

THEORY OF OPERATION

A service technician should understand how a gas appliance operates before attempting to service the appliance. This section provides descriptions of the different types of fuel gases and explains gas heating values. A definition of specific gravity of gas is given along with its characteristics and effects. Gas combustion principals are explained and gas burner components are described and illustrated. The end of this section contains illustrations which demonstrate basic cooking appliance theory of operation.

Types of Fuel Gas:

Gases used to supply heat energy are called fuel gases. Common fuel gases are not simply one kind of hydrocarbon, they are mixtures of hydrocarbon gases. They contain other gases as well, such as free hydrogen, carbon dioxide and nitrogen. As an example natural gas might contain 85% methane, 12% ethane and 3% of other gases. The presence of each of these gases in the fuel gas has some effect on the nature of the gas.

Some common fuel gasses are methane [CH_4], ethane [C_2H_6], Propane [C_3H_8] and butane [C_4H_{10}]. Propane and butane are nearly odorless. Natural gas that is processed to remove condensables and moisture, has little or no odor and no color. Odorants are added to natural gas before distribution to aid in leak detection. A common odorant used is a colorless liquid containing sulfur compounds.

Heating Value of Gas:

Heat energy produced when burning a fuel gas is commonly expressed in British Thermal Units (BTU). One BTU of heat will raise the temperature of one pound of water one degree Fahrenheit.

The more carbon and hydrogen atoms in each molecule of a fuel gas, the higher its heating value. Natural gas which is high in methane has a heating value of about 950 to 1150 BTU per cubic foot. The variance is due to the various other substances found in natural gases. The more ethane, propane or butane in the gas raises the heating value. Propane, or LP gas, has a heating value of about 2500 BTU per cubic foot, and butane about 3200 BTU per cubic foot.

Specific Gravity of Gas:

The specific gravity of a gas is the weight of one cubic foot, or the gas compared to one cubic foot of dry air. When stating the specific gravity of a gas, a pressure and temperature must be clearly stated. In the gas industry, the standard conditions of pressure and temperature are 30.0 inches of mercury and 60° F. A pressure of 30.0 inches of mercury will sustain a column of mercury 30 inches high in a tube with a vacuum on top of the column. Since air is used as the reference, its specific gravity is always 1.0. This value of 1.0 has no direct physical meaning with regard to air, such as its density. It is only a relative number or ratio used to express specific gravity of other gases.

The specific gravity of a gas will determine if the gas will rise or fall when released into the air. Natural gas will rise since its specific gravity is less than 1.0 at 0.4 to 0.8. Propane has a specific gravity of 1.5 and butane 2.0. These gases will fall when released into the air. They sometimes collect in low spots into pools which become a hazard if open flames are present.

In addition, specific gravity has two other characteristics. It has an important effect on the flow of gases through orifices, and hence the rating of the burners. Gas flow through an orifice is dependent upon the orifice size and the gas pressure upstream of the orifice. More of a lighter gas will flow through a given orifice size than a heavier gas at the same gas pressure. This effect is taken into account in tables and calculators used to select orifice sizes for burners.

The gas flow in pipes is also affected by specific gravity. At a given pressure at a pipe inlet, more lighter gas will flow through a pipe than a heavier gas.

Principals of Gas Combustion:

Combustion

When oxygen acts with a substance to produce large amounts of heat rapidly.

Requirements for Combustion

There are three required elements for combustion to occur; Fuel (Gas), Oxygen (Air) and Heat (Ignition Temperature, which for gas is between 1100°F/593°C and 1200°F/649°C). All must be present. Removing any one of the three and combustion will cease.

Chemistry of Combustion

Combustion of gas is a chemical reaction between fuel gas and oxygen. The basic elements of common fuel gasses are hydrogen [H] and carbon [C]. When hydrogen burns, water vapor [H₂O] is produced. Complete burning of carbon in fuel gases form carbon dioxide [CO₂] and water vapor [H₂O].

Controlled Combustion

Controlled combustion takes place when gas and air are supplied at proper rates to assure complete combustion of the gas in a steady flame. When a gas appliance is operating properly, burning starts at the burner ports. Gas flow is controlled by gas orifice size and gas pressure upstream of the orifice. Air is mixed with the gas before it passes through the burner ports. This added air is called "Primary Air". The remaining air required for complete combustion is supplied to the burner at the point of combustion and is called "Secondary air".

Adjustments of the gas-to-air ratio and the secondary air supply is the key to obtaining stable blue flames at a burner. Proper amounts of primary and secondary air are required for quiet and efficient burner operation and for complete combustion of the gas. Air Shutters or other devices provide control of primary air. Inlet opening and flue outlets control Secondary Air flow.

Total air

In an ideal situation, primary and secondary air is all that is needed (for the oxygen required) to burn the gas, but some additional air is required to assure complete burning of the gas. The total air, "primary", "secondary" and "excess" are expressed as percentages of the amount needed. About ten cubic feet of air is required to completely burn one cubic foot of gas. For this reason an appliance should not be operated in an air tight home.

Limits of Flammability

Not all air-to-gas mixtures will burn. Mixtures with 0% - 4% natural gas in air are too lean to burn. Mixtures of 4% - 14% natural gas in air can burn with a controlled flame. Flammability limits come into play when primary air adjustments are made on burners. If too much primary air is used, the mixture may become too lean and fall below flammability limits, thus preventing combustion.

Incomplete Combustion (*Causes and Effects*)

To obtain complete combustion, sufficient amounts of air must be supplied to the process. This air must have a reasonably normal oxygen content. Complete burning of gas produces harmless carbon dioxide gas and water vapor. If the air supply is insufficient, incomplete combustion occurs resulting in the formation of toxic by-products, such as carbon monoxide [CO] or aldehydes.

Carbon monoxide is colorless and odorless. Inhaling carbon monoxide in sufficient quantities could cause death by reducing oxygen levels in the blood.

Aldehydes, which are equally dangerous, have a sharp and penetrating odor which is easily detected by smell at very low concentrations. The odor caused by aldehydes should not be confused with odorants added to natural gas. The absence of aldehydes does not assure that carbon monoxide is not present. However, if the odor of aldehydes is present, then carbon monoxide is virtually always present.

Gas Burner Operation

A gas burner is a device to burn gas under control in order to produce useful heat. Primary air is brought into the burner from outside of the appliance at atmospheric pressure. The gas jet streaming from the orifice draws primary air with it into the burner.

The gas/air mixture, combined with a spark at the burner port(s) and the secondary air creates a controlled burn.

Burner Components: (PTS 17000000)

Burner Head - The component containing the burner ports where the gas/air mixture ignites. The burner ports are distributed in a useful pattern to optimize heat transfer. The flames should be spread so they can be easily reached by secondary air and provide a stable blue flame.

Venturi - Threaded brass pipe that threads into the jet holder through the distribution rings which narrows and then flares out again. This pipe helps maintain proper and constant primary air injection.

Inner Distribution Ring - Routes the gas from the simmer orifice hood to the simmer port holes located on the burner cap.

Outer distribution Ring - Routes the gas from the main burner orifice hood to the main burner port holes on the top of the burner head.

Jet Holder - This component is mounted to the burner mounting bracket and to the burner box. The main burner orifice is threaded into the jet holder as well as the venturi. It is the main support for the burner components.

Gas Orifice - An opening or hole which regulates or limits the amount of gas flowing to a burner. Gas flow rate (volume) depends on the size of the orifice (hole) and the gas pressure at the inlet of the orifice.

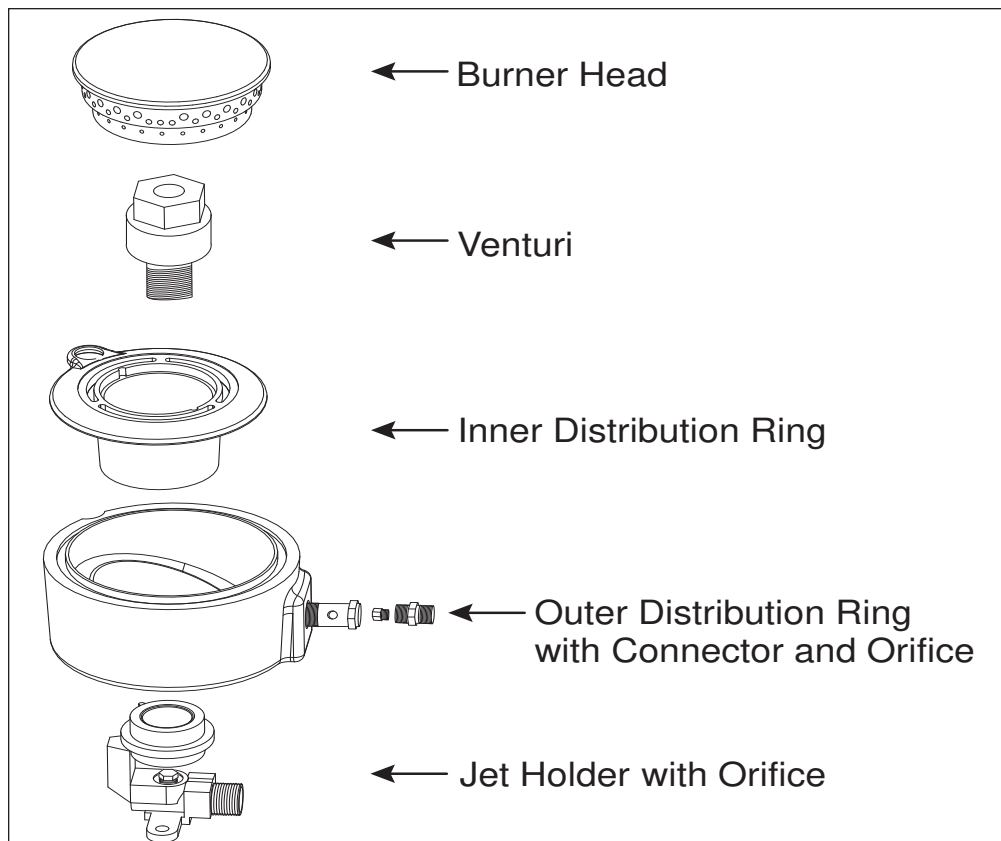


Figure 3-1. Burner Components

Burner Components: SWS 17000000

Burner Cap - Provides the upper portion of the ports required to create a combustible mix and proper flame quality of the burner and the decorative top for the burner with a black porcelain coating.

Burner - Contains the burner ports where the gas/air mixture ignites. The burner ports are distributed in a useful pattern to optimize heat transfer. The flames should be spread so they can be easily reached by secondary air and provide a stable blue flame. The burner also incorporates the Inner Distribution Ring, which Routes the gas from the simmer orifice to the simmer port holes, and the Outer Distribution Ring, which routes the gas from the main burner orifice to the main burner port holes.

Venturi - Helps maintain proper and constant primary air injection.

Electrode - The Electrode supplies the spark to ignite the burner. The electrode senses the flame, once the burner is ignited and will stop sparking. If no flame is sensed, and the valve is opened, the electrode will start sparking to re-ignite the flame. This is part of the auto-reignition system.

Orifice Holder - This component is mounted to the burner mounting bracket and to the burner box. The Simmer and Main orifice is threaded into the orifice holder and routes the gas to the appropriate ports of the burner. It is the main support for the burner components.

Simmer Orifice and Main Orifice - An opening or hole which regulates or limits the amount of gas flowing to a burner. Gas flow rate (volume) depends on the size of the orifice (hole) and the gas pressure at the inlet of the orifice.

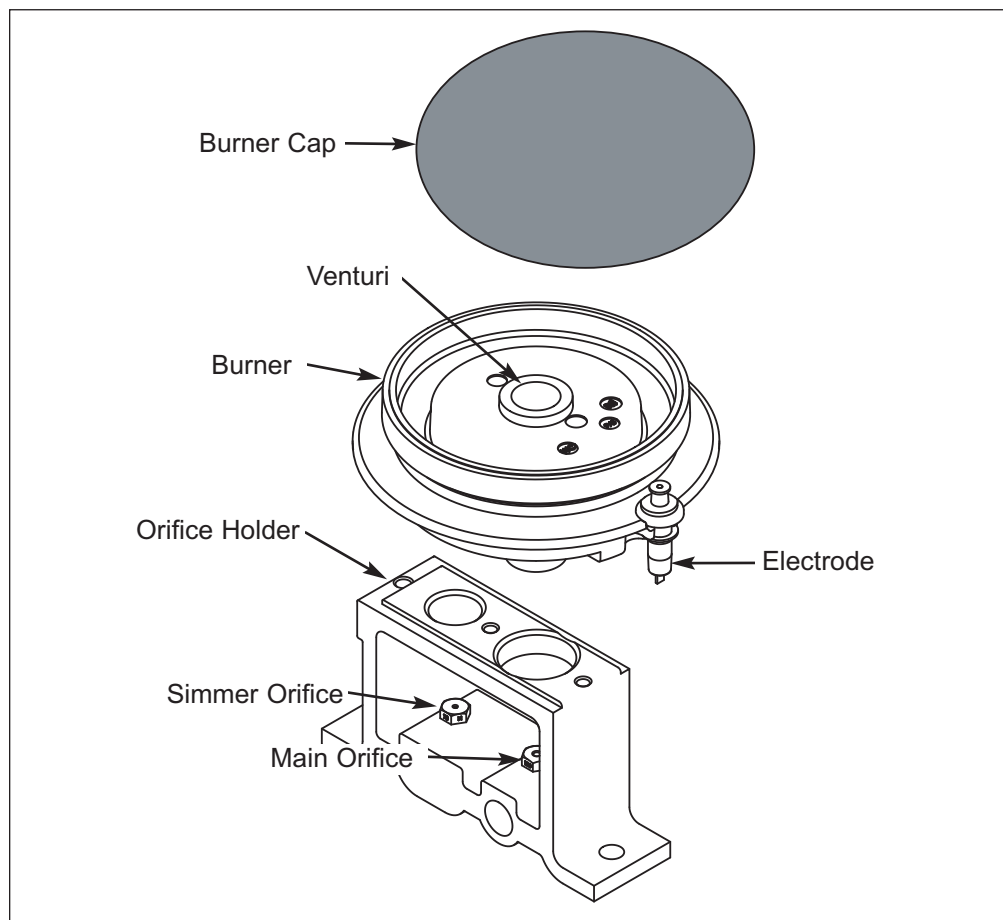


Figure 3-1A. Burner Components

Types of Burners:

Blue Flame Burners

All Wolf open surface burners, including the French Top burners are blue flame burners. With this type of burner, primary air is mixed with the fuel gas before the gas reaches the burner ports. An orifice is used to regulate gas flow to the burner and is sized to draw exact amount of air into the burner body. Air, which is mixed with the gas inside the burner body then exits the burner ports located in the burner head, where it is ignited. Secondary air is air from around the flames. The flame produced has several zones, each represents a stage in burning of the gas. The burner tip has a thin dark blue cone called the inner or primary cone. A lighter cone called the outer cone, surrounds the inner cone. Air around the flame diffuses into the flame to burn at the outer cone. If conditions are perfect, products from the inner cone burn here. The final products of burning are carbon dioxide and water vapor. An outer mantle surrounds the outer cone where burning is usually completed. It is nearly invisible and glows only because of the high temperature of the final combustion.

Infrared Burners

Wolf dual fuel ranges also use infrared burners. The under-fired application for the charbroiler and the griddle uses a porous refractory ceramic tile burner. (See Figure 3-2) With this type of burner, a substantial amount of energy output is in the form of infrared radiant energy. With infrared heat, thermal energy is transmitted through space without heating the medium through which it travels. Infrared energy is usually not affected by air flowing between the burners and heated surfaces because of the burner's numerous and tiny flames. This type of heat is very efficient and compact. The under-fired refractory infrared burner requires 100 percent primary air and is designed to have a hot glowing burner surface. The flame burns close to the burner surface at a high temperature.

NOTE: There is no shutter on infrared burners for adjusting the primary air and there is no change in orifice size for different altitude.

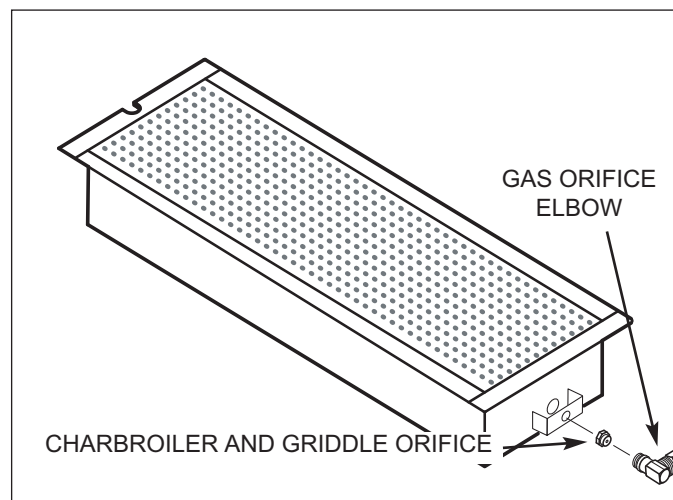


Figure 3-2. Infrared Burner

OPERATION OF THE DUAL FUEL RANGE

Surface Burners

A spark electrode ignites each surface burner. This control eliminates the need for continuous open flame pilots. For added safety and convenience, each burner is designed with an electronic re-ignition system. This feature enables any burner to automatically re-light in the event it is accidentally extinguished.

This unique dual stacked burner design combines all the burner parts in one configuration. Large burners provide a Btu/hr rating of 15,000 on HIGH and a High Simmer Btu/hr rating of approximately 3300. Small burners provide a Btu/hr rating of 9,200 on HIGH and a High Simmer Btu/hr rating of approximately 1600. All burners have simmer settings.

A distinguishing feature of the Wolf low Btu/hr control is its constant, low heat output ***without continuous ignitions***. Flame diameter remains full size, only the heat output is lowered. This is the ultimate control for simmering food.

After removing burner parts for any reason, it is extremely important that the burners are re-assembled correctly. The burner cap has a special orientation and should be seated flatly (see Figure 3-3 and Figure 3-3A).

Rotate burner cap until you feel it drop and click into position.

This patented dual stacked burner configuration makes it possible to enjoy cooking at full flame as well as maintaining control while simmering at the lowest flame setting.

Grate Placement

Low profile cast iron grates are designed for a close fit. This enables pans to move easily from one burner to another without having to lift the pan or have it tip over between the grates. Each grate sets securely on dimples on each corner of the cooktop pan. Continuous grates are interchangeable.

Control Knobs

The control knobs are positioned to correspond to the burners they regulate. The knobs on the far left regulate the burners on the left side. Conversely, the knobs on the far right regulate the burners on the right side.

Burner Lighting

To light a burner push in and turn the corresponding control knob counter clockwise to the HIGH setting. You will hear “clicking” and see the burner ignite. Once the burner is lit, continue turning the knob counter clockwise to any one of the settings, HIGH through LOW.

To select a simmer setting, turn the knob to the LOW setting. You will feel a stop-detent in the knob rotation. Push in on the knob, continuing to turn it counter clockwise. This moves the flame to the second tier. Now, select any variation within the SIMMER flame settings, HIGH through LOW.

Each knob is designed to be a “push-to-turn knob”. Although this is a child-safe design, children should never be left unattended in the kitchen when the range is in use.

Power Outage

In case of a power outage, the surface burners can be re-lit manually. Turn the control knob to “high” and place a flame near the igniter to light the burner.

DSI board operation (Griddle & French Top units only)

The DSI board serves the purpose of igniting the griddle burner, detecting the presence of this flame, and provides the signal to open the gas valve. When the thermostat is turned on, the red (call for heat) light comes on and the gas solenoid is opened. At this time you will hear a series of sparks and it will begin to check for the presence of a flame. If the igniter probe does not detect flame within a short period of time, the gas valve solenoid shuts off and there will be a delay before trying to reignite (this allows time for the non-combusted gas to dissipate). This process will reoccur in three sets and if it fails a third time the DSI board will shut down and will wait for the thermostat to be turned off and on before attempting to reignite. If flame detection is lost during operation this board will also allow time for the non-combusted gas to dissipate, but will attempt to reignite after this delay.

Charbroiler

This optional feature is designed with an infrared burner to give the highest quality and most efficient method of gas grilling. These burners become an orange-red color at the surface of the ceramic tiles. When the tiles are glowing, they transfer an intense heat to the food being grilled. This chars the outside of the food and leaves the inside tender and juicy.

The infrared burner is designed to operate at a full heat output of 16,000 BTU/hr. It is recommended using the Wolf blank-off plate when grilling most foods.

Charbroiler Operation

- Turn on the ventilation hood prior to using the charbroiler.
- If the knob is not set fully at "HIGH", the burner may turn blue and the automatic igniter will begin sparking. Turn the knob back to "HIGH".
- Preheat grill for about ten minutes before adding the food. The tiles will have an orange glow.
- For the 22-inch charbroiler, there are two separate burners with separate control knobs, which act independently of each other.

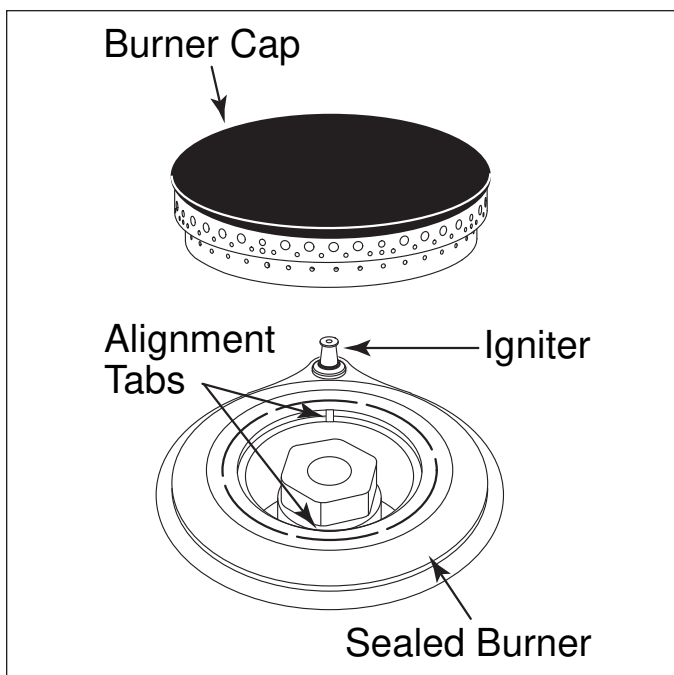


Figure 3-3. Stacked Dual Burner Assembly (PTS 17000000)

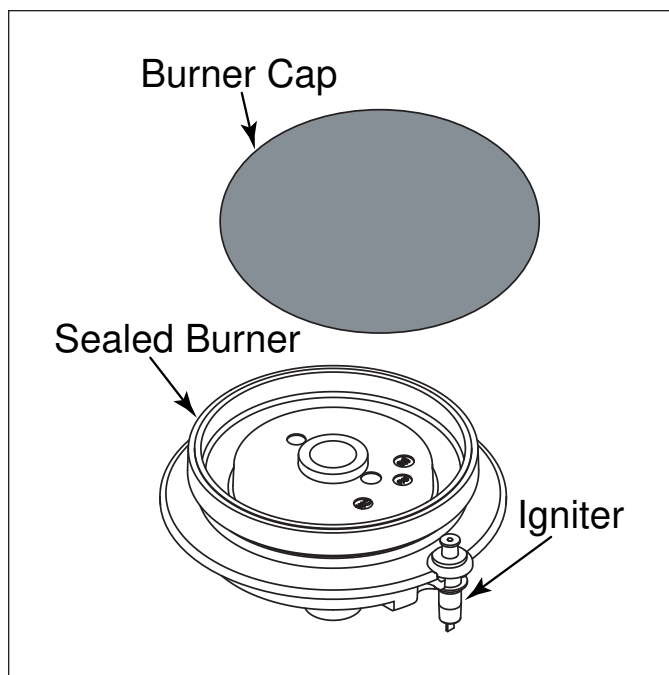


Figure 3-3A Stacked Dual Burner Assembly (SWS 17000000)

Cleaning and Maintenance

Part Identification	Material	Care Recommendation
Burner Pan Although resistant to most stains, it is not totally impervious to damage. Salt and some cooking liquids may pit and stain surface. Always remove these spills immediately. Avoid using abrasive cleaners; they will permanently scratch the surface.	Exterior Finish Porcelain Steel	<i>General care:</i> Use a clean cloth or sponge, wipe with warm water and mild detergent. Rinse and dry immediately. Apply protective polish, always in the same direction. <i>Spray degreaser:</i> Removes fingerprints and greasy spatters. Spray on a cloth and wipe surface. Buff dry immediately to avoid streaking. <i>Protective polish:</i> Apply to surface to maintain luster and protect from some food stains <i>Hard water stains:</i> Use white vinegar and water.
Burner Cap	Porcelain Enamel (matte finish) <i>Never wipe a warm or hot porcelain surface with a damp sponge; it may cause chipping or crazing (tiny hair-like cracks)</i>	Cool first. Wash in warm water with liquid detergent or mild abrasive cleaners. Foods high in acid or sugar content, such as milk, tomatoes, sauerkraut, fruit juices and pie filling, may pit or craze the surface. Remove as soon as possible. Do not cook the spill on again.
Burner Grates	Porcelain-Coated Cast Iron	Remove from cooktop and place on a flat surface near the sink. <i>Non-abrasive cleaners:</i> Hot water and liquid detergent, paste of baking soda and water, plastic pad or sponge. <i>Mild abrasive and abrasive cleaners:</i> Use sparingly.
Control Knobs	Metal	<i>General care:</i> Wipe each knob with a damp cloth and mild soap and water; rinse and dry. Never soak or use abrasive cleaners; they will scratch the finish and remove the markings.
Spark Igniters	Ceramic	Keep dry. Never spray water or cleaner directly on the igniter. When cleaning around the surface burner, be careful that the cloth does not catch on the igniter and damage it.

Charbroiler Cleaning and Maintenance

Part Identification	Material	Care Recommendation
Blank-Off Plate (If Applicable)	Stainless Steel	Wash with hot water and detergent. Use a soap-filled scouring pad to remove as much cooked-on soil as possible. The plate will turn a metallic blue color due to high heat; this is a permanent change.
Charbroiler Frame	Stainless Steel	Remove from the range. Soak in hot water and dish detergent. Wash thoroughly, scrubbing with scouring pad, if needed. Rinse and dry.
Grate	Porcelain Coated Cast Iron	When cool, lift off and set in the sink. Pour very hot water over the cooked-on residue. Cover with wet dish towels and pour more hot water over it. Allow the hot, moist conditions time to help loosen the residue. Remove remaining soil with a soap-filled scouring pad. Rinse and dry.
Igniter	Ceramic	Avoid contact with the igniter; it is fragile and can chip or break.
Mesh Screen (If Applicable)	Stainless Steel Wire	Use a wire brush to loosen any charred food particles.

Griddle

The cast iron griddle plate operates at 18,000 Btu/hr. It is thermostatically controlled which means once the set temperature is reached, the heat cycles to hold that setting. Prior to use it is necessary to "season" the griddle to protect the surface from moisture. This process will change the appearance.

NOTE: Seasoning does not create a non-stick surface. The use of additional oil is necessary during cooking.

Griddle Operation

- To heat the griddle, push in the knob and turn counter clockwise to desired temperature. It is normal to hear a clicking sound. This is the electronic ignition lighting the burner. When the burner is lighted, the thermostat will control the temperature.
- Preheat for approximately 10 to 15 minutes. When the griddle is preheated, the griddle indicator light will go out. The light will cycle on and off as the thermostat needs more heat to maintain the set temperature. This will allow heat to be evenly distributed and reach the set temperature.
- For the 22-inch griddle, there are two separate burners with separate control knobs, which act independently of each other.
- To turn off the griddle, turn the knob clockwise to the "OFF" position.

Griddle Care

- Use a metal spatula and scrape grease into the grease collection tray.
- When the surface has cooled, wipe it with a paper towel to remove excess grease or oil.
- Clean grease collection tray after each use. Do not allow grease to accumulate in the tray and become a fire hazard.
- To remove the drip tray, gently pull the tray towards yourself to lift it out. Clean drip tray with soapy water and a clean cloth.

Time of Day Clock

The clock can be visible on the display during all modes. To set clock, press the CLOCK key on display panel, "CLOCK" will flash on and off. Next, press the up or down arrow key to increase or decrease the time. Stop when correct time of day shows in display window. (See Figure 3-4). Now, press the CLOCK key or ENTER key to set clock. Two beeps will be heard when time has been entered.

NOTE: By holding down desired arrow key, counter will rapidly toggle through the numbers.

NOTE: Time will change from am to pm by passing the 12:00 mark.

Oven Timer

The oven has a timer that operates independently from the oven controls. Once a time is set in hours and minutes, the countdown is seen in the display window. Only the last minute counts down in seconds. To initiate oven timer, press TIMER key. (See Figure 3-5). Next, press the arrow up or arrow down key to increase or decrease desired amount of cooking time in hours and minutes. (See Figure 3-5). Then, press ENTER key or TIMER key to start timer. Two beeps will be heard. The oven will chime, time will continually flash when timing is complete. To exit oven timer function, press TIMER key, then press CLEAR key twice to clear time and return to clock.

FIELD OPTION MODE

Three Field option modes allows for the user to adjust or change specific option's of the ECH and oven controller, such as User Preference Offset, 12 hour to 24 hour clock and Fahrenheit to Celsius temperature.

UPO (User Preference Offset)

This option allows the user to offset a specific oven temperature $\pm 35^\circ$ in 1°F (Fahrenheit) increments. To initiate, press and hold the CLOCK key for 5 seconds. The current UPO will be displayed in the temperature readout knob, turning the knob at this point you can change the UPO. Turn the knob to the left or right to increase or decrease the UPO in 1° increments as much as $\pm 35^\circ$. (See Figure 3-6 and 3-7).

Changing Clock to 24 Hours

To set 24 hour clock, press and hold CLOCK key on display panel for 5 seconds. (See Figure 3-8). Now, press CLOCK key to change from 24 hour to 12 hour or vice versa. (See Figure 3-8). Then, press the ENTER or after short delay the clock will set by default.

Fahrenheit to Celsius

The oven can be changed from Fahrenheit to Celsius temperature or visa versa. To initiate, press and hold the CLOCK key on display panel for 5 seconds. Now, press the COOK-TIME key to change from $^\circ\text{F}$ and $^\circ\text{C}$ or visa versa. (See Figure 3-9). Next, press the ENTER key on the display panel or after short delay $^\circ\text{F}$ or $^\circ\text{C}$ will set by default.

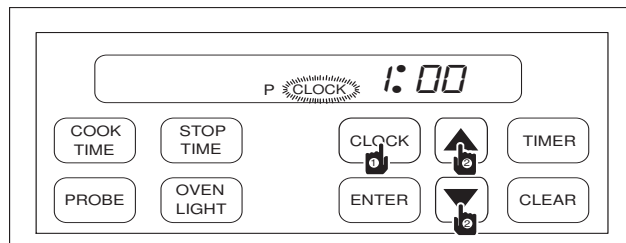


Figure 3-4. First, Press and Hold CLOCK Key for 5 Seconds. Then, Press Arrow Up or Arrow Down Key to Set Time

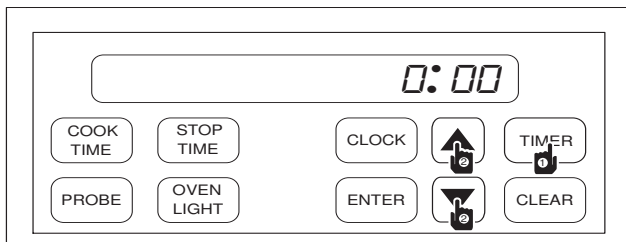


Figure 3-5. First, Press TIMER Key. Then, Use Arrow Up or Arrow Down Key to Set Desired Amount of Time

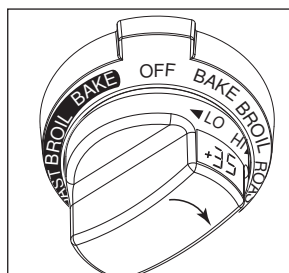


Figure 3-6. Turn Knob to Right to increase temperature

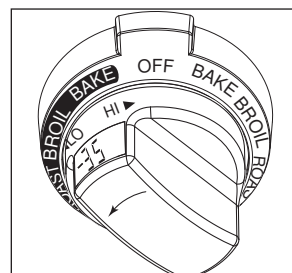


Figure 3-7. Turn Knob to Left to decrease temperature

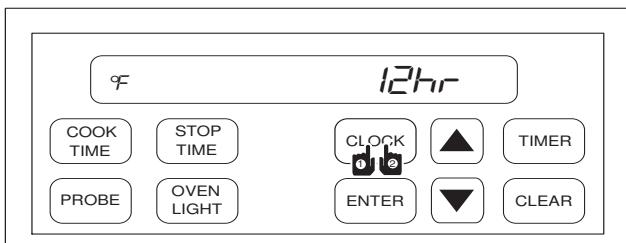


Figure 3-8. First, Press and Hold CLOCK Key for 5 Seconds. Then, Press CLOCK Key to toggle between 12hr and 24hr

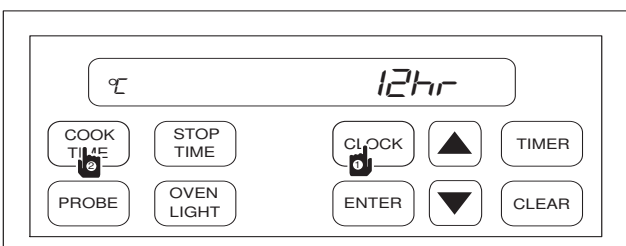


Figure 3-9. First, Press and Hold CLOCK Key for 5 Seconds. Then, Press COOK TIME Key to Toggle between $^\circ\text{F}$ and $^\circ\text{C}$

COOKING MODES

The dual fuel oven has multiple cooking modes, each dedicated to give the best results for a specific kind of cooking. The dual fuel oven also has some unique cooking features.

Most oven modes have a temperature setting of 170°F (75°C) to 550°F (290°C). The exception is Broil, Convection Broil and Proof mode.

NOTE: Bake Stone Element must be removed during all cooking modes excepts Bake Stone Mode.

Bake Mode

Both the hidden bake element and broil element are used to heat the air and cycle to maintain temperature. This mode is best for single rack cooking, primarily bakery foods. To initiate the Bake Mode, turn oven control knob bezel counter clockwise to BAKE. (See Figure 3-10). Temperature is preset to 350°F (175°C). To change oven temperature, immediately turn temperature readout knob to the right to increase oven temperature or to the left to decrease. (See Figure 3-11 and 3-12). Oven will turn on after 2 seconds or press ENTER key. To exit Bake Mode, turn oven knob bezel to OFF.

NOTE: Always preheat for Bake mode.

NOTE: Temperature probe may be used in this mode.

NOTE: Timer function may be used during this mode.

NOTE: The temperature display alternates between set and actual oven temperatures during preheat.

NOTE: Temperatures below 150°F (65°C) are displayed by the word "Lo" in the oven knob display window during preheat

NOTE: Oven will chime when oven preheat temperature has been achieved.

Bake Stone Mode

A specially designed rack and heating element are used for this mode to produce a hot oven environment necessary for baking on a ceramic stone. A heating element is added under the stone to enhance the heat from both convection fans.

To initiate Bake Stone Mode, turn the oven control knob bezel clockwise to STONE. (See Figure 3-14). Temperature is preset at 400°F (205°C). To change temperature, immediately turn temperature readout knob to right to increase oven temperature or to left to decrease. (See Figure 3-15 and 3-16). Oven will turn on after 2 seconds or press ENTER key. To exit Bake Stone Mode, turn oven knob bezel to OFF.

NOTE: "Stone" will appear and flash on hidden display and a beep tone will be heard 30 seconds if the bake stone element is not inserted into receptacle.

NOTE: Always preheat 25 minutes for Bake Stone mode.

Oven will chime when oven preheat temperature has been achieved.

NOTE: Temperature probe may be used in this mode.

NOTE: Timer function may be used during this mode.

NOTE: The temperature display alternates between set and actual oven temperatures during preheat.

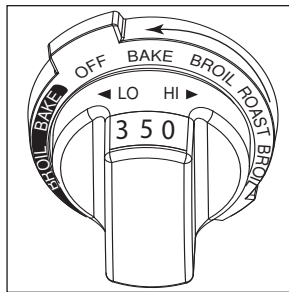


Figure 3-10. Turn Control Knob Bezel Counter Clockwise to BAKE

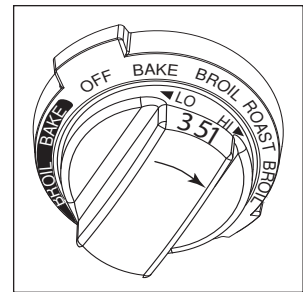


Figure 3-11. Increase Preset Temperature, Turn Knob to Right

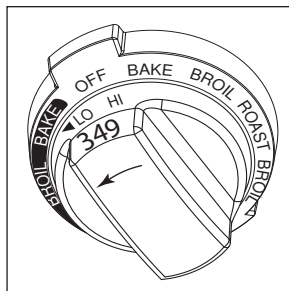


Figure 3-12. Decrease Preset Temperature, Turn Knob to Left

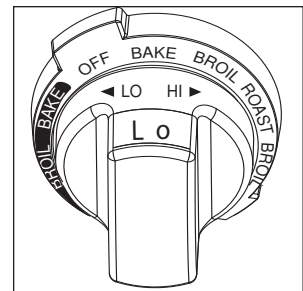


Figure 3-13. Lo appears in display window if temperature is below 150°F

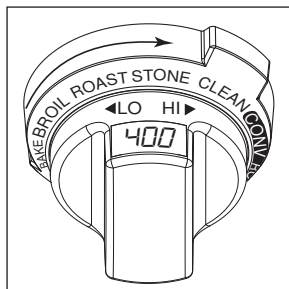


Figure 3-14. Turn Control Knob Bezel Counter Clockwise to STONE

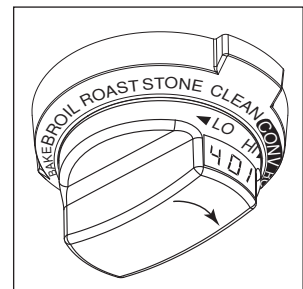


Figure 3-15. Increase Preset Temperature, Turn Knob to Right

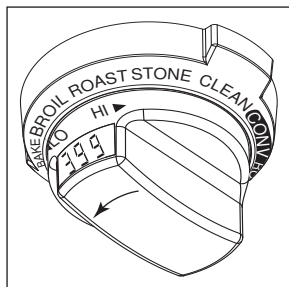


Figure 3-15. Decrease Preset Temperature, Turn Knob to Left

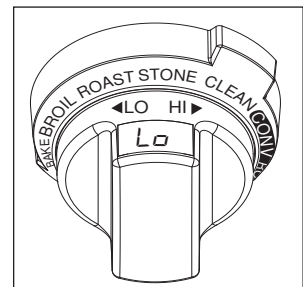


Figure 3-16. Lo appears in display window if temperature is below 150°F

Broil Mode

The top element is used to conduct an intense, radiant heat which browns one side of the food at a time. This mode is best for meats, fish and poultry pieces up to 1-inch thick.

To initiate Broil Mode, turn oven control knob bezel counter clockwise to BROIL. (See Figure 3-17). Temperature is preset to "br1" for 550°F (290°C)-Hi Broil. To change oven temperature, immediately turn the temperature readout knob to left to decrease oven setting to "br2" for 450°F (230°C)-Med Broil or "br3" for 350°F (175°C)-Low Broil. (See Figure 3-18 and 3-19). Oven will turn on after 2 seconds or press ENTER key. To exit Broil Mode, turn oven control knob bezel to OFF.

NOTE: Timer function may be used during this mode.

NOTE: Never preheat for Broil mode.

NOTE: Temperature probe may not be used in this mode.

Convection Mode

Dual convection fans, each with a heating element, operate from the back of the oven and move heated air throughout the entire oven cavity. Uniform air movement makes it possible to cook on all six rack levels simultaneously. The heat is cycled on and off to maintain temperature, resulting in evenly browned food.

To initiate Convection Mode, turn oven control knob bezel clockwise to the dark area on dial marked CONV. (See Figure 3-20). Temperature is preset at 325°F (160°C). To change oven temperature, immediately turn the temperature readout knob to right to increase oven temperature or to left to decrease oven temperature setting. (See Figure 3-21 and 3-22). Oven will turn on after 2 seconds or press ENTER key. To exit Convection Mode, turn oven knob bezel to OFF.

NOTE: Always preheat for Bake mode.

NOTE: Temperature probe may be used in this mode.

NOTE: Timer function may be used during this mode.

NOTE: The temperature display alternates between set and actual oven temperatures during preheat.

NOTE: Temperatures below 150°F are displayed by the word "Lo" in the oven knob display window during preheat.

NOTE: Oven will chime when oven preheat temperature has been achieved.

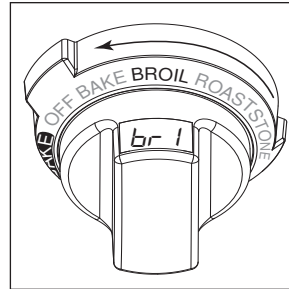


Figure 3-17. Turn Control Knob Bezel Counter Clockwise to BROIL

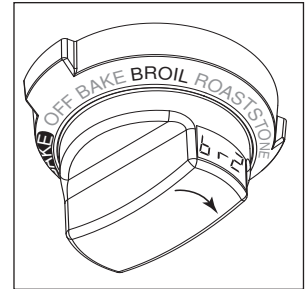


Figure 3-18. Turn Knob to the Right to change to br2.

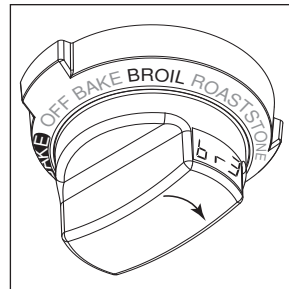


Figure 3-19. Turn Knob to the Right to change to br3.



Figure 3-20. Turn Control Knob Bezel Clockwise to Dark Area Marked CONV

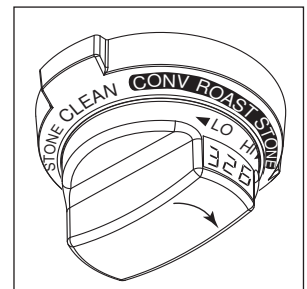


Figure 3-21. Increase Preset Temperature, Turn Knob to Right

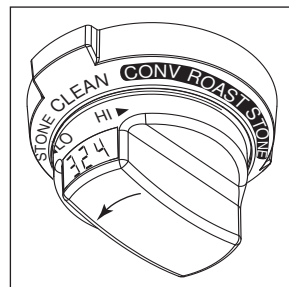


Figure 3-22. Decrease Preset Temperature, Turn Knob to Left

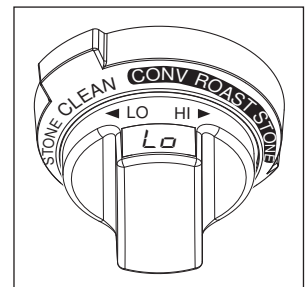


Figure 3-23. Lo appears in display window if temperature is below 150°F

Convection Bake Mode

This mode combines heat from two convection elements with some heat from the hidden bake element. Two convection fans circulate this heat within the oven cavity. The added heat from the hidden bake element make this mode ideal for pie baking.

To initiate Convection Bake Mode, turn oven control knob bezel clockwise to dark area on dial marked BAKE. (See Figure 3-24). Temperature is preset at 375°F (190°C). To change temperature, immediately turn temperature readout knob to right to increase oven temperature or to left to decrease oven temperature setting. (See Figure 3-25 and 3-26). Oven will turn on after 2 seconds or press ENTER key.

To exit Convection Bake Mode, turn oven knob bezel to OFF.

NOTE: Always preheat for Convection Bake mode.

NOTE: Temperature probe may be used in this mode.

NOTE: Timer function may be used during this mode.

NOTE: The temperature display alternates between set and actual oven temperatures during preheat.

NOTE: Temperatures below 150°F (65°C) are displayed by the word "Lo" in the oven knob display window during preheat.

NOTE: Oven will chime when oven preheat temperature has been achieved.

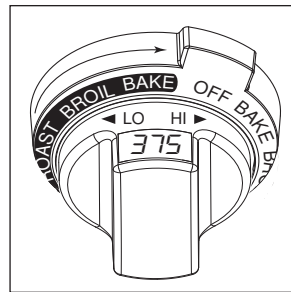


Figure 3-24. Turn Control Knob Bezel Clockwise to Dark Area Marked BAKE

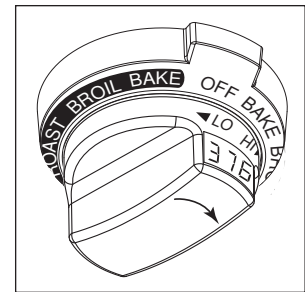


Figure 3-25. Increase Preset Temperature, Turn Knob to Right

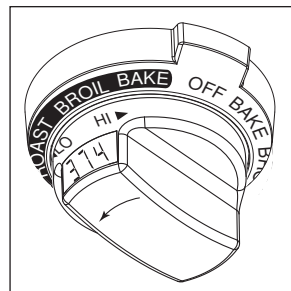


Figure 3-26. Decrease Preset Temperature, Turn Knob to Left

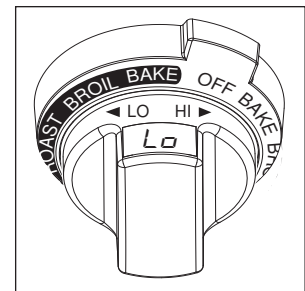


Figure 3-27. Lo appears in display window if temperature is below 150°F

Convection Broil Mode

Intense radiant heat from broil element browns and sears surface of the food. Both convection fans circulate hot air around the food. This mode shortens broiling times for thicker cuts of meat, fish and poultry. The high heat browns the exterior and convection keeps the interior moist and juicy.

To initiate Convection Broil Mode, turn oven control knob bezel clockwise to dark area on dial marked BROIL. (See Figure 3-28). Temperature is preset to "br1" for 550°F (290°C). To change temperature from, br1, immediately turn the temperature readout knob to left to decrease oven setting to "br2" 450°F (230°C)-Med Broil or "br3" 350°F (175°C)-Low Broil. (See Figure 3-29 and 3-30). Oven will turn on after 2 seconds or press ENTER key. To exit Convection Broil Mode, turn oven control knob to OFF.

NOTE: Timer function may be used during this mode.

NOTE: Never preheat for Convection Broil mode.

NOTE: Temperature probe may not be used in this mode.

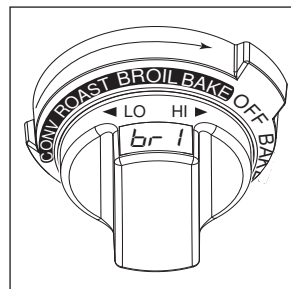


Figure 3-28. Turn Control Knob Bezel Clockwise to Dark Area Marked BROIL

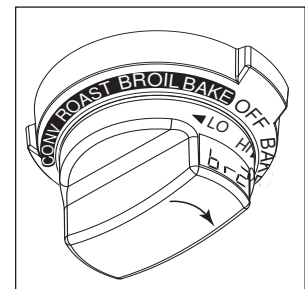


Figure 3-29. Turn Knob to Right to change to br2.

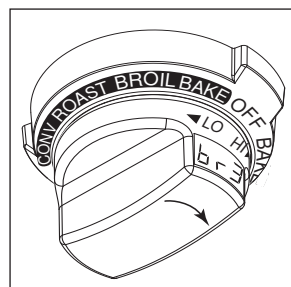


Figure 3-30. Turn Knob to Left to change to br3.

Convection Roast Mode

Heat from both convection fans, plus some heat from the broil element, intensifies the convective and radiant heating in this mode. This combination gently browns the exterior and seals in juices making it perfect for roasting tender cuts of beef, lamb, pork, and poultry.

To initiate Convection Roast Mode, turn oven control knob bezel clockwise to dark area on dial marked ROAST. (See Figure 3-31). Temperature is preset at 325°F (160°C). To change temperature, immediately turn temperature readout knob to right to increase oven temperature or to left to decrease oven temperature setting. (See Figure 3-32 and 3-33). Oven will turn on after 2 seconds or press ENTER key. To exit Convection Roast Mode, turn oven knob bezel to OFF.

NOTE: Always preheat for Convection Bake mode.

NOTE: Temperature probe may be used in this mode.

NOTE: Timer function may be used during this mode.

NOTE: The temperature display alternates between set and actual oven temperatures during preheat.

NOTE: Temperatures below 150°F (65°C) are displayed by the word "Lo" in the oven knob display window during preheat.

NOTE: Oven will chime when oven preheat temperature has been achieved.

Roast Mode

Both bake and broil elements are used to heat and cycle to maintain temperature. Designed especially for roasting the less tender cuts of meat that should be covered, such as chuck roasts, lamb shanks, pot roasts, stew meat.

To initiate Roast Mode, turn oven control knob bezel counter clockwise to ROAST. (See Figure 3-35). Temperature is preset at 350°F (175°C). To change temperature, immediately turn temperature readout knob to right to increase oven temperature or to left to decrease oven temperature setting. (See Figure 3-36 and 3-37). Oven will turn on after 2 seconds or press ENTER key. To exit Convection Roast Mode, turn oven knob bezel to OFF.

NOTE: Always preheat for Roast mode.

NOTE: Temperature probe may be used in this mode.

NOTE: Timer function may be used during this mode.

NOTE: The temperature display alternates between set and actual oven temperatures during preheat.

NOTE: Temperatures below 150°F (65°C) are displayed by the word "Lo" in the oven knob display window during preheat.

NOTE: Oven will chime when oven preheat temperature has been achieved.



Figure 3-31. Turn Control Knob Bezel Clockwise to Dark Area Marked ROAST

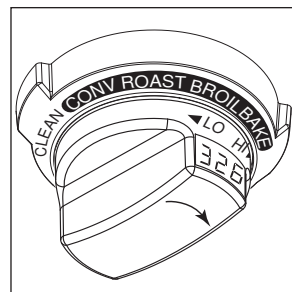


Figure 3-32. Increase Preset Temperature, Turn Knob to Right

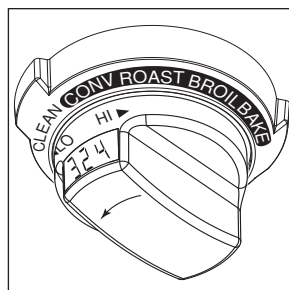


Figure 3-33. Decrease Preset Temperature, Turn Knob to Left

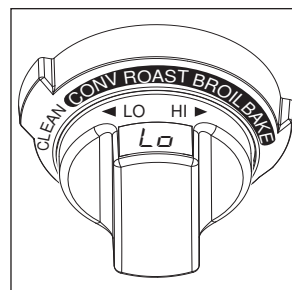


Figure 3-34. Lo Displayed Until Temperature goes above 150°.

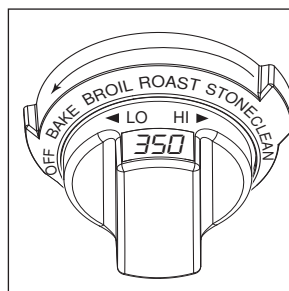


Figure 3-35. Turn Control Knob Bezel Counter Clockwise to BAKE

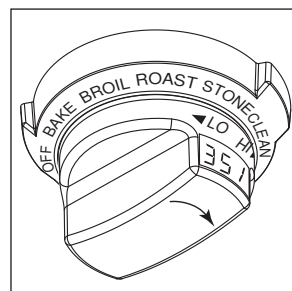


Figure 3-36. Increase Preset Temperature, Turn Knob to Right

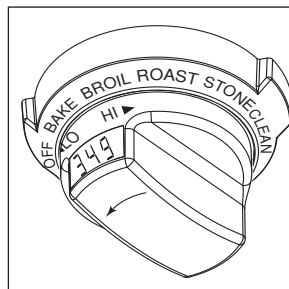


Figure 3-37. Decrease Preset Temperature, Turn Knob to Left

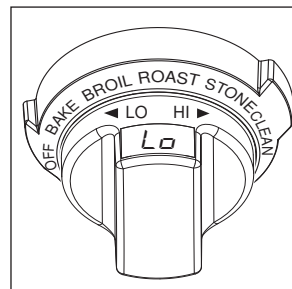


Figure 3-38. Lo Displayed Until Temperature goes above 150°.

OVEN FEATURES

Dehydration Feature

This feature allows for slowly drying out food for preservation and other cooking uses. This requires an optional accessory package.

To initiate Dehydration Feature, turn oven control knob bezel clockwise to CONV. (See Figure 3-39). Now turn control knob to left until “deH” shows in the control knob display window. 170°F (77°C). (See Figure 3-40). Then, release the temperature knob. Now, turn control knob left or right to desired dehydration temperature. (See Figure 3-41). Dehydration is between 110°F - 150°F (45°C - 65°C). To exit Dehydration Mode, turn oven knob bezel clockwise to OFF.

NOTE: Preheat is not necessary for Dehydration feature.

NOTE: Optional accessory package, not supplied with unit must be used.

Proof Mode (18" Cavity)

To activate PROOF Mode turn control knob counter clockwise to PROOF and set temperature between 85°F and 110°F. (See Figure 3-43).

Proof Feature (30" and 36" Cavity)

How PROOF feature works: A combination of Broil, Convection and Bake elements are used to heat and balance the air to maintain temperature. This feature is ideal for proofing bread dough. The oven does not allow the temperature to be set above 110°F (43.3°C). If the oven temperature is above 130°F (55°C), “HOT” will be indicated on the control panel. The user should open the oven door to allow the oven to cool down below 120°F (50°C) to prevent from destroying the yeast.

To initiate PROOF Feature, the oven must be OFF. Place dough in oven-safe dish in oven. Turn oven selector knob bezel counter clockwise to BAKE. (See Figure 3-44).

Hold Oven Selector knob to left until “PrF” shows on the knob. (See Figure 3-45). This will occur below 170°F (77°C). Release the knob, then quickly turn knob to the left or right and release to initiate PROOF.

NOTE: Oven temperature is preset at 85°F (29°C).

To change the temperature from 85°F (29°C), immediately turn the oven control knob to the right to increase the oven temperature. (See Figure 3-46). Press ENTER on the display panel or oven will turn on after 2 seconds by default. The temperature display alternates between set temperature and “PrF”. Turn oven selector knob bezel to OFF to end this feature.



Figure 3-39. Turn Control Knob Bezel Clockwise to Dark Area Marked CONV

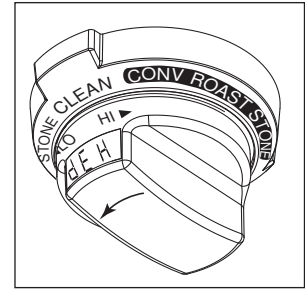


Figure 3-40. Turn and Hold Knob to Left Until “deH” Appears In Knob Display and Release Knob

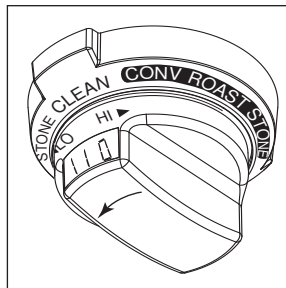


Figure 3-41. Turn Knob to Left or Right to Set Desired Dehydration Temperature

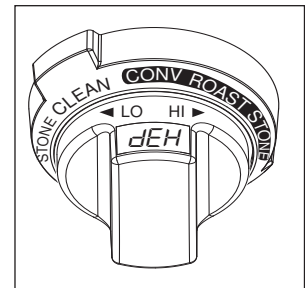


Figure 3-42. “deH” will Alternate with the Temperature in Display

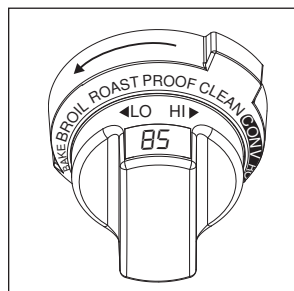


Figure 3-43. Turn Control Knob Bezel counter clockwise to PROOF

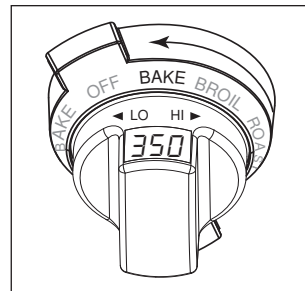


Figure 3-44. Turn Control Knob Bezel to BAKE



Figure 3-45. Turn and Hold Control Knob to Left until “PrF” is Displayed



Figure 3-46. Turn Control Knob Left or Right to Change Temperature

Delayed Start Feature

This feature controls the automatic timing of the oven's On and Off function. Set a cooking mode to start later in the day and turn off when the cooking is complete or set it to just to turn off at a preset time. See the Use & Care Manual for additional information.

Set controls to start cooking later and automatically turn off heat when finished.

To initiate Delayed Start Feature, turn oven control knob bezel to the desired mode. Change preset temperature if needed. (See Figure 3-47). Now, press COOK TIME key. Then, press up or down arrow key on the display panel to increase or decrease the desired cook time. Next, press STOP TIME key. Then, press up or down arrow key on the display panel to increase or decrease the desired stop time. Now, press ENTER key. The oven will appear as though it's on. (See Figure 3-48). The oven will turn on when clock time displays start time. To exit Delayed Start Feature, turn oven control knob bezel to OFF.

NOTE: Display appears as if the oven is on. One chime will ring before the last minute of the cooking time.

NOTE: Three chimes that repeat every 30 seconds signal end of cooking time. The oven will turn itself off.

NOTE: Do not delay the start when preheating is critical to the cooking results.

NOTE: The time-of-day clock must display the correct time prior to programming a timed activity.

Probe Feature

The probe measures internal temperature by measuring the internal temperature of food without opening oven door. It is a convenient and accurate way to achieve perfect doneness regardless of the type, cut or weight of food. Calculating a total cooking time by weight is no longer necessary using this feature.

To initiate Probe Feature, preheat oven in desired mode. Now, insert probe connector into receptacle, inside oven cavity. Next, PROBE will appear on display panel. Probe temperature is preset to 160°F (70°C). (See Figure 3-49). To change temperature, immediately turn temperature readout knob to right to increase probe temperature or to left to decrease probe temperature setting. (See Figure 3-50 and 3-51). Then, press ENTER key or after 2 seconds oven will turn on by default. Probe temperature will flash in knob display when temperature has been reached. (See Figure 3-52).

To exit, turn oven control knob bezel to OFF.

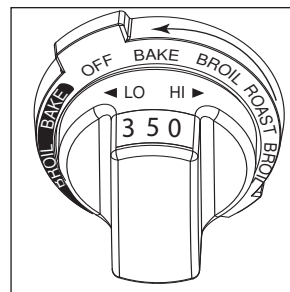


Figure 3-47. Set Control Knob Bezel to Desire Mode and Temperature

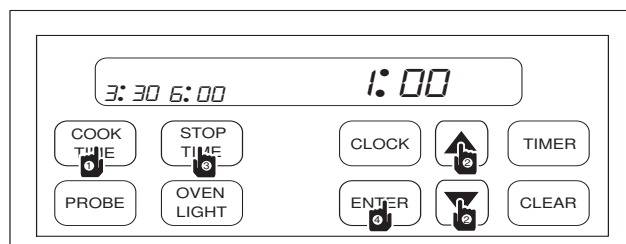


Figure 3-48. Press COOK TIME Key . Next, Press Arrow Up or Down Key To Set Desired Cook Time. Then, Press STOP TIME Key. Then, Press Arrow Up or Down Key To Set Desired COOK Time. Now, Press ENTER Key.

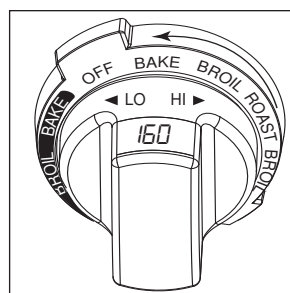


Figure 3-49. Probe Temperature Preset to 160°F

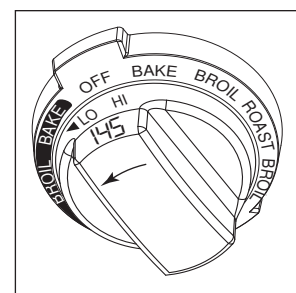


Figure 3-50. Turn Control Knob Bezel to Set Desired Temperature

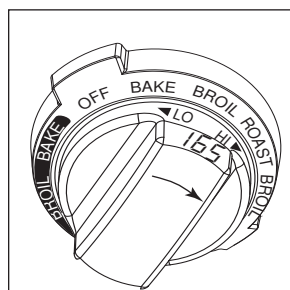


Figure 3-51. Turn Control Knob Bezel to Set Desired Temperature

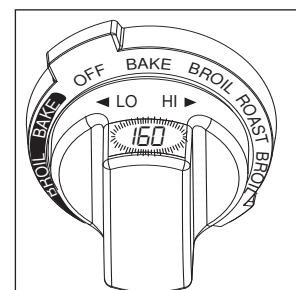


Figure 3-52. Probe Temperature will Flash when Temperature is Reached

Operation Information

Dual Fuel Range **WOLF®**

Sabbath Feature

This feature allows for baking or keeping food warm while still adhering to the "no work" requirements on religious Sabbath days.

To initiate Sabbath Feature, first add food to the oven. Now, turn oven control knob bezel to either BAKE or ROAST mode. (See Figure 3-53). Next, change preset temperature if needed. Then, press OVEN LIGHT key to turn oven lights on or off. (See Figure 3-55). Now, press and hold ENTER key on display panel for 5 seconds. (See Figure 3-55). Oven chimes twice and the word "SAb" appears in the display window on the oven temperature control knob. (See Figure 3-54). To exit Sabbath Feature, turn oven knob bezel to OFF.

NOTE: Oven remains on until this mode is cancelled.

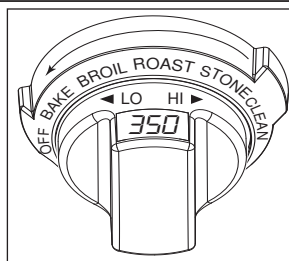


Figure 3-53. Turn Control Knob Bezel Counter Clockwise to ROAST

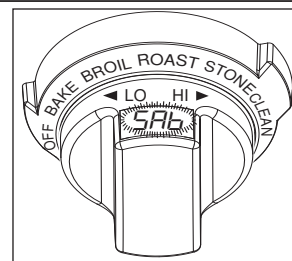


Figure 3-54. The letters "SAb" appear in the knob display.

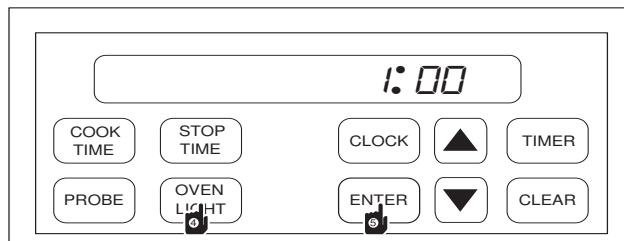


Figure 3-55. Press and Hold ENTER key to Set Oven to Sabbath.

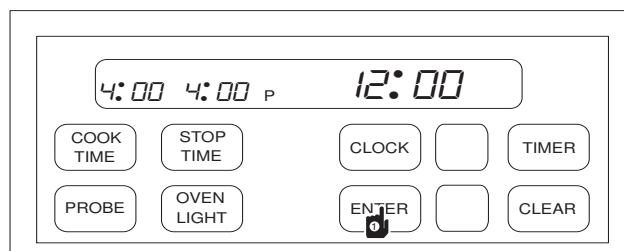


Figure 3-56. Press ENTER key. Automatically Sets for 4 Hours

Self-Clean Feature

The oven is heated in graduating steps to a preset high temperature. During this process, food soil is burned off leaving some white ash residue. For safety purposes, the door automatically locks during cleaning and unlocks when the cavity has cooled completely.

To initiate Self-clean Feature, first turn oven control knob bezel to CLEAN. (See Figure 3-57). Now, press ENTER key on the control panel or turn the oven temperature control knob bezel in either direction until "CLn" appears in temperature readout knob display window. The oven automatically sets for 4 hours. (See Figure 3-56). Self-clean feature is now enabled and "CLn" will be displayed in the oven control knob display window. (See Figure 3-58A and 3-58B). To exit Self-Clean Feature, turn oven knob bezel to OFF.

NOTE: The door gasket is important for a good seal. Do not hand clean, rub, puncture, or remove.

NOTE: Oven door will remain locked until temperature inside has cooled to below 300°F (150°C).

NOTE: Delayed Start feature can be programmed in this feature.

NOTE: Oven racks, broiler pan, any utensils stored in oven must be removed from oven cavity before self-cleaning.

NOTE: Units starting with serial number 16000000 the rack guides must also be removed.

NOTE: Model DF48 and DF60 only one cavity can be cleaned at one time.

NOTE: Model DF48 and DF60 If one cavity is being self-cleaned the other cavity cannot be used for cooking.

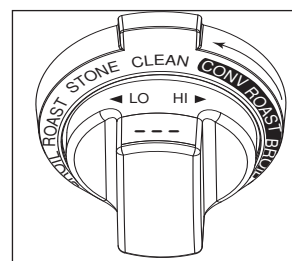


Figure 3-57. Turn Control Knob Bezel Counter Clockwise to CLEAN

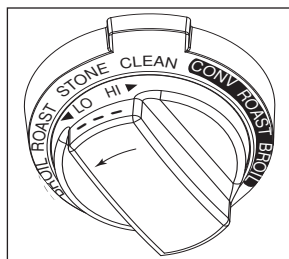


Figure 3-58A. Turn Knob to Left or Right, "CLn" will Display

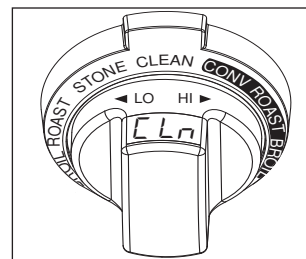


Figure 3-58B. Turn Control Knob Bezel Counter Clockwise to BAKE

DIAGNOSTIC MODE

Diagnostic Mode allows the Service Technician to inspect the functionality of the Oven Controller and Relay boards. Entering a key combination on the display panel will allow the Service Technician to enter Diagnostic Mode.

In Diagnostic Mode the last seven errors that have occurred to the oven controlling all the relays on the relay board and controller feedback of temperature and switches will be displayed.

The Electronic Control Housing will display last error code recorded in the Cook Time digit area, with Stop Time digits displaying the number that the error was recorded, number 1 being the most recent. The software version will be displayed in the Time of Day digits and current oven cavity temperature will be shown in the display window of the Oven Temperature Control Knob.

Initiating Diagnostic Mode

To initiate Diagnostic Mode, oven control knob bezel must be in the OFF position. Now, press and hold CLOCK key and TIMER key for 3 seconds. (See Figure 3-60). The ambient cavity temperature will be displayed in the temperature readout knob. Now, turn the oven temperature readout knob to the right seven separate times, this will toggle from error code 1 thru 7. (See Figure 3-62). To return to error code number one, turn oven temperature readout knob to the left seven separate times. (See Figure 3-63). The software version will be displayed in the hours and minutes display of the clock. (See Figure 3-64).

NOTE: Once diagnostic mode is entered, there is a 2 minute time out, which is restarted each time a key is pressed.

To clear error codes once unit has been fixed, press the CLEAR key.

To exit Diagnostic Mode, press the ENTER key.

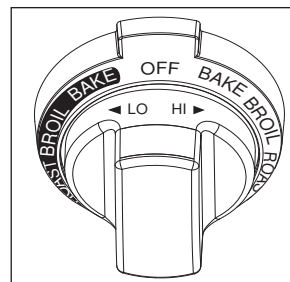


Figure 3-59. Control Knob Bezel Must be in OFF Position

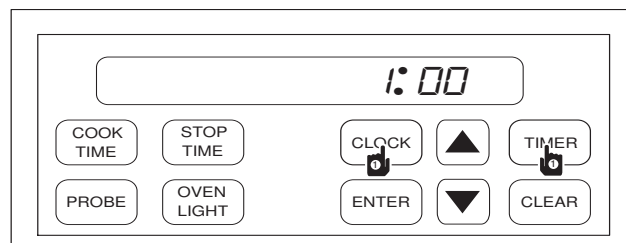


Figure 3-60. Press and Hold CLOCK and TIMER Key

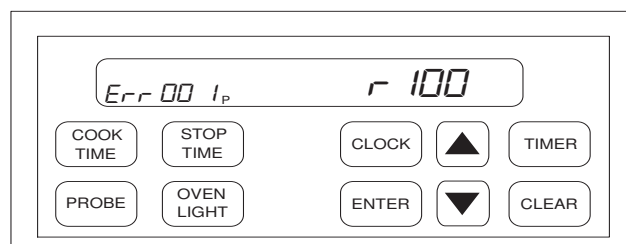


Figure 3-61. Error Code and Software Version Display

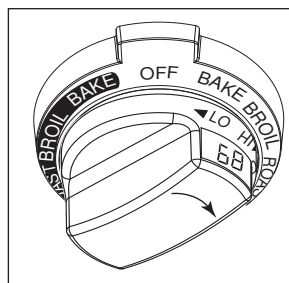


Figure 3-62. Turn Knob to Right Seven Separate Times to Toggle thru Error Codes

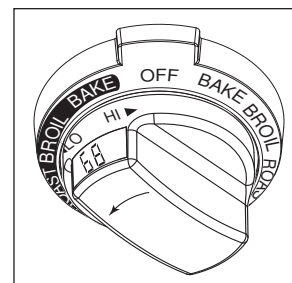


Figure 3-63. Turn Knob to Left Seven Separate Times to Toggle thru Error Codes

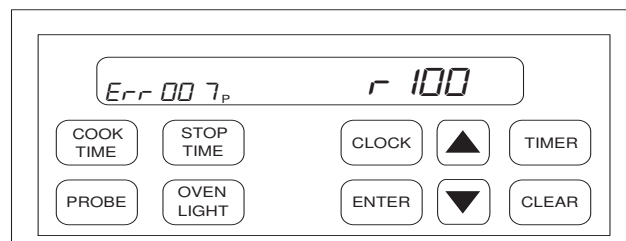


Figure 3-64. Error Code Display

ERROR INDICATORS

Error codes can give a visual and audible alarm. The visual indication will be “Err” displayed in the Cook Time digits and the number or letter of the error code will be displayed in the Stop Time digits of the Electronic Control Housing. The Oven Temperature Readout Knob will also show “Err” in the display window. The last seven errors will be stored in the EEPROM for recall when in diagnostic mode.

ERROR CODE CHART		
ERROR CODE	POSSIBLE CAUSE	TEST / ACTION
01	Door Lock or Unlock Switches not sensed within 60 seconds while driving the door lock motor	Perform motorized door lock test procedure in diagnostic mode Ohm door lock switches. Replace MDL (Motor Door Lock) Assembly if defective
02	Over temperature occurs when the oven reaches a temperature of 630 °F for an unlocked door and 950°F for a locked door	Ohm RTD sensor, replace if defective. If RTD good replace oven controller.
03	Open circuit detected on RTD Oven Sensor	Ohm RTD sensor, replace if defective. If RTD good replace oven controller.
04	Shorted circuit detected on the RTD Sensor	Ohm RTD sensor, replace if defective. If RTD good replace oven controller.
07	SPI Communication lost from ECH to the Control Board as reported by Control Board	Code reflects that the ECH cannot fine the Control Board. Replace cable first. Replace ECH if replacing cable does not correct problem
08	EEPROM checksum is incorrect. Checked at power up	Replace oven controller
09	Meat probe being sensed as shorted	Initiated diagnostic mode and check meat probe. Ohm meat probe, check reading with Tech Data
0B	Analog to Digital error during calibration phase	Replace oven controller
0C	Communication lost with oven controller	Replace oven controller
0E	Power relay shorted, sensed as closed when should be open Failure of element circuit Failure of relay drive circuitry	Replace relay board Replace relay board Replace relay board

Figure 3-65. Error Code Chart

TESTING THE OVEN RELAY BOARD

Element Testing

First access diagnostic mode. Once in diagnostic mode, the technician can turn the oven control knob bezel to activate an element. The element relay and the double line breaker(dlb) will close to complete a 240/208 VAC circuit through a specific element. If the oven controller detects the current running through the closed circuit, the **CFH light will be illuminated.

NOTE: Diagnostic Mode will end 2 minutes after last key stroke or when the CLEAR key is pressed.

Turn Bezel (Cooking Mode)	Relay(s) Activated	Response
Stone (Use "PROOF" for 18" Cavity)	Left Convection Element	**CFH Indicator Light Illuminates
Clean	Right Convection Element	**CFH Indicator Light Illuminates
Conv	Bake Stone Element <i>(must be plugged in)</i>	**CFH Indicator Light Illuminates
Conv Roast	Inner Bake Element	**CFH Indicator Light Illuminates
Conv Broil	Broil Element	**CFH Indicator Light Illuminates
Conv Bake	Outer Bake Element	**CFH Indicator Light Illuminates

Figure 3-66. Element Testing Chart

** Call For Heat

RTD Testing

First access Diagnostic Mode. Once in diagnostic mode, the RTD temperature is shown in display window of temperature control knob. If the RTD is open, "Err 03" will be shown in the display of the electronic control housing. If the RTD is shorted, "Err 04" will be shown in the display of the electronic control housing.

NOTE: Diagnostic mode will end 2 minutes after last key stroke or when the ENTER key is pressed.

Probe Testing

First access Diagnostic Mode. Next, press the PROBE key *(this will switch the readout to probe temperature as shown in the display window of the temperature control knob)*. If the probe has not been inserted, "out" will be shown as the probe temperature in the display window of the temperature control knob. If the probe is shorted, "Err 09" will be shown in the display of the electronic control housing.

NOTE: Diagnostic Mode will end 2 minutes after last key stroke or when the ENTER key is pressed.

Fans and Motors

First access diagnostic mode. Once in diagnostic mode, the technician can turn the oven control knob bezel or press a key on the Electronic Control Housing to activate a fan or a motor. The fan and motor relays will close to complete a 120 VAC circuit through a specific fan or motor. If the oven controller detects the functionality through switches, the **CFH indicator light will be illuminated.

NOTE: Diagnostic mode will end 2 minutes after last key stroke or when the ENTER key is pressed.

Turn Bezel (Cooking Mode) or Press Key on Electronic Control Housing	Relay(s) Activated	Action	Response
Broil	Right Convection Fan	Right Convection Fan Turns ON	Right Convection Fan ON
Roast	Left Convection Fan and 18" cavity convection fan	Left Convection Fan Turns ON	Left Convection Fan ON
Bake	Oven Light		Oven Light Turns On
Cook Time	Lo Cooling Fan	Cooling Fan ON	Cooling Fan ON at Low Speed
Stop Time	High Cooling Fan	Cooling Fan ON	Cooling Fan ON at High Speed
Clock NOTE: For DF48 and DF60 "CLOCK" cycles left MDL. Use "TIMER" to cycle right MDL.	Motor Door Lock (MDL)	MDL Switch in Closed Position	"P" Icon Appears
		MDL Switch in Transition	No Icon in Display
		MDL Switch in open Position	"A" Icon Appears
Probe	Probe		Meat Probe Temperature is Shown in Display Window of Temperature Control Knob
Clear			Clears All Stored Errors from EEPROM
Enter			Exits Diagnostic Mode

Figure 3-67. Fan and Motor Testing Chart