



# Gas Controls

A large, stylized, light gray graphic in the background, resembling a snowflake or a star with six points. Each point is composed of a series of small circles connected by lines, creating a complex, geometric pattern.

## Technical Reference Manual

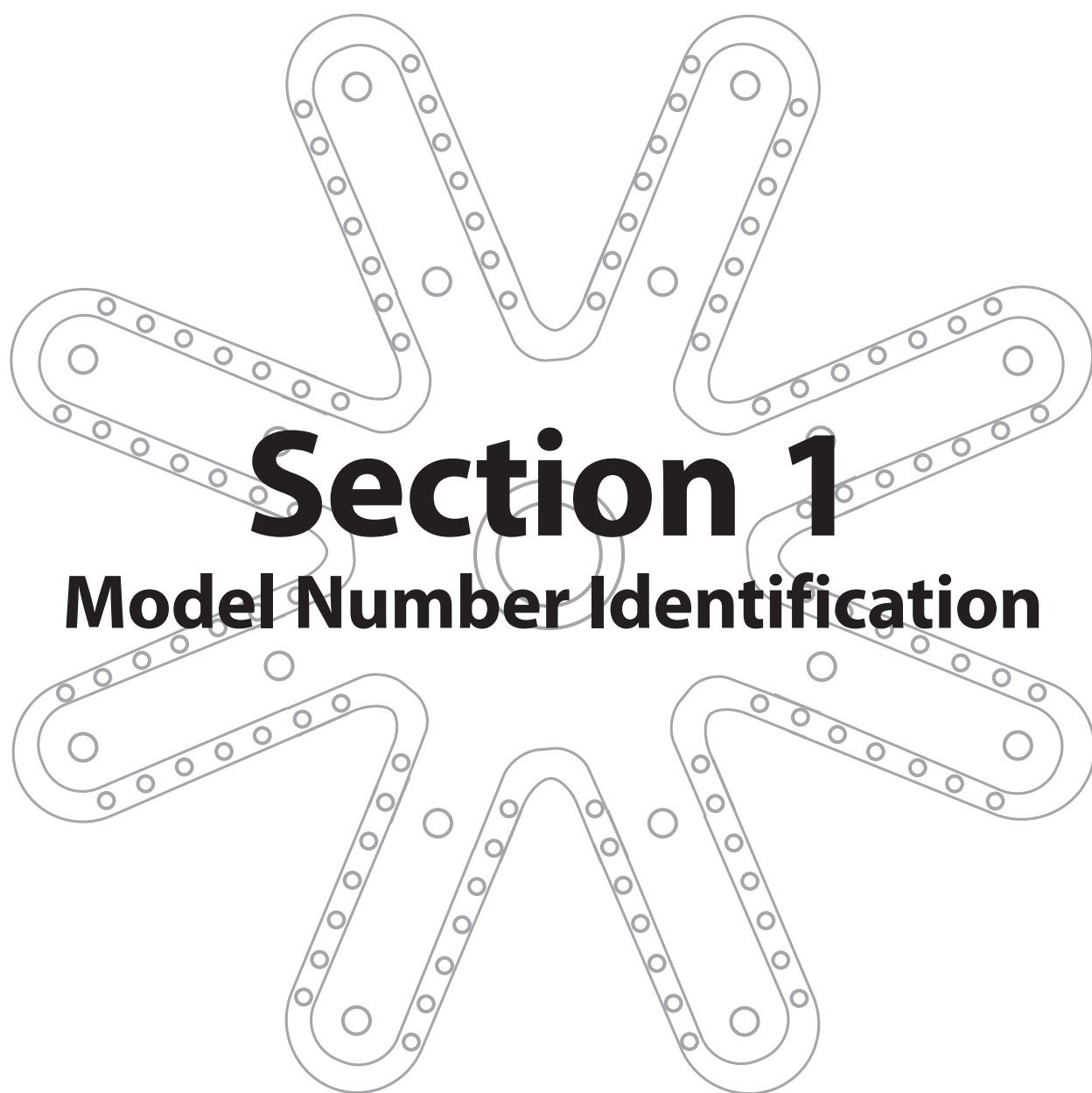


# Garland & US Range Technical Reference Manual

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# **Section 1**

## **Model Number Identification**

## General Information All Models

- All equipment is supplied with 6" (152mm) legs unless specified
- In the Commonwealth of Massachusetts this product must be installed by a licensed plumber or gas fitter.

## Garland G Series Restaurant Ranges (2007 – Sit Control)

### Clearances

| Clearances Applicable For All Models |             |            |
|--------------------------------------|-------------|------------|
| Surface                              | Sides       | Rear       |
| Combustible Wall Minimum             | 12" (305mm) | 6" (152mm) |
| Non-Combustible Wall Minimum         | 0"          | 0"         |

### Gas Pressures

| Gas     | Minimum Supply Pressure | Manifold Operating Pressure |
|---------|-------------------------|-----------------------------|
| Natural | 7"WC (17.5 mbar)        | 4.5"WC (11.25 mbar)         |
| Propane | 11"WC (28 mbar)         | 10"WC (25 mbar)             |

### Gas Inlet Size

| Model Width                    | Connection                      |
|--------------------------------|---------------------------------|
| 24" (610mm) &<br>36" (914mm)   | 3/4" NPT<br>Rear Gas Connection |
| 48" (1219mm) &<br>60" (1524mm) | 1" NPT<br>Rear Gas Connection   |

### Individual Burner Input Rates

| Burner  | Input BTU/HR |             |
|---|--------------|-------------|
|   | Natural Gas  | Propane Gas |
| Open Top  | 33,000       | 26,000      |
| Hot Top Burner (In lieu of 2 open top burners)        | 20,000       | 19,000      |
| Griddle Burner (In lieu of 2 open top burners)        | 20,000       | 19,000      |
| Raised Griddle Broiler (Consists of 3 burners)        | 33,000       | 33,000      |
| Oven Burner For Full Size Standard or Convection Oven | 38,000       | 32,000      |
| Space Saver Oven                                      | 32,000       | 28,000      |

Rates are for installations up to 2000' (610m) above sea level

## Base Model Designations & Total Input Rates

| Model #    | Description  | Input BTU/Hr |             |
|------------|--|--------------|-------------|
|            |  | Natural Gas  | Propane Gas |
| G24-4S     | 24" (610mm) nominal size unit, 4 open burners, storage base  | 132,000      | 104,000     |
| G24-4L     | 24" (610mm) nominal size unit, 4 open burners, space saver oven  | 164,000      | 132,000     |
| G36-6S     | 36" (914mm) nominal size unit, 6 open burners, storage base  | 198,000      | 156,000     |
| G36-6R     | 36" (914mm) nominal size unit, 6 open burners, standard oven   | 236,000      | 188,000     |
| G36-6C     | 36" (914mm) nominal size unit, 6 open burners, convection oven   | 236,000      | 188,000     |
| G48-8SS    | 48" (1219mm) nominal size unit, 8 open burners, storage base   | 264,000      | 208,000     |
| G48-8RS    | 48" (1219mm) nominal size unit, 8 open burners, standard oven, storage base  | 302,000      | 240,000     |
| G48-8CS    | 48" (1219mm) nominal size unit, 8 open burners, convection oven, storage base  | 302,000      | 240,000     |
| G48-8LL    | 48" (1219mm) nominal size unit, 8 open burners, 2 space saver ovens  | 328,000      | 264,000     |
| G60-10SS   | 60" (1524mm) nominal size unit, 10 open burners, storage base  | 330,000      | 260,000     |
| G60-10RS   | 60" (1524mm) nominal size unit, 10 open burners, standard oven, storage base   | 368,000      | 292,000     |
| G60-10CS   | 60" (1524mm) nominal size unit, 10 open burners, convection oven, storage base                                       | 368,000      | 292,000     |
| G60-10CR   | 60" (1524mm) nominal size unit, 10 open burners, standard oven, convection oven                                      | 406,000      | 324,000     |
| G60-10RR   | 60" (1524mm) nominal size unit, 10 open burners, 2 standard ovens  | 406,000      | 324,000     |
| G60-10CC   | 60" (1524mm) nominal size unit, 10 open burners, 2 convection ovens  | 406,000      | 324,000     |
| G60-6R24SS | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, storage base                      | 231,000      | 189,000     |
| G60-6R24RS | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, standard oven, storage base       | 269,000      | 221,000     |
| G60-6R24CS | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, convection oven, storage base     | 269,000      | 221,000     |
| G60-6R24CR | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, standard oven, convection oven    | 307,000      | 253,000     |
| G60-6R24RR | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, 2 standard ovens                  | 307,000      | 253,000     |
| G60-6R24CC | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, standard oven, 2 convection ovens | 307,000      | 253,000     |

Rates are for installations up to 2000' (610m) above sea level

# US Range U Series Restaurant Ranges (2007 – Sit Control)

## Clearances

| Clearances Applicable For All Models |             |            |
|--------------------------------------|-------------|------------|
| Surface                              | Sides       | Rear       |
| Combustible Wall Minimum             | 12" (305mm) | 6" (152mm) |
| Non-Combustible Wall Minimum         | 0"          | 0"         |

## Gas Pressures

| Gas     | Minimum Supply Pressure | Manifold Operating Pressure |
|---------|-------------------------|-----------------------------|
| Natural | 7"WC (17.5 mbar)        | 4.5"WC (11.25 mbar)         |
| Propane | 11"WC (28 mbar)         | 10"WC (25 mbar)             |

## Gas Inlet Size

| Model Width                    | Connection                      |
|--------------------------------|---------------------------------|
| 24" (610mm) &<br>36" (914mm)   | 3/4" NPT<br>Rear Gas Connection |
| 48" (1219mm) &<br>60" (1524mm) | 1" NPT<br>Rear Gas Connection   |

## Individual Burner Input Rates

| Burner   | Input BTU/HR |             |
|--|--------------|-------------|
|  | Natural Gas  | Propane Gas |
| Open Top                                       | 32,000       | 26,000      |
| Hot Top Burner (In lieu of 2 open top burners) | 20,000       | 19,000      |
| Griddle Burner (In lieu of 2 open top burners) | 20,000       | 19,000      |
| Raised Griddle Broiler (Consists of 3 burners) | 33,000       | 33,000      |
| Oven Burner Standard or Convection             | 38,000       | 32,000      |
| Space Saver Oven                               | 32,000       | 28,000      |

Rates are for installations up to 2000' (610m) above sea level



## Base Model Designations & Total Input Rates

| Model #    | Description   | Input BTU/Hr |             |
|------------|---|--------------|-------------|
|            |   | Natural Gas  | Propane Gas |
| U24-4S     | 24" (610mm) nominal size unit, 4 open burners, storage base   | 128,000      | 104,000     |
| U24-4L     | 24" (610mm) nominal size unit, 4 open burners, space saver oven   | 160,000      | 132,000     |
| U36-6S     | 36" (914mm) nominal size unit, 6 open burners, storage base   | 192,000      | 156,000     |
| U36-6R     | 36" (914mm) nominal size unit, 6 open burners, standard oven  | 230,000      | 188,000     |
| U36-6C     | 36" (914mm) nominal size unit, 6 open burners, convection oven  | 230,000      | 188,000     |
| U48-8SS    | 48" (1219mm) nominal size unit, 8 open burners, storage base  | 256,000      | 208,000     |
| U48-8RS    | 48" (1219mm) nominal size unit, 8 open burners, standard oven, storage base                                       | 294,000      | 240,000     |
| U48-8CS    | 48" (1219mm) nominal size unit, 8 open burners, convection oven, storage base                                     | 294,000      | 240,000     |
| U48-8LL    | 48" (1219mm) nominal size unit, 8 open burners, 2 space saver ovens   | 320,000      | 264,000     |
| U60-10SS   | 60" (1524mm) nominal size unit, 10 open burners, storage base   | 320,000      | 260,000     |
| U60-10RS   | 60" (1524mm) nominal size unit, 10 open burners, standard oven, storage base                                      | 358,000      | 292,000     |
| U60-10CS   | 60" (1524mm) nominal size unit, 10 open burners, convection oven, storage base                                    | 358,000      | 292,000     |
| U60-10CR   | 60" (1524mm) nominal size unit, 10 open burners, standard oven, convection oven                                   | 396,000      | 324,000     |
| U60-10RR   | 60" (1524mm) nominal size unit, 10 open burners, 2 standard ovens   | 396,000      | 324,000     |
| U60-10CC   | 60" (1524mm) nominal size unit, 10 open burners, 2 convection ovens   | 396,000      | 324,000     |
| U60-6R24SS | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, storage base                   | 225,000      | 189,000     |
| U60-6R24RS | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, standard oven, storage base    | 263,000      | 221,000     |
| U60-6R24CS | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, convection oven, storage base  | 263,000      | 221,000     |
| U60-6R24CR | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, standard oven, convection oven | 301,000      | 253,000     |
| U60-6R24RR | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, 2 standard ovens               | 301,000      | 253,000     |
| U60-6R24CC | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler 3 convection ovens              | 301,000      | 253,000     |

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# Sunfire X Series Restaurant Ranges

## (2007 – Sit Control)

### Clearances

| Clearances Applicable For All Models |             |            |
|--------------------------------------|-------------|------------|
| Surface                              | Sides       | Rear       |
| Combustible Wall Minimum             | 12" (305mm) | 6" (152mm) |
| Non-Combustible Wall Minimum         | 0"          | 0"         |

### Gas Pressures

| Gas     | Minimum Supply Pressure | Manifold Operating Pressure |
|---------|-------------------------|-----------------------------|
| Natural | 7"WC (17.5 mbar)        | 4.5"WC (11.25 mbar)         |
| Propane | 11"WC (28 mbar)         | 10"WC (25 mbar)             |

### Gas Inlet Size

| Model Width                  | Connection                      |
|------------------------------|---------------------------------|
| 24" (610mm) &<br>36" (914mm) | 3/4" NPT<br>Rear Gas Connection |
| 60" (1524mm)                 | 1" NPT<br>Rear Gas Connection   |

## Individual Burner Input Rates

| Burner   | Input BTU/HR |             |
|--|--------------|-------------|
|  | Natural Gas  | Propane Gas |
| Open Top                                       | 30,000       | 26,000      |
| Hot Top Burner (In lieu of 2 open top burners) | 20,000       | 19,000      |
| Griddle Burner (In lieu of 2 open top burners) | 20,000       | 19,000      |
| Raised Griddle Broiler (Consists of 3 burners) | 33,000       | 33,000      |
| Oven Burner Standard                           | 33,000       | 29,000      |
| Space Saver Oven                               | 25,000       | 25,000      |


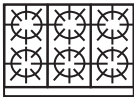
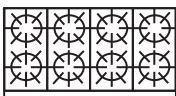
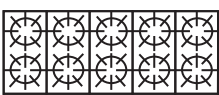
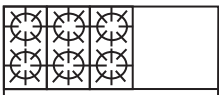
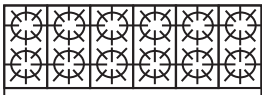
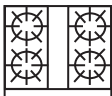
Rates are for installations up to 2000' (610m) above sea level

## Base Model Designations & Total Input Rates

| Model #    | Description  | Input BTU/Hr |             |
|------------|--|--------------|-------------|
|            |  | Natural Gas  | Propane Gas |
| X24-4S     | 24" (610mm) nominal size unit, 4 open burners, storage base  | 120,000      | 104,000     |
| X24-4L     | 24" (610mm) nominal size unit, 4 open burners, space saver oven  | 145,000      | 129,000     |
| X36-6S     | 36" (914mm) nominal size unit, 6 open burners, storage base  | 180,000      | 156,000     |
| X36-6R     | 36" (914mm) nominal size unit, 6 open burners, standard oven   | 213,000      | 185,000     |
| X60-10SS   | 60" (1524mm) nominal size unit, 10 open burners, storage base  | 300,000      | 260,000     |
| X60-10RS   | 60" (1524mm) nominal size unit, 10 open burners, standard oven   | 333,000      | 289,000     |
| X60-10RR   | 60" (1524mm) nominal size unit, 10 open burners, 2 standard ovens  | 366,000      | 318,000     |
| X60-6R24SS | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, storage base                | 203,000      | 189,000     |
| X60-6R24RS | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, standard oven, storage base | 246,000      | 218,000     |
| X60-6R24RR | 60" (1524mm) nominal size unit, 6 open burners, 24" (61mm) raised griddle/broiler, 2 standard ovens            | 279,000      | 247,000     |

Rates are for installations up to 2000' (610m) above sea level

# Garland Restaurant Series

| Top Section   |  | Base                                   | Models                            |
|---|--|--|-----------------------------------|
|                                | 2 x 12"<br>Sections<br>24" Wide              | (1) Space Saver Oven                   | G28, H28, P28                     |
|   |  | (1) Storage Base                       | G28S, H28S, P28S                  |
|                                | 3 x 12"<br>Sections<br>36" Wide              | (1) Standard Oven                      | 286, 386, G286, GV286, H286, P286 |
|   |  | (1) Range Base<br>Convection Oven      | G286RC, H286RC, P286RC            |
|   |  | (1) Storage Base                       | G286S, H286S, P286S               |
|                                | 4 x 12"<br>Sections 48"<br>Wide              | (2) Space Saver Ovens                  | G288, H288, P288                  |
|   |  | (1) Std. Oven &<br>(1) Storage Base    | G288S, H288S, P288S               |
|   |  | (1) Convection Oven                    | G288RC, H288RC, P288RC            |
|   |  | (2) Std. Ovens                         | 284, 384, G284, GV284, H284, P284 |
|                                | 5 x 12"<br>Sections 60"<br>Wide              | (1) Std. Oven &<br>(1) Storage Base    | 287, 387, G287, H287, P287        |
|   |  | (1) Std. Oven &<br>(1) Convection Oven | G284RC, H284RC, P284RC            |
|   |  | (2) Convection Oven                    | G284RC2, H284RC2, P284RC2         |
|   |  | (2) Std. Ovens                         | 283, 383, G283, GV283, H283, P283 |
|   |  | (1) Std. Oven &<br>(1) Storage Base    | 282, 382, G282, H282, P282        |
|   |  | (1) Std. Oven &<br>(1) Convection Oven | G283RC, H282RC, P283RC            |
| <br>24" Raised Griddle/Broiler | 60" Wide<br>6 Burner                         | (2) Convection Ovens                   | G283RC2, H283RC2, P283RC2         |
|   |  | (2) Std. Ovens                         | 285, 385, G285, H285, P285        |
|   |  | (1) Std. Oven &<br>(1) Storage Base    | 281, 381, G281, H281, P281        |
|   |  | (1) Std. Oven &<br>(1) Convection Oven | G285RC, H285RC, P285RC            |
|   |  | (2) Convection Oven                    | G285RC2, H285RC2, P285RC2         |
|   |  | (2) Std. Ovens                         | G289, H289, P289                  |
|                              | 6 x 12"<br>Sections<br>72" Wide<br>12 Burner | (1) Std. Oven                          | G289S, H289S, P289S               |
|   |  | (1) Storage Base                       | G289RC, H289RC, P289RC            |
|   |  | (1) Std. Oven &<br>(1) Convection Oven | G289RC2, H289RC2, P289RC2         |
|   |  | (2) Convection Ovens                   | G289RC2, H289RC2, P289RC2         |
|                              | 4 Burner<br>30" Wide                         | (1) Standard Oven                      | G-30, G-30A                       |

|   |  |
|---|--|
| <b>Minimum Supply Pressure::</b><br>NAT - 7" WC<br>PRO - 11" WC | <b>Manifold Operating Pressure:</b><br>NAT - 4.5" WC<br>PRO - 10" WC |
|---|--|

# Garland Heavy Duty

## Master Series Model Numbers

| Prefix Definitions |   | Suffix Definitions |                                   |
|--------------------|---|--------------------|-----------------------------------|
| M                  | Master                                    | E                  | Electric Spark Pilot Ignition     |
| MS                 | Master Sentry c/w open top pilot shut off | B                  | Broiler                           |
| MST                | Master Sentry Cc/s total flame failure    | T                  | Modular Top Section               |
|                    |   | S                  | Storage cabinet under top section |
|                    |   | RC                 | Range with convection oven        |
|                    |   | RC                 | Rang with standard oven           |

| Model            | Width | Description   |
|------------------|-------|---|
| M,MS, MST42R(E)  | 34    | Range with oven, 2 open top burners & a 17" wide sold hot plate or optional griddle                 |
| M,MS, MST42RC(E) | 34    | Range with convection oven, 2 open top burners & a 17" wide solid hot plate or optional griddle     |
| M,MS, MST42S(E)  | 34    | Range with storage compartment, 2 open top burners & a 17" wide solid hot plate or optional griddle |
| M,MS, MST42T(E)  | 34    | Modular top, 2 open top burners & a 17" wide sold hot plate or optional griddle                     |
| M,MS, MST43R(E)  | 34    | Range with oven and six open top burners  |
| M,MS, MST43RC(E) | 34    | Range with convection oven and six open top burners   |
| M,MS, MST43S(E)  | 34    | Range with storage compartment and six open top burners   |
| M,MS, MST43T(E)  | 34    | Modular top with six open top burners   |
| M,MS, MST44R(E)  | 34    | Range with oven and four open top burners   |
| M,MS, MST44RC(E) | 34    | Range with convection oven and four open top burners  |
| M,MS, MST44S(E)  | 34    | Range with storage base and four open top burners   |
| M,MS, MST44T(E)  | 34    | Modular top with four open top burners  |
| M,MS, MST45R(E)  | 34    | Range with oven and two 17" wide spector-heat plate sections  |
| M,MS, MST45RC(E) | 34    | Range with convection oven and two 17" wide spector-heat plate sections                             |
| M,MS, MST45S(E)  | 34    | Range with storage compartment and two 17" wide spector-heat plate sections                         |
| M,MS, MST45T(E)  | 34    | Modular top with two 17" wide spector-heat plate sections   |
| M,MS, MST46R(E)  | 34    | Range with oven and two 17" wide even heat hot top sections   |
| M,MS, MST46RC(E) | 34    | Range with convection oven and two 17" wide even heat hot top sections                              |
| M,MS, MST46S(E)  | 34    | Range with oven storage compartment and two 17" wide even heat hot top sections                     |
| M,MS, MST46T(E)  | 34    | Modular top with two 17" wide even heat hot top sections  |
| M,MS, MST47R(E)  | 34    | Range with oven and 34" wide valve controlled griddle   |
| M,MS, MST47RC(E) | 34    | Range with convection oven and 34" wide valve controlled griddle                                    |
| M,MS, MST47S(E)  | 34    | Range with storage base and 34" wide valve controlled griddle                                       |
| M,MS, MST47T(E)  | 34    | Modular top with 34" wide valve controlled griddle  |
| M48R(E)          | 34    | Range with oven and 34" wide thermostatically controlled griddle                                    |
| M48RC(E)         | 34    | Range with convection oven and 34" wide thermostatically controlled griddle                         |
| M48S(E)          | 34    | Range with storage base and 34" wide valve controlled griddle controlled griddle                    |
| M48T(E)          | 34    | Modular top with 34" wide thermostatically controlled griddle                                       |
| M,MS, MST54R(E)  | 34    | Range with oven, two open top burners & a 17" wide spectro-heat section                             |
| M,MS, MST54RC(E) | 34    | Range with convection oven, two open top burners & a 17" wide spectro-heat section                  |
| M,MS, MST54S(E)  | 34    | Range with storage base, two open top burners & a 17" wide spectro-heat section                     |
| M,MS, MST54T(E)  | 34    | Modular top with two open top burners & a 17" wide spectro-heat section                             |
| M,MS, MST5S      | 17    | Range 17" wide storage base and spectro-heat section  |
| M,MS, MST5T      | 17    | Modular top with 17" spectro-heat section   |
| M,MS, MST4S(E)   | 17    | Range with storage base and two open top burners  |
| M,MS, MST4T(E)   | 17    | Modular top with two open top burners   |
| M,MS, MST6S(E)   | 17    | Range with storage base and 17" wide even heat hot top  |
| M,MS, MST6T(E)   | 17    | Modular top with 17" wide even heat hot top   |
| M,MS, MST7S(E)   | 17    | Range with storage base and 17" wide valve controlled griddle                                       |
| M,MS, MST7T(E)   | 17    | Modular top with 17" wide valve controlled griddle  |
| M,MS, MST8S      | 17    | Range with storage base and 17" wide thermostatically controlled griddle                            |
| M,MS, MST8T      | 17    | Modular top with 17" wide thermostatically controlled griddle                                       |
| M,MS, MST17B(E)  | 17    | 17" wide char-broiler   |

| Model          | Width | Description           |
|----------------|-------|-----------------------|
| M,MS,MST24B(E) | 24    | 24" wide char-broiler |
| M,MS,MST34B(E) | 34    | 34" wide char-broiler |
| M35            | 17    | Deep fat fryer        |
| M70            | 24    | Deep fat fryer        |

**Minimum Supply Pressure:**

NAT – 7"WC

PRO – 11"WC

**Manifold Operating Pressure:**

NAT – 6"WC

PRO 10"WC

## Garland 40 Series Heavy Duty

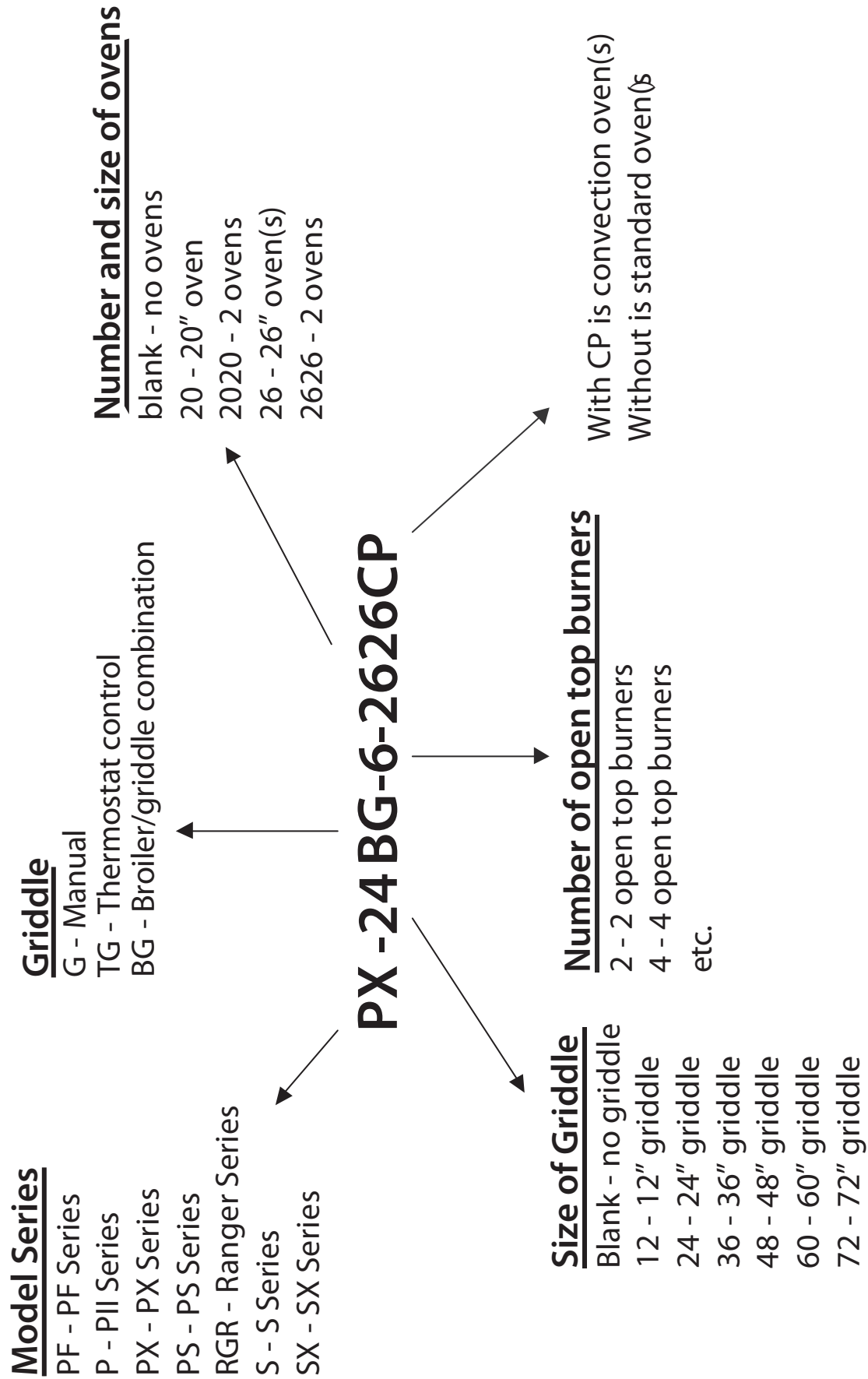
| Suffix Definitions |                                     |
|--------------------|-------------------------------------|
| R                  | Standard oven base                  |
| RC                 | Convection oven base                |
| S                  | Storage base                        |
| SD                 | Storage base with doors             |
| T                  | Modular top/Table top               |
| FT                 | Front open burner, rear hot top     |
| G                  | Griddle                             |
| GTH                | Thermostatically controlled griddle |

| Minimum Supply Pressure: | Manifold Operating Pressure: |
|--------------------------|------------------------------|
| NAT – 7"WC               | NAT – 6"WC                   |
| PRO – 11"WC              | PRO 10"WC                    |

| Model      | Width | Description   |
|------------|-------|---|
| 42-40R     | 34"   | 17" Valve controlled griddle on the left and 2 open top burners w/standard oven |
| 42-40R-6   | 34"   | 17" even heat hot top on the left and 2 open top burners w/standard oven        |
| 42-40R-5   | 34"   | 17" spectro-heat plate and 2 open burners                                       |
| 43-40R     | 34"   | 6 open top burners with standard oven   |
| 43-40FTR   | 34"   | 3 open burners front and 3 hot tops rear with standard oven                     |
| 43-40R-34G | 34"   | 34" Valve controlled griddle with standard oven                                 |
| 44-40R     | 34"   | 4 open top burners with standard oven   |
| 44-40FTR   | 34"   | 2 open top burners front and 2 hot tops rear with standard oven                 |
| 45-40R     | 34"   | Two 17" spectro-heat plate sections with standard oven                          |
| 46-40R     | 34"   | Two 17" even heat plate sections with standard oven                             |
| 47-49R     | 34"   | 34" valve controlled griddle with standard oven - US built only                 |
| 48-49R     | 34"   | 34" thermostatically controlled griddle with standard oven - US built only      |
| 40-4S      | 17"   | 2 open top burners with storage base  |
| 40-5S      | 17"   | 17" spectro-heat plate with storage base  |
| 40-6S      | 17"   | 17" even heat plate with storage base   |
| 40-7S      | 17"   | 17" valve controlled griddle with storage base                                  |
| 40-8S      | 17"   | 17" thermostatically controlled griddle with storage base                       |
| 2-40       | 34"   | Double stacked standard oven  |

|                     |  |
|---------------------|--|
| Oven Burner         | 40,000 BTU/Hr (Standard and RC ovens)                                      |
| Open Burner         | 14,000 BTU/Hr each 12" section (ex. 43-40R)                                |
|                     | 14500 BTU/Hr for units built in Mississauga                                |
| Open Burner         | 20,000 BTU/Hr each 17" section (ex. 44-40R)                                |
| Spectro-heat burner | 15,000 BTU/Hr each burner, 45,000 BTU/Hr per 17" section                   |
| Even Heat Hot Top   | 30,000 BTU/Hr each burner US built - 27,000 built in Mississauga           |
| Griddle Burner      | 30,000 BTU/Hr each burner (valve and thermostatically controlled griddles) |
|                     | 27,000 BTU/Hr each burner for units built in Mississauga                   |

US Range Restaurant Series Model Numbers



# US Range Heavy Duty Cuisine Series Models

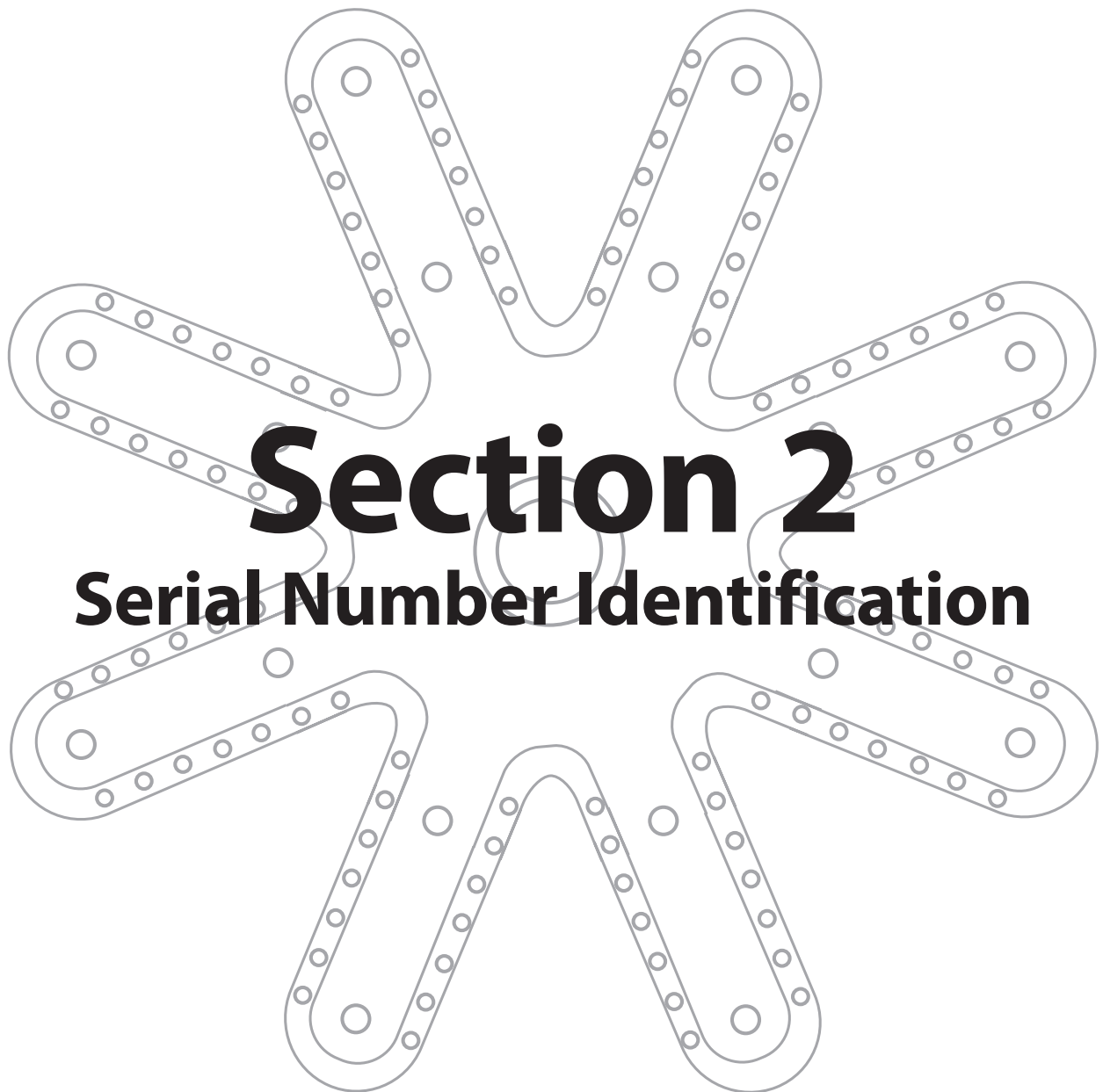
| Model Number | 12" Open Burner Section | 18" Open Burner Section | 18" Fry Top Griddle | 24" Fry Top Griddle | 36" Fry Top Griddle | 12" Even Heat Hot Tops | 18" Even Heat Hot Tops | 18" Spectro Heat Hot Tops | 12" or 18" French Top Section |
|--------------|-------------------------|-------------------------|---------------------|---------------------|---------------------|------------------------|------------------------|---------------------------|-------------------------------|
| 836-1        |                         |                         |                     |                     | 1 Section           |                        |                        |                           |                               |
| 836-1-1      |                         |                         |                     |                     | 1 Section           |                        |                        |                           |                               |
| 836-2        | 1 Section               |                         |                     | 1 Section           |                     |                        |                        |                           |                               |
| 836-3        |                         |                         |                     | 1 Section           |                     | 1 Section              |                        |                           |                               |
| 836-4        |                         | 1 Section               | 1 Section           |                     |                     |                        |                        |                           |                               |
| 836-5        |                         |                         | 1 Section           |                     |                     |                        | 1 Section              |                           |                               |
| 836-6        | 3 Sections              |                         |                     |                     |                     |                        |                        |                           |                               |
| 836-7        |                         | 2 Sections              |                     |                     |                     | 3 Sections             |                        |                           |                               |
| 836-8        |                         |                         |                     |                     |                     |                        | 2 Sections             |                           |                               |
| 836-9        |                         |                         |                     |                     |                     |                        |                        | 2 Sections                |                               |
| 836-10       |                         |                         |                     |                     |                     |                        | 1 Section              | 1 Section                 |                               |
| 836-11       |                         |                         |                     |                     |                     |                        |                        |                           |                               |
| 836-12       | 1 Section               |                         |                     |                     |                     | 2 Sections             |                        |                           |                               |
| 836-13       | 2 Sections              |                         |                     |                     |                     | 1 Section              |                        |                           |                               |
| 836-14       |                         | 1 Section               |                     |                     |                     |                        | 1 Section              |                           |                               |
| 836-15       | 3 Sections Front        |                         |                     |                     |                     |                        |                        |                           | 3 Sections Back               |
| 836-16       |                         | 2 Sections Front        |                     |                     |                     |                        |                        |                           | 2 Sections Back               |
| 836-17       |                         | 1 Section               |                     |                     |                     |                        |                        | 1 Section                 |                               |

| BTU Ratings                 |                | Natural Gas   | Propane Gas   |
|-----------------------------|----------------|---------------|---------------|
| Oven Burner                 | Standard       | 40,000 BTU/Hr | 35,000 BTU/Hr |
|                             | Convection     | 37,000 BTU/Hr | 37,000 BTU/Hr |
| Open Top Burner (2 Burners) | Each Burner    | 30,000 BTU/Hr | 28,000 BTU/Hr |
|                             | 12" Section    | 25,000 BTU/Hr | 25,000 BTU/Hr |
| Even Heat Hot Top Burner    | 18" Section    | 35,500 BTU/Hr | 35,500 BTU/Hr |
|                             | 18" Section    | 12,500 BTU/Hr |               |
| Spectro Heat Burner         | Front Open Top | 30,000 BTU/Hr | 28,000 BTU/Hr |
|                             | Rear Hot Top   | 15,000 BTU/Hr | 15,000 BTU/Hr |
| French Top                  |                |               |               |

All model numbers are based on a 36" width unit.  
 Models 836 are 36" in depth  
 Models 841 are 41" in Depth  
 Models with a C prefix built in Mississauga plant  
 Models with a 0 prefix indicate with out oven  
 Models with M suffix indicates modular top  
 Models with a C suffix indicate a convection oven

|                           |            |             |
|---------------------------|------------|-------------|
| <b>Supply Pressure</b>    | NAT – 7"WC | PRO – 11"WC |
| <b>Operating Pressure</b> | NAT – 6"WC | PRO 10"WC   |





# **Section 2**

## **Serial Number Identification**

# Serial Number Identification

## Manufacturing Date Codes

Table 1

|          |                |
|----------|----------------|
| G = 1986 | 01 = January   |
| H = 1987 | 02 = February  |
| J = 1988 | 03 = March     |
| K = 1989 | 04 = April     |
| L = 1990 | 05 = May       |
| M = 1991 | 06 = June      |
| N = 1992 | 07 = July      |
| O = 1993 | 08 = August    |
| P = 1994 | 09 = September |
| Q = 1995 | 10 = October   |
| R = 1996 | 11 = November  |
| S = 1997 | 12 = December  |
| T = 1998 |                |
| U = 1999 |                |
| V = 2000 |                |
| W = 2001 |                |
| X = 2002 |                |
| Y = 2003 |                |
| Z = 2004 |                |

Serial numbers are useful in determining the age of the equipment and if it is under warranty. In some cases, the serial number is describes as a code or W/N for warranty number.

Garland used manufacturing date codes in addition to serial numbers. Before 1986, the manufacturing code was always F01. This indicated it was built in Factory #1 and had no chronological meaning. Starting in 1986, these codes represented the date of manufacture. The alphabetical character indicates the year and the two digits indicate the month. See Table 1 for a listing of years and months assigned.

## Older Garland Serial Numbers

Equipment built in the Garland Freeland, Pa. plant used a six digit serial number up to the mid 1990's In table 2, you will be able to tell approximately when the appliance was built.

Table 2

| NUMBER | DATE    | NUMBER | DATE    | NUMBER | DATE    |
|--------|---------|--------|---------|--------|---------|
| 033000 | 6/1974  | 160000 | 4/1985  | 335000 | 4/1991  |
| 035000 | 10/1974 | 170000 | 9/1985  | 340000 | 6/1991  |
| 040000 | 5/1975  | 180000 | 3/1986  | 345000 | 10/1991 |
| 045000 | 1/1976  | 190000 | 9/1986  | 350000 | 1/1992  |
| 050000 | 8/1976  | 200000 | 11/1986 | 355000 | 5/1992  |
| 055000 | 3/1977  | 210000 | 3/1987  | 360000 | 8/1992  |
| 060000 | 10/1977 | 220000 | 7/1987  | 365000 | 10/1992 |
| 065000 | 4/1978  | 230000 | 10/1987 | 370000 | 1/1993  |
| 070000 | 10/1978 | 240000 | 3/1988  | 375000 | 5/1993  |
| 075000 | 5/1979  | 250000 | 6/1988  | 380000 | 8/1993  |
| 080000 | 11/1979 | 260000 | 10/1988 | 385000 | 11/1993 |
| 090000 | 10/1980 | 280000 | 1/1989  | 390000 | 1/1994  |
| 100000 | 7/1981  | 280000 | 5/1989  | 395000 | 5/1994  |
| 110000 | 3/1982  | 290000 | 9/1989  | 40000  | 7/1994  |
| 120000 | 1/1983  | 300000 | 1/1990  | 41000  | 11/1994 |
| 130000 | 8/1983  | 310000 | 5/1990  | 42000  | 1/1995  |
| 140000 | 3/1984  | 320000 | 9/1990  | 42500  | 7/1995  |
| 150000 | 8/1984  | 330000 | 1/1991  | 43000  | 11/1995 |

## Interim Garland Serial Numbers (1998-2007)

In January 1993, a revised serial number for Garland products was implemented. Our sister company Frymaster used this system and Garland adapted it for its own use. The following is a break down of this format with the product codes.

### S/N 9301PC0001

|                 |                  |                   |   |
|-----------------|------------------|-------------------|---|
| 93 = Year Built | 01 = Month Built | PC = Product Code | 0001 = Sequential number of unit built that month |
|-----------------|------------------|-------------------|---|

In some cases, you will find the serial number ending with an R, i.e. 9904RG002R. This indicated that the unit was built in our Mississauga Plant. The R was removed in 2002 and switched to the 4 digits after the product code.

In table 3, you will find a listing of Garland product codes.

**Table 3**

|    |   |    |   |
|----|---|----|---|
| CE | ED Series Fryer, Broiler, Griddle Hot Plate and Food Warmer   | HE | 10 Series, 10-31/70 Fryer   |
| CG | G22 Series Fryer, Griddle, Hot Plate, G24 Series Griddle, Hot Plate, GD Series Broiler, Griddle, CG/GAW Chain Griddles        | ME | E18 Series, E24 Series, Hot Food Well, Heat Lamp                                  |
| CU | Coffee Urns, New US Range Cuisine Series (C836)   | OE | TE3, TE4, TE2A Electric Convection Ovens , 2000 Series Deck Ovens, Pizza Ovens    |
| PC | Pronto  | OG | TG3, TG4, TG2A Gas Convection Ovens G2000 Series Bake and Roast Ovens, G48P Oven  |
| GR | H/P 280 Series when they were built in Freeland, Pa   | RE | 680 Series, E20 Stock Pot, ERC, ER-10 Series Broilers, 680 Series Broilers        |
| BG | G80 Series Charbroiler SRC, SRC16-40, 280 Series Broiler, Residential BBQ   | TP | F30/F40E & G Frypan Skillets  |
| HG | Master Series, 40 Series, Old US Range Cuisine (836), 35/70 Series Fryer, 80B Broiler   | TS | SEL/S Cleveland Frypan, SET-10, SET-15 Skillets                                   |
| RG | G280 Series, G28, G34, S/ST280 Series, H/HP280 Series, 35-280 Fryer, Bistro Series, G20 Stock Pot, Old US Range Cuisine (836) | RR | Residential Range Hoods, Residential Ranges RCS30, R30, R280                      |
| PR | US Range Performer Range  | CJ | Convection Ovens, Garland MCO, ICO, ECO, BCO, US Range Series SDG, CG-100, DG-100 |
| AG | G56P/B Air Deck   | AO | APO Oven  |

### US Range Serial Numbers

| Older Serial Numbers  |   | Newer Serial Numbers                   |
|---|---|--|
| W048968724  | 45729A001D95  | 9801PR0000                             |
| 04 = Month Built<br>89 = Year Built<br>24 = Number of units built | 45729 = Sales order #<br>A = Product Line Code<br>001 = Number of units built<br>D = Month Built<br>95 = Year Built | Same as current Garland Serial Numbers |

### Current Serial Number

As of 2007 all Garland/US Range serial numbers no longer contain a product code, this includes the 2007 Restaurant Ranges (Sit Control). The number is now all numbers consisting of Year, Month and sequence number.





# **Section 3**

## **Certification Markings**

# Certification Markings

There are many marks used on equipment manufactured and distributed by Garland. Below is a summary of what the marks are and where they are used.

## Sanitation Mark

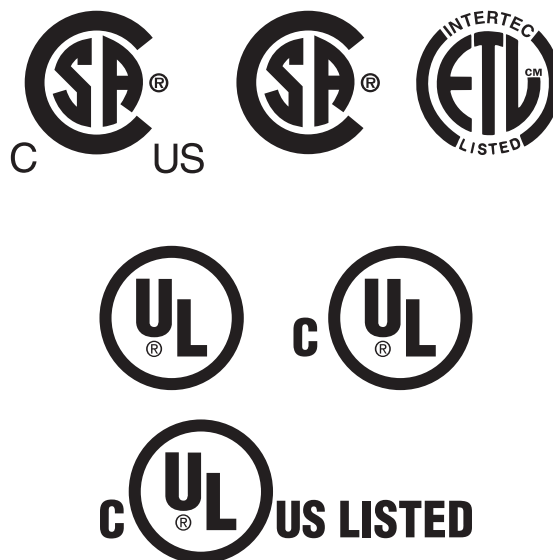


All equipment sold in the USA requires a mark to show that it complies with ANSI/NSF Standards 2 & 4. These standards concern material and their suitability for food contact, food hygiene and minimum safe operating temperatures, and construction prohibiting gaps where bacteria can grow or vermin can inhabit. Garland predominantly uses NSF for certification to these ANSI/NSF 2 & 4 standards and apply the NSF mark to the equipment. This mark is either found on the rating plate or as a separate blue sticker on the front of the unit.

UL is now offering their own sanitation mark as shown in the two examples above. Products displaying these marks are tested to the same NSF standards. At this time the UL sanitation marks are not as well recognized as the NSF and we will continue to use the NSF mark for now.

Although a sanitation mark is not required in Canada, there are certain areas where the Canadian Food Inspection Agency (CFIA) may have a requirement. Typically they get involved with equipment sold to meat processing plants. In this case, CFIA will accept proof of NSF listing.

## Electric Cooking Equipment



**CSA** – There are many marks for electric cooking equipment. Most of the equipment produced at GCR bears the CSA C/US mark. The CSA mark is for Canada only. These marks indicate that all testing was performed / witnessed by CSA and has been tested to the appropriate CSA and UL Standards

**ETL** – Some of our distributed electrical equipment, such as induction units bear the ETL mark. The ETL mark used is typically the ETL C/US mark, with the C and US at the 8 and 4 o'clock positions similar to the CSA mark. This mark indicates that all testing was performed / witnessed by Intertek Testing Services and has been tested to appropriate CSA and UL Standards.

**UL** – Equipment manufactured at GCI bears the UL, cUL marks for the USA and Canada respectively, we can also consolidate these marks into one mark UL C/US LISTED mark. These marks indicate that all testing was performed / witnessed by Underwriters Laboratories and has been tested to the appropriate CSA and UL standards.

## Gas Cooking Equipment



**CSA Blue Star** – All gas equipment manufactured at GCR and some at GCI carry the CSA Blue Star Mark. This shows that the equipment plus its electrical features are approved to the US standards and can be sold in the USA only. Equipment bearing this mark is certified to the harmonized ANSI Z83.11/CGA 1.8 standard.

**CSA Blue Flame** – All gas equipment manufactured at GCR and some at GCI carry the CSA Blue Flame Mark. This shows that the equipment plus its electrical features are approved to Canadian standards and can be sold in Canada only. Equipment bearing this mark is certified to the harmonized ANSI Z83.11/CGA 1.8 standard plus some additional requirements from standard CSA No. # 3.

**UL Gas-Fired** – Some gas equipment manufactured by GCI bears the UL GAS-FIRED mark. There are three types of mark, UL, cUL and cUL<sub>US</sub>; the marks are for the US, Canada and, Canada/US respectively. Equipment bearing this mark is certified to the harmonized ANSI Z83.11/CGA 1.8 standard.

Note: when you look at all the marks used in the Garland group, you will notice that GCR uses only CSA and GCI uses predominantly UL. The reason for this comes down to two reasons.

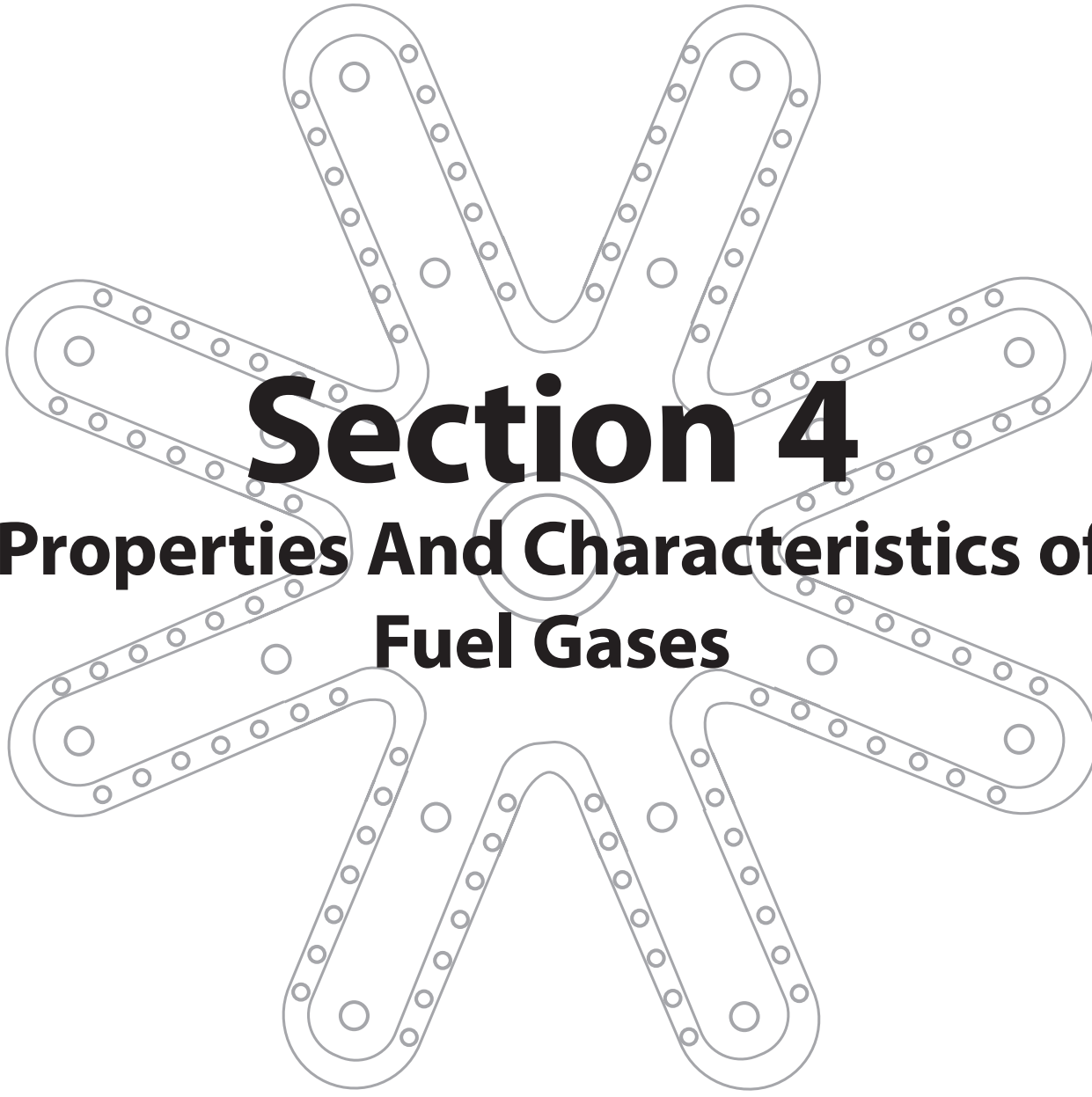
1. Geography – CSA is located in Toronto and very close to GCR. This helps keep approval costs to a minimum and improves response time for CSA.

UL is located in Mellville, NY, which is only two hours away from GCI. UL is used because of their relatively close proximity to GCI.

2. Relationships – GCR and GCI have close relationships with CSA and UL respectively. Over time a level of trust has developed between Garland and the certifying bodies. Making the approval process run very smoothly





A large, stylized graphic in the background consisting of six interlocking, elongated oval shapes arranged in a circular pattern, resembling a snowflake or a star. Each shape has a series of small circles along its inner edge.

# **Section 4**

## **Properties And Characteristics of Fuel Gases**

# Properties And Characteristics Of Fuel Gases

The petroleum gases most commonly used in the gas industry are natural gas and its two processed derivatives, propane and butane. The two most commonly used fuels in commercial cooking equipment are natural gas and propane. The major ingredient in fuel gas is methane.

## Natural Gas

Natural gas exists because of a naturally occurring mixture of Hydrogen (H) and Carbon (C) and small amounts of other gases. Since natural gas is made up mostly of methane, it is usually represented by the chemical formula  $\text{CH}_4$ .

## Propane

LP gases (Liquid petroleum gases) are hydrocarbons that are refined, stored and transported as liquid under pressure. Your BBQ propane tank is an example of how this gas is stored as a liquid. It then vaporizes into a fuel gas when it is released for use in a gas-burning appliance. LP gas is extracted from both oil and natural gas. Under normal atmospheric temperature and pressure, propane is a gas. At cooler temperatures and at higher pressures, it is easily changed to a liquid form. Propane is represented by the chemical formula  $\text{C}_3\text{H}_8$ .

## General Properties

Natural gas and propane are nontoxic, tasteless, colorless, invisible and odorless. Since they are undetectable, for safety, an odorant known as mercaptan must be added to the natural and propane gas. Mercaptan lets the user know that gas has escaped. Approximately one pound of mercaptan is added to every million cubic feet of gas.

There are other properties of natural and propane gas that you should be aware of. They are specific gravity, expansion factors, boiling point and calorific value of natural and propane gas.

## Specific Gravity

Also known as relative density, specific gravity is the comparison between the weight of the volume of vapor or liquid and the weight of an equal volume of air or water.

## Specific Gravity of Vapor Gases

To be able to compare the specific gravity of air and gas, both must be at the same pressure and temperature. Air has a specific gravity of 1.0. Natural gas has a specific gravity of 0.6. Natural gas is lighter than air and will rise to the ceiling when there is a leak. Propane gas has a specific gravity of 1.52 compared to air and will usually settle in low areas.

## Specific Gravity of LP

When compared to water LP has a specific gravity of 0.51. Propane is lighter than water and if it were to be spilled in a liquid form on water, it would float on the surface.

## Expansion Factors

When the temperature of a liquid increases, it causes the liquid to expand, causing the volume of the liquid to increase as well.

Your propane tank at home is usually only filled to 80% of its capacity to allow for expansion. The space between the liquid and top of the tank is replaced by vapor, which you use as propane gas. The pressure caused by the molecular movement of LP gas vapors is called vapor pressure. When you remove this vapor from the container, it lowers the vapor pressure, it causes the remaining liquid gas to boil and replace the vapor. This stabilizes the reduced pressure in the tank.

When a fuel changes from a liquid to a gas, expansion takes place. Each gas has a different ratio of expansion. Natural gas expands at a ratio of 600:1 and propane at a ratio of 270:1 at atmospheric pressure.

## Boiling Point

The pressure of a tank is determined by the temperature of the liquid inside it. At atmospheric pressure, natural gas has a boiling point of  $-258^\circ\text{F}$ . Propane has a boiling temperature of  $-44^\circ\text{F}$ .

Natural gas is almost always provided by a utility company in the form of gas but the utility company may store it liquefied.

If the temperature of a fuel gas is lowered below its boiling point, it will not vaporize and no vapor pressure will develop. The boiling in a tank only stops when the vapor pressure is high enough to suppress the boiling of the liquid at that particular temperature in the tank. This pressure only varies with the temperature not with the liquid content of the cylinder tank. The pressure in a cylinder is at the same pressure whether the tank is 20% or 70% full.

## Calorific Value (Heat Content)

The calorific value of a fuel is also known as the heat content. It is described as the energy released when a given volume of fuel is burned. The unit of measure commonly used is British Thermal Units per cubic foot ( $\text{BTU}/\text{ft}^3$ ). A BTU is the amount of heat required to raise the temperature of 1 pound of water  $1^\circ\text{F}$ .

The calorific value of natural gas varies because of different components of the natural gas that may be present. The general value used in industry is  $1000 \text{ BTU}/\text{ft}^3$  for natural gas and  $2520 \text{ BTU}/\text{ft}^3$  vaporized.

When calculating the input rate of an appliance, the calorific value of the gas is taken into consideration.

A large, stylized, light gray graphic in the background, resembling a snowflake or a star with six points. Each point is composed of a series of small circles connected by lines, creating a complex, geometric pattern.

# **Section 5**

## **Operation Of Controls**

# Operation Of Controls

**CAUTION:** Gas will flow to top burners even with the top pilots out. Gas will not be interrupted. It is the responsibility of the operator to check the ignition of the burners. ***SHOULD IGNITION FAIL AFTER 10 SECONDS, TURN THE BURNER VALVE OFF AND WAIT 5 MINUTES AND TRY AGAIN.***

## Open Top Burners

**All models where applicable, i.e H286, 43-40R, 44-40RC.**

1. Remove top grates and ring grates.
2. Check flash tubes to see that they are properly positioned on burner change ports.
3. Light Pilots.
4. Replace top grates and ring grates.

**Models after 11/2007 where applicable, i.e. G, U, X Series with SIT control.**

1. Remove both pieces of the two piece grates.
2. Light Pilots.
- 3> Replace both pieces of the two piece grates.

**All Models:** Turn the valve completely on. The burner flame should be 1/2" stable blue flame and should impinge on the underside of a pot placed on the ring grate.

## Shut Down

1. Turn all valves to the "OFF" position.
2. If the unit is to be shut down for an extended period of time, close the in line gas valve.

## Hot Top Sections

**All models where applicable, i.e. H286-1, P284-3, 40-40S, 43-40-1R, 42-40RC, G, U, X Series with SIT control**

1. Raise or remove hot top sections. Each burner has one pilot located at the front right side of the burner.
2. Light the pilots. The pilot burner should be adjusted to provide for rapid ignition on the burner.
3. Turn the burner valve on. A sharp blue flame should be approximately 1/4" high.
4. Replace hot top sections.

## Thermostatic Controlled Griddles

1. Raise the griddle at the front and block.
2. Light the pilots located at the front right side of each burner.
3. Sensing bulbs must be fully inserted into their individual holders which are located on the underside of the griddle.
4. Set the thermostat to maximum, one at a time. The burner should have a 5/16" stable flame.
5. Lower the griddle carefully into position taking extreme caution not to leave any part of the capillary tube in the burner compartment.

## Thermostatic Controlled Griddles (SIT)

Refer to the Sit control Oven Pilot lighting procedure later in this section. The griddle procedure is the same as the oven.

## Valve Controlled Griddles

1. Raise the griddle at front and block.
2. Light the pilots located at the front right side of each burner.
3. Turn the burner valves on to full position. Burners should have a 1/2" to 5/8" stable blue flame.
4. Lower the griddle into position.

## Raised Griddle/Broiler

**(H/P283, 282, 285, 281)**

Before turning the main gas supply on, make sure all valves are in the off position.

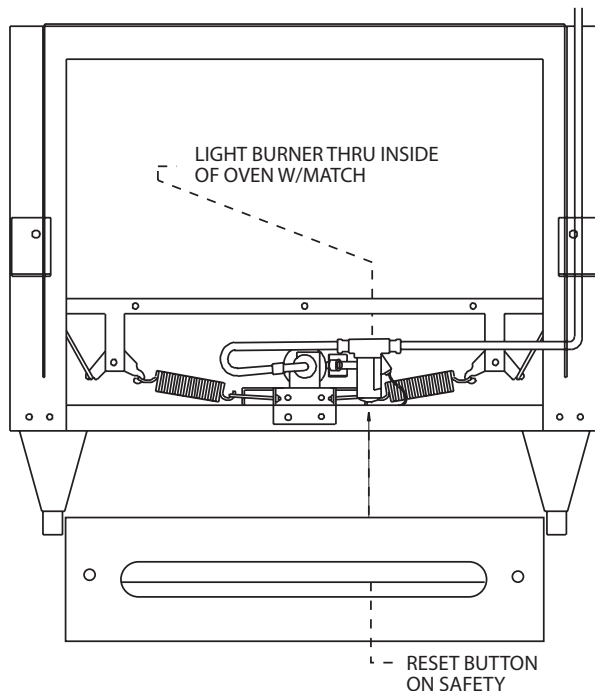
1. Light the pilots located in the broiler section. The left pilot is a tee (double pilot) to control the left and center burners. The right pilot controls the right burner.
2. Turn the valves completely on. The burner should have a 5/16" stable blue flame.

**All units are tested and adjusted at the factory, however, burner and pilots should be checked at the time of installation and adjusted if necessary.**

## Standard Oven

### Lighting

- 1 Remove oven buttons.
2. Depress and hold the reset button (Red) located at the lower front of the oven (beneath the oven door) while lighting the oven pilot. Continue to depress the reset button for 60 seconds. Release the button, if the pilot does not stay lit, repeat this procedure after 5 minutes



### Shut down

1. Turn all valves and thermostats to the off position.
2. If a range is to be shut down for an extended period of time, close the in line gas valve.

### Relighting

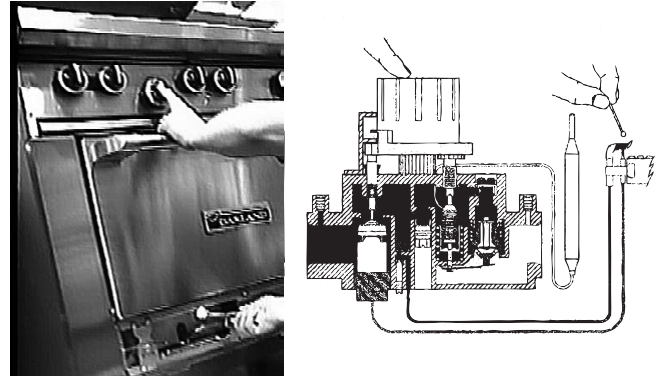
- 1 Shut all gas valves off.
2. Wait 5 minutes.

3. Repeat lighting instructions in section "A" above.

## G, U, X Restaurant Ranges (Sit Control)

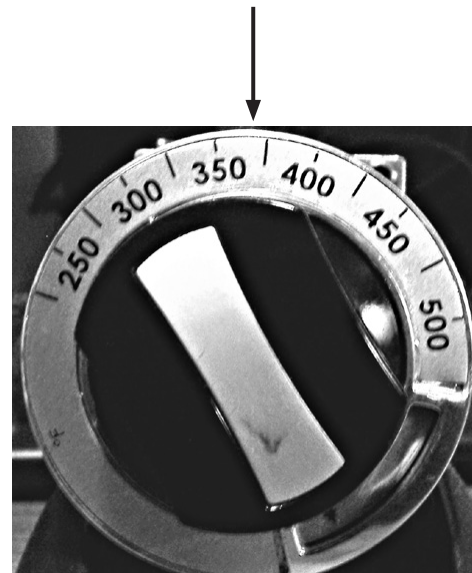
### Lighting

1. Push in the SIT control knob.



While holding the valve knob fully in, press the ignitor button and light the oven pilot.

2. When the pilot is lit, continue to hold the valve knob fully in for 10 seconds, then release it. If the pilot goes out, wait for five (5), minutes, then repeat step 1.
3. When the pilot has been established, turn the knob counter-clockwise, and align the desired oven temperature to the 12:00 position.



4. To keep the main burner flame off and but the pilot flame lit ,turn the control knob clockwise to the stop position. This knob is configured to leave the pilot on continuously.

5. To shut the pilot completely off, extinguish the pilot flame. The internal pilot valve will automatically close within 60 seconds. Each time this is done, the pilot will have to be re-lit.

NOTE: This procedure is the same for the convection models with SIT controls.

## Range Base Convection Ovens "RC"

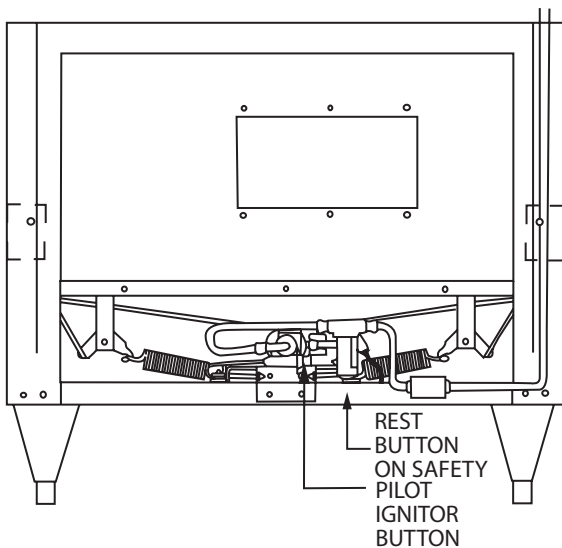
### This section pertains to the forced air unit.

For 115 V usage, a cord and plug are provided but connection to the electrical service must comply with local codes; or in the absence of local codes, with the National Electrical Code, ANS/NFPA No. 70-(current edition).

A wiring diagram is attached to the rear of this unit for your use.

### Lighting Instructions

1. Use the access through the louver panel, hold the reset button (RED) located on the oven safety valve.
2. Using the access hole located below the louver in the panel, push the RED IGNITOR BUTTON continuously until the oven pilot ignites.
3. If the pilot does not stay lit after you release the reset button, wait 5 minutes and repeat Step 2 and hold the reset button approximately 60 seconds.



### Lighting Instructions

1. Use the access through the louver panel, hold the reset button (RED) location on the oven safety valve. (See prior).

2. Using the access hole located below the louver in the panel, push the RED IGNITOR BUTTON continuously until the oven pilot ignites. (See Prior)
3. If the pilot does not stay lit after you release the reset button, wait 5 minutes and repeat Step 2 and hold the reset button approximately 60 seconds.

### Start Up.

1. Activate the power switch to the cook position.
2. Turn the oven valve on. Turn the thermostat to the desired setting.

### Cool Down

1. Turn the thermostat and oven valve off.
2. Open the door.
3. Activate the power to the cool down position.

### Shut down

1. Turn the thermostat off.
2. Return the power switch to the "OFF" position.
3. Turn the oven valve off

The motor on the range convection oven is maintenance free since it is constructed with sealed ball bearings. It is designed to provide durable service when treated with ordinary care. We have a few suggestions to follow on the care of your motor.

- A. **Never** operate the oven without convection oven fan. Use of this oven without the convection fan will cause premature motor failure!
- B. When the motor is operating, it cools itself internally by air entering the rear of the motor case, provided proper clearance has been allowed.
- C. Since the blower wheel is in the oven cavity, it is at the same temperature as the oven. If the motor is stopped while the oven is hot, the heat from the blower wheel is conducted down the shaft and into the armature of the motor. This action could shorten motor life.
- D. We recommend that at the end of the bake or roasting period, when the oven will be idle for any period of time, or before shutting down completely, that the doors be left open, and by use of the cool-down position on the fan switch, the fan continues to run for at least 20 minutes. The "FAN" should never be turned "OFF" when the oven is "HOT".

A large, light gray decorative graphic in the background, consisting of a central circle with six stylized, elongated, teardrop-shaped elements radiating outwards, each containing a series of small circles.

# **Section 6**

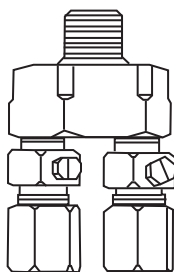
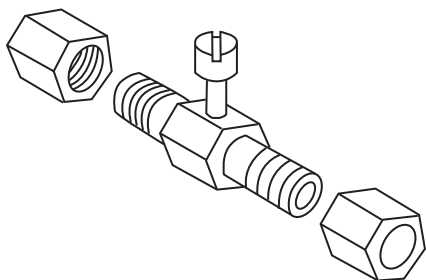
## **Gas Valves And Adjustments**



# Gas Valves And Adjustments

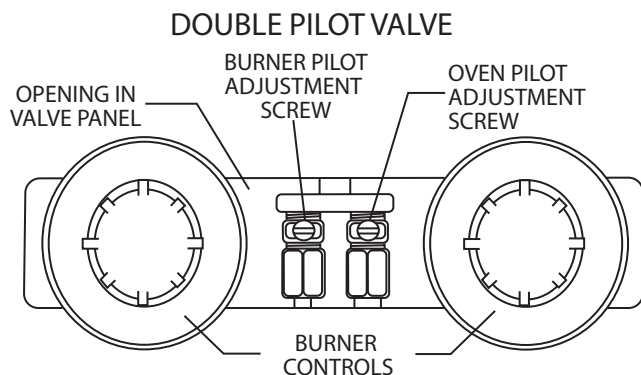
## Pilot Adjustment Valves

- Also known as gum valves.
- Available in single or double.
- Double contains adjustment for an open top burner and oven.
- Adjustable with a set-screw.
- Turn set-screw counter-clockwise to increase flow.
- Turn set-screw clockwise to decrease flow.

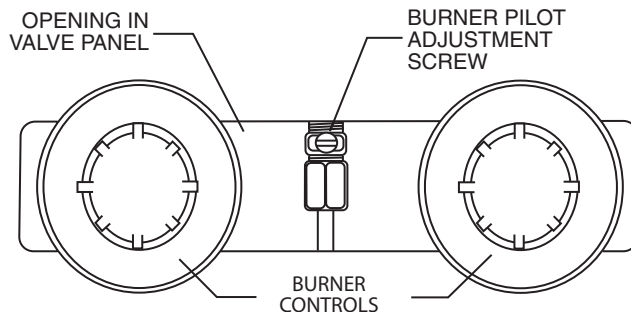


## Pilot Adjustment Location

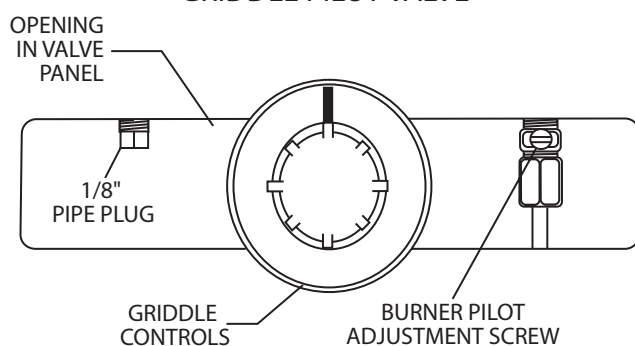
- All pilot adjustments valves are mounted on the range top manifold as illustrated in drawings below.
- Next to the burner control knobs.
- Easily accessible for adjustments using a straight blade pocket screwdriver.



SINGLE PILOT VALVE



GRIDDLE PILOT VALVE



## Open Top Burners

If required the open burner pilot should be adjusted so that the tip of the pilot flame reaches the middle of the flash tube opening. This flame may show a slight yellow tip.

## Griddle and Hot Tops

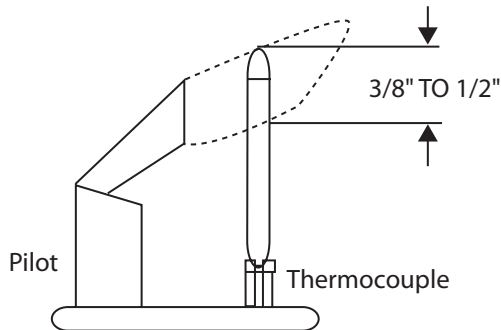
The pilot burner for the griddle or hot top burner should provide for a rapid ignition of the burner, but should not impinge on any part of the burner. When properly adjusted, it should neither lift off the burner nor should it show a yellow tip.



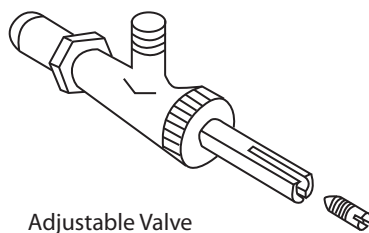
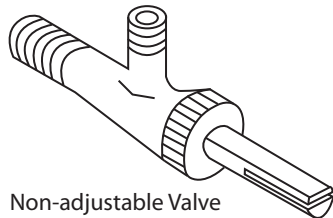
## Oven Pilot

Oven pilots should reach and engulf the tip of the thermocouple as illustrated below. If the pilot flame fully engulfs the thermocouple premature failure will occur.

### Oven Pilot



## Gas Burner Control Valves



## Full Range Non-adjustable Top Burner Valve

- Used for open top burners.
- Regulates the flow of gas to the burner.
- Solid "D" stem, no adjustment screw down the shaft.
- It is a fixed non-adjustable control

## Adjustable Hi/Low Top Valve

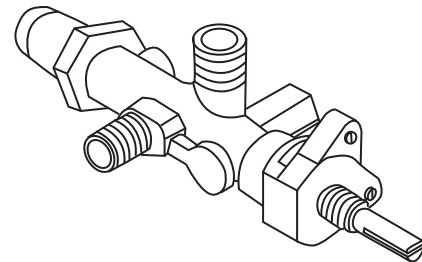
- Regulates the flow of gas to manual control griddles.
- "D" stem is split containing an adjustable screw for low position.
- Use a straight blade pocket screwdriver to adjust low setting higher or lower.

**Reminder! Adjustments on valves are for the low flames setting only.**

## Full Range Non-Adjustable Control

- Used to control the flow of gas for the oven,
- Used together with the oven thermostat.
- Used fully open or fully closed (no medium setting).
- No adjustments or calibrations.

## Combination Valve



- Pilot safety and gas control in one.
- Also known as "flame failure device".
- Used together with oven thermostat on the Master Series and ST280 Series.
- Also available on some Garland counter top models.
- Uses a magnetic coil energized by a thermocouple to hold gas valve open.
- Cuts off gas supply when not sensing a pilot flame.

## Flame Failure Devices And How They Work

There are three principles at work in a flame failure valve. One is the thermocouple, which generates in millivoltage, the other is the electric magnetic coil within the valve, which holds the valve open or allows it to shut if there is no millivoltage and the third is the valve itself.

The thermocouple is two dissimilar metals, which form a junction, and when they are heated, they create a millivoltage. This millivoltage, is used to power the magnetic coil.

The thermocouple is connected to a coil, which is at most times at the back of the valve. The coil operates on very low millivoltage to create a magnetic field that holds a plunger open inside the valve. If there is no millivoltage, the plunger is released and shuts down the valve shutting off gas flow to the pilot and burner.

The valve itself allows you to bypass the plunger by pushing it in. This allows gas flow to the pilot, which then must be ignited. The valve must be held depressed for approximately 30 seconds in order to sufficiently heat the thermocouple and generate millivoltage. If the valve is not depressed for 30 seconds it shuts down the gas flow.

Once the pilot is lit and the millivolts have been generated, the magnetic coil takes over and holds the valve open. If there is no heat at the thermocouple, the valve will not stay open. The same coil controls the burner flow, therefore, if you have ignited the thermocouple and you've got the valve to stay open, you can then go ahead and turn the burner on and the pilot will light the burner.

The particular pilot used on most of our burners is a fishtail design, which throws flames in two directions (one to ignite the burner and the other to keep the thermocouple junction hot). In between the pilot and the thermocouple is an electrode, which can be used to spark ignite the pilot. This can either be from a piezo igniter or from an electric spark.

All enclosed burners ignite in the high position and then they have to be pushed into go to the low position. The reason for this is to ensure no delay in ignition.

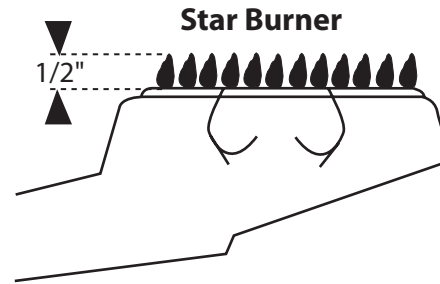
### Burner Gas/Air Adjustments

Variations in field conditions, rough handling of the equipment in transit may indicate the need for adjustment of the primary air to the burners. Check the operation and adjust as below to provide a sharp blue flame at the full rate (open valve fully so that the thermostat is calling for maximum gas flow).

1. On the burner (star, "H" griddle, broiler, oven burners) locate the air shutter.
2. Loosen the lock nut so that the air shutter turns freely.
3. Reinstall the burner.
4. Turn on the gas flow and ignite the burner.
5. Rotate the air shutter to obtain the following:

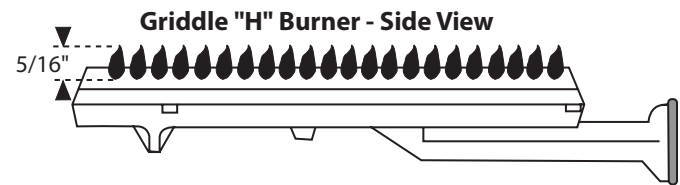
### Open (Star) burner

1/2" stable, sharp inner blue cones.



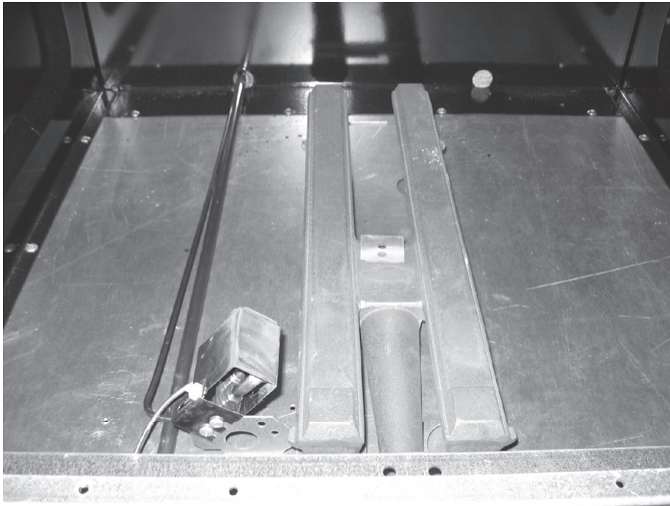
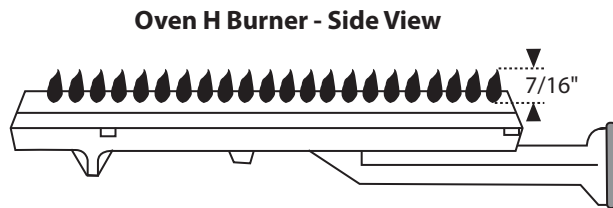
### Hot tops, griddles

5/16" stable sharp inner blue cones.



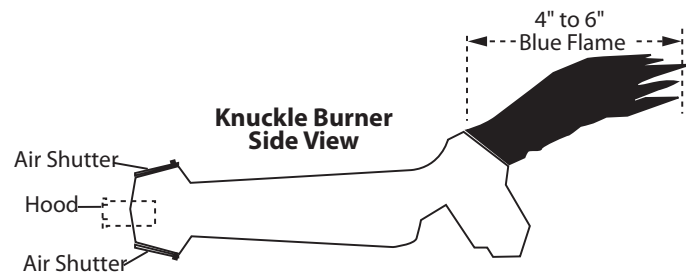
## Oven burners,

If the burner flames are soft and unstable or show yellow tipping increase the amount of air by opening the air shutter.



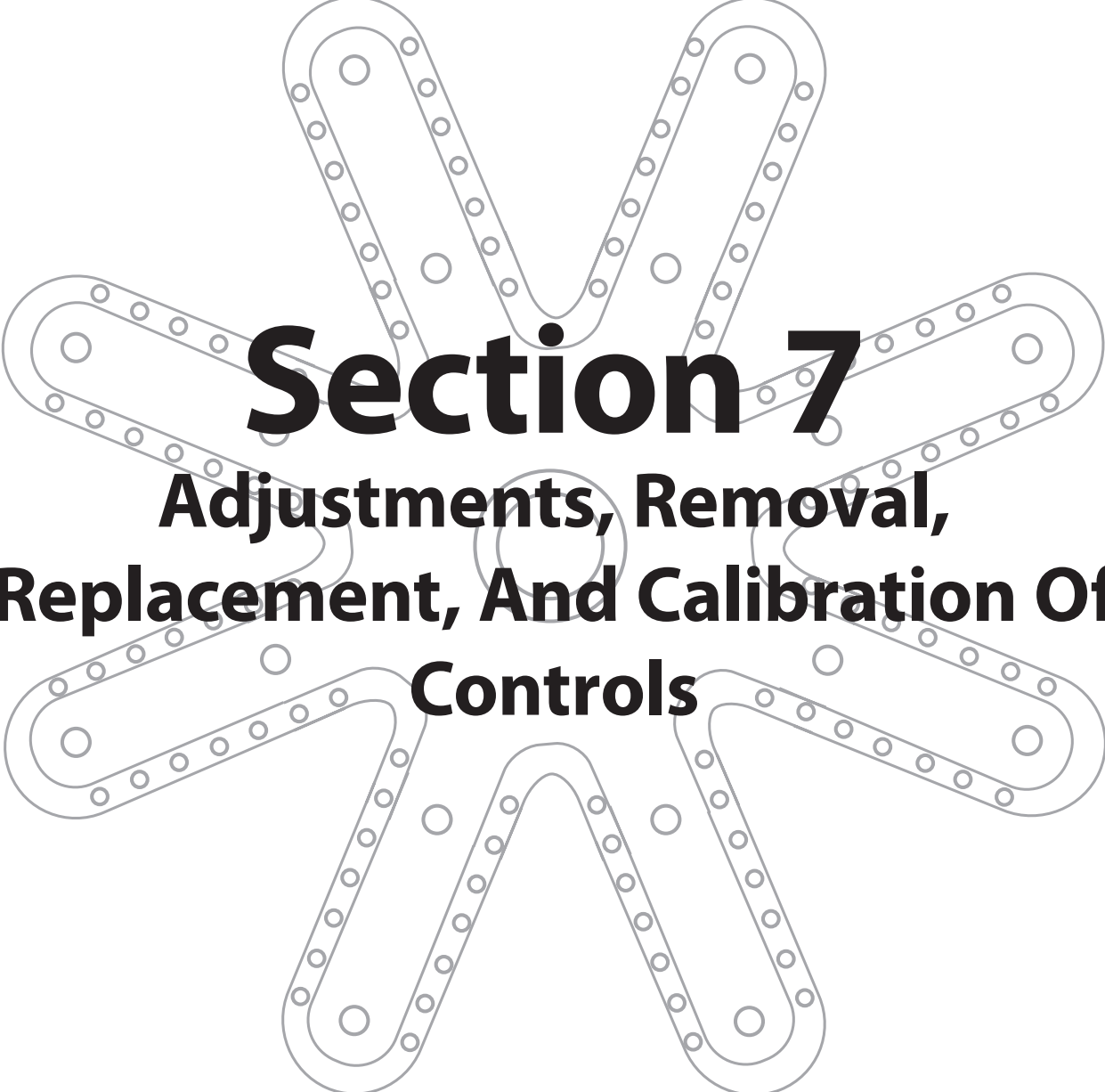
## Knuckle burners

4" to 6" stable, blue flame, with slight yellow tips.



**Note:** If the burner flames are sharp, but lift off the burner ports, reduce the amount of primary air by closing the air shutter.



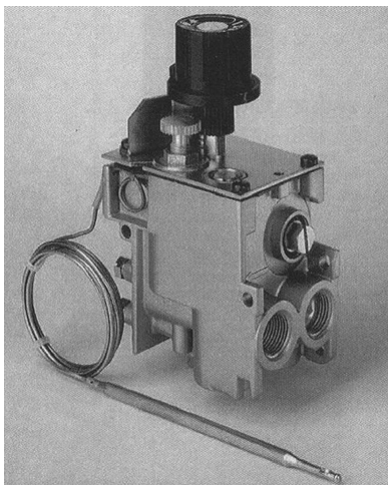


# **Section 7**

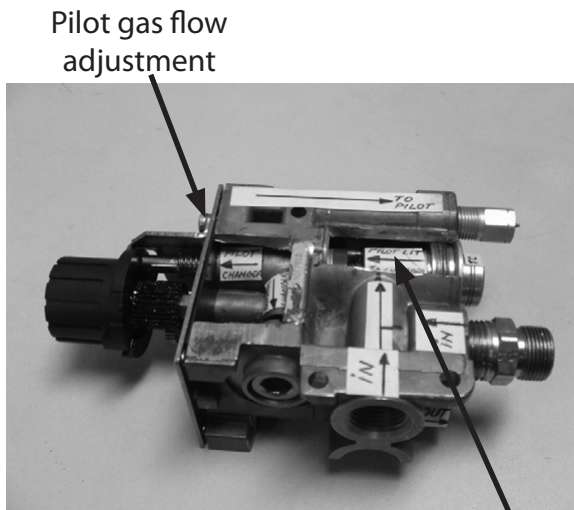
## **Adjustments, Removal, Replacement, And Calibration Of Controls**

## 630 Euro Sit Control

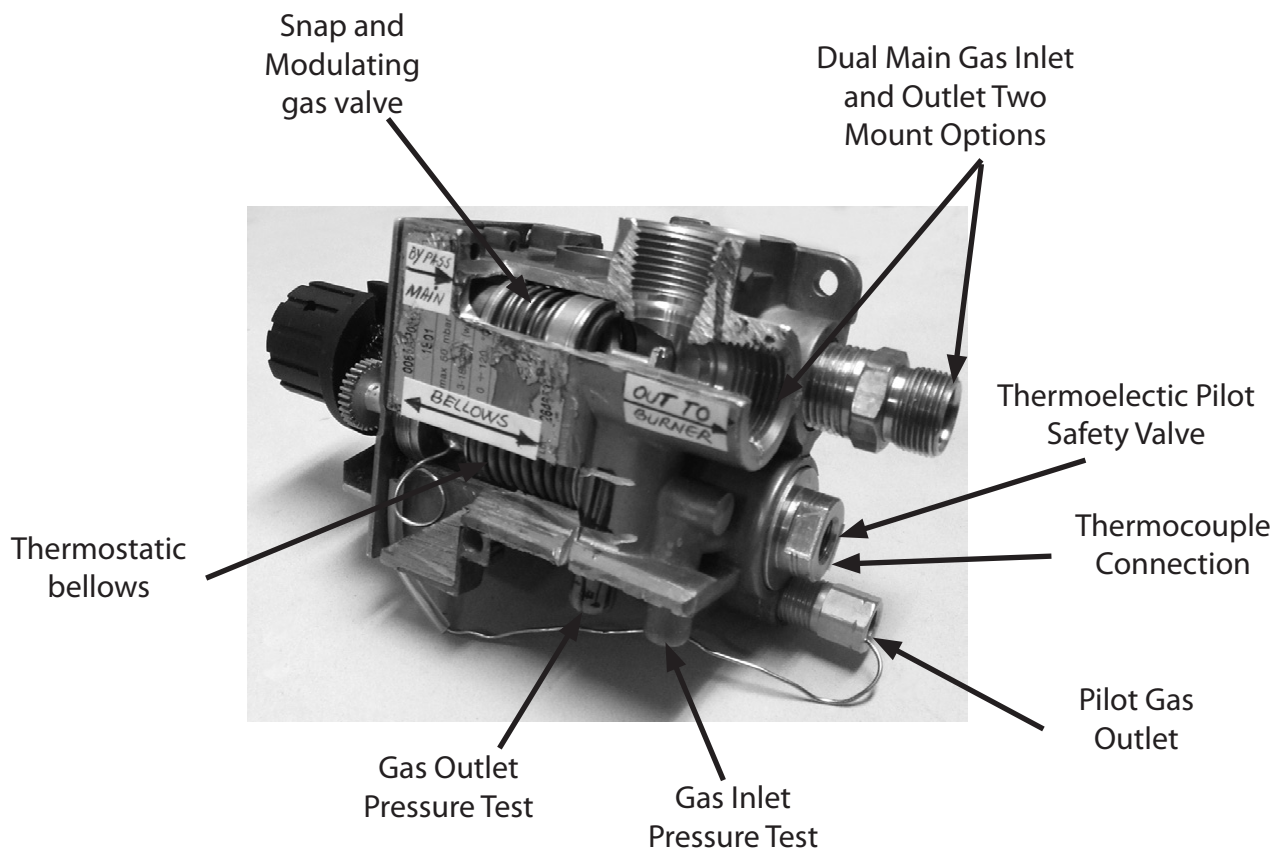
The 630 EUROSIT is a multifunction single knob valve with combined modulating/snap thermostat control.



**SIT Control**



Thermoelectric Flame Failure Device



The gas inlet and outlet test points should not be used. A simple manifold test of incoming pressure will be sufficient. If the pilot flame is present and stable, but the burner does not come on, the SIT Control should be considered inoperative.

## Sit Control

### Griddle SIT Control

P/N **4523007**

Shorter Thermocouple

No Heat Cover

Temperature Control

Range **176°F – 600°F**

**(80°C – 320°C)**

### Oven SIT Control

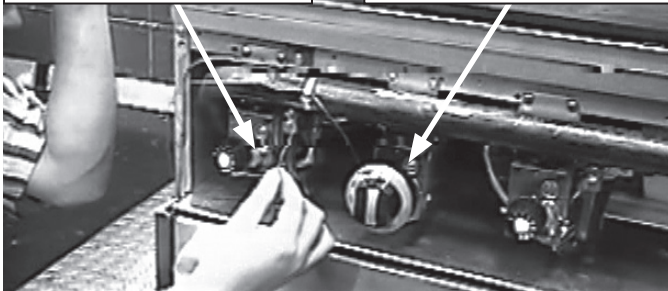
P/N Oven – **4523006**

59" Thermocouple

Temperature Control

Range **212°F – 644°F**

**(100°C – 340°C)**



This control, although very similar to the mechanical controls found on Garland's current range and griddle models, has several major economical efficiencies that offer reliability advantages to the customer.

It is a safety valve, and thermostat in one assembly, and the safety valve is away from traditional high heat environment of the oven burner.

1. The safety valve (should not be removed from the body of the control for any reason.
2. Familiar Open circuit, closed circuit, and drop out checks should be made if the internal safety valve is suspected to be at fault.
3. This control does not require any initial flame setting (currently known as "bypass"). The control has an internal fixed bypass orifice.
4. This control does not require internal calibration. (Some minor knob adjustments could be appropriate, but it would be rare.
5. If a Sit control component is suspected to be internally at fault, replace the control.
6. Initial gas pressure checks are required to validate that the control cannot control knob set temperature.

## Removal And Replacement

### Thermostat Replacement

1. Remove left and middle grates.
2. Remove grate support gas line cover
3. Remove gas line shield
4. Remove Grease crumb tray
5. Remove left column trim piece (3 screws), then push down and pull off.
6. Remove left combustion chamber plate - 2 screws, tilt and remove.
7. Remove the two screws holding the pilot assembly and shield.

### SHIELDS

4528285 (LH)

4525300 (RH)

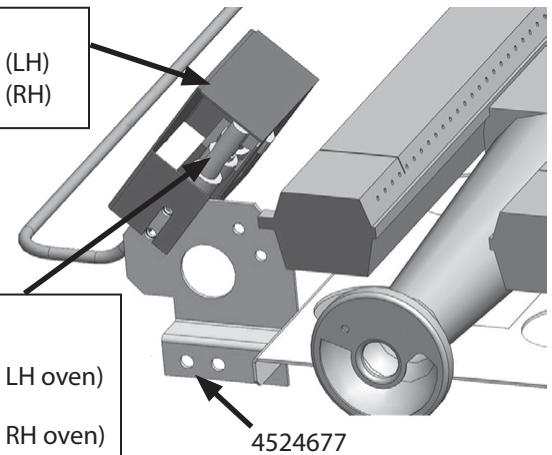
### PILOTS

2200700

(used on LH oven)

2200701

(used on RH oven)

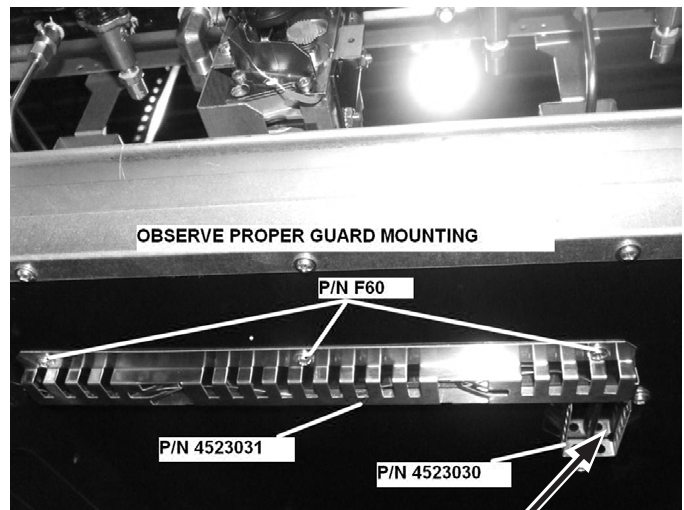
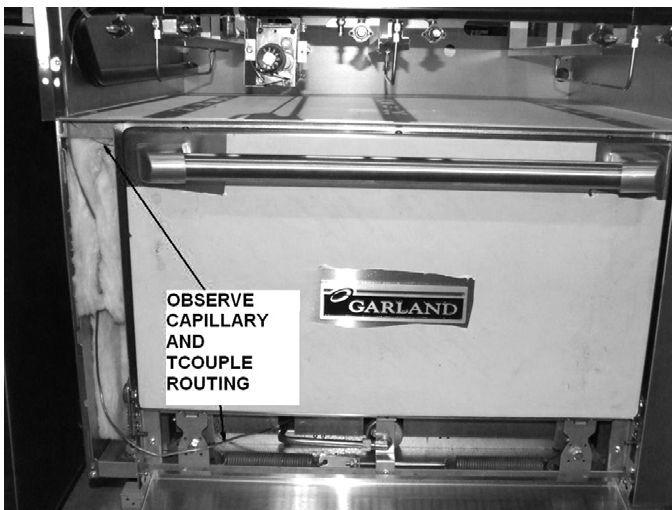
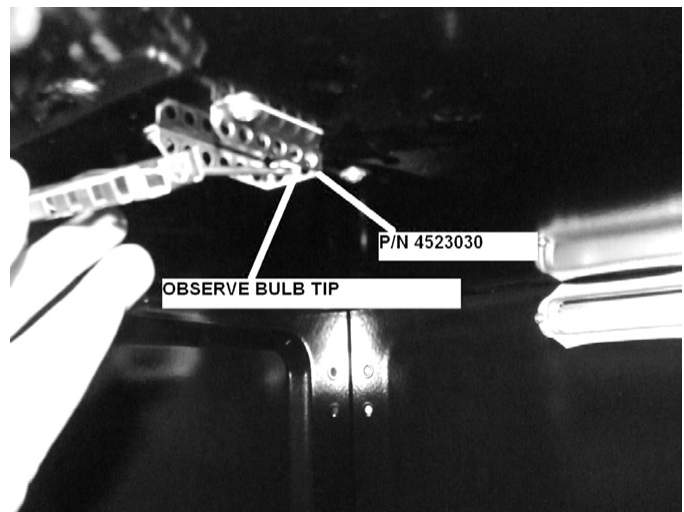
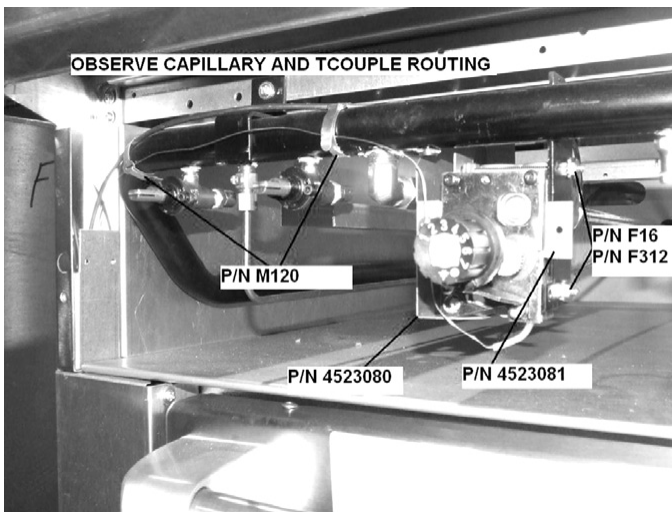


8. Push, unlock, and free the thermocouple from the pilot thermocouple tip holder.

Note: you can remove the oven bottoms for ease of access.

9. #10 metric wrench should be used on thermocouple fittings at the control; be careful not to lose the thermocouple adapter.
10. "Fish" the thermocouple down and out. BE CAREFUL NOT TO DAMAGE THE THERMOSTATS' CAPILLARY



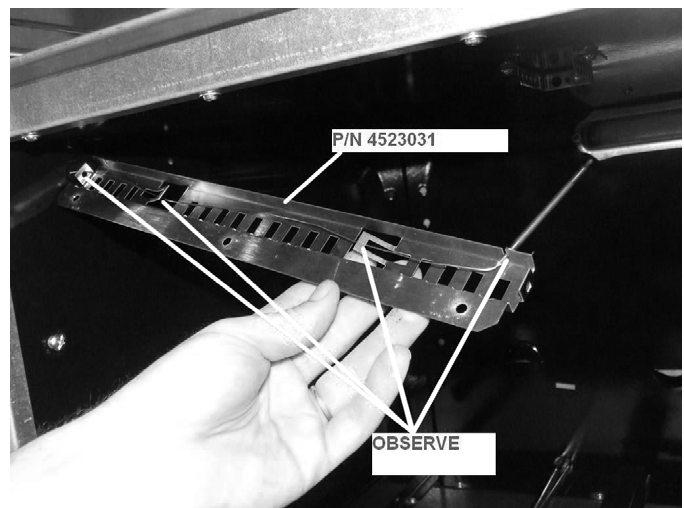


- 11 Install the new thermocouple using the above procedure, but in reverse.

### Thermostat Replacement:

1. Unmount the oven thermostat capillary from its holder.
2. Carefully snake the capillary through the guide holes and out of the guard holder.

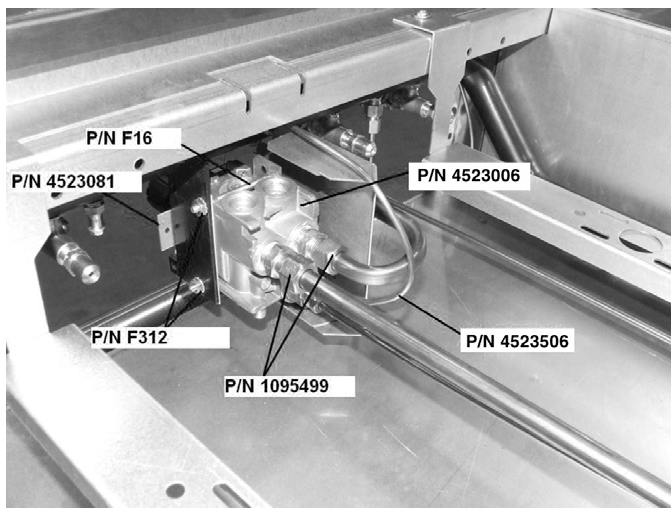
Bulb Tip Holder



Control capillary guard mounting



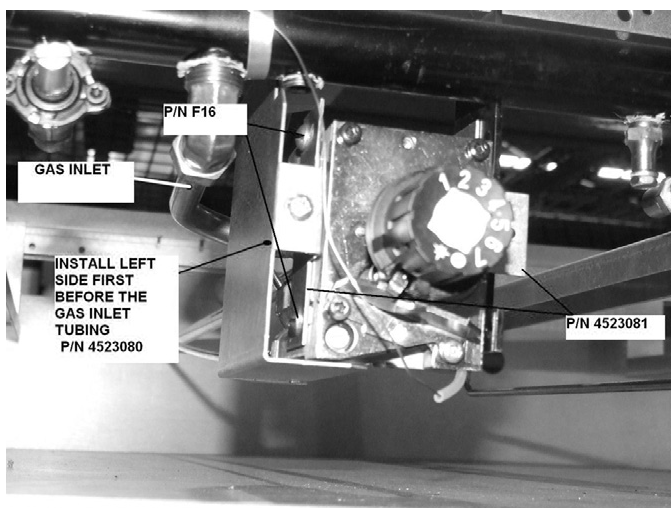
3. Remove the gas lines from the valve. You will also need to remove the fittings from the valve.
4. Remove the two nuts and bolts that hold the thermostat in place. (Do not lose)



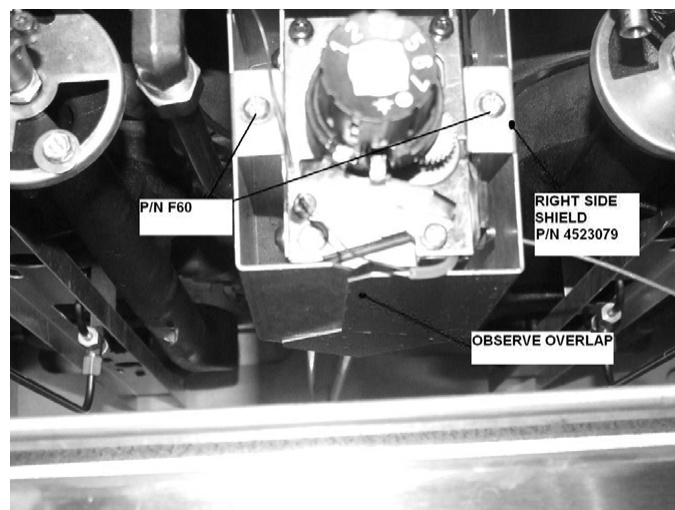
5. Remove the thermostat

#### To install a new thermostat:

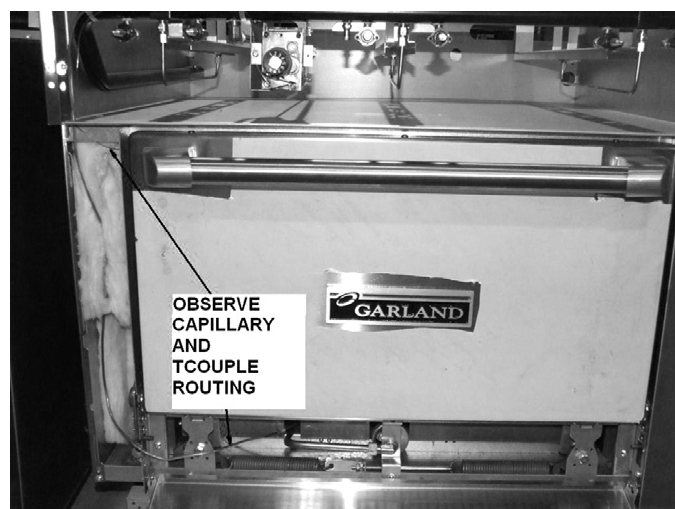
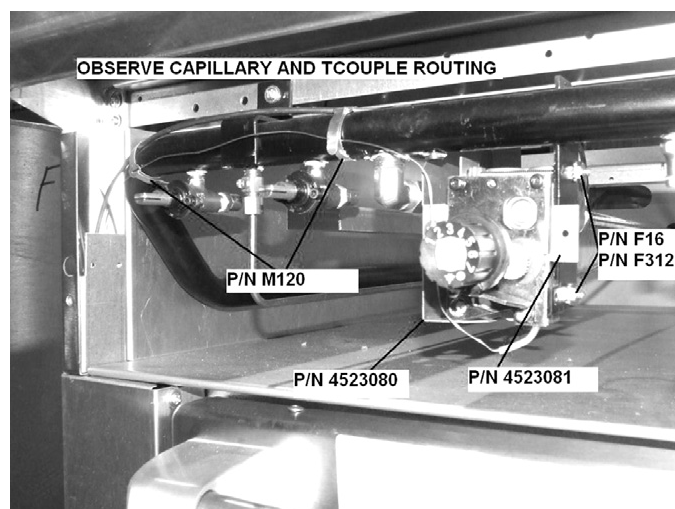
1. Ensure that the fittings removed from the housing are installed in the same location where they were found on the control that is being replaced
2. Reverse the process listed above, ensuring that the proper sequence of installation is followed:
  - A. Install left side first before the gas inlet tubing.



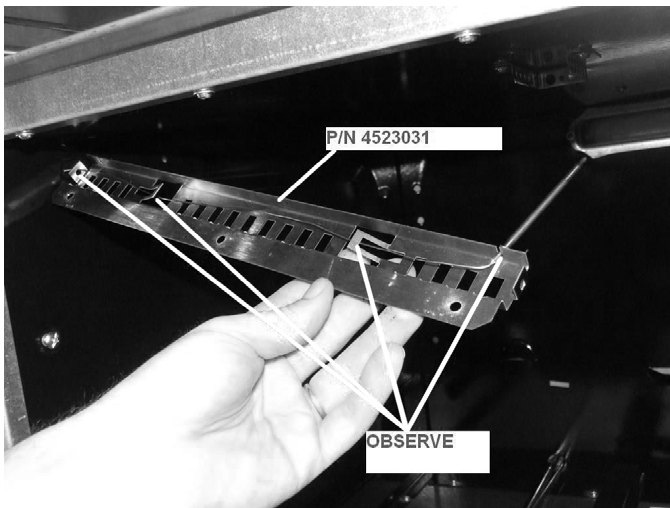
- B. Observe overlap.



- C. Observe capillary and T couple routing



- D. Insure that the temperature bulb is secured in the capillary guard holder as shown:



3. Check for leaks
4. Perform an operational check of the new control using your pyrometer as a crosscheck. Temperature recovery should be most responsive when initial temperature setting is set to 400 ° F. Temperature swings of  $\pm 30$  ° F at this temperature should be no longer than thirty minutes when heating a cool unit.

NOTE: For complete Sit Control installation instructions refer to Garland Service for an installation DVD.

## BJWA Gas Thermostat



The BJWA control is a combination of gas cock and by-pass type thermostat. It is available with both by-pass and pilot adjustments. With the BJWA, the gas is turned on, and the temperature setting is made, with a single turn of the dial.

The BJWA can be adapted to have a multiple orientation and number of outlets. It can be mounted above or below the manifold via a flanged nipple.

Adjustments are on the front for by-pass and temperature calibration.

The BJWA is typically used on US Range Ovens and griddle and on Garland griddles.

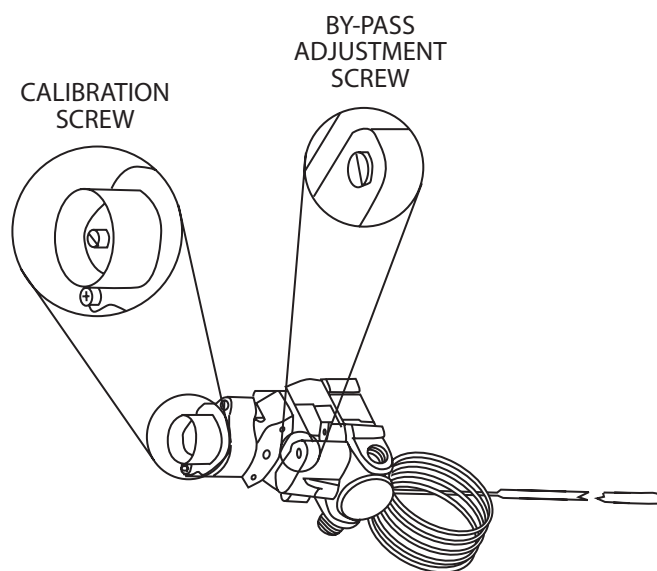
- Ambient temperature 32°F (0°C) to 350°F (177°C)
- Maximum inlet pressure 0.5 PSI
- Capacity (Natural Gas): To 70,000 BTU/Hr

### By-Pass Feature

The BJW has a by-pass feature which when the appliance reaches the temperature at which the dial is set, the control cuts down the flow of gas to the amount required to keep the appliance at that temperature. However, the control must by pass enough gas to keep the entire burner lighted. To maintain this minimum flame, the by-pass must be set carefully and accurately. Instructions on setting the by-pass feature on the BJWA are as follows:

1. Light the burner, then turn the dial to "FULL ON".
2. After 5 minutes, turn the dial clockwise to a point slightly beyond the first mark on the dial.
3. Remove the dial and bezel.
4. With a screwdriver, turn the by-pass adjuster – counter-clockwise to increase the flame, clockwise to decrease it, until there is a minimum blue stable blue flame over the entire ported area of the burner.
5. Replace the bezel and dial, turning the dial clockwise, until it locks in the "OFF" position.

**NOTE:** A replacement thermostat will come with the by-pass in the closed position.



## Calibrating The BJWA Thermostat

This control is a precision component, it is carefully calibrated at the factory. Re-calibration should not be undertaken until the by-pass flame has been adjusted and the operating gas pressure has been confirmed.

To check the temperature when re-calibrating, use an appropriate temperature reading meter. Position of the instrument/thermocouple should be in the geometric center of the oven. For a griddle, use a disc type thermocouple placed in the center of each zone. **There should be no products in the oven or on the griddle**

If the dial has a removable metal insert, proceed as follows:

1. Remove the dial and push out the insert.
2. Replace the dial and turn to the 350° mark.
3. After the burner has been on about 15 minutes, check the temperature.
4. Continue to check the temperature at 5 minute intervals until 2 successive readings are within 5° of each other.

**The control should be re-calibrated if your reading is not within  $\pm 20^\circ$  F of the dial setting (350°F). If re-calibration is required, the additional steps that need to be taken are as follows:**

5. Hold the dial firmly, insert a screwdriver through the center of the dial and push the calibration stem. Do Not turn this stem.
6. While holding the calibration stem firmly with the screwdriver, turn the dial until it is set at the actual temperature as shown on your meter. Release the pressure on the calibration stem. Replace the dial inset.
7. Set the dial at 400°F mark. Check the temperature again as indicated in step 3 and 4 above. If the temperature is not within  $\pm 20^\circ$  of the dial setting (400°F), the control should be replaced.

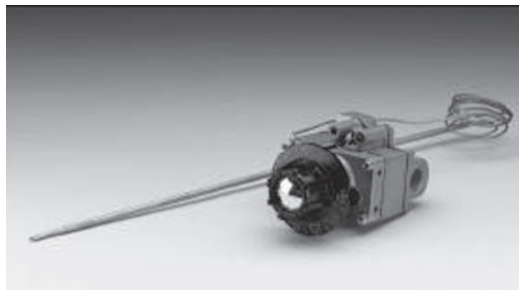
If the dial does not have a removable insert or the dial has a "D" type stem, use the following procedure to re-calibrate.

1. Set the dial to the 350°F mark.
2. After the burner has been on about 15 minutes, check the temperature.
3. Continue to check the temperature at 5 minute intervals until 2 successive readings are within 5°F of each other.

**The control should be re-calibrated if your reading is not within  $\pm 20^\circ$  of the dial setting (350°F). If re-calibration is required, the additional steps that are need to be taken are as follows:**

4. Remove the dial assembly or the complete "D" type stem.
5. Push the calibration stem inward with a screw driver, while holding the calibration stem firmly in, turn the stem clockwise to obtain a lower temperature or counter-clockwise for a higher temperature. Each mark on the retainer represents 25°F. Replace the dial assembly or "D" type stem with dial.
6. Set the dial at 400°F mark. Check the temperature again as indicated in step 3 and 4 above. If the temperature is not within  $\pm 20^\circ$  of the dial setting (400°F), the control should be replaced.

# Heavy Duty FDO Control Thermostat

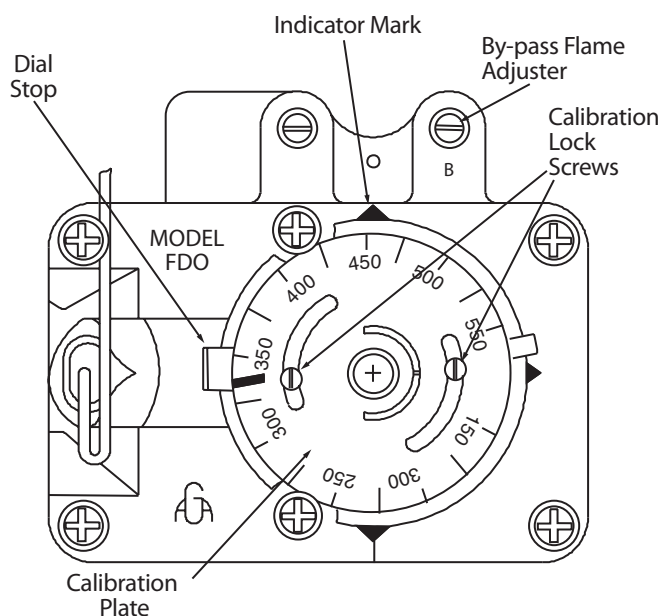


The FD Control is a heavy duty, high capacity gas thermostat. It is a modulating snap by-pass.

Garland uses the FD Control for range ovens and Pizza decks.

Adjustments are at the front for by-pass and temperature calibration.

## Instructions for Model FDO Heavy Duty Control



The model FDO is a precision made instrument, carefully set at the factory to accurately control oven temperatures, from 150° F (66°C) to 500°F (260°C). All adjustments are accessible from the front of the appliance after removing the dial. To remove the dial, grasp the knob portion and pull straight out.

1. With the oven cold, turn the dial counter-clockwise slowly from "Low Stop", until the bypass seat just snaps on.
2. Remove the dial.
3. With a screw driver, turn the bypass flame adjuster screw counter-clockwise to increase the bypass flame or clockwise to decrease the entire flame to a minimum stable flame.
4. Replace the dial. CAUTION: While making this adjustment, if the oven should become heated while the dial is set at a low range below 350°F (177°C), the bypass flame will shut off completely. If this occurs, turn the dial counter-clockwise slowly until the bypass gas snaps on. Then check the bypass adjustment as stated.

Below is the dial insert used by Garland on FD Control thermostats. Note the space between 300°F and the 350°F mark.



## Re-calibration

Field re-calibration is seldom necessary, and should not be resorted to unless poor cooking results definitely prove that the control is not maintaining the temperature to which the dial is set. To check the oven temperature when re-calibrating use an indicating potentiometer or reliable mercury oven thermometer.

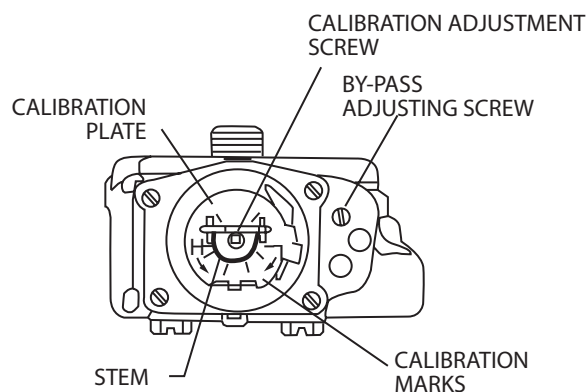
1. Place the thermocouple of the test instrument or thermometer in the geometric center of the oven.
2. Light the main burner. Observe which indicator mark aligns with the low stop position of the dial. Use this indicator mark for all settings.
3. Turn the dial so 400°F (240°C) lines up with the "low setting" indicator mark.



4. Allow the oven, or appliance, to heat and the thermostat to cycle three times. After sufficient time, check the temperature, if the temperature does not read with in  $\pm 20^\circ$  of the dial setting, re-calibrate as follows:
5. Pull the dial straight off without turning the thermostat shaft.
6. Hold the calibration plate and loosen the two calibration screws until the plate can be moved independently of the control.
7. Turn the calibration plate so that the instrument of the thermometer reading is in line with the indicator mark. Hold the plate and tighten the screws firmly.
8. Replace the dial.
9. Note: If the above adjustment is prevented by the two loosened calibration lock screws being in contact with the ends of the screw clearance plate to the proper location, reassemble the screws in the other tapped holes designed for them.

If the thermostat is cycling beyond the  $20^\circ$  tolerance and the appliance is under warranty **re-calibrate the thermostat** or if not under warranty consult the owner for proper action. If the thermostat is out of calibration more than fifty (50) degrees, it will not like hold an attempt of re-calibration, we suggest that the thermostat be replaced.

## UN Type Griddle Thermostat



The Robertshaw UN throttle-type griddle control requires a by-pass adjustment. To adjust, proceed as follows:

1. Be sure that the pilot flames are lit and adjusted.
2. Turn the dial to  $200^\circ\text{F}$  ( $93^\circ\text{C}$ ) mark and allow the griddle to heat for approximately 5 minutes.
3. Turn the dial clockwise to "LOW" position. The control will cut down to the BY-PASS flame.
4. Carefully remove the dial, making sure the setting is not disturbed.

5. With a screwdriver, turn the by-pass adjustment screw and adjust to the "LOWEST POSSIBLE STABLE FLAME COVERING THE ENTIRE BURNER". Turn the screw clockwise to decrease or counter-clockwise to increase the size of the by-pass flame.
6. Replace the dial.
7. Turn the dial to the "OFF" position.

### Re calibration

**Do not re-calibrate until the following has been checked:**

1. BY-PASS FLAME for proper adjustment (see above).
2. Check that the control bulb is fully inserted into the bulb tube.

To check calibration, proceed as follows:

Use a Robertshaw test instrument with a special disc type thermocouple or a reliable "SURFACE" TYPE thermometer. (Note: A drop of oil on the face of the disc will provide better contact.

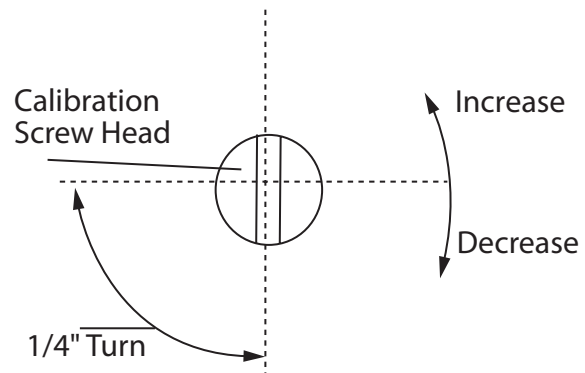
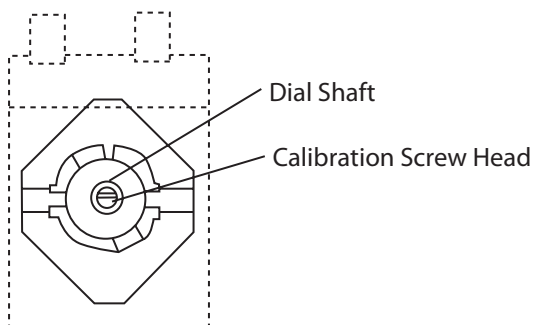
1. Turn all griddle temperature control dials to 350°F (177°C). In order to allow the temperature to stabilize, the controls must be allowed to cycle three times before taking a test reading.
2. Check the temperature reading when the control cuts down to by-pass by placing the sensor firmly on the griddle surfaces directly above the sensing bulb of the control. Reading of the test instrument should be between 335°F (168°C) and 365°F (185°C).
3. If the dial setting does not agree with the test instrument reading within the above limits, re-calibrate as follows:

4. Remove the dial making sure the setting is not disturbed.
  5. Each division mark on the calibration plate equals 15°F. With a screw driver, turn the calibration screw clock-wise (toward LOW) to reduce the temperature, or counter-clockwise (toward HIGH) to increase the temperature.
- Example – The dial setting is at the 350°F mark. The test instrument is reading 380°F. Turn the calibration screw clockwise (toward LOW) two divisions.
6. Replace the dial, turning the dial to the "OFF" position.
  7. Repeat steps 1 through 3 to make sure the correct adjustment has been made.

## Electric Thermostat

### Thermostat Operation

It is normal for a hydraulic thermostat to cycle with a temperature differential of 45° to 50°. If the thermostat is cycling beyond the 15° tolerances above or below the set point and the appliance is under warranty, re-calibrate the thermostat or if not under warranty, consult the owner for proper action. If the thermostat is out of calibration more than 50°, it will not likely hold an attempt of re-calibration. We suggest that the thermostat be replaced.



### Thermostat calibration

#### Oven thermostat

1. Place the thermocouple of the test instrument in the center of the oven.
2. Turn the oven temperature control dial to 400°F. In order to allow the oven temperature to stabilize, the oven control must be allowed to cycle twice before taking a test reading.
3. Check the temperature reading just when the control cycles "OFF" as indicated by the cycling pilot lamp. If the temperature dose not read within 15° of the dial setting, re-calibrate as follows:

4. Carefully remove the thermostat dial, not disturbing the dial setting.
5. Hold the thermostat shaft steady and with a small flat blade screw driver, turn the calibration screw located inside the shaft clockwise to decrease the temperature or counter-clockwise to increase the temperature. Note each 1/4 turn of the screw will create a change of approximately 25°F.
6. Replace the thermostat dial and repeat steps 1 through 3 to verify that the correct adjustment has been made.
3. Check the griddle temperature when the thermostat just cycles "OFF" by placing the thermocouple firmly on the griddle surface directly above the sensing bulb of the thermostat. The reading should be between 285°F and 315°F. If the reading is outside of these limits, calibrate as follows:
4. Carefully remove the thermostat dial, not disturbing the dial setting.
5. Hold the thermostat shaft steady and with a small flat blade screw driver, turn the calibration screw, located inside the shaft, clockwise to decrease the temperature and counter-clockwise to increase the temperature. Note each 1/4 turn of the screw will create a change of approximately 25°F.
6. Replace the thermostat dial and repeat steps 1 through 3 to verify that the correct adjustment has been made.

### **Griddle thermostat**

1. Use a test instrument with a special type thermocouple or a reliable surface type pyrometer. Note: a drop of oil on the face of the disc will provide better contact with the plate.
2. Set all griddle thermostats to 300°F. In order to allow the griddle temperature to stabilize, the thermostats must be allowed to cycle twice before taking a test reading.





A large, light gray decorative graphic in the background, consisting of a central circle with six stylized, elongated, teardrop-shaped elements radiating outwards, each containing a series of small circles.

# **Section 8**

## **Gas Pressure Regulators**

# Gas Pressure Regulators

## Purpose Of A Gas Pressure Regulator

Gas pressure regulators have two main purposes, to reduce supply main pressure to safe operating pressures of connected appliances and to maintain constant downstream pressure, regardless of changes in the gas flow or upstream pressure variations.

Supply gas pressure is usually higher than the safe operating pressures of connected appliances.

If an appliance receives too much fuel, it will over fire. If it receives too little fuel, it will under fire. It will produce too much or too little heat. Combustion characteristics could change resulting in carbon monoxide generation. The appliance may not work properly or efficiently.

## Main Categories Of Regulators

**Service Regulator** is used in natural gas systems to reduce service line pressure to building line pressure at the gas meter. In propane, they are used to reduce the service line pressure to building line pressure and placed between the storage container and the building.

**System Regulator** is used to reduce building line pressure when pressure required by a system of appliances or equipment is less than the pressure in the pipe where it enters the building.

**Appliance Regulator** is used to reduce building line pressure to the pressure required by the appliance. It is often built into a combination control.

Downstream refers to the flow of gas after it has passed the regulator. Upstream refers to the flow of gas before it passes through the regulator.

A manual shut-off valve must be installed upstream of the regulator so that the regulator may be isolated for servicing.

System regulators may require an internal relief device or a line relief device to allow excess gas to be vented outdoors. Some vents contain a leak-limiting device to restrict flow so that gas accumulation does not reach dangerous levels. These are not required to vent outdoors.

The pressure setting on a line relief device should not be higher than the lowest rated item downstream of the relief device. Most natural and all propane relief devices must be vented outdoors.

## Hydrostatic Relief Device

A hydrostatic relief device is used in propane systems. They are to be installed between two valves in a propane system. If liquid propane is trapped between two closed valves in piping or hose, it will begin to expand as its temperature increases. The hydrostatic relief device relieves this pressure and prevents the pipe from bursting.

## Venting Of Regulators

Vent lines must be protected from damage including water entry and inset damage. Vent line size must be at least the nominal pipe size of the vent outlet of the pressure regulator but not less than 0.25".

Individual vent lines may be connected to a single vent line provided this single vent line is twice the area of the total area of the connected bleed vent lines. Vent lines must be increased by one pipe size diameter for every 50 ft. The increase must be made at the regulator vent outlet.

In natural gas, when using a diaphragm or combination control valve, relieved gas may be vented to the low-inlet pressure appliance combustion chamber. It must have a continuous pilot.

## Terminology

**Set Point** is the desired outlet pressure of the regulator. As flow rate increases, the downstream pressure decreases.

**Lock up** is the pressure above the set point that is used to shut the regulator off tight. To make a tight seal, the regulator must increase the downstream pressure to force the disk into the knife-edge. This is called lock up pressure.

**Droop and offset** describe the downstream pressure drop set point. At this point, the valve is opened and there is an increase flow of gas. Droop is a percentage of the set point pressure. The accuracy of a regulator is determined by the amount of flow it can pass for a given amount of droop. The closer a regulator is to the set point, the more accurate it is.

**The Loading Element** is used to counterbalance the downstream pressure. It is usually a spring.

**The Measuring Element** is usually a diaphragm. It is used to measure the changes in the downstream pressure. It is attached by a stem to the restricting element so that they both move together.

**The Restricting Element** moves in response to the measuring element when the downstream pressure changes. Usually, it is a disk or plug that controls the amount of flow by varying the orifice opening.

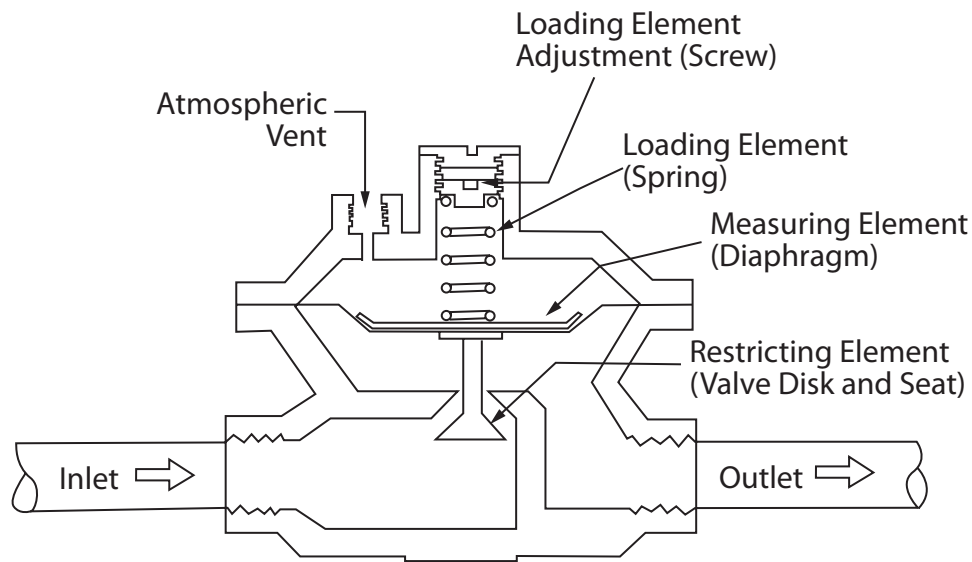
**The Atmospheric Vent** allows the air above the diaphragm to escape or enter as the diaphragm moves up or down.

**Vent Limiting Orifice** is used in appliance regulators. It allows equal limits of inhalations and escape of air from the upper diaphragm chamber. If the diaphragm ruptures, the leakage is limited to less than 1 cubic foot per inch at 7" W.C. gas pressure. The size of the orifice is 38.

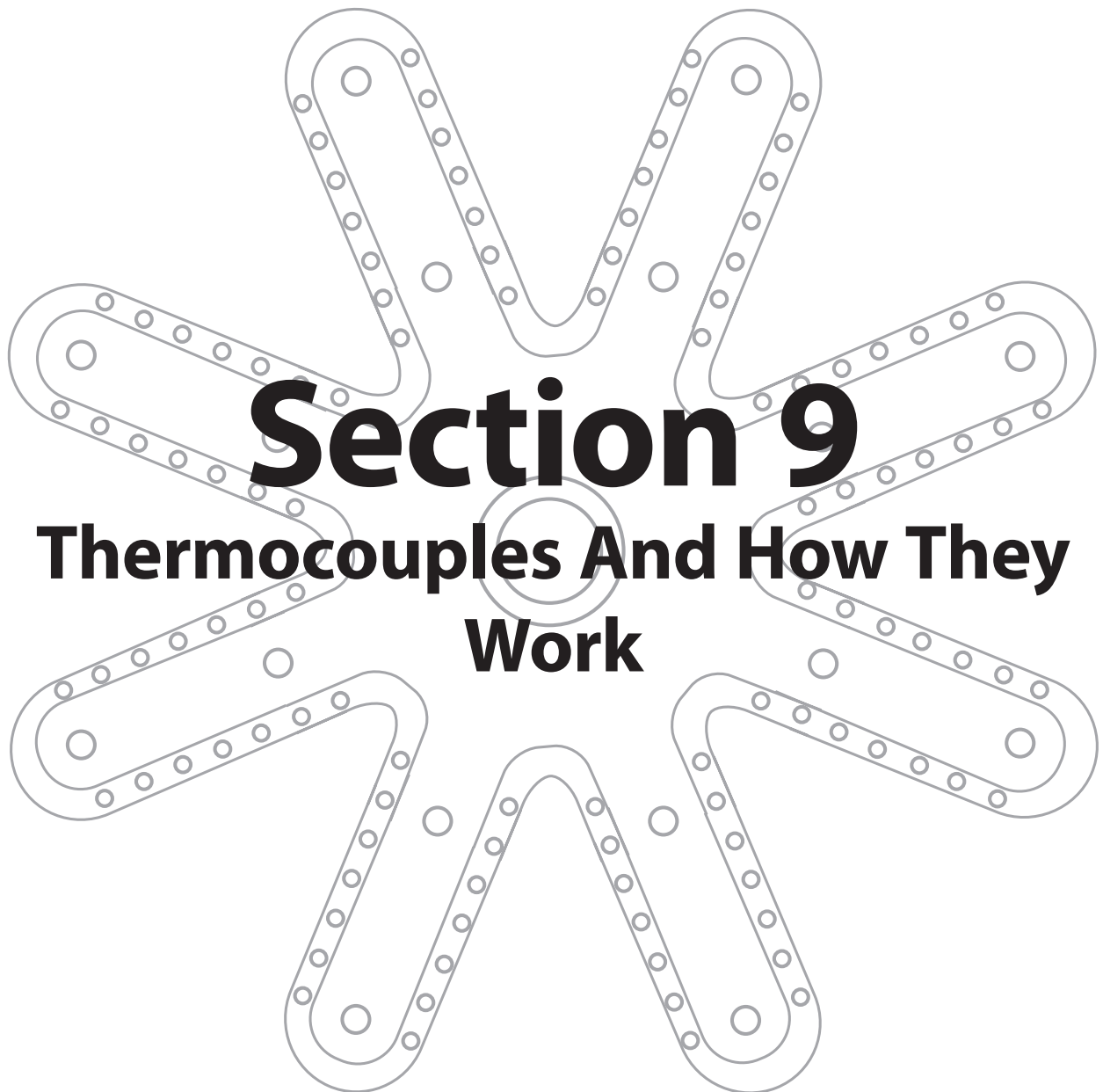
**Low Capacity Appliance Regulators** carry both main burner and pilot gas loads. They are usually marked with the symbol "P". This means they are suitable for pilot load capability. These are designed to produce a fine pressure control. They work with small pilot flame flows that are mandatory operating requirements for some appliances.

**High Capacity Appliance Regulators** are only used to regulate the gas pressure to the main burner. The pilot flame receives the 7" W.C. gas pressure delivered by the gas meter or system regulator. The gas to the pilot flame is controlled by a throttling valve (needle valve) sometimes called the B-cock.

## Basics Of A Gas Pressure Regulator







# Thermocouples And How They Work

Thermocouples are used to generate voltage to hold a magnet on a pilot safety valve. It plays an important part of the flame safety system in a gas oven.

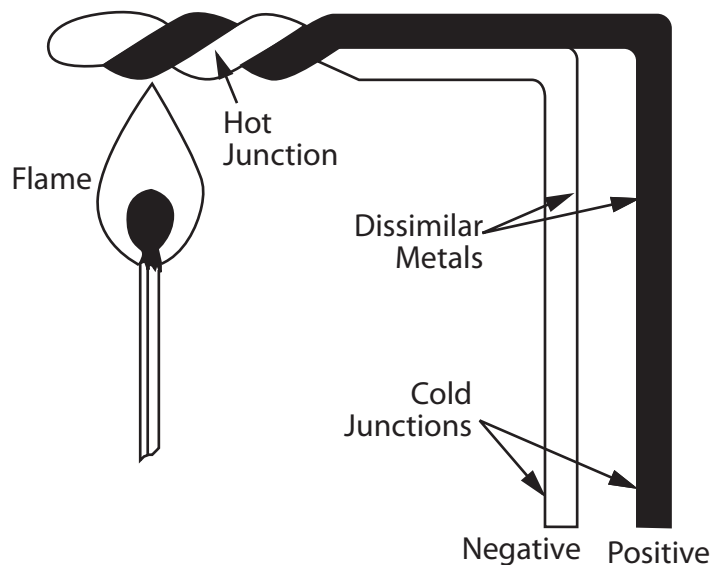
The thermocouple uses the combined effects of temperature change and electricity. It consists of a bimetallic strip joined at one end (called the hot junction). When the hot junction is heated, a DC voltage is generated across the two other ends of the strips (the cold junction).

The thermocouple is used to prove the pilot flame. If the pilot flame goes out, the thermocouple prevents the main gas from opening.

The magnitude of the voltage across the cold junction depends on the:

- Two materials of the bimetallic strip
- Temperature difference between the hot and cold junctions

The small amount of electricity produced is 20 to 30 millivolts. This millivoltage is used to hold open an electromagnet assembly in the gas control. If the pilot goes out, the thermocouple will cool down and no longer generate electricity and in turn, de-energize the magnet, closing the valve.



A large, stylized graphic in the background consisting of six interlocking, elongated oval shapes arranged in a circular pattern, resembling a snowflake or a star. Each shape has a series of small circles along its inner edge.

# **Section 10**

## **Trouble Shooting**

### **The Oven Pilot Safety System**

# Trouble Shooting The Oven Pilot Safety System

## Automatic Pilot Valve

The automatic pilot valve is a protective device that allows gas to flow to the oven burner only when the pilot burner is burning. (This is used on GARLAND ovens and ranges to have safe lighting provisions provided by the flow interrupter that will not allow gas to flow to the oven burner while the red button is depressed.)

GARLAND has used two different types of pilot safety valves. On the 280 Series the valve used up to July 1988 was the Robertshaw TS-11J. From July 1988 to September 2000, the Johnson BASO H15HQ-6 valve was being used. The Heavy Duty Series used the Robertshaw TS-11J up to October 1990; from then on the Johnson BASO H15HQ-6 valve was being used. Figure 1 showing the TS-11J and Figure 2 showing the Johnson BASO H15HQ-6. Garland has since started using the Robert Shaw TS-11J valve on all Garland and US Range using this system.

Figure 1

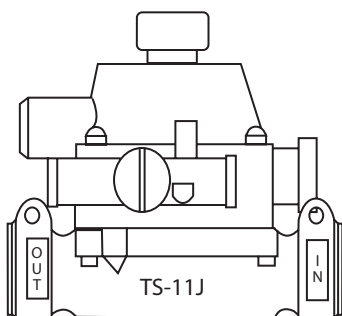
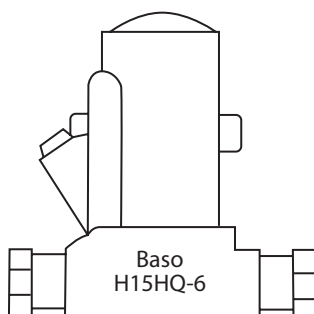


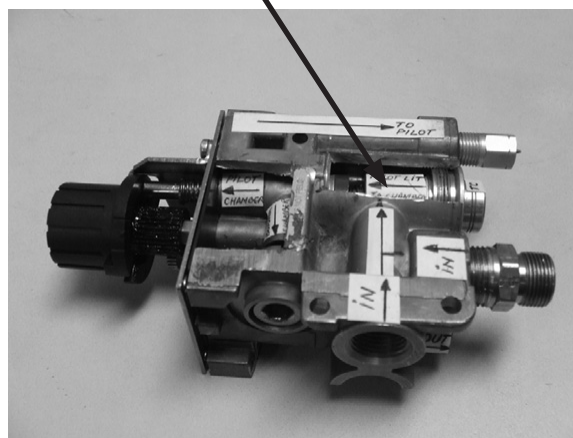
Figure 2



## 2007 (Sit Control) X, U, & G Series Safety Systems

Garland's new Restaurant ranges contain a gas control system enclosed in one component; the Sit Control. The oven/griddle pilot safety system is an internal subcomponent of the control. If, during a normal safety valve system check, the safety valve/coil is found to be weak or inoperative, **the complete control must be replaced.**

Thermoelectric  
Flame Failure Device



**Note:** This control uses a different adapter, than the one described below to complete a Closed circuit test.

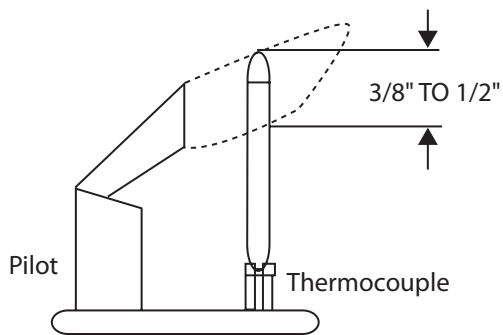
## Thermocouple replacement.

A thermocouple nut should be started and turned all they way in by hand. An additional quarter turn with a small wrench will then be sufficient to seat the lock washer and maintain adequate contact. A too loose or too tight connection of the thermocouple nut to the automatic pilot valve can prevent the thermocouple from activating the valve. A visual examination of the thermocouple lead should be made to make sure that there are no cracks or ruptures. Every effort has been made to insure trouble-free performance of this system with a minimum of service.

## To Test Magnet Assembly And Thermocouple Operation

Heating the thermocouple tip by the pilot flame produces an electric potential that is used to energize the magnet that, in turn holds open the main and pilot valves. When the pilot is "OUT" or improperly adjusted, insufficient heat is applied to the thermocouple tip to produce adequate electrical generation that results in the control shutting itself off.





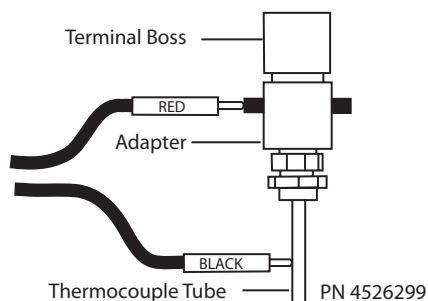
If, while following the proper lighting procedures, the magnet cannot be made to "HOLD", inspect the pilot flame for proper size and adjustment (see pilot burner adjustment). If the magnet will still not hold, make the following checks.

### Closed Circuit Test

(To test magnet & thermocouple as a complete unit)

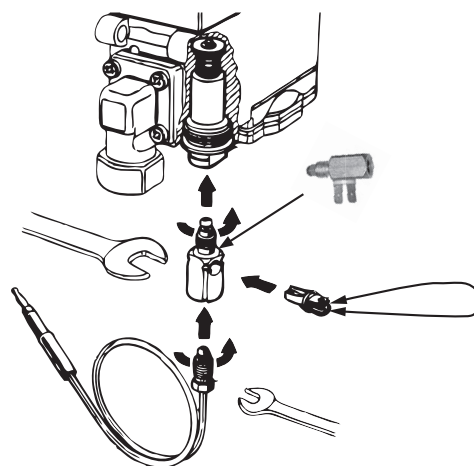
To make the closed circuit test, remove the thermocouple lead from the magnet contact. Place an adapter (Robertshaw Part #75036) in the magnet contact and turn the thermocouple into the adapter finger tight. Connect millivolt leads to the adapter and thermocouple lead as shown in figure "A".

Figure A



In the Sit Control, insert a metric M9 adapter in the magnet contact to complete the safety valve check as shown in Figure B.

Figure B



1. Make sure the thermocouple is properly inserted into the pilot housing, and has no play. Also check gas tubing connection at the pilot and tighten if loose.
2. Re-light the pilot, and read the meter after the pilot has been burning for three minutes. If the pilot will not continue burning, depress and hold the temperature knob to manually open the SIT safety valve to check the thermocouple output for this closed circuit check. If insufficient (normal output for closed circuit is 8-14 millivolts), and under 7 millivolts, replace the thermocouple. If the millivolt reading is above 7 mV, and the safety magnet does not hold, replace the valve.
3. If the closed circuit mV reading is the same as the open circuit reading, the coil is electrically open, and the valve must be replaced.
4. Check for drop out time which should occur within 60 seconds and at approximately 2 mV since the pilot was out.
5. Relight the pilot and turn the main burner On. As the oven heats up, it is normal to see a slight decrease of millivolts.

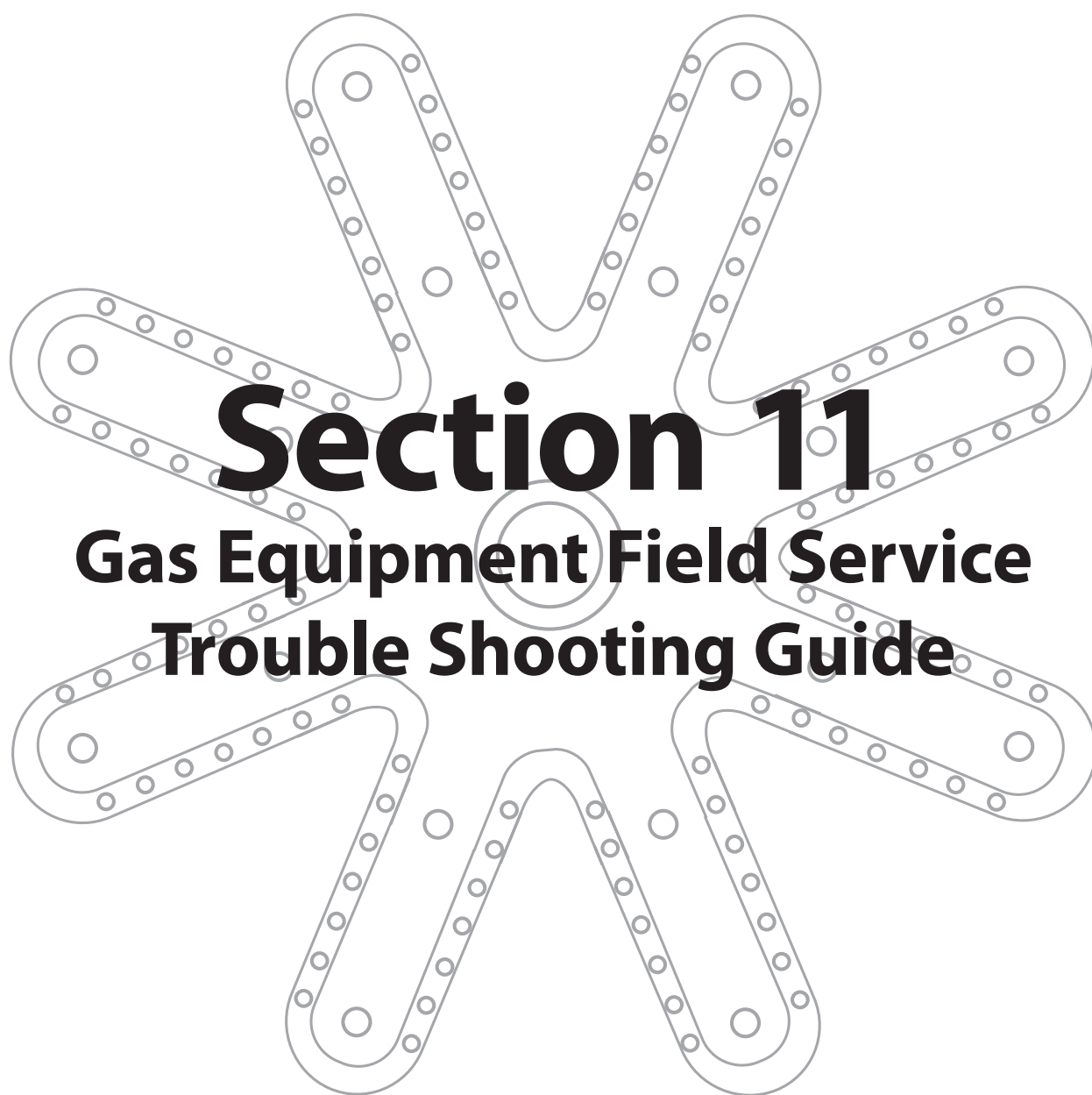
|    |                | Thermocouples |            |       |
|----|----------------|---------------|------------|-------|
|    |                | SIT           | Robertshaw | Orkli |
| mV | Closed Circuit | 8-14          | 10-15      | 8-14  |
|    | Open Circuit   | 18-28         | 20-30      | 24-30 |
|    | Drop out       | 2             | 5          | 2     |

## **Open Circuit Test**

1. Disconnect the thermocouple from the safety valve.
2. Attach the thermocouple to the millivolt test instrument.
3. Heat the sensor end of the thermocouple at the pilot flame or similar flame characteristics, monitoring the millivolt meter.
4. If the millivolt reading is below 14 millivolts, replace the thermocouple.

**NOTE: The Sit thermocouple open circuit voltage will be approximately 18-28 millivolts.**

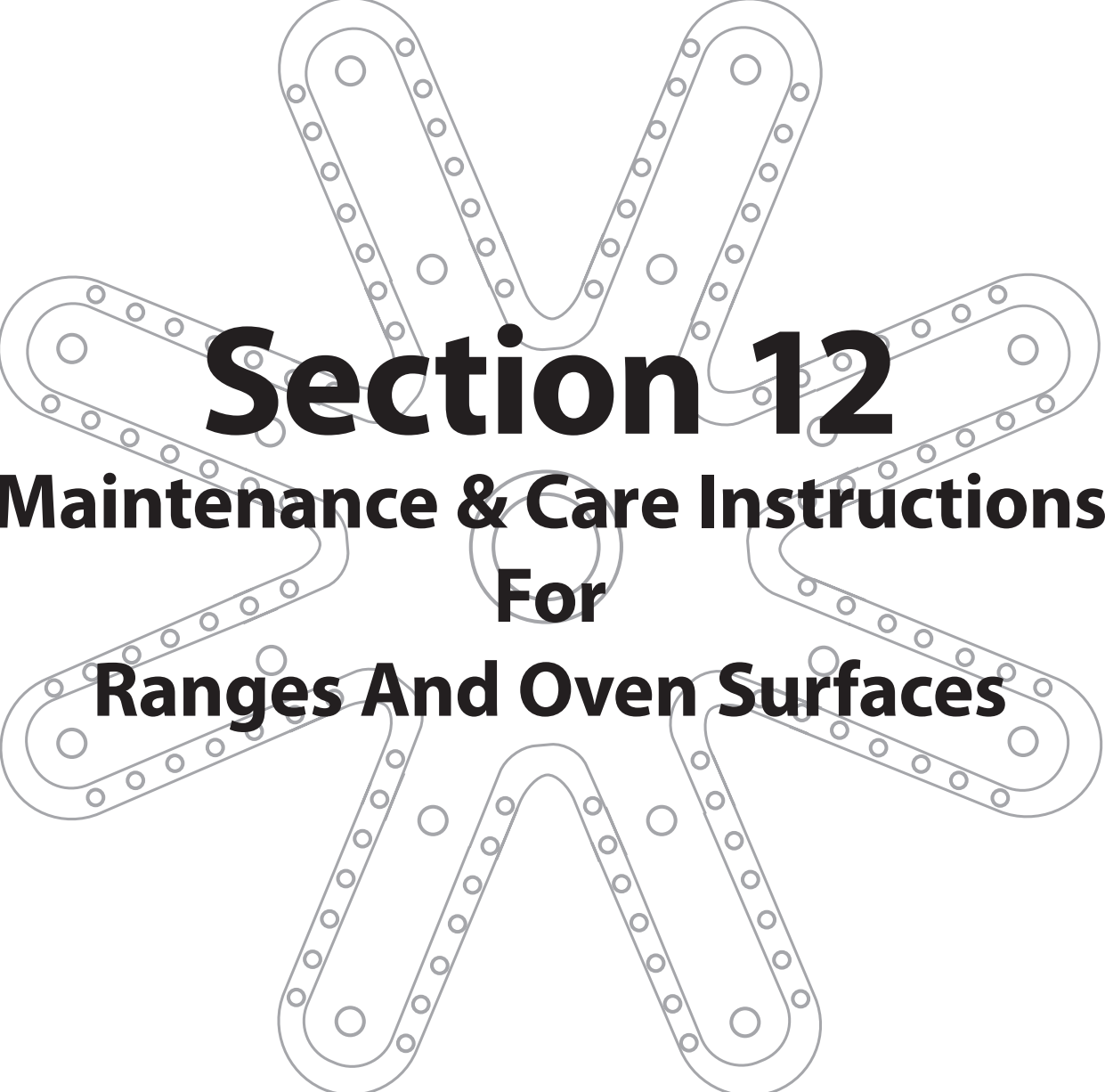
5. If the closed circuit mV reading is the same as the open circuit reading, the coil is electrically open, and the valve must be replaced.



# Gas Equipment Field Service Troubleshooting Guide

A professional as listed in your maintenance and repair center guide should perform service.

| PROBLEM   | POSSIBLE CAUSE  | SOLUTION   |
|---|---|--|
| Burner flame soft-lazy tip yellow.  | Not enough air mixing with gas.                             | Open air shutter.  |
| Flame lifts off burner ports. Flashes back in Burner. Pops excessively when turned off. | To much air mixing with gas.                                | Close air shutter.   |
| Delayed ignition.   | Unit over gassed or orificed incorrectly                    | Check gas pressure and orifice size.   |
| Pilot burner will not ignite.   | Burner adjusted improperly. Burner                          | Adjust gas and air mixture.  |
|   | Burner ports plugged.                                       | Clean burner ports.  |
|   | Pilot flame too small.                                      | Adjust pilot valve.  |
|   | Draft in kitchen  | Determine cause.   |
| Flame lifts off pilot orifice.  | Pilot over gassed.  | Adjust pilot valve.  |
| Oven pilot keeps going out.   | Faulty thermocouple or safety valve.                        | Check safety system.   |
|   | Pilot flame too small.                                      | Adjust pilot valve.  |
|   | Loose connection on safety valve                            | Tighten connection.  |
|   | Main burner blowing pilot out                               | Adjust gas and air mixture.  |
| Millivolt output low on open circuit test.  | Pilot flame too small.                                      | Adjust pilot flame.  |
|   | Flame yellow-pilot dirty.                                   | Clean and adjust pilot.  |
|   | Thermocouple faulty.  | Replace.   |
| Millivolt output high on open circuit test but low on closed circuit test.              | Short in magnet.  | Replace safety valve.  |
| Millivolt output high on open closed circuit test but safety valve will not open.       | High millivolt reading on drop out test.                    | Replace safety valve.  |
| <b>SIT Control</b><br>Oven too hot or not hot enough                                    | Control out of calibration                                  | Compensate with a small adjustment on knob. If not helpful, replace the control. |
| Oven too hot or not hot enough  | Control out of calibration or bypass improperly set.        | Check calibration and set bypass.  |
| <b>SIT Control</b><br>Burner flame shuts off when oven gets up to temperature.          | Non adjustable bypass feature inoperable                    | Replace control  |
| Burner flame shuts off when oven gets up to temperature.                                | By-pass set too low.  | Adjust by-pass.  |
|   | By-pass set to high causing control to go into snap action. | Adjust by-pass.  |
| Door will not stay closed.  | Not enough tension on springs.                              | Adjust tension nut clockwise.  |
|   | Springs broken, hinge link broken                           | Replace faulty parts.  |
| Door will not stay open.  | Too much tension on springs.                                | Adjust tension nut counter-clockwise.  |
| Door not closing on one side.   | Door warped.  | Re-stress door.  |
| Doors not level or low in center of unit.   | Trunion support loose.                                      | Level and tighten support.   |
|   | Trunion support worn.                                       | Replace.   |

A large, stylized graphic in the background consisting of a central circle with six elongated, rounded rectangular shapes radiating outwards, resembling a star or a snowflake. Each of these shapes has a series of small circles along its inner and outer edges.

# **Section 12**

## **Maintenance & Care Instructions**

### **For**

## **Ranges And Oven Surfaces**

# Garland and US Range Operating, Maintenance and Care

## Instructions For Ranges and Oven Surfaces

### *Exterior*

#### **Black Baked Enamel**

Allow equipment to cool after use and wash all grease deposits from exterior with a hot mild detergent or soap solution. Dry thoroughly. Do not use abrasives.

#### **Brushed Chrome or Brushed Nickel**

Wash when cool with hot mild detergent or soap solution. Do not use abrasives.

#### **Stainless Steel**

Normal soil may be removed with a detergent or soap solution applied with a cloth. To remove grease that has baked on, apply cleanser to a damp cloth or sponge. Rub cleanser on the metal in the direction of the polishing lines of the metal. Never rub in a circular motion. Soil and burnt deposits, which do not respond, can usually be removed by rubbing the surface with Scotch-Brite scouring pads or stainless scouring pads. Do not use ordinary steel wool.

Heat tint can be removed by a vigorous scouring in the direction of the polish lines using Scotch-Brite scouring pads or a stainless scouring pad in combination with a powdered cleanser.

### *Top Sections*

#### **Griddle Top**

##### **Seasoning**

Before being used for the first time, all griddle surfaces must be seasoned. Wash griddle with a hot detergent or soap solution, rinse and dry thoroughly. Set griddle heat to lowest possible temperature for 30 minutes. Apply a thin film of cooking oil. Allow oil to remain on griddle 5 minutes then wipe off. Reset heat to medium temperature and apply a second film of oil. Wipe off excess after 5 minutes. Reset heat to cooking temperature and apply a final film of oil wiping off surplus after 3 minutes. The griddle is now seasoned and ready for use. The griddle may be re-seasoned at any time by cleaning thoroughly and following the seasoning procedure.

### **Cleaning**

Griddle plates should be wiped daily while still warm. Remove carbonized grease or food with a spatula. When necessary, clean the griddle's surface thoroughly using a fine griddle brick or a liquid griddle cleaner (available from your kitchen equipment dealer). Polish the griddle surface to a bright finish. Wash the griddles surface, rinse and dry thoroughly. Re-season the griddle.

### **Operating Suggestions**

- Avoid overheating the griddle as this causes sticking and grease carbonizing resulting in a hard to clean surface.
- Do not hit the spatula on the griddle plate, as this will nick the surface.
- Clean the grease tray often to eliminate spillovers

### **Hot Top or Boil Plate**

#### **Cleaning**

Hot tops should be wiped while still warm. Remove burnt materials with a spatula. When top is cool, wash the surface with a mild detergent or soap. Dry thoroughly. Wipe with a slightly oiled cloth.

### **Operating Suggestions**

- Do not leave the top "full on" when not in use as this abuses the unit, causes heat tint, wastes fuel and heats up the kitchen unnecessarily.
- Use cooking utensils with flat bottoms for maximum efficiency.

### **Open Top**

#### **Cast Iron Tops & Grates**

When cast iron ring grates (which are covered in grease) arrive at the end users, the following seasoning and care is recommended.

- Wash top grates with hot mild detergent or soap solution. Dry thoroughly. Rub with vegetable oil on all exposed surfaces in the direction of the grain.

- Soiled and burnt deposits can be removed with a wire brush. Difficult to remove burnt on deposits can usually be removed using an oven cleaner. Wash, dry thoroughly, and then rub with vegetable oil.
- Continuing this procedure will prohibit the development of rust and will eventually form a non-stick surface with the caramelization of oil on the cast iron top grates and rings.

## **Porcelain Tops & Grates**

Top grates should be washed daily with a hot detergent or soap solution and dried thoroughly.

## **Drip Pans**

Should be emptied and washed daily.

## **Operating Suggestions**

- Avoid the use of oversized pots.
- Avoid spillovers.
- Covered pots will boil faster.

## **Oven**

### **Cleaning**

The interior of oven is porcelain enamel and should be wiped clean daily. Clean with a soap solution. At least once a week, the oven should be thoroughly cleaned with a detergent or any commercial oven cleaner recommended or use with porcelain enamel. Clean oven bottom daily to remove spillovers.

### **Continuous Clean Ovens**

The continuous clean enamel is a porous type coating and, while some soils will start to burn off at baking temperature, some will be absorbed into the coating out of sight. It is recommended and necessary to heat the oven to 500°F, from time to time, and "burn-off" at this temperature for a couple of hours to help clear the porous coating.

Some soils such as cherry pie filling, barbecue sauce, ketchup, sugar, etc., have a tendency to carbonize and take on a puffed up appearance during normal cooking cycles. These lumps of hardened soil should be brushed out of the oven before the burn-off cycle is started.

Care should be taken to avoid excessive soil drippings. If soils are deposited on the coating at a rate faster than the coating can tolerate, a puddle will form and eventually glaze over. This glaze will have to be removed. This may involve scraping the glaze surface with a knife, but normally a wet SOS or Jet pad will be adequate. The continuous clean coating has abrasion resistance so that the steel wool type pads will not harm nor scratch the surface.

Do not use abrasive powder type cleaners. These powder type cleaners will tend to fill porous coating and reduce activity of the coating during future use.

Do not use sodium hydroxide content type cleaners such as Easy Off, Jifoam, etc. The continuous clean has been subjected to tests with these cleaners and, while there has been no visible attack until after at least 3 applications, staining does occur at this point and is very pronounced.

Slight discoloration after a severe spill-over and cleaning may develop. This will in no way affect future clean off ability.

## **Operating Suggestions**

- Low temperature roasting is recommended for minimum meat shrinkage and best retention of juices.
- Lining ovens with aluminum foil may upset the heat balance
- Warped pans or pie tins result in poor bakes.
- Highly polished pans usually cause light bottoms.
- Burned goods and cracked cakes are generally the result of temperature being too high.
- Dried out baked products means temperature was too low.
- Load pans evenly, spacing away from each other and sides of oven.

## **Broilers**

### **Cleaning**

Remove and clean grid racks and shields daily. While rack is removed, clean the interior. Carriage mechanisms should be kept clean particularly around the roller bearings.

## **Operating Suggestions**

- Rack roller bearings must be lubricated once a month with high temperature grease.

- To broil meat, place it on an unused heated area of the rack.
- Delicate fish is best broiled in a pan or on a metal platter.

## ***Stock Pot Ranges***

### **Cast Iron Tops**

When cast iron tops (which are covered in grease) arrive at the end users, the following seasoning and care is recommended.

- Wash top grates with hot mild detergent or soap solution. Dry thoroughly. Rub with vegetable oil on all exposed surfaces in the direction of the grain.

- Soiled and burnt deposits can be removed with a wire brush. Difficult to remove burnt on deposits can usually be removed using an oven cleaner. Wash, dry thoroughly, then rub with vegetable oil.
- Continuing this procedure will prohibit the development of rust and will eventually form a non-stick surface, with the caramelization of oil on the cast iron grates.

### **Cleaning**

Use a hot mild detergent or soap solution to clean exterior daily. Dry thoroughly.



A large, stylized graphic in the background consisting of six interlocking, elongated oval shapes arranged in a circular pattern. Each shape has a series of small circles along its inner edge, resembling a chain or a decorative border.

# **Section 13**

## **Gas Technician's Glossary**

# Gas Technician's Glossary

**Air-Gas Ratio:** The ratio of combustion air supply flow rate to the fuel gas supply flow rate.

**Air Shutter:** An Adjustable shutter on the primary air opening of a burner, which is used to control the amount of combustion air introduced into the burner body.

**Atmospheric Pressure:** The pressure exerted upon the earth's surface by the weight of atmosphere above it.

**Automatic Gas Pilot Device:** A gas pilot incorporating a device, which acts to automatically shut off the gas supply to the appliance burner if the pilot flame is extinguished.

**British Thermal Unit (BTU):** Is the heat energy produced when burning a fuel gas. It is defined as the quantity of heat required to raise the temperature of one pound of fresh water one degree F. An ordinary wooden match produces approximately 1 BTU of heat.

**Butane:** A hydrocarbon fuel gas heavier than methane and propane and a major constituent of liquefied petroleum gases.

**Combustion:** The rapid oxidation of fuel gases accompanied by the production of heat or heat and light.

**Combustion Air:** Air supplied in an appliance specifically for the combustion of a fuel gas.

**Combustion Chamber:** The portion of an appliance within which combustion normally occurs.

**Combustion Products:** Constituents resulting from the combustion of a fuel gas with the oxygen in air, including the inert, but excluding excess air.

**Cubic Foot of Gas (Standard Conditions):** The amount of gas that will occupy 1 cubic foot when at a temperature of 60°F, and under a pressure equivalent to that of 30 inches of mercury.

**Density:** The weight of a substance per unit volume. As applied to gas, the weight in pounds of a cubic foot of gas at standard pressure and temperature.

**Dewpoint:** The temperature at which a vapor will start to condense into its liquid form.

**D.M.S.:** Drill Manufacturer's Standard equivalent to Standard Twist Drill or Steel Wire Gage numbers.

**Draft Hood (draft diverter):** A device built into an appliance, or made part of a vent connector from an appliance. It is designed to: 1) assure the ready escape of the products of combustion in the event of no draft, backdraft, or stoppage beyond the draft hood; 2) prevent a backdraft from entering the appliance; 3) neutralize the effect of stack action of a chimney or gas vent upon the operation of the appliance.

**Downdraft:** Excessive high air pressure existing at the outlet of chimney or stack, which tends to make gases flow downward in the stack.

**Excess Air:** Air that passes through an appliance and the appliance flues in excess of that which is required for complete combustion of the gas. Usually expressed as a percentage of the air required for complete combustion of the gas.

**Extinction Pop:** This is merely flashback occurring when a burner is turned off. It is usually instantaneous although it can occur several seconds after the burner has been turned off. What happens is that primary air continues to flow into the burner even though the gas jet has been cut off and does not inject air. The mixture in the burner changes from the normal operating mixture to all air and flow rate through the ports falls towards zero. Under these conditions, it is possible for the flame speed to exceed flow velocity at some instant and flashback may occur. The result is a tiny explosion or pop. Increasing primary air input will reduce the flashback tendency.

**Fahrenheit:** The common scale of temperature measurement in the English system of units. It is based on the freezing point of water being 32°F and the boiling point of water being 212°F at standard pressure conditions.

**Flame Speed:** Speed at which the flame front moves toward the air-gas mixture issuing from the burner port. It depends on the quantity of air-gas mixture and type of gas.

**Flame Stability:** Primary air, Flame speed, port size and port depth are several factors affecting flame stability. Flames on a burner tend to stabilize at a point where flow velocity out and burning speed back are equal. This balance of flow velocities and burning speed explain why flames change when primary air or gas rate is adjusted.

**Flame Temperature:** Maximum is reached when perfect combustion is achieved.

**Flame Velocity:** The speed at which a flame travels through a fuel-air-mixture. Burning speeds vary with types of gases, and the amount of air mixed with the gas. This air to gas ratio is very important in that it is directly related to flame stability

**Flashback:** An undesirable flame characteristic in which burner flames strike back into a burner to burn there or to create a pop after the gas supply has been turned off. Flashback occurs when gas-air flow velocity is less than burning speed at some point near a burner port. Flashback is a condition where gas ignites within the burner. Any factor, which increases burning speed, tends to promote flashback, and any factor decreasing flow velocity from the ports will contribute to flashback. Flashback is more prevalent with faster burning gases. Natural gas is a relatively slow burning gas hence flashback is less likely. Reducing primary air is the usual cure for flashback.

**Flashback Arrestor:** A gauze, grid or any other portion of a burner assembly used to avert flashback.

**Flashtube:** An ignition device, commonly used for igniting gas on range top burners. An air-gas mixture from the burner body is injected into the end of a short tube. The mixture moves along the tube, is ignited by a standing pilot flame at the other open end of the tube and the flame travels back through the mixture in the flashtube to ignite the gas at the burner ports.

**Floating Flames:** An undesirable burner operating condition, usually indicating incomplete combustion in which flames leave the burner ports to "reach" for combustion air.

**Flue Gases, Flue Products:** The combination of combustion products and excess air leaving the combustion area. Since water is produced as a vapor in the burning of the gas, it is also present in the flue products. If the flue products and vent system remain hot enough, this vapor is harmlessly discharged. If not, the vapor can reach the dew point and condense into water, which can accumulate in the system.

**Flue Loss:** The heat lost in flue products exiting from the flue outlet of an appliance.

**Flue Outlet:** The opening provided in an appliance for the escape of flue gases.

**Ignition Temperature:** Temperature at which an air-gas mixture will initiate and support combustion

**Inches of Mercury Column:** A unit used in measuring pressures. One inch of mercury column equals a pressure of 0.491 pounds per square inch.

**Inches of Water Column:** A unit used in measuring pressures. One inch of water column equals a pressure of 0.578 ounces per square inch. One inch mercury column equals about 13.6 inches water column.

**Incomplete Combustion:** Combustion in which the fuel is only partially burned. A poorly vented appliance restricts flow of air into an appliance. Lack of ventilation around an appliance may lower oxygen content in the surrounding air. This can be a result of spillage of combustion products into the room as well. These conditions can cause incomplete combustion and poor performance of an appliance. Adequate, but not excessive ventilation is a must and cannot be over emphasized.

**Inerts:** Non-combustible substances in a fuel, or in flue gasses, such as nitrogen or carbon dioxide.

**Infrared Burner (Radiant Burner):** A burner, which is designed to operate with a hot, glowing surface. A substantial amount of its energy output is in the form of infrared radiant energy.

**Injection:** Drawing primary air into a gas burner by means of a flow of fuel gas.

**Input Rate:** The quantity of heat or fuel supplied to an appliance, expressed in volume or heat units per unit time, such as cubic feet per hour or BTU per hour.

**Input Rating:** The gas burning capacity of an appliance in BTU per hour as specified by the manufacturer. Appliance input ratings are based on sea level operation and need not be changed for operation up to 2 000 feet elevation. For operation at elevations above 2 000 feet, input ratings should be reduced at the rate of 4 percent for each 1 000 feet above sea level.

**Lean Mixture:** An air-gas mixture, which contains more air than the amount needed for complete combustion of the gas.

**Lifting Flames:** An unstable burner flame condition in which flames lift or blow off the burner port(s). Excessive primary air can cause flames to lift and blow off the burner ports, which can be noisy as well as inefficient. More importantly, however, is the production of dangerous carbon monoxide under this condition. Any factor, which reduces burning speed, promotes lifting flames. Also, any factor, which increases flow velocity from ports, contributes to lifting flames. Over-firing of burners is also a cause. The normal cure for lifting flames is the reduction of primary air input to the burner.

**Liquefied Petroleum Gases:** The terms "Liquefied Petroleum Gases", "LPG" and "LP Gas" mean and include any fuel gas which is composed predominantly of any of the following hydrocarbons, or mixtures of them: propane, propylene, normal butane or isobutane and butylenes.

**Limits of Flammability:** Upper and lower ranges of gas in the air-gas mixture that will support combustion. Low amount of fuel makes mixture lean. High amount of fuel renders mixture rich.

**Manifold:** The conduit of an appliance, which supplies gas to the individual burners.

**Manifold Pressure:** The gas pressure in an appliance manifold, upstream of burner orifices.

**Manufactured Gas:** A fuel gas that is artificially produced by some process, as opposed to natural gas, which is found in the earth. Sometimes called "town gas".

**Methane:** A hydrocarbon gas with formula  $\text{CH}_4$ , one carbon atom linked to four hydrogen atoms. The principal component of natural gas.

**Mixed Gas:** A gas in which the heating value of manufactured gas is raised by co-mingling with natural or LPG (except where natural gas or LPG is used only for "enriching" or "reforming")

**Mixer:** That portion of a burner where air and gas are mixed before delivery to the burner ports.

1. Mixer Face: The air inlet end of the mixer head.
2. Mixer Head: That portion of an injection type burner, usually enlarged, into which primary air flows to mix with the gas stream
3. Mixer Throat: (Venturi) That portion of the mixer which has the smallest cross-sectional area, and which lies between the mixer head and the mixer tube.
4. Mixer Tube: That portion of the mixer, which lies between the throat and the burner head.

**Natural Draft:** The motion of flue products through an appliance generated by hot flue gases rising in a vent connected to the furnace outlet.

**Natural Gas:** A fuel which is derived from the earth consisting primarily of Methane ( $\text{CH}_4$ ). Natural gas is considered non-toxic and non-poisonous. Natural gas has little or no odor in its refined state. Odorants are added, such as mercaptan and sulphur compounds, to aid in leak detection.

**Orifice:** An opening in an orifice cap (hood), orifice spud or other device through which gas is discharged, whereby the flow of gas is limited and/or controlled. (See also universal orifice)

**OVERRATING:** Overrating is the operation of a gas burner at a greater rate than it was designed for.

**Port:** Any opening in a burner head through which gas or an air-gas mixture is discharged for ignition.

**Port Loading:** The input rate of a gas burner per unit of port area, obtained by dividing input rate by total port area. Usually expressed in terms of BTU per hour per square inch of port area.

**Pressure Regulator:** A device for controlling and maintaining a uniform outlet gas pressure.

**Primary Air:** The combustion air introduced into a burner, which mixes with the gas before it reaches the burner port. Usually expressed as a percentage of air required for complete combustion of the gas. Ideal burning conditions generally is 10 cubic feet of air per cubic foot of gas.

**Primary Air Inlet:** The opening or openings through which primary air is admitted into a burner. Products of Combustion: Carbon dioxide and water vapor formed in burning plus the nitrogen in the reactants that entered with the combustion air.

**Propane:** A hydrocarbon gas heavier than methane but lighter than butane. It is used as a fuel gas alone, mixed with air or as a major constituent of liquefied petroleum gases.

**Rich Mixture:** A mixture of gas and air containing too much fuel or too little air for complete combustion of the gas.

**Secondary Air:** Combustion air externally supplied to a burner flame at the point of combustion. It is the remaining air required for complete combustion besides primary air.

**Soft Flame:** A flame partially deprived of primary air such that the combustion zone is extended and inner cone is ill-defined.

**Soot:** A black substance, mostly consisting of small particles of carbon, which can result from incomplete combustion and appear as smoke.

**Specific Gravity:** The weight of one cubic foot of gas compared to one cubic foot of dry air, at a common pressure and temperature. The specific gravity of a gas determines whether it will rise or fall when released into air. Air is given a specific gravity rating of 1.0. Since natural gases have a specific gravity of 0.4 to 0.8, it will rise when released into the air. Propane gas, however, with a specific gravity rating of 1.5 and butane gas 2.0 both will fall when released into air.

**Universal Orifice:** A combination fixed and adjustable orifice designed for the use of two different gases, such as LPG and natural gas.

**Updraft:** Excessively low air pressure existing at the outlet of a chimney or stack which tends to increase the velocity and volume of gases passing up the stack.

**Utility Gases:** Natural gas, manufactured gas, liquefied petroleum gas-air mixtures or mixtures of any of these gases.

**Vent:** A device, such as a pipe, to transmit flue products from an appliance to the outdoors. This term also is used to designate a small hole or opening for the escape of a fluid (such as in a gas control or regulator)

**Vent gases:** Products of combustion from gas appliances plus excess air, plus dilution air in the venting system above a draft hood.

**Venturi:** A section in a pipe or a burner body that narrows down and then flares out again.

**Viscosity:** The property of a fluid to resist flow.

**Yellow Tipping of Flames:** Too severe a reduction in primary air also causes its problems. Yellow tipping is one of them. Flames will eventually become all yellow if no primary air is supplied. Glowing carbon particles in the flame cause these yellow tips. Soot will form if these yellow flames impinge on cooler surfaces. Here again, carbon monoxide can be produced. Yellow tipping is corrected by the injection of more primary air.

**Water Column:** Abbreviated as W.C. A unit used for expressing pressure.



A large, stylized, light gray graphic in the background of the page. It consists of six interlocking, elongated, rounded shapes arranged in a circular pattern, resembling a stylized star or a complex geometric design. Each shape has a series of small circles along its inner and outer edges.

# **Section 14**

## **Range Wiring Diagrams**

# Garland and US Range Gas Ranges Wiring Diagrams

| Number  | Description                                | Page |
|---------|--|------|
| N/A     | Garland Restaurant Duty left RC Oven       | 73   |
| N/A     | Garland Restaurant DUTY RC2 Oven           | 74   |
| 3056100 | US Range C836C Cuisine Series              | 75   |
| 229064  | US Range 836C Cuisine Series               | 76   |
| 2706601 | US Range Px/S Series Left Single RC Oven   | 77   |
| 2706602 | US Range Px/S Series Right Single RC Oven  | 78   |
| 2706603 | US Range Px/S Series 2 RC Ovens            | 79   |
| 4514771 | US Range Px/SX Series Left Single RC Oven  | 80   |
| 4514772 | US Range Px/SX Series Right Single RC Oven | 81   |
| 4514774 | US Range Px/SX Series Two RC Ovens         | 82   |
| 2529700 | ME/MSTE 40RC Electric Spark                | 83   |
| 2529701 | M/MS 40RC                                  | 84   |
| 2529600 | M/MS 40 Electric Spark                     | 85   |
| 2444200 | Sentry Electric Spark                      | 86   |
| 2444300 | STE286RC, STE284RC Left, ST283RCE          | 87   |
| 4524261 | G/U Series Right (single) Convection Oven  | 88   |
| 4524262 | G/U Series Left Convection Oven            | 89   |
| 4524263 | G/U Series Two Convection Ovens            | 90   |
| 4524800 | RGB G/U Series Right Convection Oven       | 91   |
| 4524801 | RGB G/U Series Left Convection Oven        | 92   |
| 4524802 | RGB G/U Series Two Convection Ovens        | 93   |

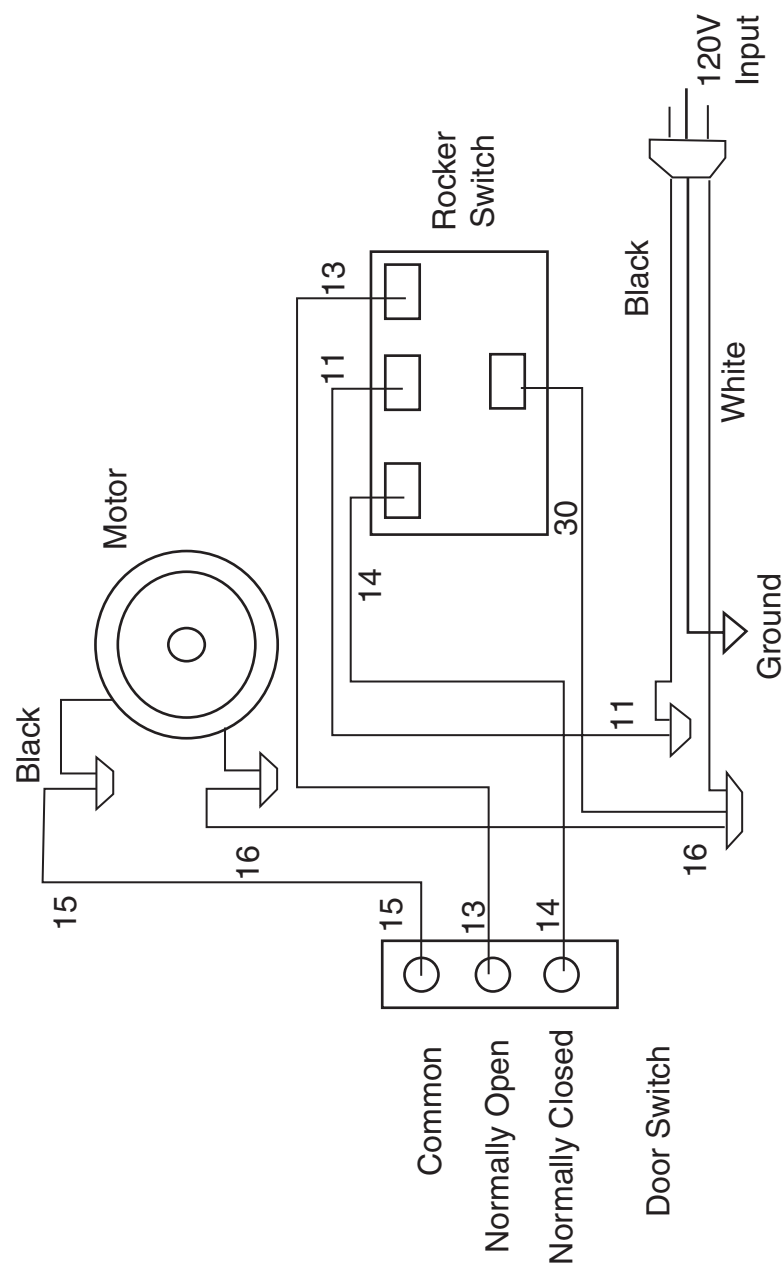
## Instruction Drawings

|       |              |   |    |
|-------|--------------|---|----|
| 30129 | Sheet 2 of 3 | Master Series Broiler/Range interconnection kit     | 94 |
| 30129 | Sheet 3 of 3 | Restaurant Series Broiler Range interconnection kit | 95 |
| 45239 |              | G, U, X, (Sit control) Interconnect kit             | 96 |

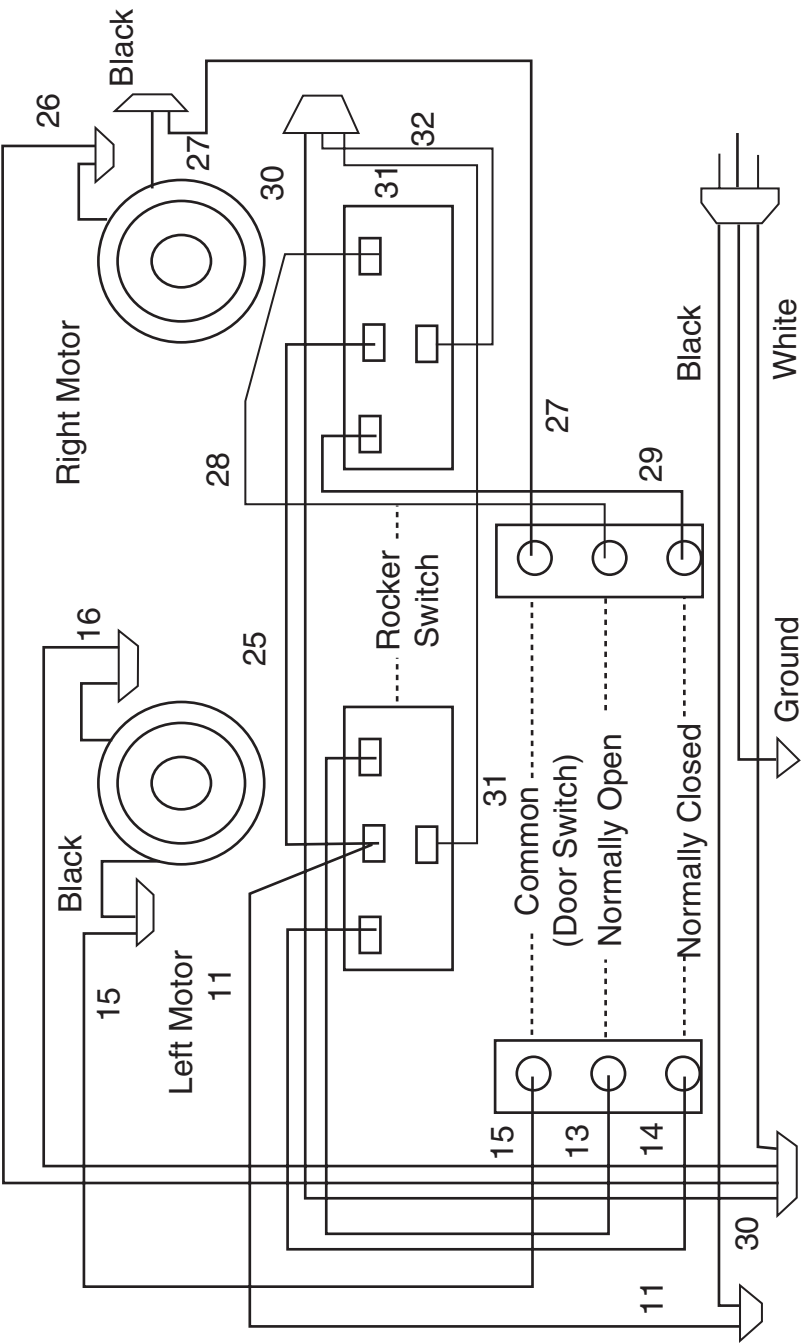


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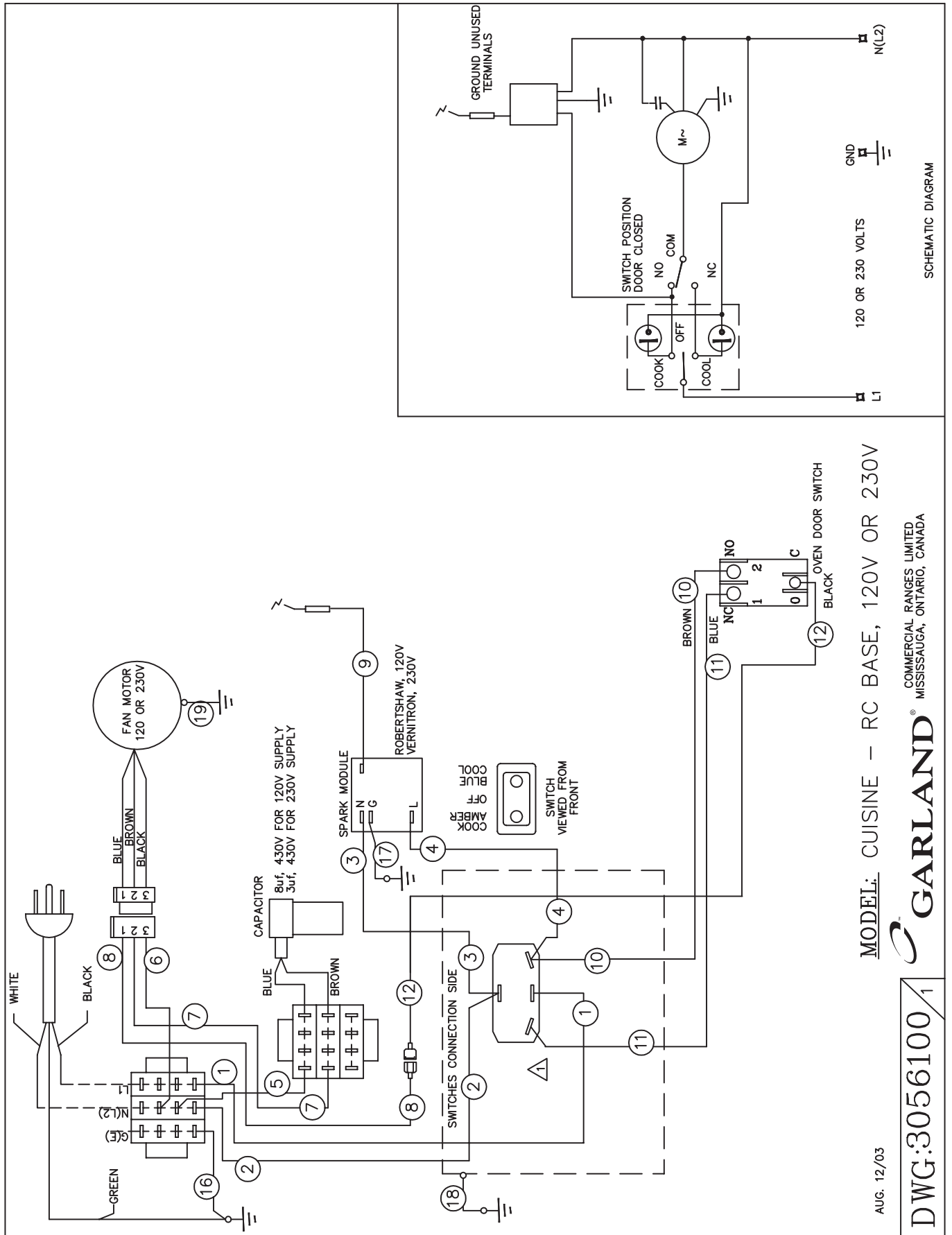
Garland Restaurant Duty left RC Oven



Left "RC" Oven Section  
120 Volts, 3.4 Amps, Single Phase



"RC2" Wire Diagram  
120 Vol, 6.8 Amps, Single Phase





## WIRE DIAGRAM 836-C/841-C

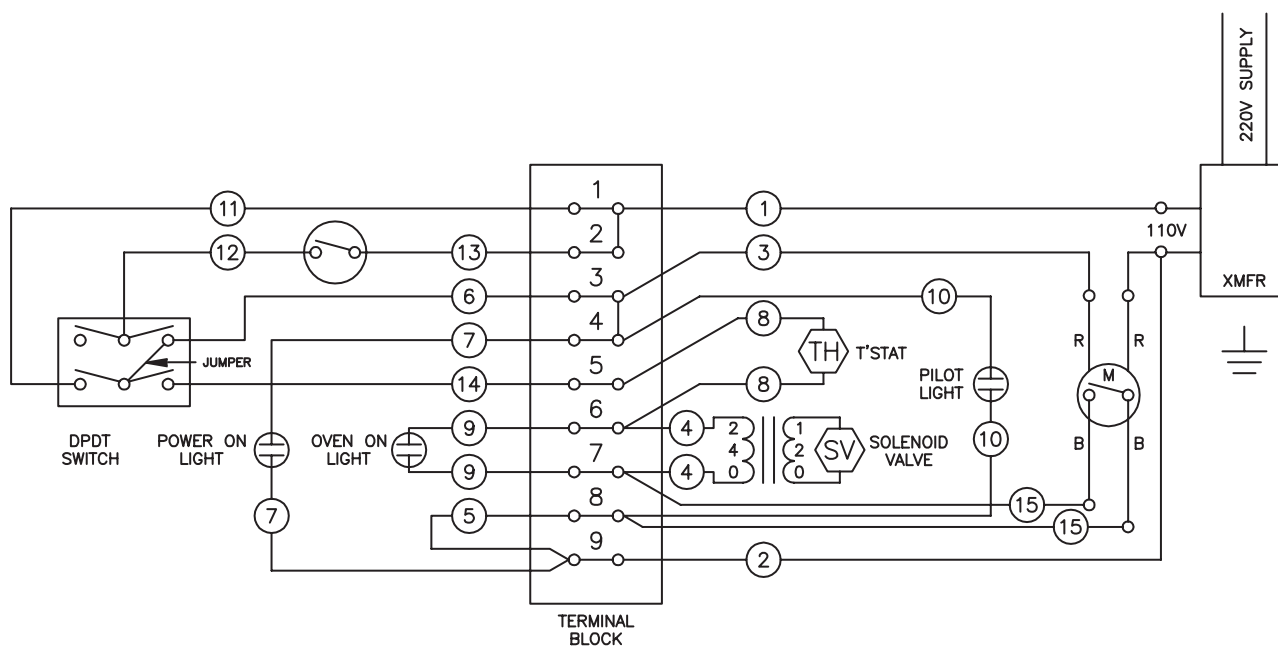
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REV 2

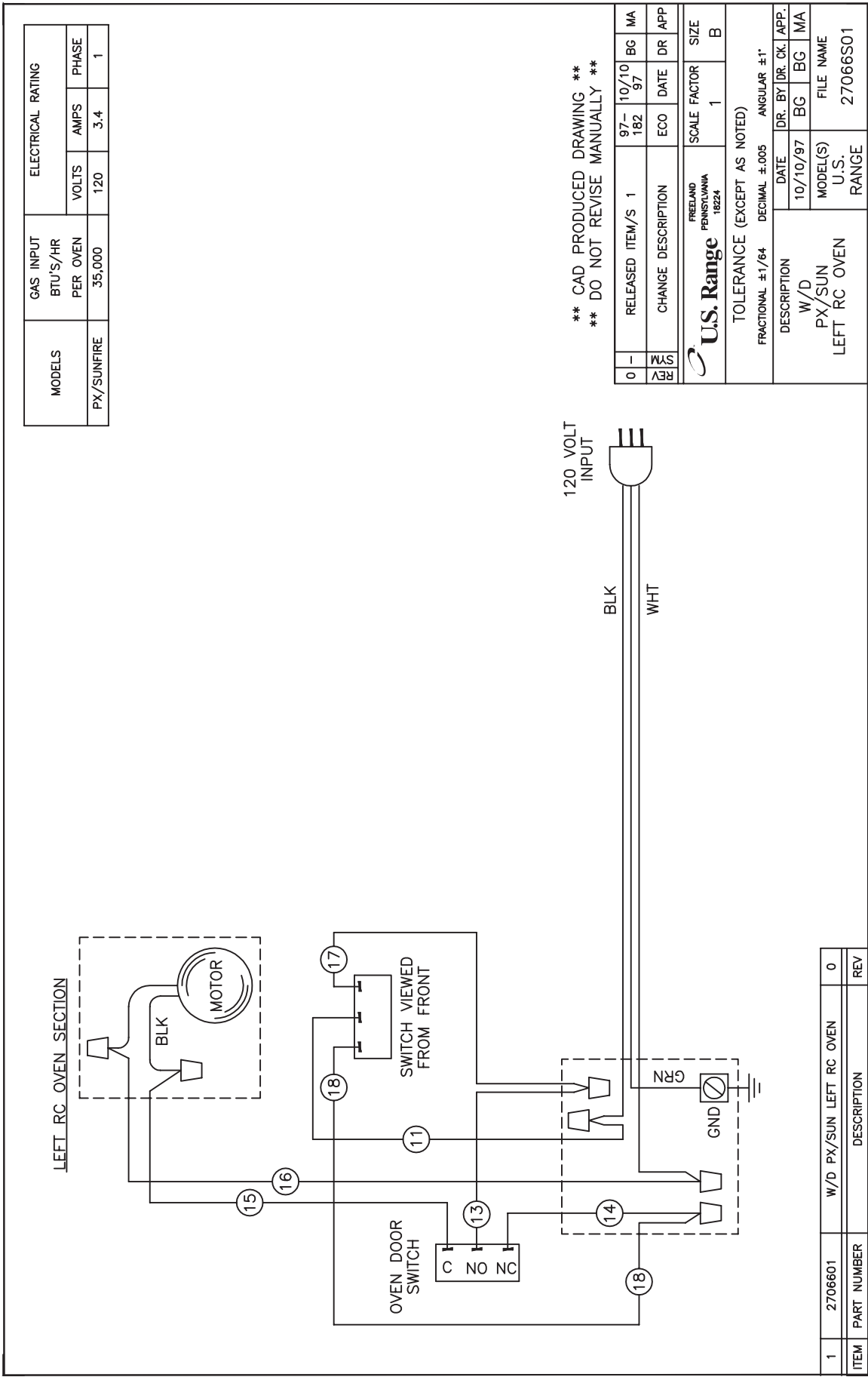
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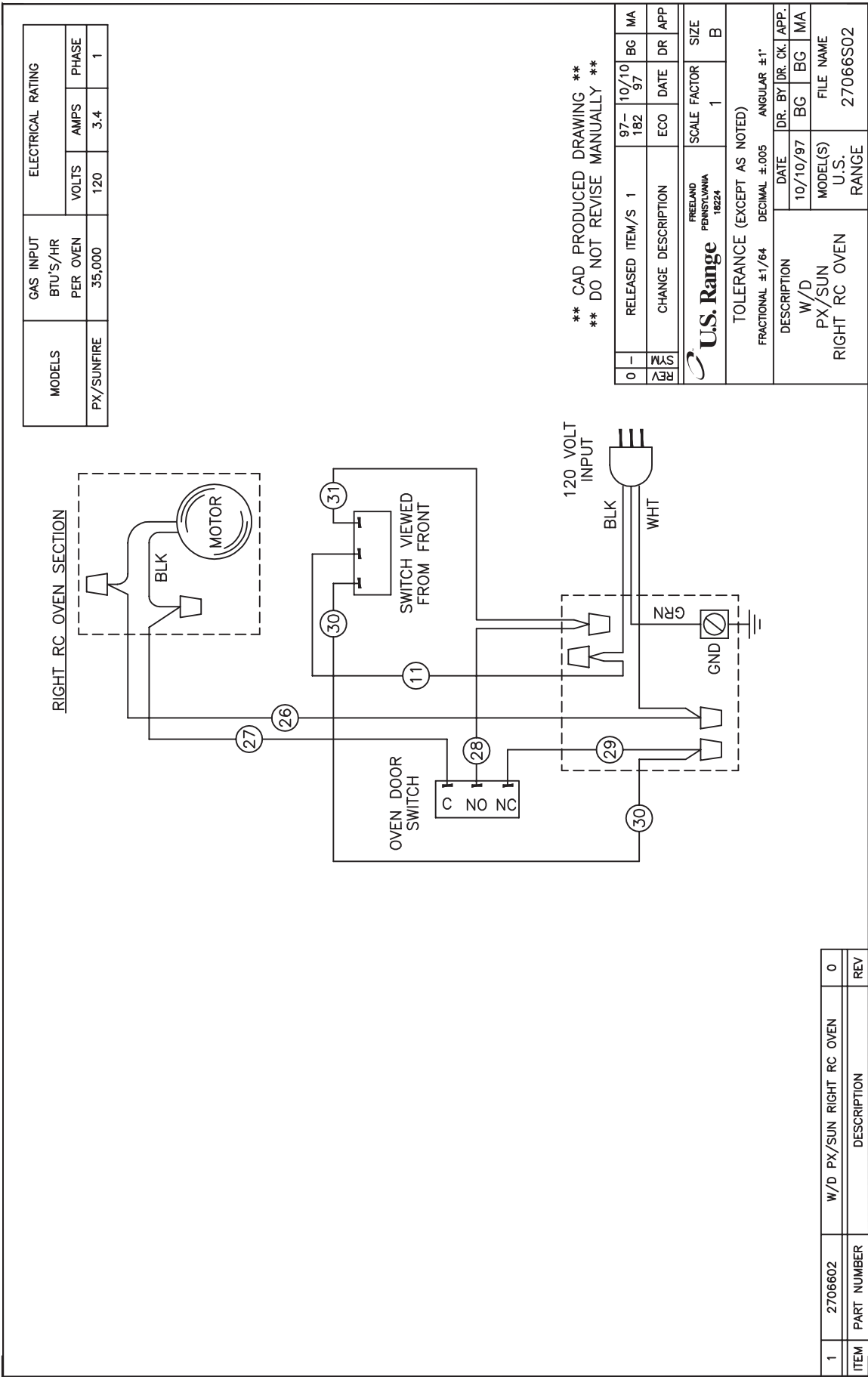
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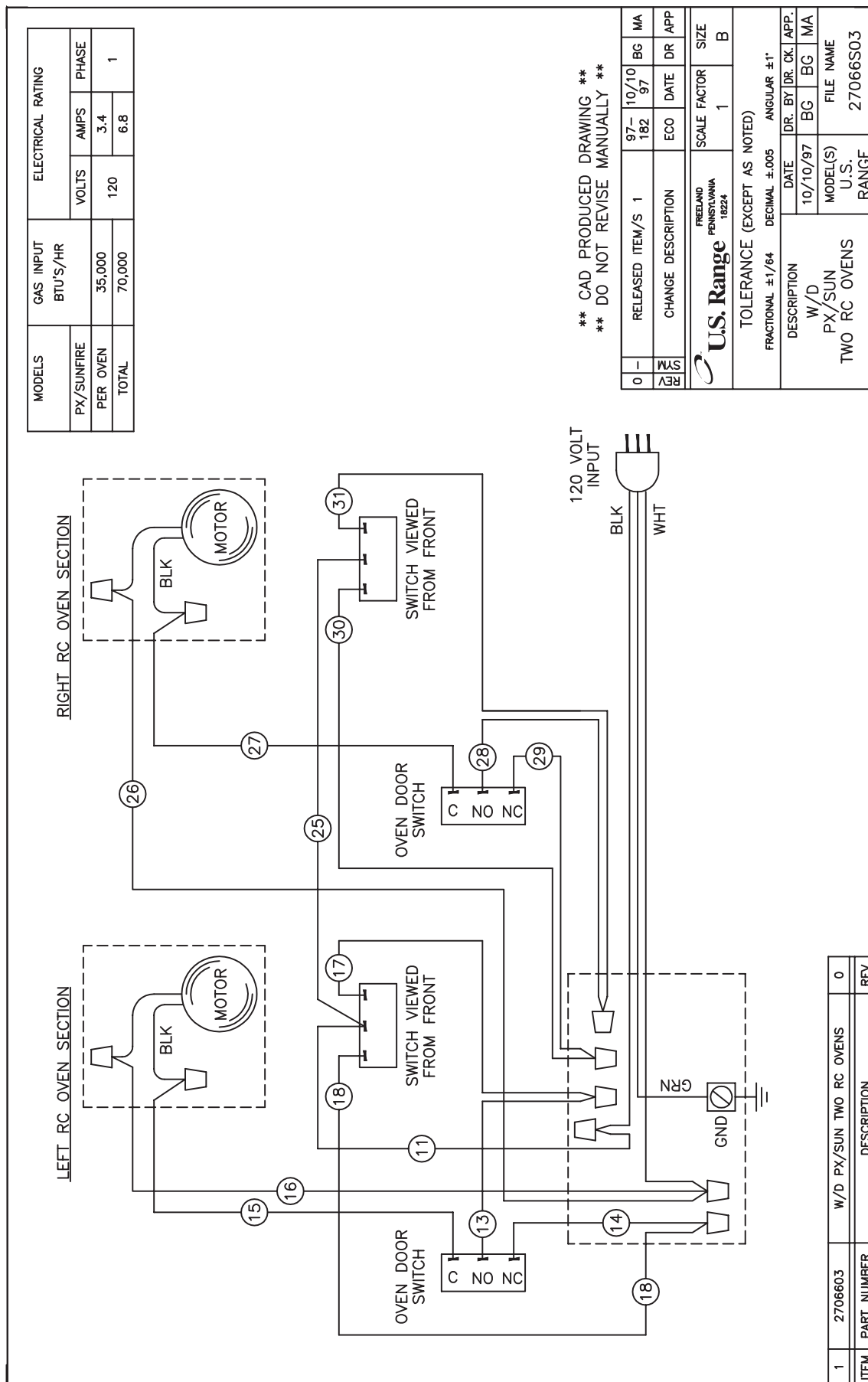


MOTOR:  
 1/4 HP  
 220 VOLTS  
 1 PH/50 HZ  
 1725 RPM

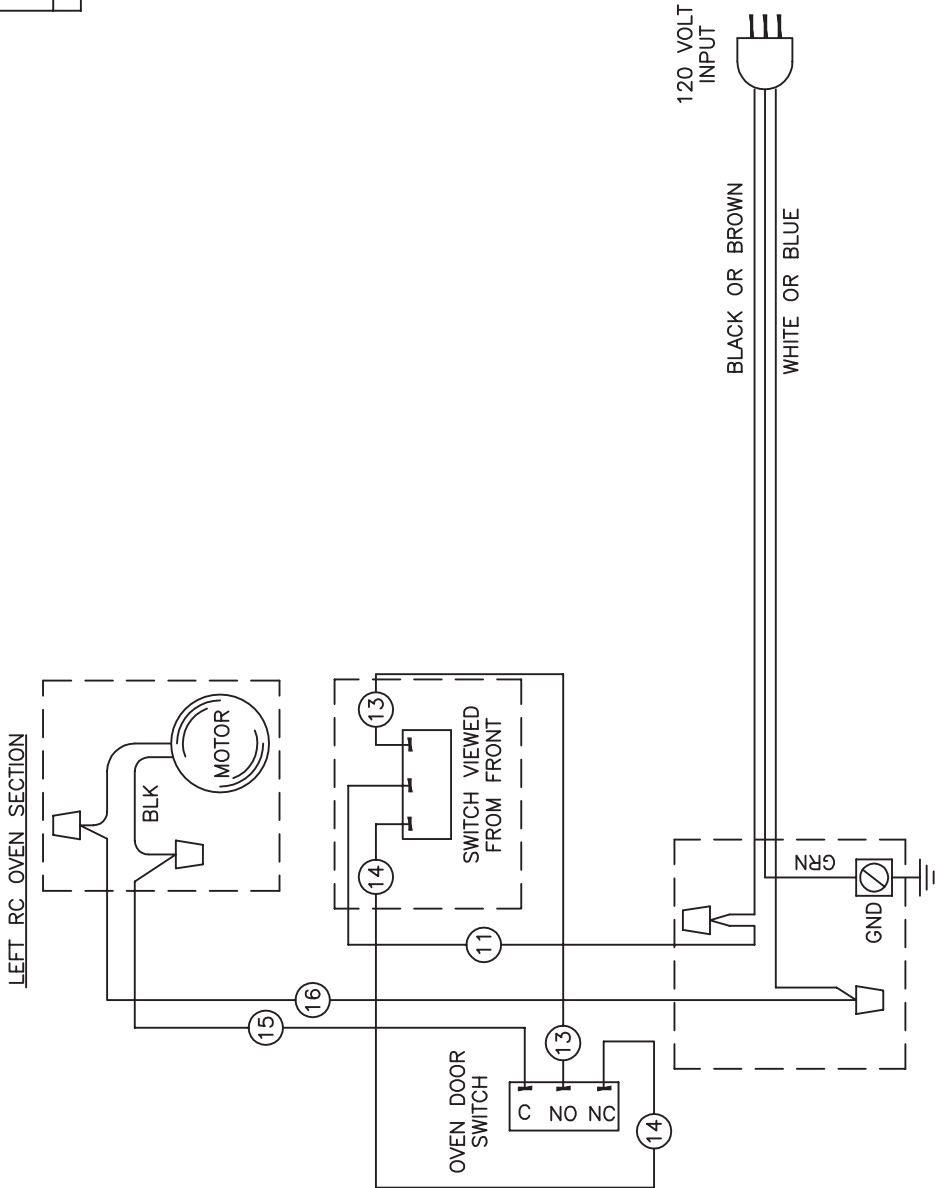
FOR SUPPLY CONNECTIONS, USE WIRES  
 SUITABLE FOR AT LEAST 194°F (90°C)







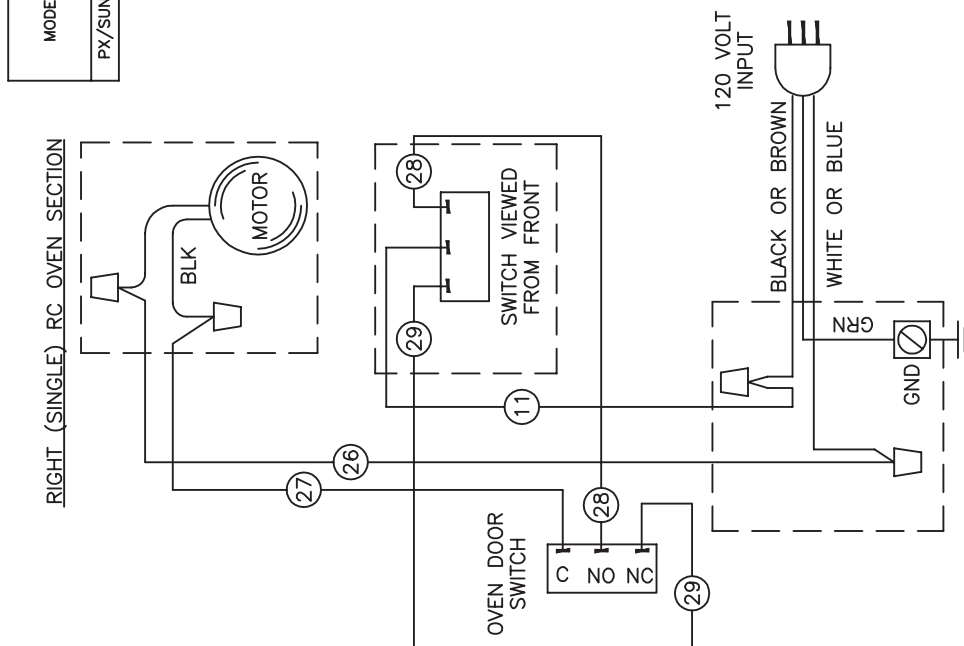
| MODELS     | GAS INPUT<br>BTU'S/HR<br>PER OVEN | ELECTRICAL RATING |      |       |
|------------|-----------------------------------|-------------------|------|-------|
|            |                                   | VOLTS             | AMPS | PHASE |
| PX/SUNFIRE | 35,000                            | 120               | 3.4  | 1     |



| REV                          | DESCRIPTION | DR    | DATE      | APPR       |
|------------------------------|-------------|-------|-----------|------------|
| REVISIONS                    |             |       |           |            |
| TOLERANCES (EXCEPT AS NOTED) |             |       |           |            |
| ± 0.31                       |             |       |           |            |
| ANG. ± 2°                    |             |       |           |            |
| DR                           | APPR        | SCALE | DATE      |            |
| V.C.                         |             | N/A   | NOV 17/02 |            |
| TITLE:                       |             |       |           |            |
| W/D PX/SUN LEFT RC OVEN      |             |       |           |            |
| PX/SUN 120V                  |             |       |           |            |
| GARLAND®                     |             |       |           |            |
| CORONA RANGE UNIT            |             |       |           |            |
| MISSISSAUGA, ONTARIO, CANADA |             |       |           |            |
| 4514771                      |             |       |           | SHT 1 OF — |

| 1    | 4514771     | W/D PX/SUN LEFT RC OVEN | 0   |
|------|-------------|-------------------------|-----|
| ITEM | PART NUMBER | DESCRIPTION             | REV |

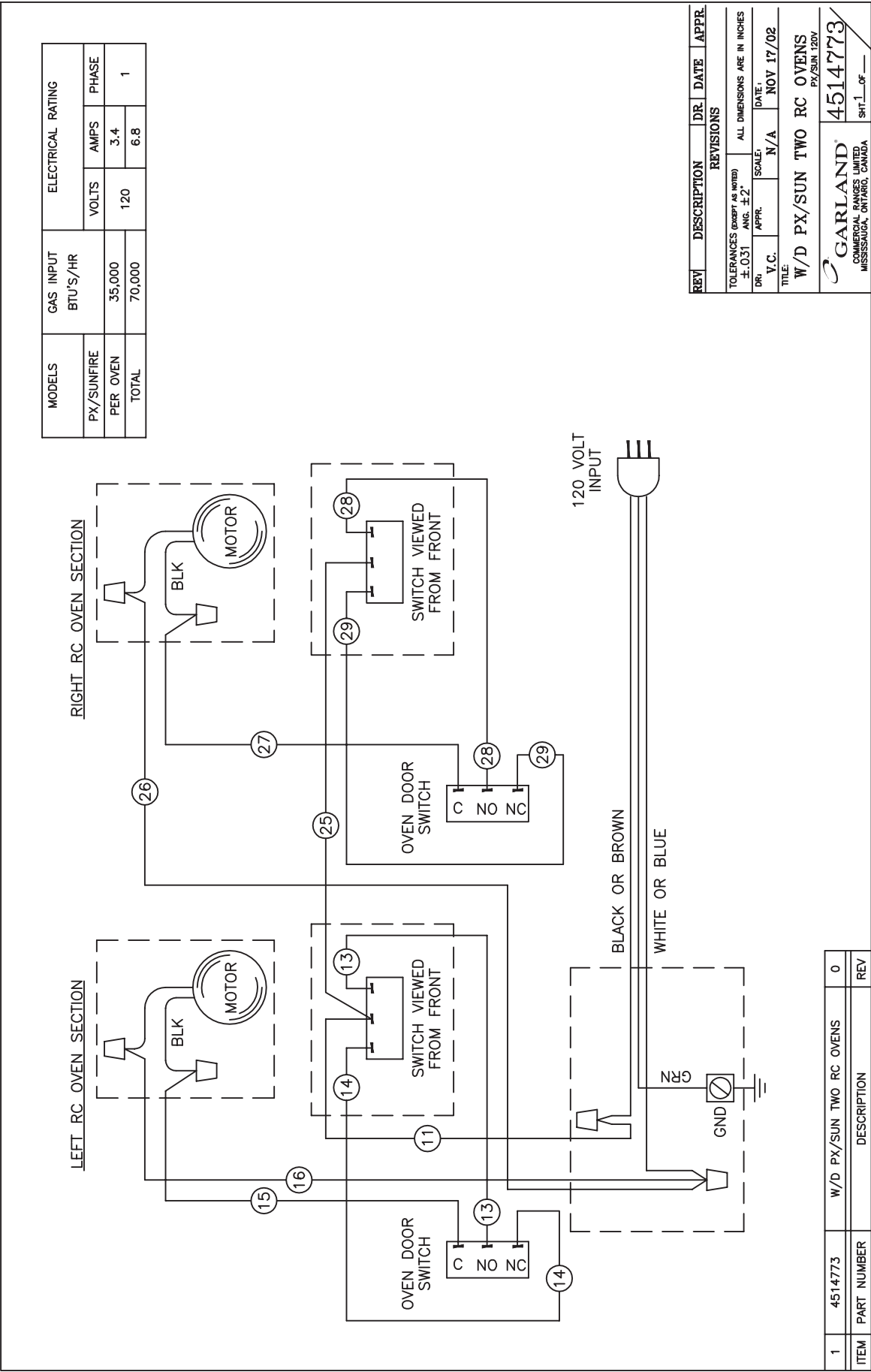




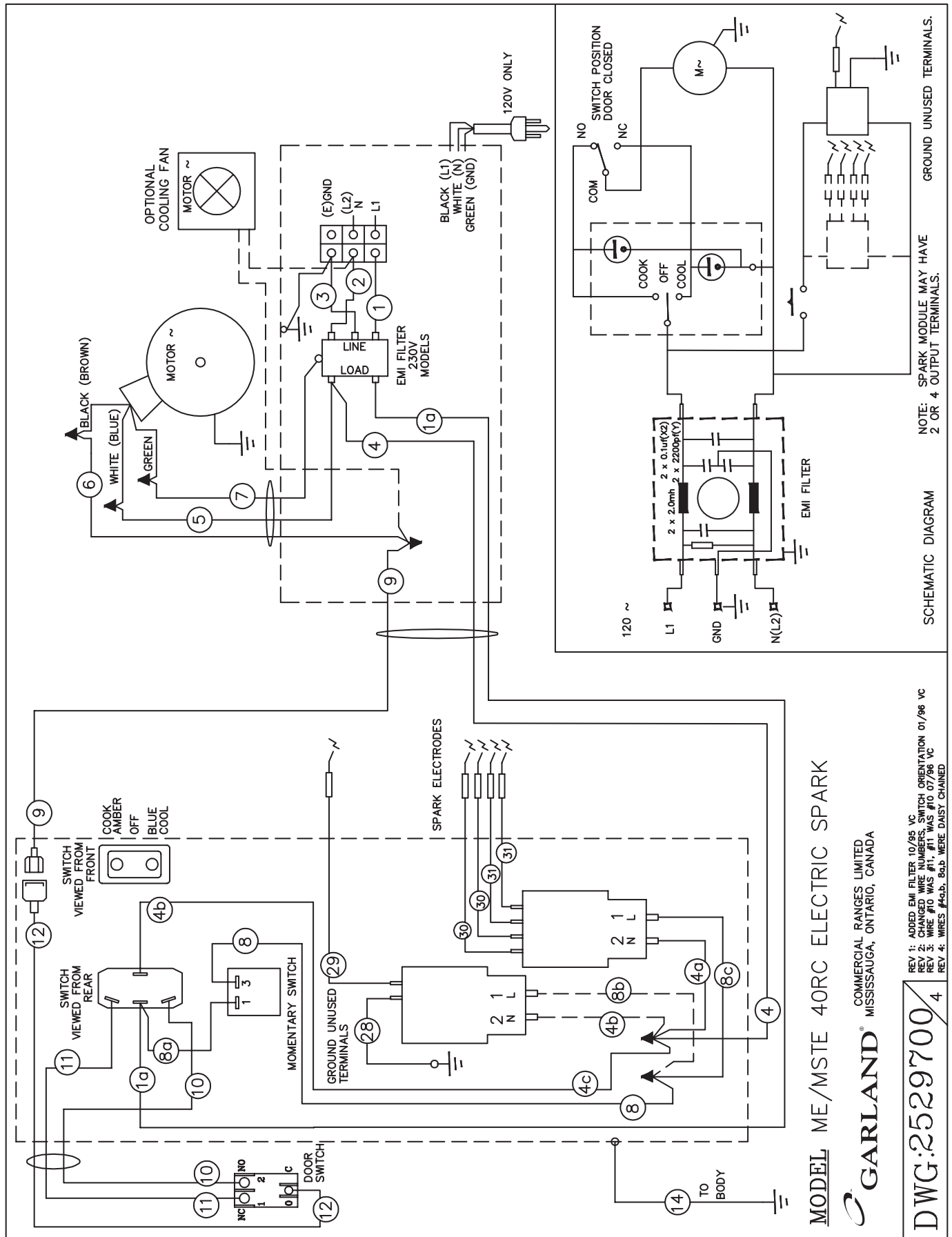
| MODELS     | GAS INPUT<br>BTU'S/HR<br>PER OVEN | ELECTRICAL RATING |      |       |
|------------|-----------------------------------|-------------------|------|-------|
|            |                                   | VOLTS             | AMPS | PHASE |
| PX/SUNFIRE | 35,000                            | 120               | 3.4  | 1     |

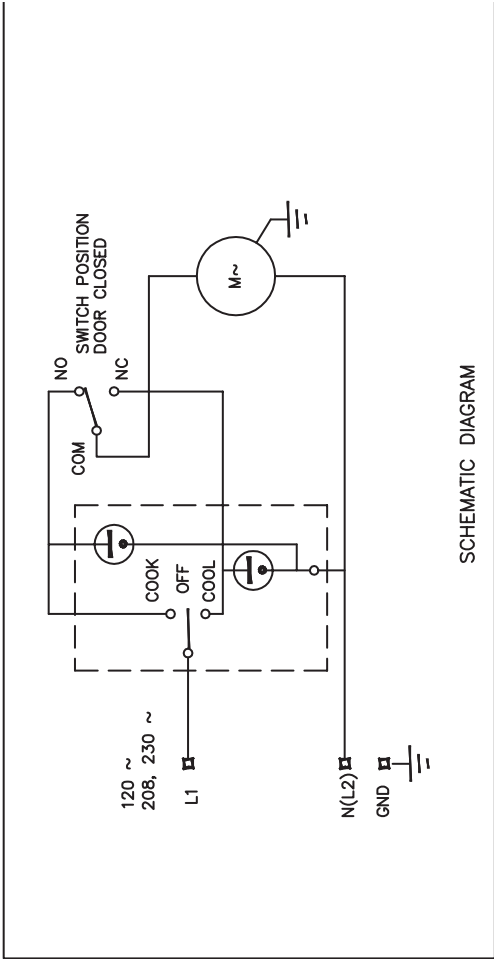
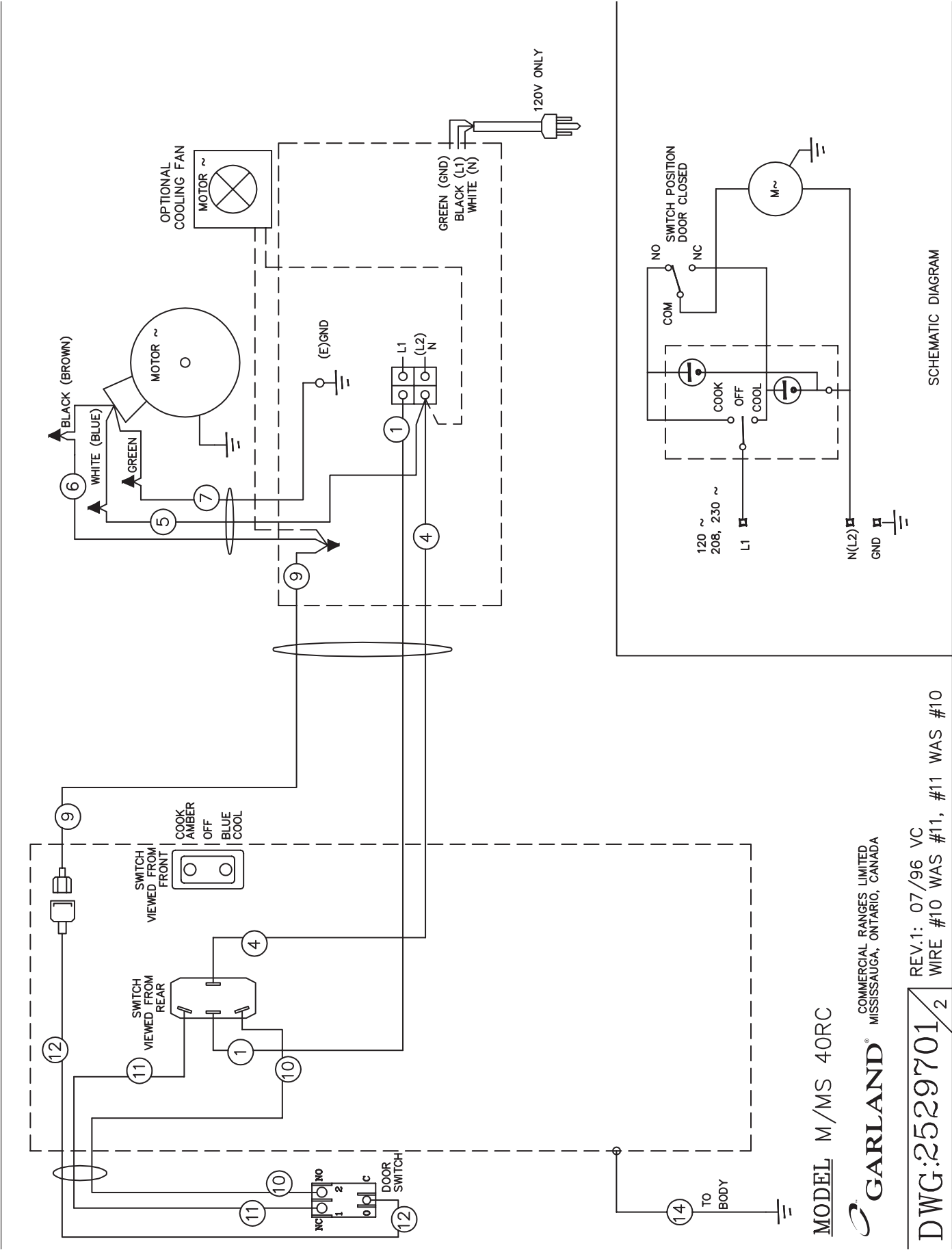
|                              |             |                              |      |           |
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| REV                          | DESCRIPTION | DR                           | DATE | APPR      |
| REVISONS                     |             |                              |      |           |
| TOLERANCES (EXCEPT AS NOTED) |             | ALL DIMENSIONS ARE IN INCHES |      |           |
| ±.031 ANG. ±2°               |             | DATE                         |      |           |
| DR                           | APPR        | SCALE                        | N/A  | NOV 17/02 |
| V.C.                         |             |                              |      |           |
| TITLE                        |             | W/D RIGHT (SINGLE) RC OVEN   |      |           |
|                              |             | PX/SUN 120V                  |      |           |
| GARLAND®                     |             | 4514772                      |      |           |
| COMMERCIAL RANGES LIMITED    |             | SHEET 1 OF 1                 |      |           |

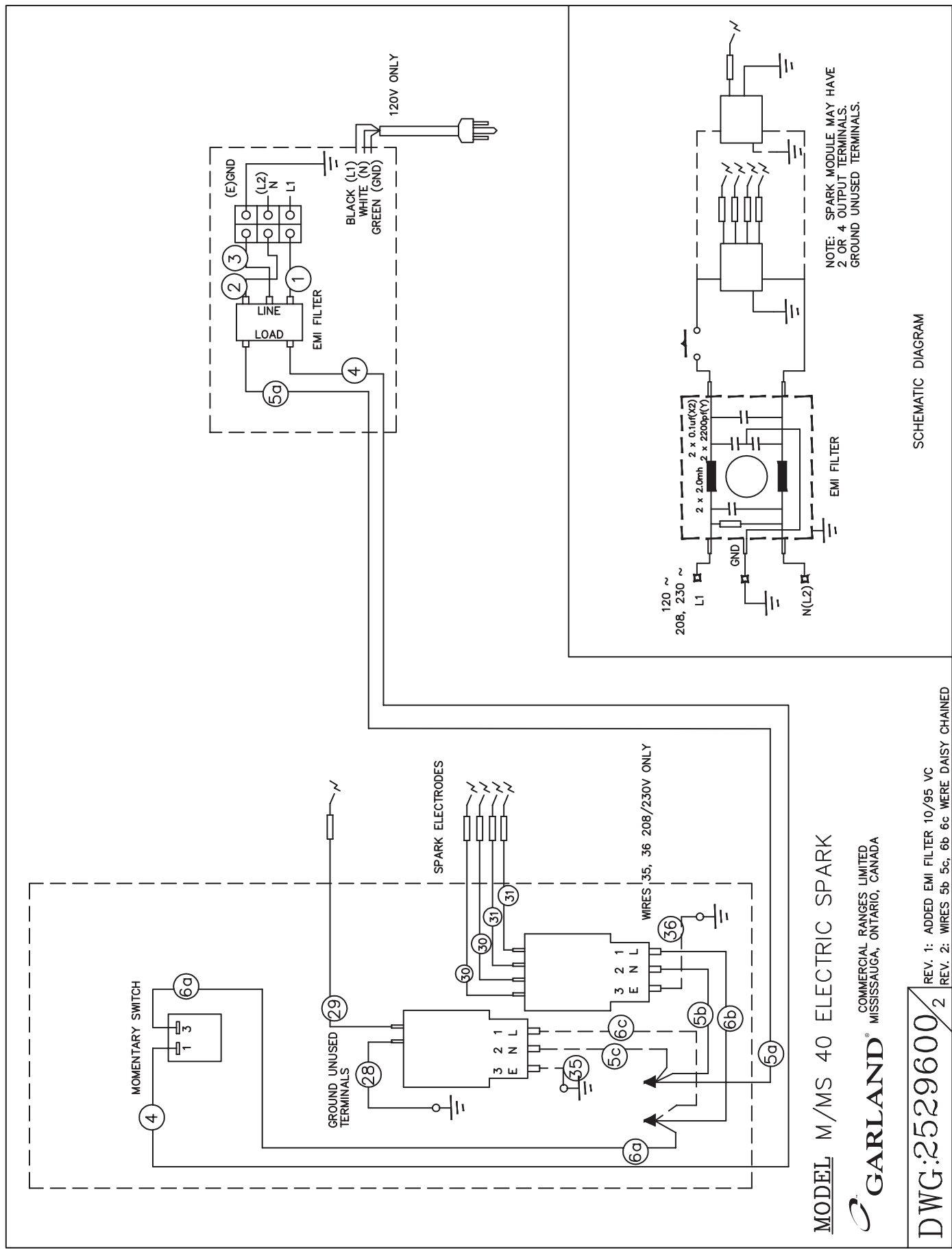
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| ITEM | PART NUMBER | DESCRIPTION              | REV |

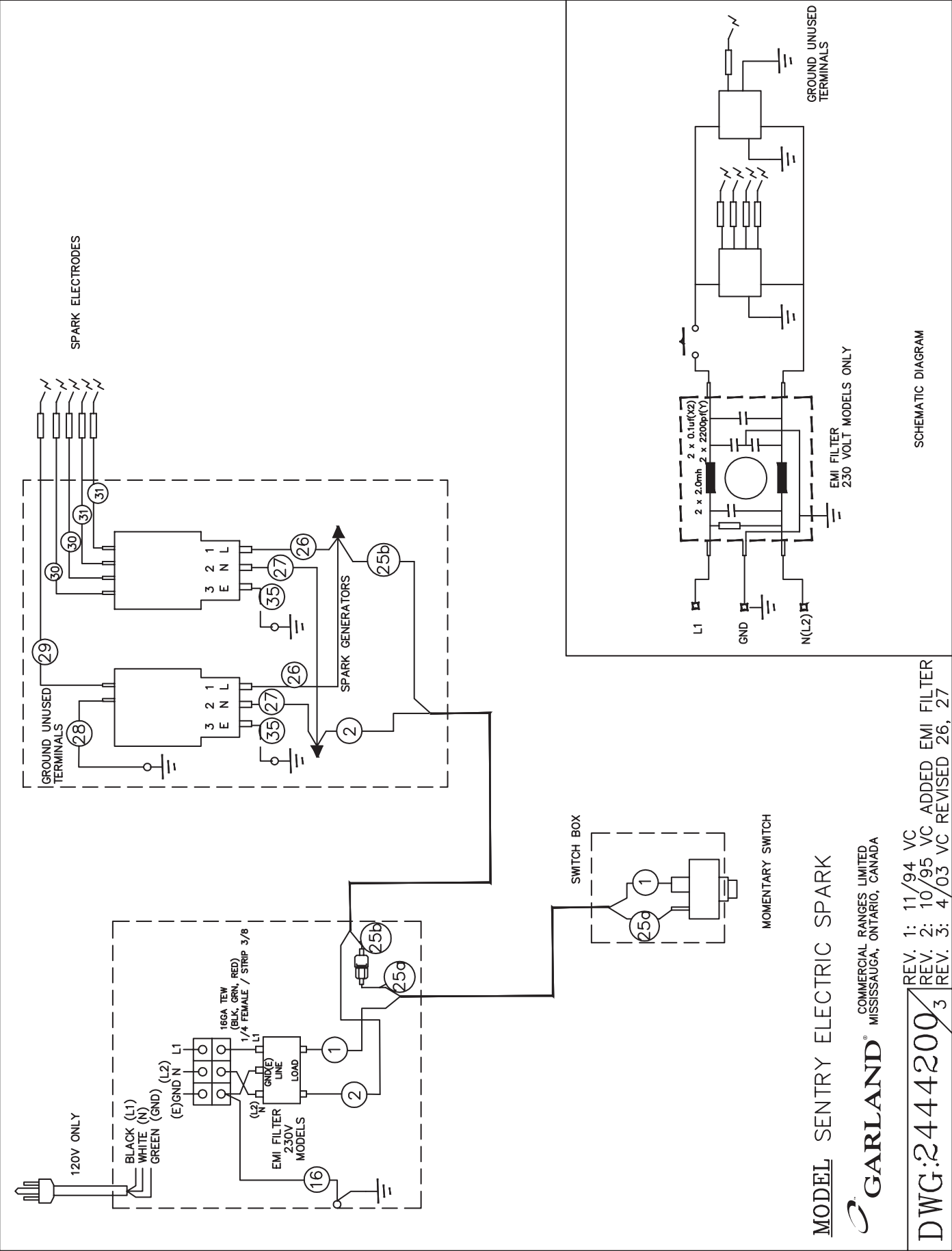


| REV                          | DESCRIPTION | DR    | DATE | APPR      |
|------------------------------|-------------|-------|------|-----------|
| REVISIONS                    |             |       |      |           |
| TOLERANCES (EXCEPT AS NOTED) |             |       |      |           |
| ± 0.31                       |             |       |      |           |
| ANG. ± 2°                    |             |       |      |           |
| DR                           | APPR        | SCALE | N/A  | DATE      |
| V.C.                         |             |       |      | NOV 17/02 |
| TITLE                        |             |       |      |           |
| W/D PX/SUN TWO RC OVENS      |             |       |      |           |
| PX/SUN 120V                  |             |       |      |           |
| GARLAND® 4514773             |             |       |      |           |
| COMMERCIAL RANGES LIMITED    |             |       |      |           |
| MISSISSAUGA, ONTARIO, CANADA |             |       |      |           |
| SHT 1 OF 1                   |             |       |      |           |







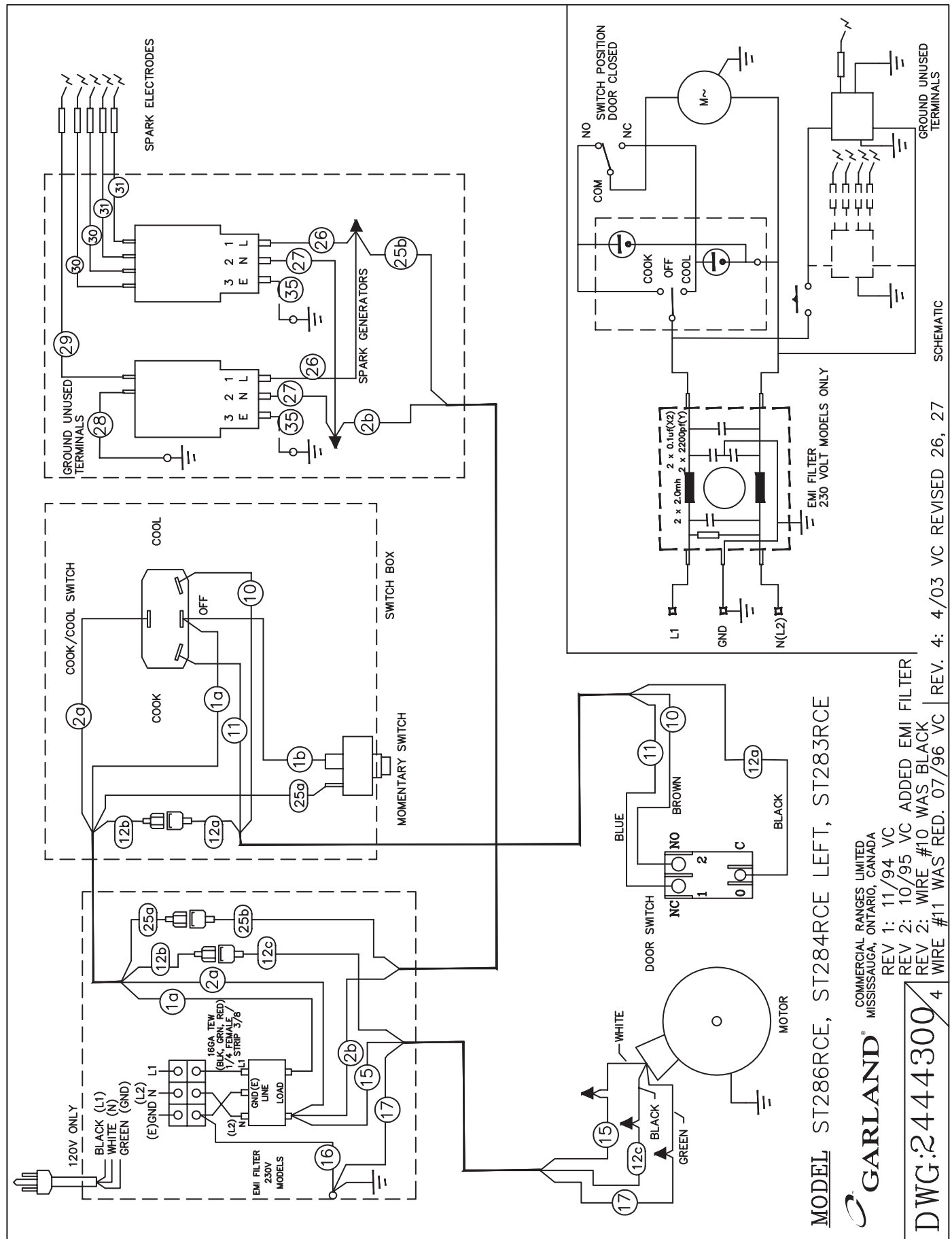


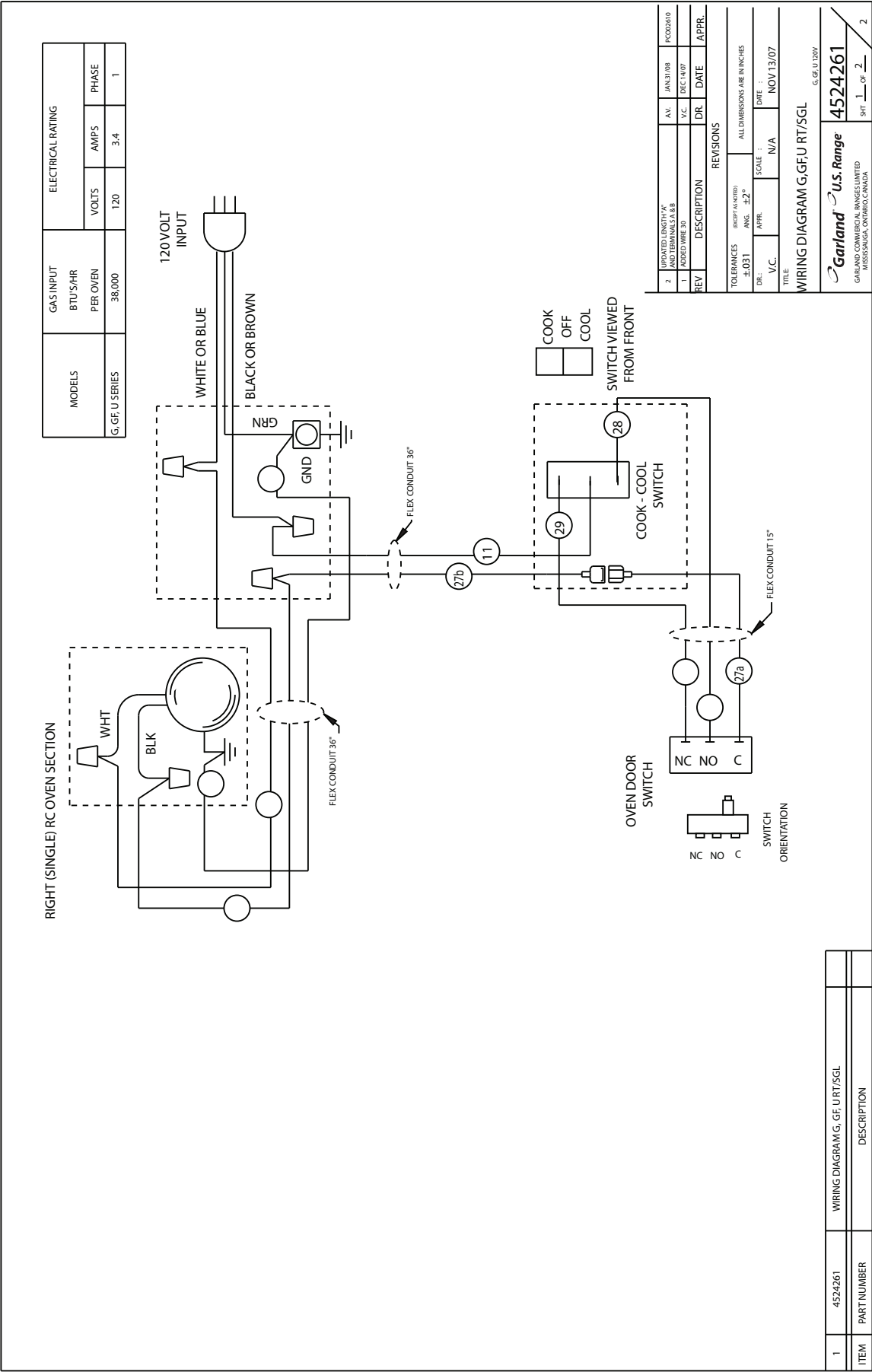
SCHEMATIC DIAGRAM

MODEL SENTRY ELECTRIC SPARK

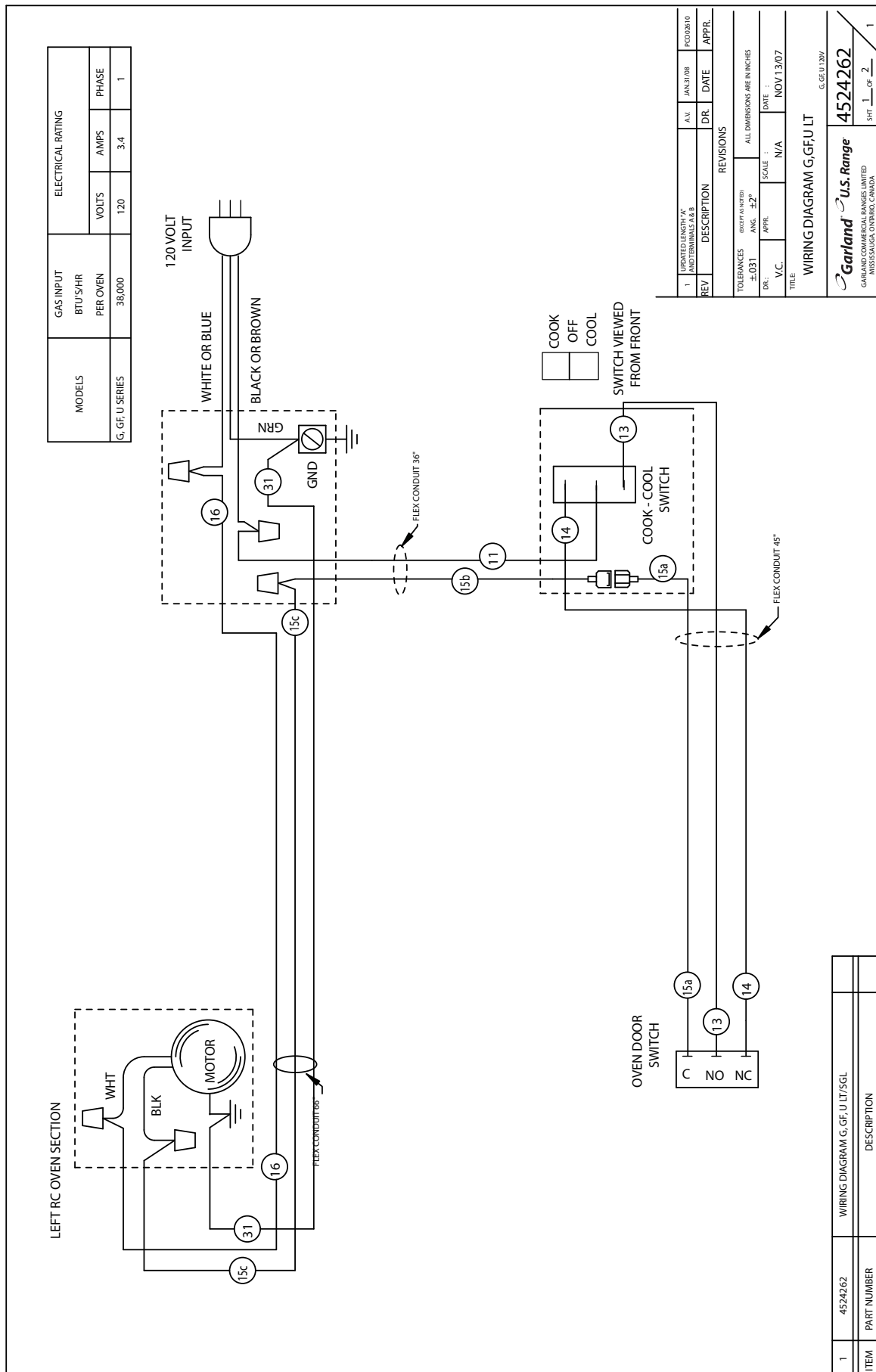
GARLAND® COMMERCIAL RANGES LIMITED  
MISSISSAUGA, ONTARIO, CANADA

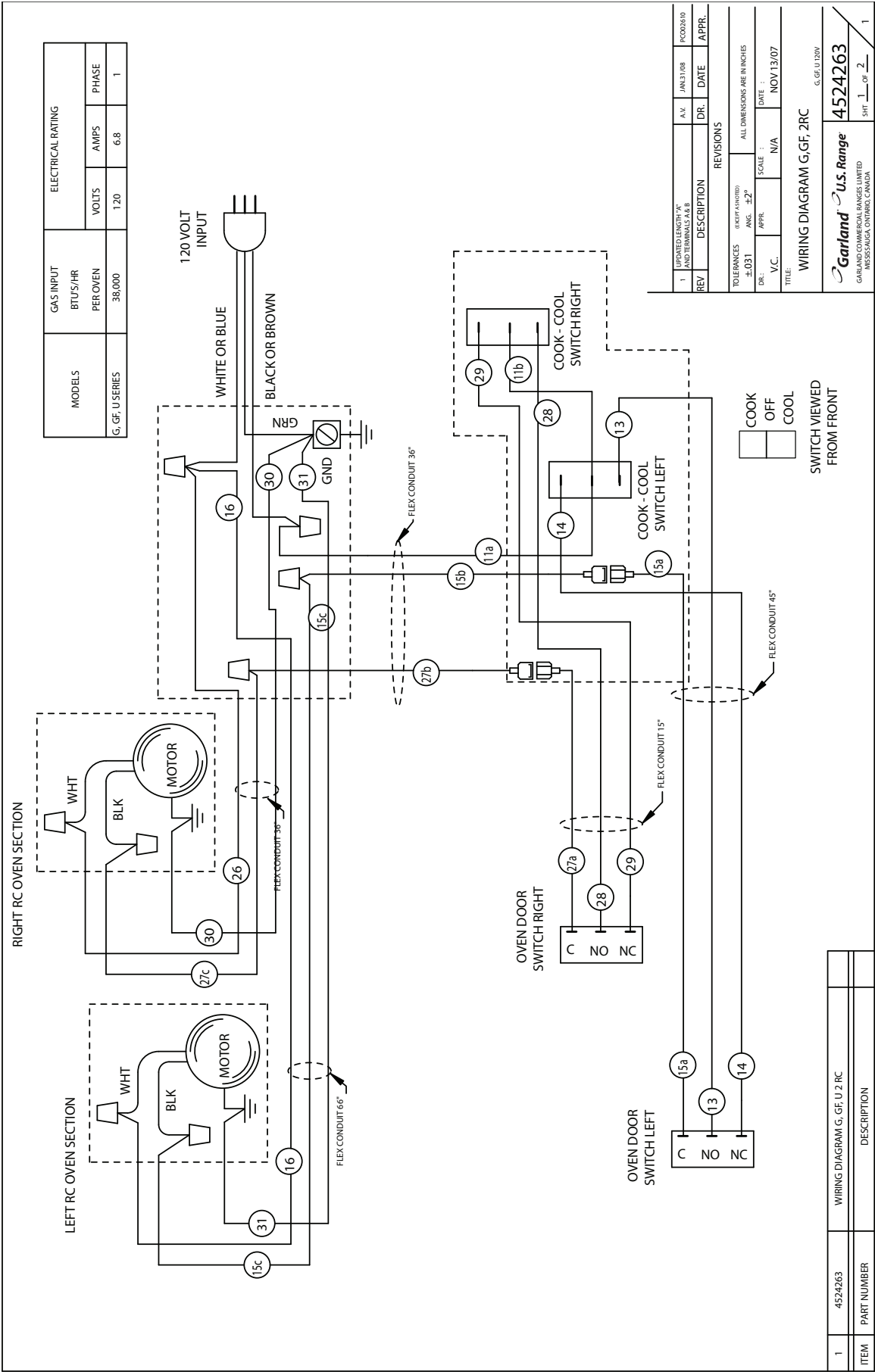
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REV. 1: 11/94 VC  
REV. 2: 10/95 VC ADDED EMI FILTER  
REV. 3: 4/03 VC REVISED 26, 27

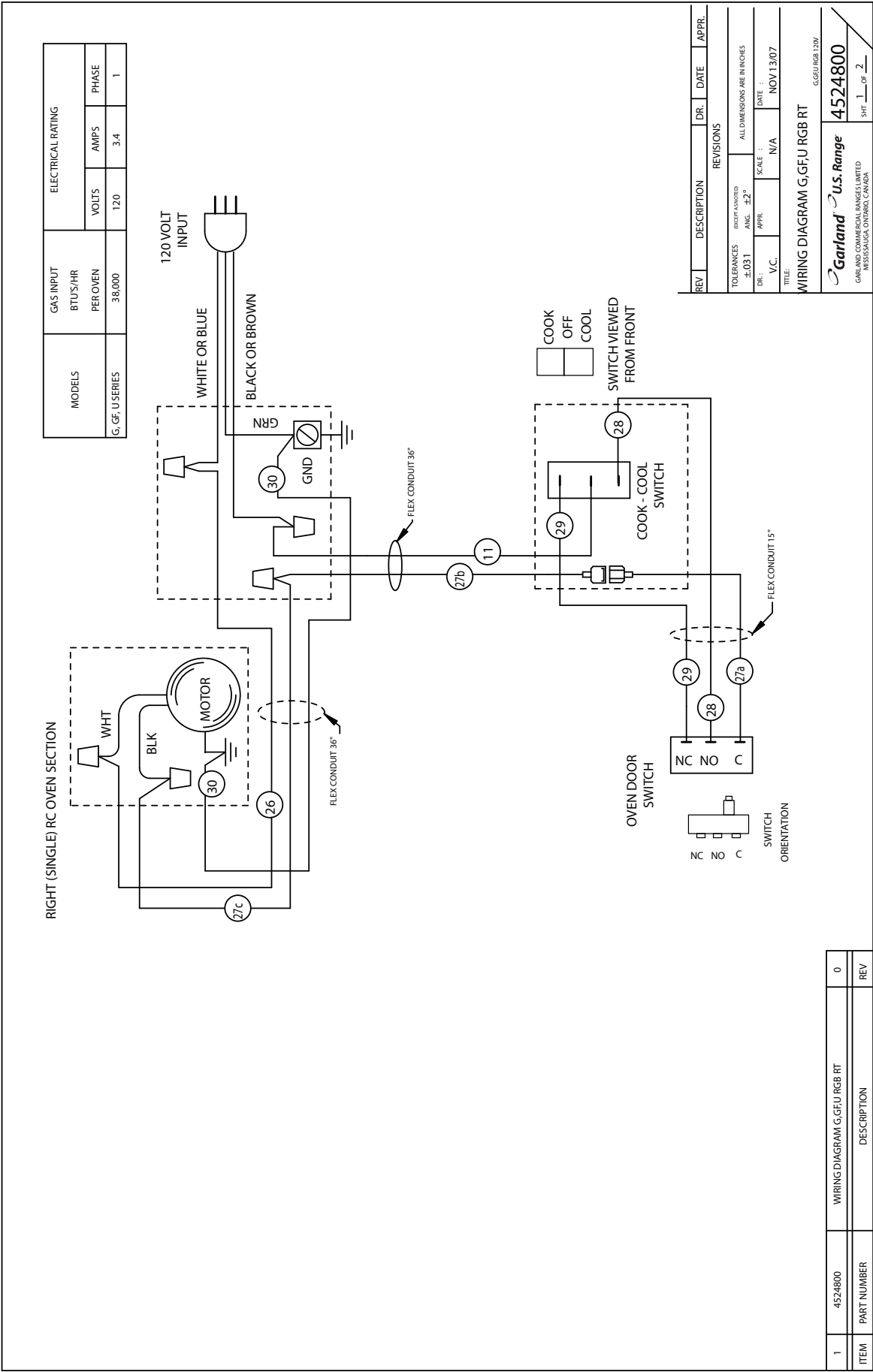


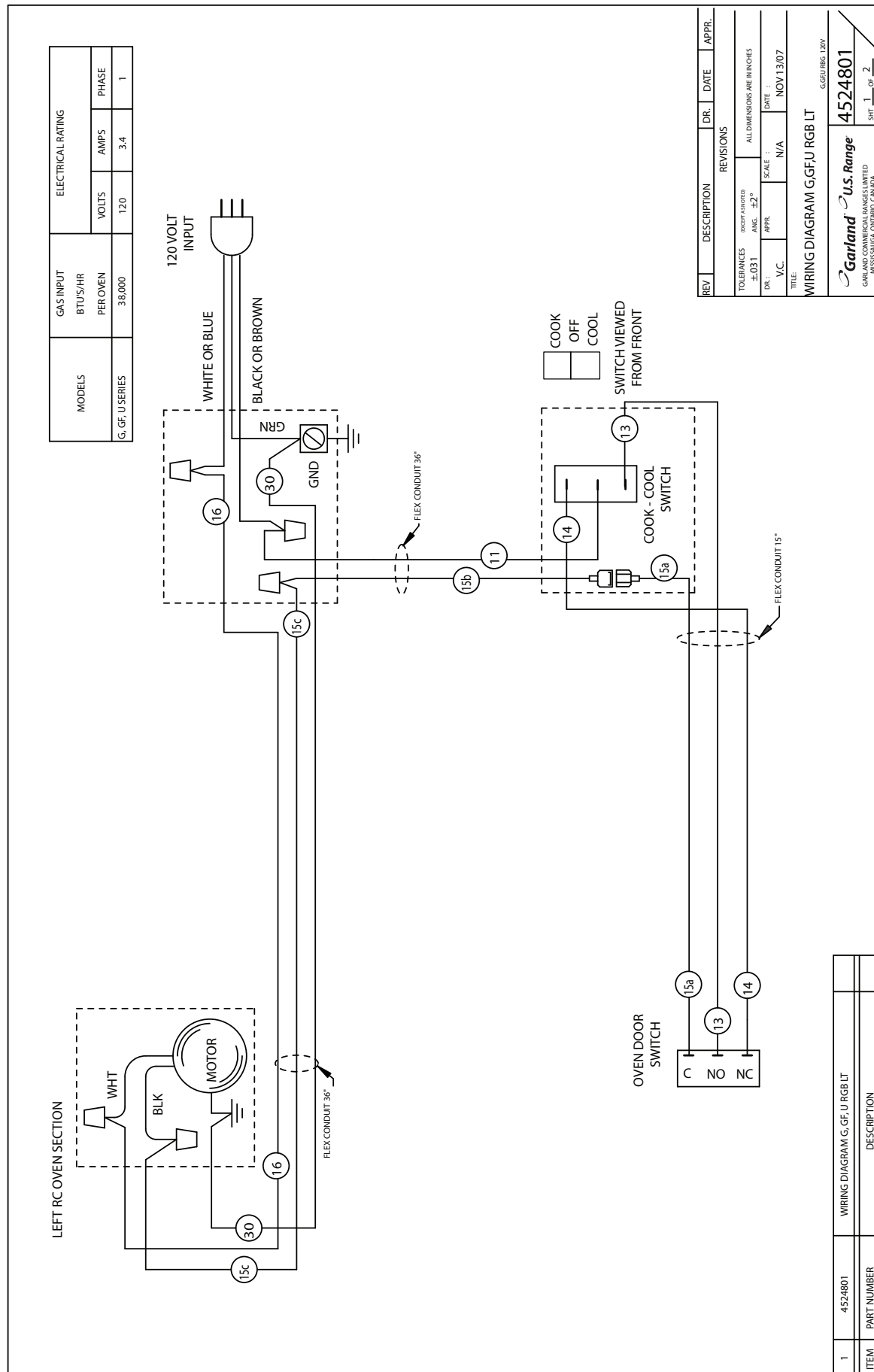


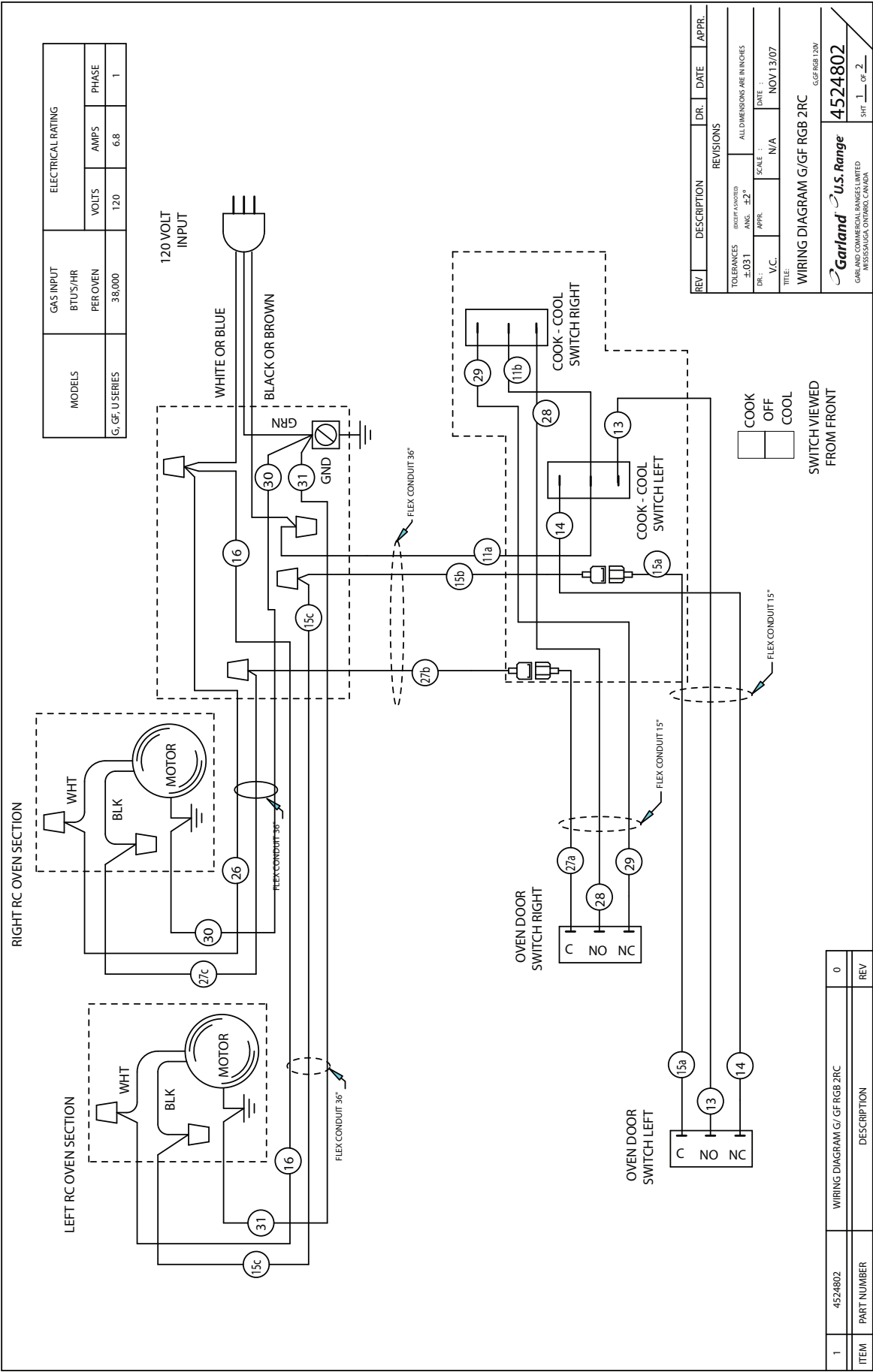




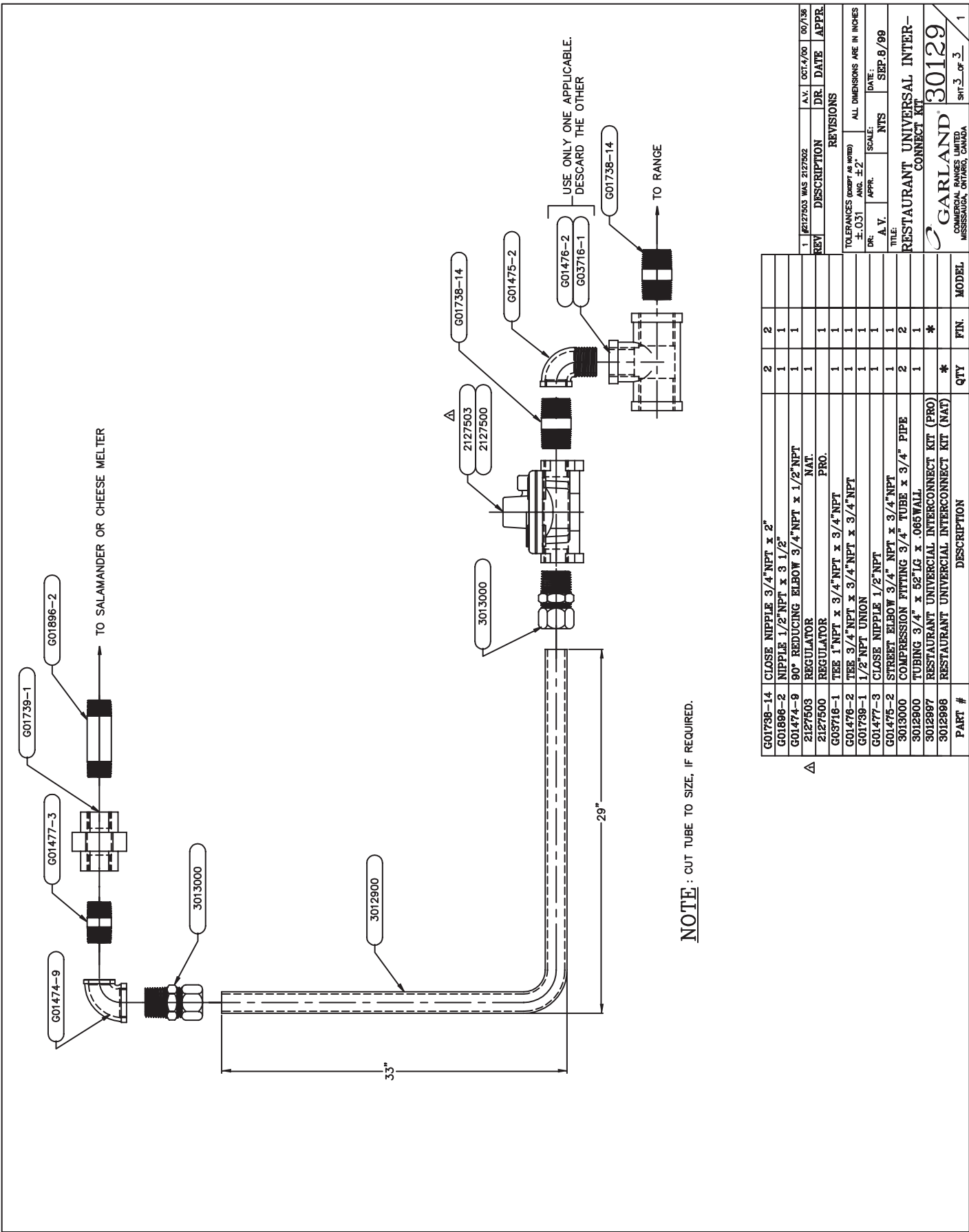


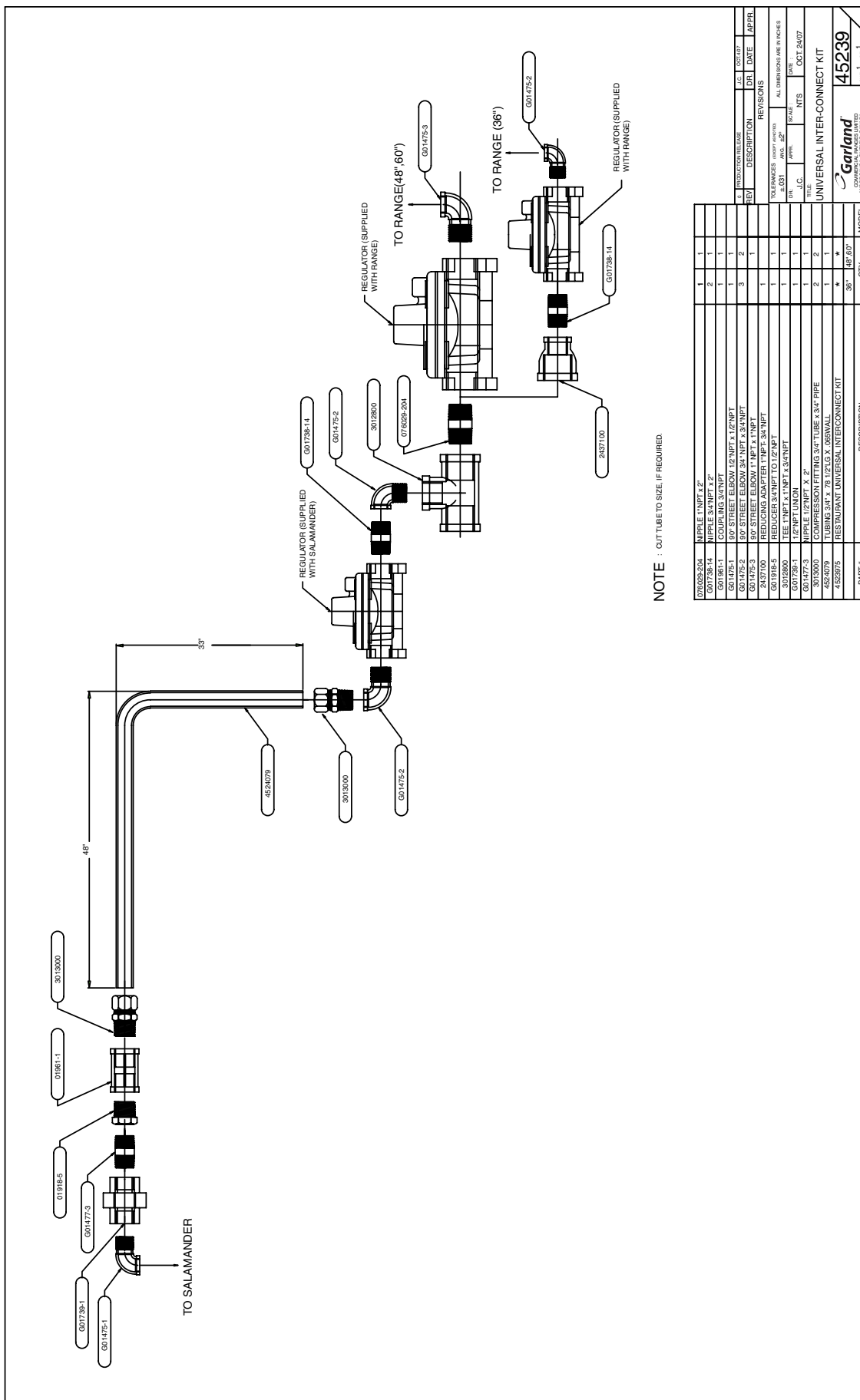






Part # GCTRM Rev 3 (12/10/09)





**NOTE** : CUT TUBE TO SIZE, IF REQUIRED.

| REV | DESCRIPTION        | LC | DATE | APPRO |
|-----|--------------------|----|------|-------|
| 1   | PRODUCTION RELEASE |    |      |       |

| REVISIONS |                    |
|-----------|--------------------|
| REV       | DESCRIPTION        |
| 1         | PRODUCTION RELEASE |

| DIMENSIONS (CONVERT TO INCHES) |       |
|--------------------------------|-------|
| IN                             | MM    |
| 1.000                          | 25.4  |
| 0.001                          | 0.025 |

| SCALE    |          |
|----------|----------|
| AS SHOWN | AS NOTED |
| 1" = 1'  | 1" = 1'  |

| UNIVERSAL INTER-CONNECT KIT |   |
|-----------------------------|---|
| PARTS LIST                  |   |
| 1                           | 1 |
| 2                           | 1 |
| 3                           | 1 |
| 4                           | 1 |
| 5                           | 1 |
| 6                           | 1 |
| 7                           | 1 |
| 8                           | 1 |
| 9                           | 1 |
| 10                          | 1 |
| 11                          | 1 |
| 12                          | 1 |
| 13                          | 1 |
| 14                          | 1 |
| 15                          | 1 |
| 16                          | 1 |
| 17                          | 1 |
| 18                          | 1 |
| 19                          | 1 |
| 20                          | 1 |
| 21                          | 1 |
| 22                          | 1 |
| 23                          | 1 |
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A large, stylized graphic in the background consisting of six interlocking, elongated oval shapes arranged in a circular pattern. Each shape has a series of small circles along its inner edge, resembling a chain or a decorative border.

# **Section 15**

## **Service Bulletins**



## **BULLETIN # B-54-2008-S**

**From: Parts and Service Department**  
**To: All Authorized Service Agencies**

**Date: June 18, 2008**

**Product: Garland G, U, and X Series Restaurant Range Models**  
**Subject: Sit Valve Introduction**

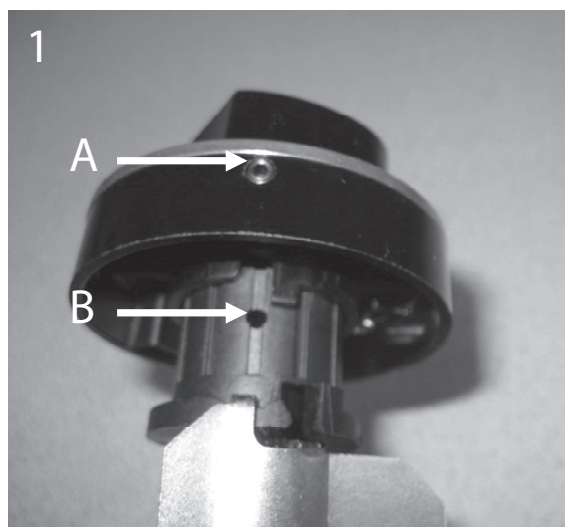
Please find the enclosed introduction to the Sit Valve Modulating/Snap Thermostat used in the Garland G, U, and X Series Restaurant Range Models. These instructions will be added to our existing manuals, and they are designed to inform technicians of some common details and the general overview of the Sit Thermostat.

Please contact The Garland/US Range Parts or Technical Service Department with any questions.

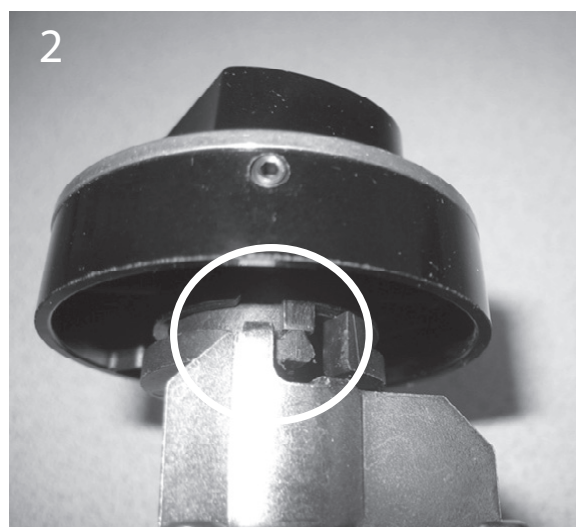
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## Sit Valve Field Guide G, U, and X Series



When installing the knob, align the set screw (a) with the hole on the hub (b).



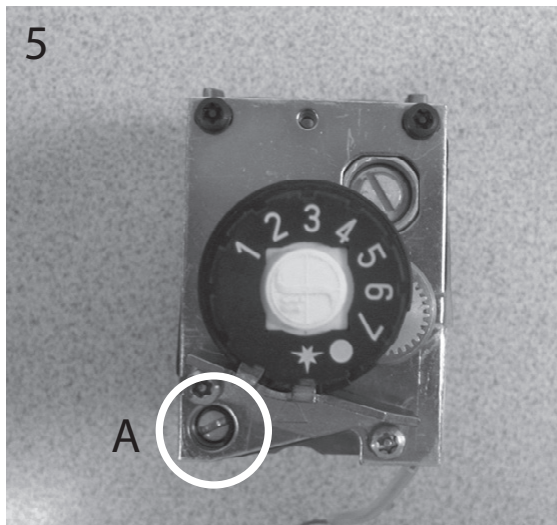
When installed correctly, the knob tab extends the hub stop so the knob cannot be overturned into



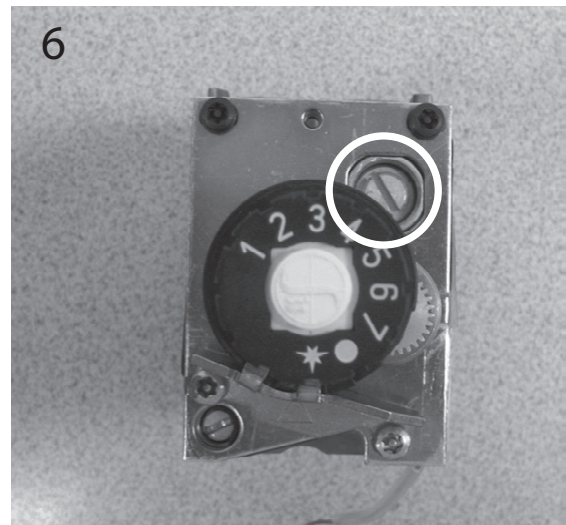
The tab must be intact on the knob for the knob to properly stop as shown in figure 2. If the tab is missing the knob will continue to turn until the pilots are extinguished. If the tab is damaged or missing, replace the knob.



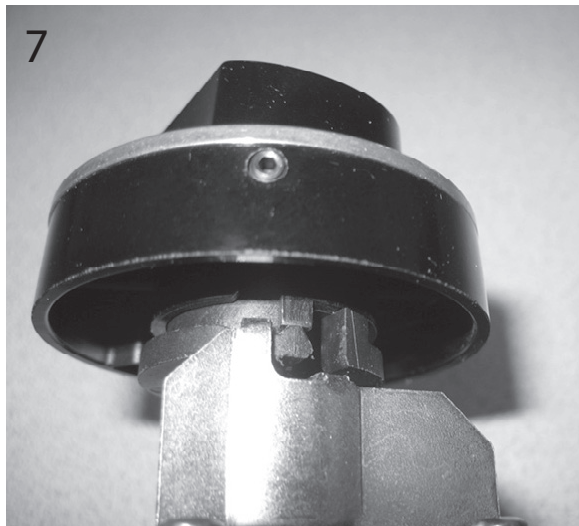
To calibrate the Thermostat, use the two screws on the knob. The factory preset position has the screws centered in the slots. The total range for adjustment is 35 degrees. (17.5 up or down) Please see notes\*



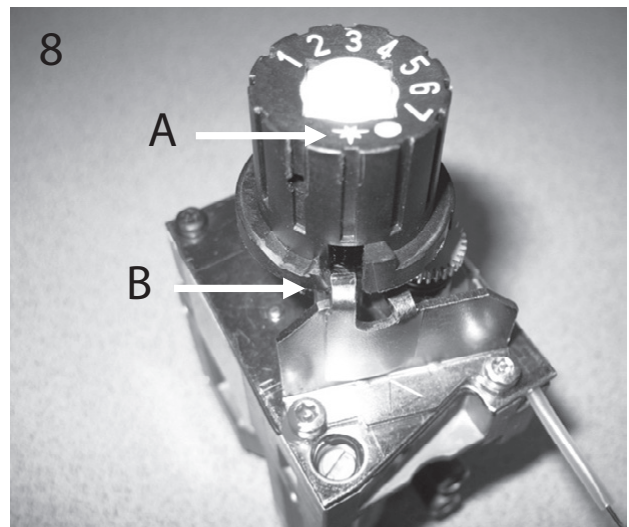
To adjust the pilot size, turn the pilot adjustment screw (A). The pilot flame should be approximately  $\frac{3}{4}$  of an inch long.



No adjustment should be made to the screw circled above. Please see notes\*



To shut down all gas to pilots and burners, loosen the knob set screw and gently pull knob off and proceed to figure 8.



With the knob removed, turn the hub until the metal tab (B) lines up with the \* symbol (A). With the hub in the position shown, the gas should be off at the pilots and burners. When ready to relight the pilot, turn the hub to the position shown in figure one and push in to light.

### **\* Notes:**

**The Sit Thermostat used in the Garland G, U and X series is a Modulating/Snap thermostat with a multifunctional single knob.**

**The part number for the Oven Thermostat is 4523006 (Long Capillary) and the Griddle Thermostat is 4523007 (Short Capillary).**

**Before any calibration is attempted, the thermostat should be set at 400°F and be allowed to cycle for a minimum of 30 minutes. After 30 Minutes, if the temperature reading is between 370° And 430°F, the control is functioning correctly and should not be replaced. It can be calibrated however as the needs of the customer dictate. (See Figure 4) If the Control reads lower than 370°F or higher than 430°F after 30 minutes at 400° F the control should be replaced.**

**DO NOT ADJUST the screw pictured in figure 6. The Main Burner Flame is not adjustable. ( There is a fixed orifice in the control)**



## BULLETIN # A-50-2009-S

**From: Parts and Service Department**  
**To: All US Authorized Service Agencies**

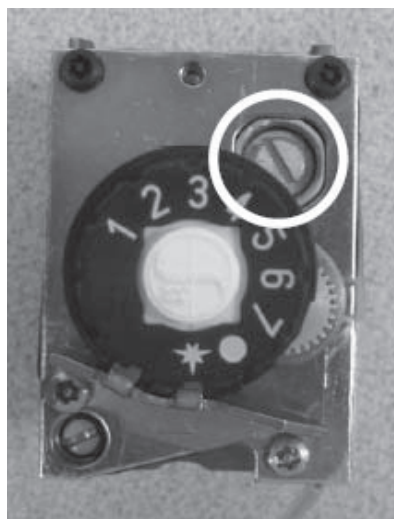
**Date: April 6, 2009**

**Subject: SIT Control Operational Guide**  
**Models Affected: G, GF, U, and X Series Ranges**

Due to many questions regarding the operation of the SIT Control, below is a description of the valves operation for review.

The SIT control is a Modulating Snap Combination Safety Valve and Thermostat Control.

The First Stage Screw shown below, is installed by the control manufacturer and should not be adjusted. If you believe it has been tampered with, turn the screw all the way clockwise until tight for the proper setting. **(Do not over tighten)**

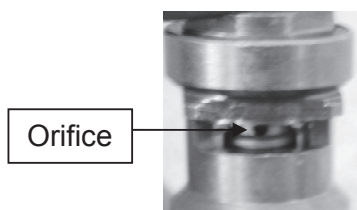


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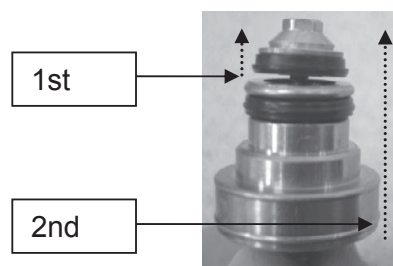
Garland uses a fixed drilled orifice to regulate the first stage in the SIT Control as shown below.



**(Internal component shown,  
do not disassemble control)**

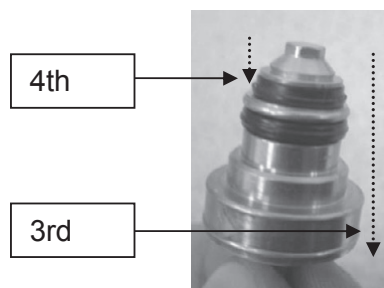
**When a call for heat is initiated, the thermostat will cycle as follows:**

First stage, as shown below, begins when the thermostat applies light pressure to the base of the valve assembly. The greater the degrees for the thermostat to rise to set point, the higher the pressure will be. When higher pressure is applied to the base of the valve assembly, the second stage begins. The second stage raises the entire valve assembly.



**(Internal component shown,  
do not disassemble control)**

As the control approaches set point, the valve assembly lowers, modulating the flame, until it completely closes, leaving the fixed flame of the first stage to continue. Until all pressure is removed and valve assembly is fully closed as shown below.



**(Internal component shown,  
do not disassemble control)**

So to review, first stage is a fixed flame based on an orifice within the control and second stage is modulating, based on variable valve assembly positioning. Both snap closed when the thermostat satisfies the call for heat by relieving the pressure from the Valve Assembly.

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## **BULLETIN # B-63-2009-S**

**From: Parts and Service Department**  
**To: All Authorized Service Agencies**

**Date: May 22, 2009**

**Product: G, U and X Model Ranges**  
**Subject: Tips to Determine Oven/ Griddle Pilot Outage Root Cause**

Please be advised we have had instances of pilot outages on our new range line, where the onsite technician has not been able to determine root cause. Enclosed is a list of items to review, to determine intermittent pilot problems.

1. Check the Thermostat knobs. Knobs that have the tabs broken or are mis-aligned on the thermostat bodies will cause pilot outage while trying to adjust temperature values. This will not apply to any Flame-failure type units.
2. Ensure Back Guards and High-Shelves are properly mounted on the rear of the range. Any deviation or leakage on the guard or shelf install could cause the unit to "front-vent" and extinguish the oven/griddle or top section pilot.
3. Ensure dynamic manifold pressures are according to factory specification. Check incoming supply values, and /or any type of supply pressure fluctuation. \* NOTE\* 48" and 60" models require a 1" regulator to ensure proper manifold pressures are within defined specifications.
4. Check for Ventilation cross drafts, or drafts along the floor. Inconsistent vent pressure or flue blockages can conceivably cause the pilots to "drop out" during normal cycling of the thermostats
5. Ensure pilot and burner orifices are sized correctly to ensure the proper amount of fuel at the pilot and burners to ensure stability of the pilot flame. Check that the pilot orifice is seated properly on the pilot olive sleeve and there are no leaks at the compression fittings or pilot line.
6. Check milli voltage from the thermocouples to ensure the correct amount of milli voltage is present. Refer to your unit's technical service manual to determine the correct amount of voltage.

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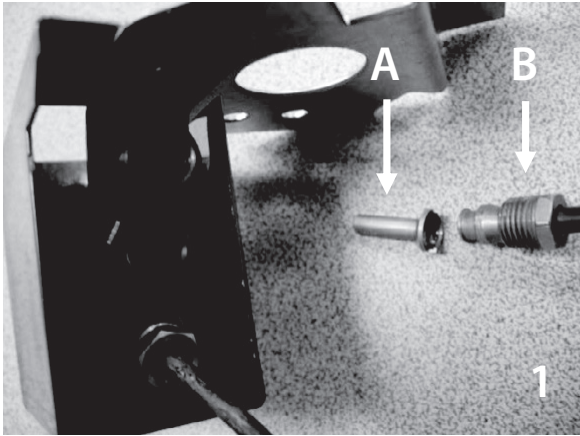
**A:US C:Canada B:Canada/US I:International S: Service P: Parts W: Warranty G: General**  
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7. Check the spring tension on the oven doors to ensure the doors are fully closed when the unit is hot. An open oven door can cause flue gases to collect in behind the front panel and choke off the upper section pilots.
8. Please ensure all tubing ends are free of burrs or tubing debris. Also ensure there has been no reduction of the tubing I.D. where the lines have been cut to fit.
9. Ensure the pilot hood is located correctly. One side of the hood is to feed the burner; the other side is to feed the thermocouple tip. Ensure the tip of the thermocouple is fully engulfed and glows red. These are visual checks that can be verified by the mV readings. Also ensure the pilot assembly is enclosed back into its box after servicing.

If these checks are performed accordingly and you are still having intermittent pilot problems, please contact our Technical Support at 800-427-6668 for further instruction and review.

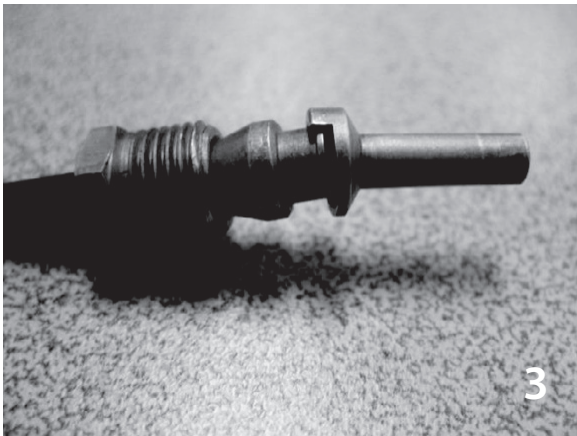
## G U X Pilot Assembly Guide G, U, and X Series Oven Pilots



When assembling the Pilot, the pilot orifice (a) interlocks with the grooved ferrule (b).



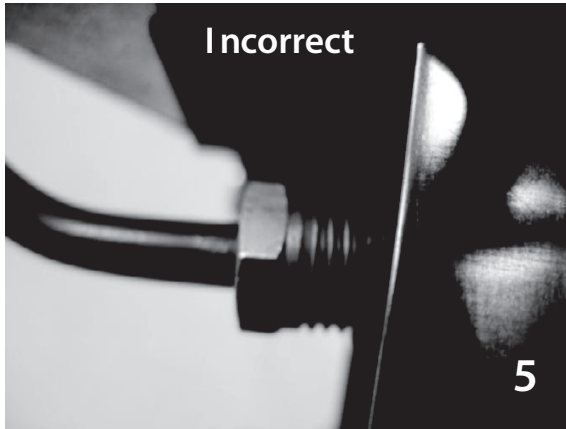
When installed incorrectly, the lip prevents the ferrule from seating completely with the orifice. This will have a negative effect on the pilot flame and needs to be corrected.



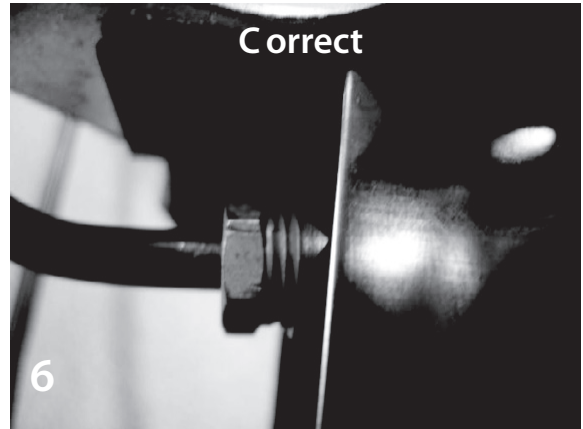
The orifice and ferrule can be interlocked prior to insertion, to verify they will seat properly within the pilot assembly.



When inserted and tightened, they will seal tightly and the pilot will operate as designed.



When the pilot is assembled **incorrectly**, approximately **4 threads** will be shown.



With a pilot assembled **correctly** approximately **2 threads** will be visible.

 **Garland<sup>®</sup>**

 **U.S. Range<sup>®</sup>**