

C-86

P/N 105299
REV. 4/90

Instruction Manual for LAC Series

LAC Series Despatch Ovens are bench ovens to 260°C (500°F) with forced convection airflow.

<u>MODEL</u>	<u>VOLTS</u>	<u>HEATER</u>	<u>WATTS</u>	<u>AMPS</u>	<u>HZ</u>	<u>PHASE</u>
LAC 1-10	120	1,000	10.0	50/60		1
LAC 1-38A	120	1,600	16.5	50/60		1
LAC 1-38B	240	1,800	9.2	50/60		1
LAC 1-67	240	2,400	11.7	50/60		1
LAC 2-12	240	3,600	18.4	50/60		1
LAC 2-18	240	4,800	23.4	50/60		1

PREFACE

This manual is your guide to the Despatch LAC Series Ovens. It is organized to give you the information you need quickly and easily.

The INTRODUCTION section provides an overview of the Despatch LAC Series Ovens.

The THEORY OF OPERATION section details the function and operation of assemblies and subassemblies on the Despatch LAC Series Ovens.

The INSTRUCTIONS section provides directions on unpacking, installing, operating and maintaining the Despatch LAC Series Ovens.

The APPENDIX section contains Special Instructions for operating the control instrument, an Error Message Table, a Troubleshooting Table, a list of Accessories and a Warranty.

An efficient way to learn about the oven would be to read the manual while working with the corresponding oven control system. This will give you practical hands-on experience with information in the manual and the oven.

While reading this manual, if a term or section of information is not fully understood, look up that item in the appropriate section to familiarize yourself with that item. Then go back and reread that section again. Information skipped, not understood or misunderstood could create the possibility of operating the equipment in an unsafe manner. This can cause damage to the oven or personnel or reduce the efficiency of the equipment.

NOTE: Read the entire INTRODUCTION and THEORY OF OPERATION before installing the oven.

WARNING: Failure to heed warnings in this instruction manual and on the oven could result in death, personal injury or property damage.

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INTRODUCTION

The INTRODUCTION section provides an overview of the Despatch LAC Series Ovens. The LAC Series Ovens have the most effective heat distribution and the fastest processing time of any lab oven its size. Air is discharged from the left side wall of the oven and circulates through the chamber.

Special Features

The sturdy construction and three inch insulation of the Despatch LAC Series Ovens contribute to high temperature uniformity. Other special features include:

- PID (Proportional, Integral, Derivative) digital CONTROL instrument to control temperature fluctuations.
- Digital control and manual reset HI-LIMIT instrument to protect the chamber's workload as well as the oven itself.
- Unique Despatch design to combine higher fan volume of forced recirculated air with a computerized system of perforated stainless steel walls for the ultimate in temperature uniformity.
- Welded double wall construction and fiberglass insulation to reduce heat loss. Silicone rubber gaskets further minimize heat leakage.
- Rapid response heater with a five year warranty.
- Scratch-resistant Silver-Clay® baked enamel exterior and stainless steel interior for easy cleaning.
- Space-saving, stackable design.

Specifications

Dimensions

Table 1 Dimensions

Model	Chamber Size in (cm) W D H	Capacity feet ³ (liters)	Overall Size in (cm) W D H	Maximum Number of Shelves	Exhaust Diameter Located on Back of Chamber (in)
LAC 1-10	12 12 12 (30)(30)(30)	1 (28)	20 19 30 (51)(48)(76)	5	1
LAC 1-38A	19 18 19 (48)(46)(48)	3.8 (108)	27 25 37 (69)(64)(91)	8	2
LAC 1-38B	19 18 19 (48)(46)(48)	3.8 (108)	27 25 37 (69)(64)(91)	8	2
LAC 1-67	24 20 24 (61)(51)(61)	6.7 (190)	34 27 42 (86)(69)(107)	11	2
LAC 2-12	24 24 36 (61)(61)(90)	12 (340)	34 31 54 (86)(79)(137)	17	2 - 2½
LAC 2-18	36 24 36 (90)(61)(90)	18 (510)	48 31 54 (122)(79)(137)	17	2 - 2½

Power

Line voltages may vary in some geographical locations. If your line voltage is much lower than the oven voltage rating, warm-up time will be longer and motors may overload or run hot. If your line voltage is higher than name plate rating, the motor may run hot and draw excessive amps.

If the line voltage varies more than 10% from the oven voltage rating, some of the electrical components such as relays, temperature controls, etc. may operate erratically.

Table 2 Power Requirements

Model	Volts	Amps	Hertz	Phase	Heater KW	Cord and Plug
LAC 1-10	120	10.0	50/60	1	1	Included, 15 Amp
LAC 1-38A	120	16.5	50/60	1	1.6	Included, 20 Amp
LAC 1-38B	240	9.2	50/60	1	1.8	Included, 15 Amp
LAC 1-67*	240	11.7	50/60	1	2.4	Included, 15 Amp
LAC 2-12*	240	18.4	50/60	1	3.6	None, Hardwired
LAC 2-18*	240	23.4	50/60	1	4.8	None, Hardwired

The LAC 2-12 and LAC 2-18 must be hardwired to the electric supply using 10 AWG or larger wires suitable for at least 75°C (167°F).

*Oven designed for 240 volts (see name plate on oven) will operate satisfactorily on a minimum of 208 volts, but with a 25% reduction in heater power. If your power characteristics are lower, contact Despatch Industries, Inc.

Temperature

Table 3 Temperature Specifications

Model	LAC 1-10	LAC 1-38 A & B	LAC 1-67	LAC 2-12	LAC 2-18
Time to Temperature (minutes)					
25°C - 100°C	8	7	5	5	6
25°C - 200°C	25	25	20	20	10
25°C - 260°C	40	40	35	35	20
Recovery Time Door Open One Minute (minutes)					
100°C	1	2	2	2	2
200°C	4	7	5	6	5
260°C	9	10	8	12	8
Temperature Uniformity at					
100°C	±1°C	±1°C	±1°C	±1°C	±1°C
200°C	±2°C	±2°C	±2°C	±2°C	±2°C
260°C	±2°C	±3°C	±3°C	±3°C	±3°C
Operating Range w/20°C Ambient	35 - 260°C	35 - 260°C	35 - 260°C	50 - 260°C	50 - 260°C
Control Stability	±0.3°C	±0.3°C	±0.3°C	±0.3°C	±0.3°C
Repeatability	±0.5°C	±0.5°C	±0.5°C	±0.5°C	±0.5°C

* Indicates the maximum uniformity with the fresh air damper closed and the exhaust air damper open

Capacities

Table 4 Capacities

Model		LAC 1-10	LAC 1-38 A & B	LAC 1-67	LAC 2-12	LAC 2-18
Maximum Load	Lbs	100	125	150	175	200
Maximum Shelf Load	Lbs	50	25	25	25	25
Exhaust	CFM	Adj. to 5	Adj. to 20	Adj. to 25	Adj. to 35	Adj. to 60
Recirculating Fan	CFM	150	300	300	600	600
	H.P.	1/25	1/4	1/4	1/2 (2-1/4)	1/2 (2 - 1/4)
Approximate Net Weight	Lbs.	95	165	203	285	500
	KG	43	75	92	130	227
Shipping Weight	Lbs.	115	200	400	535	575
	KG	52	91	181	243	261

THEORY OF OPERATION

The THEORY OF OPERATION section details the function and operation of assemblies and subassemblies on the Despatch LAC Series Ovens.

The Despatch LAC Series Ovens have the most effective heat distribution system and the fastest processing time of any lab oven its size. These ovens are especially useful for testing, preheating, sterilizing, drying, aging and curing as well as other production applications.

The Despatch LAC Series Ovens incorporate horizontal airflow with precision digital control to deliver uniform, fast processing. The overall result is efficient productivity under strenuous conditions.

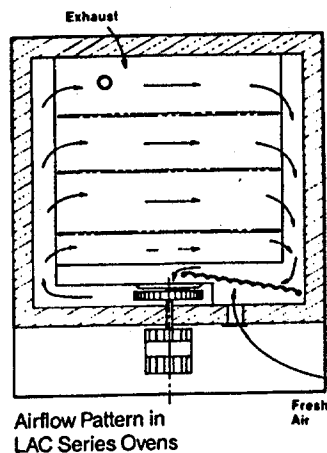


Figure 1 illustrates the precision horizontal airflow in the Despatch LAC ovens.

The unique Despatch computerized design, moves forced convected heat through perforated stainless steel walls. The air is recirculated with a high volume fan. The Despatch LAC Series Ovens employ higher volume fans than any competitive model. The chamber can be densely loaded without interfering with the process. Air delivery temperature is within $1/2^{\circ}\text{C}$ of the number appearing on the digital display. Fresh air intake is regulated by a panel-mounted damper control.

CONTROL Instrument

The LAC Series Ovens are equipped with a PID (Proportional, Integral, Derivative) digital CONTROL instrument.

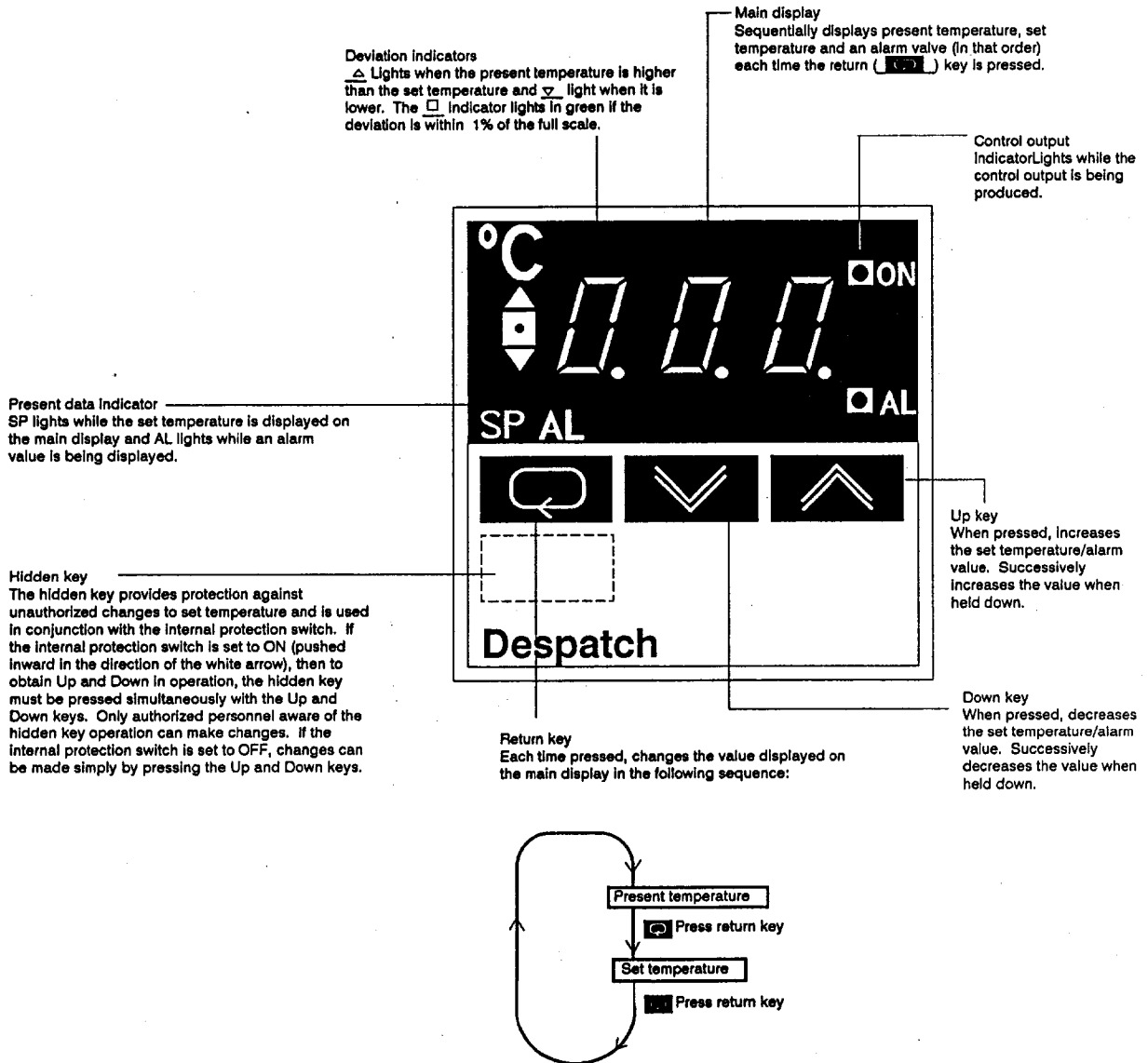


Figure 2 illustrates the CONTROL instrument installed on the Despatch LAC Series Ovens.

NOTE: The ALARM function is not used.

The PID controller has a distinct advantage over ovens equipped with on-off type CONTROL instruments. Initially, the controller allows the heater to operate at full power. However, as the actual oven chamber temperature gets closer to the desired operating temperature (setpoint), the heater-on time is gradually reduced. This PID control action minimizes temperature overshoot and results in virtually no temperature fluctuation during processing.

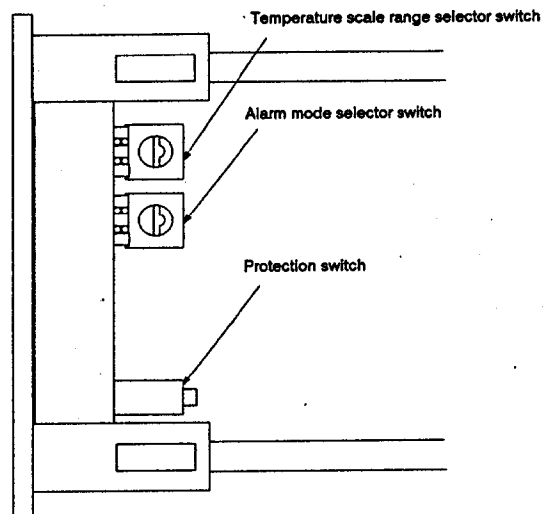
Function Settings

The CONTROL instrument has been preset and tested for the specified operating conditions. Special instructions for changing the function settings are referenced in the Appendix of this manual.

The CONTROL instrument selector switches are a 10-pin rotary DIP switch.

WARNING: Do not change the function settings unless absolutely necessary.

Right side view



Left side view

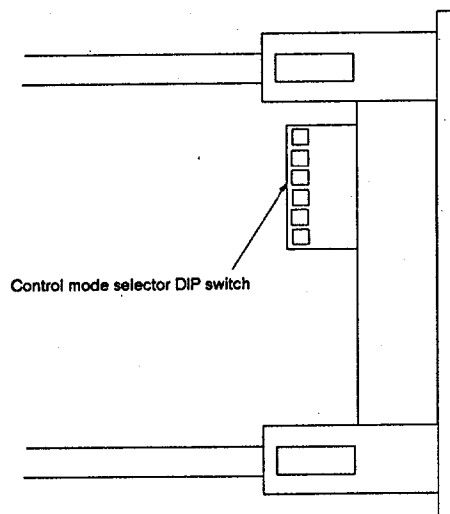
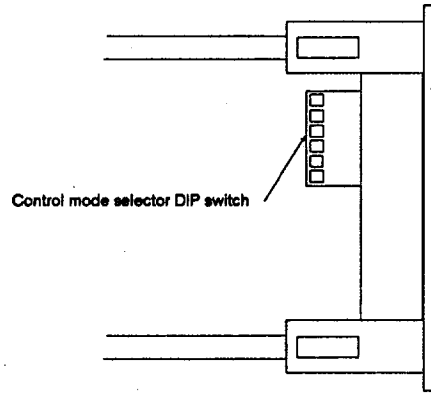


Figure 3 illustrates the internal DIP switches on the CONTROL instrument.

The protection switch may be used in conjunction with the front panel hidden key to prevent unauthorized changes to temperature settings. The

Function Settings (Cont.)

A 6-pin in-line DIP switch on the other side of the CONTROL instrument mechanism selects °F/°C scale ranges, ON/OFF or PID control mode, input shift function and more.



NOTE: The factory has preset the control for PID action with a 2 second proportional period (pins 1 and 2). No adjustment is required under normal operation.

Figure 4 illustrates the internal DIP switches on the CONTROL instrument.

The following table shows the selections made by each pin position.

Table 5 DIP Selector Switches

Function		1	2	3	4	5	6
Control Mode	PID action On/OFF action	ON OFF					
Proportional period	2 seconds 20 seconds		ON OFF				
Control output	Normal Reverse			ON OFF			
Input shift function	Setting enabled Setting disabled				ON OFF		
Temperature sensor standard for inputs	DIN JIS					ON OFF	
Scale indication for dual-scale range selections	°F °C						ON OFF

The temperature range has been factory preset for your LAC Series Oven. The alarm mode selector switch has been disabled (setting 0 or 9). No adjustment of the alarm mode selector is necessary.

Input Shift Function

The input shift function of the CONTROL instrument has been preset and tested for the specified operating conditions. Special instructions for changing the input shift function are referenced in the Appendix of this manual.

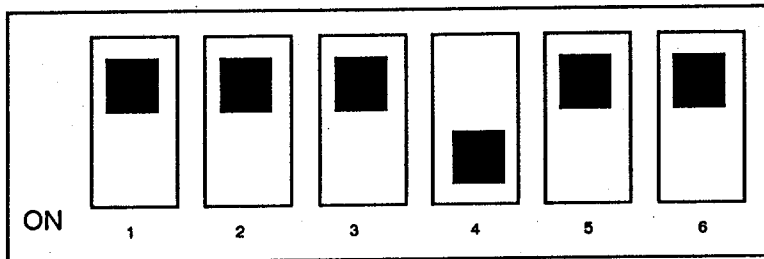


Figure 5 illustrates the input shift function DIP switch in the enable position.

The input shift function may be useful to make the following small temperature corrections to the control system.

- Correction of known sensor calibration errors.
- Correction of any known steady temperature offset between the heated work-piece (load) and sensor. This is useful for applications where the sensor cannot be located exactly at the work-piece.
- Alignment of temperature indications in a multi-zone/multi-controller application, e.g., at ambient temperature.

Note that the input shift function changes the value of the controlled temperature when used in closed loop control. For example, with a setpoint and indication of 100°C and input shift set at +10°C, the controlled temperature will be 90°C.

NOTE: The offset value remains effective even after pin 4 has been set to OFF. If the compensation action is not needed, be sure to set the offset value to 0.

Table 6 Input Shift Examples

Main Display	Temperature measured by sensor	Temperature indication
H 0 without offset	100°C	100°C
H 9 offset by +9°	100°C	109°C
L 9 offset by -9°	100°C	91°C

Tune Setting

The CONTROL instrument has been preset and tested for the specified operating conditions. Special instructions for changing the tune setting are referenced in the Appendix of this manual.

The CONTROL instrument on the LAC Series Oven can be manually tuned. For your convenience the factory has tested and preset the PID action to its optimum values. These values need not be changed under normal operating conditions. The sampling period is 500 ms.

Table 7 Factory PID Settings

Proportional Band	1% of full scale
Reset Time	1 minute
Rate Time	0 minutes

WARNING: Do not change the tuning unless absolutely necessary.

HI-LIMIT Instrument

The LAC Series Oven is equipped with a HI-LIMIT instrument. The purpose of the HI-LIMIT instrument is to provide a protective measure for the product and/or the oven itself. If the setting on the HI-LIMIT is exceeded, the heating process will discontinue, thus protecting the product and/or the oven.

Set the HI-LIMIT instrument to a temperature slightly higher than the CONTROL instrument setpoint or to a temperature that should not be exceeded in the process. If the setting on the HI-LIMIT instrument is exceeded the heater will shut down. The HI-LIMIT instrument must be manually reset by pushing the button on the HI-LIMIT instrument.

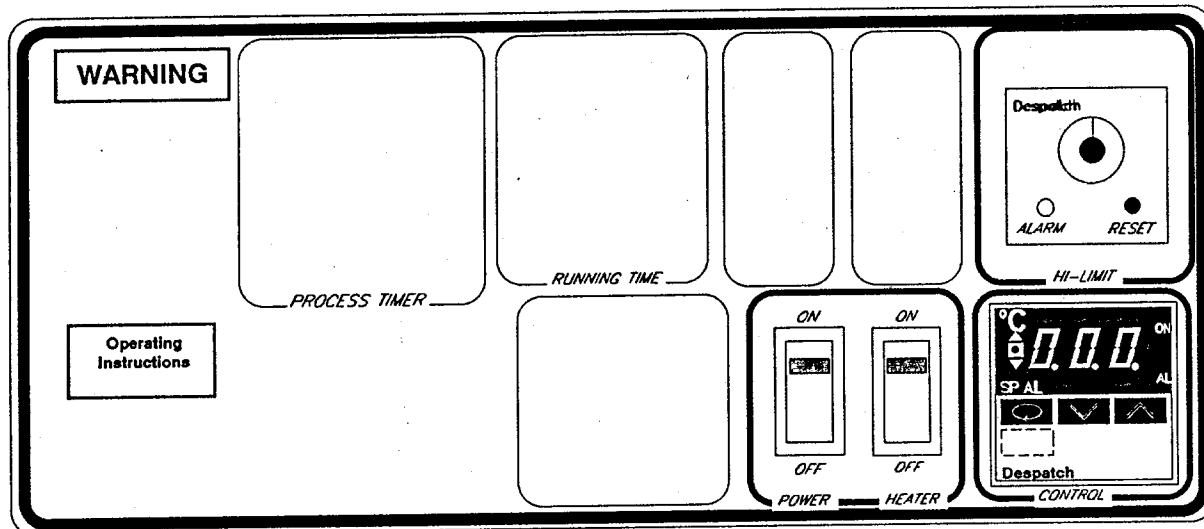


Figure 6 illustrates the control panel on the LAC series oven.

Product HI-LIMIT Instrument

If the product being processed has a critical high temperature limit, the HI-LIMIT instrument should be used as a product HI-LIMIT instrument. The HI-LIMIT instrument should be set to a temperature somewhat below the temperature at which the product could be damaged. Use the CONTROL instrument or a pyrometer to determine the product high-limit setting.

Oven HI-LIMIT instrument

If the product does not have a critical high temperature limit, the HI-LIMIT can be used as an oven HI-LIMIT instrument. An oven HI-LIMIT instrument protects oven equipment.

Since the HI-LIMIT instrument does not show the temperature, it can be properly set only after oven is in operation. Until then, the HI-LIMIT should be set at maximum position so all preliminary testing and adjusting can be done.

INSTRUCTIONS

The INSTRUCTIONS section provides directions on unpacking, installation, operation and maintenance of the Despatch LAC Series Ovens.

Unpacking and Inspection

Remove all packing materials and thoroughly inspect the oven for damage of any kind that could have occurred during shipment.

- See whether the carton and plastic cover sheet inside carton are still in good condition.
- Look at all outside surfaces and corners of the oven for scratches and dents.
- Check the oven controls and indicators for normal movement, bent shafts, cracks, chips or missing parts such as knobs and lenses.
- Check the door and latch for smooth operation.

If there is damage, and it could have happened during shipment follow these instructions.

1. Contact the shipper immediately and file a written damage claim.
2. Contact Despatch Industries, Inc. to report your findings and to order replacement parts for those that were damaged or missing.
3. Please send a copy of your filed damage claims to Despatch.

Next, check to make sure you have received all the required materials. Your shipment should include:

- One (1) Despatch oven,
- One (1) Instruction manual,
- One (1) Warranty card,
- Two (2) Shelves
- One (1) Package containing four rubber feet

If any of these items are missing from the packaged contents, contact Despatch Industries, Inc. to have the appropriate materials forwarded to you.

Finally, to protect the warranty on your new LAC Series Oven, complete the warranty card and mail it to Despatch within 15 days after receipt of the equipment.

Set-up

1. Remove adhesive backing sheet from the rubber feet.
2. Attach rubber feet to the bottom corners of the oven.
3. Place oven on a bench top or an optional cabinet base.

The oven must have a minimum of two (2) inches clearance in the rear to provide proper ventilation. The oven may be placed next to another cabinet, or next to another oven, with three-quarters (3/4) of an inch clearance (the doors will still open).

WARNING: All grounding and safety equipment must be in compliance with applicable codes, ordinances and accepted safe practices.

Make sure oven is level and plumb; this will assure proper heat distribution and operation of all mechanical components.

4. Identify correct power source indicated on the specification plate.
5. Plug oven directly to the electric supply.

Oven HI-LIMIT instrument

Before putting oven into production, adjust the oven HI-LIMIT instrument as follows:

1. Set CONTROL instrument at 14°C (25°F) above the desired operating temperature.
2. Push black button to reset the HI-LIMIT instrument and operate oven until the CONTROL instrument is regulating.
3. Carefully adjust HI-LIMIT instrument downward until it trips. HEATER ON LED on the heater switch goes off.
4. Reset CONTROL instrument at the desired operating temperature. The two instruments are now set in their correct positions.

WARNING: Never operate oven at a temperature in excess of the maximum operating temperature which is 260°C (500°F).

It will be necessary to reset the HI-LIMIT instrument whenever it has tripped. The HI-LIMIT instrument may be reset by first allowing the oven chamber to cool slightly (or turning the HI-LIMIT instrument thermostat up several degrees) and pushing the black reset button.

Operating

Users and operators of this oven must comply with operating procedures and training of operating personnel as required by the Occupational Safety and Health Act (OSHA) of 1970, Section 5 and relevant safety standards, as well as other safety rules and regulations of state and local governments. Refer to the relevant safety standards in OSHA and National Fire Protection Association (NFPA), Section 86A of 1977, Chapter 1, Section 1-6 and Appendix F or any subsequent editions.

WARNING: Do not use oven in wet, corrosive or explosive atmospheres unless this oven is specifically designed for a special atmosphere.

Despatch Industries, Inc. cannot be responsible for either the process or process temperature used, or for the quality of the product being processed. It is the responsibility of the purchaser and operator to see that the product undergoing processing in a Despatch oven is adequately protected from damage. Carefully following the instructions in this manual will assist the purchaser and operator in fulfilling that responsibility.

Loading the Oven

When loading the oven avoid spills of anything onto the heater elements or onto the floor of the oven. Do not place the load on the oven floor plate. This may cause the load to heat unevenly and the weight may cause shorting out of the heater elements. Use the shelves provided.

The two shelves are designed to be pulled out about half way without tipping. The support capacity of the shelves is twenty-five (25) pounds. Do not overload the shelves.

Distribute workload evenly so that airflow is not restricted. Do not overfill your oven. The workload should not take up more than two-thirds of any dimension of the inside cavity.

Pre-Start-Up Checklist

- ✓ **Know the system** Read this manual carefully. Make use of its instructions and explanations. The know how of safe, continuous, satisfactory, trouble-free operation depends primarily on the degree of your understanding of the system and of your willingness to keep all parts in proper operating condition.
- ✓ **Check line voltage** This must correspond to nameplate requirements of motors and controls. A wrong voltage can result in serious damage. Refer to the section on power connections in the INTRODUCTION of this manual.
- ✓ **Fresh air and exhaust** Do not be careless about restrictions in and around the fresh air and exhaust openings and stacks. Under no condition permit them to become so filled with dirt that they appreciably reduce the air quantity. The proper ventilation clearances should be fulfilled at all times. Refer to the Set-up instructions in this manual.
- ✓ **Ventilation** There is an exhaust opening in the rear of the unit that is always open. The fresh air can be adjusted open or closed by adjusting the vent mechanism on the control panel. Adjust the vent to the proper vent opening.
- Helpful hints**
- For drying ovens, open vent to prevent buildup of moisture within the oven.
 - For sample heating, close the vent when no ventilation is required.

Start-Up

For fastest oven heat-up time, close the vent. After desired temperature is reached, vent may be adjusted as needed.

1. Start fan
 - a. Open oven door.
 - b. Press POWER rocker switch to the ON position. You will hear the recirculating fan start.
 - c. Shut oven door.
 - d. Check that the amber LED on the CONTROL instrument is on.
2. Enter setpoint on the CONTROL instrument.
 - a. Press CONTROL instrument return key repeatedly until SP LED comes on and the setpoint temperature is displayed.
 - b. Use up key or down key to enter the setpoint to the desired operating temperature.
 - c. Press the return key repeatedly until the actual oven temperature is displayed.
- 3 Set HI-LIMIT instrument.

Set the HI-LIMIT instrument to a temperature slightly higher than the setpoint or to a temperature that should not be exceeded in the process. If the HI-LIMIT instrument is exceeded the heater will shut down. The HI-LIMIT instrument must be manually reset by pushing the black button on the HI-LIMIT instrument.

WARNINGS: Do not use any flammable solvent or other flammable material in this oven. Do not process closed containers of any substance or liquid in this oven because they may explode under heat.

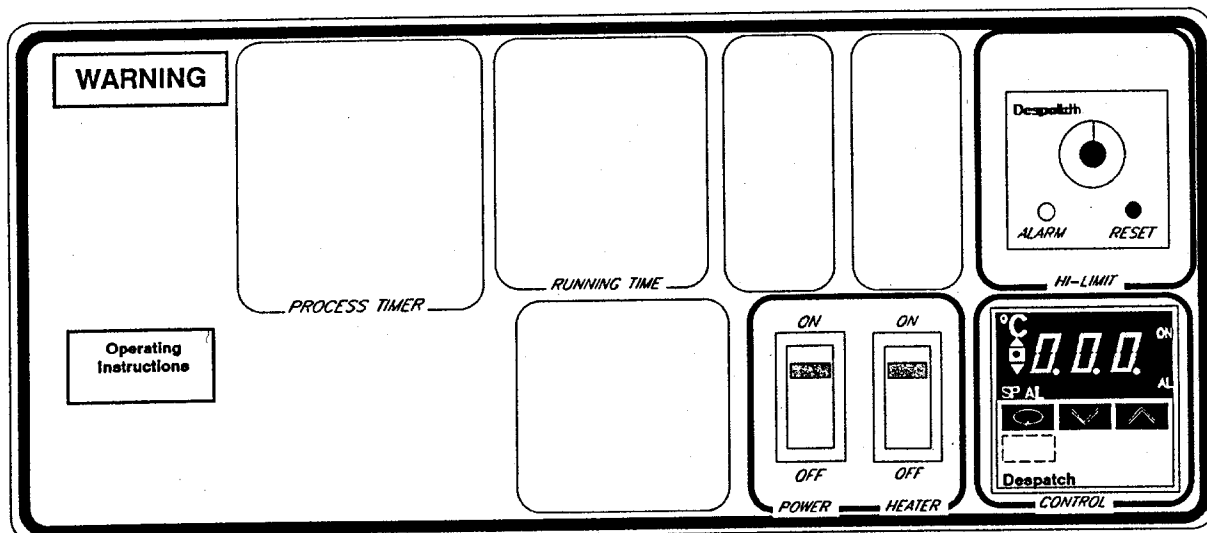


Figure 7 illustrates the control panel on the LAC series oven.

Start-Up (Cont.)

4. Turn the heater rocker switch to the ON position. The white light will come on, indicating a heat on condition. As the oven temperature approaches setpoint, the white light will cycle on and off as controlled by the CONTROL instrument.
5. After heating cycle is complete, turn the heater rocker switch to the OFF position. Do not turn the power off until the oven chamber temperature is below 100°C (212°F).

Maintenance

Do not attempt any service on this oven before opening the main power disconnect switch.

Checklist

- ✓ **Keep equipment clean** Gradual dirt accumulation retards air flow. A dirty oven can result in unsatisfactory operation such as unbalanced temperature in the work chamber, reduced heating capacity, reduced production, overheated components, etc. Keep the walls, floor and ceiling of the oven work chamber free of dirt and dust. Floating dust or accumulated dirt may produce unsatisfactory work results. Keep all equipment accessible. Do not permit other materials to be stored or piled against it.

- ✓ **Protect controls against excessive heat** This is particularly true of controls, motors or other equipment containing electronic components. Temperatures in excess of 51.5°C (125°F) should be avoided.

- ✓ **Establish maintenance and check-up schedules** Do this promptly and follow them faithfully. Careful operation and maintenance will be more than paid for in continuous, safe and economical operation.

- ✓ **Maintain equipment in good repair** Make repairs immediately. Delays may be costly in added expense for labor and materials and in prolonged shut down.

- ✓ **Practice safety** Make it a prime policy to know what you are doing before you do it. Make **CAUTION, PATIENCE,** and **GOOD JUDGEMENT** the safety watchwords for the operation of your oven.

- ✓ **Lubrication** Fan motor bearings are permanently lubricated. All door latches, hinges, door operating mechanisms, bearing or wear surfaces should be lubricated to ensure easy operation.

Tests

Tests should be performed carefully and regularly. The safety of personnel as well as the condition of equipment may depend upon the proper operation of any one of these controls at any time.

CONTROL Instrument

Test the CONTROL instrument every 40 hours. Check that the heater LED is cycling on and off, indicating that the heater is working.

HI-LIMIT Instrument

Test the HI-LIMIT instrument every 40 hours. With the oven operating at a given temperature, gradually turn the HI-LIMIT instrument knob down to setpoint operating temperature. The HI-LIMIT instrument has tripped when the heater LED on the HEATER switch shuts off. Push the HI-LIMIT instrument reset after returning the thermostat to its original setting.

WARNINGS: Failure to heed warnings in this instruction manual and on the oven could result in death, personal injury or property damage.

Replacement

Parts

To return parts contact Despatch Industries to obtain an MRA (material return authorization) number. This number must be attached to the returned part for our identification. If required, a new part will be sent and invoiced to you. When the return part is received, credit will be given, if in warranty.

Be sure that when you are ordering parts or service to give the model, serial and part number. This will expedite the process of obtaining your replacement part.

WARNING: Disconnect main power switch or power cord before attempting any repairs or adjustments.

CONTROL instrument

(Tools needed: one quarter (1/4) inch socket set)

1. Disconnect power.
2. Remove screws from the face of the control panel and slide it forward.
3. Disconnect control panel from the oven by unplugging the quick disconnect plug.
4. Remove wires from the old control instrument, noting which numbered wires connect to which terminals.

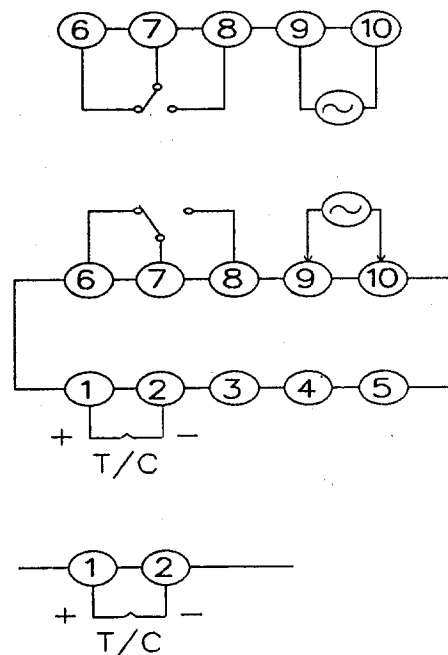


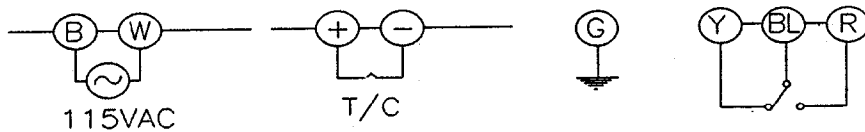
Figure 8 illustrates connections to the CONTROL instrument.

5. Slide old CONTROL instrument out by releasing the white holding arms on the mounting frame.
6. Slide new CONTROL instrument into the white mounting frame.
7. Reattach wires to the new CONTROL instrument. Make sure that the wires are connected correctly.
8. Connect control panel to the quick disconnect plug.
9. Replace control panel.

HI-LIMIT instrument

(Tools needed: Screwdriver, one quarter (1/4) inch socket set)

1. Disconnect power.
2. Remove screws from the face of the control panel.
3. Slide control panel forward.
4. Disconnect control panel from the oven by unplugging the quick disconnect plug.
5. Remove wires from the HI-LIMIT instrument, noting which numbered wires connect to which terminals.



WHITE > LINE
BLACK > LINE
GREEN - GROUND
RED - NO
YELLOW - NC
BLUE - C

Figure 9 illustrates connections to the HI-LIMIT instrument.

6. Remove screws holding the HI-LIMIT instrument.
7. Slide old HI-LIMIT instrument out of the control panel.
8. Slide new HI-LIMIT instrument into the control panel.
9. Replace mounting screws.
10. Reattach wires to the new HI-LIMIT instrument. Make sure the correct wires are attached.
11. Connect the control panel to the quick disconnect plug.
12. Replace the control panel.

Fan Motor

(Tools needed: Screwdriver, 5/32 inch Allen wrench, one quarter (1/4) inch socket set)

1. Remove floor plate.
 - a. Remove screws from the floor plate.
 - b. Lift floor plate out of the oven.
2. Loosen set screws (2) on fan wheel in middle of oven bottom. You can reach the fan wheel by going through the heater or by disconnecting and removing the heater to gain access to the fan. Instructions for removing the heater are provided on the following page.
3. Place oven on its back.
4. Remove bottom plate. This will reveal the fan motor.
5. Remove fan motor.
 - a. Unscrew screws (4) holding motor mounts to body.
 - b. Disconnect motor leads from the terminal strip on power panel.
 - c. Lift the fan motor from the oven body.

After fan wheel has run at temperature for awhile, it will stick to the shaft. Some force may be required to separate the fan wheel from the fan motor shaft.

6. Take motor mounts off old motor.
7. Put motor mounts onto new motor.
8. Replace fan motor.
 - a. Insert shaft into shaft collar. Put fan wheel onto shaft from inside of oven.
 - b. Reattach motor mounts to oven body, making sure grommets are in place.
 - c. Reattach motor lead wires to terminal strip.
9. Replace oven bottom.
10. Turn oven right side up.
11. Adjust fan wheel for 3/16 inch clearance between wheel and inlet ring.
12. Tighten set screws on the fan wheel.
13. Check that set screws hit the flats machined into the motor shaft.

Heater Unit

(Tools needed: Crescent wrench, screwdriver, one quarter (1/4) inch socket set)

1. Remove floor plate.
 - a. Remove screws from the floor plate.
 - b. Lift floor plate out of the oven.
2. Disconnect heater leads from heater element with wrench. Note which wires go on which terminals.
3. Unscrew screws holding the heater frame to the oven body.
4. Remove heater and discard.
5. Screw down new heater frame.
6. Attach heater leads to appropriate terminals.
7. Replace interior floor and screws.

Warning Signs

If it appears that any warning, danger, caution or information label or sign has been damaged or lost, contact Despatch Industries, Inc. for replacements. Call or write:

Customer Service
Despatch Industries, Inc.
PO Box 1320
Minneapolis, MN 55440
Call Toll Free 800-328-5476
(in Minnesota 800-462-5396)

APPENDIX

Special Instructions

The LAC series oven has been preset and tested at the factory for specified operating conditions. In most applications, it will not be necessary to alter the oven's settings. This section contains additional information and reference for special operating conditions.

CONTROL instrument

Function Setting

Various functions of the CONTROL instrument are set by switches located inside. To gain access to these switches, the internal mechanism must be drawn out of the housing.

1. Push tab on the underside of the housing and pull out the internal mechanism.

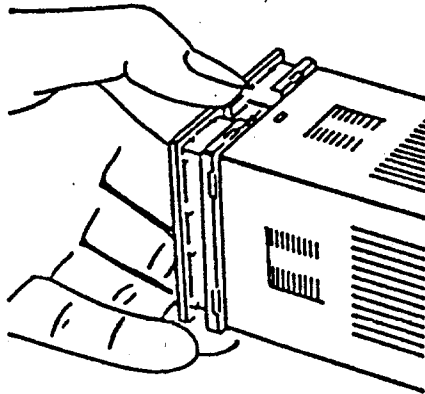


Figure 10 illustrates CONTROL instrument housing.

Input Shift Function

The temperature indication can be shifted by following these instructions.

1. Set control mode selector switch number 4 to the ON position.

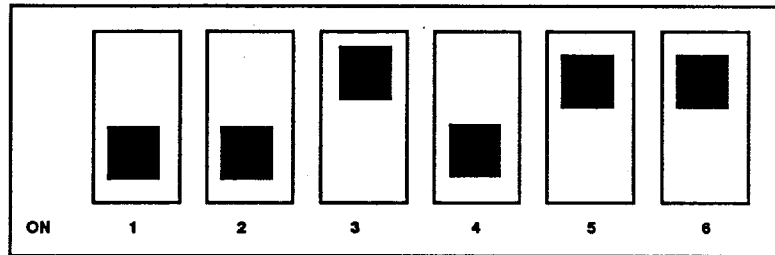


Figure 11 illustrates the mode selector switch in the ON position, enabling the input shift function.

2. Press mode key repeatedly until the message **H0** (indicating 0 input shift) is displayed on the main display.
3. Use the Up or Down key to shift value.

Fine adjustment of the temperature indication and the resulting controlled temperature is possible without changing or affecting the setpoint.

NOTE: The offset value remains effective even after pin 4 has been set to OFF. If the compensation action is not needed, be sure to set the offset value to 0

The input shift value can be set within the range from -99°C to $+99^{\circ}\text{C}$. For ranges that have resolution to 0.1° , the input shift value can be set within the range from -9.9°C to $+9.9^{\circ}\text{C}$.

Tune Setting

The following instructions should be followed to change the factory preset PID values.

WARNING: Do not change the tune setting unless absolutely necessary.

1. Set control mode switch to PID (factory preset)
2. Short-circuit internal shunt jumper connector A and B

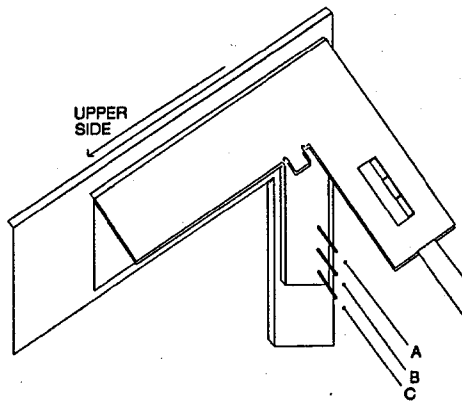


Figure 12 illustrates the internal jumpers A, B and C.

3. Turn power ON. All deviation indicators will come on.

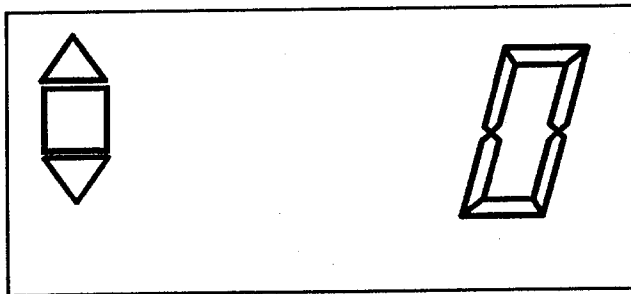



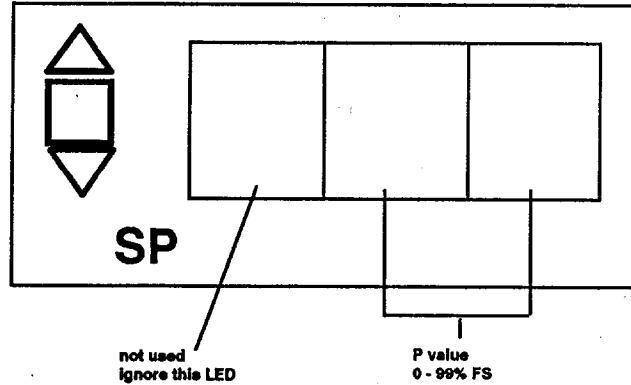


Figure 13 illustrates the tune display on the CONTROL instrument.




Tune Setting (Cont.)

- Press  key and the SP LED comes on. In this mode, you can set the P value (proportional band) using the  and the  key.



NOTE: When P value is 0, on-off action is assumed.

Figure 14 illustrates the tuning P display on the CONTROL instrument.

- Press  key and the mode indicator AL is lit. In this mode, you can set the I value (reset) using the  and  keys.

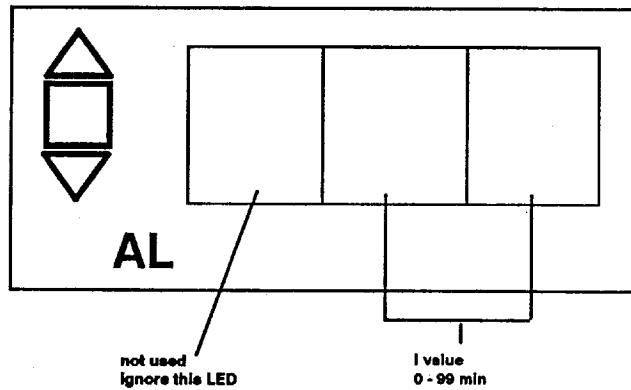





Figure 15 illustrates tuning I display on the CONTROL instrument.

Tune Setting (Cont.)

6. Press  key and the character H appears in the left digit. In this mode, you can set the D value (rate) using the  and  keys.

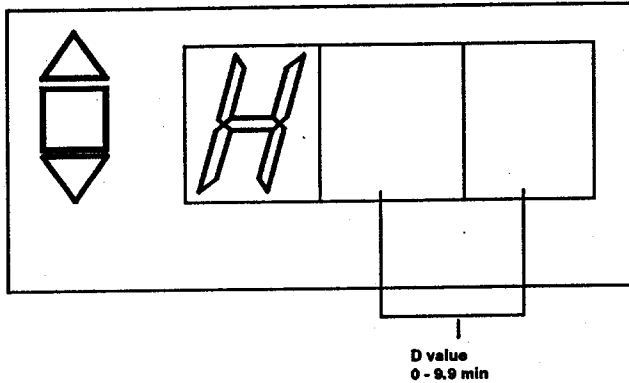


Figure 16 illustrates tuning D display on the CONTROL instrument.

7. Remove internal jumper.

Error Messages

The CONTROL instrument is provided with self-diagnostic functions and will display the following error messages to simplify troubleshooting.

Table 8 Error Messages

Message	Cause	CONTROL instrument output
FFF	Temperature has risen beyond temperature scale range.	OFF during heating (reverse) action.
---	Temperature has fallen below temperature scale range.	ON during heating (reverse) action.
FFF(blinks)*	Temperature has risen much beyond scale range.	OFF
	Break in the thermocouple.	OFF
__(blinks)*	Polarities (Positive and negative) of thermocouple have been reversed.	OFF
	Temperature has fallen much below scale range.	
E11*	Memory failure.	CONTROL instrument output and the alarm output are OFF
E33*	Analog-to-digital converter failure. CONTROL instrument must be repaired if recovery is not made by turning power off once and on again.	CONTROL instrument output and the alarm output are OFF.

NOTE: When the thermocouple input is short-circuited, the ambient temperature is displayed.

*Key operations are disabled.

Troubleshooting

Any equipment operating for as many hours a day as lab ovens often do is likely to have problems now and then. Below are possible problems and suggested solutions. If you have a problem not listed and do not know what to do, contact Despatch Industries at our toll free Help Line 800-328-5476 (in Minnesota 800-462-5396).

Difficulty	Probable Cause	Suggested Remedy
Failure to heat	No power	Check power source and/or oven and wall fuses.
	Broken or frayed out	Replace with new cord and plugset.
	Burned out heating	Replace element (see warranty element statement)
	CONTROL instrument malfunction	Replace controller
	Loose wire connections	Disconnect power and check connections behind control panel.
Slow heat up	Improperly loaded in chamber	Reduce load or redistribute load
	Low line voltage	Supply sufficient power and proper connections. Check to see if circuit is overloaded.
	1 or 2 heating	Replace burned out element (see elements warranty statement, back page).
	240 volt oven is connected	Raise line voltage to a 208 volt line.
	Fan motor failure	Replace fan motor.
Frequent heater element out	Harmful fumes generated by load	Increase vent opening or burn discontinue process.
	Spillage or splattering of material on heater elements	Disconnect power and clean oven chamber and elements.
	Overheating oven	Check the HI-LIMIT instrument.
Erratic temp.	CONTROL instrument malfunction	Replace CONTROL instrument.
Inaccurate temp.	CONTROL instrument miscalibration	Recalibrate CONTROL instrument (see section on CONTROL instrument input shift function).
	Optional HI-LIMIT instrument setting	HI-LIMIT instrument should be 10-25 +°C higher than CONTROL instrument setpoint.
Excess surface temp. or door	Door seal deterioration	Replace door seal.
Improper airflow	Fan motor failure	Replace fan motor.
	Unbalanced fan wheel	Replace fan wheel.

Troubleshooting (Cont.)

Difficulty	Probable Cause	Suggested Remedy
Excessive vibration	Dirty fan wheel	Clean fan.
	Unbalanced fan wheel	Replace fan wheel.
Oven will not control at setpoint	HI-LIMIT instrument set too low	Set the HI-LIMIT instrument higher.
	CONTROL instrument malfunction	Replace control.
	Air friction of recirculation fan	Open exhaust air vent. Unit will not control below room ambient plus 45+°C (81+°F) with vent closed.
Heater does not shut until the temp. reaches the HI-LIMIT instrument setting	CONTROL instrument malfunction	Replace CONTROL instrument.
	Relay malfunction	Replace relay.

Accessories

The LAC Series Ovens have several available options that can easily be field installed.

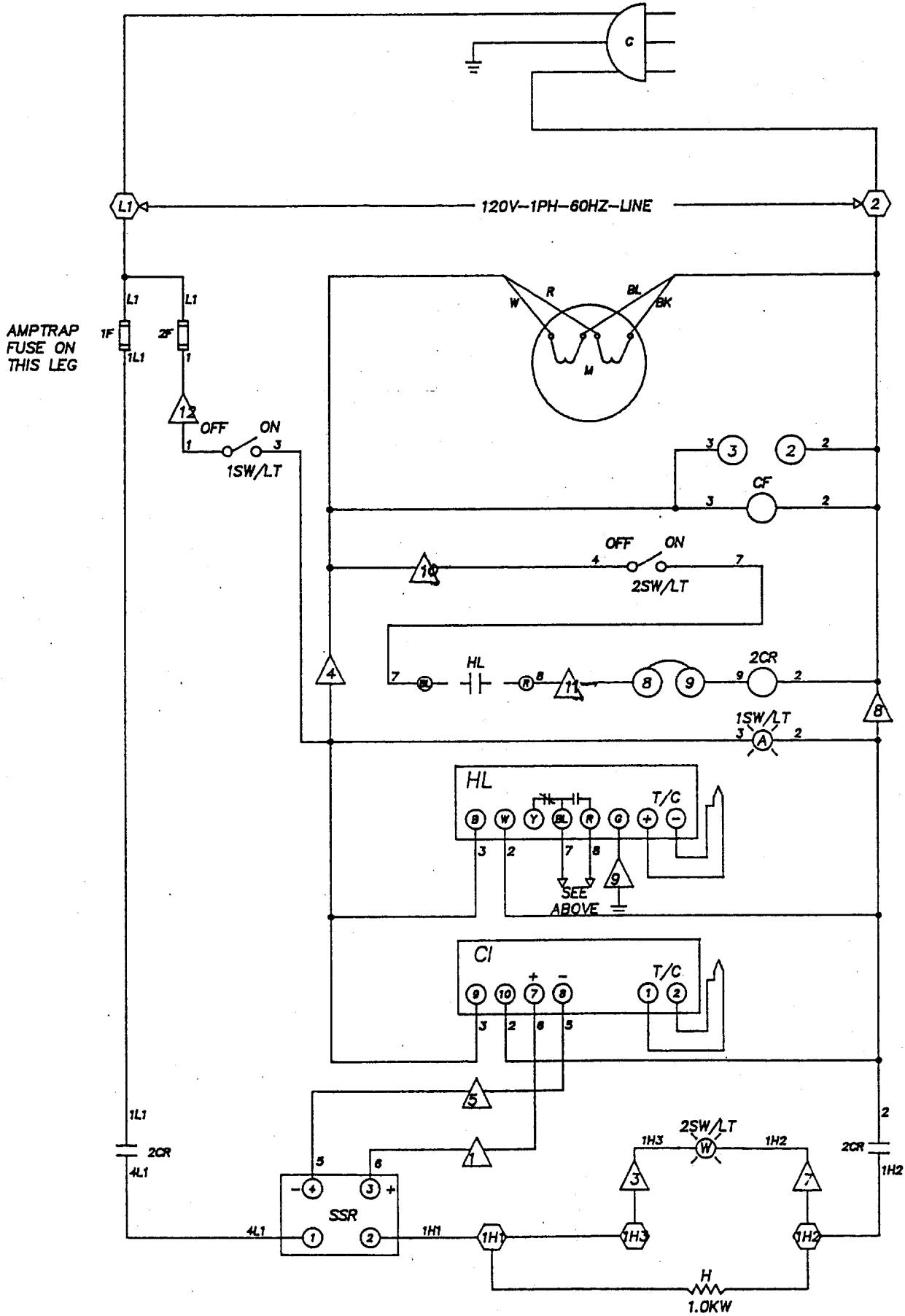
Table 9 Accessories

Option	Functional Description
Signal timer kit	One hour timer signals the end of the cycle with a bell.
Process timer kit	Shuts down the heater at the end of the cycle while the fan continues to run. Available in 6 or 12 hour ranges.
Running time meter kit	Logs the overall processing time. The digital meter charts up to 99,999.9 hours of process time and cannot be reset.
Digital process timer kit	The digital timer is adjustable from 0.01 seconds to 999 hours. The timer can time up or down from setpoint. The digital timer shuts down the heater at the end of the process while the fans continue to run. (N/A on LAC1-10.)
Recorder kit	The round chart recorder follows the temperature changes and records them for permanent record.
Extra shelves	
Base cabinets	
Stacking kit	

The above items can all be field installed. For further information on these items or other available options, please contact your Despatch representative.




Drawings

LAC1-10-3

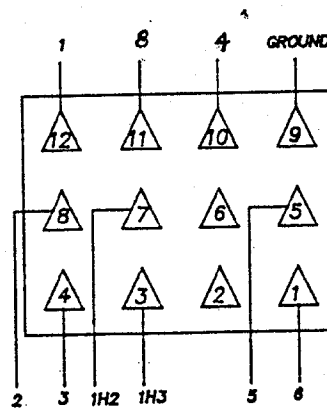


MATERIAL LIST			
ITEM	PART #	QTY	DESCRIPTION
CI	088838	1	DESPATCH CONTROL J T/C
HL	088420	1	DESPATCH HI-LIMIT J T/C
T/C	051443	1	JJ39012E-00-16-2036-2 T/C
H	007773	1	1000 WATT HEATER
M	008333	1	00.04 HP MOTOR
1&2F	007471	1	F030A2SP FUSEBLOCK
1F	007456	1	A25X015 FUSE
2F	007453	1	250V 6 AMP FUSE
CF	006049	1	MU2A1 CABINET FAN
2CR	080187	1	20A 240V DPST RELAY
SSR	057345	1	50A SOLID STATE RELAY
1SW/LT	074182	1	SPST SWITCH W/AMBER PILOT LIGHT
2SW/LT	074183	1	SPST SWITCH W/WHITE PILOT LIGHT
C	031233	1	POWER CORD

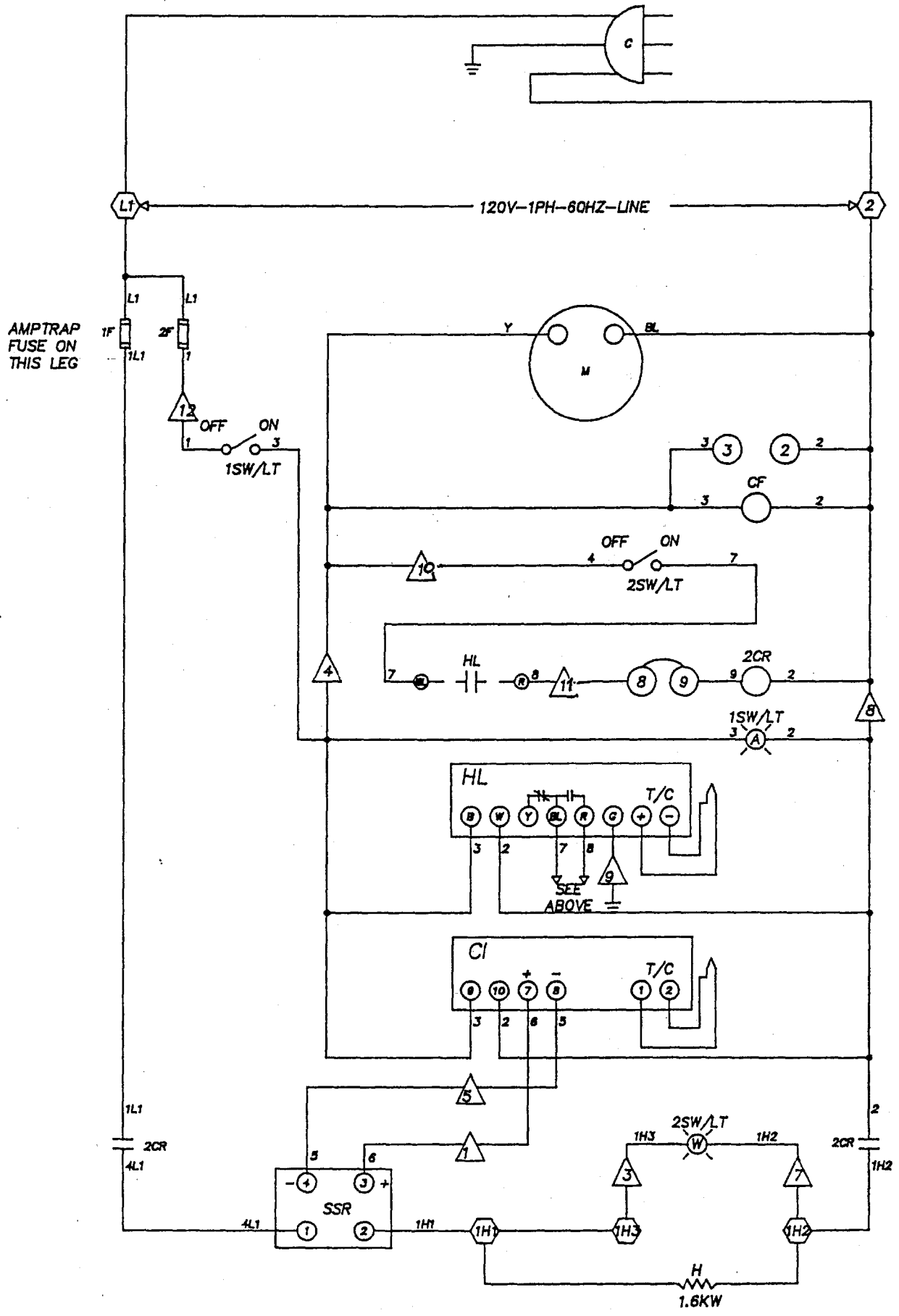
CONNECTION LEGEND

-  PLUG CONNECTOR
-  OPTION CONNECTION
-  TERMINAL

DISCONNECT PLUG



LAC1-38A-3



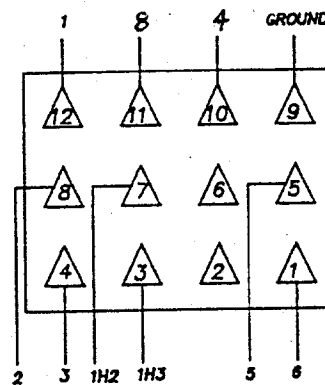
LAC1-38A-3

MATERIAL LIST			
ITEM	PART #	QTY	DESCRIPTION
CI	088838	1	DESPATCH CONTROL J T/C
HL	086420	1	DESPATCH HI-LIMIT J T/C
T/C	084913	1	JJ39012U-00-16-C048-2 T/C
H	007774	1	1600 WATT HEATER
M	107136	1	00.25 HP SODP MOTOR
1&2F	007471	1	F030A2SP FUSEBLOCK
1F	007457	1	A25X020 FUSE
2F	007453	1	250V 6 AMP FUSE
CF	006049	1	MU2A1 CABINET FAN
2CR	080187	1	20A 240V DPST RELAY
SSR	057345	1	50A SOLID STATE RELAY
1SW/LT	074182	1	SPST SWITCH W/AMBER PILOT LIGHT
2SW/LT	074183	1	SPST SWITCH W/WHITE PILOT LIGHT
C	074496	1	POWER CORD

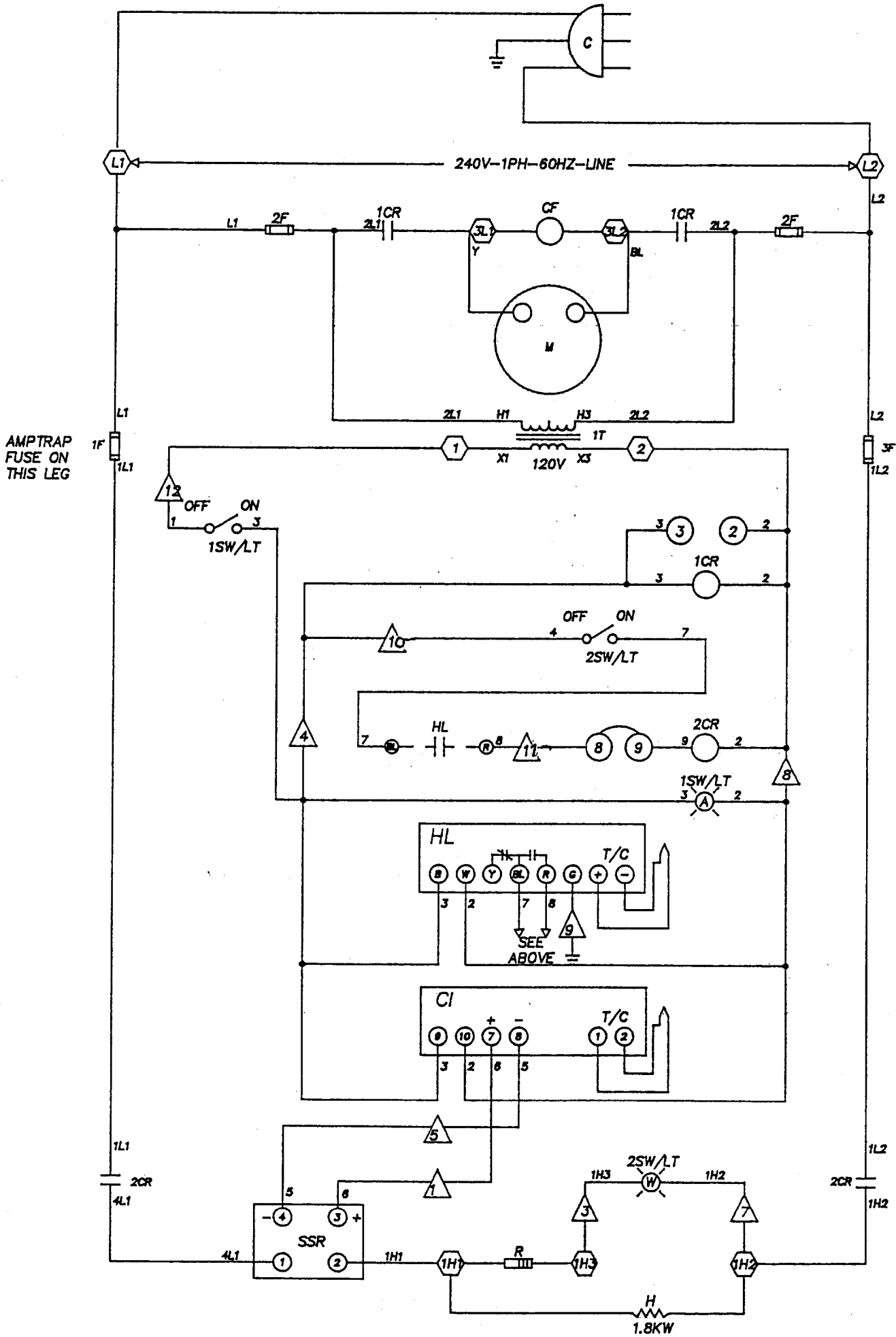
CONNECTION LEGEND

- 2
PLUG CONNECTOR
- 2
OPTION CONNECTION
- 1
TERMINAL

DISCONNECT PLUG






LAC1-38B-3

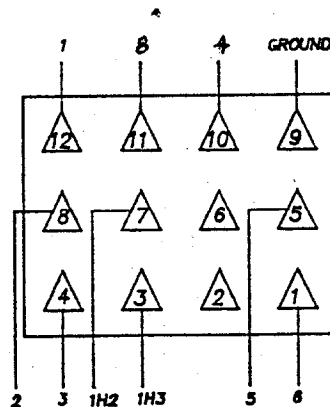


MATERIAL LIST			
ITEM	PART #	QTY	DESCRIPTION
CI	088838	1	DESPATCH CONTROL J T/C
HL	086420	1	DESPATCH HI-LIMIT J T/C
T/C	084913	1	JJ39012U-00-16-C048-2 T/C
H	007775	1	1800 WATT HEATER
M	107136	1	00.25 HP SODP MOTOR
1&3F	007471	1	F030A2SP FUSEBLOCK
1F	007456	1	A25X015 FUSE
3F	007611	1	250V 15 AMP FUSE
2F	007471	1	F030A2SP FUSEBLOCK
	007453	2	250V 6 AMP FUSE
CF	015229	1	MU3A1 CABINET FAN
1T	088811	1	75VA 240/208V TRANSFORMER
1-2CR	080187	1	20A 240V DPST RELAY
SSR	057345	1	50A SOLID STATE RELAY
1SW/LT	074182	1	SPST SWITCH W/AMBER PILOT LIGHT
2SW/LT	074183	1	SPST SWITCH W/WHITE PILOT LIGHT
R	010531	1	100K OHM 1 WATT RESISTOR
C	105115	1	POWER CORD

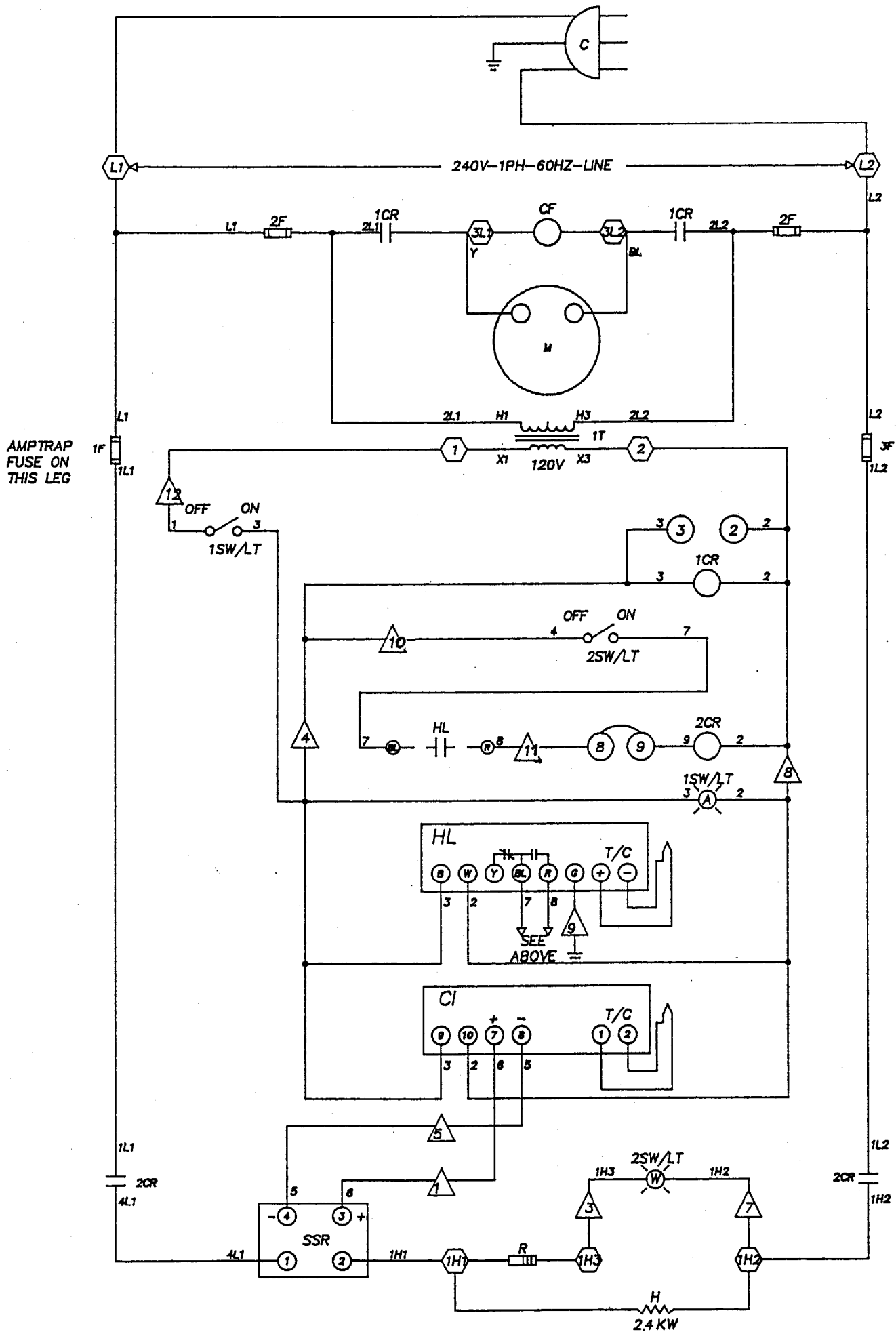
CONNECTION LEGEND

-  PLUG CONNECTOR
-  OPTION CONNECTION
-  TERMINAL

DISCONNECT PLUG

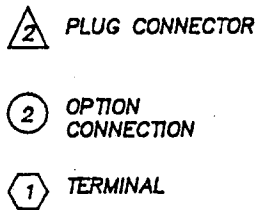


LAC1-67-3

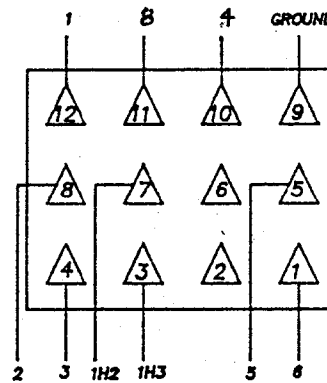


MATERIAL LIST			
ITEM	PART #	QTY	DESCRIPTION
CI	088838	1	DESPATCH CONTROL J T/C
HL	086420	1	DESPATCH HI-LIMIT J T/C
T/C	084193	1	JJ39012U-00-16-C048-2 T/C
H	007776	1	2400 WATT HEATER
M	107136	1	00.25HP SODP MOTOR
1&3F	007471	1	F030A2SP FUSEBLOCK
1F	007456	1	A25X015 FUSE
3F	007611	1	250V 15 AMP FUSE
2F	007471	1	F030A2SP FUSEBLOCK
	007453	2	250V 6 AMP FUSE
CF	015229	1	MU3A1 CABINET FAN
1T	088811	1	75VA 240/208V TRANSFORMER
1-2CR	080187	1	20A 240V DPST RELAY
SSR	057345	1	50A SOLID STATE RELAY
1SW/LT	074182	1	SPST SWITCH W/AMBER PILOT LIGHT
2SW/LT	074183	1	SPST SWITCH W/WHITE PILOT LIGHT
R	010531	1	100K OHM 1 WATT RESISTOR
C	105115	1	POWER CORD

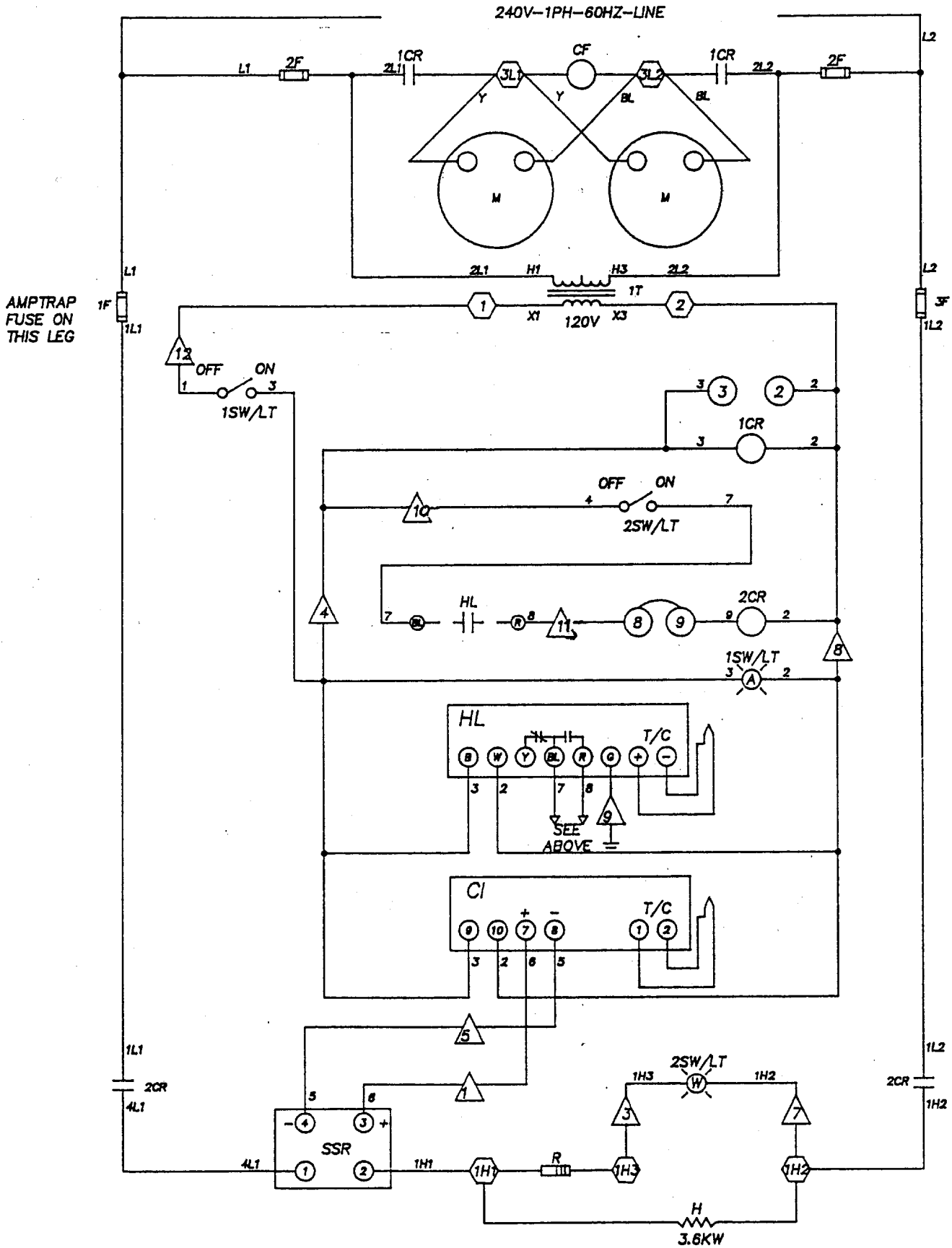
CONNECTION LEGEND



DISCONNECT PLUG






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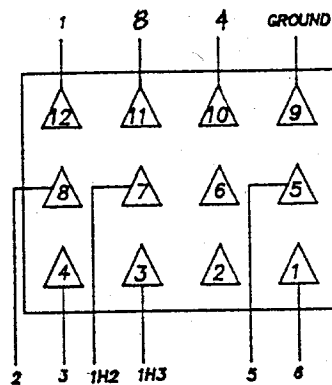


MATERIAL LIST			
ITEM	PART #	QTY	DESCRIPTION
CI	088838	1	DESPATCH CONTROL J T/C
HL	086420	1	DESPATCH HI-LIMIT J T/C
T/C	084913	1	JJ39012U-00-16-C048-2 T/C
H	007778	1	3600 WATT HEATER
M	107136	2	00.25HP SODP MOTOR
1&3F	007471	1	F030A2SP FUSEBLOCK
1F	013217	1	A25X025 FUSE
3F	007615	1	250V 25 AMP FUSE
2F	007471	1	F030A2SP FUSEBLOCK
	007453	2	250V 6 AMP FUSE
CF	015229	1	MU3A1 CABINET FAN
1T	088811	1	75VA 240/208V TRANSFORMER
1-2CR	080187	1	20A 240V DPST RELAY
SSR	057345	1	50A SOLID STATE RELAY
1SW/LT	074182	1	SPST SWITCH W/AMBER PILOT LIGHT
2SW/LT	074183	1	SPST SWITCH W/WHITE PILOT LIGHT
R	010531	1	100K OHM 1 WATT RESISTOR

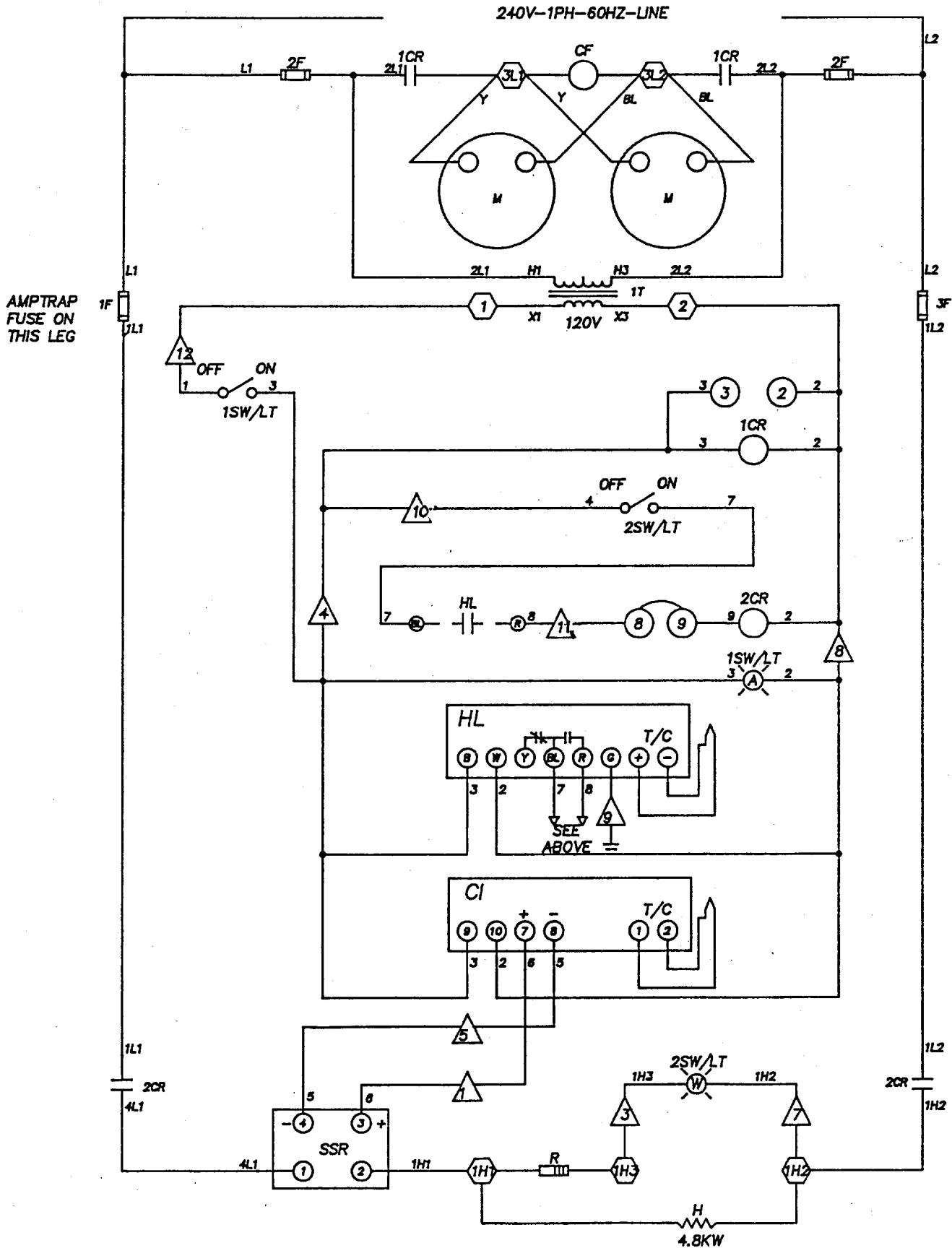
CONNECTION LEGEND

-  PLUG CONNECTOR
-  OPTION CONNECTION
-  TERMINAL

DISCONNECT PLUG






LAC2-18-3

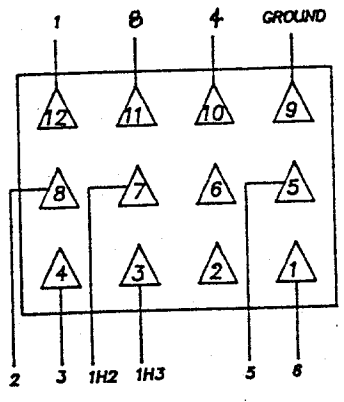


MATERIAL LIST			
ITEM	PART #	QTY	DESCRIPTION
CI	088838	1	DESPATCH CONTROL J T/C
HL	086420	1	DESPATCH HI-LIMIT J T/C
T/C	084193	1	JJ39012U-00-16-C048-2 T/O
H	007776	2	2400 WATT HEATER
M	107136	2	00.25HP SODP MOTOR
1&3F	007471	1	F030A2SP FUSEBLOCK
1F	007458	1	A25X030 FUSE
3F	007617	1	250V 30 AMP FUSE
2F	007471	1	F030A2SP FUSEBLOCK
	007453	2	250V 6 AMP FUSE
CF	015229	1	MU3A1 CABINET FAN
1T	088811	1	75VA 240/208V TRANSFORMER
1-2CR	080187	1	20A 240V DPST RELAY
SSR	057345	1	50A SOLID STATE RELAY
1SW/LT	074182	1	SPST SWITCH W/AMBER PILOT LIGHT
2SW/LT	074183	1	SPST SWITCH W/WHITE PILOT LIGHT
R	010531	1	100K OHM 1 WATT RESISTOR

CONNECTION LEGEND

-  PLUG CONNECTOR
-  OPTION CONNECTION
-  TERMINAL

DISCONNECT PLUG



Industrial Equipment Commercial Warranty

Despatch Industries, Inc. warrants equipment manufactured by Despatch Industries, Inc. to be free from defects in workmanship and materials under normal use and service for a period of one (1) year from the date of delivery or the period of twenty-one hundred (2,100) accumulated hours of use, whichever period is shorter.

Components manufactured by others, including but not limited to expendable items, are excluded from this warranty and are warranted (if at all) only in accordance with the warranty, if any, issued by such other manufacturer.

Use or service with corrosive or abrasive chemicals is not deemed normal.

If Purchaser gives written notice specifying the particular defect within 14 days after discover thereof, Despatch Industries, Inc. will correct without charge any workmanship that is demonstrated to Despatch Industries, Inc.'s satisfaction to have been defective at time of installation or erection and will repair or replace, at the warrantor's option, without charge, FOB, Despatch Industries, Inc. factory, parts covered by this warranty that upon inspection are found defective under normal use within the warranty period stated above.

All work of removal and reinstallation or installation of parts, whether or not found defective, and shipping charges for defective or replacement parts shall be at the sole expense of the Purchaser.

The foregoing warranty shall not apply to equipment repaired or altered by others, unless such repairs or alterations were specifically agreed to in writing by an officer of Despatch Industries, Inc.

Despatch Industries, Inc. shall not be liable for incidental or consequential damages of any kind (whether for personal injury, lost profits or otherwise), whether arising from breach of this warranty, negligence or other tort or otherwise, which occurred during the course of installation of equipment, or which result from the use or misuse by user, its employees or others of the equipment supplied hereunder, or from any malfunction or nonfunction of such equipment, and Purchaser's sole and exclusive remedy against Despatch Industries, Inc. for any breach of the foregoing warranty or otherwise shall be for the repair or replacement of the equipment or parts thereof affected.

The foregoing warranty shall be valid and binding upon Despatch Industries, Inc. if and only if user loads, operates and maintains the equipment supplied hereunder in accordance with the instruction manual to be provided upon delivery of the equipment.

Despatch Industries, Inc. does not guarantee the process of manufacture by user or the quality of product to be produced by the equipment supplied hereunder, and Despatch Industries, Inc. shall not be liable for lost profits.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES AND REPRESENTATIONS WHATSOEVER, INCLUDING BUT NOT LIMITED TO THOSE OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.