ATHENA®

The Temperature Control Company

Hot Runner
Temperature Control Systems
Mainframe Installation Manual

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1.0 MAINFRAME INSTALLATION

Installation and service should be performed by qualified personnel only!

1.1 Location

The proper location is important for dependable service. The control system should be located so as to allow free air movement into and out of the mainframe. Consideration should be given to allow the least exposure to heat, dust, dirt, moisture and corrosive vapors. The front of the system must be readily accessible for setup and adjustment purposes.

1.2 Connecting Input Power

A) Check nameplate to make sure that the control system was wired at the factory for the power source to which it is to be connected. It is possible to change the wiring of the control system in the field to any of the power sources shown on the diagrams on the back of the unit. These diagrams are reproduced on the following pages for your convenience. See Section 1.3 for instructions on how to do this re-wiring.

B) Remove back panel by removing the screws around its perimeter.

C) Select input cable size and configuration based on load requirements and local electrical codes.

D) Insert AC input cable through cable clamp provided on side of mainframe.

E) Attach leads to terminal strip as shown on mainframe back panel for power source as shown on nameplate or as re-wired.

F) Be sure to attach ground as shown on wiring diagram.

G) Take up excess slack in cable and secure with strain relief clamp provided on the outside of the cabinet.

H) Route AC input cable to a branch circuit disconnect switch and attach leads to the fused side of the switch. Be sure the ground lead is attached to a good earth ground.

1.3 Wiring Control System for Different Power Sources

See diagrams following this section or on rear of cabinet for the power sources for which this control system may be wired. These changes may be made without tools, although a pair of long-nosed pliers may be helpful. Changes are made by moving the wires that run from the control module connectors to the various power buses.

1.3.1 Schematic “A”

If the power source is not specified, the control system will be wired for Schematic “A” or 208-240 volt 4-wire, three phase power at the factory. This is standard in the U.S and Canada. For purposes of these instructions, it is assumed that the control system is being changed from Schematic “A” to the other schematics.

1.3.2 Schematic “B”

Schematic “B” is used in most countries in Europe; it is for 380/415 or 220/240 volt, 5 wire, three phase power. To make these changes, it is necessary to move the wire from pin #7 on each module connector to bus MP/N. In addition, move one of the black wires from the fan to bus MP/N. If the system has a C/V monitor, move the yellow, green, blue and gray wires from the flat cable to MP/N. Take one pilot light wire from the back of the main circuit breaker and extend it to bus MP/N.

This arrangement is also valid for running the control system on 120/208, when 120 volt heaters are used. The control modules and C/V monitor must have their power transformer connections changed to 120 volts. The pilot light wiring does not have to be modified.

Please note that the large power wires that run from the AC power input block to the circuit breaker to the distribution buses are not the correct colors for European use. If the control system is to be used permanently in Europe, these wires should be changed. A kit with instructions is available from the factory. Control systems can be furnished with European colors at no charge, if specified at time of order.

1.3.3 Schematic "C"

This configuration is called "Open Delta," and is found in some areas of the United States. To change to this configuration, it is necessary to move the wire from pin #7 on each module connector to bus MP/N. Move one of the black fan wires to MP/N. Remove the rest of the wires from TL/3 and split them between RL/l and SL/2, to balance the load. If the system has a C/V Monitor, move the yellow, green, blue and gray wires from the flat cable to MP/N. Take one pilot light wire from the back of the main current breaker and extend it to bus MP/N.

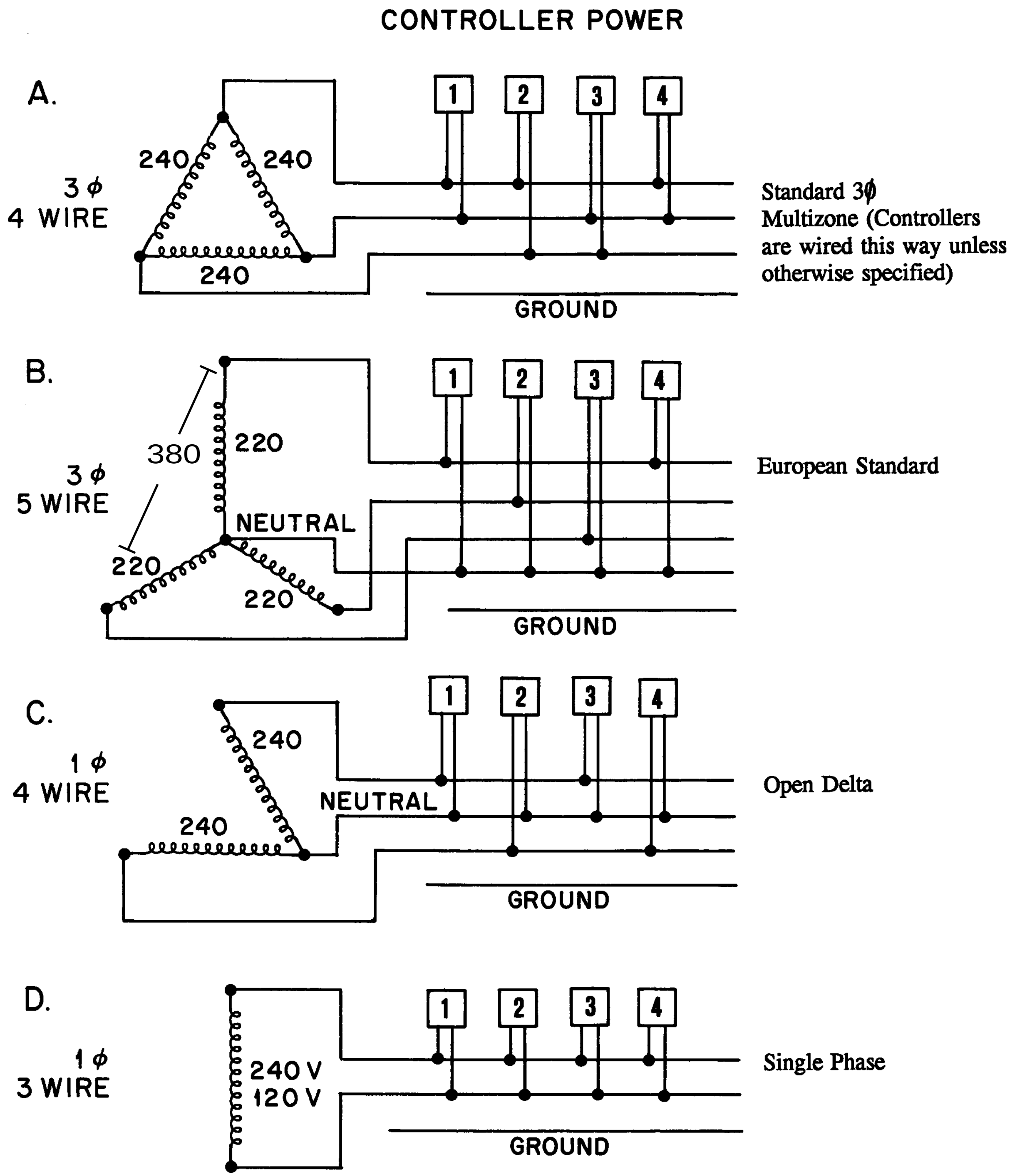
1.3.4 Schematic "D"

This schematic is for single phase operation. Move all of the wires from pin #6 of each module connector to RL/l; move all of the wires from pin #7 to SL/2.

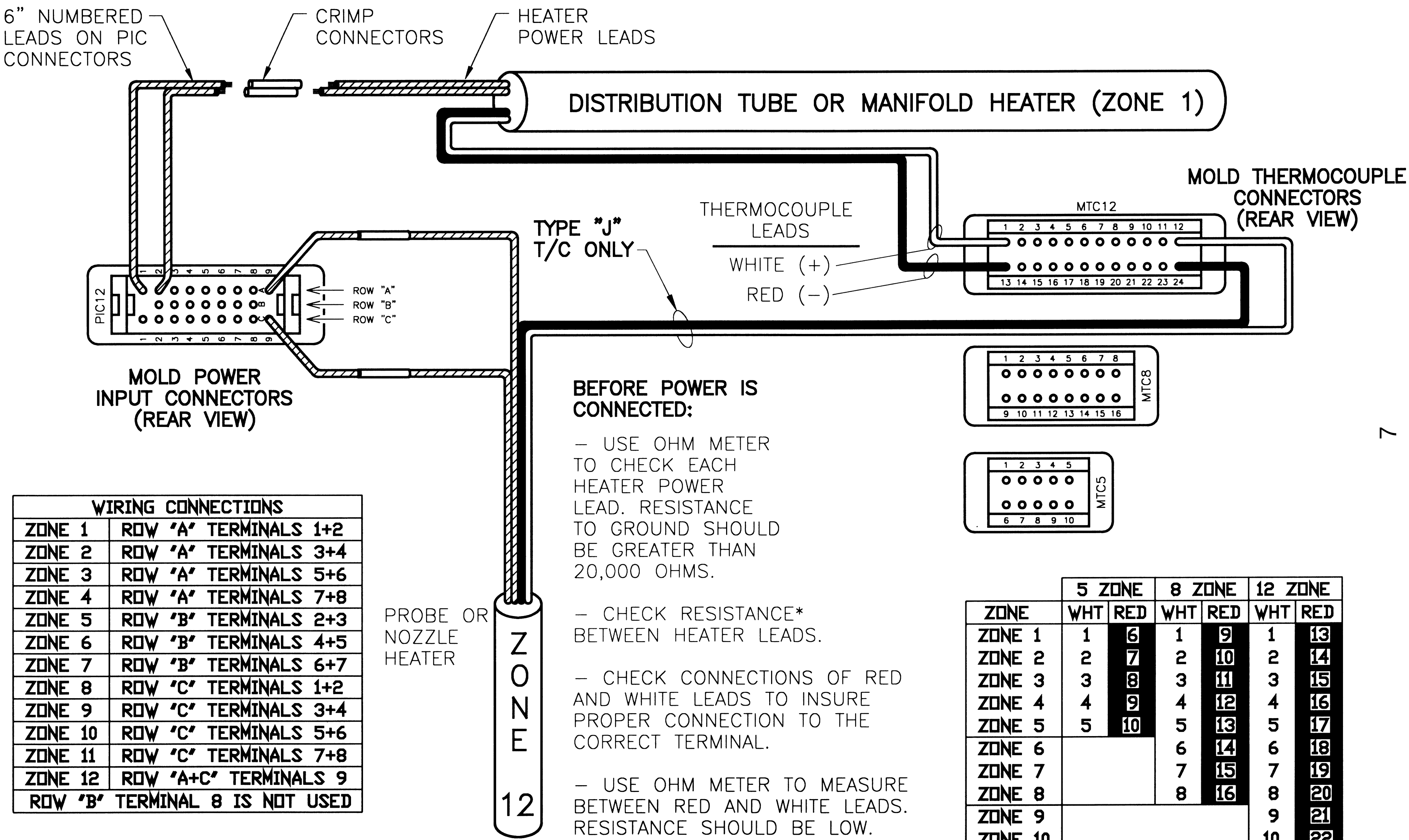
1.3.5 Nameplate

Be sure to change the data on the nameplate to reflect changes made in the wiring.

1.3.6 Wiring Diagram



WIRING DIAGRAM FOR RUNNERLESS MOLDING SYSTEM



BEFORE POWER IS CONNECTED:

– USE OHM METER TO CHECK EACH HEATER POWER LEAD. RESISTANCE TO GROUND SHOULD BE GREATER THAN 20,000 OHMS.

– CHECK RESISTANCE* BETWEEN HEATER LEADS.

– CHECK CONNECTIONS OF RED AND WHITE LEADS TO INSURE PROPER CONNECTION TO THE CORRECT TERMINAL.

– USE OHM METER TO MEASURE BETWEEN RED AND WHITE LEADS. RESISTANCE SHOULD BE LOW.

– MEASURE BETWEEN EACH HEATER POWER LEAD AND EACH THERMOCOUPLE LEAD. RESISTANCE SHOULD BE GREATER THAN 20,000 OHMS.

WIRING CONNECTIONS	
ZONE 1	ROW 'A' TERMINALS 1+2
ZONE 2	ROW 'A' TERMINALS 3+4
ZONE 3	ROW 'A' TERMINALS 5+6
ZONE 4	ROW 'A' TERMINALS 7+8
ZONE 5	ROW 'B' TERMINALS 2+3
ZONE 6	ROW 'B' TERMINALS 4+5
ZONE 7	ROW 'B' TERMINALS 6+7
ZONE 8	ROW 'C' TERMINALS 1+2
ZONE 9	ROW 'C' TERMINALS 3+4
ZONE 10	ROW 'C' TERMINALS 5+6
ZONE 11	ROW 'C' TERMINALS 7+8
ZONE 12	ROW 'A+C' TERMINALS 9
ROW 'B' TERMINAL 8 IS NOT USED	

	5 ZONE		8 ZONE		12 ZONE	
ZONE	WHT	RED	WHT	RED	WHT	RED
ZONE 1	1	6	1	9	1	13
ZONE 2	2	7	2	10	2	14
ZONE 3	3	8	3	11	3	15
ZONE 4	4	9	4	12	4	16
ZONE 5	5	10	5	13	5	17
ZONE 6			6	14	6	18
ZONE 7			7	15	7	19
ZONE 8			8	16	8	20
ZONE 9					9	21
ZONE 10					10	22
ZONE 11					11	23
ZONE 12					12	24

HEATER VOLTS MARKED ON HEATER X **HEATER** VOLTS MARKED ON HEATER ÷ **HEATER** WATTS MARKED ON HEATER ≅ *** MEASURED RESISTANCE OHMS**

240 VOLTS X 240 VOLTS ÷ 820 WATTS ≅ 70 OHMS

NOTE: All grounds must be connected to mold to ensure operator safety.

DATE	DESCRIPTION	REV
12/24/99	RELEASED FOR PRODUCTION	A

REVISIONS

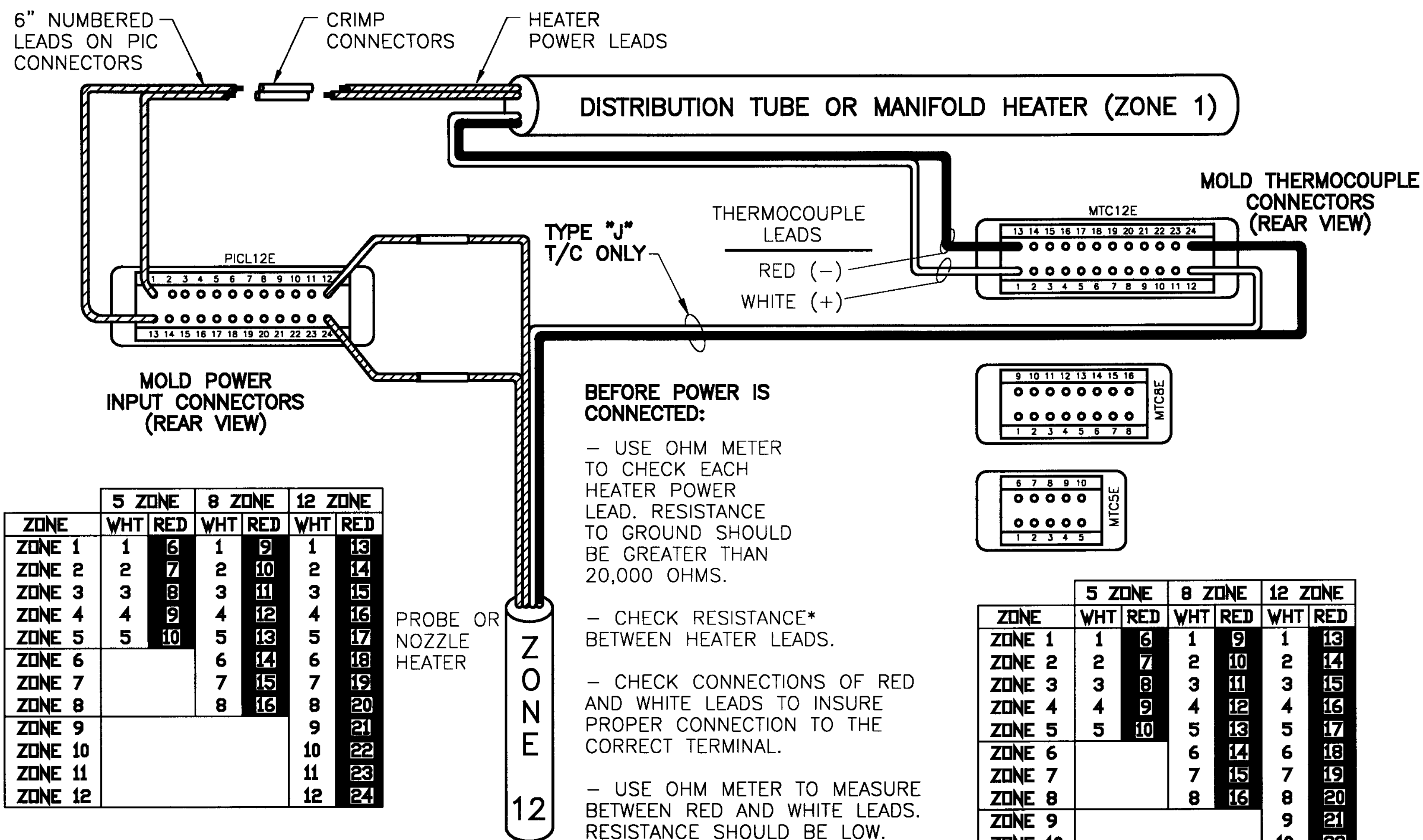
ATHENA CONTROLS, INC.

TITLE: HOTRUNNER SYSTEM; CUSTOMER WIRING

DWG NO. 809A005U01 REV A

DATE 12/24/99 SCALE N/A DRAWN BY JAD CHECKED BY MSM

WIRING DIAGRAM FOR CE RUNNERLESS MOLDING SYSTEM



ZONE	5 ZONE WHT	5 ZONE RED	8 ZONE WHT	8 ZONE RED	12 ZONE WHT	12 ZONE RED
ZONE 1	1	6	1	9	1	13
ZONE 2	2	7	2	10	2	14
ZONE 3	3	8	3	11	3	15
ZONE 4	4	9	4	12	4	16
ZONE 5	5	10	5	13	5	17
ZONE 6			6	14	6	18
ZONE 7			7	15	7	19
ZONE 8			8	16	8	20
ZONE 9					9	21
ZONE 10					10	22
ZONE 11					11	23
ZONE 12					12	24

BEFORE POWER IS CONNECTED:

– USE OHM METER TO CHECK EACH HEATER POWER LEAD. RESISTANCE TO GROUND SHOULD BE GREATER THAN 20,000 OHMS.

– CHECK RESISTANCE* BETWEEN HEATER LEADS.

– CHECK CONNECTIONS OF RED AND WHITE LEADS TO INSURE PROPER CONNECTION TO THE CORRECT TERMINAL.

– USE OHM METER TO MEASURE BETWEEN RED AND WHITE LEADS. RESISTANCE SHOULD BE LOW.

– MEASURE BETWEEN EACH HEATER POWER LEAD AND EACH THERMOCOUPLE LEAD. RESISTANCE SHOULD BE GREATER THAN 20,000 OHMS.

ZONE	5 ZONE WHT	5 ZONE RED	8 ZONE WHT	8 ZONE RED	12 ZONE WHT	12 ZONE RED
ZONE 1	1	6	1	9	1	13
ZONE 2	2	7	2	10	2	14
ZONE 3	3	8	3	11	3	15
ZONE 4	4	9	4	12	4	16
ZONE 5	5	10	5	13	5	17
ZONE 6			6	14	6	18
ZONE 7			7	15	7	19
ZONE 8			8	16	8	20
ZONE 9					9	21
ZONE 10					10	22
ZONE 11					11	23
ZONE 12					12	24

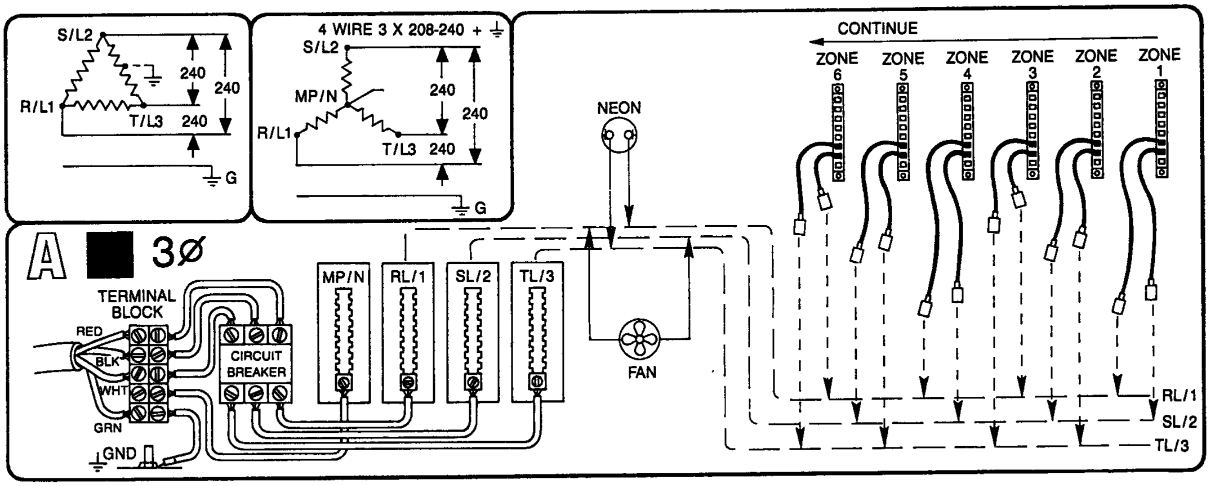
HEATER VOLTS MARKED ON HEATER $\times$ **HEATER** VOLTS MARKED ON HEATER $\div$ **HEATER** WATTS MARKED ON HEATER $\cong$ *** MEASURED RESISTANCE OHMS**

240 VOLTS X 240 VOLTS $\div$ 820 WATTS $\cong$ 70 OHMS

NOTE: All grounds must be connected to mold to ensure operator safety.

Input Power Wiring Diagram – Option A

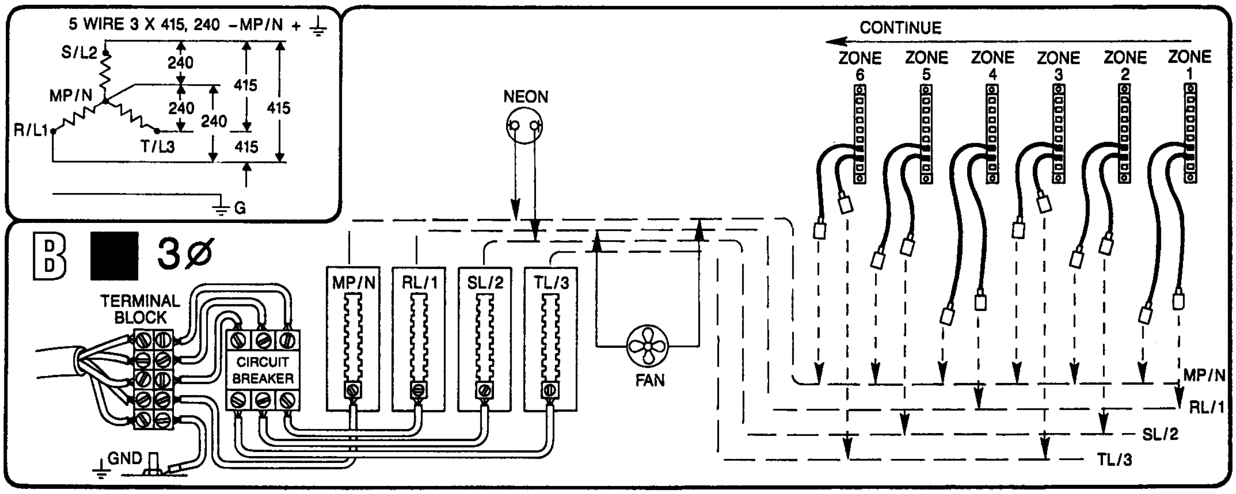
208-240 Vac, 3-Phase, 4-Wire Delta or "Y" Power Distribution System



Each module is powered from one of the three phases. Module One, for example is powered from Phase 1, which is supplied by RL/1 and SL/2. Module Two is powered from Phase 2, which is supplied by SL/2 and TL/3. Module Three is powered by Phase 3, which is supplied by RL/1 and TL/3. At this point, the sequence repeats itself. For example, Module Four is connected the same as Module One to RL/1 and SL/2 and Module Five is connected the same as Module Three to RL/1 and TL/3. Module Seven is then connected to the same phase as Modules One and Four, etc. This method of connection ensures the greatest likelihood of line balance.

Input Power Wiring Diagram – Option B

380-415 Vac, 3-Phase, 5-Wire "Y" Power Distribution System



CAUTION NOTE: The voltages from line to line in this system are 380 to 415 volts. Severe damage to module and mainframe could result if this type of AC input system is connected in the 208-240 Vac configuration. This type of power distribution is very uncommon in the United States, but is the most common system used in other countries.

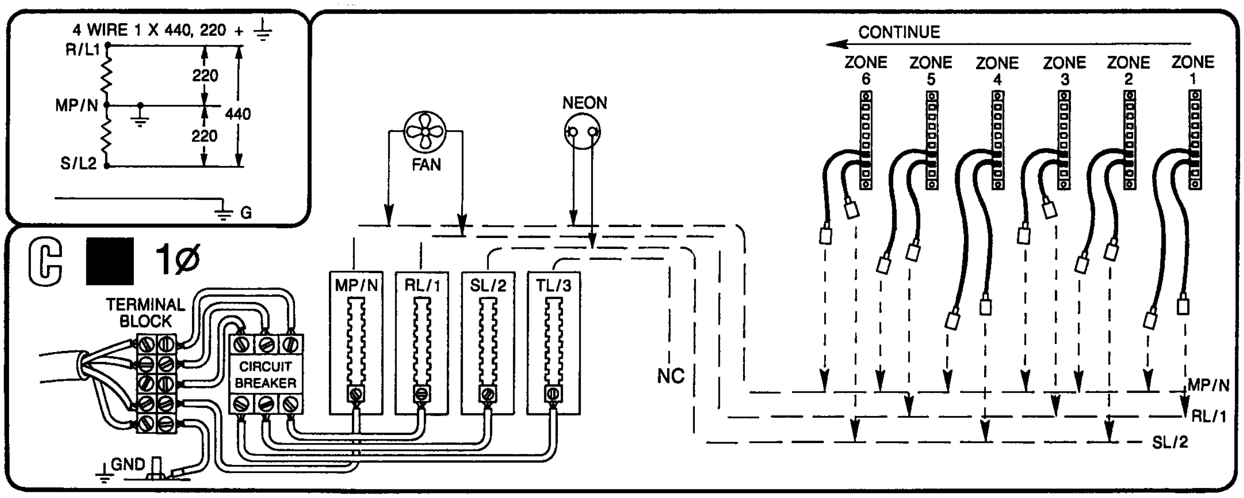
WARNING: If export of this system is intended, make sure that the wiring is reconfigured for the country where it is to be used.

Please note that the 380-415 volt Power Distribution System is the same as the 208-240 Vac "Y" connection, except for the voltage levels and the use of the MP/N to develop the 240 volts from the 380-415 volt system. Note that all modules in this system have one line connected to MPN and the other side connected to one of the 3-phase lines.

Example: Module One is connected to Phase 1, which is supplied by RL/1 and MP/N.
Module Two is connected to Phase 2, which is supplied by SL/2 and MP/N.
Module Three is connected to Phase 3, which is supplied by TL/3 and MP/N.
Module Four starts the sequence over again. It is connected to Phase 1 RL/1 and MP/N, etc.

Input Power Wiring Diagram – Option C

240 Vac, Single-Phase, 4-Wire Power Distribution System



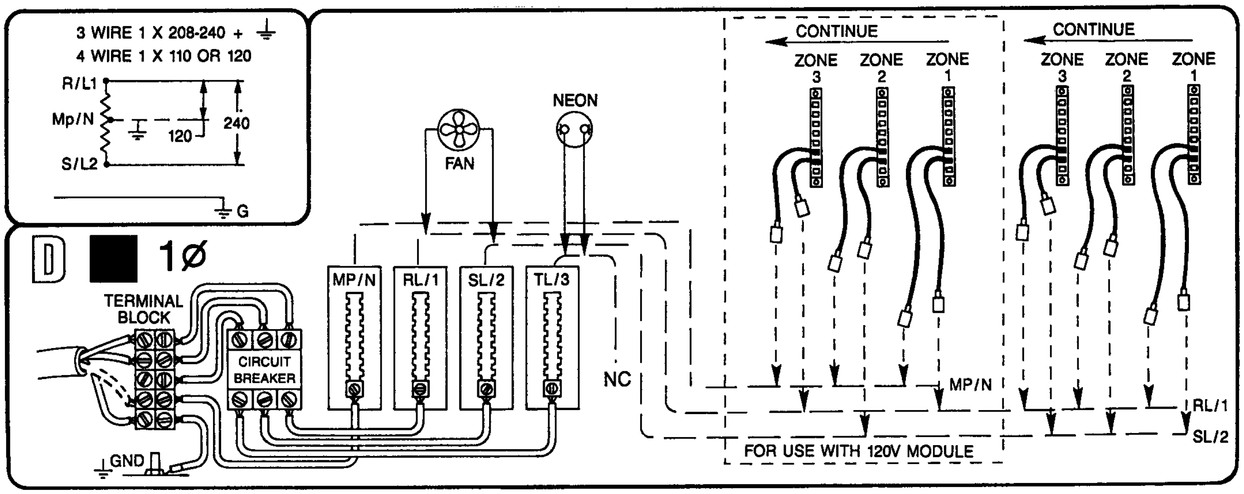
The 240 volt single-phase connection only uses two power lines plus ground.

CAUTION: Only power conductors should be connected through the circuit breaker. Never make ground connections through a circuit breaker. Notice that the output of the circuit breaker is connected to terminal strips RL/1 and SL/2. Also, notice that ground is common with MP/N in this system. All modules in this system have to be connected to MP/N and either RL/1 or SL/2. Line balance is achieved by alternating between RL/1 and SL/2.

Example: Module One is connected to MP/N and RL/1
Module Two is connected to MP/N and SL/2, etc.

Input Power Wiring Diagram – Option D

208-240 Vac, Single-Phase, 3-Wire 120 Vac, Single-Phase 4-Wire Power Distribution System



The above diagram depicts two different wiring configurations. One is 208-240 volt, single-phase, 3-wire. Note that lines RL/1 and SL/2 are connected through the circuit breaker to the appropriate terminal strips. All modules in this system will be connected between RL/1 and SL/2. MP/N is common with ground and is not connected through the circuit breaker.

In the 120-volt connection (module connections shown within the dotted area), the 120 volts is developed between RL/1 and MP/N and SL/2 and MP/N. Again, ground and MP/N are not connected through the circuit breaker. Each module in this system will be connected to MP/N and either RL/1 or SL/2. Line balance is achieved by alternating between RL/1 and SL/2.

Example: Module One is connected to MP/N and RL/1
Module Two is connected to MP/N and RL/2, etc.

2.0 MODULE INSTALLATION AND SECONDARY WIRING

2.1 Module Installation

With the main circuit breaker in the "OFF" position, install each module being careful to fully seat in the connectors at the rear of the slot. Then press in the plastic lock at the bottom of the module.

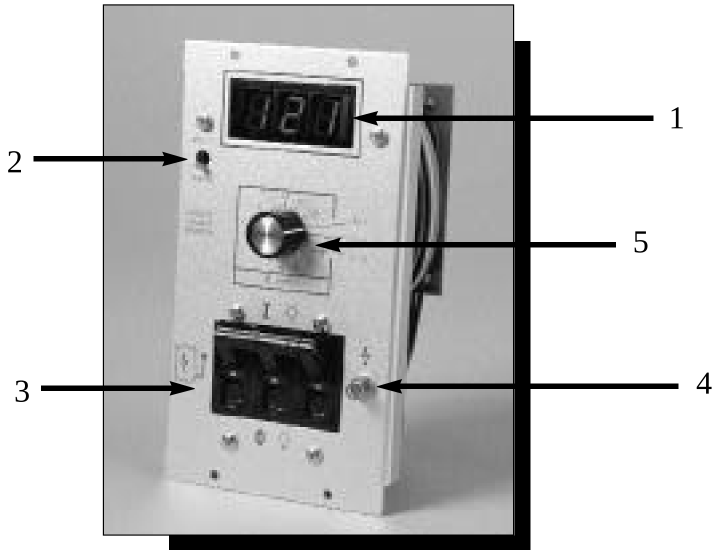
2.2 Secondary Wiring

Carefully connect all heaters and thermocouples to their respective circuits, making sure that there are no short circuits. It is important that each thermocouple is wired to the zone that controls the associated heater.

2.3 Check-out

We recommend using Chart 1 of our troubleshooting procedure to ensure that the control system is working properly (See section 3.4. 1).

2.4 Digital Current/Voltage Monitor



1-METER

A dual function, multi-range display is used to monitor either individual zone heater current in amperes or AC voltage of each phase of a three-phase input.

2-VOLTS/AMPS SWITCH

Determine whether meter functions as an Ammeter or Voltmeter. Refer to the serial number plate on the side of the mainframe to determine system input voltage requirements.

3-MAIN POWER SWITCH (DISCONNECT/BREAKER)

Used to turn the system ON or OFF.

4-MAIN POWER INDICATOR

Illuminates to indicate the Main Power Switch is on and that input power is applied to the system.

5-SELECTOR SWITCH

Used to select which zone or AC power line is being monitored.

In the R/Ll, S/L2, or T/L3 positions the meter will indicate AC voltage of the line selected. The VOLTS/AMPS switch MUST be in the VOLTS position to read AC input voltage.

To measure individual zone current, place the VOLTS/AMPS switch in the AMPS position and select the zone to be monitored with the SELECTOR SWITCH. For systems that exceed 23 zones, place the switch in the “24” position and use the SELECTOR SWITCH in the upper cabinet to monitor zones 24 and higher.

WIRING

3 WIRE 208-240 Vac
Ll-brown, blue, violet
L2-red, yellow, gray
L3-green, orange

4 WIRE 380 Vac
Ll-brown, violet
L2-red
L3-orange

NEUTRAL-yellow,
green, blue, gray

3.0 CONTROL SYSTEM TROUBLESHOOTING

These procedures assume that your temperature control system has been installed in accordance with the installation instructions. Be sure that all wiring has been correctly done and that the power being supplied is the same as specified on the nameplate on the controller frame.

Problems that arise may be divided into two groups. The first is associated with the controller itself, the wiring, heaters and thermocouples. This group is characterized by abnormal indications on the controller modules, such as blinking lights and displays or pilot lights “off.” We have developed a set of troubleshooting charts to help you locate these problems.

The second group of problems are associated with design of the mold and hot runner system or with processing conditions. These problems are often more difficult to diagnose and to repair. Outlined below are some of the common problems we have found.

3.1 Temperature Oscillation

This is usually caused by the location of the thermocouple being too far away from the heater it is controlling. In order to provide proper control, the thermocouple should be located between one-half and one inch of its heater. Oscillation during processing can also be caused if the melt temperature is significantly above or below the setpoint of the zone.

3.2 Temperature Too High

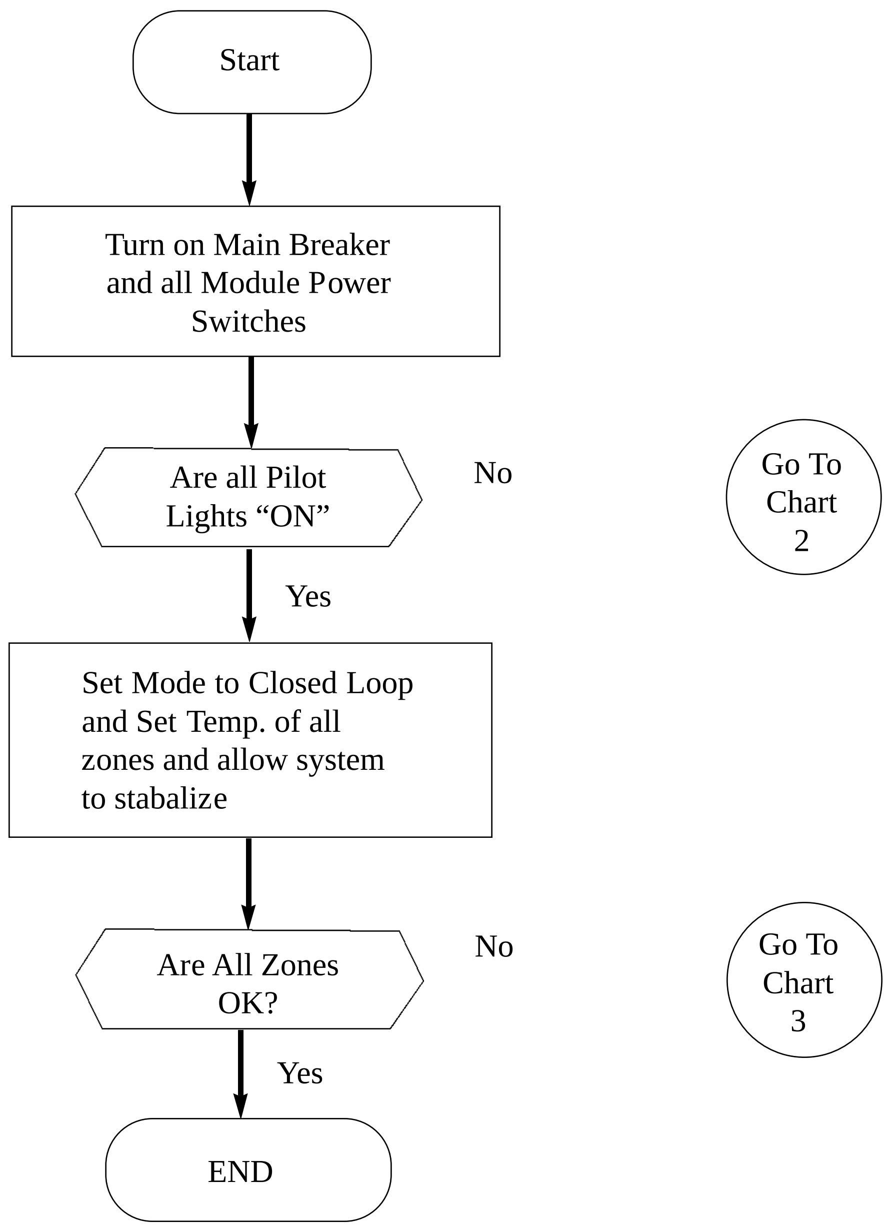
This is usually caused either by heat from an adjacent zone or from having the melt temperature above the setpoint of that zone. This problem is also caused if the TC is not wired to the same control module as the corresponding heater.

3.3 No Heat Indication

Some of the hardware problems that cause this indication are described in the chart section of this procedure. It is also the indication that appears when something has occurred electrically to upset the microprocessor in the control module. It corresponds to the “Tilt” light on a pinball machine. It is reset by turning the power switch on the module off and then on. A random occurrence is not cause for concern. Should it happen regularly, however, it indicates that there is more interference on the power line to the control system than the filtering in the power supply can accommodate. The solution usually is to connect the controller as close to the electrical service entrance as possible, and not to the molding machine where the motors and solenoids cause electrical interference.

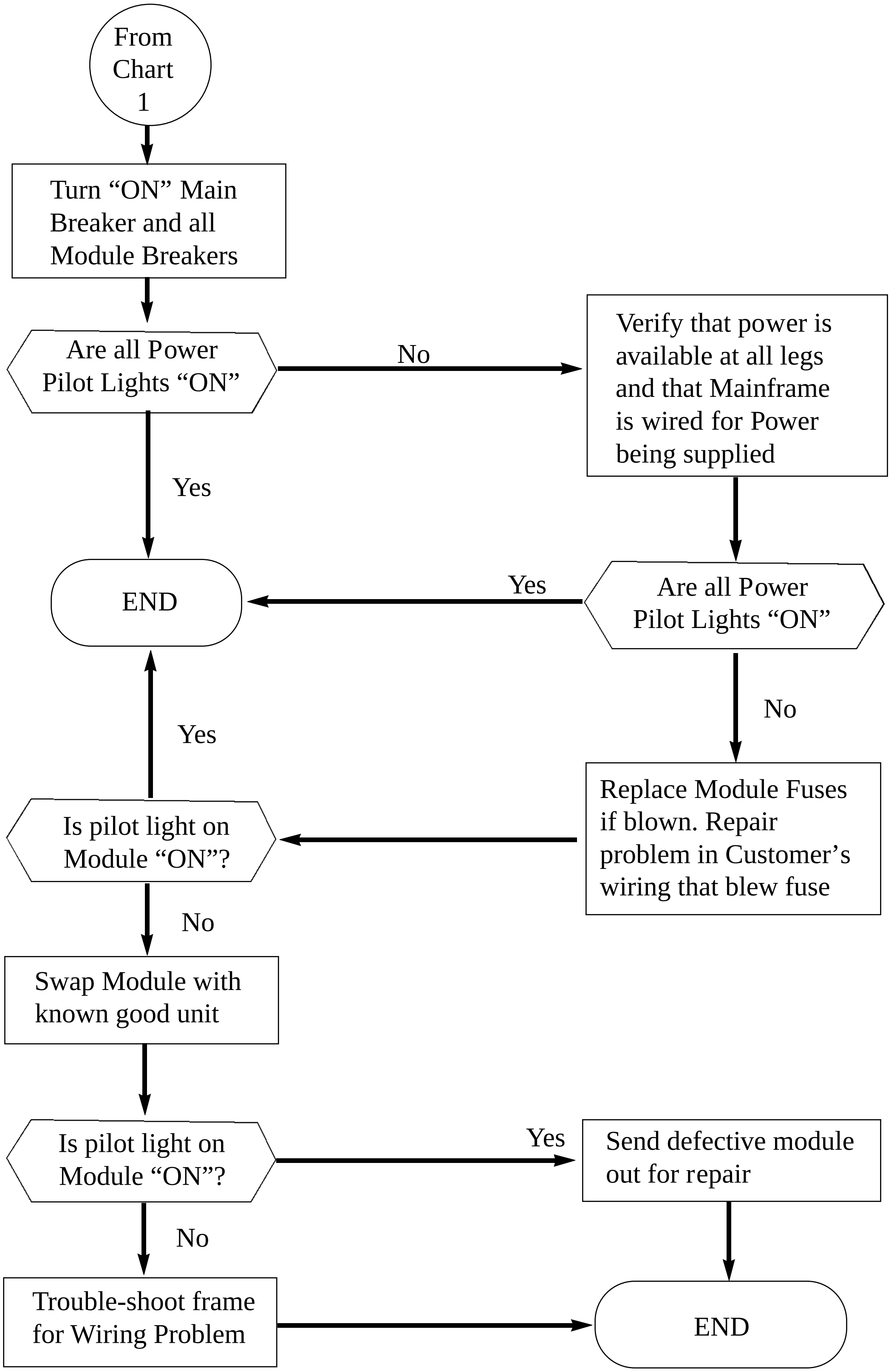
3.4.0 CONTROLLER TROUBLESHOOTING CHARTS

3.4.1 CONTROLLER TROUBLESHOOTING CHART 1
FAULT CLASSIFICATION

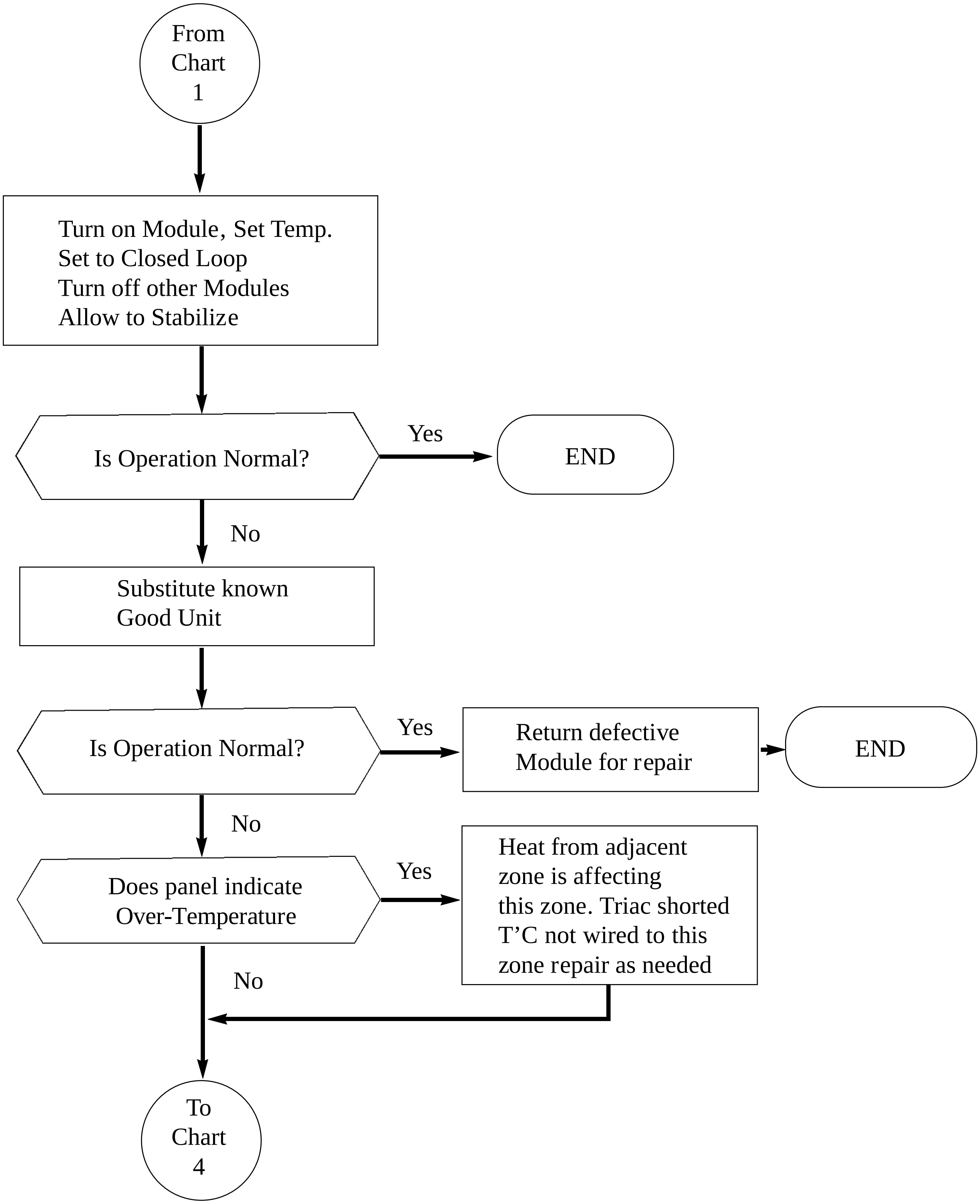


3.4.2

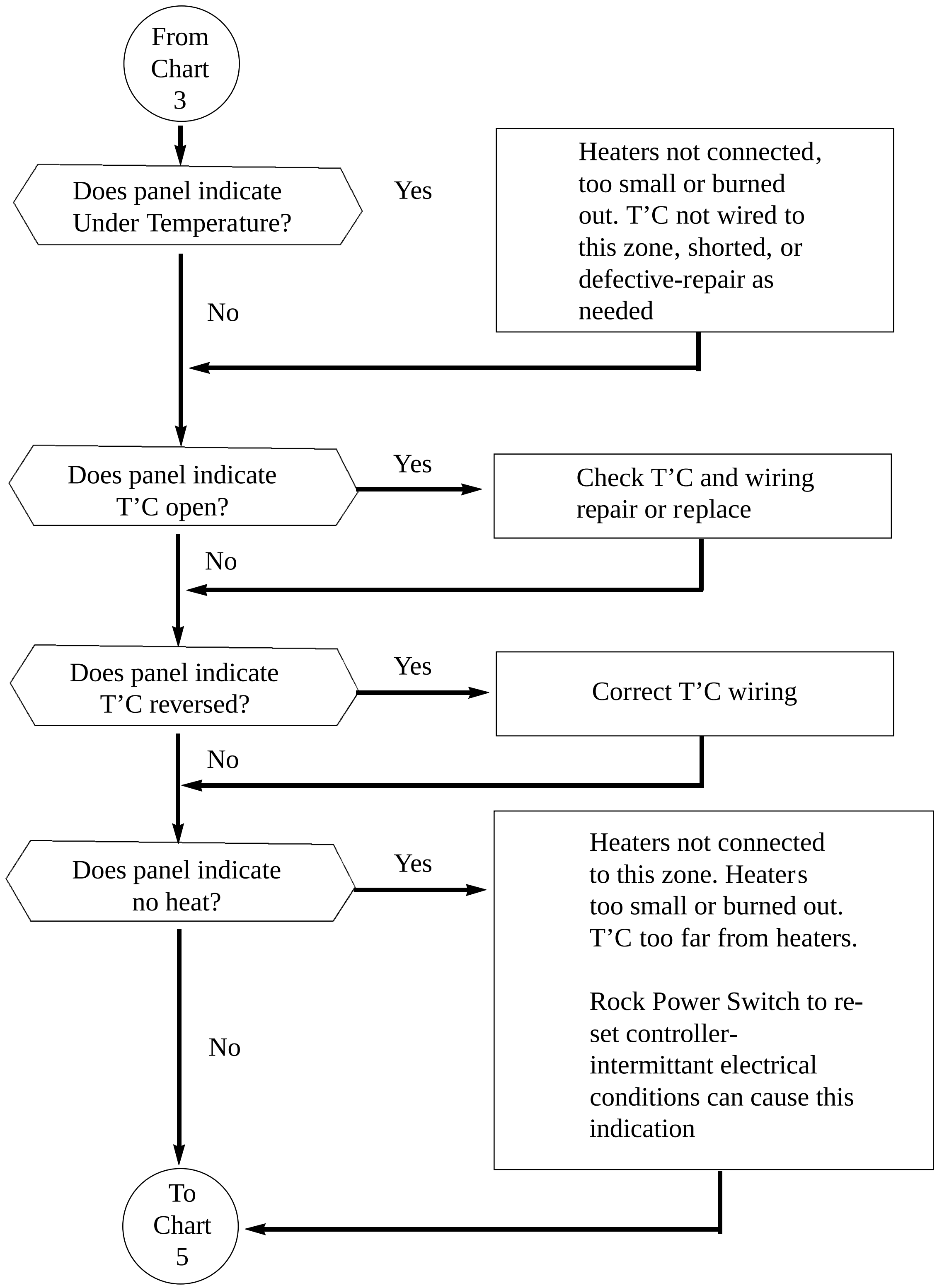
CONTROLLER TROUBLESHOOTING CHART 2
POWER



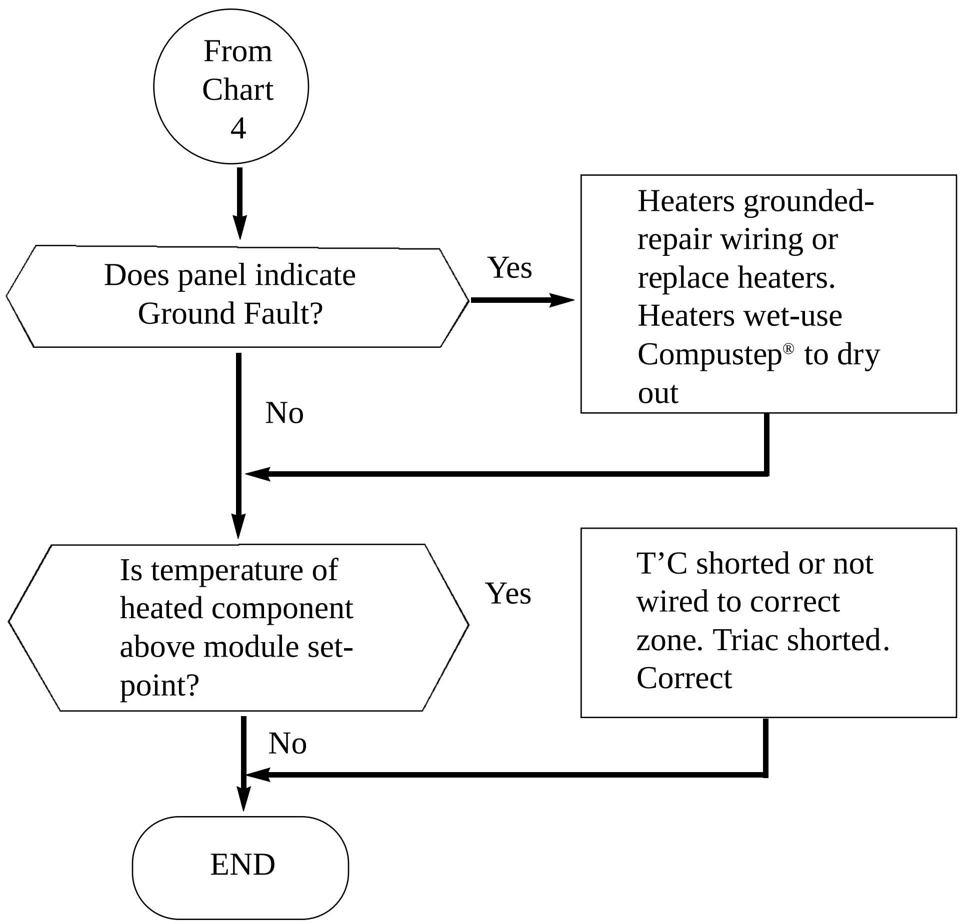
3.4.3 CONTROLLER TROUBLESHOOTING CHART 3 MODULE



3.4.3 CONTROLLER TROUBLESHOOTING CHART 4
MODULE



3.4.3 <u>CONTROLLER TROUBLESHOOTING CHART 5 MODULE-(cont)</u>



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