

User Guide

CD Carousel Dryers

**Electric models CD100 to CD3200
with Compu-Dry controls**

Installation

Maintenance

Operation

Troubleshooting

***Instant Access
Parts and Service
(800) 458-1960
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IMD030F



WARNING - Reliance on this Manual Could Result in Severe Bodily Injury or Death!

This manual is out-of-date and is provided only for its technical information, data and capacities. Portions of this manual detailing procedures or precautions in the operation, inspection, maintenance and repair of the product forming the subject matter of this manual may be inadequate, inaccurate, and/or incomplete and cannot be used, followed, or relied upon. Contact Conair at info@conairgroup.com or 1-800-654-6661 for more current information, warnings, and materials about more recent product manuals containing warnings, information, precautions, and procedures that may be more adequate than those contained in this out-of-date manual.

Please record your equipment's model and serial number(s) and the date you received it in the spaces provided.

It's a good idea to record the model and serial number(s) of your equipment and the date you received it in the User Guide. Our service department uses this information, along with the manual number, to provide help for the specific equipment you installed.

Please keep this User Guide and all manuals, engineering prints and parts lists together for documentation of your equipment.

Date:
Manual Number: IMD030F
Serial number(s):
Model number(s):

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WARNING:

This dryer utilizes contactors which contain mercury. As of January 1, 1990, mercury is to be considered as a hazardous substance and dealt with accordingly.

In the rare event that a relay should be vaporized, the levels of the mercury vapor in the air would be below public safe levels within one hour. During that hour there is no practical hazard; a person would have to inhale concentrated fumes continuously for weeks before an opportunity existed to experience noticeable symptoms.

Standard procedure in the case of a spill is nearly as simple as cleaning up any spill.

- A. Sweep the mercury and parts into a “Ziplock” type of bag or air-tight container.
- B. Dispose of mercury in normal fashion as done with scrap metals.

Also included with your instruction packet is an MSDS sheet (#7439-97-6) for your use.

WARNING:

For your safety, DO NOT store or use flammable or explosive materials in the vicinity of this equipment.

INTRODUCTION

EQUIPMENT DESCRIPTION:

For Models CD-100 Including A, H and
CD-200 Central Series
CD-300 equipped with Compu-
CD-400 Dry Controls.
CD-600
CD-800
CD-1000
CD-1600
CD-2400

Conair Franklin "Closed Loop" Dehumidifying Dryers provide hot, low dewpoint air, to hygroscopic plastic material, loaded into a drying hopper, for fast moisture removal.

Drying air is passed through cartridges containing a molecular sieve desiccant where moisture is deposited. The dry air is then heated to a pre-set temperature so that air entering the drying hopper is always hot and "thirsty". Moisture picked up from the plastic material passes through a return hose from the drying hopper and once again passes through the molecular sieve desiccant.

As the desiccant cartridges which are in the process cycle, or on-stream, approach saturation, they are moved out of the process drying air mode and into the regeneration mode. Depending on the dryer model, at least one cartridge is always on-stream, removing moisture from the process air, while one cartridge is regenerating. Regeneration air flow is completely isolated from process air flow and is accomplished by passing filtered room air, heated to 425 degrees F. through the desiccant and purging it of moisture.

The maximum efficiency of automatic drying is fully achieved only when the hopper is automatically loaded and kept full. A CONAIR vacuum hopper loader is recommended.

HOW IT WORKS: (See Figure 1)

Process Circuit

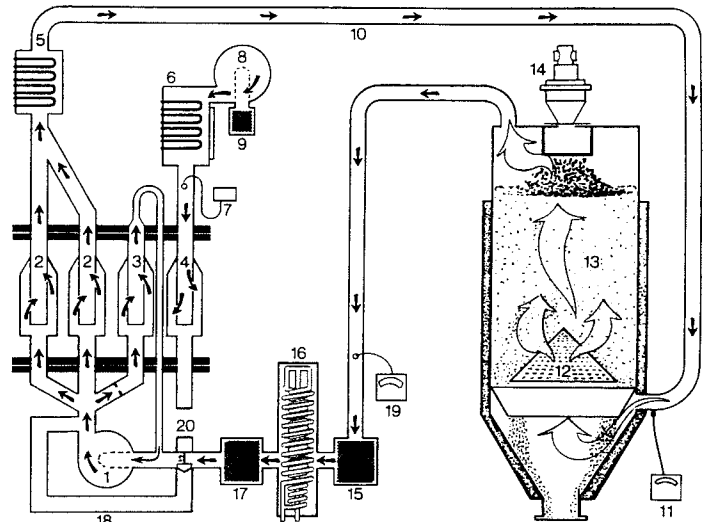
Return air is pulled through the process filter (17) by the process blower (1) and delivered into the on-stream desiccant cartridges (2), where it is thoroughly dehumidified. Then it passes into the process heater (5), where the air is heated to the

temperature selected by the operator. The process Temperature Sensor (11) located at the hopper inlet assures heating to the proper temperature.

The flexible process hose (10) conducts the air into the drying hopper where it is distributed evenly through the pellets (13), heats them, and removes their moisture content. The moisture bearing air is then drawn into the return flexible hose, and the entire cycle is repeated. The spreader cone (12) insures even material flow through the hopper. The automatic vacuum loader (14) maintains a full drying hopper.

AIR FLOW PATTERN

Figure 1



Regeneration Circuit: (See Figure 1)

A gear motor rotates the desiccant carousel so that moisture-bearing cartridges (2) move off-stream and into the regeneration mode (4). Independent of the process air circuit, the regeneration blower (8), draws air through a filter (9), over the heater elements (6) and heats it to 425 degrees F. The heated air flows through the "wet" cartridge (4) and purges it of moisture. The moist air is blown out the exhaust. (For summer operation, or operation in air conditioned rooms, the moist air may be exhausted outdoors; however, care should be taken that the vent is properly sized and does not restrict air flow.)

Cooling Circuit: (See Figure 1)

Immediately following regeneration, the fresh cartridge must be cooled before being placed back on-stream. To accomplish this, a fraction of process air is bled through the cartridge (3). This allows the fresh cartridge to be properly cooled to the process temperature range.

High Heat Models: (See Figure 1)

With the increased KW capability of high heat models, return air temperatures can exceed the 125 to 130 degrees Fahrenheit safe range. If this happens, dehumidifying can be greatly hampered because the desiccant cannot effectively remove moisture from high temperature air. To avoid this, an aftercooler (16) is installed which uses circulating water to reduce the return air temperature.

A secondary filter (15) is also provided on high heat models to trap fines returning from the material in the drying hopper, before they can coat the aftercooler coils, reducing the aftercooler's efficiency.

Power Miser Options: (See Figure 1)

In an effort to decrease the amount of energy consumed by your dehumidifying dryer when operated at less than full capacity, Conair Franklin offers Power Miser options.

Power Miser 1 is designed to eliminate unnecessary use of the regeneration heaters (6) by sensing the process air dewpoint and modifying the desiccant carousel indexing cycle (See "Time Cycle", Page 2) to allow the on-stream cartridge(s) (2) to be fully depleted of their moisture absorbing capabilities before rotating into regeneration. During this period, the regeneration heaters (6) are turned off, along with the regeneration blower (8) which saves energy.

Power Miser Two is designed to reduce use of the process heaters (5) by sensing the return air

temperature (19) to determine if the material throughput is below the capacity of the dryer. (If it is, the volume of air passing through the drying hopper is reduced with a modulating valve (20), which is controlled by the Compu-Dry Microprocessor, until the volume of drying air matches the requirements for the throughput of material in the hopper.) This lowered air volume requires less heat; and as a result, minimizes process heater use and saves energy.

THE DESICCANT ASSEMBLY: (See Figure 2)

The heart of your Conair Franklin Dehumidifying Dryer is the patented, indexing, multiple desiccant cartridge assembly.

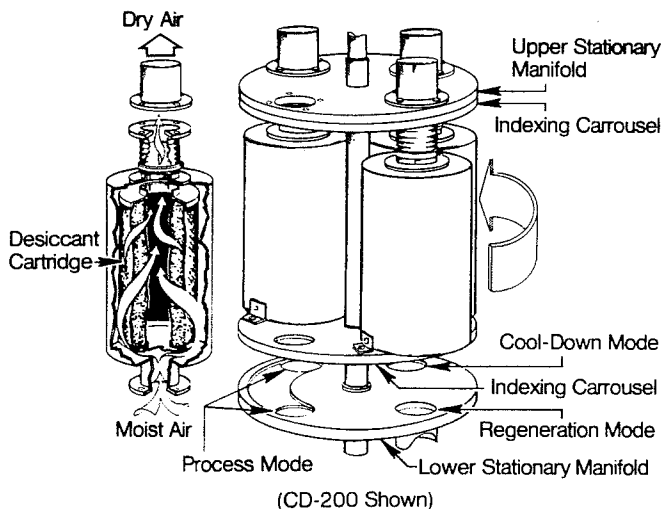
The "hollow core" desiccant cartridge design efficiently exposes the molecular sieve desiccant to the moist air returning from the drying hopper. While cartridges are in the process air stream, water molecules in the return air are trapped in the desiccant, while low dewpoint air leaves the cartridges and enters the dryer's air heater compartment.

Before an "on-stream" desiccant cartridge can become completely saturated with moisture, it indexes "off-stream" to a high-temperature regeneration position over a separate air port in the bed plates. The core-type design and compact size of the cartridge enables it to regenerate quickly, using less energy. (Residual regeneration heat is retrieved and added to process drying heat, to further lower power consumption.)

The dryers have been designed with a timed index cycle capable of handling the worst conditions.

DESICCANT CAROUSEL

Figure 2



Time Cycle for Indexing

Dryer	Time between indexes (minutes)*
CD100	30
CD200-CD2400	15

Note: The CD2400 has two carousels. As soon as the first carousel stops indexing, the second one will index.

*With Power Miser One option not active.

DRYING HOPPER

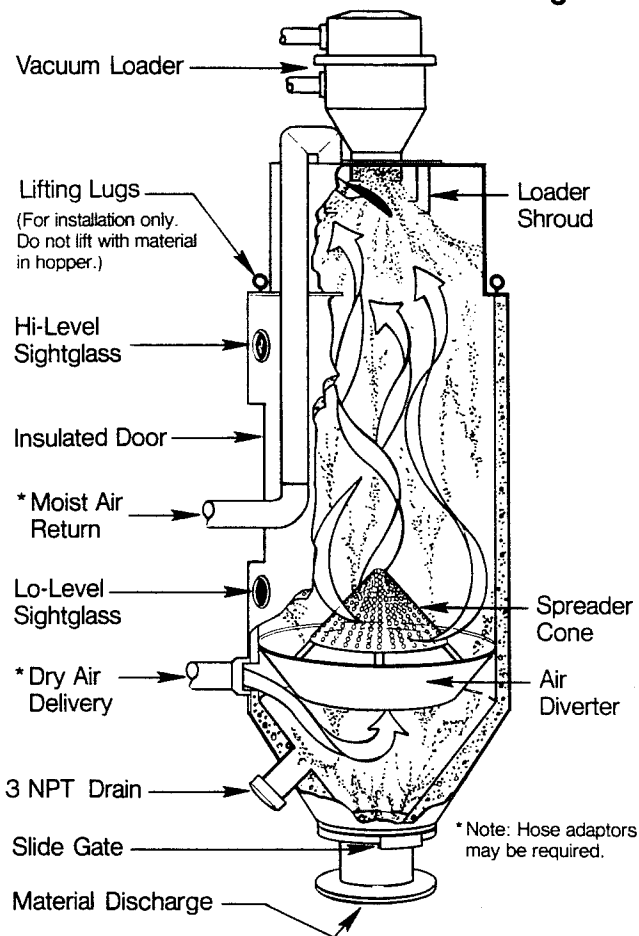


Figure 3

MECHANICAL INSTALLATION:

Drying Hopper: (See Figure 3)

To install the drying hopper, the bottom flange of the slide gate assembly must be drilled in order to properly fit the bolting pattern on the throat of the process machine. If there are physical interferences with the slide gate assembly or you are installing a smaller "Challenger" Hopper with an aluminum slide gate, an adapter plate must be fitted to the throat of the process machine first.

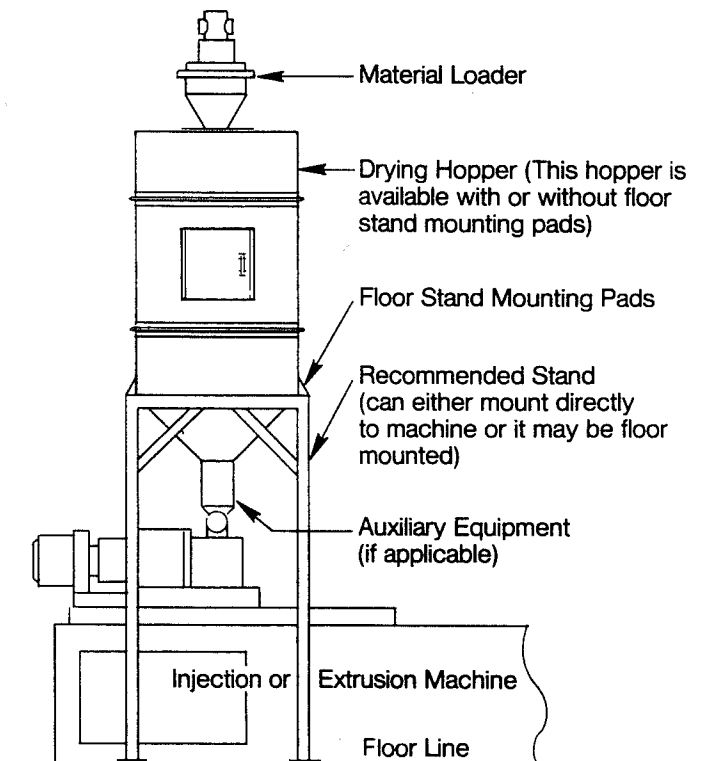
Before installing the hopper, carefully check inside for parts which have been placed there for shipping. Certain hoppers are supplied with removable spreader cones and air diverters which must be installed as shown in Figure 3. Some hoppers require the installation of the return air down tube which mounts to the opening at the top of the hopper and clamps to the hopper body.

Inspect and clean the hopper thoroughly to remove any dirt which may have accumulated during shipping. Also clean the drying hopper internal surfaces with solvent to remove rust preventative coating.

Bolt the adapter plate (if necessary) to the throat of the molding machine. Bolt the hopper slide gate assembly to the adapter plate. It is left to the discretion of the customer if it is easier to remove the slide gate and mount it to the throat of the molding machine first and then mount the drying hopper to the top of the slide gate, or to mount the entire slide gate/drying hopper assembly to the machine without disassembly. As mentioned before, an automatic hopper loader is recommended for the top of the drying hopper to provide a constant supply of fresh material for dehumidifying. If such a loader is used, be sure to properly install the loader shroud in the top of the drying hopper. This shroud rests in the hole

DRYING HOPPER INSTALLATION WITH FLOOR STAND

Figure 4



at the top of the hopper and acts as a cylindrical diverter for the material as it is discharged from the loader to prevent ambient moisture from entering the drying hopper through the loader.

Install the vacuum loader to the top of the drying hopper, using the clamping lugs provided. It is not necessary, nor recommended, to drill holes in the top of the hopper.

Because of the many different processing machines and combinations of auxiliary equipment used in conjunction with drying hoppers, it is impossible to totally engineer each and every

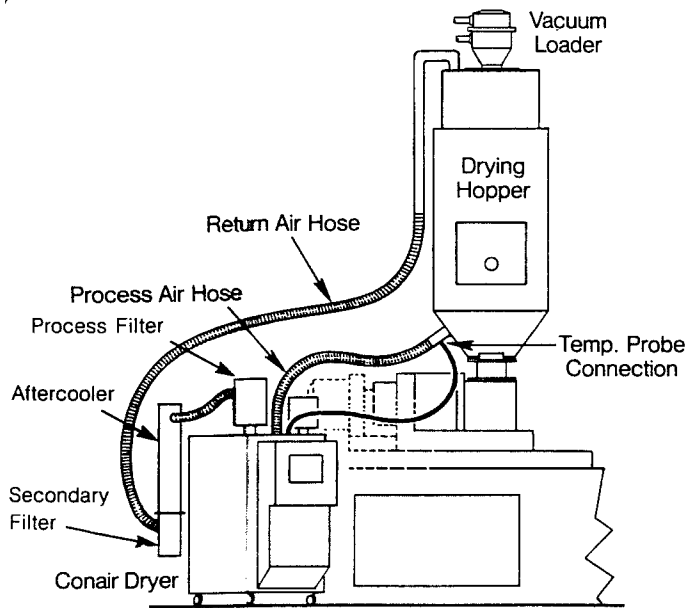
arrangement. For this reason, we can only recommend the arrangement shown in Figure 4, which we feel is best from a safety standpoint. Notice the various components which may be used in a typical installation. If there is no auxiliary equipment between the drying hopper and the machine, it may not be necessary to use the stand, (which places the load of the drying hopper on the machine (or floor) rather than on the auxiliary equipment). The customer is responsible for insuring that the size and strength of the fasteners used to install the hopper are capable of supporting it.

The dryer should be located as close to the hopper as possible (no more than 10 feet away) to reduce heat loss. The front of the control panel and the filters should be easily accessible.

NOTE: BUYER IS RESPONSIBLE FOR STRUCTURAL INTEGRITY OF THE FINAL INSTALLATION.

TYPICAL DRYER INSTALLATION

Figure 5



Standard Dryers:

Clamp the flexible process air hose to the dry air outlet of the dryer. Clamp the other end of the hose to the dry air delivery inlet at the bottom of the drying hopper. Install the flexible return air hose between the moist air return outlet on the hopper and the return air inlet on the dryer.

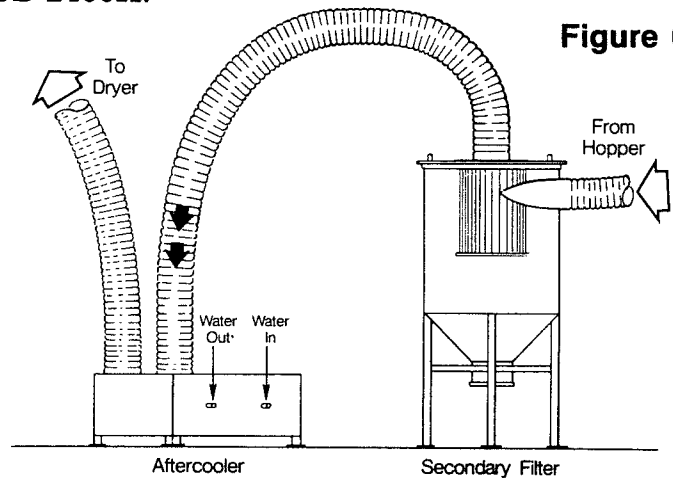
Do not allow either of the flexible hoses to crimp or kink. If the hoses are too long, cut them to fit. Also, it is advisable to support long sections of

hose wherever possible, by tying them to overhead structural members.

High Heat Dryers: (See Figure 5)

High-heat dryers are equipped with increased kw capabilities to handle drying temperatures ranging from 150 to 350 degrees F. As a result of the higher temperatures, an aftercooler is required to lower the return air temperature to a safe range before it enters the dryer. To prevent contamination of the aftercooler by fines drawn in from the drying hopper, a secondary filter is also employed at the inlet to the aftercooler. These two items must be installed on the dryer with hardware supplied for this purpose. See Figure 11 for correct placement of high heat components for models CD-100H through CD-800H. Figure 6 shows the floor mounted aftercooler and secondary filter for models CD-1000H through CD-2400H.

Figure 6



An insulated process delivery hose is also supplied for these models. It should be installed from the Dry Air Delivery port of the dryer to the inlet of the drying hopper. This insulated hose reduces the amount of heat lost to the surrounding atmosphere. The return hose from the drying hopper on high heat dryers must be clamped to the inlet of the secondary filter. On models CD-100 through CD-400, the secondary filter clamps directly to the aftercooler, but on models CD-600 through CD-2400 a hose must be connected between the secondary filter and the aftercooler. The aftercooler in turn must be hosed to the process filter inlet of the dryer.

The aftercooler should be supplied with tap or tower water in the range of 55 to 70 degrees F. through the pipe couplings provided. Flow rates will be approximately one to three GPM for dryer models CD-100 through CD-600 and two to five

GPM for CD-800 through CD-2400. Water pressure should not exceed 60 PSI. Flexible water hoses are recommended with a length that permits easy removal of the aftercooler coils for cleaning.

Process Temperature Probe—All Models: (See Figure 5)

Install the process drying air temperature probe (shipped inside the control cabinet) into the fitting on the inlet of the drying hopper. If your hopper is equipped with hose adaptors, insert the temperature probe in the coupling provided in the air inlet adaptor. This permits accurate temperature sensing. The coupling provided in the hopper should be plugged to prevent loss of air. Plug the other end of the probe into the jack located on top of the control panel.

NOTE: Care should be taken while handling the temperature probe. If dropped, severe damage may occur to it.

ELECTRICAL INSTALLATION:

MAKE SURE TO CONNECT YOUR DRYER TO THE CORRECT VOLTAGE. Verify voltage by checking the name plate on the side of the control box. All units are pre-wired at the factory for service on one voltage only:

**DO NOT ATTEMPT
TO ALTER VOLTAGE CONNECTIONS!**

The appropriate wiring diagrams for your model of dryer are included with this manual. They provide complete wiring details and an electrical parts list. In the event of loss, the electrical print numbers for your dryer are listed inside the control cabinet door. Additional copies may be ordered for a nominal cost through the Conair Service Department.

A 3-phase disconnect switch is provided in the control for hook-up to your electrical supply. Be sure that the cable used for hook-up is of a sufficient rating, is grounded and is equipped with a sufficient shielding for physical protection. Strain relief bushings must be used at the cable entry point of the control cabinet.

Follow all appropriate local, state, national and industrial electrical codes.

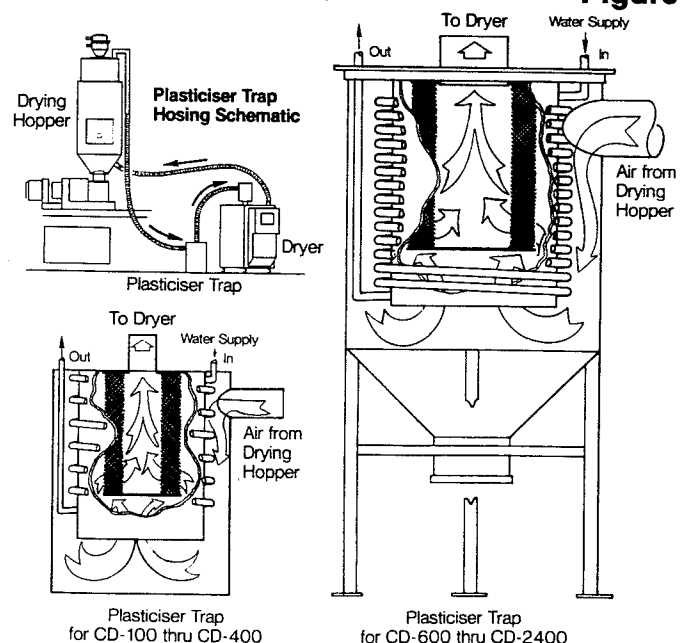
Plasticizer Trap Installation: (See Figure 7) A problem encountered occasionally in drying plastic material is the giving off of volatiles, by the material, at the selected drying temperature. This condition exists commonly when processing cellulose. (To minimize this problem, do not "overdry" the material. Extended residence time at elevated temperatures should be avoided.) The largest problem created by this condition is the acute and rapid clogging of the process filter on standard dryers, and the secondary filter of high-heat models.

To avoid this problem, Conair Franklin offers Plasticizer Traps to provide a location where these volatiles can be collected. The traps are equipped with cooling coils, which require water in the 55 to 70 degrees F. range. The return air from the hopper, which carries the volatiles, contacts the plasticizer coils causing condensation of the volatiles on the cool surface. The trap is equipped with a cartridge filter within the piping support shroud that provides additional filtering. Cleanout of the trap is accomplished by removing the cooling coil and filter through the lid assembly. On larger models, condensed volatiles can be removed through the bottom dump cap.

When installing a plasticizer trap, be sure to allow ample clearance on all sides for cleanout. Supply water should be connected using hose (to permit servicing) and supplied at a rate of 1 to 3 gpm. See Figure 7 for proper piping between the dryer and hopper.

PLASTICISER TRAPS

Figure 7



START-UP:

Your dehumidifying dryer is a 3-phase electrical device that must be checked for proper rotation of the blowers before being put into regular service. Confirm that: (1) 3-phase electrical power has been applied to the isolating disconnect switch within the control enclosure; (2) that the voltage is correct; (3) the amperage rating of the circuit is sufficient and (4) the cable is properly equipped with strain relief bushings to prevent cable abrasion or mechanical disconnection due to strain.

To check for proper rotation of the blowers:

1. Turn the on/off rocker switch of the Compu-dry to the "on" position. The switch itself should light to indicate power to the control.
2. Remove the "to process" hose from the top of the dryer in order to check air flow direction.
3. Press the dryer's "RUN" key to start all regular dryer functions, then press "stop" to stop the dryer.
4. On Conair Models CD100 through CD400 check the flow of air at the "to process" air outlet. Air flow should be *positive*, or blowing air *out*. Note: If the dryer has been used recently and is hot, or if the "to process" outlet is difficult to reach, use the "from process" hose connection at the inlet to the process air filter and verify that air flow is *negative* or pulling air *into* the filter housing. For CD800 through CD2400, use a mechanics mirror to monitor rotation of the blower.

If blower rotation is incorrect, disconnect power at the *dryer cable source*, then switch any two of the 3-phase leads at the disconnect switch. *Do not attempt to alter the direction of individual motors*. All motors are properly phased together at the factory.

NOTE: If the dryer is moved frequently, an optional "Improper Blower Direction Alert" may be installed to inform the operator of improper air flow, resulting from out-of-phase wiring.

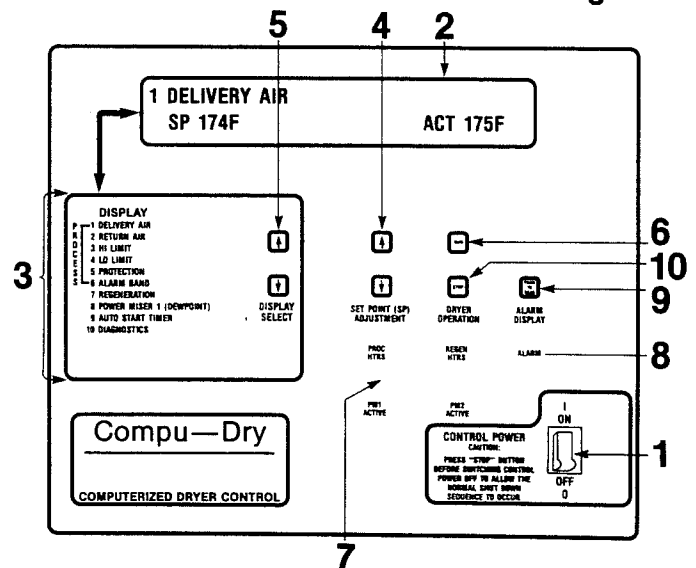
5. Check for proper rotation of the desiccant carousel. Rotation of the carousel should be *counterclockwise* when viewed from the top (EXCEPT for the CD-100, which indexes in a *clockwise* direction). Note: Direction of desiccant tank assembly rotation is *independent* of

3-phase power connection. If desiccant tank assembly is indexing in the wrong direction, contact the Conair Franklin Service Department.

To test carousel indexing: With dryer power switch "off", press in and hold the desiccant carousel limit switch, located on the perimeter of the carousel bed plates, while turning on the power switch and pressing the "run" key. Then release the limit switch. The display should indicate the dryer is in the indexing mode. On all models except the CD-2400, the carousel may not index immediately because of automatic cool down of the heater boxes. Within 30 seconds, the carousel should index. The limit switch follower should come to rest in the bed plate valley, once rotation is complete.

COMPU-DRY CONTROL

Figure 8



CONTROL:

Function Set-up: (See Figure 8)

By switching the "on/off" switch (Item #1) to the "on" position, the Display (Item #2) will be energized. The display has been designed to give the operator an indication as to what function is being monitored at any given time, as well as the setpoint and actual temperature of those functions. The two-line display shows the function number and description of the function on the first line and the setpoint (SP) temperature and actual (ACT) temperature on the second. The word "function" refers to the parameter list (Item #3). The first seven functions relate to the actual plastic material drying or "process" circuit of the dryer. The remaining parameters relate to other

functions of the dryer which can be monitored on the display. With the display function #1 (Process Delivery Air), we may increase or decrease the setpoint by using the up and down keys labeled "Setting Adjustments" (Item #4). As you press the up or down key, you will see the setpoint on the display change or "scroll" accordingly. There are two scrolling speeds designed into the control. When first pressed, the slower scrolling rate is evoked. After five seconds, the faster rate is evoked. When you have properly adjusted function #1 (Process Delivery Air) to the desired processing temperature, move on to the next function for proper adjustment. This is done by utilizing the up and down keys labeled "Function Select" (Item #5). By pressing the down key, the display will change from function #1 to function #2 (Return Air). If this function has not been installed in the dryer, the display will indicate so. In this case, move on to the next function by pressing the down key labeled "Function Select".

Continue to step through each function and key in the appropriate setpoint for each one of these functions as it pertains to your application. Once all functions have been adjusted properly, the dryer may be started by pressing the key labeled "RUN" (Item #6). If any malfunctions occur, an alarm light (Item #8) will be energized, alerting the operator. By pressing the Alarm Display key (Item #9), the nature of the malfunction will be described on the display and the audible alarm, if equipped, will be silenced.

Initially when an alarm occurs, the alarm light will flash on and off alerting the operator. After the operator has pressed the Alarm Display key, the alarm light will stop flashing but will remain lit until the alarm has been cleared. If it is inconvenient to correct the nature of the alarm and the dryer is permitted to run, it is conceivable that a more serious alarm could occur subsequent to the first alarm. In order to alert the operator of any additional alarms, the alarm light will start to flash again and the audible alarm (if supplied) will be sounded, alerting the operator that some other malfunction has occurred.

While the dryer is running, there are indicating lights (Item #7) which advise the operator what heater banks may currently be energized or which optional functions may be energized. Note that the indicating lights for the heater banks or optional functions are not visible unless energized.

In order to shut the dryer down, the stop key (Item #10) should be used rather than the on/off switch (Item #1).

The stop key starts a programmed shutdown mode which de-energizes both process and regeneration heaters for a short period, prior to de-energizing the blowers. Once the dryer has shut down (blowers stopped), the on/off switch (Item #1) may be turned to the off position.

Display Functions:

The following is a list of all display functions, along with a brief description of each. For those functions which relate to options which are not installed, the Display will read "Option Not Installed".

1. Process Delivery Air Temperature — Should be set for the material being processed (eg: for ABS, SP = 180°F). This temperature is monitored and controlled at the inlet to the drying hopper.
2. Process Return Air Temperature — This function is used as a temperature monitor and the display will indicate the actual return air temperature on the first line of the display.

2 Return Air Temp 120°F
PM2 SP 125°F Act 126°F

Figure 9

In addition to this basic function, the display may also contain the set point and actual temperatures for the PM2 option. The setting should be 125°F for standard dryers and 150°F for high-temperature dryers. This additional information is displayed on the second line as illustrated in Figure 9.

*3. Process Hi-Limit — This parameter safeguards against unauthorized personnel raising the process delivery temperature above an acceptable level for a given material. The process temperature setting cannot exceed the hi-limit setting; therefore, it is impossible to accidentally raise the process temperature above the hi-limit. This setting may be any temperature greater than or equal to the process delivery air temperature. A safe setting would normally be ten degrees above the process temperature setting.

*4. Process Low Limit — This is similar to the Hi-Limit. The setting may be any temperature less than or equal to the process delivery air temperature. A safe setting would normally be ten degrees below the process temperature setting.

*5. Process Protection — (Optional) This parameter provides an adjustable hi-limit safety setpoint for the process circuit of the dryer, by utilizing an independent temperature probe located at the outlet of the process heater box. Because of the difference in location between the standard “To Process” probe at the hopper and the Process Protection probe, a difference in temperatures between these two probes is common and must be anticipated before setting the process protection setpoint. (At the time of shipment, the SP temperature is set to maximum). First, operate the dryer normally to allow the ACT temperature at the process protection probe to stabilize and register the temperature at that location. Then set the process protection setpoint (SP) to 10 degrees above the actual (ACT). This provides a 10 degree safety margin to protect the process temperature from climbing out of control and possibly melting material in the drying hopper. The most common reason for such a malfunction is the improper installation of the “To-Process” probe in the air inlet of the drying hopper. In such a circumstance, the dryer’s heaters react to an erroneous temperature reading (usually ambient temperature) and continue to provide heat to the material in an attempt to reach setpoint.

*This parameter requires an access code in order to change the setpoint. With the access code set at “54”, it is possible to raise or lower the setpoint.

The dryer must be stopped to enter the access code. Press the “down” arrow key (DISPLAY SELECT) until “ACCESS CODE” appears on the display (Function 10). Press the “up” arrow key SETPOINT ADJUSTMENT) until “54” appears on the display. With the access code set, go back and change the setpoint of the desired parameter. Once the dryer has been started, the access code will reset, locking out setpoint adjustments.

6. Process Alarm Band — This parameter is adjustable from 5 °F to 20 °F above and below the Process Delivery Setpoint. Should the actual process temperature fall outside this band width, an alarm condition will be evoked. See Troubleshooting section for more detail.

7. Regeneration — This function indicates the actual regeneration temperature. If this temperature falls below the setpoint, an alarm condition will alert the operator. (See Troubleshooting Section).

The regeneration temperature refers to the temperature of an independent flow of air which is used to purge moisture from the desiccant after it becomes laden with moisture removed from the plastic in the drying hopper. This function occurs simultaneously with the “process” functions, but on tanks indexed out of the process circuit. (See Figure #1).

8. Power Miser 1 — (There are 2 variations of PM1; PM1 and Deluxe PM1) Power Miser 1 has a fixed set point of -3 °F. Power Miser 1 Deluxe has setpoint adjustment capabilities. Adjust the setpoint to the desired dewpoint for processing. If this option has been factory installed, it has been pre-adjusted to -3 °F. This is an acceptable setpoint for most materials, but you may readjust the setpoint should your application require a different setpoint (adjustable from -50 °F to 0 °F).

9. Auto Start Timer — This option permits automatic start-up at a predetermined time. It is adjustable from 0 to 100 hours. If you wish to start-up in 24 hours, set the timer at 24 and the dryer will automatically start at that time.

CAUTION: Make sure your temperature parameters are properly set for the material to be dried upon start-up, before using this feature. Failure to do so could result in severe damage to your material.

Once the time setting has been set, press the “RUN” key to start the timing cycle. The display will count down to 0 and the dryer will start. The timer must be reset each time you wish to use this feature. On power interruptions the microprocessor retains where the time left off, and will resume the countdown once power is available. (For Central Dryers, this is function #5).

10. Diagnostics — This function is reserved for entering access codes and setup codes for various functions. These codes are referred to throughout the manual as required.

Once you have checked all setpoints and are satisfied, you may start the dryer by pressing the “RUN” Key.

A “cold” dryer may take up to 45 minutes to reach full operating capacity. If the unit has not been used in some time, allow sufficient time for warm-up.

Also, if the dryer has just been installed or has not been operated for a long period of time, the desiccant tanks may have reached moisture equilibrium with the surrounding air, in which case it is conceivable that you could actually add moisture to the resin which is being dried. To properly dry out the desiccant tanks under these conditions the use of the purge cycle may be required. In order to activate the “Purge Cycle”, the dryer must not be running. Move to one window past the “Diagnostics”.

PURGE CYCLE OFF

Use “Setpoint Adjustment” UP key to turn the Purge Cycle “ON”.

PURGE CYCLE ON

Then press “RUN” to activate the cycle. During this cycle, the dryer will function as follows:

1. Other functions can be observed by pressing the function UP and DOWN arrow keys. The display will automatically default back to the “Purge Cycle” window, one minute after the use of the Function Select keys.
2. The process heaters will remain de-energized while the dryer is being purged of moisture. The Regeneration heaters will be energized and maintain 425 degrees F. throughout the Purge Cycle.
3. The “Purge Cycle” continues for 90 minutes, then it will change to:

PURGE CYCLE COMPLETE

The dryer will continue to operate in this mode until the “RUN” button is pressed. The process heaters will energize if necessary and maintain temperature. At this point, the Purge Cycle is automatically turned “OFF”.

The “Purge Cycle” will be shortened if the dryer is equipped with Power Miser 1 Deluxe option and the dewpoint becomes less than the setpoint.

DISPLAY INTENSITY (VACUUM FLUORESCENT ONLY):

Dryers that are equipped with vacuum fluorescent displays are capable of having the intensity increased or decreased. The unit is shipped with a display intensity which should suit most customer applications. However if you find it necessary to change the intensity, perform the following procedure:

While the dryer is stopped, press the Display Select “DOWN” arrow to “Diagnostics”. By entering one of the following access codes, the intensity of the display will change accordingly:

Access Code	Display Intensity
20	100%
21	75%
22	50% (Default Value)
23	25%

After you have entered your selected intensity level, press the "Stop" key. At that point you should observe the display intensity increase or decrease, depending on your selection. The dryer will maintain the new intensity level until it is altered again by following the same procedure.

Keep in mind that the life of the vacuum fluorescent display is directly proportional to the intensity which it is operated at. By increasing the intensity of the display, the life of the unit will be somewhat decreased. This, however, should still fall within a satisfactory life span of such a component.

P. C. BOARD TROUBLESHOOTING:

The Microprocessor has been designed with a modular concept. (Individual printed circuit boards for various functions) The following list describes each printed circuit board and what function it serves.

1. CPU Board:

There are three LED's on the board which serve as troubleshooting aids.

Status Light: (normally flashing)

This LED will flash if the microprocessor is working properly. If the LED is not flashing, there is a malfunction with the board or there is an inadequate supply of power.

Halt/Run Light: (Normally on)

This LED will be off if the 12 volt power supply falls below an acceptable level. The microprocessor is automatically reset, which will shut the dryer off.

Reset Light: (normally off)

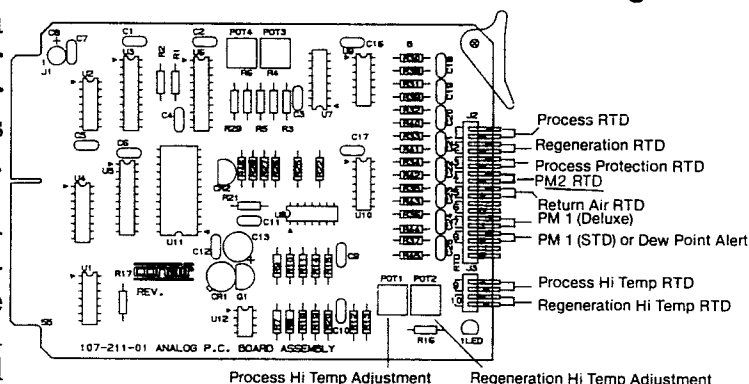
If the microprocessor detects an internal error, this LED will be energized and the dryer will shut down. This LED flashes on when the Compu-Dry control is first turned on or off.

Chart for Processor Board:

Part Number	LED1	LED2	LED3
107-119-02	Reset	Status	Run
107-206-01	Status	Halt	Reset
107-262	Reset	Status	Run

ANALOG BOARD

Figure 10



2. Analog Board:

The analog board contains 10 channels which are used for taking an input signal from either RTD temperature sensors or pressure transducers and then translating it to a signal which the CPU is capable of manipulating. Two special channels on the board are used to monitor the temperature in the heater boxes. Inputs to these channels are identified on the analog board as terminals 1&2, 3&4 (J3). In conjunction with the inputs, there are two potentiometers (1 POT, 2 POT) which have been factory adjusted and sealed. These pots set the temperature hi-limit in the respective heater boxes. Should the temperature in the heater box exceed this hi-limit, the dryer will automatically shut down and the display will indicate the nature of the malfunction.

The pots should not be re-adjusted except by a qualified Conair Franklin serviceman.

1LED on the board will be de-energized should an overtemp condition occur. In order to determine which heater box has overheated, first place a jumper between terminals 1&2 (J3). If 1LED is energized, the problem has occurred in the process heater box. If 1LED does not light, place the jumper between terminals 3&4 (J3). If 1LED is energized, the problem had occurred in the regeneration heater box. Do not leave the jumper on the terminals. This would override the hi-limit shutdown. Severe damage could occur as a result.

See Figure 10 for the proper input channel for each temperature (or other input signals) being monitored or controlled.

The I/O board(s) of your Compu-Dry is the interface between the microprocessor and external devices. Signals are channeled to and from limit switches, push buttons, overloads, motors, heaters and various other devices through this board.

Your Compu-Dry control may be equipped with up to two kinds of I/O boards; Standard and General Purpose (GP).

3. Standard I/O Board:

The Standard I/O board is equipped with a bank of LED's which illuminate in coordination with all input/output channels.

1 LED—"Watch Dog Timer": (normally off)

This LED will be energized if a malfunction is detected in the microprocessor hardware. When it is illuminated, all outputs are de-energized.

2 LED through 10 LED:

See the wiring diagram supplied with your dryer for the specific functions associated with each LED.

11 LED—Power Supply: (normally on)

This LED indicates the 12 volt power supply to this board is satisfactory.

In addition to the "Standard" I/O Board, the "General Purpose" I/O is supplied on CD-1000 through CD-2400 Dryers, or any model equipped with certain options. This GP I/O (like the Standard I/O) is equipped with LED's that illuminate in coordination with the I/O channels.

1 LED through 18 LED:

See the wiring diagram supplied with your dryer for the specific functions associated with each LED.

19 LED: (normally on)

This LED indicates the 12 volt power supply to the GP I/O is satisfactory.

PREVENTATIVE MAINTENANCE:

Filter Cleaning:

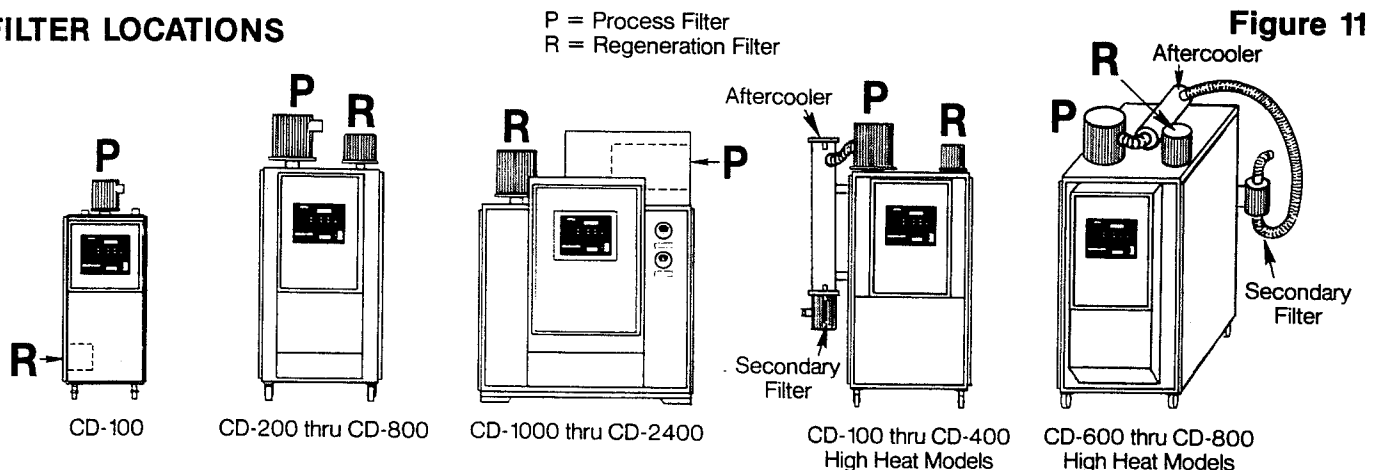
Both the process filter and the regeneration filter serve to protect the desiccant from contamination by dirt, dust and fines. If contamination occurs, drying efficiency will be severely diminished. Therefore, it is important that the filters be cleaned at regular intervals. Length of time between cleanings will depend on the type of resin being processed and the working environment, but typical intervals range from three to fourteen days.

When the plastic material being processed contains a large proportion of dust and fines, an optional auxiliary filter is recommended.

VERY IMPORTANT:

The process air filter assures that only clean air flows through the drying circuit. Fines carried in the return air stream may eventually clog the filter, which can decrease efficiency. Check filter frequently and clean as necessary.

FILTER LOCATIONS



Process Filters: (See Figure 11)

First, shut down dryer. This must be done so that dirt and humidity are not drawn into the drying circuit. Then, remove the filter from its housing and clean the cartridge filter. Use a vacuum cleaner on the outside of the cartridge to remove dirt and fines. If you are using compressed air to *blow* out dirt and fines, always blow from the inside - out. When replacing the filter, *make sure it is properly seated*.

During cleaning, check carefully for holes or tears in filter paper. If defects are found, replace old filter(s) with new one(s) before placing dryer back into operation. New filter cartridges may be ordered from Conair Franklin.

Regeneration Filters: (See Figure 11)

Regeneration filters should be cleaned in a similar manner as the process filters.

NOTE: Contamination is the principal cause of desiccant failure; if a desiccant cartridge should become contaminated, drying efficiency will be severely reduced.

WARNING:

Contamination, if it is permitted to collect in heater boxes, presents a possible fire hazard. This contamination can collect if the filters are not properly seated, or if the dryer is not shut down during cleaning.

Secondary Filters—High Heat Dryers: (See Figure 11)

Shut down the dryer and remove the secondary filter from its housing. The filter is a cloth bag type designed to prevent material dust from clogging the Aftercooler coils and process filter. Clean the filter thoroughly with a vacuum cleaner or compressed air. Replace the filter if it shows signs of extreme wear, holes, separating or an inability to pass air any longer. Reinstall the filter in its housing and clamp securely.

Aftercooler Cleaning—High Heat Dryers: (See Figure 11)

The coils of the Aftercooler circulate water that causes a reduction in temperature of the drying circuit's return air. Dust carried over from the hopper accumulates on the copper coils of the Aftercooler and as a result, reduces the After-

cooler's ability to lower the return air temperature. The coils must be cleaned periodically to remove the accumulated dirt.

Shut down the dryer and allow the Aftercooler's water to bring down the temperature of the Aftercooler chamber to a safe level. Then, expose the coils by releasing the clamps and *removing* the coils on Models CD-100 through CD-800, or by removing the lid on the CD-1000 through CD-2400 models. Clean the coils and housing thoroughly by steam cleaning or by applying an industrial solvent. This will provide optimum heat transfer. Be sure to thoroughly vacuum or blow all particles of dirt from the Aftercooler chamber before replacing the coils and/or securing the Aftercooler cover.

This procedure should be carried out on a regular basis to provide optimum performance of the Aftercooler, but the need for continuous cleaning may indicate the need for a plasticizer trap preceding the secondary filter/Aftercooler combination. (Consult Conair Franklin).

Plasticizer Trap Cleaning: (See Figure 7—from "Installation" Section)

The Plasticizer trap provides a specific condensation point for volatiles given off during drying and returning to the dryer in the return air stream. The trap provides a collection chamber for these volatiles. Three areas of the trap require maintenance:

- a. The Collection Chamber — The accumulated volatiles collect in this chamber which must be emptied periodically and cleaned. Your trap may be one of two types which provide access to the collection chamber by releasing the lid clamp, removing the coil assembly and allowing the trap "barrel" to be emptied and cleaned (CD-100 through CD-400); or, removing the access cover at the base of the trap to permit draining of the volatiles from the collection chamber (CD-600 through CD-2400).
- b. The Trap Coils — These coils within the plasticizer provide a suitable temperature with cool water for the volatiles to condense out. The coils should be cleaned periodically to provide optimum heat transfer for the collection of the volatiles. Release the lid clamps

of the trap, pull out the coils and clean them with steam cleaning or by applying an industrial solvent. It is advisable to clean the collection chamber at this time ("a" above), as well as the trap's cartridge filter ("c" below).

- c. The Trap Cartridge Filter — As a final guard against the passing of volatiles back into the dryer's process air circuit, a cartridge filter is included in the trap in a metal shroud within the trap's coils. Remove the four thumb screws on top. Pull out the filter and clean thoroughly with a vacuum or compressed air as described in "process filter maintenance" above. Replace the filter if it is torn or clogged. Be sure to reinstall it carefully.

Lubrication:

All motors are lubricated for life and require no lubrication.

Important: Sealing surfaces between desiccant carousel plates should *never* be lubricated. If, for some reason, it becomes necessary to disassemble the dryer, care should be taken during reassembly to insure that all sealing surfaces are clean and free of dirt and grease.

Other Maintenance Areas:

In addition to filter and auxiliary component cleaning, these other areas should be checked periodically.

1. Hoses: Both inside the dryer and out. Check to be sure they are not cracked, torn or have holes that could allow ambient air to leak in or dry air to leak out. Be sure all hoses are fitted correctly to the dryer and hopper. Be sure all adaptors (if required) are in place and are clamped tightly.
2. Gaskets: During any routine service, gaskets throughout the dryer should be checked to be sure if they are intact and in place: Heater boxes, filter gaskets, hopper door, loader flange.
3. Desiccant Tank "O" Rings: Each tank is fitted with an "O" ring on the bottom to prevent air leaks. Be sure it is in place and in good condition, especially when replacing the tanks.

4. Check Heater Amperages: The wiring diagram for your dryer specifies the proper amperage for each heater bank. Verify these amperages periodically with an amprobe to check for burned out heaters.

SERVICING:

1. **Desiccant Cartridge Replacement:** (See Figure 12)

Note: Desiccant cartridges have an almost unlimited life as long as they are not contaminated by material fines or dust. Be sure your cartridges are actually contaminated before attempting replacement.

- a. Model CD-100: The three desiccant cartridges are friction fitted to a single, rotating bed plate. Turn off the dryer, unclamp the hose at the top of the cartridge, and work it out of place. Be sure to firmly reinstall the replacement cartridge with an "O" ring on its base. Re-hose tightly.
 - b. Models CD-200 through CD-2400: The desiccant cartridges for these models are fitted between two sets of rotating plates within the carousel assembly. Turn off the dryer and release at least one hose clamp at the top of the cartridge. Loosen or remove the bolts at the base of the cartridge. Lift the cartridge straight up to clear the protruding tube at the bottom, pull the bottom out and lower the cartridge away from the hose connection at the top. When reinstalling the replacement cartridge be sure to include the "O" ring on the base tube and hose securely at the top. The mounting bolts at the base of the cartridge should hold the tank firmly in place against the "O" ring seal. Be sure to tighten the bolt in the bedplate *before* tightening the bolt in the desiccant cartridge.
2. **Heating Element Replacement:** The elements are located in "heater boxes" mounted in or on the dryer housing. Check Figure 1 to be sure which heater box contains the heating elements that need to be replaced by following the air flow path. Disconnect power to the dryer and be sure to refer to the wiring diagram and parts list to assure use of the proper replacement part. Use care in unbolting the heater box covers to be sure that

the gasket seal is not damaged. The elements are bolted to an internal mounting plate beneath the access covers of the heater box. On models CD-100, CD-1600 and CD-2400, the mounting plate may be pried away from the heater box flange to expose the heaters once the access cover is removed. On models CD-200 through CD-1000, however, the mounting plate is recessed within the heater box opening. For these models, screw two of the mounting plate fastening bolts into the threaded holes of the mounting plate to break the seal between the plate and the flange. The plate can then be removed to expose the heaters.

Replace the elements carefully and be sure to reinstall all jumper wires and bars identical to original installation. Test all electrical connections for strength. Replace the heater box covers carefully and bolt firmly. Verify proper operation immediately by measuring heater amperage. See the wiring diagram for proper amperages.

3. **Electrical Contactor Replacement:** Depending on the size of your dryer, it will either be equipped with mercury displaced contactors (D100 thru D600) or electro-mechanical contactors (D800 thru CD2400). As with any mechanical device, there is a maximum life cycle to these components. Therefore, we have added software in the Compu-Dry control to advise you when the process or regeneration contactors should be replaced. When the replacement message appears on the display,

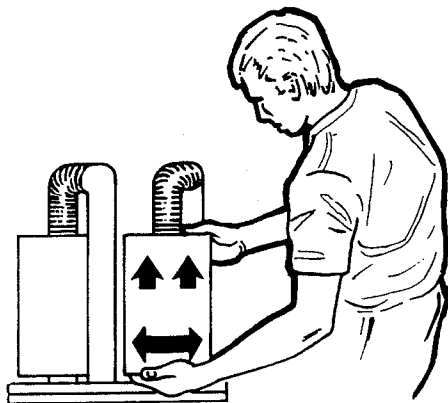
we recommend, at that point, replacing the contactor in order to safeguard against component failure; and consequently, downtime for the machine. If it is inconvenient at the time the alarm occurs to change the contactor, we have incorporated a function which will delay the alarm for a period of approximately two weeks. At that point, the alarm will be redisplayed to remind you to replace the contactor. Once the contactor has been replaced, the reset procedure listed below should be utilized to cancel the alarm message and reset the counter.

4. **Contactor Alarm Reset:** While the dryer is stopped, press the display select "DOWN" arrow to Diagnostics. Enter Access Code 54. Continue to press the display select "DOWN" key until the "Reset Process Contact Count" appears in the display. Press the setpoint "UP" arrow. The word YES should appear on the display. Press the Stop key to reset the life cycle count. If you have performed the procedure properly, the message "Contact Count Has Been Reset" will appear on the display. NOTE: This procedure should only be used when the contactor is replaced.
5. **Contactor Alarm Delay:** If it is inconvenient at the time the alarm occurs to actually change the contactors, use the following procedure to delay the alarm until you are able to make the replacement.

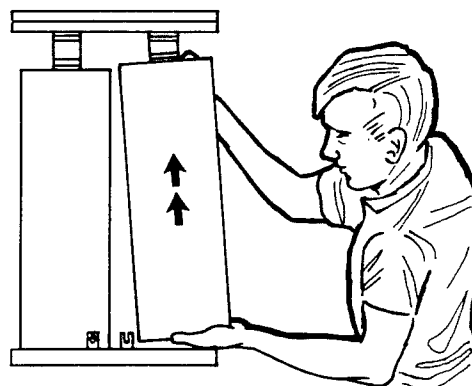
While the dryer is stopped, press the display select "DOWN" arrow to Diagnostics. Using

DESICCANT TANK REMOVAL

Figure 12



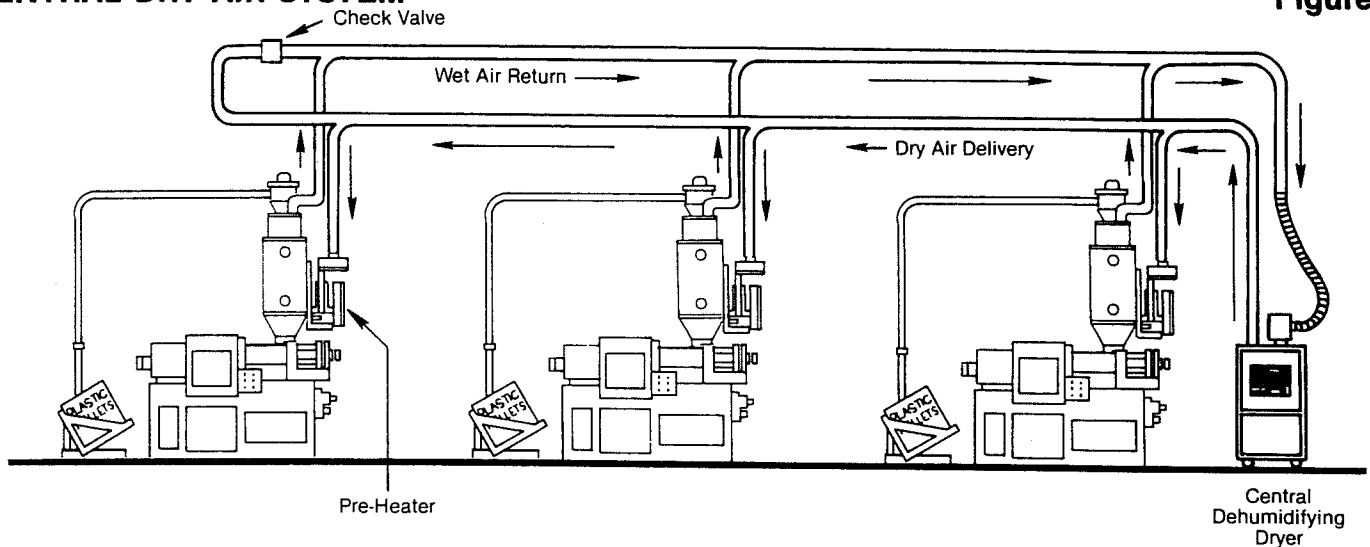
CD-100



CD-200 through CD-2400

CENTRAL DRY AIR SYSTEM

Figure 13



the setpoint "UP" arrow, enter access code of 54. Press the display select "DOWN" arrow until the message "Extend Process Count" appears on the screen. Note that if it had been a regeneration contactor that needed replaced, the word "Regeneration" would have appeared in place of "Process" in the message. Press the setpoint "UP" arrow until the word YES appears on the display. By pressing the stop key, the function will be complete and the message "Contact Count Has Been Delayed" will appear on the screen.

CENTRAL DRY AIR SYSTEM:

A Conair Franklin Central Dry Air System is an alternative arrangement for simultaneous drying and heating of materials at several processing machines. The goal of centralized drying is to offer individual pre-heat temperatures to each machine in the system, while spreading the cost of the dehumidified air supply across the number of machines serviced.

Small pre-heaters are mounted on or near each drying hopper to provide individual process temperatures to each station, so that each machine can run a different material. A central dehumidifying dryer, (without a process heater) provides low dewpoint air to each station through a common dry air delivery line. The moisture bearing air coming from each station returns to the dehumidifying dryer through a separate, wet air return line. (See Figure 13).

The equipment used in Central Dry Air Systems (Dryer and Pre-heaters) are very similar to conventional Conair Drying units and the instructions for these units can easily be adapted to supply information regarding installation, maintenance and servicing. See the earlier parts of this manual for information regarding the Central Dehumidifying Dryer and information for the pre-heaters can be found in the Conair "C-50 Dryer" instructions.

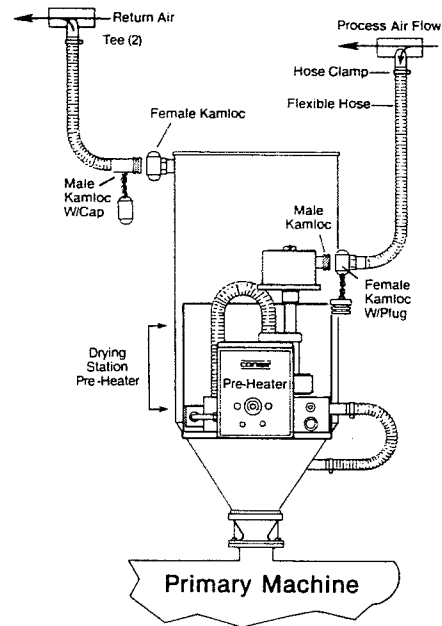
Two important considerations in Central Dry Air Systems are: (1) the need for maintaining a dehumidifying closed-loop when stations within the system are taken out of service and disconnected and (2) balancing the air flow of the system when only one or two of the stations are in operation.

Air balancing problems are resolved with the use of a check valve (See Figure 13), located in the trunk line at the furthest point from the dehumidifying dryer. This check valve permits the full circulation of air through the system when only one or two stations are in operation. Be sure this valve is located properly in the trunk line for correct air flow through it.

To properly maintain a closed-loop, yet allow for removal of a station from service, "Kamlock" connectors with plugs are provided at each station (See Figure 14). These connectors permit secure connection to each pre-heater and drying hopper for normal operation but permit easy disconnection and plugging of the line if the station needs to be removed from the processing machine. In this way, dehumidified air will not be lost to atmosphere and wet plant air will not be drawn into the trunk line of the Central system.

TYPICAL CENTRAL DRY AIR SYSTEM STATION

Figure 14



TROUBLE SHOOTING

Alarm Conditions:

The Micro Processor has been programmed to alert the operator to various malfunctions which may occur. Should a malfunction occur, the alarm light on the dryer will light. In order to determine the nature of the malfunction, press the "Alarm Display" button. There will be a message on the display describing the malfunction. Once a malfunction has occurred, the dryer is programmed to automatically follow a pre-defined sequence. If the malfunction is of a nature which will cause damage to your material or facilities, the dryer is programmed to shut down. If the malfunction presents no danger, the dryer is programmed to continue running but at the same time advise the operator as to the nature of the problem.

The following is a listing of pre-programmed messages concerning potential malfunctions:

ALARM DISPLAY	MALFUNCTION	SOLUTION	AUTOMATIC SEQUENCE IF MALFUNCTION OCCURS
1. O.L. Process Blower Or Lost +12 Power	A. The overload on the process blower has tripped. This could be caused by not having the overload properly adjusted or the motor may be drawing excessive current. B. No 12 volt power	A. Check setting on overload and adjust if necessary. Reset overload. Check motor current against name plate current to insure motor is not drawing excessive amperage. B. Check LED 11 on I/O Board. ("ON" if 12 volts is present)	Dryer shuts down & alarm light is energized.
2. O.L. Regeneration Blower	Same as process blower overload	Same as process blower overload	Regen. heaters & blower are de-energized & alarm light is energized
3. Hi Temperature Limit, Regen/Process	Either the regeneration or process hi-temp limit has been exceeded because of an abnormally high temperature in the heater box.	Check both heater boxes for signs of excessive heat. Clear any restricted lines. Check for proper air flow in both circuits. See analog board (Page 10) for details	Dryer shuts down & alarm light is energized

ALARM DISPLAY	MALFUNCTION	SOLUTION	AUTOMATIC SEQUENCE IF MALFUNCTION OCCURS
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4. Del. Air Probe Malfunction	Either the Temperature sensor has not been properly connected to control box or the sensor is defective.	Check Connection. Check probe for obvious damage and replace if necessary.	Dryer shuts down & alarm light is energized.
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5. Regen. Probe Malfunction	Either loose connection at terminals on analog board or the sensor is defective.	Same as Del. Air Probe	Regeneration heaters and blower are de-energized & alarm light is energized.
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6. Process Protection Probe Malfunction	Same as Regen. Probe	Same as Del. Air Probe	Alarm light is energized
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7. Index Cycle Too Long Check L.S. and Motor	A. The carousel has rotated too far during indexing B. Carousel has not rotated due to drive motor malfunction or gear drive is defective.	Check position of limit switch relative to bed plate. A. Make sure limit switch is properly adjusted. B. Test motor for proper operation (See Dryer Start-up) C. Check motor control circuit including fuse	All heaters are de-energized & alarm light is energized.
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8a. Process Temperature unsatisfactory-Low.	The process temperature is below an acceptable level. A. Process temperature setting too high for dryer to maintain temperature at setpoint. B. Dryer may be too far from hopper. C. Air flow may be reversed. D. Heaters may be defective. E. Process Temperature Sensor not properly positioned at inlet of hopper. F. Supply voltage different from nameplate voltage.	Check heater amperage for defective heaters. Check air flow direction. Check location of process Temperature Sensor. Check supply voltage against nameplate voltage. Consult CONAIR for additional assistance.	Dryer shuts down & alarm light is energized.
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ALARM DISPLAY	MALFUNCTION	SOLUTION	AUTOMATIC SEQUENCE IF MALFUNCTION OCCURS
14. Delivery air less than alarm band.	The actual process air temperature is less than the alarm band setting. A. Possible heater failure. B. Process setpoint too high.	Check heater amperage. Consult CONAIR.	Alarm light is energized.
15. Return Air Temp. Above Limit	Return Air Temperature is above 180 °F	Insure hopper is full of material. Add aftercooler if not already part of the system. If aftercooler exists check coils and clean if necessary.	Dryer shuts down, alarm light is energized.
16. Return Air Temp. Unsatisfactory	Return Air Temperature is above 150 °F	Same as Return Air Temp. above limit.	Alarm light is energized.
17. Replace Process Contactor	The contactor has met manufacturers recommended life cycle.	Replace contactor and reset alarm.	Alarm light is energized.
18. Replace Regeneration Contactor	The contactor has met manufacturers recommended life cycle.	Replace contactor and reset alarm.	Alarm light is energized.
19. Return Air Probe Malfunction.	Either loose connection at terminals on analog board or the sensor is defective.	Same as Del Air Probe.	Alarm light is energized.

Conair has made the largest investment in customer support in the plastics industry. Our service experts are available to help with any problem you might have installing and operating your equipment. Your Conair sales representative also can help analyze the nature of your problem, assuring that it did not result from misapplication or improper use.

WE'RE HERE TO HELP

To contact Customer Service personnel, call:



HOW TO CONTACT CUSTOMER SERVICE

From outside the United States, call: 814-437-6861

You can commission Conair service personnel to provide on-site service by contacting the Customer Service Department. Standard rates include an on-site hourly rate, with a one-day minimum plus expenses.

If you do have a problem, please complete the following checklist before calling Conair:

- Make sure you have all model, serial and parts list numbers for your particular equipment. Service personnel will need this information to assist you.
- Make sure power is supplied to the equipment.
- Make sure that all connectors and wires within and between control systems and related components have been installed correctly.
- Check the troubleshooting guide of this manual for a solution.
- Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.
- Check that the equipment has been operated as described in this manual.
- Check accompanying schematic drawings for information on special considerations.

BEFORE YOU CALL ...

Additional manuals and prints for your Conair equipment may be ordered through the Customer Service or Parts Departments for a nominal fee.

EQUIPMENT GUARANTEE

Conair guarantees the machinery and equipment on this order, for a period as defined in the quotation from date of shipment, against defects in material and workmanship under the normal use and service for which it was recommended (except for parts that are typically replaced after normal usage, such as filters, liner plates, etc.). Conair's guarantee is limited to replacing, at our option, the part or parts determined by us to be defective after examination. The customer assumes the cost of transportation of the part or parts to and from the factory.

PERFORMANCE WARRANTY

Conair warrants that this equipment will perform at or above the ratings stated in specific quotations covering the equipment or as detailed in engineering specifications, provided the equipment is applied, installed, operated and maintained in the recommended manner as outlined in our quotation or specifications.

Should performance not meet warranted levels, Conair at its discretion will exercise one of the following options:

- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)
- Replace the original equipment with other Conair equipment that will meet original performance claims at no extra cost to the customer.
- Refund the invoiced cost to the customer. Credit is subject to prior notice by the customer at which time a Return Goods Authorization Number (RGA) will be issued by Conair's Service Department. Returned equipment must be well crated and in proper operating condition, including all parts. Returns must be prepaid.

Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

WARRANTY LIMITATIONS

Except for the Equipment Guarantee and Performance Warranty stated above, Conair disclaims all other warranties with respect to the equipment, express or implied, arising by operation of law, course of dealing, usage of trade or otherwise, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.