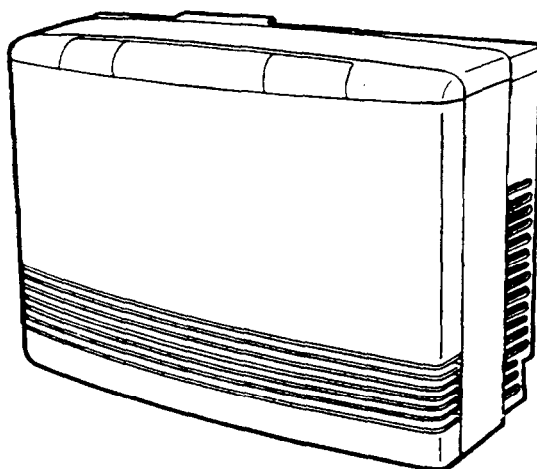


**RHFE-556 FTR**

**RHFE-556 FM/FDT**

**RHFE-431 FT**

### ENERGYSAVER



ISO 9002 Lic 4983  
Standards Australia

Head Office Certified

Distributed and Serviced in Australia under a Quality  
System certified as complying with ISO 9002 by  
Standards Australia Quality Assurance Services

**Rinnai Australia Pty Ltd**  
(Head Office)  
**10-11 Walker Street**  
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Gas Association**

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All of our gas products are AGA  
tested and approved

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# **WARNING**



**ALL WIRING INSIDE THIS APPLIANCE MAY BE AT 240 VOLTS POTENTIAL.**

**ALL SERVICE WORK MUST BE CARRIED OUT BY AN AUTHORISED PERSON.**

**DO NOT TEST FOR GAS ESCAPES WITH AN OPEN FLAME.**

This manual has been compiled by the Rinnai Australia Technical Customer Services. While many individuals have contributed to this publication, it will be successful only if you - the reader and customer - find it useful. We would like to extend an invitation to users of this manual to make contact with us, as your feedback and suggestions are valuable resources for us to include as improvements. Rinnai are constantly working toward supplying improved appliances as well as information, and specifications may be subject to alteration at any time.

# *Glossary of Terms*

This glossary of terms is provided to assist you in understanding some of the language used throughout this manual.

|        |   |                                             |
|--------|---|---------------------------------------------|
| dB(A)  | - | sound pressure level in decibels, "A" range |
| DC     | - | direct current                              |
| AC     | - | alternating current                         |
| Hz     | - | Hertz                                       |
| IC     | - | integrated circuit                          |
| kcal/h | - | kilocalorie per hour                        |
| kPa    | - | kilopascals                                 |
| LED    | - | light emitting diode                        |
| mA     | - | milliamps                                   |
| MJ/h   | - | megajoule per hour                          |
| mm     | - | millimetres                                 |
| OHS    | - | over heat switch                            |
| PCB    | - | printed circuit board                       |
| CPU    | - | central processing unit                     |
| POT    | - | potentiometer                               |
| rpm    | - | revolutions per minute                      |
| SV     | - | solenoid valve                              |
| Ø      | - | diameter                                    |
| Δ°C    | - | temperature rise above ambient              |
| POV    | - | modulating valve                            |
| TH     | - | thermistor                                  |

## 1. Background

The RHFE-556FTR/431FT/556FM incorporate an improved modulating control system to provide comfortable heating. Other features of these appliances are improved safety, operation (including remote control - FTR version only) installation, and maintenance features.

The 556FM version has been specifically introduced for installation in education or similar institutions, where the dual timer features may not be required.

## 2. Characteristics

- i) Built into the main PCB is the software to adapt all versions for connection to a central ON-OFF control.
- ii) Gas flow modulates in 8 steps between HI ~ LOW/and OFF, achieving comfortable and efficient heating.
- iii) The 556FTR and 431FT versions include a 24 hour digital clock and dual timer, and an economy mode function to reduce gas consumption without affecting comfort.
- iv) Temperature control is monitored by fuzzy-neuro technology.
- v) The 556FTR incorporates remote control ON-OFF and temperature selection.
- vi) All operation and temperature control is with easy-to-use push buttons.
- vii) If a problem occurs and service is required, an error coded message appears on the digital or LED display to direct the service technician to the cause of the problem.
- viii) Information about any previous faults is stored in the PCB and can be recalled during servicing.

## 3. About the 556FTR/431FT/556FM

The bodywork is formed from 0.6 mm galvanised steel sheet, which forms a box to which the components, heat exchangers and blowers are attached. The whole assembly is covered by an outer case which is constructed from 0.6 mm galvanised steel sheet, and plastic mouldings.

The combustion chamber is constructed from 1.0 mm hot dip aluminium coated steel sheet, located in the lower centre of the appliance.

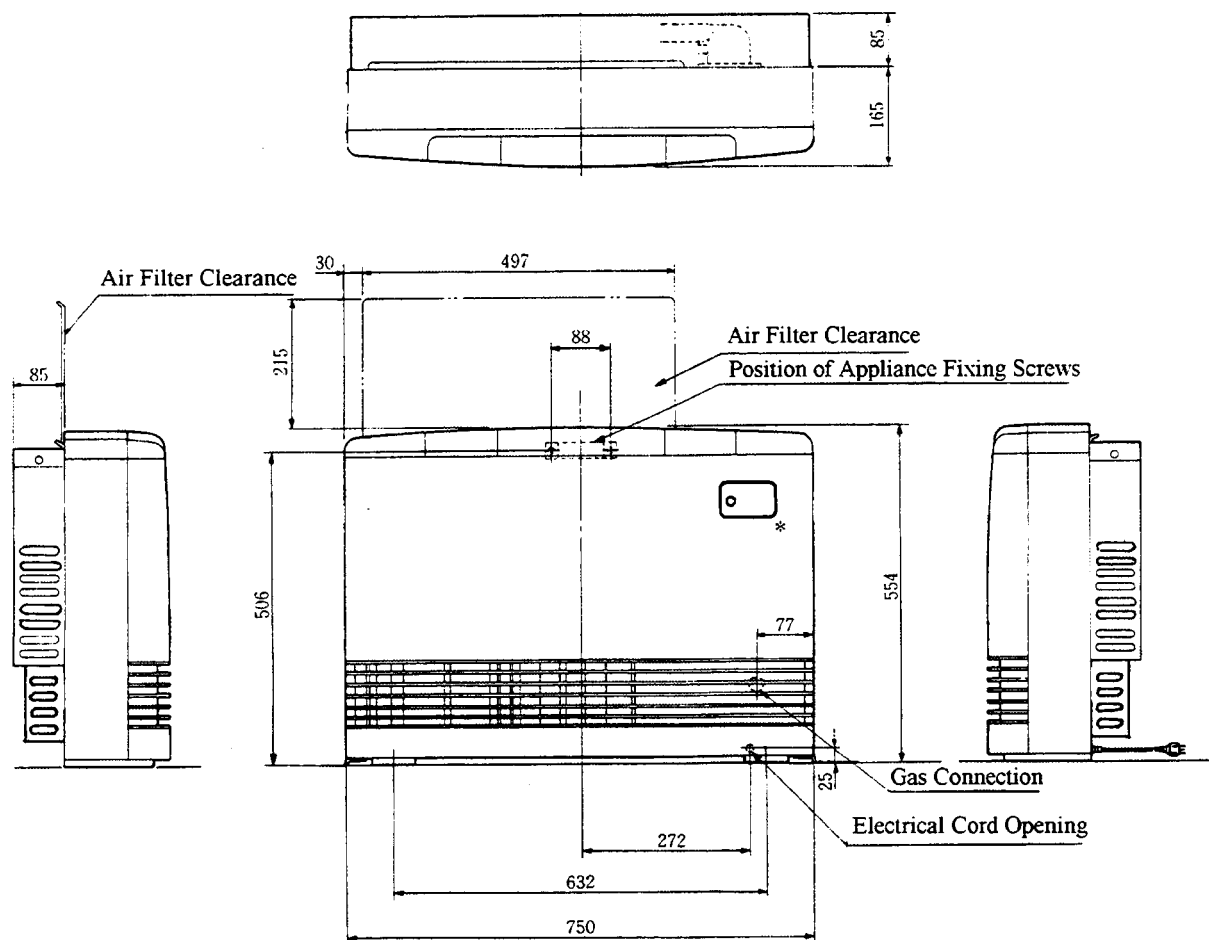
The heat exchanger is composed of two sub-heat exchanger sets. The left hand set, N<sup>o</sup>.1 is constructed of 1.0 mm aluminised steel. The right hand set, N<sup>o</sup>.2 is constructed of 0.8 mm stainless steel. The inlet of sub-heat exchanger N<sup>o</sup>.1 is connected to the outlet of the combustion chamber, the outlet is connected to sub-heat exchanger N<sup>o</sup>.2. Sub-heat exchanger N<sup>o</sup>.2 consists of 5 “sub” sections. Constructed from 0.8 mm stainless steel. The outlet of sub-heat exchanger N<sup>o</sup>.2 is constructed from 0.5 mm stainless steel and connected to the flue by a concertina stainless steel tube.

The combustion air fan draws combustion air from the outside atmosphere through the flue manifold pipe. Air is then blown into the combustion chamber via a rubber tube. Combustion products in the combustion chamber are pushed out into sub-heat exchanger N<sup>o</sup>.1, to sub-heat exchanger N<sup>o</sup>.2, and then into the 34 mm flue pipe which is connected through the flue manifold to the outside atmosphere.

The flue system is connected with stainless steel concentric pipe. The inner pipe (34 mm diameter.) is the combustion gas outlet, and is connected to the outlet of sub-heat exchanger N<sup>o</sup>.2. The outer pipe (70 mm diameter) is the combustion air inlet and is connected to the inlet of the combustion fan air pipe. Various flue lengths are available.

Ignition is continuous spark in conjunction with an electrically operated solenoid and control is monitored by the PCB. Gas passes through the 15 mm BSP inlet fitting, then via a flange connection to the solenoid valves N<sup>o</sup>.1, N<sup>o</sup>.2, a regulator modulating valve, aluminium injector manifold, before entering the burner.

Note: All dimensions are in mm.

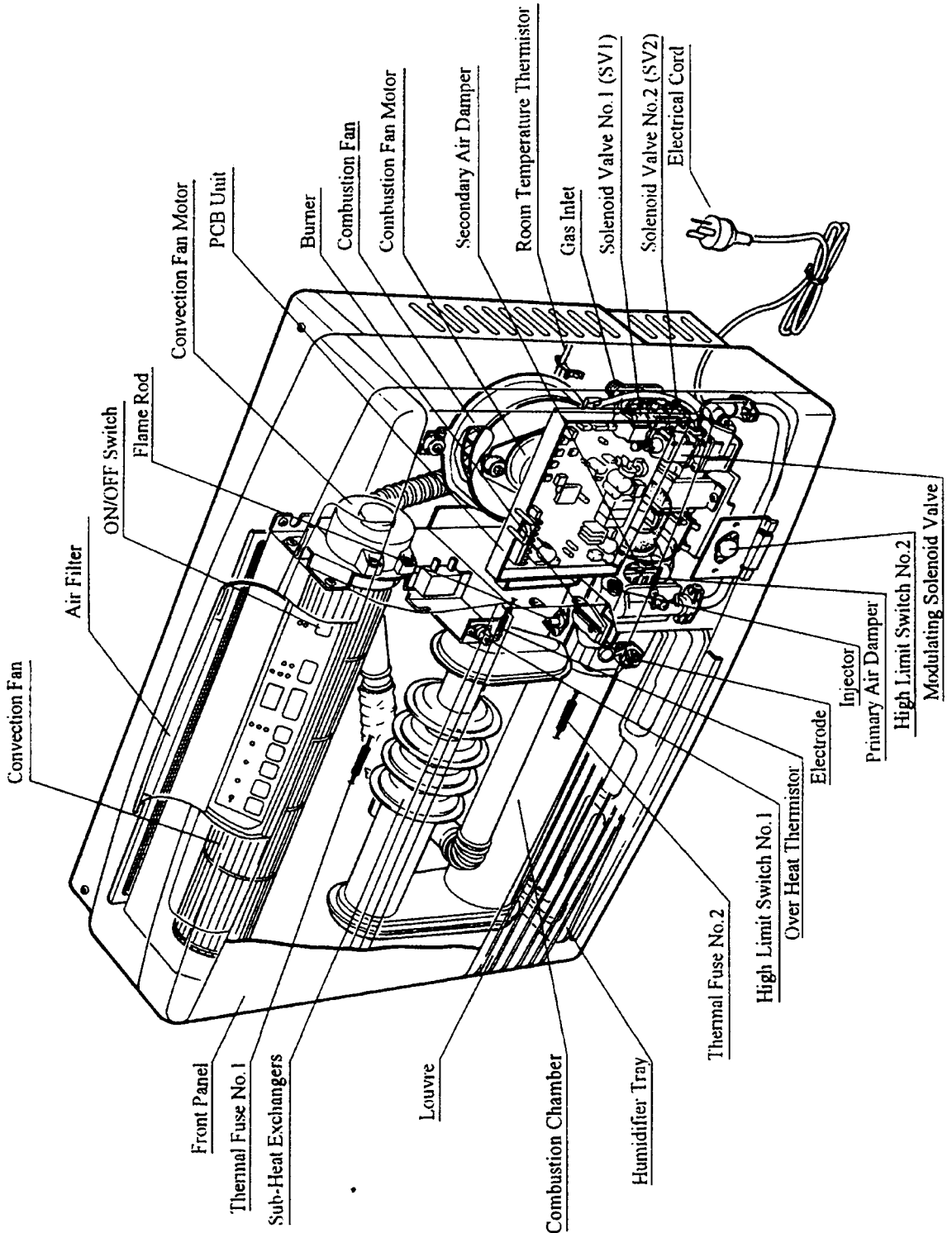


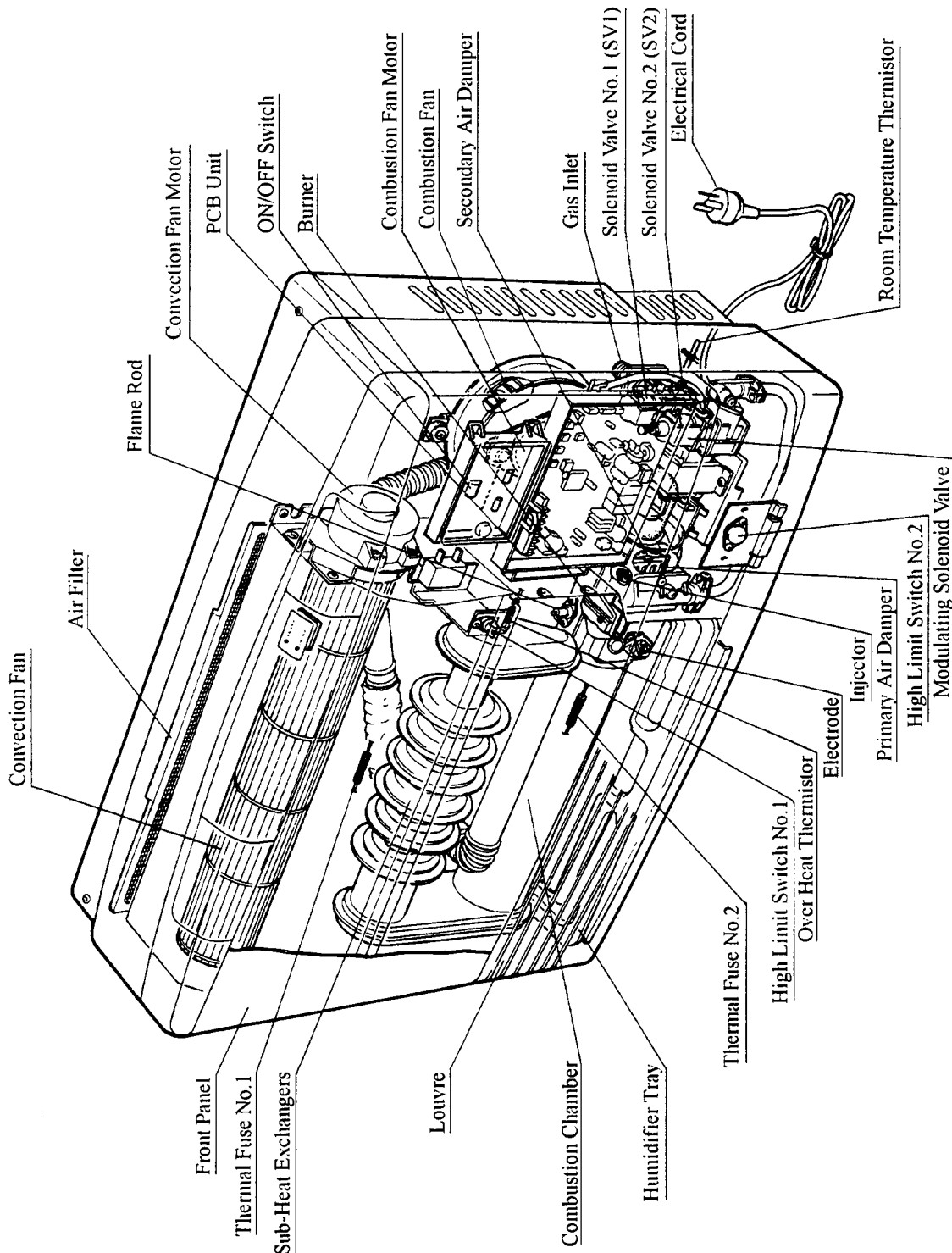
\* FM version only

### 3. SPECIFICATIONS:

|                                                  |                                                                                                                                                                               |                          |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Model:                                           | <b>RHFE-556FTR / 556FM</b>                                                                                                                                                    | <b>RHFE-431FT</b>        |
| Type of Appliance:                               | Fan Forced Flued Gas Space Heater                                                                                                                                             |                          |
| Dimensions:                                      | Width: 750 mm<br>Depth: 165 mm (with back spacer 250 mm)<br>Height: 554 mm                                                                                                    |                          |
| Weight:                                          | 22                                                                                                                                                                            |                          |
| Connections:                                     | Electrical AC 230/240V 50 Hz<br>Gas R ½ BSP Male Thread                                                                                                                       |                          |
| Gas Consumption (kW):<br>(Max. / Min).           | 23 / 9                                                                                                                                                                        | 18 / 8                   |
| Output (MJ/h)<br>(Max. / Min).                   | 5.4 / 2.1                                                                                                                                                                     | 4.0 / 1.8                |
| Combustion system:                               | Stainless Steel Bunsen Burner                                                                                                                                                 |                          |
| Ignition system:                                 | Continuous spark                                                                                                                                                              |                          |
| Operation:                                       | Finger touch control buttons (non-lock)                                                                                                                                       |                          |
| Temperature control:                             | Electronic thermostat modulating HI-LOW/OFF                                                                                                                                   |                          |
| Temperature range:                               | LOW (10°C) – 16 ~ 26°C - HI                                                                                                                                                   |                          |
| Warm air outlet                                  | Bottom of appliance                                                                                                                                                           |                          |
| Air volume control:                              | Hi – LOW (proportional)/OFF                                                                                                                                                   |                          |
| Timer operation:<br><b>(556FTR / 431FT only)</b> | Timer – 24 hour, 2-way programmable, intelligent<br>Operation – 24 hour<br>Clock – 24 hour digital display<br>Temperature Control - 26°C limit when using timer program       |                          |
| Indicators:                                      | Burner ON, child lock, filter, economy, digital display, over-ride,<br>Clock setting, timer setting, timer, temperature display                                               |                          |
| Operating buttons:                               | ON-OFF, up-down, child lock, economy, timer, clock setting, over-ride, timer set                                                                                              |                          |
| Remote control:<br><b>(556FTR only)</b>          | ON-OFF, temperature adjustment                                                                                                                                                |                          |
| Economy mode:                                    | Energy saving feature                                                                                                                                                         |                          |
| Child lock:                                      | Locks all controls except OFF                                                                                                                                                 |                          |
| Humidifier Tray:                                 | Capacity – 1300 cc                                                                                                                                                            |                          |
| Safety devices:                                  | Flame failure<br>Overheat<br>Power failure<br>Power surge<br>Fan delay<br>Flame rod<br>Bi-metal switch, thermal fuse, thermistor<br>PCB<br>3 Amp fuse<br>Micro computer timer |                          |
| Noise level range:                               | HI – LOW = 41 ~ 33 dB(A)                                                                                                                                                      | HI – LOW = 38 ~ 31 dB(A) |

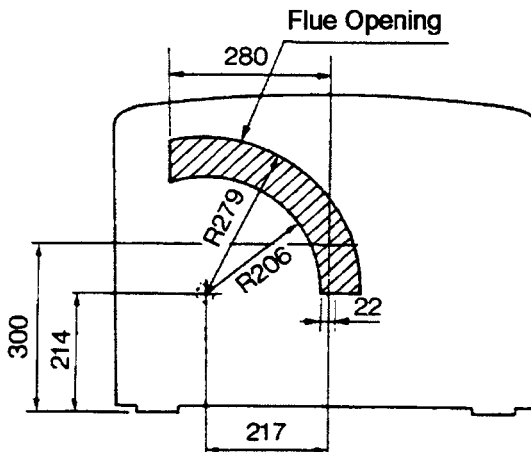
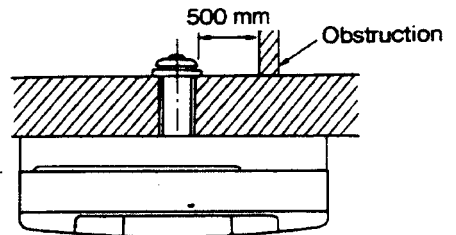
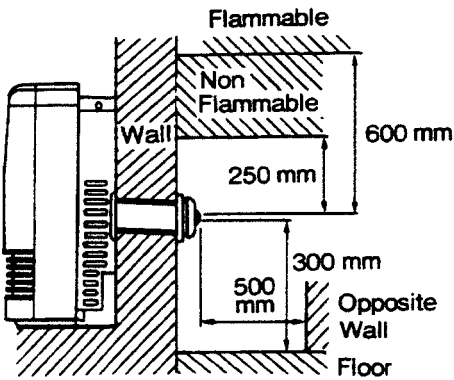
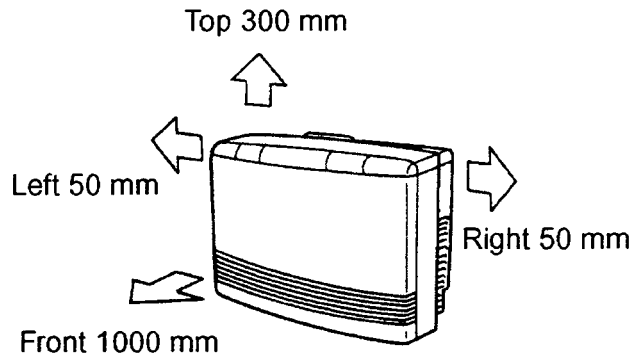
RHFE-556 FTR  
RHFE-431 FT



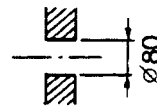


**NOTE**

The information provided here is only a guide. For full details on installation procedures you are advised to contact Rinnai directly, or consult the Customers Operating and Installation booklet.



Flue Hole



## 1. Basic combustion specification

| Item                                 |    | Specification                   |          |            |          |
|--------------------------------------|----|---------------------------------|----------|------------|----------|
| Rinnai model number                  |    | RHFE-556FTR/556FM               |          | RHFE-431FT |          |
| Gas type                             |    | NG                              | Propane  | NG         | Propane  |
| Gas consumption MJ/h                 | HI | 23                              | 23       | 18         | 18       |
|                                      | LO | 9                               | 9        | 8          | 8        |
| Injector size (ø mm)                 |    | 1.30                            | 0.85     | 1.10       | 0.70     |
| Injector quantity                    |    | 4                               | 4        | 4          | 4        |
| Secondary damper (ø mm) and quantity |    | 33x47 (1)                       | 2.5 (15) | 33x47 (1)  | 2.5 (15) |
| Regulator pressure (kPa)             | HI | 0.51                            | 1.06     | 0.65       | 1.10     |
|                                      | LO | 0.09                            | 0.18     | 0.15       | 0.32     |
| Burner marking                       |    | P                               | P        | P          | P        |
| Combustion method                    |    | Bunsen burner                   |          |            |          |
| Burner type                          |    | Stainless slit style            |          |            |          |
| Solenoid valve                       |    | Direct single seated valve type |          |            |          |
| Modulating solenoid valve            |    | Rinnai electronic control       |          |            |          |

## 556/431 PCB Dip Switch positions

| Gas     | Model |           | 1 | 2  | 3 | 4 |  |
|---------|-------|-----------|---|----|---|---|--|
| N.G.    | 556   | 2, ON     |   | ON |   |   |  |
|         | 431   | 2,3,4, ON |   | ON |   |   |  |
| Propane | 556   | 1, ON     |   | ON |   |   |  |
|         | 431   | 1,3,4, ON |   | ON |   |   |  |

## 2 Combustion fan speeds

|               | RHFE-556FTR/556FM |         | RHFE-431FT |         |
|---------------|-------------------|---------|------------|---------|
|               | Propane           | Natural | Propane    | Natural |
| Ignition      | 1500              | 1530    | 1260       | 1320    |
| Re-ignition   | 1980              | 1830    | 1530       | 1560    |
| Normal - High | 3180              | 3180    | 2430       | 2430    |
| Normal - Low  | 1290              | 1290    | 1140       | 1170    |

### 3.1 Warm air discharge temperature distribution

#### RHFE-556FTR/556FM

Condition: < High Combustion >

Test gas: Natural  
 Measured input: 22.8 MJ/h  
 Nominal input: 23 MJ/h  
 Room temperature: 22 °C

(Unit Δ °C)

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 67 | 67 | 18 | 18 | 33 | 7  |
| 59 | 61 | 18 | 27 | 34 | 20 |
| 81 | 37 | 39 | 42 | 40 | 69 |
| 65 | 78 | 69 | 73 | 65 | 83 |
| 37 | 95 | 74 | 95 | 88 | 83 |
| 44 | 86 | 98 | 98 | 92 | 81 |

Condition: < Low Combustion >

Test gas: Natural  
 Measured input: 8.9 MJ/h  
 Nominal input: 9 MJ/h  
 Room temperature: 22 °C

(Unit Δ °C)

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 33 | 38 | 10 | 11 | 17 | 8  |
| 27 | 34 | 12 | 16 | 19 | 17 |
| 36 | 20 | 33 | 26 | 23 | 42 |
| 28 | 53 | 41 | 41 | 43 | 57 |
| 17 | 60 | 48 | 56 | 55 | 60 |
| 22 | 45 | 61 | 56 | 57 | 50 |

3.2 Warm air discharge temperature distribution

RHFE-431FT

Condition: < High Combustion >

Test gas: Natural  
Measured input: 17.5 MJ/h  
Nominal input: 18 MJ/h  
Room temperature: 22 °C

(Unit Δ °C)

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 34 | 53 | 13 | 13 | 33 | 18 |
| 47 | 66 | 31 | 22 | 38 | 24 |
| 74 | 53 | 39 | 25 | 35 | 42 |
| 46 | 72 | 63 | 48 | 55 | 47 |
| 47 | 75 | 65 | 61 | 92 | 68 |
| 66 | 76 | 72 | 66 | 88 | 77 |

Condition: < Low Combustion >

Test gas: Natural  
Measured input: 7.8 MJ/h  
Nominal 8 MJ/h  
Room temperature: 22 °C

(Unit Δ °C)

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| 24 | 31 | 8  | 6  | 9  | 9  |
| 30 | 38 | 21 | 14 | 19 | 15 |
| 49 | 32 | 32 | 20 | 20 | 23 |
| 25 | 43 | 40 | 30 | 36 | 30 |
| 29 | 46 | 43 | 38 | 54 | 41 |
| 29 | 44 | 45 | 39 | 53 | 48 |

4.1 Warm air discharge velocity

RHFE-556FTR/556FM

< High Operation >

(Unit: m/sec)

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1.71 | 2.49 | 3.31 | 2.73 | 2.83 | 0.59 |
| 3.04 | 1.92 | 0.99 | 0.80 | 0.97 | 1.76 |
| 3.43 | 2.50 | 2.30 | 2.94 | 1.47 | 2.58 |
| 3.50 | 3.06 | 2.94 | 3.42 | 2.06 | 3.21 |
| 3.56 | 3.40 | 3.16 | 3.15 | 2.86 | 2.74 |
| 3.51 | 3.42 | 3.06 | 3.32 | 3.42 | 2.81 |

< Low Operation >

(Unit: m/sec)

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1.14 | 1.68 | 2.38 | 2.05 | 1.79 | 0.49 |
| 1.98 | 1.32 | 0.83 | 0.66 | 0.70 | 1.18 |
| 2.36 | 1.82 | 1.50 | 2.07 | 1.14 | 1.86 |
| 2.33 | 2.22 | 1.88 | 2.27 | 1.39 | 2.26 |
| 2.25 | 2.37 | 2.12 | 2.40 | 2.05 | 2.02 |
| 2.30 | 2.20 | 2.27 | 2.23 | 2.51 | 1.96 |

- Conditions:
- Convection fan revolutions
  - Measured with burner off
  - Average air velocity on High: 2.65 m/sec
  - Average air velocity on Low: 1.83 m/sec
  - Area of louvre: 0.0285 m<sup>2</sup>
  - Air flow rate on High: 4.53 m<sup>3</sup>/min
  - Air flow rate on Low: 3.13 m<sup>3</sup>/min

High: 1080 rpm

Low: 770 rpm

## 4.2 Warm air discharge velocity

### RHFE-431FT

< High Operation >

(Unit: m/sec)

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 0.55 | 2.16 | 2.92 | 1.40 | 2.04 | 0.48 |
| 2.87 | 2.09 | 1.71 | 0.71 | 1.22 | 1.82 |
| 2.78 | 2.39 | 2.01 | 1.51 | 1.42 | 2.78 |
| 2.85 | 2.98 | 2.51 | 2.41 | 2.46 | 3.12 |
| 2.87 | 3.20 | 2.94 | 3.04 | 2.58 | 3.10 |
| 2.88 | 2.78 | 3.35 | 3.04 | 2.83 | 2.41 |

< Low Operation >

(Unit: m/sec)

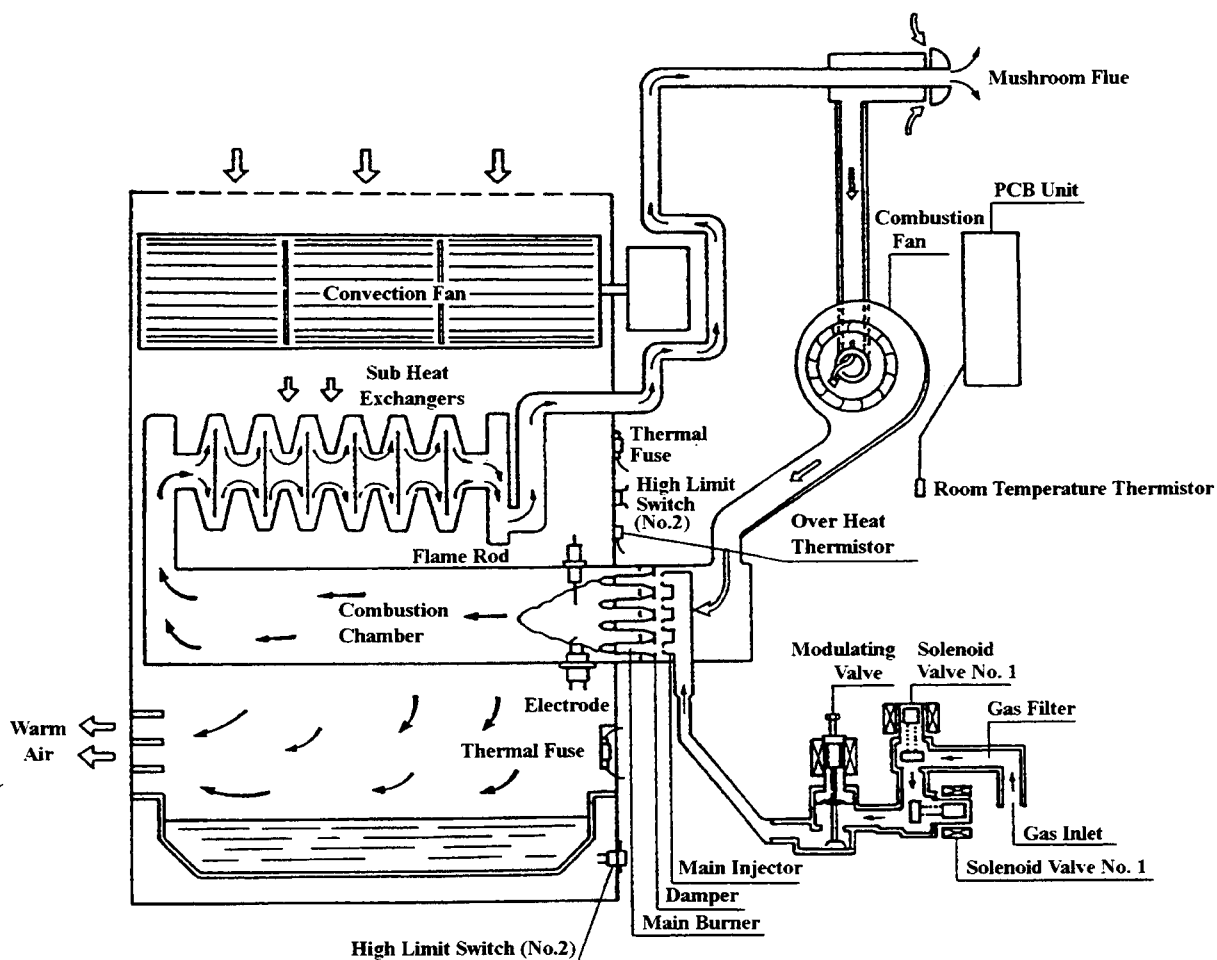
|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 0.44 | 1.34 | 2.33 | 1.25 | 1.55 | 0.43 |
| 2.34 | 1.32 | 1.14 | 0.54 | 0.99 | 1.27 |
| 2.15 | 1.77 | 1.52 | 1.3  | 1.01 | 2.00 |
| 2.15 | 2.23 | 1.91 | 1.95 | 1.85 | 2.19 |
| 2.14 | 2.51 | 2.25 | 2.33 | 2.15 | 2.41 |
| 2.36 | 2.11 | 2.56 | 2.38 | 2.17 | 1.71 |

- Conditions:
- Convection fan revolution. High: 890 rpm  
Low: 680 rpm
  - Measured with burner off
  - Average air velocity on High: 2.34 m/sec
  - Average air velocity on Low: 1.78 m/sec
  - Area of louver: 0.0285 m<sup>2</sup>
  - Air flow rate on High: 4.00 m<sup>3</sup>/min
  - Air flow rate on Low: 3.04 m<sup>3</sup>/min

## 5. Noise Level

- Measurement taken during normal combustion.
- Unit: dB(A).

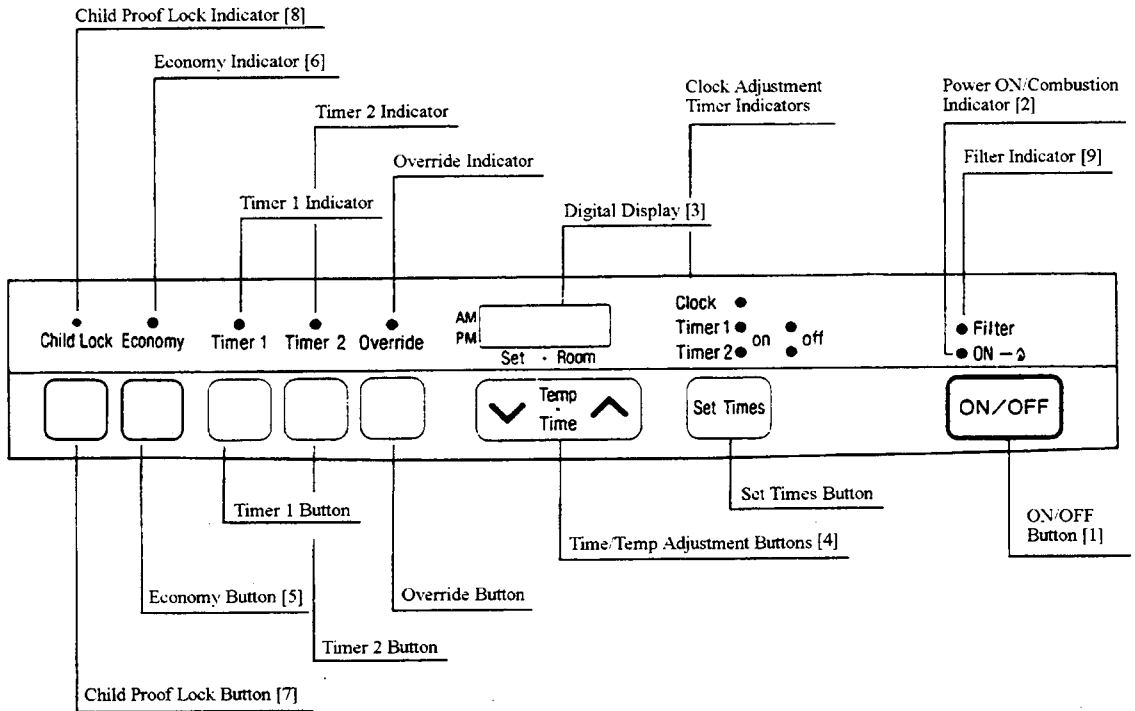
|      | 556FTR/556FM | 431FT |
|------|--------------|-------|
| High | 41           | 38    |
| Low  | 33           | 31    |



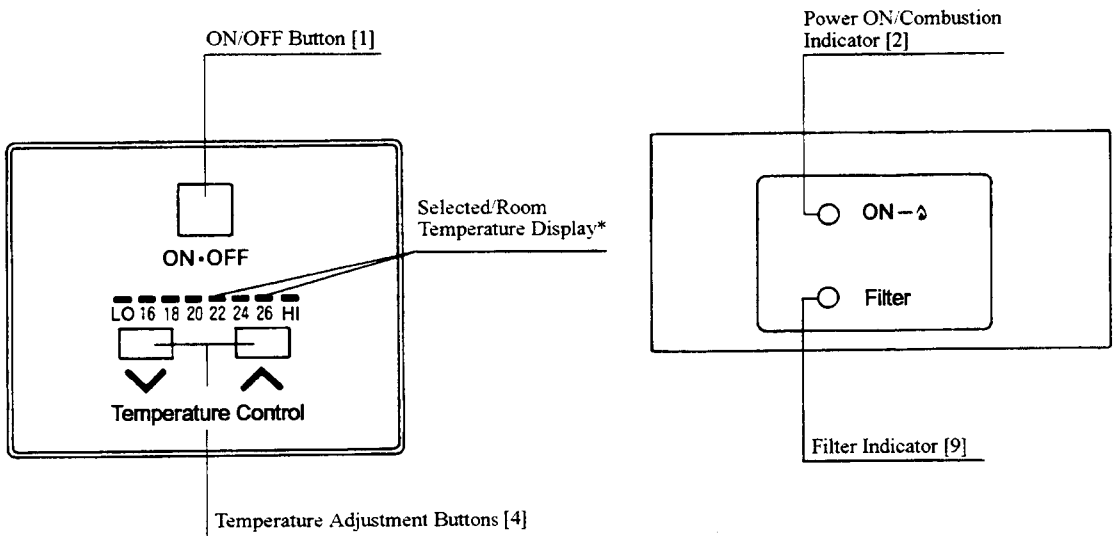
✱ Refer to Appendix 1 at rear of manual for explanation on setting clock, timers, and operating timers for 556FTR/431FT.

### RHFE-556FTR

### RHFE-431FT



### RHFE-556FM



✱ **Flashing LED is room temperature.**  
**Steady LED is selected temperature.**

※ Numbers in brackets refer to location of functions on control panel, page 13.

## 1. Normal Operation

Push the ON/OFF button [1] to operate the appliance. The power ON/combustion indicator [2] will glow green. The combustion fan will run on high until pre-purge is completed.

Pre-purge is completed after approximately 15 seconds, following which, the combustion fan will decrease revolutions to enable ignition to occur. After the combustion fan reaches a pre-determined speed, (depending on gas type) the electrode produces the spark to begin the ignition cycle.

After the spark is sensed as having crossed the spark gap by the PCB, the solenoids (SV<sub>1</sub> & SV<sub>2</sub>) as well as the modulating valve will open and allow gas to flow to the burner.

The flame rod senses the flame on the main burner. After the flame is sensed, the power ON/combustion indicator [2] changes to red and the spark stops. After an additional 15 seconds the convection fan begins to operate.

The room temperature is sensed by the temperature thermistor located at the rear of the appliance. The printed circuit board controls the air/gas ratio to the optimum level according to the selected temperature. The combustion fan is adjusted in conjunction with the opening degree of the modulating valve. The convection fan is adjusted in the same manner.

## 2. Thermostat Control

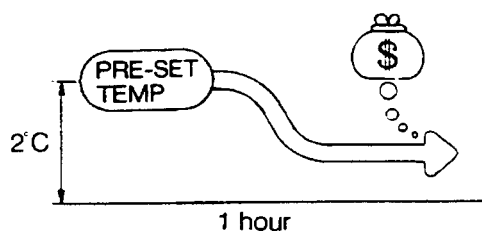
The selected and room temperatures are displayed on the digital or LED display [3]. Time and temperature are displayed alternately depending whether the heater is running or not (556FTR/431FT only). The selected temperature is altered by pressing the time/temperature adjustment buttons [4].

## 3. Turning Off

Simply press the ON/OFF button [1]. The solenoids, together with the modulating valve will close. The combustion fan will also stop, and all indicators will go out. After the burner extinguishes, the convection fan will continue to run for up to 210 seconds, ensuring the appliance is cool.

## 4. Economy Mode (556FTR/431FT only)

To engage the economy function press the economy button [5] while the heater is operational. The economy indicator [6] will glow. The economy function is designed to drop the selected temperature by a total of 2°C over a period of one hour, once the selected temperature has been reached. After 30 minutes the temperature will be reduced by 1°C. After a further 30 minutes the temperature will be reduced by another 1°C.



This does not result in a loss to the heating effectiveness, rather it is an energy saving feature.

You may press the economy button [5] at any time again, to cancel the economy function.

## **5. Child Proof Lock (556FTR/431FT only)**

To activate the child proof lock press the child lock button [7]. The child proof lock indicator [8] will glow.

If the child proof lock is activated during normal operation, then no functions other than the ON/OFF switch will be operable until the lock is released.

If the child proof lock is activated whilst the appliance is OFF, then the complete range of functions will be locked.

## **6. Filter Indicator**

When the air filter becomes covered in dust and the temperature inside the appliance rises, the filter indicator [9] will glow.

## **7. Fuzzy Logic**

The main aim of this function is to heat a room comfortably, without cold draughts from the appliance, by controlling the flow of air coming from the heater as the heat exchanger temperature rises. This also increases heating efficiency.

In order to achieve comfortable heating, it is preferable to avoid cold draughts from the appliance. Also for increased efficiency it is important to reduce overheating the room and concentrate heating the area where people are most often situated.

Fuzzy logic has been adopted in order to achieve the above improved heating pattern.

The information which becomes the basis for "fuzzy" control is 'room temperature' and 'the time elapsed since the start of combustion'. The means of control is the speed of the convection fan.

In the case of a conventional fan heater, the convection fan operates normally from the time of ignition and a cold draught may accompany the flow of air from the appliance. To tone down this unsuitable or uncomfortable situation, fuzzy logic controls the speed of the convection fan after taking into consideration the room temperature at the time of ignition. For example: in the case of the room temperature being low, then the fan is made to rotate at a low speed. As the room temperature rises, the speed of the convection fan is gradually increased. In this way it is possible to ensure a comfortable volume of warmed air whilst decreasing the possibility of cold draughts immediately after ignition.

The fan speed increases proportionally as time passes, and the room gradually heats up. This improves the warm air distribution, assisting in a reduction of stratification throughout the room and resulting in more effective heating conditions. The PCB continually monitors the room temperature and adjusts the fan speed depending on the conditions at the time.

## **8. Clock and Timer Setting and Operation (556FTR/431FT only)**

Refer to *appendix 1* at back of this manual.

.

**Flame rod sensor**

Senses main burner ignition and shuts off the solenoid valves when the flame current drops below  $0.1 \mu\text{A}$ .

\* Ignition sensing current: under  $0.8 \mu\text{A}$ .

\* Extinction sensing current: above  $0.1 \mu\text{A}$ .

**Spark sensing circuit**

Senses the location of spark and opens the solenoid valves only when the spark location is confirmed as correct.

**Pre-purge circuit**

Purges heat exchanger and flue prior to spark commencing.

**Combustion fan rpm sensing circuit**

Senses the operation of the combustion fan and maintains a pre-determined rotation speed.

**Overheat protection switches**

Shut off the solenoid valves and cut off gas supply in the case of over heating.

i) Bimetal OHS1

Operates at  $130 \pm 5^\circ\text{C}$

Recovery at  $115 \pm 7^\circ\text{C}$

ii) Bimetal OHS2

Operates at  $90 \pm 5^\circ\text{C}$

Recovery at  $75 \pm 7^\circ\text{C}$

iii) Thermal Fuses

|            |                           |
|------------|---------------------------|
| Cut out at | $152 \pm 2^\circ\text{C}$ |
|            | $152 \pm 2^\circ\text{C}$ |
|            | $130 \pm 2^\circ\text{C}$ |
|            | (one shot)                |

iv) Thermistor

Operates at different temperatures depending on gas input, see page 17.

**Fan delay**

The convection fan starts after a short delay to avoid cold draughts, and keeps running after burner extinction to allow the unit to cool down.

|        |         |
|--------|---------|
| ON AT  | 15 sec  |
| OFF AT | 210 sec |

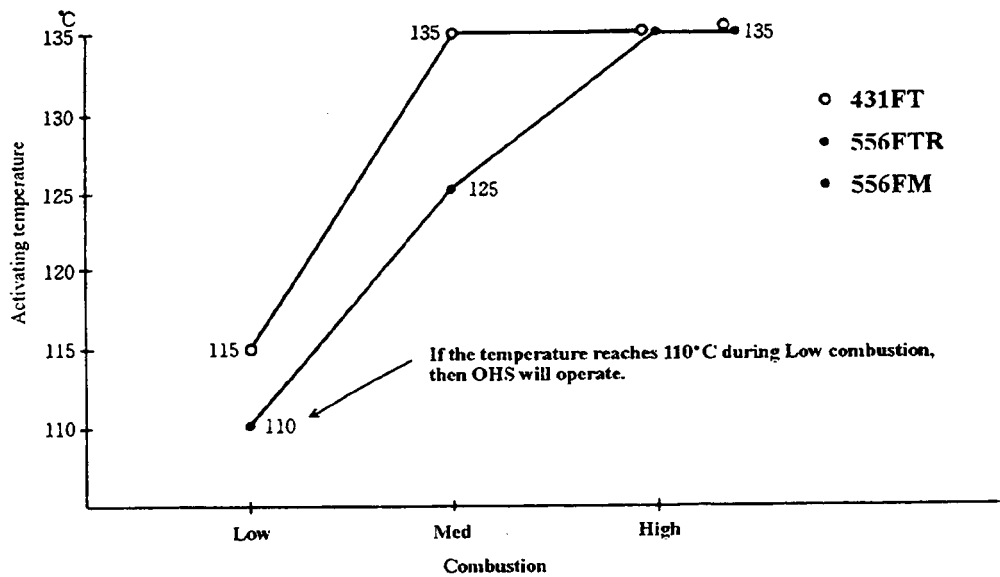
**Power failure circuit**

Shuts off the solenoid valves if a power power failure occurs. The unit will relight after the power is restored, and the clock time will be slow by the amount of time the power was off.

1. Overheat Control Method

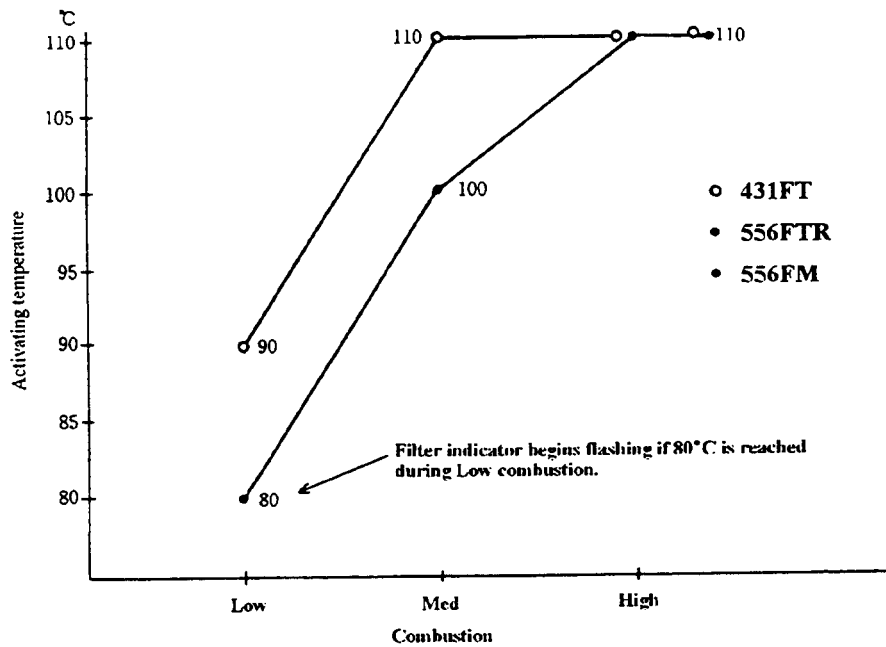
The overheat thermistor activates the overheat sensor and the filter indicator, as well as increasing the fan rpm.

(A) Overheat Sensor



\* The overheat thermistor activates at different temperatures for different gas rates.

(B) Filter Indicator

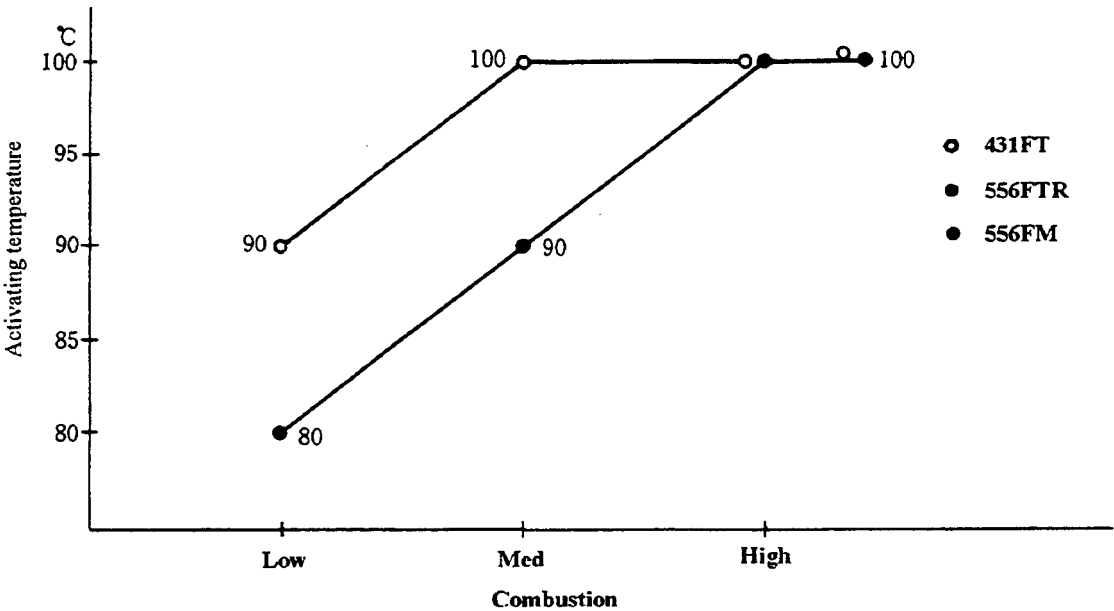


**Note 1:** Once the overheat limit temperature has been sensed and the filter indicator begins flashing, it will not go out, even if the temperature falls below the limit.

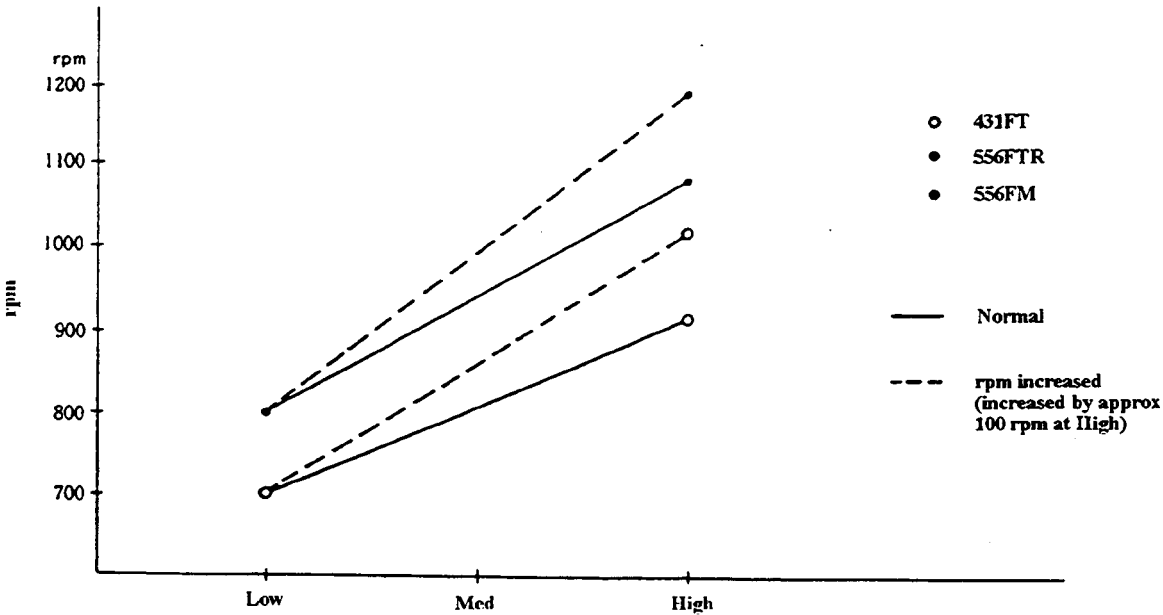
**Note 2:** Once the filter indicator begins flashing, gas input is limited to roughly 90% of high combustion.

(C) Convection Fan RPM Increase

The fan rpm increase to compensate for a reduction in air flow due to a clogged air filter or other causes. The convection fan rpm is normally determined by combustion level. The speed changes by approximately 10 rp/sec while increasing, or decreasing.



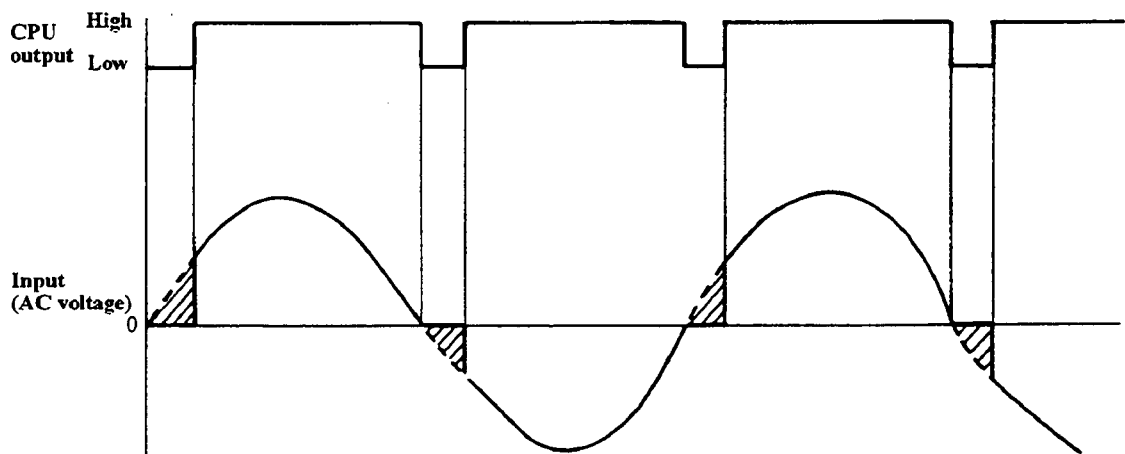
Once the temperature reaches the activating level and the convection fan speed increases, the fan speed remains at this increased level, even when the temperature at the thermistor falls lower than the activating temperature, during operation.



The solid line on the graph shows the fan speed during normal operation with a clean air filter. The fan speed with the air filter blocked (thermistor activated) is shown by the dotted line.

2. Convection Fan Control

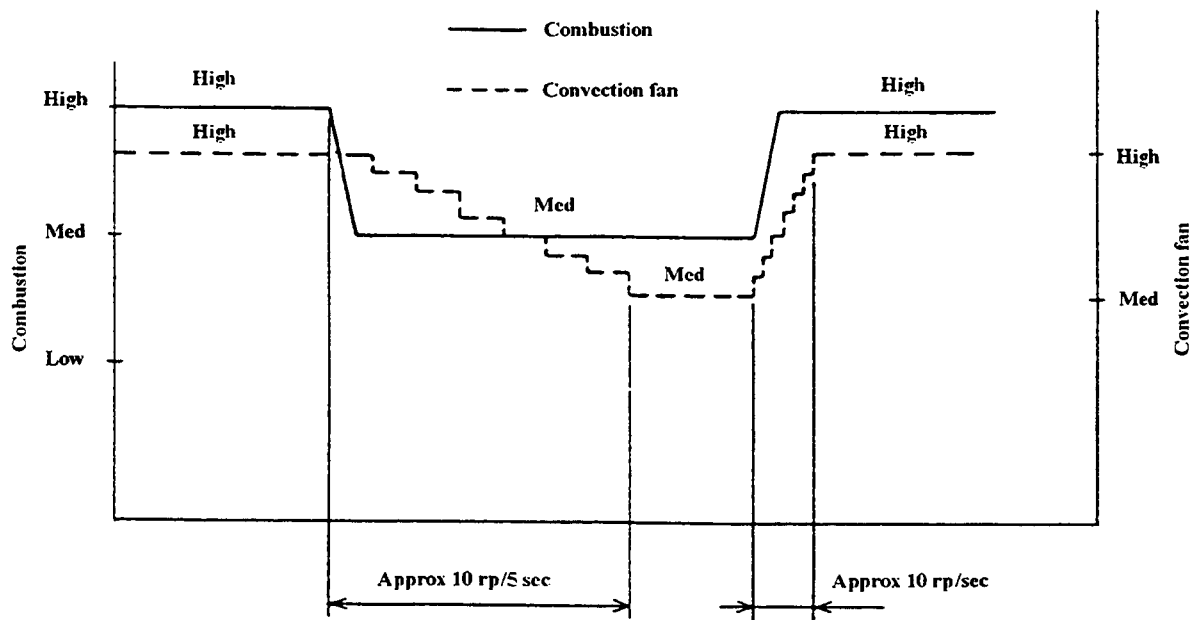
The phase control method regulates speed by turning off the fan activation signal for a specified interval after sensing that the AC wave form has crossed the zero point on the axis, and then applying input from which a portion of the output power wave form has been cut. Speed is controlled in proportion to the cut section.



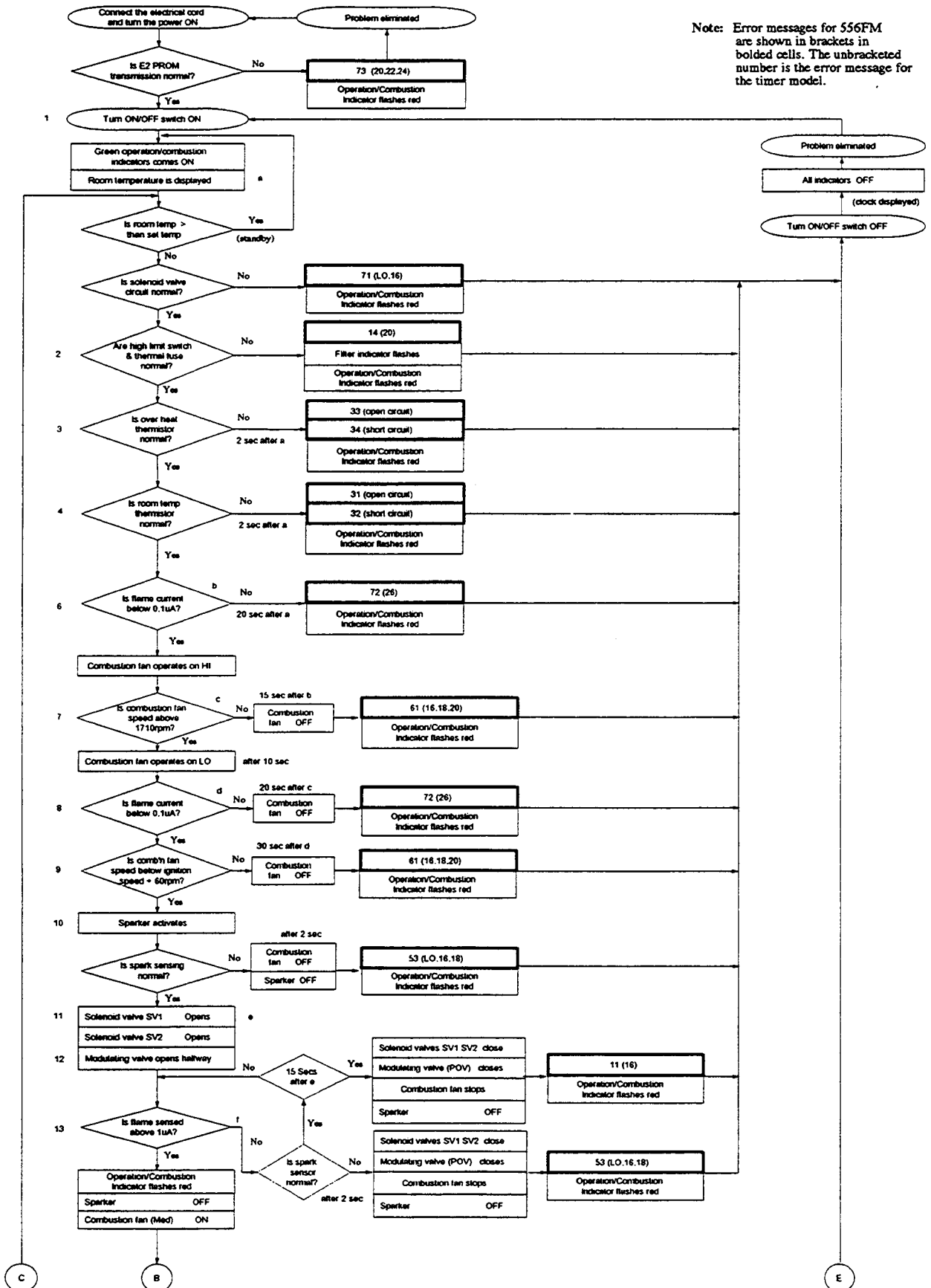
The shaded regions in the wave form are cut, and altering the size of these cut areas alters the fan input voltage, which controls the speed.

3. Fan Delay

The fan delay keeps the convection fan running for a specified time after combustion has ceased in order to efficiently use the residual heat within the unit, while at the same time cooling the unit down.



Note: Error messages for 556FM are shown in brackets in bold cells. The unbracketed number is the error message for the timer model.





| Flow ref. | CN       | Wire colour                                 |            | Value (Normal)                                                                                                          |                                  |
|-----------|----------|---------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|           |          |                                             |            | 556FTR/556FM                                                                                                            | 431FT                            |
| 1         | I        | red - blue<br>blue - blue                   |            | DC 3 ~ 10 V, $\infty$ resistance (current flows when switched on)                                                       |                                  |
| 2         | H        | white - black                               |            | below DC 1 V, below 4 $\Omega$ (current flows)                                                                          |                                  |
|           | H1       | black - red (Hi-limit switch No. 1)         |            |                                                                                                                         |                                  |
|           | H2       | red - white (Hi-limit switch No. 2)         |            |                                                                                                                         |                                  |
|           | H3       | white - white (Thermal fuse No. 1)          |            |                                                                                                                         |                                  |
|           | H2<br>H3 | white - white (Thermal fuse No. 2)          |            |                                                                                                                         |                                  |
| 3         | A        | white - white                               |            | 0.6 ~ 523 k $\Omega$ ( < 0.6 k $\Omega$ : short, >523 k $\Omega$ : open)                                                |                                  |
|           |          | temperature                                 |            | 0°C: 218 k $\Omega$ , 20°C: 78k $\Omega$ , 50°C: 21k $\Omega$ , 80°C: 7.3k $\Omega$ , 100°C: 3.6k, 135°C: 1.5k $\Omega$ |                                  |
| 4         | A        | yellow - yellow                             |            | 1.8 ~ 844 k $\Omega$ ( < 1.8 k $\Omega$ : short, >844 k $\Omega$ : open)                                                |                                  |
|           |          | temperature                                 |            | 0°C: 123 k $\Omega$ , 20°C: 39k $\Omega$ , 30°C: 23k $\Omega$ , 40°C: 14k $\Omega$                                      |                                  |
| 5         | A        | grey - grey                                 |            | 1.8 ~ 844 k $\Omega$ ( < 1.8 k $\Omega$ : short, >844 k $\Omega$ : open)                                                |                                  |
|           |          | temperature                                 |            | 0°C: 123 k $\Omega$ , 20°C: 39k $\Omega$ , 30°C: 23k $\Omega$ , 40°C: 14k $\Omega$                                      |                                  |
| 6         | E1       | yellow - yellow                             |            | below DC 0.1 $\mu$ A                                                                                                    |                                  |
| 7         | G        | black - white                               |            | below 57 Hz                                                                                                             |                                  |
| 8         | E1       | yellow - yellow                             |            | below DC 0.1 $\mu$ A                                                                                                    |                                  |
| 9         | G        | black - white                               |            | below ignition revolution + 2 Hz                                                                                        |                                  |
|           |          | ignition revolution                         | initial    | LP: 50 Hz, NG: 51 Hz                                                                                                    | LP: 42 Hz, NG: 44 Hz             |
|           |          |                                             | re-attempt | LP: 66 Hz NG: 61 Hz                                                                                                     | LP: 51 Hz NG: 52 Hz              |
| 10        | F        | blue - red                                  |            | AC 85 ~ 110 V                                                                                                           |                                  |
| 11        | F        | black - yellow                              |            | DC 78 ~ 100 V, 1.3 ~ 2.2 k $\Omega$                                                                                     |                                  |
| 12        | H        | grey - grey                                 |            | DC 1 ~ 15 V (low ~ high) 80 ~ 100 $\Omega$                                                                              |                                  |
| 13        | E1       | yellow - yellow                             |            | above DC 1 $\mu$ A                                                                                                      |                                  |
| 14        | A        | white - white<br>(filter sign)              | high       | flashes below 2.9 k $\Omega$                                                                                            | flashes below 2.9 k $\Omega$     |
|           |          |                                             | low        | flashes below 7.3 k $\Omega$                                                                                            | flashes below 5.3 k $\Omega$     |
| 15        | G        | black - white<br>(normal revolution)        | high       | LP: 106 Hz, NG: 106 Hz                                                                                                  | LP: 81 Hz, NG: 81 Hz             |
|           |          |                                             | low        | LP: 43 Hz, NG: 43 Hz                                                                                                    | LP: 38 Hz, NG: 39 Hz             |
| 16        | A        | white - white<br>(Hi-limit switch operates) | high       | operates at below 1.5 k $\Omega$                                                                                        | operates at below 1.5 k $\Omega$ |
|           |          |                                             | low        | operates below 2.9 k $\Omega$                                                                                           | operates below 2.6 k $\Omega$    |
| 17        | D        | grey - pink                                 |            | AC 50 ~ 108 V (low ~ high), 90 ~ 180 $\Omega$                                                                           |                                  |

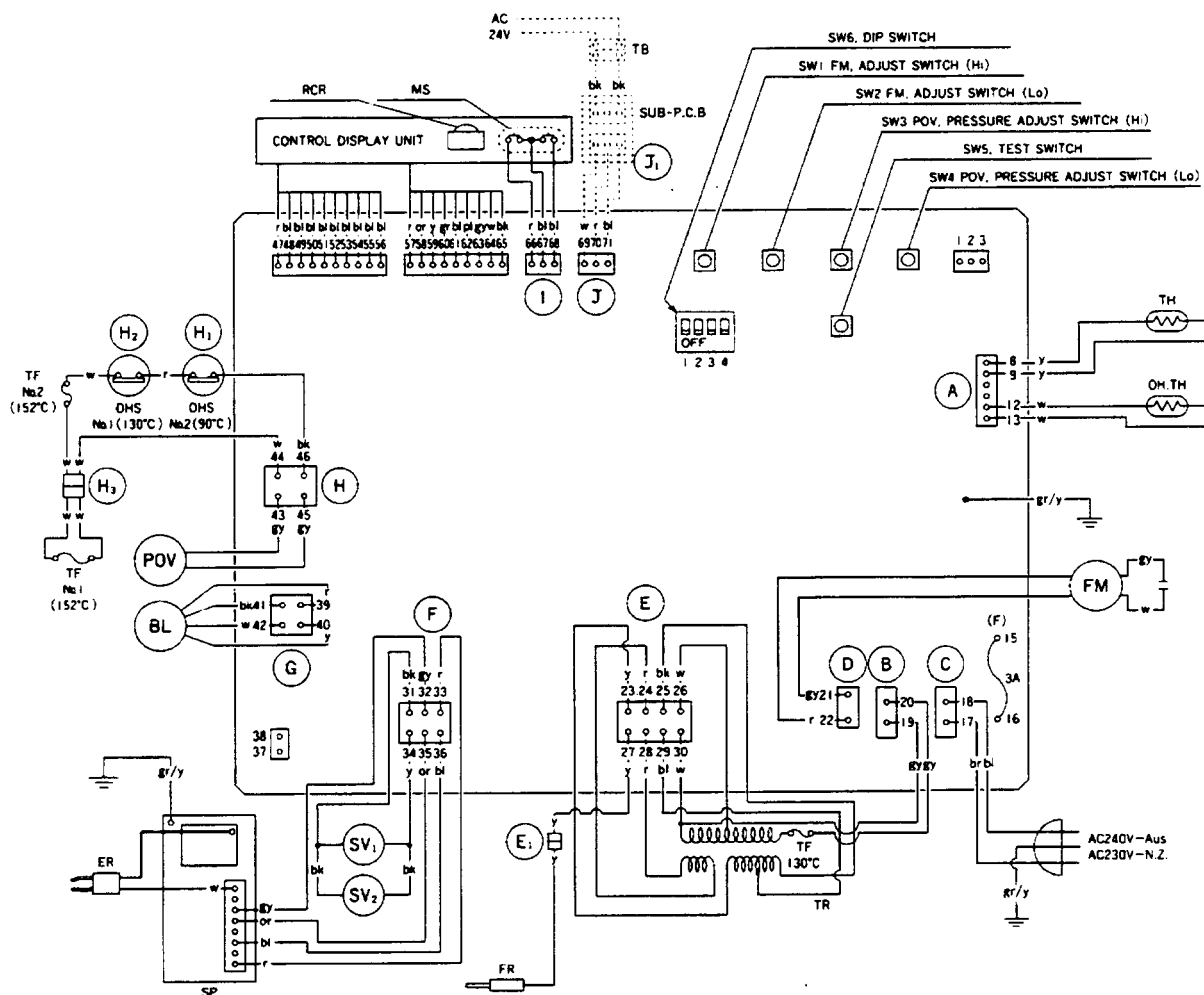
\* Operational flow chart, see page 20.

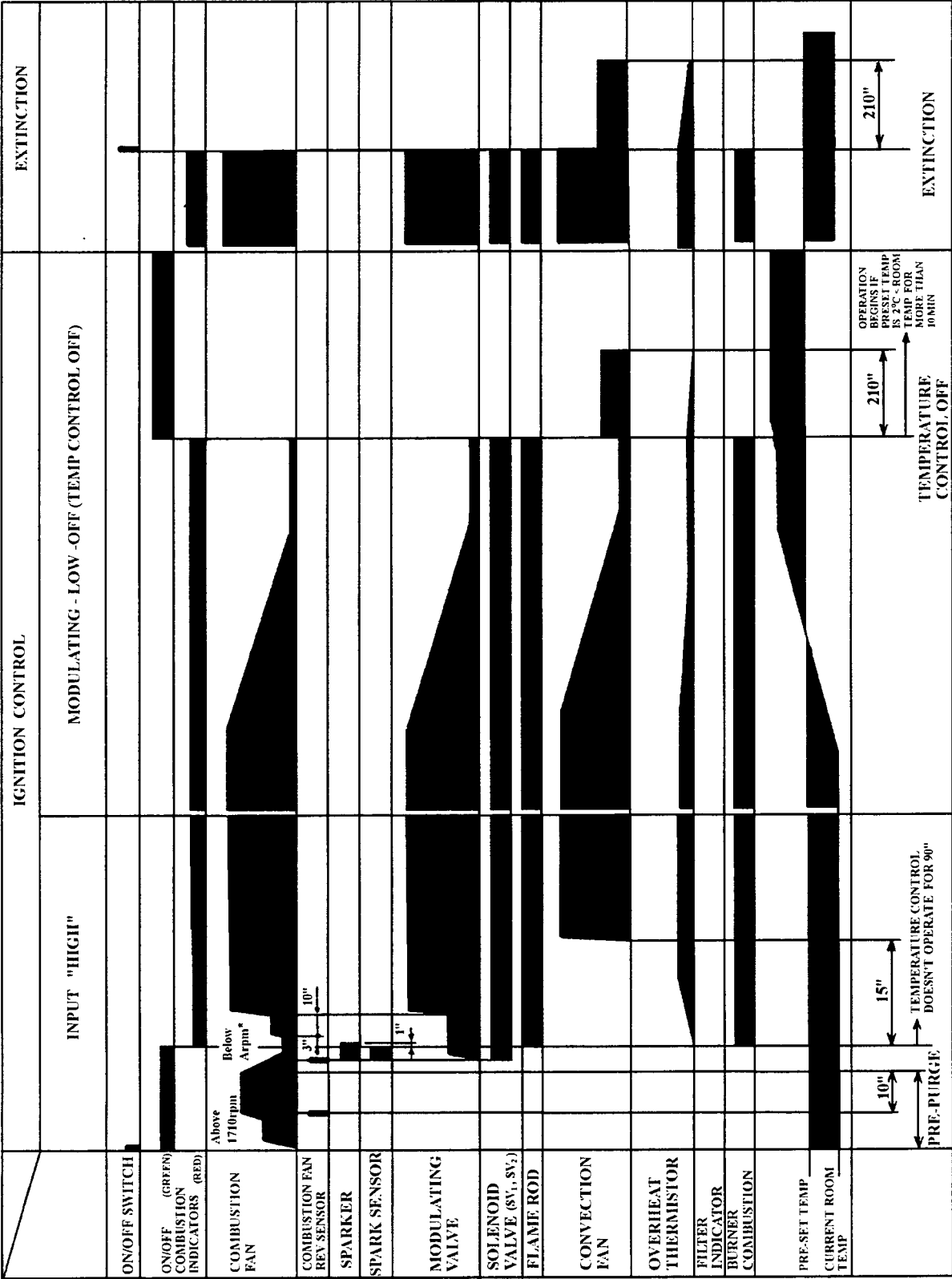
\* CN denotes connector number on wiring diagram, see page 23.

## Transformer values

|               | Australia [240 V] | New Zealand [230 V] |
|---------------|-------------------|---------------------|
| Yellow - Blue | AC 130 ~ 180 V    | AC 130 ~ 180 V      |
|               | 200 ~ 400 Ω       | 200 ~ 400 Ω         |
| Blue - Black  | AC 10 ~ 16 V      | AC 10 ~ 16 V        |
|               | 1 ~ 3 Ω           | 1 ~ 3 Ω             |
| Red - Red     | AC 25 ~ 50 V      | AC 25 ~ 50 V        |
|               | 1 ~ 3 Ω           | 1 ~ 3 Ω             |
| Grey - Grey   | AC 216 ~ 264 V    | AC 207 ~ 253 V      |
|               |                   |                     |

| MARK   | PART NAME                 |
|--------|---------------------------|
| MS     | MAIN SWITCH               |
| RC     | REMOTE CONTROL            |
| TH     | THERMISTOR                |
| TF1~2  | THERMAL FUSE 1~2          |
| F      | FUSE                      |
| CF     | CONVECTION FAN            |
| FCC    | FAN CONTROL CIRCUIT       |
| ER     | ELECTRODE                 |
| POV    | MODULATING SOLENOID VALVE |
| TR     | TRANSFORMER               |
| RCR    | REMOTE CONTROL RECEIVER   |
| TB     | TERMINAL BLOCK            |
| OH.TH  | OVER HEAT THERMISTOR      |
| OHS1~2 | OVER HEAT SWITCH 1~2      |
| FM     | FAN MOTOR                 |
| BL     | COMBUSTION FAN MOTOR      |
| SP     | SPARKER                   |
| FR     | FLAME ROD                 |
| SV1~2  | MAIN SOLENOID VALVE 1~2   |
| CPU    | CENTRAL PROCESSING UNIT   |



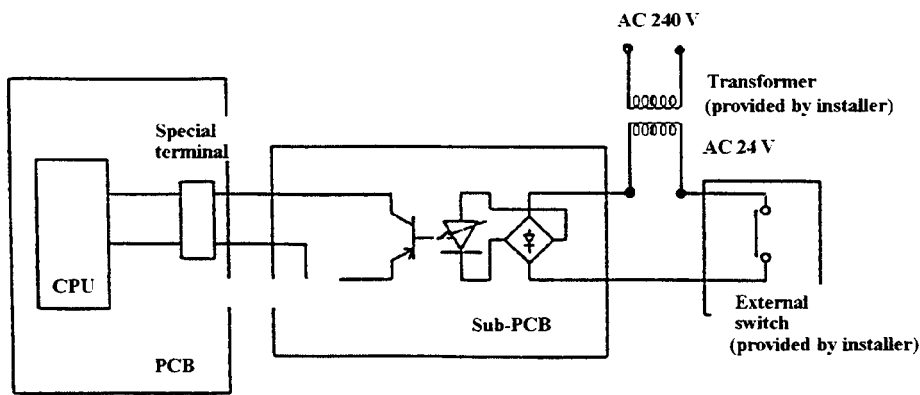


\* Ignition revolution (refer to Diagnostic Points)

| PROBLEM                                             | FLAME FAILURE<br>"12" FLASHING | OVER HEAT<br>"14" FLASHING | POWER FAILURE<br>(OVER 0.2 SEC)<br>"00" FLASHING<br>OR RE-IGNITION                                                                                                        |
|-----------------------------------------------------|--------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ON/OFF SWITCH                                       |                                |                            |                                                                                                                                                                           |
| ON/OFF<br>(GREEN)<br>COMBUSTION<br>INDICATORS (RED) |                                |                            |                                                                                                                                                                           |
| COMBUSTION<br>FAN                                   |                                |                            |                                                                                                                                                                           |
| COMBUSTION FAN<br>REV SENSOR                        |                                |                            |                                                                                                                                                                           |
| SPARKER                                             |                                |                            |                                                                                                                                                                           |
| SPARK SENSOR                                        |                                |                            |                                                                                                                                                                           |
| MODULATING<br>VALVE                                 |                                |                            |                                                                                                                                                                           |
| SOLENOID<br>VALVE (SV, SV <sub>2</sub> )            |                                |                            |                                                                                                                                                                           |
| FLAME ROD                                           |                                |                            |                                                                                                                                                                           |
| CONVECTION<br>FAN                                   |                                |                            |                                                                                                                                                                           |
| OVERHEAT<br>THERMISTOR                              |                                |                            |                                                                                                                                                                           |
| FILTER<br>INDICATOR<br>BURNER<br>COMBUSTION         |                                |                            |                                                                                                                                                                           |
| PRE-SET TEMP                                        |                                |                            |                                                                                                                                                                           |
| CURRENT ROOM<br>TEMP                                |                                |                            |                                                                                                                                                                           |
|                                                     | 2" 210"                        | 255"                       | POWER FAILURE POWER<br>INSTALLED*<br>* REIGNITES WHEN POWER<br>FAILURE < 0.2 SEC.<br>"00" OR "12" AND "COMBUSTION<br>INDICATOR" FLASHING WHEN<br>POWER FAILURE > 0.2 SEC. |

| PROBLEM                                          | IGNITION FAILURE<br>"1" FLASHING                                                                                                                                                                              | DOESN'T SENSE SPARK<br>"55" FLASHING                                                                                                                                                                                                                                                     | ROTATION SPEED OF<br>COMBUSTION FAN DOESN'T<br>RISE "61" FLASHING                                                                                                                           | ROTATION SPEED OF COMBUSTION<br>FAN STAYS "HIGH" AND DOESN'T<br>SENSE "LOW" "61" FLASHING                                                                                                   |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ON/OFF SWITCH                                    |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| ON/OFF (GREEN)<br>COMBUSTION<br>INDICATORS (RED) |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| COMBUSTION<br>FAN                                |  <p>ABOVE 1710 rpm</p>  <p>BELOW Arpm</p> |  <p>ABOVE 1710 rpm</p>  <p>BELOW Arpm</p>                                                                            |  <p>BELOW 1710 rpm</p>                                                                                    |                                                                                                           |
| COMBUSTION FAN<br>REV SENSOR                     |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| SPARKER                                          |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| SPARK SENSOR                                     |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| MODULATING<br>VALVE                              |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| SOLENOID<br>VALVE (SV, SV2)                      |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| FLAME ROD                                        |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| CONVECTION<br>FAN                                |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| OVERHEAT<br>THERMISTOR                           |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| FILTER<br>INDICATOR                              |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| BURNER<br>COMBUSTION                             |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| PRE-SET TEMP                                     |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
| CURRENT ROOM<br>TEMP                             |                                                                                                                             |                                                                                                                                                                                                        |                                                                                                           |                                                                                                           |
|                                                  |  <p>10"</p>  <p>15"</p>                   |  <p>10"</p>  <p>2"</p>  <p>15"</p> |  <p>10"</p>  <p>30"</p> |  <p>10"</p>  <p>30"</p> |

An optional sub-PCB driven by a 24 AC signal is available directly from Rinnai to enable the RHFE-556FTR/431FT/556FM to be controlled from a central location. This is particularly useful in schools and institutions. The connection operates when signals from the outside 24V control circuit are electrically isolated by a photo-transistor and the sub-PCB sends these signals to the CPU.



- When the central control is switched on, appliance can be operated normally at the unit.
- When the central control is switched off, appliance stops, goes into stand-by mode and no operation is possible from the unit.

« Summarising control actions »

| Control                   | Operating sequence | Current state of appliance | Change in operation at appliance |
|---------------------------|--------------------|----------------------------|----------------------------------|
| Central Control (Outside) | ON - OFF           | OFF                        | OFF                              |
|                           |                    | ON                         | STAND-BY                         |
|                           | OFF - ON           | OFF                        | OFF                              |
|                           |                    | STAND-BY                   | ON                               |

| Control        | Operating sequence | Current state of central control | Change in operation at appliance |
|----------------|--------------------|----------------------------------|----------------------------------|
| Appliance side | OFF - ON           | OFF                              | STAND-BY                         |
|                |                    | ON                               | ON                               |
|                | STANDBY - OFF      | OFF                              | OFF                              |
|                | ON - OFF           | ON                               | OFF                              |

*RHFE-556FTR: Error is displayed as a number on clock flashing.*  
*RHFE-431FT: Error is displayed as a number on clock flashing.*  
*RHFE-556FM: Error is displayed as the room temperature LEDs flashing.*

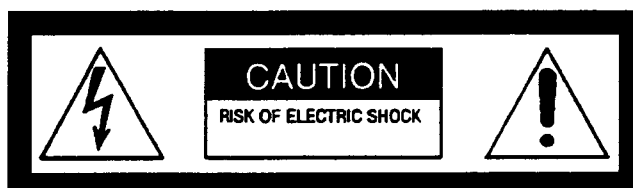
When a safety device is activated, the cause will be indicated by a flashing display. (Filter indicator will also flash in the case of overheat.)

| 556FTR/431FT | 556FM           | Probable Cause                            | Comments                                                                                    | Ref † |
|--------------|-----------------|-------------------------------------------|---------------------------------------------------------------------------------------------|-------|
| <b>--:--</b> | <b>LO~HI</b>    | Power failure                             | When power failure is sensed operation stops.                                               | -     |
| <b>11</b>    | <b>16</b>       | Miss ignition                             | Flame current does not reach 1.0 $\mu$ A within the given time, after solenoid valve opens. | 14    |
| <b>12</b>    | <b>LO</b>       | Flame failure                             | Flame rod current remains below 0.1 $\mu$ A for 3 seconds during initial combustion.        | 14    |
| <b>14</b>    | <b>20</b>       | Over heat safety device                   | High-limit temperature thermistor or thermal fuse has activated.                            | 2, 6  |
| <b>16</b>    | <b>HI</b>       | Over temperature cut off                  | Room temperature is sensed as being above 40°C for longer than 10 minutes.                  | 5     |
| <b>31</b>    | <b>22·24</b>    | Room temperature thermistor disconnection | Room temperature thermistor open circuit                                                    | 5     |
| <b>32</b>    | <b>24·26</b>    | Room temperature thermistor short circuit | Room temperature thermistor wire trapped, touching bare metal                               | 5     |
| <b>33</b>    | <b>18·20·22</b> | High-limit thermistor disconnection       | High limit thermistor open circuit                                                          | 4     |

† Refers to the number on the left of the operational flow chart page 20, and diagnostic points page 22.

| 556FTR/431FT | 556FM              | Probable Cause                      | Comments                                                                                         | Ref † |
|--------------|--------------------|-------------------------------------|--------------------------------------------------------------------------------------------------|-------|
| <b>34</b>    | <b>20·22·24</b>    | High-limit thermistor short circuit | High limit thermistor wiretrapped, touching bare metal                                           | 4     |
| <b>53</b>    | <b>LO·16·18</b>    | Abnormal spark sensed               | Sparker not OFF within 20 seconds at time of ignition                                            | 11    |
|              |                    |                                     | 1st spark sense not within 2 seconds                                                             |       |
|              |                    |                                     | 2nd spark sense spark not continuous for 1 second after solenoid valve opens                     |       |
| <b>61</b>    | <b>16·18·20</b>    | Abnormal combustion fan motor rpm   | Speed is not achieved within time or goes over speed level                                       | 15    |
| <b>70</b>    | <b>18·20</b>       | ON/OFF switch failure               | ON/OFF switch connects continuously for more than 15 seconds                                     | 1     |
| <b>71</b>    | <b>LO·16</b>       | Solenoid valve check                | Solenoid valve(s) (SV <sub>1</sub> , SV <sub>2</sub> ) signal and response signal are different. | 12    |
| <b>72</b>    | <b>26</b>          | Flame rod failure                   | Flame rod output does not cease within 20 seconds.                                               | 7     |
| <b>73</b>    | <b>22·24·26·HI</b> | Communication failure               | Data transfer between CPU and E <sup>2</sup> PROM fails.                                         | -     |

† Refers to the number on the left of the operational flow chart page 20, and diagnostic points page 22.



## 1. The main faults and their remedies

\* The numbers on the right hand side of this table refer to “Causes of faults and suggested remedies” on page 31.

| Fault symptom                                                            | 556FTR<br>431FT                     | 556FM †                             | Check points / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Economy indicator will not come ON.                                  |                                     |                                     | <ul style="list-style-type: none"> <li>* Confirm that Economy Mode has been selected</li> <li>* Confirm electrical cord is securely into the power point</li> </ul>                                                                                                                                                                                                                                                                                             |
| After having pressed the ON - OFF switch the appliance will not operate. | <b>11</b>                           | <b>16</b>                           | <ul style="list-style-type: none"> <li>* Check gas supply ..... 1</li> <li>* Confirm no gas escapes ..... 1</li> <li>* Check for air in the gas supply ..... 1</li> <li>* Reconfirm gas type specified ..... 1</li> </ul>                                                                                                                                                                                                                                       |
| Insufficient heating.                                                    |                                     |                                     | <ul style="list-style-type: none"> <li>* Check selected room temperature setting ..... 2</li> <li>* Check for blocked air filter ..... 3</li> <li>* Check for an obstruction in the warm air flow ..... 4</li> <li>* Reconfirm gas pressure at appliance ..... 1</li> </ul>                                                                                                                                                                                     |
| Burner goes out during operation.                                        | <b>12</b><br><b>14</b><br><b>16</b> | <b>LO</b><br><b>20</b><br><b>HI</b> | <ul style="list-style-type: none"> <li>* Ensure flue terminal is not blocked ..... 5</li> <li>* Ensure air filter is not blocked ..... 3</li> <li>* Check for an obstruction in the warm air flow ..... 4</li> <li>* Reconfirm gas type specified</li> <li>* Confirm no gas escapes ..... 1</li> <li>* Check for flash back ..... 6</li> <li>* Check for high room temperature ..... 7</li> <li>* Reconfirm electrical supply at power point ..... 8</li> </ul> |
| Gas odour.                                                               |                                     |                                     | <ul style="list-style-type: none"> <li>* Confirm no gas escapes</li> <li>* Product of combustion leak ..... 9</li> </ul>                                                                                                                                                                                                                                                                                                                                        |
| Heater stops.                                                            | <b>--:--</b>                        | <b>ALL</b>                          | <ul style="list-style-type: none"> <li>* Power failure ( &gt; 0.2 seconds ) ..... 1</li> </ul>                                                                                                                                                                                                                                                                                                                                                                  |

† Error is displayed as room temperature LEDs flashing

## 2. Causes of faults and suggested remedies

▲ ..... 556FTR/431FT

△ ..... 556FM

### 1. Gas supply

In cases of miss ignition, insufficient heating and gas smell, check that:

- \* The gas supply pressure is correct.
- \* The specified gas type is correct for the area.
- \* There are no breaks/escapes in gas supply.
- \* There is no air in the gas supply.
- Check the gas pressure at both the meter and the appliance.
- Air in the gas line will prevent the appliance from igniting.

### 2. Thermostat setting

When the room does not reach the selected temperature, or the appliance will not remain alight, check that:

- \* The selected temperature is not set lower than the room temperature.
- Select the required temperature setting with the UP/DOWN selection buttons.

### 3. Blocked air filter

If insufficient heating or lockout occurs, check that:

- \* The air filter is not blocked with dust.
- If the air filter is blocked, the safety device will operate.
  - ▲ ..... 14 flashing
  - △ ..... 20 flashing
- The filter must be cleaned at least once per month.

### 4. Air flow obstruction

If insufficient heating or lockout occurred, check that:

- \* There are no obstacles in front of the appliance or louveres.
  - ▲ ..... 14 flashing
  - △ ..... 20 flashing
- There should be no articles within one (1) metre of the front of the appliance.

### 5. Flue terminal

If flame failure occurs during normal operation, check that:

- \* The flue terminal on the exterior wall is not obstructed in any way.
  - ▲ ..... 12 flashing
  - △ ..... LO flashing
- Check in particular for shrubs growing over the flue terminal or a thick build up of spider webs.

### 6. Flash back protection

If flame failure occurs during normal operation, check:

- \* The flue terminal air intake is not blocked.
- \* For dust or foreign material on the burner.
- \* Combustion specification and gas type.
  - ▲ ..... 12 flashing
  - △ ..... LO flashing

### 7. Room temperature

- \* Is the room temperature unusually high?
  - 10 minutes after having sensed 40°C the appliance will automatically go out.
    - ▲ ..... 16 flashing
    - △ ..... HI flashing

### 8. Power failure

- \* If there has been a power failure for 0.2 seconds or longer .Current time will be displayed on display when “set times” button is pressed once. (Time will be slow by duration of power failure).
  - ▲ ..... --:-- flashing
  - △ ..... LO ~ HI flashing

### 9. Smell of products of combustion

If there is a smell of gas or products of combustion, check that:

- \* The flue manifold behind appliance has not come undone.
- The products of combustion are leaving the appliance through the flue terminal.

Before contacting Rinnai please check the following points.  
These points are part of the normal operation of the unit.

## At Ignition

Heater does not operate.

Is the heater plugged in?  
Have the fuses or breaker blown at the switch board?  
Is there a power failure?  
Is the air filter blocked?  
Is anything blocking the outlet for the hot air?  
Is the flue blocked?  
Are Timers set? Clear Timers and operate again.  
Is central timer ON? (where fitted)

Warm air does not flow when the burner lights.

The fan is started automatically after a short delay.  
This is to allow the heat exchanger to warm up,  
helping to avoid cold draughts.

Smoke or strange smells are produced on the first trial light up after installation.

This is caused by grease or oil and dust on the heat exchanger and will stop after a short time.

Sharp clicking noises at ignition, or when the unit cuts down on the thermostat, or goes out.

This is simply expansion noise from the heat exchanger.

## During combustion

Clunking noise when the thermostat operates.

This is the sound of the solenoid gas valves opening and closing.

Unit is not heating room.

Is the air filter blocked?  
Is the set temperature high enough?  
Is the warm air outlet blocked by anything?  
Are the doors and windows of the room closed?

Air filter is blocked or the louvres are blocked or obstructed.

Allow heater to cool, clean air filter, operate again.

Heater will not re-ignite after overheating.

Even after unit has cooled down the heater does not ignite again. Repair is necessary.  
Contact your local agent or Rinnai for a Service call.

## When the unit is turned off

Convection fan continues to run after turning OFF.

This is to remove the residual heat from the heat exchanger, the fan will stop when the heater cools down.

## Other Points

Steam is discharged from the flue terminal.

High efficiency appliances tend to discharge water vapour on cold days, this is normal.

Unit cuts off without apparent reason.

Check if central timer is switched OFF (where fitted), or whether filters are blocked, (dirty filters will cause the heater to overheat).

Power Failure.

When power is restored, the appliance will begin to heat if it was ON at the time the power failed. Clock will be slow by the length of the power failure.

Remote control doesn't operate.

Check battery.  
Try moving closer to heater.

**a. After having operated the appliance and:**

- i) The combustion fan doesn't begin to rotate, or it suddenly stops after having run for a short time.
- ii) There is no spark (after 30 seconds).
- iii) The solenoids do not open, preventing gas flow to the burners.
- iv) The convection fan does not begin to rotate, approximately 15 seconds after ignition.



|                            |   |    |   |                                                                             |
|----------------------------|---|----|---|-----------------------------------------------------------------------------|
| Is there electrical supply | → | NO | → | 1. Confirm the connection at the wall socket<br>2. Is the 3 amp fuse blown? |
|----------------------------|---|----|---|-----------------------------------------------------------------------------|



YES

**The appliance does not operate.**

- i) Open circuit or loose pin connector on PCB or wiring loom.
- ii) ON/OFF button faulty. ▲ ... 70, Δ ... 18-20 flashing
- iii) Faulty Printed Circuit Board.
- iv) Control panel PCB faulty.
- v) OHS is in the 'OPEN' position. (Closed → Normal) ▲ ... 14, Δ ... 20 and filter flashing
- vi) Thermal fuse has melted.
- vii) Solenoid circuit is faulty. ▲ ... 71, Δ ... LO-16 flashing

**The combustion fan doesn't rotate, or the appliance fails after a short time.**

- i) Combustion fan shaft allen screw loose.
- ii) An obstruction in the combustion fan is preventing it from rotating.
- iii) Combustion fan does not reach pre-determined speed. ▲ ... 61, Δ ... 16-18-20 flashing
- iv) The flame rod current is greater than 0.1  $\mu$ A during pre-purge. ▲ ... 72, Δ ... 26 flashing
- v) The combustion fan rpm does not match the ignition rpm check. ▲ ... 61, Δ ... 16-18-20 flashing
- vi) Faulty spark generator. ▲ ... 53, Δ ... LO-16-18 flashing
- vii) Faulty PCB.

**There is no spark.**

- i) High tension cord disconnected or broken.
- ii) Insulation leak from the high tension cord, (Spark sound is not regular).
- iii) The spark gap is not correct (normal spark gap is  $3.5 \pm 0.5$  mm).
- iv) Weak or shorting spark.
- v) Faulty PCB.

**b. The solenoids do not open, preventing gas flow to the burners.**

- i) Open circuit or loose pin connectors on PCB or wiring loom.
- ii) Faulty solenoid, or coil.
- iii) Faulty sparker, (no spark is sensed).
- iv) Faulty PCB

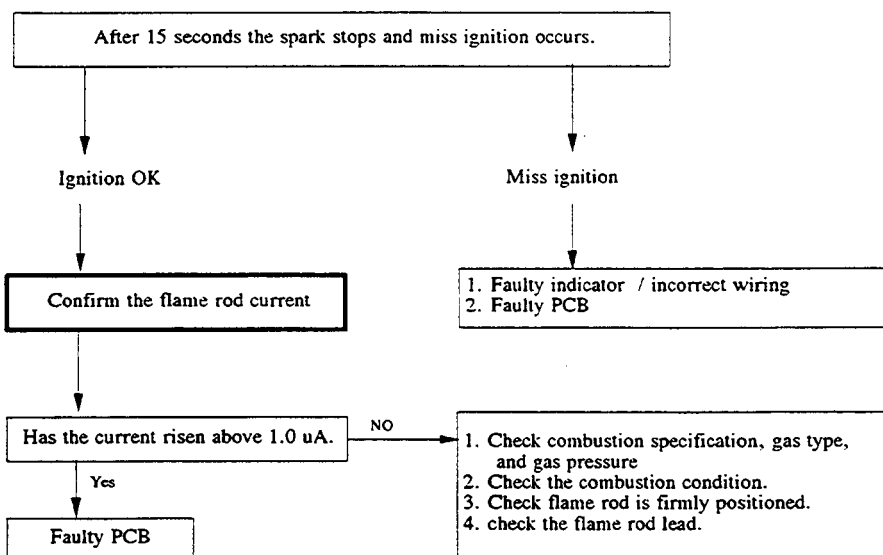


**c. The convection fan doesn't rotate.**

- i) Convection fan shaft allen screw loose.
- ii) An obstruction in the convection fan is preventing it from rotating.
- iii) Flame rod faulty.
- iv) Faulty PCB.



**d. There is the sound of ignition, however the 'combustion' injector does not glow red.**



**e. After repeated efforts to operate the appliance, it will not ignite. ▲ ... 11, Δ ... 16 flashing**

- i) Air in the gas supply line.
- ii) Incorrect gas pressure.
- iii) Incorrect gas type, or a kink or break in the gas supply.
- iv) Faulty or weak spark.
- v) Blocked injector. Is the combustion specification correct?

## f. The flame fails during normal operation.

1. Power failure for 0.2 seconds or longer.

▲ ... “\_ \_ : \_ \_”, Δ ... LO ~ HI flashing

2. Safety devices are activated.

\* Room temperature is sensed at above 40°C for 10 minutes.

▲ ... 16, Δ ... HI flashing

\* Air filter is blocked and the OHS is activated.

▲ ... 14, Δ ... 20 and filter flashing

\* Obstruction in the flue terminal.

▲ ... 12, Δ ... LO flashing

\* Blockage or insufficient gas supply.

▲ ... 12, Δ ... LO flashing

\* Gas pressure is abnormally low.

\* The area surrounding the flue terminal may be restricted.

\* Obstruction in front of the heater.

▲ ... 14, Δ ... 20 and filter flashing



3.

Safety Devices activated  
no fault evident.

Have you ensured that the connectors are in the correct  
positions, and also the wiring is not disconnected anywhere?

The above has been checked, but after ignition flame failure occurs.

Flame failure safety device will shut-down the unit.

Confirm flame rod current is correct and stable at above 1.0 uA

Yes

Faulty PCB

No

1. Do the test point pressure, dampers  
and injector all conform the specification.
2. Check condition of flame rod and burner.

4.

Flame fails and flash back error code flashes.

5.

1. Blocked flue terminal
2. Dust in the burner terminal
3. Incorrect gas type or pressure setting.

Flame failure occurs between 2~3 minutes after ignition.

Is flame rod current greater than 1.0 uA.

Yes

Combustion fan lead

Faulty

OK

PCB faulty

replace

No

- \* Is the gas pressure normal?
- \* Is the flame rod faulty?



- Before starting inspection, check wiring harness and double check that all connectors are tight.
- Before carrying out checks marked ※, remove power cord from wall socket.

| Nature of Fault                                                                                                                                   | Examination Point            | Diagnostic Point                                                                                                              | Values                                                                                                                                                         | Y/N           | Action                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------|
| A. "—:—" fails to flash when power cord is plugged in, and temperature is not displayed when unit is turned on (normal sequence can not proceed). | (1) Is the voltage correct?  | Check electric socket and voltage.                                                                                            | AC 220 - 260 V                                                                                                                                                 | Yes           | Go to (2).                      |
|                                                                                                                                                   |                              |                                                                                                                               |                                                                                                                                                                | No            | Repair electric source.         |
|                                                                                                                                                   | (2) Blown or defective fuse? | 1. Measure fuse resistance.                                                                                                   | > 1 $\Omega$                                                                                                                                                   | Yes           | Go to (3).                      |
|                                                                                                                                                   |                              |                                                                                                                               |                                                                                                                                                                | No            | Replace fuse.<br>Go to (2) - 2. |
|                                                                                                                                                   |                              | ※ 2. Measure resistance of convection motor coil after removing 2P connector.                                                 | (D) Grey - Pink<br>90 - 180 $\Omega$                                                                                                                           | Yes           | Go to (2) - 3.                  |
|                                                                                                                                                   |                              |                                                                                                                               |                                                                                                                                                                | No            | Replace convection motor.       |
|                                                                                                                                                   |                              | ※ 3. Measure resistance of combustion motor coil after removing 4P connector.                                                 | (G) Red - Yellow<br>< 1 M $\Omega$                                                                                                                             | Yes           | Go to (2) - 4.                  |
|                                                                                                                                                   |                              |                                                                                                                               |                                                                                                                                                                | No            | Replace combustion motor.       |
|                                                                                                                                                   |                              | ※ 4. Measure resistance of transformer after removing 8P connector.                                                           | (E) White - White<br>6-19 $\Omega$ .<br>(E) Red - Red<br>1-3 $\Omega$ .<br>(E) Black - Blue<br>0.5 - 2 $\Omega$ .<br>(E) Blue - Yellow<br>200 - 400 $\Omega$ . | Yes           | Go to (2) - 5.                  |
|                                                                                                                                                   |                              |                                                                                                                               |                                                                                                                                                                | No            | Replace transformer.            |
|                                                                                                                                                   |                              | ※ 5. Remove lead wires of solenoid valves (SV <sub>1</sub> , SV <sub>2</sub> ) and measure coil resistance between terminals. | SV <sub>1</sub> 1.3 - 2.2 k $\Omega$ .<br>SV <sub>2</sub> 1.3 - 2.2 k $\Omega$ .                                                                               | Yes           | Go to (2) - 6.                  |
|                                                                                                                                                   |                              |                                                                                                                               |                                                                                                                                                                | No            | Replace solenoid valve.         |
|                                                                                                                                                   |                              | ※ 6. Remove lead wire(s) of modulating valve (POV) and measure coil resistance between terminals.                             | (H) Grey - Grey<br>80 - 100 $\Omega$                                                                                                                           | Yes           | Replace PCB.                    |
|                                                                                                                                                   |                              |                                                                                                                               |                                                                                                                                                                | No<br>Replace | Replace modulating valve.       |
|                                                                                                                                                   | (3) Is the ON/OFF switch OK? | ※ Check continuity of switch after removing 3P connector (turn switch ON and OFF)<br>Red - Blue<br>Blue - Blue.               | (I) OFF: $\infty$<br>ON: 0 $\Omega$                                                                                                                            | Yes           | Go to (4).                      |
|                                                                                                                                                   |                              |                                                                                                                               |                                                                                                                                                                | No            | Replace switch.                 |

| Nature of Fault                                                                                              | Examination Point                                                                                                                                         | Diagnostic Point                                                               | Values                                                                                                    | Y/N | Action                                                        |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------|
|                                                                                                              | (4) Is the transformer OK?                                                                                                                                | Check transformer secondary voltage.                                           | (E) Red - Red<br>AC 28 - 50 V<br>(E) Black - Black<br>AC 10 - 16 V<br>(E) Blue - Yellow<br>AC 130 - 180 V | Yes | Replace PCB.                                                  |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Replace transformer.                                          |
| B. Error code appears soon after turning heater on (normal sequence cannot proceed).                         | (5) Is overheat switch 1 or 2 OFF?<br>(Δ ... 20 flashing<br>▲ ... 14 flashing)<br>If unit was over heated, it will turn back ON once the unit cools down. | ※ With ON/OFF switch OFF, check continuity between both terminals.             | (H1) Black - Red<br>< 1 Ω<br>(H2) White - Red<br>< 1 Ω                                                    | Yes | Go to (6).                                                    |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Replace overheat switch 1 and/or 2.                           |
|                                                                                                              | (6) Has the temperature fuse melted?<br>(Δ ... 20 flashing<br>▲ ... 14 flashing)                                                                          | ※ With ON/OFF switch OFF, check continuity between both terminals.             | (H3) White - White<br>0 Ω<br>(H2) (H3) White - White<br>0 Ω                                               | Yes | Replace PCB.                                                  |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Replace temperature fuse.                                     |
|                                                                                                              | (7) Is the combustion motor wiring OK?<br>(Δ ... 16, 18, 20 flashing<br>▲ ... 61 flashing)                                                                | ※ Check combustion motor coil resistance using same procedure as (2)-3 above.  | Red - Yellow<br>< 1 M Ω                                                                                   | Yes | Go to (8).                                                    |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Replace combustion motor.                                     |
| C. No spark                                                                                                  | (8) Is there any spark leakage due to loose or disconnected high tension lead                                                                             | Check connection visually and by hand.                                         | Good connection and no leakage.                                                                           | Yes | Go to (10).                                                   |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Connect properly.                                             |
|                                                                                                              | (9) Is the spark unit voltage low?                                                                                                                        | Measure sparker input voltage.                                                 | (F) Blue - Red<br>AC 85 - 110 V                                                                           | Yes | Replace sparker.                                              |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Replace PCB.                                                  |
| D. Spark fails to produce ignition (stops after approx. 15 sec.)<br>(Δ ... 16 flashing<br>▲ ... 11 flashing) | (10) Are the solenoid valves (SV <sub>1</sub> , SV <sub>2</sub> ) ON?                                                                                     | ※ 1. Check solenoid valve coil resistance using same procedure as (2)-5 above. | SV <sub>1</sub> 1.3 - 2.2 k Ω.<br>SV <sub>2</sub> 1.3 - 2.2 k Ω.                                          | Yes | Go to (11) - 2.                                               |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Replace solenoid valve.                                       |
|                                                                                                              |                                                                                                                                                           | 2. Check solenoid valves terminal voltage.                                     | (F) Black - Yellow<br>DC 78 - 100 V                                                                       | Yes | Go to (12).                                                   |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Replace PCB.                                                  |
|                                                                                                              | (11) Is the modulating valve (POV) OK?                                                                                                                    | 1. Check test point pressure.                                                  | Is it at the specified pressure?                                                                          | Yes | Check injector / damper.                                      |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Go to (12) - 2.                                               |
|                                                                                                              |                                                                                                                                                           | 2. Check position of SW6 switches on PCB.                                      | Refer to Section 13-1.                                                                                    | Yes | Go to (12) - 3.                                               |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Set to proper position                                        |
|                                                                                                              |                                                                                                                                                           | ※ 3. Check modulating valve coil resistance.                                   | (H) Grey - Grey<br>80 - 100 Ω                                                                             | Yes | Adjust regulator pressure. If it does not match, replace PCB. |
|                                                                                                              |                                                                                                                                                           |                                                                                |                                                                                                           | No  | Replace modulating valve.                                     |

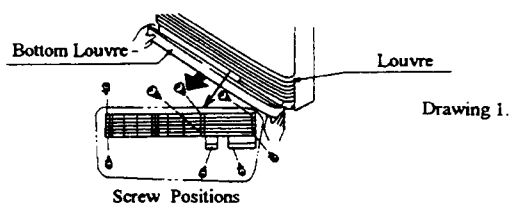
| Nature of Fault                                                                                                                                 | Examination Point                                                                           | Diagnostic Point                                                                                                                                                             | Values                                                                                    | Y/N | Action                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|
| E. Ignition occurs, but combustion indicator does not operate. (Sparker stops after approx. 15 sec)<br>(Δ ... 16 flashing<br>▲ ... 11 flashing) | (12) Is the modulating valve OK?                                                            | Measure test point pressure as in (11)-1 above.                                                                                                                              | Is it at the preset pressure?                                                             | Yes | Go to (14) after checking injector and damper.  |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Adjust regulator pressure.                      |
|                                                                                                                                                 | (13) Is the current of the flame rod (FR) circuit >1.0 μA .                                 | ※ Check flame rod circuit current. (Disconnect, measure between connector and lead.)                                                                                         | (E1) Yellow - Yellow flame rod >1.0 μA.                                                   | Yes | Replace PCB.                                    |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Replace flame rod.                              |
| F. Heater does not reach preset room temperature.                                                                                               | (14) Is the thermistor OK?                                                                  | ※ Disconnect thermistor from unit and measure resistance between terminals. As there may be some variance due to temperature setting, use the chart at the right as a guide. | (A) Yellow - Yellow<br>0°C : 123 kΩ<br>20°C : 39 kΩ                                       | Yes | Replace PCB.                                    |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Replace thermistor.                             |
| G. Heater stops during use (turns off prematurely).                                                                                             | (15) Shut off mechanism activated.<br>(Δ ... LOW flashing<br>▲ ... 12 flashing)             | Check flame rod circuit current (flow chart No. 7, No. 9).                                                                                                                   | (E1) Yellow - Yellow flame rod >0.1 μA. (Disconnect, measure between connector and lead.) | Yes | Check for dust clogging, FR wire and connector. |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Replace PCB                                     |
|                                                                                                                                                 | (16) OFF function activated.<br>(Δ ... HI flashing<br>▲ ... 16 flashing)                    | Was the heater used for a long period at a high temperature?                                                                                                                 | Over ten minutes at above 40°C.                                                           | Yes | Explain usage.                                  |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Replace PCB.                                    |
|                                                                                                                                                 | (17) Overheat switch activated.<br>(Δ ... 20 flashing<br>▲ ... 14 flashing)                 | 1. Check for dust on air filter, convection fan and air outlet.                                                                                                              | Is the dust build up extreme?                                                             | Yes | Clean.                                          |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Go to (18) - 2.                                 |
|                                                                                                                                                 |                                                                                             | 2. Check combustion specifications                                                                                                                                           | Correct?                                                                                  | Yes | Go to (18) - 3.                                 |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Adjust accordingly                              |
|                                                                                                                                                 |                                                                                             | ※ 3. Is the convection fan revolution speed correct?<br>Measure motor coil resistance. See (2)-2.                                                                            | (D) Grey - Pink<br>90 - 180 Ω                                                             | Yes | Go to (18) - 4.                                 |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Replace motor.                                  |
|                                                                                                                                                 |                                                                                             | 4. Check voltage at 2P terminal D on PCB (convection fan) .                                                                                                                  | HIGH - LOW<br>AC 50 - 108 V                                                               | Yes | Check fan lock / obstruction, spin, etc.        |
|                                                                                                                                                 |                                                                                             |                                                                                                                                                                              |                                                                                           | No  | Replace PCB.                                    |
| H. All other problems.                                                                                                                          | Are there any loose or defective connections?<br>Is central timer operating (where fitted)? |                                                                                                                                                                              |                                                                                           | Yes | Repair                                          |

(Note: If a problem is not remedied by replacing the appropriate part, the wiring harness is defective (short circuit, open circuit and/or defective connectors). Check for any short or open circuit. Lightly wiggle wires and harness to check for loose or faulty connectors.)

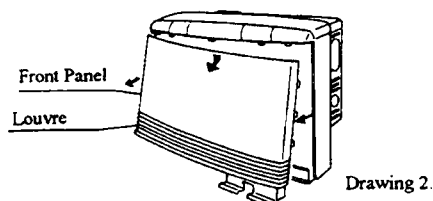


\* Disconnect electrical supply

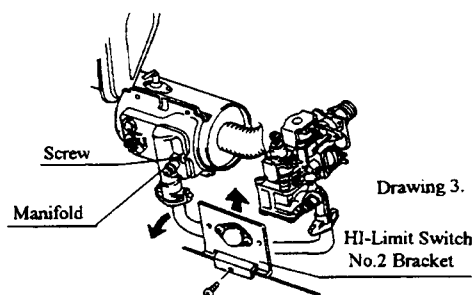
1. Remove bottom trim (pull)
2. Remove 8 screws inside bottom louvre, pull complete front panel forward at bottom, unclip from escutcheon panel and remove from heater
3. Replace small gas label on gas inlet
4. Replace large gas label on back of appliance
5. Change very small gas label on Data Plate
6. Complete details on conversion sticker, place sticker inside left hand side panel
7. Undo main gas tube connection at manifold, 1 screw, push tube down
8. Remove "O" ring from manifold connection and refit to main gas tube (to avoid trapping "O" ring when re-assembling)
9. Remove manifold, (2 screws) take care with gasket
10. Remove burner cover, (6 screws) take care with gasket
11. Carefully remove front damper, (1 screw) see drawing 4.
12. Using pointed nose pliers, carefully pull the right hand damper forward, and out of the burner assembly
13. Gently fit new damper- tag faces to the right
14. Refit front damper
15. Remove injectors
16. Fit new main injectors
17. Refit manifold, (slide into pin locators) then secure with screws, take care with gasket
18. Connect main gas tube, take care with "O" ring
19. Connect appliance to electricity (and gas if disconnected).
20. Follow gas pressure setting procedure, see next page.
21. Test for gas escapes
22. Replace front cover



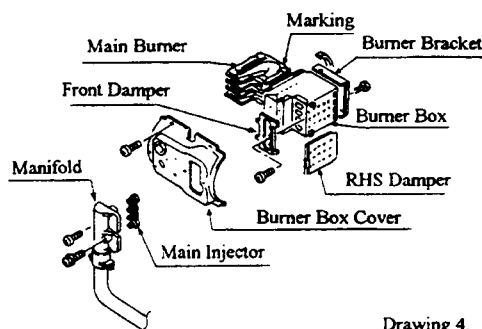
Drawing 1.



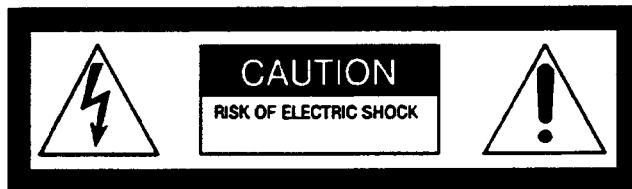
Drawing 2.



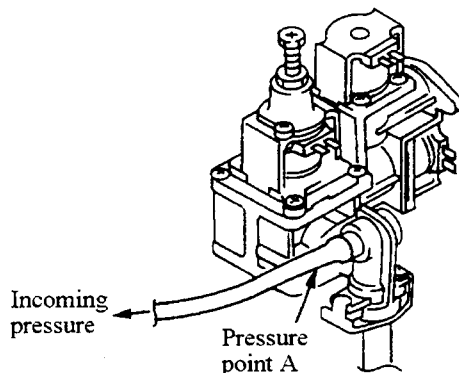
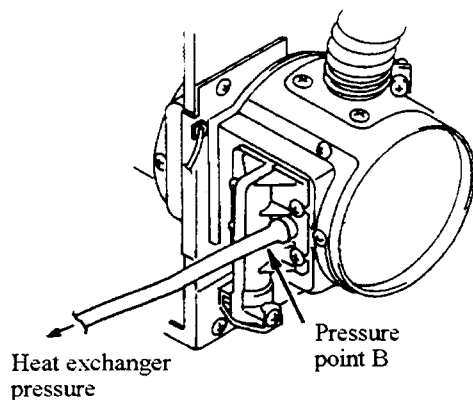
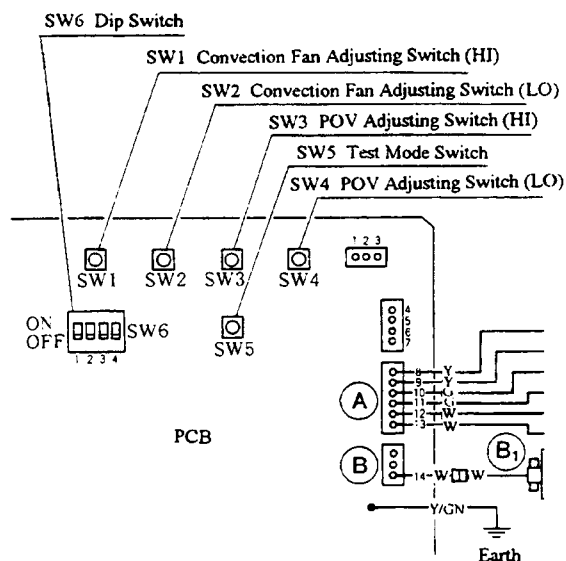
Drawing 3.

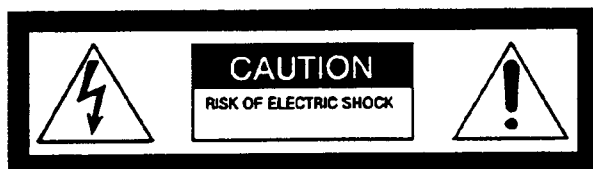


Drawing 4.



1. Check SW6 Dip Switches are correct for the gas type for which the appliance is to be used. (Refer to page 7.)
2. There are two test points, one on the heat exchanger, one on the gas manifold. Connect pressure gauge to both test points. (Connect one side of the gauge to one point, the other side of the gauge to the other.) If you are using an electronic manometer, connect the  $\ominus$  side to the heat exchanger test point. (Refer to data plate for pressures.)
3. Press the ON/OFF button to operate unit.
4. With appliance operating, press SW5 once.
5. Press SW4 to operate appliance on forced low. Adjust the setting to the correct pressure using “^” and “v” buttons on the control panel.
6. Press SW4 again to lock in selected setting.
7. Press SW3 to operate appliance on forced high. Adjust the setting to the correct pressure using “^” and “v” buttons on the control panel.
8. Press SW3 again to lock in the selected setting.
9. Press SW5 once to return heater to normal operation.
10. Press ON/OFF button to turn the unit off.
11. Remove the gauge from the test points and replace the test point screws.
12. Test for gas escapes.





**NOTE:** Before proceeding with dismantling, be sure to follow the **CAUTION** instructions before each explanation.

- eg. - Isolate gas supply.  
 - Disconnect electrical supply from wall socket.

| <i>Item</i>                                                 | <i>Page</i> |
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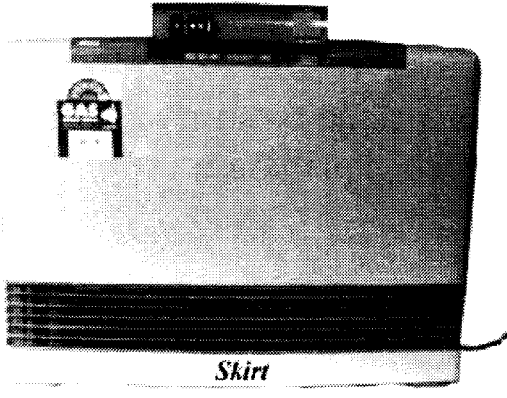
Unless otherwise stated, re-assembly is the reverse of dismantling.

## 1. Front Panel Removal

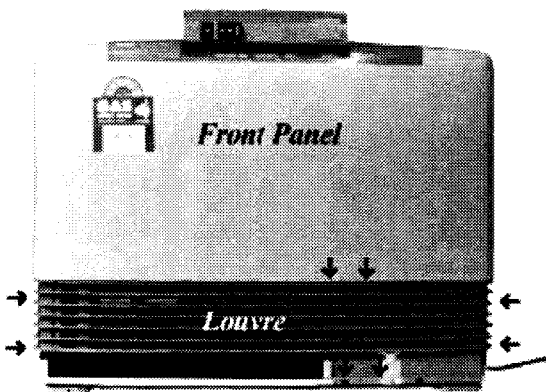
### CAUTION

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

- i) Grip sides of skirt and pull forward to remove.



- ii) Remove eight (8) screws to release louvre and front panel.



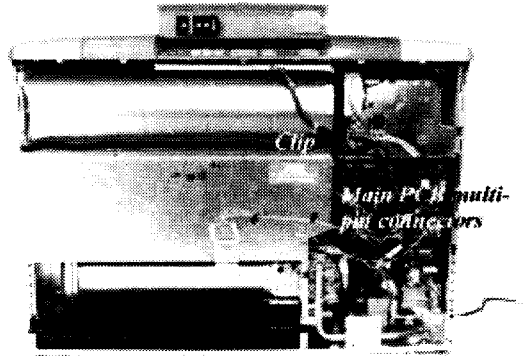
- iii) Grip bottom left and right hand corners of louvre, pull forward to release together with front panel.

## 2. Top Panel, Control Panel, and Control Panel PCB Removal

### CAUTION

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

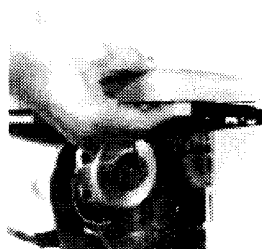
- i) Remove front panel assembly, see section 1.  
ii) Remove two (2) screws, one on each side of control panel.  
iii) Release three (3) multi-pin connectors from main PCB.  
iv) Release the control panel PCB harness from wire clip on convection fan, and clip on main PCB casing.



- v) Place index finger against side casing and pull control panel forward with middle finger to release from tab.  
vi) Repeat on opposite side, lift panel on both sides to completely remove from appliance, together with top panel.

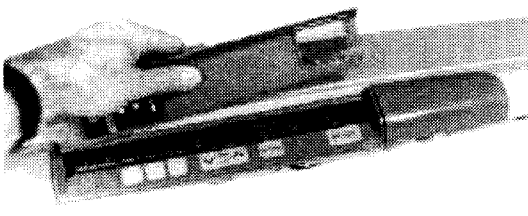


**Pull with middle finger**



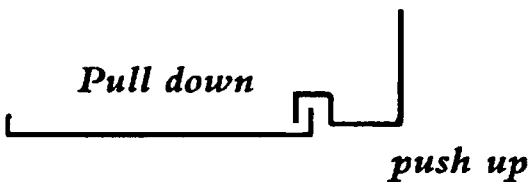
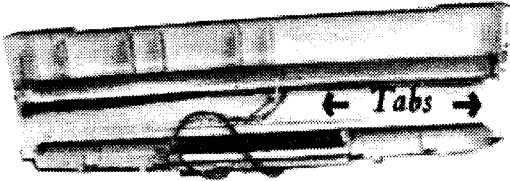
**Lift to remove**

- vii) Grip control panel cover and lift up, applying light strength on one side to disconnect the hinge pin from control assembly.

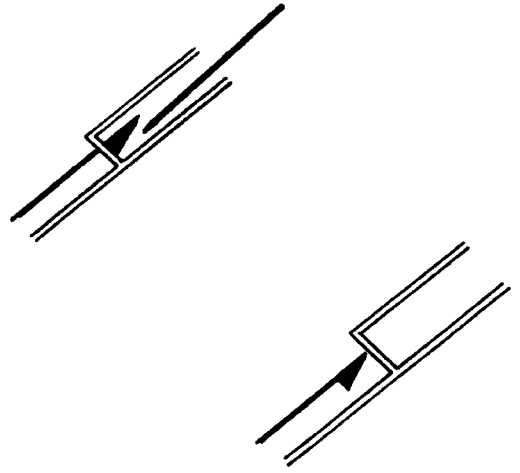


*Lift, applying light strength*

- viii) Control panel and top panel are connected by a strip of tabs. (Tabs are moulded into control panel.) With panels turned over grip each end and push control panel upwards, using the index finger. At the same time push down on top panel support with thumb.



- ix) Using a thin bladed screw driver, release the tab securing the control panel assembly.

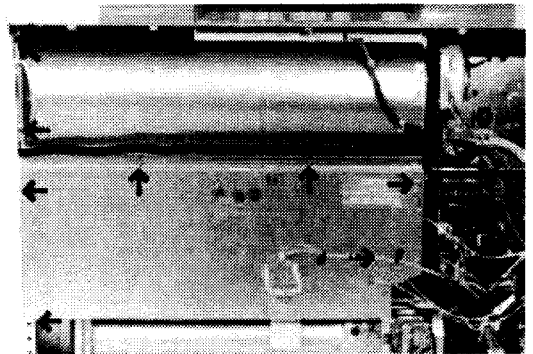


### 3. Convection Fan/Motor Removal

#### **CAUTION**

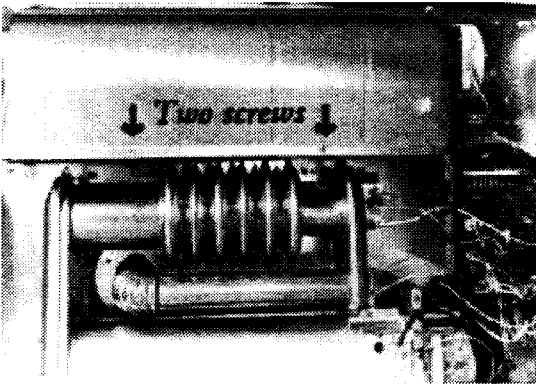
**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

- Remove front panel assembly, see section 1.
- Remove top panel and control panel assembly, see section 2 ii) ~ vi).
- Remove two (2) screws on left hand side which secure complete convection fan assembly to casing.

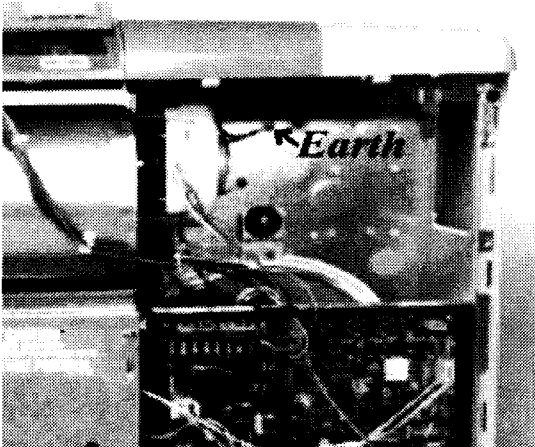


- Remove six (6) screws securing heat shield, and lift heat shield off.

- v) Remove two screws securing bottom section of the complete convection fan assembly.



- vi) Remove two (2) screws on right hand side securing convection fan assembly to casing.
- vii) Remove one (1) earth screw.
- viii) Release one (1) multi-pin connector from PCB, and remove wires from clip on main PCB casing.



- ix) Grip convection fan complete assembly on both sides, pull forward and lift to remove from casing.

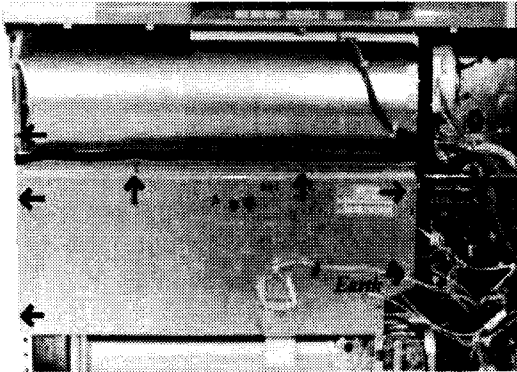
**Note:** Convection fan blade and/or motor may be replaced individually, however, to avoid problems associated with balancing, Rinnai recommends exchanging the complete assembly.

#### 4. Heat Exchanger Removal

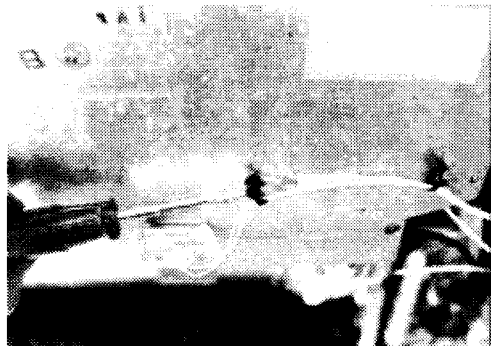
##### **CAUTION**

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

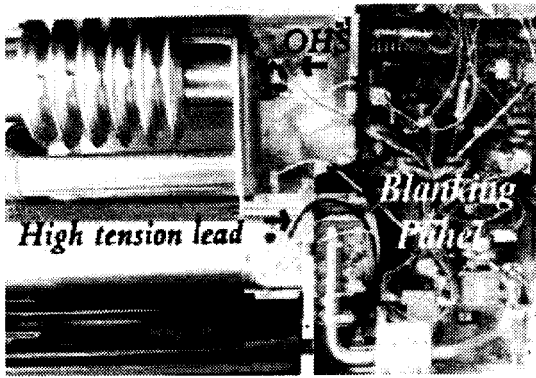
- i) Remove front panel assembly, see section 1.
- ii) Remove one (1) earth connection on front heat shield.
- iii) Release fusible link (pull down) on front of heat shield.
- iv) Release six (6) screws securing heat shield.



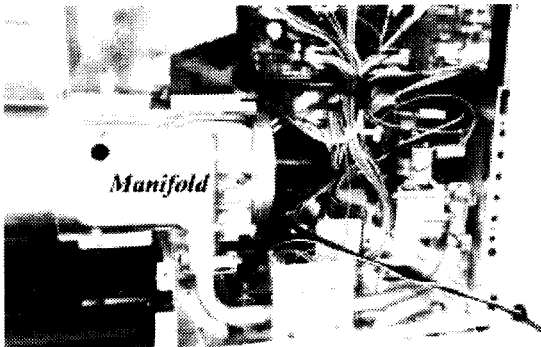
- v) Release fusible link wires from black clamps using screwdriver, and lift off heat shield.



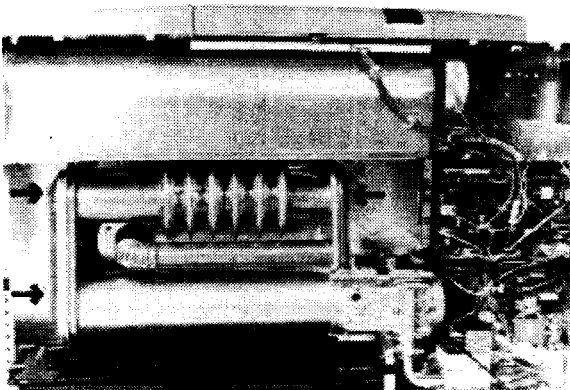
- vi) Disconnect overheating switch and thermistor, two (2) screws.
- vii) Disconnect flame sensing lead (pull hard).
- viii) Remove spark sensing lead, and high tension lead (pull off gently).
- ix) Remove blanking panel, one (1) screw.



- x) Remove one (1) air intake tube securing screw, one (1) gas supply tube securing screw and two (2) heat exchanger securing screws.
- xi) Rotate clip at end of gas supply tube and push down on tube to release from manifold.



- xii) Remove three (3) heat exchanger securing screws.



- xiii) Grip heat exchanger on left hand side, then lift to release it from a tab and pull forward from the left hand side.

**Note:** Be careful not to damage O-ring on gas supply tube when removing right hand side of heat exchanger assembly.

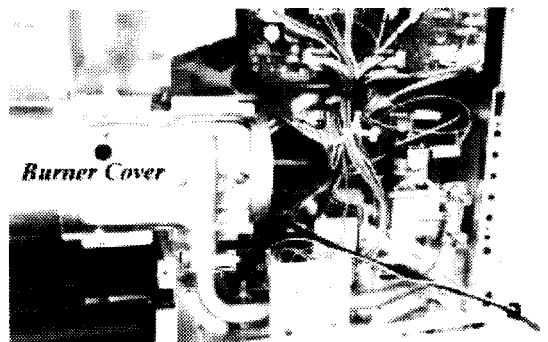
**Note:** Refer section 5 vi) to disconnect burner from heat exchanger complete assembly.

## 5. Burner Removal

### CAUTION

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

- i) Remove front panel assembly, see section 1.
- ii) Remove front heat shield, see section 4 ii) ~ v).
- iii) Remove blanking panel, one (1) screw.
- iv) Remove spark sensing lead and high tension lead (pull off gently).
- v) Remove one (1) gas supply tube securing screw.
- vi) Remove six (6) burner cover screws; gently manoeuvre forward and out of burner chamber by pulling on manifold.

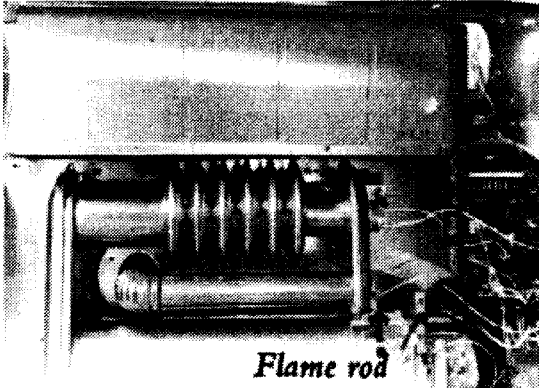


## 6. Flame Rod Removal

### CAUTION

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

- i) Remove front panel assembly, see section 1.
- ii) Remove front heat shield, see section 4 ii) ~ v).
- iii) Remove two (2) screws using a right angled screw driver.

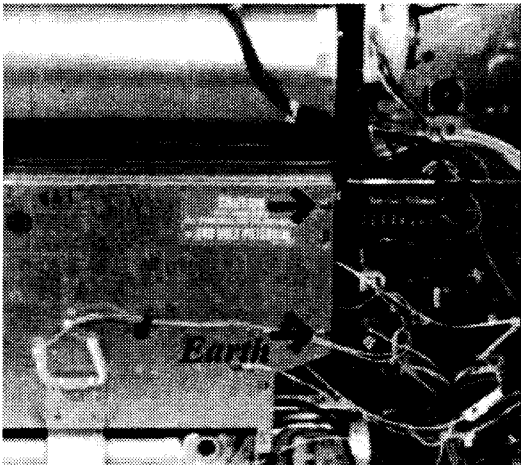


## 7. Main PCB Removal

### CAUTION

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

- i) Remove front panel assembly, see section 1.
- ii) Release PCB by removing two (2) screws on left hand side.



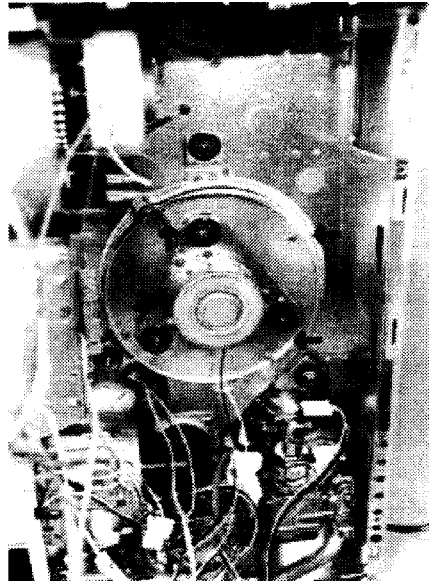
- iii) Lift PCB on right hand side and gently manoeuvre it out.
- iv) Disconnect all multi-pin connectors and wire harness from clips of PCB casing.
- v) Remove one (1) earth connection on front shield.

## 8. Combustion Fan Removal

### CAUTION

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

- i) Remove front panel assembly, see section 1.
- ii) Remove main PCB, see section 7 ii) ~ iv).
- iii) Remove four (4) combustion fan securing screws and one (1) earth screw.



- iv) Grip triangular fan motor plate and pull forward to remove fan from casing.

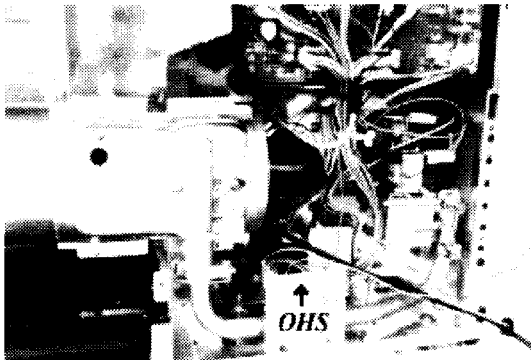
**Note:** Arrow should be aligned when fan assembly is replaced.

## 9. Spark Generator/Supply Transformer Removal

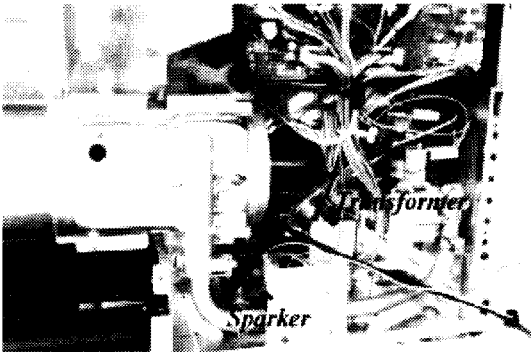
### CAUTION

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

- i) Remove front panel assembly, see section 1.
- ii) Remove OHS bracket in lower right hand section of appliance.



- iii) Remove two (2) screws securing the base bracket and lift to remove from unit.



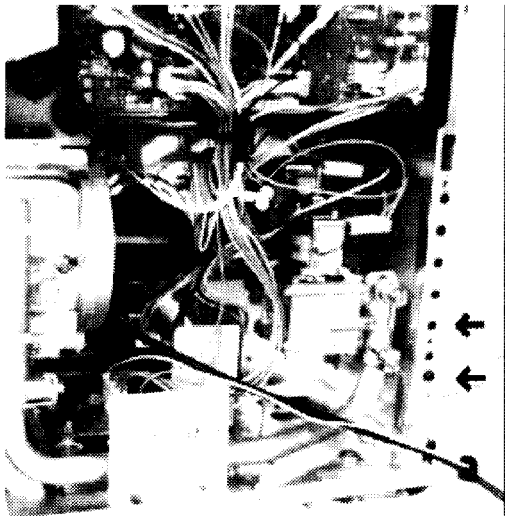
- iv) Disconnect transformer at main PCB connector.
- v) Disconnect spark generator at spark board.

## 10. Gas Control Removal

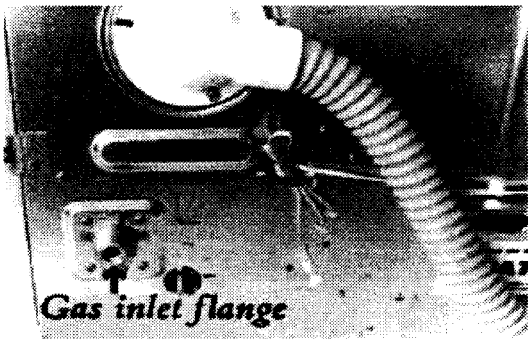
### CAUTION

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

- i) Turn off gas supply at meter and disconnect appliance from installation.
- ii) Remove front panel assembly, see section 1.
- iii) Release solenoid connectors and gas supply tube securing screw. Release aluminium tube. Take care with O ring.



- iv) Remove four (4) screws surrounding the gas inlet flange.



- v) Pull gas control assembly forward to remove from appliance.

**Note:** Ensure test point screw is fitted to gas controls, if fitting new control.

## 11. Room Thermistor Removal

**Note:** Room temperature thermistor and heat exchanger overheat thermistor are connected together as one harness.

### **CAUTION**

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

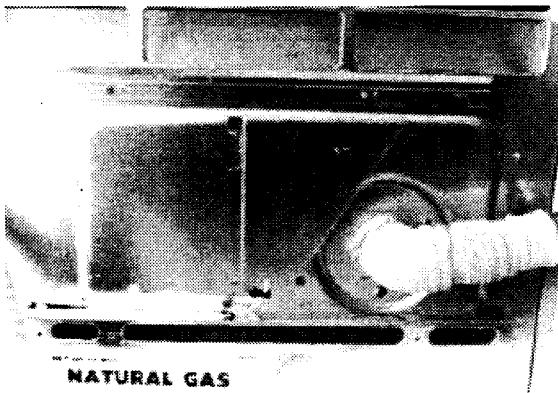
- i) Remove front panel assembly, see section 1.
- ii) Remove top and right hand side rear spacer panels.
- iii) Reach in behind appliance and unclip thermistor from purse locks.
- iv) Remove six (6) screws securing heat shield and lift heat shield off. See section 3 iii).
- v) Remove overheat thermistor. See section 4 vi).

## 12. Thermal Fuse Removal

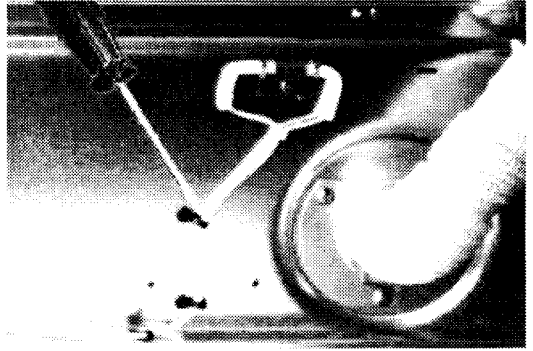
### **CAUTION**

**240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.**

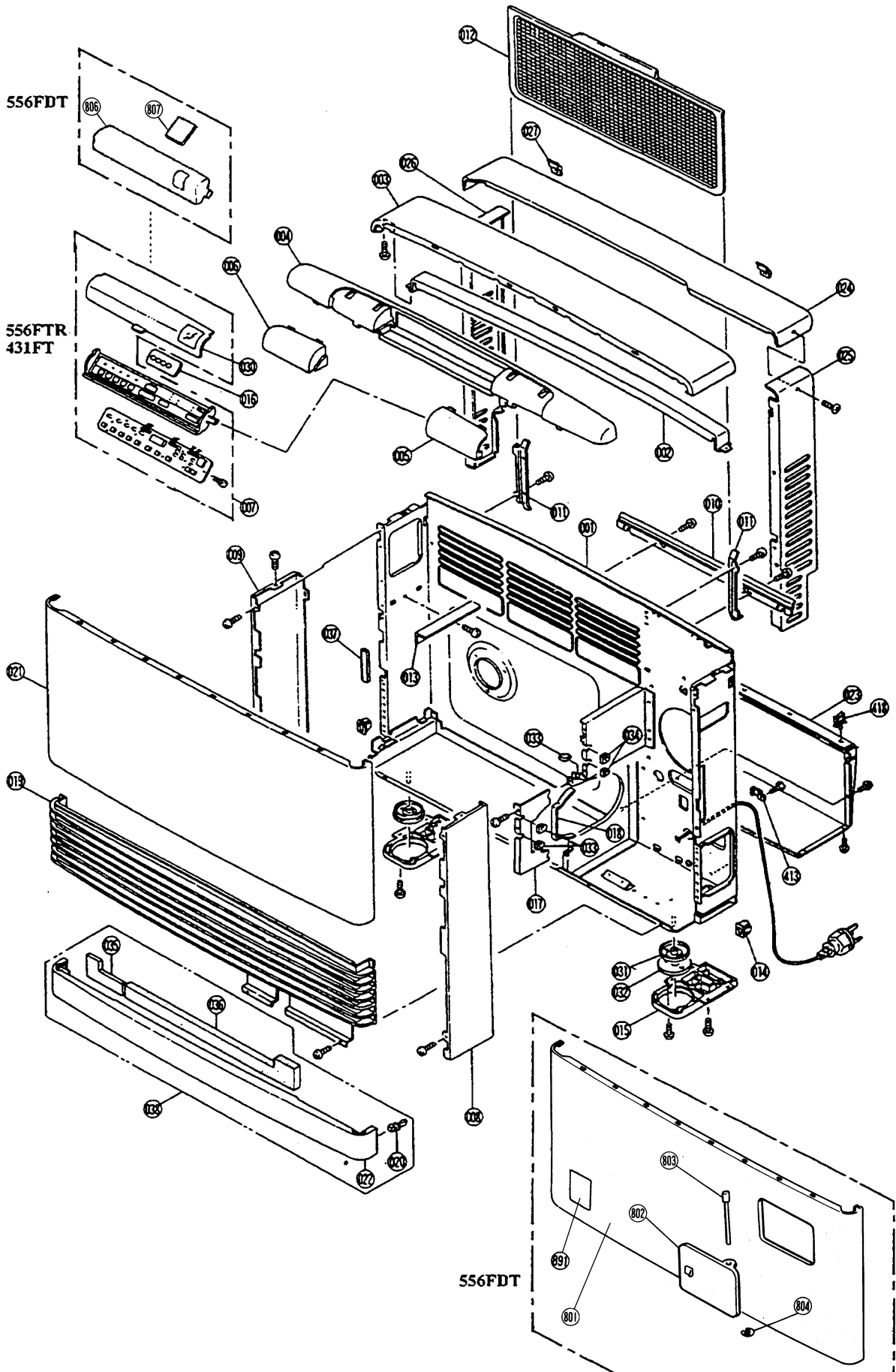
- i) Turn off gas at meter and disconnect appliance from installation.
- ii) Remove front panel assembly, see section 1.
- iii) Remove two (2) screws securing thermal fuse cover plate at rear of unit.

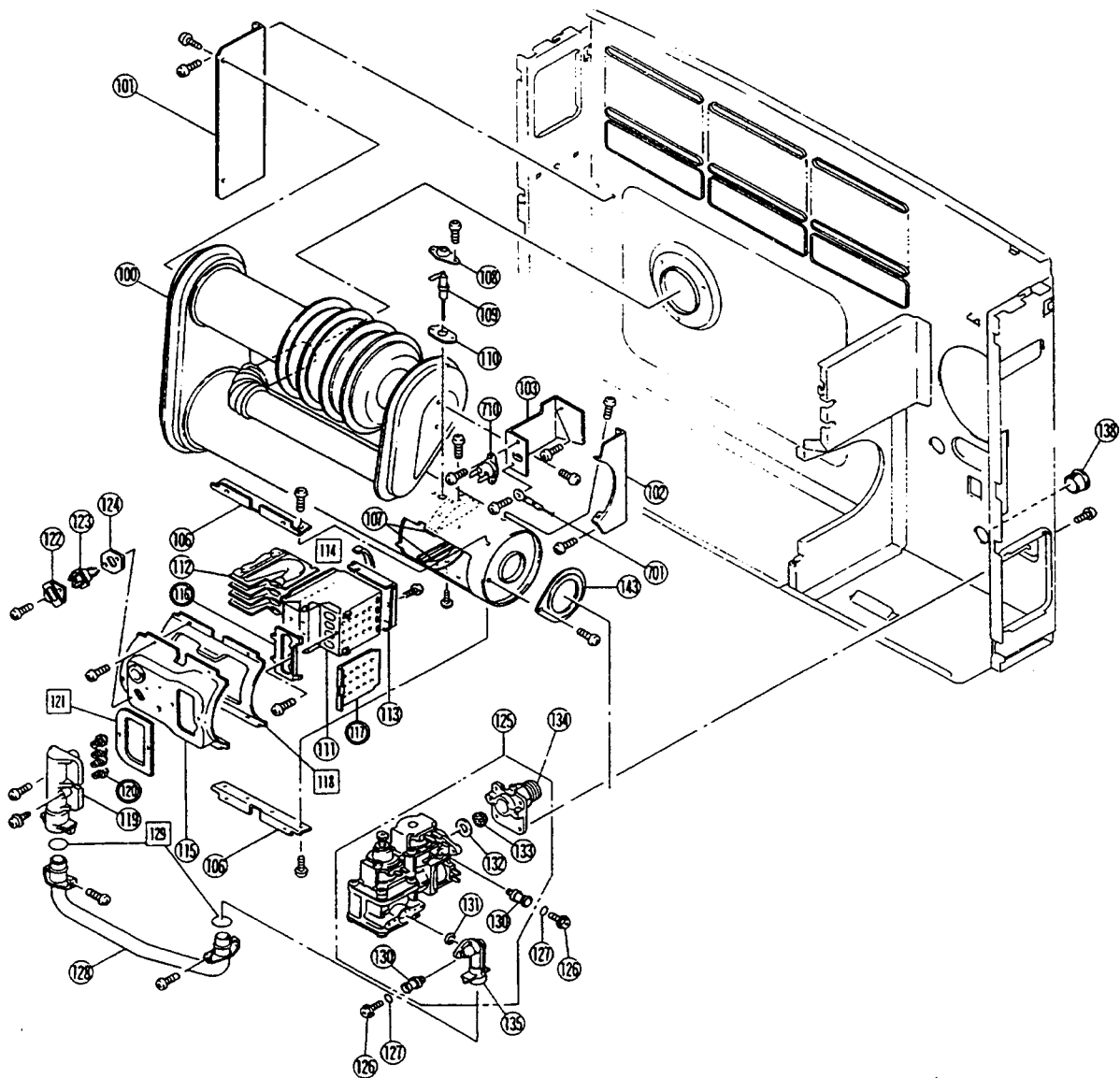


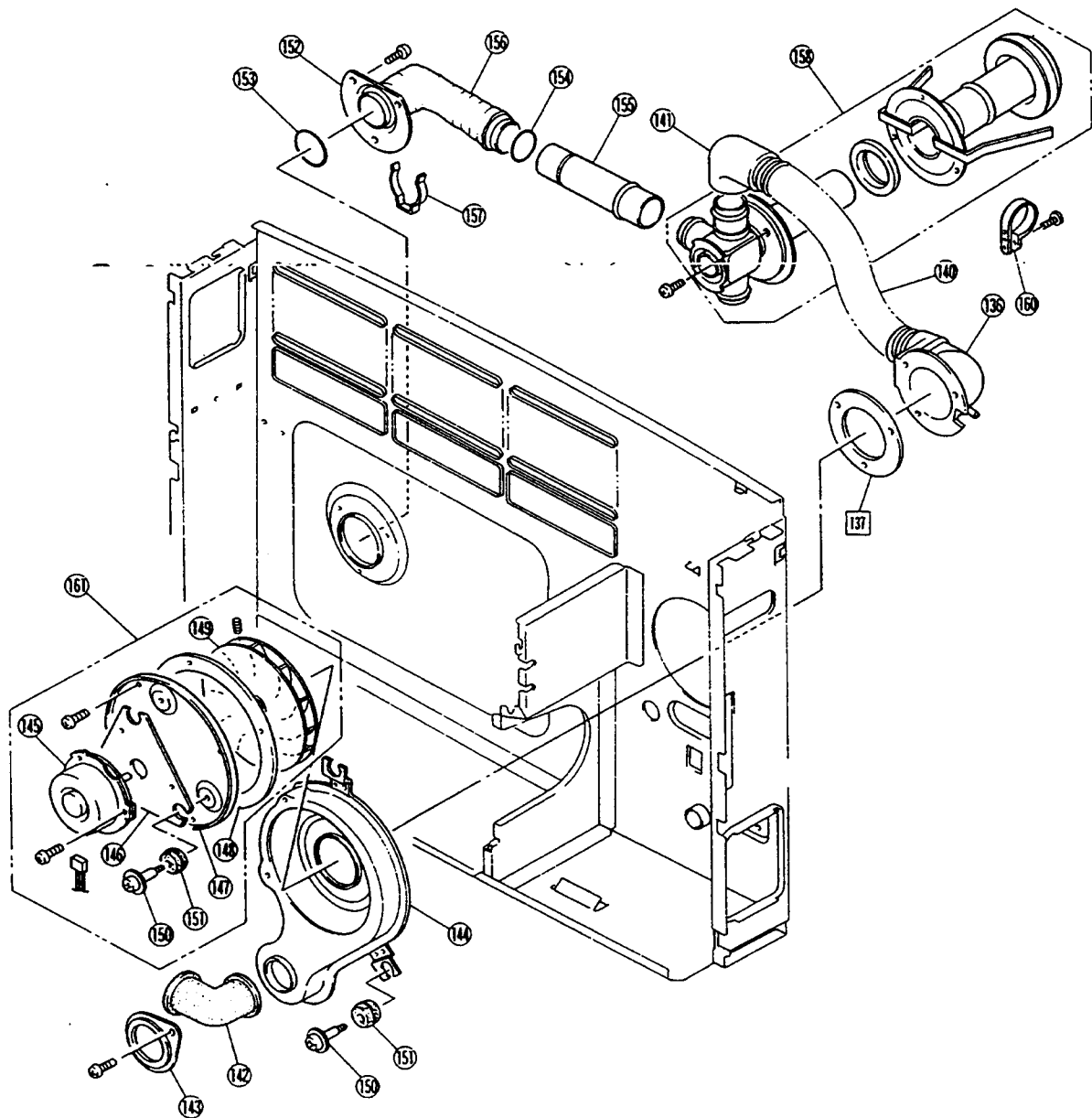
- iv) Release thermal fuse (pull down).
- v) Release thermal fuse wires from black clamps using screwdriver.



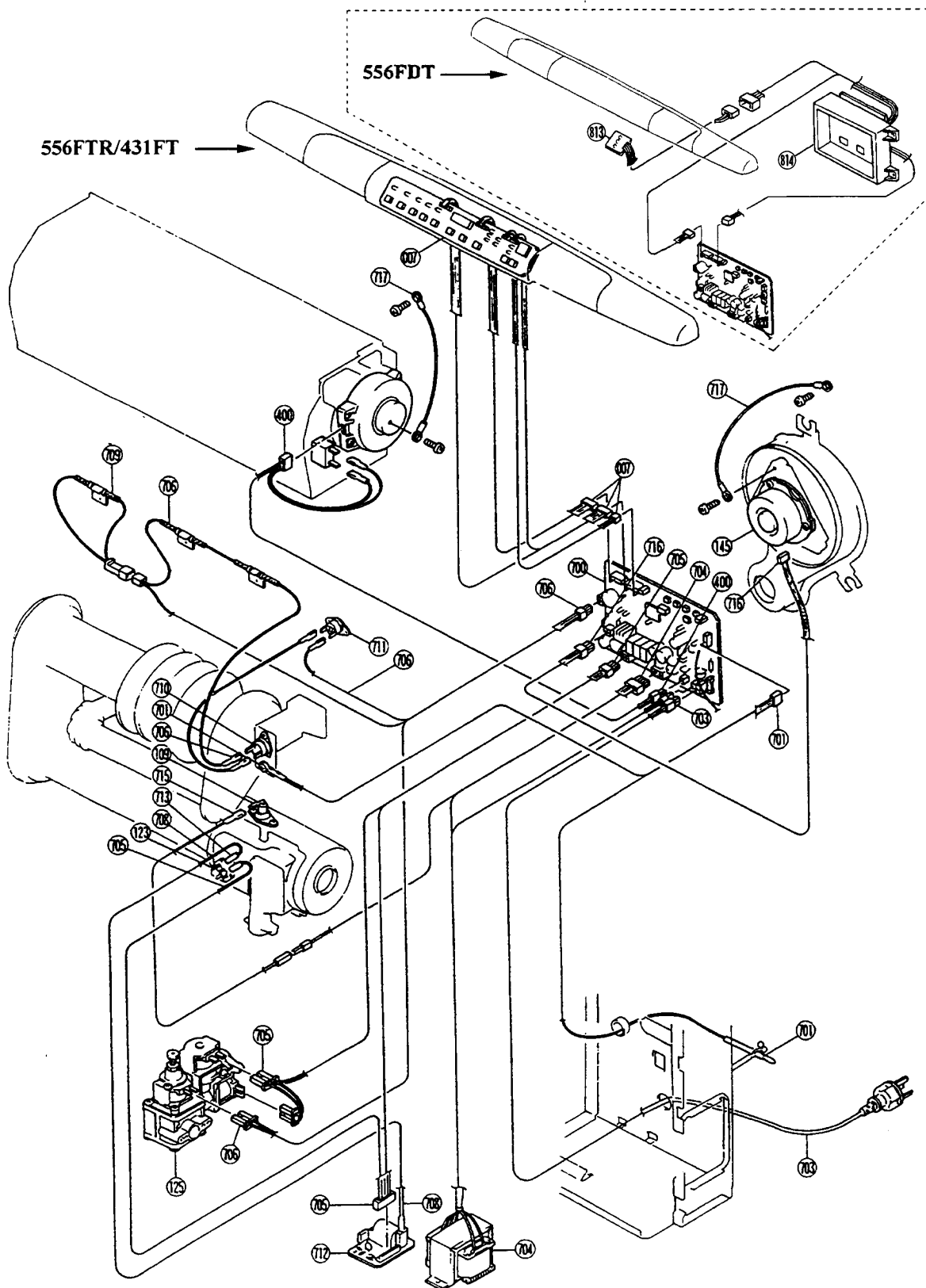
- vi) Disconnect wire connector along harness to release completely from appliance.











| No  | Part Name                            | RA Part No | RNZ Part No | QTY |
|-----|--------------------------------------|------------|-------------|-----|
| 001 | Rear Panel Assy C                    |            |             | 1   |
| 002 | Top Panel Support                    |            |             | 1   |
| 003 | Top Panel B                          | 90175472   | 3000        | 1   |
| 004 | Control Panel Plastic Body B         | 90175480   | 3006        | 1   |
| 005 | Control Panel Moulding RHS B         | 90175498   | 3007        | 1   |
| 006 | Control Panel Moulding LHS B-1 (556) | 90175506   | 3008        | 1   |
| 006 | Control Panel Moulding LHS B-3 (431) | 90178625   | 3229        |     |
| 007 | Control Panel Complete Assy (556)    | 90175514   | 3009        | 1   |
| 007 | Control Panel Complete Assy (431)    | 90178476   |             | 1   |
| 008 | Side Panel RHS B                     | 90175522   | 3011        | 1   |
| 009 | Side Panel LHS B                     | 90175530   | 3021        | 1   |
| 010 | Filter Clip Bottom                   |            |             | 1   |
| 011 | Filter Clip Sides                    |            |             | 2   |
| 012 | Air Filter Assy B                    | 90175548   | 3026        | 1   |
| 013 | Convection Fan Bracket               |            |             | 1   |
| 014 | Latch                                |            | 3028        | 2   |
| 015 | Foot                                 |            | 3030        | 2   |
| 016 | Remote Control                       | 90175555   | 3031        |     |
| 017 | Warm Air Sealing Bracket             |            |             | 1   |
| 018 | Heat Exchanger Packing B             | 90175563   |             | 1   |
| 019 | Louvre Assy B                        | 90175571   | 3032        | 1   |
| 020 | Strike                               | 90175589   | 3038        | 2   |
| 021 | Front Panel C                        | 90175597   | 3024        | 1   |
| 022 | Bottom Trim Assy B                   |            |             | 1   |
| 023 | Back Panel Heat Shield               |            |             | 1   |
| 024 | Back Spacer Top B                    | 90175605   | 3049        | 1   |
| 025 | Back Spacer RHS B                    | 90175613   | 3050        | 1   |
| 026 | Back Spacer LHS B                    | 90175621   | 3060        | 1   |
| 027 | Wall Fixing Bracket                  | 90147471   | 6684        | 2   |
| 030 | Control Cover Assy                   | 90178484   | 3063        | 1   |
| 031 | Foot Base Assy                       | 90168337   | 1610        | 2   |
| 032 | Rubber Foot                          | 90168329   | 4024        | 2   |
| 033 | Cord Bush B                          |            |             | 3   |

| No  | Part Name                            | RA Part No           | RNZ Part No  | QTY |
|-----|--------------------------------------|----------------------|--------------|-----|
| 34  | Cord Bush A                          |                      |              | 2   |
| 35  | Heat Insulating Material A           |                      | 3064         | 1   |
| 36  | Heat Insulating Material B           |                      | 3065         | 1   |
| 37  | Packing                              |                      |              | 1   |
| 38  | Bottom Trim Complete Assy B          | 90175647             |              | 1   |
| 100 | Heat Exchanger Complete Assy B (556) | 90175654             | 3066         | 1   |
| 100 | Heat Exchanger Complete Assy C (431) | 90178492             |              | 1   |
| 101 | Heat Exchanger Fixing Bracket        |                      |              | 1   |
| 102 | Combustion Chamber Fixing Bracket    |                      |              | 1   |
| 103 | OHS Bracket                          |                      |              | 1   |
| 106 | Flange                               |                      |              | 2   |
| 107 | Seal Bracket Assy                    |                      |              | 2   |
| 108 | Flame Rod Bracket                    |                      | 3068         | 1   |
| 109 | Flame Rod                            | 90142803             |              | 1   |
| 110 | Flame Rod Packing                    | 90173113             | 3069         | 1   |
| 111 | Burner Box                           |                      |              | 1   |
| 112 | Burner LP/NG                         | 90170630             | 3091         | 4   |
| 113 | Burner Clip Assy                     |                      |              | 1   |
| 114 | Burner Box Packing                   | 90175662             |              | 1   |
| 115 | Burner Box Fixing Bracket Assy       |                      |              | 1   |
| 116 | Primary Air Damper                   | 90178559             |              | 1   |
| 117 | Secondary Air Damper LP<br>NG        | 90170754<br>90170911 |              | 1   |
| 118 | Fixing Bracket Packing               | 90175670             |              | 1   |
| 119 | Injector Manifold                    | 90178542             |              | 1   |
| 120 | Main Injector (556) LPG<br>NG        | 90165168<br>90165036 | 3092<br>3093 | 4   |
| 120 | Main Injector (431) LPG<br>NG        | 90178526<br>90178534 |              | 4   |
| 121 | Manifold Packing                     | 90175688             | 3094         | 1   |
| 122 | Electrode Clip                       |                      | 3096         | 1   |
| 123 | Electrode                            | 90175696             | 3097         | 1   |
| 124 | Electrode Packing                    | 90173105             | 3098         | 1   |
| 125 | Gas Control Assy LP/NG               | 90175704             | 3099         | 1   |
| 126 | Pressure Test point Screw            |                      |              | 2   |
| 127 | O-ring                               |                      |              | 2   |
| 128 | Gas Supply Connection Tube           |                      | 3100         | 1   |

| No  | Part Name                                                                                                                                                | RA Part No                                                      | RNZ Part No | QTY |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------|-----|
| 129 | Gas supply Connection Tube Assy O-ring                                                                                                                   | 90165523                                                        | 3077        | 2   |
| 130 | Pressure Point                                                                                                                                           |                                                                 |             | 2   |
| 131 | Packing                                                                                                                                                  | 90176611                                                        | 3101        | 1   |
| 132 | Packing                                                                                                                                                  |                                                                 |             | 1   |
| 133 | Gas Filter                                                                                                                                               |                                                                 |             | 1   |
| 134 | Gas Inlet (1/2)                                                                                                                                          | 90165515                                                        |             | 1   |
| 135 | Elbow B                                                                                                                                                  | 90165549                                                        |             | 1   |
| 136 | Air Supply Inlet C                                                                                                                                       | 90123043                                                        |             | 1   |
| 137 | Air Supply Packing                                                                                                                                       | 90123050                                                        |             | 1   |
| 138 | Bush                                                                                                                                                     |                                                                 |             | 1   |
| 139 | Bush                                                                                                                                                     |                                                                 |             | 1   |
| 140 | Flexible Intake Hose                                                                                                                                     | 90122961                                                        |             | 1   |
| 141 | Air Intake Elbow                                                                                                                                         | 90122953                                                        |             | 1   |
| 142 | Combustion Chamber Flexible Connection Tube                                                                                                              | 90175720                                                        | 3102        | 1   |
| 143 | Flexible Connection Tube Clip                                                                                                                            |                                                                 | 3103        | 2   |
| 144 | Combustion Fan Casing Assy A                                                                                                                             |                                                                 |             | 1   |
| 145 | Combustion Motor                                                                                                                                         |                                                                 | 3079        | 1   |
| 146 | Combustion Motor Fixing Bracket                                                                                                                          | 90165481                                                        |             | 1   |
| 147 | Combustion Fan Cover                                                                                                                                     | 90165473                                                        |             | 1   |
| 148 | Blanking Panel Packing                                                                                                                                   | 90165465                                                        |             | 1   |
| 149 | Combustion Fan                                                                                                                                           | 90165457                                                        |             | 1   |
| 150 | Motor Fixing S Tight Screw                                                                                                                               |                                                                 |             | 6   |
| 151 | Mounting Rubber Convection Fan                                                                                                                           | 90122862                                                        |             | 6   |
| 152 | Flue Outlet Connection Assy                                                                                                                              | 90158783                                                        |             | 1   |
| 153 | Sealing O-ring E                                                                                                                                         | 90122946                                                        |             | 1   |
| 154 | Sealing O-ring D                                                                                                                                         | 90122920                                                        |             | 1   |
| 155 | Flue Outlet Connection B                                                                                                                                 | 90158791                                                        |             | 1   |
| 156 | Flue Outlet Cover                                                                                                                                        | 90165382                                                        |             | 1   |
| 157 | Insulation Clip                                                                                                                                          | 90165374                                                        |             | 1   |
| 158 | Mushroom Flue<br>AA Flue (75-115 mm)<br>A Flue (115-240 mm)<br>B Flue (240-400 mm)<br>C Flue (400-600 mm)<br>D Flue (600-800 mm)<br>E Flue (800-1000 mm) | FM0302AA<br>FM0302A<br>FM0302B<br>FM0302C<br>FM0302D<br>FM0302E |             | 1   |
|     |                                                                                                                                                          |                                                                 |             |     |

| No  | Part Name                      | RA Part No | RNZ Part No | QTY |
|-----|--------------------------------|------------|-------------|-----|
| 160 | Clip                           | 90178146   |             | 2   |
| 161 | Combustion Fan (Complete Assy) | 90175738   | 3105        | 1   |
|     |                                |            |             |     |
| 398 | Convection Fan (Complete Assy) | 90175746   | 3106        | 1   |
| 399 | Capacitor                      |            | 3107        | 1   |
| 400 | Convection Fan Motor           |            | 3108        | 1   |
| 401 | Convection Fan Motor Base      |            |             | 1   |
| 402 | Line Flow Fan                  |            | 3109        | 1   |
| 403 | Convection Fan Casing Assy     |            |             | 1   |
| 404 | Bearing                        | 90156704   |             | 1   |
| 405 | Humidifier Tray Cover          |            | 3110        | 1   |
| 406 | Humidifier Tray                | 90175753   | 3111        | 1   |
| 407 | Sparker Fixing Bracket         |            |             | 1   |
| 408 | OHS Fixing Bracket             |            |             | 1   |
| 409 | Heat Shield Assy               |            |             | 1   |
|     |                                |            |             |     |
| 413 | Electrical Cord Holder         |            |             | 1   |
| 414 | PCB Unit Fixing Bracket        |            |             | 1   |
| 415 | Circuit Board Spacer           |            |             | 4   |
| 416 | Cable Clip                     |            |             | 1   |
| 417 | Cable Clip                     |            |             | 1   |
| 418 | Wire Clip                      |            |             | 3   |
| 419 | Speed Clip                     |            |             | 3   |
|     |                                |            |             |     |
| 699 | PCB Unit Assembly              |            |             |     |
| 700 | PCB Unit                       | 90175779   | 3113        | 1   |
| 701 | Room temperature Thermistor    | 90176787   | 3144        | 1   |
|     |                                |            |             |     |
| 703 | Electrical Cord                |            | 3115        | 1   |
| 704 | Transformer - Australia        | 90175795   |             | 1   |
| 705 | Transformer - New Zealand      |            | 3116        | 1   |
| 706 | Wiring harness A Assy          |            | 3117        | 1   |
|     |                                |            |             |     |
| 708 | High tension Lead Assy         | 90175803   |             | 1   |
| 709 | Thermal Fuse Harness Assy      | 90175811   | 2957        | 1   |

| No  | Part Name                            | RA Part No           | RNZ Part No | QTY |
|-----|--------------------------------------|----------------------|-------------|-----|
| 710 | Overheat Switch (130°C OFF)          | 90178567             |             | 1   |
| 711 | Overheat Switch (90°C OFF)           | 90178575             |             | 1   |
| 712 | Sparker                              | 90175829             | 2958        | 1   |
| 713 | Electrode Sleeve                     |                      |             | 1   |
| 714 | Thermal Fuse Cover                   |                      |             | 1   |
| 715 | Flame Rod Lead Wire                  |                      |             | 1   |
| 716 | Motor Harness A                      |                      |             | 1   |
| 717 | Convection Motor Earth Wire          |                      |             | 2   |
|     |                                      |                      |             |     |
|     | Data Plate (556) LPG<br>NG           | 90175977<br>90175985 |             | 1   |
|     | Data Plate (431) LPG<br>NG           |                      |             |     |
|     | Warning Label                        | 90175993             |             | 1   |
|     | Wiring Diagram (556)                 | 90176009             |             | 1   |
|     | Wiring Diagram (431)                 |                      |             |     |
|     | Warning Label (Electric)             | 90176017             |             | 1   |
|     | "Top" Indicator Label for flue & fan | 90176025             |             | 1   |
|     | Gas Energy Rating Label (556)        | 90176033             |             | 1   |
|     | Gas Energy Rating Label (431)        |                      |             |     |
|     | Conversion Kit to NG (556)           | 90177445             |             | 1   |
|     | Conversion Kit to LPG (556)          | 90177452             |             | 1   |
|     | Conversion Kit to NG (431)           |                      |             |     |
|     | Conversion Kit to LPG (431)          |                      |             |     |
|     |                                      |                      |             |     |
| 750 | Central ON-OFF Adaption Kit Assy     | 90175712             |             | 1   |
| 751 | Sub PCB                              |                      |             | 1   |
| 752 | Terminal                             |                      |             | 1   |
| 753 | Central Harness                      |                      |             | 1   |
| 754 | Sub PCB Connector                    |                      |             | 1   |
| 755 | Circuit board Spacer                 |                      |             | 1   |
| 756 | Bush                                 |                      |             | 1   |
|     |                                      |                      |             |     |
|     |                                      |                      |             |     |