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Kitchen Appliances

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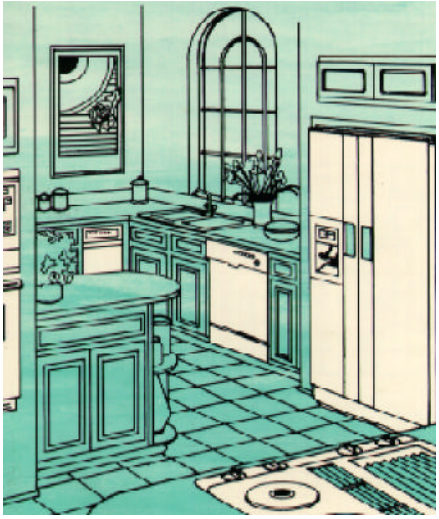

KITCHEN APPLIANCES

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Housing and Equipment Specialist

SHOPPING ENERGY $ENSE HI 18

A new kitchen appliance is a major investment, not only in the initial purchase cost but also in the use, care, energy consumption, and maintenance for the lifetime of the appliance.

Most major household appliances have a relatively long life expectancy. Therefore, a poor choice can be both irritating and costly, especially if the appliance must be replaced early because of high energy and repair costs or failure.

Most of today's appliances use less energy than those made just 10 years ago (see Figure 1). When comparing refrigerators from 1972 to 1984, an energy-efficient refrigerator can save, on the average, $47 per year in reduced energy costs. An energy-efficient dishwasher can save, on the average, $35 per year. Ranges are not required to have energy guide labels; therefore, their energy use has not been calculated.

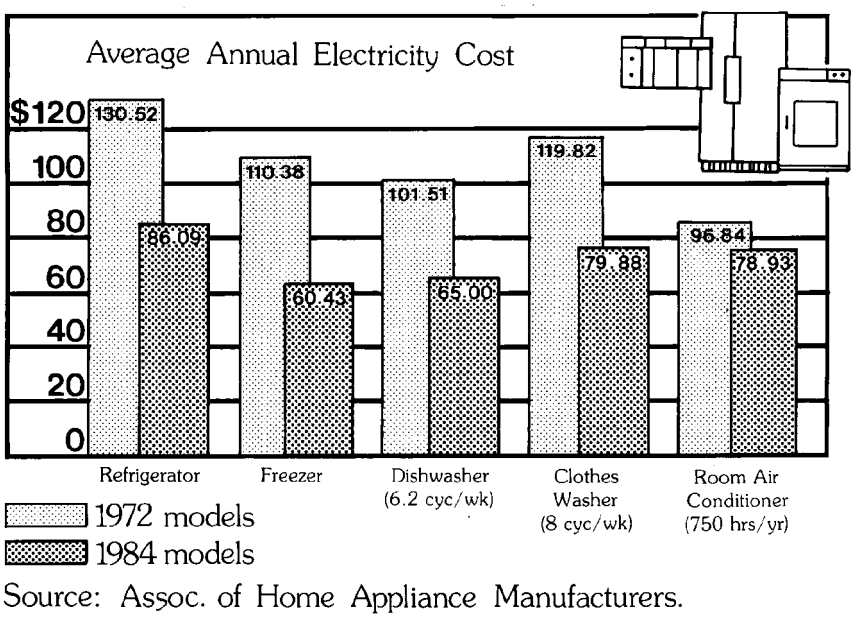

Figure 1. Energy Costs for Appliances.

Following are details about what is new in ranges, refrigerators, and dishwashers and how to evaluate their energy efficiency.

RANGES

The basic **free-standing range** is the most common type. It is self-contained, finished on both sides, sits on the floor, and is usually placed between two base cabinets or at the end of a line of cabinets. Some free-standing ranges have a second, smaller oven mounted above the cooking surface.

A variation of the free-standing style is the **slide-in range**, which is self-contained and rests on the floor. The sides are usually unfinished, but end panels are available when either side is visible.

A **drop-in range** is permanently installed flush with the base cabinets and is supported on a low cabinet base. A drop-in range is a good choice for an island design because it is flush with the surrounding counter and is built-in.

EXTERIOR FINISHES

Porcelain enamel is the material most frequently used for ranges because it is resistant to heat, acids, stains, and scratches and because its color will not fade or yellow with use.

Baked or synthetic enamel is a paint material applied at high temperatures. This finish resists knocks and blows better than porcelain enamel but cannot withstand abrasion. Enamel is usually less expensive and is considered less durable than porcelain enamel.

Stainless Steel is available in matte and glossy finishes. It is very durable, corrosion and stain-resistant, easy to clean; and does not dent easily, but it may discolor if overheated.

Chrome-plated surfaces will not chip, scratch, or dent easily. However, heat may cause chrome to discolor, turning it blue-brown over time.

Vitro-ceramic is a new material imported from West Germany. It is noted for ease of cleaning. This is not the same glass material that was previously used on ceramic cooking surfaces. The color does not yellow with time and it is easy to clean and maintain. Vitro-ceramic is used in the construction of several smooth-glass cooking surfaces.

OTHER FEATURES

Electronic controls are now found on ranges as well as cooktops and ovens. Electronic controls may increase the initial cost of an appliance, but they are a good investment because they offer more precision and reliability than mechanical controls.

Available on ranges are a variety of cooking **timers** that keep time from 5 minutes to 4 hours. They have reminder options, automatic shut-offs, buzzers or chimes, or warning lights to indicate completed cooking times. Timers help save energy because they prevent overcooking.

Many new ranges have **built-in venting**. A high-low range may have venting from the top oven, where air is vented through a wall. Other ranges may have down-draft systems that must be vented through floors or walls. A down-draft ventilation system is a good choice for an island or peninsula kitchen design because it eliminates the need for an overhead exhaust system.

NEW COOKING SYSTEMS

The **halogen cooking system** (see Figure 2) is one of the newest cooking units available. Its tungsten halogen lamps appear to produce virtually instantaneous heat and light. The halogen unit surface is made of vitro-ceramic. This new, smooth surface is also used for some of the induction cooking systems.

The **induction cooking system** (see Figure 3) is quite new to many consumers. It is fast, safe, and energy efficient. Target temperatures can be instantly achieved and very low temperatures can be easily maintained to eliminate burning.

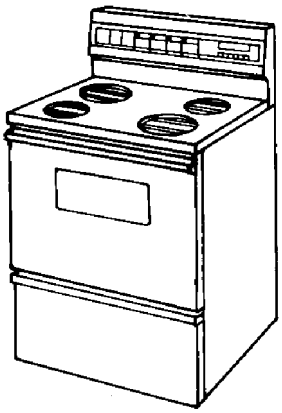

Figure 2. Halogen Cooking System.

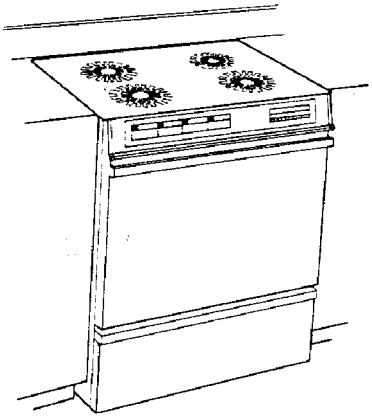

Figure 3. Induction Cooking System.

The cooking surface stays cool, so less heat escapes into the kitchen. Only the cookware, which must be magnetic, and the food get hot--not the entire cooking surface.

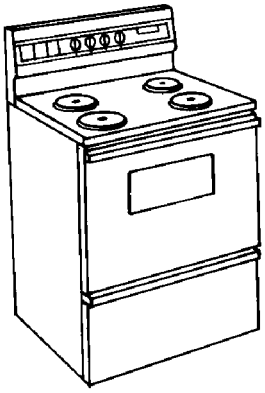

Figure 4. Solid Disk Cooking System.

The **solid-disk cooking system** (see Figure 4) is somewhat new in this country and currently very popular. European design, ease of cleaning, and evenness of cooking are some of the reasons for its popularity. The disk requires frequent application of a special cleaning treatment (provided with the range) to keep it looking new. Since the solid disk is made of cast iron, it is slow to heat-up, cooks evenly, and retains heat well. Energy can be saved by turning the element off and using the retained heat to complete cooking.

The **convertible cooking system** (see Figure 5) ranges can be custom designed simply by unplugging a module and plugging in a different one. There are modules for induction, halogen, solid-disk, conventional-coil, and glass ceramic cooking. Extra modules are also available for deep-fat frying, griddling, grilling, barbecuing, and wok cooking. Convertible cooking surfaces work well in open kitchen areas because an overhead exhaust unit is not needed due to the presence of down-draft ventilation systems.

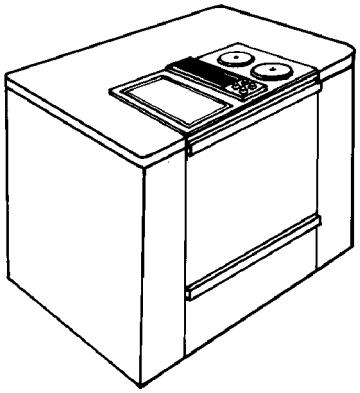

Figure 5. Gas Cooking System.

Pilotless gas ranges (see Figure 6) are relatively new. Elimination of the continually burning pilot light results in big energy savings. It also keeps the kitchen cooler.

The new gas ranges are easier to clean. On many of the new gas ranges, the top lifts up or off so burners can be easily removed and cleaned. In addition, the knobs, burner bowls, and cookware supports can be easily removed for cleaning.

Some of the newest gas ranges have sealed burners. Food particles cannot collect underneath the burners so spills are easy to clean.

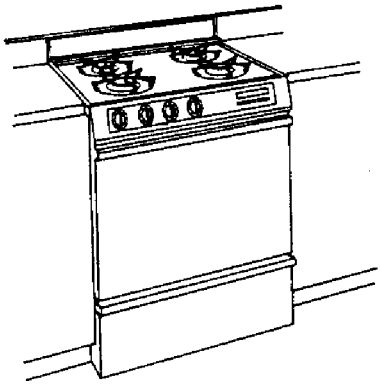

Figure 6. Convertible Cooking System.

OVENS

An **oven window and light** make it easy to check the progress of baking items without opening the door. Opening the door wastes energy and can effect baking results. Some oven windows have three panes of heat-resistant glass with air trapped between each pane which minimizes heat loss through the window.

However, a window is a convenience only if the consumer can see through it clearly. Factors affecting visibility are the color of the glass, the brightness of the oven light, and the coarseness of the screening that is often used to reinforce the glass.

A proper **seal** is vital to keeping heat inside the oven for efficient operation and excellent baking results. A silicone rubber seal can withstand very high temperatures, thus has a long life. Strong springs are important to hold the oven door tight against the seal.

One of the newest features found in ovens is **convection cooking.** It is available in portable, full-size, free-standing, and built-in wall ovens. In convection ovens, a fan blows the heated air over and around food, increasing the rate of moisture evaporation and thus decreasing cooking time (see Figure 7).

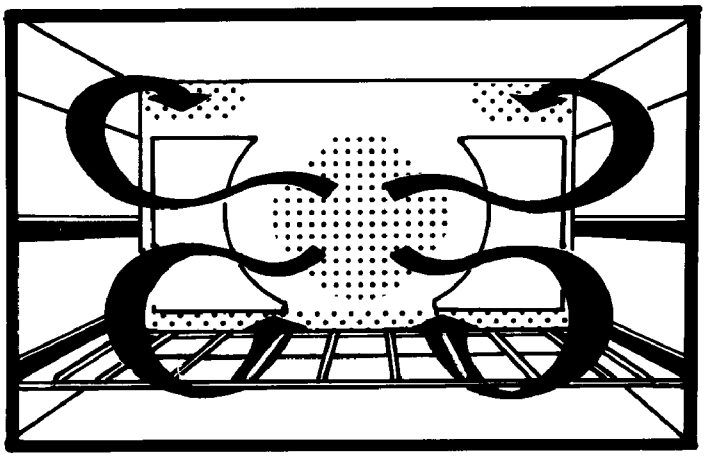

Figure 7. Convection Oven Air Movement.

The oven temperature can be reduced 25 to 50 degrees when cooking with convection because of the air circulation and more even cooking. Shorter cooking times and lower temperatures add up to important energy and dollar savings. Because convection ovens use forced-air for cooking, noise level is a consideration. It should be low enough to not be irritating.

Some manufacturers are making **combination ovens** as an option to conventional gas or electric ovens. These combination ovens allow microwave-convection, microwave-conventional, or convection-conventional cooking in a single large oven. The consumer can cook with either method or combine them for faster cooking. Some combination ovens can reduce cooking time by one-third.

AUTOMATIC OVEN CLEANING

Self-cleaning (pyrolytic) is the true self-cleaning system. It uses high heat during a special one to three-hour cycle to decompose food soil and grease. During the cycle, which is clock controlled, the oven door is latched and locked. The door cannot be opened until the oven cools.

When self-cleaning ovens were first introduced, consumers were concerned about how much energy they might use in the cleaning cycle. The new self-cleaning ovens, gas and electric, are sealed tighter and have more insulation than conventional and continuous-cleaning ovens (see Figure 8).

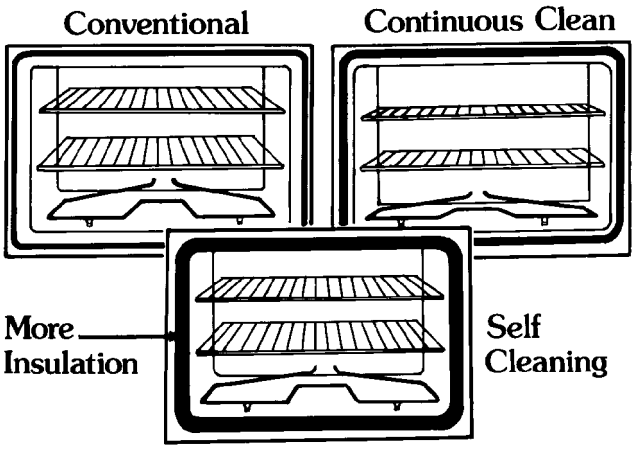

Figure 8. Ovens.

They actually save enough energy during normal baking to clean the oven six times a year, which is more than most consumers clean. It actually costs less to operate and clean a self-cleaning oven than to operate and buy cleaning solutions for a regular oven.

Continuous cleaning (catalytic) uses a porous coating on the oven walls that partially absorbs and disperses the food soil and grease. This cleaning process takes place during normal baking and keeps the oven presentably clean, but the racks and door parts must be cleaned by hand. This special oven coating cannot be cleaned with soap, detergent, or commercial oven cleaners without causing permanent damage. In addition, the continuous cleaning oven does not look as clean as the self-cleaning oven.

ENERGY EFFICIENCY OF RANGES

Some cooking surfaces are more energy efficient than others. Manufacturers report that the induction and halogen cooking systems save time and energy and the solid disk and glass-ceramic cooking systems use more energy and take longer to heat.

Most of the energy used in a typical oven is not absorbed by the food. It is absorbed by the oven mass, lost through the walls, or through the vent. Therefore, a smaller oven with better and more insulation, a tight oven door seal, strong door springs, and improved latches will save energy. In addition, combination and convection ovens reduce cooking time and usually operate at lower temperatures than conventional ovens.

In the early 1970s, the federal government decided that some appliances were about as energy efficient as the industry could make them, so ranges and electric dryers were exempted from energy-guide labeling. Today, however, there has been renewed discussion of requiring energy-guide labels on ranges because of the new developments and technologies in the industry.

QUESTIONS TO ASK ABOUT RANGES

1. What finishes are used on the cooking surface and the sides of the range? How durable are the finishes?

2. What type of cooking element is on the range?
3. How does the cooking system compare to other systems in speed of heating, heat retention, and energy use?
4. What are the extra features and what do they do?
5. What type of venting system is used or needed?
6. What type of cookware is needed?
7. How is the oven cleaned? Self-cleaning? Continuous-cleaning? Manual-cleaning?
8. What energy-conserving and quality features are found in the oven?
9. Does the range have a combination convection-conventional, microwave-conventional, or microwave-convection oven?

REFRIGERATORS

There are many options to choose from when shopping for a new refrigerator. Choices include a variety of models and styles that have new convenience and energy-saving features.

Before purchasing a refrigerator, it is a good idea to measure the space available for the new refrigerator as well as door and hallway clearances. These measurements can be compared to the refrigerator's outside dimensions to make sure it will fit into the kitchen.

When deciding what size of refrigerator to purchase, a rule-of-thumb is a minimum of 12 cubic feet for the first two persons in the household, plus 2 more cubic feet for each additional person.

NEW MODELS

The newest **side-by-side refrigerators** are the three-door models (see Figure 9). Some have upper freezers that allow easy access to frequently used items with a minimal loss of cold air as well as lower freezers for long-term frozen food storage.

For families that require a lot of refrigerator space, there are the **separate refrigerator and freezer units** designed to be used together (see Figure 9). These units can be as large as 30 cubic feet each.

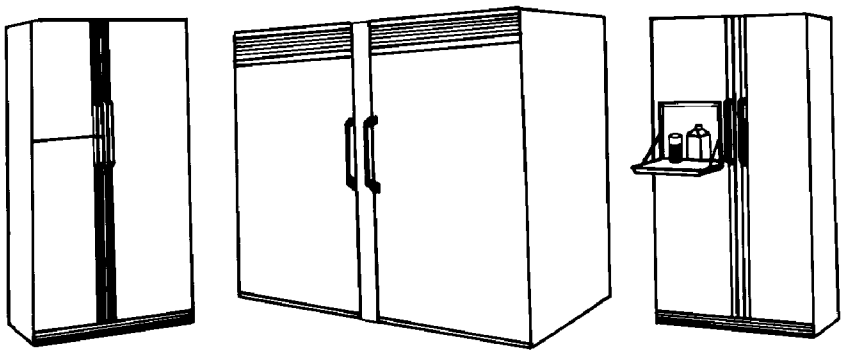

Figure 9. Side-by-side Refrigerator, Separate Refrigerator and Freezer Units, and Pull-Down Door Refrigerator.

Built-in refrigerators and freezers are made to be flush with surrounding cabinets. To create the built-in look, custom panels can be placed on doors to match cabinets. Unlike top-mounted refrigerator/freezer models, which are about 30 inches deep, built-ins are only 24 inches deep. Some of the built-in refrigerator/freezers are taller, as much as 19 inches higher than top-mounted refrigerator/freezers, and they are 5 inches wider.

Pull-down door or access door models have small doors in the refrigerator that allow access to shelves inside the refrigerator. Frequently used items can be stored on those shelves and energy can be saved by opening only the small doors rather than the full refrigerator doors (see Figure 9).

DEFROST SYSTEMS

With **manual-defrost systems**, the removal of frost and condensation from both the fresh food and freezer compartments are entirely manual.

In **partial automatic or cycle defrost systems**, only the fresh food compartment is defrosted automatically. The freezer compartment must be emptied and manually defrosted.

In **automatic or no-frost systems**, frost is removed automatically in both the refrigerator and freezer compartments.

NEW FEATURES

Through-the-door dispensers dispense ice and water through the door of the freezer compartment (see Figure 10). Although these dispensers reduce door-storage space, they also eliminate the need to open the refrigerator and/or freezer door every time ice or water is desired. The refrigerator must be plumbed to get a water supply, which is an additional installation cost.

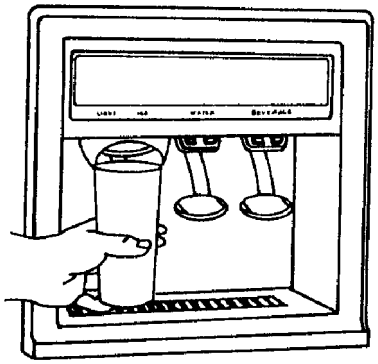

Figure 10. Through-the-door Dispensers.

Adjustable shelves give the consumer flexibility in food storage. Shelves come in traditional open-wire or in tempered glass. Tempered glass shelves prevent spills from reaching the foods below.

Glide-out rollers allow the consumer to clean behind and under the refrigerator (see Figure 11). With glide-out rollers, one person can easily move a refrigerator away from the wall.

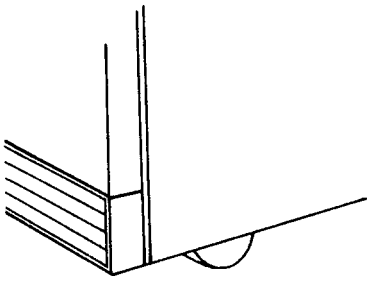

Figure 11. Glice-out Rollers.

Condenser-coils can be mounted on the front bottom, back bottom, the entire back, or the top of the refrigerator. If the condenser coils are mounted on the bottom front of the refrigerator, they are easy to clean but collect a lot of dust. Coils mounted on the bottom back of the refrigerator can be cleaned by moving the refrigerator out from the wall. These types of coil systems generally require less cleaning because they collect less dust. Frequent cleaning is important because dust acts as an insulator, thus increasing energy use.

Condenser coils mounted on the top of the refrigerator are more energy efficient because the heated air escapes into the room rather than heating the refrigerator. Because hot air rises, bottom-mounted condenser coils heat up the refrigerator body, even though a fan blows heated air out in front of the refrigerator.

Another important feature is a **reversible door**, which allows the consumer to choose the direction the door opens. On some refrigerators, an indication of a reversible door is a button on the top side of the refrigerator.

Before buying a new refrigerator, check kitchen layout to determine if the door should open to the left or the right. Not all models have reversible doors and if the door opens on the wrong side, the door is often left open longer and cold air escapes.

Decorative exterior panels allow buyers to fit the appliance into a color scheme and decorating theme. These panels are easy to mount on the refrigerator front and can be easily changed depending on color scheme.

Adjustable **short-stop hinges** prevent the refrigerator door from opening too wide and cold air from escaping. Short-stop hinges can also be used to prevent damage to adjacent cabinets or walls from the refrigerator door.

Some refrigerators are made the **same depth as standard kitchen cabinets**, which means that they do not jut out into the kitchen like other refrigerators (see Figure 12).

A **tight door gasket** keeps cold air in and warm air and moisture out. Some refrigerators have strong magnets on all four sides of the door to prevent air leakage and to keep the door shut tighter. One way to check the door seal is to notice the resistance when the door is opened. The more difficult it is to open the door, the tighter the door seal.

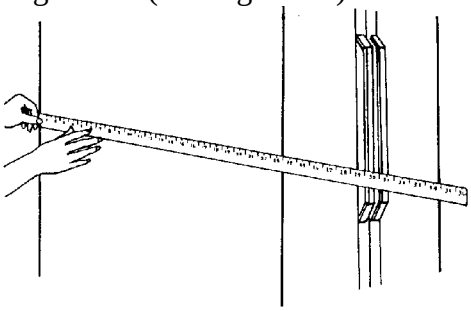

Figure 12. Refrigerator Same Depth as Kitchen Cabinets.

New refrigerators have **improved insulation** in their walls and doors, which lowers heat absorption from the room and reduces operating time and energy consumption. Look for extra-thick foam insulation, up to 2.7 inches in the freezer compartment, up to 2.2 inches in the fresh-food compartment, and up to 1.5 inches in the door. For the same thickness, urethane foam is twice as efficient as fiberglass.

Many of the new refrigerators have **automatic ice makers**. These are either factory-installed or available as an optional kit for later installation. Automatic ice makers increase energy costs by as much as 300 kwh per year, or about $21 a year at .07 cents per kwh. The refrigerator must be plumbed to a water line, which is an additional installation cost.

Adjustable food storage controls allow the consumer to change the temperature and/or humidity of the different compartments for such foods as fresh vegetables, fruits, puddings, meats, and cheeses.

An **energy saver switch** located inside the refrigerator can be shut off when humidity is low, thus saving energy (see Figure 13). When activated, heaters reduce moisture condensation, particularly around the freezer door, where moist air meets cold surfaces. If used continuously, the energy-saver option actually adds to energy consumption; therefore, it should be turned on only when moisture condensation is high.

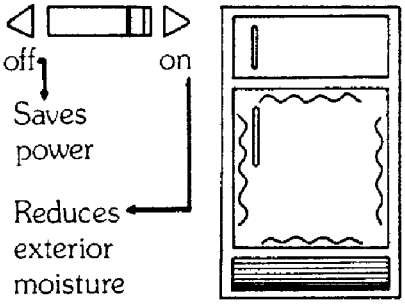

Figure 13. Energy Saver Switch.

New refrigerators have more efficient compressors that make more **noise** and run longer, but use less energy. Frequent running provides more stable temperatures within refrigerator and freezer compartments. While high-speed-motor compressors do not make more noise, they generally have a higher-pitched sound level. Some of the sound comes from fans that distribute cold air through the interior and cool the compressor motor. An ice maker can also increase noise from the refrigerator as it fills with water or drops frozen cubes into the bin. Timers, temperature controls, and coils may produce faint clicks, gurgles, or pops. These are all normal sounds in new refrigerators.

Electronic controls generally increase the cost of a refrigerator but they do offer some new features. With the touch of a finger, electronic controls can make more ice and change temperatures (see Figure 14).

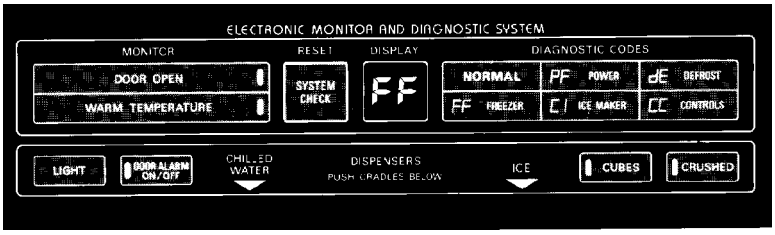

Figure 14. Electronic Controls.

Some electronic controls have **diagnostic features** that continuously monitor and report on the refrigerator's performance. Lighted symbols and sound signals inform the owner about correct operation or problems such as the door being left open or power being turned off.

ENERGY EFFICIENCY OF REFRIGERATORS

The efficiency of a refrigerator is an important consideration because it uses more energy than any other appliance in the kitchen. The total cost of a refrigerator is a combination of the purchase price and what it costs to operate and maintain over its lifetime. High-efficiency models may carry a higher price tag but they may pay for themselves with lower operating costs. Operating costs depend on the efficiency of the condenser and motor, the type and amount of insulation, additional design features, and the daily use of the refrigerator such as the number of door openings per month. Larger models and those with ice makers generally use more electricity. Models with automatic defrost systems use more electricity than those with partial or manual defrost. A manual defrost unit can use considerable energy if frost is allowed to build up over 1/4 inch.

The bright-yellow energy guide labels displayed on the fronts of appliances in stores can be helpful when comparing energy costs of different refrigerators (see Figure 15).

The label will give the certified cubic foot volume, average annual energy consumption in kilowatt hours, and average annual cost of operation in dollars and cents. The costs vary from model to model along with the capacities, freezer sizes, temperature settings, and type of defrost systems. Make sure to compare units of the same size and with the same features.

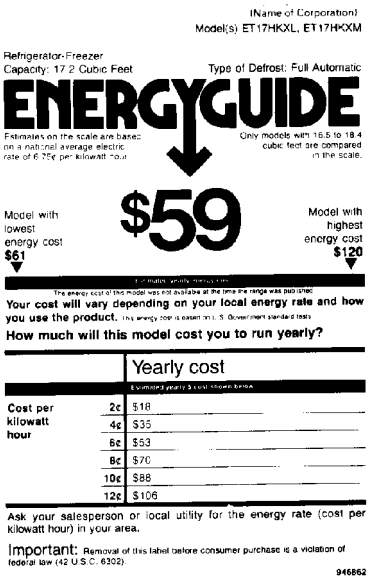

Figure 15. Energy Guide Label.

QUESTIONS TO ASK ABOUT REFRIGERATORS

1. What are the disadvantages and advantages of the different styles and models of refrigerators?

2. What defrost system is used?
3. Is the door reversible?
4. Are the shelves adjustable?
5. Does the refrigerator have glide-out rollers for easy movement?
6. What energy-savings features are included? Added insulation? Tight door seal? Energy-saver switch?
7. If the refrigerator has an automatic ice maker, how much will it cost to operate per year?
8. How accessible are the condenser coils to clean?
9. What are the extra features and what do they do?

DISHWASHERS

In today's kitchens, an automatic dishwasher is no longer a luxury. Automatic dishwashers use less water and sanitize dishes far better than hand washing.

MODELS

The **built-in** models are designed to fit into a 24-inch-wide space between cabinets and underneath the countertop. A few small-capacity models fit into an 18-inch space. Built-ins can be finished or paneled to match kitchen cabinets.

The **convertible-portable** models are essentially the same size as built-ins but have finished sides and tops, drain and fill hoses with a faucet connector, and casters for easy rolling to the sink. They are designed for families who move often or cannot remodel to include a built-in dishwasher. An advantage of the convertible-portable dishwashers is that they can be installed later as built-ins if desired.

The **under-sink** model is designed to save space in smaller kitchens. It fits under a specially designed sink or under a special double sink with a disposer under the second bowl (see Figure 16).

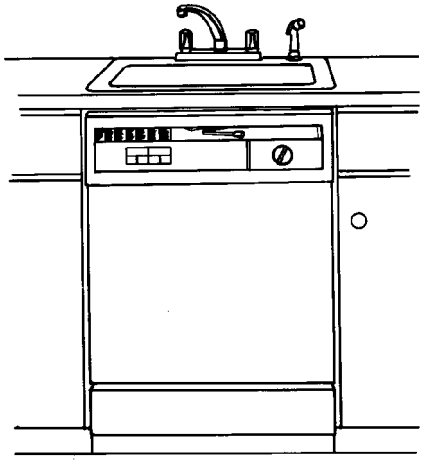

Figure 16. Under-sink Dishwasher.

CONTROLS

A new feature found in dishwashers is **electronic touch controls** (see Figure 17). Touch controls offer options previously unavailable, such as delay-start and diagnostic features. The delay-start option allows the dishwashing cycle to begin anywhere from 10 minutes to 9 hours after programming. With this feature owners can take advantage of off-peak electric rates, run the dishwasher when there isn't a high demand for hot water or simply when it is most convenient. The diagnostic feature allows a service technician to instantly check various functions of the dishwasher's operation. This feature can

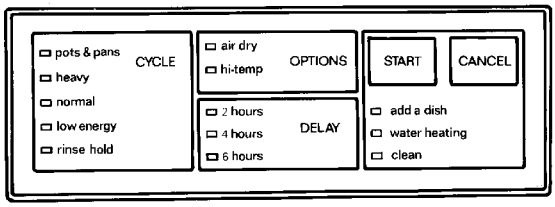

Figure 17. Electronic Touch Controls.

shorten service time and prevent repair errors. Some models even indicate the relative energy level used by each cycle and also display alert messages.

WASHING OPTIONS

Washing options may include a low-energy option for moderate to lightly soiled loads, a regular wash for normal loads, a rinse-and-hold wash option, a china-crystal option, and a pots-and-pans option. The rinse-and-hold option rinses the dishes off after each partial loading and then holds until a full load is collected. The china-crystal option is usually shorter than the regular wash and may have reduced spray force. The pots-and-pans option is for heavily-soiled dishes, pots, pans, and utensils.

Cycle times and water consumption vary considerably among different makes and models of dishwashers. Cycle times and water consumption can be checked by asking to see a machine's specification sheet, the instruction manual, or the model's use-and-care booklet. A normal or heavy duty cycle, including drying, can run anywhere from an hour to an hour and a-half. Short cycles vary from 35 minutes to more than an hour. Water consumption varies as well. For some machines, the water usage is from 8 to 14 gallons depending on the cycle, on others from 6 to 11 gallons.

To improve washing action and reduce hot-water usage, spray arms and nozzles have been added in a variety of locations (see Figure 18). More water sources mean better water distribution. The sizes and number of holes in spray arms are a good indication of a dishwasher's cleaning efficiency. Small holes create more vigorous washing action to remove stubborn food deposits. Holes that are closer to the size of a toothpick rather than the size of a pencil will produce better washing action.

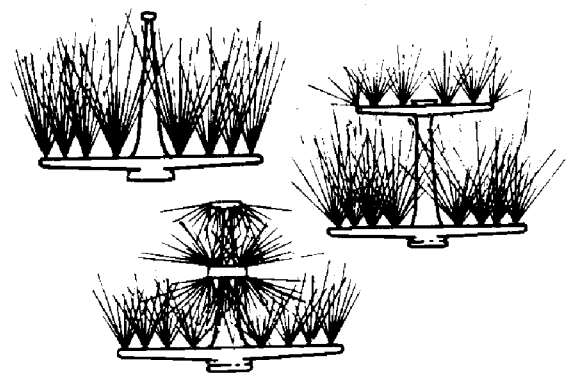

Figure 18. Water Spray Actions in Three Dishwashers.

A good **water filtering system** will trap the smallest food particles and prevents them from recirculating with the water and redepositing on dishes. Self-cleaning filters eliminate the need to remove the filter from the dishwasher for cleaning. Three different filtering systems used in dishwashers are the strainer,flusher, and small disposal systems (see Figure 19).

The strainer system works by collecting food particles so they are not redeposited onto the dishes. The flusher system works by flushing water and food particles down the drain. The disposal system is designed to collect food particles, grind them up, then flush them down the drain.

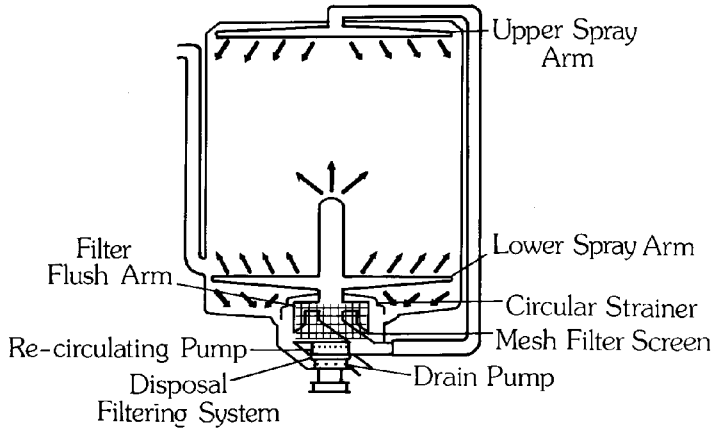

Figure 19. Dishwasher Filtering System.

WATER HEATING OPTIONS

A **water temperature booster** checks the temperature of the incoming water and heats the water to the desired temperature. If the water is not hot enough (less than 140 degrees F) it is heated automatically to provide good washing results. A temperature of 140 degrees F is needed to dissolve dishwashing detergents and to provide effective cleaning. The water temperature booster feature is especially important if a household often runs out of hot water or if the water heater is set at a low temperature to save energy.

A **sanitary cycle** has a built-in heating element that maintains or increases the temperature of the water used in washing, during the last rinse, or both. In addition, the drying temperature may be increased. In some models, the rinse or drying temperature reaches 180 degrees F, which is recommended for sanitizing by the U. S. Public Health Service. The sanitary cycle can be effective in reducing or preventing illness in the home because high temperatures kill disease-carrying organisms.

DRYING OPTIONS

After the final rinse, the dishes are dried by either radiant heat or forced air. With the forced-air system, heated air is circulated through the dishwasher by a fan. With the radiant-convection system, a heating element is used to dry dishes. To conserve electricity, the consumer should select a dishwasher with an “Energy Saver” setting that allows dishes to air dry without the use of the heating element.

RACKING CAPACITY

Most new dishwashers have more racking capacity. The purpose of racking is to separate dishes and hold them securely so they receive the maximum exposure to water action. Load the dishwasher according to instructions. Not all dishwashers should be loaded the same.

Adjustable upper racks can be raised or lowered on one or both sides to accommodate tall items above or bulky items below. There are also **flip-down racks** that provide an extra level for cups and oblong items. They fold back, out of the way, to make room for larger items.

Some dishwashers have **racks with high sides** to stabilize dinner plates and other large items. Shoppers with unusual-sized dishes will find it helpful to shop with “plate in hand.”

Some models have a **silverware basket** that slides into the door. This allows for more interior loading space.

ADDITIONAL FEATURES

Built-in dishwashers often come with **color panels** that permit changing the color of the dishwasher for decorating flexibility.

Dishwashers also come with different types of **tubs and door liners**. Tubs and door liners are generally made of porcelain enamel, stainless steel, or molded plastic. Stainless steel is the most expensive of the three, followed by porcelain enamel and molded plastic.

The hot, alkaline dish washing solution necessitates a tough tub lining in dishwashers. Purchase a finish that resists chipping, cracking, or peeling.

Some new dishwashers also have **more insulation** to reduce heat loss and cut down on noise while running.

ENERGY EFFICIENCY OF DISHWASHERS

New dishwashers are 54 percent more energy-efficient than the older models (see Figure 20). Energy savings are achieved because cycles use less hot water, less energy, and require less time to complete the washing action.

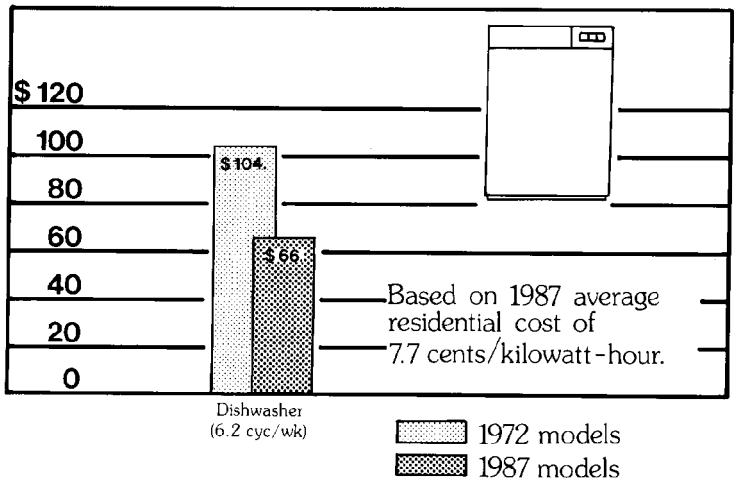

Figure 20. Energy Costs for Dishwashers.

The consumer needs to carefully compare the energy-cost estimates on dishwashers energy guide labels. (See Figure 21.) Energy guide labels will provide the approximate annual operating cost based on the number of loads washed per week and the local utility rates for gas and electricity for heating water. These figures are based on specific-use cycles established as a standard test for all dishwashers. Check the actual capacity and features, as these vary from model to model. The more energy-efficient models have higher price tags, but the money saved on the electric bill may make it economical as a long-range investment.

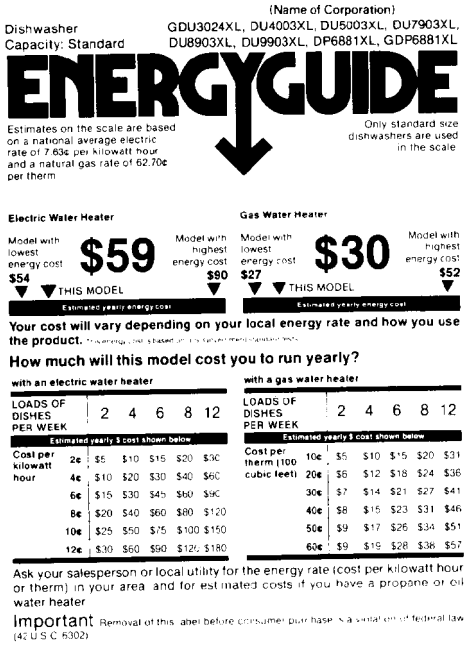

Figure 21. Energy Guide Label.

QUESTIONS TO ASK ABOUT DISHWASHERS

1. What finishes are used on the outside and inside of the dishwasher? How durable are the finishes?
2. Does the dishwasher have additional insulation to reduce operating noise?
3. What are the washing and drying options?
4. How much water do the washing and rinsing options use?

5. How long do the washing and rinsing cycles run?
6. Does the dishwasher have features that save energy and water, such as delay-start or air-dry option?
7. Is there a light to indicate when the dishwasher is in operation?
8. Does the dishwasher have an automatic rinse dispenser?
9. What type of and how efficient is the filtering system?
10. Does the dishwasher have a temperature booster or sanitizing cycle?
11. Are the racks designed to be flexible and easy to load? Ask the salesperson for drawings of how racks should be loaded.
12. Will the bottom rack hold tall items?
13. What are the features that increase storage capacity, such as movable racks?
14. Does the dishwasher have additional spray arms to ensure thorough washing of dishes?
15. Does the dishwasher have a garbage disposal in the filtering system?

WARRANTIES

Keep warranty contracts and sales slips for all appliances for future reference. Insist that the sales slip fully describe the product and any terms of the sale. Record the date of purchase, model, and serial number. Also, record in detail any service or repair work done after purchase.

QUESTIONS TO ASK ABOUT WARRANTIES

1. Does the warranty cover the entire product? Only certain parts? Is labor included?
2. Who is responsible for repairing the product? The dealer? A service agency? The manufacturer?
3. Who pays for what under the warranty? Parts? Labor? Shipping charges? Travel charges?
4. How long is the warranty on the entire appliance? On individual parts or assemblies?
5. If the product is out of use because of a service problem, or if it has to be removed from the home for repair, will a substitute product or service be provided? By whom?
6. Does the manufacturer have a do-it-yourself repair program and toll-free information number?

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