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TECH – NOTES

VGSC SELF – CLEAN GAS FREESTANDING RANGES JUNE 2001



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VGSC306-4B SELF-CLEAN FREESTANDING GAS RANGE

	BASIC SPECIFICATIONS
Description	VGSC306-4B
Gas Requirements	Shipped natural gas standard: field convert to LP/Propane with standard regulator: accepts standard residential ¹ / ₂ " (1.3cm) ID gas service line.
Electrical Requirements	120VAC/60Hz: 4 ft. (121.9cm), 3 wire cord with grounded 3-prong plug attached to product.
Maximum Amps Usage	3.0 amps
Surface Burner Rating	15,000 BTU NAT. / 13,500 BTU LP (4.4 kW NAT / 4.0 Kw lp)
Broil Burner Rating	Infrared 18,000 BTU NAT. / 16,000 BTU LP (5.3 kW NAT / 4.7 Kw LP)
Bake Burner Rating	30,000 BTU NAT / LP (8.8 Kw NAT / LP)



COMPONENT LOCATION



DIRECT SPARK IGNITION (DSI)

The DSI module provides supervised operation of the gas valve, oven burner spark ignition with flame sense. The DSI control interfaces with a Thermostat, a Gas Valve and Spark Electrode to provide a complete DSI and Gas Distribution system for gas ranges. Closing contacts on the Thermostat and Selector switch initiate micro controlled logic, which supervises gas distribution to an oven burner and the ignition / flame sense safety circuits. Closing Thermostat and Selector switches apply L1 to the Bake (J1-6) or Broil (J1-7) inputs. This signal is detected by the micro, which operates the gas valve and spark ignition sequence. The Logic Flow Diagram (pg 12 & 13) and Timing Diagrams (pg 14) illustrates the typical valve / ignition supervision sequence provided be the micro as follows:

(1) Power up initializes the micro ports and performs an internal Self-Test and a Flame Safety Check. Failure of this test sequence aborts operation in the lockout mode. Which safety inhibits gas flow and sparking to prevent ignition of any residual gas.

(2) Verification of the safety checks initiates the Valve Trail Timer, which energizes the bake or broil solenoid. The spark output rate is coordinated to the flame sense sequence, confirmation of flame sense typically occurs after 2 sparks. If flame is detected, the spark is inhibited, and the valve will be open as long as flame sense is normal and a call for heat is detected. If flame is not detected, the spark rate will continue for the full duration of Valve Trail Time. Combustion failure during the ignition trail period or after the flame has been established, will de-energize the solenoid for a 40 second inter-purge time before initiating another trail for ignition. If the control fails to establish proof of flame after a specified number of ignition attempts, the external lockout is executed.

(3) LOCKOUT: The control will lockout if any selfchecks fail during normal operation. Also the control will lockout if it failed to ignite gas after the selected number of ignition attempts or ignition recycles. In lockout the valve and ignition means are turned off. The control must be manually reset be cycling bake or broil off and back on.



DOOR LOCK CONTROL / TIMER VGSC306

Function: The **Door Lock Control / Timer** is activated by the line voltage at the "SEL" contact (red/white-120vac). Relay "RL1" and "RL2" close, providing voltage to the **Door Lock Motor**. The relays stay closed until 10 seconds after **Sensor #3** (white/green) receives a signal that the **Door Lock** is fully closed. Once this happens relay "RL2" opens to stop the **Door Lock Motor**. Relay "RL1" stays closed providing voltage to the **Auto Reset Thermostat**. Relays "RL3" and "RL4" close powering the **Cooling Fan Motor** and **Cycle Relay**. "RL3" and "RL4" will stay closed for approximately 3 ½ hours unless power is interrupted to **Sensor #3** or **SEL**. In which case "RL3" and "RL4" will open, interrupting the clean

cycle and **Cooling Fan**, and **"RL2"** will close, opening the **Door Lock. "RL2"** will stay closed until 2 seconds after **Sensor #4** is powered.



6 – POSITION SELECTOR SWITCH





WIRING DIAGRAM FREESTANDING GAS SELF-CLEAN RANGE



VGSC BAKE



BAKE WIRING DIAGRAM - BAKE MODE: Turn the selector switch to the BAKE POSITION, closing SELECTOR SWITCH contacts 1 & 12. Turning the temperature control to the desired temperature will close THERMOSTAT contacts 1 & 2. The CYCLE LIGHT will come on and cycle with the THERMOSTAT when the desired temperature is reached and will go off and on with the cycle of the thermostat to maintain the desired temperature. The contacts 1 & 2 will remain closed on the AUTO RESET until the temperature raises beyond 600 F. L1 voltage is applied to BAKE input (pin 6) on the module. The BAKE input is detected by the micro, which operates the BAKE VALVE and SPARK IGNITION sequence. (See pages 12 and 13 for a full description of operation and page 14 for the timing sequence.)



CONVECTION BAKE MODE: Turn the selector switch to the CONV. BAKE POSITION, closing SELECTOR SWITCH contacts 1 & 12 and 5 & 7. Contacts 1 & 12 supplies L1 voltage to the MODULE. Contacts 5 & 7 supplies L1 voltage to the CONVECTION FAN MOTOR. Turning the temperature control to the desired temperature will close THERMOSTAT contacts 1 & 2. The CYCLE LIGHT will come on and cycle with the THERMOSTAT when the desired temperature is reached and will go off and on with the cycle of the thermostat to maintain the desired temperature. Contact 1 & 2 will remain closed on the AUTO RESET until the temperature raises beyond 600 F. L1 voltage is applied to BAKE input (pin 6) on the module. The BAKE input is detected by the micro, which operates the BAKE VALVE and SPARK IGNITION sequence. (See pages 12 and 13 for a full description of operation and page 14 for the timing sequence.)

VGSC CONVECTION BROIL



BROIL MODE: Turn the selector switch to the BROIL POSITION, closing SELECTOR SWITCH contacts 1 & 11. Turning the temperature control to BROIL will close THERMOSTAT contacts 1 & 2. The CYCLE LIGHT will come on and will cycle off and on with the cycling of the THERMOSTAT. L1 voltage is applied to BROIL input (pin 7) on the module. The BROIL input is detected by the micro, which operates the BROIL VALVE and SPARK IGNITION sequence. (See pages 12 and 13 for a full description of operation and page 14 for the timing sequence.)

VGSC CONVECTION BROIL



CONVECTION BROIL MODE: Turn the selector switch to the CONV. BROIL POSITION, closing SELECTOR SWITCH contacts 1 & 11 and 5 & 7. Contacts 1 & 11 supplies L1 voltage to the MODULE. Contacts 5 & 7 supplies L1 voltage to the CONVECTION FAN MOTOR. Turning the temperature control to CONV. BROIL will close THERMOSTAT contacts 1 & 2. The CYCLE LIGHT will come on and will cycle off and on with the cycling of the THERMOSTAT . L1 voltage is applied to BROIL input (pin 7) on the module. The BROIL input is detected by the micro, which operates the BROIL VALVE and SPARK IGNITION sequence. (See pages 12 and 13 for a full description of operation and page 14 for the timing sequence.)



VGSC CLEAN – BEFORE DOOR LOCK

SELF-CLEAN MODE (Before the door locks): Turn the SELECTOR SWITCH to the SELF-CLEAN MODE. Turn the TEMPERATURE control past the clean setting until the knob stops. THERMOSTAT contacts 1 & 2 will close supplying L1 voltage to the SELECTOR SWITCH contacts 1 & 2. SELECTOR SWITCH contacts 2 & 10 will close supplying voltage to CLEAN/TIMER contact T2. SELECTOR SWITCH contacts 5 & 6 will close supplying voltage to CLEAN/TIMER contact T2. SELECTOR SWITCH contacts 5 & 6 will close supplying voltage to CLEAN/TIMER contact for the Period. Power to SEL on the CLEAN/TIMER board will close contacts L1 & LS1 completing the circuit for the DOOR LOCK MOTOR through the AUTO RESET contacts 1 & 2 and LS2 & M1 on the CLEAN/TIMER board. This powers the DOOR LOCK MOTOR until 10 seconds after SENSOR 3 is signaled by VC that the DOOR LOCK SWITCH SW2 has been closed mechanically (along with SW3) by the DOOR LOCK BOLT.





SELF-CLEAN MODE (Before 600 F after door lock): **10** seconds after the signal to SENSOR 4, SWITCH LS2 & M1 is opened, stopping the DOOR LOCK motion. T1 & T2 closes applying voltage to BROIL input Pin 7 on the MODULE. (L2 - T-STAT contacts 1 & 2 - SEL. SW. Contacts 2 & 10 - CLEAN TIMER contacts T2 & T1 - DOOR LOCK SW3 - T-stat COM & NO - SEL. SW. 4 & 8 - MODULE PIN 7 BROIL). The BROIL input is detected by the micro, which operates the BROIL VALVE and SPARK IGNITION sequence. The Broil Burner is energized for the step in the Clean Cycle. **T3 & T4** close powering the COOLING FAN MOTOR (L2 - CLEAN TIMER T4-T3 to COOLING FAN MOTOR - Neutral.)





SELF-CLEAN MODE (After 600 F after door lock): L2 to THERMOSTAT, contacts 2 & 1, - SEL. SW. contacts 2 & 10 to CLEAN TIMER contacts T2-T1 and to DOOR LOCK switch SW3 to THERMOSTAT contacts COM & NC to SEL. SW. contacts 3 & 9 to BAKE RELAY to MODULE pin 6 (Bake). The BAKE input is detected by the micro which operates the BAKE VALVE and SPARK IGNITION sequence. After approximately 3 ¹/₂ hours the CLEAN TIMER board will time out and will terminate the cycle. The temperature and the selector switch is to be turned OFF. 30 minutes will be required for the oven to cool enough for the door latch to disengage.

TROUBLE SHOOTING GUIDEVGSC SELF-CLEAN FREESTANDING RANGE			
PROBLEM	PROBABLE CAUSE	CORRECTION	
***BAKE SHUTS OFF *Selector Switch to Bake *Baking Temperature Set *Cycle Light is on *Bake Ignitor does not Spark *No Flame on Burner	CONTROL BOARD IS LOCKED OUT (IF FLAME IS NOT DETECTED, THE EXTERNAL LOCKOUT IS EXECUTED)	(Turn off Selector Switch (2) Turn off Temperature Control (3) Position ignitor (4) Adjust Air Shutter (5) Turn on Selector Switch (6) Turn on Temperature Control.	
*** Range Completely Inoperative Electrically	No supply voltage to range No voltage to range circuits	Check fuse/ breaker box Check high limit switch	
 No Bake: * Selector Switch to Bake * Baking Temperature set * No Cycle Light 	1A. No voltage to Thermostat.1B. Defective T-stat contacts.	 1A. Check for 120VAC at the Thermostat terminals BA to Neutral. If no voltage is present check for broken or burned wires. 1B. Check continuity across 	
2.No Bake: * Selector Switch to Bake * Baking Temperature set * Cycle Light is on	 2A. Selector Switch contacts to 12 open. 2B. Safety Reset Relay contacts to 2 open. 	 2A. Check continuity at contacts to 12 on Selector Switch. Open contacts, replace Selector Switch. 2B. Check continuity at contacts to 2 on Safety Auto Reset, Open contacts, replace Safety Auto Reset. 	
 3. No Bake: * Selector Switch to Bake * Baking Temperature set * Cycle Light is on * Bake Ignitor does not click 	3A. Direct Spark Ignition Module (DSI) inoperative.	3A Check for 120VAC to pin #6 (BA / Yel). 120VAC present, Replace DSI module.	
 4. No Bake: * Selector Switch to Bake * Baking Temperature set * Cycle Light is on * Bake Ignitor clicks * Gas supply tubing on wrong * Gas Valve 	4A. Open coil in the Bake Solenoid valve.4B. Air in the gas line.	 4A. Check continuity across the Solenoid coils, If open replace the Solenoid Gas Valve. When the coil is okay check the wiring. 4B. Purge the Gas Line, turn control off and retry. 	
5. No Convection Bake:* Bake functions normally	5A. Open contacts in the Selector Switch.5B. Open Motor windings in the Convection Fan Motor.	5A. Check continuity from 5 to 7 on the Selector Switch. If open replace Selector Switch.5B. Check continuity across the Motor windings. If open replace Motor. Check wiring.	

PROBLEM	PROBABLE CAUSE	CORRECTION
 6. No broil: * Selector Switch set to Broil * Temperature set to Broil * Bake functions normally * Cycle Light is on * Broil Ignitor does not click * Gas supply tubing on wrong * Gas Valve 	6A. Open contacts in the Selector Switch.6B. Direct Spark Ignition Module (DSI) inoperative.	 6A. Check continuity from 1 to 11 on the Selector Switch. If open replace Selector Switch. Check wiring. 6B. Check for 120VAC at pin 7 (BR / RED) on the Module. If voltage is present, replace Module. No voltage check wiring.
 7. No Broil: * Selector Switch set to Broil * Temperature set to Broil * Bake functions normally * Cycle Light is on * Broil Ignitor clicks 	7A. Open coil in Broil Solenoid valve.7B. Air in the gas line.	7A. Check continuity across Broil Valve. If open, replace valve.7B. Purge the gas line, turn the control off and retry.
 8. No Convection Broil: * Selector Switch set to Broil * Temperature set to Broil * Broil Functions normally 	8A. Open contacts in the Selector Switch.8B. Open Windings in the Convection Fan Motor.	 8A.Check continuity from 5 to 7 on the Selector Switch. If open replace Selector Switch 8B. Check continuity across the Motor windings. If open replace Motor. Check wiring.
 9. No Self-clean: Before Door Lock *Selector Switch to Clean * Thermostat to Clean (Against the upper stop) * Bake functions normally * Broil functions normally * Clean Light does not light * Door does not lock 	 9A. Selector Switch contacts 2 to 10 open 9B. Selector Switch contacts 5 to 6 open 9C. No power to L1 on the Timer PCB. 9D. No power to Pin 1 on the 	 9A. Check continuity from contact 2 to 10. If open replace Selector Switch. Contacts okay, check for Power at T2 on the Timer PCB. No power, check the wiring from Selector Switch form the Selector Switch to the Timer (PC) Board. 9B. Check continuity from contact 5 to 6. If open replace the Selector Switch. Contacts okay, check for power at SEL on the timer PC board. No power check the wiring from selector Switch to Timer PCB. 9C. Check wiring from L2 to L1.On Timer PCB. 9D. Check continuity from Timer
、	 9D. No power to Pin 1 on the Auto Reset 9E. No Power to Timer PCB contact LS2. 	 9D. Check continuity from Timer PCB Pin L1 to LS1. If open replace the Timer PCB. 9E. Auto Reset not closing. Check Continuity from Auto Reset Pin 1 to Pin 2. If open replace Auto Reset. Contact okay check wiring from Auto Reset Pin 2 to Timer PCB Pin LS2.

PROBLEM	PROBABLE CAUSE	CORRECTION
	9F. No power to Door Lock Motor	9F. Check for power at M1 on the Timer PCB. If no power replace the Timer PCB. Power at M1, check wiring to Door Lock Motor. Check continuity of the Door Lock Motor. No contin- uity, replace the Motor.
 10. No Self-clean: Before 600 F After Door Lock * Selector Switch to Clean * Thermostat to Clean (Against the upper stop) * Bake functions normally * Broil functions normally * Clean Light is on 	 10A. Selector Switch contacts 2 to 10 open 10B. Timer PCB open contacts T1 to T2. 	 10A. Check continuity from pin 2 to 10. If open replace Selector Switch. Continuity checks okay. 10B Check for power at T2 on the Timer PCB, no power check wiring from Selector Switch to Timer PCB. Check continuity from T1 to T2 on Timer PCB. If open replace Timer PCB. 10C Check for power and the power of the power
 Door lock engaged No spark to Broil Igniter No Broil flame 	 10C. Door Lock Switch SW3 open. 10D. Micro switch on the T-stat open. 10E. Selector Switch contacts 4 to 8 open. 	 10C Check for power at the COM connection on the Micro-switch on the Thermostat. No power, check the Door Lock Switch SW3 for continuity. If open, replace SW3 on the Door Lock. 10D. Check continuity across pin COM to NO. If open replace Thermostat. 10E. Check continuity across pins 4 to 8. Open contacts, replace Selector Switch. Contacts okay, check the wiring from pin 8 to the DSI module.
 11. Partial Self-clean: After 600 F After Door Locks * Broil Burner comes on during the first half of Self-clean. * Bake Burner fails to Ignite during the last half of the clean cycle. * Bake functions normally 	 11A. Selector Switch contacts 3 to 9 open. 11B. Bake Relay contacts 9 to 6 open. 	 11A. Check continuity from pin 3 to 9 on the Selector Switch, open Contacts replace Selector Switch 11B. Check continuity from pin 9 to 6 on the Bake Relay, open contacts replace Relay.
 12. Cooling Fan: * Does not come on when place in self-clean. * Self-clean cycle okay during initial startup. 	12A. Timer PCB contacts T4 to T3 open.	12A.Check continuity from T3 to T4 on Timer PCB. If open replace the Timer PCB. Contacts good check continuity across the Fan Motor. No continuity, replace the motor.
 13. Cooling Fan: * Does not turn off (The Cooling Fan will normally run for several minutes after a self-clean cycle, until the temperature drops to a safe level.) 	13A. Fan Switch defective.	13A.Fan Switch is normally open. Check continuity when cold, if closed, replace the Fan Switch.

VGSC306 DIAGNOSTICS BAKE

NOTE: RANGE MUST BE TURNED ON FOR AT LEAST 40 SECONDS BEFORE MAKING THESE TESTS.

Check for 120 VAC at J1-4 to J1-10 (see illustration #1). No voltage, diagnose main wiring harness. 120VAC should always be present at this point. Disconnect the line voltage to the range for approximately 1 minute. Then reconnect the supply voltage. If the supply voltage is not restored check for an open overload protector or a broken wire from the terminal block.



DOES BAKE CYCLE FUNCTION PROPERLY?

NO: Check POLARITY of supply. Even if no ground is connected, the module will not be able to sense flame presence at the ignitor if the polarity is reversed.

Does the BAKE BURNER establish a flame then shut off? *YES:*

Does spark continue after flame is established? *NO:* Replace Valve.

- *YES:* Check the ignitor for continuity. If no continuity, replace ignitor. If supply voltage polarity is correct, check BAKE IGNITOR wire for loose connection. If connection is good, replace module.
- Does the BAKE BURNER establish a flame then shut off?

NO: Is 120VAC present to J1-4 to J1-6 (illustration #2)?

NO: Diagnose main wiring harness and / or thermostat.



Is 120VAC present from J1-4 to J1-6? *YES:*

10)9	76	4321	Illustration #3
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 ו120י	VAC	: 	<u>+</u>	

Is 120VAC present from J1-4 TO J1-7 (illustration #3)?

YES: Diagnose THERMOSTAT. The module will lock out if a call for Bake and Broil exists simultaneously.

Is 120VAC present from J1-4 to J1-7?

NO: Remove call for Bake (turn Thermostat off) test valve continuity, measure resistance between J1-1 and J1-2, then J1-1 to J1-3 (illustration #4). Are both resistances 216 ohms \pm 30 ohms?

10 9	76	4321	Illustration #4
0 0	00	0 000 Jl	
		ttt	

- NO: Measure resistance at the valve, if resistances are different then measured at module, diagnose wiring harness. If resistances are the same as measured at module, then replace the valve. Remove call for bake (turn thermostat off), test valve continuity; measure resistance between J1-1 and J1-2, then J1-2 to J1-3 (illustration #4). Are both resistances 216 ohms ± 30 ohms?
- *YES*: Connect DC voltmeter to J1-1 (+) and J1-2 (-), wait 40 seconds then start a Bake cycle. Six seconds after the Bake cycle is started, does a DC voltage of 7 to 15 VDC appear?
- *YES:* If voltage is higher the 15VDC, check the main wiring harness for bad connections. If OK, replace valve.

Does spark occur at ignitor? *NO:*

Does spark occur at Broil ignitor, not Bake?

YES: Check for correct wiring to Bake / Broil valves.

Does spark occur at Broil ignitor, not Bake?

YES: Check ignitor for crack in the ceramics. If cracks are found, replace ignitor. Diagnose Bake ignitor wiring harness. Check for reversed Bake and Broil wires at the valves. If OK replace module.

Does spark occur at ignitor?

YES: The ignitor position is out of tolerance for proper ignition. Adjust or replace ignitor and burner.

June 12, 2001

VGSC306 DIAGNOSTICS BROIL

NOTE: RANGE MUST BE TURNED ON FOR AT LEAST 40 SECONDS BEFORE MAKING THESE TESTS.

Check for 120 VAC at J1-4 to J1-10 (see illustration #1). No voltage, diagnose main wiring harness. 120VAC should always be present at this point. Disconnect the line voltage to the range for approximately 1 minute. Then reconnect the supply voltage. If the supply voltage is not restored check for an open overload protector or a broken wire from the terminal block.



DOES BROIL CYCLE FUNCTION PROPERLY?

NO: Check POLARITY of supply. Even if no ground is connected, the module will not be able to sense flame presence at the ignitor if the polarity is reversed.

Does the BROIL BURNER establish a flame then shut off? *YES:*

Does spark continue after flame is established?

NO: Replace Valve.

- *YES:* Check the ignitor for continuity. If no continuity, replace ignitor. If supply voltage polarity is correct, check BROIL IGNITOR wire for loose connection. If connection is good, replace module.
- Does the BROIL BURNER establish a flame then shut off?
- *NO:* Is 120VAC present to J1-4 to J1-7 (illustration #5)?
- NO: Diagnose main wiring harness and /or thermostat.



Is 120VAC present from J1-4 to J1-7? *YES:*



- Is 120VAC present from J1-4 TO J1-6 (illustration #6)?
- **YES:** Diagnose THERMOSTAT. The module will lock out if a call for Bake and Broil exists simultaneously.

Is 120VAC present from J1-4 to J1-7?

NO: Remove call for Broil (turn Thermostat off) test valve continuity, measure resistance between J1-1 and J1-2, then J1-1 to J1-3 (illustration #7). Are both resistances 216 ohms ± 30 ohms?

- NO: Measure resistance at the valve, if resistances are different then measured at module, diagnose wiring harness. If resistances are the same as measured at module, then replace the valve. Remove call for Broil (turn thermostat off), test valve continuity; measure resistance between J1-1 and J1-2, then J1-2 to J1-3 (illustration #4). Are both resistances 216 ohms ± 30 ohms?
- *YES*: Connect DC voltmeter to J1-1 (+) and J1-2 (-), wait 40 seconds then start a Broil cycle. Six seconds after the Broil cycle is started, does a DC voltage of 7 to 15 VDC appear?
- *YES*: If voltage is higher the 15VDC, check the main wiring harness for bad connections. If OK, replace valve.

Does spark occur at ignitor? *NO:*

Does spark occur at Bake ignitor, not Broil?

YES: Check for correct wiring to Bake / Broil valves.

Does spark occur at Bake ignitor, not Broil?

YES: Check ignitor for crack in the ceramics. If cracks are found, replace ignitor. Diagnose Broil ignitor wiring harness. Check for reversed Bake and Broil wires at the valves. If OK replace module.

Does spark occur at ignitor?

YES: The ignitor position is out of tolerance for proper ignition. Adjust or replace ignitor and burner.

VGSC CHECK LIST

(PRODUCT MANUFACTURED BETWEEN JANUARY 4, 2000 – MAY 12, 2000

Symptoms: Range will not come on. Intermittent sparking. No sparking,

Check POLARITY.

Check for 120VAC between J1 - 4 and J1 - 10. There should always be 120VAC at this point.



Check for power between pin 4 and 6 (J1 connector on DSI PC board).



If power is not present, check wiring and/or Thermostat.



If power is present, check power between 4 and 7. The module will lock out if a call for bake and broil exists simultaneously.

CORRECTION: When all voltages are correct to the board, check the part number for the board. Part #PA020025 is the part number used before May 12, 2000. Replace board with new board PA020035.

SYMPTOM: Range cycles off during bake and will not re-ignite.

CORRECTION: Check for the three ports added opposite the spark igniter. If the three ports are not there, replace the bake burner with part #PB050059.



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