Raker

Appliance Repair Professionals, Inc.

Icemakers

Manual 9

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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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ICEMAKERS

An icemaker is a very complicated, interesting device that has become a common household item. Homeowners have become dependent on icemakers and are willing to spend a lot of money to keep them in repair. In this lesson, we are going to cover the operating theory of icemakers so that you have a good overall understanding of how they work. Also, we will discuss the specific designs, and of course their failure patterns.

Most of our study will concentrate on icemakers found in the freezer compartment of a typical domestic refrigerator. The majority of service calls are on that style. Occasionally, in upper income homes, other types will be encountered. Several companies manufacture free standing icemakers, designed to fit under a counter. They are 12-18" wide and include an independent refrigeration unit. Normally, they are found in a separate bar area. These units will be covered toward the end of this lesson.

Uncle Harry's
Story Time

My own personal record was repairing three icemakers in the same house! The kitchen had an icemaker in the huge SubZero freezer. The second one was a Whirlpool installed under a bar in a game room. Incidentally, to give you a feel for the house, the decorations in the game room included a full-sized mannequin of an umpire with his arms raised straight up.

The third icemaker was in a cabana house kitchen, next to a huge pool. The cabana was larger than most modest homes. In hindsight, I guess they needed three icemakers.

Icemakers are like refrigerators, in that they are mysterious in their operation. Anything mysterious helps us out. The more obscure an operation, the higher the profit. Icemakers are a real money maker for appliance technicians. They fail frequently for numerous reasons. Even under ideal conditions, it is rare for one to last over ten years. Often chemicals in the water cause them to fail in a few years.

In many cases, the best and most profitable solution to a bad icemaker is total replacement. A replacement results in a profit of $100.00-$150.00! Stocking replacement kits on your truck can make you money in a hurry. As reserve cash becomes available, it is one of the first major parts investments to make. ***Uncle Harry*** carries four different ones on the truck. He is ready for almost anything.

Icemakers are handled in this course as a separate lesson for several reasons:

1. Icemaker logic and service are different from that of the refrigerator.

2. Since they are a big money maker, we need to carefully cover them so that you are prepared when opportunities arise.

3. They have a reputation for being very tricky to repair properly. We want to be very thorough, so that you don't run into callback problems.

Uncle Harry's
Story Time

Back in the 70's, after icemakers had been out for a few years, I remember running into a friend of mine, John Reese. John was already an old hand at appliance repairs. I had noticed that over a period of weeks, he had been buying a lot of parts for GE icemakers. One day my curiosity got the best of me.

"John, what are you doing buying all those icemaker parts?"

Without saying anything, he went out to his truck and came back in with a GE icemaker in his hands.

He said, "I've replaced the mold heater, the drive motor, the thermostat, the gears, the mold, and the comb in this icemaker, and it still won't work dependably."

"John, you've replaced every part of it. There's nothing left."

He said, "Yeah, I know, but it still won't work right."

Knowing John, he never gave up. I'm sure he eventually fixed it.

Back then, we still attempted to repair the icemaker unit itself, but eventually we woke up to reality and gave up. By the end of this lesson you will have an insight into the experience gained by professional technicians over many years.

The proper strategy in icemaker repair is similar to freon systems. First, it is necessary to understand exactly how they work so that you can properly diagnose them. With that full understanding, it is possible to separate an icemaker failure into the three categories. Failures occur because of problems with:

1. The freezer temperature and air flow.

2. The water valve, water supply, and associated piping including:

A. The water supply line between the valve and the icemaker.

B. An ice jam in the fill spout.

C. The water supply line to the refrigerator.

3. The icemaker unit itself.

Knowing for sure which of these three is the source of the problem eliminates any guess work and potential for callbacks.

We will use a divide and conquer method for studying icemakers. We will start with the easy problems and work our way toward the difficult ones. First we will study the temperatures and conditions needed for an icemaker to work. Second we will study the various supply and piping systems.

Once these are fully understood, we will go in for the kill and study the icemaker unit itself. Believe it or not, the supply lines and the water valve are responsible for about half of all icemaker service calls.

1. Freezer Temperatures and Airflow

First, let's talk about the perfect environment for an icemaker. Remember back when we started on washing machines, we talked about electric and water supply, temperatures, drain lines, etc. The icemaker is similar. It needs its own special environment in order to function properly. Often an icemaker will stop working, not because of a problem in the icemaker unit, but rather, a problem in the freezer.

To function, an icemaker needs the air temperature to be less than 20°F. Icemakers are always installed directly in the air coming off of the evaporator. Often the air hitting the icemaker is below zero. This insures quick freezing of the water and a reasonable production of ice.

Incidentally, low production of ice (or the failure of an icemaker to work) is usually the first indicator of a problem with the refrigerator. Conversely, if the customer is complaining of poor refrigeration but the icemaker is still working, you immediately know that the freezer temperature is below 20°F. More than likely, the problem is going to be blocked air-flow or a control setting problem, instead of anything serious.

It is good to keep in mind that an icemaker is nothing more than a manual ice tray. It merely has a few gizmos attached to dump the ice every once in a while. It still needs to be in a cold environment for a good length of time to freeze the water. As a crude rule of thumb, a properly operating icemaker will fill up a typical icemaker bucket in about a day. Production is always better overnight. Production always drops down during the day because the freezer and refrigerator door are being opened. Temperatures shoot up for short periods of time and water won't freeze as fast.

A brand new refrigerator, freshly plugged in, will take over twelve hours, and sometimes as long as twenty-four, to make its first tray of ice. Calm down any panicky customer that gets antsy checking the freezer. Tell them to close the doors and leave it alone for a day. After waiting a full day, check it and only then draw conclusions.

Uncle Harry's
Story Time

A panicked customer paged me late one Friday afternoon. Another service company had left the house a few hours before. They had repaired the icemaker for the third time. Now the entire refrigerator was thawing out. The customer had called the other company and had only gotten an answering machine. He had my number from a mailer and paged me.

There I was, tired after a long week. My 10 year old daughter was with me and I had just pulled in my driveway when my pager went off!

I slowly walked into the house. Even though I didn't feel like it, I followed my own advice and immediately called the number.

After hearing his story, I asked the customer to check and make sure that the control was turned on. He said that he already done that. "Yes, it was on."

A customer with no refrigeration is a high priority call.

The house wasn't too far away, so reluctantly I went. Upon arrival, the first thing I checked was the cold control. It was an Amana and the primary control was behind frozen food in the freezer section. This is an unusual spot for the control; the damper in the fresh food side was set normally. Of course the fresh food one was the one the customer had checked. Naturally, the freezer control was turned off. Apparently, my competitor was in such a hurry that, after fixing the icemaker, the dummy forgot to turn the unit back on.

I laughed at the ridiculous situation. The customer happily paid the service charge. He was back in service. I recommended that he call the other company and ask for a refund.

I couldn't wait to tease my competitor; the next time I met him. He was mightily embarrassed and had quickly refunded some of the money.

About two weeks later, the same customer paged me on a Sunday. Again his icemaker was dead, and he wasn't about to call my competitor again. I asked him a few questions. He had had a large party the night before.

I said, "I doubt that there is anything wrong with your icemaker. Keep the doors closed today, take two aspirins and if there is any further problem, call me in the morning. The icemaker just need to recuperate from the party."

I never heard another word from him.

Icemakers have a reputation for being difficult to diagnose. This is mostly because they are very slow acting and hard to test. It's important to understand exactly how they work in order to properly repair them.

It's not practical to stand around for an hour or two while the water freezes and turns to ice. Only then will the icemaker cycle and dump the frozen cubes. Even the very best mechanic can only:

1. Repair or replace an icemaker,

2. Cycle it and watch it fill with water,

3. Cross his fingers,

4. Close the freezer door, and leave.

Instead of running the unit through a cycle like a dryer, the technician must rely on training and be able to **predict** what the icemaker will do rather than waiting around for it to happen.

Separating Freezer From Icemaker Problems

The very first step in diagnosing all icemakers is to carefully measure the temperature. Lay a thermometer on top of the cube tray and wait several minutes.

Uncle Harry's
Trick of the Trade # 130

If the temperature is above 20°F., investigate the freezer

If it's below 20°F., investigate the icemaker.

If the freezer has been turned off, it's unlikely that you will be able to diagnose the icemaker. It's still possible to run the icemaker through a cycle and make sure it fills with water. Cycling it will also check out the internal workings of the icemaker. However these are only a partial indication, not a sure test.

As with all refrigeration calls, before running an icemaker call, it's essential that the customer be told to leave the refrigerator on for over a day. Otherwise, it's better to postpone the call.

"Well, it was broken, so I unplugged it,"

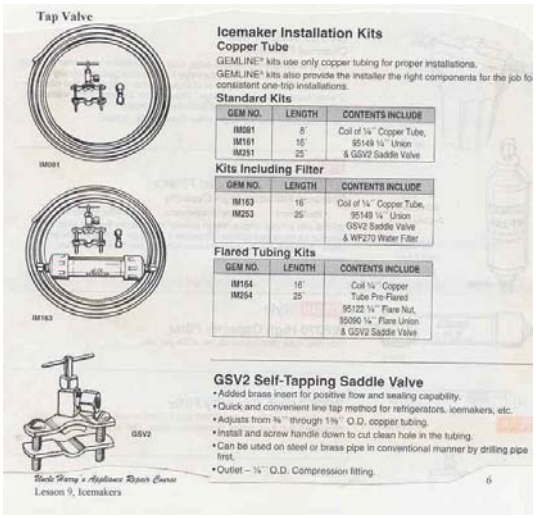
Anytime you hear these words, you know you're in deep trouble. A graceful exit is the next best move. Stop back another day, after the unit has cooled off. Otherwise, you're just wasting your time.

Don't forget, the icemaker will not work until it's below 20°F.

2. The Water Valve and Associated Problems (Common to All Brands of Icemakers)

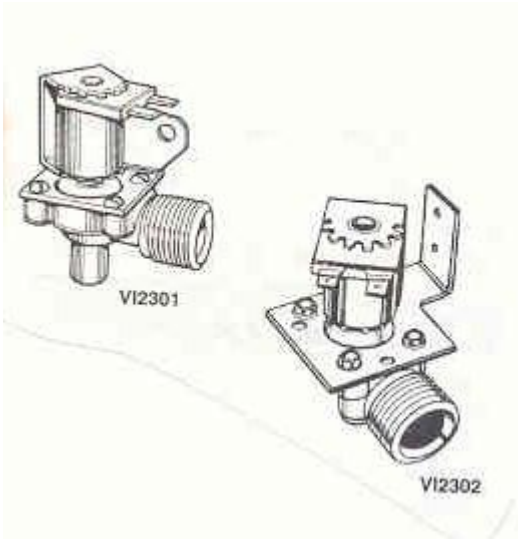
The water valve on the icemaker operates exactly like the washing machine water valve. Instead of rubber hoses, the supply line is a 1/4" copper or 1/4" plastic line. The small line is connected to the cold water supply by a tap valve. Often the tap valve is found under the kitchen sink. In other cases the line feeds through a hole in the floor to the basement.

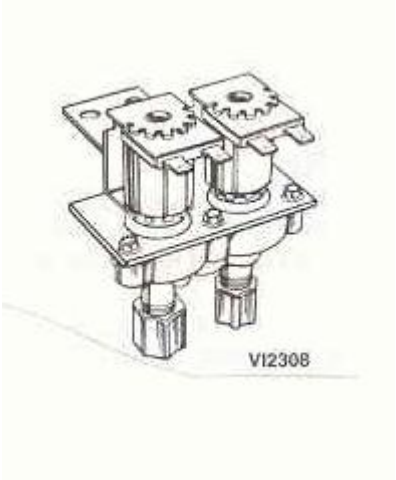
Fig. 09-01
Tap Valve

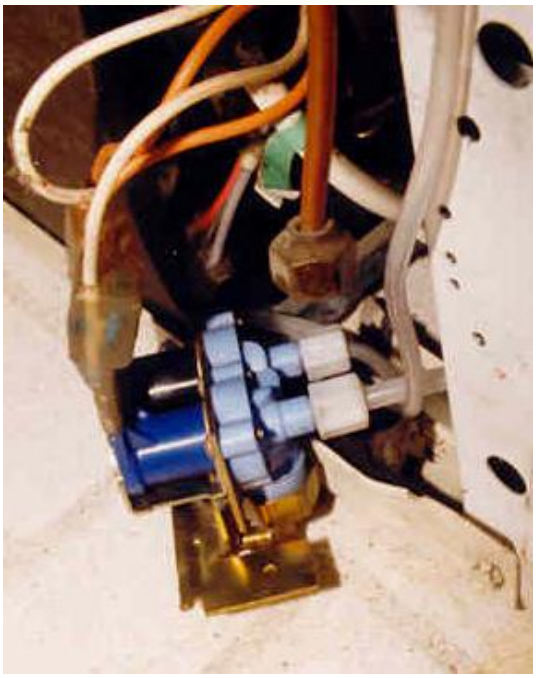


At the refrigerator, the supply line connects to the icemaker water valve. The valve has an internal washer to restrict the water flow. The "metering washer" drops the flow to a rate of about 6 oz. of water in 10 sec. Frequently, the icemaker valve is combined with the valve that supplies the water to the door. This style is a double solenoid model that provides both needs from the same water line.

Fig. 09-02
Single and Double Water Valves







Regardless of the configuration, icemaker valves fail the same way that the water valves fail in washing machines. The failures may create different symptoms from those on the washer, but the logic is the same. They fail in the following ways:

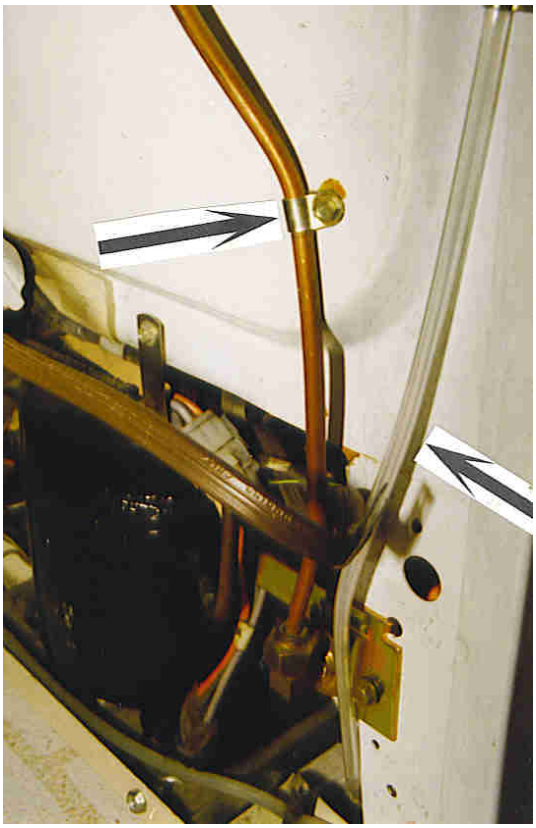
1) A dripping valve.

2) A flooding Valve

3) A bad coil.

4) Clogged water system.

Fig. 09-03
Copper Feed line and Plastic Outlet from the Water Valve



1) A Dripping Water Valve

Water leaving the water valve travels up the back of the refrigerator through a 1/4" plastic tube.

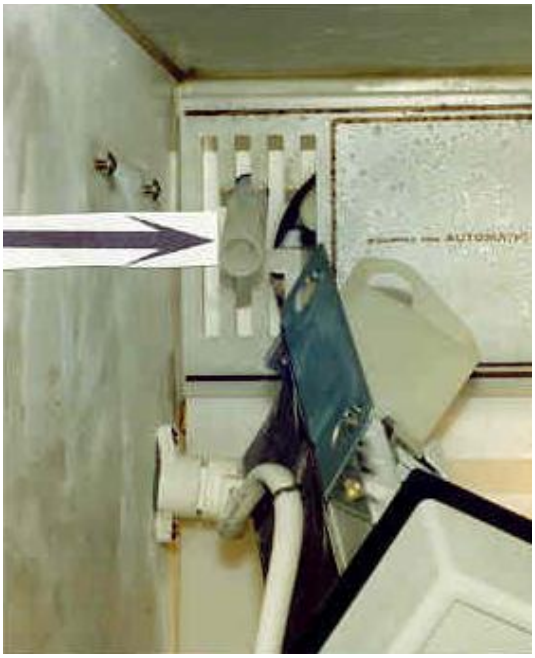
It enters the refrigerator through a tilted spout. The spout pierces the insulated wall of the refrigerator. The exit end of the spout pours water into the icemaker.

Fig. 09-04
A Cracked Icemaker Spout Being Replaced

A most common valve failure is for it to leak small amounts of water into the icemaker while in the off position. A dripping water valve will cause one of two problems. If it's a very small drip, it will cause a freeze-up in the supply spout on the back wall of the refrigerator.

Fig. 09-05

The Icemaker Spout as it Enters the Icemaker



The supply tube is tilted so the water will drain into the icemaker mold. If the water flow is only a slow drip, it will freeze before it flows off the end of the supply tube. Gradually, the drips will build up like a glacier does, until it plugs the supply tube. Once plugged the icemaker occasionally cycles vainly waiting for water.

Uncle Harry's
Trick of the Trade # 131

To thaw a frozen fill spout use your freezer "drain opening tool," the battery filling syringe. Using very hot water, squirt water up the tube until it thaws.

Fig. 09-06
Thawing a Frozen Spout

In most cases a new water valve is needed to prevent refreezing of the spout. However there is one common exception.

Uncle Harry's
Trick of the Trade # 132

Water spouts freeze up if a refrigerator is infrequently used. For instance, this problem will often arise while people are away on vacation. A simple flushing will solve the problem. A bad door gasket or partially open door will also cause spout freeze up.

Why is this problem caused by minimal usage and the increase of fresh air leaking in? Spout freezing occurs in the following steps:

1. The water spout pierces the insulation. Naturally, this creates a small cold spot on the back wall of the refrigerator.

2. The water spout is not air tight.

3. Air seeps in around the spout.

4. When it chills the surrounding air, a few drops of water condense, just like "dew" in the morning. This problem is aggravated by high humidity in the summer.

5. The condensate runs down the spout and freezes before it falls off the end.

6. Over a long period of time, with no icemaker water to flush it away, the condensate will build up enough to plug the line.

Look back at the photograph of the broken water spout. There is an arrow showing where putty installed by the factory to seal the spout at the back wall. Installing the putty minimizes air leakage and reduces freeze-up.

2) A Flooding Valve

A second but less common valve failure is flooding. If the valve fails to shut off, water will pour out of the icemaker and create a mess. The customer will desperately locate the cutoff and shut down the supply.

Uncle Harry's
Trick of the Trade # 133

Be Careful!

1. A bad icemaker can also cause a flood. The internal cam or microswitch may have failed and continuously called for water. Does water continue to come in even with the icemaker unplugged? If so, the valve is definitely bad.

2. A bad mold can cause a slow overflow (see mold problems)

3) A Bad Coil

Testing a water valve can be accomplished in several ways. They are listed with the fastest first.

1. By cycling the icemaker (see icemaker units).

2. Using a homemade test cord to bypass the icemaker (again in icemaker units).

3. Using a line cord directly on the icemaker valve itself.

Fig. 09-07
Testing a Icemaker Valve with a Homemade Line Cord

Uncle Harry's
Trick of the Trade # 135

Make your test cord about 8' long. With a long cord you can operate it while watching the inside of the freezer.

Uncle Harry's
Trick of the Trade # 134

Icemaker valves almost always made an audible hum during operation. Listen for the hum during diagnosis.

An Audible Hum But No Water

There are four reasons for no water:

1. A clog or shut off in the supply.

2. A break in the line from the valve to the icemaker. The water is probably flowing onto the floor or into the drain pan and no one has noticed.

3. A frozen spout like we just covered.

4. A faulty valve, even though the coil is good.

The most frequent cause of this problem is a frozen spout. Before pulling out the refrigerator to inspect the valve, loosen the icemaker and visually check the spout. If all is well, pull out the refrigerator. Use the following test procedure:

1. Remove the icemaker valve, leaving the inlet water line still attached.

2. Position the valve over a bucket.

3. Connect a test cord to the suspect solenoid.

4. Plug the test cord into the trouble light.

If water squirts into the bucket, then there is a clog in the feed to the refrigerator. If there is still no water, partially loosen the supply fitting on the valve. Water should start to force its way out. No water indicates a supply line problem. Full pressure indicates a valve problem.

Uncle Harry's
Trick of the Trade # 136

It is very common for the plastic line to deteriorate where it is close to the hot compressor. The plastic line cracks up from the heat.

4) The Water Supply System

As strange as it may seem the supply line to the refrigerator causes as many service calls as a failure of the icemaker. The supply line fails in the following ways:

1. It kinks and leaks from moving the refrigerator.

2. Copper lines rot out from corrosive water and begins to seep water.

3. Plastic lines crack from heat or age and begin to spray.

4. The tap valve leaks or clogs up. *Sometimes, they just get shut off accidentally*!

5. The line clogs up or gets pinched shut.

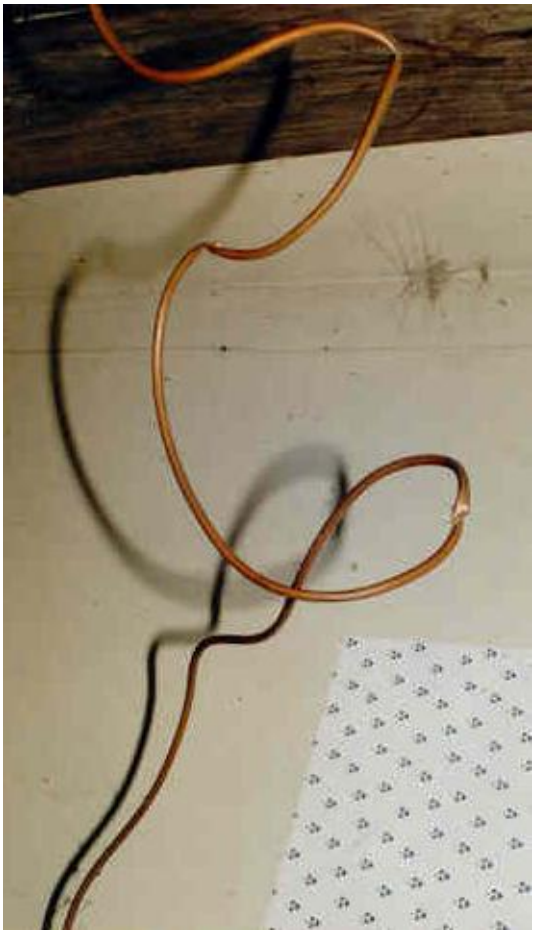


Fig. 09-08
A Kinked Supply Line

It is not very hard to find a problem is in the supply, once the refrigerator is pulled out. Repairing it may take a little time. The repair is more a remodeling job then an appliance repair. It may require drilling holes in cabinets and running new 1/4" copper tubing.

Plastic versus Copper

Originally, all supply lines were copper. In recent years, many homes have gone to plastic piping and tubing. Each has its advantages and disadvantages.

Copper is more expensive, stronger and requires tubing cutters for installation. Copper is subject to corrosion where plastic is not.

Plastic is much cheaper and easier to run. However, it is more fragile and is prone to early failure from heat. It also is easily pinched and accidentally cut.

Installing a new supply line.

There are two key tricks to installing a durable icemaker supply line.

1. Always leave plenty of extra line in a neat pigtail coil behind the refrigerator. Leave about 6 feet of extra line to allow easy movement of the unit.

2. Always secure the 1/4" line to the refrigerator with a clamp (note the upper arrow on page 8). Do not depend on the connection to the water valve for support. It will begin to leak after the unit is pulled out a few times.

3. The Icemaker Unit

Icemakers started becoming popular in the 70's. Like many other appliances, in the early years, they were made in many unusual ways. Most of the early icemakers were more trouble than they were worth. They were very frustrating to work on.

Each new design that came out caused a lot of trial and error diagnosis by technicians. Many service companies became discouraged and avoided or refused icemaker calls in the 70's. It was almost impossible to keep them running. The callbacks were so frequent that it became a very disheartening task.

Slowly over a period of years, technicians became familiar with the failures and the designs improved. Gradually the patterns began to appear. The poorer ones were discarded, and eventually, the best were left in the marketplace.

Since the life of an icemaker is less than ten years, it is unusual today to see one that was manufactured earlier than 1985. With a little luck, you will never see any of the early Rube Goldberg Designs.

Uncle Harry's
Story Time

In the early days of icemakers, there were some real gems. In the 60's, Frigidaire had a design that resembled a miniature, upside down bulldozer track. Each tread was concave and held water. The track operated like a conveyor belt and gradually moved forward.

Theoretically, the cubes were frozen as they fell off the end of the track into the bin. This was not always the case. Sometimes, the icemaker happily dumped water into the bin.

I remember, vividly, replacing a fill valve on one of those units. Believe it or not, the valve was mounted in the center underneath the refrigerator. In order to get to it, I had to empty everything and tilt back the entire refrigerator.

They don't make things like they used to. We can thank God for that.

Icemakers have all the previous components in common, the fill valve and the piping. Of course, the icemaker controls the power to fill valve. It turns the valve on for a controlled length of time and fills the mold.

We have now covered all of the support components and it is now time to attack the "command center", the icemaker unit itself.

Icemakers have been made in numerous ways. Fortunately, few of the older designs lasted for very long. Life would be a lot more complicated if they had. Of all the early designs, only four basic designs have survived:

1. The Whirlpool Comb-Type Icemaker.

    A. The Brass End Plate Style (older version.)

    B. The Modular Version (current style.)

2. The GE Pop-up Icemaker.

3. The Whirlpool Twist-Tray Icemaker.

4. The Amana Twist-Tray Icemaker.

Virtually all new refrigerators use the Whirlpool Comb Type. This style is used in all new Whirlpool (of course), GE, SubZero, Maycor, and Amana products.

The last three designs have all been used within the last fifteen years and are still creating service calls. Consequently, it is still important to be able to repair them. In many cases, it is possible to update an old unit with the current Whirlpool design. Eventually, it will only be necessary to have experience on the Whirlpool style.

The Whirlpool Comb-Type Icemaker (Brass EndPlate Style)

Before we begin to analyze the first icemaker unit, review the first of the two exploded views on page 19. (Many of the parts of the Whirlpool design are very similar to other icemakers.) The key components that combine to operate the Whirlpool icemaker are:

1. The mold than forms the cubes (#51).

2. The drive motor (#17).

3. The mold thermostat (#30).

4. The mold heater (#43).

5. The water valve microswitch (#31).

6. The shut off arm.(#37).

(Always check to be sure that the arm is down. The icemaker is **off** when the arm is in the **up** position.)

Looking at the exploded view may be frightening at first, but most of the components are of little consequence to your overall understanding. In simplified logic they operate in the following way:

The Sequence of Operation (the short version)

1. The mold fills with water.

2. The water freezes.

3. The mold heater and drive motor come on.

4. The crescent-shaped cubes are scooped out by the comb into the storage bin. Once the bin is full, the sensing arm stops the icemaker.

Actually, of course the actual operation is a bit more complicated.

We will begin a more thorough analysis of the sequence of operation at the point where the water has frozen to ice, and the icemaker begins to cycle.

The heart of the icemaker is the **mold** or ice tray. Two important items are mounted against the mold.

1. The control thermostat.

2. The mold heater.

The control thermostat is normally open, breaking the circuit to the motor and other components. This open circuit holds the icemaker in a stall position. The control thermostat is the component that stalls the icemaker if the freezer is not cold enough.(see the circuit diagram page 21.)

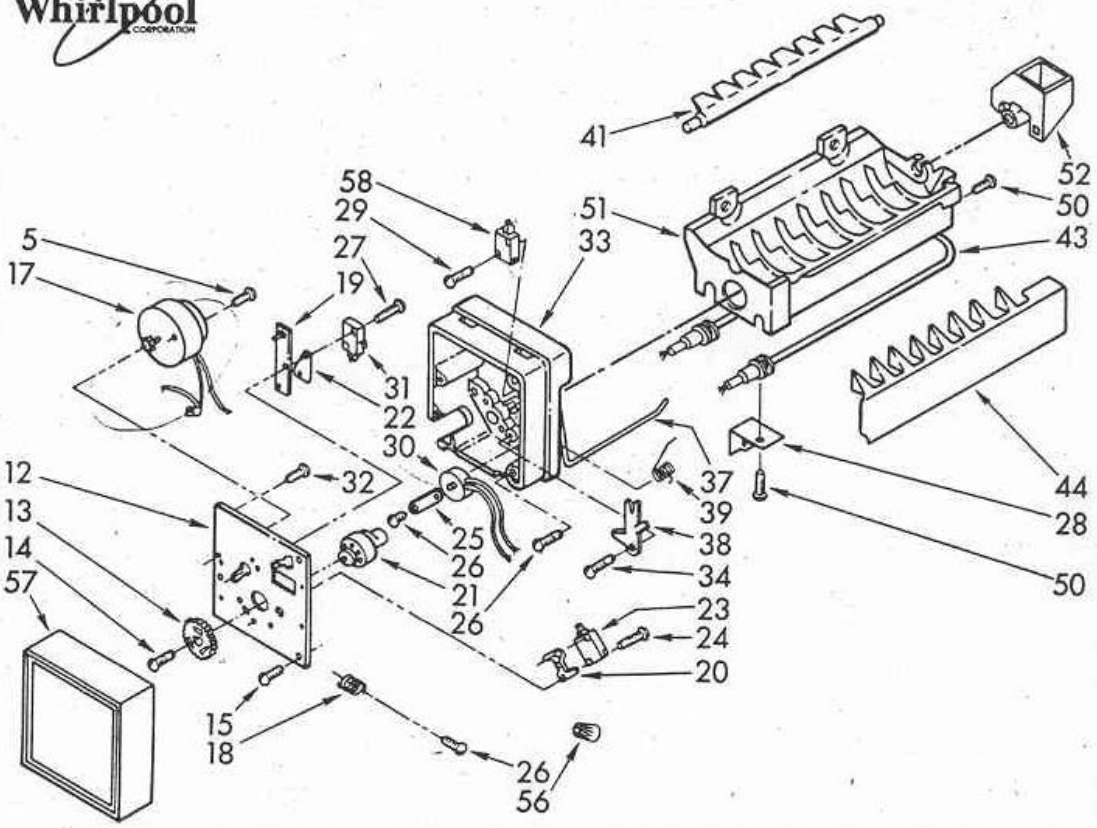
Fig. 092_08a

WHIRLPOOL: Ice Maker

SCHEMATIC **NOTE:** Please Supply Your Model Number for Each Appliance

Whirlpool CORPORATION

TYPICAL COMPACT TYPE 8-CAVITY REFRIGERATOR ICE MAKER



Illus. No.	Part No.	DESCRIPTION
5	488361	Screw (Use w/motor no. 625846)
12	627782	Plate, mounting
13	625914	Gear
14	488806	Screw
15	488787	Screw, 8-18 x 1/2
17	798654	Motor Kit
18	627163	Spring, ice thickness adjusting screw
19	625836	Plate, valve switch
20	625834	Spacer, holding switch
21	625913	Cam
22	984683	Insulator
23	625851	Switch, holding
24	488361	Screw, 4-40 x 1
25	625829	Clamp
26	488372	Screw, 8-32 x 1
27	488362	Screw, 4-40 x 3/4
28	625910	Bracket
29	488360	Screw, 4-24 x 3/4
30	627047	Thermostat
31	625851	Switch, water valve
32	487282	Screw, ground
33	625827	Support
34	833587	Screw, shoulder
37	627003	Arm, shut-off
38	625830	Arm, lever
39	480855	Spring, shut-off arm
41	627169	Ejector
43	625893	Heater, mold
44	627753	Stripper, ice
50	488646	Screw, 8-32 x 3/8
51	627170	Mold and heater assembly (Includes illus. 43)
52	833593	Bearing and inlet
56	227991	Connector, wire
57	833873	Cover
58	625851	Switch, shut-off

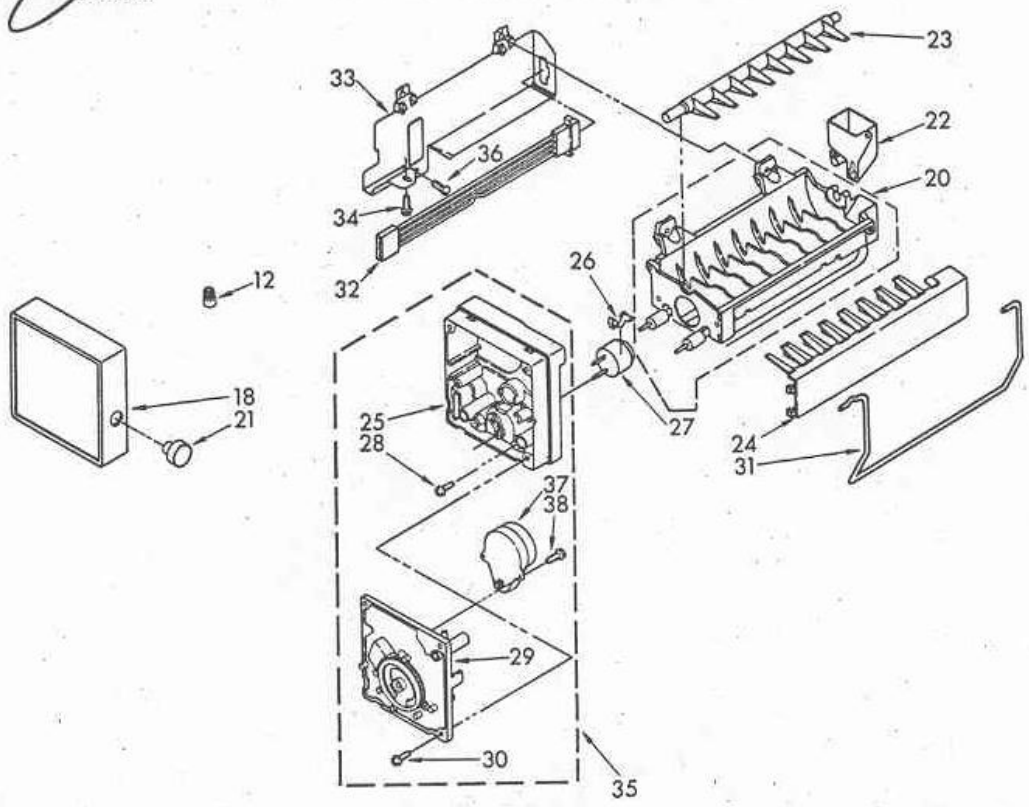
Fig. 092_08b

WHIRLPOOL: Ice Maker

SCHEMATIC **NOTE:** Please Supply Your Model Number for Each Appliance

Whirlpool CORPORATION

TYPICAL MODULAR REFRIGERATOR ICE MAKER

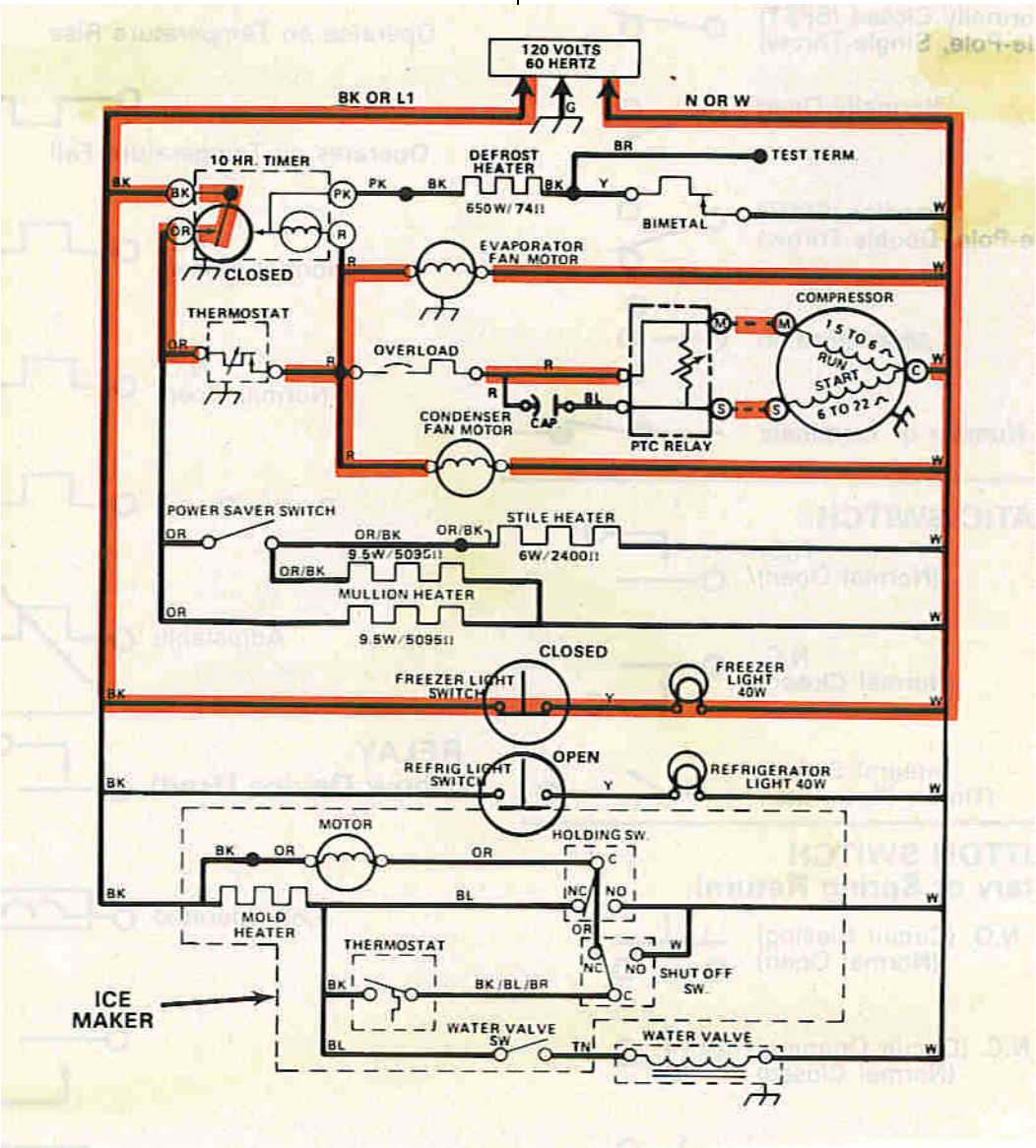


Illus. No.	Part No.	DESCRIPTION
12	227991	Connector, wire
18	1116224	Cover
20	627997	Mold and heater assembly (Also order 542638 silicone grease)
21	527992	Knob
22	627791	Bearing and inlet
23	627843	Ejector
24	627788	Ice stripper
25	627790	Support
26	627796	Retainer, thermostat
27	627985	Thermostat (Also order 542639) cement, alumilastic

Illus. No.	Part No.	DESCRIPTION
28	489163	Screw, 10-32 x 43/64
29	628135	Module assembly
30	681249	Screw, 6-18 x 3/4
31	627792	Shut off arm
32	627840	Harness, wiring
33	627751	Heat shield
34	489128	Screw, 8-32 x 27/64
35	483042	Module assembly (Includes items 25, 28, 29, 30, 37, & 38)
36	486214	Screw, 8-15 x 1/2
37	627811	Motor
38	489136	Screw

Fig. 092_09

Circuit Diagram of Whirlpool Refrigerator Including an Icemaker.



The Sequence of Operation (the detailed version)

The Starting Line

The control thermostat closes at approximately 17°F and the dump cycle begins. The thermostat is closely adjacent to the ice cubes and will not close until the ice cubes are frozen solid.

When the thermostat closes, two things happen simultaneously:

1. The drive motor begins to turn the comb that will sweep the cubes out of the tray

2. The mold heater comes on.

Beginning at a 9 o'clock position, the comb slowly rotates until the comb hits the cubes at about the 3 o'clock position.

Intermediate Position

At the 3 o'clock point, if the heater has warmed the outer surfaces of the cubes enough, they break loose. The comb will then continue to rotate and sweep the cubes around and out of the mold.

If the cubes are still frozen, the comb will stall at the 3 o'clock position. The drive motor will keep pressure against the cubes and wait until they partially melt. The drive motor is designed to sit in a stalled position without damage. It will wait until they finally break loose and complete the sweep of the mold. Of course if the mold heater is bad the comb will sit, forever stalled.

Uncle Harry's
Trick of the Trade # 137

Occasionally, a chip of ice will lodge in the teeth of the comb and jam it. It can be easily removed and the icemaker will resume operation.

Nearing the Finish Line

When the comb reaches about 8 o'clock, a cam operates the water valve microswitch. The microswitch turns on the water fill valve for 8-10 seconds. The fill valve dispenses approximately 6 oz. of water into the icemaker mold.

The combined heat from the mold heater and the warm water entering the mold will have, by this time, warmed the mold and opened the mold thermostat.

The Finish Line

When the comb reaches the 9 o'clock position, it stops, waiting for the thermostat to close again on refreezing.

This brings us back to the beginning of the cycle.

For many, it is a tempting to take apart icemakers, and replace the individual components. Superficially, this appears to be more profitable than spending money on a new one.

Uncle Harry's

Trick of the Trade # 138

Forget It!

Always replace, never repair a failed icemaker.
(There are a few exceptions, which will be covered later.)

I feel that one of the major factors in repairing icemaker units is because of "poor cold conduction." (see aluminate cement note on #27 of the modular exploded view.)

Aluminate is a special glue used to improve the transfer of cold between components. It is very difficult to replace components that are imbedded in the mold and duplicate factory originals. They never seem to work quite as well.

For this and other financial reasons, I recommend replacement rather then repair.

Forcing a BRASS Whirlpool Icemaker to Cycle

For fast diagnosis it is often necessary to force an icemaker to cycle. It is impractical to wait for the thermostat to close. Each brand and model icemaker has its own individual tricks.

For instance, the method used on the older brass end icemaker will ruin the modular style. It is important to memorize each cycling method. Whirlpool comb type icemakers have been made in two styles. They are easily distinguished by looking at the end plate, once the cover is removed.

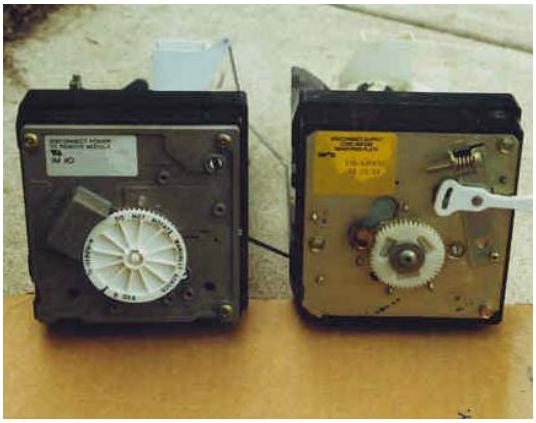
Uncle Harry's

Trick of the Trade # 139

Remove the cover plate by using your fingernails. Grab the white cover at the seam and pull hard.

The older style (on the right) has a brass colored metal endplate. The newer style, known as the “modular” icemaker, is made of a gray colored plastic.

Fig. 092_10
New Style and Old Style Side-by-Side



To cycle the old style, grab the comb with your fingers and rotate it clockwise. You may feel like you are about to break the unit because this requires considerable force. After about 1/8” of a turn the dead spot will be cleared and the drive motor will begin to run.

Once the motion begins, it takes about two minutes for a complete cycle. It will follow the sequence just covered.

Icemaker Failures

Now that we have an understanding of the **correct** operation, we will proceed with **failures**. They fall into the following groups:

1. No water in the mold.

2. Motor will not advance.

3. Jams part of the way through the cycle.

4. Water leaks into the storage bin.

5. Will not dump frozen cubes

Some of these failures have already been covered. However, this list is complete and includes **every** failure. Possibilities not already covered will now be covered in detail.

1. No Water In The Mold

At the end of the cycle when the icemaker is supposed to fill, three things can happen:

1) The unit fills with water indicating that, so far everything is OK.

2) An audible hums occurs but no water comes in (see testing water valves.)

3) All is deathly quiet.

3) All is Deathly Quiet

If there is no valve noise during the cycle test there are three possibilities:

A. The valve coil itself (see testing water valves.)

B. The switch circuit within the icemaker.

C. The wiring to the icemaker.

There is a second and faster method of determining if the valve is OK and if the problem is inside the icemaker. This method eliminates moving the refrigerator.

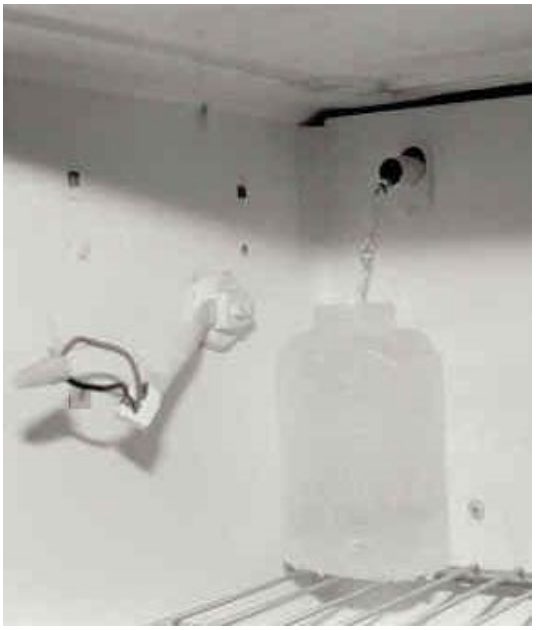
Uncle Harry's
Trick of the Trade # 140

Use a homemade test cord made from an old icemaker. The cord is wired to bypass the icemaker switch and operate the water valve. Unplug the icemaker cable and plug in the test cord for a few seconds. See if the water begins to flow. It is wise to set a cup in the catch position. If the water does flow the problem is within the icemaker (replace it.) Otherwise, go to the water valve diagnosis.

To make a test cord, connect the hot line voltage to the wire going to the water valve. On Whirlpool, connect the brown and black wires together, ignoring the rest.

Color Code:
White = Common
Black = Line Voltage
Green = Ground
Brown = Connection to Valve

Fig. 092_11
Using a Homemade Test Cord



In very rare circumstances the problem will be in the wiring to the valve. If it is, it will be at the fittings on either end.

2. Motor Will Not Advance

The drive motor fails to advance for two reasons.

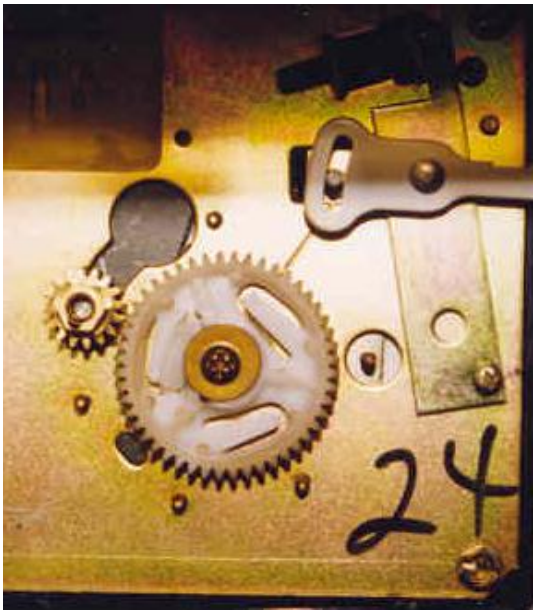
A. It is not getting any power.

If the temperature is below 20°F and the ice maker is not cycling occasionally, even empty, then the icemaker is faulty. There is a problem in the thermostat circuit. Replace the icemaker.

B. The motor is faulty.

Try to cycle the icemaker manually. If it fails to pick up and move on its own, after the dead spot is bypassed, replace the icemaker.

Fig. 092_12
Broken Drive Gear (note the clearance between the gears.)



3. Jams Part of the Way Through the Cycle

If the icemaker jams part of the way through the cycle, several things can be wrong.

1. A chip of ice stuck in the comb, as previously covered.

2. A bad motor as covered in section 2.

3. Broken drive gear.

A broken drive gear on the brass model is one of the few effective icemaker unit repairs.

Notice the difference in the spacing between the two pairs of gears in the photographs. The faulty one with a cracked hub is in the previous page. A new one is shown on this page. It is also common to find a tooth broken off the larger gear.

The large plastic drive gear frequently breaks and can be quickly replaced. (Note: This is only true of the brass end icemaker, **no other**.)

Fig. 092_13
A New Gear Installed (note the meshing of the teeth.)

A broken gear will cause various problems. Fortunately it can be easily found by a quick visual inspection.

A. If it is broken completely free the motor will run continuously.

B. If it has a broken tooth, it will make ice occasionally. It will work for a little while if the home owner fiddles with it. Fiddling will move the gear past the broken spot.

Uncle Harry's
Story Time

A new customer was referred to me by a plumber. The plumber had attempted to fix her icemaker. He had tried everything he knew. He and a helper had spent over an hour and a half working on it . He reran the water line, cleaned everything, cycled it over and over, and finally gave up. For his extended efforts, including a helper, he charged $75.00.

After hearing the story, I pulled the cover off the icemaker and checked the gear. It had a tooth missing. I walked out to the truck, got a new gear and installed it. Total time elapsed less than ten minutes.

I made small talk for a short time and gave her a bill for $72.00. Up to this point she had not told me what the plumber had charged. Now she told me.

Her comment was,

"You were only here ten minutes, and you charged almost as much as the plumber. He and a helper were here for over an hour."

As pleasantly as possible, I replied,

"Yes, that's true, but the difference is that I ***fixed*** *it."*

There wasn't a whole lot more she could say.

4. Water Leaks into the Storage Bin

Water leaking or overflowing into the ice cube storage bin is a common problem. It has several causes:

1) A leaking water valve (see valve problems)

2) A tilted icemaker. This is not a frequent problem, but occasionally someone will bump or fool with the icemaker and tilt it. If it is not close to level, water will simply spill over the edge. This adjustment is not critical and can be judged by eye. A carpenter's level is not necessary.

3) A bad ice cube **mold.** (the most common problem)

Fig. 092_14

A Bin Filled With Water Caused by Wicking

Uncle Harry's
Trick of the Trade # 141

As a mold ages, corrosion builds up on its surface. The corrosion forms a chemical coating that actually absorbs water. When the corrosion reaches the top of the mold, water will actually rise **above** the water level and **drip over the top of the mold**!

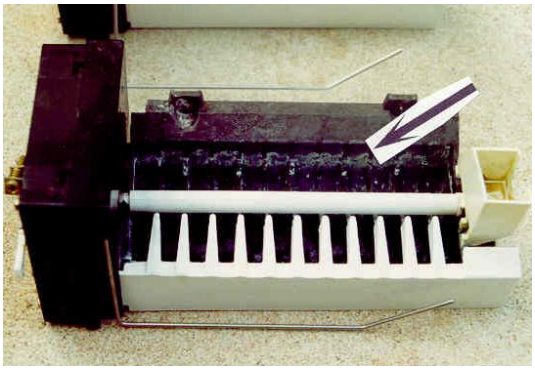
This phenomenon is known as wicking.

The corrosion acts like a candle wick and causes the mold to leak. Cleaning off the corrosion is not effective, replace the icemaker! In some cases wicking will empty the icemaker in a matter of hours.

This problem occurs over a long period of time and gradually gets worse as the corrosion builds up. Finally the customer gets tired of discarding the lumped together cubes and calls for help. Careful questioning of the customer will provide good clues. In contrast, a leaking water valve usually occurs suddenly.

Customers often have a hard time understanding and **believing** this weird process. Nevertheless, it is true. How else is water able to get over the top of a solid metal mold and drip?

Fig. 092_15
Corrosion on a Mold



The Whirlpool Modular Icemaker

The modular version of the comb type icemaker is an updated money saving design. Most of the unit is now plastic. The design theory remains virtually the same.

It is referred to as the modular unit because it comes apart in big sections, instead of lots of little pieces like its predecessor. Refer back to the two exploded views and note module assembly #35. It includes most of the operating components.

Again it is tempting to replace the modular head and save money on the whole unit.

Uncle Harry's
Trick of the Trade # 141

Forget it Again!

The modular head costs nearly as much as the entire icemaker unit. A new icemaker kit has a year warranty and eliminates other potential problems.

The decision is what some people call a "no brainer."

The Differences Between the Brass and Modular Icemakers

The primary difference between the two is the method used for manually cycling them. As mentioned, the older units are cycled by twisting the comb with your fingers.

This will ruin a modular icemaker. It says so right in the end of the unit. The modular unit has very fragile copper contacts behind the plastic back plate.

To cycle the modular unit it is necessary to jump between two test points on the back plate. They are marked "T" and "H". After a few seconds the dead spot is bypassed and the jumper can be removed.

Uncle Harry's
Trick of the Trade # 143

When you bypass the thermostat, there will be a faint "click" and a small spark as the icemaker motor comes on. Listen and watch for them.

The comb positions are also different on the modular units. The off position of the comb is about 1:30 on a clock face. The sequence is the same as the old unit.

Fig. 092_16
A Jumper Installed

(Note icemaker is in mid-cycle, mark is vertical)

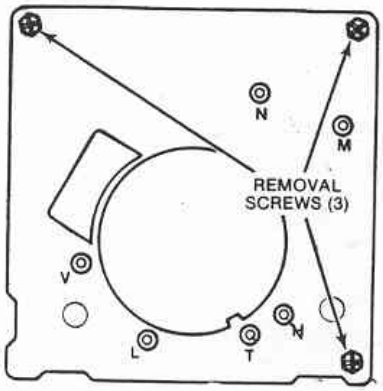
The large white plastic gear is marked with a blue line. That small mark sits at 5:30 in the stall position.

A new icemaker comes set in mid cycle. The instant you plug it in the comb begins to rotate toward the off point. If you can install it fast enough it will fill with water automatically, as it reaches the end of the cycle

On the following page is a service sheet on modular icemakers.

MODULAR ICE MAKER SERVICE SHEET

MODULE TEST POINTS



MODULE OHMMETER CHECKS (NO POWER TO ICEMAKER & EJECTOR BLADES IN PARK)			
TEST POINTS	COMPONENT	MODULE POSITION	OHMS
L-H	MOLD HEATER	ATTACHED TO SUPPORT	72
L-M	MOTOR	DISCONNECT FROM SUPPORT	8800

SERVICE PROCEDURES

COVER—
PULL WATER ADJUSTMENT KNOB FIRST AND SNAP OFF COVER. INDEX KNOB AND REINSTALL IN SAME POSITION FOR SAME WATER FILL.

MODULE, MOTOR AND SUPPORT ASSEMBLY—
INSERT PHILLIPS DRIVER IN ACCESS PORTS IN MODULE. LOOSEN BOTH SCREWS. DISCONNECT SHUT—OFF ARM. PULL MOLD FROM SUPPORT ASSEMBLY.

SHUT-OFF ARM—
PULL OUT FROM SUPPORT. REINSERT TO FULL DEPTH.

MOLD & HEATER—
REMOVE MODULE, MOTOR AND SUPPORT ASSEMBLY.

BIMETAL—
REMOVE MODULE MOTOR AND SUPPORT ASSEMBLY. PULL OUT RETAINING CLIPS WITH BIMETAL.

FILL CUP—
REMOVE MODULE, MOTOR AND SUPPORT ASSEMBLY. REMOVE EJECTOR BLADES AND SHUT-OFF ARM. PULL FILL CUP FROM MOLD.

EJECTOR BLADES OR STRIPPER—
REMOVE MODULE, MOTOR, SUPPORT ASSEMBLY. WHEN REINSTALLING EJECTOR BLADES, REALIGN "D" COUPLING WITH MODULE CAM.

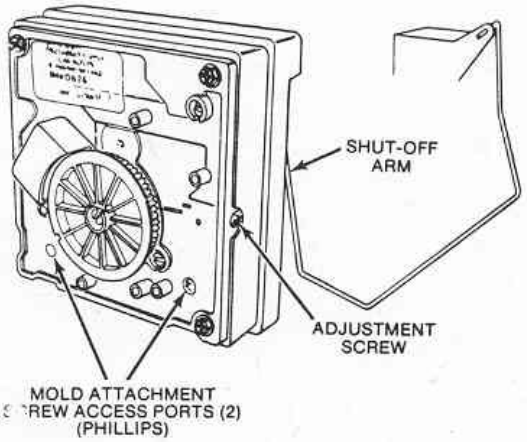
SPECIFICATIONS:

MOLD HEATER—185 WATTS, 72 OHMS
THERMOSTAT—CLOSE 17° ± 3°
(BIMETAL) OPEN 32° ± 3°
WATER FILL—140CC, 7.5 SEC.
MOTOR—1.5 WATTS, 8800 OHMS
MODULE—STAMPED CIRCUIT, PLUG-IN CONNECTORS
CYCLE—ONE REVOLUTION (EJECTS & WATER FILL)
FOR 120 VOLT MODEL

MODULE VOLTAGE CHECKS WITH METER OR TEST LIGHT (POWER TO ICEMAKER)			
TEST POINTS	COMPONENT	LINE VOLTAGE	0 VOLTS
L-N	MODULE	POWER OK	NO POWER
T-H	BIMETAL	OPEN	CLOSED
L-H	HEATER	ON	OFF
L-M	MOTOR	ON	OFF
N-V	WATER VALVE	ON	OFF

WATER LEVEL ADJUSTMENT

TURNING THE SCREW CLOCKWISE DECREASES THE WATER FILL.
- 1/2 TURN EQUALS 20CC OR 1.2 SEC.
- FULL TURN EQUALS 40CC OR 2.4 SEC.
- MAXIMUM ADJUSTMENT IS ONE FULL TURN EITHER DIRECTION ADDITIONAL ROTATION COULD DAMAGE MODULE



Uncle Harry's
Story Time

A large prosperous restaurant near my house called for service. They had three domestic appliances that needed repair. They had a kitchen company taking care of their commercial equipment. The restaurant included several other buildings that were upscale residences. One in particular was occupied by the owner. Naturally I wanted to satisfy the new customer.

All of the repairs were straight forward, except the icemaker in the owner's SubZero freezer. It was the new modular type and I suspected that someone had manually twisted the comb. It would work, but not reliably. I advised a new one.

SubZero uses the standard comb type icemaker, but the shut off arm is different. The Whirlpool kit doesn't quite fit. SubZero must engineer a few minor changes in their units. They also charge nearly $200.00 for a replacement kit. This is double the normal icemaker price.

The module assembly (#29 in exploded view #2) looked the same as any other unit. Instead of spending $200.00 for a special icemaker, I only purchased the module unit for about $50.00. Although it was designed to fit Whirlpool, I installed it on the SubZero and it worked fine. It was the first and possibly the last time, I ever replaced a part of a module icemaker.

I made same amount of net profit, plus a happy new customer.

Making a Test Cord

A different test cord is needed for the modular unit because the cable end is different. The color coding is the same

Other than the differences mentioned, diagnosis and repair of the modular unit are the same as the older style.

Buying Icemakers

There are two ways to purchase Whirlpool icemakers.

1. A repair kit.

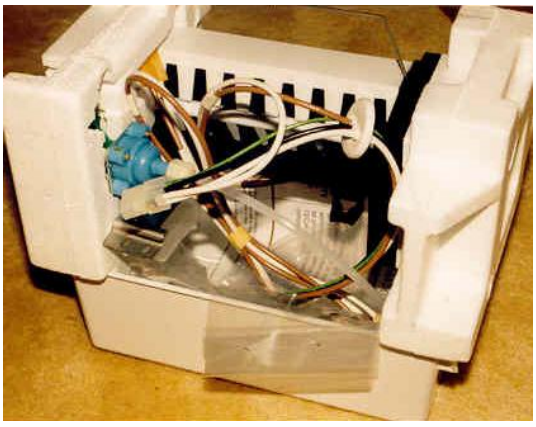
It includes various cables and clips needed to adapt the new updated kit to all previous icemaker installations. It comes with a thick instruction book.

2. A new installation kit.

The new installation kit includes everything needed to install an icemaker from scratch. Only the feed line to the refrigerator is omitted. The kit includes a new bin bucket, water valve (worth $20.00) and tubing.

Most of the time an installation kit can be purchased for less than the repair kit.

Fig. 092_17
An Installation Kit



Uncle Harry's
Trick of the Trade # 142

The first time you install a new icemaker, use the repair kit. This will acquaint you with the process. Save all the extra cables and read the book. From then on, only buy installation kits and adapt the new icemaker to fit. Save all the extra tubing and valves for future jobs.

In many cases it will be necessary to cut the feed cable and splice the old cable to the new icemaker. The wires are color coded the same way. Only the end fittings change over the years.

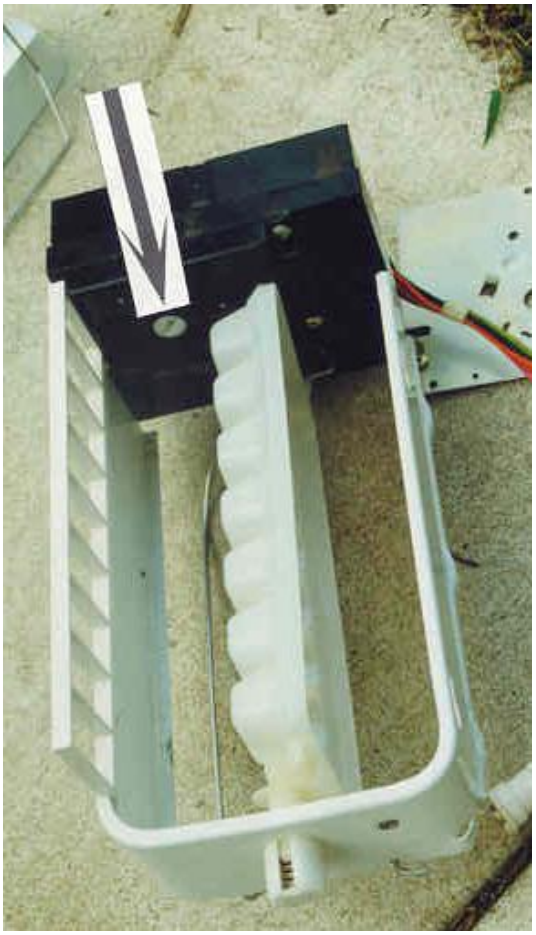
Icemaker installation kits come two ways, one to fit refrigerators with porcelain liners (part # 1129313) and two, those that have plastic liners (part # 1129316.)

The repair kit is part # 4317943.

The Whirlpool Twist Tray Icemaker

In the early 80's, the Whirlpool engineers came up with the bright idea of including the defrost clock within the icemaker. The icemaker that utilizes that fancy scheme has a completely different design. It looks very similar to a manual ice cube tray mounted on a rod.

Fig. 092_18
Whirlpool Twist-Tray



The ice cubes freeze in a plastic mold and resemble miniature pillows. When the cold thermostat is satisfied, it begins twisting the ice cube tray. It twists motor in a motion much like what you would do by hand. The tray twists and snaps out the cubes. It then winds back into its original horizontal position and refills.

On the Following Page is an Exploded View of a Twist-Tray

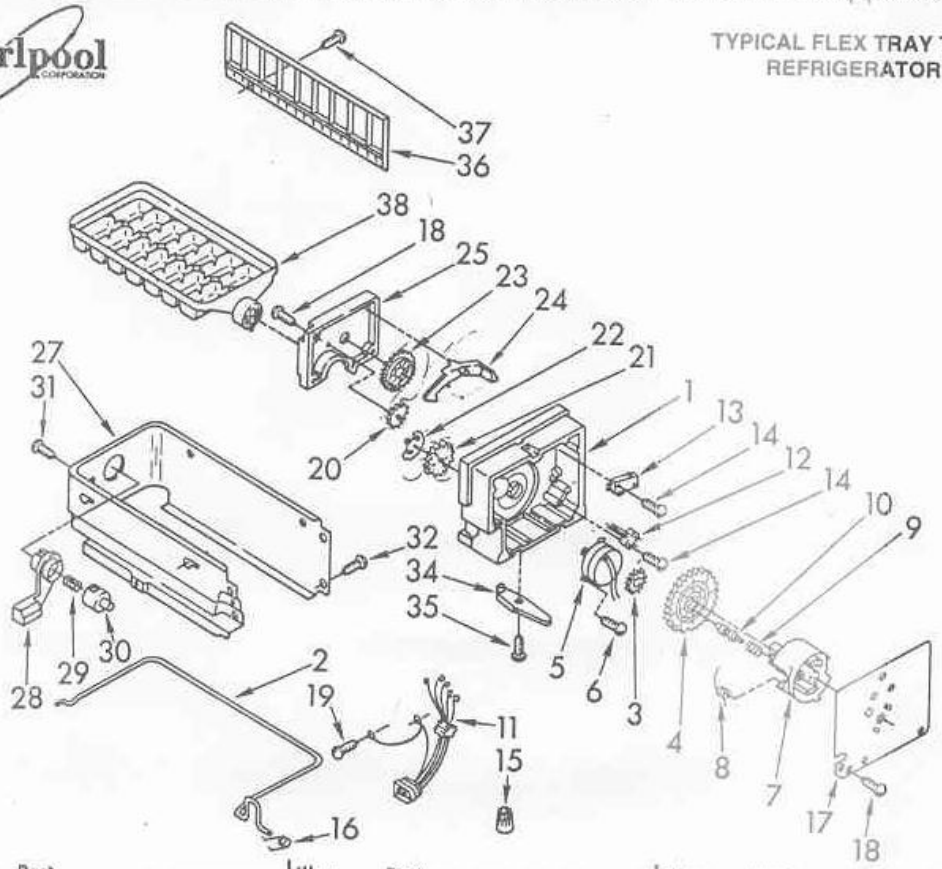
Fig. 092_19 | **Exploded View of a Twist-Tray**

WHIRLPOOL: Icemaker

SCHEMATIC **NOTE:** Please Supply Your Model Number for Each Appliance

Whirlpool

TYPICAL FLEX TRAY TYPE REFRIGERATOR



Illus. No.	Part No.	DESCRIPTION
1	627530	Housing, control
2	627617	Arm, shut-off
3		Gear, timer (Order gear kit 978138)
4		Gear, drive (Order gear kit 978138)
5	482763	Motor
6	488974	Screw, 6-20 x 3/8 (2)
7	482122	Cam kit
8	627507	Spring, cam
9	627508	Spring, drive pin
10	627509	Drive pin
11	627527	Wiring harness (Consult product parts list)
12	627511	Switch, water valve
13	627512	Switch, timer
14	488360	Screw, 4-24 x 3/4 (4)
15	227991	Connector, wire (2)
16	480855	Spring, shut-off arm
17	627513	Plate
18	482269	Screw, 8-18 x 5/8 (3)
19	487282	Screw, ground 8-32 x 1/4
20		Gear and pinion (Components of 978140 gear kit)
21		Gear (Components of 978140 gear kit)
22		Cam and pinion (Components of 978140 gear kit)
23		Gear and cam (Components of 978140 gear kit)
24		Lever, cam (Components of 978140 gear kit)
25	627519	Cover, gear
27	627538	Frame
28	627521	Bearing support and cam
29	627522	Spring, bearing
30	627523	Bearing
31	489031	Screw, 8-18 x 1/2
32	486210	Screw, 8-18 x 5/8 (4)
34	627524	Lever, shut-off
35	488787	Screw, 8-18 x 1/2
36	981270	Package guard
37	965173	Screw, 8-18 x 3/8
38	627711	Ice tray

Of course all of the valve and supply system lines are the same as already studied. However, diagnosis of the twist tray is slightly different from the comb design. In addition they have a few other problems.

First, they are inherently more complicated because the defrost timer is build into the unit.

As strange as it may sound, a frost-up problem caused by a bad defrost clock will require replacement of the icemaker.

Uncle Harry's
Trick of the Trade # 144

Whirlpool refrigerators with a twist-tray icemaker cannot be operated without an icemaker because the clock is inside. If you unplug the icemaker the refrigerator goes dead.

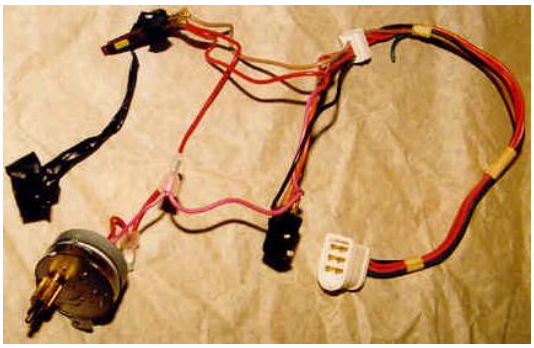
Gemline, an "after market" parts maker, once had a kit that replaced the twist tray with a comb type icemaker plus a separate defrost clock. But Gem is now gone and so are nearly all of these icemakers.

The easiest way to diagnose a twist tray icemaker is again with the homemade cord made up from a discarded icemaker. Disassemble an old icemaker leaving the open contact wafer switch and microswitch intact. Insulate the open wiring with tape.

The wafer switch can be used to operate the water valve like on other test cords. The microswitch can be operated to turn on and off the refrigerator compressor and defrost heater circuit like a defrost clock.

With this test cord each component can be checked to make sure that they are all functioning. By elimination you can determine that the fault is in the icemaker and not elsewhere.

Fig. 092_20
Twist-Tray Test Cord



There is an alternative way to cycle the unit. On the back of the black head unit is a large slotted white screw. Twisting the screw partway will begin the icemaker cycle. (Note the arrow on the picture on page #36.)

The twist tray model is getting rarer, as each year goes by. At present, they represent less than 5% of all Whirlpool icemakers.

Twist tray icemakers have another unusual flaw. As the mold ages, it loses its non-stick coating. In some cases, a cube will stick in the mold during the ejection process. If a stuck cube remains behind, the ice cube mold will overflow on the next fill cycle. This will result in ice cubes frozen together in the bottom of the bin. It is possible to replace the mold without replacing the entire icemaker. Molds on the twist trays pop right out and the new one can be popped right in.

The defrost clock inside the twist-tray is built into the gears of the icemaker. The icemaker motor runs continuously to operate the defrost mechanism. The tray twists only when the cold thermostat tells it to.

Uncle Harry's

Trick of the Trade # 145

It is possible for only the ice making section to fail and not stop the defrost section from working. In some cases the customer will ignore the bad icemaker and continue using the refrigerator. Eventually the rest of the icemaker will fail and frost will build up.

Like before, to diagnose the problem, manually operate the defrost heater with a test cord. If the heater works on the test cord replace the half-bad icemaker. It is now all bad.

The twist-tray replacement kit costs about twice as much as the regular icemaker. Be careful to price them before quoting a customer. The insides of a twist-tray are a nightmare of cogs and gears. If you take one apart, don't expect to be able to get it together again.

Uncle Harry's
Story Time

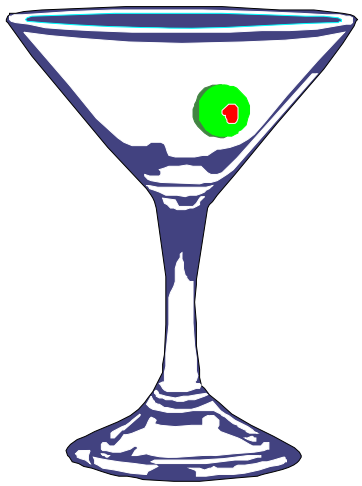
One time I had a service call on a twist tray icemaker in a big side-by-side refrigerator. The house was a well decorated, fairly new condominium in a well-to-do neighborhood. An elderly woman, living by herself, escorted me to the refrigerator and proceeded to describe the problem.

She launched into a dissertation on production of ice, various brands of icemakers, their shapes, sizes, advantages and disadvantages. She was as familiar with the various styles of making ice as I was. She claimed that certain cubes melted faster in the glass and that some provided more cooling than others. There was no doubt that she was very familiar with the use of ice cubes. I was a little bit surprised, but customers always entertain, so I passed it off.

The icemaker needed to be replaced. During the replacement, I had to open the refrigerator door. There were only a few items on the shelves. Taking up most of the main shelf in the refrigerator were a gallon of Smirnoff vodka and a gallon of Beefeater gin, both chilled and at the ready. Both showed evidence of considerable consumption.

I now knew the source of ice cube expertise on the part of my customer. I got several callbacks on the installation of that icemaker. I was unable to find any problems. I eventually determined that the customer was failing to fully close the freezer door.

Every time she left the door ajar, the ice production would drop to zero panic would set in and she would call me. I finally concluded that the consumption of that gin was the source of the problem not any error on my part.

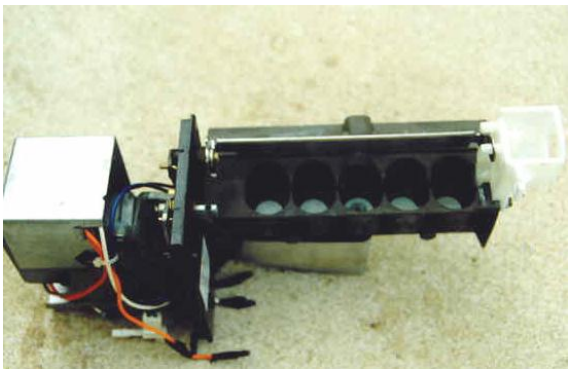


GE Pop-Up Icemakers

New GE refrigerators use the Whirlpool comb style icemaker that we've just studied. GE refrigerators built in the 70's and early 80's used a different design. The GE pop-up design makes cubes shaped like miniature trash cans lined up five in a row. The ice cubes are pushed up and out of the mold by a plunger and swept by an arm into the ice cube bin.

Few of these icemaker are still around as GE has gone to comb type.

Fig. 092_21
GE Pop-Up Icemaker



The GE icemaker has a cold thermostat, like the icemakers just studied, but it operates in a different way.

The sequence of operation

1. The ejection cycle begins when the cold thermostat is satisfied.

2. The mold heater and the icemaker motor come on. The drive motor starts to raise the of the plunger lever.

3, The plunger raises the ice cubes up to the top of the mold.

4. After the cubes get to the top of the plunger travel, the sweep arm snaps the cubes into the bin, returns to its original position.

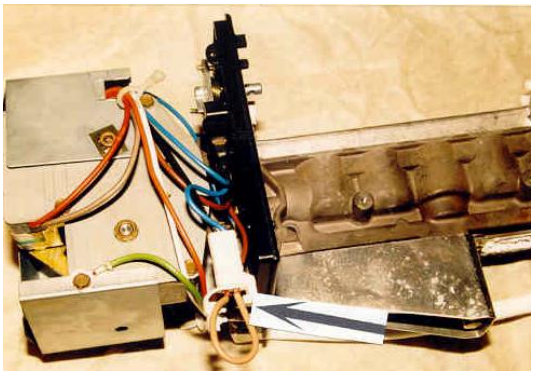
5. The plunger drops back down into the standby position.

6. The water valve is energized to refill the mold.

Cycling the GE Pop-Up Icemaker

On the bottom of the GE icemaker is a little rubber fitting covered by a little rubber fold-back cap. Folding back the little cap reveals two test points. Shorting these two test points together with a U-shaped jumper will bypass the thermostat and begin the ejection cycle.

Fig. 092_22
Using a Test Jumper to Cycle a G. E. Icemaker



The diagnostic logic for the GE Pop-Up icemaker is identical to that of the Whirlpool comb style. Eliminate the other possibilities by deduction and replace the icemaker.

Common Failures of GE Icemakers

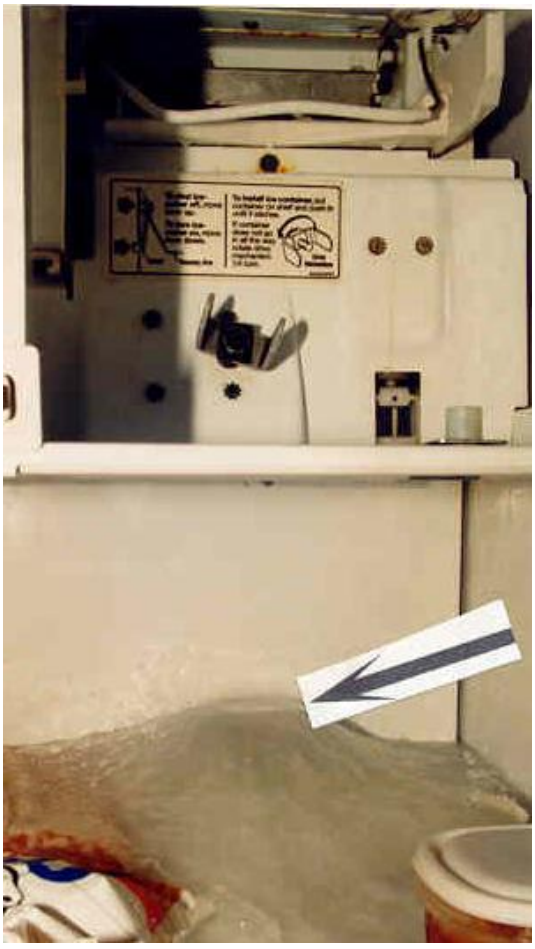
1. Leakage **through** the mold.

The plunger that ejects the cubes must slide up and down through a watertight seal in the bottom of the ice cube mold. The seal eventually fails, allowing water to drip through the mold. The water forms large upside down icicles in the icemaker bin.

The icemaker in the photograph is an unusual one. It is installed sideways in the back of a top freezer that has a dispenser.

Replacement requires removing the grinding motor and a special model icemaker.

Fig. 092_23
Mountain of Ice Under a GE Icemaker



Uncle Harry's
Trick of the Trade # 146

Although it might be tempting and kits are available to rebuild the mold, don't even think about it. Replace the icemaker. Reread the story about John Reese and the GE icemaker.

2. Wicking

As mentioned on Whirlpool icemakers, the GE is made of the same metal and it is also prone to wicking.

Uncle Harry's
Trick of the Trade # 147

If wicking is the problem, icicles will form in the **front** corner or in the **back** corner of the icemaker rather than in the **center**.

In either case, replace the icemaker. Unfortunately, the GE pop-up icemaker is twice as expensive as the popular comb type. *Uncle Harry* and others have experimented with replacing the old GE pop-up with the current and cheaper Whirlpool comb. It works fine, with one exception.

Many GE refrigerators come with the grinding chamber built in which dispenses ice cubes and crushed ice through the door. The ice cubes enter the crushing chamber through a cylinder. On the older models, the cylinder is tapered and occasionally a crescent-shaped cube will jam in the cylinder. The original round cubes will not jam.

On newer models, the diameter of the cylinder is uniform and it is less likely for the crescent cubes to jam. Experiments have been positive in using the crescent on the cylindrical tube models. GE factory representative's caution against doing so. Their only concern is occasional jamming. On a normal icemaker without the through-the-door dispensing system, replacing the cylindrical tube with a crescent cube style icemaker saves money and results in a more dependable service.

Uncle Harry's
Trick of the Trade # 148

Again, chop the connective wiring off a discarded GE icemaker and make up your own test cord for checking out the water valve system without pulling out the refrigerator.

Connect the white and brown wires together, ignoring the rest.

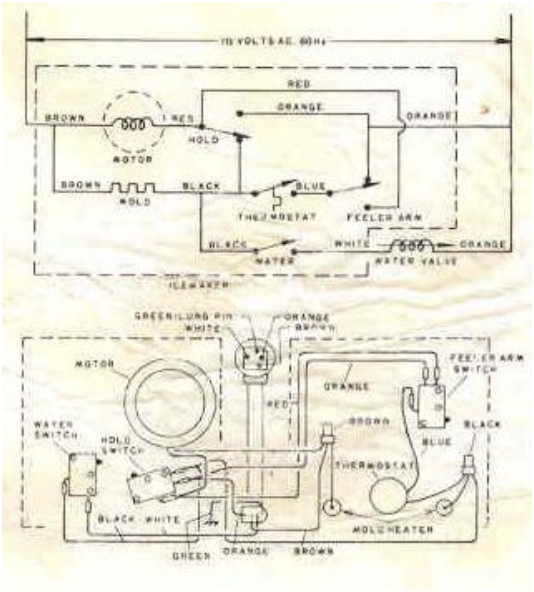
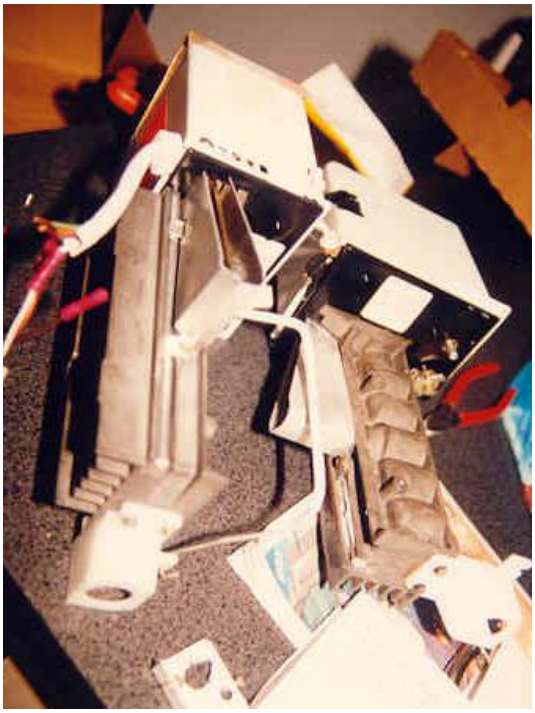


Fig. 092_24
GE Test Cord and Circuit Diagram

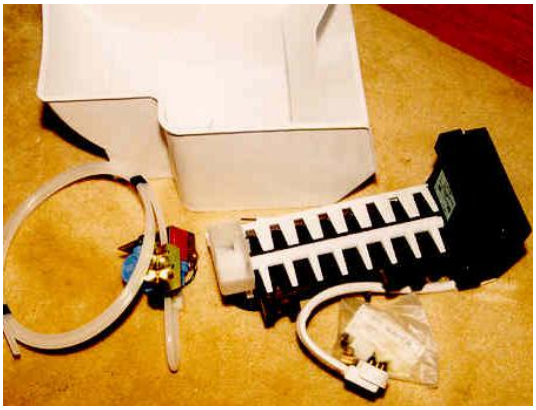
Replacing a GE Icemaker

The shut-off arm, clips and the mounting clips are reused when replacing a GE icemaker.
Fig. 092_25



A Modern GE Icemaker Installation Kit

Fig. 092_26



The new GE icemaker kit still includes the older brass end plate style icemaker. It is no longer brass color, but the design is the same.

The Amana Flex Tray Icemaker

The Amana Flex Tray operates in a method similar to the Whirlpool flex tray. However it does not have a defrost timer built into the head. Diagnosis is the same as are the problems.

The Amana flex tray comes in three separate pieces, the head assembly, the ice cube tray, and the shaft. The shaft is reused, but the head and the tray should be replaced as a set. The set is expensive like the GE Pop-Up Icemaker.

Of all the icemakers studied so far the Amana style creates the most callbacks and is the least dependable design.

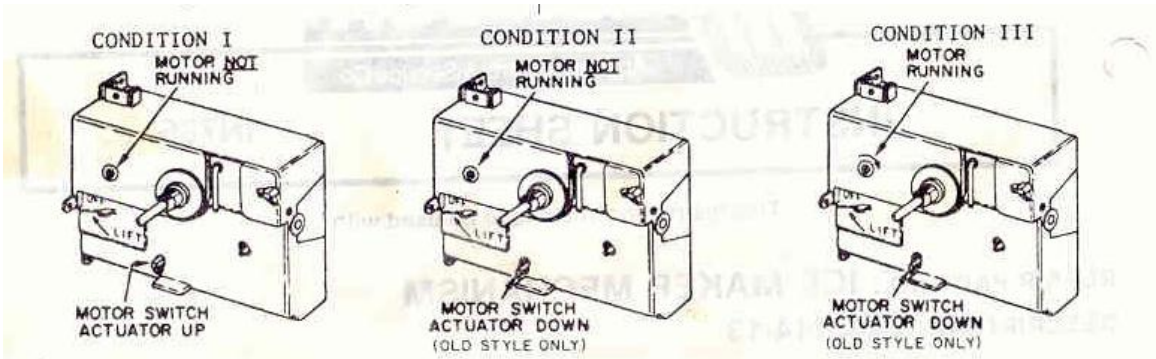
Fig. 092_27

The Amana Flex Tray Icemaker

Fig. 092_28

Cycling the Amana Flex Tray Icemaker

Following are instructions on cycling and testing the Amana Flex Tray.



CONDITION I

1. Pull motor switch actuator down. If motor runs, you may have a temperature problem.
2. Check the refrigerator for proper temperature. Freezer temperature must be below +15°F. for motor to start. For the best ice cube production, the freezer temperature should be below +5°F. If the temperature is proper, proceed to step 2 of CONDITION II.

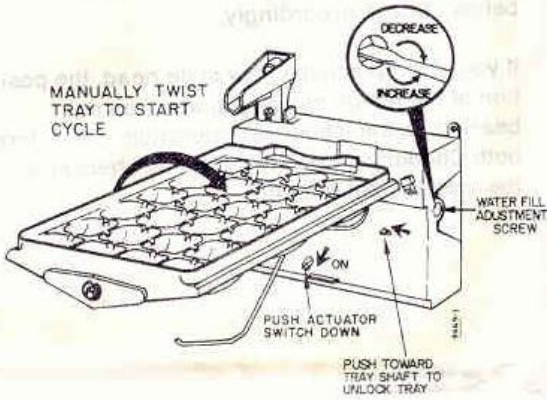
   If motor will not run with motor switch actuator down, see CONDITION II.

CONDITION II

1. Check for sensor arm in "off" position or storage pan full of ice.
2. Check wiring to head mechanism. Volt meter should read 110 v. across red and white leads.
3. If voltage checks okay, replace head mechanism.

CONDITION III

1. Manually cycle the ice maker (see illustration). Requires approximately 8 minutes.
   a. Push motor switch actuator down.
   b. Push tray lock toward tray shaft to unlock tray.
   c. Manually twist tray to start cycle.



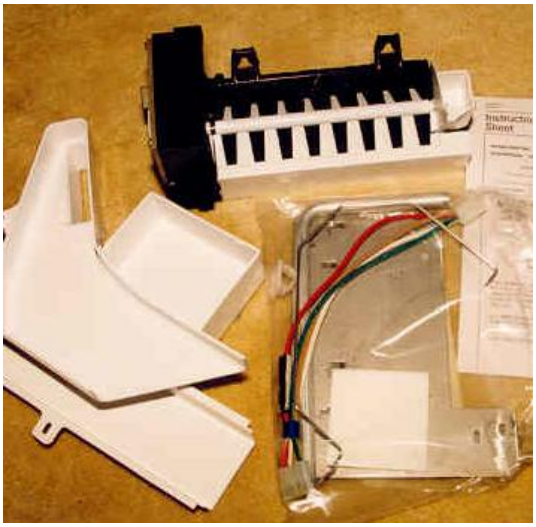
Uncle Harry's

Trick of the Trade # 149

Fortunately in 1996, Maytag came out with a crescent style icemaker kit (part #MHIK 7989) designed to replace the flex tray design. It's reasonably priced and is a major improvement over the old system. Use the new kit to update the old style.

Fig. 092_29

A Flex Tray Conversion Kit



Frigidaire Twist-Tray

For a number of years Frigidaire made a twist-tray icemaker similar to the Amana design. Fortunately, nearly are of them are on the junk pile.

Originally this unit was only available in pieces. It caused a great deal of lost hair for many servicemen. Today, it can be bought as a complete unit. It must replaced as unit much like all the others. It is unique in that it fills from the top.

Fig. 092_30

Frigidaire Icemaker

Note the regular ice cube tray beneath the broken icemaker

Under-the-Counter Icemakers

There are a number of under counter icemakers manufactured for use in bars, poolside houses and entertaining rooms in upper income homes. We will go over them to acquaint you with the style of operation. The following information is not intended to be all inclusive. Instead it is an overview.

Scotsman, Sub-Zero, Whirlpool, and U-Line all manufacture mini-refrigerators with icemakers inside. The U-Line and Sub-Zero utilize the crescent or comb type icemakers and are diagnosed exactly the same way.

However, in both cases, the manufacturers have made modifications in order to jam them into a very tight space. It's necessary to buy the icemaker units from those respective manufacturers rather than utilizing universal crescent icemakers.

One of the key problems is heat transfer. Special pastes are used to transfer the cooling from the freon to the mold. In order for the icemaker to work properly, it needs to be installed exactly as it was by the manufacturer. U-Line is a small off-brand company and troublesome to work on.

Uncle Harry's

Trick of the Trade # 150

Discourage service calls on U-Line refrigerators. You will never make any money on them. Advise the customer to buy a new one.

Whirlpool Free Standing Icemakers

The Whirlpool free-standing icemaker operates on a different principle. It utilizes what is called the "hot gas defrost system" to unmold the ice cubes. This defrost system was described back under refrigeration.

The icemaker includes a recirculating reservoir of water. The water level is controlled by a small float valve similar to the type used in a toilet tank. About a quart of water is allowed to accumulate in a small storage well.

The water from the well is sprayed by a pump up into an upside-down cold ice cube mold. The spray dribbles back into the well and recirculates. The mold is chilled by freon. Gradually the water freezes in the mold and forms an ice cube.

When the mold gets cold enough and the thermostat has been satisfied, the defrost cycle begins. Instead of using an electric heater, the unit uses the hot gas coming out of the freon compressor. The hot gas valve diverts the discharge side of the compressor into the evaporator bypassing the cooling effects of the condenser.

The hot freon melts the outside skin of the cubes and they fall out of the mold and bounce into the collection bin.

Problems with the Whirlpool Free-Standing Icemaker

Most of the problems with recirculating icemakers, Whirlpool included, center around the water system. They are:

1. Clogged spray orifices.

2. Clogged pump.

3. Corrosion in the water lines.

4. Corrosion in the float valve.

Problems of this type can be successfully tackled. Chemicals known as “descalers” can be run through recirculating icemakers to eliminate the scale that builds up over the years and diminishes the efficiency.

The Scotsman Icemaker

Scottsman primarily makes icemakers for commercial use. They are found in restaurants, nursing homes, and motels. Occasionally, you may encounter a small one built for households. Rube Goldberg collaborated with Scotsman's engineers in designing their icemaker.

The Scotsman design has been around for a long time and is similar to the Whirlpool recirculating cube maker. It also has a reservoir of water that recirculates over an evaporator.

Whirlpool uses the same system on some of their models

The Sequence of Operation

1. Instead of forming cubes in the evaporator, it forms a rectangular block of ice. The ice block gradually gets thicker and thicker, like a glacier, until finally, the cold thermostat is satisfied

2. The hot gas defrost cycle begins.

3 The water pump shuts off and the hot gas warms up the evaporator plate

4. The heat loosens the rectangular block that slides off evaporator, down a ramp, and across a wire grid. This is where Goldberg gets his hand in.

5. It ends up on a wire grid. The stainless steel wire grid is heated up and believe it or not, the ice block gradually melts through the grid, forming perfectly rectangular cubes

6. The neatly cut cubes fall into the ice bin.

In both the Whirlpool and the Scotsman, once the ice bin gets filled up to the point where the ice cubes touch a thermostat probe, the unit shuts down. It will stay off until either ice melts or is removed.

Of course, water will accumulate in the bottom of the bin. It must be disposed either by a gravity drain or by a pump system. Drain pumps are a common source of problems.

The most common complaint on the Scotsman centers around the melting grid.

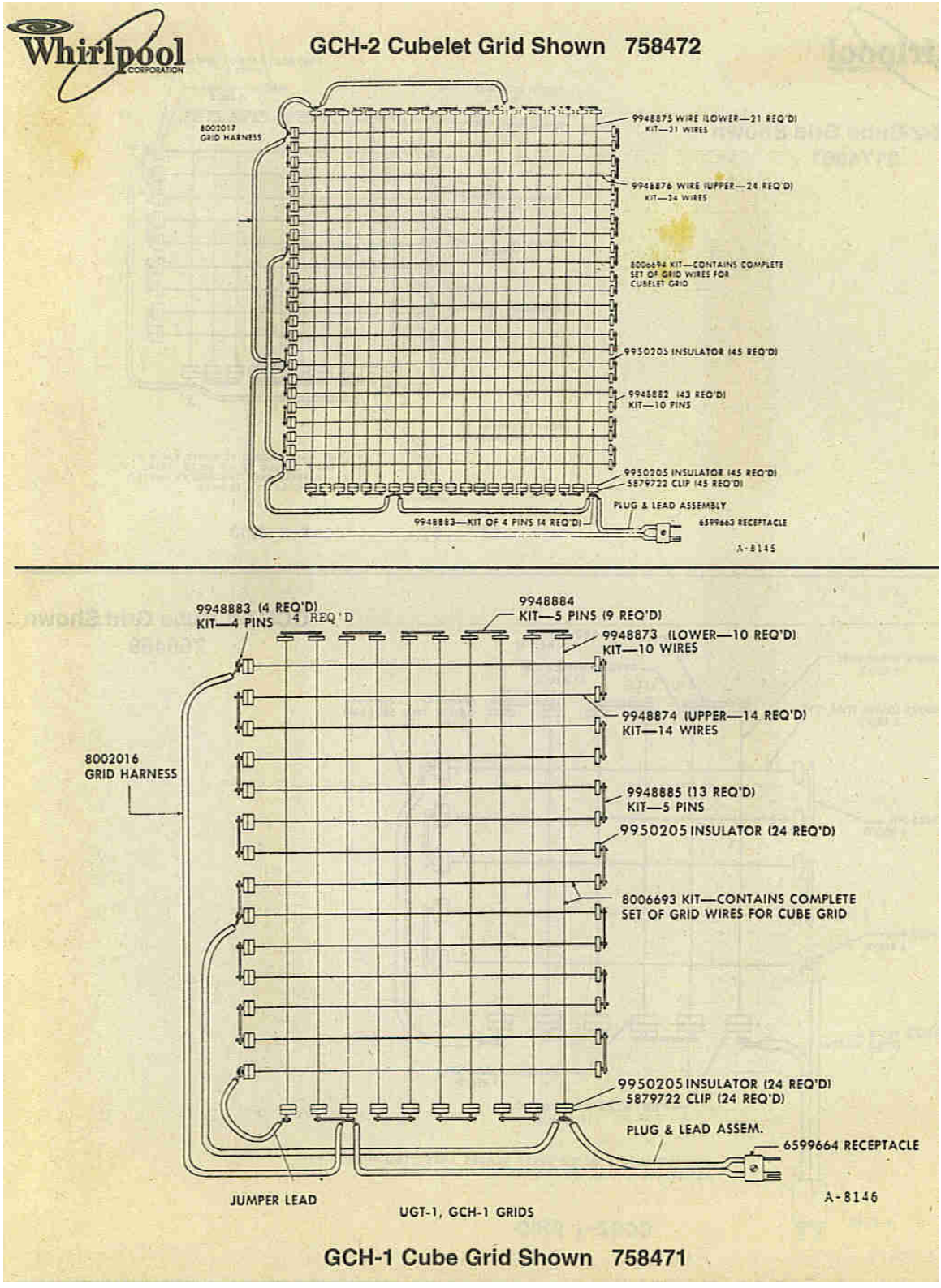
All of the refrigeration parts will work, but the grid will not melt the block. Ice blocks will jam up on the top of the grid and slowly melt through.

The grid is a low voltage device and it is prone to corrosion and poor conductivity. The cutting grid can be easily removed and carefully cleaned, checked with an ohmmeter and reinstalled and tested.

If necessary, the grid can be purchased or rebuilt with new parts. Freestanding icemakers cost between $700 and $1200 to replace. Customers are inclined to repair them if at all possible.

Fig. 092_31

A Whirlpool and Scotsman Grid Unit is shown on the following page



Icecube dispensing systems

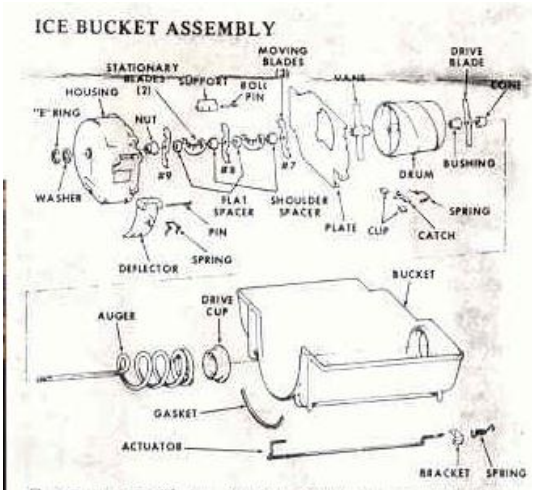
Through the 80's and into the 90's, Whirlpool, GE, and Amana began making through-the-door dispensing systems. These are more common on side-by-side models. The ice dispensing system is a simple worn gear or vaned drum that forces the ice into a grinding chamber.

On some models, when the drum rotates in one direction, the cubes fall out through a flapper in the door. When crush is elected, the rotation reverses and the cubes are forced through a series of stainless steel teeth and crushed.

The systems are reliable and seldom need more than flushing out with hot water to fix. Most of the time, homeowners are capable of keeping the grinding chamber in operation on their own.

Other models use a stainless steel corkscrew to move the cubes into the grinder**.**

Fig. 092_32
GE Grinding Chamber Exploded View



Components of ice bucket must be assembled as shown. Moving blades are stamped: "7", "8" and "9" and must be assembled on auger shaft with numbers facing out (toward front).

REPLACEMENT PARTS—CUSTOMER DISPENSER

Auger Motor	WR60X101
Drive Fork	WR2X4854
Drive Fork "J" Nut	WR1X1547
Solenoid	WR62X26
Auger Drum	WR17X1004
Freezer Door Interlock Switch	WR23X161
Cube Selector Switch	WR23X144
Time Delay	WR9X268
Lanyard	WR2X4237
Water Reservoir	WR17X1388

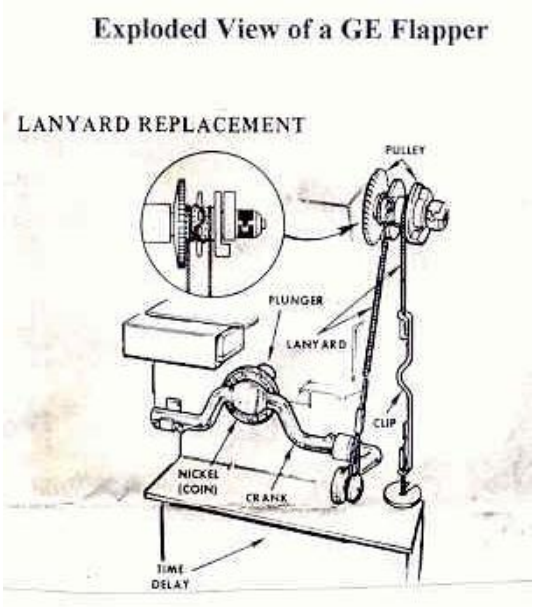
Uncle Harry's
Story Time

I once had a service call on a GE through-the-door ice dispenser. The refrigerator was about 8 years old and upon investigation, the grinding chamber teeth were worn out. The cylinder was cracked and all the pieces just appeared to be worn to a frazzle.

Never before had I seen such excessive wear on an ice cube dispenser. I showed the various worn out components to the customer and asked for an explanation of the excessive wear.

She and her husband had six boys between the ages of 7 and 18, and all were still living at home! Even the best design wears out with that type of use.

Fig. 092_33
Exploded View of a GE Flapper



Problems With the Flapper Assembly

The ice cubes drop through a trap door into the cup. The flapper door is the only seal between the outside air and the freezer air. It's very important that that door close properly or moisture will collect in the area around the flapper door. Eventually, it will freeze up the flapper mechanism.

GE Flapper System

GE, in particular, has had frost up problems associated with the dispenser system. If the flapper is jammed open or the seal wears out, moisture will build up in the door insulation. It is very difficult and time consuming to thaw out fiberglass. It is best to chop out the old insulation and replace it with new. Pack in as much as possible.

The inner access cover on the door is held on by plastic clips that are released from the top. Treat them gently, they are easy to break.

Cold Water Dispensers

Many in-the-door dispensers include a cold water supply. The water valve, instead of being a single coil, is a double coil. The second coil supplies water to a storage chamber in the back of the fresh food section. On demand, water flows out of the storage bladder, through the bottom of the refrigerator, up in the bottom of the door, through the door insulation, and into the cup.

Problems with the water dispenser system are usually in the plastic water lines. Wherever the water line passes near a hot area, it will deteriorate and crack.

GE has also had problems with freezing of the water line in the bottom of the refrigerator or freezer. GE provides a repair kit to replace the water feed line. The water line is special size, 5/16" plastic hose that's hard to find. The necessary parts can be found in a GE kit (part # WR 17x1483.)

Uncle Harry's
Trick of the Trade # 151

Amana icemakers with door dispensing systems include a "kill switch" built into the grinding motor box. It's necessary to either depress the switch or to install the grinding chamber in order to cycle the icemaker. Don't waste 1/2 hour, like I did, trying to figure out why an apparently good icemaker would not work. I finally realized that there was an enabling switch built into the side of the grinder motor.

Conclusion

We have now gone over every popular brand and nearly all of the oddball icemakers. We have also covered all of the supply system problems. All of their failure patterns have been reviewed. It is extremely unlikely for you to encounter any icemaker problem not covered in this lesson.

Icemakers are a challenge and a real money maker. There is satisfaction in fixing something as devious and subtle as an icemaker. They are one of the hardest appliance systems to correctly repair. Few customers have any conception of how difficult it is to properly fix an icemaker. Fortunately, you have the benefit of drawing on knowledge coming from years of experience.

By carefully studying this lesson, and after a few service calls, icemakers will be just as easy for you to repair as any other appliance.

Icemaker Flat Rates

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

Icemakers

1) Replace broken gear on crescent type	85.00
2) Replace Whirlpool icemaker (1129316, plastic liner)	225.00
3) Replace Whirlpool twist-tray (628384)	235.00
4) Replace GE pop-up (WR30X304)	245.00
5) Replace GE crescent style (IM2)	235.00
6) Replace Amana twist-tray with update (MHIK7989)	245.00
7) Install water line	129.00
8) Install customer's icemaker and water line	155.00
9) Replace water valve (single coil)	115.00
10)Replace water valve (double coil)	148.00
11)	
12)	

Examination

Manual 9

Icemakers

(Note: More than one answer maybe correct.)

1. Icemaker repairs are
A. usually obvious.
B. like refrigerators.
C. very subtle.
D. easy for homeowners.

2. Before your start any repair work on a icemaker
A. wash your hands.
B. take the temperatures.
C. pull out the refrigerator.
D. eat lunch.

3. Icemakers fail because of
A. freon leaks.
B. clogged water lines.
C. warm freezer temperatures.
D. improper voltage.

4. The icemaker unit is
A. usually repaired.
B. seldom repaired.
C. easy to repair.
D. a dog to repair.

5. A tap valve
A. is used in music.
B. bolts on a water line.
C. sometimes clogs.
D. supplies icemaker water.

6. Icemaker valves fail
A. from too much use.
B. when it's too cold in the freezer.
C. because of bad coils.
D. like washer valves

7. The icemaker spout
A. is trouble free.
B. freezes up.
C. cracks.
D. is sealed with putty.

8. A water valve can be tested
A. with a line cord.
B. with hot water.
C. with an amprobe
D. several ways.

9. Early icemaker designs were
A. unreliable.
B. excellent.
C. miserable to repair.
D. A & C.

10. The most popular icemaker today is a
A. twist tray type.
B. pop-up type.
C. Whirlpool comb type.
D. none of the above.

11. The comb of an icemaker
A. stalls at the frozen cubes.
B. sometimes jams.
C. often breaks.
D. A, B, & C.

12. The brass style icemaker
A. can be cycled with a jumper.
B. is cycled by twisting the comb.
C. can be repaired.
D. causes rust.

13. The modular icemaker
A. can be cycled with a jumper.
B. is cycled by twisting the comb.
C. can be repaired.
D. is a redesign of the brass style.

14. A broken gear on a brass icemaker
A. will require a new icemaker.
B. will not hurt anything.
C. can cause intermittent ice production.
D. can be replaced.

15. A worn ice cube flapper
A. can be tested with an ohmmeter.
B. can cause frost up in the door.
C. allows air to leak in.
D. means a new ice maker.

16. Wicking
A. causes leaks.
B. is used by candle makers.
C. comes from corrosion.
D. A, B, & C.

17. Icemaker test cords
A. are purchased by part number.
B. are made from old icemakers.
C. are used to check water valves.
D. are used to check icemakers.

18. The Whirlpool twist tray
A. was used in the 80's.
B. can be replaced with a comb type.
C. is cheap and simple to diagnose.
D. includes the defrost clock.

19. The GE pop-up icemaker
A. includes a defrost clock.
B. leaks through the center.
C. is cycled with a jumper.
D. A, B, & C.

20. The Amana flex-tray
A. can be replaced with a Maytag kit.
B. is unreliable.
C. is cycled by twisting the ice tray.
D. overflows because of stuck cubes.

Examination Answers

Manual 9

IceMakers

1. B or C. Icemaker repairs are subtle and difficult for homeowners to perform.

2. B. Icemakers will not function until the freezer is at the proper temperature.

3. A, B & C. A freon leak would cause warm temperatures stalling an icemaker's operation. Clogged water lines will restrict water flow to the icemaker and of course, warm freezer temperature is the same as a freon leak.

4. B & D. Only in special cases are icemaker units repaired.

5.A, B, C & D. A tap valve is used in music, although it has nothing to do with appliance repair. A tap valve bolts on the water line to supply icemaker and they can clog with debris.

6. C & D. Icemaker valves fail like washer water valves. They can have bad coils , seep or flood.

7. B C & D. The icemaker spout is a source of trouble. Water freezes in it, sometimes it cracks, and air leakage is minimized by refrigerator putty.

8. A & D. Water valves can be tested directly with a homemade line cord, by cycling the icemaker, or by using an icemaker test cord.

9. A, C & D. Early icemakers seldom held up for more than a few years and caused a lot of frustration for homeowners.

10. C. The Whirlpool comb-type icemaker is used in nearly all new refrigerators.

11. A & B. The icemaker comb stalls for a short time at the frozen cubes until the mold heater breaks the ice loose from the mold. A piece of ice caught in the comb can jam it.

12. B & C. Twisting the comb will cycle the brass style icemaker. A broken nylon end gear can easily be replaced.

13. A & C. The modular comb type icemaker is only cycled with a jumper and is usually replaced rather than repaired.

14. C & D.

15. B & C. The worn ice cube flapper built into the freezer door can cause frost in the door insulation from humid air that leaks in.

16. D. Wicking is the name for mold corrosion that causes water to leak over the top. Of course, wicking is used by candle makers also, but this has nothing to do with appliances.

17. B, C & D. A homemade test cord is used for quick tests of water valves and icemakers.

18. A, B & D. The Whirlpool twist tray is unique in that it includes a defrost clock. To replace it with a current comb type requires a special kit which wires in a new defrost clock.

19. B & C. GE pop-up icemakers leak through the center seal and are cycled with a jumper much like the current Whirlpool comb style icemaker.

20. A, B, C, D. A replacement Maytag coil type icemaker kit eliminates the older flex tray design. The older flex tray is expensive to replace, is unreliable, and is difficult to cycle manually. As the icemaker tray deteriorates and becomes sticky, cubes lodge in the mold. This can cause an overflow.