



**CONSUMER SERVICES TECHNICAL
EDUCATION GROUP PRESENTS**

CL-5

COMMERCIAL LAUNDRY



MECHANICALLY CONTROLLED WASHERS

JOB AID

Part No. 4321689



INTRODUCTION

This Job Aid "CL-5" Commercial Laundry Direct Drive Washers, Literature #4321689, provides for specific information about the installation, service, and repair of Whirlpool Commercial Laundry washers. This Job Aid has been updated to provide the most recent information on design, features, installation, troubleshooting, service, and repair procedures.

GOALS AND OBJECTIVES

The goal of this Job Aid is to provide detailed information that will enable the service technician to properly install, diagnose malfunctions, and repair Whirlpool Commercial Laundry washer products.

The objectives of the Job Aid are:

For the service technician to:

- Fully Understand proper safety precautions.
- Successfully install, troubleshoot, and diagnose malfunctions.
- Successfully perform necessary repairs.
- Successfully return the laundry product to proper operational status.



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

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GENERAL SAFETY FIRST

Your safety and the safety of others is very important.

We have provided many important safety messages in this Job Aid and on the appliance. Always read and obey all safety messages.



This is the safety alert symbol.

This symbol alerts you to hazards that can kill or hurt you and others.

All safety messages will follow the safety alert symbol and either the word "DANGER" or "WARNING." These words mean:

⚠ DANGER

You can be killed or seriously injured if you don't immediately follow instructions.

⚠ WARNING

You can be killed or seriously injured if you don't follow instructions.

All safety messages will tell you what the potential hazard is, tell you how to reduce the chance of injury, and tell you what can happen if the instructions are not followed.

Literature Reference

For on-line access to all pertinent Whirlpool commercial laundry service information, go to:

<http://cltpsc.whirlpoolcorp.com/techinfo/techinfonew/literature.htm>

Enter as complete a model number as possible and then click search

Note: Canadian model numbers begin with a "Y"
Government models begin with a "G"



COMMERCIAL LAUNDRY MECHANICALLY CONTROLLED WASHING MACHINES

MODEL & SERIAL NUMBER DESIGNATIONS

MODEL NUMBER

MODEL NUMBER	C	A	E	27	6	1	K	Q	0
PRODUCT GROUP C = Commercial Laundry									
PRODUCT IDENTIFICATION A = Automatic Washer E = Electric Dryer G = Gas Dryer S = Stack Dryer									
CONTROL CODE E = Electronic Control M = Electromechanical P = Pushbutton Single Unit or Stacked Pair W = Resource Saver									
FEATURE CODE Cabinet Width in Inches (29" or 27")									
FEATURE / VARIATIONS 4 = Metercase or Coinslide Equipped Stack W/O Windows 5 = Metercase and Coinslide Equipped 6 = Metercase Equipped Stack With Windows 7 = Card Reader Ready / Equipped Stacked Pair 9 = Full Width Console									
FEATURE CODE 0 = Electric 1 = Single Speed or Gas 2 = Two Speed									
YEAR OF INTRODUCTION J = 2000, K = 2001, L = 2002, M = 2003, P = 2004, R = 2005, S = 2006									
COLOR CODE Q = White									
ENGINEERING REVISION NUMBER 0 = Basic, 1 = 1st Revision, 2 = 2nd Revision									

SERIAL NUMBER

SERIAL NUMBER	C	L	16	02287
MANUFACTURING SITE C = Clyde, OH (Washers) M = Marion, OH (Dryers)				
YEAR OF PRODUCTION L = 2001, M = 2002, N or P = 2003, R = 2004, S = 2005, T = 2006				
WEEK OF PRODUCTION				
PRODUCT SEQUENCE NUMBER				

MODEL & SERIAL NUMBER LABEL AND LITERATURE PACK LOCATIONS

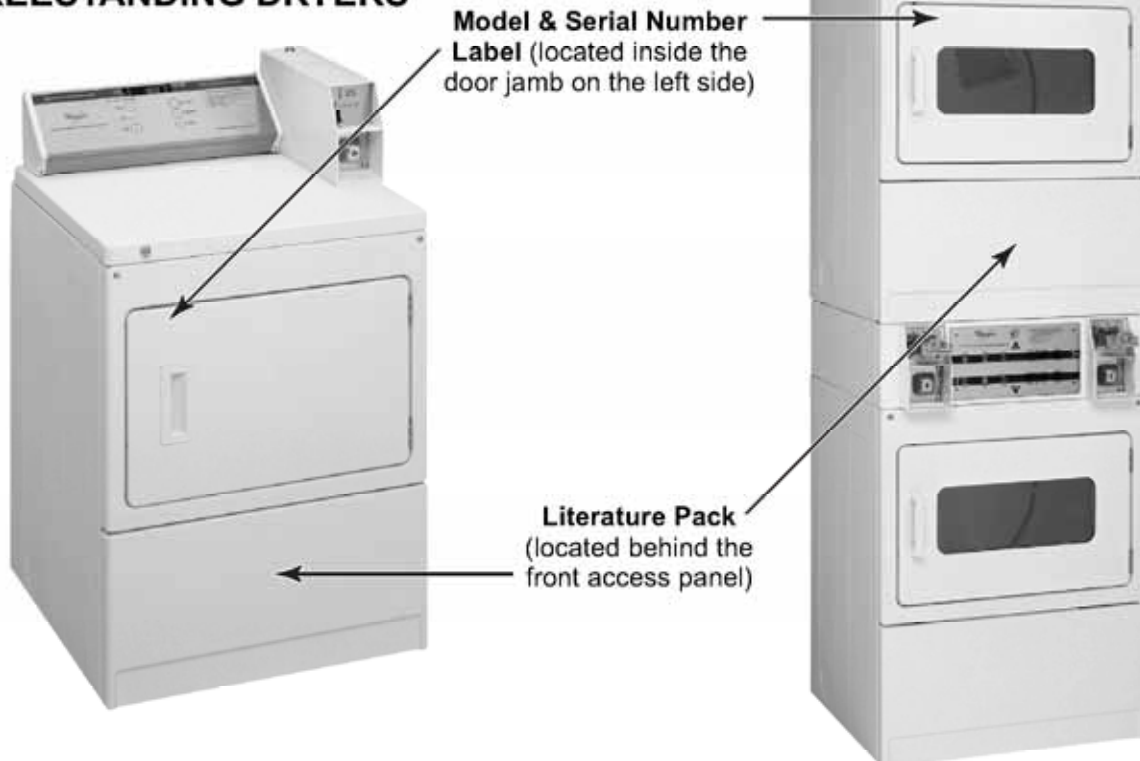
The Model & Serial Number label and Literature Pack locations are shown below. The Literature Pack includes a wiring diagram, parts list, and tech sheet.

WASHERS



STACK DRYERS

FREESTANDING DRYERS



MONEY ACCEPTOR PARTS CROSS REFERENCE



KEY	PART NAME	WHIRLPOOL PART No.	ESD PART No.	GREENWALD PART No.	SET-O-MATIC PART No.
1	FUNNEL COIN	185471	N/A	N/A	N/A
2	METERCASE CONVERSION KIT (Includes Item 1 & 13)	8318238	N/A	N/A	N/A
3	DOOR SERVICE	3351138	N/A	N/A	N/A
4	VERTICAL & COIN KIT* (WASHER AND DRYER) (Includes 5, 6, 9, 10, 12, 14, 24)	3954807	72093	N/A	N/A
5	KEY FRONT LOCK OR TOP LOCK	358745	MULTIPLE OPTIONS	4R-777	MULTIPLE OPTIONS
6	MONEY BOX WITH KEY	8316525	T2101-XD	UG600B	GBX-(LOCK CODE LETTER A, N, T, D OR N)
7	VERTICAL & COIN SLIDE* (Slide Only)	8316520	V8-200 (71689)	20-3020	V8L-001 CHROME V8L-005 BLACK
8	COIN DROP*	N/A	N/A	N/A	N/A
	CAW2762K	N/A	N/A	N/A	54WU1-WPL-CAW
	CAW2762K	N/A	N/A	N/A	54WU1-WPL-CAW
	CEW2760B	N/A	N/A	N/A	54DU1-WPL-CEW
	EGW2761B	N/A	N/A	N/A	54DU1-WPL-GCW
STACK DRYERS	N/A	N/A	N/A	54DU1-WPL-STACK	
9	COIN SLIDE EXTENSION WASHER	8316521	21053	88-1164	15A-007
10	COIN SLIDE EXTENSION DRYER	8316523	21064	88-1135	15A-008
11	COIN SLIDE EXTENSION STACK DRYER	1396424	N/A	84-2037	N/A
12	BOLT SLIDE MECHANISM	8316521	21749	77-83-8	N/A

KEY	PART NAME	WHIRLPOOL PART No.	ESD PART No.	GREENWALD PART No.	SET-O-MATIC PART No.
13	COIN SLIDE ADAPTER PLATE	279650	N/A	N/A	N/A
14	DECAL KIT	8316574	72097	1711	N/A
15	INSERT, BLANK	8318264	21216	N/A	N/A
16	INSERT, \$.25	8318265	21193	N/A	N/A
17	DPL COINLESS ACTUATOR STACK DRYER	4396490	N/A	2001-DPL-SD	N/A
	DPL COINLESS ACTUATOR DRYER	4396750	N/A	2001-DPL-D	N/A
	DPL COINLESS ACTUATOR WASHER	4396749	N/A	2001-DPL-W	N/A
18	CARD READER KIT WASHER	N/A	11-000-252	2001-WF-SHW	N/A
19	CARD READER KIT DRYER	N/A	11-000-251	2001-WF-FRD	N/A
20	CARD READER KIT STACK DRYER	N/A	11-000-253	2001-WF-FSD	N/A
21	FRONT LOCK ASSEMBLY	358290	0300-ETWH	8-11181-33-777	EXT030-A FOR MOST APPLICATIONS
22	DRYER TIMER CAMS				
	3-PIN (60 Minutes)	1887891	N/A	N/A	N/A
	4-PIN (45 Minutes)	1887893	N/A	N/A	N/A
	6-PIN (30 Minutes)	1887917	N/A	N/A	N/A
	8-PIN (30 Minutes)	1888044	N/A	N/A	N/A
12-PIN (15 Minutes)	359853	N/A	N/A	N/A	N/A
23	FRONT LOCK BLANK	38721	N/A	N/A	N/A
24	MECHANICAL COIN COUNTER	N/A	N/A	Dryer Kit: 1795 Washer Kit: 1748	N/A
25	TOP LOCK (Stack Dryer Control Panel Lock)	8316526	0400ET	68-17432-777	N/A
26	DUAL PAY KIT	N/A	11-000-264 Wash 11-000-233 Dry	N/A	N/A

*STATE COINAGE TYPE (US QUARTER, US DOLLAR, CANADIAN DOLLAR, CANADIAN QUARTER, CANADIAN DOLLAR, ETC.)

THE LISTED MONEY ACCEPTORS ARE NOT TESTED AND APPROVED FOR USE BY WHIRLPOOL CORPORATION. IT IS THE RESPONSIBILITY OF THE MONEY ACCEPTOR MANUFACTURER TO ENSURE COMPATIBILITY AND OPERATION WITH THE WHIRLPOOL CORPORATION PRODUCTS. MODIFICATIONS MAY VOID THE WHIRLPOOL CORPORATION PRODUCT WARRANTY.

NOTES:

Commercial Laundry Service Agreement

The **CL Service Agreement** allows a trade partner to submit warranty claims for Commercial Laundry Parts and Labor (in some cases). A completed Warranty Claims Form must be submitted for each product where parts were installed within the warranty period in order to receive reimbursement for the part(s) purchased.

Warranty claims can be submitted on-line from the Service Bench website: www.servicebench.com
For additional Details consult the **Service Operating Guide** at www.cltpsc.whirlpoolcorp.com, then WARRANTY CLAIMS, then OPERATING GUIDE.

To apply for a **CL Service Agreement**, fill in the needed information and submit it from the web page: www.servicebench.com/comm/reg

For information on finding warranty service, contact Whirlpool at: 1-800-No-Belts > Then option 5.

COMMERCIAL LAUNDRY WASHER WARRANTY

- ✓ **LABOR WARRANTY, MODELS THAT BEGIN WITH GCA, GCE, GCG**
 - These models come with a 1-year labor 3-year part warranty. They do not have coin slides or coin boxes, but are considered commercial.

- ✓ **LABOR WARRANTY, MODELS CAM2752KQ, CEM2750KQ, CGM2751KQ**
 - These Whirlpool models come factory coin equipped and if the sale date is after 7/1/2003 they have a 1-year labor and 3-year parts warranty.

- ✓ **LABOR WARRANTY, ROPER MODELS RAK2751, REK2950, RGK2951**
 - These models come with a 90-day labor & 2-year parts warranty. They have coin slides and coin boxes factory installed

- ✓ **NO LABOR WARRANTY, MODELS THAT BEGIN WITH CA,CE,CG,CSP**
 - Although commercial washers and dryers with models that begin as listed above do not have ANY labor warranty, Whirlpool Corporation policy allows for labor concession within 2 weeks of date of purchase (DOP)

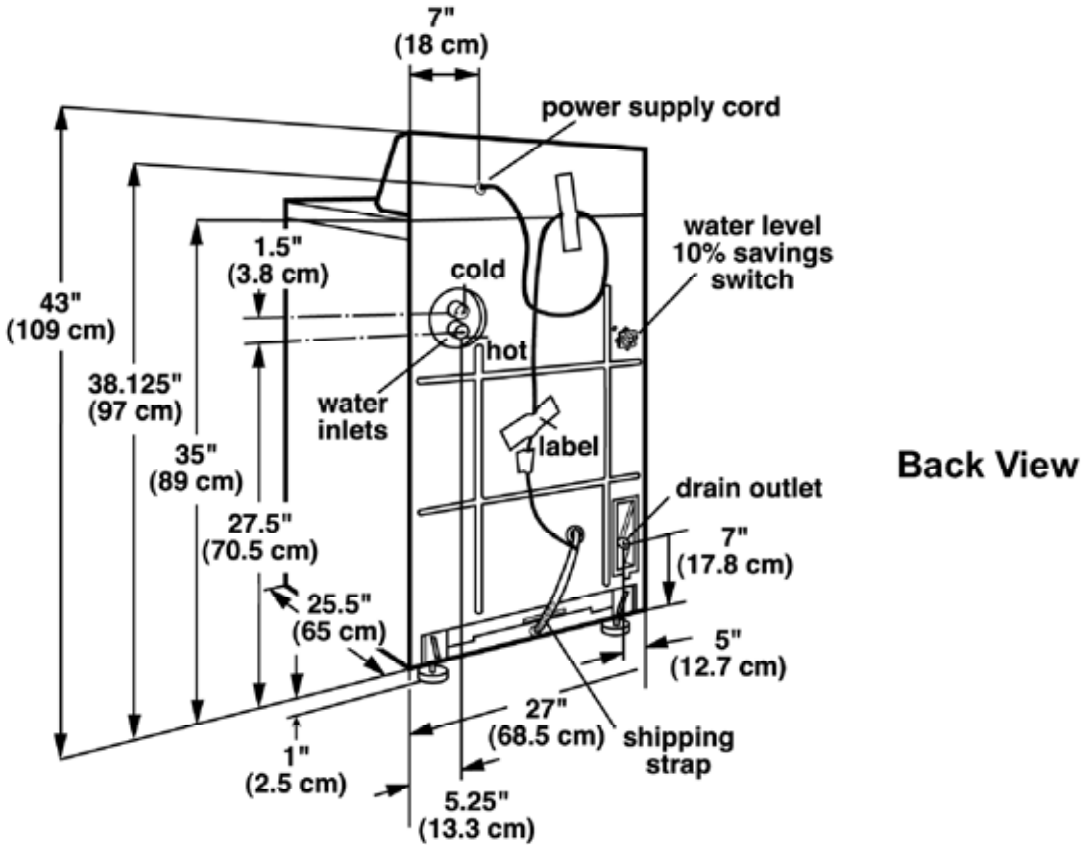
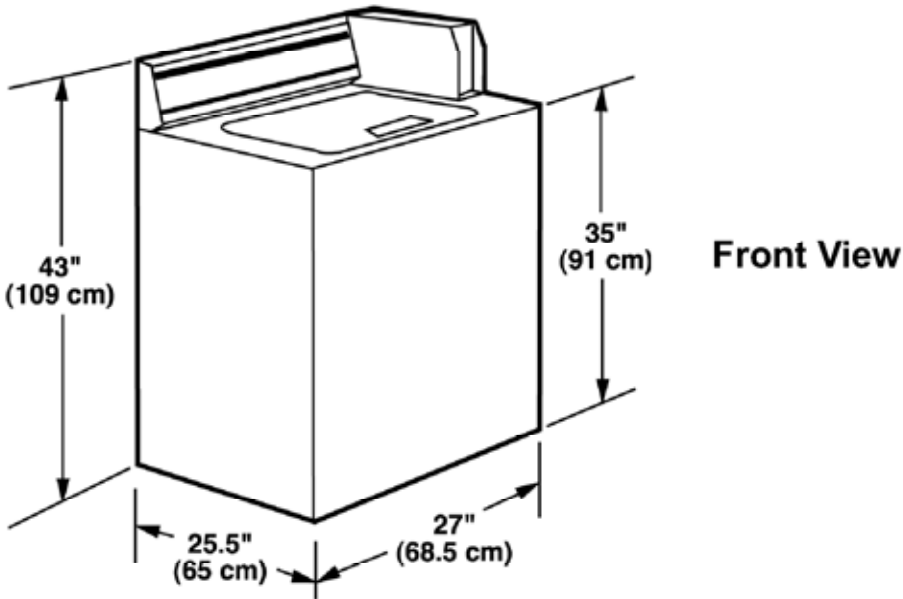
- ✓ **COIN MECHANISM REPAIRS**
 - Whirlpool Corporation Independent Service Contractors are required to handle the repair/replacement of the coin mechanism on commercial laundry products that come factory equipped with coin slides.

NOTE: Whirlpool and Roper commercial laundry have units that are coin slide equipped from the factory (see warranty summary). Whirlpool designated servicers must run all service requests. Coin equipment is warranted on products factory coin equipped! For warranty repairs on these products contact Whirlpool at: 1-800-NOBELTS

INSTALLATION INFORMATION

WASHERS

Dimensions



Washer Installation Instructions

▲WARNING



Electrical Shock Hazard

Disconnect power before servicing.

Replace all parts and panels before operating.

Failure to do so can result in death or electrical shock.

BEFORE YOU START

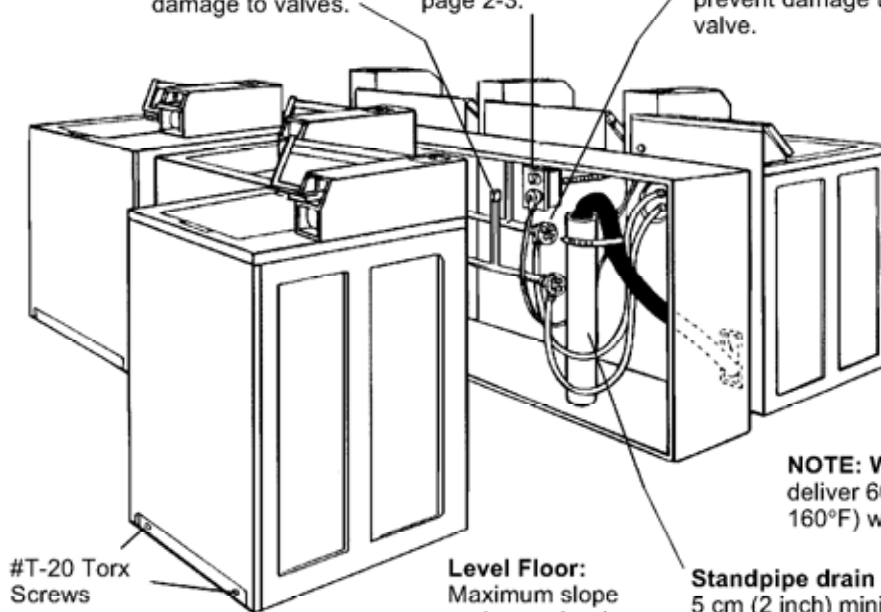
Check location where washer will be installed. Proper installation is your responsibility. Make sure you have everything necessary for correct installation.

Single washer installations require 30 cm (12 inch) minimum risers to provide an air cushion and prevent noise and damage to valves.

Grounded electrical outlet is required. See "Washer Electrical Requirements" on page 2-3.

Hot and cold water faucets must be within 1.2 meters (4 feet) of the back of the washer and provide water pressure 690 kPa (10-100 PSI). A pressure reduction valve should be used in the supply line where inlet pressure entering the building exceeds 690 kPa (100 PSI) to prevent damage to the washer mixing valve.

Untape and open washer lid. Remove packages and hoses from washer.



#T-20 Torx Screws

Level Floor: Maximum slope under washer is 2.5 cm (1 inch).

NOTE: Water Heater—Set to deliver 60°C to 70°C (140°F to 160°F) water to the washer.

Standpipe drain system: Needs a 5 cm (2 inch) minimum carry-away capacity of 64.4 liters (17 gallons) per minute. Top of standpipe must be at least 86.4 cm (34 inches) high and no higher than 183 cm (72 inches) from bottom of washer & not sealed shut.

Support: Floor must be sturdy enough to support loaded washer weight of 143 Kg (315 pounds).

Ambient Temperature for the machine location must stay above freezing (preferably above 40 degrees) and be less than 120 degrees Fahrenheit.

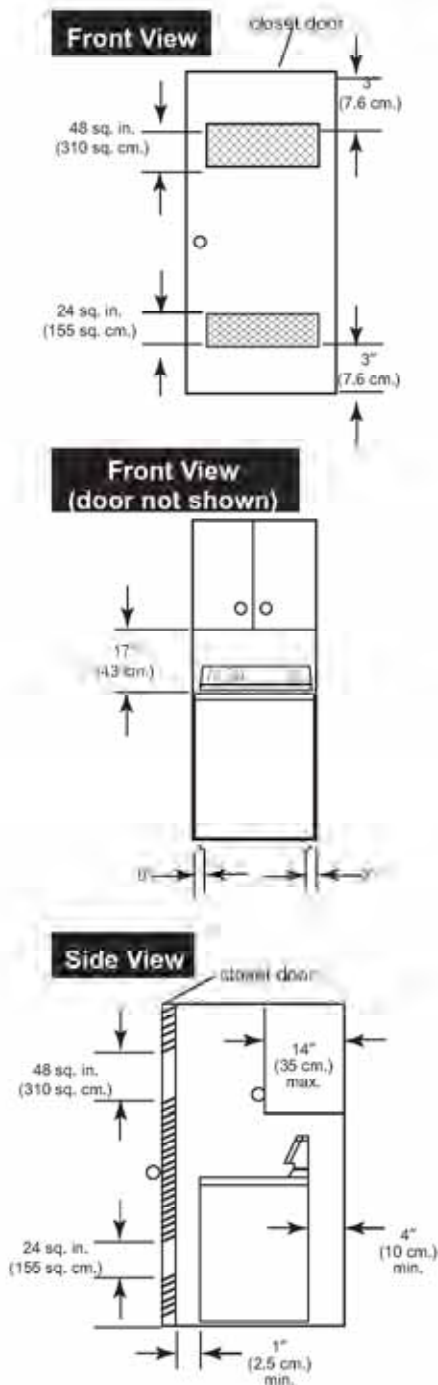
On coin-operated washers, front access to the pump area is available by removing the two #T-20 Torx screws and then removing the front panel.

Important: Observe all governing codes and ordinances.

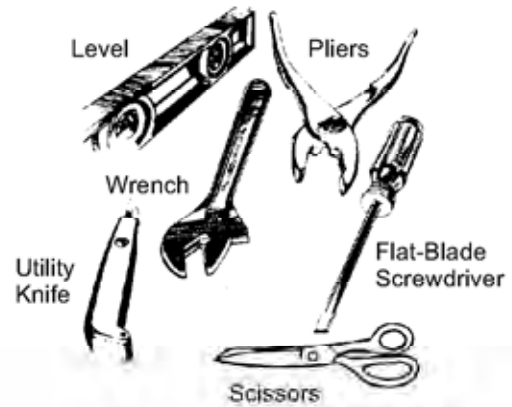
A floor drain should be provided under the bulkhead. Prefabricated bulkheads with electrical outlets, water supply lines, and drain facilities should be used only where local codes permit.

RECESSED AREA INSTRUCTIONS

This washer may be installed in a recessed area or a closet. The installation dimensions shown are the minimum spaces allowable. Additional spacing should be considered for ease of installation and servicing. If the closet door is installed, the minimum air openings at the top and bottom of the door are required. Louvered doors with air openings in the top and bottom are acceptable. Companion appliance spacing should be considered.



TOOLS NEEDED FOR INSTALLATION



PARTS SUPPLIED FOR INSTALLATION



- 1 Hose Clamp
- 2 Inlet Hoses
- 4 Flat Washers
- 2 Front Leveling Legs W/Nuts
- 1 Drain Hose

WASHER ELECTRICAL REQUIREMENTS

⚠ WARNING



Electrical Shock Hazard
Plug into a grounded 3-prong outlet.
Do not remove ground prong.
Do not use adapter.
Do not use an extension cord.
Failure to follow these instructions can result in death, fire, or electrical shock.

If codes permit and a separate ground wire is used, it is recommended that a qualified electrician determine that the ground path is adequate.

Do Not ground to a gas pipe.

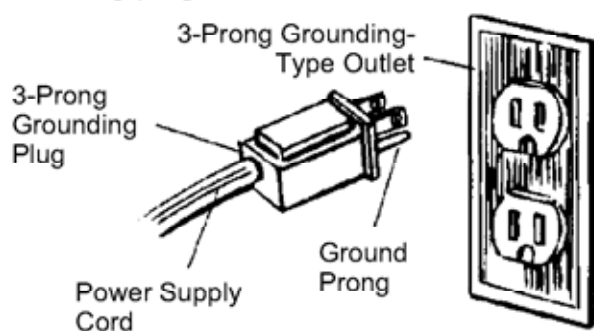
Check with a qualified electrician if you are not sure the washer is properly grounded.

Do Not have a fuse in the neutral or ground circuit.

A 120-volt, 60-Hz, AC-only, 15- or 20-ampere fused electrical supply is required. (Time-delay fuse or circuit breaker is recommended.) It is recommended that a separate circuit serving only this appliance be provided.

Grounding Instructions

For the safety of the customer, this washer must be grounded. The washer is equipped with a power supply cord that has a 3-prong grounding plug.



To minimize a possible shock hazard, the cord must be plugged into a mating 3-prong grounding-type receptacle, which has been grounded in accordance with National Electrical Code (ANSI/NFPA 70), and all local and state codes. If a mating outlet is not available, it is the personal responsibility and obligation of the customer to have a properly grounded 3-prong outlet installed by a qualified electrician.

IMPORTANT: Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Do not modify the plug provided with the appliance. If it will not fit the outlet, have a proper outlet installed by a qualified electrician.

INSTALLING THE WASHER

⚠️ WARNING

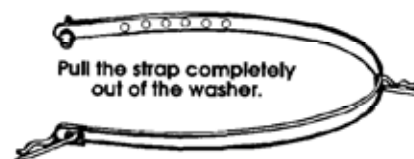
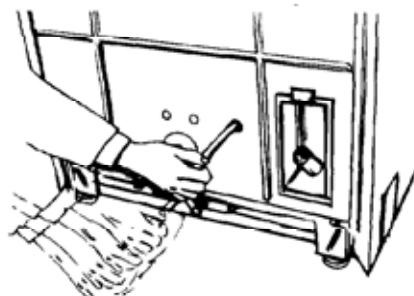
Excessive Weight Hazard

Use two or more people to move and install washer.

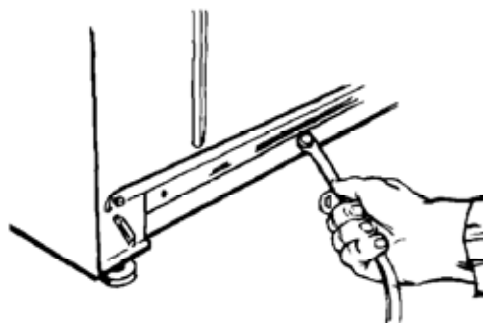
Failure to do so can result in back or other injury.

Removing the shipping strap is necessary for smooth operation. If the shipping strap is not removed, the washer will make excessive noise.

1. Do not cut yellow strap. Pull yellow strap firmly, until completely removed from washer. There will be two cotter pins on the end of the shipping strap when it is pulled out of the washer. The electrical plug is attached to this shipping strap.



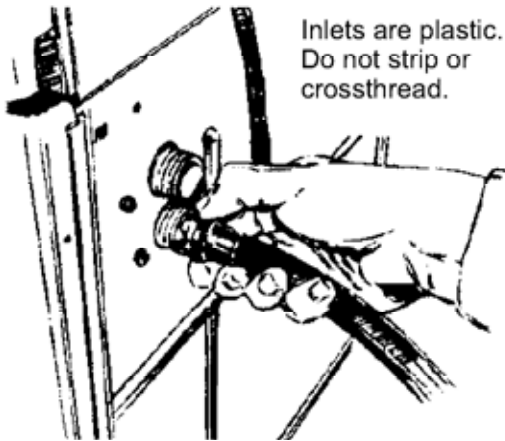
2. The shipping strap plug must be completely removed from the washer for the self-leveling legs to be released. Save the shipping strap for use in step 7.



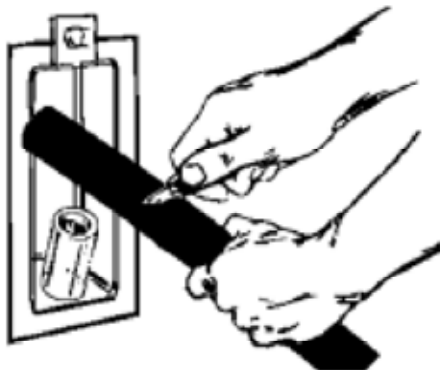
3. Insert a flat washer into **each** end of the inlet hoses. Check that washers are firmly seated in couplings.



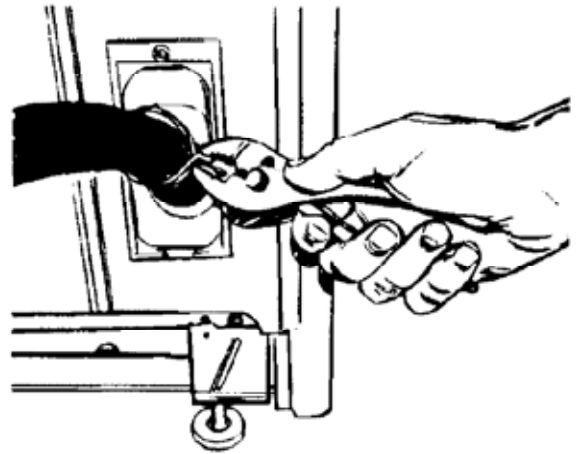
4. Attach hose to bottom inlet valve opening first. Then second hose to top inlet. Tighten couplings by hand; then use pliers to make an additional two-thirds turn. Slide washer onto cardboard or hardboard before moving across floor.



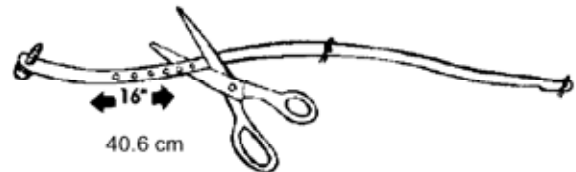
5. Move washer close to final position. Put the "hooked" end of drain hose into the standpipe. Estimate length of drain hose needed when washer is in final position. Hose must be cut exactly to length so the "hooked" end is held tightly over edge of standpipe. If drain hose is too long, cut straight end of hose. (**Do not cut the "hooked" end of drain hose.**) Do not force excess length of drain hose down the standpipe. This could cause siphoning. See step 8.



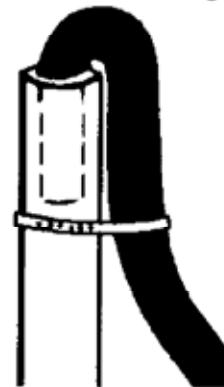
6. Place hose clamp over washer drain connector. Push drain hose onto washer connector. Use pliers to open clamp and slide clamp over drain hose. Check for good fit.



7. Measure and mark a point approximately 16" (40.6 cm) from the plug end of the shipping strap. Cut the shipping strap at this point.



8. Put the "hooked" end of drain hose into the standpipe. Tightly wrap the shipping strap around the standpipe. Push plug into the nearest hole in the shipping strap. Check that hose is not twisted or kinked and is securely in place with an air gap on the top.



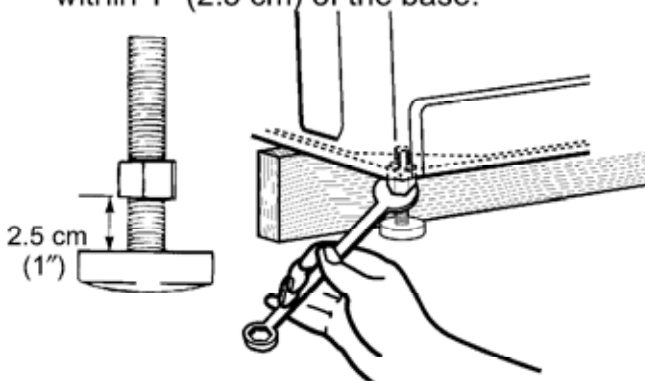
9. Before attaching water inlet hoses, run water through both faucets into a bucket. This will get rid of particles in water lines that might clog hoses. Mark which is the hot water faucet.



10. Attach bottom hose (inlet marked "H") to hot water faucet. Attach top (inlet marked "C") to cold water faucet. Tighten coupling to faucet by hand, then use pliers to make final two-thirds turn.

11. Prop up the front of the washer about 4" (10.2 cm) with a wood block, or similar object. The block needs to support the weight of the washer.

12. Screw the locknut on each front foot to within 1" (2.5 cm) of the base.

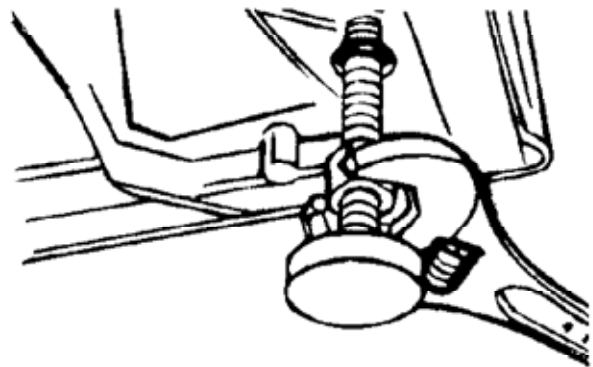


13. Screw the feet into the correct holes at the front corner of the washer until the nuts touch the washer. **NOTE:** Do not tighten the nuts until the washer is level, step 17.

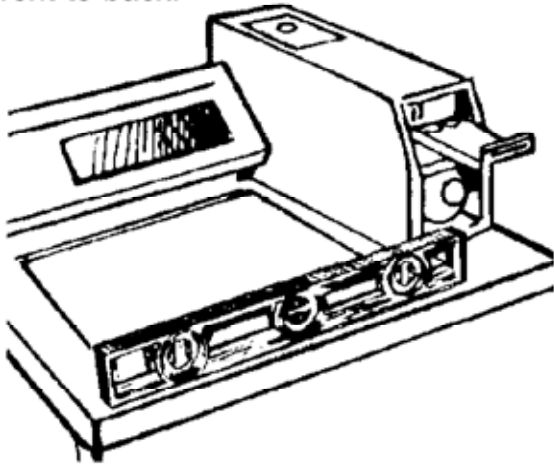


14. Tilt washer backward and remove the wood block. Gently lower washer to floor. Move washer to its permanent location. Remove cardboard or hardboard from under washer.

15. Tilt washer forward raising back legs 1" (2.5 cm) off of floor. To adjust rear leveling legs, gently lower washer to floor.



16. Check washer level by placing a level on top of the washer, first side-to-side, then front-to-back.

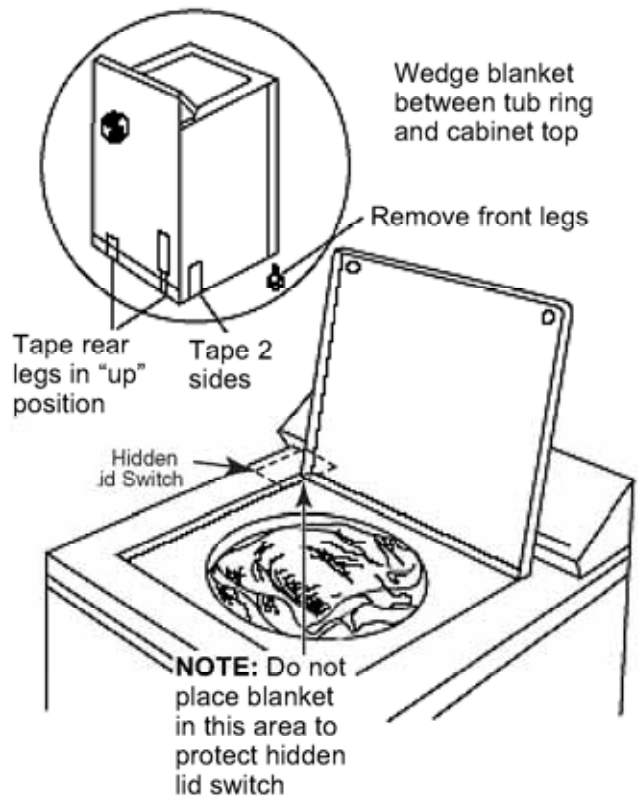


17. If washer is not level, adjust the front legs up or down. Make final check with level. Best results are obtained when the washer is tilted 1/4 bubble toward the rear and level side-to-side. When washer is level, use wrench to turn nuts on front legs up tightly against washer base. If nuts are not tight against washer base, the washer may vibrate.
18. Check that all parts are now installed. If there is an extra part, go back through steps to see which step was skipped.
19. Turn on water faucets and check for leaks. Tighten couplings if there is leaking. Do not over tighten; this could cause damage to faucets.
20. Check that you have all of your tools. Check that the shipping strap with 2 cotter pins and plug was removed from the back of the washer and used to secure the drain hose. If entire strap is not removed, washer may vibrate and be noisy.
21. Untape power supply cord.
22. Plug into a grounded 3-prong outlet.
23. Install the chosen money acceptor per the instructions under the appropriate money acceptor section of this Job Aid.

MOVING THE WASHER

To move the washer to a new location, perform the following steps:

1. Remove the front legs from the base of the washer.
2. Place both rear leveling legs in the upper position and tape them securely in place.
3. Apply tape to the side and bottom of the cabinet near the rear.
4. Open the washer lid, wedge a blanket between the tub ring and the cabinet top to keep the tub from moving.
5. Move the washer to the desired location. Be careful not to drop the washer while using a hand truck.



NOTE:

Laundry Drain Requirements:

Laundry Tub or Utility Sink -

1. Laundry tub or utility sink should have a minimum capacity of 20 gallons.
2. Top of tub or sink must be a minimum of 34" and not more than 72" from the bottom of the washer.

Floor Drain -

1. Floor drain systems require a Siphon Break (Part No. 285320.) Siphon Break must be above the high water level in the washer tub (a minimum of 28" from the bottom of the washer.)
2. Additional drain hose will be required for a Floor Drain installation.

Standpipe Drain -

1. A minimum 2" diameter drain pipe with a minimum carry-away capacity of 17 gallons per minute is required.
2. Top of standpipe must be a minimum of 39" and not more than 72" from the bottom of the washer.

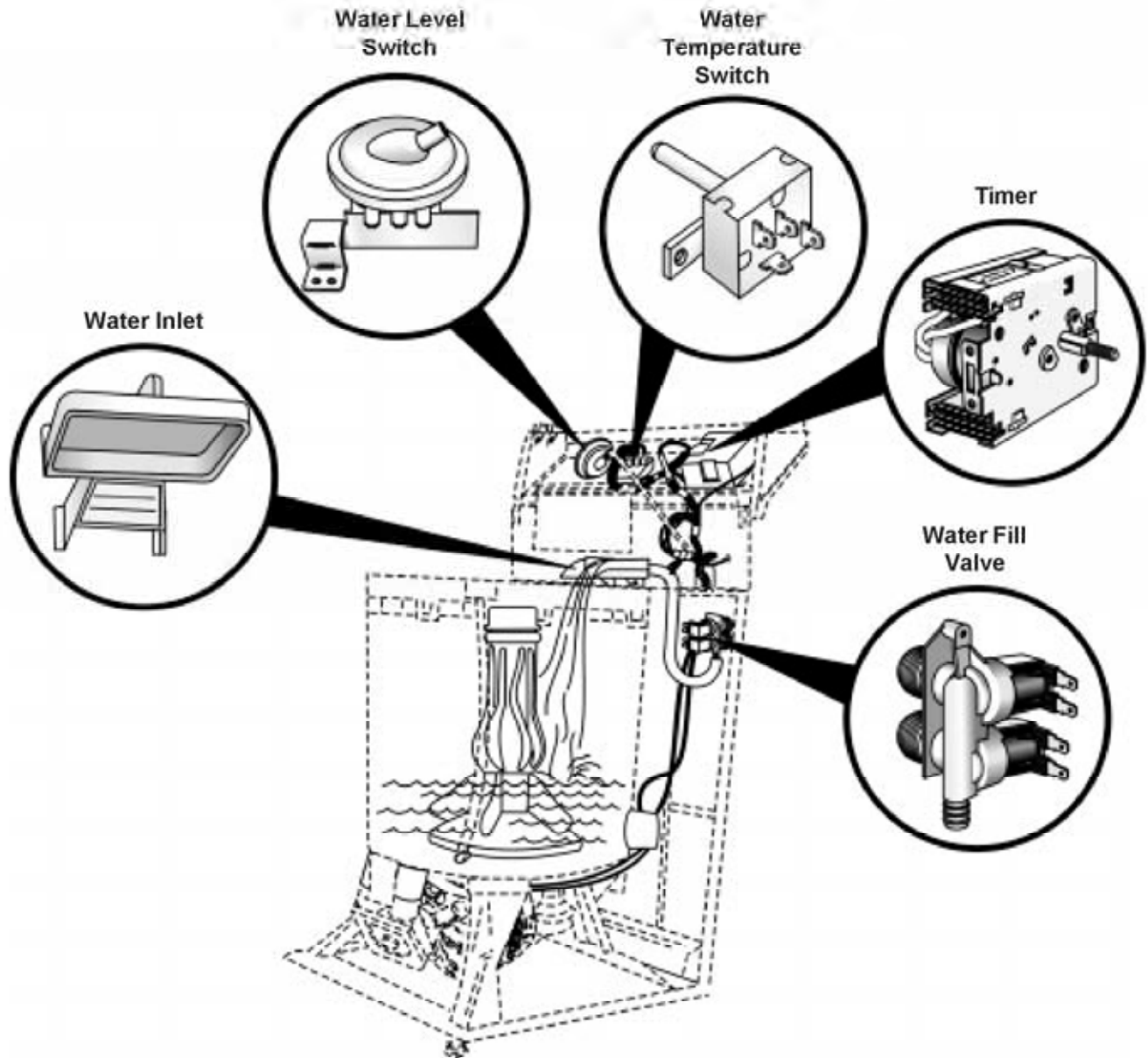
COMMON INSTALLATION PROBLEMS

1. Water does not pump out.
Causes:
 - a. Drain hose too high (over six feet).
 - b. Blockage or crimp in the drain hose.
 - c. Drain pipe not vented.
2. Water on the floor.
Causes:
 - a. A leaking hose on the water inlet valve or faucet.
 - b. A leaking drain hose connection.
 - c. The drain hose is coming out of the stand pipe when draining.
 - d. Restricted drain pipe -- running beyond capacity.
3. The machine vibrates or "walks".
Causes:
 - a. Improperly installed front feet, or lock nut not tightened to base of unit.
 - b. The washer is not level.
 - c. The shipping strap is not removed or a retaining pin is still attached to a shipping pin on the base of the washer.
 - d. Floor not solid.
 - e. Rear leveling legs not set.
4. The machine doesn't fill.
Causes:
 - a. The water faucets are not turned on.
 - b. There is a blockage in the hose or the fill valves.
 - c. Drain hose siphoning -- too low in stand-pipe, or siphon break not installed.

THEORY OF OPERATION

All washers perform essentially the same four functions. They fill with water, agitate, drain the water, and spin the water out of the clothing.

FILL



- Before the washer can fill, the customer makes selections that:
 - Control the agitation speed in the wash cycle by selecting cycle type.
 - Control the temperature of the wash and rinse water by setting the water temperature switch. The water temperature switch is identified by the dotted box in Fig. 3-1. The wash temp switch chart indicates three possible switches, depending on the model washer being used. The switch letters in the chart, H W and C are the possible water temperature selections, Hot, Warm, and Cold. The first letter is the wash temperature, the second letter is the rinse temperature.
 - Control the amount of water required for the amount of clothing by setting the water level or by adjusting the pressure switch.
- Once the selections are made, a series of switches are closed in the timer and water temperature switch. If, for example, the customer selects the beginning of the REGULAR cycle, increment 4 on the Timer Sequence Chart below, and a WARM wash and COLD rinse, the following switches would be closed.

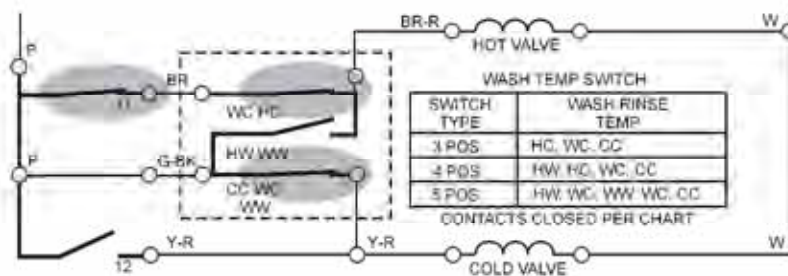


Fig. 3-1



TIMER SEQUENCE CHART

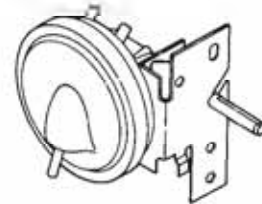
The water level switch is set to move from the EMPTY position to the FULL position depending on how much tension is set on the switch diaphragm.

- When the customer starts the machine, power is supplied to the hot and/or cold water inlet solenoids. In the example above, both inlet solenoids are energized to allow water to fill the tub.
- As the water level rises in the tub, it causes an increase in air pressure in the air dome assembly mounted to the side of the tub. A hose between the air dome and the water level switch transfers this air pressure against the diaphragm in the water level switch, causing electrical contacts to move from V to P, (EMPTY position), to V to T, (FULL position). The washer stops filling and the water level switch is providing voltage to the timer motor and the drive motor to begin agitation.

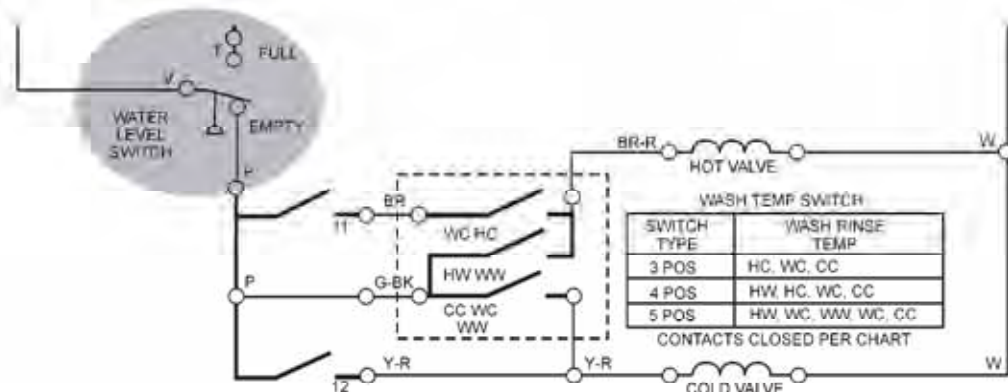
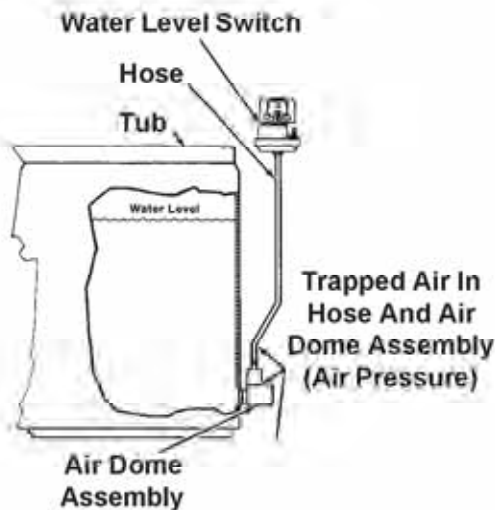
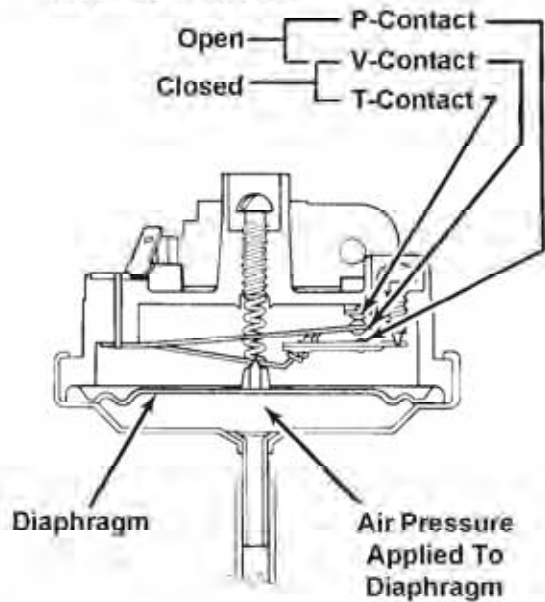
Newer Water Level Switch



Older Water Level Switch

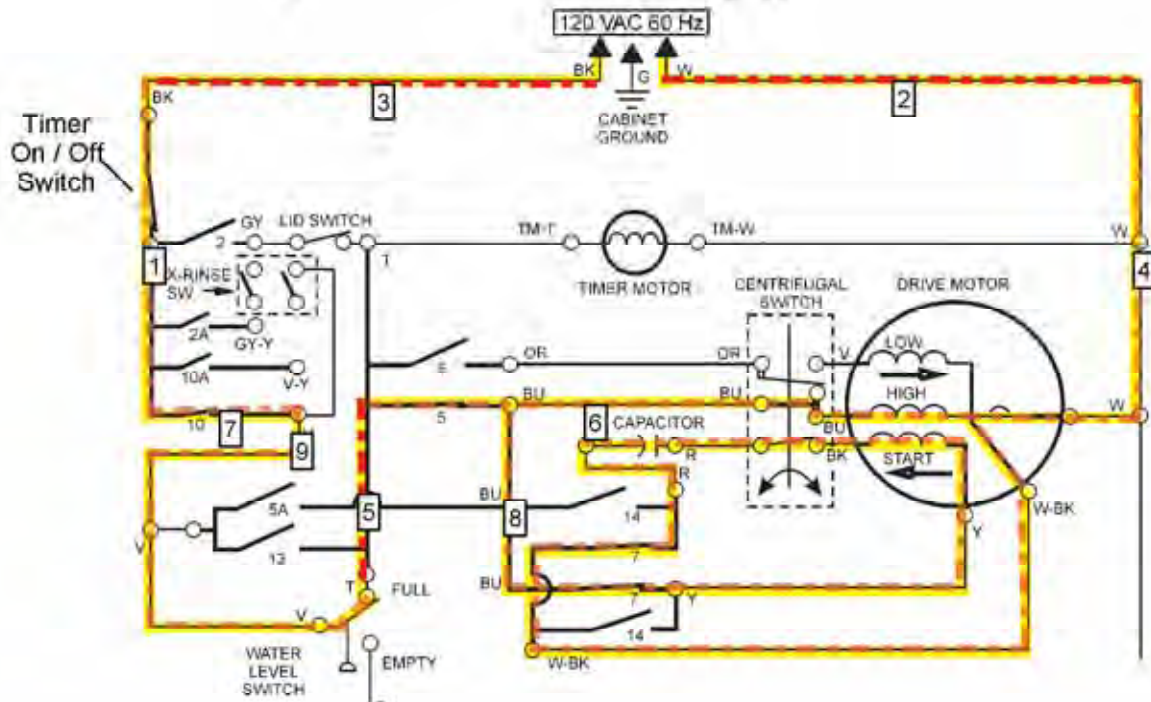


WATER LEVEL SWITCH AT FULL POSITION

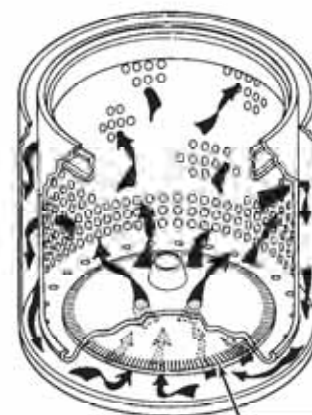
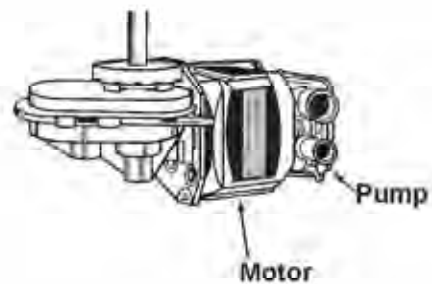


WASHER THEORY OF OPERATION

- Once there is power to the timer motor, the timer will start to advance. The drive motor will also begin to turn counterclockwise in the agitation direction. The direction of current through the drive motor start winding will determine the direction the drive motor runs. In the agitation mode, contacts 7 are closed, causing current to flow in the start winding opposite the flow in the run winding.



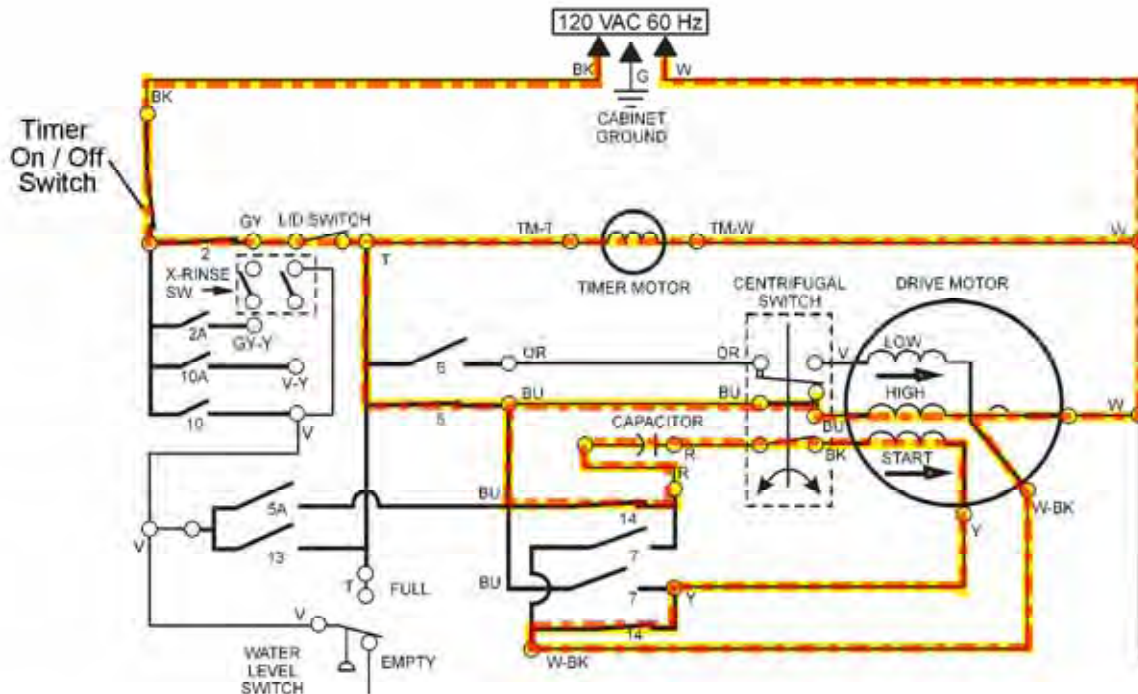
- The motor is coupled directly to the transmission and will cause the transmission shaft to turn in the agitate direction. The agitator is mounted directly to the transmission shaft and is driven back and forth to provide agitation.
- The water pump is mounted directly to the motor and will also turn in the agitate direction. At this point the pump is running in reverse, so water does not leave the tub.
- During the agitation cycle, the wash water is being pulled through a basket mounted lint filter, (if equipped), by pumping vanes molded into the underside of the agitator. Due to the shape of the filter, lint is captured on the filter fins.
- Also, during the agitation cycle, the transmission is being set up for neutral drain to provide a pump-out prior to going into spin.
- Once the timer has advanced to the end of the wash cycle, contacts open in the timer causing the drive motor to stop.



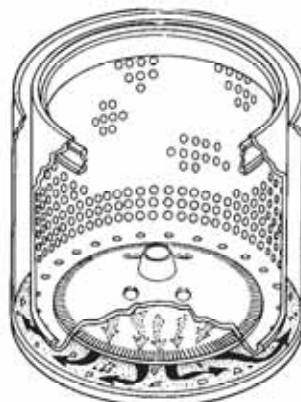
NOTE: Lint filter not on new commercial models

DRAIN CYCLE EXPLAINED

1. The timer advances to the next step in the process, which is the drain cycle. This time, contacts 14 in the timer are closed, energizing the drive motor to run in a clockwise direction. The current flow in the start winding is the same as that in the run winding.

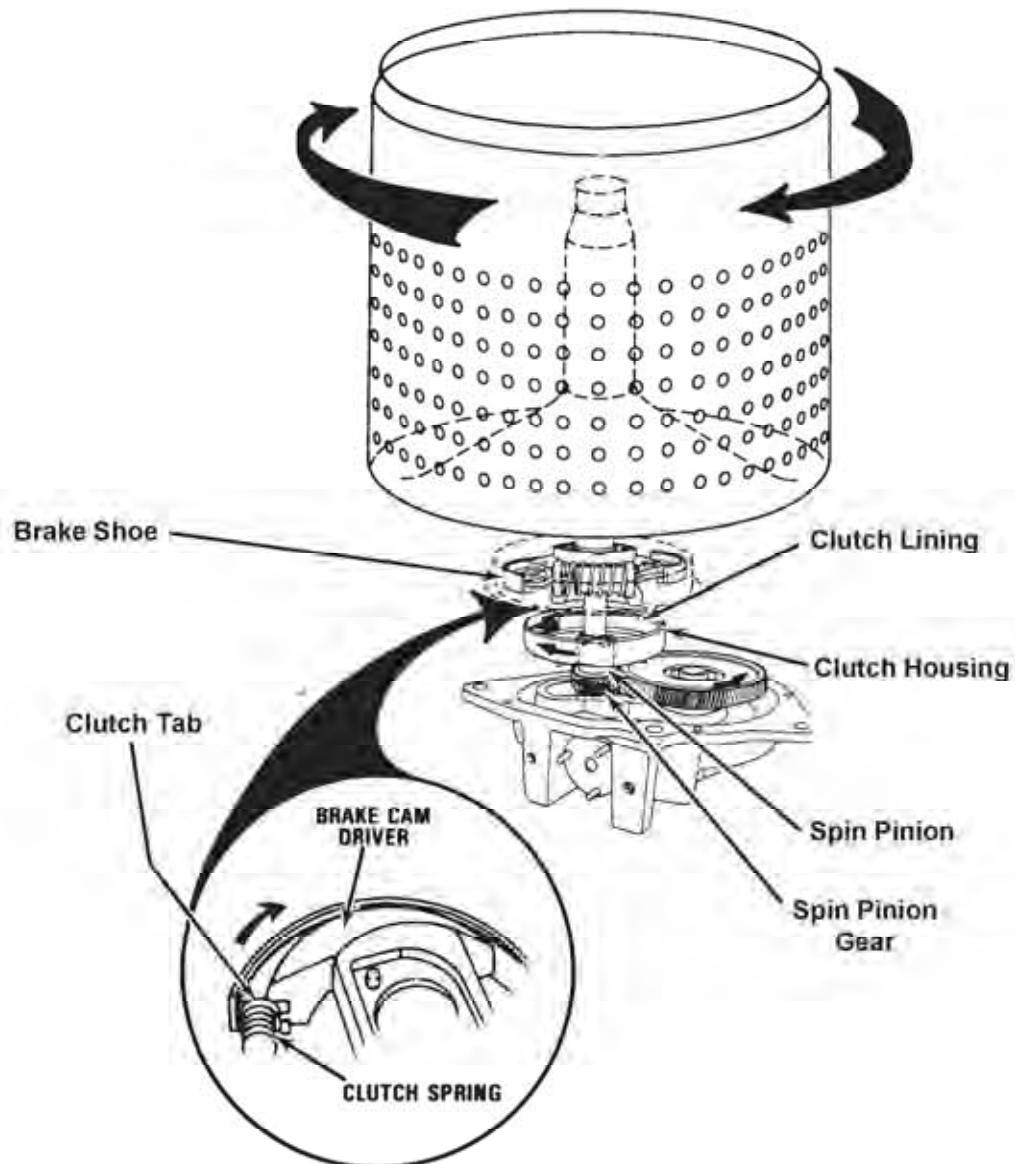


2. The drive motor now turns the pump in the clockwise or drain direction causing the pump to drain the dirty water out of the tub through the drain hose.
3. If the model has a Magic Clean Lint Filter: The weight of the water being pulled over the lint filter flushes the lint from the filter and out the drain hose with the dirty water (See page 3-4).



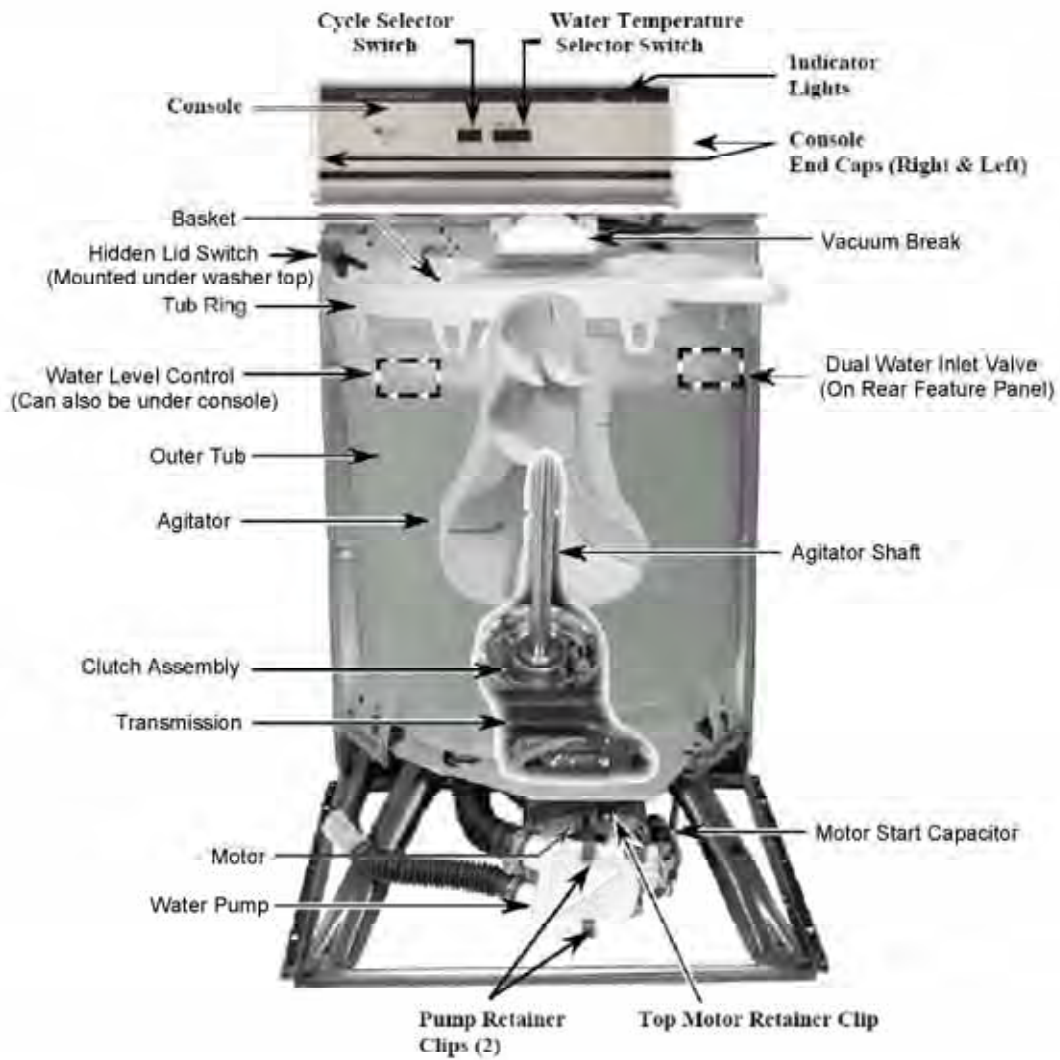
4. After a two-minute drain, the timer contacts open momentarily, stopping the drive motor. This momentary pause causes the transmission to reset itself for the spin cycle.

5. After the motor restarts, in the same clockwise direction, the transmission is reset for the spin mode and the spin pinion begins to turn.
6. A clutch housing is mounted directly to the transmission spin pinion and begins to turn as well.
7. Inside the clutch housing is a clutch lining that is turned by the clutch housing by friction. The clutch lining is an almost complete circular band that is cushioned with a spring to allow the clutch to slip as the basket is coming up to speed. This slip prevents high torque loads on the motor and allows the motor to bring this heavy load up to speed without overloading.
8. The clutch lining is designed to contact the basket drive brake cam which releases the basket drive brakes during the spin cycle, allowing the basket drive to turn freely.
9. The basket drive is connected to the basket with a drive block and nut. The turning basket drive causes the basket to begin to spin.
10. As the basket gets up to its full spin speed, the clutch slippage is gradually reduced until the clutch, basket drive and basket are being driven as if they were one unit.



COMMERCIAL WASHER

COMPONENT ACCESS LOCATIONS



WARNING



ELECTRIC SHOCK HAZARD

Disconnect the washer from the electrical power outlet before performing any service or repairs.

Replace all panels before operating.

Failure to follow these instructions could result in death or electrical shock.

ACCESSING COMPONENTS IN THE CONSOLE

A number of critical components can be accessed from inside the control console. These components are:

1. Timer
2. Push-button Switch Assembly
3. Water Level Switch

Servicing Components in the Console

1. Remove the two Phillips-head screws securing the front corners of the console to the washer top.
2. Tip the console back on the hinges that secure the top of the console to the washer back.
(Fig. 3-2)

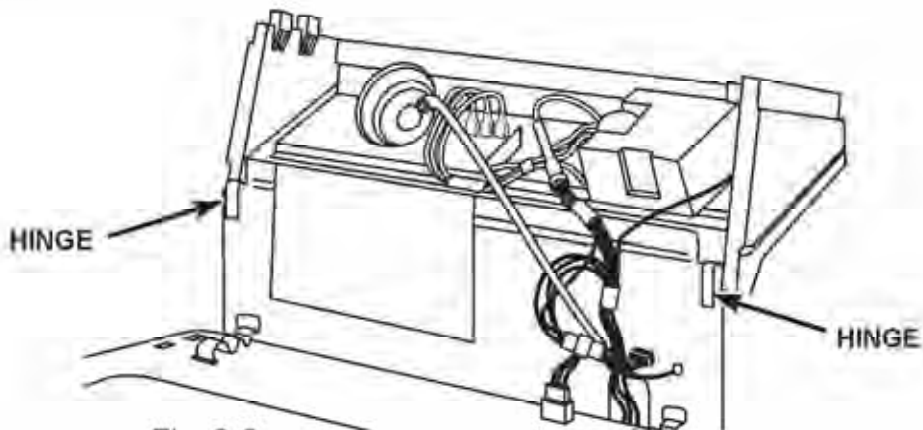


Fig. 3-2

NOTE: Timer is located inside of the metercase on coin-operated units. Water level pressure switch has been moved around over years from under the console as shown, to the feature panel under the top of the unit.

Removing the Timer

There are two types of timers. One can be identified by a plastic body. The other has a metal body.

Plastic Body

NOTE: DO NOT ATTEMPT TO REMOVE A TIMER KNOB BY PULLING UP FROM THE FRONT (OUTSIDE OF THE CONSOLE). Doing so will damage the split timer-shaft and result in requiring the replacment of the entire timer assembly.

1. To remove the timer knob, push the knob in from the front.
2. At the back of the timer, pull the black tab out approximately 3/16" (being careful not to pull the tab completely out of the timer), then pull the timer knob off of the timer's shaft.



Fig. 3-3

3. Slide the timer dial from the timer hub (if present).
4. Unplug the wiring harness connector from the timer assembly terminals.
5. Remove the one (1) Hex-head screw securing the left side of the timer assembly to the console mounting plate. Then lift the left side and slide the tabs at the right side of the timer assembly from the console mounting plate. Exact mounting instructions may change by model line.



Fig. 3-4

Metal Body

1. To remove the timer knob, push the knob in from the front and unscrew it from the timer shaft. (Fig. 3-5)
2. Slide the timer dial from the timer hub.
3. Remove the two (2) Hex-head screws securing the timer assembly to the console mounting plate.
4. Unplug the wiring harness connector from the timer assembly terminals.

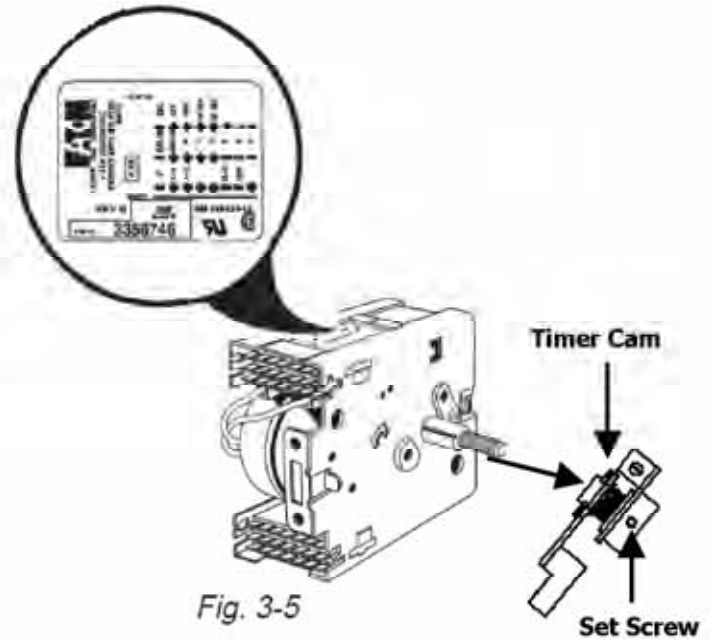
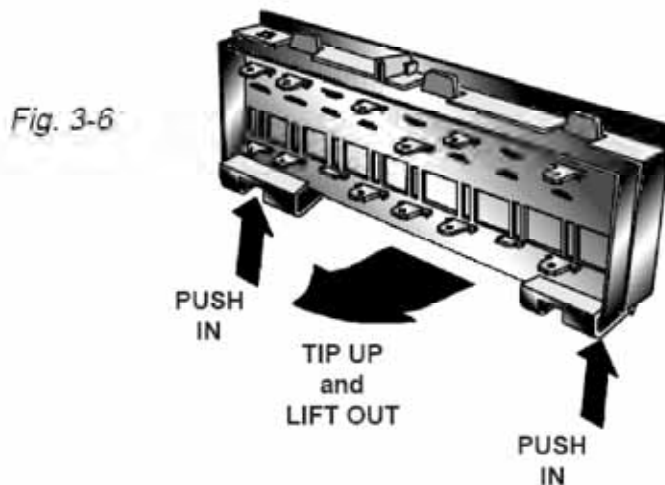


Fig. 3-5

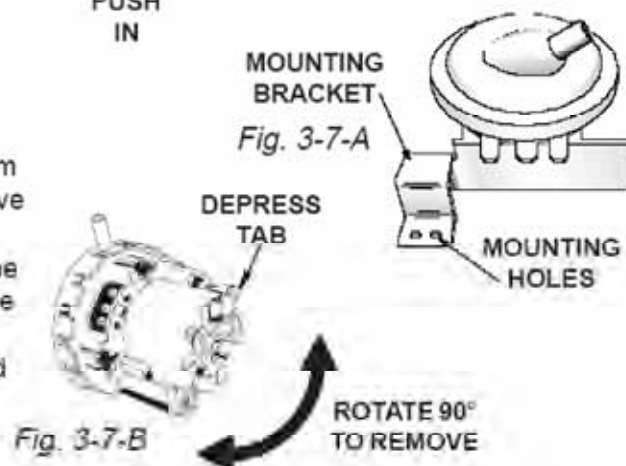
Removing the Push-Button Assembly

1. Unplug the wiring harness connectors from the switch assembly terminals using a pair of needlenose pliers.
2. Press in the two (2) tabs at the bottom of the switch assembly. Then, lift the bottom of the switch assembly up and lift it away from the console mounting plate. (Fig. 3-6)



Removing the Water Level Switch

1. Pull the knob off of the switch shaft.
2. Unplug the wiring harness connector from the switch assembly terminals and remove pressure switch tubing.
3. Remove the Hex-head screw securing the water level switch mounting bracket to the console mounting plate (Fig. 3-7-A) OR depress tab and rotate the switch 90° and pull it from the console mounting plate. (Fig. 3-7-B)



REMOVING THE HIDDEN LID SWITCH

⚠️ WARNING



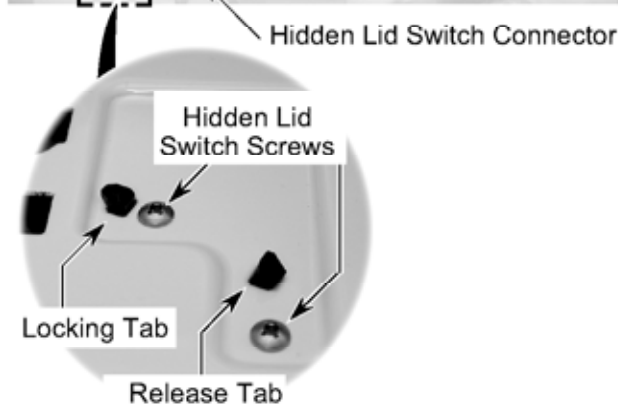
Electrical Shock Hazard

Disconnect power before servicing.

Replace all parts and panels before operating.

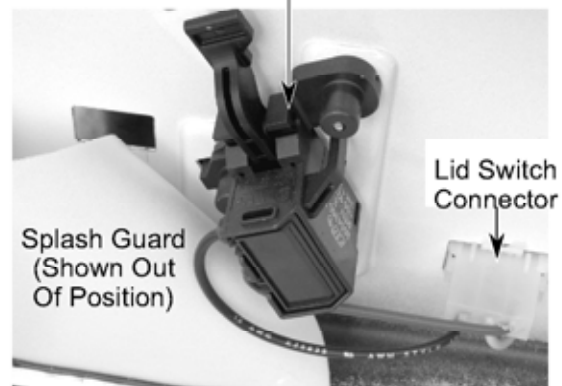
Failure to do so can result in death or electrical shock.

1. Unplug washer or disconnect power.
2. Position the console to its service position (see page 4-2 for the procedure).
3. Disconnect the main harness connector from the hidden lid switch connector.
4. Remove the 5/16" hex-head screw from the hidden lid switch ground wire.
5. Press the locking tab on the lid switch connector to release it, and push the connector out of the cutout.
6. Remove the two hidden lid switch mounting screws.

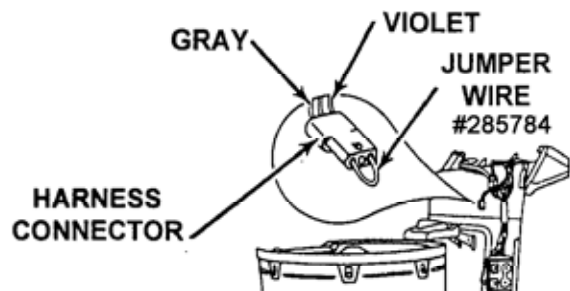


7. Raise the washer lid.
8. From the left side of the unit, reach between the cabinet top and the tub ring, and disconnect the lid switch connector.
9. Grasp the hidden lid switch (you may have to push the splash guard out of the way). With your other hand, press the release tab on the hidden lid switch on the cabinet top, and remove the switch.

Grasp Hidden Lid Switch & Remove It



NOTE: For diagnostic use only, use Whirlpool Jumper Wire Kit #285784 to operate the unit with the lid off or open.



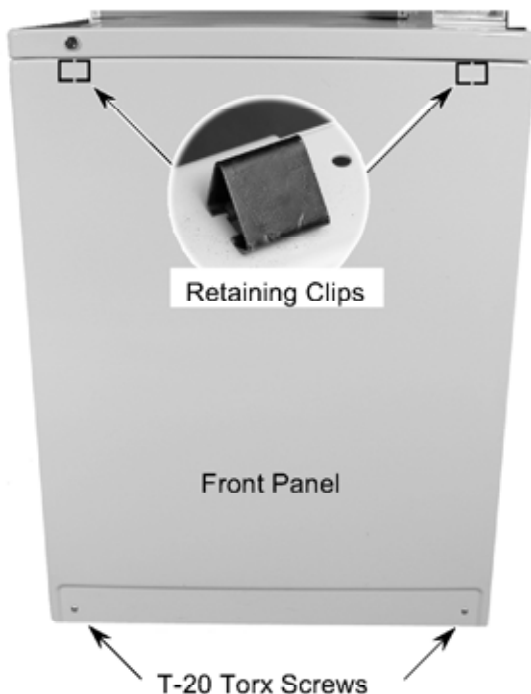
REMOVING THE PUMP, MOTOR START CAPACITOR, & MOTOR

⚠️ WARNING



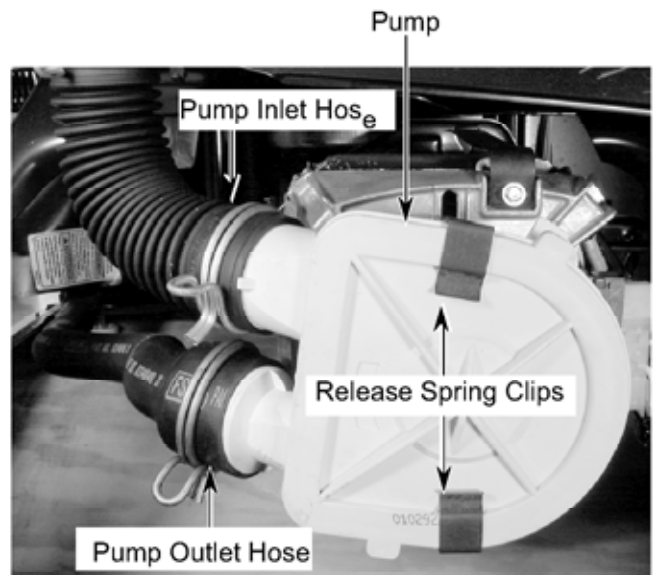
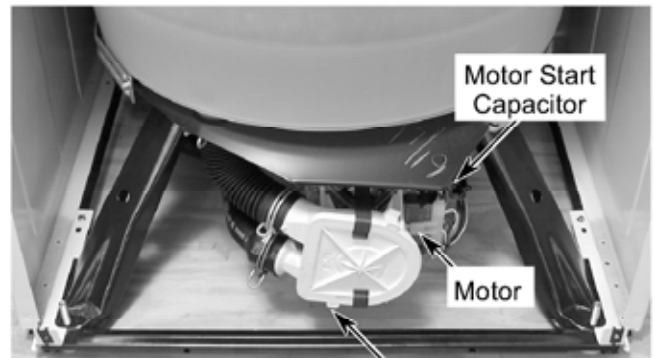
Electrical Shock Hazard
Disconnect power before servicing.
Replace all parts and panels before operating.
Failure to do so can result in death or electrical shock.

1. Unplug washer or disconnect power.
2. Remove the two T-20 Torx screws from the bottom of the front panel.
3. To remove the front panel, pull the bottom forward to release it from the two top retaining clips, and remove the panel.

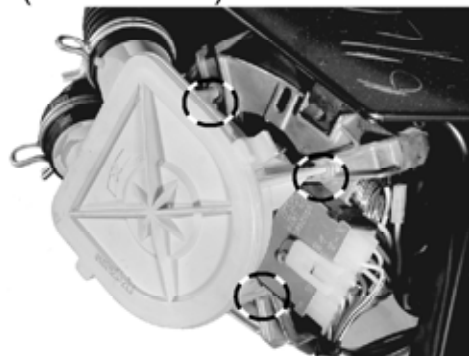


NOTE: The pump, motor start capacitor, and motor can more easily be accessed by tilting the washer back, or by laying it on its rear panel.

4. To remove the pump:
 - a) Release the two pump spring clips and pull the pump away from the motor.
 - b) Place a container near the two pump hoses to catch the water, then remove the clamps from the inlet and outlet hoses, and pull them off the pump.

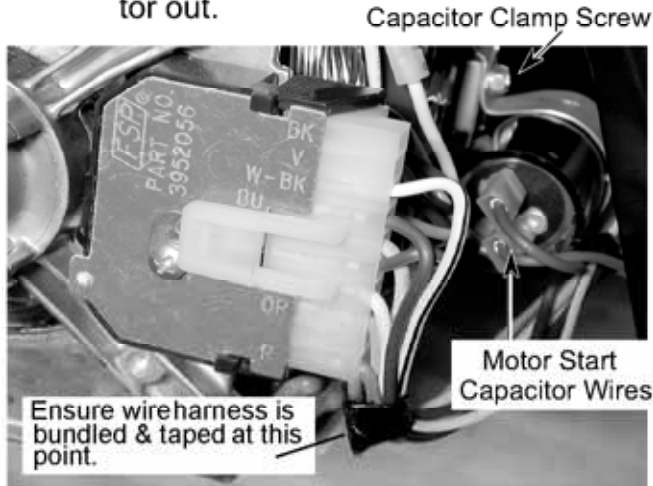


REASSEMBLY NOTE: Position the pump on the motor shaft with the feet in the bracket indents (circled below).



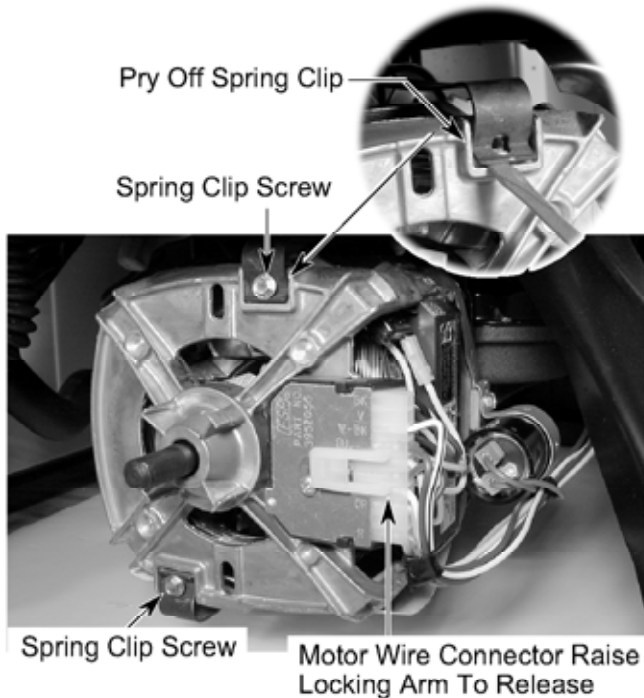
5. **To remove the motor start capacitor:**

- a) Disconnect the two wires from the motor start capacitor terminals.
- b) Loosen the hex-head screw on the capacitor clamp and slide the capacitor out.

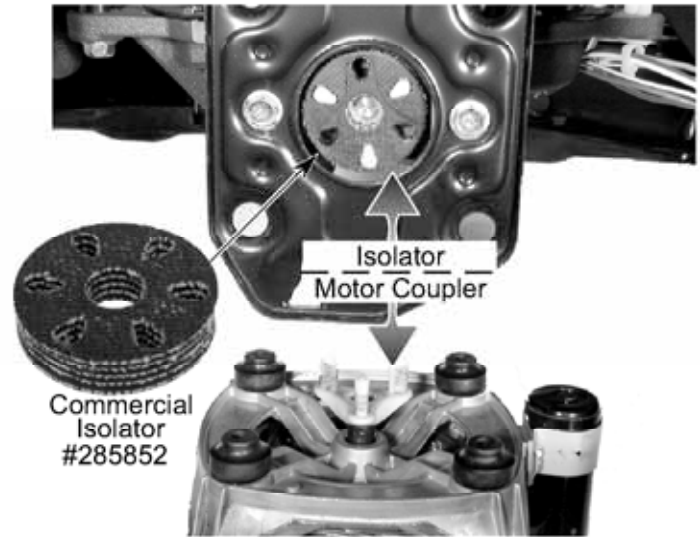


6. **To remove the motor:**

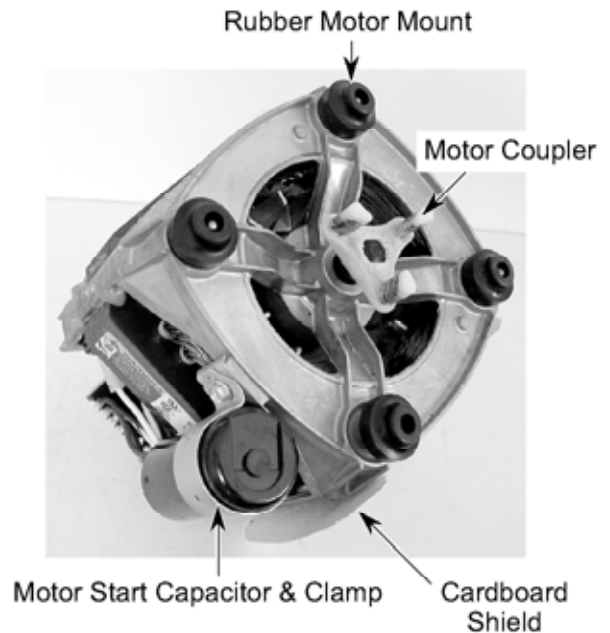
- a) Remove the pump (see step 4 for the procedure).
- b) Raise the locking arm and disconnect the wire connector from the motor.
- c) Disconnect the two wires from the motor start capacitor terminals.
- d) Remove the hex-head screw from each of the two motor mounting spring clips.



- e) Support the bottom of the motor with one hand to keep it from dropping, then pry the end of the top spring clip off the motor with a screwdriver, (see the round inset), and remove the lower spring clip.
- f) Lower the front of the motor until the motor coupler pins disengage from the motor coupler isolator, and remove the motor.



- g) Remove the following components from the motor:
 - Motor Coupler
 - Motor Start Capacitor & Clamp
 - Rubber Motor Mounts (4)
 - Cardboard Shield



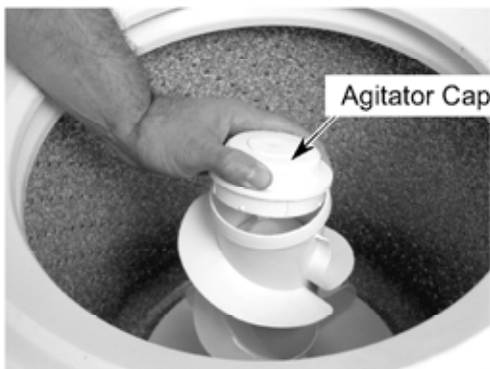
REMOVING THE AGITATOR & TRANSMISSION

⚠️ WARNING



Electrical Shock Hazard
Disconnect power before servicing.
Replace all parts and panels before operating.
Failure to do so can result in death or electrical shock.

1. Unplug washer or disconnect power.
2. **To remove the agitator:**
 - a) Unsnap the agitator cap from the agitator and remove it.

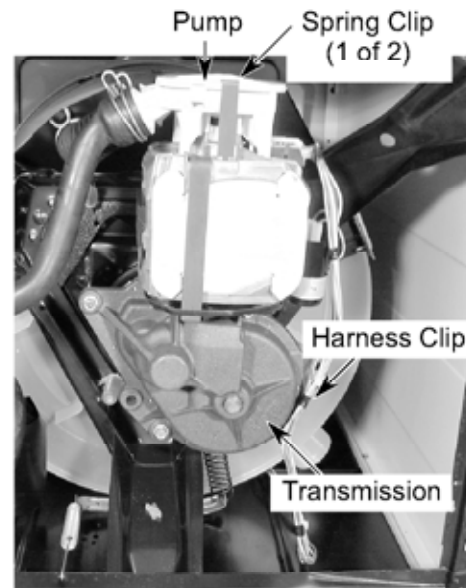


- b) Pull out the air dome cover, with its rubber O-ring from inside the top of a 2-piece agitator, if no cover go to step c.



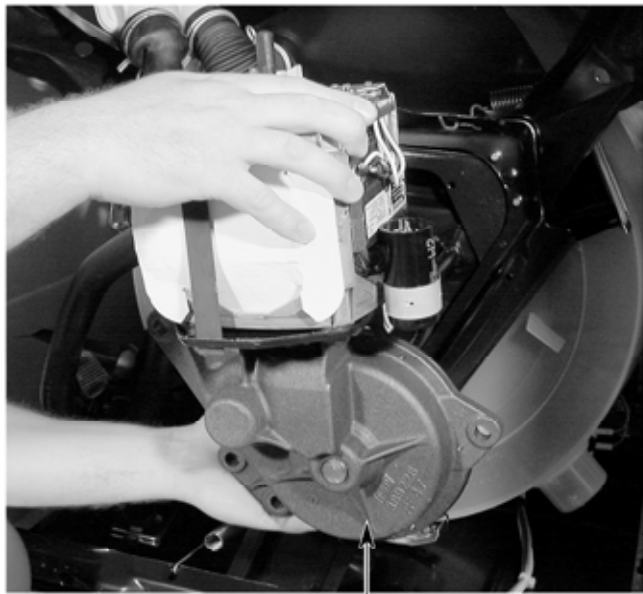
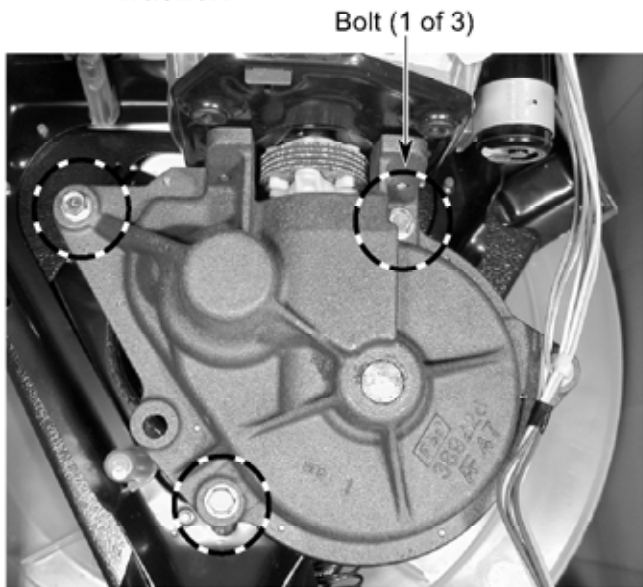
- c) Remove the bolt from the agitator and lift the agitator out of the washer.

3. **To remove the transmission:**
 - a) Tape the washer lid closed.
 - b) Tilt the washer back at a 45° angle, or lay it on its back panel.
 - c) Unclip the two spring clips from the pump and remove the pump from the motor shaft (see step 4 on page 4-6).
 - d) Disconnect the motor wire connector and the two motor start capacitor wires (see step 6 on page 4-7).
 - e) Disconnect the harness clip from the transmission.



Continued on the next page.

- f) Remove the three 1/2" bolts from the transmission and pull the transmission and motor assembly away from the washer.

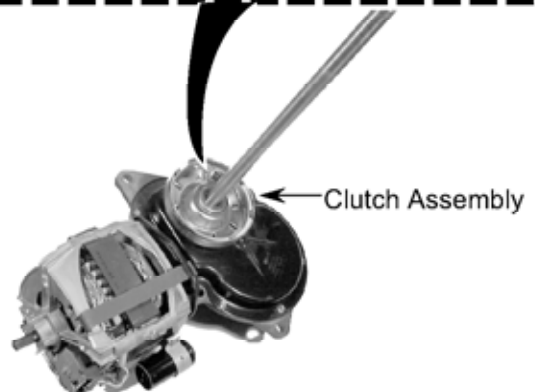
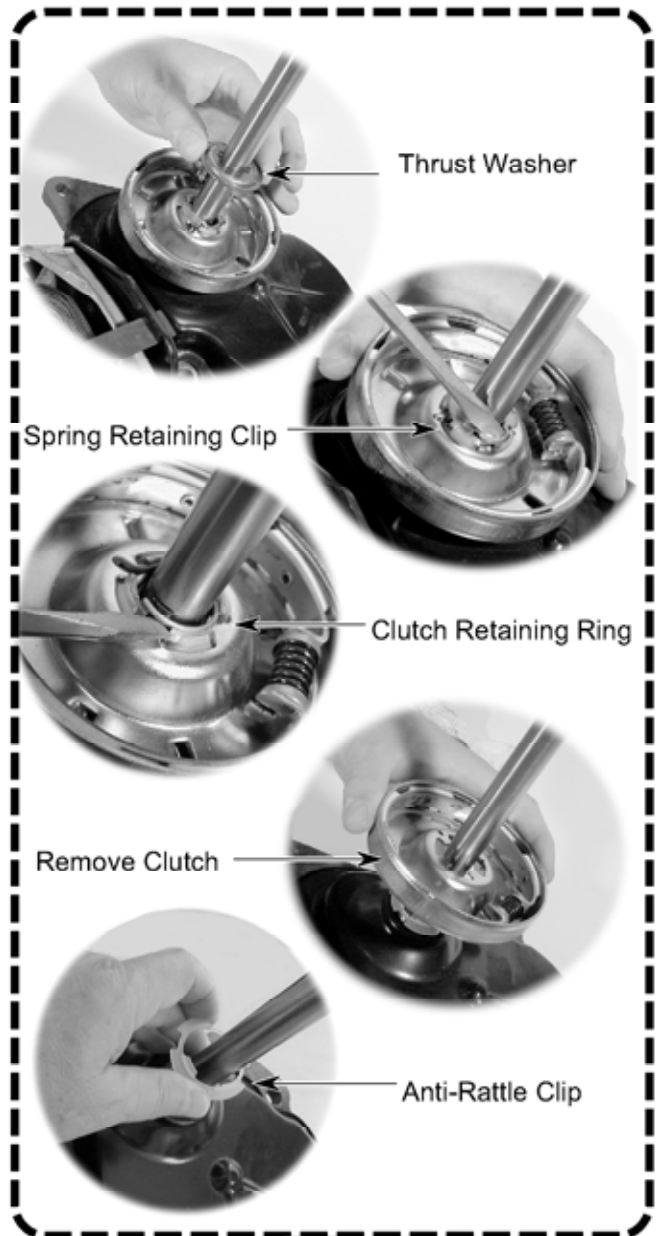


Pull Transmission & Motor From Washer

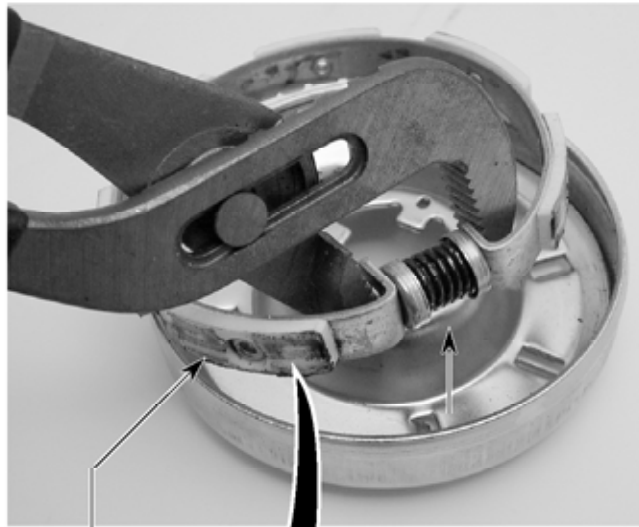
Refer to the photos in the next column.

- g) Remove the thrust washer from the agitator shaft.
- h) Use a screwdriver and unsnap the spring retaining clip from the agitator shaft.
- i) Use a screwdriver and unsnap the clutch retaining ring from the agitator shaft.

- j) Slide the clutch off the agitator shaft.
- k) Slide the anti-rattle clip off the agitator shaft.

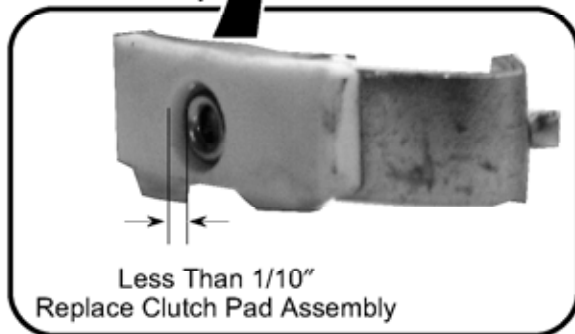


- l) Use a pair of pliers and remove the pad assembly from the clutch drum by compressing the clutch lining spring.



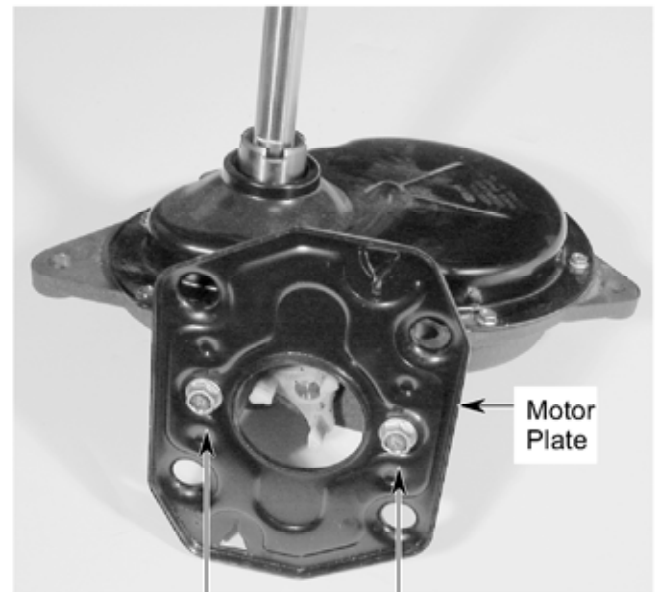
Clutch Pad Assembly

Clutch Drum



- m) Clean the inner surface of the clutch drum and the clutch pad assembly surfaces with an approved solvent, such as brake cleaner. Both assemblies must be free of dirt, oil, and grease so that the proper spin speed and water extraction may be achieved.

- n) Inspect the inside contact surface of the drum for scratch marks, or uneven wear. Inspect the clutch pad assembly for loose, or worn pads (see the inset photo to the left). If the distance between the clutch pad contact surface and the clutch pad rivet head is less than $1/10$ " , replace the clutch assembly with part #285785.
- o) Remove the motor from the transmission (see step 6 on page 4-7 for the procedure).
- p) Remove the two $1/2$ " hex-head bolts from the motor plate and remove the plate.



Motor Plate

$1/2$ " Hex-Head Bolts

NOTE: For an exploded parts view of the transmission, see page 7-2.

REMOVING THE CABINET ASSEMBLY

⚠️ WARNING



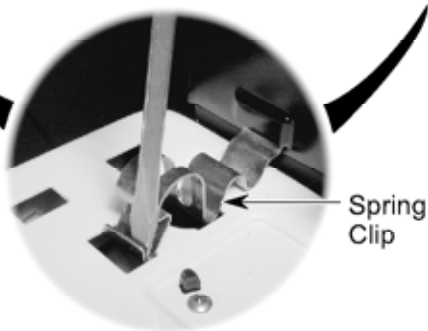
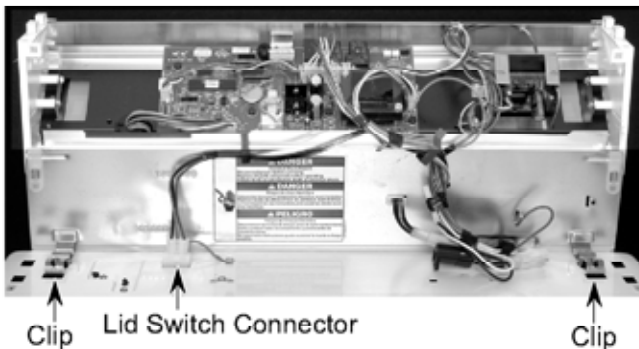
Electrical Shock Hazard

Disconnect power before servicing.

Replace all parts and panels before operating.

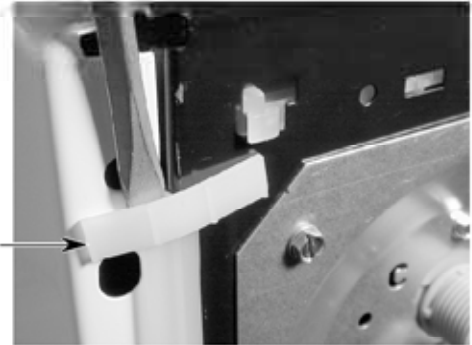
Failure to do so can result in death or electrical shock.

1. Unplug washer or disconnect power.
2. Position the console to its service position (see page 4-2 for the procedure).
3. Disconnect the main harness from the lid switch connector.



4. Use a screwdriver and unsnap the two cabinet spring clips from the cabinet top.
5. Use a screwdriver and unsnap the two cabinet side straps from the back of the washer.

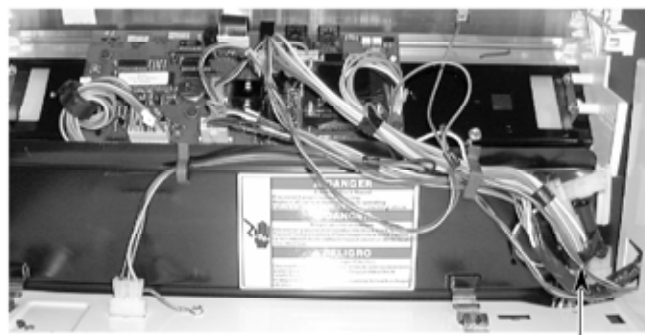
Cabinet Side Strap (1 of 2)



6. If removable, remove the cabinet front panel.
7. Then remove the three bottom 5/16" side panel hex-head screws (2 on right, 1 on left).



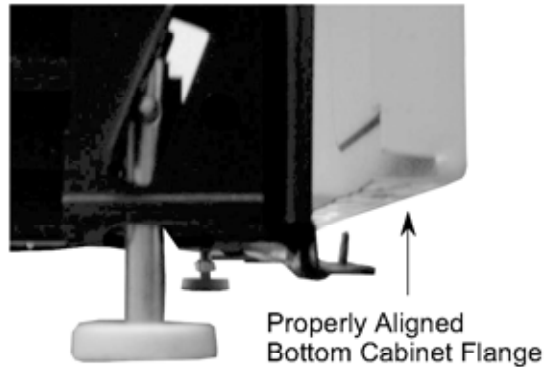
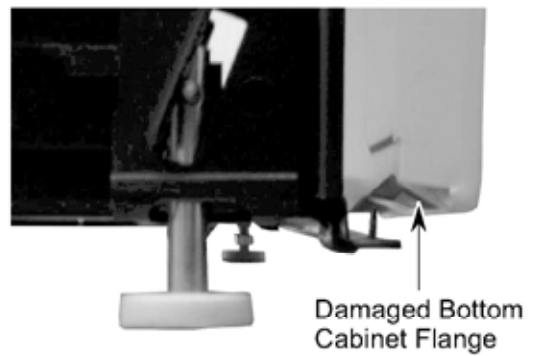
8. **On older metercase models**, disconnect all metercase electrical connections, and pull them into the console before removing the cabinet. Newer models have in-console disconnects.



Pull Wire Harness Out Of Metercase

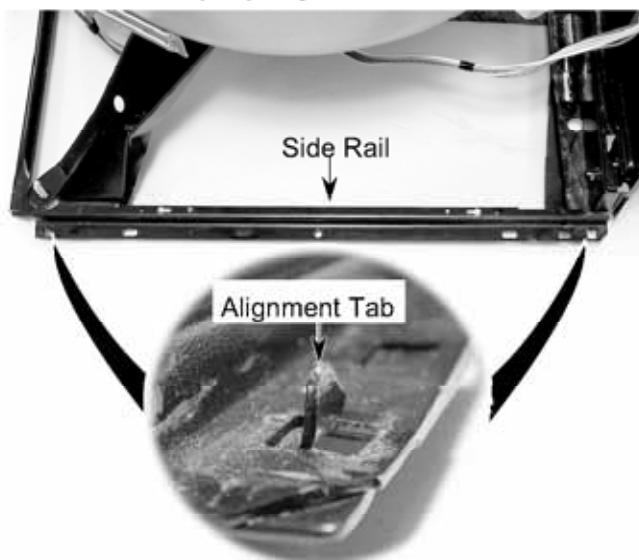
9. Lift the cabinet slightly and tip it forward on its front edges.

IMPORTANT: The cabinet will not stand on its own in the upright position with its front access panel removed.



NOTE: On front access units, we can remove the right and left side panels of the cabinet, instead of removing the complete cabinet assembly. However, you will have to remove the front panel first.

REASSEMBLY NOTE: When reinstalling the cabinet, make sure that the small alignment tabs at the front and rear of each side rail are fully upright, as shown below, and not bent over. Also make sure that the side rails are straight and not deformed, otherwise, the cabinet will not fit properly.



NOTE: Tension can be added to the cabinet clips to insure better frame-to-cabinet fit by adjusting the clips. Apply pressure in the direction of the arrow while holding the clip in the pliers. Another method is to install kit #488495.



REMOVING THE TUB RING, BASKET, OUTER TUB, AND BASKET DRIVE ASSEMBLY

⚠️ WARNING



Electrical Shock Hazard
Disconnect power before servicing.
Replace all parts and panels before operating.
Failure to do so can result in death or electrical shock.

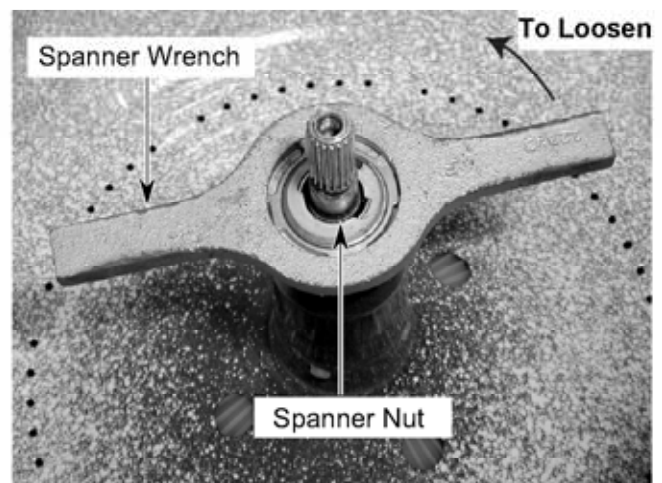
1. Unplug washer or disconnect power.
2. Remove the cabinet assembly (see page 4-11 for the procedure).
3. Remove the agitator (see step 2 on page 4-8 for the procedure).
4. **To remove tub ring from the outer tub:**
 - a) Press down on the tub ring at each of the clips and pull the clips away from the outer tub catches.
 - b) Lift the tub ring off the basket.



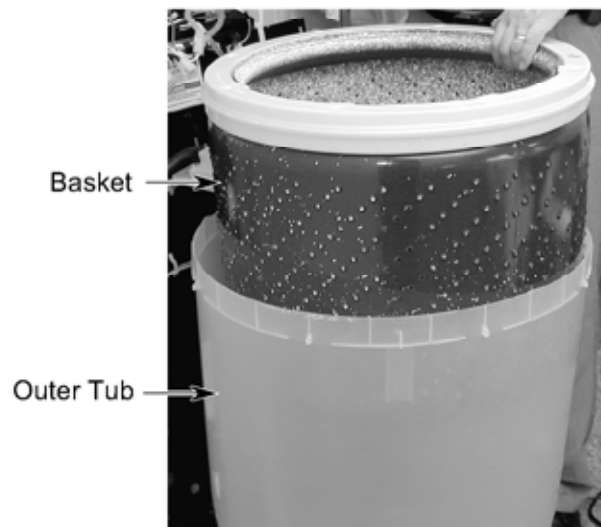
TUB RING REASSEMBLY NOTE: When reinstalling the tub ring, snap the tub ring clip with the narrow opening onto the catch on the outer tub first, then work around the ring to snap the remaining clips in place.

5. To remove the basket:

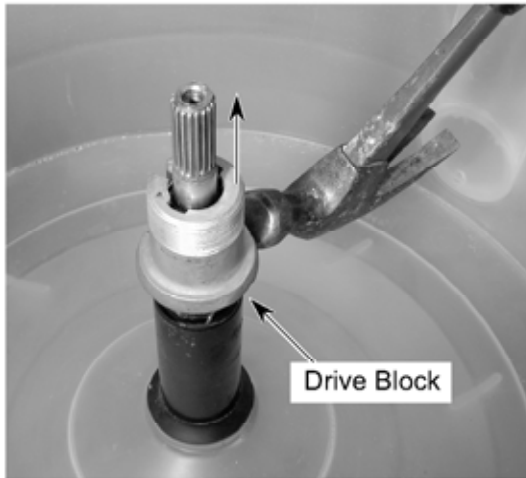
- a) Use a spanner wrench and remove the spanner nut from the drive block. Tap the spanner wrench with a hammer to loosen the nut while holding the basket.



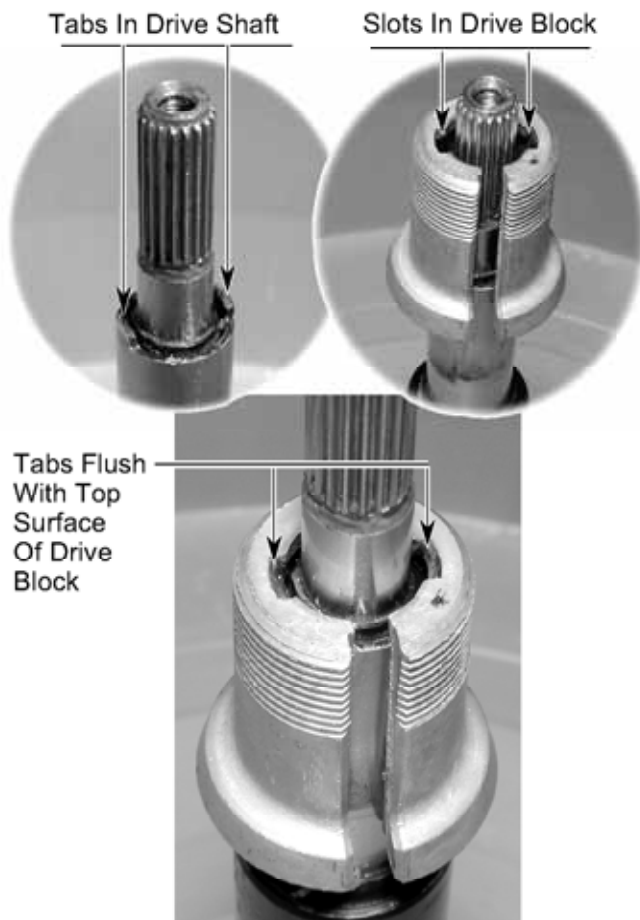
- b) Press down on one side of the basket with the heels of both hands and release the basket from the drive block, then lift the basket off the drive shaft, and out of the outer tub.



- c) Tap the bottom of the drive block with a hammer and remove it from the basket drive shaft.



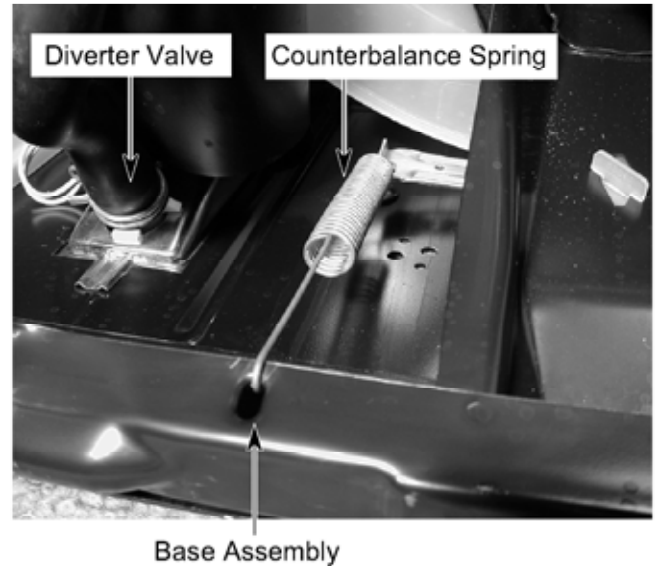
DRIVE BLOCK REASSEMBLY NOTE: When reinstalling the drive block on the basket drive, make sure to align the two slots in the drive block with the corresponding two tabs on the top of the basket drive shaft. If they are misaligned the basket drive and drive block will fail.



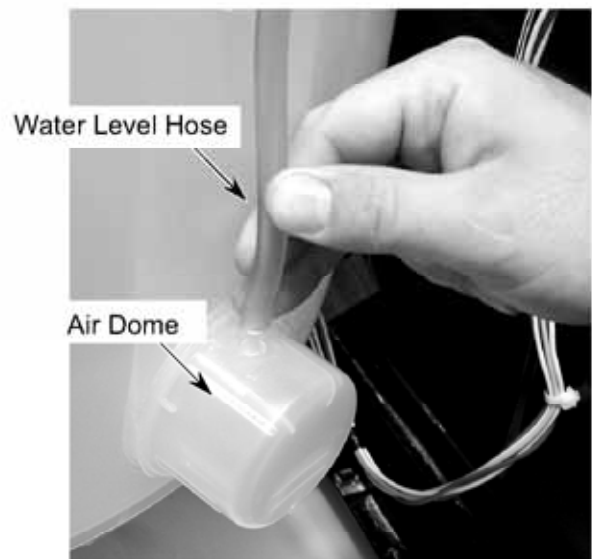
6. **To remove the outer tub:**

- a) Remove the end of the counterbalance spring from the hole in the frame.

NOTE: The long end of the spring is connected to the base assembly near the drain outlet. The washer in the photo below is shown laying on its rear panel.

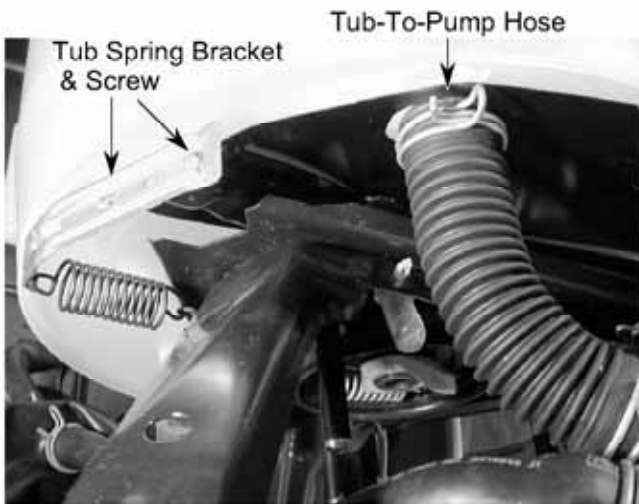


- b) Disconnect the end of the water level hose from the side of the outer tub.



Continued on the next page.

- c) Remove the end of the tub-to-pump hose from the bottom of the outer tub.
- d) Remove the hex-head screw from each of the outer tub spring brackets.

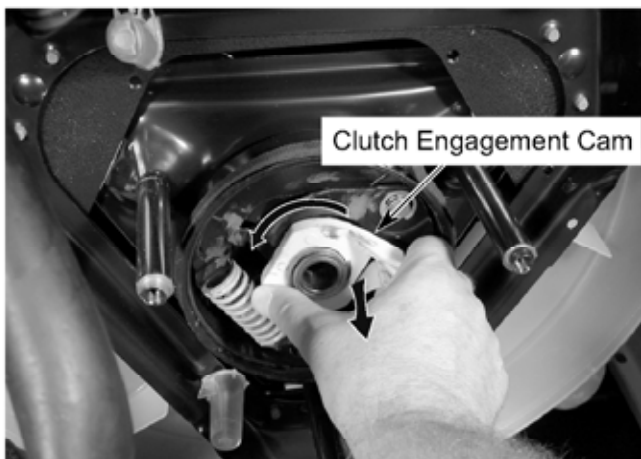


- e) Turn the outer tub while you lift it off the support assembly.

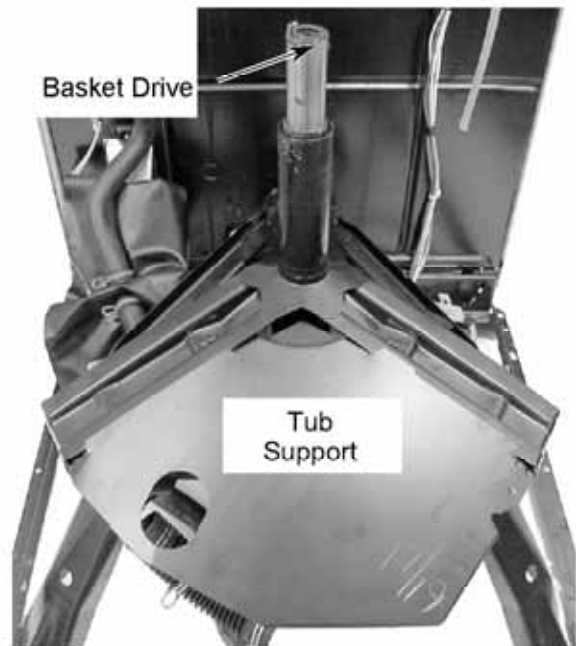
OUTER TUB REASSEMBLY NOTE: When you reinstall the outer tub, install the rear tub spring bracket first.

7. To remove the basket drive assembly:

- a) Remove the tub ring and the basket (see steps 4 and 5 on page 4-13 for the procedures).
- b) Remove the agitator and the transmission (see page 4-8 for the procedures).
- c) Turn the clutch engagement cam on the basket drive counterclockwise while pulling it toward you, and remove the basket drive from the support assembly.

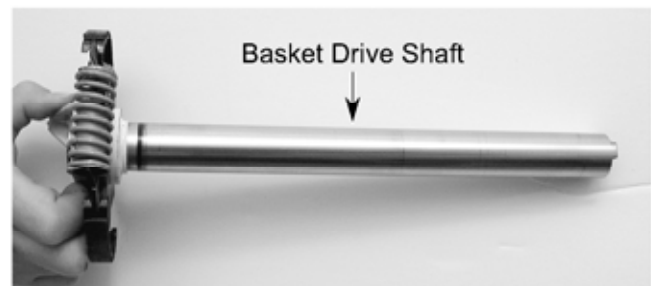


- d) Lift the tub support off of the washer base.



SERVICE NOTES:

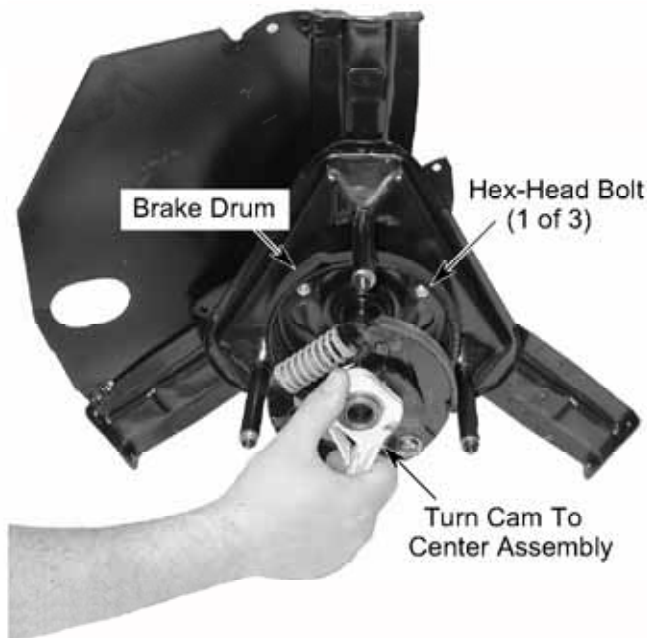
- While the basket drive is removed, check for shaft wear, using the procedure shown on page 6-6.



- If the brake drum on the tub support is removed for any reason, it will have to be properly realigned with the basket drive brake lining, when it is reinstalled. If this is not done the clutch pads and brake lining will wear prematurely, and the basket will contact the cabinet on spin down, causing a loud “bang.”

To align the brake lining and the brake drum:

- A. Install the brake drum on the basket drive support with its three 1/2" hex-head bolts and tighten them until they are just finger tight.
- B. Insert the shaft of the basket drive assembly into the tub support while turning turning the clutch engagement cam counterclockwise. Turning the clutch will compress the brake spring, and allow the the brake to clear the brake drum. Push the basket drive assembly into the tub support until the assembly bottoms out.
- C. Carefully turn the clutch engagement cam counterclockwise two complete revolutions, while applying enough force to the cam to insure that the basket drive brake linings firmly contact the brake drum.
- D. Increase pressure on the clutch engagement cam to compress the basket drive spring, then remove the basket drive from the support. Make sure that the brake linings do not touch the drum during the removal process.
- E. Retighten each of the brake drum hex-head bolts a little at a time until all 3-bolts are secure.



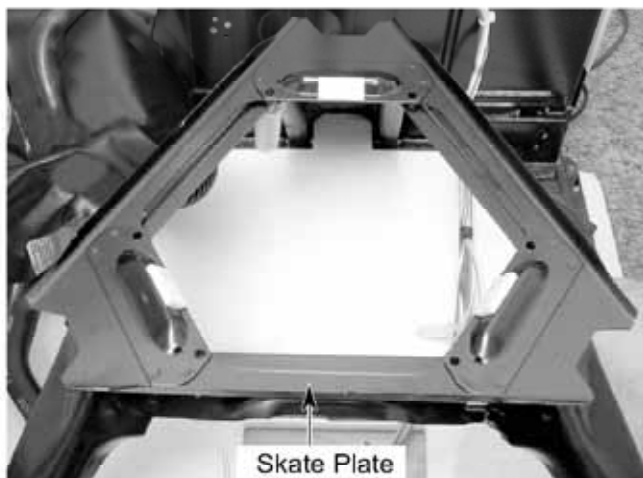
REMOVING THE SUSPENSION SYSTEM & BASE ASSEMBLY

⚠️ WARNING

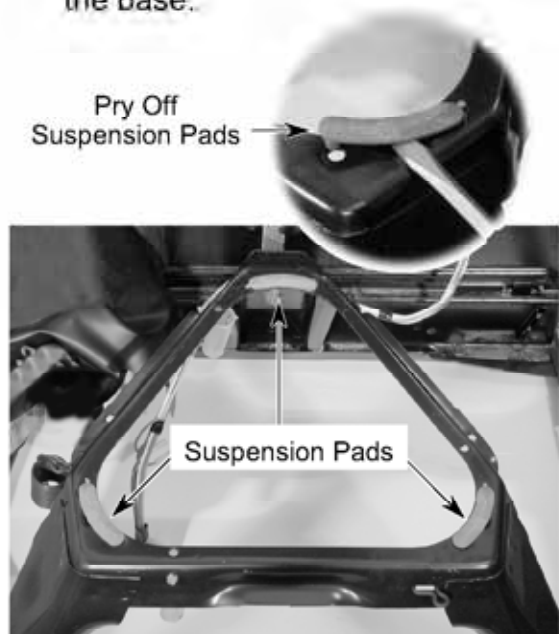


Electrical Shock Hazard
Disconnect power before servicing.
Replace all parts and panels before operating.
Failure to do so can result in death or electrical shock.

1. Unplug washer or disconnect power.
2. Remove the cabinet (see page 4-11 for the procedure).
3. **To remove the suspension system:**
 - a) Remove the pump (see page 4-6).
 - b) Remove the tub-to-pump hose from the bottom of the tub (see page 4-15).
 - c) Remove the motor (see page 4-7).
 - d) Unhook the ends of the three tub springs and the counterbalance spring from the tub brackets (see page 4-14).
 - e) Disconnect the water level hose from the air dome (see page 4-14).
 - f) Lift the tub assembly off the skate plate and the tub support.



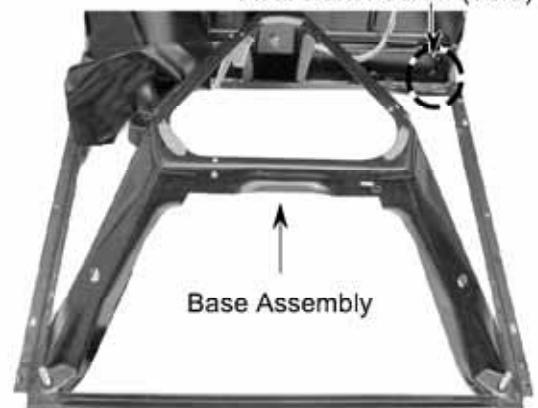
- g) Lift the skate plate off the base assembly (see the bottom left photo).
- h) The three suspension pads can now be removed by prying them off the top of the base.



4. **To remove the base assembly:**
 - a) Perform step 3, then remove the tub assembly and skate plate.
 - b) Remove two 5/16" hex-head base assembly screws from the rear panel.
 - c) Remove the rear panel from the base assembly.
 - d) If you are replacing the base assembly, remove the feet, springs, etc. from the assembly.

NOTE: The new base assembly is supplied with suspension pads already installed.

Rear Panel Screw (1 of 2)



REMOVING THE VACUUM BREAK

⚠️ WARNING



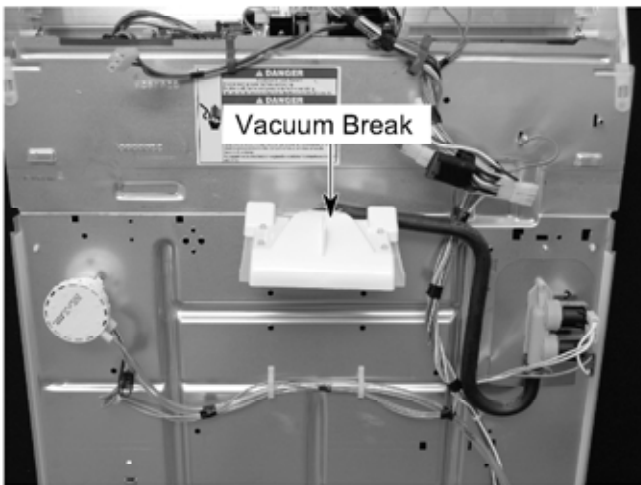
Electrical Shock Hazard

Disconnect power before servicing.

Replace all parts and panels before operating.

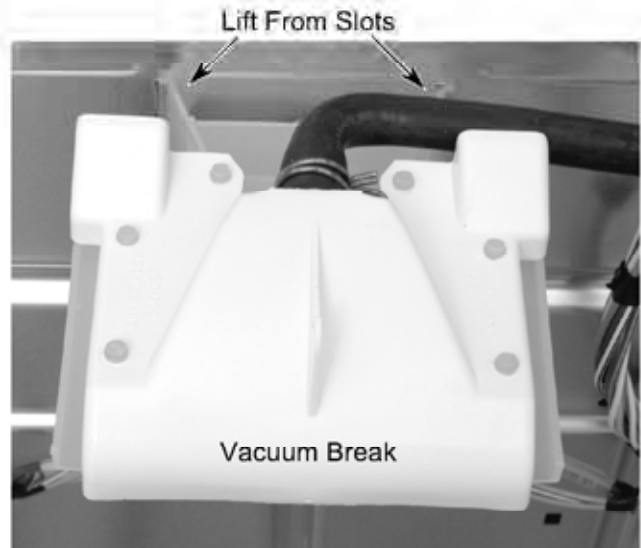
Failure to do so can result in death or electrical shock.

1. Unplug washer or disconnect power.
2. Remove the cabinet assembly from the washer (see page 4-11 for the procedure).



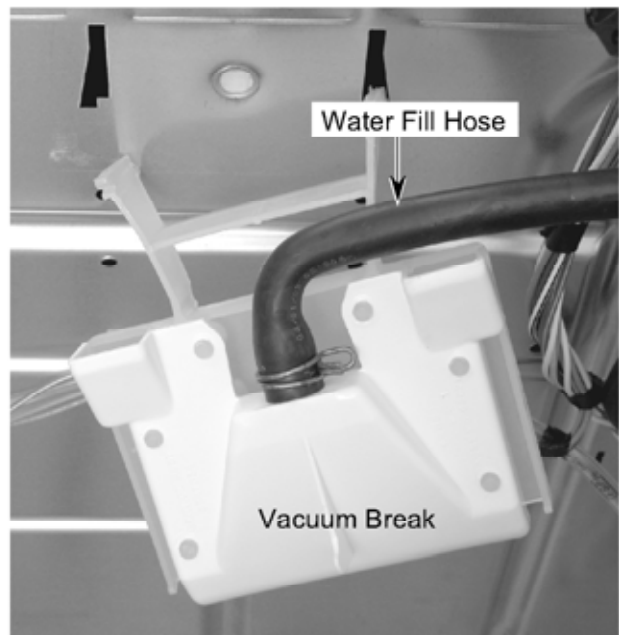
(View Of Rear Panel With Basket Removed)

3. Push outward on the lower part of the two vacuum break mounting tabs, lift out at the bottom, and remove the vacuum break from the slots in the rear panel.



4. Disconnect the water fill hose from the vacuum break.

NOTE: Use a container to catch the water from the hose.



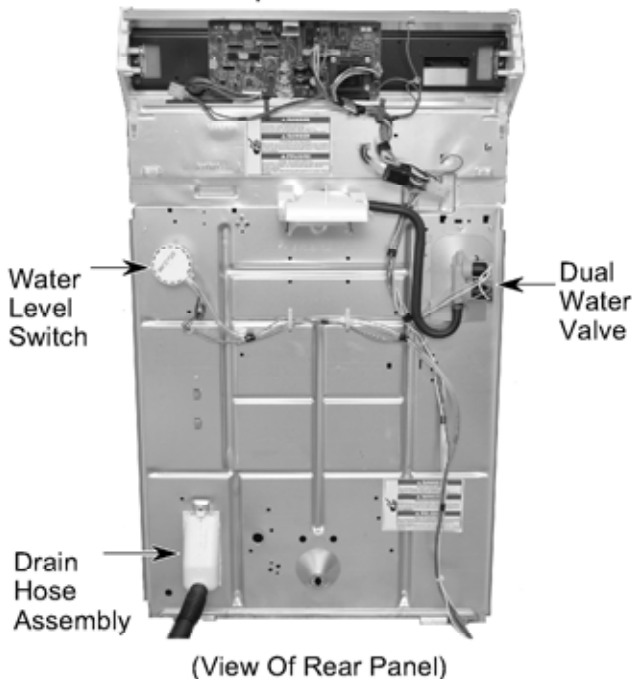
REMOVING THE DUAL WATER VALVE, WATER LEVEL SWITCH, AND DRAIN HOSE ASSEMBLY

⚠️ WARNING



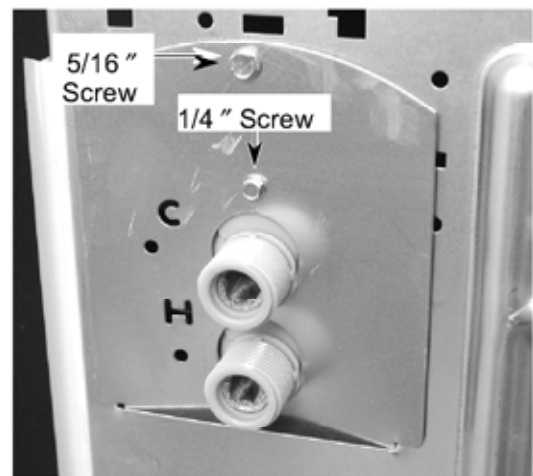
Electrical Shock Hazard
Disconnect power before servicing.
Replace all parts and panels before operating.
Failure to do so can result in death or electrical shock.

1. Unplug washer or disconnect power.
2. Position the washer so that you can access the rear panel.

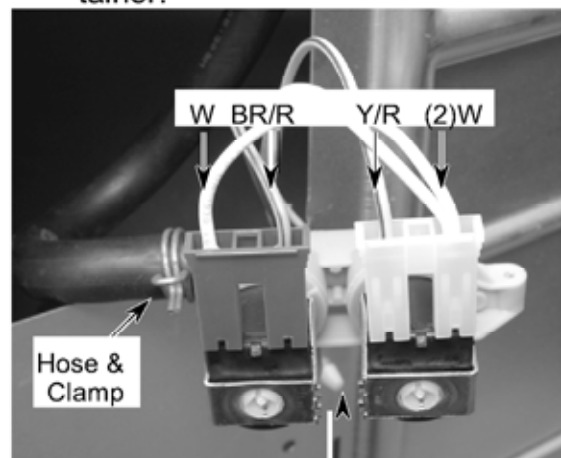


3. To remove the dual water valve:

- a) Remove the 5/16" hex-head mounting plate screw and the 1/4" dual water valve hex-head screw from the mounting plate.
- b) Lift the mounting plate and remove it from the rear panel.
- c) Lift the dual water valve and unhook it from the hole in the mounting plate.



- d) Pull the dual water valve out of the rear panel opening and disconnect the two wire connectors from the terminals. **NOTE:** Be sure to reinstall the red and white connectors as shown below.
- e) Remove the clamp from the end of the hose and drain the water into a container.



Dual Water Valve

DIAGNOSIS AND TROUBLESHOOTING

DIAGNOSIS AND TROUBLESHOOTING CHART

PROBLEM	POSSIBLE CAUSE	ACTION
1. MOTOR WILL NOT RUN NOTE: In diagnosing this problem, start the washer. If the motor runs in either agitate or drain, the motor is OK.	No/low voltage to machine	Supply voltage is (100-130 volts)
	Thermal overload tripped	Check Overload
	Timer switches	Check continuity
	Poor connection on timer	Secure terminal
	Motor centrifugal switch	Check continuity
	Motor disconnect block loose	Secure disconnect block
	Motor	Check windings
	Wiring harness	Check continuity
	Incorrect harness wiring	Check harness connections
	Water level switch	Check continuity
	Pump jammed	Replace pump
	Gearcase jammed	Replace gearcase
	Lid open in spin cycle	Close lid
2. NO AGITATE OR SPIN BUT MOTOR RUNS	Broken motor coupler	Replace coupler
	Internal gearcase problem	Replace gearcase
3. WATER WILL NOT ENTER MACHINE.	Water turned off at supply	Check faucet - turn on
	No/low voltage to machine	Supply voltage is (100-130 volts)
	Water temperature switch	Check continuity
	Timer switches	Check continuity
	Wiring harness	Check continuity of wiring
	Poor connection at water inlet valve solenoid	Secure terminal
	Water level switch	Check continuity
	Incorrect harness wiring	Check harness connections
	Water level switch out of calibration	Replace switch
4. WATER LEVEL TOO LOW.	Customer misunderstanding of correct water level.	On Highest setting, water level should be 14" from basket bottom.
	Water Level Switch out of calibration.	Replace Water Level Switch (Do NOT attempt to change calibration)
5. MACHINE WILL NOT AGITATE.	Wiring harness	Check continuity
	Motor	See problem 1
	Stripped agitator spline	Replace agitator
	Damaged agitate cam	Replace gearcase
	Damaged agitate gear	Replace gearcase
	Broken agitator shaft	Replace gearcase
6. INTERMITTENT AGITATE.	Pause in timer	Normal condition
	Damaged agitate cam	Replace gearcase
	Agitate gear clutch teeth worn or broken	Replace gearcase

PROBLEM	POSSIBLE CAUSE	ACTION
7. KNOCK DURING AGITATE.	Agitator dogs worn (2-piece agitator)	Replace agitator dogs
	Excessive clearance on pinion thrust or main drive gear	Replace gearcase
8. TRIES TO AGITATE DURING SPIN.	Shift actuator or cam damaged	Replace gearcase
9. WATER DOES NOT DRAIN FROM MACHINE.	Clogged drain	Remove obstruction
	Pump	Replace pump
	Drain hose kinked	Reposition hose to prevent kink
10. SLOW OR NO SPIN NOTE: In diagnosing this problem, start the washer in spin and see if the clutch drum spins. If it spins, the problem is <i>not inside the gearcase</i> . If the clutch drum does not spin, all or some of the problem is inside the gearcase.	Lid open	Close lid
	Lid switch defective	Check continuity
	Lid switch disconnect plug open	Check plug engagement
	Wiring harness	Check continuity
	Timer switches	Check continuity
	Motor	See problem 1
	Cam driver broken	Replace driver
	Weak clutch spring	Replace spring
	Spin tube	Check bearings and replace
	Clothes between basket and tub	Remove tub ring to reach clothes
11. MACHINE WILL NOT SPRAY RINSE.	Water inlet valve	Proper voltage? then check continuity
	Water temp. switch (if used)	Check continuity
	Timer switches	Check continuity
	Wiring harness	Check continuity
12. EXCESSIVE VIBRATION OR MACHINE WALKS.	Not level	Level
	Front leveling leg locknuts not tight	Secure locknut against frame after leveling
	Weak floor	Advise customer
	Unbalanced load	Redistribute load
	Shipping pins not removed	Remove pins
	Rear leveling legs stuck	Loosen
	Rear Cabinet sides loose	Remove top clips, push cabinet sides inward when reinstalling top clips
	Suspension plate sticky	Replace plate
	Suspension plate damaged or worn	Replace plate
	Suspension pads damaged or worn	Replace pads
	Tub support friction area sticky	Replace tub support
	Tub support damaged or worn	Replace tub support
	Suspension springs missing broken or not connected	Replace or reconnect springs
Basket ballast missing	Replace basket balance ring	
Base bent/out of square	Replace base	

PROBLEM	POSSIBLE CAUSE	ACTION
13. CLOTHING DAMAGE	Excessive use of bleach	Instruct customer
	Overloading of machine	Instruct customer
	Foreign objects	Remove
	Water level too low	Increase water level
	Agitates during spin	See problem 8
	Agitator surface rough	Replace agitator
	Basket surface rough	Replace basket
14. GEARCASE LEAKS OIL	Leak at agitator shaft	Replace seal
	Leak at cover seal	Reseal
	Too much oil in gearcase	Use only 13-15 ounces in gearcase
	Defective cover	Replace cover
15. WATER LEAKS	Use of low water level with high agitation	Advise customer to use higher water level
	Leaking components	Repair or replace
16. SQUEALING	Worn tub support bearings	Lube basket-drive shaft or bearings

COMPONENT TESTING

NOTE: Refer to the wiring diagram for the specific model being serviced. The wiring diagram can be found on the unit feature panel or behind the front panel.

⚠ WARNING



Electrical Shock Hazard

**Disconnect power before servicing.
Replace all parts and panels before operating.**

Failure to do so can result in death or electrical shock.

DIAGNOSTIC GUIDE

Before servicing unit, check the following:

1. Insure there is power to the unit
2. Is washer properly installed as well as properly leveled and balanced?
3. All tests and checks should be made with a VDM or DVM having a sensitivity of 20,000 ohms per volt DC or greater.
4. Check all connections before replacing components. Look for broken or loose wires, failed terminals, or wires not inserted correctly or far enough into the connectors.
5. The most common cause for control failure is corrosion of connectors. Therefore, disconnecting and reconnecting wire connectors will be necessary throughout test procedures.
6. Resistance and continuity checks must be made with the unit unplugged or the power disconnected from the unit.

⚠ WARNING



Electrical Shock Hazard

Disconnect power before servicing.

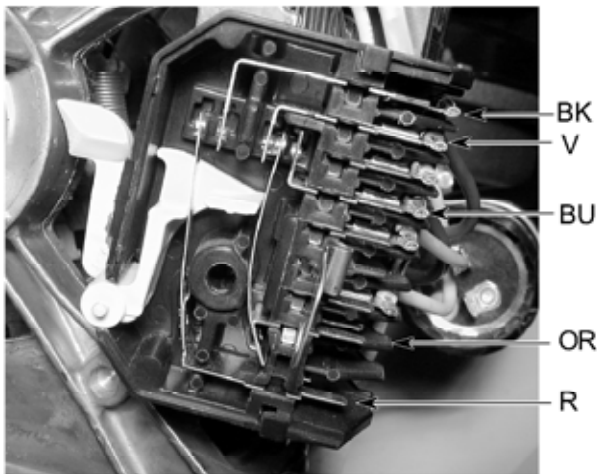
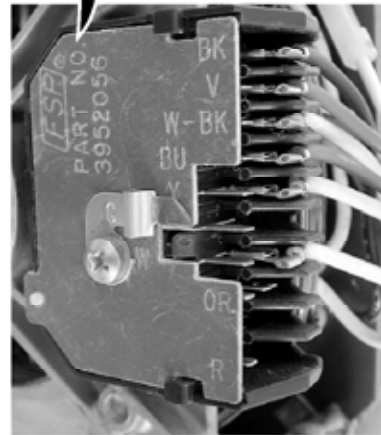
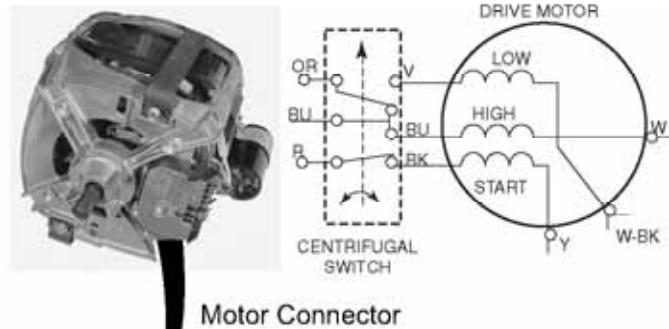
Replace all parts and panels before operating.

Failure to do so can result in death or electrical shock.

MOTOR

Refer to page 4-7 for accessing the motor.

1. Unplug washer or disconnect power.
2. Disconnect the plug from the motor connector.
3. Set the ohmmeter to the R x 1 scale.
4. Touch the ohmmeter test leads to the following motor lead colors (shown on the connector plate). The meter should indicate as shown in the Motor Test Table.
5. Touch the ohmmeter test leads to the following motor switch connections. The meter should indicate as shown in the Motor Switch Test Table.



MOTOR TEST TABLE

FUNCTION	TEST TERMINALS	READING
LOW SPEED	V TO W-BK	18-26 OHMS
HIGH SPEED	BU TO W	1 - 1.5 OHMS
START WINDING	BK TO Y	5 - 10 OHMS
THERMAL PROTECTOR	W TO W	0 OHMS

MOTOR SWITCH TEST TABLE

STATE	TEST TERMINALS	READING
AT REST	R TO BK	1 - 2 OHMS
	OR TO BU	
	OR TO V	
AT SPEED OR SWITCH ARM RELEASED*	R TO BU	OPEN (INFINITE OHMS)
	R TO BK	
	OR TO BU	
	OR TO V	
	R TO BU	1 - 2 OHMS

* SWITCH ARM CAN BE RELEASED BY REMOVING THE SWITCH FROM THE MOTOR



▲WARNING

Electrical Shock Hazard

Disconnect power before servicing.

Replace all parts and panels before operating.

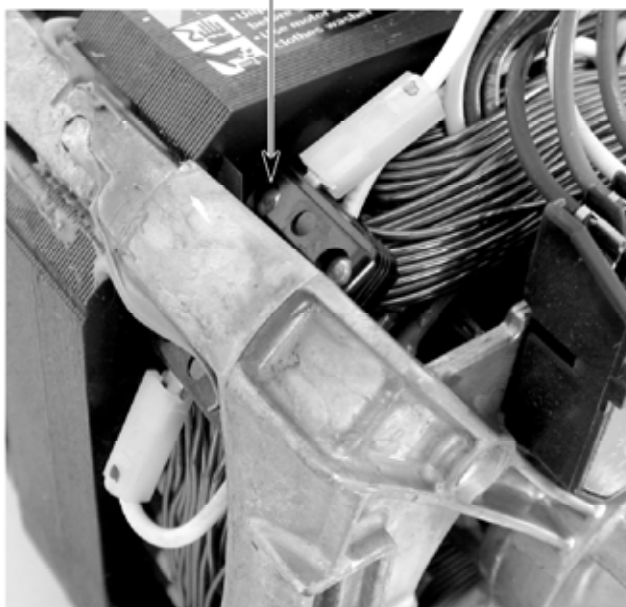
Failure to do so can result in death or electrical shock.

MOTOR THERMAL PROTECTOR

Refer to page 4-7 for accessing the motor.

1. Unplug washer or disconnect power.
2. Disconnect one of the wires from the motor thermal protector.
3. Set the ohmmeter to the R x 1 scale.
4. Touch the ohmmeter test leads to the terminals of the motor thermal protector. The meter should indicate a closed circuit (0 Ω).

Motor Thermal Protector

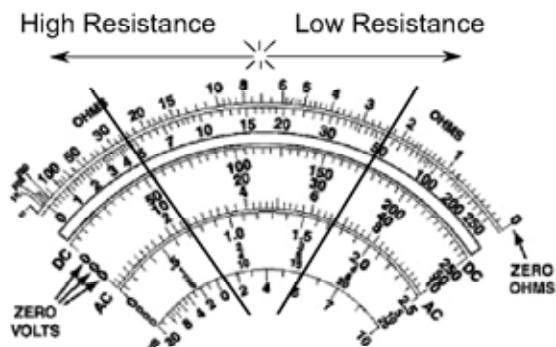


MOTOR START CAPACITOR

Refer to page 4-7 for accessing the motor.



1. Unplug washer or disconnect power.
2. Discharge the capacitor by touching each of the terminals with a 20,000 Ω (red, black, orange) resistor to ground.
3. Disconnect the wire connectors from the capacitor terminals.
4. Set the ohmmeter to the R x 1K scale.
5. Touch the ohmmeter test leads to the capacitor terminals. The meter should quickly rise to a low resistance, (see the illustration), and then gradually fall to a high resistance. To repeat the test, reverse the ohmmeter leads. The result should be the same if the capacitor is good.





⚠ WARNING

Electrical Shock Hazard

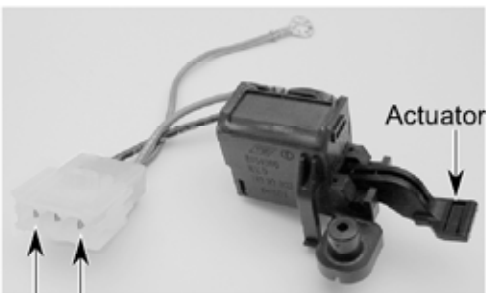
Disconnect power before servicing.

Replace all parts and panels before operating.

Failure to do so can result in death or electrical shock.

HIDDEN LID SWITCH

Refer to page 4-5 for accessing the hidden lid switch.



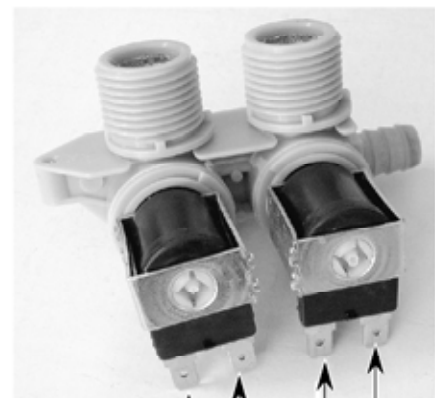
Pins 1 & 3

1. Unplug washer or disconnect power.
2. Disconnect the 3-wire hidden lid switch connector from the top of the washer.
3. Set the ohmmeter to the R x 1 scale.
4. Touch the ohmmeter test leads to hidden lid switch connector pins 1 and 3. The meter should indicate an open circuit (infinite).
5. With the ohmmeter test leads at pins 1 and 3 of the hidden lid switch connector, press the actuator on the hidden lid switch. The meter should indicate a closed circuit (0 Ω).

DUAL WATER VALVE

Refer to page 4-19 for accessing the water inlet valve.

1. Unplug washer or disconnect power.
2. Disconnect the wire connectors from the dual water valve solenoids.
3. Set the ohmmeter to the R x 1 scale.
4. Touch the ohmmeter test leads to each of the solenoid terminals. The meter should indicate approximately 800 to 1300 Ω for each solenoid.



Solenoid Connectors



▲WARNING

Electrical Shock Hazard

Disconnect power before servicing.

Replace all parts and panels before operating.

Failure to do so can result in death or electrical shock.

WATER LEVEL SWITCH

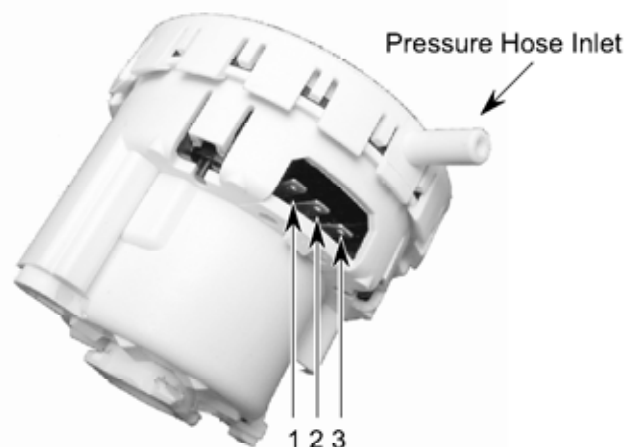
Refer to either page 4-4 or 4-19 for accessing the water level switch. (Depending on model)

1. Unplug washer or disconnect power.
2. Disconnect the wire connector from the water level switch.

3. Set the ohmmeter to the R x 1 scale.

NOTE: To activate the switch, blow into the pressure hose inlet.

4. Touch the ohmmeter test leads to the test points indicated in the Water Level Switch Test Table. The switch should change states when sufficient air pressure is applied to the pressure hose inlet.



Pin 1 = Full
Pin 2 = C (Common)
Pin 3 = Empty

WATER LEVEL SWITCH TEST TABLE

STATE	TEST TERMINALS	WIRE COLORS	READING
UNDER PRESSURE	C TO EMPTY	V-W TO W-P	OPEN
	C TO FULL	V-W TO T	0-10 OHMS
NO PRESSURE	C TO EMPTY	V-W TO W-P	0-10 OHMS
	C TO FULL	V-W TO T	OPEN



▲WARNING

Electrical Shock Hazard

Disconnect power before servicing.

Replace all parts and panels before operating.

Failure to do so can result in death or electrical shock.

BASKET DRIVE SHAFT CHECKS

Refer to page 4-15 for accessing the basket drive.

1. Unplug washer or disconnect power.
2. With the basket drive removed, check for excessive wear on the shaft (see photo). Excessive wear can be identified by a ridge between the bearing contact surfaces, and the center area of the shaft. If ridges can be felt along the bearing wear areas (greater than .005"), replace the basket drive.
3. If replacement of the upper and lower centerpost seals is ever necessary, check for wear ridges on the basket drive shaft. If ridges are present, replace the basket drive.

BASKET DRIVE SHAFT →

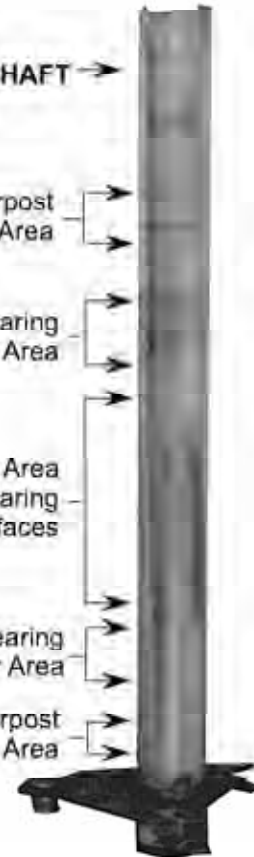
Upper Centerpost Seal Wear Area

Upper Bearing Wear Area

Center Area Between Bearing Contact Surfaces

Lower Bearing Wear Area

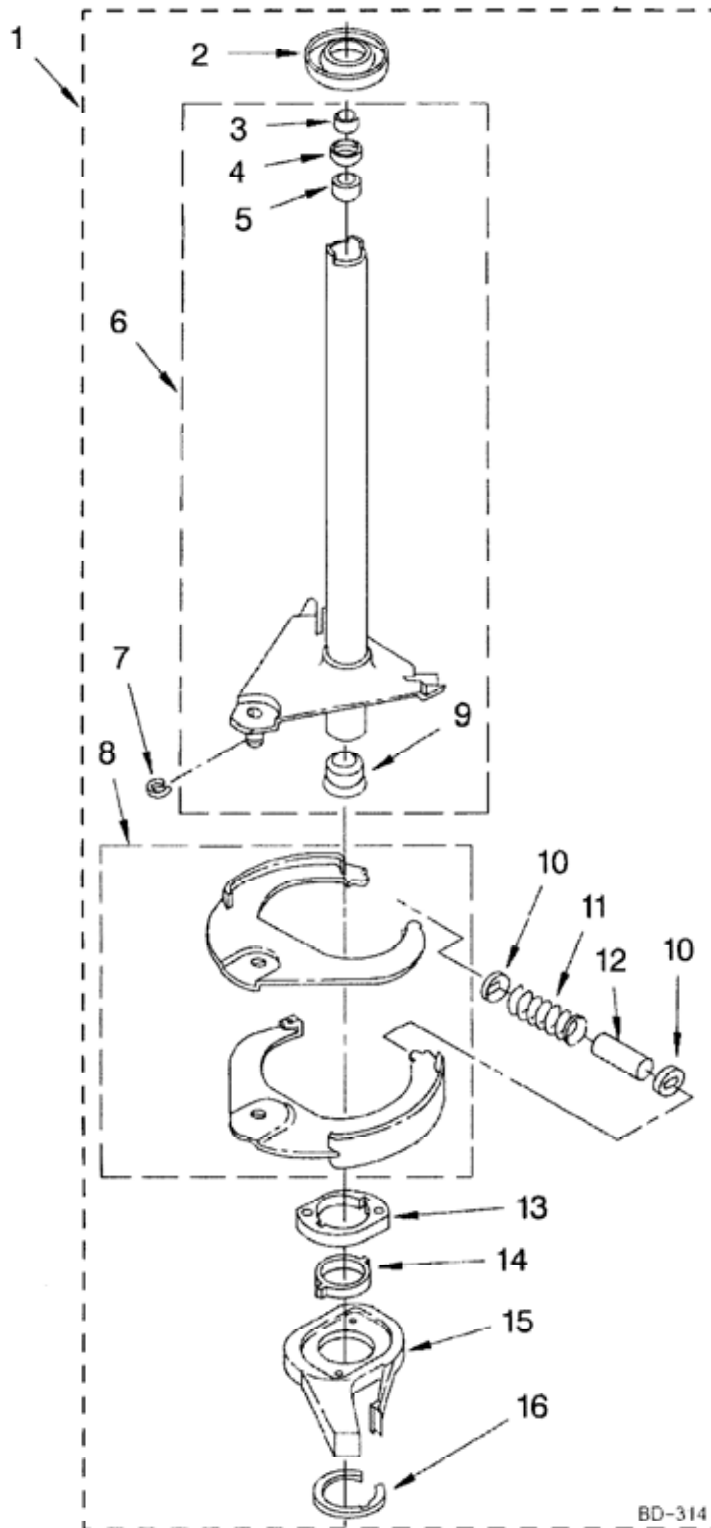
Lower Centerpost Seal Wear Area



TECH TIPS

PARTS LIST

BRAKE AND BASKET DRIVE ASSEMBLY



Illus. No.	Part No.	DESCRIPTION
1	388951	Brake And Drive Tube (Complete)
2	62858	Ring, Thrust
3	91939	Seal, Oil
4	356427	Seal, Drive Tube
5	356937	Spacer, Drive Tube
6	64027	Tube, Basket Drive (Includes Illus. 3, 4, 5 & 9)
7	64035	Ring, Retaining
8	64232	Brake Shoe
9	62703	"T" Bearing, Spin Tube
10	62648	Cap, Brake Spring (2)
11	62647	Spring, Brake
12	62909	Sleeve, Brake Spring
13	63023	Cam, Brake Release
14	63022	Sleeve, Cam
15	64194	Driver, Brake Cam
16	90368	Ring, Retaining

FOLLOWING PARTS NOT ILLUSTRATED

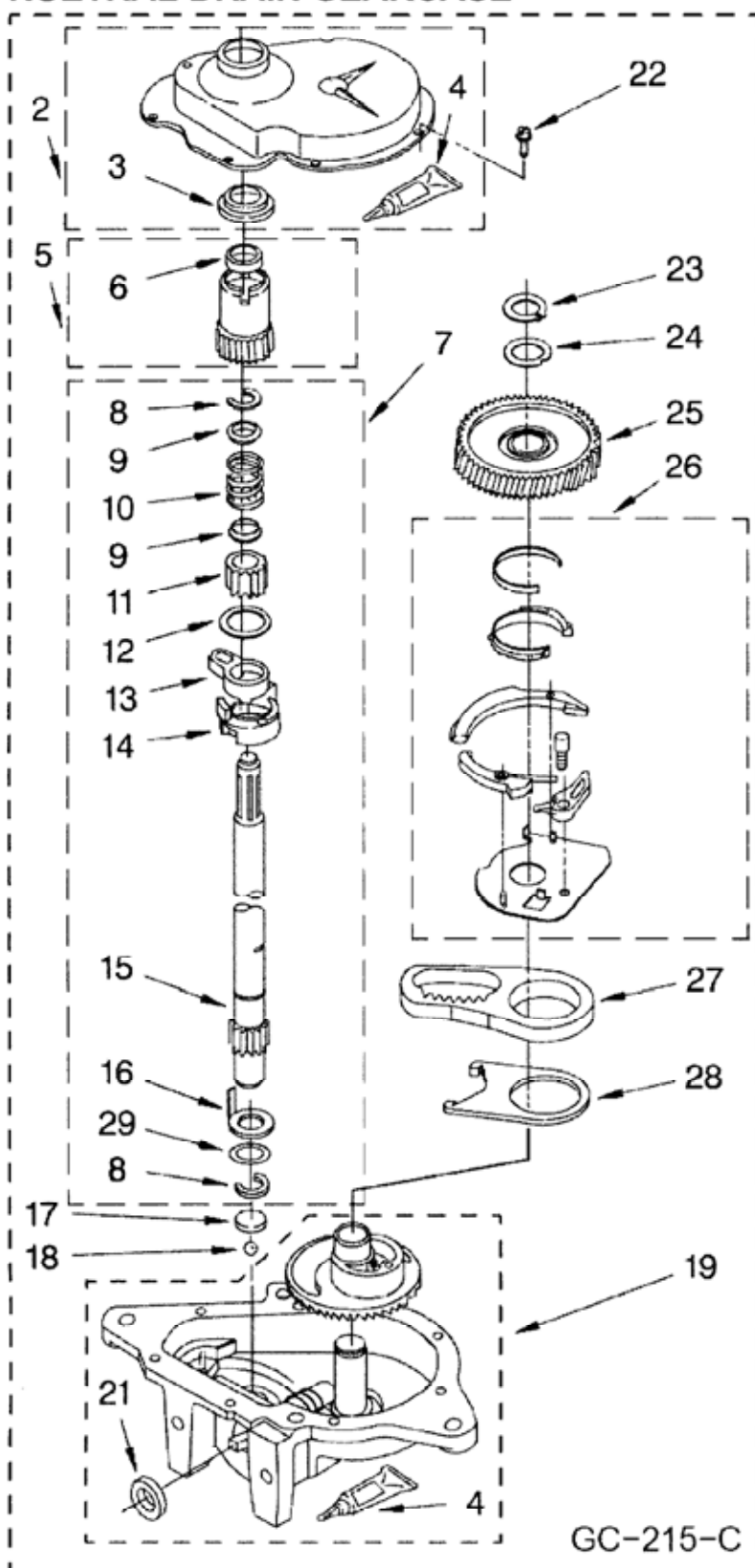
285208 Lubricant (Use Only In Brake Shoe Assembly On Roller & Pin)

BD-314

FOR ORDERING INFORMATION REFER TO PARTS PRICE LIST

TECH TIPS PARTS LIST

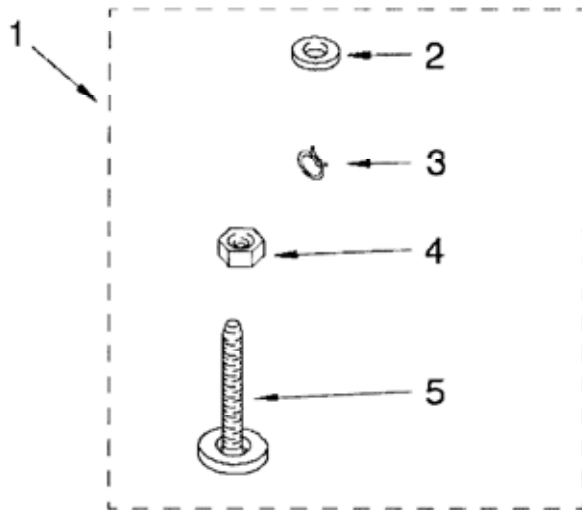
NUETRAL DRAIN GEARCASE



Illus. No.	Part No.	DESCRIPTION
1	3360630	Gearcase (Complete)
2	285202	Cover, Gearcase
3	3349985	Seal, Gearcase Cover
4	285195	Sealer, Gasket (.20 Fl. Oz.) (6 ml)
5	63320	Pinion, Spin (Includes Illus. 25)
6	356427	Seal, Spin Pinion
7	389387	Shaft, Agitator (Complete)
8	90369	Ring, Retaining (2)
9	62677	Retainer, Spring
10	62676	Spring, Agitate
11	63273	Gear, Agitate (Includes 15 and 29)
12	62619	Washer, Agitate Gear
13	62580	Cam Follower (Includes 14)
14	62581	Cam, Agitate (Includes 13)
15	285509	Shaft, Agitator (Includes 11 and 29)
16	62618	Washer, Cam Thrust
17	16018	Bearing, Thrust
18	85529	Ball, Bearing
19	389230	Bottom and Pinion, Gearcase
21	285352	Seal, Thrust Plug
22	3351614	Screw, Gearcase Cover, Mounting (8) (10-24 x 3/8)
23	3362552	Ring, Retaining
24	285735	Washer Kit, Thrust
25	62570	Gear, Spin
26	388253	Neutral Assembly
27	3349296	Rack, Connecting
28	62621	Actuator, Shift
29	388815	Washer, Intermediate

FOR ORDERING INFORMATION REFER TO PARTS PRICE LIST

MISCELLANEOUS



Illus. No.	Part No.	DESCRIPTION
1	3954579	Miscellaneous Parts Bag
2	16123	Washer, Inlet Hose (1-1/16 x 5/8) (4)
3	3368912	Clamp, Hose
4	3359452	Nut, Lock (3/8-16)
5	389102	Foot, Front (2)

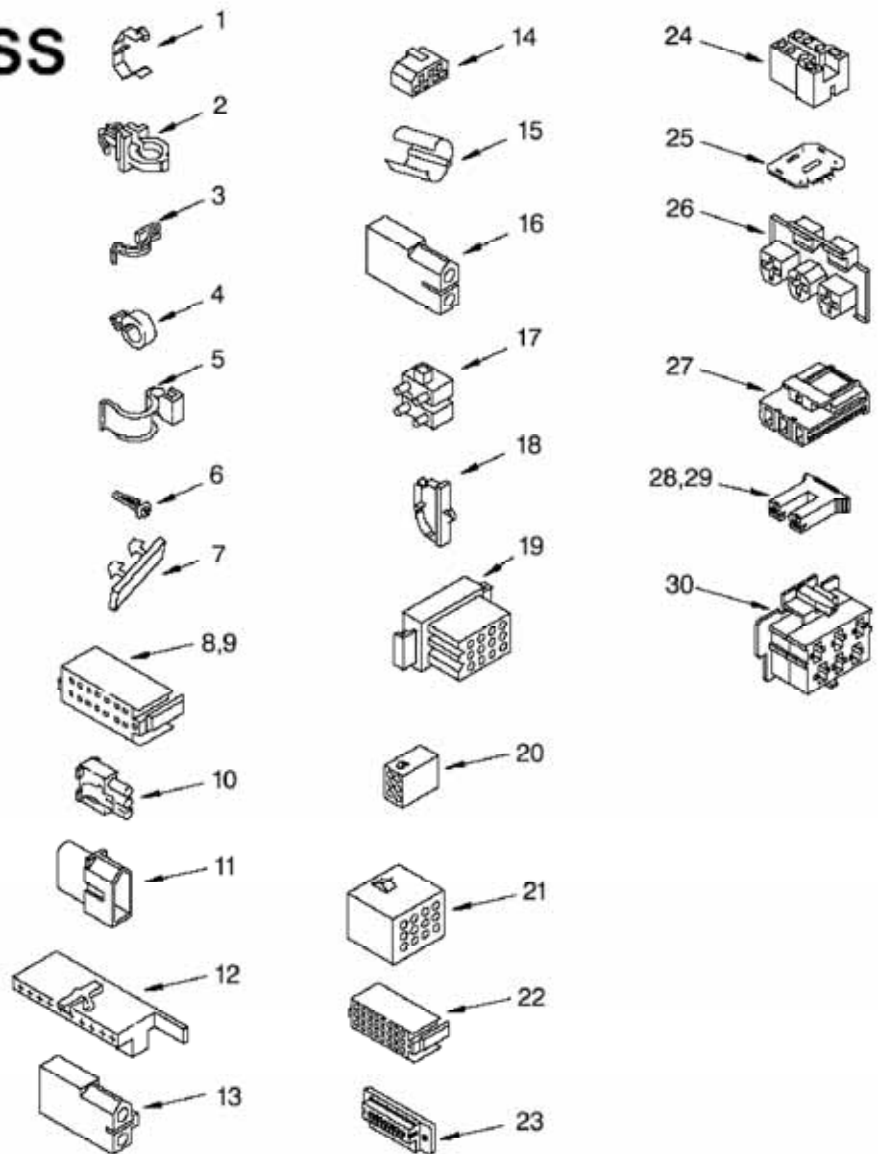
OPTIONAL (NOT INCLUDED)

Illus. No.	Part No.	DESCRIPTION
PAINT, TOUCH UP (1/2oz.)		
	72017	White
PAINT, PRESSURIZED SPRAY (12 oz.)		
	350938	Primer, Gray
	350930	White

Illus. No.	Part No.	DESCRIPTION
PAINT, BULK (1 qt.)		
	799344	White (Uncut)
OIL		
	350572	Oil, Gearcase (16 Oz.)

Illus. No.	Part No.	DESCRIPTION
LUBRICANT		
	285208	Lubricant (Use Only in Brake Shoe Assembly On Roller and Pin)
SEALER		
	285195	Sealer, Gasket (20 Fl. Oz.) (6 ml)

WIRE HARNESS PARTS

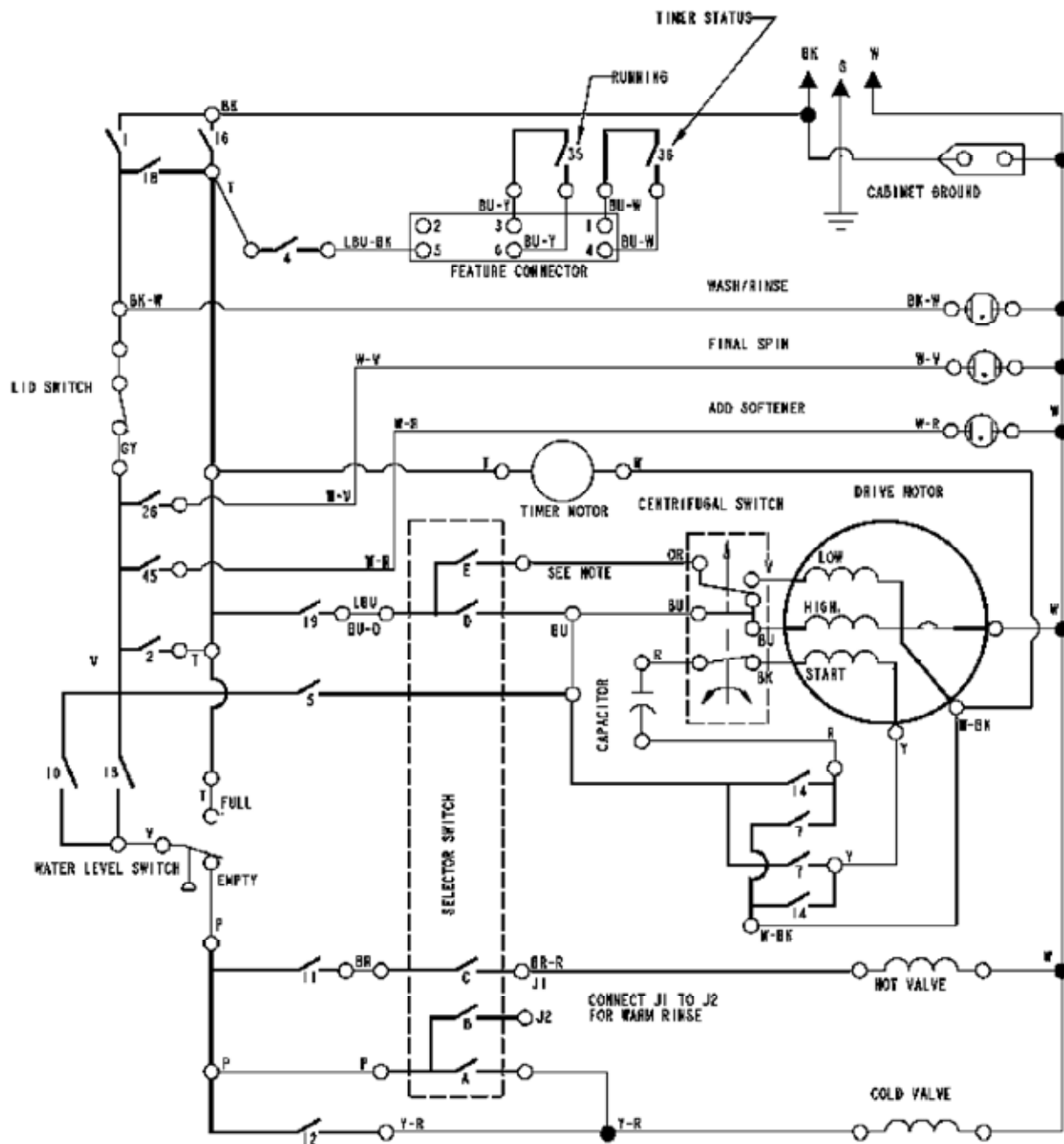


Illus. No.	Part No.	DESCRIPTION
1	3349557	Clip, Harness
2	388498	Clip, Harness
3	3347812	Clip, Harness
4	3352501	Clip, Harness
5	90016	Clip, Harness
6	3390496	Clip, Harness
7	389379	Retainer, (Suds Models)
8	352090	Timer, Block Disconnect (White)
9	352089	Timer, Block Disconnect (Black)
10	62889	Receptacle, Terminal (3-Way) (Lid Switch) (Use Term. 94613) Or 94614.)
11	353424	Plug, Terminal (3-Way) (Power Cord) (Use Term. 94613)
12	62505	Block, Disconnect (Motor 2 Speed) (Use Term. 352088)

Illus. No.	Part No.	DESCRIPTION
13	3348075	Block, Disconnect (Motor 3 Speed) (Use Term. 94613 Or 94614.)
14	3347243	Block, Disconnect (Use Term. 352088)
15	63523	Protector
16	717252	Connector (2-Way) (Use Term. 94614)
17	387566	Plug, Terminal (4-Way) (Power Cord) (Use M3 Screws)
18	3352944	Clip, Harness
19	3390423	Block, Disconnect (12-Way) (Timer) (Use Term. 94613)
20	3347730	Receptacle (6-Way) (Use Term. 94613)
21	388818	Plug, Terminal (12-Way) (Use Term. 94613 Or 94614.)
22	3369366	Timer, Block Disconnect (Black) (Amp) (Use Term. 3369365)

Illus. No.	Part No.	DESCRIPTION
23	3349494	Connector, Etc
24	60687	Connector, Relay (Use Term. 308569)
25	3407125	E.T.C. Control
26	3948617	Connector (T.P.A.) (3-Circuit) (Lid Switch) (Use Term. 3948619 OR 3948620.)
27	3360056	Connector (T.P.A.) (3-Circuit) (Pressure Switch) (Use Term. 3948619 OR 3948620.)
28	3354925	Block, Connector (Cold Valve) (Use Term. 693217)
29	3354926	Block, Connector (Hot Valve) (Use Term. 693217)
30	3948615	Connector (T.P.A.) (6-Circuit) (Temp. Switch) (Use Term. 3948619 OR 3948620.)

BASIC MECHANICALLY CONTROLLED 2-SPEED WASHER DIAGRAM



NOTES:

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