



# Mechanical Convection Ovens

Models: MO1420A/SA/PA/SPA  
MO1430A/PA  
MO1440A/SA/PA/SPA  
MO1440C/SC/PC/SPC  
MO1450A/SA/PA/SPA  
MO1450C/PC

## Installation and Operation Manual

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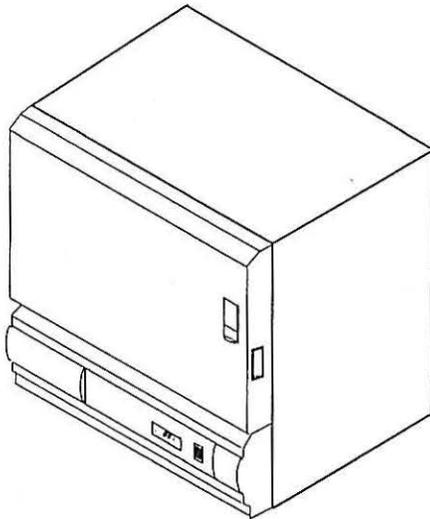
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## 1 Introduction



The Lindberg/Blue M MO Series Mechanical Convection Ovens include a microprocessor-based temperature controller which automatically optimizes control parameters during oven operation. An internal blower circulates heated air for maximum temperature uniformity throughout the chamber.

### 1.1 Front Panel Components

The front panel contains the following features:

- Power On switch.
- Temperature Controller which senses the process temperature of the oven and controls the heaters which supply the heat necessary to achieve the desired setpoint.
- 7-day digital timer (optional).

### 1.2 Components Located Off the Panel

The following components are located off the front panel:

- The Temperature Limit Switch disconnects power to the heater in the event of an overtemperature condition. The switch requires manual reset after the overtemperature condition is corrected.
- The Overtemperature reset mechanism is a green lever accessible through a hole above the mounting screws on the lower left side of the unit.
- Intake and Exhaust Vents. The intake vent is located at the center of the left side and the exhaust vent is located at the right side of the top face.
- The Overtemperature Protection Relay disconnects the heater in the event of an overtemperature condition.

### 1.3 Specifications

Table 1. Lindberg/Blue M MO 1420–1450 Series Mechanical Convection Ovens

Model	Dimensions W x D x H in. (cm)			Voltage	Exterior Finish	Weight lbs. (kg)	Heater Power kW	Line Current Amps	Max. Temp. °F (°C)
	Chamber	Exterior	Shipping (Approximate)						
MO1420A	13 x 16 x 10 (33 x 41 x 25)	25 x 22.5 x 32 (64 x 57 x 81)	30 x 28 x 38 (76 x 71 x 97)	120 V, 50/60 Hz. Single Phase	Painted Steel	130 (59)	1.0	11.1	572 (300)
MO1430A	13 x 16 x 15 (33 x 41 x 38)	25 x 22.5 x 37 (64 x 57 x 94)	30 x 28 x 43 (76 x 71 x 109)			180 (82)	1.3	13.6	
MO1440A	22 x 16 x 15 (56 x 41 x 38)	34 x 22.5 x 37 (86 x 57 x 94)	39 x 28 x 43 (99 x 71 x 109)	240 V, 50/60 Hz. Single Phase		200 (91)	1.9	18.4	
MO1440C						9.3			
MO1450A	22 x 16 x 24 (56 x 41 x 61)	34 x 22.5 x 46.5 (86 x 57 x 118)	39 x 28 x 53 (99 x 71 x 135)	120 V, 50/60 Hz. Single Phase		220 (100)	2.1	20.3	
MO1450C								10.2	
MO1420SA	13 x 16 x 10 (33 x 41 x 25)	25 x 22.5 x 32 (64 x 57 x 81)	30 x 28 x 38 (76 x 71 x 97)	120 V, 50/60 Hz. Single Phase	Stainless Steel	130 (59)	1.0	11.1	
MO1440SA	22 x 16 x 15 (56 x 41 x 38)	34 x 22.5 x 37 (86 x 57 x 94)	39 x 28 x 43 (99 x 71 x 109)	240 V, 50/60 Hz. Single Phase		200 (91)	1.9	18.4	
MO1440SC						9.3			
MO1450SA	22 x 16 x 24 (56 x 41 x 61)	34 x 22.5 x 46.5 (86 x 57 x 118)	39 x 28 x 53 (99 x 71 x 135)	120 V, 50/60 Hz. Single Phase		220 (100)	2.1	20.3	

## 2 Safety Considerations



**WARNING!** Do not modify or change system components. Replacement parts must be O.E.M. exact replacement equipment. Modification or use of the equipment in a manner other than expressly intended may cause death or serious injury. This includes use of user-supplied components and materials not specifically designed for the oven. Reconfiguring the controller may cause death or serious injury.

Lindberg/Blue M shall not be liable for any damages, including incidental and/or consequential damages, regardless of the legal theory asserted, including negligence and/or strict liability.

Before using, user shall determine the suitability and integrity of the product for the intended use and that the unit has not been altered in any way. User assumes all risk and liability whatsoever therewith.



**CAUTION!** Do not locate the oven near combustible materials, or corrosive or hazardous fumes or vapors. Incorrect oven location may cause personal injury, damage to the oven, or property damage.



**CAUTION!** Make sure the oven door is closed when the oven is operating. Operating the oven with the door open for extended periods of time may cause personal injury, damage to the oven, or property damage.



**WARNING!** This oven is not intended for hazardous materials workload processing. Contact your safety engineering staff before processing questionable loads in this oven. Contact Lindberg/Blue M for information on other products designed to process hazardous materials. Processing combustible or volatile fluids or materials in this oven may emit explosive vapors, which may cause death or serious injury.



**WARNING!** For proper operation of the unit and for safety, make sure that the unit is level when installed. Door may swing shut on personnel if the unit is tilted and the entire unit may tip when the door is open.



**CAUTION!** Keep combustible materials away from the heating element located at the bottom of the oven. Combustible materials spilled or dropped on the heating element may cause personal injury, damage to the oven, or property damage.

## 3 Pre-Installation

All standard Lindberg/Blue M Mechanical Convection Ovens are shipped electrically complete. Positioning and connecting correct electrical service are the only requirements for placing the oven into operation.

### 3.1 Unpacking

*Carefully unpack and inspect the unit and all accessories for damage. If you find any damage, keep the packing materials and immediately report the damage to the carrier. We will assist you with your claim, if requested. Do not return goods to Lindberg/Blue M without written authorization. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment.*

### 3.2 Atmosphere Systems

This oven is not designed to operate in corrosive environments.



**WARNING!** Do not locate units in areas near combustible materials or hazardous fumes or vapors.



**CAUTION!** Corrosive environments can lead to shortened life or deterioration of unit and performance. This unit is not designed to maintain a positive pressure. Not suitable for use with toxic, flammable, or volatile materials.

## 4 Installation

Do not exceed the electrical and temperature ratings printed on the dataplate of the oven.



**WARNING!** Improper operation of the oven could result in dangerous conditions. To preclude hazard and minimize risk, follow all instructions and operate within design limits noted on the dataplate.

### 4.1 Location

Keep line voltage variations to a minimum for best control accuracy. Do not locate unit in areas of wide ambient temperature variation, such as near vents or outdoor entrances. Place unit at least one foot from walls, although more space may be required for ease of maintenance.



**WARNING!** For proper operation of the unit and for safety, make sure that the unit is level when installed. Door may swing shut on personnel if the unit is tilted and the entire unit may tip when the door is open.

### 4.2 Wiring

For detailed wiring information, refer to the wiring diagrams at the end of this manual.



**CAUTION!** Connect the oven to the proper power source. Failure to use the specified voltage can result in damage to the oven.

All models are supplied with a line cord. If you prefer to connect directly to a circuit breaker, remove the line cord and replace it with appropriately rated hard wiring.

Information for sizing fuse, circuit breaker, or power lines appears on the oven dataplate and in the general specifications table (refer to Table 1 on page 1). Fuse protection must never exceed 125% of oven's current rating.



**DANGER!** For personal safety and trouble-free operation, this unit must be properly grounded before it is used. Always conform to the National Electrical Code and local codes. Utilize proper grounding techniques to reduce RFI and EMI for electronic gear. Do not connect unit to already overloaded power lines; lower voltage to unit will decrease power to the heating elements.

### 4.3 Exhaust Modifications

Never use an exhaust stack directly between the oven and the exhaust. A draft diverter, vacuum breaker, exhaust hood, or similar device (refer to Figure 1) must be connected between the oven and the exhaust. This connection prevents "chimney effect" which sucks heat out of the chamber and results in slow run-up time or poor temperature uniformity.

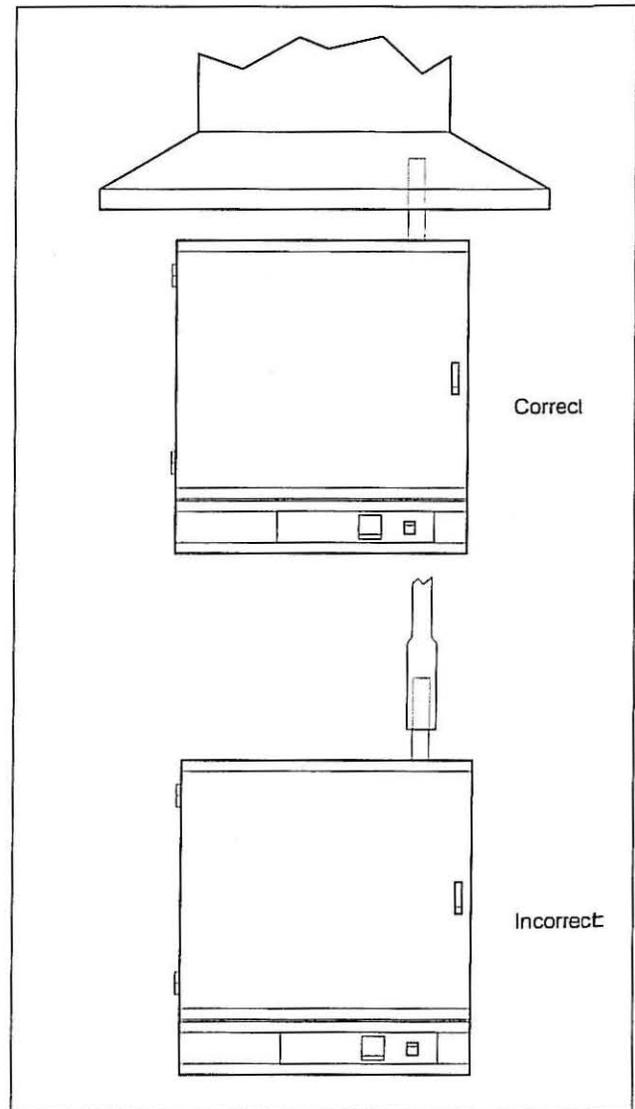


Figure 1. Exhaust Modifications

## 5 Start Up



**WARNING!** Before operating this equipment, read the applicable MSDS (Material Safety Data Sheets) at the back of this manual.



**WARNING!** When installing, maintaining, or removing the fiberglass insulation, the following precautions will minimize airborne dust and fiber:

- Keep personnel not involved in the installation out of the area.
- Use a good vacuum to clean area and equipment. Use a dust suppressant if sweeping is necessary. Do not use compressed air.
- Use disposable mask suitable for nuisance dust.
- Wear long sleeve clothing, gloves, hat, and eye protection to minimize skin and eye contact. Do not wear contact lenses.
- Thoroughly wash self after work is complete.
- Launder work clothing separate from other clothes and thoroughly clean laundering equipment after use. If clothing contains a large amount of dust and/or fiber, dispose of rather than clean.
- Promptly place used fiberglass parts and dust in plastic bags and dispose of properly.

### 5.1 Oven Operation

1. Turn on the main power switch. Allow the controller to run through its initial diagnostics.
2. Verify operation of the blower motor.
3. Place workload into oven.
  - To open the oven door, press the lower portion of the black door latch located on the front of the oven (refer to Figure 2).
  - To close the door, push it shut tightly while pressing the upper portion of the black door latch (refer to Figure 2).
4. Press ▲ or ▼ until the desired setpoint shows on the bottom line of the display (refer to Figure 3 on page 5).

### 5.2 Intake and Exhaust Vents

The intake vent is located at the center of the left side and the exhaust vent is located at the right side of the top face. For most applications, vents should be closed during operation of the oven; closed vents result in more efficient operation and greater temperature stability. However, there are some applications which benefit from partially or fully open vents.

Vents should be partially or fully open for the following application:

- To provide operation near ambient temperatures. The oven may not reliably control temperatures near ambient. Opening the vents allows sufficient heat loss to permit such operation.
- To provide slow cool down of work load. Some work loads may be damaged by heat shock when the oven door is opened. Vents can be opened to allow work load to cool gradually.
- To provide removal of vapors which result from the heating process. Most drying operations that release vapors are best performed with vents partially opened to prevent the accumulation of solid by-products.

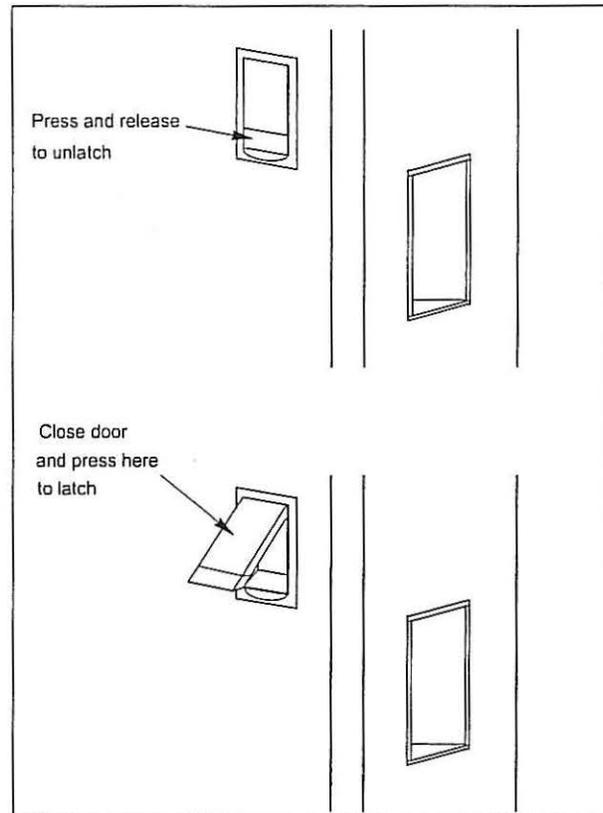


Figure 2. Oven Door Operation

## 6 Operation – 91e Controller

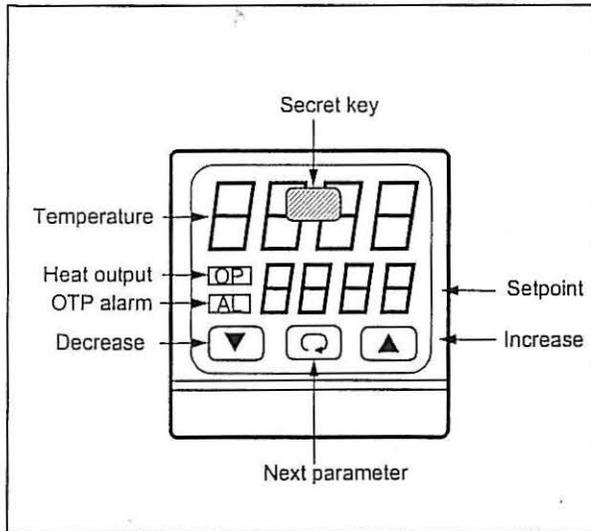


Figure 3. 91e Control Panel

The 91e Controller is used with models whose names end with A, SA, C, and SC. If your model is PA, SPA, PC, or SPC, refer to Section 7 on page 7 for operation with the 91p Controller.

The oven temperature controller is configured and tuned at the factory to function well for most applications. Occasionally, it may be advisable to configure the temperature controller differently to suit a particular working environment or process.



**CAUTION!** Before reconfiguring the controller, read this chapter and the *Model 91e Operation Manual*. Reconfiguring the controller can change the unit characteristics and design parameters, which can hamper performance and make the equipment dangerous to use.

This chapter provides brief instructions on how to perform the following configuration changes:

- Setting the Temperature.
- Setting the Overtemperature Protection Temperature.
- Changing Between Celsius and Fahrenheit.
- Setting the Ramp to Setpoint Time.

Detailed instructions on configuring the temperature controller are found in the *Model 91e Operation Manual*.

### 6.1 Normal Controller Operation

The Temperature Controller senses the process temperature of the oven and supplies the heat necessary to achieve the desired setpoint. The controller includes an LED display and a pushbutton keypad.

Refer to Table 2 for a list of LED displays and keypad functions.

The process value or the parameter code displays on the top line. The process value (actual temperature) displays whenever the instrument is unattended.

Table 2. 91e Parameter Functions

Parameter Code	Default Value	Description
<b>LED Display</b>		
tunE	off	Auto tune.
AL.SP	315	Overtemperature protection limit.
Conf	6217	Controller configuration.
Prop	6	Proportional band.
Int.t	80	Integral time.
dEr.t	1	Derivative time.
Ofst	0	Temperature offset.
SP.HI	300	Setpoint high limit.
SP.Lo	0	Setpoint low limit.
SP.rr	off	Setpoint ramp function.
H.ct	1.0	Heat cycle time.
LP.br	off	Loop break alarm.
Line	60	Line frequency (50 for European models).
<b>Pushbutton Keypad</b>		
		The scroll key advances the display to show units (°C, °F), tuning operations, and alarm setpoint (AL.SP). While in the protected list (see Secret Key below) the scroll key advances the display to the next parameter code and setting. The scroll key can also be used to abort operations in configuration mode (see Section 6.4).
		The up arrow key is used to increase a setpoint or a parameter setting.
		The down arrow key is used to decrease a setpoint or a parameter setting.
Secret Key		The secret key (shown in Figure 3) is used to access the protected list parameters from the alarm display AL.SP and to exit the protected list.

**Note:** The three pushbutton keys are not illuminated when the instrument is unattended. Touch any key on the front panel of the controller to light up the keys.



**CAUTION!** Do not adjust the setpoint high limit setting above 300°C (572°F).

## 6.2 Setting the Temperature

To set the temperature to the desired setpoint, complete the following steps:

1. Press any button on the controller keypad to illuminate the ▲, ▼, and ↻ keys.
2. Press ▲ or ▼ until the desired setpoint is indicated on the bottom line of the display.

## 6.3 Setting the Overtemperature Protection (OTP) Temperature

**Note:** *The high limit alarm in the temperature controller disables the heater output.*

To set the alarm on the temperature controller (typically 5°C above the desired main temperature setpoint), complete the following steps:

1. Illuminate the keys by pressing any button. Proceed directly to step 2 if the keys are already lit.
2. Press ↻ until AL.SP shows on the top line of the display.
3. Press ▲ or ▼ until the desired overtemperature limit setpoint shows on the bottom line of the display.

## 6.4 Changing Between Celsius and Fahrenheit

To change between Celsius and Fahrenheit display, complete the following steps:

1. Turn power to the controller off and then on.  
The following codes display:  
tESt  
1111  
8888  
XXXX (This will be a four digit configuration code, for example 6213).
2. When the four digit configuration code displays, press and hold down the "secret key."
3. Press ▼ until the fourth digit flashes.  
For Celsius operation, press ▲ until the number 7 is displayed (Fahrenheit is number 3).

**Note:** *Don't change the other three numbers since they will affect the alarm, sensor type, and range limits of the control.*

4. Press the secret key to enter in the new configuration (or press ↻ to abort the procedure).

## 6.5 Setting the Ramp to Setpoint Rate

To set the ramp to setpoint time, complete the following steps:

1. Press ↻ until AL.SP displays.
2. Press the secret key.
3. Keep pressing ↻ until SP.rr displays.
4. Press ▲ or ▼ to enter the new value (0.1 to 50°C/minute or 0.2 to 90°F/minute).
5. Press the secret key again to exit the protected list.

**Note:** *The setting should be within the capabilities of the unit. Some units are factory configured to ramp as quickly as possible.*

When you use the setpoint ramp rate function, the self-tuning feature is disabled and the display does not show tune as an option.

## 7 Operation – 91p Programmable Controller

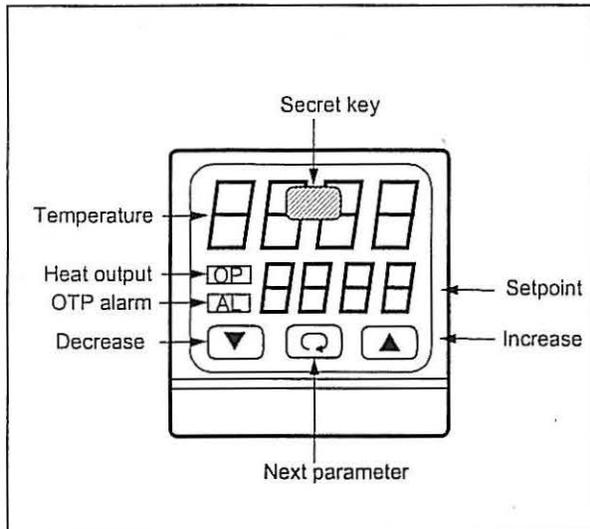


Figure 4. 91p Control Panel

The 91p controller is used with models that include the “P” suffix in the model number.

### 7.1 91p Controller

The 91p controller is fully programmable with eight ramps and eight dwells. This controller includes a self-tuning feature. Refer to the *91p Installation and Operation Manual* for detailed instructions.

### 7.2 Basic Operation

Refer to the *Model 91p Installation and Operation Manual* for complete instructions. Figure 4 shows the control panel.

- In general, to operate the 91p controller:
  - Touch any button to illuminate the ▲, ▼, and ↻ keys.
  - Press ▲ or ▼ until the desired setpoint is indicated on the bottom line of the display.
  - Press ↻ until °C, °F, or LIN is displayed. Then press the “secret key”. Continue pressing ↻ to view the parameters.
- To modify parameter values, display the desired parameter in the upper display and press ▲ or ▼.
- To return to the measured value display from the protected list, press the “secret key” (shown in Figure 4).

### 7.3 91p Program Parameters

Use the control parameters to adjust the 91p controller. Refer to Table 3 for a list of control parameters and a description of parameter functions. Refer to the *91p Installation and Operation Manual* for detailed instructions.

Table 3. 91p Parameter Functions

Parameter Code	Default Value	Function
<b>LED Display</b>		
tunE	off	Auto tune.
AL.SP	315	Overtemperature protection limit.
Prog		Programmer state select and status announcement. This parameter has three settings: <ul style="list-style-type: none"> <li>• IdLE: program in standby.</li> <li>• run: program running.</li> <li>• hold: program in hold.</li> </ul>
Conf	621d	Controller configuration.
Prop	6	Proportional band.
Int.t	80	Integral time.
dEr.t	1	Derivative time.
Ofst	0	Temperature offset.
SP.Hi	300	Setpoint high limit.
SP.Lo	0	Setpoint low limit.
SP.rr	off	Setpoint ramp function.
H.ct	1.0	Heat cycle time.
LP.br	off	Loop break alarm.
Line	60	Line frequency (50 for European models).
<b>Pushbutton Keypad</b>		
↻		The scroll key advances the display to show units (°C, °F), tuning operations, and alarm setpoint (AL.SP). While in the protected list (see Secret Key below) the scroll key advances the display to the next parameter code and setting. The scroll key can also be used to abort operations in configuration mode (see Section 7.6).
▲		The up arrow key is used to increase a setpoint or a parameter setting.
▼		The down arrow key is used to decrease a setpoint or a parameter setting.
Secret Key		The secret key (see Figure 4) is used to access the protected list parameters from the display °C, °F, or LIN and to exit the protected list.

**Note:** The three pushbutton keys are not illuminated when the instrument is unattended. Touch any key on the front panel of the controller to light up the keys.



**CAUTION!** Do not adjust the setpoint high limit setting above 300°C (572°F).

### 7.4 Programming the 91p Controller

Use the 91p program parameters to program the 91p controller for specific applications. For sample programs refer to Section 7.4.3 and Section 7.4.4 below.

#### 7.4.1 Entering a Program

To enter a program:

1. Scroll through parameters until °C is displayed.
2. Press the secret key (refer to Figure 4 on page 7) to access the program parameters.
3. Scroll to the first parameter Pr. Set Pr to the number of ramp/dwell pairs in the program you want to enter (see examples below). The maximum is 8.
4. Use the up and down arrows to enter the appropriate values for the ramp, dwell and level parameters. Set these three parameters for each ramp/dwell pair up to the number specified by Pr (for example, if Pr=4, then the last group of values you enter will be r4, d4, and L4).
5. The next parameter will be Hb, which specifies maximum deviation from temperature profile (see the example below).
6. Once you have entered the complete profile the controller will return to the normal display.

#### 7.4.2 Running a Program

To run a program, scroll to **Prog** and select the value RUN. When the program has completed its run, the temperature will return to idle mode setpoint.

#### 7.4.3 Three-step Example

Example 1 (shown in Figure 5) has three ramp/dwell pairs, so Pr is set to the value 3. The idle setpoint (SP) is set to 260°C prior to running the program.

Ramp slowly to a level of 90°C (L1) at a rate of 1.5°C/minute (r1). At this level the furnace dwells for 30 minutes (d1). Then ramp to 250°C (L2) at a rate of 4°C/minute (r2). Dwell at 250°C for 50 minutes (d2), then ramp to 300°C (L3) at a rate of 2.5°C/minute (r3). After dwelling at 300°C for 40 minutes (d3) the furnace returns to the 260°C setpoint (SP) at the natural cooling rate.

This program executes once because the loop counter (LC) is set to the value 1. The Holdback parameter (Hb) is set to 20: if at any time during program execution the measured temperature deviates from programmer setpoint profile by more than 20°C, the program clock will stop until the measured value is within the holdback band.

The program is:

SP	260	r2	4.00
tunE	OFF	L2	250
LC	1	d2	50
Pr	3	r3	2.50
r1	1.50	L3	300
L1	90	d3	40
d1	30	Hb	20

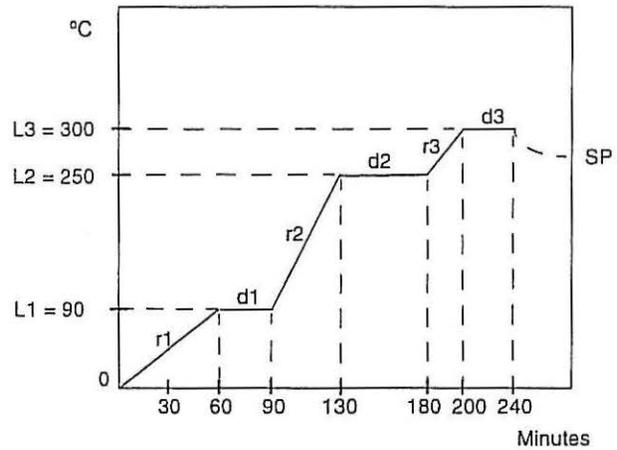


Figure 5. Three-step Program

#### 7.4.4 Continuous Loop Example

Example 2 (shown in Figure 6) uses the setting LC = Cont to hold furnace temperature at 300°C indefinitely.

Ramp to a level of 300°C (L1) at a rate of 10°C/minute (r1). Then dwell at 300°C for 20 minutes (d1). Because LC, the loop count parameter, is set to Cont (continuous), the program repeats the r1/d1 sequence, maintaining the L1 temperature 300°C until the furnace is reprogrammed or shut off.

The program is:

tunE	OFF	r1	10.00
LC	Cont	L1	300
Pr	1	d1	20
Hb	20		

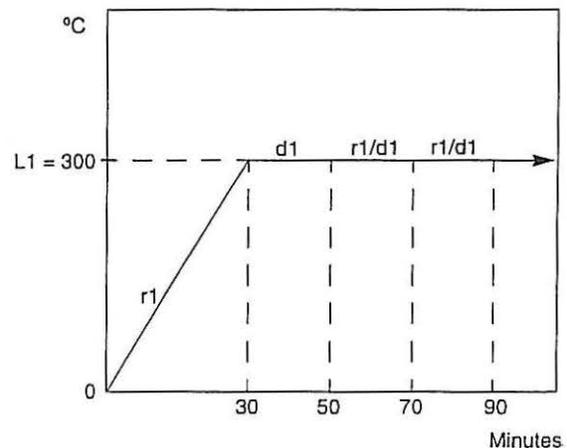


Figure 6. Continuous Loop

### 7.5 Setting the Overtemperature Protection (OTP) Temperature

**Note:** *The high limit alarm in the temperature controller disables the heater output.*

To set the alarm on the temperature controller (typically 5°C above the desired main temperature setpoint), complete the following steps:

1. Illuminate the keys by pressing any button. Proceed directly to step 2 if the keys are already lit.
2. Press  until AL.SP shows on the top line of the display.
3. Press  or  until the desired setpoint shows on the bottom line of the display.

### 7.6 Changing Between Celsius and Fahrenheit

To change between Celsius and Fahrenheit display, complete the following steps:

1. Turn power to the controller off and then on.

The following codes display:

tESt

1111

8888

XXXX (This will be a four digit configuration code similar in number to 621d, as an example).

2. When the four digit configuration code displays, press and hold down the "secret key."
3. Press  until the fourth digit flashes.  
For Celsius operation, press  until d is displayed (Fahrenheit is number 9).

**Note:** *Don't change the other three numbers since they will affect the alarm, sensor type, and range limits of the control.*

4. Press the secret key to enter in the new configuration (or press  to abort the procedure).

## 8 Maintenance



**CAUTION!** Maintenance should only be performed by trained personnel.



**WARNING!** Disconnect oven from main power before attempting any maintenance to oven or its controls.



**WARNING!** Before maintaining this equipment, read the applicable warning at the back of this manual.

For wiring schematics and replacement parts specifications, refer to Section 10 on page 12.

### 8.1 Cleaning



**WARNING!** Disconnect oven from main power before attempting any maintenance to oven or its controls.

Use a high pressure compressed air hose to blow dust out of the oven compartment. Clean the stainless steel oven interior with a cloth dampened in clean water. Remove stubborn stains with mild dishwashing detergent.

### 8.2 Heating Elements



**WARNING!** Disconnect oven from main power before attempting any maintenance to oven or its controls.

Periodically inspect the heating element and blower wheel compartments for cleanliness, especially when operating the unit in a dusty environment. Failure to keep these areas clean can lead to early element burn-out.

To replace heating elements, complete the following steps:

1. Remove the inner chamber compartment.
2. Disconnect the leads from element terminals located in the wiring compartment.
3. Straighten the element leads and pull them through the insulators into the element compartment.
4. Depress the element support clips and remove the element.
5. To install the new element, reverse the above procedure. Check gasket seal integrity before securing the inner chamber compartment.

### 8.3 Blower Motor

The blower is fitted with a sealed bearing and requires no lubrication for the life of the unit.

### 8.4 Overtemperature Alarm Protection (OTP)

The Load Overtemperature Alarm System audibly indicates if the temperature inside the chamber exceeds the load alarm setpoint. To insure proper operation, this alarm system must be checked at least once a month.

To test the load overtemperature alarm, complete the following steps:

1. Operate the oven without a product load at your normal operating temperature.
2. Readjust main temperature control to a temperature above the load alarm setting, **AL.SP**.
3. Observe the unit closely until the load alarm **AL.SP** trips.
4. Reset the main temperature control to normal operating temperature.

### 8.5 Oven Overtemperature Control (OTC)

The Oven Overtemperature System operates only if a problem occurs with the main controller or solid-state relay. This system is factory set to prevent catastrophic failure of the oven.

When the temperature exceeds the factory-set alarm setpoint, the overtemperature device disables the heaters until manually reset.

The Overtemperature Reset resets the overtemperature device identified as LS on the wiring diagram. It is a green lever accessible through a hole above the mounting screws on the lower left side of the unit.



**CAUTION!** Use an electrically insulated tool for Overtemperature reset.

### 8.6 Door System Check



**WARNING!** Disconnect oven from main power before attempting any maintenance to oven or its controls.

Periodically inspect the door latch, trim, catch, and gasket for signs of deterioration (unusual paint discoloration on the front face of the oven, softness or deformation of the plastic, slower response times, cracking or tearing at the gasket). Failure to maintain the integrity of the door system will reduce the lifespan of the oven.

To replace the gasket, complete the following steps:

1. Remove the inner chamber mounting screws (under the gasket and on the rear chamber wall).
2. Pull the inner chamber away from the cabinet.
3. Slip the gasket off the perimeter of the inner chamber.
4. Repeat Steps 1 through 3 in reverse order to install the new gasket. Be certain that the gasket does not roll under the inner chamber when pushing the inner chamber back into the cabinet.

### 9 Troubleshooting



**WARNING!** Troubleshooting procedures involve working with high voltages which can cause injury or death. Troubleshooting should only be performed by trained personnel.

This section is a guide to troubleshooting controller and oven problems. Refer to Table 4 for controller troubleshooting procedures. Refer to Table 5 on page 12 for oven troubleshooting procedures.

**Table 4. Controller Troubleshooting**

Problem	Solution
Controller reads SnSr.	<p>Thermocouple:</p> <ol style="list-style-type: none"> <li>1. Check the thermocouple visually for breaks. If a break is evident, replace thermocouple.</li> <li>2. Check the thermocouple for continuity with an ohmmeter. If there is no continuity, replace thermocouple.</li> <li>3. Check all thermocouple connections. Connections should be clean and free of corrosion.</li> </ol>
Controller reads tunE FAIL.	<p>Self-tuning operation failed because controller cannot maintain setpoint:</p> <ol style="list-style-type: none"> <li>1. Touch any key to acknowledge the message.</li> <li>2. Remove the cause of failure, such as blown heater fuse, etc.</li> </ol>
Controller reads LinE FAIL.	<p>Loss of controller power during self-tuning operation renders sampled data questionable:</p> <ol style="list-style-type: none"> <li>1. Touch any key to acknowledge the message.</li> <li>2. Verify power supply.</li> <li>3. Reinitiate self-tuning procedure.</li> </ol>

Table 5. Oven Troubleshooting

Problem	Probable Causes	Solution
The controller displays do not illuminate.	The oven is not connected to the power supply.	Check oven connection to power source.
	Main switch is defective.	Replace power switch.
	Fuse(s) blown.	Replace fuse(s) and verify power connections.
Temperature varies or fluctuates.	Improper loading.	Test the unit empty. If results are satisfactory, the oven was improperly loaded. Redistribute the load.
	Poor sensor connections.	Check connections. Clean and tighten.
	Contaminated sensor.	Replace sensor.
	Poor ventilation of base.	Clear the area around the base.
	Inlet and/or exhaust vents are open.	Close vents.
	Inadequate tuning values.	Auto-tune the controller.
	Insufficient stabilization time.	Allow load ample time to reach equilibrium.
Temperature Offset.	Controller degradation and/or sensor degradation.	Calibrate the controller and/or replace the sensor.
Oven does not heat.	No power.	Check power source, fuses, breakers, and connections.
	Defective solid-state relay.	Replace solid-state relay.
	Tripped overtemperature control (see Section 8.5 on page 10).	Reset the OTC system, following the instructions in Section 8.5.
	Defective sensor.	Replace sensor.
	Controller malfunction.	Verify controller parameters/replace controller.
	One or more heater coils are burned out (coil may be open, shorted, or shorted to ground).	Replace heater.
	Heater coils are improperly connected.	Verify power source with the appropriate schematic representation.
Slow heat up.	Low line voltage.	Install line of sufficient and proper voltage (isolate the oven from other electrical loads).
	Heavy load in chamber.	Reduce load in chamber to allow sufficient circulation.
	One heater coil burned out.	Replace heater.
	Open inlet and/or exhaust vents.	Close vents.
	Improper door closure.	Adjust door latch compression nut to meet gasket on all edges.
	Gasket deterioration.	Replace gasket.

## 10 Wiring Diagrams

The following pages contain the wiring schematics and replacement parts tables for all the MO Series models described in this manual.

Wiring diagram for MO1420 and MO1430 models with voltage "A"

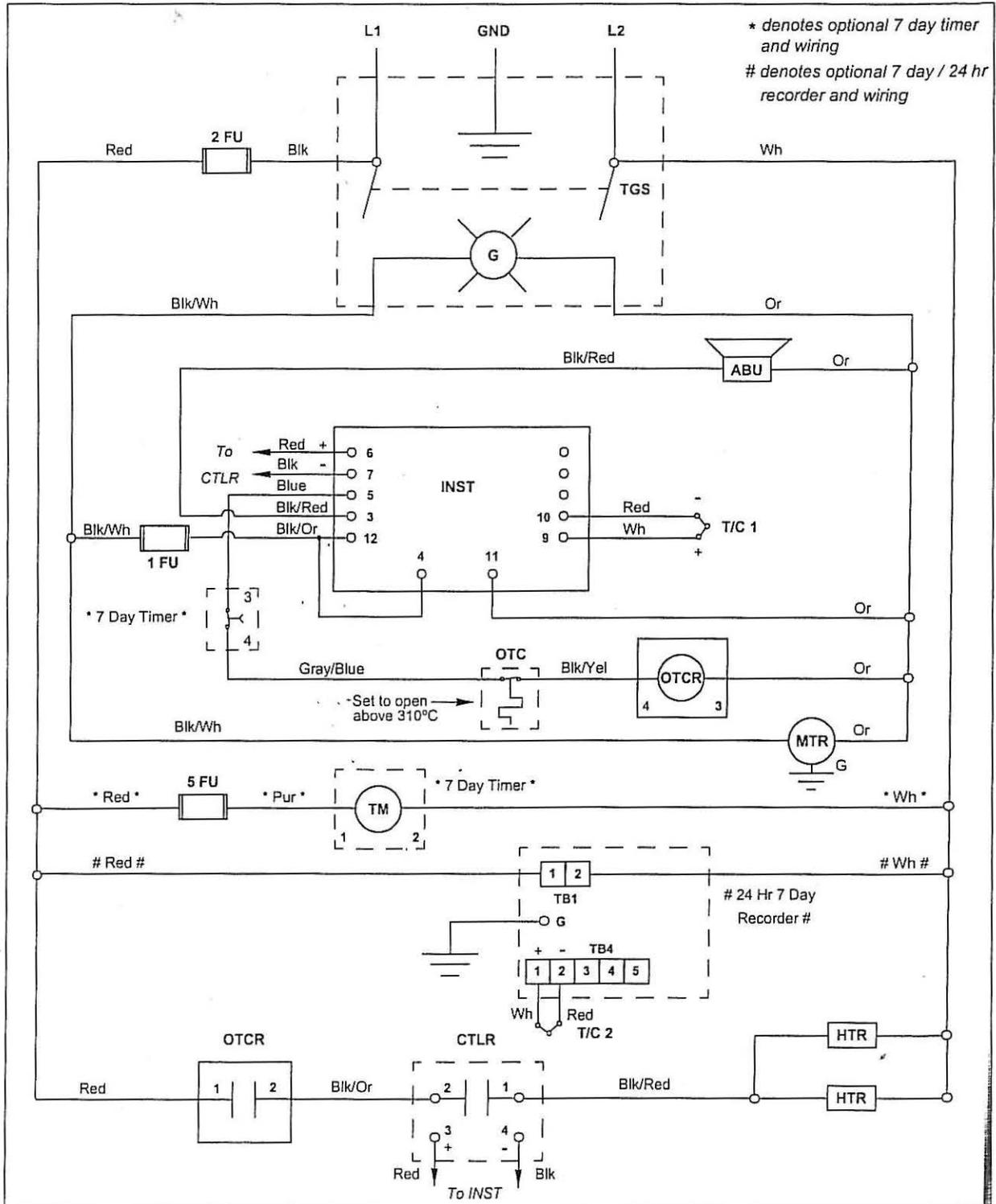


Table 6. Replacement Parts - Models MO1420(P)A, MO1420S(P)A, and MO1430(P)A Only.

Item Number	Description	Model Number			
		MO1420A, MO1420SA	MO1420PA, MO1420SPA	MO1430A	MO1430PA
CTLR	Control Relay	102460	102460	102460	102460
1 FU	Control Fuse	E04J-1	E04J-1	E04J-1	E04J-1
2 FU	Heater Fuse	E04J-15	E04J-15	E04J-15	E04J-15
HTR	Heater	A-121-979	A-121-979	A-121-976	A-121-976
INST	Control	118008	36875H01	118008	36875H01
LS	Limit Switch (OTC)	38687H01	38687H01	38687H01	38687H01
PL	Plug	118124	11824	48951H02	48951H02
OTCR	OTC Relay	E02K-3-07	E02K-3-07	E02K-3-07	E02K-3-07
ABU	Alarm Buzzer	E01-1	E01-1	E01-1	E01-1
T/C	Thermocouple	C11B-1-1	C11B-1-1	C11B-1-1	C11B-1-1
TGS	Toggle Switch	118007	118007	118007	118007
MTR	Blower Motor	118921	118921	118921	118921

Wiring diagram for MO1440 and MO1450 models with voltage "A"

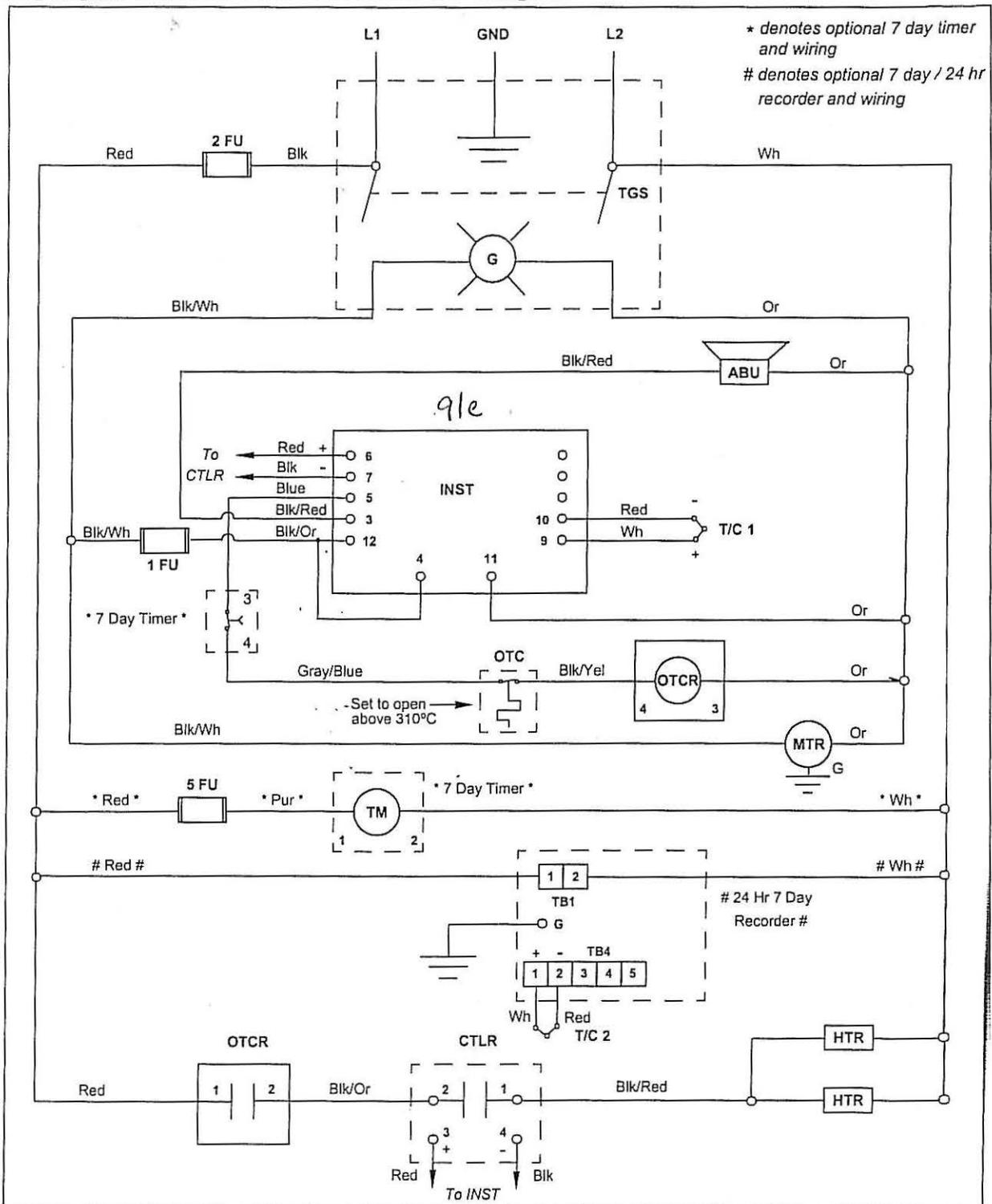


Table 7. Replacement Parts - Models MO1440(P)A, MO1440S(P)A, MO1450(P)A, and MO1450S(P)A Only

Item Number	Description	Model Number			
		MO1440A, MO1440SA	MO1440PA, MO1440SPA	MO1450A, MO1450SA	MO1450PA, MO1450SPA
CTLR	Control Relay	102460	102460	102460	102460
1 FU	Control Fuse	E04J-1	E04J-1	E04J-1	E04J-1
2 FU	Heater Fuse	E04J-20	E04J-20	E04J-20	E04J-20
HTR	Heater	A-121-972	A-121-972	A-121-977	A-121-977
INST	Control	118008	36875H01	118008	36875H01
LS	Limit Switch (OTC)	38687H01	38687H01	38687H01	38687H01
PL	Plug	48951H07	48951H07	48951H07	48951H07
OTCR	OTC Relay	E02K-3-07	E02K-3-07	E02K-3-07	E02K-3-07
ABU	Alarm Buzzer	E01-1	E01-1	E01-1	E01-1
T/C	Thermocouple	C11B-1-1	C11B-1-1	C11B-1-1	C11B-1-1
TGS	Toggle Switch	118007	118007	118007	118007
MTR	Blower Motor	118921	118921	118921	118921

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Wiring diagram for MO1440 and MO1450 models with voltage "C"

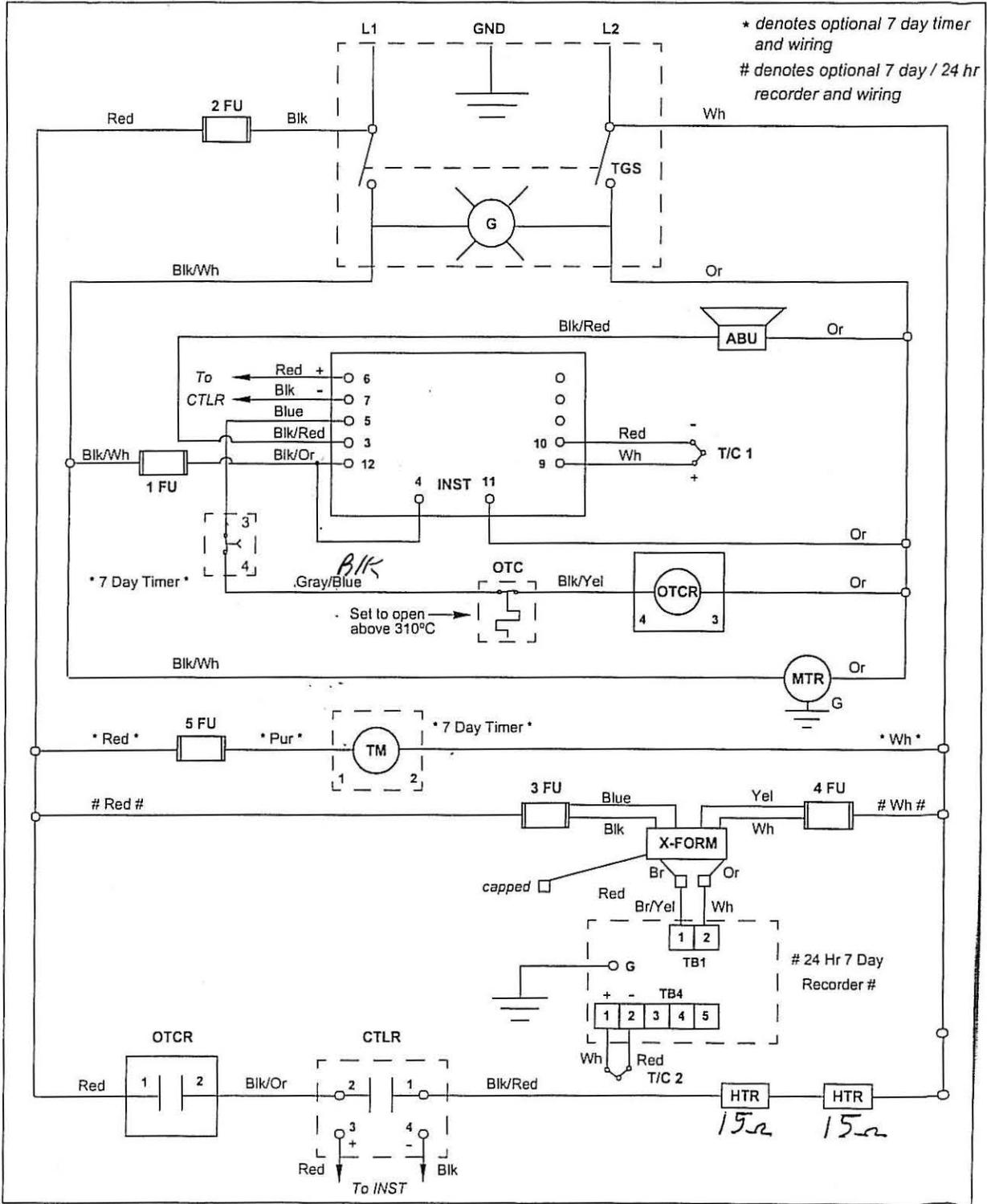


Table 8. Replacement Parts - Models MO1440(P)C, MO1440S(P)C, and MO1450(P)C Only

Item Number	Description	Model Number			
		MO1440C and MO1440SC	MO1440PC and MO1440SPC	MO1450C	MO1450PC
1 FU	Control Fuse	E04J-1	E04J-1	E04J-1	E04J-1
2 FU	Heater Fuse	E04J-10	E04J-15	E04J-15	E04J-15
HTR	Heater	A-121-972	A-121-972	A-121-977	A-121-977
INST	Control	118008	36875H01	118008	36875H01
LS	Limit Switch (OTC)	38687H01	38687H01	38687H01	38687H01
OTCR	OTC Relay	E02K-2-04	E02K-2-04	E02K-2-04	E02K-2-04
CTLR	Control Relay	102460	102460	102460	102460
ABU	Alarm Buzzer	118393	118393	118393	118393
T/C	Thermocouple	C11B-1-1	C11B-1-1	C11B-1-1	C11B-1-1
TGS	Toggle Switch	118006	118006	118006	118006
MTR	Blower Motor	118921	118921	118921	118921
PL	<i>Service</i> Plug <i>Cord</i>	48951H03	48951H03	48951H03	48951H03

## 11 Warranty

### 11.1 Domestic Warranty (United States and Canada)

Lindberg/Blue M warrants this product to the owner for a period of twelve (12) months from date of shipment by Lindberg/Blue M. Under this warranty Lindberg/Blue M through its authorized Dealer or service organizations, will repair or at its option replace any part found to contain a manufacturing defect in material or workmanship, without charge to the owner, for a period of ninety (90) days, the labor, and a period of one (1) year, the parts, necessary to remedy any such defect. All components used in the manufacture of this product are covered by this warranty excluding heating elements and thermocouples.

This warranty is limited to products purchased and installed in the United States and Canada. It does not apply to damage caused from failure to properly install, operate, or maintain the product in accordance with the printed instructions provided. This warranty shall not apply to equipment or parts which have been subjected to negligence, accident, or damage by circumstances beyond Lindberg/Blue M's control or improper operation, application, maintenance, or storage.

To obtain prompt warranty service, contact the nearest Lindberg/Blue M authorized service center or Dealer. A listing of these companies will be provided upon request. Lindberg/Blue M's own shipping records showing date of shipment shall be conclusive in establishing the warranty period.

This warranty is in lieu of any other warranties, expressed or implied, including merchantability or fitness for a particular purpose. The owner agrees that Lindberg/Blue M's sole liability with respect to defective parts shall be as set forth in this warranty, and any claims for incidental or consequential damages are expressly excluded.

### 11.2 International Warranty (excluding Canada) 12 Months Parts Warranty

Lindberg/Blue M warrants this product to the original owner for a period of twelve (12) months from the date of shipment from the Lindberg/Blue M factory. Thermocouples and heating elements are excluded from this warranty. If any part is found to contain a manufacturing defect in material or workmanship Lindberg/Blue M will, at its option, repair or replace the part. Lindberg/Blue M assumes no responsibility for any labor expenses for service, removal, or reinstallation required to repair or replace the part, or for incidental repairs, and such costs are the responsibility of the Owner and his Dealer.

The warranty does not apply to damage caused by accidents, misuse, fire, flood, Acts of God or any other events beyond Lindberg/Blue M's control or to damage caused from failure to properly install, operate, or maintain the product in accordance with the printed instructions provided by Lindberg/Blue M. To obtain prompt warranty service, simply contact the Dealer from whom you purchased the product or the nearest Dealer handling Lindberg/Blue M products. Lindberg/Blue M's own shipping records showing date of shipment shall be conclusive in establishing the warranty period.

This warranty is in lieu of any other warranties, expressed or implied, including merchantability or fitness for a particular purpose. The owner agrees that its sole remedy and Lindberg/Blue M's sole liability with respect to defective parts or any other claim shall be as set forth in this warranty, and any claims for incidental, consequential or other damages are expressly excluded.

## Important

For your future reference and when contacting the factory, please have the following information readily available:

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

The above information can be found on the dataplate attached to the equipment. If available, please provide the date purchased, the source of purchase (Lindberg/Blue M or specific agent/rep organization), and purchase order number.

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### IF YOU NEED ASSISTANCE:

#### LINDBERG/BLUE M SALES DIVISION

Phone: 704/658-2711  
800/252-7100

FAX: 704/645-3368

#### LABORATORY PARTS and SERVICE

Phone: 704/658-2891  
800/438-4851

FAX: 704/658-2576

#### TECHNICAL SUPPORT

Phone: 800/438-4851

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