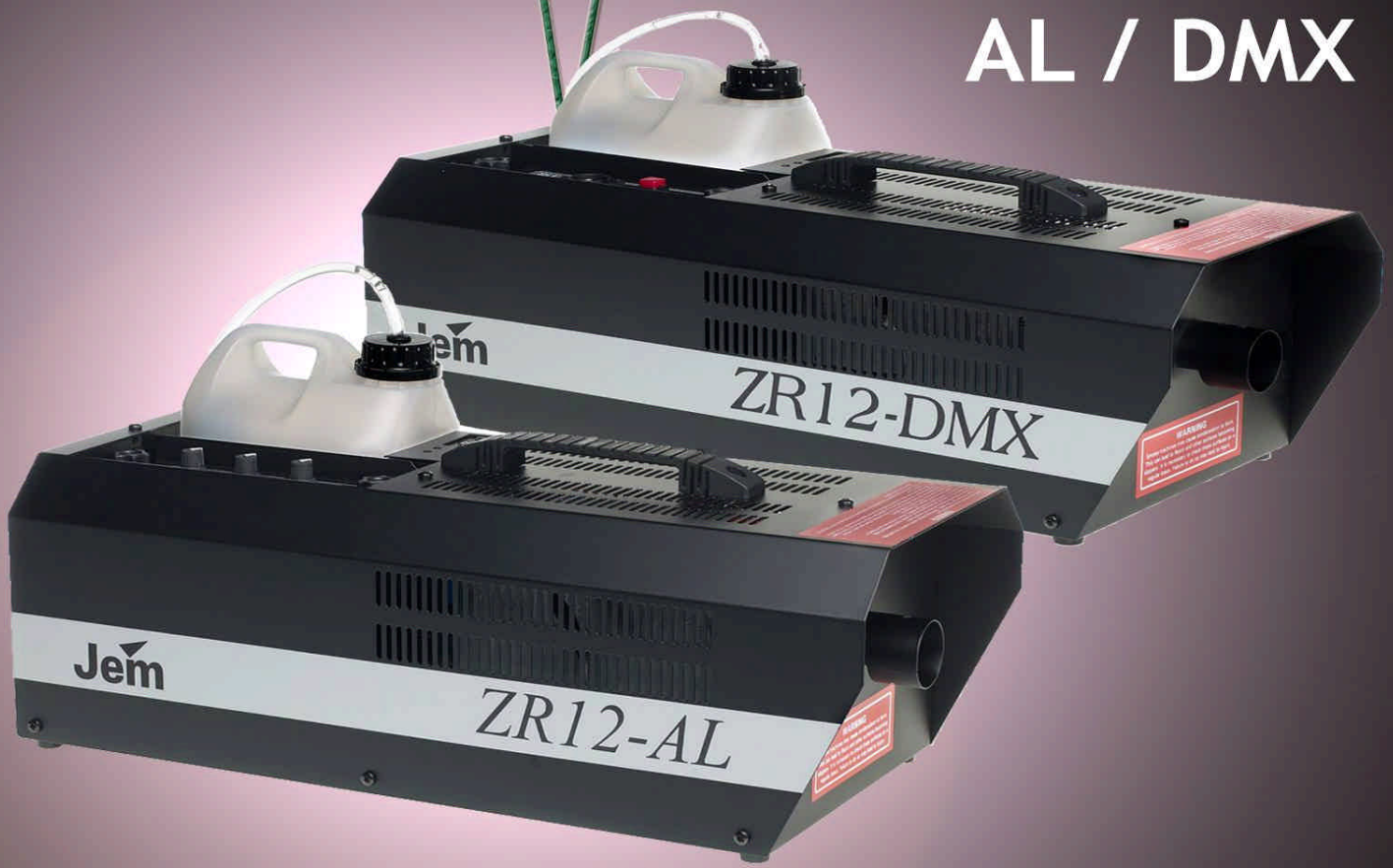
SMOKE MACHINE SERVICE MANUAL

Martin

Jem

JEM ZR12
AL / DMX



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JEM Smoke Machine Training Program

INDEX

AN INTRODUCTION TO SMOKE TECHNOLOGY

Smoke Machine Markets

Jem / Martin smoke machines are categorised into 2 ranges: The ***Professional*** and the ***Club / DJ*** range.
If a product is branded as a "Martin" product this is aimed at the ***Club / DJ*** market.
All products branded as a "JEM" product are classed as ***Professional*** and are aimed at the higher end touring / installation market.
All JEM / Martin Smoke products can be used across both of the different markets without any ***compromise of performance or features.***

Smoke machine principles:

All JEM / Martin ***conventional*** smoke machines utilise the same technology:

In Brief:

> When the ***run button*** on the ***remote*** is pressed, ***smoke fluid*** is pumped from a removable ***container*** situated within the machine via the flexible fluid pipe into an ***oscillating piston pump***.
> The ***fluid*** passes through the ***pump*** and enters the ***heat exchanger*** were the ***fluid is vaporised*** and exits as thick, white ***smoke.***

The ***heat exchanger*** is comprised of a ***heating element*** and a ***coil*** of copper or steel tubing between 3 and 6 metres in length. This is cast into a mass of ***aluminium***.

The ***heat exchanger*** is heated via the ***heating element***.
This is controlled by a ***J Type thermocouple*** fitted to the ***heat exchanger.***
The ***temperature*** is determined by the ***calibration*** of the ***main control PCB***.

Once the working ***temperature*** is reached, the ***main control PCB*** will allow the ***pump*** to be operated and the machine will now be ready to ***run***.

Haze machine principles:

The JEM ZR24/7 and Magnum Hazer work on the same smoke generation principles as the JEM / Martin smoke machines.
The only difference is the smoke output on a hazer exits into a ***metal chamber*** where there is a ***fan*** creating a ***fast moving air stream***. This air stream ***disperses*** the smoke output and creates the ***haze***.

Again the principles are identical to that of a ***conventional*** smoke machine.
There is a ***pump, heat exchange, PCBs*** and ***onboard controls***. The major difference is the ***air chamber***.
A ***radial fan*** is used with this system. It is used to allow the exiting smoke to have the ***maximum dispersal***.
As with several of the smoke machines, the haze machine has a ***low fluid shut off*** system. This is an ***electronic temperature control device*** that measures the ***temperature*** of the ***heat exchange*** over a short period. If the ***temperature*** has not changed but the unit has been ***pumping***; the unit will assume that the system has ***run out of fluid*** and shut down. ***This prevents the system from running dry and burning out the pump.***

CE mark

All products that are produced by JEM / Martin carry the ***CE Certification***.
These products meet the requirements of the following ***EC Standards*** and as such, comply with the ***EMC (Electromagnetic Compatibility)*** and ***LVD (Low Voltage Directives)***, directives of the ***European Community***:

EN 50 081-1 1992 Generic Emission Standard for domestic and light Industrial environments.

EN 50 082-1 1992 Generic Immunity Standard for domestic and light Industrial environments.

EN 60 335-1 1995 Safety of household and similar electrical appliances

These standards reference the following European standards:

Emissions:

EN 55 022 /B	RF voltage and field strength
EN 60 555	Harmonic current content
EN 55 014	RF voltage (discontinuous)

Immunity:

IEC 801-2	Electrostatic discharge to case
IEC 801-4	Common mode fast transients

These standards also meet the requirements of ***CISPR 22***.

JEM did not carry the ***CE*** mark on products that were produced prior to 1995.
These products can be identified by either the ***DIN/XLR*** socket on the rear or top of the unit or the ***Mains PCB***:
If the unit has a ***5 pin DIN*** or a ***4 pin XLR*** without the ***CE*** text on the rear, the unit is classed as ***NON-CE***.
If the PCB has a ***12 pin Molex*** connector fitted to it, this is classed as a ***NON-CE*** unit.

Searching for information on the INTERNET

If you require information with regards to JEM / Martin Smoke, Haze and Heavy Fog products an ideal place to start is the Internet.

Martin has a dedicated team of staff who are constantly monitoring and updating the information that is placed onto the ***INTERNET***. This is to ensure that the best possible service is being given to not just dealers and end users but also to internal staff.

Locating information is simple:

First go to: ***www.jemsmoke.com***

Here you will find information on all of our current range of products including news, bulletins, specifications and even videos of machines in action.

To access support information:

On the left hand side of the screen there are several different categories.

Click on ***SUPPORT***.

This will bring you to the ***SMOKE USER SUPPORT*** page.

If you have a ***LOGIN NAME AND PASSWORD*** then press the ***LOGIN*** icon at the top of the page and enter your username and password into the relevant boxes.

(If you do not have a ***LOGIN NAME*** you can still use the site, just with limited access to information)

Select ***SMOKE*** from the menu on the left hand side.

Go to the ***PRODUCTS MENU*** and choose the ***PRODUCT*** you require information on.

Now go to the ***CATEGORY*** menu and select which piece of information you require (parts,manuals,etc)

Once you have done this press the ***SEARCH*** icon.

All of the information relevant to the product you have chosen will now be displayed.

A LOGIN is required for access to ***TECHNICIAN*** and ***DISTRIBUTOR SUPPORT*** areas.

Please direct all inquires regarding access to your national distributor.

Which fluid can I use with my machine?

X=NO O=YES	Pro-Smoke Studio DX Mix	Pro-Smoke Super ZR Mix	Pro-Smoke High-density SP Mix	I-Fog	Reg. DJ Fluid	Party Pack	Pro Haze	Heavy Fog Fluid B2 Mix	Heavy Fog Fluid C3 Mix
									
ZR12 AL / DMX	O	O	O	O	O	X	X	X	X

What can my machine do?

The ZR12 brothers are mid-sized, portable fog machines with enhanced output to provide a continuous flow of dry dense fog.
Distinguished from each other by their features of control, the ZR12 AL uses a multifunctional remote, while the ZR12 DMX has added DMX input for extra flexibility and control. These individual command features allow you to equip yourself with the right tool for the right job.
The ZR12 DMX can be programmed into any DMX controller and easily incorporated into any light show design. Additionally, the DMX interface features a test fire button that enables operation without the DMX connection.
The ZR12 AL provides an economical solution with a built in remote for easy command access.
The ZR12 AL and ZR12 DMX are extremely quick to heat up, meaning greater control of fog when you want it.
Both the ZR12 AL and ZR12 DMX are suited for a wide variety of applications. From rental to theatres, TV studios and clubs.
You can use either control option in either machine for greater flexibility of use. (ZR12 AL controller in ZR12 DMX machine and vice versa).
Create a greater accuracy of fog placement with the ZR ducting system. Available as an accessory to the whole ZR family, the ducting extension ensures uniformity and coverage in any environment.

“The ZR12 AL is the result of classical Jem design principles. Electronic pump ramping provides continuous and even fog output. Soft start electronics gives a low level of operating noise, ideal for TV and theatre environments. Overheat protection is provided by the Direct Thermal Protection device. Output has been enhanced through a 1000W vaporizing chamber and unlike other machines of its size; the ZR12 AL is extremely quick to heat-up meaning greater control of fog when you want it.
Jem’s unique "8 x Mode" expands the time capability of the standard timer settings by multiples of 8, far beyond those normally found on fog machine remotes.
And uniquely for a machine of its class, multiple machines can be linked and operated from the multifunctional remote control. Auto timer and fog level controls are available as well.”

“The machine includes all the same features as the ZR12 AL yet has added DMX input via a specially designed on-board interface for extra flexibility and control.
The ZR12 DMX can be programmed into any DMX controller and easily incorporated into any light show design. Additionally the DMX interface features a test fire button that enables operation without the DMX connection.
The ZR12 DMX is the result of classical Jem design principles. Electronic pump ramping provides continuous and even fog output. Soft start electronics gives a low level of operating noise, ideal for TV and theatre environments and for ultimate flexibility multiple machines can be operated from a single remote.
Overheat protection is provided by the Direct Thermal Protection device. Output has been enhanced through a 1000W vaporizing chamber and unlike other machines of its size; the ZR12 DMX is extremely quick to heat-up meaning greater control of fog when you want it.”

Specifications (AL):

Physical
Length: 500 mm
Width: 225 mm
Height: 165 mm
Dry weight: 11 kg

Performance
Max. smoke output (approx.): 500 m^3 per minute
Max. operating time at full output (approx.): 80 mins
Operating time: Continuous, automatic level adjustment
Warm-up time: Approx. 7 minutes

Control and Programming
Control options: Remote control (supplied) or DMX with optional DMX interface module
Remote control features: Instant or timer-controlled output, 0-100% adjustable output level

Timer Range: Delay 2-18 secs (X1), 16-144 secs (X8) / Run Time 2-18 secs (X1), 16-144 secs (X8)

Fluid System
Fluid pump: Oscillating piston, high pressure
Onboard fluid capacity: 2.5 l
Max. fluid consumption at peak output: 75 ml per minute

Construction
Housing: Steel & aluminium
Heat exchanger: 1000 W, direct thermal protection

Installation
Orientation: Floor (No Flying Kit Available)

Connections
Remote control: 5-pin DIN
0-10 V analogue: 5-pin DIN
Power cable entry: Hard-wired

Electrical
AC power (EU models): 220-240 V nominal, 50 Hz
AC power (US models): 110-120 V nominal, 60 Hz
Main fuse (220-240 V power): 5 AT (slow blow)
Main fuse (110-120 V power): 10 AT (slow blow)

Typical Power and Current
US model
110 V, 60 Hz: 1070 W, 9.72 A
115 V, 60 Hz: 1169 W, 10.16 A
120 V, 60 Hz: 1273 W, 10.61 A
EU model
220 V, 50 Hz: 899 W, 4.08 A
230 V, 50 Hz: 982 W, 4.27 A
240 V, 50 Hz: 1070 W, 4.45 A
Measurements made at nominal voltage. Allow for a deviation of +/- 10%.

Thermal
Maximum ambient temperature (Ta max.): 40° C
Exterior surface temperature, steady state: 50° C
Max. nozzle temperature: 200° C

Approvals

CE

EU safety: EN 50 081-1, EN 50 082-1
EU safety: EN 60 335-1 (1995)

Accessories
Pro Smoke Studio (DX Mix) fluid, various sizes available
Pro Smoke Super (ZR Mix) fluid, various sizes available
Pro Smoke Super (Fragranced) fluid, various sizes available
Pro Smoke High Density (SP Mix) fluid, various sizes available
I-fog fluid, various sizes available
Ducting Kit (Including adapter and 5m of 4-inch (104mm) ducting): P/N 92625004
DMX Interface ZR12: P/N 92765015

Ordering Information
JEM ZR12 AL, 110V: P/N 92215101
JEM ZR12 AL, 240V: P/N 92215100

Service Info (internal only - do not publish)
Cooling time before service or maintenance: 20 minutes
Minimum clearance around air vents: 0.20 m

Specifications (DMX):

Physical
Length: 500 mm
Width: 225 mm
Height: 165 mm
Dry weight: 11 kg

Performance
Max. smoke output (approx.): 500 m^3 per minute
Max. operating time at full output (approx.): 80 mins.
Operating time: Continuous, automatic level adjustment
Warm-up time: Approx. 7 minutes

Control and Programming
Control options: Remote control (supplied), DMX, 0-10 V analogue
Remote control features: DMX Interface with manual push button
DMX channels: 1
Protocol: USITT DMX512/1990

Fluid System
Fluid pump: Oscillating piston, high pressure
Onboard fluid capacity: 2.5 l
Max. fluid consumption at peak output: 75 ml per minute

Construction
Housing: Steel & aluminium
Heat exchanger: 1000 W, direct thermal protection

Installation
Orientation: Floor (No Flying Kit Available)

Connections
Remote control: 5-pin DIN
DMX data: 3-pin locking XLR
0-10 V analogue: 5-pin DIN
Power cable entry: Hard-wired

Electrical
AC power (EU models): 220-240 V nominal, 50 Hz
AC power (US models): 110-120 V nominal, 60 Hz
Main fuse (220-240 V power): 5 AT (slow blow)
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Thermal
Maximum ambient temperature (Ta max.): 40° C
Exterior surface temperature, steady state: 50° C
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Accessories
Pro Smoke Studio (DX Mix) fluid, various sizes available
Pro Smoke Super (ZR Mix) fluid, various sizes available
Pro Smoke Super (Fragranced) fluid, various sizes available
Pro Smoke High Density (SP Mix) fluid, various sizes available
I-fog fluid, various sizes available
Ducting Kit (Including adapter and 5m of 4-inch (104mm) ducting): P/N 92625004
DMX termination plug, 3-pin male XLR: P/N 91613017

Ordering Information
JEM ZR12 DMX, 120 V: P/N 92215111
JEM ZR12 DMX, 240 V: P/N 92215110

Service Info (internal only - do not publish)
Cooling time before service or maintenance: 20 minutes
Minimum clearance around air vents: 0.20 m

SERVICE OF MACHINES

TOOLS AND THINGS:

For successful servicing of a machine you will need some basic tools which are in good working order and the right size for the job. Other tools / equipment are available for specific jobs but in most cases these are not needed for general service.

Equipment needed:

Screwdrivers
- Pozidrive, size 1 and 2
- Flat tip, size small and medium

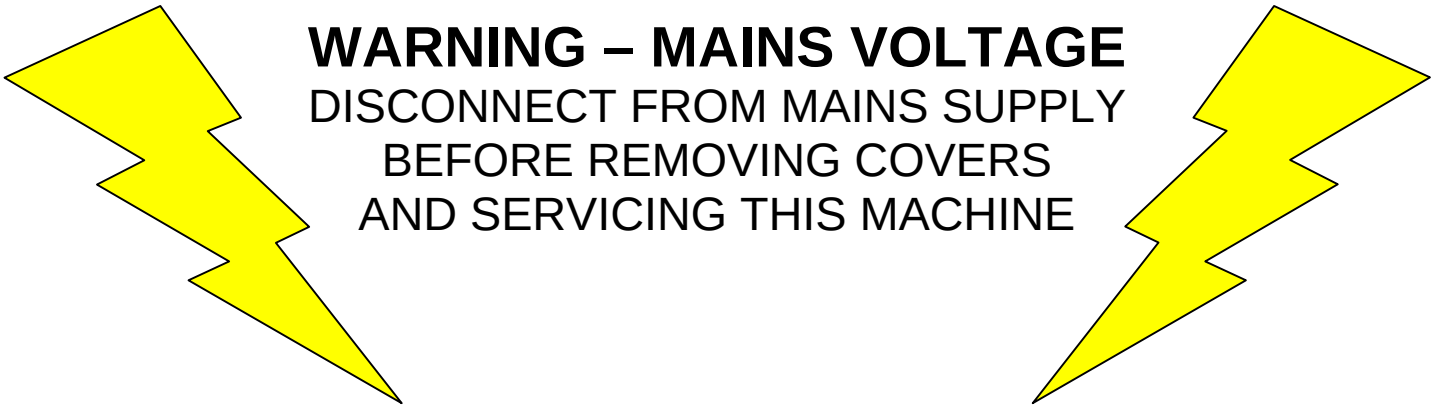
Wrenches
- 7mm
- 12mm x2

Pliers
- Needle Nose, small
- Wire Cutters, small

Digital Multi Meter (With ability to measure mV)

Additional Items / recommended:

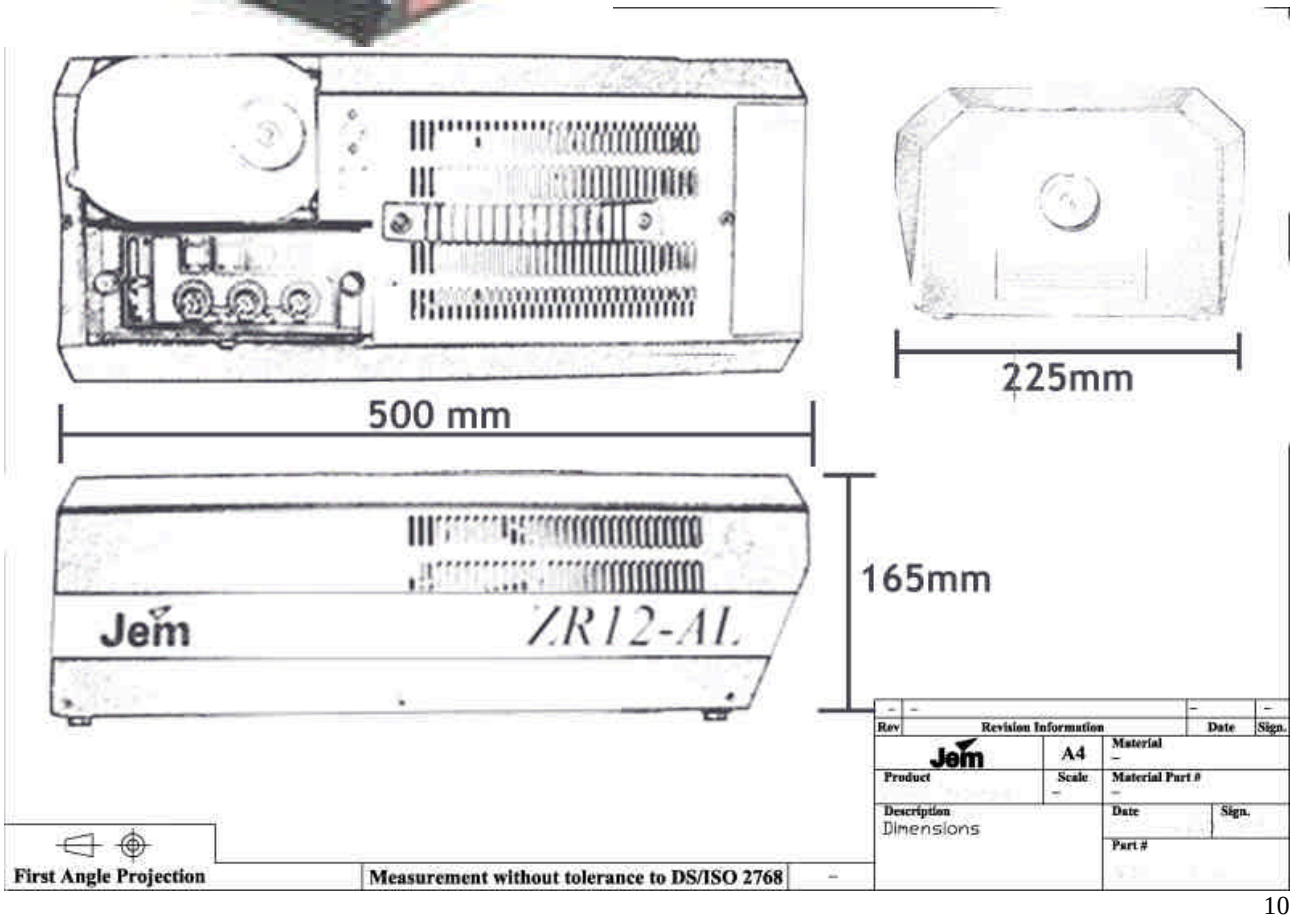
Cable Ties (***p/n 13104000***)
Silicone Sealant
JEM Calibration Box (***p/n 92620005***)
Paper towels (or other absorbent material)
Ammeter (For measuring current draw of machine – could be handheld or bench mounted)
Epsilon 5 Portable ISP Programmer ***(p/n 50502004)***
Common Sense !!



PROCEED WITH EXTREME CAUTION

ZR12 MACHINE OVERVIEW

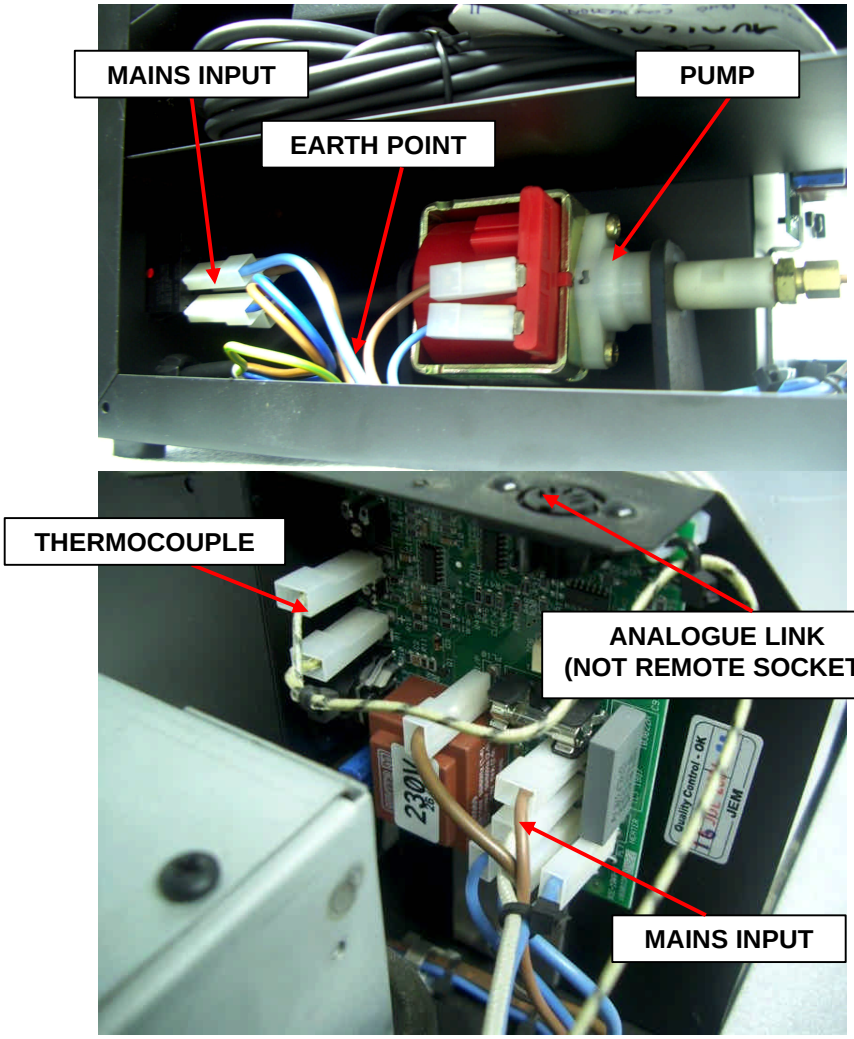
The Outside:

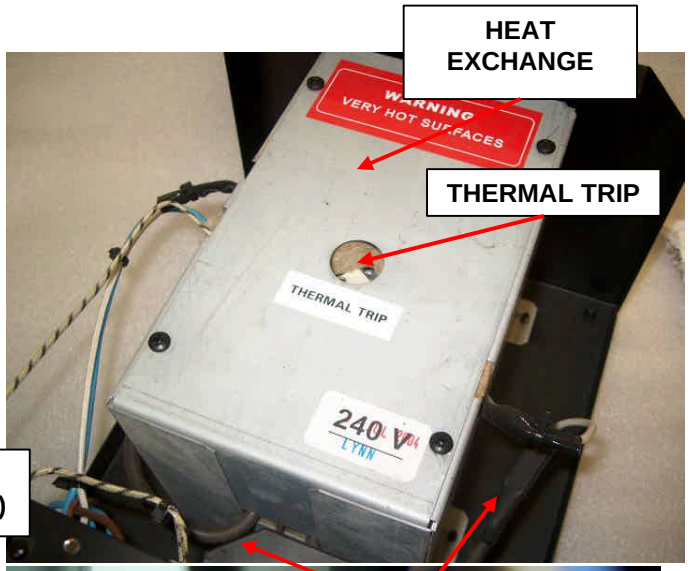


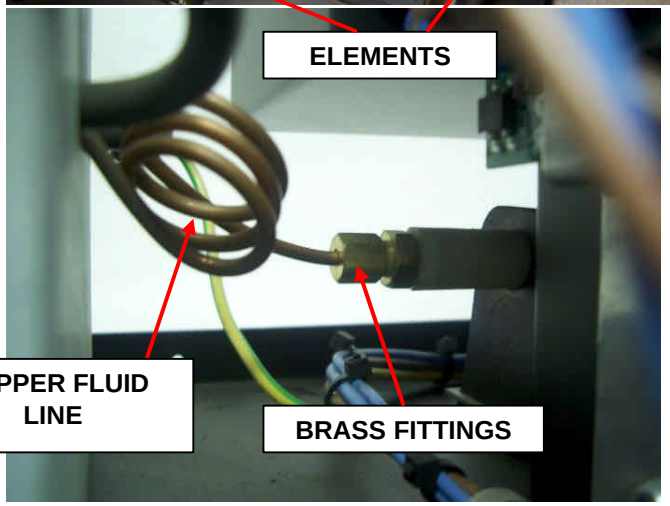
Opening The Machine:

1. ***DISCONNECT FROM MAINS SUPPLY.***
2. Remove the 10 M4x10 pozidrive TAPTITE screws from the outside of the machine and store safely.
3. Lift off the lid.

The Inside:







HOW TO….

REFER TO SCHEMATICS / DIAGRAMS IN THE APPENDIX FOR MORE DETAILS

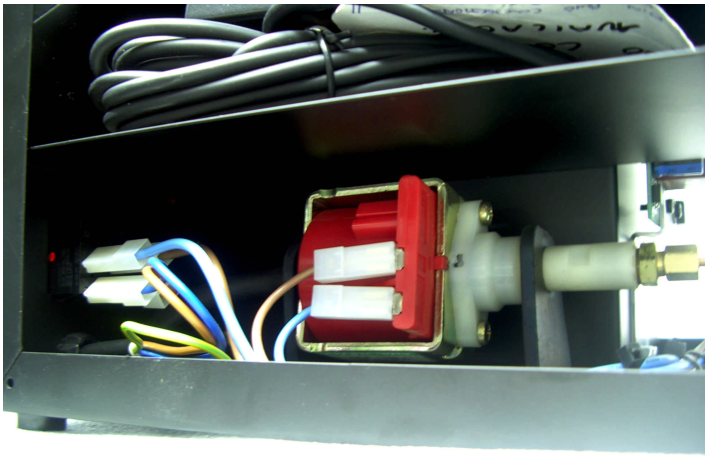
How To Change A Heat Exchange:

1. Always try to change a ***HEAT EXCHANGE*** when it is cold as the exposed metal parts can be **VERY HOT**.
2. ***DISCONNECT FROM MAINS SUPPLY.***
3. Remove ***TOP COVER.***
4. Disconnect the ***THERMOCOUPLE*** from the ***MAIN PCB.***
5. Disconnect the ***HEAT EXCHANGE POWER WIRES*** from the terminals of the ***PCB.***
6. Remove the negative (***BLUE***) wire from the heater.
7. Undo the brass nut that connects the ***BRASS ASSEMBLY*** to the ***HEAT EXCHANGE*** and disconnect the fluid line from the pump.
8. Undo the 4 screws that hold the ***HEAT EXCHANGER*** to the ***CHASSIS.***
9. Withdraw the ***NOZZLE*** of the heater through the hole and remove the heat exchange from the chassis***.***

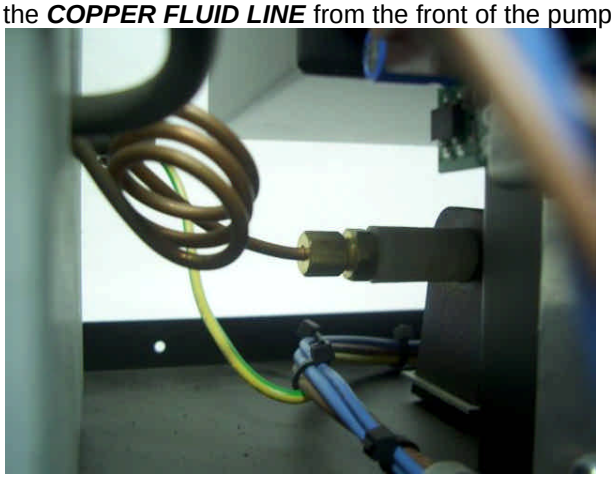
Refitting Your New Heater:

1. Replace heat exchange in chassis ***NOZZLE FIRST***.
2. Screw the 4 screws back in through the bottom of the chassis
3. Replace the negative (***BLUE***) wire to the ***HEAT EXCHANGER ELEMENT***.
4. Reconnect the ***HEATER POWER*** wires to the ***TERMINALS*** *of the* ***PCB.***
5. Using a ***NEW OLIVE*** refit the ***COPPER FLUID LINE*** to the ***PUMP***.
6. ***RECALIBRATE*** the temperature of the unit. (***See Calibration Section***)

How To Change A Pump:



1. ***DRAIN ALL FLUID FROM THE SYSTEM FIRST.***
2. ***DISCONNECT FROM MAINS SUPPLY.***
3. Remove ***TOP COVER***.
4. Disconnect the ***POWER*** wires from the ***PUMP***.
5. Disconnect the ***BLACK RUBBER FLUID LINE*** from the rear of the ***PUMP***.
6. Move the fluid line out of the way. (***BE CAREFUL OF FLUID COMING BACK DOWN THE PIPE***)
7. Disconnect the ***COPPER FLUID LINE*** from the front of the pump.



8. Unhook the rear ***RUBBER MOUNT*** from the pump.
9. Withdraw the pump from the front ***RUBBER MOUNT.***
10. Remove the ***PUMP*** from the machine.
11. Remove the ***BRASS FITTING*** from the front of the ***PUMP.***

REFITTING:

12. Fit the ***BRASS FITTING*** to the front of the pump using a ***THREAD SEALANT COMPOUND.***
13. Fit the new ***PUMP*** to the ***CHASSIS*** by inserting the front end first into the ***RUBBER MOUNT.***
14. Hook the rear mount onto the back of the pump.
15. Reconnect the ***BLACK RUBBER PIPE***.
16. Reconnect the ***POWER*** wires to the ***PUMP*** – ***BROWN INSIDE / BLUE OUTSIDE.***
17. Turn machine on and ***RE-PRIME*** the system.
18. Refit ***TOP COVER***.

How To Change A PCB:

REFER TO SCHEMATICS / DIAGRAMS IN THE APPENDIX FOR MORE DETAILS

PCB

1. ***DISCONNECT FROM MAINS SUPPLY.***
2. Remove ***TOP COVER***.
3. Remove the 2 screws at the bottom of the ***PCB HEATSINK*** from ***INSIDE THE BOTTLE COMPARTMENT*** holding the nut that is inside the ***PCB*** compartment.
4. Disconnect the ***PCB WIRING LOOMS*** from the ***PCB*** (Note orientation before removal).
5. Remove the 4 ***PLASTIC RIVETS*** from the 5-pin din sockets.

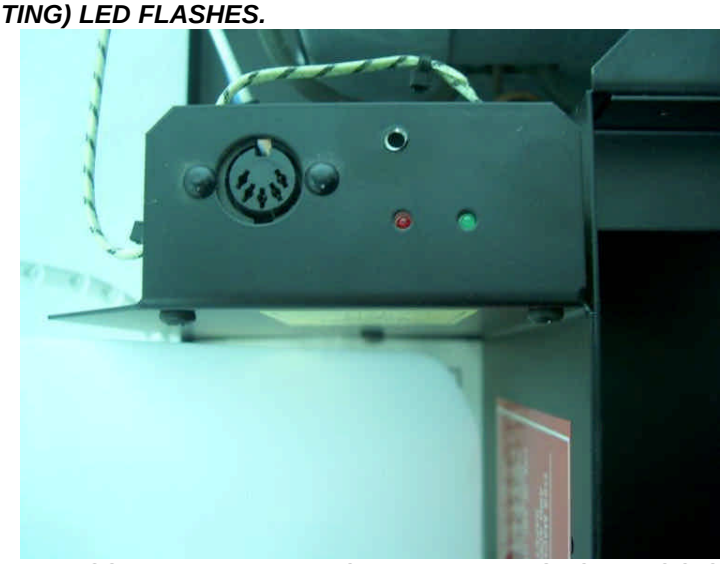
6. The ***PCB*** is mounted on 2 mounting posts which will need to be squeezed to remove the pcb.
7. Remove the ***HEATSINK*** from the ***PCB*** by removing the 2 screws/nuts/washers.

REFITTING:

8. Fit the ***HEATSINK*** to the ***PCB*** using the 2 screws/nuts adding ***THERMAL TRANSFER PASTE*** underneath component ***Q6.***
9. Fit new ***PCB*** to the mounting posts.
10. Insert the 4 ***PLASTIC RIVETS*** into the din sockets.
11. Insert the 2 screws into the heatsink from the bottle compartment and secure with the nuts in the PCB compartment.
12. Reconnect the ***PCB WIRING LOOMS*** (Observe polarity).
13. Refit the ***TOP COVER***.

Calibration:

1. Set the ***JEM CALIBRATION BOX*** to the required mV setting (13.4mV).
2. Make sure the ***RAMP BUTTON*** on your ***CALIBRATION BOX (GREY***) is ***OFF***.
3. Remove the ***TOP COVER***.
4. Disconnect the ***THERMOCOUPLE*** from the ***PCB***.
5. Connect the ***RED TERMINAL*** of the ***CALIBRATION BOX*** to the ***POSITIVE (+) THERMOCOUPLE*** connector of the ***PCB***.
6. Connect the ***BLACK TERMINAL*** of the ***CALIBRATION BOX*** to the ***NEGATIVE (-) THERMOCOUPLE*** connector of the ***PCB***.
7. Turn the machine on and tweak the ***TEMPERATURE CALIBRATION POT*** until the ***RED (HEATING) LED FLASHES.***



8. ***IF YOU PRESS THE RAMP BUTTON IN THE LED SHOULD GO OUT AND COME BACK ON AGAIN WHEN YOU RELEASE THE BUTTON.***
9. Disconnect the ***CALIBRATION BOX*** from the ***THERMOCOUPLE*** connectors.
10. Replace the ***THERMOCOUPLE*** onto the ***DMX/PROGRAM PCB (PRE 11/06: YELLOW = + BLUE = - / POST 11/06: BLACK = + WHITE = -)***
11. Turn the machine on and check for current draw.
12. Let the machine heat up and check using a digital volt meter that the ***RED (HEATING) LED*** turns ***OFF*** at the correct point.
13. The ***GREEN (OK) LED*** should turn on about 1mV lower than the peak temperature setting. ***(RED LED TURNING OFF)***
14. ***TEMPERATURE CALIBRATION IS NOW COMPLETE***.

SPARE PARTS LISTS

240V

Part	Description	Spare Part Number	Comments
PUMP		05761003	240V RED BODY
PCB	MAIN	62020002	240v MAIN CONTROL PCB - TESTED
PCB	REMOTE	62020505	TESTED w/o BUTTON TOPS OR KNOBS
HEAT EXCHANGE	COMPLETE		COMPLETE BUILT UP HEAT EXCHANGE c/w BRASS FITTINGS
HEAT EXCHANGE	BARE Inc BRASSWORK	26460670	BARE EXCHANGE (No insulation or casework) c/w BRASS FITTINGS
HEAT EXCHANGE	BRASSWORK ONLY	26460170	BRASS FITTINGS ONLY
HEAT EXCHANGE	CASEWORK	n/a	CASEWORK AVAILABLE SEPARATELY - CONTACT jem-service@martin.dk
HEAT EXCHANGE	INSULATION	26520070	PRE CUT INSULATION KIT
HEAT EXCHANGE	THERMAL TRIP ONLY	05041021	TRIP SWITCH ONLY
HEAT EXCHANGE	THERMAL TRIP Inc LOOM		TRIP SWITCH INCLUDING LOOM
CASEWORK	CARRY HANDLE (PLASTIC)	19200050	PLASTIC CARRY HANDLE
CASEWORK	TOP LID	26561670	TOP LID
CASEWORK	MAIN CHASSIS	26561660	MAIN CHASSIS - BARE
CASEWORK			OTHER CASEWORK IS AVAILABLE - CONTACT jem-service@martin.dk
OTHER	BOTTLE	34300521	2.5L FLUID BOTTLE
OTHER	REMOTE CONTROL ANALOGUE	92765002	COMPLETE ANALOGUE REMOTE CONTROL
OTHER	REMOTE CONTROL DMX	92765015	COMPLETE DMX INTERFACE / REMOTE CONTROL
OTHER	FLUID LINE ASSEMBLY	62520045	INCLUDES CAP, FILTER AND CONNECTOR
OTHER	MAINS SWITCH	05523021	ILLUMINATED MAINS ON/OFF SWITCH
OTHER	WIRING LOOMS COMPLETE		ALL WIRING LOOMS FOR MACHINE
OTHER	STICKERS COMPLETE		ALL STICKERS / LABELS FOR MACHINE

110V

Part	Description	Spare Part Number	Comments
PUMP		05761001	110V RED BODY
PCB	MAIN	62020004	110v MAIN CONTROL PCB - TESTED
PCB	REMOTE	62020505	TESTED w/o BUTTON TOPS OR KNOBS
HEAT EXCHANGE	COMPLETE		COMPLETE BUILT UP HEAT EXCHANGE c/w BRASS FITTINGS
HEAT EXCHANGE	BARE Inc BRASSWORK	26460830	BARE EXCHANGE (No insulation or casework) c/w BRASS FITTINGS
HEAT EXCHANGE	BRASSWORK ONLY	26460170	BRASS FITTINGS ONLY
HEAT EXCHANGE	CASEWORK	n/a	CASEWORK AVAILABLE SEPARATELY - CONTACT jem-service@martin.dk
HEAT EXCHANGE	INSULATION	26520070	PRE CUT INSULATION KIT
HEAT EXCHANGE	THERMAL TRIP ONLY	05041021	TRIP SWITCH ONLY
HEAT EXCHANGE	THERMAL TRIP Inc LOOM		TRIP SWITCH INCLUDING LOOM
CASEWORK	CARRY HANDLE (PLASTIC)	19200050	PLASTIC CARRY HANDLE
CASEWORK	TOP LID	26561670	TOP LID
CASEWORK	MAIN CHASSIS	26561660	MAIN CHASSIS - BARE
CASEWORK			OTHER CASEWORK IS AVAILABLE - CONTACT jem-service@martin.dk
OTHER	BOTTLE	34300521	2.5L FLUID BOTTLE
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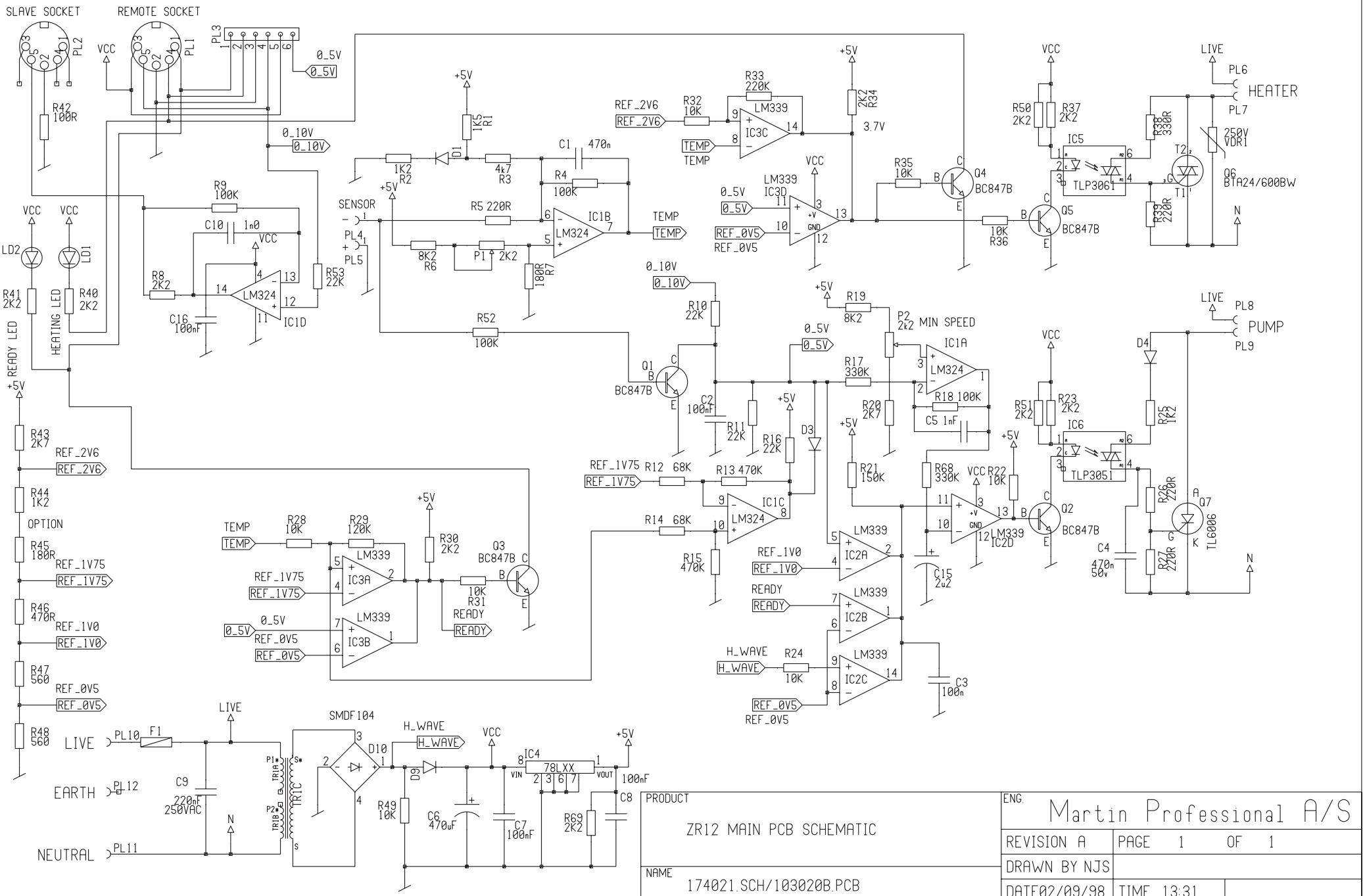
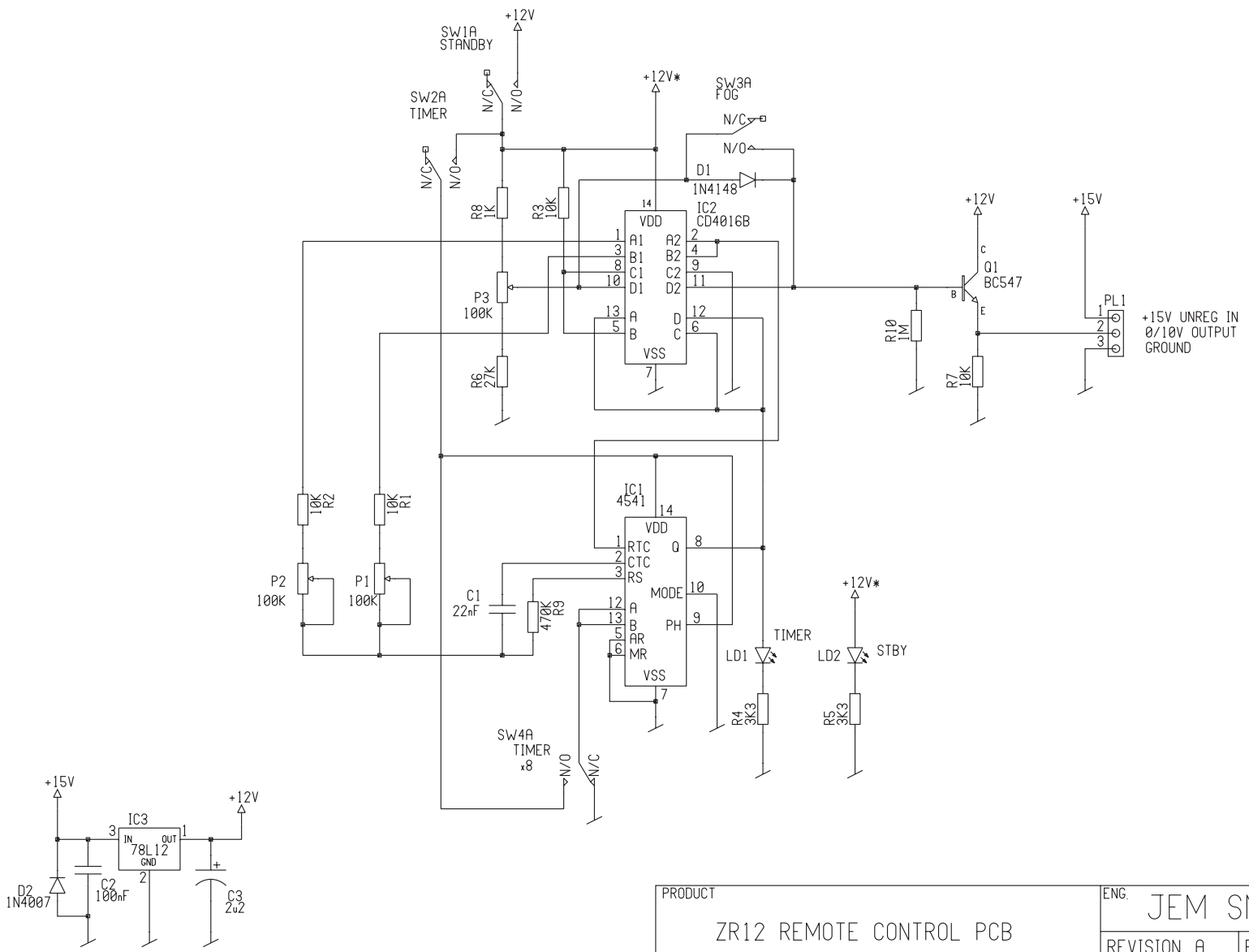
OTHER	FLUID LINE ASSEMBLY	62520045	INCLUDES CAP, FILTER AND CONNECTOR
OTHER	MAINS SWITCH	05523021	ILLUMINATED MAINS ON/OFF SWITCH
OTHER	WIRING LOOMS COMPLETE		ALL WIRING LOOMS FOR MACHINE
OTHER	STICKERS COMPLETE		ALL STICKERS / LABELS FOR MACHINE

APPENDIX

Fuse Ratings

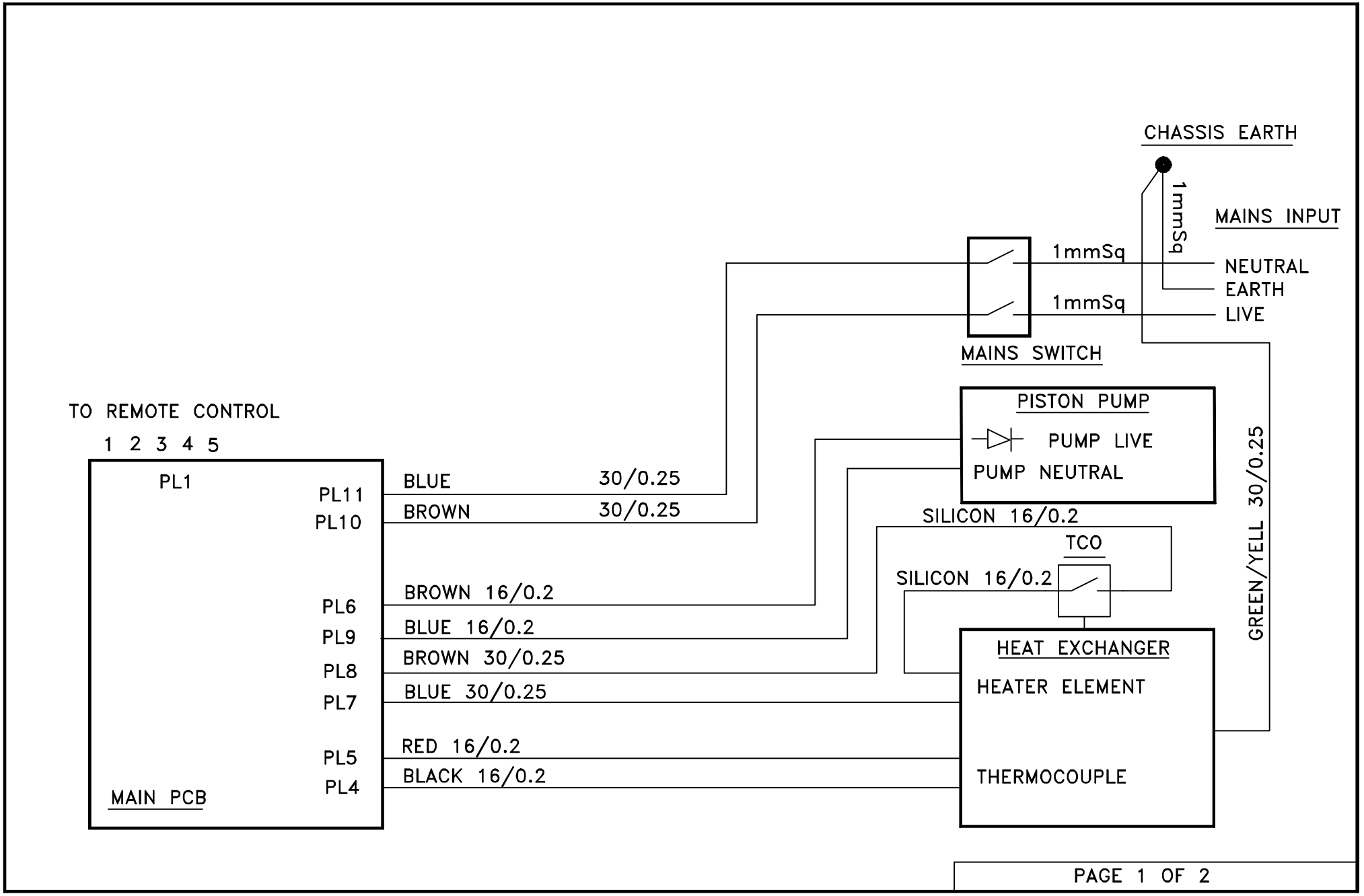
Fuse	240V	110V
External	6.3A	10A


SLAVE SOCKET
REMOTE SOCKET
PL1
PL2
PL3
VCC
0_5V
0_10V
R42 100R
LD1
LD2
HEATING LED
READY LED
R40 2K2
R41 2K2
R9 100K
C10 1n0
R8 2K2
C16 100nF
R53 22K
IC1D
LM324
SENSOR
PL4
PL5
R1 1K5
D1
R2 1K2
R3 4k7
C1 470n
R4 100K
R5 220R
R6 8K2
P1 2K2
R7 180R
IC1B
TEMP
R52 100K
R10 22K
Q1 BC847B
C2 100nF
R11 22K
R16 22K
D3
R19 8K2
P2 2k2 MIN SPEED
IC1A
R17 330K
R18 100K
C5 1nF
R20 2K7
R21 150K
R13 470K
R14 68K
R15 470K
IC1C
REF_1V75
REF_2V6
REF_1V0
REF_0V5
R43 2K7
R44 1K2
R45 180R
R46 470R
R47 560
R48 560
OPTION
R28 10K
R29 120K
IC3A
IC3B
R30 2K2
R31 10K
Q3 BC847B
READY
R32 10K
R33 220K
IC3C
LM339
2K2 R34
3.7V
R35 10K
Q4 BC847B
R36 10K
IC2A
IC2B
IC2C
IC2D
R68 330K
R22 10K
C15 2u2
C3 100n
H_WAVE
R24 10K
R50 2K2
R37 2K2
IC5
TLP3061
R38 330R
R39 220R
T2
T1
250V VDR1
Q6 BTA24/600BW
Q5 BC847B
LIVE
PL6
HEATER
PL7
N
R51 2K2
R23 2K2
IC6
TLP3051
R25 1K2
R26 220R
R27 220R
Q2 BC847B
Q7 TL6006
C4 470n 50v
PL8
PUMP
PL9
LIVE
EARTH
NEUTRAL
PL10
PL11
PL12
F1
C9 220nF 250VAC
SMDF104
D10
D9
R49 10K
C6 470uF
C7 100nF
IC4 78LXX
VIN
VOUT
R69 2K2
C8 100nF
TRIAC
PRODUCT
ZR12 MAIN PCB SCHEMATIC
NAME
174021.SCH/103020B.PCB
ENG.
Martin Professional A/S
REVISION A
PAGE 1 OF 1
DRAWN BY NJS
DATE02/09/98
TIME 13:31

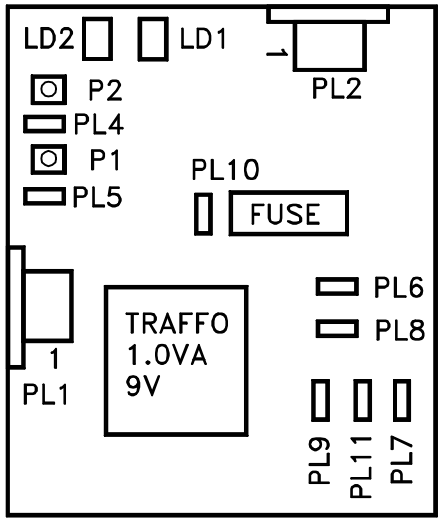


PRODUCT	ZR12 REMOTE CONTROL PCB	ENG. JEM SMOKE PLC
		REVISION A / PAGE 1 OF 1
NAME	174022.SCH/37045A.PCB	DRAWN BY NJS
		DATE07/09/98 / TIME 10:57

JEM SMOKE plc.



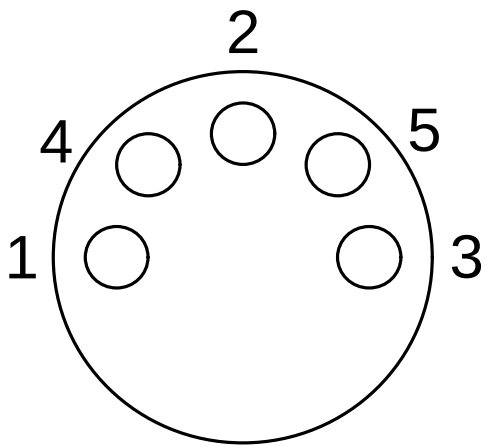
DRAWN: N.SCULLY *DATE:* 03/09/98 *TITLE:* ZR12 WIRING DIAGRAM *DWG. No.* 174020 *REV.* A



CONNECTOR FUNCTIONS		
PL1	1	READY LED (ACTIVE LOW)
	2	GROUND
	3	15V UNREG. SUPPLY
	4	HEATING LED
	5	0/10V INPUT SIGNAL
PL2	2	GND
	5	0/10V SLAVE OUPUT
PL4	1	THERMOCOUPLE –VE
PL5	1	THERMOCOUPLE +VE
PL6	1	LIVE TO PUMP
PL7	1	NEUTRAL TO HEATER
PL8	1	LIVE TO HEATER
PL9	1	NEUTRAL TO PUMP
PL10	1	LIVE INPUT
PL11	1	NEUTRAL INPUT
P1	TEMPERATURE CONTROL	
P2	PUMP SPEED CONTROL	

DRAWN: N.SCULLY *DATE:* 03/09/98 *TITLE:* ZR12 MAIN PCB LAYOUT *DWG. No.* 174020 *REV.* A

ZR12 DMX REMOTE CONTROL XLR PLUG PIN OUTS



1 - NOT USED

4 - NOT USED

2 - BLACK (GND).

5 - WHITE (0 - 10v)

3 - YELLOW (+16v).

VIEWED FROM THE SOLDER SIDE OF THE DIN PLUG

PIN OUT DESCRIPTION

1, NOT USED

4, NOT USED

2, GND TO DMX CARD

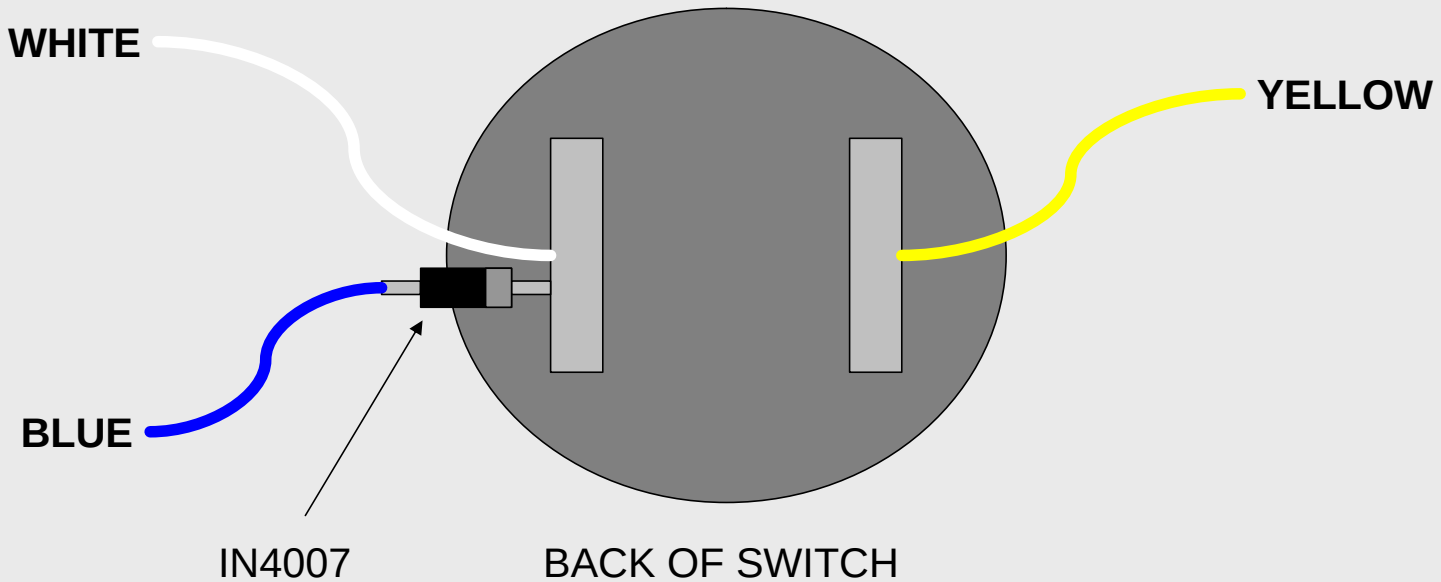
5, TO + TERMINAL OF SWITCH
(STRAIGHT TO SWITCH, NOT DIODE ON BLUE WIRE)

3, TO SWITCH - TERMINAL

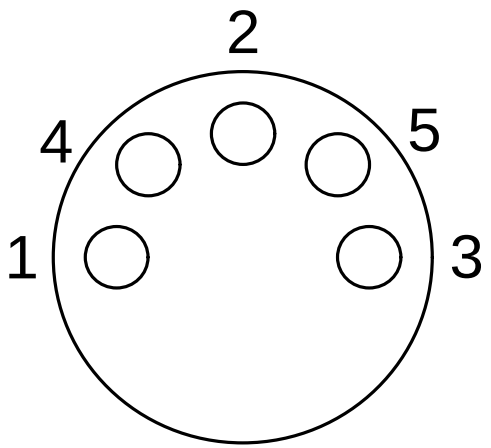
ZR12 DMX Remote Pins
Drawing No. 2012/1A
Drawn by: GS 28/03/2006

Jem

ZR12 DMX REMOTE TEST SWITCH



ZR12AL REMOTE CONTROL DIN PLUG PIN OUTS



1 - YELLOW (READY).

4 - WHITE (HEAT).

2 - BLACK (GND).

5 - BLUE (0 - 10v)

3 - RED (+16v).

VIEWED FROM THE SOLDER SIDE OF THE DIN PLUG

PIN OUT DESCRIPTION

1, GND WHEN MACHINES UP TO TEMPERATURE

4, GND WHEN MACHINES HEATING

2, GND

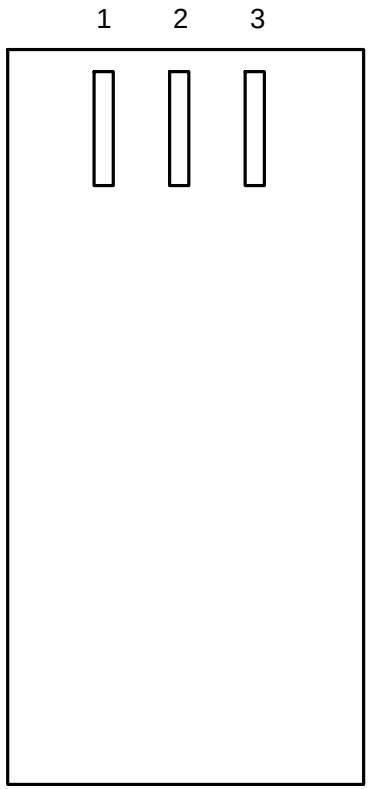
5, 0 - 10v INPUT, NEEDS 1.5v TO HEAT AND
2v -10v PUMP SPEED WHEN MACHINES READY

3 +16v OUTPUT

ZR12AL Remote Plug Pin
Drawing No. 2011/1A
Drawn by: GS 28/03/2006

Jem

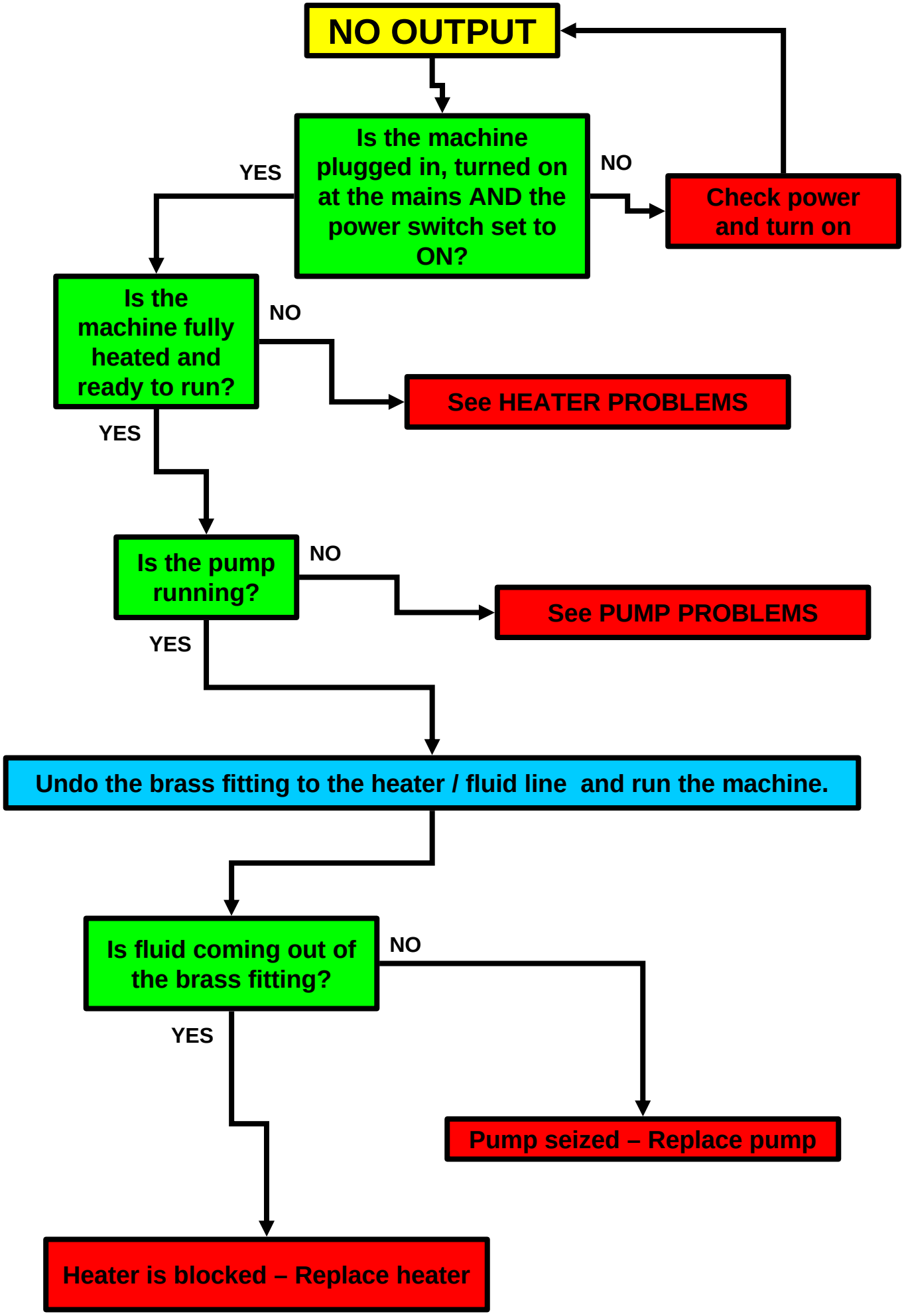
ZR12AL REMOTE PCB PIN OUTS

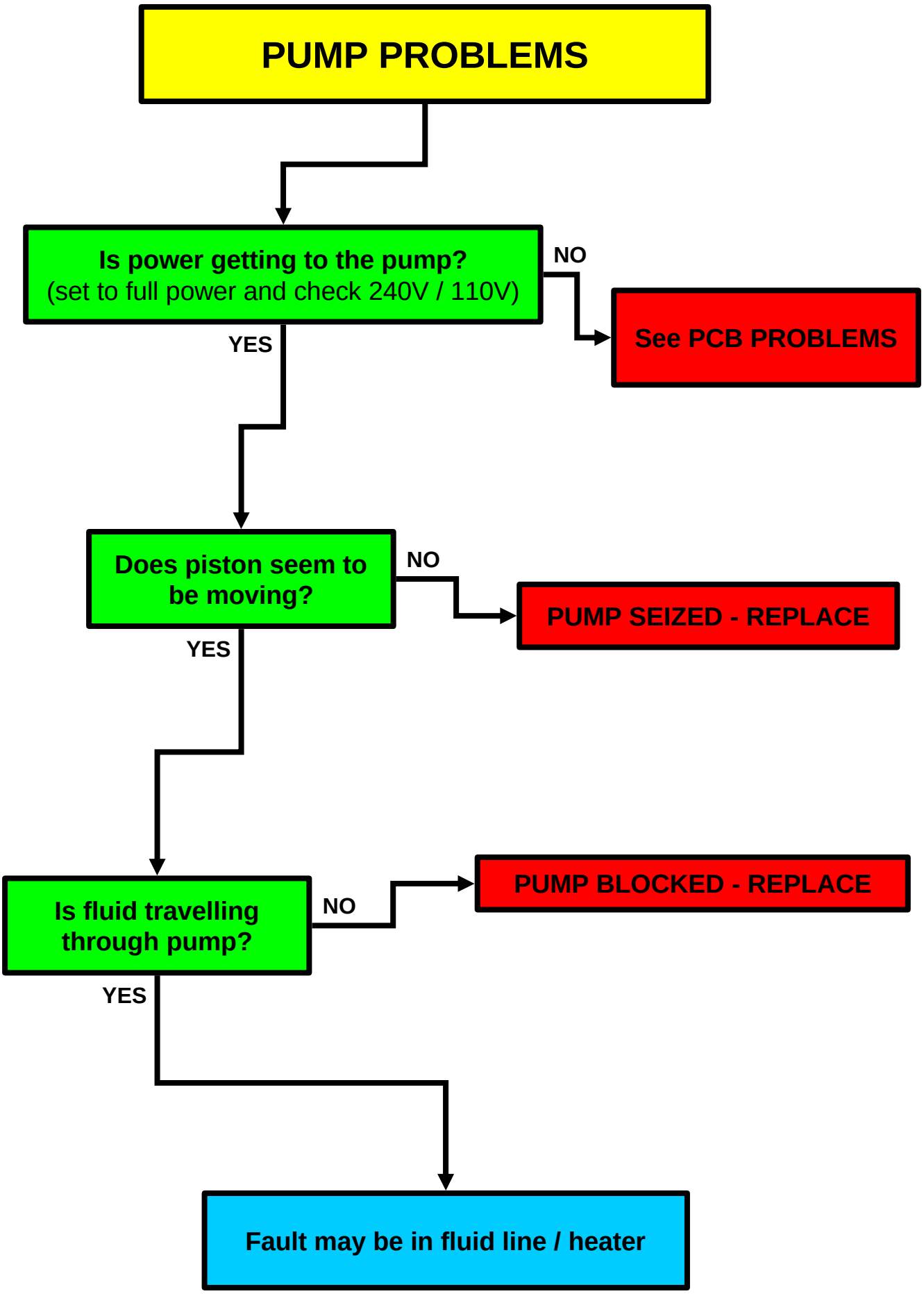


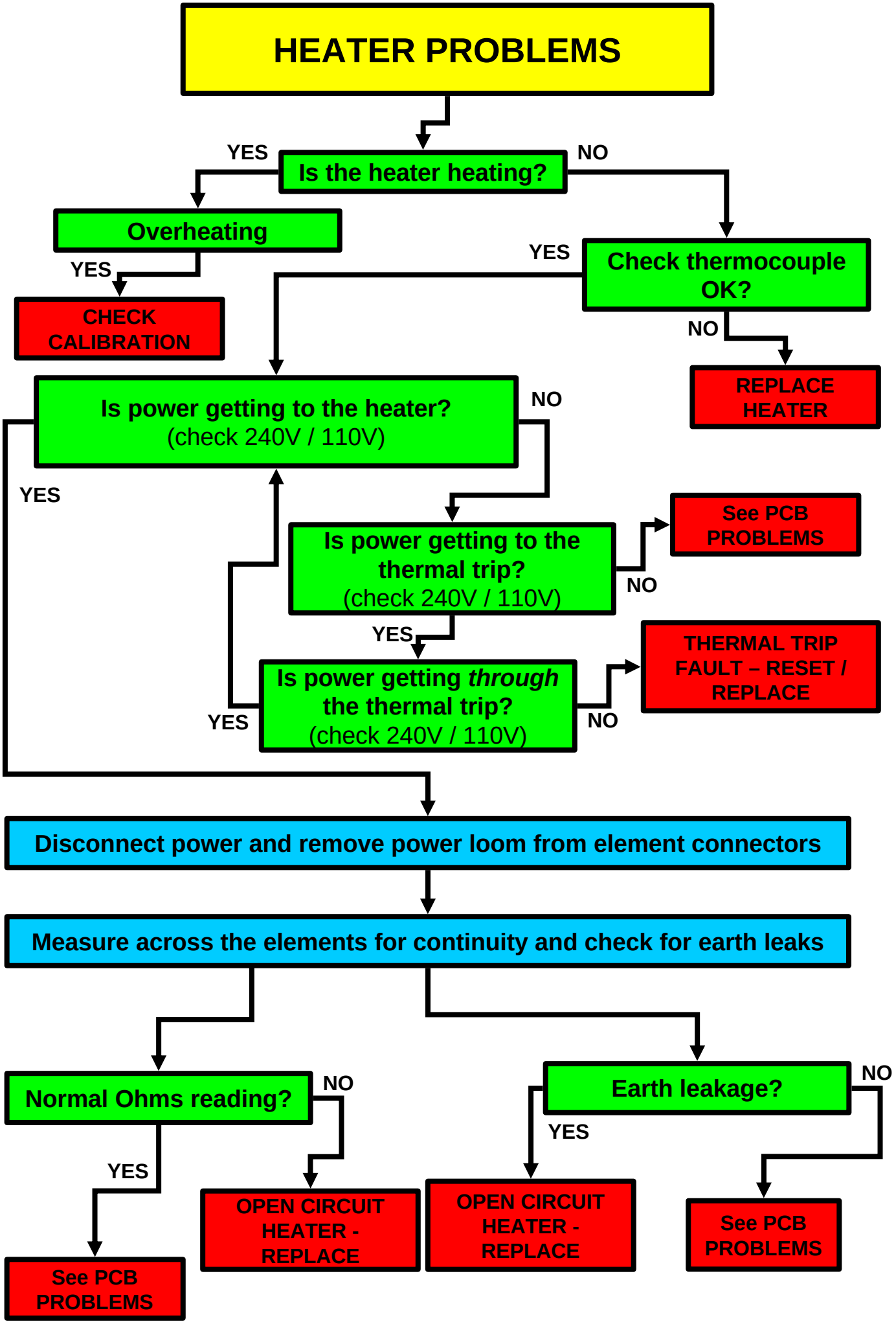
PIN
1, BLACK
2, BLUE
3, RED

ZR12AL REMOTE
PCB PIN OUTS
Drawing No. 2011/2A
Drawn by : GS 28/03/2006

Jem


NO OUTPUT
Is the machine plugged in, turned on at the mains AND the power switch set to ON?
YES
NO
Check power and turn on
Is the machine fully heated and ready to run?
NO
See HEATER PROBLEMS
YES
Is the pump running?
NO
See PUMP PROBLEMS
YES
Undo the brass fitting to the heater / fluid line and run the machine.
Is fluid coming out of the brass fitting?
NO
YES
Pump seized – Replace pump
Heater is blocked – Replace heater


PUMP PROBLEMS
Is power getting to the pump?
(set to full power and check 240V / 110V)
NO
See PCB PROBLEMS
YES
Does piston seem to be moving?
NO
PUMP SEIZED - REPLACE
YES
Is fluid travelling through pump?
NO
PUMP BLOCKED - REPLACE
YES
Fault may be in fluid line / heater


HEATER PROBLEMS
Is the heater heating?
YES
NO
Overheating
YES
CHECK CALIBRATION
Check thermocouple OK?
YES
NO
REPLACE HEATER
Is power getting to the heater? (check 240V / 110V)
NO
YES
Is power getting to the thermal trip? (check 240V / 110V)
See PCB PROBLEMS
NO
YES
Is power getting *through* the thermal trip? (check 240V / 110V)
THERMAL TRIP FAULT – RESET / REPLACE
YES
NO
Disconnect power and remove power loom from element connectors
Measure across the elements for continuity and check for earth leaks
Normal Ohms reading?
NO
YES
See PCB PROBLEMS
OPEN CIRCUIT HEATER - REPLACE
Earth leakage?
NO
YES
OPEN CIRCUIT HEATER - REPLACE
See PCB PROBLEMS

PCB PROBLEMS

APART FROM THE OBVIOUS FUSES / WIRING ETC. PCB FAULT FINDING IS TOO IN-DEPTH TO COVER HERE – PLEASE REFER SERVICING / REPAIR TO A QUALIFIED ENGINEER