



ELECTROLUX HOME PRODUCTS NORTH AMERICA

SERVICE MANUAL

NEXT GEN

***30" & 36" GAS
FREESTANDING RANGES***

Frigidaire

TAPPAN

W White-Westinghouse

Gibson

Kelvinator 

5995361531

April 2001

SAFE SERVICING PRACTICES - ALL APPLIANCES

To avoid personal injury and/or property damage, it is important that **Safe Servicing Practices** be observed. The following are some limited examples of safe practices:

1. **DO NOT** attempt a product repair if you have any doubts as to your ability to complete it in a safe and satisfactory manner.
2. Before servicing or moving an appliance:
 - Remove the power cord from the electrical outlet, trip the circuit breaker to the OFF position, or remove the fuse.
 - Turn off the gas supply.
 - Turn off the water supply.
3. Never interfere with the proper operation of any safety device.
4. **USE ONLY REPLACEMENT PARTS CATALOGED FOR THIS APPLIANCE. SUBSTITUTIONS MAY DEFEAT COMPLIANCE WITH SAFETY STANDARDS SET FOR HOME APPLIANCES.**
5. **GROUNDING:** The standard color coding for safety ground wires is **GREEN**, or **GREEN with YELLOW STRIPES**. Ground leads are not to be used as current carrying conductors. It is **EXTREMELY** important that the service technician reestablish all safety grounds prior to completion of service. Failure to do so will create a hazard.
6. Prior to returning the product to service, ensure that:
 - All electrical connections are correct and secure
 - All electrical leads are properly dressed and secured away from sharp edges, high-temperature components, and moving parts
 - All non-insulated electrical terminals, connectors, heaters, etc. are adequately spaced away from all metal parts and panels
 - All safety grounds (both internal and external) are correctly and securely connected
 - All panels are properly and securely reassembled

ATTENTION!!!

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

Table of Contents

SAFE SERVICING PRACTICES	2
QUICK REFERENCE SHEET	12
MAXIMUM SURFACE TEMPERATURES	13
SECTION A - INSTALLATION INSTRUCTIONS	14 - 34
Installation instructions 30" ranges	14 - 25
Safety	14
Clearances and Dimensions	14
Fuel types	14
Important notes to installer	15
Important note to consumer	15
Important safety instructions	15
Models with self-clean feature	15
Tools you will need	16
Normal installation steps	16
Anti-tip bracket installation instructions	16
Provide adequate gas supply	17
Seal the openings	17
Connect the range to the gas supply	18
Checking manifold gas pressure	18
Electrical requirements	18
Extension cord precautions	18
Grounding instructions	18
Surface burners	19
Installation of burner cap assembly	19
Electric ignition surface burners	19
Adjusting low setting of surface burner valve	19
Electric ignition burners	19
Air shutter oven burner	19
Air shutter broil burner	19
Make sure the range is level	19
Converting to LP	20 - 25
Tools Required for LP conversion	20
Converting the pressure regulator	21
Converting surface burner to LP	22
Converting the oven and broil burners	23
Reconnect gas and electric supply to range	23
Air shutter adjustment oven and broil burners	24
Installation of new LP/Propane rating/serial plate	25
Conversion to natural gas	25
Installation instructions 36" ranges	26 - 34
Safety	26
Dimensions and clearance	26
Important notes to the installer	27
Important safety instructions	27
Provide an adequate gas supply	28
Seal the openings	28
Connecting the range to gas	28
LP gas conversion	29
Pressure regulator conversion	29
Surface burner valves conversion	30
Adjusting low surface burner setting	30
Air adjustment shutter	30
Converting oven burner orifice	31
Converting broil burner orifice	31
Electrical requirements	32
Extension cord cautions	32

Grounding instructions	32
Check operation	32
Check igniters	32
Non self clean models	33
Adjusting simmer setting	33
Leveling the range	33
Anti-tip bracket installation	33
SECTION B - GAS FLOW	35 - 38
Gas flow	35
Electric circuits	36
How gas flow system works	37
Troubleshooting	37
Burner flame too large	37
Burner flame too small	37
Burner flame yellow tipped	37
Top burner flame lifts off	37
Top burner spark ignition system	38
How it works	38
Troubleshooting	38
Igniters do not spark	38
Igniter system works normal for all but one valve	38
Igniter sparks at normal rate with all valves turned off	38
Igniter sparks intermittently with all valves turned off	38
SECTION C - ELECTRONIC OVEN CONTROL SYSTEMS	39 - 94
ES 100 oven control system	39 - 43
How to program the ES 100 control	39
To set the clock	39
To set the minute timer	39
To change the minute timer while in use	39
To set the control for baking	39
To change the oven temperature after baking has started	40
To set the oven control for broil	40
How the ES 100 system operates	40
Bake	40
Broil	41
Calibration	41
To change calibration	41
Troubleshooting	41
F1 code	41
F3 code	41
Control will not program	42
Blank display	42
No heat	42
Sample schematic for ES 100 control system	43
Es 200 oven control system	44 - 51
How to program the ES 200	44
Temperature conversion	44
To set the clock	44
To set the minute timer	44
To change the minute timer while in use	45
To set the control for baking	45
To change the oven temperature after baking has started	45
To set the control for continuous bake or 12 hour energy saving	45
To set the control for oven lockout feature	45
To set the control to broil	45
To set the control for a self-clean cycle	46
When the self-clean cycle is complete	46

Stopping or interrupting a self-cleaning cycle	46
How the ES 200 operates	46
Bake	46
Broil	47
Clean	47
Calibration	47
To change the calibration	47
Troubleshooting	48
F1 code	48
F3 code	48
F9 code	48
Control will not program	48
Blank display	48
No heat	48
Control operates normally but bake & broil burners do not heat	48
Broil burner operates but bake does not heat	49
Bake burner operates but broil does not heat	49
Self-cleaning	49
Oven door does not lock when the oven is programmed for clean	49
Oven door locks when the oven is programmed for clean but the oven does not heat	49
Lock motor runs continuously	49
Door latch is partly closed with the door open	49
Sample schematic for ES 200 control system	50
The ES 300 electronic oven control system	51
How to program the ES 300 system	51
For a silent control panel	51
Temperature conversion	51
To set the clock	51
To set the minute timer	51
To change the minute timer while it is in use	52
To cancel the minute timer before the set time has run out	52
To set the controls for bake	52
To change the oven temperature after baking has started	52
To set control for continuous bake or 12 hour energy saving	52
To set the control oven lockout	52
To set the timed bake feature	52
To program the oven to begin baking immediately and shut off automatically	53
To program oven for a delay start time and to shut-off automatically	53
When the set bake time runs out	53
To change the oven temperature or bake time after baking has started	53
Speed bake	53
General cooking instructions	53
To set speed bake cooking system	54
To Broil	54
Self-cleaning oven	54
To start the self-clean cycle	55
When the self-clean cycle is completed	55
How the ES 300 control system works	55
Bake	55
Time bake	56
Speed bake	56
Broil	56

Clean	56
Calibration	57
To change the calibration	57
Troubleshooting	57
F1 code	57
F3 code	57
F9 code	57
Control will not program	57
Time bake does not operate	57
Blank display	57
No heat	58
Broil burner operates but bake burner does not	58
Bake burner operates but broil burner does not	58
Fan in oven does not run when speed bake switch is turned on	58
Self-cleaning	59
Oven door locks but oven does not heat in clean	59
Lock motor runs continuously	59
Door latch is partly closed with door open	59
Sample schematic for ES 300 control system	60
The ES 400 electronic oven control system	61
How to program the ES 400	61
Clock	61
To set the clock	61
Changing between 12 or 24 hour time of day display	61
To set the control for continuous bake or 12 hour energy saving	61
Minute timer	61
To set the minute timer	62
To change the minute timer while in use	62
To cancel the minute timer before the set time has run out	62
Oven lockout feature	62
To active the oven lockout	62
To reactivate oven operation	62
Temperature display Fahrenheit or Celsius	62
Silent control operation	62
To change from sound to silent operation	62
Preheat	62
To change preheat temperature while oven is preheating	63
Bake	63
Time bake	63
To program the oven to begin baking immediately and to shut off automatically	63
To program oven for a delayed start time and to shut-off automatically	64
Broil	64
To set the oven to broil at 550 degrees F.	64
Convection bake	65
Convection roast	65
To start the self-clean cycle	65
To set the controls for the self-cleaning cycle to start immediately and shut off automatically	65
When the self-clean cycle is completed	66
Stopping or interrupting a self-cleaning cycle	66
How the ES 400 operate	66
Preheat	66
Bake	67
Time bake	67

Convection bake	67
Convection roast	67
Broil	68
Clean	68
Calibration	68
To check oven calibration	68
To adjust the oven temperature higher	68
To adjust the oven temperature lower	68
Troubleshooting	68
F1 code	68
F3 code	69
F9 code	69
Control will not program	69
Time bake does not operate	69
Convection bake	69
Blank display	69
No heat	69
Bake and broil burner does not heat	70
Broil burner operates but bake burner does not heat	70
Bake burner operates but broil burner does not heat	70
Self-cleaning	70
Oven door does not lock when the oven is programmed for clean	70
Oven door locks when the oven is programmed for clean but oven does not heat	70
Lock motor runs continuously	70
Sample schematic for ES 400 control system	72
The ES 450 electronic oven control system	73
How to program the ES 450	73
Clock	73
Changing between 12 or 24 hour time of day display	73
Continuous bake or 12 hour energy saving	73
Minute timer	74
To change the minute timer while it is in use	74
To cancel the minute timer before the set time has run out	74
Oven lockout feature	74
To active the oven lockout	74
To reactivate oven operation	74
Temperature display Fahrenheit or Celsius	74
To change from Fahrenheit to Celsius	74
Silent control operation	74
To change from sound operation to silent operation	74
Preheat	75
Bake	75
Time bake	75
To program the oven to begin baking immediately and to shut off automatically	75
To program oven for a delay start time and to shut-off automatically	76
Broil	76
To set oven to broil	76
Convection bake	77
Setting food category feature	77
Self-clean	77
To set the control for the self-cleaning cycle to start immediately and shut off automatically	78
When the self-clean cycle is complete	78

Stopping or interrupting a self-cleaning cycle _____	78
To set the controls for the self-cleaning cycle to start at a delayed time and shut off automatically _____	78
When the self-clean cycle has completed _____	78
How the ES 450 operates _____	78
Preheat _____	78
Bake _____	79
Time bake _____	79
Convection bake _____	79
Fixed setting _____	80
Meats _____	80
Cakes _____	80
Breads _____	80
Broil _____	80
Clean _____	80
Calibration _____	80
To check oven calibration _____	80
To change calibration _____	80
Troubleshooting _____	81
F1 code _____	81
F3 code _____	81
F9 code _____	81
Control will not program _____	81
Time bake does not operate _____	81
Convection bake _____	81
Neither the fan motor or the assist element operate _____	81
Fan motor does not operate _____	81
Assist element does not operate _____	81
Blank display _____	81
No heat _____	82
Control operates normally but the bake and broil burners do not heat _____	82
Broil burner operates but bake burner does not heat _____	82
Bake burner operates but broil burner does not heat _____	82
Self-cleaning _____	82
Oven door does not lock when the oven is programmed for clean _____	82
Oven door locks when the oven is programmed for clean but the oven does not heat _____	83
Lock motor runs continuously _____	83
Door latch is partly closed with door open _____	83
Sample schematic for ES 450 Control system _____	84
Electronic oven control system for 36" self-cleaning gas ranges _____	85
How to program the 36" gas range control _____	85
For a silent control panel _____	85
Temperature conversion Fahrenheit/Celsius _____	85
Lockout _____	85
Sabbath feature _____	85
To set the clock _____	86
To set the minute timer _____	86
To change the minute timer _____	86
To cancel the minute timer before the set time has run out _____	86
To set the preheat temperature _____	87
To set the control for normal baking _____	87
To set or change temperature _____	87
To set automatic timer _____	87
To start heating immediately and shut-off automatically _____	87

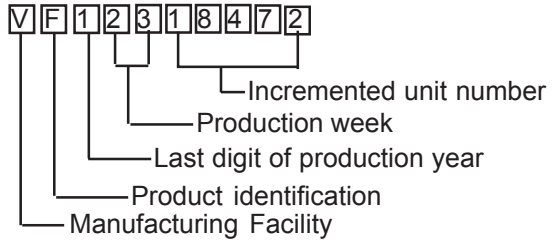
Once the oven controls are set	87
For a delayed start time and shut-off automatically	88
To broil	88
To set the oven control for self-clean cycles	88
Calibrating oven temperature	89
How the electronic oven control system on a 36" gas range operates	89
Preheat	89
Bake	90
Broil	90
Clean	90
Calibration	91
To change calibration	91
Troubleshooting	91
F1 code	91
F3 code	91
Door code	91
Control will not program	91
Blank display	91
No heat	92
Control operates normally but the bake and broil burners do not heat	92
Broil burner operates but the bake burner does not heat	92
Bake burner operates but the broil burner does not heat	92
Self-cleaning	92
Oven does not heat in self-clean	92
Oven heats in self-clean but the oven is not clean	92
Sample schematic for 36" gas range	93
Warmer drawer	94
To set the warmer drawer control	94
How the warmer drawer circuit works	94
Troubleshooting	94
If the element does not heat	94
If the element heats during preheat then stays off until the temperature drops to about 130 degrees	95
Element does not cycle off	95
Warmer drawer is slow to preheat	95
Warmer drawer heats but indicator light does not glow	95
SECTION D - DISASSEMBLY AND REPLACEMENT OF PARTS	96 - 129
30" gas ranges	96 - 112
Removing backguard back panel	96
Removing infinite switches	96
Removing indicator light	97
Removing electronic oven control	97
Removing oven light switch	97
Removing the control panel	97
Removing the end cap	97
Removing the main top	98
Removing sealed burner base	99
Removing top burner igniter	99
Removing fixed top orifice sealed burner	99
Removing manifold panel sealed burners	99
Removing burner pan	100
Removing top burner igniter switches	100
Removing top burner valve	100
Removing the manifold pipe	101
Removing the latch mechanism	101
Oven door	101

Removing oven door seal	101
Removing oven door	101
Door hinge adjustment	102
Removing the hinge opening cover	102
Removing the door hinge	102
Removing the upper door trim	102
Removing door handle	102
Removing outer door glass trim	103
Removing center door glass	103
Removing door wool shield	103
Removing glass package and inner door liner	103
Removing oven bottom	103
Removing bake burner baffle	103
Removing bake burner igniter	104
Removing bake burner (self-clean models)	104
Removing burner heat shield (self-clean models)	104
Convection and speed bake models	105
Removing fan cover	105
Removing fan blade	105
Removing convection assist element	105
Removing broil burner and baffle (self-clean models)	106
Removing broil igniter	106
Removing oven vent (self-clean models)	106
Removing oven safety valve (self-clean models)	106
Components removed from the rear of the range	107
Removing rear manifold cover	107
Removing back cover	107
Removing heat shield	107
Removing pressure regulator	108
Removing top burner igniter spark module	108
Removing lock motor assembly	108
Removing oven sensor	109
Door switch and rod removal	109
Removing convection and speed bake motor assemblies	109
Removing bodyside panels	110
Storage drawer	111
Removing storage drawer front panel	111
Removing inside drawer panel	111
Removing drawer glides	111
Removing the warmer drawer	111
Removing the warmer drawer side rails	112
Removing warmer drawer low limit thermostat	112
Removing the warmer drawer element	112
36" gas range	113 - 129
Removing backguard glass and trim	113
Removing control buttons	113
Removing electronic oven control	113
Removing fluorescent lamp starter	113
Removing starter base	113
Removing fluorescent ballast	114
Removing oven light or fluorescent light switch	114
Removing backguard trim	114
Removing back panel of backguard	115
Removing fluorescent lamp socket	116
Removing splasher panel	116
Removing grates, griddle cover griddle fifth burner pan and main top	116
Removing pressure regulator	116

Removing top burners	117
Removing top burner igniters	117
Removing main top support rod	117
Removing top burner knobs	118
Removing control panel	118
Removing top burner igniter switch	118
Removing top burner valves	118
Removing manifold pipe	119
Removing the latch handle knob	119
Removing lock mechanism cover	119
Removing lock mechanism arm	119
Removing lock switch arm	120
Removing lock mechanism	120
Removing burner box side panels	120
Removing the burner box	121
Oven door	121
Removing oven door seal	121
Oven door removal	121
Removing the oven door trim	121
Removing oven door handle	122
Removing door glass	122
Removing top outer glass spacers	122
Removing center door glass	122
Removing the wool shield	122
Removing the glass package	123
Removing inner door liner	123
Removing oven door springs	123
Removing oven door hinge	123
Removing storage drawer	123
Removing storage drawer handle	123
Removing storage drawer panel	124
Removing storage drawer rollers	124
Removing storage drawer rails	124
Removing storage drawer front panel	124
Removing the oven bottom	125
Removing bake burner baffle	125
Removing bake burner igniter	125
Removing bake burner	125
Removing the bake burner pan	125
Removing oven valve cover	126
Removing oven safety valve	126
Removing broil burner	126
Removing the broil burner igniter	127
Removing broil burner baffle	127
Removing oven vent	127
Removing oven light cover	128
Removing oven light bazel	128
Removing oven light socket	128
Removing rear cover	128
Removing oven sensor	128
Removing spark module	129
Removing lock switch	129
Removing bodyside panels	129

QUICK REFERENCE SHEET

1. Serial number breakdown:



2. Oven sensor resistance chart:

RTD SCALE	
Temperature °F	Resistance in Ohms
32 +/- 1.9	1000 +/- 4.0
75 +/- 2.5	1091 +/- 5.3
250 +/- 4.4	1453 +/- 8.9
350 +/- 5.4	1654 +/- 10.8
450 +/- 6.9	1852 +/- 13.5
550 +/- 8.2	2047 +/- 15.8
650 +/- 9.6	2237 +/- 18.5
900 +/- 13.6	2697 +/- 24.4

3. Oven igniter current spec:

3.2 to 3.6 amps

MAXIMUM SURFACE TEMPERATURES (allowed for gas and electric ranges)

When Electrolux tests side panels and doors for skin temperature, certain U.L. and/or A.G.A. guide lines must be followed.

1. Product must be undamaged, correctly assembled and have the correct oven temperature.
2. All skin temperatures are based on a room temperature of 77°F (25°C) and an oven set temperature of 400°F.
3. Oven must be cycling at 400°F for one hour before test is conducted.
4. Pyrometers, (temperature testers), must be of high quality and properly adjusted.
5. An increase or decrease of 1°F in the room ambient temperature, will allow a 1°F increase or decrease in the maximum allowable surface temperature of the range.

Side Panel, Painted 152°F

Side Panel, Porcelain 160°F

Oven Door, Glass 172°F

Oven Door, Painted 152°F

Oven Door, Porcelain 160°F

Warmer Drawer, Painted 152°F

Warmer Drawer, Porcelain 160°F

Cooktop No Temperature Limits Apply

Lower Console No Temperature Limits Apply

Oven Vent Area No Temperature Limits Apply

	Knobs and Handles		Skirt	
	Plastic*	Metal	Plastic*	Metal
Conventional Gas & Electric	167°F	131°F	182°F	152°F
Self-Clean Gas at Clean Temperature	167°F	131°F	182°F	152°F
Self-Clean Gas at Clean Temperature	182°F	152°F	182°F	152°F

* Includes plastic with metal plating not more than 0.005" thick and metal with a plastic or vinyl covering not less than 0.005" thick

SECTION A - 30" GAS RANGE INSTALLATION INSTRUCTIONS

INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER.
IMPORTANT: SAVE FOR LOCAL ELECTRICAL INSPECTOR'S USE.
 READ AND SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE.

⚠ WARNING If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.



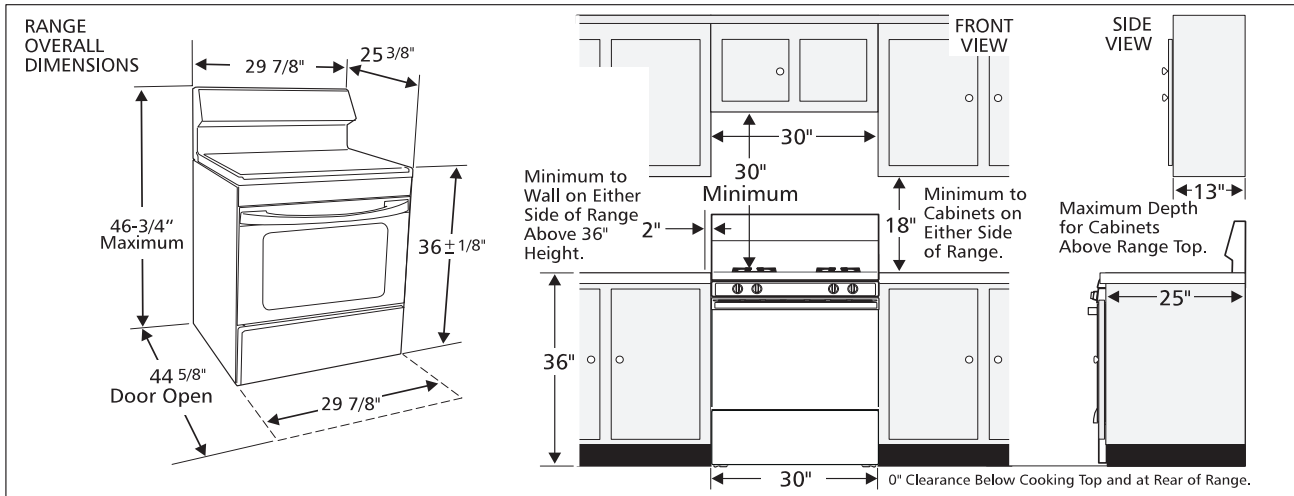
FOR YOUR SAFETY:

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS:**
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.



⚠ WARNING

- ALL RANGES CAN TIP
- INJURY TO PERSONS COULD RESULT
- INSTALL ANTI-TIP DEVICE PACKED WITH RANGE
- SEE INSTALLATION INSTRUCTIONS



Clearances and Dimensions

1. **Location—Check location where the range will be installed.** Check for proper electrical and gas supply, and the stability of the floor.
2. **Dimensions that are shown must be used.** Given dimensions provide minimum clearance. Contact surface must be solid and level.

Provide Proper Fuel Type

Before Proceeding: Your range is preset to operate on natural gas only. Some models are shipped convertible with parts and conversion instructions supplied. Other models have a LP/Propane Conversion Kit available through your dealer.

⚠ CAUTION **DO NOT** attempt to convert this range to LP/Propane settings without the proper LP/Propane conversion kit provided with the range or obtained from your dealer. Follow all instructions provided with the conversion kit.

Important Notes to the Installer

1. Read all instructions contained in these installation instructions before installing range.
2. Remove all packing material from the oven compartments before connecting the gas and electrical supply to the range.
3. Observe all governing codes and ordinances.
4. Be sure to leave these instructions with the consumer.

Important Note to the Consumer

1. Keep these instructions with your owner's guide for future reference.

IMPORTANT SAFETY INSTRUCTIONS

Installation of this range must conform with local codes or, in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1—latest edition when installed in the United States.

This range has been design certified by CSA International. As with any appliance using gas and generating heat, there are certain safety precautions you should follow. You will find them in the Use & Care Manual, read it carefully.

- **Be sure your range is installed and grounded properly by a qualified installer or service technician.**
- **This range must be electrically grounded in accordance with local codes or, in their absence, with the National Electrical Code ANSI/NFPA No .70—latest edition when installed in the United States.** See Grounding Instructions on page 19.
- **Before installing the range in an area covered with linoleum or any other synthetic floor covering, make sure the floor covering can withstand heat at least 90°F above room temperature without shrinking, warping or discoloring.** Do not install the range over carpeting unless you place an insulating pad or sheet of 1/4-inch thick plywood between the range and carpeting.
- **Make sure the wall coverings around the range can withstand the heat generated by the range.**
- **Do not obstruct the flow of combustion air at the oven vent nor around the base or beneath the lower front panel of the range.** Avoid touching the vent openings or nearby surfaces as they may become hot while the oven is in operation. This range requires fresh air for proper burner combustion.

⚠ WARNING Never leave children alone or unattended in the area where an appliance is in use. As children grow, teach them the proper, safe use of all appliances. Never leave the oven door open when the range is unattended.

⚠ WARNING Stepping, leaning or sitting on the doors or drawers of this range can result in serious injuries and can also cause damage to the range.

- **Do not store items of interest to children in the cabinets above the range.** Children could be seriously burned climbing on the range.
- **To eliminate the need to reach over the surface burners, cabinet storage space above the burners should be avoided.**
- **Adjust surface burner flame size so it does not extend beyond the edge of the cooking utensil.** Excessive flame is hazardous.
- **Do not use the oven as a storage space.** This creates a potentially hazardous situation.
- **Never use your range for warming or heating the room.** Prolonged use of the range without adequate ventilation can be dangerous.
- **Do not store or use gasoline or other flammable vapors and liquids near this or any other appliance.** Explosions or fires could result.
- **Reset all controls to the "off" position after using a programmable timing operation.**

FOR MODELS WITH SELF-CLEAN FEATURE:

- **Remove broiler pan, food and other utensils before self-cleaning the oven.** Wipe up excess spillage. Follow the precleaning instructions in the Owner's Guide.
- **Unlike the standard gas range, THIS COOKTOP IS NOT REMOVABLE.** Do not attempt to remove the cooktop.

⚠ WARNING DO NOT MAKE ANY ATTEMPT TO OPERATE THE ELECTRIC IGNITION OVEN DURING AN ELECTRICAL POWER FAILURE. RESET ALL OVEN CONTROLS TO "OFF" IN THE EVENT OF A POWER FAILURE.

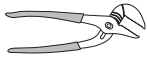
The electric ignitor will automatically re-ignite the oven burner when power resumes if the oven thermostat control was left in the "ON" position.

When an electrical power failure occurs during use, the surface burners will continue to operate.

During a power outage, the surface burners can be lit with a match. Hold a lighted match to the burner, then slowly turn the knob to the LITE position. Use extreme caution when lighting burners this way.

Before Starting - Tools You Will Need For Leveling Legs and Anti-Tip Bracket:

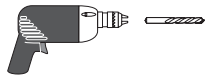
- Adjustable wrench or channel lock pliers



- 5/16" Nutdriver or Flat Head Screw Driver



- Electric Drill & 1/8" Diameter Drill Bit (5/32" Masonry Drill Bit if installing in concrete)




For gas supply connection:

- Pipe wrench 


For burner flame adjustment:

- Phillips head  and blade-type screwdrivers 

For gas conversion (LP/Propane or Natural):

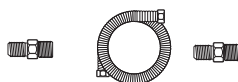
- Open end wrench - 1/2" 

Additional Materials You Will Need:

- Gas line shut-off valve 
- Pipe joint sealant that resists action of LP/Propane gas



- A new flexible metal appliance conduit (1/2" NPT x 3/4" or 1/2" I.D.) must be design certified by CSA International. Because solid pipe restricts moving the range we recommend using a new flexible conduit (4 to 5 foot length) for each new installation and additional reinstallations.



- Always use the (2) new flare union adapters (1/2" NPT x 3/4" or 1/2" I.D.) supplied with the new flexible appliance conduit for connection of the range.

Normal Installation Steps:

1. Anti-Tip Bracket Installation Instructions

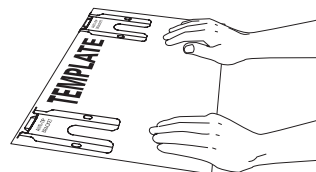
Important Safety Warning:

To reduce the risk of tipping of the range, the range must be secured to the floor by a properly installed anti-tip bracket and screws packed with the range. Failure to install the anti-tip bracket will allow the range to tip over if excessive weight is placed on an open door or if a child climbs upon it. Serious injury might result from spilled hot liquids or from the range itself.

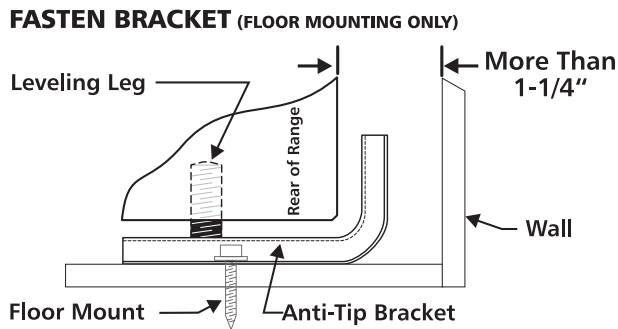
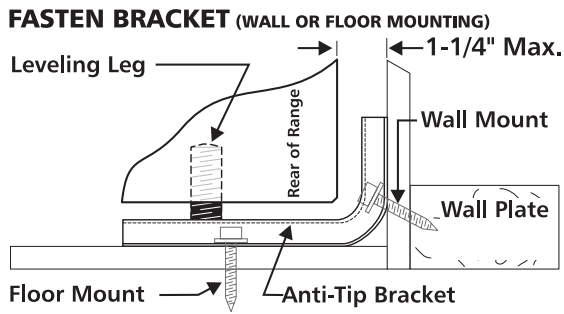
If range is ever moved to a different location, the anti-tip brackets must also be moved and installed with the range.

Instructions are provided for installation in wood or cement fastened to either the floor or wall. When installed to the wall, make sure that screws completely penetrate dry wall and are secured in wood or metal. When fastening to the floor or wall, be sure that screws do not penetrate electrical wiring or plumbing.

- A. Locate the Bracket Using the Template** - (Bracket may be located on either the left or right side of the range. Use the information below to locate the bracket if template is not available). Mark the floor or wall where left or right side of the range will be located. If rear of range is against the wall or no further than 1-1/4" from wall when installed, you may use the wall or floor mount method. If molding is installed and does not allow the bracket to fit flush against the wall, remove molding or mount bracket to the floor. For wall mount, locate the bracket by placing the back edge of the template against the rear wall and the side edge of template on the mark made referencing the side of the range. Place bracket on top of template and mark location of the screw holes in wall. If rear of range is further than 1-1/4" from the wall when installed, attach bracket to the floor. For floor mount, locate the bracket by placing back edge of the template where the rear of the range will be located. Mark the location of the screw holes, shown in template.

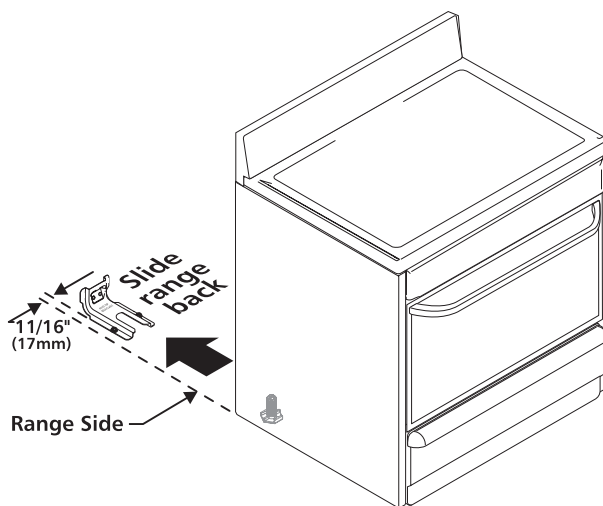


- B. Drill Pilot Holes and Fasten Bracket** - Drill a 1/8" pilot hole where screws are to be located. If bracket is to be mounted to the wall, drill pilot hole at an approximate 20° downward angle. If bracket is to be mounted to masonry or ceramic floors, drill a 5/32" pilot hole 1-3/4" deep. The screws provided may be used in wood or concrete material. Use a 5/16" nutdriver or flat head screwdriver to secure the bracket in place.



C. Level and Position Range

Level range by adjusting the (4) leveling legs with a wrench. Note: A minimum clearance of 1/8" is required between the bottom of the range and the leveling leg to allow room for the bracket. Use a spirit level to check your adjustments. Slide range back into position. Visually check that rear leveling leg is inserted into and fully secured by the Anti-Tip Bracket by removing lower panel or storage drawer. For models with a warmer drawer or broiler compartment, grasp the top rear edge of the range and carefully attempt to tilt it forward.



2. Provide an adequate gas supply.

This unit is pre-set to operate on 4" natural gas manifold

pressure. A convertible pressure regulator is connected to the manifold and **MUST** be connected in series with the gas supply line. If the LP/Propane conversion kit has been used, follow instructions provided with the kit for converting the pressure regulator to LP/Propane use.

Care must be taken during installation of range not to obstruct the flow of combustion and ventilation air.

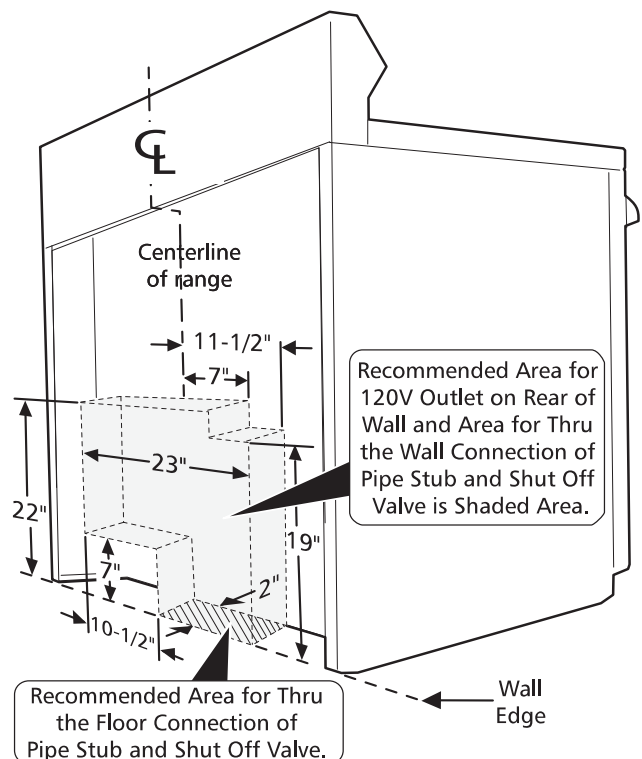
For proper operation, the maximum inlet pressure to the regulator should be no more than 14 inches of water column pressure. The inlet pressure to the regulator must be at least 1 inch greater than regulator manifold pressure. Examples: If regulator is set for natural gas 4 inch manifold pressure, inlet pressure must be at least 5 inches; if regulator has been converted for LP/Propane gas 10 inch manifold pressure, inlet pressure must be at least 11 inches.

Leak testing of the appliance shall be conducted according to the instructions in step 4g.

The gas supply line should be 1/2" or 3/4" I.D.

3. Seal the openings.

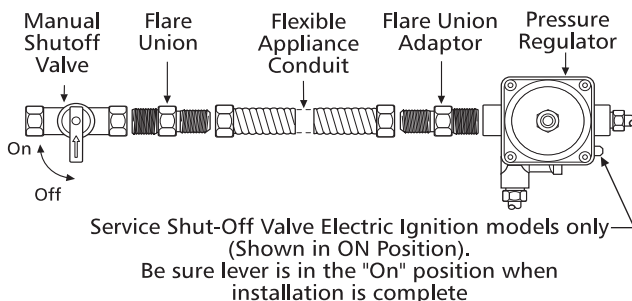
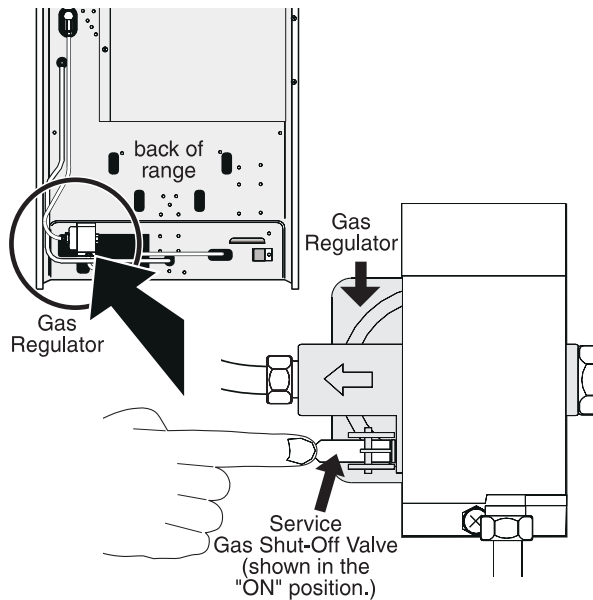
Seal any openings in the wall behind the range and in the floor under the range after gas supply line is installed.



4. Connect the range to the gas supply.

To prevent leaks, put a pipe joint sealant on all male (outside) pipe threads. The regulator is in the location shown below.

CAUTION Do not allow regulator to turn on pipe when tightening fittings.



- Install an external manual gas shut-off valve to gas supply line in an easily-accessible location outside of the range. Be sure you know how and where to shut-off the gas supply to the range.
- Attach appliance conduit to flare union on regulator.
- Attach appliance conduit to the flare union on the regulator.
- Install flare union adaptor to external manual shut-off valve.
- Attach appliance conduit to flare union on shut-off valve.

- Make sure service shut-off valve on pressure regulator is in "ON" position.
- Check for leaks. Turn the gas supply on to the range and use a liquid leak detector at all joints and conduits to check for leaks in the system.

WARNING Do not use a flame to check for gas leaks.

Checking Manifold Gas Pressure

See page 23.

5. Read electrical connection details below and connect electricity to range.

WARNING Before servicing, disconnect electrical supply at circuit breaker, fuse or power cord.

Electric Requirements:

An individual, properly grounded and polarized branch circuit protected by a 15 amp. circuit breaker or time delay fuse. See serial plate for proper voltage.

Extension Cord Precautions:

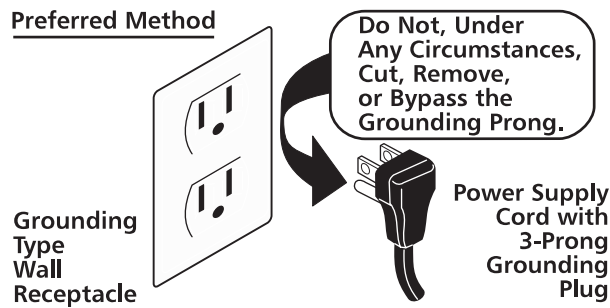
Because of potential safety hazards under certain conditions, we strongly recommend against the use of any extension cord. However, if you still elect to use an extension cord, it is absolutely necessary that it be a UL listed 3-wire grounding type appliance extension cord and that the current carrying rating of the cord in amperes be equivalent to or greater than the branch circuit rating. Such extension cords are obtainable through your local service organization.

WARNING PLEASE READ CAREFULLY! For personal safety, this product must be properly grounded.

Grounding Instructions:

The power cord of this appliance is equipped with a 3-prong (grounding) plug which mates with a standard 3-prong grounding wall receptacle to minimize the possibility of electric shock hazard from this appliance. The customer should have the wall receptacle and circuit checked by a qualified electrician to make sure the receptacle is properly grounded and polarized.

Where a standard two-prong wall receptacle is encountered, it is the personal responsibility and obligation of the customer to have it replaced with a properly grounded three-prong wall receptacle.



DO NOT, UNDER ANY CIRCUMSTANCES, CUT OR REMOVE THE THIRD (GROUND) PRONG FROM THE POWER CORD.

Surface Burners:

See Page 21.

6. Installation of Burner Cap Assembly

See Page 22.

7. Electric Ignition Surface Burners

Operation of electric igniters should be checked after range and supply line connectors have been carefully checked for leaks and range has been connected to electric power.

- a) To check for proper lighting, **push in and turn** a surface burner knob **counterclockwise** to the **LITE** position. You will hear the igniter sparking.
- b) The surface burner should light when gas is available to the top burner. Purge air from supply lines by leaving knob in the **LITE** position until burner ignites. Each burner should light within four (4) seconds in normal operation after air has been purged from supply lines.
- c) Visually check that burner has lit. Once the burner lights, the control knob should be turned out of the LITE position.
- d) There are separate electrodes (igniters) for each burner. Try each knob separately until all burner valves have been checked.
- e) If burner goes out, reset control to OFF.

8. Adjust the "LOW" Setting of Surface Burner Valve (Linear Flow Valves Only):

See Page 23.

Operation of Oven Burners and Oven Adjustments

9. Electric Ignition Burners:

Operation of electric igniters should be checked after range and supply line connectors have been carefully checked for leaks and range has been connected to electric power.

The oven burner is equipped with an electric control system as well as an electric oven burner igniter. If your model is equipped with a waist-high broil burner, it will also have an electric burner igniter. These control systems require no adjustment. When the oven is set to operate, current will flow to the igniter. It will "glow" similar to a light bulb. When the igniter has reached a temperature sufficient to ignite gas, the electrically controlled oven valve will open and flame will appear at the oven burner. There is a time lapse from 30 to 60 seconds after the thermostat is turned ON before the flame appears at the oven burner. When the oven reaches the dial setting, the glowing igniter will go off. The burner flame will go "out" in 20 to 30 seconds after the igniter goes "OFF." To maintain any given oven temperature, this cycle will continue as long as the dial (or display) is set to operate.

After removing all packing materials and literature from the oven:

- a) Set oven to BAKE at 300°F. See [Use & Care Manual](#) for operating instructions.
- b) Within 60 seconds the oven burner should ignite. Check for proper flame, and allow the burner to cycle once. Reset controls to off.
- c) If your model is equipped with a waist-high broiler, set oven to BROIL. See [Use & Care Manual](#) for operating instructions.
- d) Within 60 seconds the broil burner should ignite. Check for proper flame. Reset controls to off.

10. Air Shutter-Oven Burner

See Page 24

11. Air Shutter-Broil Burner

See page 24

12. Make Sure Range is Level.

Level the range by placing a level horizontally on an oven rack. Check diagonally from front to back, then level the range by either adjusting the leveling legs or by placing shims under the corners of the range as needed.

13. After installation is complete, make sure all controls are left in the OFF position.

Instructions for converting range to operate on Liquefied Petroleum Gas



**INSTALLATION AND SERVICE MUST BE PERFORMED BY
A QUALIFIED INSTALLER.
IMPORTANT: SAVE FOR LOCAL ELECTRICAL INSPECTOR'S USE.
READ AND SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE.**



⚠ WARNING This conversion kit must be installed by a qualified service technician in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. Failure to follow instructions may result in fire, explosion or production of carbon monoxide causing property damage, personal injury or loss of life. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with this kit.

⚠ CAUTION Before proceeding with the conversion, shut off the gas supply before disconnecting electrical power to the range. Be sure both power supplies are off before installing the conversion kit. Failure to do so could cause serious bodily injury.

Determine the combination of top burners that are featured on your range. Then identify the parts you need from this kit to complete the LP conversion. When burners are converted from Natural to LP the BTU rating is as follows:

5,000 BTU* Natural Gas to 4,500 BTU* LP Gas 9,500 BTU* Natural Gas to 8,000 BTU* LP Gas
12,000 BTU* Natural Gas to 10,000 BTU* LP Gas 14,000 BTU* Natural Gas to 11,000 BTU* LP Gas

Quantity	Part Number	Part Description	Notes
1	316037526	L.P. Conversion Kit Label	English & French
1	316248105	Instructions for converting range to LP Gas	English, French & Spanish
1	316005215	Rating Plate - English	4 - 8K
1	316005216	Rating Plate - English	3 + 1
1	316005217	Rating Plate - English	2 + 1 + 1
1	316005218	Rating Plate - English	1 + 1 + 1 + 1
1	316005219	Rating Plate - French	4 - 8K
1	316005220	Rating Plate - French	3 + 1
1	316005221	Rating Plate - French	2 + 1 + 1
1	316005222	Rating Plate - French	1 + 1 + 1 + 1
1	316241200	L.P. Conversion Label	English, French & Spanish
1	316237904	Orifice - 11,000 BTU*	RED
1	316237905	Orifice - 10,000 BTU*	GREEN
1	316237906	Orifice - 8,000 BTU*	NO COLOR
1	316237907	Orifice - 4,500 BTU*	BLUE

***Note: For operation at elevations above 2000 ft., appliance rating shall be reduced at the rate of 4 percent for each 1000 ft. above sea level.**

IMPORTANT: After replacing the natural gas to LP orifices, be sure to keep the original factory installed natural gas orifices for future range conversion back to natural gas. The factory orifices are marked with 101 for 5,000 BTU; 154 for 9,500 BTU; 175 for 12,000 BTU and 193 for 14,000 BTU.

Tools Required for L.P. Conversion:

3/8", 1/2" and 5/8" Open End Wrench 

1/8" Wide Flat Blade Screwdriver 

7mm Nutdriver 

How to Convert the Range for use with LP/Propane Gas

1. Convert the Pressure Regulator

To access the gas regulator, remove the storage drawer or warmer drawer. If equipped with a storage drawer, open and remove the drawer completely. For models equipped with a storage drawer or front panel, remove the storage or front panel and skip steps a & b below. For models equipped with warmer drawer, follow all the instructions below to remove the warmer drawer.

- ⚠ WARNING** Electrical Shock Hazard can occur and result in serious injury or death. Disconnect electrical power to the range before removing the warmer drawer for servicing.
- Locate glide lever on each side of drawer, pull up on the left glide lever and push down on the right glide lever (See Figure 1).

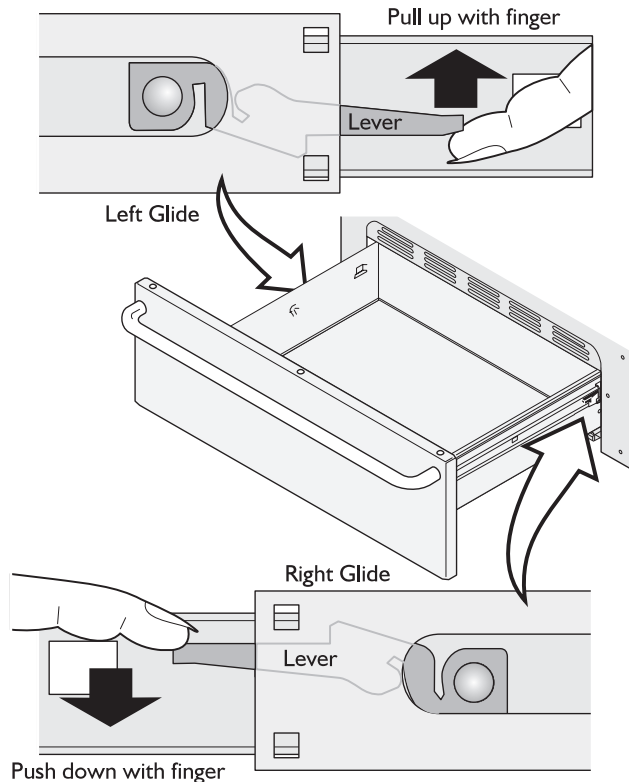


Figure 1

- Pull the drawer away from the range (See Figure 2).
- Remove the regulator access cover if equipped. **Do not remove the Pressure Regulator or allow it to turn.**
- Remove the dust protector from the cap. Using a 5/8" wrench, unscrew the cap from the pressure regulator. **Do not remove the spring from the regulator.**

- Turn the cap over so the hollow end faces outward. Place the solid end of the cap into the loop end of the dust protector (See Figure 3).
- Replace the cap on the regulator. The letters LP should be visible on the exposed end of the cap. Snap the dust protector over the regulator cap.

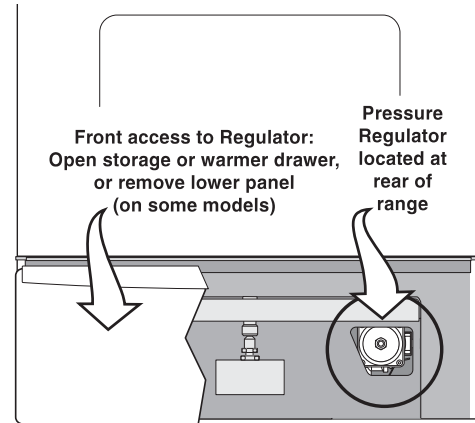


Figure 2

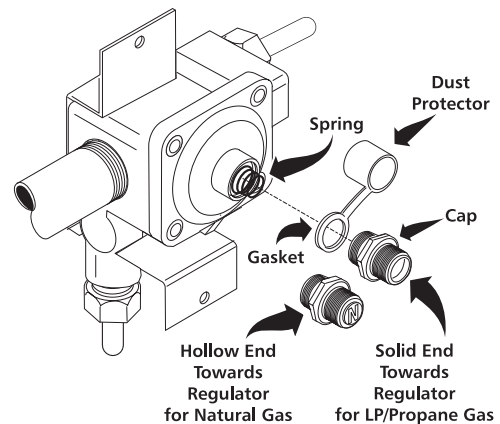


Figure 3

Possible Surface Burner configurations

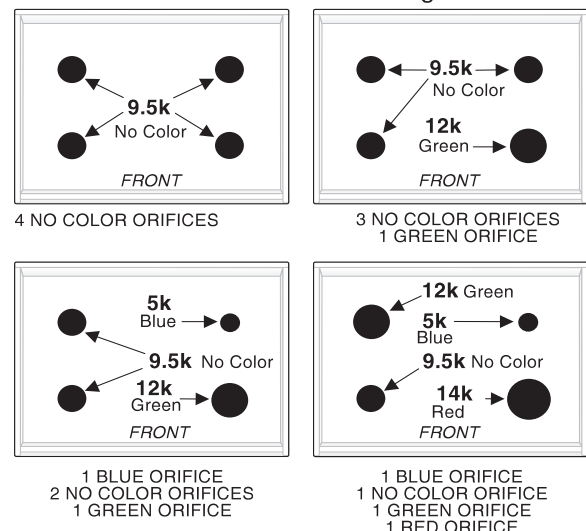


Figure 4

Natural Gas Orifice to LP Orifice Conversion for each type of burner

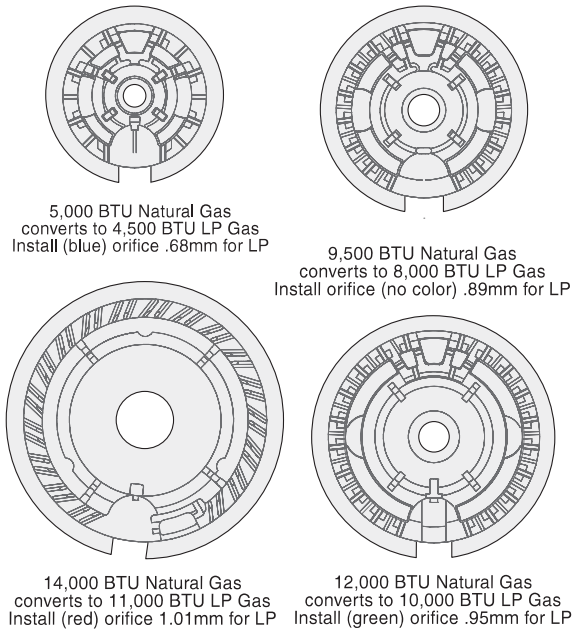


Figure 5

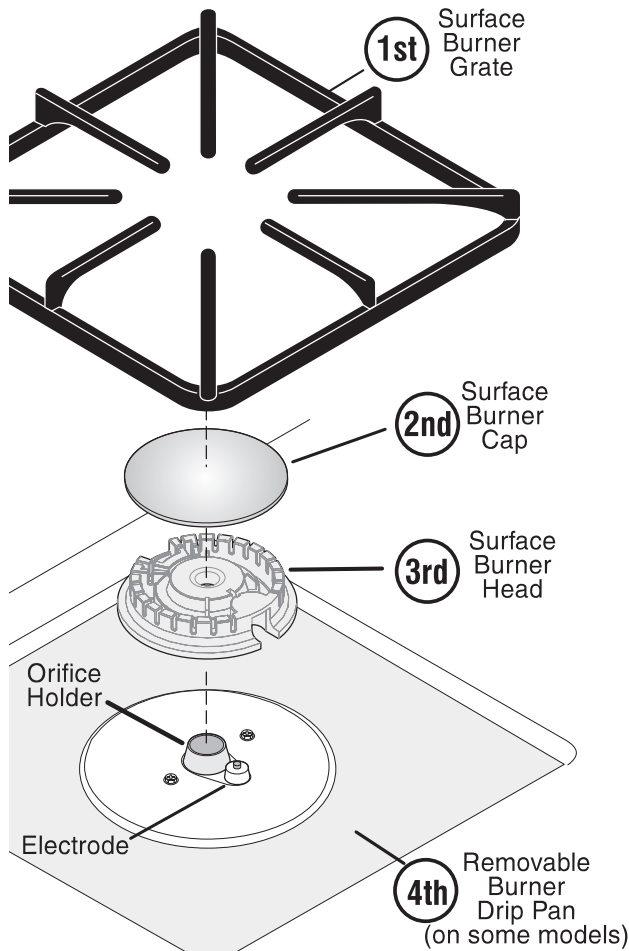


Figure 6

2. Convert Surface Burners for use with LP/Propane Gas

CAUTION Unlike the standard gas range, **THIS COOKTOP IS NOT REMOVABLE**. Do not attempt to remove this cooktop. Save the natural gas orifices removed from the appliance for possible future conversions to natural gas.

For all burner locations:

- Remove the top grate and burner cap (See Figure 6).
- Use your hand to remove the burner head.
- Remove the four factory installed natural gas orifices from the center of the orifice holders using a 7 mm nutdriver (See Figure 7). Remember to keep the original Natural Gas Orifices for later conversion to Natural Gas. Refer to page 1 under "IMPORTANT" to identify their markings.
- Replace the orifice in each of the four orifice holders with the correct LP/Propane gas orifice (refer to the LP Kit chart listed on page 1; also refer to Figures 4 and 5 for the correct LP orifice installation at each of the four surface burner locations). Tighten each orifice until snug. Use caution not to overtighten.
- Replace the four burner heads (be sure burner head mates correctly with each surface igniter) then replace the burner caps and grates.

WARNING Use caution when replacing each burner cap so the electrode is not damaged.

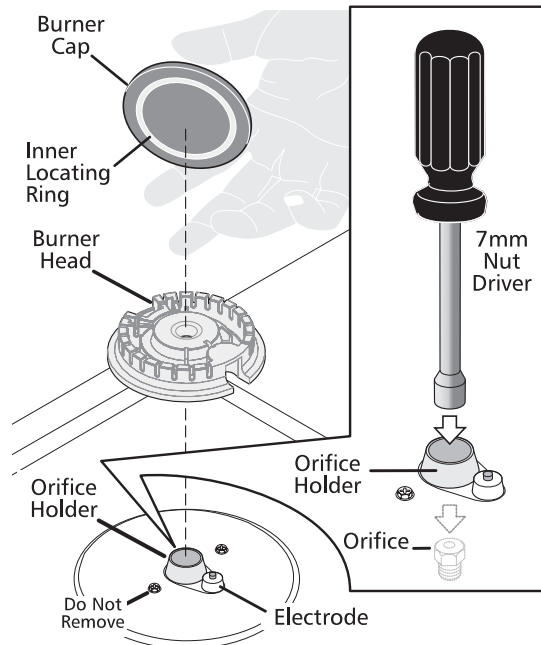


Figure 7

3. Convert Oven Burner Orifice for LP/Propane Gas (16,000 BTU*)

- a. Locate the oven burner spud (See Figure 8).
- b. Using a 1/2" wrench, turn down the adjustable spud, which injects gas into the oven burner, until snug against the LP/Propane metering pin (approximately 2-1/2 turns). **Do not over tighten.**

4. Convert Waist-High Broiler Burner Orifice Flame for LP/Propane Gas (13,500 BTU*) —Self-Cleaning Models Only

- a. Open the oven door.
- b. Locate the broiler burner spud and turn down until snug against the LP/Propane metering pin (approximately 2-1/2 turns). **Do not over tighten** (See Figure 8).

5. Reconnect Gas and Electrical Supply to Range.

Leak testing of the appliance shall be conducted according to the Installation Instructions provided with the Range.

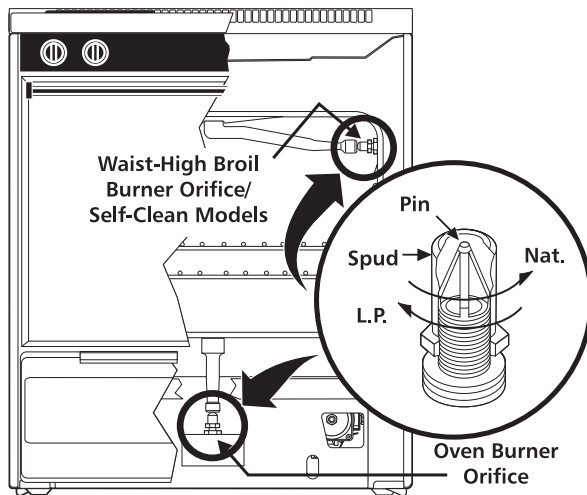


Figure 8

Checking Manifold Gas Pressure

If it should be necessary to check the manifold gas pressure, remove the burner cap and connect a manometer (water gauge) or other pressure device to the top right front burner orifice. Using a rubber hose with inside diameter of approximately 1/4," hold tubing down tight over orifice. Turn burner valve on. For an accurate pressure check, have at least two (2) other surface burners burning. Be sure the gas supply (inlet) pressure is at least one inch above specified range manifold pressure. The gas supply pressure should never be over

14" water column. When properly adjusted the manifold water column pressure is 10" for LP/Propane gas or 4" for Natural gas.

⚠ CAUTION Do not use a flame to check for gas leaks.

- a. Disconnect the range and its individual shut-off valve from the gas supply piping system during any pressure testing of that system at test pressures greater than 14" of water column pressure (approximately 1/2" psig).
- b. The appliance must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 14" of water column pressure (approximately 1/2" psig).

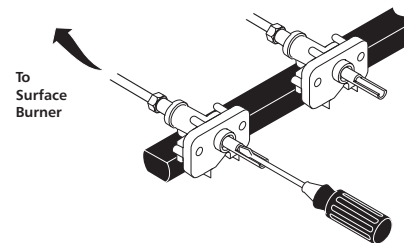


Figure 9

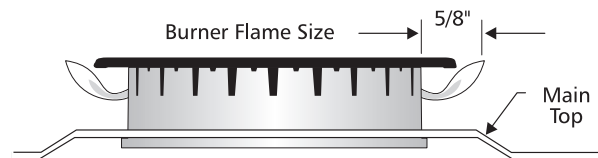


Figure 10

Test to verify if "LOW" setting should be adjusted:

- a. Push in and turn control to LITE until burner ignites.
- b. Push in and quickly turn knob to LOWEST POSITION.
- c. If burner goes out, reset control to OFF.
- d. Remove the surface burner control knob.
- e. Insert a thin-bladed screwdriver into the hollow valve stem and engage the slotted screw inside. Flame size can be increased or decreased with the turn of the screw. Turn counterclockwise to increase flame size. Turn clockwise to decrease flame size. (See Figures 9 and 10).
Adjust flame until you can quickly turn knob from LITE to LOWEST POSITION without extinguishing the flame. Flame should be as small as possible without going out.

7. Air Shutter-Oven Burner

The air shutter for the oven burner may need adjustment, especially if the unit has been converted for use with LP/ Propane gas. The approximate flame length of the oven burner is 1 inch (distinct inner, blue flame) (See Figure 11).

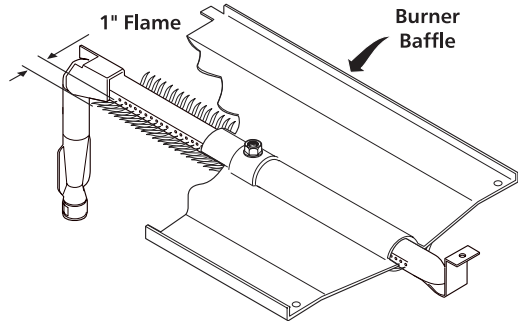


Figure 11

To determine if the oven burner flame is proper:

- To access the air shutter you must remove the warmer drawer.
- Remove the oven bottom by removing the screws at rear of oven bottom. Lift up the rear of oven bottom and slide toward back of range to disengage from front of oven front frame.
- Remove burner baffle by removing nut located on top of baffle and two screws from front edge of oven front frame. Lift baffle straight up and out of the oven.
- Set the oven to bake at 350°F and observe the flame. If the flame is yellow in color, increase air shutter opening size. If the flame is a distinct blue color, but lifting away from the burner; reduce the air shutter opening size.
- Turn off oven and allow to cool before adjusting air shutter. To adjust loosen lock-screw (See Figure 12), reposition air shutter, and tighten lock-screw.

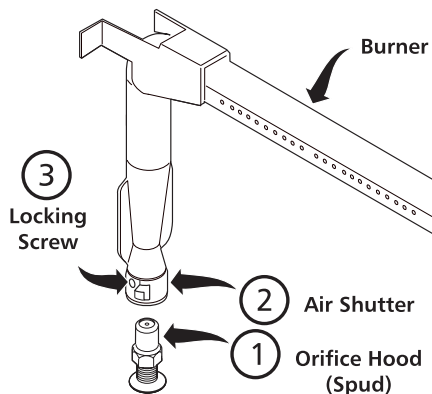


Figure 12

Retest the burner by repeating step “d” above. When the burner flame is a distinct blue color burning steady, the air shutter is adjusted correctly.

- Replace burner baffle and oven bottom.

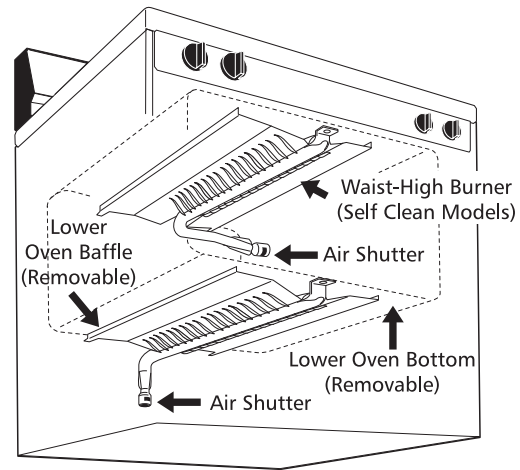


Figure 13

8. Air Shutter-Broil Burner

- Observe the flame to determine if the broiler burner flame is properly adjusted. It should be steady with approximately 1" blue cones and no yellow or orange flame tips (See Figure 13).
- If adjustment to the air shutter is necessary, locate the broiler burner air shutter (See figure 14), loosen shutter lock screw, and adjust to obtain optimum flame. This will normally be completely open for LP/ Propane gas. If the flame is yellow in color, increase the air shutter opening size. If the flame is a distinct blue, but lifting away from the burner, reduce the air shutter opening size. Tighten the shutter set screw.

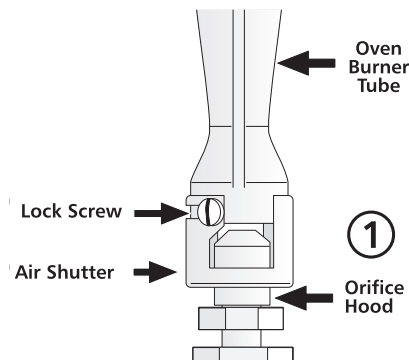


Figure 14

9. Replace Storage Drawer or Warmer Drawer (instructions for warmer drawer if equipped):

- a. **Pull the bearing glides to the front** of the chassis glide (See Figure 15).
- b. Align the glide on each side of the drawer with the glide slots on the range.
- c. Push the drawer into the range until levers “click” (approximately 2”). Pull the drawer open again to seat bearing glides into position. **If you do not hear the levers “click” or the bearing glides do not feel seated remove the drawer and repeat steps “a” through “c”.** This will minimize possible damage to the bearing glides.
- c. Remove the four LP orifices using 7mm nutdriver and replace with the four original factory installed natural gas orifices at their original locations (See figure 4 for locations).
- d. Convert Oven Burner Orifice for Natural Gas by loosening spud counter-clockwise (approximately 2-1/2 turns; See step 3).
- e. Convert Waist-High Broiler Burner Orifice (Self-Cleaning Models Only) for Natural Gas by loosening spud counter-clockwise (approximately 2-1/2 turns). (See step 4.)

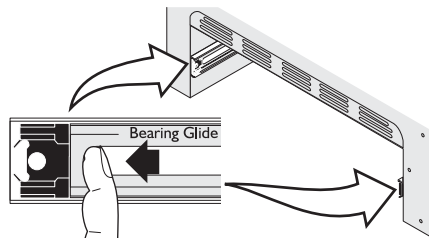


Figure 15

- f. Readjust “LOW” Setting for Surface Burner Valves following instructions. (See step 6.)
- g. Readjust Oven & Broil Burner Air Shutters. (See steps 7 & 8.)

10. Installation of New LP/Propane Rating/Serial Plate

Record the model and serial number on the LP/Propane Rating/Serial plate provided in this kit. The information can be obtained from the existing Rating/Serial plate. Place new plate as close as possible to the existing Rating/Serial plate on range (See the recommended locations shown in Figure 16).

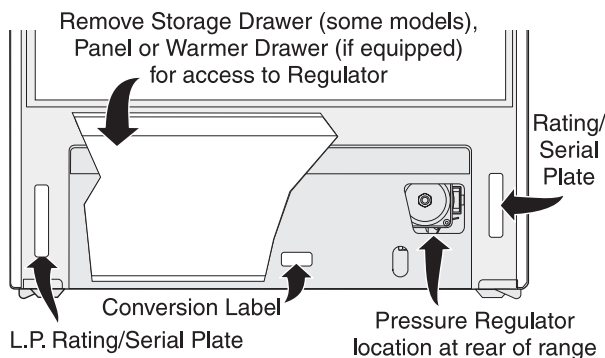


Figure 16

CONVERSION TO NATURAL GAS

If it becomes necessary to convert the range back to natural gas:

- a. Disconnect gas and electrical supply from range.
- b. Convert pressure regulator (See step 1), turn cap over so the solid end of cap faces outward. Place the hollow end of the cap into the loop end of the dust protector.

36" GAS RANGE INSTALLATION INSTRUCTIONS



INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER.

IMPORTANT: SAVE FOR LOCAL ELECTRICAL INSPECTOR'S USE. READ AND SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE.

⚠ WARNING If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

FOR YOUR SAFETY:

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS:**
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

Dimensions and Clearance

Provide adequate clearance between range and adjacent combustible surfaces.

TYPICAL CONTROL PANEL	X. HEIGHT
HI Profile Control Panel	45 5/8" min.
LO Profile Control Panel	40 7/8" Min.

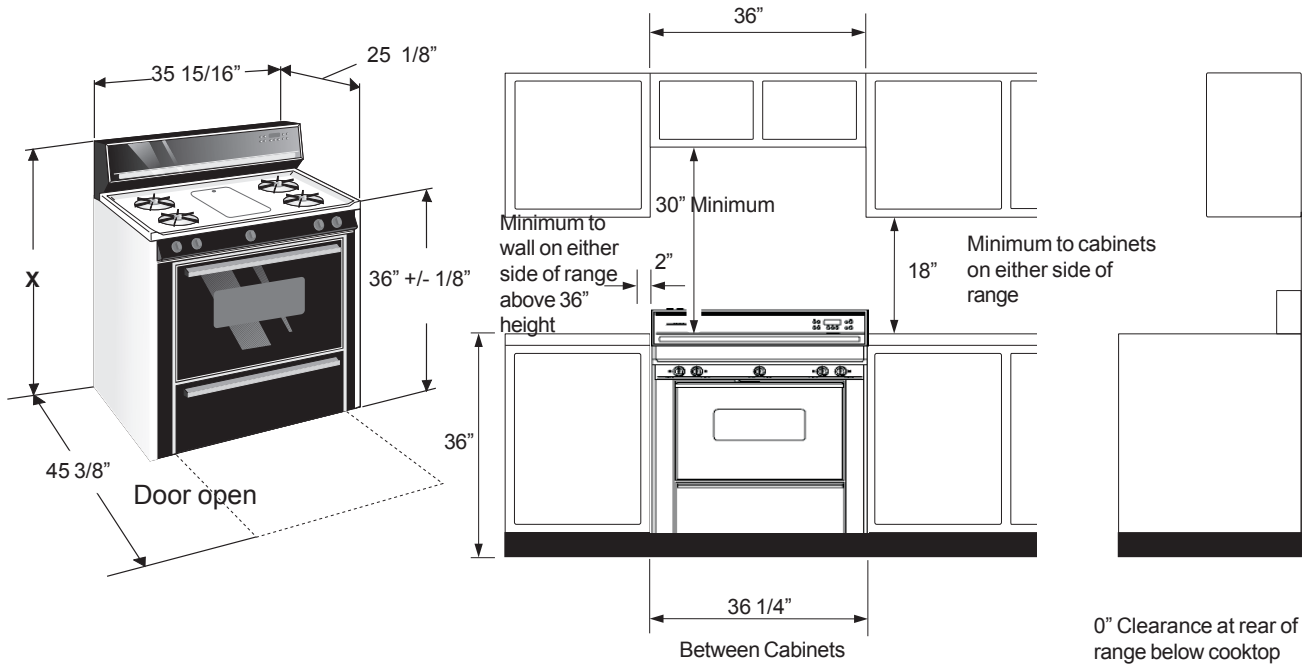


Figure 1

Important Notes to the Installer

1. Read all instructions contained in these installation instructions before installing the range.
2. Remove all packing material before connecting the electrical supply to the appliance.
3. Observe all governing codes and ordinances.
4. Be sure to leave these instructions with the consumer.

Important Note to the Consumer

Keep these instructions with your Use and Care Guide for future reference.

IMPORTANT SAFETY INSTRUCTIONS


Installation of this range must conform with local codes, or in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1—latest edition.

This range has been design certified by American Gas Association (A.G.A.). As with any appliance using gas and generating heat, there are certain safety precautions you should follow. You will find them in the Use and Care Guide, read it carefully.

- **Be sure your range is installed and grounded properly by a qualified installer or service technician.**
- **This range must be electrically grounded in accordance with local codes, or in their absence, with the National Electrical Code ANSI/NFPA No. 70—latest edition.**
- The installation of appliances designed for manufactured (mobile) home installation must conform with Manufactured Home Construction and Safety

Standard, title 24CFR, part 3280 [Formerly the Federal Standard for Mobile Home Construction and Safety, title 24, HUD (part 280)] or when such standard is not applicable, the Standard for Manufactured Home Installation 1982 (Manufactured Home Sites, Communities and Set ups), ANSI Z225.1

- **Before installing the range in area covered with linoleum or any other synthetic floor covering, make sure the floor covering can withstand heat at least 90°F above room temperature without shrinking, warping or discoloring. Do not install the range over carpeting unless you place an insulating pad or sheet of ¼" thick plywood between the range and carpeting.**
- **Make sure the wall coverings around the range can withstand the heat generated by the range.**
- Do not obstruct the flow of combustion air at the oven vent nor around the base or beneath the lower front panel of the range. Avoid touching the vent openings or nearby surfaces as they may become hot. This range requires fresh air for proper burner combustion.
- **Do not store items of interest to children in the cabinets above the range.** Children could be seriously burned climbing on the range to reach items.
- **To eliminate the need to reach over the surface burners, cabinet storage space above the burners should be avoided.**
- **Adjust surface burner flame size so it does not extend beyond the edge of the cooking utensil.** Excessive flame is hazardous.
- **Do not use the oven as a storage space.** This creates a potentially hazardous situation.
- **Never use your range for warming or heating the room.** Prolonged use of the range without adequate ventilation can be hazardous.
- **Do not store or use gasoline or other flammable vapors and liquids near this or any other appliance.** Explosions or fires could result.
- Remove broiler pan and other utensils and wipe up excess spillage before self-cleaning the oven (if equipped).

	<p>⚠ WARNING</p> <ul style="list-style-type: none">• All ranges can tip.• Injury to persons could result.• Install anti-tip device packed with range.	<p>⚠ WARNING</p> <p>To reduce the risk of tipping of the range, the range must be secured by properly installed anti-tip bracket (s) provided with the range. To check if the bracket(s) is installed properly, grasp the top rear edge of the range and carefully tilt it forward to make sure the range is anchored.</p>
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⚠ CAUTION Do not make any attempt to operate the electric ignition oven during an electrical power failure. Resumption of electric power when OVEN TEMP and OVEN SET controls are in any position other than OFF will result in automatic ignition of the oven or broiler burner.

In case of a power outage, you can light the surface burners on your range with a match. Hold a lighted match to the burner, then slowly turn the knob to the LITE position. Use extreme caution when lighting burners this way.

Surface burner in use when electrical power failure occurs will continue to operate normally.

The oven burner and broil burner on your range are lighted by electrical ignition. The oven and broiler cannot be operated in the event of a power failure.

1. Before Installing the Range

Remove shipping material

Remove all tape, shipping and packaging materials and the oven rack packaging. Lift up cooktop and remove the two shipping screws from the cooktop burners (see figure 2).

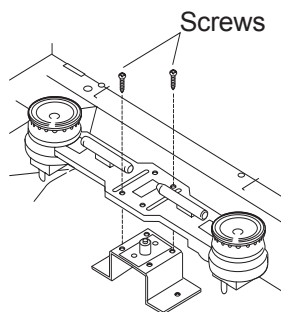


Figure 2

2. Provide an Adequate Gas Supply

This range is designed to operate on natural gas at 4" of manifold pressure or on LP gas at 10" of manifold pressure. It is shipped from the factory set for natural gas. If it is to be used with LP gas, adjustments must be made.

A convertible pressure regulator is connected in series with the manifold of the range and must remain in series with the supply line regardless of whether natural or LP gas is being used.

For proper operation, the maximum inlet pressure to the regulator must be no more than 14" of water column (W.C.) pressure.

For checking the regulator, the inlet pressure must be at least 1" water column pressure greater than the regulator manifold outlet setting. If the regulator is set for 4" of manifold pressure, the inlet pressure must be at least 5". If the regulator is set for 10", the inlet pressure must be at least 11".

The gas supply line into the range should be 1/2" or 3/4" I.D. flexible metal appliance connector five feet in length.

3. Seal the Openings

Seal any openings in the wall behind the range and in the floor under the range when hookups are completed.

4. Connect the Range to Gas

Refer to Figures 4 to 7 for recommended connections.

- A. Install a manual shut-off valve in the gas line in an easily accessible location outside of the range. Be sure you know how and where to shut-off the gas supply to the range.
- B. Install 1/2" flare union adaptor supplied with the connector, to the 1/2" NPT internal thread on pressure regulator.

Gas Connection for Electric Ignition Models

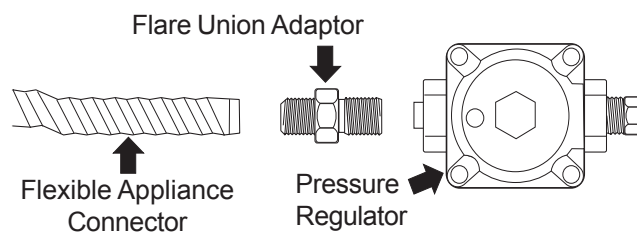


Figure 3

- C. Because solid pipe restricts moving the range we recommended use of A.G.A. design certified flexible metal appliance connector. Connect flexible appliance to flare union.
- D. Move range into approximate position and connect flexible appliance connector to gas supply line with proper flare union adaptor. The adaptor supplied with the flexible connector must be used.
- E. Check for leaks. Turn the gas supply on the range and use a liquid leak detector at all joints and connections to check for leaks in the system.

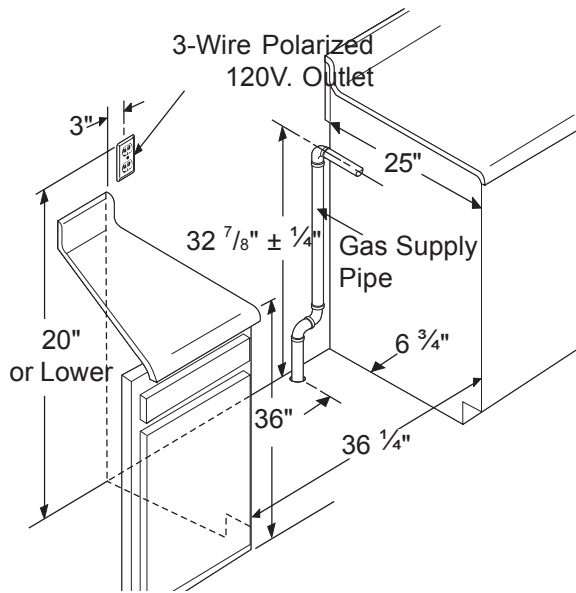


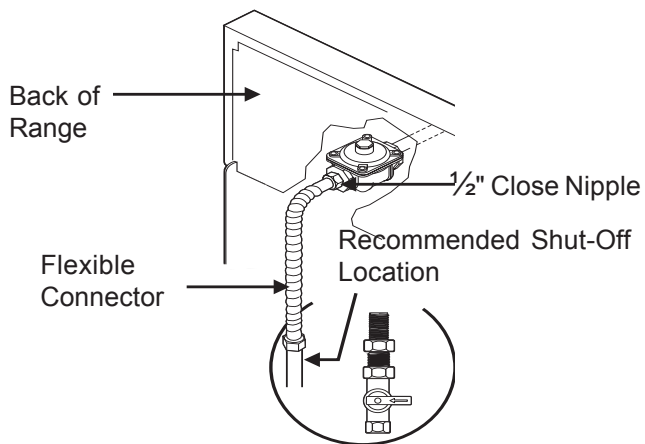
Figure 4

Recommended locations for installing the electrical outlet and pipe opening may be adjusted to meet specific requirements.

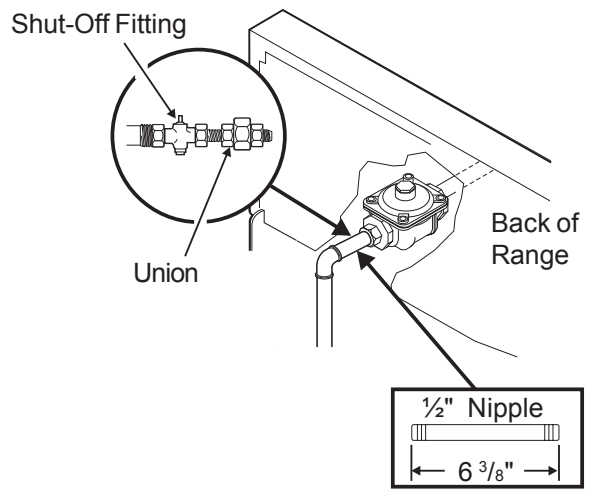
⚠ WARNING Do not use a flame to check for leaks from gas connections. Checking for leaks with a flame may result in a fire or explosion.

Disconnect this range and its individual shutoff valve from the gas supply piping system during any pressure testing of that system at test pressures greater than 14" of water column pressure (approx. 1/2" psig).

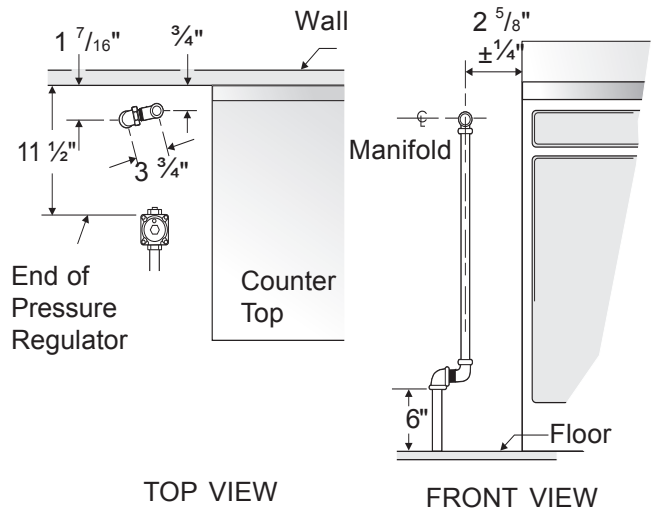
Isolate the range from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 14" of water column (approx. 1/2" psig).



**Flexible Connector Hookup
Figure 5**



**Solid Pipe Hookup
Figure 6**



Solid Pipe Hookup Detail

Figure 7

5. LP/Propane Gas Conversion

A. Pressure Regulator Conversion

Do Not Remove the Pressure Regulator

Remove cap-screw and snap out the nylon gas indicator by pushing it sideways. Turn the nylon gas indicator for type gas (Natural or LP) and snap it back in the cap-screw. Put cap-screw back on gas regulator.

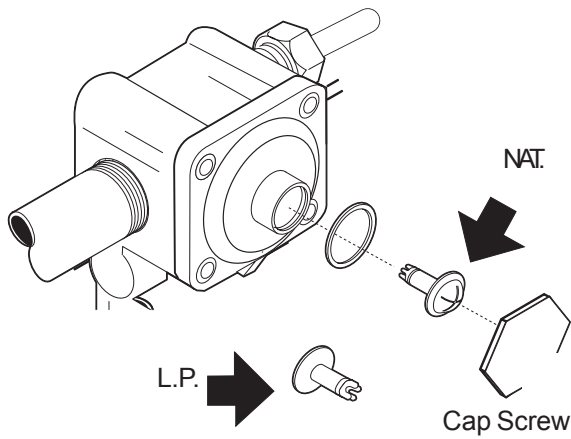
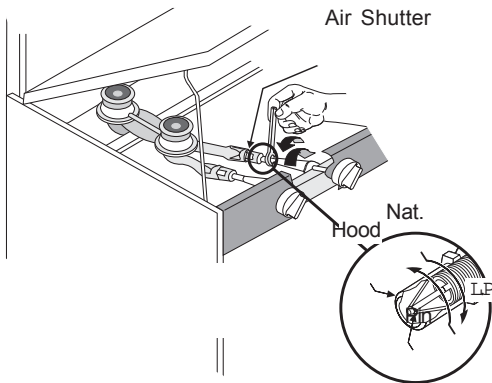


Figure 8

B. Surface Burner Valves Conversion



Top Burner Adjustment

Figure 9

1. Lift cooktop to gain access to the surface burner spuds.
2. With 1/2" wrench, turn spud down or clockwise until snug (approximately 2 1/2 turns). This restricts the flow of gas through spud to that allowed only by the hollow LP metering pin. **Do not overtighten.**

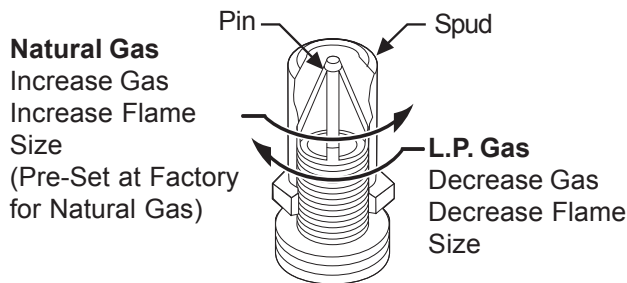


Figure 10

3. Lower main top and apply gas to check for proper flame size. Flame should be steady with approximately 1/2" blue inner cones and no yellow or orange tips.

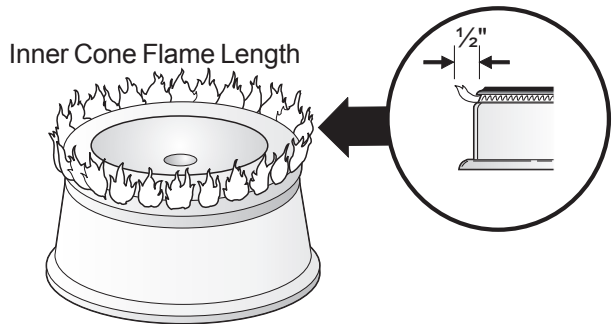


Figure 11

Proper Air Adjustment

If air shutter is adjusted so that too much air flows into the burner, the flame will appear unsteady, possibly not burning all the way around and will be noisy (like a blow torch).

C. Readjust the "LOW" Setting Surface Burner Valve

1. Turn control to LITE until burner ignites.
2. Quickly turn knob down to LOWEST SETTING.
3. If burner goes out, readjust valve as described in "Adjust the LOW Setting Surface Burner Valve" from Page .

D. Air Adjustment Shutter

Apply gas to the burner and adjust air shutter on burner venturi tube to proper flame. For LP gas, the air shutter is generally left completely open.

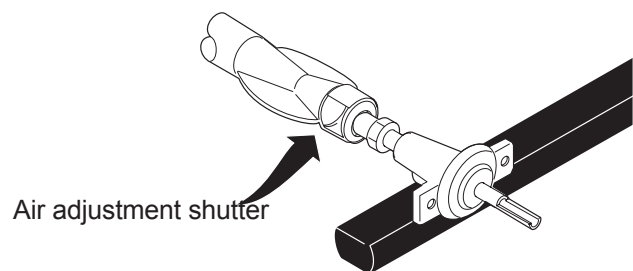


Figure 12

The air adjustment for each burner is located at the open end of the venturi tube and sits on the hood of the valve. The shutter is held in place by friction fit.

If air shutter needs adjusting, rotate the shutter to allow more or less air into the burner tubes as needed.

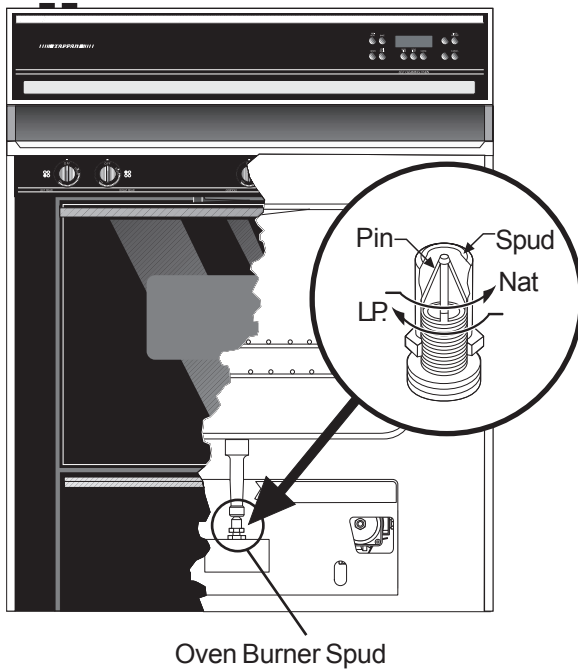


Figure 13

E. Convert Oven Burner Orifice

1. Remove storage drawer if equipped or lower panel to gain access to oven burner spuds.
2. Remove oven bottom and oven burner baffle located on top of burner. To remove oven bottom, pull up at rear, disengage front of bottom from oven front frame, and pull the oven bottom straight out of the oven. Remove burner baffle so that the burner flame can be observed.
3. Using ½" wrench, turn down the adjustable spud which injects gas into the oven burner, until snug against the LP metering pin. This will be approximately 2 ½ turns. **Do Not Overtighten.**
4. Push the BAKE TEMP button, then SET the temperature to 300°F. Wait until burner starts to cycle. To determine if the oven burner flame is proper, observe the flame. It should be steady with approximately 1" blue cones and no yellow or orange flame tips.

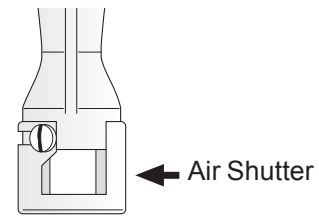


Figure 14

5. If adjustment to the air shutter is necessary, locate oven burner air shutter, loosen shutter set screw and adjust to obtain optimum flame (figure 14). This will normally be completely open for LP gas. Tighten shutter set screw.

F. Convert Waist High Broiler Burner Orifice Flame (Self-Clean Models Only)

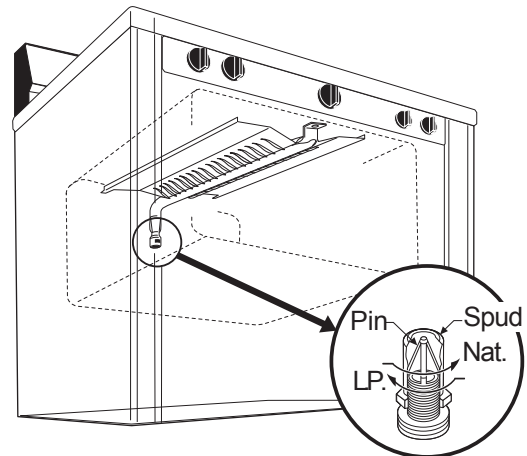


Figure 15

1. Open oven door.
2. Locate broiler burner spud and turn down approximately 2 ½ turns so that spud is snug against LP metering pin. **Do Not Overtighten.**
3. To determine if burner flame is proper, push the BROIL button, then turn the SET knob to the LO setting, and observe broiler flame. It should be steady and sharp with approximately 1" blue cones and no yellow or orange flame tips.
4. If adjustment to the air shutter is necessary, locate oven burner air shutter, loosen shutter set screw and adjust to obtain optimum flame (figure 14). This will normally be completely open for LP gas. Tighten shutter set screw.

G. Connect Electricity to Gas Range

Electrical Requirements

120 volt, 60 Hertz, individual, properly grounded and polarized branch circuit protected by a 15 amp. circuit breaker or time delay fuse.

Extension Cord Cautions:

Because of potential safety hazards under certain conditions we strongly recommend against the use of any extension cord. However, if you still select to use an extension cord, it is absolutely necessary that it be a UL listed 3-Wire grounding type appliance extension cord and that the current carrying rating of the cord in amperes be equivalent to or greater than the branch circuit rating. Such extension cords are obtainable through your local service organization.

Grounding Instructions

IMPORTANT Please read carefully.

For personal safety, this appliance must be properly grounded.

The power cord of this appliance is equipped with a 3-prong (grounding) plug which mates with a standard 3-prong grounding wall receptacle (see Figure 16) to minimize the possibility of electric shock hazard from the appliance.

The wall receptacle and circuit should be checked by a qualified electrician to make sure the receptacle is properly grounded.

Preferred Method

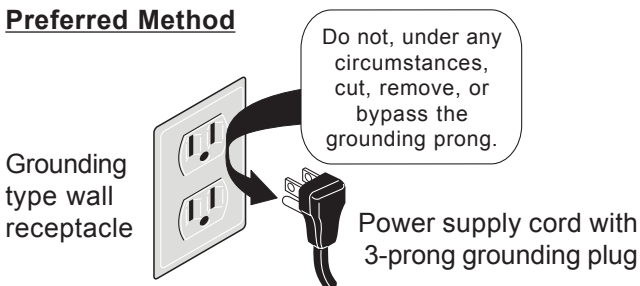


Figure 16

Where a standard 2-prong wall receptacle is installed, it is the personal responsibility and obligation of the consumer to have it replaced by a properly grounded 3-prong wall receptacle.

⚠ CAUTION Do not, under any circumstances, cut or remove the third (ground) prong from the power cord.

Disconnect electrical supply cord from wall receptacle before servicing range.

H. Check Operation

Refer to the Use and Care Guide packaged with the range for operating instructions and for care and cleaning of your range.

Do not touch the burners. They may be hot enough to cause burns.

1. Check the igniters

Operation of electric igniters should be checked after range and supply line connectors have been carefully checked for leaks and range has been connected to electric power.

Note: If range is to be operated on L.P. gas, conversion of regulator and adjustment of burner spuds is necessary before ignition check.

a) Surface Burner Igniters

To check for proper lighting, push in and turn a surface burner knob to the LITE position. The surface burner should light when gas is available to top burner. Each burner should light within 4 seconds in normal operation after air has been purged from supply lines. Once the burner lights, knob should be rotated out of the LITE position. Try each valve separately until all burners have been checked out.

b) Oven Igniter System

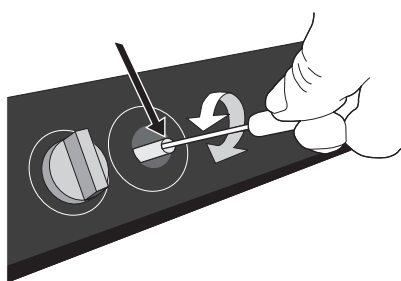
Self-Clean Models - Remove all materials and literature from oven and:

1. Push the BAKE TEMP button and set the oven temperature to 300°F. Within 60 seconds the bake (lower) burner will ignite. Check for proper flame; push the CANCEL button.
2. Push the broil button and set the oven temperature to 300°F. Within 60 seconds the broil (upper) burner will ignite. Check for proper flame. Allow burners to cycle at least one time; push the CANCEL button.

Non Self-Clean Models - Remove all materials and literature from oven and:

1. Turn oven temperature knob to BAKE (300°F). Within 60 seconds the lower burner should ignite. Check for proper flame. Turn knob to off.
2. Turn oven temperature knob to BROIL. Within 60 seconds the lower burner should ignite. Check for proper flame. Turn knob to off.

2. Adjust the “LO” or “SIMMER” Setting of Surface Burner Valves (see Figure 17)



Screw in Stem

Figure 17

- a. Turn control to LITE until burner ignites.
- b. Quickly turn knob down to LOWEST POSITION.
- c. If burner goes out, readjust valve as follows: Remove the surface burner control knob, insert a thin-bladed screw driver into the hollow valve stem and engage the slotted screw inside. Flame size can be increased or decreased with the turn of the screw. Adjust flame until you can quickly turn knob from LITE to LOWEST POSITION without extinguishing the flame. Flame should be as small as possible without going out.

3. Make Sure Range Is Level

Level the range by placing a level horizontally on an oven rack. Check diagonally from front to back, then level the range by either adjusting the leveling legs or by placing shims under the corners of the range as needed.

4. When installation is complete, connect the power cord and set the time of day on the electronic oven control as explained in the Owner's Guide.

5. Verify the operation of the electronic control functions as per instructions given in the Owner's Guide.

6. Make sure the air flow from the oven vent and the air flow to the bottom front of range is unobstructed.

When All Hookups are Complete

Make sure all controls are left in the OFF position.

NOTE: Refer to Owner's Guide for complete instructions for ordering parts or making inquiries about this range.

NOTE: Refer to Owner's Guide for operating instructions and cleaning instructions.

Model and Serial Number Location

The model and serial plate is located in the left hand side, underneath the surface cooktop.

When ordering parts for or making inquiries about your range, always be sure to include the model and serial numbers and a lot number or letter from the serial plate of your range.

Your serial plate also tells you the rating of the burners and type of fuel and the pressure the range was adjusted for when it left the factory.

7. Important Safety Warning

This range must be properly secured to the floor by using the included anti-tip brackets and screws. Failure to install the brackets could allow the range to accidentally tip over if excessive weight is placed on an open door or if a child climbs upon it. Serious injury might result from spilled hot liquids or from the range itself. Refer to the instructions below for proper installation. Figure 18.

NOTE: If the range is ever moved to a different location, the anti-tip brackets must also be moved and installed with the range.

Anti-Tip Bracket Installation Instructions:

The anti-tip kit is located in a plastic bag in the oven.

Tools Required:

5/16" Nutdriver or Flat Head Screwdriver

Adjustable Wrench

3/16" Dia. Masonry Drill Bit (if installing in concrete)

Attach brackets to the floor at the back of the range to hold both rear leg levelers. When fastening to the floor, be sure that screws do not penetrate electrical wiring or plumbing. The screws provided will work in either wood or concrete.

Range may be anchored to floor in a dwelling house with hold down brackets as illustrated in Figure 18. These hold down brackets allow range to be freely pulled out from the wall for cleaning or servicing without the use of tools.

1. Attach brackets to the floor or rear wall with screws provided. **Important:** Attachment must be secured to solid floor or wall. Do not attach to plaster, sheet rock, or other soft material. If attachment is to rear wall, any moldings must be removed in area behind range.
2. If brackets are to be attached to masonry or ceramic floors, position brackets on floor and mark hole location. Drill 3/16" holes.
3. Lower both rear leg levelers about three turns so the brackets will slide over leveler head.
4. Level the range front to back and side to side with the two front leg levelers and the rear levelers.
5. Slide range into place making sure rear legs are trapped by ends of brackets. Range may need to be shifted slightly to one side as it is being pushed back to allow rear legs to align with brackets. Remove lower panel or storage drawer to inspect brackets or grasp the top rear edge of the range and carefully attempt to tilt it forward to make sure range is properly anchored.

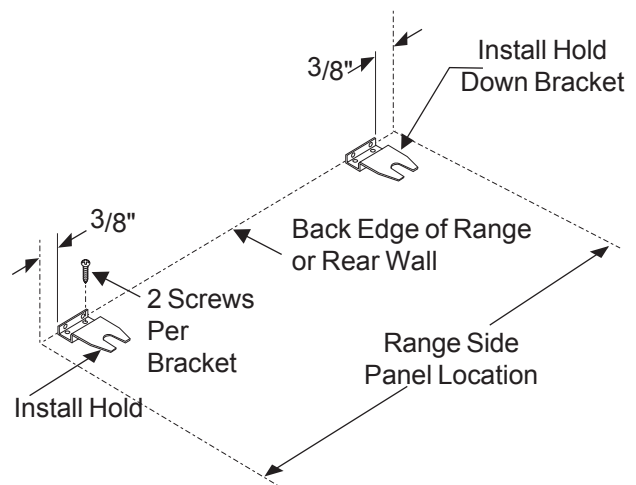


Figure 18

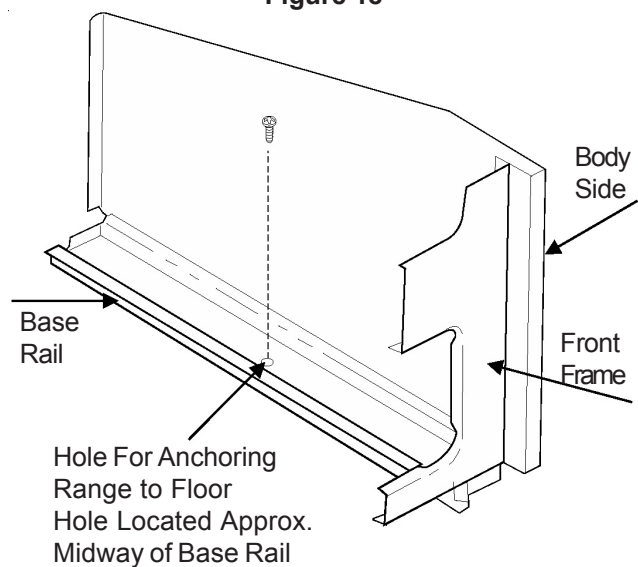


Figure 19

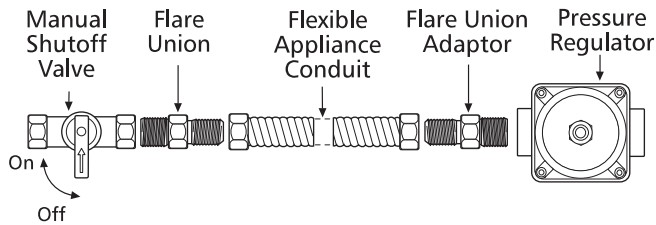
For mobile homes, the range must be additionally anchored to the floor as illustrated in Figure 19.

1. Remove false panel or storage drawer to gain access to the anchoring holes.
2. A 1/4" diameter hole is provided in the center of each base rail for anchoring to floor.

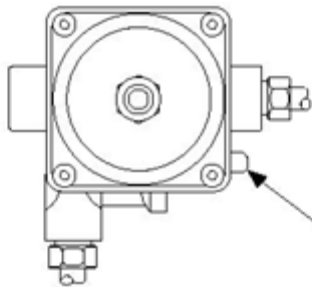
Stepping, leaning or sitting on the door or drawer of this range can result in serious injuries and also cause damage to the range.

SECTION B - GAS FLOW

The home gas supply is connected to the range at the pressure regulator located at the rear of the range.

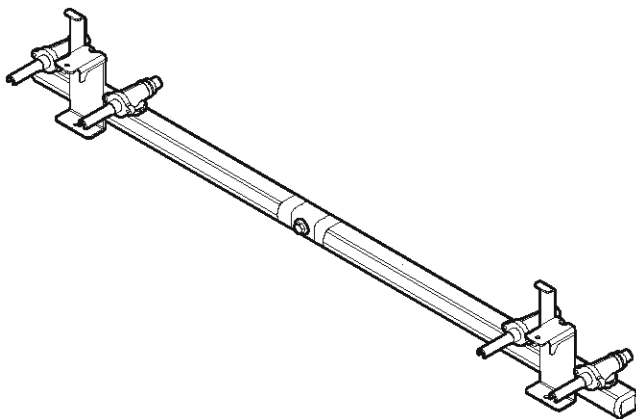


The pressure regulator has two outlets; one is connected to the manifold pipe, the other to the oven safety valve. The outlet to the oven safety valve is equipped with a manual shut-off valve so that gas to the oven safety valve may be turned off at the regulator.



Service Shut-Off Valve shown in ON position.

The gas travels from the other outlet of the pressure regulator through a supply tube to the manifold pipe. The manifold pipe is a rigid steel pipe used to distribute gas to the four top burner valves.



The top burner valves are mounted to the manifold pipe and are used to control the gas flow to the top burners. The valve goes from closed to completely open by manually rotating the valve stem from 0 to 270 angular degrees. Gas flow goes from zero to maximum flow at 90 degrees, and from maximum to minimum as the valve stem is turned from 90 to 270 degrees. When the top burner valve is turned on, gas passes through the valve into the supply tube connecting the sealed burner.



OFF ..LITE.. hi 6 5 4 3 2 lo



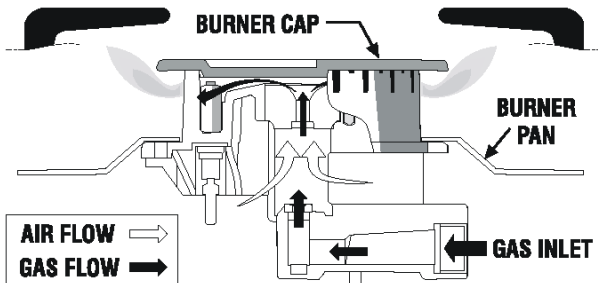
The sealed burner contains the orifice that controls the maximum amount of gas to the burner head.

The sample of orifice sizes are as follows:

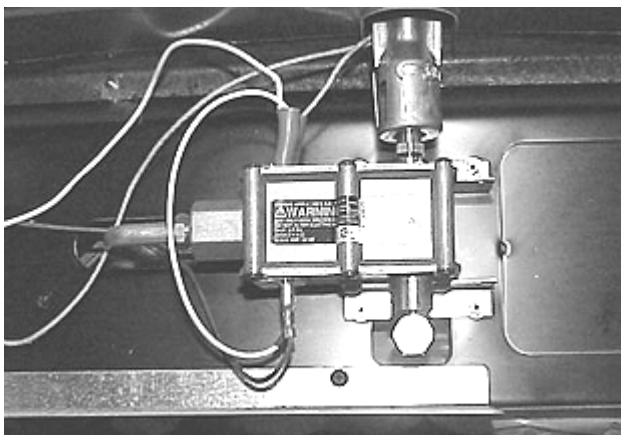
<u>Burner Type</u>	<u>Natural</u>	<u>Liquid Propane</u>
Simmer Burner	5,000 BTU 1.08 mm	4,500 BTU 0.66 mm
Standard Burner	9,000 BTU 1.54 mm	7,500 BTU 0.89 mm
Power Burner	11,000 BTU 1.63 mm	10,000 BTU 1.00 mm

As the gas passes between the orifice and the burner head, air is mixed with the gas to form a combustible mixture. The burner head disperses the gas air mixture to the burner ports where ignition occurs.

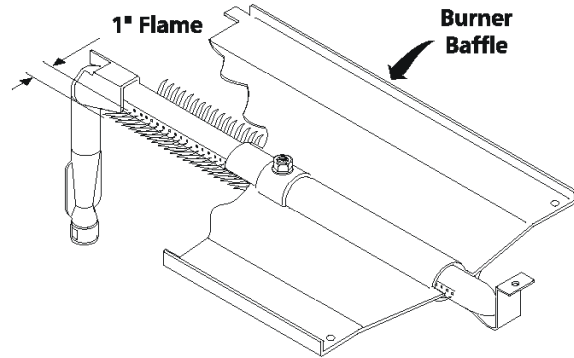
The burner cap must be in place for the burner to operate.



The second outlet of the pressure regulator is connected to an electric dual safety valve. Unless the manual shut-off on the pressure regulator is in the off position, gas is present at the safety valve at all times. The safety valve has two outlets that are controlled by separate, electrically heated, bimetal strips. One outlet has a spud covering a mixer pin that injects gas into the oven burner. The second outlet is connected by a tube to supply gas to the broiler burner.



The oven burner is ported and allows an even amount of gas to flow from both sides of the burner. When gas is injected into the burner by the safety valve, it passes into the venturi to draw primary air through the air shutter opening. The gas and air are mixed in the venturi and passed through the burner ports to be ignited by the silicon carbide oven igniter.



When supplied to the broil burner, gas and air are mixed at the throat of the burner venturi. This mixture is distributed inside a plenum and passes through a fine mesh screen to be ignited by the silicon carbide broiler igniter.



ELECTRIC CIRCUITS

Range models with spark ignition for the top burners and silicon carbide igniters for both the bake and broil burners use electricity for oven light circuit, electronic oven control circuit, warmer zone element, warmer drawer element, top burner ignition, bake burner ignition circuit, and broil burner ignition circuit. These items operate on line to neutral voltage, and their circuits are connected in parallel. The range is connected to a 120 VAC, 15 amp household outlet, by a three prong plug and line cord. The other end of the cord branches into red wires carrying line one to the circuits, white wires that supply neutral for the circuits, and one green wire connected to the chassis for safety grounding.

HOW THE GAS FLOW SYSTEM WORKS

Gas flow systems on gas ranges are designed to operate on one of two gas pressures - 4 inches of water column for natural gas and 10 inches of water column for LP gas. To obtain these operate pressures two things are needed. Input pressure must be at least a 1/2 inch above the operating pressure and a supply line that has the volume necessary to support these pressure under full flow. If the gas supply is correct, it is the job of the pressure regulator to increase or decrease the volume of gas in the range system to maintain these set pressures under different gas flows. A fixed orifice for each burner then controls the maximum flow to the burner. In the tubing between the pressure regulator and the orifices is either an electric or mechanical valve that allows the gas to one of the burners to be turned on an off. When a valve is turned on, the orifice injects gas into the burner. As the gas enters the burner it passes by an opening that allows air to be pulled into and mix with the gas to form a combustible mixture. The faster the gas enters the burner the more air is drawn in. If the gas to air mixture is between 4% and 14% gas the mixture is combustible. The closer the mixture is 9% gas to 91% air, the cleaner the flame.

TROUBLESHOOTING

Burner flame is too large:

1. Either the orifice is too large or the gas pressure is too high.
2. Turn on another burner. If the flame on the second burner is normal the orifice is too large. If the second flame is large check the gas pressure under flow. If the gas pressure is high change the pressure regulator. If the gas pressure is correct check the size of both orifices.

Burner flame is too small:

1. Either the orifice is too small or the gas pressure is too low.
2. Turn on another burner. If the flame on the second burner is normal the orifice is too small or there is a restriction in the tubing to the burner.
3. If the second flame is small check the gas pressure under flow. If the gas pressure is low check the gas supply to the range under flow. If the gas supply to the range is between 4 1/2 and 14 inches if installed on natural gas, or 11 inches if installed on LP gas, change the pressure regulator.

4. If the gas pressure is correct either both orifices are too small or a restriction is in the tubing.

Note: Always check the gas pressure on the furthest orifice from the pressure regulator.

Burner flame is yellow tipped:

1. Not enough air to gas ratio. Either gas pressure is low, or there is a restriction in the tubing, or the wrong size orifice has been installed.
2. Turn on another burner. If the flame on the second burner is normal then there is a restriction in the tubing or the orifice is the wrong size.
3. If the second flame is yellow tipped also check the gas pressure under flow. If the gas pressure is low check the gas supply to the range under flow. If the gas supply to the range is between 4 1/2 and 14 inches if installed on natural gas, or 11 inches if installed on LP gas, change the pressure regulator.
4. If the gas pressure is correct, either both orifices are too small or there is a restriction in the tubing.

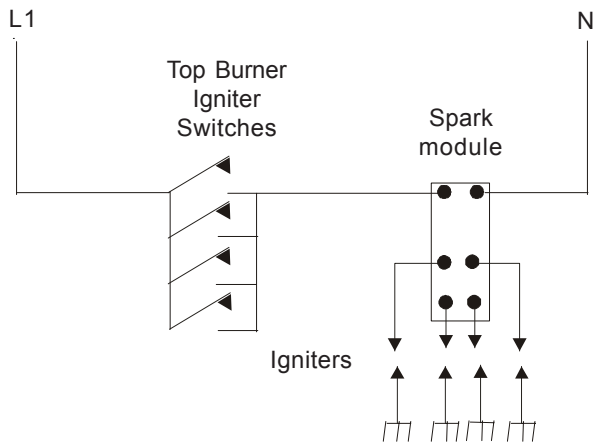
Top Burner flame lifts off and roars when oven burner is on:

1. By products are leaking under the main top. Check the oven vent area for any opening from the oven that would allow leakage or any voids in the insulation.

TOP BURNER SPARK IGNITION SYSTEM

How it works:

The top burner spark ignition system is made up of a switch installed around the shaft of each valve, a spark module and an igniter installed next to the burner heads on seal burner models or between two burners on standard top burners. 120 VAC is applied to the switches whenever power is connected to the range. The switches are connected in parallel so when any of the switches are closed, 120 VAC is applied to the spark module. The spark module output is connected to the igniters. When electrical power is applied to the spark module the module builds up an electrical charge across the output terminal that is connected to the igniters. When the electrical charge builds to a point that it can break down the dielectric (air) between either the igniter and the burner on sealed burner models or the igniter tips on standard burner model, the igniter sparks to light the burner.



TROUBLESHOOTING

Igniter does not spark when any of the switches are turned to the lite position:

1. Check electrical power to range.
2. Turn the gas off to the range. Remove the back cover and with the switches turn to lite position measure the input voltage to the spark module. If the meter reads zero the wire to the switches or from the switches is broken. If the meter reads 120 VAC go to step 3.
3. Remove power from the range and disconnect the wires from the output terminals of the spark module. Reconnect power and turn one of the valves to the lite position. If the spark module makes a snapping noise, the wiring to the igniters is defective. If no snapping is heard the spark module is defective.

Igniter system works normally for all but one valve:

1. Defective igniter switch on that valve.

Igniter sparks at normal rate with all valves turned off:

1. Shorted switch or wire. Check each switch with an Ohmmeter.

Igniter sparks intermittently with all valves turned off:

1. Defective spark module.

SECTION C - ELECTRONIC CONTROL SYSTEMS

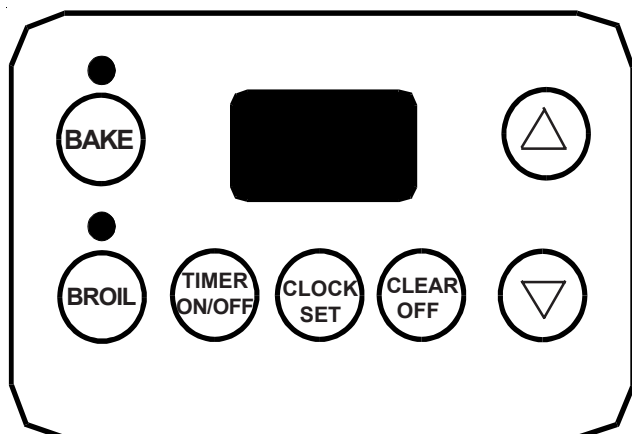
This manual will cover six electronic oven control systems.

1. ES 100
2. ES 200
3. ES 300
4. ES 400
5. ES 450
6. Control for 36" self-cleaning gas ranges.

THE ES 100 ELECTRONIC CONTROL SYSTEM

The ES 100 electronic oven control system is used to control oven on non self-cleaning model ranges.

HOW TO PROGRAM THE ES 100



To Set the Clock:

When the range is first plugged in, or when the power supply to the range has been interrupted, the display will flash "12:00".

1. Press **Clock Set**.
2. Within 5 seconds, press and hold the **Up Arrow** or **Down Arrow** until the correct time of day appears in the display.

To Set the Minute Timer:

1. Press **Timer ON/OFF**.
2. Press the **Up Arrow** to increase the time in one

minute increments. Press and hold the **Up Arrow** to increase the time in 10 minute increments. The timer can be set for any amount of time from 1 minute to 11 hours and 59 minutes.

Note: If you press the **Down Arrow** first, the timer will advance to 11 hours and 59 minutes.

3. The display shows the timer count down in minutes until one minute remains. Then the display will count down in seconds.
4. When the set time has run out, the timer will sound a 3 second beep. 0:00 will appear in the display until **Timer ON/OFF** is pressed.

Note: While the minute timer is counting down, the ":" will flash. The minute timer does not start or stop cooking. It serves as an extra timer in the kitchen that will beep when the set time has run out. The minute timer can be used alone or during any of the other oven functions. When the minute timer is in use with any other function, the minute timer will be shown in the display. To view other functions, press the pad for that function.

To Change the Minute Timer while it is in use:

While the timer is active and shows in the display, press and hold the **Up Arrow** or **Down Arrow** to increase or decrease the time.

To Cancel the Minute Timer before the set time has run out:

Press **Timer ON/OFF**.

To Set or Change the Temperature for Baking:

The oven can be programmed to bake at any temperature from 170°F to 500°F.

To Set the Controls for Baking:

1. Press **Bake**. "— — °" appears in the display.
2. Within 5 seconds, press the **Up Arrow** or **Down Arrow**. The display will show "350°F." By pressing and holding the **Up Arrow** or **Down Arrow**, the temperature can then be adjusted in 5°F increments.
3. When the **Up Arrow** or **Down Arrow** is released, the oven will begin heating to the selected temperature. When the displayed temperature reaches the desired baking temperature, the control will beep 3 times.
4. To cancel the baking function, press **Clear Off**.

To Change the Oven Temperature after Baking has Started:

1. Press **Bake** and make sure the bake temperature is displayed.
2. Press the **Up Arrow or Down Arrow** to increase or decrease the set temperature.

To Broil:

1. Slide broiler drawer out to the stop position.
2. Remove broiler pan and insert.
3. Always position rack before setting control, while range is cool.
4. Position rack by tilting front of rack up and pulling rack out from locating holes in rear of broiler drawer. Reposition back of rack in the desired locating holes and allow front of rack to slide down into the corresponding slots in front of broiler drawer.

For rare meats, position the rack closer to the burner (upper position).

For medium foods use middle position.

For well-done foods such as chicken, lobster tails or thick cuts of meat, position the rack further from the burner (lower position).

5. Place insert on broiler pan, then place meat on insert. **DO NOT** use the broiler pan without the insert. **DO NOT** cover the insert with aluminum foil. The exposed fat could ignite.
6. Place broiler pan on rack; make sure the broiler pan with the insert is positioned as shown. Be sure front of pan is positioned correctly in rack.
7. Slide the broiler drawer all the way into the range. Press **Broil** on Oven Control.
8. Press and hold the **Up Arrow** or **Down Arrow** until the desired broil setting level appears in the display. Press the **Up Arrow** for HI (high) broil or the **Down Arrow** for LO (low) broil. Most foods can be broiled at the HI broil setting. Select the LO broil setting to avoid excess browning or drying of foods that should be broiled to the well-done stage.
9. Broil on one side until food is browned; turn and cook on the second side. Note: Always pull the rack out to the stop position before turning or removing food.
10. When broiling is finished, press **Clear Off**.

11. When removing broiler pan from broiler drawer always use pot holders.

Note: The broiler pan and the insert allows grease to drain and be kept away from the high heat of the broiler **DO NOT** use the pan without the insert. **DO NOT** cover the insert with foil; the exposed grease could ignite.

⚠ WARNING **DO NOT** use the broiler drawer for storage. Items placed in the broiler drawer will catch fire.

⚠ CAUTION Should an oven fire occur, close the oven door and turn off the oven. If the fire continues, use a fire extinguisher. **DO NOT** put water or flour on the fire. Flour may be explosive.

HOW THE ES 100 OPERATES

The ES 100 electronic oven control system is made up of two parts that control electrical power to the oven igniter and valve.

1. Electronic oven control.
2. Oven temperature sensor.

When the bake pad is touched, and a temperature is set with the up or down arrows the oven relay on the board closes, and applies line to neutral voltage across the oven circuit. The oven circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the oven burner. The gas is then ignited by the heat of the oven igniter and the oven begins to heat up. In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the resistance of the oven sensor indicates the temperature in the oven is about 10 degrees above the programmed temperature, the microprocessor opens the relay. This removes power from the oven circuit and closes the safety valve. When power is removed from the oven circuit the oven temperature begins to lower. As the oven temperature

lowers the resistance of the oven sensor decreases. When the oven drops to about 10 degrees below the programmed temperature the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the oven circuit.

Note: 120 VAC is at the oven igniter as long as the control calls for heat.

Note: Oven controls may have a spread of more or less than 20 degrees. The important thing is the average temperature in the oven. The average temperature in the center of the oven should be within 10 degrees of the programmed temperature.

BROIL

When the broil pad is touched, and high or low is set with the up or down arrows, the oven relay on the board closes, applying line to neutral voltage across the oven circuit. The oven circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat, reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the burner. The gas is then ignited by the heat of the igniter and the oven begins to heat up. In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control for HI or LO settings and will cycle the burner when the temperature is reached.

CALIBRATION

To check oven calibration:

1. Place a thermometer or thermocouple in the center of the oven.
2. Program the oven temperature for 350 degrees. Allow the oven to cycle three times.
3. Average the highest and lowest reading. The average should be within 10 degrees of 350.

The calibration of the ES100 system cannot be adjusted:

1. If the oven temperature test off. Check the resistance of the oven sensor circuit against the chart below. If the sensor circuit check good replace the control.

RTD SCALE	
Temperature (°F)	Resistance (ohms)
32 ± 1.9	1000 ± 4.0
75 ± 2.5	1091 ± 5.3
250 ± 4.4	1453 ± 8.9
350 ± 5.4	1654 ± 10.8
450 ± 6.9	1852 ± 13.5
550 ± 8.2	2047 ± 15.8
650 ± 9.6	2237 ± 18.5
900 ± 13.6	2697 ± 24.4

TROUBLESHOOTING

The ES 100 has some self diagnostics built into the microprocessor to help in troubleshooting the system. When a failure occurs one of two codes will appear in all the display windows: F1 or F3.

F1 code:

F1 indicates a malfunction in the control itself, and the control should be replaced.

F3 code:

F3 indicates a defective sensor, electronic oven control or the wiring in between. To determine which part is defective:

1. Disconnect the 6 pin plug from the back of the oven control that connects the sensor to the oven control.
2. With an Ohmmeter measure the resistance between pins 1 and 2 in the plug (**not on the control board**). If the meter reads around the value of the oven temperature sensor resistance chart the oven temperature sensor is defective. If the meter reads less than 800 Ohms or more than 3000 Ohms, go to step 3.
3. Disconnect the harness from the oven sensor and measure the resistance of the oven sensor. If the reading is the same as that in step two the oven sensor is defective. If the reading is correct with the chart the harness is defective.

RTD SCALE	
Temperature (°F)	Resistance (ohms)
32 ± 1.9	1000 ± 4.0
75 ± 2.5	1091 ± 5.3
250 ± 4.4	1453 ± 8.9
350 ± 5.4	1654 ± 10.8
450 ± 6.9	1852 ± 13.5
550 ± 8.2	2047 ± 15.8
650 ± 9.6	2237 ± 18.5
900 ± 13.6	2697 ± 24.4

continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the oven circuit is open.

If the control appears to be operating normally, and the oven heats in bake but not in broil, or the oven heats in broil but not bake, replace the control.

Control will not program:

If the control will not program check for an open sensor circuit. If the sensor circuit is good replace the control.

Blank Display:

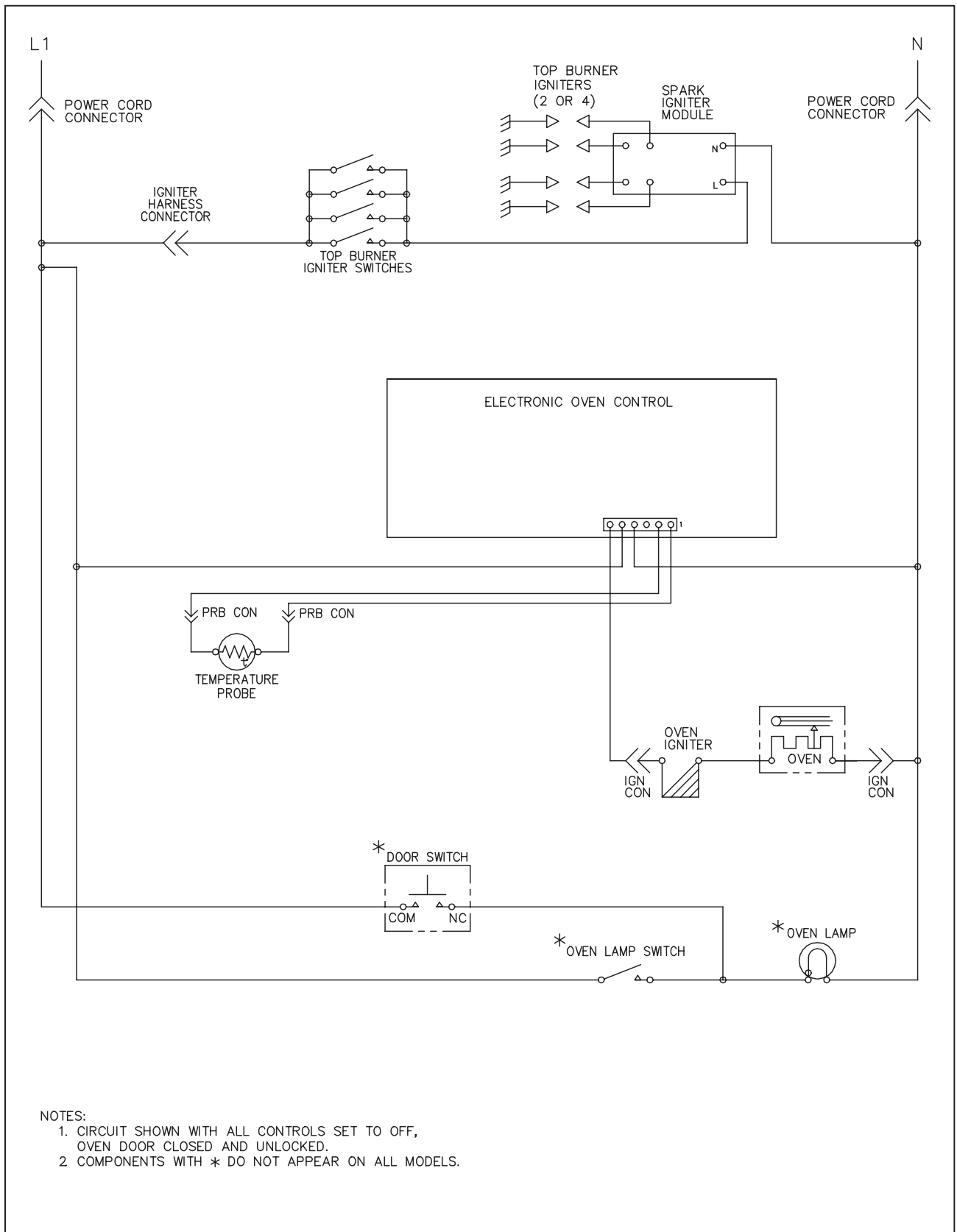
If the display on the oven control is blank, with the range connected to electrical power:

1. Go to the back of the control and measure the voltage drop between pins 5 and 4 of the 6 pin plug. If the meter reads line to neutral voltage (120 VAC) the control is defective. If the meter reads zero the wiring in the range is defective.

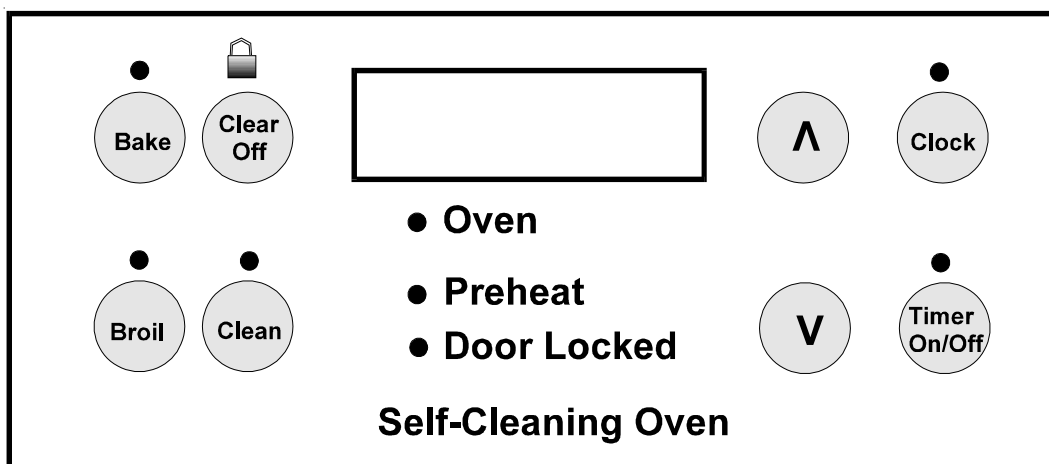
No heat:

If the control appears to be operating normally, but the oven does not heat in bake or broil:

1. Program the control for bake and check to see if the oven igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing check the manual gas shut-off for the oven to be sure gas is being supply to the safety valve. Then remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the oven circuit for a poor connection.
2. Go to the back of the oven control, disconnect the six pin plug and measure the voltage drop between pins 5 and 6. If the meter reads 120 VAC the control is defective. If the meter reads zero the igniter, safety valve or the wiring in the oven circuit is open. Go to step 3.
3. Disconnect power to the range, disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the



SAMPLE SCHEMATIC FOR ES100 CONTROL SYSTEM



THE ES 200 ELECTRONIC OVEN CONTROL SYSTEM

The ES 200 electronic oven control system is used to control the oven on self-cleaning model ranges that do not have the timed bake, speed bake or the convection features.

HOW TO PROGRAM THE ES 200

The oven can be programmed to: **BAKE, BROIL, SELF-CLEAN, CONTINUOUS BAKE** and **SET FOR OVEN LOCKOUT**.

TEMPERATURE CONVERSION

The electronic oven control is set to operate in °F (Fahrenheit) when shipped from the factory. The oven can be programmed for any temperature from 170°F to 550°F (65°C to 287°C).

To change the temperature to °C (Celsius) or from °C to °F (control should not be in a Bake or Clean mode):

1. Press **Broil**. "— —" appears in the display.
2. Press and hold the **Up Arrow** until "HI" appears in the display.
3. Press and hold **Broil** until °F or °C appears in the display.
4. Press the **Up Arrow** or **Down Arrow** to change °F to °C or °C to °F.
5. Press any control pad to return to normal operating mode.

Note: The time of day must first be set in order to operate the oven.

To Set the Clock:

When the range is first plugged in, or when the power supply to the range has been interrupted, the display will flash "12:00".

1. Press **Clock**.
2. Within 5 seconds, press and hold the **Up Arrow** or **Down Arrow** until the correct time of day appears in the display.

Note: Clock cannot be changed during self-clean cycle.

To Set the Minute Timer:

1. Press **Timer ON/OFF**.
2. Press the **Up Arrow** to increase the time in one minute increments. Press and hold **Up Arrow** to increase the time in 10 minute increments. The timer can be set for any amount of time from 1 minute to 11 hours and 59 minutes. **Note:** If you press the **Down Arrow** first, the timer will advance to 11 hours and 59 minutes.
3. The display shows the timer count down in minutes until one minute remains. Then the display will count down in seconds.
4. When the set time has run out, the timer will beep 3 times. It will then continue to beep 3 times every 60 seconds until **Timer ON/OFF** is pressed.

Note: The minute timer does not start or stop cooking. It serves as an extra timer in the kitchen that will beep when the set time has run out. The minute timer can be used alone or during any of the other oven functions. When the minute timer is in use with any other function, the minute timer will be shown in the display. To view other functions, press the pad for that function.

To Change the Minute Timer while it is in use:

While the timer is active and shows in the display, press and hold the **Up Arrow** or **Down Arrow** to increase or decrease the time.

To Cancel the Minute Timer before the set time has run out:

Press **Timer ON/OFF** .

To Set or Change the Temperature for Baking:

The oven can be programmed to bake at any temperature from 170°F to 550°F (65°C to 287°C).

To Set the Controls for Baking:

1. Press **Bake**. "— — —" appears in the display.
2. Within 5 seconds, press the **Up Arrow** or **Down Arrow**. The display will show "350°F (177°C)." By pressing and holding the **Up Arrow** or **Down Arrow**, the temperature can then be adjusted in 5°F (1°C) increments.
3. As soon as the **Up Arrow** or **Down Arrow** is released, the oven will begin heating to the selected temperature. When the displayed temperature reaches the desired baking temperature, the control will beep 3 times.
4. To cancel the baking function, press **Clear/Off**.

To Change the Oven Temperature after Baking has Started:

1. Press **Bake** and make sure the bake temperature is displayed.
2. Press the **Up Arrow** or **Down Arrow** to increase or decrease the set temperature.

To Set Control for Continuous Bake or 12 Hour Energy Saving:

The oven control has a built-in 12 Hour Energy Saving feature that will shut off the oven if the control is left on for more than 11 hours and 59 minutes. The oven can be programmed to override this feature for continuous baking.

To set control for continuous baking:

1. Press **Timer ON/OFF** , "0:00" will appear in the display.

2. Press and hold **Timer ON/OFF** down for 5 seconds until tone is heard, " — — hr" will appear in display for continuous cooking. The current time of day will return to the display.

3. To cancel the Continuous Bake function, press **Timer ON/OFF** and hold for 5 seconds until tone is heard. "12hr" will appear in the display indicating that the control has returned to the 12 Hour Energy Saving feature.

To Set Control for Oven Lockout:

The control can be programmed to lock the oven door and inactivate the oven controls.

To set Control for Oven Lockout feature:

1. Press **Clear/Off** and hold for 3 seconds. "Loc" will appear in display, the "Door Locked" indicator light will flash and the motor driven door lock will begin to close automatically. **DO NOT open oven door** while the indicator light is flashing. Allow about 15 seconds for the oven door to lock. Once the oven door is locked, the current time of day will appear in the display.
2. To cancel the lockout feature, press **Clear/Off** and hold for 3 seconds. The control will unlock the oven door and resume normal operation.

To Broil:

1. Arrange oven rack while oven is still cool. Position the rack as suggested in the chart below.

Rack Position From Top	Food
1	Rare steaks
2	Fish, medium steaks, hamburgers, chops
3	Well-done foods such as chicken and lobster

2. Press **Broil**.
3. Press and hold the **Up Arrow** or **Down Arrow** until the desired broil setting level appears in the display. Press the **Up Arrow** for **HI** broil or the **Down Arrow** for **LO** broil. Most foods can be broiled at the **HI** broil setting. Select the **LO** broil setting to avoid excess browning or drying of foods that should be broiled to the well-done stage.

4. Place the insert on the broiler pan, then place the food on the insert. **DO NOT** use the broiler pan without the insert or cover the insert with aluminum foil. The exposed grease could ignite.
5. Place the pan on the oven rack. **Open the oven door to the broil stop position when broiling.**
6. Broil on one side until food is browned; turn and cook on the second side. **Note:** Always pull the rack out to the stop position before turning or removing food.
7. When broiling is finished, press **Clear/Off**.

CAUTION: Should an oven fire occur, close the oven door and turn off the oven. If the fire continues, use a fire extinguisher. **DO NOT** put water or flour on the fire. Flour may be explosive.

To Start the Self-Clean Cycle:

For satisfactory results use a 2 hour self-clean cycle for **light soils** and a 3 hour cycle for **average to heavy soils**.

To Set the Controls for a Self-Clean Cycle:

1. Be sure the clock shows the correct time of day.
2. Press **Clean**. "— — —" appears in the display.
3. Press the **Up Arrow** until "3:00" appears in the display for a 3 hour cycle, or press the **Down Arrow** until "2:00" appears in the display for a 2 hour cycle.
4. As soon as the **Up Arrow** or **Down Arrow** is released, "CLn" appears in the display.
5. As soon as the controls are set, the motor driven lock will begin to close automatically and the "LOCK" indicator light will flash. **DO NOT** open the door while the light is flashing (it takes about 15 seconds for the oven door to lock).
6. The "LOCK" light will glow until the cleaning cycle is completed or cancelled, and the oven temperature has cooled.

When the Self-Clean Cycle is Completed:

1. The time of day or "End" will appear in the display window and the "Clean" and "LOCK" light will continue to glow.
2. Once the oven has cooled down for about 1 hour and the "LOCK" light has gone out, the oven door can be opened.

3. If "End" is in the display and the "Clean" indicator remains on, press **Clear/Off**. The time of day will appear in the display.

NOTE: When the oven is cool, wipe away any residue or powdered ash with a damp cloth or paper towel.

Stopping or Interrupting a Self-Cleaning Cycle:

If it becomes necessary to stop or interrupt a self-cleaning cycle.

1. Press **Clear/Off**.
2. Once the oven has cooled down for about 1 hour and the "LOCK" light has gone out, the oven door can be opened.
3. Restart the self-clean cycle once all conditions have been corrected.

HOW THE ES 200 OPERATES

The ES 200 electronic oven control system is made up of three parts that control the bake and broil burners, and the locking of the door in clean.

1. Electronic oven control.
2. Oven temperature sensor.
3. Oven door lock mechanism.

BAKE

When the bake pad is touched, and a temperature is set with the up or down arrows, the bake relay on the board closes, applying line to neutral voltage across the oven bake circuit and the preheat and oven indicator lights on the control illuminate. The bake circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the bake burner. The gas is then ignited by the heat of the bake igniter and the oven begins to heat up. In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads

the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the resistance of the oven sensor indicates temperature in the oven is about 10 degrees above the programmed temperature the microprocessor opens the relay, which removes power from the bake circuit and closes the safety valve. When power is removed from the bake circuit the oven temperature begins to lower. As the oven temperature lowers the resistance of the oven sensor decreases. When the oven drops to about 10 degrees below the programmed temperature the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the bake circuit. After the first cycle the preheat indicator light on the control goes out indicating the oven is preheated.

Note: Full power is on the oven igniter as long as the control calls for heat.

Note: Oven controls may have a spread of more or less than 20 degrees. The important thing is the average temperature in the oven. The average temperature in the center of the oven should be within 10 degrees of the programmed temperature.

BROIL

When the broil pad is touched, and high or low is set with the up or down arrows, the broil relay on the board closes, applying line to neutral voltage across the broil circuit and oven indicator lights on the control will illuminate. The broil circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit, the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the broil burner. The gas is then ignited by the heat of the broil igniter and the oven begins to heat up. In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor and compares it with a programmed temperature set into the control for HI or LO and will cycle the burner when the temperature is reached.

CLEAN

When the clean pad is touched and a clean time is set, (if the oven door is closed closing the contacts COM to NO of the door switch), the door lock relay on the electronic oven control closes providing line to neutral voltage (120 VAC) to the lock motor. "Cln" appears in the display and the door lock indicator light blinks. The lock motor starts to rotate closing the contacts of the door lock switch. When the motor rotates one half turn the contacts of the door lock switch reopen sending a signal to the control telling it that the door is locked, and to open the contacts of the lock relay. The door lock indicator light glows steady and the control closes the bake relay providing power to the bake circuit. The clean temperature is preset into the control at around 860 degrees. It takes about 45 minutes for the oven to reach 860 degrees. When the temperature is reached the control cycles the bake burner off and on to maintain the temperature until the clean time is completed. When the clean time is completed, the control removes power from the bake circuit and the oven cools down. When the temperature in the oven goes below 500 degrees the control closes the contacts of the lock relay. The lock motor turns 180 degrees closing and reopening the contacts of the lock switch and unlocking the door and turning off the door lock indicator light. The open contacts of the lock switch tell the control that the door is unlocked and to open the contacts of the lock relay.

CALIBRATION

To check oven calibration:

1. Place a thermometer or thermocouple in the center of the oven.
2. Program the oven temperature for 350 degrees. Allow the oven to cycle three times.
3. Average the highest and lowest reading. The average should be within 10 degrees of 350.

To change the calibration:

1. Touch the bake pad on the control, and using the up arrow set the oven temperature to maximum 550 degrees.
2. Within 3 seconds touch and hold the bake pad (usually about 5 seconds) until "00" appear in the display.

Note: If any numbers other than "00" appear in the display, the control has been calibrated in the field before.

- By using the up or down arrows the calibration temperature can be changed + or - 35 degrees.
- When the desired calibration is reached, touch the cancel pad to return the control to normal operation.

TROUBLESHOOTING

The ES 200 has some self diagnostics built into the microprocessor to help in troubleshooting the system. When a failure occurs one of three codes will appear in all the display windows: F1, F3 or F9.

F1 code:

F1 indicates a malfunction in the control itself, and the control should be replaced.

F3 code:

F3 indicates a defective sensor, electronic oven control or the wiring in between. To determine which part is defective:

- Disconnect the 15 pin plug from the back of the oven control that connects the sensor to the oven control.
- With an Ohmmeter measure the resistance between pins 12 and 13 in the plug (**not on the control board**). If the meter reads around the value of the oven temperature sensor resistance chart, the oven control is defective. If the meter reads less than 800 Ohms or more than 3000 Ohms, go to step 3.
- Disconnect the harness from the oven sensor and measure the resistance of the oven sensor. If the reading is the same as that in step two the oven sensor is defective. If the reading is correct with the chart the harness is defective.

RTD SCALE	
Temperature (°F)	Resistance (ohms)
32 ± 1.9	1000 ± 4.0
75 ± 2.5	1091 ± 5.3
250 ± 4.4	1453 ± 8.9
350 ± 5.4	1654 ± 10.8
450 ± 6.9	1852 ± 13.5
550 ± 8.2	2047 ± 15.8
650 ± 9.6	2237 ± 18.5
900 ± 13.6	2697 ± 24.4

F9 code:

F9 code indicates the control has detected a problem with the motor door latch assembly. Check the contacts of the lock switch, wiring to the lock motor assembly, and the lock motor.

Control will not program:

If the control will not program check for an open sensor circuit. If the sensor circuit is good replace the control.

Blank Display:

If the display on the oven control is blank, with the range connected to electrical power:

- Go to the back of the control, disconnect the 15 pin plug and measure the voltage drop between pins 4 and 5 in the plug. If the meter reads line to neutral voltage (120 VAC) the control is defective. If the meter reads zero the wiring in the range is defective.

No heat:

If the control appears to be operating normally, but the bake and broil burners do not heat:

- Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing, go to step 3. If the igniter is glowing check the manual gas shut-off for the oven to be sure gas is being supplied to the safety valve. Then remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.
- Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 4. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.
- Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 4 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 5.
- Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 2 and 4 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the broil circuit is open. Go to step 5.
- Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads

open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter shows continuity one of the wires in the circuit is open.

If the control appears to be operating normally, and the broil burner operates but the bake burner does not heat:

1. Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing check the manual gas shut-off for the oven to be sure gas is being supplied to the safety valve. Then remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.
2. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 4 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally, and the bake burner operates but the broil burner does not heat:

1. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.
2. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 2 and 4 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the broil circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it

for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

Self-cleaning:

Oven door does not lock when the oven is programmed for clean:

1. Remove power from the range, go the back of the control and disconnect the 15 pin plug. Measure the resistance between pins 5 and 6 in the 15 pin plug. If the meter reads infinity the lock motor or the wiring to the lock motor is defective. If the meter reads around 1500 ohms go to step 2.
2. Measure the resistance between pins 9 and 11 in the 15 pin plug with the oven door closed. If the meter reads infinity the door switch or the wiring to the door light switch is defective. If the meter reads zero go to step 3.
3. Measure the resistance between pins 9 and 10 in the 15 pin plug. If the meter reads infinity the lock switch or the wiring to the lock switch is defective. If the meter reads zero the control is defective.

Oven door locks when the oven is programmed for clean but the oven does not heat:

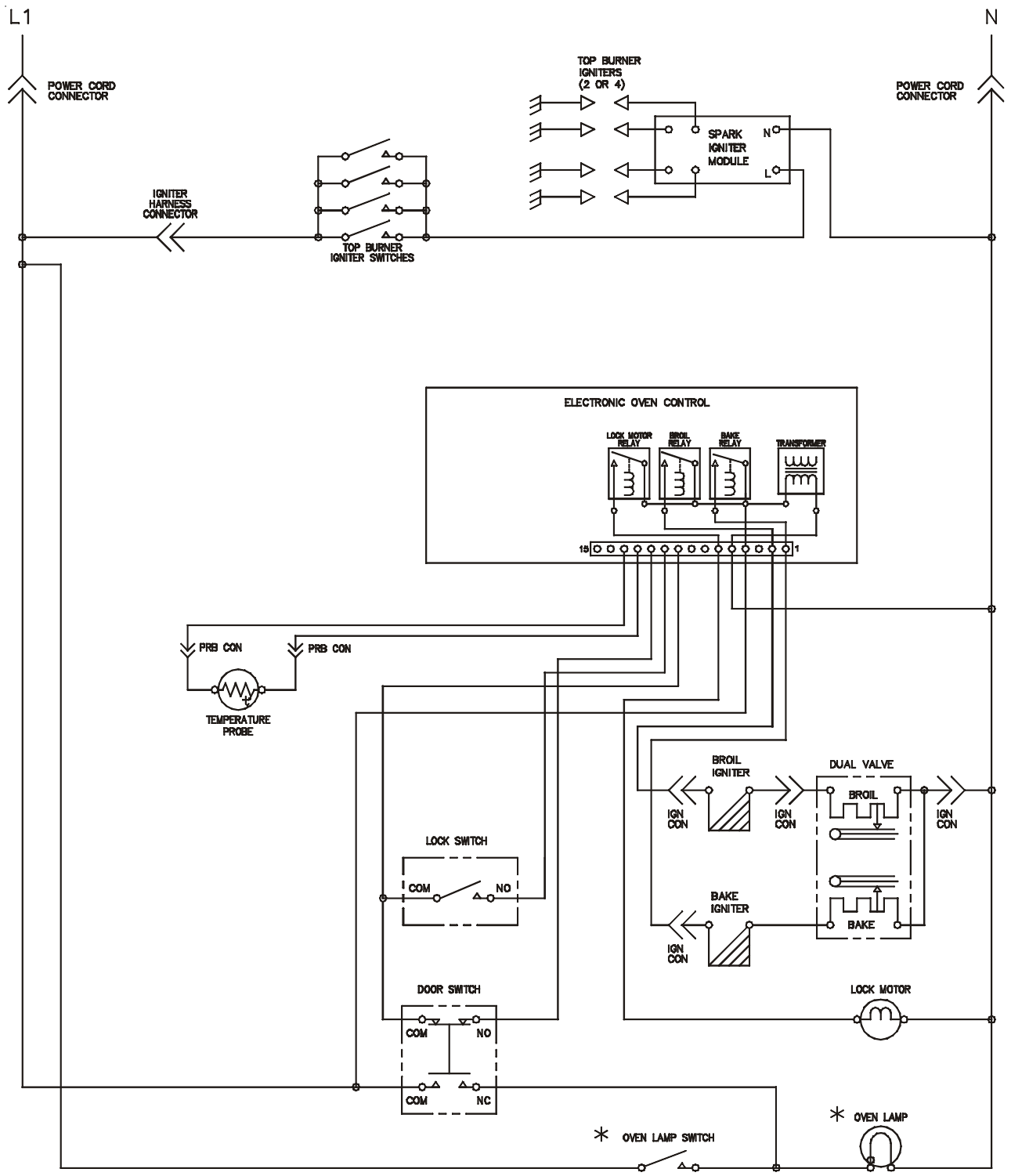
1. If the oven operates in normal bake replace the control.

Lock motor runs continuously:

1. With the door in the unlock position, remove power from the range. Go to the back of the control and disconnect the 15 pin plug from the control. With an Ohmmeter measure the resistance between pins 9 and 10 in the 15 pin plug. If the meter reads zero the lock switch or the wiring to the lock switch is defective. If the meter reads infinity go to step 2.
2. Depress the arm of the lock switch, and measure the resistance between pins 9 and 10 in the 15 pin plug. If the meter reads infinity the lock switch or the wiring to the lock switch is defective. If the meter reads zero the control is defective.

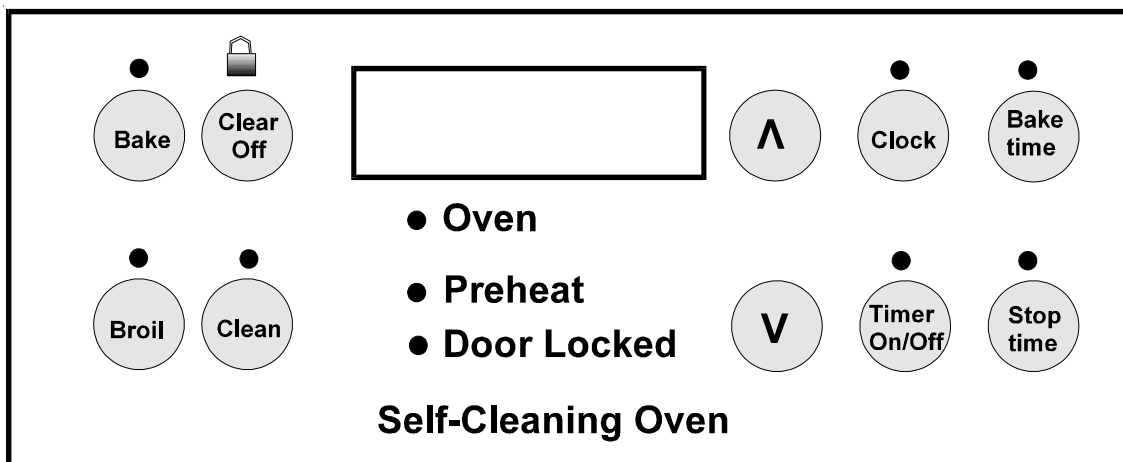
Door latch is partly closed with door open, cannot close door:

1. Program the oven for self-clean, and hold in on the door switch for 30 seconds. Touch cancel and hold door switch in for 30 seconds. The lock motor should lock and unlock the door.



- NOTES:
1. CIRCUIT SHOWN WITH ALL CONTROLS SET TO OFF, OVEN DOOR CLOSED AND UNLOCKED.
 2. COMPONENTS WITH * DO NOT APPEAR ON ALL MODELS.

SAMPLE SCHEMATIC FOR ES 200 CONTROL SYSTEM



THE ES 300 ELECTRONIC CONTROL SYSTEM

The ES 300 electronic oven control system is used to control oven on self-cleaning model ranges that do not have the convection feature.

HOW TO PROGRAM THE ES 300

The oven can be programmed to: **BAKE, TIME BAKE, SPEEDBAKE (some models), BROIL, SELF-CLEAN, CONTINUOUS BAKE** and set for **OVEN LOCKOUT**.

For a silent control panel:

When choosing a function, a beep will be heard each time a pad is pressed. If desired, the controls can be programmed for silent operation. Press and hold **Stop time**. After 7 seconds, the control will beep once. This will block the controls from sounding when a pad is pressed. To return the sound, press and hold **Stop time** again for 7 seconds until the control beeps once.
Note: The control will return to the audible mode after a power outage.

Temperature conversion:

The electronic oven control is set to operate in °F (Fahrenheit) when shipped from the factory. The oven can be programmed for any temperature from 170°F to 550°F (65°C to 287°C).

To change the temperature to °C (Celsius) or from °C to °F (control should not be in a Bake or Clean mode):

1. Press **Broil**. "— —" appears in the display.
2. Press and hold the **Up Arrow** until "HI" appears in the display.

3. Press and hold **Broil** until °F or °C appears in the display.
4. Press the **Up Arrow** or **Down Arrow** to change °F to °C or °C to °F.
5. Press any control pad to return to normal operating mode.

To Set the Clock:

When the range is first plugged in, or when the power supply to the range has been interrupted, the display will flash "12:00".

1. Press **Clock**.
2. Within 5 seconds, press and hold the **Up Arrow** or **Down Arrow** until the correct time of day appears in the display.

Note: The clock cannot be changed during any timed bake or self-clean cycle.

To Set the Minute Timer:

1. Press **Timer On/Off**.
2. Press the **Up Arrow** to increase the time in one minute increments. Press and hold the **Up Arrow** to increase the time in 10 minute increments. The timer can be set for any amount of time from 1 minute to 11 hours and 59 minutes. **Note:** If you press the **Down Arrow** first, the timer will advance to 11 hours and 59 minutes.
3. The display shows the timer count down in minutes until one minute remains. Then the display will count down in seconds.

- When the set time has run out, the timer will beep 3 times. It will then continue to beep 3 times every 60 seconds until **Timer On/Off** is pressed.

Note: The minute timer does not start or stop cooking. It serves as an extra timer in the kitchen that will beep when the set time has run out. The minute timer can be used alone or during any of the other oven functions. When the minute timer is in use with any other function, the minute timer will be shown in the display. To view other functions, press the pad for that function.

To Change the Minute Timer while it is in use:

While the timer is active and shows in the display, press and hold the **Up Arrow** or **Down Arrow** to increase or decrease the time.

To Cancel the Minute Timer before the set time has run out:

Press **Timer On/Off**.

To Set or Change the Temperature for Baking:

The oven can be programmed to bake at any temperature from 170°F to 550°F (65°C to 287°C).

To Set the Controls for Baking:

- Press **Bake**. "— — —" appears in the display.
- Within 5 seconds, press the **Up Arrow** or **Down Arrow**. The display will show "350°F (177°C)". By pressing and holding the **Up Arrow** or **Down Arrow**, the temperature can then be adjusted in 5°F (1°C) increments.
- As soon as the **Up Arrow** or **Down Arrow** is released, the oven will begin heating to the selected temperature. When the displayed temperature reaches the desired baking temperature, the control will beep 3 times.
- To cancel the baking function, press **Clear Off**.

To Change the Oven Temperature after Baking has Started:

- Press **Bake** and make sure the bake temperature is displayed.
- Press the **Up Arrow** or **Down Arrow** to increase or decrease the set temperature.

To Set Control for Continuous Bake or 12 Hour Energy Saving:

The oven control has a built-in 12 Hour Energy Saving feature that will shut off the oven if the control is left on for more than 11 hours and 59 minutes. The oven can be programmed to override this feature for continuous baking.

To set control for continuous baking:

- Press **Timer On/Off**, "0:00" will appear in the display.
- Press and hold **Timer On/Off** down for 5 seconds until tone is heard, "— — hr" will appear in display for continuous cooking. The current time of day will return to the display.
- To cancel the Continuous Bake function, press **Timer On/Off** and hold for 5 seconds until tone is heard. "12hr" will appear in display indicating that the control has returned to the 12 Hour Energy Saving feature.

To Set Control for Oven Lockout:

The control can be programmed to lock the oven door and inactivate the oven controls.

To set Control for Oven Lockout feature:

- Press **Clear Off** and hold for 3 seconds. "Loc" will appear in display, the "Door Locked" indicator light will flash and the motor driven door lock will begin to close automatically. **DO NOT open oven door** while the indicator light is flashing. Allow about 15 seconds for the oven door to lock. Once the oven door is locked, the current time of day will appear in the display.
- To cancel the lockout feature, press **Clear Off** and hold for 3 seconds. The control will unlock the oven door and resume normal operation.

To Set the Timed Bake Feature:

The **BAKE TIME** and **STOP TIME** controls operate the Timed Bake feature to turn the oven on and off at the times you select in advance. The oven can be programmed to start immediately and shut off automatically or to begin baking at a later time with an automatic shutoff.

To Program the Oven to Begin Baking Immediately and To Shut Off Automatically:

1. Be sure that the clock shows the correct time of day.
2. Place the food in the oven.
3. Press **Bake**.
4. Within 5 seconds, press the **Up Arrow or Down Arrow**. The display will show "350°F (177°C)". By holding the **Up Arrow or Down Arrow**, the temperature can then be adjusted in 5°F (1°C) increments.
5. Press **Bake Time**. "0:00" will flash in the display.
6. Press the **Up Arrow or Down Arrow** until the desired baking time appears in the display.
7. The oven will turn on and begin heating.

To Program Oven for a Delayed Start Time and to Shut-Off Automatically:

1. Be sure that the clock shows the correct time of day.
2. Place the food in the oven.
3. Press **Bake**.
4. Within 5 seconds, press the **Up Arrow or Down Arrow**. The display will show "350°F (177°C)". By holding the **Up Arrow or Down Arrow**, the temperature can then be adjusted in 5°F (1°C) increments.
5. Press **Bake Time**. "0:00" will flash in the display.
6. Press the **Up Arrow or Down Arrow** until the desired baking time appears.
7. Press **Stop Time**. The earliest possible stop time will flash in the display.
8. Press the **Up Arrow or Down Arrow** until the desired stop time appears in the display.
9. Once the controls are set, the control calculates the time when baking will start in order to finish at the time you have set.
10. The oven will turn on at the delayed start time and begin heating.

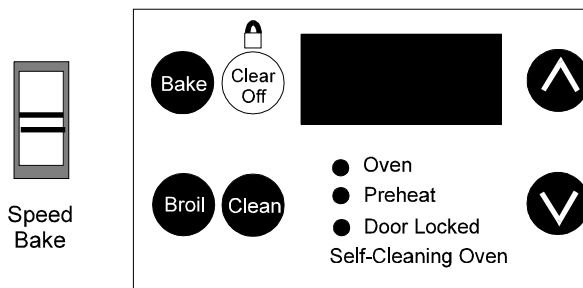
When the Set Bake Time Runs Out:

1. "END" will appear in the display window and the oven will shut off automatically.
2. The control will beep 3 times every 60 seconds until **Clear Off** is pressed.

To Change the Oven Temperature or Bake Time after Baking has Started:

1. Press the function pad you want to change.
2. Press the **Up Arrow or Down Arrow** to adjust the setting.

CAUTION: Use caution with the Timed Bake feature to cook cured or frozen meats and most fruits and vegetables. Foods that can easily spoil such as milk, eggs, fish, meat or poultry, should be chilled in the refrigerator first. Even when chilled, they should not stand in the oven for more than 1 hour before cooking begins, and should be removed promptly when cooking is completed.



Speed Bake™ Cooking System (If equipped):

Speed Bake™ Cooking System uses a fan to circulate the oven's heat uniformly and continuously around the oven. This improved heat distribution allows for fast, even cooking and browning results. It also gives better baking results when using two racks at the same time. Heated air flows around the food from all sides, sealing in juices and flavors. Meats cooked with **Speed Bake™ Cooking System** are juicier. Poultry is crisp on the outside while staying tender and moist on the inside. Breads and pastry brown more evenly. Most foods baked in a standard oven can be cooked faster and more evenly with **Speed Bake™ Cooking System**.

General Cooking Instructions:

1. To convert baking times for normal recipes to

Speed Bake times, start with a 30% reduction in time and increase the time until the desired doneness is obtained. Time reductions will vary depending on the amount and type of food.

2. Preheating is not necessary when cooking with **Speed Bake**, except with items such as cakes, cookies, biscuits, breads, etc.
3. When using two racks at the same time, place in positions 2 and 5 for the best results.
4. Layer cakes and similar food items will have better results when baked with the normal bake function.

To Set Speed Bake™ Cooking System:

1. Program the oven as you normally would for baking. Speed Bake may be used with Bake, Time Bake and Delayed Time Bake features.
2. Press and release **Speed Bake** switch. The indicator light will glow and the fan will come on after a **6 MINUTE DELAY**. If the oven temperature has already reached **350°F**, the fan will come on immediately. The fan stays on when the oven door is closed and shuts off while the oven door is opened. The fan will continue to operate until baking is complete.
3. To cancel the Speed Bake function, press **Clear Off** on the oven control as you would to cancel any baking function.

NOTE: The Speed Bake feature will not work during a clean cycle.

NOTE: In the Speed Bake feature, the oven cannot be set lower than 250°F.

To Broil:

1. Arrange oven rack while oven is still cool. Position the rack as suggested in the chart below.

Rack Position From Top	Food
1	Rare steaks
2	Fish, medium steaks, hamburgers, chops
3	Well-done foods such as chicken and lobster

2. Press **Broil**.

3. Press and hold the **Up Arrow or Down Arrow** until the desired broil setting level appears in the display. Press the **Up Arrow** for **HI** broil or the **Down Arrow** for **LO** broil. Most foods can be broiled at the **HI** broil setting. Select the **LO** broil setting to avoid excess browning or drying of foods that should be broiled to the well-done stage.
4. Place the insert on the broiler pan, then place the food on the insert. **DO NOT** use the broiler pan without the insert or cover the insert with aluminum foil. The exposed grease could ignite.
5. Place the pan on the oven rack. **Open the oven door to the broil stop position when broiling.**
6. Broil on one side until food is browned; turn and cook on the second side. **Note:** Always pull the rack out to the stop position before turning or removing food.
7. When broiling is finished, press **Clear Off**.

CAUTION: Should an oven fire occur, close the oven door and turn off the oven. If the fire continues, use a fire extinguisher. **DO NOT** put water or flour on the fire. Flour may be explosive.

SELF-CLEANING OVEN

A self-cleaning oven cleans itself with high temperatures (well above cooking temperatures) which eliminate soil completely or reduce it to a fine powdered ash you can wipe away with a damp cloth.

Adhere to the following cleaning precautions:

- **DO NOT** use oven cleaners or oven protective coatings in or around any part of the self-cleaning oven.
- **DO NOT** clean the oven door gasket. The woven material of the oven door gasket is essential for a good seal. Care should be taken not to rub, damage or remove the gasket.
- **DO NOT** use any cleaning materials on the oven door gasket. Doing so could cause damage.
- **Remove the broiler pan and insert, all utensils and any aluminum foil. These items cannot withstand high cleaning temperatures.**
- Oven racks may be left in the oven or may be removed. If they go through the clean cycle their color will turn slightly blue and the finish will be dull. After the cycle is complete and the oven has cooled,

rub the sides of the racks with wax paper or a cloth containing a small amount of baby oil or salad oil (this will make the racks glide easier into the rack position).

- **Remove any excess spillovers** in the oven cavity **before** starting the self-cleaning cycle. To clean, use hot, soapy water and a cloth. Large spillovers can cause heavy smoke or fire when subjected to high temperatures. **DO NOT** allow food spills with a high sugar or acid content (such as milk, tomatoes, sauerkraut, fruit juices or pie filling) to remain on the surface as they may leave a dull spot even after cleaning.
- Clean any soil from the oven frame, the door liner outside the oven door gasket and the small area at the front center of the oven bottom. These areas heat sufficiently to burn soil on. Clean with soap and water.

NOTE: Prior to setting the Self-Clean cycle, any spills remaining on the oven bottom should be removed.

To Start the Self-Clean Cycle:

For satisfactory results use a 2 hour self-clean cycle for **light soils** and a 3 hour cycle for **average to heavy soils**.

To Set the Controls for a Self-Clean Cycle:

1. Be sure the clock shows the correct time of day.
2. Press **Clean**. "— — —" appears in the display.
3. Press the **Up Arrow** until "3:00" appears in the display for a 3 hour cycle, or press the **Down Arrow** until "2:00" appears in the display for a 2 hour cycle.
4. As soon as the **Up Arrow** or **Down Arrow** is released, "CLn" appears in the display.
5. As soon as the controls are set, the motor driven lock will begin to close automatically and the "LOCK" indicator light will flash. **DO NOT** open the door while the light is flashing (it takes about 15 seconds for the oven door to lock).
6. The "LOCK" light will illuminate until the cleaning cycle is completed or cancelled, and the oven temperature has cooled.

When the Self-Clean Cycle is Completed:

1. The time of day or "End" will appear in the display window and the "Clean" and "LOCK" light will

continue to illuminate.

2. Once the oven has cooled down for about 1 hour and the "LOCK" light has gone out, the oven door can be opened.
3. If "End" is in the display and the "Clean" indicator remains on, press **Clear Off**. The time of day will appear in the display.

NOTE: When the oven is cool, wipe away any residue or powdered ash with a damp cloth or paper towel.

Stopping or Interrupting a Self-Cleaning Cycle:

If it becomes necessary to stop or interrupt a self-cleaning cycle:

1. Press **Clear Off**.
2. Once the oven has cooled down for about 1 hour and the "LOCK" light has gone out, the oven door can be opened.
3. Restart the self-clean cycle once all conditions have been corrected.

CAUTION: Use care when opening the oven door after the self-cleaning cycle. Stand to the side of the oven when opening the door to allow hot air or steam to escape.

CAUTION: DO NOT force the oven door open. This can damage the automatic door locking system. Use caution when opening the door after the self-cleaning cycle is completed. The oven may still be VERY HOT.

HOW THE ES 300 CONTROL SYSTEM WORKS

The ES 300 electronic oven control system is made up of four parts that control the bake and broil burners, the speed bake fan on some models, and the locking of the door in clean.

1. Electronic oven control.
2. Oven temperature sensor.
3. Oven door lock mechanism.
4. Speed bake switch.

BAKE

When the bake pad is touched, and a temperature is set with the up or down arrows, the bake relay on the board

closes, applying line to neutral voltage across the oven bake circuit. The preheat and oven indicator lights on the control will illuminate. The bake circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the bake burner. The gas is then ignited by the heat of the bake igniter and the oven begins to heat up. In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the resistance of the oven sensor indicates the temperature in the oven is about 10 degrees above the programmed temperature the microprocessor opens the relay, which removes power from the bake circuit and closes the safety valve. When power is removed from the bake circuit the oven temperature begins to lower. As the oven temperature lowers, the resistance of the oven sensor decreases. When the oven drops to about 10 degrees below the programmed temperature the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the bake circuit. After the first cycle the preheat indicator light on the control goes out indicating the oven is preheated.

Note: Oven controls may have a spread of more or less than 20 degrees. The important thing is the average temperature in the oven. The average temperature in the center of the oven should be within 10 degrees of the programmed temperature.

TIME BAKE

The time bake function allows the oven to be programmed to stop baking at a set time, or to delay the start and stop baking at a set time. The stop time cannot be set for more than 11 hours and 59 minutes ahead of the time of day.

SPEED BAKE

Speed bake operates the same as the bake cycle. However, when the speed bake switch is turned on the electronic oven control waits for 6 minutes before closing

the contacts of the speed bake relay on the board. When the contacts do close it provides line to neutral (120 AC) to the speed bake fan in the oven. The fan will now operate continuously until **Clear Off** is touched. Also, if the oven door is opened during a speed bake operation the fan stops and then restarts when the door is closed.

BROIL

When the broil pad is touched, and high or low is set with the up or down arrows, the broil relay on the board closes, applying line to neutral voltage across the broil circuit and oven indicator lights on the control will illuminate. The broil circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the broil burner. The gas is then ignited by the heat of the broil igniter and the oven begins to heat up. In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control for HI or LO and will cycle the burner when the temperature is reached.

CLEAN

When the clean pad is touched and a clean time is set (if the oven door is closed closing the contacts COM to NO of the door switch), the door lock relay on the electronic oven control closes providing line to neutral voltage (120 VAC) to the lock motor. The lock motor starts to rotate closing the contacts of the door lock switch. When the motor rotates one half turn, the contacts of the door lock switch reopen sending a signal to the control telling it that the door is locked, and to open the contacts of the lock relay. The control then closes the bake relay providing power to the bake burner. The clean temperature is preset into the control at around 860 degrees. It takes about 45 minutes for the oven to reach 860 degrees. When the temperature is reached the control cycles the bake burner off and on to maintain the temperature until the clean time is completed. When the clean time is completed the control remove power from the bake circuit and the oven cools down. When the temperature in the oven goes below 500

degrees, the control closes the contacts of the lock relay. The lock motor turns 180 degrees closing and reopening the contacts of the lock switch and unlocking the door. The open contacts of the lock switch tells the control that the door is unlocked and to open the contacts of the lock relay.

CALIBRATION

To check oven calibration:

1. Place a thermometer or thermocouple in the center of the oven.
2. Program the oven temperature for 350 degrees. Allow the oven to cycle three times.
3. Average the highest and lowest reading. The average should be within 10 degrees of 350.

To change the calibration:

1. Touch the bake pad on the control, and using the up arrow set the oven temperature to maximum 550 degrees.
2. Within 3 seconds touch and hold the bake pad (usually about 5 seconds) until "00" appear in the display.

Note: If any numbers other than "00" appear in the display, the control has been calibrated in the field before.

3. By using the up or down arrows the calibration temperature can be changed + or - 35 degrees.
4. When the desired calibration is reach, touch the cancel pad to return the control to normal operation.

TROUBLESHOOTING

The ES 300 has some self diagnostics built into the microprocessor to help in troubleshooting the system. When a failure occurs one of three codes will appear in all the display windows: F1, F3 or F9.

F1 code:

F1 indicates a malfunction in the control itself, and the control should be replaced.

F3 code:

F3 indicates a defective sensor, electronic oven control or the wiring in between. To determine which part is defective:

1. Disconnect the 15 pin plug from the back of the oven control that connects the sensor to the oven control.
2. With an Ohmmeter measure the resistance between pins 12 and 13 in the plug (**not on the control board**). If the meter reads around the value of the oven temperature sensor resistance chart the oven control is defective. If the meter reads less than 800 Ohms or more than 3000 Ohms, go to step 3.

RTD SCALE	
Temperature (°F)	Resistance (ohms)
32 ± 1.9	1000 ± 4.0
75 ± 2.5	1091 ± 5.3
250 ± 4.4	1453 ± 8.9
350 ± 5.4	1654 ± 10.8
450 ± 6.9	1852 ± 13.5
550 ± 8.2	2047 ± 15.8
650 ± 9.6	2237 ± 18.5
900 ± 13.6	2697 ± 24.4

3. Disconnect the harness from the oven sensor and measure the resistance of the oven sensor. If the reading is the same as that in step two the oven sensor is defective. If the reading is correct with the chart the harness is defective.

F9 code:

F9 code indicates the control has detected a problem with the motor door latch assembly. Check the contacts of the lock switch, wiring to the lock motor assembly, and the lock motor.

Control will not program:

If the control will not program check for an open sensor circuit. If the sensor circuit is good replace the control.

Time bake does not operate:

If the time bake feature does not operate check to be sure it is being programmed correctly. If so replace the control.

Blank Display:

If the display on the oven control is blank, with the range connected to electrical power:

1. Go to the back of the control, disconnect the 15 pin plug and measure the voltage drop between pins 4 and 5 in the plug. If the meter reads line to neutral voltage (120 VAC) the control is defective. If the meter reads zero the wiring in the range is defective.

No heat:

If the control appears to be operating normally, but the bake and broil burners do not heat:

1. Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing go to step 3. If the igniter is glowing check the manual gas shut-off for the oven to be sure gas is being supplied to the safety valve. Then remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.
2. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 4. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.
3. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 4 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 5.
4. Go to the back of the oven control disconnect the 15 pin plug from the control and measure the voltage drop between pins 2 and 4 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the broil circuit is open. Go to step 5.
5. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally, and the broil burner operates but the bake burner does not heat:

1. Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing check the manual gas shut-off for the oven to be sure gas is being supplied to the safety valve. Then remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current

flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.

2. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 4 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally, and the bake burner operates but the broil burner does not heat:

1. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.
2. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 2 and 4 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the broil circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

Fan in oven does not run when speed bake switch is turned on:

Note: There is a six minute delay before the fan will operate at the start of the speed bake program.

1. Remove power from the range and set the speed bake switch to on. Disconnect the 15 pin plug from the oven control and measure the resistance between pins 14 and 15 (in the plug, not on the EOC). If the meter reads infinity, the speed bake switch or the

wiring to the speed bake switch is defective. If the meter reads zero go to step 2.

2. Measure the resistance between pins 9 and 11 in the 15 pin plug. If the meter reads infinity, the door switch or the wiring to the door switch is defective. If the meter reads zero go to step 3.
3. Spin the motor blade. If the blade turns hard or doesn't move, remove the motor and check for an obstruction. If the blade spins free, measure the resistance between pins 3 and 5. If the meter reads infinity, the motor or the wiring to the motor is defective. If the meter reads around 15 Ohms replace the control.

Self-cleaning:

Oven door does not lock when the oven is programmed for clean:

1. Remove power from the range, go to the back of the control and disconnect the 15 pin plug. Measure the resistance between pins 5 and 6 of the 15 pin plug (in the plug). If the meter reads infinity the lock motor or the wiring to the lock motor is defective. If the meter reads around 1500 ohms go to step 2.
2. Measure the resistance between pins 9 and 11 in the 15 pin plug with the oven door closed. If the meter reads infinity the door light switch or the wiring to the door light switch is defective. If the meter reads zero go to step 3.
3. Measure the resistance between pins 9 and 10 in the 15 pin plug. If the meter reads infinity the lock switch or the wiring to the lock switch is defective. If the meter reads zero the control is defective.

Oven door locks when the oven is programmed for clean but the oven does not heat:

1. If the oven operates in normal bake replace the control.

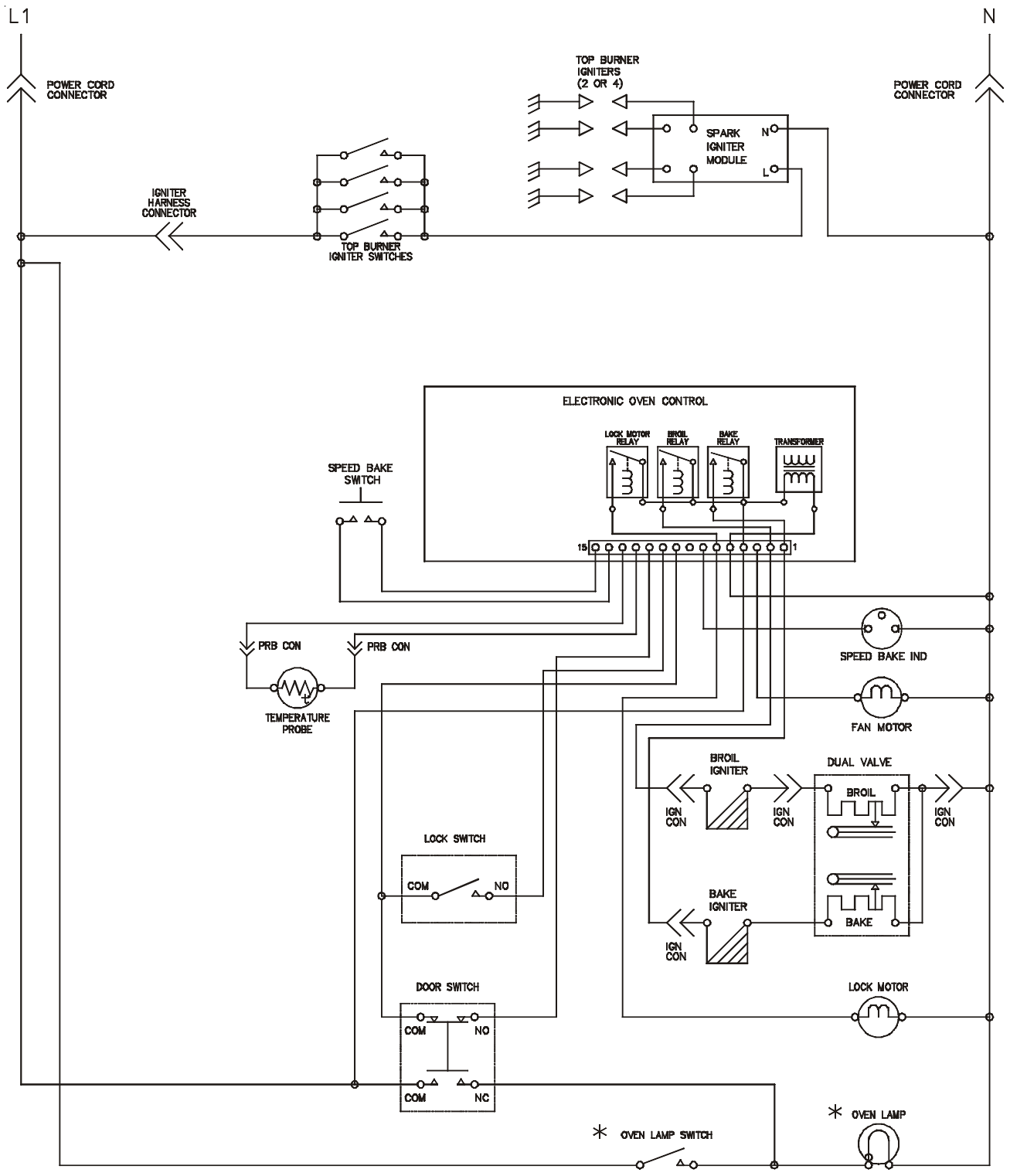
Lock motor runs continuously:

1. With the door in the unlock position, remove power from the range. Go to the back of the control and disconnect the 15 pin plug from the control. With an Ohmmeter measure the resistance between pins 9 and 10 in the 15 pin plug. If the meter reads zero the lock switch or the wiring to the lock switch is defective. If the meter reads infinity go to step 2.
2. Depress the arm of the lock switch, and measure the resistance between pins 9 and 10 in the 15 pin

plug. If the meter reads infinity the lock switch or the wiring to the lock switch is defective. If the meter reads zero the control is defective.

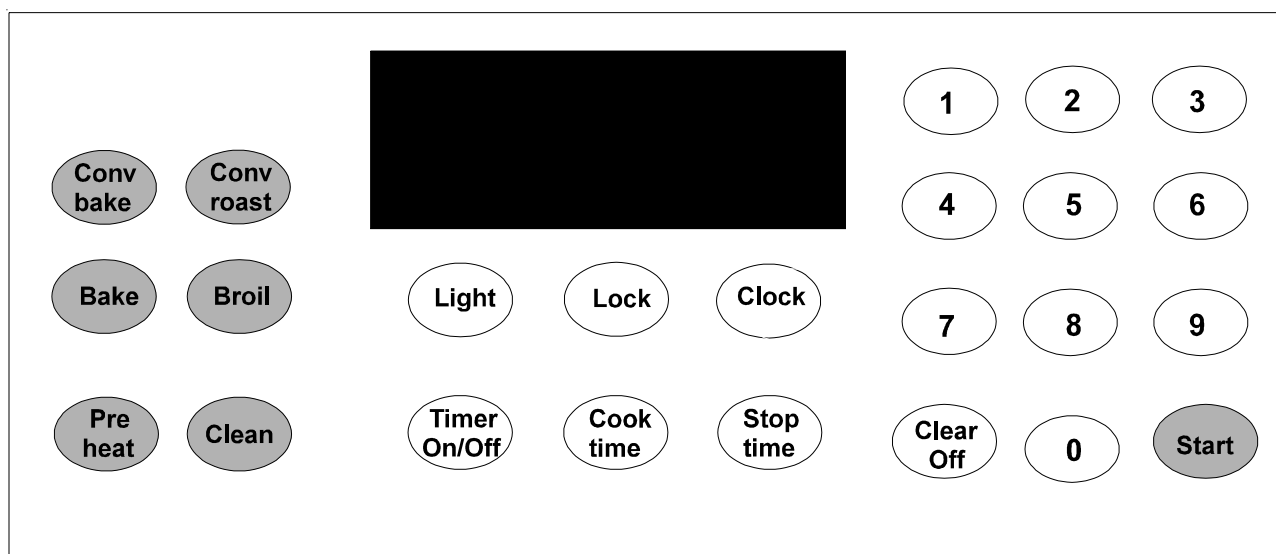
Door latch is partly closed with door open, cannot close door:

1. Program the oven for self-clean, and hold in on the door switch for 30 seconds. Touch cancel and hold door switch in for 30 seconds. The lock motor should lock and unlock the door.



- NOTES:
1. CIRCUIT SHOWN WITH ALL CONTROLS SET TO OFF, OVEN DOOR CLOSED AND UNLOCKED.
 2. COMPONENTS WITH * DO NOT APPEAR ON ALL MODELS.

SAMPLE SCHEMATIC FOR ES 300 CONTROL SYSTEM



THE ES 400 ELECTRONIC OVEN CONTROL SYSTEM

The ES 400 electronic oven control system is used to control the oven on self-cleaning model ranges with the convection feature.

The oven can be programmed to: BAKE, TIME BAKE, BROIL, CONVECTION BAKE, CONVECTION ROAST, SELF-CLEAN, CONTINUOUS BAKE and SET FOR OVEN LOCKOUT.

HOW TO PROGRAM THE ES 400

Clock:

The clock may be set for 12 or 24 hour time of day operation. The clock has been preset at the factory for 12 hour operation. When the range is first plugged in, or when the power supply to the range has been interrupted, the timer in the display will flash and **PF** (power failure) will appear in the display.

To set the Clock (example 1:30):

1. Press **Clock** . "CLO" will appear in the display.
2. Press the numbers 1, 3, 0 to set the time of day to 1:30. "CLO" will disappear after 4 seconds and the clock will start. Or, you may press **Start**. "CLO" will disappear and the clock will start.

Changing between 12 or 24 hour time of day display:

1. Press and hold **Clock** for 6 seconds a beep will sound.
2. The display will show **12:00** to indicate the 12 hour time of day operation is active.

3. Press **Clean** to toggle between the 12 and 24 hour time of day display. The display will show either **12:00** or **24:00**.
4. Press **Start** to accept the change or press **Clear/Off**.
5. Reset the correct time as described in **To set the Clock**.

Please note that if the 24 hour time of day mode was chosen, the clock will now display time from 0:00 through 24:00 hours.

To set the control for continuous bake or 12 Hour Energy Saving:

1. Press and hold **Timer On/Off** for 7 seconds, ":-" or "24" will appear in the display and the control will beep once.
2. Press **Clean** to toggle between the 12 Hour Energy Saving and continuous bake features.

Note: "12" in the display indicates the control is set for the 12 Hour Energy Saving mode and "--" indicates the control is set for the continuous bake feature.

3. Press **Start** to accept the change or press **Clear/Off** to reject the change.

Minute Timer:

The minute timer serves as an extra timer in the kitchen that will beep when the set time has run out. It does not start or stop cooking. The minute timer can be used during any of the other oven functions. The minute timer can be set for any amount of time from 1 minute to 11 hours 59 minutes in the 12 or 24 hour modes.

To Set the Minute Timer:

1. Press **Timer On/Off**, “0:00” and “**TIMER**” will flash in the display.
2. Push the number pads to set the desired time in the display. Press **Start**, the time will begin to count down and “**TIMER**” will glow in the display. Note: If **Start** is not pressed the timer will return to the time of day.
3. When the set time has run out, “**END**” will show in the display and 3 beeps, every 60 seconds, will sound until **Timer On/Off** is pressed.

To Change the Minute Timer while it is in use:

1. Press **Timer On/Off** and enter the new time using the number pads then press **Start** to start with the new time.

To Cancel the Minute Timer before the set time has run out:

1. Press and hold **Timer On/Off**. The display will return to the time of day.

Oven Lockout Feature:

The Oven Lockout feature prevents the oven from being accidentally turned on. It does not disable the clock, minute timer, or surface elements (or) burners. It disables the oven light switch, but the oven light will turn on if the oven door is opened.

To activate the Oven Lockout:

1. Press and hold **Lock** for three seconds.
2. After 3 seconds the lock icon light will come on and “**DOOR LOCKED**” will flash in the display. Once the oven door is locked the “**DOOR LOCKED**” indicator will quit flashing and remain on along with the lock icon light.

To reactivate Oven operation:

1. Press and hold **Lock** for three seconds. A beep will sound and the lock icon light will clear and the time of day will be shown. The “**DOOR LOCKED**” will continue to flash until the oven door has completely unlocked.
2. The oven control may then be programmed for all operations.

Temperature Display - Fahrenheit or Celcius:

The oven control can be programmed to display temperatures in Fahrenheit or Celsius. The range has been preset at the factory to display in Fahrenheit.

To change from Fahrenheit to Celsius or Celsius to Fahrenheit:

1. Identify which display the control is set for now. To tell if the range is set for Fahrenheit or Celsius press **Broil** and hold for 7 seconds. A beep will then sound. If “**F**” appears, the display is set to show temperatures in Fahrenheit. If “**C**” appears, the display is set to show temperatures in Celsius.
2. Press **Clean** to toggle between the Fahrenheit to Celsius display mode. The display will show either “**F**” or “**C**”.
3. Press **Start** to accept the change or press **Clear Off** to reject the change.

Silent Control Operation:

The silent operation feature allows the control to be operated without sounds or beeps whenever necessary. If desired the control can be programmed for silent operation and later returned to operating with all the normal sounds and beeps.

To change control from normal sound operation to silent control operation:

1. Identify which sound operation the control is set for now. To tell if the range is set for normal or silent operation press and hold **Stop Time** for 7 seconds. “**DELAY**” will flash in the display. If “**:SP**” appears, the control will operate with normal sounds and beeps. If “**:—**” appears, the control is in the silent operation mode.
2. Press **Clean** to toggle between the normal sound operation and silent operation mode. The display will show either “**:SP**” or “**:—**”.
3. Press **Start** to accept the change or press **Clear Off** to reject the change.

Preheat:

This Preheat mode will bring the oven up to temperature and then beep to know when to add food. Preheating the oven is recommended when baking breads and cakes. Use this mode when recipes call for preheating.

Preheating the oven allows the center of the oven temperature to reach maximum performance by turning on the broil burner first for top heat and then switching to the bake burner before food is added. It is not necessary when roasting or cooking casseroles. The oven can be programmed to preheat at any temperature from 170°F to 550°F.

To Set the Preheat Temperature to 350°F:

1. Arrange oven racks.
2. Press **Preheat**. “—°” and “BAKE” will show in the display.
3. Press the numbers to set the desired temperature for preheating. The set temperature and “BAKE” will show in the display.
4. Press **Start**. “PRE” and “BAKE” will show in the display as the oven heats and reaches the set temperature.

Note: After the oven has reached the desired temperature the control will beep and the “PRE” light will turn off and oven temperature will be displayed. If the beep was missed, a quick glance at the display with the “PRE” missing in the oven display and the oven temperature shown in its place is a good way to check that the oven has reached the preheat temperature. Once the oven has preheated, **PLACE FOOD IN THE OVEN**. The “BAKE” light will stay on.

Press **Clear Off** when baking is complete or to cancel preheat.

To change Preheat Temperature while oven is preheating (example changing from 350 to 425°F):

If it is necessary to change the preheat temperature while the oven is preheating to the original temperature:

1. While preheating, press **Preheat**. “—°” and “BAKE” will show in the display.
2. Enter the new preheat temperature. Press the numbers for the new set temperature. The new set temperature and “BAKE” will show in the display.
3. Press **Start**. “PRE” and “BAKE” will show in the display as the oven heats and reaches new set temperature.

When baking is complete press **Clear Off**.

Bake:

Use this mode when preheating is not necessary: such as, when roasting or cooking casseroles. The oven can be programmed to bake at any temperature from 170°F to 550°F (The sample below is for 350°).

To Set the Bake Temperature to 350°F:

1. Arrange oven racks and place food in oven.
2. Press **Bake**, —° will show in the display.
3. Press 3 5 0. “350°” will flash and “BAKE” will show in the display.
4. Press **Start**. “BAKE” and “350°” oven temperature will show in the display.

Press **Clear Off** to stop baking or cancel bake at any time.

To change the Bake Temperature (example 350° to 425°F):

1. After the oven has already been set to bake at 350° and should the temperature need to be changed to 425°, press **Bake** and “—°” will show in the display. Then press 4 2 5. “425°” and “BAKE” will show in the display.
3. Press **Start**. “BAKE” and the new oven temperature will show in the display.

Timed Bake:

COOK TIME or **STOP TIME** control the Time Bake operation. The automatic timer will turn the oven **off** at the time you select in advance.

Use caution when using the automatic timer. Use the automatic timer when cooking cured or frozen meats and most fruits and vegetables. Foods that can easily spoil such as milk, eggs, fish, meat or poultry, should be chilled in the refrigerator first. Even when chilled, they should not stand in the oven for more than 1 hour before cooking begins, and should be removed promptly when cooking is completed. Eating spoiled food can result in sickness from food poisoning.

To Program Oven to Begin Baking Immediately and to Shut Off Automatically (example Bake at 350°F for 50 minutes):

1. Be sure that the clock shows the correct time of day.

2. Arrange oven rack(s) and, if roasting or cooking a casserole, place the food in the oven.
3. Press **Bake**, “—” will show in the display.
4. Press 3 5 0. “350°” will flash and “BAKE” will show in the display.
5. Press **Start**. “350°” and “BAKE” will show in the display.
6. Press **Cook Time**. “TIMED” will flash; “BAKE”, “00:00” and “350°” will show in the display.
7. Enter the desired baking time using the number pads pressing 5 0. “TIMED” will flash and “BAKE”, “00:50” and “350°” will show in the display.

Note: Baking time can be set for any amount of time from 1 minute to 11 hours and 59 minutes (maximum time for both 12 or 24 hour display modes).

8. Press **Start**. Both the “TIMED” and “BAKE” icons will remain on in the display. Once Timed Bake has started, the current time of time will return in the display.

Note: Once Timed Bake has activated, press **Cook Time** to display the cook time remaining in the Timed Bake mode.

Press **Clear Off** when baking is complete or at any time to cancel the Timed Bake mode.

DELAYED TIMED BAKE, COOK TIME and STOP TIME control the Timed Bake operation. The automatic timer will turn the oven **on and off** at the time you select in advance.

To Program Oven for a Delayed Start Time and to Shut Off Automatically (example Bake at 350° F for 50 minutes, finishing at 5:30):

1. Be sure the clock shows the correct time of day.
2. Arrange oven rack(s) and, if roasting or cooking a casserole, place the food in the oven.
3. Press **Bake**, “—” will show in the display.
4. Press 3 5 0. “350°” will flash and “BAKE” will show in the display.
5. Press **Start**. “350°” and “BAKE” will show in the display.
6. Press **Cook Time**. “TIMED” will flash; “BAKE”,

“00:00” and “350°” will show in the display.

7. Enter the desired baking time using the number pads pressing 5 0. “TIMED” will flash and “BAKE”, “00:50” and “350°” will show in the display.

Note: Baking time can be set for any amount of time from 1 minute to 11 hours and 59 minutes (maximum time for both 12 or 24 hour display modes).

8. Press **Start**. “TIMED, BAKE” and “350°” will appear.
9. Press **StopTime**. Enter the desired stop time using the number pads 5 3 0.
10. Press **Start**. Once Timed Delay Bake has started, the set oven temperature will disappear, “TIMED”, “DELAY” and “BAKE” and the current time of time will show in the display.

Note: Once Timed Bake is activated, press **Cook Time** to display the cook time remaining in the Timed Bake mode. Press **Clear Off** when baking has complete or at any time to cancel the Delayed Timed Bake mode.

When the set bake time runs out:

1. “End” will appear in the display window and the oven will shut off automatically.
2. The control will beep 3 times. The control will continue to beep 3 times each minute until **Clear Off** is pushed.

Broil:

The broil burner will naturally glow red-orange. Heat radiates down from the broiler for even coverage. Be sure you center the broiler pan directly under the burner for best results. Broil may be set for temperatures from 400°F to 550°F. Arrange and position the oven rack while oven is still cool. The broiler pan and its insert allow dripping grease to drain and be kept away from the high heat of the broiler. **DO NOT** use the pan without its insert. **DO NOT cover the insert with foil.** The exposed grease could ignite. Should an oven fire occur, leave the oven door closed and turn off the oven. If the fire continues, throw baking soda on the fire or use a fire extinguisher. **DO NOT** put water or flour on the fire. Flour may be explosive and water can cause a grease fire to spread and cause personal injury.

To Set the oven to Broil at 550°F:

1. Place the insert on the broiler pan, then place the food on the insert. **DO NOT** use the broiler pan without the insert. **DO NOT** cover the broiler insert

with aluminum foil. The exposed fat could ignite.

2. Arrange oven rack and place the pan on the oven rack. Be sure to center the broiler pan directly under the broil burner. **Close the oven door when broiling.**
3. Press **Broil**. “**BROIL**” will flash and “—°” appear in the display.
4. Press 5 5 0. “**BROIL**” will flash and “**550°**” appear in the display.
5. Press **Start**. The oven will begin to broil. “**BROIL**” and “**550°**” appear in the display.
6. Broil on one side until food is browned; turn and cook on the second side. Season and serve.

Note: Always pull the rack out to the stop position before turning or removing food.

7. The “**BROIL**” light in the display will stay.
8. To cancel broiling or when broiling is complete press **Clear Off**.

Convection Bake:

To Set the Convection Bake Temperature to 350°F:

1. Arrange oven racks and place food in oven.
2. Press **Conv Bake**. “**CONV BAKE**” icon will flash and “—°” will show in the display.
3. Press 3 5 0. “**CONV BAKE**” icon will flash and “**350°**” will show in the display.
4. Press **Start**. The “**CONV BAKE**” icon will remain on. Also the “**350°**” oven temperature and the oven icon will show in the display.

Note: The convection fan will come on a short time after the oven has been set for Convection Bake. The oven icon display will begin rotating indicating that the Convection Fan is operating.

5. Press **Clear Off** to stop baking or cancel bake at any time.

Convection Roast:

The Convection Roast feature is used when cooking with meat. This feature has been designed to give optimum cooking performance for roasting meats.

To set the Convection Roast Feature (example 350°F):

1. Arrange interior oven racks and place food in oven.
2. Press **Conv roast**. “**MEATS**” will flash and “--” will be displayed.
3. Press 3 5 0. “**MEATS**” will flash and “**350°**” will appear in the display.
4. Press **Start**. “**Meats**” and “**350°**” will appear in the display. The convection fan icon will come on.

Press **Clear Off** to stop Convection Roast, or to cancel Convection Roast at any time.

To Start the Self-Clean Cycle:

If you are planning to use the oven directly after a self-clean cycle remember to allow time for the oven to cool down and the oven door to unlock. This normally takes about one hour. So to self-clean for 3 hours will actually take about 4 hours to complete.

*We recommend a 2 hour self-clean cycle for **light soils**, a 3 hour cycle for **average soils**, and a 4 hour cycle for **heavy soils** (to assure satisfactory results).

During the self-cleaning cycle, the outside of the range can become very hot to the touch. **DO NOT** leave small children unattended near the appliance; they may be burned if they touch the hot oven door surfaces.

DO NOT force the oven door open. This can damage the automatic door locking system. Use care when opening the oven door after the self-cleaning cycle. Stand to the side of the oven when opening the door to allow hot air or steam to escape. The oven may still be VERY HOT.

To Set the Controls for the Self-Cleaning Cycle To Start Immediately and Shut Off Automatically:

1. Be sure the clock shows the correct time of day and the oven door is closed.
2. Press **Clean**. “**CLEAN**” will flash and “**3:00**” will show in the display. If a 2 or 4 hour clean is desired use the number pads to enter the time. Set the cleaning time based on the amount of soil you have—light, medium or heavy.
3. Press **Start**. The “**DOOR LOCKED**” icon will flash; “**CLEAN**” icon and the letters “**CLn**” will remain on in the display.

- As soon as the controls are set, the motor driven oven door lock will begin to close automatically and once the door has been locked the “**DOOR LOCKED**” indicator light will quit flashing and remain on. Also the oven icon will show in the display.

Note: It takes about 15 seconds for the oven door lock to close.

When the Self-Clean Cycle is Completed:

- Only the time of day and the word “**DOOR LOCKED**” will remain in the display.
- Once the oven has cooled down for approximately 1 hour, and the word “**DOOR LOCKED**” shown in the display has gone out, the oven door can then be carefully opened.

Stopping or Interrupting a Self-Cleaning Cycle:

If it becomes necessary to stop or interrupt a self-cleaning cycle due to excessive smoke or fire in the oven:

- Press **Clear Off**.
- Once the oven has cooled down for approximately 1 hour and the “**DOOR LOCKED**” icon is no longer displayed, then the oven door may be opened.

To Set the Controls for the Self-Cleaning Cycle To Start at a Delayed Time and Shut off Automatically (example 3 hour self-clean cycle to finish at 9:00):

- Be sure the clock shows the correct time of day and the oven door is closed.
- Press **Clean**. “**CLEAN**” will flash and “**3:00**” (default 3 hour clean cycle) will show in the display. **If a 2 or 4 hour clean is desired** use the number pads to enter the time. Set the cleaning time based on the amount of soil you have—light, medium or heavy.
- Press **Start**. The “**DOOR LOCKED**” icon will flash; “**CLEAN**” icon and the letters “**CLn**” will remain on in the display.
- Press **Stop Time**. Enter the desired Stop Time using the number pads 9 0 0.
- Press **Start**. The “**CLn**” icon will turn off; “**DELAY**”, “**DOOR LOCKED**” and “**CLEAN**” icons will remain on.
- As soon as the controls are set, the motor driven oven door lock will begin to close automatically and once the door has been locked the “**DOOR LOCKED**”

indicator light will quit flashing and remain on.

- The control will calculate backward from the set stop time to determine when the self-cleaning cycle should begin. The self-cleaning cycle will come on automatically at the calculated time. At that time, the icon “**DELAY**” will go out; “**CLEAN**” and “**CLn**” will appear in the display.

When the Self-Clean Cycle has Completed:

- Only the time of day and the “**DOOR LOCKED**” icon will remain in the display.
- Once the oven has cooled down for approximately 1 hour, and the word “**DOOR LOCKED**” shown in the display has gone out, the oven door can then be carefully opened.

HOW THE ES 400 OPERATES

The ES 400 electronic oven control system is made up of three parts that control the bake and broil burners, and the locking of the door in clean.

- Electronic oven control.
- Oven temperature sensor.
- Oven door lock mechanism.

PREHEAT

When the preheat pad is touched, and a temperature is programmed with the number pads, the broil relay on the board closes, applying line to neutral voltage across the broil circuit for the first six minutes. The display will show “Pre” and “Bake”. The broil circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat, reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The broil section of the safety valve opens allowing gas to flow into the broil burner. The gas is then ignited by the heat of the broil igniter and the oven begins to heat up. After six minutes the control turns the broil circuit off and activates the bake circuit. The bake circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it

heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The bake section of the safety valve opens allowing gas to flow into the bake burner. The gas is then ignited by the heat of the bake igniter and the oven begins to heat up.

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the resistance of the oven sensor indicates temperature in the oven is about 10 degrees above the programmed temperature the microprocessor opens the relay, which removes power from the bake circuit and closes the safety valve. When power is removed from the bake circuit the oven temperature begins to lower. As the oven temperature lowers the resistance of the oven sensor decreases. When the oven drops to about 10 degrees below the programmed temperature the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the bake circuit. After the first cycle the "Pre" will disappear in the display indicating the oven is preheated.

Note: Oven controls may have a spread of more or less than 20 degrees. The important thing is the average temperature in the oven. The average temperature in the center of the oven should be within 10 degrees of the programmed temperature.

BAKE

When the Bake pad is touched, and a temperature is programmed with the number pads, the bake relay on the board closes, applying line to neutral voltage across the bake circuit and "Bake" will appear in the display. The bake circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat

reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The bake section of the safety valve opens allowing gas to flow into the bake burner. The gas is then ignited by the heat of the bake igniter and the oven begins to heat up

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the resistance of the oven sensor indicates temperature in the oven is about 10 degrees above the programmed temperature the microprocessor opens the relay, which removes power from the bake circuit and closes the safety valve. When power is removed from the bake circuit the oven temperature begins to lower. As the oven temperature lowers the resistance of the oven sensor decreases. When the oven drops to about 10 degrees below the programmed temperature the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the bake circuit.

TIME BAKE

The time bake function allows the oven to be programmed to stop bake at a set time, or to delay the start and stop baking at a set time. The stop time cannot be set for more than 11 hours and 59 minutes ahead of the time of day.

CONVECTION BAKE

When the convection bake pad is touched and a temperature is set two things happen that do not happen in normal bake. The electronic oven control automatically raises the temperature 15 degrees and after five minutes, the control turns the fan and the assist element on. The delay is needed for the oven flame to have proper venting stack action. After five minutes, and if the oven door is closed, the convection relay on the electronic oven control closes providing line to neutral voltage to the convection fan motor and the convection assist element. This relay remains closed until the program is canceled or is interrupted by the opening of the oven door. If interrupted by the opening of the oven door, the relay will automatically close when the door is closed.

CONVECTION ROAST

Convection roast operates the same as convection bake except the control does not operate above the set

temperature and the temperature differential is larger.

BROIL

When the Broil pad is touched, and a temperature is set between 400 and 550 degrees F (usually 550 degrees), the broil relay on the board closes, applying line to neutral voltage to the oven broil circuit and "Broil" will appear in the display. The broil circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat, reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The broil section of the safety valve opens allowing gas to flow into the broil burner. The gas is then ignited by the heat of the broil igniter and the oven begins to heat up.

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor in the tip of the oven sensor is a positive thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor and compares it with a programmed temperature set into the control. The broil burner will cycle when the set temperature is reached.

CLEAN

When the Clean pad is touched and a clean time is set (and if the oven door is closed closing the contacts COM to NO of the door switch), the door lock relay on the electronic oven control closes providing line to neutral voltage (120 VAC) to the lock motor. The lock motor starts to rotate closing the contacts of the door lock switch. When the motor rotates one half turn, the contacts of the door lock switch reopen sending a signal to the control telling it that the door is locked and to open the contacts of the lock relay. The control then closes the bake relay providing power to the bake circuit. The clean temperature is preset into the control at around 860 degrees. It take about 45 minutes for the oven to reach 860 degrees. When the temperature is reached the control cycles the bake circuit off and on to maintain the temperature until the clean time is completed. When the clean time is completed, the control removes power from the bake circuit and the oven cools down. When the temperature in the oven goes below 500 degrees the

control closes the contacts of the lock relay. The lock motor turns 180 degrees closing and reopening the contacts of the lock switch and unlocking the door. The open contacts of the lock switch tell the control that the door is unlocked and to open the contacts of the lock relay.

CALIBRATION

To check oven calibration:

1. Place a thermometer or thermocouple in the center of the oven.
2. Program the oven temperature for 350°F. Allow the oven to cycle three times.
3. Average the highest and lowest reading. The average should be within 10 degrees of 350°F.

To adjust the oven temperature higher:

1. Press the **Bake pad** for 6 seconds. "0" will appear in the display.
2. To increase the temperature use the number pads to enter the desired change. The temperature may be increased up to 35°F.
3. Press **Start** to accept the temperature change and the display will return to the time of day. Press **Clear Off** to reject the change if necessary.

To adjust the oven temperature lower:

1. Press the **Bake pad** for 6 seconds. "0" will appear in the display.
2. To decrease the temperature use the number pads to enter the desired change and then press **Clean**. The temperature may be decreased up to 35°F.
3. Press **Start** to accept the temperature change and the display will return to the time of day. Press **Clear Off** to reject the change if necessary.

TROUBLESHOOTING

The ES 400 has some self diagnostics built into the microprocessor to help in troubleshooting the system. When a failure occurs one of three codes will appear in all the display windows: F1, F3, or F9.

F1 code:

F1 indicates a malfunction in the control itself, and the control should be replaced.

F3 code:

F3 indicates a defective sensor, electronic oven control or the wiring in between. To determine which part is defective:

1. Disconnect the 15 pin plug from the back of the oven control that connects the sensor to the oven control.
2. With an Ohmmeter measure the resistance between pins 14 and 15 in the plug (**not on the control board**). If the meter reads around value of the oven temperature sensor resistance chart the oven control is defective. If the meter reads less than 800 Ohms or more than 3000 Ohms, go to step 3.

RTD SCALE	
Temperature (°F)	Resistance (ohms)
32 ± 1.9	1000 ± 4.0
75 ± 2.5	1091 ± 5.3
250 ± 4.4	1453 ± 8.9
350 ± 5.4	1654 ± 10.8
450 ± 6.9	1852 ± 13.5
550 ± 8.2	2047 ± 15.8
650 ± 9.6	2237 ± 18.5
900 ± 13.6	2697 ± 24.4

3. Disconnect the harness from the oven sensor and measure the resistance of the oven sensor. If the reading is the same as that in step two the oven sensor is defective. If the reading is correct with the chart the harness is defective.

F9 code:

F9 code indicates the control has detected a problem with the motor door latch assembly. Check the contacts of the lock switch, wiring to the lock motor assembly, and the lock motor.

Control will not program:

If the control will not program check for an open sensor circuit. If the sensor circuit is good, replace the control.

Time bake does not operate:

If the time bake feature does not operate check to be sure it is being programmed correctly. If so, replace the control.

Convection bake:

If neither the fan motor or the assist element operate after the five minute delay when convection bake is programmed.

1. Remove power from range. Go to the back of the electronic oven control and disconnect the 15 pin plug. With the oven door closed measure the resistance between pins 10 and 12 in the 15 pin plug in the plug. If the meter reads open check the door switch and the wiring from the electronic oven control to the door switch. If the meter reads zero go to step 2.
2. Measure the resistance between pins 5 and 7. If the meter reads around 10 Ohms the control is defective. If the meter reads infinity either the wiring to the fan motor and element is broken or both the fan motor and the element are defective.

If the assist element heats but the fan motor does not operate when convection bake is programmed, the fan motor is defective or the fan blade blocked.

If the fan motor operates but the assist element does not heat when convection bake is programmed, the wiring between fan and element is defective or the element is open.

Blank Display:

If the display on the oven control is blank and with the range connected to electrical power:

1. Go to the back of the control, disconnect the 15 pin plug and measure the voltage drop between pins 1 and 5 in the plug. If the meter reads line to neutral voltage (120 VAC) the control is defective. If the meter reads zero the wiring in the range is defective.

No heat:

If the control appears to be operating normally, but the bake and broil burners do not heat:

1. Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing go to step 3. If the igniter is glowing check the manual gas shut-off for the oven to be sure gas is being supply to the safety valve. Then remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.
2. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 4. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current

flow is 3.2 or more check the wiring in the broil circuit for a poor connection.

3. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 3 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 5.
4. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 2 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the broil circuit is open. Go to step 5.
5. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally and the broil burner operates but the bake burner does not heat:

1. Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.
2. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 3 of the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally and the bake burner operates but the broil burner does not heat:

1. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing

go to step 2. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.

2. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 2 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the broil circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

Self-cleaning:

Oven door does not lock when the oven is programmed for clean:

1. Remove power from the range, go the back of the control and disconnect the 15 pin plug. Measure the resistance between pins 5 and 6 in the 15 pin plug (in the plug). If the meter reads infinity the lock motor or the wiring to the lock motor is defective. If the meter reads around 1500 ohms go to step 2.
2. Measure the resistance between pins 10 and 12 of the 15 pin plug with the oven door closed. If the meter reads infinity the door switch or the wiring to the door light switch is defective. If the meter reads zero go to step 3.
3. Measure the resistance between pins 11 and 12 in the 15 pin plug. If the meter reads infinity the lock switch or the wiring to the lock switch is defective. If the meter reads zero the control is defective.

Oven door locks when the oven is programmed for clean but the oven does not heat:

1. If the oven operates in normal bake replace the control.

Lock motor runs continuously:

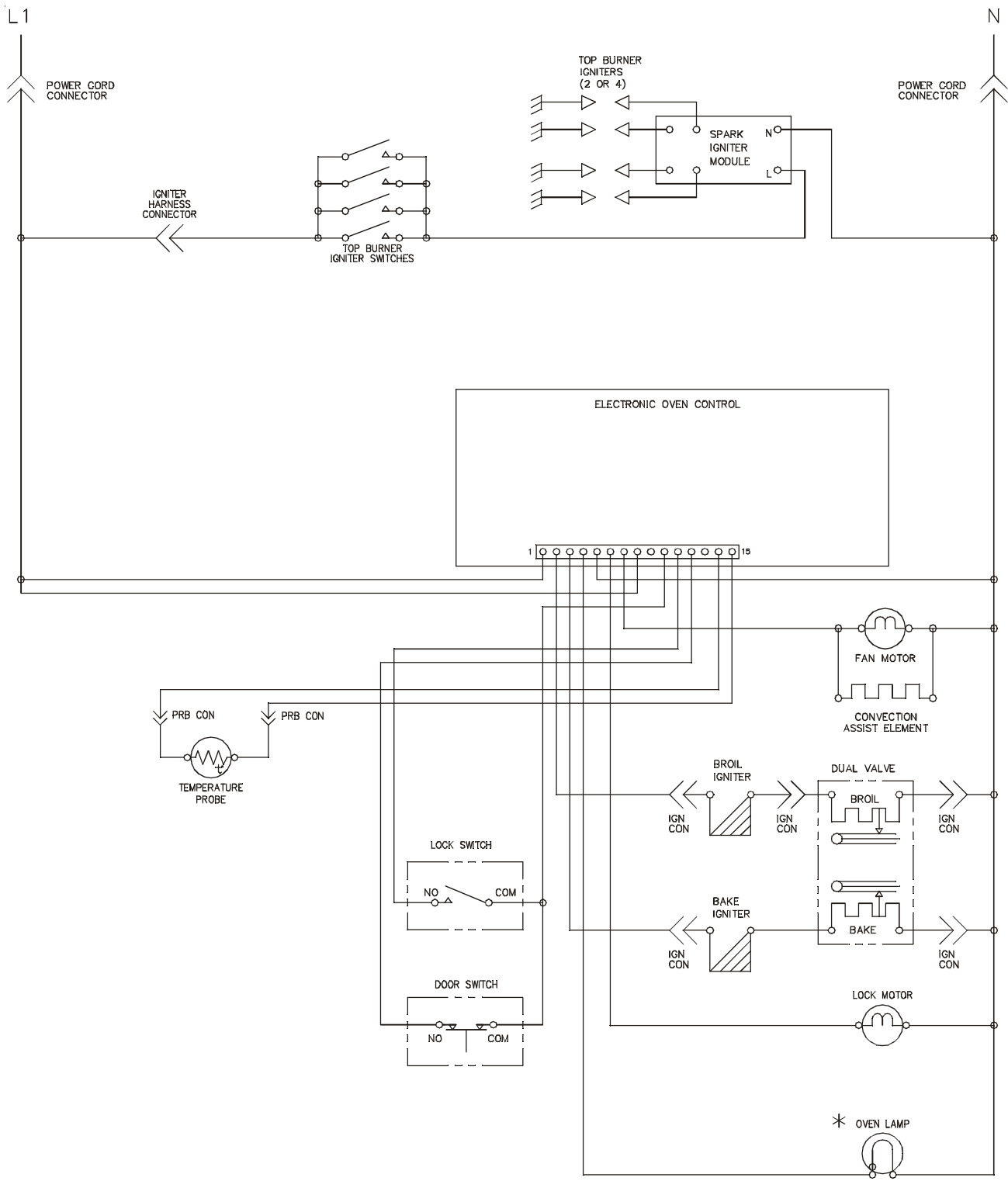
1. With the door in the unlock position, remove power from the range. Go to the back of the control and disconnect the 15 pin plug from the control. With an Ohmmeter measure the resistance between pins 10

and 11 in the 15 pin plug. If the meter reads zero the lock switch or the wiring to the lock switch is defective. If the meter reads infinity go to step 2.

- 2, Depress the arm of the lock switch, and measure the resistance between pins 10 and 11 in the 15 pin plug. If the meter reads infinity the lock switch or the wiring to the lock switch is defective. If the meter reads zero the control is defective.

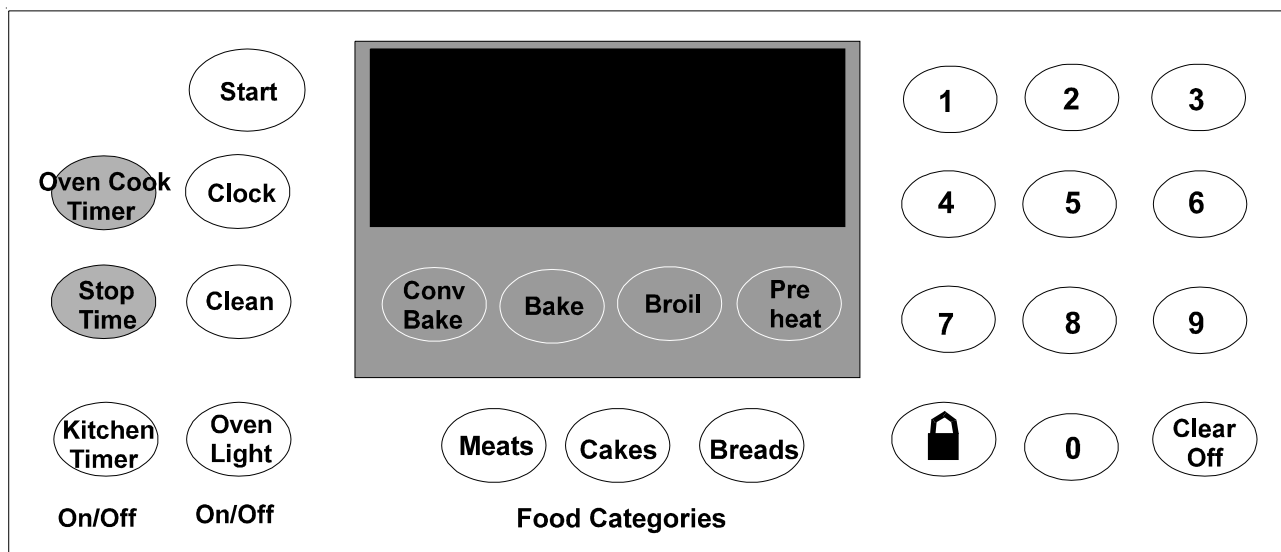
Door latch is partly closed with door open, cannot close door:

1. Program the oven for self-clean, and hold in on the door switch for 30 seconds. Touch cancel and hold door switch in for 30 seconds. The lock motor should lock and unlock the door.



- NOTES:
1. CIRCUIT SHOWN WITH ALL CONTROLS SET TO OFF, OVEN DOOR CLOSED AND UNLOCKED.
 2. COMPONENTS WITH * DO NOT APPEAR ON ALL MODELS.

SAMPLE SCHEMATIC FOR ES 400 CONTROL SYSTEM



THE ES 450 ELECTRONIC CONTROL SYSTEM

The ES 450 electronic oven control system is used to control the oven on self-cleaning model ranges that have the convection and pre-programmed features.

HOW TO PROGRAM THE ES 450

The oven can be programmed to: BAKE, TIME BAKE, BROIL, CONVECTION BAKE, SELF-CLEAN, CONTINUOUS BAKE, PREPROGRAM FUNCTIONS and SET FOR OVEN LOCKOUT.

Clock:

The clock may be set for 12 or 24 hour time of day operation. The clock has been preset at the factory for 12 hour operation. When the range is first plugged in, or when the power supply to the range has been interrupted, the timer in the display will flash and **PF** (power failure) will appear in the display.

To set the Clock (example 1:30):

1. Press **Clock**. "CLO" will appear in the display.
2. Press the numbers 1 3 0 to set the time of day to 1:30. "CLO" will disappear after 4 seconds and the clock will start. Or, you may press **Start**. "CLO" will disappear.

Changing between 12 or 24 hour time of day display:

1. Press and hold **Clock** for 6 seconds; a beep will sound.
2. The display will show **12:00** to indicate the 12 hour time of day operation is active.

3. Press **Clean** to toggle between the 12 and 24 hour time of day display. The display will show either **12:00** or **24:00**.
4. Press **Start** to accept the change or press **Clear/Off**.
5. Reset the correct time as described in **To set the Clock**.

Please note that if the 24 hour time of day mode was chosen, the clock will now display time from 0:00 through 24:00 hours.

Continuous Bake or 12 Hour Energy Savings:

The oven control has a factory preset built-in 12 Hour Energy Saving feature that will shut off the oven if the oven control is left on for more than 11 hours and 59 minutes. The oven can be programmed to override this feature for continuous baking.

To set the control for continuous bake or 12 Hour Energy Saving

1. Press and hold **Timer On/Off** for 7 seconds, ":-" or "24" will appear in the display and the control will beep once.
2. Press **Clean** to toggle between the 12 Hour Energy Saving and continuous bake features.

Note: "12" in the display indicates the control is set for the 12 Hour Energy Saving mode and "--" indicates the control is set for the continuous bake feature.

3. Press **Start** to accept the change or press **Clear/Off** to reject the change.

Minute Timer:

The minute timer serves as an extra timer in the kitchen that will beep when the set time has run out. It does not start or stop cooking. The minute timer can be used during any of the other oven functions. The minute timer can be set for any amount of time from 1 minute to 11 hours 59 minutes in the 12 or 24 hour modes.

To Set the Minute Timer:

1. Press **Timer On/Off**, “0:00” and “**TIMER**” will flash in the display.
2. Push the number pads to set the desired time in the display Press **Start**, the time will begin to count down and “**TIMER**” will glow in the display. Note: If **Start** is not pressed the timer will return to the time of day.
3. When the set time has run out, “**END**” will show in the display and 3 beeps, every 60 seconds, will sound until **Timer On/Off** is pressed.

To Change the Minute Timer while it is in use:

1. Press **Timer On/Off** and enter the new time using the number pads then press **Start** to start with the new time.

To Cancel the Minute Timer before the set time has run out:

1. Press and hold **Timer On/Off**. The display will return to the time of day.

Oven Lockout Feature:

The Oven Lockout feature prevents the oven from being accidentally turned on. It does not disable the clock, minute timer, or surface elements (or) burners. It disables the oven light switch, but the oven light will turn on if the oven door is opened.

To activate the Oven Lockout:

1. Press and hold **Lock** for three seconds.
2. After 3 seconds the lock icon light will come on and “**DOOR LOCKED**” will flash in the display. Once the oven door is locked the “**DOOR LOCKED**” indicator will quit flashing and remain on along with the lock icon light.

To reactivate Oven operation:

1. Press and hold **Lock** for three seconds. A beep will

sound and the lock icon light will clear and the time of day will be shown. The “**DOOR LOCKED**” will continue to flash until the oven door has completely unlocked.

2. The oven control may then be programmed for all operations.

Temperature Display - Fahrenheit or Celcius:

The oven control can be programmed to display temperatures in Fahrenheit or Celsius. Your range has been preset at the factory to display in Fahrenheit.

To change from Fahrenheit to Celsius or Celsius to Fahrenheit:

1. Identify which display your control is set for now. To tell if your range is set for Fahrenheit or Celsius press **Broil** and hold for 7 seconds. A beep will then sound. If “**F**” appears, the display is set to show temperatures in Fahrenheit. If “**C**” appears, the display is set to show temperatures in Celsius.
2. Press **Clean** to toggle between the Fahrenheit to Celsius display mode. The display will show either “**F**” (Fig. 4) or “**C**”.
3. Press **Start** to accept the change or press **Clear Off** to reject the change.

Silent Control Operation:

The silent operation feature allows the control to be operated without sounds or beeps whenever necessary. If desired the control can be programmed for silent operation and later returned to operating with all the normal sounds and beeps.

To change control from normal sound operation to silent control operation:

1. Identify which sound operation your control is set for now. To tell if your range is set for normal or silent operation press and hold **Stop Time** for 7 seconds. “**DELAY**” will flash in the display. If “**:SP**” appears, the control will operate with normal sounds and beeps. If “**:—**” appears, the control is in the silent operation mode.
2. Press **Clean** to toggle between the normal sound operation and silent operation mode. The display will show either “**:SP**” or “**:—**”.
3. Press **Start** to accept the change or press **Clear Off** to reject the change.

Preheat:

This Preheat mode will bring the oven up to temperature and then beep to let you know when to add your food. Preheating the oven is recommended when baking breads and cakes. Use this mode when recipes call for preheating. Preheating the oven allows the center of the oven temperature to reach maximum performance by turning on the broil burner first for top heat and then switching to the bake burner before food is added. It is not necessary when roasting or cooking casseroles. The oven can be programmed to preheat at any temperature from 170°F to 550°F.

To Set the Preheat Temperature to 350°F:

1. Arrange oven racks.
2. Press **Preheat**. “—°” and “BAKE” will show in the display.
3. Press the numbers to set the desired temperature for preheating. The set temperature and “BAKE” will show in the display.
4. Press **Start**. “PRE” and “BAKE” will show in the display as the oven heats and reaches the set temperature.

Note: After the oven has reached the desired temperature the control will beep and the “PRE” light will turn off and the oven temperature will be displayed. If the beep was missed, a quick glance at the display with the “PRE” missing in the oven display and the oven temperature shown in its place is a good way to check that the oven has reached the preheat temperature. Once the oven has preheated, **PLACE FOOD IN THE OVEN**. The “BAKE” light will stay on.

Press **Clear Off** when baking is complete or to cancel preheat.

To change Preheat Temperature while oven is preheating (example changing from 350 to 425°F):

1. While preheating, press **Preheat**. “—°” and “BAKE” will show in the display.
2. Enter the new preheat temperature. Press the numbers for the new set temperature. The new set temperature and “BAKE” will show in the display.
3. Press **Start**. “PRE” and “BAKE” will show in the display as the oven heats and reaches new set temperature.

When baking is complete press **Clear Off**.

Bake:

Use this mode when preheating is not necessary, such as roasting or cooking casseroles. The oven can be programmed to bake at any temperature from 170°F to 550°F. The sample below is for 350°F.

To Set the BAKE Temperature to 350°F:

1. Arrange oven racks and place food in oven.
2. Press **Bake**, “—°” will show in the display.
3. Press 3 5 0. “350°” will flash and “BAKE” will show in the display.
4. Press **Start**. “BAKE” and “350°” oven temperature will show in the display.

Press **Clear Off** to stop baking or cancel at any time.

To change the Bake Temperature (example 350° to 425°F):

1. After the oven has already been set to bake at 350° and should the temperature need to be changed to 425°, press **Bake** and “—°” will show in the display. Then press 4 2 5. “425°” and “BAKE” will show in the display.
3. Press **Start**. “BAKE” and the new oven temperature will show in the display.

Timed Bake:

COOK TIME or **STOP TIME** control the Time Bake operation. The automatic timer will turn the oven **off** at the time you select in advance. Use caution when using the automatic timer. Use the automatic timer when cooking cured or frozen meats and most fruits and vegetables. Foods that can easily spoil such as milk, eggs, fish, meat or poultry, should be chilled in the refrigerator first. Even when chilled, they should not stand in the oven for more than 1 hour before cooking begins, and should be removed promptly when cooking is completed. Eating spoiled food can result in sickness from food poisoning.

To Program the Oven to Begin Baking Immediately and To Shut Off Automatically (example Bake at 350°F for 50 minutes):

1. Be sure that the clock shows the correct time of day.
2. Arrange oven rack(s) and, if roasting or cooking a casserole, place the food in the oven.

3. Press **Bake**, “—°” will show in the display.
4. Press 3 5 0. “350°” will flash and “BAKE “ will show in the display.
5. Press **Start**. “350°” and “BAKE “ will show in the display.
6. Press **Cook Time**. “TIMED” will flash; “BAKE”, “00:00” and “350° will show in the display.
7. Enter the desired baking time using the number pads pressing 5 0. “TIMED” will flash and “BAKE”, “00:50” and “350°” will show in the display.

Note: Baking time can be set for any amount of time from 1 minute to 11 hours and 59 minutes (maximum time for both 12 or 24 hour display modes).

8. Press **Start**. Both the “TIMED” and “BAKE” icons will remain on in the display. Once Timed Bake has started, the current time of time will return in the display.

Note: Once Timed Bake is activated, press **Cook Time** to display the cook time remaining in the Timed Bake mode.

Press **Clear Off** when baking is complete or at any time to cancel the Timed Bake mode.

DELAYED TIMED BAKE - COOK TIME and STOP TIME control the Time Bake operation. The automatic timer will turn the oven **on and off** at the time you select in advance.

To Program Oven for a Delayed Start Time and to Shut Off Automatically (example Bake at 350° F for 50 minutes, finishing at 5:30):

1. Be sure the clock shows the correct time of day.
2. Arrange oven rack(s) and, if roasting or cooking a casserole, place the food in the oven.
3. Press **Bake**, “—°” will show in the display.
4. Press 3 5 0 . “350°” will flash and “BAKE“ will show in the display.
5. Press **Start**. “350°” and “BAKE “ will show in the display.
6. Press **Cook Time**. “TIMED” will flash; “BAKE”, “00:00” and “350°” will show in the display.

7. Enter the desired baking time using the number pads pressing 5 0 . “TIMED” will flash and “BAKE”, “00:50” and “350°” will show in the display.

Note: Baking time can be set for any amount of time from 1 minute to 11 hours and 59 minutes (maximum time for both 12 or 24 hour display modes).

8. Press **Start.**“TIMED, BAKE” and “350°” will appear.
9. Press **StopTime**. Enter the desired stop time using the number pads 5 3 0.
10. Press **Start**. Once Timed Delay Bake has started, the set oven temperature will disappear, “TIMED”, “DELAY” and “BAKE” and the current time of time will show in the display.

Note: Once Timed Bake is activated, press **Cook Time** to display the cook time remaining in the Timed Bake mode. Press **Clear Off** when baking has complete or at any time to cancel the Delayed Timed Bake mode.

When the set bake time runs out:

1. “End” will appear in the display window and the oven will shut off automatically.
2. The control will beep 3 times. The control will continue to beep 3 times each minute until **Clear Off** is pushed.

Broil:

The broil burner will naturally glow red-orange. Heat radiates down from the broiler for even coverage. Be sure you center the broiler pan directly under the burner for best results. Broil may be set for temperatures from 400°F to 550°F. Arrange and position the oven rack while oven is still cool. The broiler pan and its insert allow dripping grease to drain and be kept away from the high heat of the broiler. **DO NOT** use the pan without its insert. **DO NOT cover the insert with foil.** The exposed grease could ignite. Should an oven fire occur, leave the oven door closed and turn off the oven. If the fire continues, throw baking soda on the fire or use a fire extinguisher. **DO NOT** put water or flour on the fire. Flour may be explosive and water can cause a grease fire to spread and cause personal injury.

To Set the oven to Broil at 550°F:

1. Place the insert on the broiler pan, then place the food on the insert. **DO NOT** use the broiler pan without the insert. **DO NOT** cover the broiler insert with aluminum foil. The exposed fat could ignite.

2. Arrange oven rack and place the pan on the oven rack. Be sure to center the broiler pan directly under the broil burner. **Close the oven door when broiling.**
3. Press **Broil**. “**BROIL**” will flash and “—°” appear in the display.
4. Press 5 5 0. “**BROIL**” will flash and “**550°**” appear in the display.
5. Press **Start**. The oven will begin to broil. “**BROIL**” and “**550°**” appear in the display.
6. Broil on one side until food is browned; turn and cook on the second side. Season and serve.

Note: Always pull the rack out to the stop position before turning or removing food.

7. The “**BROIL**” light in the display will stay.
8. To cancel broiling or when broiling is complete press **Clear Off**.

Convection Bake:

To Set the Convection Bake Temperature to 350°F:

1. Arrange oven racks and place food in oven.
2. Press **Conv Bake**. “**CONV BAKE**” icon will flash and “—°” will show in the display.
3. Press 3 5 0. “**CONV BAKE**” icon will flash and “**350°**” will show in the display.
4. Press **Start**. The “**CONV BAKE**” icon will remain on. Also the “**350°**” oven temperature and the oven icon will show in the display.

Note: The convection fan will come on a short time after the oven has been set for Convection Bake. The oven icon display will begin rotating indicating that the Convection Fan is operating.

5. Press **Clear Off** to stop baking or cancel bake at any time.

Setting Food Category Feature:

The **Meats**, **Cakes**, and **Breads** pads in the food categories have been designed to give optimum performance for the foods selected in each category.

The **Meats** pad combines a cook cycle with the

convection fan and element to roast meats and poultry. Preheating is not necessary for meats and poultry. Heated air circulates around the food from all sides, sealing in juices and flavors. Foods are crispy brown on the outside while staying moist on the inside.

The **Cakes** pad provides a preheat with a gentle cycling of heat, giving cakes more volume and allowing delicate foods to cook more evenly. Cook times may need to be extended when baking 4 cake layers at one time.

The **Breads** pad adds a preheat feature to the bake cycle to thoroughly heat the oven from top to bottom to give more evenly browned food.

To set the Food Categories Feature (example Meat to Cook at 350°F):

1. Arrange interior oven racks and place food in oven.
2. Press **Meat** pad. “**MEATS**” will flash and “—” will be displayed.
3. Press 3 5 0. “**MEATS**” will flash and “**350°**” will appear in the display.
4. Press **Start**. “**MEATS**” and “**350°**” will appear in the display and the convection fan icon will come on.

Press **Clear Off** to stop cooking or to cancel cooking Meats, Cakes, or Breads at any time.

Self-Clean:

When planning to use the oven directly after a self-clean cycle remember to allow time for the oven to cool down and the oven door to unlock. This normally takes about one hour. So to self-clean for 3 hours will actually take about 4 hours to complete.

*We recommend a 2 hour self-clean cycle for **light soils**, a 3 hour cycle for **average soils**, and a 4 hour cycle for **heavy soils** (to assure satisfactory results).

During the self-cleaning cycle, the outside of the range can become very hot to the touch. **DO NOT** leave small children unattended near the appliance; they may be burned if they touch the hot oven door surfaces.

DO NOT force the oven door open. This can damage the automatic door locking system. Use care when opening the oven door after the self-cleaning cycle. Stand to the side of the oven when opening the door to allow hot air or steam to escape. The oven may still be VERY HOT.

To Set the Controls for the Self-Cleaning Cycle To Start Immediately and Shut Off Automatically:

1. Be sure the clock shows the correct time of day and the oven door is closed.
2. Press **Clean**. “**CLEAN**” will flash and “**3:00**” will show in the display. If a 2 or 4 hour clean is desired use the number pads to enter the time. Set the cleaning time based on the amount of soil in the oven—light, medium or heavy.
3. Press **Start**. The “**DOOR LOCKED**” icon will flash; “**CLEAN**” icon and the letters “**CLn**” will remain on in the display.
4. As soon as the controls are set, the motor driven oven door lock will begin to close automatically and once the door has been locked the “**DOOR LOCKED**” indicator light will quit flashing and remain on. Also the oven icon will show in the display.

Note: It takes about 15 seconds for the oven door lock to close.

When the Self-Clean Cycle has Completed:

1. Only the time of day and the word “**DOOR LOCKED**” will remain in the display.
2. Once the oven has cooled down for approximately 1 hour, and the word “**DOOR LOCKED**” shown in the display has gone out, the oven door can then be carefully opened.

Stopping or Interrupting a Self-Cleaning Cycle:

If it becomes necessary to stop or interrupt a self-cleaning cycle due to excessive smoke or fire in the oven:

1. Press **Clear Off**.
2. Once the oven has cooled down for approximately 1 hour and the “**DOOR LOCKED**” icon is no longer displayed, then the oven door may be opened.

To Set the Controls for the Self-Cleaning Cycle To Start at a Delayed Time and Shut off Automatically (example 3 hour self-clean cycle to finish at 9:00):

1. Be sure the clock shows the correct time of day and the oven door is closed.
2. Press **Clean**. “**CLEAN**” will flash and “**3:00**” (default 3 hour clean cycle) will show in the display. **If a 2 or 4 hour clean is desired** use the number pads to enter the time. Set the cleaning time based on the

amount of soil in the oven—light, medium or heavy.

3. Press **Start**. The “**DOOR LOCKED**” icon will flash; “**CLEAN**” icon and the letters “**CLn**” will remain on in the display.
4. Press **Stop Time**. Enter the desired Stop Time using the number pads 9 0 0.
5. Press **Start**. The “**CLn**” icon will turn off; “**DELAY**”, “**DOOR LOCKED**” and “**CLEAN**” icons will remain on.
6. As soon as the controls are set, the motor driven oven door lock will begin to close automatically and once the door has been locked the “**DOOR LOCKED**” indicator light will quit flashing and remain on.
7. The control will calculate backward from the set stop time to determine when the self-cleaning cycle should begin. The self-cleaning cycle will come on automatically at the calculated time. At that time, the icon “**DELAY**” will go out; “**CLEAN**” and “**CLn**” will appear in the display.

When the Self-Clean Cycle has Completed:

1. Only the time of day and the word “**DOOR LOCKED**” will remain in the display.
2. Once the oven has cooled down for approximately 1 hour, and the word “**DOOR LOCKED**” shown in the display has gone out, the oven door can then be carefully opened.

HOW THE ES 450 OPERATES

The ES 450 electronic oven control system is made up of three parts that control the bake and broil burners, and the locking of the door in clean.

1. Electronic oven control.
2. Oven temperature sensor.
3. Oven door lock mechanism.

PREHEAT

When the preheat pad is touched, and a temperature is programmed with the number pads, the broil relay on the board closes, applying line to neutral voltage across the broil circuit for the first six minutes. The display will show “Pre” and “Bake”. The broil circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first

applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat, reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The broil section of the safety valve opens allowing gas to flow into the broil burner. The gas is then ignited by the heat of the broil igniter and the oven begins to heat up. After six minutes the control turns the broil circuit off and activates the bake circuit. The bake circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The bake section of the safety valve opens allowing gas to flow into the bake burner. The gas is then ignited by the heat of the bake igniter and the oven begins to heat up.

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the resistance of the oven sensor indicates temperature in the oven is about 10 degrees above the programmed temperature the microprocessor opens the relay, which removes power from the bake circuit and closes the safety valve. When power is removed from the bake circuit the oven temperature begins to lower. As the oven temperature lowers the resistance of the oven sensor decreases. When the oven drops to about 10 degrees below the programmed temperature the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the bake circuit. After the first cycle the "Pre" will disappear in the display indicating the oven is preheated.

Note: Oven controls may have a spread of more or less than 20 degrees. The important thing is the average temperature in the oven. The average temperature in the center of the oven should be within 10 degrees of the programmed temperature.

BAKE

When the Bake pad is touched, and a temperature is programmed with the number pads, the bake relay on the board closes, applying line to neutral voltage across the bake circuit and "Bake" will appear in the display. The bake circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The bake section of the safety valve opens allowing gas to flow into the bake burner. The gas is then ignited by the heat of the bake igniter and the oven begins to heat up

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the resistance of the oven sensor indicates temperature in the oven is about 10 degrees above the programmed temperature the microprocessor opens the relay, which removes power from the bake circuit and closes the safety valve. When power is removed from the bake circuit the oven temperature begins to lower. As the oven temperature lowers the resistance of the oven sensor decreases. When the oven drops to about 10 degrees below the programmed temperature the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the bake circuit.

TIME BAKE

The time bake function allows the oven to be programmed to stop bake at a set time, or to delay the start and stop baking at a set time. The stop time cannot be set for more than 11 hours and 59 minutes ahead of the time of day.

CONVECTION BAKE

When the convection bake pad is touched and a temperature is set two things happen that do not happen in normal bake. The electronic oven control automatically raises the temperature 15 degrees and after five minutes,

the control turns the fan and the assist element on. The delay is needed for the oven flame to have proper venting stack action. After five minutes, and if the oven door is closed, the convection relay on the electronic oven control closes providing line to neutral voltage to the convection fan motor and the convection assist element. This relay remains closed until the program is canceled or is interrupted by the opening of the oven door. If interrupted by the opening of the oven door, the relay will automatically close when the door is closed.

FIXED SETTINGS

Meats

When the meats pad is touched the oven operates with the convection fan and assist element at the set temperature.

Cakes

When the cakes pad is touched the oven operates at a lower than set temperature with less temperature differential.

Breads

When the breads pad is touched the oven operates at a higher than set temperature with more temperature differential.

BROIL

When the Broil pad is touched, and a temperature is set between 400 and 550 degrees F (usually 550 degrees), the broil relay on the board closes, applying line to neutral voltage to the oven broil circuit and "Broil" will appear in the display. The broil circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat, reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800 degrees F the current flow in the circuit exceeds 3.2 amps. The broil section of the safety valve opens allowing gas to flow into the broil burner. The gas is then ignited by the heat of the broil igniter and the oven begins to heat up.

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven

temperature increases. The microprocessor in the tip of the oven sensor is a positive thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor and compares it with a programmed temperature set into the control. The broil burner will cycle when the set temperature is reached.

CLEAN

When the Clean pad is touched and a clean time is set (and if the oven door is closed closing the contacts COM to NO of the door switch), the door lock relay on the electronic oven control closes providing line to neutral voltage (120 VAC) to the lock motor. The lock motor starts to rotate closing the contacts of the door lock switch. When the motor rotates one half turn, the contacts of the door lock switch reopen sending a signal to the control telling it that the door is locked and to open the contacts of the lock relay. The control then closes the bake relay providing power to the bake circuit. The clean temperature is preset into the control at around 860 degrees. It take about 45 minutes for the oven to reach 860 degrees. When the temperature is reached the control cycles the bake circuit off and on to maintain the temperature until the clean time is completed. When the clean time is completed, the control removes power from the bake circuit and the oven cools down. When the temperature in the oven goes below 500 degrees the control closes the contacts of the lock relay. The lock motor turns 180 degrees closing and reopening the contacts of the lock switch and unlocking the door. The open contacts of the lock switch tell the control that the door is unlocked and to open the contacts of the lock relay.

CALIBRATION

To check oven calibration:

1. Place a thermometer or thermocouple in the center of the oven.
2. Program the oven temperature for 350°F. Allow the oven to cycle three times.
3. Average the highest and lowest reading. The average should be within 10 degrees of 350°F.

To adjust the oven temperature higher:

1. Press the **Bake pad** for 6 seconds. "0" will appear in the display.
2. To increase the temperature use the number pads to enter the desired change. The temperature may be increased up to 35°F.

3. Press **Start** to accept the temperature change and the display will return to the time of day. Press **Clear Off** to reject the change if necessary.

To adjust the oven temperature lower:

1. Press the **Bake pad** for 6 seconds. "0" will appear in the display.
2. To decrease the temperature use the number pads to enter the desired change and then press **Clean**. The temperature may be decreased up to 35°F.
3. Press **Start** to accept the temperature change and the display will return to the time of day. Press **Clear Off** to reject the change if necessary.

TROUBLESHOOTING

The ES 450 has some self diagnostics built into the microprocessor to help in troubleshooting the system. When a failure occurs one of three codes will appear in all the display windows: F1, F3, or F9.

F1 code:

F1 indicates a malfunction in the control itself, and the control should be replaced.

F3 code:

F3 indicates a defective sensor, electronic oven control or the wiring in between. To determine which part is defective:

1. Disconnect the 15 pin plug from the back of the oven control that connects the sensor to the oven control.
2. With an Ohmmeter measure the resistance between pins 14 and 15 in the plug (**not on the control board**). If the meter reads around value of the oven temperature sensor resistance chart the oven control is defective. If the meter reads less than 800 Ohms or more than 3000 Ohms, go to step 3.

RTD SCALE	
Temperature (°F)	Resistance (ohms)
32 ± 1.9	1000 ± 4.0
75 ± 2.5	1091 ± 5.3
250 ± 4.4	1453 ± 8.9
350 ± 5.4	1654 ± 10.8
450 ± 6.9	1852 ± 13.5
550 ± 8.2	2047 ± 15.8
650 ± 9.6	2237 ± 18.5
900 ± 13.6	2697 ± 24.4

3. Disconnect the harness from the oven sensor and measure the resistance of the oven sensor. If the reading is the same as that in step two the oven sensor is defective. If the reading is correct with the chart the harness is defective.

F9 code:

F9 code indicates the control has detected a problem with the motor door latch assembly. Check the contacts of the lock switch, wiring to the lock motor assembly, and the lock motor.

Control will not program:

If the control will not program check for an open sensor circuit. If the sensor circuit is good, replace the control.

Time bake does not operate:

If the time bake does not operate check to be sure it is being programmed correctly. If so, replace the control.

Convection bake:

If neither the fan motor or the assist element operate after the five minute delay when convection bake is programmed:

1. Remove power from range. Go to the back of the electronic oven control and disconnect the 15 pin plug. With the oven door closed measure the resistance between pins 10 and 12 in the 15 pin plug in the plug. If the meter reads open check the door switch and the wiring from the electronic oven control to the door switch. If the meter reads zero go to step 2.
2. Measure the resistance between pins 5 and 7. If the meter reads around 10 Ohms the control is defective. If the meter reads infinity either the wiring to the fan motor and element is broken or both the fan motor and the element are defective.

If the assist element heats but the fan motor does not operate when convection bake is programmed, the fan motor is defective or the fan blade blocked.

If the fan motor operates but the assist element does not heat when convection bake is programmed, the wiring between fan and element is defective or the element is open.

Blank Display:

If the display on the oven control is blank and with the range connected to electrical power:

1. Go to the back of the control, disconnect the 15 pin plug and measure the voltage drop between pins 1 and 5 in the plug. If the meter reads line to neutral voltage (120 VAC) the control is defective. If the meter reads zero the wiring in the range is defective.

No heat:

If the control appears to be operating normally, but the bake and broil burners do not heat:

1. Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing go to step 3. If the igniter is glowing check the manual gas shut-off for the oven to be sure gas is being supply to the safety valve. Then remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.
2. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 4. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.
3. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 3 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 5.
4. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 2 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the broil circuit is open. Go to step 5.
5. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally and the broil burner operates but the bake burner does not heat:

1. Program the control for bake and check to see if

the bake igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.

2. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 3 of the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally and the bake burner operates but the broil burner does not heat:

1. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.
2. Go to the back of the oven control, disconnect the 15 pin plug from the control and measure the voltage drop between pins 1 and 2 in the 15 pin plug. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the broil circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

Self-cleaning:

Oven door does not lock when the oven is programmed for clean:

1. Remove power from the range, go the back of the control and disconnect the 15 pin plug. Measure

the resistance between pins 5 and 6 in the 15 pin plug (in the plug). If the meter reads infinity the lock motor or the wiring to the lock motor is defective. If the meter reads around 1500 ohms go to step 2.

2. Measure the resistance between pins 10 and 12 of the 15 pin plug with the oven door closed. If the meter reads infinity the door switch or the wiring to the door light switch is defective. If the meter reads zero go to step 3.
3. Measure the resistance between pins 11 and 12 in the 15 pin plug. If the meter reads infinity the lock switch or the wiring to the lock switch is defective. If the meter reads zero the control is defective.

Oven door locks when the oven is programmed for clean but the oven does not heat:

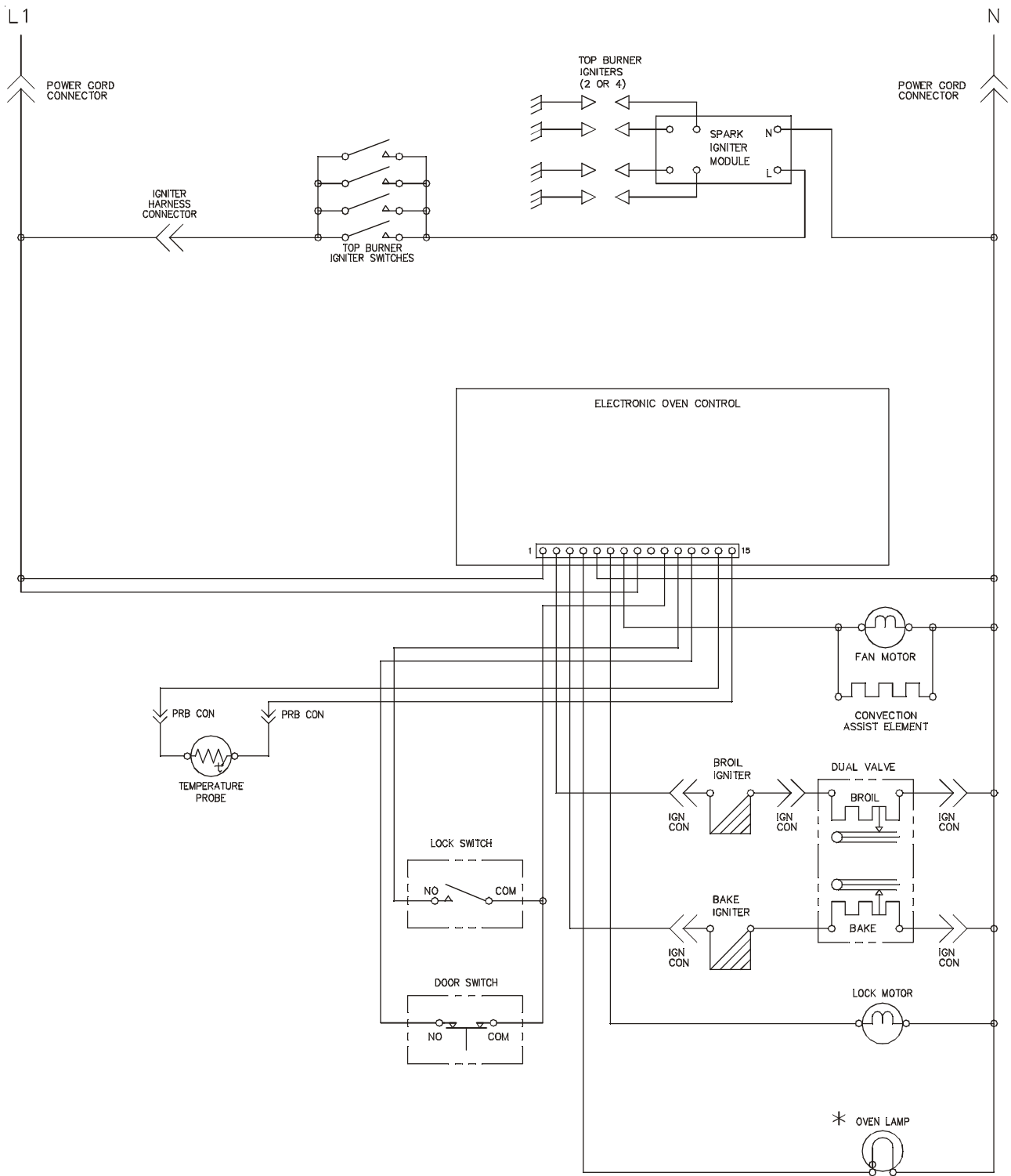
1. If the oven operates in normal bake replace the control.

Lock motor runs continuously:

- 1 With the door in the unlock position, remove power from the range. Go to the back of the control and disconnect the 15 pin plug from the control. With an Ohmmeter measure the resistance between pins 10 and 11 in the 15 pin plug. If the meter reads zero the lock switch or the wiring to the lock switch is defective. If the meter reads infinity go to step 2.
- 2, Depress the arm of the lock switch, and measure the resistance between pins 10 and 11 in the 15 pin plug. If the meter reads infinity the lock switch or the wiring to the lock switch is defective. If the meter reads zero the control is defective.

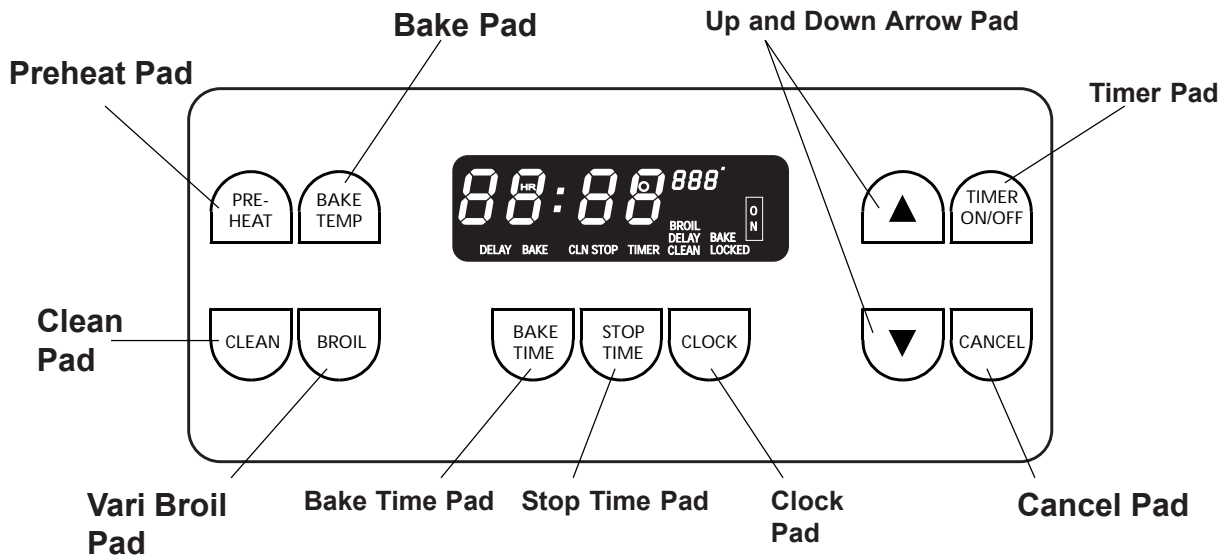
Door latch is partly closed with door open, cannot close door:

1. Program the oven for self-clean, and hold in on the door switch for 30 seconds. Touch cancel and hold door switch in for 30 seconds. The lock motor should lock and unlock the door.



- NOTES:
1. CIRCUIT SHOWN WITH ALL CONTROLS SET TO OFF, OVEN DOOR CLOSED AND UNLOCKED.
 2. COMPONENTS WITH * DO NOT APPEAR ON ALL MODELS.

SAMPLE SCHEMATIC FOR ES 450 CONTROL SYSTEM



ELECTRONIC OVEN CONTROL SYSTEM FOR 36" GAS RANGES

The electronic oven control on the 36" gas range is used on self-clean models.

The oven can be programmed to: **BAKE, TIME BAKE, BROIL, SELF-CLEAN, and CONTINUOUS BAKE.**

HOW TO PROGRAM THE 36" GAS RANGE E.O.C.

For a silent control panel:

When choosing a function, a beep will be heard each time a pad is pushed. If desired, the controls can be programmed for silent operation. Push and hold **STOP TIME**. After 7 seconds, the control will beep once. This will block the controls from sounding when a pad is pushed. To return the sound, push and hold **STOP TIME** again for 7 seconds until 1 beep is heard.

Temperature Conversion (Fahrenheit / Celsius):

The electronic oven control is set to operate in °F (Fahrenheit) when shipped from the factory. To change the temperature to °C (Celsius) or from °C to °F:

1. Push the **PREHEAT pad** and set the oven temperature to 500°F/260°C or more using the **UP** or **DOWN ARROW pad**.
2. Push the **PREHEAT pad** within the next 2 seconds for 3-4 seconds. A beep sounds and a number appears in red to the right of the display. For the conversion, "1" must be displayed. If another number is displayed, push the **PREHEAT pad** and select "1".

3. Push the **UP** or **DOWN ARROW pad** to change °F to °C or °C to °F in the display.

4. Push the **CANCEL pad** to confirm your choice.

Lockout (Child-Resistant Lock):

Lockout is an added feature that allows the oven controls to be locked. This feature makes the oven child-resistant and allows cleaning of the control panel without accidentally activating the oven.

Lockout can be set or cancelled by pressing the **BAKE/COOK TIME** and **STOP TIME pads** at the same time. During this mode, depressing any button results in the word "OFF" being displayed for 2 seconds.

While in Lockout, the display will show the current time of day.

Sabbath Feature / 12 Hour Shut-Off:

All our models have the possibility to operate over 24 hours but for energy conservation, the electronic oven control has been set at the factory to limit all cooking operations to 12 hours (except during timed bake). To provide sabbath feature (or to cancel this setting):

1. Push the **PREHEAT pad** and set the oven temperature to 500°F/260°C or more using the **UP ARROW pad**.
2. Push the **PREHEAT pad** within the next 2 seconds for 3-4 seconds. A beep sounds and a number appears in red to the right of the display. For the conversion, "3" must be displayed. If another number is displayed, push the **PREHEAT pad** and select "3".

3. Push the **UP** or **DOWN ARROW** pad to change from 12 hour to 9999 in the display, for no 12 hour shut-off.
4. Push the **CANCEL** pad to confirm your choice.

Other Displays:

When proceeding through steps 1 and 2 in the **Temperature Scale Conversion** or in the elimination of the **Sabbath feature /12-hour Shut-off** time limit, two other words can be seen in the display. One is **ESC** with **O** in red. It cannot be changed. The other is **USE** or **SALE** with **3** in red. This one is for factory use and should stay on **USE**.

SETTING THE CLOCK AND TIMER

To Set the Clock:

When the range is first plugged in, or when the power supply to the appliance has been interrupted, the display will flash.

1. Push **CLOCK**. The word "TIME" will appear in the display. (The timer allows you 5 seconds to go to step 2).
2. Push and hold the **UP** or **DOWN ARROW** until the correct time of day appears in the display. The word "TIME" will disappear after 6 seconds and the clock will start. Or, you may push **CANCEL** and the word "TIME" will disappear and the clock will start.

To Set the Minute Timer:

1. Push **TIMER** pad. ":00" and the word "TIMER" will glow in the display.
2. Push and hold the **UP ARROW** until the desired time appears in the display. As soon as the **UP ARROW** is released, the time will begin to count down in the display.
3. When the set time has run out, the timer will beep 3 times. It will then continue to beep once every 10 seconds for 5 minutes (or until **TIMER** is pushed).

Note: The minute timer does not start or stop cooking and is not active during self-clean. It serves as an extra timer in the kitchen that will beep when the set time has run out. The minute timer can be used independently during any of the bake or broil functions. The timer can be set for any amount of time from 5 seconds to 9 hours and 55 minutes.

To Change the Minute Timer :

Push and hold the **UP** or **DOWN ARROW** to increase or decrease the time.

To Cancel the Minute Timer before the set time has run out :

Push and hold the **DOWN ARROW** until ":00" appears in the display. Or you may cancel the minute timer by pushing **TIMER**.

When setting the minute timer for:	The time will appear in the display and increase in:
5 seconds to 2 minutes	5 second increments
2 minutes to 10 minutes	10 second increments
10 minutes to 1 hour	1 minute increments
1 hour to 9 hours and 55 minutes	5 minute increments

SETTING OVEN CONTROLS

To Set the Preheat Temperature:

Use the preheat function for regular baking as recommended in the recipe. The preheat function reduces preheating time.

To Set the Control for Normal Baking:

1. Push **PREHEAT**. "— — —°" and the word "BAKE" will glow in the display. Proceed to the next operation within 5 seconds.
2. Push the **UP** or **DOWN ARROW**. "350°F/177°C" will appear in the display. Use the **UP** or **DOWN ARROW** to increase or decrease the bake temperature in increments of 5°F/1°C. After 5 seconds, "PRE", "BAKE" and "ON" will appear in the display. The oven will begin heating to the selected temperature. When the oven heats up to this temperature, a beep sounds to indicate that preheating is completed. The timer automatically goes on to the baking mode. You can now place food in the oven for baking.

To change the temperature after baking has begun, repeat steps 1 and 2.

To cancel the preheat function, push PREHEAT, or push CANCEL.

To Set or Change the Temperature for Normal Baking:

The oven can be programmed to bake at any temperature from 170°F/77°C to 550°F/288°C.

1. Push **BAKE**. "— — —°" and the word "BAKE" will flash in the display.
2. Push the **UP** or **DOWN ARROW**. The display will show "350°F/177°C". By holding the **UP** or **DOWN ARROW**, the temperature can then be adjusted in 5°F/1°C increments.
3. As soon as the **UP** or **DOWN ARROW** is released, the oven will begin heating. The display will show the actual oven temperature as it increases to the desired setting. If preheating is necessary, wait until the selected temperature is shown in the display.
4. To cancel the baking function, push **CANCEL**.

To change the temperature after normal baking has begun, repeat steps 1 and 2 above.

CAUTION: Use caution when using the automatic timer. Use the automatic timer when cooking cured or frozen meats and most fruits and vegetables. Foods that can easily spoil such as milk, eggs, fish, meat or poultry, should be chilled in the refrigerator first. Even when chilled, they should not stand in the oven for more than 1 hour before cooking begins, and should be removed promptly when cooking is completed.

To Set the Automatic Timer (Timed Bake Feature):

The **BAKE/COOK TIME** and **STOP TIME** pads control the Time Bake operation. The automatic timer will turn the oven on and off at the times you select in advance. The oven can be programmed to start immediately and shut off automatically or to begin baking at a later time with an automatic shut off.

To start heating immediately and to shut off automatically:

1. Be sure that the clock shows the correct time of day.
2. Place the food in the oven.
3. Push **BAKE/COOK TIME** "— —:— —" and the words "BAKE TIME" will glow in the display window.
4. Push and hold the **UP ARROW** until the desired baking time appears in the display. The baking time can be set for any amount of time from 5 minutes to 11 hours and 59 minutes. When setting the baking time, the time will appear in the display and increase in 5 minute increments.
5. Push **BAKE** "— — —°" and the word "BAKE" will flash in the display.
6. Push and hold the **UP** or **DOWN ARROW** until the desired baking temperature appears in the display.

Once the controls are set:

- a. The oven will come on and begin heating to the selected baking temperature.
- b. The words "BAKE" and "ON" will appear in the display.
- c. The main display will show the oven baking time and will count down by minutes until it reaches ":00".

When the set BAKE/COOK TIME runs out:

- a. ":00" will appear in the display window and the oven will shut off automatically.

- b. The control will beep 3 times.
- c. The control will then continue to beep once every 10 seconds for 5 minutes or until **CANCEL** is pushed.

For a delayed start time and to shut off automatically:

Follow steps 1-4 above, THEN:

- 5. Push the **STOP TIME**. The time when baking will stop will appear in the display window. The words "BAKE STOP TIME" will glow in the display.
- 6. Push and hold the **UP ARROW** until the time that you want cooking to be completed appears in the display.
- 7. Push the **BAKE** "— — —°" will appear, and the word "BAKE" will flash in the display.
- 8. Push and hold the **UP ARROW** until the desired baking temperature appears in the display.
- 9. If the baking temperature is not set, the control will beep. "— — —°" and the word "BAKE" will flash in the display.
- 10. The control will calculate backward from the set stop time to determine when the baking should begin. The words "DELAY" and "BAKE STOP TIME" will glow in the display.
- 11. The baking will come on automatically at the calculated time. At that time, the word "DELAY" will go out and "ON" will appear.
- 12. To cancel the countdown, press **CANCEL**.

When the set BAKE/COOK TIME runs out:

- a. ":00" will appear in the display window and the oven will shut off automatically.
- b. The control will beep 3 times.
- c. The control will then continue to beep once every 10 seconds for 5 minutes or until **CANCEL** is pushed.

To Broil:

NOTE: Close the oven door to the broil stop position when broiling.

- 1. Push **VARI BROIL**. "— — —" and the word "BROIL" will flash in the display.
- 2. Push and hold the **UP or DOWN ARROW** until the

desired broil setting level appears in the display.

- 3. When broiling is finished, push **CANCEL**.

<u>Setting</u>	<u>Doneness</u>
LO (LOW)	Well done
HI (High)	Rare

OVEN CLEANING

To Start the Self-Clean Cycle:

*We recommend a 2 hour self-clean cycle for **light soils**, a 3 hour cycle for **average soils**, and a 4 hour cycle for **heavy soils**.

To Set the Controls for the Self-Cleaning Cycle To Start Immediately and Shut Off Automatically:

- 1. Be sure the clock shows the correct time of day and the door is closed.
- 2. Push **CLEAN**. "CLN TIME" will flash in the display.
- 3. Push and hold the **UP or DOWN ARROW** until "3 HR:00" appears in the display. Set the cleaning time based on the amount of soil you have—light, medium or heavy.
- 4. Move the door locking lever to the right. If the locking lever is not moved, the control will display the word "DOOR" and beep 3 times, with a single beep every 10 seconds until the locking lever is moved. If the locking lever is not moved within 30 seconds, the clean function will be automatically cancelled.
- 5. The word "CLEAN" will be displayed. The "OVEN" light will come on and cycle with the oven elements.

To Stop or Interrupt a Self-Cleaning Cycle:

If it becomes necessary to stop or interrupt a self-cleaning cycle due to excessive smoke or fire:

- 1. Push **CANCEL**.
- 2. Once the oven has cooled down and the word "LOCKED" shown in the display has gone out, then the oven door can be opened.

To Set the Controls for the Self-Cleaning Cycle To Start at a Delayed Time and Shut off Automatically:

Follow steps 1-3 above, THEN:

- 4. Push **STOP TIME**. The time of day that the self-

cleaning cycle ends will appear in the display. The words "CLN STOP TIME" will flash in the display.

5. Push and hold the **UP or DOWN ARROW** until the time of day that you want the cleaning to be completed appears in the display.
6. Move the door locking lever to the right. If the locking lever is not moved, the control will display the word "DOOR" and beep 3 times, with a single beep every 10 seconds until the locking lever is moved. If the locking lever is not moved within 30 seconds, the clean function will be automatically cancelled.
7. The control will calculate backward from the set stop time to determine when the self-cleaning cycle should begin. The words "DELAY" and "CLN STOP TIME" will glow in the display.
8. The self-cleaning cycle will come on automatically at the calculated time. At that time, the word "DELAY" will go out and "ON" will appear.

When the Self-Clean Cycle is Completed:

1. The time of day will appear in the display window and the word "LOCKED" may remain in the display.
2. Once the oven has cooled down and the word "LOCKED" shown in the display has gone out, then the oven door can be opened.

CAUTION: DO NOT force the oven door open. This can damage the automatic door locking system. Use caution when opening the door after the self-cleaning cycle is completed. The oven may still be VERY HOT.

CALIBRATING THE OVEN TEMPERATURE

When first using the oven, be sure to follow recipe times and temperatures. If you think the oven is too hot or too cool, the temperature can be adjusted. Before adjusting the oven temperature, test a recipe by using a temperature set higher or lower than the recommended temperature. The baking results should help you to decide how much of an adjustment is needed.

To Adjust the Oven Temperature:

1. Push **BAKE**.
2. Set the temperature to 550°F/288°C by pushing the **UP ARROW**.
3. Within 2 seconds, push and hold **BAKE** for approximately 5 seconds until the special 2 digit display appears. Release **BAKE**. The display now

indicates the difference in degrees between the original factory temperature setting and the current temperature setting. If the oven control has the original calibration, the display will read "00."

4. The temperature can now be adjusted up or down 35°F/17°C, in 5°F/1°C increments, by pushing the **UP or DOWN ARROW**. Adjust until the desired amount of degrees offset appears in the display. A minus sign (-) will appear before the number to indicate the oven will be cooler by the displayed amount of degrees.
5. When you have made the desired adjustment, push **CANCEL** to go back to the time of day display.

HOW THE ELECTRONIC OVEN CONTROL SYSTEM ON THE 36" GAS RANGE OPERATES

The 36" gas self-cleaning range electronic oven control system is made up of three parts that control the bake and broil burners, and the locking of the door in clean.

1. Electronic oven control.
2. Oven temperature sensor.
3. Oven door lock mechanism.

Preheat:

When the preheat pad is touched, and a temperature is programmed with the up or down arrows the bake relay on the board closes, applying line to neutral voltage across the oven bake circuit and "Pre" appears in the display. The bake circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat, reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800°F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the bake burner. The gas is then ignited by the heat of the bake igniter and the oven begins to heat up.

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the

resistance of the oven sensor indicates the temperature in the oven is about 10°F above the programmed temperature, the microprocessor opens the relay, which removes power from the bake circuit and closes the safety valve. When power is removed from the bake circuit the oven temperature begins to lower. As the oven temperature lowers, the resistance of the oven sensor decreases. When the oven drops to about 10 degrees below the programmed temperature, the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the bake circuit. After the first cycle the "Pre" in the display goes out indicating the oven is preheated.

Note: 120 VAC is at the oven igniter as long as the control calls for heat.

Bake:

When the bake pad is touched, and a temperature is set with the up or down arrows the bake relay on the board closes, applying line to neutral voltage across the oven bake circuit. The bake circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit the resistance of the igniter is high enough that the current flow in the circuit is below the amount needed to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat, reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800°F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the bake burner. The gas is then ignited by the heat of the bake igniter and the oven begins to heat up.

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor, and compares it with a programmed temperature set into the control. When the resistance of the oven sensor indicates the temperature in the oven is about 10°F above the programmed temperature, the microprocessor opens the relay, which removes power from the bake circuit and closes the safety valve. When power is removed from the bake circuit the oven temperature begins to lower. As the oven temperature lowers, the resistance of the oven sensor decreases. When the oven drops to about 10°F below the programmed temperature the resistance of the sensor tells the microprocessor to close the relay contacts, and provide power to the bake circuit.

Note: Oven controls may have a spread of more

or less than 20°F. The important thing is the average temperature in the oven. The average temperature in the center of the oven should be within 10°F of the programmed temperature.

Broil:

When the broil pad is touched, and HI or LO is set with the up or down arrows, the broil relay on the board closes, applying line to neutral voltage across the broil circuit and the oven indicator lights on the control will illuminate. The broil circuit is a series circuit made up of the electronic oven control, a silicon carbide igniter that reduces in resistance as it heats up, and a current sensitive oven safety valve that needs a minimum of 3.2 amps of current to open. When electrical power is first applied to the circuit, the resistance of the igniter is high enough that the current flow in the circuit is below the amount need to open the safety valve. As electrical current flows through the igniter it causes the silicon carbide material to heat, reducing the resistance of the igniter and increasing the current flow in the circuit. When the temperature of the igniter reaches around 1800°F the current flow in the circuit exceeds 3.2 amps. The oven safety valve opens allowing gas to flow into the broil burner. The gas is then ignited by the heat of the broil igniter and the oven begins to heat up.

In the tip of the oven sensor is a positive coefficient thermistor that increases in resistance as the oven temperature increases. The microprocessor reads the resistance of the oven sensor and compares it with programmed temperature set into the control for HI or LO and will cycle the burner when the temperature is reached.

Clean:

After the door is closed, the clean pad is touched, a clean time is set, and the latch handle is moved to the lock position, contacts COM to NO of the lock switch close telling the electronic oven control that the door is locked. "Clean" and "on" appear in the display and the control closes the bake relay providing power to the bake circuit. The oven starts to heat. When the temperature in the oven reaches around 500°F the bimetal tab on the lock mechanism rotates and prevents the door from being unlocked. The clean temperature is preset into the control at around 860°F. It takes about 45 minutes for the oven to reach 860°F. When the temperature is reached, the control cycles the bake burner off and on to maintain the temperature until the clean time is completed. When the clean time is completed the control removes power from the bake circuit and the oven cools down. When the temperature in the oven goes below 500°F the bimetal tab has turned and the door can be unlocked.

CALIBRATION

To check oven calibration:

1. Place a thermometer or thermocouple in the center of the oven.
2. Program the oven temperature for 350°F. Allow the oven to cycle three times.
3. Average the highest and lowest reading. The average should be within 10°F of 350°F.

To change the calibration:

1. Touch the bake pad on the control, and using the up arrow set the oven temperature to maximum of 500°F.
2. Within 3 seconds touch and hold the bake pad (about 5 seconds) until "00" appear in the display.

Note: If any numbers other than "00" appear in the display, the control has been calibrated in the field before.

3. By using the up or down arrows the calibration temperature can be changed + or - 35°F.

TROUBLESHOOTING

The control for the 36" self-cleaning gas range has some self diagnostics built into the microprocessor to help in troubleshooting the system. When a failure occurs one of three codes will appear in all the display windows: F1, F3 or door.

F1 code:

F1 indicates a malfunction in the control itself, and the control should be replaced.

F3 code:

F3 indicates a defective sensor, electronic oven control or the wiring in between. To determine which part is defective:

1. Disconnect the 8 pin plug from the back of the oven control that connects the sensor to the oven control.
2. With an Ohmmeter measure the resistance between pins 1 and 2 in the plug (**not on the control board**). If the meter reads around the value of the oven temperature sensor resistance chart the oven control is defective. If the meter reads less than 800 Ohms or more than 3000 Ohms, go to step 3.

RTD		SCALE	
Temperature	(°F)	Resistance	(ohms)
32 ± 1.9		1000 ± 4.0	
75 ± 2.5		1091 ± 5.3	
250 ± 4.4		1453 ± 8.9	
350 ± 5.4		1654 ± 10.8	
450 ± 6.9		1852 ± 13.5	
550 ± 8.2		2047 ± 15.8	
650 ± 9.6		2237 ± 18.5	
900 ± 13.6		2697 ± 24.4	

3. Disconnect the harness from the oven sensor and measure the resistance of the oven sensor. If the reading is the same as that in step two the oven sensor is defective. If the reading is correct with the chart the harness is defective.

"door" Code:

When the word "door" appears in the display when the oven is programmed for clean this means the control thinks the lock switch is open.

1. Make sure the latch handle is in the latch position.
2. Disconnect power from the range and go to the back of the control and disconnect the eight pin plug.
3. Measure the resistance between pins 5 and 7. If the meter reads zero the control is defective. If the meter reads infinity the lock switch or the wires from the control to the lock are open.
4. Remove the cover from the rear of the range and disconnect the wires from the latch switch. Measure the resistance between the terminals of the lock switch. If the meter reads zero the wires from the control to the lock switch are open. If the meter reads infinity the switch is defective.

Control will not program:

If the control will not program check for an open sensor circuit. If the sensor circuit is good replace the control.

Blank display:

If the display on the oven control is blank, with the range connected to electrical power:

1. Go to the back of the control, and measure the voltage drop between terminals E1 and E2. If the meter reads line to neutral voltage (120 VAC) the control is defective. If the meter reads zero the wiring in the range is defective.

No heat:

If the control appears to be operating normally, but the bake and broil burners do not heat:

1. Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing go to step 3. If the igniter is glowing check the manual gas shut-off for the oven to be sure gas is being supply to the safety valve. Then remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.
2. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 4. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.
3. Go to the back of the oven control and measure the voltage drop between terminals E1 and E7. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 5.
4. Go to the back of the oven control and measure the voltage drop between terminals E6 and E9. If the meter reads 120 VAC the control is defective. If the meter reads zero the broil igniter, safety valve or the wiring in the oven circuit is open. Go to step 5.
5. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally and the broil burner operates but the bake burner does not heat:

1. Program the control for bake and check to see if the bake igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing remove the bake igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the bake circuit for a poor connection.

2. Go to the back of the oven control and measure the voltage drop between terminals E1 and E7. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

If the control appears to be operating normally and the bake burner operates but the broil burner does not heat:

1. Program the control for broil and check to see if the broil igniter is glowing. If the igniter is not glowing go to step 2. If the igniter is glowing remove the igniter, connect it to 120 VAC and measure the current flow through the igniter. If the current flow is less than 3.2 amps replace the igniter. If the current flow is 3.2 or more check the wiring in the broil circuit for a poor connection.
2. Go to the back of the oven control and measure the voltage drop between terminals E6 and E9. If the meter reads 120 VAC the control is defective. If the meter reads zero the bake igniter, safety valve or the wiring in the oven circuit is open. Go to step 3.
3. Disconnect the wires from the igniter and check it for continuity with an Ohmmeter. If the meter reads open replace the igniter. If the meter shows continuity check the continuity of the safety valve. If the meter reads open replace the safety valve. If the meter show continuity one of the wires in the circuit is open.

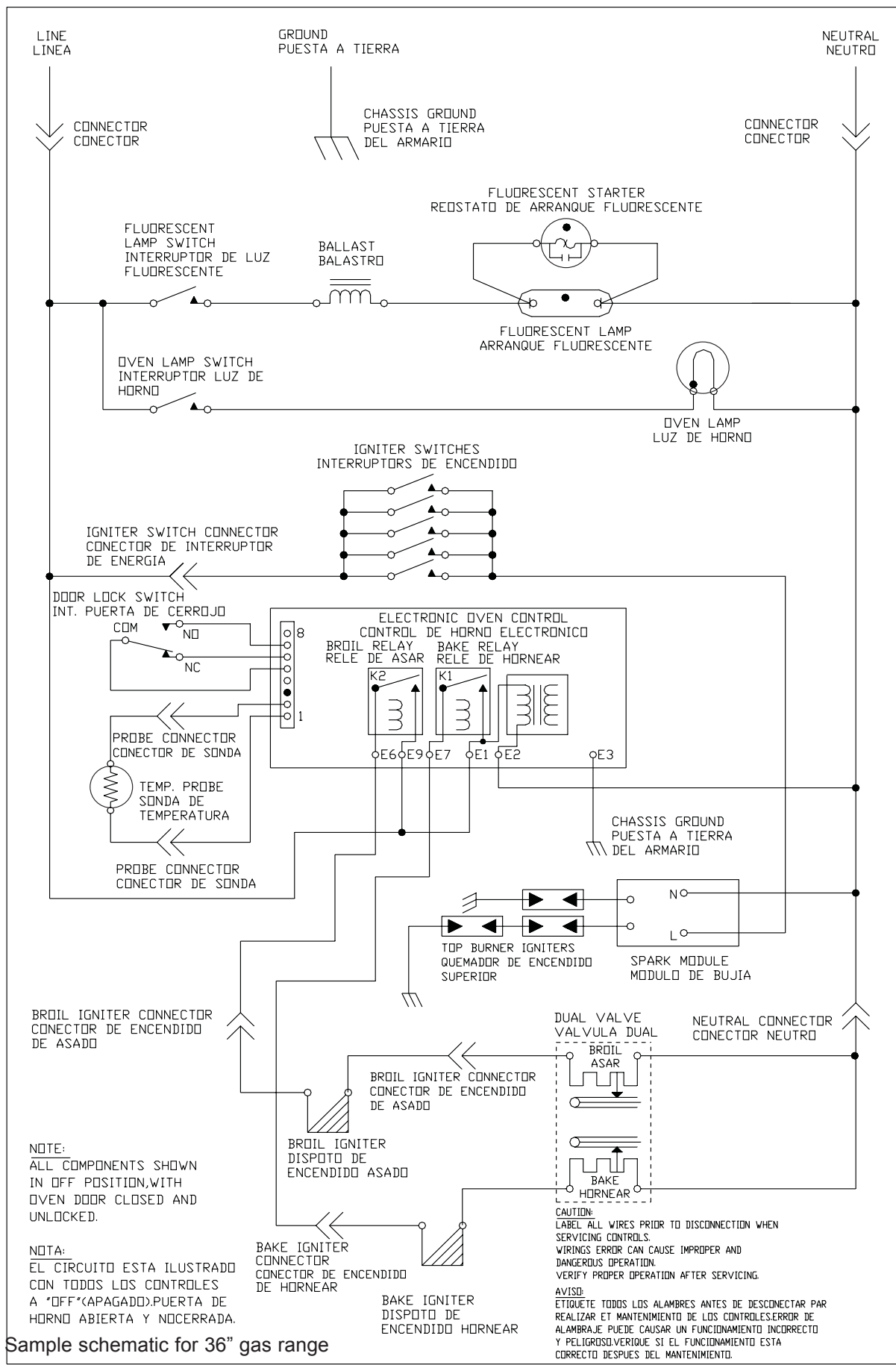
Self-cleaning:

Oven does not heat in self-clean:

1. Does the oven operate in normal bake? If yes and the word "door" is not in the display, replace the control. If no, go to the previous "No heat" section..

Oven heats in self-clean but the oven is not clean:

1. If the oven heats in self-clean but the oven is not clean either the control was programmed for to short of clean time or the control is cycling at too low of clean temperature. Run another clean cycle and if the oven is still not clean replace the control.

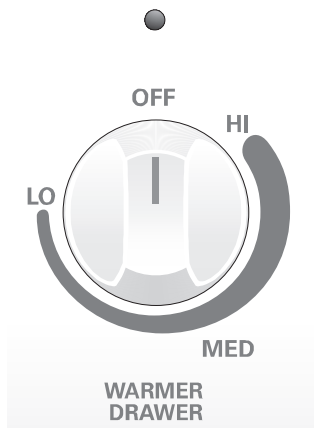


Sample schematic for 36" gas range

WARMER DRAWER

The warmer drawer is used to hold food at a serving temperature usually between 160°F to 190°F.

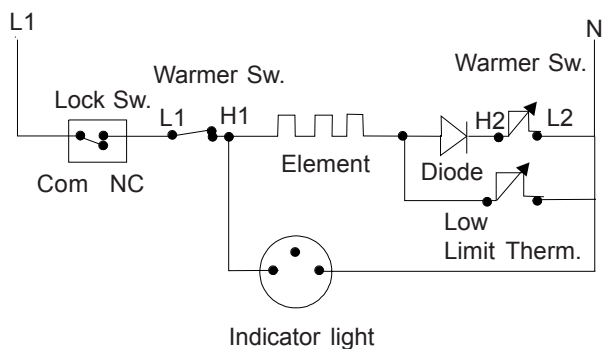
To Set the Warmer Drawer Thermostat Control:



The thermostat control is used to select the temperature of the warmer drawer. It is located on the control panel. To set the thermostat, push in and turn the knob to the desired setting. The temperatures are approximate, and are designated by HI, MED and LO.

1. Turn the knob to select the desired temperature setting.
2. For best results, preheat the drawer before adding food. An empty drawer will preheat in approximately 15 minutes.
3. Turn the thermostat control to **OFF** after use.

How the Warmer Drawer Circuit Works:



The warmer drawer circuit operates in two cycles: Preheat and Hold. The first cycle, preheat, is controlled by the low limit thermostat which is set to open at about 200°F and reclose at about 130°F. The low limit thermostat is connected electrically in parallel with the diode and

cycling contacts of the warmer switch. No matter where the warmer knob is set during the first cycle, the temperature will always go to about 200°F. The hold cycle begins after the initial first cycle when the warmer drawer temperature is then controlled by the cycling contact of the warmer drawer switch. The diode is placed in the circuit to lower the power to the element by about 30% during the holding cycle. This allows the warmer drawer to preheat faster, and then operate at a lower temperature during hold.

Troubleshooting:

There are five ways a warmer drawer control system with a standard infinite switch can fail:

1. The element does not heat.
2. The element heats during preheat, then stay off until the temperature drops to about 130°F.
3. The switch does not cycle the element off in the holding cycle.
4. Slow preheat.
5. The element operates correctly, but the indicator light does not glow.

If the element does not heat:

1. Check to see if the indicator light is glowing. If the indicator is not glowing remove the back panel of the backguard and measure the voltage drop between terminal L1 on the switch to neutral. If the meter reads zero the lock switch or the wiring to the lock switch is open. If the meter reads line to neutral voltage (120 VAC) go to step 2.
2. Turn the switch on and measure the voltage drop between terminal H1 on the switch and neutral. If the meter reads zero the switch is defective. If the meter reads line to neutral voltage the indicator light or the wiring to the indicator light is defective. Correct the indicator light problem and go to step 3.
3. Remove the warmer drawer and measure the voltage drop across the terminals of the element. If the meter reads line to neutral voltage the element is defective. If the meter reads zero go to step 4.
4. Measure the voltage drop from each terminal of the element to neutral. If the meter reads zero on both terminals the wire from terminal H1 on the switch to the element is open. If the meter reads line to neutral voltage, check the wiring to the low limit thermostat, the diode, and the cycling portion of the warmer

switch. If the wiring is good, the low limit thermostat is defective, and either the diode or the switch is also defective.

If the element heats during preheat, then stays off until the temperature drops to about 130°F:

1. Check the diode and the cycling portion of the warmer switch.

If the element does not cycle off:

1. Remove one wire from the low limit thermostat and set the warmer switch to low. If the element cycles after the drawer has warmed up, the low limit thermostat is defective. If it does not, the warmer switch is defective. It is also possible for a wire on the neutral side of the element to be shorted to chassis.

If the warmer drawer is slow preheating:

1. Normal preheat time is around 15 minutes with the drawer empty. Check the low limit thermostat. If the contacts are open, replace the thermostat.

If the warmer drawer heats, but the indicator light does not glow:

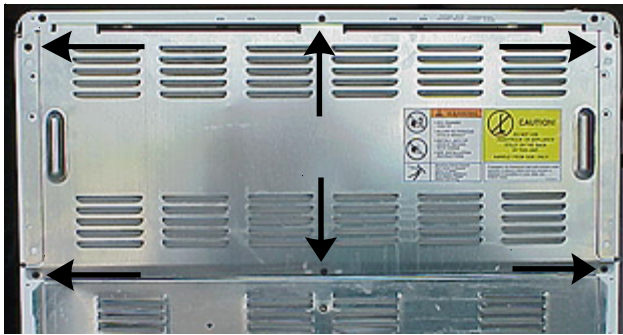
1. Check the indicator light and the wiring to the indicator light. (Note: The indicator light does not cycle with the element.)

SECTION D - DISASSEMBLY AND PARTS REPLACEMENT

30" RANGE

Backguard back panel:

1. Disconnect power from range.
2. Remove six screws and lift the panel off.

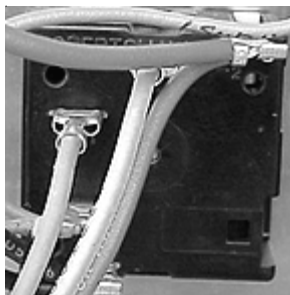


Backguard back panel

Note: Screws may be removed using either a 1/4" nut driver or an S1 square drive.

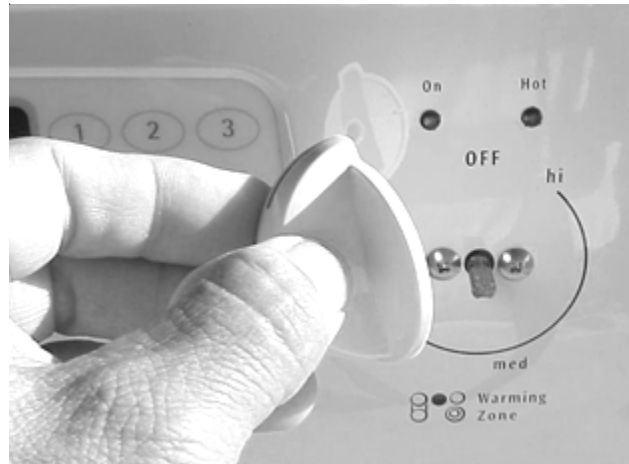


Infinite Switches used for surface elements, warm and serve zone, and warming drawer (if equipped):



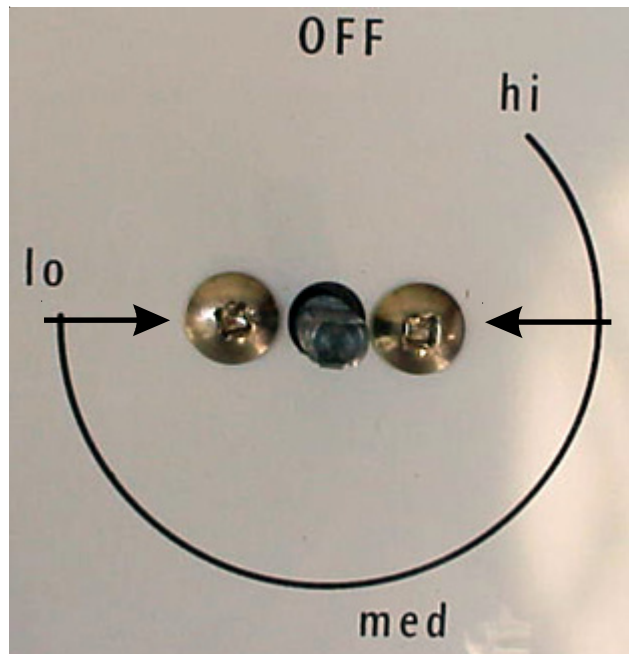
Infinite switch

1. Disconnect power from the range.
2. Remove the back panel from the backguard.
3. Mark and disconnect the wires from the infinite switch.
4. Remove the knob by pulling straight off.



Knob

5. Remove the two Phillips-head screws holding the switch to the control panel.

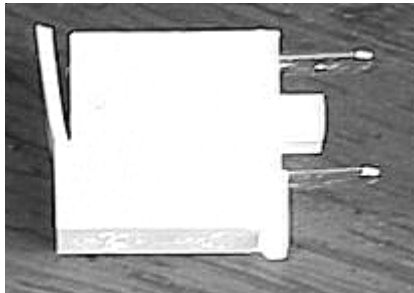


Two Screws

6. Pull the switch from the back of the range.

To remove the indicator light:

1. Disconnect power from the range.
2. Remove the back panel from the backguard.
3. Disconnect the wires from the light.
4. Push in and down.



Indicator light

To remove the electronic oven control:

1. Disconnect power from the range.
2. Remove the back panel from the backguard.
3. Disconnect wires and harness from the control board.
4. Remove the four screws. (One from each corner.)



Electronic oven control

To remove the oven light switch:

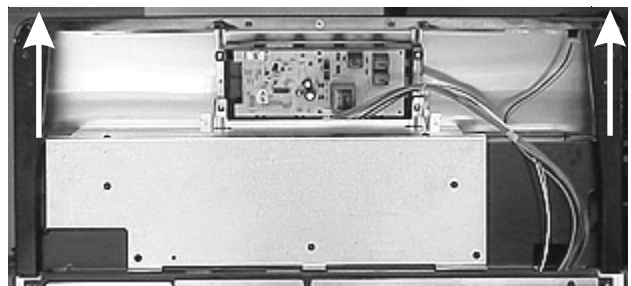
1. Disconnect power from the range and remove the back panel from the backguard.
2. Disconnect the wires from the switch, squeeze the sides, and push up.



Oven light switch

To remove the control panel:

1. Disconnect power from the range.
2. Remove the back panel from the backguard.
3. Remove the knobs.
4. Disconnect the infinite switches.
5. Disconnect the electronic oven control.
6. Disconnect the indicator light and the oven light switch.
7. Remove two square drive screws from the back top corners.



Corner screws

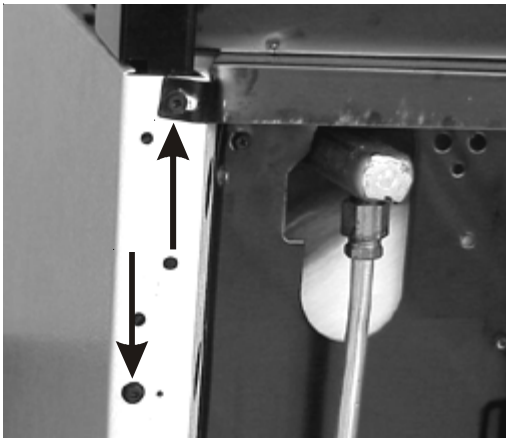
8. Remove two phillips screws, one in each corner of lower front. Roll the bottom of the control panel out and lift up.



Front corner screw

To remove the end cap:

1. Disconnect power from the range and remove the control panel.
2. Remove the two screws holding the end cap to the bodyside.



Two screws

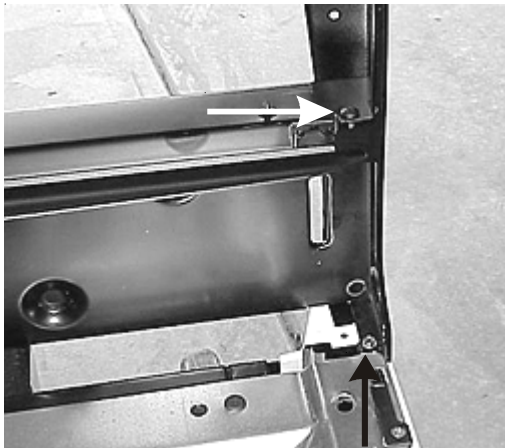


Lift and lock rod

Ranges with sealed burners:

3. Remove one screw holding the end cap to the back shield, one screw holding the end cap to the top of the side panel and lift the end cap up.

1. Lift off the four burner caps and heads.



Two screws



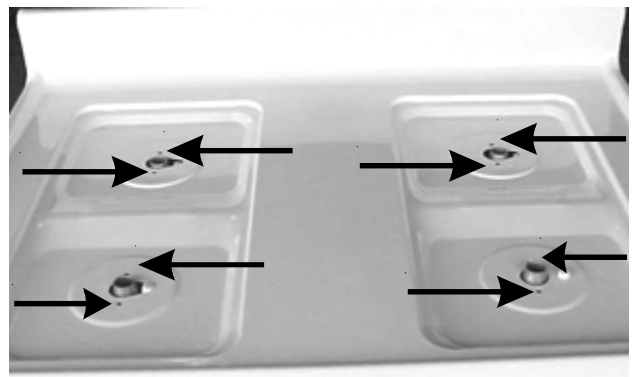
Burner cap and head

2. Remove the two screws from each burner holding burner base to the main top.

To remove the main top:

Ranges with standard top burners:

1. Lift the front of the main top and disengage the lift and lock rods.
2. Lift the top up and forward.



Two screws at each burner

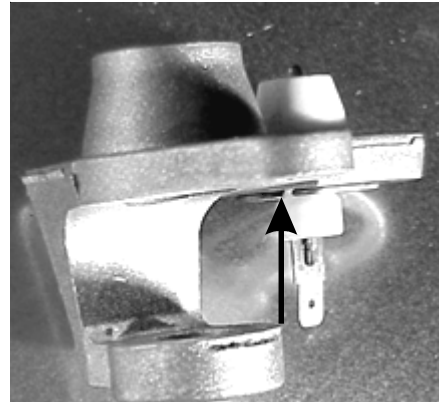
- Slide a putty knife between the main top and the control panel to disengage the hold down clips, one on each end.



Main top hold down clips



- Slide the spring clip off holding the igniter to the burner base and slide the igniter over and out.



Igniter spring clip

Removing sealed burner base :

- Remove the main top.
- Hold the burner base and use a 5/8" wrench to remove the nut holding the base to the tubing.



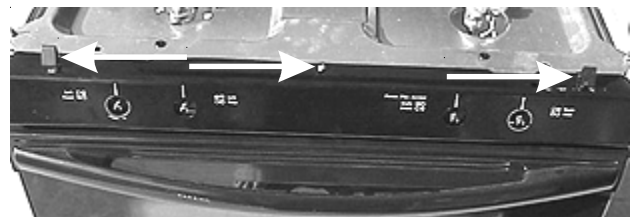
Removing burner base

Removing fix top orifice seal burner:

- Use a 9/32" spin tight to turn the orifice counter clockwise.

Removing the manifold panel sealed burners:

- Remove the knobs by pulling them straight off.
- Remove the main top.
- Remove the three screws holding the top of the control panel to the burner box.



Control panel top screws

Removal of igniter:

- Disconnect the igniter lead from the igniter.

Note: The terminal on the igniter wire has a locking tab. To release, push in on the tab.



Locking terminal

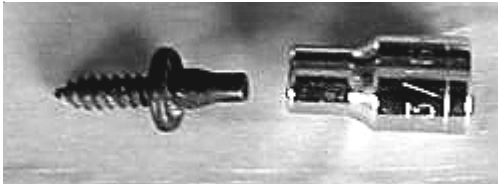
- Remove the four screws holding the bottom of the control panel to the front frame and lift the control panel off.



Control panel bottom screws

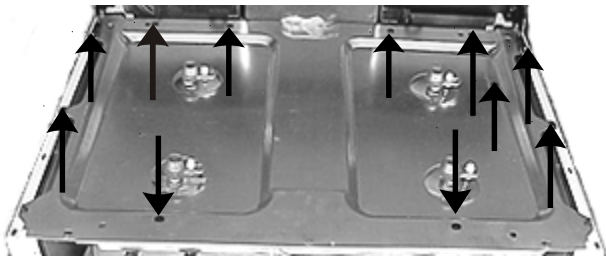
Removing burner pan:

1. Disconnect electrical power and turn the gas supply off.
2. Remove the main top and manifold panel.
3. Remove the two main top locator pins using a 3/16" socket.



Locator pin and 3/16" socket

4. Remove the eleven screws holding the burner box to the manifold pipe, the bodysides, and back flange.



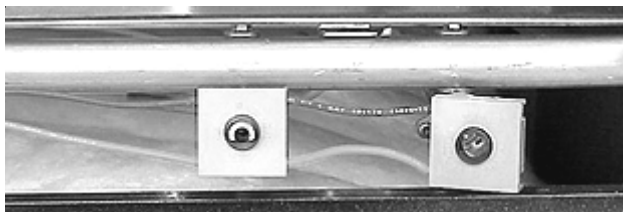
Burner pan screws

5. Lift the burner pan up and off.

Removing the top burner igniter switches:

Note: The four switches and the harness are an assembly and are changed as an assembly.

1. Disconnect electrical power.
2. Remove the manifold panel and burner pan.
3. Pull the switches off the shafts of the valves.

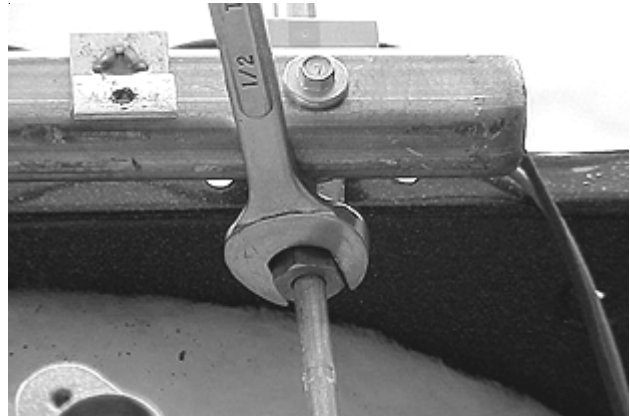


Igniter switches

4. Disconnect the red lead from the spark module and use the disconnect in the harness to disconnect the black lead.

Removing the top burner valves:

1. Disconnect electrical power and turn the gas supply off.
2. Remove the main top, manifold panel and burner pan.
3. Using a 1/2" wrench disconnect the burner tubing from the valve.



Disconnecting burner tubing

4. Remove the bolt holding valve to the manifold with a 1/4" socket.



Valve bolt

Note: When reinstalling the valve be sure the gasket between the valve and manifold is in place.



Valve mounting gasket

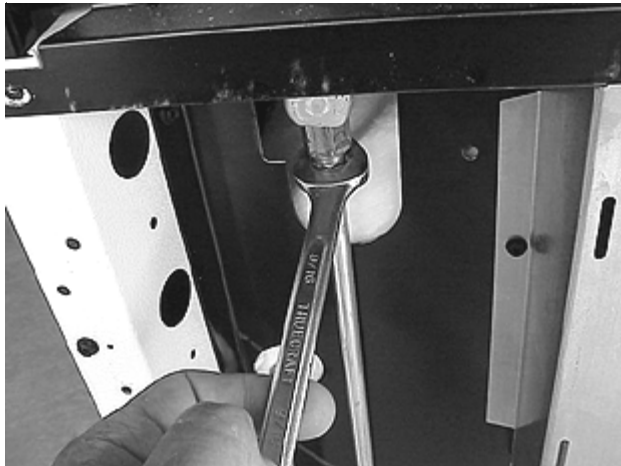
Removing the manifold:

1. Disconnect electrical power and turn the gas supply off.
2. Remove the main top, manifold panel and burner pan.
3. Remove the top burner valves.
4. Remove the small panel from the rear of the range that covers the tubing from the pressure regulator to the manifold by removing one screw.



Small panel

5. Using a 9/16" wrench disconnect tubing from the pressure regulator and slide the manifold out the front.

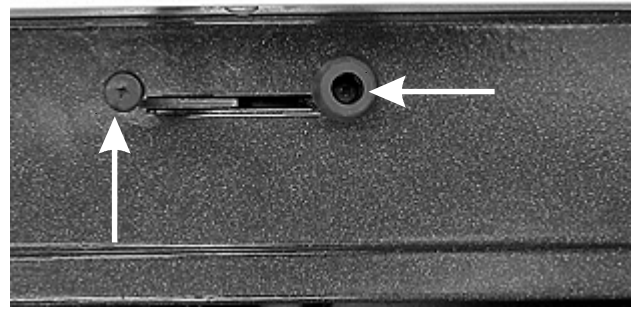


Disconnecting tubing from pressure regulator

Removing the latch mechanism:

1. Disconnect electrical power and turn the gas supply off.
2. Remove the main top, manifold panel and burner pan.

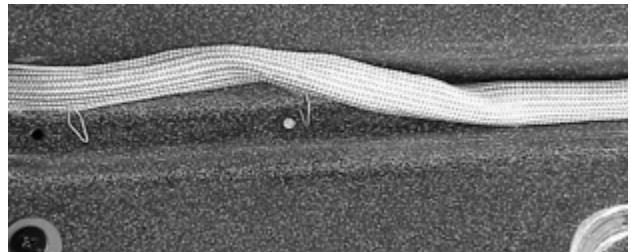
3. Remove the two screws holding the latch to the front frame and slide the latch back.



Latch screws

To remove oven door seal:

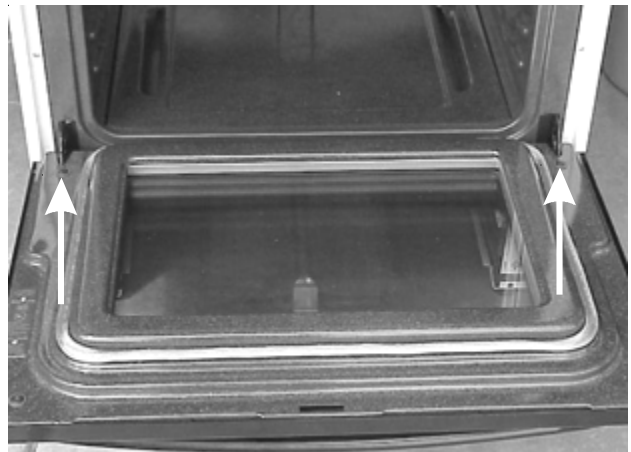
1. The oven door seal is snapped to the inner door with wire clips. To remove the seal pull up on the seal.



Door seal and clips

To remove oven door:

1. The oven door is held to the oven door hinges by two screws. (One in each hinge.)
2. To remove the oven door remove the two screws.
3. Close the door to the broil stop position and lift up.



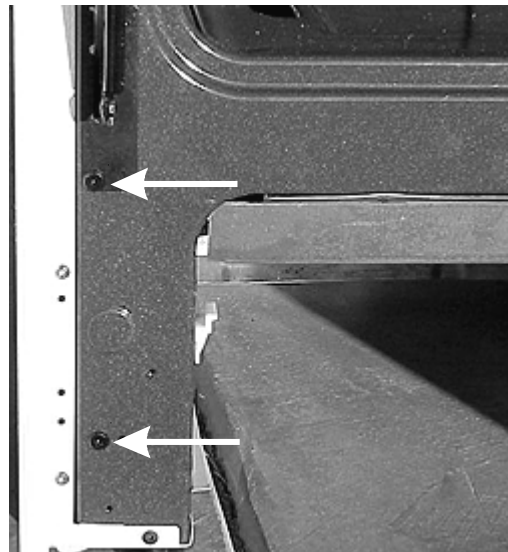
Oven door hinge screws

Door hinge adjustment:

1. Each side of the door may be raised by adjusting the screw in the end of each hinge.



Oven door adjustment screw



Door mounting hinge screws

Removal of the hinge opening cover:

1. The top of the hinge opening cover is tab and is slid behind the front frame. The bottom of the hinge opening is held to the front frame by the top hinge screw.



Hinge cover

Door hinge removal:

Note: There is a left and right door hinge.

1. Remove the two screws holding the hinge to the front frame.
2. Collapse the hinge, push down and tip the bottom of the hinge toward the back of the range.

3. When the top of the inner hinge go below the opening in the front frame pull the hinge out.

Oven door disassembly:

Removing the upper door trim:

1. Remove the oven door and lay it on a flat surface.
2. Remove the two screws holding the trim to the inner liner.
3. Slide the trim off the top of the door.



Trim screws

Removing door handle:

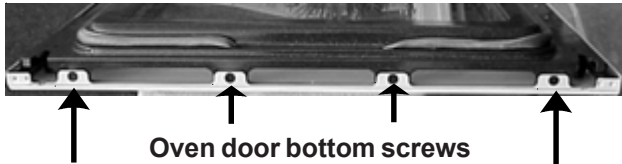
1. Remove upper door trim.
2. Remove the two screws holding the door handle to the upper door trim.



Oven door handle screws

Removing outer door glass and trim:

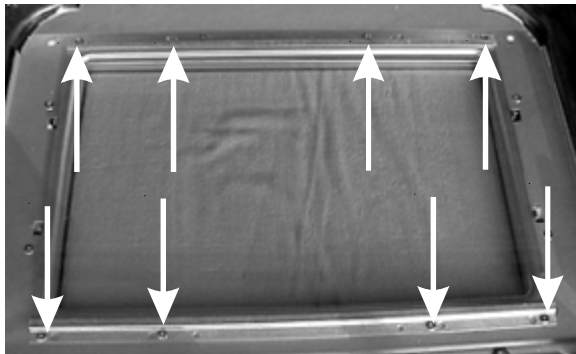
1. Remove upper door trim.
2. Remove four screws at the bottom holding the trim to the inner door liner, and lift the glass and trim off.



Oven door bottom screws

Removing center glass:

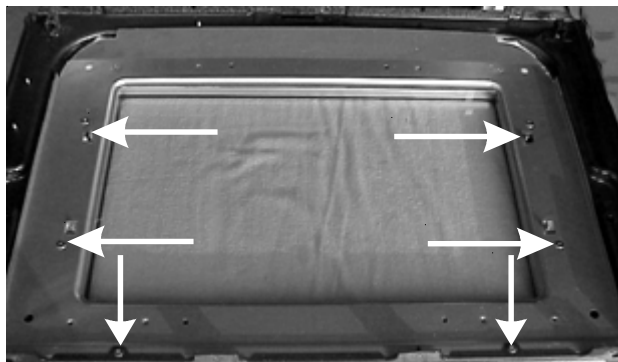
1. Remove the outer door glass and trim.
2. Remove the eight screws, four from each, holding the top and bottom center glass trims.
3. Remove the trims and lift the glass off.



Eight trim screws

Removing wool shield:

1. Remove the center glass.



Six wool shield screws

2. Remove the six screws, two at the bottom and two on each side, holding the wool shield to the inner liner and slide the wool shield up and off.

Glass package and inner door liner:

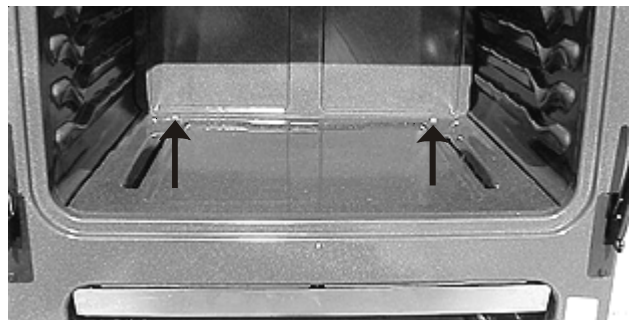
1. Remove the wool shield and the glass package can be lifted out.
2. With the glass package removed the door seal, and insulation and the inner door remains.



Glass package and insulation

Removing oven bottom:

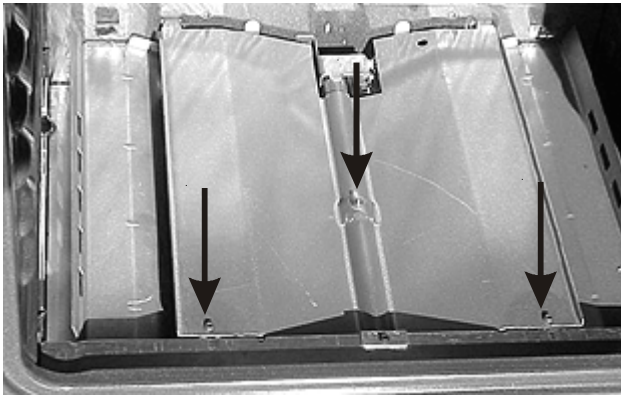
1. Remove the two screws holding rear of the oven bottom to liner tabs and lift the rear of the bottom up and slide it back.



Oven bottom screws

Removing bake burner baffle:

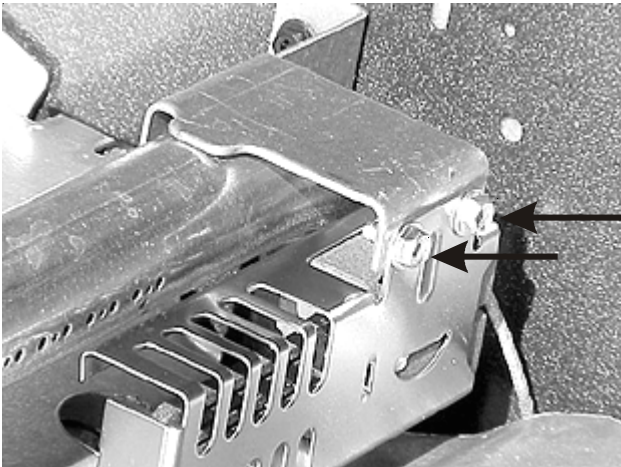
1. Using a 3/8" socket remove the nut holding the baffle to the burner.
2. Remove the two screws holding the baffle to the front frame.



Burner baffle nut and two screws

Removing oven burner igniter:

1. Disconnect electrical power from range.
2. Remove oven bottom and burner baffle.
3. Remove the two screws holding the igniter to the burner.

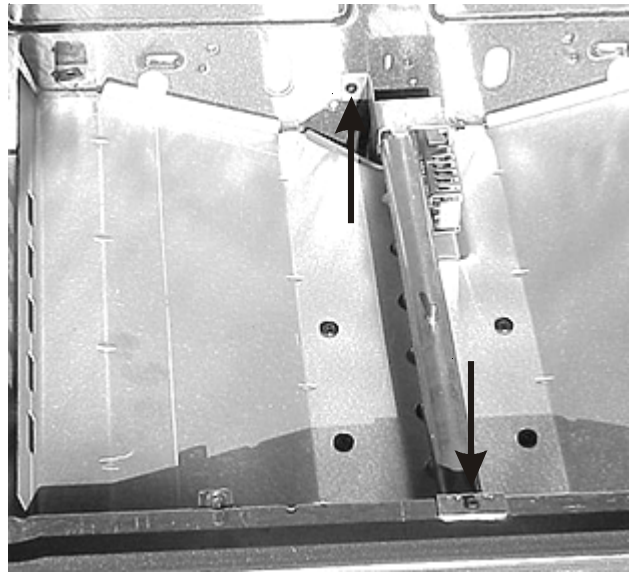


Igniter mounting screws

4. When replacing the igniter the replacement igniter will come as a kit. The kit will have an igniter with short wires and two ceramic wire nut. It will be necessary to cut and splice the wires.

Replacing the oven burner (self clean models):

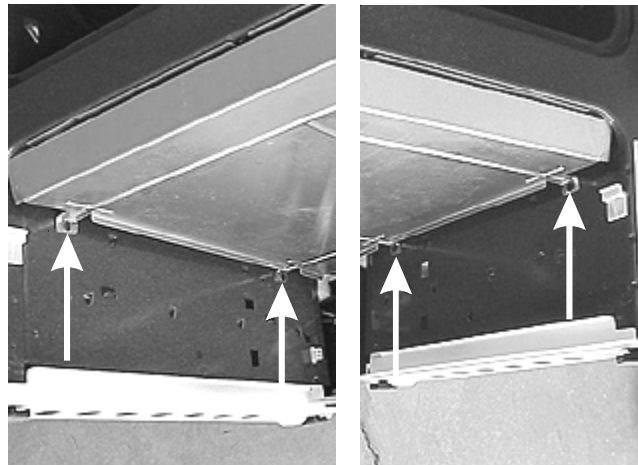
1. Disconnect electrical power from range.
2. Remove oven bottom, burner baffle and bake igniter.
3. Remove one screw holding the burner to the rear oven liner and one screw holding the burner to the front frame.



Self-clean oven burner mounting screws

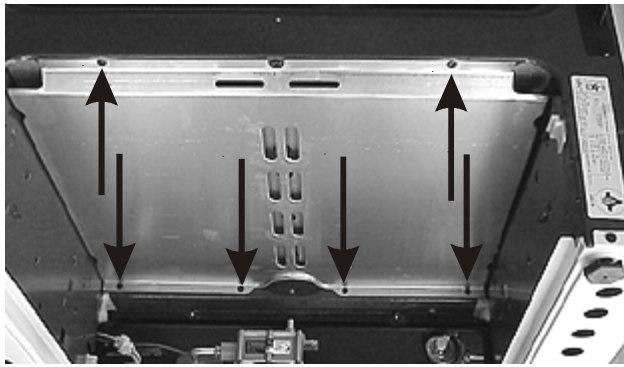
Removing burner heat shields (self-clean models):

1. Disconnect electrical power from range.
2. Remove oven bottom, burner baffle and storage drawer.
3. Remove the four screws holding the lower heat shield to the oven liner sides and pull the shield out the front.



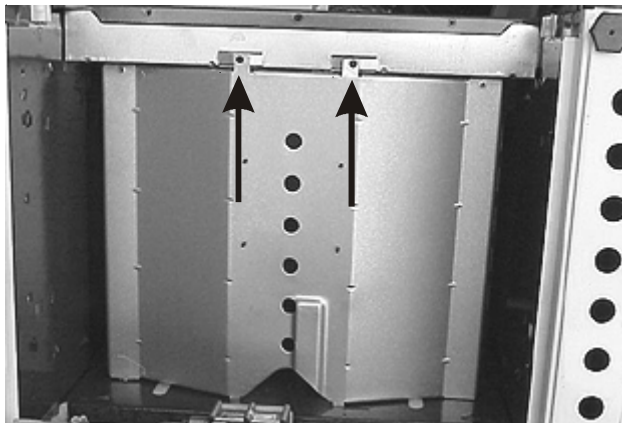
Heat shield screws

4. Remove the six screws holding the middle baffle to the rear and front frame of the range and slide the baffle out the front.

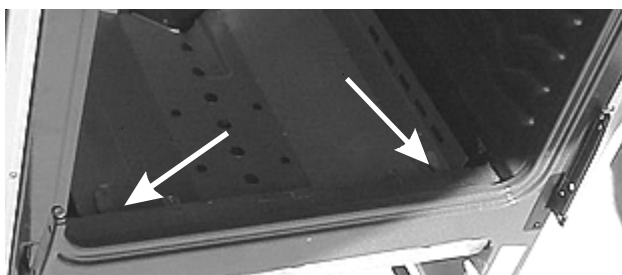


Heat shield screws

5. To remove the upper heat shield remove two screws from the bottom and two screws from the top, then drop front of the shield down into the drawer area and pull it out the front.



Heat shield screws from bottom



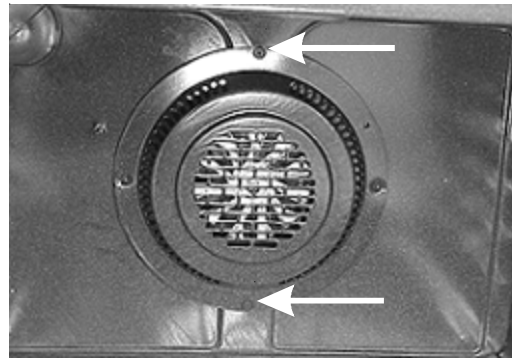
Heat shield screws from top

Note: The upper heat shield has four screws driven through the bottom center. These screws are used as spacers and if the shield is replaced must be installed on the new shield.

Fan cover (convection and speed bake models):

1. Disconnect power from the range.

2. Remove the two screws holding the cover to the oven liner and remove the cover.



Fan cover screws

Fan blade (convection and speed bake models):

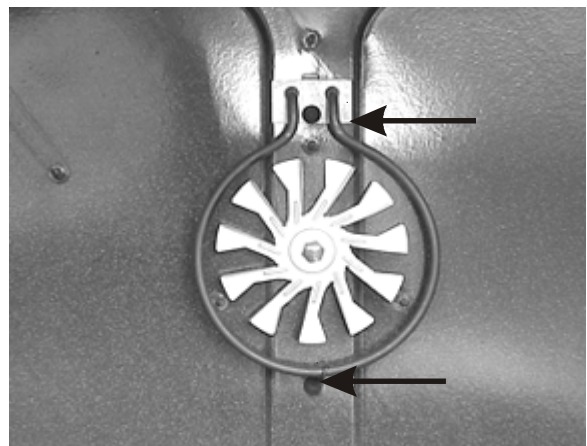
1. Disconnect power from the range.
2. Remove the fan cover.
3. Hold the fan blade and remove the nut by turning clockwise with a 1/2" wrench.
4. With the nut removed pull the fan blade off the shaft.



Removing fan blade

Removing assist element (convection models):

1. Disconnect power from the range.

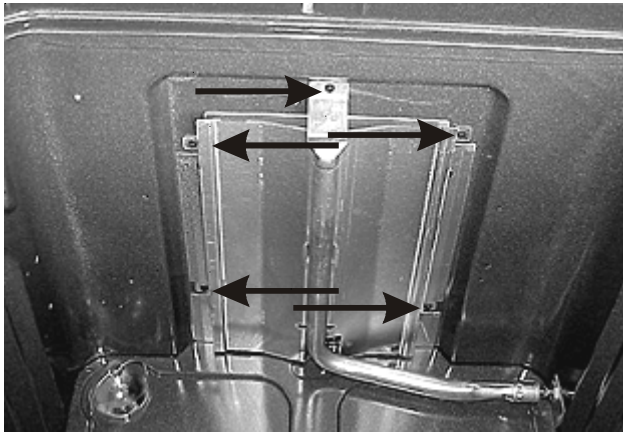


Assist element screws

2. Remove the fan cover.
3. Remove the two screws holding the element to the oven liner.
4. Pull the element into the oven and disconnect the wires.

Removing broil burner and baffle (self-cleaning models):

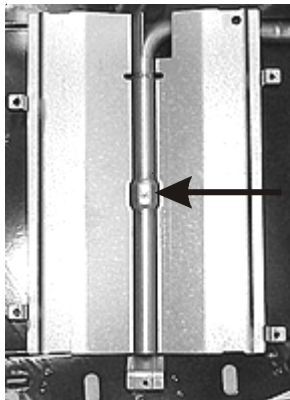
1. Remove the five screws holding the burner and baffle to the top of the oven and lift the burner off the spud.



Broil burner and baffle screws

Removing burner baffle from broiler burner:

1. Using a 3/8" socket remove the nut holding the baffle to the burner.

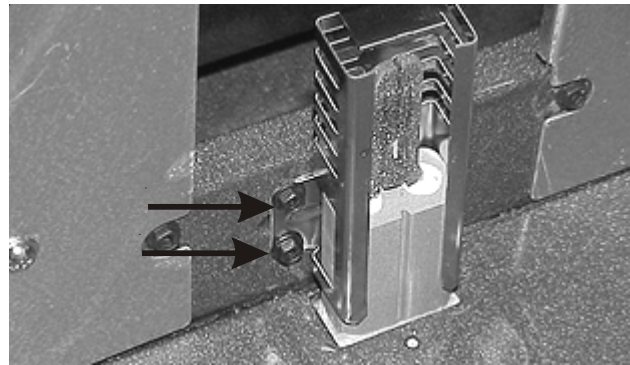


Burner baffle nut

Removing broiler igniter

1. Disconnect electrical power from the range.
2. Remove the broiler burner and baffle.

3. Remove the two screws holding the igniter to the oven liner and pull the igniter forward.

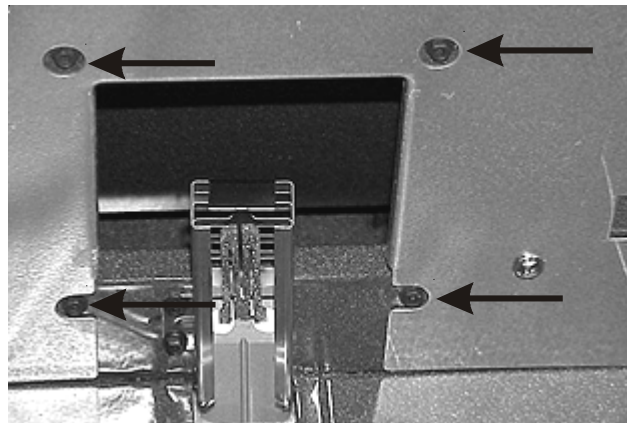


Igniter screws

4. When replacing the igniter, the replacement igniter will come as a kit. The kit will have an igniter with short wires and two ceramic wire nuts. It will be necessary to cut and splice the wires.

Removing oven vent (self-clean models):

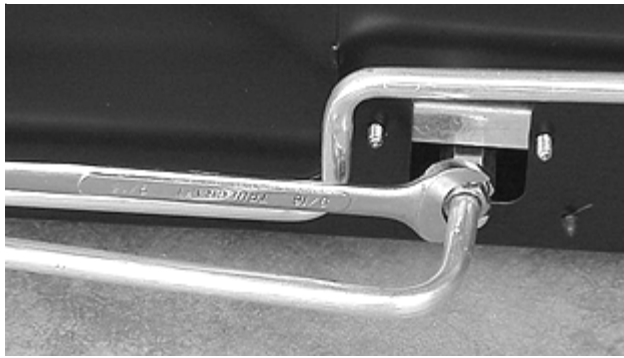
1. Remove the main top and burner pan.
2. Remove the broiler burner and baffle.
3. Remove four screws holding vent to the oven liner and roll the top of the vent forward.



Vent screws

Removing oven safety valve: (self-clean models)

1. Disconnect electrical power and turn off the gas to the range.
2. Go to the rear of the range and using a 9/16" wrench disconnect the tubing at the safety valve that goes to the broiler burner.



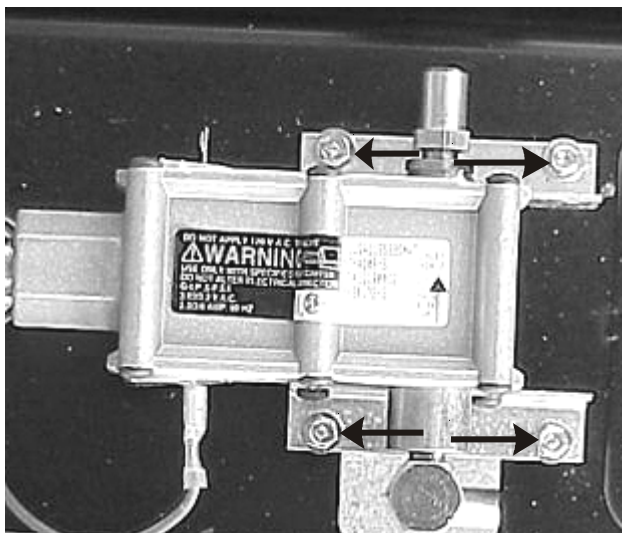
Disconnecting tubing at rear of safety valve

3. Remove storage drawer and disconnect the wires from the safety valve.
4. Using a 9/16" wrench disconnect the gas tubing at the valve from the pressure regulator.



Disconnecting tubing inside at safety valve

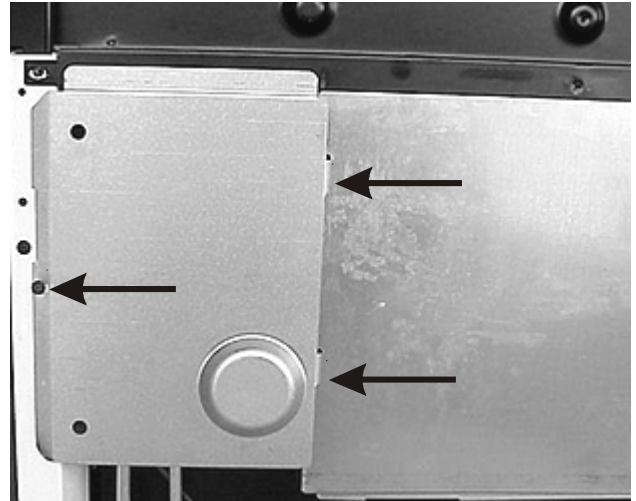
5. Remove the four screws holding the safety valve to the rear liner.



Four screws

Removing rear manifold cover:

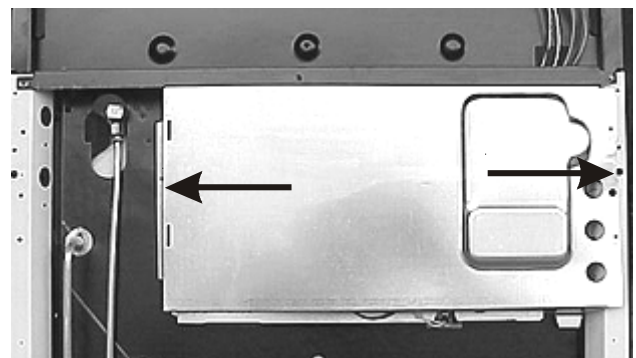
1. Remove one screw holding the cover to the bodyside and swing the cover out.



One screw and two tabs

Removing back cover:

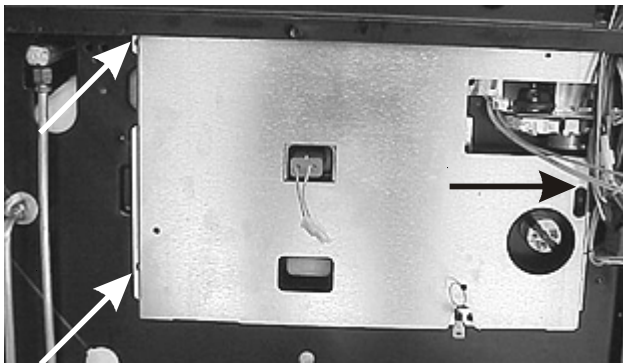
1. Disconnect electrical power from the range.
2. Remove rear manifold cover.
3. Remove one screw from each end of the panel.



Back cover screws

Removing the heat shield:

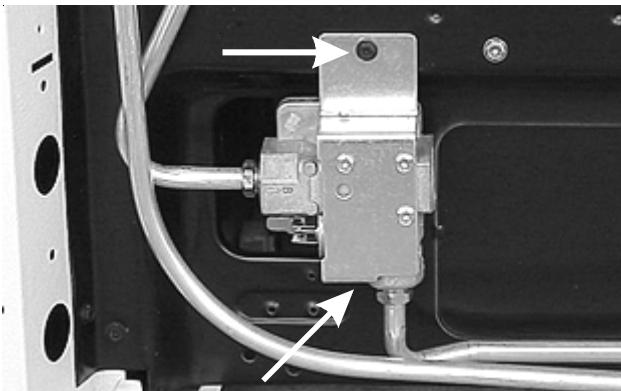
1. Disconnect electrical power from the range and remove rear cover.
2. Disconnect the wires from the oven light and oven sensor.
3. Remove the three screws holding the heat shield to the oven back.



Three screws

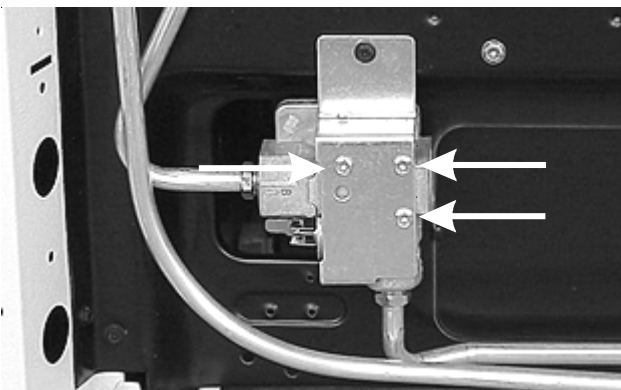
Removing the pressure regulator:

1. Disconnect electrical power and turn off the gas to the range.
2. Using a 9/16" wrench disconnect the tubing at from the pressure regulator.
3. Remove the two screws holding the bracket to the back of the range and lift the regulator off.



Two bracket screws

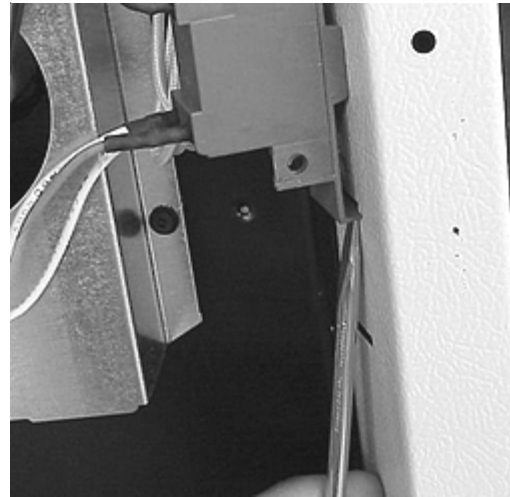
4. Remove the three screws holding the pressure regulator to the bracket.



Three screws

Removing top burner spark module:

1. Disconnect electrical power from the range and remove rear cover.
2. Disconnect the wire from the spark module.
3. The spark module is held to the bodyside by two tabs. To release the spark module push up on the bottom tab with a screw driver.

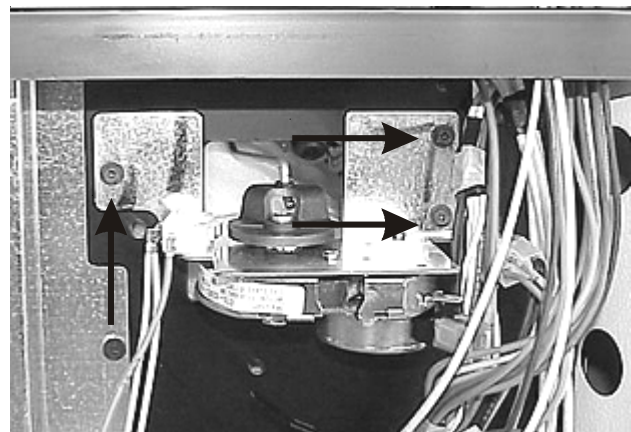


Push up on tab

4. To reinstall snap the module back into bodyside.

Removing lock motor assembly:

1. Disconnect electrical power from the range and remove rear cover.
2. Disconnect and mark the wires from lock motor assembly.
3. Remove the three screws holding lock assembly to the back of the range.

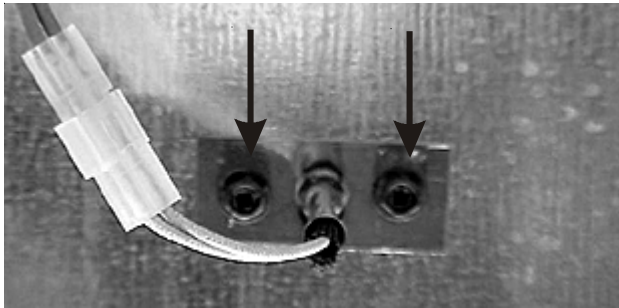


Lock motor assembly mounting screws

- Drop the assembly down and tip the rear of the assembly up to disengage the lock rod.

Removing oven sensor:

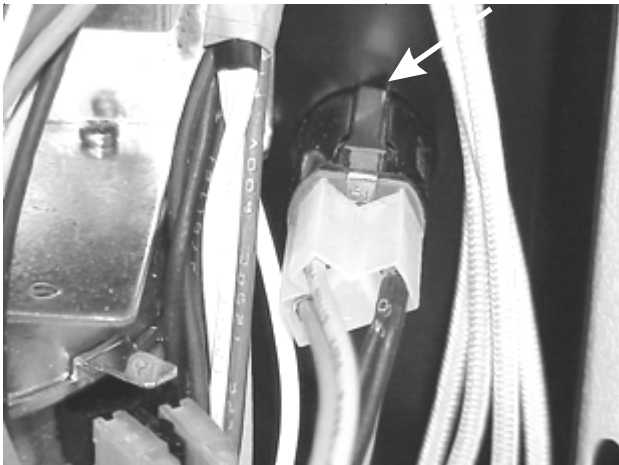
- Disconnect electrical power from the range.
- Unplug the oven sensor.
- Remove the two screws holding the sensor to the back of the range.



Oven sensor screws

Door switch and rod removal:

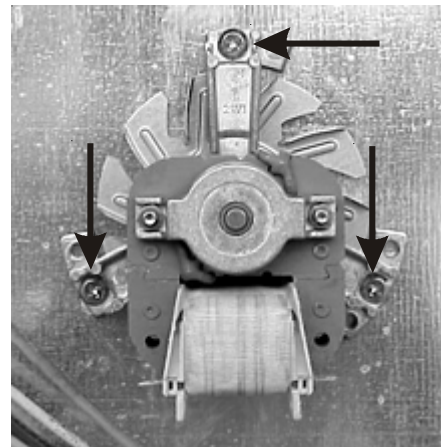
- Disconnect power from range.
- Remove main top, burner pan and back cover.
- Squeeze the spring loaded tabs of the door switch and push into range. Once the switch clears the back panel, the switch can be unhooked from the rod and the rod slid back into the range.



Door switch tabs

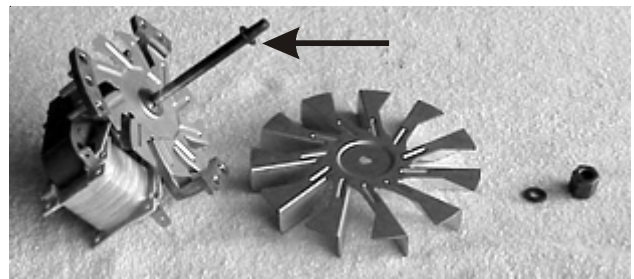
Removing convection and speed bake motor assemblies:

- Disconnect electrical power and remove back panel.
- Remove fan blade inside oven. (See fan blade removal.)
- Mark and remove the wires from motor assembly.
- Remove the three screws holding the assembly to the back of the range.

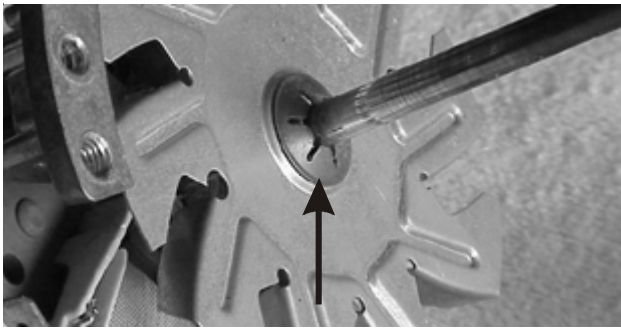


Fan motor screws

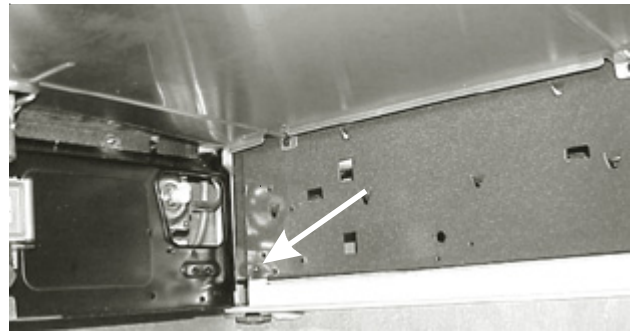
- Pull the motor shaft out the back of the range.
- The fan blade is spaced on the shaft by a C clip and the cooling fan blade is held in place on the shaft by a tennamen nut.



C clip



Tennen nut



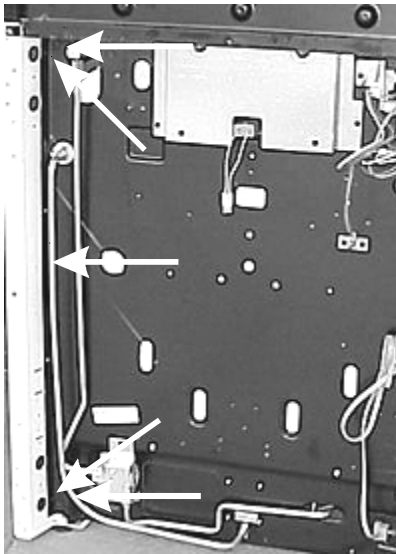
Bodyside bottom rail screw

Removing bodyside panels:

1. Disconnect power and remove the back of the control panel and the back cover.
2. Place a rug or padding under the range to protect the floor.
3. Remove the backguard end cap on the side of the range that the bodyside is being removed.
4. Remove the oven door and drawer.
6. Remove five screws holding the bodyside panel to the back of the range.

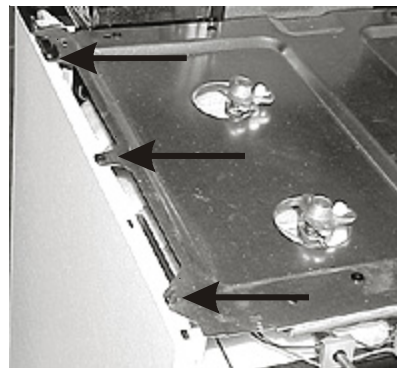


Bodyside front screws



Bodyside back screws

8. Remove the top locating pin and the two screws holding the bodyside to the burner pan.



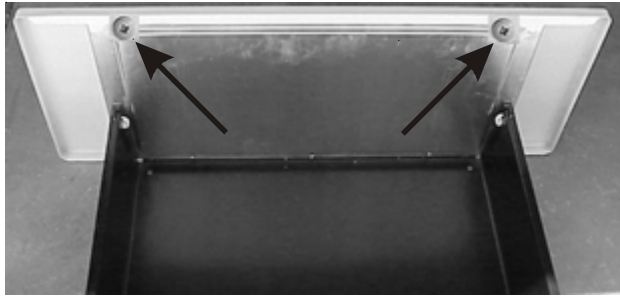
Bodyside top screws and pin

6. Remove one screw in the back holding the bodyside panel to bottom rail.
7. Remove five screws from the front. It is not necessary to remove the two short screws holding the heat shield in the upper corner, but you do need to transfer this to the replacement panel if the panel is being replaced.

9. With one hand in the oven and the other in the back lift the side of the range with the bodyside you are removing. Slide the bodyside down and the bottom of the panel out.

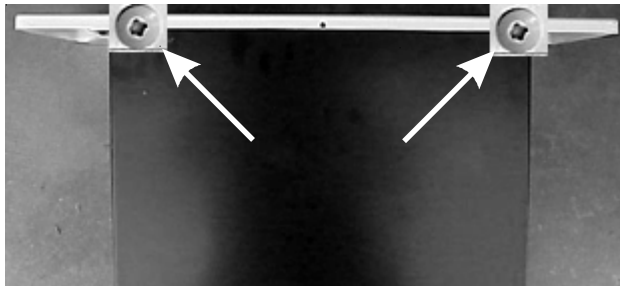
Removing the storage drawer front panel:

1. Remove two screws upper inside panel.



Two inside screws

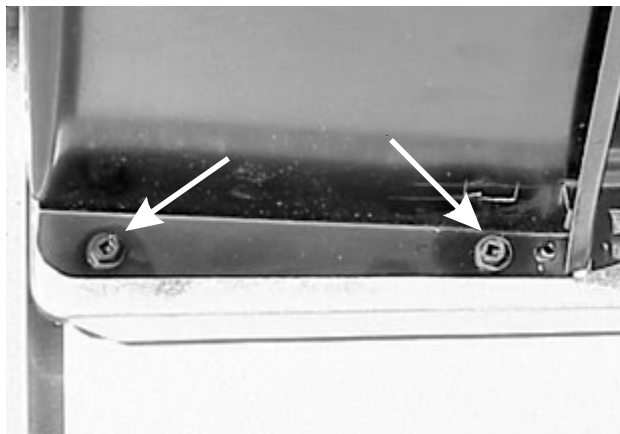
2. Remove two screws bottom edge of the panel.



Two bottom edge screws

Removing inside drawer panel:

1. Remove four screws, two on each side, holding the inner panel to the drawer.



Two screws on each side

Removing drawer glides:

There are four drawer glides mounted to the drawer, one

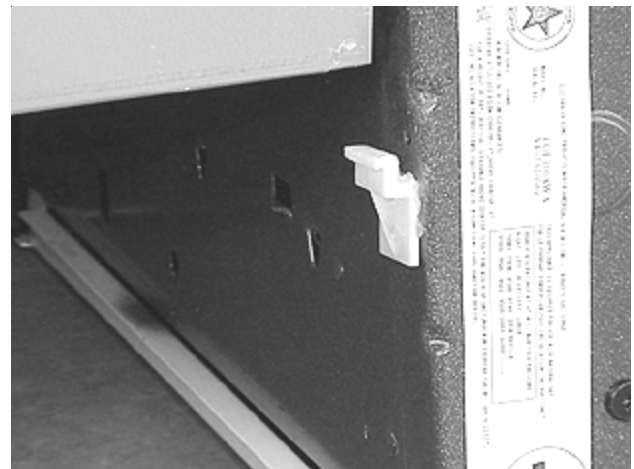
on each side in the front and one on each side in the rear:

1. Press in on the locking tab and pull the glide from the drawer.



Locking tab

There are two drawer glides mounted to the frame of the range, one on each side in the front.



Drawer glide

1. To remove the glide it is necessary to get behind the frame of the range, but when reinstalling, it snaps into place. If the glide is going to be replaced break it out. If the same glide has to be reinstalled it is necessary to remove the bodyside to get to the tab.

Removing the warmer drawer:

1. Pull the drawer out to the stop.
2. There is a latch on each of the drawer glides. Lift the latch on the right side and push down on the latch on the left side and pull the drawer the rest of the way out.



Right side latch

Removing the warmer drawer side rail:

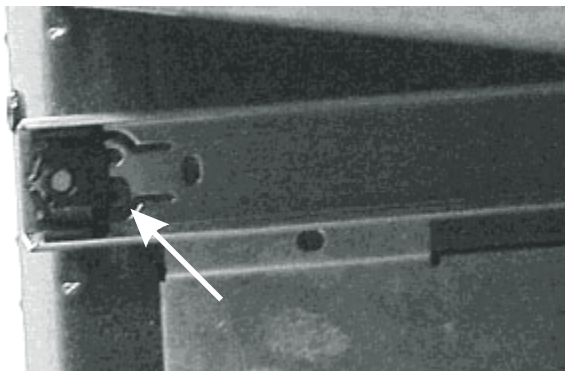
1. The side rail snaps to the side of the drawer. To remove the rail lift up on the rail.



Side rail

Removing drawer rail from range frame:

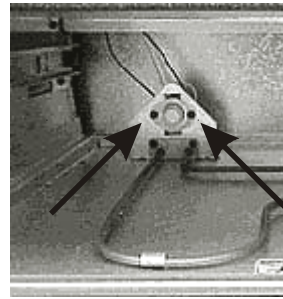
1. Remove the screw holding the rail to the frame and pull forward on the rail.



Rail screw

Removing warmer drawer low limit thermostat:

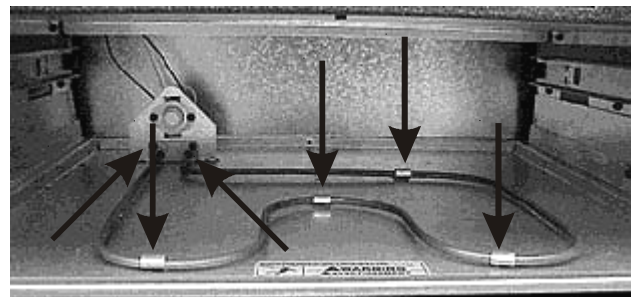
1. Disconnect power from range.
2. Remove wires from back of thermostat.
3. Remove the two screws holding the thermostat to the bracket and pull the thermostat forward.



Thermostat screws

Removing the warmer drawer element:

1. Disconnect power from range.
2. Remove wires from the element.
3. Remove the two screws holding the element to the bracket and the four screws holding the element to the base. Pull the element forward out of the bracket.

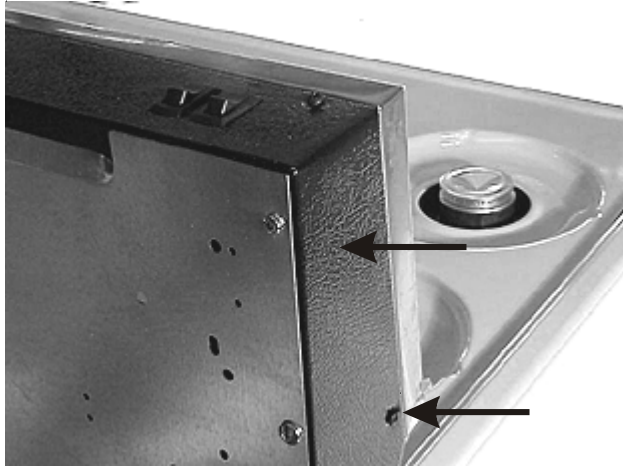


Warmer drawer element screws

36" RANGE

Backguard glass and trim:

1. Disconnect power from range.
2. Remove four screws two from the ends, and two from the top and pull the glass and trim forward.



Backguard screws

Control buttons:

1. The control buttons are rubber and snap into the backguard glass.

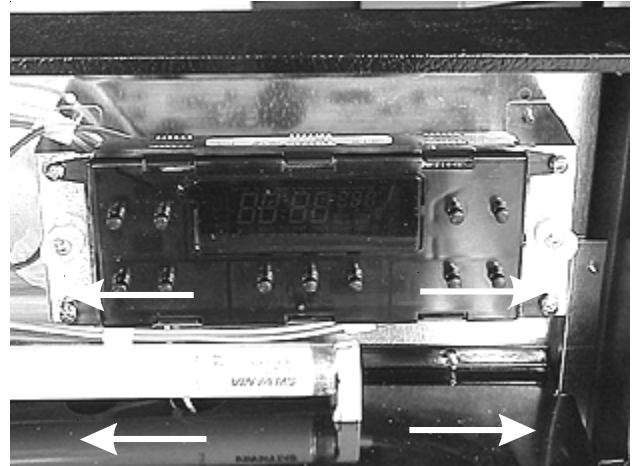


Control buttons

Electronic oven control:

1. Disconnect power from range and remove the backguard glass.

2. Remove the four screws holding the control to the brackets.



Electronic oven control mounting screws

3. Pull the control forward, mark and disconnect the wires from the terminals and unplug eight pin plug.

Fluorescent lamp starter:

1. Disconnect power from range and remove the backguard glass.
2. The starter base is mounted into the left bracket that holds the electronic oven control. Push in and turn the starter counter clockwise.

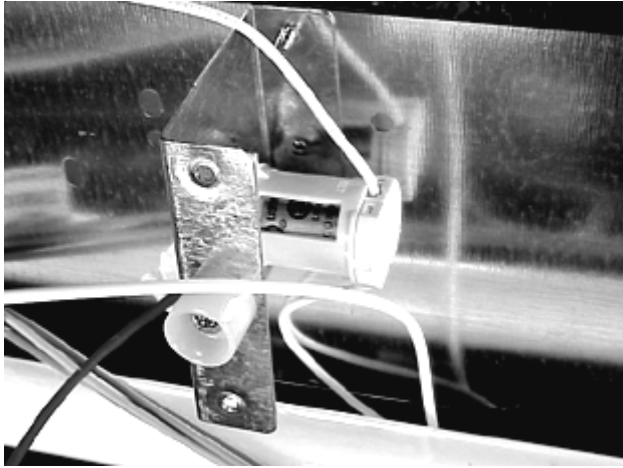


Lamp starter

Starter base:

1. Disconnect power from range, remove the backguard glass, electronic oven control and starter.

2. The starter base is mounted into the left bracket that holds the electronic oven control by two plastic tabs.
3. Disconnect the wires and squeeze plastic brackets.



Starter base

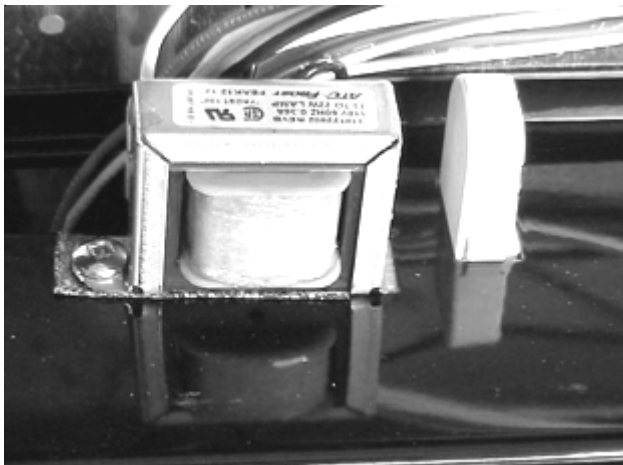
1. Disconnect power from range and remove the backguard glass.
2. Disconnect the wires from the switch, squeeze the spring load clips on the end of the switch, and push it through the trim.



Light switch spring clips

Ballast:

1. Disconnect power from range and remove the backguard glass.
2. The ballast is held to the splasher panel by one screw and a tab. To remove the ballast disconnect the wires, remove the screw and slide the ballast sideways.



Ballast screw

Backguard trim:

1. Disconnect power from range and remove the backguard glass.
2. The trim is held to the splasher panel in front by two screws, one in each low corner.

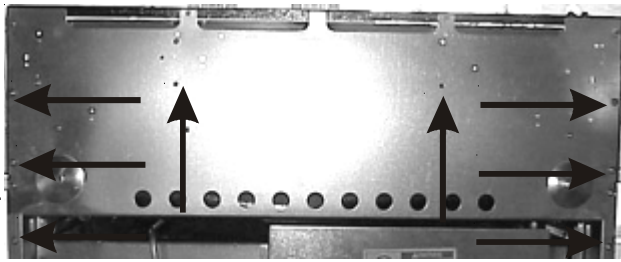


Backguard screw in each corner

Oven light and fluorescent light switches:

The oven light and fluorescent switches are snapped into the top of the backguard trim.

3. The trim is held to the back panel of the backguard by eight screws, three on each side and two across the top.

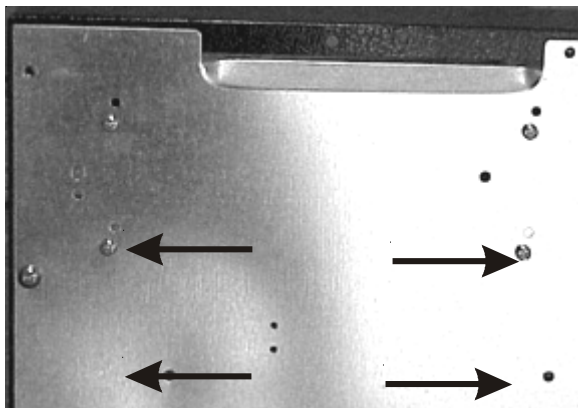


Backguard trim screws

4. Remove the two screws in front, the eight screws in back, disconnect the wires from the oven light and fluorescent switches and lift the trim off.

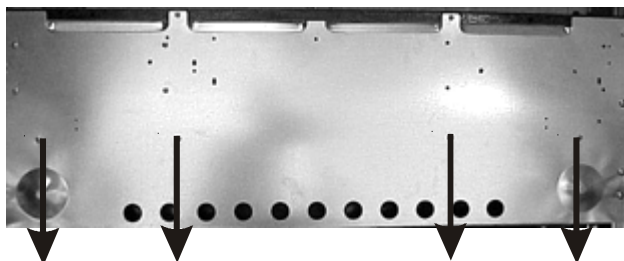
Back panel of backguard:

1. Disconnect power from range, remove the backguard glass and trim.
2. Remove the four screws holding the electronic oven control bracket to the back panel.



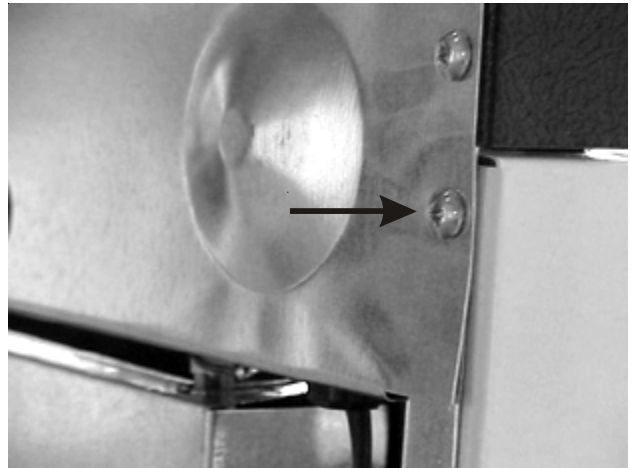
EOC backpanel screws

3. Remove the four screws holding the splash panel to the back panel.



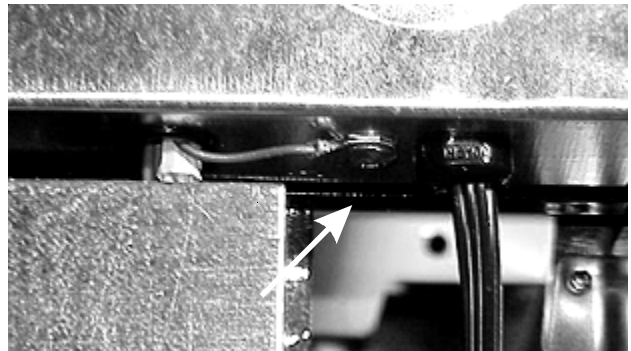
Splash panel screws

4. Remove the two screws holding the back panel to the bodysides.



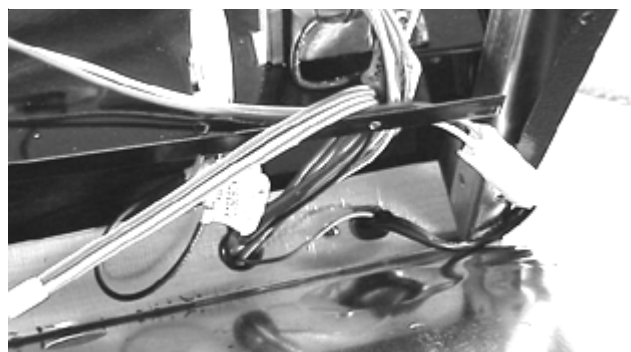
Backpanel/bodyside screws

5. Remove the screw holding the ground wire to the back panel.



Ground wire screw

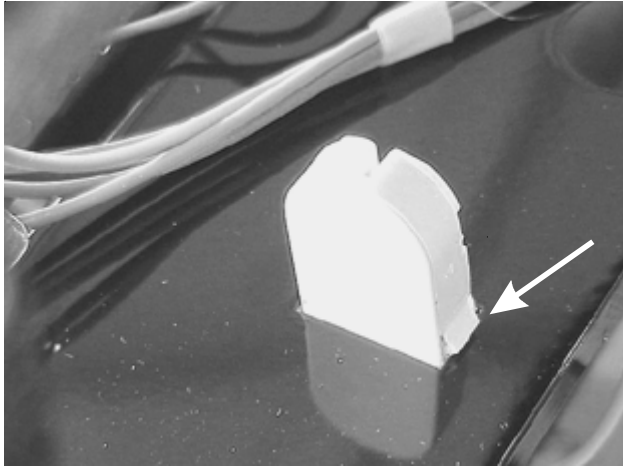
6. Tip the top of the back panel out, release the wiring from the bottom of the panel and lift the panel off.



Wiring

Fluorescent lamp socket:

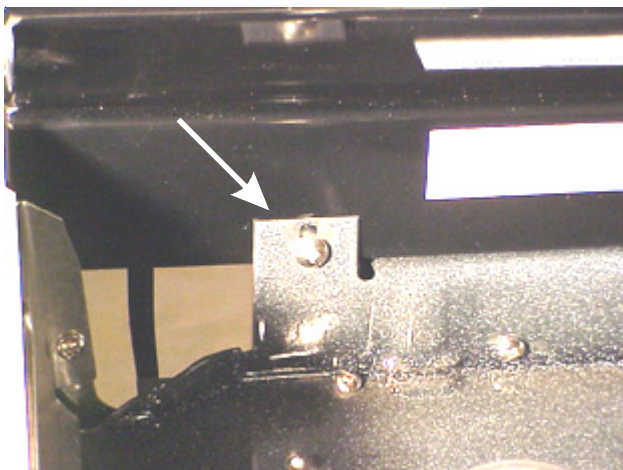
1. Disconnect power from range, and remove the backguard back panel.
2. Disconnect the wires from the socket, squeeze the tabs on the end of the socket and push it down through the splasher panel.



Lamp socket tab

Splash panel:

1. Disconnect power from range, remove the trim, the backguard back panel, the ballast, and disconnect the wiring to the fluorescent light sockets.
2. Remove the one screw holding the splash panel to the burner box and lift the splash panel off.



Splash panel/burner box screw

Main top and burner box area

Grates, griddle cover, griddle, fifth burner pan and main top:

1. The grates, griddle cover, griddle, fifth burner pan and main top lift off.



Grates



Griddle cover



Griddle



Pan



Main top

Pressure regulator

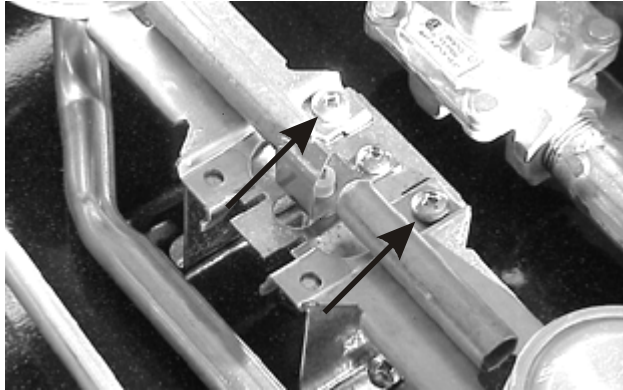
1. Turn the gas off and lift off the main top.
2. Disconnect the incoming gas line at the regulator.
3. Remove the pressure regulator from the manifold pipe by turning it clockwise.



Pressure regulator

Top burner:

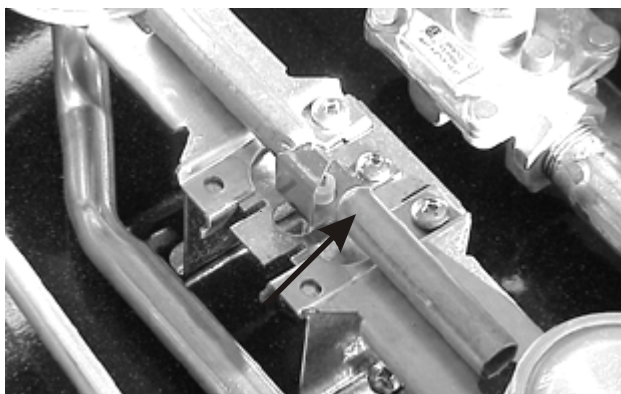
1. The top burners are held to the top burner brackets by one screw. To remove a burner, lift the main top, remove the burner screw and lift the burner off the spud.



Burner screw

Top burner igniter:

1. The top burner igniters are held to the top burner brackets by one screw, but their wires run under the burner box. To replace the left side and griddle burner igniter lift the main top, remove the cover from the rear of the range to gain access to the spark module. Remove the screw holding the igniter to the burner bracket and slide the igniter sideways. With the igniter removed from the bracket, cut the wire as close to the igniter as possible. Tape the end of the wire on the replacement igniter to the end of the wire of the original. Using the original wire pull the wire for the replacement igniter through to the spark module.



Igniter screw

2. One igniter tip from the griddle is connected to the igniter for the righthand burners. Since the

replacement wire has an igniter on each end the wire cannot be cut.

3. To replace these igniters, remove the right hand bodyside, push the igniters down through the burner box, reach under the burner box through the opening made by the removal of the bodyside and pull the igniters out.

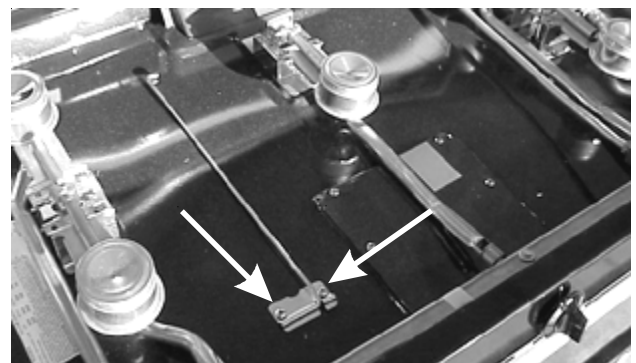


Igniter wire

4. To install the igniters push the igniters up through the burner box holes, slip them into their brackets and screw the igniter brackets to the burner brackets.

Main top support rod:

1. A support rod is provided to hold the main top in the raised position. The rod is held to the burner box by a bracket and two screws.
2. To remove the support rod remove the main top and remove the two screws holding the bracket to the burner box.



Support rod and bracket screws

Top burner knobs:

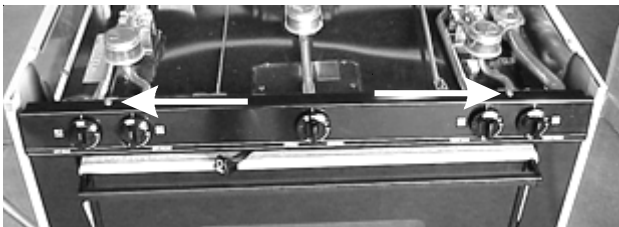
1. To remove the top burner knobs, pull the knob straight off.



Top burner knob

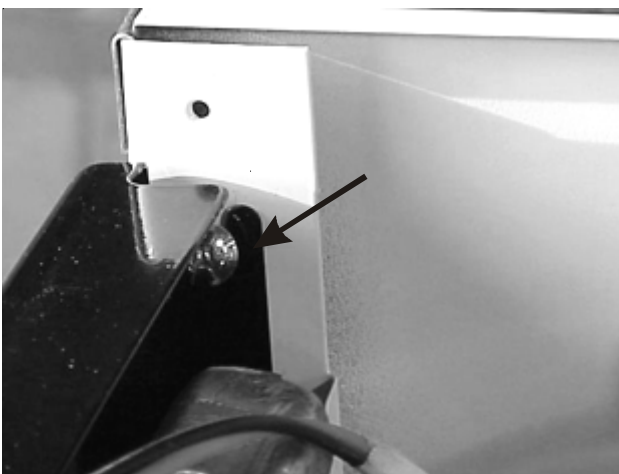
Control panel:

1. The control panel is held in place by two screws at the top.



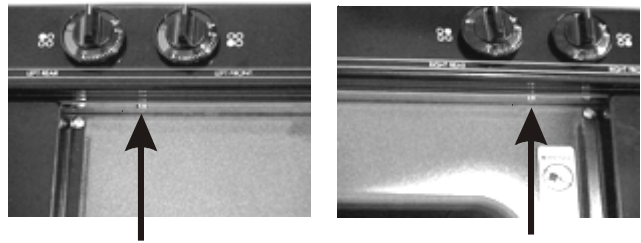
Control panel top screws

2. Disconnect power and remove the screw on the lefthand side that hold control panel to the bodyside.



Side screw

3. Open the oven door and remove the two screws holding the control panel to the front frame.



Control panel front frame screws

4. Pull out on the bottom of the control panel.

Top burner igniter switch:

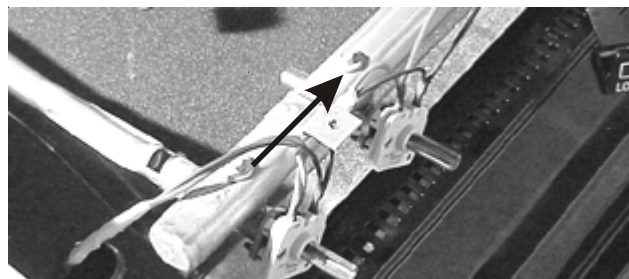
1. Disconnect power, remove the control panel, unplug wires from the switch and slide switch off valve stem.



Igniter switch

Top burner valve:

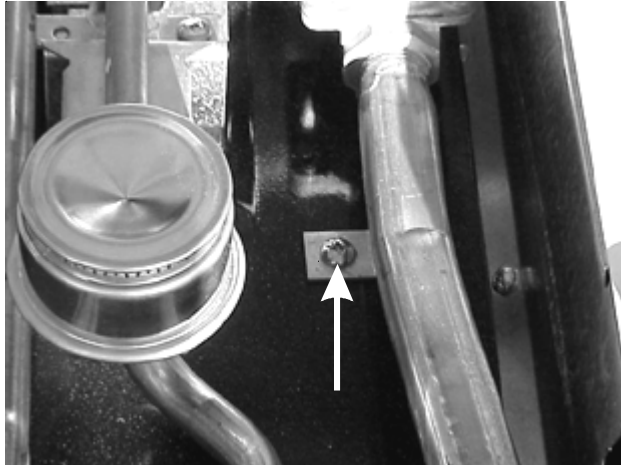
1. Remove the main top, control panel and burner for the valve that is to be removed.
2. Disconnect power and remove the one bolt holding the valve to the manifold pipe with a 1/4 spin tight. Drop the valve down and slide the igniter switch off.



Bolt

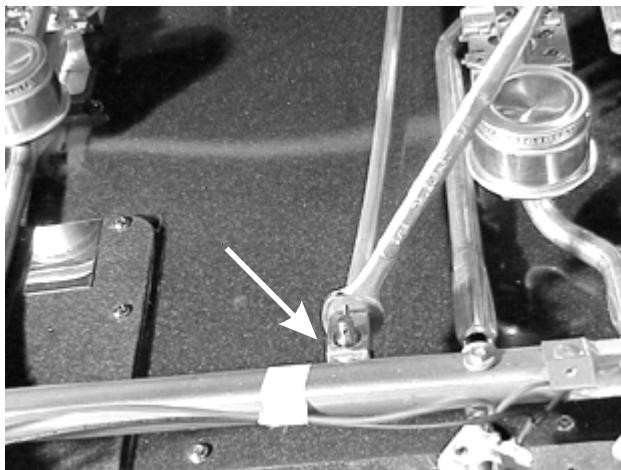
Manifold pipe:

1. Disconnect power, remove the main top, top burners, control panel and top burner valves.
2. Remove the one screw holding the manifold pipe to the burner box.



Manifold pipe screw

3. Turn the gas off to the range, disconnect the gas tube that goes from the manifold to the oven valve using a 9/16" wrench and lift the manifold pipe out.



Manifold tubing connection

Door latch handle knob:

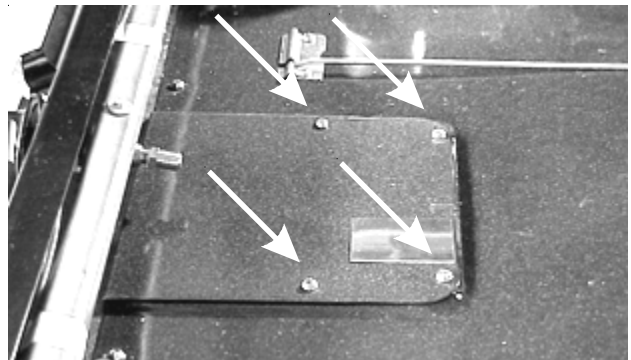
1. The latch handle knob is held in place by one phillip head screws. Remove the screw and slide knob off.



Latch handle screw

Lock mechanism cover:

1. To remove the lock mechanism cover, remove the four screws holding the cover to the burner box and lift the cover off.



Lock mechanism cover

Lock mechanism arm:

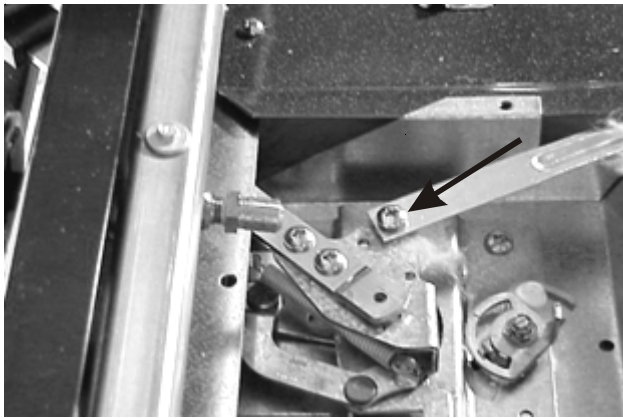
1. To remove the lock mechanism remove the lock mechanism cover, remove the two screws holding the holding the arm to the lock mechanism and pull the arm out the front of the range.



Lock arm screws

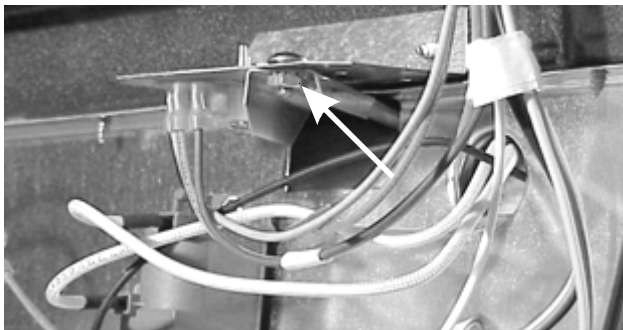
Lock switch arm:

1. Remove the lock mechanism cover and remove shoulder screw holding switch arm to mechanism.

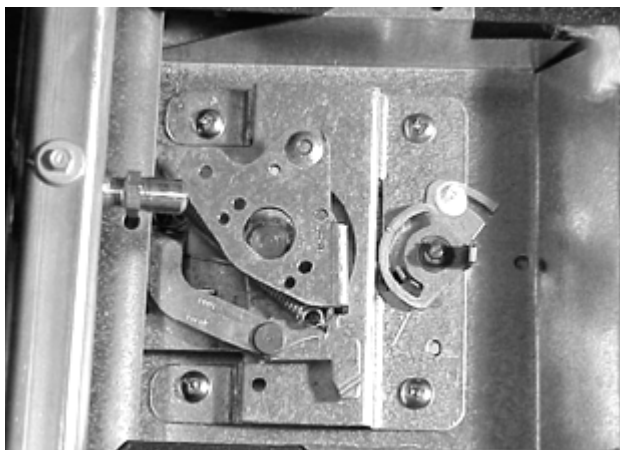


Shoulder screw location

2. Remove the cover from the rear of the range, remove the nut and bolt that hold the switch arm to the lock switch mechanism, and slide the arm out the back.



Switch arm at rear of range



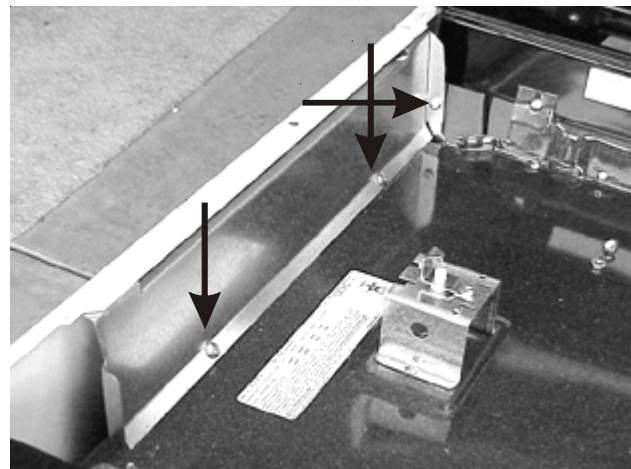
Lock mechanism mounting screws

Lock mechanism:

1. Disconnect power, remove the lock mechanism cover, remove the locking arm and pull the lock switch arm back out of the lock mechanism area.
2. Remove the four screws holding the lock mechanism to the lock mechanism pan and lift the mechanism out.

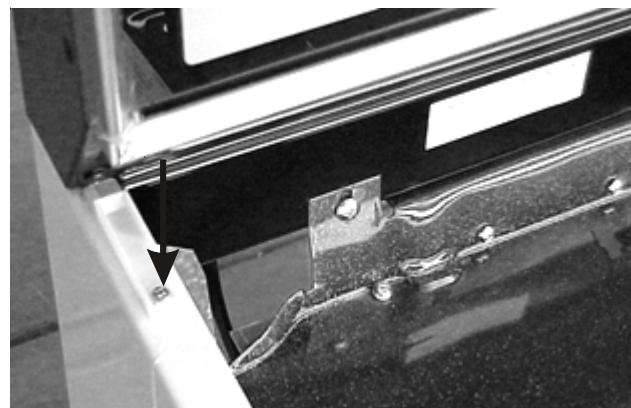
Burner box side panels:

1. The burner box side panel is held to the burner box by three screws and the side panel by one screw.
2. To remove a burner box side panel, remove the main top and the three screws holding the burner box side panel to the burner box.



Burner box side panel screws

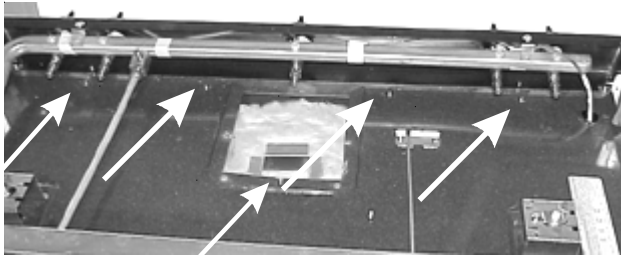
3. Remove the one screw holding the burner box side panel to the side panel and pull the bottom burner box side panel out.



Side panel screw

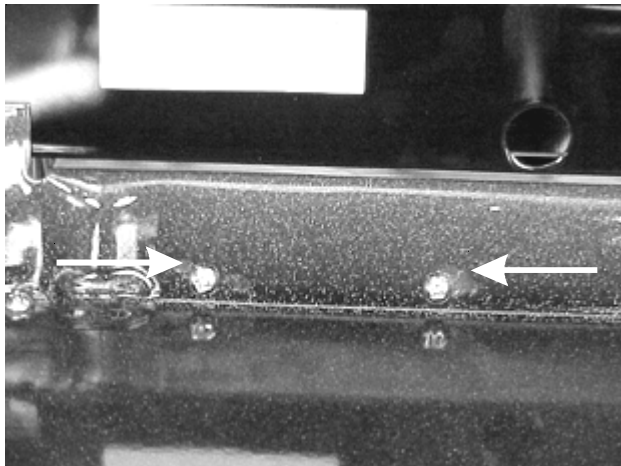
Burner box :

1. To remove the burner box disconnect power, remove the main top, burner box side panels, control panel, burners, manifold pipe, lock mechanism, and splash panel.
2. The burner box is held to the front frame by four screws and to a spacer at the rear of the lock mechanism opening by one screw.



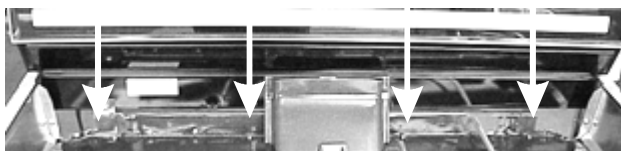
Burner box screws

3. Remove the back cover from the rear of the range then remove the two screws at the rear of the burner box that hold the lock switch bracket to the burner box.



Lock switch bracket screws

4. Remove the one screw holding the burner box to the splasher panel, the four screw holding the burner box to the top of the rear panel and lift the burner box out.

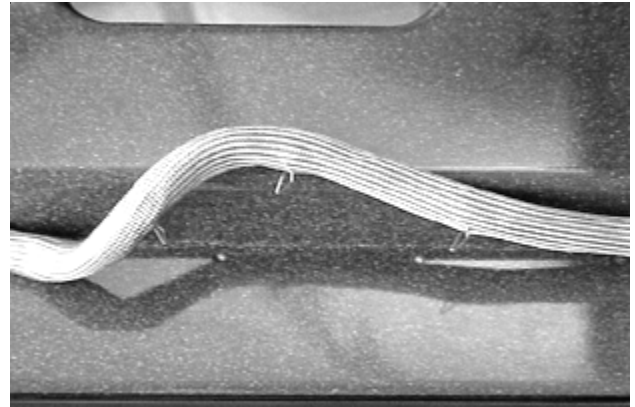


More screws

Oven Door

Oven door seal:

1. The oven door seal is snapped into a hole in the inner door panel by spring clips.
2. To remove the seal pull up on the seal.



Door seal spring clips

Oven door removal:

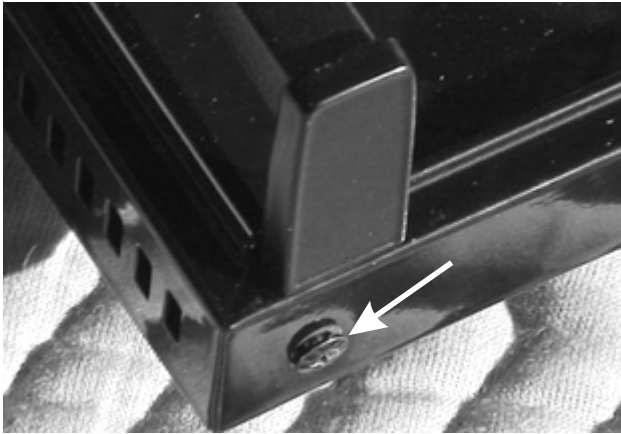
1. Open the door to the broil stop position and lift the door off.



Broil stop position

Oven door trim:

1. The oven door trim is held to the inner liner by four screws, two at the bottom and one on each side at the top.



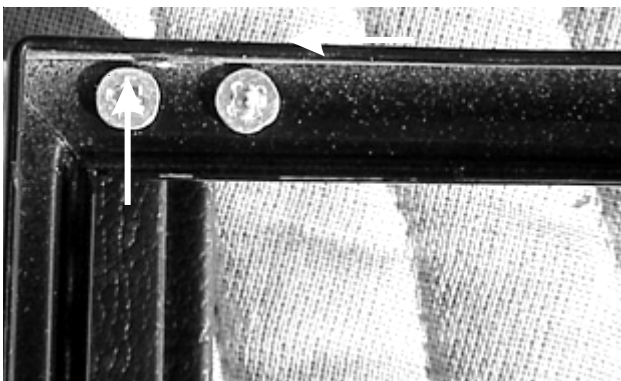
Oven door trim screw



Door trim bottom screws

Oven door handle:

1. The oven door handle is held to the oven door trim by four screws, two in each top corner. To remove the handle remove the trim from the door and remove the four screws.



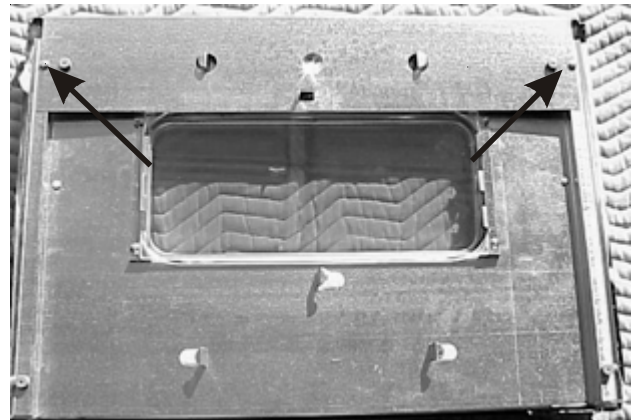
Oven door handle screws

Outer door glass:

1. With the door trim removed the outer door glass may be lifted off.

Top outer glass spacer:

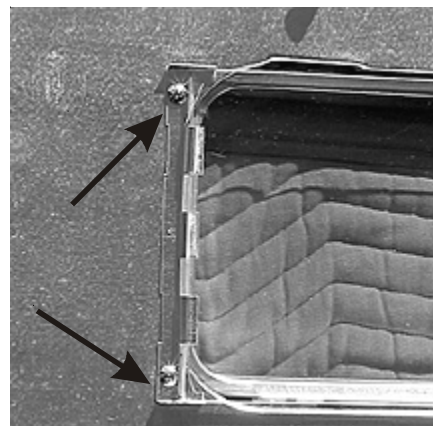
1. With the outer door glass removed the top outer glass spacer may be removed by removing one screw from each end.



One screw at each end

Center door glass:

1. The center door glass is held in place by two brackets that are held to the wool shield by two screws on each side.
2. To remove the center glass remove the outer door glass, and one of the brackets by removing the two screws from the bracket and sliding the glass out.



Center glass bracket

Wool shield:

1. The wool shield is held to the inner door liner by two screws.
2. To remove the wool shield, remove the outer door glass, the two screws holding shield to the inner liner and lift the wool shield off.



Wool shield screws

Glass package

1. Remove the wool shield, lift the wool out, and remove the four screws holding the glass package to the inner door liner.



Glass package

Inner door liner:

1. With the glass package and door seal removed, the inner door liner is left.

Oven door springs:

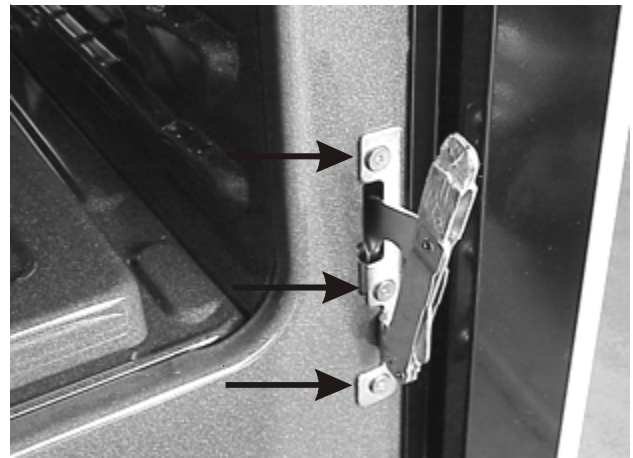


Door spring

1. The oven door springs are connected on one end to the oven door cam and on the other to the bottom rail of the range.
2. To remove the spring, remove the drawer and with the oven door closed, disconnect the spring from the hinge and disconnect the spring from the rail.

Oven door hinge:

1. Remove the door spring and the door.
2. Remove the three screws holding the door hinge to the front frame and pull the hinge out of the front frame.



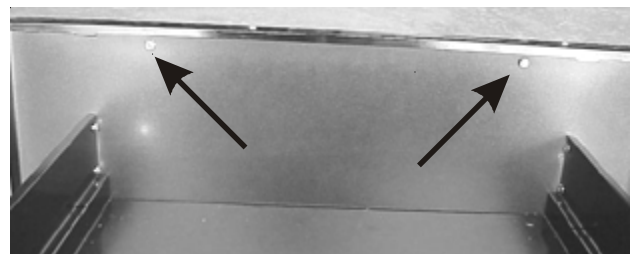
Door hinge screws

Storage drawer:

1. To remove the storage drawer pull the drawer out to the stop, lift up on the drawer and pull out.

Storage drawer handle:

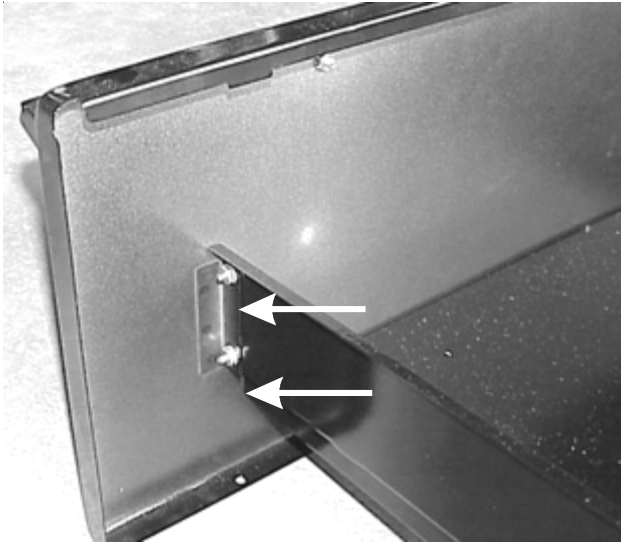
1. The drawer handle is held to the drawer panel by two bolts and nuts. to remove the handle unscrew the nuts and pull the handle off.



Drawer handle nuts

Storage drawer panel:

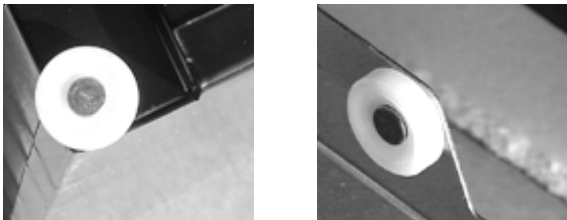
1. The drawer panel is held to the drawer body by bolts and nuts, two on each side. To remove the panel remove the four nuts and bolts.



Drawer panel nuts and bolts

Storage drawer rollers:

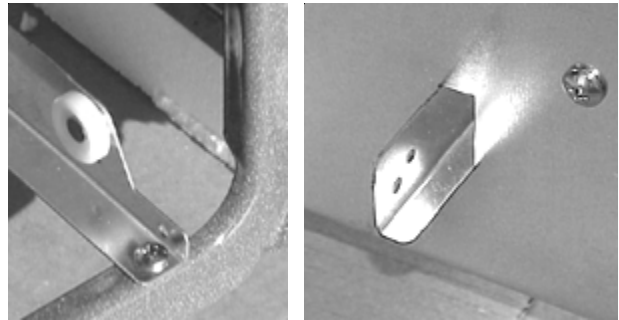
1. There are four rollers, two on the drawer and two on the rails, that the drawer glides on.
2. These rollers are riveted on. The replacement roller will come as a kit with a roller, a shoulder bolt, and a nut. To replace the roller, drill out the rivet and use the kit.



Riveted rollers

Storage drawer rails:

1. The storage drawer rails are held to the front frame by one screw and supported in the rear by an opening in the rear panel.



Storage drawer rails

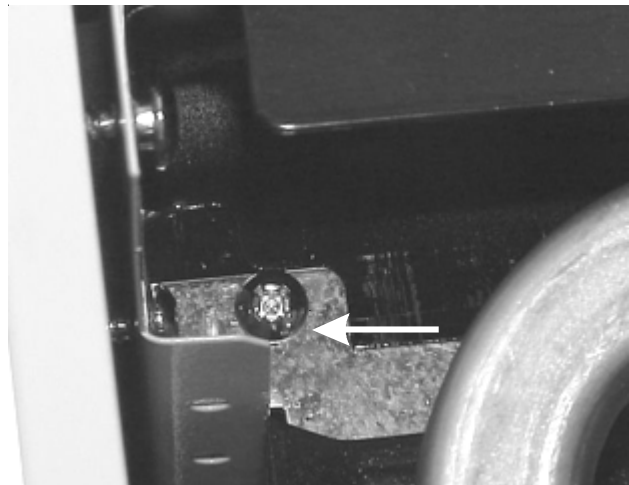
Front panels:

1. The front panels are held in place by two screws from the front and one behind the control panel.
2. Remove the two screws from the front, one at the bottom and one at the top, holding the panel to the front frame.



One at the top and one at the bottom

3. Remove one screw behind the control panel and lift the panel off.



One screw behind the control panel

Oven bottom:

1. The oven bottom is held in place by two tabs at the rear and a flange in the front. To remove the oven bottom, pull forward on the oven bottom until the tabs have cleared the brace.

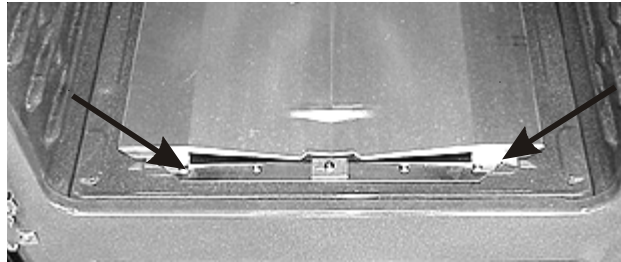


Flange

Tabs

Oven burner baffle:

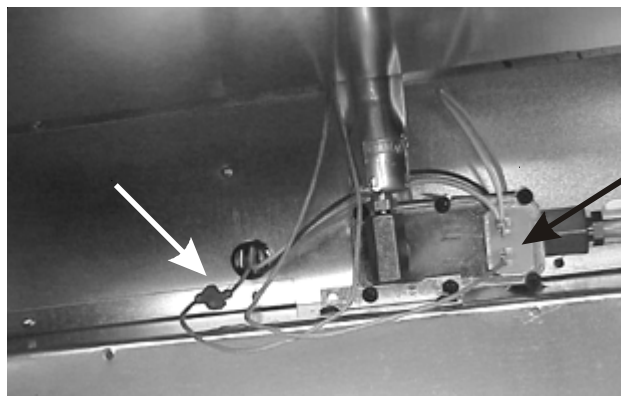
1. Remove the oven bottom, the two screws holding the baffle to the front frame and slide the baffle forward.



Burner baffle screws

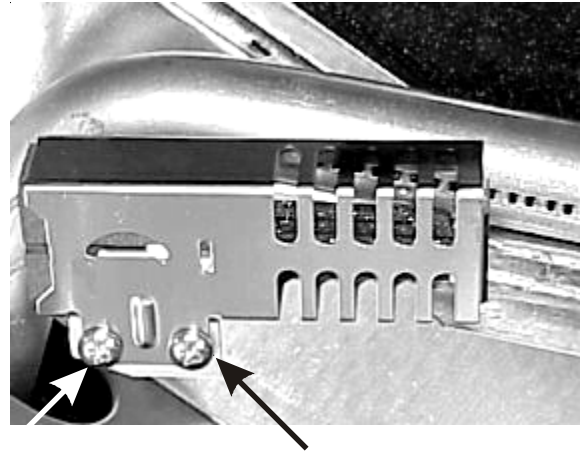
Bake burner igniter:

1. Disconnect power, remove the burner baffle and the oven safety valve cover.
2. Disconnect the igniter wires from the safety valve and harness.



Igniter wires

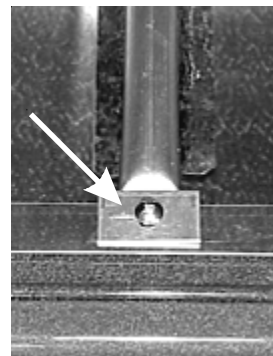
3. Remove the two screws holding the igniter to the bake burner and lift the igniter off.



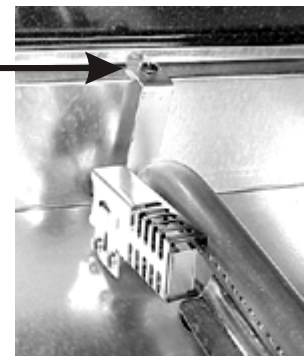
Igniter mounting screws

Bake burner:

1. Disconnect power, remove the burner baffle and the screws holding the igniter to the burner.
2. Remove one screw at the rear holding the burner to the burner pan and one screw at the front holding the burner to the front frame.



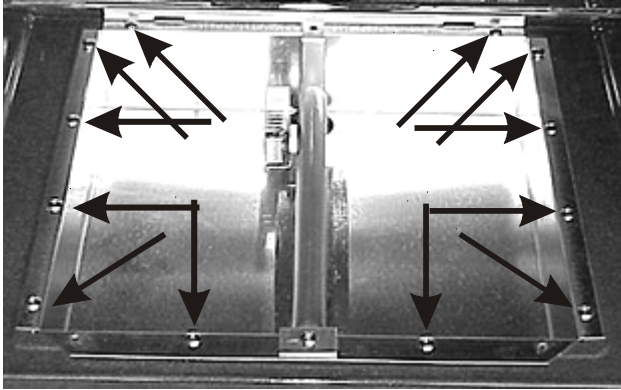
Front screw



Rear screw

Bake burner pan:

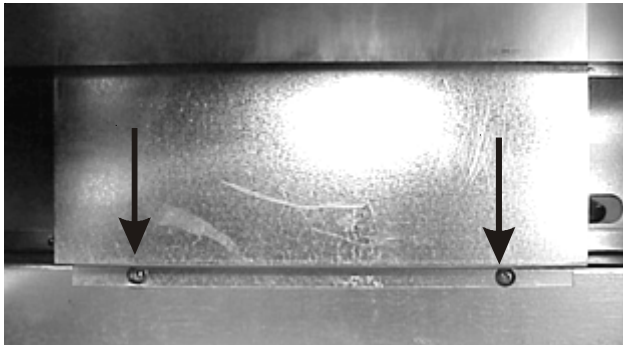
1. Remove the baffle, bake burner, four screws on each and two screws in the front and rear holding the pan to the oven bottom frame.



Twelve burner pan screws

Oven valve cover:

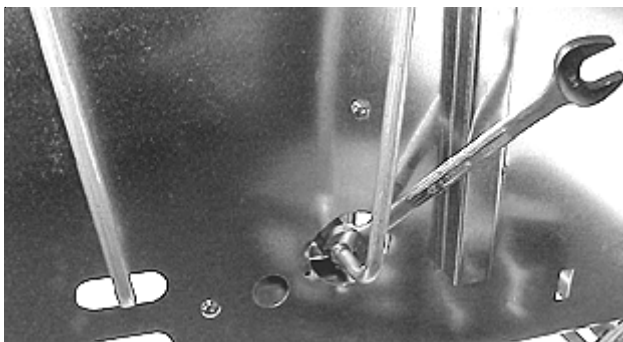
1. Remove the storage drawer.
2. Remove the two screws holding the cover to the valve shelf.



Valve cover screws

Oven safety valve:

1. Turn off the gas and disconnect power to the range.
2. Remove the storage drawer, bake burner and safety valve cover.



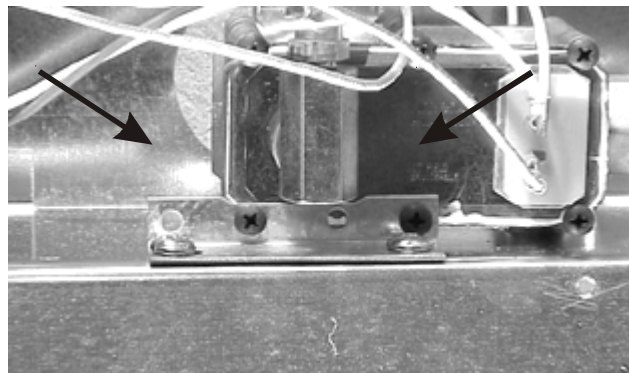
Disconnect tubing at back of safety valve

3. From the rear of the range using a 5/8" wrench, disconnect the tube that goes between the safety valve and the broil burner at the safety valve.
4. From the front of the range using a 5/8" wrench, disconnect the tube that comes from the manifold to the safety valve at the safety valve.



Disconnect tubing from front

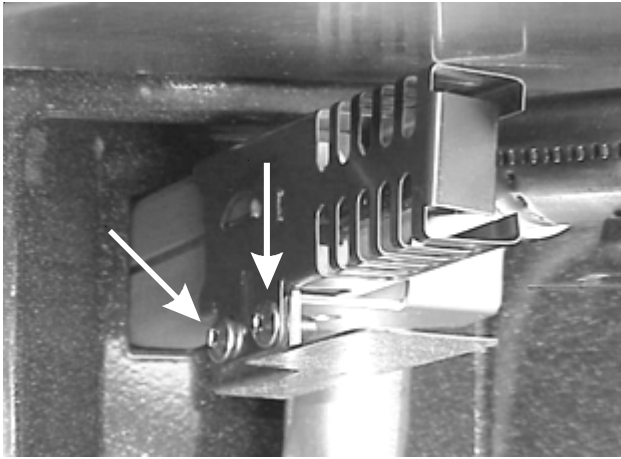
5. Remove the two screws holding the safety valve bracket to the rear brace of the range, pull the valve forward and disconnect the wires from the valve.



Safety valve mounting screws

Broil burner:

1. Remove the two screws holding the broil burner igniter to the broil burner.



Broil Igniter screws

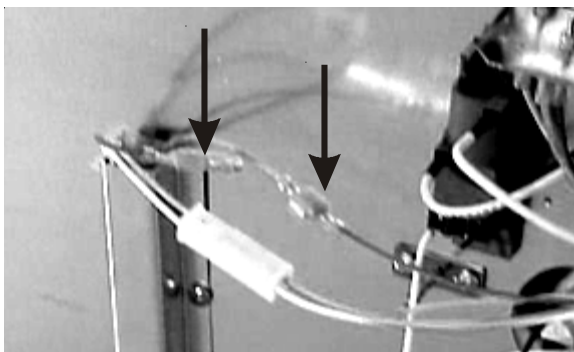
2. Remove the one screw holding the front of the burner to the top of the oven and drop the front of the burner down.



Broil burner mounting screw

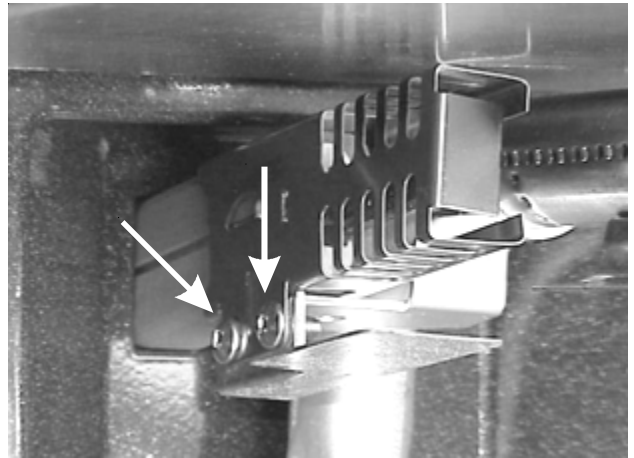
Broil burner igniter:

1. Disconnect electrical power, remove the cover from the rear of the range and disconnect the wires to the broil burner igniter.



Two wires

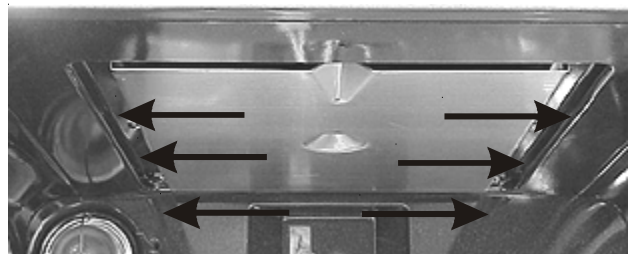
2. Remove the two screws holding the broil burner igniter to the broil burner and pull the igniter into the oven.



Broil igniter screws

Broil burner baffle:

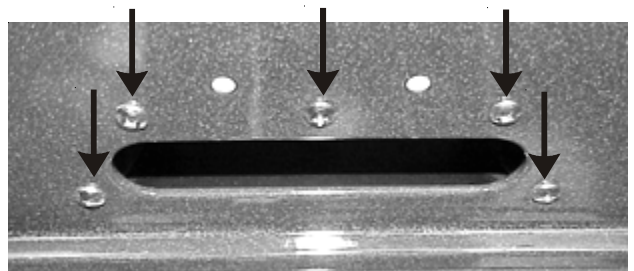
1. Remove the broil burner and six screws holding the baffle to the top of the oven.



Broil baffle screws

Oven vent:

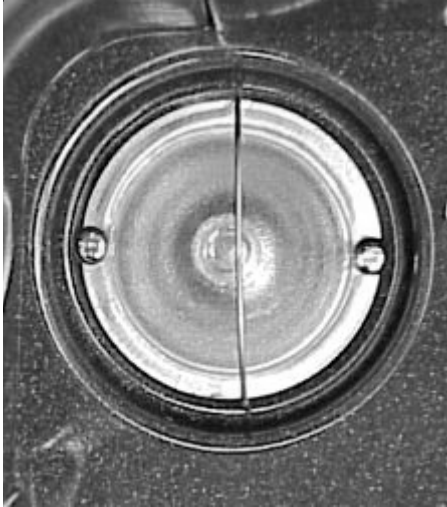
1. Disconnect power, remove the burner box, broil burner and broil burner baffle.
2. Remove the five screws inside the oven holding the vent to the top of the oven and lift the vent off.



Vent screws

Oven light cover:

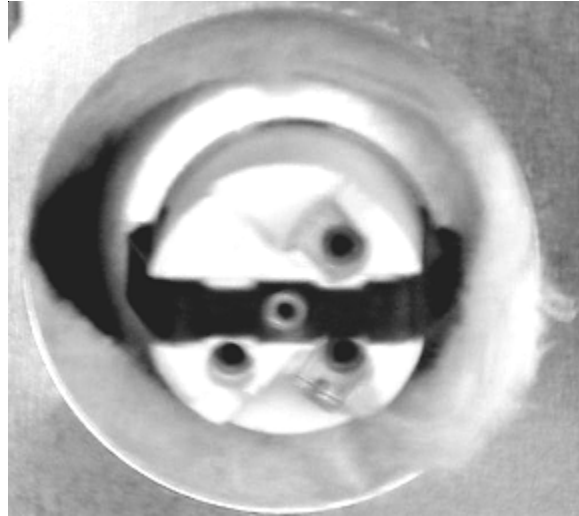
1. The oven light cover is held in place by a spring loaded wire. Snap the wire to either side to release the cover.



Oven light cover wire

Oven light socket:

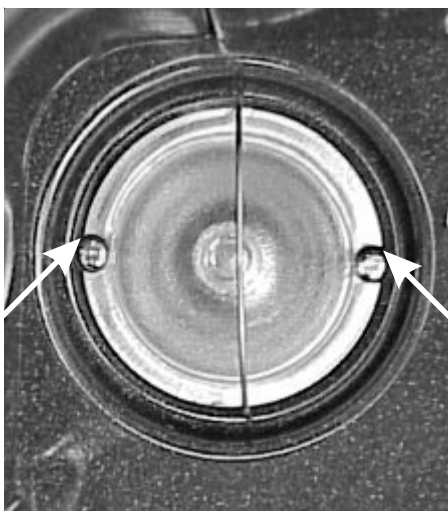
1. Remove the cover from the rear of the range.
2. Squeeze the spring clips on the side of the light socket and push it into the oven.



Socket spring clips

Oven light baze:

1. Disconnect power, remove the cover from the rear of the range and disconnect the wires from the light socket.
2. From inside the oven remove the two screws holding the baze to the oven liner and pull the baze and light socket into the oven.



Baze screws

Rear cover:

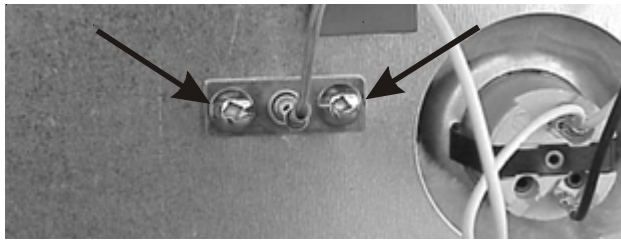
1. The rear cover is held to the back of the range by two screws. Disconnect power, remove the screws and lift the cover off.



Rear cover screws

Oven sensor:

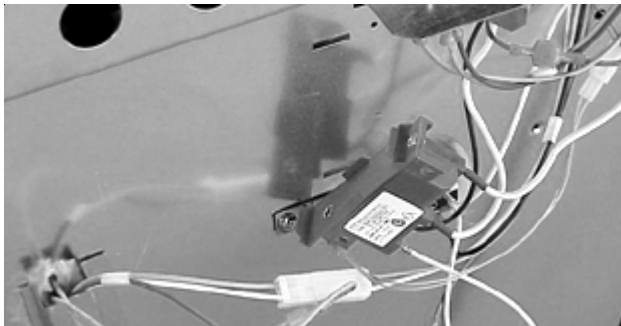
1. Remove the rear cover, unplug the sensor wires, remove the two screws holding the sensor to the rear wall and pull out the rear.



Oven sensor mounting screws

Spark module:

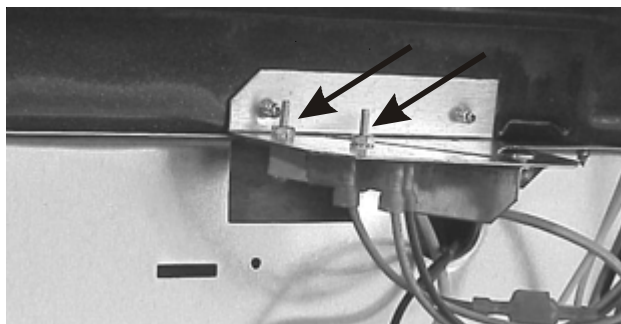
1. Disconnect power, remove the rear cover and unplug the wire from the module.
2. The module is held to the rear panel of the range by two tabs, one at the bottom and one at the top that go into two slots in the rear panel of the range. To remove the module take a standard screw driver and push up on the bottom tab.



Spark module mounting tabs

Lock switch:

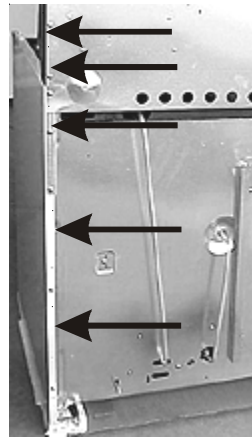
1. The lock switch is held to the lock switch bracket by two bolts and nuts.
2. To remove the lock switch, disconnect power, remove the rear cover, disconnect the switch wires, and remove the two bolts and nuts.



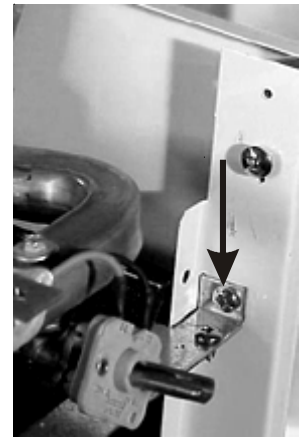
Lock switch bolts and nuts

Bodyside panels:

1. Disconnect electrical power, remove the main top, control panel and front filler panel on the side of the bodyside to be removed.
2. Remove five screws holding the back of the bodyside to the rear of the range and and one screw holding the bodyside to the front frame in the control panel area.

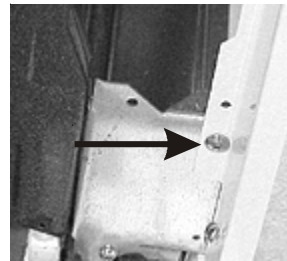


Rear screws



Front screw

3. Remove one screw at the lower front, one screw at the top of the panel holding the nylon main top locator. Lift the panel off.



Lower front



Top bracket

