

MAYTAG

Customer Service

MAYTAG NEPTUNE™



Washer Service Manual

16010061
Compiled From
16008373, 16010199,

SAFETY PRECAUTIONS

This manual is to be used only by a Maytag Authorized Service Technician familiar with and knowledgeable of proper safety and servicing procedures and possessing high quality testing equipment associated with microwaves, gas, and electrical appliance repair.

All individuals who attempt repairs by improper means or adjustment subject themselves and others to the risk of serious or fatal injury.

USE ONLY GENUINE MAYTAG APPROVED FACTORY REPLACEMENT COMPONENTS.

INTRODUCTION

Each model will be covered separately in a section pertaining only to its control system and internal components. Because the basic structure for all washers is the same, they will be covered generally without regard to model.

Model(s) covered in this manual:

MAH3000

For additional information on material covered in this manual, including safety issues, contact:

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SECTION 1. GENERAL INFORMATION

PRE-INSTALLATION REQUIREMENTS

NOTE: *Proper installation is the responsibility of the purchaser.*

Checkpoints for proper installation:

- Properly grounded electrical outlet is required. Use 15 amp fuse or compatible circuit breaker for electrical service.
- Standpipe Drain System must accept 1½" O.D. drain hose. Standpipe height of 36" is recommended.

NOTE: *If drain standpipe is in excess of 5 feet above floor level, install pump accessory kit, part number 22002136.*

- This unit is not equipped with a siphon break, and the drain hose must be elevated to a minimum height of 24". A 36" high standpipe is recommended. For all installations the drain hose must be supported by the drain hose strap on the back of the washer.
- Hot and Cold water faucets must be within four (4) feet of the back of the washer. This allows quick access for immediate water shut off.
- Water heater should be set to deliver a minimum of 120°F (49° C) hot water to the washer.
- Do not store or operate washer in temperatures below freezing. This can cause damage to the pump, hoses and other components.
- Water pressure of 20 - 120 P.S.I. is required to fill the washer in the appropriate time frame. Pressures of less than 20 P.S.I. may

cause an extended fill time. Refer to the troubleshooting section for more information regarding a solution for slow fill situations.

- Best performance is obtained with the washer installed on a solid floor. Wood floor constructions may need to be reinforced to minimize vibration from unbalanced load situations. Carpets and soft tile surfaces are also contributing factors to vibration and/or movement during the spin cycle. Never install washer on a platform or weak support structure.

UNCRATING INSTRUCTIONS

NOTE: *The following steps must be performed in the correct order to ease uncrating.*

1. Remove the carton by cutting only in marked areas of the carton. **CAUTION:** *Hoses are connected to the washer.*
2. Carefully remove any packaging materials from the outside of the washer. **IMPORTANT:** *DO NOT cut the red straps securing the power cord and inlet hoses at this time.* They will be removed later during installation.
3. Remove the accessory package from inside the tub.
4. Remove the crate bottom from the washer by removing crate bottom wire clips.

INSTALLATION

1. Two separate red shipping straps are used to secure the machine for shipping purposes and to secure the power cord with the water inlet hoses. Remove the straps in the following sequence:
 - A. Locate the metal buckles securing the red straps which extend through slots in the rear wall of the cabinet. The buckles are positioned in the center of the red straps. Carefully cut the red straps, and remove the metal buckles. **NOTE: Cut the straps as close to the buckles as possible.** Discard the buckles.

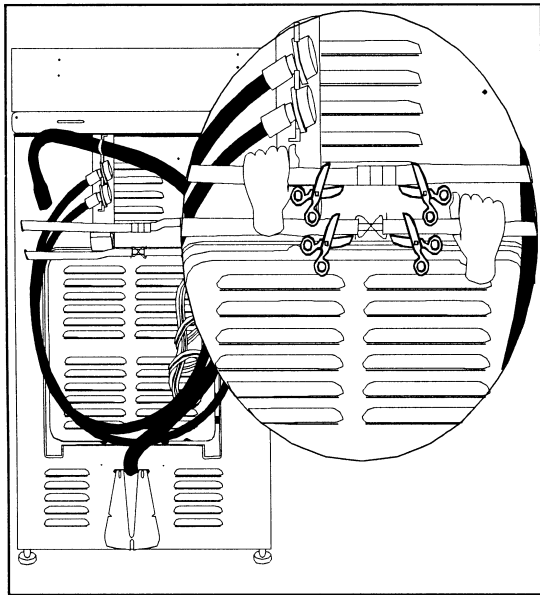


Figure 1-1

- B. Grasp each loose strap individually and pull the strap to remove it from the cabinet. Discard the strap (Figure 1-2).
2. Tip washer slightly forward. Loosen rear leveling leg lock nuts. Tip washer back slightly to loosen front leveling leg lock nuts (Figure 1-3).

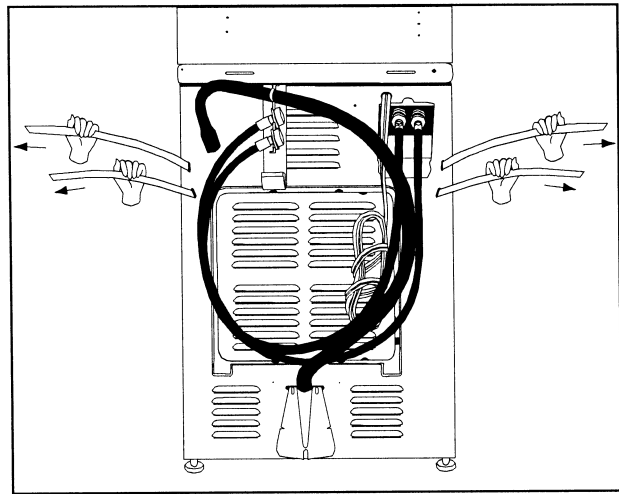


Figure 1-2

3. Locate the two (2) ½" hex head shipping bolts extending up through the bottom of the base (Figure 1-4). The shipping bolts are near the center of the base toward the front of the washer. Remove both bolts, freeing the tub and suspension. Do not be alarmed should the tub assembly shift when the last bolt is removed. Some shifting of the tub is normal.

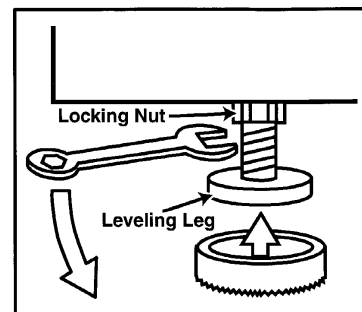


Figure 1-3

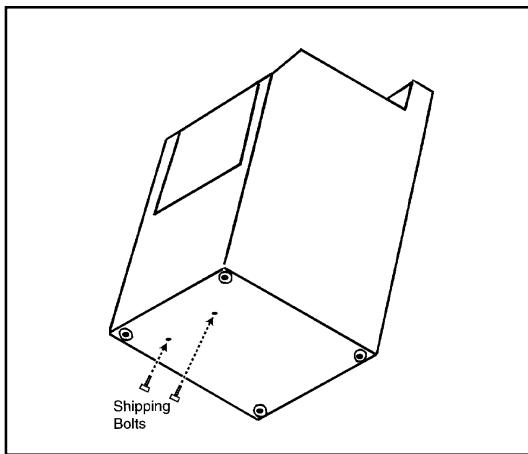


Figure 1-4

4. Slide the washer into position and check the levelness and stability of the washer. If necessary, slide the washer out of position to either raise or lower the leveling leg as required to level and stabilize the washer securely on all four legs. Slide the washer back into position to confirm levelness to the floor. When the washer is level, **tighten the locking nuts up against the base of the washer.** This will secure the leveling legs in place.
5. Install the rubber feet, found in the installation package, on all four (4) legs (*Figure 1-3*).
6. Pull the drain hose vertically to the drain strap. Then route the drain hose through the drain hose strap on the back of the washer and snap into the plastic hook of the strap.
7. Install gooseneck end of drain hose into drain standpipe. Be sure the connection is *not airtight* between the drain hose and standpipe. **Standpipe must be at least 24" high.** 36" height is recommended.
8. Connect inlet hoses to water supply using screen washers (found in the installation package) at faucet connections, with the domed screen facing the faucet. Attach hoses to the faucets and the water valve.

Turn on the water and check for leaks (*Figure 1-5*). **Note the H and C designations on the water valve bracket for the Hot and Cold hoses.**

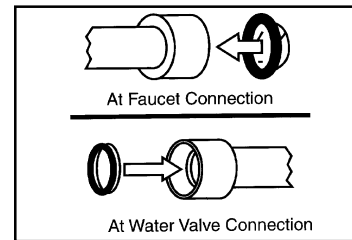


Figure 1-5

NOTE: Accessory inlet hoses are available in various lengths, up to 10 feet.

GROUNDING POLARITY CHECKS

The receptacle used for all Maytag products operating on 120 Volts AC must be properly grounded and polarized.

The power cord should be equipped with a three (3) PRONG POLARIZED GROUNDING PLUG FOR PROTECTION AGAINST SHOCK HAZARD and should be plugged directly into a properly grounded and polarized receptacle. **CAUTION: Do not cut or remove the grounding prong from this plug.**

It is the responsibility of the person installing the appliance to ensure it is adequately grounded and polarized at the point of installation. Local conditions and requirements should be taken into consideration. In cases where only a two (2) prong receptacle is available, it is the personal responsibility of the customer to have it replaced with a properly grounded and polarized three (3) prong receptacle (*Figure 1-6*).

Plug power cord into a properly grounded 120 volt AC-approved electrical service. This must be protected by a dedicated 15 amp fuse or circuit breaker.

All grounding and wiring should be performed in accordance with national and local codes. **USE OF ADAPTERS IS NOT RECOMMENDED.**

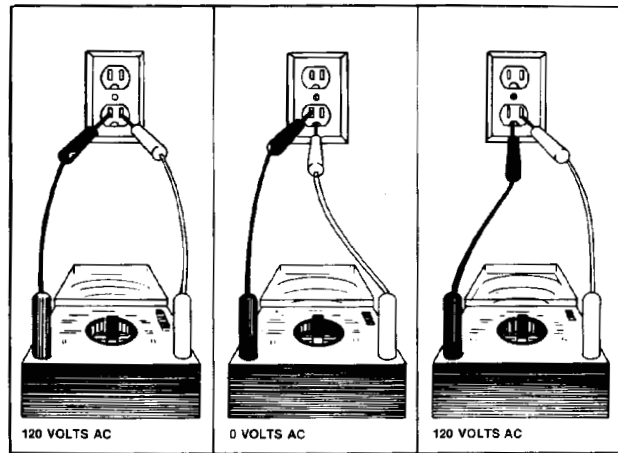


Figure 1-6

SPECIFICATIONS

CAPACITY	3.1 Cubic Feet		
ELECTRICAL	120 volts, 60 Hz; Requires 15 amp circuit breaker or fused electrical supply. Power cord must be connected to a properly grounded and polarized outlet.		
MOTOR	Switched Reluctance Motor controlled by a microprocessor motor control board. Motor pulley ratio (motor to spinner RPM) 14 to 1.		
POWER USAGE	Motor Input:	During Wash Tumble	- 150 Watts
		During Rinse Tumble	- 175 Watts
		Top Spin	- 800 Watts
	(Wattage readings taken with no clothes in spinner.)		
TUMBLER SPEED	Wash Tumble	47-51 RPM	
	Rinse Tumble	47-51 RPM	
	High Speed Spin	800 RPM (± 50 RPM based upon optimum spin performance.)	
WATER USAGE	Water pressure should be 20-120 p.s.i. (1.06-8.44 kg/cm) at inlet hose connection. Total water usage is approximately 25 gallons; varies with clothes load. Water fill in the spin basket with no clothes, measured near the rear seam of the spin basket.		
	WASH LEVEL	3-4 inches	
	RINSE LEVEL	4-5 inches	
HOSE LENGTHS	Four-foot inlet hoses with inlet washers and attaches to water valve. Drain hose attaches to pump and will accommodate 36" drain stand pipe.		
DIMENSIONS	Cabinet dimensions: 27" (68.58cm) W x 27 ½" (69.85cm) D x 36" (91.44cm) H.		
WEIGHT (Approx.)	Uncartoned	190lb. (86kg.) Approx.	
	Crated	200lb. (91kg.) Approx.	
SCREW & BOLT TORQUES	Bolt, Counter Weight	7in. lbs.	(± 3in. lbs)
	Bolt, Spin Pulley	30in. lbs	(± 3in. lbs)
	Bolt, Belt Adjuster	90in. lbs	(± 10in. lbs)
	Screw, Front Baffle	25in. lbs	(± 3in. lbs)
	Screw, Rear Baffle	18.5in. lbs	(± 3in. lbs)
	Clamp, Hoses	15+ in. lbs	
	Nuts, Spinner Support	18in. lbs	(± 3in. lbs)
	Nuts, Suspension Struts	7in. lbs	(± 3in. lbs)

WASHER CONTROLS

The control system in the Neptune horizontal axis washer generally consists of a timer and microprocessor-based machine control. These receive input signals and send output signals to other equipment in the washer, including the motor and motor control, user input switches, user indicator lights, the door latch and lock assembly, water valves, drain pump, unbalance switches, dispenser actuator wax motors, a pressure switch, and a tub light.

The machine control has direct control of these items:

- Motor speed and direction, through signals to the motor control.
- Door lock wax motor.
- Hot and cold water valves, with an input signal from the timer and pressure switch.
- Timer motor.
- On Light.

In general, the timer dial is rotated to a desired setting, selects the cycles options using the option switches, and starts the washer. The machine control reads the inputs from the timer, option switches and pressure switch then send output signals to the motor control and other components based upon those inputs. When the machine control has completed its set of instructions for the specific timer setting, it energizes the timer motor output to advance the timer to the next increment, reads a new set of input signals from the timer, and acts upon them. This continues until the cycle is complete. *(See Figure 1-7 & 1-8 for a generic representation of the Neptune washer control system.)*

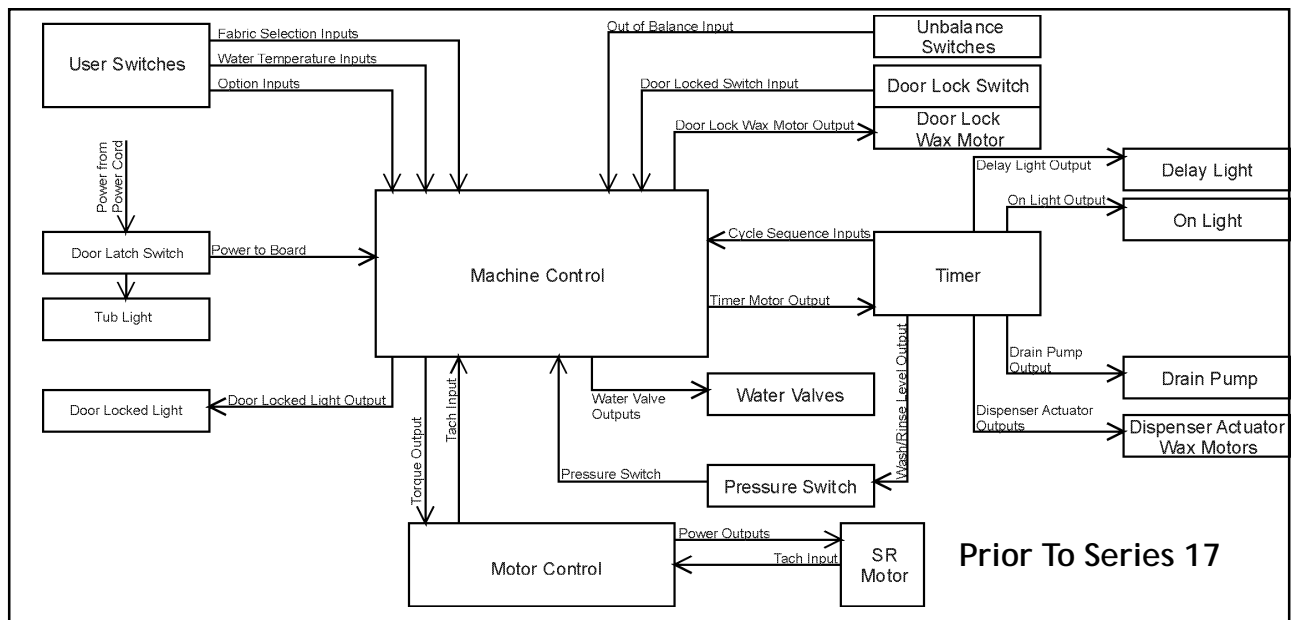


Figure 1-7

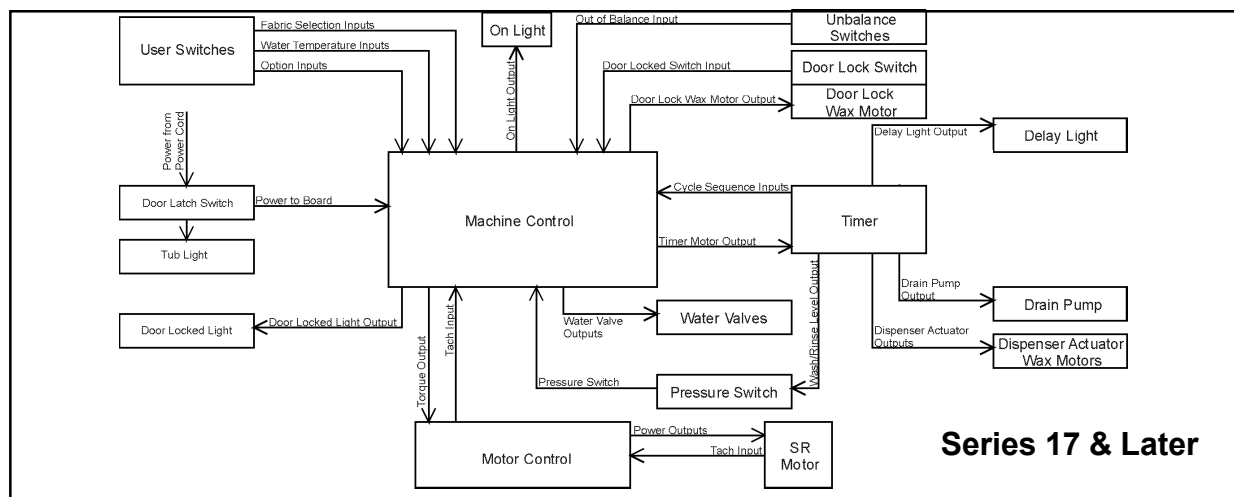


Figure 1-8

INPUT DEFINITIONS

DOOR LOCK SWITCH INPUT

When input is present, this is indication the washer door is locked. The machine controller will not command the spinner to spin faster than 50 rpm when the input is not present prior to spin.

END-OF-CYCLE SIGNAL INPUT

The End-of-Cycle Signal Input is energized through a user input switch on the control panel. When this is energized and the cycle has finished, the machine control will sound the End-of-Cycle signal (*See End-Of-Cycle Signal Output*).

FABRIC SELECTION INPUTS

The Fabric Selection Inputs are energized through a user input switch on the control panel. The machine control reads these inputs to determine which cycles should be run when the washer is started.

MAX EXTRACT INPUT

The Max Extract Input is energized through a user input switch on the control panel. When input is energized, the machine control will modify the final spin profile to the max extract profile.

NOTE: *If the user selects the Hand Washables fabric selection, all spins will follow the Max Extract profile regardless of whether the user selects the Max Extract option.*

OUT-OF-BALANCE INPUT

The Out-of-Balance Input Signal is provided by three normally-closed switches wired in sequence. If any of these switches opens due to an out-of-balance condition, the signal will be momentarily lost (*See Unbalance Control System*).

PRESSURE SWITCH INPUT

The input signal from the Pressure Switch serves two purposes. It supplies power for the water valves and provides an indication to the machine control as to whether the commanded water level has been reached.

When the timer advances into a cycle sequence that calls for water, power is supplied through the timer to either the wash or rinse level contacts on the pressure switch. When the water level in the tub is below the full level for that setting, the pressure switch circuit is closed, supplying power for the water valves to the machine control. When the water level switch is satisfied, the pressure switch circuit is opened and power for the water valves is no longer passed to the machine control. The

machine control interprets this loss of power as an indication that the water level has reached the full level.

When the washer is at the "full" level and the timer is set in a Prewash Tumble, Main Wash Tumble, Light Wash Tumble, or Rinse Tumble increment, the machine control will begin the sequence timing defined for each cycle and fabric selection setting (*See Cycle Sequence Definitions*).

During the drain and spin increments after the main wash, first rinse, second rinse, and extra rinse increments, the wash side circuit in the pressure switch is closed. When the water level drains below the wash full level, the circuit will close and energize the pressure switch input. The machine control interprets this signal (not to energize the water valve outputs) to measure how quickly the washer is draining. If the machine control commands a spin speed above 51 rpm before the pressure switch input is energized, it will drop the speed to 0 rpm and hold there until the pressure switch input is energized. An additional delay equal to the length of time elapsed will occur before the pressure switch input is energized. If four minutes elapse without the pressure switch input being energized, the machine control will energize the timer motor output to advance the timer into the next increment and continue with the cycle.

START/STOP INPUT

The start/stop input is energized by the momentary Push-to-Start/Stop Switch. If this input is energized when a cycle is in progress, the machine control will disengage the line relay, both water valve output signals, the door lock wax motor signal, the timer motor output signal, and the on-light output signal. If this input is energized when a cycle is not in progress, the machine control will energize the line relay and begin the cycle sequence as defined by the timer and user input switches (*See Push-To-Start/Line Relay Operation*).

TACH INPUT

The tach input is a feedback signal from the motor control. It provides eight pulses per revolution of the switched reluctance motor. The motor runs at 14 times the speed of the spinner (14:1 belt ratio). The tach input is used for monitoring speed and out-of-balance detection (*See Tachometer Circuit Diagnostics*).

If the machine control commands a motor speed and direction but does not sense a tach input signal within five seconds, it will disengage the line relay to stop the washer. This generally indicates a locked rotor or a malfunction in the motor control.

If the machine control senses a tach input signal when it is not commanding the motor to run, it will disengage the line relay to stop the washer.

If the machine control commands a coast down from final spin speed but is still receiving a tach input signal after two minutes, it will disengage the line relay to stop the washer.

TEMPERATURE SENSOR INPUT

A thermistor is located in the water valve to monitor the blended incoming water temperature. The machine control uses this input signal to regulate the water temperature with the warm or cold wash or warm rinse temperature selections (*See Water Valve Outputs*).

TIMER INPUTS

The Timer Input signals are energized through the cams in the timer. The timer operates with a 30 second drive cycle and a 5.8 second advance time (*See Timer Input Charts*).

WATER TEMPERATURE INPUTS

The Water Temperature inputs are two separate signals defined by a user input switch on the control panel. The machine control interprets these signals to determine what the water temperature should be for each fill (*See Water Valve Outputs*).

OUTPUT DEFINITIONS

DOOR LOCKED LIGHT OUTPUT

NOTE: *This section applies only to washers between Series 10 and 16. The "Door Locked" lights on washers from Series 17 and after are controlled by a "Door Locked" light switch.*

The Door Locked Light Output signal powers a 1/3 watt neon indicator lamp on the control panel. This output is first energized when the Door Lock Wax Motor Output is energized. At the end of the cycle, it remains energized for 50 seconds after the Door Lock Switch Input shuts down. This delay allows the wax motor to fully retract and unlock the door.

NOTE: *The washer will continue to tumble at the end of cycle until this 50 second delay is elapsed.*

DOOR LOCK WAX MOTOR OUTPUT

The Door Lock Wax Motor Output signal powers a wax motor in the door lock assembly. The wax motor extends to drive the door lock system for the washer.

If the washer is started with the timer set in a Prewash Tumble, Main Wash Tumble, or Light Wash Tumble increment, the machine control will wait for three minutes before energizing the Door Lock Wax Motor Output. This delay is not affected by water level. This output remains energized until the end of the cycle.

If the washer is started with the timer set in a Prewash Drain, Bleach Dispense, Spin1, Rinse Tumble, Spin2, or Spin3 increment, the machine control will energize this output immediately.

The machine control will continuously energize the Door Lock Wax Motor Output during the final (Spin 3) sequence until 30 seconds before the washer begins to coast from the final speed.

END-OF-CYCLE SIGNAL OUTPUT

The End-Of-Cycle Signal Output is an internal signal on the machine control between the microprocessor and annunciator. The end-of-cycle signal sounds when a wash cycle is finished and the End-Of-Cycle Input is energized. The end-of-cycle signal sounds as six pulses in a 0.35 seconds on, 0.15 seconds off pattern (*See Timer Input Charts*).

ON LIGHT OUTPUT

NOTE: *This section applies only to washers from Series 17 and after. The "Door Locked" lights on washers between Series 10 and 16 are controlled by a cam on the timer.*

The Door Locked Light Output signal powers a 1/3 watt neon indicator lamp on the control panel. This output is energized when the washer is operating in a wash or spin cycle. Note that the "On" light is not illuminated when the timer is in a delay increment.

TIMER MOTOR OUTPUT

The machine control energizes the Timer Motor Output to allow for variable-length timer increments. If the washer is started with the timer set in a Prewash Tumble, Main Wash Tumble, Light Wash Tumble, or Rinse Tumble increment, the machine control will not begin the cycle sequence timing until the water level reaches the appropriate level. The Timer Motor Output is disengaged during this time.

The machine control will stop the washer by disengaging the line relay if the following occur: 1) The machine control energizes the timer motor until it senses a timer change. 2) The timer motor remains energized for five minutes while the timer inputs change (*See Timer Input Charts*).

The machine control counts the number of rinses during a normal wash cycle. In the first and second Rinse Tumble increments, the machine control will energize the Timer Motor Output as soon as the Pressure Switch Input is no longer energized, indicating that the water has reached the full level. In the third and fourth (if Extra Rinse is selected) Rinse Tumble increments, the machine control will energize the Timer Motor Output 30 seconds after the Pressure Switch Input is no longer asserted.

The machine control will energize the Timer Motor Output when the timer is set into a Spin1, Spin2, or Spin3 increment 30 seconds before the end of the spin. It will remain energized until the timer inputs change.

TORQUE OUTPUT

The machine control commands motor speed and direction through the Torque Output from the machine control to the motor control. This output is a pulse width modulated (PWM) signal (*See Section 2: Machine Control*).

Vcc REFERENCE VOLTAGE OUTPUT

The Vcc Outputs are a reference voltage for many of the signal outputs. On the machine control, the Vcc outputs are 24 VDC referenced to the 120 VAC neutral line.

WATER VALVE OUTPUTS

The machine control determines whether the hot or cold Water Valve Outputs should be energized during each timer increment, but it only gates the power to the water valves, it does not directly provide that power. When the timer is in an increment calling for water, power passes from the timer to the wash or rinse level circuit in the pressure switch. When the water level is below the full level, the pressure switch circuit is closed and the power passes to the machine control. The machine control gates the power to the hot and cold Water Valve Outputs. When the pressure switch senses that the full level is reached, the

circuit opens and de-energizes the Pressure Switch Input on the machine control, which de-energizes the Water Valve Outputs.

The machine control will read the Water Temperature Sensor Input to determine the blended water temperature passing through the water valve. In a warm wash fill, the machine control will first energize both the hot and cold Water Valve Outputs for five seconds then de-energize the cold Water Valve Output and monitor the water temperature. When the Water Temperature Sensor Input passes the warm threshold (approx. 20 K Ohms), the machine control will re-energize the cold output for the remainder of the fill.

In a cold wash fill, the machine control will first energize only the cold Water Valve Output for five seconds. It then energizes the hot Water Valve Output and monitors the Water Temperature Sensor Input until it passes the cold threshold (approx. 44 K Ohms), when it de-energizes the Hot Water Valve Output for the remainder of the fill.

If the user selects a warm rinse temperature, the machine control will count the rinses and allow a warm rinse fill only on the third and fourth (if the user also selects the Extra Rinse option) rinses. The first two rinses will be cold only. The machine control does not regulate water temperature during the rinses.

NOTE: *If the user chooses the Easy Care/Perm Press fabric selection, all rinse fills will be cold regardless of whether the user also selected the warm rinse temperature.*

CYCLE SEQUENCE DEFINITIONS

NOTE: Refer to Section 2: Timer Input Charts for information on the timing of each cycle sequence.

BLEACH DISPENSE

In a Bleach Dispense increment, the machine control will follow the same tumble pattern and speed as in a Main Wash Tumble increment.

DELAY

During a Delay increment, the door Lock Wax Motor Output, Door Locked Light Output (Series 17 and later only), Motor Torque Output, "On" light (Series 10 to 16 only), and Water Valve Outputs are de-energized. Note that the Delay indicator is energized through a cam on the timer.

EXTRA RINSE

When the user selects the Extra Rinse option, the spin increment following the third rinse will follow the Spin2 cycle sequence. The Timer Motor Output will be energized 60 seconds prior to the end of the spin cycle sequence and will remain energized to advance the timer through the "Off" increment into the Rinse Tumble increment.

If the Extra Rinse option is not selected, this spin will follow the Spin3 cycle sequence and the Timer Motor Output will be energized 30 seconds prior to the end of the final spin.

IDLE

The Idle increment follows the final spin increment in each cycle. If the Door Lock Switch Input is energized when the timer advances into the Idle increment at the end of the cycle, the machine control will tumble the washer until 50 seconds after the Door Lock Switch input is no longer energized. This allows time for the Door Lock Wax Motor to fully retract. At this time, the Door Lock Light Output (washers between Series 10 and 16 only) or the "On" Light Output (Series 17 and later

washers only) will de-energize and the End-of-Cycle Signal will sound if the user had selected the End-of-Cycle Signal option.

LIGHT WASH TUMBLE, MAIN WASH TUMBLE, and RINSE TUMBLE

The machine control will tumble the washer at the pattern and speed defined by the Fabric Selection Inputs (*See Cycle Review*). Each tumble will start only after the previous tumble has completely stopped. The machine control will reverse the tumble direction after each pause. The machine control will continue to tumble the washer until the timer inputs change.

In a Light Wash Tumble or Main Wash Tumble increment, the machine control will de-energize the line relay if the washer continues to tumble for 29 minutes. This would only occur if the timer were to stall (*See Section 1: Timer Motor Output and Section 2: Timer Input Chart*).

PREWASH DRAIN

During a prewash drain increment, the washer will tumble at the same speed and in the same pattern as in the Prewash Tumble increment for the fabric selection. The Door Lock Wax Motor Output will be energized during this increment (*See Prewash Tumble*).

PREWASH TUMBLE

When the timer is set into a Prewash Tumble increment, the machine control will tumble at 51 rpm in the following tumble pattern:

<u>Cycle</u>	<u>Tumble-Pause Pattern</u>
Cotton/Sturdy	6 sec. - 24 sec.
Easy Care/Perm Press	6 sec. - 24 sec.
Delicates	6 sec. - 24 sec.
Hand Washables	3 sec. - 27 sec.

In a Prewash Tumble increment, the machine control will de-energize the line relay if the washer continues to tumble for 15 minutes. This would only occur if the timer were to stall (See Section 1: Timer Motor Output and Section 2: Timer Input Chart).

MISCELLANEOUS

Door Latch Switch Monitoring

At the end of a cycle, when the timer advances into the Idle increment, the machine control will keep the line relay energized until it loses power when the door latch switch opens. This guards against the switch contacts welding closed. In this condition, the machine control will limit what additional cycles can be run before the door is opened as follows:

Washers between Series 10 and 16

The machine control will allow the washer to restart only if the user sets the timer into a Rinse Tumble or Spin3 increment.

Washers from Series 17 and Later

The machine control will allow the washer to restart in any setting. After that cycle completes, the user must open the door before the machine control will allow a third cycle to start.

Door Lock/Spin Control

When the machine control begins a spin increment, it will not command spin speed above 51 rpm unless the door lock switch input is energized. At the start of a spin increment, the machine control will drop the speed to 0 rpm then tumble until the switch is energized. At that point, it will restart the spin sequence. If the door lock switch is not energized after 2 minutes of tumbling, the machine

control will energize the timer motor output until the timer inputs change so the washer can proceed with the cycle.

At the end of spin sequence, if the door lock switch input is de-energized before the washer drops below 91 rpm, a hardware circuit on the machine control will interrupt the torque output signal, which forces the motor control to 0 rpm, and energize the door lock wax motor circuit to lock the door. This hardware circuit will keep the door lock wax motor circuit energized until the door lock switch input signal is energized.

Redistribution

The machine control commands a distribution profile speed ramp from 0 rpm to 85 rpm at the beginning of each high speed (above 100 rpm) spin. When the washer reaches 85 rpm, the machine control monitors the Tach Input to determine if the speed varies through one revolution of the spinner basket. If it senses a high enough variation in speed (suggesting an out-of-balance condition in the clothing load), it will drop the spinner speed to 0 rpm and force a short reverse tumble to redistribute the clothing load before resuming the spin. If any of the out-of-balance switches trip and open the out-of-balance input circuit at a speed below 500 rpm, the machine control will also drop the speed to 0 rpm and force the reverse tumble to redistribute the clothing load.

The following rules determine the maximum number of redistribution attempts that will be allowed in each spin step before the machine control skips the step and continues with the spin profile (*See Section 2: Unbalance Control System*).

Push-To-Start Relay Operation

STARTING THE WASHER

1. With the door closed, press the push-to start switch.
2. The red no. 28 wire sends a signal to the machine control to start running.
3. 120 VAC is supplied to the machine control board through black wire no. 27.
4. The machine control closes an internal switch to energize the line relay.
5. When the push-to-start button is released, power remains supplied to the machine control and the washer from gray wire no. 26 through the line relay.

STOPPING THE WASHER

1. With the washer running, power is supplied to the machine control and washer from gray wire no. 26 through the line relay.
2. When the user presses the push-to-start button, a signal is sent to the machine control through red wire no. 28 telling the washer to shut down.
3. The machine control opens the internal logic switch which de-energizes the line relay.
4. When the user releases the push-to-start button, power is removed from the machine control and washer (Black wire no. 27).

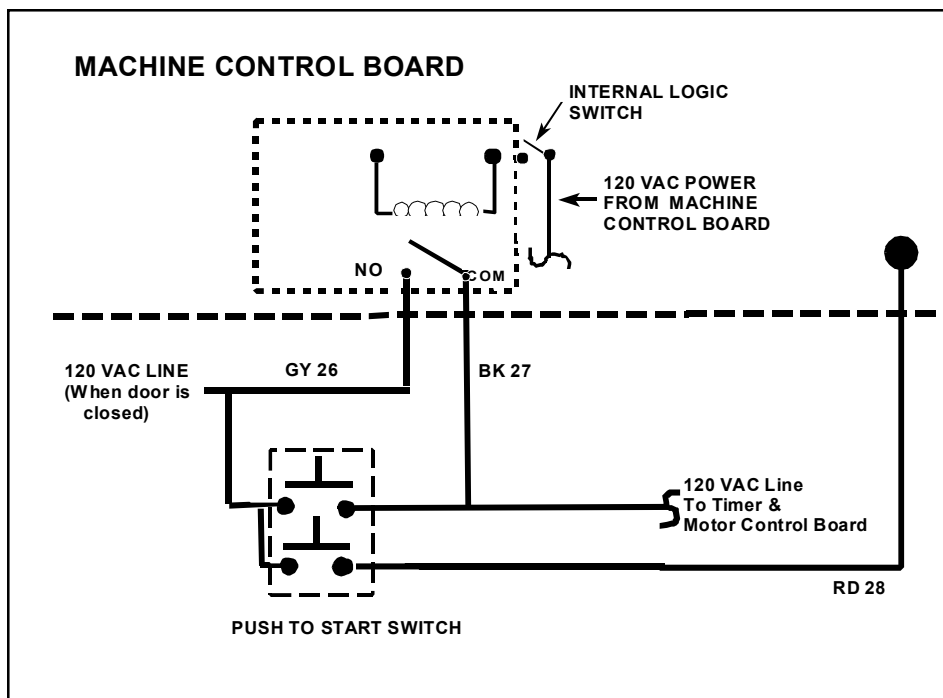


Figure 1-8

CYCLE REVIEW

Main Wash Time/Total Cycle Time - Minutes (See Notes).

Non-Max Extract	Cotton/ Sturdy	Easy Care/ Perm Press	Delicates	Hand Washables
Heavy Wash	23.0/49.0	20.0/45.5	20/46.5	Not Applicable
Normal Wash	17.0/43.0	14.0/39.5	14.0/40.5	Not Applicable
Light/Quick Wash	11.0/37.0	8.0/33.5	7.0/34.5	Not Applicable
Final Spin (RPM /Min)	800/3.5	600/3.0	500/4.5	Not Applicable

Max Extract Cycles	Cotton/ Sturdy	Easy Care/ Perm Press	Delicates	Hand Washables
Heavy Wash	23.0/46.0	20.0/41.5	20.0/42.0	20.0/43.0
Normal Wash	17.0/40.0	14.0/35.5	14.0/36.0	14.0/37.0
Light/Quick Wash	11.0/34.0	8.0/29.5	8.0/30.0	8.0/31.0
Final Spin (RPM /Min)	800/4.0	600/3.5	500/5.0	500/5.0

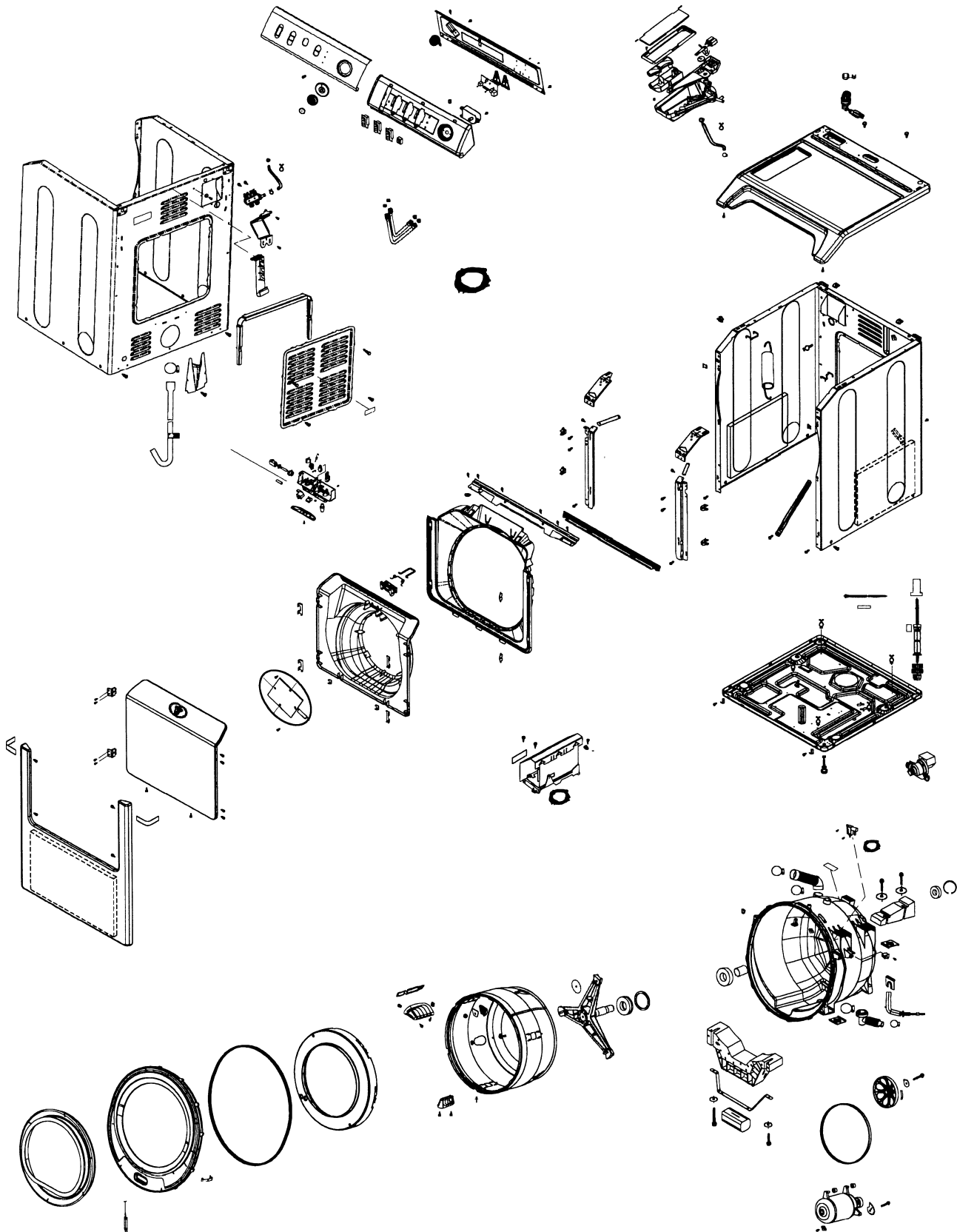
Notes:

1. The main wash times listed include 2 minutes of bleach fill and tumble time.
2. The total cycle times are approximate and will vary based on water fill times, due to types of clothing loads, available water pressure and the time for the door lock system to retract at the end of the cycle.
3. The main wash time is affected significantly if the machine control detects an excessive amount of suds. The washer will go into a suds reduction routine, consisting of a series of additional rinse and partial drain cycles to reduce the suds present (*See Troubleshooting & Diagnosis - Clothes Wet at End of Spin*).

Tumble Pattern - Number of seconds tumbling/Number of seconds of pause between tumbles.

Cotton/ Sturdy	Easy Care/ Perm Press	Delicates	Hand Washables
7/3	5/3	6/24	3/27

GENERAL COMPONENT EXPLODED VIEW



SECTION 2. ELECTRICAL COMPONENTS & TESTING

ELECTRICAL TEST EQUIPMENT

The equipment required to service Maytag products depends largely upon the conditions you encounter. Locating a malfunction will

often require the use of electrical testing equipment such as:

Description	Part Number
Analog Test Meter	20000005
Digital Test Meter	20001001
Clamp-On Ammeter	20000002
AC Voltage Sensor	20000081

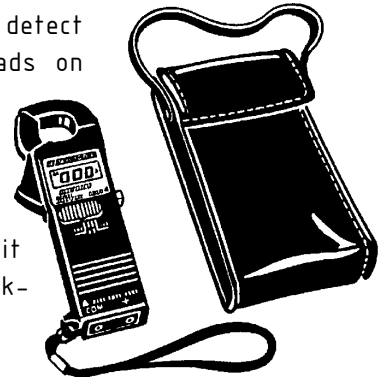


Analog Test Meter

can be used to check for open or closed circuits, measure resistance, AC and DC volts, and temperature.

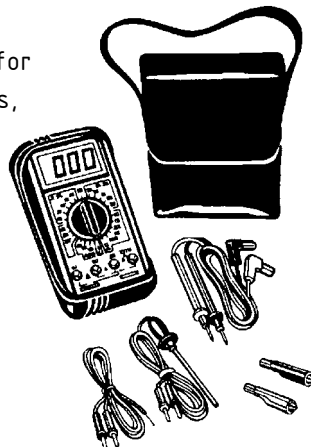
Clamp-On Ammeter

can be used to detect shorts. Overloads on the circuit breaker or fuse can be traced to either the washer or circuit breaker by checking the washer current draw.



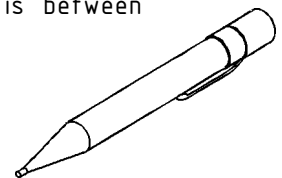
Digital Test Meter

can be used to check for open or closed circuits, measure resistance, AC and DC volts, and temperature.



AC Voltage Sensor

can be used to alert you if AC voltage is present so proper safety precautions can be observed. The tip of the sensor will glow bright red if voltage is between 110-600 volts AC.



ELECTRICAL TESTS



Warning - Always shut off electrical power to the unit before beginning any service repair procedures.

Grounded Components

When performing service diagnostics, replacements and repairs, always check to determine whether all ground wires linking panel and components are reattached if removed.

Voltage Checks

Generally, these checks will consist of taking readings at the wall receptacle to determine the availability of voltage to the product. Voltage checks on individual components of a product are not recommended due to the possibility of electrical shock. Component part testing is best accomplished through continuity checks with an Appliance Test Meter (*See Electrical Test Equipment*).

NOTE: *Use of the meter on voltage higher than the indicated range may cause permanent damage to the meter. To prevent damage, first select the highest range and then lower the range for readings which fall within the lower scale.*

Set up meter for use as follows:

1. Turn selector knob to desired meter function and appropriate range.
2. Plug black lead into socket marked black (-).
3. Plug red lead into socket marked red (+).
4. Place test leads into receptacle to determine voltage available.

Water Valve Test

Check the water valve for electrical continuity. **This check should be made with the electrical supply disconnected from the washer.** Remove the wire harness from the water valve terminals and place the ohm meter probes on the terminals of the water valve. The water valve solenoid coil should have a resistance between 500-1000 ohms. If no ohms are shown on the display of the electrical test meter, the solenoid coil has an open winding and the valve should be replaced. The thermistor in the water valve changes in resistance in direct relationship to water temperatures. To monitor the performance of the thermistor, run a partial hot water fill and check the ohm resistance of the thermistor circuit. Then, run a cold water fill and measure the resistance again. There should be a notable difference in the resistance readings. To check the ohm resistance, pull the P2 wire harness connector off the machine control and locate the P2(5) and P2(6) leads in the connector (*Figure 2-3*).

Wax Motor Check - Door Lock Mechanism

Check the wax motor for proper resistance. **This check should be made with the electrical supply disconnected from the washer.** Remove the wire harness from the wax motor terminals and place the ohm meter probes on the terminals of the wax motor. The wax motor should have a resistance of approximately 1900 ohms at room temperature. To check wax motors through console, see section: *Machine Control page 2-5*.

Timer & Console Switches

The timer is located in the control console on the back. It is composed of a series of switches driven by an electric timer motor. The timer motor rotates a pinion gear which then rotates internal cams. As the cams rotate, they lift and drop various switch contacts which ride on the cam. The internal switches provide cycle sequence or step inputs to the machine control to control the pump, dispenser wax motors, delay light, ON light and timer motor.

The timer wire harness connector can be pulled and the individual contacts for the various circuits can be checked with an ohm meter. As illustrated, timer contact for the drain pump is 14T (**Figure 2-1**).

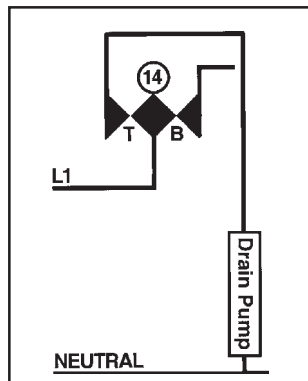


Figure 2-1

You can identify the wire for the drain circuit (**Figure 2-2**) by tracing down the side of the connector to contact 14, and across to align with column T.

Contact 8B in the connector is a direct contact to the neutral leg of the timer. When an ohm meter probe is placed into the 14T connection and the other probe is placed into 8B, an ohm reading of the complete drain circuit can be performed. The drain circuit should have a resistance of approximately 18 ohms. This is the resistance reading of the pump

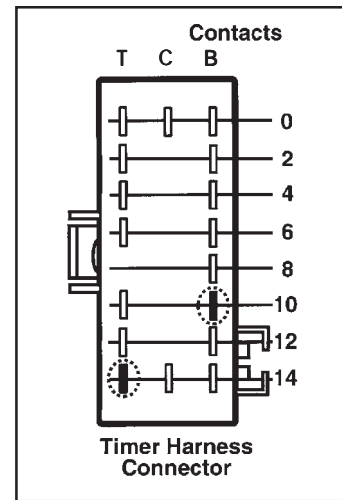


Figure 2-2

motor windings. The following chart can be used for checking other components via the timer wire harness connector.

Description	Connector	Connector	Ohms
Pump Motor	14T	10B	18
Bleach Wax Motor	2B	10B	950-1100
Softener Wax Motor	2T	10B	950-1100
Timer Motor	10T	10B	5000

Timer Input Charts

As stated previously, the machine control board receives inputs from the timer monitor where the timer is in the cycle. The machine control board accomplishes this by routing four circuits through the timer. Two of the circuits (1A & 1B) are supplied with 120 VAC and the other two circuits (2A & 2B) are 24 VDC. The voltages for the four circuits is shown on the timer chart of the electrical schematic enclosed in the washer console.

Software in the machine control board specifically monitors the timer input circuits to determine where the timer is in all the wash cycles and will rapidly advance the timer to OPEN and break contacts in the timer. The timer is solely used as an off-board set of relay switches. **Note: The timer motor is hard wired to timer cams 10T and 10B in the timer.**

CYCLE SEQUENCE	TIMER 1A (120 VAC) PK19/P7(8)	TIMER 1B (120 VAC) YL16/P7(7)	TIMER 2A (24 VDC) PU17/P3(3)	TIMER 2B (24 VDC) BU18/P3(5)
PREWASH TUMBLE	0	1	1	0
PREWASH DRAIN	1	1	1	0
MAIN WASH TUMBLE	0	1	0	0
LIGHT WASH TUMBLE	1	1	0	0
BLEACH DISPENSE	1	0	1	0
RINSE TUMBLE	1	0	0	1
SPIN 1	0	0	1	0
SPIN 2	0	0	0	1
SPIN 3	0	1	0	1
EXTRA RINSE	1	1	0	1
DELAY	1	0	0	0
IDLE	0	0	0	0

Key: 0 = Input Signal Not Asserted 1= Input Signal Asserted

There are conditions under which the machine control will shut the cycle down if the timer does not advance.

- During Extra Wash/Prewash: If the timer inputs do not change away from Prewash Tumble for 15 minutes, the machine control will open the line relay.
- During Main Wash: If the timer inputs do not change for 29 minutes, the machine control will open the line relay.
- During any increment when the machine control energizes the timer motor until it sees the timer inputs change: If the timer inputs do not change for 5 minutes with the timer motor continuously energized, the machine control will open the line relay.

These varying delays are to allow the washer to progress through several increments where the timer inputs normally do not change. In these cases, the machine control energizes the timer motor for 30 seconds, which is its advance time. It does not look for a timer input change.

Machine Control

The machine control microprocessor board is located in the control console, mounted to the rear panel. The board receives input from the timer, door latch and lock switches, and unbalance and selector switches on the console. It also communicates with the motor control board to facilitate the various cycles and drive the motor for optimum performance. Torque and speed of the motor are monitored through the motor control board.

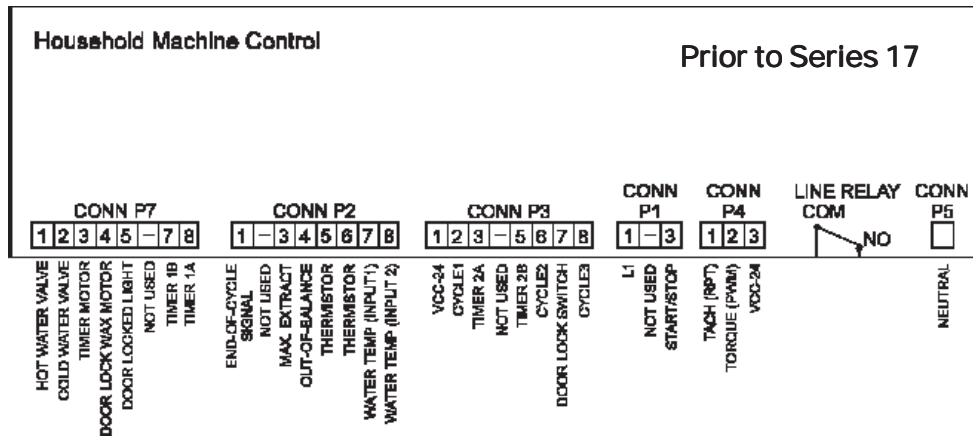


Figure 2-3

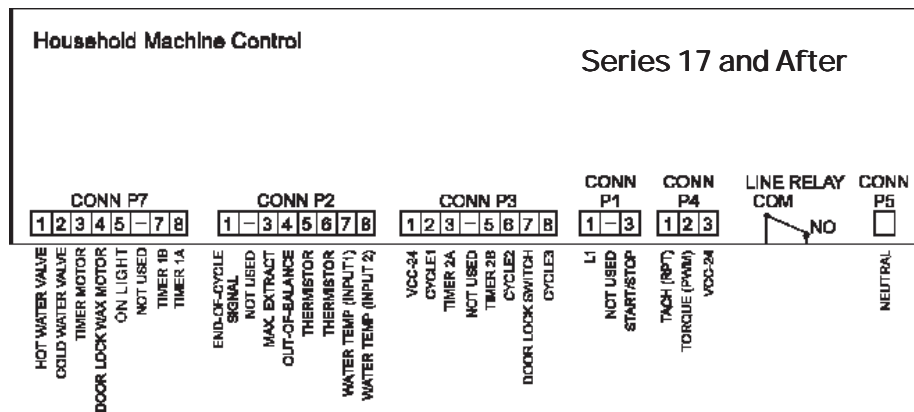


Figure 2-3b

Both incoming and exiting voltage are monitored through the machine control board and the surrounding circuitry. The following table lists the voltages for the various terminals on the microprocessor board. If proper voltage is not present, check switches and wiring for any loose connections or open circuits by disconnecting the power supply and performing continuity checks of individual circuits. **NOTE: Connector P5 is Neutral input and L1 input is the Line Relay Connector Comm (Gray wire), L1 output is Line Relay Connector Comm (Black wire).**

To check voltages from the board, turn timer dial to a wash cycle and press the start/off button. This will activate the L1 relay board and apply power on the machine control.

FUNCTION	MACHINE CONTROL BOARD TERMINAL/WIRE	MACHINE CONTROL BOARD TERMINAL/WIRE	VOLTAGE-APPROX. (When Activated)	TIMER CONTACT
Permanent Press (Fabric Switch)	P5 (WH11)	P3/2 (PK 37)	24 VDC	Not Involved
Delicates (Fabric Switch)	P5 (WH11)	P3/6 (OR 38)	24 VDC	Not Involved
Hand Wash (Fabric Switch)	P5 (WH11)	P3/8 (BR 39)	24 VDC	Not Involved
Cotton/Sturdy (Fabric Switch)	P5 (WH 11) P5 (WH 11) P5 (WH 11)	P3/2 (PK 37) P3/6 (OR 38) P3/8 (BR 39)	0 VDC 0 VDC 0 VDC	Not Involved
Signal ON/OFF (Options Switch)	P5 (WH 11)	P2/1 (PU 21)	24 VDC - ON 0 VDC - OFF	Not Involved
Extra Rinse (Options Switch)	P5 (WH 11)	P7/8 (PK 19)	120 VAC	12B, 6B,8T
Max Extract (Options Switch)	P5 (WH 11)	P2/3 (YL 20)	24 VDC	Not Involved
Push To Start Switch (When pressed)	P5 (WH 11)	P1/3 (RD 28)	120 VAC	Not Involved
Unbalance Control	P5 (WH11)	P2/4 (OR 40)	24 VDC	Not Involved
Door Lock - Spin	P3 (1)	P3/7 (YL 36)	24 VDC	Not Involved
Motor Control & Machine Control	P5 (WH11)	LINE RELAY COM (BK 27 or BK1)	120 VAC	Not Involved
Hot Water Valve	P5 (WH11)	P7/1 (OR7)	120 VAC or 500-1000 Ohms	Not Involved
Cold Water Valve	P5 (WH11)	P7/2 (BU 9)	120 VAC or 500-1000 Ohms	Not Involved
Door Lock Wax Motor	P5 (WH11)	P7/4 (BR 14)	120 VAC	Not Involved
Bleach Wax Motor	P5 (WH11)	Not Involved	120 VAC	2T
Softener Wax Motor	P5 (WH11)	Not Involved	120 VAC	2B
Delay Light	P5 (WH11)	Not Involved	120 VAC	4T
On Light (Series 17)	P5 (WH11)	P7/5 (RD 3)	120 VAC	Not Involved

DRIVE MOTOR

The drive motor is a switched reluctance type motor. The basic operating principle of the switched reluctance motor is direct magnetic attraction between the stationary electromagnetic coils (stator) and a specially configured rotor or armature (**Figure 2-4**). The rotor is comprised of stacked plates or laminations mounted on a center shaft. The shape of these laminations are characteristic of the switched reluctance motor. The rotor, when viewed from the end of the rotor, has "teeth" much like a gear. These "teeth", or pole pieces, are pulled as the result of direct current power through the stator coils.

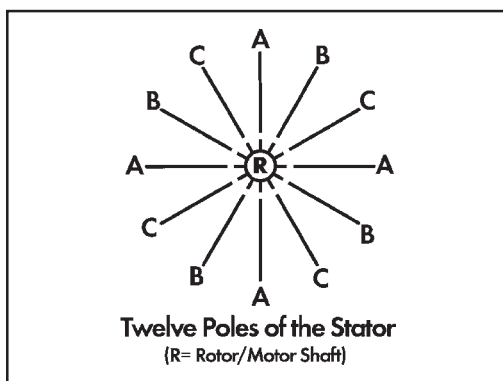


Figure 2-4

Multiple stator coils are positioned around the rotor and are connected in three different phased "sets" of paired coils.

Magnetic attraction causes the rotor poles to turn toward the coils. The electronic motor control board switches the magnetic field off as the rotor pole piece approaches; then, turns on another set of coils further ahead. It is this switching action of motor phases that determines direction and rotational speed of the rotor (and shaft). The motor control board changes the 120 VAC voltage line input to 170 VDC, and distributes the current phases to the stator coil sets in sequence to the drive motor.

The following illustration shows the motor terminals for each of the coils involved. The letters with positive and negative symbols indicate the motor phase circuitry of the terminals.

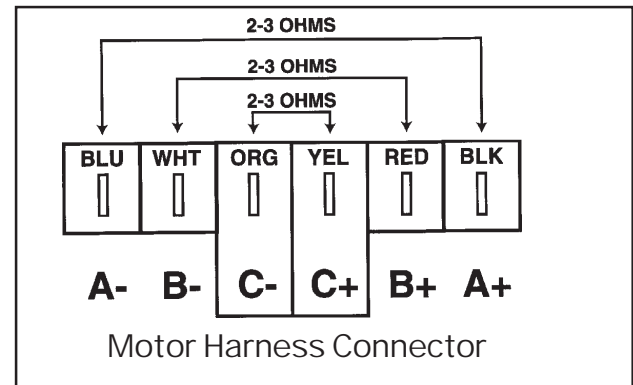


Figure 2-5

Refer to section titled **Motor Control** for board identification of A, B and C terminal/harnesses (**Figure 2-6**). Also, see the wiring schematic for harness identification.

MOTOR CONTROL BOARD

The motor control board receives 120 VAC voltage from the line cord and distributes DC voltage to the drive motor. The motor control converts the voltage from single phase to 3 phase for the drive motor.

Another purpose of the motor control is to monitor the drive motor speed through a tachometer circuit linking the motor control board to a tachometer on the drive motor. This is a 3-wire circuit comprised of a Black, Blue and White wire harness. Failure of this circuit will cause the motor to start jerking in place or accelerate rapidly for up to 5 seconds. This occurs whenever the tachometer in the drive motor is trying to locate the proper shutter and sensor sequence. For example, if the tachometer signal is lost from the motor control to the machine control just prior to spin, the motor will ramp up for 5 seconds then stop.

Motor & Motor Control Test

1. Set the timer knob into the delay increments.
2. Press the push-to-start switch to start the washer in the delay mode. Confirm the delay light is ON.
3. Check for 120 VAC between the L and N terminals (black wire no.27 and white wire no. 13) on the motor control board. If not present, check wiring between the machine control and the motor control boards.
4. Unplug the washer power cord. Test cord to the same board terminals.
5. Remove JP4 Interface connector wire harness on front end of motor control board.
6. Plug the washer power cord into a 120 VAC power source. The motor control will immediately execute a test routine and the motor should run, rotating the spinner at 50 rpm.
6. **If the motor runs**, and the spinner rotates at the proper RPM speed, the problem lies outside of the motor and motor control circuit. Disconnect power to the washer and reconnect the JP4 Interface connector to the motor control.
7. **If the motor does not run:**
 - A. Check the 10-amp fuse located on the control board, either visually or with an ohm meter. If bad, completely replace motor control/wire harness assembly (**Figure 2-6**).
 - B. If the fuse is functioning, visually check the six semiconductors on the heat sink for any damage. If damaged, replace motor control/wire harness assembly complete and check motor windings for damage (**See Drive Motor**). Replace motor if necessary (**Figure 2-6**).
 - C. If fuse and semiconductors show no visible damage, perform the motor phase test.
8. Unplug the washer power cord and replace motor control board connector JP4 when finished.

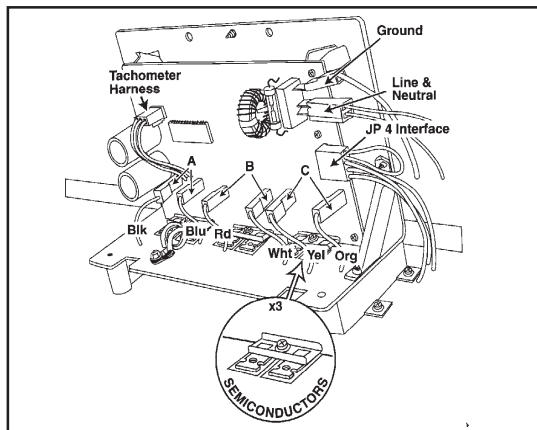


Figure 2-6

Motor Phase Test

It is possible for the motor to still run under light loads when one of the phases of the motor is nonfunctional. One possible symptom would be a "growling" noise from the motor. Torque is decreased when the motor is out of phase. This could result in a customer complaint that the load is not spinning out properly or it does not tumble consistently with a large load (**See Section 3: Troubleshooting**).

To gain access to the motor control board terminals (*Figure 2-6*):

1. **Disconnect power to the washer prior to testing.**
2. Remove the two screws securing the motor control assembly to the base. Unsnap the two twist-lock wire ties restraining the motor to the motor control board harness base.
3. Remove the green ground wire, line & neutral wires and the JP4 connector from the motor control board.
4. Carefully lift the front end of the motor control board to disengage the rear locking tabs from the slots in the base. Slowly drag the motor control board, with motor harness attached, toward the front of the washer and place in front of the washer.
5. Remove the screw securing the splash shield covering the face of the motor control board. Pivot the splash shield with top screw in the motor control board metal frame, allowing the plastic shield to become an electrical shield between the motor control board and the base.
6. Reconnect the ground wire, line 1 and neutral wires. Leave the JP4 connector off the board (*Figure 2-6*).
7. Place the timer knob into the delay increments.
8. Plug the power cord into the wall socket and press the push-to-start button.
9. **Check Phase C** by disconnecting the yellow or orange wire at the motor control board. If the motor operates with a slight growling sound, phases A and B are operating correctly. Reconnect phase C and test with phase B disconnected. If the motor does not run properly, phase A or B is not functioning. Perform the motor

windings check (*See Motor Windings Check*).

10. **Check Phase B** by disconnecting the white or red wire at the motor control board. If the motor operates with a slight growling sound, phases A and C are operating correctly. Reconnect phase B and test with phase A disconnected. If the motor does not run properly, phase A or C is not functioning. Perform the motor windings check (*See Motor Windings Check*).

Motor Windings Check

1. **Disconnect power to the unit.**
2. Remove each pair of phase wires from the motor control and perform an ohm check of each wire leading to the motor. Each wire pair should show 2-3 ohms resistance (*Figure 2-5*).
2. There should be no continuity between any of the terminals and the frame of the motor.
3. Check that all six motor terminals are secure and at the same height in the connector housing. Replace motor if terminals are pressed into the motor.
4. Remount the six-position motor connector onto the motor. Reassemble the drip shield cover onto the motor control.
5. Reposition the motor control into the washer when finished. Make sure the two screws and the twistlock wire ties are fastened properly to the wire harness.

PHASE	WIRE COLORS	MOTOR CONDITION	RESULT/SOLUTION
C	Yellow or Orange	Runs Does Not Run	-Phases A&B are operating correctly. (Check Phase A and B) -Phase A or B is non-functional. (See Step 10)
B	White or Red	Runs Does Not Run	-Phases A&C are operating correctly. (Check Phase A and C) -Phase A or C is non-functional. (See Step 10)
A	Black or Blue	Runs Does Not Run	-Phases B&C are operating correctly. (Check Phase B and C) -Phase B or C is non-functional. (See Step 10)

Tachometer Circuit Diagnostics

The tachometer system of the motor is comprised of a plastic wheel, called a shutter, and an optical sensor (*Figure 2-9*). The shutter is mounted to the end of the motor shaft under the plastic endbell covering of the motor. The edge of the shutter resembles a "picket fence" with different size "pickets." The pattern consists of six different "pickets" which are repeated eight times. An optical sensor is mounted to one side of the shutter and monitors the "pickets" as they pass through the sensor.

As the "pickets" pass through the sensor field, signals are generated and transmitted to the motor control board through the tachometer wire harness (*Figure 2-10 and 2-11*).

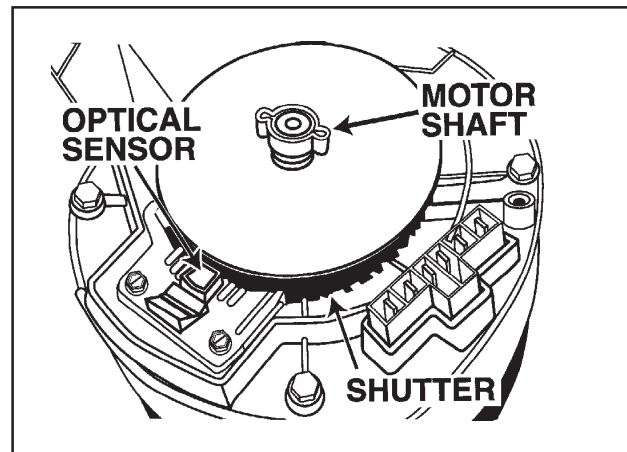


Figure 2-9

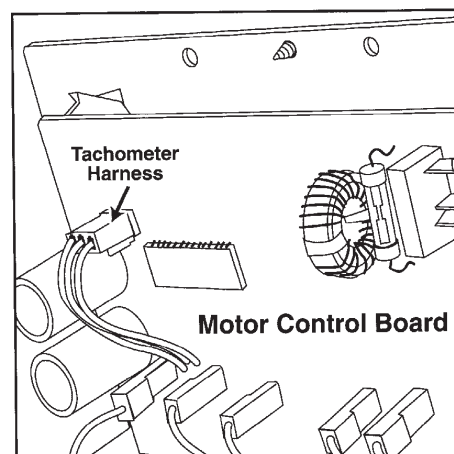


Figure 2-10

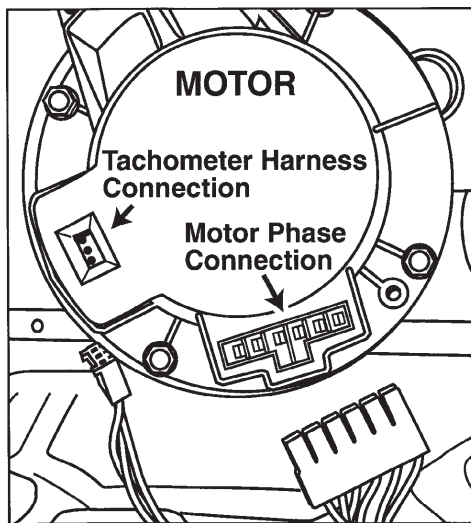


Figure 2-11

The motor control monitors the signals and communicates this information to the machine control. The purpose of this signal is to tell the motor when to energize each winding in the motor and to tell the machine control the actual motor speed.

Note: *If the machine control board does not receive an input signal from the motor control/tachometer circuit (JP4 connector), the motor speed will rapidly accelerate for 5 seconds then shut down. The machine control will sense a "locked rotor" condition and the motor will stop. If the motor control does not receive an input signal from the motor, the motor will "jerk" for 5 seconds then shut down.*

1. Inspect the motor control wire harness for integrity of the connections on both ends. The harness is comprised of a White, Blue and Black wire.
2. Set the washer into the Delay Wash cycle and press the start/off button. The unit will start without activating the motor. Leave the tachometer harness on the motor control and insert the meter probes into the back side of the tachometer harness.

The following table indicates voltage checks of the tachometer harness between the motor and motor control board.

Tachometer Wire Checks	Voltage Found	Condition Of Component
White to Black (From Motor Control)	11 VDC (± 2.5 VDC)	Good Motor Control Board
White To Black (From Motor Control)	0 VDC	Bad Motor Control Board
White To Black (From Motor Control)	+ 13 VDC or <9 VDC	Bad Motor
Blue to Black (From Drive Motor)	No change in DC volts as motor is turned slowly	Bad Motor
Blue to Black (From Drive Motor)	Voltage changes from 0 - 5 VDC volts as motor is turned slowly.	Good Motor

UNBALANCE CONTROL SYSTEM

The unbalance control system is comprised of the inertial switch, outer tub displacement switch, strut displacement switch and a cabinet vibration sensor mounted to the machine control board. The three switches are wired in series on a 24 VDC circuit, monitored by the machine control board. The sensor is mounted on the machine control board.

Software in the machine control board will begin monitoring the switches when the spin speed reaches 90 rpm. The inertial unbalance switch monitors outer tub vibrations above 150 rpm. Inside the door is a cabinet vibration absorber designed to counter the vibration of the tub and serve as a tuned absorber for the whole washer.

Whenever a displacement switch is tripped, the machine stops and redistributes the clothes load. This involves a three (3) second pause, followed by a five (5) second reverse tumble (47-49 rpm) to redistribute the clothes load. The washer will pause again for three (3) seconds, then start the distribution profile again. To redistribute the load, the machine tumbles the load (50-90 rpm) and again attempts to pass through critical (about 150 rpm). The machine will try to redistribute twice as the washer attempts to spin at 800 rpm.

Once the load is properly redistributed and the speed reaches above 500 rpm, the inertial switch and cabinet vibration sensor are used. If the inertial switch or sensor is activated, the washer will drop in spin speed. This is based upon the speed at which switch activation takes place. See *Figure 2-12* outlining the spin speed categories and the corresponding reduced speeds. If the switches are not activated, the final spin speed will reach a maximum of 850 rpm and then drop to find the optimum performance level, based upon readings taken by the cabinet vibration sensor. Consumers may be confused by the up-and-down cycling of the motor. However, the machine is searching for the optimal speed performance.

<u>R P M</u>	<u>F U N C T I O N</u>
47	Tumble
47-85	Distribution
90-250	Accelerate Through Critical
250-499	Accelerate Through Critical
500-575	High Speed Acceleration - WILL DROP TO 450 RPM
600-675	High Speed Acceleration - WILL DROP TO 555 RPM
> 675	High Speed Acceleration - WILL DROP TO 650 RPM
750-800.....	TOP SPIN SPEED

Figure 2-12

Tub Displacement Switch

The tub displacement switch is located on the upper right hand side of the outer tub, below the top concrete weight, between the outer tub and the cabinet. The switch senses the outer tub touching the cabinet side as the machine passes through critical. When this switch is tripped, the machine stops and redistributes the load.

Testing the Tub Displacement Switch:

1. **Disconnect power to the unit.**
2. Place ohm meter leads across the two terminals of the switch. Depress the button on the switch. If the contacts open, the switch is good. If not, replace the switch.

Strut Displacement Switch

The strut displacement switch is clipped to the top of the left rear strut. The switch senses the outer tub bottoming out on the strut as the machine accelerates above 90 rpm. This is caused by the twisting motion of the outer tub. This additional switch is required because the twisting motion may not trip the outer tub displacement switch. The primary cause for activation would be an unbalance at the front and rear of the spinner on opposite sides.

The strut displacement switch is wired in series with the tub displacement switch and causes the same type of redistribution.

Testing the Strut Displacement Switch:

1. **Disconnect power to the unit.**
2. Place ohm meter leads across the two terminals of the switch. Depress the button on the switch. If the contacts close, the switch is good. If not, replace the switch.

Inertial Unbalance Switch

The inertial unbalance switch is located on the upper right hand side of the outer tub, in front of the top concrete weight. The switch consists of a moving weight in the switch body which presses against the switch contacts. If the unbalance of the outer tub becomes too erratic, the moving weight will open the contacts in the switch. When the machine controller senses the switch opening, the machine controller will reduce the spin speed to 650, 550, or 450 rpm depending on the current speed closest to the level spin speed (i.e. 625 rpm trip would drop to 550 rpm) (*See Figure 2-12*).

Testing the Inertial Unbalance Switch:

Testing of the switch may prove difficult. The switch will not open unless the switch is moved side to side creating a "G" force of 8 - 9 Ft. lbs.

1. **Disconnect power to the unit.**
2. Place ohm meter leads across the two terminals of the inertial switch. Move the switch side to side. If the contacts do not open easily, the switch is good. If the switch contacts are open or easily tripped, replace the switch.

Cabinet Vibration Sensor

The cabinet vibration sensor is mounted to the lower left corner of the machine control board. This is a piezo-electric strip mounted to the machine control board. With a mass attached to the end of the strip, the machine controller monitors the cabinet vibration as the machine reaches top speed. The machine controller uses the vibration sensor to attempt to spin the washer at the optimum speed with the least amount of vibration. Optimum speed changes from machine to machine due to: changes in mass of the absorber; changes in

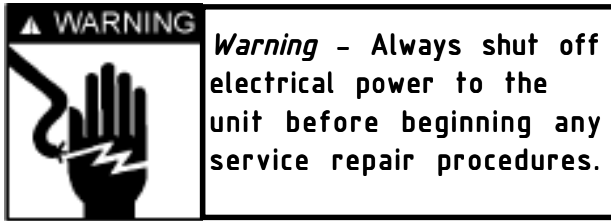
spring rate of the absorber; and changes in the pulley-belt ratio. It can also change from run to run due to the size of the clothes load and type of floor. The sensor finds the optimum speed on every run. The optimum speed is between 750 and 850 rpm.

Cabinet Vibration Absorber

This is a tuned absorber mounted in the door. The tuned absorber consists of a mass suspended by springs tuned to vibrate at approximately 800 rpm. The mass vibrates 180 degrees out of phase with the vibration of the cabinet. This cancels out much of the vibration caused by the clothes load at 800 rpm (*See Section 5: Cabinet Assembly*).



SECTION 3. TROUBLESHOOTING



Shuts OFF When Push-To-Start Button Released:

Check for proper wiring of BK 27 to COMM and GY 26 to NO. If reversed, the washer will shut off when button is released. If wiring is proper, replace machine control board. Line relay may be bad (*See Section 1: Push-To-Start Line Relay Operation*).

Runs For Five Seconds Then Shuts OFF:

Suspect a communication problem between motor, the motor control board and the machine control board. Check the motor and motor control system by removing the JP4 connector on the motor control board. Set the timer dial into the delay cycle and then press the push to start switch. If the motor operates and the washer goes into a 50 rpm tumble, then the source of the problem is the RD 30 wire leading from the motor control to the P4(2)/RD30 connector on the machine control board. When the machine control tells the motor control to run the motor, it monitors the red wire to determine if the motor is actually running. If the board does not see a return signal, the washer will shut down.

If RD30 wire is making contact, then suspect possible problems with timer input circuits. (*See the following section on Machine Operation Does Not Match Cycle Description*):

Washer Runs Five Minutes Then Shuts OFF:

During the wash cycle, the machine control communicates with the timer, via the timer input circuits. If the machine control board does not see a change in timer inputs over a period of 5 minutes, it will open the line relay and shut the washer off. Check the timer input circuits for poor connections at the timer and the machine control board. Replace timer if necessary (*See Section 2: Timer Input Circuits*).

Shuts OFF In The Middle Of The Spin Cycle:

During the spin cycle, the machine control monitors the door lock mechanism to ensure the door is locked. This is done through the door lock enable switch. During "lock mode," the shaft of the door lock mechanism is pressed forward by the door lock wax motor, and the shaft presses in the button of the door lock enable switch. If the machine control board sees the switch OPEN during the spin cycle, the machine control board will automatically shut the washer OFF. This is caused by a weak spring in the door lock wax motor. Replace the complete door lock mechanism.

Shuts OFF During Final Rinses:

The machine control board is programmed to allow a maximum continuous fill time of six minutes or an accumulated fill time of 8 minutes for each full wash cycle. If the required fill time exceeds the time limit, the washer will shut down. This is to prevent flooding in the event there is a loose hose clamp or damaged air dome hose. Check the incoming water lines for a minimum pressure of 20 psi. If lower, the customer can use smaller clothes loads and reduce the pressure to 10 psi. An alternative solution would be to change the plastic inlet screens to metal screened washers and remove the nozzle extender found in the water valve inlet hose near the dispenser inlet.

Tumbles Only:

When the door lock mechanism is in the "locked" mode, the wax motor has extended, forcing the latch axle to engage the door lock enable switch. This ensures the door is fully locked and the switch can then complete the signal back to the machine control board indicating the door is locked. Check connector P3(7)/YL 36 wire to verify if the terminal is making good contact to the board terminal. Check the door lock enable switch for continuity when the button is depressed. Replace door lock mechanism if necessary.

Continues To Tumble After The Wash Cycle Is Finished:

Check for a stuck button on the door lock enable switch in the door lock mechanism. You can verify this at the machine control board by checking for continuity across P3(7)/YL 36 to P3(1)/RD23. If the door is unlocked and there is continuity, the switch button is stuck. At the end of the wash cycle, the machine control monitors the door lock enable switch for disengagement. If the switch is stuck, the washer will continue to tumble till the door unlocks, even though the door is actually unlocked. Replace the door lock mechanism.

Third Rinse Cycle Is Always Cold:

If the user rotates the timer dial to the third or fourth rinse, the water will always be cold regardless of temperature selection. The machine control board counts the number of rinses through the wash cycle. When the third and fourth rinse are reached, the board will check the rinse temperature selection for proper fill temperature (***See Section 1: Water Temperature Inputs***).

Excessive Vibration:

Ensure that shipping bolts and straps have been removed from the washer. Check the levelness of the washer and ensure the leveling leg nuts are tightened up against the cabinet. Check the tightness of the upper and lower weights on the outer tub. Check for loose cabinet screws. Place hand on side of cabinet to determine if vibration noise due to cabinet flex. Apply sound dampening pad to inner cabinet wall if necessary. Check the unbalance circuit and wiring for continuity at the machine control (P2(4) to P3(1)). Continuity should be present. If not, check the wiring connections at the strut, outer tub and interial unbalance switches. If a switch is bad or a wire off, the machine control will not know when an unbalance occurs. The machine control board checks the state of the circuit prior to beginning the spin cycle, then monitors the circuit throughout the cycle. If the circuit is OPEN, the board will not see "a change in state" whenever one of the normally-closed switches is activated during an unbalanced load condition.

Machine Operation Does Not Match Cycle Description:

The machine control board monitors where the timer is in the cycle and then uses this information to start different operations, such as drain, fill, tumble and spin. Four input wires from the timer to the machine control board inform the machine control board where the timer is in the wash cycle. However, if one or more of these wires are making an intermittent contact with the machine control board, the board can be "misinformed" and will not respond properly.

Check the connections of the timer input wires leading from the timer to the machine control board (***See Section 2: Timer Input Charts***). Also, check wiring of all console switches to ensure no cross-wiring of 24 VDC and 120 VAC circuits.

Door Leaks:

Usually this occurs when the door is re-mounted into the shroud and the technician fully tightens the top hinge screw prior to inserting the lower screw. The technician should fully seat the door into the shroud evenly prior to tightening the hinge bracket screw into the shroud. Check also for excess plastic flashing in the tab area of the plastic shroud. Carefully remove the excess flash and remount the boot gasket.

"Thumping" Noise In Spin:

The noise could be from loose lower front weight mounting bolts or a loose bolt securing the driven pulley. Check the belt for a weak seam and replace if necessary. Check the motor adjustment bolt for tightness.

"Ticking or Knocking" Noise In Spin:

The noise could be from a loose wire harness, plastic purse-lock wire harness retainer on upper hose hitting the topcover or a plastic injection mold standoff on the outer tub bearing housing may possibly be interfering with the driven pulley.

Also, check the drive belt for a weak spot on the belt. Usually felt on the backside of the belt as a "flat" spot. Replace the belt.

RF (Radio Frequency) Interference:

The interference could occur if the RPT shutter on the motor was misaligned or a motor terminal has been pushed inward slightly when the motor harness connector was placed on the motor. Remove the motor phase harness connector and check the motor terminals. Replace the motor if the motor terminals are loose.

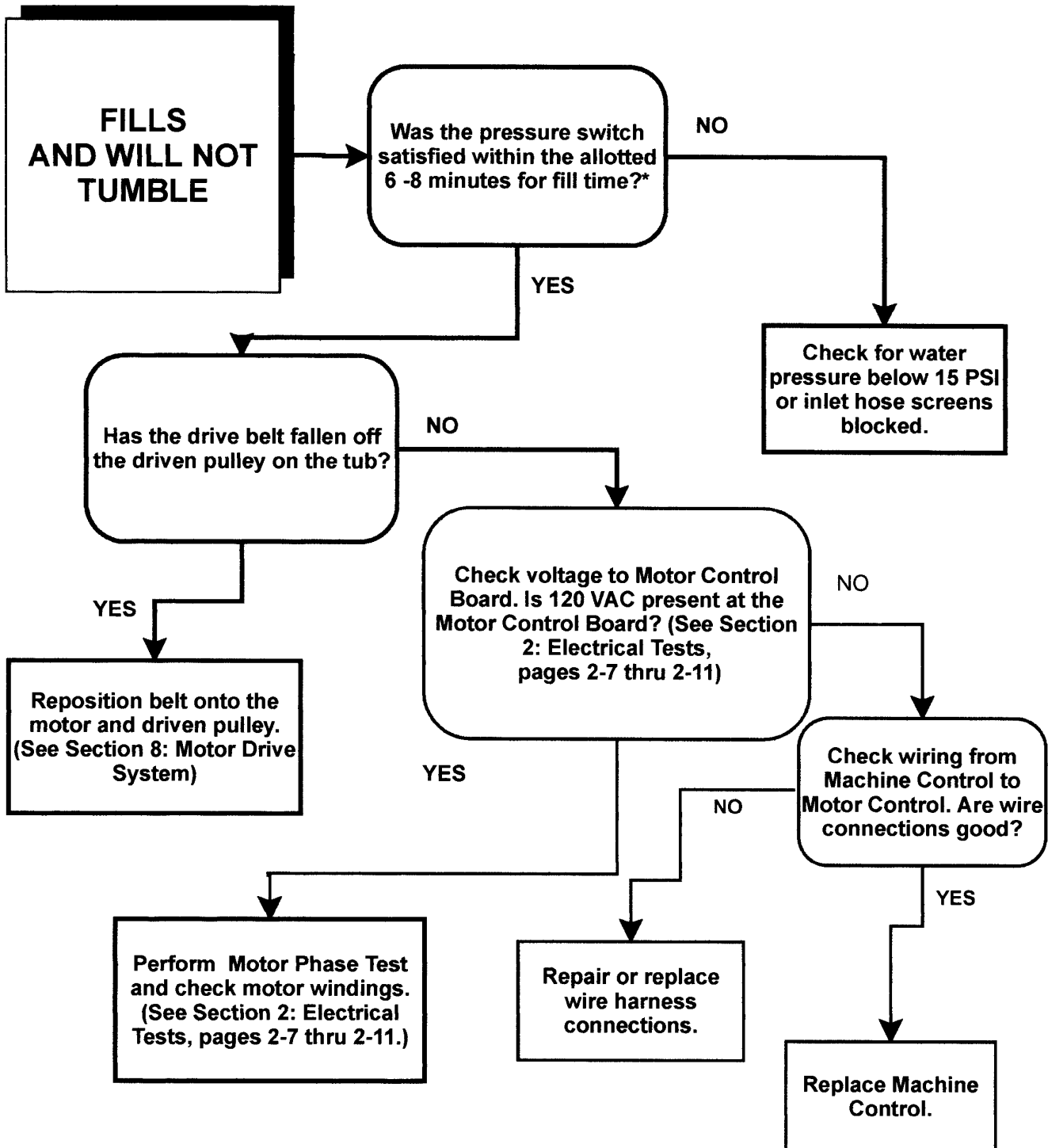
Dispenser Does Not Dispense:

Examine the siphon cap to see if the cap was twisted, causing the cap to seal the siphon tube against the bottom of the siphon cup. Reposition cap to lift the siphon tube off the bottom of the cup. The wax motors are activated a full 30 seconds prior to turning on the water valves. If the timing is not correct, suspect a bad wiring connection. Also, examine the linkage of the actuator arm and proper location of the spring on the wax motor (*See Section 6: Water Carrying Components*).

Clothes Wet:

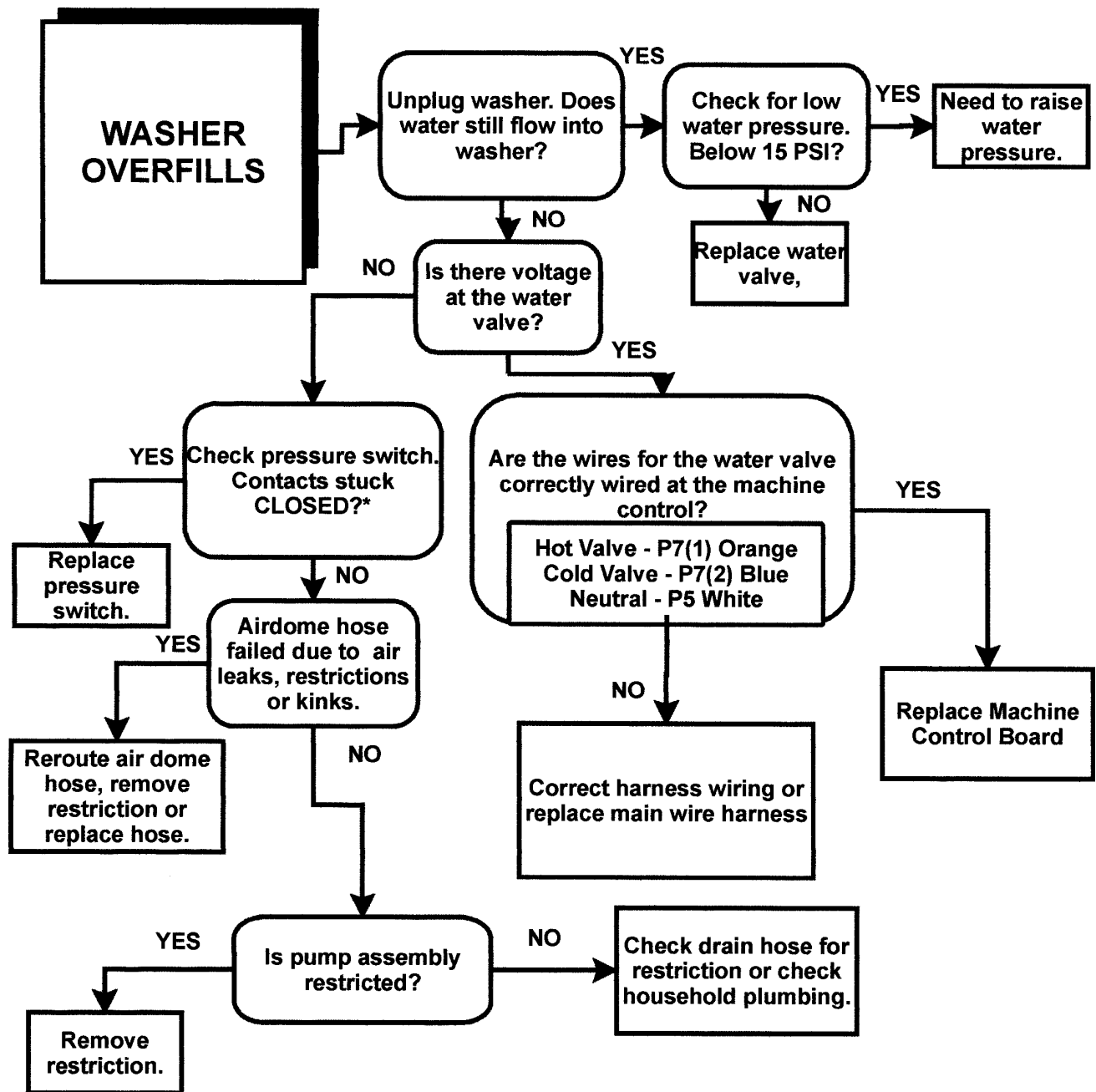
Possibly due to the washer shutting down too soon or excessive suds present. Did the timer advance to OFF? If yes, then excessive suds may be the cause or the inertial unbalance switch tripped too soon, resulting in lower spin speeds. Change the inertial switch if suds were not detected. **Note: If the timer motor is energized for five minutes without the cycle inputs changing, the machine control board will drop the line voltage relay.**

TROUBLESHOOTING



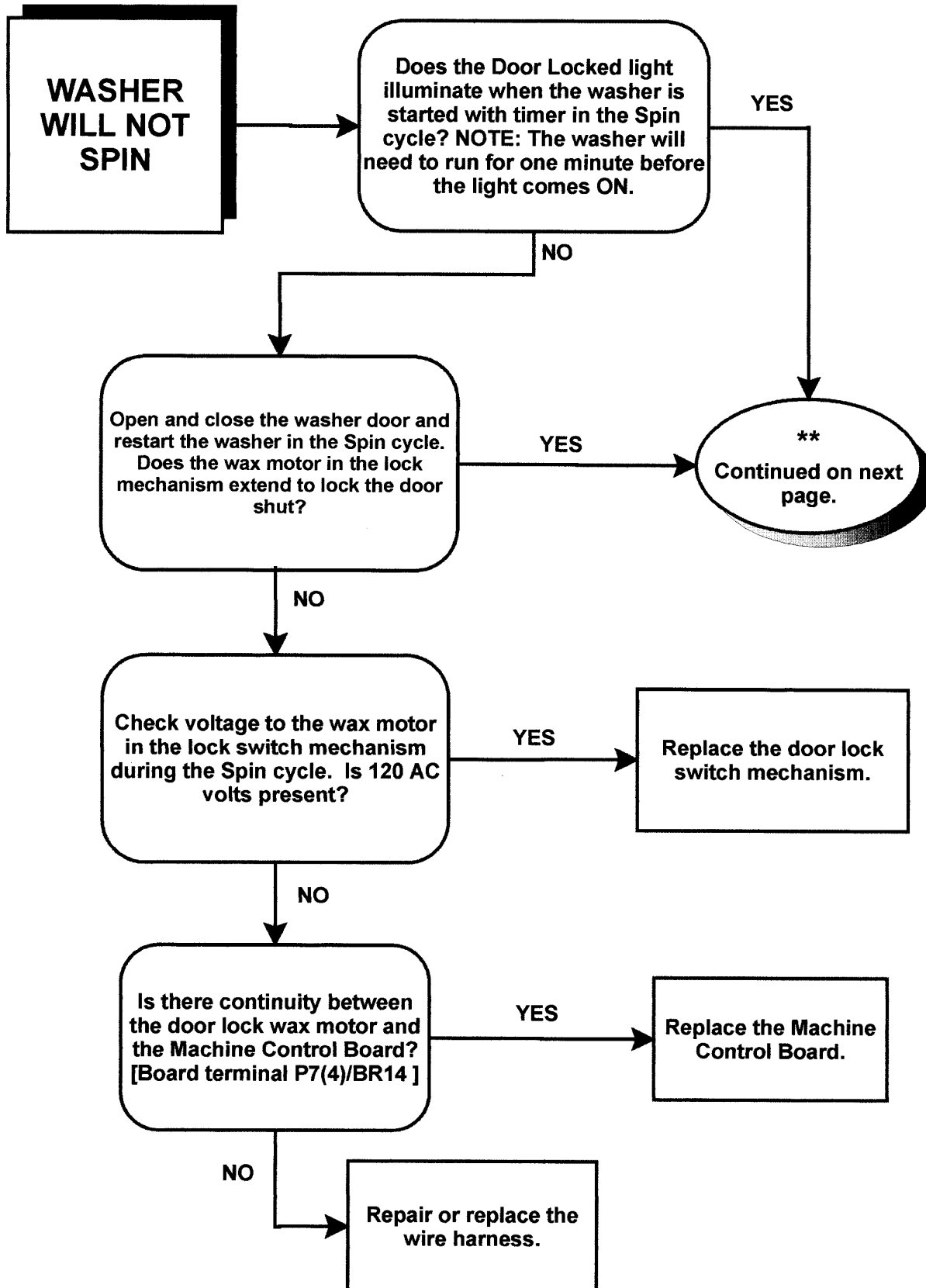
*** NOTE: The Machine Control Board will attempt to fill the washer and satisfy the pressure switch during an accumulated period of 6 - 8 minutes. If the time exceeds this time frame, the washer will shut down.**

TROUBLESHOOTING

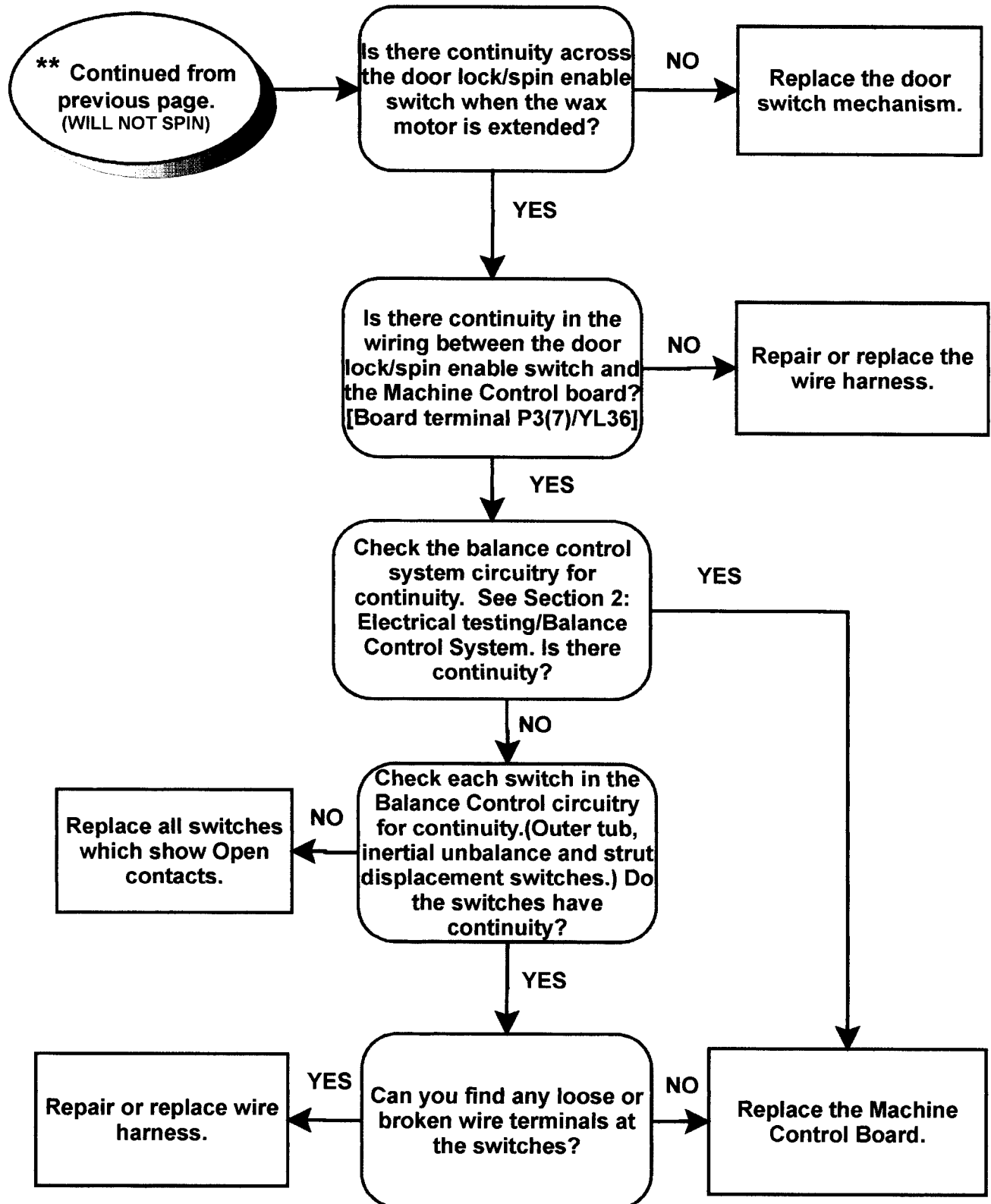


* NOTE: The Machine Control Board will attempt to fill the washer and satisfy the pressure switch during an accumulated period of 6 - 8 minutes. If the time exceeds this time frame, the washer will shut down. However, the consumer can reactivate the washer and the washer will add another 6 - 8 minutes of fill time.

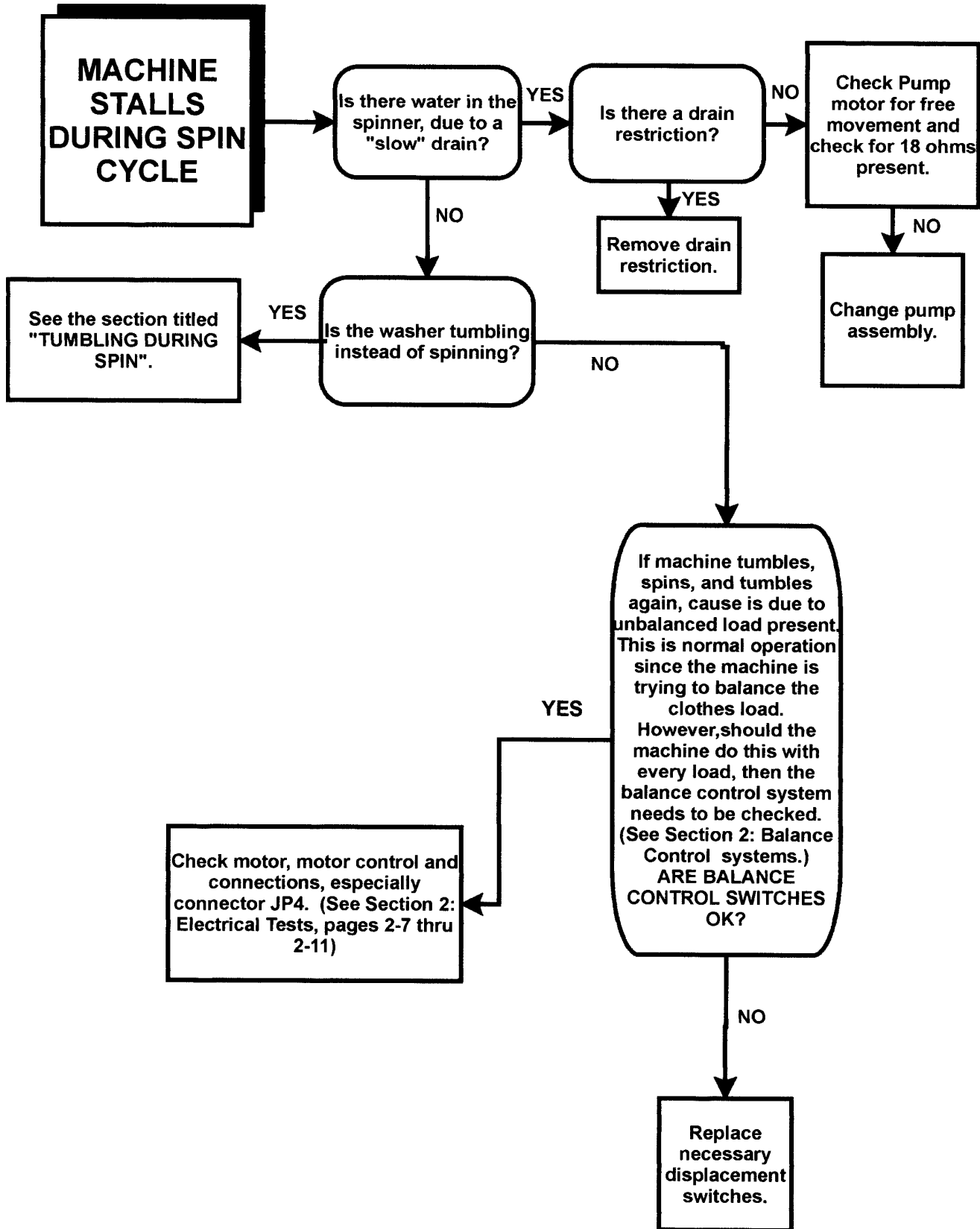
TROUBLESHOOTING



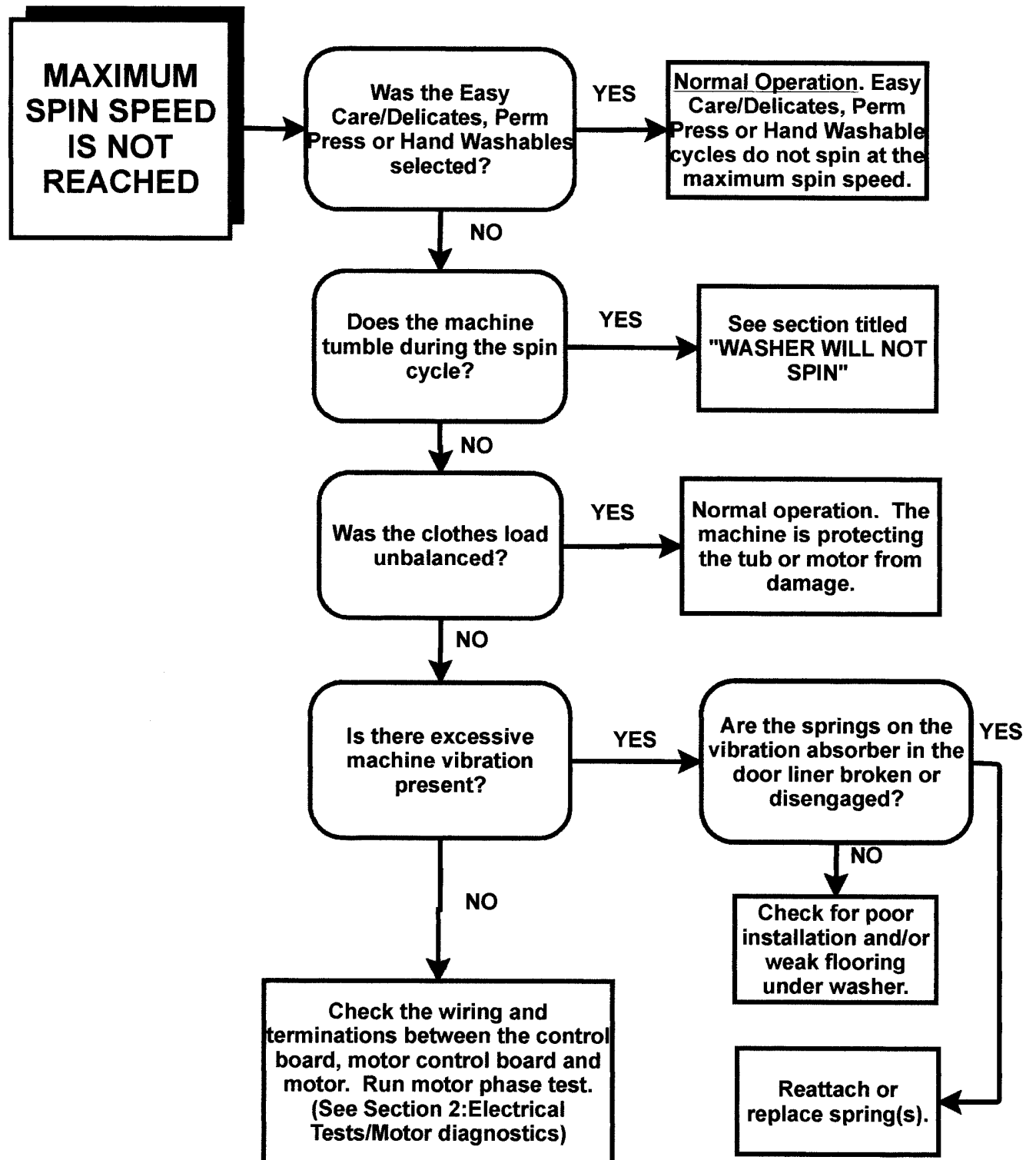
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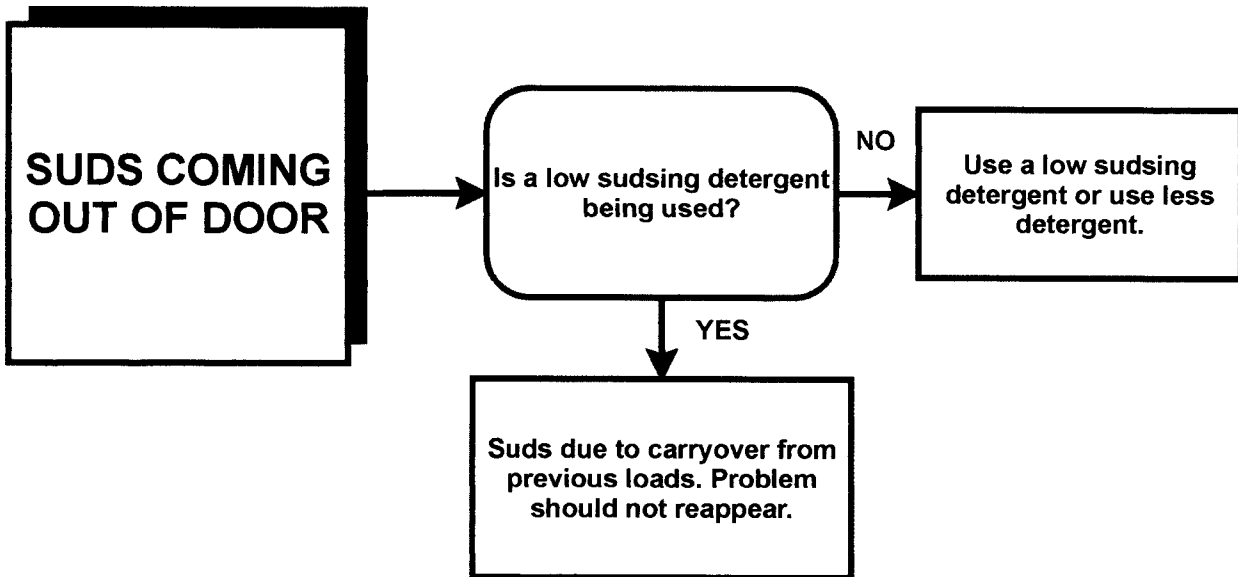
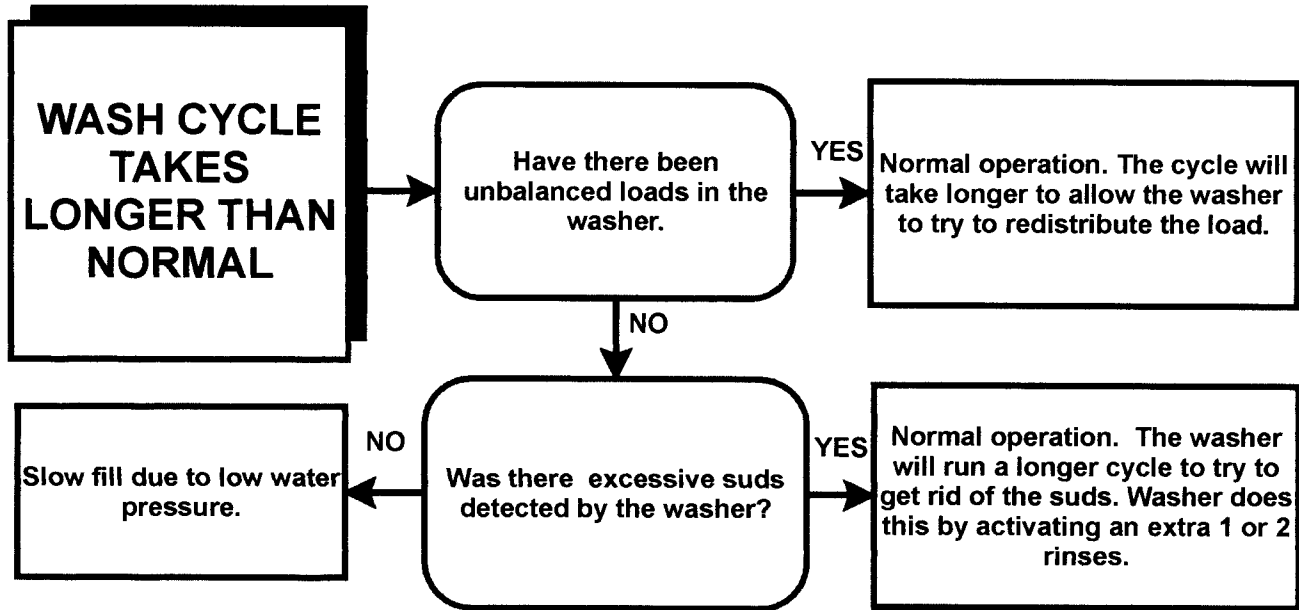
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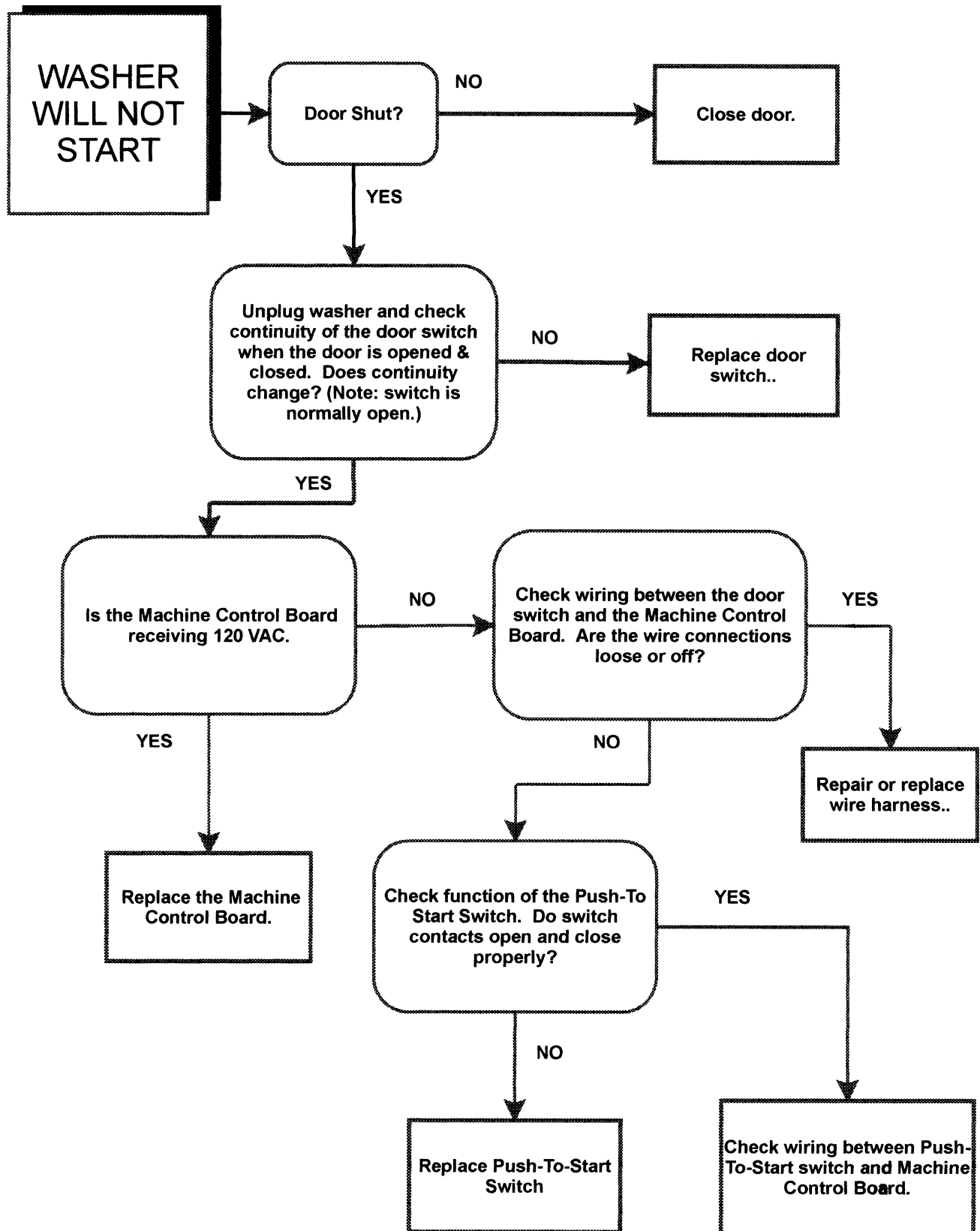
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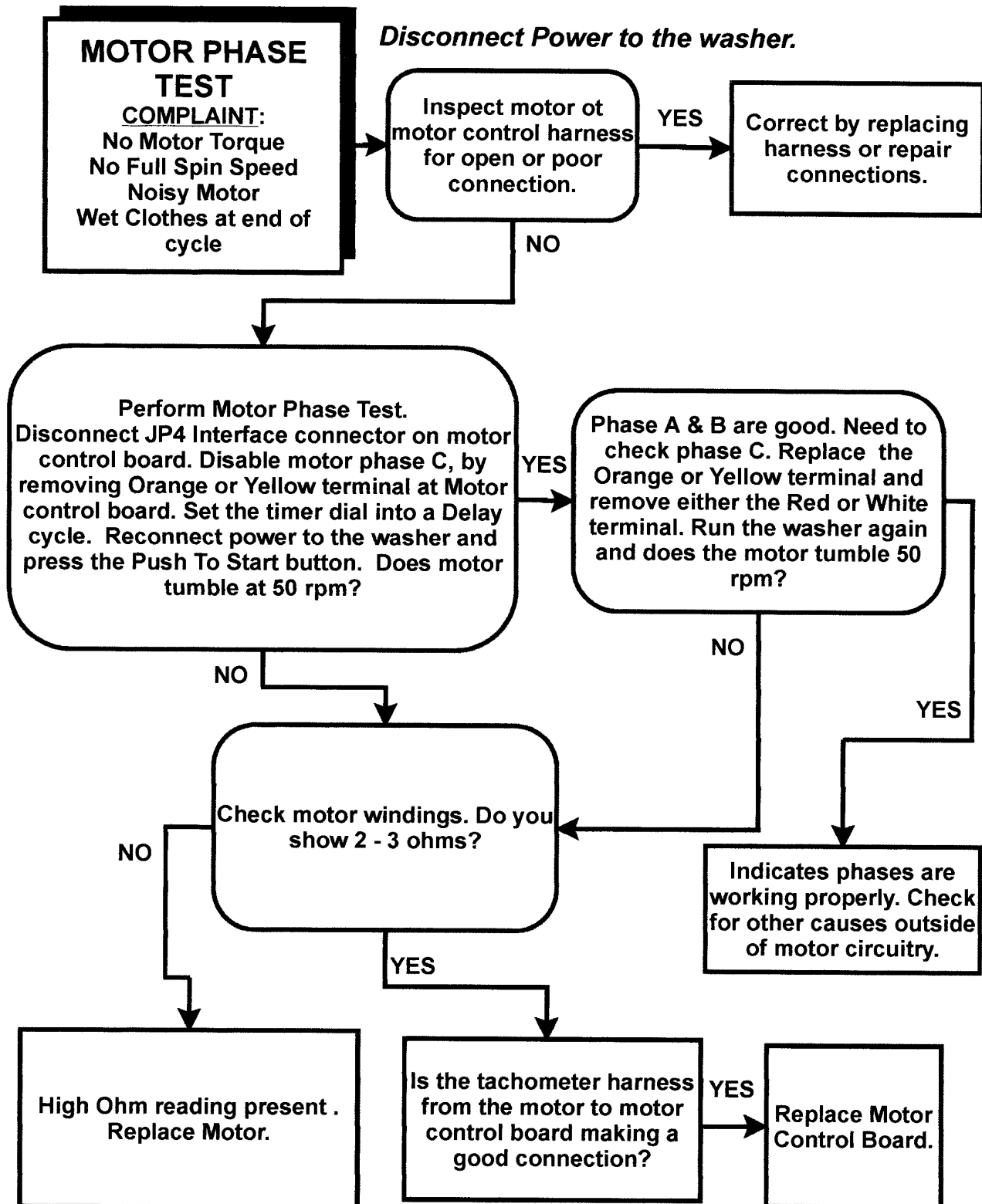
TROUBLESHOOTING



TROUBLESHOOTING



TROUBLESHOOTING



MISCELLANEOUS INFORMATION

Energy Usage:

The energy usage averages up to 0.10 Kwh per cycle, when using the Regular cycle with Normal wash. Peak amperage is 7.5 amps during acceleration to high speed spin, with nominal running amperage at a maximum of 5.0 amps.

Washer Wattages:

The following wattages are approximate and without clothes:

<u>Function:</u>	<u>Wattages:</u>
Delay	10-15
Tumbling (empty) & water fill	50-70
Tumbling (Full-Wash level)	110-120
Tumbling (Full-Rinse Level)	140-150
Draining (No tumble) with water	45-50
Draining (No tumble) no water	30-35
Spinning (100 rpm)	85-90
Spin Acceleration (100-200 rpm)	130-150
Spinning (400 rpm)	160-170
Spinning (850 rpm)	400-410

SECTION 4. CONSOLE



Warning - Always shut off electrical power to the unit before beginning any service procedure.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the three screws securing the console rear cover plate across the rear top edge of the console (*Figure 4-1*).

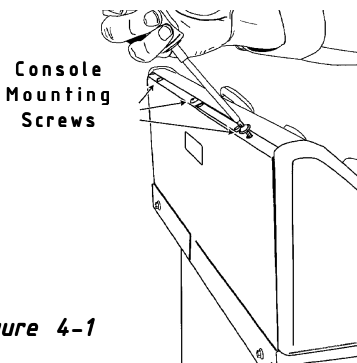


Figure 4-1

3. Lay a drop cloth across the top cover of the washer.
4. Grasp the top of the console and gently rock the top forward (*Figure 4-2*).

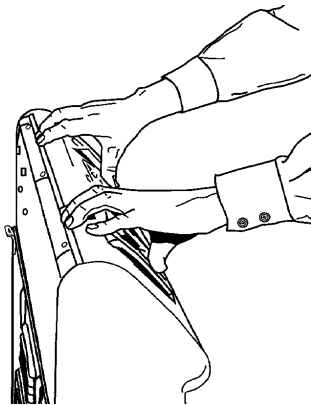


Figure 4-2

5. Push the bottom of the console toward the back panel to disengage the six locking feet from the top cover (*Figure 4-3*).

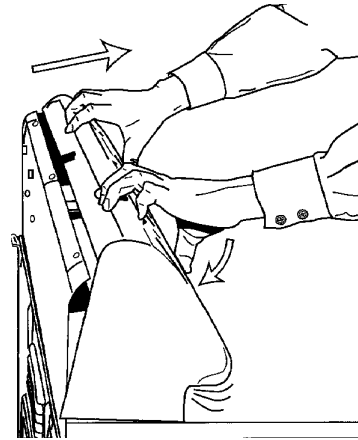


Figure 4-3

6. Carefully lift and roll the console forward onto the top cover. You now have access to the console components and wiring (*Figure 4-4*).

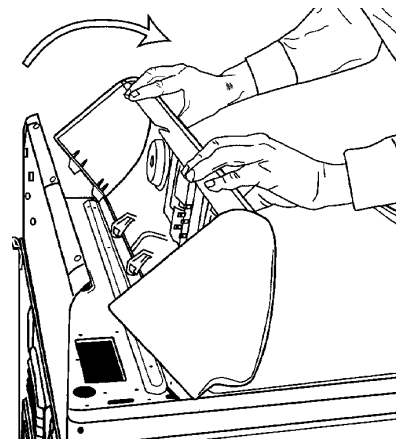


Figure 4-4

7. **To Reinstall:** Roll the console back into an upright position, engaging the locking feet into the slots in the top cover. Replace the three screws to attach console back to rear panel.

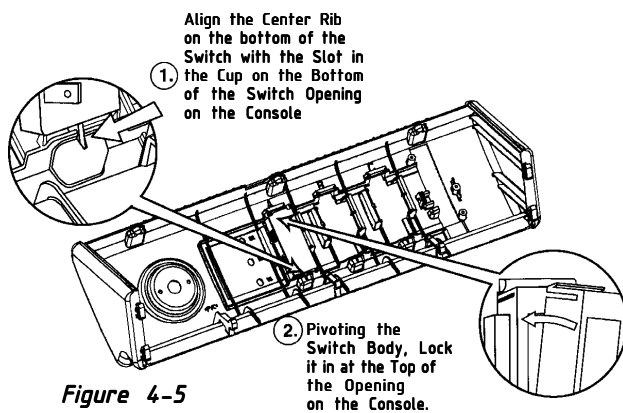
VERTICAL SWITCHES (Push Button)

REMOVAL

Depress the tab at the top of the switch with a screwdriver to disengage the tab from the console. Pivot the switch away from the console to remove (Figure 4-5).

REPLACEMENT

Align the rib on the bottom of the switch with the slot in the console. Pivot the switch up into the console until the tab engages the console securely. Check that the locating tabs on either side of the switch's lower alignment rib are in position to properly center and lock the switch into the lower part of the switch opening.



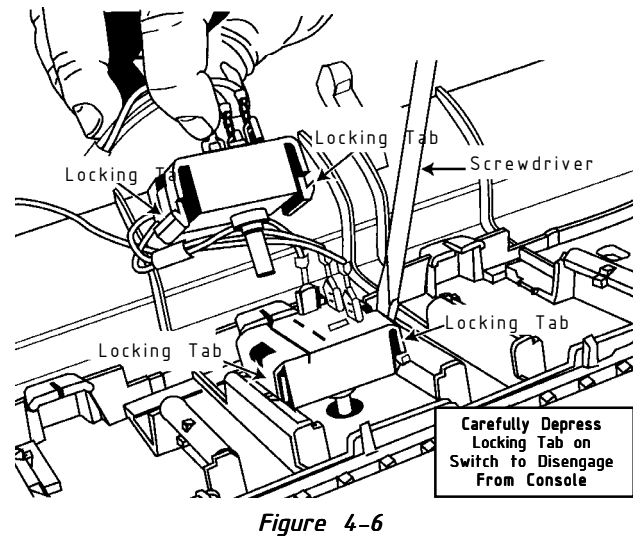
HORIZONTAL SWITCHES (Push-to-Start)

REMOVAL

Depress the locking tab on the switch to disengage it from the locking tab on the console. Pivot the switch from the console (Figure 4-6).

REPLACEMENT

Position one side into the console and pivot the other tab into the console and apply enough pressure to engage the tab into the console.



TIMER REMOVAL

1. **Disconnect power to the unit.**
2. Carefully lift the timer knob and dial off the timer shaft by pulling the knob away from the face of the control console (*Figure 4-7*).

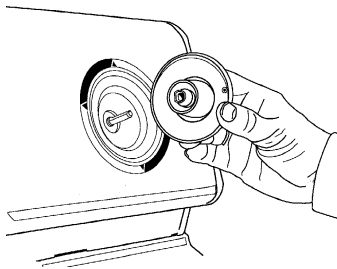


Figure 4-7

3. Disengage the console assembly from the top cover and roll forward (*See Console Removal*).
4. Remove timer mounting screw on back of timer in the console.
5. Slightly lift the locking tab on the back of the timer (*Figure 4-8*).
6. With the locking tab lifted, slide the timer body toward the end cap of the console. This will disengage the retaining tabs of the timer from the slots in the console.
7. Lift the timer away from the console.

REPLACEMENT

1. Align the three tabs of the timer into the slots of the console.
2. Insert the timer into the slots and slightly lift the locking tab of the timer. Slide the timer away from the endcap until the locking tab can engage with the square hole in the console.
3. Replace mounting screw.

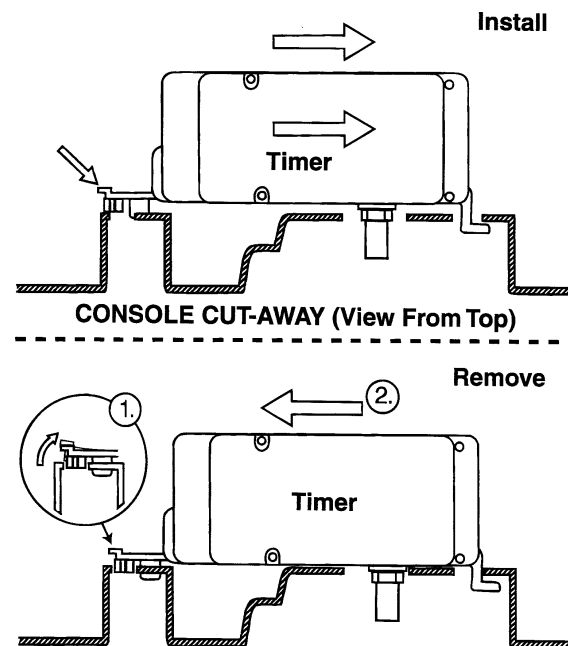
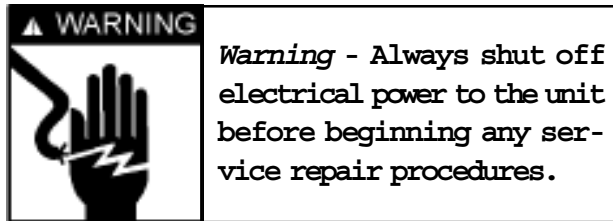


Figure 4-8

SECTION 5. CABINET ASSEMBLY



DOOR ASSEMBLY & HINGES

The door assembly is reversible. It contains an inertial vibration damper comprised of a steel plate suspended with springs. The damper is designed to tune out excessive vibrations generated by the machine during the spin cycle. Replacement inner door liners are shipped with the vibration damper in place.

REMOVAL

1. Open the door and remove the center screw of each hinge secured to the inner flange of the front panel in the door opening.
2. Grasp the door with both hands and lift the hinge area slightly. Draw the door assembly away from the machine. This will disengage the hinges from the slots in the front shroud (**Figure 5-1**). If the hinges bind, press out on the plastic shroud near the hinge toward the cabinet.

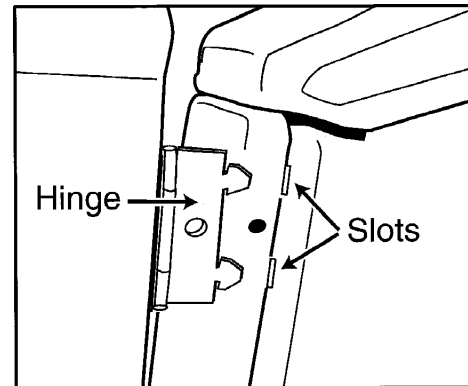


Figure 5-1

REVERSAL

1. Repeat the above steps and, remove the corresponding sheet metal spacers on the opposite side.
2. Remove the hinges from the door and re-locate them to the other side of the door.
3. Remount the door into the new slots and secure with one screw into each hinge.
4. Mount the sheet metal spacers onto the side where the hinges were previously to cover the hinge slots in the front shroud.

DISASSEMBLY

1. Remove ten screws located across the bottom and along either side of the door panel. The top edge of the outer panel is folded over the inner door plug.
2. With the outer door panel removed, the stabilizer is exposed and is attached to the inner door plug.

Cabinet Vibration Absorber

The purpose of the cabinet vibration absorber is to provide a dampening effect to the washer during the spin cycle. By dampening the machine vibration, the washer is able to maintain and achieve optimum spin performance. The stabilizer is attached to the inner door plug with two screws.

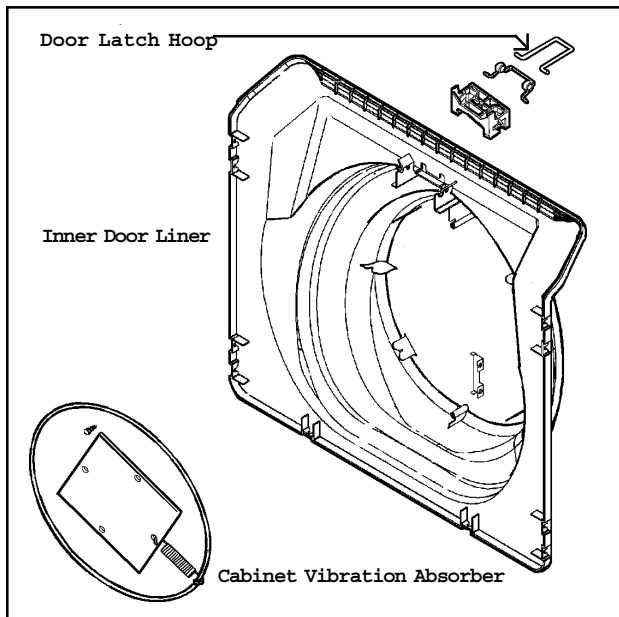


Figure 5-2

Door Latch Hoop

The door latch hoop is snapped into the door liner. A spring retains the hoop in the proper position to align with the door lock mechanism when the door is closed. A plastic support is snapped into place over the latch hoop to add strength (Figure 5-2).

FRONT PANEL

REMOVAL

1. Disconnect power to the unit.

2. Open the door and remove the four screws along the inside lip of the door opening. The two that are located vertically, on either side of the door opening, secure the front panel to the front shroud assembly (Figure 5-3). Care should be taken when opening and closing the door with the screws removed.
3. Remove the door.

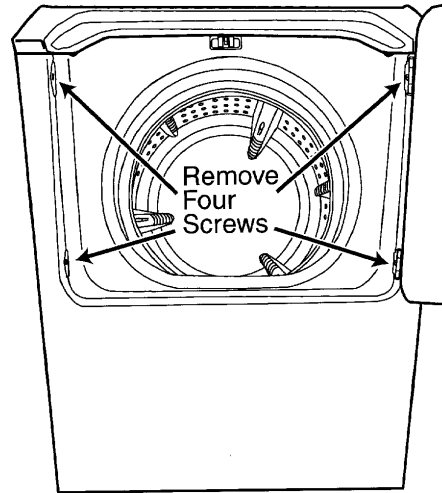


Figure 5-3

4. To remove the front panel, open the door, twist the upper right and left panel extensions inward by pressing in on the outer upper edges of the front panel posts. This will disengage the front panel posts from clips located on the face of the cabinet flange (Figure 5-4).
5. Tilt the top of the front panel away from the washer. Then, remove the front panel (Figure 5-4).

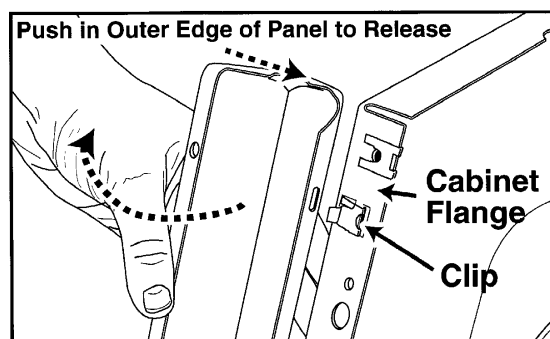


Figure 5-4

TOP COVER

REMOVAL

1. Remove the front panel (*See Front Panel Removal*).
2. Remove the four screws fastening the dispenser bezel to the top of the top cover (*See Dispenser Assembly*).
3. Remove two 5/16" hex head screws securing the two hold down brackets on the top cover (*Figure 5-5*).
4. To remove the hold down brackets, swing the bracket to the outside to unhook the bracket from the slot in the top cover lip (*Figure 5-6*).
5. If the door is still positioned on the front shroud, open the door prior to lifting the front of the top cover and tilt the top cover toward the rear of the machine.

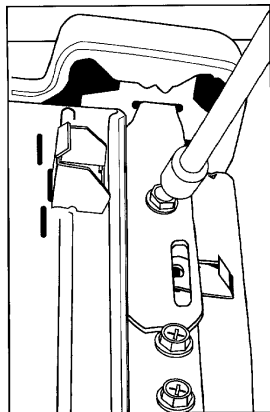


Figure 5-5

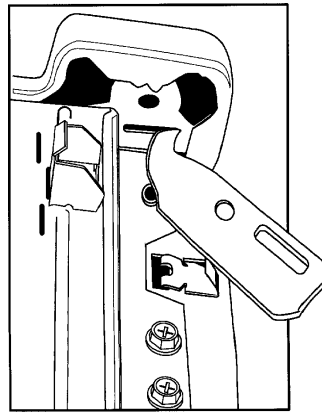


Figure 5-6

DOOR LOCK MECHANISM

The purpose of the door lock mechanism is to secure the door during the spin cycle. When the door is shut, the wire loop on the door engages the rotating gear in the door lock mechanism (*Figure 5-7*). When the proper water level is reached and the pressure switch is satisfied, 120 VAC is applied to the wax motor. The piston in the wax motor will extend, pushing the latch axle and sliding gear from left to right. Teeth on the face of the sliding gear will intermesh with the teeth on the side of the rotating gear (normally takes about 45-60 seconds). This interlocking of teeth provides the locking action of the lock mechanism.

At the end of the spin cycle, when tumbler speed drops below 90 RPM, voltage is no longer applied to the wax motor. The wax motor will cool and relax the piston on the wax motor. The latch axle and sliding gear are then pulled from right to left, disengaging the teeth of the sliding gear from the rotating gear (normally takes 1 - 1½ minutes). This allows the rotating gear to be in a position to rotate if necessary, should the door be opened.

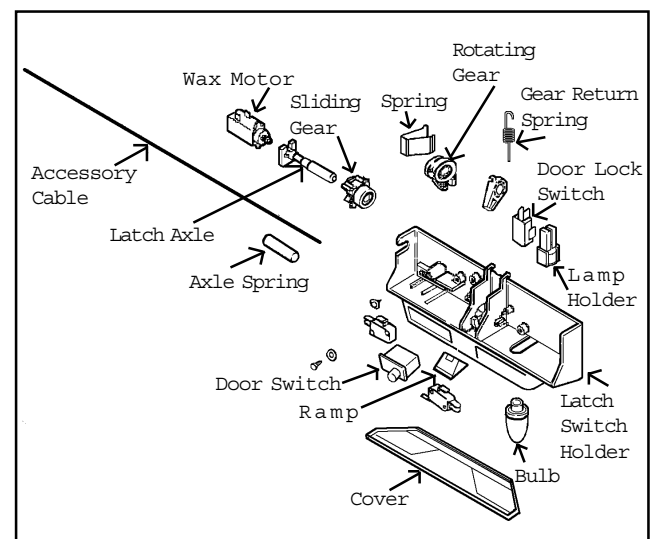


Figure 5-7

Two switches in the door lock mechanism inform the machine microprocessor control when the door is latched shut and when the door is securely locked. For more information, refer to section on **Electrical-Mechanical Troubleshooting**.

An emergency access cord (filament) is attached to the sliding gear, should the wax motor fail in the extended position and entry into the washer is necessary. To gain access to the cable, removal of the dispenser bezel is necessary. Once removed, the cable is exposed. By carefully applying both a steady pull of the access cord and opening force to the door, the wax motor is overridden and the sliding gear is pulled from right to left away from engagement with the rotating gear. Thus, allowing the rotating gear to release the wire loop of the door.

NOTE: *When the cord is released, the lock will return to a locked position (Figure 5-8).*

REMOVAL

1. Remove the front panel and raise the top cover to expose the door lock mechanism (*See Front Panel & Top Cover*).
2. Remove the wires from the lock switches, wax motor and light fixture.
3. Remove light.
4. Remove two 5/16" hex-head screws securing the switch support to the metal shroud support (*Figure 5-8*).

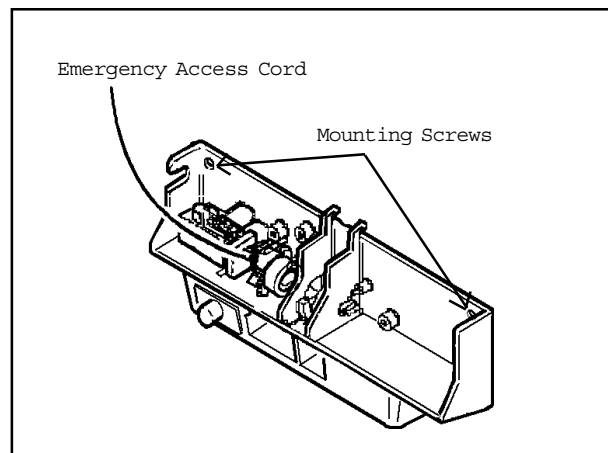


Figure 5-8

FRONT SHROUD ASSEMBLY

The shroud assembly ties the sides of the cabinet together across the front for stability and provides support for mounting of the door assembly, front panel and door lock mechanism. To gain access to components behind the front shroud, the assembly can be removed as a whole assembly and lifted onto the top of the washer. This will allow access to the tub cover, spin basket, sump area and etc..

REMOVAL

1. Remove the front panel and raise the top cover to expose the front shroud assembly (*See Front Panel & Top Cover*).
2. With the door open, unsnap the boot gasket from around the inside perimeter of the door opening by pulling out on the sealing lip of the gasket (*Figure 5-9*).

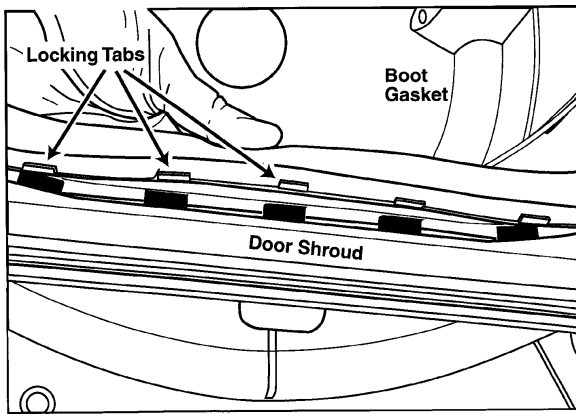


Figure 5-9

3. Remove the door (See *Door Assembly and Hinge Removal*).
4. Removal and replacement of the screws in the following order, as illustrated, is necessary to provide proper alignment of the parts. Failure to do so will hinder removal and replacement of the shroud onto the cabinet (Figure 5-10).

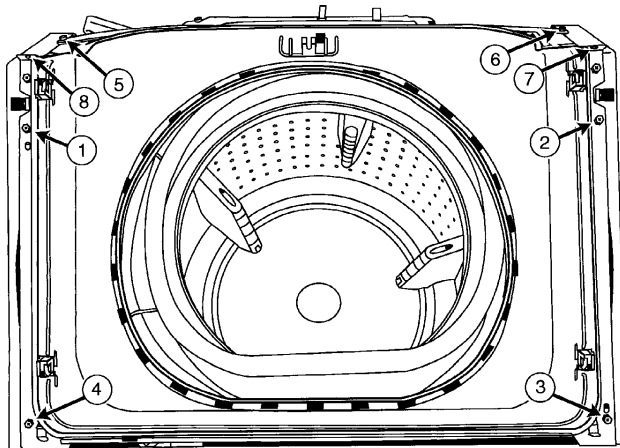


Figure 5-10

5. Place a soft cloth over the top of the concrete weight. Carefully lift and stand the shroud assembly on top of the tub. The assembly can lean back against the top cover. The wire harness on the left side of the upper cabinet is long enough to do this. When replacing the shroud, be sure to tuck the harness inside the upper flange of the top cover to keep the wires from being pinched and damaged.

CABINET ASSEMBLY w/REAR ACCESS PANEL

Removal of the access panel gains access to the rear components of the washer (Figure 5-11).

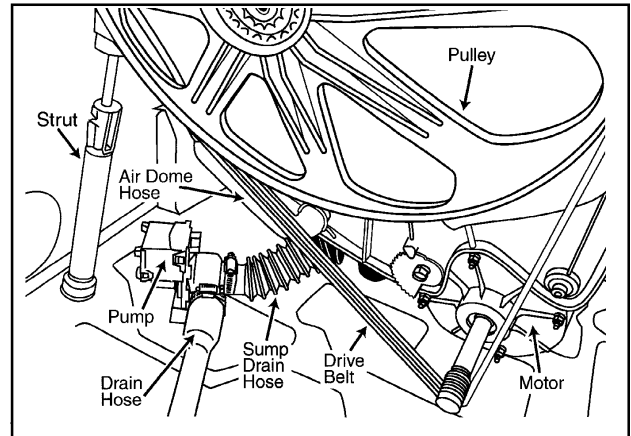


Figure 5-11

REMOVAL

Remove the four hex-head screws surrounding the access panel (Figure 5-12).

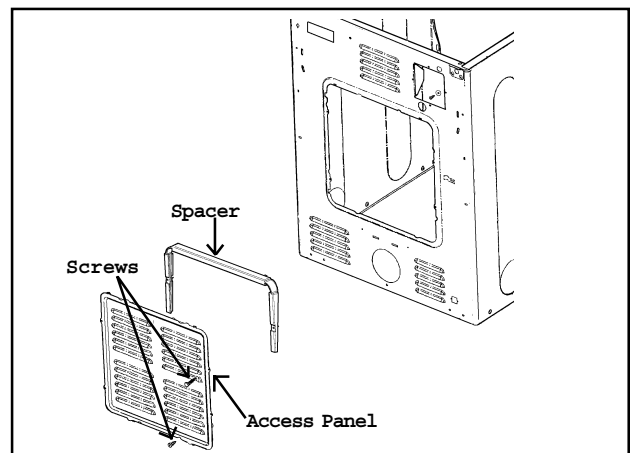


Figure 5-12

SECTION 6. WATER-CARRYING COMPONENTS



Warning - Always shut off electrical power to the unit before beginning any service repair procedures.

WATER VALVE

The water valve is accessible from the front or rear of the machine.

REAR REMOVAL

1. **Disconnect power to the unit.**
2. Shut off the water to the inlet hoses and remove the hoses from the water valve connections of the washer.
3. Remove the two 1/4" hex head screws securing the water valve bracket to the cabinet (*Figure 6-1*).

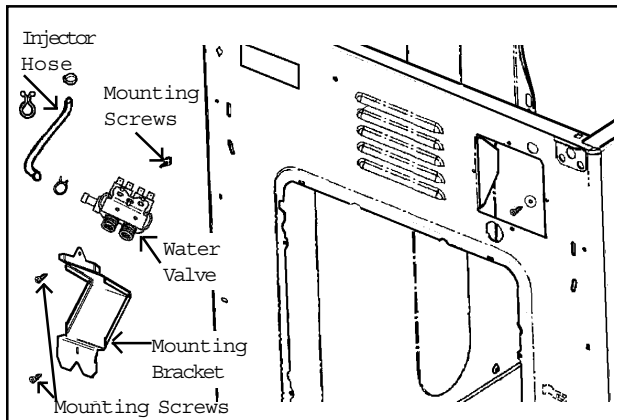


Figure 6-1

4. While pulling the lower end of the bracket down slightly, slide the bracket to the left. This will allow the injector hose to clear the rear cabinet opening.

5. While pulling the bracket away from the cabinet, rotate the left side of the bracket away from the washer.
6. Remove the wire harness from the water valve coils (Blue & White wires - Cold; Orange & White wires - Hot) and remove the clamp from the injector hose.
7. Remove two 5/16" hex head screws securing the valve to the mounting bracket.

FRONT REMOVAL

1. **Disconnect power to the unit.**
2. Shut off the water supply to the inlet hoses.
3. Remove the front panel.
4. Remove dispenser bezel and raise the top cover to expose the upper rear cabinet area (*See Front Panel & Top Cover Removal*).
5. Remove the wire harness from the water valve coils (blue & white wires - cold; orange & white wires - hot) and remove the clamp from the injector hose. **When the valve is replaced, the hot water valve coil is on the left.**
6. Remove the two 5/16" hex head screws securing the water valve bracket to the cabinet.
7. Carefully lift the valve and direct the inlet hoses through the openings in the rear mounting bracket.
8. Remove the inlet hoses from the water valve connections. **If possible, clamp the hoses shut and/or have a towel handy in case of overspray when water pressure is relieved.**

WATER LEVEL PRESSURE SWITCH

The water pressure switch is located in the console area and mounted to a galvanized bracket secured to the rear panel of the console. The air dome hose is inserted into the lower end of the mounting bracket (**Figure 6-2**). The nipple of the pressure switch is inserted into the end of the air dome hose which is secured by the lower mounting bracket.

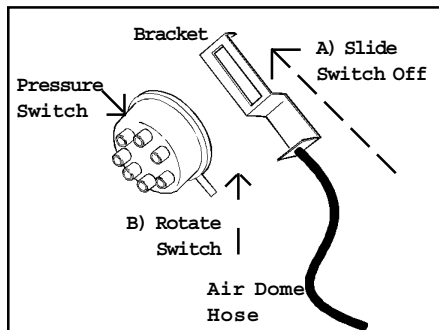


Figure 6-2

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the console (*See Console Removal*).
3. Slide the pressure switch up, away from the air dome hose.
4. Remove wire harness from the pressure switch.
5. Rotate the pressure switch 90 degrees to disengage locking tabs on the back of the switch from the mounting bracket.
6. The mounting bracket for the pressure switch is secured to the rear console panel with one screw.

7. To replace, insert air dome hose into the bracket. Insert the pressure switch nipple into the air dome hose. Press the pressure switch into the bracket until it "snaps" into place.

AIR DOME HOSE

The air dome hose connects the pressure switch to the air dome located in the sump area of the outer tub. Routing of the air dome hose passes from the console down the rear wall of the cabinet to the rear sump area of the outer tub. Two holding clips retain the air dome hose to the cabinet away from the belt and pulley.

REMOVAL FROM CONSOLE

1. **Disconnect power to the unit.**
2. Remove the console (*See Console Removal*).
3. Slide the pressure switch up on the mounting bracket, away from the air dome hose. The mounting bracket for the pressure switch is secured to the rear panel of the console (*See Figure 6-2*).
4. Pull the air dome hose down through the top cover opening.

REMOVAL FROM OUTER TUB

1. **Disconnect power to the unit.**
2. From behind the outer tub, slide off the retainer clip securing the air dome hose to the rear spout of the outer tub.
3. Remove one of the rear baffles.
4. Grasp and lift the airdome hose from the sump area (*See Figure 6-3*).

5. Pull the air dome and hose out through the sump opening in the spin basket (**Figure 6-3**).

REPLACEMENT/ROUTING

1. Thread the narrow end of the hose through the air dome outlet in the rear of the outer tub (**Figure 6-3**). Apply alcohol to lubricate the hose to ease insertion into the outer tub air dome outlet.

NOTE: *Using soap and water may lead to a potential leak.*

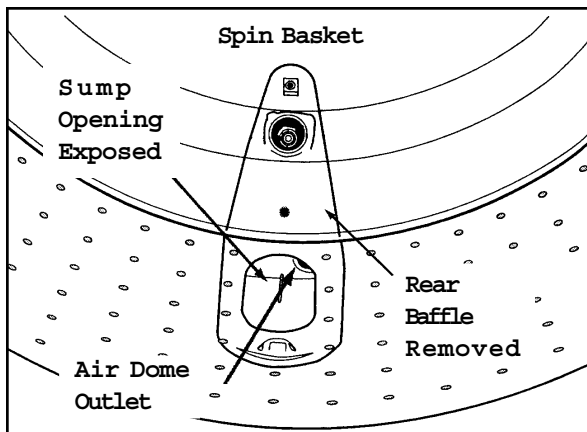


Figure 6-3

2. Secure the retainer clip on the outside ridge of the air dome hose.
3. Push the bent end of the air dome down into the sump area, below the spin basket, making sure the flat rubber tab on the air dome is down inside the drain sump opening.
4. The air dome hose is retained to the rear wall of the cabinet with two clips.

NOTE: *A silver indicator mark is located approximately 20 inches away from the air dome. The indicator mark must be located under the lower clip to allow the correct amount of slack in the hose.*

5. Remove all slack in the hose between the upper and lower clips holding the air dome hose. This reduces the potential for noise.
6. Route the air dome hose into the center rear hole in the top cover. Route toward the pressure switch and secure the hose to the pressure switch.

DISPENSER ASSEMBLY

The dispenser assembly is located in the left hand side of the top cover. Three bays dispense the fabric softener, bleach and detergent into the wash load. A double wax motor mechanism directs the flow of water into each specific bay when required for disbursement into the wash load. When a specific fluid is required, the water is directed into that bay. As water fills the bay, the fluid level rises. When the fluid reaches a specific height, it is siphoned out into the dispenser injector hose to the wash load.

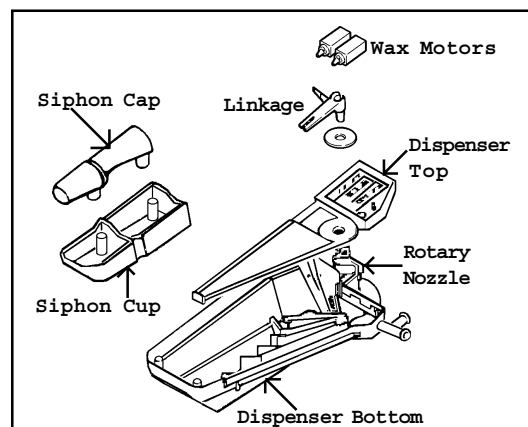


Figure 6-4

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the siphon cup and cap.
3. Remove the four screws securing the dispenser bezel and assembly to the top cover.

- 4 Remove the front panel and top cover (*See Front Panel & Top Cover Removal*).
- 5 Disconnect the hoses attached to the dispenser assembly.
- 6 While lifting, rotate the dispenser assembly 90 degrees in a counterclockwise direction.

NOTE: *The two tabs on the side wall of the dispenser bottom may break off if the above procedure is not followed properly.*

FRONT WATER FLUME INJECTOR

As water is filling the dispenser assembly, water is also diverted to a hose leading to the front of the outer tub.

As the water enters the top of the outer tub through the hose, it passes through a water flume. The flume directs the water toward the front of the tub to saturate the clothes load.

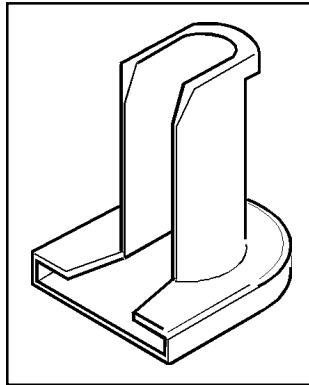


Figure 6-5

REMOVAL

- 1 **Disconnect power to the unit.**
- 2 Remove the front panel and raise the top cover to expose the upper front cabinet area (*See Front Panel & Top Cover Removal*).
- 3 Remove the front shroud assembly (*See Front Shroud Assembly Removal*).
- 4 Remove the outer tub cover (*See Outer Tub Cover Removal*).

- 5 Remove the hose clamp and injector hose from the spout on the front upper area of the outer tub.
- 6 In order to provide sufficient space to remove the injector, place a 5/8" - 3/4" wedge between the spinner and the outer tub.
- 7 Pinch the two tabs exposed on the outer edge of the outer tub spout and press the injector into the tub. Reverse the previous steps to replace the injector.

PUMP ASSEMBLY

The pump assembly is mounted to the right rear area of the base.

REMOVAL

- 1 **Disconnect power to the unit.**
- 2 Spread a towel below the drain hoses prior to loosening the hose clamps. This will catch any residual water left in the hoses and sump area.
- 3 Remove the hose clamps and hoses from the pump.
- 4 Remove the wiring harness from the pump motor terminals.
- 5 Rotate the pump assembly in a counterclockwise direction. The support legs of the pump are slotted to engage in keyed slots in the base. Reverse the steps to re-mount the pump.

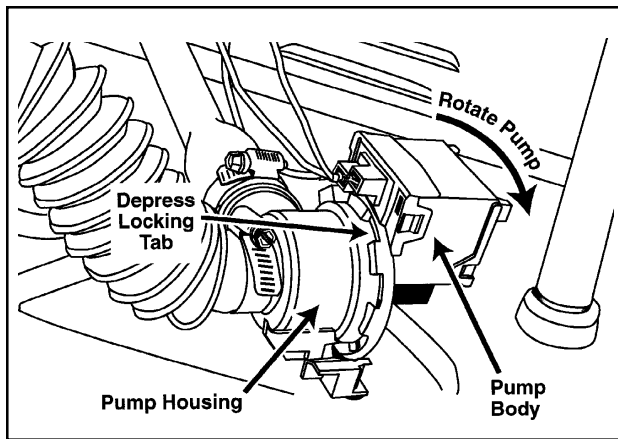


Figure 6-6

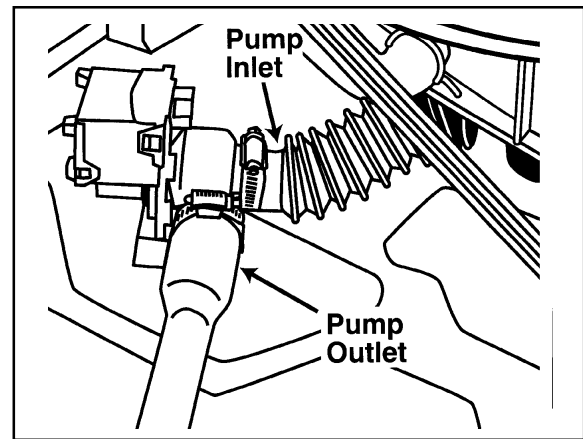


Figure 6-7

CLEANING THE PUMP

The pump assembly can also be disassembled without removing the hoses from the pump (See Figure 6-6).

1. Depress the locking tab on the face of the pump housing.
2. Rotate the block portion of the pump containing the motor windings toward the front of the washer. This will disengage the locking tabs of the pump housing from the pump face.
3. Carefully remove the pump body away from the housing. The drain impeller is exposed for cleaning.

4. Position the second pump near the first pump and connect the accessory connector to the sump intake of the second pump. Secure with the clamp in the kit.
5. Connect the drain hose to the drain outlet of the second pump. Secure with a clamp.
6. The second pump assembly is not secured to the washer's base frame.
7. Installation is complete.

Pump Accessory Kit

1. **Disconnect power to the unit.**
2. Disconnect the drain hose from the existing pump in the washer.
3. Attach the accessory connector to the pump drain outlet and secure with the clamp found in the kit.

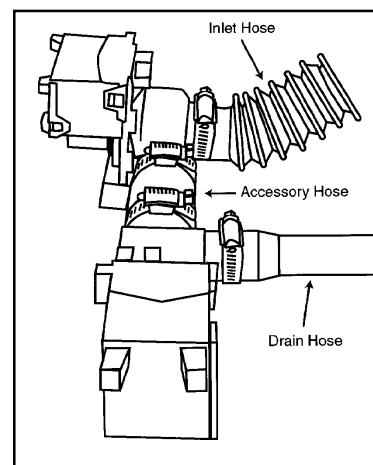


Figure 6-8

DRAIN HOSE

The drain hose attaches to the pump and is routed through the lower rear wall of the cabinet. The drain hose is protected externally by a shield.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the four ¼" hex head screws securing the access panel to the rear wall of the cabinet.
3. Remove the ¼" hex head screw securing the drain hose shield. Remove shield.
4. With access into the machine compartment, spread a towel under the connection of the drain hose to the pump. Loosen the clamp and remove the drain hose (*Figure 6-10*).
5. Reverse the previous steps for replacement.

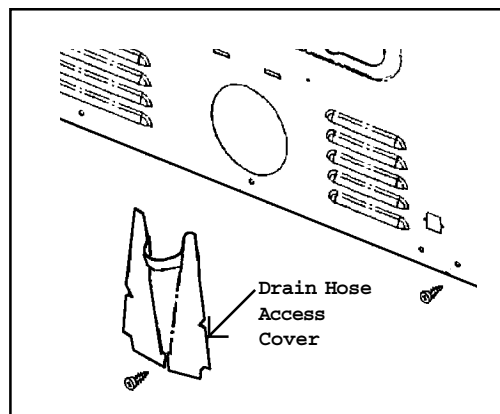


Figure 6-9

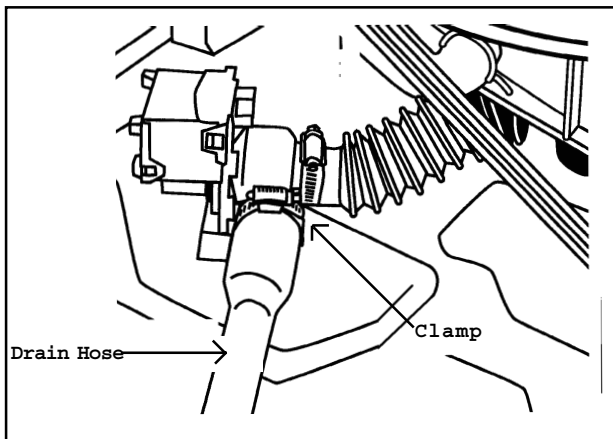


Figure 6-10

SECTION 7. OUTER TUB & SPINNER ASSEMBLY



Warning - Always shut off electrical power to the unit before beginning any service repair procedures.

BAFFLES

The baffles in the spin basket distribute and redistribute the clothes during the tumbling action of the washer.

REMOVAL

1. **Disconnect power to the unit.**
2. The three rear baffles within the spin basket are removed by removing the two crosshead screws securing each baffle from inside the spin basket.
3. The three front baffles within the spin basket are removed by removing the two ¼" hex head screws from outside of the spin basket. To gain access, remove the outer tub cover. The front baffle mounting screws can now be reached through the sump area, using a flat ratchet with a ¼" drive socket.

DOOR BOOT

The door boot rubber gasket provides a seal between the outer tub assembly and the front shroud. The boot seal is secured to the front shroud by locking tabs on the boot seal, which engage with slots in the shroud. Attachment to the outer tub is by a wire loop stretched around the perimeter of the opening in the outer tub cover and secured with a spring.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the front panel, top cover and front shroud (*See Front Panel, Top and Front Shroud Removal*).
3. Using one of the two hold down brackets (*See Figure 5-6*) or one of the two front support springs, grasp the hook of the boot clamp spring. With the other hand, press the wire loop into the door boot. This will brake the wire into the door boot and not allow the wire to slip.

NOTE: Be careful not to bend or crease the wire loop. If the wire loop becomes bent, the result will be a potential leak upon replacement of the boot seal onto the outer tub cover.

4. Pull the boot clamp spring hook toward the wire loop and disengage the spring from the wire loop.
5. Carefully remove the wire loop from the lip of the outer tub cover.

NOTE: Note the orientation ribs on the outer tub cover and the locating notches in the door boot seal lip.

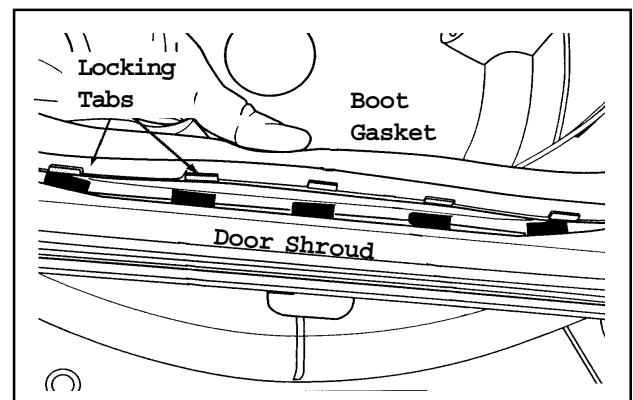


Figure 7-1

6. Unsnap the locking tabs of the door boot around the inside perimeter of the door shroud (**Figure 7-1**).

REPLACEMENT

1. Align the door boot with the D-shape toward the front, with the flat of the D toward the bottom. Also, locate the large tab toward the top center of the shroud.
2. Stretch the rear lip of the door boot onto the tub cover.
3. Move the rear door boot lip along the face of the tub cover until the locator notches in the door boot align with the locator ribs in the tub cover. Check alignment of the six rib marks and reposition if necessary. This is necessary in order to have the locking tabs on the inside perimeter of the door boot align with the corresponding tabs on the front shroud.
4. Carefully loop the wire loop with spring around the lip of the outer tub cover and place the spring at the 11:00 o'clock position, just left of the top rib of the outer tub cover. Hook the end of the spring over the nearest tub cover clip to hold the spring and wire in position for final hookup to the other end of the wire loop.
5. Using either the hold down bracket or the outer tub spring, grasp the hook end of the spring and apply pressure on the clamp wire into the door boot.
6. Pull the spring hook toward the wire loop to engage the spring with the wire loop.

NOTE: *Be careful not to bend or crease the wire loop. If the wire loop becomes bent, the result will be a potential leak upon replacement of the boot seal onto the outer tub cover.*

7. Reposition the front shroud on the front of the washer and secure (**See Front Shroud**).
8. Pull the front edge of the door boot and locate the widest locking tabs, located at the 12, 4 & 8 o'clock positions. Insert the locking tabs into the large interlocking slots in the shroud. (Spraying the surface with window cleaner or a soap solution aids reinsertion of the tabs into the plastic front shroud.) Press the thick rubber section of the door boot into the groove in the shroud so the locking tabs engage in the slots.
9. Press the remaining locking tabs into the perimeter of the shroud.

OUTER TUB COVER

The outer tub cover has a gasket seal embedded in the outer flange of the cover to seal the cover to the outer tub. The cover is secured to the outer tub by means of twelve (12) locking clips evenly spaced around the perimeter of the cover. When the outer tub cover is removed, access to the sump area and the front injector flume is possible.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the front panel, top cover and front shroud (**See Front Panel, Top Cover, and Front Shroud Removal**).
3. Using a flathead screwdriver, slide under the clip and pry to remove. Remove the remaining clips from the outer tub cover.
4. Remove the cover from the outer tub. This exposes the sump area on the floor of the outer tub and the water injector flume on top of the outer tub.

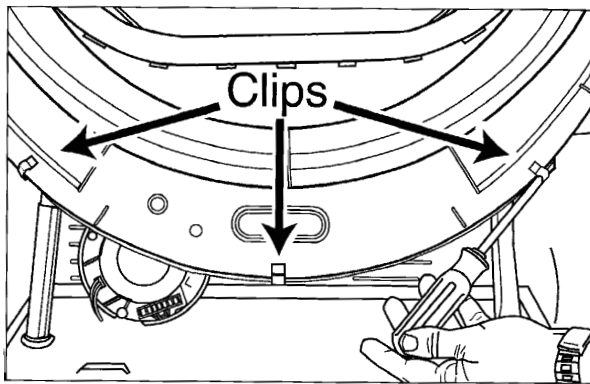


Figure 7-2

SPIN BASKET ASSEMBLY w/BALANCE RING

The balance ring is securely fastened to the spin basket and cannot be obtained as a separate repair part. To obtain, order complete spin basket assembly. The balance ring is filled with a calcium chloride solution and baffles.

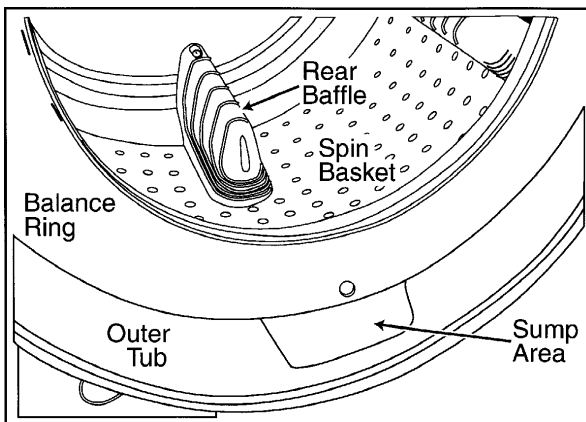


Figure 7-3

within the ring allow the fluid to disperse within the ring evenly. By rotating the spin basket, you can hear the fluid dispersing within the baffles of the balance ring. This sound is normal.

The spin basket is mounted to the spinner support by means of threaded studs on the support extending through the spin basket and secured with nuts. The mounting nuts are concealed under the rear baffles (Figure 7-4).

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the front panel, top cover, front shroud, outer tub cover and rear baffles (See *Front Panel, Top cover, Front Shroud, Outer Tub Cover and Rear Baffle Removal*).
3. To separate the spinner tub support from the spinner, remove the three rear baffles within the spin basket by removing the two screws securing each baffle (See *Baffle Removal*).
4. Remove the three locking type nuts ($\frac{1}{2}$ " socket) securing the spin basket to the spider assembly (Figure 7-5).

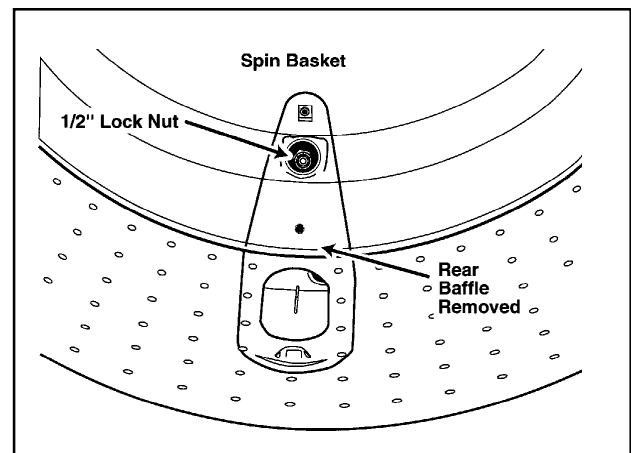


Figure 7-4

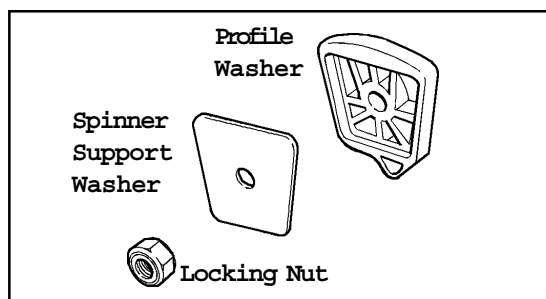


Figure 7-5

5. Remove the spin basket by lifting it off the threaded bolts of the spinner support.
6. When replacing the spin basket onto the spinner support, replace the washers under the three locking type nuts. Secure the $\frac{1}{2}$ " nuts firmly (18 in. lbs. torque).

DRIVE PULLEY

The drive pulley can be accessed via the rear access panel of the washer. The pulley is secured to the shaft of the spider assembly by a bolt. The direction of pulley rotation controls the spin action of the spin basket.

1. **Disconnect power to the unit.**
2. Remove the rear access panel from the washer to access the pulley area.
3. Remove the bolt and the spider shaft will be exposed. Carefully slide the pulley off the spider shaft, using a "rocking/side-to-side" motion. If the pulley has a snug fit, use your Spanner Wrench to apply enough leverage to pry the pulley off the shaft (*Figure 7-6*).

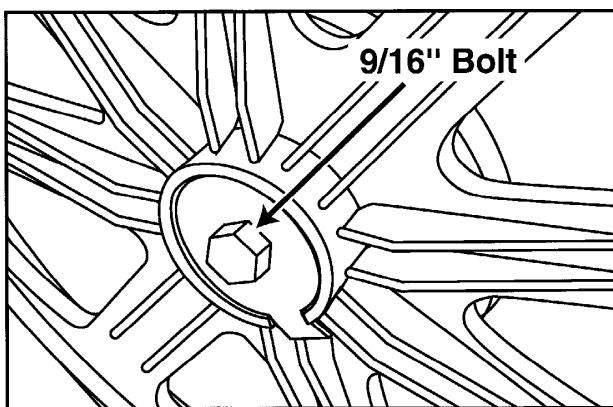


Figure 7-6

REPLACEMENT

1. Slide pulley on shaft.
2. Insert new tabbed washer and secure the bolt with a 9/16" socketed ratchet wrench (30 in. lbs. torque).

NOTE: *If the washer is cupped, flip the washer on the pulley so the cupped portion extends away from the shaft. Failure to do so can result in a binding of the spinner support shaft and seals.*

SPINNER TUB SUPPORT

The spinner tub support attaches to the spin basket and the shaft of the spider extends through a seal system to the exterior of the outer tub with a pulley attached to the end of the shaft (**Figure 7-7**). This assembly supports the spin basket and transfers the rotation of the drive pulley directly to the rotation of the spin basket.

NOTE: *When the spinner tub support is removed, the shaft seal system should be replaced.*

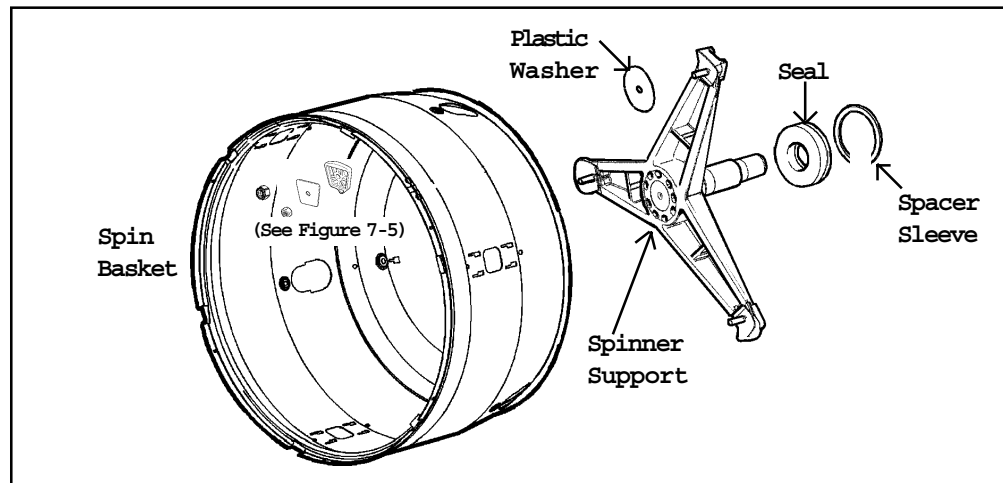


Figure 7-7

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the front panel, top cover, front shroud and outer tub cover (**See Front Panel, Top Cover, Front Shroud and Outer Tub Cover Removal**).
3. Remove the drive pulley (**See Pulley Removal**).
4. With the pulley removed, the spin basket with the spider shaft can be pulled from the front of the outer tub assembly.
5. To separate the spinner tub support from the spinner, remove the three rear baffles within the spin basket by removing the two screws securing each baffle (**See Baffle Removal**).
6. Remove the three locking nuts ($\frac{1}{2}$ " socket) securing the spin basket to the spider assembly.
7. Remove the shaft seal (**Figure 7-8**).

REPLACEMENT

1. Reverse the previous steps.
2. **IMPORTANT:** *Secure the three locking nuts ($\frac{1}{2}$ " socket) on the spinner tub support studs (18 in. lbs. torque).*

SEAL SYSTEM

A multi-lipped water seal is positioned on the tub support shaft leading to the outer tub bearing. This prevents water inside the tub from reaching the bearings. The water seal is accessed by removing the tub support shaft. It is comprised of a stainless steel seal face positioned on the tub support shaft, which mates with a rubber gasket. Grease on the face of the rubber gasket provides lubricant for the steel seal face. The steel seal face provides the rotating seal surface against the circular rubber ribs in the face of the rubber seal. This makes for three rib contacts at various diameters, providing three seals.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the spinner tub support with spinner (*See Spinner Tub Support Removal*).

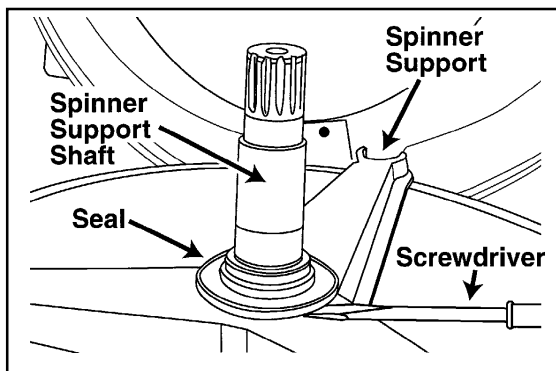


Figure 7-8

3. With a flathead screwdriver, pry the seal carefully off the tub support shaft (*Figure 7-8*).

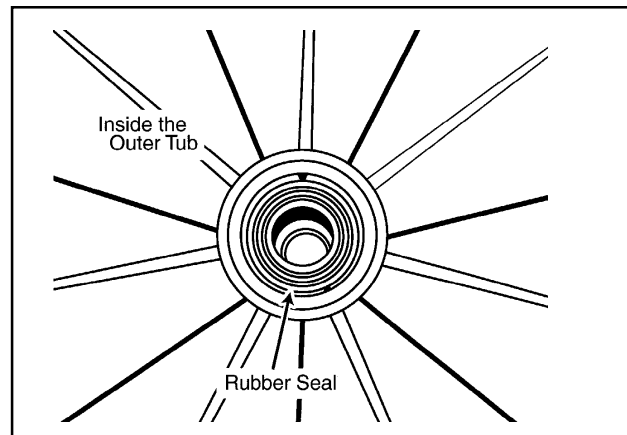


Figure 7-9

4. Reach inside the outer tub bearing area and remove the rubber seal. Discard both the steel seal washer and the rubber seal (*Figure 7-9*).
5. Position the spacer, replacement rubber seal and steel seal washer into the outer tub bearing area.
6. Position the spinner with spinner support shaft into the outer tub and insert the shaft through the seal in the rear of the outer tub until the spinner support shaft seats into place.
7. Reposition the drive pulley with tabbed washer onto the spinner support shaft. Insert the retaining bolt and tighten securely (30 in. lbs. torque). This will draw the shaft and seals into proper alignment.

OUTER TUB ASSEMBLY

The outer tub assembly is suspended from two springs positioned toward the upper front of the cabinet and supported in the rear by two struts which are secured to the base frame. Two counter weights are mounted to the outer tub from above and below the tub. The aluminum bearing housing retains both inner and outer bearings for the spinner tub support shafts.

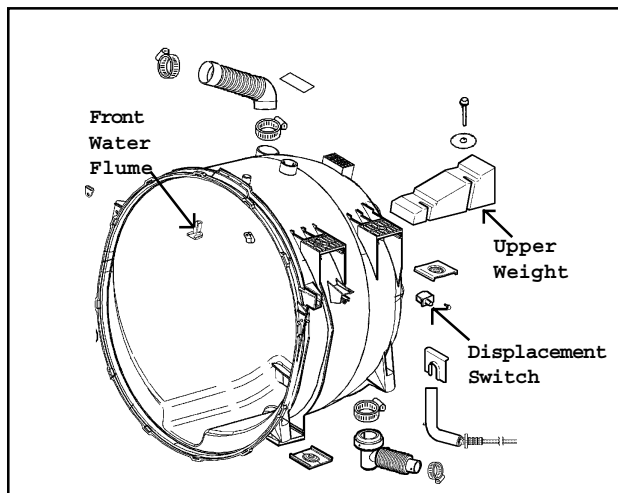


Figure 7-10

BEARINGS

The bearings are not repairable or replaceable. Replacement of the complete outer tub assembly is required.

COUNTER WEIGHTS

Two counter weights are secured to the outer tub assembly. One is secured to the top of the tub assembly and the other is secured to the bottom of the tub assembly.

REMOVAL OF UPPER WEIGHT

1. Disconnect power to the unit.
2. Lift top cover (See Top Cover).
3. Remove the two ½" counter balance bolts securing the weight to the top of the outer tub assembly.

NOTE: The bolts screw into two nuts below the weight, under the tub mounting pad (Figure 7-11).

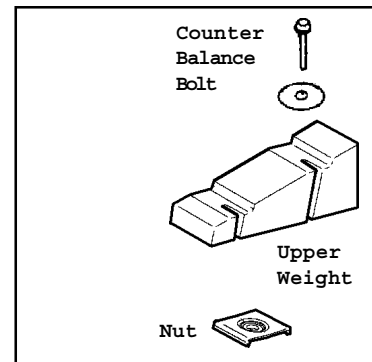


Figure 7-11

REMOVAL OF LOWER FRONT WEIGHT

1. Remove the front panel (See Front Panel).
2. Remove the two bolts securing the weight to the outer tub assembly. Use a 9/16" socket (Figure 7-12).
3. Lower the front weight and guard against hitting the motor control microprocessor board mounted to the base assembly.

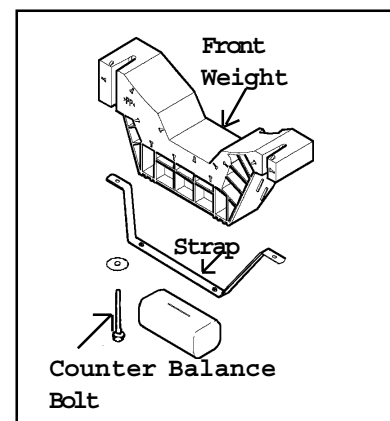


Figure 7-12

STRUT ASSEMBLY

Two struts are mounted to the base and inserted into rubber isolators in the rear of the outer tub assembly. The struts provide suspension support to the outer tub assembly.

REMOVAL

- 1 **Disconnect power to the unit.**
- 2 Remove the front panel, top cover and front shroud (*See Front Panel, Top Cover and Front Shroud Removal*).
- 3 Disconnect dispenser hoses and injector hose connections to the outer tub.
- 4 Lean the cabinet forward to access the two locking nuts that secure the struts to the bottom of the base frame assembly. Use an 8mm or ½" socket. Remove the locking nuts and lower strut washers.
- 5 With the washer standing upright, roll the washer forward and off the struts, which mount into the rubber isolators inserted into the rear of the outer tub.
- 6 **To Reinstall:** Reverse the previous steps.

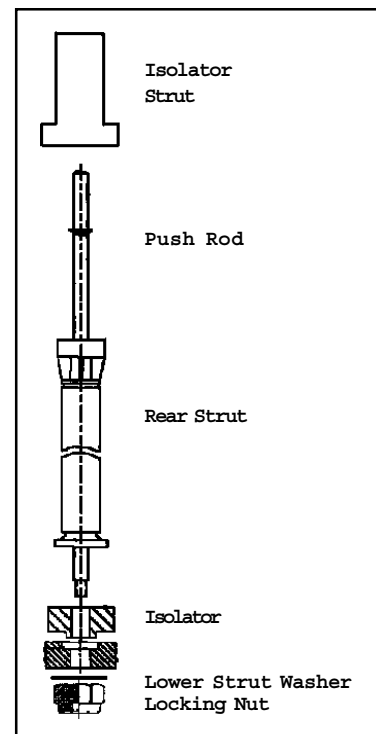


Figure 7-13

- 4 Release the small locking tab on top of the switch and rotate the switch to disengage the switch from the strut.
- 5 **To Reinstall:** Reverse the aforementioned steps.

Strut Displacement Switch

- 1 **Disconnect power to the unit.**
- 2 Remove the rear access panel for immediate access or remove the front panel.
- 3 Remove the wires to the switch.

INERTIAL UNBALANCE SWITCH

The purpose of the switch is to monitor the lateral horizontal movement of the outer tub during spin (above 500 RPM), versus the vertical movement. When a severe amount of motion is detected, the machine control will implement a reduction in speed or start a redistribution of the clothes load. This is done by gradually stopping the motor. After the motor stops, the tumbler will alternately tumble, first in one direction then another. After a brief time, the machine will again work up to a full spin. Should the machine detect another unbalance, the control will implement another redistribution of the load.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the front panel and lift the top cover (*See Front Panel & Top Cover Removal*).
3. The switch is located on the upper right hand side of the outer tub assembly (*Figure 7-14*).
4. Remove the two screws securing the switch to the outer tub assembly.

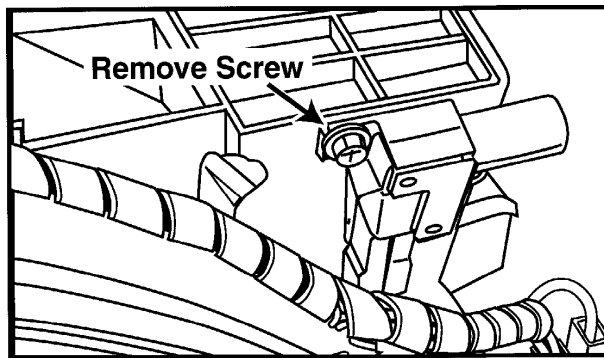


Figure 7-14

TUB DISPLACEMENT SWITCH

The displacement switch is located on the right hand side of the outer tub assembly, below the upper weight. The location of the switch on the outer tub will activate the switch whenever the outer tub assembly makes contact with the wall of the cabinet. Should contact with the cabinet occur before the machine reaches 500 rpm, the machine control is alerted and will reduce speed to implement a redistribution program.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the front panel and lift the top cover (*See Front Panel & Top Cover Removal*).
3. The switch is located on the upper right hand side of the outer tub assembly, directly behind the right upper front suspension spring (*Figure 7-15*).
4. Remove the screw and flat washer securing the switch in place.
5. Using a flathead screwdriver, pry the switch body from the outer tub assembly.

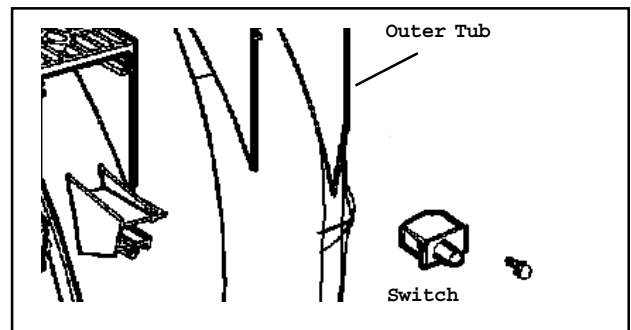
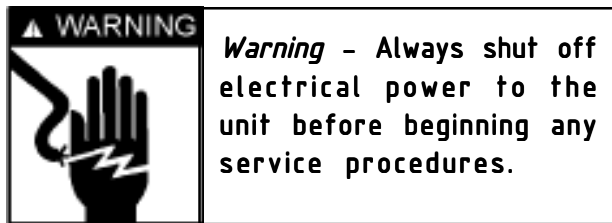


Figure 7-15

SECTION 8. MOTOR DRIVE SYSTEM



The motor drive system tear-down procedure covers all components related to the drive system, such as the drive motor, drive belt, motor control, machine control and accelerometer switch.

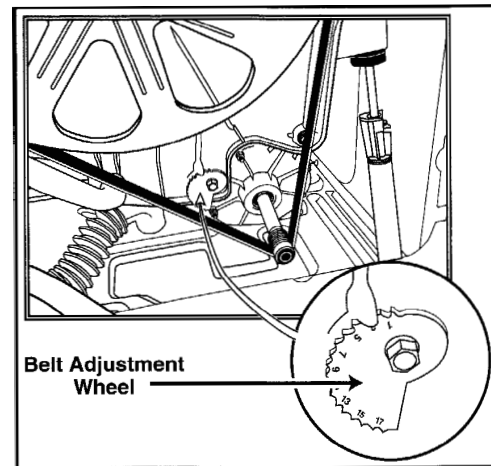


Figure 8-1

DRIVE BELT

The drive belt has six (6) ribs which mate with the face of the motor pulley. The belt encircles the motor pulley and the drive pulley of the spinner.

REMOVAL

1. **Disconnect power to the unit.**
2. Roll the belt off the drive pulley and remove from the motor pulley.

ADJUSTMENT

Check belt tension. If loose, remove the belt, loosen the belt adjustment wheel bolt and rotate the wheel one notch in a clockwise rotation. Check belt tension again. The belt should experience no more than 1" deflection when depressed toward the inside (*Figure 8-1*).

DRIVE MOTOR

The drive motor is hinged into the left bottom area of the outer tub and secured to the outer tub by the bolt on the belt adjustment wheel. A slot in the mounting bracket of the outer tub allows the motor to pivot and allows adjustment of the drive belt tension.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the front panel, rear access panel and the front weight (*See Front Panel & Rear Access Removal*).
3. From the rear, locate the belt adjustment wheel and note the adjustment number aligned with the rib of the outer tub. This will help later when the belt adjustment wheel is placed back onto the outer tub and the belt is remounted on the motor and drive pulley. Remove the bolt securing the belt adjustment wheel (*Figure 8-2*).

- Lift the motor slightly to disengage the belt from the motor pulley. Place motor on the base frame.

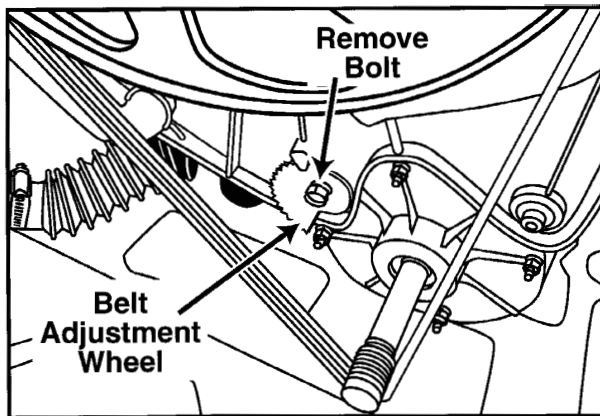


Figure 8-2

- From the front, remove the wire harnesses from the back of the motor.
- Grasp the motor and slide it carefully from the pivot hang holes in the outer tub.

REPLACEMENT

- Reverse the previous procedures to re-mount the motor.

NOTE: *Prior to hanging the motor, reconnect motor wire harnesses and ground wire.*

- Prior to hanging the motor on the outer tub, check the positioning of the rubber motor mounts.
- Check belt tension. If loose, loosen the belt adjustment wheel bolt and rotate the wheel one notch in a clockwise rotation. Check belt tension again. The belt should experience no more than a 1" deflection when depressed to the inside.

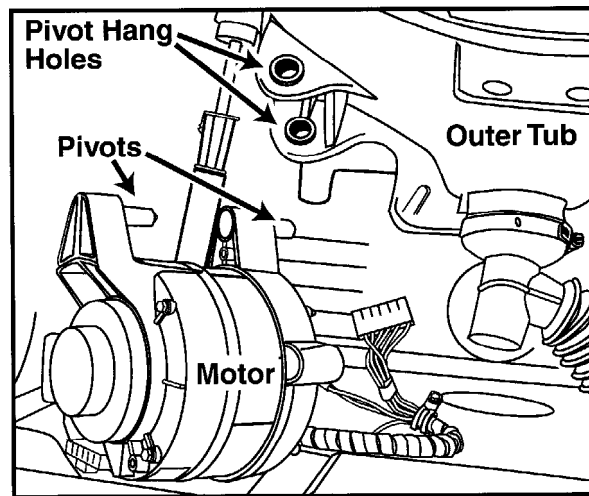


Figure 8-3

MACHINE CONTROL

The machine control is located in the control console and is secured to the rear cover.

REMOVAL

- Disconnect power to the unit.**
- Remove the control console (*See Control Console Removal*).
- Remove the wiring from the machine control, paying close attention to the wire harness hookup to the control board.
- Remove the two 5/16" nuts securing the board to the rear console panel.
- Reverse the previous procedures to re-mount the board.

MOTOR CONTROL

The motor control is located behind the front panel in the lower right hand side of the cabinet. The assembly comprises of the circuit board, control cover, mounting plate and motor wire harness.

REMOVAL

1. **Disconnect power to the unit.**
2. Remove the front panel (*See Front Panel Removal*).
3. Remove the shield/cover from the motor control board by depressing the locking tab found along the lower left side of the motor control base plate.
4. Remove the wire harness leading to the control console (*Figure 8-4*).
5. Remove the wire harness from the motor.
6. Remove two mounting screws in front of the motor securing the assembly to the base. A rear locating tab on the motor control base engages with a slot in the base frame.
7. To replace, reverse the previous steps.

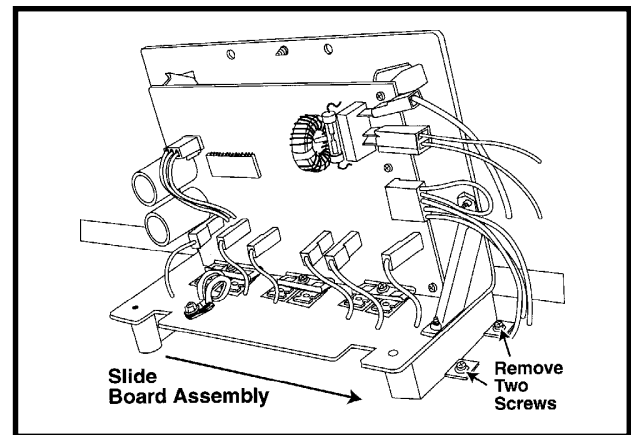
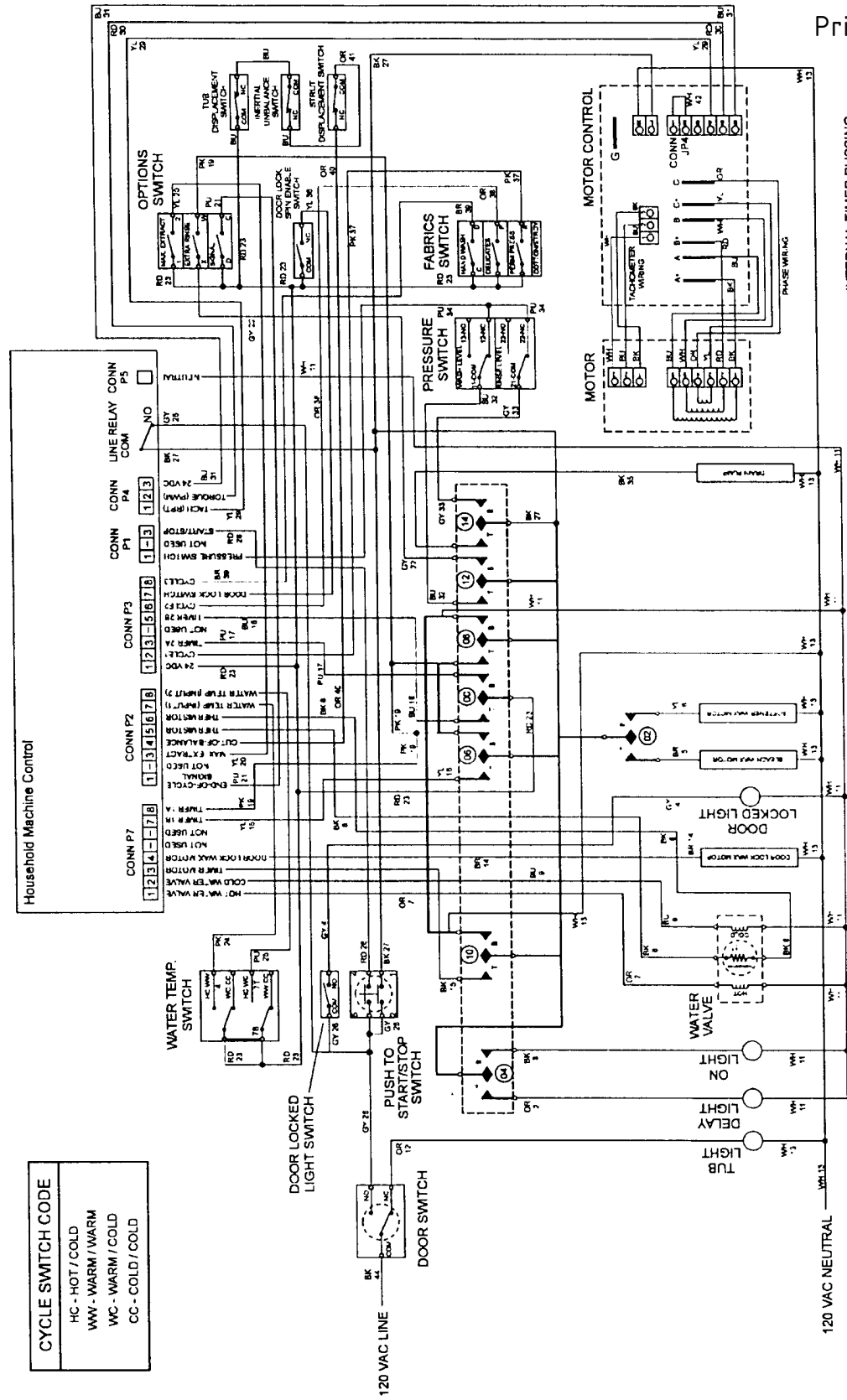


Figure 8-4

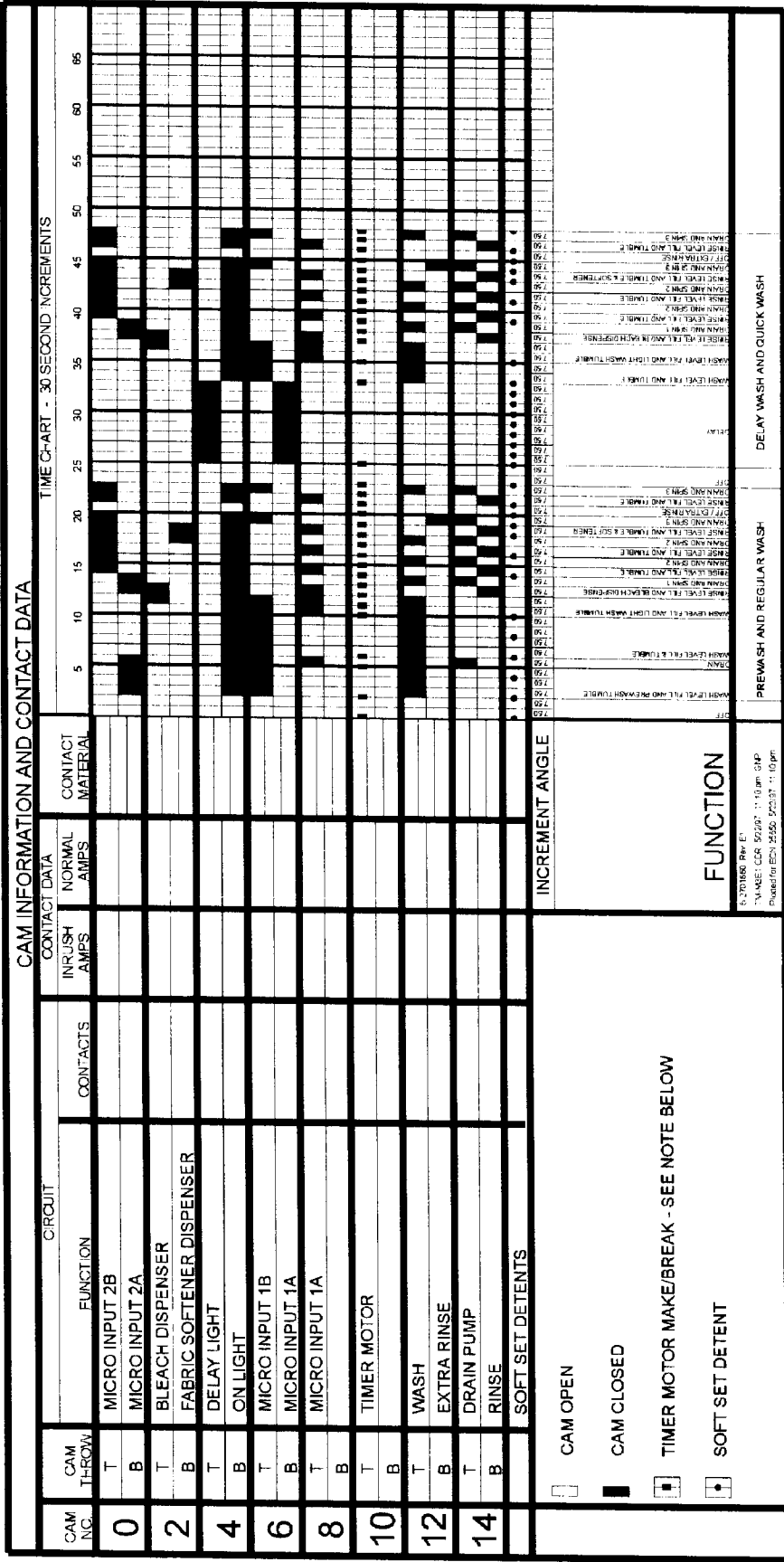
SECTION 9. ELECTRICAL SCHEMATICS & TIMER INFORMATION

Prior to Series 17



CYCLE SWITCH CODE	
HC	- HOT / COLD
WW	- WARM / WARM
WC	- WARM / COLD
CC	- COLD / COLD

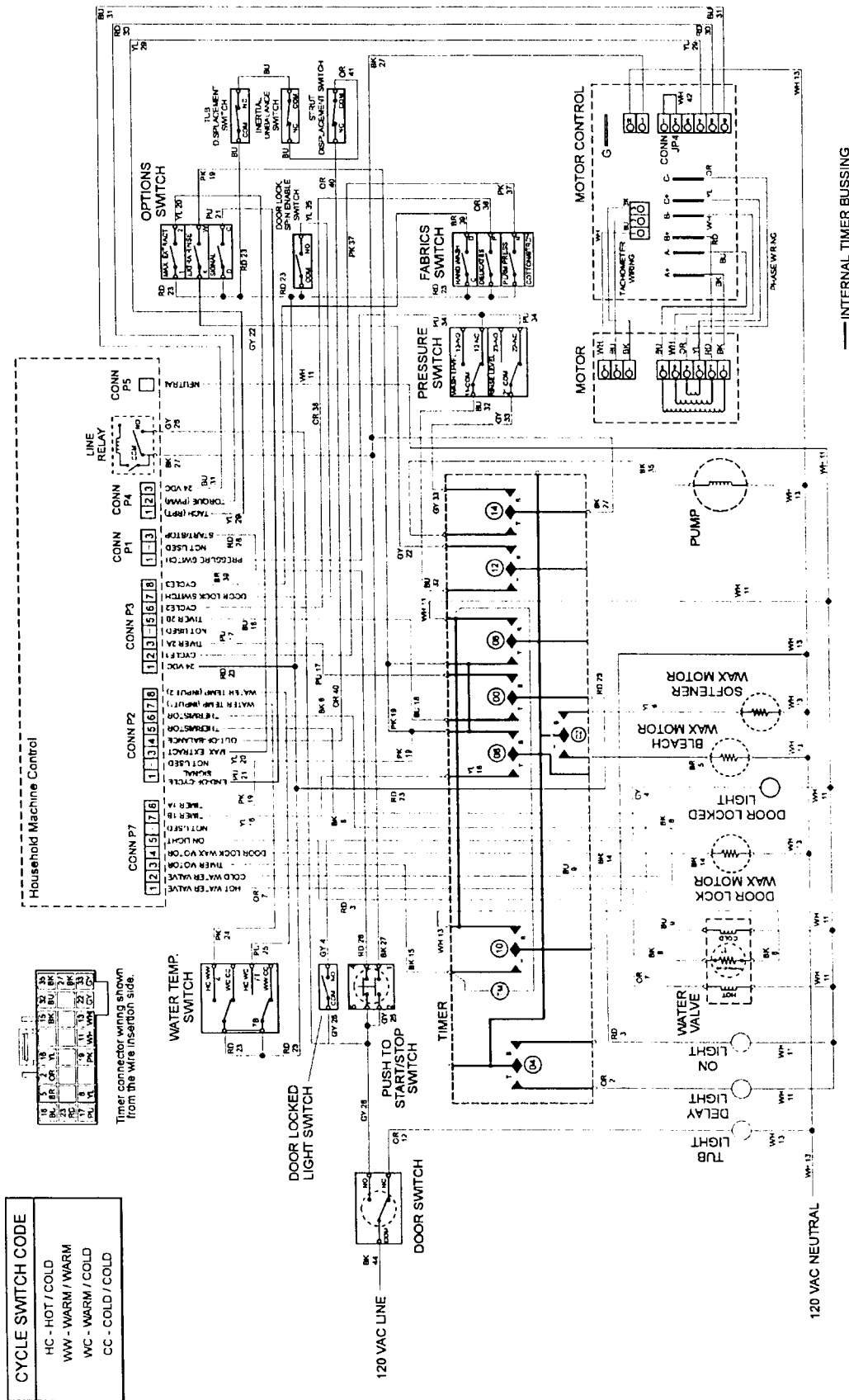
TIMER CHART - Prior to Series 17



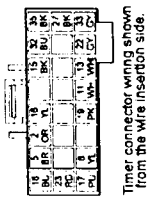
THE TIMER MOTOR, WHEN CONTROLLED BY THE MICROPROCESSOR, MUST ALWAYS COMPLETE THE ADVANCE WHEN HAND-SET OR TIMER-DRIVEN INTO THE ADVANCE PORTION OF THE 30 SECOND INTERVAL. ALL OTHER CONTACTS MUST ALSO MAKE AND BREAK DURING THE 5.8 SECOND ADVANCE.
IF EXTRA RINSE IS SELECTED, THE MICROPROCESSOR CONTROL WILL ADVANCE THE TIMER THROUGH THE OFF / EXTRA RINSE INCREMENT. IF EXTRA RINSE IS NOT SELECTED, THE TIMER WILL STOP AT THE OFF / EXTRA RINSE INCREMENT.

INTERNAL BUSSING: 2C - 4C - 6C - 8C - 10C - 12C - 14C, 6B - 8T, AND 8B - 10B
CONTACT 6-TOP MUST BREAK BEFORE CONTACT 14-BOTTOM MAKES IN INCREMENTS 13 AND 38.

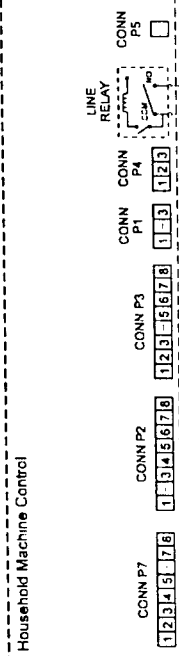
ELECTRICAL SCHEMATIC - Series 17



CYCLE SWITCH CODE	
HC	- HOT / COLD
WM	- WARM / WARM
WC	- WARM / COLD
CC	- COLD / COLD

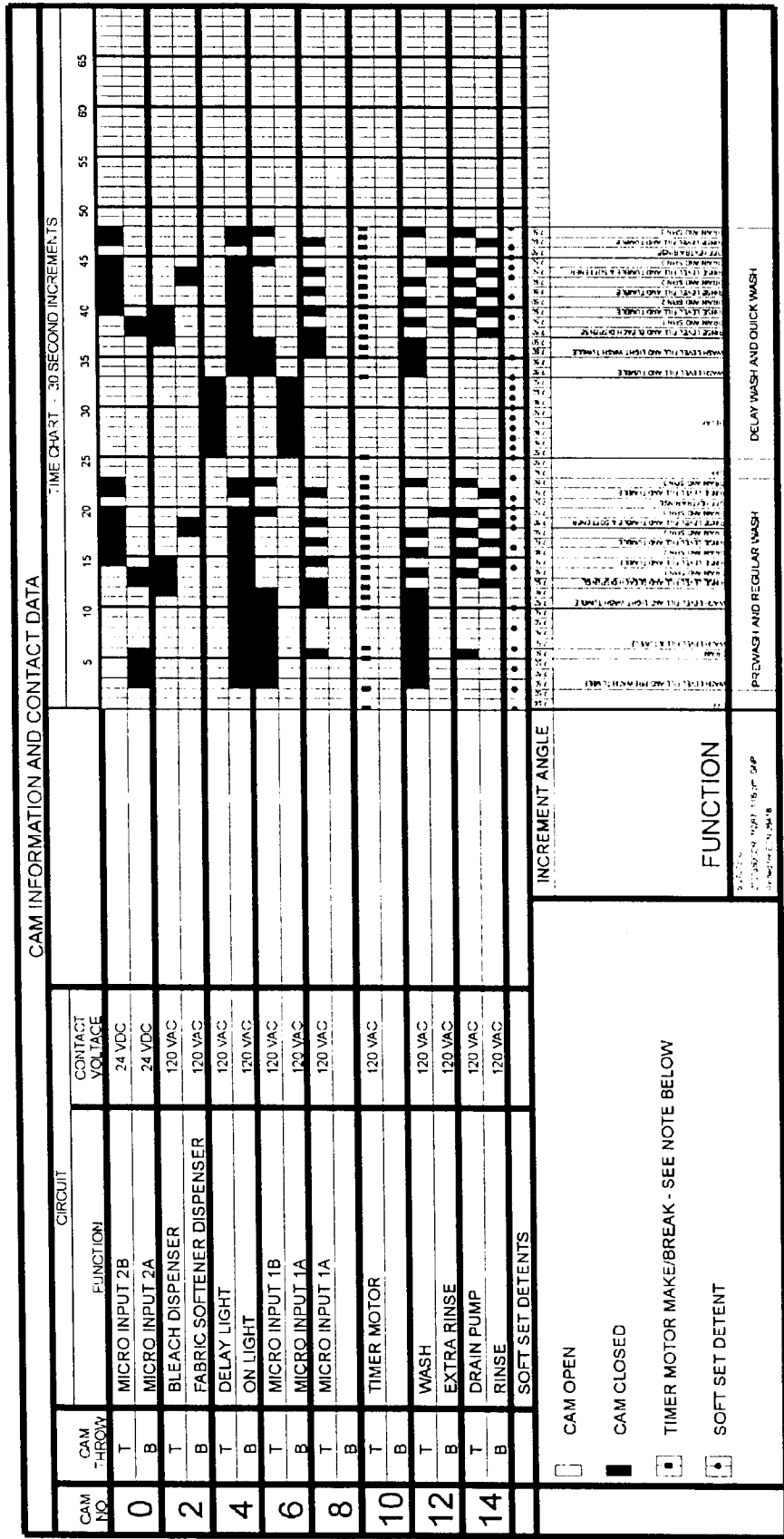


Household Machine Control



INTERNAL TIMER BUSSING

TIMER CHART - Series 17



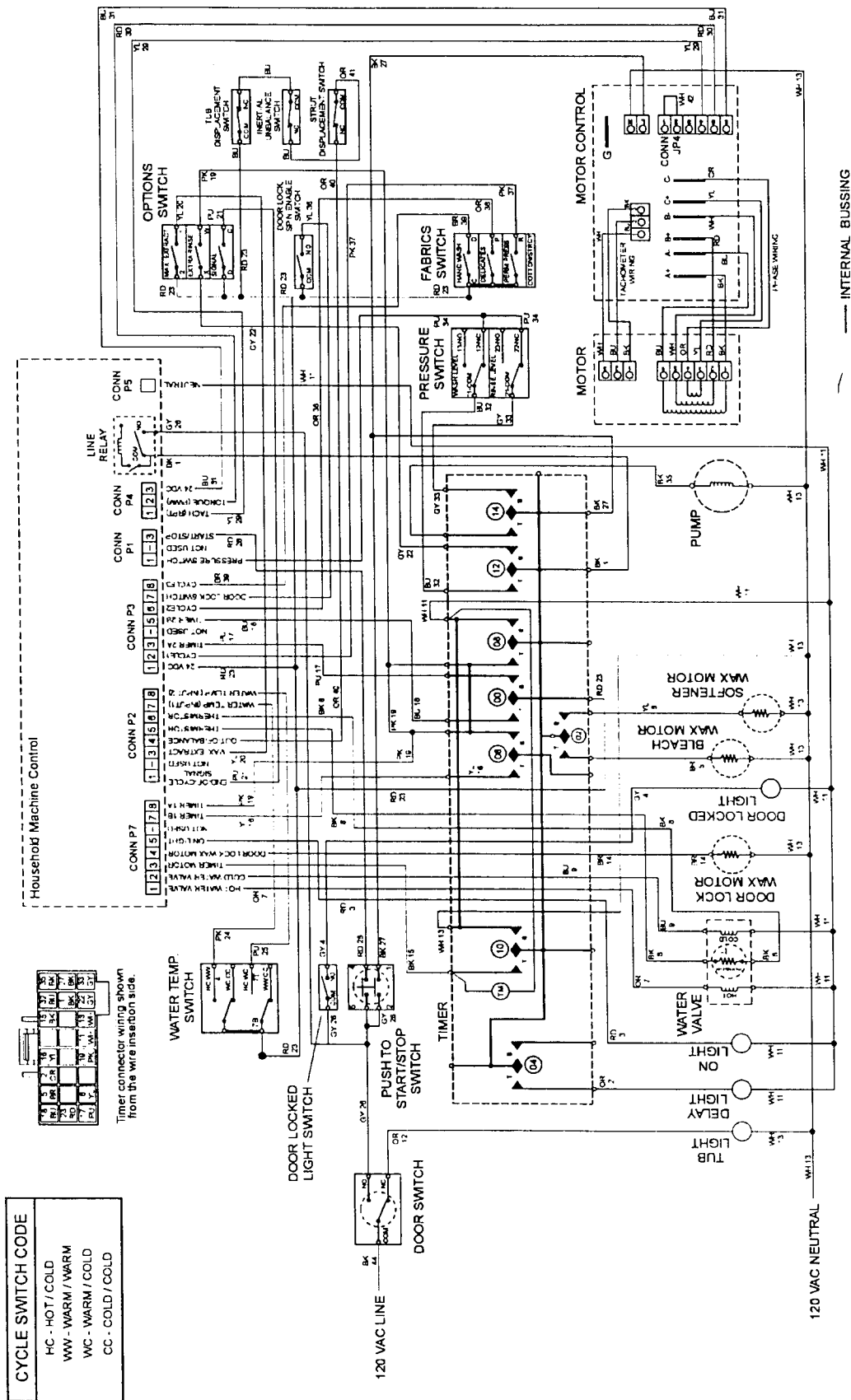
THE TIMER MOTOR, WHEN CONTROLLED BY THE MICROPROCESSOR, MUST ALWAYS COMPLETE THE ADVANCE WHEN HAND-SET OR TIMER-DRIVEN INTO THE ADVANCE PORTION OF THE 30 SECOND INTERVAL. ALL OTHER CONTACTS MUST ALSO MAKE AND BREAK DURING THE 5 SECOND ADVANCE.

IF EXTRA RINSE IS SELECTED, THE MICROPROCESSOR CONTROL WILL ADVANCE THE TIMER THROUGH THE OFF / EXTRA RINSE INCREMENT. IF EXTRA RINSE IS NOT SELECTED, THE TIMER WILL STOP AT THE OFF / EXTRA RINSE INCREMENT.

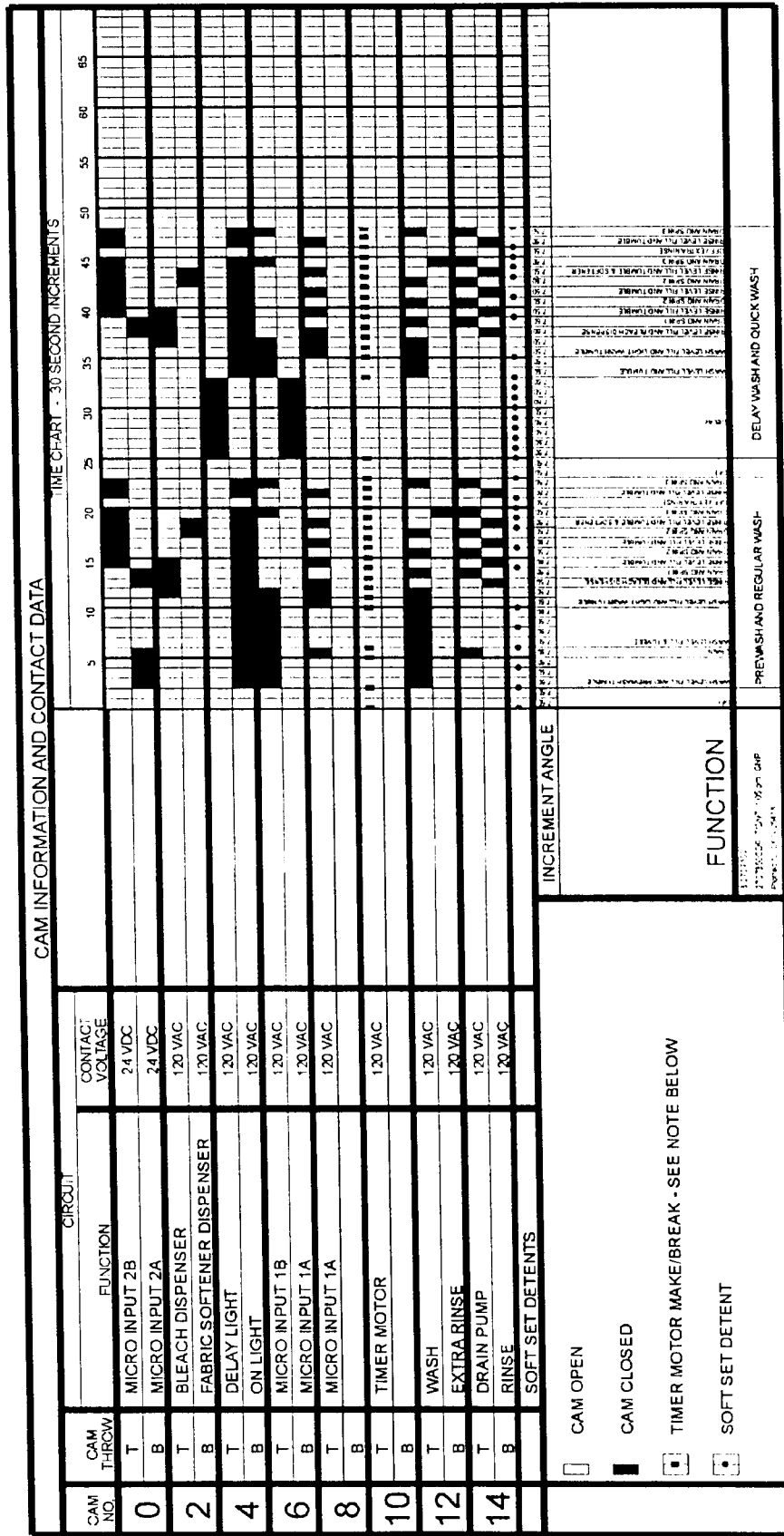
INTERNAL BUSSING: 2C - 4C - 6C - 8C - 10C - 12C - 14C, 6B - 8T, AND 8B - 10B

CONTACT 6-TOP MUST BREAK BEFORE CONTACT 14-BOTTOM MAKES IN INCREMENTS 13 AND 38.

ELECTRICAL SCHEMATIC - Series 18



TIMER CHART - Series 18



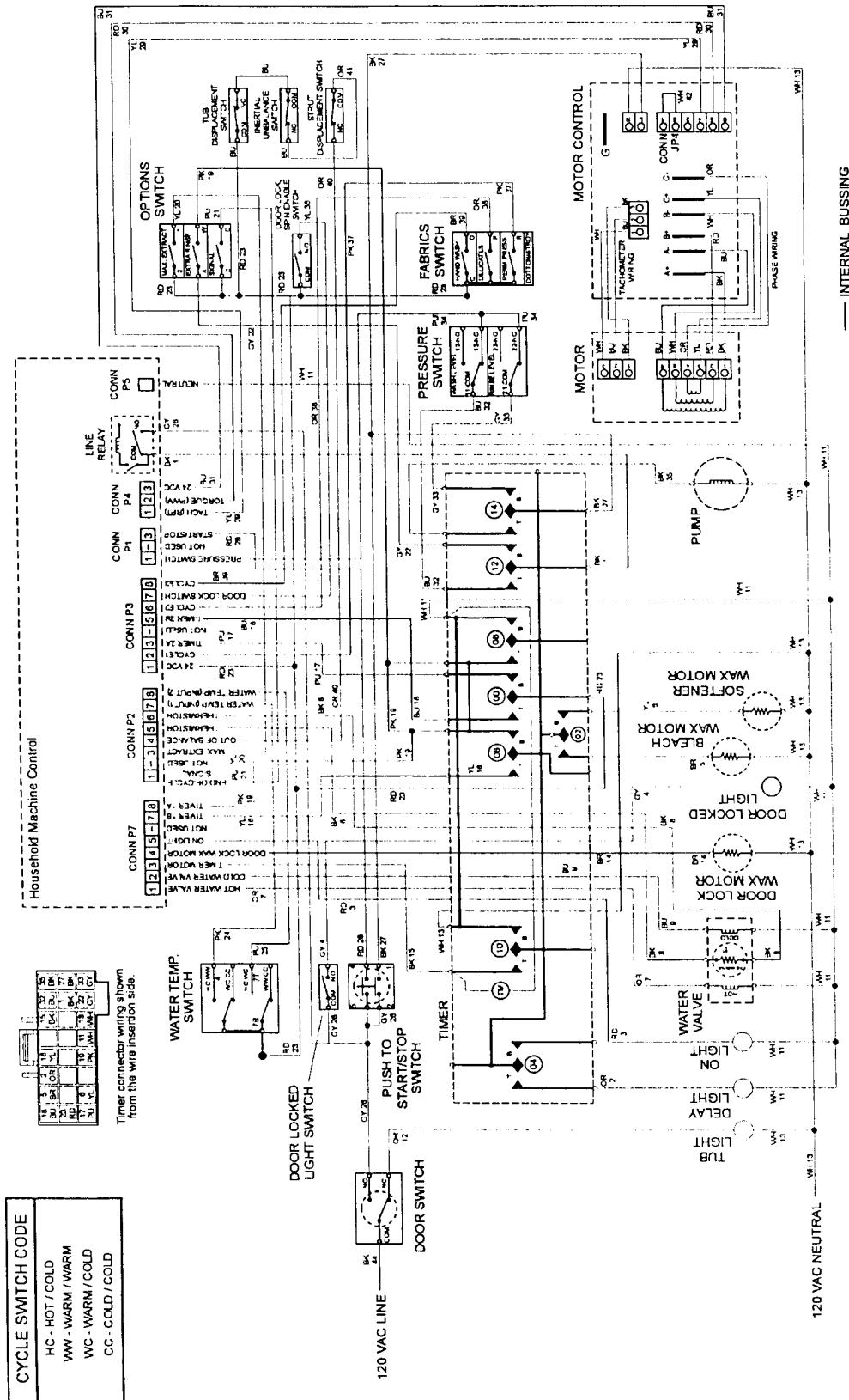
THE TIMER MOTOR, WHEN CONTROLLED BY THE MICROPROCESSOR, MUST ALWAYS COMPLETE THE ADVANCE WHEN HAND-SET OR TIMER-DRIVEN INTO THE ADVANCE PORTION OF THE 30 SECOND INTERVAL. ALL OTHER CONTACTS MUST ALSO MAKE AND BREAK DURING THE 5 SECOND ADVANCE.

IF EXTRA RINSE IS SELECTED, THE MICROPROCESSOR CONTROL WILL ADVANCE THE TIMER THROUGH THE OFF / EXTRA RINSE INCREMENT. IF EXTRA RINSE IS NOT SELECTED, THE TIMER WILL STOP AT THE OFF / EXTRA RINSE INCREMENT.

INTERNAL BUSSING: 2C - 4C - 6C - 8C - 10C - 12C - 14C, 6B - 8T, AND 8B - 10B

CONTACT 6-TOP MUST BREAK BEFORE CONTACT 14-BOTTOM MAKES IN INCREMENTS 13 AND 38.

ELECTRICAL SCHEMATIC - Series 19



NOTES:



INTRODUCTION

Attached is supplement three (16008373-03) for service manual 16008373, which replaces supplement two (16008373-02). This Maytag Washer Service Manual supplement covers **Models MAH4000 & MAH5500A**. We suggest you file this with your 16008373 Manual for reference.

**Models covered in this manual supplement:
MAH4000 MAH5500A**

CONTENTS

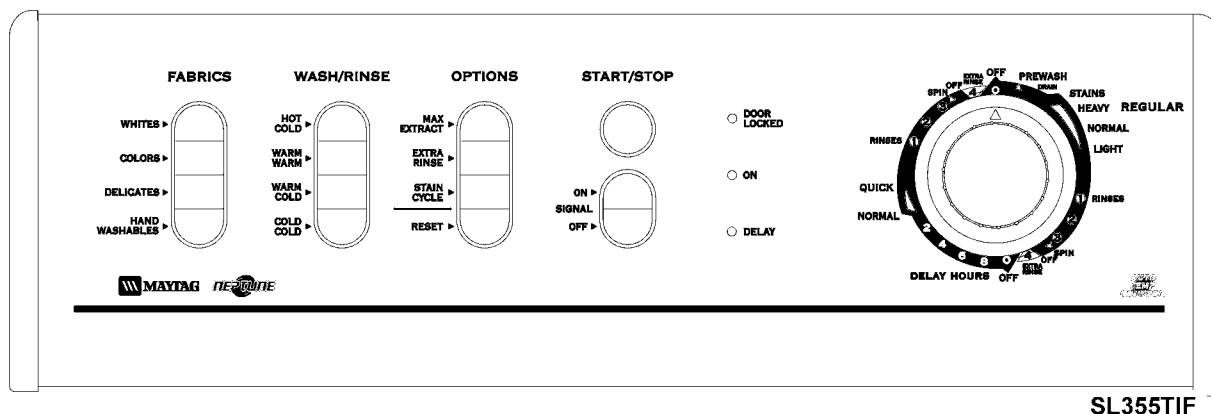
SECTION 1. MAH4000/MAH5500A CONTROL FACIA	1
SECTION 2. SPECIFICATIONS	2
SECTION 3. BASIC MACHINE OPERATION	3
SECTION 4. WASHER CONTROLS OVERVIEW	3
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For additional information on material covered in this manual, including safety issues, contact:

**Maytag Appliances Sales Company
240 Edwards Street, S.E.
Cleveland, TN 37311
Phone: 423-472-3333**

(The following information is supplemental to the information found in the basic manual part number 16008373.)

SECTION 1. MAH4000/MAH5500A CONTROL FACIA



SL355TIF

SECTION 2. SPECIFICATIONS

CAPACITY	3.1 Cubic Feet		
ELECTRICAL	120 Volts, 60 Hz; Requires 15 amp circuit breaker or fused electrical supply. Power cord must be connected to a properly grounded and polarized outlet.		
MOTOR	Switched Reluctance Motor controlled by a microprocessor motor control board. Motor Pulley Ratio (Motor to Spinner RPM) 14 to 1.		
POWER USAGE	Motor Input: During Wash Tumble - 170 Watts During Rinse Tumble - 195 Watts Top Spin - 800 Watts (Wattage readings taken with no clothes in spin.)		
TUMBLER SPEED	Wash Tumble	47 - 51 RPM	
	Rinse Tumble	47 - 51 RPM	
	High Speed Spin	800 RPM (+ 50 RPM based upon optimum spin performance)	
WATER USAGE	Water pressure should be 20 - 120 P.S.I. (1.06-8.44 kg/cm) at inlet hose connection. Total water usage is approximately 25 gallons, varies with clothes load. Water fill in the spin basket with no clothes, measured near the rear seam of the spin basket WASH LEVEL 3-4 inches RINSE LEVEL 4-5 inches		
HOSE LENGTHS	Four foot inlet hoses with inlet washers and attached to water valve. Drain hose attached to pump and will accommodate 36" drain stand pipe.		
DIMENSIONS	Cabinet Dimensions: 27" (68.58cm) W x 27 1/2" (69.85cm) D x 36" (91.44cm)H		
WEIGHT (Approx.)	Uncartoned 190 lb. (86 kg.) Approx.		Crated 200 lb. (91 kg.) Approx.
SCREW & BOLT TORQUES	Bolt, Counter Weight	7 in. lbs.	(+ 3 in. lbs.)
	Bolt, Spin Pulley	30 in. lbs.	(+ 3 in. lbs.)
	Bolt, Belt Adjuster	90 in. lbs.	(+ 10 in. lbs.)
	Screw, Front Baffle	25 in. lbs.	(+ 3 in. lbs.)
	Screw, Rear Baffle	18.5 in. lbs.	(+3 in. lbs.)
	Clamp, Hoses	15 + in. lbs.	
	Nuts, Spinner Support	18 in. lbs.	(+ 3 in. lbs.)
	Nuts, Suspension struts	7 in. lbs.	(+ 3 in. lbs.)

SECTION 3. BASIC MACHINE OPERATION

The model MAH4000 and MAH5500A are similar to the MAH3000 washer, with the exception being the MAH4000 and MAH5500A have a recirculation pump in series between the outer tub outlet and the drain pump. When the water pressure switch becomes satisfied (Series 11 and later on the MAH4000 and all the MAH5500A), power is then applied to the recirculation pump. The recirculation pump draws water from the bottom of the outer tub and circulates the water up through the detergent hose, then into the top of the outer tub. By doing this, the washer is able to provide a more even distribution of detergent throughout the wash load.

SECTION 4. WASHER CONTROLS OVERVIEW

The software of the MAH4000 and MAH5500A models is slightly different than the software used in the MAH3000 washer. Fabric Selections on the control console were changed from Cotton/Sturdy to Whites, Easy Care/Perm Press to Colors, Delicates remained the same. **Series 10** of the MAH4000 washer allowed the recirculating pump to be directly controlled by the timer. (*Figure 4-1*)

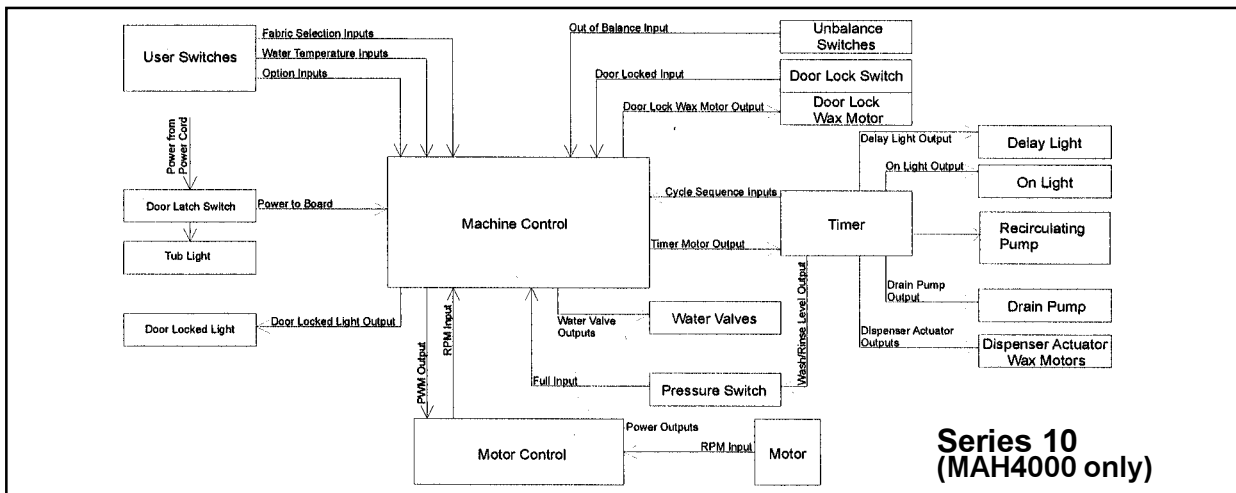


Figure 4-1

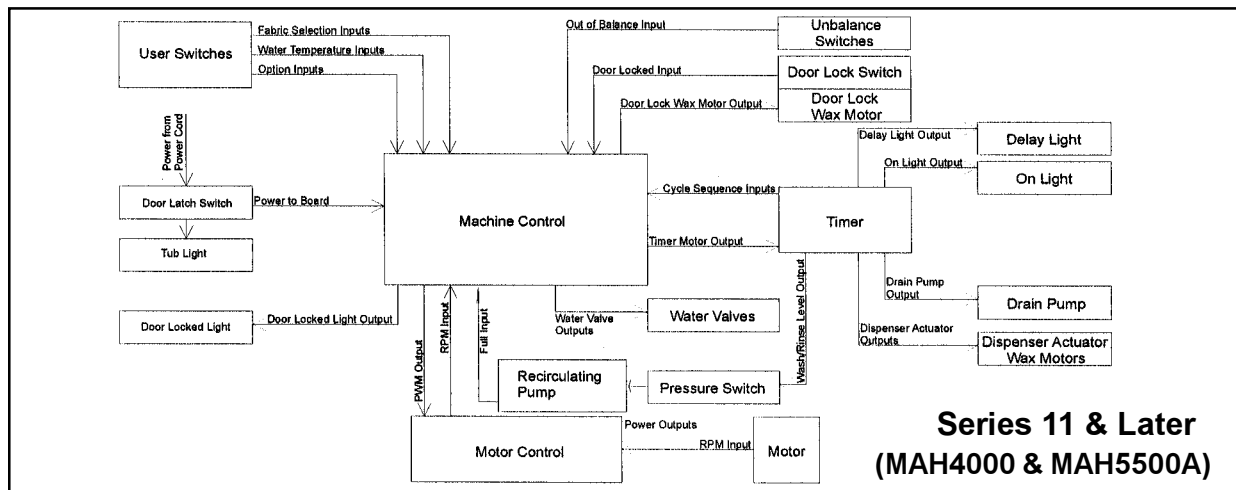


Figure 4-2

A new Stain Cycle and revised tumble patterns were introduced and will be described in the following pages.

At **series 11** the timer was changed, wire harness revised and the schematic was changed. The timer cams were changed in the timer, the wire harness changed to pull wires out of the timer connector and the pump is now in series with the pressure switch, also an extra wire was jumpered across the pressure switch. Now the recirculating pump is controlled through the pressure switch (**Figure 4-2**). This was done to force the washer to fill with water prior to starting the recirculation pump.

SECTION 5. CYCLE REVIEW

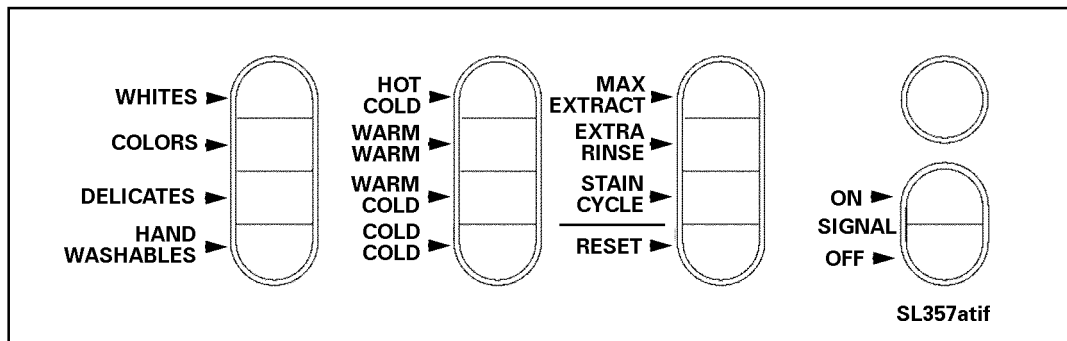


Figure 5-1

Cycles on the Fabrics switch now list the cycles according to how clothes are sorted. This simplifies how to select the cycles in doing the wash. A new Stain Cycle was added to the Option Switch which adds cycle wash time, various tumble patterns and an additional rinse with longer tumble times during the rinse. (**See Figure 5-1**)

Cycle Times:

All Wash Time/Total Wash Cycle				
Non-Max Extract	Cotton/Sturdy	Easy Care/Perm Press	Delicates	Hand Washables
Heavy Wash	23.0/49.0	20.0/45.5	20/46.5	Not Applicable
Normal Wash	17.0/43.0	14.0/39.5	14.0/40.5	Not Applicable
Light/Quick Wash	11.0/37.0	8.0/33.5	7.0/34.5	Not Applicable
Final Spin (RPM/Min)	800/3.5	600/3.0	500/4.5	Not Applicable
Heavy Wash	23.0/46.0	20.0/41.5	20.0/42.0	20.0/43.0
Normal Wash	17.0/40.0	14.0/35.5	14.0/36.0	14.0/37.0
Light/Quick Wash	11.0/34.0	8.0/29.5	8.0/30.0	8.0/31.0
Final Spin (RPM/Min)	800/4.0	600/3.5	500/5.0	500/5.0

Notes:

1. The main wash times listed include 2 minutes of bleach fill and tumble time.
2. The total cycle times are approximate and will vary based on water fill times, due to types of clothing loads and the time for the door lock system to retract at the end of the cycle.
3. The main wash time is affected significantly if the machine control detects an excessive amount of suds via a loss of motor torque. The washer will go into a suds reduction routine, consisting of a series of additional rinse and partial drain cycles to reduce the suds present. **(See Troubleshooting & Diagnosis - Clothes Wet at End of Spin)**

Tumble Pattern - Number of seconds tumbling/ Number of seconds of pause between tumbles.			
Cotton/Sturdy	Easy Care/ Perm Press	Delicates	Hand Washables
7/3	5/3	6/24	3/27

Stain Cycle:

General overview of Stain Cycle:

- 1) Tumble in the "normal" tumble pattern until it has completed filling plus 3 minutes.
- 2) Tumble for an additional 15 minutes with a 6T/24P tumble pattern.
- 3) Return to selected tumble pattern and proceed with remainder of the wash time preselected.
- 4) Bleach fill and first rinse fill temperature will be the same as the wash fill temperature.
- 5) Rinse times (including fills) are now 5-1/2 minutes, 4 minutes, 4 minutes and 4-1/2 minutes.
- 6) The fourth rinse is forced, which would be warm if warm rinse selected. (Colors will not default to cold on the 4th rinse.)

The following is an example of a Stain Cycle:

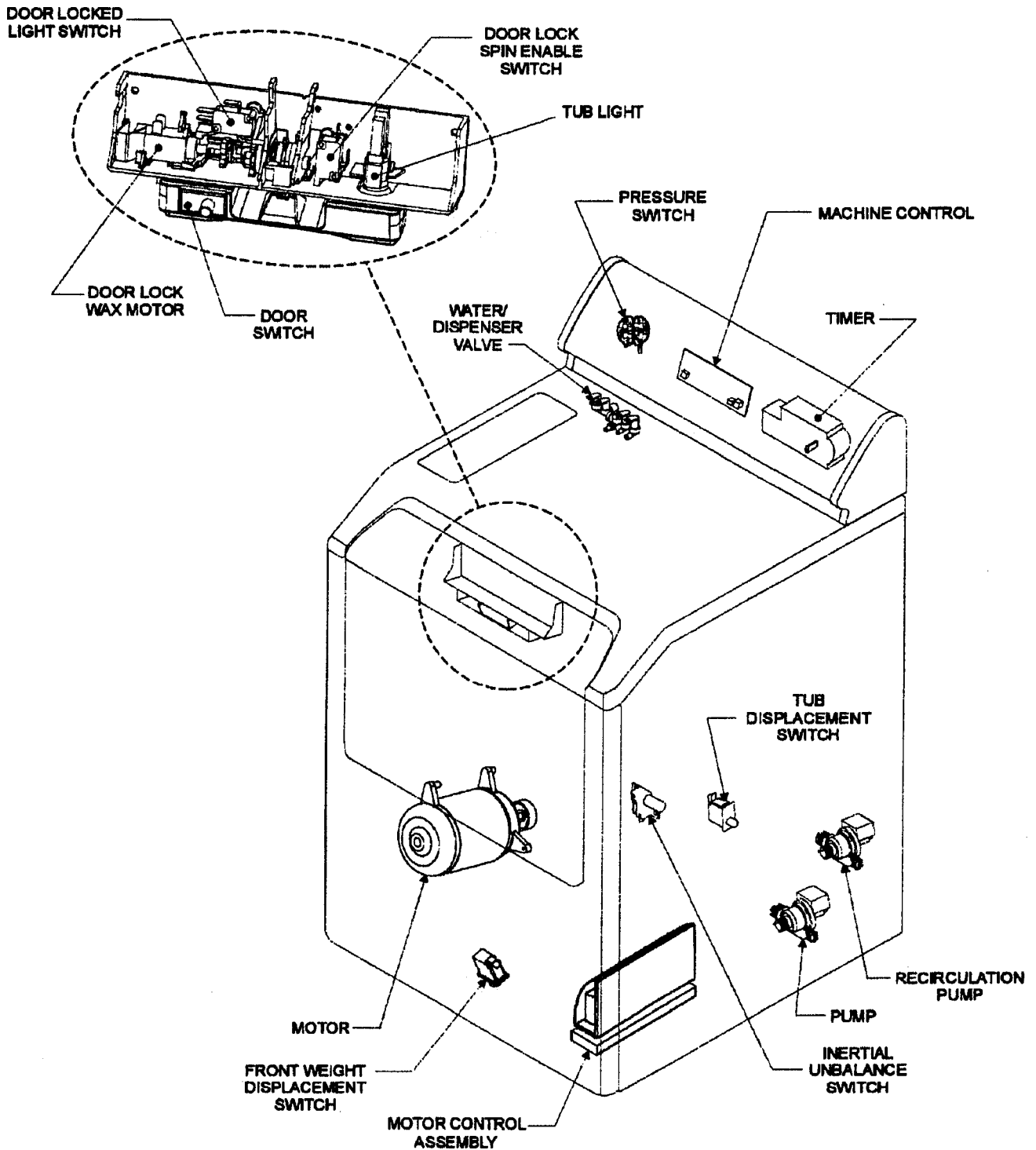
Whites, Warm/Cold, Stain Cycle selected on timer, Extra Rinse not selected.		
Cycle Function	Stain Cycle Option Switch "Not selected"	Stain Cycle Option Switch "Selected"
Fill/Wash	Fill Time 20 Minutes @ 7T/3P (7T=7 second tumble, 3P=3 second pause)	Fill Time 3 Minutes @ 7T/3P 15 Minutes @ 6T/24P 17 Minutes @ 7T/3P
Bleach/Tumble	2 Minutes	2 Minutes
1st Rinse	2 Minutes Fill & Tumble	5-1/2 Minutes Fill & Tumble
2nd Rinse	2 Minutes Fill & Tumble	4 Minutes Fill & Tumble
3rd Rinse	2-1/2 Minutes Fill & Tumble	4 Minutes Fill & Tumble
4th Rinse		4-1/2 Minutes Fill & Tumble
Final Spin	6-1/2 Minutes	6-1/2 Minutes
Total Run Time:	_____ 46 Minutes	_____ 74 Minutes

Suds detection during stain cycle:

1. Torque baseline is set during the first 3 minutes of Wash cycle after the washer is filled.
2. Suds detection is frozen during 15 minutes of the 6/24 tumble action during Wash/Fill cycle.
3. Suds detection begins when cycle resumes the initial selected tumble pattern .

SECTION 6. GENERAL COMPONENT - EXPLODED VIEW

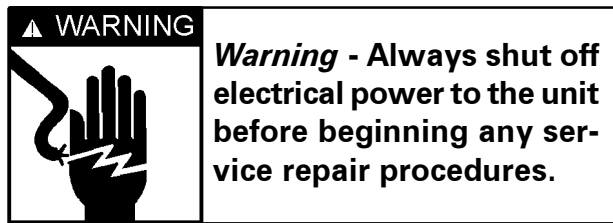
Component Identification & Location:



SECTION 7. ELECTRICAL INFORMATION

FUNCTION	MACHINE CONTROL BOARD TERMINAL/WIRE	MACHINE CONTROL BOARD TERMINAL/WIRE	VOLTAGE-APPROX. (When Activated)	TIMER CONTACT
Colors (Fabric Switch)	Line Relay NO (GY 26)	P3/2 (PK 37)	24 VDC	Not Involved
Delicates (Fabric Switch)	Line Relay NO (GY 26)	P3/6 (OR 38)	24 VDC	Not Involved
Hand Washables (Fabric Switch)	Line Relay NO (GY 26)	P3/8 (BR 39)	24 VDC	Not Involved
Whites (Fabric Switch)	Line Relay NO (GY 26)	P3/2 (PK 37) P3/6 (OR 38) P3/8 (BR 39)	0 VDC 0VDC 0VDC	Not Involved
Signal ON/OFF (Options Switch)	Line Relay NO (GY26)	P2/1 (PU 21)	24 VDC - ON 0 VDC - OFF	Not Involved
Extrac Rinse (Options Switch)	P5 (WH 11)	P7/8 (PK 19)	120 VAC	12B (GY 22)
Stain Cycle (Options Switch)	Line Relay NO (GY 26)	P3/* (BR39)	24 VDC	Not Involved
Max Extract (Options Switch)	Line Relay NO (GY26)	P2/3 YL 20)	24 VDC	Not Involved
Push To Start Switch (When Pressed)	P5 (WH 11)	P1/3 (YL 28 or RD 28)	120 VAC	Not Involved
Unbalance Control	Line Relay NO (GY 26)	P2/4 (OR 40)	24 VDC	Not Involved
Door Lock - Spin	P3 (1)	P3/7 (YL 36)	24 VDC	Not Involved
Machine Control & Motor Control Power	P5 (WH11)	Line Relay Com (BK 27)	120 VAC	Not Involved
Hot Water Valve	P5 (WH11)	P7/1 (OR7)	120 VAC or 500-1000 Ohms	Not Involved
Cold Water Valve	P5 (WH11)	P7/2 (BU 9)	120 VAC or 500-1000 Ohms	Not Involved
Door Lock Wax Motor	P5 (WH11)	P7/4 (BR 14)	120 VAC	Not Involved
Bleach Water Valve	P5 (WH11)	Not Involved	120 VAC	2T (BR 5)
Softener Water Valve	P5 (WH11)	Not Involved	120 VAC	2B (YL 6)
Delay Light	Line Relay NO (GY 26)	Not Involved	120 VAC	4T (OR 2)

SECTION 8. WATER CARRYING COMPONENTS



WATER VALVE

The water valve is accessible from the front of the machine. The flow rate of the dispenser 3 gpm.

Removal

1. Discontinue power and water to the machine.
2. Remove the front panel and lift the top cover.
3. Remove the wire harness connections to the water valve solenoids.
4. Loosen and remove the hose clamps on the inlet hoses leading away from the water valve.
5. Locate and loosen the valve mounting screw by turning the screw at least three full turns.

NOTE: *The mounting screw serves as a locating pin to hold the valve in position on the mounting bracket. By partially removing the screw, the water valve can now be slid to the left and removed from the bracket (Figure 8-1).*

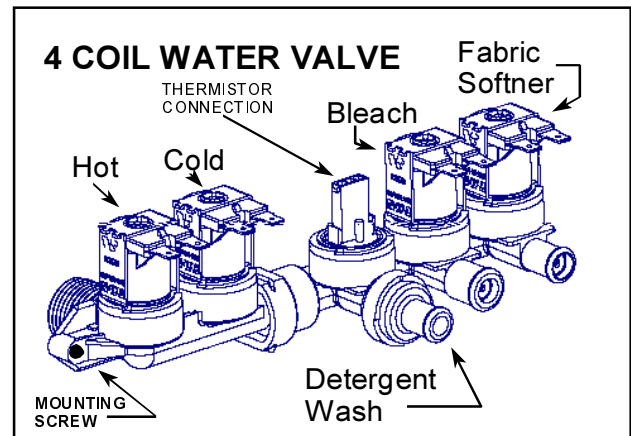


Figure 8-1

6. Carefully lift the valve with the inlet hoses attached and direct the inlet hoses through the openings in the valve mounting bracket.
7. The hoses can be crimped or the water shut off at the faucets. Place a towel below the valve and remove the inlet hoses from the water valve.
8. To reinstall, reverse the aforementioned procedure.

DISPENSER ASSEMBLY

The wax motor and linkage system designed for proper dispersing of the water into the bleach and fabric softener dispensing cups has been eliminated. The new system uses a 4 coil water valve with designated inlet hoses leading to each dispensing cup. The 4 coil water valve operates like a 2 coil water valve. The two water valve coils are individually dedicated to dispensing water through the bleach and fabric softener dispensing cups. When either of these valves is open, part of the flow will be routed through the dispenser cup. A portion of the flow will still be routed through the detergent wash area.

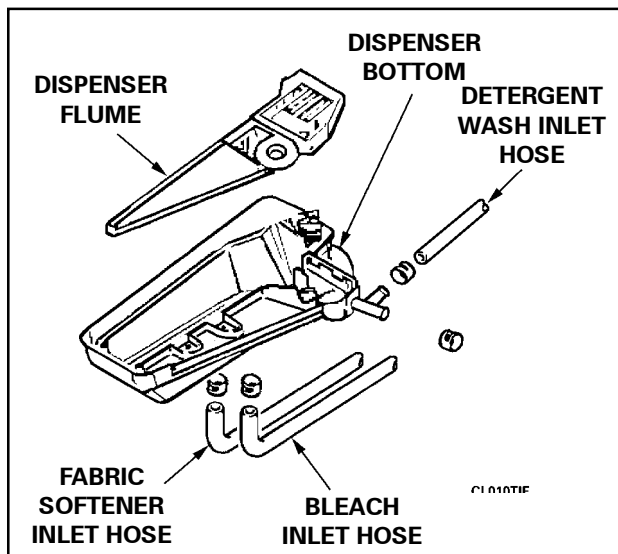


Figure 8-2

As a result of this revision, a new dispenser bottom, water valve and hoses were introduced. (See Figure 8-2)

OPERATION:

When Bleach or Fabric Softener is required to dispense, the dedicated solenoid on the water valve is activated the same as the previously used wax motor. Water is directed to dedicated spouts on the dispenser bottom. (See Figure 8-3)

Inside the dispenser bottom, water is directed into the designated channels leading to the siphon cup assembly.

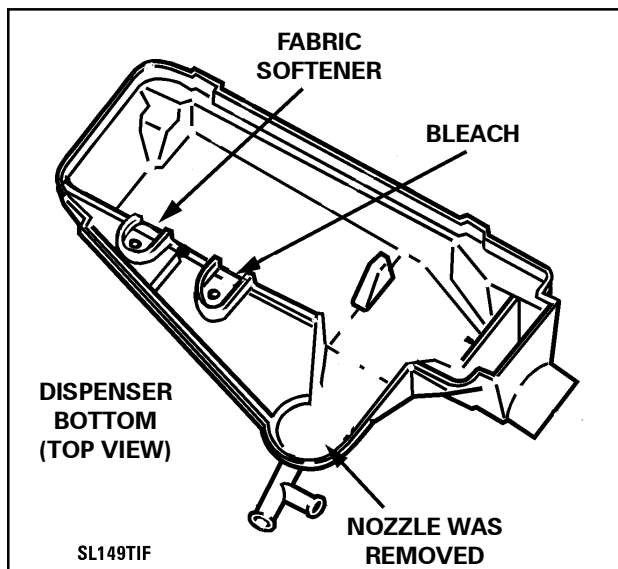


Figure 8-3

RECIRCULATION PUMP

The Recirculation Pump is accessible from the front or the rear of the machine. The pump is connected in series with the outer tub pump hose and the drain hose. (See Figure 8-4)

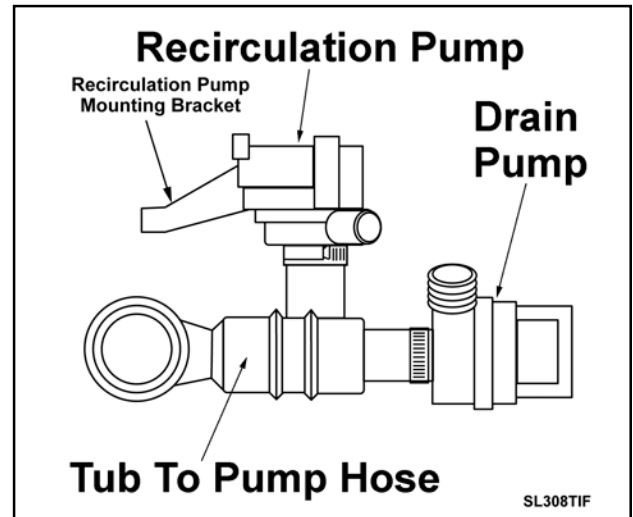


Figure 8-4

1. Disconnect power and water to the machine.
2. Remove the front panel.
3. Lay a towel under the tub to pump hose and loosen the clamp on the pump connection to the hose.
4. Loosen the clamp on the detergent hose connected to the side of the recirculation pump.
5. Lift the recirculation pump at an angle to disengage the locating tab of the mounting bracket from the baseframe. (See Figure 8-5)

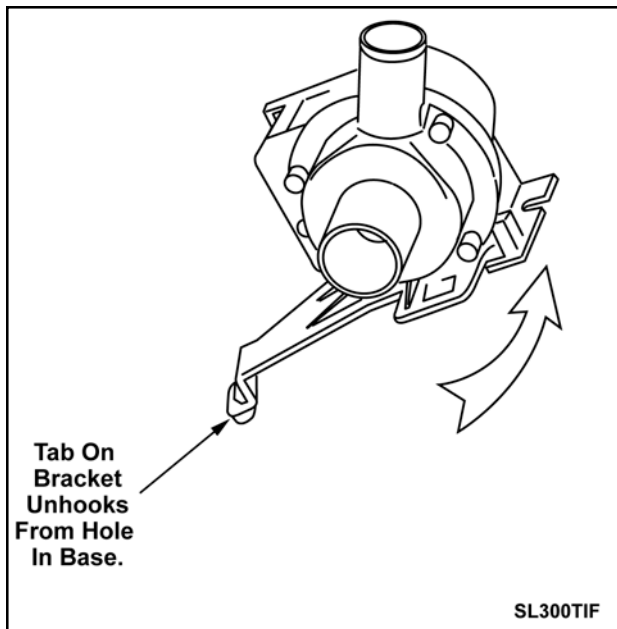


Figure 8-5

- To remove the pump from the mounting bracket, pull down on the mounting tabs and slide the pump off the mounting bracket. (See Figure 8-6)

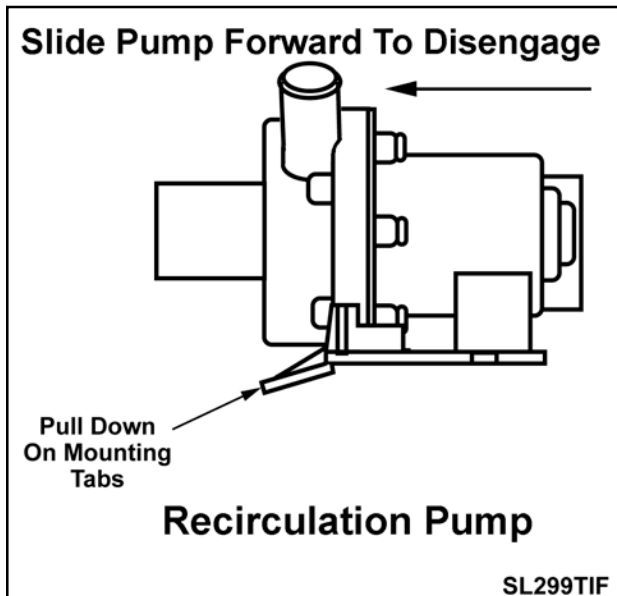


Figure 8-6

DETERGENT HOSE

The detergent hose leads from the recirculation pump up the rear of the washer cabinet and leads to the top of the outer tub assembly. The hose provides a path for the water to recirculate from the lower part of the outer tub assembly to the enter on top of the outer tub assembly.

Note: *Small indicator marks are painted on the hose to locate and properly position the metal mounting clips onto the hose.*

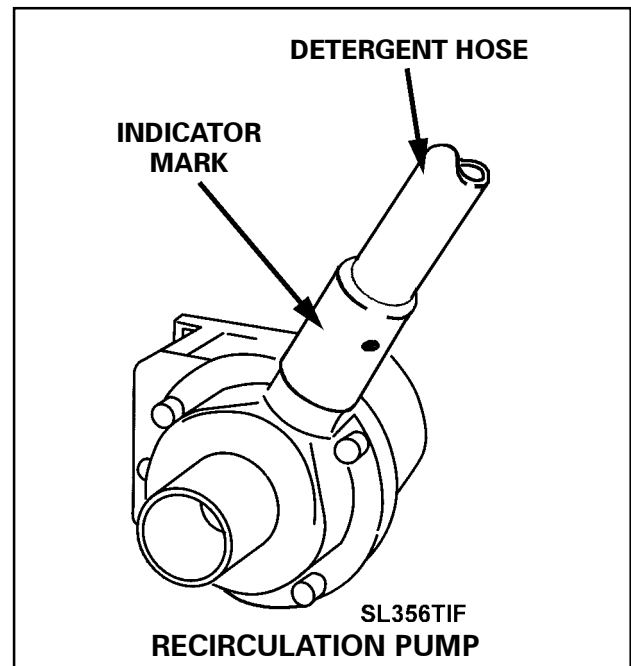


Figure 8-7

Removal

- Disconnect power and water to the washer.
- Remove the detergent hose from the recirculation pump.

NOTE: *Indicator mark on hose for reinstallation.*

3. Locate the rear mounting clip on the detergent hose in the access panel opening and slide the clip off the cabinet flange. (See Figure 8-8)

Note: When reinstalling clip to cabinet ensure the clip is approximately 1 inch up from the inside corner of the access opening to prevent kinking of the hose.

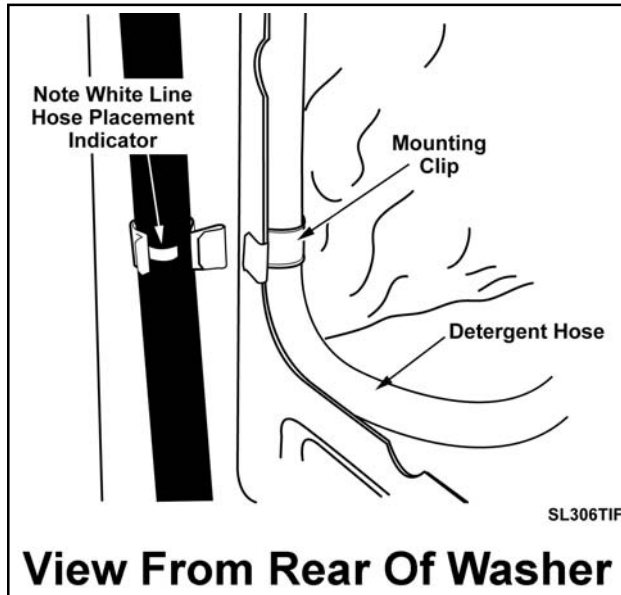


Figure 8-8

4. Follow the detergent hose vertically up to the air dome hose mounting bracket. The detergent hose is tucked behind the air dome hose. (See Figure 8-9)

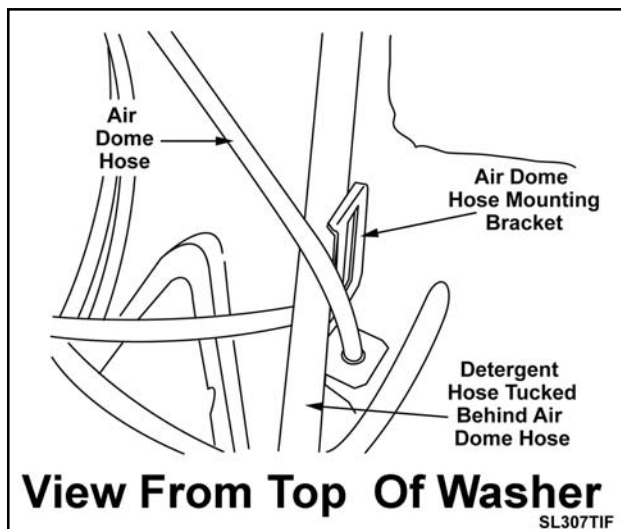


Figure 8-9

5. The detergent hose then goes vertically to the upper right rear flange of the cabinet and is retained by two metal clips. Indicators are on the hose showing the proper positioning of the clips on the hose.

NOTE: The upper left clip should be positioned directly above the top air dome hose retainer. (See Figure 8-11 & 8-12)

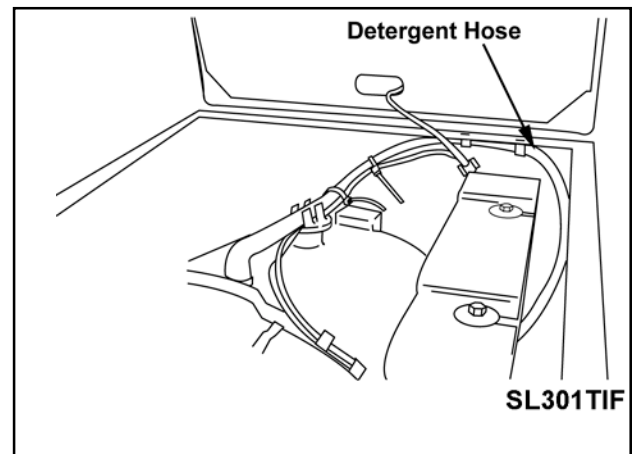


Figure 8-10

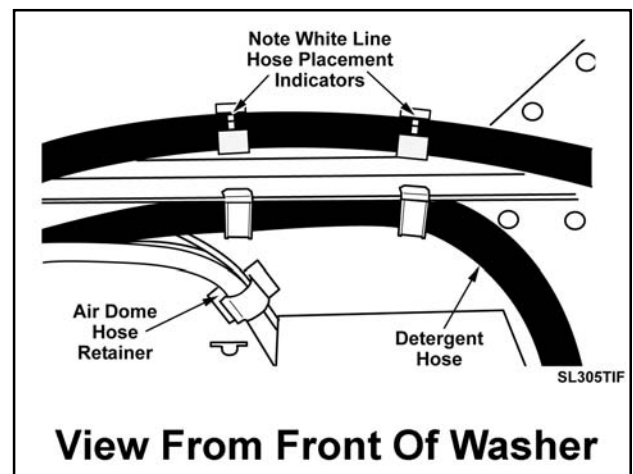


Figure 8-11

6. The detergent hose turns 90 degrees toward the front of the washer and passes through the saddle horn on the top of the outer tub. Unsnap the hose from the saddle horn. (See Figure 8-12)

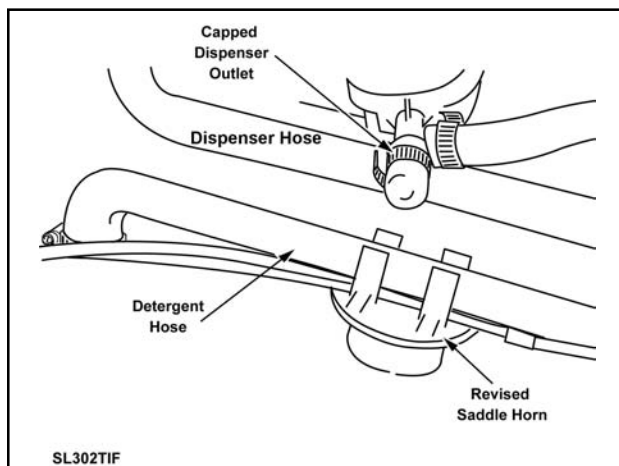


Figure 8-12

7. The saddle horn is secured to the top of the outer tub with a screw.

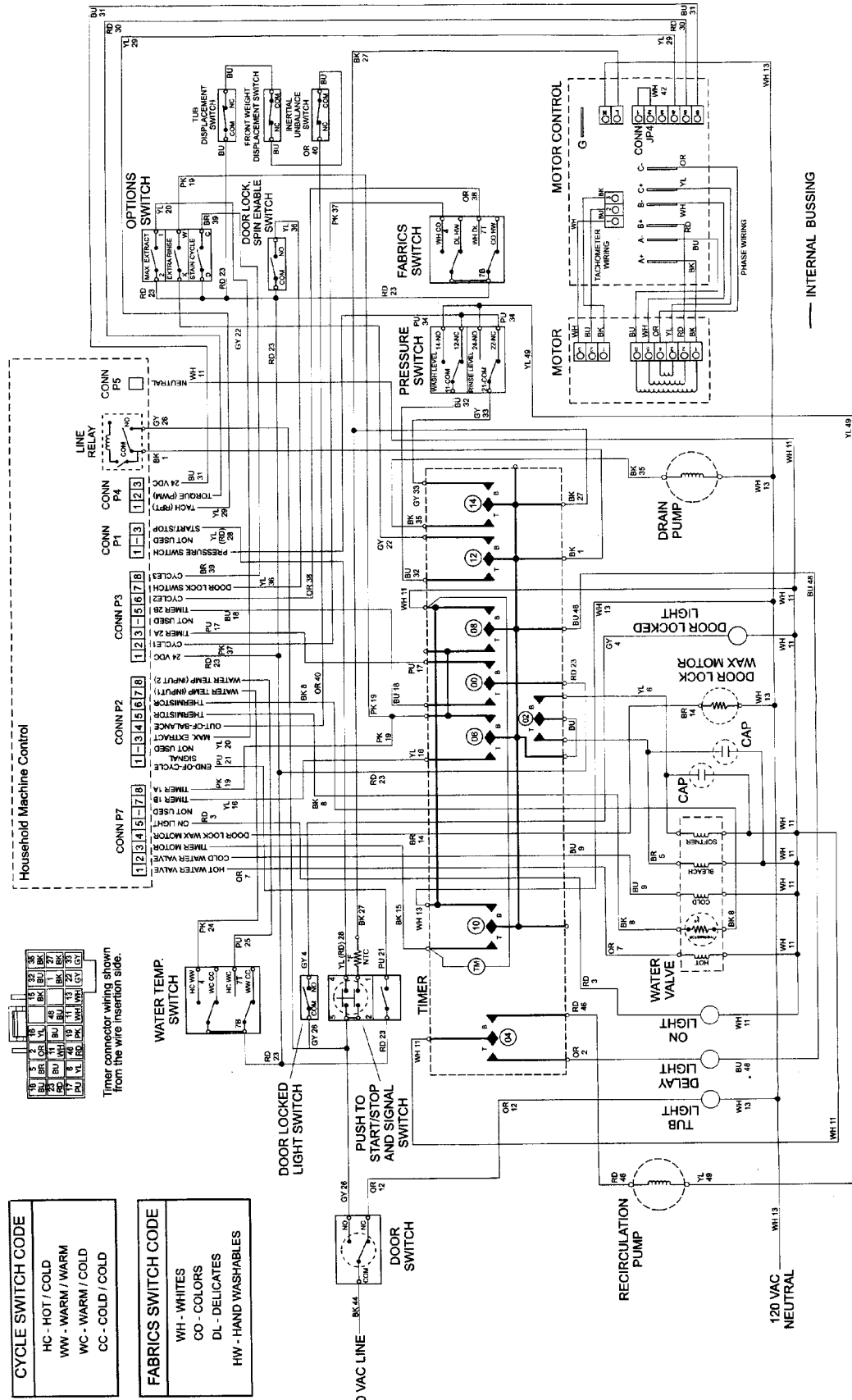
NOTE: *The upper wire harness for the unbalance circuit is snapped into the saddle horn with the detergent hose.*

8. Loosen the clamp on the detergent hose on the outer tub and remove the hose.
9. To reinstall, reverse the removal steps taking note of the indicators on the hose in reference to the mounting clips, making sure the hose does not kink above the recirculation pump.

SECTION 9. WIRING INFORMATION

Please refer to the technical schematic packed in the control console in the washer for up to date wiring information for the product your are servicing. The schematics on the following pages are only a general reference at the time this manual was printed.

SERIES 10 - SCHEMATIC (MAH4000 only)

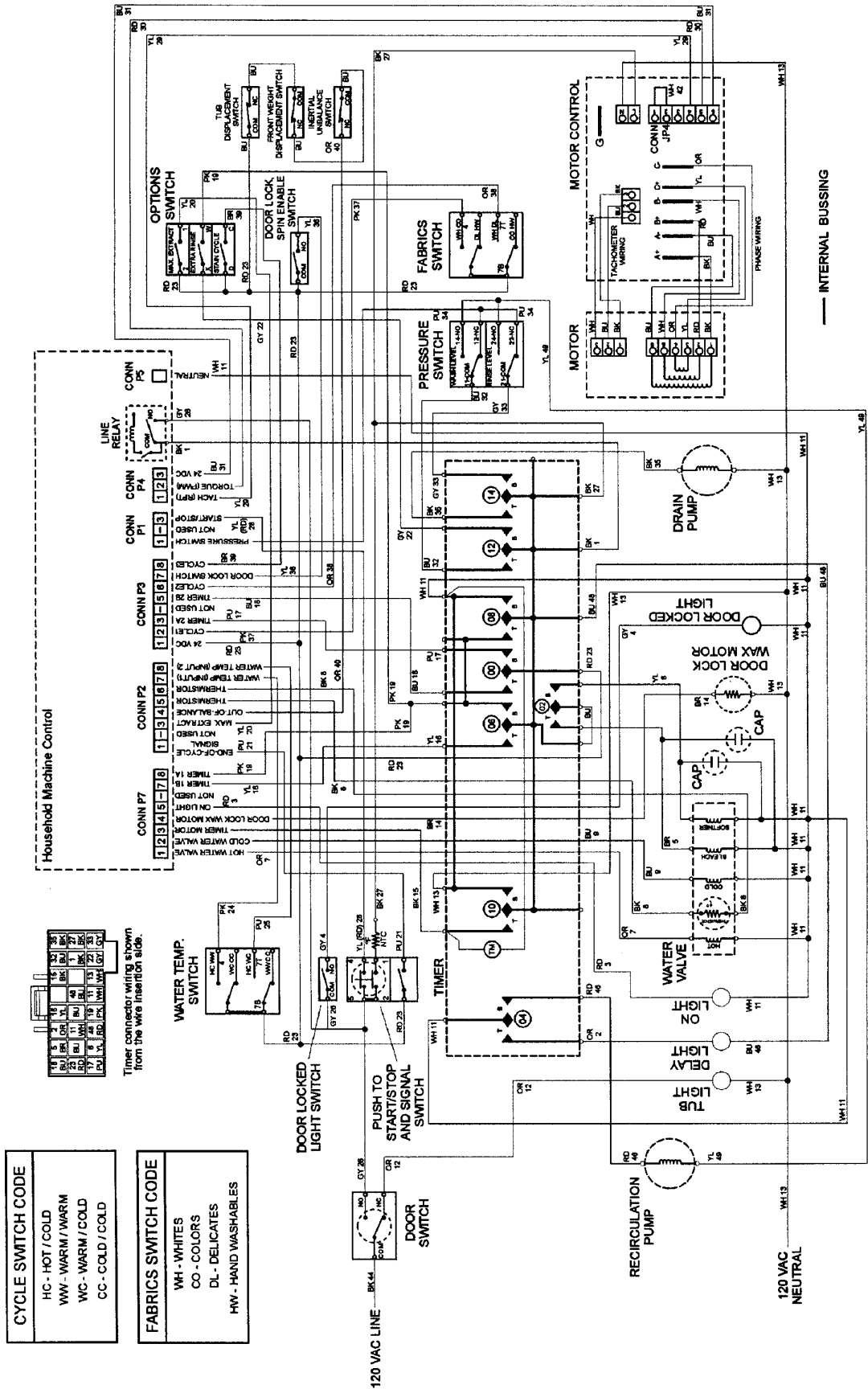


CYCLE SWITCH CODE	
HC -	HOT / COLD
WW -	WARM / WARM
WC -	WARM / COLD
CC -	COLD / COLD

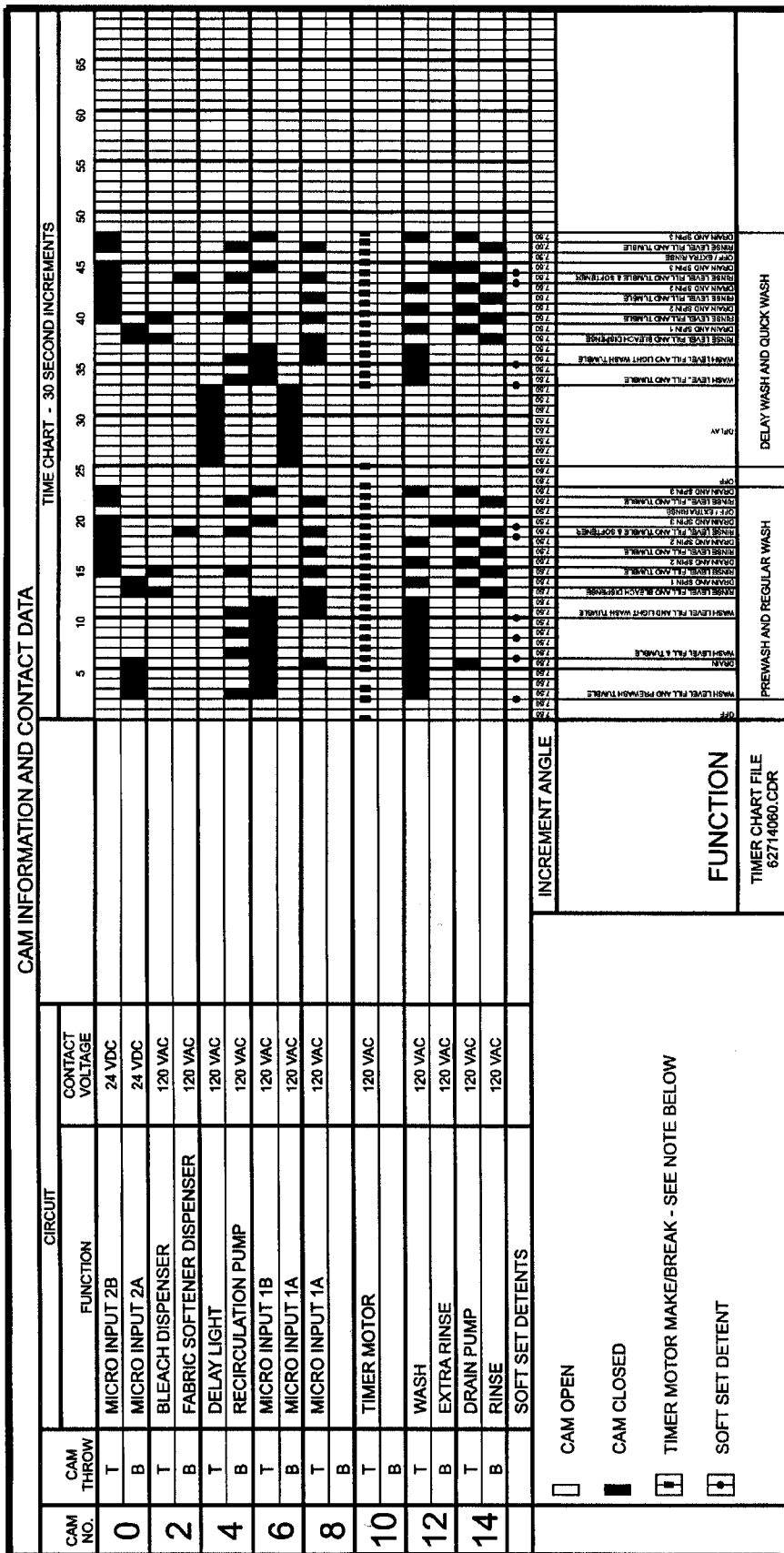
FABRICS SWITCH CODE	
WH -	WHITES
CO -	COLORS
DL -	DELICATES
HW -	HAND WASHABLES

Timer connector wiring shown from the wire insertion side.

SERIES 11 (MAH4000 and MAH5500)



SERIES 10 - TIMER CHART (MAH4000)



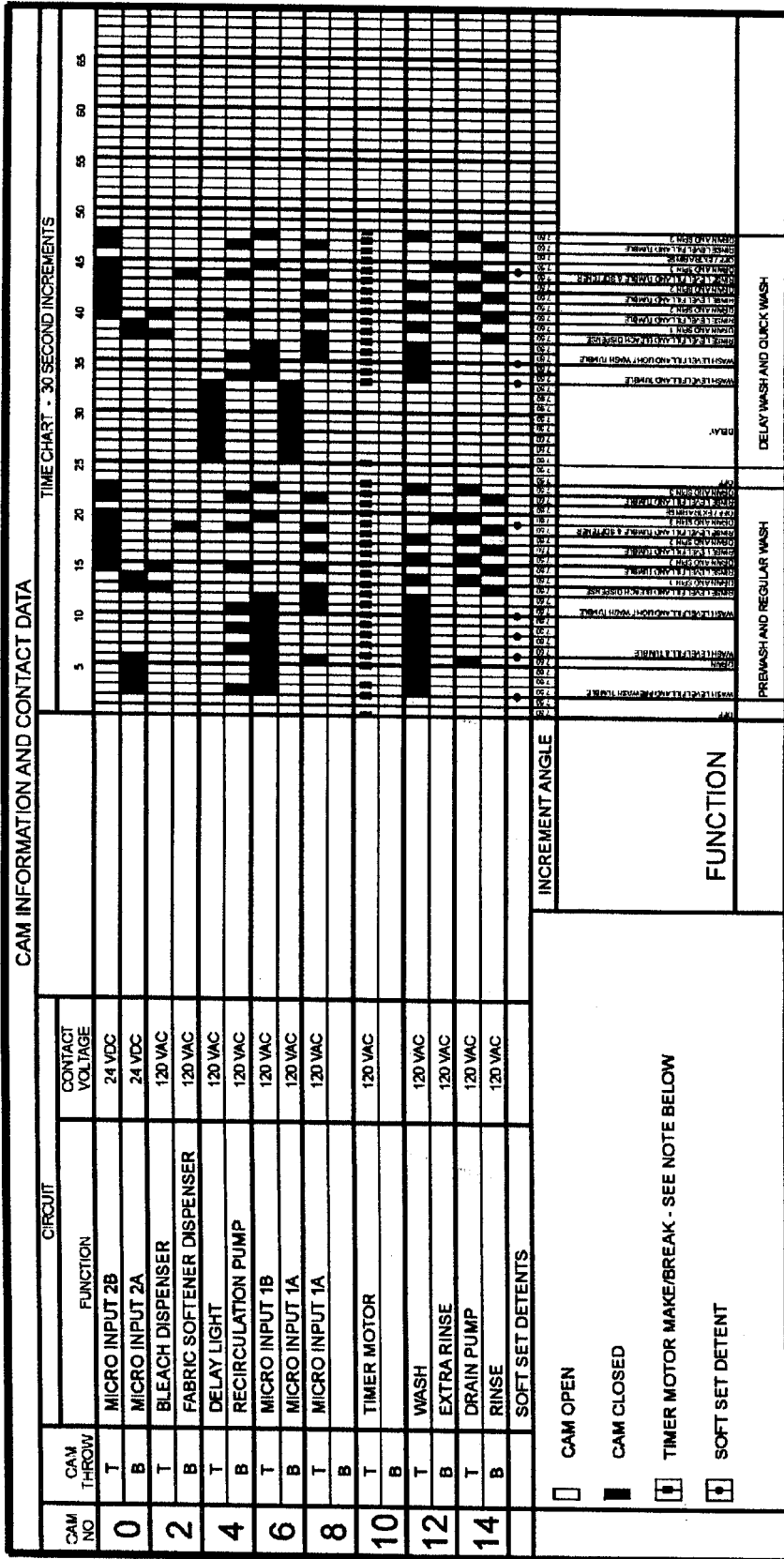
THE TIMER MOTOR, WHEN CONTROLLED BY THE MICROPROCESSOR, MUST ALWAYS COMPLETE THE ADVANCE WHEN HAND-SET OR TIMER-DRIVEN INTO THE ADVANCE PORTION OF THE 30 SECOND INTERVAL. ALL OTHER CONTACTS MUST ALSO MAKE AND BREAK DURING THE 5.8 SECOND ADVANCE.

IF EXTRA RINSE IS SELECTED, THE MICROPROCESSOR CONTROL WILL ADVANCE THE TIMER THROUGH THE OFF / EXTRA RINSE INCREMENT. IF EXTRA RINSE IS NOT SELECTED, THE TIMER WILL STOP AT THE OFF / EXTRA RINSE INCREMENT.

INTERNAL BUSSING: 6C - 8C - 10C - 12C - 14C, 6B - 8T, AND 8B - 10B

CONTACT 6-TOP MUST BREAK BEFORE CONTACT 14-BOTTOM MAKES IN INCREMENTS 13 AND 38.

SERIES 11 - TIMER CHART (MAH4000 & MAH5500A)



THE TIMER MOTOR, WHEN CONTROLLED BY THE MICROPROCESSOR, MUST ALWAYS COMPLETE THE ADVANCE WHEN HAND-SET OR TIMER-DRIVEN INTO THE ADVANCE PORTION OF THE 30 SECOND INTERVAL. ALL OTHER CONTACTS MUST ALSO MAKE AND BREAK DURING THE 5.8 SECOND ADVANCE.

IF EXTRA RINSE IS SELECTED, THE MICROPROCESSOR CONTROL WILL ADVANCE THE TIMER THROUGH THE OFF / EXTRA RINSE INCREMENT. IF EXTRA RINSE IS NOT SELECTED, THE TIMER WILL STOP AT THE OFF / EXTRA RINSE INCREMENT.

INTERNAL BUSSING: 8C - 8C - 10C - 12C - 14C, 8B - 8T, AND 8B - 10B

CONTACT 6-TOP MUST BREAK BEFORE CONTACT 14-BOTTOM MAKES IN INCREMENTS 13 AND 38.

MAYTAG

New Century Neptune Washer Service Manual Supplement

Attached is Supplement five for service manual **16008373**.

This Maytag Washer Service Manual supplement covers **Models MAH5500B and MAH7500**. The following information is supplemental to the information found in the basic manual part number **16008373**. Please refer to this manual for detailed service information.

We suggest you file this with your **16008373** Manual for reference.

INTRODUCTION

Attached is supplement five (16008373-05) for service manual 16008373, which in addition to supplement three (16008373-03). This Maytag Washer Service Manual supplement covers **Models MAH5500B & MAH7500A**. We suggest you file this with your 16008373 Manual for reference.

**Models covered in this manual supplement:
MAH5500B MAH7500A**

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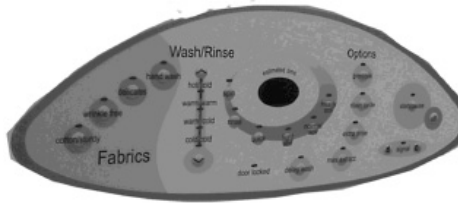
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SECTION 4. ELECTRICAL COMPONENTS & TESTING	4-1
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For additional information on material covered in this manual, including safety issues, contact:

**Maytag Appliances Sales Company
240 Edwards Street, S.E.
Cleveland, TN 37311
Phone: 423-472-3333**

SECTION 1. GENERAL INFORMATION

**MAH5500B CONTROL FACIA
(LED Screen)**



**MAH7500 CONTROL FACIA
(LCD Screen)**



SPECIFICATIONS

CAPACITY	3.1 Cubic Feet		
ELECTRICAL	120 Volts, 60 Hz; Requires 15 amp circuit breaker or fused electrical supply. Power cord must be connected to a properly grounded and polarized outlet.		
MOTOR	Switched Reluctance Motor controlled by a microprocessor motor control board. Motor Pulley Ratio (Motor to Spinner RPM) 14 to 1 (MAH5500B) 14.1 to 1 (MAH7500A)		
POWER USAGE	Motor Input: During Wash Tumble - 170 Watts During Wash Tumble w/heater - 1300Watts During Rinse Tumble - 195 Watts Top Spin - 800 Watts (Wattage readings taken with no clothes in spin.)		
TUMBLER SPEED	Wash Tumble	47 - 55 RPM	
	Rinse Tumble	47 - 55 RPM	
	High Speed Spin	800 RPM (+ 50 RPM based upon optimum spin performance) LED Washer (MAH5500B) 1000 RPM No tuning of system at 1000 rpm. LCD Washer (MAH7500A)	
WATER USAGE	Water pressure should be 20 - 120 P.S.I. (1.06-8.44 kg/cm) at inlet hose connection. Total water usage is approximately 25 gallons, varies with clothes load. Water fill in the spin basket with no clothes, measured near the rear seam of the spin basket WASH LEVEL 2-3 inches RINSE LEVEL 3-5 inches		
HOSE LENGTHS	Four foot inlet hoses with inlet washers and attached to water valve. Drain hose attached to pump and will accommodate 36" drain stand pipe.		
DIMENSIONS	Cabinet Dimensions: 27" (68.58cm) W x 27 1/2" (69.85cm) D x 36" (91.44cm)H		
WEIGHT (Approx.)	Uncartoned 177 lb. (80kg.) Approx.		Crated 187lb. (85kg.) Approx.
SCREW & BOLT TORQUES	Bolt, Counter Weight	7 ft. lbs.	(+ 3 ft. lbs.)
	Bolt, Spin Pulley	38 ft.lbs.	(+ 3 ft. lbs.)
	Bolt, Belt Adjuster	22 ft. lbs.	(+ 2 ft. lbs.)
	Screw, Front Baffle	25 in. lbs.	(+ 3 in. lbs.)
	Screw, Rear Baffle	18.5 in. lbs.	(+3 in. lbs.)
	Clamp, Hoses	15 + in. lbs.	
	Nuts, Spinner Support	18 ft. lbs.	(+ 3 ft. lbs.)
	Nuts, Suspension struts	7 ft. lbs.	(+ 3 ft. lbs.)

BASIC MACHINE OPERATION

Models MAH5500B and MAH7500 are similar to the MAH4000 washer, with the exception being they do not have recirculation of the wash water. A special sump cap is placed directly above the sump area which catches the detergent and allows for a better mixing of the detergent and the wash water. The door lock mechanism was updated from a wax motor system to a solenoid, resulting in faster locking and unlocking of the door. The water level pressure switch was relocated from the console to the top of the pump, thus eliminating the airdome hose. The motor drive system was changed to a sensorless system, thus eliminating the tach sensor in the motor in the harness leading to the motor control board. Heater with thermistor was added to the sump area of the tub to heat the wash water on the MAH7500A model.

General Flow Of A Complete Wash Cycle

There are several user selections which modify the main wash. Fabric selection impacts tumble pattern. Wash/rinse temperature selection determines water fill temperature. Soil level and quick wash selections determine wash time. The Stain cycle and Presoak options add additional time with a special tumble pattern to the main wash. The stain cycle option also adds rinse time to non-heavy cycles and some warmer rinses. The Quick cycle reduces wash time and only has two rinses. For this cycle, less detergent should be used.

- 1) The wash cycle is selected and started by user by pressing Start/Pause button
- 2) The door lock mechanism is verified by locking it and unlocking it. The door is left unlocked.
- 3) The drain pump will turn on (energized) for a short period of time.
- 4) The water fill will begin after a delay from the time the pump is turned off. The temperature of the water entering the tub depends on the user selections.
- 5) After 30 seconds the door will be locked and the machine will tumble at the Handwash wash tumble pattern (less aggressive) until the machine is at wash level. The exception would be if the Cotton/Sturdy is selected or Quick cycle and the washer would have a 7/3 tumble pattern. Note: No permanent locking, tumbling, or spinning shall be done for 30 seconds after any cycle is started or re-started. Filling and draining will be allowed in this initial period. Once filled, the tumble pattern and the total wash time depends on the user selections. A Wash Tumble Flush occurs shortly after the water reaches the wash fill level. A Wash Tumble Flush will have special tumbling speed to ensure the proper mixing of the detergent.
- 7) Shortly before the end of the wash cycle bleach will be dispensed.
- 8) The washer will then drain and spin.
- 9) The washer will fill tumble, drain, and spin repeatedly to rinse the clothes. The number of rinses and spin speeds will be dependent on user selections. Toward the end of the wash and rinse spin, the cold water valve will be turned on for 6 seconds. During the final rinse the machine will perform a tumble flush to clean the machine.
- 10) A final drain and high speed spin will be performed to extract the water from the clothes.

CYCLE SEQUENCES

Wash Time Tumble:

Wash Selections	Tumbling Time
a) Extra Heavy (LCD Model Only)	32 minutes wash tumble 2 minute bleach fill.
b) Heavy	27 minutes wash tumble 2 minute bleach fill.
c) Normal	14 minutes wash tumble 2 minute bleach fill.
d) Light	8 minutes wash tumble 2 minute bleach fill.
e) Quick	3 minutes wash tumble 2 minute bleach fill.

Rinse Tumble Times:

Rinse Selections	Tumbling Time
a) Normal or Light, no stain	1st Rinse - 3 minutes 2nd Rinse - 3 minutes Extra Rinse - 3 minutes 3rd Rinse - 3 minutes*
b) Stain, Extra Heavy or Heavy	1st Rinse - 4.5 minutes 2nd Rinse - 4.5 minutes Extra Rinse - 4.5 minutes 3rd Rinse - 4.5 minutes*
c) Quick	1st Rinse - 2 minutes Extra Rinse - 2 minutes 2nd Rinse - 2 minutes*
d) Rinse	All Rinses - 3 minutes

***Note: The final rinse time does not include the Tumble Flush time. Tumble Flush time will add a minimum of 30 seconds to a maximum of 60 additional seconds to the final rinse time. (See definition of Tumble Flush)**

Basic Tumble Patterns:

Fabric Selections	Basic Tumbling Pattern and Speed
a) Cotton/Sturdy	7/3 at 47 rpm for
b) Wrinkle Free	5/3 at 51 rpm
c) Delicates	6/24 at 51 rpm
d) Handwash	3/27 at 51 rpm
e) Fill for all except Cotton/Sturdy and Quick Wash	3/27 at 51 rpm
f) Quick Wash (regardless of all fabric selections)	7/3 at 51 rpm

Note: "7/3" means 7 seconds on, 3 seconds off, reverse direction and repeat.

Number of Rinses:

Extra Heavy, Heavy, normal, or light	Quick	Rinse	Spin	Extra-- Rinse	Stain	No. of Rinses
X						3
	X					2
	X			X		3
		X				1-4
			X			0
X				X		4
X				X	X	4
X					X	4
		X		X		2 MAH5500B
		X		X		2-4 MAH7500

The water temperature entering the washer during rinse is tempered. The following table shows the temperature based on the user selections.

INPUT WATER TEMPERATURE

Extra Heavy, Quick, heavy, normal, or light Option Selected	Selected Temperature	Rinse	Stain Cycle	Rinse water temperature
Y	H/C, W/C, and C/C	N	N	Non-tempered cold.
Y	W/W	N	N	80°F for the final rinse only. Non-tempered cold for all other rinses.
N	H/C, W/C, and C/C	Y	N	Non-tempered cold
N	W/W	Y	N	All rinses 80 °F
Y (heavy, normal, and light only, quick is not allowed with stain)	H/C, W/C, and C/C AND W/W	N	Y	The first rinse is the same as the wash temperature. The rest of the rinses are the same as if stain cycle was not selected.

ON/OFF SEQUENCE OF PUMP DURING SPIN CYCLE

Spin Speed	Drain Pump
a) <540 rpm	On continuous
b) <100 rpm when in redistribution.	Off
c) ≥540 rpm and during the first minute	15 second on and 15 second off duty cycle.
d) ≥540 rpm and 30 seconds after the machine has reached the target speed.	15 second on and 45 seconds off duty cycle.
e) Coast down during final spin	Off until machine reaches 300 RPM and then on until the machine reaches 0 RPM.
f) Coast down during all other spins	On continuous until next step in the cycle

SECTION 2. WASHER CONTROLS OVERVIEW

The software for the MAH5500B and the MAH7500 is different than the MAH4000 washer. The new controls operate via a membrane pad on the MAH5500 and a touch screen/membrane pad on the MAH7500 washer.

Features of MAH5500B (LED Washer):

- A membrane switch (keyboard) with an embedded LED display.
- The user can select a delay start.
- The wash/rinse temperatures and wash cycles are remembered and based on the previous fabric type selected.
- The user can select another wash cycle during the operation and the control will determine the completion of the cycle.
- The control panel displays the estimated time remaining in the cycle
- The control panel stores codes to aid the service person in diagnostics.
- The control panel detects hose reversal and changes the fills as necessary.

Features of MAH7500 (LCD Washer):

- A membrane switch (keyboard) with a LCD display and touch screen.
- The user can select a delay start.
- The wash/rinse temperatures and wash cycles are remembered and based on the previous fabrics type selected.
- The control panel drives a heater located in the sump.
- The control displays the estimated time remaining in the cycle.
- The control panel detects hose reversal and changes the fills as necessary.
- The control panel stores codes to aid the service person in diagnostics.

BASIC CONTROL BOARD PHILOSOPHY FOR BOTH WASHERS:

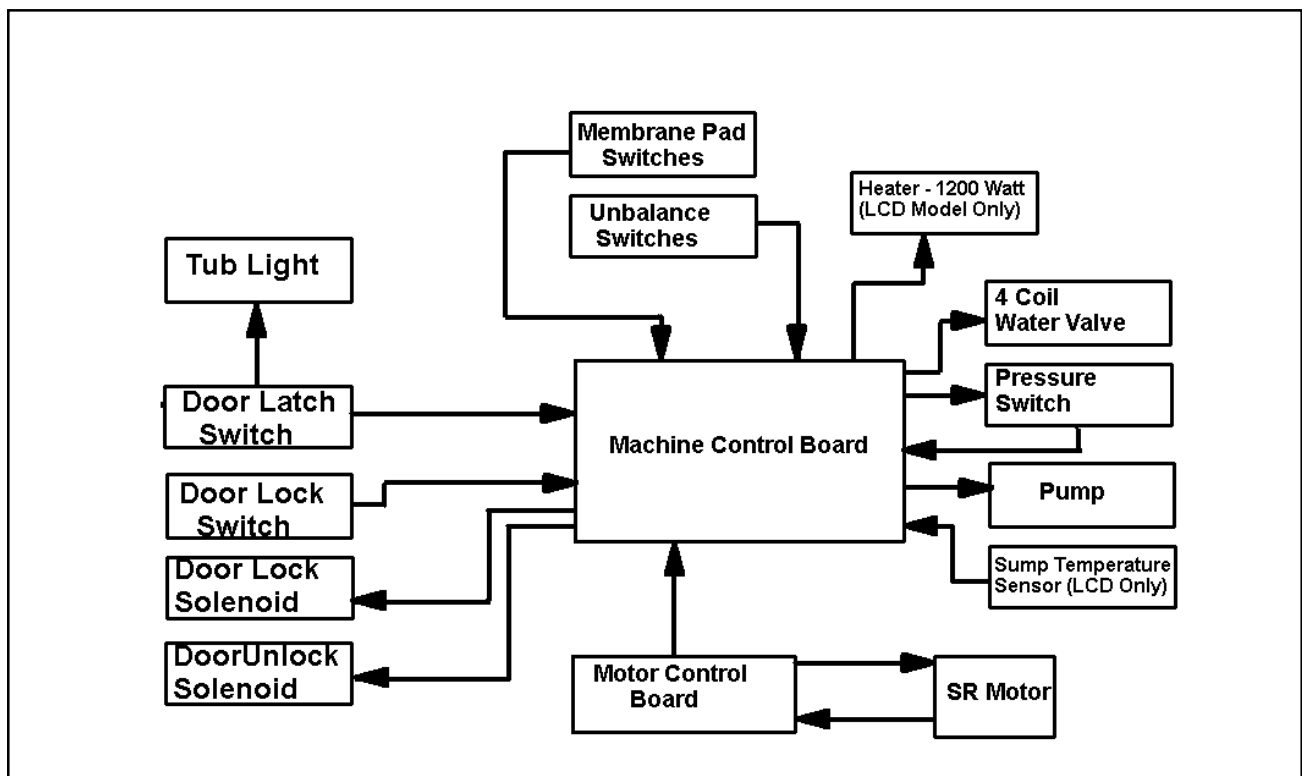


Figure 1

USER INTERFACE SELECTIONS: (LED Washer)

The user can select the setting of several features while in the User Interface Active Mode or the Main Wash Cycle. The user sets the features by pressing a key on the keypad and the machine goes into the set mode. If the machine is in the main wash cycle, additional criteria may be applied prior to changing the feature. The modes to set a feature are:

- Fabric Mode
- Temperature Mode
- Cycles Mode
- Delay Mode
- Signal Mode
- Options Mode

FABRIC MODE

When a Fabrics key is pressed, the last cycle that was not a Quick, Rinse, or Spin cycle, will be recalled. Each Fabrics key (Cotton/Sturdy, Wrinkle Free, Delicates, Handwash,) remembers the wash/rinse temperature settings, max extract option, extra rinse option, and wash settings.

TEMPERATURE MODE

Four discrete wash/rinse temperature selections are provided, each with an associated LED. Up and down arrow keys are used to make the wash/rinse selection. Holding down one of these keys will advance at a rate of one level per half second. Wash/rinse selection will not wrap around.

CYCLES MODE

When a wash key is selected (heavy, normal, light, quick, rinse, or spin), the LED shall be lit and remain lit until another wash cycle is selected. The wash LEDs do not change during the wash cycle.

DELAY MODE

The delay start option is primarily used when a person wants to run the washing

machine at night or some other time to better suit the needs of the household.

The consumer can select the time delay from 1 hour to 9 hours in increments of 1 hour. The user shall press the delay button for each 1 hour increment. Holding down the delay wash key will advance through the one hour increments to off and start over again.

The delay time (in hours) shall be shown in left digit and an 'H' (for hours) shall be shown in the right digit of the display.

If delay wash has been selected, but Start/Pause has not been pressed to initiate it, then the Start/Pause LED will flash off and on to indicate that it must be pressed. The Start/Pause key must be pressed to initiate a delay wash cycle. Once it has been pressed, the Start/Pause LED will stay on constant and the time will begin to count down and the display will indicate hours of delay remaining. When one hour of the delay is reached, the time will be shown in minutes in the two digits of the display.

Note: *If a regular cycle has been running for more than five seconds, the delay wash key will be locked out.*

SIGNAL MODE

The volume level of the end of cycle signal is adjustable. The sound ranges from "off" to "3" in increments of 1. The user will be able to select the plus (+) to increase the volume level. The user will be able to select the minus (-) to decrease the volume level. When the user first presses either of these keys, the current end of cycle signal will be demonstrated.

Subsequent presses of either the plus or minus button within 5 seconds of the previous key press will increase or decrease one level. The new end of cycle shall sound.

OPTIONS MODE

When the extra rinse key is selected, an extra rinse is added for the wash cycles.
(Page 1-3 Extra Rinse Table)

When max extract speed key is selected, the max extract profile will be used for spin cycle based on the fabric selection.

When the stain cycle key is selected, the water input temperature, the wash time, the tumbling pattern, speed, and amount of rinses may be modified.

When the presoak key is selected, a presoak is added before the main wash cycle.

DISPLAY CHARACTERISTICS

Door Locked LED:

When the door is finally locked, the door locked LED is lit. When the door is finally unlocked, the door locked LED is not lit.

Two Digit Display:

The display shows the estimated time remaining in the total cycle in minutes. This time will count down during the total time cycle.

If the selected Wash cycle button is pushed, the estimated time remaining in that wash cycle shall be displayed for 5 seconds and the associated Wash level LED will flash. After 5 seconds, the estimated time remaining for the total cycle will be displayed and the wash level LED will return to being on constant.

Changing Selections:

Fabric, temperature, and options selections may be changed at any time. The current cycle step will be suspended and the appropriate cycle step will be restarted with the new selections. The machine will not stop, but rather the changes will be dynamic.

The main Wash Keys may be changed at any time. The cycle time remaining is recalculated and displayed. The remaining time is calculated by applying the actual time in the new cycle. If the user had originally selected Heavy wash and 3 minutes has elapsed and the user then selects Normal wash, the time remaining will be 12 minutes. (e.g. 15 minutes Normal wash minus 3 actual minutes = 12 minutes). If the user had originally selected Quick wash, 1 minute had elapsed, and then the user selects Heavy wash, the new remaining time will be 19 minutes (20 minutes heavy wash minus 1 minute actual time).

The main Wash key may not be changed if there is less than 2 minutes time remaining in the wash cycle (Bleach Fill). Although the button can be depressed, the LED status will change but the time remaining or wash cycle will not change.

USER INTERFACE SELECTIONS:

(LCD Washer)

All selections described under the LED washer section are familiar except in the Delay mode. In this mode, time is increased in 15 minute increments up to 12 hours.

INPUT MODIFICATIONS DEFINED

PRESSURE SWITCH INPUT

The pressure switch is a two level pressure switch. (*Figure 4-2*) The low level contacts provide a path for a 24 VDC sensing circuit, the high level contacts provide an electrical path for 110 VAC to the water valve relays on the board. Another sensor on the board monitors the high level circuit to determine when the high level is reached and the circuit is opened. Thus, shutting off the water valve relays.

During wash fill, the low level of the pressure switch is sensed with 24 VDC and provides an indication to the control board the water level has satisfied the low level. Once satisfied, the 24 VDC circuit is opened. The board then opens the water valve relays and shuts off the water valves.

During rinse fill, the high level provides an indication to the machine control as to whether the high water level has been reached. When the water level switch is satisfied, the pressure switch circuit is opened and power for the water valves is no longer passed through the machine control.

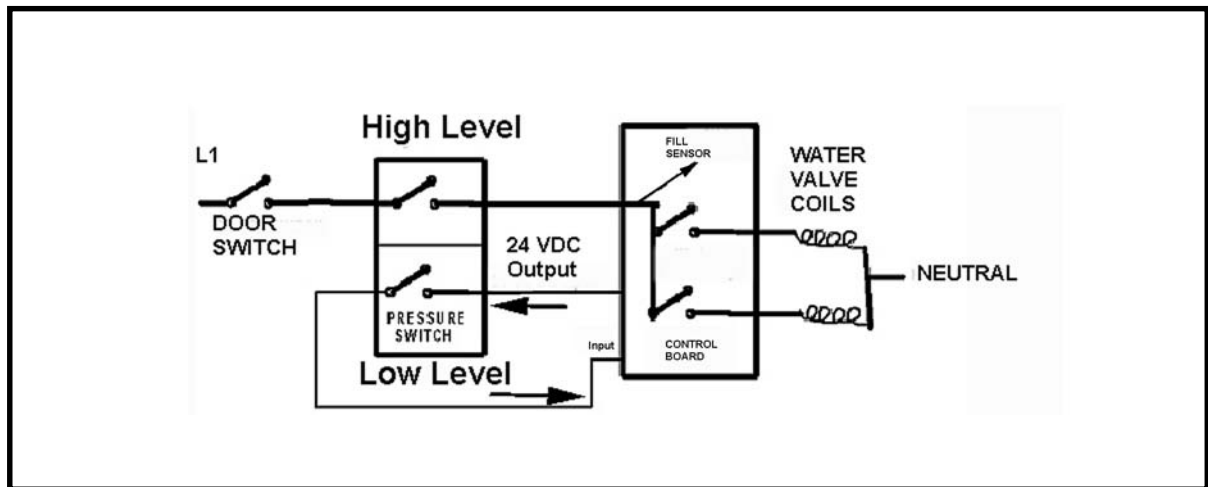


Figure 2

TEMPERATURE SENSOR INPUT

A thermistor is located in the water valve to monitor the blended incoming water temperature. The machine control uses this input signal to regulate the water temperature with the warm or cold wash and warm rinse temperature selections (*See Water Valve Outputs*).

On the MAH7500 model, another thermistor is located on the heater assembly. The machine control board uses this input signal to maintain the water temperature in the sump area of the outer tub, by cycling the heater on/off.

DOOR LOCK SWITCH INPUT

When input is present, this is indication the washer door is locked. The machine controller will not command the spinner to tumble or spin when the door lock input is not present.

If the door is opened during a cycle, the control will pause the cycle on the MAH5500B.

START/PAUSE INPUT

The start/pause input is selected on the membrane switch for both washers. If this input is initially selected the machine control will begin the wash cycle sequence as defined by the user input selections. If this input is selected when a cycle is in progress, the machine control will pause the cycle and unlock the door when it is safe to do so.

(Note: Machine control board is powered up all the time. There no longer is a line relay used, as opposed to the MAH3000, 4000 and 5500A models.)

TACH INPUT

The tach input is a feedback signal from the motor control. It provides eight pulses per revolution of the switched reluctance motor. The motor runs at 14 times the speed of the spinner (14:1 belt ratio). The tach input is used for monitoring speed and out-of-balance detection (***See Tachometer Circuit Diagnostics***).

If the machine control commands a motor speed and direction but does not sense a tach input signal within 2 or 3 seconds, it will assign a HELP code number and perform 10 retries. If unsuccessful, this generally indicates a locked rotor or a malfunction in the motor control.

If the machine control commands a coast down from final spin speed but is still receiving a tach input signal after two minutes, it will log appropriate service codes.

OUTPUT MODIFICATIONS DEFINED

DOOR LOCK/UNLOCK SOLENOID OUTPUT

The Door Lock/Unlock Solenoid Output signal is a 60 millisecond pulse sent to a solenoid in the door lock assembly. The solenoid is attached to a lever which moves a slider in the mechanism to lock the door after it has been closed and the cycle started. The solenoid has two coils, one for locking and one for unlocking when a pulse is directed to specific terminals on the solenoid. Power is not continuously applied to the solenoid, because this would damage the solenoid.

END-OF-CYCLE SIGNAL OUTPUT

The End-Of-Cycle Signal Output is an internal signal on the machine control between the microprocessor and annunciator. The end-of-cycle signal sounds when a wash cycle is finished. The end-of-cycle signal sounds as four pulses on the MAH5500B and 3 pulses on the MAH7500 in a 0.5 second intervals. If the door is opened right at the end of the cycle or during the end of cycle beeps, then the signal will stop on the MAH5500B only. If the start/pause key is pressed near the end of the cycle, the end of cycle signal will not occur unless the cycle is restarted and allowed to finish. If the Off key is pressed, the end of cycle signal will not occur. The end of cycle signal will occur when the door is unlocked and ready to open on the MAH5500B. On the MAH7500, the signal sounds then the door is unlocked.

HEATER OUTPUT (LCD Washer only)

The machine control board turns the heater on to heat the wash water during the main wash until the temperature reaches the targeted main wash temperature. The heater is turned back on at any point the temperature falls 5° F

below the main wash target temperature. The heater monitors the water temperature through the thermistor in the heater assembly. Selecting the energy saver, will turn off the heater and will not affect tumble patterns.

Main Wash Target Temperatures

The heater will not be turned on if the following conditions exist:

1. Low level of the water pressure switch is not satisfied.
2. The door is open.
3. During the Bleach fill.
4. Energy Saver on.

User Selections	Input water tempered	Maximum heater on time
Cold Wash - no heater	Cold water Tempered wash	N/A
Cold Wash with stain cycle option & heater.	65°F, Will heat water to 65°F if necessary.	Main wash time
Warm Wash - no heater	Warm water Tempered warm	N/A
Warm Wash with stain cycle option and heater.	105°F, will heat to 105°F if necessary	Main wash time
Hot Wash - no heater	Hot water	N/A
Hot Wash with stain cycle and heater.	Hot water, then heat to 130°F if necessary	Main wash time

DOOR LOCKED LIGHT OUTPUT

The Door Locked Light Output signal powers a LED on the membrane pad switch of the LED washer. This output is energized when the washer door is locked.

VDC REFERENCE VOLTAGE OUTPUT

The VDC Outputs are a reference voltage for many of the signal outputs. On the machine control, the VDC outputs are 24 VDC referenced from P2(3) to the individual outputs.

WATER VALVE OUTPUTS

The machine control determines whether the hot or cold Water Valve Outputs should be energized during the wash cycle based upon the user selections. When water fill is required, the machine control board will activate relays on the board, supplying power to the water valves.

The machine control gates the power to the hot and cold Water Valve Outputs. When the pressure switch senses that the full level is reached, the circuit opens and the machine control de-energizes the Water Valve Outputs.

The machine control will monitor the thermistor resistance and fill time to achieve proper wash temperatures.

During a warm wash the cold may be cycled off periodically to achieve the desired water temperature.

On a cold wash the hot valve may be cycled on and off.

CYCLE SEQUENCE DEFINITIONS

IDLE/PAUSE MODE (LED Model)

After pressing the Off key, the entire washing machine will shut down after unlocking the door and will be in the Idle Mode. In the idle mode all the outputs are de-energized, all the LEDs and display are off.

If the Start/Pause key is pressed during the wash cycle the washer shall stop all the functions of the washer, placing the washer in the Idle Mode. The Start/Pause LED will flash indicating the pause mode. The current place in the cycle will be saved.

If the Start/Pause key is pressed the door will not be unlocked until the spin speed is 0 rpm.

If the Start/Pause key is pressed while flashing (in pause mode), the machine shall return to the start of the cycle step when paused and the time displayed be recalculated to the start of the cycle step. The Start/Pause LED will stay on whenever the machine is running in a cycle. **Note: The door must be closed prior to resuming the cycle.**

BLEACH DISPENSE

The Bleach Fill occurs 2 minutes prior to the end of the wash portion of the cycle. A bleach fill consists of turning the bleach water valve and the appropriate fill water valve(s) on until the water reaches high water level or for 24 seconds, whichever comes first. This is to ensure the bleach is used completely during this wash. The fill temperature during the Bleach fill shall be based on the user selections. If stain cycle is selected then bleach fill and final rinse are based on user selections. If stain cycle is not used, then only the final rinse is affected.

REDISTRIBUTION

As the machine is accelerating into spin, if it detects that the clothes load is unbalanced and would cause excessive vibration, it will decelerate and tumble the clothes in an attempt to redistribute them in a more uniform manner so that vibration is reduced.

The machine control commands a distribution profile speed ramp from 0 rpm to 85 rpm at the beginning of each

high speed (above 100 rpm) spin. When the washer reaches 85 rpm, the machine control monitors the Tach Input to determine if the speed varies through one revolution of the spinner basket. If it senses a high enough variation in speed (suggesting an out-of-balance condition in the clothing load), it will drop the spinner speed to 0 rpm and force a short reverse tumble to redistribute the clothing load before resuming the spin. If any of the out-of-balance switches trip and open the out-of-balance input circuit at a speed below 500 rpm, the machine control will also drop the speed to 0 rpm and force the reverse tumble to redistribute the clothing load before resuming the spin.

SUDS DETECTION

The suds detection feature tries to eliminate excessive suds during the main wash or rinse cycles. Suds detection is disabled during a stain cycle tumble pattern.

If suds are detected, the estimated time left on the wash cycle will be modified to account for 4 additional rinses.

The washer will try twice in early spins and 21 times when in the final spin.

LCD Washer: If four out of seven cycles have suds detected, "Too many Suds detected" should be displayed on the screen.

LED Washer: If suds are still detected, the "rinse" LED shall blink, 3 seconds on, 3 seconds off and "sd" will be displayed.

TUMBLE FLUSH (Two types of flush)

Wash tumble is a higher tumble speed than normal while the machine is filled with water. The purpose of this function is to clean the machine. Rinse tumble flush is performed during the final rinse to reduce the chance of suds creation.

MISCELLANEOUS

DOOR LOCK PHILOSOPHY

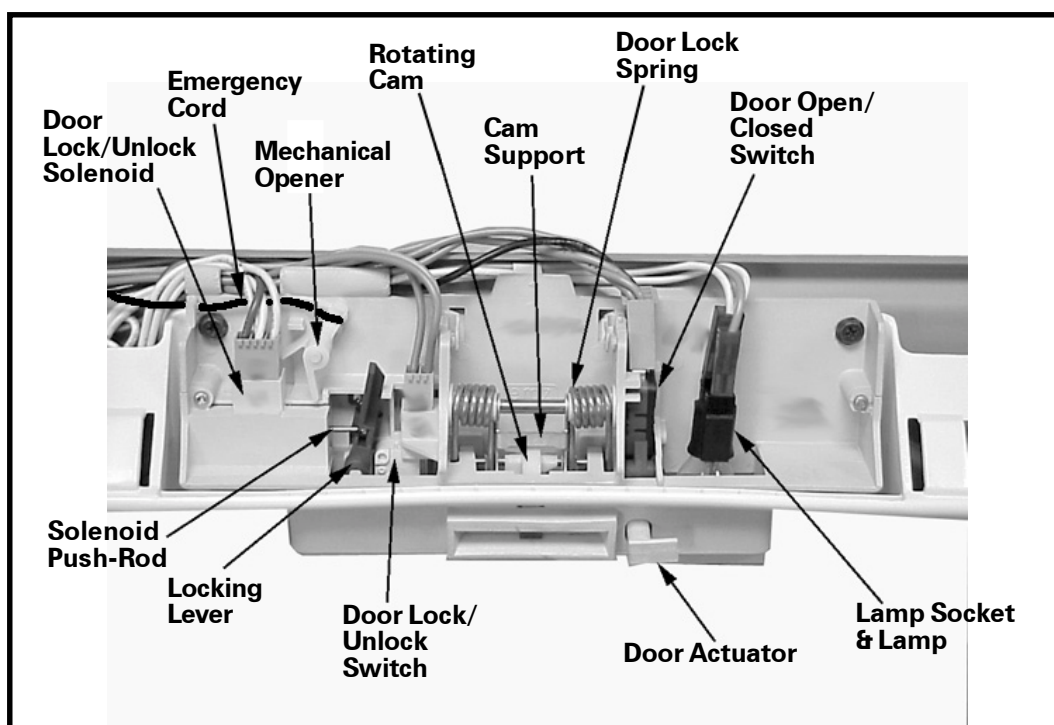
The door lock mechanism is checked by the machine control board for proper operation. This is done in the following manner.

1. The door will be locked. If the door does not lock on the first try, a help code 47 is logged into the control memory. The display will show the door has not locked.
2. If the door lock switch check shows that the door is locked, then the door will be unlocked and the cycle will continue unless the door fails to unlock. If the door fails to unlock, the cycle will be paused until the door is able to unlock for 30 seconds and lock again.

DOOR LOCK OPERATION

1. By closing the door, the door lock hoop rotates the catch cam and the door actuator is depressed actuating the door open/closed microswitch.

2. A 60 millisecond 120 VAC impulse from the machine control board to the lock solenoid extends the push rod of the solenoid and moves the lock lever to the right only to lock the door. The lock lever in turn is engaged with the slider and slides the slider toward the door lock mechanism and inhibits the door lock mechanism from releasing the door lock hoop of the door.
5. The slider will actuate the door lock/unlock microswitch in the locked position and the washer will begin the wash cycle.
6. When the wash cycle is finished an impulse from the machine control board to the unlocking solenoid unlocks the door by pulling the slider away from the door latching mechanism and the lock/unlock microswitch.
7. The consumer can now open the door.
8. By opening the door, the open/closed microswitch is open.



POWER LOSS/FAILURE

Power-up after a power-loss during a main wash cycle. The machine cycle will resume at the appropriate cycle step after the Start/Pause key has been pressed. The control recovers the saved information on power-up after a power loss. The recovery will be to the appropriate step in the cycle and within 3 minutes of the cycle step where the power loss occurred. The LCD display will be reset to the appropriate time left after the Start/Pause key has been pressed and not indicate a power failure at that point. The main wash cycle will resume immediately after the Start/Pause key has been pressed.

When a power loss occurs during the final spin of a main wash cycle, the cycle will end, on the MAH5500B. The MAH7500A will finish the spin cycle.

Power-up after a power-loss during service mode, continuous mode, or advertising mode will cancel these modes.

These modes will not resume after the power-up until the user selections are pressed again.

If a power outage occurs during a cycle the washer will come back up in the paused state. When paused (either by a power outage or by the user), the washer will remember where it was. The machine will not automatically time-out and cancel a cycle while paused. The display will remain on for 10 minutes after it is paused with no activity. After 10 minutes of no activity, the display will turn off, but the machine will remember where it was and the display will be turned back on with any user activity.

MAH5500B:

Information Saved:	Cause:
The beginning of the Last cycle step performed.	Power-loss
Current User Interface selections	Power-loss
Diagnostic codes, the total number of the diagnostics since diagnostic number has been cleared.	When occurred
The number of cycles run	End of a completed wash cycle.

MAH7500A:

Continuously monitors and saves information to memory every minute or as cycle selection change.

SPECIAL FEATURES

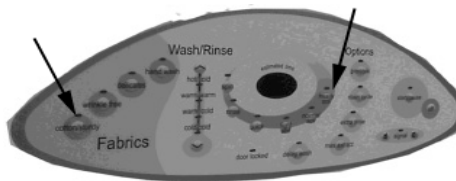
The LCD and LED washers come with several new features not available with the earlier versions of the Neptune washers. By pressing a combination of keys, the washer can be placed into an Advertising Mode or into a Service Mode for the service technician.

ADVERTISING MODE

This mode will continuously display the LEDs on the keyboard or illuminate the LCD touch screen.

LED Washer

Pressing the **heavy soil** and **cotton/sturdy** keys for 3 seconds shall start the washer in the Advertising mode. No functions will be run except illuminating the LEDs.

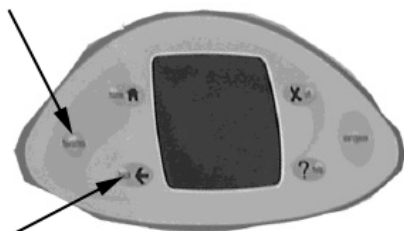


The Advertising mode lights the LEDs in a row and proceed in row order. The segments on the display are turned on in unison.

LCD Washer

This mode will continuously display the touch screen on the keyboard.

Pressing the **favorites** and **back** keys for 3 seconds shall start the washer in the Advertising mode.



While in advertising mode, the display will cycle through several screens. If the touch screen or any key (except off) is pressed, the advertising sequence will be temporarily interrupted and the control will go to the Interactive State.

When this occurs, the user is able to navigate through the control as normal (including setting favorites, setting preferences, etc.), but the machine will not be allowed to run a cycle. The only methods of exiting the advertising mode are to remove power from the machine or to

press and hold both the **back** key and the **favorites** key for 3 seconds.

After 5 minutes of inactivity in the interactive mode, the control will time out and return to Advertising Mode and the advertising sequence will begin again. Any settings or changes that the user has made while in the interactive mode will not be remembered.

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, user interface check, quick spin, and control system diagnose mode or advance the washer to the next step in the wash cycle. (See Service Mode Table) The information will be displayed and a variety of other information about the machine can be accessed via the Help and Diagnostic codes.

To aid the service technician, special software was incorporated into the control boards of the MAH5500B & MAH7500 washers. The software is used to monitor several functions of the washer during operation and identify any abnormalities as they arise. These abnormalities can be monitored in the Service Mode and the board will list previously identified failures as either a Help or a Diagnostic code.

The Help codes are generally logged when the severity level of the abnormality is not sufficient enough to shut down the washer or require service.

The Diagnostic codes are generally logged identified when the severity level of the abnormality detected is higher and service may be required.

NOTE: Due to the various differences in the two washer control systems, the following pages will focus first on the LED washer then the LCD washer.

The Help and Diagnostic code lists are stored in separate permanent memories with a maximum of nine codes per list.

LED WASHER:

Accessing Service Mode:

Pressing down the **delicates** and **heavy soil** keys for 3 seconds places the machine in the service mode.

SPECIAL TESTS

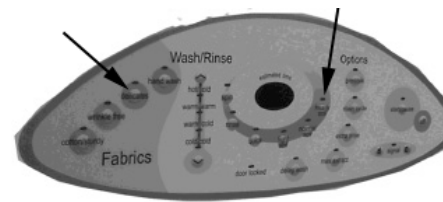
The following table lists the various tests available while in the Service Mode, which can be accessed by pressing the following keys:

SERVICE MODE TABLE LED Washer:

Press Keys	Special Test/Function
Normal	Shows Motor Torque
Wrinkle Free	Membrane Pad Check
Quick	Fast Time Down Test
Spin	Quick Spin Test
Light Soil	Displays Software Revision Number
Delicates	Quick Service Cycle
Rinse	Board Output Test
Stain Cycle	Help Codes
Presoak	Diagnostic Codes
Hand Wash	Board Input Tests

Membrane Pad Check

While in service mode, pressing the **wrinkle free** key will start a membrane pad switch check.



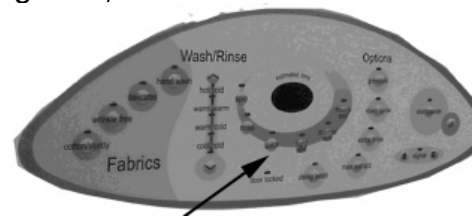
The membrane check involves turning all the embedded LED on the membrane pad off except for the wrinkle free key. All the LED's can be toggled by pressing the key associated with the LED.

At any point, if there are 5 seconds of inactivity, then this test will exit without any display.

The off key must be pressed twice within 30 seconds in order to cancel this test.

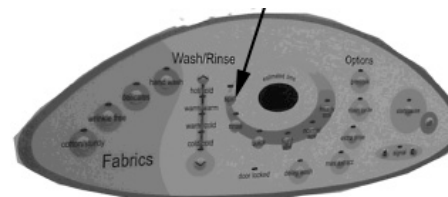
FAST TIME DOWN TEST

While in service mode, the pressing of **quick** key will advance the program to the next portion of the wash cycle. (Refer to page 1-2)



QUICK SPIN TEST

While in service mode, the pressing of **spin** key shall start the washer in the **quick spin mode**.



The following Quick Spin test steps are as follows:

- 1) Lock the door.
- 2) Spin to 350 rpm and hold for 6 seconds.
- 3) Spin to 550 rpm and hold for 6 seconds.
- 4) Spin to 600 rpm and hold for 6 seconds.
- 5) Spin to 650 rpm and hold for 6 seconds.
- 6) Spin to 800 rpm and hold for 6 seconds.
- 7) Spin to 1000 rpm and hold for 6 seconds.

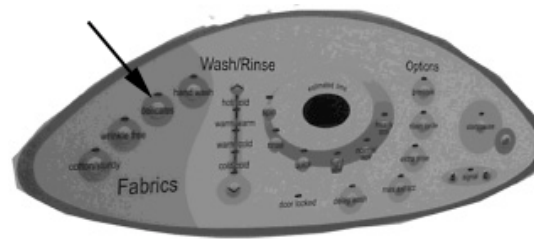
If the **Spin** key is pressed again during the Quick Spin test, the current speed will be held indefinitely. Pressing the Spin key again will allow the quick test to proceed as listed above.

When the washer is in the spin cycle during the Service Mode, the speed will be displayed as follows.

Speed Range	Displayed
a) 0-99 rpm	0-99 (actual)
b) 100-999 rpm	Speed / 10
c) 1000 + rpm	<p style="text-align: center;">1st digit</p> <p>A ≥ 1000 or < 1000 RPM</p> <p>B ≥ 1100 or < 1200 RPM</p> <p>C ≥ 1200 or < 1300 RPM</p> <p style="text-align: center;">2nd digit - tens</p> <p>Example: A2 = 1020 RPM</p> <p style="padding-left: 100px;">B6 1160 RPM</p>

QUICK SERVICE CYCLE

Pressing the **delicates** key will start a **quick service cycle**. This will be a quick check of all systems.



The following steps will be followed.

1. Energize the cold and bleach. Fill to Low level, then turn bleach and cold off.
2. Energize the hot and fabric softener. Fill to high level, then turn all valves off.
3. Tumble using 7/3 tumble pattern for 12 sec.
4. Lock the door.
5. Turn the drain on.
6. Spin to 800 RPM using default rates.
7. End spin and Coast down.
8. Unlock the door when the RPM is zero.
9. Display a 'PA' on continuously for 10 seconds if no diagnostic codes were logged during this test.

The up arrow if pressed will advance to the next step. The right most dot should be turned on as an indication of failure and stay on until quick service cycle test has reached the end. Any diagnostic code logged during this test should result in failure of the test, but should not necessarily stop the test.

If any steps in the quick service cycle fail, then a service mode is entered, and the first diagnostic code that was logged would be displayed.

While in quick service cycle, the pressing of the **hand wash** will suspend the machine at this step until the Hand Wash key is pressed again up to 30 minutes. All

LED's will flash on and off while the cycle is paused.

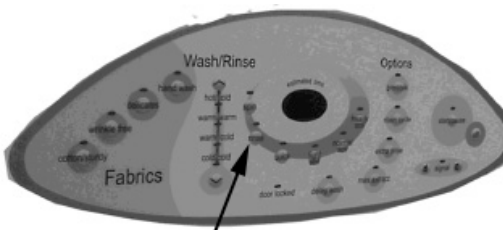
BOARD INPUT TEST

While in service mode press the hand wash key places the washer into the Board Input Test.

Key Pressed:	Function:	Feedback:
Cotton/Sturdy	Door Position	"d0" Open "d1" Closed
Delicates	Latch Position	"L0" Unlocked "L1" Locked
Wrinkle Free	High Water Level	"~0" Below Level "~1" Above Level
Hand Wash	Low Water Level	"_0" Below Level "_1" Above Level
Temp Down	Unbalance Circuit	"u0" Balanced "u1" Unbalanced
Temp Up	Water Temperature	Degrees * F.
Spin	Vibration Signal	0-255 *
Rinse	Brown Out Level	0-225 *
Quick	Accelerometer circuit	PA = Passes FA = Fails
*Two digit display =0-99; max extract LED=100; Max extract LED and extra rinse LED=200.		

BOARD OUTPUT TEST

While in service mode, pressing the *rinse* key places the washer into the Board Output test. This test will turn on a specified output after a key press. All output will be turned off after 10 minutes. or if another output is selected.



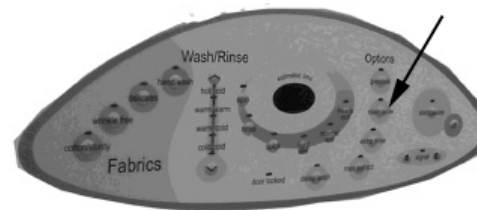
Key Pressed:	Function Performed
Cotton/sturdy	Hot Water Valve
Wrinkle Free	Cold Water Valve
Delicates	Bleach Valve
Hand Wash	Fabric Softener Valve
Presoaks	Drain Pump
Stain Cycle	Motor Control
Extra Rinse	Unlock Door (Sends a pulse every 2 seconds)
Max Extract	Lock Door (Sends a pulse every 2 seconds)

HELP CODES

When the washer performs differently from design, a Help code is identified and assigned. The severity level is generally less than that of a diagnostic code.

Accessing The Help Codes

Place the washer into the service mode, then press the *stain cycle* key. A 'h' will display and turn the LED on above the Stain Cycle key.



The Help codes can be reviewed by using the arrow keys. The up/down arrow will go track up/down the list one code at a time. The first code to display will be the latest code generated. The oldest code will be on the bottom of the list. If there are no help codes available, '- -' will be displayed. If the code happened on the previous cycle, then the rightmost dot will be turned on.

Number of Cycles Since Code Assigned

While this help code is displayed, if the **extra rinse** key is pressed and held, the machine shall display the number of cycles ago the Help code occurred while the key is held. Also, while this key is being held, the LED will be turned on by the key. When this key is let up, then the help code is again displayed. If there are no help codes available, '- -' will be displayed while this key is pressed. If the code is over 99 cycles ago, then '- -' will be displayed.

Clearing the Help Codes

The list of Help Codes can be cleared from the memory of the board, by pressing **heavy soil** and **stain** keys for 3 seconds while viewing the list.

For a listing of available Help codes, see **Section 5: DIAGNOSTIC/HELP CODE TABLES**.

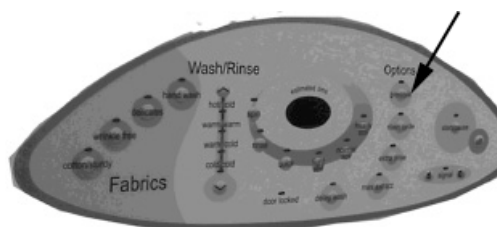
DIAGNOSTIC CODES:

When a problem with the wash system is detected a diagnostic code is assigned and logged into the control board memory with the last cycle count at which it occurred. Diagnostic codes are generally more severe than a Help code.

In some cases, when the washer shuts down, something shall be displayed on the display until the consumer presses a key or opens the door. See the table for specific actions or references to where the proper action is defined.

Accessing Diagnostic Codes

After the machine is in the service mode, pressing **presoak** key will display a 'd' and turn the LED on above the presoak key. The diagnostic codes can be viewed by using the arrow keys. The down arrow will go down the list.



The first time the down arrow key is pushed, the newest code is displayed. The up arrow will go up the list one code each time it is pushed with no wrap. The topmost will be a 'd'. The bottommost will be the oldest code. If there is no diagnostic codes available, '- -' will be displayed for the diagnostic code. If the code happened on the previous cycle, then the rightmost dot should be turned on.

Number of Cycles Since Code Assigned

While this diagnostic code is displayed, if the **cotton/sturdy** key is pressed and held, the machine shall display the number of cycles ago the diagnostic code occurred while the key is held. Also, while this key is being held, the LED should be turned on by the key. When this key is let up, then the diagnostic code is again displayed. If there is no diagnostic codes available, '- -' will be displayed while this key is pressed. If the code is over 99 cycles ago, then '- -' will be displayed.

Clearing Diagnostic Code List

The diagnostic code list can be cleared from memory, by pressing **heavy soil** and **presoak** keys for 3 seconds while viewing the list.

ACCESSING SERVICE MODE

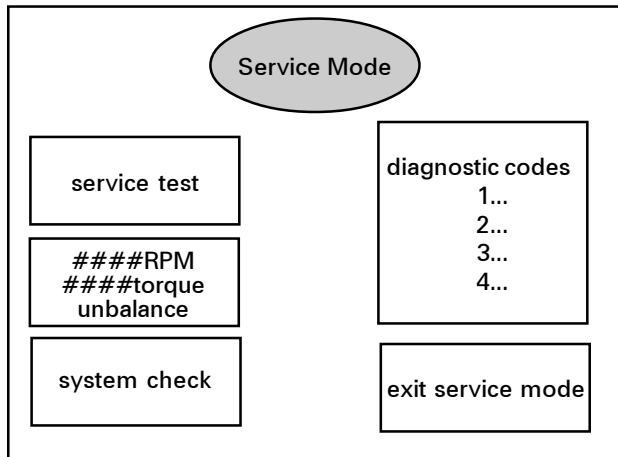
LCD WASHER:

Press and hold the **back** and **help** keys for 5 seconds to enter the Service Mode.



Pressing the Service Mode keys again, will take the machine out of the Service Mode.

The following screen will appear on the touch screen.

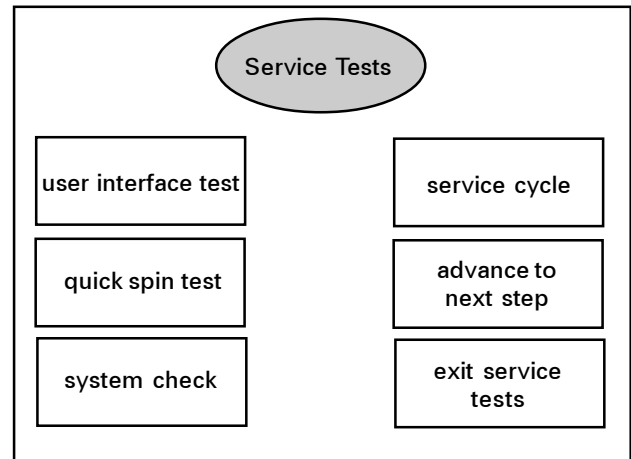


The Service Mode screen lists four different touch panels; service tests, RPM/torque, unbalance diagnostic codes and exit service mode. Pressing any of the touch screens will activate a different screen dedicated to that function, except RPM/torque.

If the washer is in operation when the service mode is activated, the current spinner RPM, torque and unbalance will be listed.

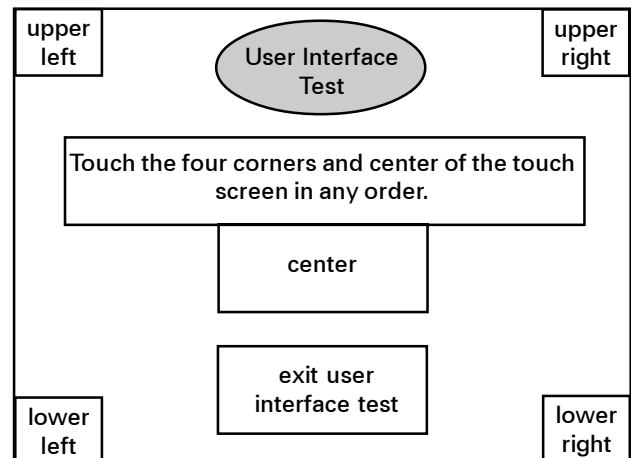
The diagnostic codes listed are the last four codes assigned by the washer.

Service Tests



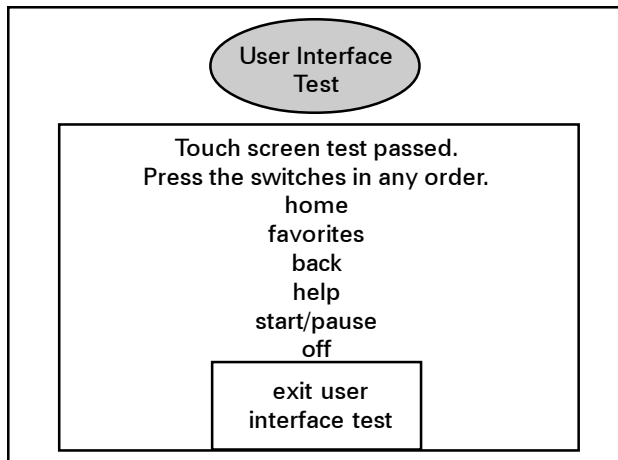
The service tests are identical to the LED washer, except instead of pressing LED keys, the technician can touch any of the screens on the washer control panel to initiate.

User Interface Tests



This will check the touch screen. The service technician is prompted to "Touch the four corners and center of the touch screen in any order." When each area is pressed, the button display will reverse image. If all areas are sensed, the control will display "Touch screen test passed." If any area(s) is not sensed within 10 seconds, the technician will be prompted to "Touch the area(s) not highlighted." If the area can still not be sensed within 10 seconds, the control will display "Touch

screen test failed." In either case the screen will step to the next screen to check the membrane switches.



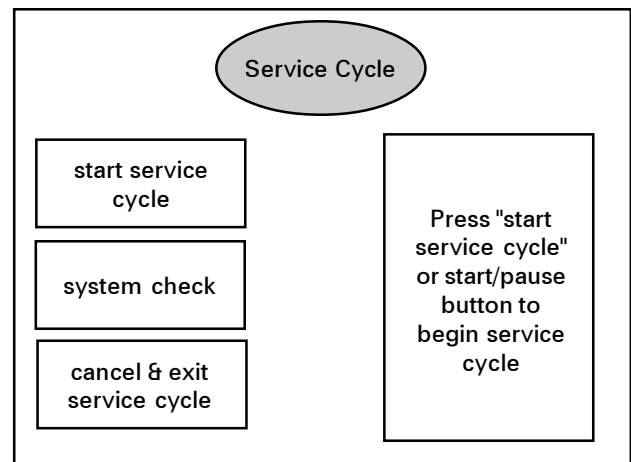
This test checks the membrane switches on the console pad.

The screen displays the status of the touch screen test that was just performed. The technician is then prompted to "Press the 5 keypads in any order." When each key is pressed, it will display in reverse image and remain that way. If all keys are sensed, the control will display "Membrane switch test passed." If any key(s) is not sensed within 10 seconds, the technician will be prompted to "Touch the key(s) that are not highlighted." If key(s) again are not sensed within 10 seconds, the control will display which key(s) failed.

The last step of the user interface test is to display the entire screen in reverse image for 2 seconds and then resume normal display mode. This is done as soon as the membrane switch test is complete. This is a visual test only.

Service Cycle

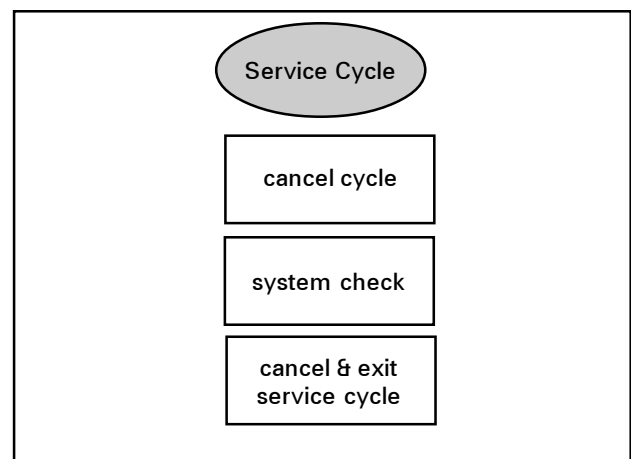
The service cycle can be run during a wash/spin cycle or can be used to initiate a particular cycle in the washer. To access this, select **service cycle** in the Service Mode.



To start a wash cycle in the Service Cycle: If the washer is not operating in a wash cycle, touch the icon **start service cycle** or **start/pause** key to begin the service cycle.

During a cycle:

While the washer is running, and service cycle is selected, the following screen will display and you can perform system checks of the various inputs and outputs of the washer by selecting **system check**. (See System Check)

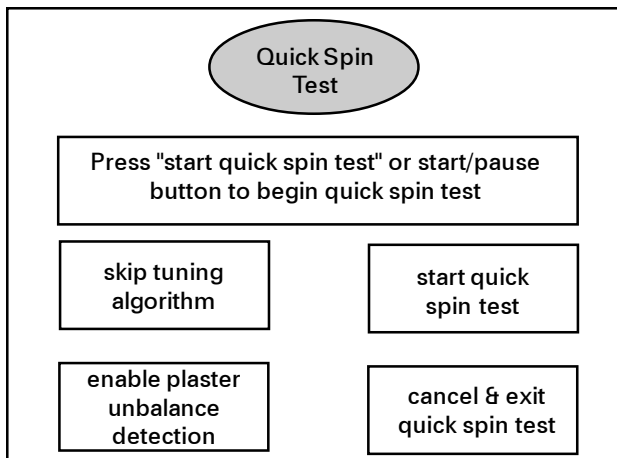


The service cycle will advance the washer through various parts of the wash cycle and will display the following on the control panel.

- "Cold water fill"
- During the second step of the test, the technician will be prompted to "Open and close the door and then restart by pressing start/pause".
- "Locking the door", "Cold water and bleach fill" and "Warm water and bleach fill"
- "Tumble"
- "Hot water fill"
- "Hot water and fabric softener fill" and "Warm water and fabric softener fill"
- "Static drain"
- "Spin"
- "Coast down and unlock at 0 RPM"
- "Service cycle complete"

Advance to next step: When this icon is selected during the cycle, it will advance to the next step in the service cycle.

Note: This selection is valid only if a cycle is running.



Select **start quick spin test** or **start/pause** key to begin **quick spin test**.

The default is that the tuning algorithm will apply, but it can be skipped. Plaster detection will default to disabled, but can be enabled.

The following will be displayed during the quick spin test:

- "Locking the door"
- "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"

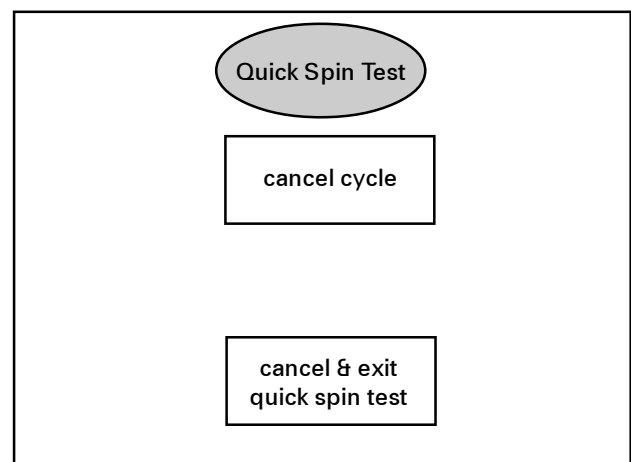
Any of the steps in this test can be held or paused up to 30 minutes, by touching the **start/pause key**.

Skip tuning algorithm: When selected, the tuning algorithm will be skipped. This must be selected before tuning.

Enable plaster unbalance detection: When selected, plaster unbalance detection will be enabled. This must be selected before spin starts.

Cancel & exit quick spin test: this returns you to the service tests screen.

If the washer is already running and the quick spin test is selected on the service test screen, the above screen will be displayed.



SYSTEM CHECK

System checks can be run when the washer is running a wash cycle or not. If the washer is not in a wash cycle, the following screen will display and allow the technician to toggle various components On/Off.

At the same time, the screen will display the current status of the component inputs to the control board.

If the washer is already running a cycle and the system check is activated, then the screen will display the status of all the outputs and inputs to the control board.

To toggle outputs, press PAUSE and select output below	
Output Status hot water on cold water on bleach valve on fabric softener on drain on motor control on heat on	Input Status door closed door locked unbalance detected wash level (low) speed rinse level (high) sensed fill temperature sump temperature ambient temperature RPM
cancel cycle	exit system check

Cancel & exit quick spin test: this returns you to the service tests screen.

Cancel cycle: This will stop the current cycle.

Exit system check: This will exit the system check screen and revert back to the previous screen shown on the display panel.

DIAGNOSTIC/HELP CODES

software version XXXX	Diagnostic/Help Codes	cycle count XXXX
diagnostic codes: 1... 2... 3... 4... 5... 6... 7... 8... 9...	help codes: 1... 2... 3... 4... 5... 6... 7... 8... 9...	
clear diagnostic codes	exit diagnostic/help codes	clear help codes

Diagnostic codes: Display all diagnostic codes.

Help codes: Display all help codes.

Software version: Display current software version.

Cycle count: Display the cycle count
exit diagnostic/help codes: Return to previous screen.

Clear diagnostic codes: Clear the entire list of diagnostic codes.

Clear help codes: Clear the entire list of help codes.

Software version: Display current software version

For a listing of available diagnostic and help codes, see **Section 5: DIAGNOSTIC/HELP CODE TABLES**.

Section 3: DIAGNOSTIC/HELP CODE TABLES.

HELP CODES LISTING:

Help Code	Description	Trigger	Action to be Taken
01	Plaster Unbalance Load Detected.	Unbalance load condition existed during initial ramp up or spin cycle. Resulted in redistribution cycle.	Informative only; non-critical condition
02	Reset Seen	Electrical noise detected by machine control board.	Identify where specifically in the cycle this occurred, to aid in identifying which components may have been initially actuated. Check for loose connections of these components and correct if necessary. If random, suspect incoming power supply to washer.
03-06	(Not Used)		
07	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.
08	One locked rotor	During startup, the Spinner did not reach 10 rpm within 2 sec. (During Wash/Tumble)	Informative only; non-critical condition.
09	Fill hoses are reversed	Water valve thermistor readings are contrary to what is being demanded by washer control board.	Informative only; (LED washer only)
10	Locked rotor condition during a spin	Locked rotor condition during a spin.	Informative only; non-critical condition.
11	(Not used)		
12	(Not used)		
13	Low Speed Unbalance Detected.	Opening of unbalance switches at speed <500 rpm	Informative only; not-critical condition.
14	(Not used)		
15	(Not Used)		

Help Code	Description	Trigger	Action to be Taken
16	Spin suds lock	Suds lock, full on for 1 second within a spin at less than 500 rpm during a 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	(Not used)		
18	(Not used)		
19	Power down	Loss of power	LED washer will also display "PF"
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 450-850 rpm	Motor on at full power for 30 seconds between 450-850 rpm	Informative Only
24-29	(Not used)		
30-32	(Not used)		
33	Excessive Subs Detected During wash/tumble	Control board detects motor torque fluctuations dropping in torque readings	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 450 rpm	Perform Diagnostic Motor/Motor Control Board test. Check wire harness connections at motor, motor control board (JP4 connector) and machine control board connection
35	Too much power during wash/tumble	Maximum torque requested in wash/tumble	Perform Diagnostic Motor/Motor Control Board test. Check wire harness connections at motor, motor control board (JP4 connector) and machine control board connections
36	Motor still running after 120 seconds of coast down after a spin	Motor still running after 120 seconds of coast down after a spin	Informative only
37	Motor running too fast during tumble for too long	1 minute after start of tumble, if speed is > 85 rpm.	Informative only

Help Code	Description	Trigger	Action to be Taken
38-39	(Not Used)		
40	Motor running and the Door is not locked	Motor running and the door is not locked	Perform Diagnostic Motor/Motor Control Board test. Check wire harness connections at motor, motor control board (JP4 connector)
41	No 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 (LCD Only)
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 (LCD Only)
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 (LCD Only)
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 powerup and unlocks retries	Informative only; Refer to Diagnostic code 62 (LCD Only)
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
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	Check for loose wire connections and for bad door lock sense switch

DIAGNOSTIC CODES LISTING:

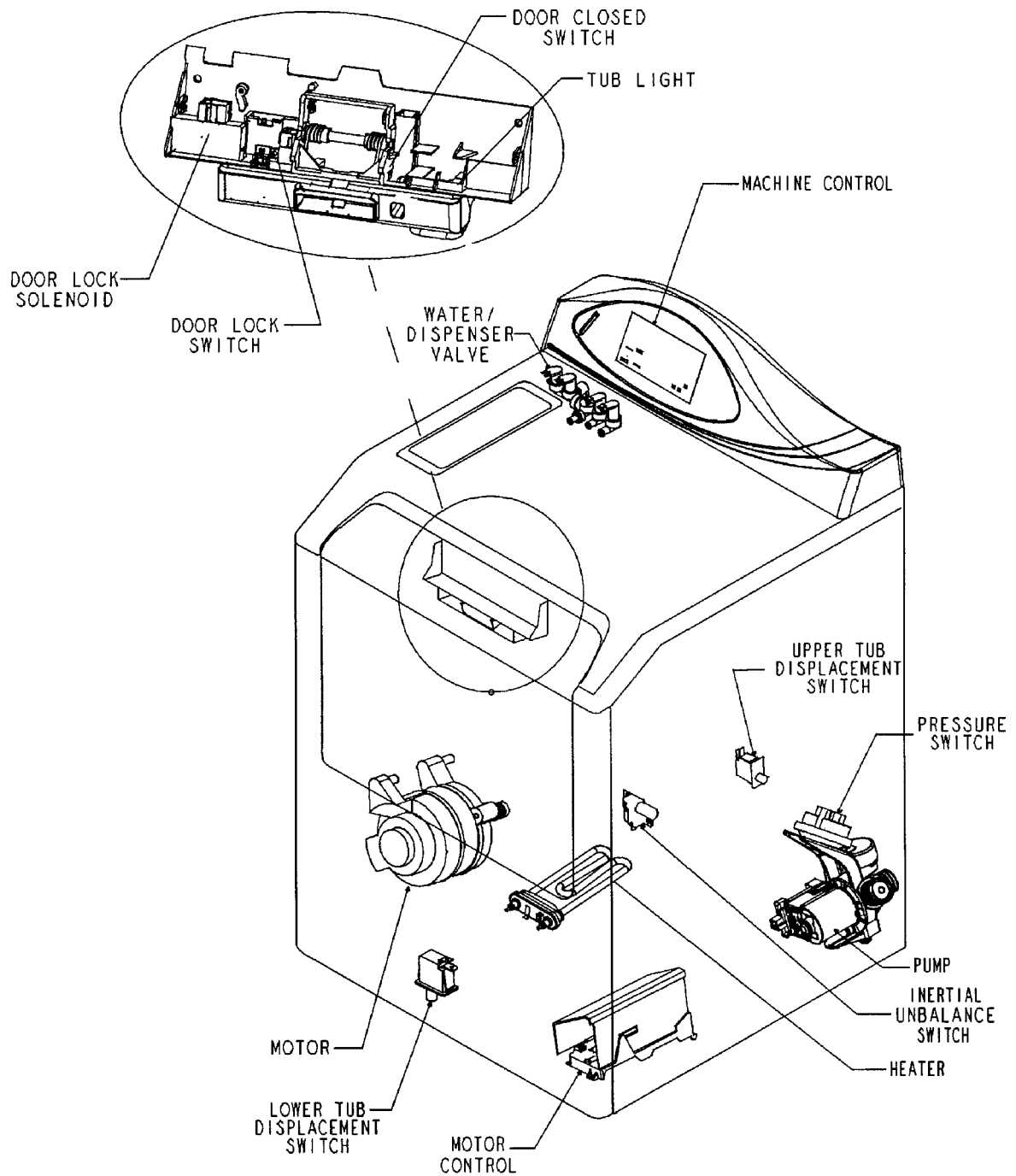
Diag. Code	Description	Trigger	Action to be Taken
01	No drain	The water level fails to drop below the low water level in final spin	LED - Will display "nd" LCD - Display washer will not drain Check for: •Restricted drain system •Kinked/plugged drain hose or pump •Faulty pump •Loose wire connections •Bad control board
02	The door fails to unlock	Door failed to unlock after 11 attempts	LED - Will display "LO" LCD - Display washer will not unlock Check for: •Faulty door lock solenoid •Loose wire connections •Faulty door lock switch •Faulty door lock sense switch •Bad control board
03	No fill	Continuous fill of 12 minutes.	LED - Will display "nF" LCD - Display washer will not fill Check for: •Clogged inlet screens •Water Available •Loose wire connections •Pressure switch contacts •Bad control board
04	The door fails to lock	Door failed to lock after 11 attempts	LED - Will display "FL" LCD - Display washer will not lock Check for: •Faulty door lock solenoid •Loose wire connections •Faulty door lock switch •Faulty door lock sense switch •Bad control board
05	Continuous unbalanced circuit	See section for unbalanced loads. (During spin only)	Check for: •Faulty unbalance switches •Loose wire connections •Bad control board
06	Locked rotor	Locked rotor is still locked after 10 consecutive retry attempts	LED - Will display "Lr" LCD - Display motor is not working Check for: •Perform Diagnostic motor/motor control test •Loose wire connections •Blinded spinner shaft bearings
07	Heater is not heating	Heater has been on for 10 min and water temperature has not increased	Check for: (LCD only) •Loosed wire connections to heater and thermistor •Faulty thermistor •Faulty heater •Perform System Check (page 14)

Diag. Code	Description	Trigger	Action to be Taken
08	Water sensor level fault	The low water level are not satisfied before the high water level contacts are made in the pressure switch	Check for: <ul style="list-style-type: none"> •Perform special tests (LED) or system checks (LCD) •Loose wire connections •Faulty pressure switch
09	(Not Used)		
10	Low rpm unbalanced load	Never reached 400 rpm due to an unbalanced load	Check for: <ul style="list-style-type: none"> •Loose wire connections •Faulty unbalance switches •Unlevel washer; leveling legs not locked •Weak floor
11	Non-volatile memory error	Difficulty in reading memory	<ol style="list-style-type: none"> 1. Clear diagnostic codes 2. Unplug and replug in power cord washer at power supply outlet 3. If a condition still exists, replace machine control board.
12-14	(Not Used)		
15	Stuck key	A key is sensed to be pressed more than 75 seconds, the key shall be assumed to be stuck	<ol style="list-style-type: none"> 1. Perform membrane pad check 2. Replace console w/membrane pad assembly if necessary
16	High speed not achieved due to high motor torque	Speed never went over 400 rpm during a main wash cycle because the max torque was seen for too long	Check for: <ul style="list-style-type: none"> • Excessive suds • Faulty pump • Tight bearings on spinner shaft • Tight bearings on motor shaft • Bad motor or machine control board
17	Door switch was not seen open since the last final spin	The door has not been opened after a complete wash cycle. Door switch was not seen open since the last final spin	<p>LED - Will display "od"</p> <p>LCD - Indicate door was not seen open between wash loads</p> <p>Check for:</p> <ul style="list-style-type: none"> • Faulty door switch (welded contacts) •Customer may have tried to repeat wash cycle without opening door
18	Door lock switch seen open during cycle	Door lock switch is read as open with motor running	<ul style="list-style-type: none"> • Check for loose wire connections • Clear the diagnostic code and recheck; if re-occures, perform diagnostic motor/motor control board test •Check for faulty motor relay on the machine control board

Diag.- Code	Description	Trigger	Action to be Taken
19	Door lock sense or motor control relay failed	Door lock sense switch on machine control board is read as open with motor running	(LED Washer only) See list for diagnostic code 18
20	Door switch input seen open during cycle	Door switch is open	(LED Washer only) <ul style="list-style-type: none"> • Loose wire connections • Faulty door switch • Customer tried to forcibly open door while locked
21	Door sense switch failed on machine control board	Door sense switch is read as open and the door locked switch is read as locked	See diagnostic code 20 or 22
22	Door switch seen open during cycle	Door switch is read as open and the door locked switch is read as locked	<ul style="list-style-type: none"> • Clear the diagnostic code and recheck; if reoccurs, perform diagnostic motor/motor control board test • Check for faulty motor relay on the machine control board • Loose wire connections • Faulty door switch
23	Door failed to unlock	Door lock is locked and a user tries to start a cycle	<ul style="list-style-type: none"> • Faulty door lock sense switch • Faulty door lock solenoid
24	Motor over speed	Motor tach signal is seen at maximum speed	1. Replace motor control board
25	Motor tach signal exists without motor running	Tach signal exists without torque commanded. (Abnormal condition only)	1. Replace motor control board
26	(Not Used)		
28	Valve thermistor failure	Abnormal high/low temperature or ohm resistance seen	<ul style="list-style-type: none"> • Loose or pinched wires • Bad water valve
29	Sump thermistor failure	Abnormal high/low temperature or ohm resistance seen	<ul style="list-style-type: none"> • Loose or pinched wires • Bad water valve (LCD Only)
61	Door lock switch sensed locked during cycle when not expected	Door became locked during 30 second unlocked period at beginning of cycle	<ul style="list-style-type: none"> • Faulty door lock sense switch • Faulty door lock solenoid (LCD Only)
62	Conditions for unlock not met during cycle	(See Help Codes 41, 42, 43)	<ul style="list-style-type: none"> • Faulty door lock solenoid • Loose wire connections • Faulty door lock switch • Faulty door lock sense switch • Check for bad motor control board (LCD Only)

GENERAL COMPONENT - EXPLODED VIEW

Component Identification & Location:



Glossary of Terms

Add Fill – This is the additional filling of the water after the first initial fill to bring the water level back up to the appropriate level after the clothes have absorbed the water.

Bleach water valve – This is the coil and valve assembly that allows water to enter the bleach dispenser when this coil is energized. In order for water to flow, this coil needs to be energized in conjunction with a fill water valve.

Cold water valve – This is the coil and valve assembly that allows cold water to enter the machine when this coil is energized.

Diagnostic code – A problem with a system that is severe enough that the cycle was stopped and it is recommended the machine be serviced.

Distribution – A special acceleration profile used between the spinner speeds of 50 rpm and 85 rpm which is designed to evenly distribute the clothes load.

Help code – A system responded differently than expected, but in most cases did not cause the cycle to stop.

Hot water valve – This is the coil and valve assembly that allows hot water to enter the machine when this coil is energized.

Intermediate Rinse – This is a rinse that falls between the first rinse and the final rinse.

Fill water valve – This is a Cold water valve or a Hot water valve.

Final Rinse – This is the last rinse of the cycle just preceding the final spin portion of the cycle.

First Rinse – This is the first rinse following the main wash portion of the cycle.

Key – Any Membrane switch or touchscreen keypad.

Key press – Any membrane switch key press or touchscreen press.

Non-tempered cold – This will only have the cold water valve energized.

Non-tempered warm – This will have both the cold water valve and the hot water valve energized.

Non-tempered hot – This will only have the hot water valve energized.

Plaster – This is the point at which the centrifugal force of the spinning action is greater than the force of gravity so that the clothes no longer tumble, but are kept plastered against the spinner.

User activity – Any key press or door opening or closing.

Redistribution – As the machine is accelerating into spin, if it detects that the clothes load is unbalanced and would cause excessive vibration, it will decelerate and tumble the clothes in an attempt to redistribute them in a more uniform manner so that vibration is reduced.

Softener water valve – This is the coil and valve assembly that allows water to enter the fabric softener dispenser when this coil is energized. In order for water to flow, this coil needs to be energized in conjunction with a fill water valve.

Spin – This is the process of rotating the clothes at a high speed so that the centrifugal force extracts the water from the clothes so that it can be drained from the machine.

Spin Speed – This is the speed of the washer spinner during extraction.

Spinner – This is the wash basket that holds the clothes and is turned by the motor.

Static Drain – This is a drain with no tumble action.

Tempered – This refers to fills which cycle the cold or hot water valve to achieve a desired final temperature.

Tumble – This is the process of rotating the clothes in one direction for a time, pausing for a period and then reversing direction and repeating this action. The speed of the spinner is slow enough so that the clothes are being tumbled (i.e. lifted out of and dropped back into the water/detergent solution).

Tumble Flush – This is a tumble at a higher tumble speed than normal while the machine is filled with water. The purpose of this function is to clean the machine, mix detergent and during the final rinse to reduce chance of suds creation.

Tumble Speed – This is the speed of the washer spinner.

Tumble drain – When the drain pump is on while the machine is tumbling at the specified tumble pattern for the cycle.

Wrinkle Free – This is both a type of fabric selection (such as with cotton/sturdy, Delicates, and Hand Wash) and a spin speed setting.

SECTION 4. ELECTRICAL COMPONENTS & TESTING

ELECTRICAL TESTS



Warning - Always shut off electrical power to the washer before beginning any service repair procedures.

Grounded Components

When performing service diagnostics, replacements and repairs, always check to determine whether all ground wires linking panel and components are reattached if removed.

Water Valve Test

The water valve test is similar to the test outlined in the 16008373 manual, except, to check the ohm resistance of thermistor, pull the P3 wire harness connector off the machine control and locate the P3(6) and P3(7) leads in the connector on the machine control board. Note the thermistor has been relocated on the valve to the outlet of the valve. (*See Figure 4-1*)

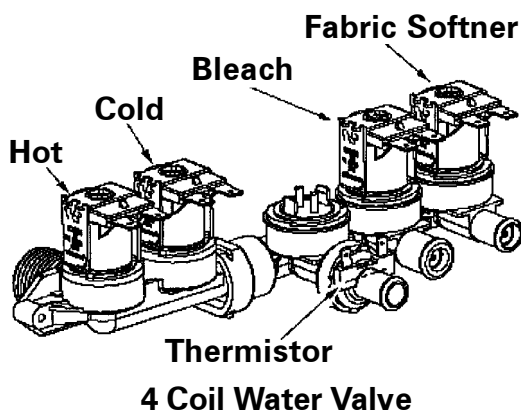


Figure 4-1

The thermistor is on NTC and will drop in resistance when the temperature increases.

Door Lock Test

The door lock can be verified by the following procedure.

LED Model

1. Place the washer into Service Mode. (See Section 2; Accessing Service Mode)
2. Advance to the Board Output Test and press Max Extract to Lock the door and Extra Rinse to Unlock the door.

LCD Model

1. Place the washer into Service Mode. (See Section 2; Accessing Service Mode)
2. Select Service Tests, then Quick Spin Tests to actuate the door lock mechanism. Hit Cancel to unlock the door.

Note: The relay on the control board for the door lock mechanism is disabled if the motor control board indicates the spinner speed is > 7 RPM.

For more information related to door lock mechanism, please refer to **Section 2: Miscellaneous; Door Lock Philosophy.**

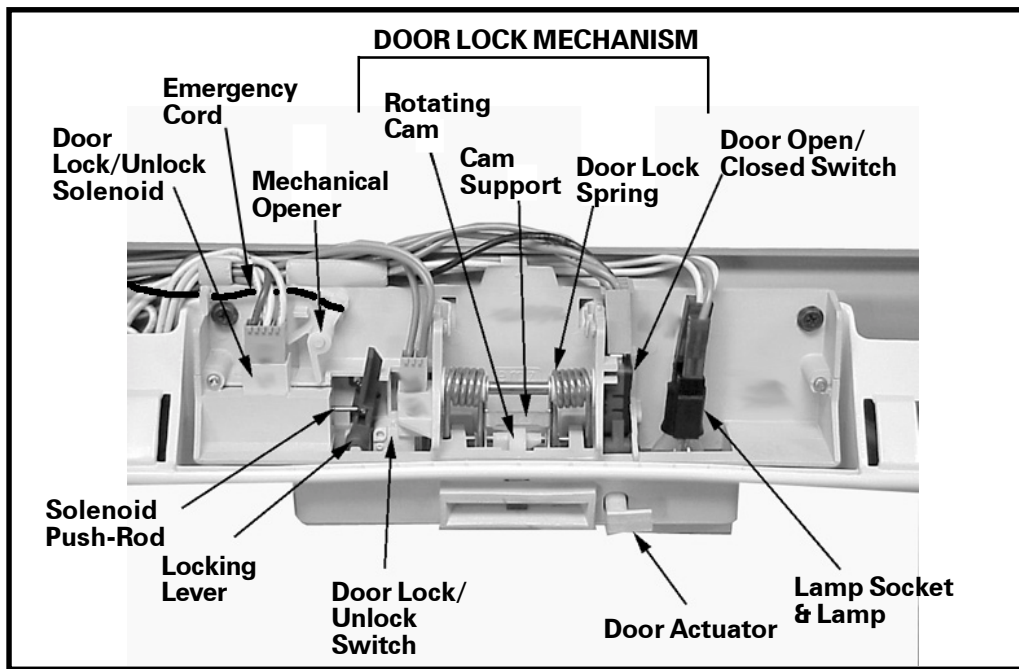


Figure 4-2

Machine Control

The machine control microprocessor board is located in the control console, mounted to the plastic console. The board receives input from the membrane pad/touch screen, door lock switches, and the unbalance switches. The control also communicates with the motor control board to facilitate the various cycles and drive the motor for optimum performance. This is done by monitoring torque and speed of the motor through the motor control board.

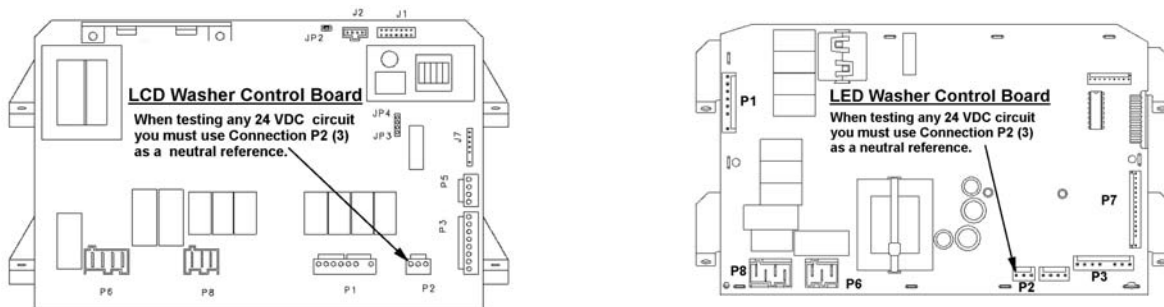


Figure 4-3

Both incoming and exiting voltage is monitored through the machine control board and the surrounding circuitry. The following table lists the voltages for the various terminals on the microprocessor board. If proper voltage is not present, check switches and wiring for possible loose connections or open circuits by disconnecting the power supply and performing continuity checks of individual circuits. NOTE: Connector P8(2) (White wire) is Neutral input and L1 input is the connector P6(2) (Black wire), L1 output is connector P6(3) (Black wire).

The machine control board outputs can be verified by placing the washer into the Service Mode and performing a Board Output Test. (**See Section 2; Service Mode; Board Output Test.**)

INPUT/OUTPUT VOLTAGES (LCD Washer)

Description	Connector/ Pin Number	Connector/ Pin Number	Voltage	Comments
Bleach water valve output	P1(5)	P8(2)	120 VAC	
Chassis Ground	P3(1)		Ground	
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	P2(3)	P3(8)	24 VDC	
Door switch input	P8(1)	P8(2)	120 VAC	
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	MAH7500 Only (~14 ohms)
High water level - input	P1(8)	P8(2)	120 VAC	
Hot water valve output	P1(3)	P8(2)	120 VAC	500 - 1K ohms
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	P2(3)	P3(5)	24 VDC	
Motor control tach	P2(1)	P2(3)	24 VDC	
Neutral (120 VAC)	P8(2)		Neutral	
Unbalance input	P2(3)	P3(4)	24 VDC	
Softener water valve	P1(6)	P8(2)	120 VAC	
Sump thermistor	P5(3)	P5(4)	VDC	NTC device (see thermistor temperature chart - page 4-8 LCD model only (3K-18K ohms)
Torque PWM	P2(2)	P2(3)	24 VDC	
Water valve thermistor	P3(6)	P3(7)	5 VDC	10K-85K ohms)

INPUT/OUTPUT VOLTAGES (LED Washer)

Description	Connector/ Pin Number	Connector/ Pin Number	Voltage	Comments
Bleach water valve output	P1(5)	P8(2)	120 VAC	
Chassis Ground	P3(1)		Ground	
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	P2(3)	P3(8)	24 VDC	
Door switch input	P8(1)	P8(2)	120 VAC	
Door unlock output	P8(2)	P8(2)	120 VAC	60 millisecond pulse
Drain pump output	P8(4)	P8(2)	120 VAC	
(Open)	P6(2)	P8(1)		
High water level - input	P1(8)	P8(2)	120 VAC	
Hot water valve output	P1(3)	P8(2)	120 VAC	500 - 1K ohms
L1- machine control board	P6(1)	P8(2)	120 VAC	
L1- motor control	P8(3)	P8(2)	120 VAC	
Lower water level - input	P2(3)	P3(5)	24 VDC	
Motor control tach	P2(1)	P2(3)	24 VDC	
Neutral (120 VAC)	P6(3)		Neutral	
Unbalance input	P2(3)	P3(4)	24 VDC	
Softener water valve	P1(6)	P8(2)	120 VAC	
Torque PWM	P2(2)	P2(3)	24 VDC	
Water valve thermistor	P3(6)	P3(7)	5 VDC	(10K-85K ohms)

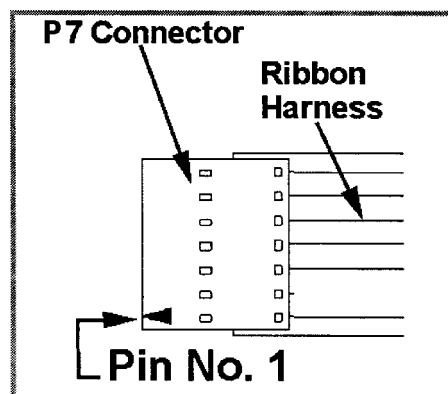
Membrane Pad Checks

On the MAH5500B washer you can perform the Membrane Pad Check with the control console. (See Section 2; Accessing Service Mode; Membrane Pad Check)

On both washers, you can check the membrane pads, by pulling the P7 connector from the machine control board and locating the corresponding switch pin numbers in the ribbon harness.

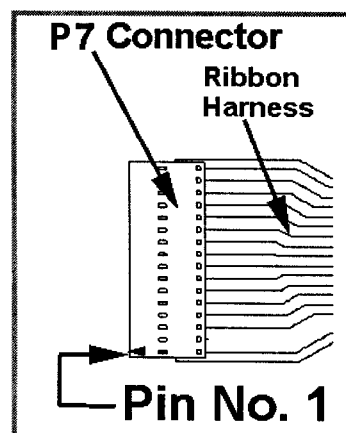
LCD Washer

Membrane Pad	Pin Number	Pin Number
Home	P7(3)	P7(5)
Favorites	P7(4)	P7(5)
Back	P7(3)	P7(6)
Start/Pause	P7(3)	P7(7)
Off	P7(4)	P7(7)
Help	P7(4)	P7(6)



LED Washer

Membrane Pad	Pin Number	Pin Number
Cotton/Sturdy	P7(4)	P7(10)
Wrinkle free	P7(5)	P7(10)
Delicates	P7(6)	P7(10)
Hand wash	P7(6)	P7(11)
Wash/rinse +	P7(4)	P7(12)
Wash/rinse -	P7(5)	P7(11)
Spin	P7(5)	P7(12)
Rinse	P7(6)	P7(12)
Quick	P7(4)	P7(11)
Light soil	P7(4)	P7(13)
Normal soil	P7(6)	P7(13)
Delay wash	P7(5)	P7(13)
Heavy soil	P7(6)	P7(14)
Presoak	P7(5)	P7(6)
Stain Cycle	P7(6)	P7(14)
Extra Rinse	P7(5)	P7(15)
Max extract	P7(6)	P7(15)
Start/pause	P7(4)	P7(16)
Off	P7(5)	P7(16)
Signal -	P7(6)	P7(15)
Signal +	P7(6)	P7(16)



DRIVE MOTOR

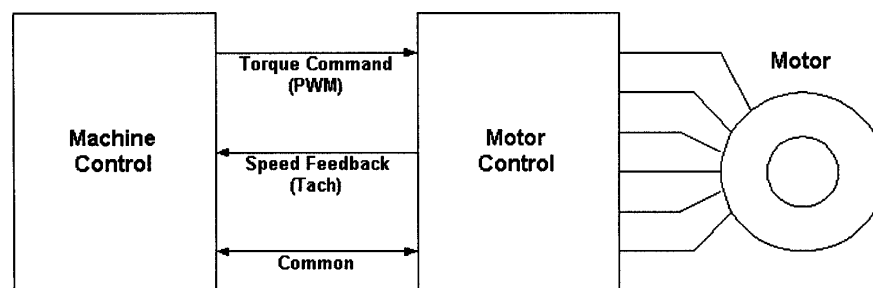
The drive motor is still a switched reluctance type motor. ***(For more information, please refer to manual 16008373, Section 4; Drive Motor.)***

The new motor is a sensorless motor drive system. The word "sensorless" indicates that motor direction and speed detection are performed electrically without the aid of the sending device. Meaning, the sensor was eliminated from the end of the motor along with the wire harness leading to the RPT connection on the motor control board.

MOTOR CONTROL BOARD

The motor control is able to determine the motor's position by monitoring the active phases in the motor. This is done by sending pulse signals to the motor and then timing the echo signal. By doing this, the motor control is able to determine the motor speed and direction. This information is then calculated to determine the motor speed.

The motor control has a software switch in it that will turn off all power devices for as long as the main voltage is above 133 VAC. Once the mains voltage drops below that voltage, the power devices will be re-enabled and the motor control will resume normal operation.



Motor Control Access

Slight modifications were made to the motor control bracket and the plastic drip shield.

Drip Shield Removal

1. Push the plastic shield on either side of the locking tab to buckle and unlock the shield from the motor control bracket. ***(Figure 4-4)***

Motor Control Board Removal

1. Pull the vertical tab forward and lift the front of the motor control board and slide the control forward to lift and remove the control from the bracket. ***(Figure 4-5)***

2. The motor control board bracket is secured with two screws in front and secured to the baseframe via a tab on the bracket inserted into a slot in the baseframe.

Figure 4-4

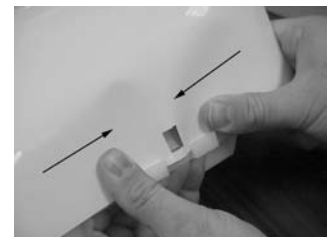
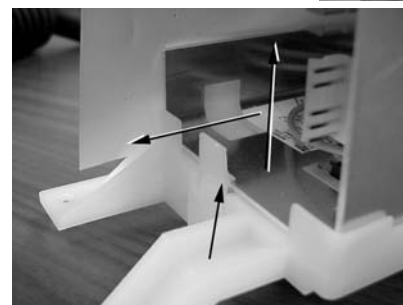


Figure 4-5



Motor Drive System Test

To check the system, check the board for proper output to the motor control. This is done by performing a board output check. Then perform the Motor And Motor Control Test.

Machine Control Board Output Test

1. Place the washer into Service Mode. (See Section 2; Accessing Service Mode)
2. LED Washer: Access **Board Output Test** and press **Stain Cycle**. This will send a signal to the motor control to operate the motor. This will test the board relay for 120 VAC output to the motor control board. Motor will not operate, because the door is not locked.

LCD Washer: Access **Service Tests** and press **system check**. Touch the screen to toggle the motor control on. This will test the board relay for 120 VAC output to the motor control board.

Motor Phases

With the introduction of the sensorless motor, the **Motor Phase Test** is no longer required. If the motor experiences a phase problem, the motor will not run.

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. (*Figure 4-6*)
3. Reconnect the washer power cord to supply voltage.
4. Press **Help** and **Back** function to activate Service Mode.

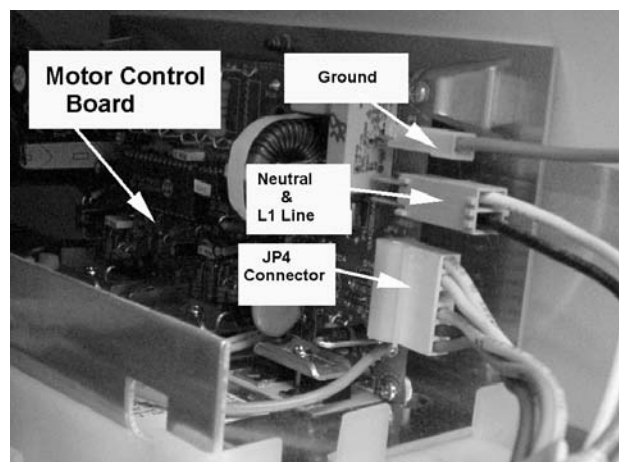


Figure 4-6

5. LED Washer: **Select Board Output Test**; close door or push door actuator button; touch the **stain cycle** membrane switch.

LCD Washer: Select **System Check**; close door or push door actuator button: 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 speed: the problem lies outside of the motor and motor control circuit. Disconnect power to the washer and reconnect the JP4 Interface connector to the motor control.

If the motor runs, and the spinner does not rotate: Check for missing belt.

8. **If the motor does not run**:
 - a. Check the 10 amp fuse located on the control board, either visually or with an ohm meter. If bad, replace motor control/wire harness assembly completely. (*Figure 4-7*)

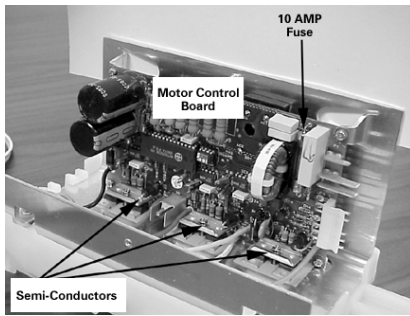


Figure 4-7

- b. If the fuse is functioning, check the six semiconductors on the heat sink visually for any damage. If damaged, replace motor control/wire harness assembly complete.
- c. If no visible damage is present, check motor windings for any open circuits. (*See Figure 4-8 & 4-9*) Replace motor if necessary.

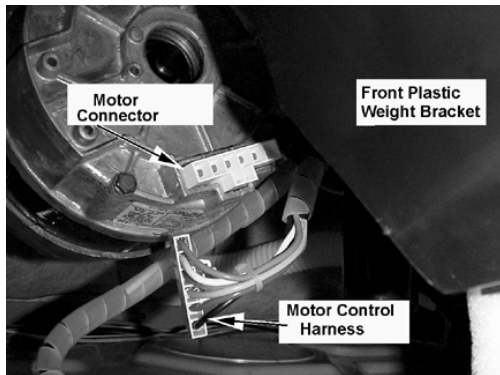
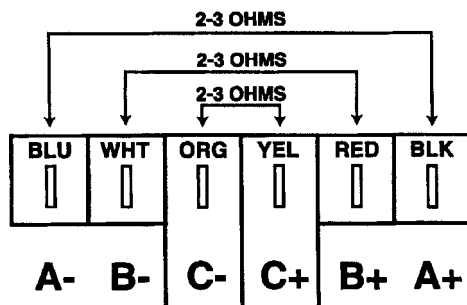


Figure 4-8



Motor Connector

Figure 4-9

- 9. Unplug the washer power cord and replace motor control board connector JP4 when finished.

HEATER ASSEMBLY

The heater assembly located in the sump area of the outer tub is only on the MAH7500, LCD washer only. A thermistor located in the heater assembly monitors the water temperature in order to cycle the heater on/off to regulate the proper temperatures.

After the wash level has been reached, the control will turn the heater on until the heater thermistor indicates the temperature reaches or exceeds the target main wash temperature. Then the control will de-energize the heater. The heater will be turned back on when the heater thermistor indicates the temperature falls below the target main wash temperature – 5°F during the main wash. The control will cycle the heater off again when the temperature reaches the target wash temperature.

The intent is to keep the temperature between the target main wash temperature and 5°F below that. When the heater is off, it will remain off for at least 10 seconds, and when the heater is turned on, it will remain on for at least 10 seconds. The heater should be turned off and will remain off when the maximum heater on time limit is reached (37 minutes), or the end of the wash period is reached. The heater will be turned off at the beginning of bleach fill at the end of main wash. The heater will be turned off during add fills.

Heater Will Not Turn On

- 1 The heater will not turn on if the door is not closed or if there is a problem with the door sense circuit.

- 2 The heater will not turn on if there is a problem with the low water level sense. The control is required to see the low water level go from not satisfied to satisfied at the beginning of the cycle before the heater is turned on. The heater will be turned off within 30 seconds whenever the wash water level becomes not satisfied.
- 3 The heater will never turn on for more than the maximum heater on time of 37 minutes, and will not turn on outside of Presoak and the main wash period.

Thermistor Temperature Chart

User Selections	Main Wash Tempering, Based on the Water Valve Thermistor	Heating Targets Using the Heater Based on the Heater Thermistor
	(Min.-Max. Ohms)	(Min./Max. Ohms)
a) Cold wash - with energy saver selected	65° F/18° C (65K-72K ohms)	No Heating
b) Cold wash - with energy saver de-selected		Heat to 65° F/18° C (15.3K - 16.8K ohms)
c) Warm wash - with energy saver selected	105° F/40.5° C (20K-30K ohms)	No Heating
d) Warm -with energy saver de-selected		Heat to 105° F/41° C (6.2K-6.6K ohms)
e) Hot wash - with energy saver selected	Hot water	No Heating
f) Hot wash - with energy saver de-selected		Heat to 130° F/54° C (3.9K-4. 1K ohms)

SECTION 5. TEARDOWN & WIRING INFORMATION

▲ WARNING



Warning - Always shut off electrical power to the unit before beginning any service repair procedures.

The replacement console assembly consists of the console, medallion and membrane pad.

CONSOLE REMOVAL

1. Disconnect power to the unit.
2. Remove the four screws securing the console to the rear cover plate.

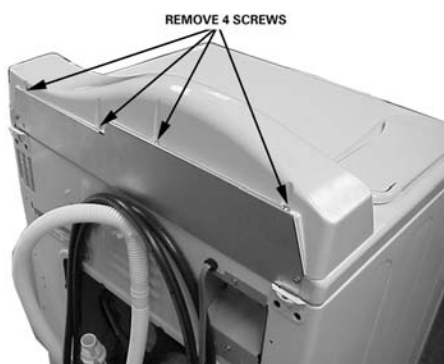


Figure 5-1

3. Lay a drop cloth across the top cover of the washer.
4. Grasp the top of the console and gently rock the top of the console forward away from the rear console back. Note the hooked tabs on bottom of the console, which engage the slots in the top cover.



Figure 5-2

5. For reinstallation, reverse the aforementioned steps.

MICROPROCESSOR BOARD REMOVAL

1. Disconnect power to the washer.
2. Remove the console assembly.
3. Carefully remove the membrane pad harness and other wires from the microprocessor board.

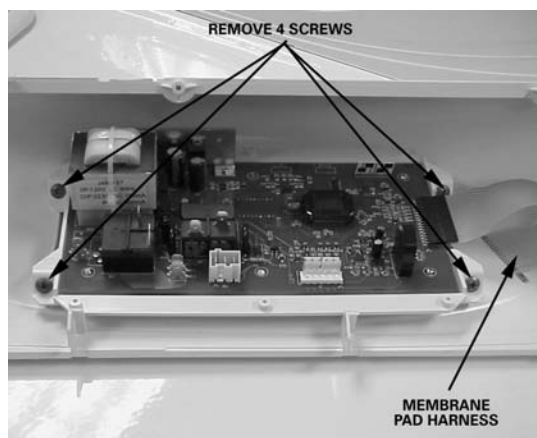


Figure 5-3
LCD MODEL



Figure 5-4
LED MODEL

4. Remove the four mounting screws securing the board to the console.
5. Remove the board from the console.
6. **Note:** To avoid the potential for accidental static discharge damage to the replacement board, you must be properly grounded prior to handling the board. This can be accomplished by using a special grounded strap tied on your wrist and grounded to the product, or simply touching a grounded source to discharge any static charge build up on your person.
7. Insert the replacement board into the console and secure the mounting bracket to the console.
8. Reattach wire harnesses and membrane pad harness to the replacement machine control board.

CONSOLE COVER PLUG

The cover plug inserts into the rear of the console to fill a cavity void in the console. The plug is secured to the console via a console screw mounted directly behind it.

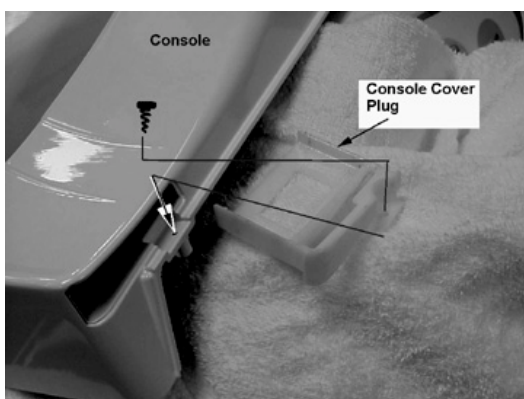


Figure 5-5

The cover plug simply fills a void area in the console for cosmetic purposes only.

CABINET ASSEMBLY

The overall cabinet assembly design is identical to the MAH4000 washer, except for the revised door lock mechanism, door latch hoop and front shroud. For simplicity reasons, we will address only the exceptions in this chapter.

DOOR LATCH HOOP

The latch hoop was redesigned, eliminating the latch hoop support and spring.

REMOVAL

1. Remove the door assembly from the washer.
2. Dissassemble the door assembly by removing the outer door panel.
3. Locate the locking tab on the door latch hoop and pry the tab up.
4. Squeeze the side tabs to disengage the locating pins on the sides of the latch hoop from the door liner.
5. Reinstallation is a reversal of the aforementioned steps.

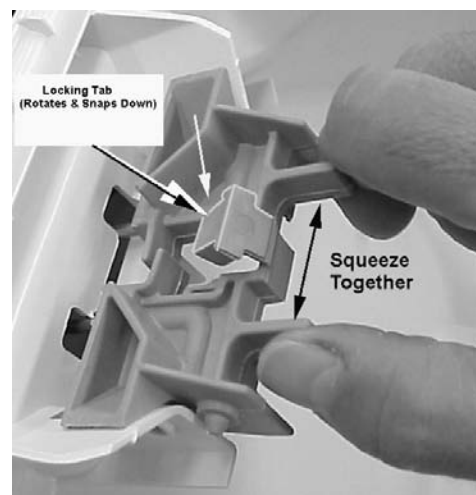


Figure 5-6

DOOR LOCK MECHANISM

The door lock mechanism is now locked and unlocked via solenoids, resulting in faster locking and unlocking of the washer door. The mechanism is a non-repairable assembly and must be replaced as an assembly.

An Emergency Access Cord is available and is accessible by removing the dispenser bezel. The nylon cord is located and pulled in a direction away from the lock area. The cord is attached to the mechanical opener. When the cord is pulled, the opener will pivot and push the locking lever into the open position.

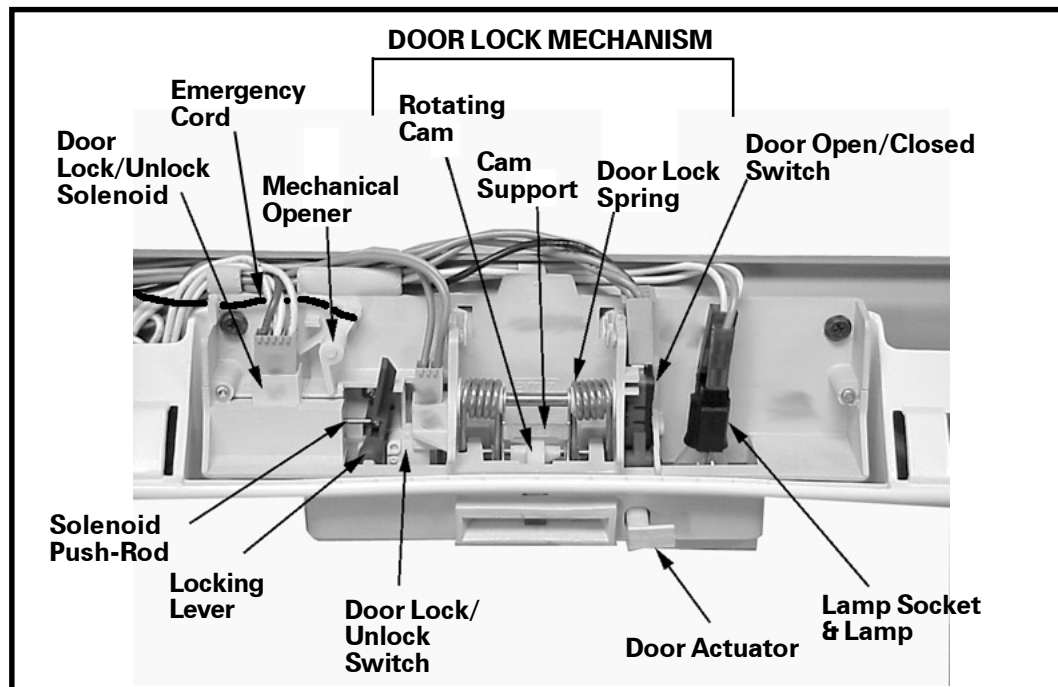


Figure 5-7

Removal

1. Disconnect power to the washer.
2. Remove the front panel, dispenser bezel and lift the top cover to expose the door lock assembly.
3. Remove the individual wire harnesses from the assembly and the two mounting screws.
4. Roll the top of the door lock assembly forward and lift from the front shroud assembly.

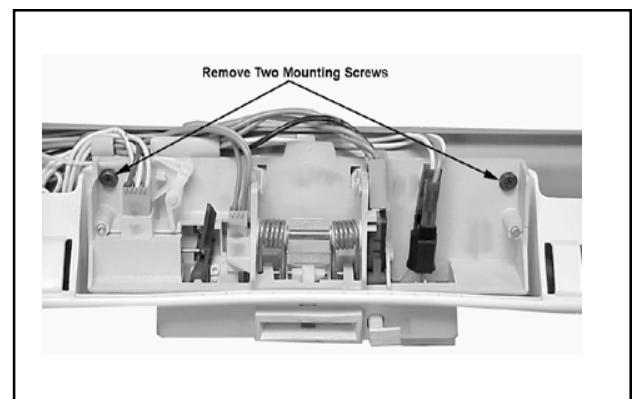


Figure 5-8

REAR ACCESS PANEL

Removal of the access panel gains access to the rear components of the washer (Figure 5-9).

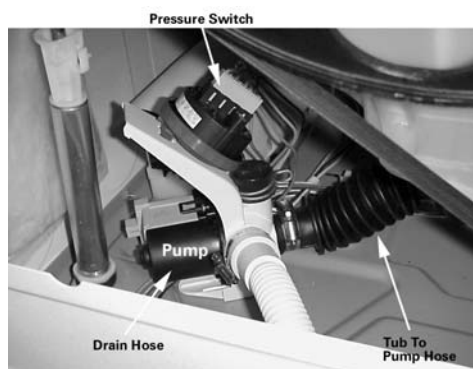


Figure 5-9

WATER SYSTEM COMPONENTS

▲ WARNING



Warning - Always shut off electrical power to the unit before beginning any service repair procedures.

WATER VALVE

The water valve is accessible from the front of the machine. The flow rate of the valve is 4 gpm.

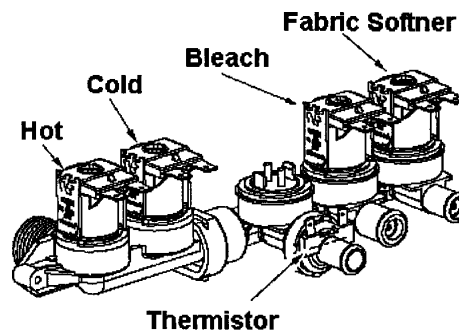
Removal

1. Discontinue power and water to the machine.
2. Remove the front panel and lift the top cover.
3. Remove the wire harness connections to the water valve solenoids.
4. Loosen and remove the hose clamps on the inlet hoses leading away from the water valve.

5. Locate and loosen the valve mounting screw by turning the screw at least three full turns.

NOTE: *The mounting screw serves as a locating pin to hold the valve in position on the mounting bracket. By partially removing the screw, the water valve can now be slid to the left and removed from the bracket (Figure 5-10).*

6. Carefully lift the valve with the inlet hoses attached and direct the inlet hoses through the openings in the valve mounting bracket.
7. The hoses can be crimped or the water shut off at the faucets. Place a towel below the valve and remove the inlet hoses from the water valve.



4 Coil Water Valve

8. To reinstall, reverse the aforementioned procedure.

PRESSURE SWITCH

The pressure switch was relocated from the console and mounted to a bracket extension molded as part of the pump assembly. A vertical outlet on the pump has a rubber cap positioned over the outlet with a spout and is clamped into position. The nipple of the pressure switch is inserted into the rubber spout. Pressurization in the vertical outlet of the pump actuates the pressure switch and determines proper fill levels.

REMOVAL

1. Remove the rear access panel or the front panel to access the pressure switch.
2. Place a towel beneath the pump.
3. Remove the plastic bag covering the pressure switch. Press in the locking tabs on the back of the pressure switch and pivot the pressure switch off the pump bracket.
4. Grasp the pressure switch and lift the nipple of the pressure switch from the pump cap.

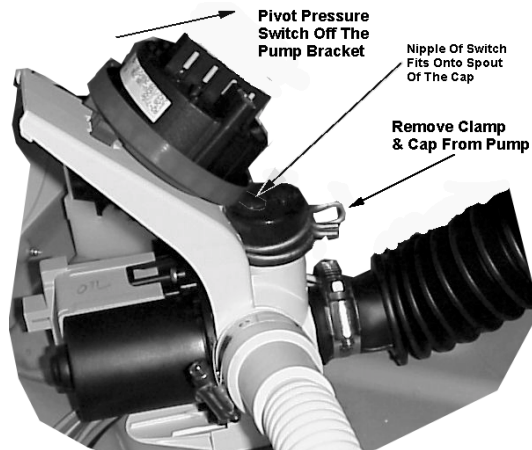


Figure 5-11

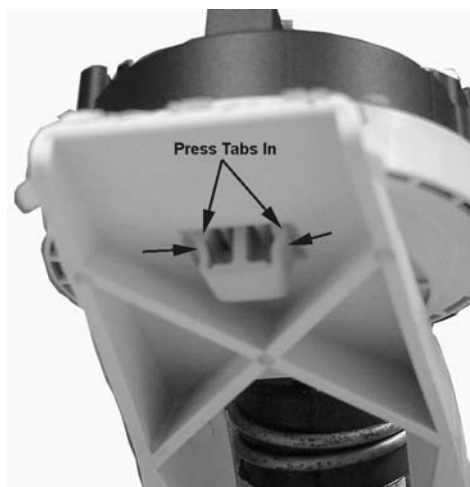


Figure 5-12

REINSTALLATION

1. Reverse the aforementioned steps 1-4.
2. **IMPORTANT:** Reposition the plastic bag back onto the pressure switch.

PUMP ASSEMBLY

The pump is rated at 80 watts and mounts identically to the pump used in the MAH3000 washer. The pressure switch mounting bracket is a molded part of the pump housing. For removal instructions, see page 6-4 in the 16008373 manual.

HEATER ASSEMBLY

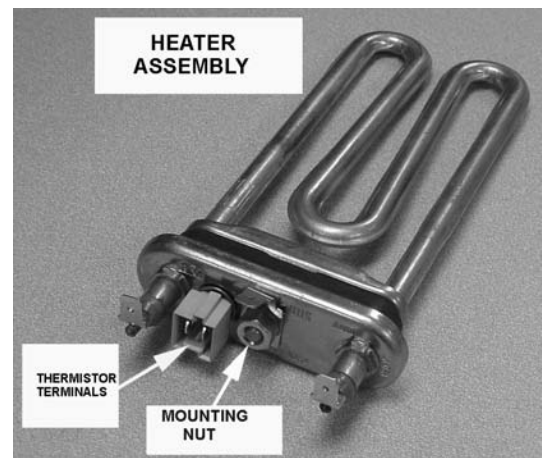


Figure 5-13

The 1000 watt heater is located in the tub cover below the door opening and above the sump area of the washer. A thermistor on the heater regulates the temperature of the heater to maintain proper water temperature when selected. The heater is secured to the tub cover by means of rubber compression. An inner mounting plate is located opposite of the external mounting plate with a layer of rubber between. When the nut is secured, the rubber is compressed and expands to seal the heater entry hole in the tub cover. Heater resistance is 14 ohms.

REMOVAL

1. Disconnect power to the washer.
2. Remove the wires leading to the heater assembly.
3. Locate the mounting nut and loosen the nut by turning the nut in a counter clockwise direction. This will uncompress the rubber.
4. Carefully remove the heater assembly from the tub cover. (If the heater has been in place for a period of time, the rubber may have taken a set. Then a complete tub cover removal would be deemed necessary to push the heater assembly out of the tub cover.)

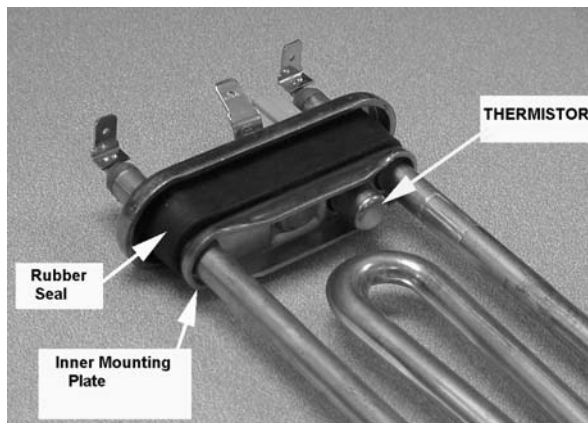


Figure 5-14

Thermistor Removal

The thermistor is press fitted into the rubber seal of the heater. To remove, simply push the thermistor out and reinsert the replacement thermistor.

SUMP COVER

The sump cover is located in the lower rear area of the outer tub assembly, directly above the sump area and the drain outlet. The purpose of the sump cover is to cap-

ture the detergent dispensed into the top dispenser. By capturing the detergent, the washer can provide a better mix of water and detergent in the wash water. During normal operation, the sump cover is flushed of detergent during the wash cycle.

REMOVAL

1. Remove the front panel, tub cover and the spinner.
2. Remove the mounting screw securing the cover to the outer tub.

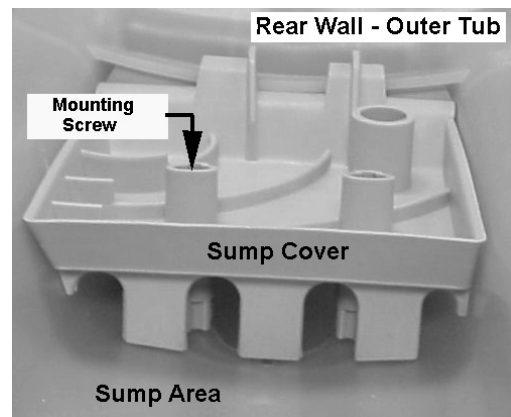


Figure 5-15

3. Lift the front of the sump cover and disengage from rear lip of outer tub.

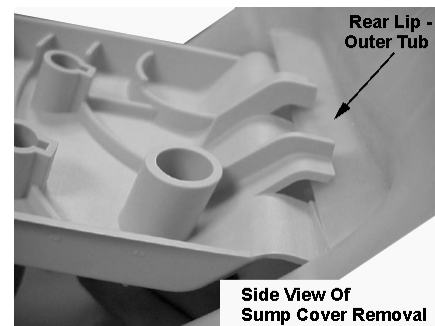
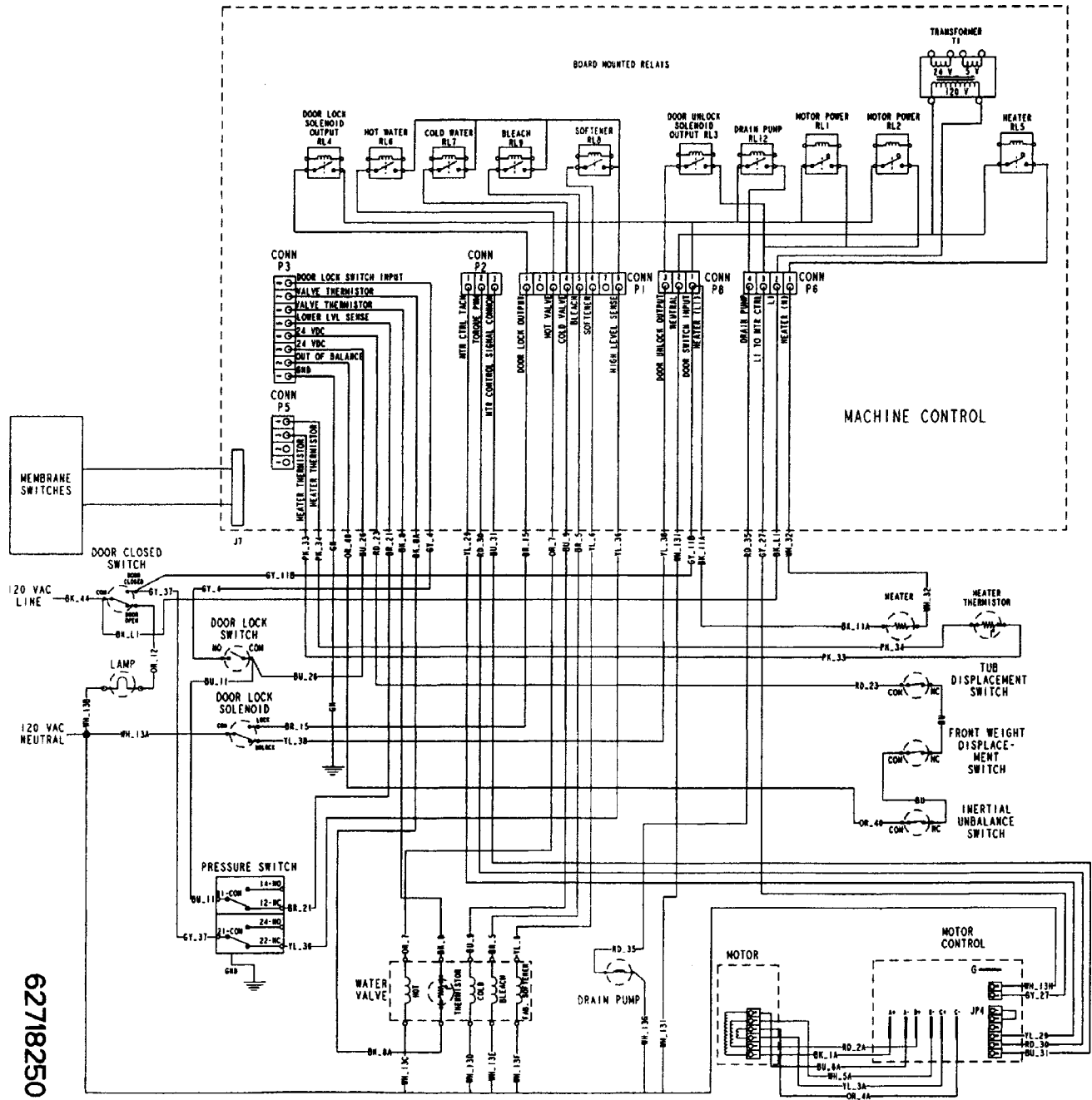


Figure 5-16

WIRING INFORMATION

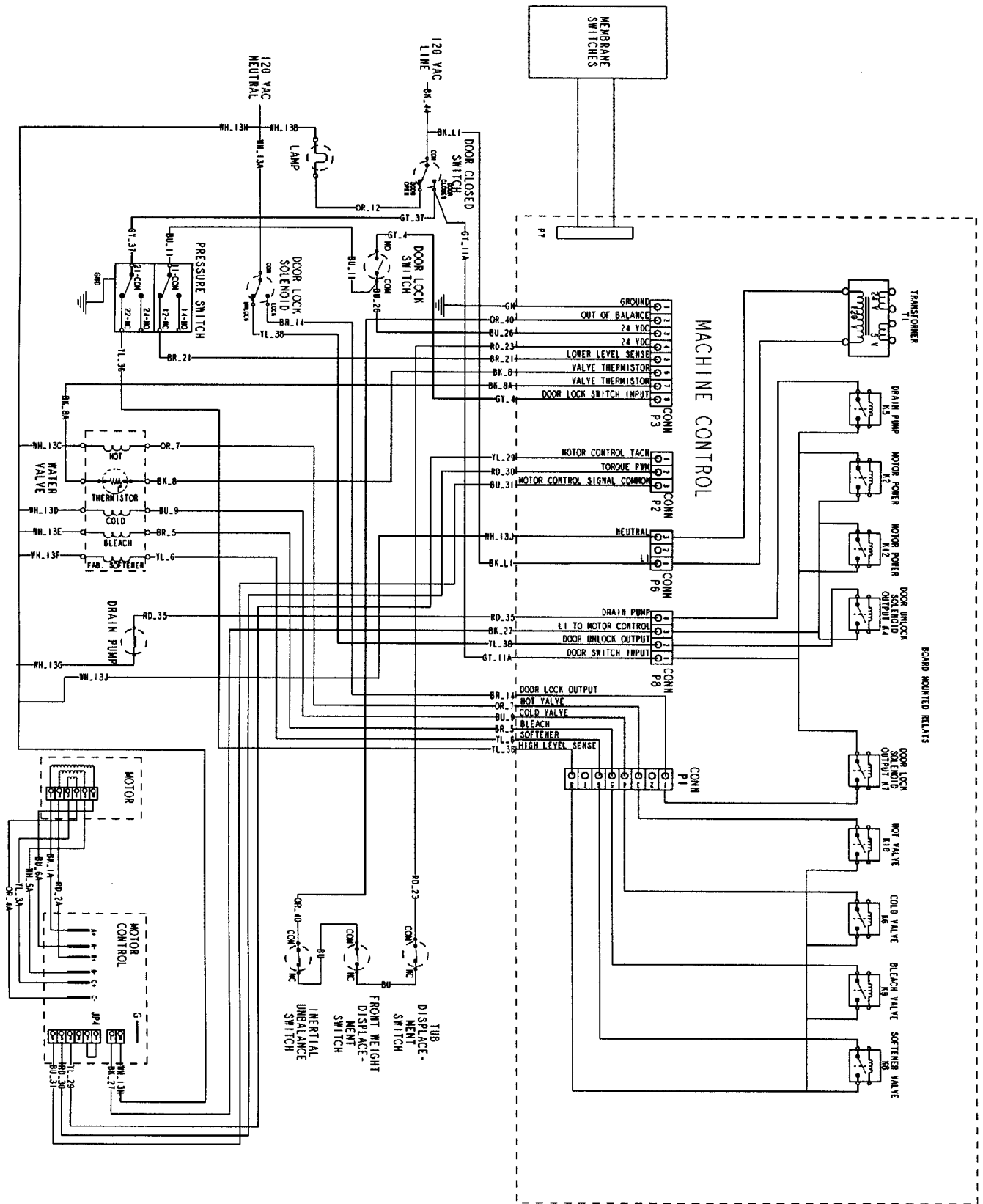
Please refer to the technical schematic packed in the control console in the washer for up to date wiring information for the product your are servicing. The schematics on the following pages are only a general reference at the time this manual was printed.

MAH5500B



62718250

MAH7500



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