

SERVICE DATA SHEET
Electric Range with ES 330/330i Electronic Oven Controls

NOTICE - This service data sheet is intended for use by persons having electrical and mechanical training and a level of knowledge of these subjects generally considered acceptable in the appliance repair trade. The manufacturer cannot be responsible, nor assume any liability for injury or damage of any kind arising from the use of this data sheet.

SAFE SERVICING PRACTICES

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- Before servicing or moving an appliance remove power cord from electrical outlet, trip circuit breaker to OFF, or remove fuse.
- Never interfere with the proper installation of any safety device.
- GROUNDING: The standard color coding for safety ground wires is GREEN or GREEN WITH YELLOW STRIPES. Ground leads are not to be used as current carrying conductors. It is extremely important that the service technician reestablish all safety grounds prior to completion of service. Failure to do so will create a potential safety hazard.
- Prior to returning the product to service, ensure that:
 - All electric connections are correct and secure.
 - All electrical leads are properly dressed and secured away from sharp edges, high-temperature components, and moving parts.
 - All uninsulated electrical terminals, connectors, heaters, etc. are adequately spaced away from all metal parts and panels.
 - All safety grounds (both internal and external) are correctly and securely reassembled.

Oven Calibration

Set the electronic oven control for normal baking at 350°F. Obtain an average oven temperature after a minimum of 5 cycles. Press Stop, Clear, Off or Cancel to end Bake mode.

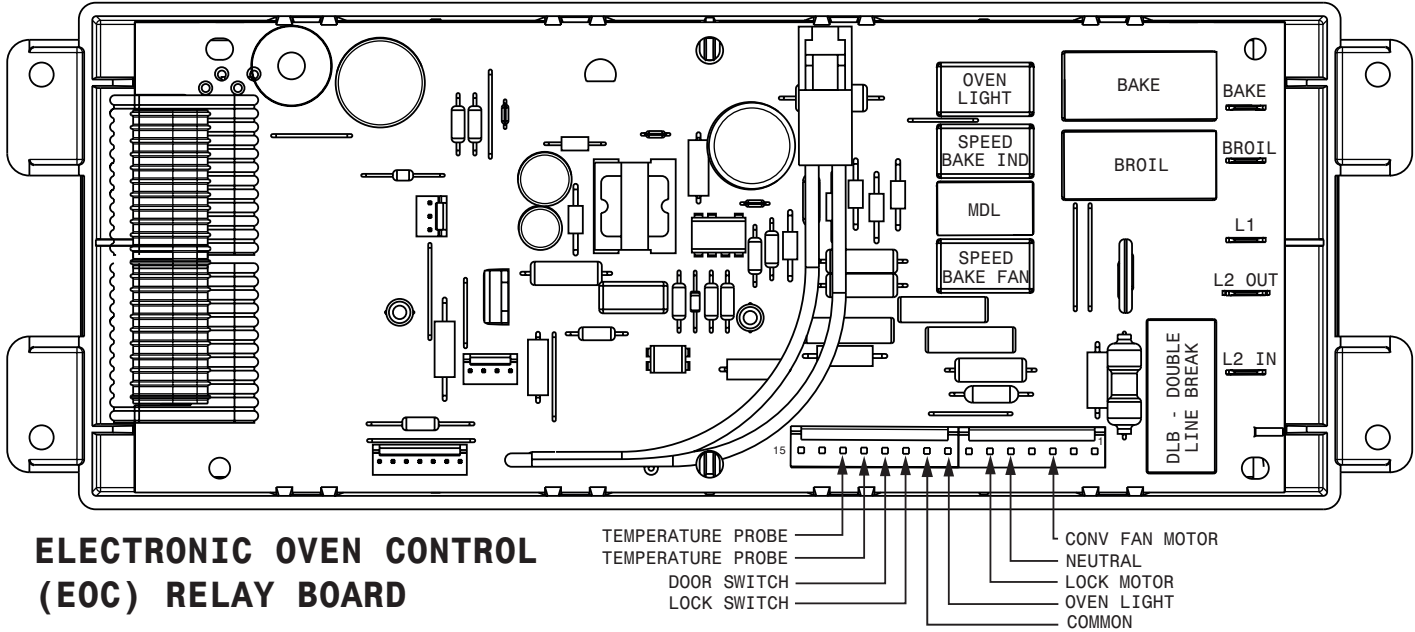
Temperature Adjustment

- Set EOC to bake at 550°F.
- Within 5 seconds of setting 550°F, press and hold the bake pad for approximately 15 seconds until a single beep sounds (longer may cause F11 shorted keypad alarm).
- Calibration offset should appear in the display.
- Use the slew keys to adjust the oven temperature up or down 35°F in 5°F increments.
- Once the desired (-35° to 35°) offset has been applied, Press Stop, Clear, Off or Cancel.

Note: Changing calibration affects normal Bake mode. The adjustments made will not change the Self-Cleaning cycle temperature.

Modular Control Systems

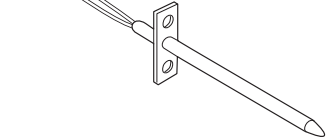
This appliance is equipped with a modular system of controls. The modular system consists of various boards which communicate with one another to drive cooking functions. Oven functions, if available, operate through an oven user interface (UI or UIB) and an oven relay board. Cooktop functions, if available, operate through a cooktop UI/UIB and a cooktop relay board. There may be additional boards which work within the system to drive specific functions (refer to the schematics and diagrams and this sheet). Low voltage operating and communications power for the modular boards is provided through the wiring schemes. The boards that generate low voltage operating and communications power depend upon the individual control system (refer to the schematics and diagrams on this sheet). These voltages are only the operational voltages. Do not use these voltages as confirmation of communication between the boards. Communication occurs through software programming on each board. This communication is not detectable by volt ohmmeters. The programming is self-monitored and the UI displays will show error codes based on detected failures. The individual boards are not field repairable. See the schematics and diagrams included on this sheet for more unit-specific details.



RTD SCALE	
Temperature °F (°C)	Resistance (ohms)
32 ± 1.9 (0 ± 1.0)	1000 ± 4.0
75 ± 2.5 (24 ± 1.3)	1091 ± 5.3
250 ± 4.4 (121 ± 2.4)	1453 ± 8.9
350 ± 5.4 (177 ± 3.0)	1654 ± 10.8
450 ± 6.9 (232 ± 3.8)	1852 ± 13.5
550 ± 8.2 (288 ± 4.5)	2047 ± 15.8
650 ± 9.6 (343 ± 5.3)	2237 ± 18.5
900 ± 13.6 (482 ± 7.5)	2697 ± 24.4
Probe circuit to case ground	Open circuit/infinite resistance

Electronic Oven Control Fault Code Descriptions		
Fault Code	Likely Failure Condition/Cause	Suggested Corrective Action
F10	Runaway Temperature. Oven heats when no cook cycle is programmed.	If Oven is cold: 1. If fault code is present with cold oven test oven temperature sensor probe circuit resistance. Use RTD scale found in the tech sheet. 2. Replace probe or repair wiring connections if defective. 3. If temperature sensor probe circuit is good but fault code remains when oven is cold replace the EOC. If Oven is overheating: 1. If oven is severely overheating/heating when no cook cycle is programmed test oven temperature sensor probe circuit resistance using the RTD scale found in the service tech sheet. Also verify that the temperature sensor probe is properly installed in the oven cavity. 2. Disconnect power from the range, wait 30 seconds and reapply power. If oven continues to heat when the power is reapplied, replace the EOC. NOTE: Severe overheating may require the entire oven to be replaced should damage be extensive.
F11	Shorted Keypad or selector switch.	1. Reset power supply to range - Disconnect power, wait 30 seconds and reapply power. 2. Check/reseat ribbon harness connections between touch panel and EOC. 3. Test keyboard circuits. Replace touch panel if defective. 4. If keyboard circuits check good replace the EOC.
F12 F13	EOC Internal software error or failure.	1. Disconnect power, wait 30 seconds and reapply power. If fault returns upon power-up, replace EOC.
F20	Communication failure between oven and cooktop control boards	1. Reset power supply to range – Disconnect power, wait 30 seconds and reapply power. 2. Check/reseat communication between oven (MACS BUS) and cooktop controller (MACS2) 3. If problem persists, replace each board individually then retest until problem clears
F30 F31	Open oven sensor probe circuit. Shorted oven sensor probe circuit.	1. (F30) Check resistance at room temperature & compare to RTD Sensor resistance chart. If resistance is correct replace the EOC. If resistance does not match the RTD chart replace RTD Sensor Probe. Check Sensor wiring harness between EOC & Sensor Probe connector. 2. (F31) Check resistance at room temperature, if less than 500 ohms, replace RTD Sensor Probe. Check for shorted Sensor Probe harness between EOC & Probe connector. If resistance is correct replace the EOC.
F40	Communication failure between oven and cooktop control boards	1. Reset power supply to range – Disconnect power, wait 30 seconds and reapply power. 2. Check/reseat communication between oven (MACS BUS) and cooktop controller (MACS2) 3. If problem persists, replace each board individually then retest until problem clears
F90 F91 F92 F93 F94 F95	Door lock motor or latch circuit failure.	If lock motor runs: 1. Test continuity of wiring between EOC and lock switch on lock motor assy. Repair if needed. 2. Advance motor until cam depresses the plunger on lock motor switch. Test continuity of switch contacts. If switch is open replace lock motor assembly. 3. If motor runs and switch contacts and wiring harness test good, replace the EOC. If lock motor does not run: 1. Test continuity of lock motor windings. Replace lock motor assembly if windings are open. 2. Test lock motor operation by using a test cord to apply voltage. If motor does not operate replace lock motor assy. 3. If motor runs with test cord check continuity of wire harness to lock motor terminals. If harness is good replace the EOC.

Resistance Temperature Detector

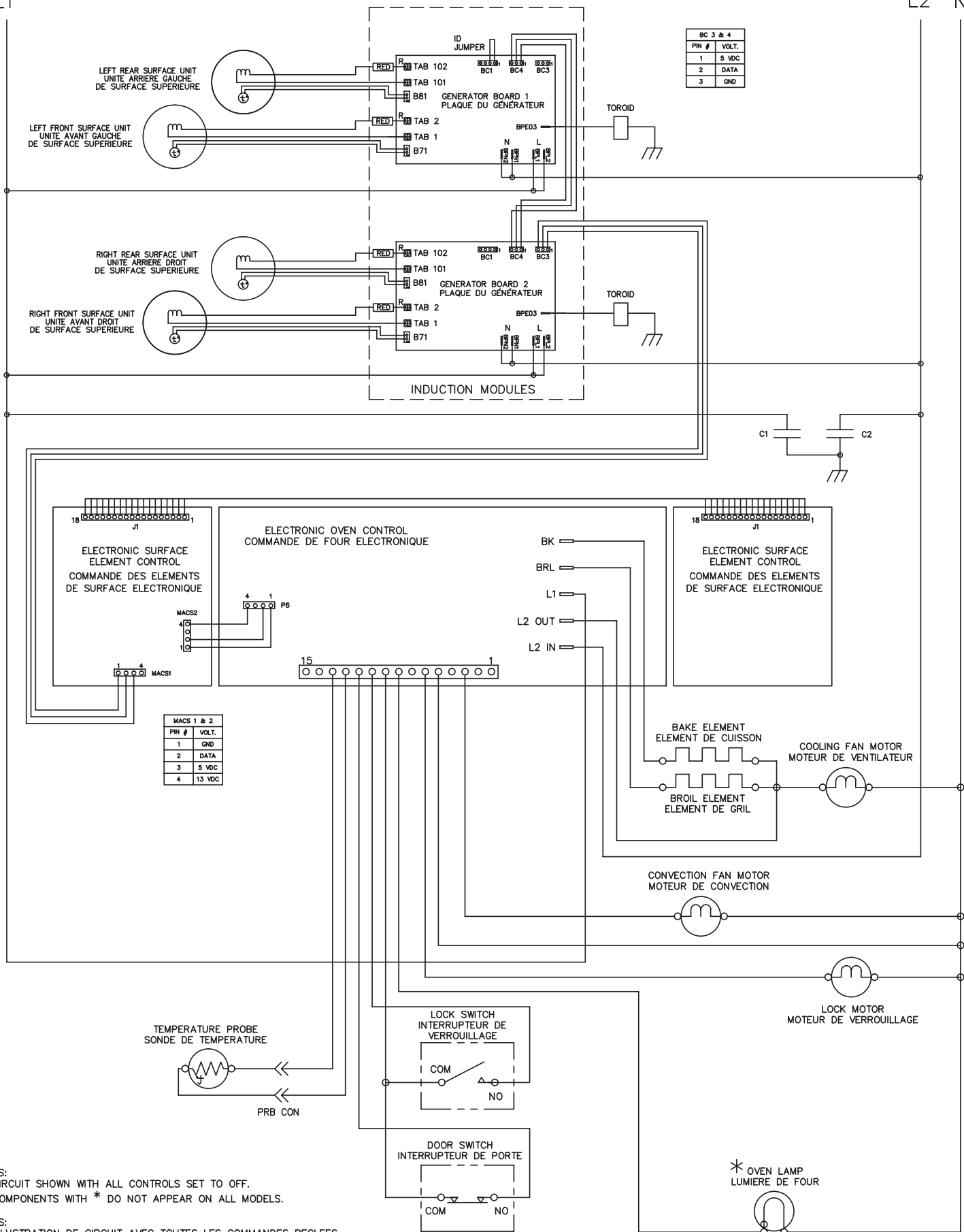


CIRCUIT ANALYSIS MATRIX	EOC RELAYS					DOOR SWITCH COM-NO	WARMER DRAWER LOCK SWITCH MDL (some models)	COOKTOP LOCKOUT (some models)
	L1 TO BAKE	L1 TO BROIL	L1 TO MOTOR DOOR LATCH	L1 TO CONV/ SPEED BAKE FAN	L1 TO CONV/ SPEED BAKE INDICATOR LIGHT			
BAKE/TIME BAKE	X	X*					X	
CONV/SPEED BAKE	X	X*		X	X		X	
BROIL		X					X	
CLEAN	X							
UNLOCKED							X	
LOCKING			X				X	
LOCKED								
UNLOCKING			X				X	
DOOR OPEN								
DOOR CLOSED						X		
COOKTOP ACTIVE								X
NOTE: X= Check active circuits * =Alternates with bake element								

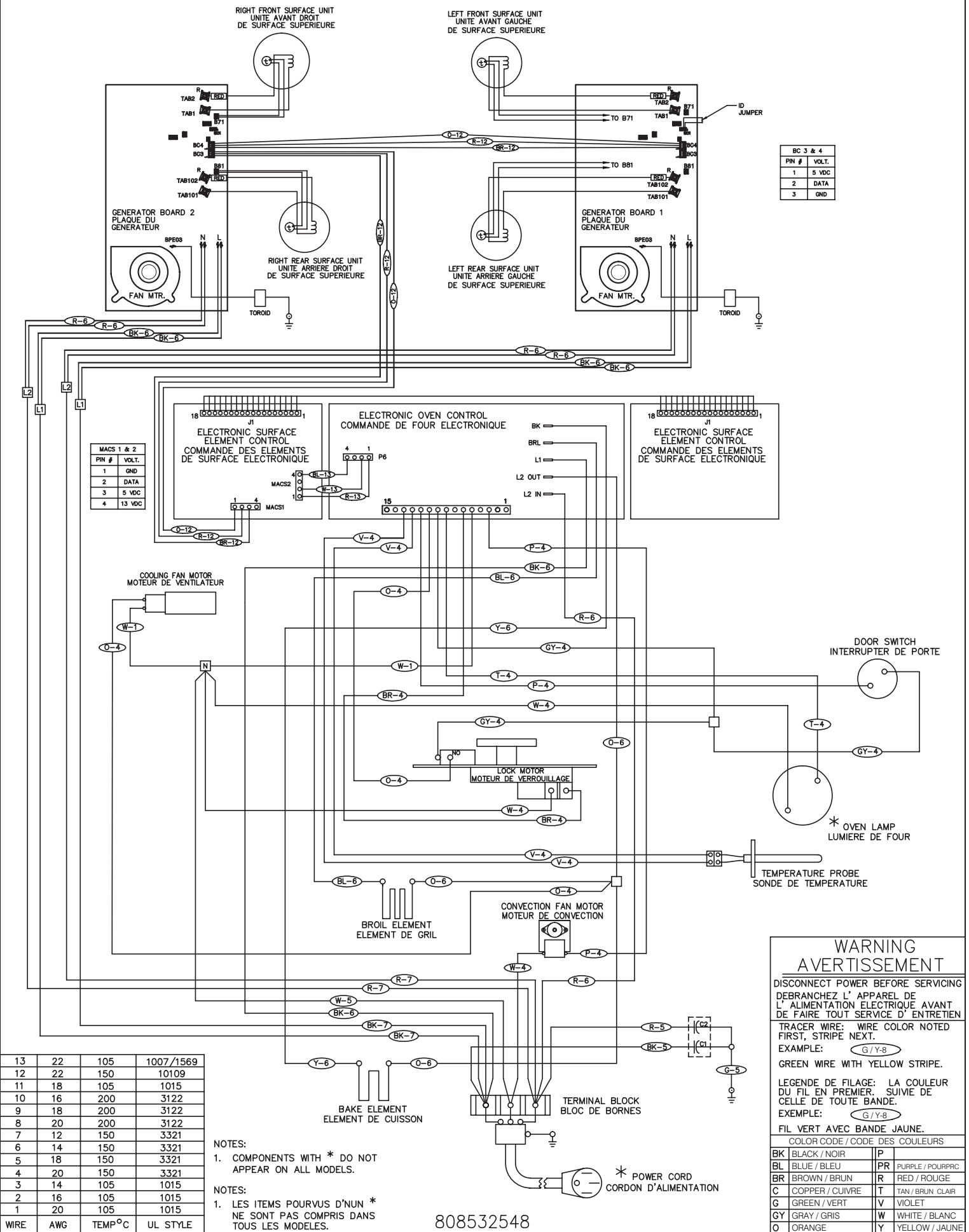
IMPORTANT
DO NOT REMOVE THIS BAG
OR DESTROY THE CONTENTS
WIRING DIAGRAMS AND SERVICE
INFORMATION ENCLOSED
REPLACE CONTENTS IN BAG

L1

L2 N



808532548



808532548

WARNING AVERTISSEMENT

DISCONNECT POWER BEFORE SERVICING
DEBRANCHEZ L' APPAREL DE
L' ALIMENTATION ELECTRIQUE AVANT
DE FAIRE TOUT SERVICE D' ENTRETIEN

TRACER WIRE: WIRE COLOR NOTED
FIRST, STRIPE NEXT.

EXAMPLE: G/Y-B

GREEN WIRE WITH YELLOW STRIPE.

LEGENDE DE FILAGE: LA COULEUR
DU FIL EN PREMIER. SUIVIE DE
CELLE DE TOUTE BANDE.

EXAMPLE: G/Y-B

FIL VERT AVEC BANDE JAUNE.

COLOR CODE / CODE DES COULEURS

BK	BLACK / NOIR	P	PURPLE / POURPRE
BL	BLUE / BLEU	PR	PURPLE / POURPRE
BR	BROWN / BRUN	R	RED / ROUGE
C	COPPER / CUIVRE	T	TAN / BRUN CLAIR
G	GREEN / VERT	V	VIOLET
GY	GRAY / GRIS	W	WHITE / BLANC
O	ORANGE	Y	YELLOW / JAUNE

SERVICE DATA SHEET

Electric Ranges with ES3000 and Induction Smoothtop

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 - All uninsulated electrical terminals, connectors, heaters, etc. are adequately spaced away from all metal parts and panels.
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Electronic Surface Element Control (ESEC)

This range is equipped with an Electronic Surface Element Control (ESEC), which precisely controls the smoothtop cooking elements at multiple settings. For the user, the elements are operated by pressing the touch pads located on the control panel for the desired settings. The control settings are shown in 1-digit displays.

Hot Surface indication - If any of the induction elements are hot, a hot surface light will remain ON until the cooktop cools.

ESEC lockout feature  - The electronic oven control's self-clean and Cooktop Lockout features will not operate when a surface element is ON. Conversely, the surface elements controlled by the ESEC will not operate when an oven control self-clean or Cooktop Lockout mode is active. When the oven control is in a self-clean or Cooktop Lockout mode,  will appear in the oven control display to signify that the surface heating elements are locked out.

ESEC system components -

The ESEC system consists of the following components:

ES3000 oven/cooktop control (EOC) - circuit boards mounted in plastic chassis.

Induction control assembly - circuit boards in plastic housings mounted under the cooktop on a metal tray with six screws.

Notes on replacing parts

Replacing an induction generator board – When replacing an induction generator board under the cooktop, do not over-tighten the 2 screws that secure each board to the range. Over-tightening the screws can damage the plastic housings holding the circuit boards.

Replacing an induction element

Ensure correct coil location.

IMPORTANT

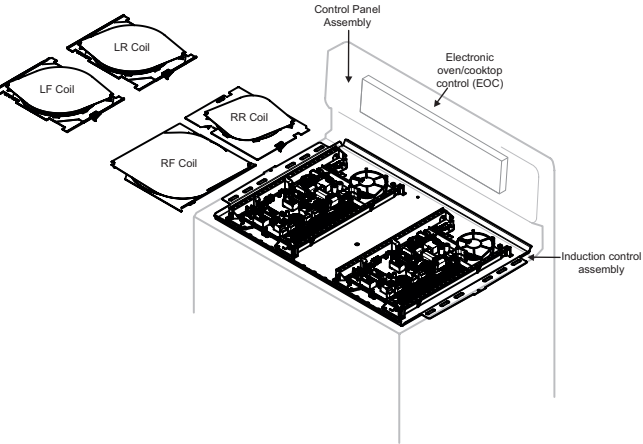
DO NOT REMOVE THIS BAG

OR DESTROY THE CONTENTS

WIRING DIAGRAMS AND SERVICE

INFORMATION ENCLOSED

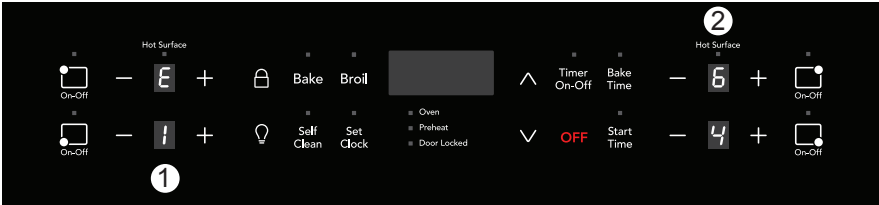
REPLACE CONTENTS IN BAG



Displayed Power Level	Power Level %
L	4.0
2	5.5
3	10.5
4	15.5
5	21.0
6	31.0
7	45.0
8	54.0
9	64.0
H	100.0
P	156-164

Error notification in an induction system

Induction related alarms are displayed using all 4 displays of the user interface. The Rear Left display is used to notify the user that the message being displayed is an error and is represented with an “E” in the display. The Front Left display is used to show which induction generator board is generating the error.



1.

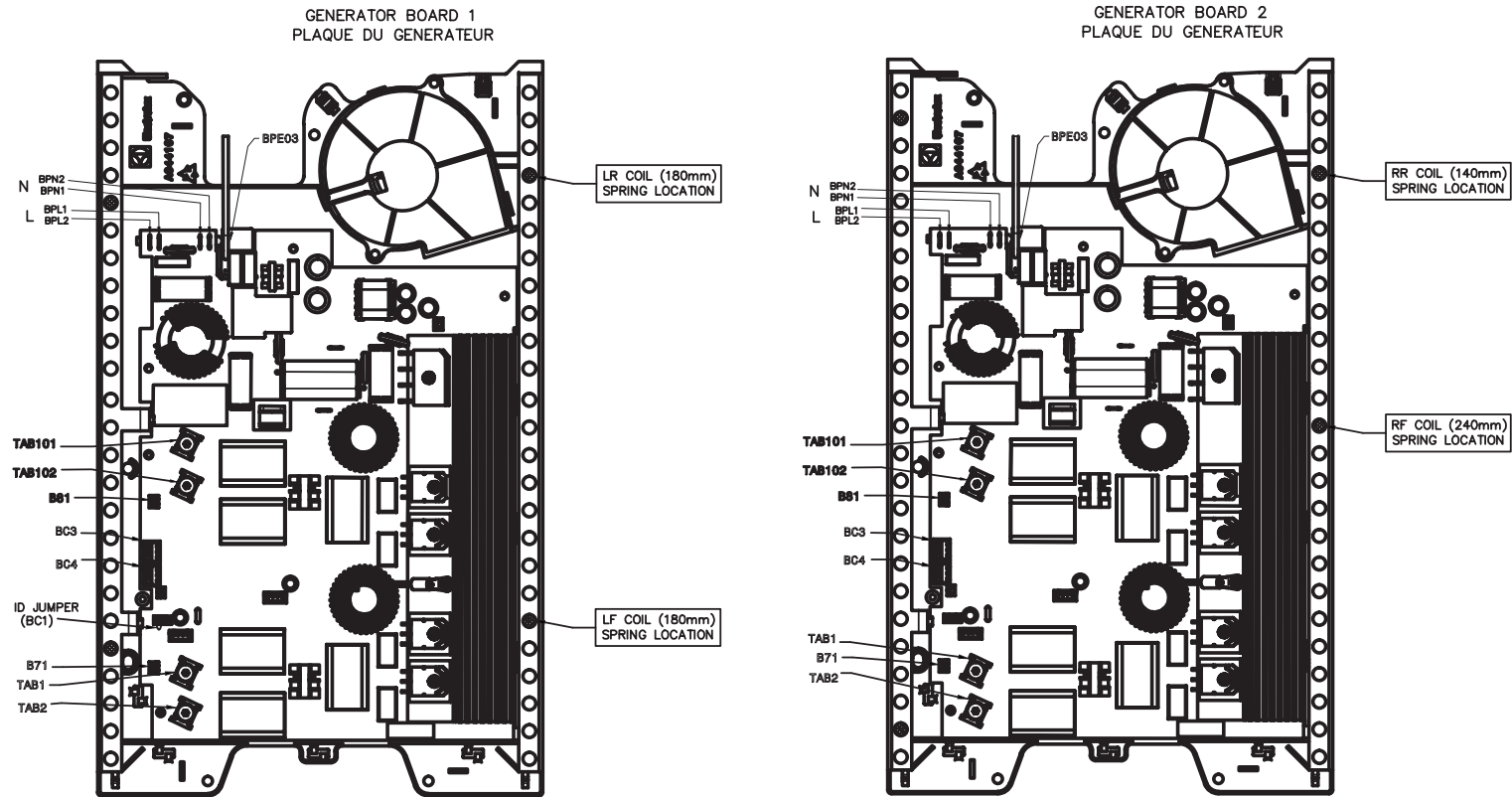
The Front Left display showing “1” above indicates that the left generator board is producing the error. If display shows a “2”, this indicates that the right generator board is producing the error. If display shows a “0”, this indicates that the issue was generated by the cooktop control and not the induction generator.
2.

The Front Right and Rear Right displays display the actual error. An example of a stuck cooling fan on the left induction generator board (E164) is shown above.

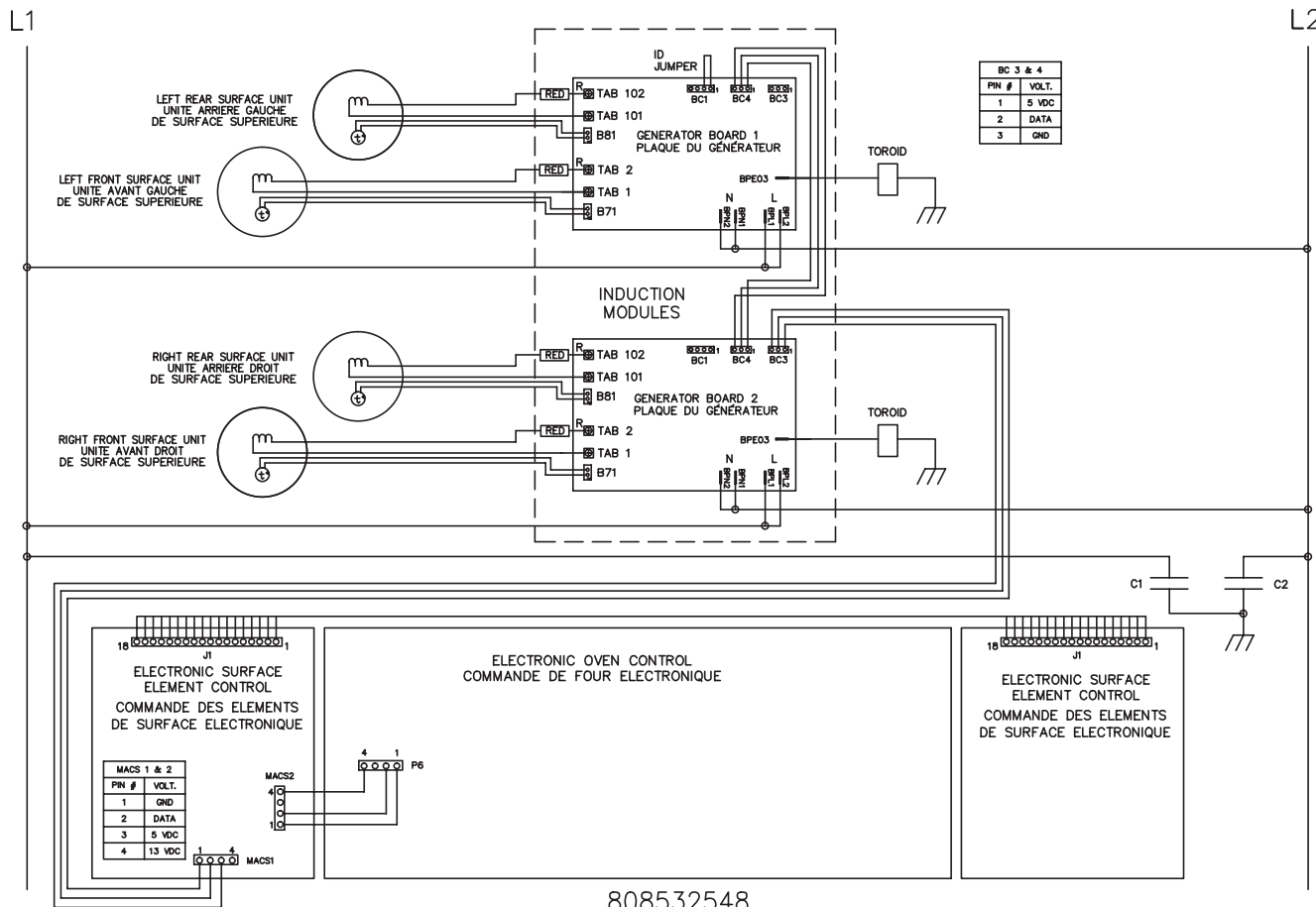
Replacing the ES3000 control* – When replacing the oven/cooktop control in the backguard, DO NOT over tighten the screws that secure it. Upper and lower support brackets should be reinstalled.

*** Please note:** Electronic boards are very sensitive to static electricity. Static electricity can permanently damage electronic boards. Before handling these parts, be sure to drain static electricity from your body by properly grounding yourself.

SCHEMATIC DIAGRAM - Induction Controls Wiring/Connections



SCHEMATIC DIAGRAM - ESEC with Induction Cooktop



Electronic Surface Element Control System (ESEC) Error Code Descriptions

When a specific error condition occurs in the ESEC system, a code will be displayed in the electronic control panel as shown in the error notification in an induction system section. For each Error Code there is a listing of the likely cause or failure condition, as well as suggested corrective actions to be taken. Always reset the power by disconnecting or turning off the power supply for 30 seconds to see if the failure condition will clear. If the error code returns perform the steps one at a time in the order listed below to correct the specific failure condition. **NOTE: If multiple changing error codes are displayed check for disconnected wires or cables.**

Tech Sheet Abbreviations and Terminology		
EOC = Electronic Oven Control	ESEC = Electronic Surface Element Control	TST = Touch Sensor Technology (touch control glass panel)
UIB = User Interface Board	TSEC = Touch Sensor Electronic Control	RTD = Resistance Temperature Device. (Temp Probe or Temp Sensor)
VSC = Variable Speed Control	PS = Power Supply board (PS1 , PS2, etc.)	TCO = Thermal Cut Out also “Thermo Disc” or “Thermal Limiter”

Error Code	Likely Cause or Failure Con- dition	Suggested Corrective Action
011	Stuck key	1. If a key was pressed inadvertently for a long time this error code will be displayed. Make sure there is nothing (water, utensils) in contact with the keyboard. The fault code should go away once the key is released and the Stop key is pressed. If the F011 error comes back when a key is pressed it means the error condition is still there. If the F011 error does not come back it means the error condition is gone and the oven can be used. 2. If the fault code cannot be cleared, replace the oven/cooktop control.
012	Keyboard configuration error	1. Verify the unit has the proper cooktop user interface board based on the model number and parts catalog. 2. Replace the oven/cooktop control if incorrect or the issue persists.
013	Non-volatile memory alarm	1. Disconnect power, wait 30 seconds and reapply power. If fault returns upon power-up, replace oven/cooktop control.
020	Loss of communication between cooktop UI and oven UI	1. Check all harness connections between user interface board and generator board, including all jumper connections (see schematic). 2. If problem persists, check continuity of harness between each control board and user interface. 3. If problem persists, check low voltage (refer to wiring diagram) between the oven control and user interface board. If loss of communica- tion is detected, verify low voltage going in and out of boards and harnesses. 4. If problem persists, replace the oven/cooktop control.
022	Loss of communication between generator board and user interface board.	1. Check all harness connections between user interface board and generator board, including all jumper connections (see schematic). 2. If problem persists, check continuity of harness between each control board and user interface. Replace harness if defective. 3. If problem persists check low voltage (refer to wiring diagram) between the oven control and oven/cooktop control. Also, check for low voltage between the oven/cooktop control and Induction boards 1 and 2. If loss of communication is detected, verify low voltage going in and out of boards and harnesses. 4. If harness is good and problem persists, replace induction generator board 1. 5. If problem persists, reinstall original induction generator board 1 and replace induction generator board 2.
126 226	Macs communication mismatch	1. Disconnect power to the unit, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.
035	ON indicator display failure: the displays cannot display the LEDs properly, the mechanism for the displays has failed.	1. Disconnect power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace oven/cooktop control.
149 249	Induction generator board configu- ration compatibility error.	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. Has the appliance been recently serviced? If so, verify the part numbers of the replaced components. Incorrect replacement parts will cause software errors. 3. If parts check correctly and the problem persists, replace the induction board indicated by the error code. 4. If problem persists, replace the oven/cooktop control.
051	Unable to read cancel key/tail sense error	1. Disconnect power to the unit, wait 30 seconds, then reapply power. 2. Test wiring harness between left and right cooktop UI's (J1 connector on each board). 4. If fault persists, replace the oven/cooktop control.
157 257	MAINS (power supply) relay stuck on induction powerboard.	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code.
158 258	400v detection error on induction powerboard.	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code.
159 259	Too low mains voltage detected on induction generator board	1. Check line voltage coming into the appliance. 2. If problem persists, replace the induction board indicated by the error code.
161 261	15v supply out of window on induction generator board	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code.
164 264	Cooling fan on the induction generator board is blocked or otherwise unable to turn.	1. Check for interference, blockages, debris, dust, or anything else that would physically prevent the fan from moving. 2. If problem persists, replace the induction board indicated by the error code.
165 265	Open temperature sensor on induction coil.	1. Verify that induction coil temperature sensor is connected to generator (B71 & B81). 2. Test resistance of each sensor for ± 100K ohms at room temperature. Replace coil if sensor is open or shorted. 3. If problem persists replace the induction generator board indicated by the error code.
167 267	Loss of communication between control and power micros on induction generator board	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code

Error Code	Likely Cause or Failure Condition	Suggested Corrective Action
168 169 268 269	Failure check found inconsistent voltage or current measurement between the two induction generator board microprocessors.	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code
170 270	Failure check found inconsistent power frequency detection between the two induction generator board microprocessors.	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code.
171 271	Failure check found inconsistent power currents between the drive circuit for the coils (IGBT) and the main power current on the induction generator board.	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code.
172 272	Internal syncing error between the two induction generator board microprocessors	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code.
173 273	Failure check found too-high temperature on induction generator board.	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code.
174 274	Heat sink sensor open or shorted.	1. Check that the sensor is installed correctly, measure approximately 100K Ohm for NTC.. 2. If problem persists, replace the induction board indicated by the error code.
175 275	Failure check found a bad sensor or a shorted circuit on the induction generator board.	1. Check the sensor connections on the induction board indicated by the error code. 2. If problem persists, replace the induction board indicated by the error code.
180 280	Power supply and/or frequency lost on the induction generator board.	1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the induction board indicated by the error code.
181 281	Cooling fan not connected on induc- tion generator board.	1. Check cooling fan connections on the induction board indicated by the error code. 2. If problem persists, replace the induction board indicated by the error code.

Additional Failure Conditions			
Symptom or Failure	Control Display	Possible Cause or Condition	Suggested Corrective Action
Pan does not heat up.	Normal operation	Pan too small for proper pan detection and only works with low power.	Use larger pan or this pan on a smaller cooking zone. Refer to owners guide for proper pan selection.
	Flashing power level Display and pan does not heat.	Pan not detected.	Check whether the pots or pans are suitable for induction. Refer to owners guide for proper pan selection.
		Induction surface unit not correctly connected or surface unit open.	Check the surface unit wire terminal connections. Ensure that they are properly connected and tightened. Test continuity of element (should be less than 1 ohm).
		Distance between surface unit and glass ceramic too large.	Check whether the surface unit is properly positioned and touching the glass cooktop surface.
Individual buttons cannot be used or cannot always be used.	None	1. Test cables and connections. 2. Membrane control panel defective. 3. EOC defective.	1. Follow instructions for proper use of controls. 2. Verify membrane tail connections between EOC and ESEC. Replace if defective or damaged. 3. Replace EOC.
Cooking power too low or shuts down prematurely.	None	Fluids spilled or object lying on control panel keypads.	Clean up spills or remove objects. Restart cooktop in normal manner.
	Normal Operation	Ventilation slots obstructed.	Clear vent openings.
		Unsuitable pots (bottom bent).	Follow owner's guide for proper pan selection.
		Distance between surface unit and glass ceramic too large.	Check whether the surface unit is properly positioned and touching the glass cooktop surface.
		Fan does not start.	1. With two cook zones operating, verify that the fan runs at a slow speed. If fans do not run, check for foreign objects or stuck fan motor. 2. Test continuity of motor windings. Replace motor if open. 3. Replace induction control assembly.
Steady "Hot surface" indicator light when cooking zone is cold and switched off.	"Hot surface" indicator light	Induction coil temperature sensor failure	1. Test surface unit RTD approx. 100K ohms at room temperature. Replace surface unit if resistance is not correct. 2. Replace induction generator board.
Cooktop does not initialize/operate.	Blank No display No beep	EOC not powered.	Verify installation and harness connections to EOC.
		Defective EOC.	Replace EOC.