



**TURBOCHEF®**  
TECHNOLOGIES, INC.



**C3/AB, C3/C, C3Multi, C3/CMulti**  
**CONVECTION MICROWAVE OVEN**  
**SERVICE AND REPAIR MANUAL**



TURBOCHEF TECHNOLOGIES INC.

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## TurboChef Technologies, Inc. C3/AB & C3

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# READ THIS FIRST

Before working on the TurboChef Technologies, Inc. C Series oven you must first read the safety instructions on the following pages. The C3 series oven is a combination convection/microwave oven. While servicing this oven, an RF meter must be used at all times to check for microwave leakage. This RF reading must be recorded on your work invoice.

Very often poor cleaning will result in microwave leakage. Please refer to chapter 2, Cleaning & Operation, for information on the proper cleaning procedures.

Before removing the metal skin to access the electrical components in this oven, the power must be shut off and the oven unplugged. Wait at least one full minute before removing the oven skin so that the magnetron circuit can self-discharge. **FAILURE TO DO SO MAY RESULT IN DEATH OR SERIOUS INJURY.**

**PLEASE NOTE: THIS MANUAL ONLY COVERS C3/AB OVENS PRODUCED BY THE BLODGETT OVEN CORPORATION, C3MULTI OVENS PRODUCED TURBOCHEF, C3/C AND C3/CMULTI OVENS PRODUCED BY TURBOCHEF TECHNOLOGIES IN CHINA.**

**This manual is divided into seven (6) chapters as follows:**

- |                             |  |
|-----------------------------|--|
| 1. INSTALLATION SPECS -     | This chapter includes oven specifications and the parameters for proper installation.  |
| 2. CLEANING & OPERATION -   | Improper cleaning can and will affect the operation of this oven. This chapter includes a brief description of the cleaning and operation procedures of the oven and the procedures to edit or change a cooking program. |
| 3. TEST -                   | This chapter details the Test Mode, which allows the technician to operate individual components or section of the C3 SERIES oven. <b>Using this feature will isolate most electrical troubleshooting problems.</b>      |
| 4. ELECTRICAL COMPARTMENT - | This chapter identifies the electrical compartment components and provides voltage information. <b>Use the key to help isolate electrical troubleshooting problems.</b>  |
| 5. CONVECTION CIRCUIT -     | This chapter provided information on the convection and blower motor speed control. Removal and cleaning of the catalytic converter are also provided.   |
| 6. MICROWAVE CIRCUIT -      | This chapter includes information on the microwave circuit and stirrer motor.  |

**This Service and Repair manual is set up for use by qualified technicians only. If you are unfamiliar with this oven, call TurboChef Technologies Inc.**

# IMPORTANT SAFETY INSTRUCTIONS

**WHEN USING ELECTRICAL APPLIANCES, THE FOLLOWING  
BASIC SAFETY PRECAUTIONS SHOULD BE STRICTLY ADHERED TO:**



## **WARNING!!**

**To reduce the risk of burns, electric shock, fire, injury to persons or exposure to excessive microwave energy:**

1. Read all instructions before using the appliance.
2. Read and follow the specific **PRECAUTIONS TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY** found on pages iii & iv.
3. This appliance must be grounded. Connect only to properly grounded outlet. See **GROUNDING INSTRUCTIONS** found on page v.
4. Install or locate this appliance only in accordance with the provided installation instructions.
5. Some products such as whole eggs and sealed containers - for example, closed glass jars - may explode and **SHOULD NOT** be heated in this oven.
6. Use this appliance only for its intended use as described in the manual. **DO NOT** use corrosive chemicals or vapors in this appliance. This type of oven is specifically designed to heat, cook, or dry food. It is **NOT** designed for industrial or laboratory use.
7. Children **SHOULD NOT** use this appliance.
8. **DO NOT** operate this appliance if it has a damaged cord or plug, if it is not working properly, or if it has been damaged or dropped. See **POWER SUPPLY CORD REPLACEMENT** found on page v.
9. This appliance should be serviced only by qualified service personnel. Contact the nearest authorized service facility for examination, repair or adjustment.
10. **DO NOT** cover or block any openings on the appliance.
11. **DO NOT** store this appliance outdoors. **DO NOT** use this product near water - for example, near a kitchen sink, in a wet basement, or near a swimming pool.
12. **DO NOT** immerse cord or plug in water.
13. Keep cord away; from heated surfaces.
14. **DO NOT** let cord hang over edge of table or counter.
15. **DO NOT** use a water jet for cleaning.
16. See the Maintenance section of this manual.
17. To reduce the risk of fire in the oven cavity:
  - a) **DO NOT** overcook food. Carefully attend appliance if paper, plastic, or other combustible materials are placed inside the oven to facilitate cooking.
  - b) Remove wire twist-ties from paper or plastic bag in oven.
  - c) If materials inside the oven should ignite, keep oven door closed, turn oven off, and disconnect the power cord, or shut off power at the fuse or circuit breaker panel.
  - d) **DO NOT** use the cavity for storage purposes. **DO NOT** leave paper products, cooking utensils, or food in the cavity when not in use.

**SAVE THESE INSTRUCTIONS**

## PRECAUTIONS TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

1. **DO NOT** attempt to operate this oven with the door open since open-door operation can result in harmful exposure to microwave energy. It is important not to defeat or tamper with the safety interlocks.
2. **DO NOT** place any object between the oven front face and the door or allow soil or cleaner residue to accumulate on the sealing surfaces.
3. **DO NOT** operate the oven if it is damaged. It is particularly important that the oven door close properly and that there is no damage to the:
  - a) Door (bent).
  - b) Hinges and latches (broken or loosened).
  - c) Door seals and sealing surfaces.
4. The oven **SHOULD NOT** be adjusted or repaired by anyone except properly qualified service personnel.

**SAVE THESE INSTRUCTIONS**

## **PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY**

1. DO NOT operate or allow the oven to be operated with the door open.
2. Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
  - a) Interlock operation.
  - b) Proper door closing.
  - c) Seal and sealing surfaces (arcing, wear, and other damage).
  - d) Damage to or loosening of hinges and latches.
  - e) Evidence of dropping or abuse.
3. Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, wave guide, or transmission line, and cavity for proper alignment, integrity, and connection.
4. If the oven is operative prior to servicing, a microwave emission check should be performed prior to servicing the oven. Refer to page 6-2 of this manual for microwave leakage testing procedure.
5. Any defective or mis-aligned components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.
6. A microwave leakage check to verify compliance with the Federal Performance Standard **MUST BE** performed on each oven prior to release to the owner. Refer to page 6-2 of this manual for microwave leakage testing procedure.

**SAVE THESE INSTRUCTIONS**

## GROUNDING INSTRUCTIONS

This appliance **MUST BE** grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This appliance is equipped with a cord having a grounding wire with a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded.



### **WARNING!!**

**Improper use of the grounding can result in a risk of electric shock.**

Consult a qualified electrician or serviceman if the grounding instructions are not completely understood, or if doubt exists as to whether the appliance is properly grounded.

**DO NOT** use an extension cord. If the power supply cord is too short, have a qualified electrician or serviceman install an outlet near the appliance.

## POWER SUPPLY CORD REPLACEMENT

If the power supply cord is damaged, it **MUST BE** replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.

## General Note about Construction

Please be advised that the TurboChef C3 series ovens are manufactured in various locations, as such the C3/C and C3/Cmultit are constructed using the Metric System. Therefore, it is very important to note the model number of the unit you are servicing to ensure you get the correct Metric component. Care has been given in this manual to list the different part numbers for the Metric and Imperial (C3/AB and C3Multi) ovens. In addition, please note that most hardware on the C3/C and C3/Cmulti oven is metric unless otherwise specified.

**SAVE THESE INSTRUCTIONS**



## RF INTERFERENCE CONSIDERATIONS

This oven generates radio frequency signals. This device has been tested and determined to be in compliance with applicable part of FCC part 18 requirements and to the protection requirements of Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility at the time of manufacture. However, some other equipment may exhibit sensitivity to signals below these limits resulting in interference with that equipment.

If your equipment experiences interference, the following steps should be considered:

1. Increase the physical separation between this oven and the sensitive equipment.
2. If the sensitive device can be grounded, do so following accepted grounding practices.
3. If battery powered microphones are being affected, insure that the batteries are fully charged.
4. Keep sensitive equipment on electrically separate circuits, if possible.
5. **DO NOT** route intercom wires, microphone wires, or speaker cables near oven.

**SAVE THESE INSTRUCTIONS**

# TurboChef Technologies, Inc. C series

## OVEN DESCRIPTION

| SPECIFICATIONS                           | C3/AB, C3MULTI, C3/C, AND C3/CMULTI   |
|--|---|
| Dimensions (single unit)                 | 29" W x 25.5" H x 29.5" D (73.66 cm x 64.77 cm x 74.93 cm)  |
| Dimensions (double stacked units)        | 29" W x 43" H x 29.5" D (73.66 cm x 109.22 cm x 74.93 cm)   |
| Maximum Input                            | 7.2 kW  |
| Power Supply                             | 208 VAC, 60Hz, 1 $\phi$ , 35 amp, 3 wire including ground   |
| US (1 $\phi$ ) All Models                | 240 VAC, 60 Hz, 1 $\phi$ , 30 amp, 3 wire including ground  |
| Europe(1 $\phi$ ) All Models             | 230-240 VAC, 50 Hz, 1 $\phi$ , 30 amp, 3 wire including ground  |
| US (3 $\phi$ ) C3Multi and C3/Cmulti     | 208 VAC, 60Hz, 3 $\phi$ , Delta, 30 amp, 4 wire including ground<br>240 VAC, 60 Hz, 3 $\phi$ , Delta, 22 amp, 4 wire including ground   |
| Europe (3 $\phi$ ) C3Multi and C3/Cmulti | 380-415 VAC, 50 HZ, 3 $\phi$ , WYE, 15 Amp, 5 wire including ground<br>230-240 VAC, 50 HZ, 3 $\phi$ , Delta, 22 Amp, 4 wire including ground  |
| Microwave Frequency                      | 2.45 GHz  |
| Connections including ground             | The unit is supplied with a 6' power cord that includes:<br>US (1 $\phi$ ) NEMA 6-50P<br><b>Europe(1f) 32A IEC 60309 plug</b><br>US (3 $\phi$ ) NEMA 15-50P<br><b>Europe(3f) 32A IEC 5 Pin plug</b><br>The outlet box, receptacle, and wall plate are to be furnished by the installing contractor. |
| Maximum Power Usage                      |   |
| Convection Oven                          | 5.2 kW  |
| Microwave Oven                           | 2.0 kW  |

TABLE 1 - 1 Oven Specifications

## INSTALLATION

The TurboChef Technologies, Inc. oven is manufactured to comply with applicable CE, ETL, FDA, and FCC requirements. In addition, the unit is ETL classified to NSF 4. Note: Some European models may or may not be certified under US FDA and/or ETL regulations. All equipment is designed and certified for safe operation when installed in accordance with local and/or national codes. Many local codes exist, and it is the responsibility of the owner and installer to comply with these codes. In addition, if the oven is not UL or ETL listed it MAY NOT BE USED or SOLD US or any of its territories.

In no event shall the manufacturer assume any liability for damages or injuries resulting from installations which are not in compliance with the instructions and codes listed above.



### WARNING!!

**DEATH, INJURY, AND EQUIPMENT DAMAGE could result from improper installation of this oven or installation of an oven which has been damaged during shipment or storage. Either of these conditions could void the equipment warranty.**

**DO NOT INSTALL an oven suspected of damage.**

**INSTALL this oven according to the policies and procedures outlined in this manual.**

### **OVEN LOCATION**

The well planned and proper placement of your oven will result in long term operator convenience and satisfactory performance.

Be sure to place the oven in an area which is accessible for proper operation and servicing.

The countertop or work surface must be able to support the weight of 250 pounds. The manufacturer shall not assume liability for damage or injury resulting from improper installation of equipment including temporary or unstable work stations or countertops.

There must be 2" (5.08 cm) between the top of the unit and any shelf or other surface.

The oven must be installed level front to back and side to side. The oven legs may be bolted to the counter top if desired.

## BASIC CLEANING PROCEDURES

### PROBLEMS ASSOCIATED WITH IMPROPER CLEANING

The oven may not be operating correctly because it is not being cleaned properly. If the door is leaking microwaves, erratic operation of the display and other electrical components can occur. Also food deposits left in the oven will turn into black carbon from the high heat. Carbon can cause arcing inside the cooking area and can reflect energy back to the magnetron.

If a customer tells you they are experiencing cooking performance problems, carefully inspect the cooking platter and waveguide cap for chips. If the platter or waveguide cap are chipped and soaked in water, they will absorb the water. The water will then be heated instead of the food product. The chipped part must be replaced.

### DAILY CLEANING

1. Carefully remove the ceramic cooking platter and wave-guide cap. Spray both pieces **only with TurboCare® Oven Cleaner** and set aside to allow the cleaner to penetrate. **DO NOT soak the Ceramic Cook Platter or Waveguide Cap in water.**

2. Clean the ceramic cooking platter, and wave guide cap using brushes and scrub pads. Rinse to remove all cleaner and debris. Inspect for damage and replace as required.
3. **Reinstall the clean wave-guide cap into the oven.** This will protect the wave-guide seal while the cook chamber is cleaned.
4. To clean the interior of the oven, use a 3"x5" green scrub pad. Use **only TurboCare® Oven Cleaner** on tough spots. **DO NOT** wash out the interior cooking area. The waveguide quartz seal is not a water tight seal. Wipe out the oven with a damp rag. If the door area needs cleaning, be careful not to damage the small rubber gasket around the door shunt area.
5. Remove the lower access panel and grease collection pan. Empty, clean and reinstall the pan.
6. Verify the louvers on the front and side of the oven are clean of lint and unobstructed.

### MONTHLY CLEANING

Remove and clean the exhaust cover from the back of the oven.

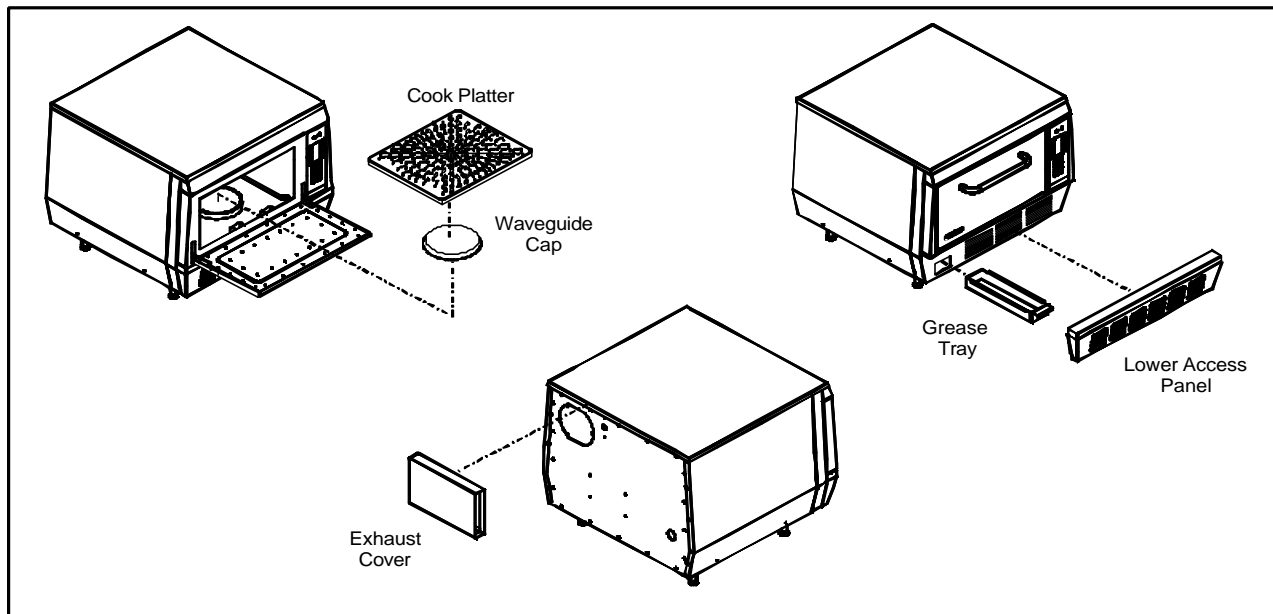


FIGURE 2 - 1 Cleaning

### GLOSSARY OF COMMON OPERATING TERMS & ERROR MESSAGES

#### OVEN OPERATING COMPONENTS

**Display** - Primary interface to relay messages to the operator.

**Keypad** - Primary interface for the operator to control the oven.

**Cook Chamber** - Cavity in which the food products are cooked.

#### PRODUCT RECIPES

**Recipe** - The food product recipe programming consists of total time, percent of total time per event, percentage of hot air flow (AIR) required and microwave (MW) level required.

**Cook Cycle** - Total time of operation for a recipe.

**Cook Event** - Segment of a recipe, up to 6 events can be used for each recipe.

**Duration** - Time, in percent of total time of a single cook event.

**Air** - Percent of convection air flow during a cook event.

**MW** - Percent of microwave used during a cook event.

**Cook Temperature Set Point** - Temperature should be a constant parameter. The same cook temperature should be used by all cook recipes.

#### MODES

**Mode** - The software environment which allows certain operations to occur. There are several modes, STANDBY, COOK, WARM UP and COOL DOWN in which the oven can operate.

**Standby Mode** - The standby mode is similar to oven off. In standby there is no power to the oven. There is power to the control, however, the oven will not operate in standby mode.

**Cook Mode** - Mode used to perform the normal oven operations, such as, monitor the key pad for requests to cook or change mode, and maintain the oven at the cook temperature set point.

**Warm-Up Mode** - Mode to bring the oven up to the cook temperature set point.

**Cool-Down Mode** - Turns off all oven components except the cooling fan and circulation blower.

#### ERROR MESSAGES

**LO MAG CURR** - the magnetron transformer is drawing less than 7 amps. The normal current draw is approximately 9 amps. The current draw is being monitored by the control board which has a current transformer mounted on it.

**LO COOK TEMP** - the temperature set for the C3 SERIES is not being maintained within 84°F (46°C) of the Cook Chamber Setpoint. It is referenced by the cook chamber type K thermocouple. Note: It may also be controlled by the heat exchanger thermocouple.

**MAG OT** - the snap disk on the magnetron has overheated and has tripped.

**BLOWER STAT** - the control board is not receiving the proper output from the convection (blower) motor speed control.

**LO MAG FLUX** - there is a small antenna in the launch tube of the wave guide. This antenna is attached to the control circuit board by an RF cable. The control circuit board detects and amplifies the signal and looks for a certain fluctuation which indicates the magnetron is operating and the stirrer blade in the launch tube is rotating. When not cooking a minimum change of 20 is being looked for. When you are cooking a product a minimum change of 10 is being looked for. When viewing the RF display, it will fluctuate quickly with a maximum value of 120 (plus or minus 20).

**Note: This feature is optional on the C3/C and C3/C Multi Ovens.**

**ELECTOVR TMP** - the K type thermocouple connected to the control board is above 140°F.

**OVEN DOOR OPEN** - (during cook cycle) the cooking door has been opened during a cook cycle and has not been closed properly.

## OPERATIONAL FLOW CHART

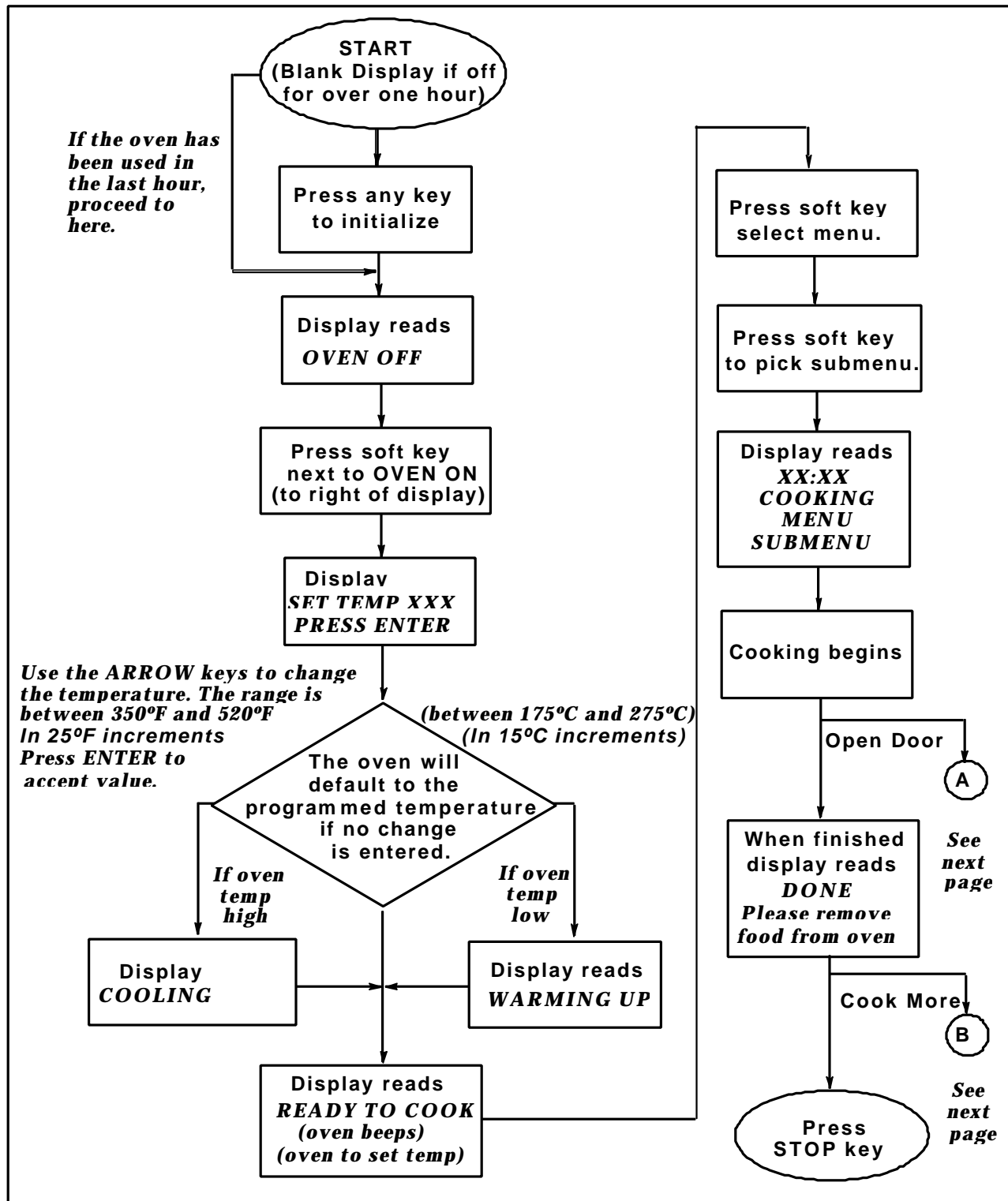


FIGURE 2 - 2a Operational Flow Chart

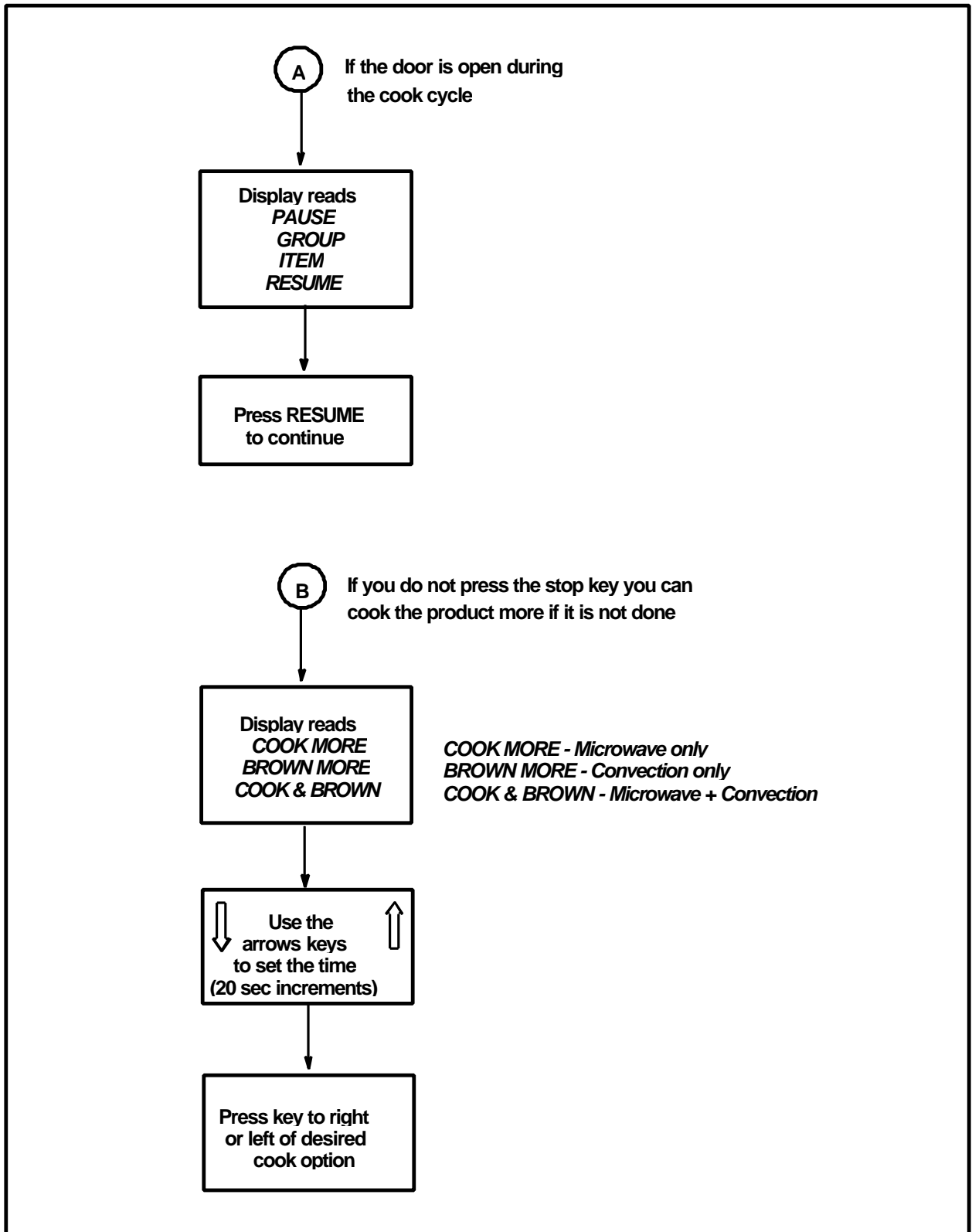


FIGURE 2 - 2b Operational Flow Chart (continued)

## PROGRAMMING FLOW CHART

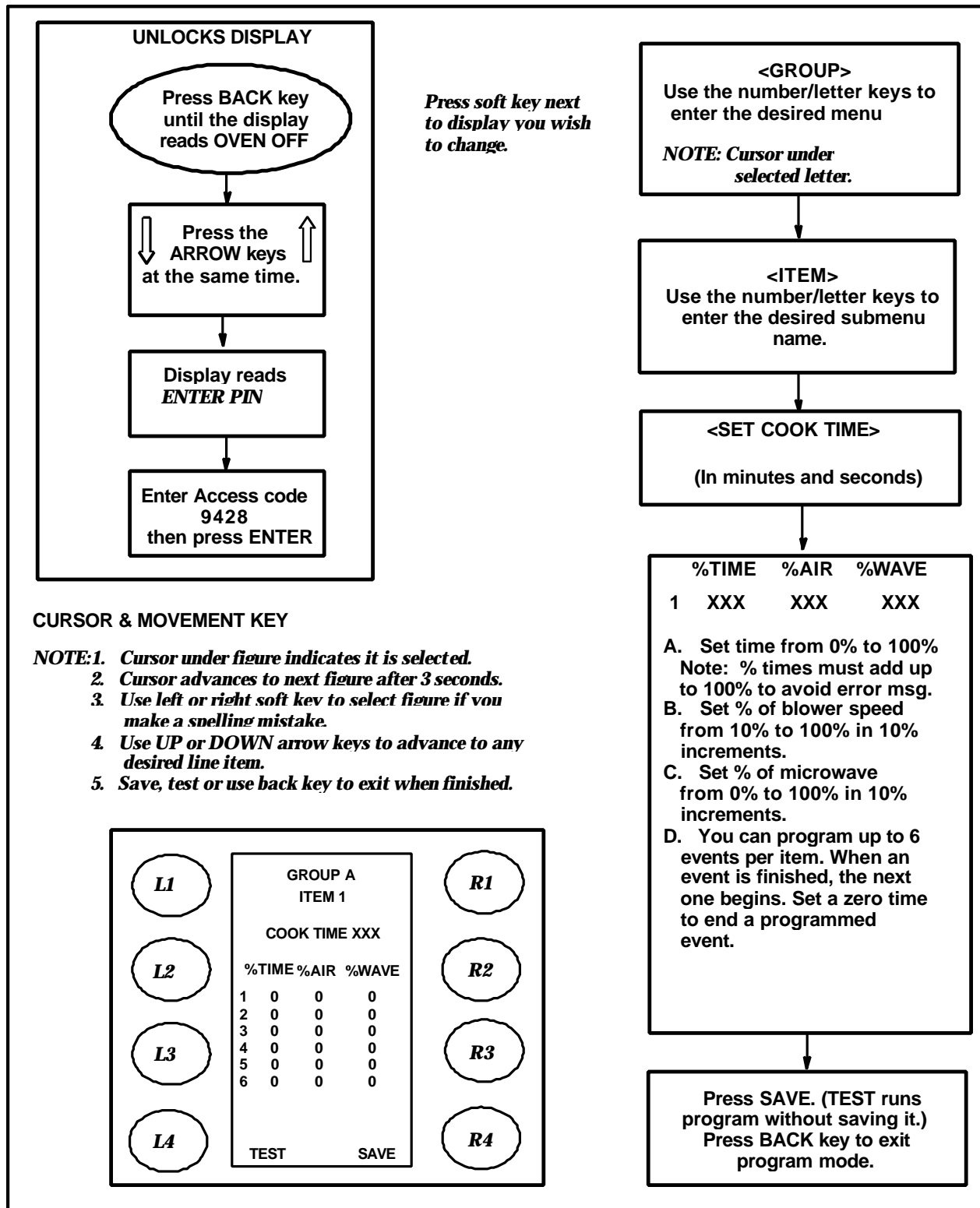


FIGURE 2 - 3 Programming Flow Chart



## TEST FUNCTION QUICK REFERENCE

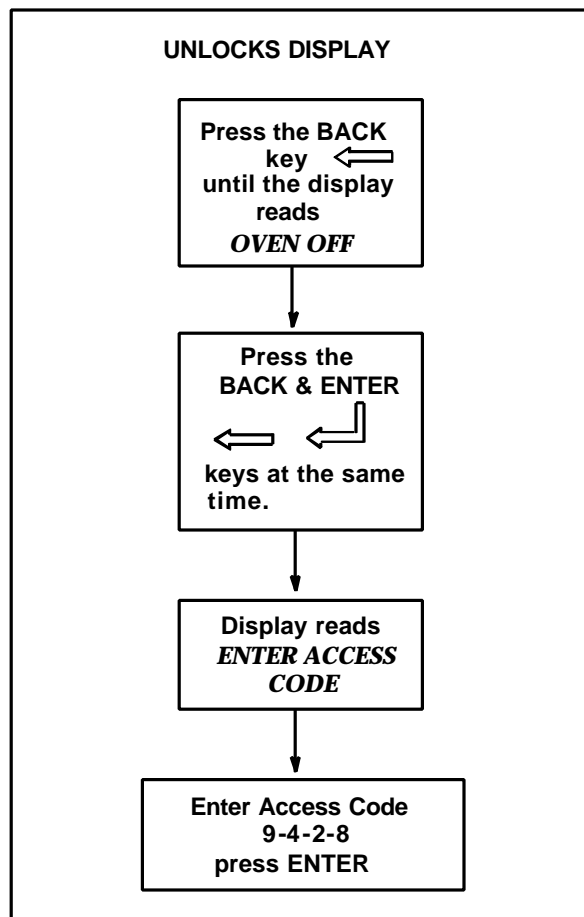


FIGURE 3 - 1 Enter Test Function Mode

The test function allows the technician to operate components individually and get diagnostic information. There are 2 pages of test functions. To change pages use the DOWN ARROW key. Refer to the brief descriptions on this page to help determine which test function will help you. Before operating a test function, read the full description of the test function on these following pages.

### DISPLAY PAGE 1

**CC XX** - thermocouple cooking cavity temperature

**BLOWER** – runs the blower motor in 10% increments

**°ELEC** – thermocouple electrical compartment temperature

**STEST** – initiates the self test function

**HX XX** – thermocouple heat exchanger temperature

**HEATER** - turns on HOT AIR heater element

**MGTRON** – (press & hold) runs the magnetron circuit

**DIAG** – runs the cooking display w/status indicators at the bottom of the display

### DISPLAY PAGE 2

**CC XX** - thermocouple cooking cavity temperature

**HX XX** – thermocouple heat exchanger temperature

**S/N** – for entering the serial number of the C3 SERIES

**CCC** - view/reset number of cook cycles

**PIN** – enters a new 4 digit password number

**F/C** - Fahrenheit or Celsius temperature display

**FF** – view/reset cook fault counters

**IAF** – allows you to view or change the Idle Airflow

## TEST FUNCTION DETAILED DESCRIPTION

### TO ENTER TEST FUNCTION MODE

1. From the standby mode, press and hold both BACK and ENTER keys simultaneously.
2. The display reads:

ENTER ACCESS CODE

3. Use the NUMERIC keypad to enter the following access code:

9 4 2 8

4. Press the ENTER key.

### TEST FUNCTION OPTIONS

The test screen displays the CC (cook cavity) and HX (heat exchange) temperature at the top of the screen.

The control displays page one of the test function options. Press the DOWN ARROW key to display page two of the test functions options.

To access a test function, press the corresponding soft key repeatedly.

### TEST FUNCTION OPTIONS - PAGE 1

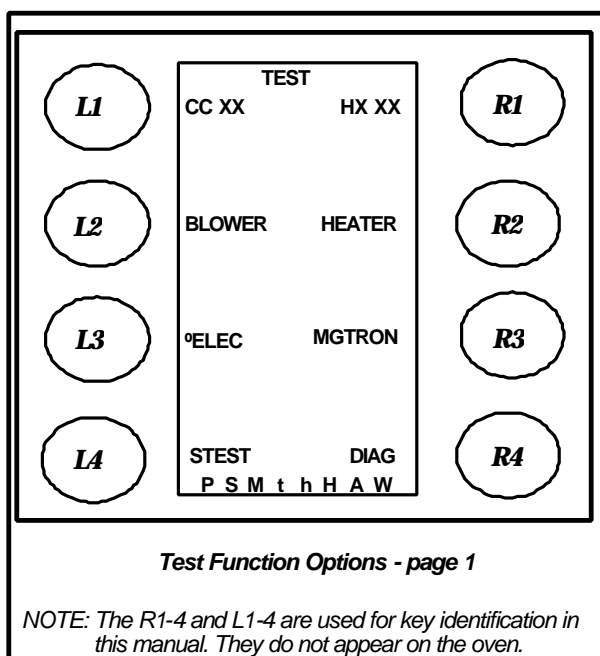


FIGURE 3 - 2 Test Functions - Page 1

### Blower Speed

The BLOWER key (L2) increments the blower speed in 10% steps. When the blower speed is 100%, the next press sets the speed to 0%.

### Electronic Compartment Temperature

The °ELEC key (L3) displays the temperature inside the electronic enclosure.

### Self Test Function

The STEST key (L4) initiates a self-test function to test all major components of the oven. Press the L4 key once to run the self test. Press the BACK key to return to the standby mode.

### Heater Test

The HEATER key (R2) turns the heater on or off. If the heaters are on, pressing the R2 key turns the heaters off. If the heaters are off and the maximum (HX) temperature (900°F) is not exceeded, pressing the R2 key turns the heaters on. If the blower speed is 0, the blower speed is set to the Idle Airflow.

### Magnetron

The MGTRON key (R3) is a press and hold key to test the magnetron. If the magnetron filaments are off when the MAG key is pressed, the message "MAG WARMING UP" is displayed. After a 3 second delay or if the filaments are already on, "MAG ON, RF xxx" is displayed. "xxx" is the fluctuating microwave power measured in the wave-guide. Any time the MAG key is released, the magnetron turns off. The filament power (magnetron cooling fan and mode stirrer) remains on for three minutes.

NOTE: The RF power indication is optional on the C3/C SERIES model oven.

### Diagnostic Display

The DIAG key (R4) turns on or off the diagnostic display feature. This feature adds temperature displays to the menu group screens.

While cooking, cook setting parameters are displayed when diagnostics are enabled.

With diagnostics enabled, status indicators are displayed on the lower left of the display. Each indicator is a letter, which is displayed in a positive sense when the status condition is on. The letter is reversed when the condition is off.

# TurboChef Technologies, Inc. C Series

## Status Indicators

There are eight status indicators:

- **P** - Cook door primary interlock switch
- **S** - Cook door secondary interlock switch
- **M** - Cook door monitor interlock switch
- **t** - Magnetron over temperature switch
- **h** - Heater turn on command
- **H** - Heater current detected
- **A** - Blower motor speed control "run" status
- **W** - Magnetron current detected

**Example:** When the status indicator is highlighted, for example **M**, the status is open or null. In this case, the Monitor switch is in the Open State.

## TEST FUNCTION OPTIONS - PAGE 2

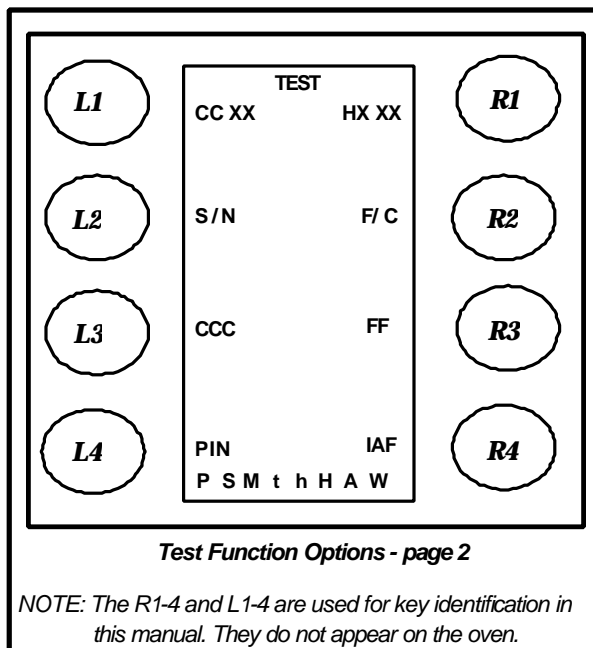


FIGURE 3 - 3 Test Functions - Page 2

## Serial Number

**NOTE:** This should only be needed when installing a new control. The S/N is located on the back of the oven.

The first press of the S/N key (L2) displays the oven's twelve-digit serial number. Use the following procedure to enter the serial number.

1. Press the S/N key again to enter the edit mode.
2. Right and left arrow key appear on either side of the serial number. These arrows are used to navigate within the text. Use the L1 SOFT KEY to move the cursor to the left. Use the R1 SOFT KEY to move the cursor to the right.

3. Use the NUMERIC KEYPAD to change the digits as follows:

- A) Press the key once to enter the number.
- B) Press the key twice to enter the first letter.
- C) Press the key three times to enter the second letter.
- D) Press the key four times to enter the third letter.
- E) Press the key five times to enter the fourth letter; if applicable.

4. Press the ENTER KEY to store the new number.

## Cook Cycle Count

The CCC key (L3) displays the cook cycle count. The count is incremented when the cook process completes at least the first event. The count includes test cooks selected while in the edit function. To reset the count, press 0 key.

## PIN Number

The PIN key (L4) is used to enter a new personal identification number (password) for accessing the edit function. When the button is pressed the display reads:

ENTER PIN \_ \_ \_ \_

Use the numeric keypad to enter the new PIN. Only numbers are applicable for the PIN.

## Temperature Units

The F/C key (R2) alternately selects Fahrenheit or Celsius for temperature displays.

## Cook Fault Counter

The FF key (R3) is used to read and reset the oven cook fault counters. Repeat pressing the FF button to view all six fault counters. Press the 0 key to reset the fault counter displayed. The faults include:

- BLOWER STATUS (blower motor speed controller)
- LOW COOK TMP (temperature)
- LOW MAG CURR (current)
- LOW MAG FLUC (rf power fluctuations)
- MAG OVER TMP (over temperature switch)
- ELEC OVR TMP (electronics)

## Idle Airflow

The first press of the IAF key (R4) displays the selected idle airflow. Subsequent presses of the IAF button increment the idle airflow in 10% steps from 20% to 50%. When the idle airflow is 50%, the next press sets the airflow to 20%.

## KEY SEQUENCE OF OPERATION - FAILURE MODE ANALYSIS

Unit will perform self test of component functions.

1. **No display.** Check items:
  - #2 (fuse)
  - #4 (24VDC power supply).
  - #9 (SMT controller board). Check for 5 VDC on P5 (J3 on ver 2) pin 1+ & 3-.
  - NOTE: Check cable connections.*
2. **Door interlock switch error.** Check items:
  - #5 (primary & monitor door switch) (secondary switch on left side of oven not shown.)
  - #6 (K2 relay)
  - #1 (CB1) (circuit breaker)
  - See page 4-6.
3. **Mag current low.** Check items:
  - #1 (CB1) (circuit breaker)
  - #3 (Convection high heat OT)
  - #6 (K3 relay filament heat)
  - #8 (K4 SS relay for magnetron)
  - #13 through #17.
  - NOTE: Reference pages 6-4 through 6-6 for component testing.*
4. **Mag Fluc Low.** Check items:
  - #12 (stir motor)
  - #9 (SMT controller board RF cable connection.)
  - #13 through #17
  - NOTE: If (RF) value on display is (0 or 1). No RF power is present. If (RF) value is displaying a number value like (60) with little fluctuation then check item #12 (Stirrer fan in launcher tube may need to be inspected. This involves removing the quartz seal.)*
  - NOTE: Reference page 6-4 through 6-6 for component testing.*
5. **Mag Thermo SW.** Check items:
  - #17 (magnetron)
  - #11 (magnetron cooling fan.)
  - NOTE: Attached to back of the magnetron is the Mag thermo snap disk.*
6. **Blower motor defective message.** Check items:
  - #18 Blower motor speed controller.
  - #19 Convection (blower) motor
  - NOTE: Reference pages 5-6 and 5-7 for BMSC defective messages.*
7. **Heat Exchanger Thermocouple OPEN. Display shows the # 999.** Check items:
  - #9 (SMT controller board connector (J2) pins #37 & #38).
  - NOTE: Check pin connections.*
  - NOTE: Reference pages 4-3 through 4-5.*
8. **CC Heat thermocouple OPEN. Display shows the # 999.** Check items:
  - #9 (SMT controller board connector (J2) pins #37 & #38).
  - NOTE: Check pin connections.*
  - NOTE: Reference pages 4-3 through 4-5.*
9. **Heat Rise Low.** Check items:
  - #7 (K5 SS relay for heater)
  - #21(K7 SS relay for heater)
  - #18 (convection motor controller)
  - #20 (CB2 and CB3) (circuit breaker)
  - NOTE: Check heater continuity.*

## ELECTRICAL COMPONENT LOCATIONS:

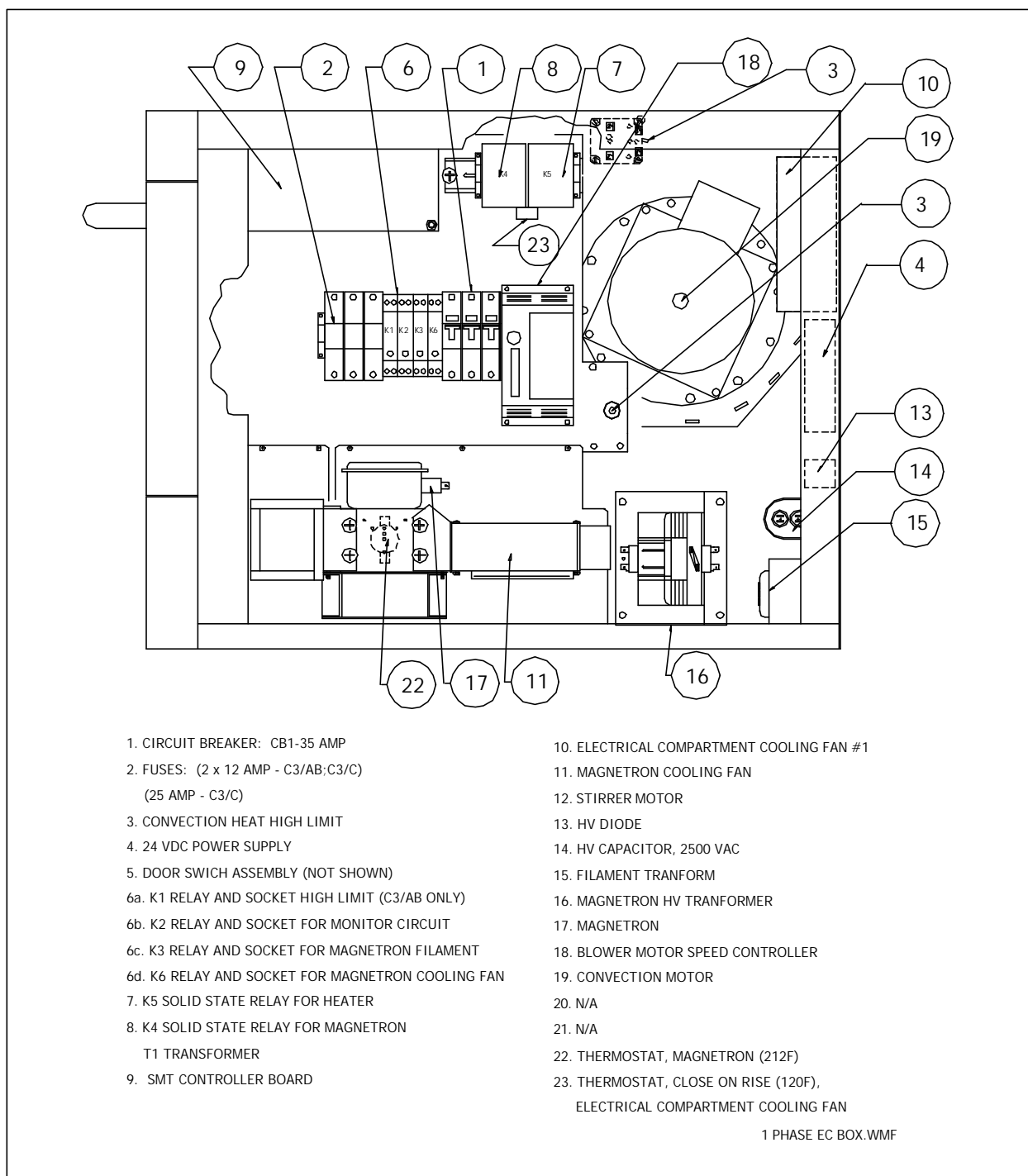


FIGURE 4-1a Electrical Component Locations C3/AB and C3/C Only

## ELECTRICAL COMPONENT LOCATIONS: “MULTI” OVENS ONLY

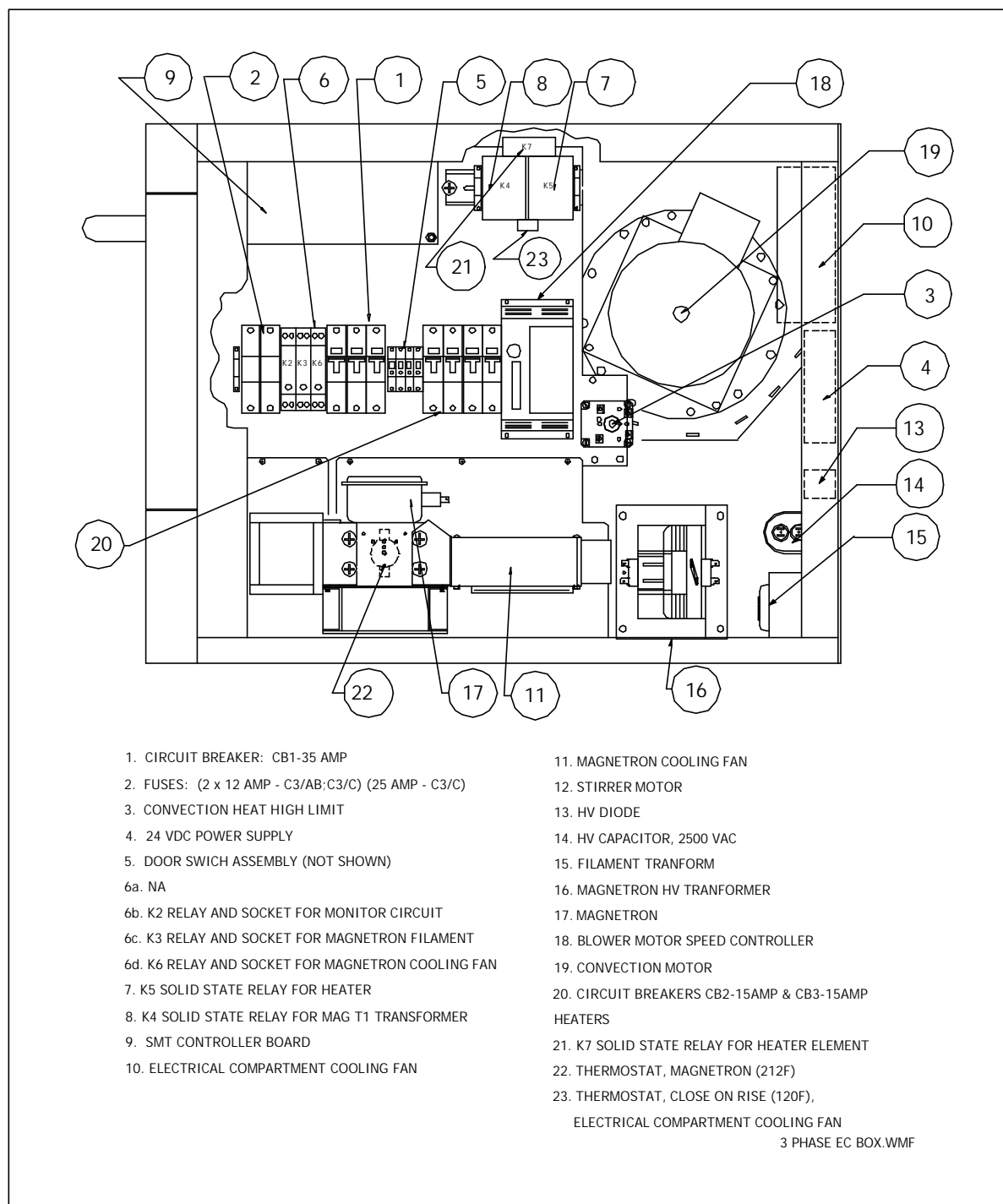


FIGURE 4–1b Electrical Component Locations C3Multi & C3/CMulti Only

### ELECTRICAL COMPONENT DESCRIPTION WITH VOLTAGE INFORMATION



#### CAUTION!

#### Magnetron voltage potential of 4800 VAC

*NOTE: To test if 208-240 VAC is present use CB1 Terminal L2A white wire as neutral.*

*NOTE: To test if voltage at coil is present, measure voltage across coil. Voltage should be present when activated.*

#### COMPONENTS

##### Item 1 Circuit Breaker CB1-35A

- 208-240 VAC Trip Coil Terminals (1 & 2).
- 208-240 VAC Line Input.
- 208-240 VAC Line Output.

##### Item 2 Fuse

- Qty (2) 12 AMP Fuse. USE ONLY GOULD ATM 12 or DIRECT EQUIVALENT.
- Qty (1) 25 AMP Fuse. USE ONLY GOULD ATM 25 or DIRECT EQUIVALENT. (C3/C Model Only)

*NOTE: Remove right side panel to expose fuse holders.*

##### Item 3 Convection Heat High Limit

- 208-240 VAC (N/O) Terminals (13 & 14).

*NOTE: Manual reset trip temp 350°C or 670°F.*

- 208-240 VAC (N/C) Terminals (11/12) & (31/32). C3Multi and C3/CMulti Only

*NOTE: Automatic reset trip temp 350°C or 670°F.*

##### Item 4 24 VDC power supply

- Line power in (L & N) 208-240 VAC.
- Output (+V & -V) 24 VDC.

##### Item 5 Door Switch Assy

- 24 VDC Switch #1 CDP (Cook door primary).
- 24 VDC Switch #2 CDS (Cook door secondary).
- 24 VDC Switch #3 CDM (Cook door monitor).

##### Item 6a. K1 High Limit Relay

- 208-240 VAC Coil terminals (8 & 1).
- 208-240 VAC Input Terminal (6).
- 208-240 VAC Output Terminals (5).

##### Item 6b K2 Relay for Monitor circuit

- 24 VDC Coil Terminals (8)+24 VDC & (1)-24 VDC.
- 208-240 VAC Input Terminal (6).
- 208-240 VAC Output Terminal (7).

##### Item 6c. K3 Relay for Filament Heat

- 24 VDC Coil Terminal (8)+24 VDC & (1)-24 VDC.
- 208-240 VAC Input Terminals (6 & 3).
- 208-240 VAC Output Terminals (5 & 4).

##### Item 6d. K6 Relay for Magnetron Cooling Fan

- 24 VDC Coil Terminals 24 VDC Input Terminals (6)-24VDC & (3)+24VDC.
- 24 VDC Output Terminals (5)-24VDC & (4)+24VDC.

##### Item 7 K5 Solid State Relay for Heater Element

- 24 VDC Coil Terminals (3+ & 4-).
- 208-240 VAC Input Terminal #1.
- 208-240 VAC Output Terminal #2.

##### Item 8 K4 Solid State Relay for Magnetron Transformer T1

- 24 VDC Coil Terminals (3+ & 4-)
- 208-240 VAC Input Terminal #1.
- 208-240 VAC Output Terminal #2.

##### Item 9 SMT Controller Board

- 24 VDC Line Input P2 location #16
- 24 VDC Line return location P2 #22
- Current Sense Transformer CT1.

*NOTE: Amp draw on wire going to Mag is 9 AMP.*

- Current Sense Transformer CT3.

*NOTE: Amp draw on wire going to Heater is 19 AMP.*

- Reference Page 6-7 for replacement.

##### Item 10 Electrical Compartment Cooling Fan #1

- 24 VDC Output from (-V 24 VDC Power supply & OT #1 terminal NO).

*NOTE: OT #1 closes at 120°F.*

##### Item 11 Magnetron Cooling Fan

- 24 VDC Input from K6 Terminals (5 & 3).
- 24 VDC Output from K6 Terminals. (5 & 4).

## TurboChef Technologies, Inc. C Series

### Item 12 Stir Motor

- 208-240 VAC Connector J1 (1 & 2)

*NOTE: Energized by K3 Filament Heat contactor.*

### Item 13 Diode

- Reference page 6-5 for test procedure.

### Item 14 Capacitor

- Reference page 6-5 for test procedure.

### Item 15 Filament Transformer

- Reference page 6-5 for test procedure.

### Item 16 Magnetron Transformer T1

- Reference page 6-5 for test procedure.

### Item 17 Magnetron

- Reference page 6-4 for test procedure.

### Item 18 Blower Motor Speed Controller

- 208 -240 VAC Line power location (N & 230V)
- Motor output (U,V,W) 24 - 240 VAC, 12-120 Hz, 3 phase.
- 24 VDC Motor control inputs and outputs.
  - #4) FWD RUN 24 VDC input.
  - #7) 0 to 10 VDC Speed input  
example, 1 VDC = 10% RPM, 2 VDC= 20% RPM.
  - #9) Speed Command.
  - #11) 24 VDC Common
  - #12) Running B.M.R

### Item 19 240 VAC Blower Motor inputs.

- 24 - 240 VAC, 12 - 120 Hz, 3Ø  
Input from B.M.S.C Terminals (U.V.W).

### Item 20 Circuit Breakers (CB2 and CB3) for Heater

- 200-240 VAC Inputs
- 200-240 VAC Outputs

### Item 21 K7 Solid State Relay for Heater Element

- 24 VDC Coil Terminals (3+ & 4-).
- 208-240 VAC Input Terminal #1.
- 208-240 VAC Output Terminal #2.

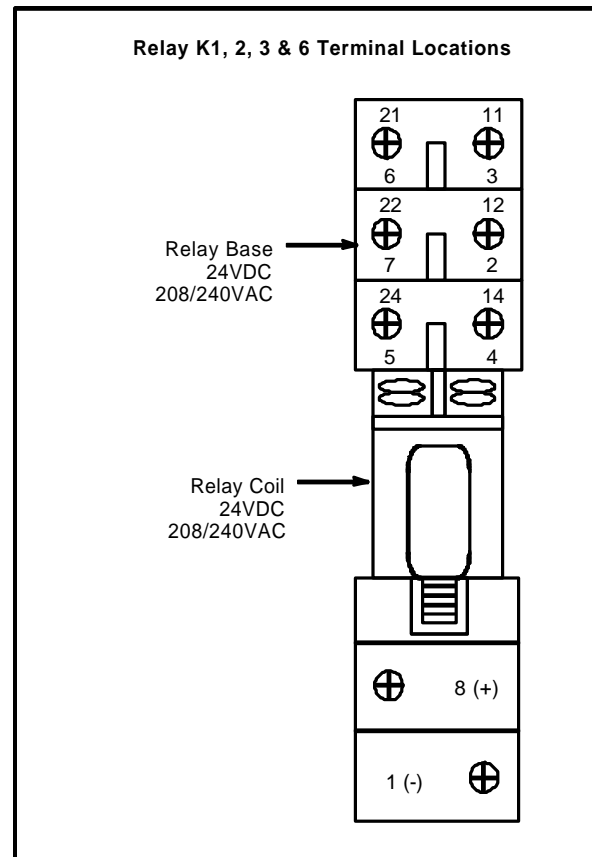


FIGURE 4 - 2 Relay Terminal Locations



## Electrical Compartment

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### ELECTRICAL COMPONENTS PARTS LIST: All C Series Ovens- (See Figures 4-1a/b)

| Item # | Part Number   | Description                                 | Used on Model(s)    |
|--------|---------------|---|---------------------|
| 1      | 0322          | Circuit Breaker CB1-35A w/Trip Coil         | C3/AB & C3/C        |
| 2      | 100596        | 12 Amp Aux Fuse                             | All                 |
| 2b     | 100597        | 25 Amp Heater Fuse                          | C3/C                |
| 2c     | 100591        | Fuse Holders                                | All                 |
| 3      | R7603         | Convection High Limit                       | C3/AB & C3/C        |
| 3      | 102016        | Convection High Limit                       | C3Multi & C3/CMulti |
| 4      | M9608         | 24 VDC Power Supply                         | All                 |
| 6      | C0278 & C0309 | Relay (24 VDC Coil/240 VAC Output) & Socket | All                 |
| 7      | 101285        | Solid State Relay for Heater                | All                 |
| 8      | 101285        | Solid Sate Relay for Magnetron              | All                 |
| 9      | 10310         | SMT Controller                              | All                 |
| 10     | M9609         | Electrical Compartment Cooling Fan          | C3/AB & C3Multi     |
| 10     | TBD           | EBM Electrical Compartment Cooling Fan      | C3/C & C3/CMulti    |
| 11     | 0262          | Magnetron Cooling Fan                       | All                 |
| 12     | 101891        | Stirrer Motor                               | All                 |
| 13     | 100480        | HV Diode                                    | All                 |
| 14     | 100206        | HV, Capacitor, 2500 V                       | All                 |
| 15     | 102091        | Filament Transformer                        | All                 |
| 16     | 102093        | Magnetron Transformer T1                    | All                 |
| 17     | 100860        | Magnetron                                   | All                 |
| 18     | 100441        | Blower Motor Speed Controller               | All                 |
| 19     | C0299         | Convection Motor Assy                       | All                 |
| 20     | 103170        | Circuit Breakers CB2 & CB3 15 Amp 15Amp     | C3Multi & C3/CMulti |

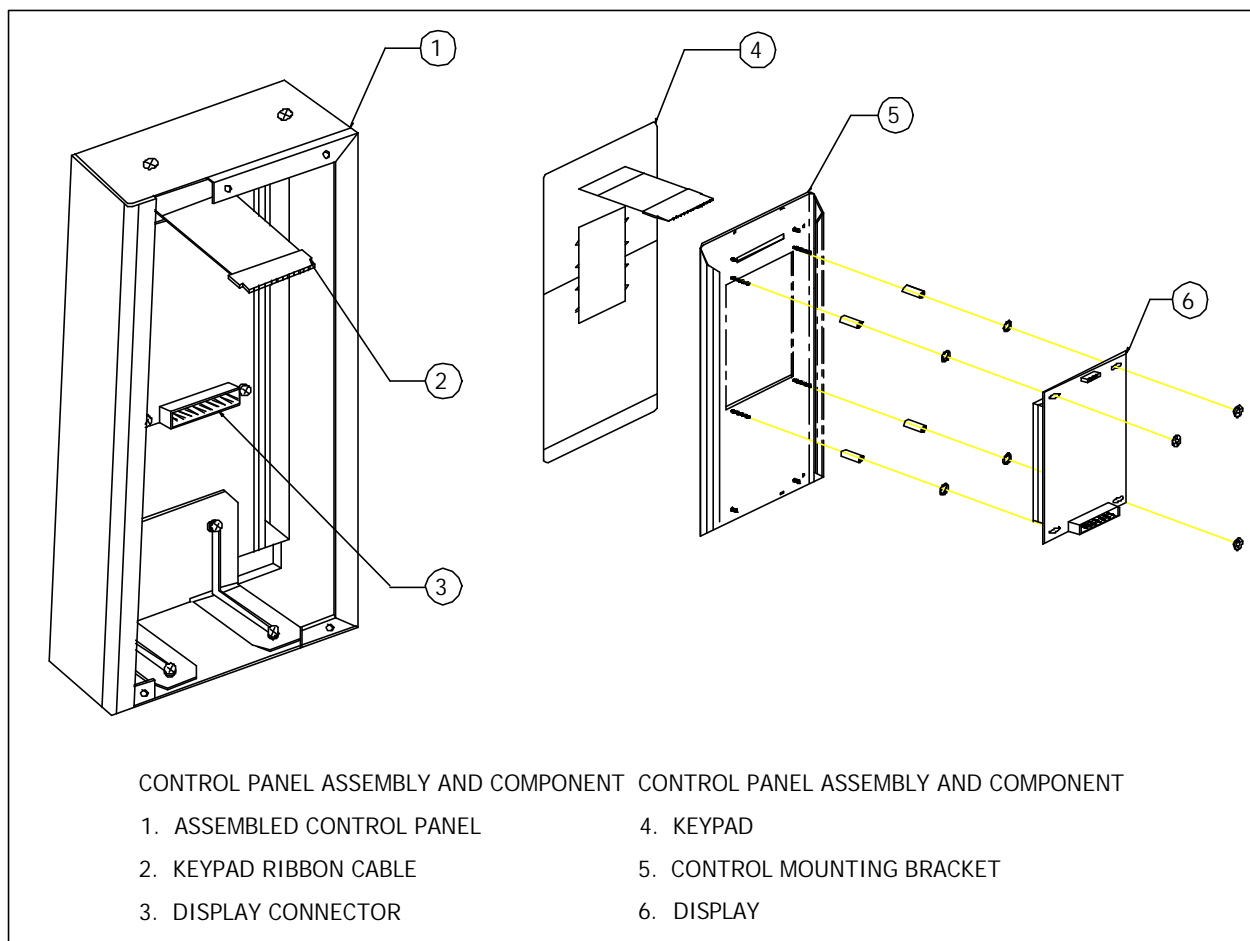
## TurboChef Technologies, Inc. C Series

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### **ELECTRICAL COMPONENTS PARTS LIST (CON'T): All C Series Ovens-** **(See Figures 4-1a/b)**

| <b>Item #</b> | <b>Part Number</b> | <b>Description</b>           | <b>Used on Model(s)</b> |
|---------------|--------------------|------------------------------|-------------------------|
| 21            | 101285             | K7 Solid State Relay         | C3Multi & C3/CMulti     |
| 22            | T102070            | Thermostat, Magnetron (212F) | All                     |
| 23            | T102085            | Thermostat, EC Box           | All                     |
| NS            | 100542             | EMI Filters (not shown)      | C3Multi & C3/CMulti     |
| NS            | C0286              | EMI Filter                   | C3/AB & C3/C            |
| NS            | 100652-1           | 240 VAC Sheathed Heater Assy | All                     |
| NS            | 100652-2           | 208 VAC Sheathed Heater Assy | All                     |
| NS            | 100652-3           | 200 VAC Sheathed Heater Assy | All                     |
| NS            |                    | NOT SHOWN                    |                         |

## CONTROL PANEL COMPONENT DETAIL



## CONTROL PANEL PARTS LIST (see above)

| ITEM | Part Number | Description                | Used on Model(s) |
|------|-------------|----------------------------|------------------|
| 1    | NA          | ASSEMBLED CONTROLLER PANEL | All              |
| 2    | NA          | KEYPAD RIBBON CABLE        | All              |
| 3    | NA          | VFD DISPLAY CONNECTOR      | All              |
| 4    | T0264       | KEYPAD                     | All              |
| 5    | T0374       | CONTROL MOUNTING PLATE     | C3/AB & C3MULTI  |
| 5    | C0374       | CONTROL MOUNTING PLATE     | C3/C & C3/CMULTI |
| 6    | T0238       | VFD DISPLAY                | All              |

# TurboChef Technologies, Inc. C Series

## DOOR SWITCHES AND CIRCUIT BREAKERS

### DOOR SWITCHES

The C series ovens have 3 door switches as mandated by law. The C3/AB and C3Multi have one door switch located on the left hand side (CDS) and is called the secondary switch. The other two switches are located on the right hand side (CDP & CDM). One is called the primary switch (CDP) and the other is called the monitor switch (CDM). The C3/C and C3/CMulti switch orientation is reversed, i.e., the monitor (CDM) and the primary switch (CDP) are located on the left side of the oven. The secondary (CDS) is located on the right side of the oven.

**The monitor switch must close before the primary and secondary switches close (as the door is closed) or the circuit breaker will trip. If the primary or secondary switch is defective and not closing the screen will display a door open error message.** To determine what sequence the doors are closing

in, you will need to access the Test mode and activate the Test mode (See pages 3-2 to 3-4). By doing so, you will activate the status indicators at the lower left bottom of the display. Slowly close the door once you have activated the Test mode and observe the status indicators. As you close the door the **M** indicator must change from a highlighted state followed by the **S** indicator and final the **P** indicator. As you open the door, the sequence must reverse, i.e., **P**, **S** and then **M**. If this sequence is not correct, YOU MUST READJUST THE SWITCHES. See section 4-7.

### CIRCUIT BREAKER (CB1)

The circuit breaker is a manual reset switch. It will trip if the total current draw is more than 35 Amps (C3/AB and C3/C)/15 Amps(C3/Multi or C3/Cmulti) or if it is activated by a safety fault. Refer to the chart below to help you determine what problem you may have if the circuit breaker has tripped.

| CIRCUIT BREAKER TRIP CHART                          |  |
|---|--|
| Component   | Possible Cause/Circuit Information   |
| Magnetron transformer                               | The magnetron transformer will draw approximately 9 amps when functioning properly. Check winding resistances (See Page 6-5).<br>A 3 amp draw indicates the diode is bad.                                    |
| Solid state contactor for Magnetron (K4)            | (See above for correct current draw.) The coil operates on 24v dc. Solid state relays tend to fail closed. Check with VOM meter.   |
| Hot air heater element                              | Use VOM meter.<br>240V element is 12 ohms / current is 20amps.<br>208V element is 9 ohms / current is 23 amps.<br>C3/C oven only: Check the 25AMP fuse inline with the CB1 and the heater. See Figures 4-1a. |
| Solid state contactor (K5) (K7) for hot air element | (See above for correct current draw.) The coil operates on 24v dc. Solid state relays tend to Fail closed. Check with VOM meter.   |
| High limit & K1 relay (C3/AB and C3/C only)         | High limit tripped (670F). Reset high limit switch with screwdriver. Check thermocouples (See page 5-4) Verify contact points (6 to 5) on K1 relay are open. Check K5.                                       |
| Door switch closure                                 | (Read first paragraph on this page.) Check Switches with VOM meter.  |

TABLE 4 - 1 Causes for Circuit Breaker Tripping

## DOOR SWITCH ADJUSTMENT

### Tools Required:

- # 1 Phillips head screw driver
- # 2 Phillips head screw driver
- 3/8" socket wrench (1/4" drive)
- Needle nose pliers
- Large flat blade screw driver

### GOAL

The goal of this adjustment procedure is to have the Monitor, Secondary and Primary switches close in that order as the oven door is closed. The switches must open in the reverse order as the door is opened, that is, the Primary, Secondary and then the Monitor open as the door opens. This procedure is written to insure proper oven operation and compliance with Federal regulations.

### ADJUSTMENT

- 1) Remove the left and right side access covers (body sides).
- 2) Remove the lower louvered front access panel.
- 3) Remove oven top. It is secured in place with four 3/8" Nylock nuts to the upper frame sides.
- 4) Remove screw located on bottom of left side corner trim (front of oven) and carefully bend the trim out of the way to allow access to left side switch assembly and associated hardware. (See Fig. 4-3 ).

#### RIGHT SIDE OF OVEN:

NOTE: The C3/C and C3/Cmulti oven switch arrangement is different from the C3/AB and the C3Multi. The C3/AB and C3/Multi monitor and primary switches are on the right-hand side of the oven and the secondary switch is on the left-hand side of the oven. Regardless of their position on the oven, the procedure for adjusting the switches is the same for both types of ovens. See Figure 4-4.

5. Remove magnetron plenum assembly (secured by one PPH screw at rear of oven). The plenum assembly is located on the bottom right side of the oven.
6. On models C3/AB and C3Multi it may be necessary to remove the 35 AMP circuit breaker in order to gain access to the limit switches. If this is necessary, label each wire prior to removing it from the Circuit Breaker in the following step.

7. Carefully pull down two tabs on the bottom of the circuit breaker and pull the breaker up and out to remove it from the din rail allowing access to the switch brackets on the right side of the oven

Note: Refer to page 4-14, DOOR ADJUSTMENT, along with this section if the cam follower bracket assembly has to be adjusted and tightened. **This is very important to prevent any potential damage to the door hardware from interference and to assure proper door closing tension.**

8. Check that the trailing arm is properly engaged in cam follower bracket assembly and trailing arm guide blocks. When the door is closed the trailing arms should sit as shown. See Figure 4-3.
9. If the trailing arm is not properly engaged in cam follower bracket assembly or if it is hitting the assembly loosen the two 3/8" nuts securing the cam follower assembly.
10. Cam follower bracket assembly has clearance at the bottom to move. Pick up on trailing arm to engage it in trailing arm guide blocks and move cam follower bracket assembly up into notch on trailing arm. See Figure 4-5. Tighten the two 3/8" nuts when adjustment is correct.
11. When properly aligned, the door should have no play when pushed in the closed position and when opened the first movement of the trailing arm should be up and over the cam follower bracket assembly (both sides of the oven) – See Fig.4-5. Additionally, when the door is closed, the trailing arms should “snap” down into position. To test this, gently pick up one of the trailing arms approximately 3/4 inch and release it. The trailing arm should “snap” back down in to the same position each time. If it hangs or does not return to the exact position each time readjust the cam roller assembly.
12. If it is determine that a proper adjustment can not be made, it may be necessary to reposition the bottom hinge on the door. To do this, loosen item 11 (see Figure 4.3) on both sides of the oven. With all screws loose, close the door and push in and down on the door. While doing so, tighten all screws on the hinge. Now repeat steps 8-11.

# TurboChef Technologies, Inc. C Series

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## LIMIT SWITCH ADJUSTMENT PRIMARY AND MONITOR

13. Actuator tab should be positioned as shown in Figure 4-6. It should be parallel to the primary switch lever. Adjust and bend (needle nose pliers) actuator tab as necessary.
14. When the door is closed and the actuator tab is in contact with the primary and monitor switches the switches should both be closed. The actuator tab should be in contact with the switch paddles such that when the switches are closed there is about 0.020" of clearance between the switch paddles and the switch bodies. Also, the actuator tab should be at or close to horizontal and be positioned approximately 3/16" from the end of the monitor switch actuator tab. Adjust the interlock switch brackets by loosening the screws as necessary. See Figure 4.6.
15. Once the switches and actuator are properly adjusted, as the door is opened the primary switch should disengage before the monitor switch.

## LIMIT SWITCH ADJUSTMENT SECONDARY

16. Refer to steps 8, 9, 10, and 11 this page. The trailing arm must be properly engaged in the cam follower bracket assembly and the trailing arm guide blocks.
17. Again, the actuator tab should be positioned as shown in detail of Figure 4-6. Adjust and bend (needle nose pliers) actuator tab as necessary.
18. When the door is closed, the actuator tab is in contact with the secondary switch paddle and the switch should be closed. There should be approximately 0.020" of clearance between the switch paddle and the switch body. Adjust the limit switch bracket by loosening the screws as necessary.

## FINAL TESTING OF DOOR SWITCH ADJUSTMENT:

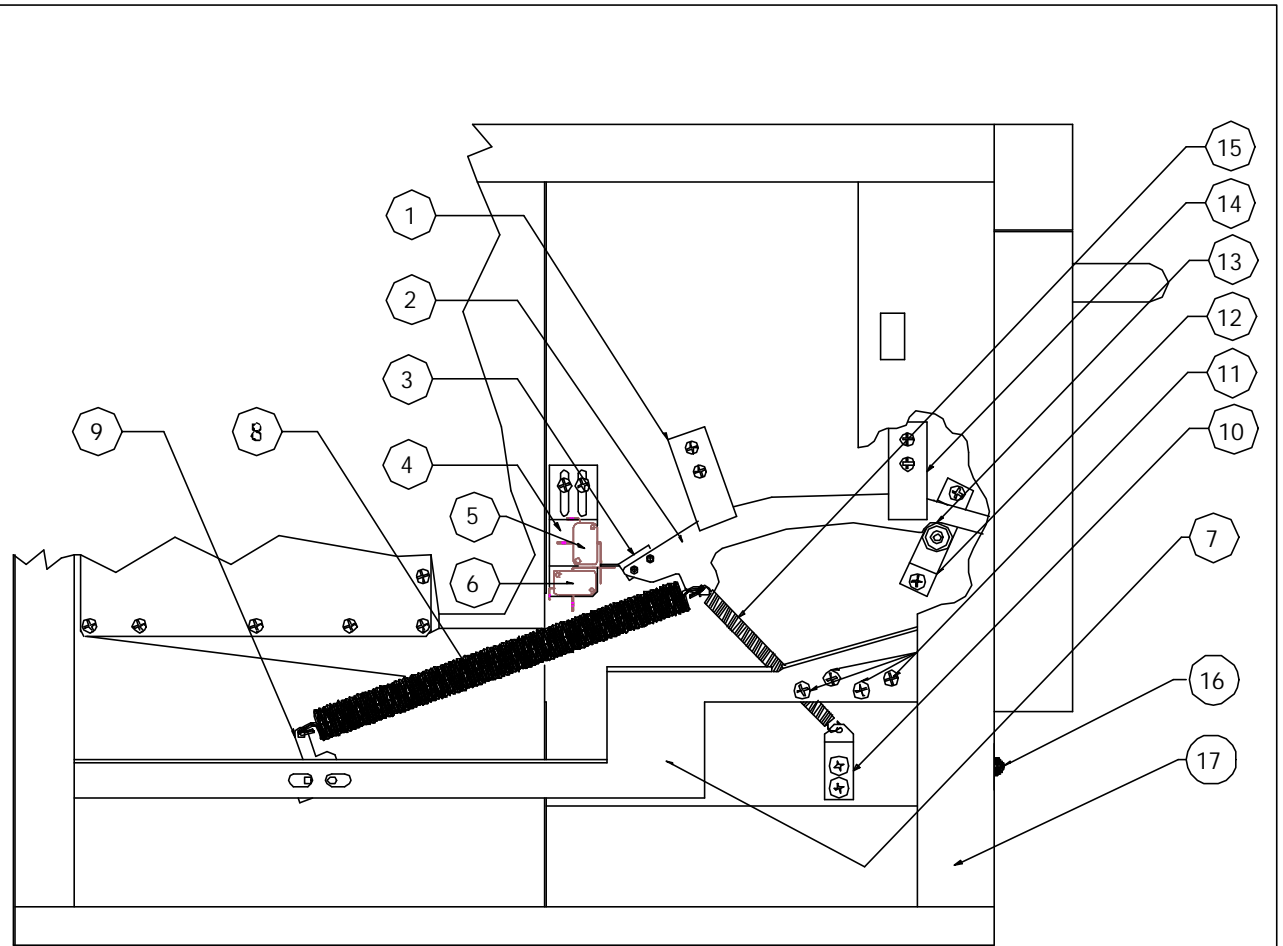
19. After the door switch assemblies have been properly aligned and adjusted on both sides, confirm that with the door closed that all three switch contacts are closed.

20. As the door is opened slowly confirm that all three switches operate in the correct sequence, i.e. as the door is opened the switches open in the order of primary, secondary, and monitor .
21. As the door is slowly closed confirm the switches close in the opposite order from above.
22. If the sequencing is not correct, readjust switch brackets and or associated hardware until all criteria are met.

## SWITCH TEST AT TEMPERATURE:

23. Reinstall main circuit breaker on din rail and reattach wiring to bottom of circuit breaker.
24. Reattach left side trim piece and magnetron plenum assembly.
25. Refit top cover and left and right side covers.
26. Plug the oven in and set the temperature to 525 8F and allow the oven to come up to temperature and remain at temperature for 15 minutes.
27. Refer to section 3, page 3-3, and put the oven into test mode. At the bottom left of the screen are the letters p, s, and m. As the oven door is slowly opened, the background of the letters will light up indicating that the switches have opened.
28. Slowly open and close the door to confirm the proper sequence of the switches, p, s, m and m, s, p respectively.
29. If the sequencing is not correct, remove the left and right side covers and adjust the switch brackets as necessary and retest the oven.
30. If the sequencing is correct, while in the test mode refer to section 6-2 and perform the microwave radiation leakage tests.

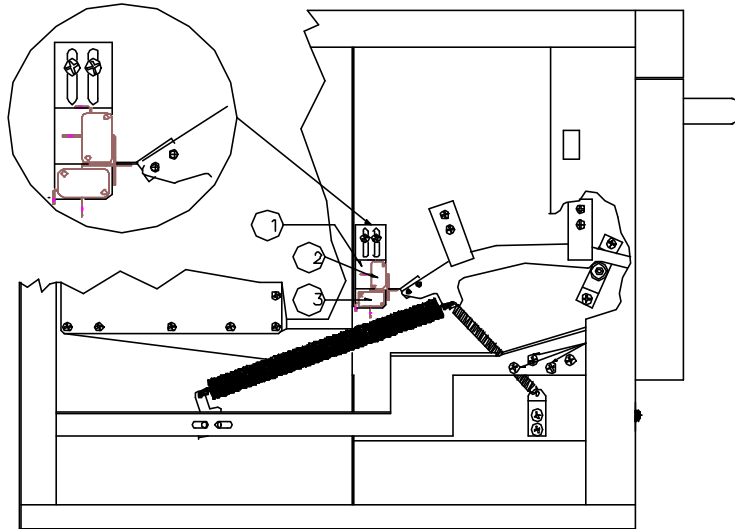
## Electrical Compartment



### DOOR REMOVAL AND REPLACEMENT (LEFT SIDE)

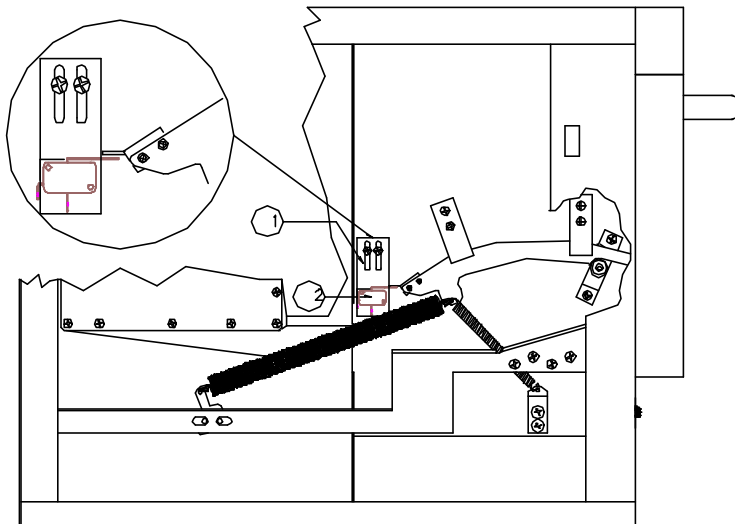
- |                                    |   |
|------------------------------------|---|
| 1. TRAILING ARM GUIDE              | 11. 10-32 SCREWS (C3, C3/AB ONLY) M5 (C3/C) |
| 2. TRAILING ARM                    | 12. CAM FOLLOWER ASSY                       |
| 3. INTERLOCK ACTUATOR BRACKET      | 13. CAM FOLLOWER ROLLER                     |
| 4. INTERLOCK SWITCH BRACKET        | 14. GUIDE BLOCK                             |
| 5. INTERLOCK MONITOR SWITCH        | 15. HELPER SPRING                           |
| 6. INTERLOCK PRIMARY SWITCH        | 16. SCREW, FRONT TRIM                       |
| 7. DOOR HINGE BAR MOUNTING BRACKET | (SHOWN WITH FRONT ACCESS PANEL REMOVED)     |
| 8. SPRING, TRAILING ARM            | 17. FRONT TRIM                              |
| 9. DOOR SPRING BRACKET             |   |
| 10. BRACKET, SPRING, LEFT          |   |

Figure 4-3 Door Interlock Mechanisms (C3/C and C3/CMulti Shown)



## C3/C AND C3/CMULTI OVENS SWITCH CONFIGURATION

1. MONITOR/PRIMARY SWITCH BRACKET
2. INTERLOCK MONITOR SWITCH
3. INTERLOCK PRIMARTY SWITCH



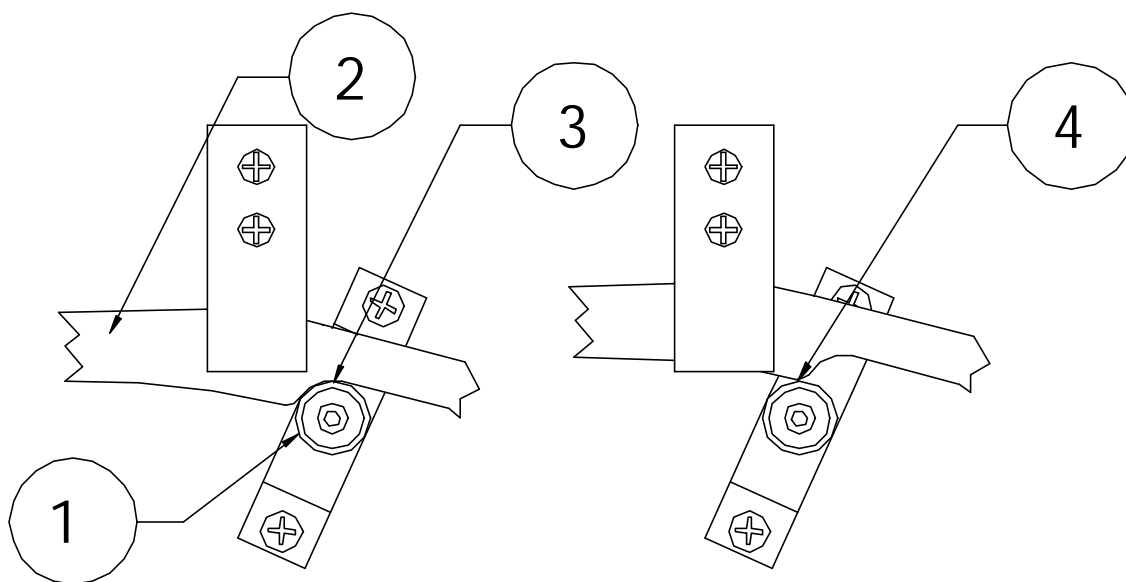
## C3, C3/AB AND C3MULTI OVENS SWITCH CONFIGURATION

1. SECONDARY SWITCH BRACKET
2. INTERLOCK SECONDARY SWITCH

C3/AB VS C3/C.WMF

Figure 4-4 Interlock Placement Differences C3/AB vs. C3/C





### TRAILING ARM AND CAM MOTION

1. CAM FOLLOWER ROLLER
2. TRAILING ARM

#### NOTES:

3. IN DOOR CLOSED POSITION, THE TRAILING ARM SHOULD SEAT AS SHOWN ON THE CAM. NOTE: BOTH THE LEFT AND RIGHT SIDES SHOULD BE ADJUSTED SUCH EACH SIDE SEATS AS SHOWN.
4. AS THE DOOR OPENS, THE TRAILING ARM MUST CONTACT CAM DURING FULL MOTION OF THE DOOR.

Figure 4-5 Trailing Arm and Cam Motion

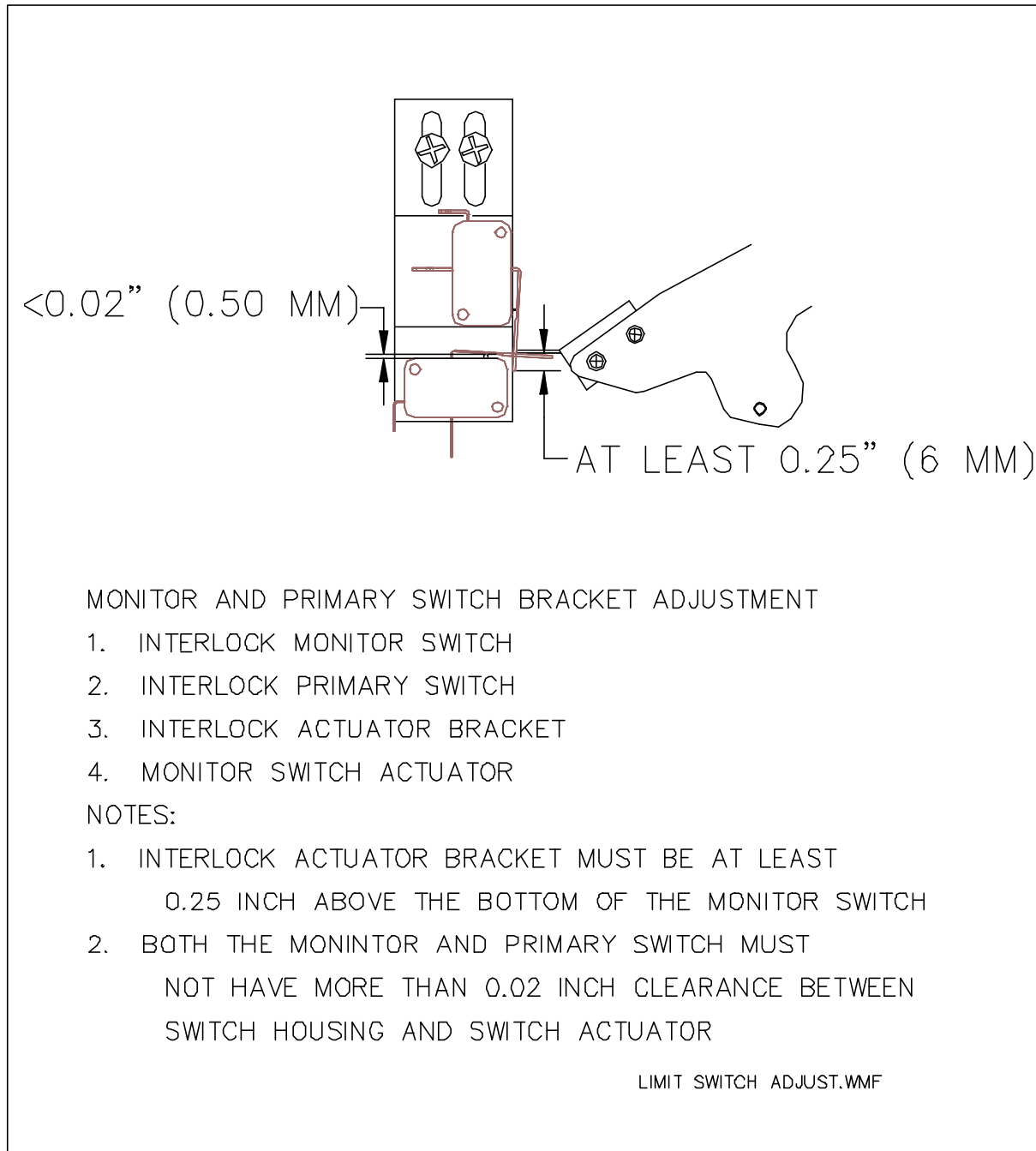


Figure 4-6: Interlock Switch Adjustment

### DOOR REMOVAL AND REPLACEMENT

#### Tools Required:

- 12" long #2 Phillips screw driver
- 3/8" hex driver
- 3/8" socket with 1/4" ratchet wrench
- Set of feeler gages
- Large flat blade screw driver

#### DOOR REMOVAL

- 1) Remove the side and top panels, top and bottom molding, control panel, and left perimeter trim piece.
- 2) Remove the interlock actuator tabs (#3) and front guide block assembly (#14) from both sides of the oven. (See FIGURE 4-7.)

**NOTE:** The guide block assembly may or may not contain guide block support shims. Guide block assemblies should be re-installed in the location they were removed from (i.e. right guide block assembly re-installed on right side) to prevent potential trailing arm binding.

- 3) Close the oven door and disconnect the springs (#8 & #15) from both trailing arms (#2).
- 4) Loosen but do not remove the nuts that hold the cam follower assembly (#12) in position, then rotate both assemblies down to vertical orientation.
- 5) Remove the door:
  - a) Remove the four 10–32 (M5) UNF Phillips screws (#11) from the door hinge bar mounting brackets (#7) on both sides of the oven.
  - b) Pull the door away from the oven, bottom first, to slide the hinge bars (#14) out of their slots. Use caution in removing the door to avoid bending the hinge bars. If the bars bind in their slots, gently wiggle the door to free them.
  - c) Remove the door, guiding the hooked portion of the trailing arm over the cam follower rollers (#13).

#### DOOR INSTALLATION

- 6) Rotate cam follower assembly (#12) down to vertical position to permit the trailing arms (#2) to pass over the cam follower roller (#11) in step 2.
- 7) Assemble the door to the oven:

- a) Slide the trailing arms through the upper slots and over the rollers.
  - b) Slide the hinge bars (not shown) through the lower slots. Use caution in installing the door to avoid bending the hinge bars. If the bars bind in their slots, gently wiggle the door to free them.
  - c) Attach the bars to the door hinge bar mounting brackets (#13) with four 10–32 (M5) UNF screws (#11) on each side (finger tight). Apply 242 thread-locker to screw threads prior to installation.
  - d) Close the door and apply even pressure (approximately 15 to 20 pounds) to the face of the door to squarely seat the door shunt on the oven face. Continue to apply this force while tightening the four screws on each side (two people are recommended).
- 8) Install the springs (#8) on each side between the trailing arm and spring brackets – See door switch adjustment section beginning on page 4-7. Any interference between any other component or wiring and the springs or trailing arms must be corrected before proceeding.
  - 9) Install the front trailing arm guide blocks (#14):
    - a) Assemble (per side) one spacer block, two guide blocks, two spacers, and two screws with lock-washers.

**NOTE:** The guide block assembly may or may not contain guide block support shims. Guide block assemblies should be re-installed in the location they were removed from (i.e. right guide block assembly re-installed on right side) to prevent potential trailing arm binding

- b) Install one guide block assembly over each trailing arm and tighten screws.
- 10) Install the interlock actuator tabs (#3):
    - a) Open the door.
    - b) Attach the interlock actuator tabs to the trailing arms with two 6–32 UNF (M3) screws, and lock and flat washers on each side.

**NOTE:** As you face the oven front both actuator tabs are mounted on the inside of the trailing arms.

# TurboChef Technologies, Inc. C Series

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## **WARNING!!**

**At the first closing of the door verify that the actuator tabs do not hit and bend on the trailing arm guides block assemblies (#1 and #14). Verify placement of the actuator tabs to insure that the interlock switch levers do not bottom out on the switch body (#6). If they do, open the door and realign switch brackets and or actuator tabs again checking for interference with the guide as the door is closed.**

## **DOOR ADJUSTMENT**

- 1) Adjust cam follower assembly (#12) to tension the trailing arms (#2) to apply closing pressure:
  - a) Close the door.
  - b) Rotate the cam follower assembly so that the top of the trailing arm engages the rear guide (#1) 0.125 inch (+0.125 - 0.031) above the top of the chamfered lead in.
  - c) The cam follower assembly roller (#11) should be located on the ramp portion of the trailing arm with 0.020" to 0.050" gap between the top of the roller and the bottom of the trailing arm radius.
  - d) Tighten the cam follower bracket nuts.
- 2) Adjust the interlock switch brackets (#4) and actuator tabs (#3):

*NOTE: Refer to page 4-6 for the final door switch adjustment. This adjustment is completed after all door adjustment steps have been completed.*

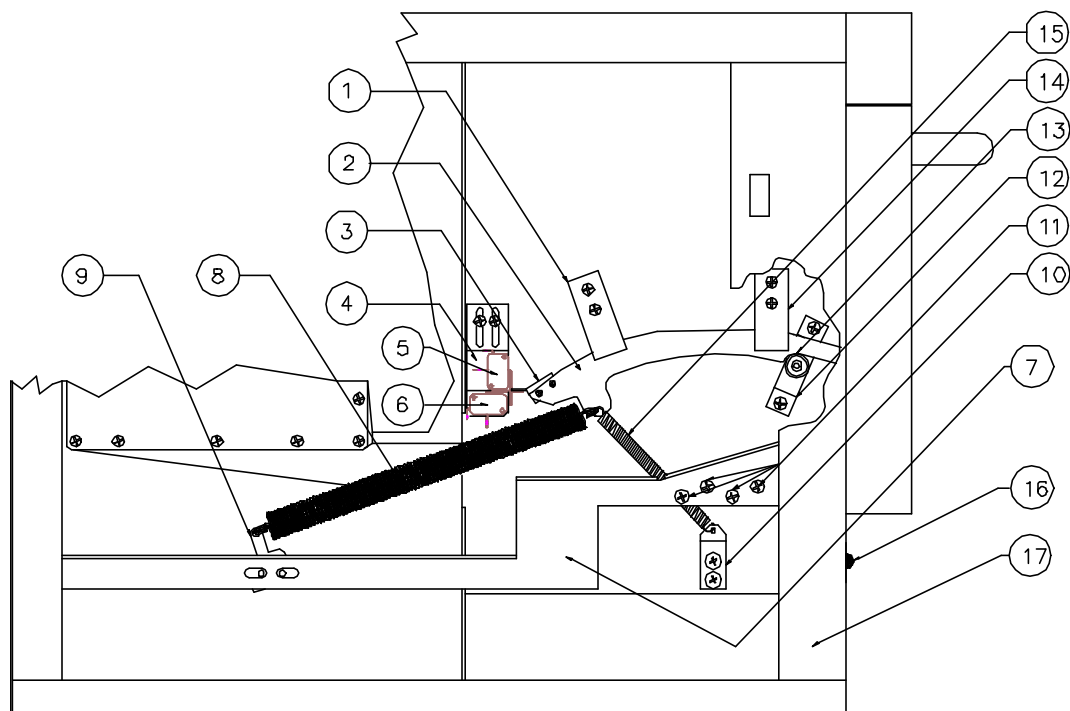
- 3) Adjust the door pivot position for best alignment by inspecting for the following conditions:
  - a) Ideally, the microwave sealing planes (the portions of the oven face and door shunt that overlap each other) should touch, since as the gap between the sealing planes increases, it becomes more likely that the microwave leakage will increase. However, because of manufacturing tolerances, the microwave sealing planes of the door shunt and the oven flange are not perfectly flat. The best door alignment minimizes the gaps between the sealing planes both top and bottom.

- b) If the hinge bars have been pushed too far into their brackets (#13), the lower edge of the sealing planes will be tight and there will be an excessive gap between the sealing planes along the top edge. In this position, with the top molding removed, most of the hex head of the shunt screws will be seen.
- c) If the hinge bars have not been pushed far enough into their brackets the upper edge of the sealing planes will be tight and an excessive gap will occur between the sealing planes along the bottom edge. This could permit excessive microwave leakage along the bottom edge.

*NOTE: To correct B or C: Loosen the door hinge bar screws (#11) on both sides. Close the door and apply **even** pressure (approximately 15 to 20 pounds) to both sides of the door to squarely seat the door shunt on the oven face. Continue to apply this force while tightening the four screws on each side (two people are recommended).*

- d) By design there is a 0.030" clearance between the Phillips head screws securing the plastic shunt cover and the oven flange on the C3/AB and C3Multi. The C3/C and C3/CMulti gap should be 0.060" (1.50 mm). Verify that one or more of these screws does not contact the oven flange and increase the gap between the sealing planes. This condition may be indicated by the head of the screw(s) marking the oven flange. If this is the case, the door may be warped or the shunt may not be flat. Adjust, repair, or replace the door so that when the door shunt is seated squarely none of the Phillips head screws contact the oven flange.
  - e) Repeat adjustment steps 1 and 2 as required after completing door alignment.
- 4) Adjust the interlock switches per procedure beginning on page 4-7.
  - 5) After adjusting the interlock switches the oven must be checked for microwave leakage. Refer to the page 6-2 for instructions and acceptable limits.

## Electrical Compartment



### DOOR REMOVAL AND REPLACEMENT (LEFT SIDE)

- |                                    |   |
|------------------------------------|---|
| 1. TRAILING ARM GUIDE              | 11. 10-32 SCREWS (C3, C3/AB ONLY)       |
| 2. TRAILING ARM                    | M5 (C3/C C3/CMULTI)                     |
| 3. INTERLOCK ACTUATOR BRACKET      | 12. CAM FOLLOWER ASSY                   |
| 4. INTERLOCK SWITCH BRACKET        | 13. CAM FOLLOWER ROLLER                 |
| 5. INTERLOCK MONITOR SWITCH        | 14. GUIDE BLOCK                         |
| 6. INTERLOCK PRIMARY SWITCH        | 15. HELPER SPRING                       |
| 7. DOOR HINGE BAR MOUNTING BRACKET | 16. SCREW, FRONT TRIM                   |
| 8. SPRING, TRAILING ARM            | (SHOWN WITH FRONT ACCESS PANEL REMOVED) |
| 9. DOOR SPRING BRACKET             | 17. FRONT TRIM                          |
| 10. BRACKET, SPRING, LEFT          |   |

LEFT SIDE DOOR VIEW.WMF

FIGURE 4 – 7a Door Removal and Replacement (Left Side)

## TurboChef Technologies, Inc. C Series

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### DOOR REMOVAL AND REPLACEMENT PARTS LIST (LEFT SIDE):

See Figure 4-7a.

| ITEM | Part Number | Description                                | Used on Model(s) |
|------|-------------|--|------------------|
| 1    | T0538       | TRAILING ARM GUIDE                         | C3/AB, C3MULTI   |
| 1    | C0538       | TRAILING ARM GUIDE                         | C3/C, C3/CMULTI  |
| 2    | T0550       | TRAILING ARM, RH                           | C3/AB, C3MULTI   |
| 2    | C0550       | TRAILING ARM, RH                           | C3/C, C3/CMULTI  |
| 3    | T0529       | INTERLOCK ACTUATOR BRACKET                 | C3/AB, C3MULTI   |
| 3    | C0529-2     | INTERLOCK ACTUATOR BRACKET                 | C3/C, C3/CMULTI  |
| 4    | T0534       | INTERLOCK SWITCH BRACKET                   | C3/AB, C3MULTI   |
| 4    | C0534       | INTERLOCK SWITCH BRACKET                   | C3/C, C3/CMULTI  |
| 5    | T0330       | INTERLOCK SECONDARY SWITCH                 | C3/AB, C3MULTI   |
| 5    | C0330       | INTERLOCK MONITOR SWITCH                   | C3/C, C3/CMULTI  |
| 6    | C0330       | INTERLOCK PRIMARY SWITCH                   | C3/C, C3/CMULTI  |
| 7    | T0516       | DOOR HINGE BAR MOUNTING<br>BRACKET         | C3/AB, C3MULTI   |
| 7    | C0516       | DOOR HINGE BAR MOUNTING<br>BRACKET BRACKET | C3/C, C3/CMULTI  |
| 8    | T0542       | SPRING, TRAILING ARM                       | C3/AB, C3MULTI   |
| 8    | C0542       | SPRING, TRAILING ARM                       | C3/C, C3/CMULTI  |
| 9    | T0535       | DOOR SPRING BRACKET                        | C3/AB, C3MULTI   |
| 9    | C0535       | DOOR SPRING BRACKET                        | C3/C, C3/CMULTI  |
| 10   | TC3-0186    | BRACKET, SPRING, LEFT                      | C3/AB, C3MULTI   |
| 10   | C0186       | BRACKET, SPRING, LEFT                      | C3/C, C3/CMULTI  |
| 11   | 1014501     | 10-32 X 3/8 PPH CRES                       | C3/AB, C3MULTI   |
| 11   | TBD         | M5 X 10 mm                                 | C3/C, C3/CMULTI  |

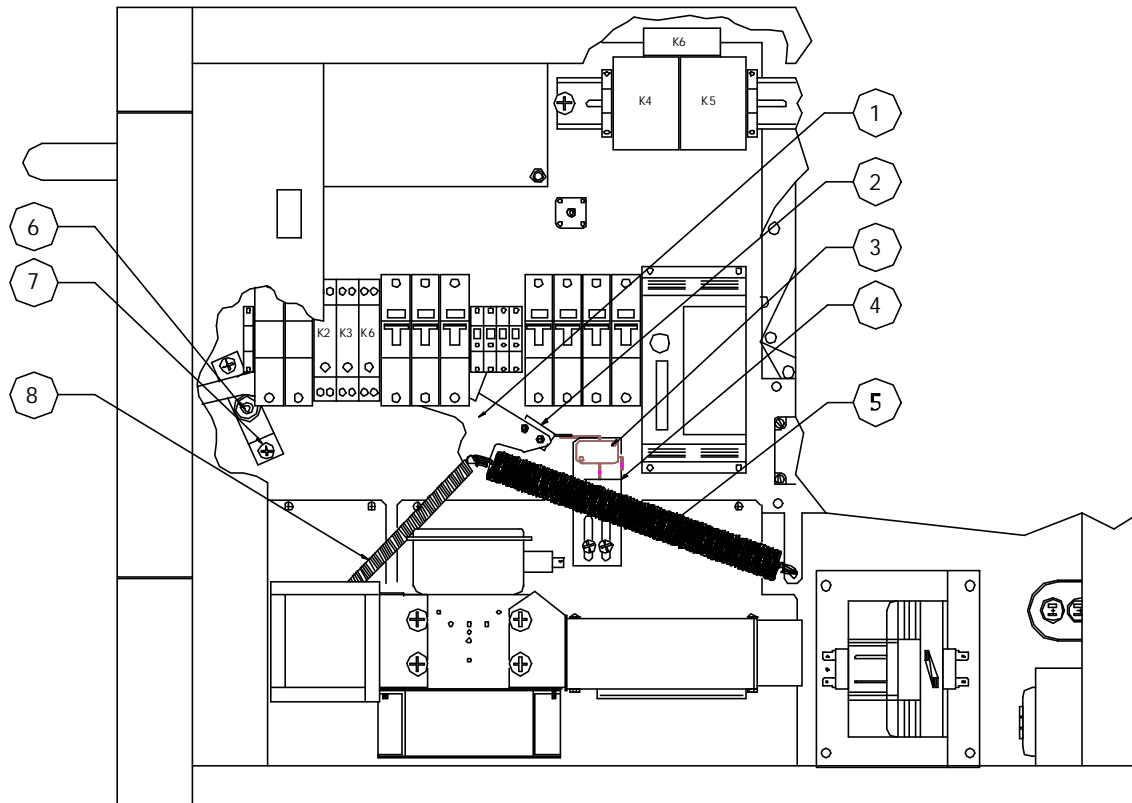
### DOOR REMOVAL AND REPLACEMENT PARTS LIST (LEFT SIDE) CON'T

## Electrical Compartment

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See Figure 4-7a.

| ITEM | Part Number | Description         | Used on Model(s) |
|------|-------------|---------------------|------------------|
| 12   | T0514       | CAM FOLLOWER ASSY   | C3/AB, C3MULTI   |
| 12   | C0514       | CAM FOLLOWER ASSY   | C3/C, C3/CMULTI  |
| 13   | T0541       | CAM FOLLOWER ROLLER | C3/AB, C3MULTI   |
| 13   | C0541       | CAM FOLLOWER ROLLER | C3/C, C3/CMULTI  |
| 14   | T0548       | GUIDE BLOCK         | C3/AB, C3MULTI   |
| 14   | C0548       | GUIDE BLOCK         | C3/C, C3/CMULTI  |
| 15   | TC3-0179    | HELPER SPRING       | C3/AB, C3MULTI   |
| 15   | C0708       | HELPER SPRING       | C3/C, C3/CMULTI  |



DOOR REMOVAL AND REPLACEMENT (RIGHT SIDE)

1. TRAILING ARM
2. INTERLOCK ACTUATOR BRACKET
3. INTERLOCK SECONDARY SWITCH
4. INTERLOCK SWITCH BRACKET
5. SPRING, TRAILING ARM
6. CAM FOLLOWER ROLLER
7. CAM FOLLOWER ASSY
8. HELPER SPRING

FIGURE 4 – 7b Door Removal and Replacement (Right Side)

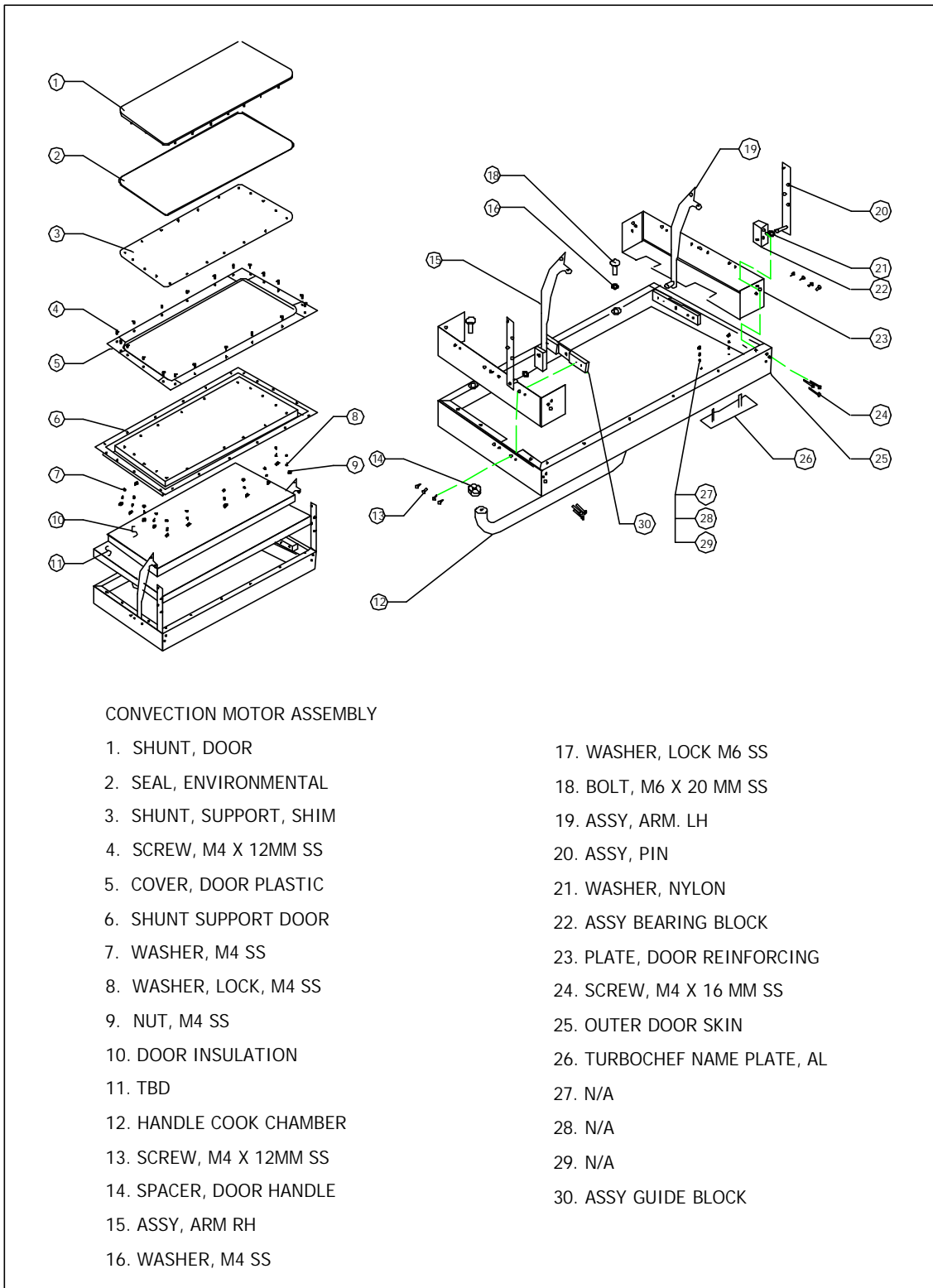


### DOOR REMOVAL AND REPLACEMENT PARTS LIST (RIGHT SIDE):

See Figure 4-7b

| ITEM | Part Number | Description                         | Used on Model(s) |
|------|-------------|-------------------------------------|------------------|
| 1    | T0550       | TRAILING ARM, RH                    | C3/AB, C3MULTI   |
| 1    | C0550       | TRAILING ARM, RH                    | C3/C, C3/CMULTI  |
| 2    | T0529       | INTERLOCK ACTUATOR BRACKET          | C3/AB, C3MULTI   |
| 2    | C0529-1     | INTERLOCK ACTUATOR BRACKET          | C3/C, C3/CMULTI  |
| 3    | T0330       | INTERLOCK MONITOR SWITCH            | C3/AB, C3MULTI   |
| 3    | T0330       | INTERLOCK PRIMARY SWITCH            | C3/AB, C3MULTI   |
| 3    | T0330       | INTERLOCK SECONDARY SWITCH          | C3/C, C3/CMULTI  |
| 4    | C0534       | INTERLOCK SWITCH BRACKET            | C3/C, C3/CMULTI  |
| 4    | T0534       | INTERLOCK MONITOR SWITCH<br>BRACKET | C3/AB, C3MULTI   |
| 4    | T0534       | INTERLOCK PRIMARY SWITCH<br>BRACKET | C3/AB, C3MULTI   |
| 5    | T0542       | SPRING, TRAILING ARM                | C3/AB, C3MULTI   |
| 5    | C0542       | SPRING, TRAILING ARM                | C3/C, C3/CMULTI  |
| 6    | T0514       | CAM FOLLOWER ASSY                   | C3/AB, C3MULTI   |
| 6    | C0514       | CAM FOLLOWER ASSY                   | C3/C, C3/CMULTI  |
| 7    | T0541       | CAM FOLLOWER ROLLER                 | C3/AB, C3MULTI   |
| 7    | C0541       | CAM FOLLOWER ROLLER                 | C3/C, C3/CMULTI  |
| 8    | TC3-0179    | HELPER SPRING                       | C3/AB, C3MULTI   |
| 8    | C0708       | HELPER SPRING                       | C3/C, C3/CMULTI  |
| N/S  | T0548       | GUIDE BLOCK                         | C3/AB, C3MULTI   |
| N/S  | C0548       | GUIDE BLOCK                         | C3/C, C3/CMULTI  |
| N/S  | T0538       | TRAILING ARM GUIDE                  | C3/AB, C3MULTI   |
| N/S  | C0538       | TRAILING ARM GUIDE                  | C3/C, C3/CMULTI  |

# TurboChef Technologies, Inc. C Series



### C3/C AND C3/CMULTI DOOR ASSEMBLY PARTS: See Figure 4-8

| Item | Part Number | Description          | Used on Model(s) |
|------|-------------|----------------------|------------------|
| 1    | C0190       | SHUNT, DOOR          | C3/C & C3/CMULTI |
| 2    | C0325       | SEAL, ENVIRONMENTAL  | C3/C & C3/CMULTI |
| 3    | C0427       | SHUNT, SUPPORT, SHIM | C3/C & C3/CMULTI |
| 4    | N/A         | SCREW, M4 X 12 MM SS | C3/C & C3/CMULTI |
| 5    | C0254       | COVER, DOOR PLASTIC  | C3/C & C3/CMULTI |
| 6    | C0426       | SHUNT SUPPORT DOOR   | C3/C & C3/CMULTI |
| 7    | N/A         | WASHER, M4 SS        | C3/C & C3/CMULTI |
| 8    | N/A         | WASHER, LOCK, M4 SS  | C3/C & C3/CMULTI |
| 9    | N/A         | NUT M4 SS            | C3/C & C3/CMULTI |
| 10   | C0575       | DOOR INSULATION      | C3/C & C3/CMULTI |
| 11   | C0431       | DOOR INSULATION      | C3/C & C3/CMULTI |
| 12   | C0267       | HANDLE COOK CHAMBER  | C3/C & C3/CMULTI |
| 13   | N/A         | SCREW, M4 X 12 MM SS | C3/C & C3/CMULTI |
| 14   | C0350       | SPACER, DOOR HANDLE  | C3/C & C3/CMULTI |
| 15   | C0500       | ASSY, ARM RH         | C3/C & C3/CMULTI |
| 16   | N/A         | WASHER, M4 SS        | C3/C & C3/CMULTI |
| 17   | N/A         | WASHER, LOCK M6 SS   | C3/C & C3/CMULTI |
| 18   | N/A         | BOLT, M6 X 20 MM SS  | C3/C & C3/CMULTI |
| 19   | C0550       | ASSY, ARM, LH        | C3/C & C3/CMULTI |
| 20   | C0503       | ASSY, PIN            | C3/C & C3/CMULTI |
| 21   | C0504       | WASHER, NYLON        | C3/C & C3/CMULTI |

## TurboChef Technologies, Inc. C Series

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### **C3/C AND C3/CMULTI DOOR ASSEMBLY PARTS (CON'T): See Figure 4-8**

| <b>Item</b> | <b>Part Number</b> | <b>Description</b>       | <b>Used on Model(s)</b> |
|-------------|--------------------|--------------------------|-------------------------|
| 22          | C508               | ASSY BEARING BLOCK       | C3/C & C3/CMULTI        |
| 23          | C0507              | PLATE, DOOR REINFORCING  | C3/C & C3/CMULTI        |
| 24          | N/A                | SCREW, M4 X 16 MM SS     | C3/C & C3/CMULTI        |
| 25          | C0193              | OUTER DOOR SKIN          | C3/C & C3/CMULTI        |
| 26          | C0581              | TURBOCHEF NAME PLATE, AI | C3/C & C3/CMULTI        |
| 30          | C0514              | ASSY GUIDE BLOCK         | C3/C & C3/CMULTI        |

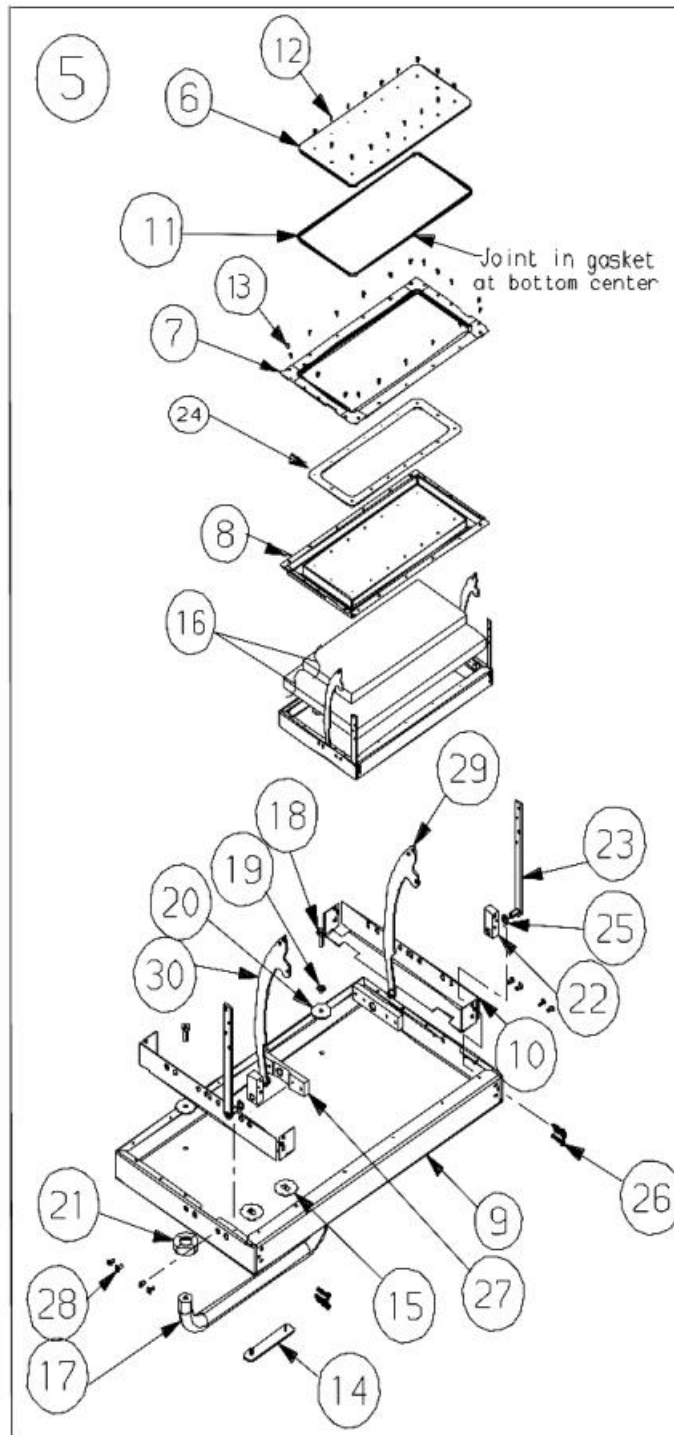


Figure 4-9: C3/AB and C3Multi Door Assembly

## TurboChef Technologies, Inc. C Series

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### C3/AB AND C3MULTI DOOR ASSEMBLY PARTS: See Figure 4-9

| Item # | Part Number | Description                      | Used on Model(s)   |
|--------|-------------|----------------------------------|--------------------|
| 6      | T0190       | SHUNT, DOOR                      | C3/AB and C3/Multi |
| 7      | T0254       | PLSTIC COVER, DOOR               | C3/AB and C3/Multi |
| 8      | T0426       | SHUNT SUPPORT DOOR               | C3/AB and C3/Multi |
| 9      | T0193       | OUTER SKIN, DOOR                 | C3/AB and C3/Multi |
| 10     | T0507       | PLATE, DOOR REINFORCING          | C3/AB and C3/Multi |
| 11     | T0325       | GASKET, SHUNT                    | C3/AB and C3/Multi |
| 12     | M0999       | SCREW, #8-32 X 3/8 SS            | C3/AB and C3/Multi |
| 13     | R7329       | SCREW, TAPPING, #8-32 X 1/2 SS   | C3/AB and C3/Multi |
| 14     | C0581       | NAMEPLATE                        | C3/AB and C3/Multi |
| 15     | NA          | NA                               | C3/AB and C3/Multi |
| 16     | T0360       | INSULATION KIT                   | C3/AB and C3/Multi |
| 17     | T0267       | HANDLE, DOOR                     | C3/AB and C3/Multi |
| 18     | 3136        | SCREW, CAP 1/4 - 20 X .75 HEX SS | C3/AB and C3/Multi |
| 19     | M0417       | WASHER, LOCK                     | C3/AB and C3/Multi |
| 20     | T0450       | WAHSER, FENDER                   | C3/AB and C3/Multi |
| 21     | T0350       | SPACER                           | C3/AB and C3/Multi |
| 22     | T0508       | BEARING AND BLOCK ASSY           | C3/AB and C3/Multi |
| 23     | T0503       | PIVOT PIN AND BRACKET ASSY       | C3/AB and C3/Multi |
| 24     | T0427       | SHUNT, SUPPORT SHIM              | C3/AB and C3/Multi |
| 25     | T0504       | WASHER, NYLON 5/16               | C3/AB and C3/Multi |
| 26     | T0505       | SCREW, #8-32 X .88 PAN HD SS     | C3/AB and C3/Multi |
| 27     | T0514       | BLOCK ASY, PIVOT, TRAILING ARM   | C3/AB and C3/Multi |
| 28     | T0558       | SCREW, #8-32 X .38 FLAT HD SS    | C3/AB and C3/Multi |
| 29     | T0550       | TRAILING ARM, ASSY LH            | C3/AB and C3/Multi |
| 30     | T0500       | TRAILING ARM ASSY RH             | C3/AB and C3/Multi |

# Electrical Compartment

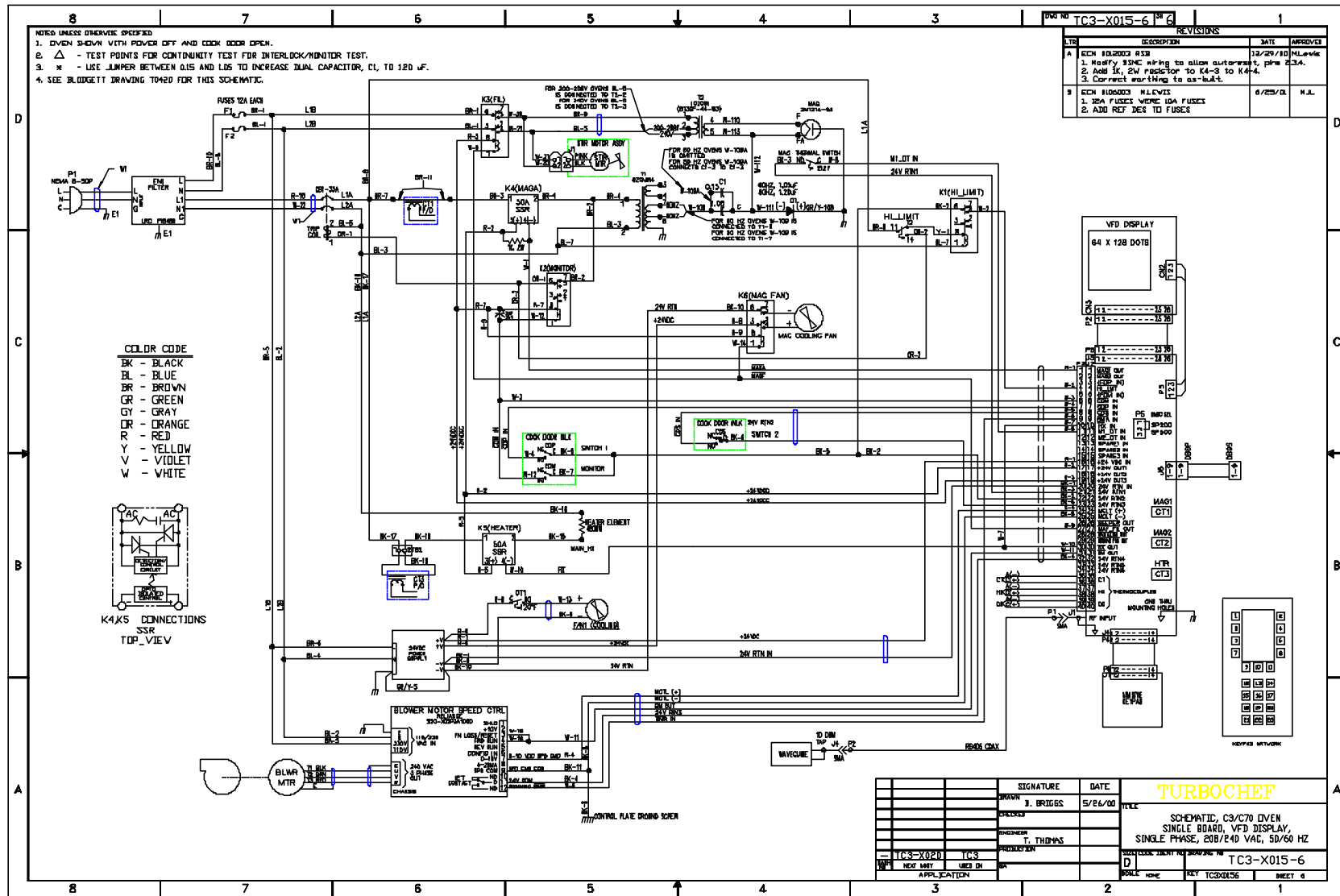
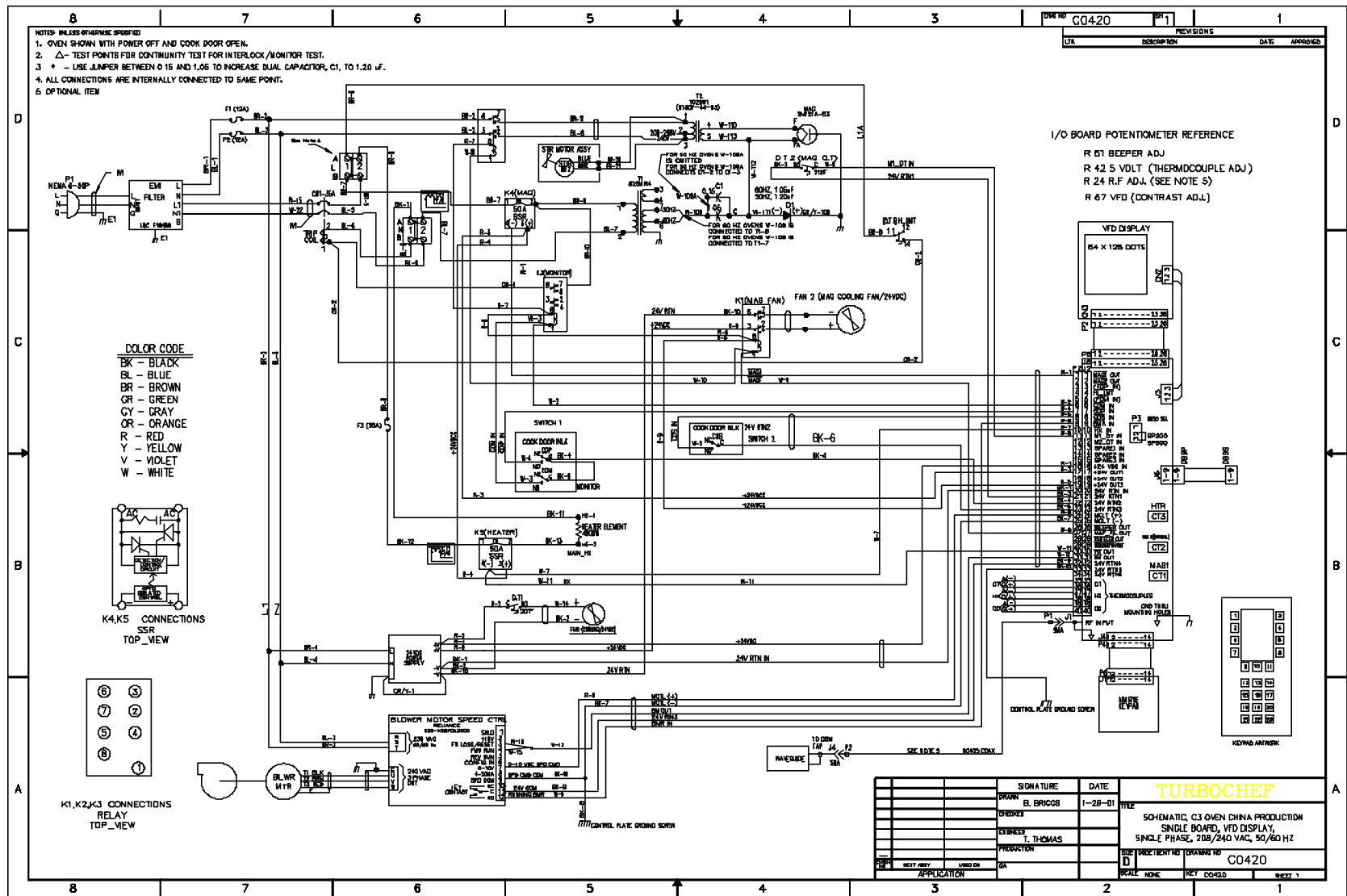


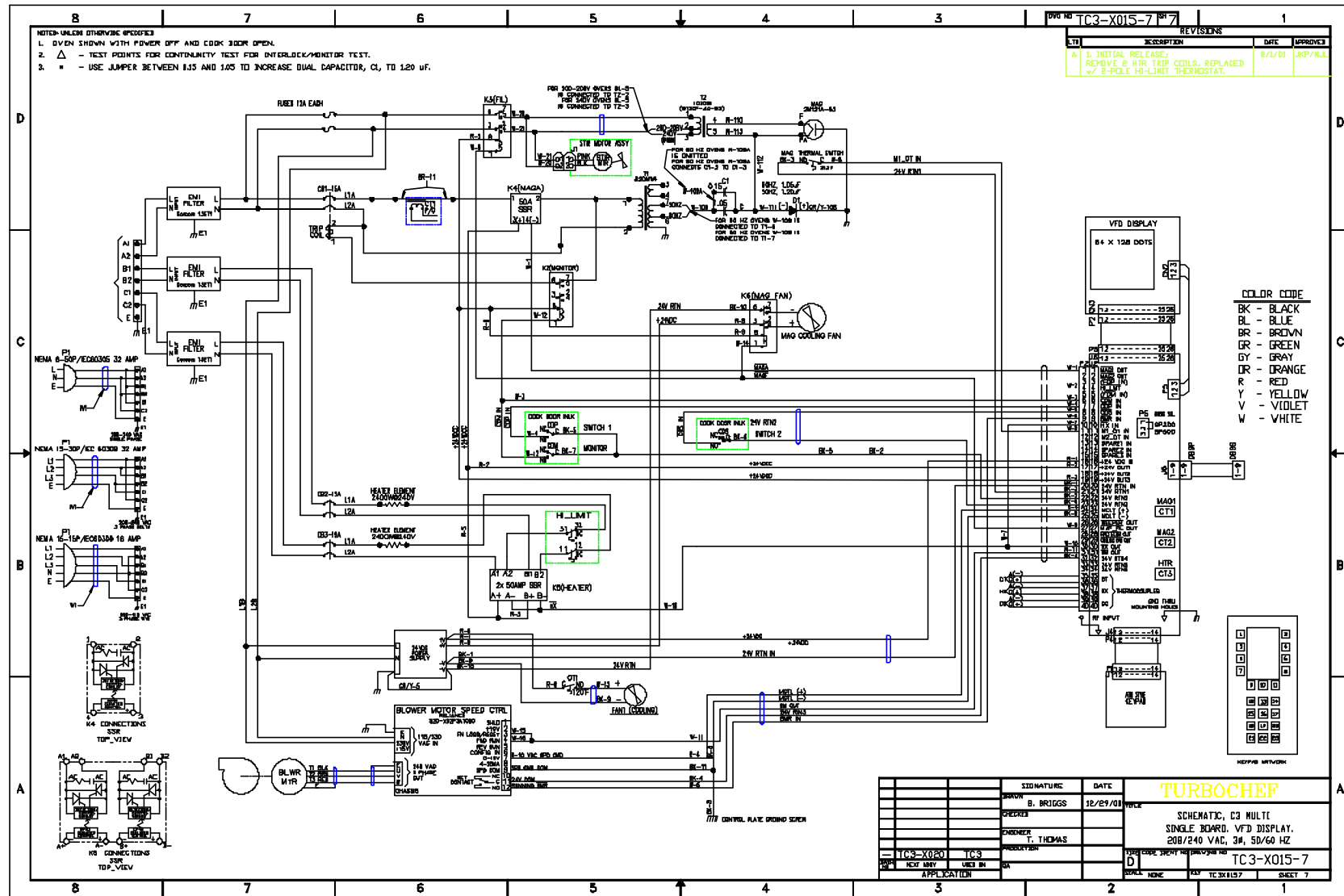
FIGURE 4 – 11a C3/AB Schematic

# TurboChef Technologies, Inc. C Series





# Electrical Compartment



### CATALYTIC CONVERTER

The catalytic converter (See Figure 5-1) is installed in the return air duct behind the heater assembly. The installation of the catalytic converter requires a catalytic converter inner frame to properly position it in the air path. The above parts may be ordered in kit form.

Due to the nature of most foods and the physics governing the operation of the C3 SERIES oven, grease buildup downstream of the cooking chamber is inevitable. Strict cleaning regiments can solve a majority of the problems, however, recirculation of undiluted greasy saturated air is the main cause of downstream grease accumulation and any associated residual flavors.

The airborne grease tends to collect and bake onto the oven surface downstream of the cooking chamber. This grease, due to the high operating temperatures of the oven, will start to rapidly decompose into derivative organic compounds.

These decompositional derivatives generally have positive and negative effects on cooking; the shorter chain derivatives add favorable flavor characteristics to the food, while the higher order carbon chains lend unpleasant flavor characteristics, such as bitter tarry tastes.

The installation of the catalytic converter greatly effects the grease handling and any residual flavors which might build up over time. A properly operating catalytic converter causes the conversion of airborne grease into water, carbon

dioxide and small amounts of nitrogen and oxygen. The catalytic converter acts as a combustion chamber for the airborne grease. The catalysts present on the filter lowers the ignition temperature of the airborne grease from approximately 700°F (371°C) to 450–550°F (232–288°C), allowing combustion to occur. The operating temperature of the oven directly determines the percentage of airborne grease conversion. A single pass of the air stream yields a 20–30% improvement in air quality.

A problem with the catalytic converter is indicated by a decrease in the effectiveness of browning (caused by a reduction in airflow) or by flavor transfer from one food group to another.

If you suspect the catalytic converter needs cleaning refer to figures on page 5-3 and below. These diagrams provide you with a location reference and exploded view (Note: The Return Air Duct Assembly Panel and the Terminal Heat Shield may be inverted on some C3/AB units. All C3/C units will have this assembly inverted). It is important to carefully remove the insulation and replace it neatly. The metal foil helps shield microwave emissions.

#### IMPORTANT NOTE:

The catalytic converter can be cleaned with TurboCare→ oven cleaner and thoroughly rinsed with DISTILLED water. Let the catalytic converter air dry before reinstalling. IF TurboCare oven cleaner is not available DO NOT SUBSTITUTE-USE DISTILLED WATER.

### CONVECTION ELEMENT AND THERMOCOUPLES

The convection element (See Figure 5-1) is located in the rear back on the left side of the oven. It is controlled by one or two solid-state relays (K5 and K7), depending on model, located in the top, center of the control compartment of the oven. Each relay coil operates on 24VDC which is supplied from the I/O control circuit assembly. The temperature is referenced by two "K" type thermocouples.

- The HX thermocouple is in the rear of the oven by the catalytic converter.
- The CC thermocouple is located on the top left side of the oven near the front by the door.

To test the operation of the convection circuit, run the oven in the test mode. See page 3-3 for Self Test information. The element will not energize if the convection motor is not running. You will have to troubleshoot the convection motor and its controller before continuing.

#### IMPORTANT HEATER DISCUSSION

The C series oven uses either an open coil or sheathed heater. The open coil element is obsolete, but may still be found in C3/AB ovens and C3/C ovens. This heater is susceptible to cleaners not approved by TurboChef. If this heater fails, it should be replaced by the newer sheathed heater (See Figure 5-3).

The sheathed heater consists of two individual heating elements encased within one sheath; therefore, when replacing the single-phase open coil heater with this unit on the C3/AB or C3/C you must wire the individual heaters in parallel (See Figure 5-4). When wired correctly the total resistance should be 12 ohms @ 240VAC (20 Amp draw). At 208 VAC the total resistance should be 9 ohms (23 amps draw).

On the C3/AB and C3/C, only, one of the heater wires to the hot air element is looped through an inductance coil transformer on the I/O control circuit assembly. It must draw a minimum current of 7.5 amps to satisfy the circuit. If it does not, the "H" status character on the Test Mode display will be a reversed character.

If a thermocouple is open, the temperature will read 999. The thermocouples are held in place with a compression fitting using a lava gland.

Before replacing a thermocouple, inspect the 40 pin connector where the thermocouples plug into

the I/O control circuit assembly. It is possible you just have a loose connection. Try unplugging and reconnecting the 40 pin connector. When replacing a defective thermocouple, it is important to reinstall the new thermocouple so it protrudes a specific distance inside the oven cavity. See FIGURE 5-2.

#### Replace the thermocouple as follows:

1. Make a note where the old thermocouple exited the compression fitting.
2. Measure the distance from the exit point to the end of the thermocouple.
3. Mark this distance on your new thermocouple with a marker or a piece of tape.
4. Install the new thermocouple

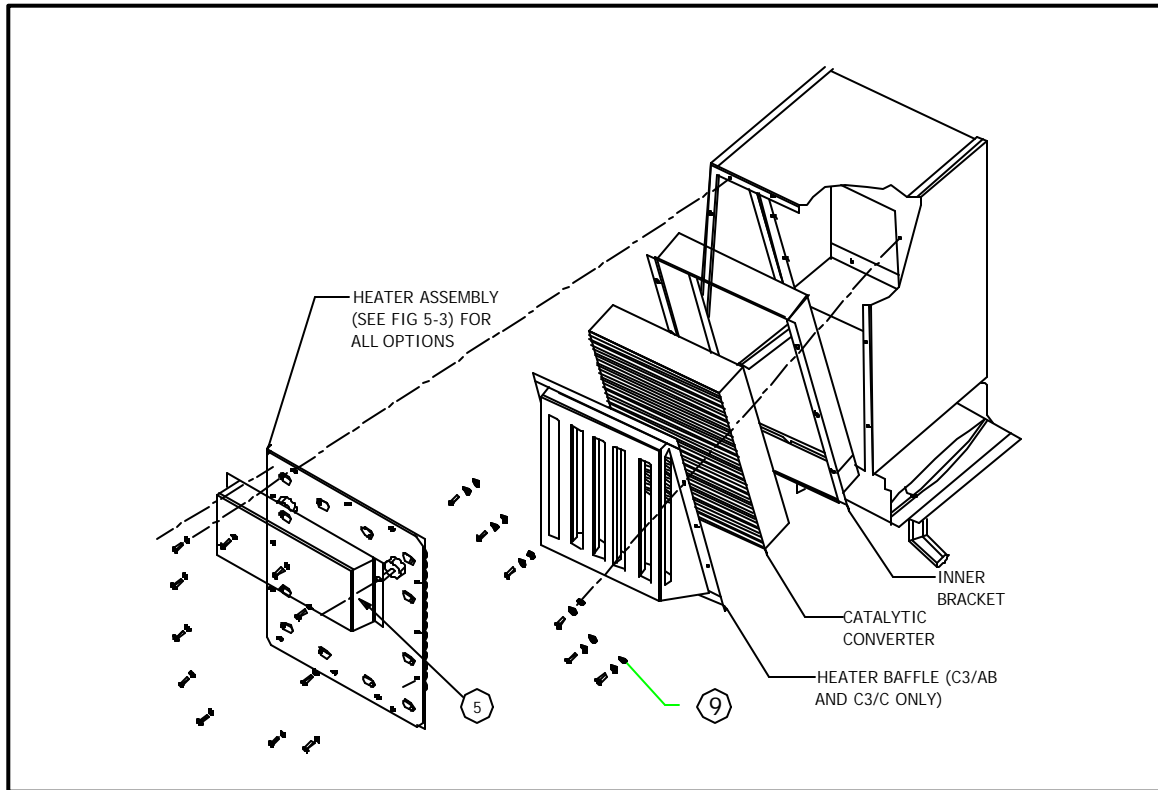


FIGURE 5 - 1 Catalytic Converter Access

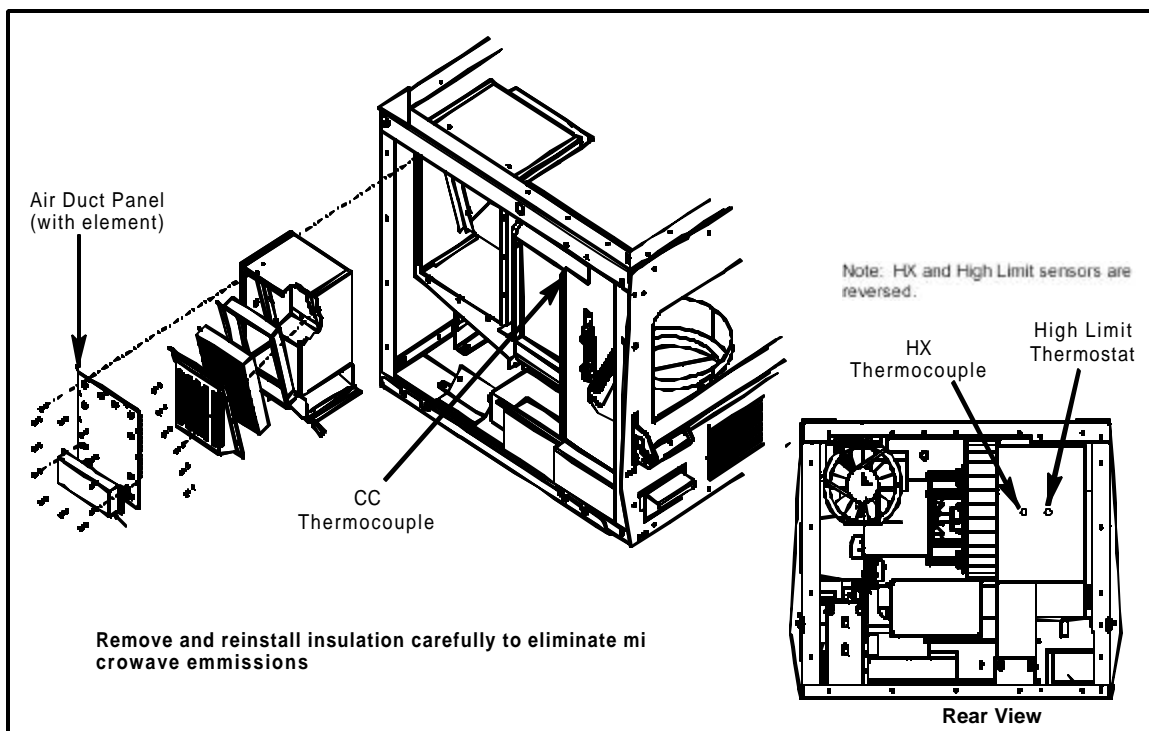


FIGURE 5 - 2 Thermocouple & Thermostat Locations

## CONVECTION ELEMENT ASSEMBLIES

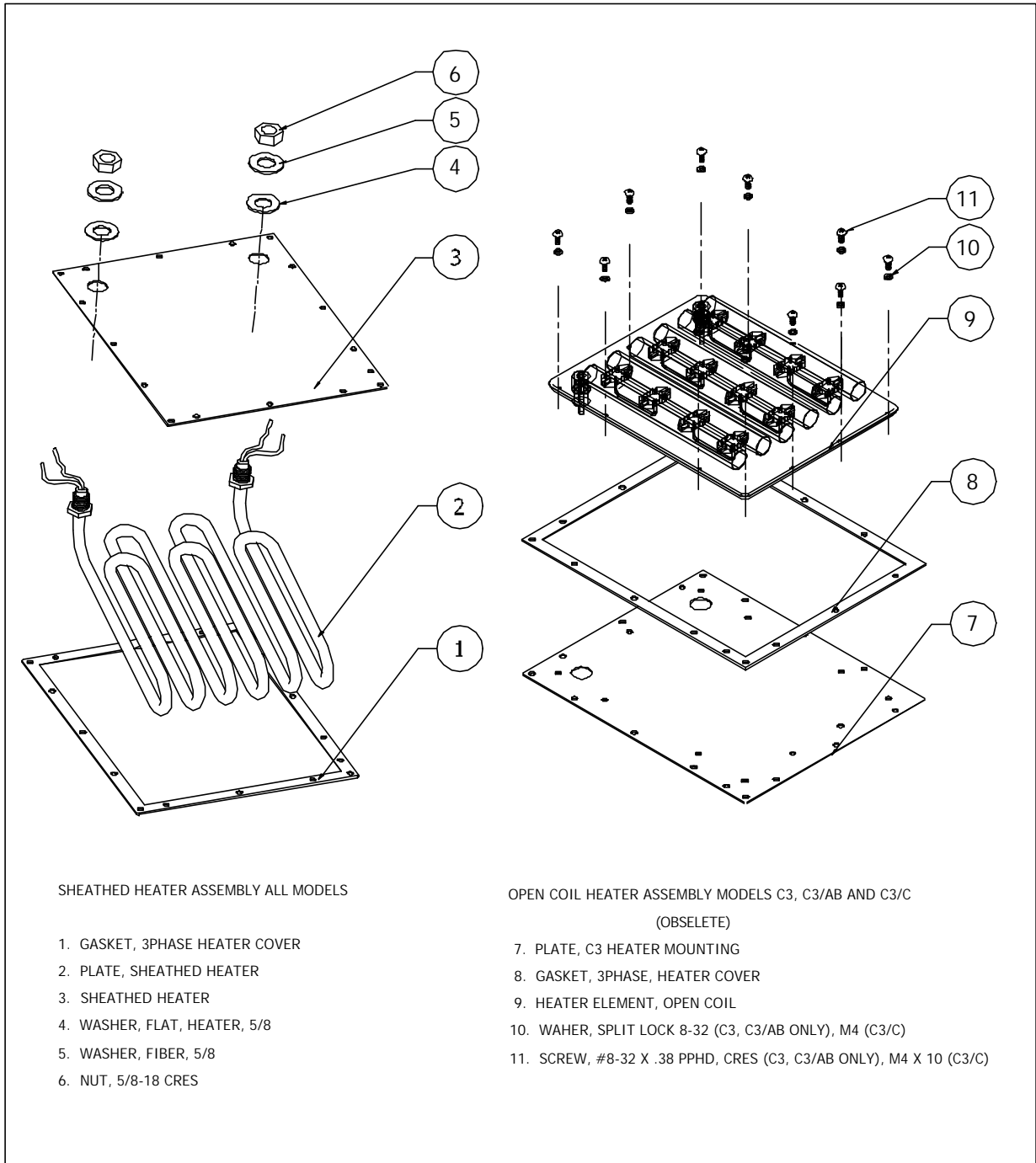


FIGURE 5 - 3 Convection Heater Assemblies

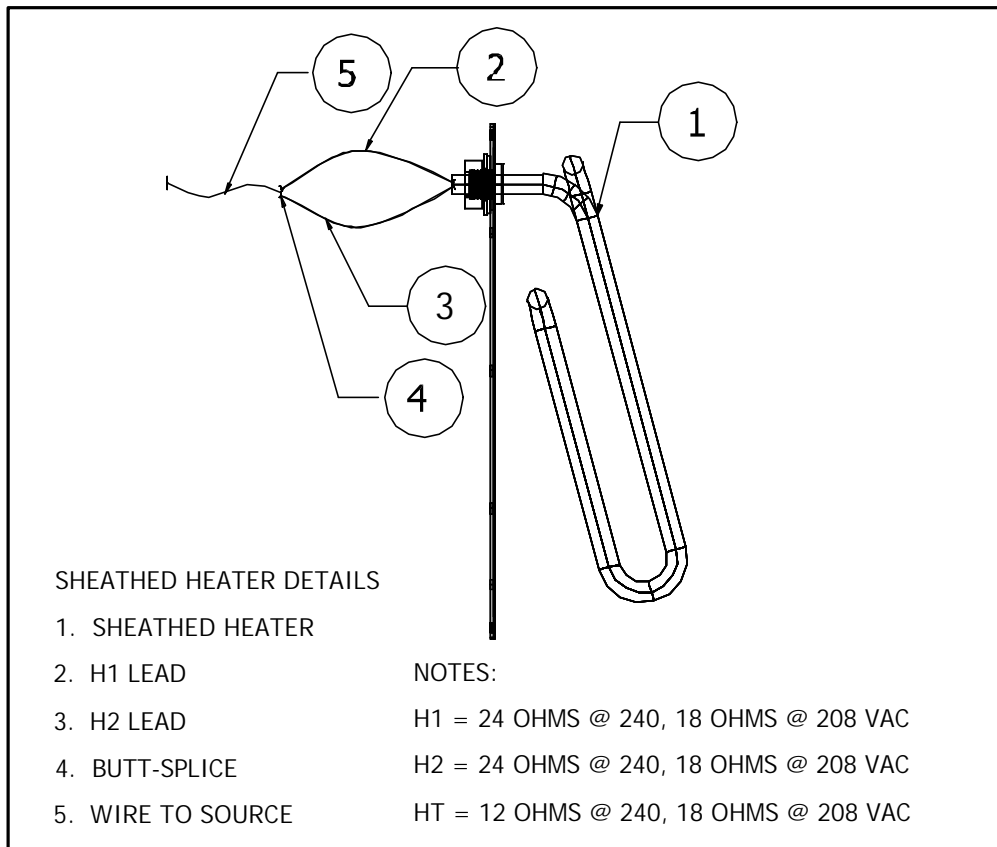


FIGURE 5 - 4 Sheathed Heater Wiring Diagram for C3/AB and C3/C Single Phase Ovens

## Convection Circuit

### CONVECTION CIRCUIT PARTS LIST: See Figure 5-3

| Item  | Part Number | Description  | Used on Model(s) |
|-------|-------------|--|------------------|
| 1     | TC3-0194    | GASKET, 3 PHASE, HEATER COVER  | All              |
| 2     | TC3-0202    | PLATE, SHEATHED HEATER   | All              |
| 3     | 100652      | 240 VAC SHEATHED HEATER  | All (240 VAC)    |
| 3     | 100663      | 208 VAC SHEATHED HEATER  | All (208 VAC)    |
| 3     | 100664      | 200 VAC SHEATHED HEATER  | All (200 VAC)    |
| 4,5,6 | NA          | SHEATHED HEATER HARDWARE (SUPPLIED W/HEATER)                                   | All              |
| 7     | TC3-0192    | PLATE, C3 HEATER MOUTING (OBSELETE)  | C3/AB, C3/C      |
| 8     | TC3-0194    | GASKET, 3 PHASE HEATER COVER   | All              |
| 9     | 100665      | 240 VAC HEATER ELEMENT, OPEN COIL (OBSELETE)                                   | C3/AB, C3/C      |
| 9     | 100666      | 208 VAC HEATER ELEMENT, OPEN COIL (OBSELETE)                                   | C3/AB, C3/C      |
| 10    | 102390      | WASHER, SPLIT LOCK, #8 CRES  | C3/AB            |
| 10    | 102230      | WASHER, SPLIT LOCK, M4   | C3/C             |
| 11    | 101665      | SCREW, #8-32 PPHD, CRES  | C3/AB            |
| 11    | 101671      | SCREW, M4 X 10 mm  | C3/C             |
| 12    | T0185       | CATALYTIC CONVERTER  | All              |
| 13    | 100440      | BLOWER MOTOR SPEED CONTROLLER  | All              |
| 14    | T0204       | PEPPERONI CATCHER (SMALL HOLE)   | C3/AB, C3/C      |
| 15    | TC3-0197A   | PEPPERONI CATCHER (EXPANDED METAL) MUST ONLY BE USED WITH SHEATHED HEATER ASSY | All              |

Note: When upgrading to a new sheathed heater, please order the following items, 1, 2, 3 (specify voltage), 15.

## CONVECTION (BLOWER) MOTOR OPERATION

### OVERVIEW

The convection (blower) motor is a variable speed convection motor which operates from zero rpms up to 7000 rpms. The blower motor speed is controlled by a SP200 AC drive control. This controller converts the 200V to 240V single phase input to a variable 3 phase output (230/460VAC). The speed is controlled by low voltage inputs (0 to 10 VDC) which are applied to pin #7 on the SP200 AC drive control from the control circuit card. If the convection (blower)

### If the convection (blower) motor is not running:

1. Verify the plug connector on the top two pins on terminal P3, on the control circuit board is in place. See page 6-7.
2. Inspect the SP200 AC drive motor control. The SP200 AC drive motor has a single LED.

motor is replaced, carefully remove and reinstall the insulation to eliminate microwave emissions. You must remove the entire motor assembly with the blower wheel to perform any work on either item.

### TROUBLESHOOTING

To run the convection (blower) motor independently, you need to operate the C3 SERIES in the TEST mode. See page 3-3 to enter TEST mode.

3. If the LED is green, the controller is operating properly and has the correct inputs.
4. If the LED is flashing red, count the number of times the LED flashes before it repeats its flashing sequence. Refer to the fault code Table 5-2 on pages 5-6 & 5-7.
5. The operating parameters of the SP200 AC drive control are preprogrammed into the control. Refer to FIGURE 5-5 to verify voltages and wiring.

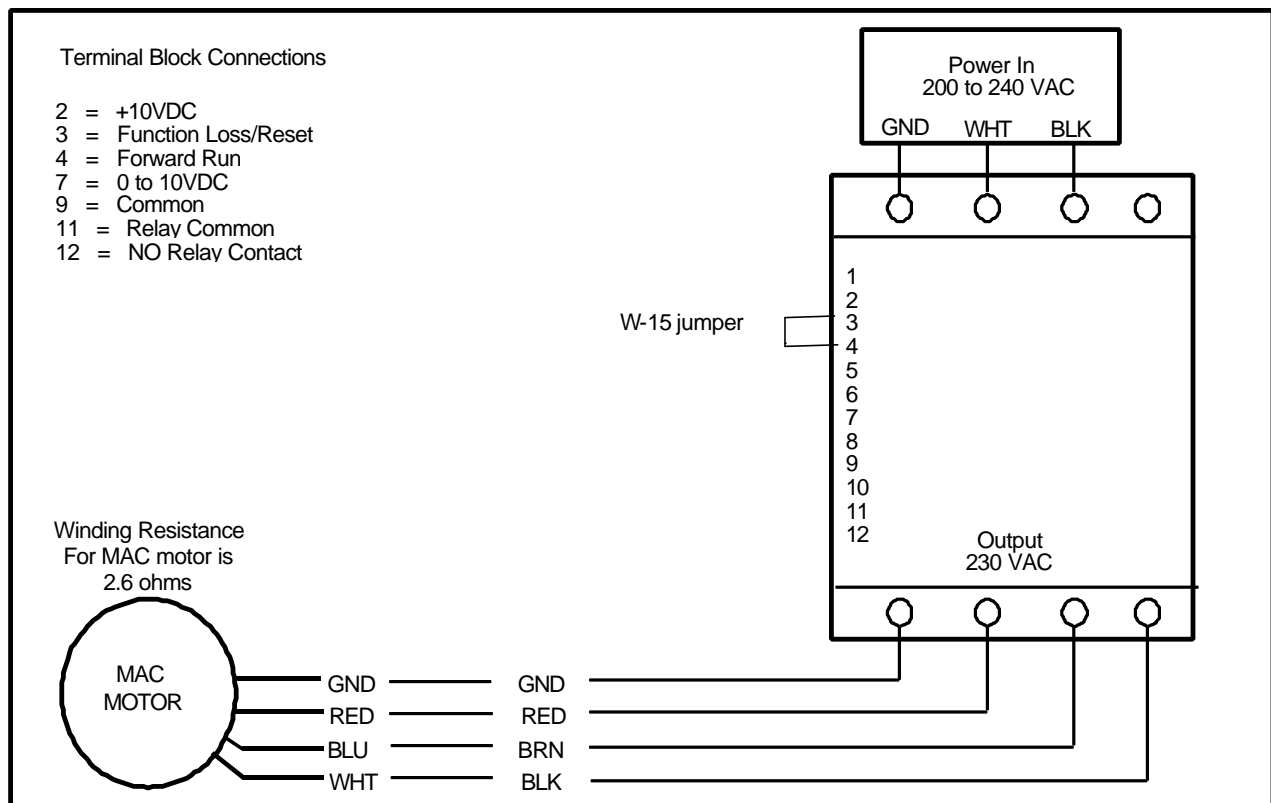


FIGURE 5 - 5 SP200 Wiring



## Blower Motor Controller Fault Codes & Troubleshooting

**NOTE:** If no fault condition exists, the LED will be green. If a fault condition exists, the LED will flash red when a local keypad is not connected. All faults can be reset by cycling the reset control input, pressing the stop key, or cycling power, except as noted in the Corrective Action column below.

**NOTE:** To recycle power, disconnect power for a full minute, or until the LED extinguishes, before reapplying power.

| # of LED Flashes | Fault Description     | Fault Cause  | Corrective Action   |
|------------------|-----------------------|--|---|
| 2                | Control Input         | <ul style="list-style-type: none"> <li>Illegal control input sequence</li> </ul>   | <ul style="list-style-type: none"> <li>3-wire: Verify Start and Jog inputs are not both ON</li> <li>2-wire: Verify that only one input (Forward, Reverse, or Jog) is ON</li> </ul>  |
| 2                | Function Loss         | <ul style="list-style-type: none"> <li>Start attempt while STOP (function loss) input is off</li> </ul>  | <ul style="list-style-type: none"> <li>Verify STOP (function loss) input is ON before attempting to start drive.</li> </ul>   |
| 3                | Under Voltage         | <ul style="list-style-type: none"> <li>Low input line</li> <li>Temporary loss of input line</li> </ul>   | <ul style="list-style-type: none"> <li>Check input line to verify voltage is within operating specifications</li> </ul>   |
| 4                | Over Voltage          | <ul style="list-style-type: none"> <li>High input line</li> <li>Decel time too fast</li> <li>Overhauling load</li> </ul>                                   | <ul style="list-style-type: none"> <li>Check input line to verify voltage is within operating specifications</li> <li>Increase decel time</li> </ul>  |
| 5                | Drive Overload        | <ul style="list-style-type: none"> <li>Excessive driven load</li> </ul>  | <ul style="list-style-type: none"> <li>Reduce the load</li> </ul>   |
| 5                | Motor Overload        | <ul style="list-style-type: none"> <li>Excessive driven load</li> </ul>  | <ul style="list-style-type: none"> <li>Verify P-02 is set correctly</li> <li>Reduce the load.</li> <li>Check for mechanical binding</li> </ul>  |
| 6                | Over Temperature      | <ul style="list-style-type: none"> <li>Operating environment is too hot</li> <li>Fan is blocked or not operating</li> <li>Excessive driven load</li> </ul> | <ul style="list-style-type: none"> <li>Verify the ambient temperature is &lt;50°C</li> <li>Verify clearance above/below drive</li> <li>Check for fan obstruction. Replace if necessary</li> <li>Reduce the carrier frequency (P-64)</li> <li>Reduce the load</li> </ul> |
| 7                | Over Current (300%)   | <ul style="list-style-type: none"> <li>Shaft rotation blocked</li> <li>Excessive driven load</li> <li>Output wiring is incorrect or shorted</li> </ul>     | <ul style="list-style-type: none"> <li>Check for obstructions to shaft rotation or reduce excessive load</li> <li>Increase accel/decel time</li> <li>Verify output wiring is correct</li> </ul>   |
| 8                | Bad Keypad Connection | <ul style="list-style-type: none"> <li>Bad connection from keypad to drive</li> </ul>  | <ul style="list-style-type: none"> <li>Verify keypad is properly connected to drive</li> </ul>  |
| 9                | Negative Slope        | <ul style="list-style-type: none"> <li>Conflicting parameter values</li> </ul>   | <ul style="list-style-type: none"> <li>Adjust values of parameters P-50 through P-54</li> </ul>   |

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| # of LED Flashes | Fault Description    | Fault Cause                    | Corrective Action   |
|------------------|----------------------|--------------------------------|---|
| 10               | Ground Short         | • Phase U                      | <ul style="list-style-type: none"> <li>• Verify output wiring is correct</li> <li>• Verify output phase is not grounded</li> <li>• Verify motor is not damaged</li> </ul> |
|                  |                      | • Phase V                      |   |
|                  |                      | • Phase W                      |   |
|                  | Phase to Phase Short | • Phase U-V                    | <ul style="list-style-type: none"> <li>• Verify output wiring is correct</li> <li>• Verify motor is not damaged</li> </ul>  |
|                  |                      | • Phase U-W                    |   |
|                  |                      | • Phase V-W                    |   |
| 11               | Checksum Failure     | • Parameter value out of range | <ul style="list-style-type: none"> <li>• Load default parameter values (P-60=1), then cycle power. If fault persists, replace drive.</li> </ul>                           |
| 12               | Microprocessor Fault | • Internal processor error     | <ul style="list-style-type: none"> <li>• Cycle power. If fault persists, replace drive.</li> </ul>  |

TABLE 5 - 2 Blower Motor Controller Fault Codes & Troubleshooting

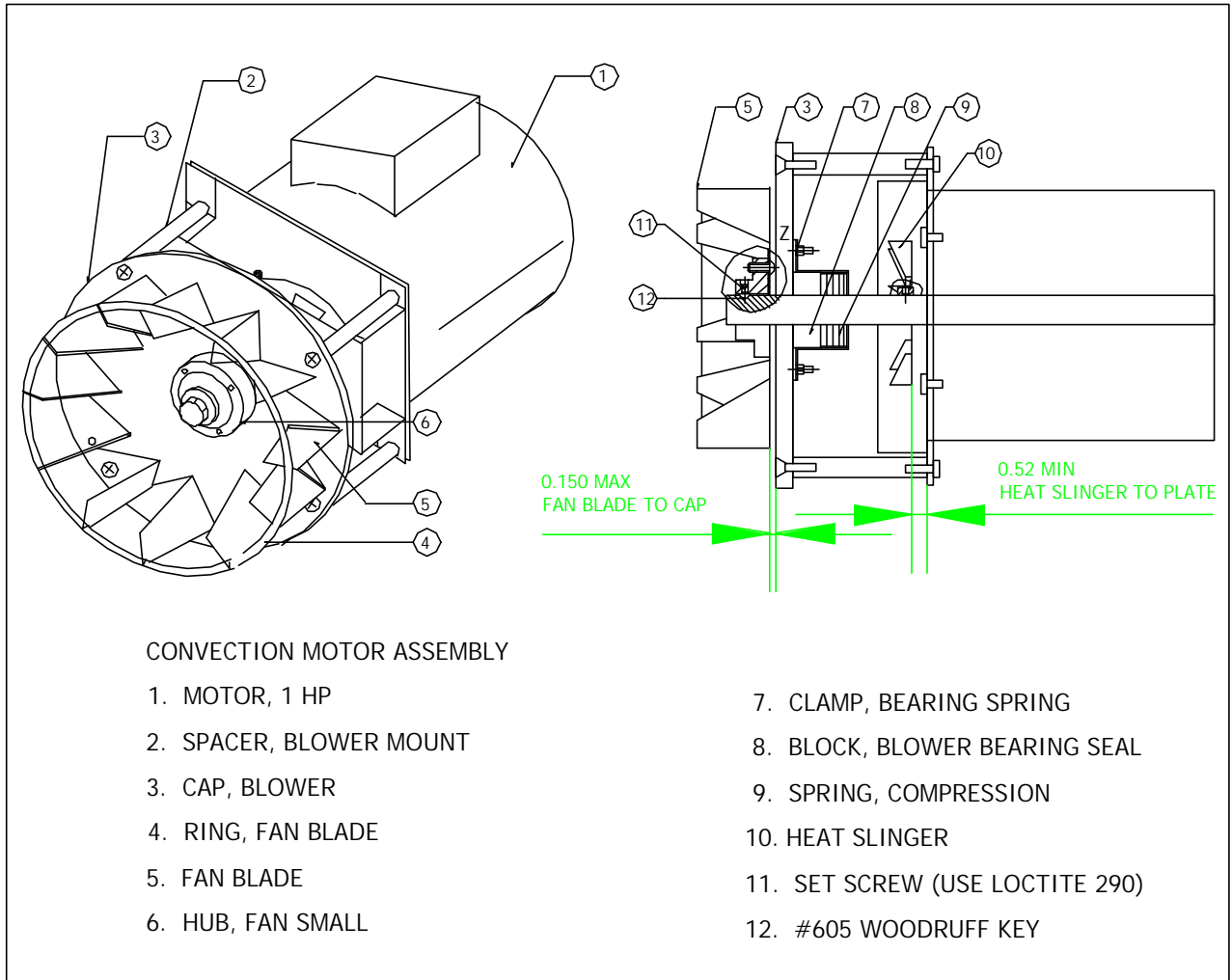


Figure 5-6: Convection Motor Detail

## TurboChef Technologies, Inc. C Series

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### CONVECTION MOTOR PARTS LIST: See Figure 5-6

| Item | Part Number | Description                | Used on Model(s) |
|------|-------------|----------------------------|------------------|
| 1    | T0076       | Motor, 1HP, Mac            | All              |
| 4    | T06050070   | RING FAN (unwelded)        | All              |
| 5    | T06050069   | BLADE, FAN (unwelded)      | All              |
| 4&5  | TC3-0214    | RING AND FAN TACK WELDED   | All              |
| 6    | T7000306-2  | HUB, FAN SMALL             | C3/AB & C3MULTI  |
| 6    | C7000306-2  | HUB, FAN SMALL             | C3/C & C3/CMULTI |
| 7    | T7001179    | CLAMP BEARING SPRING       | All              |
| 8    | T700-1177   | BLOCK, BLOWER BEARING SEAL | All              |
| 9    | T101733     | SRING, COMPRESSION         | All              |
| 10   | T102708     | HEAT SLINGER               | All              |
| 11   | T101715     | SET SCREW #8 X 5/16 SS     | C3/AB & C3MULTI  |
| 11   | TBD         | SET SCREW M4X6 SS          | C3/C C3/CMULTI   |
| 12   | T100730     | #605 WOODRUFF KEY          | All              |

## MEASURING FOR MICROWAVE RADIATION LEAKAGE

The following RF emissions test must be performed every time a service call is done on a C3 SERIES oven. Report your findings on the work order.

The following areas must be measured when performing the RF test.

- Cook Door
- At any place on the outside of the oven (with all covers in place).

### Check for microwave leakage as follows:

1. Remove front bottom trim piece.
2. Place a load in the oven for testing. The load must meet the following specifications:
  - A) Load must be 275 ml +/- 15 ml of water.
  - B) The water should be  $77 \pm 5^\circ\text{F}$  ( $25 \pm 3^\circ\text{C}$ ).
  - C) The container must be a low form, 600 ml beaker with an inside diameter of approximately 3.35" (8.5cm) and made of an electrically non-conductive material such as glass or plastic.
3. Enter the TEST mode. Refer to page 3-3 for instructions for accessing TEST mode.
4. Position the door leak test tool on the door handle. See FIGURE 6-1 for correct positioning of the leak test tool.
5. Tighten the top screw to slowly open the door. Stop when the control panel indicates that the door switch has disengaged.
6. Loosen the top screw slowly until the control panel indicates that the door switch has engaged.
7. Test for microwave leakage as follows:

This test must be done in conformance with 21 CFR, Chapter 1, Part 1030-Performance Standard for Microwave and Radio Frequency Emitting Product. Part 1030.10 Microwave Ovens. (C) Requirements - (1) Power Density Limit. **"The equivalent plane wave power density existing in the proximity of the external oven surface shall not exceed 1 milliwatt per square centimeter at any point 5 cm or more from the external surface of the oven, measured prior to acquisition by purchaser, and thereafter, 5 milliwatt per square centimeter at any point."**

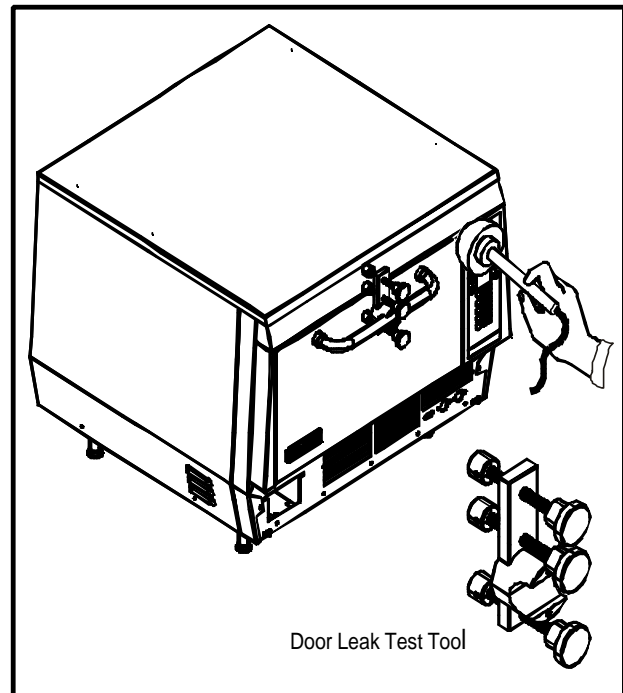
- A) The tip of the probe should be touching the oven surface being measured with the probe handle perpendicular to the surface.
- B) Move the probe counterclockwise around the perimeter of the door starting from the upper right corner at a speed of less than 0.5" per second. Be sure to probe entire door perimeter, returning to the upper right corner.

8. Exit the diagnostic mode.
9. Repeat STEPS 2 and 7 with the cook door closed.



### WARNING!!

If the unit fails the radiation test, the oven must be taken out of service immediately until the defect is corrected. In addition, the Code of Federal Regulations 21 Subpart C, 1002.20 requires that leakage readings of over 5 mW/cm<sup>2</sup> **MUST** be reported to the manufacturer.



10. FIGURE 6 - 1 Microwave Leakage Testing

## MAGNETRON CIRCUIT

### Overview of a microwave circuit

The microwave circuit consists of a magnetron and a voltage doubler circuit. The voltage doubler consists of a special step-up transformer, a capacitor, and a diode. See figure 6-2 for an explanation of how the doubler works.

The magnetron transformer is a ferro-resonant design which limits fault currents and minimizes

magnetron power changes due to input voltage changes. An automatic resetting over-temperature switch is embedded in the high voltage secondary winding and removes power from the primary winding if an over-temperature condition occurs.

In the C3 SERIES a separate transformer is used to preheat the filament for the magnetron for better operation.

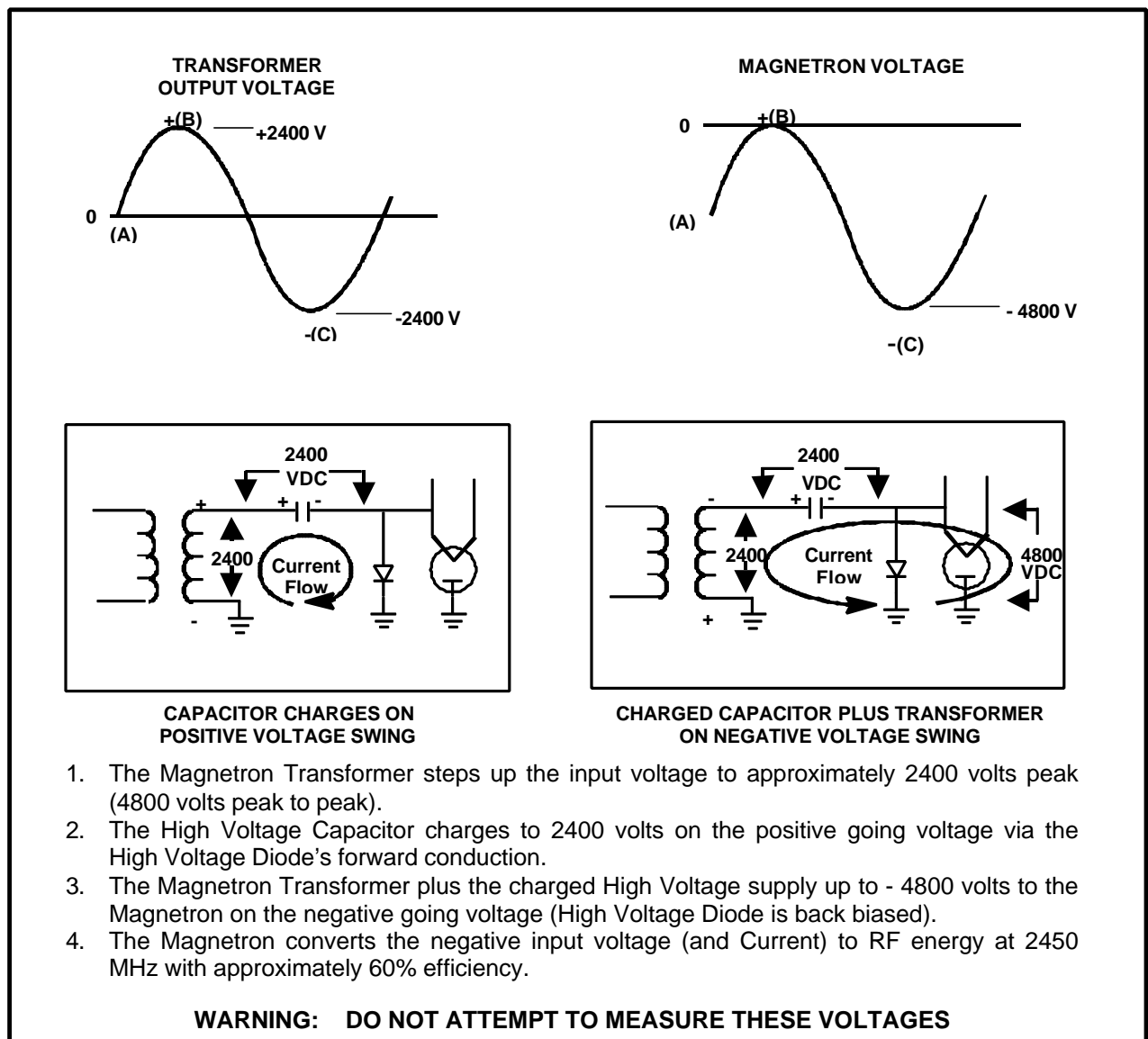


FIGURE 6 - 2 Magnetron High Voltage Power Supply

## MAGNETRON TESTING



### **WARNING!!**

The microwave circuit cannot be worked on with the unit on. The unit must be disconnected from the power source. Failure to do so could result in injury or death.



### **WARNING!!**

The HV Capacitor must be discharged before proceeding.

### **Checking a Magnetron for Open or Shorted Filaments:**

1. Disconnect the AC power source and discharge the High Voltage Capacitors.
2. Isolate the magnetron from the circuit by removing the wires from the F and FA terminals.
3. An ohmmeter connected between the filament terminals (F, FA) should indicate a reading of less than 1 Ohm.
4. A continuity check between either filament terminal and the magnetron chassis should indicate an infinite resistance (open).

## MAGNETRON REMOVAL AND REPLACEMENT

1. Remove door hinge bar support angle.
2. Remove magnetron cooling fan, duct work and magnetron as an assembly.
3. Unplug and remove magnetron.
4. Install new magnetron.
5. Check the oven for microwave leakage. Refer to page 6-1 for instructions.

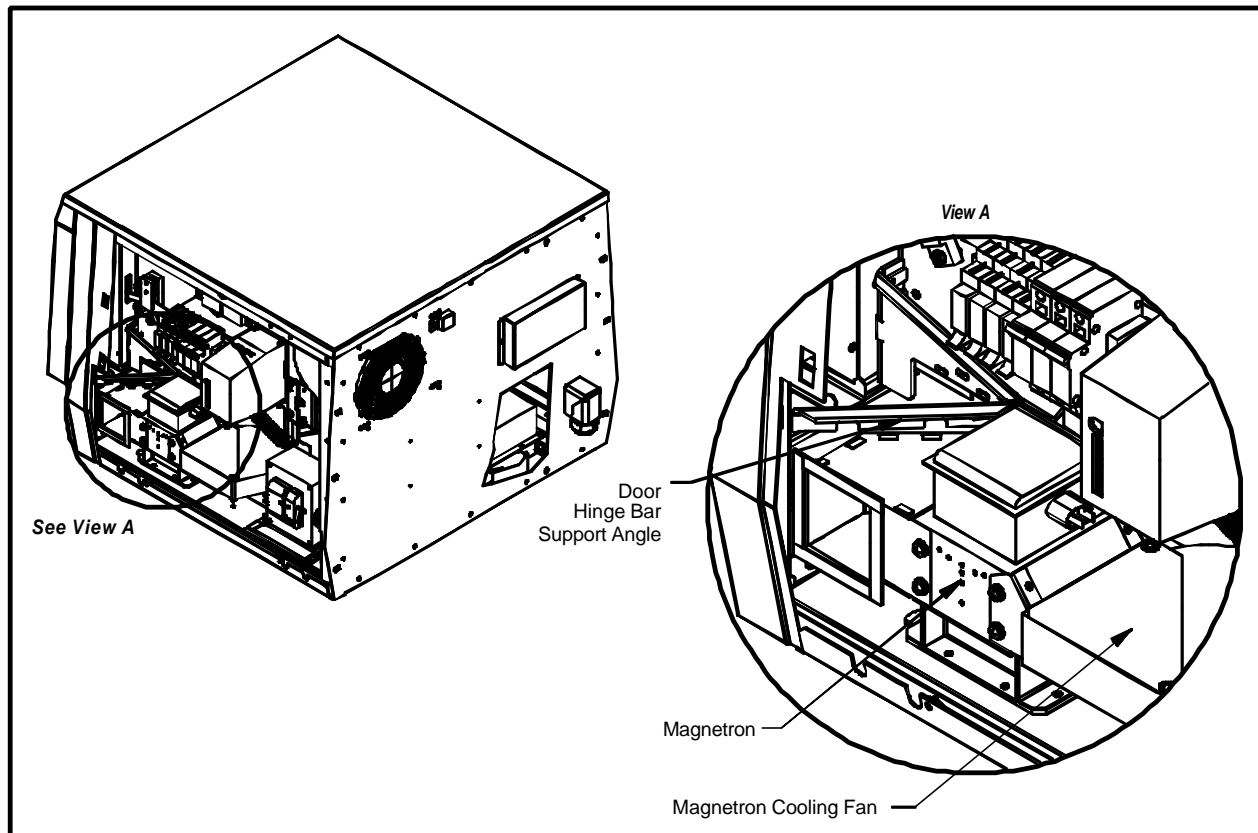


FIGURE 6 - 3 Magnetron Removal and Replacement

## COMPONENT TESTING



### WARNING!!

The microwave circuit cannot be serviced with the unit on. The unit must be disconnected from the power source. Failure to do so could result in injury or death.



### WARNING!!

The HV Capacitor must be discharged before proceeding.



### WARNING!!

Do not attempt to measure the magnetron anode or filament voltages. Failure to do so could result in injury or death.

## TRANSFORMER TESTING

1. Disconnect the power source and discharge the capacitor.
2. Isolate the transformer from the circuit. (Wires are labeled but remember where they go)
3. Check impedance of the primary and secondary windings. See TABLE 6-1 AND FIGURE 6-4.
4. Filament winding should read less than 0.1 ohms.
5. Reconnect wires.



### WARNING!!

When replacing the anode transformer, remove the varnish around the mounting holes to insure proper grounding.

| TRANSFORMER SPECIFICATIONS |                                    |                      |  |
|----------------------------|------------------------------------|----------------------|--|
| Main Transformer (Anode)   |                                    | Filament Transformer |  |
| Primary DCR                | 0.58 Ohm.                          | Primary DCR          | (1-2) 23.2 Ohm<br>(1-3) 27.8 Ohm           |
| Secondary DCR:             | (5-6) 46.39 Ohm<br>(5-7) 54.00 Ohm | Secondary DCR:       | (4-5) .020 Ohm                             |
| Input Voltage :            | 208-240 VAC, 50/60 HZ              | Input Voltage :      | 200-208/240 $\pm$ 10%, 50/60 HZ            |
| Input Current:             | 9.0 Amps RMS                       | Input Current:       | 0.42 Amps @ 208 VAC<br>0.35 Amps @ 240 VAC |
| Anode Voltage:             | 2400 VDC Peak @ 0.83 Amps          | Filament Voltage:    | 4.6 VAC @ 14 Amps                          |

TABLE 6 - 1 Transformer Specifications

## DIODE TESTING



### WARNING!!

DO NOT attempt to measure HV directly.

1. Isolate diode from circuit.
2. Connect the meter leads to the diode terminals.
3. Resistance readings (open) should be indicated in the reverse direction.
4. Resistance readings in the forward direction may be indeterminate due to the number of diodes in series making up this assembly.
5. If there is continuity in both directions (shorted diode).

## CAPACITOR TESTING

1. Disconnect the oven from the power source.
2. Isolate the capacitor from the circuit.
3. Fully discharge the capacitor.
4. Connect the ohmmeter between the capacitor terminals. The meter should indicate a low impedance and then slowly return to infinite resistance.
5. Reverse the ohmmeter leads. Repeat step 4.
6. Check each terminal to case. Infinite resistance (open) should be indicated.



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## WARNING!!

Use extreme caution when taking any current readings. Failure to do so can result in death or serious injury.

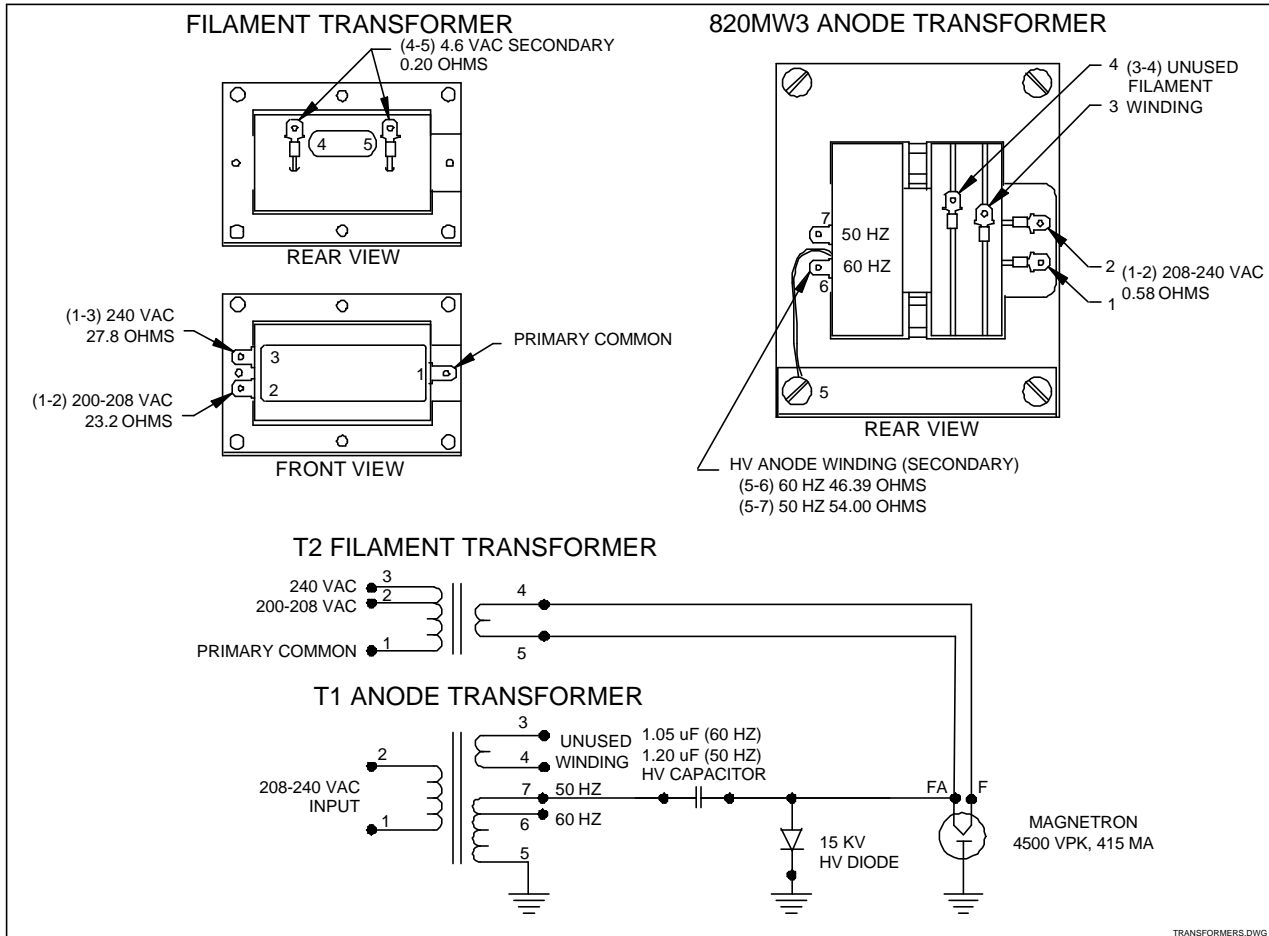


FIGURE 6 - 4 Transformer Testing

## CONTROL CIRCUIT BOARD

*NOTE: This procedure must be done after replacement of the controller board.*

1. Place the oven in the test function mode as follows:
  - A) From the standby mode, press and hold both BACK and ENTER keys simultaneously.
  - B) The display reads:  
*ENTER ACCESS CODE*
  - C) Use the NUMERIC keypad to enter the following access code:  
*9428*
  - D) Press the ENTER key.
2. Place a microwave dish with approximately 9.3 oz. (275 ml) of cool water in the oven.
3. Press and hold the MGTRON key. Observe the reading on the keypad display. Adjust the amplifier gain on R24 on I/O controller board. Refer to FIGURE 5. Turn the screw clockwise to reduce the output until the maximum reading is  $120 \pm 20$ .
 

*NOTE: The displayed reading varies greatly due to the stirrer blade motion. Observe the reading for at least 10 seconds.*
4. Press and hold the MAGTRON key. Observe the oven keypad display. Verify the number displayed varies corresponding to stir blade motion.
5. The difference between the high and low peak values must be greater than 20.

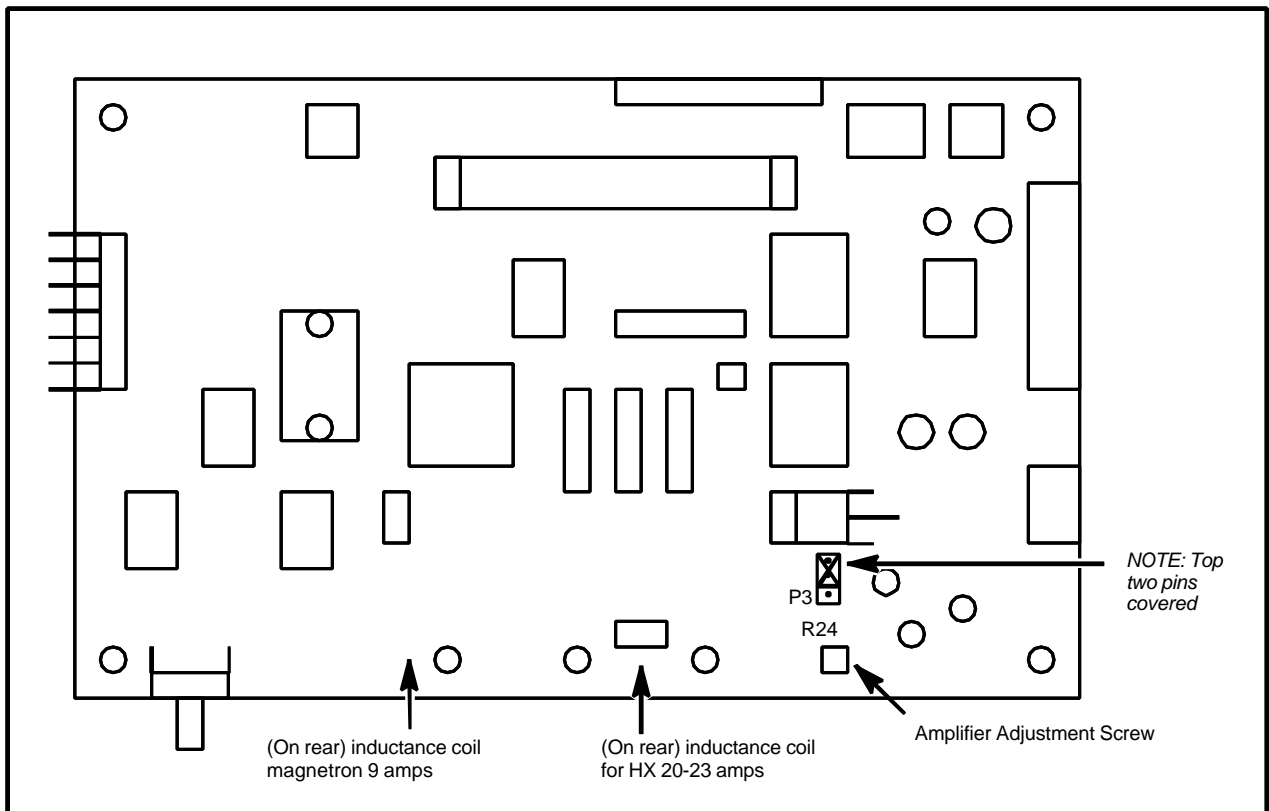


FIGURE 6 - 5 Control Circuit Board



**WAVEGUIDE COMPONENTS PARTS LIST: See Figure 6-6**

| Item # | Part Number | Description                        | Used on Model(s) |
|--------|-------------|------------------------------------|------------------|
| 1      | T0266       | BLADE, STIRRER                     | ALL              |
| 2      | T0289       | SHAFT, STIRRER                     | C3/AB, C3MULTI   |
| 2      | C0289       | SHAFT, STIRRER                     | C3/C, C3/CMULTI  |
| 3      | T0290       | HUB, STIRRER SHAFT                 | C3/AB, C3MULTI   |
| 3      | C0290       | HUB, STIRRER SHAFT                 | C3/C, C3/CMULTI  |
| 4      | T0282       | SPROCKET, STIRRER SHAFT, .125 BORE | All              |
| 5      | T0284       | BELT, STIRRER MOTOR                | All              |
| 6      | T0397       | MOUNTING PLATE, STIR MOTOR         | C3/AB, C3MULTI   |
| 6      | C0391       | MOUNTING PLATE, STIR MOTOR         | C3/C, C3/CMULTI  |
| 7      | T0283       | SPROCKET, MOTOR, 4MM BORE          | All              |
| 8      | T100891     | MOTOR, 6 RPM                       | All              |
| 9      | 101550      | SCREW, 4-40 X 5/8 PPH SS           | C3/AB, C3MULTI   |
| 9      | TBD         | SCREW, M3 x 12 mm SS               | C3/C, C3/CMULTI  |
| 10     | 102370      | WASHER, SPLIT LOCK #4 SS           | C3/AB, C3MULTI   |
| 10     | TBD         | WASHER, SPLIT LOCK M4 SS           | C3/C, C3/CMULTI  |
| 11     | 101590      | SCREW, 6-32 X 3/8 PPH SS           | C3/AB, C3MULTI   |
| 11     | TBD         | SCREW, M4 x 8 MM SS                | C3/C, C3/CMULTI  |
| 12     | 102380      | WASHER, SPLIT LOCK #6 SS           | C3/AB, C3MULTI   |
| 12     | TBD         | WASHER, SPLIT LOCK M4              | C3/C, C3/CMULTI  |
| 13     | 102035      | PIN CONNECTOR                      | C3/AB, C3MULTI   |
| 14     | 102716      | CONNECTOR HOUSING                  | C3/AB, C3MULTI   |
| 15     | 102270      | WASHER, INTERNAL LOCK, #6 SS       | C3/AB, C3MULTI   |
| 15     | TBD         | WASHER, INTERNAL, LOCK, M4 SS      | C3/C, C3/CMULTI  |
| 16     | 700-1339-1  | CLAMP, WAVEGUIDE, SINGLE WIRE      | C3/AB, C3MULTI   |
| 16     | C700-1339-1 | CLAMP, WAVEGUIDE, SINGLE WIRE      | C3/C, C3/CMULTI  |

## TurboChef Technologies, Inc. C Series

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### WAVEGUIDE COMPONENTS PARTS LIST (con't): See Figure 6-6

| Item # | Part Number | Description              | Used on Model(s) |
|--------|-------------|--------------------------|------------------|
| 17     | 700-1321    | SEAL, RIGN WAVEGUIDE     | C3/C, C3/CMULTI  |
| 18     | 102650      | WAVE, SPRING WASHER      | All              |
| 19     | 700-1213    | PLUG, WAVEGUIDE, QUARTZ  | All              |
| 20     | 700-1333    | SEAL, PLUG TEFLON        | All              |
| NS     | 100480      | HV Diode                 | All              |
| NS     | 100206      | HV, Capacitor, 2500 V    | All              |
| NS     | 102091      | Filament Transformer     | All              |
| NS     | 102093      | Magnetron Transformer T1 | All              |