Rinnai

SERVICE MANUAL

RCE-406/506/516TRH

FAN CONVECTOR

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.*
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

June 2000 - 1st edition

WARNING

Failure to comply with these instructions may result in serious personal injury or damage to the appliance.

ALL WIRING INSIDE THIS APPLIANCE MAY BE AT 240 VOLTS POTENTIAL

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

DO NOT TEST FOR GAS ESCAPES WITH AN OPEN FLAME

This manual has been compiled by 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.

SM406/506/516TRH
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

Development Background

The Rinnai Fan Convector heaters RCE-406/506/516TR have been designed to provide comfortable and efficient heating.

As a guide, the 406TRH heats an area of up to 7 sq. (70m^2) or volume of 168m^3.

As a guide, the 506TRH heats an area of up to 7.5sq. (80m^2) or volume of 200m^3.

As a guide, the 516TRH heats an area of up to 8.5 sq. (90m^2) or volume of 225m^3.

The RCE-506/516TRH is an upgrade of the RCE-506/516H

Features

- Provides combustion control in 7 stages, in addition the fan speed (rpm) is also controlled in 7 stages.
- The appliance is controlled by finger touch control switches. When the appliance is operated a short “beep” indicates that the unit is working.
- 7 segement LED display showing room and selected temperatures. Room temperature is indicated on the LED when the Av@ and Aw@ buttons are pressed; selected temperature is indicated on the LED during operation.
- Air Filter indicator illuminates when the air filter needs cleaning.
- LED display shows error codes. A history of error code information is stored to assist with servcing the unit.
- Economy mode for more efficient operation.
- Function Lock to ensure safety for children and protection of settings.
- Dual Timers

2. Specification

Model			RCE-406TRH	RCE-506TR/H	RCE-516TR/H
Type of appliance			Portable Fan Convector		
Dimensions (mm)	Height:		445		
	Width:		570		
	Depth:		185 (220)		
Weight (Kg)			With hose 11.4		
Connections	Electrical		AC 240V 50 Hz (NZ: AC 230V)		
	Gas		1.5m Approved gas hose with Bayonet fitting		
Electrical Consumption (Max. / Min.)	(Watts)		38	38	40
			30	30	30
Gas Consumption (MJ/h)	NG	HI	18	21	25
		LO	5.5	5	4.5
	Propane	HI	18	21	23
		LO	4	6	4.5
Gas Output (Max. / Min).	(kW)		4.5 /1	5.3 / 1.2	6.2 / 1.1
Burner	Form		Slit type		
	Method		Bunsen type		
Operation Method			Finger touch control switches		
Ignition Method			Continuous spark		
Room temperature control			Low....10°C 16~26°C High...Continuous High		
Gas flow control			High~Low, 7 -stages		
Position of Louvres			Bottom of appliance		
Air Volume (m^3/min)			4.7~3.0 (H~L)	5.0~3.0 (H~L)	5.6~2.8(H~L)
Air filter			# 30		
Fan Control			High ~ Low 7 - stages		
Convection Fan			Line flow type ø 110x L330		
Filter Indicator			Themistor type level 75°C		
Flame Failure			Thermocouple method		
Safety Features					
Overheat Prevention			Thermistor 105°C; Thermal fuse 157°C OFF		
Over-current Protection			3-amp fuse		
Power Failure			Power failure circuit		
Fan Delay			CPU timer method (82~255 secs)		
Tip Over			Tilt switch (Built into PCB)		
Flashback			Bi-metal switch 80°C±5°C(OFF) 65°C±5°C		
Noise Level (dB(A))	High		40	40	42
	Low		26	26	26

3. Combustion Specification

Basic Combustion Specification

Rinnai model reference		RCE-406TRH		RCE-506TRH		RCE-516TRH	
Gas Type		NG	Prop/LPG	NG	Prop/LPG	NG	Prop/LPG
Gas consumption (MJ/h)	HI	18	18	21	21	25	23
	LO	5.5	6.0	5.5	6.0	6.0	6.0
Main injector size		2.10	1.50	2.10	1.50	2.25	1.50
Thermocouple spacer			Cx2		Cx2		Cx2
Restrictor		19	22	19	22	22	22
Regulator pressure (kPa)	HI	0.67	0.99	0.90	1.37	0.94	1.63
	LO	0.07	0.13	0.07	0.13	0.06	0.13
Burner marking		4C	4N	4C	4N	4C	4N
Combustion method		Bunsen Combustion					
Burner type		Stainless steel slit style (see page 15)					
Solenoid valve		Direct single seated valve type (see page 13)					
Modulating solenoid valve		Rinnai electronic control (see page 13)					

Flame port size and number	
Natural gas	0.5 mm x 5 mm (156)
Propane gas	0.7 mm x 5 mm (150)

Noise Level

Operation Noise (dB (A))	
RCE-406TRH RCE-506TRH RCE-516TRH	High: 40 Low: 26 High: 40 Low: 26 High: 42 Low: 26

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

Warm Air Discharge Temperature Distribution - (RCE-406TRH)

Conditions: <High Combustions>

Measured Input: 17.4 MJ/h
Nominal Input: 18 MJ/h

(Unit Δ°C

55	60	60	72	67	59	56	51
58	61	58	72	60	63	57	52
60	58	54	66	56	59	55	55
57	52	49	60	52	55	48	54

(Average 57.8)

(Room temperature 26.0°C)

Conditions: <Low Combustions>

Test gas: Natural
Measured Input: 6 MJ/h
Nominal Input: 6 MJ/h

(Unit Δ°C)

19	25	28	32	30	29	26	23
19	25	28	33	28	30	26	22
19	25	26	32	27	30	25	23
18	23	24	29	26	29	23	22

(Average 25.8)

(Room temperature 25.0°C)

Warm Air Discharge Velocity

<High Operation>

(Unit m/sec)

3.79	3.77	3.46	4.27	4.38	4.04	3.65	3.28
3.33	3.90	4.02	4.30	4.38	4.13	3.90	3.39
4.10	4.50	4.70	4.40	4.49	4.49	4.40	4.16
5.04	4.55	5.13	4.55	4.48	4.85	4.56	4.75

(Average 4.22)

<Low Operation>

(Unit m/sec)

2.49	2.48	2.27	2.82	2.89	2.66	2.40	2.16
2.19	2.57	2.65	2.84	2.89	2.72	2.57	2.23
2.70	2.97	3.10	2.90	2.96	2.96	2.90	2.74
3.33	3.00	3.39	3.00	2.95	3.20	2.97	3.14

(Average 2.69)

Conditions - Convection Fan Rpm. High: 810rpm
Low: 540rpm

Measured with gas OFF

- Average air velocity on High: 4.22m/sec
- Average air velocity on Low: 2.69m/sec
- Area of louvre: 0.0187m^2
- Air flow rate on High: 4.73m^3/min
- Air flow rate on Low: 3.02m^3/min

Warm Air Discharge Temperature Distribution - (RCE-506TRH)

Conditions: <High Combustions>

Measured Input: 20.05 MJ/h
Nominal Input: 21 MJ/h 5,015 kcal/h

(Unit Δ°C

66	64	70	81	79	74	61	63
67	65	65	85	80	79	59	61
69	62	58	84	71	70	55	64
65	55	51	74	66	61	51	62

(Average 66.8)

(Room temperature 26.0°C)

Conditions: <Low Combustions>

Test gas: Natural
Measured Input: 5.1 MJ/h
Nominal Input: 5.5 MJ/h 1310 kcal/h

(Unit Δ°C)

20	24	28	32	28	27	25	24
19	24	26	34	29	28	25	23
19	24	24	35	28	28	24	24
19	23	22	32	27	28	23	24

(Average 25.6)

(Room temperature 26.0°C)

Warm Air Discharge Velocity

<High Operation>

(Unit m/sec)

3.99	3.99	3.64	4.49	4.61	4.25	3.84	3.45
3.51	4.11	4.23	4.53	4.61	4.35	4.10	3.57
4.32	4.74	4.95	4.63	4.73	4.73	4.63	4.38
5.3	4.79	5.4	4.79	4.72	5.1	4.80	5.0

(Average 4.45)

<Low Operation>

(Unit m/sec)

2.17	2.28	2.29	2.63	2.77	2.57	2.28	2.16
2.20	2.56	2.59	2.79	2.87	2.69	2.53	2.36
2.55	2.90	2.90	2.95	2.84	2.98	2.82	2.62
3.04	2.81	3.32	3.07	2.83	3.17	2.86	2.96

(Average 2.7)

Conditions - Convection Fan Rpm. High: 850rpm
Low: 540rpm

Measured with gas OFF

- Average air velocity on High: 4.45m/sec
- Average air velocity on Low: 2.7m/sec
- Area of louvre: 0.0187m^2
- Air flow rate on High: 4.99m^3/min
- Air flow rate on Low: 3.03 m^3/min

Warm Air Discharge Temperature Distribution - (RCE-516TRH)

Conditions: <High Combustions>

Measured Input: 24.3 MJ/h
Nominal Input: 25 MJ/h 5,019

(Unit Δ°C

74	69	75	87	83	77	62	64
77	70	71	92	84	83	60	63
78	65	64	90	75	73	55	67
73	57	55	78	70	61	50	63

(Average 70.8)

(Room temperature 27.0°C)

Conditions: <Low Combustions>

Test gas: Natural
Measured Input: 5.6 MJ/h
Nominal Input: 6 MJ/h

(Unit Δ°C)

24	28	33	38	35	33	30	28
22	28	32	40	35	35	29	26
23	29	29	40	33	33	28	26
22	27	26	35	32	32	26	26

(Average 30.1)

(Room temperature 26.0°C)

Warm Air Discharge Velocity

<High Operation>

(Unit m/sec)

4.60	4.54	4.17	5.1	5.1	4.82	4.33	3.98
3.97	4.68	4.66	5.0	5.2	4.90	4.64	4.31
4.91	5.4	5.7	5.2	5.2	5.3	5.0	5.0
6.0	5.4	5.8	5.5	5.3	5.6	5.3	5.7

(Average 5.0)

<Low Operation>

(Unit m/sec)

2.22	2.26	2.17	2.59	2.67	2.46	2.11	1.96
2.08	2.45	2.37	2.66	2.66	2.45	2.35	2.13
2.41	2.70	2.75	2.79	2.62	2.73	2.58	2.33
2.87	2.58	3.02	2.89	2.60	2.83	2.70	2.67

(Average 2.52)

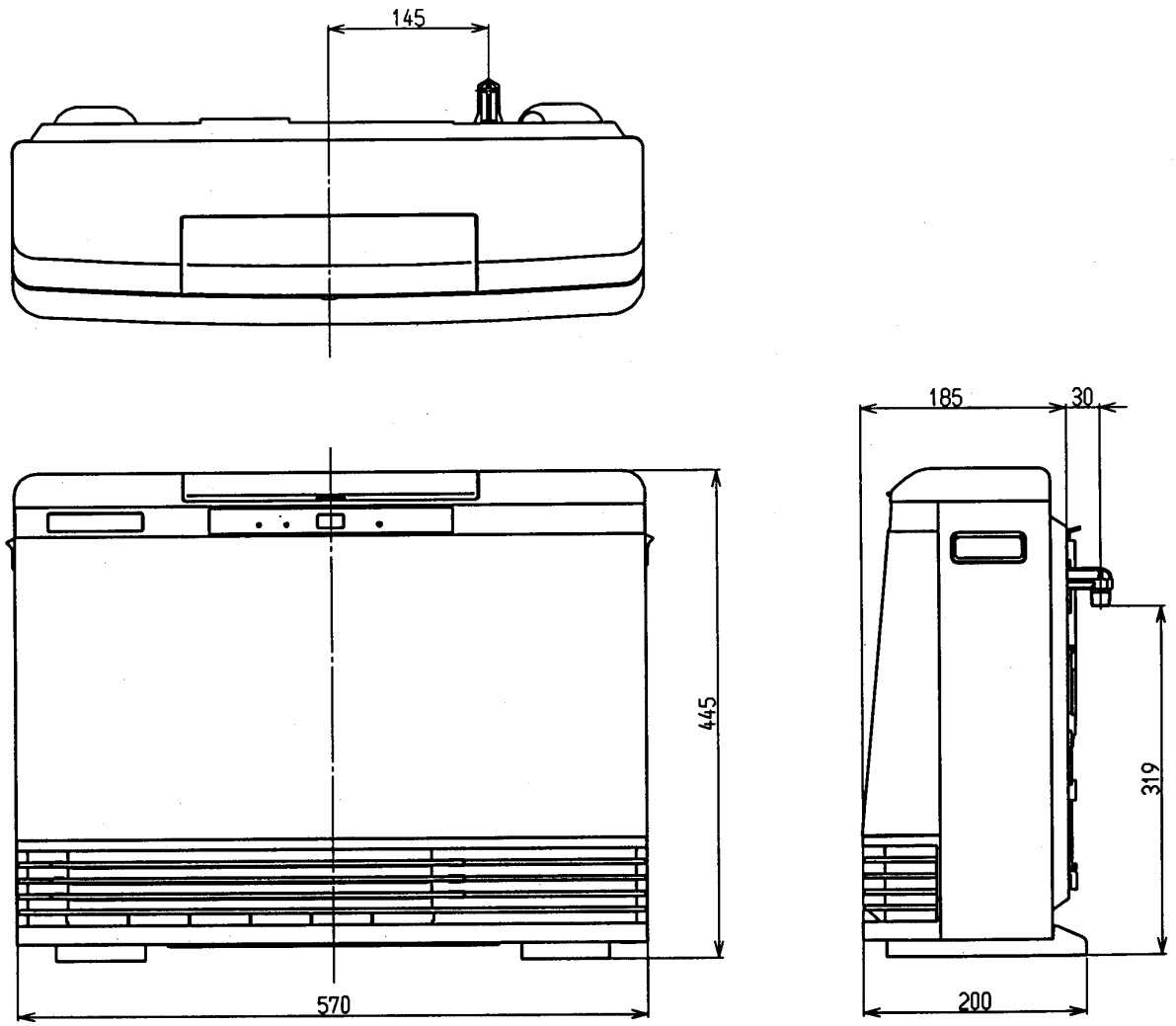
Conditions - Convection Fan Rpm. High: 960rpm
Low: 500rpm

Measured with gas OFF

- Average air velocity on High: 5.0m/sec
- Average air velocity on Low: 2.52m/sec
- Area of louvre: 0.0187m^2
- Air flow rate on High: 5.61m^3/min
- Air flow rate on Low: 2.83m^3/min

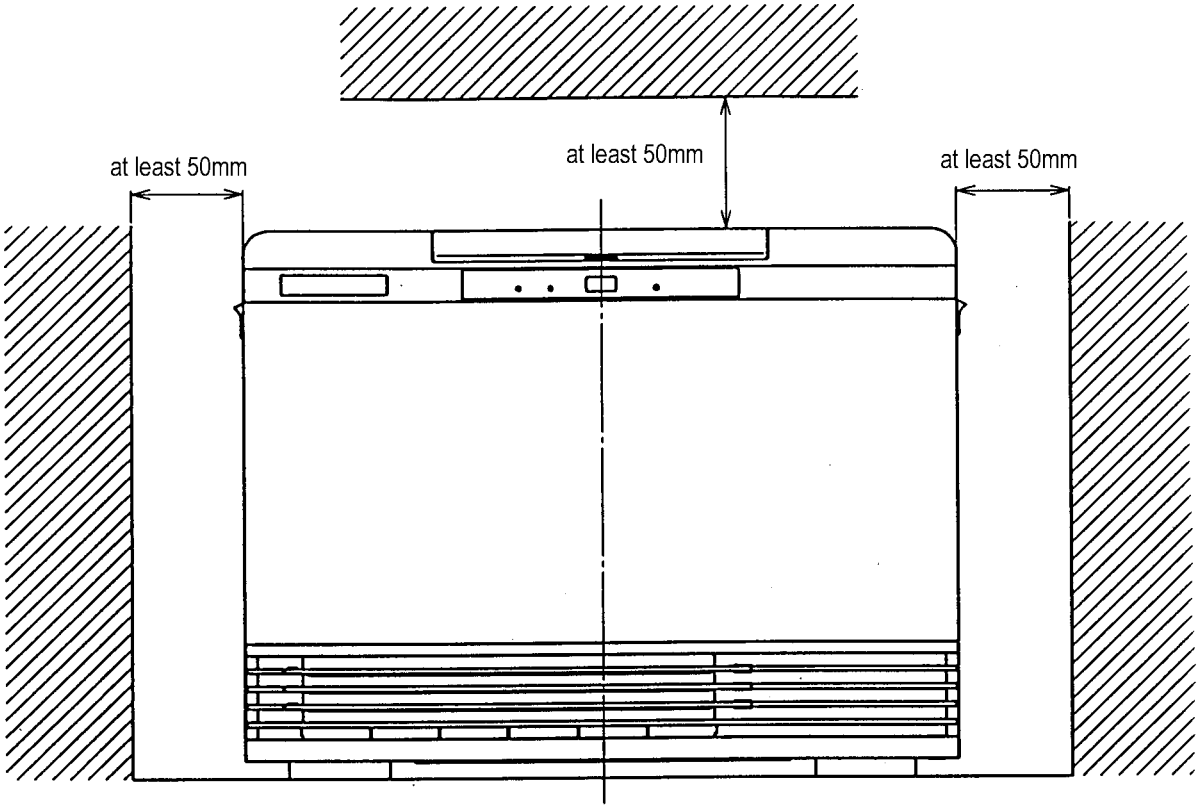
4. Dimensions

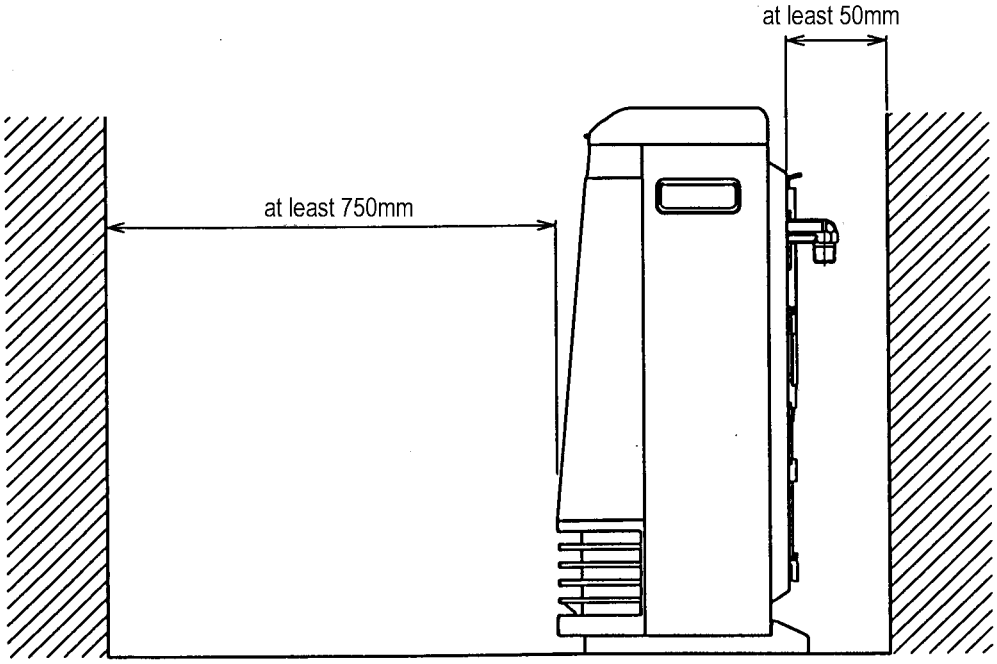
Note: All dimensions are in millimetres



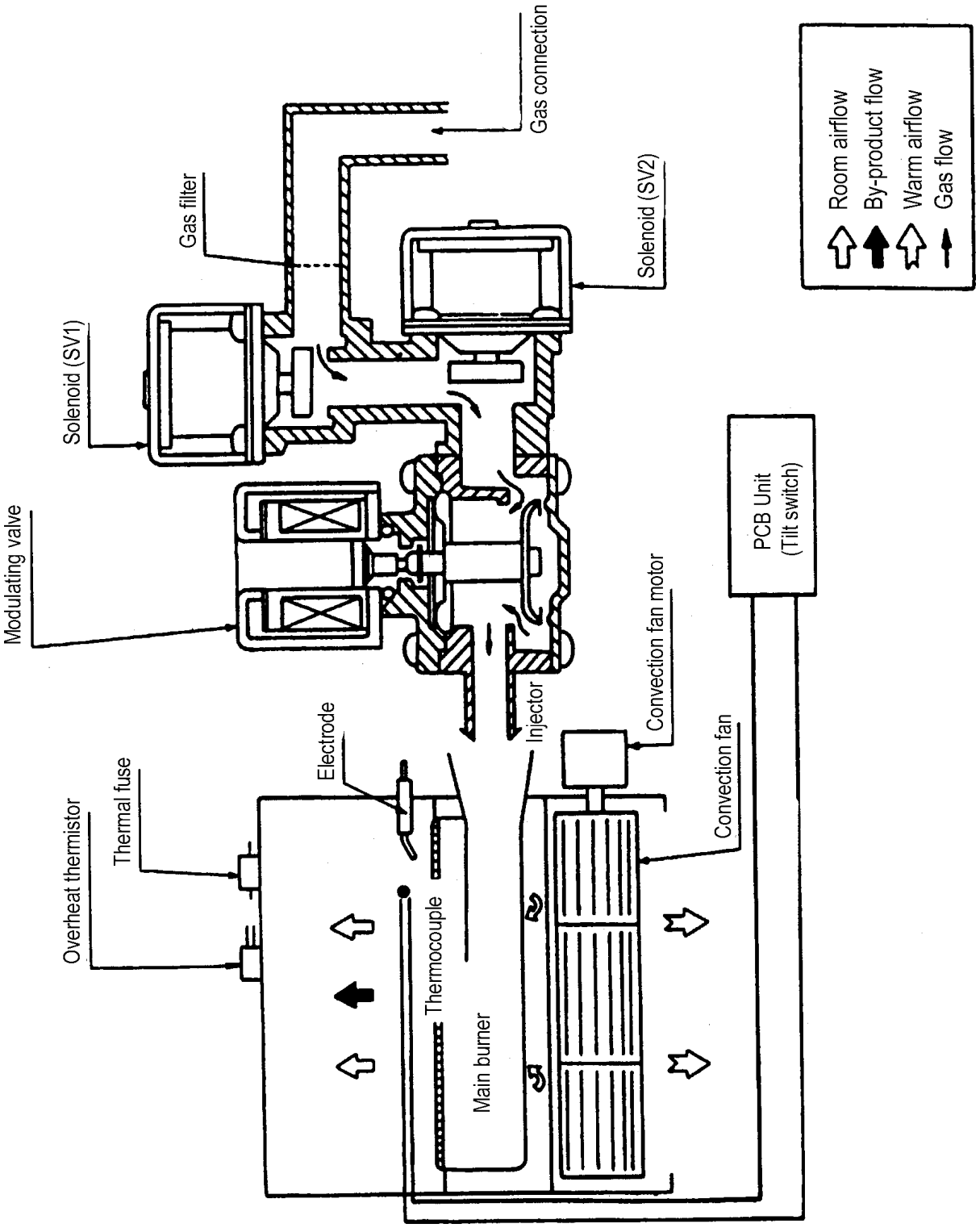
5. Installation

The following clearances are recommended for installation

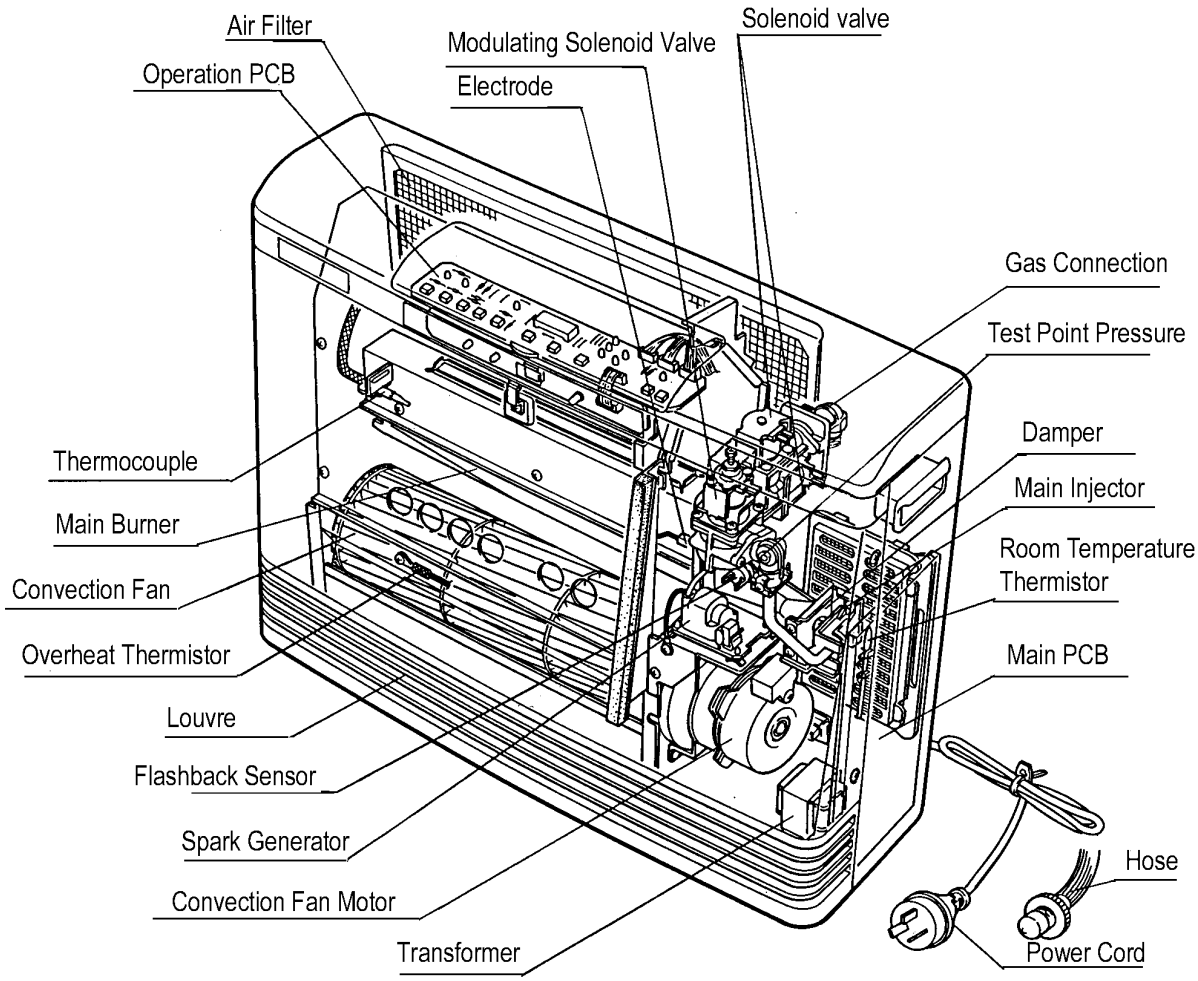




6. Schematic Diagram



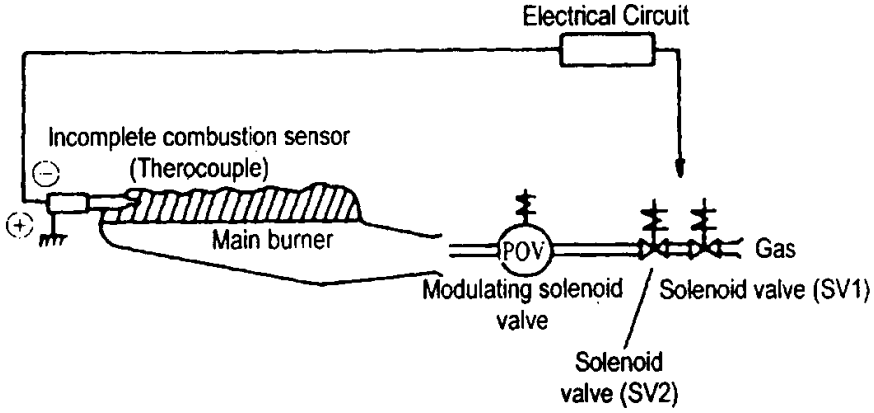
7. Cut-Away Diagram



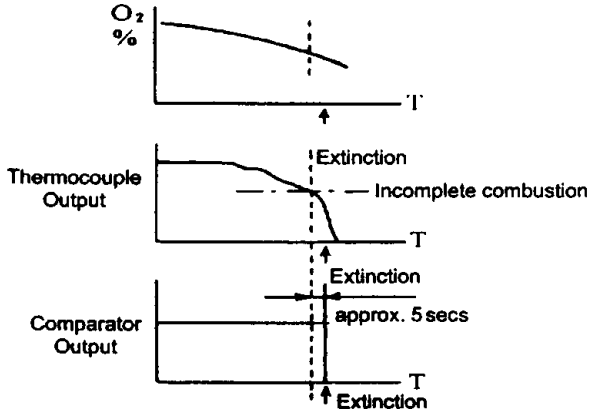
8. Main Componentry

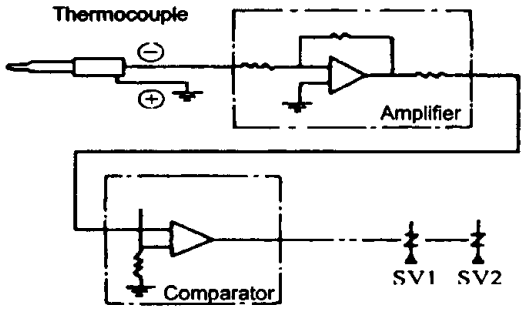
Safety Devices

Incomplete Combustion, ODS and Flame Failure Safety Device



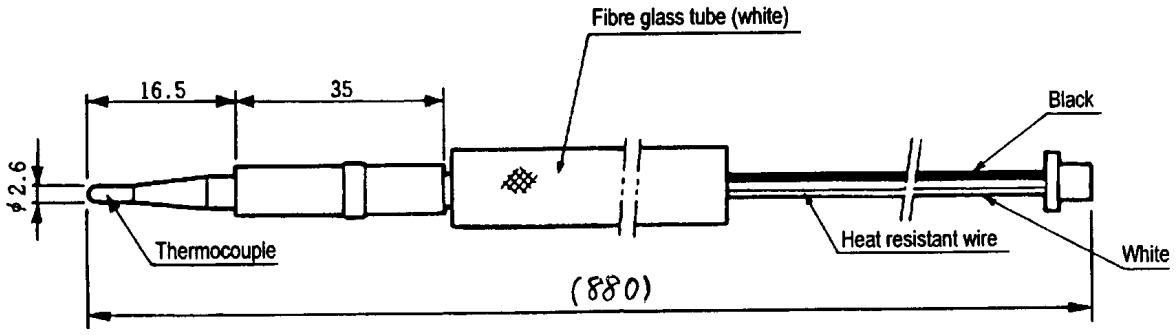
The **Incomplete Combustion Safety Device** is a flame temperature sensing type, using a sensor with a thermocouple. Thermocouples are used widely as burner safety devices. The Incomplete Combustion Safety Device is incorporated in a special burner structure and is connected to an electronic sensor. Combustion and flame failure are monitored by this system.





The amplifier amplifies the thermocouple output (20 ~ 30 m V) and any changes are checked against the comparator. If the output is lower than the standard voltage of the comparator, the PCB closes the gas valve.

Sensor Specification



Ignition Sensing Voltage (mV)	ODS Sensing Voltage (mV)					Normal Output Volt (mV) (Ref) Standard Performance NG		Drop Out Time (sec)
Output at initial check +2		RCE-406		RCE-506/516		Level 3 ~ 7	18 - 35 (High)	Below 60
		NG	LP	NG	LP			
	Level 3 ~ 7	12	18	12	14	Level 1 ~ 2	18 - 35 (Low)	
	Level 1 ~ 2	14	14	14	14			

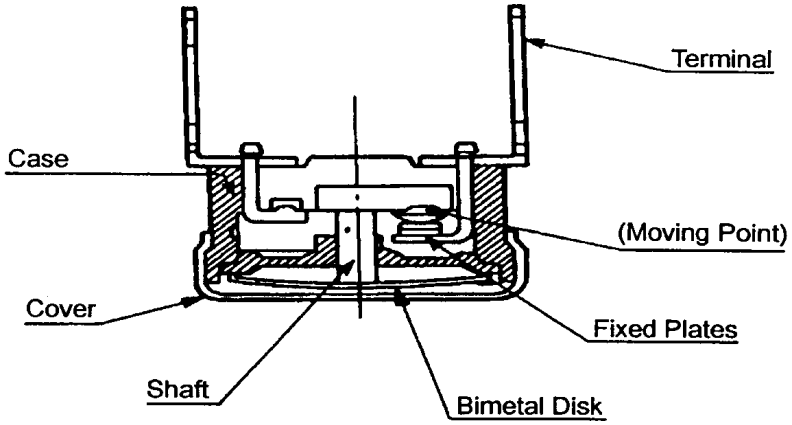
"Drop Out" = Time until the gas is cut off after flame failure.
Sensing voltage varies depending on gas type. (Refer to combustion specifications)

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 "one-shot" fuse; therefore the appliance cannot be restarted until this fuse has been replaced.

OHS Type	Performance	
Thermistor	Cut Off Temp	105◦C
Thermal Fuse	Cut Off Temp	157◦C

Flash Back Safety Device

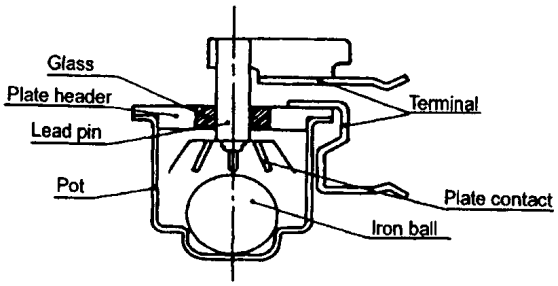


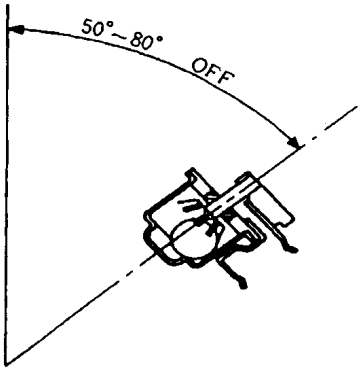
Performance	
Activating Temperature	80±5◦C OFF
Reset Temperature	65±5◦C ON

Tilt Switch Safety Device

Normally, the tilt circuit is open, but closes when the unit is tilted, activating the switch safety circuit on the PCB and shutting the solenoids.

Steel Ball Tilt Switch	Activating Angle	50° ~ 80°

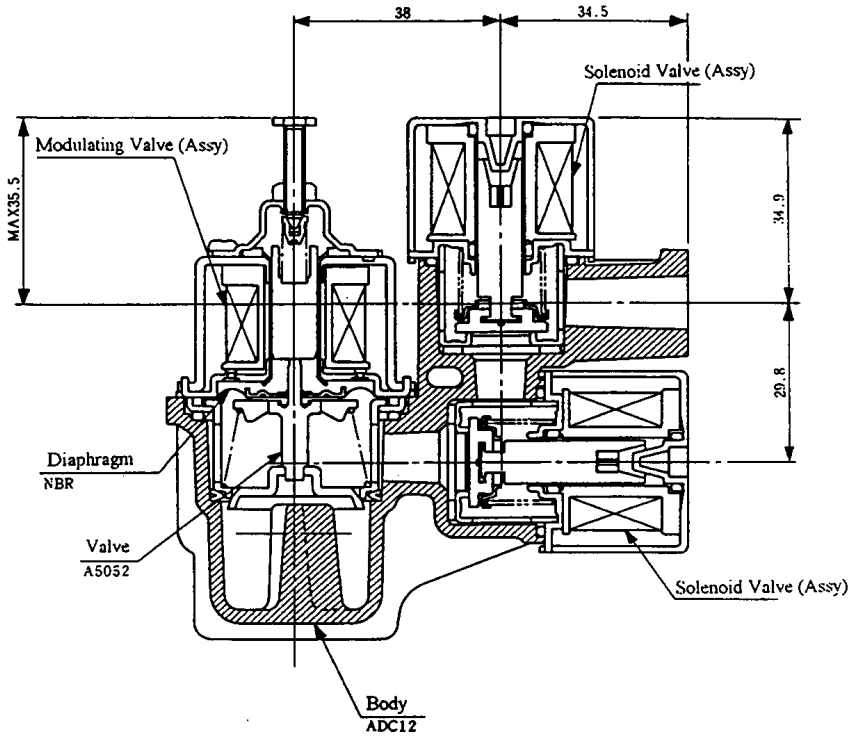




Surge Protection

Glass Fuse	3 Amp

Valves



Modulating Valve

Specification	
Voltage	Below 180 mA
Power Consumption	Below 6W

Solenoid Valve

		Solenoid Valve 1	Solenoid Valve 2
Single Seated Valve	Voltage	DC80 ~100V	DC80 ~ 100V
	Power Consumption	Below 6W	Below 6W

Electrical

Convection Fan

Convection Fan									
Type	**Diameter mm**	**Width mm**	**Air flow Rate m^3/min**				**Fan (rpm)**			
Line Flow Fan	110	330	(Gas Off)				High:±100 Low: ±100			
				406	506	516		406	506	516
			Hi	4.7	5.0	5.6	Hi	810	850	960
			Lo	3.0	3.0	2.8	Lo	540	540	500

Note: Air flow rate is measured using a duct.
Fan speed is measured with gas ON, and appliance completely assembled.

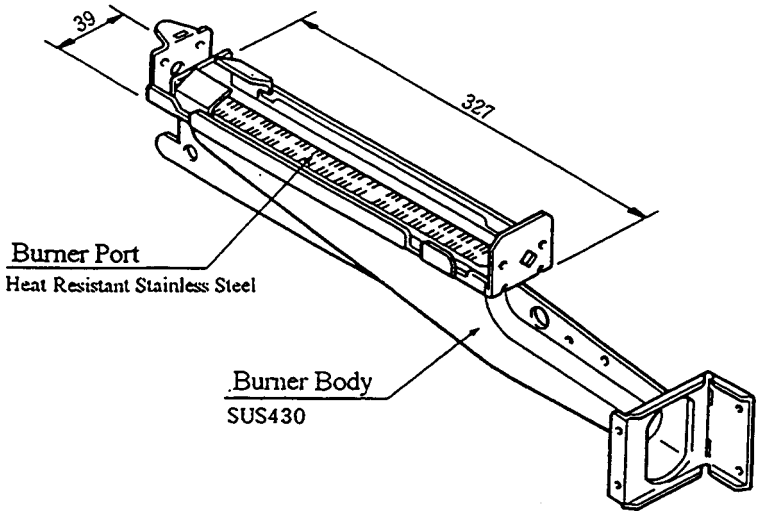
Room Temperature Control Device

	Set Temp Range	Room Temp display range	Differential
Thermistor	16~26° C	1~30° C	Approx. 0.5° C

Combustion

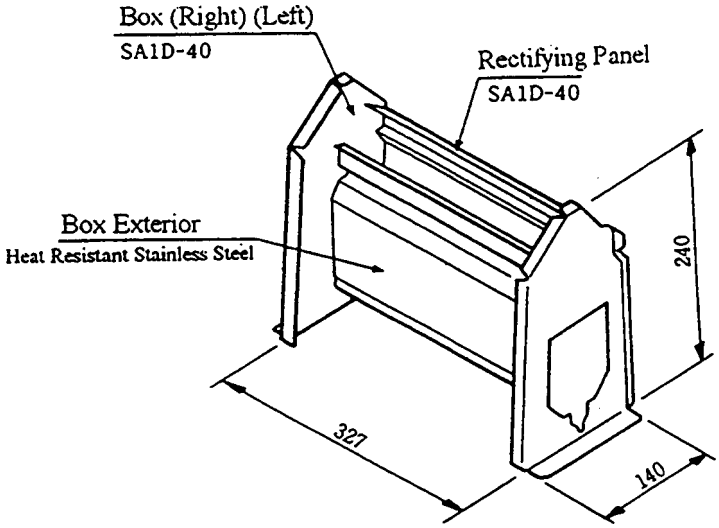
Burner

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



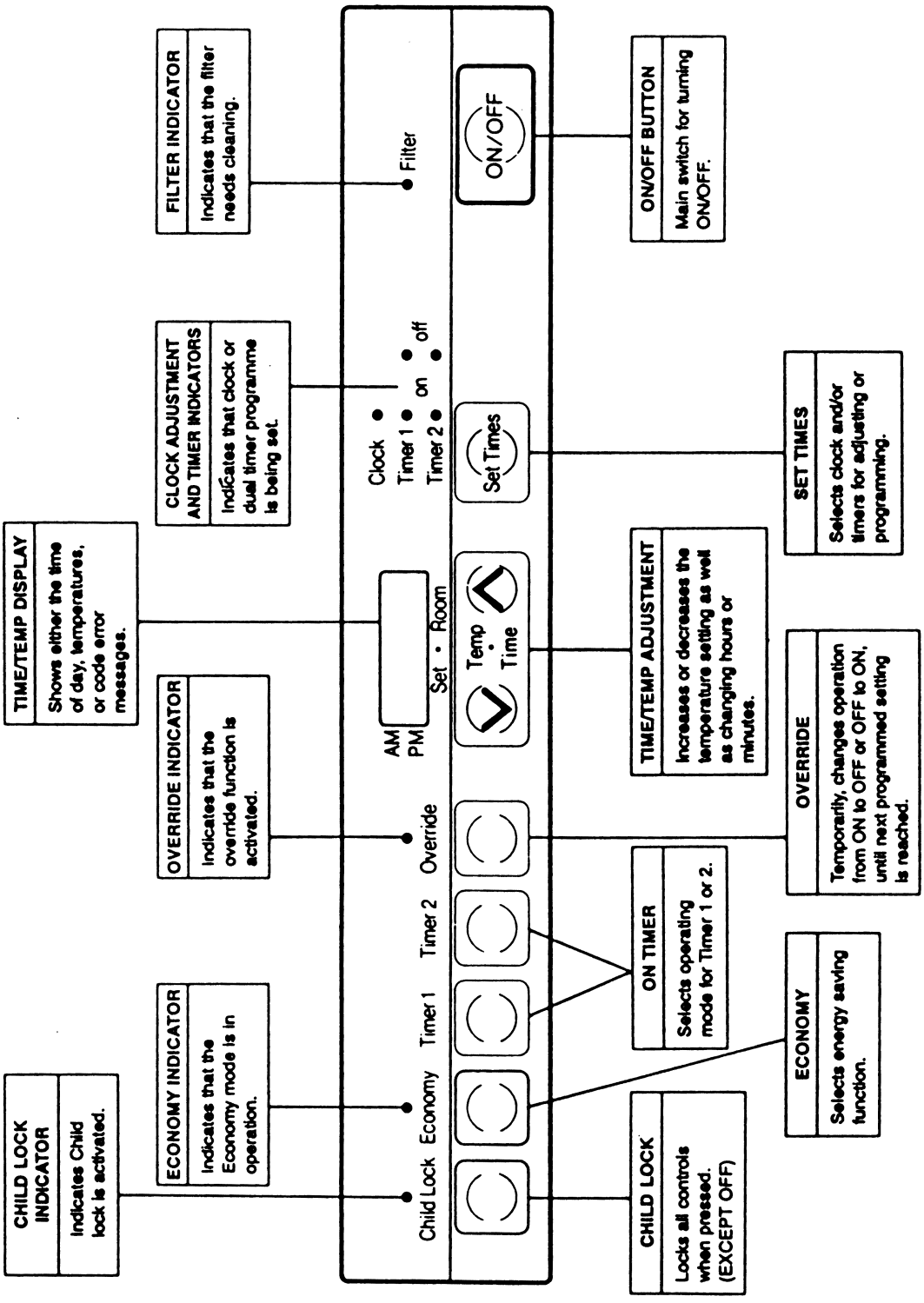
Combustion Chamber (Combustion Box)

Material	Thickness (mm)	Dimensions
SA1D-40	0.6	As below
Heat Resistant Stainless Steel	0.5	



9. Operating Principles

Control Panel



Normal Operation

- Lift lightly in the centre of the lid.
- Press the ON/OFF button.
- The Power ON/Combustion indicator illuminates green, and the convection motor starts pre-purging.
- The Digital Display displays the present room and pre-set temperature. After approximately 3 seconds, the electrode starts discharging electricity, and at the same time, the solenoid valves and the modulating valve turn ON. After ignition, while the main burner is on "High", the Power ON/Combustion indicator illuminates red as the thermocouple detects the flame and the electrical discharge ceases. (Compulsory combustion is carried out for approx. 60 sec on High).
- The PCB's micro-computer will operate the room temperature and the combustion time, and will also operate the fuzzy control until the preset room temperature is reached.

Temperature Control

- Room temperature can be adjusted to the desired temperature with the room temperature control button ("Temp/Time Adjustment").

Turning OFF

- Press the ON / OFF button.
- The solenoids and modulating valve turn OFF and combustion ceases.
- The indicator will turn off.
- The convection motor ceases operation after post-purging (82 - 255 seconds).

Economy Mode

- The Economy indicator illuminates and the appliance enters economy operation.
- It automatically decreases the preset room temperature twice every 30 minutes by 1 degree after the economy operation reaches the preset room temperature.
- Press the Economy button once more to switch off the function.
- Operates for one hour.

Child Lock

- Press the Child lock button. The child lock indicator illuminates.
- While the child lock is activated during normal operation all controls other than the ON/OFF button will be locked. When ceasing operation, the OFF button does not respond.
- The Child lock button should be pressed for approximately 2 seconds when cancelling.

Setting Clock

When the appliance is first plugged in and then turned ON, the Digital Display will show --:--. As an example, let's set the clock to 10:36 am.

- When the appliance is first plugged in or after a power failure, the Digital Display will show --:--. Note: Should the appliance be in operation during a power failure --:00 will flash.
- Press the Set Times button once, the Clock Indicator will flash.
- Press and hold the 'Δ' button; the minutes will begin to change first, then the time will change by whole hours. Release the button when AM 10:00 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 'Δ' button again, release the button when AM 10:35 shows. If you go past AM 10:35, then the '∇' button can be used to change the time settings in reverse.
- Press the Timer Set 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.

Override function

This function is intended to be used to manually override the current operation of the heater. For example; if the heater is in standby mode (i.e. between finishing time and starting time of a Timer), and the Override button is selected, then the heater will begin to operate, and heat the room.

- To operate the Override simply press the Override button. The override indicator will flash.
- Turning OFF the override button, simply press Override button again.
  The Override indicator will go out, and the heater will return to standby mode.
  The heater will continue to operate on Override until the Override button is pressed again, or one of the Timers takes over the operation of the appliance. This means that the Override mode will automatically drop out if a programmed Starting time is reached. The appliance will then return to operating at times programmed into the Timer(s).

Programming the ON/OFF Timers(s)

Before programming the Timers you must ensure that the clock has been set to the correct time. See "Setting Clock" on page 17.
As an example let's program Timer 1 to heat the room by 7:10 AM and finish at 9:00 AM.

- Press the Set Times button twice. The Digital Display will show AM 6:00. Timer 1 indicator will flash.
- Press the 'Δ' button until AM 7:00 appears, release the button, then press it again until AM 7:10 appears. (Press the '∇' button if you go past AM 7:10)
- Press the Set Times button again, the Timer 1 OFF indicator will flash. Press the 'Δ' button until AM 9:00 appears.
- Press the Set Times button three times to lock in the programmed time. The Digital Display will show the current time.

Timer 2 is programmed in the same way, remember to ensure that the Timer 2 indicator is flashing when you program in the desired setting.

The Timers can be programmed to operate for any two periods in any 24 hours. To operate the Dual Timers see "Operating the Dual Timer" on page 18. The programmed time must be selected and locked-in within one minute of the Timer indicators flashing otherwise the programmed times will not be retained in the system memory.

Operating the Dual Timer

Before operating the Timer(s), the clock time must be correct, and a starting time and finishing time for the Timer(s) must be programmed see "Setting Clock" on page 17. The two Timers operate in the same way. This heater does not commence operation at the programmed starting time. It will attempt to heat a room by the programmed starting time.

- To select the Timer(s) to commence heating; Check the time shown on the Digital Display is correct. See "Control Panel" on page 16. Check the ON and OFF times, for both Timers if necessary, see "Control Panel" on page 16.
- 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.

Set and Forget Operation

- The heater can alternate between Timers automatically during cold weather by selecting Timer 1 and Timer 2 together. Both Timer indicators will glow.
- The appliance will remain on standby at intervals between the programmed finishing and starting times of each Timer. While the heater is operating with programmed intervals the Timer indicator will flash.
- During a power failure, the system memory will retain the Timer programs, and the clock will stop at the time the power goes off.
- The clock will start again when the power comes back on, but the time will be slow by the duration of the power failure. To set the clock to the correct time after the power has come back on, simply follow the instructions on page 17.

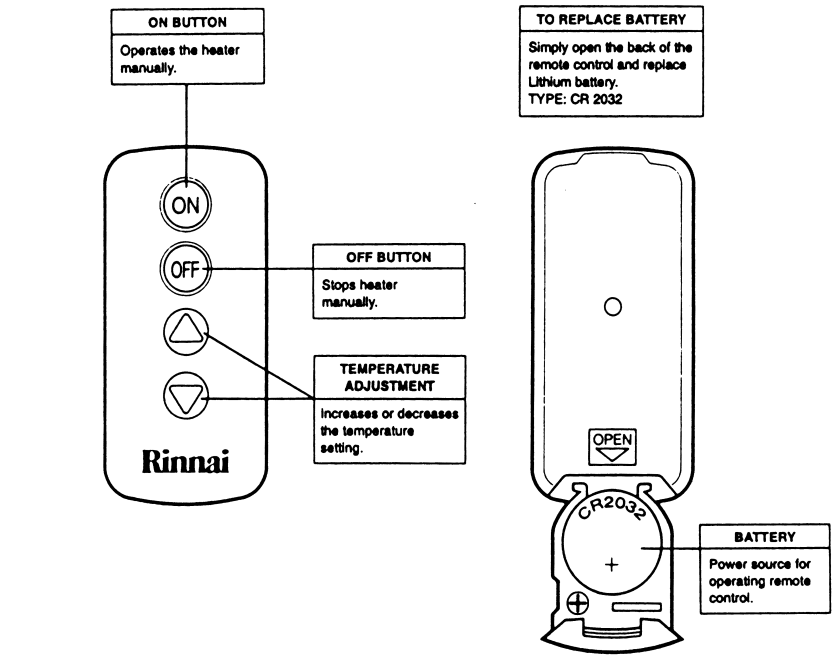
The Remote Control

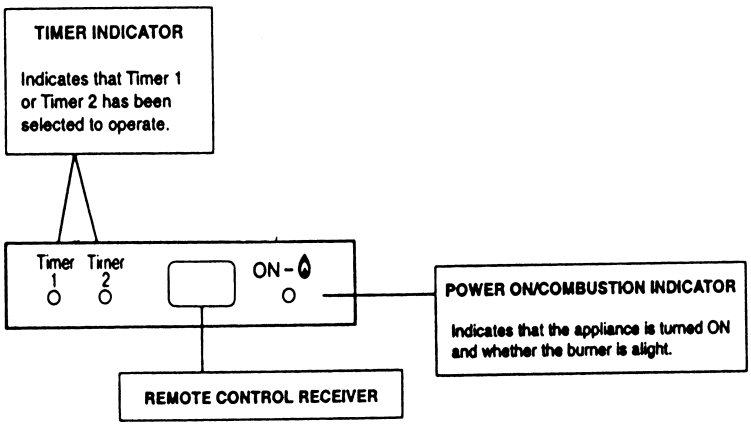
To Turn ON and OFF.

- Remote Control will not turn heater ON if Timer(s) have been selected. To manually operate when Timer(s) are not selected, simply press the ON or OFF button.

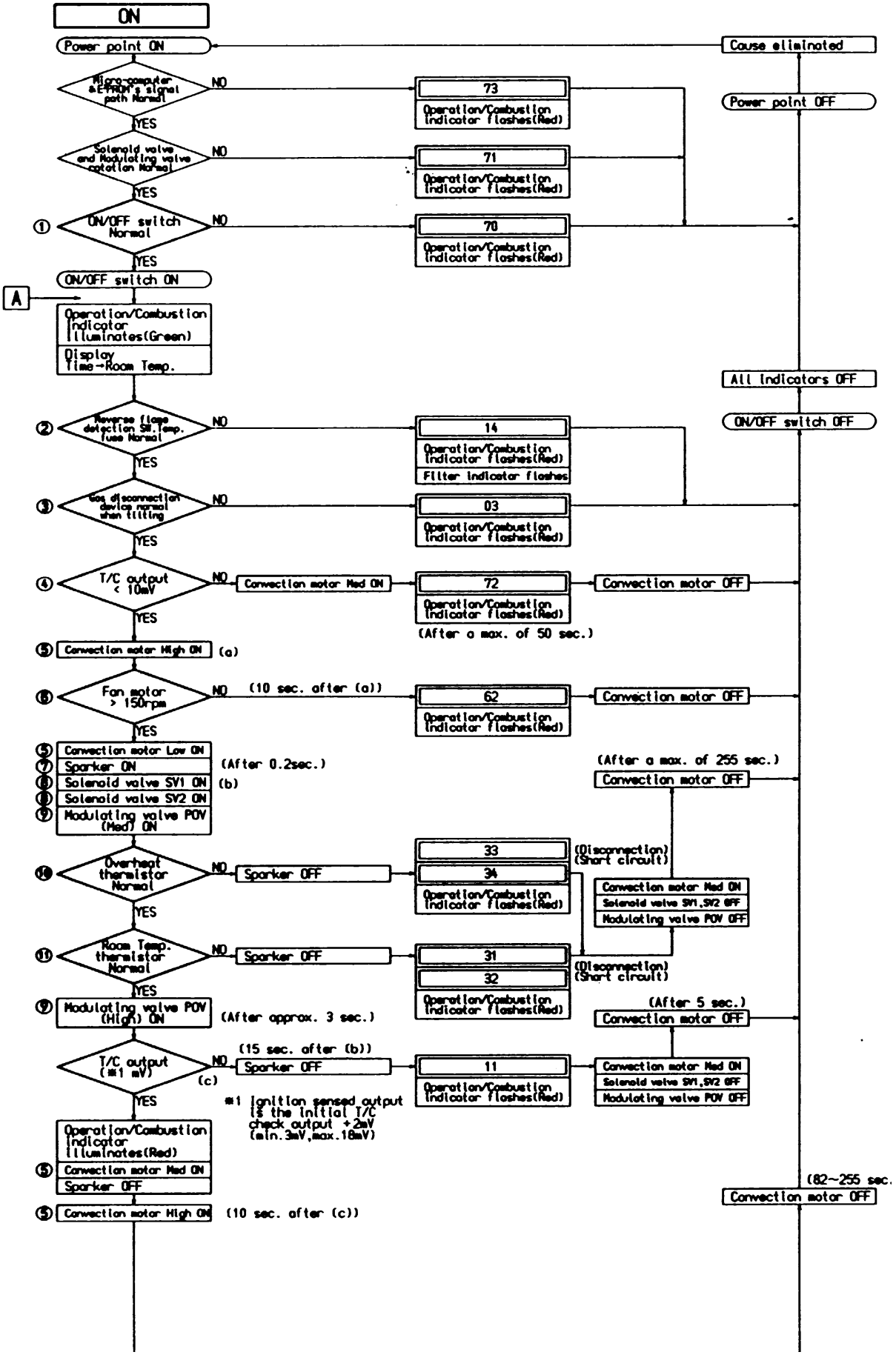
To Change Temperature

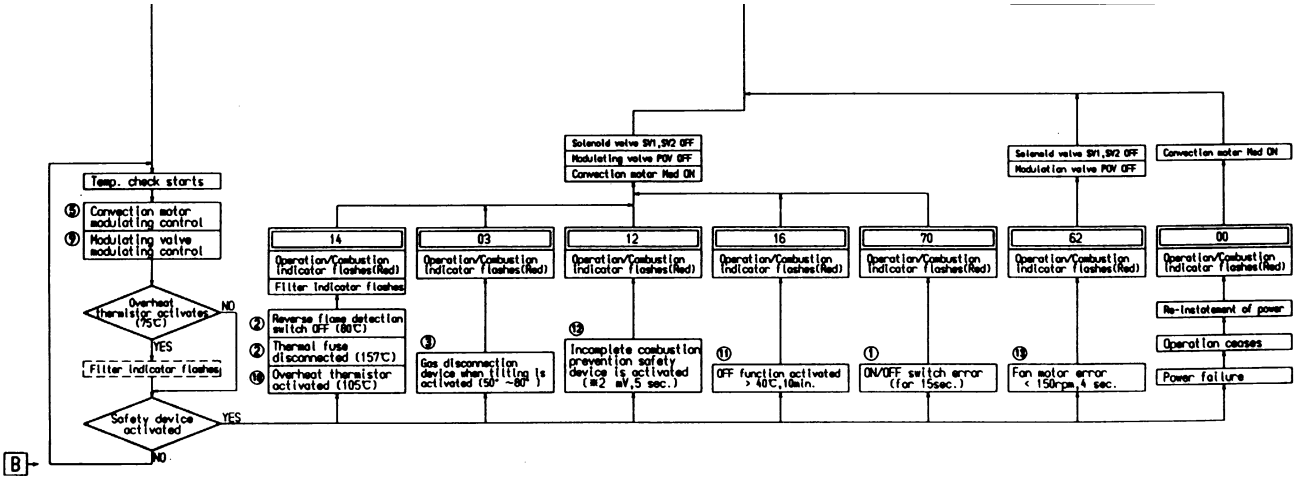
- To alter the temperature at any time while the heater is operating, simply press the 'Δ' or '∇' buttons. If the Timer(s) have been selected, and the heater is in standby mode, and the OFF button on the Remote Control is pressed, the Timer(s) will be de-activated.

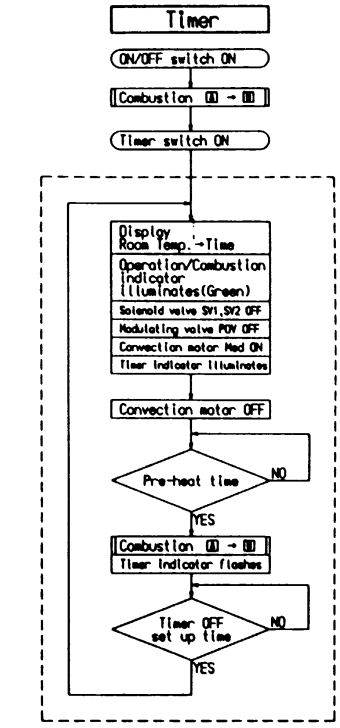




10. Operational Flow Chart





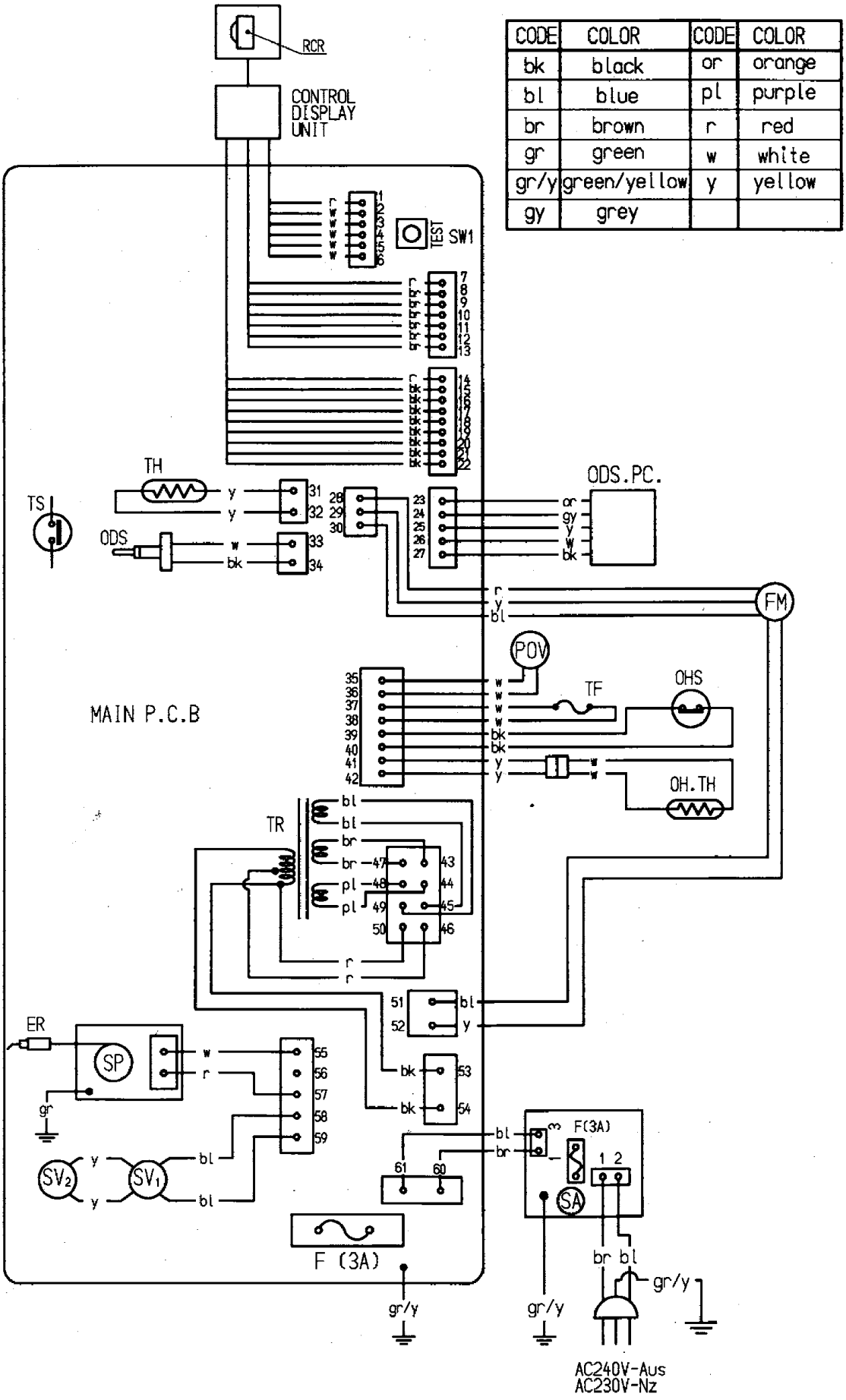


■ When Timer 1 or Timer 2 is set up,the heater will operate 1 cycle per day.(in dotted line)
When Timer 1 and Timer 2 are set up,the heater will operate 2 cycles per day.(in dotted line)

■2:

	NG	PROP.G	LPG
406TR	14mV	18mV	——
506TR	14mV	14mV	14mV
516TR	14mV	14mV	14mV

11. Wiring Diagram



CODE	COLOR	CODE	COLOR
bk	black	or	orange
bl	blue	pl	purple
br	brown	r	red
gr	green	w	white
gr/y	green/yellow	y	yellow
gy	grey		

12. Diagnostic Points

Flow Chart Nº	Wire Colour Nº	Connection No.		Value		Part
		PCB Type				
		3x Test SW's	1x Test SW's			
1	red-white	6-5	1-2	Switch off ∞ Switch on 0.1-0.4Ω		ON/OFF Switch
	white-white	2-3	5-4			
2	black-black	39-40		<1Ω		Reverse flame detection SW
	white-white	37-38				Thermal Fuse
3	-	-		DC 4-6V		Tilt Switch
4	white-black	31-30	33-34	<10mV		Thermocouple
5	Blue-yellow	60-61	51-52	AC 40-95V 90-210Ω		Convection Fan Motor
6	Blue-yellow	32-33	30-29	"32-33" DC 3-5V	"30-29" DC 1-4V	Convection fan Motor
				>600 Pulse / Min		
	blue-red	32-34	30-28	DC 3 - 8V		
7	white-red	55-57		AC 90 -110V		Ignitor
8	blue-blue	53-54	58-59	DC 80 - 100V		Solenoid Valve
	blue blue yellow yellow	-		1.3 - 2.6 kΩ		
	yellow yellow			1.3 - 2.6 kΩ		
9	white-white	35 36		DC 7 - 9V 78 - 100Ω		Modulating Solenoid Valve
10	white~white	-		10° C = 115 - 135 kΩ 20° C = 70 - 85 kΩ 40° C = 25 - 40 kΩ		Overheat Thermistor
11	yellow-yellow	31 - 32		10° C = 58 - 73 kΩ 20° C = 33 - 44 kΩ 40° C = 9 - 19 kΩ		Room Temperature Thermistor
12	white-black	31 - 30	33 - 34	(NG) > 14 mV (LP) > 18 mV		Thermocouple
13	blue-yellow	32 - 33	30 - 29	"33-33" DC 3-5V	"30-29" DC 1-4V	Convection Fan Motor
				> 600 Pulse / Min		
	blue-red	32-34	30-28	DC 3-8V		

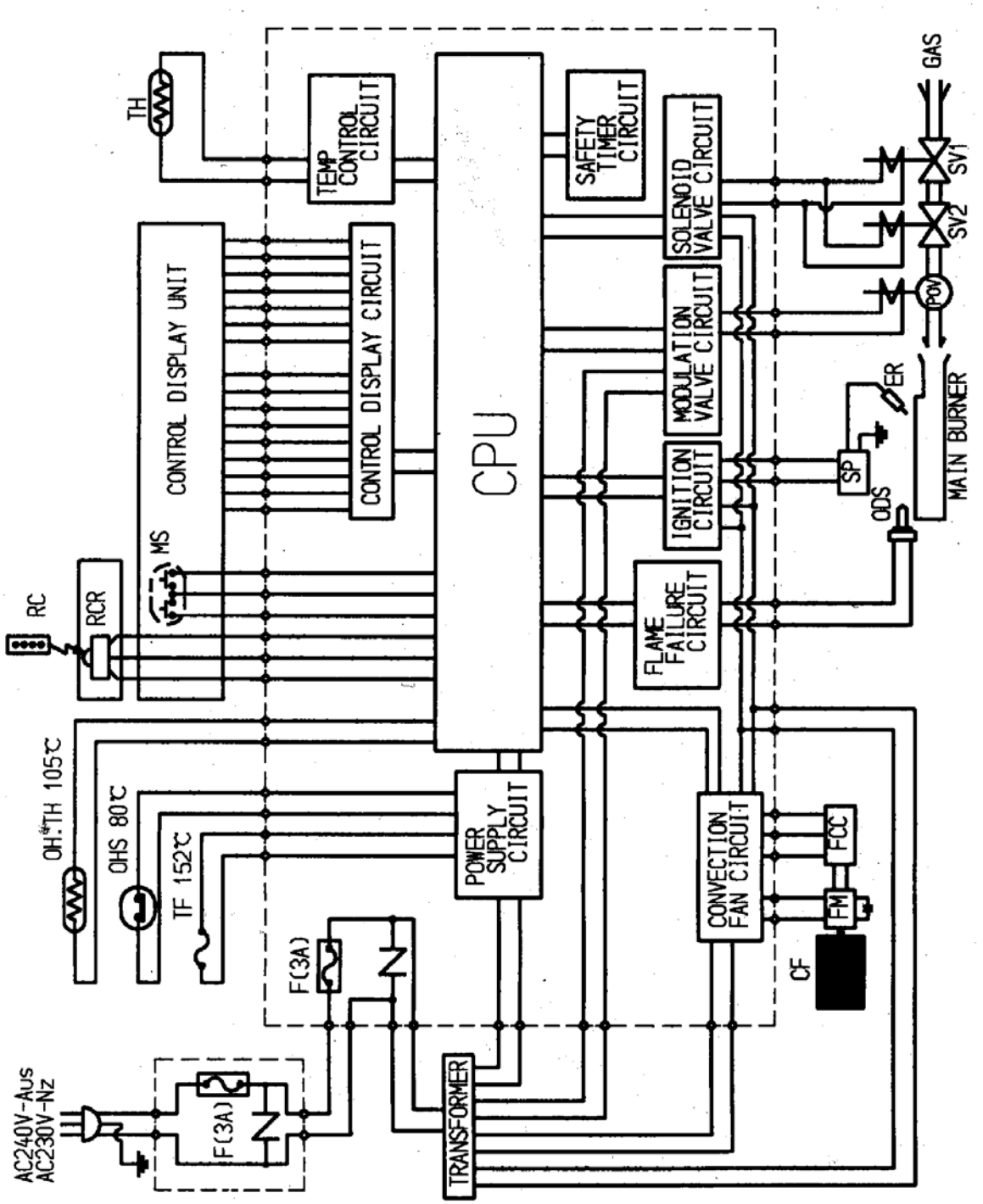
Transformer Terminal Voltages/Coil Resistances

CN	Wire Colour No.	Connection No's		Value	Part
		Original	New		
F1	Black-Black	58 - 59	53 - 54	AC 216~264V 82~95Ω	Transformer 1
F	Red-Red	46 - 50		AC 90~110V 35~45Ω	

Convection Fan (rpm) (± 100)

Model	RCE-406TRH		RCE-506TRH		RCE-516TRH	
Gas Type	High	Low	High	Low	High	Low
NG	910	570	950	570	1060	540
LP	910	540	970	540	1030	540

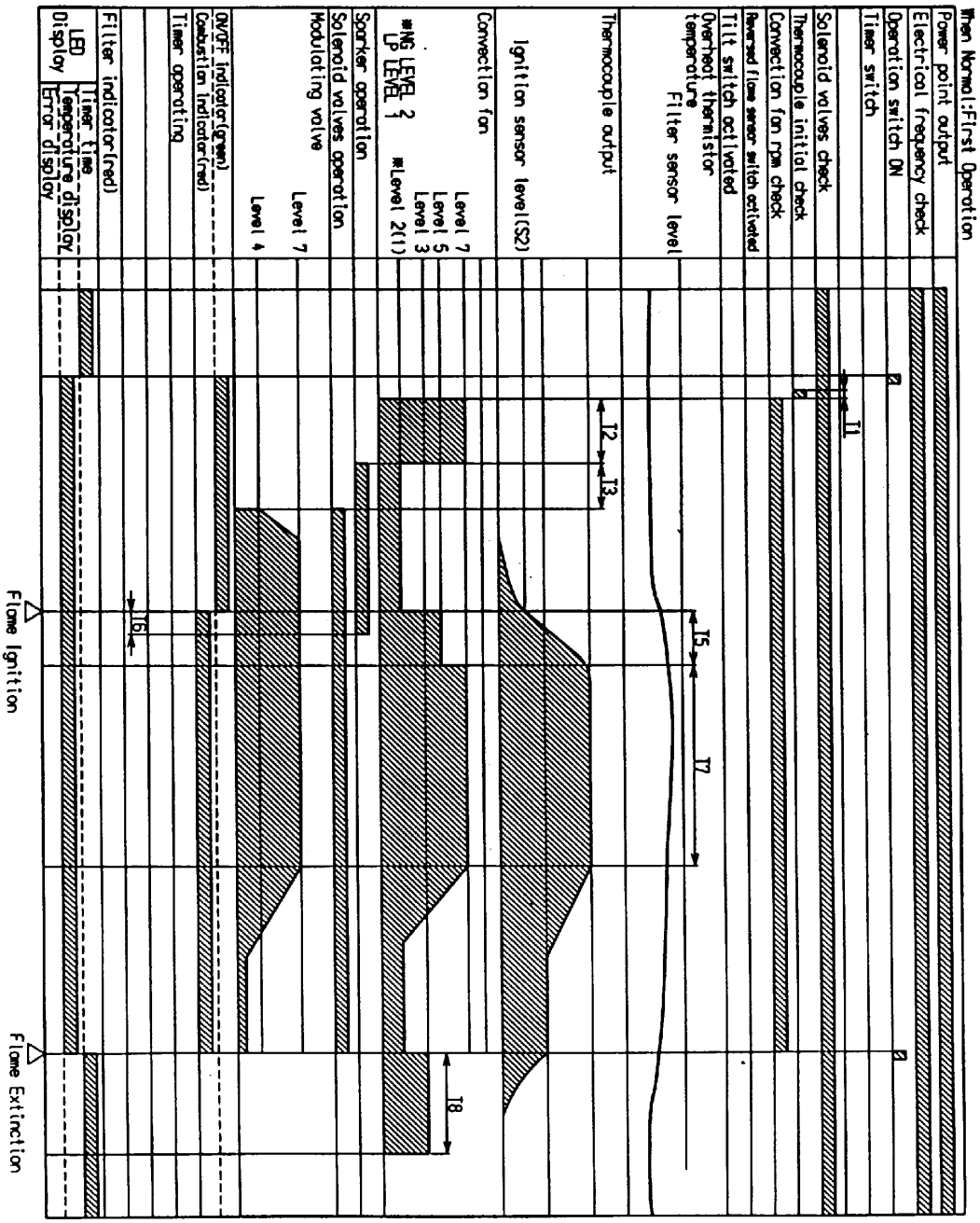
13. Block Diagram



14. Error Code Messages

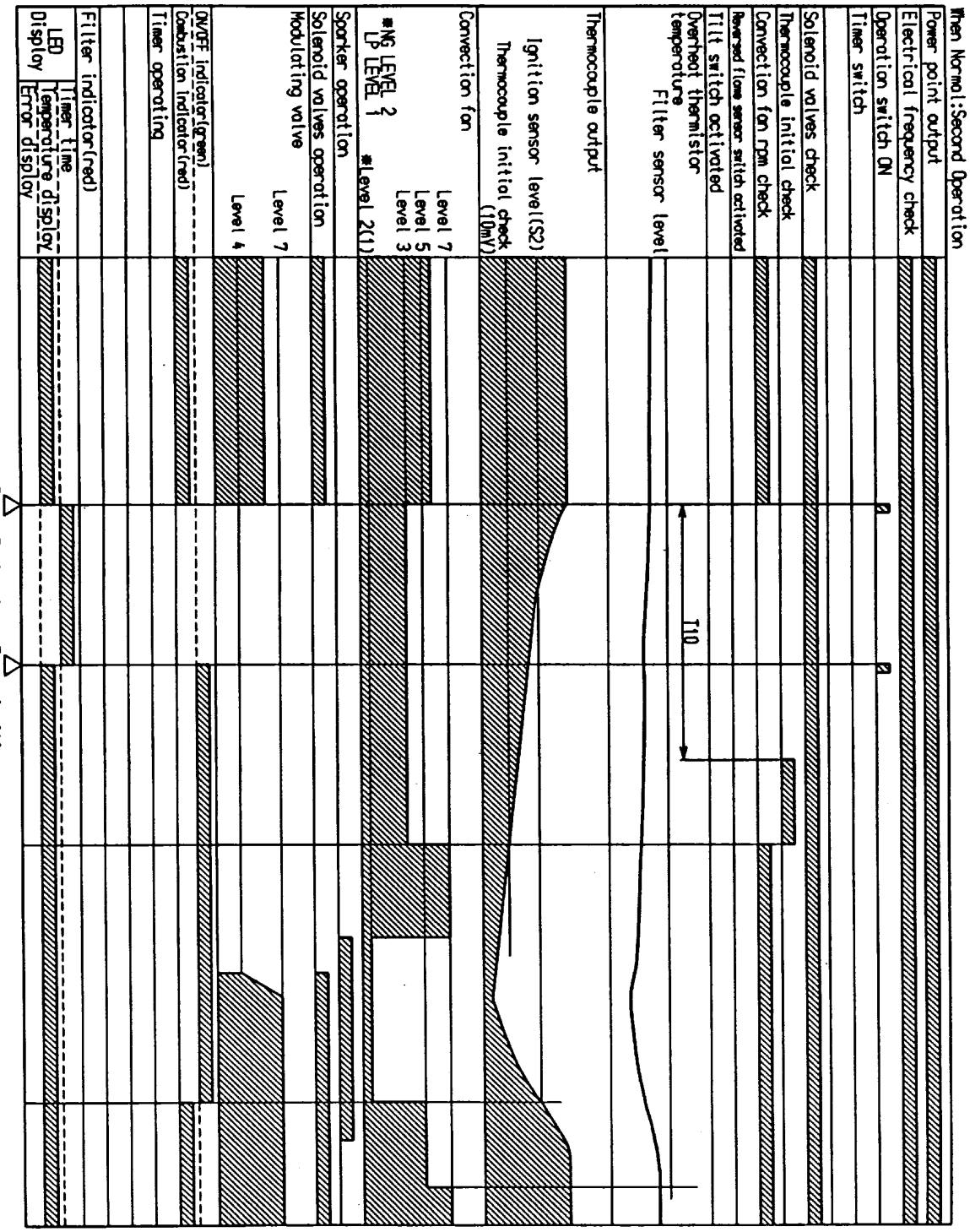
Error Code	Description	Diagnostic Point
00	Power reinstatement while ON/OFF switch ON	
03	Tilt switch is activated	Check tilt switch
11	Mis-ignition	Check thermocouple output
12	Incomplete combustion	Check thermocouple output
14	Overheat Switch is activated	Check Overheat Switch Thermistor
14	Thermal fuse melted (activated)	Check Thermal Fuse
16	Unit cuts off (10 minutes at >40° C)	Check Room Temperature Thermistor
31	Room Temperature Thermistor broken circuit	Check Room Temperature Thermistor
32	Room Temperature Thermistor short circuit	Check Room Temperature Thermistor
33	Overheat Thermistor broken circuit	Check Overheat Thermistor
34	Overheat Thermistor short circuit	Check Overheat Thermistor
62	Fan Motor/Appliance abnormal overheat	Check Convection Fan Motor
70	ON/OFF switch abnormal	Check Control PCB (ON/OFF Switch)
71	Solenoids or Modulating valve circuit abnormal	
72	Thermocouple initial value abnormal	Check thermocouple output
72	Thermocouple High cut out	Check thermocouple output >48mV for 5 secs
73	PCB (EEPROM) abnormal	

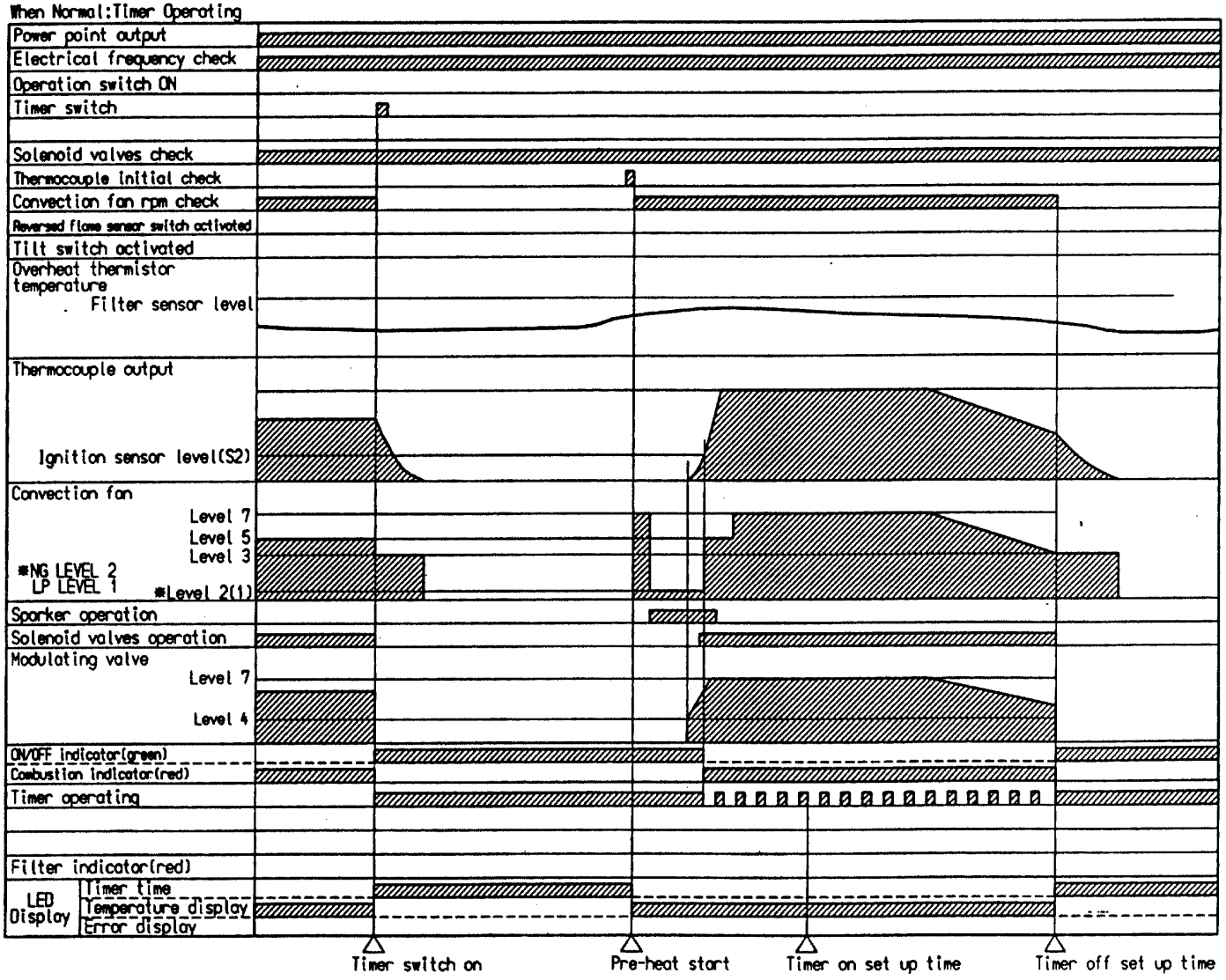
15. Time Charts



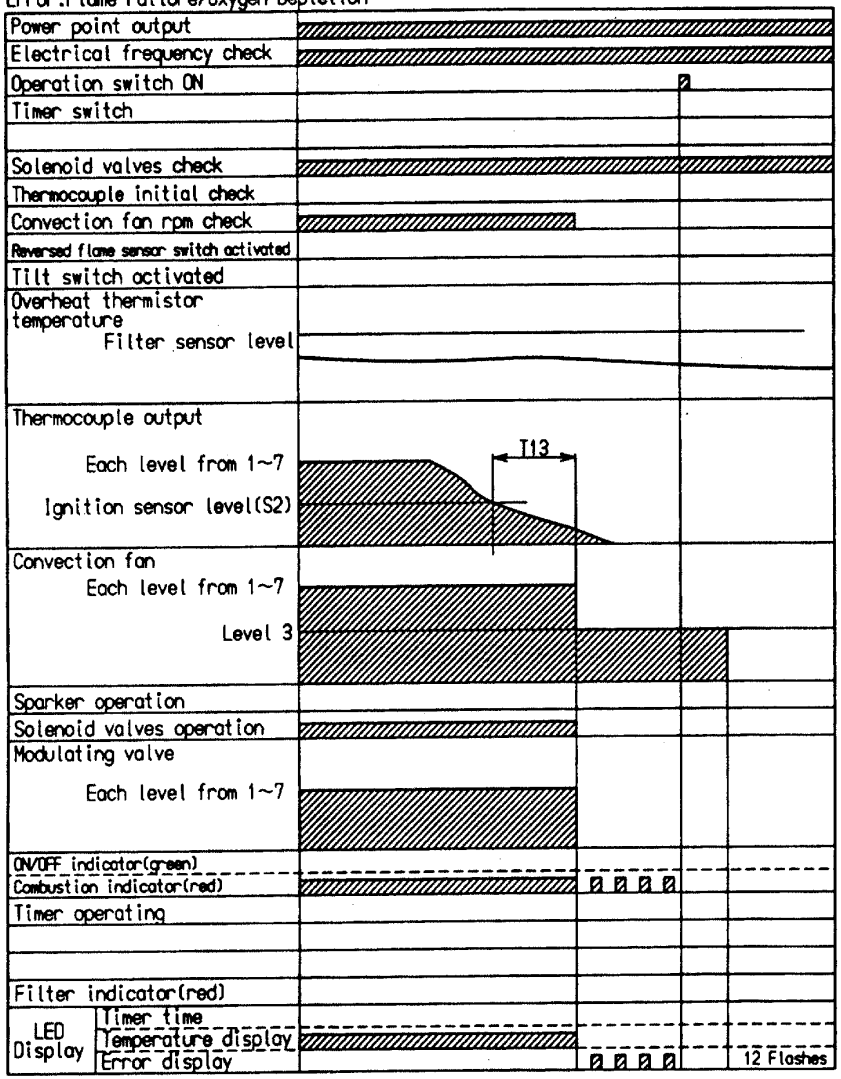
T1:Initial thermocouple ignition check max20sec.
T2:Pre-purge time 0.2sec.
T3:Pre-spark time 0.1sec.
T5:Forced combustion time 1 10sec.
T6:Forced spark time 1sec.
T7:Forced combustion time 2 50sec.
T8:Post-purge timer
-Rise temperature thermistor disconnection/ short circuit 255sec.
-Overheat thermistor activated 255sec.
-Other 82~150sec.
T10:Forced post-purge time 20sec.
T13:Flame failure sense time 5sec.
T14:Forced hold time max15sec.
T15:Activated tilt switch time 0.5sec.
T16:Activated reversal flame switch time 0.2sec.
T17:ON/OFF switch error time 15sec.
T18:Convection fan rpm failure confirmation time 4sec.
T19:Prepurge fan rpm failure confirmation time 10sec.
T20:Overheat confirmation time
- Thermal fuse melted 0.2sec.
- High limit thermistor activated 2sec.

*When the convection fan is driven,if the fan does not achieve 6rpm within 10 seconds,it is considered fan drive error and the unit cannot switch to IG.ON.

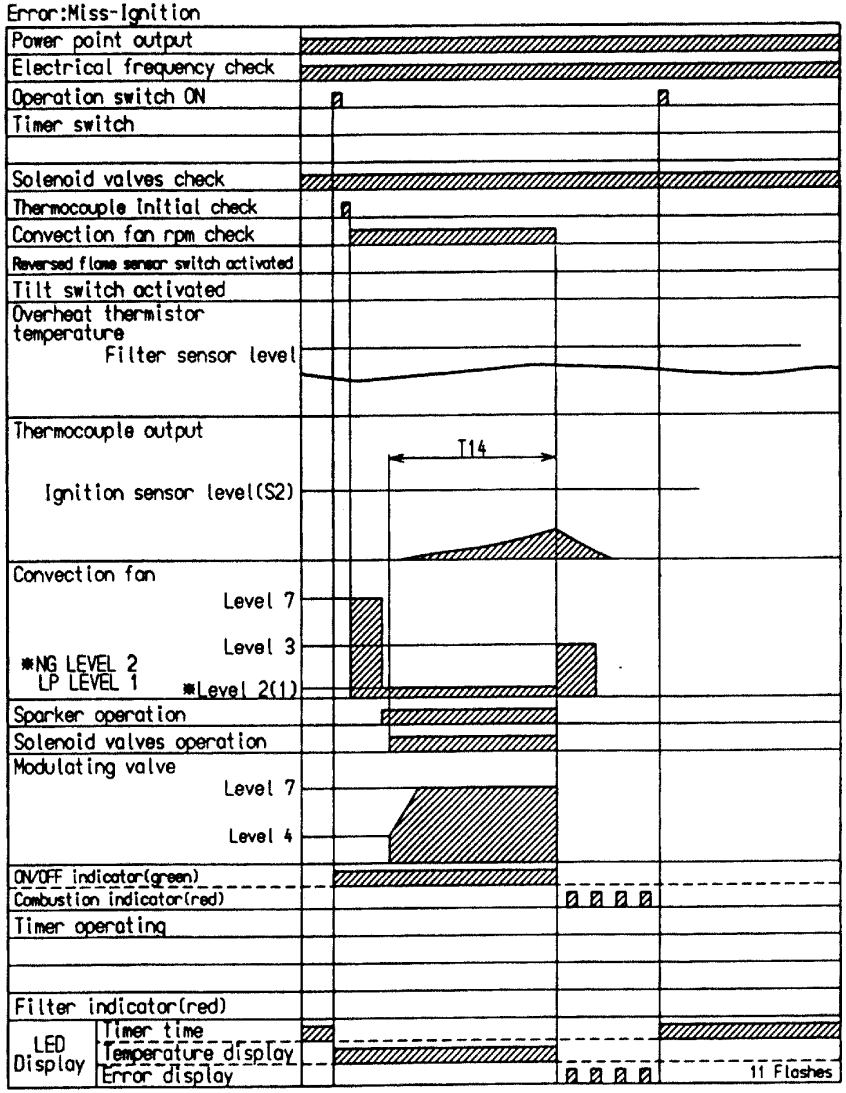

When Normal:Second Operation
Power point output
Electrical frequency check
Operation switch ON
Timer switch
Solenoid valves check
Thermocouple initial check
Convection fan rpm check
Reversed flow sensor switch activated
Tilt switch activated
Overheat thermistor temperature
Filter sensor level
Thermocouple output
Ignition sensor level(S2)
Thermocouple initial check (10mV)
Convection fan
Level 7
Level 5
Level 3
*NG LEVEL 2
LP LEVEL 1
*Level 2(1)
Sparker operation
Solenoid valves operation
Modulating valve
Level 7
Level 4
ON/OFF indicator(green)
Combustion indicator(red)
Timer operating
Filter indicator(red)
LED Display
Timer time
Temperature display
Error display
T10
Flame Extinction
Flame Ignition


When Normal:Timer Operating
Power point output
Electrical frequency check
Operation switch ON
Timer switch
Solenoid valves check
Thermocouple initial check
Convection fan rpm check
Reversed flame sensor switch activated
Tilt switch activated
Overheat thermistor temperature
. Filter sensor level
Thermocouple output
Ignition sensor level(S2)
Convection fan
Level 7
Level 5
Level 3
*NG LEVEL 2
LP LEVEL 1
*Level 2(1)
Sparker operation
Solenoid valves operation
Modulating valve
Level 7
Level 4
ON/OFF indicator(green)
Combustion indicator(red)
Timer operating
Filter indicator(red)
LED Display
Timer time
Temperature display
Error display
Timer switch on
Pre-heat start
Timer on set up time
Timer off set up time

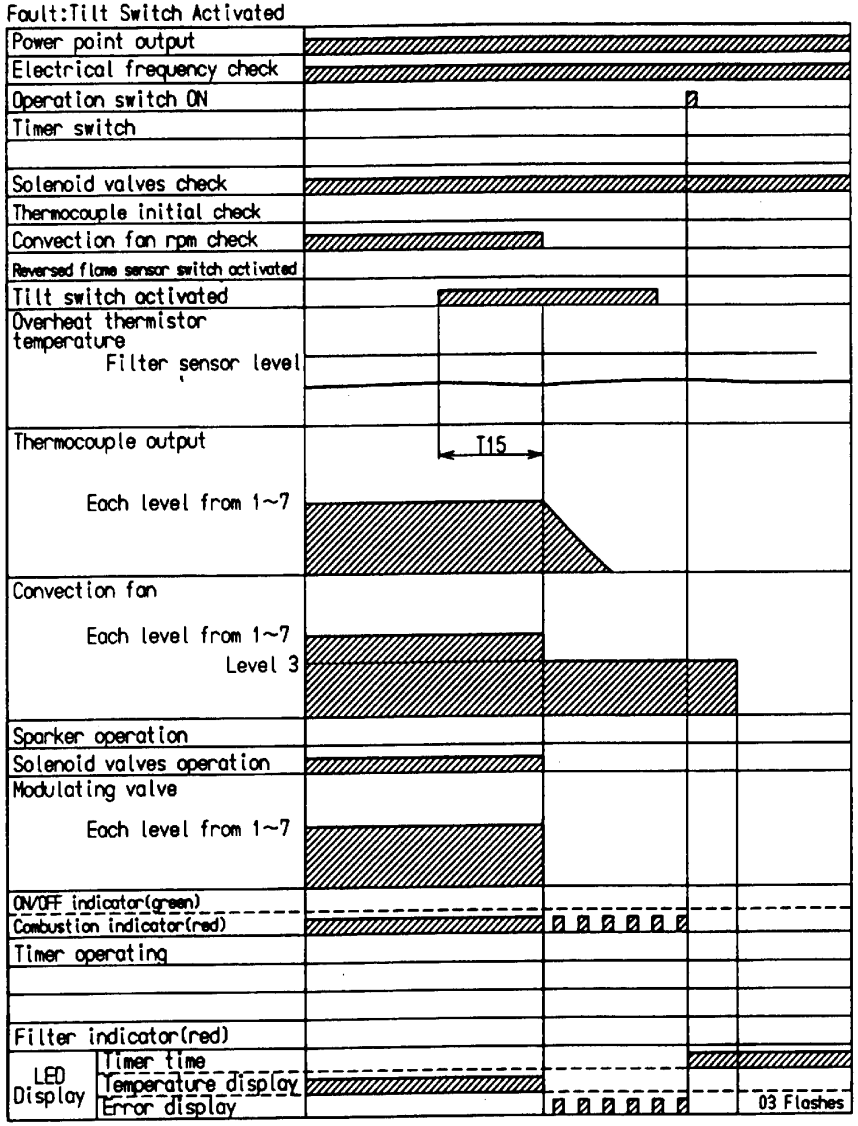
Error:Flame Failure/Oxygen Depletion



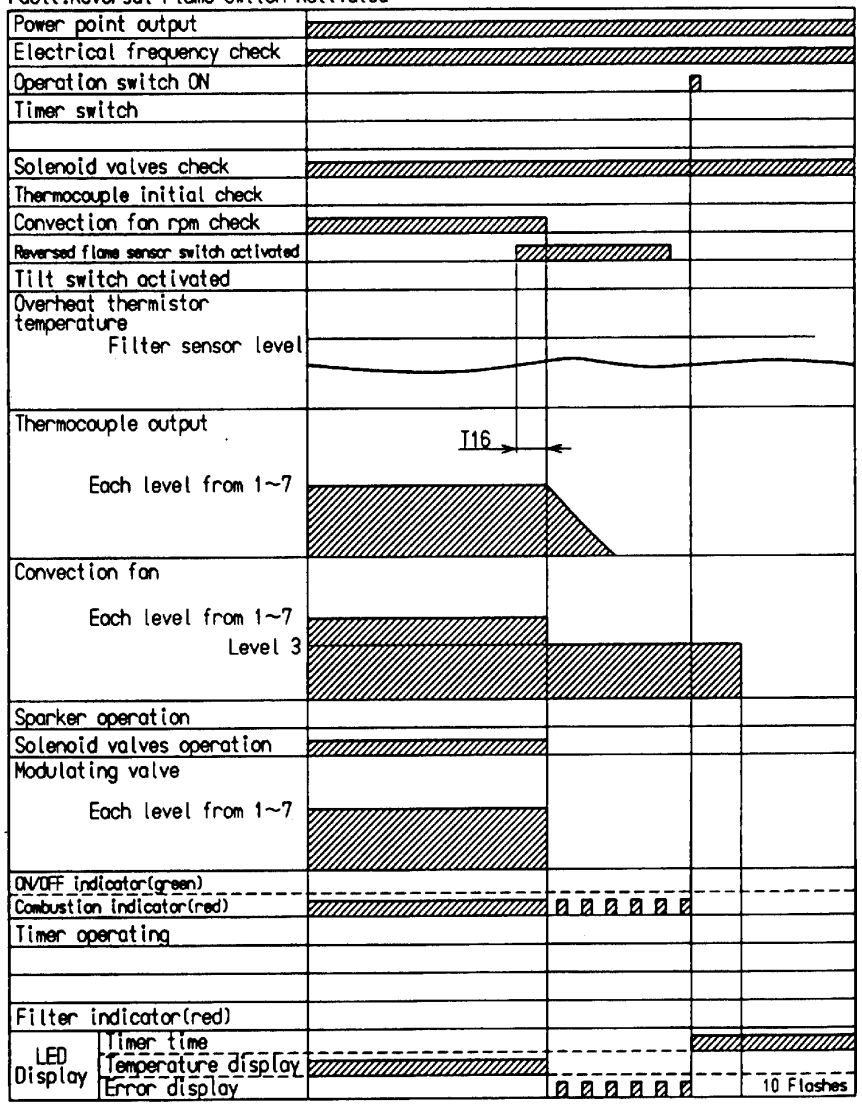
Error:Miss-Ignition



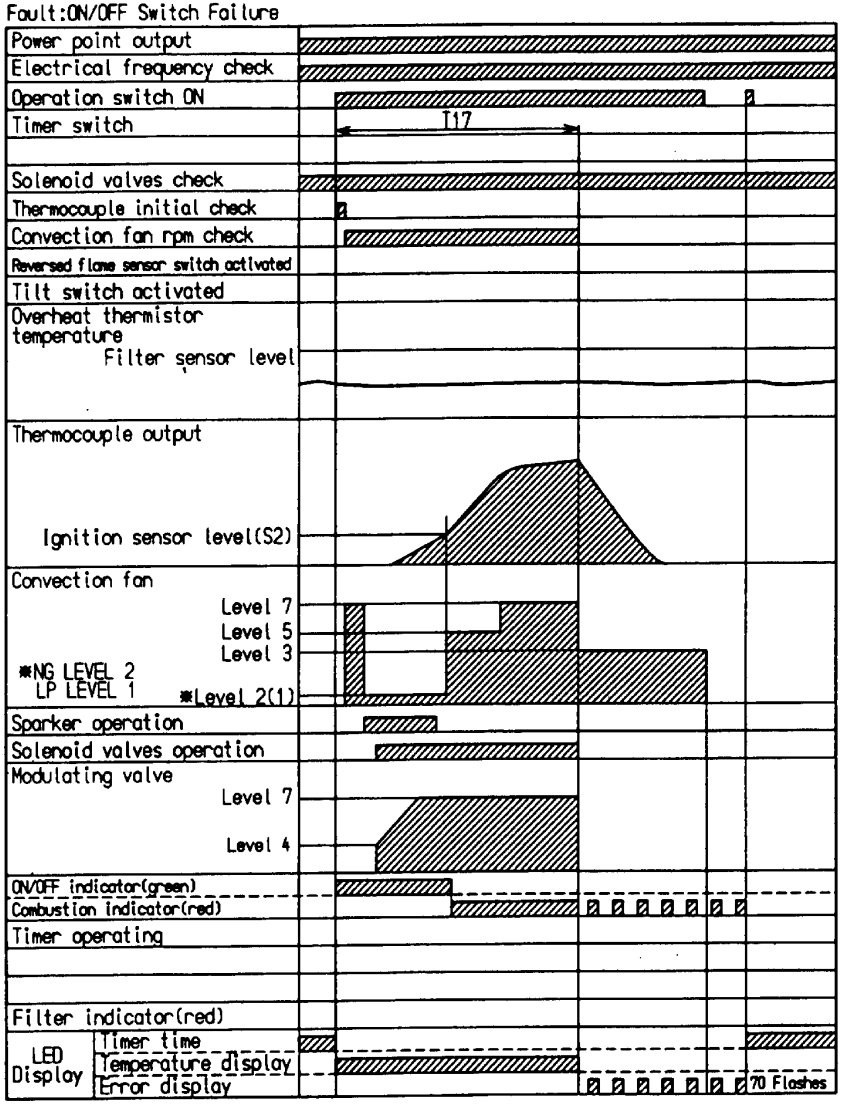
Fault:Tilt Switch Activated



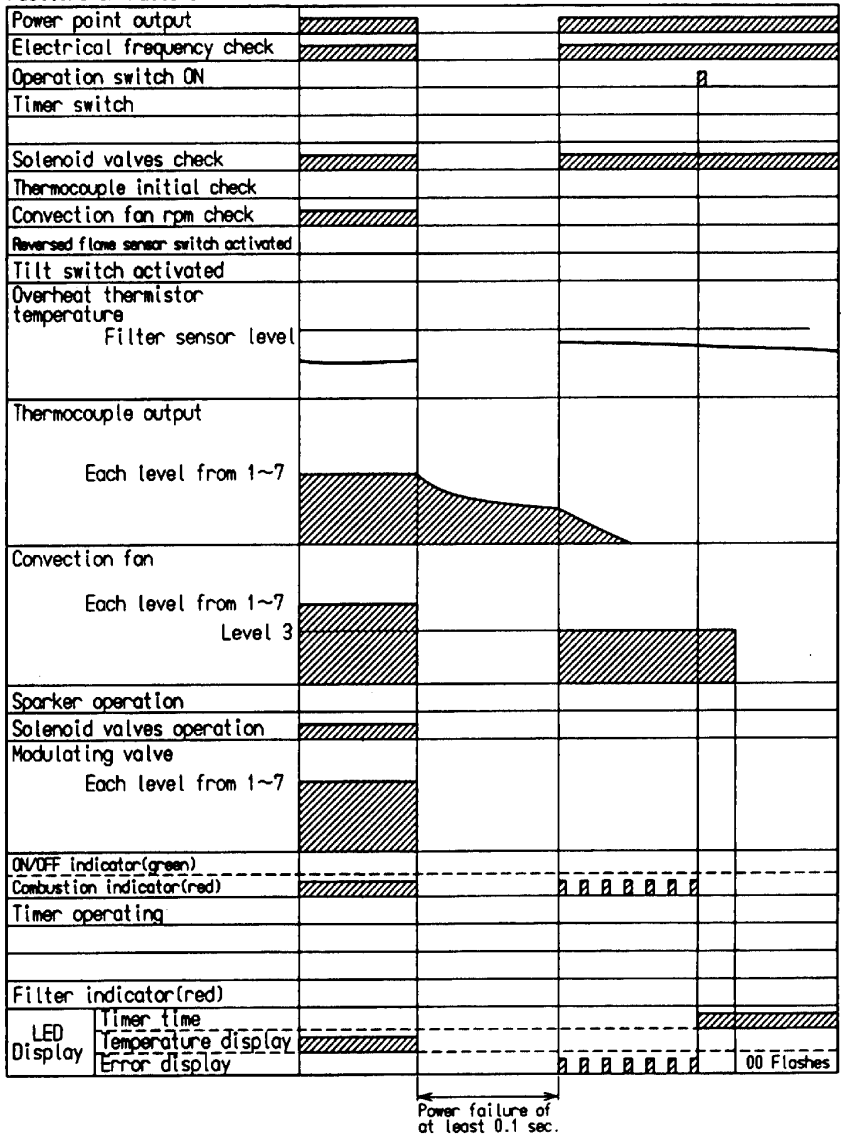
Fault:Reversal Flame Switch Activated



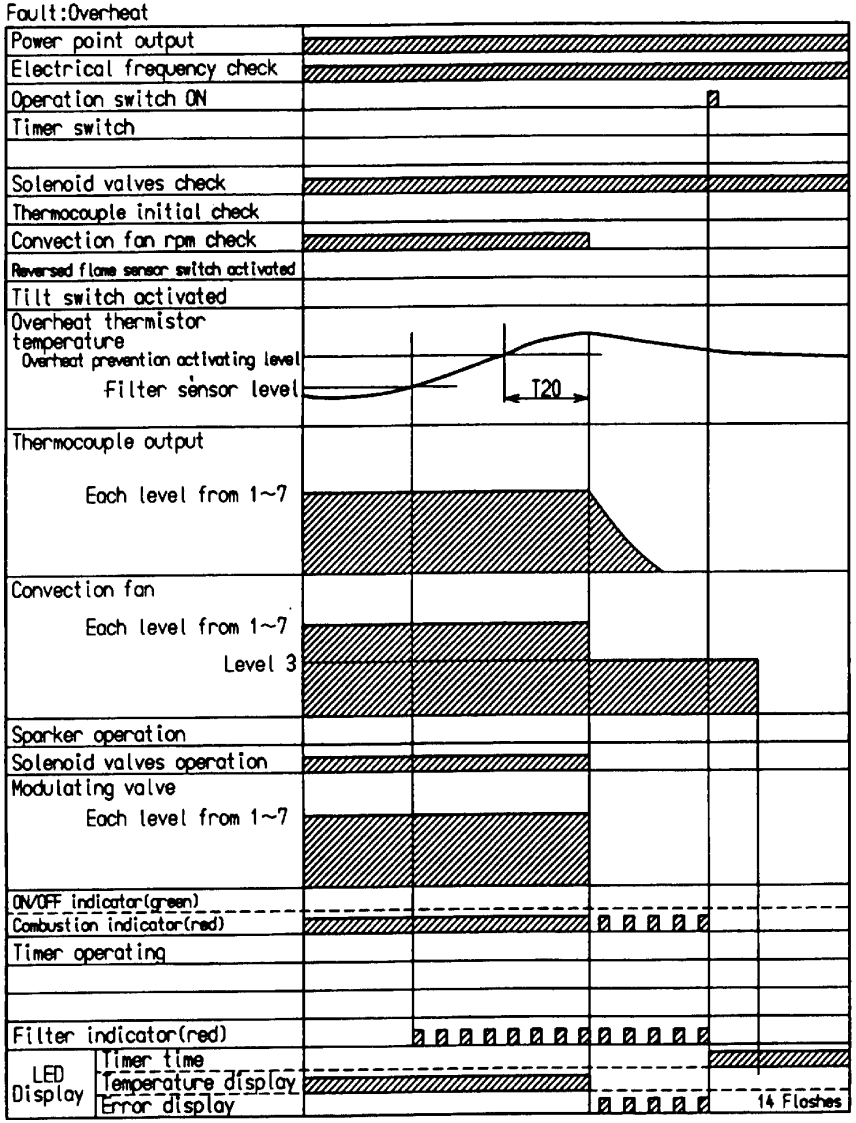
Fault:ON/OFF Switch Failure



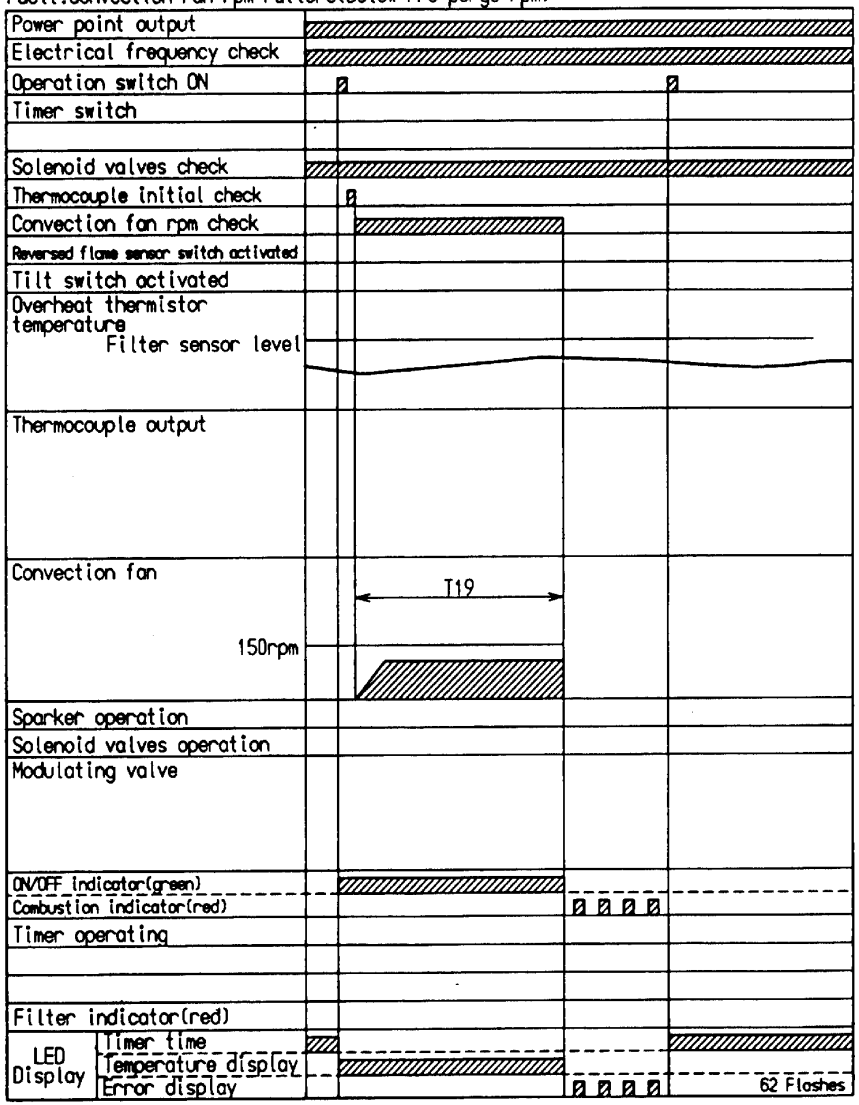
Fault:Power Failure



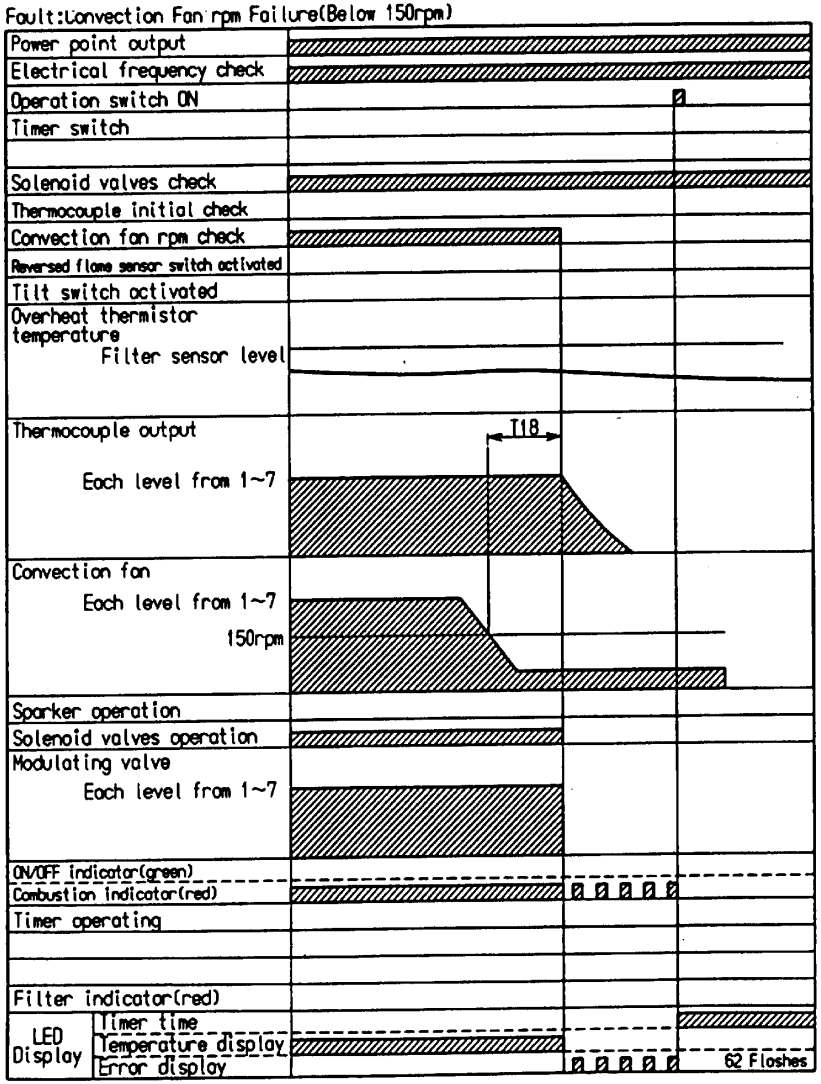
Fault:Overheat



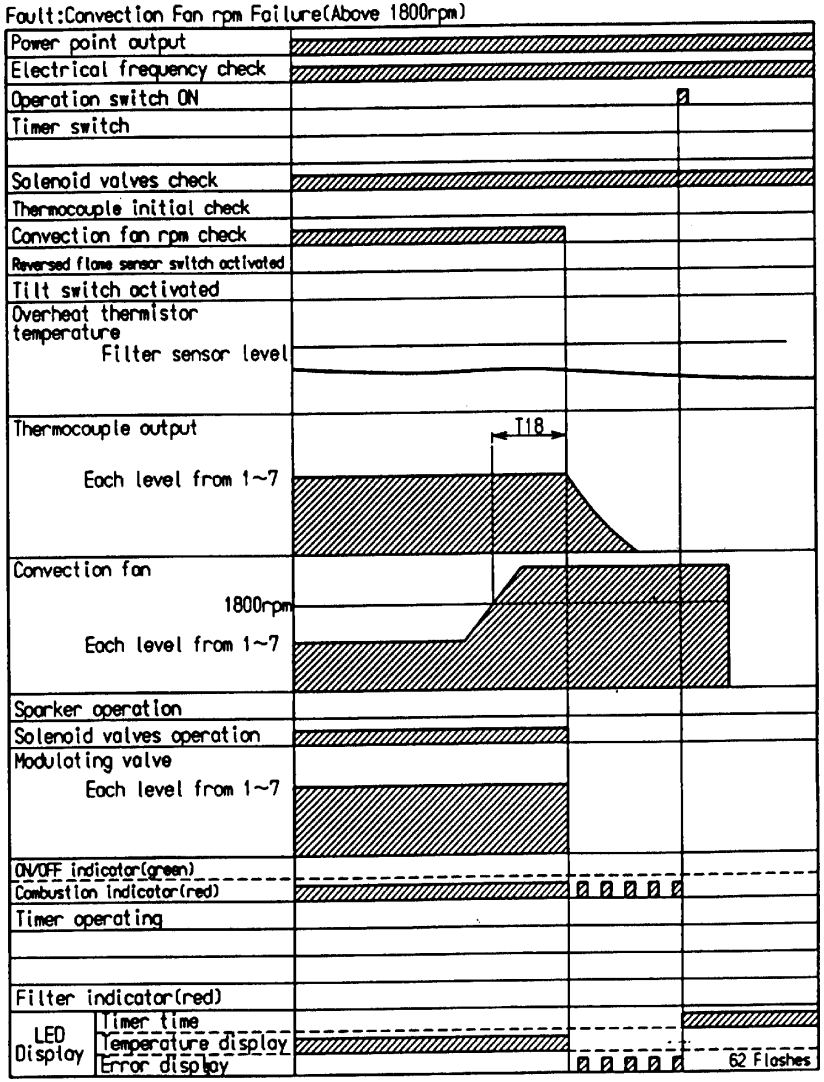
Fault:Convection Fan rpm Failure(Below Pre-purge rpm)



Fault:Convection Fan rpm Failure(Below 150rpm)



Fault:Convection Fan rpm Failure(Above 1800rpm)



16. Fault Finding Procedure

Initial Checks

Service Call System	Check Points (see information in following sections)
Appliance does not operate after having pressed ON/OFF switch.	• Check electrical cord is connected to the power point. • Confirm power supply. • Check Child Proof Lock (Function Lock).
Ignition does not occur. ON Combustion Indicator does not illuminate. (Error code "11")	• Check gas hose is plugged in. ..... 1 • Check gas type matches that supplied to appliance. • Check gas hose isn't bent/crimped. ..... 1 • Air in gas supply. 1
Room does not warm up.	• Check preset temperature. ..... 2 • Blocked air filter ..... 2 • Warm air outlet short circuit (obstruction) ..... 3 • Inadequate gas supply 1
Flame Failure. Error Code "12" Error Code "14" Error Code "00"* *When power is restored within 0.5 seconds after power failure.	• Insufficient ventilation ..... 5 • Blocked air filter ..... 3 • Power failure. • Warm air outlet short circuit (obstruction) ..... 4 • Check gas type • Strong wind in appliance. • Inadequate gas supply (pipe bent/crimped) ..... 1 • Flash back 7
There is a smell of gas.	• Leaking gas supply (faulty connection) ..... 1 • Safety device operating. • Smell of combustion by-product 6

1. Gas Supply
   <Ignition does not occur> <Room does not warm up> <Smell of gas>
   - Is the gas supply fully open?
   - Is the gas hose bent?
   - Is the gas supply squashed?
   - Is the gas supply an incorrect length?
   - Is the gas supply connected correctly?

   YEnsure the gas supply is fully open.
   YIgnition problems can be caused 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 the dust blockage? (Error code 14)

   YClean the filter at least once a week.

4. Warm Air Short Circuit (Obstructions)
<Room does not warm up> <Extinguishes suddenly>
• Are there any obstructions in front of the warm air outlet?
Do not cover or place any obstructing objects within 1 m of the warm air outlet.

5. Insufficient Ventilation
<Extinguishes suddenly>
• Is the room sufficiently ventilated? (Error Code 12)
YDuring use, ventilate the room every hour by turning a ventilator on for 1 minute or by opening a window.

6. Exhaust Smell From appliance
<There is a gaseous smell>
YThis appliance emits exhaust by-products into the room, when igniting / extinguishing, there may be a slight smell.
YAerosols and paints may also produce a smell.

7. Flashback
<Extinguishes suddenly>
• Is the air filter blocked by dust or is a curtain touching it?
• Is there any blockage in the burner or restrictor?
• Is combustion, gas pressure etc. normal? (Error Code 14)

Conditions that are not fault

Condition	Cause and Explanation
Ignition is slow and cold air is blown from appliance	When the ON/OFF switch is pressed, ignition occurs, ignition could be delayed due to air in the gas supply line. Combustion Indicator (red) will not illuminate until the thermocouple has heated up, there will be few seconds delay after ignition.
Warm air continues to blow after switching appliance OFF	The fan stops after releasing all heat residual from within the appliance. (approx. 200-255 secs if appliance has overheated)
A clicking sound when the burner ignites.	Normal ignition sound. The extent of the sound will depend on gas pressure and burner temperature; the sound may be fairly loud.
Resonant sound after ignition.	Movement of the flame as it travels across the burner. This will soon go.
After ignition there is a ticking or clicking noise.	This is expansion of the combustion chamber metal, and is normal.
The heater does not ignite upon initial use.	There may be air in the gas supply, preventing the appliance igniting immediately. After 15 seconds the spark will stop and the heater will lockout. The ON/OFF button must be reset to re-attempt ignition.
There is smoke or an unusual smell upon initial use	This is caused by grease, oil or dust in or on the combustion chamber. This will stop after a short period. Increase the ventilation when using the appliance.

17. Fault Analysis

Note: Before carrying out resistance checks, disconnect power.

A: After pressing the ON/OFF Switch:

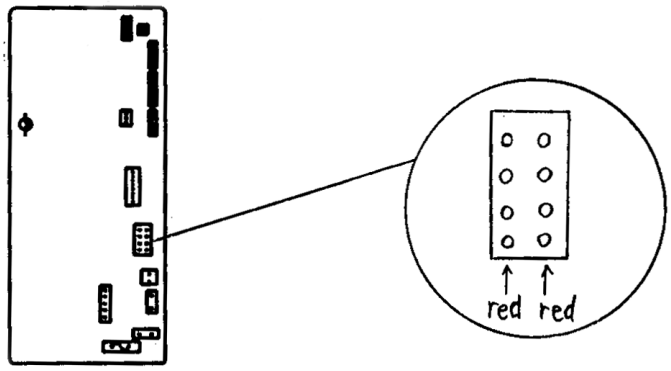
a.the room temperature and preset temperature indicators do not illuminate.
b. the convection fan does not begin to rotate.
c. the solenoid valves do not open.
d. there is no spark.

Is there electrical supply? NO →

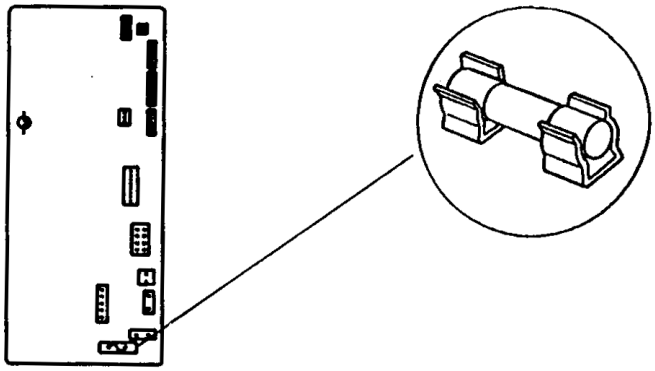
YES ↓

(see next page)

1. Check the transformer output voltage.



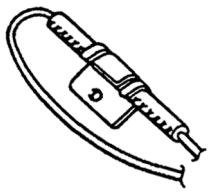
2. Is the 3 amp fuse blown?



a. The room temperature and preset temperature indicators do not illuminate.

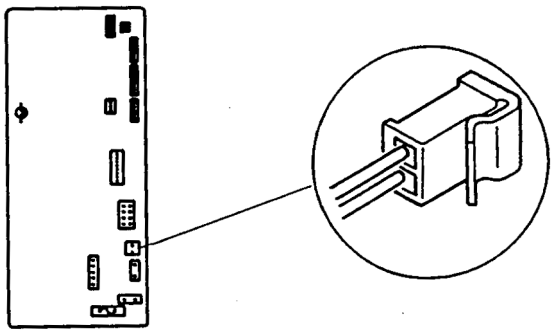
1. Broken wiring or loose pin connectors.
2. Faulty indicator PCB (ON/OFF switch).
3. Faulty PCB.
4. Thermal fuse has melted ("14" flashing).

Normal Value 0Ω
(Melts at 157°C



b. The convection fan does not begin to rotate.

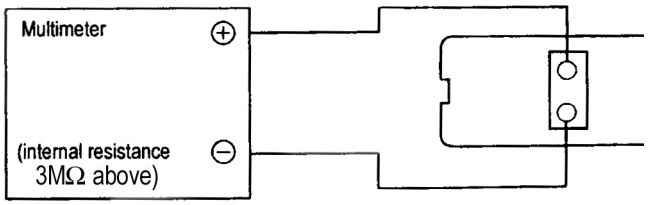
1. Convection fan shaft grub screw loose.
2. An obstruction in the convection fan is preventing the fan from rotating.
3. Faulty PCB.



Motor Coil Normal Value
90~210Ω

c. The solenoid valves do not open

1. Broken wiring or loose pin connectors.
2. Solenoid coil wiring has broken or shorted.



Normal Value

SV1	1.3~2.6kΩ
SV2	1.3~2.6kΩ
POV	78~100Ω

3. Faulty PCB.

d. There is no spark

1. High tension cord disconnected or broken.
2. Insulation leak from electrode etc.
3. Incorrect spark gap (Normal spark gap is 3.0 ~ 4.0 mm).
4. Faulty PCB.

B:After repeated efforts to operate the appliance, it will not ignite. (“11” indicated) (No warm air)

1. Air is in the gas supply.
2. Incorrect gas pressure (primary).
3. Incorrect gas type, or kink in the gas supply hose, or the hose is too long.
4. Faulty sparker.
5. Blocked injector.
6. Incorrect combustion specification. (Injector, restrictor, regulator pressure etc).

C:There is warm air, however the combustion indicator does not illuminate.

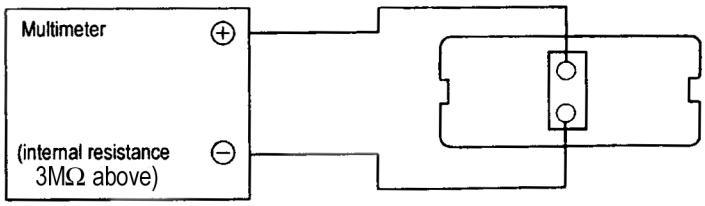
After one cycle of 15 seconds the spark stops and miss-ignition occurs.

Miss-ignition

No miss-ignition → 1. Faulty indicator/Incorrect wiring.
2. Faulty PCB.

Confirm thermocouple output

Thermocouple Output Checking Method
(Connect the multimeter to the output checking terminal at the back of the appliance).



Output Checking Terminal (Lower -, Upper +)

Is the output 14 mV DC or above?

NO → 1. Check combustion specification, gas type, and gas pressure.
2. Check the combustion.
3. Check thermocouple is firmly fixed.
4. Check the thermocouple (for short circuit/breakage).
5. Check the thermocouple height.*
* Specification varies depending on the gas type
(Refer combustion specification page)

YES

Faulty PCB

D:The flame fails during normal operation

1. Power failure. All indicators turned off. ON/OFF Switch ON after power reinstatement.
2. Tilt switch has activated. (“03” indicated).
3. A safety device has activated.
   - Air filter is blocked and OHS is activated (“14” indicated)
   - Incomplete Combustion Prevention Device (ODS) is activated due to insufficient ventilation.
   - Kink in the gas supply hose. Hose too long. (“12” indicated)
   - Gas pressure is abnormally low.
   - Clearances around the appliance are insufficient.
   - Obstructions around the heater. (Refer to Installation Instruction).

4. Safety devices are activated — Check wiring is not broken or pin connectors loose.

Flame failure occurs between 30 minutes to 1 hour after the ignition (“12” indicated)

↓

Incomplete combustion prevention device (ODS) possibly early cutoff.

↓

Check thermocouple output.

Confirm thermocouple output (mV) is stable and as shown in the table below.

Measure the output at High and Low combustion

	High Combustion	Low Combustion
NG	≥ mV	≥ 14mV
LP	≥ 14mV	≥ 14mV

YES ↓ Faulty PCB

NO →

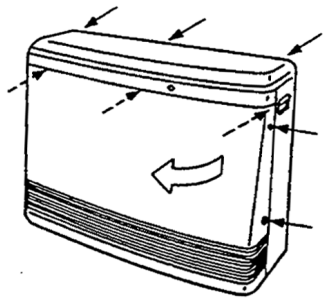
1. Check the regulator pressure, restrictor and injector all conform to the specification.
2. Faulty thermocouple and /or burner.
3. Check specification of thermocouple bracket, TC spacer etc.

Flashback (With large noise) and flame fails. "14" indicated

1. Blocked air filter.
2. Blocked burner or restrictor.
3. Dust or foreign matter in the combustion chamber.
4. Incorrect combustion specification or pressure setting.

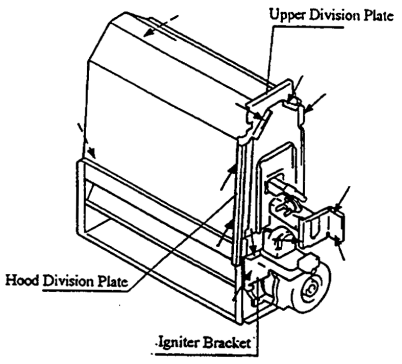
18. Gas Conversion

Diagram 1



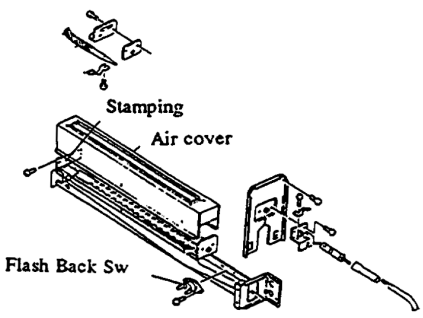
1. Remove 2 screws. Right hand side of front panel, pull complete front panel forward at RHS, unclip from escutcheon panel and remove from appliance. (Diagram 1)
2. Remove top panel, 6 screws. (Diagram 1)
3. Replace small gas label on gas inlet, and large gas label on back of appliance.
4. Place new very small gas label on Data Plate.
5. Complete details on conversion sticker, place sticker inside front panel.
6. Carefully disconnect 3 plugs from PCB.
7. Unclip thermal fuse. Disconnect OHS thermistor, 1 plug. Disconnect thermocouple from PCB. Disconnect flashback switch, don't pull on the wires.
8. Remove ignitor bracket, 1 screw.
9. Remove fan filter.
10. Disconnect High Tension lead from ignitor.
11. Undo main gas tube connection at solenoid, 1 screw. Remove "O" ring from aluminum housing and place on main gas tube (to avoid trapping "O" ring when replacing).
12. Remove injector holder, 3 screws, remove main gas tube.
13. Remove injector, 1 screw and clip.
14. Fit new main injector, secure with clip and screw.
15. Remove 2 screws securing combustion chamber at top rear of heater, and 2 screws at front base of combustion chamber. Remove combustion chamber (Diagram 2)
16. Remove main burner 2 screws on RHS, 2 screws on TC brt.

Diagram 2



17. Remove combustion chamber RH end cover and electrode, 2 screws (Diagram 3).
18. Remove flash back switch.
19. Remove stainless steel burner cover, 6 screws.
20. Remove injector bracket, 1 screw.
21. Propane burner is marked "4N". Natural Gas burner is marked "4C". Fit burner cover, flash back switch, RHS end covert, electrode and injector bracket to propane burner.

Diagram 3



22. Secure burner assembly to combustion chamber with the 2 screws on the RHS bracket.
23. Remove TC bracket from TC.
24. Fit TC to new bracket, for conversion to Propane, insert 2 spacers, to NG discard spacers.
25. Refit TC bracket to combustion chamber.
26. Refit injector holder to burner.

19. Gas Pressure Setting Procedure (New PCB)

* See “Combustion Specification” on page 3

1. Turn appliance OFF.

2. Remove test point screw, connect pressure gauge.

3. When unit has completely stopped operating, press the “SW1” switch at the top PCB panel.

4. Select the correct gas type code to appear on the LED display using “∧”(UP) and “∨” (Down) buttons. Current gas type code will indicate (13=NG, LP=LPG).

5. Pressing the PCB “SW1” again will record the gas type code. The LED display turns blank and the unit returns to normal OFF mode.

6. Press ON/OFF button and operate heater.

7. Press the “SW1” switch. “01:£”~”07:£” will indicate on the LED display, showing each combustion phase. (“00:£” is indicated for 5 secs after ignition sensed).

8. Press the “∨” buttonand change to low pressure mode. “01:£” will indicate on LED display. See dia. 2.

Pressure Setting [Low]:

	RCE-406TRH	RCE-506TRH	RCE-516TRH
NG	0.07kPa	0.07kPa	0.06kPa
Propane	0.13kPa	0.13kPa	0.13kPa

9. Adjust the secondary pressure using the regulator screw.

10. Press the “SW1” switch once to change to High pressure setting mode. “P-:--” will indicate on LED display. See diagram 2.

11. Adjust the high pressure using the “∨” and “∧” switch.

Pressure Setting [High]:

	RCE-406TRH	RCE-506TRH	RCE-516TRH
NG	0.67kPa	0.90kPa	0.94kPa
Propane	0.99kPa	1.37kPa	1.63kPa

12. Press the “Function Lock” switch. High pressure setting data is recorded when indicator changes to “07:¢£” (If “Function Lock” switch is not pressed for 12. respectively, pressing the Test switch , ON/OFF button cancels pressure). See diagram 3.

13. Press ON/OFF switch to stop (otherwise unit will not return to normal operation).

14. Remove pressure gauge, replace screw.

Diagram 1

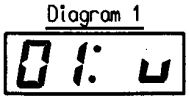


Diagram 2

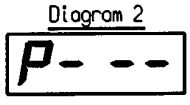
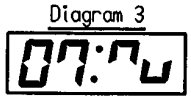


Diagram 3



20. Gas Pressure Setting Procedure (Old PCB)

* See “Combustion Specification” on page 3

1. Set dip switches to correct position. See diagram opposite.

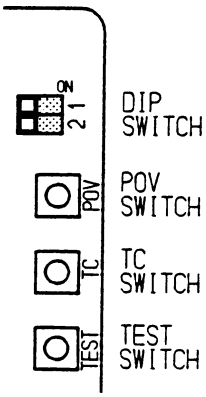
RCE-506/406TR RCE-516TR

2. Remove test point screw, connect pressure gauge.

3. With appliance operating, push TEST SWITCH once, (see diagram opposite).

4. Press the “∨” buttonon the control panel until the temperature control displays “01”.

5. Adjust the LOW pressure using the regulator screw



Pressure Setting [Low]:

	RCE-406TRH	RCE-506TRH	RCE-516TRH
NG	0.07kPa	0.07kPa	0.06kPa
Propane	0.13kPa	0.13kPa	0.13kPa

6. Adjust the secondary pressure using the regulator screw.

7. Press the “POV” button once. The indicator will display “P-:--”. (see diagram opposite).

8. Adjust the “**HIGH**” pressure using the “∨” and “∧” button on the control panel.

Pressure Setting [High]:

	RCE-406TRH	RCE-506TRH	RCE-516TRH
NG	0.67kPa	0.90kPa	0.94kPa
Propane	0.99kPa	1.37kPa	1.63kPa

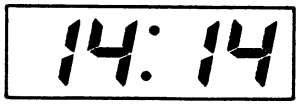
9. Press the **POV SWITCH** again, when “07” is displayed data is recorded.

10. Press **TC SWITCH.**

11. Adjust the “∨” button for HIGH combustion and “∧” button for **LOW** combustion. The two digits on the L/H are **HIGH** combustion and two digits on the R/H are **LOW** combustion of the indicator. (The TC level display changes in units of two “12” “14” etc) (Display should be as shown in the diagram opposite after setting).

Natural Gas

Propane



12. Press **TC SWITCH** to record TC levels and **TEST SWITCH** once to return to normal operation.

13. Remove pressure gauge, replace screw.

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**

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

1. Removal of the Front Panel

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

a. Remove two (2) screws securing the front panel (Right hand side).

b. Pull forward from right hand side and disengage from lugs on left hand side.

2. Removal of the Top Control Panel Assy

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

a. Follow removal of Front Panel section.

b. Remove six (6) screws from control panel, (3) screws to the rear and 3 screws to the front).

c. Disconnect wiring loom 3 connectors from main PCB.

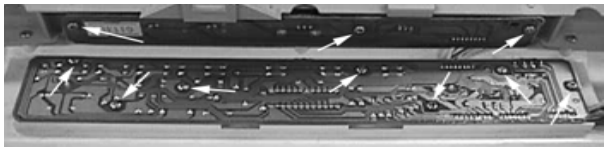
3. Removal of the Control & Indicator PCB

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

a. Follow removal of Front Panel section.

b. Follow removal of Top Control Panel Assy section.

c. Remove seven (7) screws from the control panel PCB.



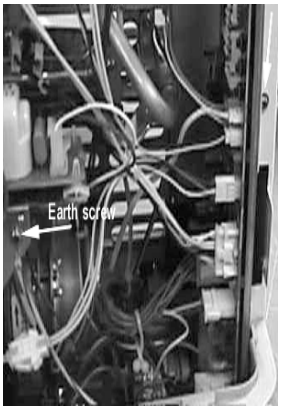
d. Remove three (3) screws from the Indicator PCB to release.

4. Removal of the main PCB

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

a. Follow removal of Front panel section.

b. Remove one (1) screw, lift out and unclip connectors. Remove earth screw from sparker bracket.

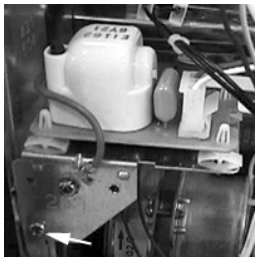


5. Removal of the Sparker PCB

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

a. Follow removal of Front Panel section.

b. Remove one (1) screw from bottom of bracket.



c. Remove high tension lead and one (1) connector.

d. Unclip sparker PCB from bracket.

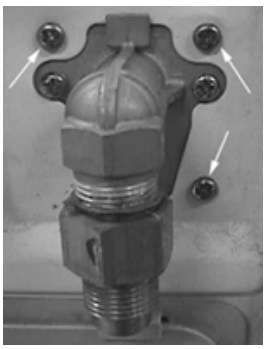
6. Removal of the Gas Control Assembly

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

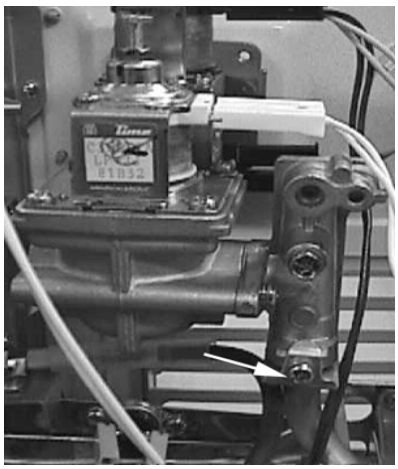
a. Follow removal of Front Panel section.

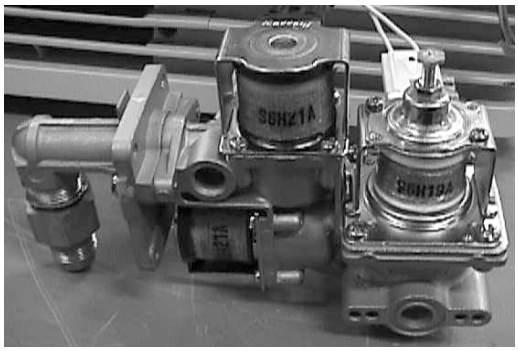
b. Disconnect the gas supply hose at rear of the appliance.

c. Remove three (3) screws from the gas control at the rear of appliance.



d. Remove one (1) screw from front of gas supply tube , disengage tube locking bracket and remove gas control assy.





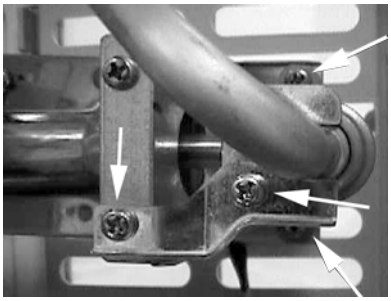
Note: Don't loose the O-ring from the gas supply tube when removing from gas control assy.

7. Removal of the Injector

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

a. Follow removal of Front Panel section.

b. Remove four (4) screws from injector block and bracket.



c. Remove one (1) screw from front of gas supply tube and disengage tube locking bracket.

d. Pull injector out to remove.

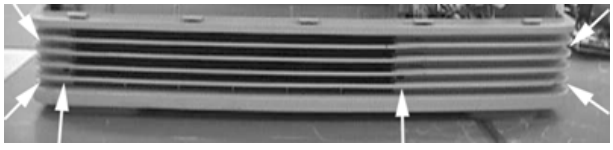
Note: Don't loose the O-ring from the gas supply tube when removing gas supply pipe from gas control assy.

8. Removal of the Bottom Louvre Assy

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

a. Follow removal of Front Panel section.

b. Remove six (6) screws from bottom louvre.



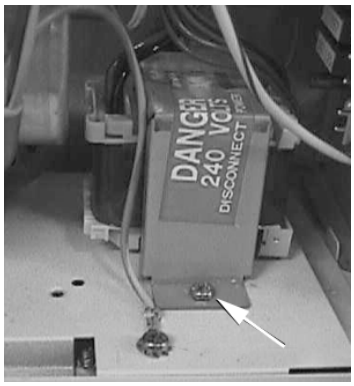
9. Removal of the Transformer

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

a. Follow removal of Front Panel section.

b. Follow removal of Bottom Louvre Assy section.

c. Remove one (1) screw at front and slide transformer forward out of bracket from rear.



10. Removal of the Combustion Chamber

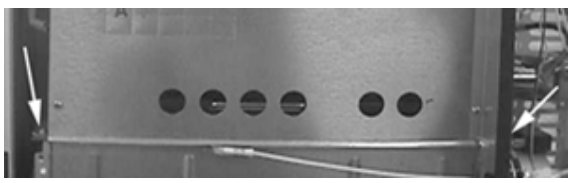
CAUTION
240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with the neon screwdriver or multimeter.

a. Follow removal of Front Panel section.

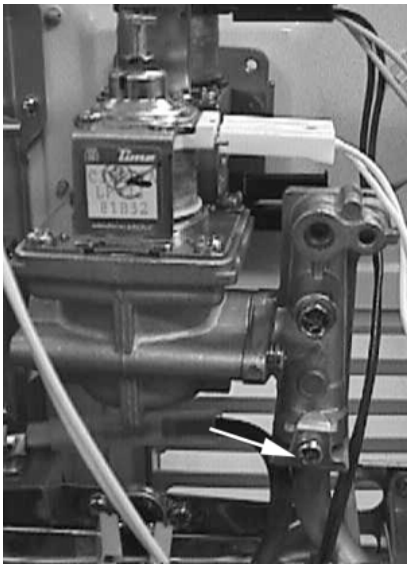
b. Remove Filter from rear of appliance.

c. Remove two (2) screws from top rear of appliance.

d. Remove two (2) screws on both sides of combustion chamber base.



e. Remove one (1) gas supply tube securing screw and disengage tube locking bracket.



f. Remove two (2) connectors from Overheat switch.

g. Unclip connectors in harness and remove thermal fuse from bracket. Manoeuvre combustion chamber out of appliance completely.

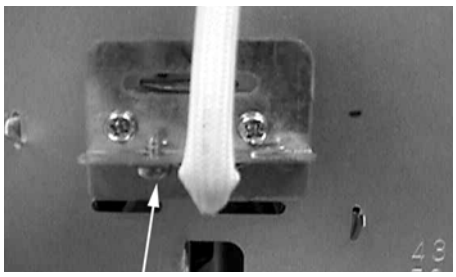
11. Removal of the Thermocouple

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

a. Follow removal of Front Panel section.

b. Follow removal of Combustion Chamber.

c. Remove one (1) screw from bottom bracket to remove thermocouple and remove connector from main PCB.



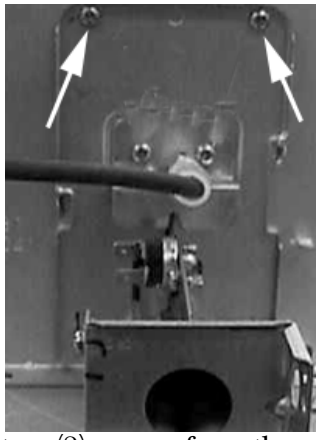
12.Removal of the Main Burner

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

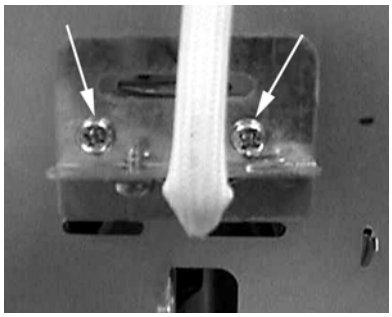
a. Follow removal of Front Panel section.

b. Follow removal of Combustion Chamber section.

c. Remove two (2) screws from top of locating bracket.

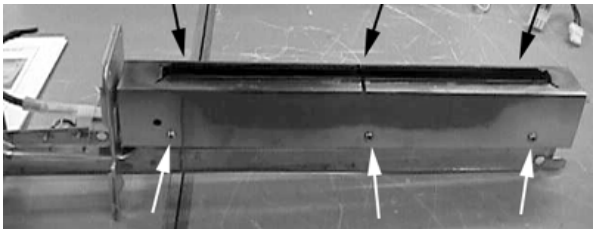


d. Remove two (2) screws from thermocouple bracket.



e. Lift top tube to release burner and pull out of combustion chamber.

f. Remove six (6) screws to remove burner cover shield.



13.Removal of the Convection Assy

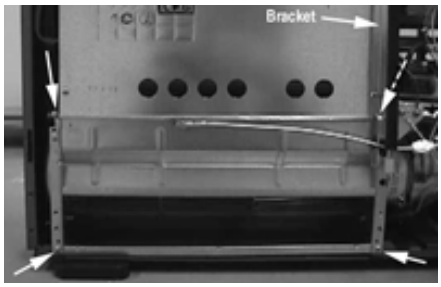
CAUTION
240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with the neon screwdriver or multimeter.

a. Follow removal of Front Panel section.

b. Follow removal of Bottom Louvre section.

c. Follow removal of sparker PCB.

d. Remove four (4) screws from fan assy, 2 at btm frt of appliance & 2 at top L/H & R/H corner.

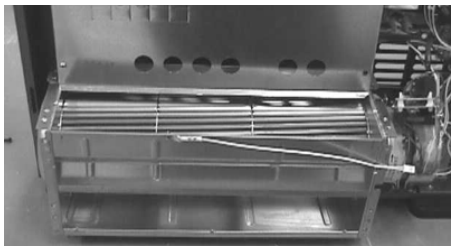


e. Remove two (2) screws from rear of heater.

f. Remove bracket two (2) screws from combustion chamber.

g. Disconnect connectors from main PCB.

h. Slide fan forward to remove.



14.Removal of the Spark Electrode

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

a. Follow removal of Front Panel section.

b. Follow removal of Top Control Panel Assy section.

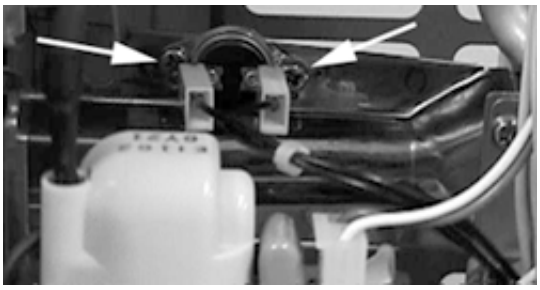
c. Remove one (1) screw to remove spark electrode.

15.Removal of the Overheat Switch

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

a. Follow removal of Front Panel section.

b. Disconnect two (2) connectors from overheat switch.



c. Remove two (2) screws to remove switch.

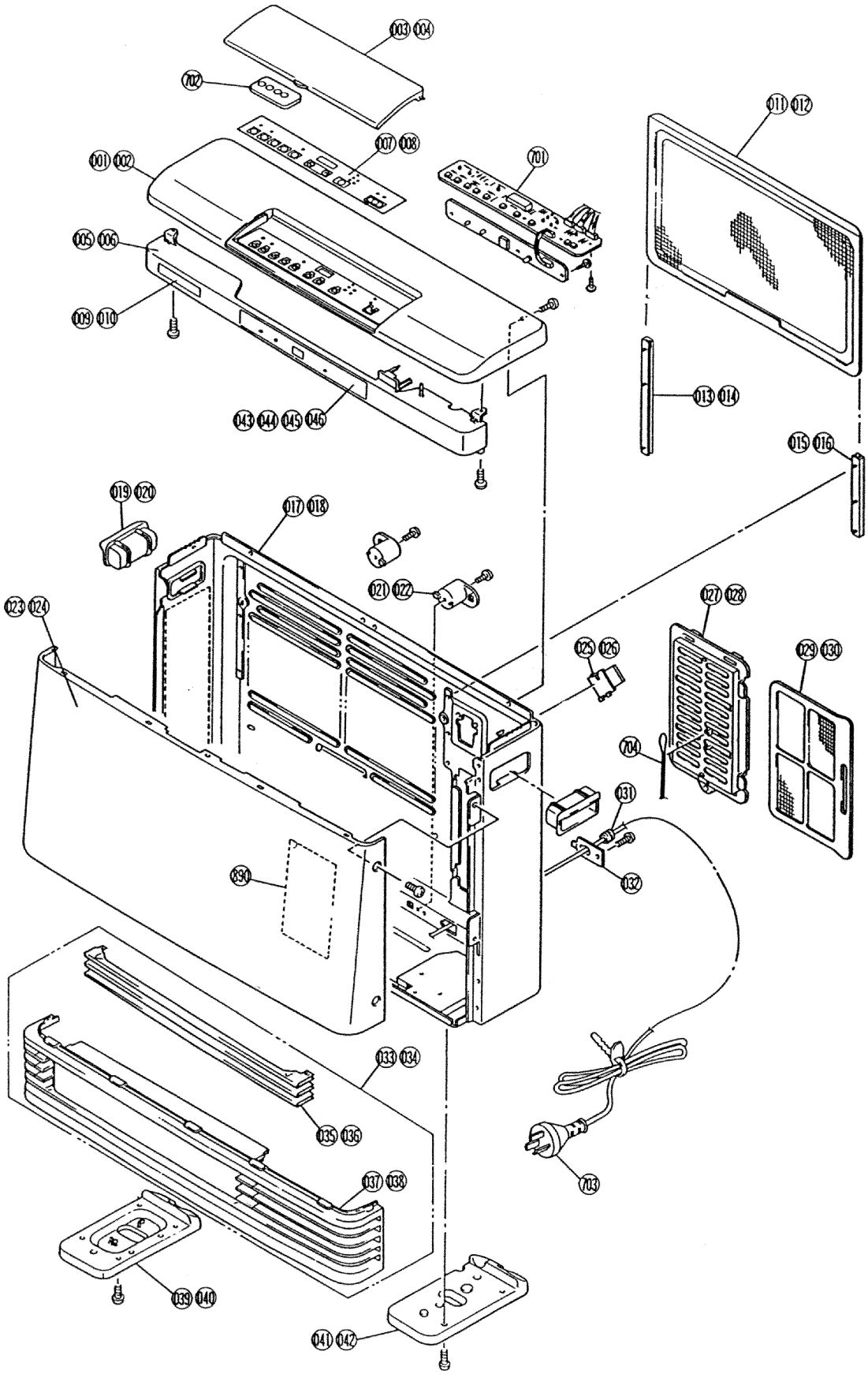
16.Removal of the Thermistor

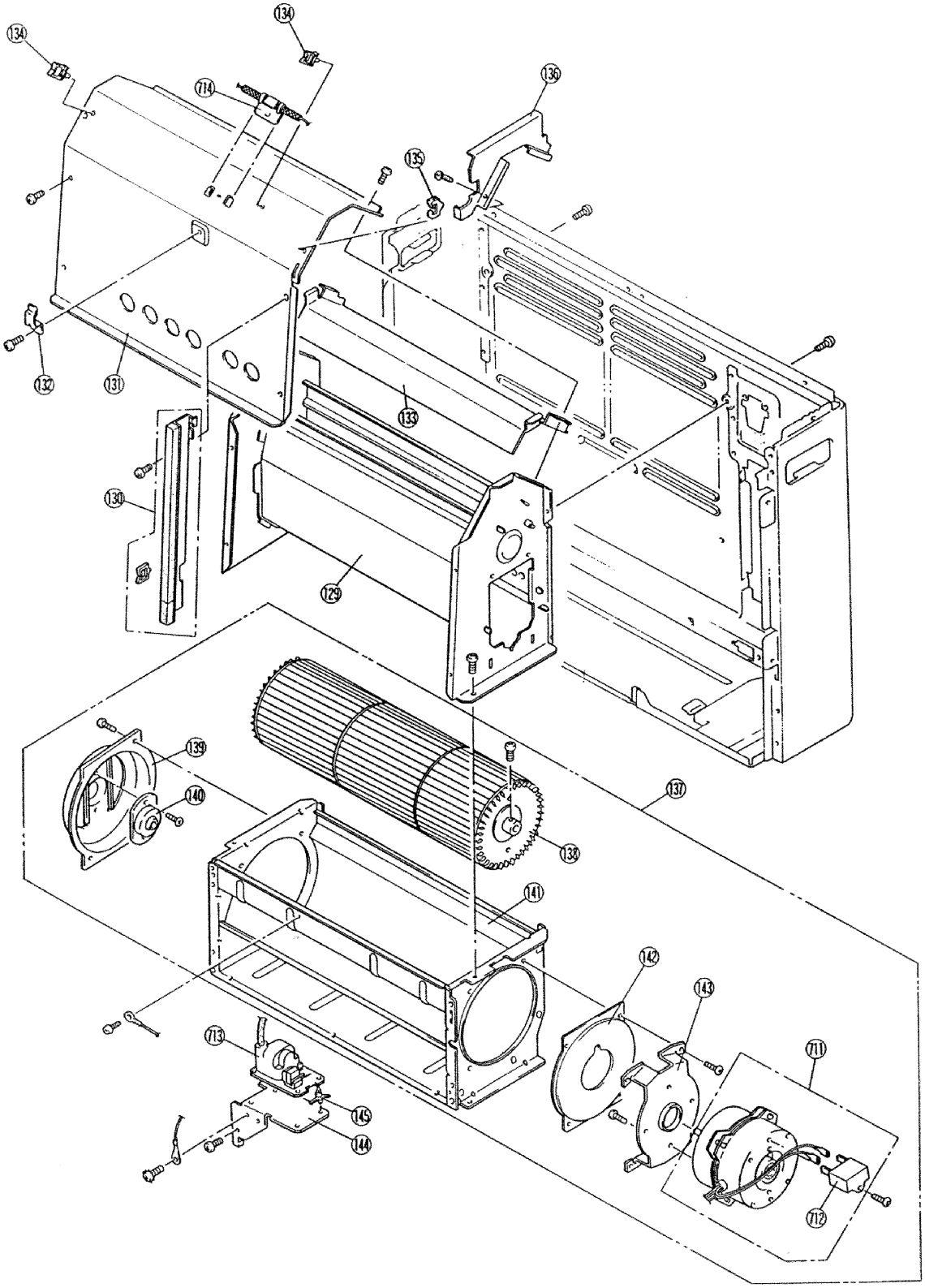
CAUTION
240 Volt exposure. Isolate the electrical supply to the appliance and reconfirm with the neon screwdriver or multimeter.

a. Follow removal of front panel section.

b. Using long nose pliars disengage thermistor from two (2) brackets on rear louvre.

22. Exploded Diagrams

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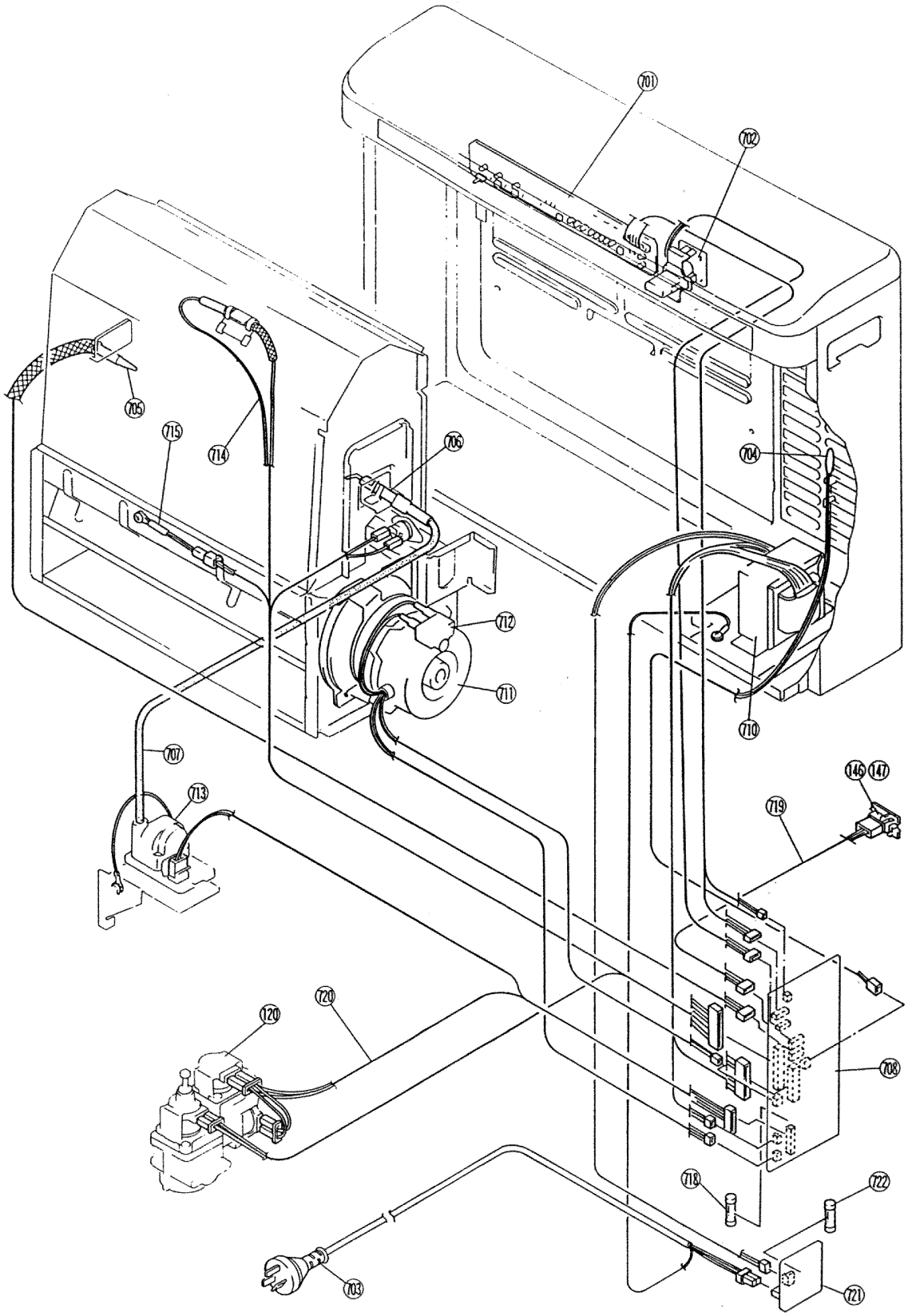
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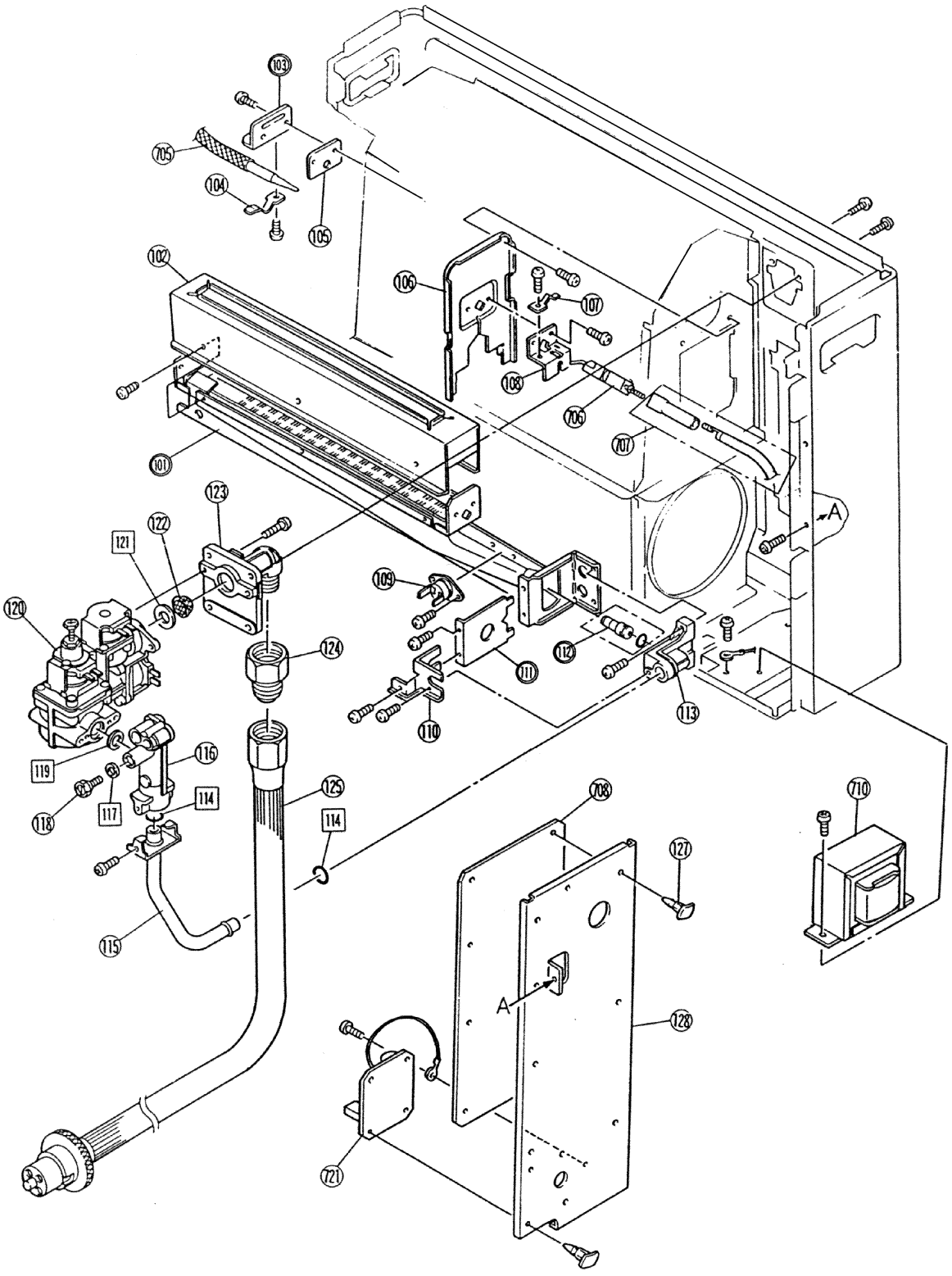
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23. Parts List

No.	RJ Part No.	Part Name	RA Part No.	Qty
001	RC-516-116-1x04	Top Panel 1, Beige	90179920	1
002	RC-516-116-2x04	Top Panel 2, Gun Metal	90179938	1
003	RC-516-117-1x01	Control Panel Lid 1, Beige	90180118	1
004	RC-516-117-2x01	Control Panel Lid 2, Gun Metal	90180126	1
005	RC-504-21-3x02	Escutcheon Panel T3, White	90180134	1
006	RC-504-21-4x02	Escutcheon Panel T4, Gun Metal	90180142	1
007	RC-516-118-1	Control Panel Label, White	90180159	1
008	RC-516-118-2x01	Control Panel Label, Gun Metal	90180167	1
009	RC-516-121-1	Rinnai Badge, White	90180175	1
010	RC-516-121-2	Rinnai Badge, Gun Metal	90180183	1
011	RC-409-21-1x02	Air Filter Assembly A, White	90176165	1
012	RC-409-21-2x02	Air Filter Assembly B, Gun Metal	90176173	1
013	RC-209-15-1x02	Air Filter Bracket A, White	90177049	1
014	RC-209-15-2x02	Air Filter Bracket B, Gun Metal	90177056	1
015	RC-504-33-1	Air Filter Bracket A, White	90177064	1
016	RC-504-33-2	Air Filter Bracket B, Gun Metal	90177072	1
017	RC-516-27-2-1x03	Rear Panel Assembly 2A, White		1
018	RC-516-27-2-2x03	Rear Panel Assembly 2B, Gun Metal		1
019	650P-69-3x01	Handle, White	90176181	2
020	650P-69-17	Handle, Gun Metal	90176199	2
021	REH211-22	Electrical Cord Holder, White	90176207	2
022	REH211-22-2	Electrical Cord Holder, Gun Metal	90176215	2
023	RC-504-52-1-2x01	Front Panel C, White	90176223	1
024	RC-504-52-1-1x01	Front Panel F, Gun Metal	90176231	1
025	REH211-20	Hose Clip, White	90176249	1
026	REH211-20-2	Hose Clip, Gun Metal	90176256	1
027	RC-504-52-1-2x01	PCB Filter Case A2, White	90176264	1
028	RC-504-52-1-1x01	PCB Filter Case A1, Gun Metal	90176272	1
029	RC-504-54-1x01	PCB Filter A, White	90176280	1
030	RC-504-54-2x01	PCB Filter B, Gun Metal	90176298	1
031	CP-90137	Electrical Cord Bush	90177106	1
032	RC-329-1033x01	Electrical Cord Fixing Bracket	90177114	1
033	RC-506-21-3x01	Louvre Complete Assembly C, Beige	90176306	1
034	RC-506-21-2x01	Louvre Complete Assembly B, Gun Metal	90176314	1
035	RC-506-23-3	Louvre Insert C, Beige		3
036	RC-506-23-2x01	Louvre Insert B, Gun Metal		3
037	RC-506-22-3x01	Main Louvre C, Beige		1
038	RC-506-22-2x02	Main Louvre B, Gun Metal		1

No.	RJ Part No.	Part Name	RA Part No.	Qty
039	RC-501-45-5x05	Foot LHS E, White	90176348	1
040	RC-501-45-4x05	Foot LHS D, Gun Metal	90176355	1
041	RC-409-26-5x03	Foot RHS E, White	90176363	1
042	RC-409-26-4x03	Foot RHS D, Gun Metal	90176371	1
043	RC-516-120-1x01	Escutcheon Panel Label 506, White	90180191	1
044	RC-516-120-2x01	Escutcheon Panel Label 506, Gun Metal	90180209	1
045	RC-516-124-1x01	Escutcheon Panel Label 516, White	90180217	1
046	RC-516-124-2x01	Escutcheon Panel Label 516, Gun Metal	90180225	1
046		Escutcheon Panel Label 406, White	90180220	1
101	RC-504-180x03	Burner Assembly, N.G.	90176389	1
101	RC-504-185x05	Burner Assembly, L.P.G.	90176397	1
102	RC-408-14-1x06	Secondary Aeration Cover, N.G.	90176405	1
102	RC-408-14-2x06	Secondary Aeration Cover, Prop. G.		1
103	RC-208-25x02	Thermocouple Bracket, N.G.	90176413	1
103	RC-208-25-3x01	Thermocouple Bracket, Prop. G.	90176421	1
104	RC-210-89x01	Thermocouple Clip	90176439	1
105	RC-208-64-3	Thermocouple Spacer C, Prop. G.	90176447	2
106	RC-208-37x07	Burner Cover		1
107	3120B-2213x01	Electrode Clip	90176462	1
108	RC-231-32	Electrode Fixing Bracket	90176470	1
109	ES-01168	Over Heat Switch (80°C OFF)	90176488	1
110	RC-208-21x02	Injector/Gas Tube Clip		1
111	RC-208-23-19x01	Restrictor, N.G. 506 / 406	90176504	1
111	RC-208-23-22x01	Restrictor, Prop. G. 506 / 406	90176520	1
111	RC-208-23-22x01	Restrictor, N. G. 516	90176520	1
111	RC-208-23-22x01	Restrictor, Prop. G. 516	90176520	1
112	RC-208-11-2-2.1	Main Injector, N.G. 506 / 406	90176538	1
112	RC-208-11-2-2.25	Main Injector, N.G. 516	90179888	1
112	RC-208-11-1-1.5	Main Injector, Prop. G. 506 / 516 / 406	90176546	1
113	RC-208-22	Injector Holder	90176553	1
114	C14K2-5	"O" Ring, P10	90176561	2
115	RC-516-30x01	Gas Supply Tube Assembly	90176579	1
116	RC-417-32-2	Manifold	90176587	1
117	CP-30094x02	Pressure Point Packing		1
118	C10D-3	Pressure Test Point Screw	92068907	1
119	M10B-13-14	"O" Ring (S14)	90176611	1
120	C36L-1	Gas Control Assembly	90176629	1
121	C3I1-7x01	Packing	90176637	1
122	RHF250-212x02	Gas Filter	90176645	1
123	RC-501-14	Gas Inlet Flange	90176652	1

No.	RJ Part No.	Part Name	RA Part No.	Qty
124	CP-30463	Gas Inlet Bush		1
125	CP-30405B	Hose Assembly		1
127	CP-90204-6	Circuit Board Spacer		7
128	RC-516-123	P.C.B. Bracket		1
129	RC-504-80x06	Combustion Chamber		1
130	RC-504-43	Combustion Chamber Divider		1
131	RC-504-16-2	Combustion Chamber Hood B		1
132	RC-504-67	Combustion Chamber Retaining Bracket		1
133	RC-504-15	Combustion Chamber Distribution Panel		1
134	CP-90203-1	Wire Saddle	90176728	2
135	CP-90207	Edge Holder	90176736	1
136	RC-516-127	Combustion Chamber Upper Divider		1
137	RC-516-16	Convection Fan Complete Assembly	90176751	1
138	RC-501-68	Convection Fan		1
139	RC-504-32	End Housing		1
140	RC-223-74	LHS Bearing	90156704	1
141	RC-501-67-2x02	Convection Fan Casing Assembly		1
142	RC-501-73x02	Convection Fan Motor Cover		1
143	RC-332-34	Convection Fan Motor Base		1
144	RC-209-83x03	Sparker Bracket		1
145	CP-90205-3	Circuit Board Spacer	90177007	4
146	RC-334-73-2	Thermocouple Check Holder, White		1
147	RC-334-73-1	Thermocouple Check Holder, Gun Metal		1
701	RC-516-119	Control P.C.B. Unit	90180233	1
702	556F-1017	Remote Control	90175555	1
703	CP-90465-1	Electrical Cord Assembly	90178161	1
704	RC-215-75x02	Thermistor Assembly	90176827	1
705	RC-231-35-2	Thermocouple Assembly	90178758	1
706	RC-223-55x01	Electrode	90137332	1
707	3320T-0271-3	High Tension Lead Assembly	90176850	1
708	ED-242	Main P.C.B. Unit	90180241	1
*	EP-102-13	Surge Absorber (Pre 96)	90176876	1
710	ET-193	Transformer Assembly - Aust (240V)	90180258	1
710	ET-194	Transformer Assembly - NZ (230V)		
711	RC-516-17	Convection Fan Motor		1
712	ES-19001-1	Capacitor (2.5µF)	90170457	1
713	EI-163	Sparker Assembly	90176918	1
714	RC-516-125	Thermal Fuse Harness	90180265	1
715	RC-215-96x01	High Limit Thermistor Assembly	90176934	1
*	RC-241-45-1	T/couple Checking Connection Harness		1
*	RC-506-41	240V 3A Glass Tube Fuse (Harness) (Pre 96	90176983	1
718	ES-03006	125V 3A Glass Tube Fuse		1
719	RC-215-99x01	Thermocouple Check Holder (Pre 96)	90176975	1
719	RC-516-128-1	Thermocouple Check Holder (Post 96)		1
720	RC-506-41	SV/Sparker Harness	90176983	1
721	ED-189x01	Surge Protector PCB (Post 96)	90150426	1
722	EP-102-13	Fuse (Post 96)		1

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