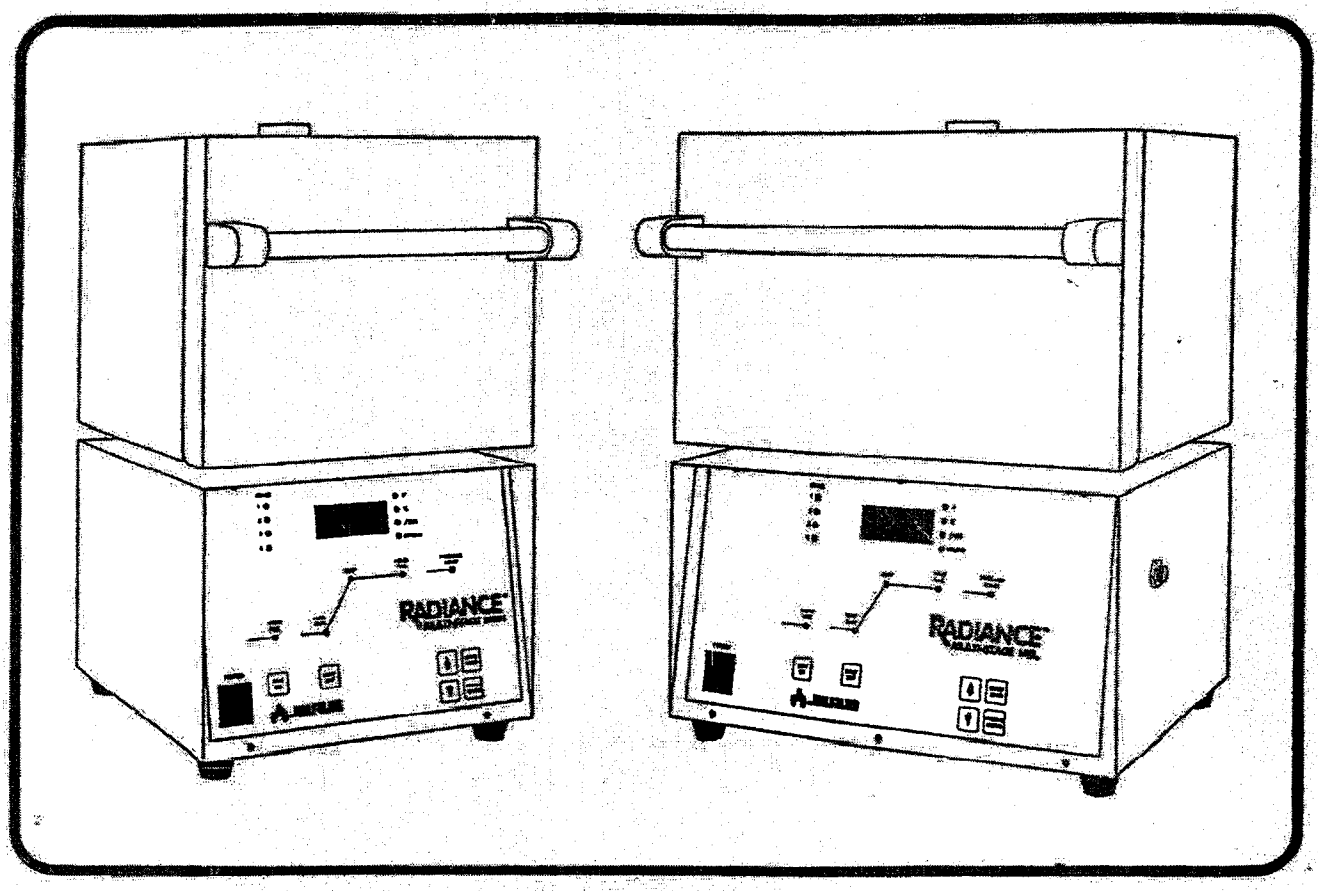
RADIANCE™ MULTI-STAGE

BURNOUT FURNACE



OPERATOR'S MANUAL

ISO 9001

JELRUS INTERNATIONAL

SPECIFICATIONS

	RADIANCE MSM	RADIANCE MSL
Electrical	100V 50/60Hz 1150W 115V 50/60Hz 1150W 220/230V 50/60Hz 1150W 240V 50/60Hz 1150W	100V 50/60Hz 1610W 115V 50/60Hz 1610W 220/230V 50/60Hz 1610W 240V 50/60Hz 1610W
Capacity	8 - 1 3/4" rings or 2 - 3" rings	15 - 1 3/4" rings or 5 - 1 3/4" rings and 3 - 3" rings
Overall Dimensions	10-3/4"W x 13-7/8"D x 18-3/4"H (27.3 cm x 35.2 cm x 47.6 cm)	14-1/2W x 14-3/8"D x 18-3/4"H (36.8 cm x 36.5 cm x 47.6 cm)
Heating Chamber Dimensions	5-1/2"W x 5-1/4"D x 5-1/8"H (14.0 cm x 13.3 cm x 13.0 cm)	9-1/8"W x 5-1/4"D x 5-1/8"H (23.2 cm x 13.3 cm x 13.0 cm)

RADIANCE MSM AND MSL

Number of Programs	30
NIGHT TIME (DELAY START)	0 - 99 hours Note: This is the time required for the program to be completed and ready to cast.
HEAT RATE[1] (Stage 1)	a. 1 - 30°F / min (1 - 17 °C / min) b. "FULL" Stage heats at the maximum rate attainable.
HEAT RATE[1] (Stages 2, 3 & 4)	a. 1 - 30°F / min (1 - 17 °C / min) b. "FULL" Stage heats at the maximum rate attainable. c. "NO" Stage is not used. b. "COOL" Stage cools down to the programmed temperature. Note: If "NO" is selected for a stage, that stage and all subsequent stages will not be used. The furnace, therefore, can be used for one, two, three or four stage operation.
TEMP Temperature	a. Stage 1: 150°F - 2012°F (66°C - 1100°C) b. Stages 2, 3, 4: 100°F - 2012°F (38°C - 1100°C)
HOLD TIME	0 - 4 hours

[1] Programmable heat rates. Actual heat rate at high temperatures may be lower depending upon furnace load and electrical voltage.

INTRODUCTION

Thank you for purchasing a Radiance Burnout Furnace. We have designed and manufactured this furnace using the latest in microcomputer technology to give you many years of dependable service. The controls on your new Radiance are different from those you may be used to for an ordinary burnout furnace. PLEASE READ THESE INSTRUCTIONS CAREFULLY. You will find that the Radiance is easy to program and operate.

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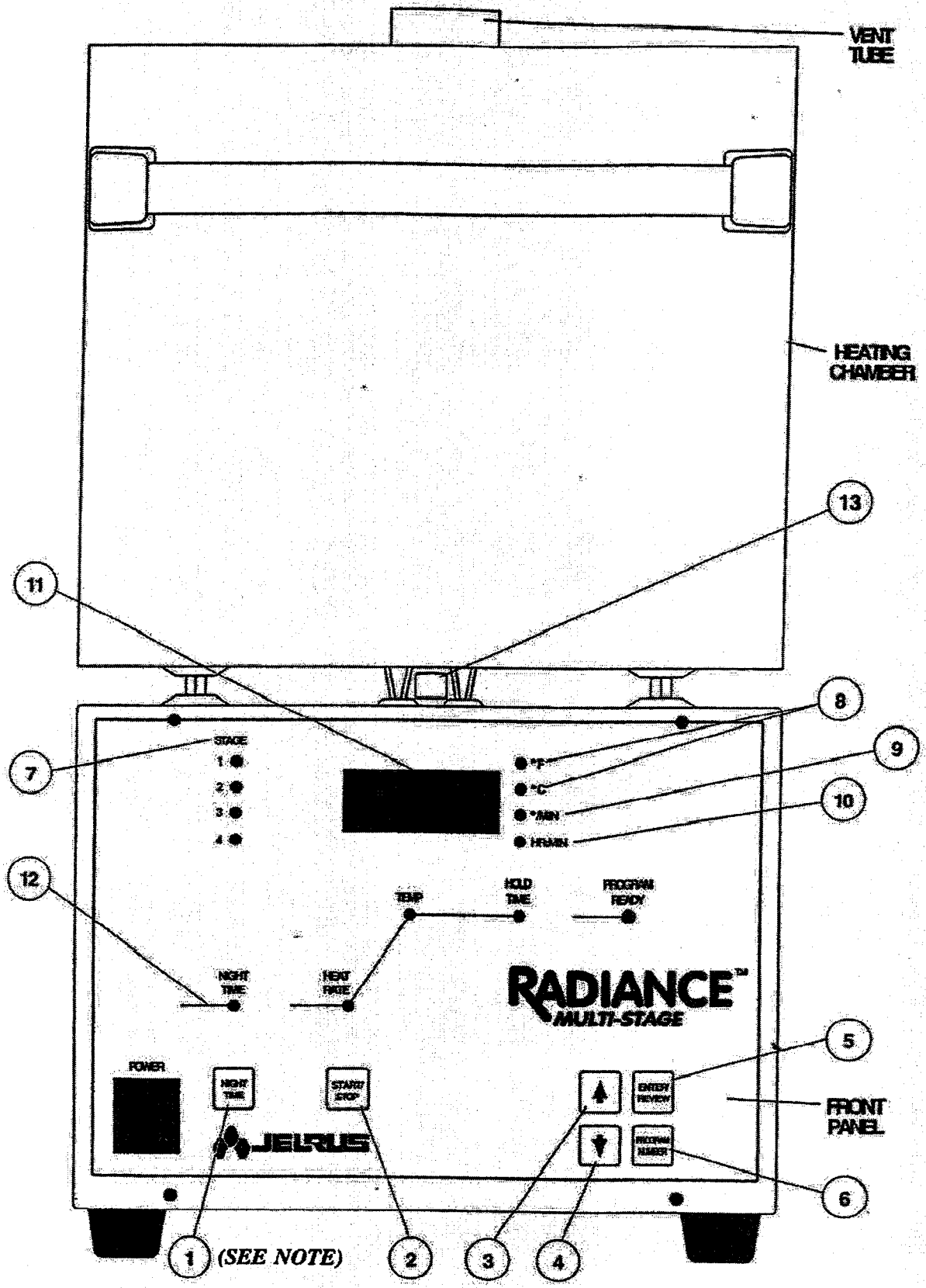
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IDENTIFICATION AND EXPLANATION OF KEY PARTS

FRONT PANEL (Figure 1)

DISPLAY	DESCRIPTION
1. NIGHT TIME (DELAY START)	Press to start a delayed program. The number entered is the time required for the program to be **COMPLETED AND READY TO CAST.** ***When a program is running, press to display the time remaining to complete the program.***
2. START / STOP	Press to start or stop a program.
3. ↑	Press to increase a number. The longer the button is pressed, the faster the numbers change.
4. ↓	Press to decrease a number. The longer the button is pressed, the faster the numbers change.
5. ENTER / REVIEW	When programming or reviewing a program in process, press to advance to the next parameter.
6. PROGRAM NUMBER	Press to select a program or to review the program currently running.
7. STAGE 1-2-3-4	While programming, the number of active stages are illumInated. In the burnout process, the current STAGE flashes.
8. °F and °C	Identifies the temperature scale. Flashes during an automatic calibration process.
9. °/MIN	Identifies the heat rate.
10. HR:MIN	Indicates time. When flashing it indicates that a power failure has occurred.
11. Main Display	A. The 4 digit display indicates the chamber temperature. B. When programming or reviewing, indicates PROGRAM NUMBER, NIGHT TIME (DELAY START) (time to completion), HEAT RATE, TEMP and HOLD TIME. C. Displays special words and error codes.
12. Program Status Graph	Indicates status of the burnout process.
13. Door Interlock Safety Switch	Shuts off electrical power from the heating plates when the furnace door is opened.

FIG. 1 - RADIANCE MSM AND MSL IDENTIFICATION

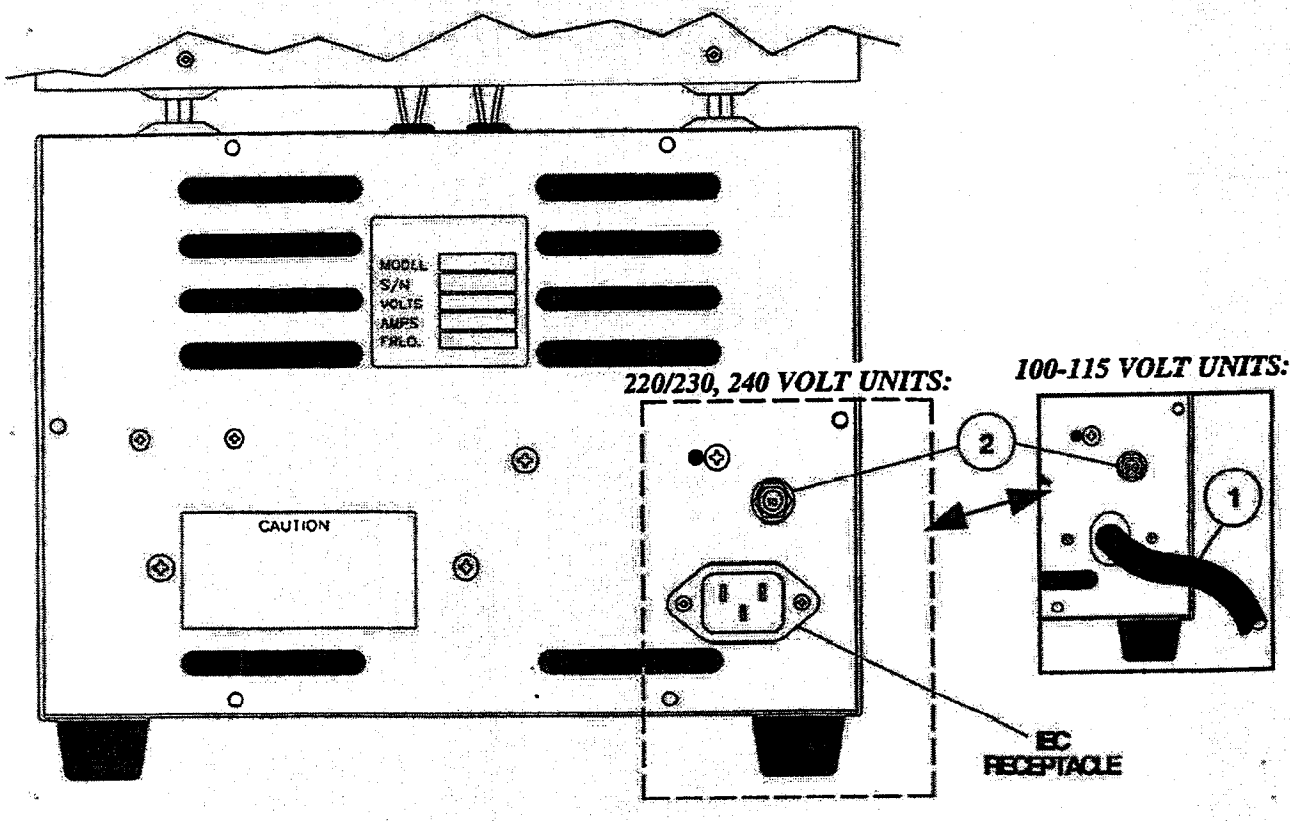


IDENTIFICATION AND EXPLANATION OF KEY PARTS

LOWER BACK PANEL (Figure 2)

DISPLAY	DESCRIPTION
1. Power Cord	A. On 100V and 115V furnaces, the AC power cord is permanently connected to the unit. B. On 220/230V and 240V furnaces, the AC power cord is detachable and connects to a standard IEC receptacle. C. AC power cords are provided to correspond to receptacles that are available in a specific country.
2. Circuit Breaker	Protects circuitry from electrical overload. - Black button will "pop out" if overload is present - To reset, wait one minute and push black button into body of circuit breaker.

FIG. 2 - RADIANCE LOWER BACK PANEL



UNPACK AND SET-UP

1. Unpack the contents of the box. Open the furnace door, remove the following materials:
   A. Vent Tube - Remove from bubble wrap and insert in hole on top of furnace.
   B. Calibration Tablet Kit - Remove plastic bag containing two tablets and save for future use.
   C. Burnout Tray - Remove tray(s) from bubble wrap and install on the floor of the chamber.

2. Place the furnace in position allowing a minimum of 2 inches (5 cm) of air space on all sides.

3. Plug the power cord into a wall receptacle. On 220/230V and 240 furnaces, first connect the power cord to the IEC receptacle located on the rear of the furnace. A separate electrical circuit is recommended. The voltage rating of your furnace is on the serial number plate.

4. The furnace is now ready for operation.

CAUTIONS:
Do not install closer than 2" (5 cm) from any combustible material. DO NOT BLOCK VENT HOLE ON TOP OF THE FURNACE. Hot gases are vented through this hole.

TO SET TEMPERATURE SCALE (Figure 1)

115V furnaces are pre-set in degrees Fahrenheit.
100, 220/230 and 240V furnaces are pre-set in degrees Celsius.

1. Turn the power switch on. (If the furnace is already on, be sure it is in the idle mode - no program is running.) The chamber temperature appears on the Main Display and the °C or °F light goes on.

2. Press ↑↓ at the same time. The degree light switches to the opposite temperature scale.

INSTALLATION

TO TURN THE "BEEP" ON AND OFF (Figure 1)

When a program is completed, 20 "beeps" sound every 15 minutes to remind the operator that the material is ready to cast.

1. Be sure the Radiance is in the idle mode - no program is running.
2. Press ↑ and (while holding) press PROGRAM NUMBER to display the status of the "beep." "ON" indicates the beep is active. "OFF" indicates the beep is inactive.
3. Use either of the ↑↓ to turn the "beeps" on or off.
4. To return to the idle mode, wait 7 seconds or press STOP/START twice. (If STOP/START is pressed once, cycle starts.)

PROGRAM AND OPERATE - ONE STAGE PROGRAM (Figure 1)

1. Turn the power switch on.

2. Press PROGRAM NUMBER. Use ↑↓ to display the desired program number (P1 - P30).

3. Press ENTER / REVIEW to select the displayed PROGRAM NUMBER. STAGE 1 and NIGHT TIME (DELAY START) lights turn on. Enter ↑↓ to set the time required for the program to be completed and ready to cast (1 - 99 hrs.).

4. Press ENTER / REVIEW. STAGE 1 light remains on, NIGHT TIME (DELAY START) light turns off and HEAT RATE light turns on. Enter ↑↓ to select the heat rate required from 1°F - 30°F/min (1C° - 17°C/min) or "FULL" for the maximum heat rate.

5. Press ENTER / REVIEW. STAGE 1 light remains on, HEAT RATE light turns off and TEMP light turns on. Enter ↑↓ to select the temperature required up to a maximum of 2012°F (1100°C).

6. Press ENTER / REVIEW. STAGE 1 light remains on, TEMP light turns off and HOLD TIME light turns on. Enter ↑↓ to program the time needed to hold at above temperature. (0 - 4 hrs) .

7. For one stage, the furnace must be programmed not to use STAGE 2, 3 or 4. Follow these steps:
   A. After completing step 6, press ENTER / REVIEW. STAGE 1 light turns off, STAGE 2 and HEAT RATE lights turn on.
   B. Press ↓. Main Display shows "....5,4,3,2,1, COOL, NO.". Select "NO" to program the furnace not to use STAGE 2, 3 or 4.

8. All necessary information for this program is now entered.

9. To run the program immediately, press START / STOP.

10. To delay the start of the program to be ready to cast at the pre-set time (see Step 3), press NIGHT TIME (DELAY START).

NOTE: If NIGHT TIME (DELAY START) is pressed while a program is running, the time remaining for completion of the program will appear on the Main Display for 5 seconds.

OPERATION

PROGRAM AND OPERATE - TWO STAGE PROGRAM (Figure 1)

1. Follow One Stage Program, Steps 1 - 6.

2. Press ENTER / REVIEW. STAGE 1 light turns off, STAGE 2 and HEAT RATE lights turn on. Main Display shows four heat rate choices. Choose one:
   A. Select heat rate between 1°F - 30°F/min (1°C - 17°C/min) using ↑↓.
   B. Select "FULL" to program maximum heat rate.
   C. Select "COOL" to program the furnace to cool to a selected temperature.
   D. Select "NO" to turn off STAGE 2, 3 and 4. This will result in a One Stage Program.

NOTE: The HEAT RATE cannot be programmed to "COOL" in STAGE 1 - only in STAGE 2, 3 or 4.

3. Press ENTER / REVIEW. HEAT RATE light turns off and TEMP light turns on. Enter ↑↓ for the temperature required: heating temperature up to a maximum of 2012°F (1100°C) or cooling temperature down to a minimum of 100°F (38°C).

4. Press ENTER / REVIEW. TEMP light turns off and HOLD TIME light turns on. Enter ↑↓ to program the time needed to hold at the above temperature (0 - 4 hrs.).

5. For two stages, the furnace must be programmed not to use STAGE 3 or 4. Follow these steps:
   A. After completing Step 4, press ENTER / REVIEW. STAGE 2 light turns off, STAGE 3 and HEAT RATE lights turn on.
   B. Press ↓. Main Display shows "....5,4,3,2,1, COOL, NO.". Select "NO" to program the furnace not to use STAGE 3 or 4.

6. All necessary information for this program is now entered.

7. To run the program immediately, press START / STOP.

8. To delay the start of the program to be ready to cast at the pre-set time (see One Stage Program, Step 3), press NIGHT TIME (DELAY START).

NOTE: If NIGHT TIME (DELAY START) is pressed while a program is running, the time remaining for completion of the program will appear on the Main Display for 5 seconds.

PROGRAM AND OPERATE - THREE STAGE PROGRAM (Figure 1)

1. Follow Two Stage Program, Steps 1 - 4.

2. Press ENTER / REVIEW. STAGE 2 light turns off, STAGE 3 and HEAT RATE lights turn on. Main Display shows four heat rate choices. Choose one:
   A. Select heat rate between 1°F - 30°F/min (1°C - 17°C/min) using ↑↓ .
   B. Select "FULL" to program maximum heat rate.
   C. Select "COOL" to program the furnace to cool to a selected temperature.
   D. Select "NO" to turn off STAGE 3 and 4. This will result in a Two Stage Program.

NOTE: The HEAT RATE cannot be programmed to "COOL" in STAGE 1 - only in STAGE 2, 3 or 4.

3. Press ENTER / REVIEW. HEAT RATE light turns off and TEMP light turns on. Enter ↑↓ for the temperature required: heating temperature up to a maximum of 2012°F (1100°C) or cooling temperature down to a minimum of 100°F (38°C).

4. Press ENTER / REVIEW. TEMP light turns off and HOLD TIME light turns on. Enter ↑↓ to program the time needed to hold at the above temperature (0 - 4 hrs.).

5. For three stages, the furnace must be programmed not to use STAGE 4. Follow these steps:
   A. After completing Step 4, press ENTER / REVIEW. STAGE 3 light turns off, STAGE 4 and HEAT RATE lights turn on.
   B. Press ↓. Main Display shows "....5,4,3,2,1, COOL, NO.". Select "NO" to program the furnace not to use STAGE 4.

6. All necessary information for this program is now entered.

7. To run the program immediately, press START / STOP.

8. To delay the start of the program to be ready to cast at the pre-set time (see One Stage Program, Step 3), press NIGHT TIME (DELAY START).

NOTE: If NIGHT TIME (DELAY START) is pressed while a program is running, the time remaining for completion of the program will appear on the Main Display for 5 seconds.

PROGRAM AND OPERATE - FOUR STAGE PROGRAM (Figure 1)

1. Follow Three Stage Program, Steps 1 - 4.

2. Press ENTER / REVIEW. STAGE 3 light turns off, STAGE 4 and HEAT RATE lights turn on. Main Display shows four heat rate choices. Choose one:
   A. Select heat rate between 1°F - 30°F/min (1°C - 17°C/min) using ↑↓.
   B. Select "FULL" to program maximum heat rate.
   C. Select "COOL" to program the furnace to cool to a selected temperature.
   D. Select "NO" to turn off STAGE 4. This will result in a Three Stage Program.

*NOTE: **The HEAT RATE cannot be programmed to "COOL" in STAGE 1 - only in STAGE 2, 3 or 4.***

3. Press ENTER / REVIEW. HEAT RATE light turns off and TEMP light turns on. Enter ↑↓ for the temperature required: heating temperature up to a maximum of 2012°F (1100°C) or cooling temperature down to a minimum of 100°F (38°C).

4. Press ENTER / REVIEW. TEMP light turns off and HOLD TIME light turns on. Enter ↑↓ to program the time needed to hold at the above temperature (0 - 4 hrs.).

5. All necessary information for this program is now entered.

6. To run the program immediately, press START / STOP.

7. To delay the start of the program to be ready to cast at the pre-set time (see One Stage Program, Step 3), press NIGHT TIME (DELAY START).

*NOTE: **If NIGHT TIME (DELAY START) is pressed while a program is running, the time remaining for completion of the program will appear on the Main Display for 5 seconds.***

REVIEW A PROGRAM (Figure 1)

1. Turn the power switch on.

2. Press PROGRAM NUMBER.

3. Press ↑↓ to select the program number to be reviewed. The PROGRAM NUMBER (P1 - P 30) will appear on the Main Display.

4. The number of stages in the program are indicated by the STAGE lights next to the Main Display.

5. Press ENTER / REVIEW. NIGHT TIME (DELAY START) light turns on. The number of hours entered for the entire program to be completed and ready to cast appears on the Main Display. After 7 seconds, if no other button is pressed, NIGHT TIME (DELAY START) turns off and the actual furnace temperature appears on the Main Display.

6. Press ENTER / REVIEW again. If 7 seconds has not elapsed, the HEAT RATE light turns on. If 7 seconds has already elapsed and the furnace temperature appears on the Main Display, press ENTER / REVIEW twice. First the NIGHT TIME (DELAY START) light turns on and then the HEAT RATE light turns on. When the HEAT RATE light is on, the programmed heat rate appears on the Main Display.

*NOTE: **STAGE 1 light is now on.***

7. Press ENTER / REVIEW and TEMP light turns on. The programmed temperature (TEMP) for STAGE 1 appears on the Main Display.

8. Press ENTER / REVIEW and HOLD TIME light turns on. The programmed HOLD TIME for STAGE 1 appears on the Main Display in HR:MIN.

9. All of the information in STAGE 1 has now been entered. If ENTER / REVIEW is pressed again, STAGE 2 light turns on. Review STAGE 2 following the same procedure as above. Continue pressing ENTER / REVIEW to review all of the individual parameters in STAGE 2, 3, or 4.

*NOTE: **NIGHT TIME (DELAY START) appears only at the very beginning of STAGE 1.***

EDIT WHILE A PROGRAM IS RUNNING (Figure 1)

1. To identify which program is running, press PROGRAM NUMBER.

*NOTE: **The program number cannot be changed using ↑↓ while the program is running.***

2. To determine the time remaining for the completion of the program, press NIGHT TIME (DELAY START). The time remaining appears on the Main Display for 5 seconds.

3. Any individual parameter can be increased or decreased during the actual running of all 30 programs.

*NOTE: **HEAT RATE cannot be changed to "NO" in the stage currently running or in the stages already completed.***

4. To change a parameter while a program is running, press ENTER/REVIEW to advance to the desired STAGE and parameter (i.e. HEAT RATE, TEMP or HOLD TIME). Initially, STAGE 1 will appear. Any parameter can be increased or decreased by pressing ↑ or ↓ .

5. Any program can be stopped or started by pressing the START / STOP button.

6. If a program is edited while running and the HEAT RATE in STAGE 2, 3 or 4 is set to "COOL" but the corresponding TEMP programmed is entered to heat to a higher temperature than the previous stage, the Radiance will try to heat with a 0°F/Min (0°C/Min) HEAT RATE. In this case, when NIGHT TIME (DELAY START) is pressed, 99:99 (HR:MIN) flashes on the Main Display, indicating that the program cannot be completed.

SAMPLE ONE STAGE PROGRAM
(To be completed and ready to cast in 24 hours)

	NIGHT TIME DELAY START	HEAT RATE	TEMP	HOLD TIME
STAGE 1	24:00	10°F (6°C)	1600°F (871°C)	1:00
STAGE 2		NO	*	*
STAGE 3		NO	*	*
STAGE 4		NO	*	*

* Though any number may appear, the unit is deactivated when "NO" is selected for the HEAT RATE.

NOTE: To turn off STAGE 2, 3 and 4, select "NO" for the HEAT RATE in STAGE 2.

Press NIGHT TIME (DELAY START). Radiance automatically turns on at the correct time to complete the program and be ready to cast in 24 hours.

SAMPLE TWO STAGE PROGRAM
(To start immediately)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1	10°F (6°C)	600°F (316°C)	30
STAGE 2	20°F (11°C)	1600°F (871°C)	1:00
STAGE 3	NO	*	*
STAGE 4	NO	*	*

* Though any number may appear, the unit is deactivated when "NO" is selected for the HEAT RATE.

NOTE: To turn off STAGE 3 & 4, select "NO" for the HEAT RATE in STAGE 3.

To start immediately, press START / STOP.

Follow the same programming procedures if a three or four stage program is desired.

SAMPLE THREE STAGE PROGRAM
(Program with Cooling)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1	10°F (6°C)	600°F (316°C)	0:30
STAGE 2	20°F (11°C)	1950°F (1066°C)	1:00
STAGE 3	COOL	200°F (93°C)	0:00
STAGE 4	NO	*	*

* Though any number may appear, the unit is deactivated when "NO" is selected for the HEAT RATE.

To start immediately, press START / STOP.

Follow the same programming procedures if a three or four stage program is desired.

Press NIGHT TIME (DELAY START) to start an overnight burnout. (See SAMPLE ONE STAGE PROGRAM to program NIGHT TIME (DELAY START) time.

NOTE: ***When the temperature is set to a lower temperature than in the previous stage, the furnace ignores the programmed HEAT RATE (except for "NO") and automatically cools to the pre-set temperature. The time required for the cooling stage is determined by the pre-set temperature. The lower the temperature, the more time needed to cool down.***

NOTE: "Beeps" occur when the Error Code appears on the Main Display.

ERROR CODE	DESCRIPTION	PROBABLE CAUSE
Er 1	INVALID ENTRY ERROR: STAGE, HEAT RATE and TEMP lights flash	Occurs when the HEAT RATE is set to COOL but the TEMP of that stage is higher than the TEMP of the prior stage (should be heating). This will not occur when a program is already running and a parameter was edited in process.
Er 2	TABLET TEMPERATURE CALIBRATION ERROR	Occurs when the temperature on the display is outside the allowable range at the time the user pressed the and ENTER / REVIEW keys simultaneously to set the Radiance calibration temperature to 1500°F. If this occurs and is not an operator error, it indicates that there is a problem with the thermocouple or the PC board. Press ENTER / REVIEW to turn off the error indication and continue with the program. Press START / STOP to end the program.
Er 3	ELECTRONICS MALFUNCTION	Occurs when PC board hardware malfunctions.
Er 4	OPEN THERMOCOUPLE	Occurs if the thermocouple is open or the connecting wire(s) are broken or disconnected from the terminal board.
Er 5	REVERSED THERMOCOUPLE	Occurs if the thermocouple extension wires have been connected backwards to the terminals on the printed circuit board. The error will be detected 5 minutes after a heating program is started. This error will also occur if the program is started and the chamber door is kept open for 5 minutes or the triac is defective, the heater plates are defective or there is a problem with the main PC Board.

ERROR CODES

ERROR CODE	DESCRIPTION	PROBABLE CAUSE
Er 6	SHORTED THERMOCOUPLE OR DEFECTIVE HEATER PLATES	Occurs if the thermocouple wires are shorted or the heater plates are defective causing Radiance to achieve a HEAT RATE of less than 6% of the maximum attainable HEAT RATE with full power applied to the heater plates for 5 minutes. This error will also occur if a program is running and the door is kept open for more than 5 minutes or the triac or the Main PC Board developed a problem during a burnout process.
Er 7	THERMAL RUNAWAY	Occurs when the temperature has exceeded 2015°F (1102°C) for 1 minute if the highest temperature programmed was less than 2000°F (1093°C). This also occurs when the temperature has exceeded 2050°F (1121°C) for 1 minute if the highest temperature programmed was 2000°F (1093°C) or higher.
Flashing 99:99 when NIGHT TIME (DELAY START) is pressed during a program	INVALID ENTRY ERROR WHILE A PROGRAM IS RUNNING	Occurs when the HEAT RATE in STAGE 2, 3 or 4 is set to "COOL" but the corresponding TEMP is entered to heat to a higher temperature than the previous stage.

CAUTION: The RADIANCE should be serviced only by qualified service technicians. Be sure to unplug the power cord and wait for the furnace to cool before performing any service operation. For help with operating or servicing your Jelrus equipment, please call Jelrus any time between 9:00 am and 5:00 pm Eastern time.

Toll Free:	1-800-JELRUS-1
In New York:	1-516-942-0202
	FAX 1-516-433-7684

TEMPERATURE CALIBRATION

Radiance Multi-Stage Burnout Furnaces come complete with temperature Calibration Tablets (2) which accurately melt at 1500°F (816°C). (Re-Order Calibration Tablet Kit - PN 15291).

Your Radiance is factory calibrated. It is not necessary to re-calibrate on installation. If it becomes necessary to re-calibrate in the future, use the following calibration procedure.

Temperature Calibration with Calibration Tablets (Figure 3)

1. Place a short metal casting ring *towards the front center* of the chamber.

2. Place a ceramic tray or a small piece of casting ring lining material on top of the ring. Place a tablet in the center of the tray.

3. Program the Radiance as follows:

	HEAT RATE	TEMP	HOLD TIME
STAGE 1	FULL	1200°F (649°C)	0:05
STAGE 2	25°F (14°C)	1700°F (927°C)	0:00
STAGE 3	NO	*	*
STAGE 4	NO	*	*

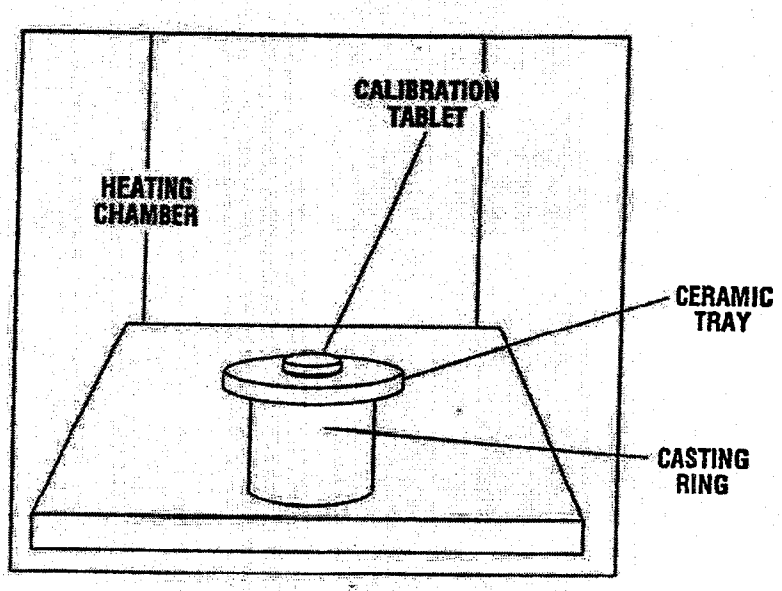
* Though any number may appear, the unit is deactivated when "NO" is selected for the HEAT RATE.

4. Close the furnace door and press START / STOP.

5. When the furnace temperature attains 1400°F (760°C) as indicated on the Main Display, open the furnace door slightly and begin to check for the melting of the tablet. Continue to do this at each 25°F (14°C) interval, opening the furnace door just enough to determine at a quick glance if the tablet has begun to liquify at the edges.

6. When the tablet begins to melt or liquify at the edges, immediately press ↑ and hold. Then press ENTER/REVIEW. Your Radiance is now calibrated. Three "beeps" sound and "CAL" appears on the Main Display.

FIG. 3 - TEMPERATURE CALIBRATION WITH TABLETS



POWER FAILURE

1. If a power failure occurs, the Radiance memorizes the conditions prior to the loss of power. When the power returns, the Radiance returns to the proper point in the program.

2. When power is returned, the HR:MIN light flashes indicating that a power failure has occurred. It continues to flash until START/STOP is pressed.

NOTE ***The HR:MIN light also flashes if the power switch is turned off and on while a program is running and START/STOP was not pressed. It will not flash if the power switch was turned off or a power failure occurred when the PROGRAM READY light was on.***

REPLACEMENT OF DOOR INSULATION AND SPRINGS

Radiance MSM - PN 15722 Door Insulation
Radiance MSL - PN 15712 Door Insulation
Radiance MSM and MSL - PN 33997 Door Spring and Hook Assembly Kit

1. Open, locate and remove the two screws on the door closest to the door hinges which hold the retainer strip in place. Remove the retainer strip.

2. Remove the one piece door insulation by sliding it toward the rear of the furnace and slightly lifting.

3. To replace the springs, remove each spring from the hook which holds it in place. Remove both the hook and spring.

4. To reinstall the new door insulation or springs and hooks, reverse the above procedure. If installing springs and hooks, add grease to junction of spring and hook and spring and hinge junction.

FIELD SERVICE

REPLACEMENT OF HEATING PLATES

REPLACEMENT PART NUMBERS

	100V	115V	220/230V	240V
MSM (Set of 2)	18907	33915	33916	33916
MSL				
Set of 2 Side Plates	27957	33918	27957	33918
Set of 2 Rear Plates	27956	33917	27956	33917

1. Remove the back panel of the furnace.

2. Remove the nuts which hold the heating plate wires to the power terminals and straighten the heating plate wires (Figure 4).

3. Open the furnace door and find the two ceramic sections at the front of the furnace chamber. Hold the furnace door partially open while removing the ceramic sections. They are not readily removed when the door is fully open. Remove the right-hand ceramic section by lifting it upward until the bottom of the section clears the sheet metal housing. Pull the bottom of the ceramic section out, then pull it down so the upper half clears the sheet metal housing. Remove the left-hand ceramic plate in the same way.

4. Remove the floor plate, then carefully slide the two side heating plates out the front of the furnace. The two rear heating plates on Radiance MSL may now be removed.

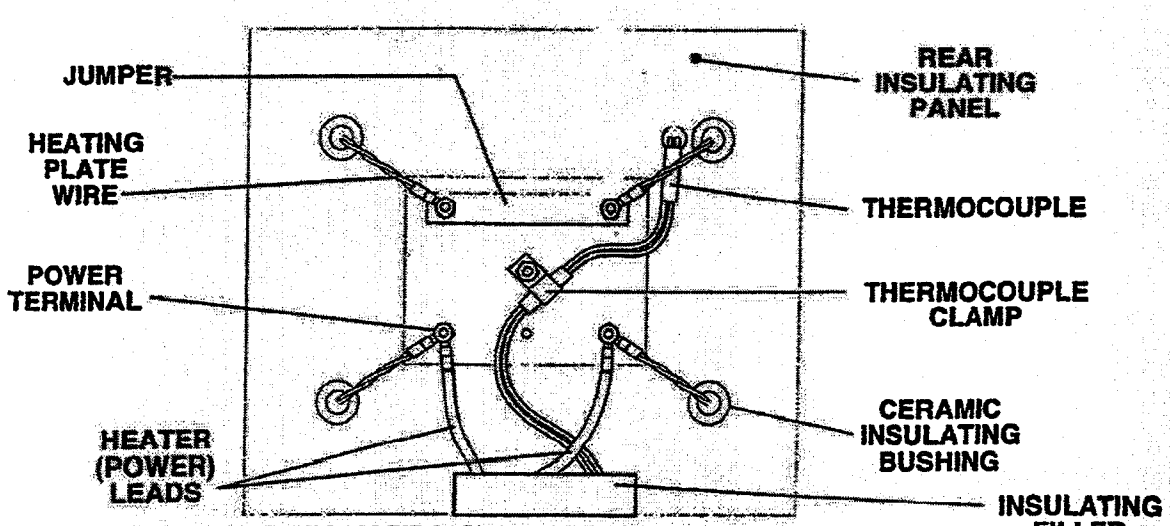
5. Check the condition of the filler strip insulation in the space to the left and right of the ceramic front sections. Replace if required *.

6. Check the condition of the floor plate which provides insulation and serves as a spacer between the bottom ends of the heating plates. Replace if required *.

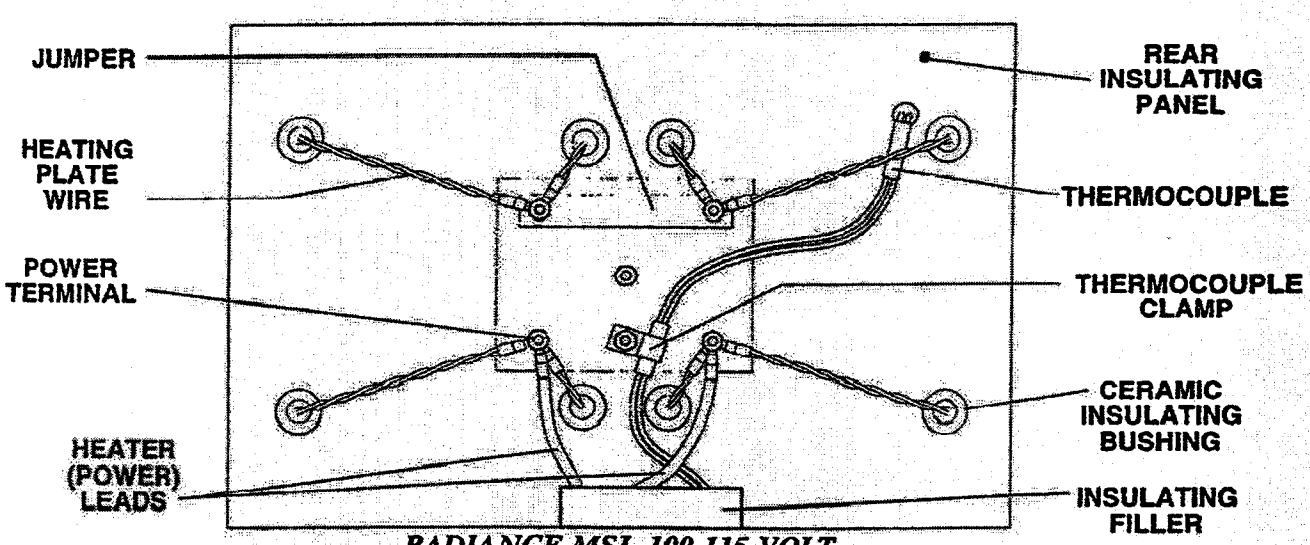
7. To install the new heating plates reverse the procedure. Push the ceramic heating plates back into place on the rear insulating panel. When reconnecting the heating plate wires at the rear of the furnace, be sure to replace all hardware in its original position. (Figure 4.) Tighten all connections.

* Replacement Part: Floor Plate w/Filler Strip Insulation
Radiance MSM: PN 33980; Radiance MSL: PN33981

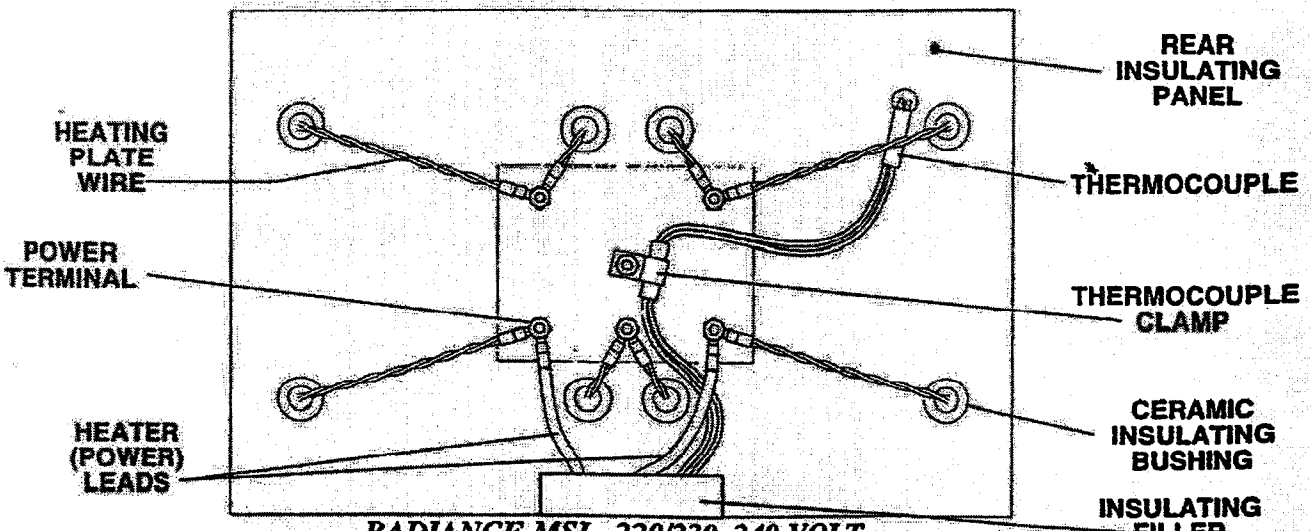
FIG. 4 - RADIANCE WITH UPPER REAR PANEL REMOVED



RADIANCE MSM (ALL VOLTAGES)



RADIANCE MSL 100-115 VOLT



RADIANCE MSL 220/230, 240 VOLT

FIELD SERVICE

REPLACEMENT OF THE MAIN PC BOARD

REPLACEMENT PART NUMBERS

	100V	115V	220/230V	240V
MSM	15500-031	15500-041	15500-053	15500-056
MSL	15500-531	15500-541	15500-553	15500-556

1. Remove the front panel (Figure 5).

2. Note and record the color and location of each wire on the thermocouple terminals located on the Main PC Board. Remove both wires.

3. Remove the calibration jack connector (J1) from the Main PC Board by pulling straight up.

4. Remove five electrical connectors (BLACK, ORANGE, YELLOW, WHITE, GREEN) from the Main PC Board by pulling straight up on the connector. DO NOT PULL ON THE WIRES.

5. Remove the nuts and lockwashers that hold the Main PC Board to the front panel and lift straight up to remove board.

6. Align the holes in the new board with the standoffs on the front panel, reinstall the fasteners and screws.

7. Reconnect the electrical connectors as follows:
   Black wire to terminal marked "H." - E5.
   Orange wire to terminal market "GATE" - E4.
   Yellow wire to terminal marked "LOAD" - E3.
   White wire to terminal marked "N" - E2.
   Green wire to ground terminal - E1.

8. Reconnect calibration jack connector. The green wire on the connector is closest to the bottom edge of the front panel.

9. Reconnect the two thermocouple wires to the thermocouple terminals observing the color coding noted in Step 2. If thermocouple wires are reversed, 5 minutes after a heating program is started, "Er 5" will appear on the Main Display.

10. Replace the front panel.

FIG. 5 - RADIANCE WITH FRONT PANEL/MAIN PC BOARD REMOVED

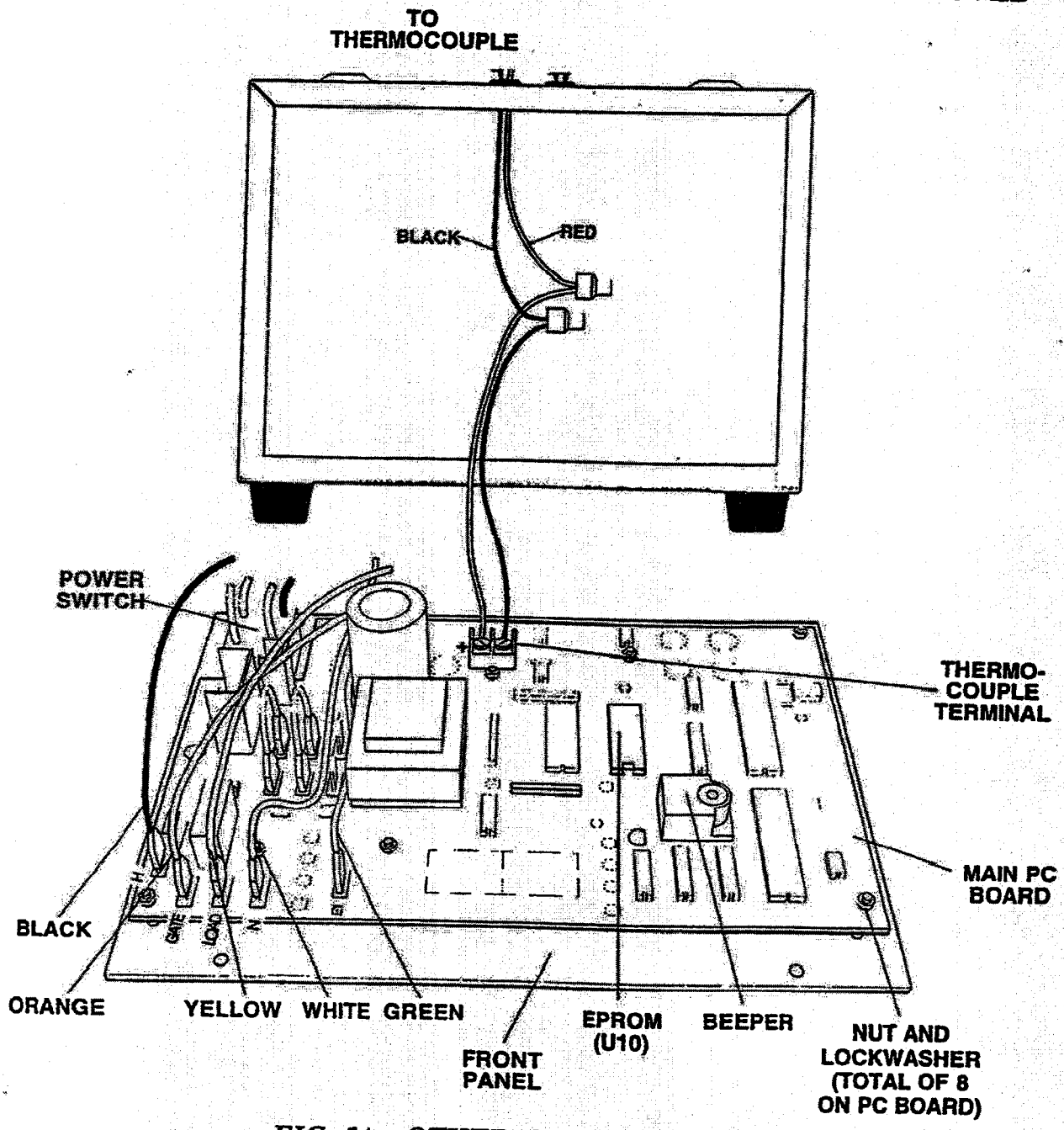
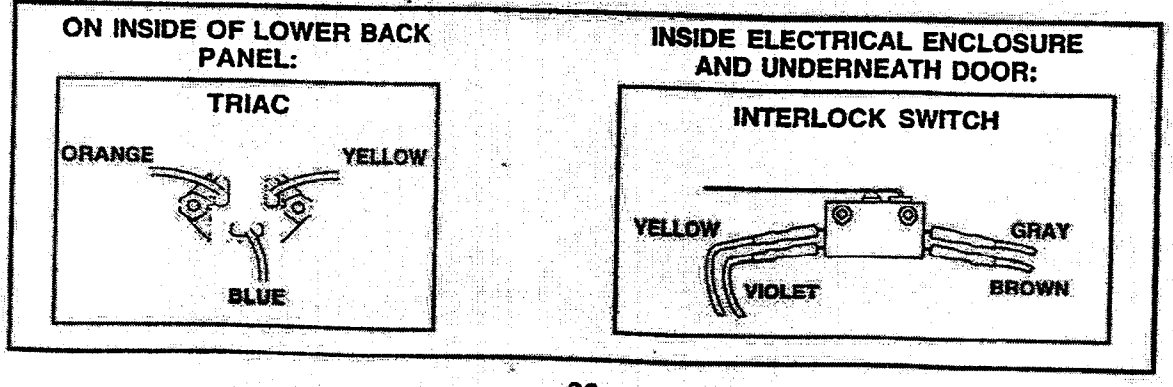


FIG. 5A - OTHER COMPONENTS:



REPLACEMENT OF THE THERMOCOUPLE ASSEMBLY (PN 18913)

1. Remove the bottom front panel and the upper and lower rear panels of the furnace. (Note the position of the vent louvers on the rear panels.)

2. Note and record the color and location of the wires on the thermocouple terminals located on the Main PC Board (Figure 5).

3. Remove the thermocouple wires from the thermocouple terminals on the Main PC Board (Figure 5).

4. Remove the clamp which secures the thermocouple to the ceramic terminal block located in the upper rear of the furnace (Figure 4).

5. Remove the heating plate wire which crosses over the thermocouple and bend it out of the way just enough to permit sliding the thermocouple out of the rear of the heating chamber (Figure 4).

6. Remove the insulating filler that covers the holes in the bottom of the upper section (Figure 4). Straighten the thermocouple wires where they were bent at a 90° angle.

7. Withdraw the thermocouple down into the lower rear of the furnace through the holes in the upper and lower sections. Discard thermocouple assembly.

8. Feed the new thermocouple from the lower rear of the furnace up through the holes in the upper and lower sections and into the upper rear of the furnace.

9. Bend the new thermocouple wires at a 90° angle approximately 3-3/8 inches (8.6 cm) from the exposed tip of the thermocouple. Be sure that there are three ceramic insulating sleeves between the thermocouple tip and the bend. Insert the new thermocouple into the hole at the rear of the heating chamber.

10. Replace the heating plate wire that was removed in Step 3. Check that there is a ceramic insulating sleeve covering the thermocouple wires where they cross the heating plate wire. Replace the clamp that holds the thermocouple wires to the ceramic terminal block. Replace the insulating filler that covers the holes in the bottom of the upper section.

11. Connect the thermocouple wires to the thermocouple terminals on the Main PC Board. Observe the color coding you noted in Step 2.

12. Replace the front panel and the upper and lower rear panels. (Be sure the vent louvers on the rear panels protrude out and face down.)

REPLACEMENT OF THE TRIAC (PN 15475)

1. Remove the lower rear panel (Figure 2).

2. Note and record the color and location of each of the three wires on the triac terminals (Figure 5A). Remove each of the three wires by pulling straight up on the connector. DO NOT PULL ON THE WIRES.

3. Remove the two nuts and screws that hold the triac in place. Lift the triac off the rear panel (Figure 5A).

4. There is an insulating pad located between the triac and the panel. If it did not come off with the triac, remove it from the rear panel. Do not reuse. Wipe the rear panel to remove any grease-like material.

5. Put the new insulating pad and then the new triac in place on the rear panel. Locate the triac so that the center terminal will face downward when the rear panel is in place.

6. Replace the three wires on the triac terminals (Figure 5A) observing the following color coding:

   Yellow wire to upper right terminal.
   Blue wire to center (lower) terminal.
   Orange wire to upper left terminal.

7. Replace the lower rear panel (Figure 2).

PARTS REPLACEMENT LIST

PARTS FOR RADIANCE MSM

DESCRIPTION	100V	115V	220/230	240V
Power Cord Kit - Japan & U.S.	15288	15288	N/A	N/A
Power Cord Kit - Australia	N/A	N/A	23206	23206
Power Cord Kit - England	N/A	N/A	23202	23202
Power Cord Kit - Europe	N/A	N/A	23203	23203
Power Cord Kit - Italy	N/A	N/A	23205	23205
Main PC Board	15500-031	15500-041	15500-053	15500-056
Heater Jumper	33130	33130	33130	33130
Ceramic Front Section	15292	15292	15292	15292
Rear Insulating Panel w/Block	33210	33210	33210	33210
Door Assembly	15284	15284	15284	15284
Door Insulation	15722	15722	15722	15722
Heating Plates Assembly Side (Set of 2)	18907	33915	33916	33916
Ceramic Terminal Block w/Terminals	33935	33935	33935	33935
Upper Rear Panel Kit	33955	33955	33955	33955
Floor Plate w/Filler Strip Insulation Kit	33980	33980	33980	33980
Door Handle Kit	15279	15279	15279	15279
Heating Chamber Insulation Kit	33982	33982	33982	33982
Thermocouple Assembly Kit	18913	18913	18913	18913
Triac Replacement Kit	15475	15475	15475	15475
Tray for Heating Chamber	33256	33256	33256	33256
Power Switch	15675	15675	15675	15675
Calibration Tablet Kit 1500°F (816°C)	15291	15291	15291	15291
Interlock Switch Kit	15275	15275	15275	15275
Vent Tube	15729	15729	15729	15729
Ceramic Insulating Bushings (Pkg. of 4)	33958	33958	33958	33958
Mounting Feet (Set of 4)	15277	15277	15277	15277
Door Spring Hook Assembly Kit	33997	33997	33997	33997
Door Hinges (Set of 2)	33998	33998	33998	33998
Terminal Block (Rear Panel)	117387	117387	117387	117387
Circuit Breaker	117046	117046	117047	117047
Heater (Power) Leads (Set of 2)	33975	33975	33975	33975
Hinges (Set of 2)	33998	33998	33998	33998
Terminal Block (Rear Panel)	117387	117387	117387	117387
Circuit Breaker	117046	117046	117047	117047
Heater (Power) Leads (Set of 2)	33975	33975	33975	33975

PARTS FOR RADIANCE MSL

DESCRIPTION	100V	115V	220/230V	240V
Power Cord Kit - Japan & U.S.	15289	15289	N/A	N/A
Power Cord Kit - Australia	N/A	N/A	23206	23206
Power Cord Kit - England	N/A	N/A	23202	23202
Power Cord Kit - Europe	N/A	N/A	23203	23203
Power Cord Kit - Italy	N/A	N/A	23205	23205
Main PC Board	15500-531	15500-541	15500-553	15500-556
Heater Jumper	33130	33130	N/A	N/A
Ceramic Front Section (Set of 2)	15293	15293	15293	15293
Rear Insulating Panel w/Block	33710	33710	33710	33710
Door Assembly	15286	15286	15286	15286
Door Insulation	15712	15712	15712	15712
Heating Plate Assembly, Side (Set of 2)	27957	33918	27957	33918
Heating Plate Assembly Rear (Set of 2)	27956	33917	27956	33917
Ceramic Terminal Block w/Terminals	33936	33936	33936	33936
Upper Rear Panel Kit	33956	33956	33956	33956
Floor Plate w/Filler Strip Insulation Kit	33981	33981	33981	33981
Door Handle Kit	15282	15282	15282	15282
Heating Chamber Insulation Kit	33983	33983	33983	33983
Thermocouple Assembly Kit	18913	18913	18913	18913
Triac Replacement Kit	15475	15475	15475	15475
Tray for Heating Chamber	33256	33256	33256	33256
Power Switch	15675	15675	15675	15675
Calibration Tablet Kit 1500°F (816°C)	15291	15291	15291	15291
Interlock Switch Kit	15275	15275	15275	15275
Vent Tube	15729	15729	15729	15729
Ceramic Insulating Bushings (Pkg. of 4)	33958	33958	33958	33958
Mounting Feet (Set of 4)	15277	15277	15277	15277
Door Spring Hook Assembly Kit	33997	33997	33997	33997
Door Hinges (Set of 2)	33998	33998	33998	33998
Terminal Block (Rear Panel)	117387	117387	117387	117387
Circuit Breaker	117046	117046	117047	117047
Heater (Power) Leads (Set of 2)	33975	33975	33975	33975

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

PROGRAM CARD FORMS

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			

Program # Metal(s)

	HEAT RATE	TEMP	HOLD TIME
STAGE 1			
STAGE 2			
STAGE 3			
STAGE 4			