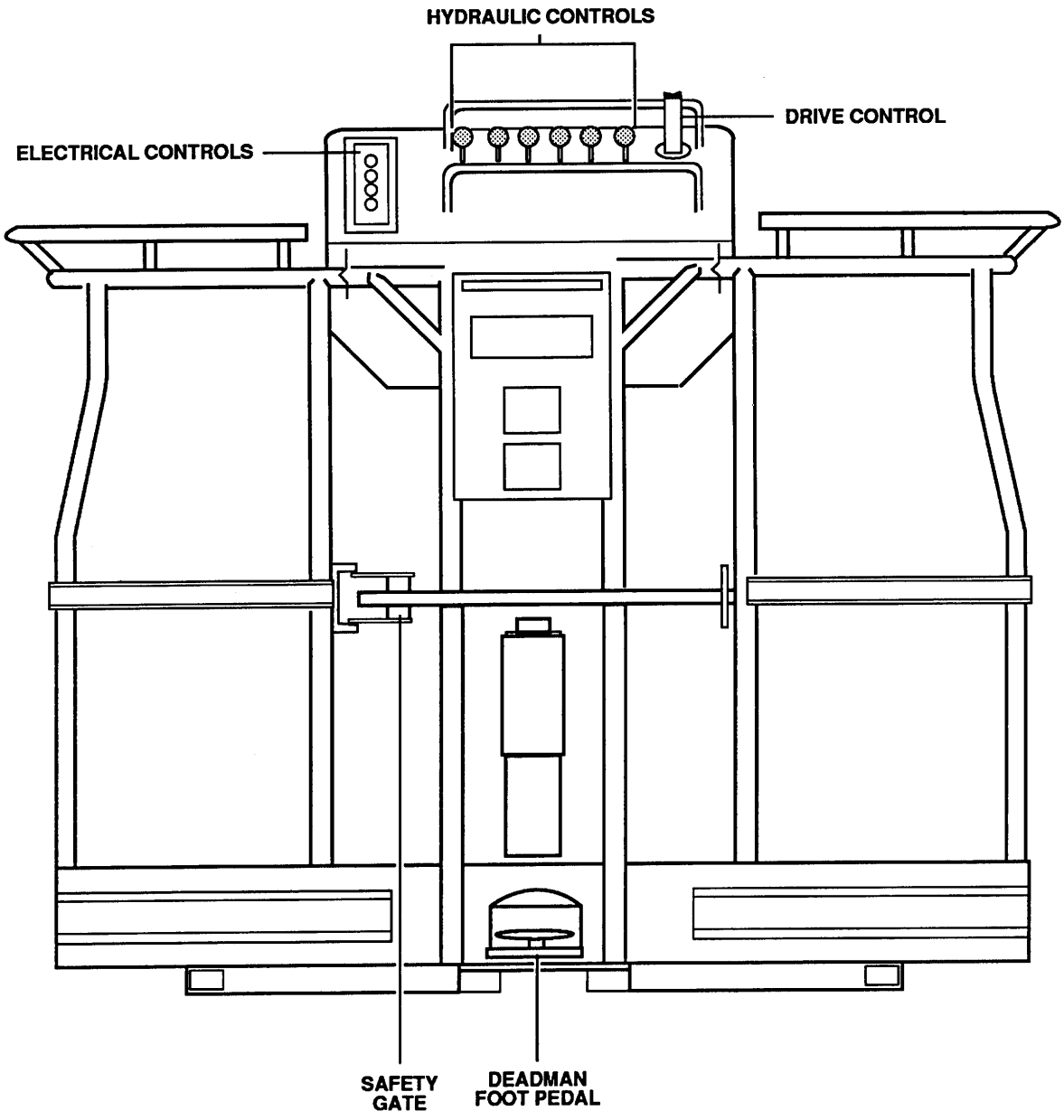
UNDERCARRIAGE COMPONENT LOCATOR



SUPERSTRUCTURE COMPONENT LOCATOR



PLATFORM COMPONENT LOCATOR



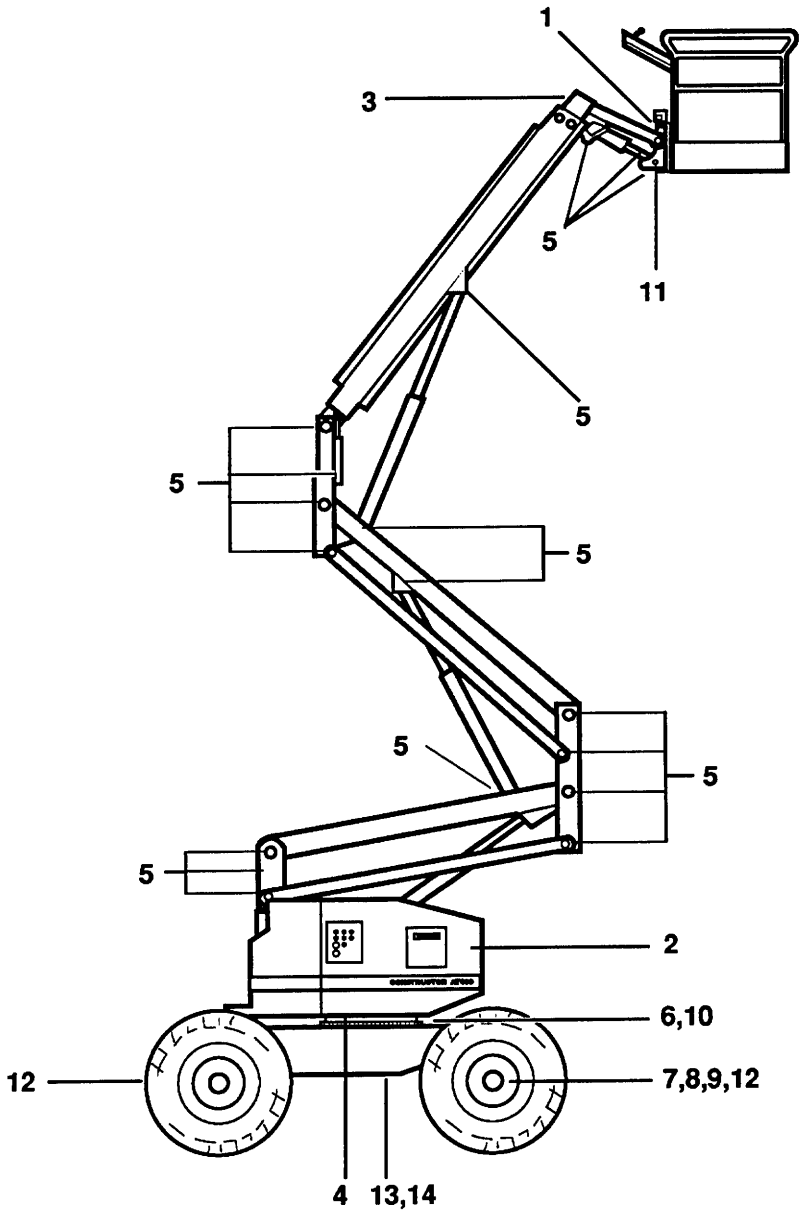
LUBRICATION CHART

NO. ON DIAGRAM	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
1	PLATFORM ROTATOR GEAR BOX	EP - 90W HALF FULL	CHECK MONTHLY OR EVERY 100 HRS.* CHANGE YEARLY OR EVERY 1,000 HRS *
2	HYDRAULIC RESERVOIR	MOBIL DTE-13 TO FULL MARK W / ALL CYLINDERS RETRACTED	CHECK DAILY,ANALYZE EVERY 6 MTHS, CHANGE YEARLY
3	BOOM SLIDE	WD-40 OR SILICON SPRAY	MONTHLY OR EVERY 100 HRS.*
4	SWING BEARING	LUBRI PLATE 630-2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
5	PIVOT PINS	EP N.L.G.I. #2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
6	SWING BEARING GEAR TEETH	EP N.L.G.I. #2 GREASE OR DRI-LUBE	EVERY 6 MONTHS OR 500 HRS.*
7	STEERING SPINDLES	EP N.L.G.I. #2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
8	STEERING HUB BEARINGS	LUBRIPLATE 630-2 CLEAN AND REPACK	YEARLY OR EVERY 1,000 HRS.*
9	STEERING LINKAGE	EP N.L.G.I. #2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
10	SWING DRIVE GEAR BOX	GEARMITE SAE85-140W TO FILL PLUG	CHECK BI-MONTHLY OR EVERY 200 HRS.* CHANGE EVERY 2 YEARS OR 2,000 HRS.*
11	PLATFORM ROTATOR SHAFT	EP N.L.G.I. #2 PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*

* WHICHEVER OCCURS FIRST.

LUBRICATION CHART

NO. ON DIAGRAM	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
12	DIFFERENTIAL	EP - 90W TO FILL PLUG	CHECK MONTHLY CHANGE YEARLY
13	PLANETARY GEARBOX	FP - 90W TO FILL PLUG	CHECK MONTHLY CHANGE YEARLY
14	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. Fluid discoloration is noticed in the hydraulic reservoir sight tube.

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

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

5. Valve spools at either operators station have continuous sticking problems.

6. Have hydraulic oil analyzed once a year under normal operating conditions.

7. Hydraulic oil should be analyzed every 6 months in extremely dusty or dirty operating conditions

B. Following the above guide will prevent premature component failure including pumps, cylinder seals, and drive motors.Therfore 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 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 valvebank also. These hoses should be flushed out when removed. The hydraulic oil filter should also be removed and the filter body and attaching hoses flushed out. Discard old filter element and replace with new element.

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 reinstalled 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 new oil must be installed in the 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.

F. Start engine and run at low RPM to allow oil to fill lines previously removed. Bring pump on stroke with function control available to do so. Use Care when doing this 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 systems as each function is cycled to its maximum limits.

CAUTION: Monitor the hydraulic reservoir 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 analyses.

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

NOTE: The drive motors are run by raising the wheels off the ground.

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 PUMPS

The engine driven hydraulic pumps used to operate the various machine functions are set up as follows:

A. Drive Pump

1. A hydrostatic pump is a variable displacement axial piston pump connected in a closed loop circuit to a fixed displacement axial piston motor. This pump is driven by the engine and provides oil flow to the drive motor when the pumps 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 a predetermined amount of 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 set at 4000 PSI by a cross port relief valve. Being as the pump/motor circuit is a closed loop allowing either side to be pressurized the cross port relief takes care of either direction of oil flow for forward or reverse travel.

B. Drive Motor

1. A fixed displacement axial piston motor is mounted to a two speed transfer case located in the undercarriage of the machine.
This motor is driven by oil flow provided from the engine mounted piston pump. The direction of rotations and speed of this motor depends on the flow from the pump. System pressure up to 4000 PSI 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 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 deadman 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 drive deadman valve is activated oil is directed to the operators drive controller and to the spring applied , hydraulically released brake.

D. Emergency Pump

This is a 12 volt electric pump which is used to provide oil flow to operate all lift 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 operators platform to the ground.

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 superstructure base 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 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 valve and deadman solenoid valve (normally open), back to tank. When a lift function is called for the lift deadman solenoid valve closes causing the oil flow to leave the manifold by the port marked "F" where it enters the ground control valve bank to operate a lift function. The lift deadman solenoid is in the manifold port marked number "2".

2. Port marked number "1". This port contains the lift function and steering relief valve, which is adjusted to 2500 PSI. Its purpose, as with any hydraulic system relief valve, is to prevent component damage and / or over extension of the machines capabilities.

3. Ports marked "SA-SB". These ports are used to direct oil flow from the electrically controlled steering valve mounted on top of the manifold block to the steering cylinders blank end or rod end ports to steer left or right. The steering valve is mounted on the manifold over Number 8 stamped in the block.

4. Port marked "DP". Hydraulic oil from the smaller gear pump enters at this port. Oil is allowed to flow through the manifold drive deadman solenoid valve (normally open) back to tank. When the drive function (operators platform only) is called for, the drive solenoid valve closes causing oil to flow to the port marked "D", where it is sent up the boom to the operators drive controller valve. The drive deadman solenoid valve is in Port #7 of the manifold.

5. Port Number 5. This is the solenoid valve which controls oil flow to the brake. Whenever the drive function is required this valve opens to allow oil flow to release the brake.

6. Port Number 4. This is the 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.

7. Port Number 6. 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.

8. Port Number 3. This port contains a check valve which isolates emergency pump flow from main system pump flow.

9. The only other ports used on the manifold block are the ports marked "T". There is one "T" port located at each end of the manifold where oil flow is directed back to the tank.

Check lift deadman control solenoid at manifold block.

1. Turn on main power key switch. Use a test light or meter to check for power at deadman solenoid when ground deadman switch is turned on. Electrical power must be evident at solenoid coil. If power is supplied to coil,valve should operate unless the coil is open. This can be checked using an ohmmeter across the coil leads. You should have a reading of 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 deadman switch in the platform.

Check Drive Solenoid Valve at Manifold Block

1. Turn on main power key switch. Switch ground platform switch to platform. Connect a test light or meter between wire #25 and wire #49 on drive solenoid. Turn the platform ignition switch to the on position. Press deadman pedal on platform and power should be available at wire #49 of drive solenoid. If power is available 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.

1. Turn on main power key switch. Switch ground platform switch to platform. Use a test light or 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 end for steer right and power at the other end for steer left. If power is available at both coils, check the coils using a ohm meter. The coils should read at least 6 ohms.

2. The valve spool can be shifted manually by pushing in on the center of each coil valve end. Check to see if the spool is free to shift both ways. If the valve spool is stuck or sticking, the valve will have to be removed for inspection.

Check brake solenoid valve at manifold block.

1. Turn on main power key switch. Switch ground platform switch to platform position. Connect a test light or meter between wire #25 and wire #19 on brake solenoid. Enter platform and start engine. Press deadman foot pedal, switch lift/drive switch to drive position and slowly move drive controller forward. The test light should light indicating power to brake solenoid valve. It may also be necessary to install a tee with pressure gauge in the brake line 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 test light lights and pressure does not come on, it is possible the solenoid valve coil is bad. This coil should be checked using an ohm meter. The coil should read at least 6 ohms if good.

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

3. There are two other areas in the electrical system which may cause the brake solenoid from functioning.

3a. Control relay time delay may keep the circuit open preventing the brake valve from operating.

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

Check low speed drive valve at manifold block.

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, deadman pedal pressed and drive controller moved forward a test light would light when connected between wire #75 and wire #25 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 a meter to obtain a reading of 6 ohms. Power is supplied to the low speed drive valve through the same relays as supply the brake valve.

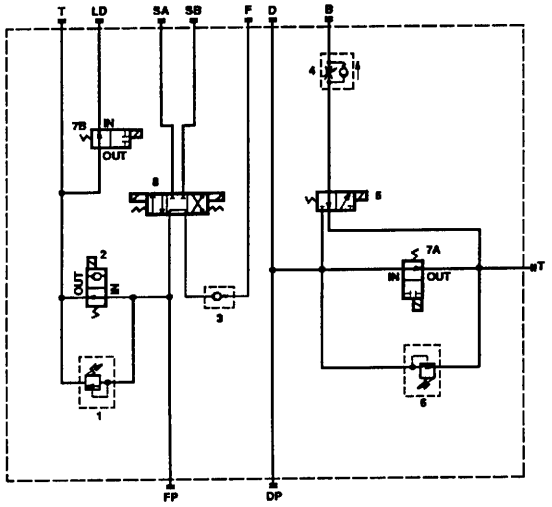
Possible Failure Points

1a. A bad boom limit switch.

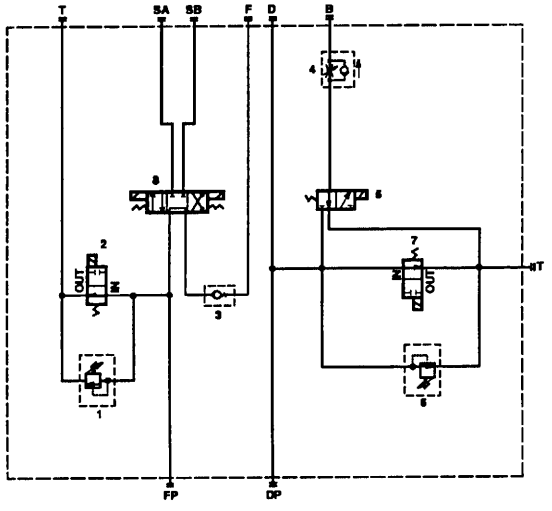
1b. The low speed drive solenoid coil is open.

1c. The low speed drive valve is sticking.

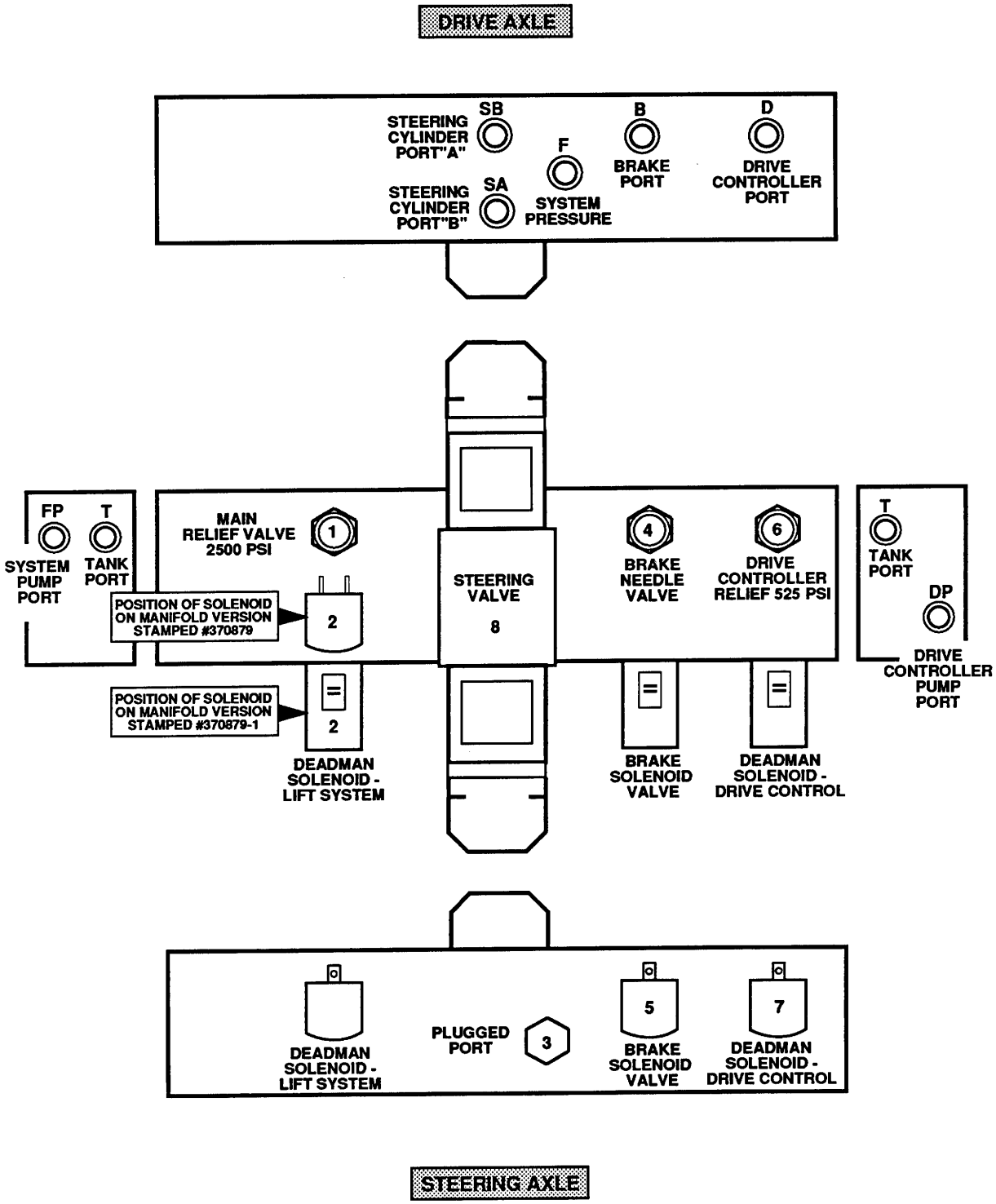
NOTE: The low speed drive solenoid valve is designed to fail to an open position. This is to prevent high speed travel when the boom is raised or if a component fails.



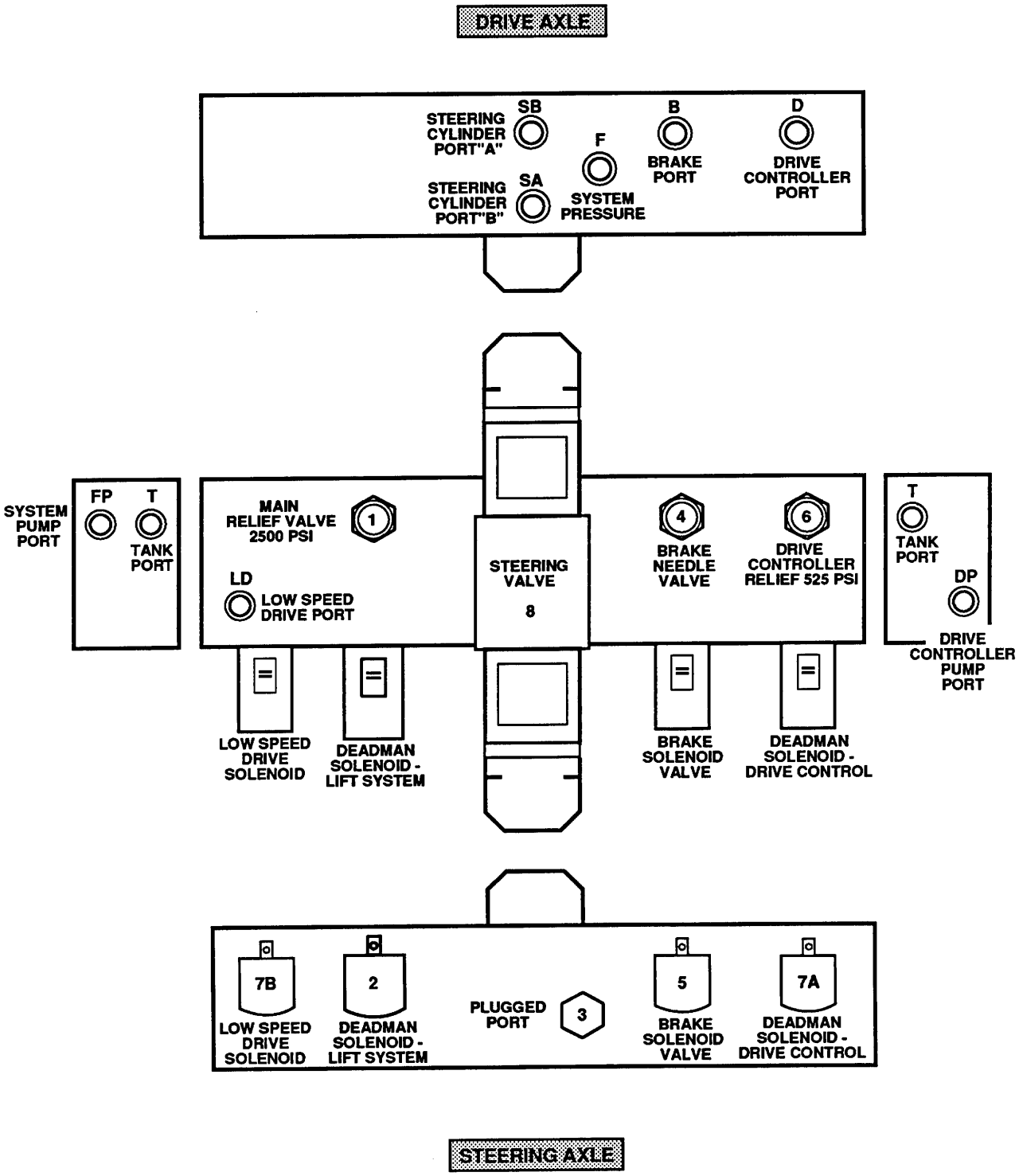
MANIFOLD 370975



MANIFOLDS 370879 &370879-1



MANIFOLDS STAMPED #370879 AND #370879-1



MANIFOLD STAMPED #370975

BOOM LIFT SYSTEM

When the operator engages the deadman control-selector 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 TROUBLE SHOOTING

Problem:

1. No boom functions will lift from ground or plat form control station.

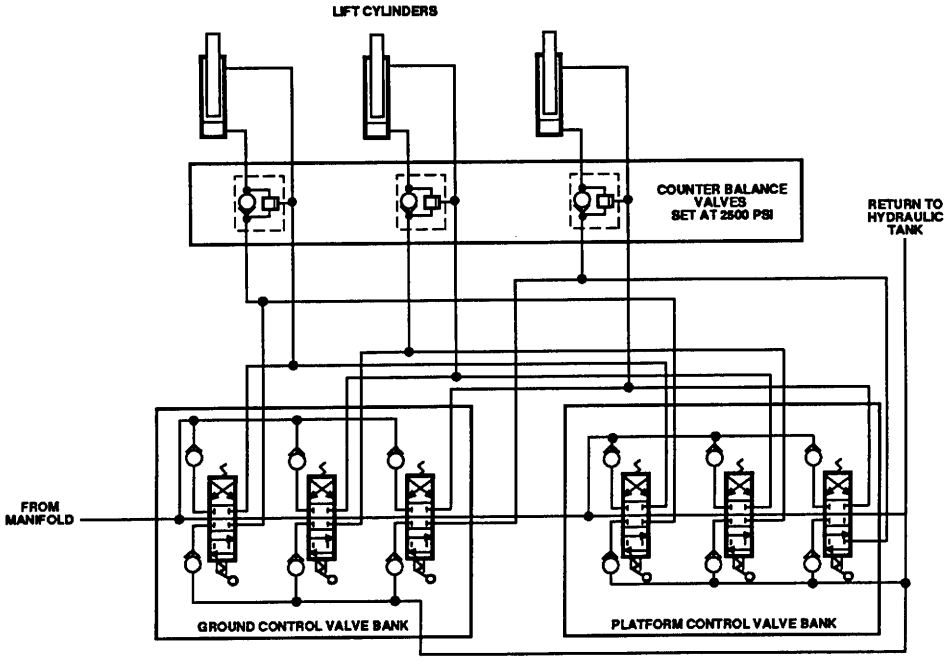
A. Check boom functions from ground station with engine shut off using emergency pump system.

1. If all three boom sections can be raised and lowered slightly the control valve bank should be good.

2. If any boom function fails to operate using the emergency pump, the problem is in the ground valve bank. To confirm this switch to platform control and check 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. Disassemble holding valve to check for foreign material or other internal damage.

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.



BOOM LIFT SYSTEM

BOOM EXTEND SYSTEM

When the deadman control-selector 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 a double acting check valve block located at the base end of the cylinder. This check valve prevents 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 a pilot pressure in the check valve going to open the rod end check valve. When the rod end check 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 check 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.

EXTEND SYSTEM TROUBLE SHOOTING

PROBLEM

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

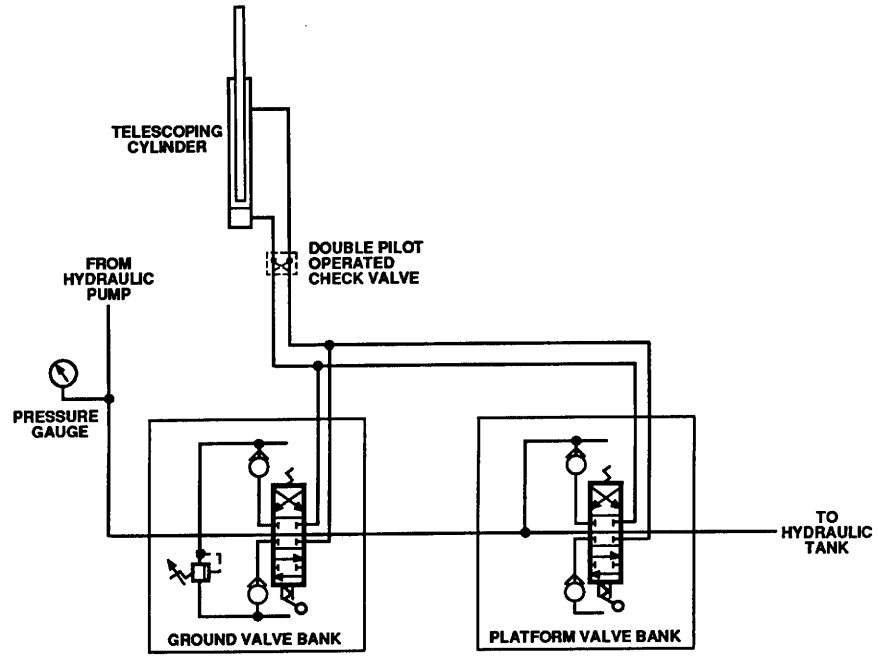
A. Check extend function from ground station with engine off using emergency pump system.

1. If boom will extend and retract slightly the control valve bank should be good.

2. If boom fails to extend or retract using emergency pump the problem is in the ground valve bank. 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 double check valve or bad cylinder rod packing. Disassemble check valve to inspect 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.



BOOM EXTEND SYSTEM

SWING SYSTEM

When the deadman control selector switch (ground control) or platform foot pedal 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 in 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 the flow of oil through it 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 TROUBLE SHOOTING

Problem:

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

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

OTHER CAUSES OF SWING FAILURE

Cause

The mechanical swing stop is preventing rotation in one direction.

Solution

Operate swing function in opposite direction

Cause

Swing pinion shaft is broken

Solution

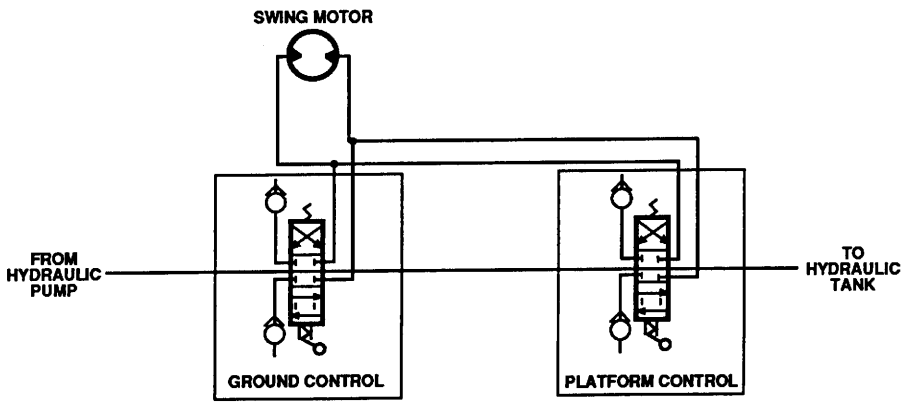
Remove and disassemble worm drive swing reducer and replace pinion shaft

Cause

Hydraulic swing motor shaft is broken

Solution

Remove and replace swing motor



SWING SYSTEM

VEHICLE STEER SYSTEM

The steering circuit is controlled by a solenoid operated 4 way directional control valve mounted on top of the hydraulic manifold block. The valve is activated by a thumb button on top of the drive control lever. When the thumb button is pressed to steer left or right the solenoid valve spool shifts to allow oil flow to the rod end or blank end of the steering cylinder. The steering cylinders 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 lift system pressure of 2500 PSI.

STEER SYSTEM TROUBLE SHOOTING

Problem:

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

Cause

Steering cylinder not mechanically connected to steering linkage.

Solution

Check for disconnected or damaged steering linkage.

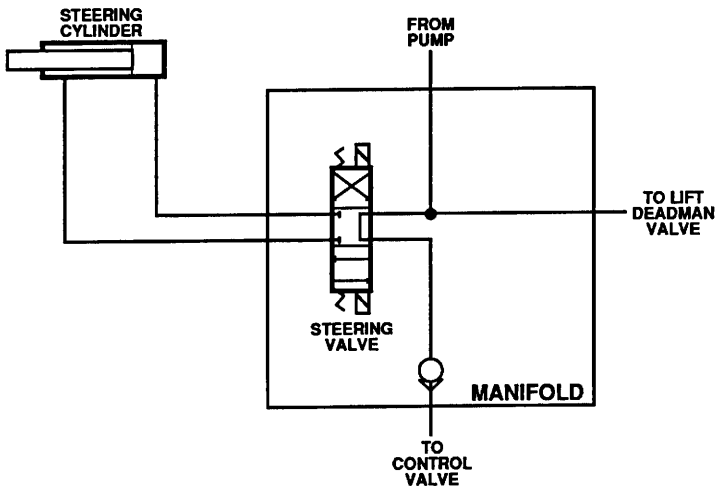
Cause

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

Solution

Locate steering valve on manifold. Shift spool manually by probing either one of the override buttons located on each end of the valve.
If steering function operates when using the manual overrides, check to see if the solenoids, located on each end of this valve, 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 wire harness to the steering control switch on forward reverse lever.

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



STEERING SYSTEM

PLATFORM LEVELING SYSTEM

The platform system is designed to automatically keep the platform level by using a master/slave cylinder set up. 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. This closed loop should keep the platform parallel to the ground in any boom configuration but due to internal leakage, make up oil must occasionally be added to the leveling circuit through the platform leveling control valve.

The platform leveling system 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. Next, the platform leveling/rotate selector switch (located on the left side of the platform control panel) must be shifted to the "platform level" position. 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 system is equipped with a holding valve (mounted on the slave cylinder) which acts as a safety valve should there be a hose or fitting failure. The holding valve prevents the slave cylinder from unintended travel through the use of a counter balance valve which is opened only after receiving pilot pressure from the control valve or master cylinder.

The platform leveling system shares its control valve with the platform rotate system. Hydraulic oil comes from the platform control valve to the pair of three-way, two position control valves which are mounted behind the platform control panel. These valves direct oil to the platform leveling circuit until energized by the selector switch when they shift and direct oil to the platform rotate system.

PLATFORM LEVELING SYSTEM TROUBLE SHOOTING

Problem:
Platform will not react to control lever movement.

1. Try the rotate circuit by changing selector valve position, if rotate circuit works the problem is not in lever operated control valve.

2. Turn selector switch to platform level and move control lever in both directions with deadman depressed.

A. If platform does not respond at all, one or both of the solenoid activated control valves may not be shifting.

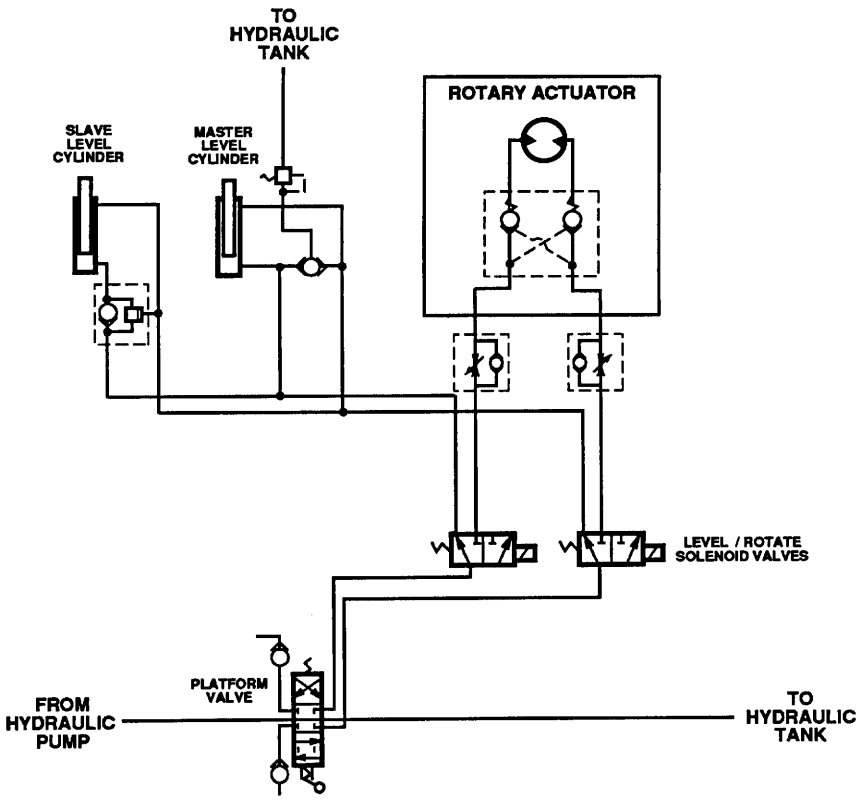
B. If platform attempts to move or leaks down, the problem is at cylinder.

Problem:
Platform Leaks Down

1. Remove line from slave cylinder holding valve to control valve.

A. If platform leaks down and oil flows from holding valve, remove holding valve and inspect it for damage or dirt. Clean, repair, or replace as necessary.

B. If cylinder leaks down but no oil flows from holding valve, problem is internal at slave cylinder. Remove, inspect and repack the slave cylinder as needed.



ROTATE / LEVEL SYSTEM

PLATFORM ROTATE CIRCUIT

The platform rotate circuit consists of a rotary actuator locked in its position by a double acting pilot-operated check valve. It is controlled through the shared use of the platform leveling control valve as explained in the previous pages on platform leveling.

To operate the rotate circuit, the platform controls must first be energized (selector switch). Next, the platform leveling/rotate selector switch (located on the left side of the platform control panel) must be in the "rotate" position. With the foot switch depressed, you can now rotate the platform by moving the control lever to the direction and speed desired.

ROTATE CIRCUIT TROUBLE SHOOTING

Problem:
Platform rotator will not react to control lever movement.

1. Try platform leveling circuit by turning selector switch. If leveling circuit works, problem is not with lever operated control valve.

2. Turn selector switch to rotate circuit and try control lever in both directions.

A. If rotator does not move at all, one or both of the solenoid activated control valves is not shifting.
B. If rotator moves one direction, look for physical constraints or foreign material blocking opposite movement.

Problem:
Platform moves faster one way than it does in other.

1. Readjust the flow controls which are located between the control valves and pilot operated check block, to give a smooth even travel.

VEHICLE DRIVE SYSTEM

The drive system is a network of a piston pump, piston motor, brake assembly, planetary gear box, transfer case and drive axles.Each will be dicussed indivdually.

A. DRIVE PUMP

1. The hydrostatic pump, driven by the engine, is a variable displacement pump with a control lever connected directly to a tiltable swash plate. When the engine is running with the control lever in the center (neutral position) there is no stroking of the axial pistons resulting in no oil flow out of the pump.

2. When the pump control lever is moved off of center in one direction oil will flow out of the pump in one direction. When the control lever is reversed, oil flow will come out of the pump in the other direction. This is what gives the machine forward or reverse travel.

B. DRIVE MOTOR

1. The other half of the drive system consists of a fixed displacement motor. This motor is coupled into 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. There is a cross port relief valve in this system to prevent component damage in either direction of travel. The relief valves are set at 4000 PSI. The system will only develop pressure required to move the machine.This system is known as a hydrostatic drive system and is used to propel many other types of equipment used in various industries.

C. BRAKE

1. The spring applied hydraulic release brake is mounted between the drive motor and the planetary gear box. When the vehicle drive operation is called for by the operator the brake is pressurized causing it to release. The brake will only release when the operator has his foot on the platform deadman foot switch 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 deadman 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.

D. PLANETARY GEAR BOX

1. The next item in the drive train located between the brake and transfer case is a two stage planetary gear box. Each stage consists of a sun gear, and a set of planet or satellite gears mounted to a carrier.

2. The reason this planetary gear box is in the drive train is to reduce the drive motor RPM's and develop the torque required by the transfer case to drive the machine in its low and high range positions.

E. TRANSFER CASE

1. The two speed transfer case is set up to provide high or low speed range for travel dependent on job site conditions. The transfer case has its 2W-4W lock up collar engaged in the 4W mode for our application. Input torque from the hydraulic drive motor through the planetary gear box into the transfer case is always supplied equally to both the front and rear output shafts of the transfer case to the front and rear drive axles.

2. The high-low shift is accomplished when the electric shift motor moves the high-low lock up collar to engage a planetary gear set assembly in the transfer case. Input torque is then transferred through the sun gear,turning the planetary gear set. The planetary gear set in the transfer case, when engaged, provides gear reduction low speed to the output shafts and drive axles.

3. High-low range selection must only be made when the unit is stopped to prevent damage to the internal gears of the transfer case.

F. DRIVE AXLE - REAR

1. The rear drive axle assembly is a standard light 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) on 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.

G. DRIVE AXLE - STEERING

1. The front or steering drive axle is mechanically identical to the rear axle other than some unique parts required for front wheel drive and steering. Manual locking hubs are standard.

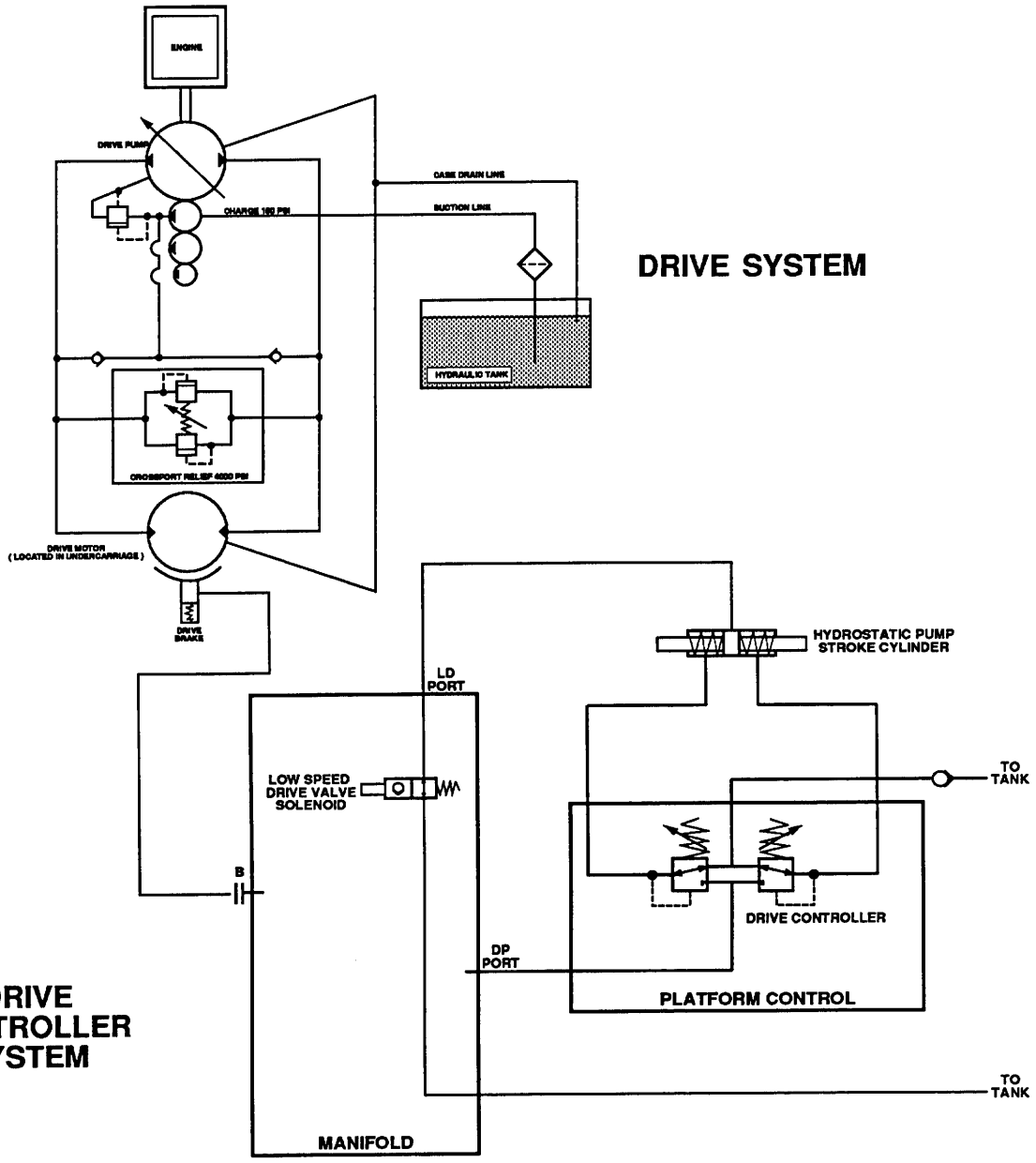
2. The transfer case is locked in the 4W drive mode for driving both axles when the machine is in use. The pointer on the hub center bar must point to the notch under the word LOCK on the hub lock cap. The only time the hub center bar should be in the FREE position is when the unit is being towed.

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.

H. 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-bypassing and must be changed regularly (at least every 100 hours) to insure system reliability.

DRIVE SYTEM HYDRAULIC SCHEMATIC



DRIVE SYSTEM CONTROL CIRCUIT

DRIVE PUMP ACTUATOR (STROKE) CYLINDER

1. The drive swash plate (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 by route of a low speed drive solenoid valve, restricting the cylinder's stroke thus restricting machine speed.

DRIVE CONTROL VALVE

1. The drive control valve is a spring centered, variable flow, two way valve.There is no hydraulic pressure going to the stroke cylinder until the deadman is depressed and the drive control handle is pushed 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 resivoir. When the handle is brought to the center position, both lines from the cylinder drain to the tank, allowing the drive pump to destroke and return to neutral.

DRIVE SYSTEM CONTROL PUMP

1. The drive control pump is mounted farthest from the engine.This gear pump delivers a constant 525 PSI to the drive control valve and the brake system.The pressure is set by placing a pressure gauge in the circuit and adjusting the pressure relief valve which is mounted on the hydraulic manifold.

MICRO SWITCH

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

DRIVE SYSTEM TROUBLE SHOOTING

Problem:
Machine won't drive either direction.

A. Connecting link from between drive pump and stroke cylinder is missing.
B. Brakes aren't releasing due to faulty micro switch or brake valve not shifting.

Problem:
Machine only drives in one direction.

A. Drive valve not working correctly, check PSI in each direction.
B. Spring centering bolt came loose from actuator cylinder.

Problem:
Hydrostatic pump seems to be dragging while in neutral.

A. Stroke arm not in proper adjustment

Problem:
Movement alarm beeping while machine is in neutral.

A. Micro switch not in proper adjustment.

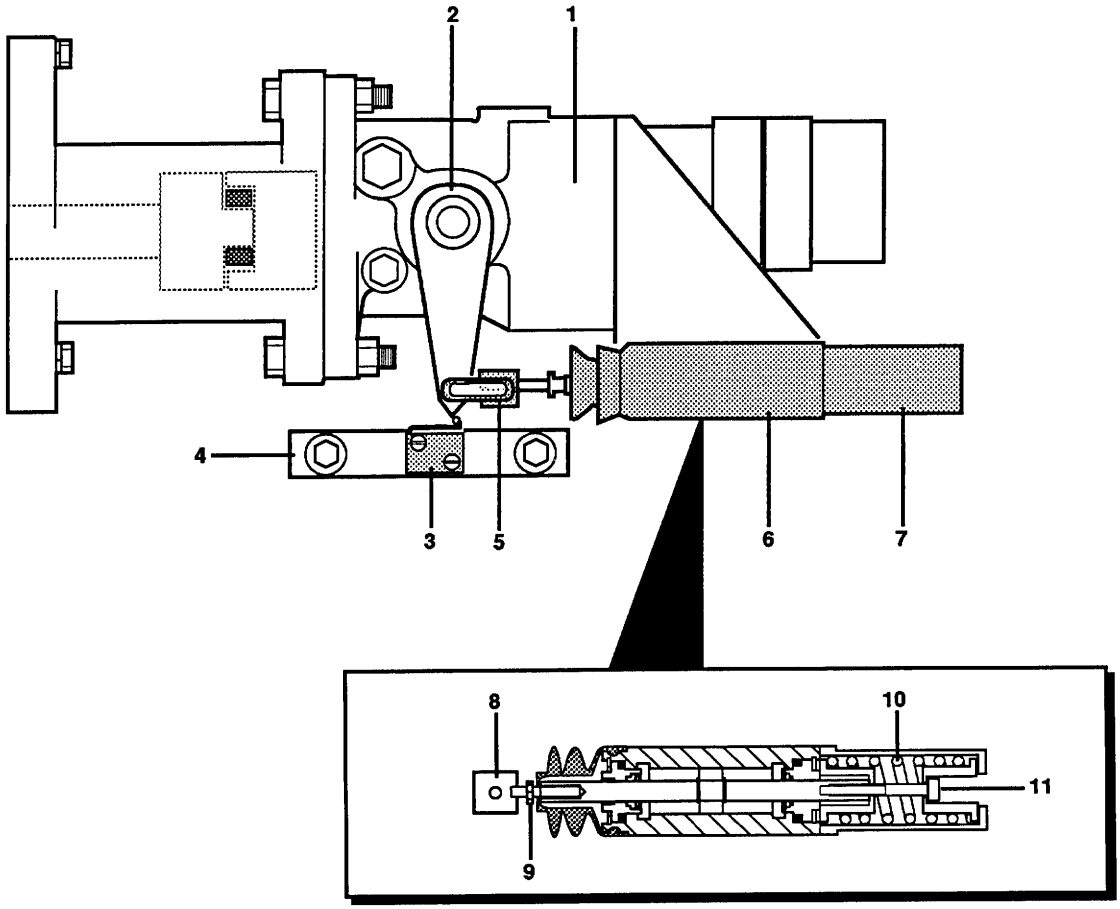
Problem:
Machine jerky when starting.

A. Inspect control linkage for proper adjusment.
B. Micro switch not in proper adjustment.
C. Inspect accelerator valves in hydrostatic pump.
D. Inspect charge check valvesin hydrostatic pump.

Problem:
Loss of power

A. Check drive control system for proper actuator stroking (should operate up to 525 PSI)
B. Check hydrostatic pump charge pressure (should be between 70-150 PSI).
1. If pump charge pressure is low, inspect suction filter and lines for restrictions.
2. Inpect charge pump.
C. Check drive system pressure (should be between 1000-4000 PSI when moving).
1. If system pressure is low, inspect accelerator valves and charge check valves in pump.

DRIVE PUMP



1	HYDROSTATIC DRIVE PUMP	**7**	END CAP
2	STROKE ARM	**8**	ROD END
3	NEUTRAL (MICRO) SWITCH	**9**	STOP NUT
4	MOUNTING BLOCK	**10**	CENTERING SPRING
5	MASTER LINK	**11**	RETAINING BOLT (6 MM X 45 MM METRIC SOCKET HEAD CAP SCREW)
6	STROKE CYLINDER		

PUMP STROKE CYLINDER ADJUSTMENT

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

1. Bleed any air from the cylinder or supply lines by cycling the drive handle with the cylinder hose fittings loose.

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.

MICRO SWITCH ADJUSTMENT

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

1. Loosen the two mounting block bolts.

2. Hold the mounting block so the stroke arm is depressing the micro switch and tighten the two mounting block bolts.

INSTALLING THE STROKE 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 readjusted as a maintenance item.**

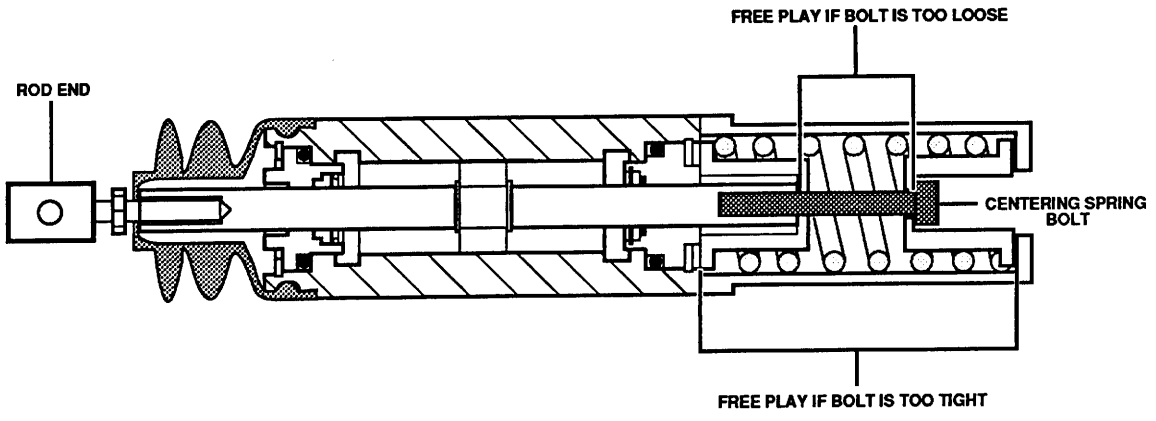
Bolt used is a 6mm x 45mm metric thread socket head cap screw.

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.

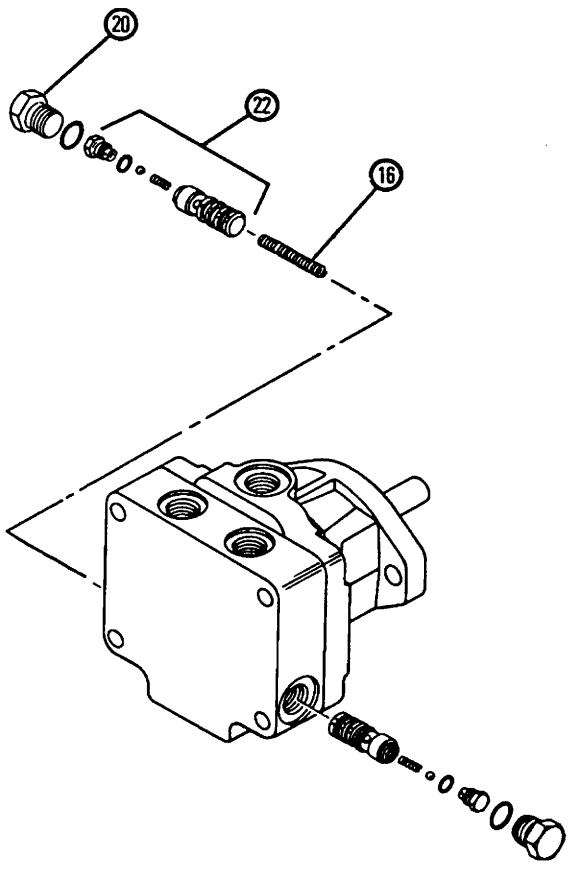


STROKE CYLINDER BOLT ADJUSTMENT

INSPECTING ACCELERATION AND CHARGE RELIEF VALVES

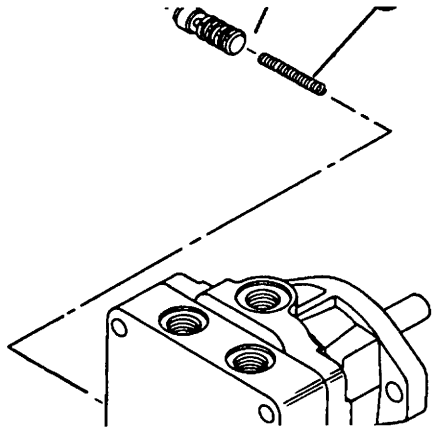
ACCELERATION VALVES

Remove plugs (20) from each side of housing and slide out one valve assembly (22) and spring (16) from one side and the other valve assembly (22)from the other side. Inspect the valves bore for damage and remove any foreign material in the valve area. Replace parts as required and reinstall into housing.



CHARGE RELIEF VALVE

Remove plug (23) then slide out the spring (26) and poppet (27) out of the housing. **Do not alter the shims (25) 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 reinstall into housing bore.



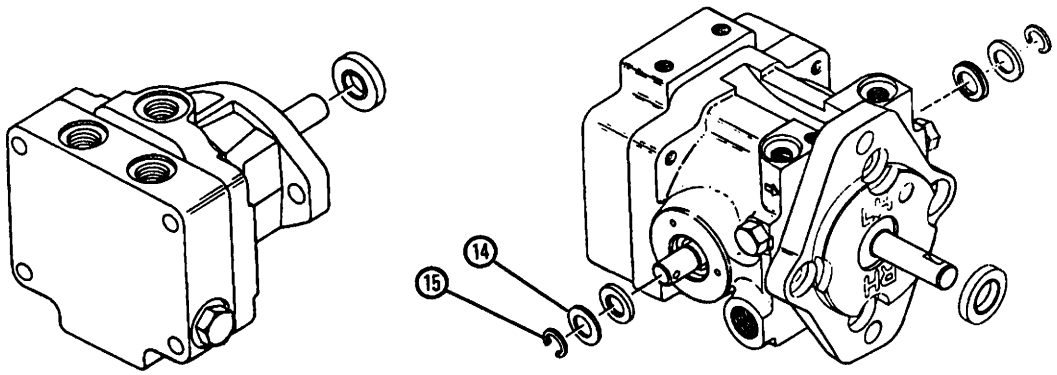
LIP SEAL REPLACEMENT

Lip type seals are used throughout the transmission. These seals can be replaced without disassembly 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 of the shaft.Once removed, the seal is not reusable.

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 (15) and washers (14) be removed before removing the seals.The washer should be replaced if it is noticeably bent or distorted



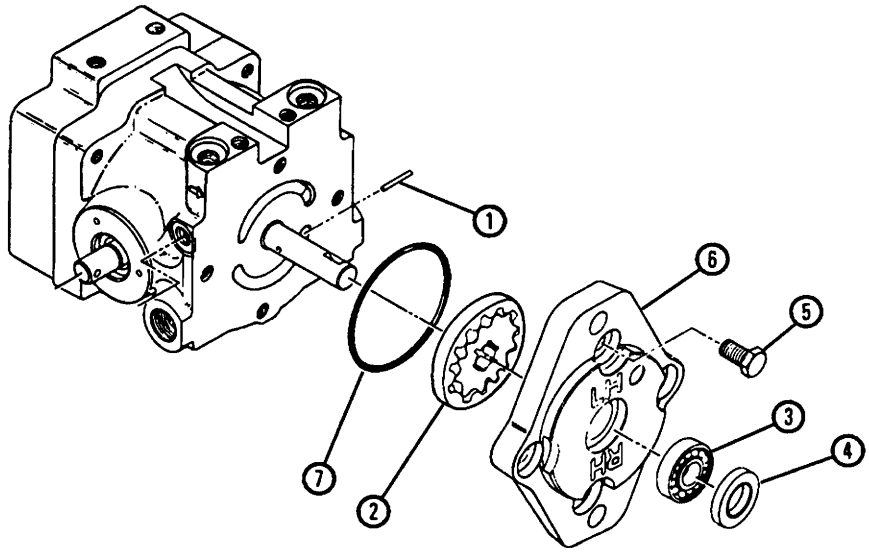
CHARGE PUMP REMOVAL AND INSTALLATION

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

2. Remove hex head screws (5) and slide the housing assembly (3,4,6&7) over shaft holding the charge pump (gerotor) cartridge and remove drive pin (1). Remove shaft seal (4) and bearing (3) 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 (1) should always be replaced. Visually inspect bearing (3), O-ring (7), and shaft seal (4) and replace as required.

4. Coat both sides of pump cartridge (2) and housing face with hydraulic oil. Install drive pin (1) into hole in shaft, then slide pump cartridge (2) 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 (3,4,&6), then slide assembly into position over shaft. Line up location marks, then insert and torque screws (5).



DRIVE PUMP INTIAL START UP PROCEDURE

1. Prior to installing the transmission, inspect for damage during shipping and handling. Make ce-train 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. Remember that the maximum inlet vacuum at normal conditions should not exceed 5in. hg. Check inlet line for properly tightened fittings and be certain it is free of restrictions.

4. Place the control lever in neutral. The control linkage must be disconnected from the transmission during initial start up.

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

6. Install a pressure gauge (1000 PSI) in the charge port with a short section of hose and a snubber needle valve to dampen pulsations. charge pressure should read 70-150 PSI.

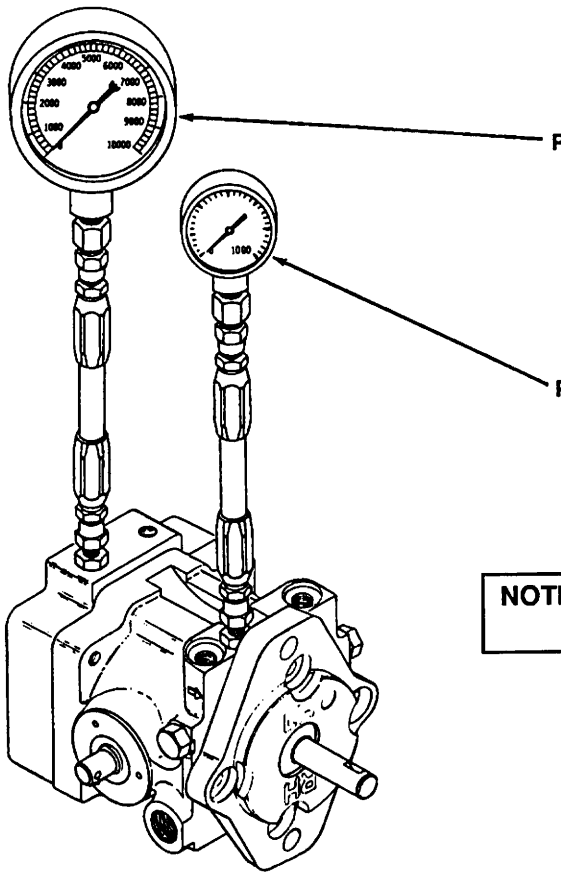
7. Start the engine and run at the lowest possible RPM until normal charge pressure has been established.

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. 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. Transmissiom is ready for operation.



PRESSURE GAUGE WITH 0 TO 5000 PSI RANGE

PRESSURE GAUGE WITH 0 TO 1000 PSI RANGE

NOTE: Input speed should be at or near maximum RPM when taking gauge readings

EMERGENCY SYSTEM AND PROCEDURES

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 operator's 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 the boom sections.

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:

1. Remove drive shaft from rear axle.

2. 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. Unit movement from unselected control lever.

3. Unit function will not stop unless power is switched off.

CORRECTIVE ACTION

1. Remove foot from deadman switch.

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.

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.

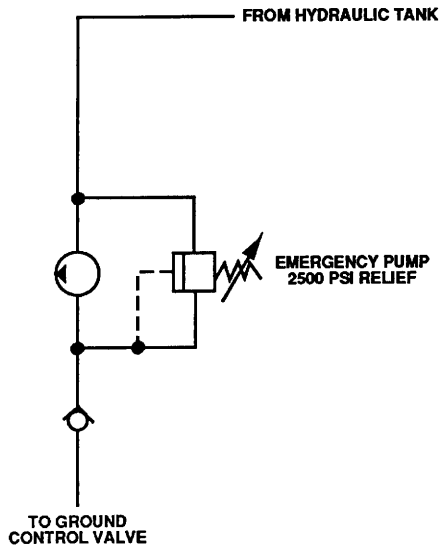
5. Render "First-Aid" to the operator.

EMERGENCY SITUATION AND LOWERING

SITUATION

Platform in contact with live power lines - operator incapacitated.

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



EMERGENCY PUMP SYSTEM

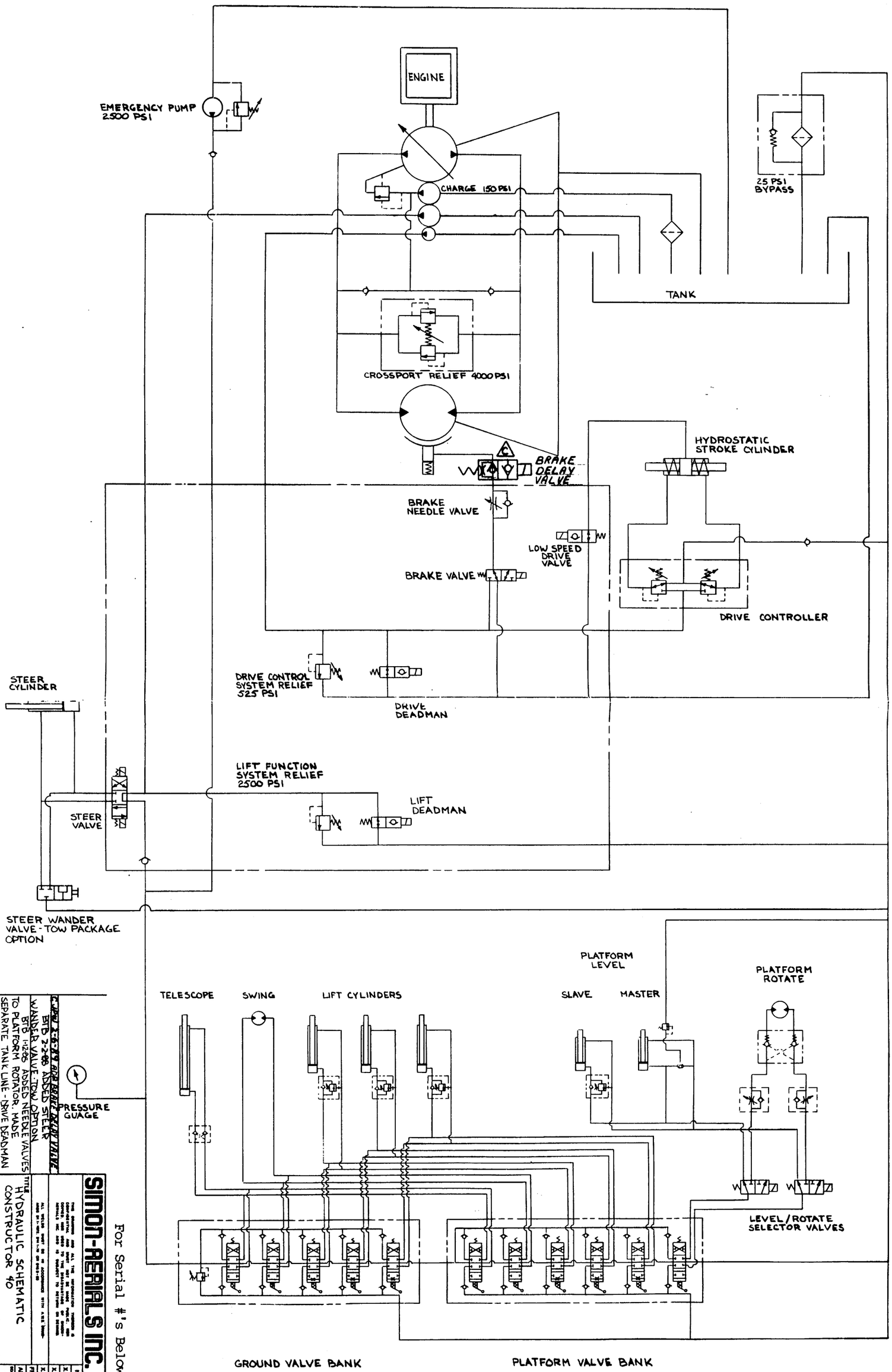
CORRECTIVE ACTION

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".

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



BTB 2-2-88 ADDED STEER WANDER VALVE-TOW OPTION
BTB 11-28-86 ADDED NEEDLE VALVES TO PLATFORM ROTATOR. MADE SEPARATE TANK LINE - DRIVE DEADMAN

BY	DATE	DESCRIPTION

DRAWN BTB 11/5/87
CHECKED BTB
APPROVED BTB
DRAWING NO SDS-213476

HYDRAULIC SCHEMATIC CONSTRUCTOR 40

For Serial #'s Below #5000

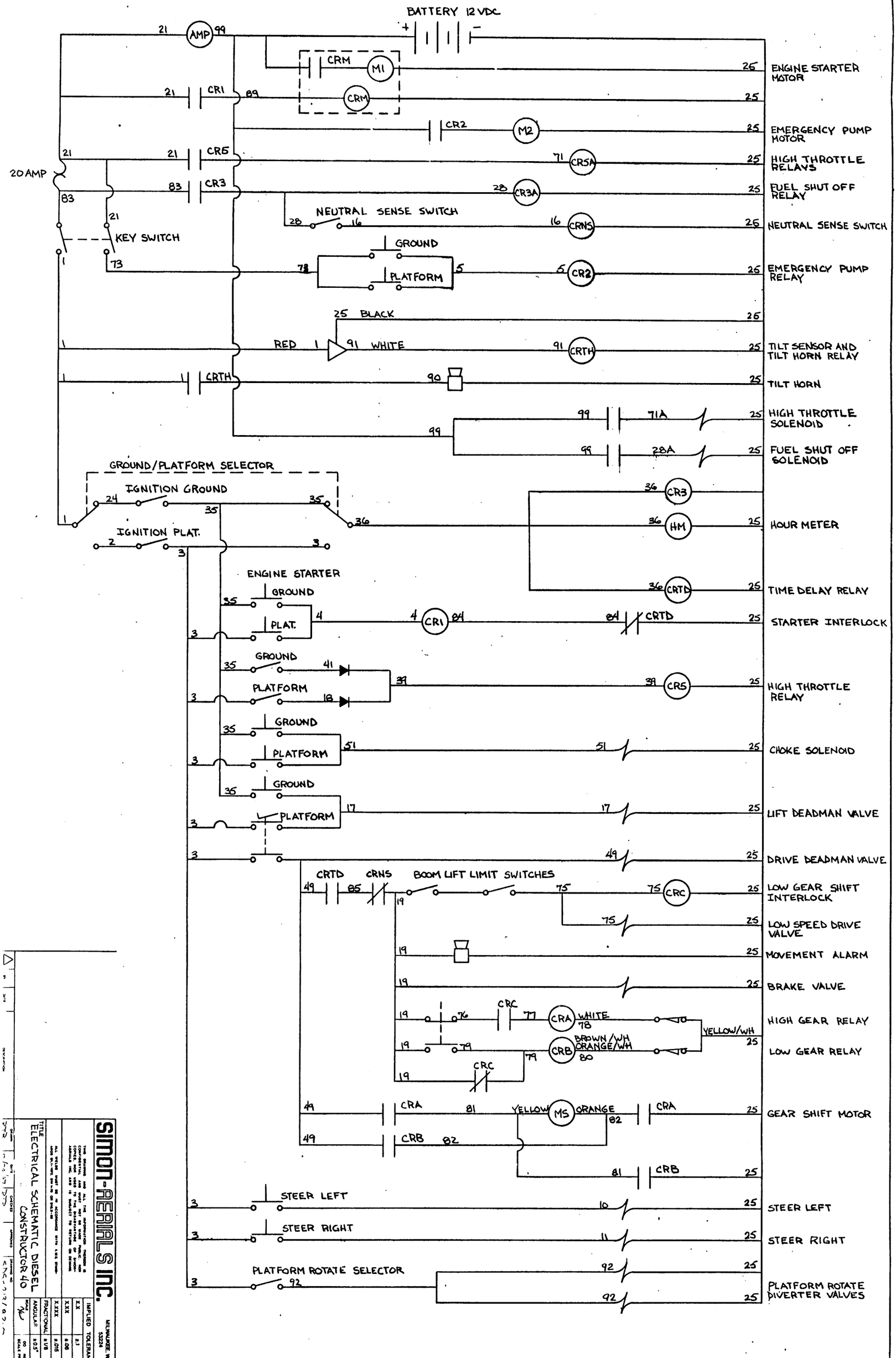
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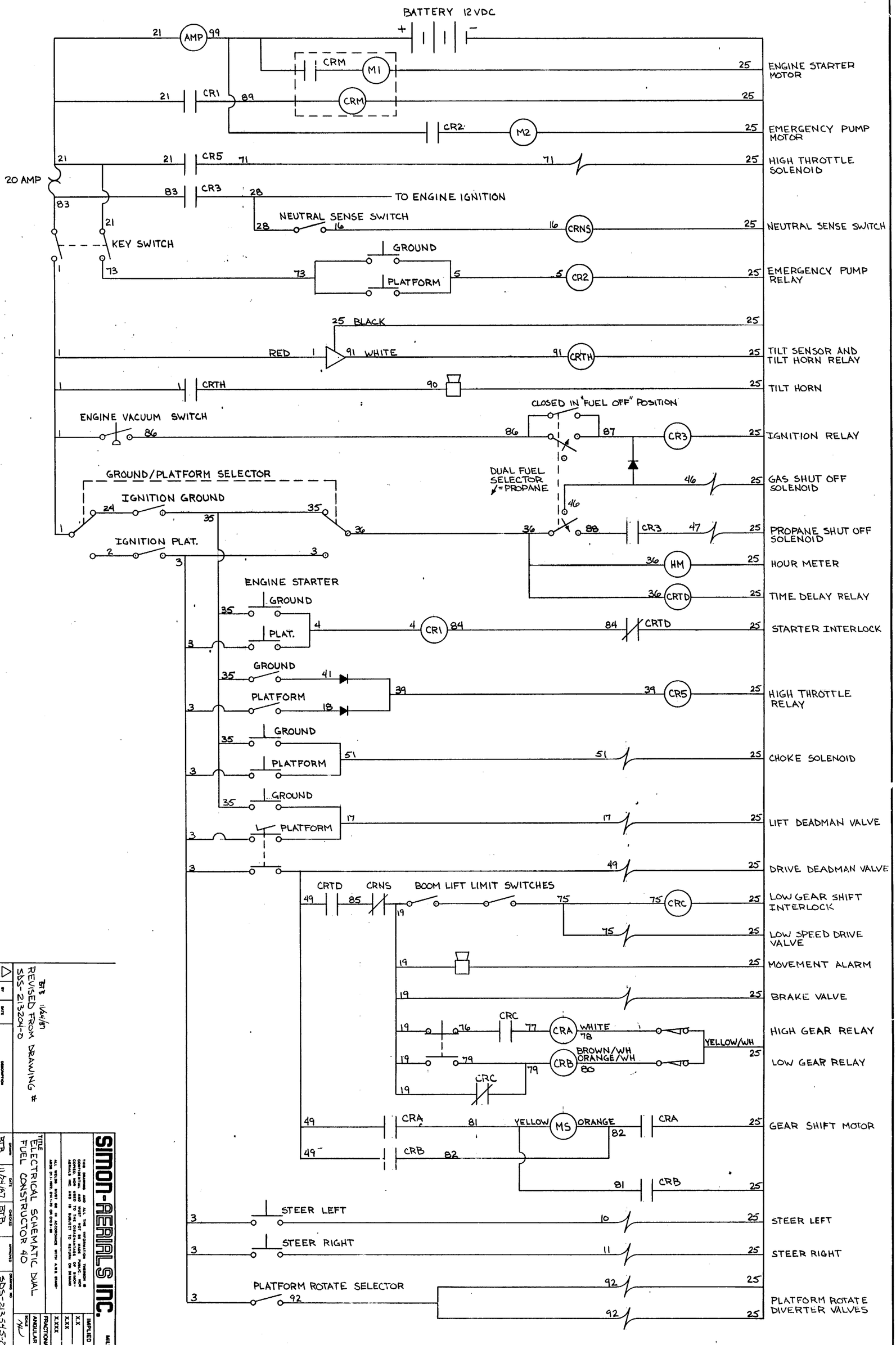


SIMON-AERIALS INC.
MILWAUKEE, WI 53224

TITLE
ELECTRICAL SCHEMATIC DIESEL
CONSTRUCTOR 40

IMPLIED TOLERANCE
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X.XXX ±.005
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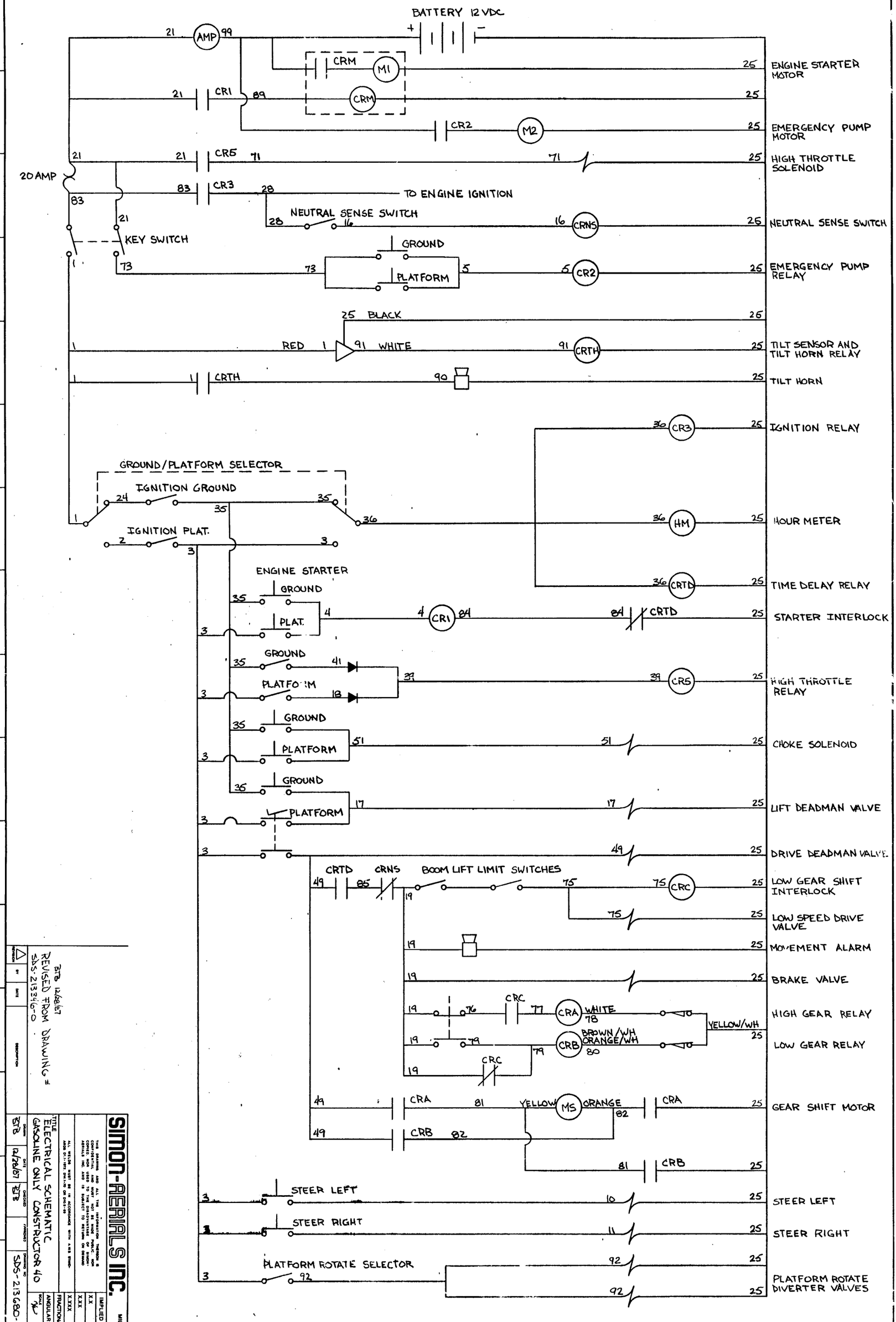
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TITLE: ELECTRICAL SCHEMATIC DUAL FUEL CONSTRUCTOR 40

DRAWING NO. SBS-213515-D



REVISIONS	BY	DATE	DESCRIPTION
△	BTB	12/28/87	REVISED FROM DRAWING # SDS-213346-0

SIMON-AERIALS INC. MILWAUKEE, WI 53224

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ADDL DIMENSIONS ON OR DECIMALS

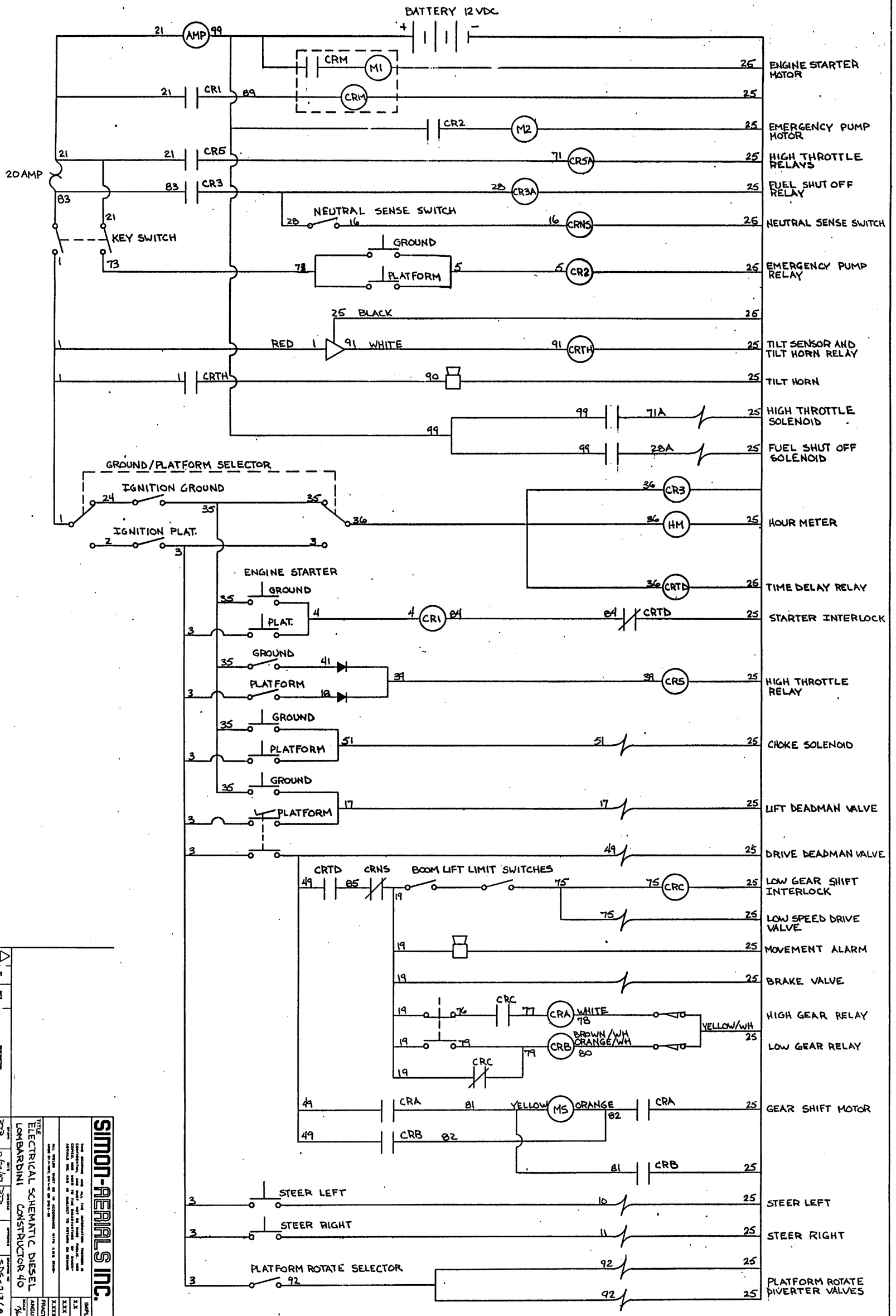
X.X	± .1
X.XX	± .03
X.XXX	± .015
FRACTIONAL	± 1/8
ANGULAR	± 0.5°
DO NOT SCALE PRINT	

IMPLIED TOLERANCE

DRAWN	BTB	12/28/87
CHECKED	BTB	
APPROVED		

TITLE: ELECTRICAL SCHEMATIC GASOLINE ONLY CONSTRUCTOR 40

DRAWING NO. SDS-213680-0



SIMON-AERIALS INC.
MILWAUKEE, WI 53224

TITLE: ELECTRICAL SCHEMATIC DIESEL LOMBARDINI CONSTRUCTOR 40

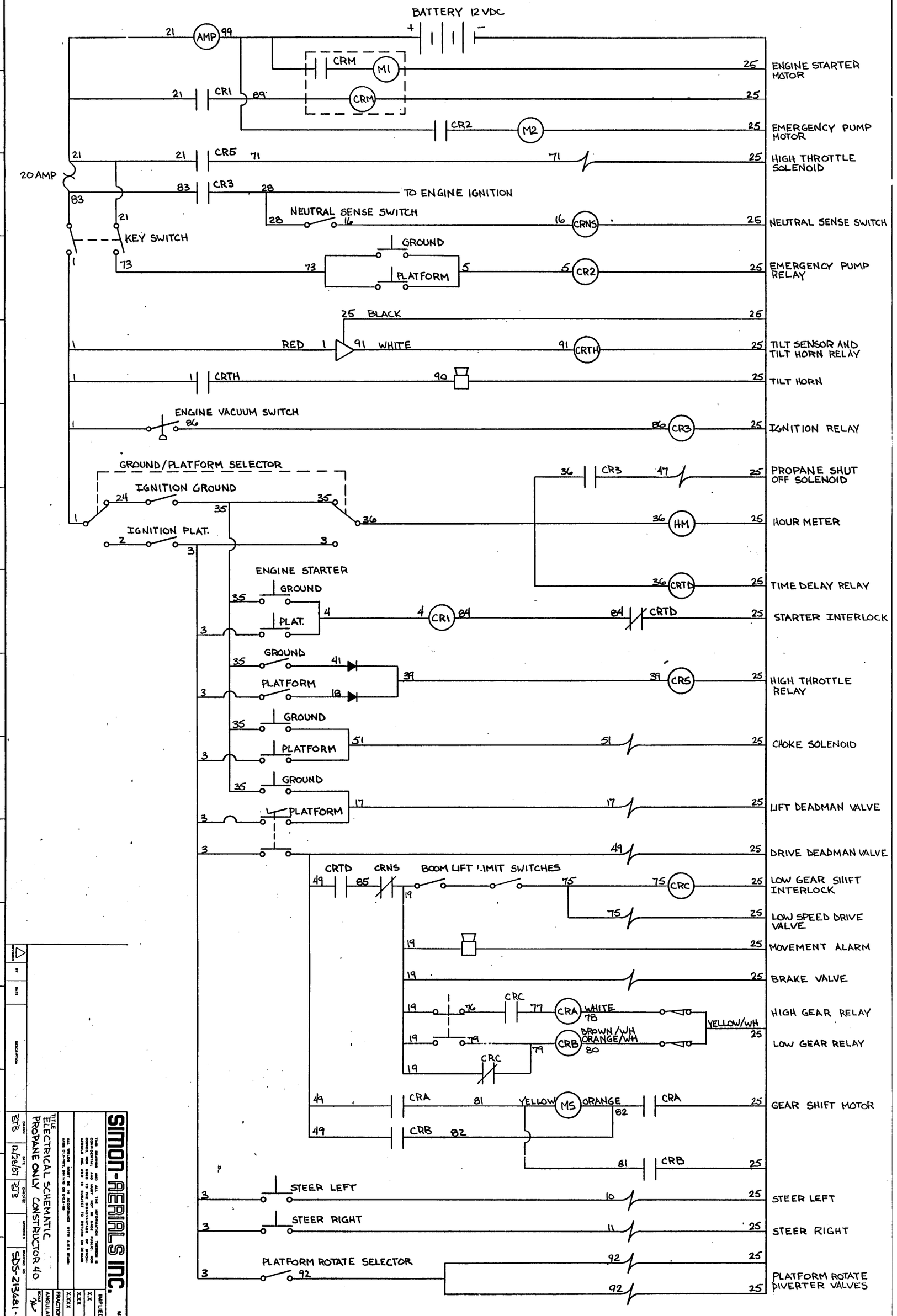
SIZE: D
SDS-213682-0
SCALE: DO NOT SCALE PRINT
SHEET 1 OF 1

REV	DESCRIPTION	DATE	APPROVED
A			
B			
C		12/29/97	RJR

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IMPLIED TOLERANCE	
X.X	± .1
X.XXX	± .005
FRACTIONAL	± 1/16
ANGULAR	± .5°



REVISION	BY	DATE	DESCRIPTION
DRAWN	BJB	12/28/07	
CHECKED	BJB		
APPROVED			
DRAWING NO	SDS-213681-0		

SIMON-AERIALS INC.

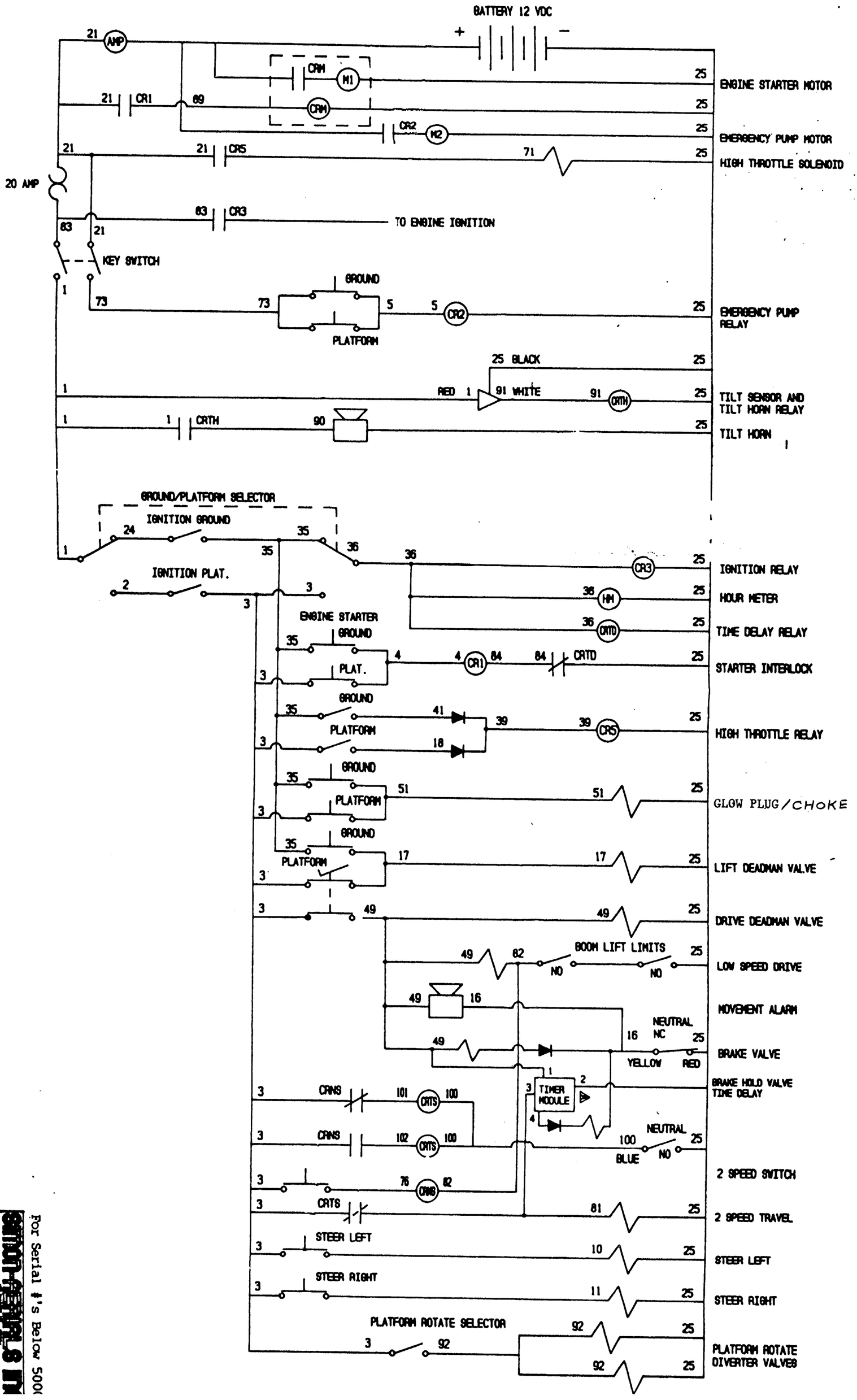
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TITLE
ELECTRICAL SCHEMATIC
PROPANE ONLY CONSTRUCTOR 40

ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1/D1.1M:2010 OR D1.3/D1.3M

	IMPLIED TOLERANCE
FRACTIONAL ± 1/16	X.XXX ± .005
ANGULAR ± 0.5°	X.XX ± .01
SCALE: NONE	X.X ± .1
DO NOT SCALE PRINT	



For Serial #'s Below 5000

ELECTRICAL SCHEMATIC