



CONSUMER SERVICES TECHNICAL EDUCATION GROUP PRESENTS

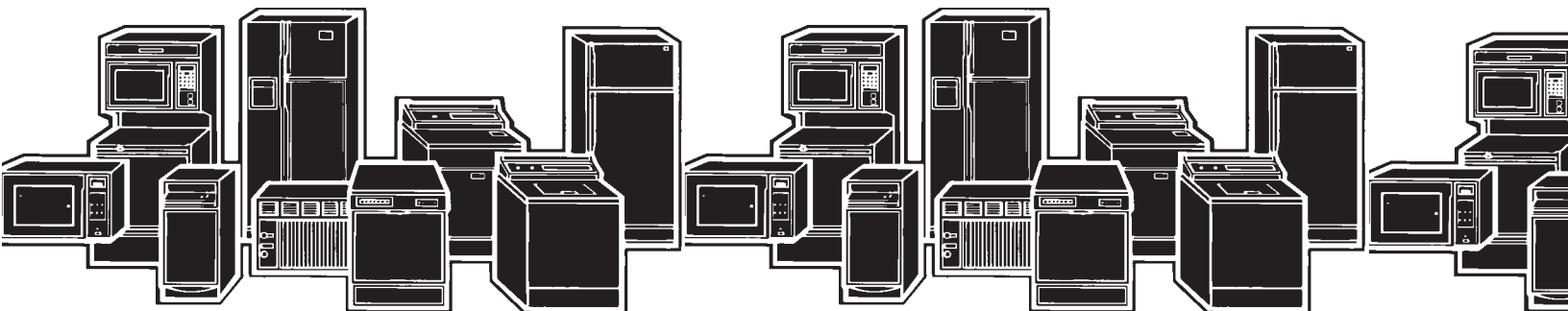
L-61

Washers and Dryers with Fifth Generation Solid State Electronic Control Systems

Fabric/Cycles	Time	Load Size	Temperature	Options	Status
<input type="checkbox"/> Heavy <input type="checkbox"/> Regular <input type="checkbox"/> Perm Press <input type="checkbox"/> Delicate <input type="checkbox"/> Hand Wash <input type="checkbox"/> Soak	<input type="checkbox"/> 14 <input type="checkbox"/> 12 Heavy <input type="checkbox"/> 10 <input type="checkbox"/> 8 Normal <input type="checkbox"/> 6 <input type="checkbox"/> 4 Light <small>Delay Hours</small>	<input type="checkbox"/> Extra Large <input type="checkbox"/> Medium <input type="checkbox"/> Small	<input type="checkbox"/> Wash/Rinse <input type="checkbox"/> Hot/Warm <input type="checkbox"/> Hot/Cold <input type="checkbox"/> Warm/Warm <input type="checkbox"/> Warm/Cold <input type="checkbox"/> Cold/Cold	<input type="checkbox"/> Super Wash <input type="checkbox"/> Extra Rinse <input type="checkbox"/> Rinse & Spin-High <input type="checkbox"/> Rinse & Spin-Low <input type="checkbox"/> Spin Only - High	<input type="checkbox"/> Fill/Wash <input type="checkbox"/> Rinse <input type="checkbox"/> Final Spin <input type="checkbox"/> LockOut Cancel Start Delay
On Select	Select	Select	Select	Select LockOut	

Cycles/Temps	Automatic	or	Timed	Options	Status
<input type="checkbox"/> Reg/Heavy-High <input type="checkbox"/> Perm Press-Med <input type="checkbox"/> Delicate-Low <input type="checkbox"/> Fluff Air-No Heat <input type="checkbox"/> Tumble Press-Med <input type="checkbox"/> Damp Dry-High	<input type="checkbox"/> Very Dry <input type="checkbox"/> More Dry <input type="checkbox"/> *Reg Dry <input type="checkbox"/> Less Dry <input type="checkbox"/> Least Dry		<input type="checkbox"/> 90 Min <input type="checkbox"/> 70 Min <input type="checkbox"/> 50 Min <input type="checkbox"/> 30 Min <input type="checkbox"/> 10 Min	<input type="checkbox"/> Cycle Signal <input type="checkbox"/> Finish Guard	<input type="checkbox"/> Drying <input type="checkbox"/> Cool Down <input type="checkbox"/> Finish Guard <input type="checkbox"/> LockOut Cancel Start
On Select	Select		Select	Select LockOut	

JOB AID
Part No. 4321848



INTRODUCTION

This Job Aid, *“Washers and Dryers with Fifth Generation Solid State Electronic Controls,”* L-61, Part No. 4321848 provides specific instruction for servicing the control system of Whirlpool-built three speed direct drive washers and gas and electric dryers equipped with fifth generation fully solid state electronic controls. These controls were introduced on Whirlpool washer model LSE9355BZO and dryer model LE/GE9848BZO and KitchenAid washer model KAWE977BWHO and dryer model KE/GYW977BWHO.

The Job Aid should be used in conjunction with the companion video tape , *“Washers and Dryers with Fifth Generation Solid State Electronic Controls,”* Part No. 4321849.

All mechanical aspects of these units are identical to Whirlpool-build Direct Drive Washers and Gas and Electric Dryers except as noted in this Job Aid. For a complete description of repair procedures refer to the Job Aids, *“Direct Drive Washers”* L-55, Part No. 787930 and *“Dryer Mechanical Systems”*, L-58, Part No. 4314557. Companion videos are also available for these Job Aid.

GOALS AND OBJECTIVES

The goal of this Job Aid is to provide specific information that will enable the service technician to repair and maintain Whirlpool-built washers and dryers equipped with fifth generation solid state electronic controls.

The objectives of this Job Aid are:

The service technician will -

- Understand the function of the solid state electronic controls
- Perform and interpret the diagnostic tests for the solid state electronic controls

TO THE INSTRUCTOR/INDEPENDENT STUDENT

This Job Aid is designed to be used with the video tape, *“Washers and Dryers with Fifth Generation Solid State Electronic Control Systems,”* Part No. 4321849. As you use this Job Aid you will see a symbol that looks like this:



It instructs you to view certain sections of the video tape. The section numbers you should view appear in the lower left corner of the screen.

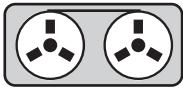
This symbol (📎) appears next to the heading, *“Confirmation Of Understanding Exercises”* which appear at the end of various sections of the Job Aid. You will need a pencil to complete these exercises.

WHIRLPOOL CORPORATION ASSUMES NO RESPONSIBILITY
FOR ANY REPAIRS MADE ON OUR PRODUCTS BY ANYONE
OTHER THAN AUTHORIZED SERVICE TECHNICIANS

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-- NOTES --



View Section 1 of the Video Tape

Section 1 EQUIPMENT AND SAFETY EQUIPMENT

All tests/checks should be made with a VOM or DVM having a sensitivity of 20,000 ohms per volt DC or greater. Voltage check should be made with wires connected. (Figure 1)

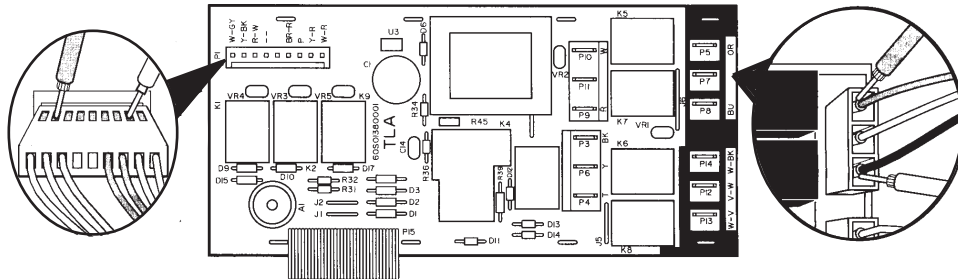


Fig. 1

SAFETY

! WARNING

ELECTRICAL SHOCK HAZARD

Disconnect the unit from household electric supply before servicing.
Failure to do so could result in serious injury or death.

! CAUTION

ELECTROSTATIC DISCHARGE (ESD) SENSITIVE ELECTRONICS

Do not open the package containing the service replacement control assembly until it is time to install it. ESD problems are present everywhere. ESD may damage or weaken the electronic control assembly. The new control assembly may appear to work well after repair is finished, but failure may occur at a later date due to ESD stress.

Use an anti-static wrist strap.

Connect wrist strap to green ground connection point or unpainted metal in the appliance.

-OR-

Touch your finger repeatedly to a green ground connection point or unpainted metal in the appliance.

Before moving the part from its package, touch the anti-static bag to a green ground connection point or unpainted metal in the appliance.

Avoid touching electronic parts or terminal contacts; handle electronic control assembly by edges only.

When repackaging a failed electronic control assembly in the anti-static bag, observe above precautions.

- NOTES -



View Section 2 of the Video Tape

Section 2

INSTALLATION CONSIDERATIONS

The most common cause of electronic control failure are the result of issues related to proper installation. Before servicing the appliance, perform the following checks:

- Is the power cord firmly plugged into a live circuit with proper voltage?
- Has a household fuse blown or circuit breaker tripped? Is the circuit on a time delay fuse?
- Is the washer or dryer in Lockout? Push and hold LOCKOUT select pad under OPTIONS for 5 seconds to release. (Figure 2)
- Are both hot and cold water faucets open and water supply hoses unobstructed?
- Check all connections before replacing components. Broken or loose wires and defective terminals can cause the same failure symptoms as a defective component.
 1. Connectors: Look at the top of the connector for broken or loose wires. Check for wires not pressed into the connector far enough to engage metal barbs.
 2. Voltage: All voltage checks must be made with all connectors ATTACHED to the board(s).
 3. Resistance: All resistance checks must be made with wiring harness or connectors DISCONNECTED.

If the appliance appears to be properly installed and a problem still exists, further diagnosis is required.

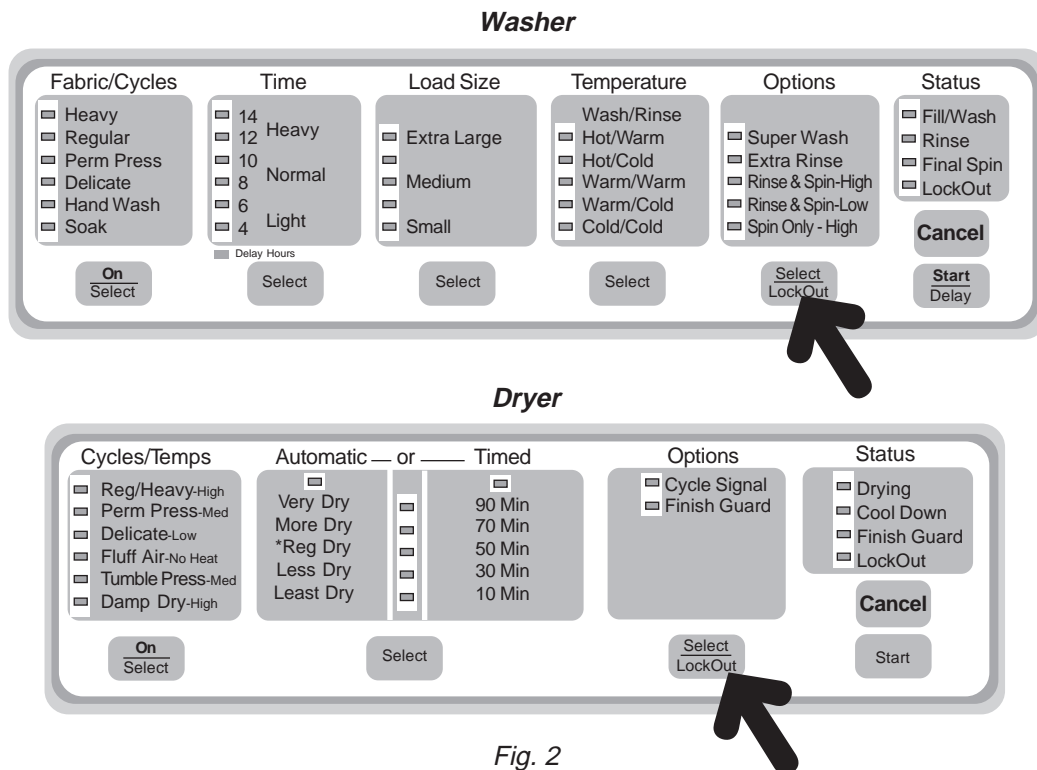
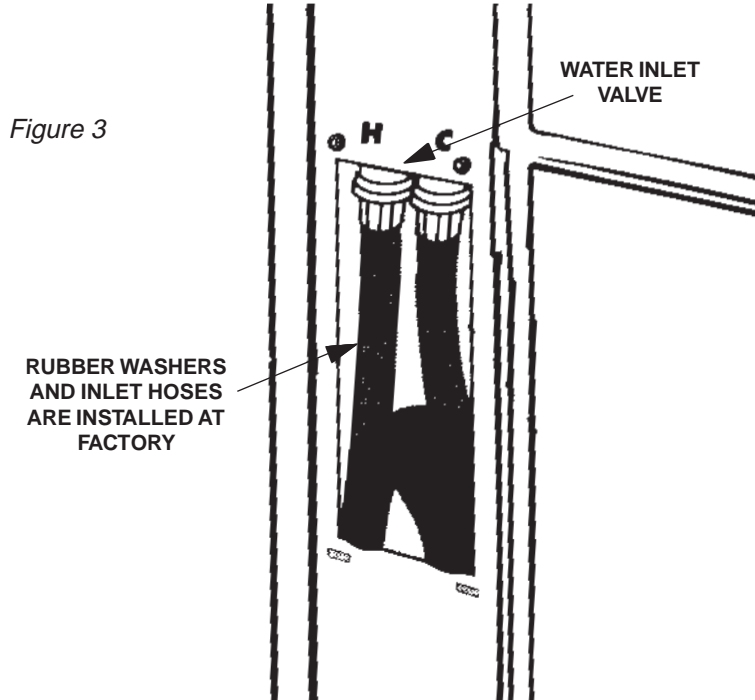


Fig. 2

INLET HOSES

The rubber washers and inlet hoses on washers with 5th Generation Electronic Controls have been installed in the factory. They will be found tucked into a cavity immediately below the inlet valve at the back of the washer. (*Fig. 3*) Some effort will be required to separate the free ends of the hoses from the plastic retainer inside the washer.



Section 2

() CONFIRMATION OF UNDERSTANDING EXERCISES

1. If a washer or dryer equipped with 5th Generation Electronic Controls fails to operate properly, what should be the first step in servicing the appliance?
 - a. Replace the Electronic Control Assembly
 - b. Make sure the appliance is plugged into a live receptacle.
 - c. Check the individual components on the printed circuit board.
 - d. Call for technical assistance.

2. If the washer or dryer is in LOCKOUT:
 - a. Press and hold the LOCKOUT button down for 5 seconds.
 - b. Unplug the appliance and wait 30 seconds before plugging it back in.
 - c. Press and hold the CANCEL button down for 5 seconds.
 - d. Replace the Electronic Control Assembly.

3. All voltage checks must be made:
 - a. With the appliance unplugged.
 - b. With the connectors attached to the printed circuit board.
 - c. With the connector disconnected from the printed circuit board.
 - d. While the appliance is running.

4. All resistance checks must be made:
 - a. With the connectors disconnected from the printed circuit board.
 - b. With the connectors connected to the printed circuit board.
 - c. With the appliance unplugged.
 - d. With the appliance running.

5. The factory installed inlet hoses:
 - a. Should be disconnected before removing the free ends from the washer.
 - b. Will require some effort to separate the free ends from their plastic retainer.
 - c. Should not be removed from the cavity until the washer is ready for operation.
 - d. Require that the rubber washers be installed on the inlet end.

- NOTES -



Section 3 THEORY OF OPERATION

Automatic Electronic Three Speed Direct Drive Washers FILL

1. The washer will fill automatically with warm water for approximately 90 seconds through the detergent dispenser when the START pad is touched. The STATUS display will indicate Fill/Wash.
2. The washer will then switch to regular fill through the Hot and Cold water inlet valves. The water will enter the washer through the water inlet vacuum brake at the rear of the tub. The Hot and/or Cold valves will energize depending on the water temperature selected.

3. The water level transducer will sense the water level in the basket and send a signal to the microcomputer assembly. The microcomputer supplies the water level transducer with 5VDC on pin 3 of connector P1. The water level transducer outputs a signal based on the amount of water in the basket between pins 1 and 3 which progressively illuminate the indicator LEDs on the LOAD SIZE options indicator.

4. If the water level reaches an overflow condition mechanical contacts on the water level transducer will remove the CPU 120V from pin 7 of connector P1. This is the power to energize the fill valves. (Fig. 4)

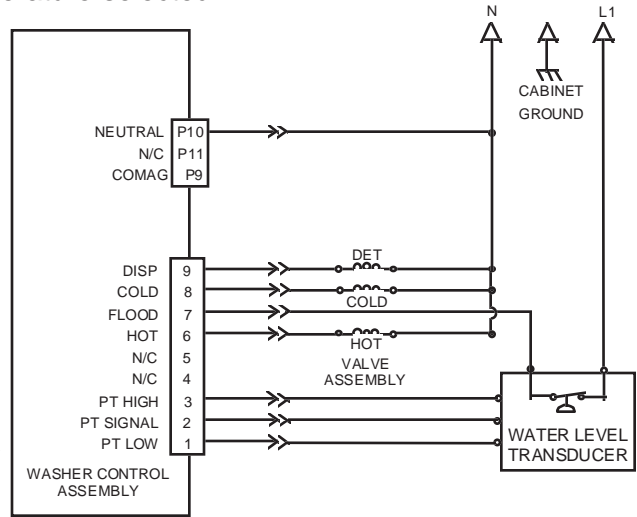


Figure 4

AGITATE

1. Once the basket is filled the COMAG applies 120V from P9 to energize the start capacitor and the start winding of the drive motor.

2. Once the motor is up to speed the Centrifugal Switch will open disconnecting the start capacitor and start winding.

3. 120V is also applied directly to the drive motor through Pin P8 (AG HI), P13 (LMED) or P14 (LLOW) to control the drive motor agitate speed. (Fig. 5)

4. When the agitate cycle is complete voltage is removed from the drive motor.

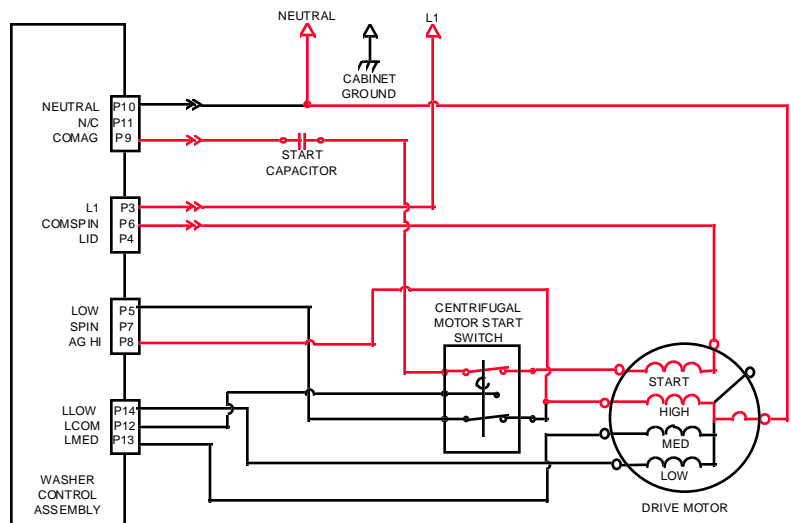


Figure 5

NOTE: The agitation speeds are:

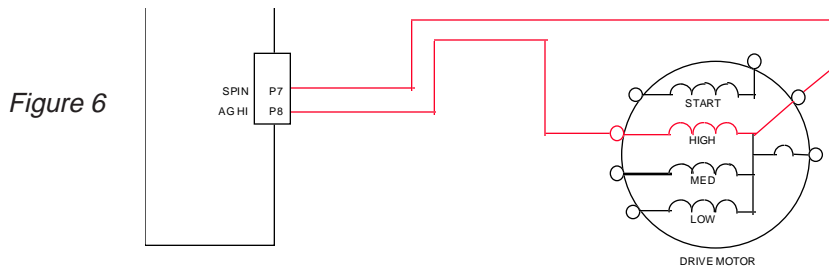
- High - 180 strokes per minute
- Medium - 120 strokes per minute
- Low - 80 strokes per minute

DRAIN

NOTE: The Start Capacitor and Start Winding of the Drive Motor are energized from P9 during the Drain Cycle.

NOTE: The Drain Cycle will be interrupted when the washer lid is opened.

The drain cycle is activated by applying 120VAC directly to the high speed winding of the drive motor between Pin P7 (Spin) and Pin P8 (Ag HI) to operate the drive motor through the high speed winding in the reverse direction. (Fig. 6)



SPIN

NOTE: The Start Capacitor and Start Winding of the Drive Motor are energized from P9 during the Spin Cycle.

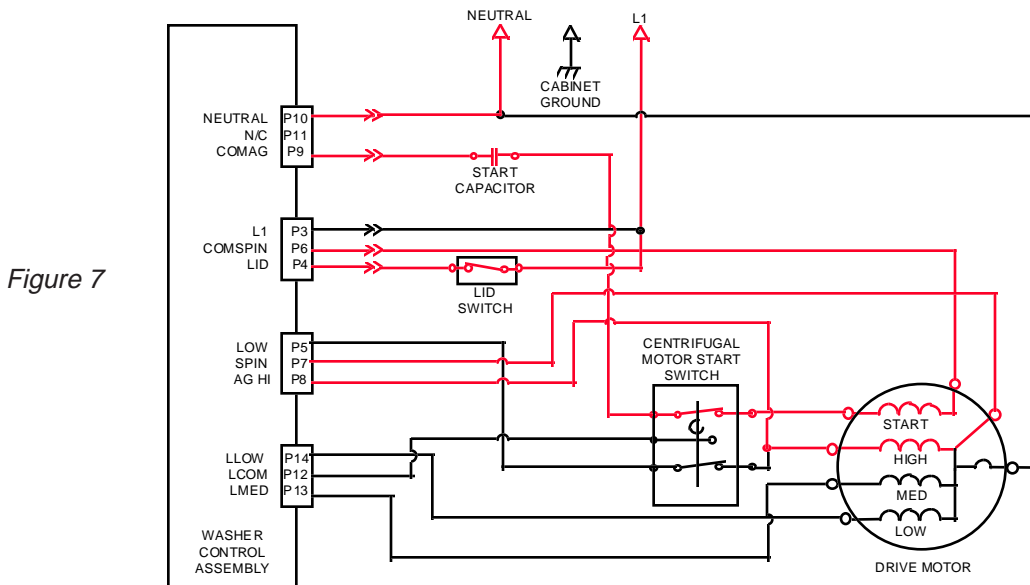
NOTE: The Spin Cycle will be interrupted when the washer lid is opened.

The spin cycle is activated in the same manner as the drain cycle with the exception that there are three spin speed options which are selected in the OPTIONS list.

Low speed is achieved by applying 120VAC between P14 and P7 to energize the drive motor through the low speed winding in the reverse direction.

Medium speed is achieved by applying 120VAC between P13 and P7 to energize the drive motor through the medium speed winding in the reverse direction.

High speed is achieved by applying 120VAC between P8 and P7 to energize the drive motor through the high speed winding in the reverse direction. (Fig. 7)



Electronic Gas and Electric Dryers

AUTOMATIC DRY

1. When any of the Automatic options are selected the dryer will run and the LED indicator above the AUTOMATIC options will be lit along with the LED indicator for the specific automatic option chosen.
2. The sensor on the back of the dryer drum will sense the amount of moisture in the load.
3. Temperatures are sensed by a thermistor. The thermistor's resistance will vary between 1000 ohms and 15,000 ohms depending on the temperature.
4. Based on the signal from the thermistor, the microcomputer will cycle the heat relay which energizes the heater coil. (Fig. 8)

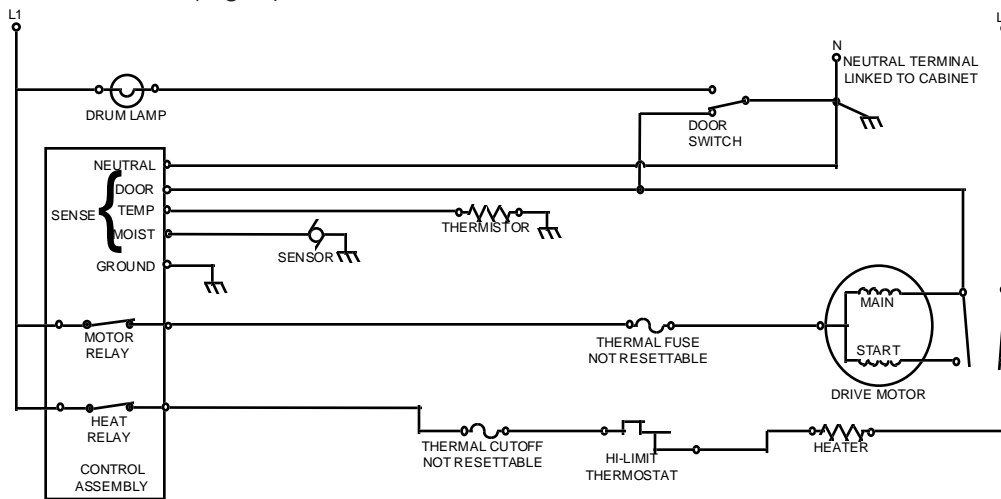


Figure 8

TIMED DRY

1. When the TIMED dry option is selected the dryer will run for the specific time selected and the LED indicator above the TIMED options will be lit along with the LED next to the specific drying time that was selected.
2. The moisture sensor on the back of the dryer drum is not active in Timed Dry. (Fig. 9)

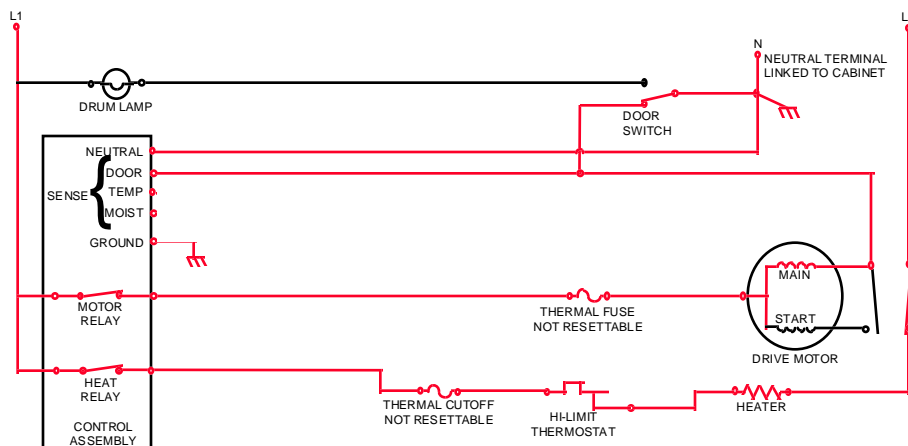


Figure 9

() Section 3 - CONFIRMATION OF UNDERSTANDING EXERCISES

1. The first portion of the washer FILL function is:
 - a. A high pressure blast of hot water to clear the lines.
 - b. A 90 second fill of hot and cold water through the detergent dispenser.
 - c. A 90 second pause.
 - d. None of the above.

2. The agitate speeds of the washer are:
 - a. High - 180 SPM (Strokes per Minute), Medium - 120 SPM, Low - 80 SPM
 - b. High - 180 RPM (Revolutions per Minute), Medium - 120 RPM, Low - 80 RPM
 - c. There is no difference in agitate speeds.
 - d. None of the above.

3. When drying clothes with the Automatic Option, drying time is determined by:
 - a. The chosen automatic option and the moisture sensor at the back of the dryer drum.
 - b. The chosen automatic option and the thermistor.
 - c. The moisture sensor and the thermistor.
 - d. The microcomputer's internal programming only.

4. If the washer should overflow:
 - a. A microcomputer will interpret the water level and shut the fill valves off.
 - b. A mechanical switch will open and shut the fill valves off.
 - c. The water level transducer will malfunction.
 - d. None of the above.



View Section 4 of the Video Tape

Section 4 SERVICING WASHERS AND DRYERS

Automatic Electronic Three Speed Direct Drive Washers

COMPONENT LOCATION AND ACCESS

Solid State Electronic Control Assembly

The Solid State Electronic Control Assembly and Water level Transducer are located inside the console. To access these components:

1. Remove the two philips head screws located at the lower left and right sides of the console.
2. Tilt the console into the service position.

All testing necessary for trouble shooting and diagnostic purposes can be performed with the console in the service position.

Detergent Dispenser

The detergent dispenser is located in the front right corner under the lid. The dispenser can accommodate both liquid and powdered laundry detergents. When removing the cabinet, disconnect the water supply hose located under a cover at the left rear of the top. Have a rag available to absorb any residual water in the hose.

Nomenclature

The nomenclature varies slightly between Whirlpool Brand and Kitchenaid Brand washers. Both units use the same solid state electronic control assembly and all switches and LEDs are located in the same positions. (Fig. 10)

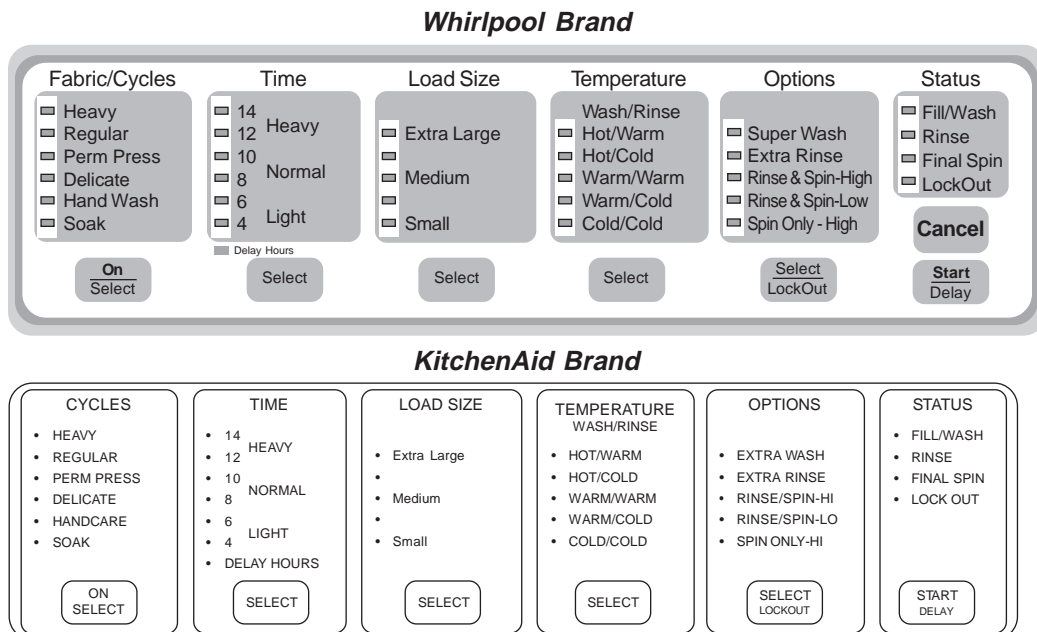
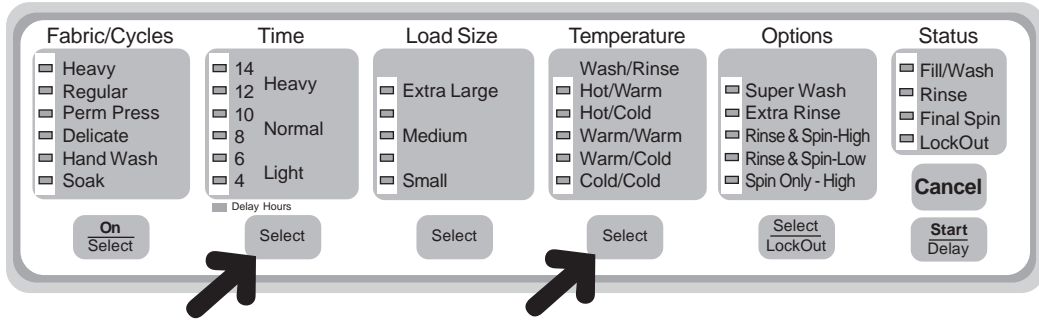


Figure 10

TESTING AND DIAGNOSIS

STARTING TEST MODE

1. Press the following "Select" pads in sequence. (Entire sequence must be done within 10 seconds) (Fig. 11)



Time + Temp + Time + Temp

Figure 11

2. Verify that all LED's are now lit at the sound of a "Beep".
3. Use the TEST GUIDE to determine which test is necessary.
4. Activate a function test by pressing the SELECT pad the number of times equal to the number of squares in the row. (Example: To activate the Agitate test for Medium Speed, press the "ON/SELECT" pad 2 times.) (Fig. 12)

WATER LEVEL TEST

Pad Presses	Selection	Function
■	Small	low
■ ■	Extra Large	High

AGITATE TEST

Pad Presses	Selection	Function
■	Heavy	High
■ ■	Perm Press	Medium
■ ■ ■	Delicate	Low
■ ■ ■ ■	Off	Off

DRAIN TEST

Pad Presses	Selection	Function
■	Spin Only - Hi	Drain

Unit will spin if enough water is drained (toggle key off, then on)

SPIN TEST

Pad Presses	Selection	Function
■ ■	4 minutes	Low
■ ■ ■	6 minutes	Medium
■ ■ ■ ■	8 minutes	High
■ ■ ■ ■ ■	Off	Off

FILL TEST

Pad Presses	Selection	Function
■		This key toggles between all LEDs on or low water level fill

VALVE TEST

Pad Presses	Selection	Function
■	Warm/Warm Det/Hot/Cold	
■ ■	Cold/Cold	Cold
■ ■ ■	Hot/Cold	Hot
■ ■ ■ ■	Off	Off

Figure 12

LID AND SPIN TEST

1. Make sure the washer lid is closed before starting test.
2. Press “SELECT” pad under Temperature four times to turn off all water valves. (NOTE: Display will show “Small” indicator light.)

Lid Switch Test

1. Press the “SELECT” pad under **TIME** until the “4” indicator LED is lit. the washer should start to spin.
2. If the washer is not spinning, open and close the lid to reset the Neutral Drain Mechanism. If the washer is still not spinning go to step 4.
3. If the washer is spinning, the lid switch is functioning correctly. Continue to **Low Speed Spin Test**.
4. If the washer is not spinning:
 - a. Unplug the washer from household power supply.
 - b. Open the console and disconnect the lid switch connector on the cabinet.
 - c. Measure continuity between the outside pins on the 3-pin connector socket with an ohm meter. (Fig. 13)
 - d. Verify that, with the lid closed, the switch is closed (0 ohms)
 - e. Verify that, with the lid open, the switch is open (~ ohms)
 - f. If either conditions in d. or e. are not true, replace the lid switch. Continue to **Low Speed Spin Test**.

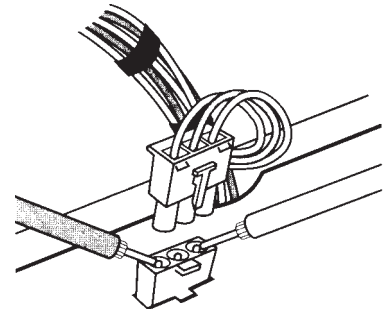


Figure 13

Low Speed Spin Test

This test should be conducted with the lid switch closed.

1. Press the “SELECT” pad under **TIME** until the 4 indicator LED is lit. the washer should start to spin.
2. Low speed spin is functioning properly if the washer is spinning. Go to **Medium Speed Spin Test**.
3. If washer is not spinning:
 - a. Unplug washer from 120VAC household power supply.
 - b. Open the console and inspect for loose connections. Disconnect and reconnect all wires from the electronic control assembly.
 - c. Close the console, plug the washer into the household power supply and repeat steps 1 & 2.

- d. If the washer still does not spin, leave the washer plugged in and check for 120VAC from connectors P14 (W-OR) to P7 (W-BK) during step 1.
- e. If 120VAC is present, check motor.
- f. If 120VAC is not present, replace the electronic control assembly.

Medium Speed Spin Test

This test should be conducted with the lid switch closed.

1. Press the “SELECT” pad under **TIME** until the "6" indicator LED is lit. The washer should start to spin.
2. Medium speed spin is functioning properly if the washer is spinning. Go to **High Speed Spin Test**.
3. If washer is not spinning:
 - a. Unplug washer from 120VAC household power supply.
 - b. Open the console and inspect for loose connections. disconnect and reconnect all wires from the electronic control assembly.
 - c. Close the console, plug the washer into the household power supply and repeat steps 1 & 2.
 - d. If the washer still does not spin, leave the washer plugged in and check for 120VAC from connectors P13 (W-V) to P7 (W-BK) during step 1.
 - e. If 120VAC is present, check motor.
 - f. If 120VAC is not present, replace the electronic control assembly.

High Speed Spin Test

This test should be conducted with the lid switch closed.

1. Press the “SELECT” pad under **TIME** until the "8" indicator LED is lit. The washer should start to spin.
2. High speed spin is functioning properly if the washer is spinning
3. If washer is not spinning:
 - a. Unplug washer from 120VAC household power supply.
 - b. Open the console and inspect for loose connections. Disconnect and reconnect all wires from the electronic control assembly.
 - c. Close the console, plug the washer into the household power supply and repeat steps 1 & 2.

- d. If the washer still does not spin, leave the washer plugged in and check for 120VAC from connectors P8 (BU) to P7 (W-BK) during step 1.
- e. If 120VAC is present, check motor.
- f. If 120VAC is not present, replace the electronic control assembly.

DRAIN TEST

This test should be conducted with the lid switch closed.

1. Press the “SELECT” pad under **OPTIONS**. (The “Small” and “Warm/Warm” indicator LEDs should be lit.)
2. The drain function is working properly if the motor is running and the water level is decreasing.
3. If the washer will not drain (eg.: The motor is not running; the water level stays the same or takes an unusually long time to drain):
 - a. Unplug the washer from 120VAC household power supply and check for kinked or clogged drain hose.
 - b. Open the console and inspect for loose connections. Disconnect and reconnect all wires from the electronic control assembly.
 - c. Close the console, plug the washer into the household power supply and repeat steps 1 & 2.
 - d. If the washer still does not drain, open the console and check for 120VAC from connectors P8 (BU) and P7 (W-BK).
 - e. If 120VAC is present and the motor is running, replace the pump.
 - f. If 120VAC is present and the motor is not running, check motor.
 - g. If 120VAC is not present, replace the electronic control assembly.

AGITATE TEST

Press the “SELECT” pad under **TEMPERATURE** four times to turn off all water valves. (The “Small” indicator LED should be lit.)

High Speed Agitate Test

1. Press the “SELECT” pad under **FABRIC/CYCLES** until the “Heavy” indicator LED is lit. The washer should start to agitate.
2. High speed function is operating properly if the washer is agitating. Continue to **Medium Speed Agitate Test**.
3. If the washer is not agitating:
 - a. Unplug the washer from 120VAC household power supply.

- b. Open the console and inspect for loose connections. Disconnect and reconnect all wires from the electronic control assembly.
- c. Close the console, plug the washer into the household power supply and repeat steps 1 & 2.
- d. If the washer still does not agitate, open the console and check for 120VAC from connectors P8 (BU) and P10 (W) during step 1.
- e. If 120VAC is present, check motor.
- f. If 120VAC is not present, replace the electronic control assembly.

Medium Speed Agitate Test

1. Press the “SELECT” pad under **FABRIC/CYCLES** until the “Perm Press” indicator LED is lit. The washer should start to agitate.
2. Medium speed function is operating properly if the washer is agitating. Continue to **Low Speed Agitate Test**.
3. If the washer is not agitating:
 - a. Unplug the washer from 120VAC household power supply.
 - b. Open the console and inspect for loose connections. Disconnect and reconnect all wires from the electronic control assembly.
 - c. Close the console, plug the washer into the household power supply and repeat steps 1 & 2.
 - d. If the washer still does not agitate, open the console and check for 120VAC from connectors P13 (W-V) and P10 (W) during step 1.
 - e. If 120VAC is present, check motor.
 - f. If 120VAC is not present, replace the electronic control assembly.

Low Speed Agitate Test

1. Press the “SELECT” pad under **FABRIC/CYCLES** until the “Delicate” indicator LED is lit. The washer should start to agitate.
2. Low speed function is operating properly if the washer is agitating.
3. If the washer is not agitating:
 - a. Unplug the washer from 120VAC household power supply.
 - b. Open the console and inspect for loose connections. Disconnect and reconnect all wires from the electronic control assembly.
 - c. Close the console, plug the washer into the household power supply and repeat steps 1 & 2.

- d. If the washer still does not agitate, open the console and check for 120VAC from connectors P14 (W-O) and P7 (W-BK) during step 1.
- e. If 120VAC is present, check motor.
- f. If 120VAC is not present, replace the electronic control assembly.

FILL AND DISPENSE TEST

Press the “SELECT” pad under **STATUS**. (The “Small” and “Warm/Warm” indicator LEDs should be lit.)

No Fill and/or No Dispense

If the washer is not filling from all three valves:

1. Unplug the washer from 120VAC household power supply.
2. Open the console and inspect for loose connections. Disconnect and reconnect all control connections that are shown in the “Fill and Dispense” strip circuit.
3. Close the console, reconnect the washer to the household power supply and repeat steps 1 & 2.
4. Use a voltmeter to verify the presence of 120VAC between these test points:
 - P1 Pin 8 (Y-R) and P10 (W) Output to the cold valve
 - P1 Pin 6 (BR-R) and P10 (W) Output to the hot valve
 - P1 Pin 8 (W-R) and P10 (W) Output to the dispenser valve
5. If 120VAC is present on all three valves, press “Cancel” and go to **Washer Overfills**.
6. If 120VAC is not present on any of the valves, replace the electronic control assembly.

Washer Overfills

1. Observe the water level to determine if the valves turn the water off when the level reaches the bottom seam of the agitator auger (less than 10 inches from the bottom of the tub, no more than 2 inches above the seam.)
2. If filling continues more than an inch above this point, the washer has overfilled.
 - a. Press “Cancel” to stop the test and unplug the washer from 120VAC household power supply.
 - b. Open the console and inspect for loose connection. Disconnect and reconnect all wires between the water level transducer and the electronic control assembly.
 - c. Close the console and plug the washer in. Enter “Diagnostic Test Mode.”
 - d. Press the “SELECT” pad under **OPTIONS** to drain the remaining water from the tub.
 - e. Repeat steps 1 and 2. If the washer still overfills, replace the water level transducer.
 - f. Repeat steps 1 and 2. If the washer still overfills, replace the electronic control assembly.

SERVICING PROCEDURES

SOLID STATE ELECTRONIC CONTROLS

NOTE: All diagnostic tests must be performed before any attempt is made to remove the electronic control assembly.

Control Assembly Removal and Replacement

Refer to Figure 14 for these procedures.

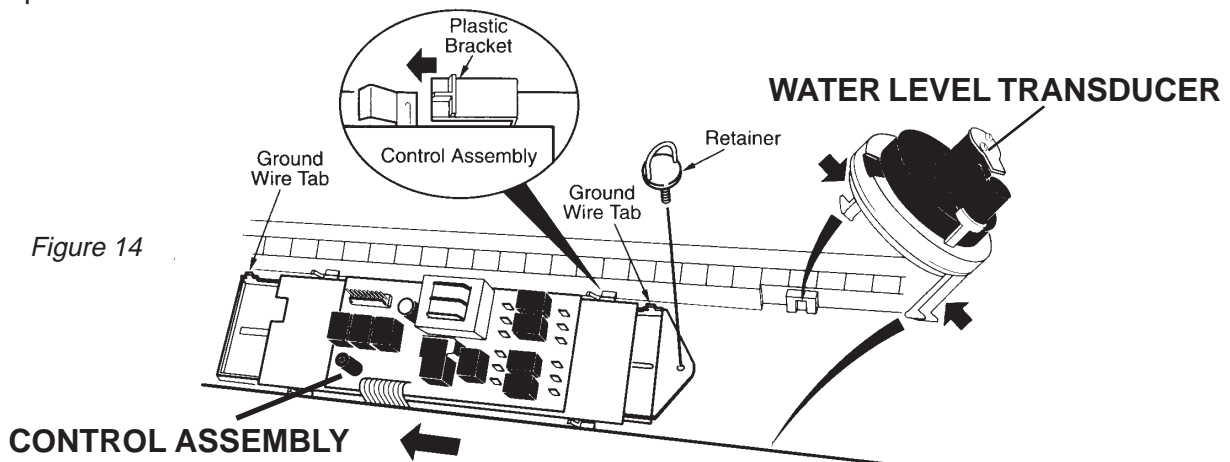
1. Open the console to the service position. The User Cards Holder should be removed first to avoid damage.
2. Unplug all five connectors from the control assembly. (A slotted screwdriver may be used between the 9-pin connector and the locking tab to aid in removal.)
3. Disconnect the ground wires (G-Y) from the metal chassis of the control assembly.
4. Pull the retainer from the right end of the assembly.
5. Free the control assembly from the plastic brackets by sliding it to the left and lifting it out.
6. Replace is the reverse order.

NOTE: Be sure to reconnect the (G-Y) ground wires to the metal chassis of the control assembly.

Water Level Transducer Removal/Replacement

Refer to Figure 14 for these procedures.

1. Open the console to the service position.
2. Remove the pressure hose tubing.
3. Unplug all connectors from the transducer.
4. Push down while pushing in on the nearest side mounting arm to remove.
5. Replace in reverse order.



Electronic Electric and Gas Dryers

COMPONENT LOCATION AND ACCESS

Solid State Electronic Control Assembly

The Solid State Electronic Control Assembly is located inside the console. To access this component:

1. Remove the two philips head screws located at the lower left and right sides of the console.
2. Slide the console forward onto a protective mat and remove the console back panel.

All testing necessary for trouble shooting and diagnostic purposes can be performed with the console in the service position.

Nomenclature

The nomenclature varies slightly between Whirlpool Brand and KitchenAid Brand dryers. Both units use the same solid state electronic control assembly and all switches and LEDs are located in the same position. (Fig. 15)

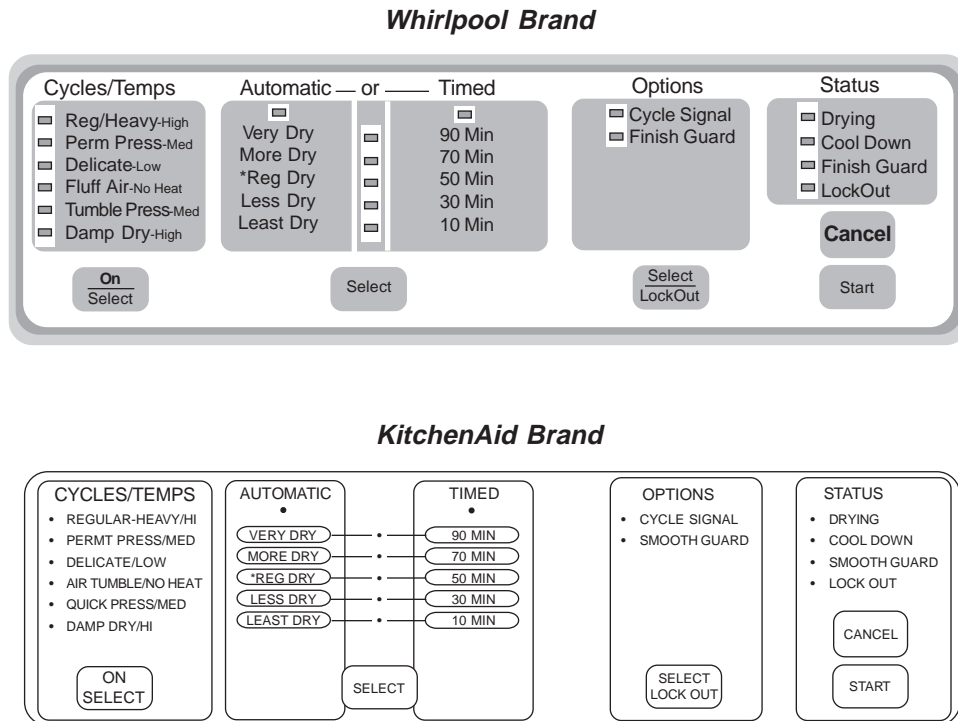


Figure 15

TESTING AND DIAGNOSIS

Diagnostics

The following problems can be diagnosed by observing the indicator LEDs on the control panel.

Power Failure

When the 3 **STATUS** LEDs are flashing: **Drying + Cool Down + Finish Guard**, a power failure may have occurred during a cycle.

- The flashing LEDs can be turned off by pressing “ON/SELECT” or “CANCEL”.

Open/Short Thermistor

When the **TIMED** LED is flashing, the thermistor or the wiring to the thermistor is open or shorted.

- The thermistor must be replaced or the wiring fault must be corrected.

Door Open

When any one of the following **STATUS** LEDs is flashing: **Drying, Cool Down or Finish Guard**, the door has been opened during a cycle.

- Close the door and press “START” within five minutes of opening the door in order to continue the current cycle.
- The electronic control will turn off automatically if the door is left open for more than five minutes or if “START” is not pressed within five minutes of closing the door.

Motor Test

If the motor will not start, check the following:

- Line Voltage (120VAC)
 - Harness/Connections
 - Motor Relay
 - Thermal Fuse
 - Motor
 - Door Switch (120VAC contacts)
 - Control Assembly
1. If the **Lockout** LED is lit, press and hold “SELECT/LOCKOUT” pad under **OPTIONS** for 5 seconds. The **Lockout** LED will turn off.
 2. Press “ON/SELECT” pad if the LEDs are on and go to step 4.
 3. If all LEDs are off:
 - a. Check the ‘120VAC supply voltage to the electronic control assembly. (W to BK)
 - b. If 120VAC is present and the harness connections are OK, replace the electronic control assembly.
 4. Press “START”

- a. If the motor does not start and there is an “Invalid Tone”, check the door switch. (D to D1)
- b. If the motor does not start and the **Drying** LED lights up, check the motor and thermal fuse.
- c. If the motor still does not start, check the motor relay (BK to BU)
- d. If 120VAC is present and the harness connections are OK, replace the electronic control assembly.

No Heat Test

If the heater will not turn on, check the following:

- | | |
|-------------------------|----------------------|
| - Line Voltage (120VAC) | - Heater |
| - Harness/Connections | - Centrifugal Switch |
| - Heat Relay | - Thermistor |
| - Thermal Cut-Off | - Control Assembly |
| - Hi-Limit Thermostat | |

1. Press “ON/SELECT” and “START”. The Drying LED will come on and the motor will start. the heater should turn on after a 4 second delay.
2. If there is no heat, check the heat relay.
 - a. If 0VAC, check the centrifugal switch, heater, hi-limit thermostat and thermal cut-off.
 - b. If 120VAC, replace the thermistor and check harness connections.

Heat In Fluff Test

If the dryer heats in Fluff Air, check the following:

- | | |
|----------------------|--------------------|
| - Harness/Connection | - Heat Relay |
| - Heater | - Control Assembly |

1. Press “ON/SELECT” until **Fluff Air** LED indicator is lit.
2. Press “START”
3. If heater is on, check the harness connections and heater.
 - a. Check the heater relay on the control board (BK to R)
 - b. If 0VAC, replace the electronic control assembly.

Shut Off Test

If the dryer will not shut off, check the following:

- | | |
|----------------------|--------------------|
| - Harness/Connection | - Motor Relay |
| - Sensor Strip | - Control Assembly |

1. Remove clothes from the dryer and press “ON/SELECT”.

2. Select **Automatic - Less Dry** and press “START”.
3. If the motor will not stop after 16 seconds, check sensor strip (Y-R to G-Y).
 - a. If 0 ohms with no load, check for a short in the sensor or the Y-R wire.
 - b. If infinite ohms (Y-R to G-Y should be infinite with no load,) replace the electronic control assembly.

If the dryer shuts off too soon in an “Automatic” cycle, check the following:

- Harness/Connection
- Sensor Strip
- Control Assembly

1. Short the sensor strip together and press “ON/SELECT”.
2. Select **Automatic - Less Dry** and press “START”.
3. If the motor stops after a 16 second delay, short Y-R at the control assembly.
4. Repeat steps 1 & 2.
 - a. If the motor runs more that 16 seconds, repair or replace the sensor and the Y-R wire.
 - b. If the motor stops after a 16 second delay, replace the electronic control assembly.

Heater Box Hi-Limit Thermostat Test

1. Remove the thermistor from the fan housing and plug the hole.

NOTE: Protect the thermistor and leads from grounding against any metal parts.

2. Completely block the exhaust outlet.
3. Turn the dryer on and allow the hi limit thermostat to cycle once. Measure the time required for the hi-limit thermostat to trip. Nominal times are anywhere from 21 to 90 seconds.
4. Reinstall the thermistor after testing the hi-limit thermostat.

Thermistor Test

1. Check the wiring to the thermistor.
2. Disconnect the thermistor and check the internal resistance. (*Figure 16*)

Thermal Fuse

A thermal fuse is used on fifth generation electronic electric dryers. The thermal fuse is wired in series in the L1 line of the dryer. If the thermistor fails, the thermal fuse opens and shuts off power to the motor and heater to prevent overheating. Once the thermal fuse has opened, it must be replaced.

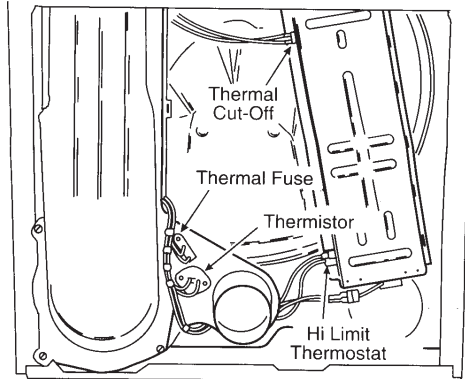
THERMISTOR RESISTANCE	
TEMP °F	Ω
50°	19.9K
60°	15.3K
70°	11.9K
80°	9.2K
90°	7.4K
100°	5.7K
110°	4.7K
120°	3.7K
130°	3.1K
140°	2.4K

Figure 16

Thermal Cut-Off

Fifth generation electronic electric dryers are equipped with a “one-shot” thermal cut-off. If the dryer does not heat and there are 240VAC to the dryer, disconnect the dryer from the household electrical source and check the thermal cut-off for continuity. If continuity is open, the thermal cut-off has failed and it must be replaced. (Fig. 17)

Figure 17



SERVICING PROCEDURES

SOLID STATE ELECTRONIC CONTROLS

NOTE: All diagnostic tests must be performed before any attempt is made to remove the electronic control assembly.

Control Assembly Removal and Replacement

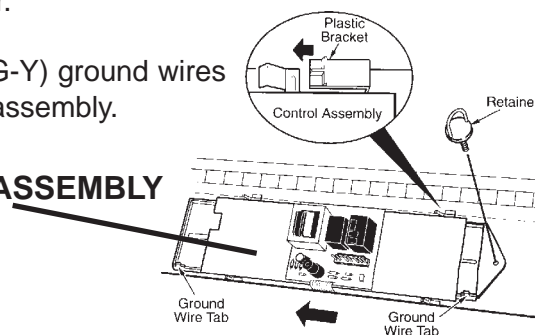
Refer to Figure 18 for these procedures

1. Open the console to the service position.
2. Unplug 9-pin connector and the 2 relay terminals from the electronic control assembly. (A slotted screwdriver may be used between the 9-pin connector and locking tab to aid in removal.)
3. Disconnect the ground wires (G-Y) from the metal chassis of the control assembly.
4. Pull the retainer from the right end of the assembly.
5. Free the control assembly from the plastic brackets by sliding it to the left and lifting it out.
6. Replace is the reverse order.

NOTE: Be sure to reconnect the (G-Y) ground wires to the metal chassis of the control assembly.

CONTROL ASSEMBLY

Figure 18



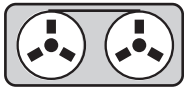
() Section 4 - CONFIRMATION OF UNDERSTANDING EXERCISES

1. To enter the test mode on 5th generation washers:
 - a. Press the ON/SELECT button four times.
 - b. Press TIME Select + TEMP Select + TIME Select + TEMP Select within 10 seconds.
 - c. Press the ON/SELECT and the CANCEL buttons twice.
 - d. Unplug the washer and wait 30 seconds before plugging it back in.

2. To enter the test mode on 5th generation dryers:
 - a. Press the ON/SELECT button four times.
 - b. Press the Automatic or Timed SELECT button four times.
 - c. Press the ON/SELECT and the CANCEL buttons twice.
 - d. There is not a test mode for the dryer.

3. The electronic control boards on 5th generation washers and dryers:
 - a. Have servicable parts mounted on them.
 - b. Should be replaced any time the appliance is serviced.
 - c. Should not be replaced until all diagnostic tests have been conducted.
 - d. None of the above.

4. 5th generation washers and dryers are:
 - a. Substantially different mechanically than previous models.
 - b. Mechanically nearly the same as previous models.
 - c. None of the above.
 - d. Hopelessly complex.



View Section 5 of the Video Tape

Section 5 **TECH TIPS**

TESTING PROCEDURE FOR WATER LEVEL TRANSDUCER

Washers equipped with 5th Generation Electronic Controls use a solid state electronic pressure transducer to convert air pressure created in the pressure dome to a low voltage square wave signal to determine water level. The microcomputer on the electronic control board translates the varying frequency of the square wave into inches of water in the tub.

This test can be conducted to determine proper operation of the pressure transducer and the control board.

1. Use a VOM and check for the presence of 5VDC between pins 1 and 3 of P1. If there is no voltage present, replace the control board.
2. With the washer empty, use a VOM and check for the present of .7VDC between pins 1 and 2 of P1. If no voltage is present, replace the pressure transducer.

NOTE: When using an **analog VOM** (with a needle movement meter) the voltage may not read exactly as indicated above. The voltage reading is dependent on the method any particular meter uses to average the square wave frequency to derive the voltage reading. As a result, a chart can not be provided to confirm water level verses voltage reading.

When using a **digital VOM** (with an LED display) the voltage reading is again dependent on the method used to derive the voltage reading by averaging the frequency of the square wave signal. Some digital VOMs can directly read the signal frequency, but this is rare. As a result, a chart can not be provided to confirm water level verses voltage reading.

Because voltage readings may not read exact factory specifications, this test is only to confirm that the output between low level (.7VDC) and the high level (5VDC) is present and that the transducer is working. It does not confirm the accuracy of the water level readings.

Current water levels can only be determined by running a wash cycle and observing the actual water level in the tub. These levels are determined by software in the microcomputer and are not adjustable.

TESTING PROCEDURES FOR LED INDICATORS

If a particular LED indicator on the electronic control board does not light when a selection is made a VOM can be used to determine if DC voltage is present across the LED leads.

If an **analog VOM** is used the needle should show a positive voltage reading if the LED is operational.

If a **digital VOM** is used it will not show a DC voltage reading on the normal DC voltage setting. The digital VOM should be equipped with a diode setting to properly check the LEDs.

PRODUCT SPECIFICATIONS AND WARRANTY INFORMATION SOURCES

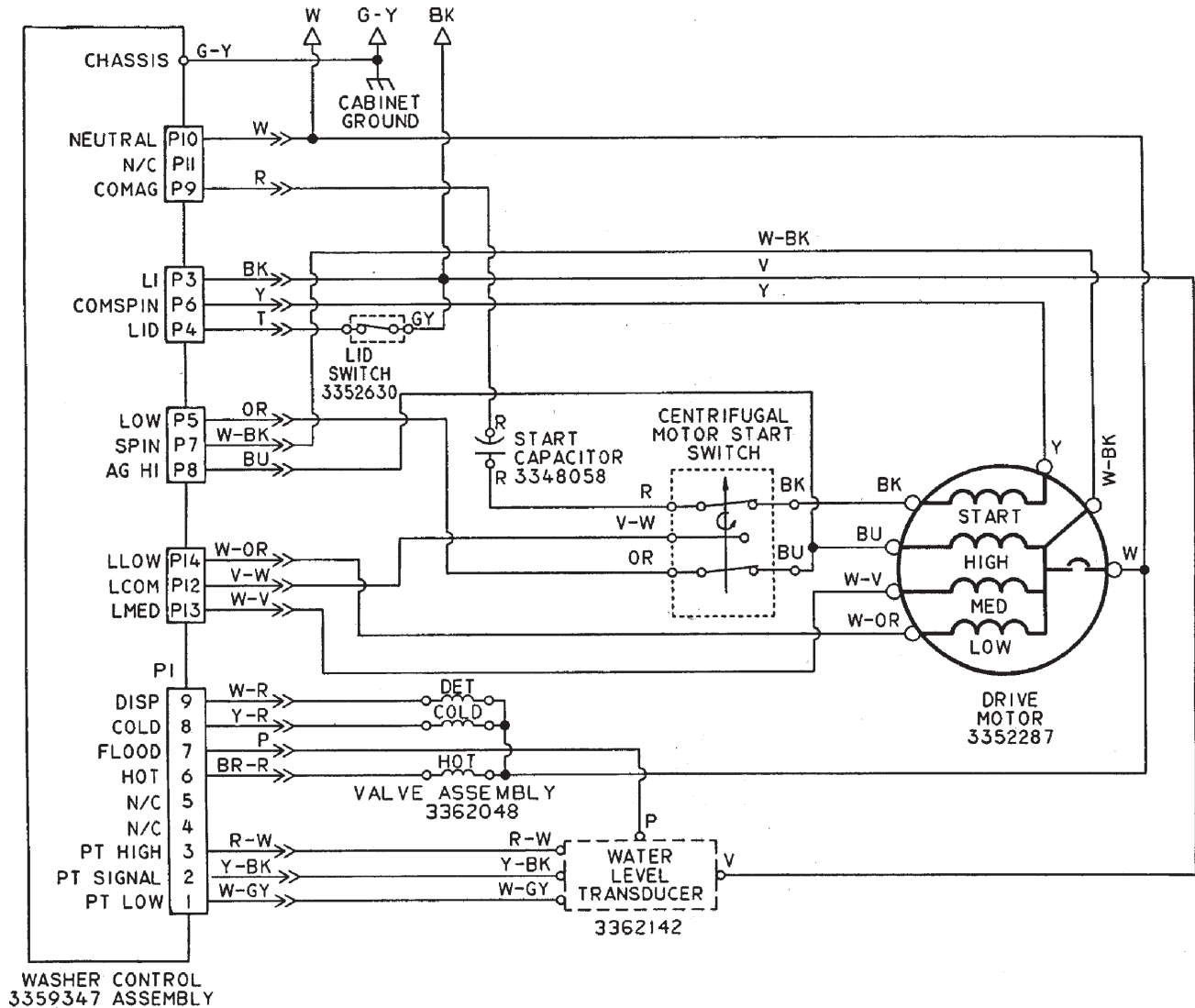
FOR WHIRLPOOL PRODUCTS: 1-800-253-1301
FOR KITCHENAID PRODUCTS 1-800-422-1230

FOR TECHNICAL ASSISTANCE WHILE AT THE CUSTOMER'S HOME CALL:
1-800-253-2870

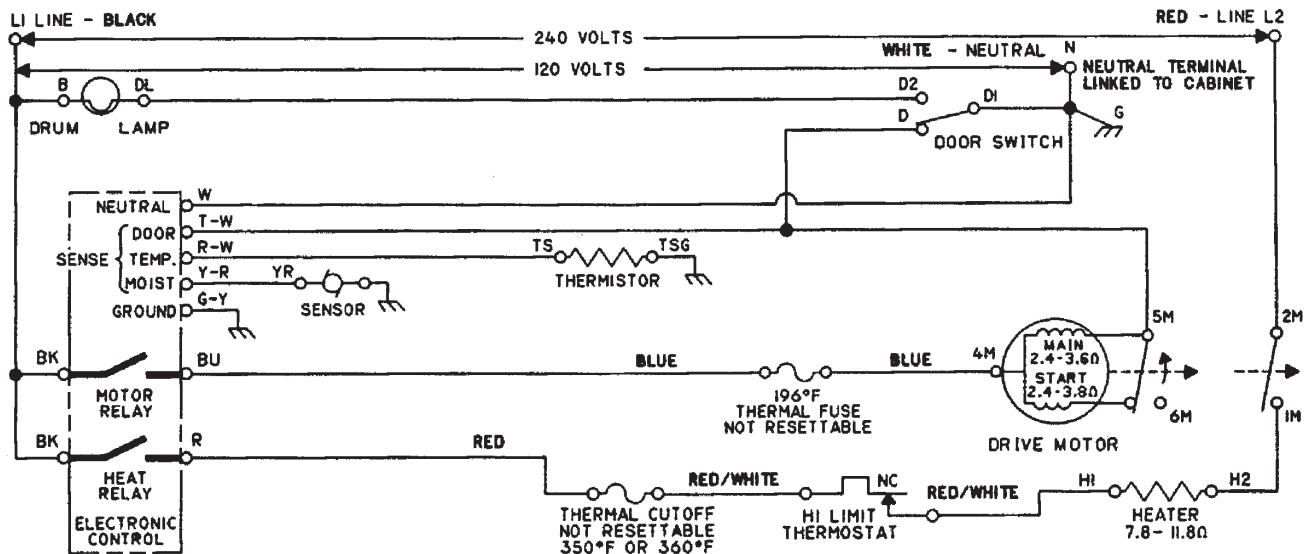
Have your store number ready to identify you as an Authorized Servicer

WIRING DIAGRAMS

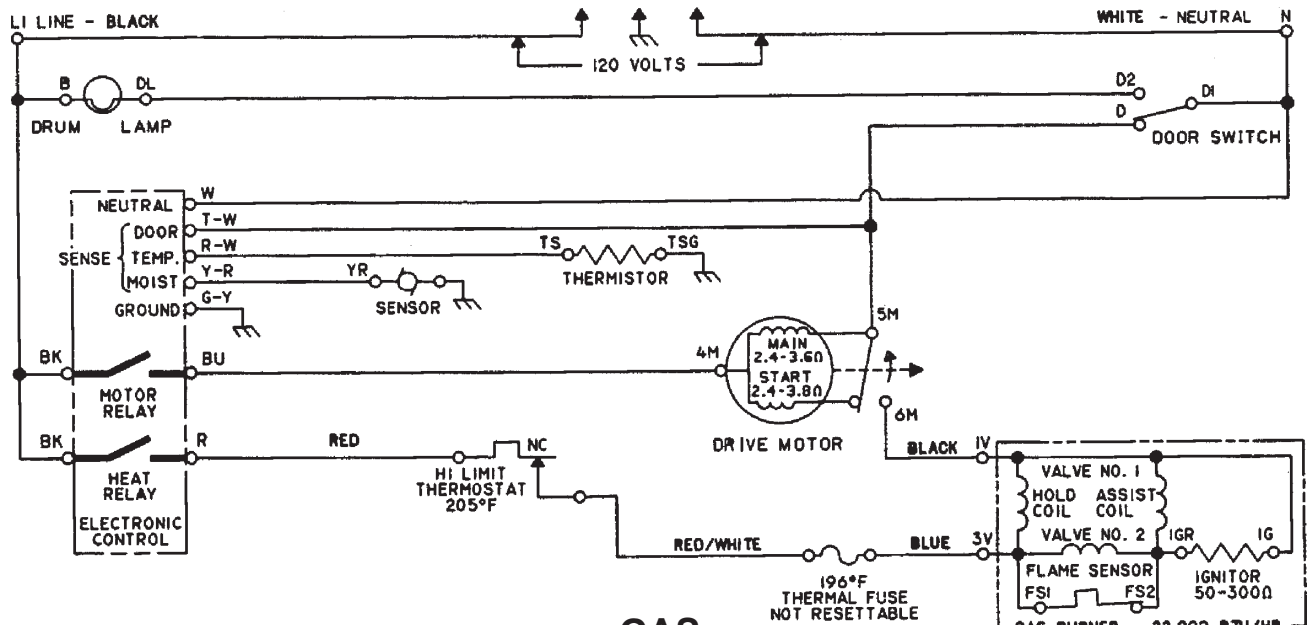
THREE SPEED AUTOMATIC WASHER



AUTOMATIC DRYER



ELECTRIC



GAS

CONFIRMATION OF UNDERSTANDING EXERCISES ANSWER SHEET

SECTION 2

1. B
2. A
3. B
4. A
5. B

SECTION 3

1. B
2. A
3. A
4. B

SECTION 4

1. B
2. D
3. C
4. B

