Fisher Scientific

Isotemp

Isotemp® Premium Ovens 700 Series

Operation Manual and Parts List

LT2148X1 (7006916) Rev. 3

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Models covered in this manual			
Model	**Size**	**Voltage**	**Forced Air/Gravity**
13247725F (6916)	Small (2.5 cu ft)	120V	Forced Air
13247725G (6917)	Small (2.5 cu ft)	120V	Gravity
13247726F (6918)	Small (2.5 cu ft)	240V	Forced Air
13247726G (6919)	Small (2.5 cu ft)	240V	Gravity
13247737F (6921)	Medium (3.8 cu ft)	120V	Forced Air
13247737G (6922)	Medium (3.8 cu ft)	120V	Gravity
13247738F (6923)	Medium (3.8 cu ft)	240V	Forced Air
13247738G (6924)	Medium (3.8 cu ft)	240V	Gravity
13247750F (6925)	Large (5 cu ft)	120V	Forced Air
13247750G (6926)	Large (5 cu ft)	120V	Gravity
13247751F (6927)	Large (5 cu ft)	240V	Forced Air
13247751G (6928)	Large (5 cu ft)	240V	Gravity

MANUAL NUMBER LT2148X1 (7006916)

REV	ECR/ECN	DATE	DESCRIPTION	By
3	30485	10/29/13	Corrected Menu button details - pg 4-2	
2	28232	2/23/12	Updated Recovery and Rise Time - pg 2-2	ccs
1	27703	7/27/11	Corrected PC board and probe number in parts list	ccs
0	--	4/26/10	Transfer to Marietta (was LT2148X1 2/9/09)	ccs

Important Read this instruction manual. Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel, and poor equipment performance. ▲

Caution All internal adjustments and maintenance must be performed by qualified service personnel. ▲

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Important operating and/or maintenance instructions. Read the accompanying text carefully.

Potential electrical hazards. Only qualified persons should perform procedures associated with this symbol.

Equipment being maintained or serviced must be turned off and locked off to prevent possible injury.

Hot surface(s) present which may cause burns to unprotected skin, or to materials which may be damaged by elevated temperatures.

Marking of electrical and electronic equipment, which applies to electrical and electronic equipment falling under the Directive 2002/96/EC (WEEE) and the equipment that has been put on the market after 13 August 2005.

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- ✔ Always use the proper protective equipment (clothing, gloves, goggles, etc.)
- ✔ Always dissipate extreme cold or heat and wear protective clothing.
- ✔ Always follow good hygiene practices.
- ✔ Each individual is responsible for his or her own safety.

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1-800-926-1166	Orders Fax

International customers, please contact your local Fisher Scientific distributor.

Table of Contents

Section 1 Introduction

Fisher Scientific Isotemp 700 Series Standard ovens are available in three sizes: Small, Medium and Large. All ovens provide PID Microprocessor control at operating temperatures ranging from 50°C (122°F) to 275°C (527°F).

The forced air ovens provide improved temperature uniformity and control, as well as faster drying. In these ovens, fresh air enters through an air intake on the bottom of the oven, then is heated in a plenum below the chamber. A blower circulates the heated air into the wall plenums and the oven chamber itself in uniform flow patterns. Exhaust air is vented through a port at the top of the oven.

Gravity flow ovens inlet air through a port located under the oven floor. Heat generated convection then gently moves the air in a vertical circulation pattern. Exhaust air is vented through a port at the oven top.

Temperature readouts and control parameters are shown on red LEDs. Three additional LEDs indicate when heater power is being applied, an error condition is encountered, or the temperature is being set.

The Small ovens accommodate a maximum of five shelves. The Medium ovens hold eight shelves, while the Large ovens each hold eleven.

Isotemp ovens incorporate a variety of safety features. A safety backup is built into the controller software: if the primary heater control fails, the backup will maintain control at 5°C above the set point. An alarm LED then indicates that the backup controller is operating the oven. A circuit breaker protects the oven from power surges. If primary and backup heater controls fail, an independent Over Temperature Device will disengage heater operation.

The silicon rubber gasket supplied with the oven is good for continuous use up to 250°C and intermittent use to 275°C. This gasket provides a better seal than the high temperature gasket and is supplied with is supplied with the unit. An optional high temperature braided gasket is available for customers using the oven frequently above 250°C. The part numbers of the supplied and optional gasket are listed below:

Oven Size	Silicon Rubber Gasket Part # (Supplied with Oven)	Braided Gasket Part # (High Temp Gasket Optional)
Small	SPN 101908	SPN 95782
Medium	SPN 101909	SPN 95783
Large	SPN 101910	SPN 95784

Section 2 Specifications

Performance Characteristics

Operating Range . . . . . .50 to 275°C

Average Uniformity @ 200°C

Forced Air Ovens . . . . . .±3°C

Gravity Ovens . . . . . .±4°C

Resolution . . . . . .1°C

Control Sensitivity . . . . . .±0.5°C

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13247751F (6927)	Large (5 cu ft)	Forced Air
13247751G (6928)	Large (5 cu ft)	Gravity

Recovery Time @ 200°C**

Small ovens - forced air	6.0 minutes
Small ovens - gravity	10.0 minutes
Medium ovens - forced air	6.0 minutes
Medium ovens - gravity	10.0 minutes
Large ovens - forced air	8.0 minutes
Large ovens - gravity	16.0 minutes

Rise Time to 275°C

Small ovens - forced air	50 minutes
Small ovens - gravity	45 minutes
Medium ovens - forced air	50 minutes
Medium ovens - gravity	40 minutes
Large ovens - forced air	70 minutes
Large ovens - gravity	60 minutes

Air Exchanges per hour*

Small ovens - forced air	43
Small ovens - gravity	24
Medium ovens - forced air	29
Medium ovens - gravity	16
Large ovens - forced air	22
Large ovens gravity	12

BTU/hr Output	@100°C	@200°C
Small ovens - forced air	1125	2750
Small ovens - gravity	470	1325
Medium ovens - forced air	1325	2925
Medium ovens - gravity	1040	2025
Large ovens - forced air	1325	3095
Large ovens - gravity	1150	2040

**as per ASTM E145*

***door open one minute*

Note Temperature Recovery Times and Temperature Rise times are based on a nominal line voltage of either 120VAC or 240VAC, and on ovens pre-calibrated to 200°C and 275°C. ▲

Electrical Requirements

Small ovens

13-247-725F . . . . . .120V, 11.5A, 1380W, 60 Hz

13-247-726F . . . . .240V, 5.8A, 1392W, 50/60 Hz

Small ovens

13-247-725G . . . . . .120V, 11A, 1320W, 60 Hz

13-247-726G . . . . .240V, 5.5A, 1320W, 50/60 Hz

Medium ovens

13-247-737F . . . . . .120V, 15.5A, 1860W, 60 Hz

13-247-738F . . . . .240V, 7.8A, 1870W, 50/60 Hz

Medium ovens

13-247-737G . . . . . .120V, 15A, 1800W, 60 Hz

13-247-738G . . . . .240V, 7.5A, 1800W, 50/60 Hz

Large ovens

13-247-750F . . . . . .120V, 15.5A, 1860W, 60 Hz

13-247-751F . . . . .240V, 7.8A, 1872W, 50/60 Hz

Large ovens

13-247-750G . . . . . .120V, 15A, 1800W, 60 Hz

13-247-751G . . . . .240V, 7.5A, 1800W, 50/60 Hz

Chamber Volumes

Small ovens . . . . . .2.5 cu ft

Medium ovens . . . . . .3.8 cu ft

Large ovens . . . . . .5.0 cu ft

Chamber Dimensions (W x D x H)

Small ovens . . . . . .18 x 18 x 13.5 in

Medium ovens . . . . . .18 x 18 x 20 in

Large ovens . . . . . .18 x 18 x 26.5 in

Environmental Conditions

Operating: 17°C to 27°C; 20% to 80% RH, non-condensing.

Installation Category II (overvoltage) in accordance with IEC 664.

Pollution Degree 2 in accordance wth IEC 664.

Altitude Limit: 2,000 meters.

Storage: -25°C to 65°C 10% to 85% relative humidity (RH)

Section 3 Installation

The oven requires an area approximately 2 ft. x 2 ft. The bench selected must be capable of supporting at least 120 lbs. for Small ovens, 130 lbs. for Medium ovens, or 135 lbs. for large ovens. Proper electrical power must be available. Locate the oven such that no extension cord is required. Two inch air clearance on all sides (6" if combustible materials) and a minimum of 24" air clearance on top is needed to allow heat dissipation and prevent temperature build-ups.

Unpacking

Fisher Scientific Isotemp® ovens are shipped in a single carton. After unpacking, locate each item shown in the list below. Report any missing items, by name and part number, to your Fisher Scientific distributor. In the event of shipping damage, retain the shipping material and file a claim with the final carrier.

Item

Shelves
- Small and Medium units - One provided
- Large units - Two provided

Shelf Supports
- Small and Medium units - Two provided
- Large units - Four provided

Note If the equipment is not used in the manner specified by the manufacturer, protection provided by the equipment may be impaired. ▲

Warning Do not use top of oven as a shelf.

Do not cover oven vent hole.

Keep combustible materials away from oven vent hole.

Hot Surface. Oven vent and exiting air are hot. Keep hands away. ▲

Preparing the Oven

1. Install the shelf.
2. Make certain all packing material has been removed from oven chamber.
3. Connect the line cord to an appropriate electrical outlet.
4. The oven is now ready for operation. No preliminary adjustments are required. Depending on customer application and laboratory procedures, a initial calibration may be done at this point. See **Display Offsets**.

Caution See data plate on oven for voltage, current and line frequency specifications. Check that the power requirements of the oven will not overload the circuit. ▲

Power Switch

The 700 Series ovens feature a front panel mounted power switch which is a combination power switch and circuit breaker, eliminating the need for separate fusing. The circuit breaker will interrupt power in the event of an oven heater malfunction.

Press the I (upper) half of the rocker-type power switch to turn the oven On. Press the 0 (lower) half to turn Off oven power. To reset the breaker, first place the switch in the Off position, then return it to the On position.

Section 4 Controls

The following sections briefly describe the locations and functions of various display fields and keypad controls. More detailed descriptions are provided, when required, in the operating sections of the manual.

Display

The 700 Series controller features a bright, one-half inch LED numeric display which reads out the oven temperature. Three smaller LEDs indicate, respectively, an alarm condition, that power is being applied to the oven heaters or that the control temperature is being set. Each display field is discussed separately below.

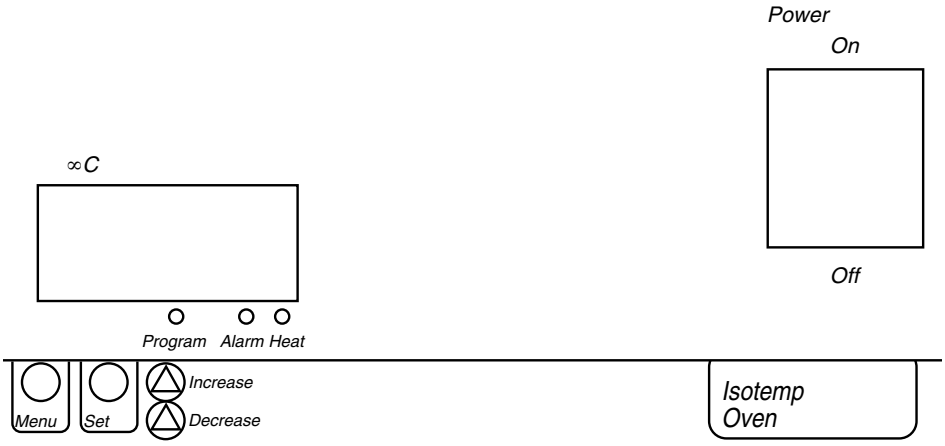


Figure 4-1. Display Fields

Temperature Display

In the normal operating mode, shows the current oven temperature. During programming, indicates the oven set temperature target.

Heat Indicator

Lights when power is being supplied to the oven heater.

Alarm Indicator

Lights if the actual oven temperature exceeds the alarm temperature. The alarm temperature is factory-adjusted to be 5°C above set temperature.

Program Indicator

Lights when the control temperature is being set.

Keypad

The 700 Series incorporates a four-key, tactile keypad. The function of each key is discussed individually below. Refer to Figure 4-1 on the previous page.

Pressing **MENU** causes the display to show C A L, then pressing SET will display the calibration offset.

Pressing **INCREASE** while holding down the SET key increases the oven set temperature, as indicated on the temperature display.

Pressing **DECREASE** while holding down the SET key decreases the oven set temperature, as indicated on the temperature display.

Pressing **SET** causes the display to show the set temperature. Used with INCREASE and DECREASE to change the set temperature. With MENU to access entry of a temperature display offset.

Section 5 Operation

The 700 Series ovens maintain a set temperature until that set temperature is changed. To achieve a set temperature, simply perform the following:

1. Place the power switch in the ON position. All 8s will flash as a test of the display.
2. Press and hold the SET.
3. Observe the set temperature in the display window.
4. To decrease the set temperature, press DECREASE while holding SET.
5. To increase the set temperature, press INCREASE while holding SET.
6. When the desired set temperature is shown, release the INCREASE or DECREASE keys. Finally, release the SET key. The oven automatically begins to control at the set temperature.

Note To rapidly increase or decrease the set temperature press and hold the appropriate arrow key. To slowly increment or decrement the set temperature 1° at a time, press and immediately release the arrow key.

Safety Precautions

Before operating the oven, always observe the following Safety Precautions:

- This unit is not explosion proof, do not use in the presence of flammable or combustible materials; fire or explosion may result. Unit contains components, which may ignite such materials.
- Fumes and spillage from acidic solutions cause corrosion of the stainless chamber. Care should be taken to maintain a neutral pH at all times.
- The heater for the unit is in the bottom of the unit. Surface temperatures at the bottom cover of the unit may be higher than set point temperature. For example: A plastic container on the heater cover may become hot enough to melt/burn the container at settings below the melting point of plastic. Do not place items on the heater cover.
- Wear insulated gloves
- Use tongs
- Never stand in front of an open oven
- Use safety goggles

Limit Alarms

The 700 Series controllers feature a deviation alarm which alerts the operator and interrupts heater power whenever the actual oven temperature differs from the set temperature by more than 5°C. This set limit cannot be adjusted by the operator.

- If the actual temperature exceeds the alarm limit, the alarm indicator LED will light.

- The reference point for the alarm is the set temperature. Any change in the set temperature will cause a corresponding shift in the alarm temperature.

  Example:

  If the set temperature is 150°C, the alarm will trip at 155°C. If the set temperature is changed to 200°C, the alarm will follow the set temperature and trip at 205°C.

- Changing the set temperature to a value more than 5°C below the present oven temperature will trip the alarm. Power is removed from the heater when an alarm condition occurs.

  Example:

  First, experiment samples were being soaked at 160°C. Experiment completed and oven reset to 140°C. The oven immediately goes in to alarm once the set point is reset to 140 from 160. The oven will stay in alarm until the oven temperature cools down to 144.9° (140,+5,-0.1).

Display Offsets

The 700 Series controllers permit the operator to select a display offset temperature. With a display offset entered, the temperature displayed will be the actual oven temperature (measured at the control thermocouple) plus or minus the display offset selected. Functionally, the offset feature permits the operator to measure and calibrate such that the display will indicate the temperature at a specific point or zone within the oven. To enter a display offset, carry out the following steps:

1. Press the MENU, the display will indicate CAL

2. To view the present offset value, press and hold the SET key.

3. To change the display offset, press and hold the SET key. Press INCREASE or DECREASE until the display indicates the desired offset.

4. Release the SET key.

5. Press MENU once to return to normal temperature control.

Examples:

1. The displayed temperature is the result of algebraically adding the actual temperature to the offset value. Thus, if an offset of -3° is being used, a measured temperature of 50° degrees will be displayed as 47°.

2. A test is to be performed at 150°C in the center of the oven and temperature is critical. Place a thermometer or thermocouple (calibrated) at the critical point and set the oven to 150°C and allow the oven to stabilize. The calibrated thermometer reads 151°C. A display offset of 1 is entered. The immediate display reads 151. The oven cools to 150°C, the display reads 150, and the calibrated thermometer reads 150.

Section 6 Service

The following sections describe procedures for servicing the 700 Series ovens. Most users may perform the first procedure, Replacing the Door Gasket. However, all other service procedures involve potential exposure to line voltage. Only qualified service personnel should undertake these procedures. The second section, Accessing the Electronics Compartment, describes procedures required for subsequent service sections and is referenced by these later sections when required.

If needed, call Technical Services for assistance.

Caution Service procedures requiring access to the electronics compartment involve exposure to line voltage and should be performed only by qualified service personnel. Disconnect oven from power source before attempting repairs. ▲

Caution Only factory authorized components should be used for all repairs. Failure to use factory authorized replacement components will void warranty and could result in unit malfunction and or hazardous operating conditions. ▲

Caution Allow oven to cool to ambient temperature before attempting repair. ▲

Replacing the Door Gasket

Note Study the method of door gasket attachment before starting disassembly. Understanding will avoid confusion later in this process. ▲

Isotemp 700 Series ovens incorporate a durable, silicone door gasket to minimize heat loss. Should the gasket become defective or be damaged, it may be replaced by following the procedure below.

1. Set the power switch to Off position and open chamber door.
2. Open door fully. Carefully remove and retain hardware from door hinges (case side). Place door on a flat surface with handle over the edge.
3. Note the joint position of the old gasket. This is where the new gasket installation will start.
4. Bend back the old door gasket and remove the Phillips head screws attaching the gasket.
5. Remove the old door gasket.
6. Loosely install two screws through the stainless steel liner and into the door wrap to align these pieces.
7. Begin installing the replacement gasket at the joint position of the old gasket. Stretch the replacement gasket around the corners of the liner to avoid bunching of the gasket material.
8. Install a Phillips head screw as the gasket rounds each corner to keep the gasket properly stretched. (The screw goes through the liner, pierces the gasket and threads into the door wrap.)
9. After all four corners are secured, install the remainder of the Phillips head screws. Make sure there is no gap at the gasket joint; stretch the gasket slightly if necessary.
10. Reinstall the door onto the case with hinges.

Replacing the Door Handle

To replace a defective door handle, perform the steps below:

1. Remove the two mounting screws holding latch cover in place.
2. Remove the two mounting screws holding defective handle in place.
3. Mount the replacement handle using two screws.
4. Adjust bottom nut (13/16) from end of shaft.
5. Secure latch cover in place with 2 screws.

Adjusting Door Cam

Due to handling in shipment or to heat distortion with use, the door cam may require adjustment. To facilitate proper closing and sealing of door, Steps 1 through 5 may have to be performed more than once.

To adjust the door cam, perform the following:

1. Open door and remove screws holding latch cover in place.
2. Locate nuts securing tongue on camshaft.
3. Loosen, but do not remove outside nut.
4. Adjust inside nut (one full-turn clockwise draws door 1/16 inch closer to cabinet when door is closed.
5. Secure cam tongue in place by tightening outside nut.
6. Secure latch cover in place with 2 screws.

Accessing Electronics Compartment

To access the electronics compartment, proceed as follows:

1. Disconnect power cord from the electrical outlet.
2. Open the chamber door. Carefully remove and retain hardware from door hinges (case side). Set door aside.
3. Slide the oven back until the front of the bezel (control panel) is at least three inches from the edge of the bench top.
4. Prop up the oven front by placing a shim under each front foot. Use shims between 1½ and 2 inches in thickness.
5. Remove two screws securing bezel from bottom of oven.
6. Slide the oven back on the table plus a few inches (to set the bezel on the bench) and rotate the bottom of the bezel out from the oven. The top clips will come loose but the wiring will still be connected.
7. Carefully set the bezel on the bench.

Replacing the Heater

To replace a defective heater, proceed as follows:

1. Disconnect power cord from the electrical outlet.

2. Remove the two screws that secure the heater cover. Remove the cover by lifting and sliding it forward. It may be necessary to use a flat-blade screwdriver to assist in lifting the cover upward. Set heater cover aside.

3. Remove the two nuts and shake-proof washers securing the heater leads, then pull the lead terminals off the heater studs.

4. Remove the two screws securing heater to cabinet. Slide heater forward to disengage back heater clips, lift back of heater up, then slide heater back and lift out.

5. Install replacement heater and re-assemble oven by generally reversing the steps above.

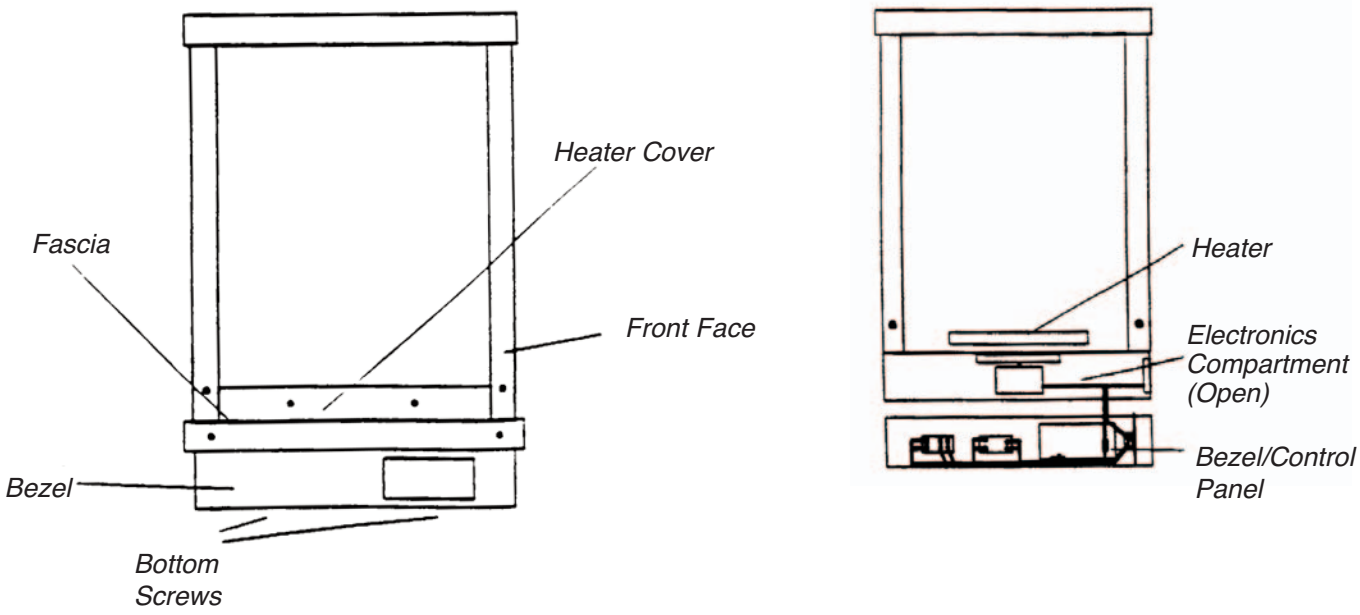


Figure 6-1. Heater Component Locations

Replacing the Cooling Fan

To replace a defective cooling fan, proceed as follows:

1. Disconnect power cord from the electrical outlet.
2. Open the chamber door. Carefully remove and retain hardware from door hinges (case side). Set door aside.
3. Slide the oven back until the front of the bezel (control panel) is at least three inches from the edge of the bench top.
4. Prop up the oven front by placing a shim under each front foot. Use shims between 1½ and 2 inches in thickness.
5. Remove two screws securing bezel from bottom of oven.
6. Slide the oven back on the table plus a few inches (to set the bezel on the bench) and rotate the bottom of the bezel out from the oven. The top clips will come loose but the wiring will still be connected.
7. Carefully set the bezel on the bench.
8. Remove the two fan power wires from push-on terminals located on fan housing.
9. Remove the three mounting screws holding the fan in place.
10. Install replacement fan and reassemble oven by generally reversing the steps above.

Note When installing the replacement fan, make certain air flow arrow molded into fan housing points into the oven chassis. ▲

Replacing the Circulating Fan Motor

Caution Sheet metal in this area is sharp. Work carefully. ▲

To replace a defective circulating fan motor, proceed as follows:

1. Disconnect power cord from the electrical outlet.
2. Open the chamber door. Carefully remove and retain hardware from door hinges (case side). Set door aside.
3. Slide the oven back until the front of the bezel (control panel) is at least three inches from the edge of the bench top.
4. Prop up the oven front by placing a shim under each front foot. Use shims between 1½ and 2 inches in thickness.
5. Remove two screws securing bezel from bottom of oven.
6. Slide the oven back on the table plus a few inches (to set the bezel on the bench) and rotate the bottom of the bezel out from the oven. The top clips will come loose but the wiring will still be connected.
7. Carefully set the bezel on the bench.
8. Remove the two screws that secure the heater cover. Remove the cover by lifting and sliding it forward. It may be necessary to use a flat-blade screwdriver to assist in lifting the cover upward. Set heater cover aside.
9. Using an Allen wrench, loosen set-screw holding the fan blade onto the motor shaft. Observe the shaft has a flat side to prevent the set-screw from turning on the shaft.
10. Locate the two electrical leads from the fan motor. Remove the leads from the push-on terminal strip located in the front of the oven bezel.
11. Lay the oven on its back with the oven bottom facing forward.
12. Detach the controller housing (oven bottom) by removing the eight screws which fasten it to the cabinet. Two screws are located on each side of the oven and four on the bottom of the oven.
13. Locate the two access holes for the motor mounting nuts located in the oven floor, in front of and in back of the motor shaft.
14. Push an 11/32-in nut driver through the front access hole, gently pushing aside the oven insulation until the nut driver reaches the front motor mounting nut.

Replacing Circulating Fan Motor (cont.)

15. Remove front nut and washer, then repeat process using back access hole to remove back motor mounting nut and washer.
16. Remove the fan motor by sliding it out.
17. Install replacement fan motor by generally reversing the steps above.

Replacing the Controller

To replace a defective controller, proceed as follows:

1. Disconnect power cord from the electrical outlet.
2. Open the chamber door. Carefully remove and retain hardware from door hinges (case side). Set door aside.
3. Slide the oven back until the front of the bezel (control panel) is at least three inches from the edge of the bench top.
4. Prop up the oven front by placing a shim under each front foot. Use shims between 1½ and 2 inches in thickness.
5. Remove two screws securing bezel from bottom of oven.
6. Slide the oven back on the table plus a few inches (to set the bezel on the bench) and rotate the bottom of the bezel out from the oven. The top clips will come loose but the wiring will still be connected.
7. Carefully set the bezel on the bench.
8. Locate terminal blocks on controller, remove all wires connected to controller. Note color and location of wires.
9. Remove four screws that hold controller to bezel, then remove old controller.
10. Install new replacement controller and reattach wires previously removed.
11. Check wiring connections against schematic, making sure that the line power wire is attached to the proper terminal, i.e., 120V or 240V.
12. Check switch DS1 setting: If forced air, set switch A to ON, otherwise; set to OFF for gravity. Switch B should always be OFF.

Replacing the Solid State Relay

To replace a defective solid state relay, proceed as follows:

1. Disconnect power cord from the electrical outlet.
2. Open the chamber door. Carefully remove and retain hardware from door hinges (case side). Set door aside.
3. Slide the oven back until the front of the bezel (control panel) is at least three inches from the edge of the bench top.
4. Prop up the oven front by placing a shim under each front foot. Use shims between 1½ and 2 inches in thickness.
5. Remove two screws securing bezel from bottom of oven.
6. Slide the oven back on the table plus a few inches (to set the bezel on the bench) and rotate the bottom of the bezel out from the oven. The top clips will come loose but the wiring will still be connected.
7. Carefully set the bezel on the bench.
8. Consult the schematic and locate the solid state relay (mounted on bezel).
9. Remove four lead wires from their screw-down terminals.
10. Remove two Phillips screws which mount the solid state relay to the bezel.
11. Lift out the solid state relay. Put new solid state relay in place, making certain that the thin, conductive pad remains between the solid state relay and the bezel.
12. Generally reverse the steps above to re-assemble oven.

Rerplacing the Safety Relay

To replace a defective safety relay, proceed as follows:

1. Disconnect power cord from the electrical outlet.
2. Open the chamber door. Carefully remove and retain hardware from door hinges (case side). Set door aside.
3. Slide the oven back until the front of the bezel (control panel) is at least three inches from the edge of the bench top.
4. Prop up the oven front by placing a shim under each front foot. Use shims between 1½ and 2 inches in thickness.
5. Remove two screws securing bezel from bottom of oven.
6. Slide the oven back on the table plus a few inches (to set the bezel on the bench) and rotate the bottom of the bezel out from the oven. The top clips will come loose but the wiring will still be connected.
7. Carefully set the bezel on the bench.
8. Consult the schematic and locate the safety relay (mounted on bezel).
9. Remove four lead wires from their push-on terminals.
10. Remove two Phillips screws which mount the safety relay to the bezel.
11. Lift out the safety relay.
12. Generally reverse the steps above to install the replacement safety relay and re-assemble oven.

Replacing the Control Thermocouple

To replace a defective control thermocouple, proceed as follows:

1. Disconnect power cord from the electrical outlet.
2. Open the chamber door. Carefully remove and retain hardware from door hinges (case side). Set door aside.
3. Slide the oven back until the front of the bezel (control panel) is at least three inches from the edge of the bench top.
4. Prop up the oven front by placing a shim under each front foot. Use shims between 1½ and 2 inches in thickness.

Replacing the Control Thermocouple (cont.)

5. Remove two screws securing bezel from bottom of oven.
6. Slide the oven back on the table plus a few inches (to set the bezel on the bench) and rotate the bottom of the bezel out from the oven. The top clips will come loose but the wiring will still be connected.
7. Carefully set the bezel on the bench.
8. Remove thermocouple wires from 6-terminal connector by loosening two securing screws.
9. On roof of oven, locate the clip, which hold thermocouple in place. Remove thermocouple from clip.
10. Pull thermocouple forward into oven chamber, exposing roughly a 6 inch section of the thermocouple wire.
11. Cut the thermocouple wire to remove the thermocouple sheath.
12. Securely loop together the cut end of the defective thermocouple with the two leads of the replacement thermocouple. Wrap tape over the length of the loops to secure them.
13. Gently pull the defective thermocouple out through the electronics compartment while guiding ("fishing") the replacement thermocouple into place.
14. Consult schematic at end of this manual. Then, generally reverse steps 1 through 9 to complete installation of new thermocouple and reassemble oven.

Note Verify the yellow thermocouple conductor is under the (+) tab and the red thermocouple conductor is under the (-) tab. ▲

Section 7 Troubleshooting

This table is intended to assist in resolving oven problems by relating symptoms to their likely cause. The service discussed below is beyond the scope of most users and should be performed by qualified and trained personnel.

Symptom	Probable Cause	Action
No power	Unit not plugged in or turned on.	Plug in or turn on.
	Defective circuit breaker.	Replace circuit breaker.
Oven temperature erratically high	Defective control thermocouple	Replace control thermocouple
Failure to heat	Set temperature less than actual temperature	Refer to Operation section
	Defective control thermocouple	Replace control thermocouple
	Poor heater connections	Tighten connections at terminal strip and/or heater.
	Defective heater element	Check heater resistance on schematic at back of manual. Replace heater unless approximately the same as schematic.
	Defective controller	Replace controller
	Defective solid state relay	Refer to schematic and replace relay or safety relay
	Temperature Device, disengaged or defective	Replacement of the Overtemperature Device is to be performed by factory authorized personnel only. Disconnect power and contact Technical Services.
Alarm LED stays on and control is higher that set temperature	Set temperature has been changed to a value less than the actual temperature minus the alarm limit	Wait for actual temperature to cool to the set temperature.
	Defective controller	Replace controller
	Defective control thermocouple	Refer to schematic and replace relays.

(continued)

Symptom	Probable Cause	Action
Set display to "EEE"	Set temperature has been changed to a value less than the actual temperature minus the high alarm limit	Wait for actual temperature to cool to the set temperature
	Defective control thermocouple	Replace thermocouple
	Faulty or broken connections	Check thermocouple connections at rear of temperature controller
Temperature off from independent thermometer	Calibration offset needs adjusted	Begin by setting offset to 0. See **Display Offsets**.

Section 8 Replacement Parts

Note Only factory authorized components should be used for repair. ▲

Replacements for oven parts may be ordered from Technical Services.

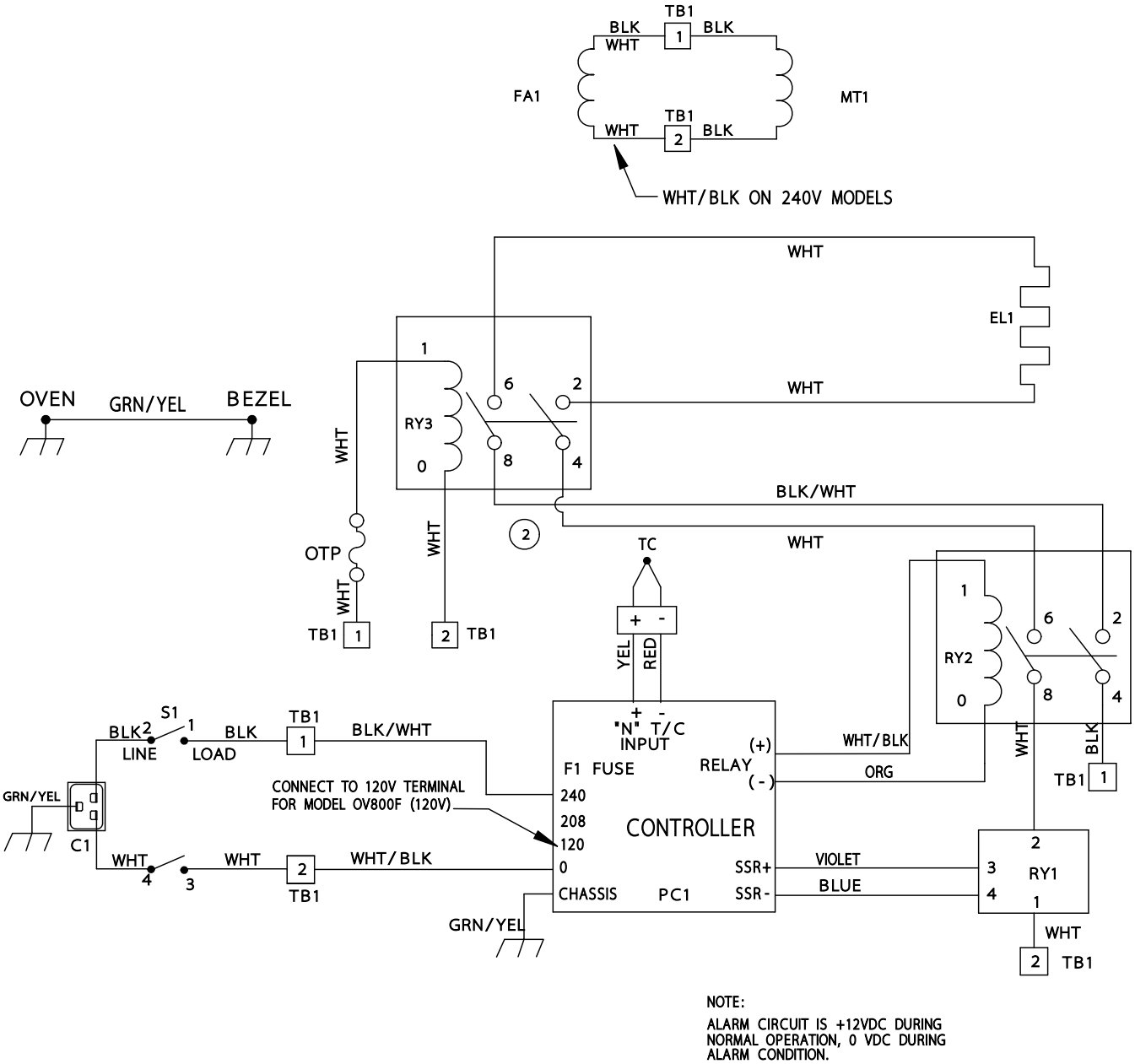
Item	Part Number (ref)
Line Cord and Plug	
120V Units	CRX121
240 V Int'l Units	CRX123
Temperature Controller 120V/240V	PCX132
Thermocouple Assembly	SPN 95603
Cooling Fan	
120V	FAX39
240V	FAX40
Circulating Fan Motor	
120V	SPN95788
240V	SPN95789
Door Handle	SPN 104976
Shelf	13-247S
Shelf Support (two per shelf)	SPN 95635
Heater Assembly (HTR)	
Small (120V)	SPN 95695
Small (240V)	SPN 95736
Medium and Large (120V)	SPN 95696
Medium and Large (240V)	SPN 95737
Door Gasket	
Small ovens	SPN 101908
Medium ovens	SPN 101909
Large ovens	SPN 101910
Door Gasket Grey Silicon Optional High Temp	
Small ovens	SPN 95782
Medium ovens	SPN 95783
Large ovens	SPN 95784

(continued)

Item	Part Number (ref)
Circuit Breaker	
Single Pole (120V)	SPN 95765
Double Pole (240V)	SPN 95786
Door Assembly	
Small	DR2034X6
Medium	DR2033X6
Large	DR2032X6
Solid State Relay (SSR)	SPN 83917
Safety Relay (K1)	
120V	SPN 95770
240V	SPN 95787
Thermal Fuse Assembly	FZ2148X2

COMPONENT CHART

REFERENCE	DESCRIPTION	120V	240V
C1	POWER ENTRY MODULE	CEX421	CEX421
EL1 (SML)	ELEMENT	95696	95737
EL1 (MED & LRG)	ELEMENT	-	95697
F1	FUSE	FZX96	FZX96
FA1	FAN	FAX39	FAX40
MT1	MOTOR	95788	95789
PC1	PC BOARD	PCX132	PCX132
RY1	SOLID STATE RELAY	88616	88616
RY2	SAFETY RELAY	102260	102260
OTP	THERMAL FUSE	FZX99	FZX99
RY3	SAFETY RELAY	95770	95787
TC	THERMOCOUPLE ASSEMBLY	95603	95603



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