SERVICE INSTRUCTIONS

Raypak 131 Pool Heater

TM020

Revision: A

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Spartan
P0131

Contents

Introduction

The information provided in these service instructions is based on the pool or spa heater being installed in accordance with AS 5601 and the Installation Instructions provided with each pool or spa heater.

Should you require further technical advice on a Raypak Pool or Spa Heater, contact your nearest Rheem Service Department where genuine replacement parts are also available.

Safety Warning

The purpose of this service manual is to provide sufficient information to allow a person with the skills as required by the Regulatory Authorities to carry out effective repairs to a Raypak Pool Heater in the minimum of time.

Safety precautions or areas where extra care should be observed when conducting tests outlined in this service manual are indicated by print in ***bold italics*** and/or a warning symbol (see below). Take care to observe the recommended procedure.

"Live" testing to be conducted. Personal Protective Clothing (PPE) shall be worn and an RCD shall be installed between the power point and 3-pin cord of the pool heater to reduce the risk of electric shock.

Isolate power before conducting the indicated test

Hot surface or liquid. Personal Protective Clothing (PPE) shall be worn to reduce the risk of scalding.

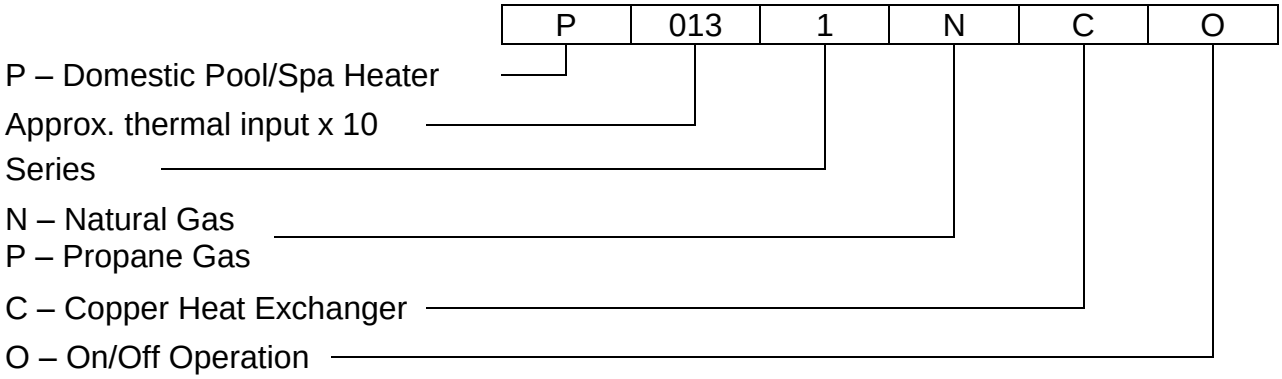
General warning symbol. Observe the instructions accompanying the symbol.

If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.

When conducting repairs to a gas appliance the gas train including injector sizes must not be altered or modified in any way.

Pool Heater Model Identification

All identification numbers are designed to convey detailed information about the pool heater to which it is attached.



Note: Model number, serial number and date of manufacture must be quoted in all correspondence.

Specifications

		P0131NCO	P0131PCO
Injector size (mm)		1.36	0.77
Burner Pressure (kPa)		0.85	2.64
Minimum Gas Pressure (kPa)		1.13	2.75
Maximum Gas Pressure (kPa)		3.5	
Input (MJ)		120	
Number of burners		15	
Gas inlet connection		RP¾/20	
Header connection		40mm	
Gas valve	Pre 2007	White Rogers 36E06-301	
	Post 2007	White Rogers 36G22-216	
Ignition module		RAM-H4M7-01	
Control board		Millennium grey or black board (24VAC 50Hz)	
45ºC inlet high limit		Campini TY60, opens 45ºC closes 35ºC (+/- 3ºC)	
55ºC outlet high limit		36TXVG11, opens 55 ºC closes 45 (+/- 3ºC)	
Transformer		Primary winding 240 Volts AC 50Hz 62.2 ohms	
		Secondary winding 24 Volts AC 50Hz 1.3 ohms	
Pressure switch[1]		Barksdale MSPS-EE05-Q71 or Tecmark MSPS-EE05	
		Adjustable: 3.5 – 34.5kPa, max pressure 55kPa	
Flow switch[1]		Adjustable: max pressure 1000kPa	
40ºC temperature probe		Refer to table on page 40	
Control circuit fuse		3A	
Relay 1[2]		Omron LY2N, DPDT, 24VAC, coil resist 186 ohms	
Relay 2[2]		Omron LY2N, DPDT, 24VAC, coil resist 186 ohms	
Reset illuminated push button		24VAC LED, 1 X N/O momentary contact	
Flow Rate (l/s)	Minimum	1.3	
	Maximum	6.9	
Power Supply		240VAC 50Hertz	

[1] The installation will have either a pressure switch ***or*** a flow switch depending upon the application (refer to 'Water Pressure Switch' on page 17 for more information).

[2] Models manufactured from the 14/4/09 feature an integrated PCB with power outage auto reset incorporating the relays.

Auxiliary Component Specifications

Component	
Electrical Interface Board (E.I.B)	Millennium 56659201 240VAC (30A max @ 240V)

Note: Auxiliary components are optional and may not be installed.

Preventative Maintenance

It is suggested for peak performance that the pool/spa heater be serviced annually.

1. Clean the cabinet louvres of any dust, lint and debris.
2. Ensure plants or shrubs etc are not obstructing the cabinet louvres.
3. Check for signs of leaking at pipe fittings and headers.
4. Clean the burner bars.
5. Check for signs of sooting, the presence of soot accumulation indicates an abnormal operating condition.
6. Check the main burner pressure and compare to that indicated on the rating label, adjust if required. Remember to replace the pressure test point screw.
7. Check main burner flame to ensure all parts ignite readily and that the flame is blue with little or no yellowing of the tips.
8. Check operation of the flame failure sensor. The burner should extinguish immediately the flame sensor is disconnected.
9. Check for signs of excessive corrosion on the cabinet and inside the combustion chamber.
10. With the burner operating disconnect one wire from the 45°C high limit (located on the inlet header), the burner should extinguish. Reconnect the wire; the reset button lamp should illuminate however the burner must not light. Press the reset button, the lamp should extinguish and the burner should light.
11. With the burner operating disconnect one wire from the 55°C high limit (located on the outlet header), the burner should extinguish. Reconnect the wire; the reset button lamp should NOT illuminate and the burner should reignite.
12. Warn customer of the danger of storing pool chemicals and/or using flammable materials or aerosol spray packs near the pool/spa heater. Aerosols and harsh chemicals can cause premature failure of pool/spa heater components.

Water Treatment (Pool Balance)

Maintenance level	Fibreglass Pools	Fibreglass Spas	Other Pool/Spa types
Water temp (ºC)	20 – 31	32 – 40	20 – 40
PH	7.3 – 7.4	7.3 – 7.4	7.6 – 7.8
Total Alkalinity (ppm)	120 – 150	120 – 150	150 – 200
Calcium Hardness (ppm)	200 – 300	150 – 200	80 – 100
Salt (ppm)	6000 MAXIMUM		
Free Chlorine (ppm)*	2 – 3	2 – 3	2 – 3

* Free Chlorine must not exceed 5ppm, however occasional chemical shock dosing of the pool or spa water should not damage the heater providing that the water is balanced to the above conditions.

Automatic chemical dosing devices and salt chlorinators are usually more efficient in heated water. Unless controlled, they can lead to excessive chlorine levels that can damage the pool/spa heater.

Product Changes

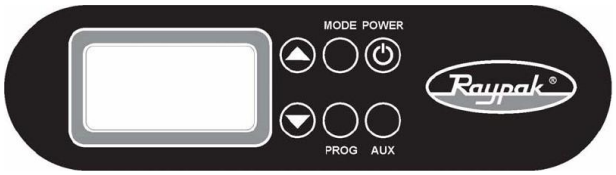
Gas Valve Change

131 Model pool heaters manufactured before the 27/3/07 utilise a White Rogers 36E06-301 gas valve, models manufactured after the 27/3/07 utilise a White Rogers 36G22-216 gas valve. The 36E06-301 gas valve is no longer available however the 36G22-216 gas valve is a direct replacement. For more information refer to ‘Gas Valve’ on page 52.

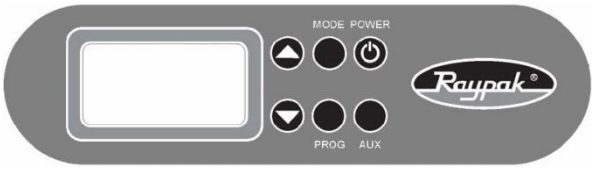
Change to Black Control Board

Raypak pool and spa heaters manufactured from July 2005 to the 31/10/2006 were fitted with a controller which has a grey decal on the control panel. Models manufactured from November 2006 onwards are fitted with a revised control board which incorporates additional software functions, fault codes and a revised wiring arrangement. The revised control board can be identified by a control panel with a black decal.

This Service Manual including fault finding charts covers both types of control panels.
Both control boards operate and are programmed in a similar fashion however black control boards have additional fault codes and features. It should be noted that the wiring arrangement also differs depending upon whether a black or grey board is fitted. Refer to page 9 for grey board wiring diagram and pages 10 & 11 for black board wiring diagrams.



Black control board



Grey control board

Addition of Reset Button Safety Lock Out Circuit & Weather Shielding.

All Raypak pool and spa heaters manufactured after 14/04/2008 have been fitted with an additional safety feature and weather shielding. The additional safety feature incorporates a red reset button located on the front control panel and two relays located in the control box (relay 1 and relay 2).

The safety lock out circuit prevents the heater from operating if the 45ºC inlet high limit trips (open circuits) due to an over temperature condition.

If the 45ºC inlet high limit trips (open circuits), relays 1 and 2 open and ‘lock out’ the pool heater control circuit preventing operation until the 45ºC inlet high limit closes and the pool heater is manually reset by pressing and releasing the red reset button. For more information refer to ‘Sequence of Operation’ on page 12 and wiring diagrams on pages 9-11.

Pool and spa heaters manufactured prior to the 14/04/2008 did not have the safety lock out circuit or additional weather shielding fitted. A recall campaign to rework all Raypak pool and spa heaters in the field was commenced in March 2008.

Any Raypak pool or spa heater that does not have a red reset button located on the control or side panel does not have a safety lock out circuit or additional weather shielding and MUST be reworked. Contact Rheem Service for more information.

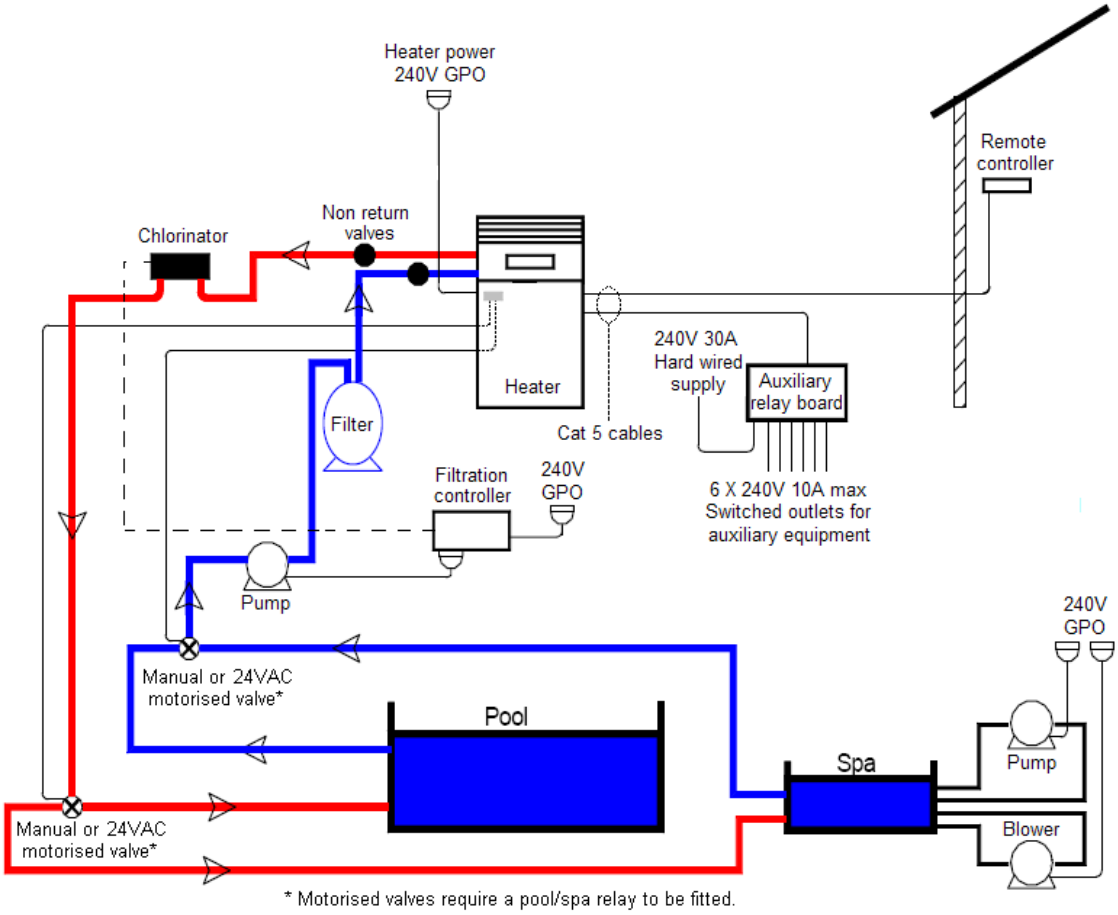
Addition of Auto Reset PCB (Incorporating Safety Lock out circuit)

All Raypak pool and spa heaters manufactured from the 14/4/09 have an additional auto reset PCB fitted. This control automatically resets the safety lockout circuit when power is applied for the first time or from a power outage overcoming nuisance lock outs.

The auto reset PCB also incorporates the safety circuit functionality noted above including relays (relay 1 and relay 2).

A manual reset (by pressing the red reset button) is still required should the 45°C inlet over temperature cut out open circuit.

Plumbing & Installation Diagram



Lighting Instructions

Main Burner

1. **STOP** read all of the safety information in the installation and operating instructions.
2. Press the pool heater ***Power*** button until the display is off.
3. Turn **OFF** all electrical power to the pool heater.
4. The pool/spa heater is equipped with an automatic ignition system, which lights the burner.
5. Wait five (5) minutes to clear out any unburnt gas. **STOP** if you smell gas and follow the safety instructions in the installation and operating instructions. If you do not smell any gas go to the next step.
6. Turn the gas isolation valve to the **ON** position.
7. Turn on electrical power to the pool/spa heater.
8. Press and release the red reset button, the reset light should go out. NOTE: For models manufactured from 14/04/09 onwards the reset button should NOT illuminate and does not need to be pressed.
9. Press and release the ***Power*** button on the control panel and set the thermostat to the desired setting.
10. The burner should light.

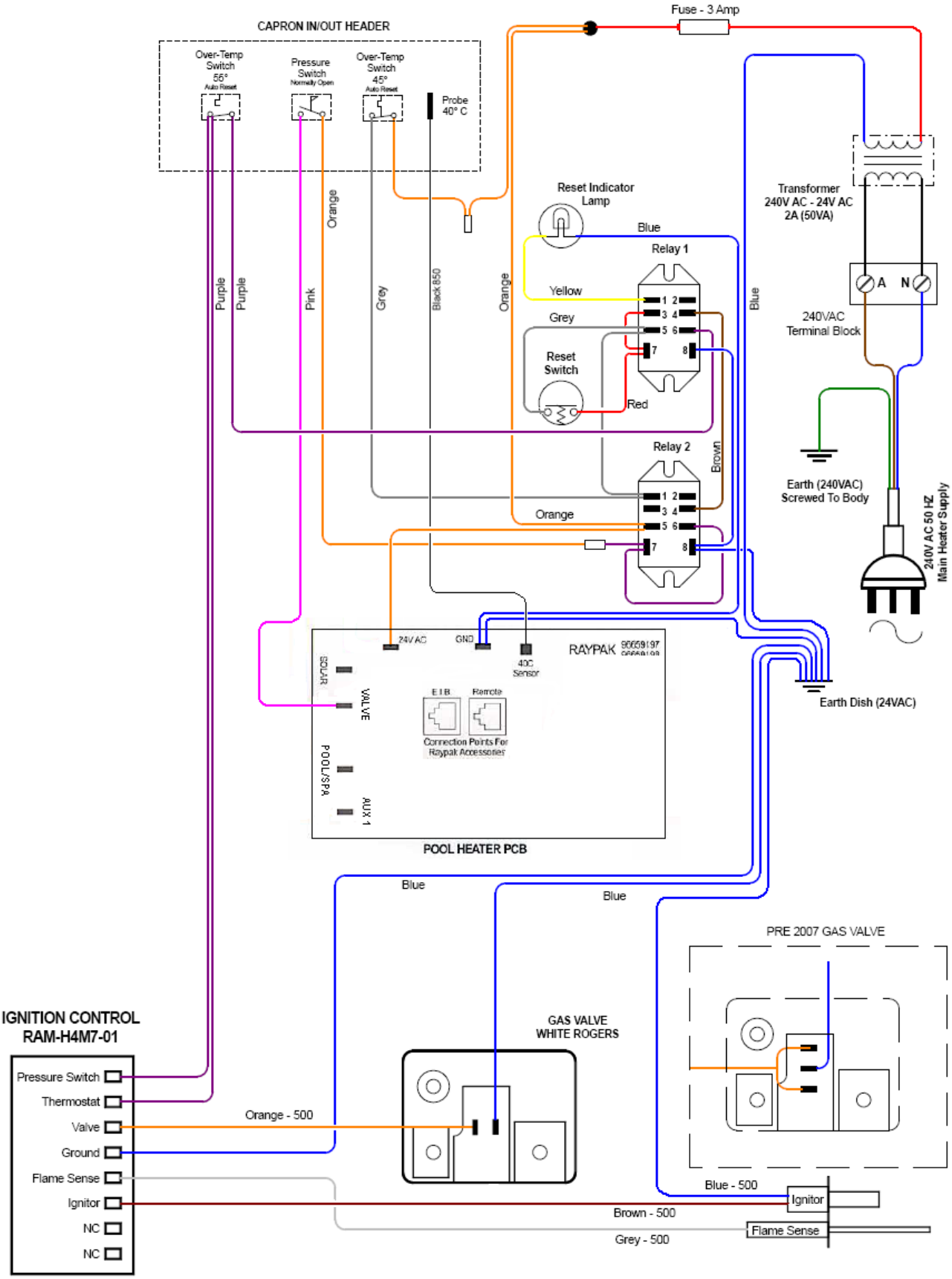
If the pool heater is not equipped with a red reset button, contact Rheem Service.

To turn off the pool heater

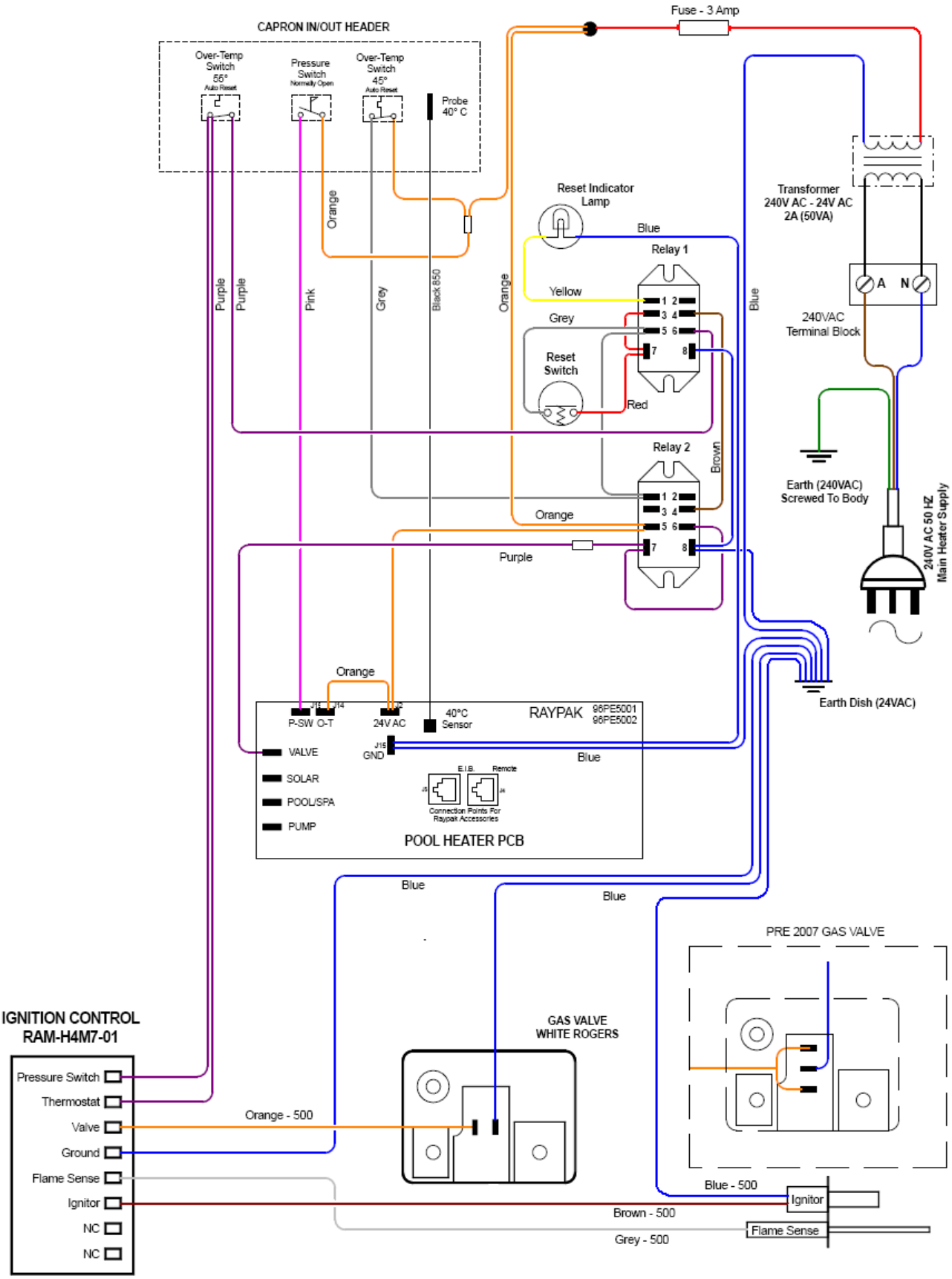
1. Press the ***Power*** button on the control panel and wait for the display to extinguish ('OFF' position).

Wiring Diagrams

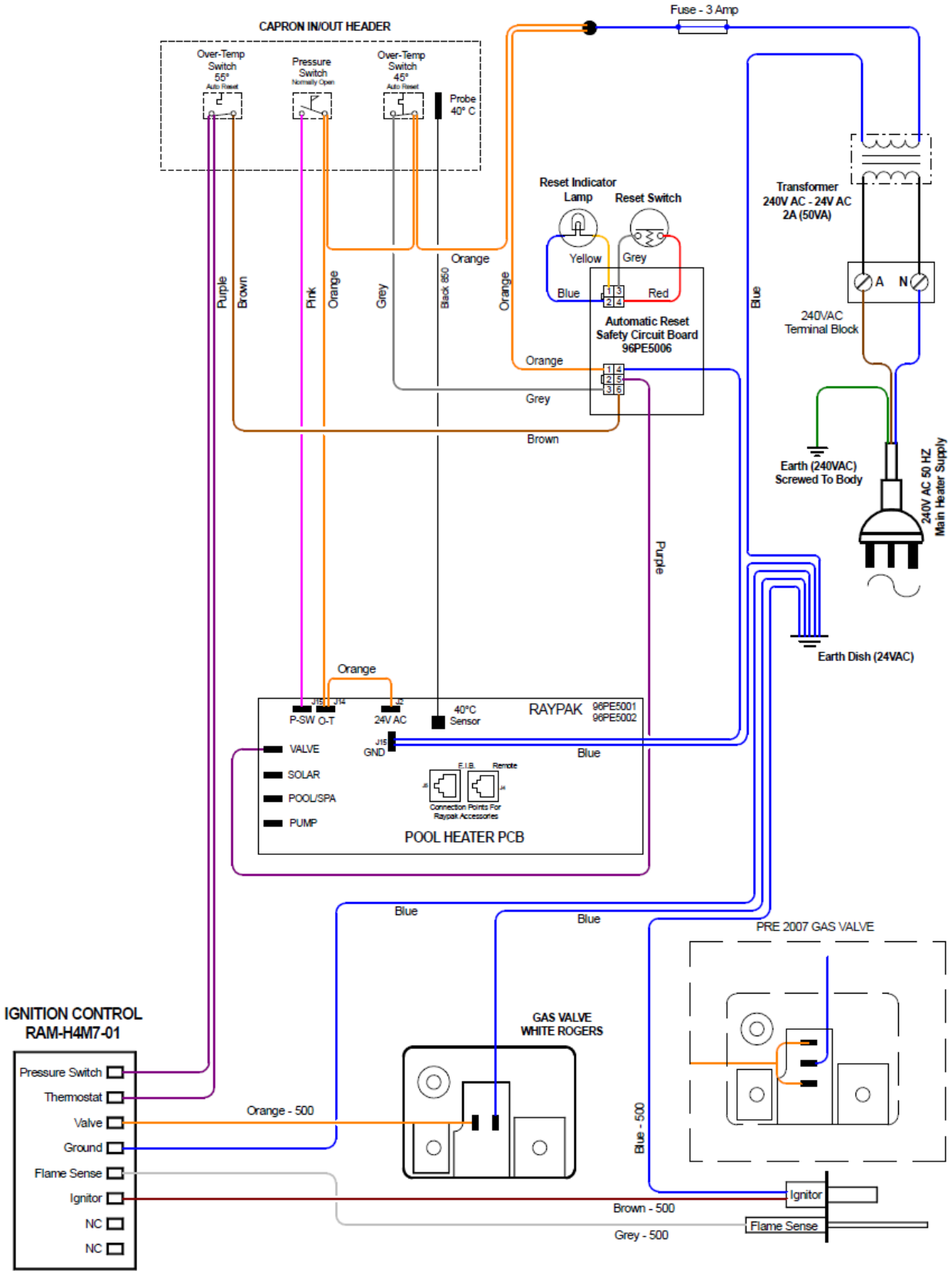
131 Wiring Diagram – Grey Control Board



131 Wiring Diagram – Black Control Board (prior to 14/4/09)



131 Wiring Diagram – Black Control Board (14/4/09 onwards)



Sequence of Operation

1. MODELS MANUFACTURED PRIOR TO 14/4/09: When power is supplied to the heater for the first time or power is removed and restored, the red reset button will illuminate indicating that the heater requires resetting. The red reset button is required to be pushed and released to reset the heater which will then be ready for operation. Actuation of the red reset button energises relay 1 which causes the reset indicator lamp to extinguish. Sequence of operation beyond this point assumes that the heater has been successfully reset.
2. Manual operation of the controller power button turns the controller on to the last mode of operation. Actuation of the pool/spa pump causes water to flow through the heater. The resulting water pressure causes the pressure switch contacts to close enabling operation of the control board gas valve output which at this stage is de-energised.
3. If the water temperature detected by the water temperature probe is 1ºC or less than the control board set point temperature, the control board will initiate a call for heat and supply power to relay 2 which will energise and supply power to the RAM ignition module via the normally open contacts of relay 2 (which closed when the control board called for heat), relay 1 (which closed in step 1 when the reset button was operated), and the normally closed contacts of the 55ºC outlet high limit (for grey boards also via the water pressure switch contacts).
4. When power is supplied to the RAM ignition module, the ignition module will perform an internal check to ensure that it is functioning correctly. If the internal check fails the ignition module will 'lock out' and require resetting by turning the controller off for 5 seconds and then turning the controller back on again. If the ignition module is reset in this manner operation will recommence from step 4.
5. If the ignition module internal check is successful, the ignition module will check the flame sensor to ensure a flame is not present. If a flame is present a DC current (µA) will be generated by the flame sensor and will be detected by the ignition module which will 'lock out' and require resetting by turning the controller off for 5 seconds and then turning the controller back on again. If the ignition module is reset in this manner operation will recommence from step 4.
6. If a flame is not detected in step 5, the ignition module will energise the igniter (which will glow red hot) and then perform a second flame sensor check to ensure a flame is not present. If a flame is present a DC current (µA) will be generated by the flame sensor and will be detected by the ignition module which will 'lock out' and require resetting by turning the controller off for 5 seconds and then turning the controller back on again. If the ignition module is reset in this manner operation will recommence from step 4.
7. If a flame is not detected in step 6, and when the ignition module detects an igniter current draw of > 1.4 amps, the ignition module will energise the gas valve which will open supplying gas to the burner which is ignited by the hot surface igniter. This type of ignition is termed HSI (hot surface ignition).

8. Upon successful ignition of the burner, the resulting flame impinges on the flame sensor which generates a DC micro amp (µA) current which is detected by the ignition module. If a flame is not detected within 15 seconds from igniter power up, the ignition module will de-energise the gas valve, 'lock out' and require resetting by turning the controller off for 5 seconds and then turning the controller back on again. If the ignition module is reset in this manner operation will recommence from step 4.

9. If a flame was detected in step 8, the burner is now operating and will remain lit until one of the following occurs at which time the gas valve will be de-energised (close):

   I. The call for heat ends (water temperature detected by the water temperature probe is 0.5ºC above the control board set point temperature).
   II. The pressure switch contacts open (no water flow).
   III. The 45ºC inlet high limit switch contacts open (over temperature condition). Refer to notes b, c and d below.
   IV. The 55ºC outlet high limit switch contacts open (over temperature condition).
   V. An external switch or time clock contact opens (if fitted).
   VI. Flame failure occurs (ignition module flame sensor does not detect a DC current).
   VII. The control board is turned off.

Notes:

a) If the 45ºC inlet high limit contacts are open at the **start** of a call for heat (step 3), relay 1 will be de-energised and no further operation will take place until the 45ºC inlet high limit contacts close (cool below 35ºC) at which time the reset indicator lamp will illuminate. The heater will then require resetting by pressing the red reset button. Also refer to point d below.

b) If the 45ºC inlet high limit contacts open **during** a call for heat and whilst the burner is operating (step 9),, relay 1 and the gas valve will be de-energised and no further operation will take place until the 45ºC inlet high limit contacts close (cool below 35ºC) at which time the reset indicator lamp will illuminate. The heater will then require resetting by pressing the red reset button. Also refer to point d below.

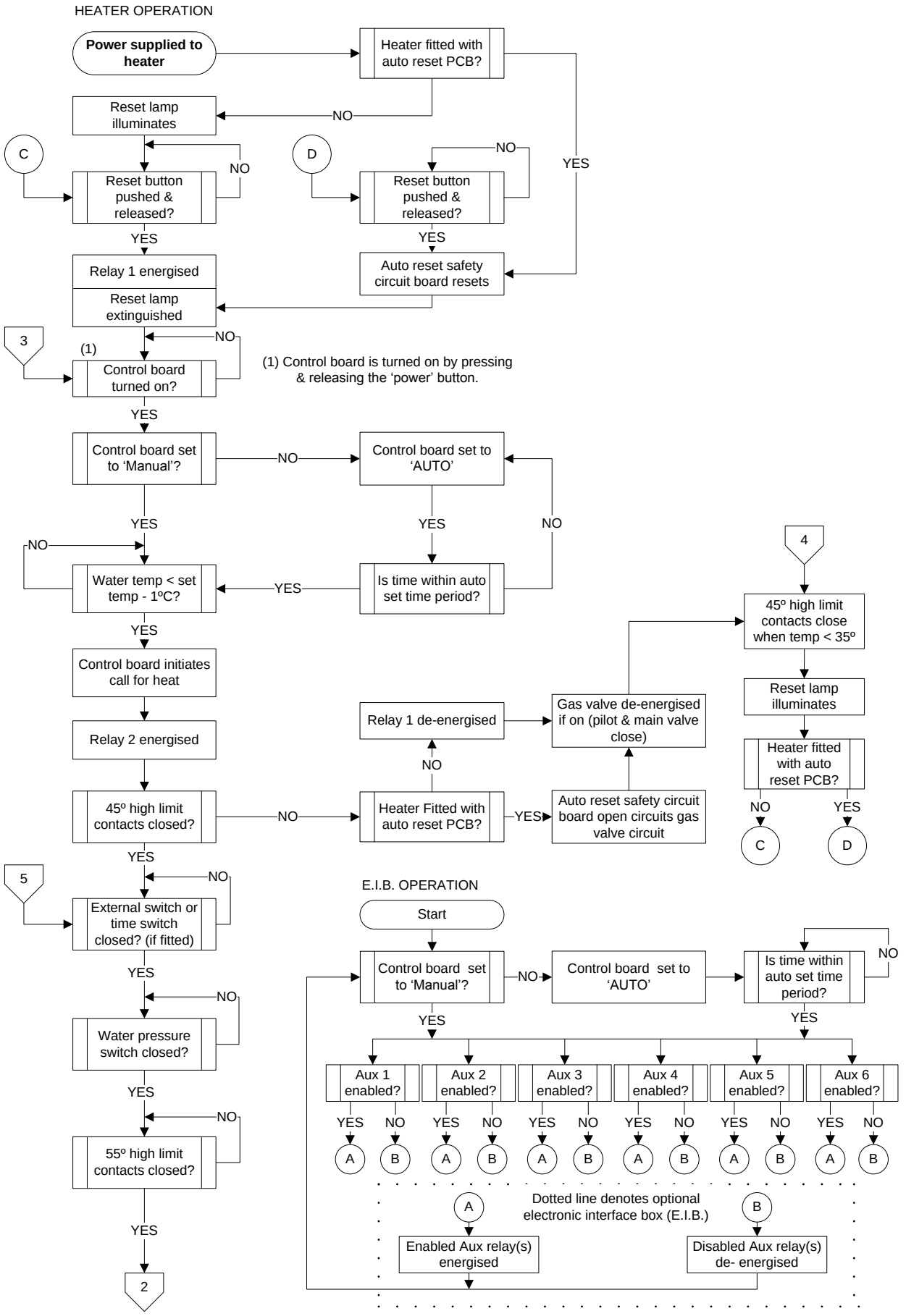
c) If a call for heat is **not** in progress and the 45ºC inlet high limit contacts are open, operation of the reset button will reset the heater, however, if the 45 ºC inlet high limit contacts are still open when a call for heat is initiated no further operation will take place until the 45ºC inlet high limit contacts close (cool below 35ºC) at which time the reset indicator lamp will illuminate. The heater will then require resetting as in step 1.

d) **NOTE:** The reset button cannot reset the heater whilst a call for heat is in progress and the 45°C Hi Limit contacts are open.

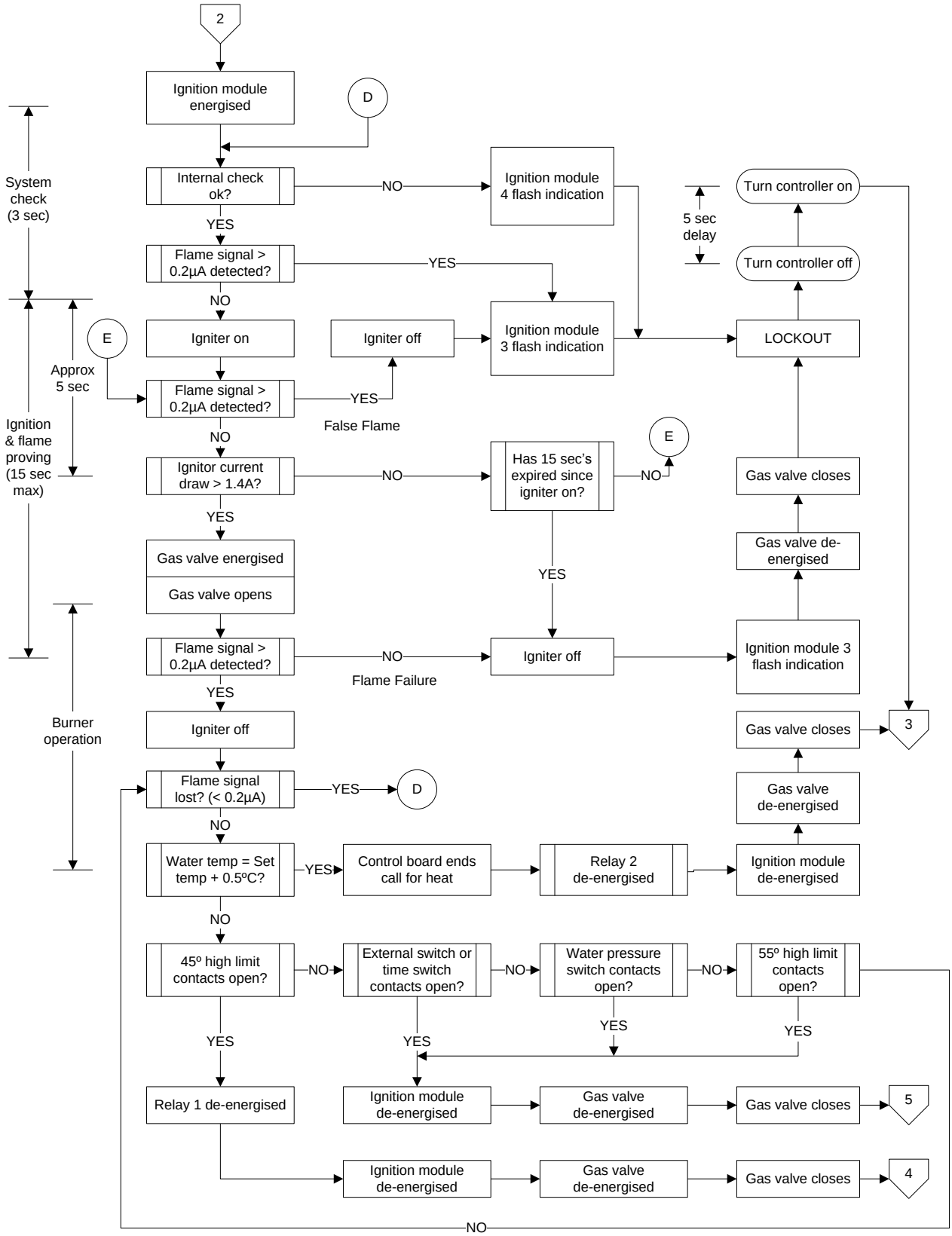
Pump Operation

Pump operation is not controlled by the heater however the pump must be operating for the burner to ignite. Actuation of the pool/spa pump causes water to flow through the heater and the resulting water pressure causes the pressure switch contacts to close enabling operation of the burner control circuit.

Operational Flow Chart 1



Operational Flow Chart 2



Components and Their Function

Gas Valve - An electromagnetic valve designed to control gas flow to the burner. 131 models manufactured before 27/3/07 utilise a White Rogers 36E06-301 gas valve, models manufactured after the 27/3/07 utilise a White Rogers 36G22-216 gas valve.

36G22-216

36E06-301 and 36G22-216 gas valves are equipped with a redundant and main solenoid valve, a pressure regulator, the 36G22-216 is also fitted with an on/off switch. Both gas valves are available in Natural Gas only and can be converted to LP Gas; refer to page 59 for gas type conversion procedure. Note: 36E06-301 gas valves are no longer available however the 36G22-216 gas valve is a direct replacement.

The gas valve gas type can be determined by the colour of the regulator spring (bare metal coloured spring for NG and grey/white powder coated spring for Propane).

The inlet gas pressure range is 1.1 – 3.5 kPa for Natural Gas and 2.75 – 3.5 kPa for Propane Gas.

Hot Surface Igniter - When energised, the hot surface igniter glows red hot and ignites gas flowing from the burner.

Flame Sensor - A probe utilised to detect if a flame is present. The probe projects across the flame area of the burner and when in contact with the flame produces a DC current (µA) which is detected by the ignition module.

Burner Manifold - A pipe fitted with a series of injectors which deliver gas from the gas valve to the burner.

Burner - A series of bars connected to the burner manifold and held in place by a sheet metal surround. Each bar contains a series of holes from which air/gas mixture flows. The burner is ignited by the hot surface igniter.

Injector - A jet with an orifice used to deliver gas for combustion. The burner injectors are located on the burner manifold. Injectors have a specific orifice size which is determined by required thermal input, burner pressure and gas type.

Transformer - An electromagnetic device that transforms the incoming power supply from 240 volts AC to 24 volts AC. The secondary voltage (24 volts AC) is utilised for operation of the control circuit components and gas valve.

45ºC Inlet High Limit - A normally closed temperature sensitive switch mounted on the inlet header connection which will cut power to the gas valve if an over temperature condition occurs. If the inlet water temperature reaches 45ºC or more, the 45ºC inlet high limit contacts will open circuit shutting down the gas valve and burner and illuminating the red reset button. The 45ºC inlet high limit contacts will automatically close when the detected water temperature drops to 35ºC however heater operation cannot continue until the heater is manually reset. Refer to sequence of operation on page 12 for more information.

55ºC Outlet High Limit - A normally closed temperature sensitive switch mounted on the outlet header connection which will open circuit power to the gas valve if an over temperature condition occurs. If the outlet water temperature reaches 55ºC or more, the 55ºC outlet high limit contacts will open circuit shutting down the gas valve and burner. The 55ºC outlet high limit contacts will automatically close when the detected water temperature drops below 45ºC at which time heater operation will automatically continue.

Water Pressure Switch - A normally open adjustable pressure sensitive switch utilised to detect the presence of water flow (pressure) in installations where the inlet/outlet pipe work is less than 1500 mm above or below the water level of the pool. For installations which exceed this range an external flow switch must be installed (refer to 'Water Flow Switch' on page 17 for more information).If the correct water flow (pressure) is present, the pressure switch contacts will close enabling operation of the gas valve/ignition system (refer to page 42 for pressure switch adjustment procedure).

Water Flow Switch - A normally open adjustable flow sensitive switch utilised to detect the presence of water flow in installations where the Inlet/Outlet pipe work is greater than 1500 mm above or below the water level of the pool. For installations where the Inlet/Outlet pipe work is less than 1500 mm above or below the water level of the pool a pressure switch must be installed (refer to 'Water Pressure Switch' on page 17 for more information). If correct water flow is present the flow switch contacts will close enabling operation of the gas valve/ignition system (refer to page 42 for flow switch adjustment procedure).

Water Temperature Probe - A thermistor located on the inlet header manifold which is utilised to detect the water temperature entering the heater (pool/spa water temperature). The temperature probes resistance value will change according to the detected temperature. The control board detects the changing resistance value and utilises this input to display the water temperature and to determine if a call for heat is required. Refer to page 40 for water temperature probe test procedure and temperature/resistance chart.

Solar Collector Water Temperature Probe (optional) - A thermistor located on the solar collector (if fitted) which is utilised to detect the water temperature at the solar collector(s). The solar collector temperature probes resistance value will change according to the detected temperature.

The control board will monitor the water temperature at the solar collector and if the water temperature at the solar collector (as detected by a solar collector water temperature probe) is above the inlet water temperature (as detected by the pool heaters water temperature probe), the control board will activate a solar diverter valve (if fitted) that allows the water from the solar collector to be used as inlet water to the pool heater. Refer to page 40 for water temperature probe test procedure and temperature/resistance chart.

Control Board (Controller) - An electronic PCB which monitors the inlet water temperature and controls the water temperature by energising and de-energising the ignition module. The control board has an LCD display with push buttons which allows for user interface. The control board can also communicate via an electric interface board (EIB) to provide additional switching of remote components i.e. pool lighting, garden lighting and/or water fountains.

A remote controller is also available as an option.

Fault Indication

The control board constantly monitors the status of the water temperature probe and solar temperature probe if fitted (black boards only). If a malfunction has been detected, the control board will display the following error codes to indicate the fault condition:

Fault	Black Board	Grey Board
Heater rework required *	F1	N/A
Water temperature probe open circuit	F2	OC
Water temperature probe short circuit	F3	SC
Solar thermistor probe short circuit	F4	SS
Water pressure switch contacts open	o	N/A
No mains power	PO	N/A

* F1 fault previously indicated an over temperature condition. This fault condition is no longer applicable due to wiring changes. If a F1 fault occurs contact Rheem Service.

Water Pressure Switch Indication (black boards only): If the water pressure is low or there is no flow through the heater, the water pressure switch contacts will open. If an open circuit pressure switch condition is detected power will be removed from the gas valve and the pilot and burner will shut down (if on).

If the controller is set to ‘On’ or ‘AUTO’ and the water pressure switch contacts are open, a small ‘o’ will be shown to the left of the temperature display.

No Mains Power Indication & Power Backup (black boards only): The controller (and remote controller if fitted) has a super capacitor power backup to keep the time of day clock operating, maintain any programmed time periods and remember the last operating mode if mains power is lost (or power supply to control board is lost).

Whenever mains power (or control board power) is lost, the controller will disable all control relays and backlight and enter a power saving mode which will maintain the time of day and any programmed time periods for between 1.5 to 2 hours. During a period of ‘no power’ the LCD will display ‘PO’.

If power is restored before the expiration of the power backup time, the controller will resume its last operating mode.

Pool/Spa Heater Run Time: The controller records and stores the number of hours the heater has been operating up to a total of 19990 hours. Run time information can be displayed on the LCD by pressing and holding down the **AUX** button for 10 seconds whilst the controller is in ‘OFF’ mode.

The displayed hours must be multiplied by 10 to calculate the actual number of hours the heater has been operating. In the example shown above the heater has been operating for a period of 88 X 10 = 880 hours (880 – 889 hours). Note: If ‘0’ is displayed the heater has been operating for 0 – 9 hours.

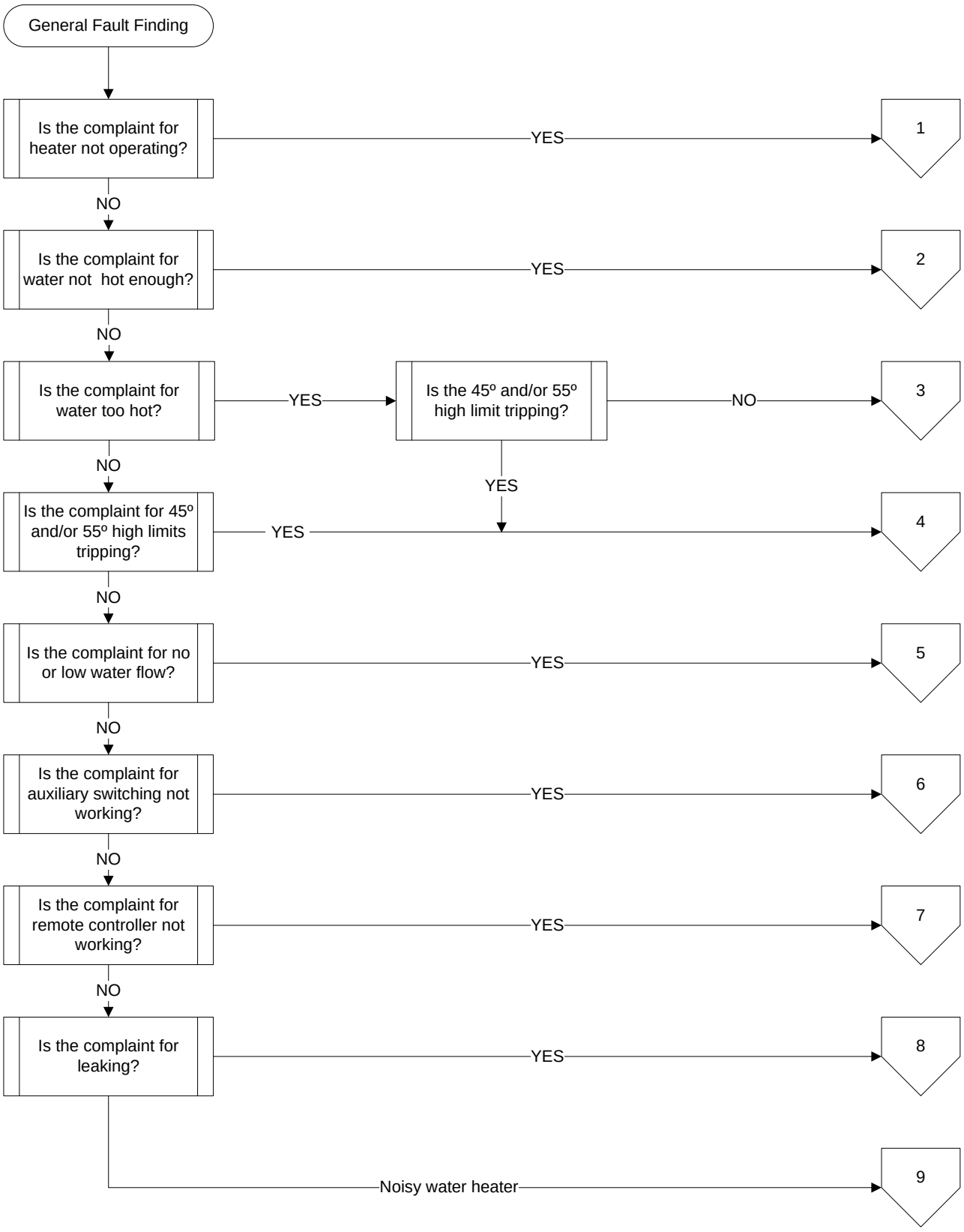
Fault Finding

Test Equipment

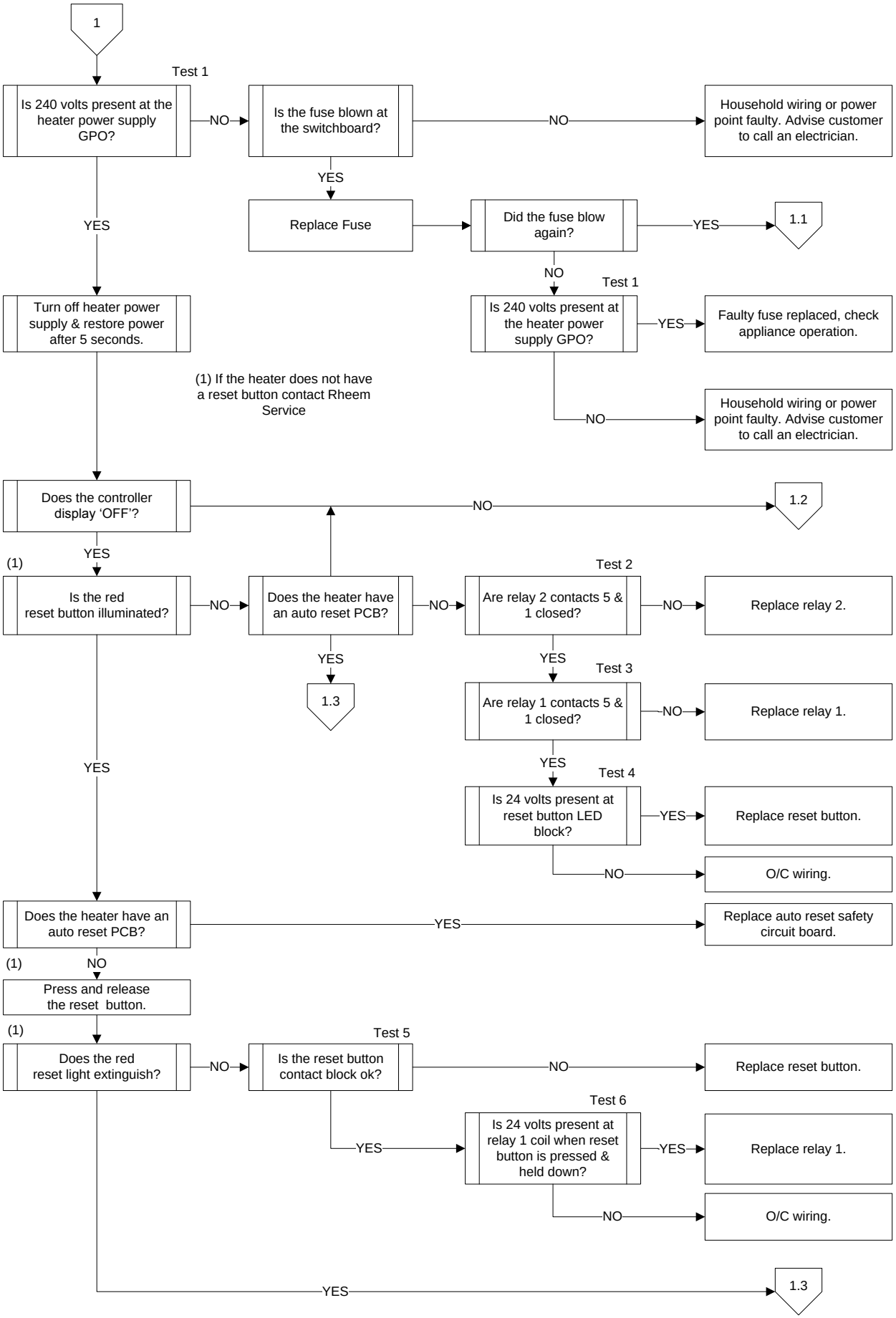
A list of test equipment which will assist in conducting diagnostic procedures is provided below. This equipment is available from Rheem Service Spare Parts Department.

Fine probe adapter kit	WH0020082
Probe to alligator clip kit	WH0020084

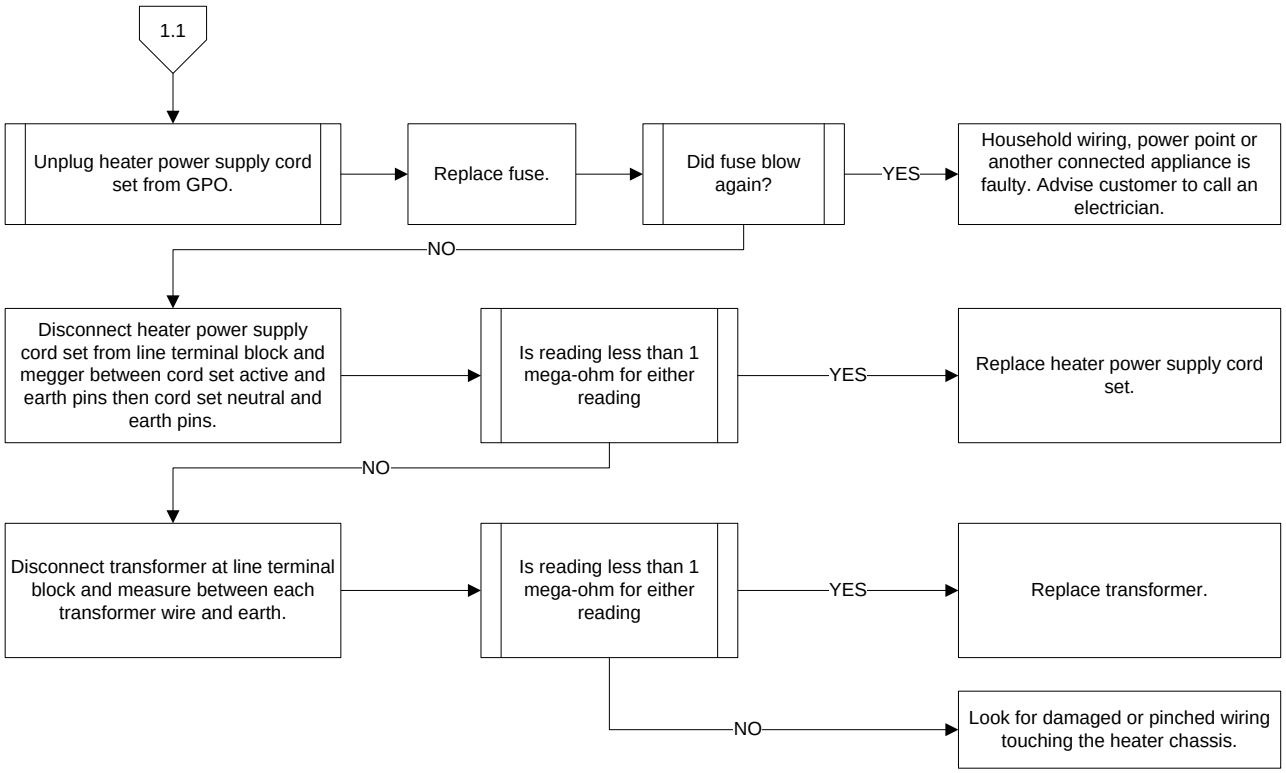
General Fault Finding Chart



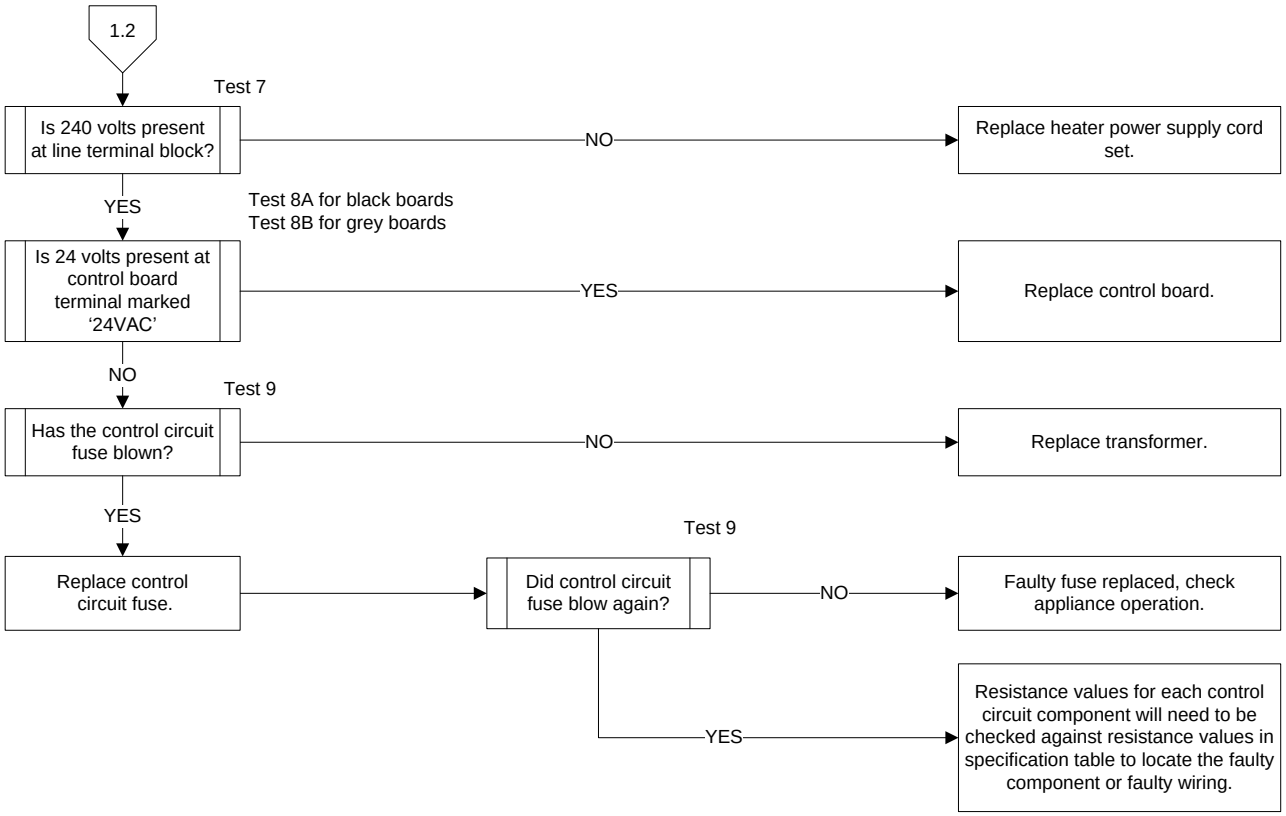
Fault Finding Chart 1



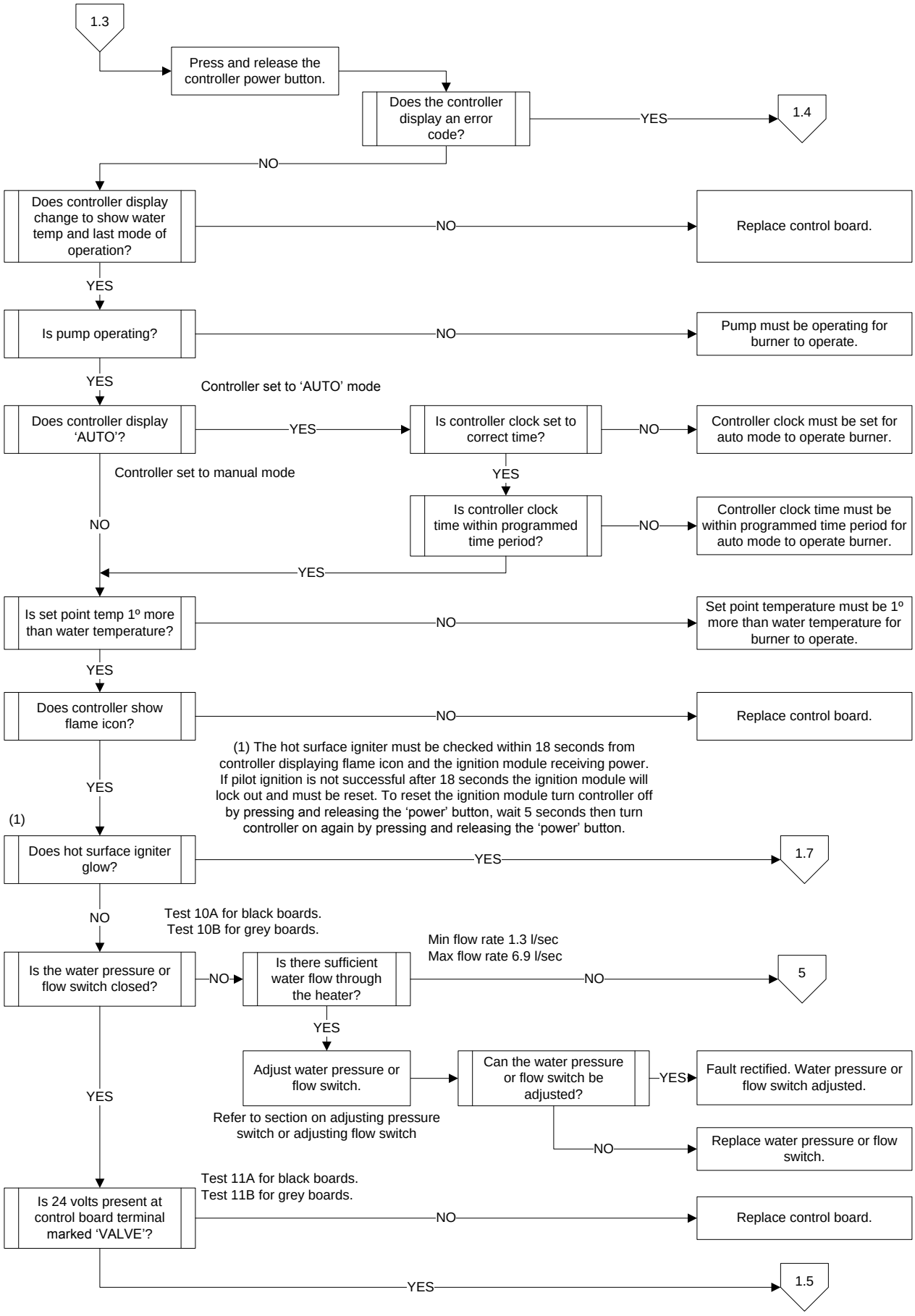
Fault Finding Chart 1.1



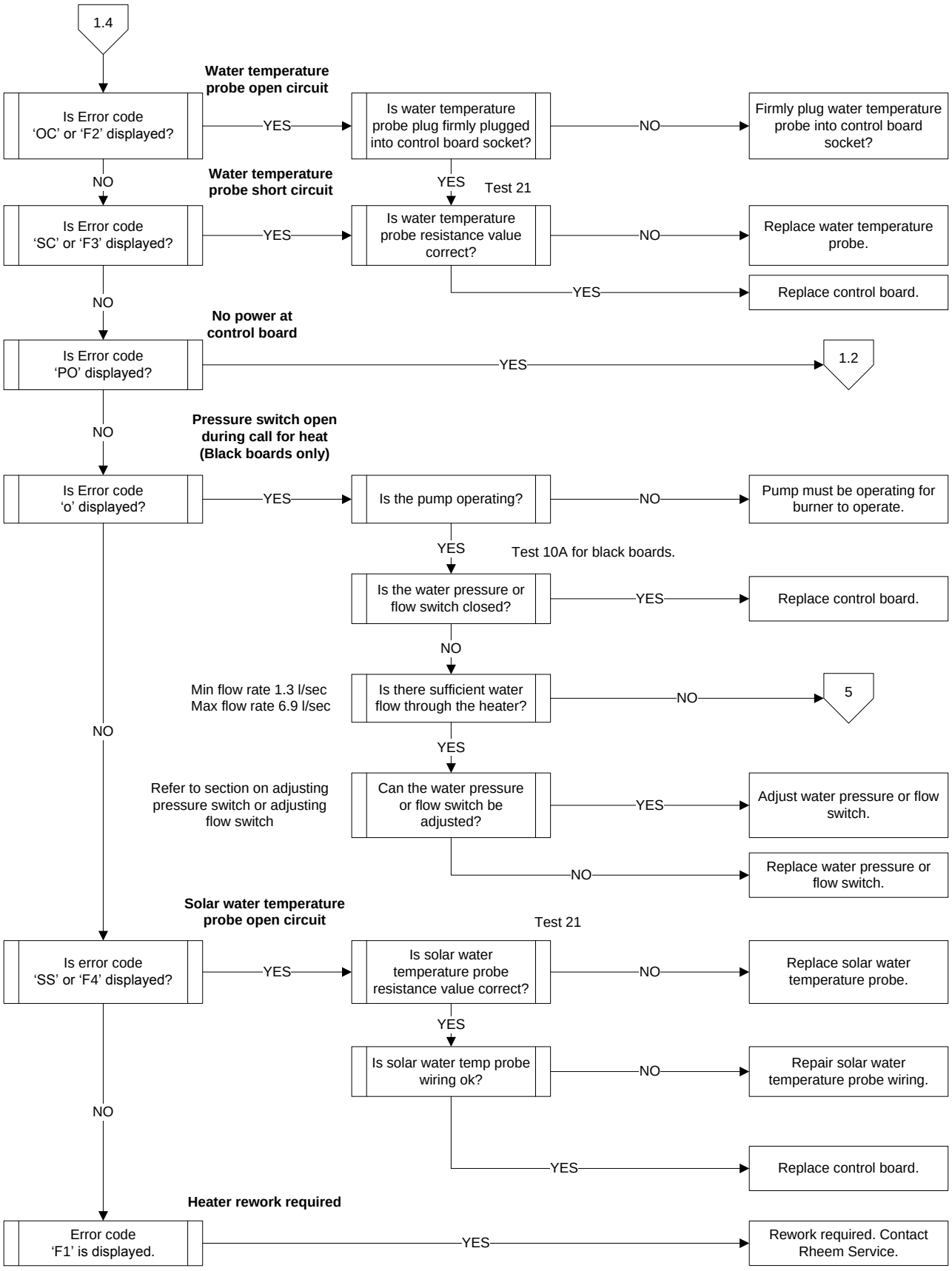
Fault Finding Chart 1.2



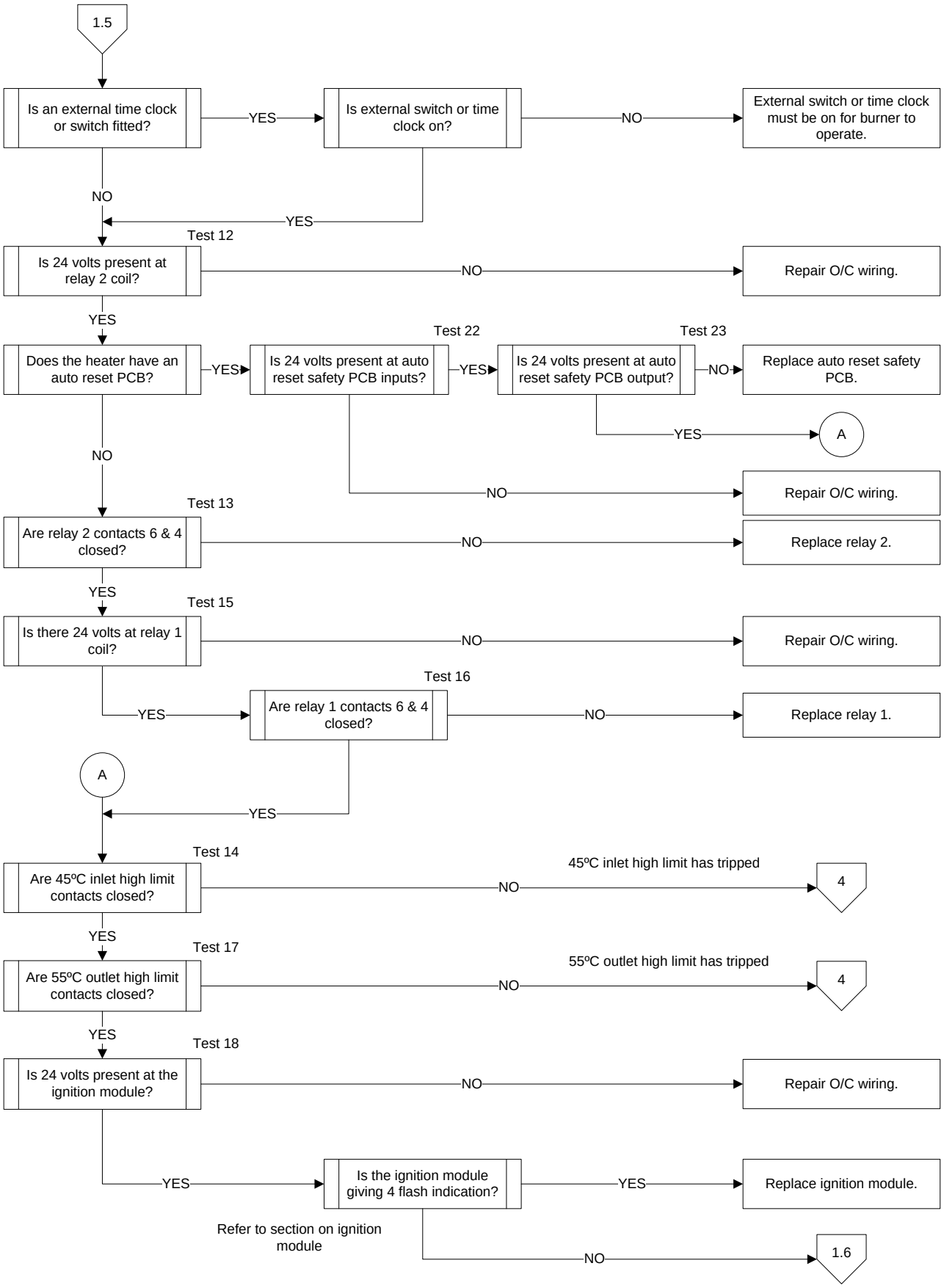
Fault Finding Chart 1.3



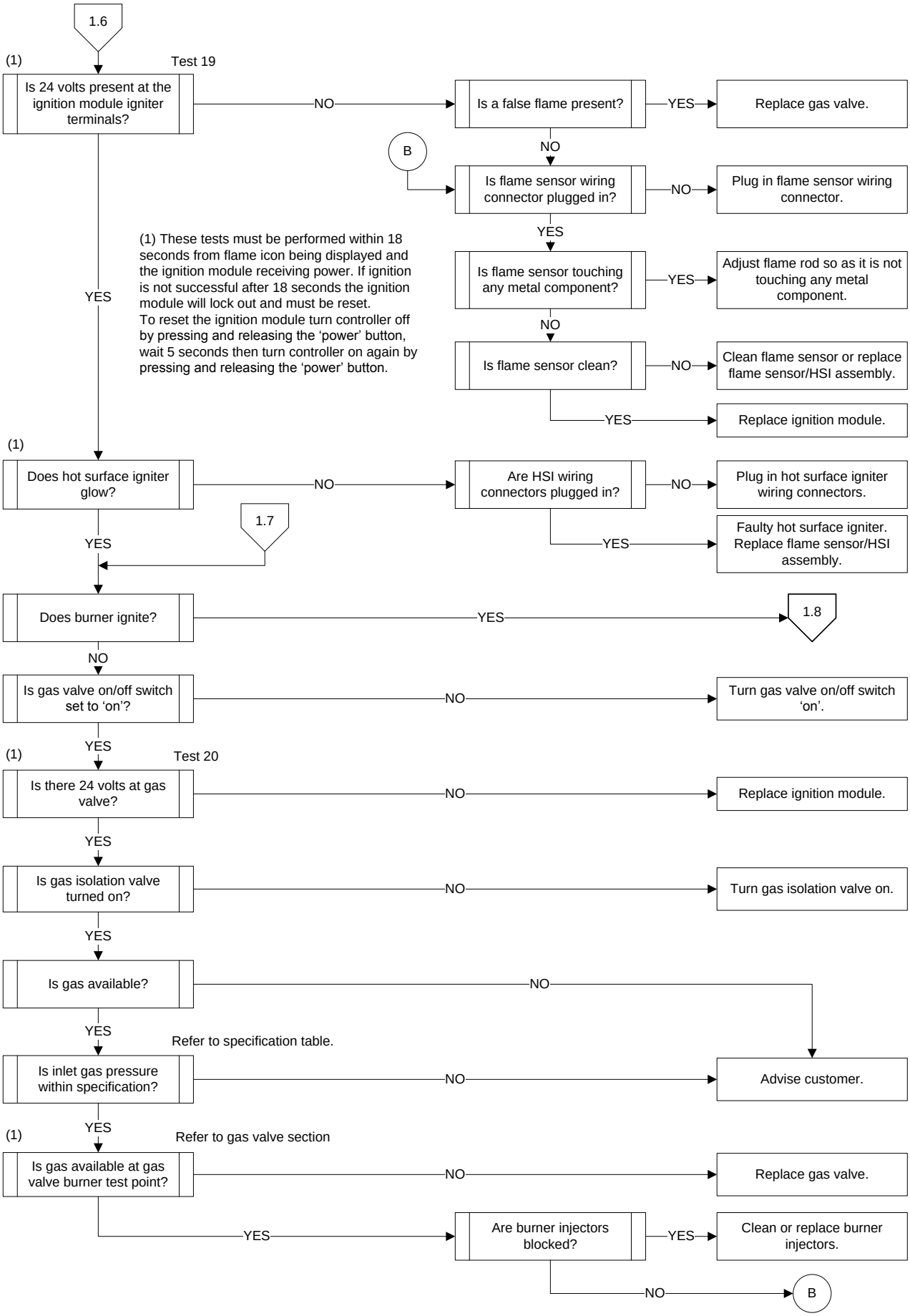
Fault Finding Chart 1.4



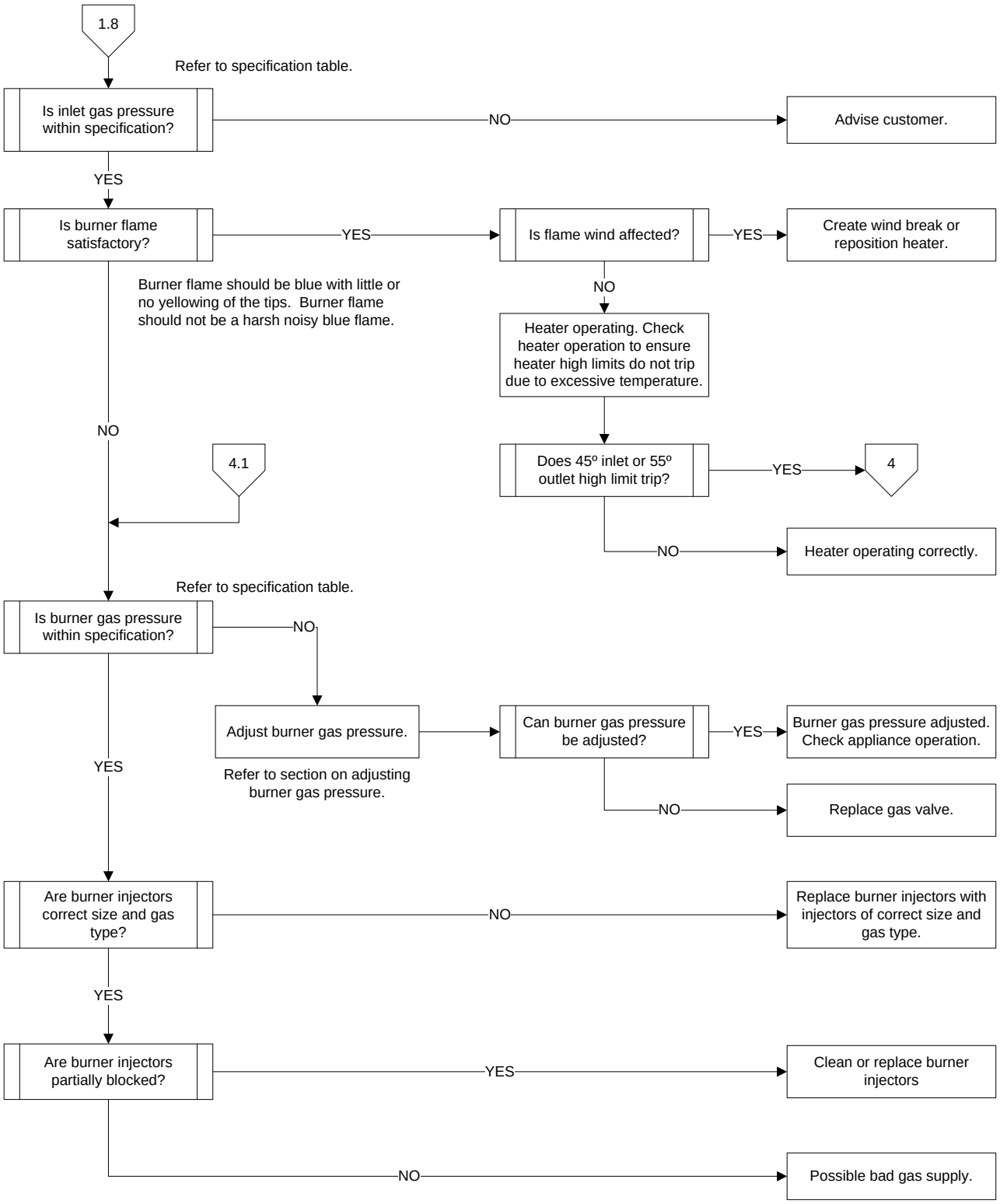
Fault Finding Chart 1.5



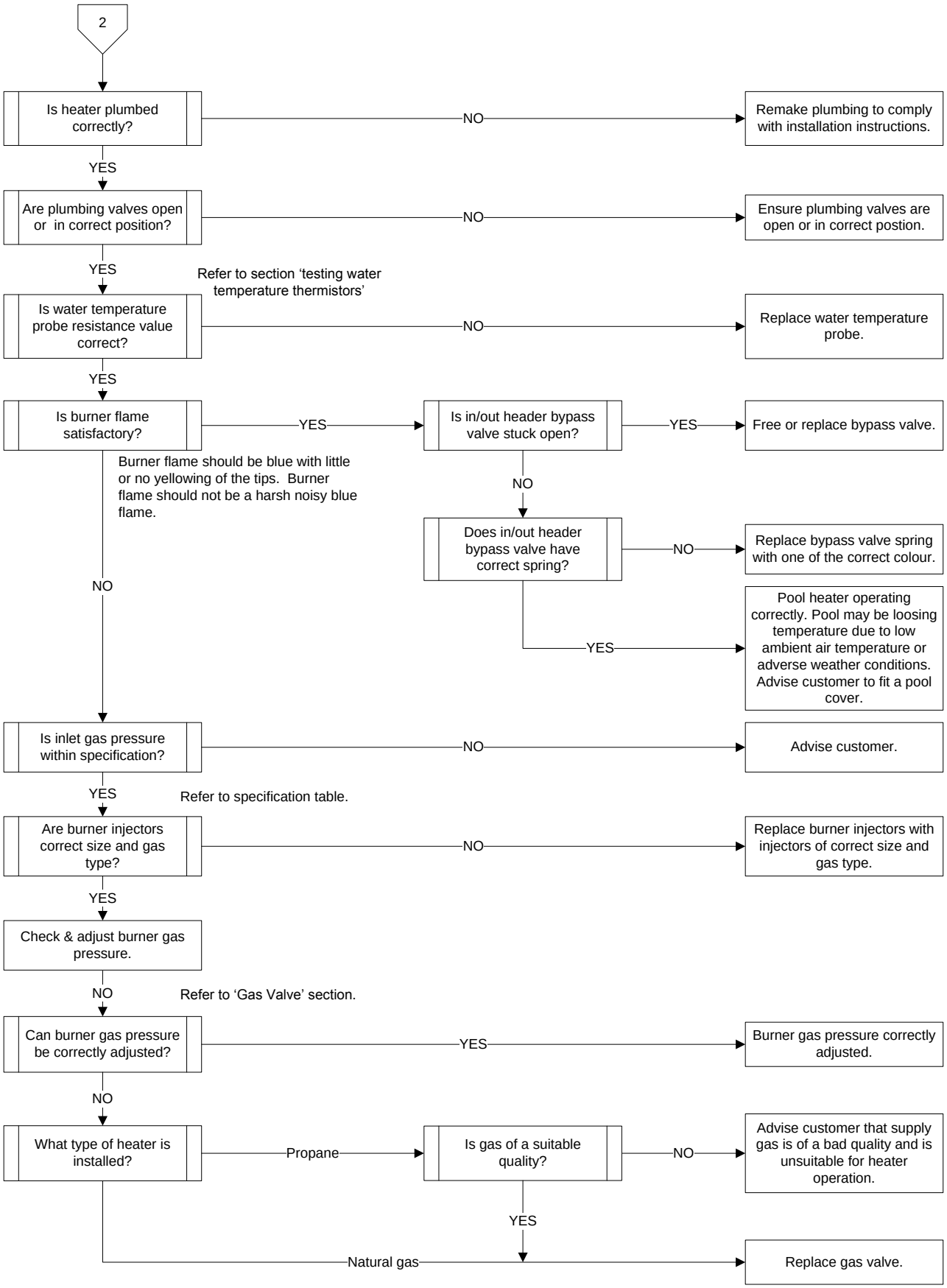
Fault Finding Chart 1.6 & 1.7



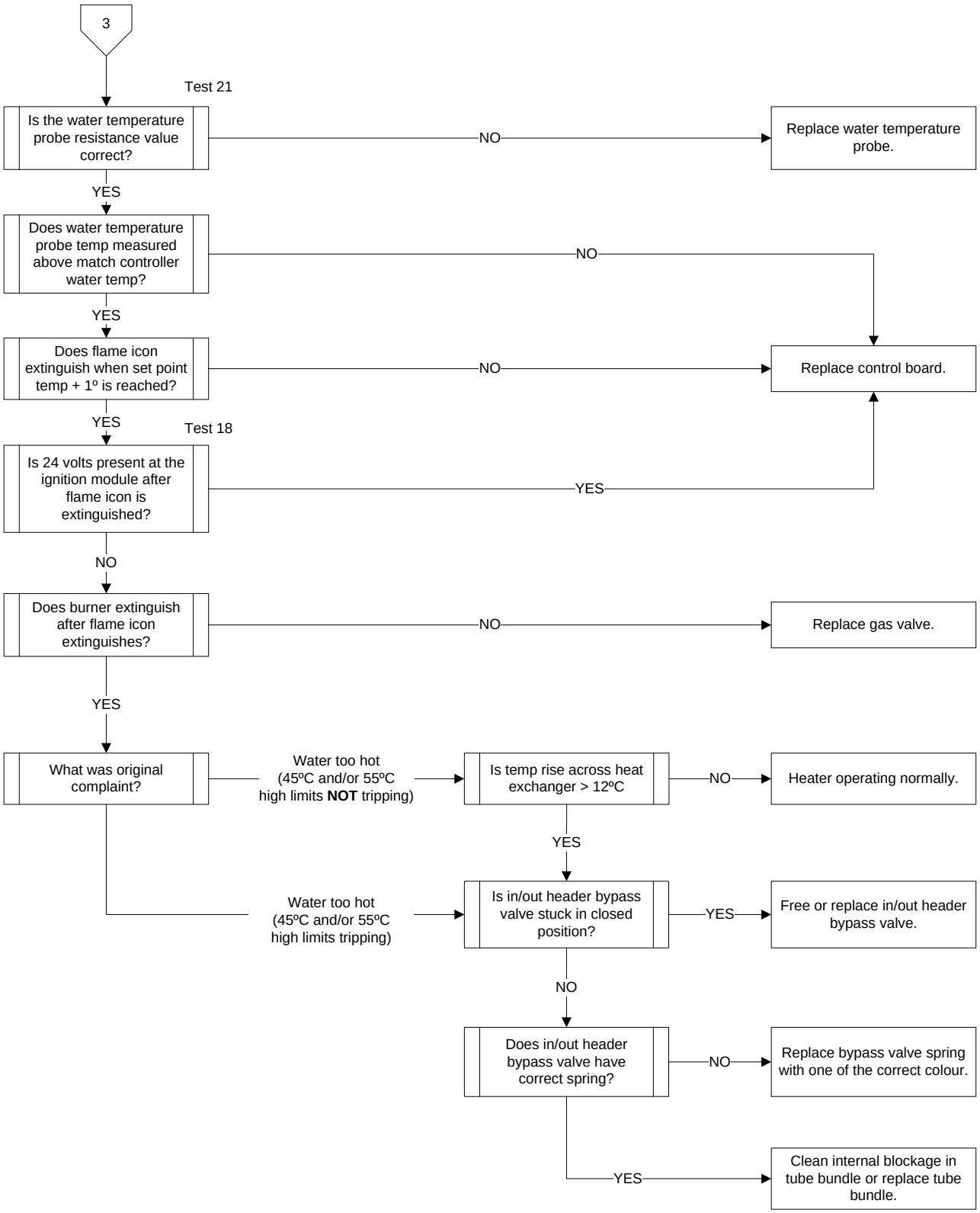
Fault Finding Chart 1.8



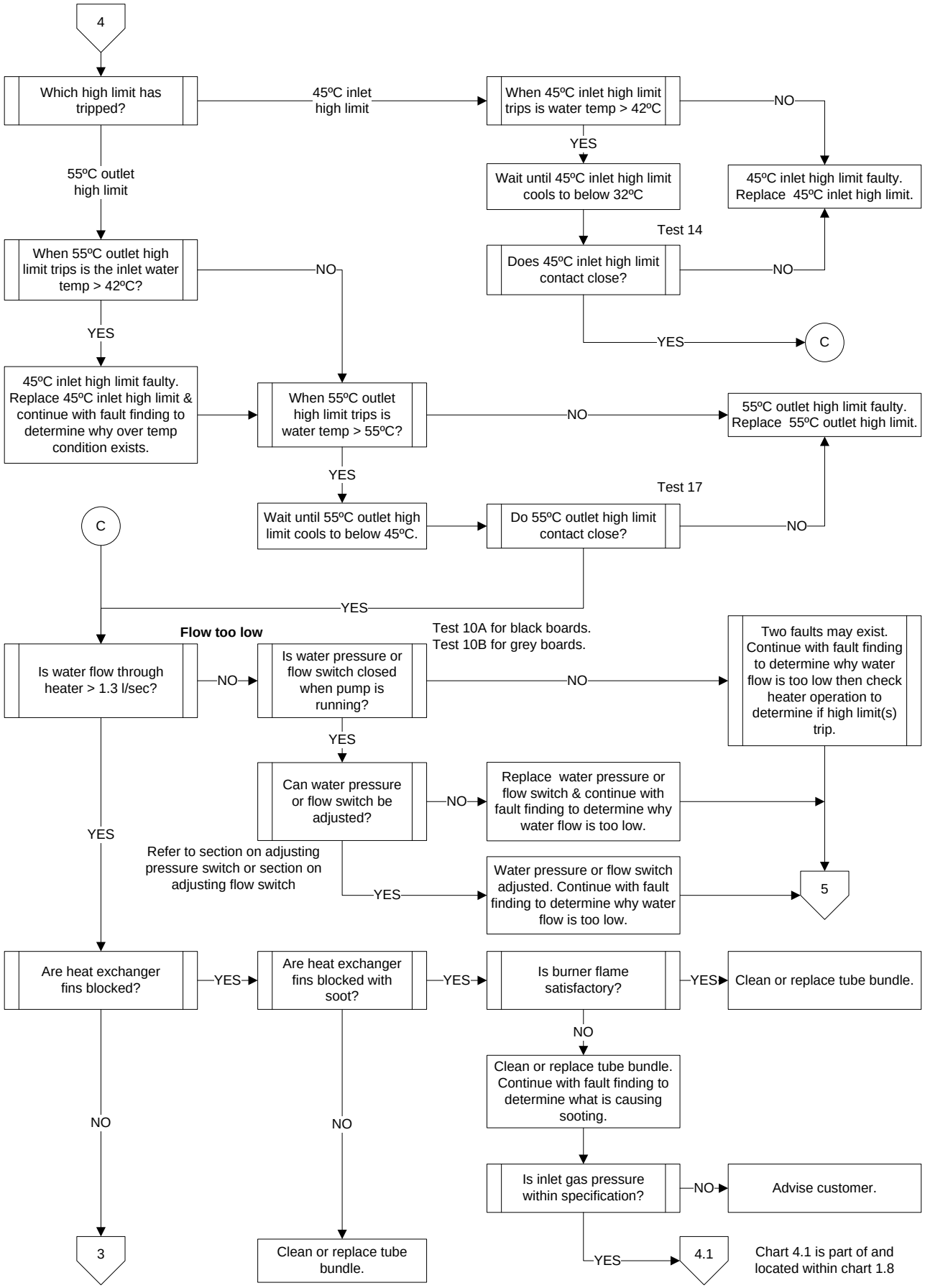
Fault Finding Chart 2



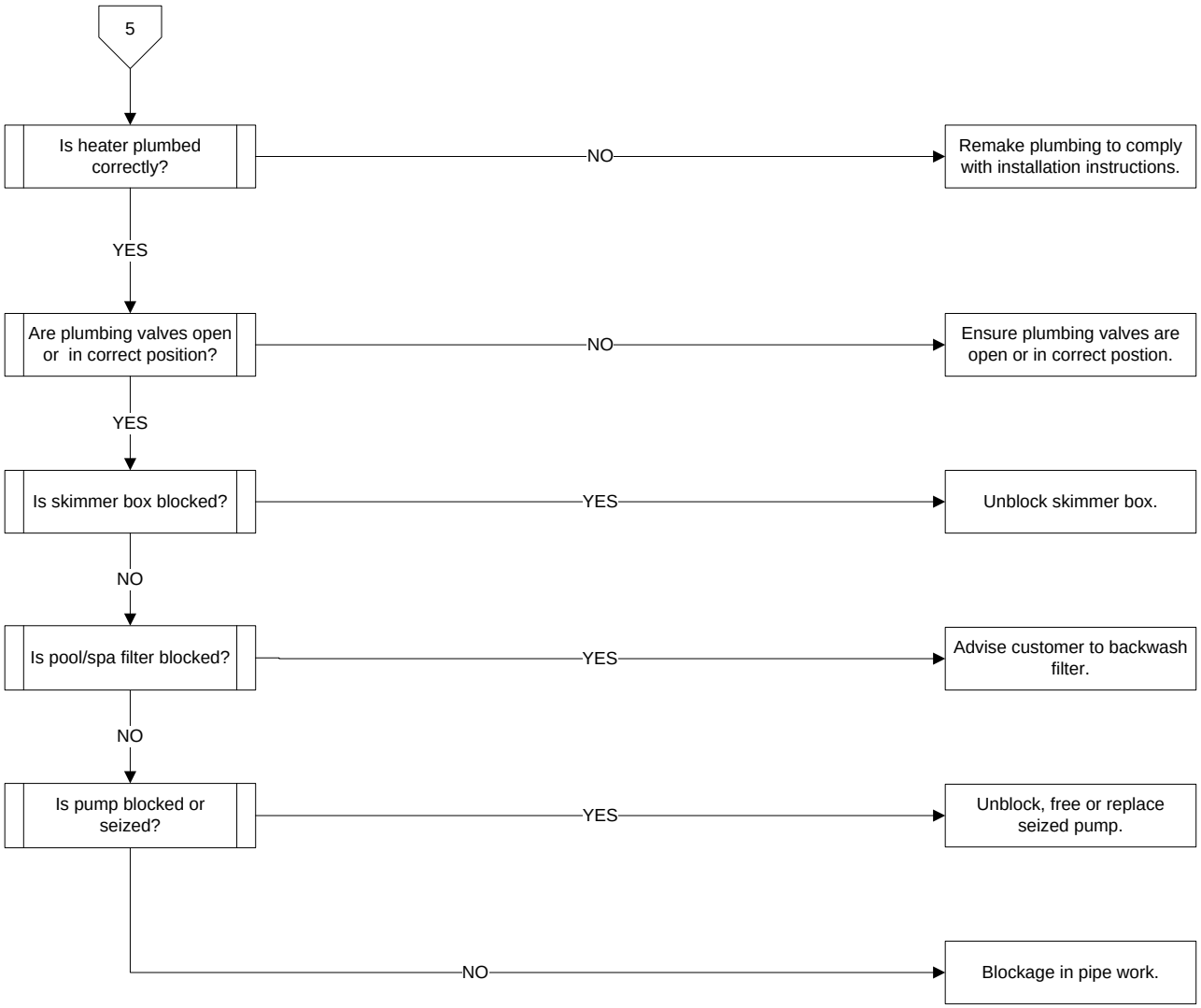
Fault Finding Chart 3



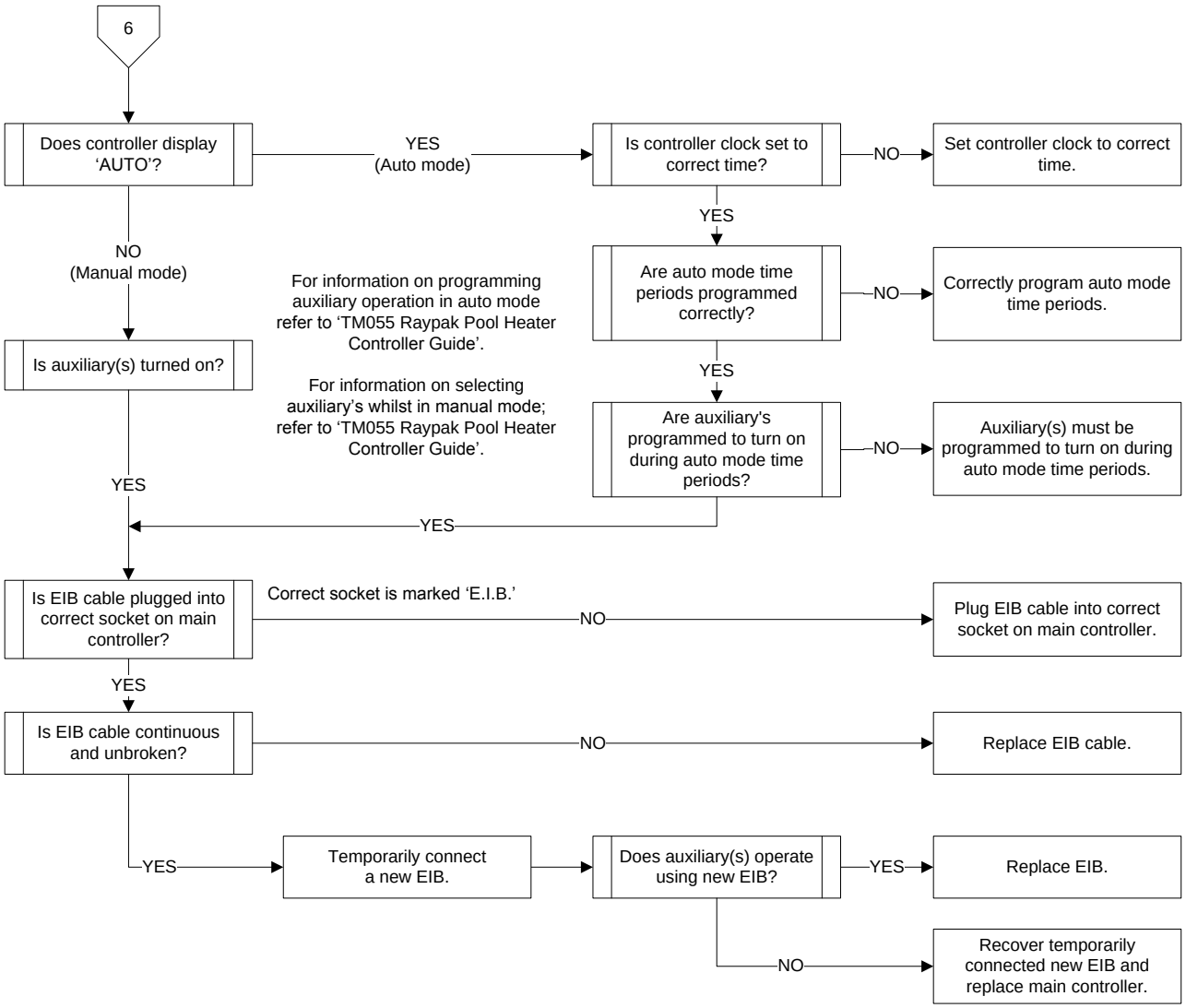
Fault Finding Chart 4



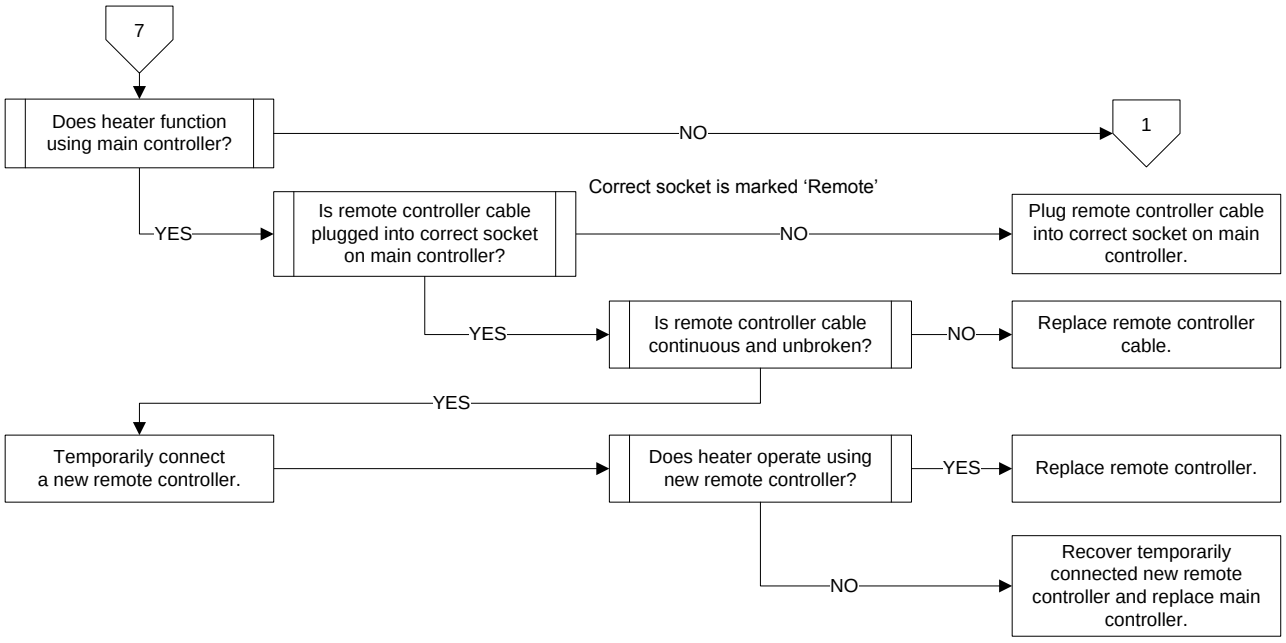
Fault Finding Chart 5



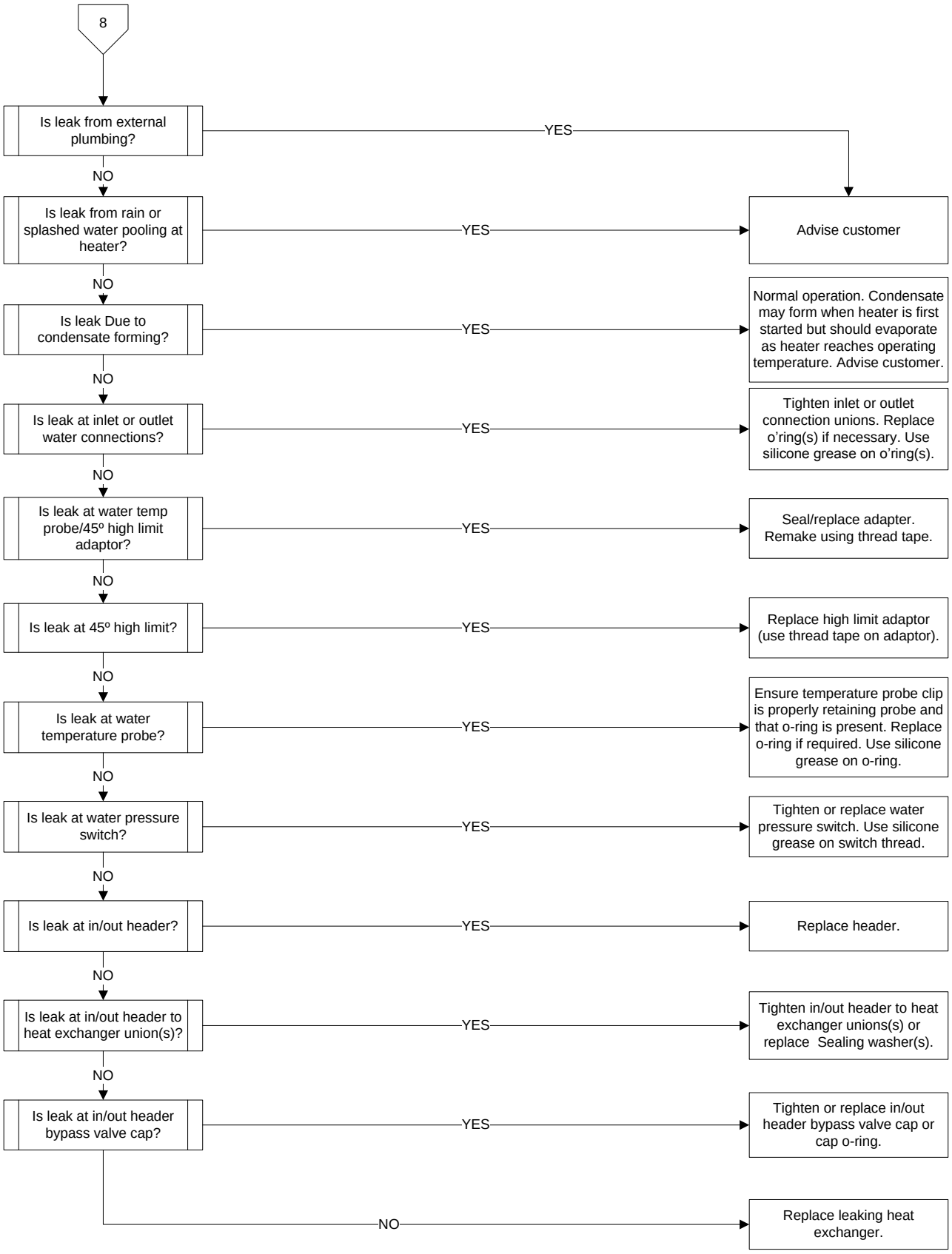
Fault Finding Chart 6



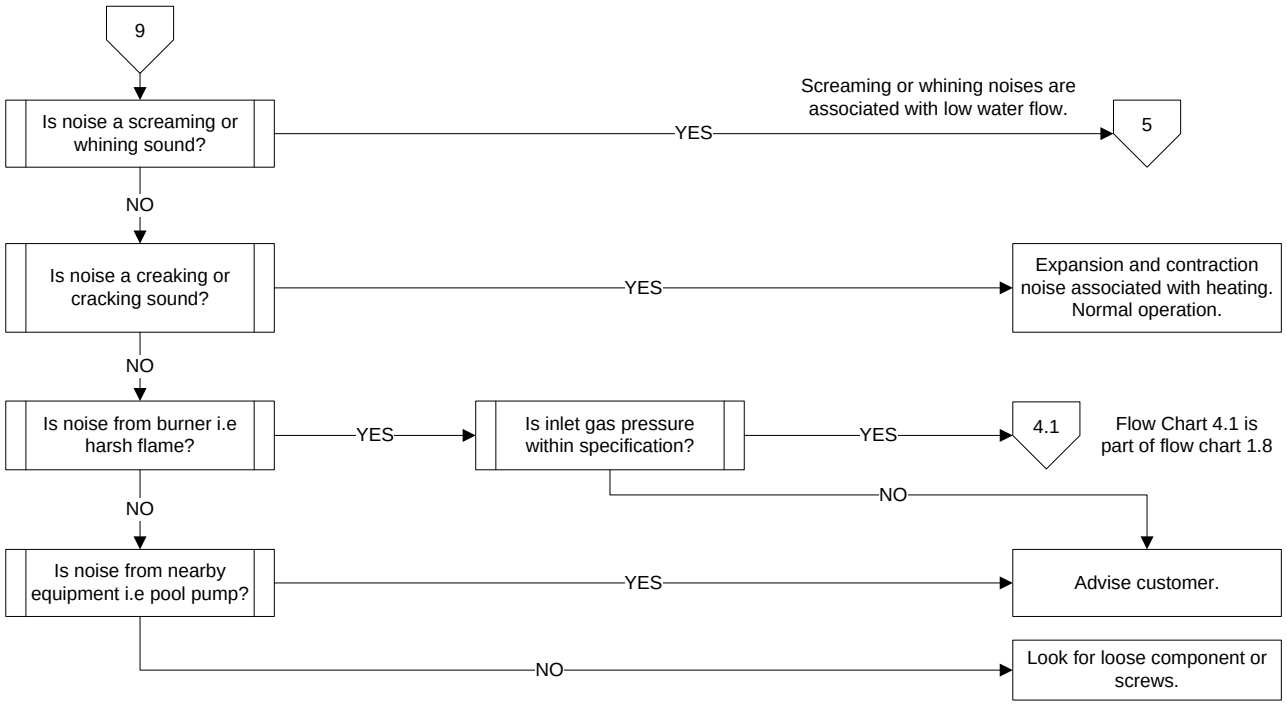
Fault Finding Chart 7



Fault Finding Chart 8

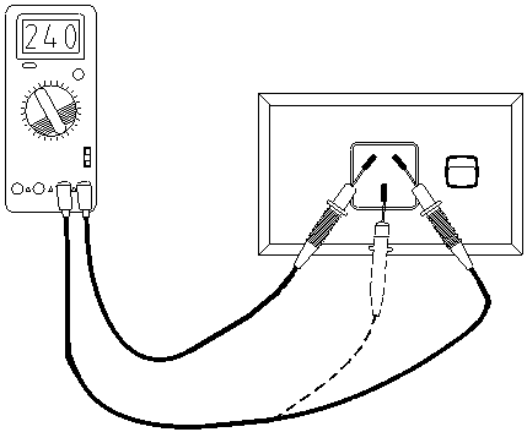
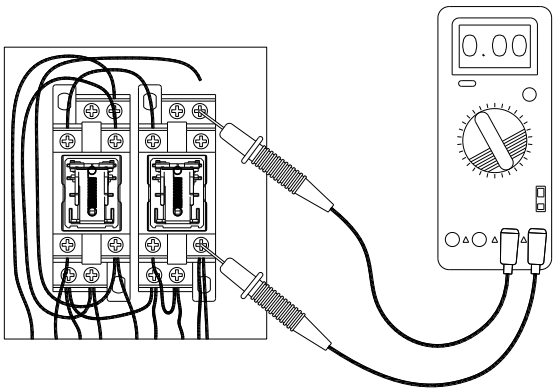


Fault Finding Chart 9



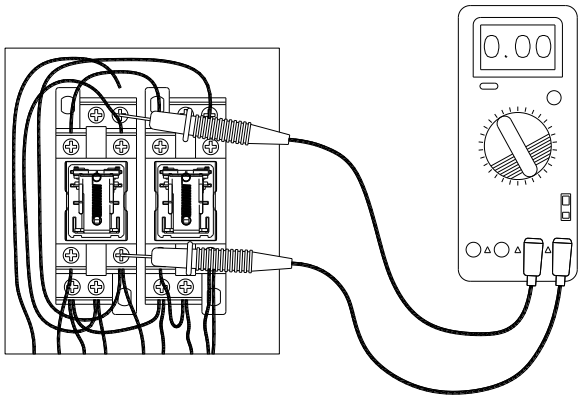
Test Procedures

Fault Finding Tests 1 – 2

Test 1	Test 2
	
Ensure power point is switched on and using a multimeter on the AC voltage scale, measure between the 3 pin sockets on the power point. Normal reading should be: Active to Neutral – 240 Volts AC. Active to Earth – 240 Volts AC. Neutral to Earth – 0 Volts.	Disconnect the grey wire from relay 2 and using a multimeter on the ohms scale, measure between the orange wire relay terminal and the disconnected grey wire relay terminal on relay 2. Normal reading should be 0 ohms (N/C contacts 5 and 1 closed).

Fault Finding Tests 3 – 6

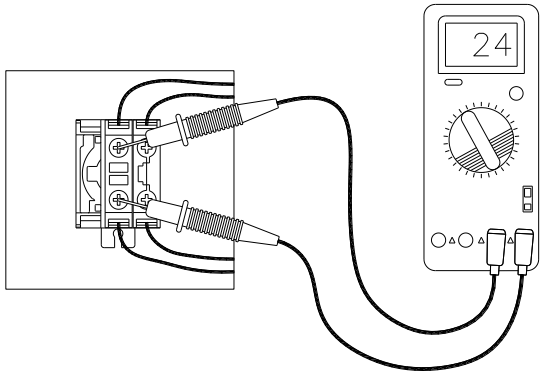
Test 3



Disconnect the yellow wire from relay 1 and using a multimeter on the ohms scale, measure between the grey wire relay terminal and disconnected yellow wire relay terminal on relay 1.

A reading of be 0 ohms
(N/C contacts 5 and 1 closed).

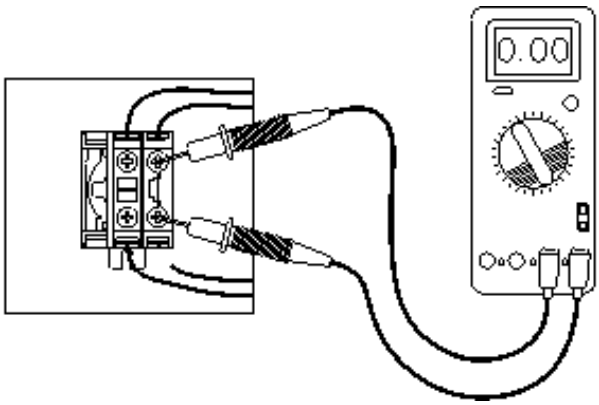
Test 4



Using a multimeter on the AC voltage scale, measure between the two terminals on the reset button LED block (yellow and blue wires).

Normal reading should be 24 Volts AC.

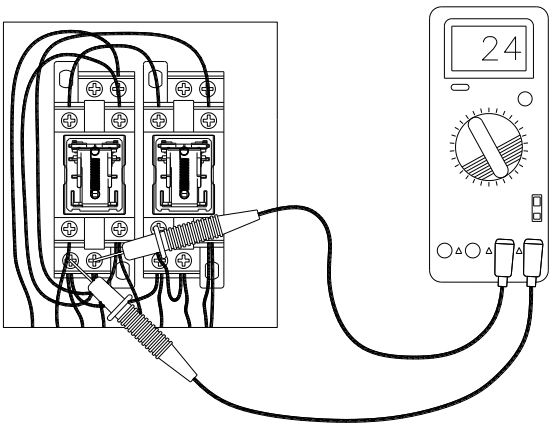
Test 5



Disconnect red wire from the reset button contact block and using a multimeter on the ohms scale, measure between the two terminals on the reset button contact block (grey and red wires). The following result should be obtained while the reset button is pushed and held in the depressed position:

0 ohms (N/O contact closed).

Test 6



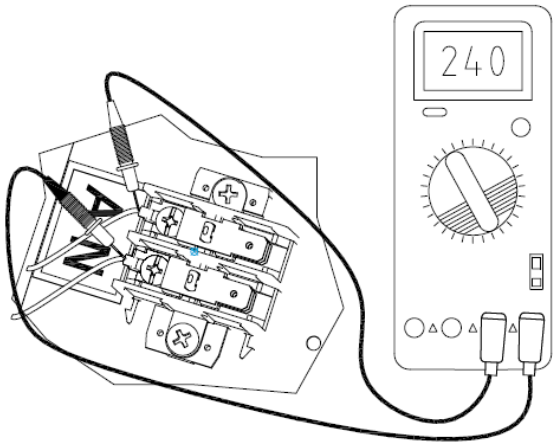
Using a multimeter on the AC voltage scale, measure between the red wire terminal and blue wire terminal on relay 1.

The following result should be obtained while the reset button is pushed and held in the depressed position:

24 volts AC.

Fault Finding Tests 7 – 9

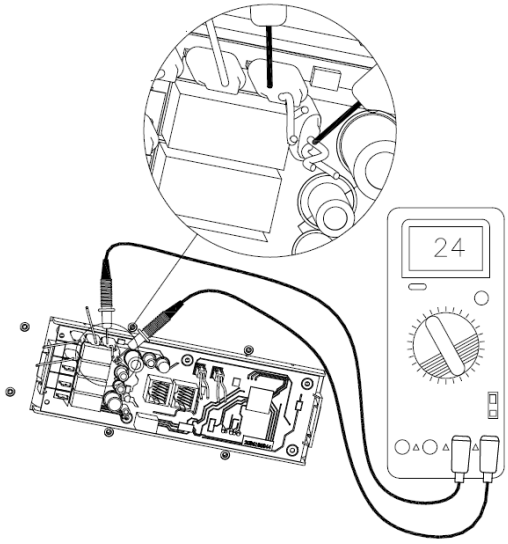
Test 7



Using a multimeter on the AC voltage scale, measure between terminal marked ‘A’ and terminal marked ‘N’ on the line terminal block.

The following result should be obtained: 240 Volts AC.

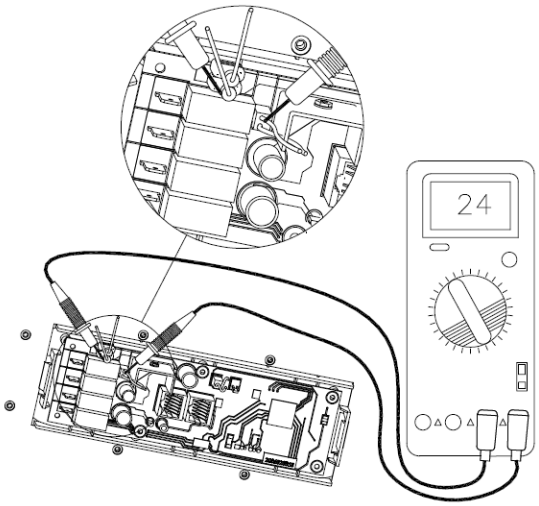
Test 8A



Using a multimeter on the AC voltage scale, measure between terminal marked ‘24VAC’ and terminal marked ‘GND’ on the control board.

The following result should be obtained: 24 Volts AC.

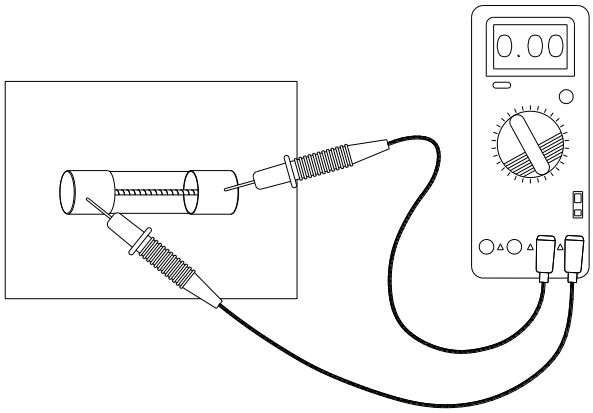
Test 8B



Using a multimeter on the AC voltage scale, measure between terminal marked ‘24VAC’ and terminal marked ‘GND’ on the control board.

The following result should be obtained: 24 Volts AC.

Test 9

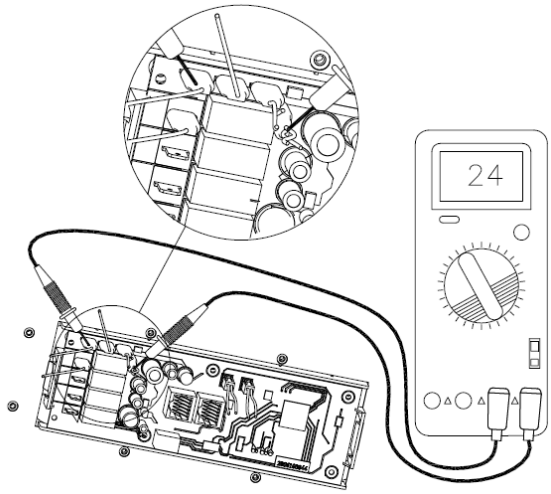


Remove glass fuse from fuse holder. Using a multimeter on the ohms scale, measure between the ends of the glass fuse.

The following result should be obtained: 0 ohms (fuse ok).

Fault Finding Tests 10A – 11B

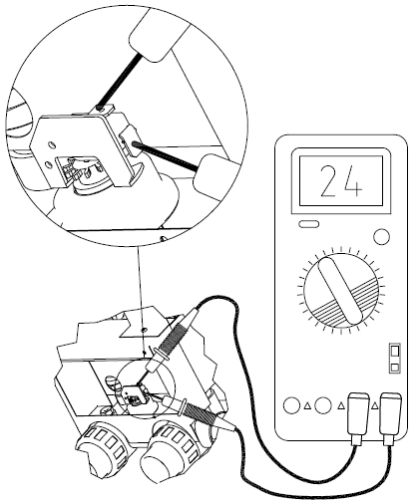
Test 10A



Using a multimeter on the AC voltage scale, measure between terminal marked ‘P-SW’ and terminal marked ‘GND’ on the control board.

The following result should be obtained:
24 Volts AC.

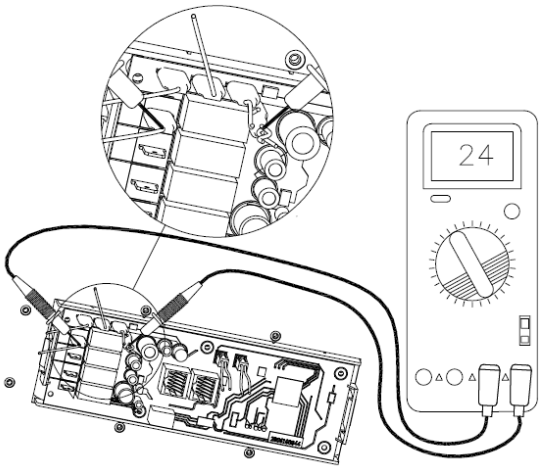
Test 10B



Isolate power, disconnect wiring at pressure or flow switch. Restore power and using a multimeter on the ohms scale, measure between the two terminals on the pressure or flow switch.

The following result should be obtained whilst the pump is operating: 0 ohms (pressure or flow switch closed).

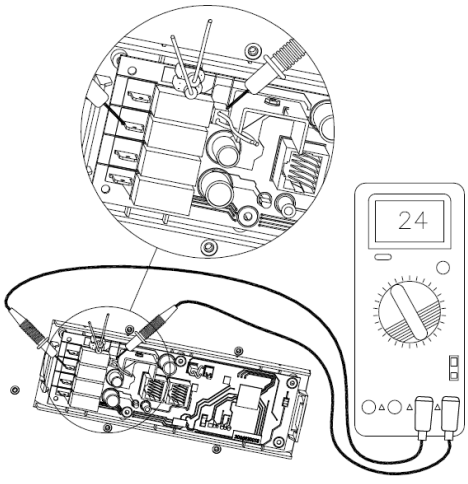
Test 11A



Using a multimeter on the AC voltage scale, measure between terminal marked ‘VALVE’ and terminal marked ‘GND’ on the control board.

The following result should be obtained:
24 Volts AC.

Test 11B

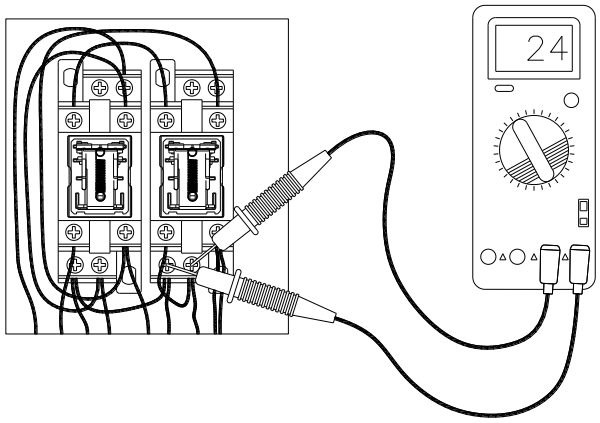


Using a multimeter on the AC voltage scale, measure between terminal marked ‘VALVE’ and terminal marked ‘GND’ on the control board.

The following result should be obtained:
24 Volts AC.

Fault Finding Tests 12 – 15

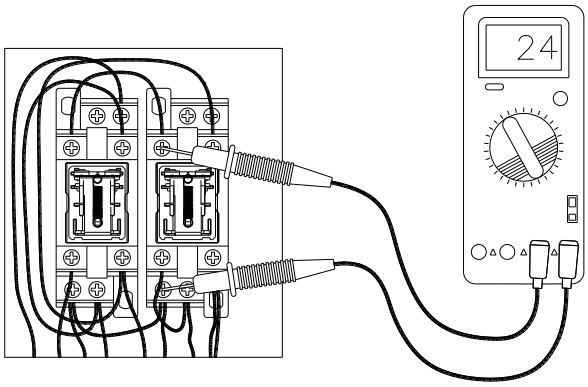
Test 12



Using a multimeter on the AC voltage scale, measure between the double violet wire terminal and blue wire terminal on relay 2.

The following result should be obtained:
24 Volts AC.

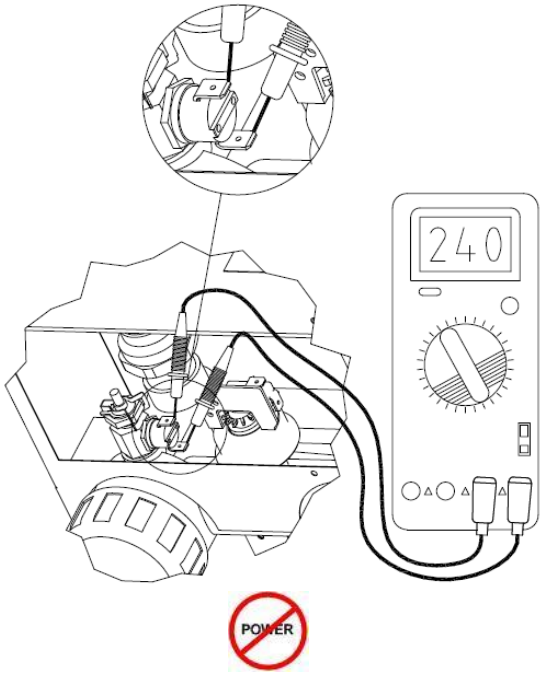
Test 13



Using a multimeter on the AC voltage scale, measure between the brown wire terminal and blue wire terminal on relay 2.

The following result should be obtained:
24 Volts AC.

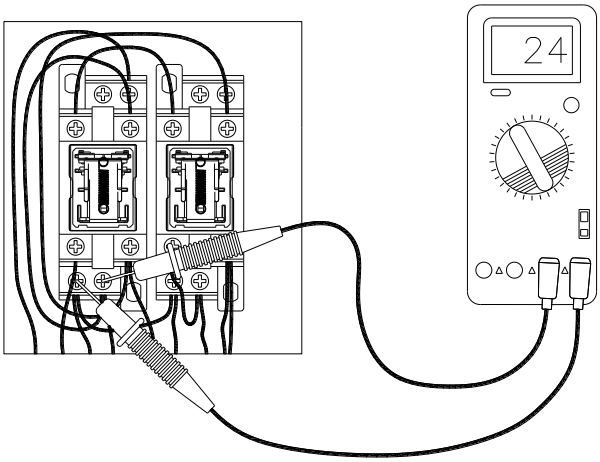
Test 14



Disconnect wiring at 45ºC inlet high limit and using a multimeter on the ohms scale, measure between the two terminals on the 45ºC inlet high limit.

The following result should be obtained:
0 ohms (high limit contact closed).

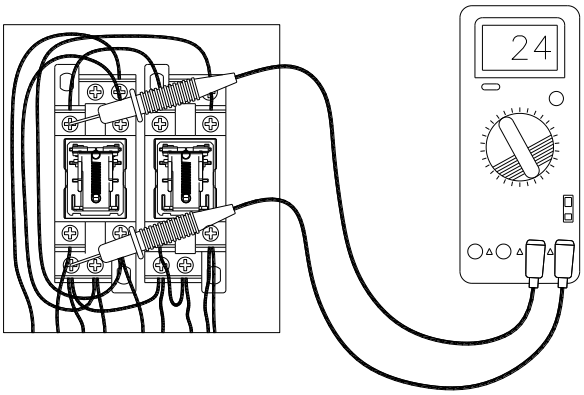
Test 15



Using a multimeter on the AC voltage scale, measure between the bottom red wire terminal and the blue wire terminal on relay 1.
The following result should be obtained:
24 Volts AC.

Fault Finding Tests 16 – 19

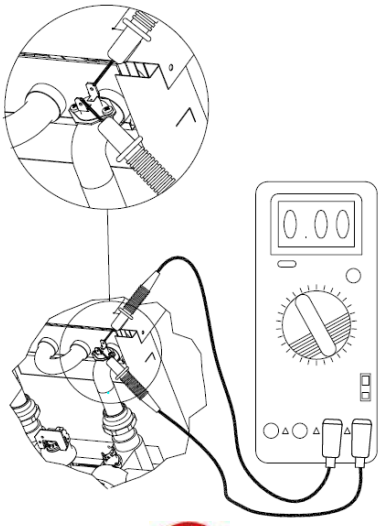
Test 16



Using a multimeter on the AC voltage scale, measure between the brown wire terminal and the blue wire terminal on relay 1.

The following result should be obtained:
24 Volts AC.

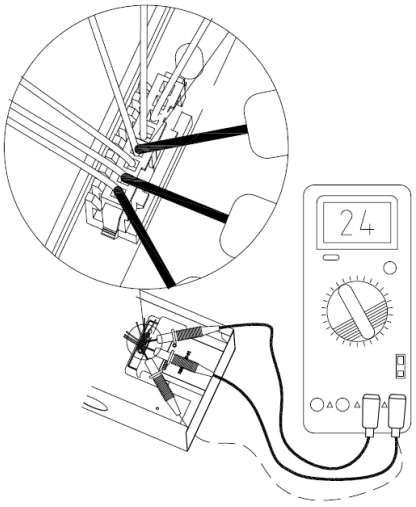
Test 17



Disconnect wiring at 55ºC outlet high limit and using a multimeter on the ohms scale, measure between the two terminals on the 55ºC outlet high limit.

The following result should be obtained:
0 ohms (high limit contact closed).

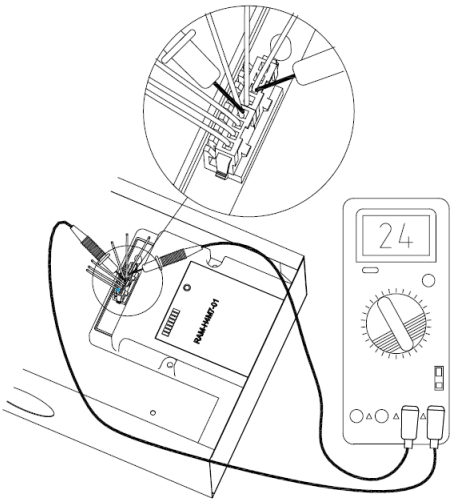
Test 18



Using a multimeter on the AC voltage scale, measure between each purple wire and the blue wire on the RAM ignition module terminal strip.

The following results should be obtained:
1st purple wire – blue wire: 24 Volts AC.
2nd purple wire – blue wire: 24 Volts AC.

Test 19

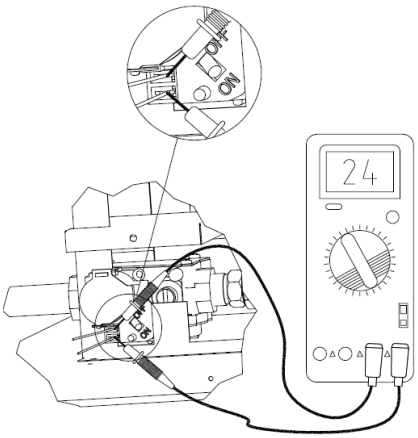


Using a multimeter on the AC voltage scale, measure between the brown wire and the blue wire on the RAM ignition module terminal strip.

The following result should be obtained:
24 Volts AC.

Fault Finding Tests 20 – 21

Test 20



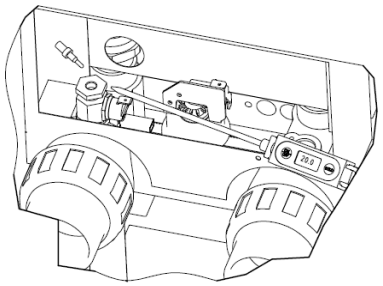
Using a multimeter on the AC voltage scale, measure between the two terminals on the gas valve.

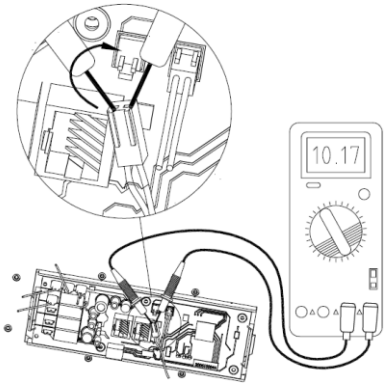
The following result should be obtained:
24 Volts AC.

Fault Finding Test 21 – Water Temperature Probes

This test procedure and the temperature/resistance chart below are the same for the water temperature probe and solar collector water temperature probe (if fitted).

1. Remove the water temperature probe from the in/out header (or solar collector) and hang in free air away from any components.
2. Place thermometer probe tip next to tip of water temperature probe so both probes measure the ambient air temperature at the same location.
3. Disconnect the water temperature probe from the control board, connect a multimeter to the probe plug and select the ohms scale on the multimeter.
4. Compare the ohms reading to the thermometer temperature and check against the water table shown below allowing for a tolerance of + or - 3ºC.



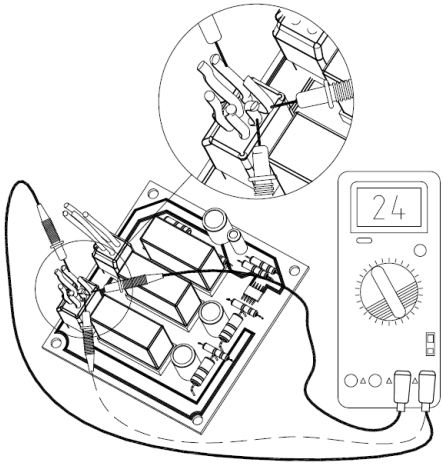
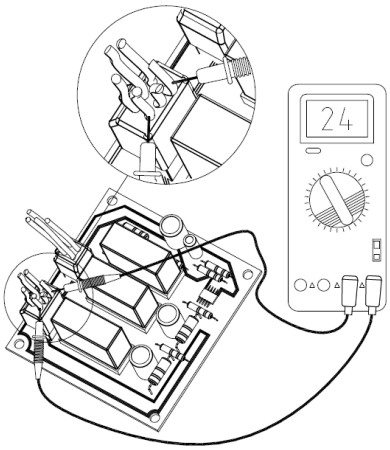


Water Temperature Probe Temperature/Resistance Chart

All temperatures shown in ºC

Temp	kΩ	Temp	kΩ	Temp	kΩ	Temp	kΩ	Temp	kΩ
50	3.53	40	4.94	30	7.04	20	10.17	10	15.58
49	3.64	39	5.09	29	7.34	19	10.55	9	16.40
48	3.76	38	5.29	28	7.59	18	11.11	8	17.01
47	3.86	37	5.43	27	7.84	17	11.85	7	17.51
46	3.97	36	5.68	26	8.90	16	12.34	6	18.88
45	4.15	35	5.88	25	8.45	15	12.81	5	18.06
44	4.30	34	6.11	24	8.79	14	13.16	4	18.77
43	4.45	33	6.31	23	9.28	13	14.06	3	21.13
42	4.58	32	6.52	22	9.55	12	14.44	2	21.68
41	4.79	31	6.77	21	9.89	11	15.03	1	23.04

Fault Finding Tests 22 – 23

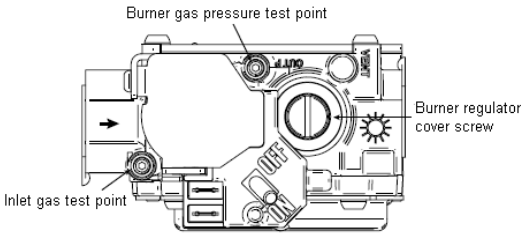
Test 22	Test 23
	
Using a multimeter on the AC voltage scale, measure between the orange and blue wire and then the violet and blue wire on the auto reset safety PCB six pin plug. The following results should be obtained: Orange – blue wire: 24 Volts AC. Violet – blue wire: 24 Volts AC.	Using a multimeter on the AC voltage scale, measure between the brown and blue wire on the auto reset safety PCB six pin plug. The following result should be obtained: 24 Volts AC.

Component Adjustment Procedures

Burner Pressure Adjustment:

Check the inlet gas pressure at the gas valve inlet test point before adjusting the gas valve burner pressure regulator.

Adjust the burner gas pressure to match the appliance rating plate as follows:

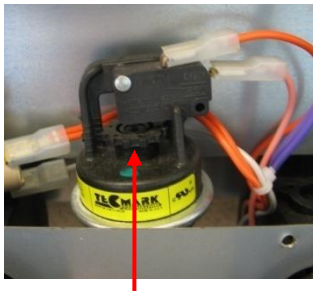


1. Remove the Lower In/Out Header Panel, Gas Valve Cover and Gas Valve Enclosure.
2. Remove the Gas Valve burner pressure adjustment screw cap by unscrewing in an anticlockwise direction.
3. Using a screwdriver, turn the inner adjustment screw clockwise to increase or counter-clockwise to reduce gas pressure to the burner.
4. Replace the burner pressure adjustment screw cap and tighten firmly to prevent gas leakage.
5. Replace the Gas Valve Enclosure, Gas Valve Cover and Lower In/Out Header Panel.

If the desired burner pressure cannot be achieved by adjusting the burner pressure regulator, check the gas supply pressure to the pool heater using a manometer at the inlet test point on the gas valve. If the inlet pressure is not within the prescribed limits, take the necessary steps to provide the correct gas pressure to the heater. If the inlet pressure is within the prescribed limits replace the gas valve.

Pressure Switch Adjustment

1. Remove the In/Out Header Access Cover. Refer to 'In/Out Header Access Cover' procedure on page 44.
2. Check that all valves are correctly positioned to allow water flow through the heater.
3. Start system pump and ensure that the correct water flow rate is flowing through the heater (minimum 1.3 l/sec maximum 6.9 l/sec).
4. Turn power on at the heater.
5. Adjust set point of the heater to 40ºC. If the heater lights proceed to step 6. If the burner does not light proceed to step 7.
6. Turn the pressure switch knurled adjustment wheel slowly anti-clockwise until the burner extinguishes then proceed to step 7.
7. Turn the pressure switch knurled adjustment wheel slowly clockwise until the heater lights then turn the adjustment wheel an additional ¼ turn.
8. Turn off the pump; the burner should now go out. If the burner does not extinguish there is a fault with the pressure switch or pool heater and fault finding will need to be performed to locate the fault.
9. If the heater did go out in step 8; the pump should be cycled on and off several times to ensure that the adjustment is correct.



Pressure switch knurled adjustment wheel

Flow Switch Adjustment

1. Check that all valves are correctly positioned to allow water flow through the heater.
2. Start system pump and ensure that the correct water flow rate is flowing through the heater (minimum 1.3 l/sec maximum 6.9 l/sec).
3. Turn power on at the heater.
4. Adjust set point of the heater to 40ºC. If the burner lights proceed to step 6. If the burner does not light proceed to step 7.
5. Turn the flow switch adjustment screw slowly anti-clockwise until the burner extinguishes then proceed to step 7.
6. Turn the flow switch adjustment screw slowly clockwise until the burner lights then turn the adjustment wheel an additional ¼ turn.
7. Turn off the pump; the burner should extinguish. If the burner does not extinguish there is a fault with the flow switch or pool heater and fault finding will need to be performed to locate the fault.
8. If the burner did extinguish in step 8; the pump should be cycled on and off several times to ensure that the adjustment is correct.

Flow switch adjustment screw

Component Replacement Procedures

Prior to performing any component replacement procedures detailed in this manual ensure the safety warnings on page 3 are read and observed, failure to do so may result in serious injury.

After performing any component replacement procedure where the power supply was removed and then restored; the red reset button must be pushed and released to reset the heater on models manufactured prior to the 14/4/09. The reset light will then extinguish indicating that the heater has been reset.

Front Access Panel

1. Turn Controller off.
2. ***Isolate power supply to the pool heater.***
3. Remove four screws retaining the Front Access Panel.
4. Remove the Front Access Panel.
5. Reassemble in reverse order of above.

Display Panel Removal

1. Remove the Front Access Panel. Refer to 'Front Access Panel' procedure above.
2. Cut cable tie retaining the water temperature probe cable to wiring loom.
3. Remove four screws retaining the Display Panel and place on ground. Note: Support the Display Panel whilst removing screws otherwise the Display Panel will fall when the last screw is removed.
4. Remove the PCB Cover Panel by pressing down on the top side and pulling away from the Display Panel. NOTE: The PCB Cover Panel is a tight fit, considerable pressure will need to be applied to disengage the PCB Cover Panel from the Display Panel.
5. Mark and disconnect the wiring from the control board.
6. Mark and disconnect the wiring from the reset button.
7. Withdraw wiring disconnected in steps 5 and 6 through the cable entry in the PCB Cover Panel
8. Reassemble in reverse order of above. Note: replace cable tie cut in step 2.

Electrical Control Box Cover

1. Remove the Front Access Panel. Refer to 'Front Access Panel' procedure above.
2. Remove single screw retaining Electrical Control Box Cover.
3. Remove the Electrical Control Box Cover away from the Electrical Control Box and slide sideways past the Display Panel wiring loom to remove.
4. Reassemble in reverse order of above.

Top Panel

1. Turn Controller off.
2. ***Isolate power supply to the pool heater and pool pump.***
3. Remove ten screws retaining the Top Panel and remove the Top Panel.
4. Reassemble in reverse order of above.

Front / Rear Upper Grille

1. Remove the Top Panel. Refer to 'Top Panel' procedure on above.
2. Remove the screws (3 in each panel) retaining the Diverter Draft Intake Panel and Flue Diverter Assembly to the left or right hand side panel.
3. Remove the screws (2 in each panel) from the 'Front Access Panel', 'Display Panel', 'Upper In/Out Header Panel' and the 'Lower In/Out Header Panel' from the same side panel as those removed in step 4.
4. Remove the 4 screws retaining the Upper Grille.
5. Gently pull the Side Panel away from the Upper Grille to disengage the locating tab.
6. Gently slide the Upper Grille locating tab out of the opposite side panel and remove.
7. Reassemble in reverse order of above.

Upper In/Out Header Panel

1. Turn Controller off.
2. ***Isolate power supply to the pool heater and pool pump.***
3. Remove four screws retaining the Upper In/Out Header Panel.
4. Remove the Upper In/Out Header Panel.
5. Reassemble in reverse order of above.

Lower In/Out Header Panel

1. Turn Controller off.
2. ***Isolate power supply to the pool heater and pool pump.***
3. Remove four screws retaining the lower in/out header panel.
4. Pull the bottom of the Lower In/Out Header Panel away from the heater then pull down to remove.
5. Reassemble in reverse order of above.

In/Out Header Access Cover

1. Remove the Upper In/Out Header Panel. Refer to 'Upper In/Out Header Panel' procedure above.
2. Remove single hex head screw retaining the In/Out Header Access Cover.
3. Pull the In/Out Header Access Cover down and lift out to remove.
4. Reassemble in reverse order of above.

Flue Diverter Assembly

1. Remove the Top Panel. Refer to 'Top Panel' procedure on page 44.
2. Remove the 10 screws retaining the Flue Diverter Assembly.
3. Remove the upper 2 screws from the front and rear Upper Grille.
4. Gently pull one of the Upper Grille panels out at the top to create a gap between the Upper Grille and the Flue Collector and lift clear.
5. Reassemble in reverse order of above.

Draft Intake Diverter

1. Remove the Flue Diverter Assembly. Refer to 'Flue Diverter Assembly' procedure on page 45.
2. Remove the 6 screws retaining the Draft Intake Diverter and lift clear.
3. Reassemble in reverse order of above.

Flue Collector

1. Remove the Top Panel. Refer to 'Top Panel' procedure on page 44***.***
2. Remove the Flue Diverter Assembly. Follow steps 2 & 3 of the 'Flue Diverter Assembly' procedure on page 45.
3. Remove the Draft Intake Diverter. Follow step 2 of the 'Draft Intake Diverter' procedure above.
4. Remove four hex head screws retaining the Flue Collector to the front and rear Refractory Supports and lift out the Flue Collector.

Jacket Assembly Complete

1. Turn controller off.
2. ***Isolate the power supply to the pool heater and pool pump***.
3. ***Isolate the pool water from the pool heater***.
4. Disconnect the pool plumbing from the pool header at the In/Out Header unions.
5. Isolate the gas supply to the pool heater and disconnect the pool heater inlet gas connection by unscrewing union in an anticlockwise direction.
6. If required, move the complete pool heater to a serviceable location.
7. Remove the Display Panel. Follow steps 2 & 3 of the 'Display Panel' procedure on page 43.
8. Disconnect the Cord Set at the Electrical Control Box. Follow steps 1-3 of the 'Cord Set' procedure on page 55.
9. Remove the Upper In/Out Header Panel. Follow steps 3 & 4 of the 'Upper In/Out Header Panel' procedure on page 44.
10. Remove the Lower In/Out Header Panel. Follow steps 3 & 4 of the 'Lower In/Out Header Panel' procedure on page 44.
11. Remove the 10 Philips head around the bottom edge of the Jacket Assembly.
12. Carefully flex the right hand side panel over the inlet gas connection pipe and lift the entire Jacket Assembly clear of the pool heater.
13. Reassemble in reverse order of above.
14. Test for gas leaks using soapy water solution.

Right Hand Side Panel

1. Remove the Cord Set. Refer to 'Cord Set' procedure on page 55.
2. Remove the Display Panel. Follow steps 1-3 of the 'Display Panel Removal' procedure on page 43.
3. Remove the Top Panel. Follow steps 3 & 4 of the 'Top Panel' procedure on page 44.
4. Remove the Upper In/Out Header Panel. Follow steps 3 & 4 of the 'Upper In/Out Header Panel' procedure on page 44.
5. Remove the Lower In/Out Header Panel. Follow steps 3 & 4 of the 'Lower In/Out Header Panel' procedure on page 44.
6. Remove the 2 screws retaining the front & rear Upper Grille panels to the right hand side panel.
7. Remove the screws retaining the Diverter Draft Intake Panel and Flue Diverter Assembly (3 in each panel) to the right hand side panel.
8. ***Isolate the gas supply*** and disconnect the pool heater inlet gas connection by unscrewing union in an anticlockwise direction.
9. Remove the screw from the front and rear edge of the right hand side panel.
10. Remove the 3 screws along the bottom edge of the right hand side panel.
11. Remove the side Panel. NOTE: Each Upper Grille has a tab which slots into the side panel. To disengage the tab, slide the panel off the tabs while keeping the panel upright.
12. Reassemble in reverse order of above.
13. Test for gas leaks using soapy water solution.

Left Hand Side Panel

1. Remove the Display Panel. Follow steps 1-3 of the 'Display Panel Removal' procedure on page 43.
2. Remove the Top Panel. Follow steps 3 & 4 of the 'Top Panel' procedure on page 44.
3. Remove the Upper In/Out Header Panel. Follow steps 3 & 4 of the 'Upper In/Out Header Panel' procedure on page 44.
4. Remove the Lower In/Out Header Panel. Follow steps 3 & 4 of the 'Lower In/Out Header Panel' procedure on page 44.
5. Remove the 2 screws retaining the front & rear Upper Grille panels to the left hand side panel.
6. Remove the screws retaining the Diverter Draft Intake Panel and Flue Diverter Assembly (3 in each panel) to the left hand side panel.
7. Remove the screw on the front and rear edge of the left hand side panel.
8. Remove the 3 screws along the bottom edge of the left hand side panel.
9. Remove the side panel. NOTE: Each Upper Grille has a tab which slots into the side panel. To disengage the tab, slide the panel off the tabs while keeping the panel upright.

Base Assembly

1. Remove the Jacket Assembly. Refer to 'Jacket Assembly Complete' procedure on page 45.
2. Remove the 2 hex head screws retaining the Gas Valve Cover and remove.
3. Remove the 2 hex head screws retaining the Gas Valve Enclosure and remove.
4. Remove the hex head screws (2 on each support) retaining the front and rear Refractory Supports to the Base Panel and lift the assembly clear of the Base Panel.
5. Reassemble in reverse order above.
6. Test for gas leaks using soapy water solution.
7. Check In/Out Header unions for water leaks.

45ºC Inlet High Limit

1. Remove the In/Out Header Access Cover. Refer to 'In/Out Header Access Cover' procedure on page 44.
2. Disconnect the wiring from the 45ºC Inlet High Limit.
3. Unscrew the 45ºC Inlet High Limit from the Adaptor in an anticlockwise direction.
4. Reassemble in reverse order of above.

Water Temperature Probe

1. Isolate the pool water from the pool heater.
2. Remove the In/Out Header Access Cover. Refer to 'In/Out Header Access Cover' procedure on page 44.
3. Remove the clip retaining the Water Temperature Probe and withdraw the Water Temperature Probe from the Adaptor. NOTE: Ensure the o-ring is also removed from the Adapter.
4. Remove the Display Panel. Follow steps 1–4 of the 'Display Panel Removal' procedure on page 43.
5. Unplug the Water Temperature Probe from the PCB socket marked '40/C Sensor'
6. Withdraw the Water Temperature Probe and wiring from the pool heater.
7. Reassemble in reverse order of above and cable tie the water temperature probe cable to wiring loom.

Adaptor - Water Temperature Probe & 45ºC Inlet High Limit

1. Remove the Water Temperature Probe. Follow steps 1-3 of the 'Water Temperature Probe' procedure above.
2. Remove the 45ºC Inlet High Limit. Follow steps 2 & 3 of the '45°C Inlet High Limit' procedure above.
3. Unscrew the Adaptor from the In/Out header in an anti-clockwise direction.
4. Fit the replacement Adapter using thread tape on the Adaptor thread.
5. Refit the Water Temperature Probe and secure using the spring clip.
6. Restore the pool water supply, start the pool pump and check for water leaks.
7. Complete reassembly in reverse order of above.

Pressure Switch

1. ***Isolate the pool water from the pool heater***.
2. Remove the In/Out Header Access Cover. Refer to 'In/Out Header Access Cover' procedure on page 44.
3. Disconnect the wiring from the Pressure Switch.
4. Unscrew the Pressure Switch in an anticlockwise direction by gripping the metal section of the Pressure Switch with a pair of multigrips.
5. Fit the replacement Pressure Switch using thread tape. Note: Do not apply excessive thread tape or over tighten as a breakage could result.
6. Restore the pool water supply, start the pool pump and check for water leaks.
7. Check the Pressure Switch adjustment. Refer to 'Pressure Switch Adjustment' procedure on page 42.
8. Complete reassembly in reverse order of above.

55ºC Outlet High Limit

NOTE: Some P0131 models are fitted with two 55°C Outlet High Limits, one on the In/Out Header and one on the Heat Exchanger Outlet.

A number of changes have been made to the weather shielding covers fitted to the In/Out Header; this procedure details the method for current assembly methods.

For P0131 models fitted with the rework kit it will be necessary to remove the Top Panel, Flue Diverter Assembly, Draft Intake Diverter and then remove the In/Out Header weather shield to access the 55°C Outlet High Limit(s).

During re-assemble the In/Out Header weather shield must be sealed to the Flue Collector using high temperature silicone.

1. Remove the Flue Diverter Assembly. Refer to 'Flue Diverter Assembly' procedure on page 45.
2. Remove the Draft Intake Diverter. Follow step 2 of the 'Draft Intake Diverter' procedure on page 45.
3. Remove the hex screw retaining the 55ºC High Limit Cover.
4. Disconnect the wiring from the 55ºC Outlet High Limit.
5. Remove the 2 screws retaining the 55ºC Outlet High Limit and remove.
6. Reassemble in reverse order of above using a small amount of heat transfer paste on the face of the 55ºC Outlet High Limit if required.

In/Out Header

1. ***Isolate the pool water from the pool heater***.
2. Remove the Lower In/Out Header Panel. Refer to 'Lower In/Out Header Panel' procedure on page 44.
3. Remove the In/Out Header Access Cover. Refer to 'In/Out Header Panel' procedure on page 44.
4. Remove the Water Temperature Probe. Follow step 3 of the 'Water Temperature Probe' procedure on page 47.
5. Mark and disconnect the wiring from the 45°C Inlet High Limit, Pressure Switch and 55°C Outlet High Limit (if fitted on the In/Out Header).
6. Remove the Flue Diverter Assembly. Refer to 'Flue Diverter Assembly' procedure on page 45.
7. Remove the Draft Intake Diverter. Follow step 2 of the 'Draft Intake Diverter' procedure on page 45.
8. Remove the hex screw retaining the 55ºC High Limit Cover. **Note:** For models fitted with the rework kit this part is not fitted.
9. Disconnect the wiring to the 55ºC High Limit mounted on the Heat Exchanger outlet and draw the wiring back through the snap bush (where required).
10. Remove the hex screws retaining the In/Out Header weather shield(s) to the Refractory Support and remove the weather shield. **Note:** On pool heaters that have the rework kit fitted the silicone seal between the weather shield and the Flue Collector will need to be broken.
11. Disconnect the pool pipe work from the pool heater at the In/Out Header Unions.
12. Disconnect the In/Out Header from the Heat Exchanger at the unions and remove the In/Out Header. **Note:** Ensure the sealing washers are removed from the Heat Exchanger.
13. Remove the 45°C Inlet High Limit and Water Temperature Probe Adapter (noting the orientation of the 45°C Inlet High Limit), the Pressure Switch and the 55°C Outlet High Limit (if fitted) from the In/Out Header and fit to the replacement In/Out Header.
14. Reassemble in reverse order of above. Do not fit the In/Out Header Access Cover or the Upper and Lower In/Out Header Panels at this stage. **Note:** Ensure the Heat Exchanger unions and water connection union o-rings are clean before reassembly and use silicone grease on o-rings if required. Use thread tape when refitting the Adapter and Pressure Switch. Do not apply excessive thread tape or over tighten as a breakage could result.
15. Restore the pool water supply, start the pool pump and check for water leaks.
16. Check the Pressure Switch adjustment. Refer to 'Pressure Switch Adjustment' procedure on page 42.
17. Complete reassembly.

Bypass Valve

1. ***Isolate the pool water from the pool heater.***
2. Remove the Upper In/Out Header Panel. Refer to 'Upper In/Out Header Panel' procedure on page 44.
3. Remove the Lower In/Out Header Panel. Follow steps 3 & 4 of the 'Lower In/Out Header Panel' procedure on page 44.
4. Disconnect the pool pipe work at the In/Out Header outlet union.
5. Unscrew the Bypass Valve Cap, located on the right hand side of the In/Out Header, in an anticlockwise direction and remove the Bypass Valve Cap followed by the Bypass Valve Spring.
6. Using a pair of long nose pliers withdraw the Bypass Valve Disc through the In/Out header outlet connection.
7. Install the replacement Bypass Valve components ensuring the Bypass Valve Disc is correctly located onto the Bypass Valve Spring and Bypass Valve Cap spindle.
8. Restore the pool water supply, start the pool pump and check for water leaks
9. Complete reassembly in reverse order of above.

Heat Exchanger

1. Remove the In/Out Header. Follow steps 1-12 of the 'In/Out Header' procedure on page 49.
2. Remove the 2 screws retaining the 55ºC Outlet High Limit to the Heat Exchanger and remove.
3. Remove the remaining screws securing the Flue Collector to the Refractory Supports and remove the Flue Collector.
4. Lift out the Heat Exchanger.
5. Reassemble in reverse order of above. Do not fit the In/Out Header Access Cover or the Upper and Lower In/Out Header Panels at this stage. **Note:** Ensure the Heat Exchanger ends are aligned with the edges of the left and right hand Refractories when reinstalling. Ensure the Heat Exchanger unions and water connection union o-rings are clean before reassembly and use silicone grease on o-rings if required. Use heat transfer paste on 55ºC outlet high limit if required.
6. Restore the pool water supply, start the pool pump and check for water leaks.
7. Check the Pressure Switch adjustment. Refer to 'Pressure Switch Adjustment' procedure on page 42.
8. Complete reassembly.

Burner Assembly

1. Remove the Front Access Panel. Refer to 'Front Access Panel' procedure on page 43.
2. Remove the Lower In/Out Header Panel. Follow steps 3 & 4 of the 'Lower In/Out Header Panel' procedure on page 44.
3. ***Isolate the gas supply to the pool heater.***
4. Disconnect burner feed pipe at burner by unscrewing union in an anticlockwise direction.
5. Remove the Philips head screws (2 in each end of the Burner Assembly) retaining the Burner Assembly to the Burner Support Brackets. Lower the Burner Assembly and remove through the rear of the pool heater. Note: Support the Burner Assembly when removing the screws or the Burner Assembly will fall.
6. Reassemble in reverse order of above. Do not fit the Lower In/Out Header Panel at this stage.
7. Restore the gas and power supplies and operate the pool heater and adjust the burner pressure to that indicated on the rating label (refer to 'Burner Pressure Adjustment' procedure on page 41).
8. Test for gas leaks using soapy water solution.
9. Complete reassembly.

Burner Manifold & Injectors

1. Remove the Burner Assembly. Refer to 'Burner Assembly' procedure above.
2. Remove the 4 Philips head screws retaining the Burner Manifold to the Burner Assembly and remove the Burner Manifold.
3. Remove the Injector(s) by unscrewing in an anticlockwise direction.
4. Reassemble in reverse order of above. Do not fit the Lower In/Out Header Panel at this stage **Note:** When fitting the replacement Injectors ensure the sealing washer is re-fitted.
5. Restore the gas and power supplies and operate the pool heater and adjust the burner pressure to that indicated on the rating label (refer to 'Burner Pressure Adjustment' procedure on page 41)
6. Test for gas leaks using soapy water solution.
7. Complete reassembly.

Gas Valve

1. Remove the Lower In/Out Header Panel. Refer to 'Lower In/Out Header Panel' procedure on page 44.
2. ***Isolate the gas supply to the pool heater.***
3. Disconnect the gas service at the gas connection to the pool heater and remove any unions on the pool heater side.
4. Disconnect the burner feed pipe at the gas control outlet by unscrewing union in an anticlockwise direction.
5. Undo 2 screws retaining the Gas Valve Cover and remove. Screws are located on the upper front and rear of the Gas Valve Cover.
6. Undo the screws retaining the Gas Valve Enclosure and remove. 2 screws are located at the back of the Gas Valve Enclosure (securing the enclosure to the base) and 1 screw is located on left hand side (securing the enclosure to the Refractory Support).
7. Mark and disconnect the wiring to the Gas Valve. Note: There may be 2 or 3 wires connected to the Gas Valve depending on the model of the Gas Valve fitted.
8. Remove the Gas Valve and unscrew the pipe extension and nipple from the inlet and outlet of the Gas Valve.
9. Fit the pipe extension and nipple to the replacement gas valve using gas thread tap or sealant.
10. Reassemble in reverse order of above. **Note:** Do not refit the Gas Valve Enclosure, Gas Valve Cover or Lower In/Out Header Panel as this stage.
11. Restore the gas supply.
12. Operate the pool heater, test for gas leaks using soapy water solution and adjust the burner pressure to that indicated on the rating label (refer to 'Burner Pressure Adjustment' procedure on page 41).
13. Complete reassembly.

Refractories & Top Refractory Retainers

Risk of skin and respiratory irritation. Gloves, face mask and overalls must be worn when handling the refractories. Spent refractories should be sealed in a plastic bag for disposal.

1. ***Isolate the gas supply to the pool heater.***
2. Follow steps 1-11 of the 'In/Out Header' procedure on page 49.
3. Follow steps 3 & 4 of the 'Heat Exchanger' procedure on page 50.
4. Remove the Igniter & Flame Rod Assembly. Refer to 'Igniter & Flame Rod Assembly' on page 54.
5. Lift out the front and rear top refractory retainers.
6. Lift out the left refractory. Note: Refractories are tight fitting and need to be worked out gradually. Pay attention to how the Refractories are assembled as the front and side Refractories are not interchangeable.
7. Lift out right Refractory.
8. Lift out front and rear Refractories.
9. Reassemble in reverse order of above. **Note:** Ensure the Heat Exchanger ends are aligned with the edges of the left and right hand Refractories when reinstalling. Ensure the water connection union o-rings are clean before reassembly and use silicone grease on o-rings if required.
10. Restore the pool water supply, start the pool pump and check for water leaks.

Lower Refractory Retainers and Refractory Supports

1. Remove the Refractories. Refer to 'Refractory & Top Refractory Retainers' procedure on page 52.
2. Remove the front and rear Lower Refractory Retainers.
3. Remove the screws retaining the left and right Lower Refractory Retainers and remove the left and right Lower Refractory Retainers.

Rear Refractory Support

4. Remove the Burner Assembly. Follow steps 4 & 5 of the 'Burner Assembly' procedure on page 51.
5. Remove the Gas Valve Cover and Gas Valve Enclosure. Refer to steps 5 & 6 of the 'Gas Valve' procedure on page 52.
6. Mark and disconnect the wiring from the Gas Valve and draw the wiring back through the cable entry in the rear Refractory Support.
7. Remove the hex head screws retaining the Rear Refractory Support to the Base Panel and remove the Rear Refractory Support.
8. Remove the Burner Assembly Support Bracket from the Rear Refractory Support.

Front Refractory Support

9. Remove the Display Panel. Follow steps 2 & 3 of the 'Display Panel' procedure on page 43.
10. Remove the Burner Assembly (if not already removed in step 4 above. Follow steps 4 & 5 of the 'Burner Assembly' procedure on page 51.
11. Remove the Electrical Control Box from the Front Refractory Support. **Note:** On some models this will require the removal of all the components within the Electrical Control Box. Refer to the various replacement procedures for each component.
12. Remove the hex head screws retaining the Front Refractory Support to the Base Panel and remove the Front Refractory Support.
13. Remove the Burner Assembly Support Bracket from the Front Refractory Support.
14. Reassemble in reverse order of above. Do not refit the Lower In/Out Header Panel at this stage. **Note**: Ensure the Heat Exchanger ends are aligned with the edges of the left and right hand Refractories when reinstalling. Ensure the Heat Exchanger unions and water connection union o-rings are clean before reassembly and use silicone grease on o-rings if required. Cable tie the Water Temperature Probe wiring to the main wiring loom.
15. Restore the pool water supply, start the pool pump and check for water leaks.
16. Restore the gas supply.
17. Operate the pool heater, test for gas leaks using soapy water solution and adjust the burner pressure to that indicated on the rating label (refer to 'Burner Pressure Adjustment' procedure on page 41).
18. Complete reassembly.

Igniter & Flame Rod Assembly

1. Remove the Front Access Panel. Refer to 'Front Access Panel' procedure on page 43.
2. Remove the 2 hex head screws retaining the Igniter & Flame Rod assembly weather shield and remove weather shield.
3. Disconnect the wiring at the flame rod spade terminal.
4. Disconnect the wiring at igniter electrode spade terminals.
5. Note the orientation of the Igniter & Flame Rod Assembly and remove the 2 screws retaining the Igniter & Flame Rod Assembly and withdraw the Igniter and Flame Rod Assembly from the combustion chamber.
6. Reassemble in reverse order of above ensuring the replacement Igniter and Flame Rod Assembly is installed in the same orientation as the one removed.

Reset Button

1. Remove the Display Panel. Follow steps 1-4 and 6 of the 'Display Panel' procedure on page 43.
2. Separate the switch and LED assembly from the push button. NOTE: 2 types of Reset Button have been used since inception.
   - Type 1. Using a small flat bladed screw driver lever the locking tab in to release the switch and LED assembly from the push button and pull to separate.
   - Type 2. Pivot the locking tab across the switch and LED assembly to release the switch and LED assembly from the push button and pull to separate.
3. Undo the lock nut to remove the push button from the Display Panel. Note the orientation of the push button to ensure the switch and LED assembly will be re-installed in the same orientation.
4. Mark and disconnect the wiring at the switch and LED blocks.
5. Reassemble in reverse order of above. To reinstall the switch and LED assembly push the switch and LED assembly onto the push button until it clicks in place. Cable tie the Water Temperature Probe wiring to the main wiring loom.

Control Board

1. Remove the Display Panel. Follow steps 1-5 of the 'Display Panel' procedure on page 43.
2. Remove the screws and washers retaining the Control Board to the Display Panel.
3. Depress the Control Board locking tabs located on the left and right hand sides of the Control Board and push the Control Board through the Display Panel.
4. Reassemble in reverse order of above and cable tie the Water Temperature Probe wiring to the main wiring loom.
5. Re-program the Control Board if required.

Terminal Block

1. Remove the Electrical Control Box Cover. Refer to 'Electrical Control Box Cover' procedure on page 43.
2. Mark and disconnect the Cord Set wiring and Transformer wiring from the Terminal Block.
3. Remove the 2 screws retaining the Terminal Block and remove.
4. Reassemble in reverse order of above.

RAM Ignition Module

1. Remove the Electrical Control Box Cover. Refer to 'Electrical Control Box Cover' procedure on page 43.
2. Remove the multi-pin wiring plug from the RAM ignition module.
3. Remove the screw(s) retaining the RAM ignition module and remove.
4. Reassemble in reverse order of above.

Cord Set

1. Remove the Electrical Control Box Cover. Refer to 'Electrical Control Box Cover' procedure on page 43.
2. Undo the top nut retaining the Cord Set earth wire to the earth stud and remove the earth wire from the stud.
3. Disconnect the Cord Set active and neutral wires from the terminal block and withdraw the Cord Set through the cable entry in the Electrical Control Box.
4. Unscrew the Cord Set cable gland compression nut in an anticlockwise direction and remove the Cord Set by withdrawing through the compression gland.
5. Reassemble in reverse order of above.

Relay 1 / Relay 2

1. Remove the Electrical Control Box Cover. Refer to 'Electrical Control Box Cover' procedure on page 43.
2. Pull the relevant Relay out of the Relay Base.
3. Reassemble in reverse order of above.

Relay Base

1. Remove the Electrical Control Box Cover. Refer to 'Electrical Control Box Cover' procedure on page 43.
2. Pull the relevant Relay out of the Relay Base.
3. Mark and disconnect the wiring from the Relay Base requiring replacement.
4. Gently lever the yellow locking clip (located on the bottom of the Relay Base) down with a flat bladed screwdriver and simultaneously lift the bottom of the Relay Base off the din rail then lift the Relay Base up and out to remove.
5. Reassemble in reverse order of above. **Note:** To install the Relay Base onto the din rail locate the top edge underneath the Relay Base onto the din rail and push the Relay Base down until the yellow locking clip clicks into position.

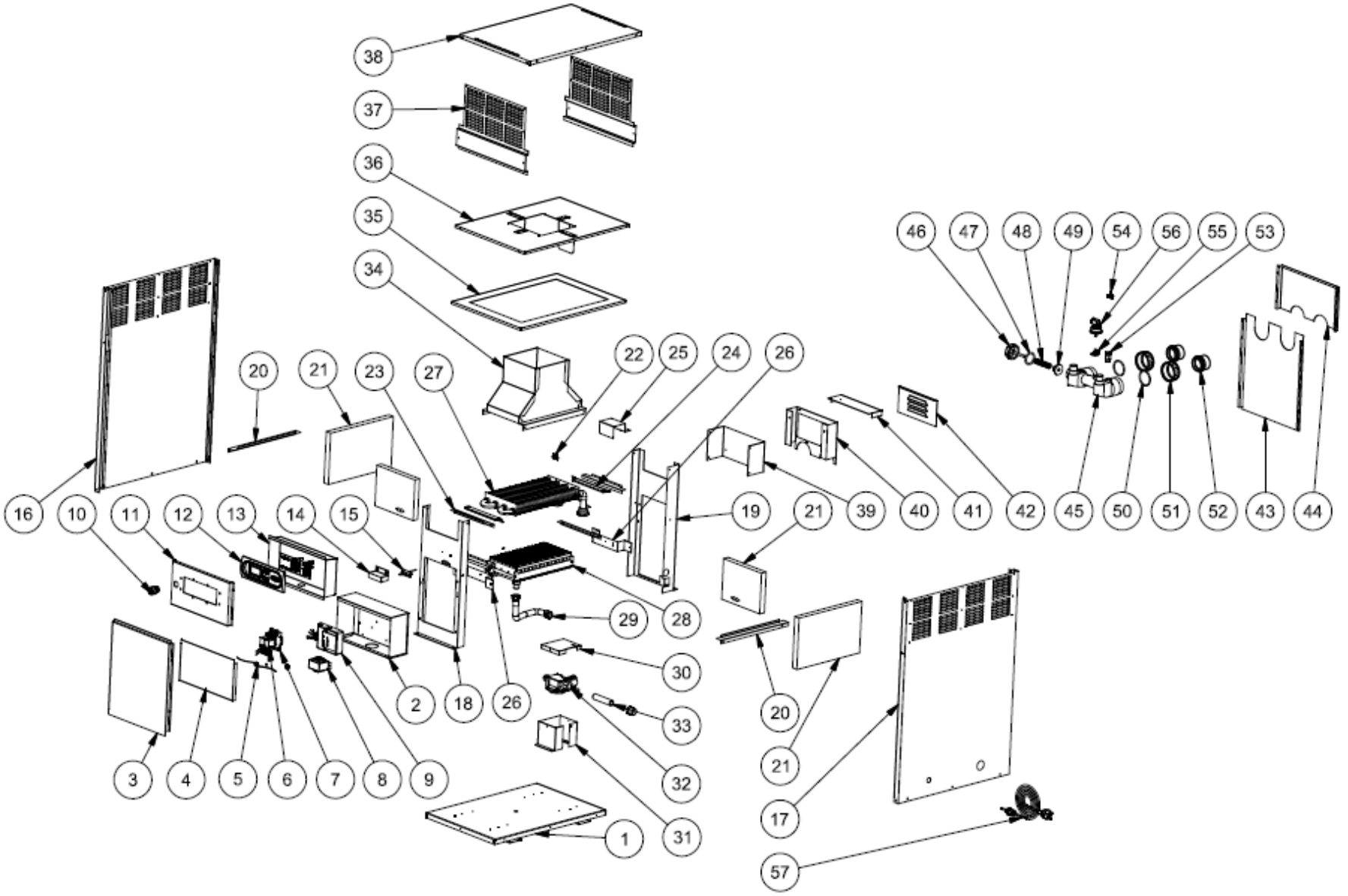
Transformer

1. Remove the Electrical Control Box Cover. Refer to ‘Electrical Control Box Cover’ procedure on page 43.
2. Disconnect the Transformer primary active and neutral wires from the Terminal Block.
3. Disconnect the Transformer secondary neutral wire from the ground nest.
4. Disconnect the Transformer secondary active wire at the fuse holder by pressing the two halves of the fuse holder together and twisting. Do not let internal fuse fall out.
5. Remove the 2 screws retaining the Transformer and remove the Transformer.
6. Reassemble in reverse order of above.

Wiring Loom

1. Remove the Electrical Control Box Cover. Refer to ‘Electrical Control Box Cover’ procedure on page 43.
2. Remove the Display Panel. Refer to ‘Display Panel’ procedure on page 43.
3. Remove the multi-pin wiring plug from the RAM ignition module.
4. Disconnect the wiring from the earth nest.
5. Disconnect the Transformer secondary winding active at the quick connect to the main wiring loom.
6. Pull the Relays 1 & 2 out of the Relay Bases.
7. Remove the Relay Bases from the din rail. Follow step 4 of the ‘Relay Base’ procedure on page 55.
8. Disconnect the wiring at the flame rod spade terminal.
9. Disconnect the wiring at igniter electrode spade terminals.
10. Remove the In/Out Header Access Cover. Refer to ‘In/Out Header Access Cover’ procedure on page 44.
11. Disconnect the wiring from the 45°C Inlet High Limit and the Pressure Switch.
12. Disconnect the wiring to the 55°C Outlet High Limit(s). Refer to 55°C Outlet High Limit’ procedure on page 48.
13. Disconnect the wiring to the Gas Valve. Follow steps 1 & 5-7 of the ‘Gas Valve’ procedure on page 52.
14. Cut all cable ties securing the Water Temperature Probe wiring to the main wiring loom.
15. Withdraw all wiring disconnected in steps 11 - 13 to the front of the pool heater.
16. Carefully draw all the wiring back through the cable entry in the Electrical Control Box.
17. Reassemble in reverse order of above. **Note**: To install the Relay Base onto the din rail locate the top edge underneath the Relay Base onto the din rail and push the Relay Base down until the yellow locking clip clicks into position. Cable tie the Water Temperature Probe wiring to the main wiring loom.

Exploded View



Replacement Parts List

Item	Description	Part Nº	Item	Description	Part Nº
1	Base Panel	56320474	28	Burner Assembly – Polidoro NG	56320497
2	Electrical Enclosure	56144829		Burner Assembly – Polidoro Propane	56320496
3	Front Access Panel	56320412	29	Gas Connector – Dormont	56320476
4	Panel Electrical Enclosure Cover	56144830	30	Panel – Gas Valve Cover	56144828
5	Fuse Holder	56659145	31	Panel – Gas Valve Enclosure	56144827
	Fuse 3A	56659146	32	Gas Valve – Natural Gas	56320218
6	Relay 24V (pre 14/4/09)	56659014	33	Pipe Extension	56509196
	PCB - Auto Reset (post 14/4/09)	56PE5006	34	Flue Collector	56320473
7	Relay Base	56659011	35	Panel – Diverter Draft Intake	56320406
8	Transformer 240/24VAC	56650931N	36	Flue Diverter Assembly	56320472
9	Ignition Module	56601004	37	Panel – Jacket Upper Front & Rear	56320402
10	Switch – Reset	56659098	38	Panel – Jacket Top	56320405
11	Panel – Display	56320410	39	Panel – Heat Shield Header Cover	56144824
12	Controller – Grey Board	56659197	40	Panel – Header Cover Wrapper	56144814
	Controller – Black Board	56PE5001	41	Panel – Header Cover Lid	56144813
13	Panel – PCB Control Cover	56144826	42	Panel – Access In/Out Header	56144832
14	Cover – Igniter	56144825	43	Panel – Access Lower Rear	56320420
15	Igniter – HSI Norton	56659144	44	Panel – Access Upper Rear	56320432
16	Panel – Jacket Side LH	56320400	45	Header – In/Out	56320495
17	Panel – Jacket Side RH	56320408	46	Cap – Bypass	56320486
18	Panel – Support Front Refractory	56320433	47	O-ring Bypass Cap	56320481
19	Panel – Support Rear Refractory	56320403	48	Spring – Bypass	56320482
20	Channel – Refractory Support (Left & Right)	56320416	49	Valve – Bypass Disc	56800369
21	Fire Tile Kit	56700466	50	O-ring – Header Connection	56320479
22	Thermostat – Hi Limit 55° Auto Reset	56601547	51	Union Nut – Header Connection	56320477
23	Channel – Refractory Support (Front & Rear)	56320415	52	Union Tail – Header Connection	56320478
24	Fibreglass Tape	56700702	53	Locator - Sensor Probe and Hi Limit	56659206
25	Panel – Hi Limit Cover	56144839	54	Water Temperature Sensor	56659202
26	Bracket Support – Gas Tray	56320428	55	Thermostat – Hi Limit 45° Auto Reset	56600188
27	Heat Exchanger	56320499	56	Pressure Switch	56651284
			57	Cordset	56659143

Replacement Parts

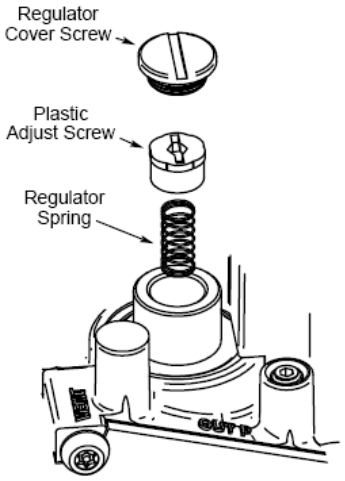
Item	Description		Part Nº
Not Shown on exploded view	Injector – Main Burner	Propane Gas	890688
		Natural Gas	890689
	Gas Valve Spring – Propane Conversion		56600872
	Wiring Loom		56009131
	Remote Controller – Grey Board		56659198
	Remote Controller – Black Board		56PE5005
	Remote Controller Cable	10 Metre	56CAB10
		20 Metre	56CAB20
		50 Metre	56CAB50

Gas Type Conversion Procedure

A serious scald hazard exists. Ensure components have sufficiently cooled before performing this procedure.

1. Remove the Burner Assembly. Refer to 'Burner Assembly' procedure on page 51.
2. Replace the Injectors with ones suitable for the new gas type. Refer to table below and follow steps 2 & 3 of the 'Burner Manifold and Injector' procedure on page 51. **Note**: Ensure the sealing washer is removed from the existing injector and fitted to the replacement injector.
3. Re-assemble and fit the Burner Assembly to the pool heater.
4. Remove the Gas Valve Cover and Gas Valve Enclosure. Refer to steps 5 & 6 of the 'Gas Valve' procedure on page 52.
5. **Natural Gas – Propane Gas Conversion**: Remove the regulator cover screw, plastic adjustment screw and gas type spring from the gas valve and replace with the grey/white powder coated spring suitable for propane (refer to diagram opposite and table below). Screw the adjustment screw half way in (approx 5 full turns).

   Propane Gas – Natural Gas Conversion: Replace the Gas Control (refer to the table below). Follow steps 3 & 7-10 of the 'Gas Valve' procedure on page 52.



6. Restore power and gas supplies, start pump and operate the pool heater.
7. Check for leaks using soapy water solution.
8. Adjust the burner pressure to that indicated in the 'Specifications' table on page 4 for the gas type. Refer to 'Burner Pressure Adjustment' procedure on page 41.
9. Mark the rating label with the new injector size details and burner pressure using an indelible ink and complete reassembly.

Gas Conversion Components

Natural Gas – Propane Gas			Propane Gas – Natural Gas		
Part Nº	Description	Qty	Part Nº	Description	Qty
56600872	Spring - Propane	1	56320218	Gas Valve	1
890688	Injector (0.77mm)	15	890689	Injector (1.36mm)	15

Raypak Pool and Spa Heater Warranty (Australia Only)

Rheem Australia will repair or if necessary replace any Raypak pool or spa heater; or any component of the pool or spa heater which fails within the Warranty Periods specified hereafter, in accordance with and subject to the conditions and exclusions mentioned herein.

Warranty conditions

1. This warranty is applicable only to pool and spa heaters manufactured from August 1st, 2005.
2. The pool or spa heater must be installed in accordance with the Raypak installation instructions included with the heater and in accordance with all statutory, local and State requirements.
3. Where a failed component or heater is replaced under warranty the balance of the original warranty period only will remain effective. The replaced part or heater does not carry a new warranty.
4. Where the heater is installed outside the boundaries of a metropolitan area as defined by Rheem, or further than 25km from a regional Rheem branch office or an accredited Rheem service Agent, the cost of transport, insurance and travelling costs between the nearest Rheem branch or Rheem Agents premises and the installed site shall be the owner's responsibility.
5. The warranty only applies to the Raypak supplied heater and genuine (Rheem or Raypak sourced) component replacement parts and therefore does not cover any plumbing or electrical parts supplied by the installer and not an integral part of the Raypak supplied heater, e.g. pressure limiting valves, isolation valves, non-return valves, electrical switches, pumps, fuses, etc.
6. The heater must have been correctly sized for the pool/spa hot water demand in accordance with Raypak pool and spa heater literature available from Raypak on request.

Warranty Exclusions

Repair and replacement work will be carried out as described in the Warranty Period, however the following exclusions may cause the warranty to become void and may incur a service charge and/or the cost of any parts used.

1. Accidental damage to the heater or any component, including:
   a. Acts of God;
   b. Failure due to misuse;
   c. Incorrect installation;
   d. Attempts to repair carried out by other than Rheem or an accredited Agent;
2. Where it is found that there is nothing wrong with the heater.
3. Where the complaint is related to excessive discharge from the pressure relief valve (if fitted) due to excessive water pressure.
4. Where there is no flow of water due to faulty plumbing;
5. Where water leaks are related to plumbing including connections to the heater.
6. Where there is a failure of gas or electricity supply or they do not comply with relevant codes or acts.
7. Where the heater or its components have failed directly or indirectly as a result of:
   a. Excessive water pressure;
   b. Excessive temperature and/or thermal input;
   c. Corrosive atmosphere;
   d. Incorrect flow rate through the heat exchanger.
8. Where the heater is located in a position that does not comply with the Raypak installation instructions or relevant statutory requirements causing the need for major dismantling or removal of any structure, or the requirement of special equipment to bring the heater to a serviceable position.
9. Repairs of any nature due to corrosion or scale formation of any of the heater components in contact with the pool or spa water.

Subject to any Statutory provisions to the contrary, this warranty excludes all claims for damage to furniture, carpets, walls, foundations or any other consequential loss either directly or indirectly due to leakage from the pool heater or its fittings caused by any mode of failure.

Notes:

1. Rheem Australia is responsible for all service activities relating to Raypak Australia product.
2. Rheem Australia reserves the right to transfer fully functional components from a defective heater to a replacement heater if required.
3. In addition to this warranty, the Trade Practices Act 1974 and similar laws in each State and Territory, provide the owner with certain minimum statutory rights in relation to your heater. This warranty must be read subject to all relevant legislation and nothing in this warranty has the effect of excluding, restricting or modifying those rights.
4. Every care has been taken to ensure accuracy in preparation of this publication. No liability can be accepted for any consequences which may arise as a result of its application.

Rheem Australia Pty Ltd ABN 21 098 823 511

Document Revision History

Title: Raypak 131Pool Heater Service Instructions	Document Nº: TM020

Revision	Details of change	D.O.I.
A	Type A Raypak pool & spa heater service instructions issued	4/09