

# Neptune Front Load Washer—Technical Information

## MAH7500\*

- Due to possibility of personal injury or property damage, always contact an authorized technician for servicing or repair of this unit.
- Refer to Service Manual 16010061 for detailed installation, operating, testing, troubleshooting, and disassembly instructions.



### CAUTION

All safety information must be followed as provided in Service Manual 16010061.



### WARNING

To avoid risk of electrical shock, personal injury or death; disconnect power to washer before servicing, unless testing requires power.

#### Service Technician Please Note:

Access diagnostic codes through **Service Mode** before beginning repair.

#### SERVICE MODE

The Service Mode provides service personnel the ability to verify the operation of the washing machine. The Service Mode can be entered at any time. While in the Service Mode, the servicer can start special service tests such as a service cycle. While in the Service Mode, menus can be displayed and a variety of other information about the machine can be accessed.

#### ACCESSING SERVICE MODE

Press and hold the “**back**” and “**help**” keys for 3 seconds to start the Service Mode. The following information will appear on the touch screen.

#### Quick Spin Test

##### service tests

0 RPM  
0 Torque  
0 Unbal

##### system check

##### diagnostic code

4-Diagnostic code #1  
9-Diagnostic code #2  
6-Diagnostic code #3  
4-Diagnostic code #4

##### exit service

Press the “**diagnostic code**” on the touch screen to see all of the diagnostic codes that have been logged. See the following table for their descriptions, triggers and actions to be taken.

#### DIAGNOSTIC CODES

Diag Code	Description	Trigger	Action to be Taken
1	No Drain	The water level failed to drop below the low water level in a final spin.	Go to “ <b>Will Not Drain</b> ”, page 4.
2	The door fails to unlock	Door failed to unlock after 11 attempts.	Go to “ <b>Will Not Unlock</b> ”, page 4
3	No fill	Continuous fill of 12 minutes or total fill of 14 minutes.	Go to “ <b>No Water Fill</b> ”, page 3.
4	The door fails to lock	Door failed to lock after 11 attempts.	Go To “ <b>Will Not Lock</b> ”, page 3.
5	Continuous unbalance circuit (During Spin only).	Unbalance circuit is always open.	Go to “ <b>Wet Clothes</b> ”, page 3. (See unbalance harness connections)
6	Locked rotor	Motor did not turn after 10 consecutive retry attempts.	Go to “ <b>Motor Drive System Test</b> ”.

# Diagnostic Codes



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Diag Code	Description	Trigger	Action to be Taken
7	Heater not heating	Temperature rise not detected when heater was on for 10 minutes.	Check heater and sump thermistor for continuity. Was heater on with no water fill?
8	Water sensor level fault	The low water level is not satisfied before the high water level contacts are opened in the pressure switch.	Go to <b>"No Fill Test"</b> , page 6
9	(Not Used)		
10	Low RPM unbalanced load	Did not reach 500 RPM due to an unbalanced load.	Go to <b>"Wet Clothes"</b> , page 3
11	Non-volatile memory error	Difficulty in reading memory	1. Unplug and reconnect power cord at power supply outlet. 2. If condition still exists, replace Machine Control Board.
12-14	(Not Used)		
15	Stuck key	A key is sensed to be pressed for more than 75 seconds, the key is assumed to be stuck.	Replace Membrane switch.
16	High speed not achieved due to high motor torque.	Speed never exceeded 500 RPM during a main wash cycle. Experienced maximum torque for extended period.	Go to <b>"Wet Clothes"</b> , page 3

Diag Code	Description	Trigger	Action to be Taken
17	Door actuator switch was not detected open since the final spin.	The door has not been opened after a complete wash cycle.	1. Customer may have tried to repeat wash cycle without opening door. 2. Go to <b>"Door Lock Test"</b> , page 6
18	Door lock detected open during cycle.	Door lock switch is detected as open with motor running	1. Clear the diagnostic code; recheck. 2. Go to <b>"Door Lock Test"</b> , page 6
19-21	(Not Used)		
22	Door switch detected open during cycle.	Door switch is detected as open and the door lock switch is perceived as locked.	Check harness connections at door open/closed switch and for switch continuity.
23	Door is locked at start of cycle.	Door lock is locked and user tries to start a cycle.	Go to <b>"Will not Unlock"</b> , page 4
24	Motor over speed	Motor tach signal detected at maximum speed.	Replace Motor Control Board
25	Motor tach signal exists without motor running.	Tach signal exists without torque command.	Clear diagnostic codes; possible line noise issue. If problem persists, replace Motor Control Board
26-27	(Not Used)		
28	Valve thermistor failure	Abnormal high/low temperature or ohm resistance detected.	Go to <b>"Wrong Water Temperature"</b> , page 4
29	Sump thermistor failure	Abnormally high/low temperature or ohm resistance detected.	Check harness connections, check continuity of sump thermistor.
62	Unlock problem	Conditions for unlock not met.	Go to <b>"Will Not Unlock"</b> .

# Troubleshooting



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**Note:** If any “unused codes” appear on the screen, disregard these codes. This is normal. The non-listed codes are insignificant codes.

### TROUBLESHOOTING THE SYMPTOMS

#### Leaking

- Make sure supply hose connections are not leaking. Check for rubber gasket damage due to over tightening.
- Make sure end of drain hose is correctly inserted and secured to drain facility.
- Avoid overloading which can push the door partially open.
- Check internal hose connections
- Check tub cover. Remove, reposition and reinstall the tub cover seal. Seal seam must be at the top of the tub cover.

#### Display Lights Up When Door Opened

- This is normal behavior.

#### No Tumble

- Washer does not tumble for the first 30 seconds after the door has been opened for safety purposes.
- Fabric cycles such as DELICATES and HAND WASH only tumble for a few seconds every 30 seconds.
- Check for loose connections at Machine Control Board, Motor Control Board and Motor.
- Perform “**Motor Drive System Test**”.
- Washer does not tumble during some drains and rinse fills.

#### No Water Fill

- Check to make sure water supply is fully turned on. Normal water level is only 2.5 to 5 inches inside and toward the rear of the spinner.
- Check for kinks in inlet hoses.
- Check for clogged inlet screens.
- Visually check hot and cold separately at dispenser for proper flows.
- Perform “**No Fill Test**” page 6.

#### Noisy

- Clothes washer should be leveled properly as outlined in installation instructions.
- Weak floors can cause vibration and walking.
- Check for loose lower front weight
- Verify rubber feet are installed on leveling legs.

- Check that the leveling leg lock nuts are tightened.
- If complaint is a high-pitched noise during fill then disconnect supply hoses and clean screens.
- Check for proper spring placement of outer tub support springs.
- Check strut operation.

#### Tub is completely full of suds

- Run the clothes washer through another complete cycle using cold water and no more detergent.
- Reduce detergent amount in the future for that specific load size and soil level. Towel loads have a minimal amount of soil present and typically create more suds.
- Use high efficiency or low sudsing detergent specially formulated for front load washers.
- Check for restricted drain system.
- Check for loose wire connections at Control Board and Drain Pump.
- Check to see if belt is off motor and pulley.
- Perform “**Motor Drive System Test**”.

#### Wet Clothes

- Very small clothes loads can cause unbalances. Add additional towels.
- Excessive suds may have been present. Check for diagnostic code 16.
- Check unbalance harness connections at all switches and at main harness connection on top of Outer Tub Assembly for connectivity.
- Inertial Unbalance Switch tripped too soon, resulting in lower spin speeds. Run Quick Spin Test to check unbalance switches and Control Board.
- Check for restricted drain system.
- Perform “**Motor Drive System Test**”.

#### Will Not Lock

- Check to see if the door is closed.
- Check electrical connections at lock assembly and Machine Control Board. Perform “**Door Lock Test**”.

# Troubleshooting



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### Will Not Unlock

- Unplug and reconnect the power cord. Wait 2 minutes to see if machine unlocks.
- Check for door locked switch circuit to be closed at Machine Control. (**See Board Input/Output Chart, pages 7-8**).
- Check to make sure belt has not fallen off.
- Check for loose electrical connections at door lock and at Machine Control Board.
- Perform "**Motor Drive System Test**".

### Will Not Start

- Plug cord into live electrical outlet.
- Check fuse or reset circuit breaker.
- Push the "**off**" button then open and close the door. Push the "**start/pause**" button to start the clothes washer.
- Check to see if the washer is in a pause or soak period in the cycle. Wait briefly for cycle to change.
- Check for restricted drain system.

### Will Not Drain

- Check for restricted drain system.
- Check low and high water levels. Perform "**No Fill Test**".
- Check for 120 VAC at the pump when a spin cycle is selected.

### Wrong Water Temperature

- Too Hot/Too Cold- since this product uses a low amount of water, the board regulates the incoming flow to temper the actual temperature of the water in the tub. This may appear to be significantly warmer/cooler than expected.
- Are both faucets turned ON fully?
- Make sure temperature selection is correct.
- Make sure hoses are connected to correct faucets and inlet connections. Flush water line before filling washer.
- Check the owner's water heater. It should be set to deliver a minimum 120°F (49°C) hot water at the tap. Also check water heater capacity and recovery rate.
- If the water heater is located a long distance from washer, water line may need to be purged prior to starting wash cycle.
- Disconnect inlet hoses and clean screens.
- This washer can sense if the fill hoses have been reversed between hot and cold. If the fill hoses on the washer were previously installed incorrectly and then corrected, the washer will

need to run through a Hot / Cold cycle. If not resolved, check for proper resistance on the water valve thermistor. (**See Board Input/Output Chart; pages 7-8**).

### Diagnostic Tests

Touching any of the screens on the washer control panel will initiate the corresponding test.

Service Tests	
user interface test	service cycle
quick spin test	advance to next step
system check	exit service tests

### User Interface Tests

This test will check the touch screen and the membrane pad. The technician will be prompted what to do.

### Service Cycle

The Service Cycle is used to run a quick cycle that performs all of the normal wash cycle functions.

**Initiating a Service Cycle:** If the washer is not operating in a wash cycle, touch the button "**service cycle**" to begin the Service Cycle.

### During a wash cycle:

Press the "**service cycle**" button; then cancel the wash cycle, and start the washer in the Service Cycle. If the washer is running during Service Cycle the screen will display the various inputs and outputs of the washer.

### System Check

(See System Check) will allow you to perform system checks of the various inputs and outputs of the washer.

### Advance To Next Step

Selecting "**advance to next step**" button advances the cycle to the next step in the cycle.

# Troubleshooting



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### Quick Spin Test

To begin test, select "**quick spin test**" button. The washer will display the following during the test:

"Static Drain"  
"Spin to 350 RPM"  
"Spin to 550 RPM"  
"Spin to 600 RPM"  
"Spin to 650 RPM"  
"Spin to 800 RPM"  
"Spin to 1000 RPM"  
"Coast down and unlock at 0 RPM"  
"Quick Spin Test complete"

Any of the steps in this test can be held or paused up to 30 minutes, by touching the "**hold at this step**" button.

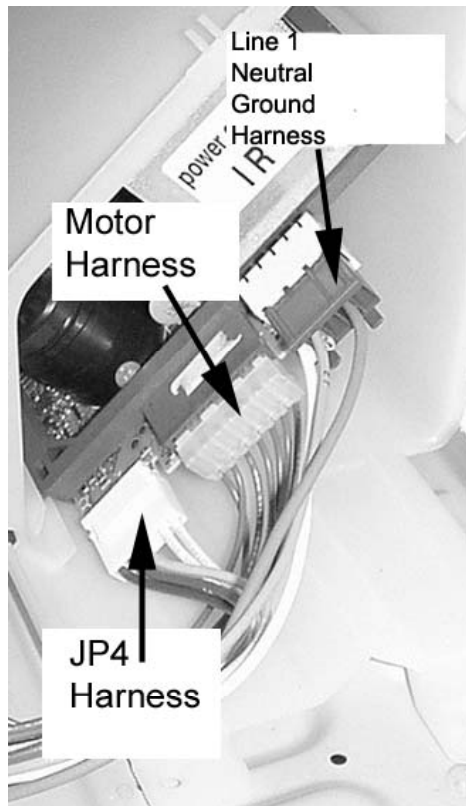
"**cancel & exit quick spin test**," returns you to the Service Tests screen.

### Motor Drive System Test

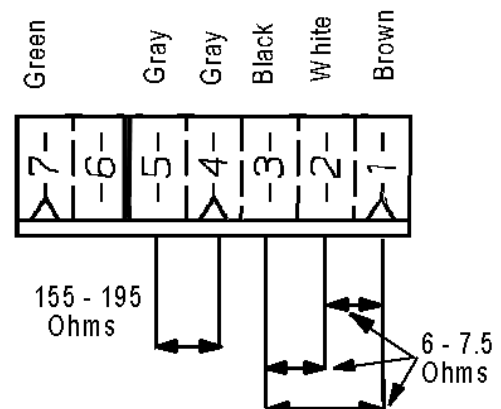
Perform a Motor and Motor Control Test.

#### Motor & Motor Control Test

1. Disconnect power to the washer.
2. Remove the front panel and pull the JP4 Connector from the Motor Control Board.



3. Reconnect the washer power cord to supply voltage.
4. Press and hold the "**help**" and "**back**" keys for 3 seconds to start the Service Mode.
5. Select "**system check**"; touch "**toggle motor control on**".
6. The Motor Control will immediately execute a test routine and the motor should run, rotating the spinner at 50 rpm.
7. If the motor runs, and the spinner rotates at the proper RPM: the problem lies outside of the motor and Motor Control Circuit.
8. If the motor runs, but the spinner does not rotate: Check for missing belt.
9. Verify 120VAC at L1 and N connection at Motor Control Board.
10. If voltage is present, then problem lies with the motor and Motor Control System.
11. Disconnect power to the washer and reconnect the JP4 Interface connector to the Motor Control.
12. Check for loose electrical connections at motor, and Motor Control Board.
13. Check phase windings of the motor.



14. If motor windings are good, replace the Motor Control Board.

#### If voltage is not present;

15. Check loose electrical connections at Machine Control Board or broken wires in harness.
16. Check door actuator switch and related wiring.

# Troubleshooting

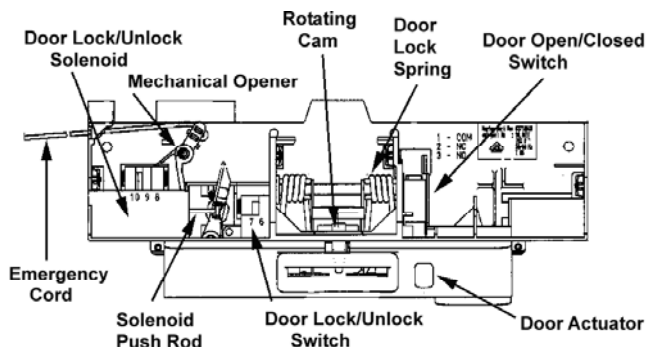


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### Door Lock/Unlock Test

**Note:** The relay on the Control Board for the door unlock mechanism is disabled if the Motor Control Board indicates the spinner speed is > 7 RPM.



#### Door Unlock Test

1. Press "**off**"; verify the Door Lock/Unlock solenoid harness connections are not loose and wiring is correct. Does the door unlock?
2. Disconnect power to the washer and perform a continuity check between Conn P8(3) of the Machine Control Board and the Neutral prong on the power cord. There should be continuity.

#### Door Lock Test

1. Start a "**system check cycle**"; verify the Door Lock/Unlock solenoid harness connections are not loose and wiring is correct. Does the door lock?
2. Disconnect power to the washer and perform a continuity check between Conn P1(1) of the Machine Control Board and the Neutral prong on the power cord. There should be continuity.

### No Fill Test

1. Verify that the cold and hot water supplies at the faucet are turned on and can supply water.
2. Remove the hoses and clean out any debris from both ends and the hot and cold water valves.
3. Close the door and start a "**spin cycle**" to drain all water from the washer to reset the Pressure Switch.
4. Press "**off**" and open the door to verify that all water is removed from the washer. If water is still present, Go to page 4.
5. If water is drained out, close the door and enter "**service mode**" (press "**help**" and "**back**" for 3 seconds). Obtain access to the Water Valve,

- Pressure Switch, and Control Board for voltage checks by raising the Top Cover and loosening the Console now. Make sure the door is closed.
6. Enter the System Check mode by pressing the appropriate button on the touch panel. The door should lock when System Check mode is entered.
  7. Verify that the low water level is empty ("wash level (low) empty"). If the low level is full, check the low water level input at the Control Board connector by reading the DC voltage between P3(5) and P3(3). If more than 2VDC, check the voltage at the Pressure Switch between the BU and the BR wires. If more than 2VDC, replace the Pressure Switch. If voltage is not present at the Pressure Switch, check or replace the wire harness. If no voltage is present at the Control Board, replace the Control Board.
  8. If the low water level is shown as empty, verify that the door is sensed closed. The Control Board cannot sense the high water level with the door open.
  9. Verify that the high water level is empty ("rinse level (high) empty"). If the high level is full, check the high water level input at the Control Board connector by reading the AC voltage between P1(8) and P8(2). If less than 60VAC, check the continuity at the Pressure Switch between the GY and YL wires. If no continuity, replace the Pressure Switch. If there is continuity, check or replace the wire harness. If more than 60VAC is present at the Control Board, replace the Control Board.
  10. If the high water level is shown as empty, turn the Cold Water Valve on by pressing the "**toggle cold**" button. Verify that cold water is flowing in the dispenser. If it is not flowing, check the Cold Water Valve for 120VAC between the BU and WH wires. If 120VAC is not present at the cold valve, check for 120VAC at the Control Board between P1(4) and P8(2). If 120VAC is present at the Control Board, check or replace the wire harness. If 120VAC is not present at the Control Board, replace the Control Board. If cold water flows, turn the cold valve off by pressing the "**toggle cold**" button.
  11. Drain all of the water out of the washer by pressing the "**toggle drain**" button until drained, then turn the drain off.
  12. Turn the Hot Water Valve on by pressing the "**toggle hot**" button. Verify that hot water is

# Troubleshooting



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flowing in the dispenser. If it is not flowing, check the Hot Water Valve for 120VAC between the OR and WH wires. If 120VAC is not present at the hot valve, check for 120VAC at the Control Board between P1(3) and P8(2). If 120VAC is present at the Control Board, check or replace the wire harness. If 120VAC is not present at the Control Board, replace the Control Board. If hot water flows, turn the hot valve off by pressing the **"toggle hot"** button.

## System Check

System Checks can be initiated at any time. If the washer is not in a wash cycle, the following screen will display and allow the technician to toggle various components On/Off.

Screen with washer in a wash cycle:

**to toggle outputs, press  
"cancel cycle" to go to system check**

### OUTPUT STATUS

hot water OFF  
cold water OFF  
bleach valve OFF  
fabric softener OFF  
drain OFF  
motor control OFF  
heat OFF  
Torque 3

### INPUT STATUS

door closed  
door unlocked  
no unbalance  
wash level (low) full  
rinse level (high) full  
fill temp 70-85 °F  
sump temp 72  
RPM 47

cancel cycle

exit system check

Screen with the washer not in a wash cycle:

## System Check

toggle  
hot on

toggle  
cold on

toggle  
bleach on

toggle  
fab. soft. on

toggle  
drain on

toggle  
mtr. ctrl. on

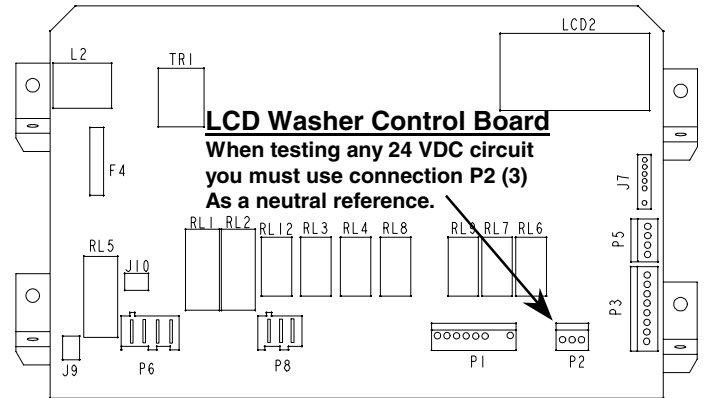
toggle  
heater on

exit system  
check

### INPUT STATUS

door closed  
door locked  
no unbalance  
wash level (low) full  
rinse level (high) full  
fill temp 70-85 °F  
sump temp 72  
RPM 0

## Machine Control Board Input/Outputs



The MAH7500 Machine Control Boards low voltage DC outputs are isolated from the 120V circuitry.

Neutral from the incoming line cannot be used to achieve a valid 24VDC reading.

## Board Input/Output Chart

Descr.	Conn/ Pin Number	Reference To Conn/ Pin Number	Voltage	Comments
Bleach water valve output	P1(5)	P8(2)	120 VAC	
Cold water valve output	P1(4)	P8(2)	120 VAC	500-1K ohms
Door Lock output	P1 (1)	P8 (2)	120 VAC	60 millisecond pulse
Door Lock switch input	P3 (8)	P2 (3)	24VDC	Locked; 24VDC
Door switch input	P8 (1)	P8 (2)	120 VAC	Closed; 120VAC
Door Unlock output	P8 (3)	P8 (2)	120 VAC	60 millisecond pulse
Drain pump output	P6 (4)	P8 (2)	120 VAC	
Heater-Neutral	P6 (1)	P8 (1)	120 VAC	
High water level - input	P1 (8)	P8 (2)	120 VAC	
Hot water valve output	P1 (3)	P8 (2)	120 VAC	500-1K ohms

# Troubleshooting



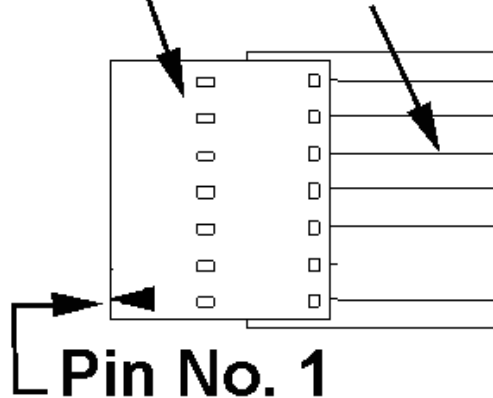
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Descr.	Conn/ Pin Number	Reference To Conn/ Pin Number	Voltage	Comments
L1 to machine control board	P6 (2)	P8 (2)	120 VAC	
L1 to motor control	P6 (3)	P8 (2)	120 VAC	
Lower water level - input	P3 (5)	P2 (3)	24VDC	Empty; 24VDC
Motor control tach	P2 (1)	P2 (3)	24VDC	
Neutral (120 VAC)	P8 (2)		Neutral	
Unbalance input	P3 (2)	P2 (3)	24VDC	No unbalance condition; 24VDC
Softener water valve	P1 (6)	P8 (2)	120 VAC	
Sump Heater Thermistor	P5(3)	P5(4)	1-5VDC	Dependent on temperature
Torque PWM	P2(2)	P2(3)	24VDC	
Water valve thermistor	P3(6)	P3(7)	1-5VDC	NTC

## P7 Connector

## Ribbon Harness



## MEMBRANE PAD CHECKS

Check the Membrane Pad, by pulling the P7 connector from the Machine Control Board and locating the corresponding switch pin numbers in the ribbon harness. There should be <100 ohms present when the pad is pressed.

Membrane Pad	Pin Number	Pin Number
<i>home</i>	P7 (3)	P7 (5)
<i>favorites</i>	P7 (4)	P7 (5)
<i>back</i>	P7 (3)	P7 (6)
<i>start/pause</i>	P7 (3)	P7 (7)
<i>off</i>	P7 (4)	P7 (7)
<i>help</i>	P7 (4)	P7 (6)



# Troubleshooting



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## HELP CODE TABLES

Help Code	Description	Trigger	Action To Be Taken
1	Plaster Unbalance Load Detected.	Unbalance load condition existed during initial ramp up of spin cycle. Resulted in redistribution cycle.	Informative only; non-critical condition
2-6	(Not Used)		
7	Slow drain	Low water level contacts of Pressure Switch not seen as resetting at end of drain cycle.	Check for restricted drain system, kinked/plugged drain hose or pump. Check pump for proper function. May see diagnostic code 01.
8	One locked rotor	During startup, the Spinner did not reach 10 rpm within 2 sec. (During Wash/Tumble).	Informative only; non-critical condition.
9	Fill hoses are reversed.	Water Valve Thermistor readings are contrary to what is being demanded by washer Control Board.	Inlet hoses reversed at the faucets for Hot and Cold.
10	Locked rotor condition during a spin.	Locked rotor condition during a spin	Informative only; non-critical condition.
11	(Not Used)		
12	Too much power at speed >850 rpm	Motor on at full power for 30 seconds at >850 rpm.	Informative only; non-critical condition.
13	Low Speed Unbalance Detected.	Opening of Unbalance Switches at speed <500 rpm and >100 rpm during a spin.	Informative only; non-critical condition.
14	High Speed Unbalance Detected	Opening of Unbalance Switches at speed >850 rpm and during a final spin.	Informative only; non-critical condition.
15	(Not Used)		

# Troubleshooting



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16	Spin suds lock	Suds lock, full power given to motor by Motor Control Board for 1 second within a spin at less than 500 RPM; for example during the spin cycle.	Too much detergent; non-HE detergent with suds suppressor being used; washing clothes with minimal amount of soils present with normal measure amount of detergent.
17	High speed unbalance detected.	Opening of Unbalance Switches at speed >500 RPM and during a final spin.	Informative Only
18	(Not Used)		
19	Power down	Loss of power.	Will indicate power failure until a key is pressed. If a cycle was in process prior to loss of power, then pressing " <b>start/pause</b> " key will resume cycle and clear the " <b>PF</b> " display.
20	(Not Used)		
21	Fast fill	Fill level reached within 2 seconds of fill initiation.	Possible slow drain scenario present or customer interrupted wash cycle and started washer over again. Check for Diagnostic Code 08.
22	(Not Used)		
23	Too Much Power At 550 - 850 rpm.	Motor on at full power too long between 550 - 850 rpm.	Informative Only
24-29	(Not Used)		
33	Excessive Suds Detected During Wash/Tumble.	Control Board detects motor torque dropping.	Too much detergent; non-HE detergent with suds suppressor being used; washing clothes with minimal amount of soils present with normal measure amount of detergent.
34	Too much power at start of spin.	Maximum torque requested in Spin Less Than 110 RPM.	Perform Motor Drive System Test. Check wire harness. Perform connections at Motor, Motor Control Board (JP4 connector) and Machine Control Board connections.
35	Too much power during Wash/Tumble.	Maximum torque requested in Wash/Tumble.	Perform Motor Drive System Test. Check wire harness connections at Motor, Motor Control Board (JP4 connector) and Machine Control Board connections.

# Troubleshooting



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36	Motor still running after 240 seconds of coast down after a spin.	Motor still running after 240 seconds of coast down after a spin.	Informative only
37	Motor running during tumble for too long.	1 minute after start of tumble, if speed is > 85 RPM.	Informative only
38-39	(Not Used)		
40	The door is not locked while spinning.	Motor running >85 RPM and the door is not locked.	Perform Motor Drive System Test. Check wire harness. Perform connections at Motor, Motor Control Board (JP4 connector) and Machine Control Board connections.
41	Loss of Tach Signal during door unlock sequence.	Cycle was paused due to failure to verify Tach Signal during unlock request.	Informative only; Refer to Diagnostic code 62
42	Motor Control Not Powered During Unlock.	Cycle was paused because Motor Control not powered during unlock request.	Informative only; Refer to Diagnostic code 62
43	Tach Signal unexpectedly present during unlock.	Cycle was paused because the Tach occurred when the Motor Control was powered during unlock request.	Informative only; Refer to Diagnostic code 62
44	Unlocking attempts disallowed because Tach Signal continues after Tach verification.	No Tach Signal observed when Motor Control is powered at the end of the failed fast power up and unlock retries.	Informative only; Refer to Diagnostic code 02
45	Door locked when not expected.		Check Door Lock Switch for welded contacts.
46	Cabinet impact sensed.	Cabinet impact detected by the frame vibration sensor.	Informative only

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47	Door did not lock after the first try.	The Door Lock Switch did not go from unlocked to locked when the door lock output was energized.	Informative Only
48	Door did not unlock after the first try.	The Door Lock Switch did not go from locked to unlocked when the door unlock output was energized.	Informative Only

# Wiring Diagram



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