**SERVICE DATA SHEET**

**Electric Ranges with 3XX 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.

**SAFEGUARD PRACTICES**

To avoid the possibility of personal injury and/or property damage, it is important that safe servicing practices be observed. The following are examples, but without limitation, of such practices:

1. Before servicing or moving an appliance remove power cord from electrical outlet, trip circuit breaker to OFF, or remove fuse.
2. Never interfere with the proper installation of any safety device.
3. **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.
4. 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 reestablished.

**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**

1. Set EOC to bake at 500°F.
2. Within 5 seconds of setting 550°F, press and hold the bake pad for approximately 15 seconds until single beep sounds (longer cause F11 shorted keypad alarm).
3. Calibration offset should appear in the display.
4. Use the slew keys to adjust the oven temperature up or down 35°F in 5°F increments.
5. 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 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 on this sheet). The individual boards are not field repairable. See software programming on each board. This communication is not detectable by volt ohmmeter. The troubleshooting 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.

**Electronic Oven Control Fault Description**

**Fault Code**

**Suggested Corrective Action**

1. **F11** Shorted keypad or selector switch
   - 1. Reset poor supply to range – Disconnect power, wait 30 seconds and reapply power.
   - 2. Check/ reset 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.

2. **F13** Shorted oven probe circuit
   - 1. Disconnect power, wait 30 seconds and reapply power. If fault returns upon power-up, replace EOC.

3. **F14** Keyboard tail failure
   - 1. Check for damage to the ribbon connection or that it is plugged in properly.

4. **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/reset communication between oven (MACS BUS) and cooktop controller (MACS2).
   - 3. If problem persists, replace each board individually then retest until problem clears.

5. **F30** Open oven sensor probe circuit
   - 1. (F30) Check resistance at room temperature & compare to RTD Sensor resistance chart. If resistance does not match chart, replace RTD Sensor Probe. Check for shorted probe circuit.
   - 2. Check/reseat communication between oven (MACS BUS) and cooktop controller (MACS2)

6. **F31** Shorted oven sensor probe circuit
   - 1. Check resistance at room temperature & compare to RTD Sensor resistance chart. If resistance does not match chart, replace RTD Sensor Probe. Check for shorted probe circuit.
   - 2. Check/reseat communication between oven (MACS BUS) and cooktop controller (MACS2)

7. **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/reset communication between oven (MACS BUS) and cooktop controller (MACS2)
   - 3. If problem persists, replace each board individually then retest until problem clears.

8. **F90** Door lock motor or latch circuit failure
   - 1. Test continuity of wiring between EOC and lock switch on lock motor assembly. Repair if needed.
   - 2. Advance motor until cam depresses the plunger on lock motor switch. Test continuity of switch contacts. If switch is good, replace the EOC.

9. **F91** Motor relay or latch circuit failure
   - 1. Test continuity of wiring between EOC and lock switch on lock motor assembly. Repair if needed.
   - 2. Replace probe or repair wiring connections if defective.

10. **F92** Door switch shut-off or latch circuit failure
    - 1. Replace probe or repair wiring connections if defective.

11. **F93** Door switch shut-off or latch circuit failure
    - 1. Replace probe or repair wiring connections if defective.

12. **F94** Door switch shut-off or latch circuit failure
    - 1. Replace probe or repair wiring connections if defective.

13. **F95** Door switch shut-off or latch circuit failure
    - 1. Replace probe or repair wiring connections if defective.

**NOTE:** Severe overheating may require the entire oven to be replaced should damage be extensive.

**Temperature °F (°C)**

- 900 ± 13.6 (482 ± 7.5)
- 250 ± 4.4 (121 ± 2.4)
- 550 ± 8.2 (288 ± 4.5)
- 650 ± 9.6 (343 ± 5.3)
- 75 ± 2.5 (24 ± 1.3)
- 32 ± 1.9 (0 ± 1.0)
- 2697 ± 24.4
- 1654 ± 10.8
- 1852 ± 13.5
- 1000 ± 4.0
- 1091 ± 5.3

**RTD SCALE**

- Resistance (ohms)
- Temperature °F (°C)

- 1000 ± 4.0 (500 ± 2.2)
- 1316 ± 6.5 (700 ± 3.6)
- 1435 ± 6.9 (800 ± 3.8)
- 1804 ± 10.8 (900 ± 5.6)
- 1902 ± 11.5 (1000 ± 6.3)
- 2047 ± 15.8 (1100 ± 8.7)
- 2237 ± 18.5 (1200 ± 11.5)
- 2697 ± 24.4 (1500 ± 13.5)

**Typical Troubleshooting**

1. 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.

2. 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 in properly installed in the oven cavity.
   - 2. Check/reseat communication between oven and cooktop controller (MACS2)
   - 3. Disconnect power from the range, wait 30 seconds and reapply power. If oven continues to heat when the power is reapplied, replace the EOC.

3. **If Oven is overheating**
   - 1. Reset poor supply to range – Disconnect power, wait 30 seconds and reapply power.
   - 2. Check/reset communication between oven (MACS BUS) and cooktop controller (MACS2)
   - 3. If problem persists, replace each board individually then retest until problem clears.

4. **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.
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5. **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 in properly installed in the oven cavity.
   - 2. Check/reseat communication between oven (MACS BUS) and cooktop controller (MACS2)
   - 3. 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.

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**Tech Sheet Abbreviations and Terminology**

- **EOC** = Electronic Oven Control
- **ESEC** = Electronic Surface Element Control
- **TBT** = Touch Sensor technology (touch control glass panel)
- **UIB** = User Interface Board
- **TSC** = 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 “Thermoc” or “Thermal Limiter”

**Electric Oven Control Wiring Diagrams**

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**SERVICE DATA SHEET**

**Electric Ranges with ES3000 and Induction Smoothtop**

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4. 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.

**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 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, an “E” 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.

**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.
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 list. 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 allow the control condition to 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.

### Error Code Likely Cause or Failure Condition Suggested Corrective Action

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Likely Cause or Failure Condition</th>
<th>Suggested Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>211 Stuck key</td>
<td>1. If a key was pressed inadvertently for a long time this error code will be displayed. Make sure there is nothing (water, objects) 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 2. If the fault code cannot be cleared, replace the oven/cooktop control.</td>
<td>1. Check that the sensor is installed correctly, measure approximately 100K Ohm for NTC. 2. If fault persists, replace the oven/cooktop control.</td>
</tr>
<tr>
<td>212 Keyboard configuration error</td>
<td>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.</td>
<td>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 communication is detected, verify low voltage going in and out of boards and harnesses.</td>
</tr>
<tr>
<td>213 Non-volatile memory alarm</td>
<td>1. Disconnect power, wait 30 seconds and reapply power. If fault returns upon power-up, replace oven/cooktop control.</td>
<td>1. Disconnect power to the unit, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
</tr>
<tr>
<td>220 Loss of communication between cooktop UI and oven UI</td>
<td>1. Verify that induction coil temperature sensor is connected to generator (B71 &amp; B81). 2. If problem persists, replace oven/cooktop control.</td>
<td>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.</td>
</tr>
<tr>
<td>222 Loss of communication between generator board and user interface board</td>
<td>1. Disconnect power to the unit, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
<td>1. Disconnect the power supply to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace oven/cooktop control.</td>
</tr>
<tr>
<td>226 Mace communication mismatch</td>
<td>1. Disconnect power to the unit, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
<td>1. Check that the sensor is installed correctly, measure approximately 100K Ohm for NTC. 2. If fault persists, replace the oven/cooktop control.</td>
</tr>
<tr>
<td>235 ON indicator display failure: the displays cannot display the LEDES properly, the mechanism for the display has failed.</td>
<td>1. Disconnect power to the unit, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
<td>1. Cycle power to the appliance, wait 30 seconds before reconnecting power. 2. If problem persists, replace the oven/cooktop control.</td>
</tr>
<tr>
<td>249 Induction generator board configuration compatibility error</td>
<td>1. Check that the sensor is installed correctly, measure approximately 100K Ohm for NTC. 2. If fault persists, replace the oven/cooktop control.</td>
<td>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.</td>
</tr>
<tr>
<td>251 Mains (power supply) relay stuck</td>
<td>1. Disconnect power to the unit, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
<td>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.</td>
</tr>
<tr>
<td>252 Power supply and/or frequency lost</td>
<td>1. Disconnect power to the unit, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
<td>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.</td>
</tr>
<tr>
<td>253 Failure check found inconsistent power frequency detection between the two induction generator boards</td>
<td>1. Check that the sensor is installed correctly, measure approximately 100K Ohm for NTC. 2. If problem persists, replace the oven/cooktop control indicated by the error code.</td>
<td>1. Check the sensor connections on the induction generator board. 2. If problem persists, replace the induction board indicated by the error code.</td>
</tr>
<tr>
<td>254 Power supply and/or frequency too high</td>
<td>1. Disconnect power to the appliance, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
<td>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.</td>
</tr>
<tr>
<td>255 Power supply and/or frequency too low</td>
<td>1. Disconnect power to the appliance, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
<td>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.</td>
</tr>
<tr>
<td>256 Cooling fan not connected on induction generator board</td>
<td>1. Disconnect power to the appliance, wait 30 seconds, then reapply power. 2. If fault persists, replace oven/cooktop control.</td>
<td>1. Check cooling fan connections on the induction generator board. 2. If problem persists, replace the induction board indicated by the error code.</td>
</tr>
</tbody>
</table>

### Additional Failure Conditions

#### Symptom or Failure Condition Control Display Possible Cause or Failure Condition Suggested Corrective Action

<table>
<thead>
<tr>
<th>Symptom or Failure Condition</th>
<th>Control Display</th>
<th>Possible Cause or Failure Condition</th>
<th>Suggested Corrective Action</th>
</tr>
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<tbody>
<tr>
<td>Pan does not heat.</td>
<td>Normal operation</td>
<td>Pan too small for proper pan detection and only works with low power.</td>
<td>Use larger pan or this pan on a smaller cooking zone. Refer to owner's guide for proper pan selection.</td>
</tr>
<tr>
<td>Flashing power level and pan does not heat.</td>
<td>Normal operation</td>
<td>Pan not detected.</td>
<td>Check whether the pots or pans are suitable for induction. Refer to owner's guide for proper pan selection.</td>
</tr>
<tr>
<td>Induction surface unit not correctly connected or surface unit open.</td>
<td>Normal operation</td>
<td>Distance between surface unit and glass ceramic too large.</td>
<td>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).</td>
</tr>
<tr>
<td>Individual buttons cannot be used or cannot always be used.</td>
<td>None</td>
<td>None</td>
<td>1. Test cables and connections. 2. Membrane control panel defective. 3. Replace EOC.</td>
</tr>
<tr>
<td>Distance between surface unit and glass ceramic too large.</td>
<td>Normal operation</td>
<td>Distance between surface unit and glass ceramic too large.</td>
<td>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).</td>
</tr>
<tr>
<td>Cooling power too low or fluctuates down prematurely.</td>
<td>None</td>
<td>Fluids spilled or object laying on control panel keypad.</td>
<td>Clean up spills or remove objects. Restart cooktop in normal manner.</td>
</tr>
<tr>
<td>Unsuitable pots (bottom bent).</td>
<td>None</td>
<td>Forbids owner's guide for proper pan selection.</td>
<td></td>
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<tr>
<td>Cooling fan on the induction generator board is blocked or otherwise unable to turn.</td>
<td>Normal operation</td>
<td>Distance between surface unit and glass ceramic too large.</td>
<td>Check whether the surface unit is properly positioned and touching the glass cooktop surface.</td>
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<td>Distance between surface unit and glass ceramic too large.</td>
<td>Normal operation</td>
<td>Distance between surface unit and glass ceramic too large.</td>
<td>Check whether the surface unit is properly positioned and touching the glass cooktop surface.</td>
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<td>Fan does not start.</td>
<td>Normal operation</td>
<td>Distance between surface unit and glass ceramic too large.</td>
<td>Check whether the surface unit is properly positioned and touching the glass cooktop surface.</td>
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<tr>
<td>Test surface until RFID approx. 100K ohms at room temperature. Replace unit if resistance is not correct.</td>
<td>Normal operation</td>
<td>Distance between surface unit and glass ceramic too large.</td>
<td>Check whether the surface unit is properly positioned and touching the glass cooktop surface.</td>
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<tr>
<td>Replace induction generator board.</td>
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