Rinnai

SERVICE MANUAL

RHFE-557 FT

ENERGYSAVER

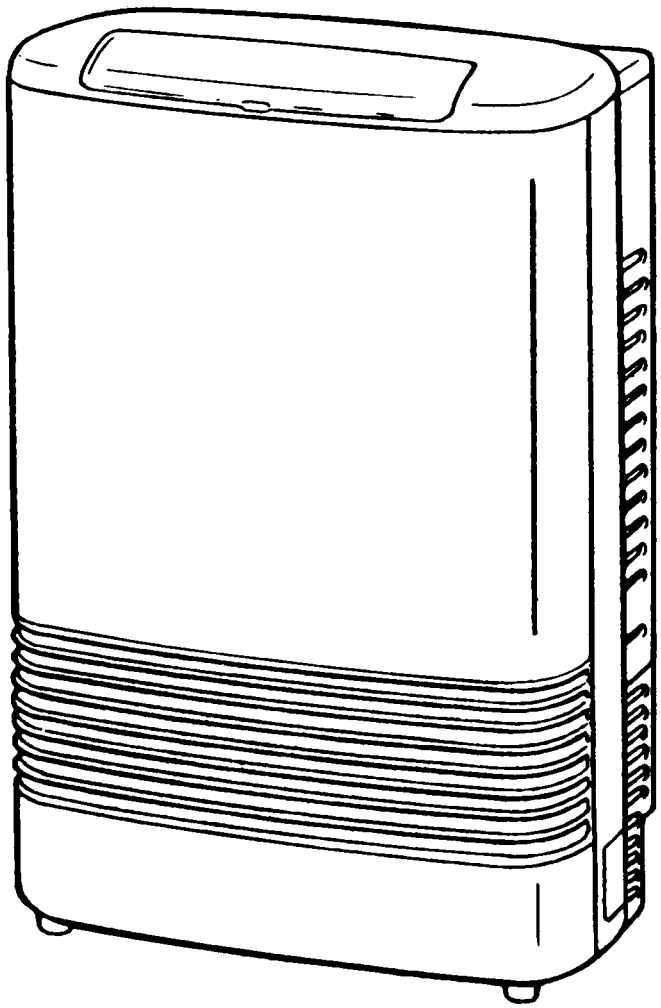


Table of Contents

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.

TELARC REGISTERED SUPPLIER
Quality Endorsed Company
ISO 9001 Reg 415

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.

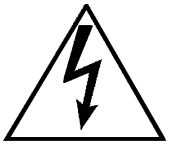
The Regulatory Compliance Mark (RCM) indicates compliance with electrical safety regulations in Australia and New Zealand
Rinnai Australia Supplier Code 5109

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.*
AS/NZS5601	*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
April 2013

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 within cannot be exchagned or diagnosed faulty.

After completing the service and confirming that there are no water or 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 Engineering & 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.

SM RHF557FTR
Issue N^{o}2

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
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
TH	-	thermistor

1. Introduction

Background

The RHFE-557FT incorporates 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.

Characteristics

- Built into the main PCB is the software to adapt all versions for connection to a central ON-OFF control.
- Gas flow modulates in 8 steps between HI ~ LOW/and OFF, achieving comfortable and efficient heating.
- The 557FT series includes a 24 hour digital clock and dual timer, and an economy mode function to reduce gas consumption without affecting comfort.
- Temperature control is monitored by fuzzy-neuro technology.
- The 557FTR incorporates remote control ON-OFF and temperature selection.
- All operation and temperature control is with easy-to-use push buttons.
- If a problem occurs or service is required, an error coded message appears on the digital 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 557FT

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, N°.1 is constructed of 1.0 mm aluminised steel. The right hand set, N°.2 is constructed of 0.8 mm stainless steel. The inlet of sub-heat exchanger N°.1 is connected to the outlet of the combustion chamber, the outlet is connected to sub-heat exchanger N°.2. Sub-heat exchanger N°.2 consists of 6 “sub” sections, constructed from 0.8 mm stainless steel. The outlet of sub-heat exchanger N°.2 is constructed from 0.5 mm stainless steel and connected to the flue by a concertina stainless steel tube.

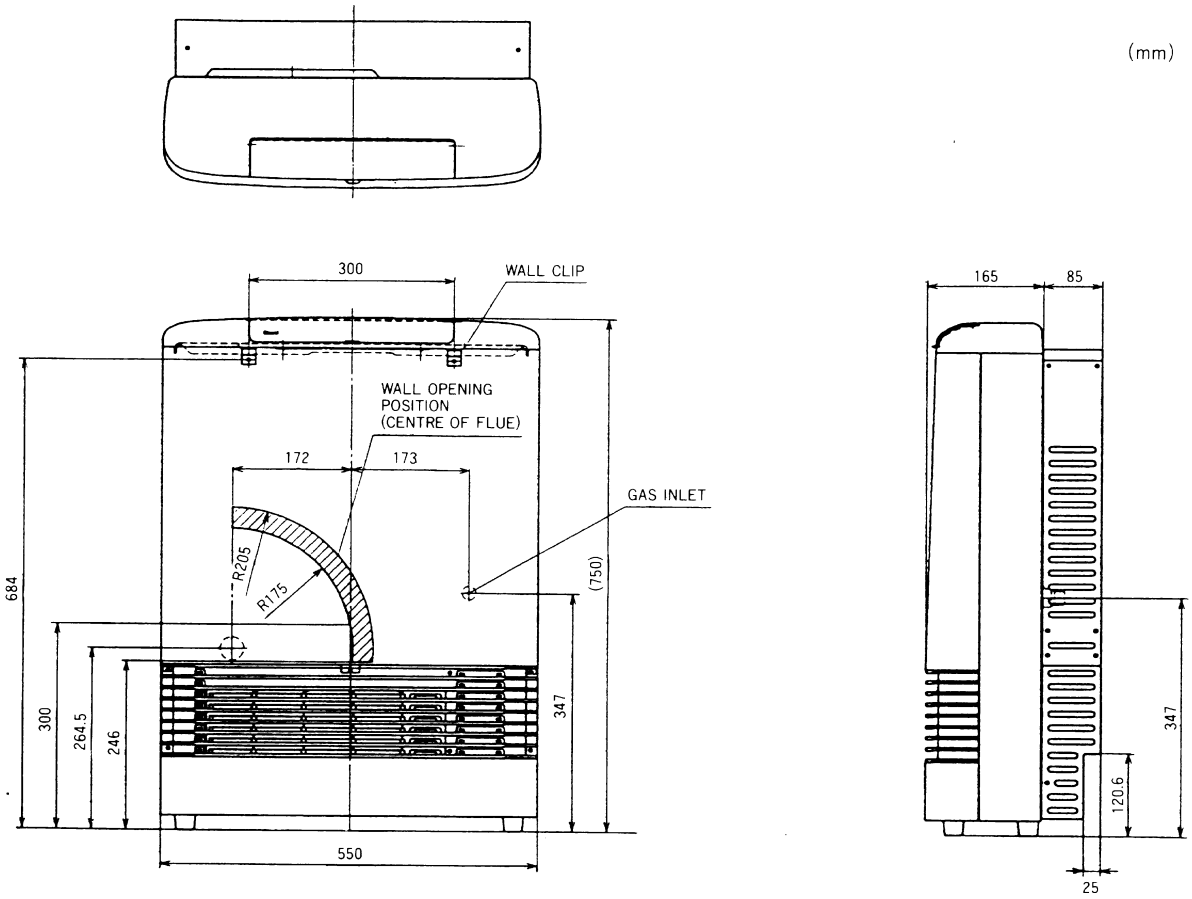
The combustion air fan draws combustion air from the outside atmosphere through the flue manifold pipe. air is then blown into the combustion chamber via a rubber tube. combustion products in the combustion chamber are pushed out into sub-heat exchanger N°.1, to sub-heat exchanger N°.2, and then into 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°.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 R 2 15 (BSP) inlet fitting, then via a flange connection to the solenoid valves N°.1, N°.2, a regulator modulating valve, aluminium injector manifold, before entering the burner.

2. Dimensions

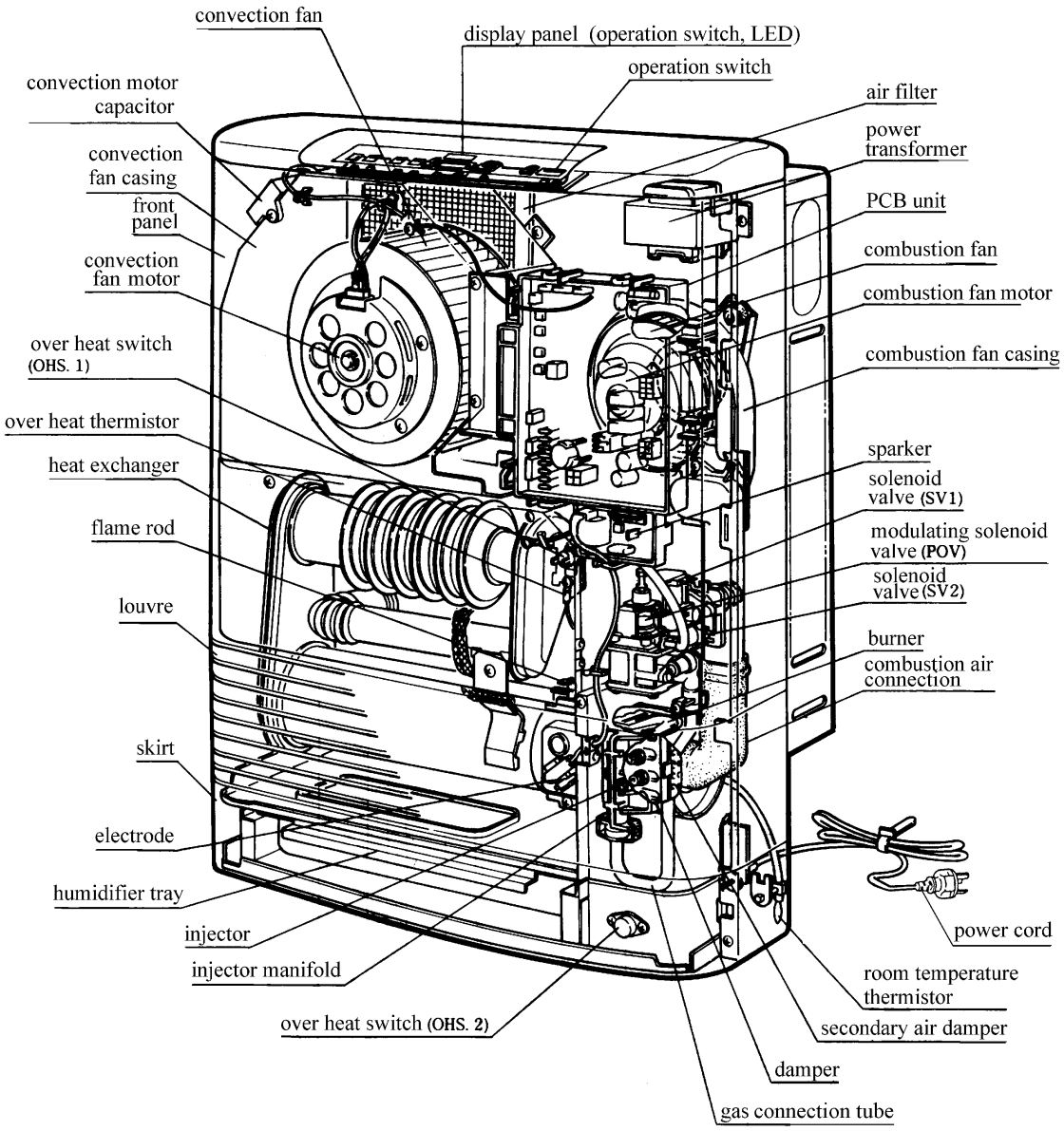
Note: all dimensions are in mm.



3. Specification

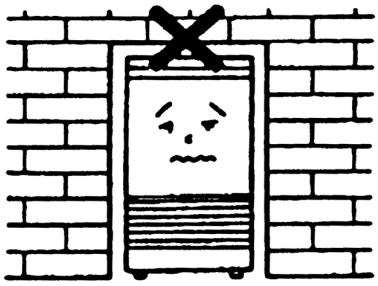
Type of appliance	Fan forced flued gas space heater
Model	RHFE-557FT
Dimensions	Width - 550 mm Depth - 165 mm (with back spacer 250 mm) Height - 750 mm
Weight	Approx 22 kg
Connections	Electrical - AC 240 V 50 Hz / 60 Hz Gas - R½ 15 BSP male thread
Input (HI/LO)	23 / 9 MJ/h
Output (HI/LO)	5.3 / 2.1 kW
Combustion system	Stainless steel bunsen burner
Ignition system	Continuous electrical spark, direct to main burner
Operation	Finger touch control buttons
Temperature control	Electronic thermostat, modulating HI-LOW/OFF
Temperature range	LOW (10°C) ~ 16 ~ 26°C ~ HIGH
Warm air outlet	Bottom of appliance
Air volume control	HI ~ LOW (proportional)/OFF
Timer operation	Timer - 24 hour, 2-way programmable, intelligent Operation - 24 hour Clock - 24 hour digital display Temperature control - 26°C limit when using timer program
Indicators	Burner ON, child lock, filter, economy, digital display, over-ride, 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	FTR models only
Economy mode	Energy saving feature
Child lock	Locks all controls except ON/OFF
Humidifier tray	Capacity - 1.2 Litres, Evaporation Rate - 0.15 L/hour
Safety devices	Flame failure - flame rod Over heat - bi-metal switch (130°C, 90°C) - thermal fuse (227°C,130°C) - thermistor (HI: 115°C OFF, LO: 100°C OFF) Power failure - PCB Power surge - 3 Amp fuse Fan delay - micro computer timer (Max 210 secs) Pre-purge - combustion fan, pre-purge timer, spark sensor Room over heat - automatic cut off at 40°C after 10 mins
Noise level range	HI ~ Low = 40 ~ 32 dB(A)

4. Cut-Away Diagram

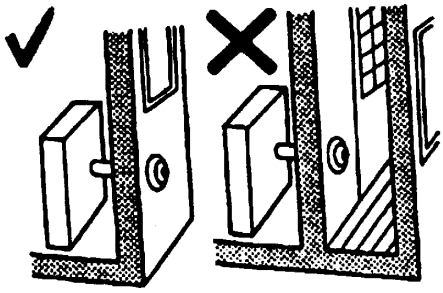


5. Installation

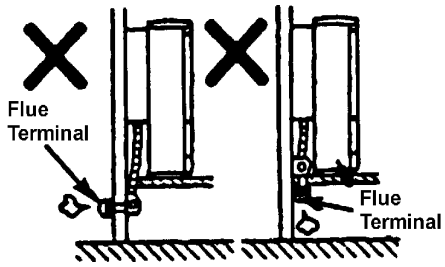
Note: The information provided here is only a guide. For full details on installation procedures please refer to the installation instructions in the customer's operating booklet.



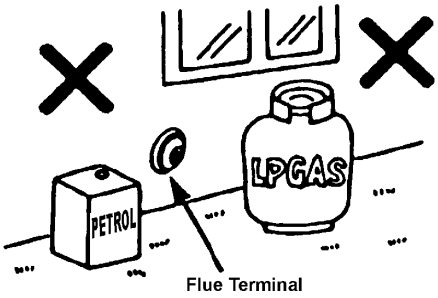
This heater is not designed to be built in.



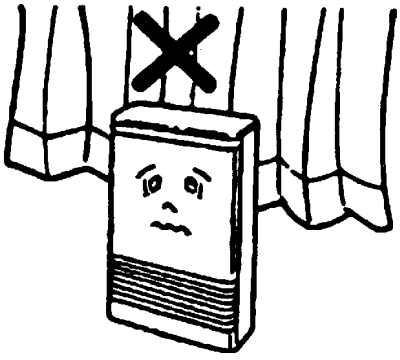
Flue may be positioned directly under opening windows, with a minimum clearance of 150 mm.



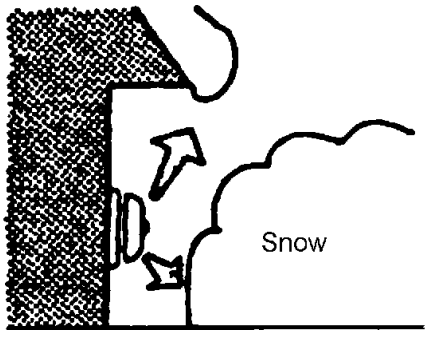
The flue is to designed to be positioned under floors or below the level of the heater.



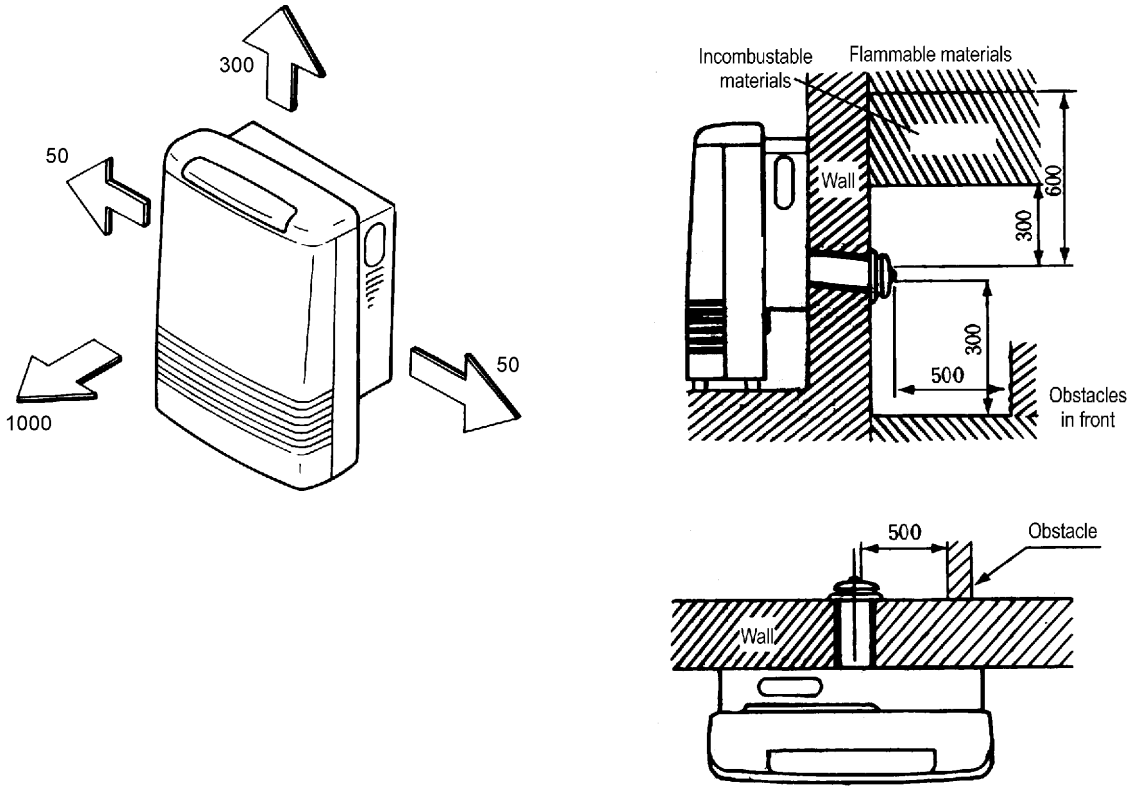
The flue terminal should be positioned away from flammable materials.



Flue fittings must be kept clear of flammable materials.



In areas subject to heavy snowfall, keep snow clear of flue terminal at all times.



Recommended minimum clearances and distances from obstructions.

6. Performance Characteristics

Basic Combustion Specification

Item		Specification	
Rinnai model number		RHFE-557 FT	
Gas type		NG	Propane/LPG
Gas consumption MJ/h	HI	23	23
	LO	9	9
Injector size (∅ mm)		1.30	0.85
Injector quantity		4	4
Secondary damper marking		A	B
Regulator pressure (kPa)	HI	0.50	1.08
	LO	0.10	0.20
Burner marking		P	P
Combustion method		Bunsen burner	
Burner type		Stainless slit style	
Solenoid valve		Direct single seated valve type	
Modulating solenoid valve		Direct single seated valve type	

Combustion fan speeds (rpm)

	Natural	Propane/LPG
Ignition	1530	1500
Re-ignition	1830	1980
Normal - High	3180	3180
Normal - Low	1290	1290

Warm air discharge temperature distribution

Condition: < High Combustion >

Test gas: Natural
Measured input: 22.55 MJ/h
Nominal input: 23 MJ/h
Room temperature: 25°C

(Unit Δ°C)

9	14	50	53	35	33	9	6
20	64	49	85	68	39	16	14
33	55	81	89	99	40	27	30
50	69	87	70	85	52	34	25
66	81	54	60	72	55	43	19
58	72	54	53	65	47	33	8

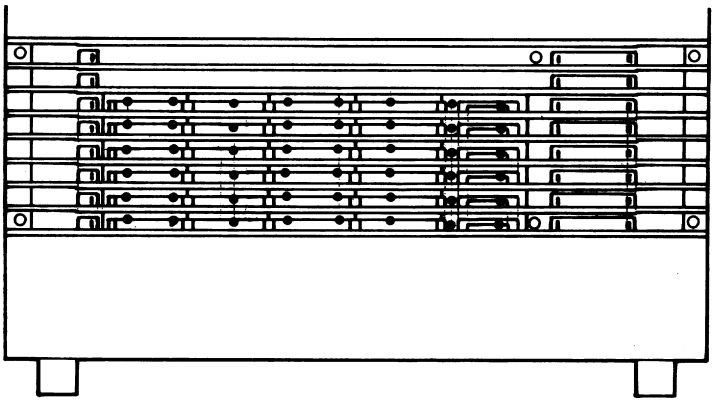
Condition: < Low Combustion >

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

(Unit Δ°C)

8	14	28	31	23	18	8	6
14	38	32	53	44	18	11	11
22	34	45	55	62	22	20	20
30	42	50	43	52	33	24	19
41	47	33	36	45	36	29	14
29	45	33	32	39	29	23	16

Measurement Points



Warm air discharge velocity

RHFE-557FT
<High Operation>

(Unit: m/sec)

1.62	2.25	3.23	3.09	1.91	2.65	2.55	0.15
2.76	2.47	2.91	2.94	2.71	3.21	2.44	1.39
3.49	3.10	3.69	2.71	3.06	4.04	2.44	2.18
3.62	2.47	3.90	3.37	3.16	3.78	2.54	1.65
3.45	2.80	3.71	3.24	3.53	3.50	3.50	2.98
2.83	3.03	3.25	2.34	3.23	3.26	3.20	3.49

<Low Operation>

(Unit: m/sec)

0.90	1.63	2.48	2.34	1.39	2.13	2.06	0.28
2.65	2.49	2.27	2.43	1.84	2.24	1.70	1.24
2.56	2.61	2.53	1.99	2.32	2.80	1.90	1.69
3.07	2.61	3.20	2.59	2.61	2.93	2.22	1.56
2.84	2.46	2.88	2.54	2.60	2.72	2.60	2.15
2.28	2.44	2.37	1.94	2.86	2.89	2.63	3.21

Conditions:
- Convection fan revolutions High: 600 rpm
- Average air velocity on High: 2.89 m/sec
- Average air velocity on Low: 2.31 m/sec
- Air flow rate on High: 4.5 m^3/min
- Air flow rate on Low: 3.6 m^3/min

Noise Level

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

High	40
Low	32

Thermal Efficiency

Conditions: Horizontal mushroom flue with unit installed against the wall and back spacers attached.

Gas Type	Combustion	Thermal Efficiency (%)
Natural	High	81.6
	Low	85.4
Propane	High	83.0
	Low	87.1

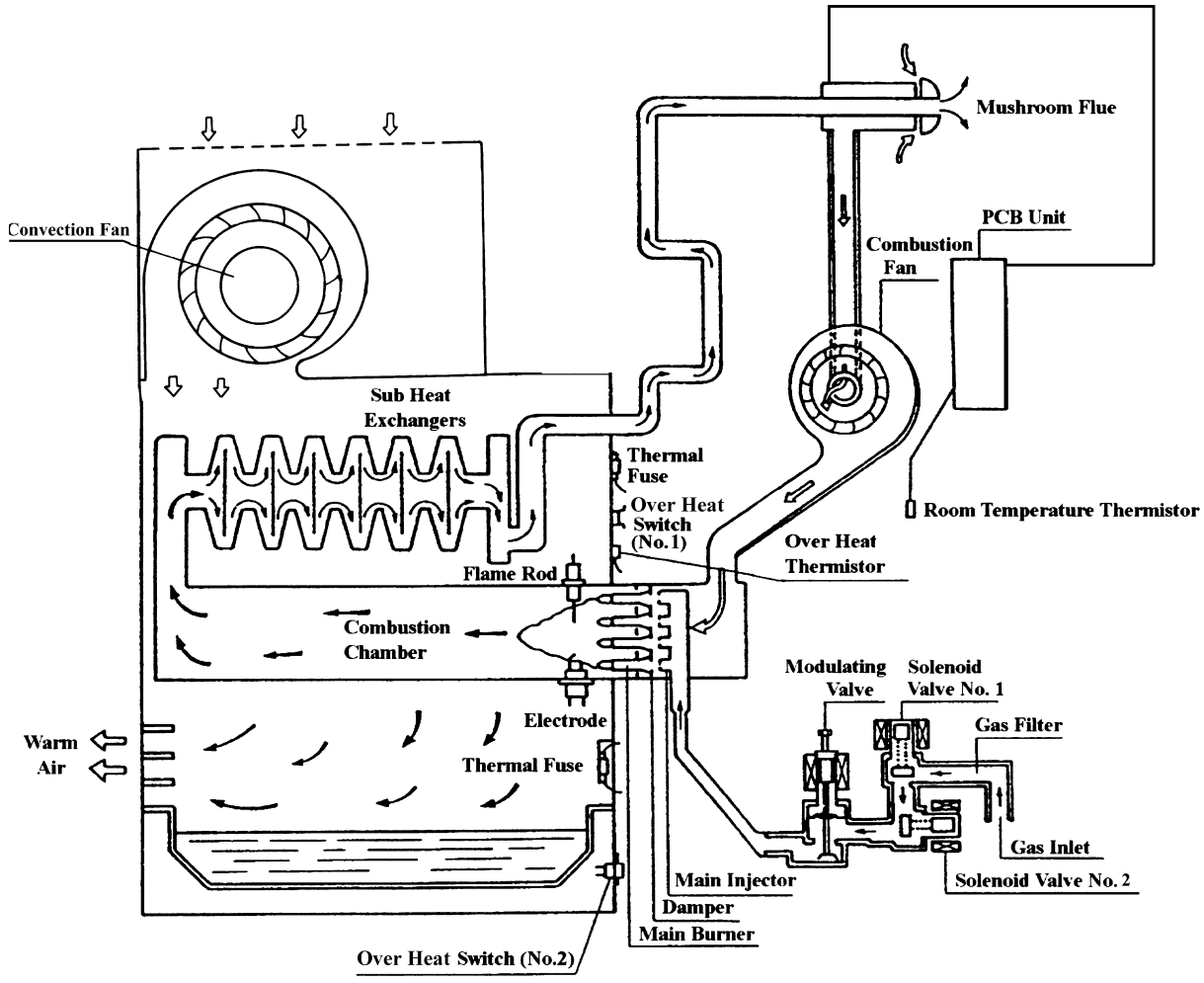
Humidifier Effect

Note: Evaporation rate varies depending on condition of use.

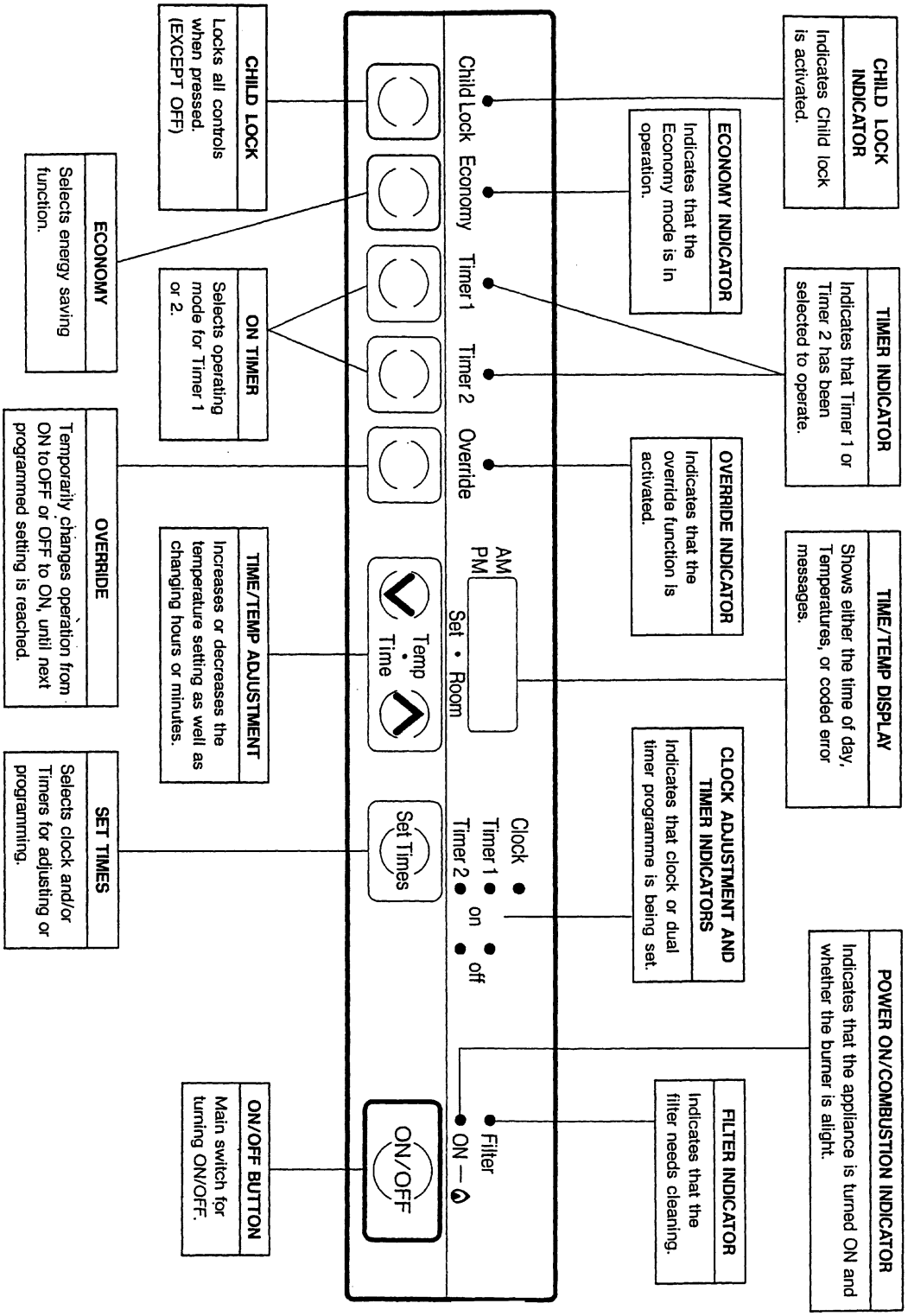
Method	Volume of water in tray (litre)	Evaporation (litre/h)
Hot air evaporation	1.2	0.15

Conditions: Standard setting: High combustion
Measurement Method: According to JIS (Japanese Industrial Standard)

7. Schematic Diagram



8. Control Panel Layout



9. Operating Principles

* Numbers in brackets refer to location of functions in control panel, page 12.

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_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 [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 convection fan adjusted in the same manner.

Thermostat Control

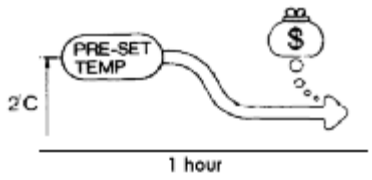
The selected and room temperature are displayed on the Time/Temp display [6]. Time and temperature are displayed alternately depending whether the heater is running or not. The selected temperature is altered by pressing the time/temperature adjustment buttons [5].

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.

Economy Mode

The engage the economy function press the economy button [11] while the heater is operational. The economy indicator [12] 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, and is an energy saving feature.

You may press the economy button [11] again at any time, to cancel the economy function.

Child Lock

To activate the child lock press the child lock button [13]. The lock indicator [14] will glow.

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

Filter Indicator

When the air filter becomes covered in dust and the temperature inside the appliance rises, the filter indicator [15] will glow.

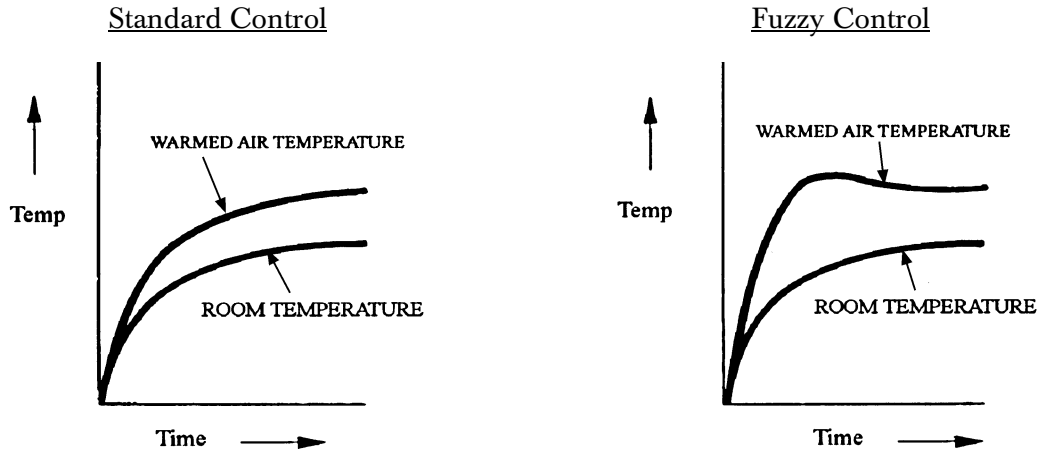
Fuzzy Logic

The Purpose of Auto Comfort [Fuzzy Logic]

The main aim of the Auto Comfort function is to heat a room by controlling the flow of the warm air coming from the heater. This increases heating efficiency as well as improving control over the flow of warm air being discharged by the appliance.

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

Fuzzy Logic is used on the RHFE-557FT in order to achieve the following 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.

Fuzzy Logic Summarised

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, the fan is made of rotate at a low speed, raising the discharge air temperature. 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 deceasing 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. Therefore the PCB continually monitors the room temperature and adjusts the fan speed according to the conditions at the time.

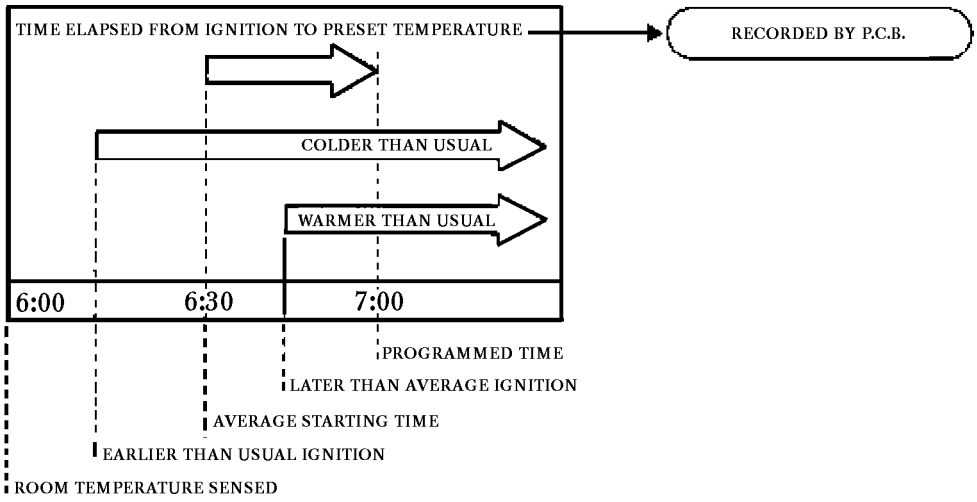
Intelligent Timer [Pre Heat]

This function enables the room to be heats to the pre-set temperature prior to the time programmed in the ON Timer. See Chapter 10, page 15 for more information.

10. Intelligent Timer [Pre-heat]

The intelligent 2-way 24-hour programmed dual digital timer [Pre-Heat] function operates in conjunction with either “On-Timer”. It enables the pre-set temperature to be reached by the time programmed by starting ignition up to an hour before the time programmed to start heating.

The actual ignition time is calculated using the difference between the room temperature and set temperature and the warming up time which elapsed the last time the appliance was used. The maximum time ignition will precede the pre-set time is 1 hour. The following chart illustrates how the intelligent timer operation.



The two timers can be programmed and used individually, or sequentially. Timer operation, once set, will remain on stand-by for the next day after the final OFF sequence, unless ON/OFF switch is pressed.

11. Safety Devices

Flame rod sensor

Senses main burner ignition and shuts off the solenoid valves when the flame current drops below 0.1 μA.

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.

Bimetal OHS1
Operates at 130±5 °C
Recovery at 115±7 °C

Bimetal OHS2
Operates at 90±5 °C
Recovery at 75±7 °C

Thermal Fuses
Cut out at 227±2 °C
130±2 °C
(one shot)

Thermistor
Operates at different temperatures depending on gas input, see page 18.

Fan delay

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

ON AT	15 sec, after ignition commences
OFF AT	max. 210 sec, after combustion

Power failure circuit

Shuts off the solenoid valves if a 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.

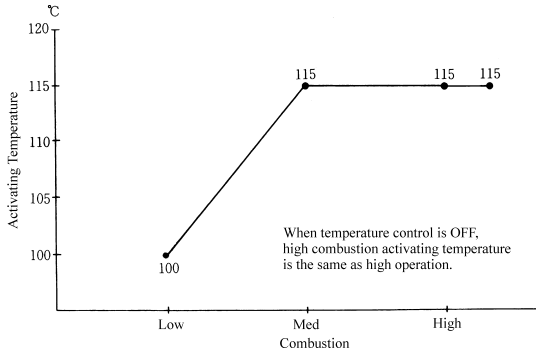
Thermistor Type Temperature Control

Controls room temperature within the range of 16 ~ 26 °C in 1 °C steps.

Overheat Control method

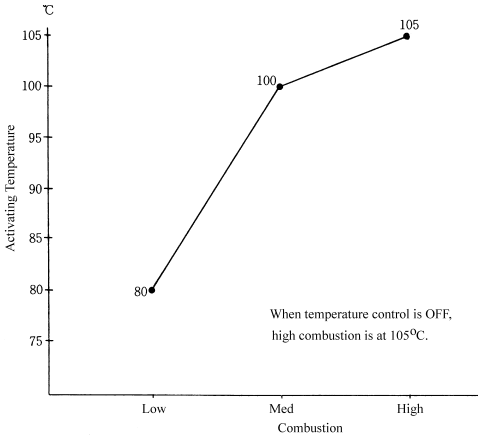
The overheat thermistor activates the overheat sensor and the filter indicator, as well as increasing the fan rpm.

(A) Overheat Sensor



The overheat thermistor activates at different temperatures for different gas rates (combustion).

(B) Filter Indicator

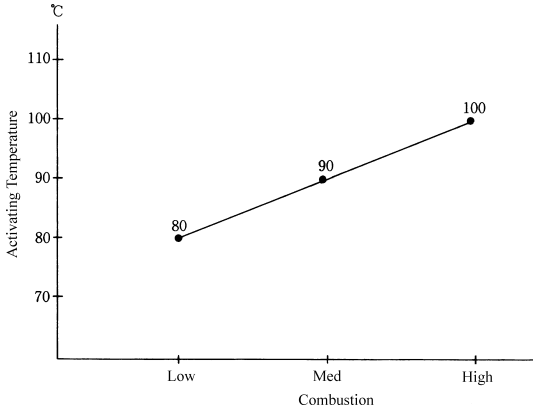


Note 1: Once the overheat limit temperature has been sensed and the filter indicator begins flashing, it will not go out, even if the temperature falls below the limit.

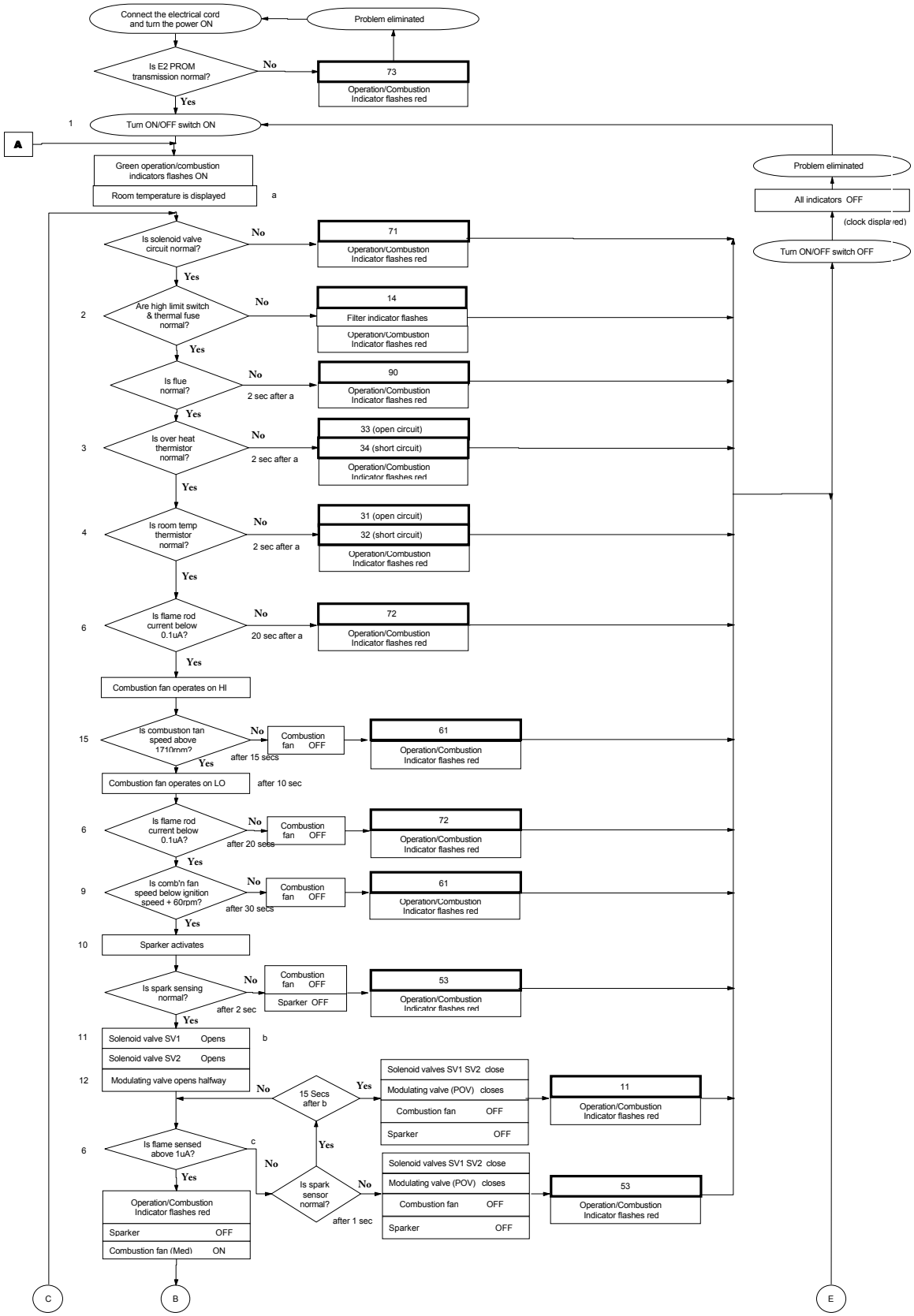
Note 2: Once the filter indicator begins flashing, gas input is limited to roughly 90% of high combustion.

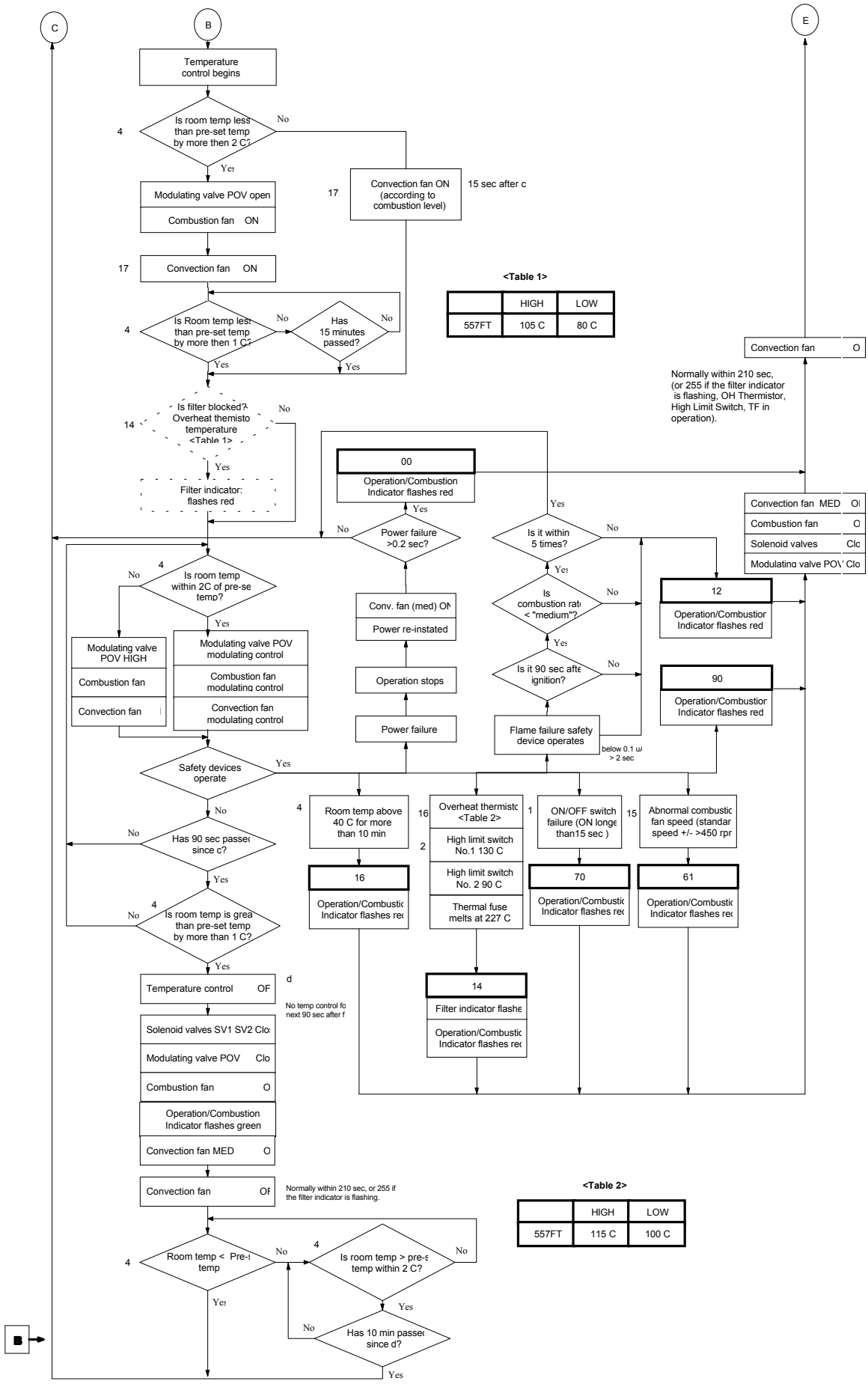
(C) Convection Fan RPM Increase

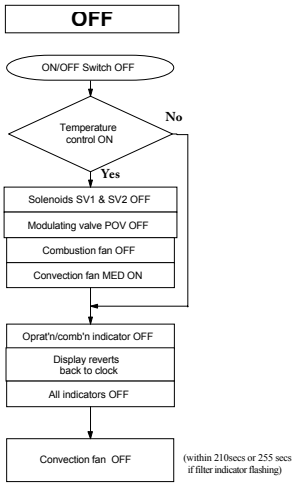
The fan rpm increases to compensate for a reduction in air flow due to a clogged air filter or other causes. The convection fan rpm is normally determined by combustion level. The speed changes by approximately 10 rp/sec while increasing, or decreasing.

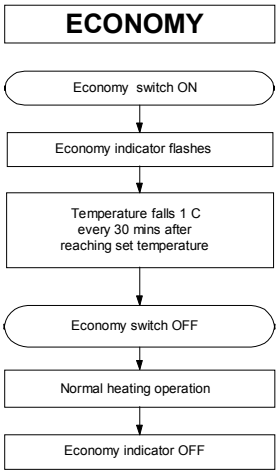


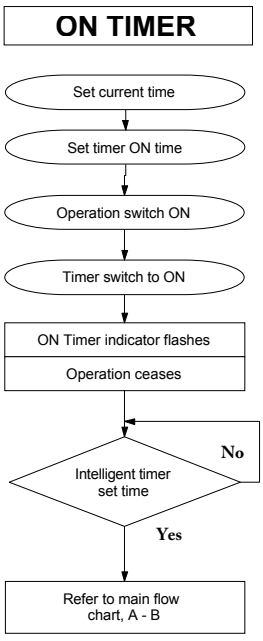
12. Operation Flow Chart

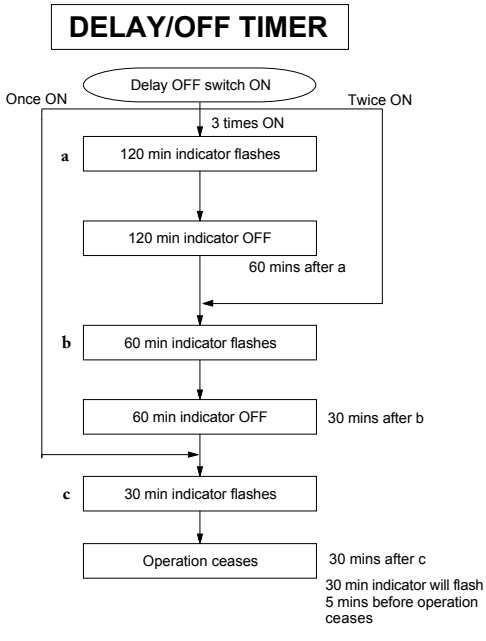



C
B
E
Temperature control begins
4
Is room temp less than pre-set temp by more then 2 C?
No
Yes
Modulating valve POV open
Combustion fan ON
17
Convection fan ON (according to combustion level)
15 sec after c
17
Convection fan ON
4
Is Room temp less than pre-set temp by more then 1 C?
No
Has 15 minutes passed?
No
Yes
Yes
<Table 1>
HIGH
LOW
557FT
105 C
80 C
Convection fan O
Normally within 210 sec, (or 255 if the filter indicator is flashing, OH Thermistor, High Limit Switch, TF in operation).
14
Is filter blocked? Overheat themisto temperature <Table 1>
No
Yes
Filter indicator: flashes red
00
Operation/Combustion Indicator flashes red
Yes
No
Power failure >0.2 sec?
Yes
Is it within 5 times?
No
Yes
Is combustion rat < "medium"?
No
Yes
Is it 90 sec afte ignition?
No
Flame failure safety device operates
below 0.1 ω > 2 sec
Convection fan MED O
Combustion fan O
Solenoid valves Clo
Modulating valve POV Clo
12
Operation/Combustior Indicator flashes red
90
Operation/Combustior Indicator flashes red
4
Is room temp within 2C of pre-se temp?
No
Yes
Modulating valve POV HIGH
Combustion fan
Convection fan
Modulating valve POV modulating control
Combustion fan modulating control
Convection fan modulating control
Conv. fan (med) ON
Power re-instated
Operation stops
Power failure
Safety devices operate
Yes
No
Has 90 sec passe since c?
No
Yes
4
Is room temp is grea than pre-set temp by more than 1 C?
No
Yes
4
Room temp above 40 C for more than 10 min
16
Operation/Combustic Indicator flashes re
16
Overheat thermistc <Table 2>
2
High limit switch No.1 130 C
High limit switch No. 2 90 C
Thermal fuse melts at 227 C
1
ON/OFF switch failure (ON longe than15 sec)
15
Abnormal combustic fan speed (standar speed +/- >450 rpr
70
Operation/Combustic Indicator flashes re
61
Operation/Combustic Indicator flashes re
14
Filter indicator flashe
Operation/Combustic Indicator flashes re
d
Temperature control OF
No temp control fo next 90 sec after f
Solenoid valves SV1 SV2 Clo
Modulating valve POV Clo
Combustion fan O
Operation/Combustion Indicator flashes green
Convection fan MED O
Convection fan Of
Normally within 210 sec, or 255 if the filter indicator is flashing.
<Table 2>
HIGH
LOW
557FT
115 C
100 C
4
Room temp < Pre-s temp
No
Yes
4
Is room temp > pre-s temp within 2 C?
No
Yes
No
Has 10 min passe since d?
Yes
B


OFF
ON/OFF Switch OFF
Temperature control ON
No
Yes
Solenoids SV1 & SV2 OFF
Modulating valve POV OFF
Combustion fan OFF
Convection fan MED ON
Oprat'n/comb'n indicator OFF
Display reverts back to clock
All indicators OFF
Convection fan OFF
(within 210secs or 255 secs if filter indicator flashing)


ECONOMY
Economy switch ON
Economy indicator flashes
Temperature falls 1 C every 30 mins after reaching set temperature
Economy switch OFF
Normal heating operation
Economy indicator OFF


ON TIMER
Set current time
Set timer ON time
Operation switch ON
Timer switch to ON
ON Timer indicator flashes
Operation ceases
No
Intelligent timer set time
Yes
Refer to main flow chart, A - B


DELAY/OFF TIMER
Delay OFF switch ON
Once ON
Twice ON
3 times ON
a
120 min indicator flashes
120 min indicator OFF
60 mins after a
b
60 min indicator flashes
60 min indicator OFF
30 mins after b
c
30 min indicator flashes
Operation ceases
30 mins after c
30 min indicator will flash 5 mins before operation ceases

13. Diagnostic Points

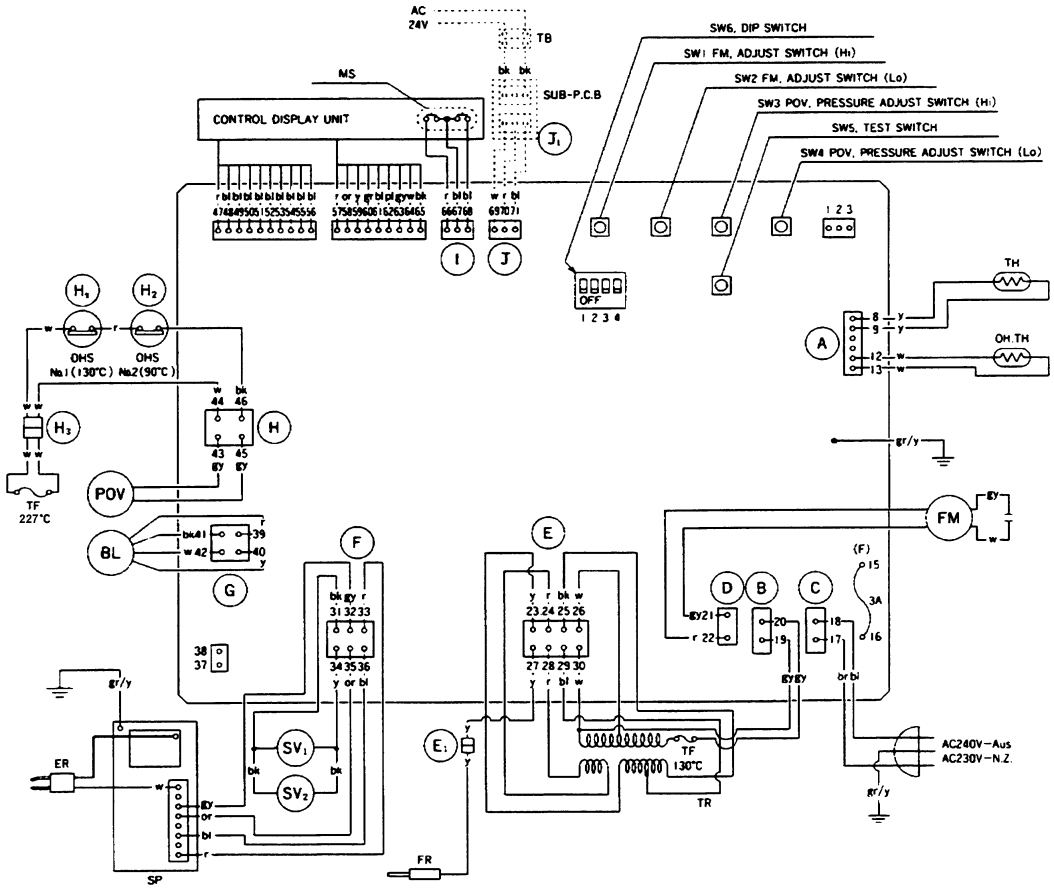
* “Operation Flow Chart” on page 18.
* “CN” denotes connector number on the “Wiring Diagram” on page 22.

Flow	CN	Component	Wire Colour	Value (Normal)
1	I	ON-OFF Switch	red - blue	DC 3 ~ 10 V, 4 resistance (current flows when switched on)
			blue - blue	
2	H	Overheat Circuit	white - black	Less than DC 1 V; < 4 Ω (current flows)
	H1	Overheat SW 1	red - white	below 1 Ω (current flows)
	H2	Overheat SW 2	black - red	
	H3	Thermal Fuse	white - white	
3	A	Overheat Thermistor	white - white	0.6 ~ 523 kΩ (< 0.6 kΩ: short, >523 kΩ: open)
			temperature	0°C:218kΩ, 20°C:78kΩ, 50°C:21kΩ, 80°C:7.3kΩ, 100°C: 3.6kΩ, 135°C: 1.5kΩ
4	A	Room Temp. Thermistor	yellow-yellow	1.8 ~ 844kΩ (< 1.8kΩ: short, >844kΩ: open)
			temperature	0°C:123kΩ, 20°C:39kΩ, 30°C:39kΩ, 40°C:14kΩ
6	E1	Flame Rod	yellow-yellow	< DC 0.1 μA
7	G	Combustion Fan	black -white	above 10mΩ
9	G	Combustion Fan	black - white	below ignition revolution + 2 Hz
		ignition revolution	initial	LP: 50Hz, NG: 50Hz; 1500 rpm
			re-attempt	LP: 65Hz, NG: 60Hz; 1950~1800 rpm
10	F	Solenoids Valve	blue-red	AC 85 ~ 110 V
11	F		black - yellow	DC 78 ~ 100 V, 1.3 ~ 2.2 kΩ
12	H	Modulating Valve	grey - grey	DC 1 ~ 15 V (low ~ high) 80 ~ 100 Ω
14	A	Over-heat Thermistor	white - white (filter indicator) high	flashes below 2.9 kΩ (filter circuit)
			low	flashes below 7.3 kΩ (filter circuit)
15	G	Combustion Fan	black - white (normal rpm) high	LP: 106Hz, NG: 106 Hz; 3180 rpm
			low	LP: 43Hz, NG: 43 Hz; 1290 rpm
16	A	Over-heat Thermistor	white - white (OHS on) high	operates below 1.5 kΩ
			low	operates below 2.9 kΩ
17	D	Convection Fan	grey - pink	AC 50 ~ 108 V (low ~ high), 90 ~ 180 Ω

Transformer Values

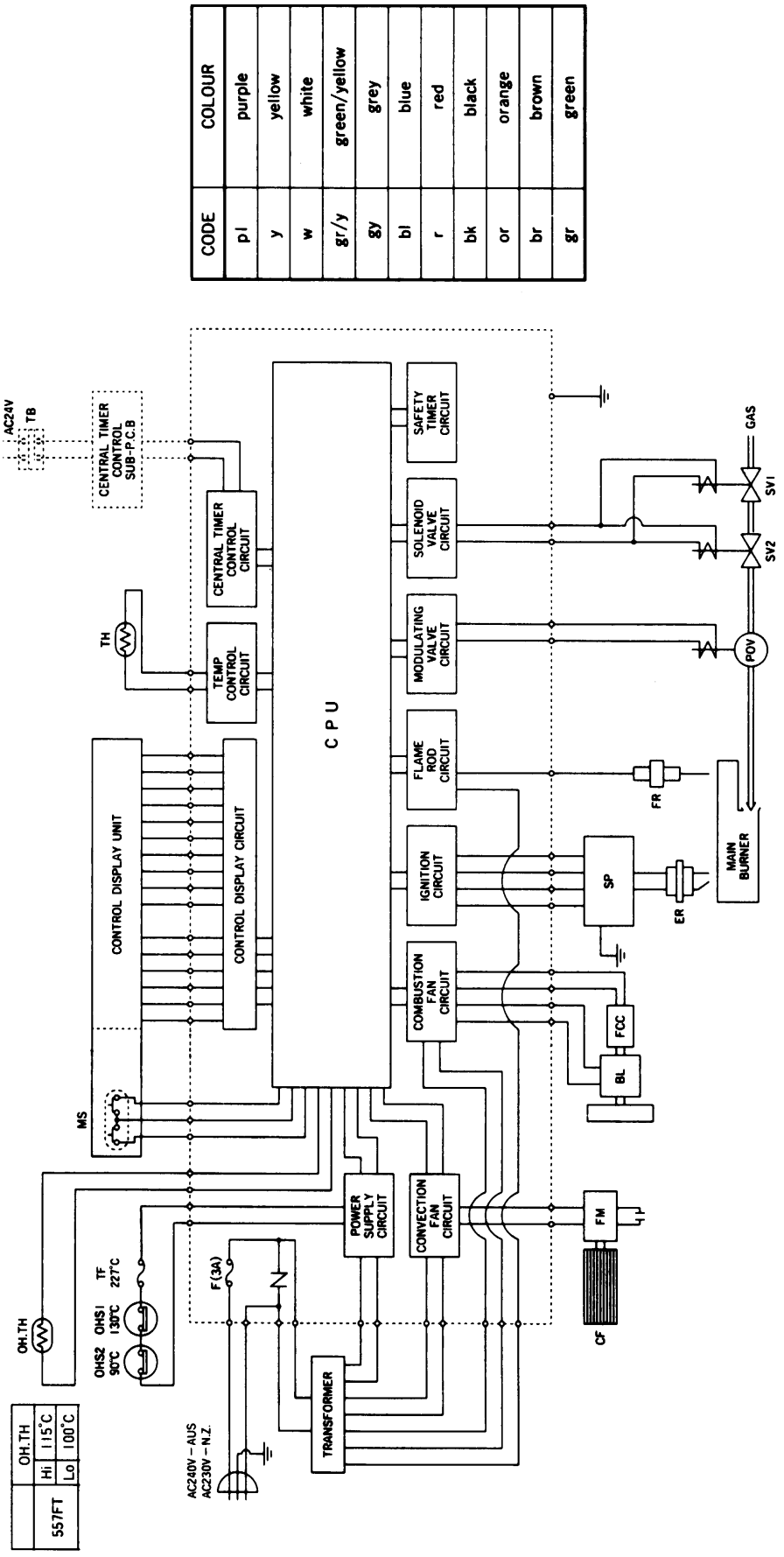
Wiring Diagram		Australia [240 V]	New Zealand [230 V]
E	Yellow - Blue	AC 130 ~ 180 V; 200 ~ 400 Ω	AC 130 ~ 180 V; 200 ~ 400 Ω
	Blue - Black	AC 10 ~ 16 V; 1 ~ 3 Ω	AC 10 ~ 16 V; 1 ~ 3 Ω
	Red - Red	AC 25 ~ 50 V; 1 ~ 3 Ω	AC 25 ~ 50 V; 1 ~ 3 Ω
B	Grey - Grey	AC 216 ~ 264 V	AC 207 ~ 253 V

14. Wiring Diagram

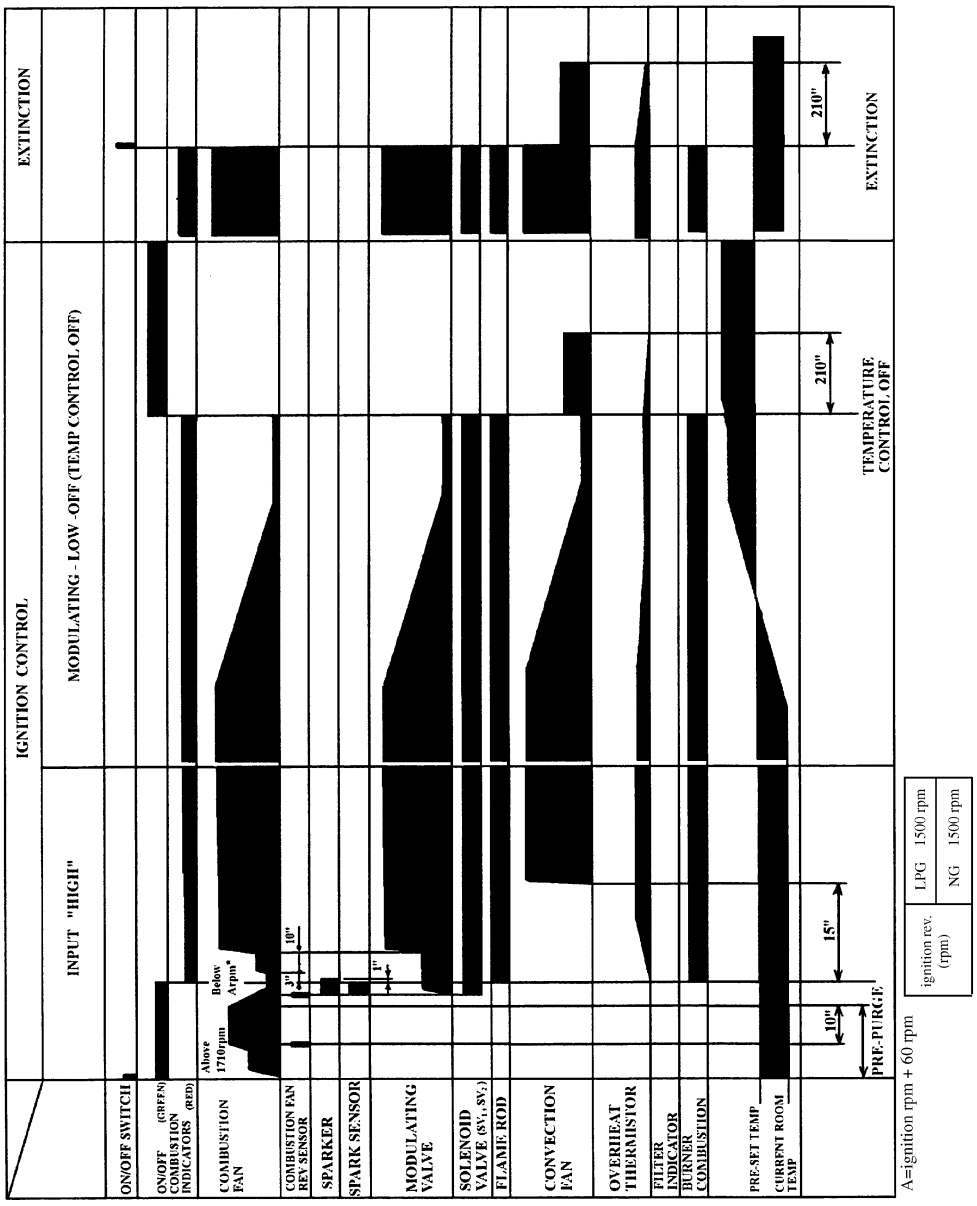


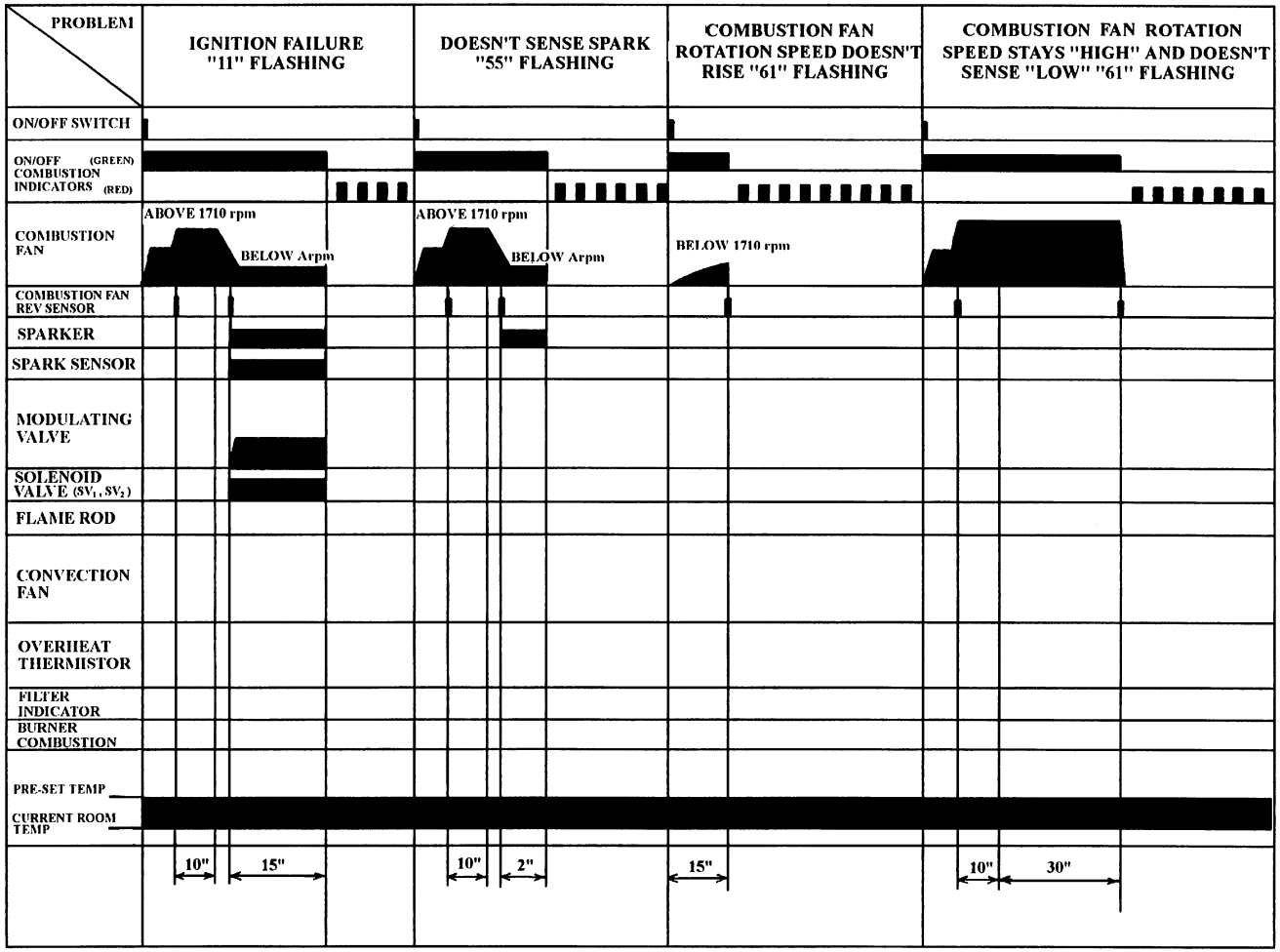
Mark	Part Name
MS	Main switch
TH	Thermistor
TF	Thermal Fuse
F	Fuse
CF	Convection Fan
FCC	Fan Control Circuit
ER	Electrode
POV	Modulating Solenoid Valve
TR	Transformer
TB	Terminal Block
OH, TH	Overheat Thermistor
OHS1~3	Overheat switch 1~3
FM	Convection fan motor
BL	Combustion fan motor
SP	Sparker
FR	Flame rod
SV1~2	Main Solenoid Valve 1~2
CPU	Central processing unit

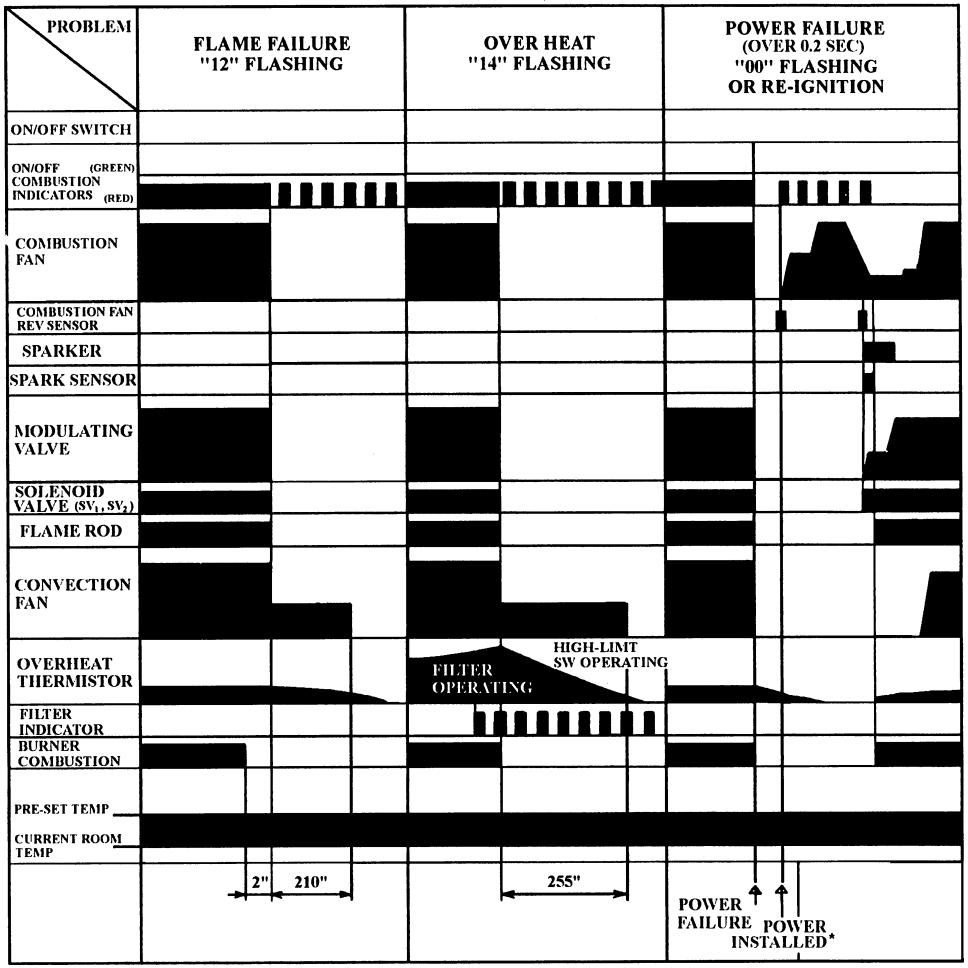
15. Block Diagram



16. Time Charts

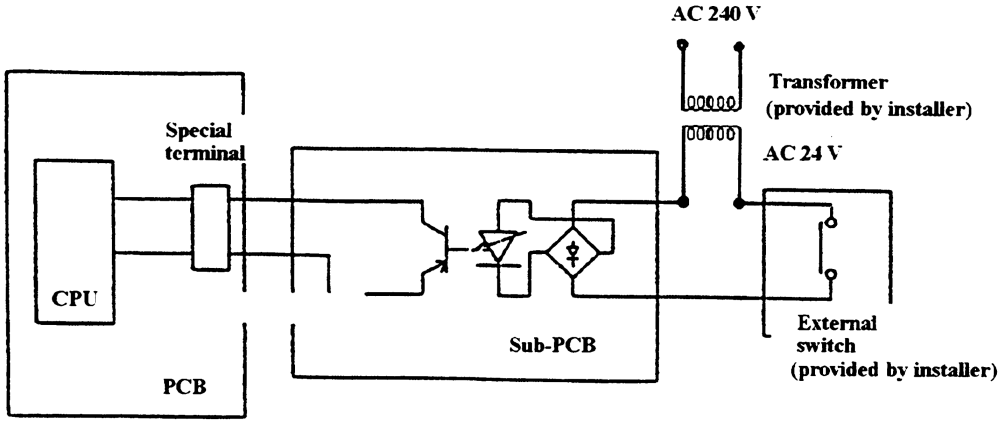



PROBLEM
IGNITION FAILURE "11" FLASHING
DOESN'T SENSE SPARK "55" FLASHING
COMBUSTION FAN ROTATION SPEED DOESN'T RISE "61" FLASHING
COMBUSTION FAN ROTATION SPEED STAYS "HIGH" AND DOESN'T SENSE "LOW" "61" FLASHING
ON/OFF SWITCH
ON/OFF (GREEN)
COMBUSTION INDICATORS (RED)
COMBUSTION FAN
ABOVE 1710 rpm
BELOW Arpm
ABOVE 1710 rpm
BELOW Arpm
BELOW 1710 rpm
COMBUSTION FAN REV SENSOR
SPARKER
SPARK SENSOR
MODULATING VALVE
SOLENOID VALVE (SV1, SV2)
FLAME ROD
CONVECTION FAN
OVERHEAT THERMISTOR
FILTER INDICATOR
BURNER COMBUSTION
PRE-SET TEMP
CURRENT ROOM TEMP
10"
15"
10"
2"
15"
10"
30"


PROBLEM
FLAME FAILURE "12" FLASHING
OVER HEAT "14" FLASHING
POWER FAILURE (OVER 0.2 SEC) "00" FLASHING OR RE-IGNITION
ON/OFF SWITCH
ON/OFF (GREEN)
COMBUSTION INDICATORS (RED)
COMBUSTION FAN
COMBUSTION FAN REV SENSOR
SPARKER
SPARK SENSOR
MODULATING VALVE
SOLENOID VALVE (SV_1, SV_2)
FLAME ROD
CONVECTION FAN
OVERHEAT THERMISTOR
HIGH-LIMT SW OPERATING
FILTER OPERATING
FILTER INDICATOR
BURNER COMBUSTION
PRE-SET TEMP
CURRENT ROOM TEMP
2"
210"
255"
POWER FAILURE
POWER INSTALLED*

17. Central ON-OFF/Timer Control Adaptor

An optional sub-PCB driven by a 24 AC signal is available from Rinnai to enable the RHFE-557FT be controlled from a central location. This is particularly useful in schools and institutions. The connection operates by signals from an outside 24V control circuit which is electrically isolated by a photo-transistor. The sub-PCB sends ON/OFF 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 control panel.

Summarised control actions

Control	Operating sequence	Current state of appliance	Change in operation at appliance
Central Control (outside)	$ON \rightarrow OFF$	OFF	OFF
		ON	STAND-BY
	$OFF \rightarrow ON$	OFF	OFF
		STAND-BY	ON

Control	Operating sequence	Current state of appliance	Change in operation at appliance
Appliance side	$OFF \rightarrow ON$	OFF	STAND-BY
		ON	ON
	STAND-BY	OFF	OFF
	$ON \rightarrow OFF$	ON	OFF

18. E^2PROM

Memory function for Error History, estimated Combustion time, and Estimated Number of Operations.

E^2 PROM (Electrically Erasable and Programmable Read Only Memory) is a ROM in which data is electronically or erased. Programmed data will be stored semi-permanently even if the power fails or is disconnected.

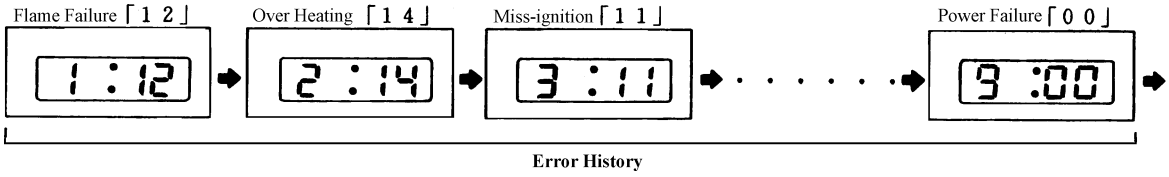
The most recent data on the past nine errors, estimated combustion time and estimated number of operations are included in the information stored in E^2 PROM.

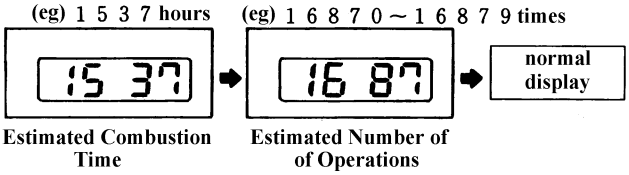
- **How to Read the Data**

  Confirm the unit is off, press '" ∧ "', '" ∨ "" and "Economy" buttons at the same time for at least 2.5 seconds (a beep will be heard once). The data will be displayed on the LED display in the following order: Error Messages, Estimated Combustion Time, Estimated Number of Operations.

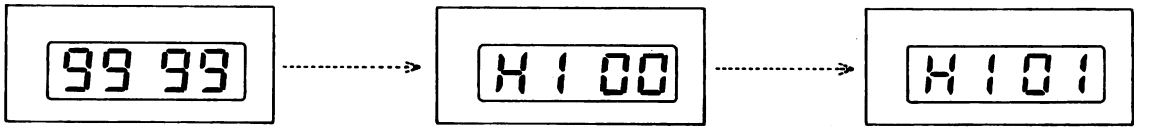
- **Data Display**

  The most recent error message (No. 1) will be displayed first, then it will be followed by up to eight previous errors (No. 2~9) displayed for 2 seconds each, as shown below. Following this, Estimated Combustion Time and Estimated Number of Operations data will be displayed for 4 seconds each as in the example below (No error messages "_ _._ _" will be displayed if no errors were recorded).

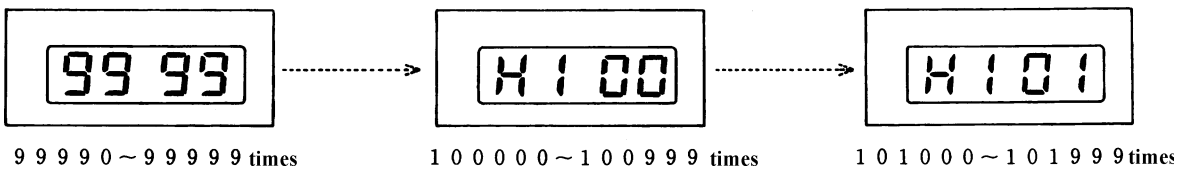




Estimated Combustion Time will be displayed as below if between 0 ~ 9,999 hours. However, if it is more than 10,000 hours, then "H" is added to the beginning of the display. Hours will be rounded up to the nearest 100 as shown below.



Estimated Number of Operations will be displayed as below (1=10 times) if between 10 ~ 99,999 times. However, if it is more than 100,000 times, then "H" is added to the beginning of the display. Operations will be rounded up to the nearest 1000.



Note: Estimated Number of Operations is the number of ON-OFF movements on the solenoid valve.

- **Deleting Data from E^2PROM**

  Confirm the unit is turned off, and press '" ∧ "", '" ∨ "", "Economy" and "Lock" buttons at the same time for at least 1 second. (Lock beep will be heard once an d another beep will be heard a second later).
  Digital display turns off and displays "_ _:_ _" when the data is deleted completely. However, the data in Estimated Combustion Time and Estimated Number of Operations cannot be deleted. Once recorded in E^2PROM, the data is protected from power failures.

[Permanent Data]

- Modulating Valve Supplement Current Value (HIGH)
- Modulating Valve Supplement Current Value (LOW)
- Convection Fan Supplement Current Value (HIGH)
- Convection Fan Supplement Current Value (LOW)
- Estimated Combustion Time
- Estimated Number of Operations

[Delectable Data](initial settings)**

- Error History (none)
- Clock (12:00 am)
- Economy Operation (OFF)
- Lock (OFF)
- Preset Room Temperature (22°C)
- ON Timer (06:00 am)

** This data can be deleted as described above.

19. Error Coded Messages

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.)

557FT	**Problem Cause**	**Comments**	**Ref** †
- -:- -	Power failure	When power failure is sensed operation stops.	-
11	Miss ignition	Flame current does not reach 0.1μA within the given time, after solenoid valve opens.	6
12	Flame failure	Flame rod current remains below 0.1μA for 3 seconds during initial combustion.	6
14	Overheat safety device	High-limit temperature themistor or thermal fuse has activated.	2
16	Over temperature cut off	Room temperature is sensed as being above 40°C for longer than 10 minutes.	4
31	Room temperature thermistor disconnection	Room temperature thermistor open circuit.	4
32	Room temperature thermistor short circuit	Room temperature thermistor wire trapped, touching bare metal.	4
33	High-limit thermistor disconnection	High limit thermistor open circuit for over 2 secs.	3

† Refers to the number on the left of the operational flow chart page 18, and diagnostic points page 21.

557FT	**Problem Cause**	**Comments**	**Ref** †
34	High-limit thermistor short circuit	High limit thermistor short for over 2 seconds.	3
53	Abnormal spark sensed	Sparker not OFF within 20 seconds at time of ignition.	-
		1st spark sensed not within 2 seconds.	
		2nd spark sensed spark not continuous for 1 second after solenoid valve opens.	
61	Abnormal combustion fan motor rpm	Speed is not achieved within time or goes over speed level.	15
70	ON/OFF switch failure	ON/OFF switch on continuously for more than 15 seconds.	1
71	Solenoid valve check	Solenoid valve(s) (SV_1, SV_2) signal and response signal are different.	11
72	Flame rod failure	Flame rod current should not go below 0.1μA within 20 seconds of starting.	6
73	Communication	Data transfer between CPU and E^2PROM	-

† Refers to the number on the left of the operational flow chart page 18, and diagnostic points page 21.

* To reset error codes, press the ON switch while the error code is showing. This will not reset error codes “71” and “73”; power needs to be rest to erase these codes.

20. Fault Finding

The main faults and their remedies

* Numbers on the right hand side of this table refer to "Causes of Faults and Suggested Remedies" on page 32.

Fault Symptom	Error Codes	Check Points / Remedy
The Economy indicator will not come ON.		* Confirm that Economy Mode has been selected * Confirm electrical cord is securely into the power point
After having pressed the ON - OFF switch the appliance will not operate.	11	* Check gas supply . . . . . .1 * Confirm no gas escapes . . . . . .1 * Check for air in the gas supply . . . . . .1 * Reconfirm gas type specified 1
Insufficient heating.		* Check selected room temperature setting . . . . .2 * Check for blocked air filter . . . . . .3 * Check for an obstruction in the warm air flow . .4 * Reconfirm gas pressure at appliance 1
Burner goes out during operation.	12 14 16	* Ensure flue terminal is not blocked . . . . . .5 * Ensure air filter is not blocked . . . . . .3 * Power Failure . . . . . .8 * Check for an obstruction in the warm air flow . .4 * Reconfirm gas type specified * Confirm no gas escapes . . . . . .1 * Check for flash back . . . . . .6 * Check for high room temperature . . . . . .7 * Reconfirm electrical supply at power point 8
Gas odour.		* Confirm no gas escapes (at connection) . . . . . .1 * Product of combustion leak 9
Power failure.	--:--	* Power failure (> 0.2 seconds) 8

† Error is displayed as room temperature LEDs flashing

Causes of Faults and Suggested Remedies

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
⇒ 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 louvres.

..... 14 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
⇒ 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

7. Room temperature

- Is the room temperature unusually high?

⇒ 10 minutes after having sensed 40°C the appliance will automatically go out.
..... 16 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

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? Is there a power failure? Have the fuse or breaker blown at the switchboard? Are the air filter, flue, or warm air outlet blocked? Are Timers set? Clear Timers and operate again. Is the 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.
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.
Unit is not heating room?	→	Is the air filter or warm air outlet blocked? Is the set temperature high enough? Are the doors and windows of the room closed?
Air filter or louvres are blocked or obstructed.	→	Allow heater to cool, clean air filter, operate again.
Heater will not reignite after overheating.	→	Heater does not reignite. Repair is necessary.

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 is 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 of power failure. Clock will be delayed by the length of the power failure.
Remote control does not operate.	→	Check battery. Try moving closer to the heater.

21. Fault Analysis

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

i) The combustion fan doesn't begin to rotate, or suddenly stops after running 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
2. Is the 3 amp fuse blown?

↓
YES
↓

a. The appliance does not operate.

i) Open circuit or loose pin connector on PCB or wiring loom.
ii) ON/OFF button faulty. ... **70 flashing**
iii) Faulty Printed Circuit Board.
iv) Control panel PCB faulty.
v) OHS is 'OPEN'. ('CLOSED'→ Normal) ... **14 and filter indicator flashing**
vi) Thermal fuse has melted.
vii) Solenoid circuit is faulty. .... **71 flashing**

↓

b. 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 go over 1710 rpm. ... **61 flashing**
iv) The flame rod current is greater than 0.1 μA during pre-purge.... **72 flashing**
v) The combustion fan rpm not below ignition rpm + 60. ... **61 flashing**
vi) Faulty spark generator. ... **53 flashing**
vii) Faulty PCB.

↓

c. 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 ± 0.5 mm).
iv) Weak or shorting spark.
v) Faulty PCB.

d. 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 (no current to SV).

e. 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.

B. After repeated efforts to operate the appliance, it will not ignite. ... ***11 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?

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

After 15 seconds the spark stops and mis-ignition occurs.

Miss-ignition

Ignition OK

Confirm the flame rod current.

1. Faulty indicator/incorrect wiring.
2. Faulty PCB.

Has the current risen above 1.0 μA.

No

1. Check combustion specification, gas type, and gas pressure.
2. Check the combustion condition.
3. Check flame rod is firmly positioned.
4. Check the flame rod lead.

Yes

Faulty PCB

D. The flame fails during normal operation.

1. Power failure for 0.2 seconds or longer. ... **"_ _ : _ _" flashing when power reinstated**
2. Safety devices are activated.

* Room temperature is sensed at above 40°C for 10 minutes. ... **16 flashing**
* Air filter is blocked and the OHS is activated. ... **14 and filter indicator flashing**
* Obstruction in the flue terminal. ... **12 flashing**
* Blockage or insufficient gas supply. ... **12 flashing**
  * Gas pressure is abnormally low.
  * The area surrounding the flue terminal may be restricted.
* Obstruction in front of the heater. ... **14 and filter indicator 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?

Flame failure 30~60 mins after ignition. "12" flashing.

↓

Is flame rod current > 1.0 μA?

Yes ↓

Faulty PCB.

No ↓

1. Confirm specification of regulator, restrictor, injector, etc..
2. Check condition of flame rod and burner.

4. Flame failure (makes a loud noise).

↓

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

5. Flame faillure occurs between 2 and 3 minutes after ignition. "12" flshing.

↓

Is flame rod current greater than 1.0 μA?

No → *Is the gas pressure normal?
*Is the flame rod faulty?

Yes ↓

Combustion fan motor control may be faulty

↓

PCB faulty

22. 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
A. "12:00" fails to flash when power cord is pugged 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 230 - 240 V	Yes	Go to (2).
				No	Repair electric source.
	((2) Blown or defective fuse?	1. Measure fuse resistance.	< 1 Ω	Yes	Go to (3).
				No	Replace fuse. Go to (2) - 2.
		*2. Measure convection motor coil resistance after removing 2P connector.	(D) Black - Pink 90 - 180 Ω	Yes	Go to (2) - 3.
				No	Replace convection motor.
		*3. Measure combustion motor coil resistance after removing 4P connector.	(G) Red - Black > 10 M Ω	Yes	Go to (2) - 4.
				No	Replace combustion motor.
		*4. Measure resistance of transformer after removing 8P connector.	(E) White - White 6-14 Ω (E) Red - Red 1 - 3 Ω (E) Black - Blue 0.5 - 2Ω (E) Blue - Yellow 200-400 Ω.	Yes	Go to (2) - 5.
				No	Replace transformer.
		*5. Remove solenoid valve lead wires (SV_1, SV_2) and measure coil resistance between terminals.	(F) Black - Yellow SV_1 1.3-2.2KΩ SV_2 1.3-2.2KΩ	Yes	Go to (2) - 6.
				No	Replace solenoid valve.
		*6. Remove modulating valve lead wire(s) (POV) and measure coil resistance between terminals.	(H) Grey - Grey 80 - 100 Ω	Yes	Replace PCB.
				No	Replace modulating valve.

	(3) Is the ON/OFF switch OK?	*Check switch continuity after removing 3P conenctor (turn switch ON and OFF) Red - Blue Blue - Blue.	(1) OFF: 4 ON: 0Ω	Yes	Go to (4).
				No	Replace switch.
	(4) Is the transformer OK?	Check transformer secondary voltage.	(E) Red-Red AC 30 - 50 V (E) Black - Yellow AC 10 - 16 V (E) Blue - Yellow AC 130 - 180 V	Yes	Replace PCB.
				No	Repalce transfomer.
B. Error code appears soon after turning heater on (normal sequence cannot proceed).	(5) Is overheat switch 1 or 2 OFF? (... 14 flashing) If unit over heated, it will turn back ON once the unit cools down.	* With ON/OFF switch OFF, check continuity between both terminals.	(H1) White-Red < 1 Ω (H2) Black - Red < 1 Ω	Yes	Go to (6).
				No	Replace overheat switch 1 and/or 2.
	(6) Has the thermal fuse melted? (..... 14 flashing)	* With ON/OFF switch OFF, check continuity between both terminals	(H3) White-White 0kΩ	Yes	Replace PCB
				No	Replace temp. fuse.
	(7) Is the combustion motor wiring OK? (... 61 flashing)	* Check combustion motor coil resistance using same procedure as (2)-3 above.	Red - Yellow >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 AC 85 - 110 V	Yes	Replace sparker.
				No	Replace PCB.
D. Spark fails to produce ignition (stops after approx. 15 sec.) (... 11 flashing)	(10) Are the solenoid valves (SV_1, SV_2) ON?	*1. Check solenoid valve coil resistance using same procedure as (2)-5 above.	(F) Black - Yellow SV_1 1.3 - 2.2 k Ω SV_2 1.3 - 2.2 k Ω	Yes	Go to (11) - 2.
				No	Replace solenoid valve.
		2. Check solenoid valve terminal voltage.	(F) Black - Yellow DC 78 - 100 V	Yes	Go to (12).
				No	Replace PCB.
	(11) Is the modulating valve (POV) OK?	1. Check test point pressure. (Modulating valve P_2)	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 (Gas changeover switch)	Yes	Go to (12) - 3.
				No	Set to proper position
		*3. Check modulating valve coil resistance.	(H) Grey - Grey 80 - 100 Ω	Yes	Adjust regulator pressure. If it does not match, replace PCB.
				No	Replace modulating valve.

E. Ignition occurs, but combustion indicator does not operate. (Sparker stops after approx. 15 sec) (... 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 0^{o}C : 123 kΩ 20^{o}C : 39 kΩ 27^{o}C : 19 kΩ	Yes	Replace PCB.
				No	Replace thermistor.
G. Heater stops during use (turns off prematurely: broken indicator motor).	(15) Shut off mechanism activated. (... 12 flashing)	Check flame rod circuit current.	(E1) Yellow - flame rod > 1.0 μA. (Disconnect, measure between connector and lead.)	Yes	Check for dust, FR wire and connector.
				No	Replace PCB
	(16) OFF function activated. (... 16 flashing)	Was the heater used for a long period at a high temperature?	Over ten minutes at above 40^{o}C.	Yes	Explain usage.
				No	Replace PCB.
	(17) Overheat switch activated. (... 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? Measure motor coil resistance. See (2)-2.	(D) Grey - Pink 90 - 180 Ω	Yes	Go to (18) - 4.
				No	Replace motor.
		4. Check voltage at 2P terminal D on PCB (convection fan) .	HIGH - LOW 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?			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.

23. Testing

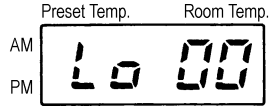
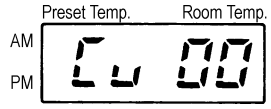
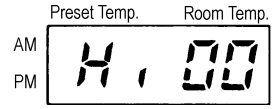
Test Mode Summary

Test Mode 1 - This mode cancels temperature control, and starts combustion mode.

Test Mode 2 - This mode controls the modulating valve and convection fan (Normally, this test mode is used when converting gas type and changing the PCB).

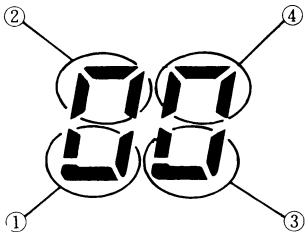
* Operating Procedures and Indicators

(A) Test Mode 1

Operating Procedures	Illuminated Indicators
1. Turn the appliance on (combustion indicator illuminates). Press test mode switch (SW 5) at top of the PCB (combustion mode changes to "Low" test mode).	LOW 
2. Change combustion and convection fan mode using the Temperature/Time setting switch located on the control panel. The mode changes from LOW → MED → HIGH each time the "/\" switch is pressed. The mode changes HIGH → MED → LOW each time the "\/" switch is pressed.	MEDIUM 
	HIGH 
3. Return operation to normal by pressing the test mode switch (SW 5) again.	Displays temperature.

Note: Indicators (digital display "00" and "22", "24", "26" and "HIGH" indicators) show that modulating valve and/or convection fan adjustment is complete.

Digital Display



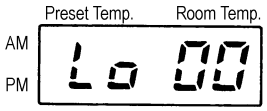
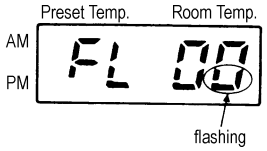
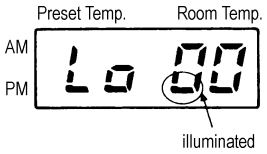
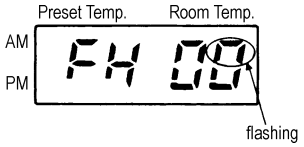
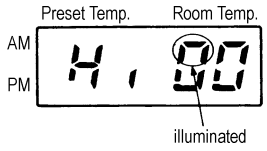
Sections of the digital display show that the following adjustments have been completed:
1) Modulating Valve (LOW)
2) Modulating Valve (HIGH)
3) Convection Fan (LOW)
4) Convection Fan (HIGH)

The indicators will be off when the PCB unit is replaced.
Indicators will illuminate after test mode 2 adjustment is completed.

2. Indicators (digital display "LO", "Cu", "Hi" and "LO", "16", "18", "20" indicators) may be flashing at times. This means the combustion mode is in transition (eg. Changing from LOW → MED). The indicators will glow steadily once combustion mode stabilises.

(B) Test Mode 2 (Adjusting Modulating Valve)
See "Gas Pressure Setting Procedure" on page 43.

(C) Test Mode 2 (Adjusting Convection Fan rpm)
Convection fan rpm is prerecorded in the PCB unit software. Therefore, adjustment is not required when the PCB unit is replaced.

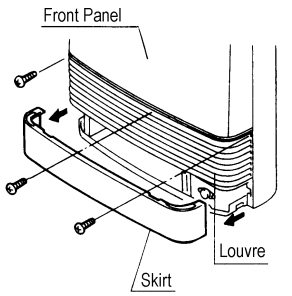
Operating Procedure	Indicators
1. Turn the appliance on (combustion indicator illuminates). Press test mode switch (SW 5) at the top of the PCB (combustion mode changes to "LO" Test mode).	
2. Press convection fan adjusting switch LO (SW). Sections of the indicators will flash to show that adjustment is in progress.	
3. Adjust by using the Temperature/Time setting SW located above the control panel. "/\" SW increases and "\/" decreases the rpm.	
4. Once the adjustment is complete, press SW2 again. Low current supplement value is recorded in E^2PROM and will be confirmed. Indicators will stop flashing and will glow steadily.	
5. Press convection fan adjustment SW HI (SW1) located at top of PCB unit. (Combustion mode changes to "HI" test mode)	
6. Adjust by using the Temp/Time setting SW located above the control panel. "/\" SW increases and "\/" decreases the rpm.	
7. Press SW1 again, once the adjusting is completed. High current supp valve is recorded on E^2PROM and will be confirmed. Indicators will stop flashing and will glow steadily.	
8. Return operation to normal by pressing the test mode SW (SW 5) again.	Displays temperature.

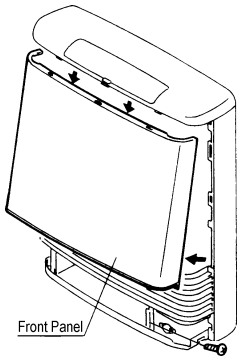
Note: The convection fan rpm changes by approximately 10~15 rpm each time "\/" or "/\" SW is pressed.

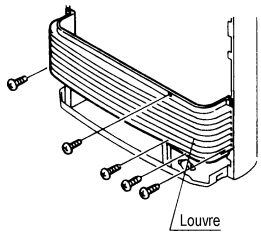
24. Gas Conversion

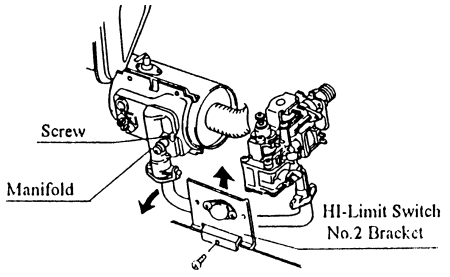
* Disconnect electrical supply and isolate gas supply.

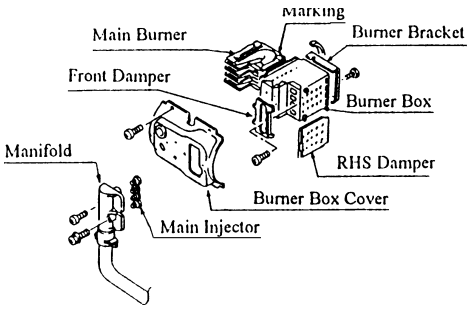
1. Remove bottom trim (pull)
2. Remove 9 screws inside bottom louvre, pull complete front panel forward at bottom, unclip from escutcheon panel and remove from heater.
3. Replace small gas label on gas inlet.
4. Replace large gas label on back of appliance.
5. Change very small gas label on data plate.
6. Complete details on conversion sticker, place sticker on the inside front cover.
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. Using pointed nose pliers, carefully pull the right hand damper forward, and out of the burner assembly.
11. Gently fit new damper - tag faces to the right.
12. Carefully remove damper (1 screw).
13. Replace the damper.
14. Remove injectors.
15. Fit new injectors.
16. Refit manifold, (slide into pin locators) then secure with screws. Take care with gasket.
17. Connect main gas tube; take care with "O" ring.
18. Reconnect appliance to electricity and gas.
19. Follow gas pressure setting procedure.
20. Check for gas escapes.
21. Replace front cover.











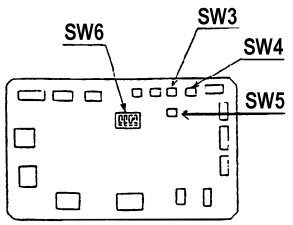
25. Gas Pressure Setting Procedure

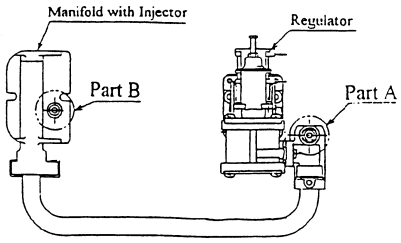
1. Set Dip Switch (SW6) to correct position. See diagram opposite.
2. Remove test pressure point screws, from heat exchanger manifold (B) and gas valve (A). Connect s side of pressure guage to the heat exchanger test point (B) and r side to the gas valve test point.
3. Turn appliance ON.
4. When the combustion lamp comes on, push SW5 once (see diagram opposite). Press SW4 to set the appliance on forced LOW
5. Adjust the LOW pressure to the correct pressure (see table below) with the "/\" and "\/" buttons on the control panel. (The RHFE-557FTR has E^2PROM operation; there should be no need to adjust the modulating valve screw).
6. Press SW4 again to lock in the low pressure setting. Press SW3 to set the appliance on forced HIGH.
7. Adjust the HIGH pressure to the correct pressure (see table below) using "/\" and "\/" buttons on the control panel.
8. Press SW3 again to lock in the high pressure setting.
9. Press SW5 again to return the appliance to normal operation.
10. Turn the appliance OFF, disconnect the pressure guage and replace the test point screw.

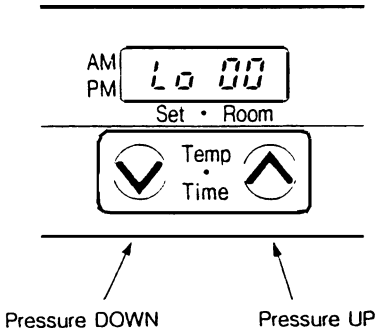
	Natural Gas	Propane Gas
HIGH	0.50 kPa	1.08 kPa
LOW	0.10 kPa	0.20 kPa

		SW6 DIP SWITCH
557FT	NG	OFF ON OFF OFF 1 2 3 4
	LPG	ON OFF OFF OFF 1 2 3 4

P.C.B. Dip Switch Position







26. Dismantling for service

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

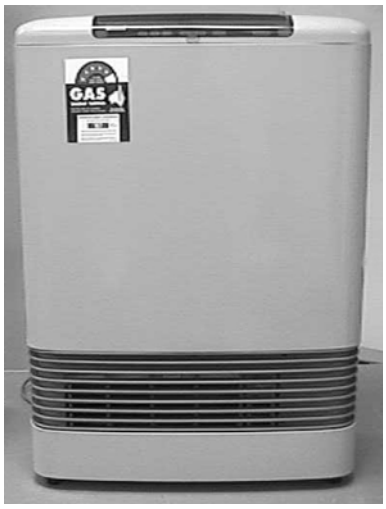
Item ***Page***

Unless otherwise stated, re-assembly is the reverse of dismantling

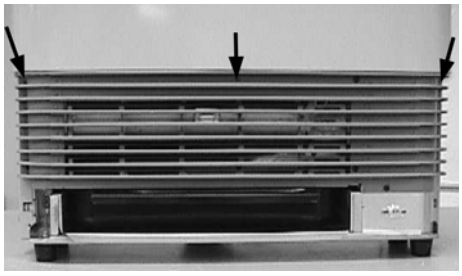
1) Removal of Front Panel

CAUTION
240 volt potential inside applaince.
Disconnect electrical supply.

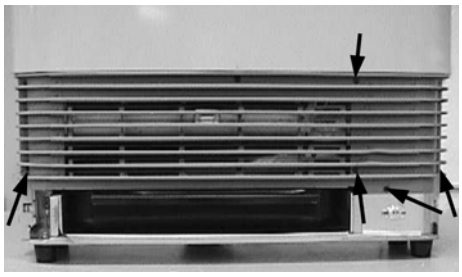
a. Grip sides of skirt and pull forward to remove.



b. Remove three (3) screws to release front panel.



c. Remove five (5) screws to release louvre.

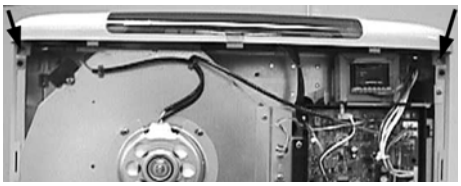


d. Grip bottom left and right hand corners of front panel, pull forward to release.

2) Removal of Top Panel, Control Panel, and Control Panel PCB.

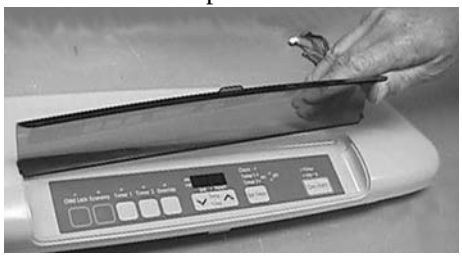
CAUTION
240 volt potential inside applaince.
Disconnect electrical supply.

a. Remove front panel assembly, see sec. 1.
b. Remove (2) two screws, one on each side of control panel.



c. Release (3) three multi-pin connectors from main PCB, releasing the control panel PCB harness from wire clip on main PCB casing.
d. Lift both sides of ocntrol panel and pull forward to remove.

e. Grip control panel cover and lift up, applying light strength on one side to disconnect the hinge pin from control assembly.
f. Unscrew seven (7) screws to remove control PCB from control panel.

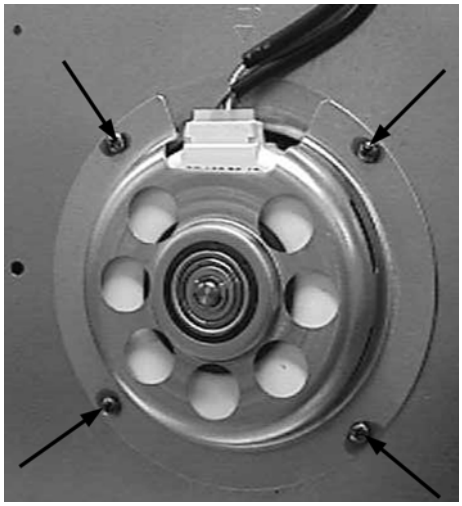


3) Removal of Convection Fan Motor

CAUTION
240 volt potential inside appliance
Disconnect electical supply.

a. Remove front panel assembly, see section1.
b. Remove top panel and control panel assembly, see section 2 b)~d).
c. Loosen allen screw securing the fan blade to the fan motor shaft using a 3 mm allen key (from back of unit).

d. Remove four (4) screws securing the motor to the casing and remove fan motor cover.

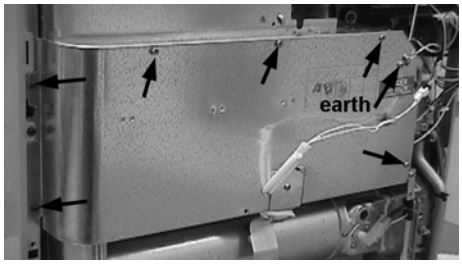


4) Removal of Heat Exchanger

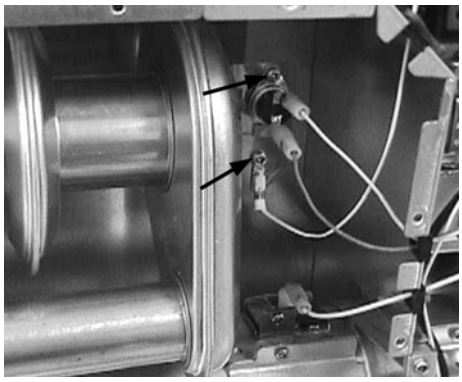
CAUTION
240 volt potential inside appliance
Disconnect electical supply.

Attention: Combustion tube gasket must be replaced (refer to part number 90131731) whenever burner tube cover plate has been removed. Need to clean off old gasket before fitting replacement gasket.

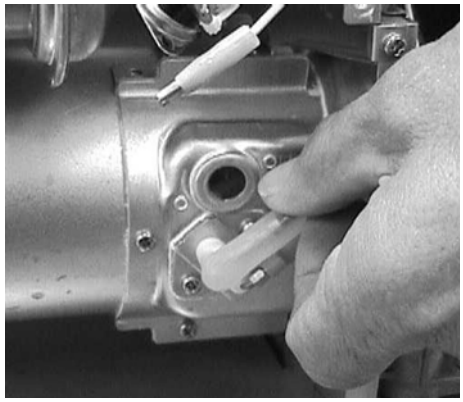
a. Remove front panel assembly, see section 1.
b. Remove one (1) earth connection on front heat shield.
c. Release fusible link (pull down) on front of heat shield.
d. Release six (6) screws securing heat shield.



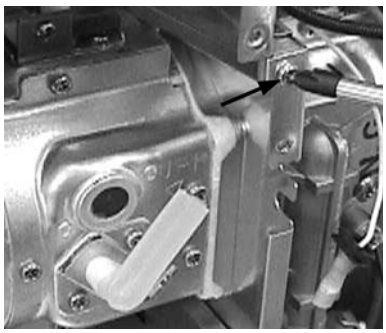
e. Disconnect overheat switch and thermistor, two (2) screws.



f. Disconnect flame sensing lead (pull hard).
g. Remove spark sensing lead, and high tension lead (pull off gently).

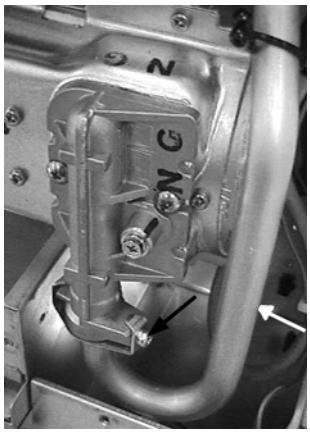


h. Remove blanking panel, one (1) screw.

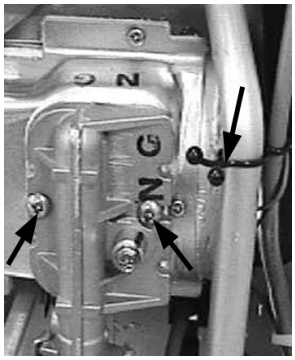


i. Remove side panel, one (1) screw.

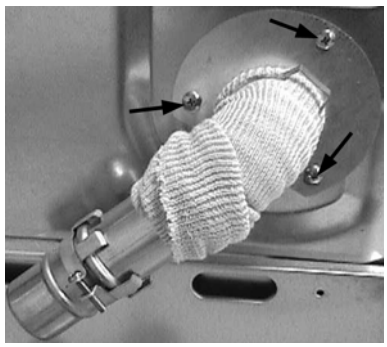
j. Remove one (1) gas supply tube securing screw and one (1) air intake tube securing tube.



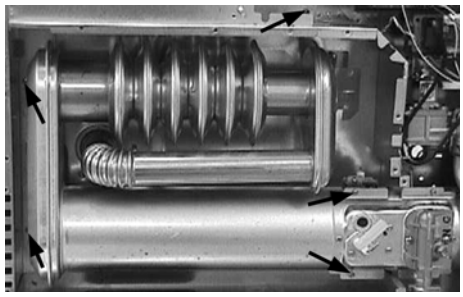
k. Rotate clip at end of gas supply tube and push down on tube to release from manifold.
l. Disengage gas supply tube.
m. Remove two (2) burner securing screws and cable tie, to remove gas supply tube.



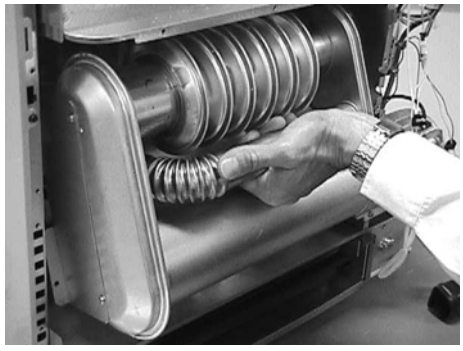
n. Remove flue spigot, three (3) screws.



o. Remove five (5) heat exchanger securing screws.



p. Grip heat exchanger and pull forward to remove.



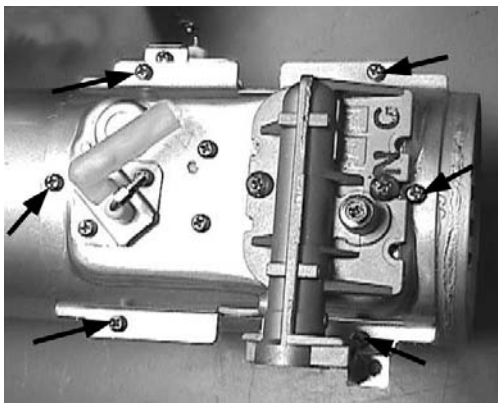
Note: Refer section 5 f)~g) to disconnect burner from heat exchanger complete assembly.

5) Removal of Burner

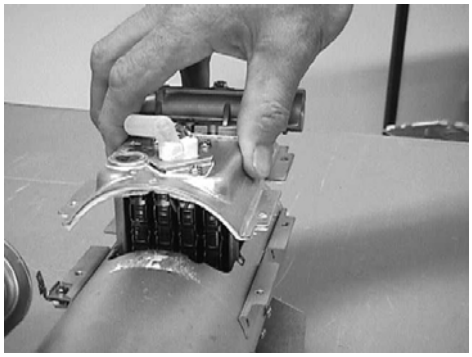
CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

a. Remove front panel assembly, see section 1.
b. Remove front heat shield, see section 4 b) ~ d).
c. Remove blanking panel, one (1) screw.
d. Remove spark sensing lead, and high tension lead (pull off gently).
e. Remove one (1) gas supply tube securing screw.

f. Remove six (6) burner cover screws.



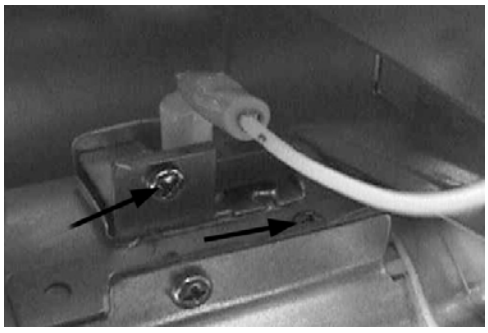
g. Gently manoeuvre burner and cover forward and out of burner chamber by pulling on manifold. Take care not to damage gasket.



6) Removal of Flame Rod

CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

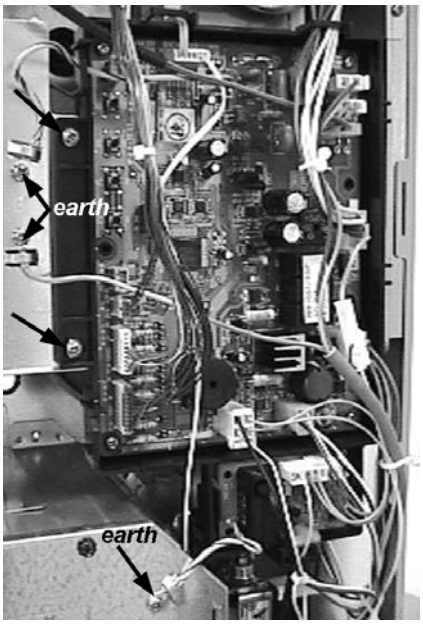
a. Remove front panel assembly, see section 1.
b. Remove front heat shield, see section 4 b)~d).
c. Remove two (2) screws (using a stubby phillips screwdriver).



7) Removal of Main PCB

CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

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

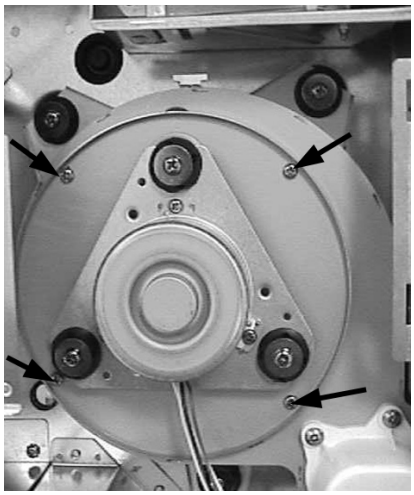


c. Lift PCB on right hand side and gently manoeuvre it out.
d. Disconnect all multi-pin connectors, and wire harness from clips of PCB casing.
e. Remove one (1) earth connection on front heat shield and one (1) earth connection on convection fan housing.

8) Removal of Combustion Fan

CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

a. Remove front panel assembly, see section 1.
b. Remove main PCB, see section 7 b)~e).
c. Remove four (4) combustion fan securing screws.



d. Grip fan motor plate and pull forward to remove fan from casing.
e. Remove connector from fan motor.

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

9) Removal of Sparker PCB

CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

a. Remove front panel assembly, see section 1.
b. Remove one (1) earth lead from heat shield.
c. Disconnect 5-pin power supply connector.
d. Unclip sparker PCB from main PCB housing from securing lugs on side.

10) Removal of Main Transformer

CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

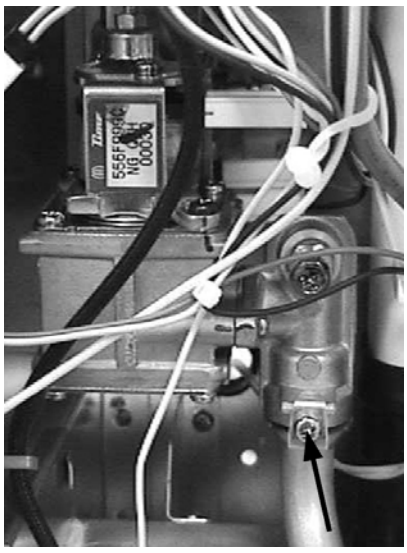
a. Remove front panel assy, see section 1.
b. Remove three (3) securing screws from transformer mounting bracket.

c. Pull forward and disconnect PCB leads to remove.

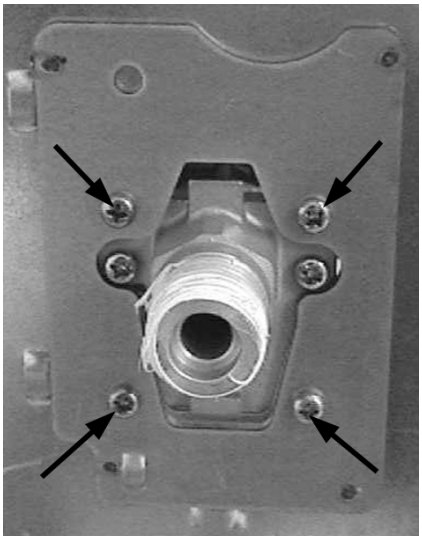
11) Removal of Gas Control

CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

a. Turn off gas supply at the meter and disconnect appliance from installation.
b. Remove front panel assy, see section 1.
c. Release solenoid connectors and gas supply tube securing screw (1), release gas supply tube. Take care with O-ring.



d. Remove four (4) screws surrounding the gas inlet flange at back of heater.



e. Pull gas control assembly forward to remove from appliance.

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

12) Removal of Room Thermistor

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

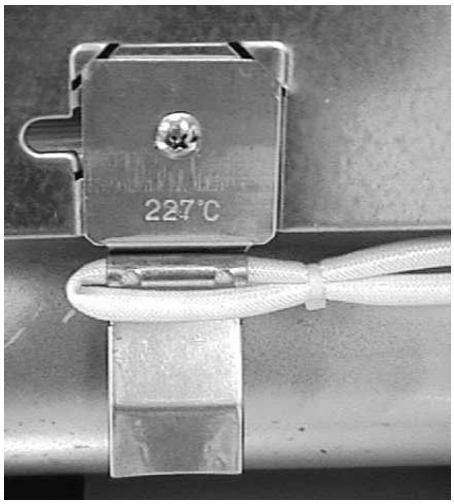
CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

a. Remove front panel assembly; see section 1.
b. Remove top and right hand side rear spacer panels.
c. Reach in behind appliance and unclip thermistor from purse locks.
d. Remove six (6) screws securing heat shield and lift heat shield off; see section 4-c)~d).
e. Remove overheat thermistor; see section 4-e).

13) Removal of Thermal Fuse

CAUTION
240 volt potential exposure. Isolate the applaince and reconfirm with a neon screwdriver or multimeter.

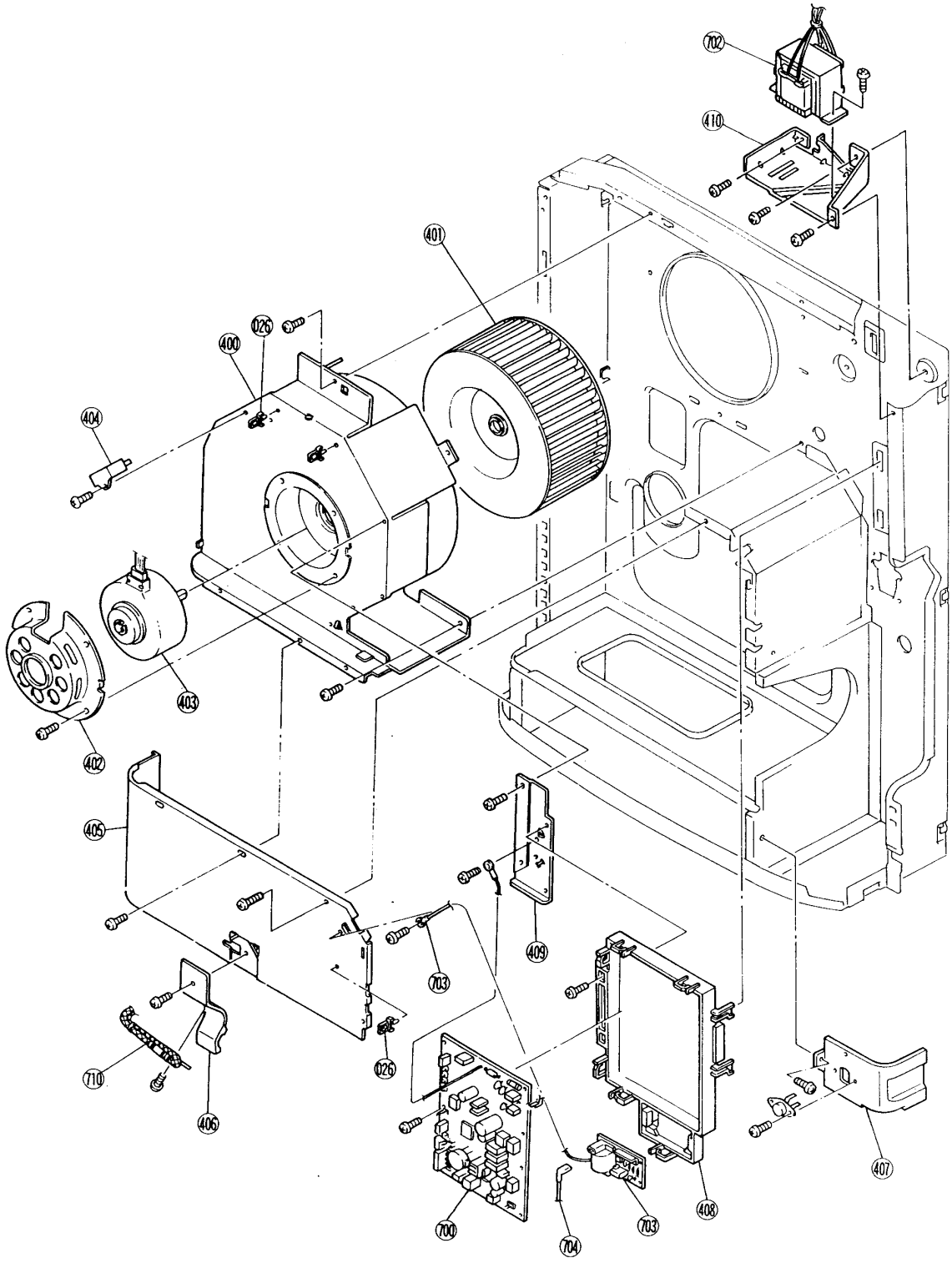
a. Turn off gas at meter and disconnect appliance from installation.
b. Remove front panel assembly; see section 1.
c. Unclip thermal fuse from support bracket (pull down).



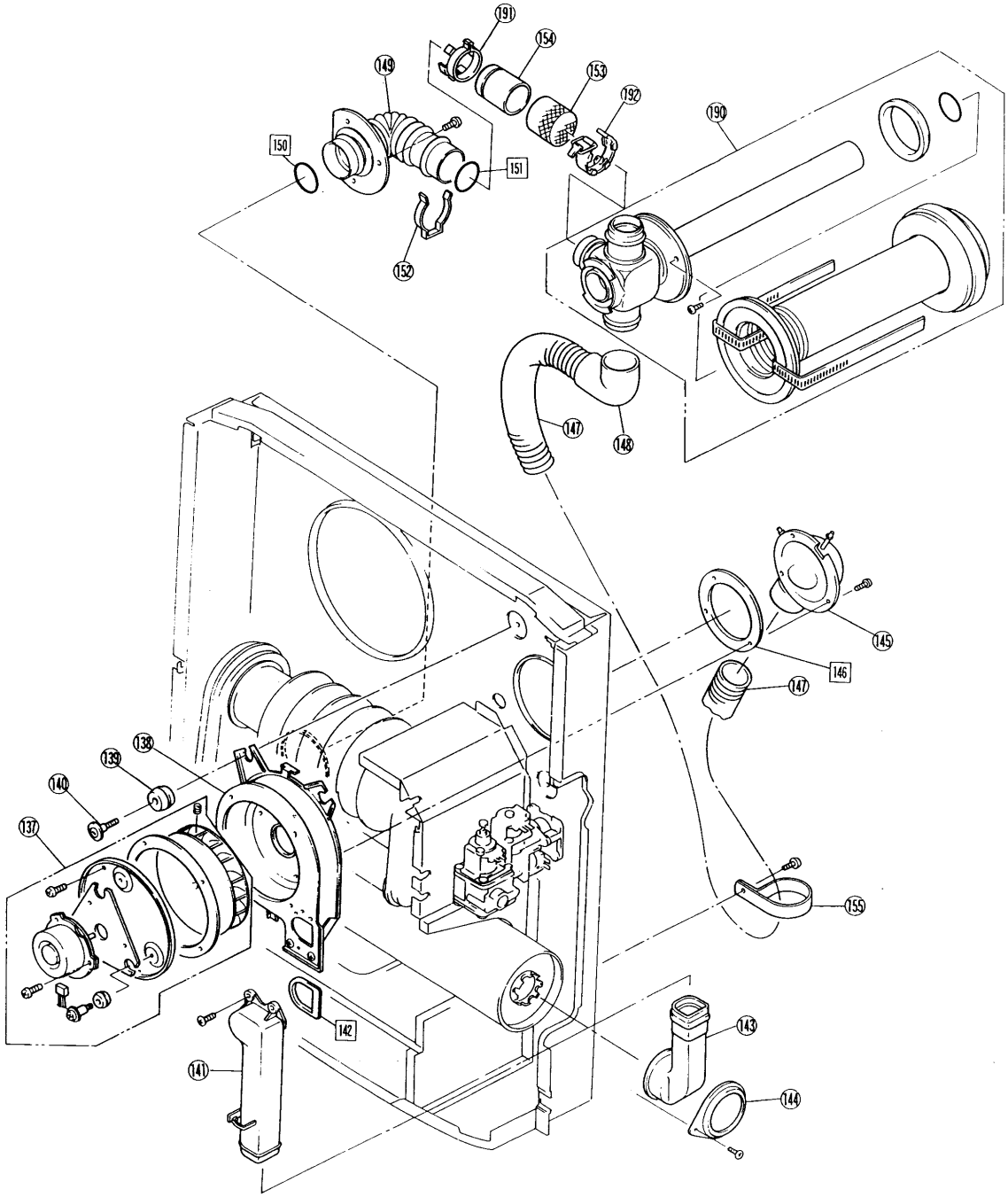
d. Disconnect wire connector along harness to release completely from appliance.

27. Exploded Diagram

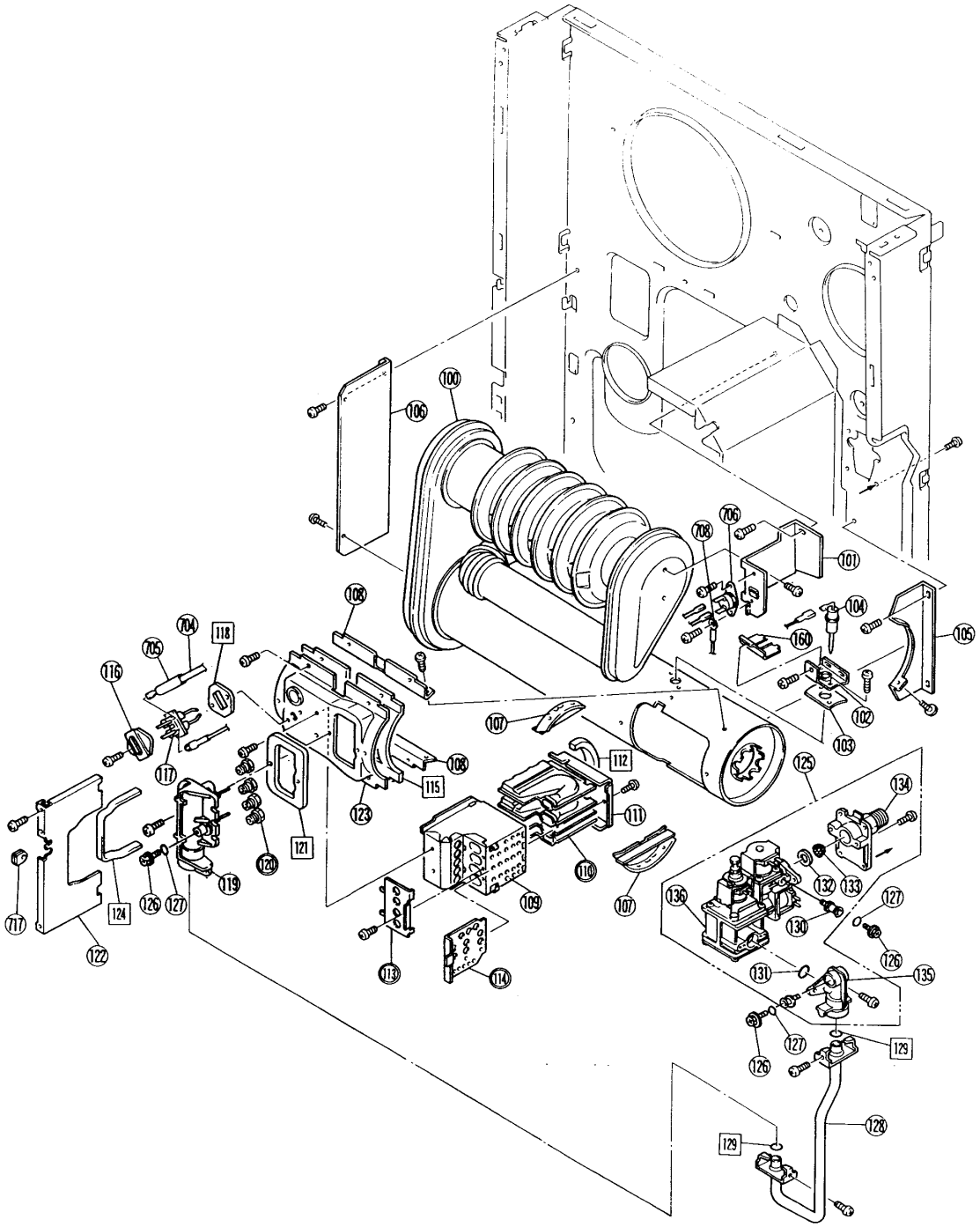
〈RHFE-557FTR〉



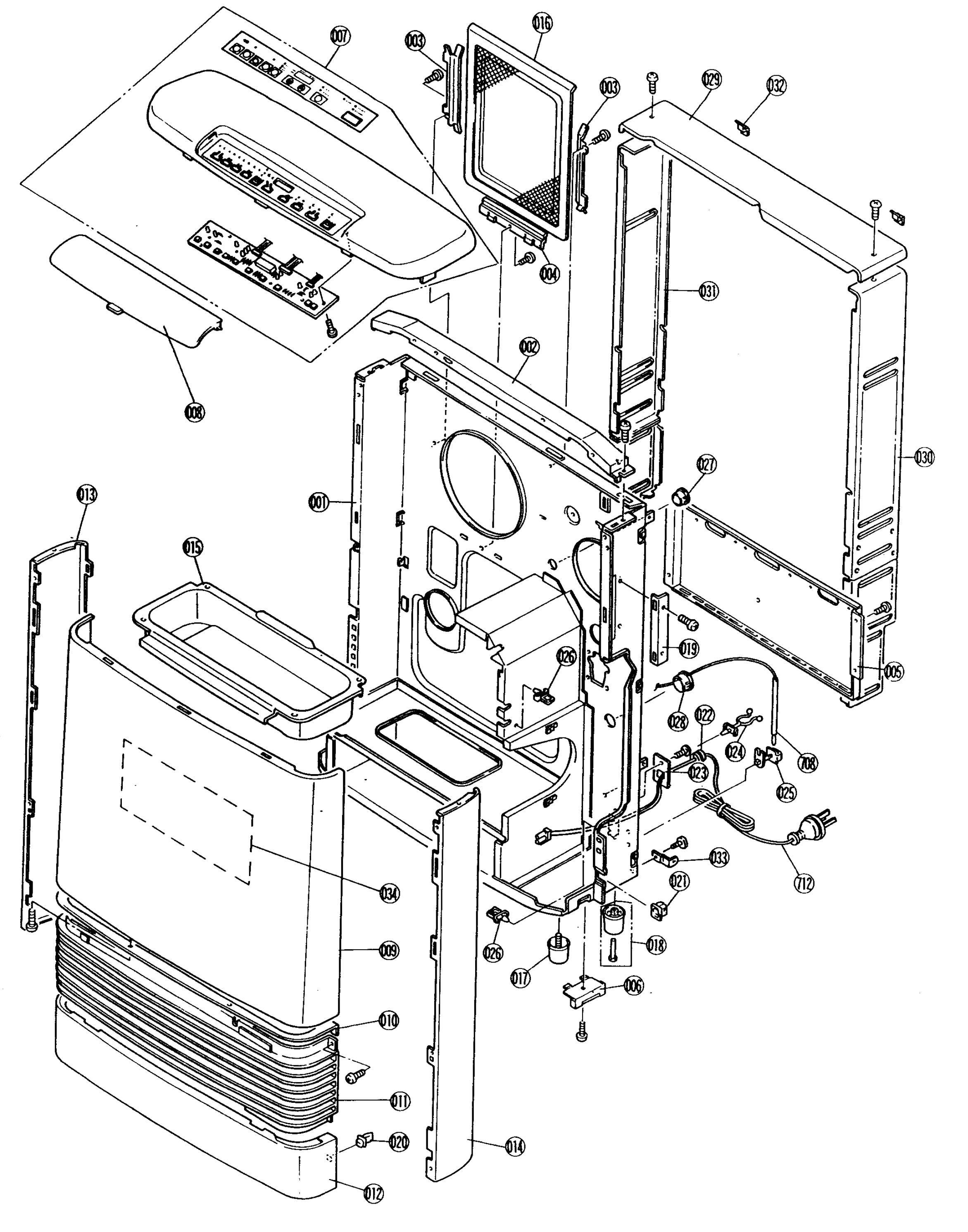
〈RHFE-557FTR〉


191
154
153
192
149
150
151
152
190
147
148
145
146
147
138
139
140
137
155
142
143
141
144

〈RHFE-557FTR〉

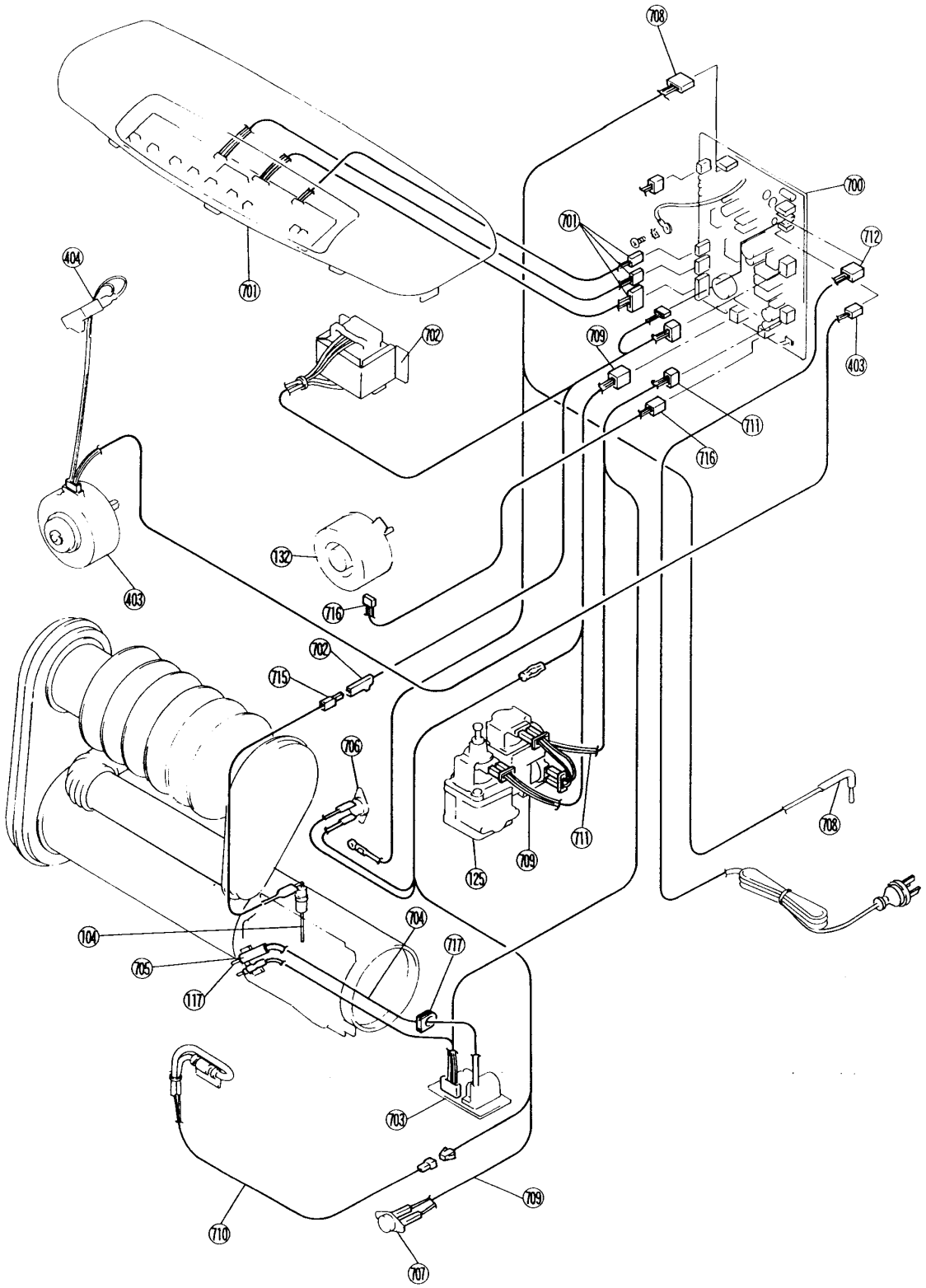

100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
160
704
705
706
708
717

〈RHFE-557FTR〉



007
003
016
003
029
032
004
031
002
008
030
027
001
013
015
019
005
026
028
022
024
708
023
025
712
033
034
021
018
026
017
009
006
010
011
014
020
012

〈RHFE-557FTR〉


708
700
701
712
404
701
702
709
403
711
716
132
403
716
702
715
706
711
708
709
125
704
104
717
705
117
703
709
710
707

28. Parts List

Effective: 28/02/2013
Supercedes: 2011
V4

RHFE-557FTR

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

No.	Part Name	RA Part No.	11 Digit Code	QTY
1	REAR PANEL A ASSEMBLY	90101825	004-595-000	1
2	TOP PLATE REINFORCE		044-028-000	1
3	FILTER SUPPORT SIDE	90102161	538-059-000	2
4	FILTER BKT BOTTOM 308/557	90102179	538-064-000	1
5	REAR PANEL INSULATION		030-022000	1
6	FLOOR FIXING BRACKET		537-677-000	2
7	CONTROL PANEL ASSY 0C	90139148	001-603-000	1
7	PANEL TOP & PCB SV 557	90199150	001-0461000	1
8	LID CONTROL SV 557	90191917	035-1525000	1
8	CONTROL LID	90185422	035-0031000	1
9	PANEL FRONT 0 557FTR	90101544	019-853-000	1
9	PANEL FRONT SV 557	90194290	019-3757000	1
10	LOUVRE D		046-195-000	1
11	LOUVRE BOTTOM 0 557	90101874	095-140-000	1
11	LOUVRE BOTTOM SV 557	90190177	095-239-000	1
12	PANEL KICK 0C 557	90102047	098-469-000	1
12	PANEL KICK SV 557	90194272	098-216600	1
13	PANEL SIDE L0C 557	90101569	003-256-000	1
13	PANEL SIDE LH SV 557	90196775	003-925-L00	1
14	PANEL SIDE RH SV 557	90191620	003-925-R00	1
14	PANEL SIDE R0C 557	90101619	003-257-000	1
15	HUMIDIFIER TRAY	90112830	078-018-000	1
16	AIR FILTER ASSY 0C 557	90102054	017-289-000	1
17	FOOT FRONT 557 556 553	90165663	015-140-000	2
18	FOOT REAR 557 556 553	90165655	015-141-000	2
20	PANEL KICK LATCH 556 557	90175589	502-242-000	1
21	LATCH	90194218	512-419-000	1
22	CORD BUSH 151 212 417 506	90177106	194-098-000	1
23	POWER CORD FIXING BRKT	90177114	538-180-000	1
24	CABLE CLIP (0248)		504-024-000	1
25	THERMISTOR HOLDER ALL	90165267	537-179-000	1
25	THERMISTOR HOLDER USE	90167263	537-179-000	1
26	WIRE SADDLE 417 506 516	90176728	514-020-000	4
27	BUSH		194-112-000	1
28	BUSH		194-119-000	1
29	SPACER TOP 0C 557FTR	90101981	034-607-000	1

RHFE-557FTR

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

No.	Part Name	RA Part No.	11 Digit Code	QTY
29	SPACER TOP SV 557	90191282	034-0042000	1
30	SPACER SIDE RH SV 557	90191285	034-004-300	1
30	SPACER SIDE R0C 557FTR	90101990	034-608-000	1
30	SPACER SIDE RH SV 557	90191285	034-0043000	1
31	SPACER SIDE LH SV 557	90191287	034-0044000	1
31	SPACER SIDE L0C 557FTR	90101999	034-609-000	1
31	SPACER SIDE LH SV 557	90191287	034-0044000	1
32	CLIP WALL SPACER	90147471	504-018-000	2
33	BACK COVER FIXING PLATE		537-678-000	2
34	UTYL-RUBBER VIBRATION ABS		540-084-000	1
100	HEAT EXCHANGE ASSY RHF557	90131731	108-168-000	1
101	OHS FIXING PLATE		537-422-000	1
102	FLAME ROD BRACKET		537-849-000	1
103	FLAME ROD GASKET B		580-458-000	1
104	FLAME ROD RHF557 556 1001	90142803	230-017-000	1
105	CHAMBER BRACKET		537-673-000	1
106	HEAT EXCHANGER BRACKET		537-735-000	1
107	SEAL PLATE ASSEMBLY		526-113-000	1
108	FRANGE		190-149-000	1
109	BURNER BOX		527-217-000	1
110	BURNER ASSY NG/LPG	90170630	157-063-LPG	1
111	BURNER SUPPORT REAR ASSEM		538-276-000	1
112	BURNER BOX GASKET RHF556	90175662	580-641-000	1
115	FIXING BRKT GASK	90175670	580-334-000	1
116	ELECTRODE RETAINER		506-145-000	1
117	ELECTRODE RHF556 557	90175696	202-132-000	1
118	ELECTRODE GASKET RHF553	90173105	580-176-000	1
119	INJ MANIFOLD 431 556	90178542	101-355-000	1
121	MANIFOLD GASKET B		580-392-000	1
122	WARM AIR SEAL PLATE		526-149-000	1
123	BURNER BOX FIXING PLATE		537-674-000	1
124	HEAT EX GASKET RHF556	90175563	580-640-000	1
125	GAS CONTROL NG/LPG	90175704	114-409-000	1
126	PRESSURE POINT SCREW	90195157	501-275-005	3
127	O-RING (S-4)	90195165	520-300-010	3
128	CONNECTING TUBE ASSEMBLY		102-936-000	1

RHFE-557FTR

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

No.	Part Name	RA Part No.	11 Digit Code	QTY
129	INLET TUBE O RING	90165523	520-024-010	2
130	PRESSURE POINT		135-014-000	1
131	O RING (S14) 506 516 318	90176611	520-325-000	1
132	GASKET 417	90176637	510-519-000	1
134	GAS INLET FLANGE 553 556	90165515	106-301-000	1
135	MOD VALVE MANIFOLD	90165549	106-504-000	1
136	MAGNET VALVE ASSEMBLY	90183682	114-358-000	1
137	COMBUSTION FAN ASSY	90142670	040-229-000	1
138	COMBUSTION FAN CASING ASS		019-0806000	1
139	CUSHION RUBBER RCE 560PTR	90183195	540-051-000	6
140	S SCREW (MOTOR)		501-303-000	6
141	COMB CHAMBER CONN TUBE	90131764	322-147-000	1
142	CONNECTING TUBE GASKET		580-457-000	1
143	COMB CHAMBER CONN ELBOW	90133968	322-148-000	1
144	CONNECTING TUBE RETAINER		538-062-000	1
145	HOUSING RHF556 557 553	90123043	094-010-000	1
146	INLET SEAL HOUSING RHF557	90123050	510-506-000	1
147	INLET HOSE RHF556 557 551	90122961	513-126-000	1
148	RUBBER INLET ELBOW RHF557	90122953	191-051-000	1
149	FLUE EXHAUST ELBOW ASSY	90122950	191-206-000	1
150	O RING 35.5MM FLUE ELBOW	90122946	520-160-000	1
151	O RING 34MM FLUE EXTENS	90122920	520-142-005	1
152	INSULATION CLIP RHF557	90165374	552-075-000	1
153	FLUE OUT COVER RHF556	90165382	034-457-000	1
154	FLUE EXH SLIDE TUBE	90122958	554-162-000	1
155	HOSE CLIP RHF556	90170341	538-065-000	2
160	FLAME ROD BRACKET		538-277-000	1
160	LONG WALL TOP (B FIUE)		055-626-000	1
160	STANDARD WALL TOP		055-553-000	1
191	FLUE LOCK STOPPER	90165366	512-326-000	1
192	SNAP STOPPER	90165358	512-327-000	1
400	CONVECTION FAN CASING ASS		019-0900000	1
401	CONVECTION FAN BLADE	90185968	040-185-000	1
402	MOTOR BRACKET A		537-850-000	1
403	CONVECTION FAN RHF557	90143116	222-343-000	1
405	INSULATING PLATE ASSEMBLY		030-843-000	1

RHFE-557FTR

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

No.	Part Name	RA Part No.	11 Digit Code	QTY
406	TF FIXING PLATE		537-851-000	1
407	OVERHEAT SWITCH NO.2 FIXI		537-853-000	1
409	UNIT BRACKET A		538-278-000	1
410	TRANSFORMER FIXING PLATE		537-852-000	1
700	PCB MAIN 557	90125337	200-717-000	1
702	TRANSFORMER MAIN RHF557	90138546	224-265-000	1
703	SPARKER UNIT RHF556 557	90175829	262-028-000	1
704	HIGH TENTION CORD		203-219-000	1
705	ELECTRODE SLEEVE		513-109-000	1
706	OHS 90C RHF431 556 557	90178575	234-506-000	1
707	OHS 130C RHF431 556	90178567	234-505-000	1
708	O/HEAT THERMISTOR 308FTR	90177502	233-119-000	1
709	MAIN HARNESS ASSEMBLY		290-077-000	1
710	TF HARNESS		290-871-000	1
711	SV HARNESS		290-075-000	1
712	POWER CORD ASSEMBLY	90185786	206-177-000	1
715	FLAME ROD LEAD B		209-340-000	1
716	MOTOR HARNESS A		290-069-000	1
717	CORD GASKET B		580-149-000	1
804	WARNING LABEL ELECTRIC	90176017	602-236-000	1
806	WARNING LABEL	90173121	602-707-000	1
807	SAVE-ENERGY LABEL		602-717-000	1
808	WATER LEVEL LABEL B		602-654-000	1
810	PACKING ASSY FOR OUTDOOR		510-0003000	1
811	REMOTE CONTROL UNIT	90175555	123-065-000	1

Contact Points

Rinnai

Rinnai Australia Pty. Ltd. ABN 74 005 138 769

Head Office

10-11 Walker Street,
Braeside, Victoria 3195
P.O. Box 460
Tel: (03) 9271 6625
Fax: (03) 9271 6622

Internet: www.rinnai.com.au
E-mail: enquiry@rinnai.com.au

National Help Line
Tel: 1300 555 545* Fax: 1300 555 655*

Cost of a local call Higher from mobile or public phones.

Rinnai has a Service and Spare Parts network with personnel who are fully trained and equipped to give the best service on your Rinnai appliance. If your appliance requires service, please call our National Help Line. Rinnai recommends that this appliance be serviced every 2 years.

RHF557-1152(00)