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INSTRUCTION MANUAL
FOR LEA SERIES CHAMBERS

Despatch LEA Series chambers are bench models
with temperatures to 95°C (203°F),
humidity, and forced convected airflow

<u>MODEL</u>	<u>VOLTS</u>	AIR HEATER <u>WATTS</u>	STEAM/IMMERSION HEATER <u>WATTS</u>	<u>AMPS</u>	<u>HZ</u>	<u>PHASE</u>
LEA1-69	240	2,400	1,000	18.0	60	1

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WARNINGS

Failure to heed warnings in this instruction manual and on equipment can result in death, personal injury or property damage.

The user(s) of this equipment must comply with operating procedures and training of operating personnel as stated in the Occupational Safety and Health Act (OSHA) of 1970, Section 5, and the National Fire Protection Association (NFPA) 86A of 1985, Section 1.6.

DO NOT use chamber in wet, corrosive or explosive atmosphere.

DO NOT attempt any service on this equipment without first disconnecting the electrical power to this unit. Disconnect main power switch or power cord.

DO NOT exceed the maximum operating temperature, 95°C (203°F).

DO NOT use any flammable solvent or other flammable materials or enclosed containers in the work chamber.

FOR supply connections on LEA, use wire suitable for rated FLA. See nameplate for FLA.

A cloud of steam may be released when the door is opened on humidity models, and steam burns.

Always confirm proper voltage source to chamber.

DO NOT operate live (heat dissipating) load in this chamber unless its power source is interlocked with chamber's overtemperature limit.

All covers and panels should be in place when unit is operating and not in service.

—CAUTION—

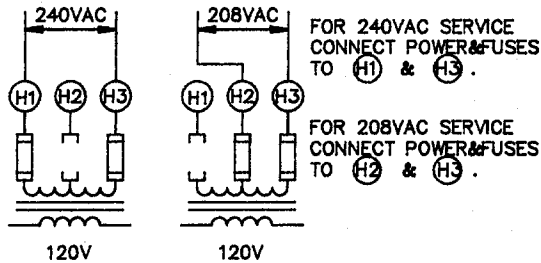
THIS UNIT HAS BEEN DESIGNED TO OPERATE WITH A POWER SOURCE OF EITHER 208 OR 230 VAC AND SINGLE PHASE.

FOR EITHER VOLTAGE THE JUMPERS ON THE SERVICE TERMINAL STRIP AND THE FUSING AND WIRING TO THE CONTROL TRANSFORMER MUST BE MODIFIED. FAILURE TO DO SO MAY CAUSE DAMAGE TO THIS UNIT.

REFER TO ELECTRICAL SCHEMATIC ENCLOSED IN THIS MANUAL.



TO PREVENT DAMAGE TO CONTROL COMPONENTS ALWAYS INSPECT WIRING CONFIGURATION ON CONTROL TRANSFORMER BEFORE CONNECTING TO VOLTAGE SOURCE. THIS UNIT IS CONFIGURABLE FOR BOTH 240 & 208 VAC INPUT. VOLTAGE CHANGE IS MADE BY CHANGING TAPS & FUSE LOCATION ON CONTROL TRANSFORMER AS SHOWN BELOW.



NOTE: UNITS ARE FACTORY CONFIGURED FOR 240VAC

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The period of the foregoing warranty, in the case of furnaces shall be ninety (90) days or five hundred twenty-five (525) accumulated hours of use, whichever period is shorter.

Components manufactured by others, including expendable items, are warranted only in accordance with the warranty, if any, issued by such other manufacturer.

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

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THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, AND SPECIFICALLY THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

The logo for Despatch Industries, Inc. features the word "Despatch" in a bold, white, sans-serif font, centered within a solid black rectangular background.

Despatch Industries, Inc.
P.O. Box 1320, Minneapolis, MN 55440-1320

INTRODUCTION

Note: Read the entire introduction to this manual before you attempt to install the oven.

INSTRUCTION MANUAL

This instruction manual covers operation and maintenance of LEA series temperature and humidity environmental test chambers. The chamber size range of these ovens is 6.9, 11 and 21 cubic feet.

This instruction manual is intended to be used with Despatch LEA series test chambers. An efficient way to learn about the oven would be to read the manual while you work with the oven. This will give you a balance between the ideas in the manual, and the mass of the oven, thus making the learning process efficient.

As you read this manual, be sure not to go past any word you do not fully understand. Look up any word you have any questions about and fully clear up its meaning. Then go back to the manual and begin reading again, just before the word you looked up.

If you go past words you do not fully understand, this may create a blank area in your understanding of the oven. That area of misunderstanding, or not understanding, could prevent you from being able to operate the oven efficiently and safely.

Several optional accessories are available on Despatch LEA ovens. This manual attempts to cover oven operation and maintenance with all the possible combinations in mind, thus you will see some instructions that are for ovens other than your exact model. After some experience with this manual and your oven, you may want to mark the parts of the manual that are applicable to your particular oven.

If you want or need information that is not in this manual, call or write:

Customer Service
Despatch Industries, Inc.
P O Box 1320
Minneapolis MN 55440
Call Toll Free 800/473-7373

Note: When ordering parts or service, give oven model number and serial number.

UNPACKING & INSPECTION

This shipment should include:

- One Despatch LEA Chamber
- One Instruction Manual
- Warranty Card

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

- See whether the crate and plastic cover sheet inside crate 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, and missing parts such as knobs and lenses.
- Look inside the control cabinet for loose or broken parts.
- Open the chamber door and look at all the chamber surfaces to see that they are flat and smooth.
- Check the door and latch for smooth operation.
- If anything is found to be out of order, check the rest of the oven very carefully for some other damage that could have occurred at the same time.

IF THERE IS DAMAGE, AND IT COULD HAVE HAPPENED DURING SHIPMENT, CONTACT THE SHIPPER IMMEDIATELY, AND FILE A FORMAL, WRITTEN DAMAGE CLAIM.

After you have filed a written damage claim with the shipper, contact Despatch Industries, Inc. to report your findings and to order replacement parts for those that were damaged or missing. Please send a copy of your filed damage claim to Despatch.

DRAIN: Some chambers are provided with a condensate drain connection. If provided, it should be connected to an open drain. If an open drain is not available, DO NOT connect to a pressurized drain. An appropriate pumping system must be added to the equipment if a pressurized drain is to be utilized.

VENT: All humidity chambers are provided with a pressure relief vent. In some cases a two way vent is provided to allow positive or negative equalization of pressure to the outside of the chamber.

D.I. WATER: Most humidity chambers utilize deionized water in the humidification system. The use of tap water for this purpose will greatly reduce system performance, and will ultimately result in a failure of the system. Deionized water must be provided to the system.

There are systems available which utilize a replaceable type deionizer. Tap water may be connected to these systems, as the cartridge deionizer will adequately treat the water for use in the humidification system. Periodic replacement of the cartridges is, however, required. Most larger equipments, as well as some smaller chambers require a connection of deionized water as cartridge type systems are ineffective in larger systems and require constant replacement. On such systems an appropriate source of deionized or demineralized water must be connected to the unit. Most water treatment companies can provide you with an appropriate system should it not already be available.

INSTALLATION

Place the chamber on a bench top or an optional cabinet base. The chamber must have a minimum of 2" clearance on all three sides to provide proper ventilation.

Make sure chamber is level and plumb. This will assure proper heat distribution and operation of all mechanical components.

Check the chamber power requirements for amperage and voltage on the cover of this manual.

Connect the electric supply directly to the chamber to terminals located behind control panel (see electrical schematic in back of manual) with all required grounding and safety equipment, in compliance with applicable codes, ordinances and accepted safe practices. For supply connections, use 10 AGW or larger wire suitable for at least 75°C (167°F) for LEA1-69. Use 8AGW or larger wire on LEA2-11 and 21 suitable for at least 90°C (194°F).

A note on line voltage: Line voltages may vary according to your geographical location. If line voltage is significantly lower than oven voltage rating, heat up times will be extended, and motor may overheat. If line voltage varies more than $\pm 10\%$ from the chamber voltage rating, temperature and humidity controls will operate erratically.

Chambers designed for 240 volts (see nameplate on oven) will operate satisfactorily on a minimum of 208 volts by changing the control transformer input leads, but with a reduction in heater power and heat-up time. If your power characteristics are lower, contact Despatch Industries, Inc.

RECOMMENDED WATER CONNECTION

1. The water inlet to the humidification system (marked humidity generator water inlet) requires demineralized or deionized water. The recommended flow rate is 1 gallon per hour. The recommended pressure is 20-40 PSI.

To install optional demineralizer cartridges to the back of chamber see section on demineralized cartridge.

Pipe the drain (marked water drain) from the chamber to an open drain.

2. Cooldown times are dependent on cooling water flow rate. Recommended cooling is 50 gallons per hour.

Optional flowmeter is recommended if water cooling is to be used. Connect a clean water supply to the flowmeter and connect flowmeter to the chamber connection (marked cooling water inlet). The brass needle valve on the face of the water flowmeter can be used for adjusting the water flow or shutting off the water flow. The other pipe on the rear of the oven (marked cooling water drain) should be piped to an open drain. Never allow drain to be plugged as a hot oven will generate a small amount of pressure when the water is first turned on.

WARNING: Steam burns!

Cooling water for the cooling coil need not be deionized or distilled. However, mineral deposits will degrade the heat transfer characteristics of the cooling coil and can become plugged over time.

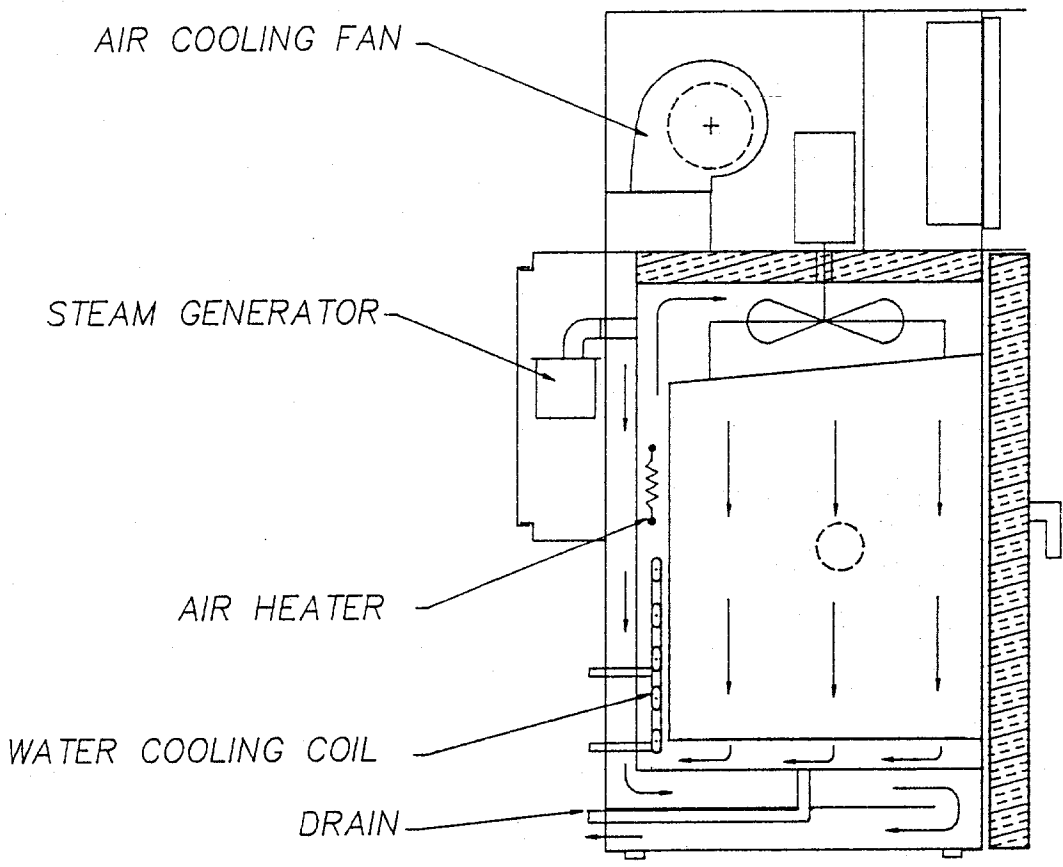
CHAMBER DESIGN

GENERAL DESCRIPTION

This manual is for a Despatch Industries LEA Series Temperature and Humidity Environmental Test Chamber. This environmental chamber has the capabilities of simulation of temperature and humidity levels as described in the specifications sections of this manual. The chamber incorporates forced air cooling, a water cooling coil, a steam generator, open element electric heaters, and a propeller fan for controlling the environment within the chamber.

An instrument panel is located on the front of the chamber above the chamber door. Located behind the instrument panel is the bulk of the electrical components. Circuits are protected by fuses and are mounted on the control panel behind the instrument panel. The steam generator is located on the rear of the chamber.

The unit is self-contained requiring only the specified utilities as determined by options included and is designed for continuous trouble-free operation when operated in a manner consistent with the procedures outlined in this instruction manual.



SIDE VIEW

AIR FLOW PATTERN

GENERAL INFORMATION ON HUMIDITY CHAMBERS

1. GLOSSARY OF TERMS

A. Relative Humidity (RH)

Amount of water vapor present in a given volume of air expressed as a percentage of maximum amount possible in that volume at a given temperature.

Example: A relative humidity of 75% means that air contains 75% of maximum moisture possible at that temperature.

B. Dew Point

Temperature at which condensation begins at a given humidity, volume and pressure.

NOTE: dew point is always lower than dry bulb temperature, except when air is saturated. At saturation, dew point, wet bulb and dry bulb temperature coincide.

2. MOUNTING METHODS FOR INTERNAL FIXTURING

Many applications for temperature/humidity chambers involve installation of internal fixtures to support components being tested and necessitate additional lead-in ports to provide entrance for wires, cables, thermocouples, etc.

NOTE: DO NOT INDISCRIMINATELY PERFORATE THE INNER CHAMBER WALLS AS THIS WILL VOID WARRANTY.

A machine screw or sheet metal screw DOES NOT CONSTITUTE A VAPOR-TIGHT SEAL. When simulating high temperature, high humidity condition, water vapor will seep through screw treads into insulation, saturate insulation and water drippage will start at bottom of outer housing.

Fixtures must be designed to facilitate their removal during regular maintenance and cleaning of the chamber. Failure to design fixtures properly may cause unnecessary delay when equipment is shut down for cleaning or maintenance.

NOTE: ANY FIXTURING OR REMOVABLE PARTS OF CHAMBER SHOWING SIGNS OF PERMANENT CORROSION SHOULD BE REPLACED.

3. MATERIALS FOR CONSTRUCTION OF FIXTURES

- A. Type 316 stainless steel is recommended for all fixtures. Any additions to chamber must be of equal or better grade. This applies not only to ports and fixtures, but to screws and related hardware to construct and mount them.
- B. Do not use any iron or mild steel materials in cabinet interior. This applies to any type of cold or hot rolled steel, either painted or plated. Painted or plated surfaces soon deteriorate under high temperature and humidity conditions. Two reasons to avoid use of these materials are:
 - 1. Corroding steel will "seed" stainless steel with particles of rust. These particles will cause rapid deterioration in any stainless steel it contacts. Once such chemical corrosion starts, it can only be stopped by electropolishing or passivation.
 - 2. This "seeding process" will cause similar corrosion on test loads; effects of this corrosion will be impossible to separate from temperature and humidity effects, and may void test results.
- C. After fabrication of stainless steel fixtures, it is essential that they be passivated before being placed in chamber. This is the only effective method in assuring that fixtures are free of contaminants. Particles of tool steel remain inbedded in stainless steel after drilling, punching and other fabrication processes. These particles must be removed, or they will begin to corrode rapidly in high temperature and humidity conditions. If such corrosion is allowed to continue, surrounding stainless steel will also corrode.
- D. Supplementary items such as plugs, sockets, wiring and printed circuit boards must be of a quality to last longer than components under test. All supplementary equipment and fixtures are subjected to same conditions as test load, and should be chosen with care.
- E. When components to be tested are ferrous metals and are expected to corrode, or purpose of test is to "force" corrosion, provision should be made to provide drip pans to retain any residue produced. This prevents residue from contacting inner chamber areas and/or control sensors.
- F. ANY PART OF FIXTURING OR ANY REMOVABLE SECTIONS OF CHAMBER INTERIOR SHOWING SIGNS OF PERMANENT CORROSION THAT CANNOT BE ELIMINATED BY PROPER CLEANING SHOULD BE IMMEDIATELY REMOVED AND REPLACED.

4. ELECTRICAL INSULATING MATERIAL

When components under test have electrical voltages applied to them, all insulating materials must be suitable for high temperature/high humidity conditions. Even very small leakage currents traveling through cabinet or fixture will produce rapid electrolytic corrosion. Fixture must be completely insulated from chamber. This is necessary to confine electrolytic corrosion just to fixture. Glazed porcelain or glass insulators, treated with Dow Corning 200 Silicon fluid, appear to be some of the best materials presently available.

5. LOADING DENSITY

Personnel often overload chambers, seeking to make most use of test equipment. While some conditions will permit indiscriminate loading, most will not. If wide tolerances are permissible, maximum loading of work chamber is permissible. It should be kept in mind, however, that fewer components in work chamber generally means closer tolerances. It is recommended that no component be loaded closer than three inches to an internal surface. If extremely close tolerances in testing are required, it is recommended that a dummy load simulating the component in size and mass be placed in chamber and a test program run.

If it is difficult to produce desired accuracy, load may be too large for chamber.

Live loads in the work chamber will affect the units ability to control at a given temperature and humidity.

6. SEALING CABLE ENTRANCE PORTS

All entrance ports for large diameter cables or wire bundles must be sealed before chamber is placed in operation. This precaution is often neglected and can cause annoying problems. Condensation will continually run down the cable and drip on floor or external instruments. Excessive water usage will occur because of these openings to atmosphere. If opening is very large, internal control stability can be affected. Silicone RTV is a suitable filler for these points provided a more sophisticated sealing method is not available.

7. CONDENSATION

All chambers are capable of operating at high temperatures and up to 95% relative humidity without condensation forming on workload. Some condensation may form on walls of work chamber; these are areas of heat loss and are slightly cooler than rest of chamber. Such condensation is normal and should not be considered as a malfunction of chamber. Severe condensation normally forms on components when loaded into cabinet that is operating at high temperature and humidity. Any material at ambient temperature may be below dew point and condensation may form on surface and continue to form until material temperature exceeds the dew point.

TO AVOID CONDENSATION WHEN LOADING OR UNLOADING CHAMBER:

- A. Test load and chamber at ambient temperature.
 - 1. Turn humidity and power OFF.
 - 2. Load chamber, close door.
 - 3. Turn power ON.
 - 4. Set temperature control for desired temperature and allow chamber to stabilize.
 - 5. Turn humidity switch ON.
 - 6. In small steps, adjust humidity control for desired setting. If immersion heat is applied too quickly, dew point may rise faster than temperature of test load, creating condensation on load surface. This effect will be most noticeable on high mass loads.

- B. Test load at ambient, chamber at high temperature and humidity.
 - 1. Turn humidity switch OFF, allowing blower to continue operating.
 - 2. Open door.

WARNING: A cloud of steam may be released when the inner door is opened, and STEAM BURNS!
 - 3. Allow chamber to cool approximately 30 minutes.
 - 4. Chamber can be loaded and operated normally as outlined in "A".

C. Unloading of the work chamber.

1. Remove load quickly upon completion of test before load cools below dewpoint. See warning above when opening door.

NOTE: FAILURE TO FOLLOW THESE INSTRUCTIONS MAY CAUSE DAMAGE TO UNIT. SUCH DAMAGE WILL NOT BE COVERED BY WARRANTY.

8. CORROSION

Corrosion is undoubtedly the most wide spread and probably the most costly water caused problem. Corrosion of ferrous and non-ferrous metals is basically an electrolytic action requiring presence of water or water vapor.

This chamber will be operating under ideal conditions for accelerating corrosion (i.e., water, water vapor, high temperature plus an infinite variety of contaminants introduced by products under test). Thereafter, it is reasonable to assume that the cost of maintaining its operation could be greater than the cost of maintaining non-humidity chambers.

Your chamber is constructed of high quality materials suitable for this type of application. It is, however, designed and manufactured to fulfill the widest variety of normal applications. Unusually corrosive applications may have special engineering problems and cannot be satisfactorily performed by a standard chamber. Frequently, only after a chamber is partially damaged does one become aware of his unusual application.

THE MOST COMMON CAUSES OF CORROSIVE ATTACK ARE AS FOLLOWS:

A. FAILURE TO PROVIDE A CLEAN WATER SUPPLY.

Dissolved solids and gases in a water supply serving the chamber are injurious to stainless steel alloys. High chloride content is particularly damaging.

B. INTRODUCTION OF THE HALOGEN SALTS (CHLORINE, FLUORINE, BROMINE, IODINE) EITHER BY THE WATER SUPPLY OR THE PRODUCTS UNDER TEST.

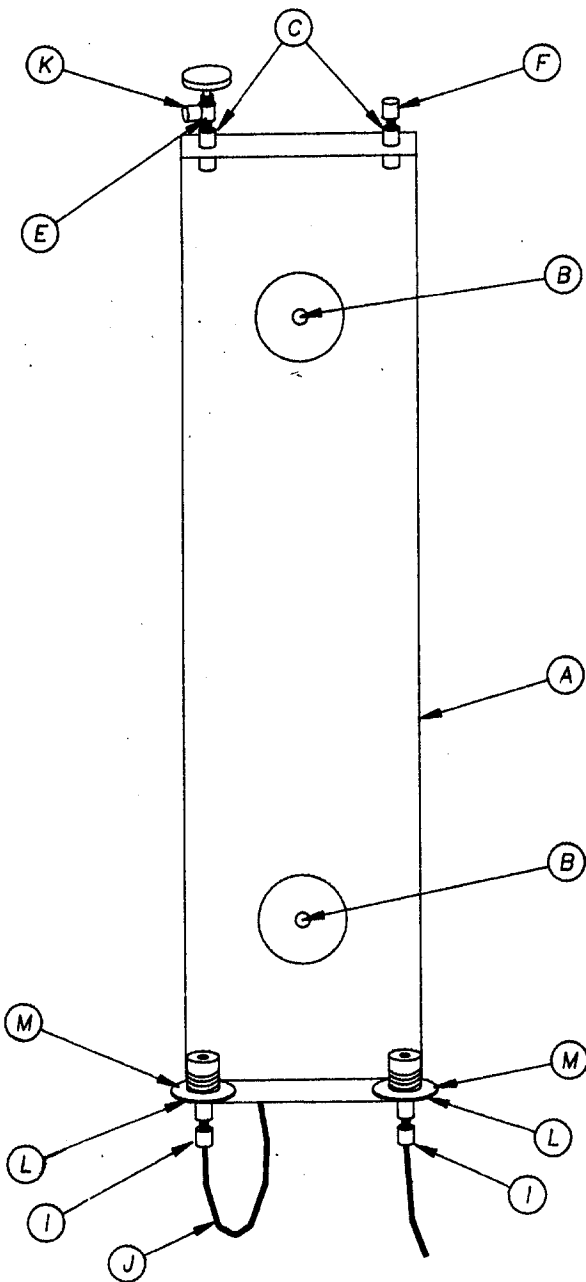
A rather common means of introducing chlorides occurs when products under test have been defluxed or degreased in a chlorinated solvent and transferred directly into the temperature/humidity chamber. Moreover, parts of vinyl chloride plastics which decompose at sustained high temperature and humidity contribute to deterioration.

- C. Failure to institute properly scheduled cleansing and preventative procedures. Failure to follow a rigid schedule of draining and flushing (10 days optimum - 30 days maximum) while chamber is in continuous operation will cause a concentration of solids and contaminants (due to water evaporation), and water will become very corrosive.
- D. Operating in industrial atmospheres containing a high chloride content.
- E. Placing fixtures, fasteners, etc., which are not of stainless steel or equal and are not electropolished or properly cleaned of foreign matter, i.e., drill chips, etc., into the chamber.

INSTALLATION INSTRUCTIONS
CARTRIDGE TYPE
DUPLEX MOUNTING BRACKET ASSEMBLY

CAUTION: Install pressure reducing valve where line pressure is greater than 100 PSI.

1. Place bracket (A) in a vertical position. Attach by screws (B) through holes in bracket.
2. Place upper pressure fittings (C) in the two outside top slotted holes in the bracket. While holding the pressure fittings, screw the shut-off valve (E) and the threaded elbow (F) into the threaded end of the pressure fittings (C).
3. Place the teflon washers (M) over the bottom end of the lower receiving blocks (G) and then insert the lower receiving blocks and washers into the two outside bottom holes. While holding each receiving block, loosely screw the nylon nut (I) onto the receiving block. Be sure the slotted openings on the receiving blocks are facing you to allow entry of the cartridges.
4. Connect the long piece of tubing (J) to the left lower receiving block (G) by pushing the tubing completely into the receiving block through the nylon nut (I) and tighten the nylon nut approximately 1/2 turn after finger tight.
5. Pass the long piece of plastic tubing (J) behind the bracket upwards to connect to the threaded elbow (F). Connect the tubing, using the same method as described in step 4.
6. Connect tubing (preferably plastic) from the water supply to the inlet shut-off valve (E) by passing the tubing through the brass nut (K) and tightening as described in step 4.



7. Connect tubing (preferably plastic) to the right lower receiving block as described in step 4 for the outlet.
8. The duplex mounting bracket assembly is now ready for installation of the cartridges of your choice. Remove the protective end caps from a cartridge. Detach the two washers that are taped to the cartridge and place one washer on the top of the cartridge and then push the washer and cartridge into the upper receiving block (G) and slide the cartridge into place. Tighten the adjusting nut (L) on the lower receiving block to firmly hold the cartridge in the bracket. Only moderate tightening should be necessary to prevent leakage. Repeat for second cartridge.
9. To obtain water flow, open shut-off valve (E) and regulate for proper flow with either the shut-off valve or the outlet valve if one is installed. (Outlet valve is not provided in kit.)
10. To replace the cartridge, turn off inlet shut-off valve (E) and loosen the adjusting nut (L) on the lower receiving block (G). Pull cartridge from the bottom, disengaging it slightly from the lower receiving block before removing it completely from the bracket. Repeat for second cartridge.
11. To order replacement parts, the bracket assembly is part number 060710 and cartridge replacements are part number 060709.

1. Water pressure is not to exceed 100 pounds per square inch.
2. Water temperature is not to exceed 100°F.
3. Do not store in area where temperature will be below 33°F or above 100°F.
4. When mounting cartridge in bracket, tighten nut moderately tight and turn on water. If leak occurs, tighten nut until leak is stopped.
5. Cartridge stock should be rotated. Guaranteed shelf life is two years.

HEATING SYSTEM

System heating is provided by means of open element nichrome wire air heater(s) located in such a manner within the conditioning plenum as to avoid any direct radiation to items within the test area.

Heaters are actuated by means of a zero voltage switching solid state relay for quiet, reliable service. The heaters are wired in the control system in a manner that if the air circulation system should be de-energized, the heaters will be de-activated.

OVERTEMPERATURE PROTECTION

The standard overtemperature safety device is an FM approved overtemperature limit controller. Also, heat limiters (thermal fuses) are usually provided in series with the heaters. Other protection can include filled bulb thermostats (manual reset) or FM approved overtemperature limit controllers for redundant protection.

HUMIDIFICATION

The humidification system is designed to operate within the following limits:

1. TEMPERATURE RANGE of 75°F(24°C) to 203°F (95°C). If the chamber is to be operated beyond these limits, the "Humidity Control" must be switched off to prevent boiling in the wet bulb sensor trough during high temperature operation and freezing of the trough during low temperature operation.
2. HUMIDITY RANGE is limited to 12% to 96% ±5% relative humidity.

HUMIDIFICATION:

Humidification is accomplished by energizing an immersion heater to boil water in the vapor generator located in the rear of the chamber. The generator is equipped with an immersion heater safety thermostat and/or liquid level float switch that will shut off the immersion heater in the event of low water. The immersion heater is controlled by a solid state relay which is actuated by the relative humidity controller. Should an overtemperature condition occur in the chamber, redundant contactors will de-energize the immersion heater in the steam generator as well as the chamber air heaters.

Note: On initial start-up, and when humidity has not been used for long periods of time, water fill float valve must have time to fill the steam generator with water before the control system calls for humidity. To accomplish this, the chamber must run for approximately 15 minutes with "cool" and humidity switches on, and humidity control instrument setpoint of zero for % RH or 35 for depression instruments.

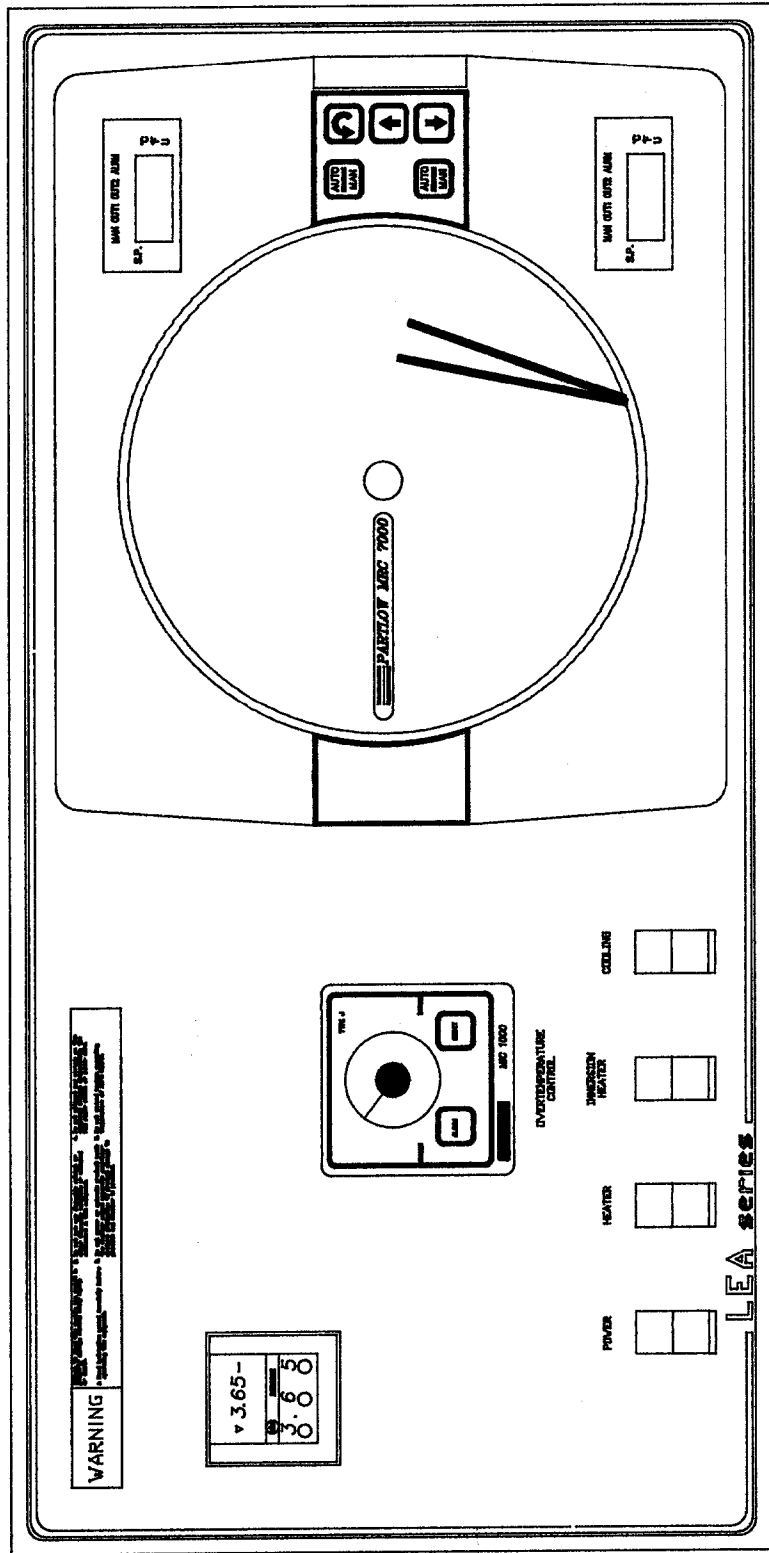
Refer to Section 12D for piping schematic and 12E for steam generator assembly replacement parts.

CAUTION: Use only demineralized or distilled water in the humidification system. The use of untreated water will cause a build up of scale in the vapor generator and wet bulb trough.

INSTRUMENT PANEL DESCRIPTION

An illustration of the standard front instrument panel is on the following page. The following is a description of front panel components.

Control Instrument	Is located at the right on the instrument panel. The standard control is a MRC 7700. This is a microprocessor based recorder/controller with two channels and a recorder.
Power Switch	Is the left most switch on the switch and light section of the instrument panel. It turns on power to all circuits when in the on position.
Cool Switch	Is the right most switch on the switch and light section of the instrument panel. This switch powers cooling fan when in on position.
Immersion Heater Switch	Is a lighted switch located to the right of the power switch. This switch must be on in order to power the humidity system. (Additional note: When light is off, water level in steam generator is low.)
Timer Switch (Optional)	Is just to the left of the power switch if timer option is included on unit.
High Limit	Is located on center portion of the standard instrument panel.



INSTRUMENTATION

STANDARD CONTROLS (MRC 7000)

The MRC 7000 Series controller is a complete microprocessor based, single loop process controller with many input and output options available for a variety of process applications. Input is RTD on temperature controller and volt input on humidity control. Outputs are solid state relay driver outputs on Output 1 and Output 2. The optional alarm output (Output 3) is also available with a 5 amp electromechanical relay or a solid state relay driver. Alarm options are programmable for either process alarm, deviation alarm, or deviation band alarm.

The MRC 7000 series incorporates proportional, integral (auto reset), and derivative (rate) actions for proportional control operation. Changing tuning parameters for proportional control operation is a front panel operation accomplished via the three key membrane pad. Also, through the keypad, parameters for second output position (spread from the first output), alarm adjustments and auto/manual selections are made.

For further information on MRC 7000, see enclosed MRC 7000 manual.

MIC 1000 TEMPERATURE LIMIT

Standard Overtemperature Limit: The standard overtemperature limit controller is a UL and FM recognized limit controller. It includes a temperature sensor within the conditioned environment. Also includes a digital setpoint dial with dual calibration in °F and °C.

The control "trips" in the event of an open sensor (upscale break). The control will "trip" anytime the sensed temperature exceeds the overtemperature setpoint. Once tripped, the unit must be manually reset and will not be reset unless the chamber temperature is below the overtemperature setpoint. The reset switch is located on the control. Auto reset will only occur on initial start-up.

The overtemperature control usually operates in conjunction with a thermal fuse protection device.

When an overtemperature condition occurs, the overtemperature control will trip. The instrument is connected to the control circuit such that this will de-energize the heater redundant contactors, thus disconnecting power to the heaters.

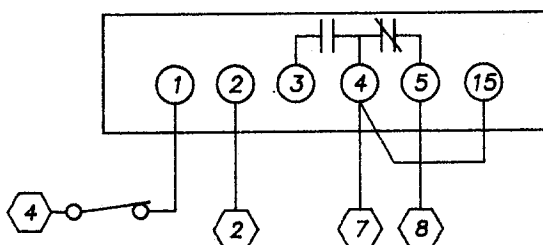
Note: Compliance with warranty requires that any live (heat dissipating) load placed in the chamber must have its power source interlocked with the overtemperature limit controller. Overtemperature protection will not be achieved if power to live loads placed in the chamber cannot be interrupted by

the overtemperature control. This can be achieved by powering a 115 VAC relay coil across equipment terminals 12 and 2. Use the normally open contacts of this relay to provide or cut power to live load. The high temperature limit must not be set more than 10°C (18°F) above the maximum rated temperature of equipment. See nameplate for equipment range.

OPTIONAL PROCESS TIMER INSTALLATION

The timer is electrically connected into oven control circuit and will shut off the heater at end of cycle. (Tools needed: screwdriver, utility knife, hack saw)

1. Disconnect power, remove screws from the face of the control panel and swing it forward.
2. From back of panel, locate pre-punched holes for process timer and timer switch. From the front of panel, use utility knife to cut holes in the overlay. Use saw to cut and remove sheet metal.
3. Mount timer to housing before mounting in the panel. Make sure rubber gasket is flush with timer bezel before tightening the screws.
4. Slide timer/housing complete through cut out until the gasket is against panel.
5. Holding the timer in place, install the mounting bracket horizontally around the timer housing and slide it forward until the ends contact the rear of the panel.
6. Using the two screws provided, attach the bracket to the timer housing and tighten screws until timer is held securely in place.
7. Install mylar insulator over rear of bracket by sliding the end tabs between the bracket and the housing and allowing metal extensions on rear of bracket to go through the slots in insulator to hold it securely in place.
8. Locate terminals marked #7 and #8 on the terminal strip. Remove jumper. Wire timer in the circuit as shown below.



9. Peel top part of backing off "Timer" sticker and apply it to front of control panel, using the two locating marks and switch hole as location guides. Peel remaining backing off and smooth sticker down.
10. Snap switch into place and wire as shown above.
11. Replace control panel.

OPERATION

Warnings and Safety Precautions

Failure to heed warnings in this instruction manual and on equipment can result in death, personal injury or property damage.

Operator Training Requirements

The user(s) of this equipment must comply with operating procedures and training of operating personnel as stated in the Occupational Safety & Health Act (OSHA) of 1970, Section 5, and the National Fire Protection Association (NFPA) 86A of 1985, Section 1.6

The users selected must be alert and competent as their knowledge and training are vital for safe equipment operation and maintenance.

All users must be thoroughly instructed and trained under the supervision of experienced person(s). User(s) must demonstrate understanding of the equipment and its operation to assure knowledge of and practice of safe and proper operating procedures.

User(s) should receive regular re-training and testing as required to maintain a high level of proficiency and effectiveness.

Training should include:

- Function of controls and safety devices.
- Handling of special atmospheres (on units with LN2 or CO2 auxiliary cool).

Despatch will provide operating instructions which include:

- Piping and wiring diagrams
- Start-up procedures
- Shut-down procedures
- Emergency procedures
- Maintenance procedures

If additional manual(s) is required contact:

Customer Service
Despatch Industries, Inc.
P O Box 1320
Minneapolis MN 55440
Call Toll Free 800/473-7373

Dangerous Atmospheres

DO NOT use in wet, corrosive or explosive atmospheres.

High Voltage

DO NOT attempt any service on this equipment without first disconnecting the electrical power to this unit. Disconnect main power switch or power cord. There are live circuits and connections even with power switch off.

High Temperature

DO NOT exceed maximum operating temperatures.

Take care when unloading for hot load.

Explosive Materials

DO NOT use any flammable solvent or other flammable materials or enclosed containers in this work space.

Electrical Service Connections

For supply connections on LEA chambers, use wire suitable for rated FLA. See nameplate for FLA.

Always check for proper voltage configuration and phase configuration before powering up unit.

Steam Burns

On humidity chambers, a cloud of steam may be released when the door is opened. Be careful! Steam burns!

Protective Covers and Panels

All covers and panels must be in place when unit is operating and not being serviced.

Protect Chamber and Test Product from Overtemperature

DO NOT operate live (heat dissipating) load in this chamber unless its power source is interlocked with chamber's overtemperature limit.

PRE-START-UP

1. 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.

2. Check Line Voltage

This LEA series chamber can be configured for (230 or 208) single phase. Verify correct configuration for your voltage.

3. Fresh Air and Exhaust Openings

Avoid restrictions in and around the fresh air and exhaust openings. Under no condition permit them to become so filled with dirt that they appreciably reduce the air quantity.

4. Connect Other Utilities

Connections for water supply and drain should be clearly labeled on the chamber if applicable to this unit.

Note: All chambers are tested at the factory; however, shipping may cause damage or deviation. Therefore, before oven is put into regular service, the following items should be inspected and adjusted if necessary: hi-limit and control instrument calibration, doors, hinges, latches and other miscellaneous parts.

CHAMBER START-UP

- A. Push power switch to "ON". Power indicator light should light. This switch will activate the fans and control circuit.
- B. Set temperature control to the desired temperature. See section on temperature control for more information on control instrument.
- C. Set humidity control to the desired relative humidity (RH). See section on humidity control for more information on instrument, and section on condensation to prevent condensation on parts.
- D. Refer to operating range graph for optimum cooling for the range of operation desired. The minimum cooling necessary will provide the best performance. Turn cooling switch on if required. Adjust water flow as necessary.
- E. Set hi-limit control by dialing in a temperature of 10-15°C (18-27°F) above process temperature. Setpoint should be low enough to prevent damage to the workload but high enough to allow the controller to control at setpoint. Hi-limit will shut off heaters if chamber temperature exceeds hi-limit setpoint. The hi-limit must be manually reset. See section on hi-limit control for more information on the hi-limit instrument.
- F. Push heater switch to "ON". Heater indicator light should light. This switch will activate the heating elements. When the desired temperature is reached, the control will proportion power to the heater as needed and the heater indicator light will flash on and off.
- G. Push humidity heater switch to "ON." Immersion heater indicator light may not come on initially as there is an approximate 15 minute delay to fill the steam generator with water. The heater will not function until the generator is full. This switch will then activate the heating elements. When the desired humidity is reached, the control will proportion power to the immersion heater as needed and the immersion heater indicator light will flash on and off.
- H. The steam generator liquid level switch is located inside the steam generator on the back of the chamber. This switch will shut off the immersion heater if the steam generator has run out of water.

MAINTENANCE

General Equipment

Repair of electrical and refrigeration systems should be performed by qualified mechanics only.

Refer to the enclosed wiring and piping schematics with bills of materials for description and function of components.

1. Keep Equipment Clean

Gradual dirt accumulation impedes air flow. A dirty chamber can result in unsatisfactory operation such as non-uniform temperatures and/or humidity in the work chamber, reduced heating capacity, reduced production, overheated components, reduced refrigeration capacity, etc.

Keep the walls, floor and ceiling of the work chamber free of corrosion, dirt, and dust. Floating dust or accumulated dirt may produce unsatisfactory test results.

Keep condenser coil clean and free of foreign matter.

Keep all equipment accessible. Do not permit other materials to be stored or piled against chamber.

2. Protect Controls Against Excessive Heat

This is particularly true of controls, motors or other equipment containing electronic components. Temperatures in excess of 38°C (100°F) should be avoided.

3. Establish Maintenance and Check-Up Schedules

Recommended frequency for scheduled maintenance is included in each section.

Follow these promptly and follow them faithfully. Careful operation and maintenance will be more than paid for in continuous, safe and economical operation.

4. Maintain Equipment in Good Repair

Make repairs immediately. Delays may be costly in added expense for labor and materials and prolong eventual shutdown.

Humidification System

1. Verify that water level controls function properly.
 - When water is below heater, light on humidity switch is off.
 - Water level is controlled to \emptyset to 1/2" above top of float switch bulb when not calling for steam.
 - Sufficient water in wet wick "peace pipe."
2. The wet bulb wick in front of the recirculating fan should be replaced approximately once a month or whenever it becomes crusty or dirty. Wet bulb sensor can be identified by a 1" piece of white tubing behind the sensor mounting bracket.
3. Clean any scale from steam generator and its components. Check it for cleanliness once a month.
4. Work Chamber Interior

Program outlined below is minimal; if chamber is operated under abnormal conditions (i.e., dirty water supply, contaminated test loads, corrosive atmosphere, etc.), increase frequency of cleaning.

- a. Every 500 operating hours in humidity mode: Drain and clean wet bulb wick assembly, control sensors, and all interior surfaces (walls, bottom, door interior). Use clean cloth and warm water. If necessary, use stainless steel wool on stains. **UNDER NO CIRCUMSTANCES USE ORDINARY STEEL WOOL: THIS WILL SCRATCH AND CAUSE CORROSION.**
- b. Every 4,000 operating hours: Remove interior baffles, wet and dry bulb assembly, and sensors. Clean all interior surfaces, including all sensors with mild detergent. Scrub all exposed surfaces until clean, using stainless steel wool if necessary. (See "a") Rinse thoroughly and dry with clean cloth. Remove contaminants from water reservoir. Install all components removed earlier, fill reservoir, drain, and refill again.
- c. When humidity chamber is under continuous use for high temperature/humidity testing, chamber **MUST** be emptied after every test cycle. Chamber should be cleaned as is necessary to remove any stains or corrosion, then chamber may be refilled with water. Optimum cleaning (as outlined in "a" and "b") interval under these conditions is ten days. Maximum interval is thirty days.

TROUBLE SHOOTING

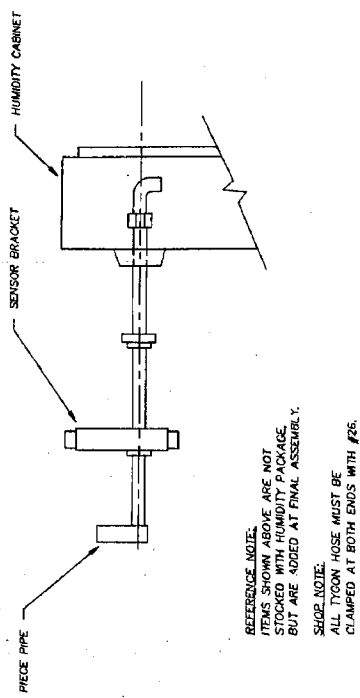
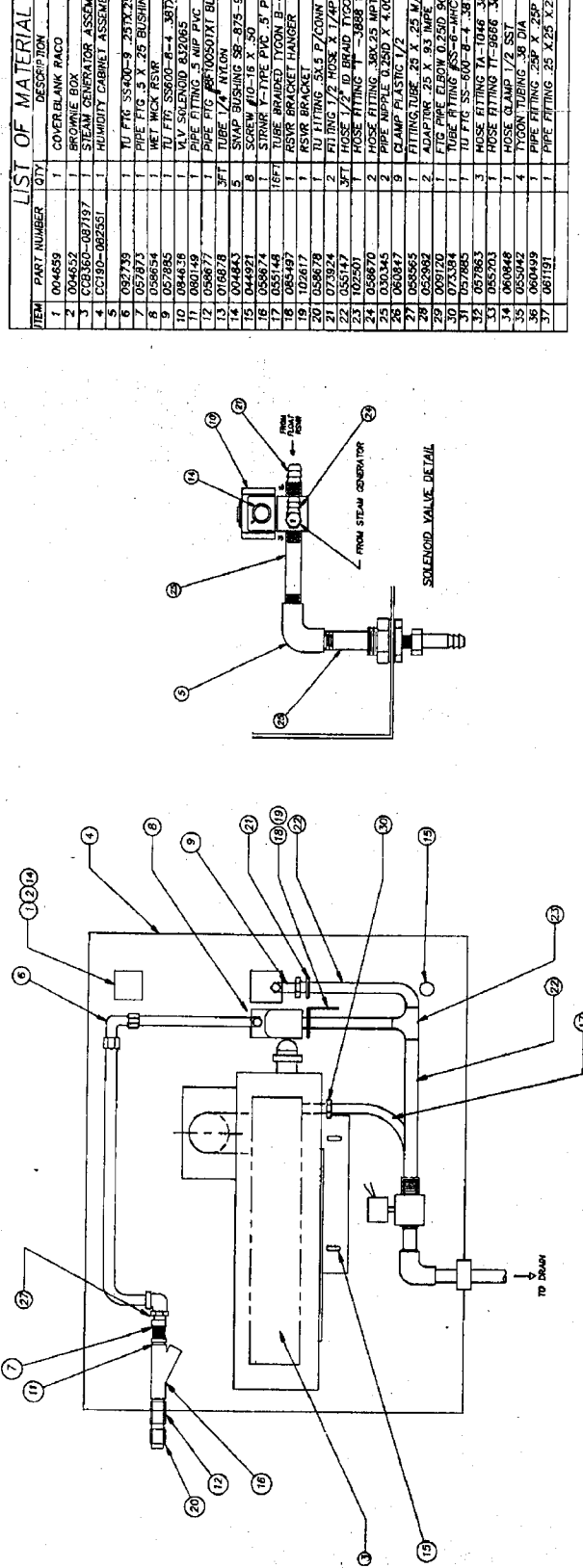
Below are possible operating problems and suggested solutions. If you have a problem not listed and don't know what to do, contact Despatch at our toll free "Help Line" 800-328-5476 (in MN 800-462-5396).

<u>Difficulty</u>	<u>Probable Cause</u>	<u>Suggested Remedy</u>
Failure to heat	No power	Check power source and/or oven and wall fuses.
	Burned out heating element.	Replace element (see warranty statement).
	Control malfunction	See trouble shooting information on control.
	Loose wire connections	Disconnect power and check connections behind control panel.
Slow heat up	Improperly loaded	Reduce load or redistribute load in work chamber.
	Low line voltage	Supply sufficient power and proper connections. Check to see if circuit is overloaded.
	Heating elements burned out	Replace burned out element (see warranty statement).
	240 volt chamber is connected to a 208 volt line	Add boost transformer to chamber.
	Fan motor failure	Check thermal protection (automatic reset). Replace fan motor.
	Water flow in cooling coil switch is on.	Shut water off or turn or cooling switch on (see operating range curve).
	Frequent heater element burn out	Harmful fumes generated by load
Overheating chamber		Do not operate over 100°C (212°F).

<u>Difficulty</u>	<u>Probable Cause</u>	<u>Suggested Remedy</u>
Erratic temperatures or humidity	Control malfunction	See trouble shooting information on controls.
Immersion heater indicator not come on	There is a 15 minute time delay	See chamber start-up light will procedure.
Inaccurate temperatures or humidity	Control miscalibration	Recalibrate control (see section on control recalibration).
Excess surface temperature around door	Door seal deterioration	Replace door seal.
Improper airflow	Fan motor failure	Replace fan motor.
	Unbalanced fan wheel	Replace fan wheel.
Excessive Vibration	Dirty fan wheel	Clean fan.
	Unbalanced fan wheel	Replace fan wheel.
Chamber will not control at setpoint	Hi-limit set too low	Set the hi-limit higher.
	Hi-limit is out of calibration	Recalibrate the hi-limit (see directions on recalibrating the hi-limit).
	Solid state relay malfunction	Replace relay.
	Control malfunction	See trouble shooting information on control.
	Air friction of recirculation fan	The minimum operating temperature is approximately 35°C above ambient room temperature. Use water cooling coil. See section showing operating range curve.
	Live load too large	Load work chamber with fewer devices.
	Water flow in cooling coil switch is on.	Shut water off or turn or cooling cooling switch off (see operating range curve).

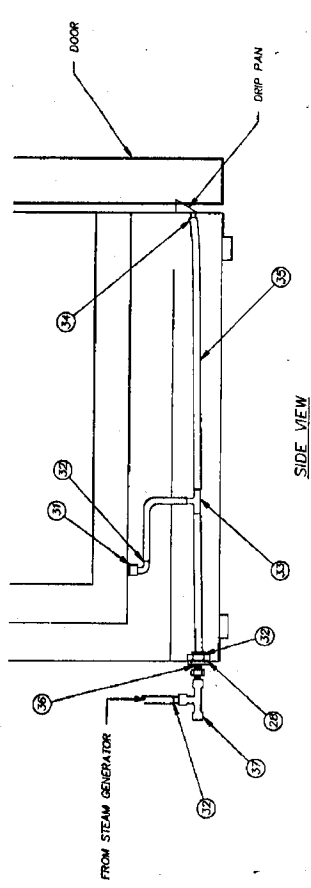
<u>Difficulty</u>	<u>Probable Cause</u>	<u>Suggested Remedy</u>
Heater does not shut off until the temperature reaches the hi-limit setting	Solid state relay shorted	Replace relay.
Condensation around door or floor	Door seal deterioration	Replace door seal.
Condensation on load	Temperature of load is below dewpoint	See condensation section on how to avoid this problem.

1 2 3 4 5 6 7 8



REFERENCE NOTE:
 ITEMS SHOWN ABOVE ARE NOT STOCKED WITH HUMIDITY PACKAGE, BUT ARE ADDED AT FINAL ASSEMBLY.
 SHOP NOTE:
 ALL TYGON HOSE MUST BE CLAMPED AT BOTH ENDS WITH F26.

LIST OF MATERIAL		087139	
ITEM	PART NUMBER	QTY	DESCRIPTION
1	004659	1	COVER BLANK R400
2	004652	1	REGULATED FLOW
3	003160-087137	1	STEAM GENERATOR ASSEMBLY
4	003160-082351	1	HUMIDITY CABINET ASSEMBLY
5	092739	1	TU FIC SS400-8 28TX28T UNION ELBOW
6	057873	1	PIPE FITG 5 X 25 BUSHING
7	059654	1	WET WICK RESV
8	027885	1	TU FIC SS600-8-4 .387X.29PT
9	060149	1	PIPE FITTING 5/8
10	059677	1	PIPE FITG 1/4 NITCON
11	016878	3FT	TUBE 1/4 NITCON BULK HD 1/2"
12	004843	5	SNAP BUSHING SB-875-9
13	044971	8	SCREW #10-16 X .50
14	059674	1	STRWR Y-TYPE PVC .5" PT
15	053748	16FT	TUBE BRAIDED TYGON B-44 4X3/8 LG
16	053748	1	BRACKET HANGER
17	107417	1	PLUG BRACKET
18	056678	1	TU FITTING 5/8 X 1/2 CONN
19	073924	2	FITTING 1/2 HOSE X 1/4PT
20	055147	3FT	HOSE 1/2 ID BRAID TYCON
21	102501	2	HOSE FITTING .38X.23 MPT
22	059670	2	PIPE NIPPLE 0.250 X 4.00 LONG
23	030345	2	CLAMP PLASTIC 1/2
24	030345	9	ADAPTER 1/2 X 1/4 X 1/2
25	059652	2	CLAMP PLASTIC 1/2
26	009120	1	FITG PIPING 6SS-6-MHC-6S 3/8SH X 1/2P
27	057885	1	TU FIC SS-600-8-4 .387 X .25P
28	057885	3	HOSE FITTING TA-1046 .387 X .25P
29	055703	1	HOSE CLAMP 1/2 SST
30	060449	1	PIPE FITTING 3/8 X 1/2 NIPPLE
31	061191	1	PIPE FITTING .25 X .25 X .25 TEE



D 8360	087139	C 00
REV	SYMBOL	REV

Despatch
 HUMIDITY CONTROL
 W/SHOWER WATER LEVEL CONTROL
 LEAT-69

D 8360 - 087139
 SIZE CODE PART NUMBER REV SERIES

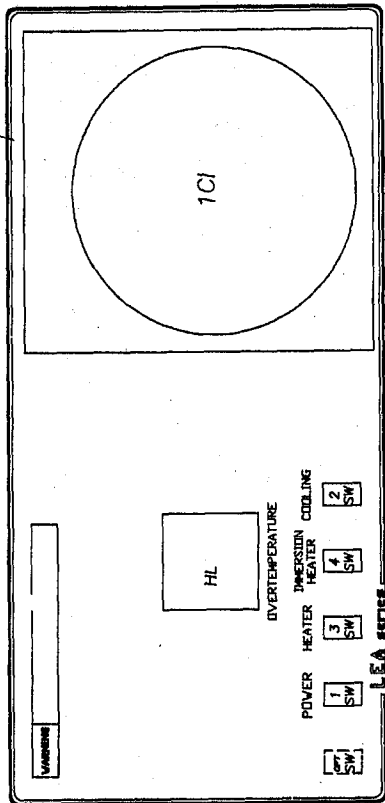
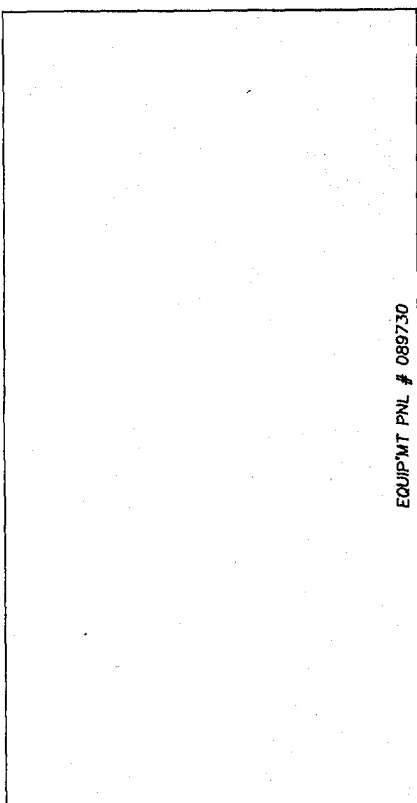
DATE	SCALE	BY	CHK	DATE
10/20/88	1:1	J. L. L.	G. P. Z.	9-8-88
APP	DATE	SCALE	BY	CHK
J. L. L.	9-8-88	1:1	J. L. L.	G. P. Z.

COMPONENTS: J. L. L. RESPIRATOR INDUSTRIES, INC.

REV	DATE	BY	DESCR
1	10/20/88	J. L. L.	INITIAL DESIGN
2	10/20/88	J. L. L.	REVISED FOR MANUFACTURE
3	10/20/88	J. L. L.	REVISED FOR MANUFACTURE
4	10/20/88	J. L. L.	REVISED FOR MANUFACTURE
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36	10/20/88	J. L. L.	REVISED FOR MANUFACTURE
37	10/20/88	J. L. L.	REVISED FOR MANUFACTURE
38	10/20/88	J. L. L.	REVISED FOR MANUFACTURE

LIST OF MATERIALS

ITEM	PART NUMBER	LEA MODEL QUANTITY				DESCRIPTION
		1-69	2-11	2-21V	2-21H	
1C	087134 (OPTION)	1	1	1	1	CTL MRC77502000000100 REC/CTL
1HL	083226	1	1	1	1	CTL MRC775020000010100W/RS422
1-4CR	047753	4	4	4	4	RELAY MIDTEX 187-327200
CF	015229	1	1	1	1	FAN M03A1 240V CAB
CoolFan	057870	1	1	2	1	FAN BLOWER B45 230
1FL	061103	1	1	1	1	SW LIQ LEV #15-650-P MAG. REED
1FU	007609	2	2	2	2	FUSE 1-ELEMENT 250V 10AMP
3FU	007456	2	2	2	2	FUSE A25 X 15 AMP TRAP
4FU	007456	2	2	2	2	FUSE A25 X 15 AMP TRAP
1HTR	054266	1	2	2	2	HTR WGN 2.4KW SST 240V
2HTR	094915	1	1	1	1	HTR WATLOW FROD CARD 1.5KW 240V
	007821	1	1	1	1	HTR WATLOW FROD CARD 3KW 230V
RecMtr	107752	1	1	1	1	MTR 0.25HP S0DP208/230/1/50/60
1-2SSR	047610	2	1	1	1	RELAY SSR OPT0-22 240025
	057345	1	1	1	1	RELAY SSR 240D45SP
1-2SW/PL	074182	2	2	2	2	SW SPST GRAY W/AMB LAMP
3-4SW/PL	081604	2	2	2	2	SW SPST GRAY W/WHIT LAMP
1T	013315	1	1	1	1	TRANF MT 200VA BX200MP12153PK
FU	007502	2	2	2	2	FUSE FNM 2.00A 250V
1-2RTD	070774	2	2	2	2	RTD 100 OHM .180 X3"LG
1T/C	053454	1	1	1	1	T/C T3X11-3-SPEC022 .180 X3"LG
1SOL	084636	1	1	1	1	VLV SOL 832065 0.25DIA 120V
VAR	014643	2	2	2	2	VARIATOR 120VAC
5SW (OPTION)	074116	1	1	1	1	DOUBLE PULL SINGLE THROW SWITCH
LT (OPTION)	001609	1	1	1	1	50 WATT INTERIOR LIGHT



B361-WD1262 E01

PAGE 2 OF 2
 CAD FILE: WD1262*1

DATE	BY	SCALE	DATE
06/28/72	R.S.	1/8" = 1"	9-3-88
DESPATCH INDUSTRIES, INC. 1000 W. 10TH ST. ST. LOUIS, MO. 63102 TEL: 314-241-1000 FAX: 314-241-1001 COPYRIGHT © 1988 DESPATCH INDUSTRIES, INC.			