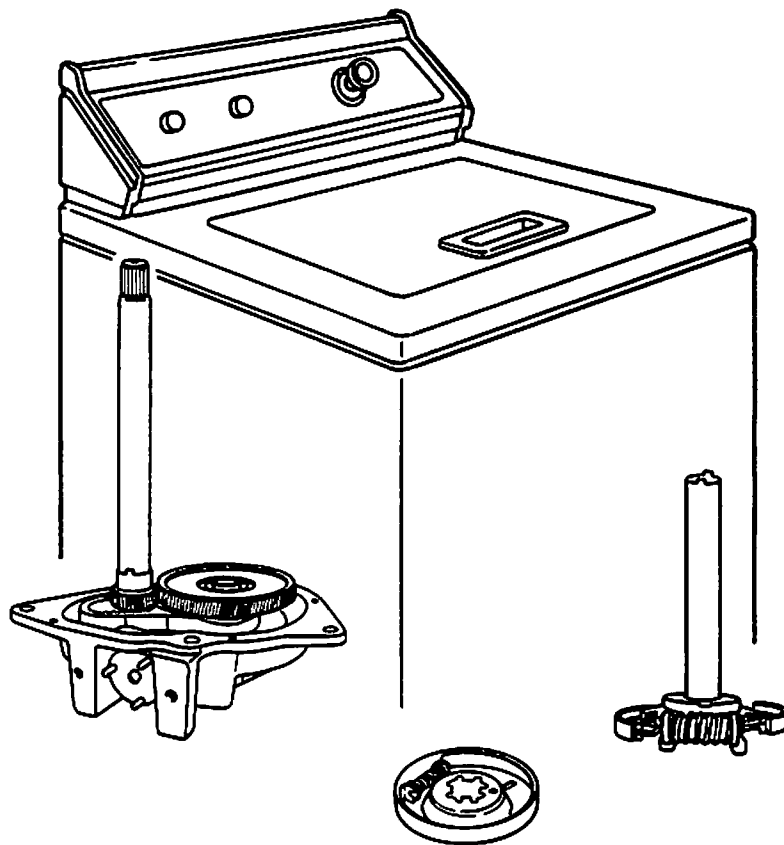


● AUTOMATIC WASHER

STUDY COURSE

Direct Drive Models

UNDERSTANDING AUTOMATIC WASHER:
● MECHANICAL COMPONENTS



MODULE 4

LIT787772 Rev. A

INTRODUCTION

The material presented in this module is intended to provide you with an understanding of the fundamentals of automatic washer servicing.

Major appliances have become more sophisticated, taking them out of the screwdriver and pliers category. Their electrical circuits include several different types of automatic controls, switches, heaters, valves, etc.. Semiconductors, solid-state controls, and other components usually associated with radio and television electronic circuits are being engineered into automatic washers, dryers, dishwashers and refrigerators.

The appliance technician is emerging into a professional status of his own. He must prepare himself now to be able to perform his duties today as well as to retain his professionalism in the future.

No longer is on-the-job training sufficient to prepare technicians for the complicated procedures required for today's sophisticated appliances. This training can best be obtained through organized classroom study and application. However, much of the knowledge necessary to service today's appliances can be obtained through study courses. Completion of this and other courses will provide you with sufficient understanding of appliances and their operation to enable you to do minor service. It will also serve as a valuable stepping stone to more advanced study and on-the-job training to improve your servicing skills.

Information contained in this module is used on WHIRLPOOL® appliances.

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*TEST	SEE TEST BOOK #787774
<i>*NOTE: We recommend taking the TEST for MODULE 4, right after studying it.</i>	

CHAPTER 1

MECHANICAL COMPONENTS

When the drive motor shaft rotates in a clockwise direction when viewed from the pump end of the motor, the gearcase shifts into pumpout then spin. The drive motor is connected to the gearcase through a rubber isolation coupling. This coupling compensates for any minor misalignment between the motor and the gearcase. In addition, the isolation coupling serves as a weak link between the gearcase and motor. Should the gearcase "lock up," the isolation coupling and motor couplings will shear, preventing the motor from being damaged (Fig. 1).

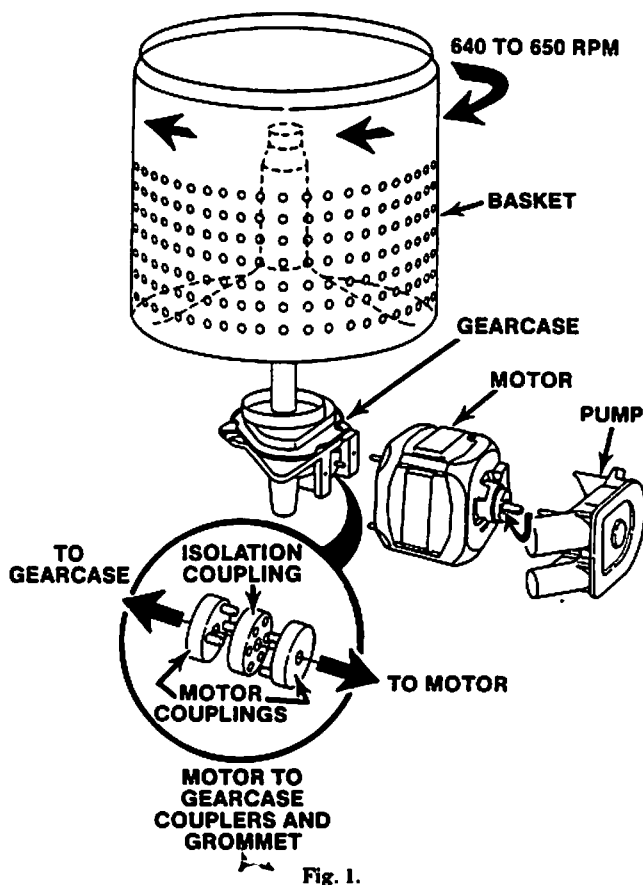


Fig. 1.

Shown, in Fig. 2, are the gearcase components used during spin. The arrows indicate their direction of motion.

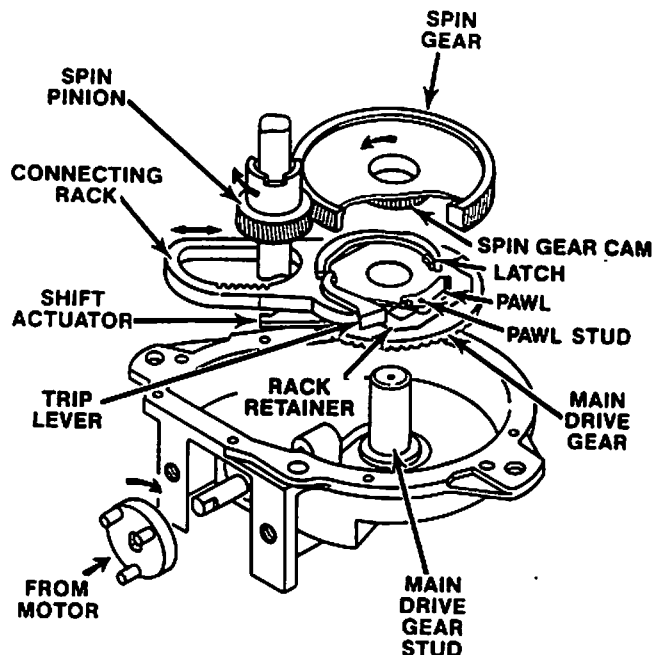


Fig. 2.

Power to the gearcase is provided by the drive motor, which drives the pinion gear through the motor couplings and isolation coupling. During spin, the drive motor drives the pinion gear in a clockwise direction. The pinion, in turn, drives the main drive gear in the direction shown (Fig. 2). As the main drive gear turns, surface friction between it and the shift actuator pulls the shift actuator in the same direction as the main drive gear until the shift actuator contacts the cam follower (Fig. 3). As the shift actuator contacts the cam follower, it stops rotating then moves forward, pushing on the protruding tab on the cam follower and rotating it into the open (spin) position. In the open position the cam follower disengages the agitate gear from the agitate clutch.

NOTE: During spin, the connecting rack drives the agitate gear in an oscillatory motion; with the agitate gear and agitate clutch disengaged, this motion IS NOT transferred to the agitator shaft.

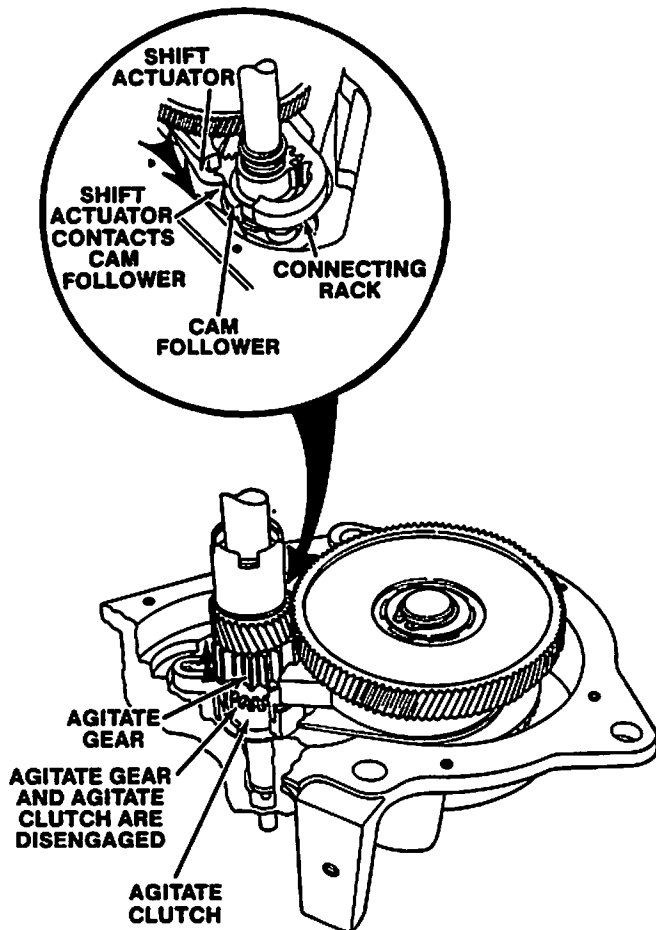


Fig. 3.

PUMP OUT BEFORE SPIN (NEUTRAL DRAIN)

A system change is being phased into production on all Direct Drive washers.

This system change will let the washer pump out the water before the basket spins. This system will be referred to as "Neutral Drain."

Some previous Direct Drive washers pumped out the water while the basket was spinning. This system was called "Direct-into-Spin."

A new gearcase, timer and water level switch are required with the Neutral Drain system. This new gearcase will have the part number and the word "Neutral" stamped on the cover.

NOTE: Gearcases cannot be interchanged between the two systems because of the Neutral Drain Mechanism, see Fig. 4, for the operational differences.

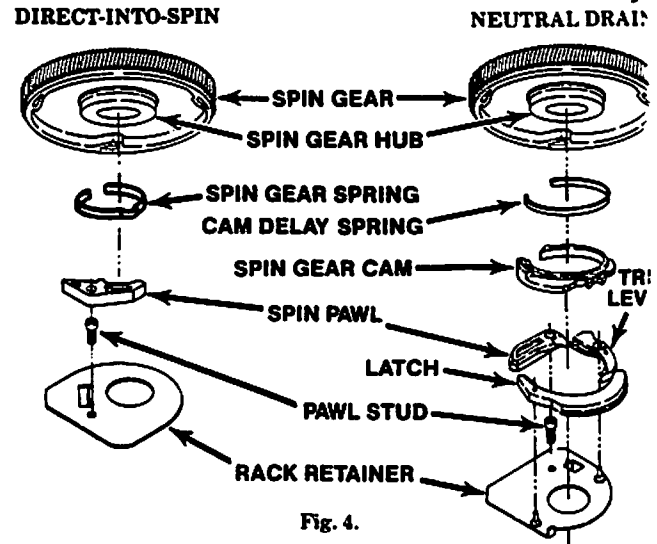


Fig. 4.

NEUTRAL DRAIN GEARCASE OPERATION

Agitation

The operation of the agitate mode in a Neutral Drain gearcase is identical to a Direct-into-Spin gearcase.

Pumpout

Functions very similar to the Direct-into-Spin gearcase except the spin pawl is held stationary to the spin gear hub, preventing it from contacting and turning the spin gear (thus, no spin).

Spin

At the end of pumpout, the timer will stop the washer for a few seconds. This short pause is required for the Neutral Drain mechanism to release the spin pawl. On start up, the spin pawl is pushed outward by the spin gear cam and contacts one of the three bosses located on the bottom side of the spin gear. This turns the spin gear, which drives the spin pinion and the clutch assembly.

COMPONENTS AND OPERATION

NEUTRAL DRAIN COMPONENTS (Fig. 5)

SPIN GEAR—has a molded "bump" on one of three bosses. This bump is required during the "Reset" mode of the neutral drain mechanism.

CAM DELAY SPRING—provides proper force to spin gear cam.

SPIN GEAR CAM—a counting device to reset the neutral drain mechanism. Cam is mounted to hub of spin gear.

SPIN PAWL—functions to drive the spin gear.

TRIP LEVER—engages cam teeth. The molded bump of the spin gear boss contacts the trip lever to lift it off the cam and advance it to the next cam tooth during the "Reset" mode of the neutral drain mechanism.

LATCH—holds Spin Gear Cam stationary to allow for neutral drain pumpout prior to spin.

PAWL STUD—attaches Rack Retainer to Main Drive Gear and provides mounting for spin pawl.

RACK RETAINER—provides two locator pins and two tabs for mounting neutral drain components.

FIGURES 5 THROUGH 10 ARE VIEWED THROUGH TOP OF GEARCASE

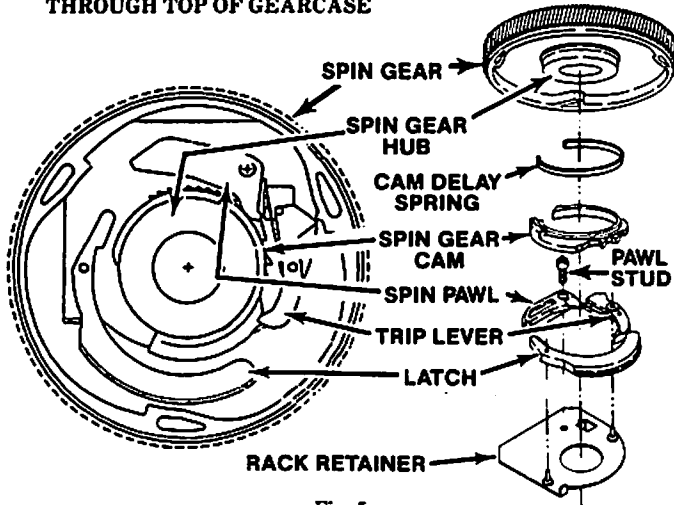


Fig. 5.

NEUTRAL DRAIN OPERATION (Fig.'s 6 & 7)

RESET DURING AGITATION

- A. The gearcase will always provide direct into spin without draining first, EXCEPT when reset, during a brief agitation period.
- B. During this agitation period, the main drive gear and neutral drain mechanism rotate clockwise and the spin gear is idle.
- C. The (A) trip lever holds the spin gear cam at the cam teeth, causing it to slip on the spin gear hub.
- D. Each revolution of the main drive gear causes the trip lever to lift off and move one cam tooth as it (B) contacts the bump on the spin gear boss.

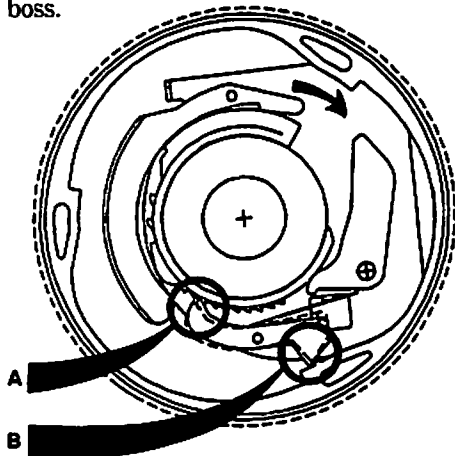


Fig. 6.

- E. To reset the mechanism to Neutral Drain, the trip lever must advance past all of the cam teeth and catch the (C) notch in the cam. This locks the cam to the trip lever and lets it slip on the spin gear hub.
- F. In this locked position, the spin pawl is held inward because the (D) pawl tail is riding on the cam.

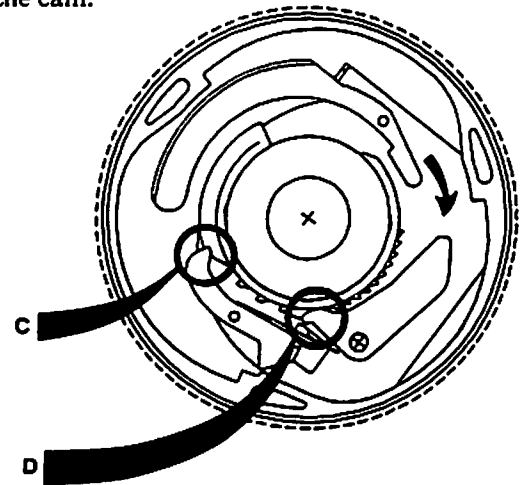


Fig. 7.

PUMP-OUT MODE (Fig. 8)

- A. During pump-out, the motor reverses direction. The main drive gear and neutral mechanism now rotate counterclockwise. During this mode, the spin gear is idle.
- B. During the first few revolutions, the (A) trip lever is contacted by the spin gear bump, is lifted off and moves to the (B) neutral lobe of the spin gear cam. In this position, contact cannot be made with the button on the spin gear.
- C. Also, during these few revolutions, centrifugal force causes the latch to pivot outward at the larger end. The opposite end of the latch has a (C) notch which catches the cam and causes it to slip on the spin gear hub. The (D) spin pawl tail is still riding against the cam, which holds the pawl inward.
- D. The motor runs and pumps out the water for a pre-set time controlled by the timer.

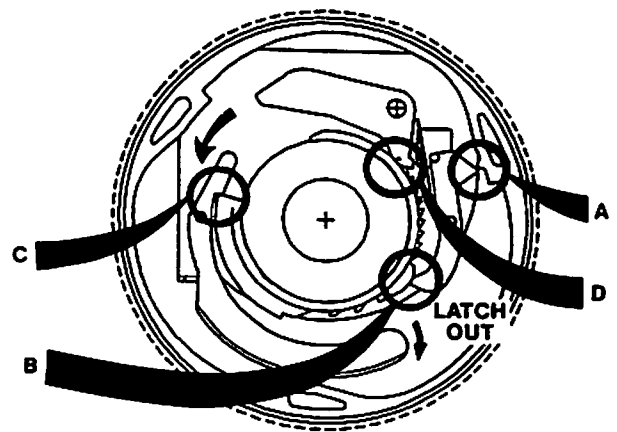


Fig. 8.

PAUSE—SHIFT TO SPIN (Fig. 9)

- A. At the end of pump-out, the washer will stop and pause for about three-to-five seconds. During this timer controlled pause, the (A) latch releases the spin gear cam. The spin gear cam is then free to rotate past the latch toward the spin pawl.

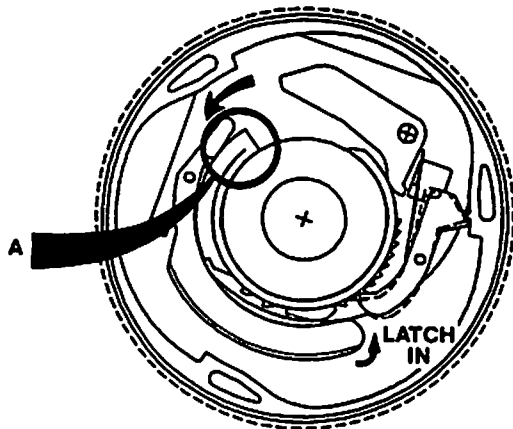


Fig. 9.

SPIN MODE (Fig. 10)

- A. Following the pause, the motor will restart, causing the neutral mechanism to rotate counterclockwise.
- B. The (B) cam rotates around and contacts the spin pawl moving it outward. This allows the pawl to make contact with one of the (C) three bosses on the bottom of the spin gear, causing it to spin.
- C. The spin gear drives the spin pinion, which rotates the clutch drum. The clutch lining spring contacts and rotates the brake release cam. When the brake is released, the basket spins.

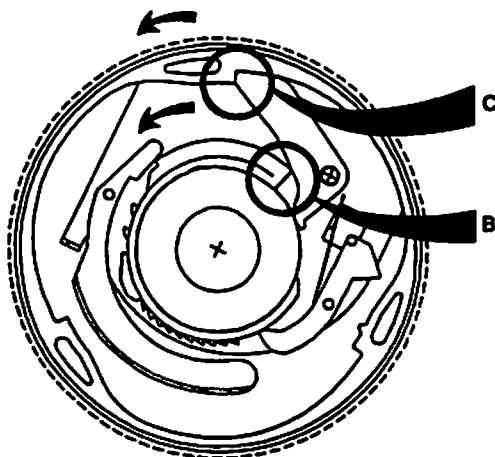


Fig. 10.

The clutch hub Fig. 11 is attached to the spin pinion gear. As the spin pinion gear turns, the clutch hub also turns. The clutch lining is forced against the clutch hub by the clutch spring. As the clutch hub turns, friction between it and the clutch lining causes the clutch lining to turn. As the clutch turns, the tab that holds the clutch spring on the lining, contacts the brake cam driver, releasing the brake. The tab on the clutch lining remains in contact with the brake cam drivers, holding the brake released and providing power to the spin tube through the brake release. The basket is attached to the spin tube with a drive block.

NOTE: When the machine shifts out of spin, pressure is removed from the brake cam driver which allows the brake linings to expand outward, contacting the brake drum which stops the basket from spinning.

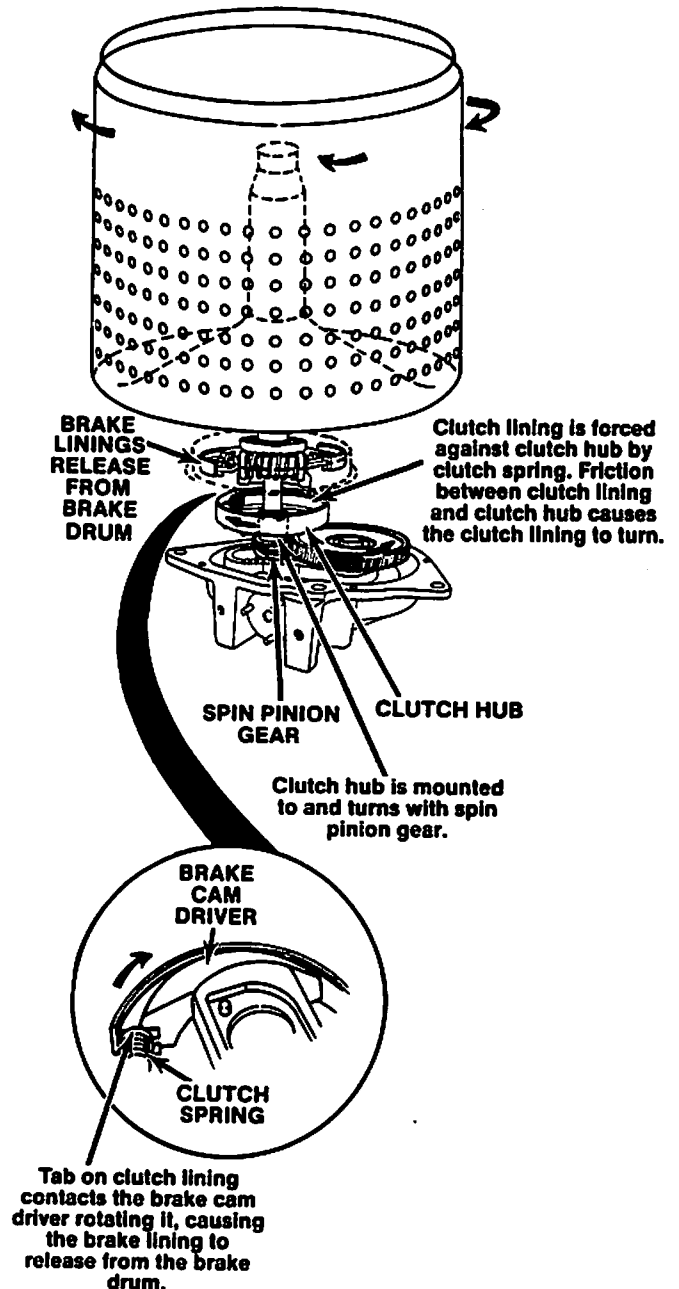


Fig. 11.

AGITATORS

The purpose of the agitator (Fig. 12) is to provide a proper washing action by moving the water and clothes around in the basket.

There are three basic designs of agitators used. They are the one piece agitator, the two piece agitator or the auger agitator where by the bottom part moves back and forth and the top part only moves in one direction.

These agitators are pressed directly onto the splined agitator shaft. A screw and rubber washer screwed into the top of the agitator shaft, is used to hold the agitator down.

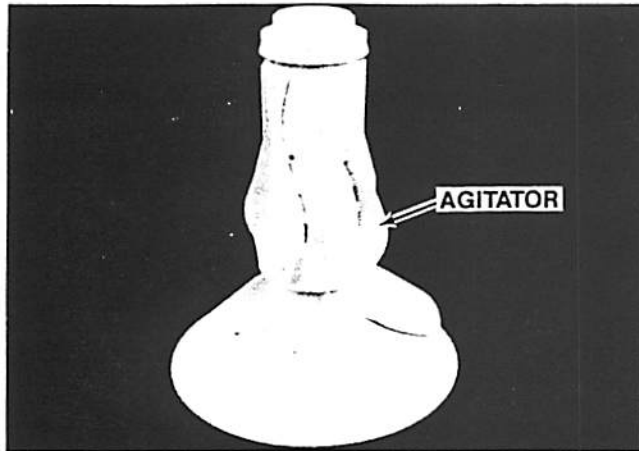


Fig. 12.

TUB

Tubs are made of a plastic material, which cause almost no service problems.

This tub is secured to the suspension plate with six screws.

TUB RING

The tub ring, or splash shield, fits on top of the tub and snaps in place. A rubber gasket is used between the tub and tub ring.

The purpose of the tub ring is to prevent water from going over the tub ring during spin or splashing over the top during agitation.

BASKET

The purpose of the basket is to hold the clothes while they are being washed and spun dry.

The basket has a porcelain finish and is perforated to allow the water to be free-flowing during recirculation and draining.

If the basket is loose on the spin tube, it will cause excessive noise. Check the drive block to make sure the cut-outs are positioned over the tabs on the spin tube, then make sure the spanner (lock) nut is tight.

Examine the inside of the basket to be certain that there are no sharp edges or perforations that might cause clothing damage. If rough spots are found, sand or burr them off. Seal the sanded areas with epoxy.

BASE

This base is a three-legged part which provides the support for the mounting of the tub support, suspension plate, gearcase, drive motor and pump.

The rear panel and wrap-around cabinet are also mounted to the base. This base has three teflon coated pads. One each is located on each of the legs and is used for the suspension plate to slide or move around during wash and spin.

SUSPENSION PLATE

This is a triangular design part (Fig. 13), located between the base and tub support. This part also has three teflon coated pads which are located in such a way that the three legs on the tub support ride on them.

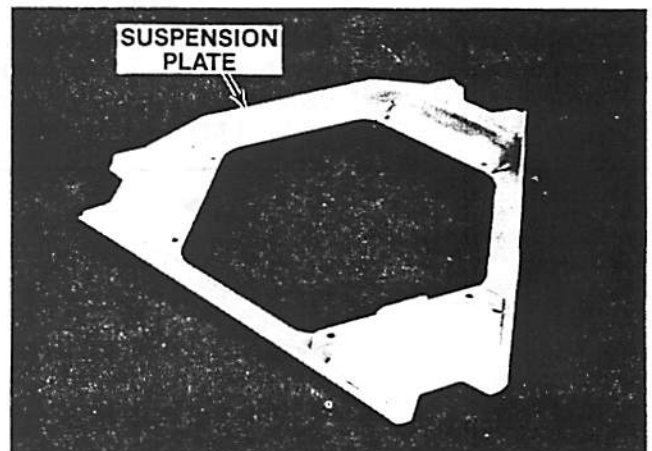


Fig. 13.

TUB SUPPORT & BRAKE

This tub support and brake (Fig. 14) contains the bearings and seals for the brake and drive tube. The tub and gearcase are mounted to this support.

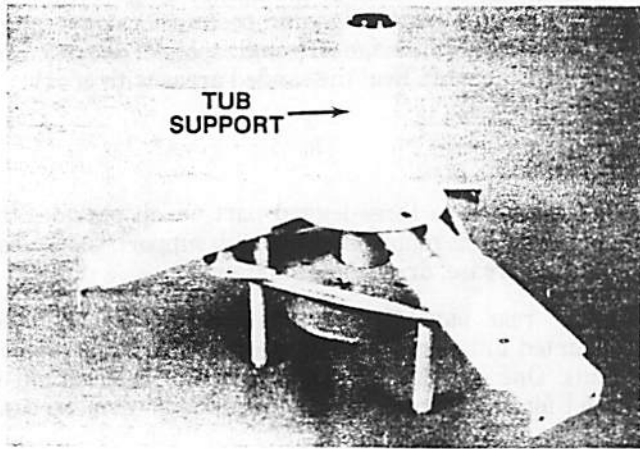


Fig. 14.

CABINET REMOVAL

Removing the cabinet to get at the components inside, is very easy. First, use a Phillips screwdriver and remove the screws (one on each side) from the front of each end cap. Next, lift up on the console and lay it back on the hinges. Pull apart the harness connectors coming from the console and the cabinet. Use a flat blade screwdriver and insert the blade (Fig. 15) into the turned-up edge of the clip, then pry back to release

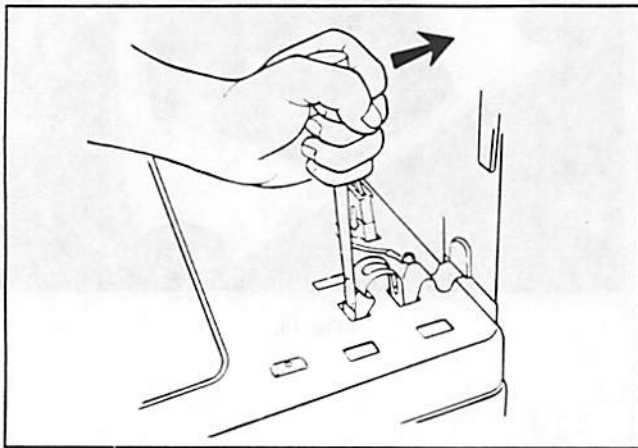


Fig. 15.

the clip from the hole in the cabinet. Don't forget the clip on the other side of the cabinet. Now, open the lid and grab the front opening, tilt the cabinet toward you then pull the cabinet away from the base. All the components inside the cabinet are now accessible.