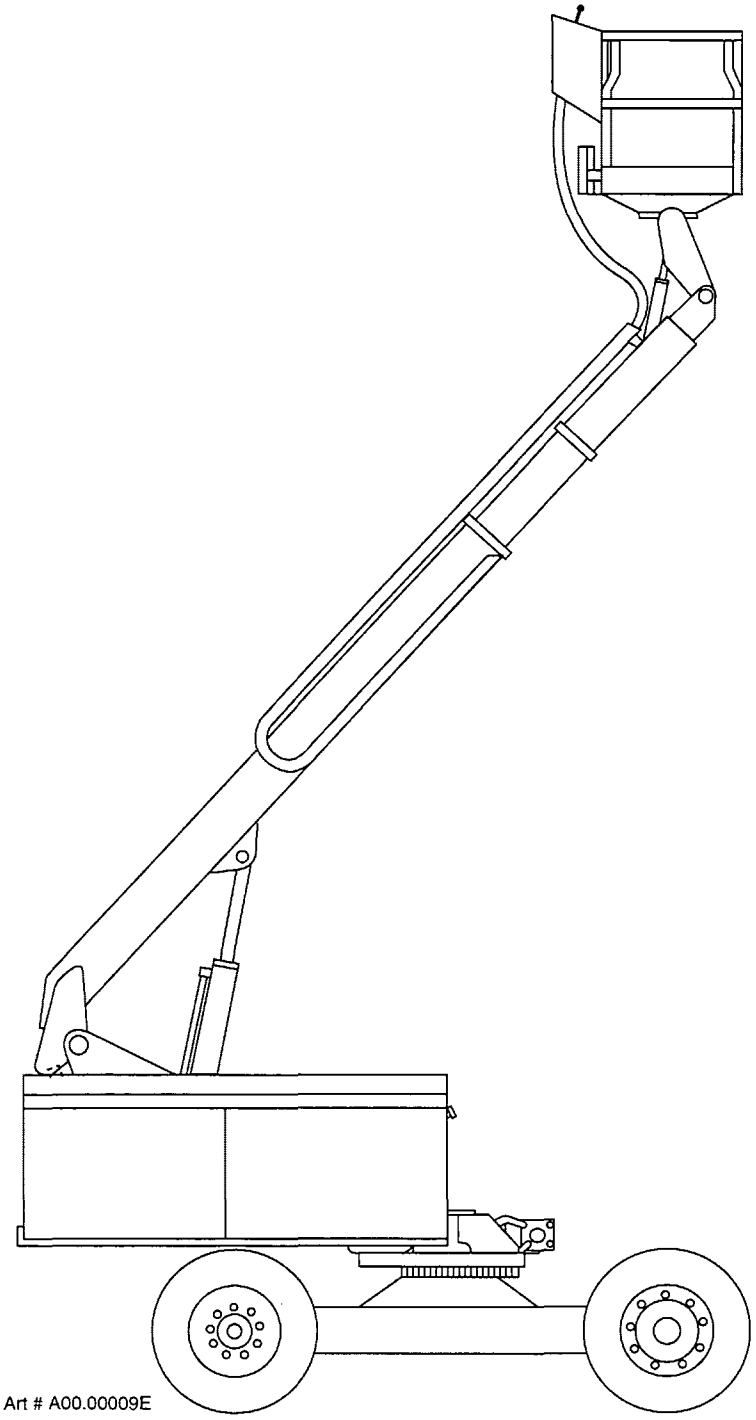
SIMON AERIALS INC.
10600 W. Brown Deer Road
Milwaukee, Wisconsin 53224
Phone (414) 355-0802
TWX: 910-262-3310
FAX: (414) 355-0832
Cable: SIMON MIL

SIMON

SERVICE MANUAL

MODEL
MP

HYDRAPORT
prior to 1 Jan. 1994



Art # A00.00009E

PART NO. 89-100207

Nomenclature	Specification and Level Fill	Interval	Fig. Item
Drive Wheel Power Hubs	SAE 90 SAE 85-140 ½ Full	Initial 100 HRS. then yearly or 1000 HRS, whichever comes first	1
Engine Oil	Summer SAE 10W40 Winter SAE 10W30 To Full mark on Dip Stick	Initial 50 HRS. then every 100 HRS. or sooner if the oil is dirty	8
Hydraulic Fluid	To Full mark on gauge with boom down and retracted Mobil DTE-13 Petro Prod. DTE-13 after Aug.1983	Analysis for serviceability 6 months, change every year	11
Boom Wear Pads	Spray Silicone	Every 6 months	16
Turntable Swing Bearing	Til new grease comes out at 45° intervals EP N.L.G.i. #2	Monthly or 100 HRS. whichever comes first	3
Cylinder Pins	Til new grease comes out EP N.L.G.i.#2	Monthly or 100 HRS. whichever comes first	6
Gasoline	Regular		9
Diesel Fuel	Type II		10
Steering Spindles	Til new grease comes out EP N.L.G.i. #2	Monthly or 100 HRS. whichever comes first	4
Wheel Bearings	Clean and repack EP N.L.G.i. #2	Yearly or 1000 HRS. whichever comes first	7

A VARIABLE DISPLACEMENT PRESSURE COMPENSATED RADIAL PISTON PUMP

This pump has 8 inlet and 8 discharge valves, 8 pistons, 8 piston springs, a cam, crankcase control valve, crankcase pressure control orifice and pressure regulator (compensator). It is obvious that as the shaft turns, the pistons move upward and downward.

On the downward piston stroke fluid is drawn into the piston from the reservoir through the inlet valve; on the upstroke the fluid is exausted through the outlet valve and into the system.

On this pump the displacement is varied by reducing the piston travel. How is this accomplished? First let us examine the piston and its spring in relation to the crankcase pressure. Observing that the force applied downward inside the piston (i.e. toward the cam) is the spring force; and also, noting that the force upward (away from the cam) is the pressure force, (crankcase pressure) acting on the piston, it follows then that whenever the pressure force is greater than the spring force, the piston will be suspended some distance away from the cam, of course dependent on the magnitude of the crankcase pressure. Consequently the piston would be in equilibrium. Of course as the crankcase pressure is further increased, the piston stroke will be reduced even more and vice-versa.

The next question that would seem to arise is: How is crankcase pressure increased and decreased to change the piston stroke? This change is accomplished by the pressure compensator and the crankcase orifice. Let's examine the compensator first. On our generalized pump drawing we see a hollow poppet type valve with a spring holding the poppet on the seat. The system pressure is acting on the poppet lip with a force equal to the spring force on the poppet. If the poppet were preloaded against the seat by the spring then the poppet would not move away from the seat untill the pressure force acting on the poppet were greater than the spring force. Of course as the poppet moves away from the seat, a flow path is open to the crankcase from the discharge side of the pump (system pressure). Observe that the exit from the crankcase is restricted by the crankcase orifice, resulting in as increase in crankcase pressure as the fluid passes from the crankcase orifice and back to the pump inlet. As stated earlier, the increase in crankcase pressure reduces the piston stroke.

The compensator poppet has a hollow center. It is through this passage that we maintain throttle control of the pump by changing the flow rate to the pump crankcase, via the foot pedal or ground handle. This procedure is effective until system pressure reaches compensator poppet cracking pressure at this point, (200-250 PSI below system pressure setting). The pump will be able to deliver its peak or maximum volume dependent only upon system demand for this volume. As system pressure increases past this point, the pressure acts on the compensator poppet gradually allowing the poppet to open, in turn adding fluid to the crankcase overcoming the capacity of the 60 thous-

C. Insure that the foot valve piston groove (or slotted side) faces towards the valve ports.

D. Insure that the pressure hose (common to the cab rotate and leveling flow control valve) is connected to the port closest to the foot valve piston rod.

6. Boom will only raise if the cab rotate, leveling flow valve is closed.

A. The cab rotate or leveling valve is leaking internally causing system pressure to be reduced by fluid bypassing the foot pedal.

7. Boom will not retract from the fully extended position only.

A. Hydraulic system pressure filter dirty, Schroeder filter only.

B. Hydraulic system pressure low.

C. Grit on boom sections, it may be necessary to lubricate the bottom of the mid and tip boom with a dry-type silicone lubricant.

8. Unit will not go into high speed drive with boom retracted and lowered.

A. Filter dirty (Schroeder filter only, see filter element in specifications).

B. On units equipped with only one high speed drive valve, and the low speed drive valve is inoperative. The low speed will bypass drive fluid slowing down drive speed somewhat (see item 9).

9. Unit will not drive with the emergency pump.

The low speed drive valve is inoperative.

10. Snap-Tite selector valves cracking the body or blowing the body seal.

A. Caused by back pressure on the return port. Insure that the pressure and return hoses are connected properly.

B. Check for blocked or partially blocked return hoses.

C. For the cab rotate and leveling vlaves, insure that the check valve is installed with the arrow pointing down (away from the selector valves). Check for internal leakage of the check valve.

11. Valves sticking in valve bank.

A. Too much valve body bolt torque and/or uneven torque. The nuts should be torqued to 15 foot pounds.

B. Valve body facing not milled square causing uneven valve stack and resulting in a distorted valve body.

C. Improper hydraulic oil in the unit. Many fluids will not mix properly causing different additives to break down and disturbing varnishes on moving and unmoving surfaces resulting in eventual failure of a component.

D. Contaminated hydraulic fluid, or old fluid. A sample should be examined and measured against original specifications of the fluid used. All fluids will get tired with age and abuse.

E. On older units, the spring in the low speed drive needle flow valve may have gotten into a drive valve jamming the spool.

REF #

1. Selector Valve -

Solenoid operated 3 position, 4 port normaly closed with manual override buttons. Selects fluid pressure to the boom lift circuit.

2. Holding Valve -

Prevents unintentional boom down movement. It allows free fluid flow into the blind end of the lift cylinder. It will not let the fluid out of the blind end of the cylinder until the pressure in the rod end overcomes a pilot spring force opening a pilot spool thus letting the cylinder retract and lower the boom.

3. Lift Cylinder -

A double acting cylinder powers the boom up and down movements and support of the boom.

4. Flow Control Valve -

This valve controls boom down speed and prevents the holding valve from bouncing and squeeling.

5. Orfices - (OLD STYLE UNITS)

This controls boom up speeds.

NOTE: Units that do not have a flow control valve will have 2 orfices controlling boom up speed and maximum boom down speed.

ITEM	TROUBLE SHOOTING	ADJUSTMENTS	REPAIR	MISC.	PARTS
1 Selector Valve	M6.2 (Fig.6) M6.2 (Fig.11) M5				D13
2 Holding Valve		M1.3 (Fig.15)			D9
3 Lift Cylinder					D9
4 Flow Control Valve		M1.3 (Fig.14)			D9
5 Orifices	M5.4				C2

Ref #

1 Motion Control Valve -

The motion control valve found in the drive system has a two fold purpose. It shuttles hydraulic oil flow to the intregal brake assemblies plus it produces a back pressure in the drive system so that unit run a way is impossible. This is accomplished by two (2) counter balance valves located in the motion control valve. Proper brake valve adjustment - open 1½ turn

2 Flow Divider Combiner -

The flow divider combiner provides a differential action for the drive motors. In a turning situation, hydraulic fluid will force the internal spools to channel fluid to the driving wheel. It also has a great impact on driving characteristics when one wheel becomes lite.

3 Globe Valve -

The Globe valve has one function. It allows hydraulic fluid to pass from one drive wheel to the other when unit is in a turn situation. It can be adjusted as to the amount of oil requested to pass but the correct setting should be approximately one and one half turn open from the closed position. In this position, the engine will load slightly and allow a metered amount of hydraulic fluid to pass to the driving wheel.

4 Drive Motors and Brake Assembly -

The brake assembly used on the Simon boom lift is a rool seal type brake. It is a wetted disc which is spring applied with hydraulic release. The drive motor rotor is keyed to a shaft which in turn is splined on both ends. One end of the splined shaft is used for the roll seal brake while the other is inserted into the gear reducer assembly.

Note: Motor internal leakage passed through the brake disc's and back to the main hydraulic reservoir thereby cooling the brake and preventing excessive brake disc wear.

There is also two (2) case drain lines which return directly to the main hydraulic reservoir to reduce motor back pressure.

Ref #

1 Main Hydraulic Pump -

The main pump is engine driven and is of a radial piston type. This pump delivers hydraulic fluid, under pressure, through the high pressure filter to the main hydraulic distribution manifold. This manifold is located in the center of the main valve bank.

2 High Pressure Filter -

The high pressure filter, filters the hydraulic fluid before it reaches the main hydraulic distribution manifold. The high pressure filter utilized on current production models is a non by-passing type. The filter element used is rated at 10 microns. This type of hydraulic filter does incorporate a differential pressure shut off valve that will stop fluid flow when the filter becomes dirty. However; this valve allows enough fluid to pass as not to crush the element from back pressure.

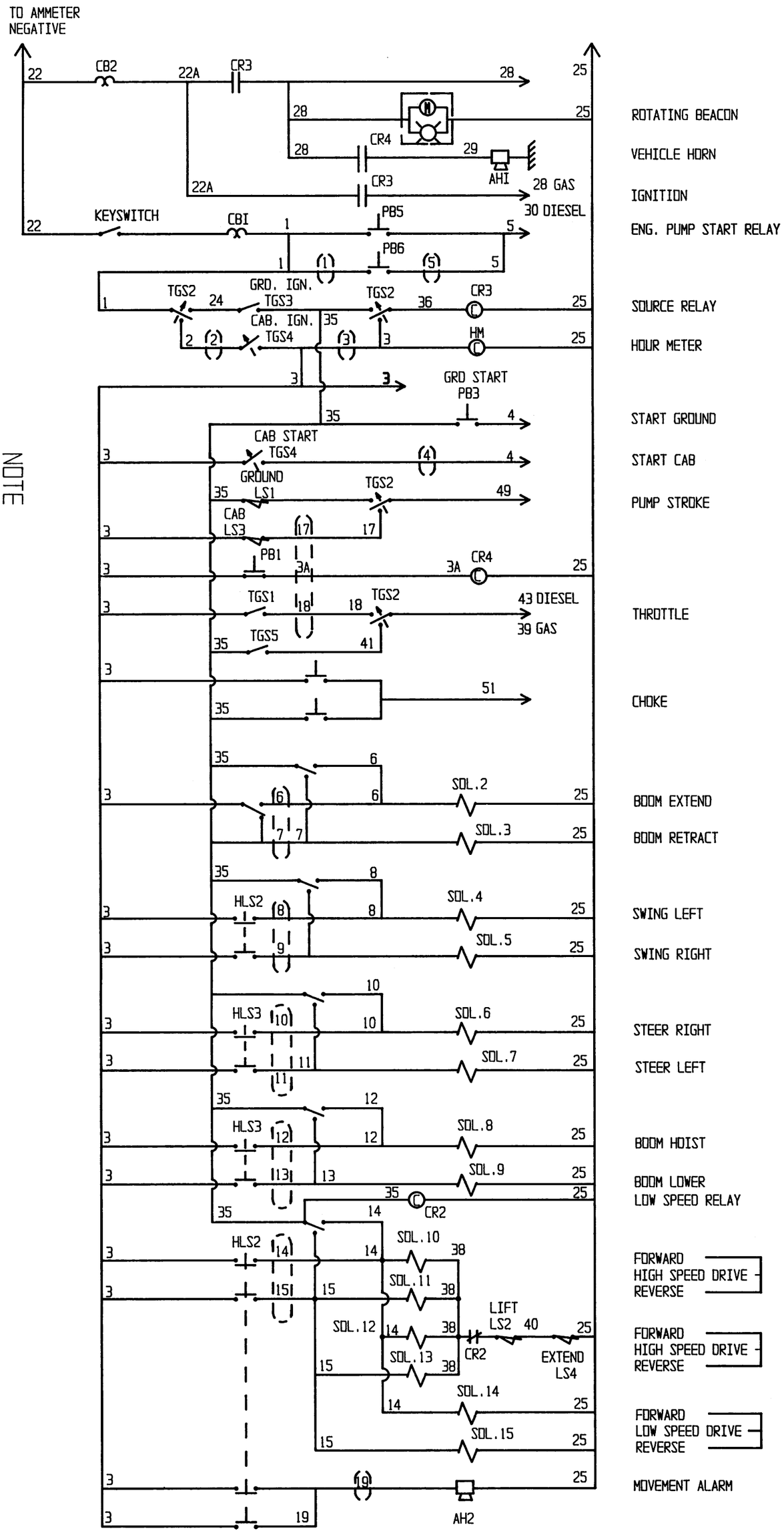
Note: Older type Simon booms utilized a high pressure filter with a by-pass circuit. This type of filter is identified by a metal 2 micron filter element located internally in the filter body. This filter housing also has a red indicator pin which, when the element is dirty, pops out of the filter head indicating a by-passing situation.

3 Emergency Pump -

The emergency pump is driven by an electric DC motor. This pump delivers hydraulic fluid, under pressure, to the main hydraulic distribution manifold. This pump should only be used in emergency situations! The electric motor is of a non-continuous type and will fail if used excessively.

4 Check Valve -

The check valve allows the main hydraulic pump free hydraulic fluid distribution to all the hydraulic systems. However; it prevents the emergency pump from bleeding off pressurized flow through the hydraport circuit when activated. This then allows full pressure to selected functions without the use the hydraport control valves.



NOTE

(X) DENOTES CONDUCTORS THROUGH CABLE IN BOOM

TGS 2 SHOWN IN GROUND CONTROLS POSITION SOLENOIDS 10 & 11 OPTIONAL

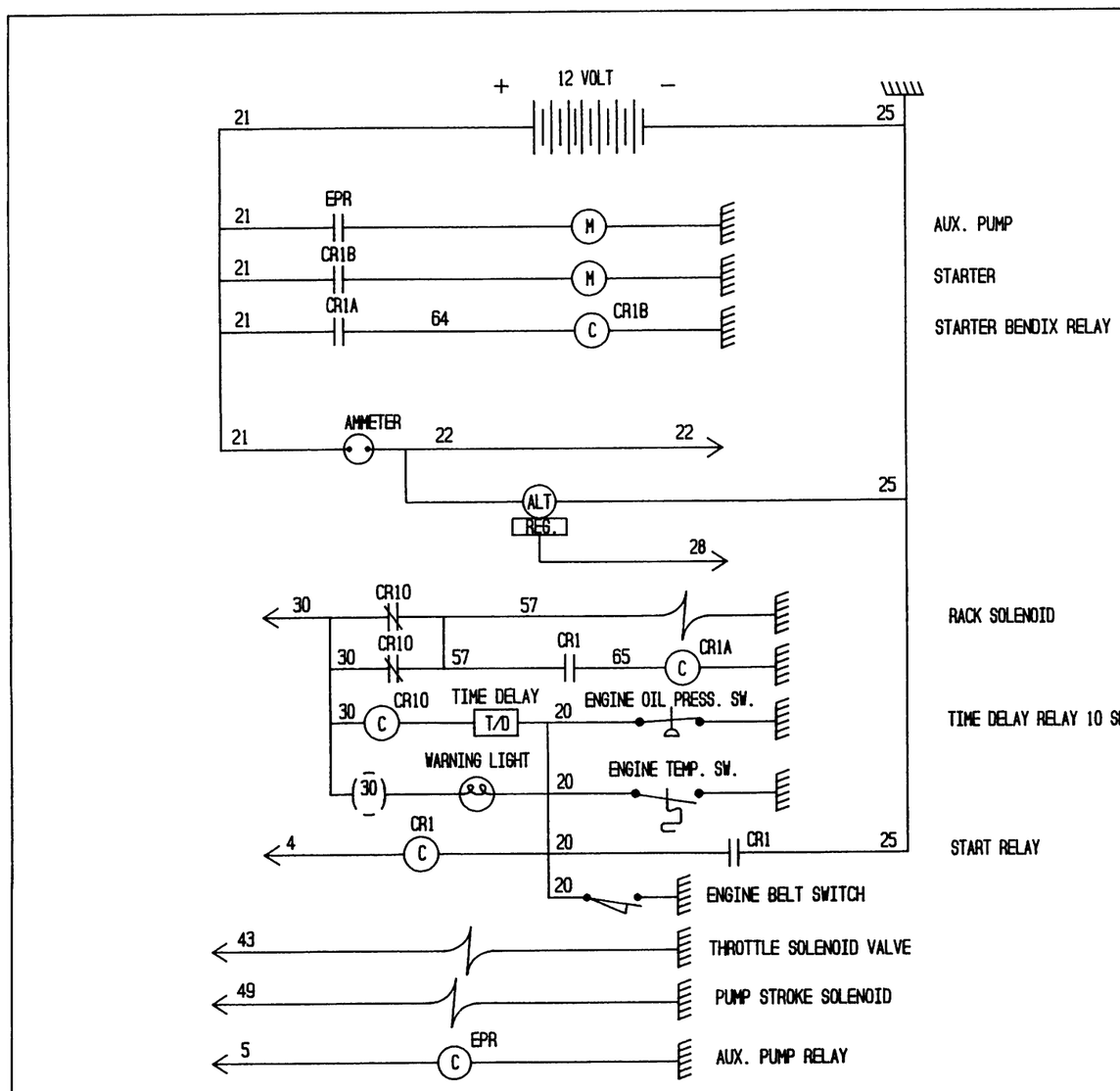
SHEET 1 OF 2

SIMON-AERIALS INC.

TITLE: ELECTRICAL SCHEMATIC HYDRAPORT CONTROL SYSTEM 35 H.P. GASOLINE

REVISION: A / 9-28-88

DWG. NO.: SDS-212419-0



ENGINE RPM IDLE 1200—1500
HIGH 2500

SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE	ELECTRICAL SCHEMATIC DEUTZ DIESEL 3 & 4 CYL.
REVISION	DRWG. NO. SCS-212426-0