

Congratulations!

The H.I. 2000 H.E.U.I. test bench will be a valuable asset to your progressive Diesel Service and Repair facility for many years.

Please take the time to read and understand this operating manual before using the H.I. 2000. Reading the manual will allow you to receive the utmost in performance and service from your HI 2000.

- 1 Carefully unpack and place HI 2000 on a solid and level base. The feet are adjustable for leveling. Check for shipping damage.
- 2 Carefully unpack and place the gradient tube assembly in position on top of the electrical control box. The four holes in the base of the gradient tube assembly will line up with the four holes in the electrical control box. Fasten the gradient tube assembly and tubes in place with the supplied fasteners.
- 3 The water needs to be connected using locally available hardware. The inlet will need a flow restriction device. (EG supplied valve) The outlet will need to be routed to a suitable drain.
- 4 The 110-volt connection may be plugged into any outlet. **The 220 3-phase connection needs to be connected by a qualified electrician.** The small latch at the front of the door is opened with a screwdriver and is turned to the right to unlock. **The safety interlock on the control box (big yellow & red knob) is opened by placing the right thumb on the small button on the top of the knob and squeezing it down to meet the horizontal bar. Make sure that the knob and bar are horizontal and then open the door. The process is reversed for closing and locking the interlock.** The complete knob needs to be turned right until the horizontal bar is vertical to turn on the 220 3-phase power.
- 5 Place approximately 10 US gallons of suitable calibration fluid (Viscor or equivalent) in the main tank by pouring it in over the cylinder head. The proper amount of fluid is when the fluid level is even with the bottom of the cylinder head. This level can be verified by looking through the casting holes in the cylinder head. This level needs to be maintained.
- 6 Now that the hookup and fill-up is complete it is time to move on to Initial settings and start up.

Initial settings and Startup

Note: all switches off except those specified to be on.

- 1 Actuator and supply pressure controls turned all the way to the left
- **backed out** -

- 2 Emergency Stop off. (OUT)
Controller power on.
Supply pump on.
Actuator pump on.
Flush switch on.
Fluid should be seen almost immediately in the flush block. Turn off the Flush switch when fluid has appeared.

- 3 Emergency Stop off.
Controller power on.
Actuator pump on.
Fluid should appear shortly in the test head. Allow the fluid to flow until the bubbles disappear. Turn off the Actuator pump and turn on the Supply pump. Allow the fluid to flow until the bubbles disappear. Turn off the supply pump. This process has bled the system.

- 4 Place 1 or 4 (depending on model) injectors in the flush block. Make sure they are fully seated and the retainers are in position above the injectors.
The injectors will be forcefully ejected from the flush block if the retainers are not properly placed! Connect the wires to the injectors.

- 5 Emergency stop off.
Controller power on.
Supply pump on.
Actuator pump on.
Flush switch on.
Test Master Switch to Injector
1-4 Injector switches to Injector
Supply pressure set to 40 – 50 psi
Actuator pressure set to 200 psi

- 6 The control unit at the top of the electrical control box needs to be set next. Push and release the buttons to change settings.

- 7 Stroke Counter to 100
Rpm to the default of 1000 + or – 100 rpm
Pulse width to the default of .8ms
Push Start button

- 8 The H.I. 2000 will now flush the injectors in the flush block. Repeat the flush process until the fluid coming out of the injectors is clean. **Return control knobs to full out and make sure that the gauges read 0 pressure. The injector and some fluid will be forcefully ejected from the flush block if the Pressure is not at 0, causing injury to the operator and / or damage to the H.I. 2000.** Remove injectors from flush block.
- 9 Place injectors in injector test head as in a stock head and connect wires, then check the fluid level and close the lid. **The injector and some fluid will be forcefully ejected from the test head if the injector is not properly installed, causing injury to the operator and / or damage to the H.I. 2000.**
- 10 Emergency stop off.
Controller power on.
Supply pump on.
Actuator pump on.
Test Master switch to Injector Test.
1-4 Injector switches to Injector
Supply pressure set to 40 – 50 psi
Actuator pressure set to 2000 psi
Stroke Counter to free run
Rpm to 1500
Pulse width 2ms
Push Start button
- 11 Allow H.I. 2000 to run until all the bubbles are gone in the tubes leading to the gradient tube assembly. **Be sure to leave the gradient control handle in the forward open position to drain.** The gradient tube assembly may seep fluid if allowed to fill completely. The H.I. 2000 operating temperature needs to be set by controlling the water flow through the cooler. The H.I. 2000 needs to be stopped and the Temp Check button pushed to check the temperature. The ball valve you installed in the water inlet should be approximately $\frac{1}{4}$ open. Allow the H.I. 2000 to run until the water turns on and then adjust the water flow until the temperature remains constant between 38 to 43 degrees Celsius. This should only need to be done once. Stop the H.I. 2000. **Make sure that the actuator and supply pressures are at 0 by backing out the control knobs completely before removing the injectors. The injector and some fluid will be forcefully ejected from the test head if the Pressure is not at 0, causing injury to the operator and / or damage to the H.I. 2000.**

Flushing procedure

Note: All switches off except those specified to be on.

- 1 Place 1 to 4 (depending upon model) injectors in the flush block assembly. Using the proper lubricant will make the job easier. Place the retaining bars in position above the injectors and connect the wires. Next check the fluid level in the main tank and close the lid.
The injectors will be forcefully ejected from the flush block if the retainers are not fully seated onto the retaining pins. This ejection and splashing of fluid may harm the operator and / or the H.I. 2000.

- 2 Emergency stop off.
Controller power on.
Supply pump on.
Actuator pump on.
Test Master switch to Injector Test.
1-4 Injector switches to Injector
Supply pressure set to 40 – 50 psi
Actuator pressure set to 200 psi
Stroke Counter to 100
Rpm to default 1000+/- 100
Pulse width to default .8ms
Push Start button

- 2 Allow the H.I. 2000 to time out while watching the fluid leaving the injectors. If the fluid is clean the flushing process is over. If the fluid is not clean repeat the flush process by pushing the start button again. Try to keep the flushing to a minimum. Remember that you are using expensive calibration fluid for the flushing process. The main tank fluid level should be checked after every flush process. If the level gets to low air will enter into the hydraulic system. This will happen if the tops of the filters are not fully under fluid. The flush tank will eventually fill with contaminated fluid and need to be drained. This is done by removing the front panel to gain access to the drain valve. The front panel latches are loosened by turning the center counter-clockwise with a screwdriver. After loosening the center, the outer knob of the latch will easily turn left or right to unlatch. **Use caution draining the fluid, as it may be hot.** Dispose of the contaminated fluid in accordance with local guidelines.

Injector flow testing

Note: All switches off except those indicated to be on.

- 1 Place clean injectors into the injector test head as in a normal stock installation. Make sure that the injectors are held in place by the stock retainers and bolts. **The injector and some fluid will be forcefully ejected from the test head if the injector is not secured, causing injury to the operator and / or damage to the H.I. 2000.** Connect the wires to the injectors, check the fluid level and close the lid.
- 2 Emergency stop off.
Controller power on.
Supply pump on.
Actuator pump on.
Test Master switch to Injector Test.
1-4 Injector switches to Injector
Supply pressure set to 40 – 50 psi
Actuator pressure set to 1000 psi
Stroke Counter to 100
Rpm to default 1000+/- 100
Pulse width default .8ms
Gradient tube lever in the back (closed) position
Push Start button
- 3 Allow the H.I. 2000 to time out. The level of fluid in the gradient tubes should be similar in all 4 tubes. Empty the gradient tubes by pulling the handle forward and set the H.I. 2000 to the settings of your choice by repeatedly pushing and releasing the controller buttons, and turning the knobs. The actuator pressure and supply pressures may also adjusted to your test settings (max. actuator setting 3000psi / max. supply setting 80-85psi). After a series of high pressure / high rpm tests the injectors should fill the gradient tubes to approximately the same level. If one injector is not filling its tube at all, make sure it's wire is connected. NOTE: To test one injector all 4 positions in the head must have an injector in them.
- 4 To test one injector only, turn off all the injector test switches except for the one you want to test. #1 injector is the injector furthest left in the test head.
- 5 **Before removing injectors make certain that the actuator and supply gauges read 0 pressure, by backing their control knobs out completely.**

Injector upper seat test

Note: All switches off except those indicated to be on.

- 1 This test will test the upper seat of the injector and the injector solenoid. Maximum on time for this test is 2 minutes. If this time is exceeded on a single injector its solenoid may burn out.

- 2 Emergency stop off.
Supply pump on.
Actuator pump on.
Test Master switch to Leak Test.
1 of the 4 Injector switches to Leak Test
Supply pressure set to 40 – 50 psi
Actuator pressure set to 1000 psi

- 3 Make sure that you only have the injector switch on for the injector you are testing. All the other injector switches should be off. Turn the leak test rheostat knob clockwise slowly. The Red light on the panel will begin to glow and the amp gauge will start to rise. Fluid should be escaping from the injector's return port. Continue to turn the knob. When approximately 4-5 amps is indicated on the amp meter the upper seat should snap shut and fluid should stop flowing. If the injector does not snap shut, check that the wire is on and that you have the right switch turned on for the injector you are testing.

Maintenance and Service

The H.I. 2000 equipment is relatively maintenance free except for the calibration fluid and filters.

The Actuator pump's electric motor has grease fitting on it. It should be greased once a year. The Actuator pump's filters are located in the main tank under the front splash shield. The H.I. 2000 comes with Fram CH6PL or Hartridge OH20/2/2/21/11 filters. The Hartridge OH20/2/2/21/11 filters being the recommended service filter. The recommend interval of service is every 6 months.

The filters are accessed by removing the front splash shield in the main tank. Depending upon the production date of your H.I. 2000 the side splash shields may also need to be removed.

The supply pump has it's own filter located under the main tank on the inside of the back panel. It is a Racor # R12S (2 micron) and has a water trap. It should be serviced on a 6 month basis.

The recommended calibration fluid is Viscor. The fluid should be changed according to the manufacturer's specifications. If you are using a different calibration fluid, use that manufacturer's specification for changing the fluid. **DO NOT USE DIESEL FUEL.** Diesel fuel will not provide consistent or accurate measurements. Use of diesel fuel may void warranty!

The fluid is changed by first removing the front panel to gain access to the drain valve. The front panel latches are loosened by turning the center counter-clockwise with a screwdriver. After loosening the center, the outer knob of the latch will easily turn left or right to unlatch. **Use caution draining the fluid, as it may be hot.** Dispose of the contaminated fluid in accordance with local guidelines.

Basic Electrical Troubleshooting

The H.I. 2000 is a complex integration of electrical, electronic and hydraulic components. This makes in-depth troubleshooting difficult, however there are a number of fuses and protection devices, that can be easily checked.

The 12V power supply is under the electrical control panel and has an on/off switch on top and an 8 amp fuse on the bottom by the power cord. Output voltage can be tested at the low voltage (vertical) terminal block in the electrical control box. **Caution: High voltages are present in the control box!** Open the Control Panel side door and with a DMM check for 13.8 Volts. If no voltage is present check for these things.- That the 110 power cord is plugged in.- That the controller switch is on.- That the 110 volt, 15 amp fuse is not blown. The 110 volt, 15 amp fuse is the lower rear fuse in the cabinet and is positioned horizontally. **Make sure that the power is turned off, and that the cords (110 and 220 volt) are unplugged.** Now you may remove the 110 volt fuse and test it with an ohm meter. You can now also test the 2 fuses in the low voltage terminal block and the 2 fuses in the high voltage (horizontal at rear) terminal block.

The 220 volt 3 Phase motor controls include 3 fuses, a magnetic starter, and a heater. The fuses are the large vertical ones at the top rear of the cabinet. Test these fuses with the same procedure as previously described for the other fuses. **Make sure that the 3 phase power is disconnected.** The magnetic starter should engage any time the actuator switch is turned on in normal operating conditions. The magnetic starter is located on the high voltage terminal block below the 3 fuses. The heater is just below the magnetic starter. The heater has a small dial on it that should be set to 15. If the dial is not set to 15 the heater will open and the reset button will pop out. To reset the heater, make sure the power is off and push the reset button in. The heater should have continuity across terminals 95 & 96.

If the H.I. 2000 keeps blowing fuses something is wrong. Look for cut, frayed or loose wires. Something is drawing more current than it should. For your own safety DO NOT defeat or bypass the protection devices.

Basic Hydraulic Troubleshooting

The H.I. 2000 hydraulic system consists of two pumps and a number of valves and solenoids.

The actuator pump is at the bottom of the stand behind the front panel and is directly driven off the 220 volt 3 phase electric motor. It's pressure is set at the factory and should not need any service.

The supply pump is directly above the actuator pump. It is magnetically coupled to its 110 volt motor, and has a maximum pressure of 80 – 85 psi. It has its own "Racor" filter that should be serviced regularly. The pump may kick out under certain high load conditions. If this happens back out the supply control knob completely and turn off the supply pump switch. Turn the supply pump switch back on after approx. 10 seconds and reset the supply control pressure.

The maximum actuator pressure is adjusted by removing the actuator pressure control handle and turning the hex head set screw on the rod. Setting the pressure over 3000 psi will cause problems with proper operation and may void warranty.

If the H.I. 2000 hydraulic system starts to act erratically the cause is probably low fluid level in the main tank. Make sure that the level is kept even with the bottom of the cylinder head.

Not Allowed Operation

The H.I. 2000 should not be run with these switch settings.

Emergency stop off.

Controller power on.

Supply pump on.

Actuator pump on.

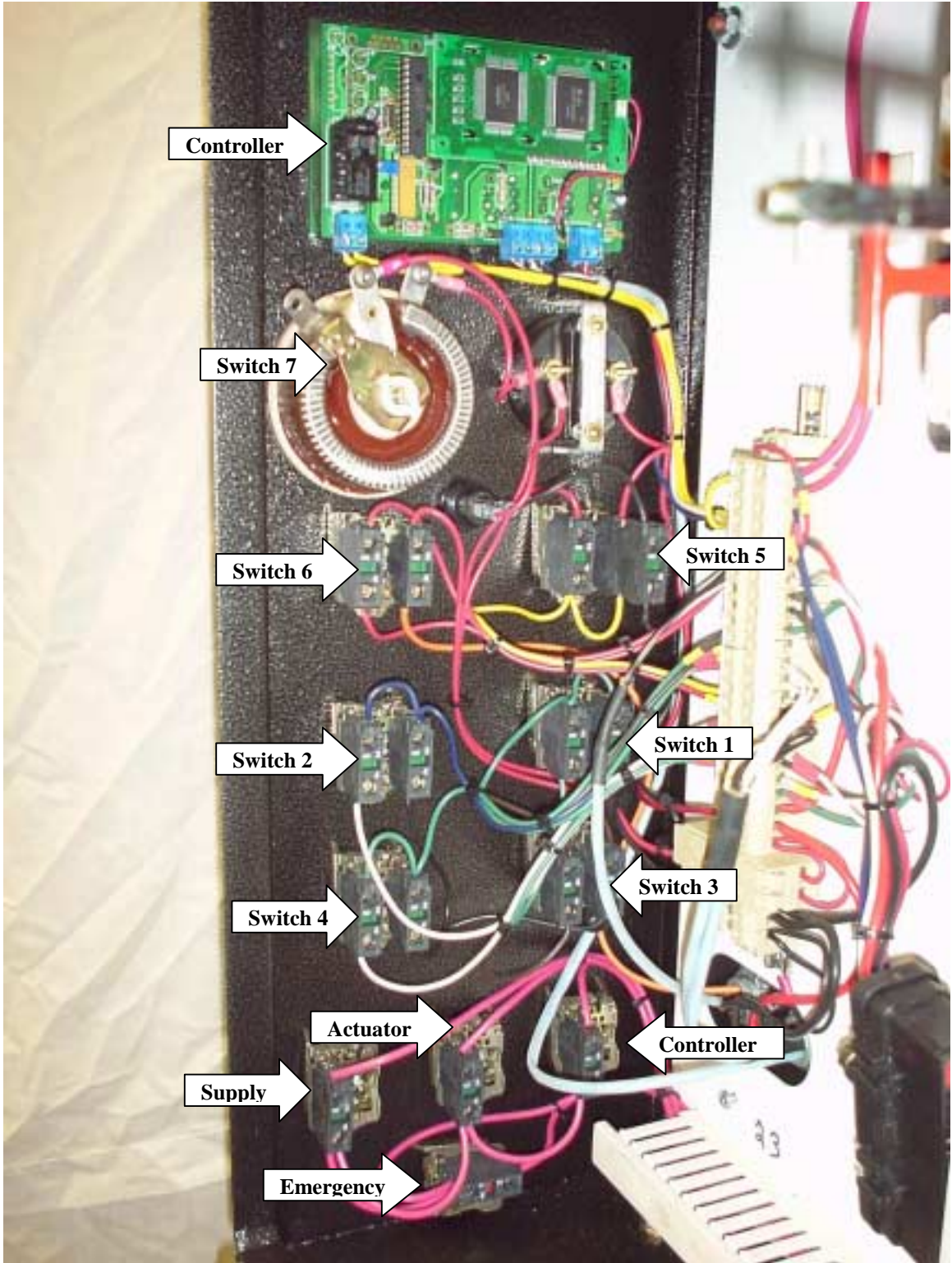
Test Master switch to Injector Test.

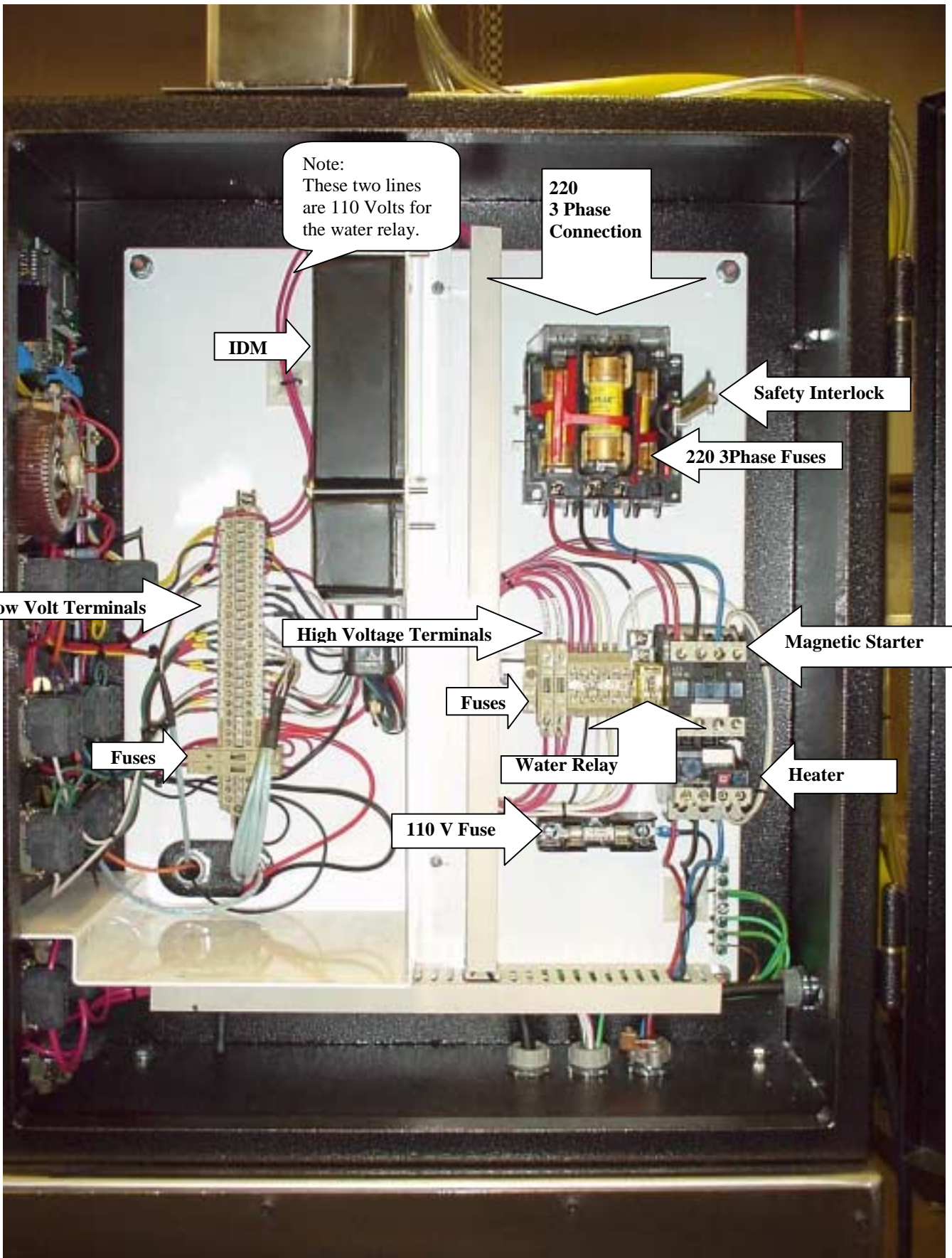
Injector switch 1,2,3 or 4 set to Leak Test

Control panel set to run in any mode

The H.I. 2000 will run at maximum RPM until the operator changes the switch settings.

		Terminal #		
Controller	1	20	Water Solenoid Relay	
Controller	2	19	Water Solenoid Relay	
Controller	6	18	IDM	17
Controller	5	17	IDM	16
Switch	6A	16	IDM	23
Common Flush Block		15	Switch	6A
Flush Block	1	14	IDM	9
Flush Block	2	13	IDM	19
Flush Block	3	12	IDM	7
Flush Block	4	11	IDM	22
Switch	4A&4B	10	Test Head	4
Switch	3A&3B	9	Test Head	3
Switch	2A&2B	8	Test Head	2
Switch	1A&2B	7	Test Head	1
Switch	5A&5B	6	Test Head	Common
Switch	5A	5	IDM	24
Switch	4A	4	IDM	20
Switch	3A	3	IDM	8
Switch	2A	2	IDM	21
Switch	1A	1	IDM	6
Controller	8	12V Bus	Power Supply	
		12V Bus	IDM	14
		12V Bus	to fused 12v	
Switch	7	Fused 12V	from 12v bus	
Switch	6B	Fused 12V	from 12v bus	
Controller	7	Ground	IDM	26
Switch	1B,2B,3B,4B	Ground	Power Supply	
Switch	5C	Ground	Chassis & Circuit Block	
Switch	6B	Direct	Circuit Block	
Controller	3	Direct	Termistor	
Controller	4	Direct	Termistor	
Switch 7	Vari-Res	Direct	Ammeter	A
Ammeter	A	Direct	Light	A
Light	B	Direct	Switch	5C
Ammeter	B	Direct	Switch	5B





Note:
These two lines
are 110 Volts for
the water relay.

220
3 Phase
Connection

IDM

Safety Interlock

220 3Phase Fuses

Low Volt Terminals

High Voltage Terminals

Magnetic Starter

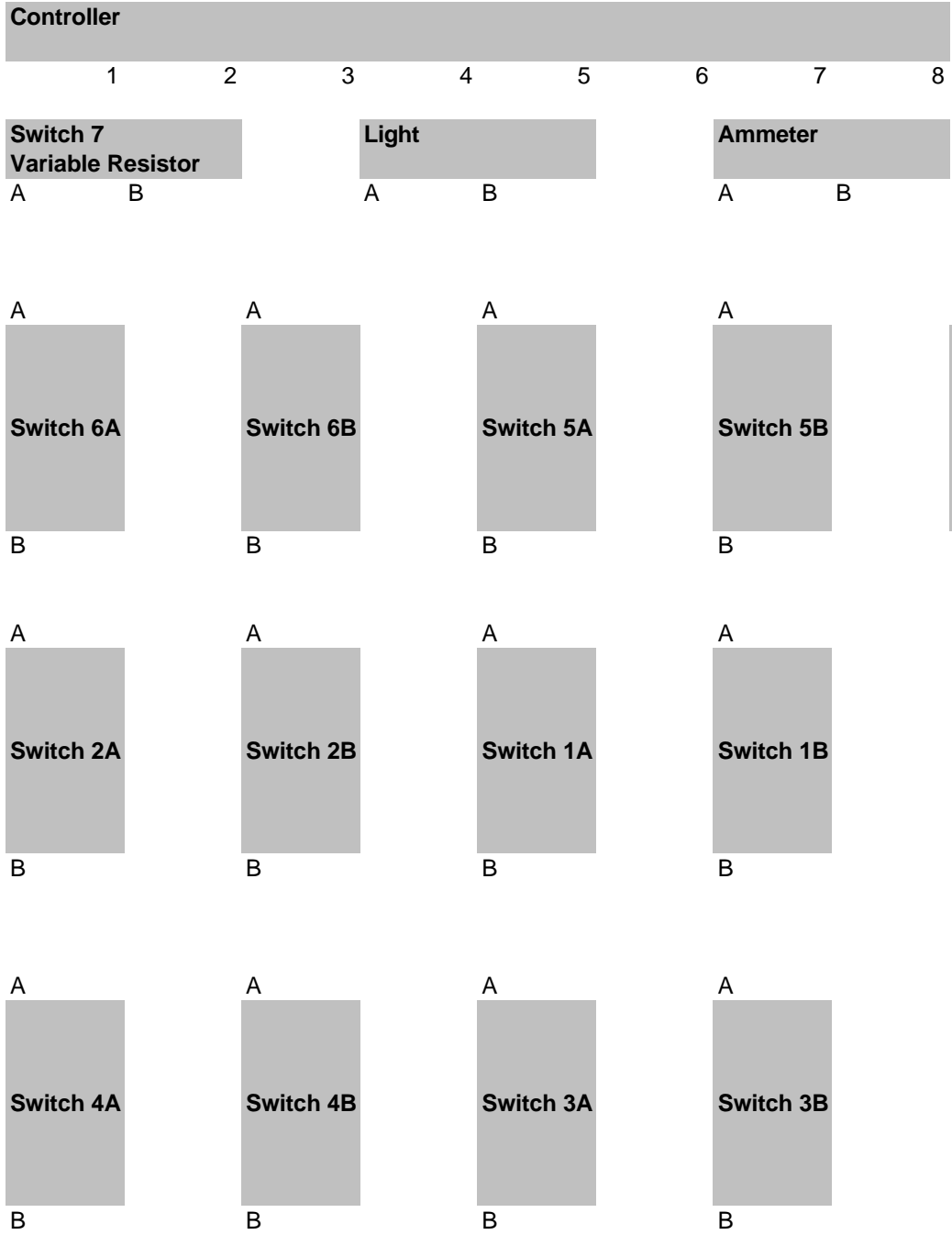
Fuses

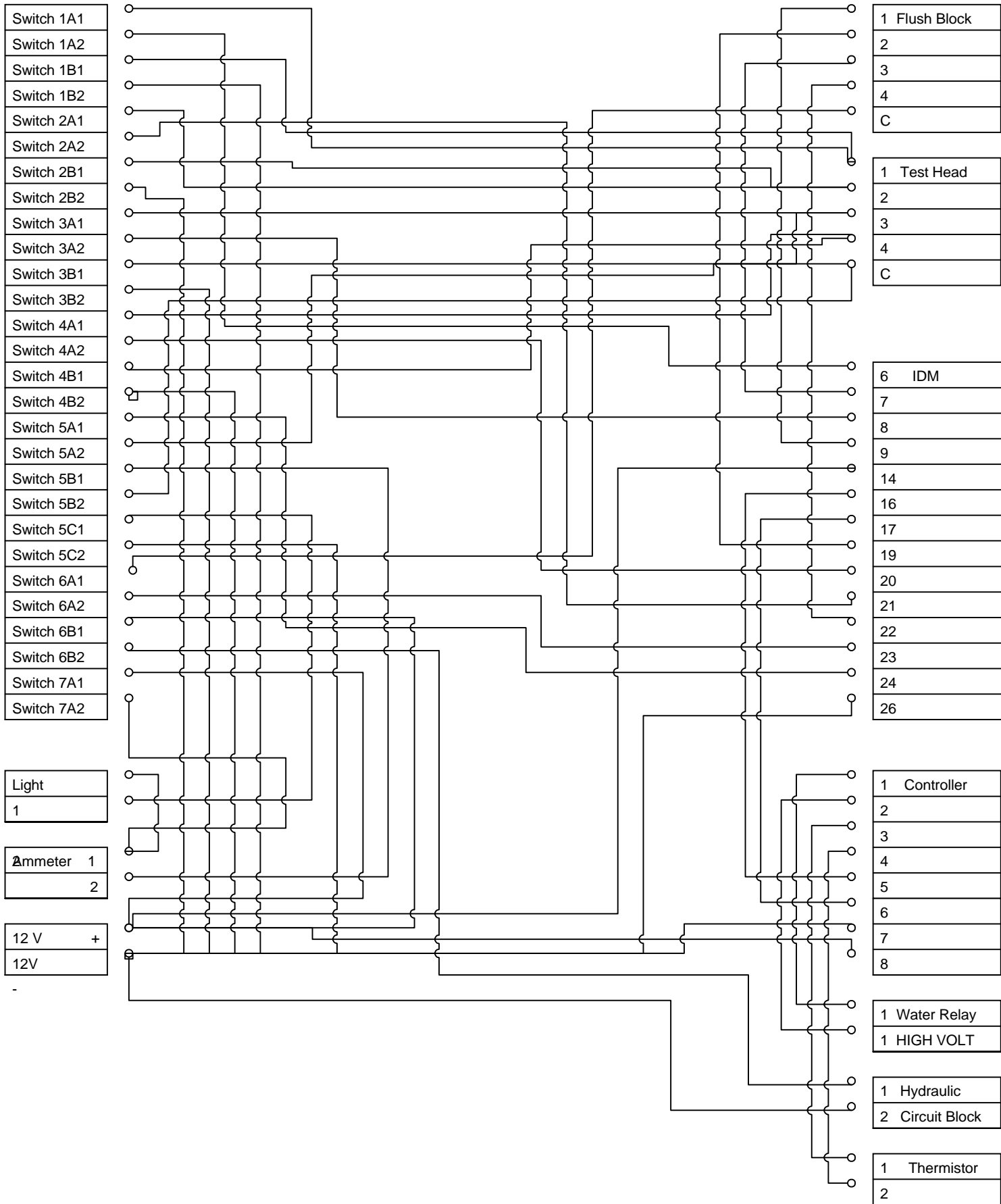
Fuses

Water Relay

Heater

110 V Fuse



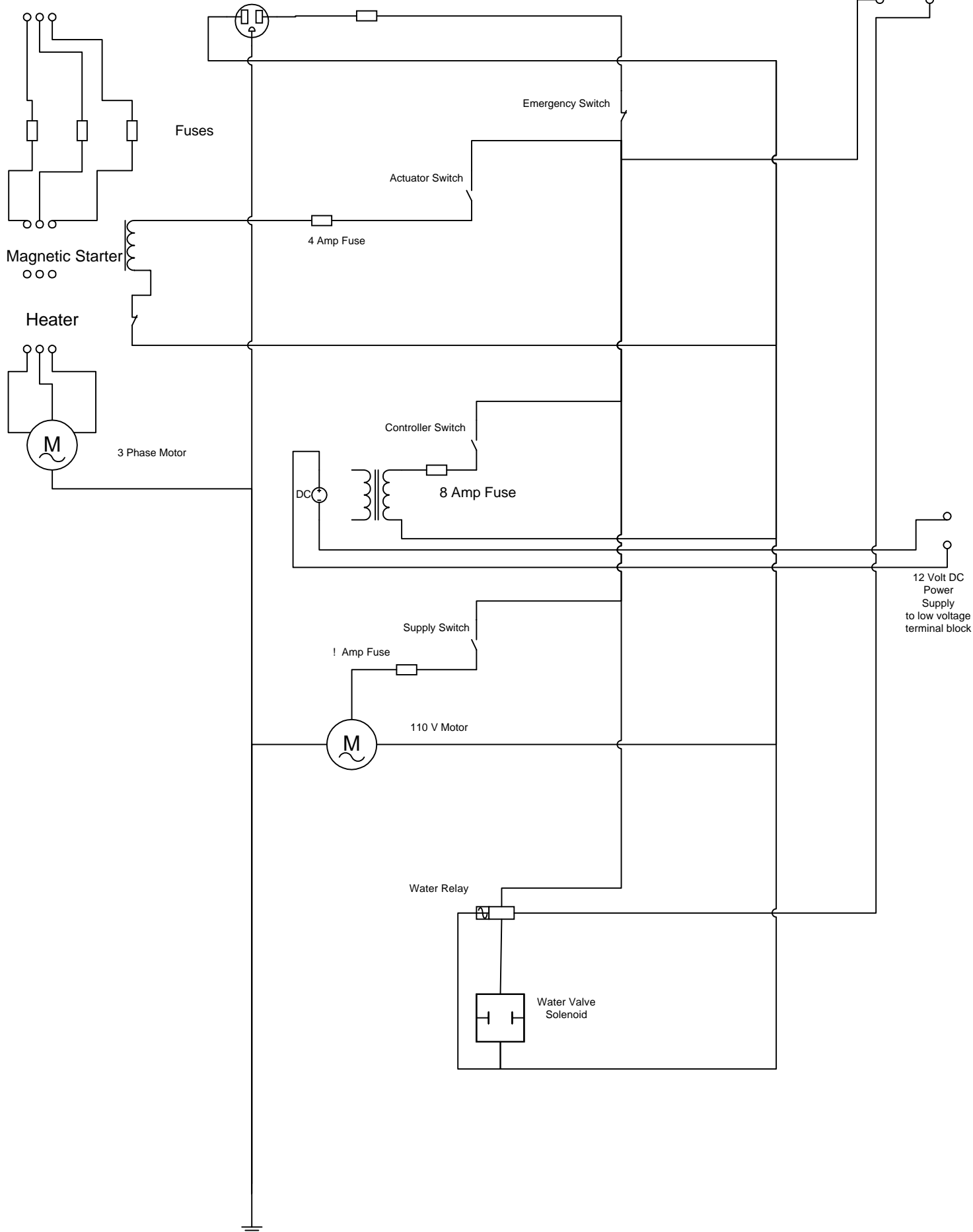


220 3 Phase

110 Volts AC

15 Amp Fuse

To Controller



Hydraulic Circuits

