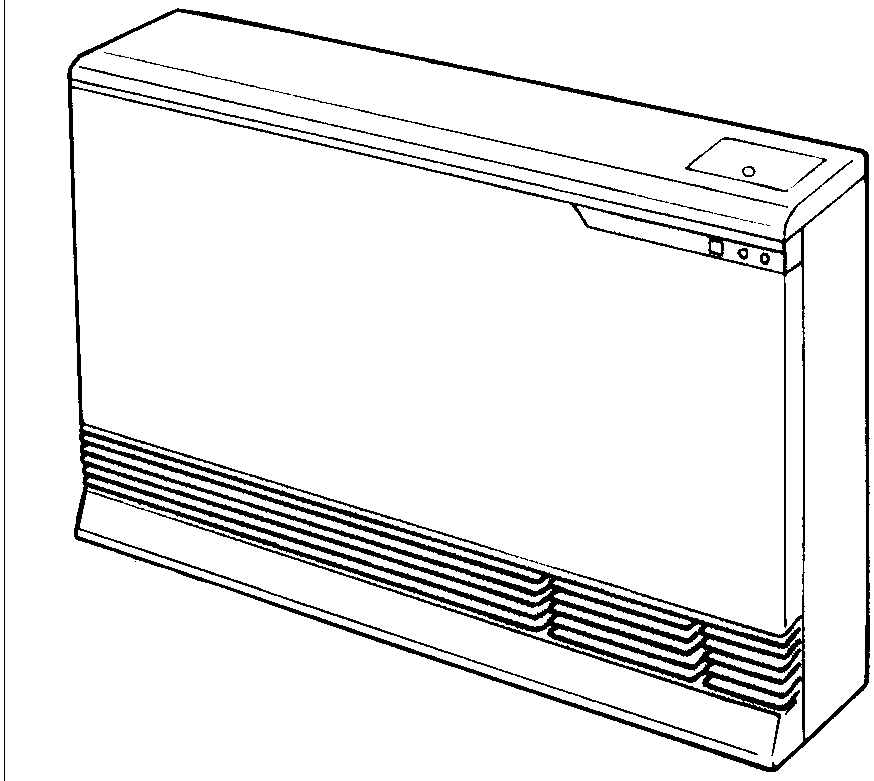
Rinnai

SERVICE MANUAL

RHFE-1004FTR

ENERGYSAVER



Proudly a member of The Australian Gas Association.
All of our products are AGA tested and approved.

The Australian
Gas Association

Quality System
Quality
Endorsed
Company
ISO 9002 Lic 4983
Standards Australia

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

Rinnai New Zealand has been certified to ISO 9001 Quality Assurance by Telarc.

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GAS
ENERGY RATING

Comparative Energy Consumption tested to The Australian Gas Association requirements of Australian Gas Code AG 103. An energy rating of 5 stars refers to an efficiency of approximately 80%, that is, 80% of gas consumed is converted to useful heat.

The Regulatory Compliance Mark (RCM) indicates compliance with electrical safety regulations in Australia and New Zealand
Rinnai Australia Supplier Code 5109

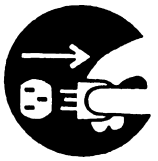
ISO 9001	*Model for Quality Assurance in design/development, production, installation and servicing, aimed primarily at achieving customer satisfaction by preventing nonconformity at all stages from design through to servicing.*
ISO 9002	*Same as ISO 9001 but excluding design.*
AG 103	*Approval requirements for gas heaters as set by The Australian Gas Association and Australian Liquefied Petroleum Gas Association Ltd, to ensure proper safety performance and quality levels are achieved.*

Produced by Customer Technical Services
July 2000

Key to Warning Symbols

Failure to comply with the following instructions may result in serious personal injuiry or damage to the appliance.

Be careful of possible electric shock. Wiring inside this appliance may potentially be at 240 Volts.



Remove the plug from the source when carrying out any of the following activities.

Read Fault Diagnosis and Wiring Diagram carefully to avoid incorrect wiring

Do not disassemble. Parts not serviceable.

Please follow instructions from page 40 to 47 carefully to ensure safe and appropriate service.

After completing the service and confirming that there are no gas leaks or incorrect wiring, test operation of unit according to the Customer Operating Instructions. After confirming normal operation, explain what was serviced to the customer and operation principles if necessary.

This manual has been compiled by Rinnai Australia Customer Technical 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.

SRV1004
Issue Nº1

Table of Contents

Glossary of Terms

This glossary of terms and symbols 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
NO_X	-	oxides of nitrogen (NO & NO_2)
OHS	-	overheat switch
PCB	-	printed circuit board
CPU	-	central processing unit
POT	-	potentiometer
rpm	-	revolutions per minute
SV	-	solenoid valve
ø	-	diameter
$\Delta\,^{\circ}C$	-	temperature rise above ambient
POV	-	modulating valve
TE	-	thermal efficiency
TH	-	thermistor

1. Introduction

Background

The RHFE-1004FTR incorporates an improved 7 step automatic heat control with an electronic thermostat to provide comfortable heating. The fan is also controlled by the thermostat. Other features of these appliances are improved safety, operation (including remote control) installation, and maintenance features.

Features

- Built into the main PCB is the software to adapt all versions for connection to a central ON/OFF timer.
- Gas flow modulates in 7 steps between HI ~ LOW/and OFF, achieving comfortable and efficient heating.
- The 1004FTR includes a 24 hour digital clock.
- The dual timer allows you to program the heater to come on for two separate periods each day, usually one period in the morning and one period in the evening. The dual timer feature means that you can set and forget your heater. It will turn itself ON and OFF at the times you have programmed until you cancel the timer program.
- The economy mode is an energy saving feature that reduces the room temperature by 3° C over a 90 minute interval without affecting comfort.
- Temperature control is monitored by fuzzy-logic technology.
- The 1004FTR incorporates a remote control to enable you to turn your appliance ON and OFF, and to adjust its temperature at your convenience. The remote control also comes with its own handy bracket for easy storage.
- All operation and temperature control is with easy-to-use push buttons.
- 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.
- Information about any previous faults is stored in the PCB and can be recalled during servicing.

About the RHFE-1004FTR

The body work is formed from 1.2 mm galvanised steel sheet, which forms a box to which the components, heat exchanger and blowers are attached. The whole assembly is covered by an outer casing which is constructed from 0.8 mm galvanised and painted steel burner.

The combustion chamber is constructed from 1.0 mm aluminised steel sheet, located in the middle of the appliance. Its dimensions are 930mm wide x 315mm deep x 670mm high.

The heat exchanger is composed of two sub-heat exchangers, which are constructed from 0.5 stainless steel sheet. There are two inlets for the front heat exchanger. One of the two inlets is connected to the combustion chamber at the top left. The other inlet is connected to the outlet of the back heat exchanger at the rear centre. The outlet of the front heat exchanger is connected to the combustion chamber at the top right and the outlet is connected to the rear inlet of the front heat exchanger.

Ignition is continous spark in conjunction with the solenoid valves. The spark is monitored and controlled by the printed circuit board.

2. Specification

Model No.			RHFE1004FTR
Name of appliance			Fan Forced Flued heater
Output (Max./Min).		(kW)	8.5 / 2.5
Gas Consumption (Max./Min).		(MJ/h)	37 / 11
Dimensions		Width	930 mm 215 mm (330 mm with base) 670 mm
Weight			42 kg
Connections		Electrical	AC 240V (Nz: AC 230V)
		Gas	R1/2" Male Thread
Changeover Capacity (Output)			Hi ~ Lo / OFF 29.6 MJ/h (29.6) ~ 8.8 MJ/h (Modulating) / OFF
Combustion Method			Bunsen
Ignition Method			Continuous Direct Discharge
Ignition Activation			Push Method (Non-lock)
Temperature Control			Electronic Thermostat Hi ~ Lo / OFF
Temperature Control Operation			Up / Down Buttons
Temperature Control Range (°C)			L (10°C) - 16 ~ 26 (in 1°C units) - H (High Boost)
Warm Air Outlet			Bottom Louvre
Timer Operation	Timer		24 Hour Digital, Intelligent Dual Timer
	Operation		24 Hour Up/Down Control
	Display		AM/PM Digital Clock Display
	Temperature Control		26°C Max. when timer is operating
Convection Fan			Hi ~ Lo / OFF (7 Step Auto-Changeover)
Warm Air Discharge Fan Volume			Max: 10.2 (m^3/min) Min: 5.8 (m^3/min)
Display	Control Panel		7 Segment Display (2 Digits x 2), AM/PM Indicator (2), Timer Setting Indicator (4), Time Setting Indicator, Economy Indicator, Function Lock Indicator, Timer 1 Indicator, Timer 2 Indicator, Override Indicator.
	Escutcheon Panel		ON/Combustion Indicator (emits 2 colours), filter Indicator.
Control Panel			ON/OFF Button, Up Button, Down Button, Economy Button, Time Setting Button, Timer 1 Button, Timer 2 Button, Override Button.
Economy Operation			Dependent on selected Button
Function Lock			Set and Cancel by pressing Up and Down Buttons Simultaneously for 2 seconds
Humidifier Tray	Capacity		Approx. 3000 ml
	Rate of Evaporation		Approx. 300 ml/h

Safety Devices	Burner Safety Device	Flame Rod Type
	Overheat Device	Hi-limit Switch, Overheat Thermistor, Thermal Fuse
	Power Failure Device	Within PCB unit
	Overcurrent Device	Glass tube fuse 5A
	Convection Fan Delay OFF	Dependant on Micro-Computer Timer
	Spark Detector	Combustion Fan rpm Detector, Pre-Purge Timer, Spark Detection - Reverse Flame safety device
	Thermostat	OFF at 10 min.>40° C (does not revert)
	Filter Indicator	Indicates blocked air filter
Electrical Consumption		Hi - 110 Lo - 64
Noise Level (dB)		Hi ~ Lo = 47 ~ 37 dB

3. Combustion Specifications

Basic Combustion Specifications

Rinnai model reference		RHFE-1004FTR	
Gas type		Natural Gas	LPG
Gas Consumption (MJ/h)	Low	11	11
	High	37	37
Injector size ∅ (mm)	Front	1.95	1.20
	Right	1.80	0.95
	Left	1.80	0.95
Damper Adjustment	Front	7/10	10/10
	Right	10/10	10/10
	Left	10/10	10/10
Regulator Pressure (kPa)	Low	0.50	1.09
	High	0.77	2.38
Burner Marking	Front	-	-
	Right, Left	LP	LP
Combustion Method		Bunsen style	
Burner Type		Stainless steel slit style	
Solenoid Valve		Direct single seated valve type	
Modulating Solenoid Valve		Rinnai electronic control	

Warm Air Discharge Temperature Distribution

Conditions: <High Combustion>

Test gas: C_3H_8
Measured Input: 36.1 MJ/h 8620 kcal/h
Nominal Input: 37 MJ/h

(Unit Δ°C)

37	50	66	52	51	44	64	40	57	34
82	102	116	111	105	92	93	79	70	54
89	73	86	92	95	81	72	82	70	68
82	58	79	78	82	74	70	76	72	71
79	65	77	77	80	74	70	73	75	60
75	60	70	68	75	73	68	68	73	71

(Average 50)

(Room temperature 23°C)

Conditions: <Low Combustion>

Test gas: C_3H_8
Measured Input: 11.1 MJ/h 2650 kcal/h
Nominal Input: 11 MJ/h

(Unit Δ°C)

28	35	42	34	36	37	37	34	29	29
53	57	73	82	80	73	66	53	51	42
56	46	50	70	70	58	51	54	50	49
51	46	49	58	58	51	50	51	51	50
51	46	50	56	56	51	50	49	52	45
50	44	50	50	52	50	48	46	50	51

(Average 27.6)

(Room temperature 23°C)

Warm Air Discharge Velocity

<High Operation>

(Unit m/sec)

2.0	2.6	2.7	2.3	2.7	1.4	2.9	2.5	3.2	3.4
3.2	3.3	3.4	3.2	3.4	3.7	3.8	2.7	3.0	3.4
2.9	3.7	3.5	3.1	3.2	3.7	4.5	2.6	3.3	3.7
3.3	4.5	4.3	3.8	4.1	3.5	4.2	3.8	3.8	3.2
4.1	4.9	4.7	4.7	5.1	4.5	4.9	4.6	4.0	1.3
4.4	4.1	4.6	4.3	5.0	4.9	4.5	4.9	4.5	4.8

(Average 3.67 m/sec)

<Low Operation>

(Unit m/sec)

1.3	1.5	1.6	0.6	1.1	0.5	1.7	1.6	1.9	2.5
1.9	2.1	2.0	1.9	2.3	2.3	2.3	0.9	1.7	2.1
1.7	2.4	2.1	1.7	2.0	2.1	2.6	1.0	1.6	2.0
2.3	2.5	2.4	2.2	2.4	2.0	2.7	2.2	2.1	1.8
2.4	2.6	2.6	2.5	2.8	2.6	2.7	2.5	2.3	0.7
2.3	1.7	2.5	2.5	2.7	2.8	2.5	2.7	2.4	2.9

(Average 2.07 m/sec)

Conditions

- Convection Fan Rpm. High: 930 rpm
  Low: 502 rpm

  Measured at full combustion

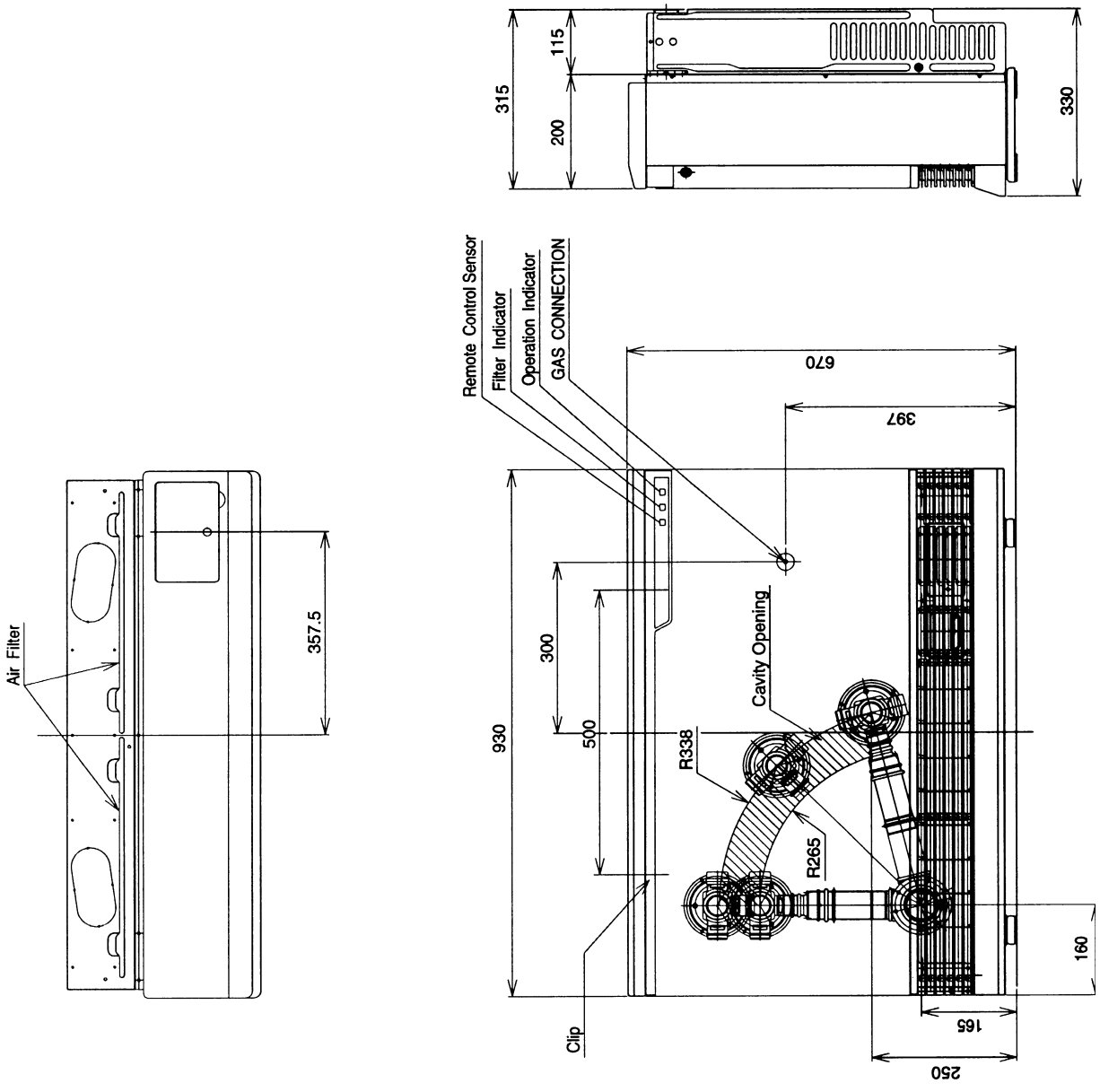
- Average air velocity on High:3.67 m/sec
- Average air velocity on Low:2.07 m/sec
- Area of louvre:0.0464 m^2
- Air flow rate on High:10.2 m^3/min.
- Air flow rate on Low:5.76 m^3/min.

Noise Level

Operation Noise (dB (A))
High: 47 Low: 37

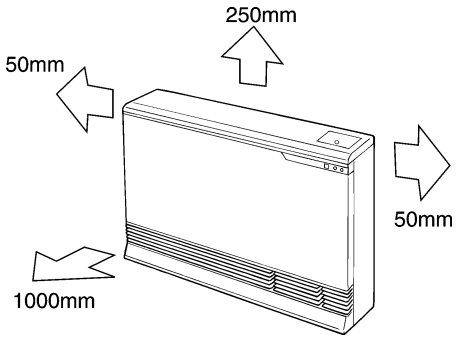
-Measuring method: According to Japanese Industry Standards
-During Combustion

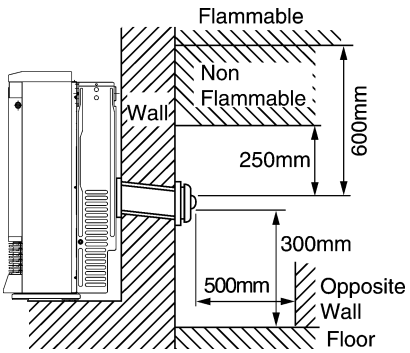
4. Dimensions

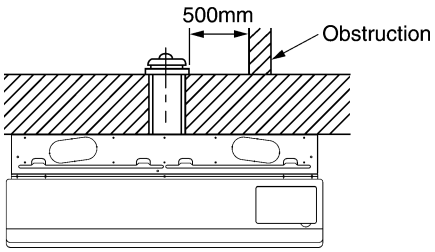


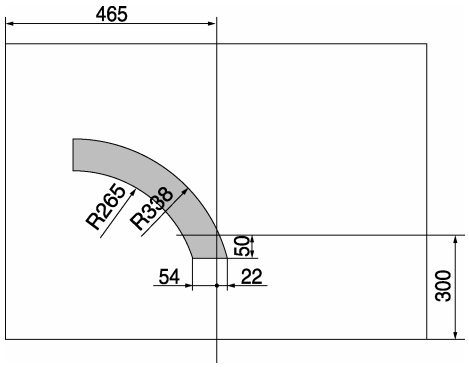
5. Installation

The following clearances are recommended for installation.

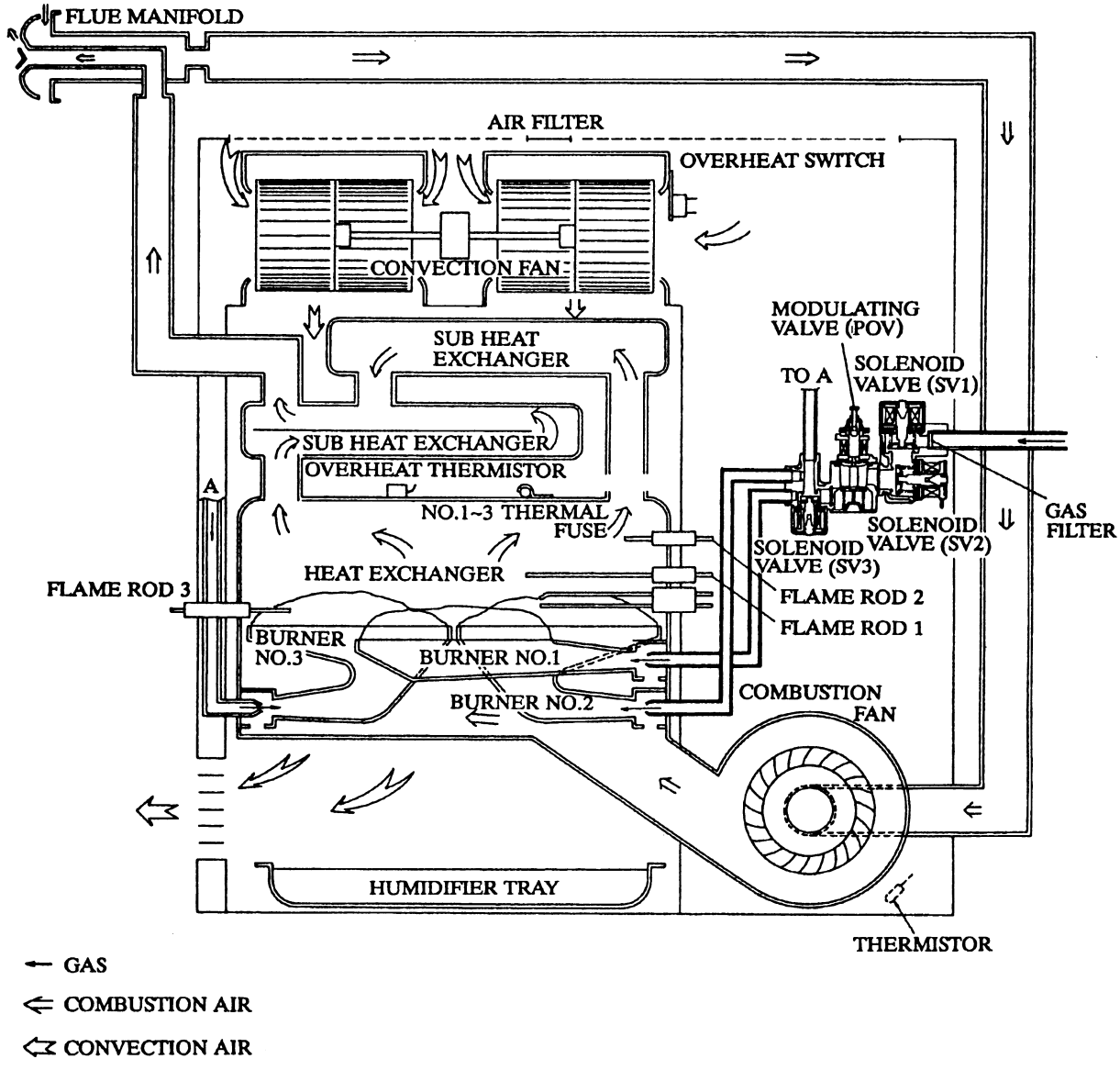




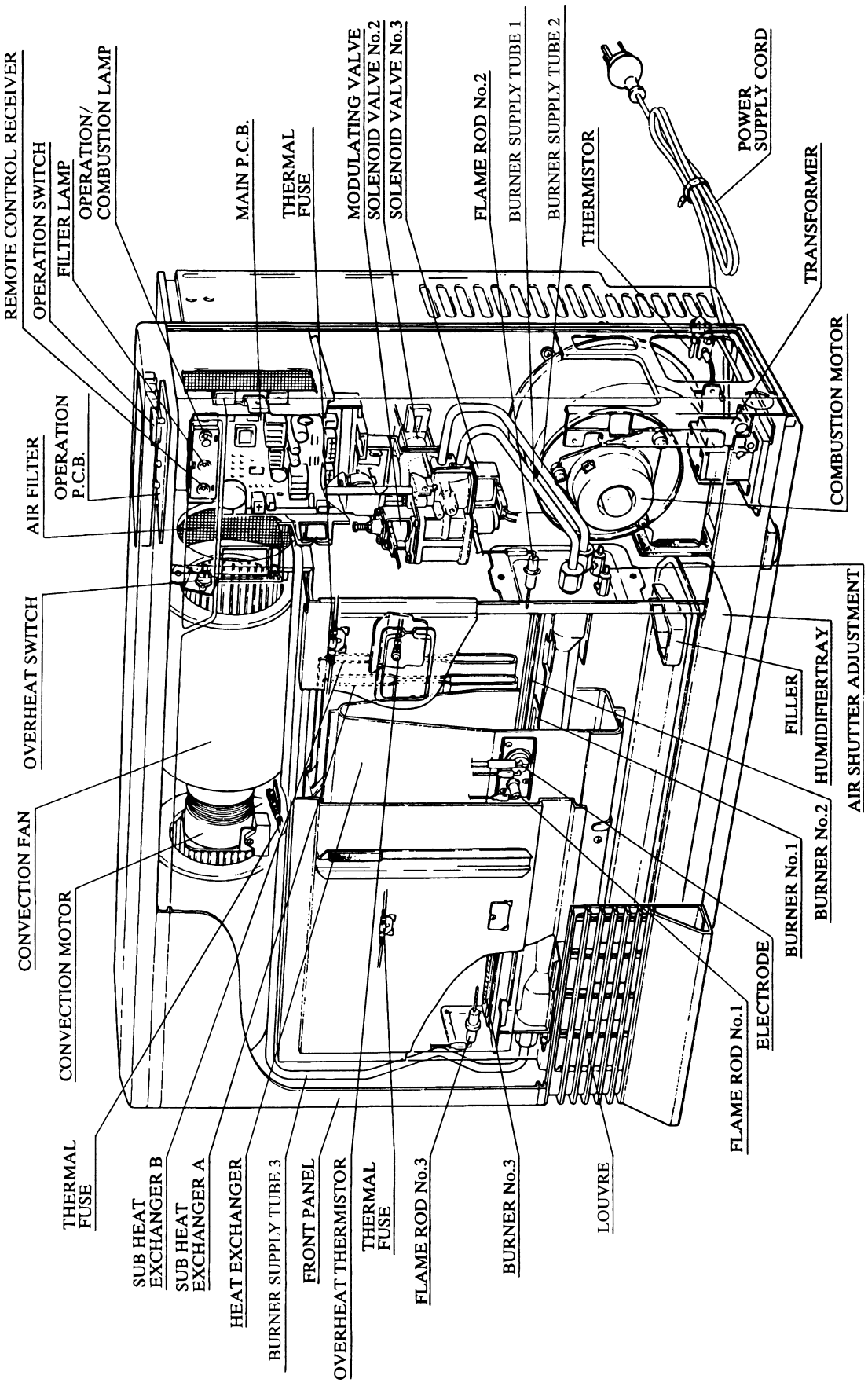




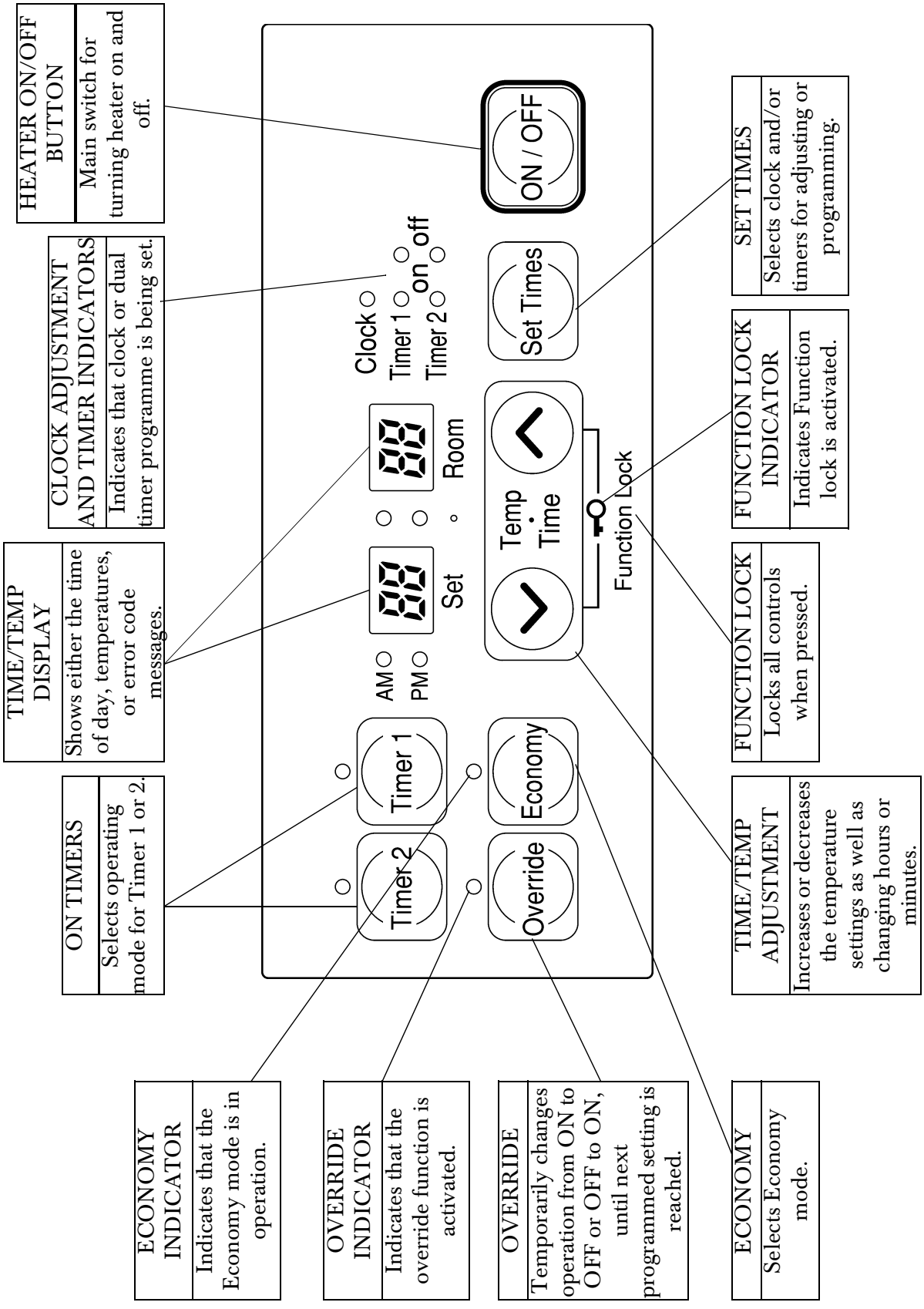
6. Schematic Diagram



7. Cut-Away Diagram



8. Control Panel Layout



9. Operating Principles

Normal Operation

Push the ON/OFF button to operate the appliance. The power ON/Combustion indicator will glow green and at the same time, the display will show the time, then the set room temperature.

The unit will check that the safety devices have no faults (ie. the Hi-Limit Switch, Thermal Fuse, Room Temperature Thermistor, and Flame Rod). The combustion fan will increase revolutions to 2580rpm. The unit will check once again that there is no flame rod current (mis-ignition detection occurs at $<0.1\mu A$).

Pre-purge is completed after approximately 15 seconds, following which, the combustion fan will decrease revolutions to 2130rpm 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_1 & SV_2) 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 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 solenoid valve (SV_3) and the opening degree of the modulating valve. The convection fan is adjusted in the same manner.

Thermostat Control

The selected temperature and room temperature are displayed on the digital or LED display (on the left and right hand side, respectively). Time and temperature are displayed alternately depending on whether the heater is running or not. The selected temperature is altered by pressing the time/ temperature adjustment buttons (ie. the up and down buttons).

Turning OFF

Simply press the ON/OFF button. 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 255 seconds, ensuring the appliance is cool.

Economy Mode

To engage the economy function press the economy button while the heater is operational. The economy indicator will glow. The economy function is designed to drop the selected temperature by a total of 3° C over a period of one and a half hours, 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, then again by 1° C after another 30 minutes.

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

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

Function Lock

To activate the function lock press the up and down button simultaneously for approximately 2 seconds. The function lock indicator will glow. If the function lock is activated during normal operation, then no function other than the ON/OFF switch will be operable until the lock is released.

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

To de-activate the function lock simply press the up and down buttons simultaneously for 2 seconds and release.

Filter Indicator

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

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 conventional fan heater, the convection fan operates normally from the time of ignition and cold draughts 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 fan speed depending on the conditions at the time.

Clock and Timer Setting and Operation

To set the Clock, press the Set Times button once. The Clock indicator will flash. Press and hold the up button. The minutes will begin to change first, then the time will change by whole hours. Release the button when the desired hour shows on the digital display. Confirm that you have selected AM. A small indicator on the left hand side of the digital display indicates the AM setting. Press and hold the up button again to select the minutes. If the desired time is passed, the down button can be used to change the time to the desired time. Press the Set Times button five times to lock in and complete setting the time. The Clock and Timer indicators will go out. A small indicator on the digital display will flash to show that the clock is operating.

To set Timer 1, press the Set Times button twice. The digital display will show AM 6:00 and Timer 1 indicator will flash. Press the up and down buttons until the desired ON time appears. Press the Set Times button again. The Timer 1 OFF indicator will flash. Press the up and down buttons until the desired OFF time appears. Press the Set Times button three times to lock in the programmed time. The digital display will show the current time.

To activate the timers, press the ON/OFF button to operate the heater. The ON indicator will glow green and the heater will begin to operate. Select the desired temperature setting. Press the Timer 1 and/or Timer 2 button(s). The Timer indicator(s) will glow and the heater will remain on standby until one hour prior to the time programmed into the selected Timer(s) is reached. When this time is reached, the Timer indicator will flash and the heater will operate. The ON indicator glows red when the heater commences operation.

10. Main Componentry

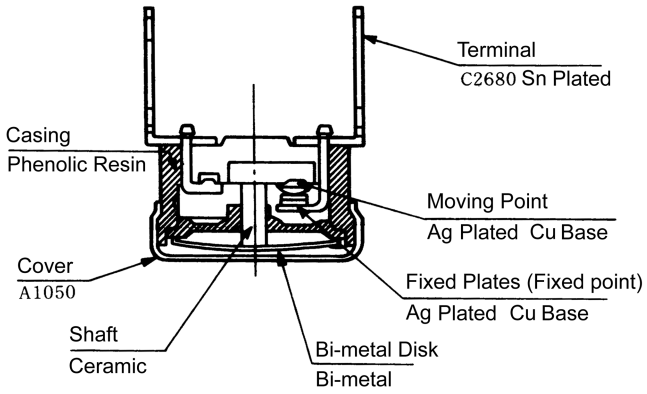
Safety Devices

Overheat Switches

If the air filter or air outlet becomes blocked, the overheat switch causes the solenoid valve to close and operation to stop. The appliance can be re-lit when it has cooled. If the air filter or outlet becomes blocked and the OHS fails, the thermal fuse will "blow", causing the solenoid valve to close and operation to stop. This is a "one-shot" fuse; therefore the appliance cannot be restarted until this fuse has been replaced.

OHS Type	Characteristics	
Thermistor	Activation Temp.	Operates at 105° C
Thermal Fuse	Cut Off Temp	152± 2° C (Qty 1) 188± $^{3}_{1}$° C (Qty 2)

Reverse Flame Detection Device

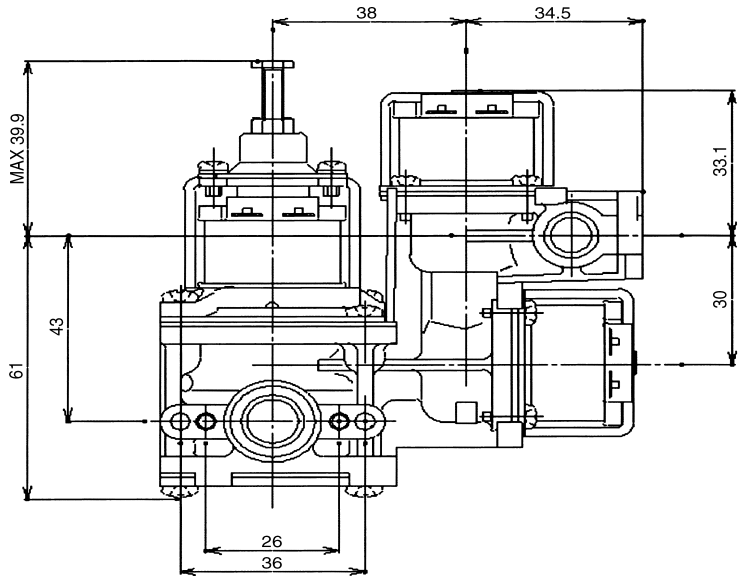


Type	Characteristics	
Reserve Flame Detection Switch (Bi-metal type)	Activation Temp.	65± 5° C OFF
	Restore Temp.	50± 10° C ON
Reverse Flame Detection Switch (Thermistor type)	Activation Temp.	100° C OFF

Surge Protection

Glass Fuse	5 Amp

Valves



Solenoid Valve

		Solenoid Valves 1, 2, and 3
Single Seated Valve	Voltage	DC90 V
	Power Consumption	< 5 W

Modulating Valve

Voltage	<180mA
Consumption	< 6 W

Electrical

	Type	Diameter (mm)	Width (mm)	Air flow m^3/min
Convection Fan	Sirocco	ϕ 150	201	High : 10.2 Low : 5.8
Combus-tion Fan	Sirocco	ϕ 134	48	—

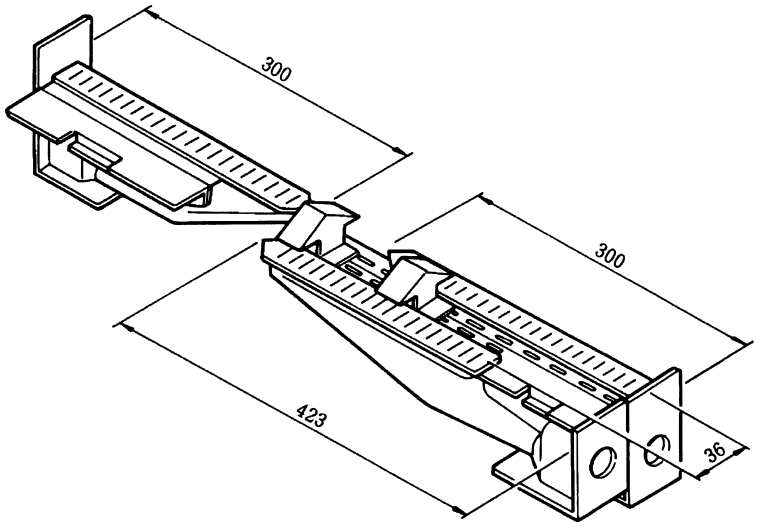
Room Temperature Control Device

	Set Temp Range	Room Temp Display Range	Differential
Thermistor	L, 16~26°C, H	1 ~ 30°C	Approx. 1.5°C

Combustion

Burner

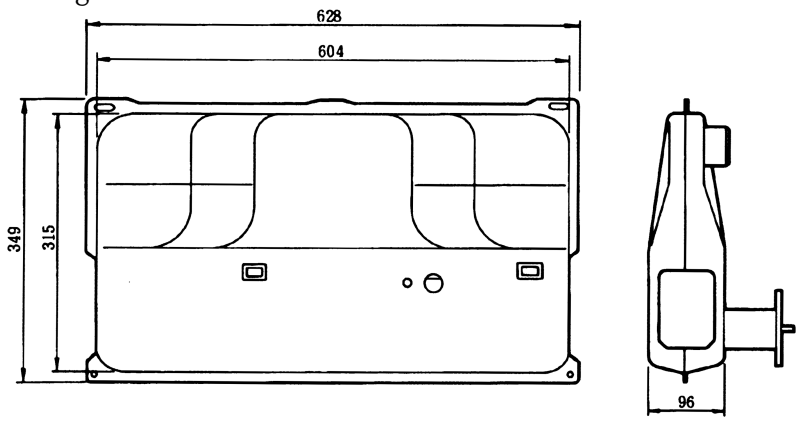
Type	Combustion Type	Burner Port Shape	Qty	Material
Main burner	Bunsen	Slit	1	Heat Resistant Stainless Steel



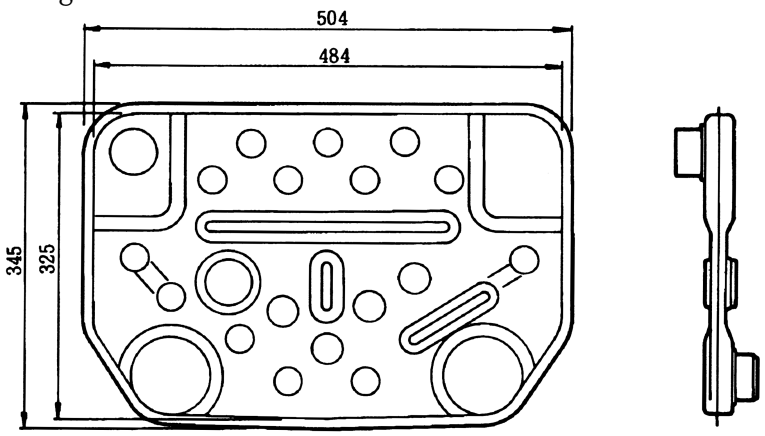
Heat Exchangers

	Material	Thickness (mm)	Dimensions
Main Heat Exchanger	SA1D-80	1.0	As below
Sub Heat Exchanger 1	Heat Resistant Stainless Steel SUS 430 - CP	0.5	
Sub Heat Exchanger2	SUS 430 - CP	0.5	

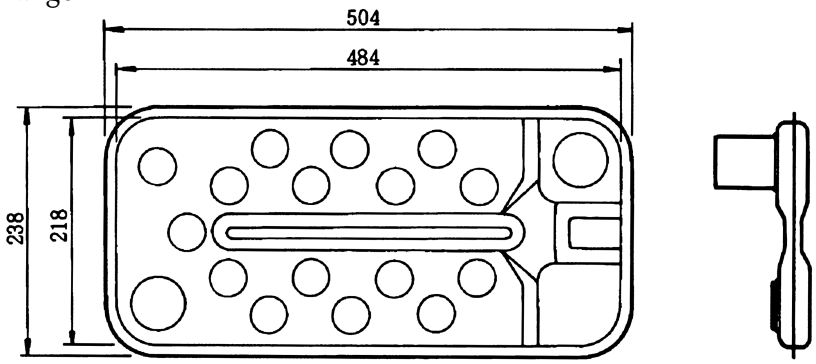
Main Heat Exchanger



Sub Heat Exchanger 1



Sub Heat Exchanger 2



11. Error Codes

Error is displayed as a number on clock 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.)

Error Code	Content	Diagnostic Check Point
00	Power re-instatement while ON/OFF switch ON	-
11	Ignition Failure	Check for spark Check gas supply
12	Flame Failure	Check gas supply pressure
14	Overheat Switch	Check Overheat Thermistor
16	Room Overheat	-
31	Room Temperature Sensor Faulty	Check Room Temperature Thermistor
32	Room Temperature Sensor Faulty	Check Room Temperature Thermistor
33	Overheat Temperature Sensor Faulty	Check Overheat Thermistor
34	Overheat Temperature Sensor Faulty	Check Overheat Thermistor
53	Sparker Failure	PCB or Sparker
61	Combustion Fan Failure	Combustion Fan
70	Faulty ON/OFF switch	Check Control PCB (ON/OFF Switch)
71	Faulty Solenoids	-
72	Faulty Flame Rod	PCB or Flame Rod
73	Communication Error	-

* When the unit is off, press the “Economy”, “∧”, and “∨” buttons simultaneously for at least 2.5 seconds to display the following at 1.9 second intervals in this order:
Error History (displays 9 most recent error codes);
Total Combustion Time;
Total Combustion Frequency; and
Total Power Failure Frequency.

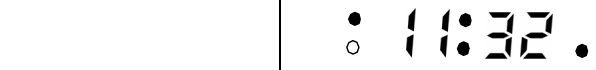
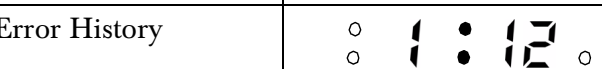
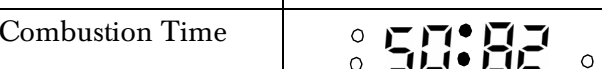
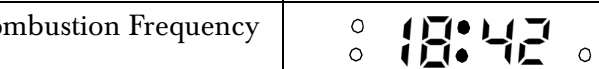
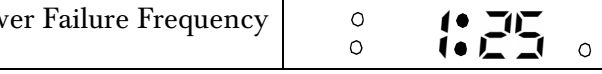
* When the unit is off, press the “Economy” and “∨” buttons simultaneously for 2.5 seconds to reset Error History.

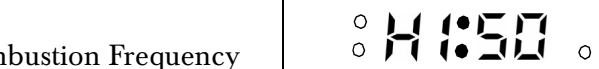
Memory Function for Maintenance Data

The 9 most recent error messages and the total combustion time, total combustion frequency, and total power failure frequency are stored in memory.

<How to recall data>
While the unit is off, press the "Economy", "∧", and "∨" buttons simultaneously for at least 2.5 seconds to bring up the error history on the display. The error history will display the following in 1.9 second intervals: the 9 most recent error messages (the most recent is No. 1; No. 9 the oldest), total combustion time, total combustion frequency, and total power failure frequency.

Example.

Item	Digital Display	Comments
Normal OFF state	Time displayed when appliance OFF 	Press "Economy", "∧", and "∨" buttons simultaneously to display error history
Error History		No. 1 (Latest Error) Flame Failure
		No. 2 Mis-ignition
		No. 3 Mis-ignition
	|	|
		No. 8 Mis-ignition
		No. 9 No error
Total Combustion Time		5082 hours of Combustion
Total Combustion Frequency		18420 times Combustion
Total Power Failure Frequency		125 times Power Failure

When the maximum no. of hours has been surpassed, the following is displayed:		
Total Combustion Time		15082 hours of Combustion (after surpassing 9999 hours)
Total Combustion Frequency		150820 times Combustion (after surpassing 99990 times)
Total Power Failure Frequency		15082 times Power Failure (after surpassing 9999 times)

<How to Reset> (Same as Initialisation of E^2 PROM)
- While the unit is OFF, press the "Economy" and "∨" buttons simultaneously for at least 5 seconds.
- The digital display will go out, and "88:88" will be displayed when resetting has completed.

E^2 PROM Data

E^2 PROM data will not be erased during a power failure. However, this data is divided into 2 groups where one of the groups of data can be reset at the external control pads.

[Permanent Data]	[Deletable Data]	(Initial Setting)
• Total Combustion Time	• Present Time	(0:00 AM)
• Total Combustion Frequency	• Error History	(None)
• Total Power Failure Frequency	• Timer 1 Time	(6:00 AM)
	• Timer 2 Time	(6:00 PM)
	• Set Room Temperature	(22◦C)
		(0 Hours)

<Resetting>
Refer to “How to Reset” under “Memory Function for Maintenance Data”.

<Test Mode>

To select test mode, press the test switch at the top of the PCB while the appliance is operating. Each time the test switch is pressed, the display will change to the following modes:

1. Enter test mode.
2. Low Pressure test mode
3. High Pressure test mode.
4. Convection Fan Low Adjustment Mode .....Displays “LF.” Use “Up” and “Down” buttons to change rpm. Press the “Economy” button to store in memory.
5. Convection Fan High Adjustment Mode ....Displays “HF.” Use “Up” and “Down” buttons to change rpm. Press the “Economy” button to store in memory.

NB: Convection fan speed is factory set. Should you require adjustment please contact the Rinnai service department.

12. Diagnostic Points

Flow Chart Nº	CN	Wire Colour Nº	Measurement Value	Part
1	A	brown-aqua	AC216~264V	Power Cord
2	F	white1-blue	<DC1V <3Ω	Thermal Fuse TF 1~3, OHS (Conv. Fan)
	F - F1	blue-white	<DC1V <1Ω	OHS
	F - F1	white-white	<DC1V <1Ω	TF 1, 2
	F	white-white	<DC1V <1Ω	TF 3
3	G	white-white	10°C: 119~136kΩ, 20°C: 74~82kΩ	Hi-Limit Switch
4	G	yellow-yellow	10°C: 59~71kΩ, 20°C: 36~41kΩ	Room Temp. TH
5	B1	yellow-FR Terminal	<DC 0.1μA	Flame Rod
	B1	red-FR Terminal	<DC 0.1μA	Flame Rod
	B1	blue-FR Terminal	<DC 0.1μA	Flame Rod
6	F	black-white	DC 0.5~5V (>2580rpm) >5160 rpm (86Hz)	Combustion Fan
7	F	black-white	DC 0.5~5V (<2310 rpm) <4620 rpm (77 Hz)	Combustion Fan
8	C	blue-red	DC 78~100V	Sparker
9	C	black1-yellow	DC 78~100V	SV 1, 2
10	F	grey-grey	Lo~Hi DC 1~15V 80~100Ω	POV
11	B1	yellow-FR Terminal	>DC 0.1μA	Flame Rod 1
	B1	red-FR Terminal	>DC 0.1μA	Flame Rod 2
	B1	blue-FR Terminal	>DC 0.1μA	Flame Rod 3
12	C	black2-pink	DC 78~100V	SV3
13	D	white-black	Lo~Hi AC 40~108V 20~70Ω	Convection Motor
14	F	black-white	(High) DC 0.5~5V (3270 rpm) 6540 rpm (109 Hz)	Combustion Fan
	F	black-white	(Low) DC 0.5~5V (2400 rpm) 4800 rpm (80 Hz)	Combustion Fan

Transformer Terminal Voltages/Coil Resistances

Wire Colour No.	Measurement Value
grey 7 - black 1	AC 216~264V 12~22Ω
blue 9 - black 8	AC 15~19V 0.5~3Ω
red 10 - red 4	AC 31~39V 0.5~3Ω
blue 9 - yellow 5	AC 178~218V 89~109Ω

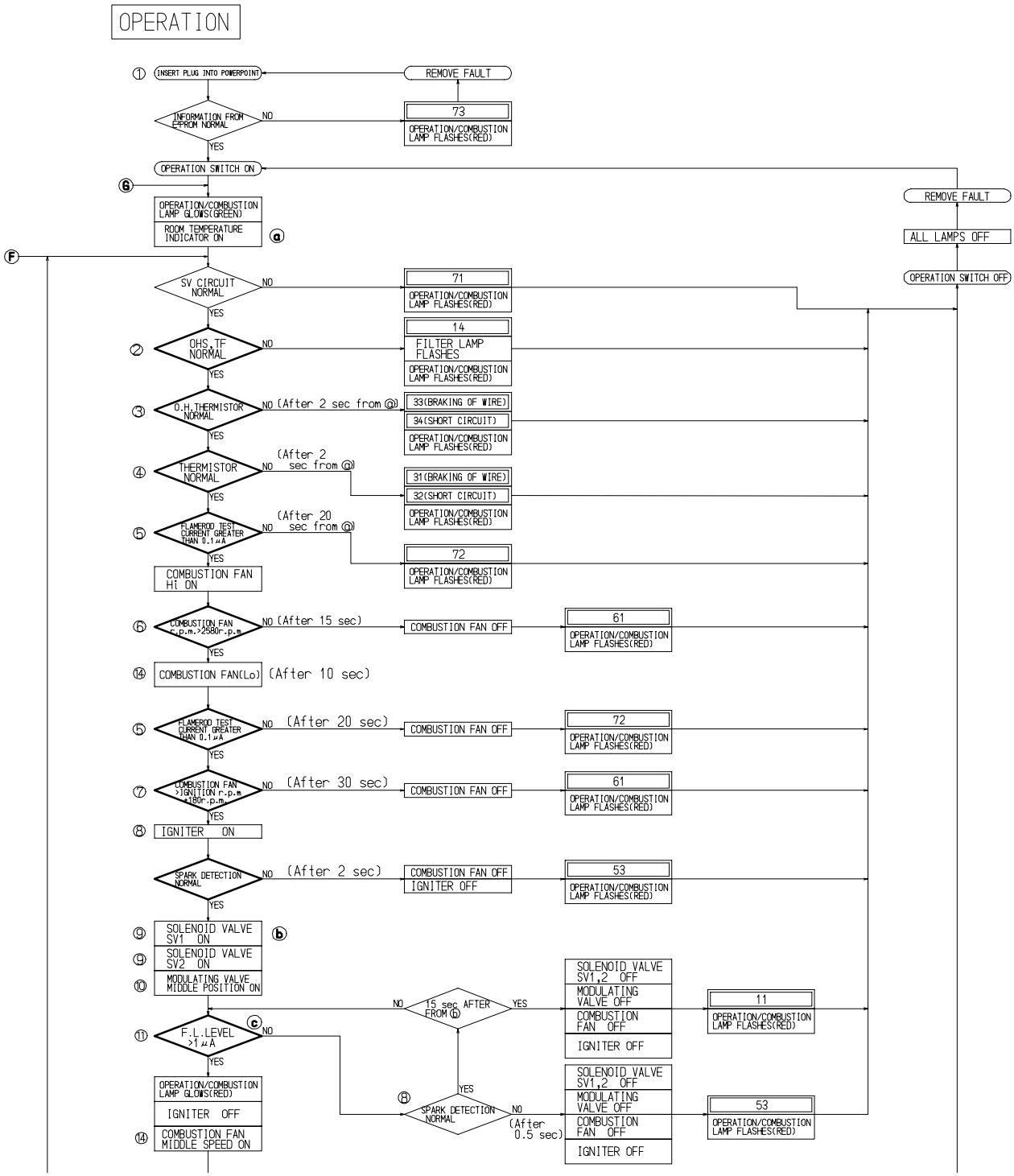
Combustion Fan

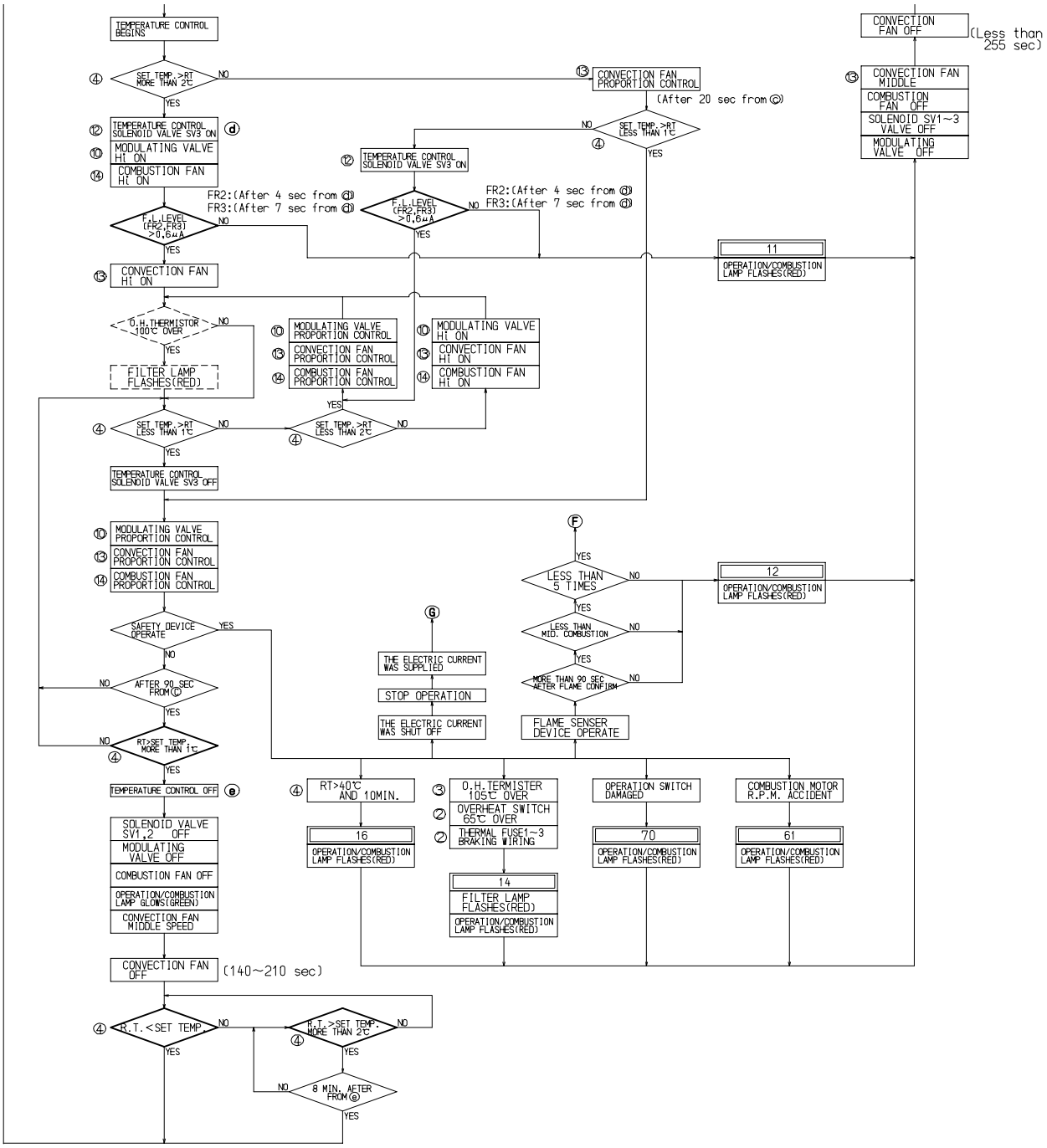
Gas Type	LPG	NG
Ignition rpm	2130 ± 30	2130 ± 30
High	3270 ± 30	3270 ± 30
Low	2400 ± 30	2400 ± 30

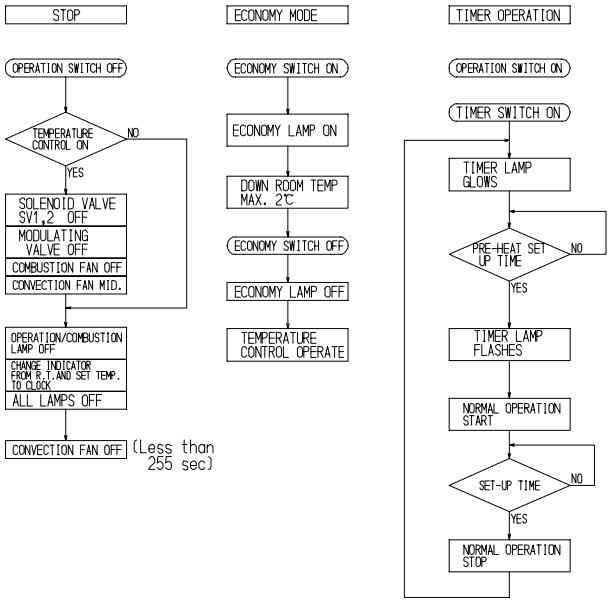
Convection Fan (rpm)

Gas Type	High	Low
NG	930 ± 30	500 ± 50
LP	930 ± 30	500 ± 50

13. Operational Flow Chart



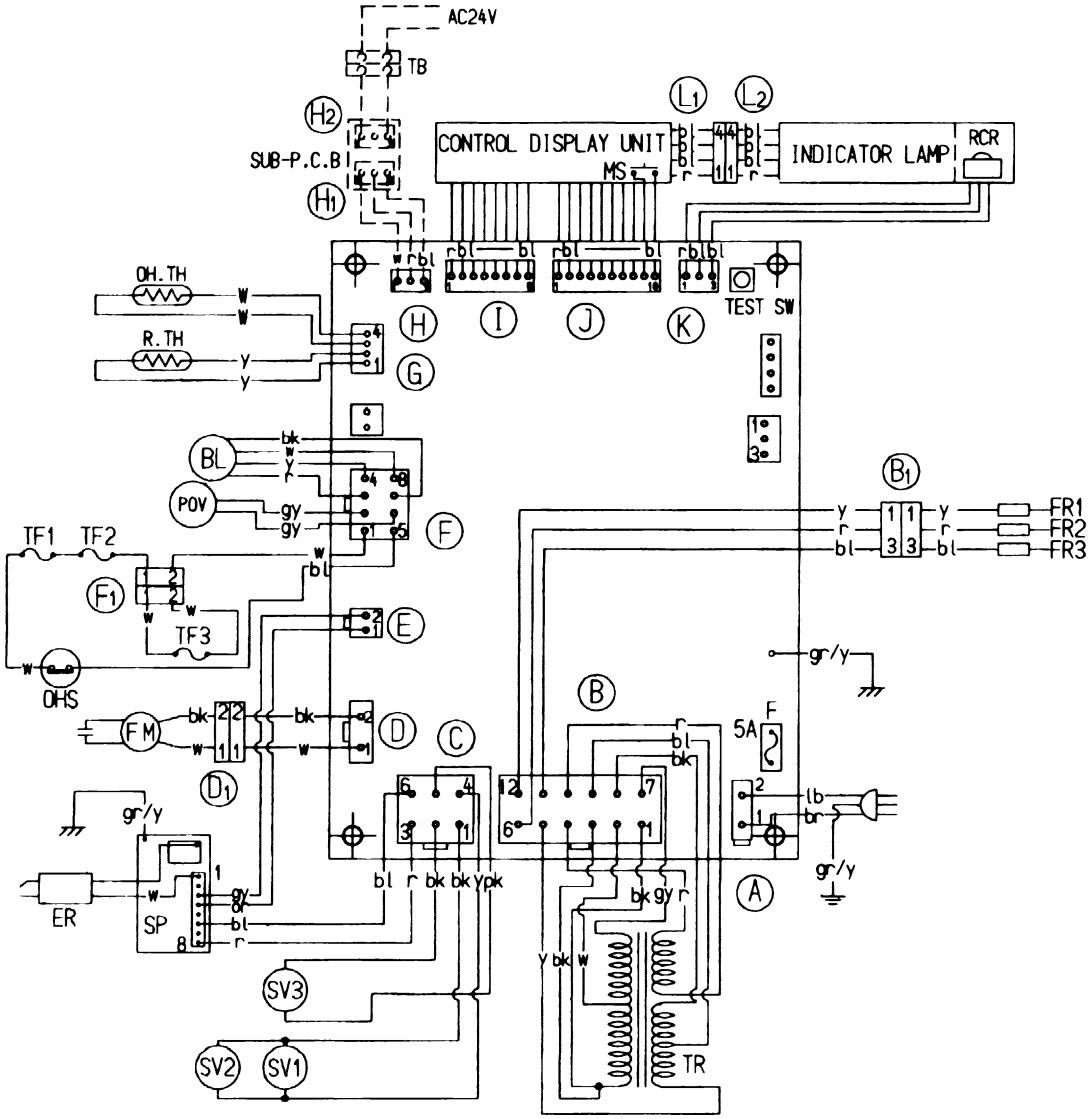

TEMPERATURE CONTROL BEGINS
SET TEMP.>RT MORE THAN 2℃
NO
YES
CONVECTION FAN PROPORTION CONTROL
(After 20 sec from ⓒ)
SET TEMP.>RT LESS THAN 1℃
TEMPERATURE CONTROL SOLENOID VALVE SV3 ON
MODULATING VALVE Hi ON
COMBUSTION FAN Hi ON
FR2:(After 4 sec from ⓐ)
FR3:(After 7 sec from ⓐ)
F.L.LEVEL (FR2,FR3) >0.6μA
CONVECTION FAN Hi ON
11
OPERATION/COMBUSTION LAMP FLASHES(RED)
O.H.THERMISTOR 100℃ OVER
FILTER LAMP FLASHES(RED)
MODULATING VALVE PROPORTION CONTROL
CONVECTION FAN PROPORTION CONTROL
COMBUSTION FAN PROPORTION CONTROL
MODULATING VALVE Hi ON
CONVECTION FAN Hi ON
COMBUSTION FAN Hi ON
SET TEMP.>RT LESS THAN 1℃
SET TEMP.>RT LESS THAN 2℃
TEMPERATURE CONTROL SOLENOID VALVE SV3 OFF
SAFETY DEVICE OPERATE
AFTER 90 SEC FROM ⓒ
RT>SET TEMP. MORE THAN 1℃
TEMPERATURE CONTROL OFF ⓔ
SOLENOID VALVE SV1,2 OFF
MODULATING VALVE OFF
COMBUSTION FAN OFF
OPERATION/COMBUSTION LAMP GLOWS(GREEN)
CONVECTION FAN MIDDLE SPEED
CONVECTION FAN OFF
(140~210 sec)
R.T.<SET TEMP.
R.T.>SET TEMP. MORE THAN 2℃
8 MIN. AFTER FROM ⓔ
Ⓕ
LESS THAN 5 TIMES
12
OPERATION/COMBUSTION LAMP FLASHES(RED)
LESS THAN MID. COMBUSTION
MORE THAN 90 SEC AFTER FLAME CONFIRM
FLAME SENSER DEVICE OPERATE
Ⓖ
THE ELECTRIC CURRENT WAS SUPPLIED
STOP OPERATION
THE ELECTRIC CURRENT WAS SHUT OFF
RT>40℃ AND 10MIN.
16
OPERATION/COMBUSTION LAMP FLASHES(RED)
O.H.TERMISTER 105℃ OVER
OVERHEAT SWITCH 65℃ OVER
THERMAL FUSE1~3 BRAKING WIRING
14
FILTER LAMP FLASHES(RED)
OPERATION/COMBUSTION LAMP FLASHES(RED)
OPERATION SWITCH DAMAGED
70
OPERATION/COMBUSTION LAMP FLASHES(RED)
COMBUSTION MOTOR R.P.M. ACCIDENT
61
OPERATION/COMBUSTION LAMP FLASHES(RED)
CONVECTION FAN OFF
(Less than 255 sec)
CONVECTION FAN MIDDLE
COMBUSTION FAN OFF
SOLENOID SV1~3 VALVE OFF
MODULATING VALVE OFF



(ERROR MESSAGES CONTRAST DIAGRAM)

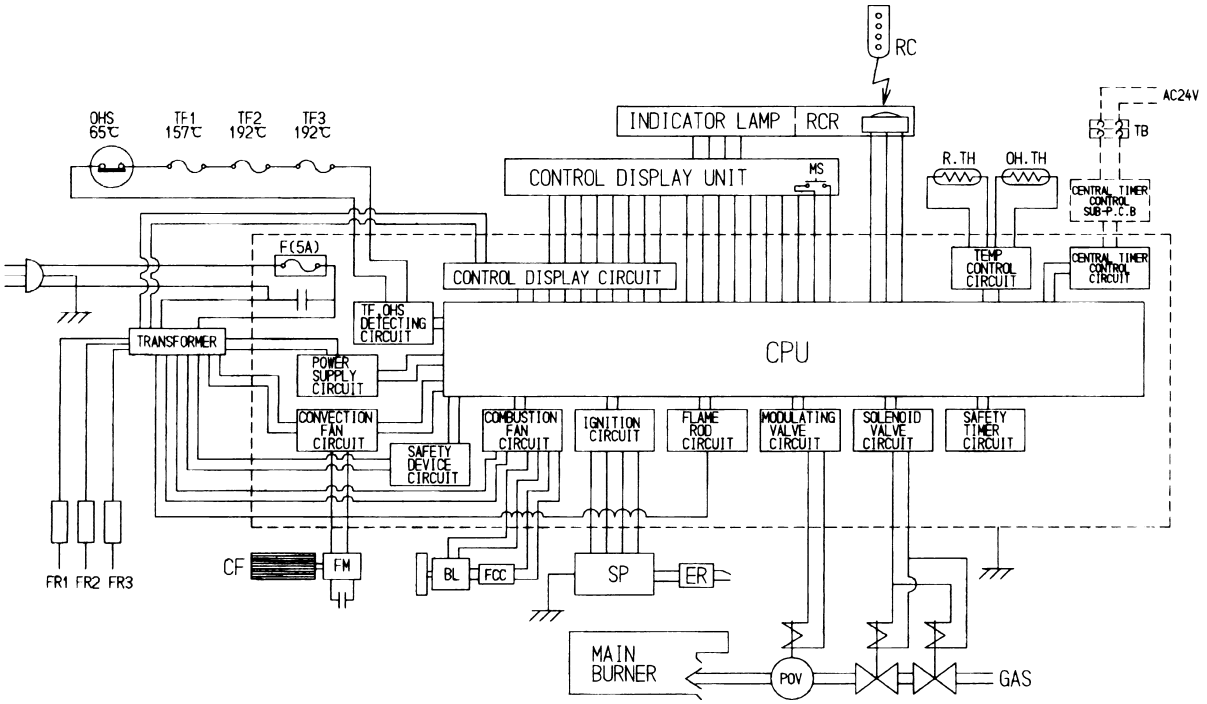
RHFE-1004FTR	FAULT
11	IGNITION FAILURE
12	FLAME FAILURE
14	OVERHEAT
16	ROOM OVERHEAT
31	ROOM TEMPERATURE SENSOR FAULTY
32	
33	OVERHEAT TEMPERATURE SENSOR FAULTY
34	
53	SPARKER FAILURE
61	COMBUSTION FAN FAILURE
70	FAULTY ON/OFF SWITCH
71	FAULTY SOLENOIDS
72	FAULTY FLAME ROD
73	COMMUNICATION ERROR
– –:– –	POWER FAILURE

14. Wiring Diagram



MARK	PART NAME	MARK	PART NAME
MS	MAIN SWITCH	OH.TH	OVER HEAT THERMISTOR
R.TH	THERMISTOR	OHS	OVER HEAT SWITCH
TF1~3	THERMAL FUSE	FM	CONVECTION FAN MOTOR
F	FUSE	SP	SPARKER
ER	ELECTRODE	SV1~3	MAIN SOLENOID VALVE 1~3
POV	MODULATING SOLENOID VALVE	BL	COMBUSTION FAN MOTOR
TR	TRANSFORMER	FCC	FAN CONTROL CIRCUIT
FR1~3	FLAME ROD 1~3	RCR	REMOTE CONTROL RECEIVER
RC	REMOTE CONTROLER	TB	TERMINAL BLOCK
CF	CONVECTION FAN	CPU	CENTRAL PROCESSING UNIT

15. Block Diagram



CODE	COLOR
bk	black
bl	blue
gr	green
gr/y	green/yellow
pk	pink
r	red
w	white
y	yellow
gy	grey
or	orange
br	brown
lb	light blue

16. Fault Finding Procedure

Initial Checks

Service Call System	Check Points (No.'s refer to causes outlined in the following pages)
Ignition does not occur after having pressed ON/OFF button. (Error code "11")	• Check gas meter/regulator is on. .....1 • Check gas pipe is not restricted (ie. crimped). .....1 • Air in gas supply. .....1 • Check gas type matches that supplied to appliance. 9
Room does not warm up.	• Check preset temperature. .....2 • Blocked air filter .....3 • Warm air outlet short circuit (obstruction) .....4 • Check gas valve to room.(Inadequate gas supply) 1
Flame Failure. Error Code "12" Error Code "14" Error Code "16"*	• Blocked flue terminal .....5 • Blocked air filter .....3 • Power failure. .....8 • Warm air outlet short circuit (obstruction) .....4 • Check gas type .....9 • Check gas hose isn't bent/crimped. ..... 1 • Reverse flame. .....6 • Unusually high room temperature. 7
There is a smell of gas.	• Leaking gas supply (faulty connection) 1

1. Gas Supply
   <Ignition does not occur> <Room does not warm up> <Smell of gas>
   - Is the gas supply fully open?
   - Is the gas pipe crimped?
   - Is the gas supply connection secure?

   YEnsure the gas supply is fully open.
   YIgnition may be delayed by poor gas supply, or air in the supply line.

2. Preset Temperature
   <Room does not warm up>
   - Is the set temperature lower than the current room temperature? (Appliance switches to "Low" approx. 1 minute after ignition)

   YSet the room temperature higher than the present room temperature.
   YAdjust to the desired room temperature with the room temperature control buttons.

3. Air Filter Blockage
   <Room does not warm up> <Extinguishes suddenly>
   - Is the air filter blocked by dust or is a curtain touching it?
   - Has the safety device been activated by dust blockage? (Error Code 14; Flashing filter indicator)

   YClean the filter at least once a month. The filter must be cleaned if the filter indicator flashes.

4. Warm Air Short Circuit (Obstructions)
   <Room does not warm up> <Extinguishes suddenly>
   - Are there any obstructions in front of the warm air louvres? (Error Code 14; Flashing filter indicator)

   YDo not cover louvres or place any obstructing objects within 1 m of the louvres.

5. Flue terminal
   <Extinguishes suddenly>
   • Is the flue terminal blocked? (Low flashing)
   YCheck the flue terminal every now and then and clean if blocked.

6. Reverse Flame
   <Extinguishes suddenly>
   • Is the flue terminal blocked?
   • Is there any blockage in the burner?
   • Is combustion, gas pressure etc. normal? (Error Code 12)

7. Room Temperature
   • Is the temperature of the room unusually high?
   YIf the unit detects 40°C for over ten minutes, the unit will stop operating.
   (Error Code 16.)

8. Power Failure
   • If a power failure occurs for at least 0.2 seconds, the unit will stop operating.
   After power has been re-instated, the unit will start operating again automatically.

9. Gas Type
   • Does the gas type match the specifications for the appliance.
   YChange according to combustion specifications.

The following are not faults

Condition	Cause and Explanation
There is smoke or an unusual smell upon initial use	There may be grease or dust adhered to the heat exchanger causing smoke when first using the appliance. This will stop after a short period. Increase the ventilation in the room when using the appliance.
The heater does not ignite upon initial use.	There may be air in the gas supply, preventing the appliance igniting immediately. If ignition does not occur after 15 seconds, the spark will stop and the heater will lockout. Turn the heater off to reset before attempting ignition again.
After ignition/extinction there is a ticking or clicking noise.	This is the sounds of the solenoid valve opening and closing the gas circuit, and is normal.
Resonant sound when the burner ignites.	Normal ignition sound. The extent of the sound will depend on gas pressure and burner temperature. (Sound is of re-ignition straight after extinction.)
Resonant sound after ignition.	Movement of the flame as it travels across the burner when combustion commences. This is normal and will soon go.
After ignition/extinction there is a ticking or clicking noise.	This is the sound of the combustion chamber metal expanding/ contracting due to heat, and is normal.
There is no warm air flow straight after turning appliance on.	The appliance is programmed not to blow any cold air. Warm air will start to flow automatically (after approx. 20 sec.) once the appliance warms up.
Resonant sound while appliance is operating	This is the sound of gas passing through the gas circuit.
The appliance turns off suddenly and does not display a flashing error code	Fuzzy logic activates so that the room temperature reaches the set temperature. When the room temperature decreases, the appliance automatically ignites to warm the room again.
Warm air continues to blow even after switching appliance OFF	The fan stops after releasing all residual heat from within the appliance. (approx. 255 sec.)
The power cord is accidentally pulled out, and although it is pushed in straight away and the appliance has been turned back on, ignition does not occur.	Do not operate the appliance again until it has cooled.

17. Fault Analysis

Note: Before carrying out resistance checks, disconnect power

A:After pressing the Heater ON/OFF button:

a. the sequence does not continue.
b. the combustion fan does not begin to rotate, or stops after rotating for a while.
c. there is no spark (approx. 15 sec. after attempted operation).
d. the solenoid valves do not open.
e. the convection fan does not begin to rotate (20 seconds after ignition).

Is there electrical supply? NO → 1. Confirm the connection at the wall socket. 2. Is the electrical fuse blown?
YES ▼

a. The sequence does not continue.

1. Broken wiring or loose pin connectors. (Open circuit)
2. Faulty ON/OFF button.
3. Faulty PCB.
4. Faulty Control Panel.
5. Faulty Overheat Switch. (Error code "14" and flashing filter indicator.)
6. Thermal Fuse had melted. (Error code "14" and flashing filter indicator.)
7. Solenoid Valve Circuit driver error. (Error Code "71")

b. The combustion fan does not begin to rotate, or stops after rotating for a while.

1. Combustion fan shaft grub screw loose.
2. An obstruction in the combustion fan is preventing the fan from rotating.
3. Open circuit or bad connection in motor circuit.
4. Flame rod current was over 0.2μA while pre-purging. (Error Code "72")
5. Combustion Fan rpm is not lower than ignition rpm of 2130rpm. (Error Code "61")
6. Spark is abnormal. (Error Code "53")
7. Faulty PCB.

c. There is no spark.

1. Loose power cord. (Broken wiring or loose pin connectors)
2. Leaks due to broken electrodes etc. (No constant sound)
3. Insufficient spark gap. (Spark electrode gap should be 3.5± 0.5mm)
4. Faulty sparker.
5. Faulty PCB.

d. The solenoid valves do not open.

1. Broken wiring or loose pin connectors.
2. Solenoid coil wiring is broken or shorted.
3. Faulty sparker. (Cannot detect spark)
4. Faulty PCB. (Solenoid valve power is less than DC90V)

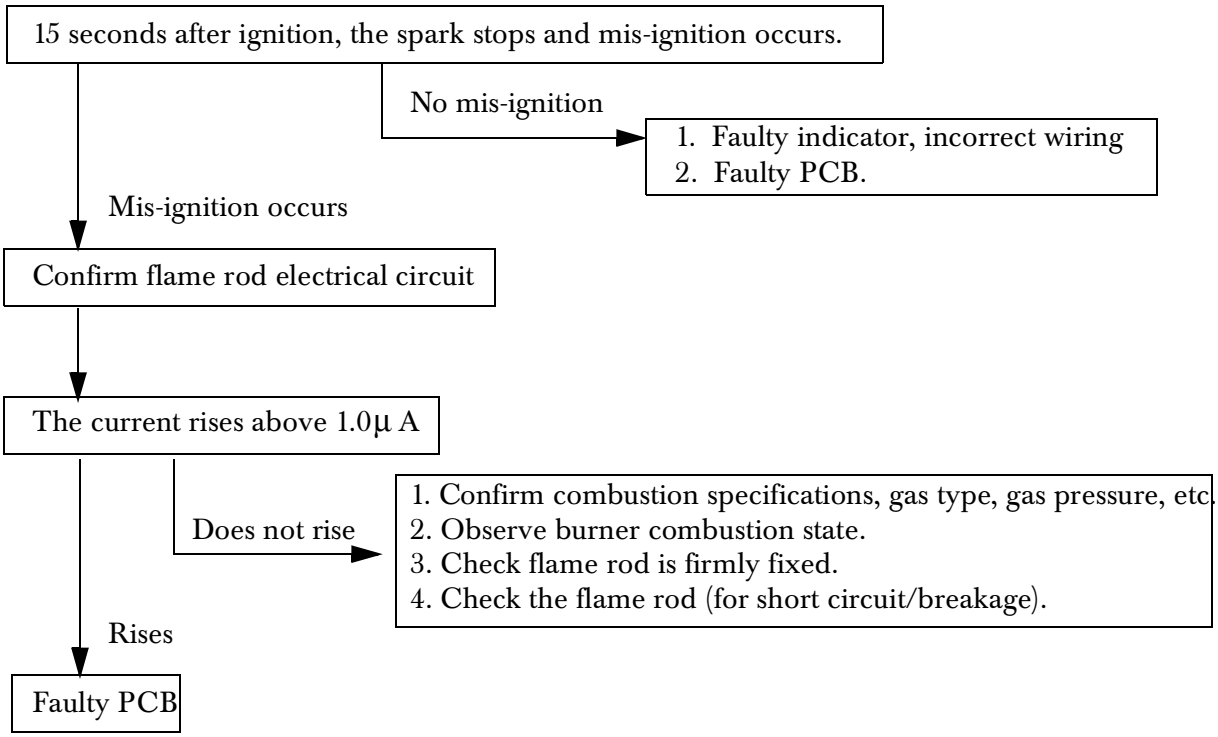
e. The convection fan does not begin to rotate.

1. Convection fan shaft grub screw loose.
2. An obstruction in the convection fan is preventing the fan from rotating.
3. Open circuit or bad connection in motor circuit.
4. Flame rod wiring is broken or shorted.
5. Faulty PCB.

B:(After repeated efforts to operate the appliance, it will not ignite (Error code "11")

1. Air within gas pipe completely purged.
2. Normal (primary) gas pressure.
3. Incorrect gas type.
4. Bent gas pipe.
5. Abnormal sparker.
6. Injector blockage or incorrect specification. (MN, Governor test pressure, etc.)

C:There is an ignition sound, however the combustion indicator does not illuminate



D:The flame fails during normal operation (sudden extinction)

1. Power failure. Commence operation after power re-instatement
2. Safety device has activated.
   - Room temperature has been detected as being above 40° C for 10 minutes. (Error code "16")
   - Overheat switch activated by air filter blockage. (Error code "14" and flashing filter indicator)
   - Blocked flue outlet. (Error code "12")
   - Bent gas pipe. (Error code "12")
   - Gas pressure abnormally low.
   - Clearances around the appliance are insufficient. (Refer to Installation Instructions)
   - Obstructions in front of appliance. (Flashing filter indicator and/or error code "14")
3. Safety devices are activated — Check connectors and lead wire connections are correct
   - Flame failure occurs between 30 minutes to 1 hour after ignition. (Error code "12")
   - Confirm flame rod electrical circuit.
   - Check that the electrical current is stable and is above the value in the table below.
     - Measure the circuit current when Hi/Lo combustion is steady. (all gases common)

During steady Hi/Lo combustion	>1.0μA

     - Not Stable → 1. Confirm governor test pressure, restrictor, injector, etc specs. 2. Faulty flame rod and/or burner.
     - Stable → Faulty PCB
4. Reverse Flame (With large noise) and flame fails.
   - 1. Obstructions in the flue outlet
     2. Obstructions in the burner.
     3. Normal combustion specifications and gas pressures.
5. Flame failure approx. 1~3 minutes after ignition. (Error code "12")
   - Flame rod current is above 1.0μA.
     - Yes → Forced combustion motor possibly incorrect.
     - No → 1. Normal governor test pressure. 2. Flame rod short circuit.
   - Faulty PCB

18. Electrical Component Analysis

- 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
E: The sequence does not continue even when the power is connected and the appliance is ON.	(1) Is the voltage correct?	Check power point and voltage.	Voltage AC 216~264V	Yes	Go to (2).
				No	Repair electrical source.
	(2) Broken thermal fuse?	1. Measure the resistance of the fuse.	<1Ω	Yes	Go to (3).
				No	Replace fuse and go to (2)-2.
		*2. Remove 2P connector of convection motor and measure coil resistances.	(D) White-Black 20~70Ω	Yes	Go to (2)-3.
				No	Replace convection motor
		*3. Remove 8P connector of combustion motor and measure coil resistance.	(F) Red-Yellow >1MΩ	Yes	Go to (2)-4.
				No	Replace combustion motor
		*4. Remove 12P connector of transformer and check coil resistance.	(B) Grey7-Black1 12~22Ω (B) Blue9-Black8 0.5~3Ω (B) Red10-Red4 0.5~3Ω (B) Blue9~Yellow5 89~109Ω	Yes	Go to (2)-5.
				No	Replace transformer
		5. Disconnect lead wires of solenoid valves (SV1, SV2, SV3) and measure coil resistance between terminals.	(C) Yellow-Black1 SV1 1.6~2.2KΩ (C) Yellow-Black1 SV2 1.6~2.2 KΩ (C) Pink-Black2 SV3 1.6~2.2 KΩ	Yes	Go to (2)-6.
				No	Replace solenoid valves
		6. Disconnect lead wire of modulating valve (POV) and measure coil resistance between terminals.	(F) Grey2-Grey6 80~100Ω	Yes	Replace PCB
				No	Replace modulating valve
	(3) Is the transformer normal?	Check the voltage of the transformer.	(D) Blue-Blue AC 10~20V (B) Blue9-Black8 AC 15~19V (B) Red10-Red4 AC 31~39V (F) Blue9-Yellow5 AC 178~218V	Yes	Replace PCB
				No	Replace transformer

F:An error code appears straight away even when appliance is ON. (sequence does not continue)	(4) Is the hi-limit switch / hi-limit thermistor working? (Error code "14") [If the appliance has overheated, after it has cooled the appliance will turn ON.]	*With the appliance in the OFF state, check the conductivity between both terminals.	(F) Blue-White <1Ω (G) White-White 10°C 119~135KΩ 20°C 74~82KΩ	Yes	Go to (5)
				No	Replace overheat switch 1 and/or 2.
	(5) Has the thermal fuse switched OFF? (Error code "14")	* Same as above	(F) Blue-White1 <3Ω	Yes	Replace PCB
				No	Replace thermal fuse.
	(6) Is the combustion motor wiring disconnected or broken? (Error code "61")	* Same as (2)-3. Check the coil resistance of the combustion motor.	Red-Yellow Same as (2)-3.	Yes	Go to (7)
				No	Replace combustion motor
G:No spark	(7) Loose high voltage cord or any spark leaks?	Check by visual observation and manually.	Installation normal No leaks	Yes	Go to (9)
				No	Correct the connection
	(8) Has voltage been marked on sparker unit?	Measure the voltage of the sparker input wire.	(C) Red-Blue DC 78~100V	Yes	Replace sparker
				No	Replace PCB
H:Spark fails to produce ignition (Sparker stops after approx. 15 sec.) [Error code "11"]	(9) Are the solenoid valves (SV1, SV2) ON?	* 1. Check the coil resistance of the solenoid valves. Same as (2)-5.	Same as (2)-5.	Yes	Go to (10)-2.
				No	Replace the solenoid valve(s).
		2. Check the solenoid valve terminal voltage.	(C) Yellow-Black1 DC 78~100V (C) Pink-Black2 DC 78~100V	Yes	Go to (11)
				No	Replace PCB
	(10) Does the modulating valve (POV) operate normally?	1. Measure the P2 of the modulating valve.	Is it at the specified pressure?	Yes	Check injector
				No	Go to (10)-2.
		2. Check gas type. Press test switch and select gas type changeover mode to carry out checking.	LPG ->L1 NG ->A1	Yes	Go to (10)-3.
				No	Set to proper position
		* 3. Check the coil resistance of the modulating valve.	(F) White-White 80~100Ω	Yes	Check pressure. Replace PCB if incorrect.
				No	Replace modulating valve.
I:Ignition occurs, but combustion indicator does not illuminate. (Sparker stops after approx. 15 sec.) [Error code "11"]	(11) Does the modulating valve (POV) operate normally?	Measure P2	Is it at the specified pressure?	Yes	Go to (13) after checking injector
				No	Check pressure.
	(12) Is the flame rod (FR) circuit current above 1μA?	Check the flame rod circuit current. (B1) Yellow-FR1 terminal (B1) Red-FR2 terminal (B1) Blue-FR3 terminal	Is the flame rod circuit current above 1μA?	Yes	Replace PCB
				No	Replace flame rod

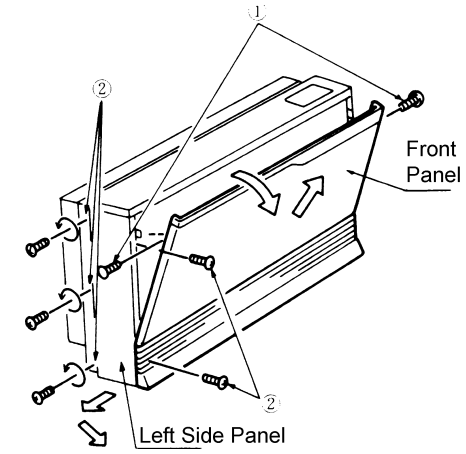
J:Appliance does not reach set room temperature.	(13) Is the thermistor normal?	Disconnect the thermistor from the unit, and measure the resistance of both terminals. The resistance will change according to the temperature of the thermistor, so use the table on the right as a guide.	Yellow-Yellow 10° C 59~71KΩ 20° C 36~41KΩ	Yes	Replace PCB
				No	Replace thermistor
K:Appliance turns off during use.	(14) Tilt switch activated. (Error code "11")	Check the flame rod circuit current. (B1) Yellow~FR1 terminal (B1) Red~FR2 terminal (B1) Blue~FR3 terminal	Flame rod <1μA	Yes	Check for dust blockage and that FR wiring is not broken
				No	Replace PCB
	(15) Room temperature high cut-off activated. (Error code "16")	Was the appliance used for a long period of time on the high setting?	>40° C for 10 minutes?	Yes	Explain usage
				No	Replace PCB
	(16) Hi-limit switch activated. (Error code "14")	(1) Is there any dust in the air filter, convection fan, or warm air circuit?	Is the dust build-up extreme?	Yes	Clean
				No	Go to (16)-2.
		(2) Confirm combustion specifications.	Are they correct?	Yes	Go to (16)-3.
				No	Adjust to correct specifications.
		(3) Is the convection fan rpm normal? Measure coil resistance of motor.Same as (2)-2.	Same as (2)-2.	Yes	Go to (16)-4.
				No	Replace motor
		(4) Check the voltage of the PCB 2P terminal.	High-Low AC40~108V	Yes	Check fan lock and air circulation
				No	Replace PCB

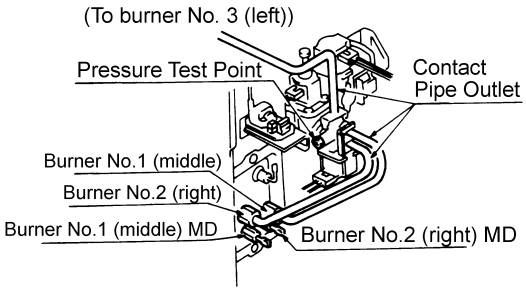
(Note : If a problem is not remedied by replacing the appropriate part, the wiring harness may be defective (short circuit, open circuit and/or defective connectors). Check for any short or open circuit. Lightly wiggle wires and harness to check for loose or faulty connectors.

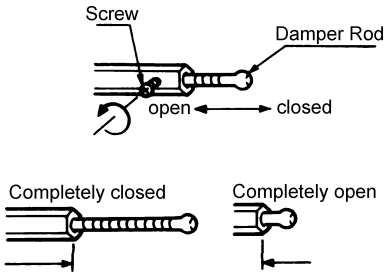
19. Gas Conversion

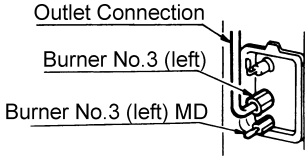
WARNING - Ensure power cord is disconnected from power point (240V potential) and gas supply is isolated.

10. Disconnect power supply.
11. Remove the front panel (see "Removal of the Front Panel" on page 41) and disconnect LED connectors.
12. Remove the left and right hand side panels (10 screws).
13. Replace small gas label on gas inlet and large gas label on back of appliance.
14. Place new very small gas label on Data Plate.
15. Complete details on conversion sticker and place sticker inside front panel.
16. Undo both Low (RHS) and High (LHS & RHS) burner gas connection tube nuts.
17. Remove the RHS and LHS injectors (see "Removal of the Injectors (RHS only)" and "Removal of the Injectors (LHS only)" on pages 44 and 45).
18. Fit new injectors.
19. Refit all supply tubes and tighten all supply tube nuts.
20. Adjust LHS damper and RHS dampers to correct position.
21. Connect appliance to gas and electricity.
22. Remove the test point screw and follow gas pressure setting procedure (see next page).
23. Turn appliance off and replace test point screw.
24. Replace the front panel.









20. Gas Pressure Setting Procedure

6. Disconnect and isolate 240 V power.
7. Carefully remove front cover and disconnect the 2 plugs attached to the PCB on front cover.
8. Press PCB switch while unit is off to change to gas pressure setting mode. Current gas type code will be indicated(L1: LPG; A1: NG).
9. Change gas type code using "/\" and "\/" buttons.
10. Press PCB test switch once to record data.
11. Press ON/OFF button to operate heater. Connect pressure gauge.
12. Press PCB test switch. "78" will be displayed on control panel.
13. Press test switch again to access "Low Pressure" mode. "PL" will be displayed on control panel.
14. Adjust the Low pressure to the correct pressure (see table below) with the "\/" (lowers gas pressure) and "/\" (raises gas pressure) buttons on the control panel. (The RHFE-1004FTR has E^2PROM operation; there should be no need to adjust the modulating valve screw.)
15. Press the Economy button to lock in low pressure setting. "18" will be displayed on control panel.
16. Press test switch twice to access "High Pressure" mode. "PH" will be displayed on control panel.
17. Adjust the High pressure to the correct pressure (see table below) with the "\/" (lowers gas pressure) and "/\" (raises gas pressure) buttons on the control panel.
18. Press the Economy button to lock in high pressure setting. "78" will be displayed on the control panel.
19. Press ON/OFF button. The display will go to clock setting and the heater will turn OFF.
20. Remove gauge from test points and replace test point screws.

	Natural Gas	LPG
Low Pressure (kPa)	0.49 kPa	1.07 kPa
High Pressure (kPa)	0.76 kPa	2.33 kPa

21. Dismantling for Servicing

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

e.g. - Isolate gas supply
- Disconnect electrical supply from wall socket

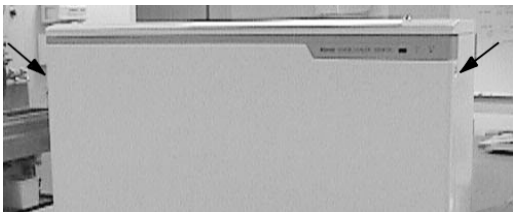
ITEM **PAGE**

1. Removal of the Front Panel

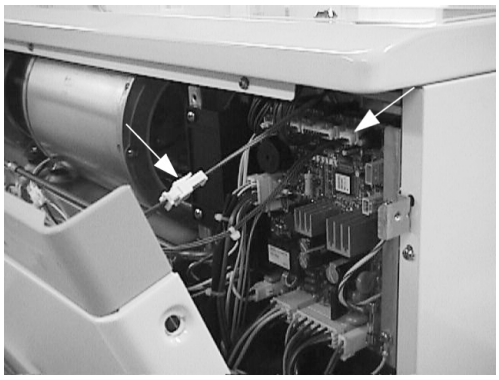
CAUTION

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

a. Remove one (1) screw from each side of the front panel to release it from the main casing.



b. The panel can be pulled forward, however, it will remain connected by the indicator wiring harness.



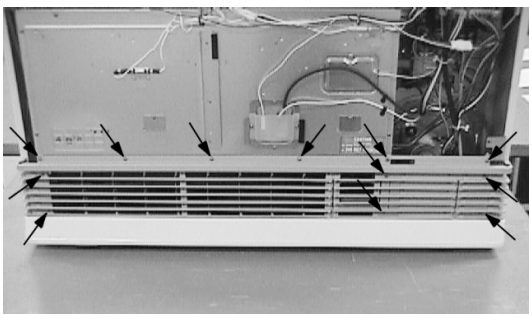
c. Release the indicator connectors to completely release the front panel.

2. Removal of the Louvre

CAUTION

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

a. Follow steps 1. a. b. and c.
b. Release the twelve (12) securing screws to remove the louvre assembly and pull forward.



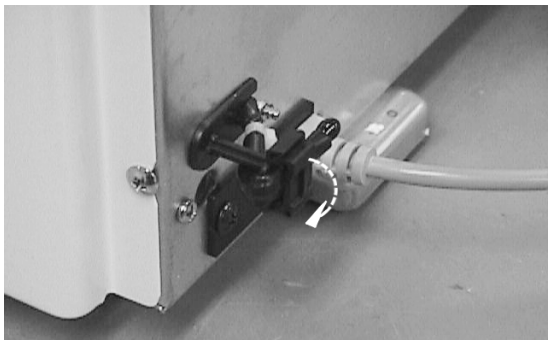
3. Removal of the Temperature Thermistor

CAUTION

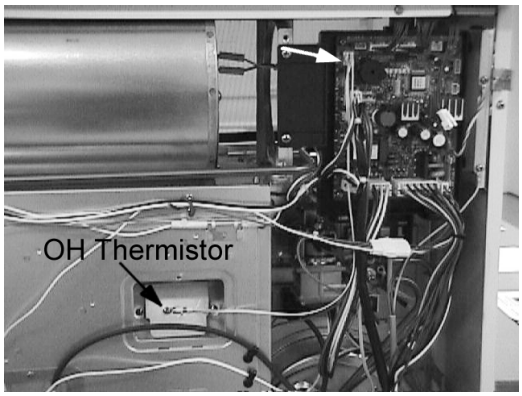
240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with a neon screwdriver or multimeter.

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

a. Follow steps 1. a. b. and c.
b. Remove the top and right hand side rear spacing panels.
c. Pry open the thermistor holder with a flat-blade screw-driver.



d. Unclip the thermistor holder from the unit to remove the holder completely.
e. Remove two (2) screws, one from the cover and one securing the OH thermistor to the heat exchanger. Disconnect complete harness from PCB.

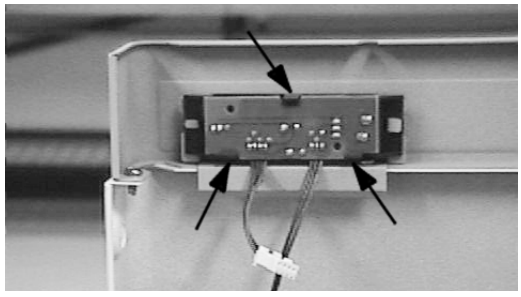


4. Removal of the Indicator Panel

CAUTION

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

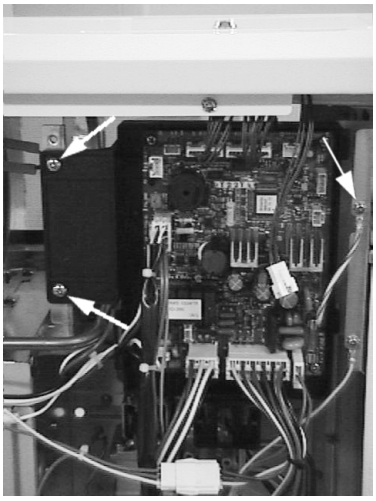
a. Follow steps 1. a. b. and c.
b. Disengage indicator panel from three (3) holding lugs.



5. Removal of the Main PCB Assembly

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

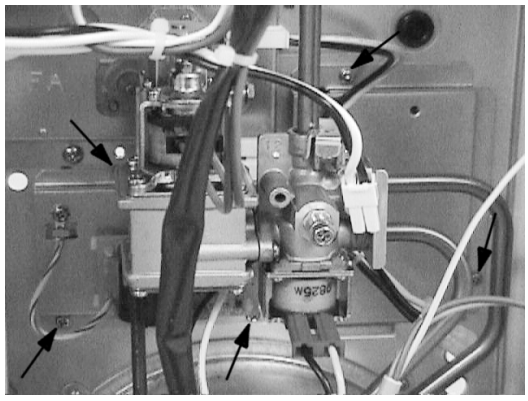
a. Follow steps 1. a. b. and c.
b. Remove all pin connectors from the PCB.
c. Remove two (2) screws and the earth lead.



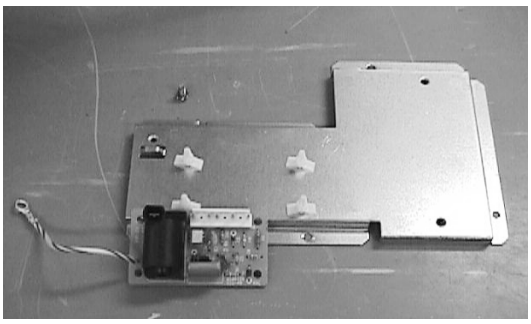
6. Removal of the Spark Generator (and Sub PCB)

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

a. Follow steps 1. a. b. and c.
b. Remove the right hand side panel. (5 screws)
c. Disconnect pin connector and high tension lead.
d. Remove five (5) screws from the spark generator backing plate.



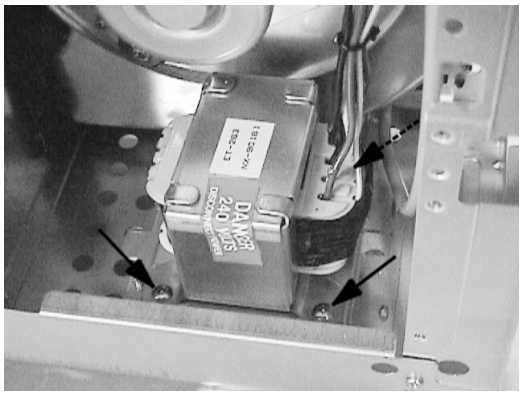
e. Remove the earth screw and disengage four (4) nylon clips.



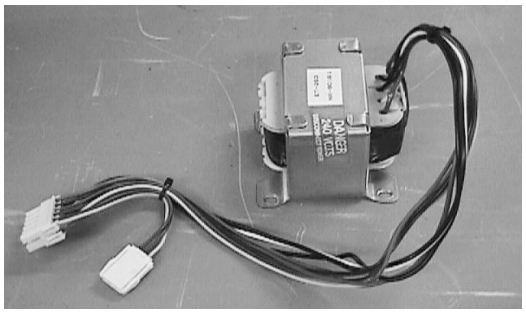
7. Removal of the Transformer

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

a. Follow steps 2. a. and b.
b. Remove the right hand side panel. (5 screws)
c. Remove three (3) screws on the transformer bracket (two at front, one at back).



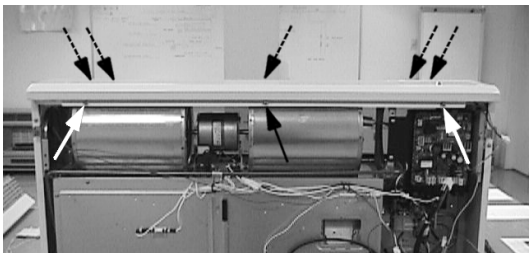
d. Disconnect harness to flame rods.



8. Removal of the Top Panel and Control Panel PCB Unit

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

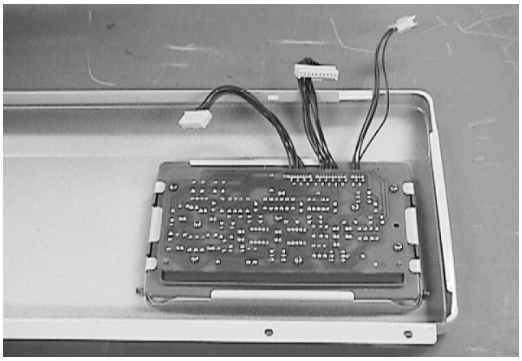
a. Follow steps 1. a. b. and c.
b. Remove the three (3) screws from the front and five (5) screws from the rear and unclip the connectors from the main PCB.

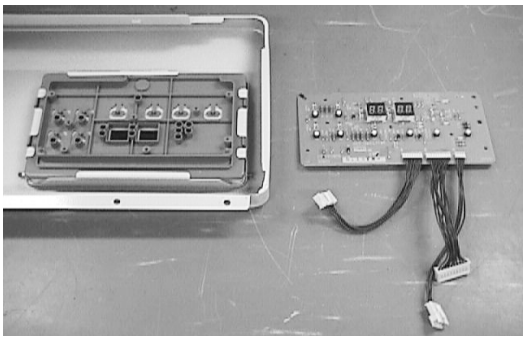


9. Removal of the Control PCB

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

a. Follow steps 8. a. and b.
b. Remove eight (8) screws.

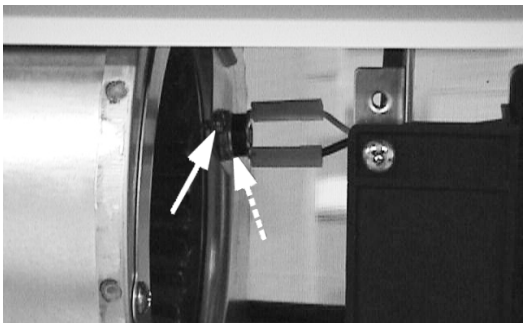




10. Removal of the OHS

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

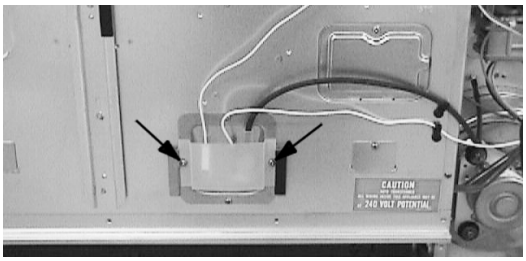
a. Follow steps 1. a. b. and c.
b. The OHS is connected to the RHS of the convection fan housing assembly.
c. Release the two (2) connectors.
d. Remove two (2) screws from the PCB and move clear.
e. Remove two (2) screws from the OHS bracket.



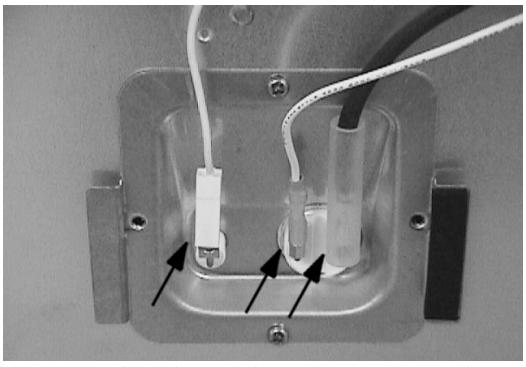
11. Removal of the Flame Rod and Sparker Electrode

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

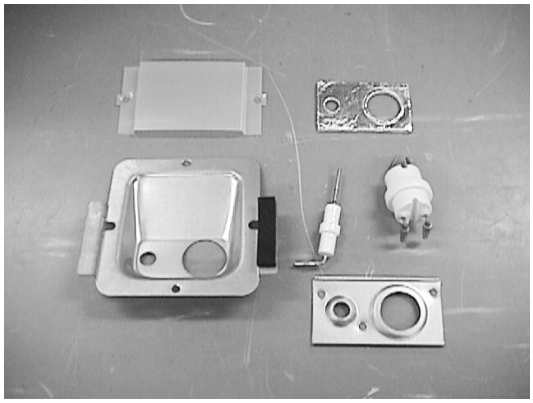
a. Follow steps 1. a. b. and c.
b. Remove the plastic electrode cover.(2 screws)



c. Release the high tension cord and electrode connections.



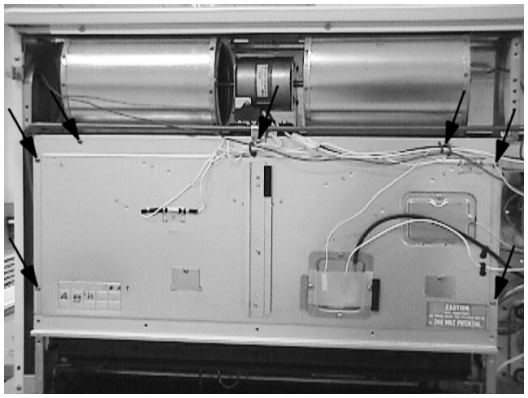
d. Remove the electrode viewing panel by removing an additional two (2) screws from the top and bottom.
e. Remove the seal packing to locate the three (3) electrode clip securing screws.
f. Undo the three (3) screws securing the electrode clip bracket and remove.



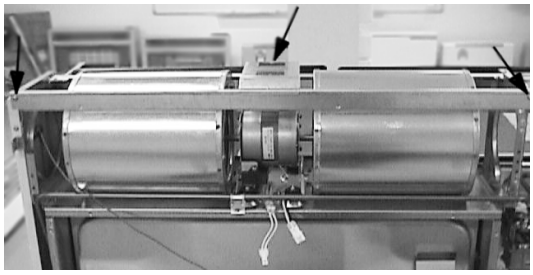
12.Removal of the Convection Fan Assembly

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

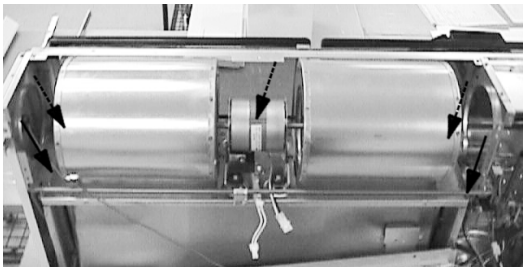
a. Follow steps 8. a. and b.
b. Follow steps 11. b. c. and d.
c. Remove the seven (7) screws on the heat shield.



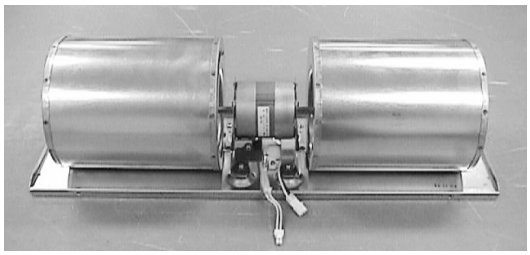
d. Remove left hand and right hand side thermal fuses.
e. Move the heat shield clear.
f. Disconnect the power supply to the fan.
g. Disconnect the thermal fuse.
h. Remove the connectors from the OHS.
i. Remove three (3) screws to release top panel support.



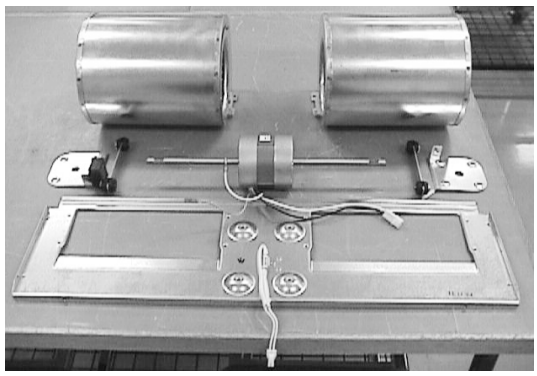
j. Remove the five (5) screws that secure the convection fan assembly to the main assembly. Two (2) at both ends and one (1) in the centre.



k. Lift fan assembly clear.
l. Further disassembly is required to replace fan motor.



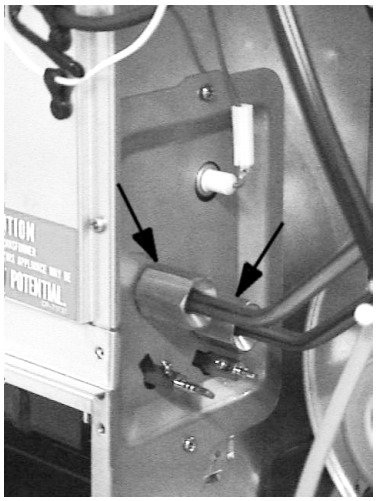
Convection Fan assembly completely disassembled.



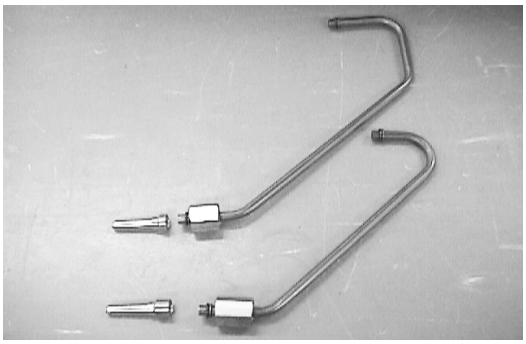
13.Removal of the Injectors (RHS only)

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

a. Follow steps 1. a. b. and c.
b. Remove the right hand side panel. (5 screws)
c. Undo the gas supply tube nuts from the burner.



d. Remove the gas supply tube securing bracket from the solenoid assembly.

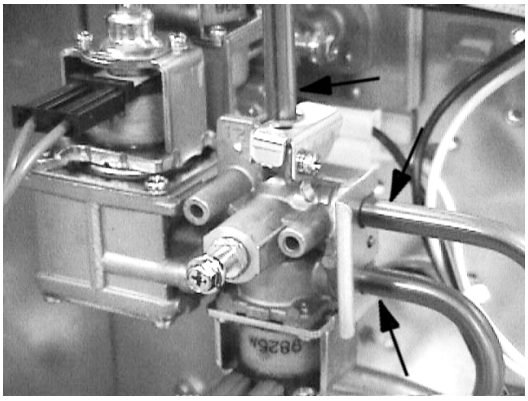


Note: Do not lose O-ring.

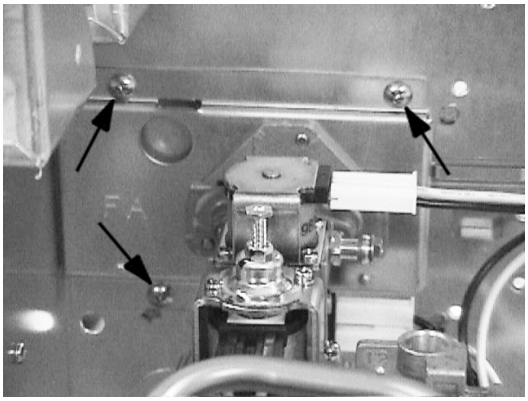
14.Removal of the Solenoid Assembly

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

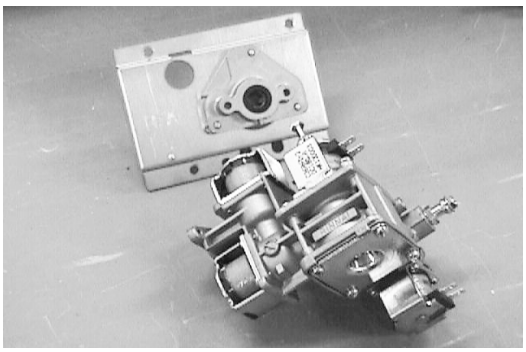
a. Follow steps 1. a. b. and c.
b. Remove the right hand side panel. (5 screws)
c. Remove three (3) burner supply tubes from gas solenoid assembly.



d. Remove three (3) screws from the gas solenoid assembly support bracket to remove from the unit.



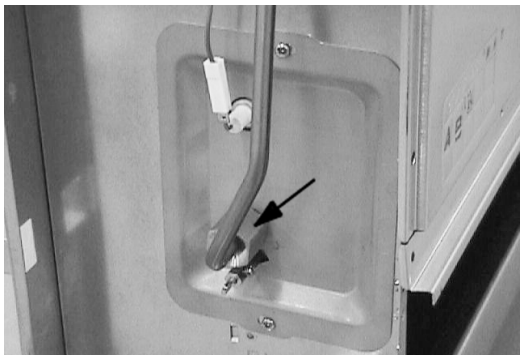
e. Remove solenoid assembly clear.
f. Remove two (2) screws from the gas solenoid assembly support bracket.



15.Removal of the Injectors (LHS only)

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

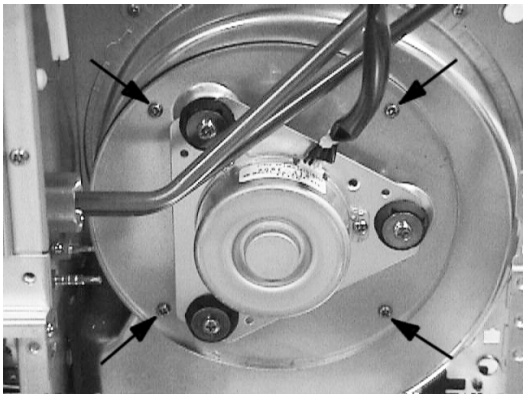
a. Follow steps 1. a. b. and c.
b. Remove the left hand side panel. (5 screws)
c. Release the gas supply connection tube to allow access to the injector.

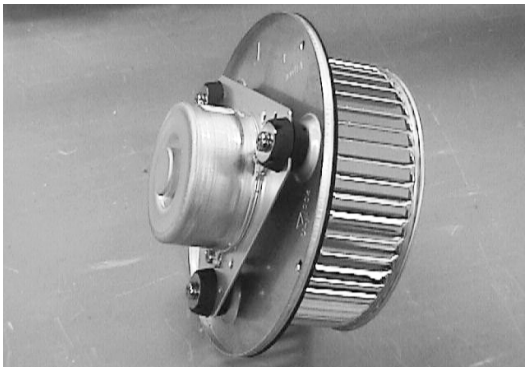


16.Removal of the Combustion Fan

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

a. Follow steps 2. a. and b.
b. Follow steps 7. b. and c.
c. Remove plug from motor.
d. Remove four (4) screws from the housing.



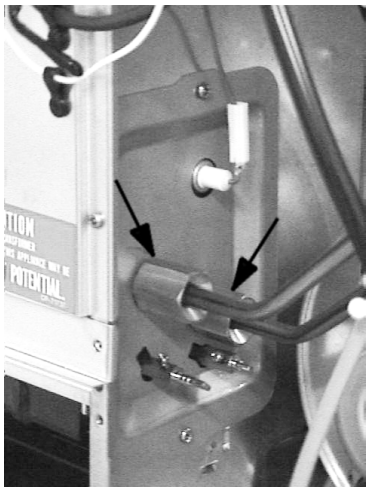


17. Removal of the Flame Rod (RHS only) and HIGH/LOW Burner Assembly

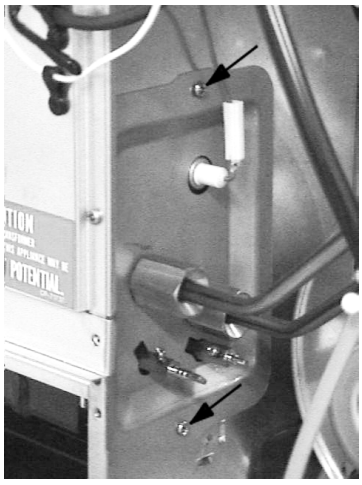
CAUTION

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

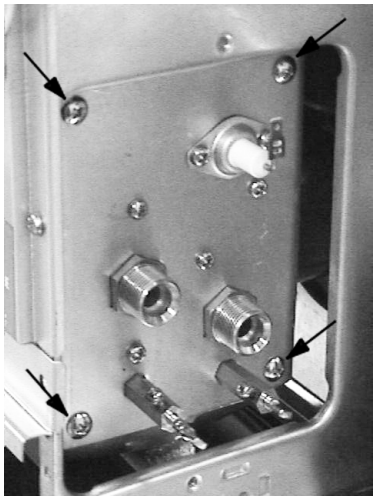
a. Follow steps 1. a. b. and c.
b. Remove the right hand side panel. (5 screws)
c. Remove the gas supply tubes.



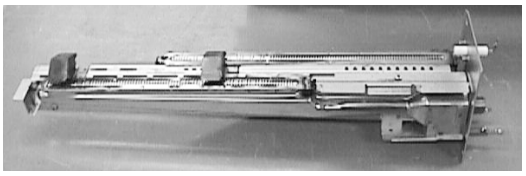
d. Disconnect the flame rod lead.
e. Remove two (2) screws to release the manifold cover.



f. Remove four (4) screws to release the burner assembly.



g. Pull to remove.

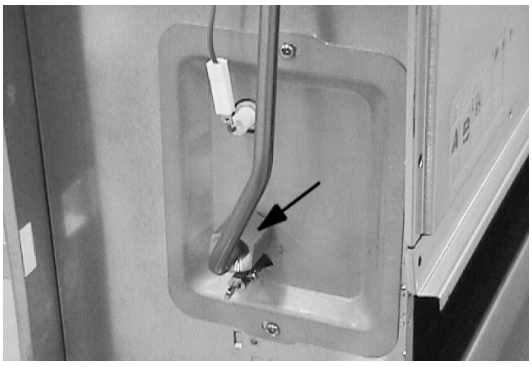


18. Removal of the Flame Rod (LHS only) and HIGH Burner Assembly

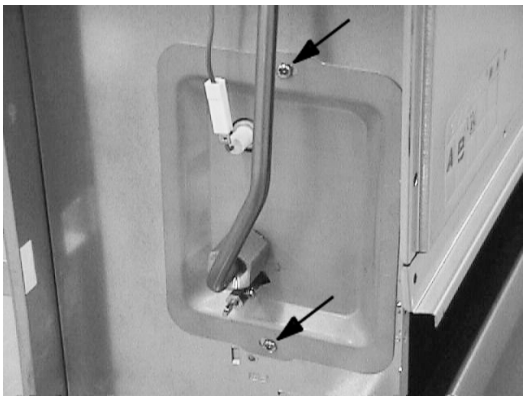
CAUTION

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

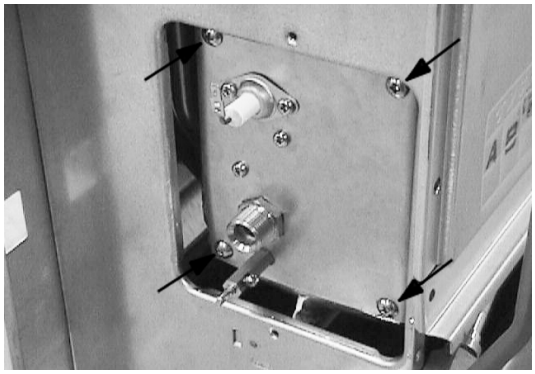
a. Remove the gas supply tube.



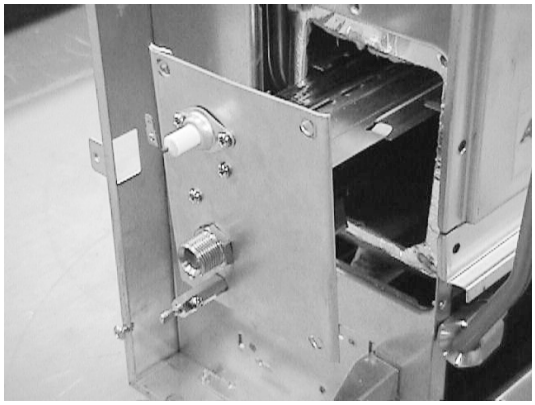
b. Remove the two (2) screws securing the manifold cover.



c. Remove the four (4) screws to release the burner assembly.



d. Pull to remove.

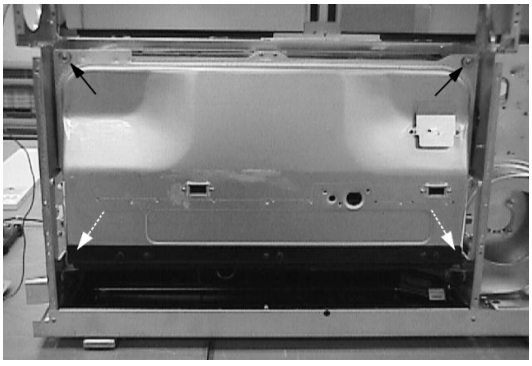


19.Removal of the Heat Exchanger

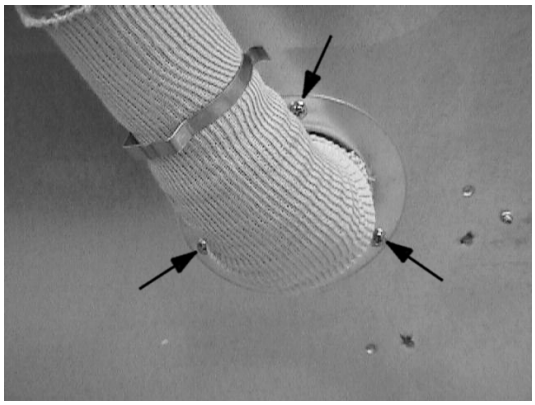
CAUTION

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

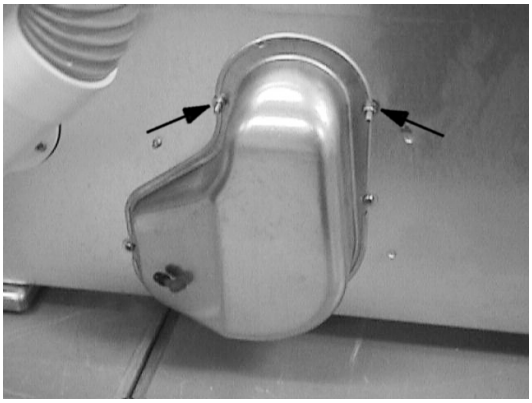
a. Follow steps 2. a. and b.
b. Follow step 12.
c. Remove the left hand side panel. (5 screws)
d. Remove the right hand side panel. (5 screws)
e. Follow steps 13. b. and c.
f. Follow step 18.
g. Remove four (4) screws from the front brackets.



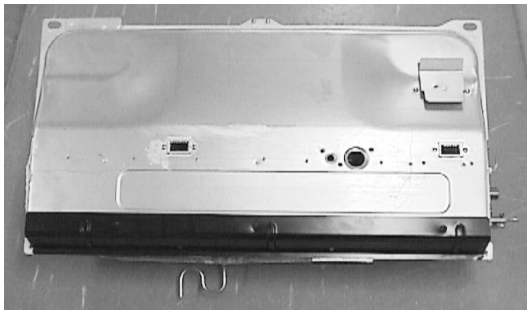
h. Remove three (3) screws from the flue outlet.



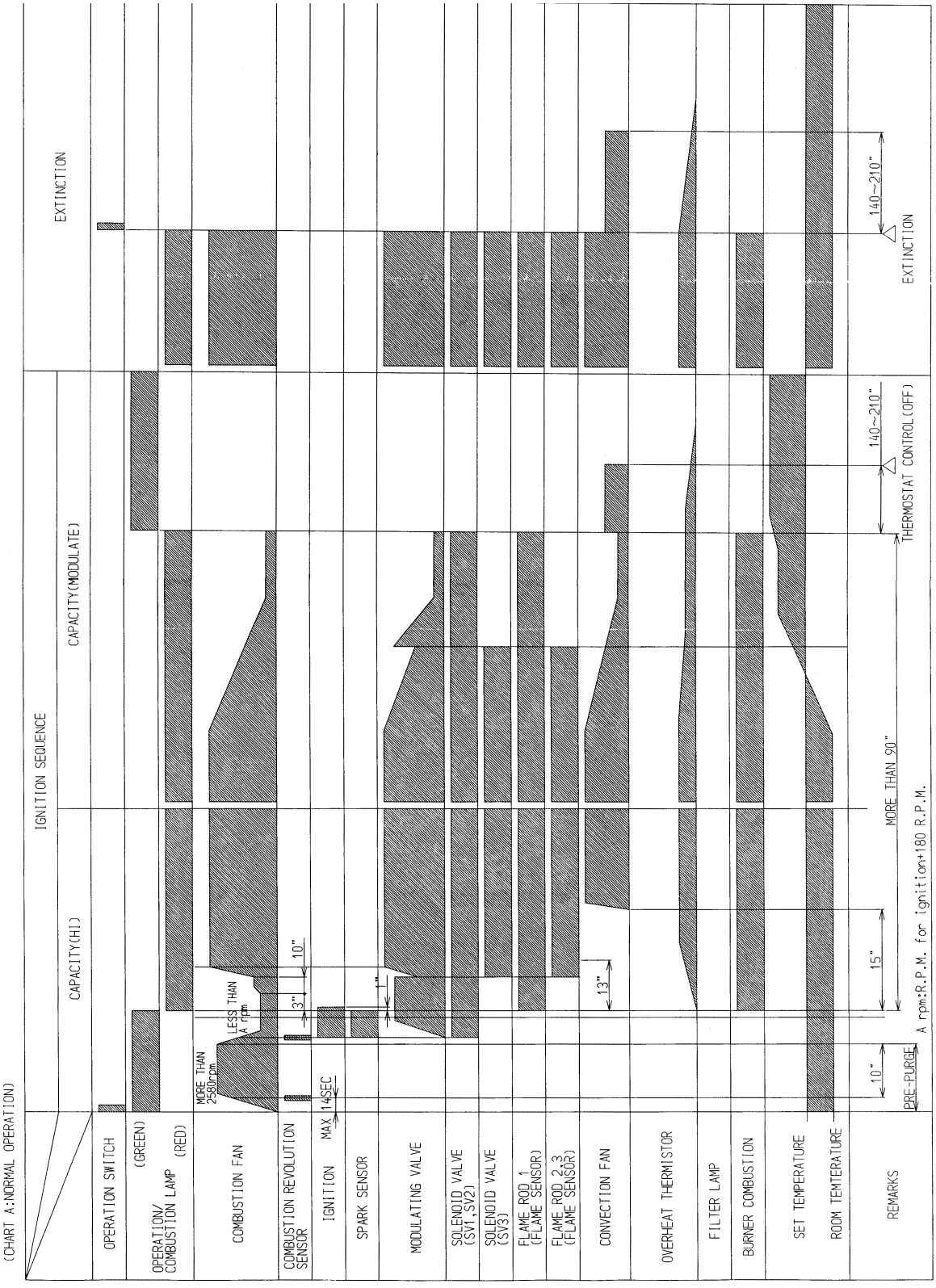
i. Remove two (2) nuts from the air inlet duct.



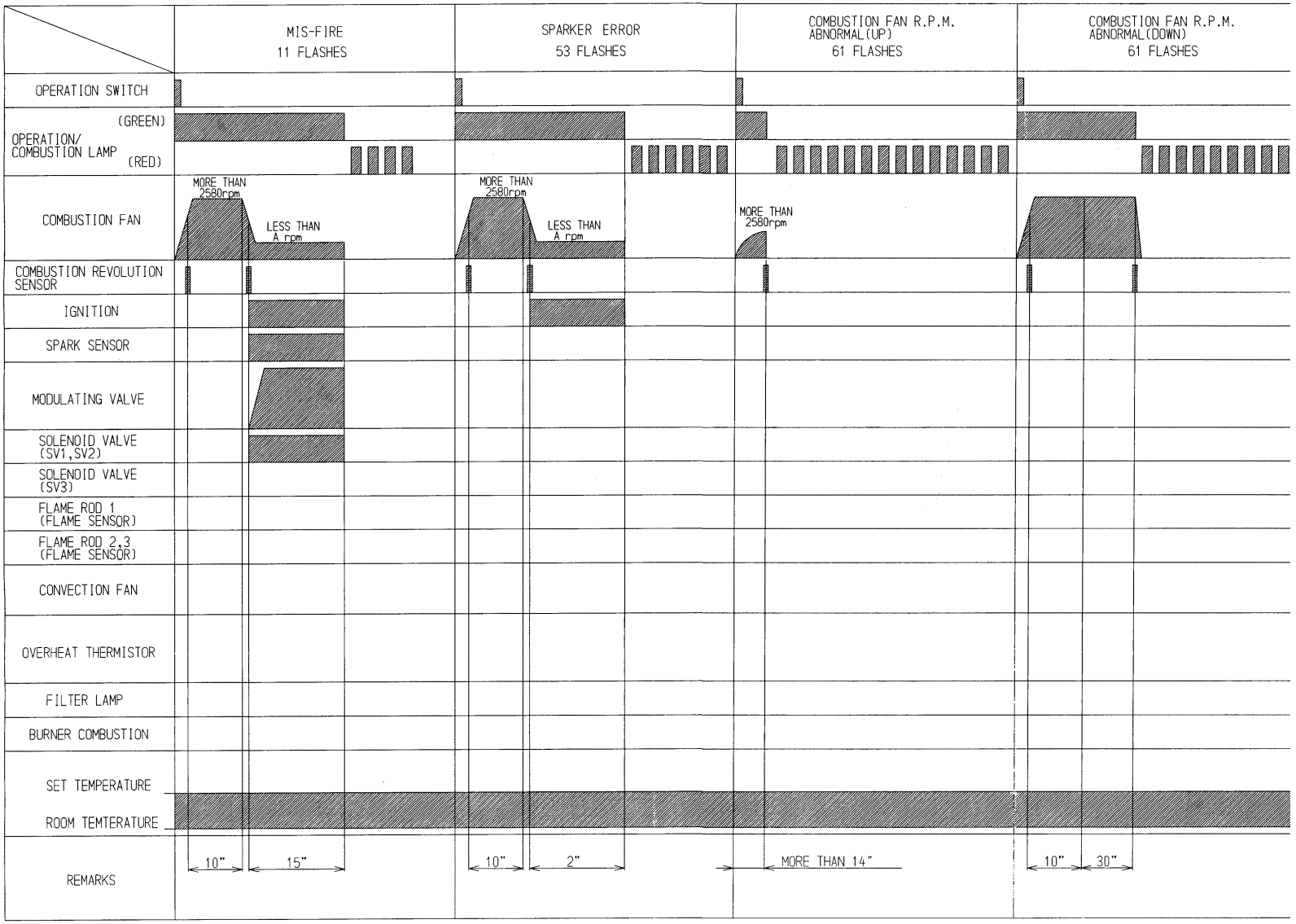
Lift the heat exchanger clear.



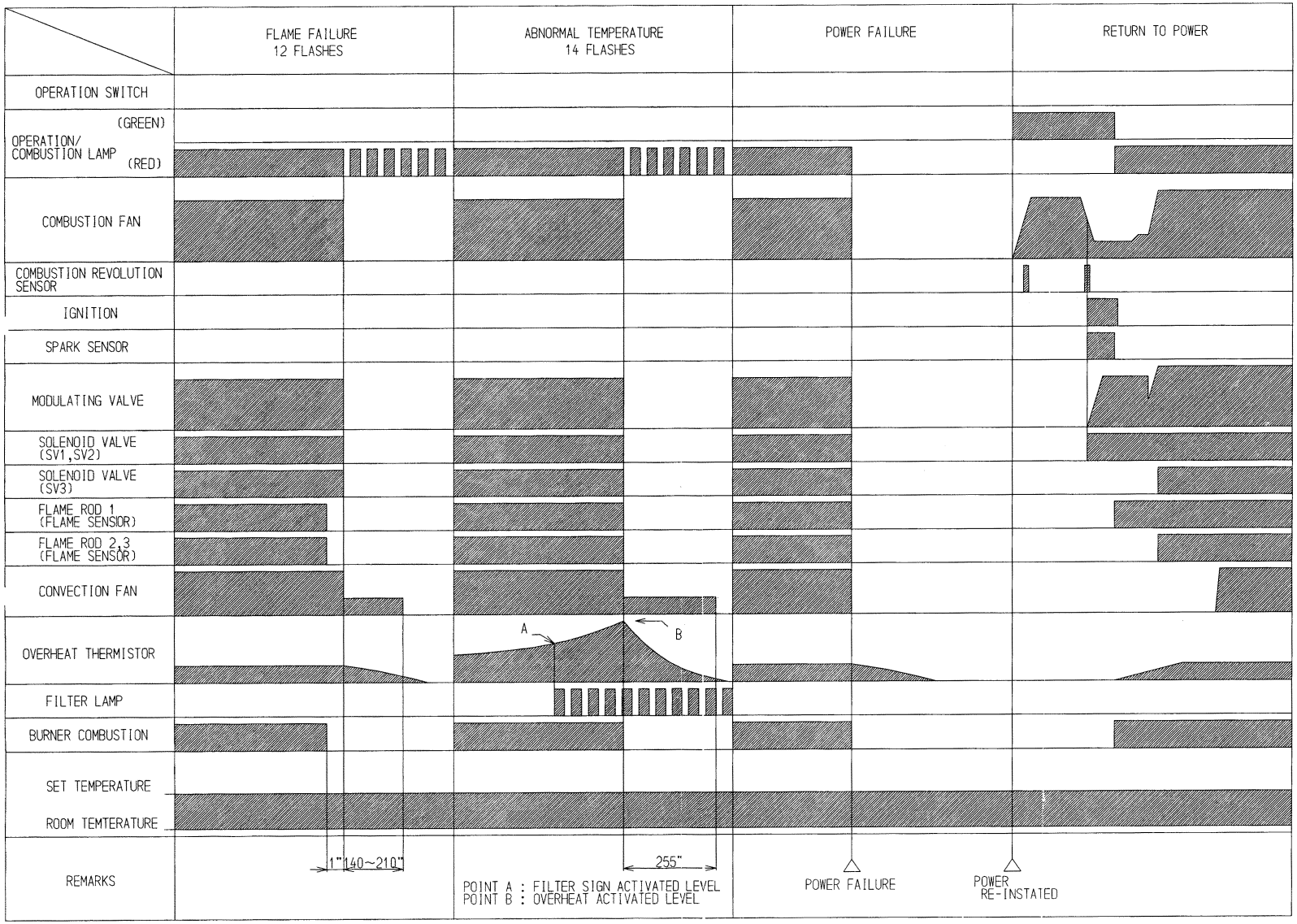
22. Time Charts



(CHART B:ABNORMAL OPERATION)



(CHART C:ABNORMAL OPERATION)



23. Parts List

Effective: 27/03/13
Supercedes: 23/05/12
V7

RHFE-1004 FTR

Note: This model does not have a PCB it has a surge arrestor Part No. 90192840.
Refer to Exploded Diagram No. 150

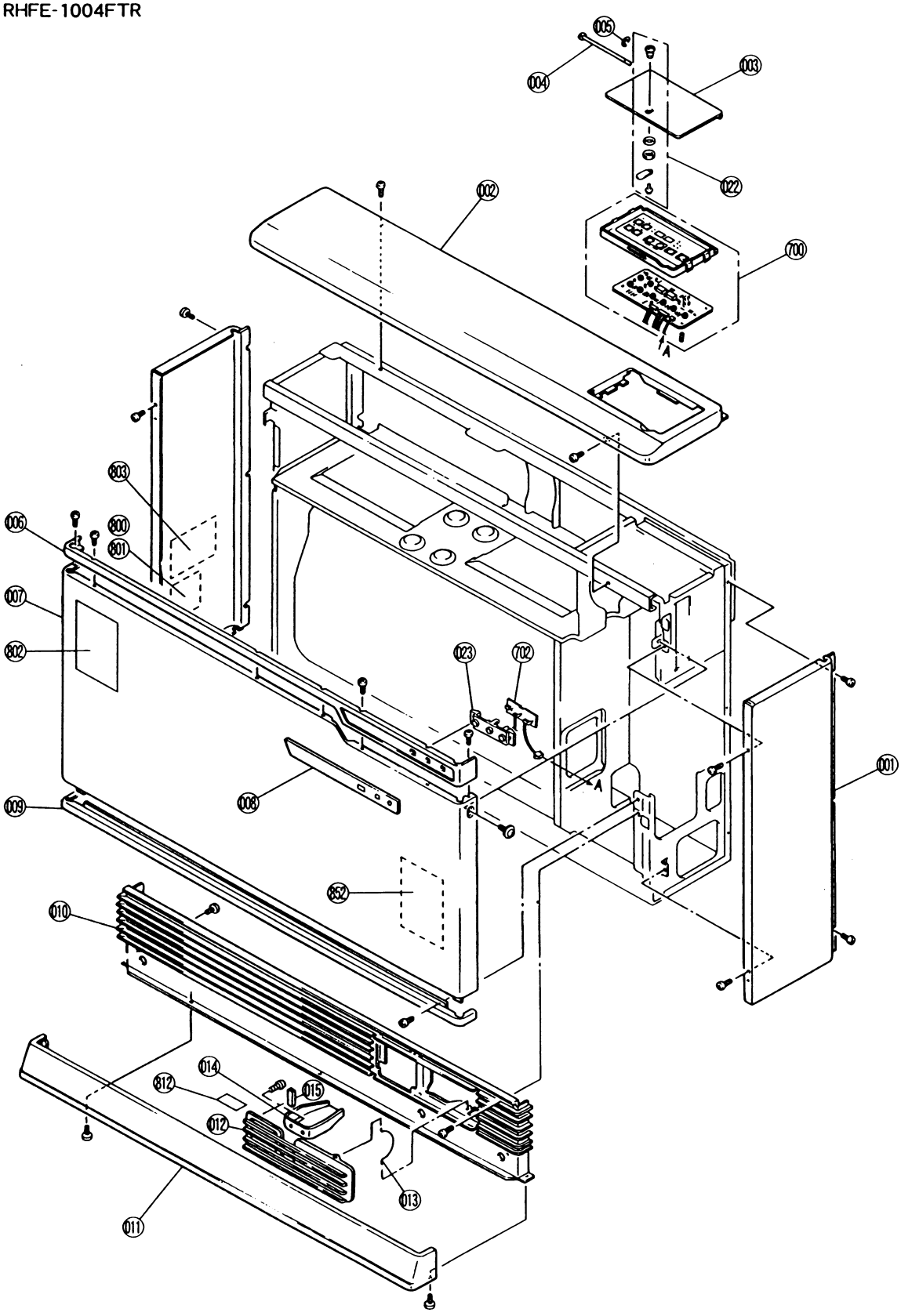
No.	Description	RA Item No.	11 Digit Code
1	PANEL SIDE L/R 0	90185513	003-262-000
2	PANEL TOP 0	90185521	001-729-000
3	LID CONTROL 0	90185539	035-0016000
4	HINGE PIN	90185547	528-168-000
5	HINGE PIN CIRCLIP	90185554	501-387-000
6	PANEL TOP TRIM 0	90103383	019-890-000
7	PANEL FRONT 0	90102930	019-868-000
8	INDICATION PANEL		063-366-000
9	TRIM LOUVRE 0	90102880	095-150-000
10	LOUVRE BOTTOM 0	90102757	095-142-000
11	PANEL TRIM BOTTOM 0C	90102682	518-039-000
12	DOOR HUMIDIFIER 0	90185570	035-0017000
13	HINGE LOUVRE DOOR	90144296	064-039-000
14	SPOUT HUMIDIFIER	90144304	517-237-000
15	MAGNET HUMIDIFIER	90161803	228-003-000
16	SPACER SIDE L0C	90108218	034-631-000
17	SPACER SIDE R0C	90108317	034-632-000
18	WALL SPACER	90147471	504-018-000
19	SPACER TOP 0C	90108192	034-630-000
20	FILTER	90185893	017-173-000
21	BRKT SUPPORT SPACER	90185901	537-552-000
22	KEY & LOCK	90180324	066-812-000
23	BRKT INDICATOR SUPPORT	90185588	208-156-000
24	BASE ASSY	90122797	015-124-000
25	RUBBER BKT ASSY	90168337	537-681-000
26	BASE RUBBER	90168329	015-180-000
100	BURNER R C		170-245-000
101	BURNER L C		170-248-000
102	SMALL BURNER C		170-246-000
103	PANEL DAMPER	90168378	140-141-000
104	GASKET BURNER BOX	90195975	510-786-000
105	BURNER RETAINER L ASSEMBLY		537-805-000
106	BURNER RETAINER R ASSEMBLY		537-752-000
107	FLAME ROD	90142803	230-017-000
108	ELECTRODE RETAINER		506-026-000
109	ELECTRODE & SENSOR	90142993	202-068-000
110	BRKT ELECTRODE CLIP	90168204	506-101-000
111	ELECTRODE SEAL	90168386	510-787-000
112	ROD AERATION	90123449	068-069-000
115	BLIND PANEL L		035-511-L00
116	BLIND PANEL R		035-511-R00
117	CONNECTING TUBE C		332-585-000
118	CONNECTING TUBE B		109-145-000
119	CONNECTING TUBE A		109-144-000
120	O RING GAS TUBE	90187188	520-388-000
121	CONNECTING TUBE FIXING BR		037-0002000
122	CONNECTING TUBE FIXING		537-393-000
123	CONNECTING TUBE BRACKET		537-732-000
124	GAS CONTROL ASSY LPG	90185711	120-841-LPG
124	GAS CONTROL ASSY NG	90185729	120-841-NG0

No.	Description	RA Item No.	11 Digit Code
137	COMB CHAMBER	90185851	314-412-000
138	SEAL AIR INLET	90158502	510-497-000
139	PACKING GLASS WINDOW	90185869	510-520-000
140	GLASS VIEWING WINDOW	90185877	061-039-000
141	GLASS RETAINER		538-231-000
142	PANEL BLANKING	90168394	035-0089000
144	HEAT EXCH NO 1	90185844	314-413-000
147	SECONDARY HEAT EXCHANGER		108-118-000
148	LOCK SPACER		550-066-000
152	HEAT EXCHANGER RETAINERS		518-006-000
153	O-RING	90199824	520-384-000
154	ELBOW EXHAUST	90158395	191-113-000
155	TUBE SLIDE EXHAUST	90158361	554-110-000
157	FLUE ADAPTER	90185935	561-041-000
158	FLUE LOCK STOPPER	use 90170234	512-333-000
159	FLUE LOCKING CLAMP - LARGE	use 90170234	512-404-000
160	FLUE LOCKING CLAMP - SMALL	use 90170234	512-428-000
161	COVER		034-758-000
162	INSULATION CLIP	use 90170234	512-250-000
163	STANDARD WALL TOP		055-553-000
164	ELBOW AIR INLET B	90145806	191-140-000
165	HOSE AIR INLET	90145632	513-080-000
166	HOUSING INLET PLASTIC	90185695	094-011-000
167	AIR INTAKE PACKING	90185703	580-725-000
170	AIR INTAKE DUCT		055-324-000
171	SEAIING GASKET		510-788-000
172	COMBUSTION FAN CASING ASS		098-0031000
173	NOISE ABSORBER FIXTURE		508-706-000
174	NOISE ABSORBER		097-002-000
177	CUSHION	90183195	540-051-000
178	S SCREW (MOTOR)		501-303-000
180	FAN COMB	90185760	040-247-000
181	BLIND CAP		035-0090000
182	FRANGE B		190-152-000
183	FILTER		017-287-000
184	GASKET	90176637	510-519-000
185	SCREW TEST POINT	90195157	501-275-005
186	O RING (S4) TEST POINT	90195165	520-300-010
187	SCREW		501-317-000
192	BUSHING REINFORCE		194-110-000
400	REAR PANEL A ASSEMBLY		004-521-000
403	WARM AIR SEAIING GASKET		510-785-000
409	MOTOR FAN CONV	90185612	222-437-000
410	FAN MOTOR BRACKET	90122847	037-659-000
411	DRUM FAN CONV LH	90132234	040-156-000
412	DRUM FAN CONV RH	90132242	040-157-000
413	FAN CASING ASSEMBLY		098-490-000
414	WARM AIR FAN BELL MOUTH		036-077-000
415	SHIELD HEAT FRONT PANEL	90195300	030-473-000
417	BLANK WINDOW PANEL		035-509-000
418	INSULATION SHEETING	90142563	251-021-000
419	OVERHEAT SWITCH WIND SHIELD		039-124-000
420	ELECTRODE BLIND PANEL		035-510-000
421	ELECTRODE COVER		034-756-000
423	OHS 1004	90185646	234-520-000

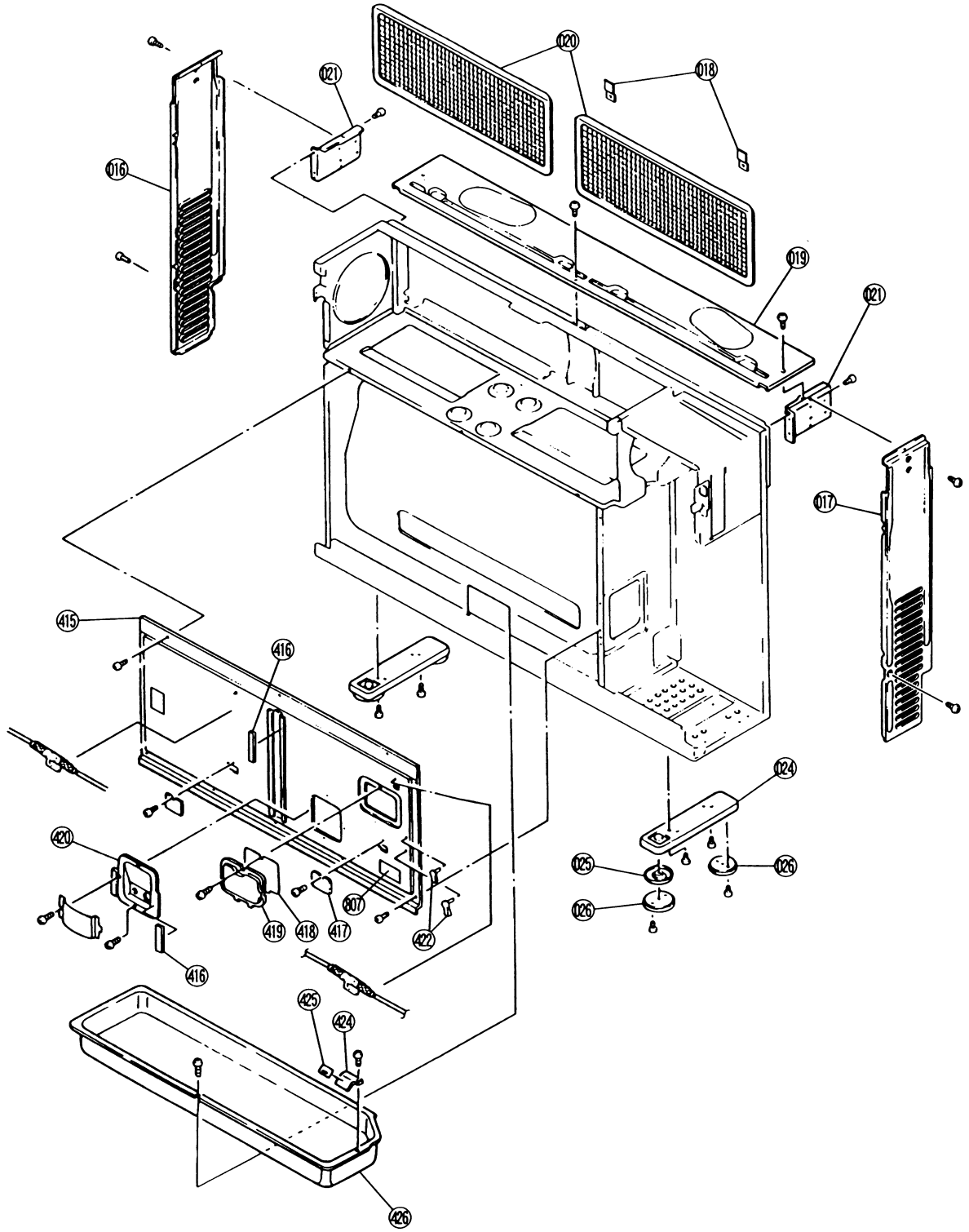
No.	Description	RA Item No.	11 Digit Code
424	WATER LEVEL INDICATOR	90170036	065-044-000
425	WATER LEVEL LABEL B		602-654-000
426	TRAY HUMIDIFIER	90145566	078-011-000
428	SEALING CAP		035-0091000
430	CIRCUIT BOARD SPACER		550-129-000
432	ELEC CORD BKT	90177114	538-180-000
435			
700	PCB CONTROL PANEL 0	90185604	200-793-000
702	LED CONTROL PANEL	90185596	200-865-000
703	SPARKER	90175829	262-028-000
704	TRANSFORMER	90185778	224-270-000
705	PCB MAIN	90185653	200-800-000
707	ELEC CORD ASSY	90185786	206-177-000
708	MOTOR HARNESS B ASSEMBLY		290-933-000
710	FLAME ROD HARNESS		290-935-000
711	HIGH TENSION CORD C		203-786-000
712	THERMISTOR ASSY	90185810	290-932-000
713	SV IG WIRE HARNESS		290-934-000
714	THERMAL FUSE ASSY	90185794	290-936-000
804	WARNING DECAL ELECTRIC	90176017	602-236-000
806	LABEL NG		602-579-000
806	STICKER LPG		602-701-000
807	WARNING DECAL	90175993	602-235-000
809	REMOTE	90187568	123-064-000
810	REMOTE CONTROL CASING		098-390-000
810	BOTH FACES ADHESIVE TAPE		532-005-000
812	"PULL" LABEL		602-658-000
854	KEY ONLY	90182544	066-835-000
999	CLIP		504K018-000
999	PIPE FOR HEAT EXCHANGER		554-195-000
999	PIPE FOR HEAT EXCHANGER A		554-196-000
	Component Kit	**90170237**	
Not Shown	Plastic tie for air inlet connection		
18	Wall Clips x 2 (90147471 Clip Wall Spacer)		
158	Flue Lock Stopper		
159	Flue Locking Clamp - Large		
160	Flue Locking Clamp - Small		
162	Insulation Clip		

24. Exploded Diagram

RHFE-1004FTR



RHFE-1004FTR



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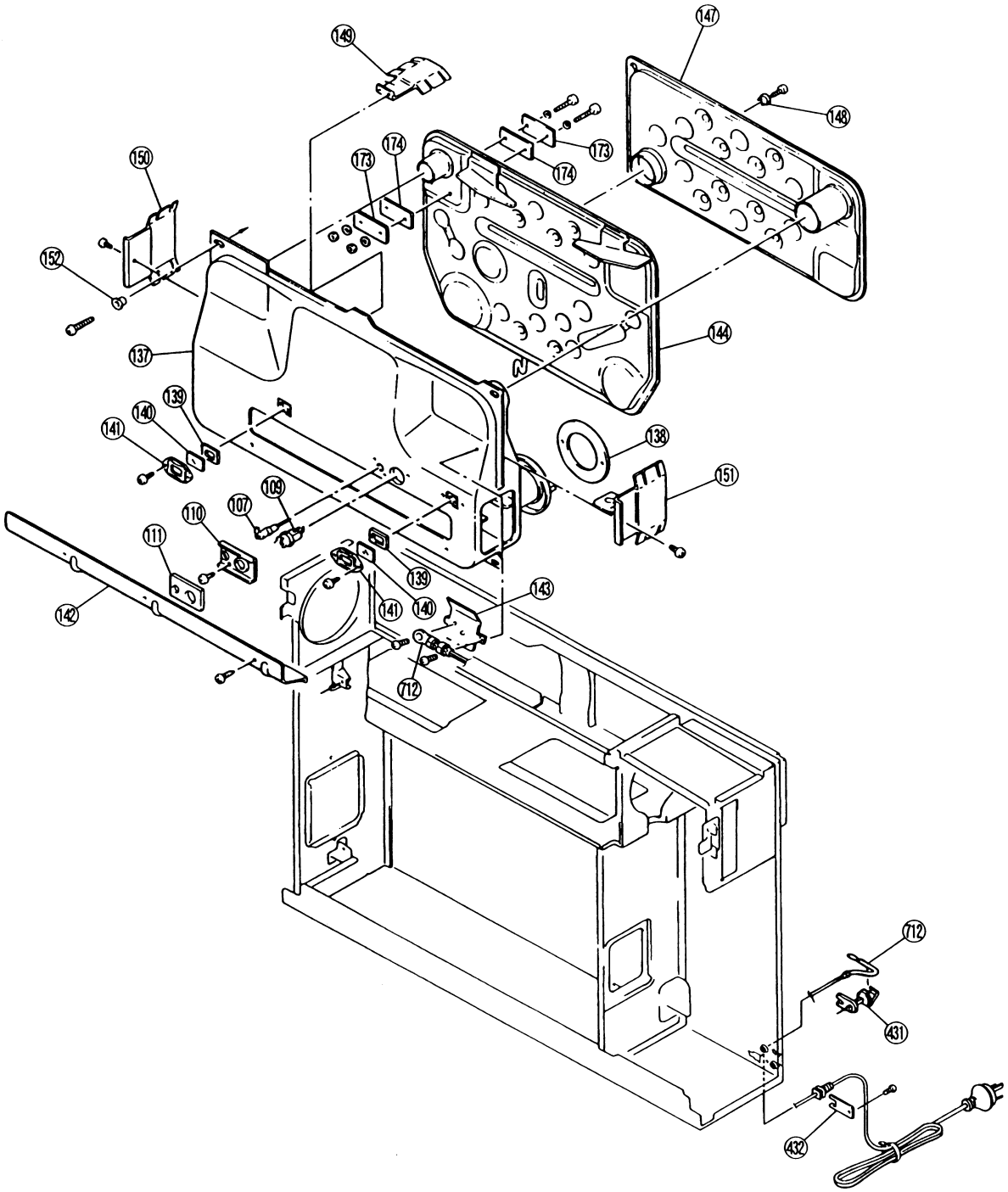

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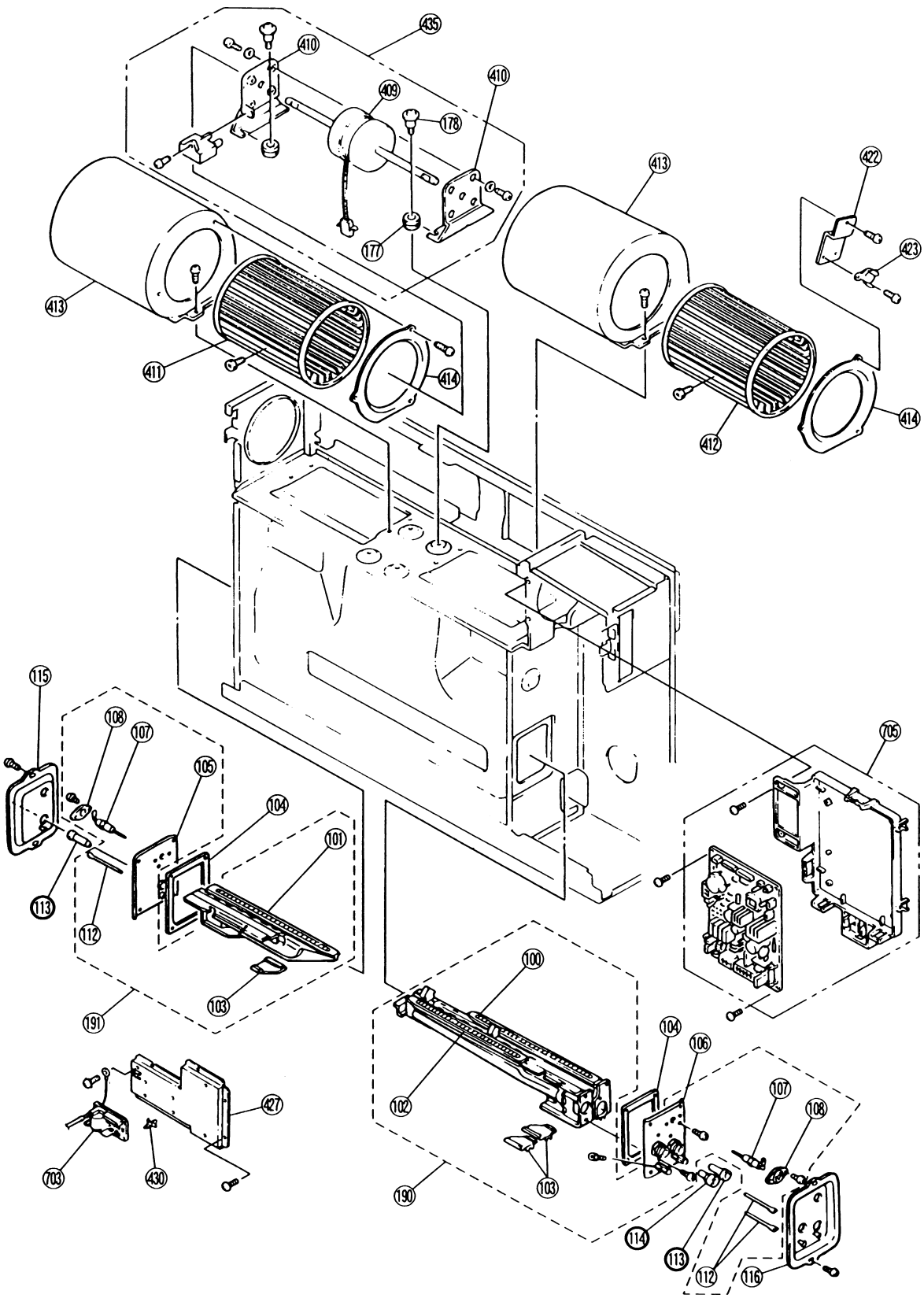

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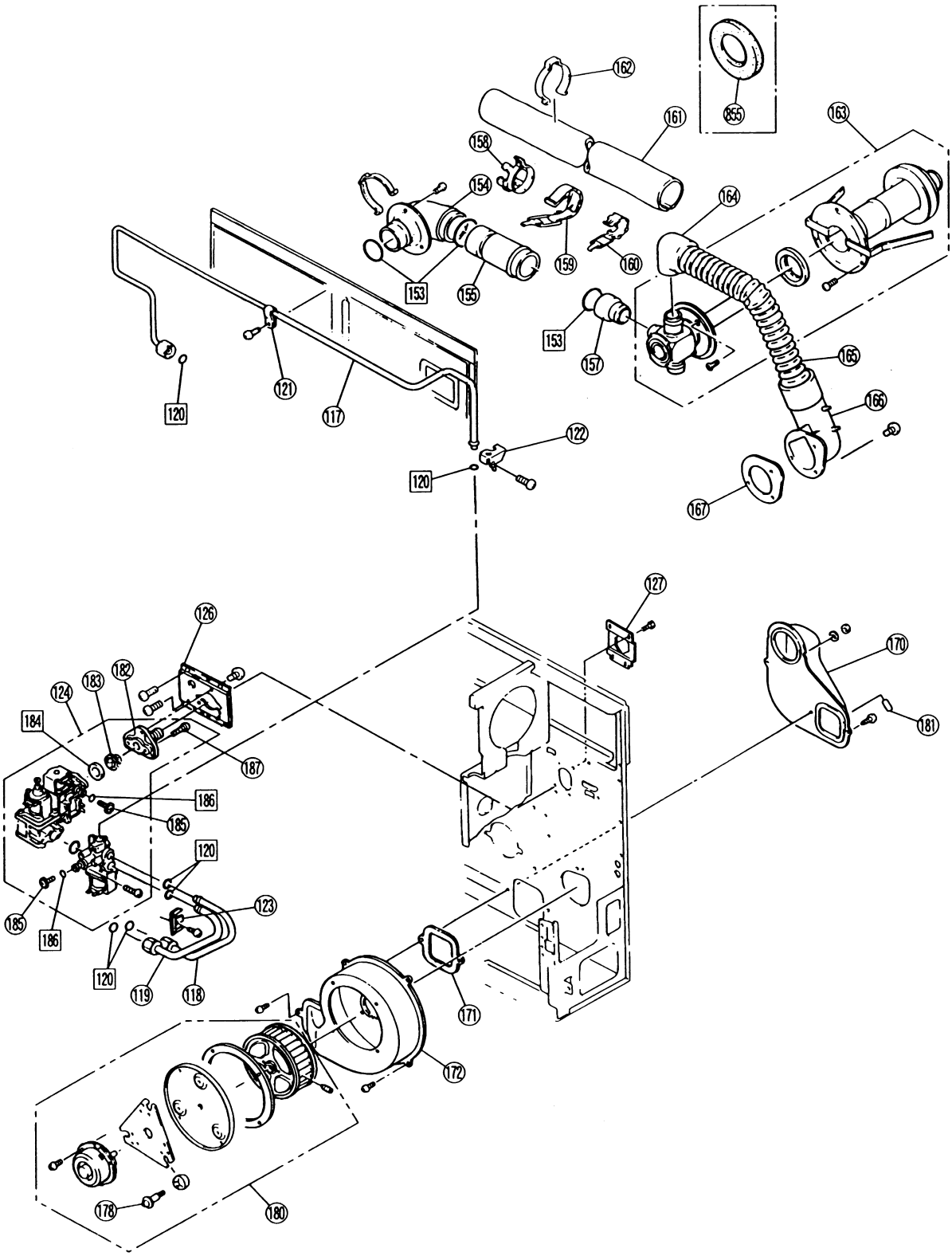

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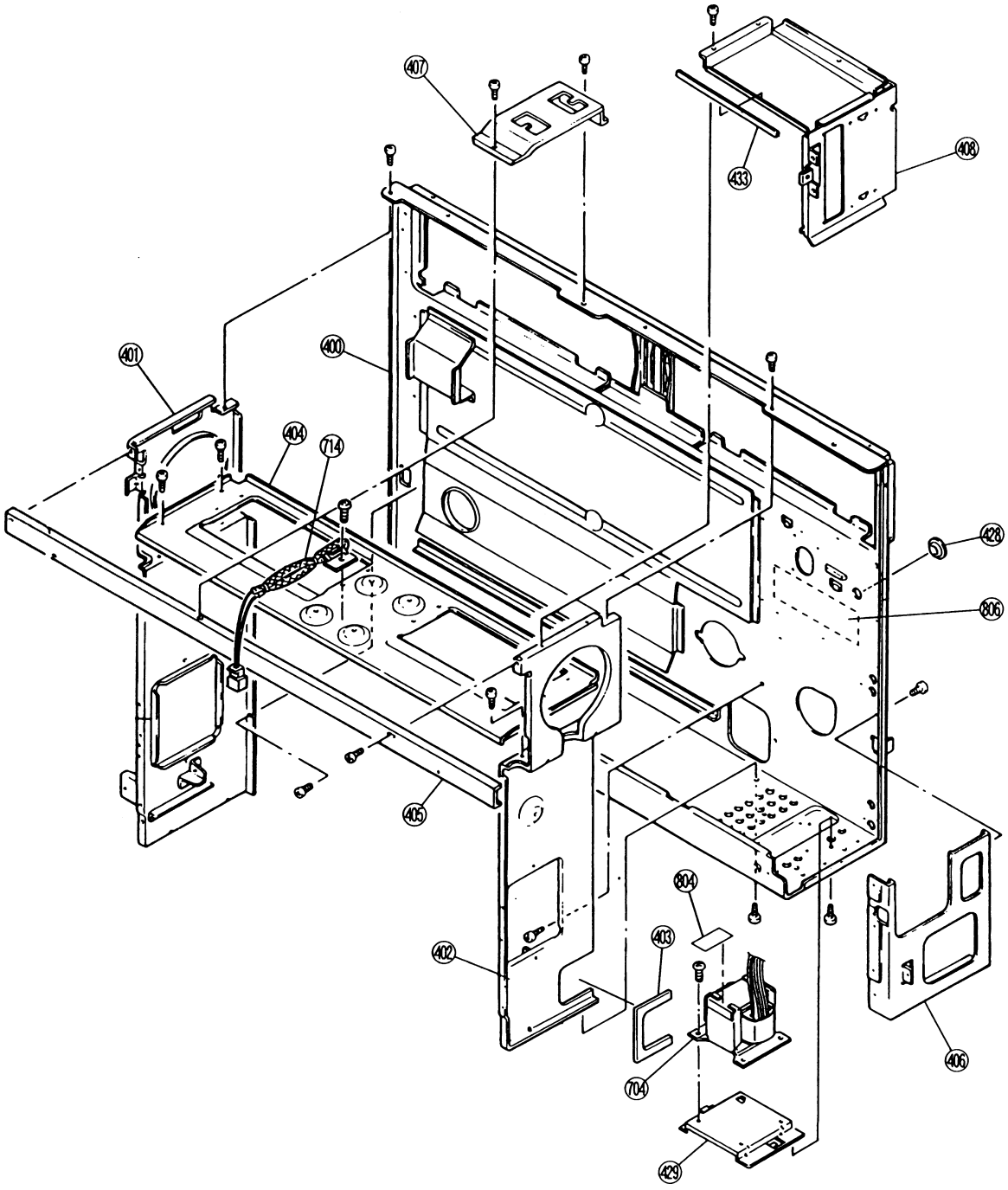

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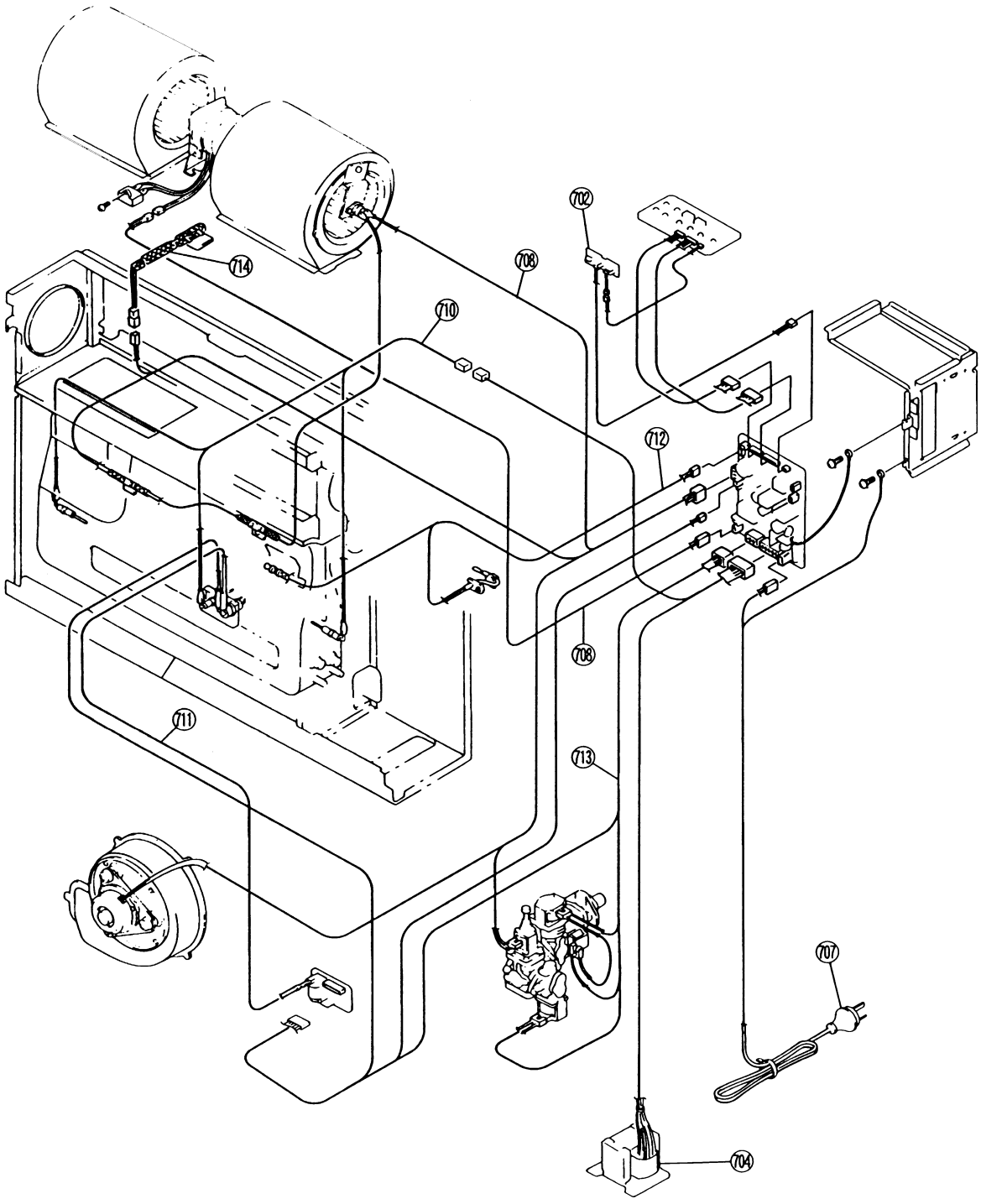

SERVICE CONTACT POINTS

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	Spare Parts	Tel: (03) 9271 6600 Fax: (03) 9271 6688
	Sales	Tel: (03) 9271 6666 Fax: (03) 9271 6611
	Emergency Hot Water	Tel: (1800) 632 386
		10-11 Walker Street, Braeside, VIC 3195
		Tel: (03) 9271 6625 Fax: (03) 9271 6622
New South Wales:	**Service**	Tel: (02) 9609 2600 Fax: (02) 9729 0467
	Sales	Tel: (02) 9609 2888 Fax: (02) 9609 5260
	Emergency Hot Water	Tel: (02) 9729 0468
		62 Elizabeth Street, Wetherill Park, NSW 2164
		Tel: (02) 9609 2111 Fax: (02) 9609 5260
South Australia:	**Service**	Tel: (08) 8345 0292 Fax: (08) 8345 4760
	Emergency Hot Water	Tel: (08) 8345 5185
		140 Days Road, Ferryden Park, SA 5010
Western Australia:	**Service**	Tel: (08) 9478 3355 Fax: (08) 9277 2531
	Emergency Hot Water	Tel: (08) 9324 4145
		18 Belgravia Street, Belmont, WA 6104
Queensland:	**Service**	Tel: (07) 3209 4622 Fax: (07) 3209 4722
	Emergency Hot Water	Tel: 0412 747 717.
		1/6 Booran Drive, Logan Central, QLD 4114
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		691 Mt. Albert Road, Royal Oak, Auckland
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