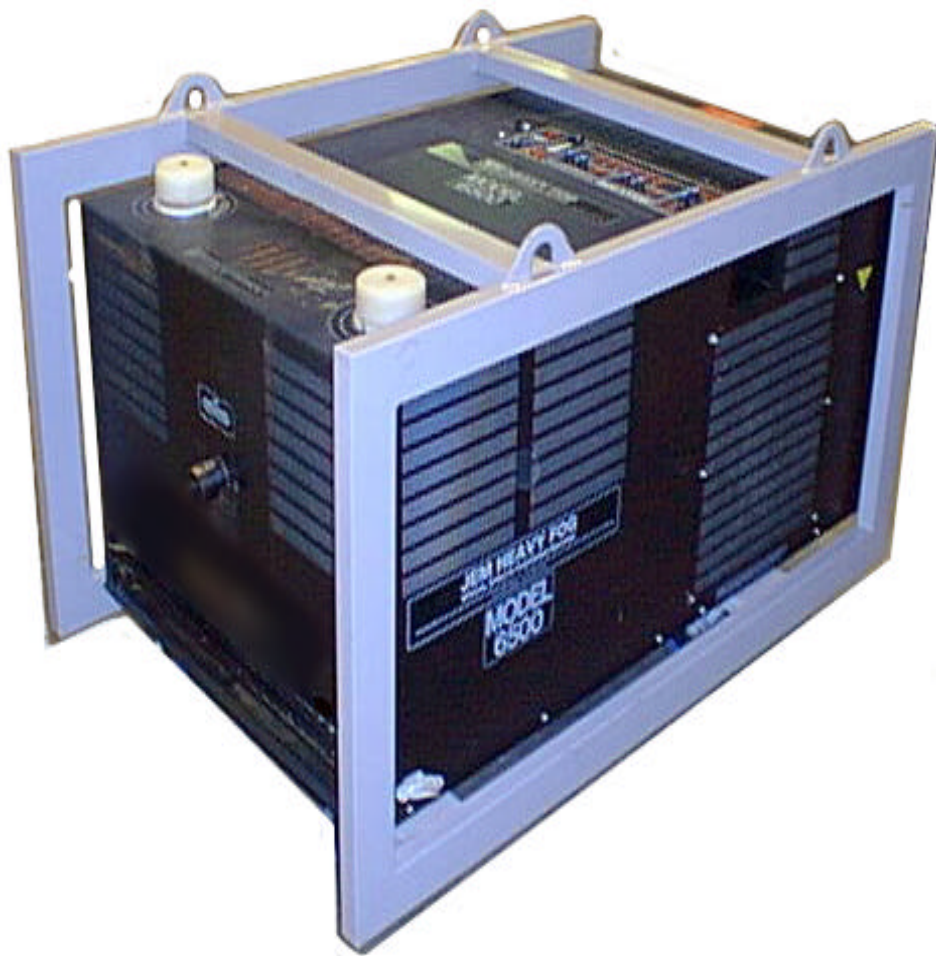


THE ULTIMATE JEM LOW LYING  
FOG/SMOKE MACHINE

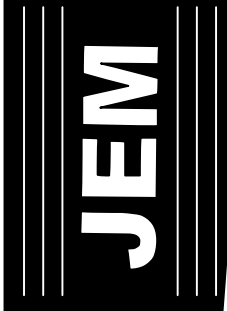
# H.F 6500

SERVICE MANUAL



PLEASE READ THESE INSTRUCTION CAREFULLY

JEM SMOKE PLC



Version 1.0 990127

# **HEAVY FOG 6500 SERVICE MANUAL**

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## **Heavy Fog 6500 Features and Specifications:**

The Heavy Fog 6500 is a dual purpose machine it can deliver Smoke or Low lying fog at continuous output 24 hours a day 7 days a week 365 days of the year. A series of vertical and horizontal louvers at the front of the machine controlled by a jot-stick mounted on the controller will direct the low lying fog wherever it is required, further more the controller has a pre-programmed louver movement to reproduce scenic effects such as Sea, Wave, Cloud, Waterfall, Curtain and volcano. The on-board 19" rack mounted controller can be removed and mounted remotely or if preferred the machine can be controlled via a lighting desk using either the 0-10v input connection through a Mono Jack plug, and the 512 DMX card Via a 5 pin XLR plus a slave socket to link the machines together.

## **Specifications:**

Power requirements:	220v-240v 50hz 3 phase 20 amps per phase 208v 60hz 60 amp Single phase.
Heaters:	10kw
Fan speed:	0-3000rpm (1.2 amps)
Smoke output:	1250mc per minute
H.F output	500 square meters per minute
Pumps:	2 x Piston pumps (0.7amps each)
Fluid capacity:	2 x 5ltr integral tanks
Fluid types:	A1, B2,C3 and C4
Dimensions:	1170 x 760 x 715mm
Weight:	210kg

## **Safety**

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- ?? Always connect to the correct mains power supply.
  - ?? Always use genuine JEM fog fluid.
  - ?? Always disconnect from the mains before attempting to start work on the JEM H.F 6500.
  - ?? Do not suspend the machine above peoples heads.
  - ?? Do not stand directly at the front of the machine when firing.
  - ?? Do not block the airflow vent at the back of the machine.
  - ?? Clean the machines filters out once a month.
  - ?? Always install in a well-ventilated area.
  - ?? Ensure correct fluid is placed into specific smoke or heavy fog tanks.
  - ?? Never attempt to do any work on the machine if it isn't described in the manual.
  - ?? Consult your supplier for advice on the JEM Heavy fog 6500.
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## **Safety**

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### **Wiring of the machine**

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Because the machine, in most cases, will be wired to a 3 phase supply, a voltage of 415volts A.C will exist across each set of phases, therefore great care must be taken when working on live apparatus.

**ELECTRICITY KILLS.** Under no circumstances should anyone without sound electrical knowledge be permitted to work on this machine while connected to a live electrical feed.

### **U.K AND EUROPEAN WIRING IF THE MACHINE**

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The U.K /European model operates on 220/240 volts and may be operated on a single 220/240 volt phase, however, this causes a substantial current draw, so it is much more desirable to use three separate phases to provide better load distribution. The machine will benefit and run much more smoothly.

### **U.S.A WIRING IF THE MACHINE**

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The wiring connection is different in the U.S. In the U.S. 2 x 110volt phases (legs) are used to obtain 208 volts, however the same cautions apply. To obtain a voltage of 208 volts from two 110 volt legs, connect all live feeds (Hots) together on one leg, and the neutral Blue wire on the other leg. This will give you 208 volts.

Note in this situation the supply neutral is not used. To those unfamiliar with use of multiple electrical phases, known as "Legs" in the USA this action may seem strange but is common in the commercial field and normal practice. As always make sure that the earth (ground wire in the USA) is properly connected. NEVER operate this machine without the earth/ground wire connected.

## Safety

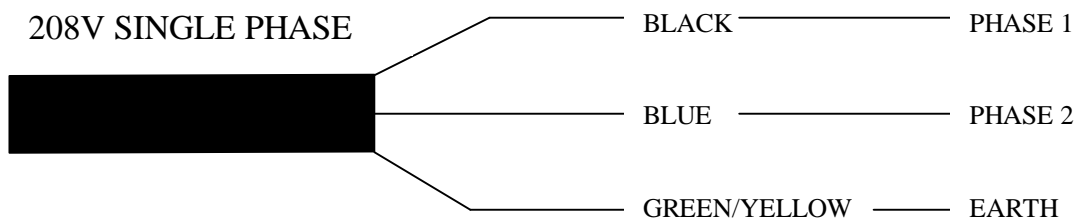
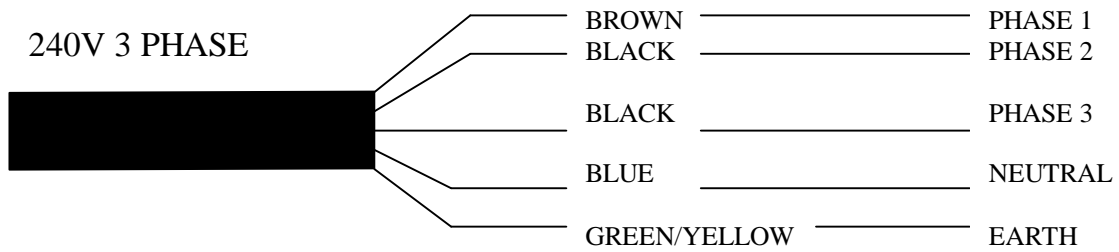
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### Wiring of the machine

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**N.B. THIS APPLIANCE MUST BE EARTHED!**

#### Wiring of Plug



## **Fault finding guide**

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<b>Problem</b>	<b>Probable Cause</b>	<b>Cure</b>
Heater, Fan and compressor fail LED's on.	Condenser fan fuse blown. Condenser fan motor faulty. Fan blade jammed. Insufficient air flow to the machine. Low gas charge. Condenser coil air outlet blocked or restricted at rear of machine.	Replace Fuse No7. Replace. Re-align. Clear restriction. Re-site machine. Check for leaks, purge and re-charge. Clear restriction and or re-site machine.
Red LED on motherboard flashing.	Overheat sensor circuit activated faulty sensor on block. O/S Triac or Opto on Trigger board.	Replace sensor or sensors.  Replace Triacs or Opto's No's 1,2 6 and 7
Heavy fog button pressed but does not activate after normal delay period.	Phase down. Contactor 1 faulty. Faulty capacitor. Pressure switch tripped.  Compressor internal thermal overload trip activated.	Check mains supply voltage. Repair or replace Contactor 1. Replace compressor capacitor. Reset and try again, if trip re-activates, check filters are clean and machine isn't in an enclosed space, reset and run again, if trips again reset and check machine for gas, when running high pressure side 200psi low pressure side 30 psi (5lb of R22 in machine) If less check for leaks. If O.K check compressor for faults. Replace.
Freeze fan and solenoid switch fail lights on.	Evaporator fan motor failure. Jammed fan wheel. Evaporator fan fuse blown. Solenoid failure. Evaporator coil sensor faulty. Mag valve sensor faulty.	Replace motor. Rectify. Replace fuse No 8 on trigger PCB. Replace coil. Replace sensor. Replace sensor.
Heavy fog smoke rising.	Evaporator fan speed to high.  Faulty thermostatic expansion valve. Restriction in refrigeration circuit. Solenoid valve jammed open. Drier blocked. Lack of refrigerant.	Fan voltage on low speed should be 75 - 85 volts, check this on mother PCB. Replace, then purge and recharge.  Check pipe work for ice build up at any one point and clear by applying heat. Clear or replace. Replace. Check for leaks, seal vacuum purge

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and recharge.

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### **Fault finding guide**

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Timer malfunction.	Damp or faulty switch.	Repair or replace.
Erratic special effects.	Excess voltage drop in control cable. Damp controller. Faulty power supply.	Try different controller or use shorter control cable.
Condenser fan runs at full speed on switch-on.	Broken sensor. Wire broken or disconnected on mother PCB.	Replace red sensor on condenser coil Repair or re-connect wire.
No heavy fog output/ or no smoke output	Tank empty. Air leak in pump or fluid line. Faulty pump. Pump fuse blown.	Refill. Locate and reseal. Replace. Replace fuse No's 5 and 6.
*Earlier models only*	Blocked change over valve. Change over fuse blown. Change over valve faulty.  Faulty switch or broken LED.	Clean and test. Replace fuse No 5. Replace or modify to current spec, using two separate pumps. Repair or replace
High current draw.	Refrigerant overcharge. Tight compressor. Compressor electrical problem. Discharge valve leak. Internal compressor leak.	Purge and recharge. Run in for a few hours. Wiring problem, Check and correct.  Re-seal. Replace compressor.
Low current draw.	Low refrigerant charge. Water in system.	Check for leaks and re-seal. Purge, evacuate and re-gas.
Servo faulty, no servo action at all.	Faulty servomotor or wiring.	Repair or replace.
Block heats up O.K but no heating LED on controller.	Socapex line 22 (Red) broken.	Repair.

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## **Fault finding guide**

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<b>Problem</b>	<b>Probable cause</b>	<b>Cure</b>
Heat fan LED & Compressor fan fail LED lights on.	Socapex line 21 (White) Broken.	Repair.
Servo appears faulty. Smoke blows low on floor or to one side.	Socapex line 3 (Yellow/Blue) or 4 (Yellow/Red) broken.	Repair.
No variable smoke output at all.	Worn or damaged slider control.	Replace.
Smoke output stuck on minimum.	Broken + volts supply to slider.	Reconnect wires on slider ensuring secure.
Machine cannot be turned on or off using "Standby" or "on " buttons. Mains LED is dim. Machine works by pressing the heavy fog button only to start.	Socapex line 5 (Green/Brown) broken.	Repair.
Machine stays in standby mode.	Socapex line 7 (White/Red) broken.	Repair.
Smoke LED will not light and difficulty selecting heavy fog function.	Socapex line 8 (Red/Brown) broken.	Repair.
Heavy fog LED will not light .	Socapex line 9 (Red/Black) broken.	Repair.
Machine will not switch from Heavy fog to smoke or vice versa, machine is stuck in smoke mode.	Socapex line 10 (Red/Blue) broken.	Repair.

## **Fault finding guide**

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<b>Problem</b>	<b>Probable cause</b>	<b>Cure</b>
Front evaporator fan will not respond to demand for smoke or heavy fog.	Socapex line 11(Pink) broken or 4066 chip next to pink wire blown.	Repair connection or replace chip.
No smoke or heavy fog but front fan still controllable with slider when smoke or heavy fog is in demand.	Socapex line 12 (Orange) broken or 4066 chip next to pink wire blown. NOTE:- 4066 chip can be damaged by plugging in the controller with the power already switched on.	Repair connection or replace chip.
Standby, mains on, Smoke only works. No heavy fog. Stuck in standby from switch on.	Socapex line 13 (Purple) broken.	Repair.
Machine will not go into ready mode although heating LED goes of and front nozzle is hot.	Socapex line 15(Brown) broken.	Repair.
No operation of solenoid switch fail Led or compressor fail LED.	Socapex line 16 (Black) broken.	Repair.
No operation of freeze fan fail and compressor fail LED's.	Socapex line 17 (Yellow) broken.	Repair.
Smoke delivered when heavy fog is required, heavy fog LED is light.	Socapex line 18 (Green) broken.	Repair.
Heavy fog LED only lights up on controller, total failure of all controls, but compressor starts up.	Socapex line 19 (Light Blue) broken.	Repair.

## **Fault finding guide**

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<b>Problem</b>	<b>Probable cause</b>	<b>Cure</b>
Mains on LED only lights up on controller. Total failure of all controls but pumps run.	Socapex line 20 (Dark Blue) broken.	Repair.

Machine has failed but there are no file lights on controller.	Socapex line 6 (White/Blue) broken	Repair.
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## **22 pin Socapex wiring table**

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<b>Pin</b>	<b>Colour</b>	<b>Function</b>
1	ORANGE/BLUE	DMX -VOLTS
2	ORANGE/GREEN	DMX +VOLTS
3	YELLOW/BLUE	VERTICAL LOUVER
4	YELLOW/RED	HORIZONTAL LOUVER
5	GREEN /GROWN	CONTROLLER LED + VE
6	WHITE/BLUE	COMPRESSOR FAIL
7	WHITE/RED	CONTROLLER ON LED -VE
8	RED/BROWN	REFRIGERATION OFF LED
9	RED/BLACK	REFRIGERATION ON LED
10	RED/BLUE	SMOKE H/F SIGNAL
11	PINK	FREEZE FAN FAIL
12	ORANGE	PUMP SIGNAL
13	PURPLE	STANDBY/ON
14	GREY	DMX GROUND
15	BROWN	READY SIGNAL
16	BLACK	DEFROST VALVE SIGNAL
17	YELLOW	FREEZE FAN FAIL
18	GREEN	PUMP CHANGEOVER
19	LT BLUE	GROUND (GND)
20	BLUE	+12VOLTS
21	WHITE	HEAT FAN FAIL
22	RED	HEATING SIGNAL

## **SERVICE AND MAINTENANCE**

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### **Internal view of the machine**

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#### **Section 1 Internal view of machine**

For an internal view of the machine you must:

1. Unscrew all 28 screws on the outside of the machine. This includes the side panels.
2. Remove the two nylon caps and nuts on the front cover and push the fluid tanks down into the machine.
3. Line up the 2 ducting clips on the front cover so they are flat and pull the lid forward. The rear lid will slide off backwards. Ensure the controller has had its joystick removed before this is done.

#### **Section 2 view off Electronics door**

1. Looking towards the front from the rear of the machine, on your left-hand side of the machine you will see a filtered side panel.
2. Unscrew all 6 (six) screws from around the edges and remove the panel.
3. There you will see a slide out electronics door, pull towards you for a view of the electronics.
4. On the electronics door you will see a Mother PCB a Trigger PCB and 2 Contactor.

#### **Section 3 Replacing the Trigger PCB**

After following section 2.

1. Remove all crimps on the board.
2. Unscrew the second Triac in from the left of the board.
3. Unscrew all four (4) nylocs in the corners of the board.
4. Pull out the molex connector.
5. Remove the board.
6. Reverse the procedure to replace the board.  
N.B. Trigger board connections are as follows,  
PRE MAY 1997 (JEM HEAVY FOG V1.0)  
N, 15,1,2,3,4,5,6,7,8,9,0,11,12,13,14.  
POST MAY 1997 (LVD\_TRIG.PCB)  
N, 15,1,2,3,4,5,7,6,8,9,10,11,12,13,14.  
The above connections are from right to left.

## **SERVICE AND MAINTENANCE**

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### **Section 4 Replacing the Mother PCB**

After following section 2.

7. Remove all wires on the board. Making note of the connections.
8. Remove all four-(4) nyloc in the corners of the board.
9. Pull the board forwards to reveal the back of the board.
10. Remove all soldered wire connections on the back of the motherboard by de-soldering them, making a note of the connections.
11. Remove the board.
12. Replace with new board.
13. Reverse procedure to replace the board.

### **Section 5 Replacing a Contactor**

After following section 2.

1. Remove all wires on the contactor you are replacing, making note where they were removed from.
2. Remove the two- (2) nuts and bolts holding the contactor in place.
3. Remove the contactor.
4. Replace contactor and Reverse procedure.

### **Section 6 Replacing a condenser sensor**

After following section 1 and removing only the back panel.

1. Cut wires as close to the red condenser sensor as possible.
2. Remove all silicone from around the old sensor, and remove sensor.
3. Strip the existing Red wires back about 3mm, ensuring the joints are staggered.
4. Place heat-shrink over the red wire connections.
5. Solder new sensor to the existing red wires.
6. Pull heat-shrink over the connections and Heat-shrink.
7. Place some Heat sink past on the copper outlet pipe from the coil.
8. Place the new sensor on top of it and tie-wrap, Ensuring you do not break the sensor

## **SERVICE AND MAINTENANCE**

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### **Section 7 Replacing a servo board**

After following section 1 and only removing the front cover.

1. The servo boxes are on either side of the machine at the front.
2. Remove the four- (4) screws holding the servo box in-place.
3. Disconnect the louver arm connector.
4. Pull the box towards you. This will give you a view of the servo PCB inside the box.
5. Disconnect the wires.
6. Unscrew the four- (4) screws on the bottom of the box that hold the servo PCB in-place.
7. Remove the PCB.
8. Replace with new PCB.
9. If the metal arm connections on the bottom of the PCB are not attached to the new PCB then disconnect the metal connections from the old PCB and fix to the new PCB.
10. When connecting, line the pot up on the bottom of the board so that it is at half way through a turn. This will give a central point on the louver when in fire mode.
11. Reverse procedure from No 7.

### **Section 8 Replacing the vapour fan**

After following section 1 and removing the front cover only.

1. Remove earth from the fan.
2. Cut up the heat-shrink until you can see where the wires join; cut the wires at this point.
3. Remove all the heat-shrink from of the cable.
4. Remove all the silicone from around the vapor fan.
5. Remove the two- (2) bolts holding the vapor fan in-place.
6. Remove the vapor fan.
7. Replace with new vapor fan.
8. To the existing wires sleeve with new heat-shrink.
9. Around the edge of the new vapor fan once in-place, seal with silicone sealant.
10. Join the wires together by soldering ensuring there is heat-shrink over the brown and blue wire joints
11. Heat shrink the connections and replace the

## **SERVICE AND MAINTENANCE**

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### **Section 9 Replacing the block**

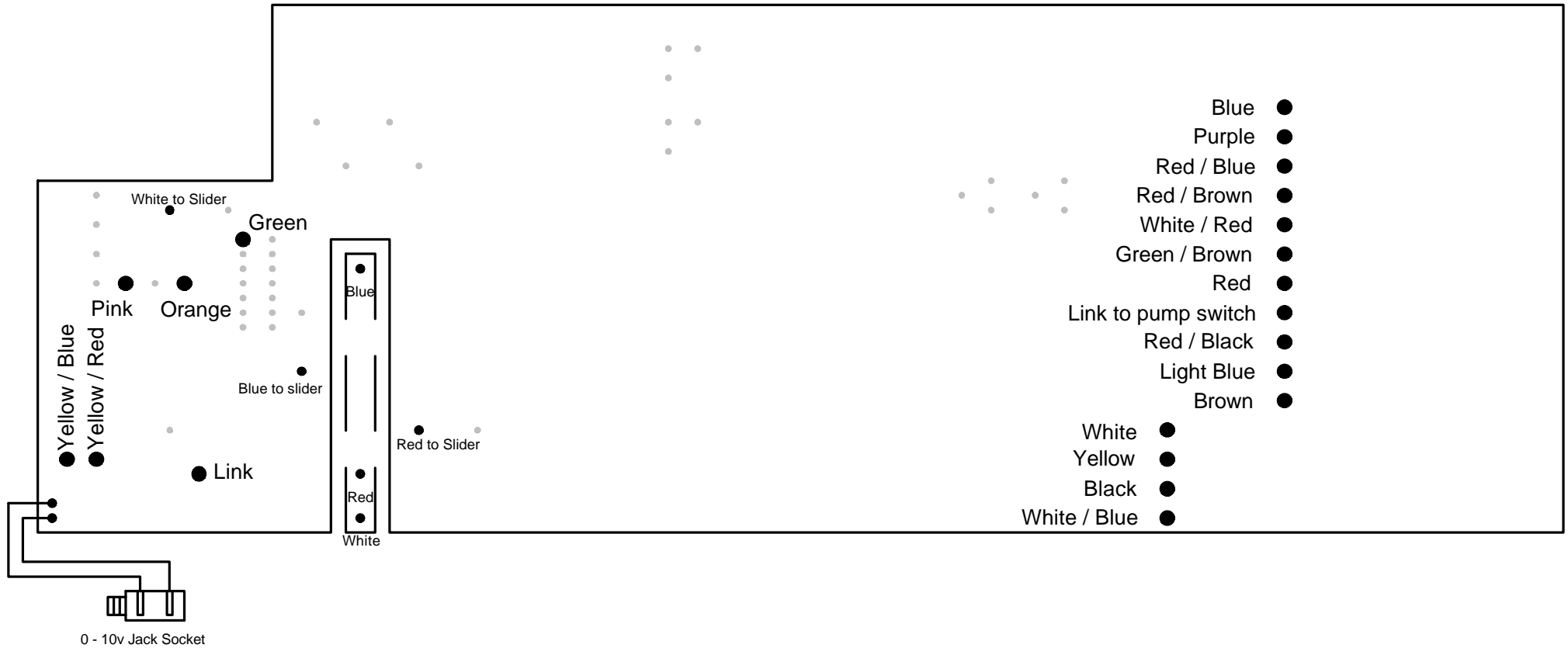
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After following section 1, taking off only the front cover make sure the machine is turned off.

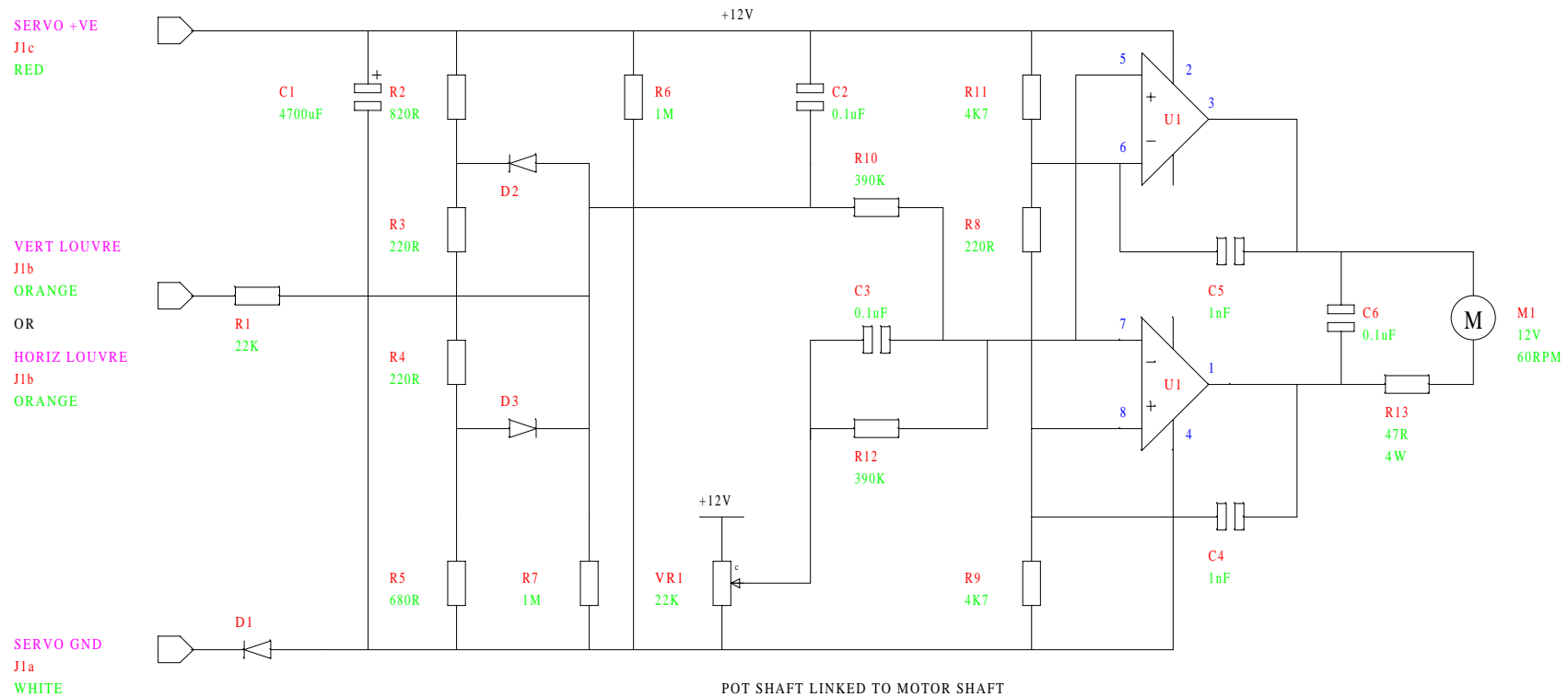
If you have the old style block the heating elements will only be coming out of the block 1" in length and there will be heat resistant wire attached to them. The new blocks have 7" of elements coming out of the block and are attached to the wires with crimps.

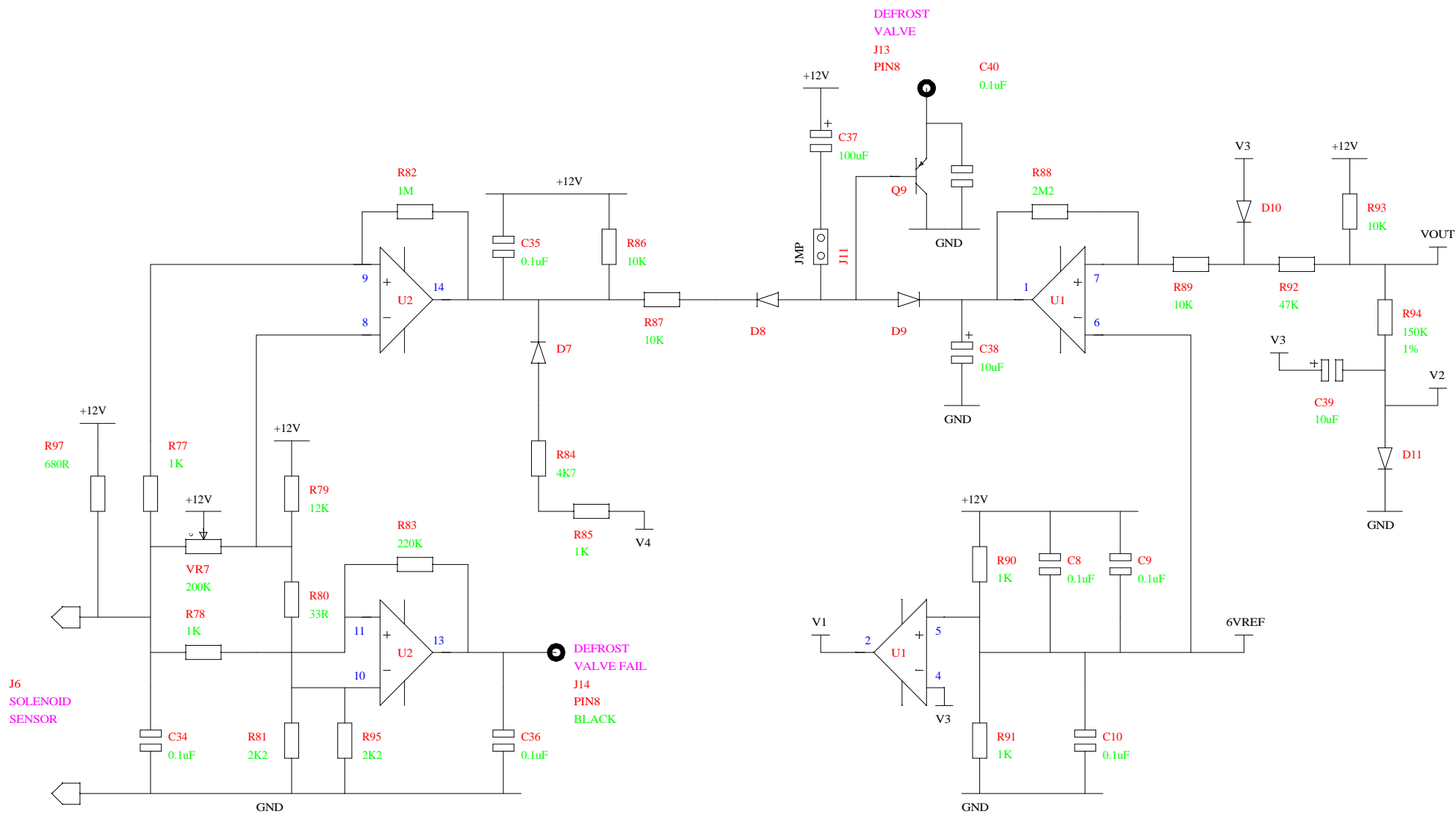
1. Remove the fluid tanks on both sides of the machine.
2. Remove the two screws that hold the sensor access plate in-place, and remove plate.
3. Remove the four- (4) screws that hold the sensor retaining plate in-place.
4. Remove the sensors, (do not cut the wires, these sensors are fragile)
5. Drill out the six (6) 1/16" rivets that hold the vapor fan plate in place, (above the block) and place plate on-top of machine, (do not cut the wires to the fan).
6. Remove the bracket that holds the block in-place, this will have an earth connection on it.
7. At the back of the block there is an 8-way dispersal cone try to pull this off, if no luck cut it off.
8. Depending on type of block, cut through or pull off the wires connected to the block elements.
9. Undo all the 4mm nuts that connect the fluid inlet pipes to the block.
10. Now you can remove the block by pulling the block in it's casing up towards you.
11. Replace with new block, ensuring that it has all the correct fittings on it and the fluid inlet pipes are bent in the right direction, the 8way dispersal cone cannot be fitted until the block is in place, You may have to cut the block shroud as shown in diagram 1 for the new block to fit.
12. Once in-place bend all 8 elements down 90 degrees.
13. Place heat-shrink over all 8 elements (3" of 12.6mm heat-shrink).
14. Cut 2" of 6.8mm heatshrink and place it over the wires that will connect to the block elements, (pushing it to the top of the wires).
15. Cut 8 x 9" of glass fibre insulation and push it over all 8 of the wires that will connect to the elements.
16. If not already connected fit all the wires with 2.5 crimps (blue).
17. Push the crimps one at a time onto the elements.  
Ensure that the Brown wires are at the bottom and the blue wires are on the top.
18. Once crimps are connected, pull down over the crimp connection the heat-shrink and shrink on with a heat gun. Pull up over the whole element the Glass fibre insulation, now pull over the glass fibre insulation the last piece of heat-shrink at the bottom (so that 12 is on the heat-shrink and 1" is over the wire) now shrink on using the heat gun.
19. Spiral-wrap the wires.
20. Connect all the fluid pipe inlets back to the block.
21. Replace the vapor fan by riveting it back into place.
22. Reconnect the bracket the holds the block in-place along with the earth tag.
23. Refit the 8-way dispersal cone.
24. Refit the sensors reversing procedures 4,3 and 2.
25. Refit the tanks.
26. Test to ensure all is working, refit the cover.

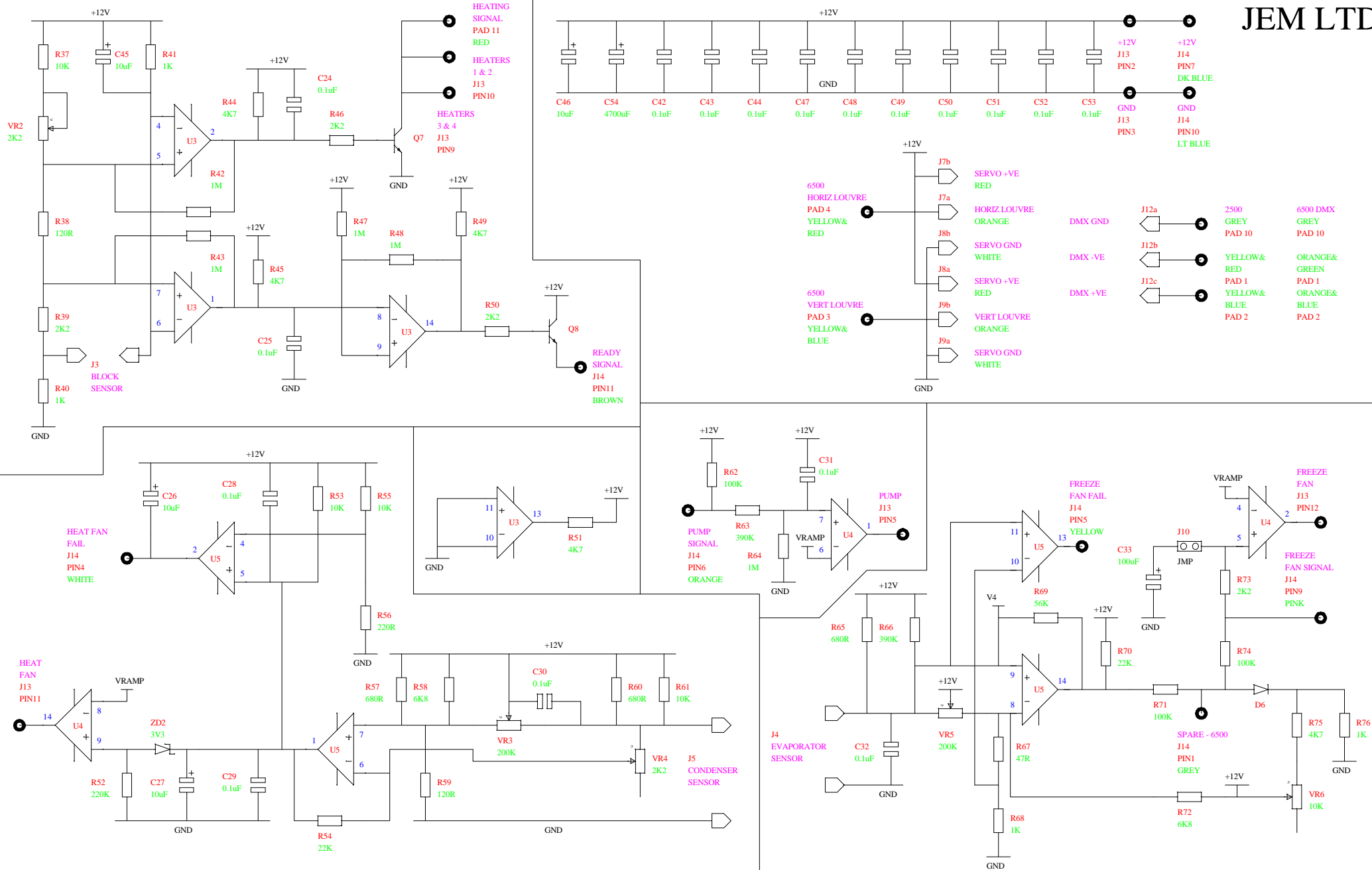
# Heavy fog 6500 controller



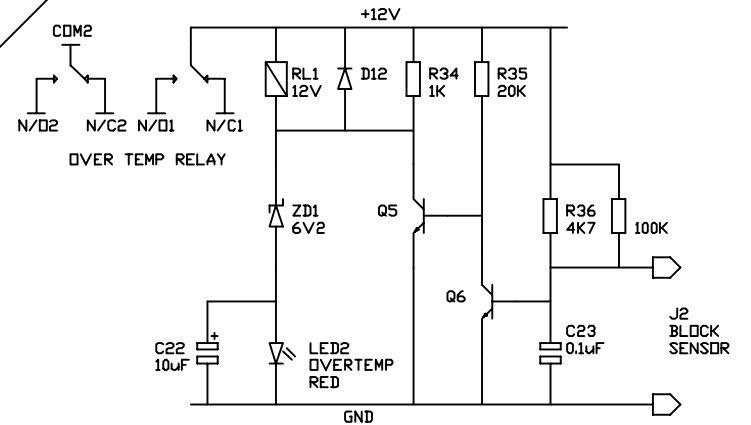
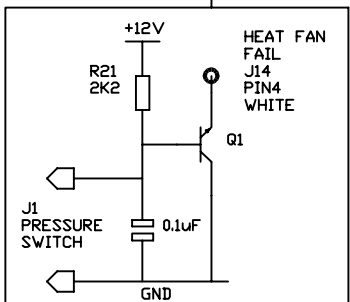
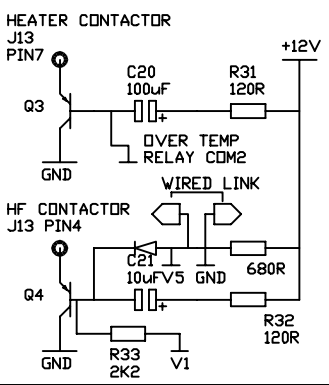
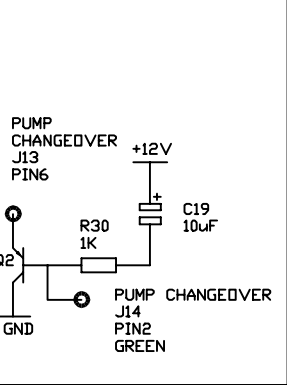
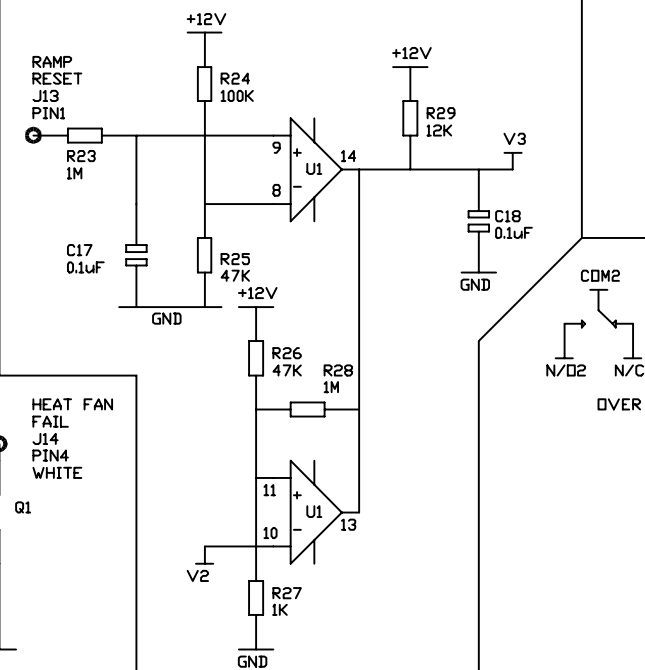
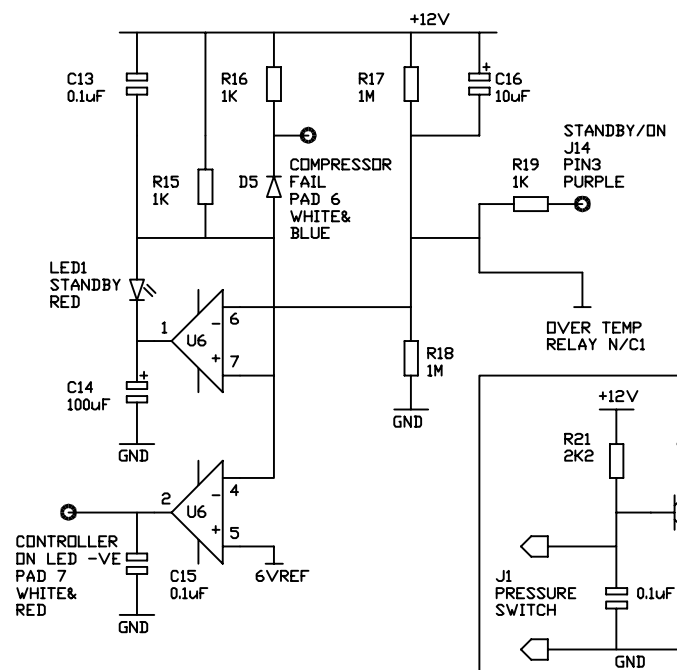
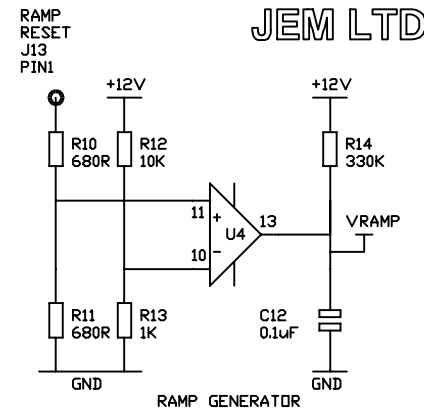
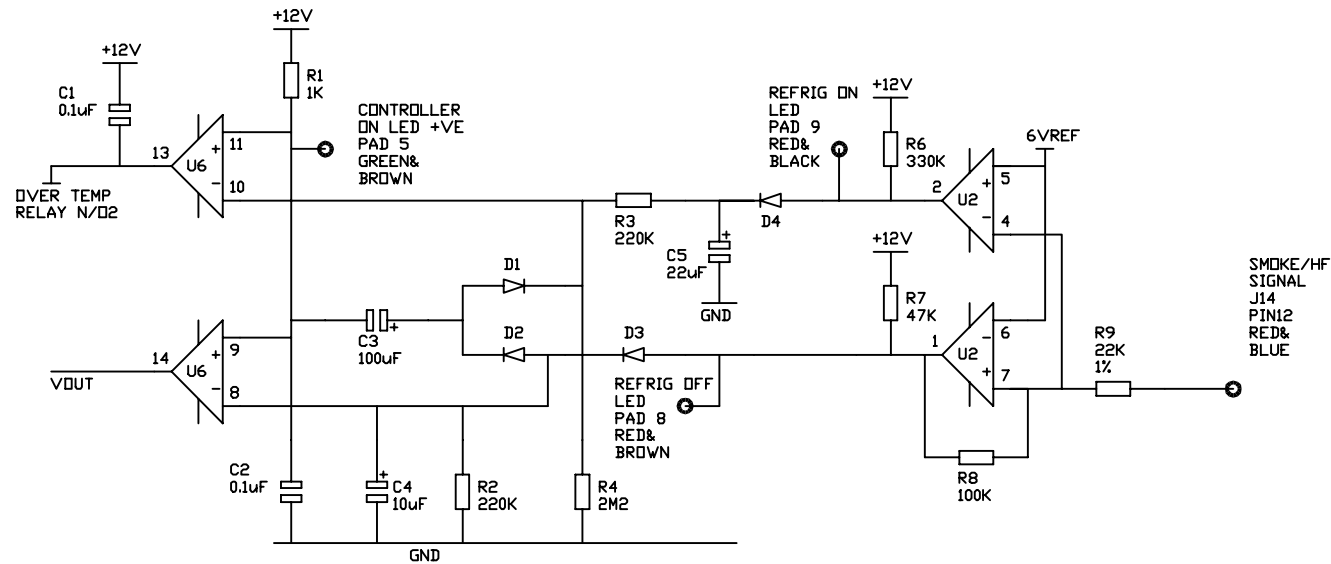


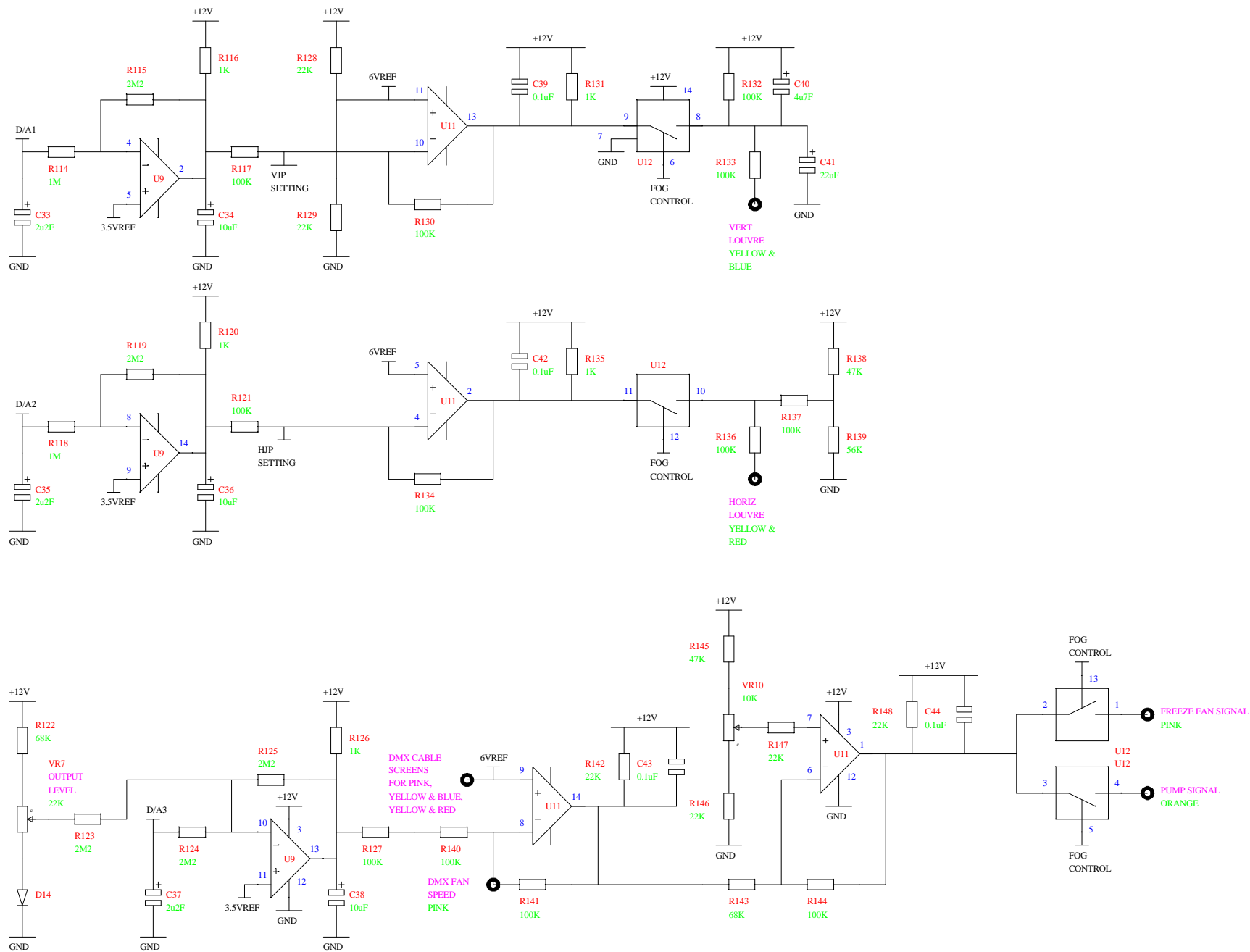


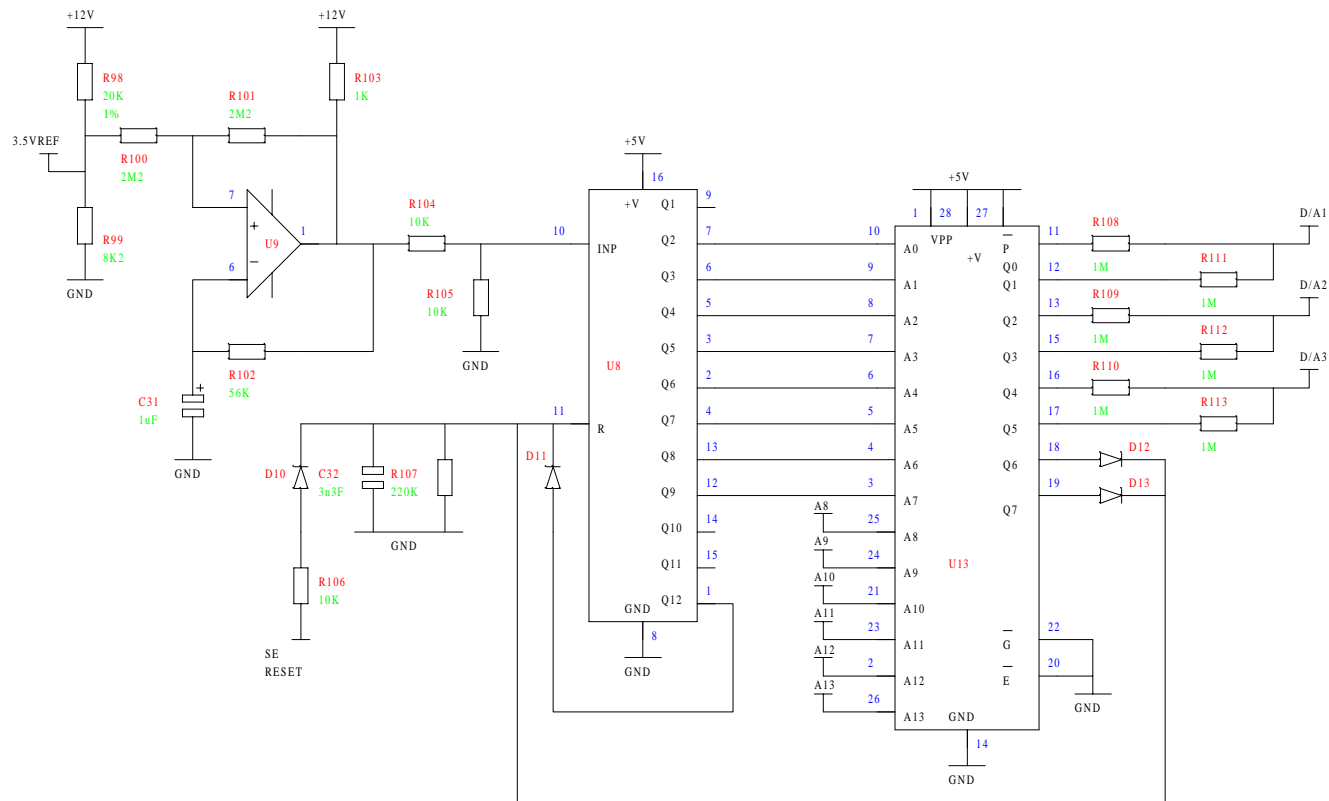


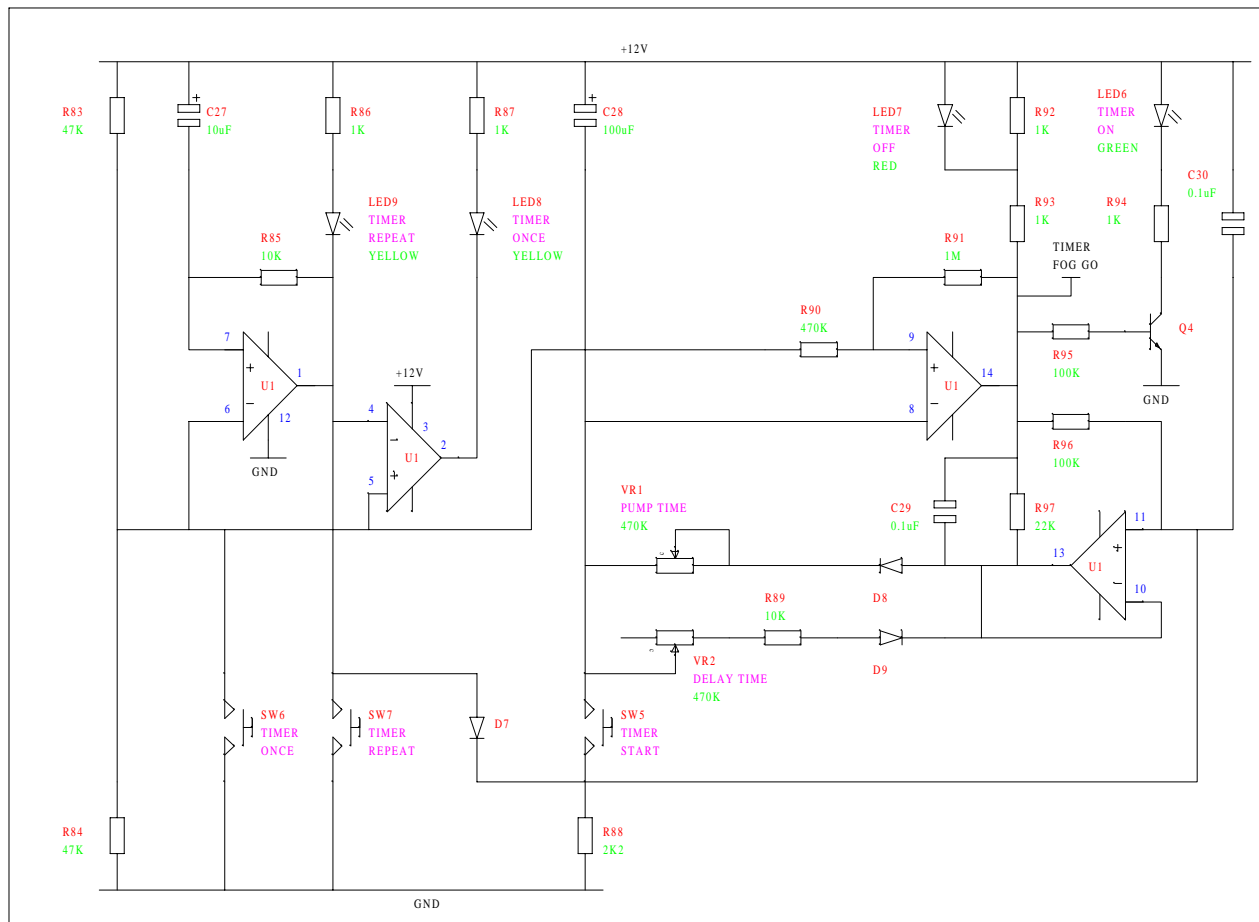
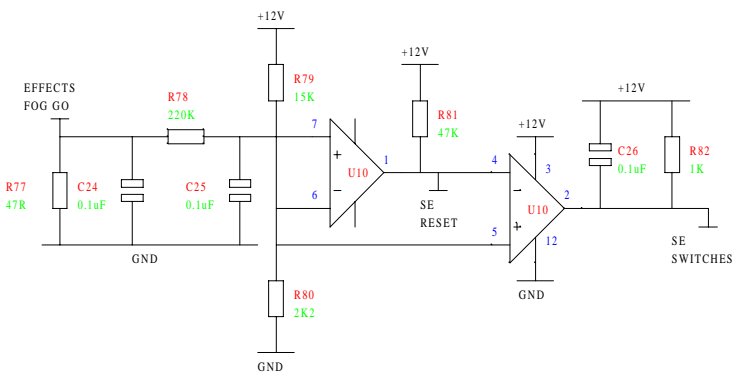
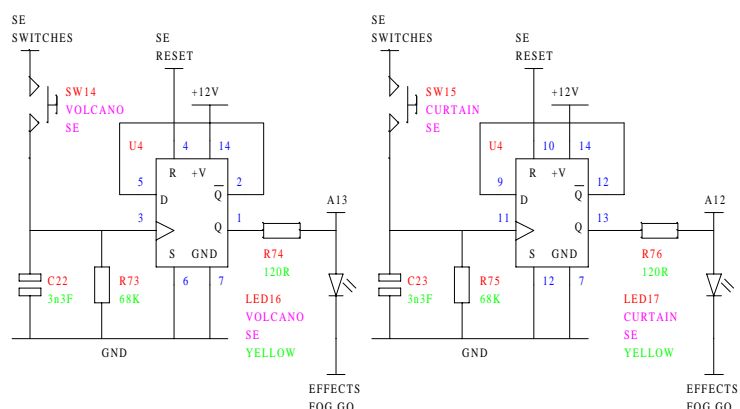
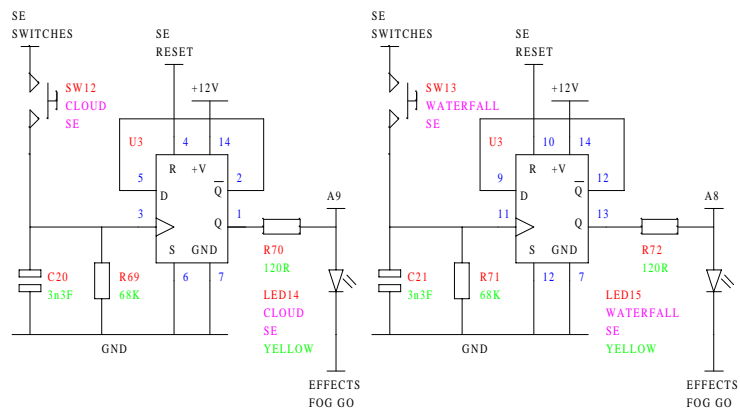
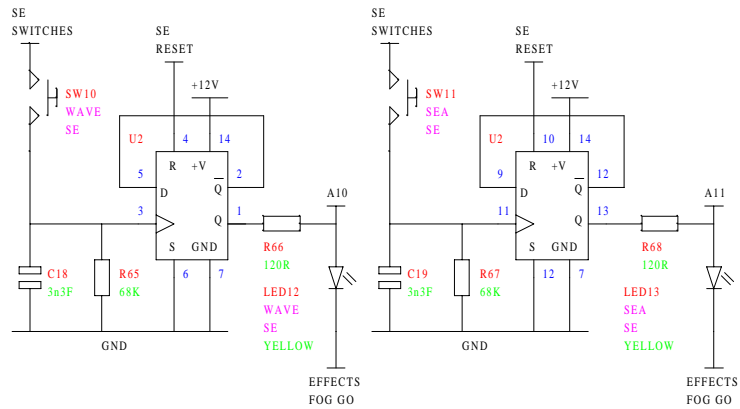


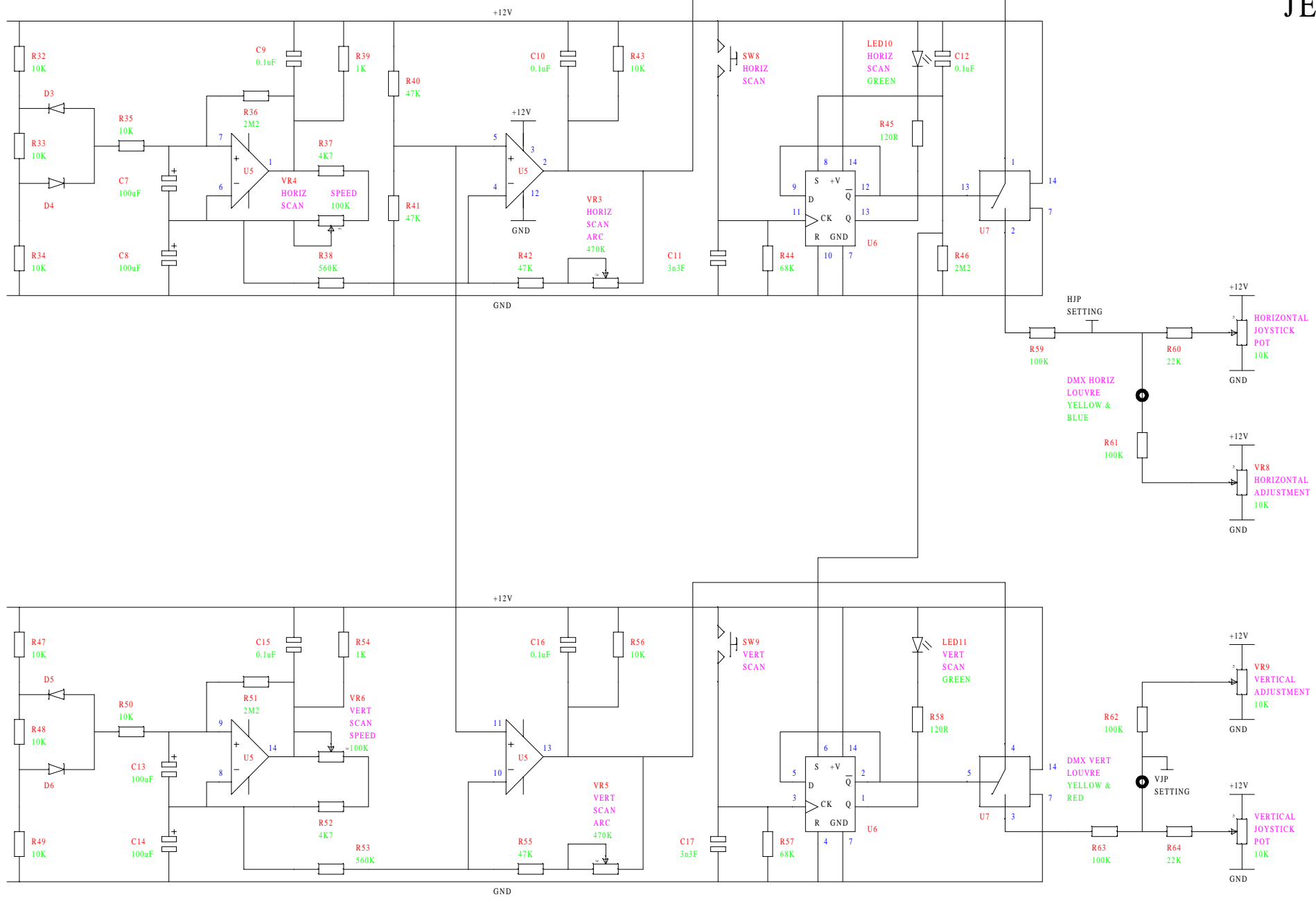
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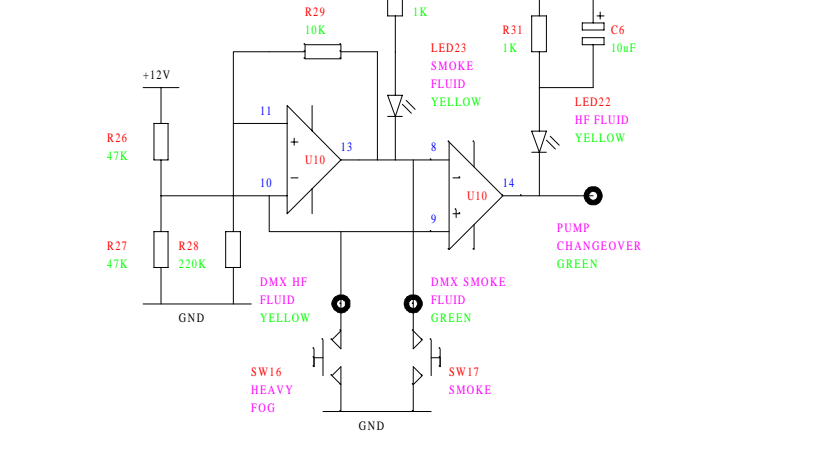
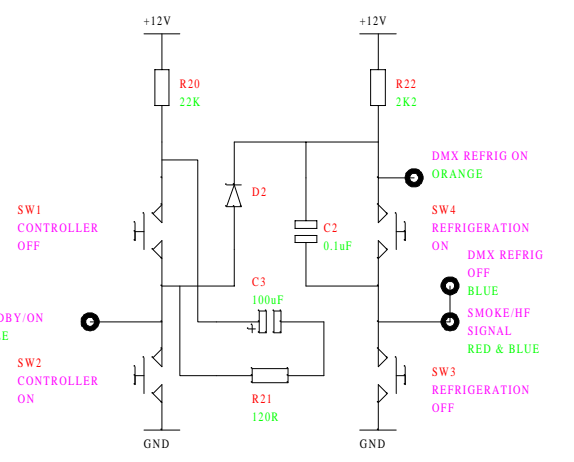
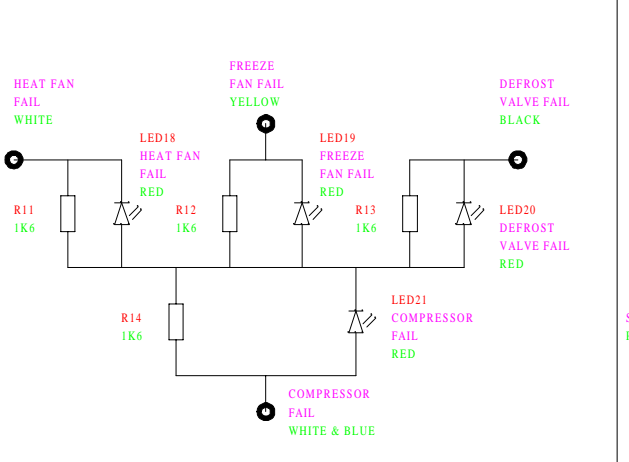
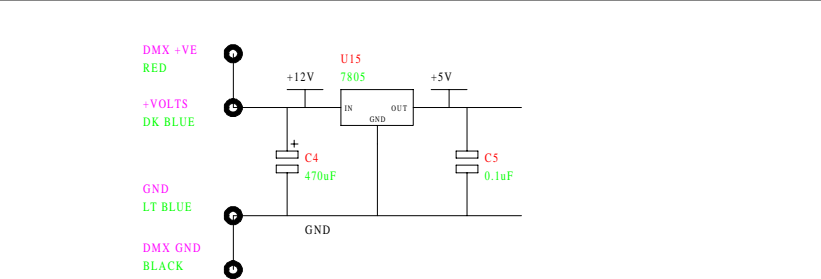
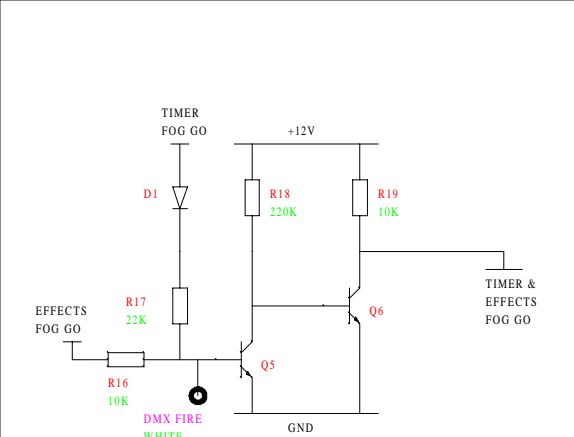
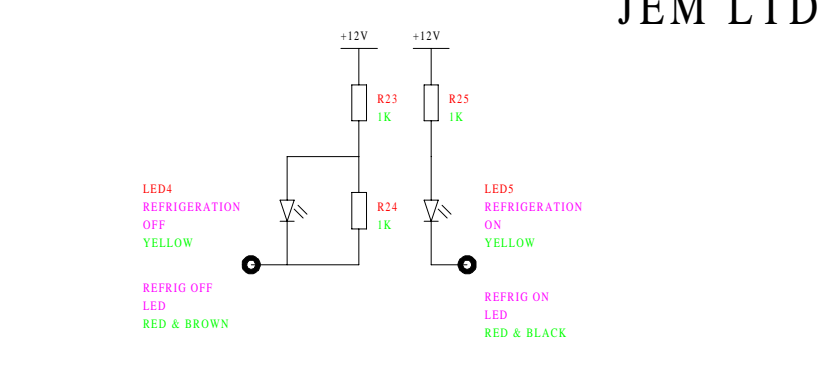
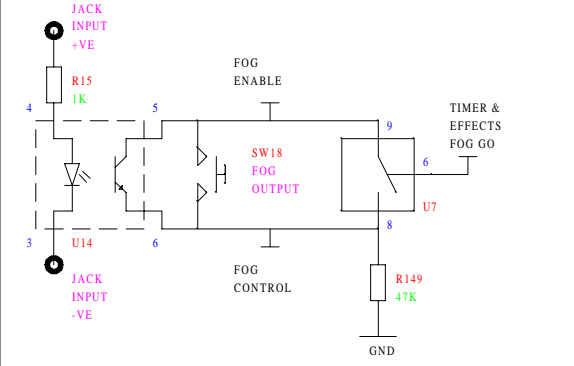
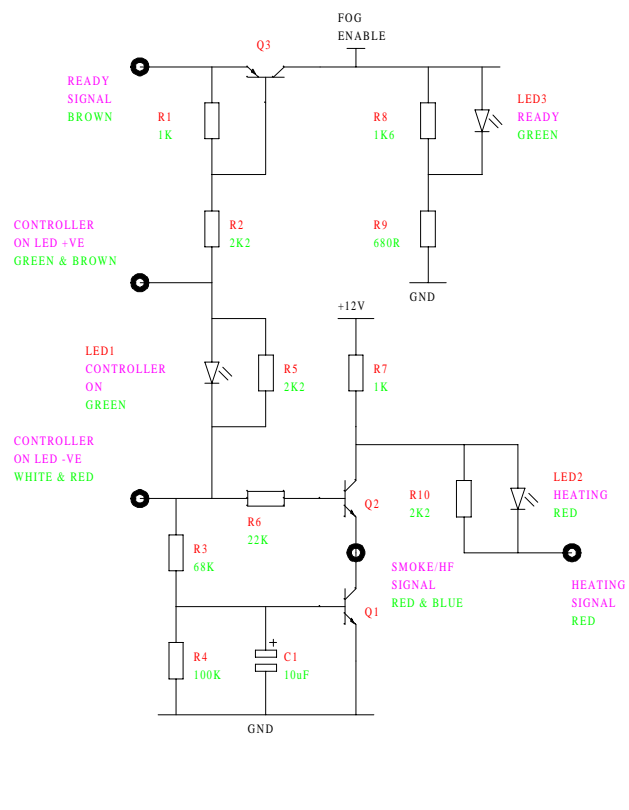


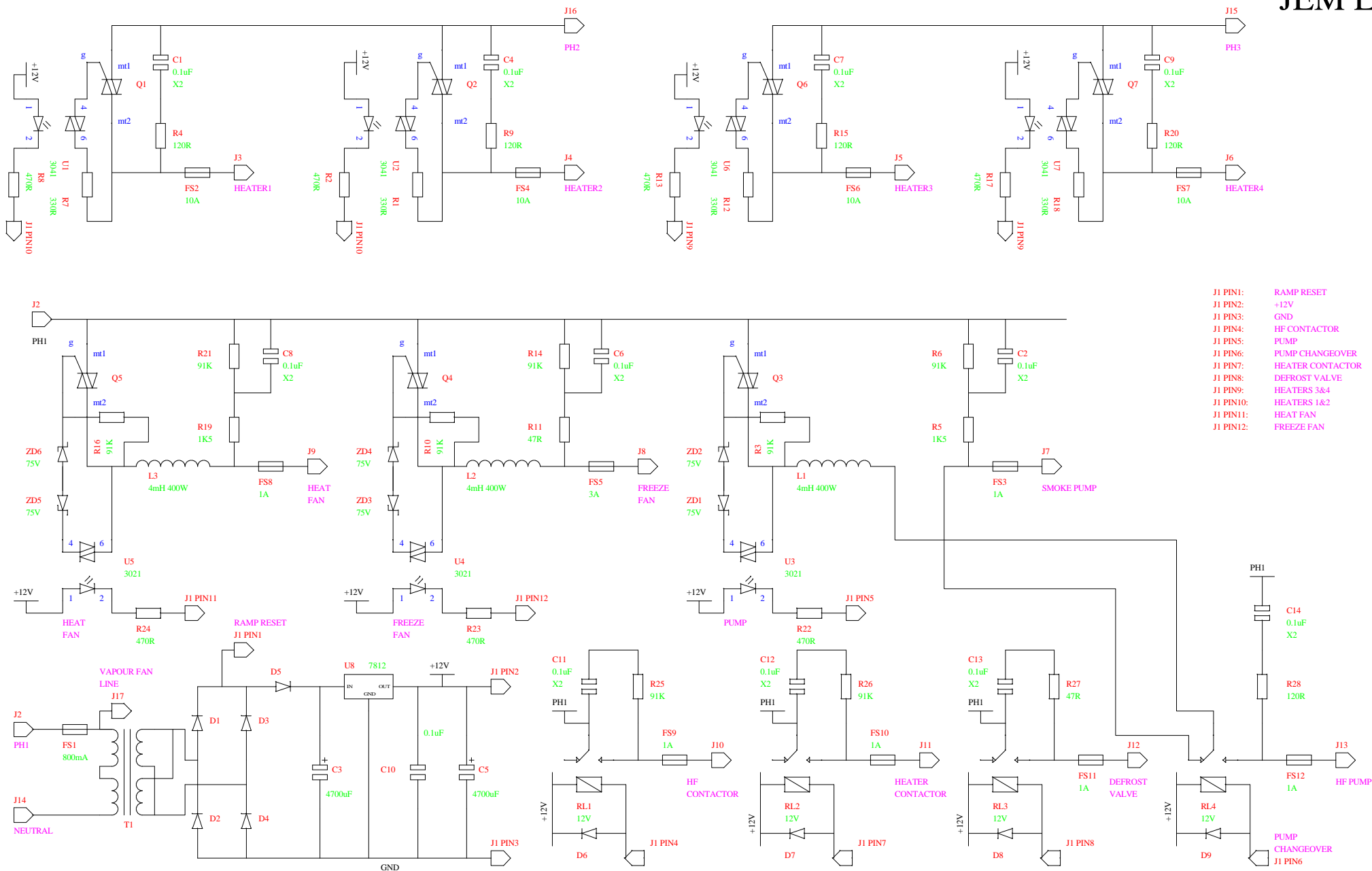




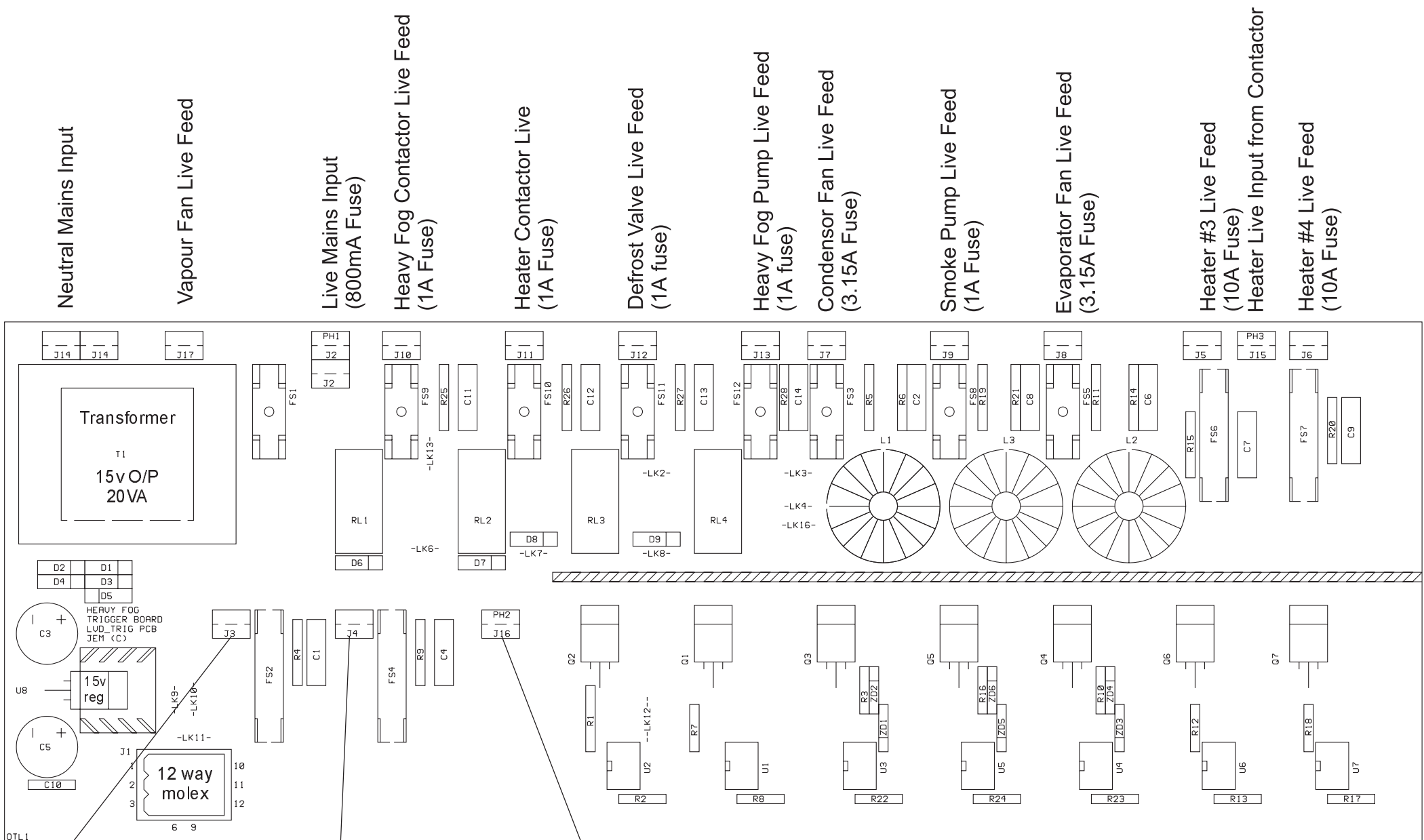








- J1 PIN1: RAMP RESET
- J1 PIN2: +12V
- J1 PIN3: GND
- J1 PIN4: HF CONTACTOR
- J1 PIN5: PUMP
- J1 PIN6: PUMP CHANGEOVER
- J1 PIN7: HEATER CONTACTOR
- J1 PIN8: DEFROST VALVE
- J1 PIN9: HEATERS 3&4
- J1 PIN10: HEATERS 1&2
- J1 PIN11: HEAT FAN
- J1 PIN12: FREEZE FAN



Neutral Mains Input

Vapour Fan Live Feed

Live Mains Input  
(800mA Fuse)

Heavy Fog Contactor Live Feed  
(1A Fuse)

Heater Contactor Live  
(1A Fuse)

Defrost Valve Live Feed  
(1A fuse)

Heavy Fog Pump Live Feed  
(1A fuse)

Condensor Fan Live Feed  
(3.15A Fuse)

Smoke Pump Live Feed  
(1A Fuse)

Evaporator Fan Live Feed  
(3.15A Fuse)

Heater #3 Live Feed  
(10A Fuse)

Heater Live Input from Contactor

Heater #4 Live Feed  
(10A Fuse)

Heater #1 Live Feed (10A Fuse)

Heater #2 Live Feed (10A Fuse)

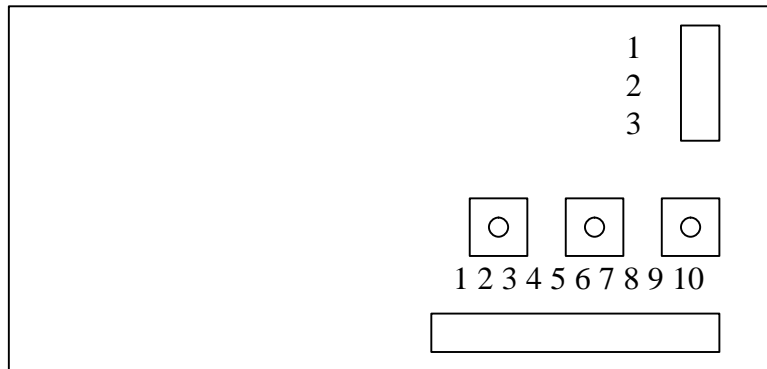
Heater Live Input From Contactor

# HF 6500 TRIGGER BOARD

## MOLEX PIN-OUTS

- |                             |                           |
|-----------------------------|---------------------------|
| Pin 1 - Half wave output    | Pin 7 - Defrost valve     |
| Pin 2 - Heavy-fog contactor | Pin 8 - Condensor fan     |
| Pin 3 - Heater contactor    | Pin 9 - Ground            |
| Pin 4 - Heaters 1 & 2       | Pin 10 - Pump change over |
| Pin 5 - +12 volts           | Pin 11 - Heaters 3 & 4    |
| Pin 6 - Pump                | Pin 12 - Evaporator fan   |

## 6500 D.M.X WIRING



1=ORANGE/BLUE FROM SOCAPEX  
2=GREEN/BLUE FROM SOCAPEX  
3=GREY FROM SOCAPEX

1=BLACK FROM P.C.B  
2=YELLOW/RED FROM P.C.B  
3=YELLOW/BLUE FROM P.C.B  
4=PINK FROM P.C.B  
5=WHITE FROM P.C.B  
6=ORANGE FROM P.C.B  
7=BLUE FROM P.C.B  
8=GREEN FROM P.C.B  
9=YELLOW FROM P.C.B  
10=RED FROM P.C.B

### DMX FUNCTIONS

#### CHANNEL

1 = COMPRESSOR ON  
2 = FLUID TANK CHANGE OVER  
3 = HORIZONTAL LOUVRE  
4 = VERTICAL LOUVRE  
5 = FIRE  
6 = NOT USED

DATE.25/02/98 6500 DMX WIRING  
DRAWN BY J.MARSHALL