

# **Secrets of Keeping Your Automatic Washer Trouble- Free**

**F**ollow two sound rules and you can become master of routine repairs. Before you begin:—

- 1** Be sure of your diagnosis—never take the machine apart, hoping that you'll stumble on the trouble.
- 2** Plan ahead for all steps of the job, both disassembly and reassembly.

By **EVAN POWELL**

Ease of service is a major point to consider in buying an automatic washer. Removable front panel and hinged top permit front servicing of this Maytag without moving the appliance from against the wall.



## Take time first to understand how your automatic washer works. After that, most repairs are usually just a matter of using common sense

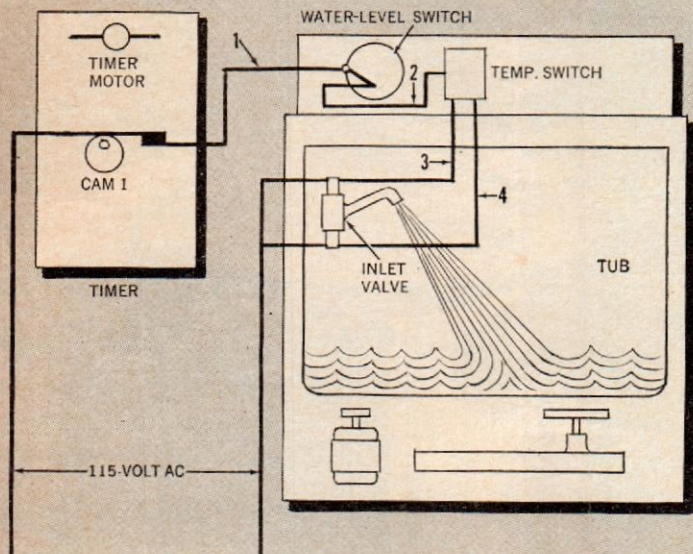
Automatic washers operate from electrical commands given by manually or automatically operated switches. The commands are carried out by solenoids and motors.

To enable you to understand how these actions take place in an automatic washer, we present this series of schematic drawings. They show the actions that occur when the master control, in this case the timer, gives various commands.

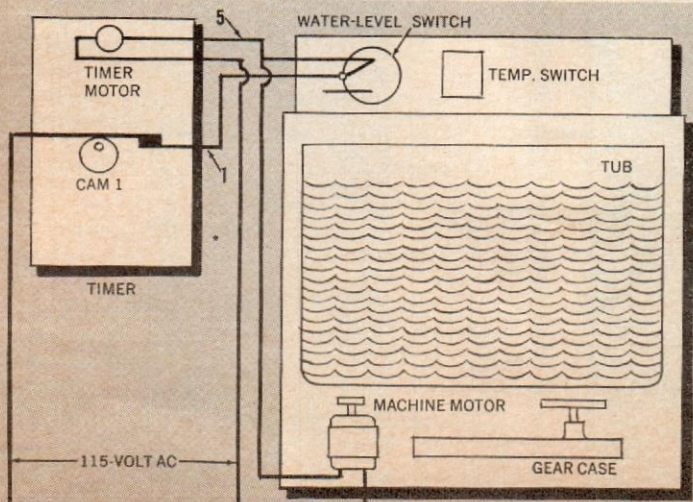
As an aid to understanding, we have removed the timer from the machine and set each of its cams to the side. This lets you see the action of each switch in the succeeding phases of the cycle that the washer passes through.

In actual practice, of course, these cams and switches are combined into one unit, and there may be 30 to 50 contacts in some of the more complex controls.

*Continued*

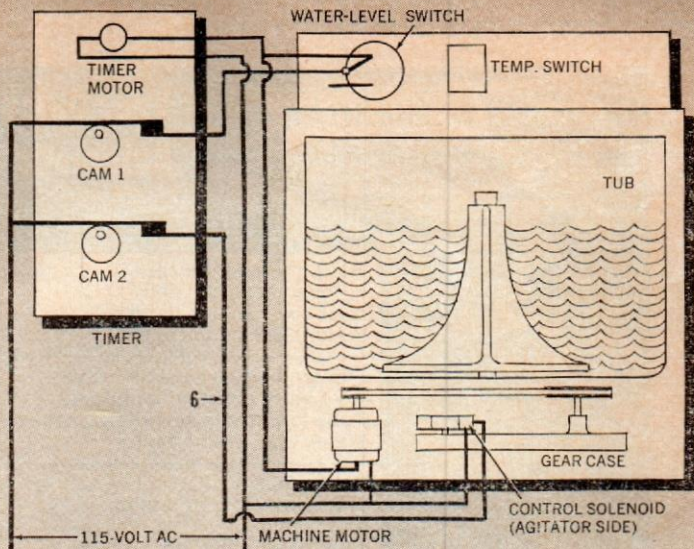


**1** **Fill cycle.** By closing a contact that applies voltage to the float or water-level switch, the timer commands the machine, through wire No. 1, to fill. Since the machine is empty, the float switch does not over-ride the command but transfers it to the temperature switch through wire No. 2. The temperature switch, previously told by the user what temperature to select, then transfers the command to the inlet-valve solenoids through wire No. 3 for cold water, wire No. 4 for hot water, or both for warm water. The solenoid, an electromagnetic device, then in effect "opens the faucet" by raising a plunger inside the valve, allowing water to flow into the machine. Notice that no circuit is completed to the timer motor at this point, and the cams controlling the switches won't be advanced before the machine is full.

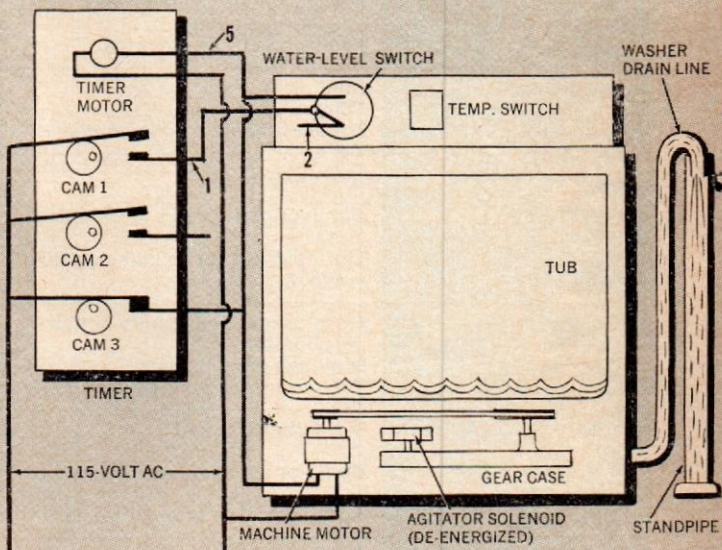


**2** **Fill cycle continued.** As the water in tub approaches the correct level, air or water pressure builds up and acts on the diaphragm of the float switch. The timer still gives its command through wire No. 1, but the movement of the diaphragm has shifted the switch to wire No. 2, releasing the temperature switch and the inlet switch from the command. Instead, the command is transferred to the timer motor and the machine motor, causing the cams within the timer to advance approximately six degrees every two minutes, and causing the machine to start running.

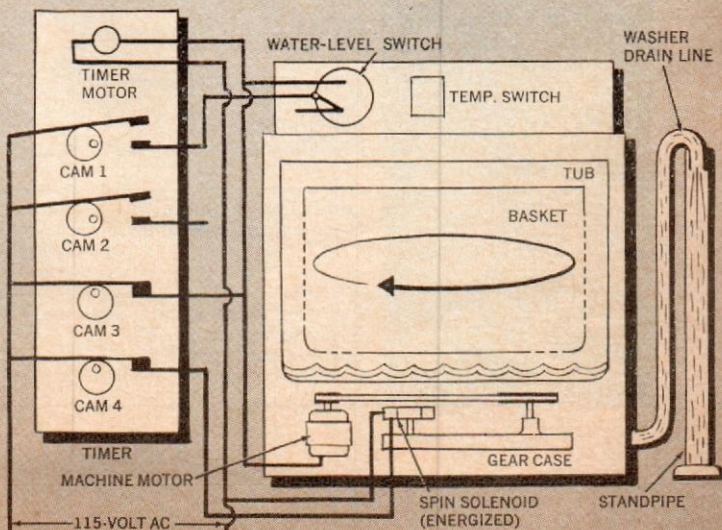
**Agitation.** As the machine begins to run, another cam is brought into action. It gives a command to another solenoid device through wire No. 6. This solenoid in effect puts the machine into gear, and the agitator moves back and forth in the water. In a tumble-type or front-loader, this cam would control a switch that would select the correct speed for basket movement, allowing the clothes to tumble in the water.



**Pump-out.** To pump the water from the machine in order to bring in fresh water for a rinse or to prepare for the final spin-dry, cam 2 has raised its movable contact, breaking the command to the agitate solenoid. This puts the agitator out of "gear" again, and at the same time moves the pump valve into the open position, allowing the pump to force the water out the drain line and into the standpipe in the house drainage system. Now, another provision must be made here, for as the water level in the machine drops, circuit No. 1, to the float switch, will again transfer from circuit No. 5 to circuit No. 2, the machine and timer motors will stop, and the machine will begin to fill again. To prevent this from happening, the cam controlling wire No. 1 has moved this contact to break the circuit and another contact (cam 3) is added to keep circuit No. 5 energized. Thus, a "bypass" circuit is established and the motors can operate the machine.

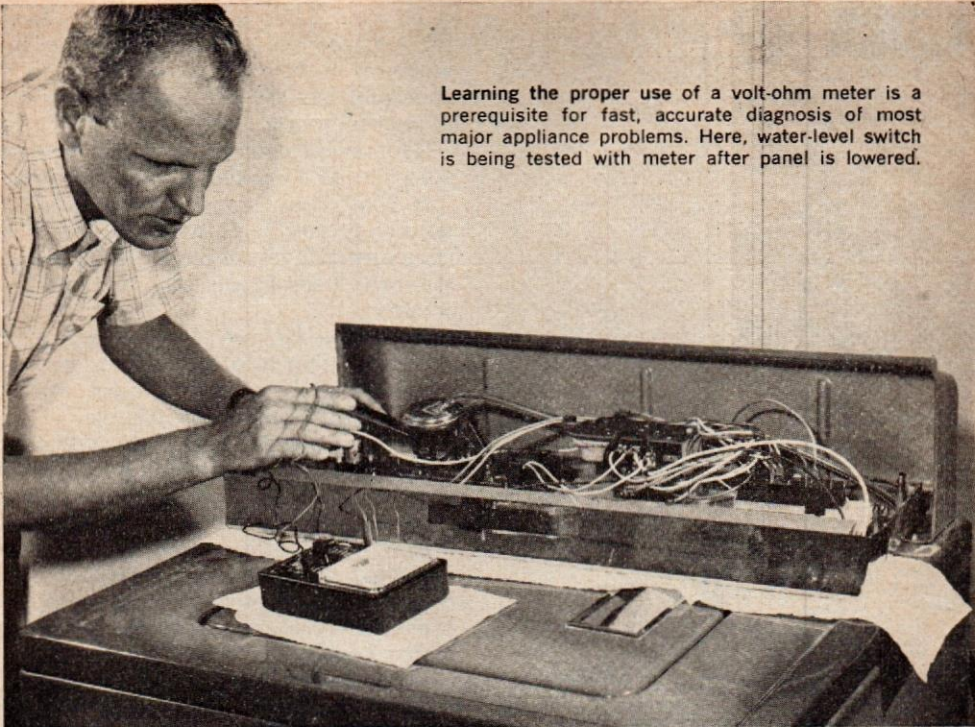


**Spin-dry.** The bypass circuit remains in action, and cam No. 4 now closes a timer contact commanding yet another solenoid device to move a mechanical linkage that operates a clutch, allowing the basket to rotate at high speed. The pump also remains in action, as centrifugal force causes the water to leave clothes; water must also be removed from the machine. After the spin operation continues for a predetermined time, all cams open their respective contacts and machine operation ceases.



# Your Quick-Check Chart for Automatic Washing Machines

Symptom	Cause	Remedy
No water enters machine	Hose crimped; faucet off Filter screens clogged Inlet-valve solenoid open Water-level switch open	Correct as needed Clean or replace Replace Replace
Water will not shut off—machine overflows	Foreign particles in inlet valve Inlet-valve solenoid grounded Tube to water-level switch blocked Water-level switch faulty	Disassemble and flush with water Replace solenoid Clear tube of obstruction Replace switch
Machine will not run	Blown fuse Faulty power cord or plug Motor faulty Belt loose or broken	Replace Replace with heavy-duty cord Repair or replace Adjust or replace
Machine will not agitate	Agitate solenoid inoperative Loose drive pulley(s) Faulty transmission drive	Replace coil or repair linkages Tighten setscrews Refer to servicing organization
Timer will not advance	Binding Timer motor open Timer escapement inoperative	Lubricate carefully Replace motor Replace timer assembly
Lint filter inoperative	Tub outlet blocked  Pump or pump valve inoperative  Lint-holding fabrics being washed with lint-giving fabrics	Remove restriction—check washer loading Disassemble pump and repair or remove foreign object from pump Observe special loading procedure
Water leaks	Hose connections faulty or hose deteriorated Drainage pipe clogged Tub or pump housing pitted	Tighten or replace  Clean drainage system Replace
Water will not pump out	Tub outlet blocked  Pump or pump valve inoperative  Pump coupling or belt broken	Remove restriction—check washer loading Disassemble pump and repair or remove foreign object from pump Replace
Machine will not spin-dry	Solenoid inoperative Water or detergent in outer tub  Lid safety switch inoperative  Clothing around basket hub  Slipping belt Slipping clutch	Replace solenoid or repair linkages See "water will not pump out"; observe oversudsing precautions Replace or adjust linkages or brackets Remove and check loading procedure Check for proper tension Adjust or replace lining as necessary
Excessive vibration	Load out of balance Machine not level or solid on floor	Rearrange clothing in basket Adjust leveling feet to correct height; see that rubber boots are in place
Unusual noise	Assorted mechanical noises Sticking friction pads Springs squeaking Belt squealing	Use makeshift "stethoscope" Clean surface to remove glaze Coat with light layer of grease Adjust to proper tension



Learning the proper use of a volt-ohm meter is a prerequisite for fast, accurate diagnosis of most major appliance problems. Here, water-level switch is being tested with meter after panel is lowered.

## Common Troubles of Automatic Washers and How to Cure Them

Let's suppose you have just returned from a summer vacation. You're looking forward to a final lazy afternoon before returning to work. As you settle down, a cry of dismay comes from the utility room where the soiled vacation laundry is piled up. The automatic washer won't work.

As you approach this modern marvel, you notice that it has filled with water. But instead of a happy splashing sound, only a faint hum is heard.

If you knew a little of what a service technician knows, you could probably spend 10 minutes with a screwdriver and  $\frac{1}{16}$ -inch wrench tightening the belt, saving the day and a fat repair bill.

Service technicians spend most of their time answering calls for such simple repairs or adjustments. Only a small percentage of calls involve difficult technical problems. So you can repair your machine more often than not.

### The tools you'll need

- Screwdrivers
- Pliers
- Set of wrenches
- Soldering gun
- Hose-clamp pliers
- Volt-ohm meter

*Continued*

No doubt, you have heard of a "basket job"—where the service technician must assemble a box of parts before he can check for the trouble. This is a product of poor planning.

To prevent your project from becoming a basket job, keep these points in mind:

- First, look ahead to the completed job before you begin work. Look at each component involved and plan each step you will take in disassembly and reassembly.

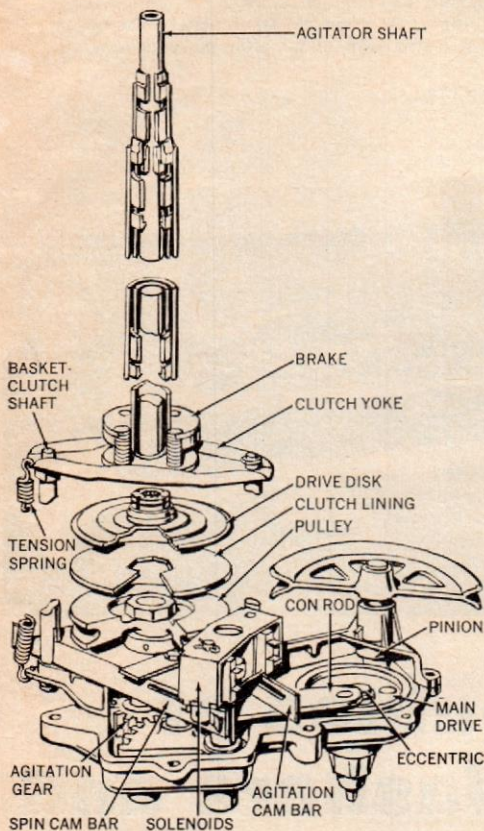
- Second, be sure of your diagnosis before you begin to dismantle the machine. Never take the machine apart with the hope of stumbling on the trouble.

Following these two rules will enable you to restore your machine to service a good part of the time. But you should also make it a rule to avoid two classes of repairs—dismantling the transmission (or replacing the transmission bearings) and repairs inside electronic controls or timers. Work in these areas requires highly specialized equipment and knowledge.

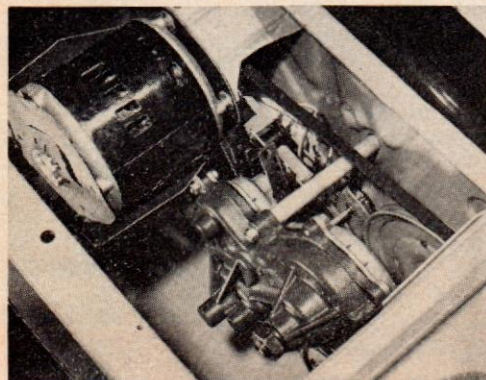
**The tools you need.** For most appliance-repair work, a set of common and Phillips screwdrivers, pliers, a set of wrenches, and a soldering gun will be sufficient. A set of 3/8- or 1/2-inch drive sockets with a ratchet makes many jobs easier.

Two tools I'd also recommend are hose-clamp pliers, costing between two and three dollars (and also useful for automobile repairs); and a volt-ohm meter (rather than a test lamp) for checking voltage and continuity. Some small imported volt-ohm meters cost as little as \$3.98. These little instruments are not intended to be extremely accurate, but they are sufficient for most home jobs.

Automatic washers vary in appearance and design, but they all wash, rinse, and spin-dry the clothes in much the same way. Top-loading washers are by far the most popular. Clothes are loaded through an opening or lid in the top of the machine into an upright basket. The basket fills with water, and a gear case or eccentric drive moves a vaned agitator or pulsator back and forth or up and down in the water. All washers clean clothing primarily by forcing water and detergent through the fabric, not just by contact with the fabric. Rinsing is provided by flooding fresh water through the washed clothing.



Cutaway view of Whirlpool drive assembly shows how agitator is driven through gear train at bottom of unit, while spinning and braking action of basket is done through clutch assembly above. Tension spring must be removed and basket-clutch shaft freed from cam bar to change belt. Photo below shows assembly as viewed through service panel.



In the top loader, clothing is dried by spinning the basket and letting centrifugal force pull water from the cloth. Some top loaders drain water through perforations in the basket into an outer tub, from which it is pumped out before the basket begins to spin. Other models begin to spin the basket while it is still filled with water. As centrifugal force mounts, water flows to the top of the basket and out into a tub formed, in many cases, by the outer cabinet itself. From here it is pumped out of the machine through the drain line and the trap installed at the rear by the wall.

In top loaders, the drive mechanism, motor, and pump are suspended under the tub, and are accessible through panels either at the front or rear of the machine.

On front-loading washers, tumble action moves clothing through the wash water. The force of the drop from the revolving drum and the water action remove dirt. Rinsing is provided by a series of fresh water charges entering and leaving the drum. The drum speeds up to provide centrifugal force for water extraction in the spin-dry cycle.

Combination washer-dryers are basically front-loading, tumble-action washers, with additional electrical circuitry and drum design provided to dry the clothing after it has been washed by the same machine. After a decline for several years, combination sales are now on an increase. These reliable and efficient machines save space and dry clothing without the need for transfer to another machine.

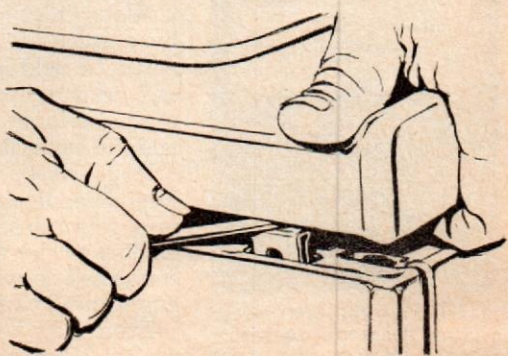
Because top-loading automatics are the most popular type now in use, and because most repair principles would apply to other types as well, we will be primarily concerned with these machines. We will make our diagnosis first from the symptoms of the machine, then from further tests in the areas where the particular problem is likely to occur. Symptoms are listed in the order they are most likely to occur in the cycle of the machine.

### **SYMPTOM: Water will not enter the machine**

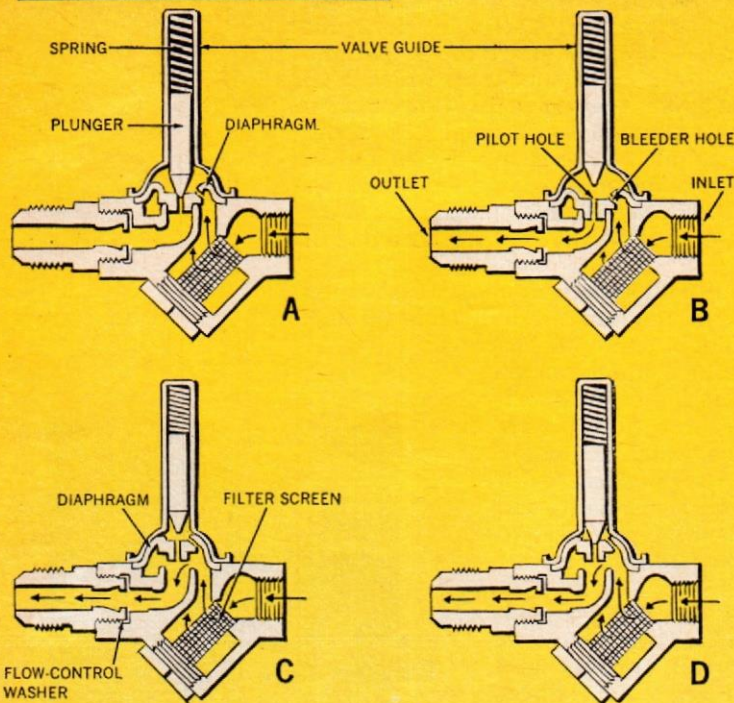
Check the obvious first: An inlet hose may be crimped, or perhaps a faucet is turned off. Water-inlet hoses have filter screens at the couplings. Sand or rust scaled off within the water line may have clogged the screens. Another filter is located in the inlet valve at the point where the hose attaches to the machine. Remove and clean these filters or replace them with new ones.



Hinged tops on most newer automatics allow easy access to many components. The inlet valve, snubber or friction pad, lid switch, and many terminals in the wiring harness are serviceable from above.



Top may be snapped up with ease in most cases by depressing the locking clips with a thin-blade screwdriver as shown in the detail drawing above.



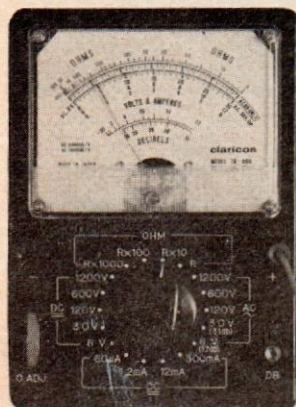
Water-inlet valve operated by a solenoid works as shown in this series of sketches. Starting with Sketch A, you find valve in its closed position. In B, plunger has risen to open the pilot hole, and water in the valve guide escapes. In C, pressure of incoming water lifts the diaphragm and the valve opens. In D, dropping of plunger closes the pilot hole, and pressure in the valve guide then closes the valve. Bleeder hole maintains balanced pressure on both sides of the neoprene diaphragm.

Still no results? Use your ears for a moment. Is there a low buzzing sound when the water should be coming in? If not, go to the water-inlet valve. To get to this valve, you must raise the top of the washer. Whirlpool and Sears machines, and some newer models of other makes, are hinged at the rear. A slight forward and upward pull will release the top from its front holding clips and allow it to pivot. Most others have screws at the rear of the top. Remove these screws, raise the top at the back, and slide it forward. Before exposing any electrical connections in this manner, *always unplug the machine.*

Water-inlet valves in automatic washers are operated by a solenoid. When current flows through this coil, a magnetic field is created, raising a plunger inside the valve and allowing water to flow into the machine. When the magnetic force is removed, spring action seats the plunger and the water flow is shut off.

Your washer will have one, two, or three of these solenoids, depending on the number of water-temperature selections. To check the coils, look for the wires leading to the water valve. Each coil will have two wires connected to its terminals. Check the coils for continuity and ground with your meter.

From this point we will use the term "continuity" to refer to a resistance test of components. Continuity means that the electrical circuit or wiring under test is not broken, or open. To make the test, set your ohm-meter on R X 10, or the closest approximate scale denoted by R



Inexpensive volt-ohm meter such as this gives reasonably accurate measurements. Care should be taken not to drop or jar the instrument. For tips on how to use such a meter, see last month's POPULAR SCIENCE.



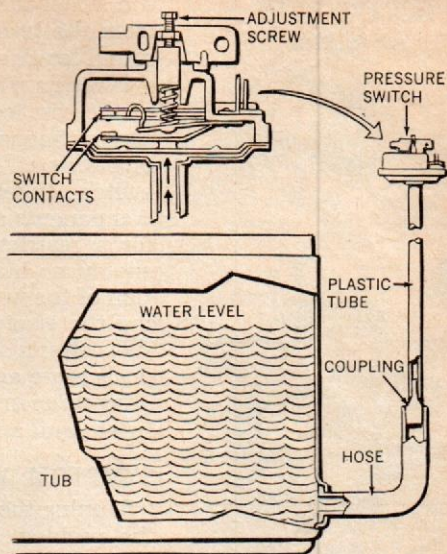
or  $\Omega$  (the symbol for ohms). Then touch the two leads to the terminals under test after first removing one wire to prevent feedback from other sources. A full-scale, or approximately full-scale, deflection of the meter should be noted.

Practice this with a light bulb. When you touch one meter lead to the shell of the lamp base and the other to the center contact, the meter needle will sweep to the right if the lamp is good, just as if you had touched the leads together. With a burned-out lamp, no deflection will be noted. Now practice with fuses. This can be especially useful with a cartridge fuse, which has no indicator to show whether the fuse is good or open.

A deflection should occur when the meter leads are placed across the terminals of a solenoid, denoting electrical continuity through the coils of wire within. To check for a ground, touch one meter lead to the frame of the cabinet, the other to each of the solenoid terminals in turn. No meter deflection should occur, showing that there is no electrical leakage to ground.

If either test shows that the solenoid is faulty, remove the screws that connect it to the valve and replace it with a new one obtained from your dealer.

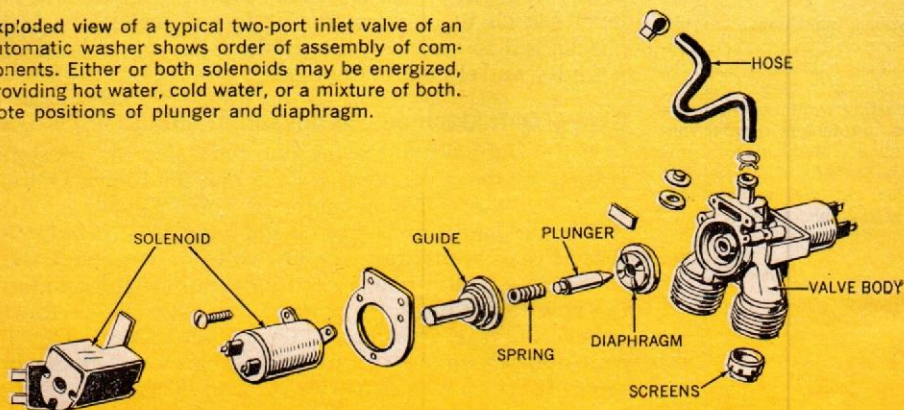
If all checks well, refer to the wiring diagram on the machine for a component marked "water-level switch" or "float switch." This switch controls the amount of water entering the basket. The diagram shows one of the wires from the timer, and another leading to the inlet-valve solenoid or to the water-temperature switch. Continuity should be read across these two terminals with no water in the basket, and with one of the wires disconnected at the push-on terminals. Now go to



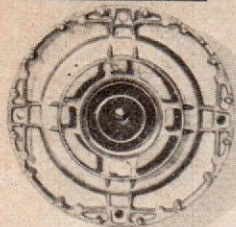
**How a pressure switch works:** As weight of water in tub increases, air pressure in sealed tube moves a diaphragm, which in turn activates switch contacts to control water level. Once set, the adjustment screw will rarely have to be calibrated.

*Continued*

Exploded view of a typical two-port inlet valve of an automatic washer shows order of assembly of components. Either or both solenoids may be energized, providing hot water, cold water, or a mixture of both. Note positions of plunger and diaphragm.



END OF BELL HOUSING



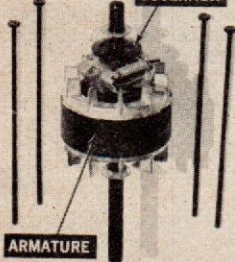
OVERLOAD PROTECTOR

CENTRIFUGAL SWITCH

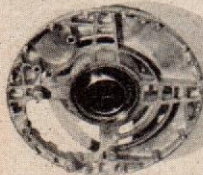


FIELD WINDINGS

GOVERNOR



ARMATURE



In typical split-phase motor, governor on the armature controls the centrifugal switch, which serves to break circuit to the starting windings when the motor approaches normal running speed. Many motors now have a centrifugal switch that may be replaced without disassembling the motor.

the water-temperature switch, and check for continuity from the terminal from the water-level switch to the terminal leading to the solenoid in question.

Keep in mind the short cuts possible when you use one of the best test instruments available—your own ears. Listen to the machine. If you hear a slight hum, the solenoid is buzzing. This tells you that the solenoid, water-level switch, timer, temperature switch, and other electrical components are good. The problem is mechanical. Check for a restriction in the water line. By the same token, should no hum be heard, eliminate the mechanical operation of the water-inlet system and devote your time to testing the electrical components with your meter. Applying your efforts and thinking along this line makes your diagnosis more accurate and much quicker, and prevents traveling up many blind alleys. It's as easy as 1, 2, 3. Observe, listen, and analyze accordingly.

### SYMPTOM: Water will not shut off (machine overflows)

Unplug the machine. If the water flow does *not* shut off, the problem lies in the water-inlet valve. These valves depend on balanced water pressure on both sides of a neoprene diaphragm, which in turn is controlled by the solenoid-operated plunger. To allow pressure balance, small 'bleed holes' are designed into the diaphragm. If a small grain of sand or particle of rust manages to escape the filters in the water line and lodges in these ports, the plunger is incapable of shutting off water flow. Small things like this can disable any washer.

To clean the valve, remove it from the machine by uncoupling the fill hoses and any other connecting hoses. Remove the quick-disconnect wiring terminals, noting the color-coded wire for each solenoid. Then remove the two screws holding the valve to the cabinet. Disassemble the valve, observing the positions of diaphragms, plungers, and springs, and flush each part (including the valve body) under running water.

If the water flow *did* shut off when the machine was unplugged, check the solenoids on the inlet valve for a ground. There should be no indication that a ground is present. Then check the tube from the tub to the water-level switch to be sure that it is not restricted. If these checks fail to uncover the problem, the water-level switch is faulty and should be replaced.

### SYMPTOM: Machine will not run at all

If the light doesn't come on, check for the presence of voltage at the receptacle—a fuse may be blown in the circuit. Put the volt-ohm meter on the 125-volt or 250-volt AC scale, and insert the leads into the receptacle. It should read approximately 115 volts. Then check the two conductors in the power cord and plug. After unplugging the machine, follow the cord to the point where the leads connect to the terminal block or the timer. Check for continuity from each terminal to one of the blades of the plug. If the cord is defective, replace it with a heavy-duty appliance cord with a grounded-type molded plug at-

tached. Be sure to follow the color code. Never use a small lamp-fixture cord or an extension cord on an automatic washer.

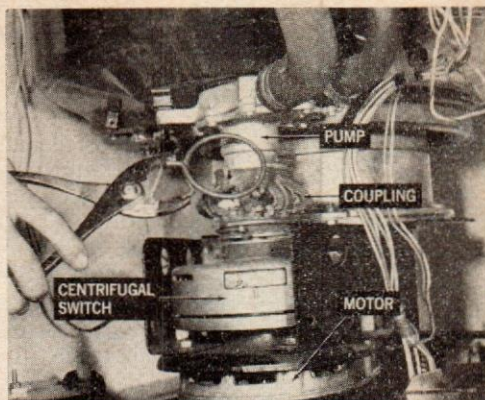
The next check would be at the motor. If it hums but does not run, or if your volt-ohm meter shows that voltage reaches the terminals of the motor, remove the belt and see if it will run. If it does, check the other belt-driven components to see if one is locked or binding. If it does not, remove the motor and take it to a motor-repair shop for inspection. Many motor problems are due only to faulty centrifugal switches or capacitors, which may be replaced at a fraction of the cost of a new motor.

If the motor runs but does not drive the belt, the motor pulley may be loose on the motor shaft or the belt may be loose or broken. In either case, you will be able to see the problem area. A loose belt is tightened on most machines by loosening the bolts that mount the motor to the superstructure, and moving it back to reduce the slack. As a rule of thumb, most belt tensions are correct when the belt may be depressed about half an inch at midpoint between the two pulleys.

Some machines have a spring-loaded device, usually a pulley, to maintain constant belt tension. If the belt stretches enough to slip, it must be replaced.

If the belt is broken, or has a flat spot from slipping over a period of time, replace it. This may appear at first glance to be quite a job on some machines. Actually, it's usually simple. Always loosen the motor mount or idler pulley that applies belt tension. Then remove the belt from the pulleys. On General Electric machines you'll have to remove one of the spring clamps from the flexible coupling that drives the water pump. Do this with spring-clamp pliers.

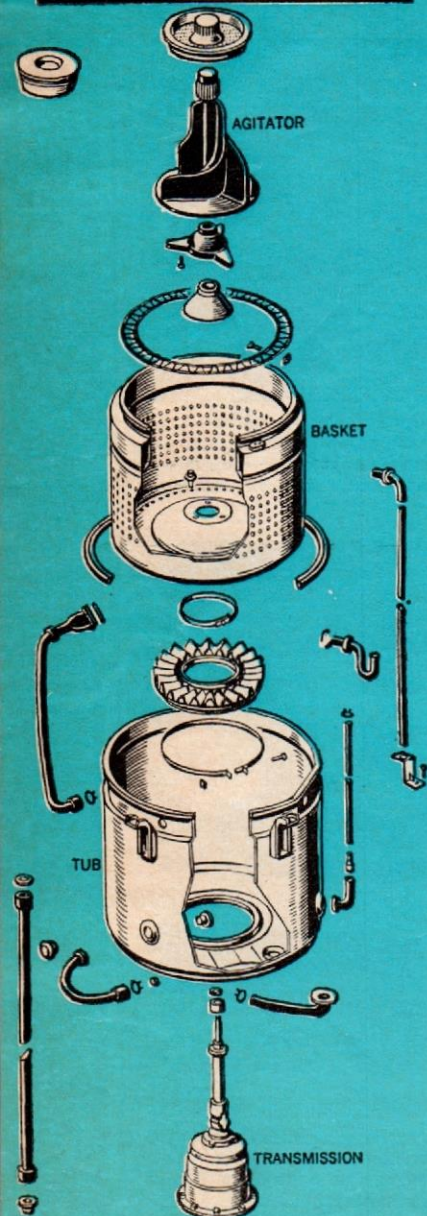
On Whirlpool and Sears machines, a spacer is provided on one of the three studs that mount the gear case to the superstructure. Remove this one spacer and the two bolts that hold the water pump in place. This will allow the belt to be removed from all but one obstruction—the basket-clutch shaft. Move the extractor cam bar toward the rear of the machine so that it is completely free from the shaft, drop the shaft down to free the belt, unhook the tension spring, pull belt free. Reverse this to install a new belt. Save the largest pulley for last—a new belt easily slips on if you turn the pulley with it in place.



Pump coupling on a General Electric washer must be removed to service the pump or clutch, or to replace the belt. Use hose-clamp pliers to remove the large spring-type clamps that retain the coupling.



GE pump assembly is easily serviced after removal from the bottom of tub. Internal flapper valve, which diverts water flow either to filter or to drain line, is controlled by direction of motor rotation.



Exploded view of tub and basket assembly shows much of the water system of an automatic washer. To check for leaks, all hoses, boots, and seals must be inspected. It is important, especially in case of a small leak, to try to locate area before moving machine.

### SYMPTOM: Machine will not agitate

Two methods are used to change from one cycle to another—by using solenoids to shift the mechanism upon a signal from the timer or cycle control, or by reversing the direction of motor rotation. A quick observation will determine which of these methods your machine uses. If solenoids are used, determine from the wiring diagram which one controls agitation. Watch its action when the timer is placed in the wash position.

If you can see its movement, you know that the solenoid coil is good and that the circuit through the timer is functioning. Check its mechanical linkage for a broken or binding link or a broken cotter pin. If no movement is observed, move the solenoid manually to be sure that the armature, or plunger, is not binding. If not, check the coil for continuity, and also check each of the two wires back to the timer.

If yours is a motor-reversal-action machine, look to see if the rotation is actually reversing in the wash and spin cycles. Always check to see if the pulley driving the gear case is turning the shaft to which it is attached. Most pulleys are locked to their shaft with Allen-head set-screws. Check the belt or belts to be sure they are not slipping.

If these observations show that the external controls of the transmission are functioning, or that the agitator is engaging but slipping, then the problem lies in the gearbox itself. Any repairs in this area should be left to a competent service technician. Such repairs are best done by a service organization that specializes in your brand of washer.

### SYMPTOM: Timer or cycle control will not advance

Check the control by turning it manually to be sure the timer shaft is not binding. If it is, apply a drop of oil carefully to the point that is causing it to bind. Never use more than a drop of oil, and never allow it to get near the electrical contacts in the timer.

Timers are driven by a small synchronous motor and a gear train, called an escapement, which advances the timer in sudden movements every one or two minutes, depending upon design. This reduces arcing at the contacts of the various switches by breaking them suddenly, rather than slowly. The timer motor is located in back of the timer in the washer console. It should be checked for continuity, and if faulty it can usually be replaced. If, however, your test shows that the escapement is broken or slipping, the complete timer assembly will have to be changed.

### SYMPTOM: Lint filter will not operate

Most late-model automatics have a filter in the water system to reduce the amount of linting from fabrics. Operating at all times when the machine is washing or rinsing, the system removes water from a tub outlet, pumps it through the filtering device and back into the washer basket. Valving devices in the pump control the water

flow and direct it either to the filter or to the drain outlet. On motor-reversal types, the pump will discharge the water when turning in one direction to provide spinning action, and to the filter when turning in the opposite direction for agitation.

Naturally, if something happens to stop water flow through the filter, the filtering action will stop. On most machines, you can see the water flow back into the machine if it is functioning correctly. On others, you must visually check the components in the filtering system to be sure the passages are not clogged.

Some fabrics, such as terry cloth, flannel, etc., give off large amounts of lint. Others, such as corduroy, hold lint. Lint givers and lint holders should not be washed in the same load, as the lint will become attached to the nap of the lint-holding fabric before it gets into the water stream where it can be filtered. If a problem with linting is encountered, a fabric softener added to the rinse water will do much to eliminate the condition, especially in the case of wash-and-wear fabrics.

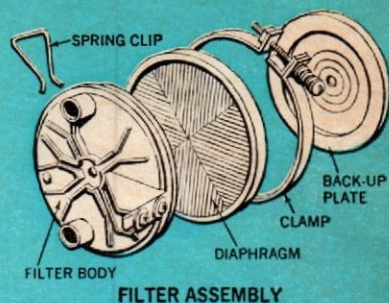
As we noted, some automatics drain water through perforations in the basket before spinning. Others spin the basket while still filled with water, the resulting centrifugal force acting to force the water over the top of the basket and into the tub, to be pumped from the machine into the drain line. It sometimes happens that a small article of clothing goes over the top along with the expelled water and blocks the drain outlet.

When this occurs, it is usually first noticeable as a loss of filtering recirculation. To remedy, raise the top of the machine, push the basket to one side, and "go fishing"; reach into the tub and feel for the clothing at the outlet, or perhaps floating in the water, and pull it free. If a guard is present at the outlet, be sure not to remove it when the clothing is taken out.

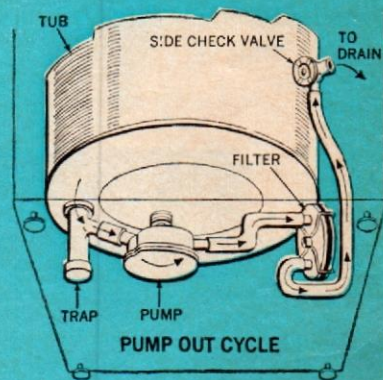
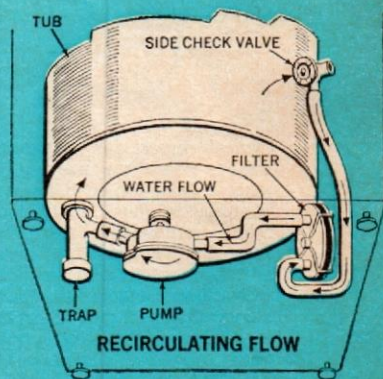
If this problem occurs frequently, check the manner in which your washer is loaded. Remember, it is water circulation through the fabric that does the cleaning. Therefore if the clothing is loaded correctly it will tumble and move through the water in the machine as it is circulating. If the machine is overloaded, the agitator will simply move in the middle of a pile of clothing, and little water action will be observed. This is the easiest and most practical way to judge any clothes load.

The rating of washers in pounds is excellent as an industry standard, but is of little value in everyday washing. It's similar to the old riddle: "Which weighs the most, a pound of lead or a pound of feathers?" While 18 pounds of a heavy denim material may not reach the capacity of your washer basket, 18 pounds of nylon quilting may not even get into your washroom, let alone the washer. If you've any doubt about a particular load, observe the water circulation and clothes movement—if both are active, there is no need to be concerned about overloading.

If loading habits are correct, and a problem still occurs with clothing passing over the basket, consult your

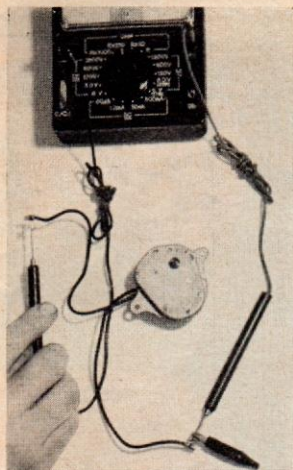


FILTER ASSEMBLY

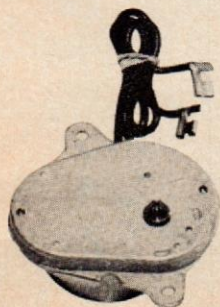
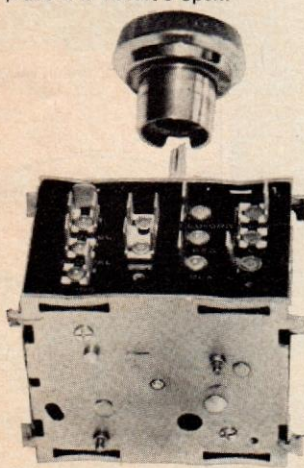


Self-cleaning lint filters on some newer washers offer high efficiency and convenience. In Whirlpool's Magic Clean at top, diaphragm contracts during washing and rinsing as water is recirculated from side check valve through filter and pump and back into bottom of machine (middle drawing). Contracted diaphragm allows water to pass but traps lint contained in water stream. When valve in pump reverses water flow as at bottom, diaphragm expands and releases trapped lint which flows to drain.

Continued



**Typical timer** for automatic washer has three main parts (shown from top to bottom in photo below): knob, switch, and motor. In most cases the motor may be replaced. Burned switches usually call for complete timer replacement. Photo above shows timer motor being tested for continuity. Replace it if circuit's open.



manufacturer. Most have a guard used on their commercial equipment which can be adapted to home washers.

If passageways to and from the washer pump are clear, and still no recirculation occurs, check the pump and its linkages. The pump is easily located by following the large outlet from the bottom of the tub. See if the pump coupling or belt is tight. The pump should turn easily by hand. If not, remove it by unfastening the attachment bolts, and remove the screws that hold the pump together.

Be sure no foreign objects have gotten into the pump and locked the impeller, which should turn easily. Impeller and pump body should be inspected visually for pitting and cracking. Valves should operate smoothly and positively. Whenever disassembling a pump, replace any seals that show a sign of leakage. Lubricate the impeller shaft and linkages. Cork gaskets must be replaced—rubber O-ring gaskets may be re-used if not damaged.

### **SYMPTOM: Water leaks from machine**

An axiom of washer-service technicians is that "leaks are where you find them." Since the appliance is using water in some manner during most of the cycle, notice carefully at what point the leak occurs. This will give a clue as to whether the leak is in the inlet system, the tub, or in the drainage system. Then, before the machine is moved, try to look under it with a flashlight to see the general location of the drip.

Check the inlet hoses before and after a fill period—heat expands the fittings and sometimes the couplings may leak only at this time. Also check the drain standpipe—it may need to be cleaned out. If you have an intermittent leak and suspect the standpipe, tie a rag around it. The next time an overflow occurs, the rag will absorb water and remain wet for several hours, while the hot drain line will dry very quickly.

Should the leak be in the machine, look for wet spots or a white stain left by detergent after the water has dried. If a hose is deteriorated it may be cut off and temporarily used. But replace it as soon as possible.

### **SYMPTOM: Water will not pump out**

Check to see if the filter water is recirculating. If not, check the same areas that you would for loss of filtration: pump, pump valves, pump belt, pump coupling, or restriction in water lines leading to the pump. When replacing the flexible pump coupling on GE washers, always install the new coupling with the fabric side out.

If water recirculation does exist, only two possibilities remain: The pump valve is not shifting from the recirculate position, or the drain line from the machine to the laundry tub or standpipe is crimped or clogged.

### **SYMPTOM: Machine will not spin-dry**

Check visually to see that the motor-reversal or solenoid action is occurring to shift the basket drive mechanism. Inspect the linkages to see that they are not bent, broken, or rusted. If they are, replace or lubricate them

so that they operate smoothly. Check the spin solenoid for continuity. If no solenoid action occurs, check the wiring harness for continuity, and then check the contacts within the timer as designated in the wiring diagram. The lid safety switch may be the culprit here. On some washers, it shuts off the entire machine when the lid is raised; on others, the spinning action only is stopped. To check it, locate the switch and check for continuity while holding it in the position it would be in with the lid shut.

If the basket spins slowly but does not pick up speed, see if there is water or detergent in the outer tub. If so, the braking action of the friction against the surface of the basket can slow the speed greatly. Oversudsing can be remedied by filling the machine with fresh water, then pumping the water back out. If oversudsing is extreme, this may have to be done several times. Also check for the possibility that clothing may have gone over the basket and wrapped around the basket hub. To detect this, you have to reach as far under the basket as possible, after first raising the top.

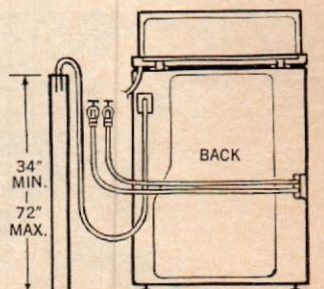
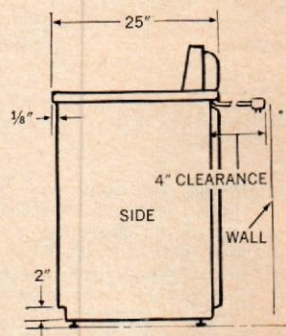
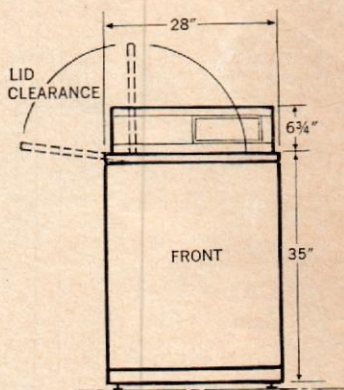
Another cause of slow spin could be a loose belt or slipping clutch. Automatic washers with a centrifugal-clutch mechanism (similar to that used on gasoline engines for power mowers, karts, etc.) generally provide no adjustment—the clutch linings have to be replaced if they are slipping. Those that use a dry-disk-type clutch to drive the basket provide an adjustment on the clutch linkage. There should be about  $\frac{1}{8}$ -inch clearance between the lining and clutch pulley when in the agitate position.

### SYMPTOM: Excessive vibration and/or noise

Automatic washers are designed to absorb quite a bit of the shock of an unbalanced load without transferring movement to the cabinet, very much as an automobile is designed to absorb the impact of road bumps without transferring the chassis movement to the body structure. In both instances, however, if the movement is severe enough the suspension cannot absorb it all. Therefore, the first thing to do if vibration occurs is to rearrange the clothes in the basket. When washing heavy, highly absorbent items such as throw rugs, wash several at a time. Although the load itself will be heavier, the increased volume of several pieces will allow the water movement to place them around the basket for balance.

Inspect the levelers on the machine. It should be approximately level, and should rest solidly on the floor.

One of the most difficult problems you may encounter is trying to locate a noise when the machine appears to be functioning normally. The best clue will be to notice the point in the cycle where the noise occurs. Note whether it is pumping, spinning, or agitating at that point, thus at least eliminating components that could not be involved. Often it is helpful to use a makeshift stethoscope. Take a large screwdriver and place the driving end on the metal housing near the area where the noise seems to originate, and hold the handle near your ear. This little trick has helped me pin down many evasive noises.



When buying a washer, compare dimensions with available space. Otherwise built-in convenience may be lost. Supply faucets, drain pipe, and the grounded receptacle should be close. Drain pipe should be approximately 34 inches high to prevent siphoning of water.

The suspension system of a washer, like an automobile, consists of springs or suspension bars and shock absorbers in the form of friction pads or snubbers. This system can be the source of assorted squeaks and pops. The snubber pads should be dry and unglazed. If not, clean them and roughen the surface with a file or on a cement surface. Coil springs, which may develop a tendency to squeak, can be treated with a little grease.

Some squeaks or squeals can be traced to the belt. Check to be sure that there is proper tension, and if necessary, use a belt dressing. Never apply oil or grease to a belt or to a clutch lining.

A few words of caution: When servicing home appliances, always be sure the equipment is unplugged when any electrical connections are exposed. Be sure the grounding wire to the cold-water line is intact before plugging a washer into the receptacle.

Never use the console or backplash of a washer to handle or move the machine; this may chip the porcelain-enamel finish. Use an old blanket or quilt to protect the finish and the floor whenever it is necessary to lay the machine down; always lay it on its front.

Do not remove the third (round) ground prong from the power cord of an appliance.

And, finally, it is usually not wise to make any mechanical repairs that may be carried under the manufacturer's warranty. You should, however, check to see that voltage is reaching the electrical outlet and that hoses are not crimped, and make any other checks that are normally considered the user's responsibility.

Should you have any question regarding your appliance, or should you wish to purchase a shop-service manual for it, you will find that the manufacturer will be glad to help you. The address of the factory will usually be located with the model-number tag on the appliance. Always mention this number whenever you write or call regarding your appliance.

**PS**

Wiring diagrams and cycle charts, generally located at rear of the appliance, can be your best friend. While no standard diagram arrangement is employed, most have been simplified so that all the components are recognizable, along with proper wiring connections.

