

*Raker*

**Appliance Repair Professionals, Inc.**

Disposers, Instant-Hots, Compactors and  
Water Heaters

**Manual 16**

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# **WARNING**

## **SAFETY PRECAUTIONS**

**Safety is very important when working on any appliance.**

**Disconnect power before servicing any appliance.**

**Always keep the work area and your shoes dry.**

**All appliances have sharp edges and should be handled carefully.**

**Before working on any gas appliance extinguish all open flames and before attempting any gas associated repair, cut off the gas feed.**

**Always sniff for gas leaks and soap bubble test any parts that may have been disturbed by repair work.**

**To minimize any potential buildup of gas in case there is a leak, always have the room open to the outside.**



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# DISPOSERS, INSTANT-HOTS, COMPACTORS AND WATER HEATERS

**T**he final manual covers four appliances that don't warrant a complete manual by themselves. Each of these, disposers, instant-hots, compactors and water heaters are simple when compared to the ones already covered. Also, they do not generate a great quantity of service calls.

This is not to say that they are not moneymakers. In fact, they **are** moneymakers; they just don't fail very often. In addition, not everyone has one. This is particularly true of trash compactors and Instant-Hots. Although, it is true that everyone has a water heater they seldom need service. Unfortunately, people are programmed to call a plumber for a water heater, instead of an appliance repairman.

Gas water heaters are not covered because they generate too few service calls. Those few calls are usually pilot problems like those described under ranges and dryers.

## Disposers

**D**isposers are the most profitable of the minor appliances. They are, one of the simplest appliances that a technician ever works on. It would be wonderfully profitable, but perhaps boring, if a business could specialize in only disposer repair and installation.

Repairing disposers really boils down to one word, "**In-Sink-Erator**". In-Sink-Erator has a virtual monopoly on the worldwide disposer market. The In-Sink-Erator design, which we'll cover in detail, is marketed under the following name brands:

1. Whirlpool
2. Kenmore
3. Kitchen-Aid
4. Emerson
5. In-Sink-Erator
6. GE
7. Hotpoint, and many others.

There are a few very cheap disposers made by off-brand companies, but 90% of what's being sold today is coming from the Emerson Electric manufacturing plants. Originally, they were only marketed as In-Sink-Erator (now owned by Whirlpool), but now their design saturates the market.

This is really good news, not bad news. Like on microwaves, a standardized design makes servicing very easy and minimizes parts stock. A technician that has mastered the In-Sink-Erator design can successfully complete all disposer calls.

Let's go over the basic operation of a garbage disposer so that you understand how it works and what happens when it fails. A garbage disposer is an electric motor with a food-grinding chamber mounted underneath the sink. It is essentially a steel blender connected to the drain line.

The top of the grinding chamber is bolted beneath the sink. Inside the chamber is a grinding plate with teeth mounted on it. As the plate spins around, the teeth grind the food to a pulp and force it through a sieve that surrounds the edge of the plate. While the disposer is operating, running water is running in the sink. Once the food is pulverized, it flushes down into the drain system. Beneath the spinning plate is a water seal that protects the motor wiring and the upper motor bearing.

There are three disposer system failures:

1. A hard object jammed in the teeth is the most common.
2. A component within the disposer motor or grinding chamber fails.
3. The trap, mounting, or piping downstream from the disposer leaks or clogs.

Disposers all have a small built-in reset button on the bottom. The reset often pops out during a minor jam. If a customer complains of a "dead disposer", ask them to push in the reset button before running a service call.

## Disposers Jams

The following is a list of typical items found in disposers:

1. nails
2. coins
3. staples
4. paper clips
5. wire ties
6. hard pieces of plastic
7. cigarette filters
8. cornsilk and cornhusks.
9. bottle caps

By pushing the protective rubber inlet aside and shining a light down into the disposer, it's usually possible to fish around and locate the jamming item. Often a long screwdriver can be placed in between the grinding plate and the wall. Twisting the screwdriver back and forth will move the plate and free the jammed item. Use long nose pliers to pick up debris. A crowbar or a 3' piece of steel pipe is ideal for hooking onto the teeth and moving the grinding plate.

*Uncle Harry's*

Trick of the Trade # 304

Be careful not to use too much force on the grinding plate. It is possible to twist the whole disposer in the sink flange, break the seal, and create a leak.



## Rusted Up Disposers

Many disposers will jam if left unused for a long period. This condition is found in homes of elderly customers that seldom use the unit. It also happens when people go on long vacations. The grinding plate will rust to the wall and the motor will be unable to break it loose. If the main seal is starting to fail, a small amount of water may leak onto the upper motor bearing and rust it. As long as it is regularly used, breaking the rusted grinding plate loose with a bar will work fine and put the disposer back into service

An unjamming wrench is supplied with all In-Sink-Erator disposers. It is designed to be inserted into the bottom of the motor shaft and twisted to move the grinding blade. In truth, it is only helpful on minor jams. More torque than can be supplied by the wrench is usually needed.

Unjamming a disposer is usually a five to ten minute job and results in a minimum charge. Some companies charge for a minimum of fifteen minutes labor over the service charge.

## *Uncle Harry's Story Time*

*One day, Phil Brooks, a now retired Baltimore technician, ran into a customer relations problem while unjamming a disposer. He quickly located a jamming paper clip, removed it from the disposer, and sat it on the countertop. He showed it to the lady and wrote her up for a service charge plus a minimum of fifteen minutes time. She looked at the bill and said,*

*"Sixty dollars, that's ridiculous! You've only been here five minutes."*

*He explained that the charge was correct and asked her to pay him. She refused. Phil had been around for a long time and didn't believe in taking any stuff from customers. Without hesitation, he said, "Okay." He threw the paper clip back in the disposer, turned it on for a second, and rejammed it. He picked up his tools and walked out the door.*

*The livid and now screaming customer chased him outside and stood in the middle of the driveway blocking his truck. Folklore has it that the woman was screaming so much that neighbors called police in order to settle the disagreement.*

*I wonder if that customer ever called Phil Brooks for service again?*

## Disposers and Septic Tanks

Customers in rural areas frequently ask,

*"Can I install a disposer when I'm on a septic tank?"*

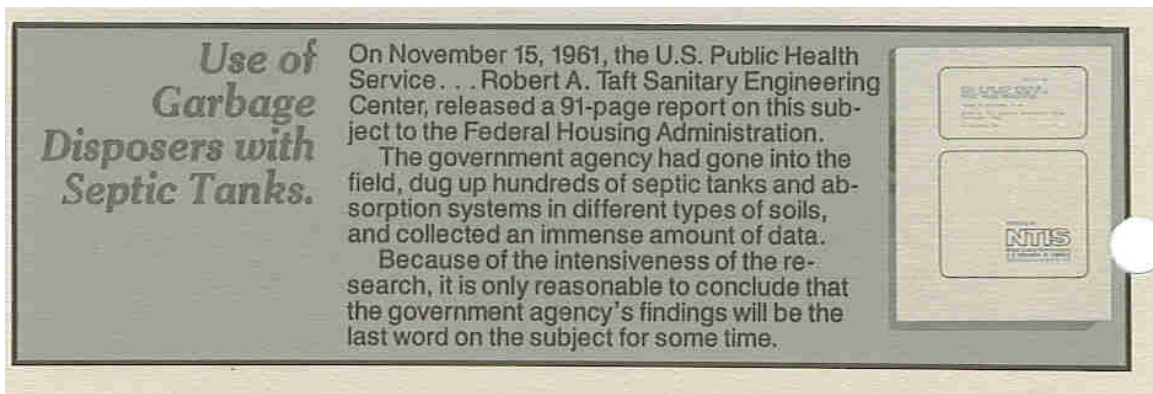
They are concerned that the output of the disposer is going to clog up the septic tank. Such concerns are unwarranted. Encourage the installation of a new disposer. Use the following information to convince a skeptical customer.

### **A Government Report From In-Sink-Erator (Fig. 16-01)**

It is true that food particles add more work to the decaying process taking place in the tank. But a properly used disposer adds only the equivalent of an additional powder room to the loading on the septic tank.

To minimize the additional loading, advise the customer to remove the bulk of the food debris from the sink before flushing the remnants down the disposer. Use the disposer as a cleanup tool rather than a trash can. Continuous flushing of **all** the cooking debris will certainly clog up the tank and often the plumbing.

A septic tank in good condition can handle the additional load with no problem.



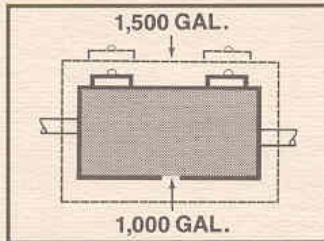
(Fig. 16-01 cont.)

*Here are some of the basic verbatim conclusions of the Government Agency:*

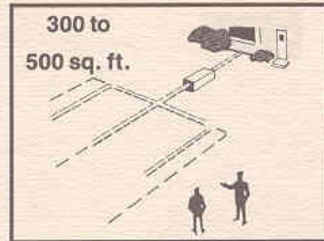
- "When adjusted for the effects of age and capacity, septic tanks receiving ground food wastes accumulated scum plus sludge at a rate about 37 percent greater than septic tanks that did not receive ground food wastes."
- "Septic tank-soil absorption systems that received ground food wastes used about 25 percent greater absorption area in order to obtain comparable performance to systems that did not receive ground food wastes."
- "The table of minimum recommended liquid capacities for septic tanks in the Manual of Septic Tank Practice or the FHA Minimum Property Standards can be used for homes equipped with food waste grinders."
- "The design tables for soil absorption systems in the Manual of Septic Tank Practice or in the FHA Minimum Property Standards can be used to determine the design bottom area for soil absorption systems that are to receive ground food wastes."
- "The addition of ground food wastes to septic tank systems had no influence on the start-up of digestion in septic tanks, nor was there any evidence that the process was impeded."
- "In general, properly designed and maintained septic tank-soil absorption systems can handle the additional loadings due to grinders through the provision of more tank capacity and increased leaching area."
- *More absorption area.*



A system using FHA and U.S. Public Health Service specifications can handle water volume from washers along with dishwashers, and food waste from garbage disposers. And, all ordinary domestic wastes.



These specifications call for a tank larger than what might otherwise be used. Rather than a 1,000-gallon minimum tank, for instance, a 1,500-gallon tank would be recommended.



In addition, the overall absorption field must also be greater. For example, an absorption field planned at 300 square feet, with water-bearing appliances, should be 500 square feet.

**Septic Tank Liquid Volume Requirements**

DWELLING SIZE	FEDERAL HOUSING AUTHORITY		U.S. PUBLIC HEALTH SERVICE		UNIFORM PLUMBING CODE	
	Gallons Without Disposer	Gallons With Disposer	Gallons Without Disposer	Gallons With Disposer	Gallons Without Disposer	Gallons With Disposer
MINIMUM	750	1125	750	1125	750	1125
1-2 BEDROOM	750	1125	750	1125	750	1125
3 BEDROOM	900	1400	900	1400	1000	1500
4 BEDROOM	1000	1500	1000	1500	1200	1800
5 BEDROOM	1250	1875	1250	1875	1500	2250
ADDITIONAL BEDROOMS	250	375	250	375	150	225

**Sizing and Locating Your Septic Tank.**

There are a number of factors that enter into both the sizing and location of your septic tank. Your septic tank system contractor will take advantage of his years of experience in recommending the size and location of yours.

However, for background information, we have printed at left the septic tank capacities recommended by the U.S. Department of Health, Education and Welfare. These capacities provide for automatic washers, dishwashers, garbage disposers and other household appliances.

As the Public Health Service points out in its **Manual of Septic Tank Practice**, "Capacity is one of the most important considerations in septic tank design. Studies have proved that liberal tank capacity is not only important from a fundamental standpoint, but is also good economy."

**Notes about Septic Tanks and Disposer Use.**

There are no formulas which determine how often septic tanks should be cleaned. Many have gone as long as 10 years, with a garbage disposer, without requiring cleaning. Others have had to be cleaned within a year. As a general rule, tanks should be inspected yearly to determine whether or not cleaning is required.

The U.S. Public Health Service has published a book on septic tanks called the "Manual of Septic Tank Practice." This book contains all the necessary information to properly design and install a septic system, including tables, specifications and methods. It is Public Health Service Publication No. 526, and can be obtained by writing Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

## Disposer Motor Failures

The disposer itself fails in a number of different ways

1. If the main seal begins to leak, water will get down into the motor. The motor will get wet, short out and fail to start. The motor may hum or it may be completely quiet when power is applied.

*Uncle Harry's*  
Trick of the Trade # 305

Feel the bottom of the disposer and if necessary, remove the cover of the wiring connection box. With the connection cover and the power off, stick your finger up inside the disposer and feel for any rust or moisture. A leaky main seal will frequently cause rust and water to collect on the bottom of the disposer.

If moisture is found replace the unit.

2. The grinding plate may break loose from the shaft of the motor and start to wobble around. Sometimes it makes loud noises as it scrapes the outer wall.

3. Teeth may break off of the grinding plate unbalancing it.

4. The motor starting switch may fail.

5. Occasionally, the seam between the grinding chamber and the top of the motor will leak or the mounting flange will rot out and the disposer will start leaking up near the sink. Once a disposer is more than five years old, the grinding chamber begins to rot from the inside. It is very difficult to take out and reinstall an old disposer without having it leak. The components are all corroded and will be difficult to reseal.

## Repairing Disposers

**F**or a moment, consider repairing a disposer. Is this wise? First, there is virtually no chance that you will stock any of the necessary repair parts. It is also unlikely that any supply houses would stock the needed parts. The parts don't sell because few technicians repair disposers. As a result, waiting for parts will delay the repair for days, and probably weeks.

In the mean time, the customer may be without a sink. How many customers are going to tolerate the loss of their kitchen sink for days or weeks? **None.**

One alternative is to install a temporary disposer. But labor rates make it impractical to install a disposer twice.

*Uncle Harry's*  
Trick of the Trade # 306

Because of the importance of keeping a kitchen sink in service, a disposer call must be completed in one trip. Saving the customer money is of secondary consideration. **Install a new disposer and get the job done.**

Don't even consider getting involved in the five disposer motor repairs. If the failure occurs during the warranty period, let the factory technicians do it. Otherwise install a new disposer.

*Uncle Harry's*  
Trick of the Trade # 307

Never, ever, take a disposer apart. Always replace it.

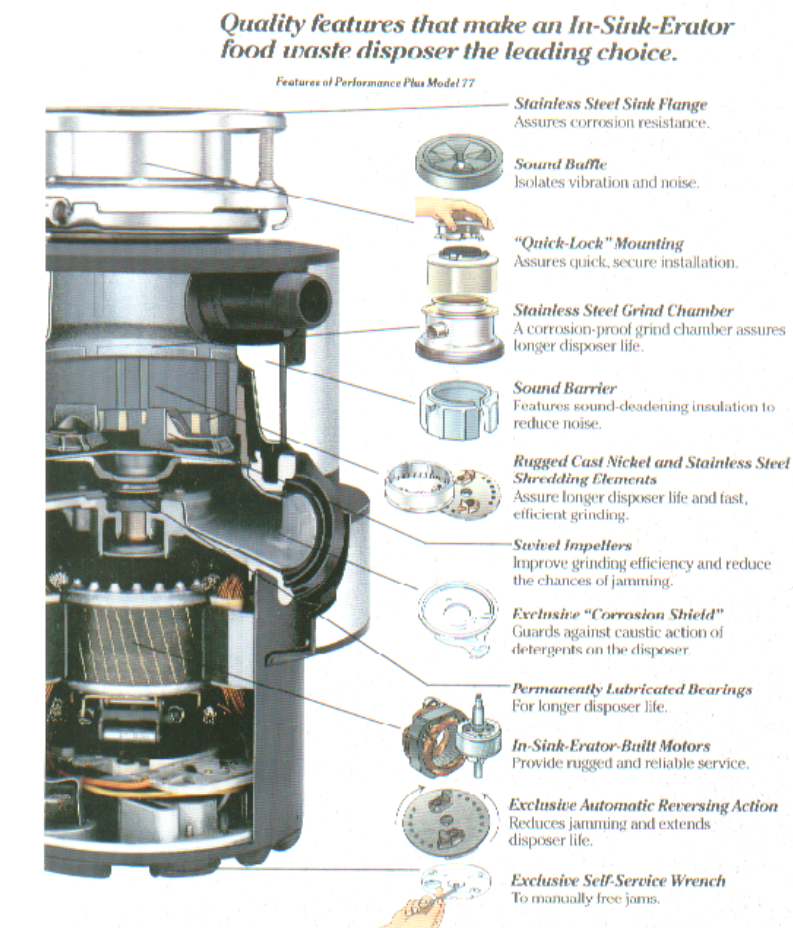
Recently, we reviewed the ICS course kindly sent to us by a student. We looked over their detailed approach to disposer repair. Numerous pages were spent on disassembly, repair, and reassembly. In reality, disposer repair is not generally practiced in the industry.

## The Tail Pipe and Sink Trap

The outlet of the disposer is called a "tail pipe". The plastic tail pipe connects the disposer to the sink trap that empties into the drain system. A new plastic tail pipe comes with each disposer. It is cut or extended to connect with the trap.

### Exploded View of a Disposer (Fig. 16-02)

A sink trap is necessary to minimize odors. Water sitting in the trap blocks out sewer gases coming from the drainage system. In the past, sink traps were made of light gauge chrome-plated brass. They rust out and leak after 15-20 years. It's wise to carry a universal trap in your truck. Sometimes old traps will crack just by removing it from the sink. Modern traps are made of PVC plastic and are much more durable.



## Batch Feed and Continuous Feed

Most disposers are “continuous feed”. Continuous means that food can be added and flushed as long as the disposer is turned on. The operator can add more food through the rubber seal at the top.

A batch feed disposer operates differently. Built into the top of the grinding chamber is an interlock switch. The interlock senses the presence of the disposer cap. The user dumps food into the disposer and locks the lid into the opening. Locking the lid turns on the disposer. Unlocking shuts it down for another batch. The lid lock device is a safety feature. Batch feed disposers are more expensive and only used in a few homes.

### Typical Off-Brand Disposers (6P935 is a “Cheapie”) (Fig. 16-03)

## Disposer Quality

### The Cheapie

In some inexpensive homes and apartment houses, builders elect to install extremely cheap disposers. The cheapest disposers have a tiny motor and tiny grinding chamber and sound very much like a vacuum cleaner when turned on. Don’t be fooled by a large horsepower rating on these tiny units, they are still junk. The cheapie costs about \$30.00 and lasts two to four years.

*Uncle Harry's*  
Trick of the Trade # 308

Don’t install anything less than a full sized 1/3 H.P. disposer.

**WHIRLAWAY GARBAGE DISPOSERS**

Disposers have permanent magnet motors which generate maximum torque on the first revolution, thereby virtually eliminating jams. Maximum 2-year limited warranty on all parts.

Each disposer is constructed with corrosion-proof drain housing made of glass-filled thermoset polyester and glass-filled nylon. Exclusive Plumb-E-Z mounting system. Anti-Jam stainless steel swivel impellers.

All units have replaceable splash guards. No. 6P935 does not require removal of mount system of any manufacturer, and includes an adaptor and splash guard for quick changeout. UL Listed, Whirlaway brand.

HP	Motor Volts	Hz	RPM	Turntable	(A)	Dimensions* (B) (C) (D)			Whirlaway Model	Stock No.	List	Each	Shpg. Wt.
1/3	115V	60	1900	Galvanized Steel	12 <sup>1</sup> / <sub>4</sub> "	6 <sup>3</sup> / <sub>16</sub> "	5 <sup>3</sup> / <sub>16</sub> "	5 <sup>3</sup> / <sub>16</sub> "	191AP	6P935	\$44.85	<b>\$37.40</b>	8.1
1/3	115V	60	1900	Galvanized Steel	12 <sup>1</sup> / <sub>4</sub> "	6 <sup>3</sup> / <sub>16</sub> "	5 <sup>3</sup> / <sub>16</sub> "	5 <sup>3</sup> / <sub>16</sub> "	191	6P934	50.10	<b>41.75</b>	8.1
1/2	115V	60	2800	Stainless Steel	13 <sup>7</sup> / <sub>16</sub> "	6 <sup>3</sup> / <sub>16</sub> "	7 <sup>5</sup> / <sub>16</sub> "	5 <sup>3</sup> / <sub>16</sub> "	391	6P936	97.00	<b>81.00</b>	10.0
3/4	115V	60	2700	Stainless Steel	14 <sup>1</sup> / <sub>2</sub> "	7 <sup>1</sup> / <sub>4</sub> "	8 <sup>5</sup> / <sub>16</sub> "	5 <sup>3</sup> / <sub>16</sub> "	991	6P937	210.00	<b>175.00</b>	13.0
1	115V	60	2700	Stainless Steel	16 <sup>3</sup> / <sub>8</sub> "	9 <sup>5</sup> / <sub>16</sub> "	8 <sup>5</sup> / <sub>16</sub> "	5 <sup>3</sup> / <sub>16</sub> "	BF891W	6P939	239.00	<b>199.00</b>	14.0
1	115V	60	2800	Stainless Steel	16 <sup>1</sup> / <sub>4</sub> "	7 <sup>1</sup> / <sub>4</sub> "	8 <sup>5</sup> / <sub>16</sub> "	5 <sup>3</sup> / <sub>16</sub> "	1091	6P938	262.00	<b>219.00</b>	15.0

*Uncle Harry's  
Story Time*

*For some reason, I have a lot of elderly customers. An old woman called me to look at her disposer. It was only three years old, but it sounded noisy and wouldn't grind the food. After arriving at her house, I opened the sink cabinet and looked at the disposer. On seeing a miniature, cheapie disposer, I started to laugh. No wonder she was having trouble.*

*She asked me, "What are you laughing at?"*

*I said, "Ma'am, you need a new disposer and when you see what a real disposer looks like, you'll understand why I laughed."*

*I brought in a new 1/2 HP In-Sink-Erator, opened the carton. I removed her old one from the sink and stood the two side by side.*

*She said, "Now I see what you're laughing at." Under her breath, she cursed the plumber that had put the cheapie in.*

## **In-Sink-Erator Models**

### **The Badger Series**

**M**ost disposers are either 1/3 or 1/2 H.P.. They come with a 1 year warranty and cost between \$40.00-60.00. Under normal usage, this quality level will last about 8-10 years.

The Badger series is designed to compete in that mass market. It comes in 1/3 and 1/2 H.P. sizes. The difference in quality is slight but there is difference in dimensions that can be very important. (See Installing a Disposer)

### **The 333**

The 333 is a very popular model commonly used by plumbers and professional appliance companies. It is a well made 1/2 H.P. model with a 3-year factory warranty. It costs around \$100.00 and has an average life of about fifteen years. Many professionals scoff at using any model below the quality of the 333. Newer models such as 444 and a professional series are now available.

### **The 333 SS**

The SS model looks like the popular 333. The difference is in the grinding chamber; it is made of stainless steel. It comes with a 4-year warranty, lasts a bit longer than the standard 333, and costs about \$20.00 more.



## The 77

The 77 is 3/4 H.P. and includes a reversing action feature. The disposer has a complicated starting switch that reverses the rotation on each startup. Theoretically, this minimizes the possibility of jams. The 77 is a premium disposer and carries a 5-year warranty.

## The Classic Series

The top of the line is a large sound proofed, reversing, 1 H.P. disposer with a 7 or sometimes even 10-year warranty. The unit is expensive, seldom seen, and takes up a lot of room under the sink.

## ISE Feature Comparison (Fig. 16-04)

## Model 17

Model 17 is In-Sink-Erator's 3/4 H.P., 5 year warranty, batch feed model. Batch feed disposers have a larger grinding chamber and are much taller. They are also considerably more expensive. The batch feed concept eliminates the risk of having someone's hand or other unintentional object getting into the disposer while it is running. It has a special lid that operates a switch built into the side of the disposer. The switch mechanism complicates the operation and causes some service calls.

**Compare the features, model by model.**

*Features common to all In-Sink-Erator disposers.*

- Permanently lubricated bearings
- Stainless steel sink flange
- Exclusive self-service wrenchette
- Overload protection switch with manual reset
- Dishwasher drain connection
- Cushioned anti-splash baffle
- Exclusive "Quick-Lock" mounting collar/assembly.

FEATURES	Classic LC 1 H.P.	Classic 1 H.P.	Model 17 3/4 H.P.	Model 77 3/4 H.P.	Model 333/SS 1/2 H.P.	Model 333 1/2 H.P.	Badger 5 1/2 H.P.	Badger 1 1/2 H.P.
Batch-feed operation	■		■					
Continuous-feed operation		■		■	■	■	■	■
Full parts & in-home service warranty	7 yrs.	7 yrs.	5 yrs.	5 yrs.	4 yrs.	3 yrs.	1 yr.	1 yr.
Anti-jam auto-reversing action	■	■	■	■				
Sound-absorbing upper shell for quiet operation	■	■		■				
Stainless steel grind chamber resists corrosion	■	■	■	■	■			
PVC grind chamber						■	■	■
Large cast nickel chrome shredder ring	■		■	■				
Stainless steel shredder ring					■	■		
Galvanized steel shredder ring							■	■
Stainless steel rotating shredder with two stainless steel, 360° slotted swivel impellers	■	■	■	■	■	■		
Galvanized steel rotating shredder with two stainless steel, 360° slotted swivel impellers							■	■
Exclusive corrosion protection shield	■	■	■	■	■	■		

## Replacing an Existing Disposer

In many cases, a disposer service call will result in a replacement. It is wise to purchase and stock at least one disposer, even a small Badger will suffice. Open the carton and carefully read over the instructions. Be prepared for a replacement before entering the household. Replacing most disposers is an easy thirty minute task. There are only a few troublesome spots. Following is an overview:

1. Clear out everything from underneath the sink.
2. Remove the drain trap.
3. Unbolt or rotate the twist-lock to drop the disposer out of the sink flange.
4. Disconnect the wiring and remove the old disposer.
5. Remove the old sink flange.

For installation, follow the directions in the carton.

When installing a new flange into the sink, seal it with a long worm of plumber's or window putty.  
(See Fig. 16-06.)

Many dishwashers dump into the disposer through a side connection into the grinding chamber. In all new disposers, that side connection is plugged. Don't forget to knockout that plug if you're going to connect a dishwasher to the disposer. Once the flange is installed, turn the disposer upside down underneath the sink and connect the wiring to it.

### *Uncle Harry's Story Time*

*Once upon a time, I repaired an antique dryer for an old-timer. While I was there, he asked me to look at his dishwasher. The dishwasher was fairly new and I quickly found out that it wouldn't drain. As is my habit, while looking over the dishwasher I carefully questioned the customer. He told me that the dishwasher stopped working right after the disposer was installed.*

*This gave me the clue I needed. I took the dishwasher drain line off the side of the disposer and stuck my little finger into the hole. **Sure enough, the plug had never been removed from the disposer.***

*The customer was certainly right - the dishwasher wouldn't work very well after the disposer was put in. Once I knocked the plug out of the side of the disposer, the dishwasher could drain and it worked fine. The dishwasher had been out of service for about three years!*

Once the disposer has been wired and the knockout checked, hold the disposer underneath the twist lock In-Sink-Erator flange.

*Uncle Harry's*  
Trick of the Trade # 309

Position your knee under the disposer to hold it up in the sink. This will free both arms to twist the locking flange into position. Snap the swivel lock into the **lock position**. Even locked, the disposer can still be turned to line up the piping.

**Detailed Installation Instructions  
(Fig. 16-05a)**

### 1 START BY CLEANING YOUR SINK'S DRAIN LINE. (If you have a brand new home, you can skip this step.)

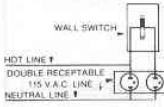
The cutting elements on your old disposer were probably worn and not grinding the waste completely. Your drain line may be partially blocked. We recommend cleaning the line before connecting your new disposer. You can do the job yourself with a drain auger. Remove the drain trap and, using the auger, clean out the horizontal drain pipe that runs from the trap to the main waste pipe. Make certain that the auger removes the hardened material that forms at the intersection of the horizontal pipe and the main waste pipe.

### 2 ELECTRICAL SUPPLY

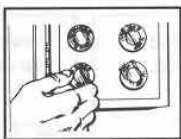
Before you attack this job, you should be thoroughly familiar with electrical power and proper procedures. If you aren't, call in a professional who is knowledgeable.

This appliance is equipped with copper wires. Use 3 conductor copper cable in accordance with your local code to make your connections to this unit.

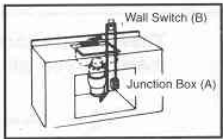
In the future you may want to install an I-S-E Hot water dispenser. It comes with a convenient 3 wire plug and cord. To accommodate it you may want to install a double wall receptacle for use with both your disposer and future hot water dispenser. During installation, one receptacle should be installed with a wall switch in the circuit, the other should be wired direct like a standard wall outlet.



NOTE: See 10 & 11 for final electrical connections.  
All wiring must comply with local electrical codes



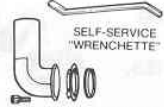
First, remove the fuse to open the circuit breaker on the circuit you plan to use for your disposer. Use a separate 15 amp, 115 volt circuit just for the disposer. If you are replacing a unit, skip to step 3. Next, use 15-20 amp, 115 volt cable to make a connection from the junction box to the on-off switch.



For Continuous Feed Models 77, Classic, 333/SS, 333 and Badger Models Only: Install a junction box and switch. (Obtain 1/2 H.P., 15-20 amp rated on-off switch and electrical wiring locally.) Position the switch in any convenient location, and connect to junction box. *All wiring must comply with local electrical codes.* 14 gauge size wire is the smallest permissible for use with a 15 amp circuit, and 12 gauge size wire is the smallest permissible for use with a 20 amp circuit.

Important note for Models 17 and Classic/LC Batch Feed only. No separate wall switch (A) is needed; switch is built into unit. Go right to "Electrical Connections."

### 3 CHECK THE PARTS AGAINST THE DRAWINGS BELOW AND MAKE SURE EVERYTHING IS THERE. (Your new disposer may not look like the one pictured.)




SELF-SERVICE "WRENCHETTE"

DISCHARGE TUBE, GASKET, METAL FLANGE AND SCREW(S)

THE MOUNTING ASSEMBLY CONSISTING OF:

- Sink flange
- Fiber gasket
- Back-up ring
- Mounting ring and 3 screws
- Snap ring

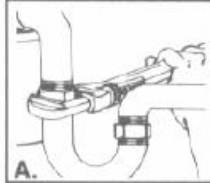


THE DISPOSER ITSELF

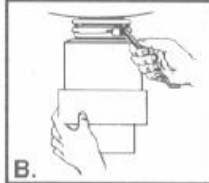
## Instructions Cont. (Fig. 15-05b)

### 4 HERE IS WHAT YOU DO IF YOU ARE REPLACING AN OLD DISPOSER.

FIRST, TURN OFF ELECTRICAL POWER at the service panel (fuse box or circuit breaker box). If the mounting is the same as your new disposer's mounting, you can use the existing mounting. Follow instructions A, B, D and E. Step 4, then go on to Step 10.



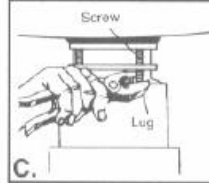
Use a pipe wrench to disconnect the drain line where it attaches to the disposer discharge tube.



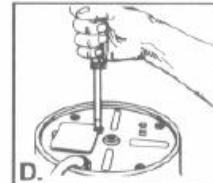
IF YOUR OLD DISPOSER HAS A DIFFERENT MOUNTING THAN YOUR NEW ONE, GO ON TO INSTRUCTION C.

If your old disposer has the same mounting as your new one, insert the end of your "wrenchette" or screwdriver into the right side of one of the disposer mounting ring lugs at the top of the disposer. Then, turn the "wrenchette" or screwdriver to the left (counter-clockwise) until the lug lines up with one of the sink mounting assembly screws.

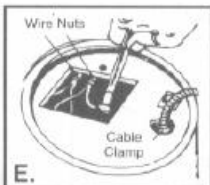
**CAUTION:** Be sure to hold the disposer with one hand while performing this step or it may fall when the mounting ring is disconnected from the sink mounting assembly. GO TO INSTRUCTION D.



If your old disposer has a different mounting than your new one, use a pliers or adjustable wrench to remove the nuts on the mounting ring. Then remove old disposer. (Some disposers have to be removed by taking off a clamp or by twisting the disposer to remove it from its mounting. Easy to figure out.)



Once the disposer is off, turn it upside down and remove the electrical plate.

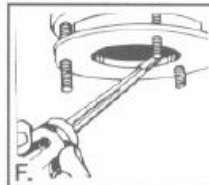


Now, use a screwdriver to remove ground wire. Remove the wire nuts from the power wires. Separate the disposer power wires from the cable wires. Loosen the screw(s) on the cable clamp and remove the cable from the disposer.

If your old disposer has a different mounting than your new one, follow steps F and G. Otherwise go on to Step 10.

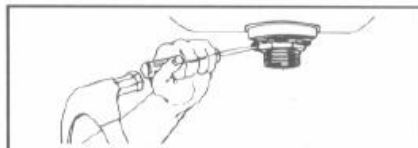


Finally, remove the old sink sleeve by pushing it up through the sink hole.

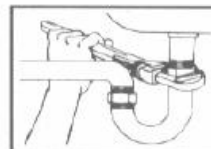


Loosen screws and remove old mounting ring and back-up ring. You may need a hammer to loosen assembly parts.

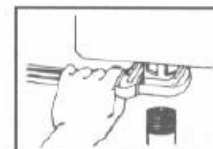
### 5 HERE IS WHAT YOU DO IF YOU ARE INSTALLING YOUR SINK'S FIRST DISPOSER.



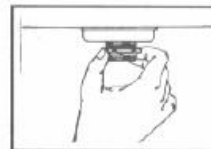
Now, remove the large-diameter nut at the base of the strainer by placing the tip of your screwdriver on the edge of the nut. (There are usually ridges to hold your screwdriver.)



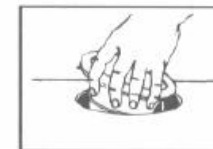
Use a wrench to loosen the nut at the top of the "P"-trap.



Next, remove the nut at the top of the sink strainer and remove the extension pipe.



The nut should be loosened enough that you can spin it off by hand.

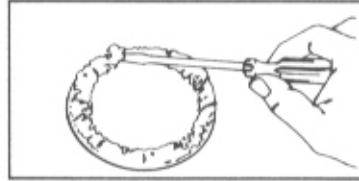


Now, push the strainer assembly up through the sink hole and remove it.

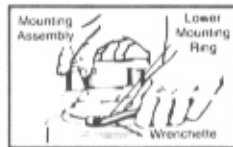
## Instructions Cont. (Fig. 15-05c)

### 6 IF YOU ARE REPLACING AN OLD DISPOSER, CLEAN THE OLD SEALANT FROM THE RIM OF THE SINK HOLE.

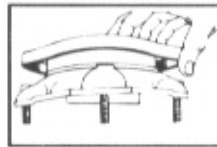
Use your screwdriver or a putty knife to scrape away all traces of the old putty or caulking from the edge of the sink drain hole. Make sure you get this as clean as possible so that you'll have a good, watertight seal for your new disposer sink sleeve.



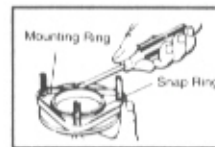
### 7 NOW, WE'RE GETTING INTO THE ACTUAL INSTALLATION. SEPARATE THE PARTS IN THE MOUNTING ASSEMBLY.



Start by disengaging the top mounting ring from the lower mounting ring. Do this by holding the top of the assembly with one hand and turning it counter-clockwise while holding one of the mounting lugs with your other hand.



Then, loosen the screws on the mounting assembly until they are just level with the surface of the mounting ring.



Now, use a screwdriver to pry off the snap ring.

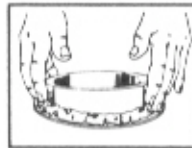


The assembly will now come apart. Set it aside and move to the next step.

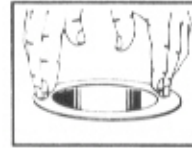
### 8 APPLY PUTTY TO THE SINK FLANGE.



Buy 1/4 lb. of non-hardening "plumber's" putty at your hardware store. Make a nice fat snake of putty by rolling it between your hands.



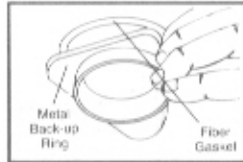
Apply this roll under the rim of the sink flange.



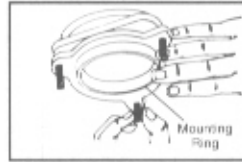
Then, place the sink's flange into the sink drain hole and push down gently but firmly to make sure it sits evenly in the putty.

## Instructions Cont. (Fig. 15-05d)

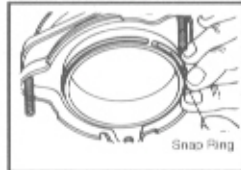
### 9 NEXT, LET'S ATTACH THE UPPER MOUNTING ASSEMBLY.



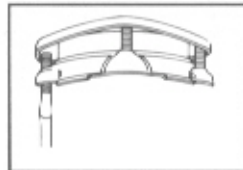
First, working from under the sink, slip the **fiber gasket** and next the **metal back-up ring** (flat side up) up and over the sink flange.



Hold the fiber gasket and metal back-up ring in place with one hand and place the mounting ring with its three screws onto the sink sleeve.



Now, push the fiber gasket, metal back-up ring and the mounting ring further up on the sink sleeve. Slide the snap ring onto the sink sleeve until it pops into place in the groove on the sleeve.

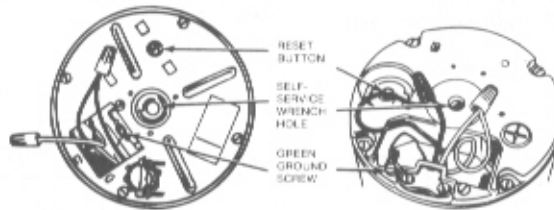


Tighten the three mounting screws with your screwdriver until the whole mounting assembly is sealed evenly and tightly against the sink.

### 10 WE'RE READY TO MAKE THE ELECTRICAL CONNECTIONS.

Remove the electrical plate from the bottom of the disposer and pull out the two electrical wires. The ground screw is also under the plate.

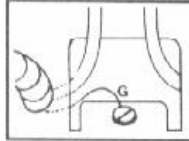
Connect the wires from the switch to the disposer wires. In making this connection, electrical wire nuts can be used or wires may be securely soldered together. *Be sure to connect white to white and black to black.* Wrap wire connections with electrical tape and put wires inside of disposer housing. Check for proper grounding, then replace the electrical cover.



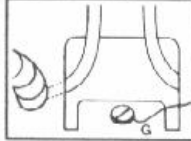
## Instructions Cont. (Fig. 15-05e)

### 11 NEXT, MAKE SURE THE DISPOSER IS GROUNDED.

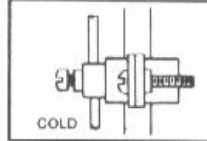
**WARNING: IF NOT PROPERLY GROUNDED, a hazard of electrical shock may exist.**  
DO NOT reconnect electrical current at main service panel until proper ground is installed. For your safety, DO NOT ground to a gas supply pipe.



Simply attach the third green wire to the green ground screw on the unit.



If you don't have a ground supply conductor, buy a length of copper wire from your hardware store that is no smaller in size than the supply wire and attach one end to the green ground screw on the unit.

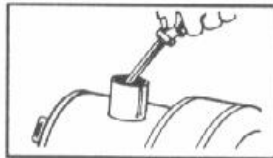


Attach the other end of this ground wire to the METAL cold water pipe. **NOTE:** Be sure that this cold water pipe is continuous METAL pipe from the sink to the ground! Use Underwriters Laboratories Inc. listed ground clamp to attach wire to pipe. If any NON-METAL pipe is used in your home water connections or if plastic pipe is used in your water supply pipe, you will need a qualified electrician to install a proper ground.



If you have a water meter in your home, check the meter to see if there is a wire that comes across it. If there is no wire, your cold water pipe is NOT GROUNDED. To properly ground it, add a #6 copper wire as shown for 200 amp service or less. Use Underwriters Laboratories Inc. listed ground clamps to attach wire to pipe.

### 12 PREPARING THE DISHWASHER DRAIN CONNECTION. (If you have a dishwasher.) If you do NOT plan to connect a dishwasher drain to the disposer, go on to step 13.



Lay the disposer on its side and insert the tip of your screwdriver into the dishwasher drain hole opening at an angle.



Rap the end of the screwdriver with a hammer until the molded plug pops out. Make sure you take the loose plug out of your disposer.

### 13 WE'RE ALMOST THERE. CONNECT THE DISPOSER TO ITS MOUNTING ASSEMBLY.



Lift the disposer and position it so that the disposer's three mounting ears are lined up **under** the ends of the sink mounting assembly screws.



Then, while holding the disposer in place, turn the lower mounting ring with the ears to the right until **all three** ears are engaged in the mounting assembly.

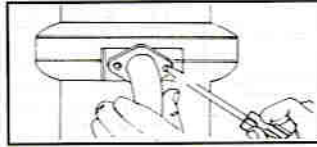
The disposer will now hang by itself. You will lock this ring later, after the plumbing connections are made.

Instructions Cont. (Fig. 15-05f)

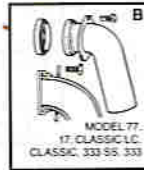
# 14 NOW, ATTACH THE DISPOSER DISCHARGE TUBE TO YOUR SINK'S DRAIN TRAP.



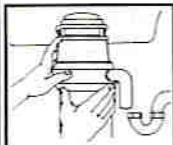
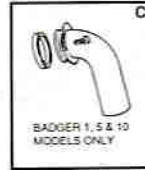
First, check inside the disposer grinding chamber to remove any foreign material that might have dropped in.



Rotate the disposer around and attach the discharge tube to the disposer. First, insert the rubber washer in the discharge opening. Then, put the metal flange over the discharge tube and screw the tube into place using the bolt(s) provided.



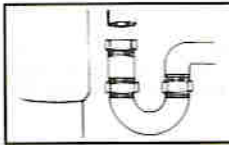
In fig. B, install the discharge tube gasket onto the discharge tube. Gasket must be installed as shown to assure a leak-proof installation. In fig. C, install discharge tube gasket into disposer discharge outlet. Gasket will be held in place by the discharge tube flange.



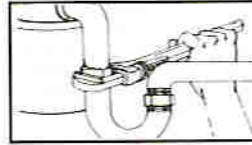
Rotate the disposer so that the discharge tube aligns with your drain trap.



**TUBE TOO LONG?** Simply cut off as much as necessary with a hack saw, making sure you have a clean, straight cut.



**TUBE TOO SHORT?** If the discharge tube doesn't reach your drain trap outlet, measure the shortness and buy a drain trap extension that includes a slip nut and install it in place.

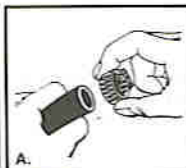


**IF IT FITS** – Simply tighten the slip nut on the trap to make your connection to the discharge tube complete. **IF DOUBLE SINK EXISTS, WE RECOMMEND USE OF SEPARATE TRAPS FOR DISPOSER AND SECOND SINK.**

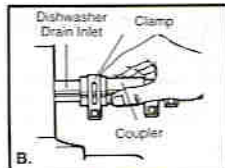
**NOTE:** Be sure to comply with all applicable plumbing codes.

## 14a. MAKE THE DISHWASHER DRAIN CONNECTION.

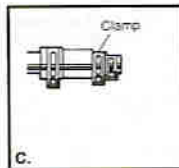
Make all connections to comply with local plumbing codes. An approved dishwasher connector kit, Part No. 6429D, is available from nearby I-S-E authorized service center. Use worm gear hose clamp on dishwasher con-



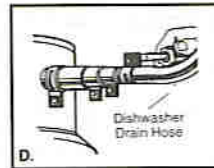
Remove the clamp or fittings from the end of your dishwasher drain hose.



Slide large end of rubber coupler, from dishwasher drain connection kit, over the inlet tube of the disposer. Fasten the coupler to disposer with the clamp provided.



Insert one end of the plastic tube into the coupler and fasten with 7/8" clamp.





Slip the remaining clamp (the one you purchased) over the dishwasher drain hose and back two or three inches. Now, slip the drain hose over the plastic tube, slide the clamp into place and tighten.

**NOTE:** Check the three clamps to be sure you have tightened all of them.



## Instructions Cont. (Fig. 15-05g)

<p><b>14b. NOW, LOCK DISPOSER IN PLACE.</b></p> <p>Place the end of your "wrenchette" or a screwdriver into the left side of one of the disposer mounting lugs at the top of the disposer. Then, turn the screwdriver or "wrenchette" to the right until the disposer is firmly secured in position, engaging the locking notch.</p> 	<p><b>14c. CHECK FOR LEAKS.</b></p>  <p>Run water slowly through the unit. Then, place the stopper in seal position and fill the sink with water.</p> <p>Finally, remove the stopper and permit the water to flow. Check for leaks and correct, if necessary. We sure hope there is nothing to correct.</p>
--	---

(Now let's do a professional job and line up the trademark stamped in the flange with the sink.)

**Installing the Sink Flange**  
**(Fig. 16-06)**



**Finishing the Wiring And A Unit  
Ready for Installation  
(Fig. 16-07)**



## Testing a New Disposer

Of course it is important to test the disposer after installation. Running water through the unit will uncover most leaks. However to **fully** water test the new piping use the following procedure:

*Uncle Harry's*  
Trick of the Trade # 310

Plug the drain with the new stopper and fill up the sink. Turn on the disposer and pull the stopper. The disposer will pressurize the drain with water and pressure test the drain lines. This simple test will uncover any leaks that might cause a callback.

**Pressure Testing a New Installation  
(Fig. 16-08)**



## Fit Problems

lining up the new disposer tail pipe with the existing sink trap can be a troublesome spot. Most of the time, there will be enough adjustment to line the two up. By turning the trap and the disposer, correct alignment can usually be achieved.

However, there are potential problems. If the disposer being replaced was very small and it is being replaced with a full-sized ISE disposer, the drain line may be too high and too close to the center. There are several solutions to this problem:

### Altering a Copper Drain Line on a Double Sink (Fig. 16-09)

1. If the trap is too high and the tailpipe is too long, it can be cut off almost 2". If the new tailpipe is too high and too far away from the existing trap, install a "tailpipe extension" and cut it to the proper length. Extensions are available at the hardware store.

2. If, after cutting the tailpiece as short as possible and the sink trap is still too high, it is necessary to lower the trap. Depending on whether the trap and drainage system are made of plastic, copper, or galvanized steel will determine the method used. If it is copper, unsolder the fittings, shorten the line and sweat the fittings back together.



A plastic PVC line is also easy to lower. Unfortunately, this will likely result in a trip to the plumbing supply house to get new plastic fittings. Plastic fittings are glued together and cannot be reused.

*Uncle Harry's*  
Trick of the Trade # 311

There is an easy way to shorten a 1 1/2" line. A section of a 1 1/2" drain line can be simply cut out and the remaining pieces spliced back with a **rubber coupling**. Couplings comes with clamps and are available at hardware stores.

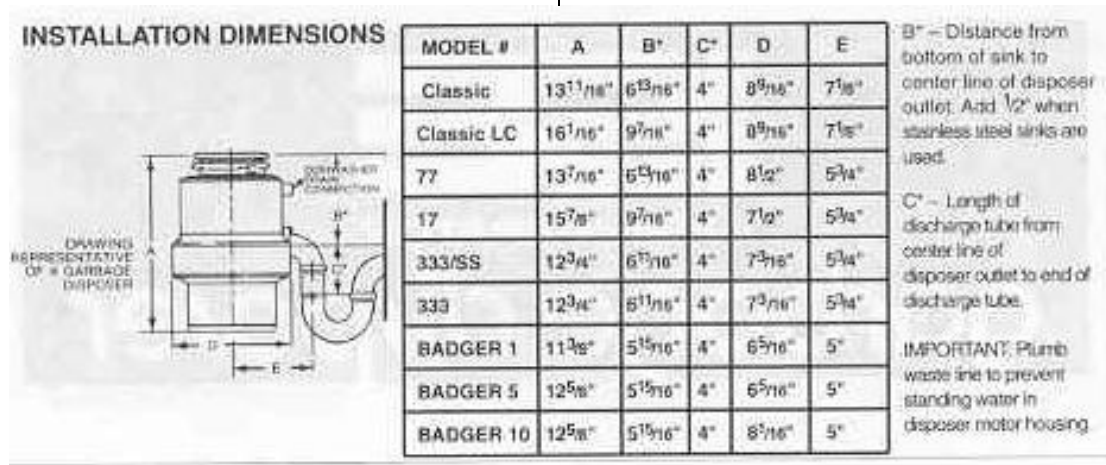
**Sample Rubber Coupling**  
**(Fig. 16-10)**



If the piping is old heavy galvanized or the drain disappears into the wall and cannot be lowered, you are in for trouble. Galvanized piping requires cutting and threading unless a rubber coupling is used. Cutting galvanized piping is always difficult. The simplest solution may be to fit in one of the smaller Badger models or a brand with dimensions similar to the original.

Home Depot and other home centers carry a variety of flexible adapters and disposers. It is possible to buy flexible traps and lines that will adapt misaligned piping. If you're fortunate enough to have frequent disposer repairs calls, it would be wise to accumulate an assortment of these fittings.

**Sample Dimensions  
(Fig. 16-11)**



Correcting this problem required turning the galvanized elbow toward the disposer with an 18" pipe wrench.

**A Misaligned Galvanized Drain Line  
(Fig. 16-12)**





**A Typical Tight Installation  
(Fig. 16-13)**



## Installing a Disposer from Scratch

In this course, we don't recommend or teach a lot of installation techniques.

This is primarily because installation work is not as profitable as appliance repair work. Disposer installation is an exception. A "replacement installation" should be priced the following way:

Total up, a service charge, an hour's time, and the cost of the disposer with a 50% markup. In 1997, the charge for a standard In-Sink-Erator Model 333 installation should be approximately \$250.00. The actual time involved will average about thirty minutes.

Installing a disposer where none exists is a lot more difficult and will take an average of an hour and a half. It also require the use of \$10.00-20.00 worth of additional materials. The increased time and material will revise the total to \$300.00-350.00. The average profit on a "from scratch installation" is about \$200.00. The hourly profit is similar to that received from regular service calls.

There are two problems that make a "from scratch installation" more difficult. First, a switch and power must be installed and second, the drain system must be altered. The piping alteration is more difficult on a double sink because of the extra piping coming from the second sink.

## Running a New Power Supply

Only in rare cases will there be a power source within the sink base cabinet. Herein lies the problem. A wall switch is installed only if a disposer was part of the original kitchen installation. It's possible, but very difficult and time-consuming, to install a wall switch after the fact. It requires punching holes in the wall and fishing wires through to the base cabinet. It is best to leave this procedure to an electrician. There is a far easier method.

*Uncle Harry's*

Trick of the Trade # 312

Tap a #14-2 with ground wire, romex wire off of the nearby dishwasher connection box and run the line through the wall of the sink cabinet with 5 or 6 ft left over. Wire in a surface mounted electrical box and switch into the cable. Mount the new switch inside the door of the cabinet within easy reach.

**A New Double-Sink Installation With  
a New Switch Being Wired In  
(Fig. 16-14)**



**Installing a New Switch Box Under a Cabinet  
(Fig. 16-15)**



An alternative is to run romex cable back to the panel box and install a separate 20 amp circuit breaker. Compliance with the National Electric Code requires a separate circuit breaker for each individual major appliance. Stealing the supply for the disposer off of the dishwasher is not according to Code and we're not recommending that you do it. However, it is a method commonly used.

The second difficulty is lining up the plumbing. In a double sink installation, a little planning may be in order. PVC plumbing fittings are very cheap and easy to work with. The plastic cuts quickly with a hacksaw. The fittings can be moved in all different configurations and tried out before they are glued permanently.

If altering the existing plumbing looks difficult, cut out all the plumbing under the sink. Simply start with fresh PVC and make it fit properly and look professional. With PVC, you can even couple to an old galvanized drain pipe as shown in Fig. 16-10. If you are unfamiliar with gluing and PVC piping take a trip to a home center and ask for advice. There you will find glue, rows of fittings and piping to fit every need.

## Conclusion

**D**isposers can be a real moneymaker. By stocking one, two, or even three disposers (as *Uncle Harry* does), you can complete a very profitable calls in one trip. A single disposer installation will improve your overall profitability for an entire week!

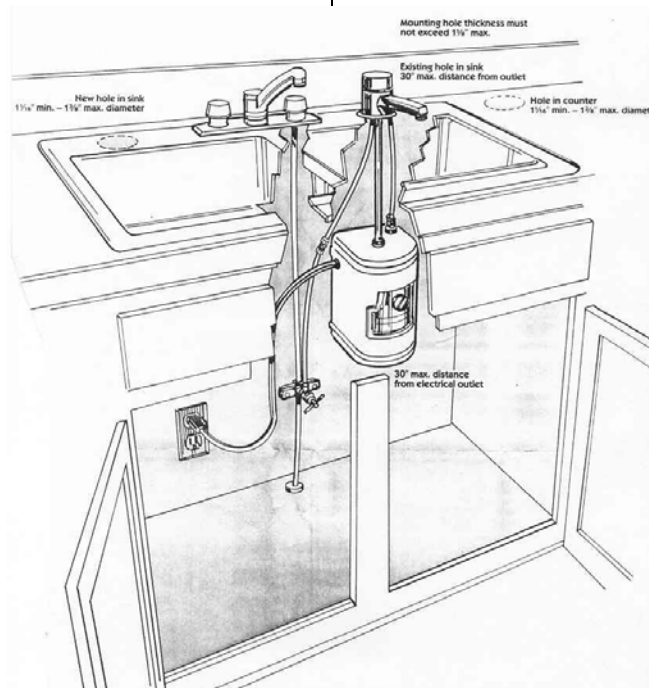
## Instant-Hots

An Instant-Hot is a miniature hot water heater mounted underneath the sink. It is designed to save time and energy by providing water at just below the boiling point (190°F.). They are commonly used to prepare instant coffee and tea. Sink mounted hot water heaters were originally patented by In-Sink-Erator along with its trademark name. For along period KitchenAid also marketed a similar model. A Instant-Hots consist of two components:

1. A sink-mounted faucet and
2. A small water tank mounted on the wall inside the sink base cabinet.

### Layout of a KitchenAid Model (Fig. 16-16)

The faucet mounts in a standard sink knock-out hole (1 1/16"). It has an incoming cold water line and two lines that connect to the water tank. The water tank has a heater and thermostat inside and is plugged into a standard wall outlet. When the faucet is turned, fresh water enters the small water tank and hot water squirts up into the faucet into a pot or cup. Instant-Hots are certainly not a very popular appliance, but a small number of people love them. They generate occasional calls for installation and service.



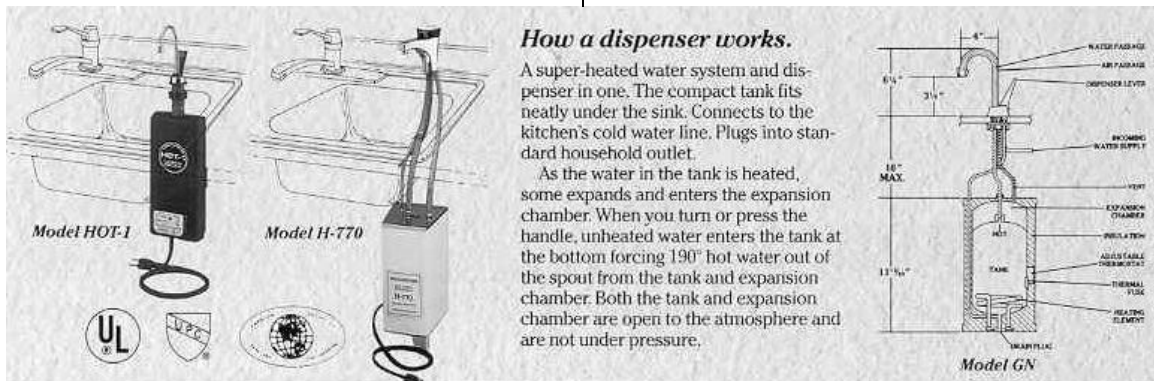
## Available Models

For years, Instant-Hot made model 770, the most common one found in homes. Kitchen-Aid made a very similar capacity model. The Kitchen-Aid and 770 are both about one gallon capacity. ISE also made a smaller 1/2 gallon model known as "The Hot One".

In 1996, since Whirlpool had both KitchenAid and In-Sink-Erator InStant-Hots on the market simultaneously, it decided to discontinue all In-Sink-Erator models. Now only KitchenAid models are available. All Instant-Hots have the following failures:

1. The tanks leak.
2. The heating element fails.
3. The thermostat either open circuits or allows the water to boil.
4. The faucet seals wear and it begins to spit hot water.

## Cut-Away View of ISE Models (Fig. 16-17)



Considering the fact that the entire unit wholesales for about \$120.00, repairs are not economical. Any repair including labor will cost over \$100.00. This expense doesn't make a whole lot of sense when the entire unit can be replaced for \$250.00.

*Uncle Harry's*

### Trick of the Trade # 313

It is best to explain the repair situation to a customer over the phone. In doing so, you accomplish several things:

1. If the customer chooses to install a new one, knowing in advance allows you to take a new Instant-Hot along.
2. You have been honest with the customer and given them the opportunity to save a service charge.
3. A new installation is the best solution. It will provide the customer with a new 1-year factory warranty instead of gambling money on an old unit.

## Instant-Hot Installation

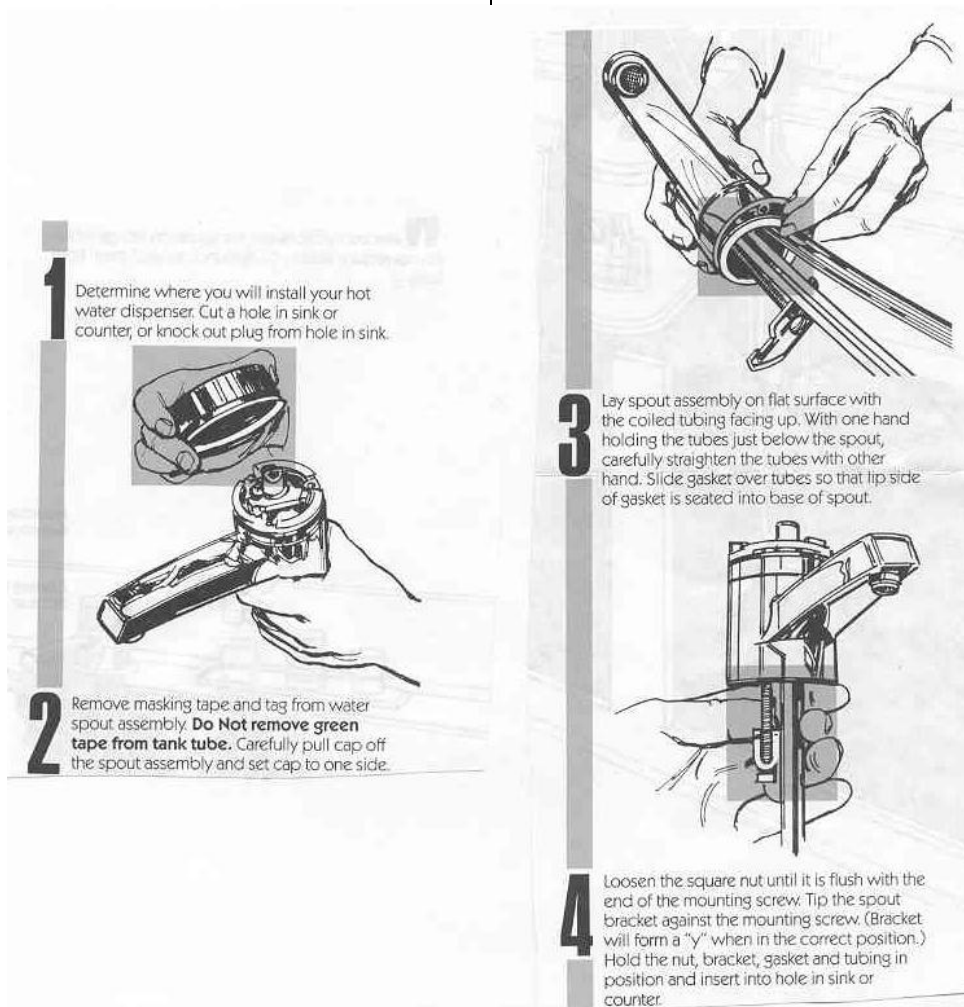
Replacement of an existing Instant-Hot is a straightforward operation.

It includes removing the old faucet from the sink and the tank from the wall and replacing both units. Replacement can be completed in thirty minutes.

### Detailed Installation Instructions (Fig. 16-18a)

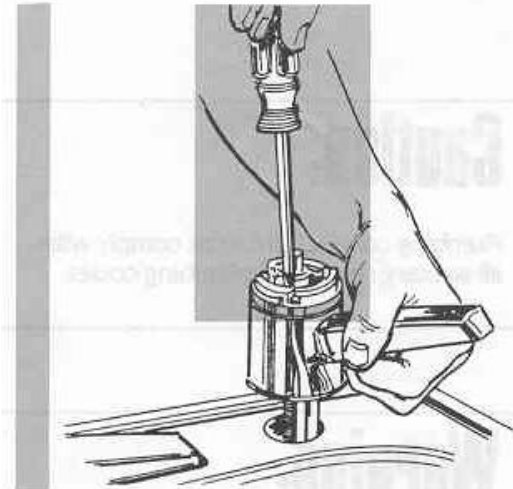
*Uncle Harry's*  
Trick of the Trade # 314

Be very careful to **fill** the Instant-Hot with cold water **before plugging** it in. If you don't, there is a high risk of damaging the heaters that are designed to be immersed in water.

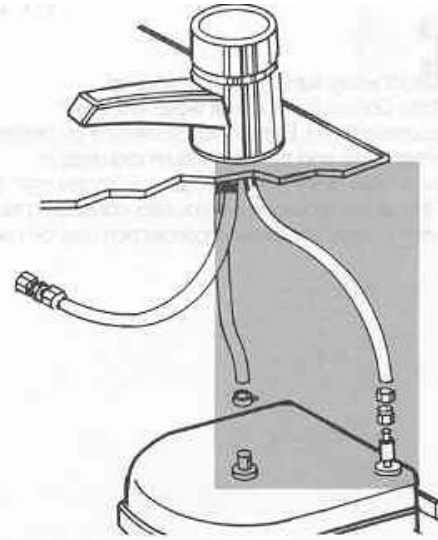




## Detailed Installation Instructions (Fig. 16-18 b.)



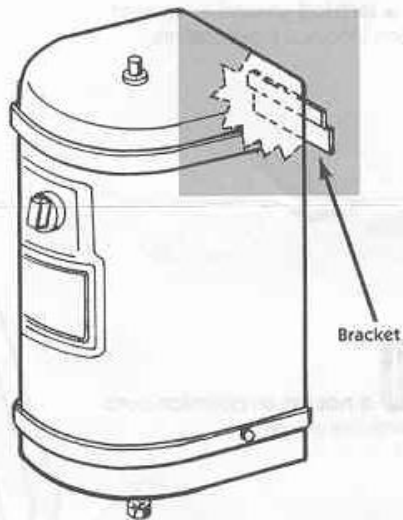
**5** Pull up on the spout body to keep tension on the spout mounting bracket and nut. Tighten the screw until the spout is securely in position. **Do not overtighten.** Snap on spout cap.



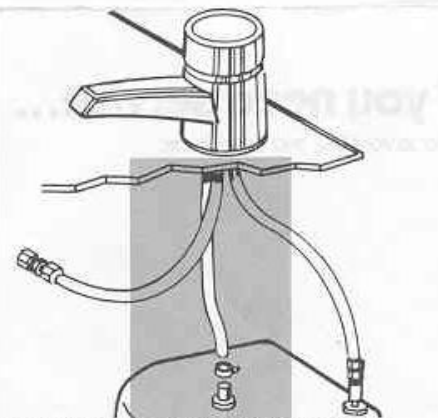
**Do not lengthen, twist or tightly bend the tubes.**

**Do not remove green tape.**

**7** Connect the longer,  $\frac{1}{4}$ " copper tube from the spout to the back tube on the top of the tank (both tubes are marked with green tape), using the compression union. Spout tube may be shortened if necessary.



**6** Position tank vertically beneath spout so that the clear tube from the spout reaches the center stainless tube on the tank and tank touches wall. With a pencil, mark the wall at the top of tank. Set tank to one side. Mark a second line  $\frac{2}{4}$ " below the other line. Install bracket with bottom of bracket even with the second line. Hang tank on bracket.



**8** Connect the clear tube from the spout to the middle tank tube using the clamp. Clear tube may be shortened if necessary.

## Detailed Installation Instructions (Fig. 16-18 c.)

**9**

Install saddle valve following kit instructions.

If water supply line is not copper, shut off water supply and drain line. Using a hand drill, drill a  $\frac{1}{4}$ " hole for the piercing pin to center on.

**NOTE: If an electric drill must be used, BE SURE THE DRILL IS GROUNDED. Fasten a separate grounding wire to a ground that complies with local electrical codes. (If in doubt, consult a licensed electrician.) IMPROPER GROUNDING MAY RESULT IN SEVERE OR LETHAL SHOCK.**

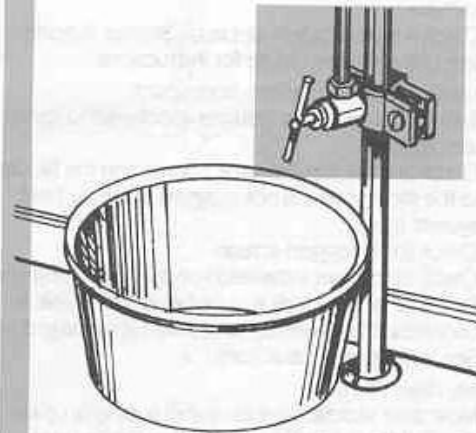
**10**

Connect  $\frac{1}{4}$ " O.D. copper tubing (not supplied) to tubing fitting.

**Do not seal the pipe with sealing compounds.**

**11**

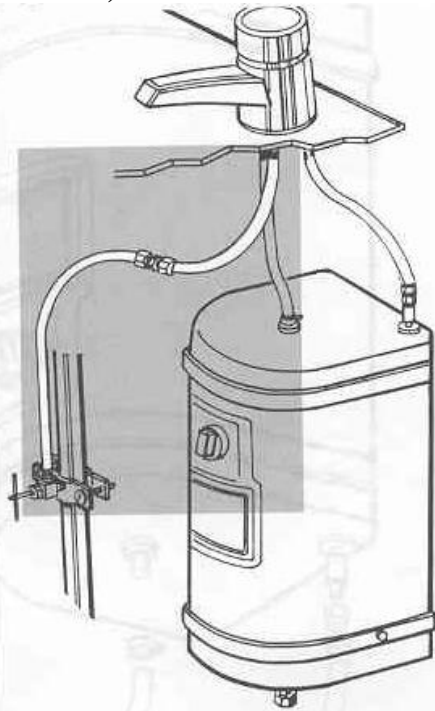
Turn saddle valve handle clockwise to pierce the water supply line and close the valve. Turn water supply back on.



**12**

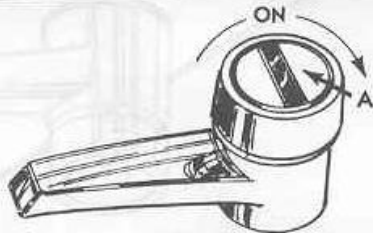
Place a container under the open end of the water supply line. Open the saddle valve and flush line. This will remove any foreign material trapped in the supply line during the saddle valve installation. Close saddle valve.

**Detailed Installation Instructions  
(Fig. 16-18 d.)**



**13** Connect the supply line from the saddle valve to the shorter spout tube.

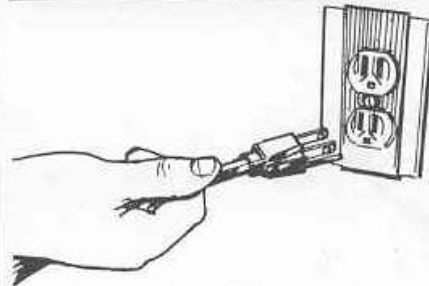
**Do not remove the internal steel filter screen from compression fitting, except to clean screen. Screen must be put back on after cleaning for proper performance.**



**14** Open saddle valve. Turn spout valve clockwise to "OPEN" position. Hold spout valve open to fill tank (about one minute). When tank is full, water will flow from spout. Turn spout to "CLOSED" position. Check for leaks.

**15** Turn thermostat knob counter-clockwise to "OFF" position. Thermostat knob controls the tank heater, not the water delivery.

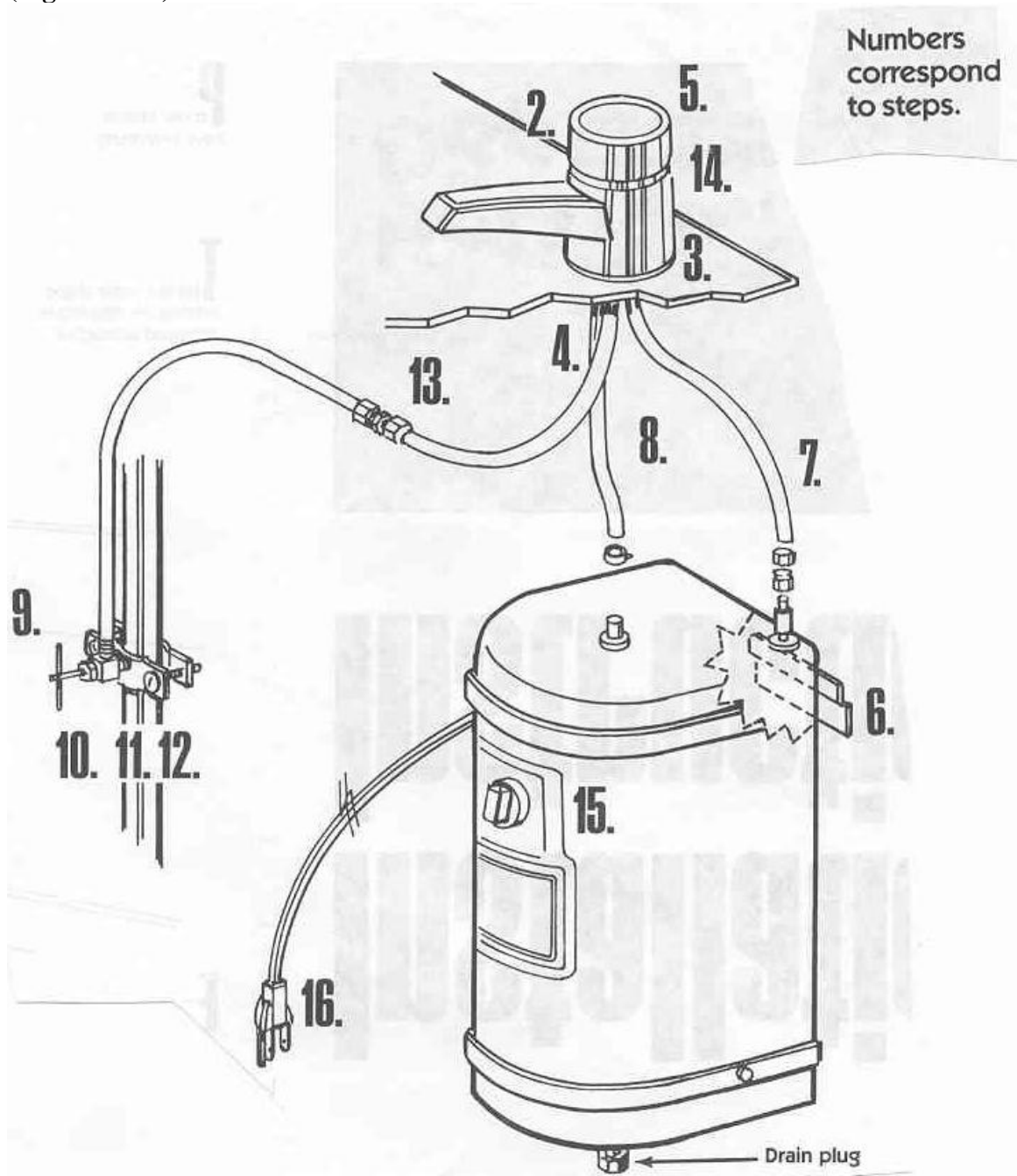
**CAUTION:**  
Fill tank with water and turn thermostat to "OFF" position before plugging hot water dispenser into power supply. If tank is empty and thermostat is in an "ON" position when the power cord is connected, the heater will overheat causing an unpleasant taste, black specks in the water, and permanent damage to the heater seals.



**16** Plug power supply cord into a properly grounded wall outlet. Turn thermostat knob clockwise to the highest position. Maximum temperature will be reached in about 15 minutes and dispenser will be ready for use. Lower the temperature setting if you notice vapor or a boiling noise. To raise or lower the water temperature, rotate the thermostat knob.

**Keep installation instructions for future reference. The instructions will make it simple to reinstall your hot water dispenser.**

**Detailed Installation Instructions  
(Fig. 16-18 e.)**



## Instant-Hot Installation from Scratch

Like installing a disposer for the first time, installing an Instant-Hot requires power from a 110 VAC receptacle. A receptacle can be mounted on the surface in an electrical box just like the switch was for a disposer. Follow the same methods described under disposers for obtaining a power supply.

### An Older Style ISE Instant-Hot and New KitchenAid Faucet (Fig. 16-19)



If the sink does not already have a knock-out provided, it may be necessary to drill the proper hole. This is accomplished by buying a 1 1/16" hole saw that attaches to an electric drill. A hole saw will quickly cut a hole in a sheet metal stainless steel sink. Don't attempt to drill a hole in a porcelain sink.

Again, read over the directions provided with the new unit before going into the house. Be familiar with the procedures. Really, the only hard part is squirming around underneath the sink and twisting your shoulders and back into a pretzel.

Installation costs also follow the pattern described under disposers.

**Replacing an ISE Tank with a  
KitchenAid  
(Fig. 16-20)**



## Trash Compactors

A trash compactor is another device that is seldom seen in homes.

They've been manufactured for a long time, but have never gained a great deal of popularity. All brands of compactors operate the same way. A compactor includes a heavy-duty metal trash bin that slides in and out of a cabinet on rails. Mounted above the trash bin in the cabinet is a motor-driven ram. Once the trash can gets full, the operator closes the cabinet and pushes the "on" button. The cycle of operation is the following:

### Two Typical Compactors (Fig. 16-21)



1. A ram is forced down by a pair of threaded rods that are driven by an electric motor.

2. The motor turns the rods until the ram reaches the trash. The motor squeezes the trash until finally it comes to a halt and stalls.

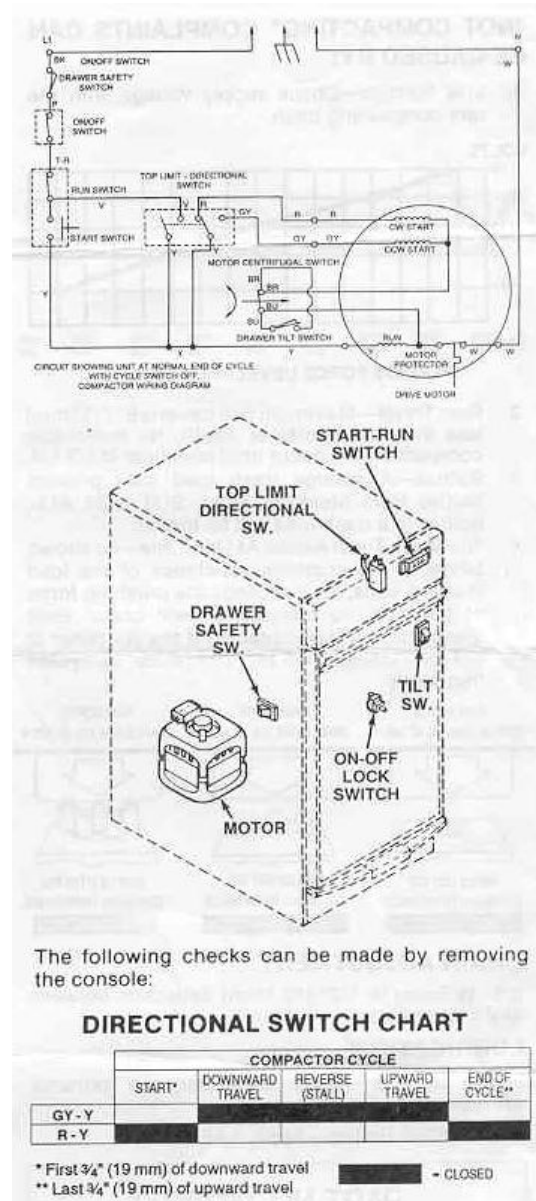
3. Once stalled, the motor restarts in the reverse direction and raises the ram all the way to the top.

As trash builds up, the ram descends less and less until finally the customer removes the trash and restarts the process.

To accomplish this simple process, several switches are involved that control the power and rotation of the motor. The switches may be in different locations on different brands but the logic remains the same. The switches include:

1. A bin or drawer interlock switch(s) insures that the motor does not run unless the bin is closed.
2. A start/run switch that is controlled by the operator.
3. A top limit directional switch.

**Typical Component Layout and Circuit Diagram (Fig. 16-22)**





## The Reversing Logic Sequence

The top limit directional switch is the only mysterious one. It accomplishes two purposes. Of course, first it shuts off the motor to keep the ram from coming through the top of the compactor. It's second and more clever purpose is to reverse the motor. When the motor reaches the top position the directional switch **stops** the motor and switches to the **down** direction. To restart the unit, the operator must bypass the direction switch. This can only be done by pressing the start/ run switch.

### Typical Upper Direction Switch (Fig. 16-23)



When the start/run switch is pressed the motor starts down and leaves the directional switch. As the motor moves down the directional switch immediately reverses to the **up** direction. (The motor doesn't immediately reverse because the centrifugal switch in the motor breaks the circuit to the directional switch whenever the motor is running.)

When the motor jams, the centrifugal switch closes the circuit back to the directional one. The motor then restarts in the up direction. Once it reaches the top and again hits the direction switch, the cycle is complete.

## Compactor Failures

Compactors have two primary failures:

1. Failure of the interlock system that prevents the ram from operating with the doors open.
2. The ramming system will distort or strip.

The service calls will usually be,

*"My compactor won't work at all", or*

*"I can't get the door open and the trash is beginning to stink up the kitchen".*

On a Whirlpool compactor, the chain and the gears are on the bottom of the compactor. On the GE, the motor and gearing system is mounted up in the ram area. A Kitchen-Aid is similar to the GE. On a few, the motor travels with the ram.

Failures of less importance occur as the tracks wear out, the bin twists or trash clogs up the gearing mechanism.

## Repairing Compactors

It's almost always necessary to remove a compactor from underneath the countertop in order to gain access to the inspection covers. If the compactor is dead, first locate and check the interlock switches. Kitchen-Aid, for instance, has two bin microswitches, one on each side. These switches are operated when the trash receptacle is fully closed. The interlocks prevent the ram from coming down when the trash bin is not in the proper position. In many cases, a standard microswitch will fit. A jammed ram is a more serious repair.

As the ram descends and the motor approaches a stall, there's a great deal of force being applied to the gearing and threaded rod system. Two large nuts move up and down following the threads on the spinning rods. These special nuts are the weak spot in the drive system. Typically, the threads will strip in one of the nuts and the ram will cock sideways. In some cases the rod also strips. If the nuts are not stripped, it is possible to unjam the ram system, remove the stuck trash and put the unit back in service.

On Whirlpool models, a large wrench can be applied to the ends of the threaded rods to rotate them by hand. On this design, it's necessary to remove the chain in order to operate the rods manually.

**Using a Socket Wrench to Unjam a  
Compactor  
(Fig. 16-24)**



If a ram is cocked at an angle, you can be confident that the threads are stripped in the drive nuts. Repair will require ordering the new nuts and a total disassembly of the compactor. Such a repair will require two trips plus over an hour and should be priced at \$200-300.00.

In some cases, when the ram jams in position, the motor overheats and goes off on overload. This can burn out the motor.

### **Replacing a Nylon Rod Nut (Fig 16-25)**

## **Conclusion**

Since there are so few compactors in regular use, it's hard to establish accurate failure patterns. Fortunately, their logic is simple and failures are usually obvious once the covers are removed. The only irritating thing about compactors is that they almost always require removal from the cabinet. Sometimes the fit is tight and care must be exercised not to tear the floor or chip the countertop.



## Electric Water Heaters

Forty to sixty gallon electric water heaters operate exactly like oversized instant-hots. They are all similar and can be repaired with a minimum of parts. Heat is generated by either one or two submerged elements bolted into the side of the tank. The elements operate on 220 VAC. Power to the elements is controlled by a thermostat(s) clamped to the tank next to the element. A resettable high limit safety thermostat is always next to one of the control thermostats. The operation of a water heater with a single thermostat and single element is very simple. The element stays on until the thermostat reaches the pre-set temperature, usually 130°F., and it cycles off.

Larger water heaters have an upper and lower element and two control thermostats. Each element is about 4000 watts. They are wired so that only one element is on at a time. By convection, just like hot air rises in a room, hot water first collects near the top of the tank. The upper element is energized first and stays on until the upper thermostat is satisfied. The upper thermostat is a three-wire device. When it cycles, it turns off the upper element and turns on the lower one. The lower element stays on until its thermostat is satisfied. Since the hotter water tends to gather at the top of the tank, the high temperature safety is mounted near the top of the tank.

## Typical Water Heater Failures

Water heaters fail in several ways:

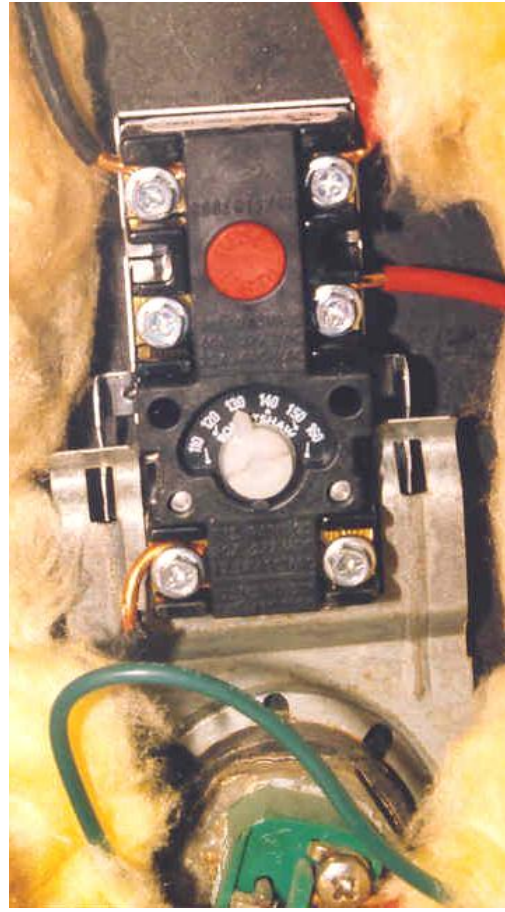
1. A control thermostat will fail and cause the high limit to pop out.
2. One of the heating elements will fail.
3. Water will begin to leak around one of the heating element or pipe fittings.
4. The tank itself will begin to leak.

### Replacing the thermostat

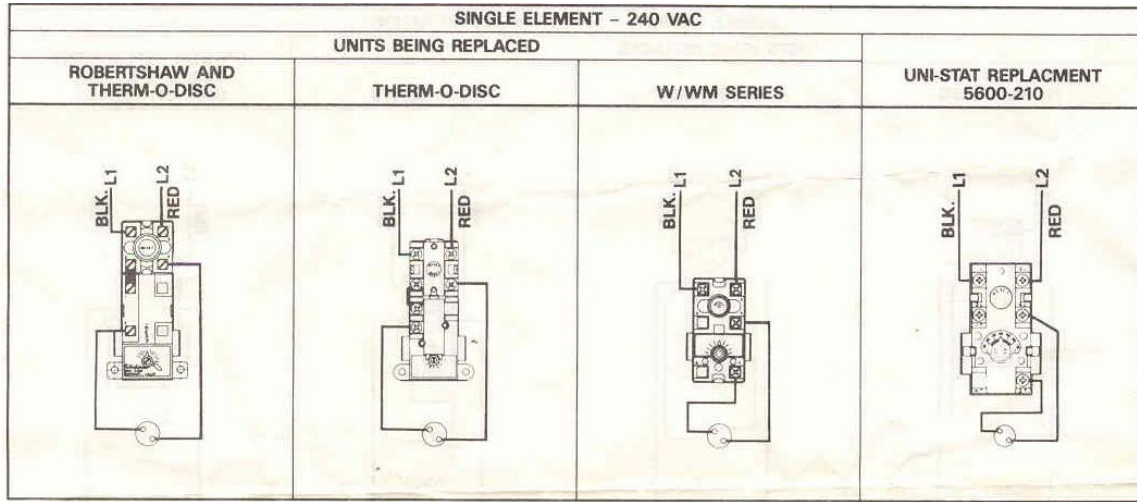
It's possible to repair nearly all water heater thermostats and limits with one universal kit. The kit includes both a control thermostat and a high limit. Both of these components will fit all brands. The circuit diagram included in the kit explains in detail how to do adapt to any model.

A water heater thermostat operates exactly like a dryer thermostat. It includes a bi-metal thermodisc. The limit is similar except it is manually resettable by pushing the red reset button. If the red high limit button pops out, it's safe to assume that a control thermostat has failed. In almost all cases, the failing thermostat is the upper, hard-working one. It's best to replace the control thermostat and the high limit as a unit.

**Different Styles of Limits and  
Thermostats  
(Fig. 16-26)**



**Typical Wiring Directions  
(Fig. 16-27)**

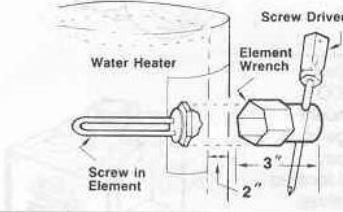


## Replacing The Heating Element

All heating element can be test with a volt or an ohmmeter. It is also possible to test the current draw with an amprobe. The most popular water heater heating elements are the screw-in type. When replacing one for the first time, purchase a cheap special hex wrench that fits the element. It makes the job fast and simple.

Many technicians drain the entire heater to replace elements. This is messy and time consuming. There is a quicker way.

### Special Wrench and Sample Elements (Fig. 16-28)

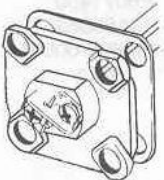
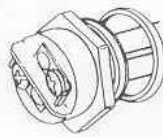


#### Screw-in Element Wrench

Designed for fast and easy replacement of recessed screw-in elements.

Part No. **DW-1** 3" Long

		FOUR BOLT RECESSED FLANGE				
	120	1000	FTG1123L	7-5/8"	FTG1107L	7-11/16"
	120	1500	FTG1153L	7-5/8"	FTG1157L	7-11/16"
	240	1500	FTG1153	7-5/8"	FTG1157	7-11/16"
	240	2000	FTG1203	7-5/8"	FTG1207	10-5/8"
	240	2500	FTG1253	9-3/8"	FTG2257	7-3/8"
	240	3000	FTG1303	10-9/16"	FTG2307	8-15/16"
	240	4500	FTG1453	13-9/16"	FTG2457	11-11/16"
	240	4500	TGW2457X1	Long Life Water Wizzard		16-1/4"
		SCREW IN TYPE				
	120	1500	SG1153L	7-5/8"		
	240	1500	SG1153	7-5/8"	SG1157	7-3/4"
	240	2000	SG1203	7-5/8"	SG1207	10-11/16"
	240	2500	SG1253	9-3/8"	SG2257	7-7/16"
	240	3000	SG1303	10-9/16"	SG2307	9"
	240	4500	SG1453	13-9/16"	SG2457	11-3/4"
	240	6000	SG2603	11-5/8"	SG2607	15-1/8"
	240	4500	SGW2457X1	Long Life Water Wizzard		16-3/8"



*Uncle Harry's*  
Trick of the Trade # 315

Replacing a heating element without draining the water heater:

1. Turn off the supply valve to the water heater.
2. Crack the pressure relief valve of top of the heater to relieve any inside pressure. (The relief will immediately reclose.)
3. Set a shallow basin under the bad element.

4. Get everything ready and quickly replace the bad element. Ignore the water that spills out as you work.

Using this procedure, the water heater is not under pressure, and the water barely trickles out. The amount of water spillage will be less one quart. Water will only gurgle and bubble into the basin.

**Replacing A Heating Element the Easy Way  
(Fig 16-29 )**



## **A Leaking Water Tank**

Customers often call to report a leaking water heater. Tanks rot through after ten to fifteen years and the whole heater needs replacement. Leaking water heater calls for the plumbers. After a few years, water heaters accumulate a great amount of rust in the bottom and are very heavy even with the water drained out. Replacement is a two man job.

However, if you are comfortable with soft-soldering copper lines and have a hand truck and a handy helper, water heater replacement is pretty simple. Removal and replacement of the copper and electric lines is the easy part. The hard part is moving out the heavy old water heater and getting the new one in position.

## **Conclusion**

**W**ater heater repair is easier than disposer work and even more profitable. Diagnosis is simple and only a few parts are needed. It is no wonder plumbers make so much money.

## Flat Rates

Following is *Uncle Harry's* suggested pricing for typical repairs. A complete set of flat rates is in the Flat Rate Book.

## Disposers & Instant Hots

Description of the Job	Price
1) Unjam unit & reset breaker	\$64.00
2) Unclog trap or dishwasher feed line	76.00
3) Install replacement disposer (Badger ISE)	185.00
4) Install replacement disposer (333 ISE)	240.00
5) Install replacement disposer (333SS ISE)	280.00
6) Install replacement disposer (17 ISE)	385.00
7) For fresh installation add for wiring and switch under sink	+75.00
8) Install KitchenAid Instant-Hot	265.00
9)	
10)	

## Trash Compactors

1) Unjam ram assembly	\$95.00
2) Replace bin or reversing switch	115.00
3) Replace threaded rod nuts	180.00
4) Replace drive motor	240.00
5)	
6)	

## Water Heaters

1) Install new thermostat and limit (5600-211)	\$148.00
2) Install new heating element	155.00
3)	

## Examination

### Manual 16

#### Disposers, Instant-Hots, Compactors and Hot Water Heaters

(Note: More than one answer maybe correct.)

1. Disposer jams
  - A. are a very common problem.
  - B. often require a pry bar.
  - C. can seldom be corrected.
  - D. are expensive to correct.
2. A disposer with a shorted winding
  - A. can be repaired from truck stock.
  - B. may kick the reset button.
  - C. should be replaced.
  - D. should be disassembled for repair.
3. Sink traps
  - A. crack and leak.
  - B. should be part of a good truck stock.
  - C. are left for the plumbers.
  - D. minimize sewage odors.
4. Tail pipes and traps
  - A. often shake loose.
  - B. can not be adjusted.
  - C. are hard to replace.
  - D. can cause alignment problems.
5. A new disposer installation
  - A. need not be tested.
  - B. needs to have water flushed through it.
  - C. is not advised.
  - D. should be pressure tested.
6. Fit problems
  - A. should be left for a plumber.
  - B. are one of the few problem areas on disposers.
  - C. require a little ingenuity.
  - D. only occur on an exact replacement.
7. Installing a disposer from scratch
  - A. may require two trips.
  - B. is difficult but profitable.
  - C. should not be attempted.
  - D. requires installing a switch on the wall.
8. Various models of disposers
  - A. are all the same size.
  - B. have the same safety features.
  - C. fit different customer needs.
  - D. A, B, & C.
9. A sink mounted water heater
  - A. supplies almost boiling water (190 °F).
  - B. can be bought from numerous manufactures.
  - C. can be difficult to diagnose.
  - D. A, B, & C.
10. Instant-Hots
  - A. are very popular.
  - B. are often repaired.
  - C. are not very popular.
  - D. are seldom repaired.

11. A leaking Instant-Hot tank  
A. means a new unit.  
B. can be sealed from the outside.  
C. is one of several failures.  
D. can be rebuilt.
12. Trash compactors use  
A. a large metal trash bin.  
B. an hydraulic system.  
C. a one directional motor.  
D. 220 VAC.
13. Trash compactors  
A. can be run with the door open.  
B. are very popular.  
C. are safety interlocked.  
D. A and C.
14. The upper directional switch  
A. acts as a safety device.  
B. resets itself.  
C. reverses the motor.  
D. A, B, & C.
15. Ramming system repairs  
A. are expensive.  
B. can be done without pulling out the unit.  
C. involve threaded rods..  
D. involve high voltage work.
16. A jammed compactor  
A. may require a large wrench.  
B. can burn out the motor.  
C. will stink up a kitchen.  
D. A, B, & C.
17. Water heaters  
A. vary by brand.  
B. generally operate on 220 VAC.  
C. can be tested with a multi-meter.  
D. are harmless when the power is off.
18. A bad water heater thermostat  
A. can cause overheating.  
B. always tests as an open circuit.  
C. may pop the limit.  
D. A, B, & C.
19. To replace an element  
A. drain the heater.  
B. relieve the pressure first.  
C. prepare for a flood.  
D. A, B, & C.
20. On a water heater the upper element  
A. does little work.  
B. usually has a safety.  
C. comes on last.  
D. comes on first.

## Examination Answers

### Manual 16

#### Disposers, Instant Hots, Compactors & Hot Water Heaters

1. A & B.
2. B & C. Never disassemble a disposer for repair. Replacement is advised.
3. A, B & D.
4. A & D.
5. B & D. A pressure test on a new disposer installation will minimize callbacks.
6. B & C Flexible tailpipe traps can minimize future problems.
7. A, B & D. Although it is a minor remodeling job, installing a disposer from scratch can be profitable.
8. C Continuous feed and batch feed models are designed to fit different customer needs.
9. A. A sink-mounted Instant Hot is only available from KitchenAid and supplies almost boiling water.
10. C & D. Instant Hots border on being a throw-away appliance like a toaster.

11. A & C It is cheaper and wiser to replace the entire unit rather than just the hot water tank.

12. A Compactors operate on 110 Volts AC using a reversing motor driving a worm gear system.

13. C. Trash compactors are interlocked so they cannot be run with the door open.

14. A, B, C & D

15. A & C

16. A, B, C & D.

17. B, C & D. All brands of water heaters are very similar and easily tested with a multimeter.

18. A & C. A shorted thermostat will cause the safety limit to pop and test as a short circuit.

19. B Only a small amount of water leaks from a full water heater if the pressure is relieved before replacement is attempted.

20. B & D. During the initial heat up, the upper element heats first and then the lower. The safety is on the upper because hot water rises to the top.