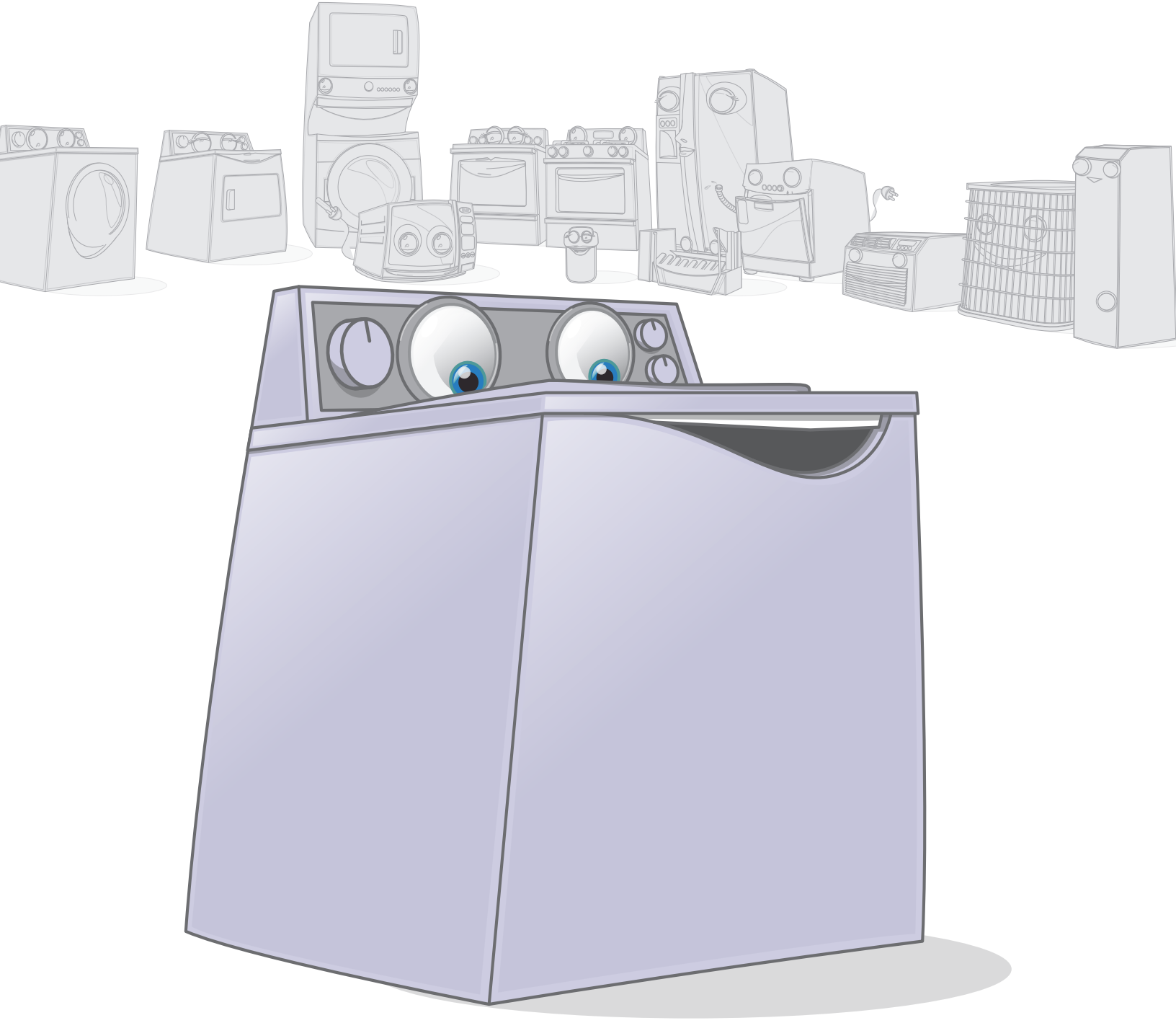
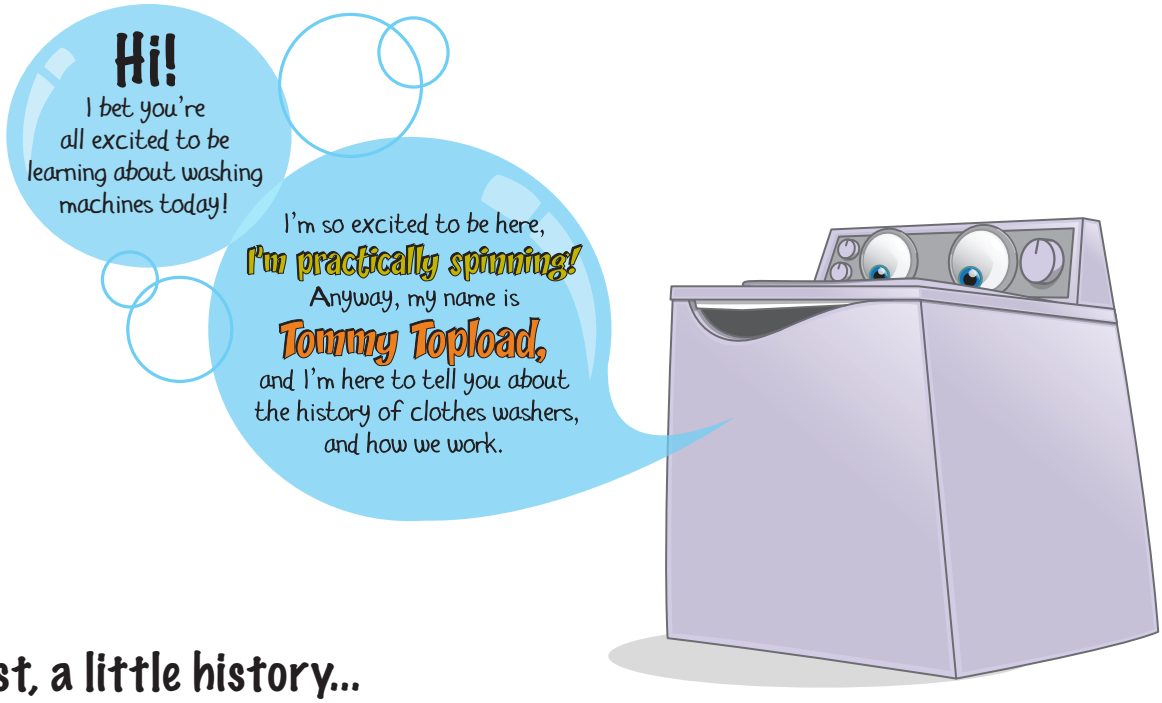


Washer
basic training



First, a little history...

"Clothes washers have been around for over 200 years, but in the early days they were very simple contraptions. What you had was basically a large tub you filled with water that you pre-heated with some kind of mechanism that sloshed the clothes around, and a wringer that you ran the clothes through to squeeze the water out. Those wringers were no joke, they could squash your fingers if you weren't careful! Emptying the tub was easy though, all you had to do was pull a plug and the water dumped out onto the ground."

"The first washing machine was designed in 1782 by a British man, H. Sidgier. His machine consisted of a cage with wooden rods and a handle for turning. Not long after, others began to copy and improve on the design, and soon paddles and dollys were being used to move the clothes around. James King invented the revolving drum in 1851, which was followed by a revolving drum with reversing action, from Hamilton Smith, in 1858."

"In the early 1900's with the advent of small electric motors, the washing machine entered the electric age. In 1906 Fisher produced the first electric washing machine, and my grandpa Sparky was one of them. They worked reasonably well, but with the motor bolted on the side, they weren't very safe since water often spilled over the side and into the motor or switch, which is how grandpa got his name! After a few…let's say 'incidents', they started being built with the motor and drum enclosed in a case sometime in the 1930s. The first fully automatic washing machine was introduced at the 1937 Louisiana State Fair by the Bendix Corporation. Ten years later General Electric introduced the first fully automatic washing machine to have an agitator.

"We've come a long way from wood barrels and wringers, to being able to adjust water and wash settings. Now, let's see how us washers work today!"

The most common parts...

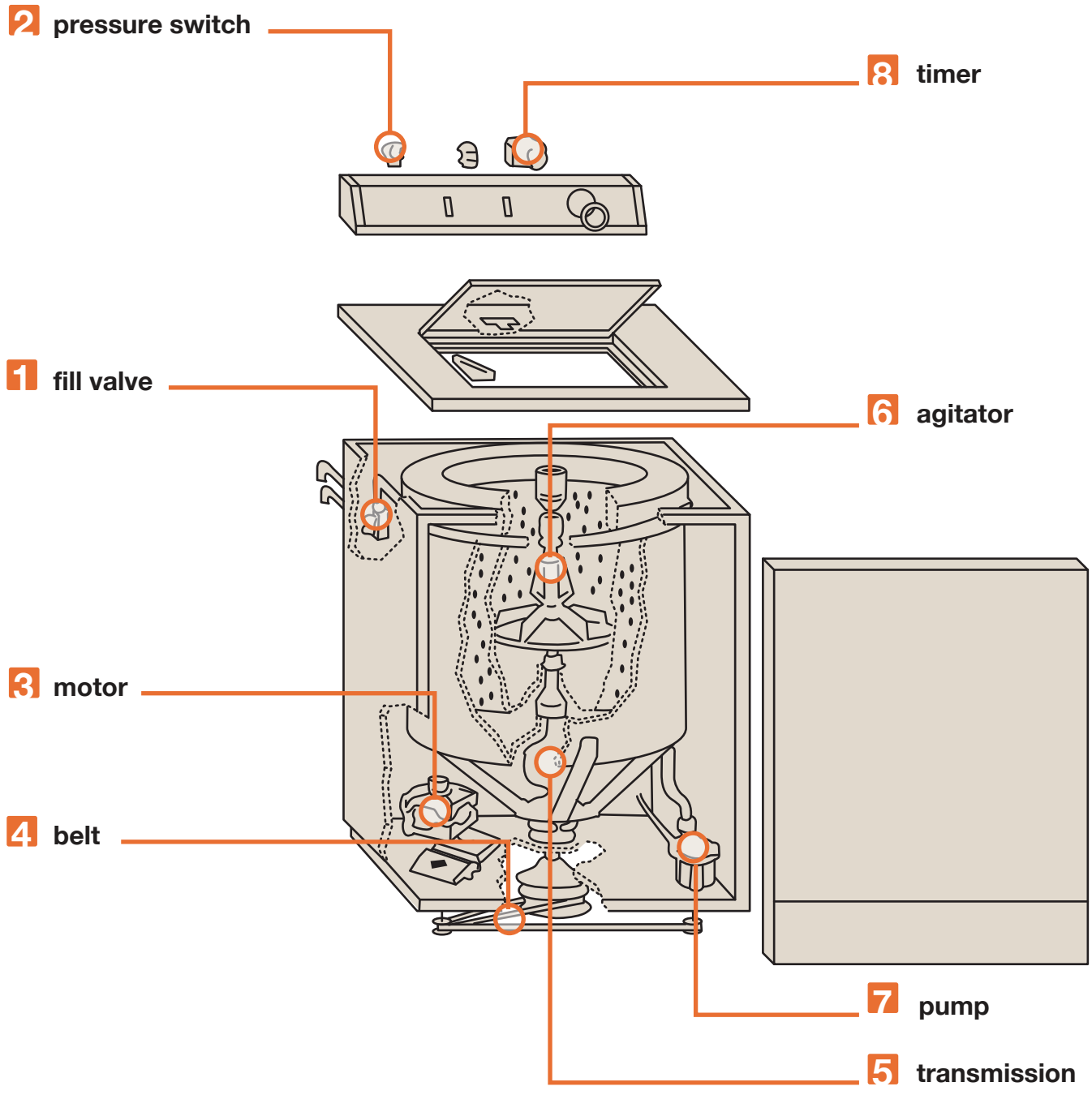
"Today, people wash clothes by putting them in the washer, turning the control knobs, and setting the timer for the operation they want. But how many people know what's really happening inside the automatic washer? Well, that's exactly what we're here to find out!"

"Modern washing machines still have a tub that holds the clothes, but now we fill up with water by using a fill valve. It used to be that the filling would stop after a certain amount of time, but now we have a way of measuring the amount of water in the tub with a pressure switch."

"The whole machine is powered now with a motor. In the past the power moved through belts to the transmission, but now-a-days most units are direct-drive (which means that they don't have a belt). The transmission converts circular motion to back and forth motion. This motion is what turns the blades that slosh the clothes around, known as the agitator. Water is re-circulated, and later sent out of the washer and down the drain by using a pump. The timer is kind of like our brain, it controls the operation and sequence of the modern automatic washer."

1. **fill valve**
   lets water into the tub
2. **pressure switch**
   measures amount of water in the tub
3. **motor**
   powers the washing machine
4. **belt**
   moves power from motor to transmission
5. **transmission**
   converts circular motion into back and forth motion
6. **agitator**
   moves clothes around inside tub
7. **pump**
   re-circulates and removes water from washer
8. **timer**
   controls operation and sequence of washer

Standard Top Load Washer



1 fill valve

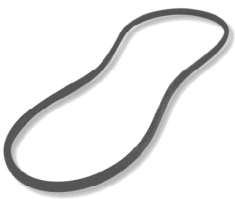
Also called:
Solenoid valve
Mixing valve
Water valve

2 pressure switch

Also called:
Water level control switch

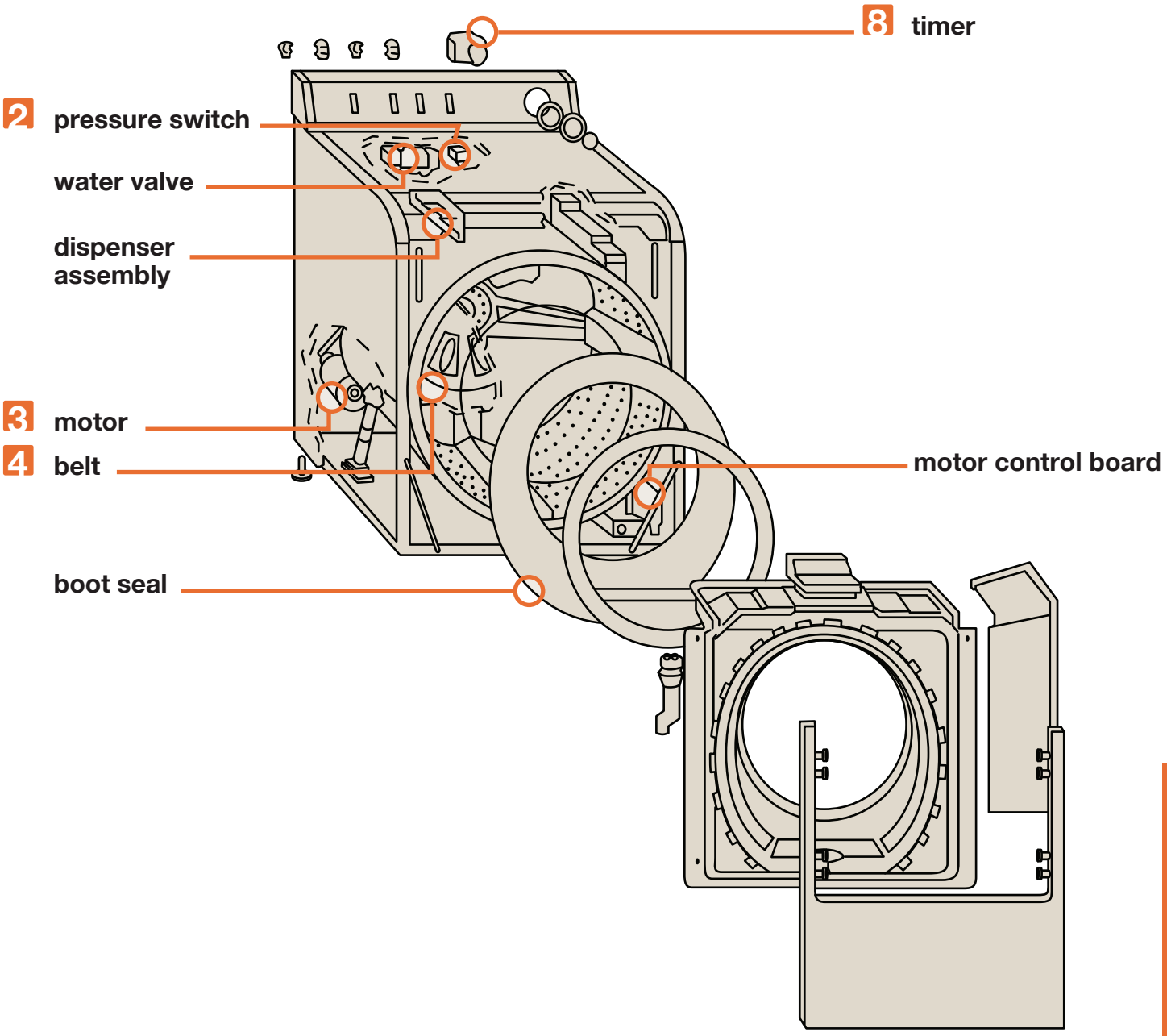
3 motor

4 belt



Also called:
Drive belt

Standard Front Load Washer



5 transmission
(top loaders only)

Also called:
Gearcase Crankcase

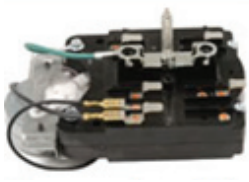
6 agitator
(top loaders only)

Also called: Clothes mover

7 pump
(top loaders only)

Also
called: Drain pump (type of pump)
Recirculating pump (type of pump)

8 timer



Also called:
Control board
Electronic control board

Pre-technology

Washing clothes in a wash tub was a very hard domestic task

1900s

1908
Early electric washing machine

Evolution of the Parts...

"Just as everything else has been changing from manual to automatic, so have machines and our parts. Timers back in the 60s and 70s were re-buildable. When your timer quit ticking the servicer would actually repair it by replacing the parts that were defective. However, as time went by, fewer and fewer parts were available to rebuild timers and our manufacturers began to encourage the replacement of the complete timer assembly. Now, the modern washing machine timers automatically set the wash and spin speed, as well as water level and length of time on each cycle, just by the consumer entering what type of clothes they are washing. The control board, which is the timer in modern machines, knows exactly what to do all the way up to choosing the temperature of the wash and rinse water. "

"Early pumps relied on the belt and the direction the motor was turning to make the pump either recirculate or drain the water according to what point it was at on the cycle. Those old pumps were big, and had to use gravity to increase the speed of the drain cycle. Although most pumps are mechanically driven, we do have some pumps that are electric, and have their own motor, so we are able to move much more water in both recirculation and drain modes. These days, some washing machines even have two pumps, one for each function, recirculate and drain."

"Agitators way back in the day, used to be simple, one piece "clothes movers". Today's agitators can be made up of multiple pieces with internal gears. For example, Whirlpool actually has these tear drop shaped "agitator dogs" to help the agitator ratchet back and forth, moving the bottom half and top half in opposite directions. Some of our manufacturers are getting rid of agitators. My friend Frank Frontload doesn't have one, but he says he doesn't mind. Front loads aren't the only ones without agitators though, one of the newest top load washers has a "washplate" instead of an agitator allowing him to use less water and be gentler on the clothes."

"The agitator sits on the transmission whose job is to shift gears from agitate, which is the back and forth motion, to spin where we actually start the process of draining the water from the clothes. That top load I mentioned a second ago--he doesn't even have a transmission. He uses a leveler to change the position of the "washplate", and he's even driven solely by the motor rotor and strator. Now, he sounds like a pretty cool dude, if you ask me!"

1960s

1961
One of the first automatic washing machines which incorporated full wash, rinsing, and spin cycles

Present

2008
Modern front load washing machine

on the wings of time

"We have been using belts from the beginning. Some of us washers even have two or more belts to work the pump and transmission off the motor. Some newer washers have been built without belts and instead have a "direct drive" design, working directly from the motor. There are variations of washer belts out there, some are what's called a "V" belt and some have cogs, or little teeth, on them. I'm glad I don't have the kind with teeth, I've heard they tickle."

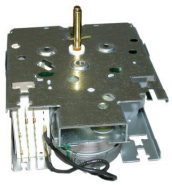
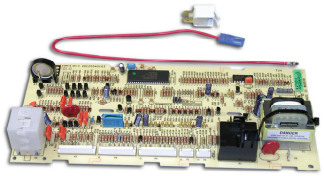
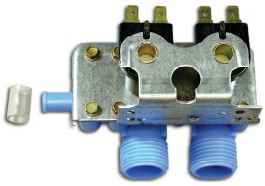
"Since the invention of the washer motor, people have truly become spoiled. One of the first washers ever produced was the old "wringer washer" that was actually powered by a peddle you had to pump with your foot. Motors are one of the first parts that made washers "automatic". As some of the more modern motors have gone away from using a belt, they have changed a lot. For instance, they no longer need to have a shaft and pulley to drive the belt. There are even separate control boards that control the speeds and directions of the motor."

"The pressure switch, also known as the water level switch, used to be repairable and adjustable. If my low water level was not low enough the servicer could adjust my pressure switch to a smaller amount of water, or vice versa for a higher level of water. These days, the pressure switch is not repairable or adjustable. Now, they come from the manufacturers with those settings and you can't change them. Older washers only have one pressure switch, but some of our newer machines have two: one for the water level for the wash cycle and one for the water level for the rinse cycle. Before, you would only find the pressure switch in the control panel, but in the newer machines, they may be down by the pump. Wow, all these changes with the newer models are starting to make me feel old!"

"Water valves are another major part in making washers "automatic," and boy, are they a blessing! Our water valves let in both hot and cold water. I'd say that's a lot better than carrying buckets of water to the machine for the wash and rinse cycles, wouldn't you agree? The water valve has gone through many changes, from letting in only hot or only cold water, to letting in a combination of hot and cold water, as well as dispensing soap, bleach, and fabric softener. Water valves are commonly going to be found in the washer's back, but with all those changes we were talking about, they might be found in the control panel area on some models."

"Now, of course there are many more parts to the washer, as we progress through these diagrams, you will get to see all of them."

parts on the wings of time

then:	now:
timer 	
valve 	
pump 	
agitator 	
transmission 	

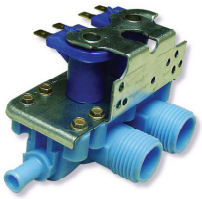
Most popular washer part numbers to remember:

Whirlpool coupler
285753A

Whirlpool agitator dogs
80040

WCI belt
134511600

GE water valve
WH13X81



Whirlpool pump
21001906

Whirlpool direct drive pump
3363394

reading parts diagrams

On the next several pages you will see a typical washer breakdown containing the parts that you have learned. Knowing the appearance of the part and the location on the wash machine will help you identify it on a diagram. Most manufacturers present their “parts list and exploded view” in this type of diagram.

The diagrams are presented in a “facing the appliance” view. When you are talking with a customer make sure that when they tell you where the part is located that they are facing the appliance, otherwise their left will actually be the right on your diagram. Many mistakes are made because of this.

Because the diagram is an “exploded view” parts are not exactly where they belong. Once you have found the particular section the part should be located in, use the lines or arrows to follow the part back to where it is actually mounted. This will help you determine if it is the part you are looking for.

Remember most parts do not include screws or trim, and most customers believe everything is included. This is why it is very important that you communicate with your customer exactly what you are seeing on the diagram. An example would be on page 9 in the diagram for the controls and rear panel, item # 44 is the timer knob and item # 45 is the timer dial. Most customers are not aware that they are two separate parts. Asking the customer if they need both pieces will eliminate the guess work and inform the customer of the fact that they do not come together. Asking secondary questions will allow you to get the customer all the parts needed to complete the repair the first time.

There are many differences between what the customer is seeing and what you see on the diagram. On the diagram you can not see color, size, or any small details that the customer may be using to describe the part. This is why using the location and what the part does may be your only way of locating the part needed. Although there are several websites that may give you a true to life picture of the part, you can not rely on that.

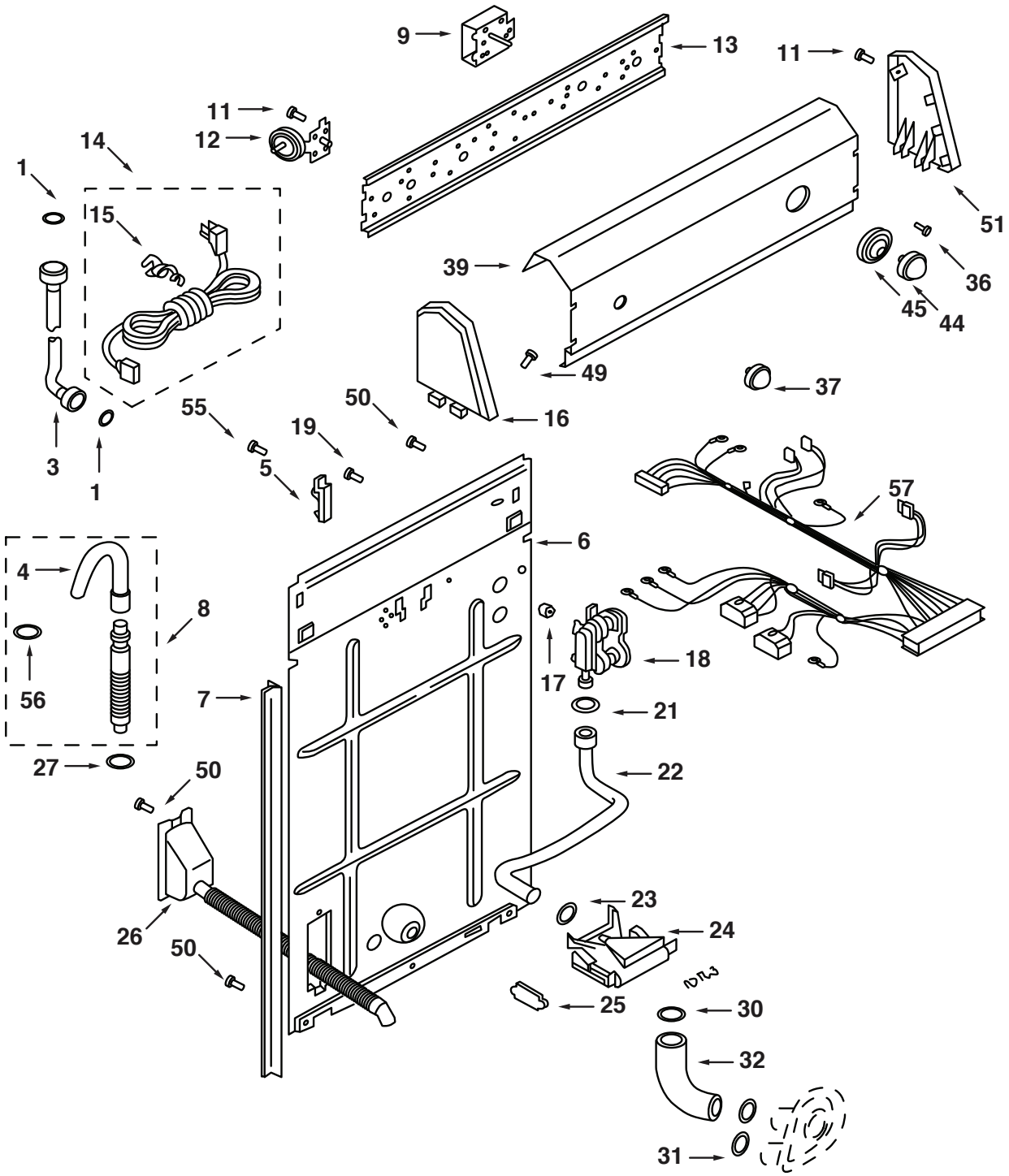
On many diagrams the manufacturer will offer parts as an assembly. They will indicate this by placing a dotted line box around several parts. If the parts have an item number, they are available separately, if there is no item number they are only available as an assembly. Always give the customer the option of replacing the assembly rather then just the one part. This usually makes the repair easier and more complete.

Take a few minutes to identify some of the parts and their locations in the diagrams on the following pages. See if you can spot the eight major parts of the washer.

parts diagrams

Typical Washer Breakdown:

controls and rear panel parts

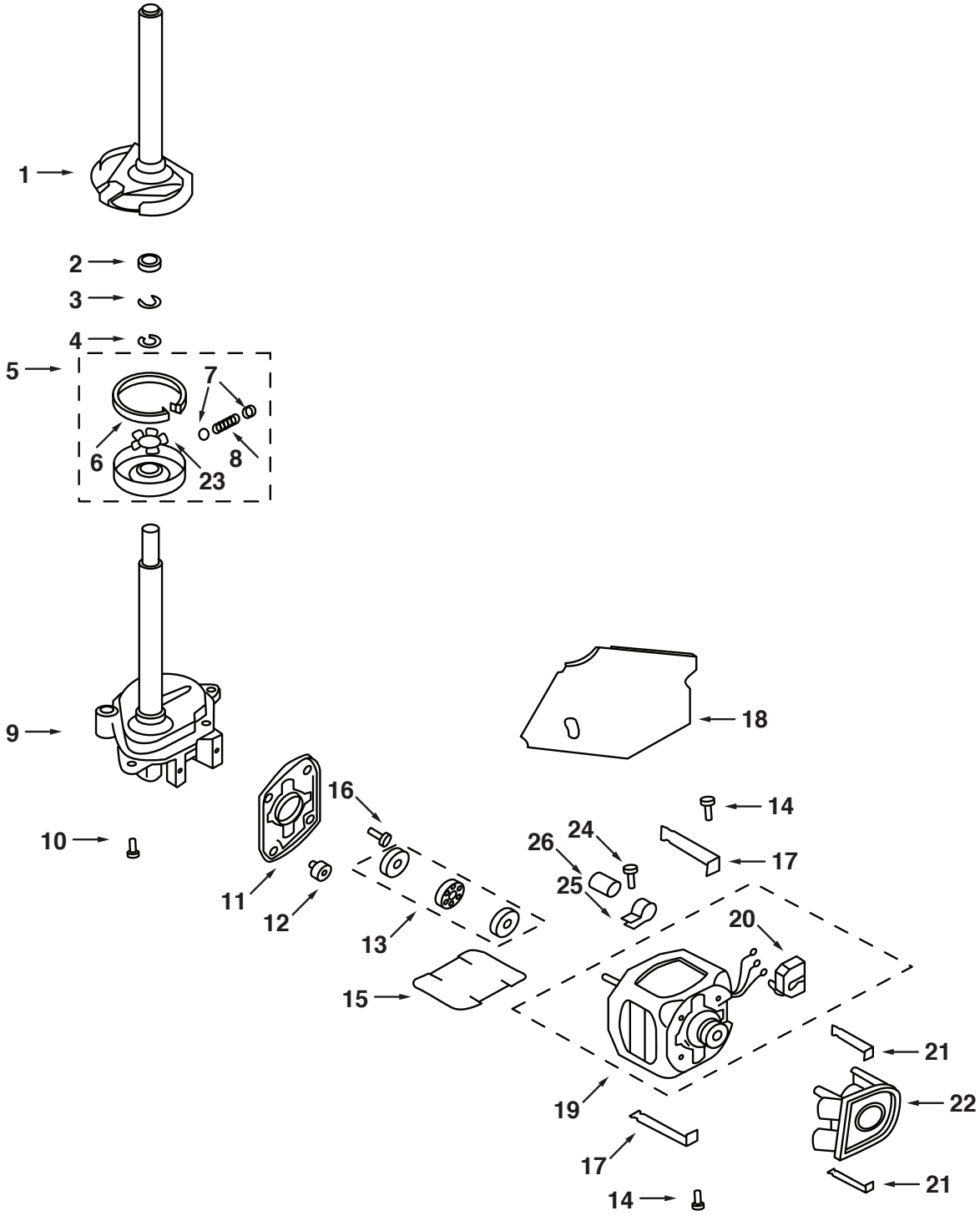


1	16123	Washer, Water Inlet Hose (4) (1-1/16 x 5/8)
3	3354858	Hose, Water Inlet (2)
4	3357027	Nozzle-Drain Hose
5	387402	Hinge, Console (2)
6	3357976	Panel, Rear
7	62747	Pad, Rear Panel
8	3357090	Extension, Drain Hose 21“ (Not Included.)
	661575	Hose, Drain 4`-8``
	661577	Hose, Drain (9`-9``) (Not Included)
9	3946451	Timer, Control (60 Hz.) (Motor Not A Service Part)
11	90767	Screw, 8A x 3/8
12	3356468	Switch, Water Level
13	3358897	Bracket, Control
14	3360514	Cord, Power
15	63848	Strain Relief, Power Cord
16	3358013	Cap, End (L.H.)
17	96160	Screen, Filter (2)
18	3360392	Valve, Water Mixing
19	90864	Screw, 10-24 x 3/8 (2)
21	272846	(Alt.)
	353367	(Alt.)
	370451	Clamp, Hose
22	62662	Hose, Vacuum Break
23	371503	Clamp, Hose
24	3347034	Break, Vacuum
25	63290	Support, Rear Panel
26	3361805	Hose-Corrugated Assy.
27	356138	Clamp, Hose
30	371502	Clamp, Hose
	370447	(Alt.)
31	353097	(Alt.)
	272858	(Alt.)
	660628	Clamp, Hose
32	62731	Hose, Pump To Tub
36	96435	Screw, Timer Mounting (10-32 x 1) (2)
37	3352167	Knob, Control (For White Model)
39	3361544	Panel, Console (For White Model)
44	3352173	Knob, Timer (For White Model)
45	3946332	Dial, Timer (For White Model)
49	3353145	Screw-Console (Panel to Top)
50	62863	Screw, 10-16 x 3/8
51	3357995	Cap, End (R.H.)
55	3357011	Screw, 10-16 x 1/2
56	3357331	Clamp, Drain Hose
57	3947386	Harness, Wiring (For Detail See Wiring Harness Parts Page)

parts
diagrams

Typical Washer Breakdown:

brake, clutch, gearcase, motor, and pump parts

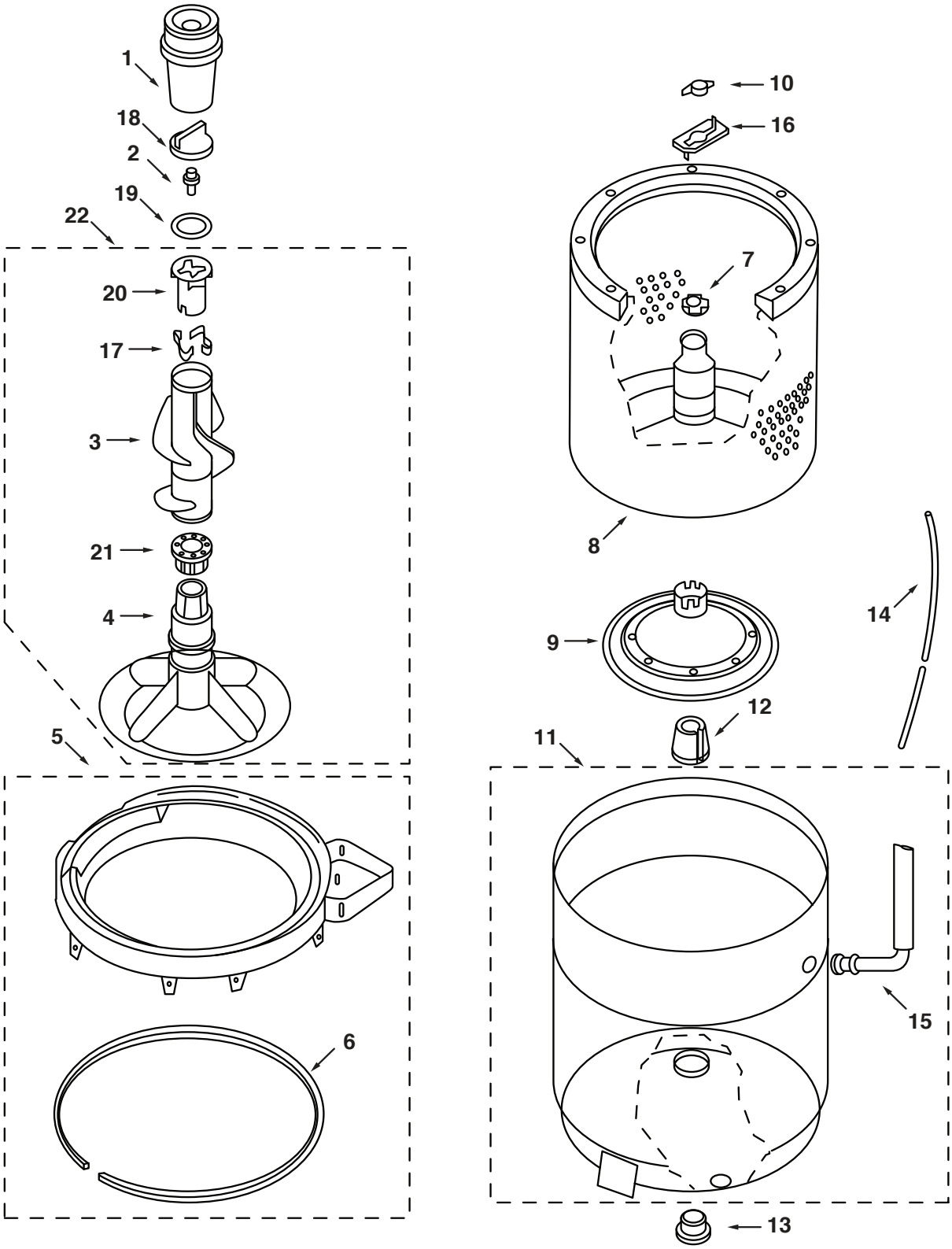


1	388951	Brake & Drive Tube (Complete) (Refer to Brake & Drive Tube
2	63292	Washer, Spin Tube Thrust
3	62697	Ring, Spin Tube Support
4	63283	Ring, Retainer
5	3946794	Clutch (Complete)
6	3946793	Band & Lining, Clutch (Includes Illus. 7 & 8)
7	62646	Cap, Clutch Spring (2)
8	3363337	Spring, Clutch
9	3360630	Gearcase (Complete) (Refer To Gearcase Parts Page For Further Breakdown)
10	3357334	Screw, Gearcase To Base (3)
11	62611	Plate, Motor Mount To Gearcase
12	62691	Grommet, Motor (4)
13	285753A	Coupling, Motor and Isolation (2)
14	3387485	Screw (2) No.10-16 X 5/8
15	3946532	Shield, Motor
16	3357334	Screw
17	3349637	Retainer, Motor (2)
18	3362089	Shield, Tub To Motor
19	661599	Motor, Main Drive
20	62851	Switch, Main Drive Motor
21	62700	Retainer, Pump (2)
22	3363394	Pump (Complete)
23	3355454	Clip, Anti-Rattle
24	62863	Screw, 10-16 x 3/8
25	357030	Clamp, Capacitor
26	357021	Capacitor, Start

parts diagrams

Typical Washer Breakdown:

agitator, basket, and tub parts



1	389142	Dispenser, Rinse
2	358237	Screw & Washer (5-16-24 x 1)
3	3348916	Clothes Mover, Three Vane
4	3348245	Agitator
5	63851	Tub Ring
6	3359585	Gasket, Tub Ring
7	21366	Nut, Spanner
8	3357026	Basket
9	3361948	Filter, Plate
10	3354845	Clip, Agitator
11	388893	Tub
12	389140	Block, Basket Drive
13	383727	Gasket, Center Post
14	3347780	Hose, Pressure Switch
15	3358198	Hose, Bleach
16	3355921	Washer, Agitator
17	80040	Dog, Agitator Clutch (4)
18	3347290	Cap, Barrier
19	3348855	Seal, Inner Auger
20	3351001	Cam, Agitator
21	3350389	Spacer, Thrust
22	3348244	Agitator (complete assy)