Servicing the Whirlpool counter-depth side-by-side

by Jim Johnson

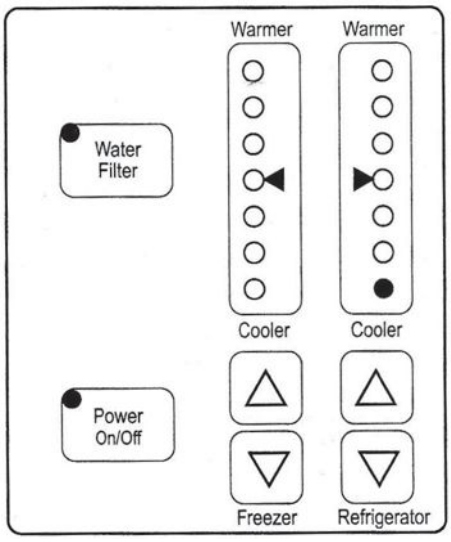

Figure 1

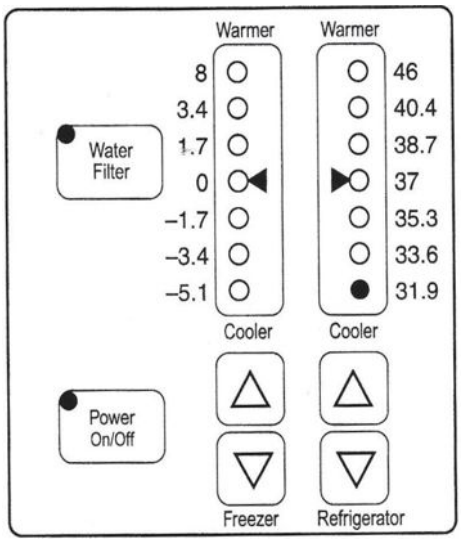

Figure 2

Introduced just over a decade ago as a seven-model line of side-by-side refrigerators (GC5SH and GC5TH series) the overall offering by Whirlpool has since evolved to include three-door, bottom-freezer units also. The model line that is our focus here are the side-by-sides that employ Whirlpool's Constant Flow Temperature Management System. The electronic control, two thermistors, variable capacity compressor, and a variable position air door between the freezer and fresh-food sections, monitors and controls the range of operating temperatures selected via the touchpad panel shown in **Figure 1**.

The two scales shown here (the assembly is located inside the fresh-food section) represent the temperatures that can be adjusted individually for both sections, and there is also a water filter status indicator that shows green when a component test indicates OK and red for failed during a diagnostic procedure. To identify the actual temperatures selected when the customer toggles through the generic settings shown, see **Figure 2**.

When troubleshooting with this particular keypad, you employ it to enter the diagnostic mode and perform specific component tests after going through the pre-diagnostic checks of testing the compartment temperatures with an accurate test device, checking to make sure that the

Step	Component Tested	Result	Comment
01	Freezer Thermistor.	Green	Thermistor is within normal range.
		Red	Thermistor is open or less than –20°F.
		Red	Thermistor is shorted or greater than 115°F.
02	Refrigerator Thermistor.	Green	Thermistor is within normal range.
		Red	Thermistor is open or less than 10°F.
		Red	Thermistor is shorted or greater than 115°F.
03	Evaporator Fan Motor.	Green	Evaporator Fan Motor is On at correct speed.
		Red	Evaporator Fan Motor is On at incorrect speed.
04	Condenser Fan Motor.	Green	Condenser Fan Motor is On.
05	Compressor.	Green	Compressor is On at 4500 rpm.
		Red	Compressor is Off waiting for minimum (7 minute) Off delay.
06	Air Door.	Green	Air Door fully opens.
07	Bimetal/Defrost Heater.	Green	Defrost Heater is energized, bimetal closed.
		Red	Bimetal open.

Figure 3

compressor, condenser fan motor and evaporator fan motor are running, and checking the position of the air door. To enter the diagnostics mode, make sure that the control is on and is operating in normal cooling mode, then:

• Press and hold the Water Filter Reset keypad.

• Immediately press and hold the Power keypad.

• Continue to press both pads for 3 seconds or until you hear a beep.

• Advance to the diagnostic sequence by pressing and holding the Water • Filter Reset keypad for 2 seconds, or until you hear a beep.

Once you are in the diagnostics mode

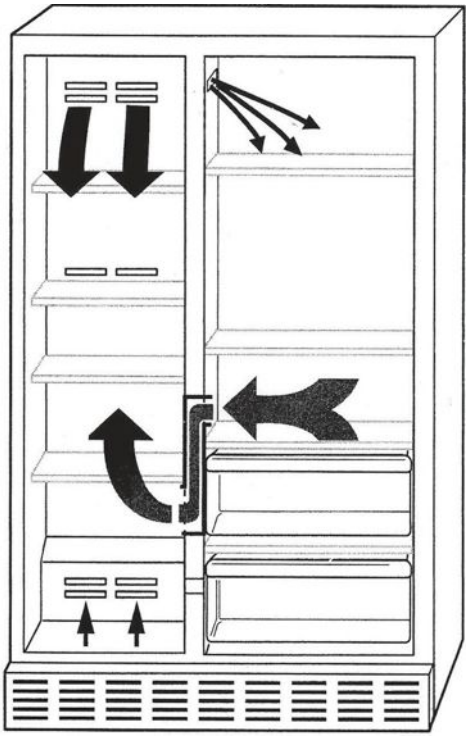

Figure 4

you will be able to check the system thermistors, operate the evaporator fan motor at 3,000 RPM, check the defrost termination thermostat and heater, and operate the condenser fan motor and compressor. **Figure 3** shows you the results that show up in either green or red on the water filter indicator LED in sequence as the diagnostics mode progresses.

At step one in the component test procedure, the motorized air door will close, and open fully at step six. Once you exit the diagnostics mode, it will close to the cor-

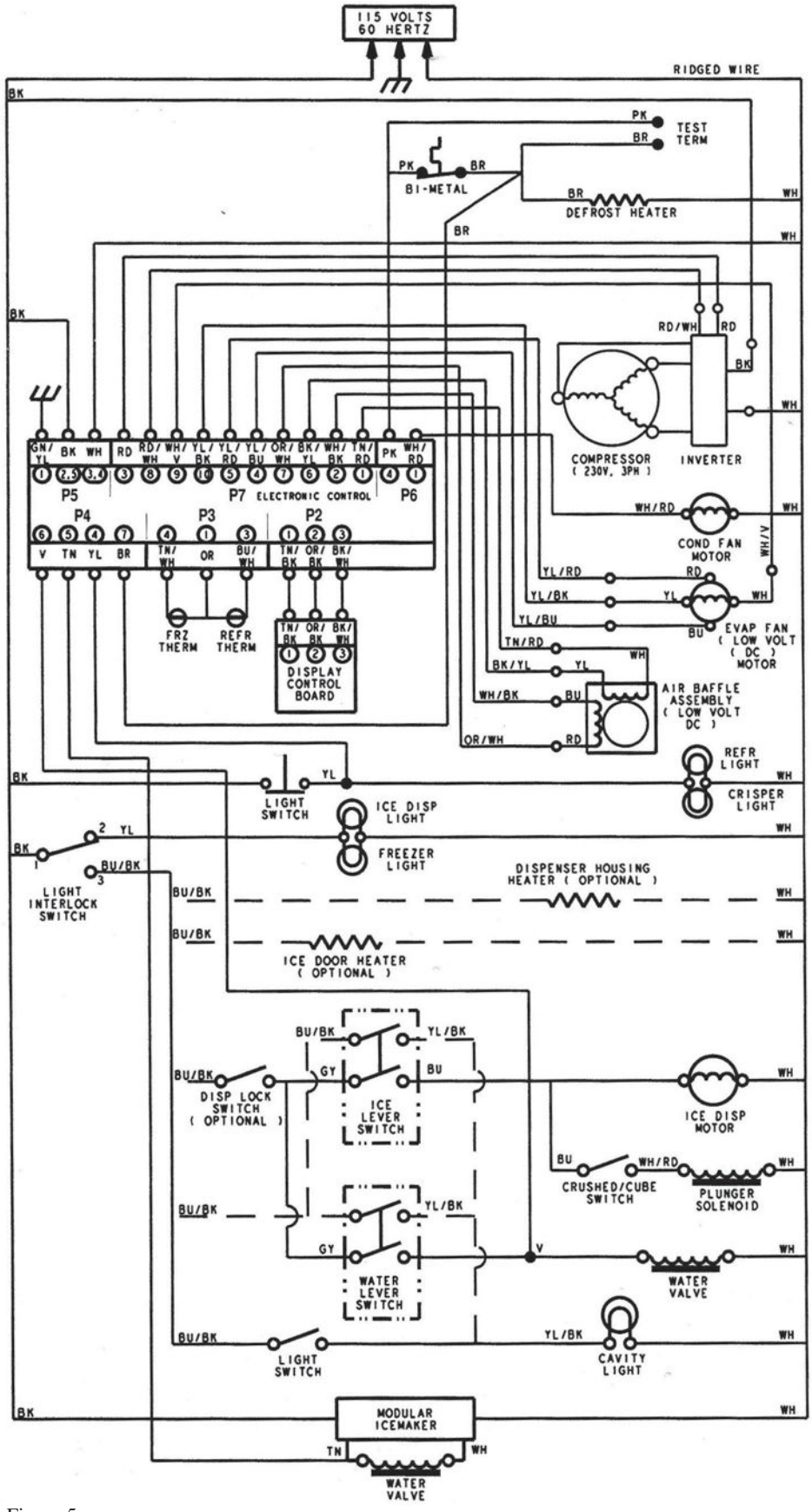

Figure 5

COMPONENT	INPUT/ OUTPUT LOCATIONS	VOLTAGES
Inverter	Red/White & Red Wires	3 To 6 Volts DC
	Black & White Wires	120 Volts AC
Main Control Board	P7-3 (Red) & P7-8 (Red/White)	3 To 6 Volts DC

Figure 6

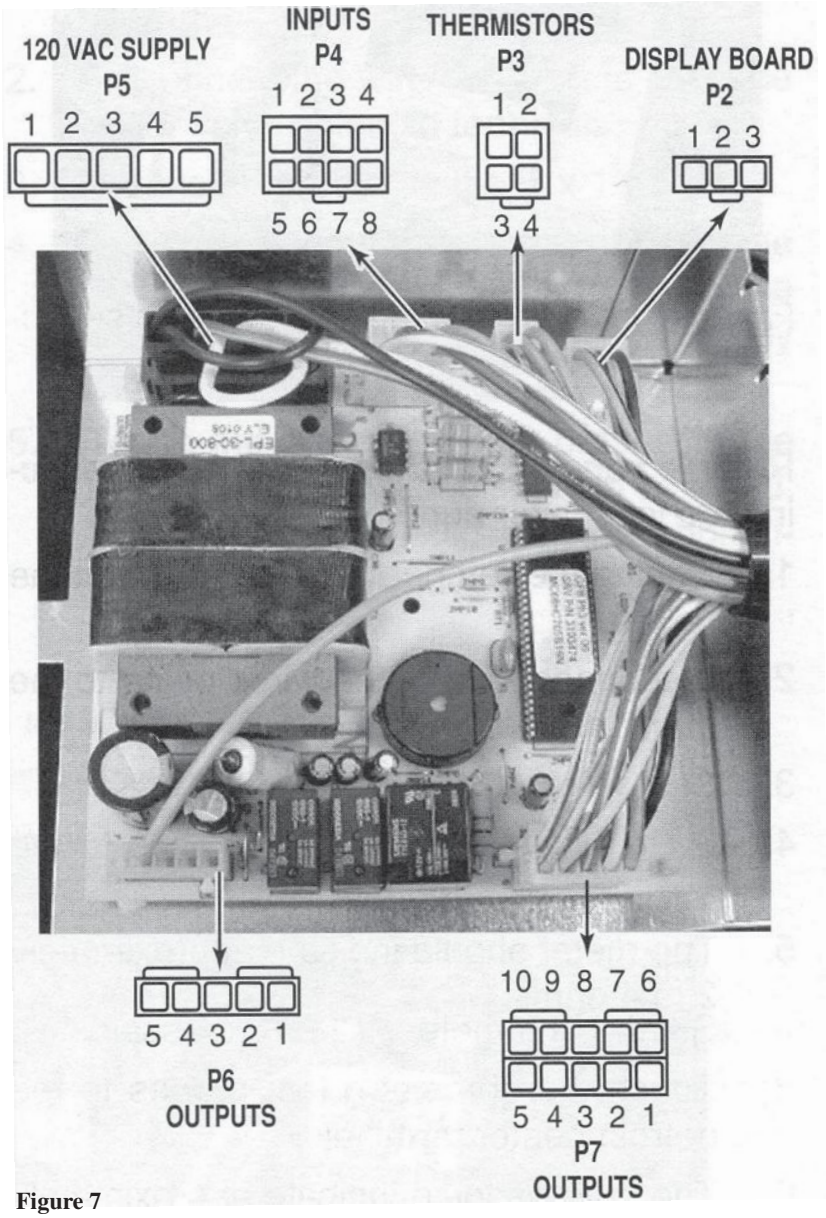

Figure 7

rect opening. Also keep in mind that if you get a red light on step seven, you can bypass the defrost termination thermostat.

You can also check to make sure that the diagnostics system is monitoring the water dispensing system and ice maker with this keypad control. To confirm the monitoring of both solenoid valves, press the refrigerator light switch while the door is open, place a container under the water spout, and activate the water dispenser. A yellow indicator on the water filter indicator LED means a normal input. When following the same procedure with the door and door switch, then activating the ice maker, the water filter indicator LED showing red indicates a normal input.

When you are ready to exit the diagnostics mode, press the Water Filter Reset keypad.

The electronic control in this model line also contains an Adaptive Defrost Control segment that initiates a pulsed defrost mode after 8 hours of compressor run time, which can vary from 8 to 100+ hours. Or, a defrost will be initiated immediately following a 1-hour time frame during which the compressor has been operating at 4,000 RPM or more, and it's been more than 8 hours since the last defrost. In the pulsed defrost system, the heater is on continuously for 7 minutes, then off for 2 minutes, and then back on for 2 minutes. This one-minute-off/two-minute-on cycle continues until the bimetal defrost termination thermostat opens, or until a 33-minute time frame as elapsed. There is also a four-minute drip time at the end of the defrost mode.

In the event of selected component failures, the control enters into certain failure default operating modes. For example, if there is a keypad failure, the control system reverts to the default temperature settings of 37°F in the refrigerator and 0°F in the freezer.

If there is a failure of a refrigerator thermistor, either an open or a short, the control system reverts to the default mode of operating the air door on a timed sequence of 16 minutes open and 30 minutes closed if the refrigerator and freezer temperature settings are 37°F and 0°F respectively. Also, in the case of this fault, the evaporator fan motor will operate on this timed cycle, and operate when the air door is open.

In the event of an open or shorted freezer

thermistor, the compressor and the evaporator fan motor will operate for 35 minutes and then shut down for 25 minutes if the control is set at the default of 37°F and 0°F. In this case, the compressor and evaporator fan motor will be operating at minimum speed.

Another factor to consider regarding the performance of the electronic control system is proper air flow, both inside the cabinet, and through the condenser section. When it comes to air flow through and between the fresh food and freezer sections, improper placement of items in either cabinet can affect the air flow pattern. Like any refrigeration system, proper air flow through the evaporator coil ensures proper temperature of the coil, which allows the thermistors to do their job properly and, ultimately allows the electronic control system to control temperatures and run time. **Figure 4** provides a view of the air flow pattern.

Relative to air flow through the condenser side of the air flow system, the electronic control in this model line senses any over-temperature problem with an on-board thermistor and shuts the compressor down. In the event of a temperature in excess of 160°F, the shutdown will occur, and the control will reset at a temperature of 130°F.

As for the overall electrical system, **Figure 5** shows a complete schematic, and some of the factors relative to component testing and operation are as follows:

If you're testing a thermistor at room temperature (75°F), the resistance reading should be between 2740 and 2910 ohms. If you prefer to test with it immersed in an ice-water mix (32°F), the resistance reading should be approximately 8550 ohms.

When the evaporator fan motor is operating, 5 to 17VDC will be present at the yellow and white wires, and a constant 12VDC will be read at the red and white wires. When testing for resistance, checking between pins 1 and 4 of the motor should show a resistance of approx. 1400 to 1700 ohms.

When testing the three-phase compressor with an ohmmeter, your reading at any two pins should be approx. 10 ohms. When the system is in the cooling mode, the voltages you should read at the inverter, and at the main control board, are shown in **Figure 6**.

PLUG	PIN #	DESCRIPTION	OUTPUT	CONDITION
P2	1	Communication Line	N/A	
	2	Display Voltage	12 VDC	Measured at pins 2 & 3
	3	GND	GND	
P3	1	Ref. Thermistor	GND	
	2	Frz. Thermistor	GND	
	3	Ref. Thermistor Output	5 VDC	Measured at pins 1 & 3
	4	Frz. Thermistor Output	5 VDC	Measured at pins 2 & 4
P4	1		N/A	
	2		N/A	
	3		N/A	
	4	Ref. Door Input	120 VAC	Voltage present when door is open
	5	Ice Maker Valve Input	120 VAC	Voltage present when ice maker is energized
	6	Dispenser Valve Input	120 VAC	Voltage present when dispenser valve is energized
	7	Bimetal Input	120 VAC	Voltage present when bimetal is closed
	8		N/A	
P5	1	AC GND	AC GND	
	2	AC L1	120 VAC	
	3	AC Neutral	AC Neutral	
	4	AC Neutral	AC Neutral	
	5	AC L1	120 VAC	
P6	1	Condenser Fan	120 VAC	Voltage present when condenser fan is on
	2		N/A	
	3		N/A	
	4	Defrost Heater	120 VAC	Voltage present when defrost heater is on
	5		N/A	
P7	1	Air Door		
	2	Air Door		
	3	Compressor Drive	3 - 6 VDC	Measured at pins 3 & 8
	4	Evap. Fan Feedback	N/A	
	5	Evap. Fan Constant	12 VDC	Measured at pins 5 & 9
	6	Air Door		
	7	Air Door		
	8	Compressor Drive	3 - 6 VDC	Measured at pins 3 & 8
	9	Evap. Fan Ground	Evap. GND	
	10	Evap. Fan Run Voltage	5 - 12 VDC	Measured at pins 9 & 10

Figure 8

If the 3 to 6VDC is not present at the inverter red and white wires, your next step is to test pins P7-3 and P7-8 on the main control board for the 3 to 6VDC. If the voltage isn't read there, the main control board has failed.

While you cannot accomplish a reliable voltage reading at the motorized air door, a test with an ohmmeter should show a resistance of approx. 400 to 450 ohms.

Regarding the defrost system components, the defrost heater should have a resistance of approx. 19 to 27 ohms, and the defrost termination thermostat bimetal is designed to close at 20°F, and open at 50°F.

When it comes to the main control board, always check the tech sheet for specific information. In **Figure 7** we're showing one example of the inputs and outputs of a control, and **Figure 8** lists the specific points to accomplish voltage checks. Ω