

A *dishwasher* is a mechanical device for cleaning dishware and cutlery. Unlike manual dishwashing, which relies largely on physical scrubbing to remove soiling, the mechanical dishwasher cleans by spraying hot water, typically between 45 and 75°C (110 and 170°F), at the dishes, with lower temperatures used for delicate items.

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DEFINITION

Define the term "dishwasher"

A **dishwasher** is a mechanical device for cleaning dishware and cutlery. Unlike manual dishwashing, which relies largely on physical scrubbing to remove soiling, the mechanical dishwasher cleans by spraying hot water, typically between 45 and 75°C (110 and 170°F), at the dishes, with lower temperatures used for delicate items. A mix of water and dishwasher detergent is pumped to one or more rotating spray arms, which blast the dishes with the cleaning mixture. Once the wash is finished, the water is drained, more hot water is pumped in and a rinse cycle begins. After the rinse cycle finishes and the water is drained, the dishes are dried using one of several drying methods. Typically a rinse aid is used to eliminate water spots for streak-free

dishes and glassware resulting from hard water or other reasons.

In addition to domestic units, industrial dishwashers are available for use in commercial establishments such as hotels and restaurants, where a large number of dishes must be cleaned. Washing is conducted with temperatures of 65–71°C (149–160°F) and sanitation is achieved by either the use of a booster heater that will provide a 82°C (180°F) “final rinse” temperature or through the use of a chemical sanitizer.

BEFORE INVENTION

History

The major obstacle to washing dishes has always been the availability of water. Early civilizations used limited numbers and types of dishes, utensils, and cookware and carried them to streams, ponds, or troughs of water for cleaning. The second choice was to carry the water to the dishes. Women carried water in buckets from communal water sources or from private pumps behind their homes or apartment buildings into the early twentieth century, when indoor plumbing finally brought water indoors, not only for bathing but for kitchen use as well.

Go to page 8 for more about Joel Houghton

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More on Josephine Cochrane on page 13

The first mechanical dishwashing device was registered in 1850 in the United States by Joel Houghton for a hand-powered wood device. This device was

made of wood and was cranked by hand while water sprayed onto the dishes. This device was both slow and unreliable. Another patent was granted to L.A. Alexander in 1865 that was similar to the first but featured a hand-cranked rack system. Neither device was practical or widely accepted.

Subsequently another hand-powered dishwasher was invented in 1887 by Josephine Cochrane with the help of George Butters in Josephine’s tool shed in Shelbyville, Tennessee and was unveiled at the 1893 World’s Fair in Chicago, Illinois under the name of Lavadora but was changed to Lavaplatos as another machine invented in 1858 already held that name. This machine is what everyone now knows as the washing machine. Cochrane’s

Advertisement
of "The Faultless Quaker"



inspiration was her frustration at the damage to her good china that occurred when her servants handled it during cleaning.

Europe's first domestic dishwasher with an electric motor was invented and manufactured by Miele in 1929.

In the United Kingdom, William Howard Livens invented a small, non-electric dishwasher suitable for domestic use in 1924. It was the first dishwasher that incorporated most of the design elements that are featured in the models of today; it included a front door for loading, a wire rack to hold the dirty crockery and a rotating sprayer. Drying elements were even added to his design in 1940. It was the first machine suitable for domestic use, and it came at a time when permanent plumbing

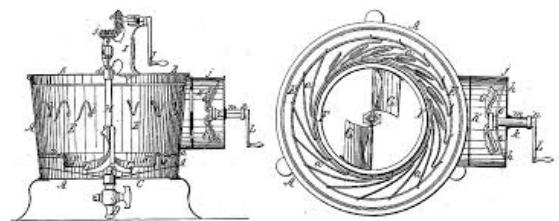
and running water in the house was becoming increasingly common.

Despite this, Liven's design did not become a commercial success, and dishwashers were only successfully sold as domestic utilities in the postwar boom of the 1950s, albeit only to the wealthy. Initially dishwashers were sold as standalone or portable devices, but with the development of the wall-to-wall countertop and standardized height cabinets, dishwashers began to be marketed with standardized sizes and shapes, integrated underneath the kitchen countertop as a modular unit with other kitchen appliances.

By the 1970s dishwashers had become commonplace in domestic residences in North America and Western Europe. By 2012, over 75

percent of homes in the United States and Germany had dishwashers.

In the 2010s manufacturers routinely offered various new energy conservation features in dishwashers. One feature was use of "soil sensors", which was a computerized tool in the dishwasher which measured food particles coming from dishes. When the dishwasher had cleaned the dishes to the point of not releasing more food particles, then the soil sensor would report the dishes being cleaned. The sensor operated with another innovation of using variable washing time. If dishes were especially dirty, then the dishwasher would run for a longer time than if the sensor detected them to be clean. In this way, the dishwasher saves energy and water by only being in operation for as long as needed.



A diagram
of the first
dishwasher
system

Joel Houghton

"Be it known that I, Joel Houghton, of Ogden in the county, of Monroe and State of New York, have invented a new and useful Machine for Cleaning Table Furniture; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked there on. The nature of my invention consists in placing the crockery or other articles of table furniture in a machine fitted to receive them, and then to wash them, by turning a shaft with arms and buckets so arranged as to throw the water upon the crockery with force, and thus acting upon and cleansing each and every article.

To enable others skilled in the art to make and

use my invention, I will proceed to describe its construction and its operation.

I construct a cylindrical vessel, metallic or of wood, such as A B C D E F. One side of this cylinder - say one-fourth - as at A C E F, is left open from near the top to the bottom. From the sides A C and E F of this opening are pieces running back far enough to form the ends of a curb, (shown by the red lines a a'), with a piece a a' fastened to and connecting these sides. This curb resembles that of a fanning-mill and contains within a horizontal wheel with two dippers or buckets b b. The shaft c passes through the sides of the curb and is supported by the uprights G G' of the frame. At one end of this shaft is a crank d, by which the wheel is turned. This shaft c may

be placed at right angles to the direction of the machine, or at an acute angle, as in the shaft c'. (Represented by dotted lines in the drawing.) The bottom of the machine slants or inclines downward toward the outer end of the curb, so as to give the water a tendency in that direction to be taken up by the buckets and thrown forward into the cylinder and also to draw the water off when necessary through a hole in the bottom of the curb.

Inside the cylinder A B C D E F is a vertical shaft H, resting on the center in a socket on the bottom, and which passes up through and above the top or cover of the cylinder. Through the top of this shaft is a hole f, through which a pin is passed, by means of which I give it a rotary motion. Connected with this shaft is a cylindri-

cal rack or crib g, and which is supported by the shaft. The diameter of the crib is so much less than that of the cylinder as to allow it to revolve freely within it. From near the middle of the shaft, also attached to it, are other wires i, which converge toward and are fastened to the lower and outer rim of the rack g. Their inclination from the center of the shaft downward and outward is about thirty degrees. On the bottom of the rack a hoop is placed on edge about midway between the shaft and the outer rim of the rack. The upper edge of this hoop is notched, so as to hold a plate or dish in place when put into the rack. The bottom of the cylinder A B C D E F being inclined toward the rim, in order to tend , the water in that direction, the machine is placed in a frame,

so as to raise that end which is farthest from the wheel as that the top or cover of the cylinder will lie horizontal.

In order to show the operation, I have substituted for the cover in the drawing a cross-piece K', to support the vertical shaft in position. Dishes and other articles of table furniture are placed within the rack g upon the conical rack in any position in which they can empty themselves, and so that their surfaces will be exposed to the direction of the buckets b in the revolution of the rack. Boiling water is poured into the machine and the top put on. The rack or crib containing things to be washed is gently made to revolve by giving a rotary motion to be shaft H. At the same time the crank is turned when water is taken up by the

buckets and thrown into the rack upon the surfaces of its contents, and this continued until they are thoroughly washed. After standing a few minutes they become dry, are taken out, and are ready for use without wiping and have a bright surface. When the horizontal shaft c is inclined, as c', the force of the water as thrown from the buckets will cause the rack g to revolve without other action on it.

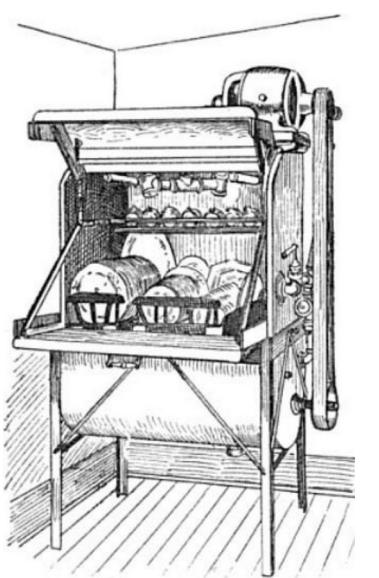
What I claim as my invention, and desire to secure by Letters Patent is -The construction of a cylinder with a cylindrical rack supported by an upright shaft resting upon and being within and supported by the cylinder, the rack having within it a conical rack and hoop to receive and hold table furniture, in combination with a curb containing a horizon-

tal wheel with buckets to throw water upon the cylindrical rack, the whole supported by a frame, and by these mechanical means cleansing the surface of table furniture without the use of hands, the entire machine being arranged, combined, and operated substantially as is herein fully set forth."

L.A Alexander

L.A Alexander

Then, in the 1860s, L.A. Alexander improved the device with a geared mechanism that allowed the user to spin racked dishes through a tub of water. Neither of these devices was particularly effective.



A sketch of
Josephine
Cochrane's
dishwasher
invention

Joesphine Cochrane

A portrait of
Josephine
Cochrane



Josephine Cochrane

Josephine Garis
Cochrane invented the first workable dishwasher. An attempt had been made before her, by a man, but it didn't work and never got off the ground.

She was born Josephine Garis in Ashtabula County, Ohio on 8 March 1839 and raised in Valparaiso, Indiana. Her father, John Garis, was an engineer from Chicago who had invented a hydraulic pump for draining marshes. Her mother was Irene Fitch, who died while Josephine was young. Her great-grandfather (not her grandfather, as some sources report) was John Fitch, who obtained a US patent for a steamboat design in 1791 (note: this was not, as some sources report erroneously, the first patent for

a steamboat design in the world, or even just in America.) Her father John Garis sent her to a private high school in Indiana. When the private school got burnt down, he sent her to live with his sister in Shelbyville, Illinois and continue her education there, where she completed high school and graduated.

At the age of 19, Josephine was married on 13 October 1858 to William A. Cochran (1831 - 1883), who was 27 at the time. He was a merchant and a county clerk for sixteen years, a Free Mason and a member of various Democratic Party committees. From 1853 to 1857, William had been in California trying to strike it rich in the Gold Rush, but didn't. He'd returned back to Shelbyville and started a dry-goods store. The couple had one son, Hallie, who died at the

age of two. Josephine and her husband were founding members of the Unitarian Church at Shelbyville (called "First Congregational" back then.) In 1870, they moved into a large home, where Josephine was able to entertain in style, which she did frequently.

Her husband died when she was 44 in 1883. After William died, she changed the spelling of her last name to Cochrane (with an "e" at the end.) It was shortly after that, while still 44, that she invented the dishwasher. She was driven both by an idea and the need for money: William had left her with a lot of debt, and only \$1,535.59 in assets. And, the story goes, while she was tired of her servants chipping her heirloom china while washing it, she didn't want to wash it herself.

On paper, she came up with a design that had you put your dishes into wire compartments, then place the compartments into a wheel cage that you lowered down into a copper tub. A motor (powered by hand) pumped first jets of hot soapy water and later hot clean water over the dishes. The dishes would be left to dry from their own heat in the device, and then be ready to put away, or use again straight from the device.

The first few men she tried to hire to put her design into reality insisted on mucking with her design, and the results didn't work. Finally, she hired a man named George Butters. His full-time job was as a mechanic for the Illinois Central Railroad. Working part-time with her in her back shed, he implemented

her design and fitted the finished machine into her kitchen for her.



The design that George Butters helped Cochrane build.

She applied for a US patent, which she received on 28 December 1886, obtaining US patent #355,139. An earlier, unsuccessful dish-washing machine had been patented, in 1850, by a Joel Houghton. It was made of wood, and hand-cranked, and just ineffectually splashed water on the dishes. Consequently, the introduction to her patent application reads that her machine is an improvement: "Be it known that I, JOSEPHINE G. COCHRAN, a citizen of the United States, residing at Shelbyville, in the county of Shelby and State of Illinois, have invented a new and useful Improvement in Dish-Washing Machines, of which the following is a specification. My invention relates to an improvement in

machines for washing dishes, in which a continuous stream of either soap-suds or clear hot water is supplied to a crate holding the racks or cages containing the dishes while the crate is rotated so as to bring the greater portion thereof under the action of the water."

Josephine named her company Garis-Cochran, after her dad and her husband, and contracted Tait Manufacturing in Decatur, Illinois to make the first dishwashers for her, with the process being managed by Butters.

In 1897, business was enough to outgrow the contracted factory and necessitate her opening her own in an abandoned schoolhouse with 3 employees overseen by Butters. She renamed the company to "Cochran's

Crescent Washing Machine Company," and got many Shelbyville residents to invest in it.

She said the hardest part of getting established was going to hotels by herself to do the sales pitches. In those days, women did not go to hotels unless accompanied by a man. Josephine displayed and demonstrated the machine herself at the Columbian Exposition in Chicago in 1893, where it was a hit and won top prize. She also sold nine of them on the spot to people who were running kitchens at the Exposition.

Her next model was motorized; it pumped the water itself, and moved the rack back and forth. She registered this one for an American patent in 1900. A subsequent model had the racks revolve,

and drained itself via a hose into the sink.

Sales were mainly to restaurants and to hotels, but not to homes, owing to the price of \$150. A few things had to change before it could break into households. In the early 1900s, most households didn't have large enough hot water tanks to supply a dishwasher, and many women actually enjoyed socializing with each other after a meal in the kitchen without the men while doing dishes.

She managed her company until she died of a stroke in on 3 August 1913 in Chicago. She was buried in Graceland Cemetery in Shelbyville, Illinois. The rights to her dishwashing machine company were bought out by the Hobart Company in 1916; Hobart later renamed itself to KitchenAid.

George
Butters

George Butters

George Butters, a local mechanic employed by the Illinois Central Railroad, to work part time helping her bring her designs to fruition in a shed behind her home. They constructed the first dishwashing machine, patented on 28 December 1886 and installed in Cochrane's kitchen.

William
Howard
Livens

William Howard Livens

William Howard Livens DSO MC (28 March 1889 – 1 February 1964) was an engineer, a soldier in the British Army and an inventor particularly known for the design of chemical warfare and flame warfare weapons. Resourceful and clever, Livens' successful creations were characterized by being very practical and easy to produce in large numbers. In an obituary, Sir Harold Hartley said "Livens combined great energy and enterprise with a flair for seeing simple solutions and inventive genius."

Livens is best known for inventing the Livens Projector, a simple mortar-like weapon that could throw large drums filled with inflammable or toxic chemicals. In World War I, the Livens Projector became the

standard means of delivering gas attacks and it remained in the arsenal of the British army until the early years of the Second World War.

In 1924, Livens invented a small dishwasher suitable for use in a domestic setting. It had all the features of a modern dishwasher, including a front door for loading, a wire rack to hold crockery and a rotating sprayer. According to family tradition Livens built a prototype for the benefit of the family. When it was tried out by their maid servant, she was later found in tears with water flooding across the floor; at that point the experiment was abandoned.



A portrait of William Howard Livens

Users operate dishwashers by scraping food from dirty dishes, loading them into the dishwasher racks, adding dishwasher detergent, turning on the device, then removing the clean dishes.

Dishwasher use starts with installation as an appliance. Most home users fix their dishwashers in one place, such as under a countertop. The user scrapes dishes clean, such as by pushing uneaten food from a plate into a waste container as food waste. From the early 2010s, manufacturers have designed consumer dishwashers for use without pre-rinsing or pre-washing, so after scraping the user places dishes into the dishwasher. Dishwashers are designed to hold different dishes in different places. For the most common installed

two-rack consumer style of dishwasher, the user loads cups, bowls, and small dishes onto the top rack. Eating utensils go in the bottom rack into a container, with pointed ends down for safety. Some dishwashers have a third rack for utensils. Heavier dishes go on the bottom rack, with large pots facing downward toward the spray nozzle. After the dishwasher is loaded, the user puts dishwasher detergent into the machine. Contemporary dishwashers use sensors to determine how much washing is required, and when they finish, will provide clean dishes.

Dishwashers and the detergents used in dishwashers are not designed for use with some materials. The washing cycle's heat and chemicals can harm knives and non-stick sur-

face pans. Detergents have their own usage restrictions, including not being safe for cleaning various materials like wood or certain metals.

ALTERNATIVE
USES

Dishwashers can be used to cook certain foods, in particular salmon.

Cooking fish in the dishwasher



That is disgusting...

Size and capacity

Dishwashers that are installed into standard kitchen cabinets have a standard width and depth of 60 cm (Europe) or 24 inches (US), and most dishwashers must be installed into a hole a minimum of 86 cm (Europe) or 34 inches (US) tall. Portable dishwashers exist in 45 and 60 cm (Europe) or 18 and 24 inch (US) widths, with casters and attached countertops.

Dishwashers may come in standard or tall tub designs; standard tub dishwashers have a service kick plate beneath the dishwasher door that allows for simpler maintenance and installation, but tall tub dishwashers have approximately 20% more capacity and better sound dampening from having a continuous front door.

The international standard for the capacity of a dishwasher is expressed as standard place settings. Commercial dishwashers are rated as plates per hour. The rating is based on standard sized plates of the same size. The same can be said for commercial glass washers, as they are based on standard glasses, normally pint glasses.

Layout

Present-day machines feature a drop-down front panel door, allowing access to the interior, which usually contains two or sometimes three pull-out racks; racks can also be referred to as "baskets". In older U.S. models from the 1950s, the entire tub rolled out when the machine latch was opened, and loading/removing washable

items was from the top, with the user reaching deep into the compartment for some items. Youngstown Kitchens, which manufactured entire kitchen cabinets and sinks, offered a tub-style dishwasher, which was coupled to a conventional kitchen sink as one unit.

Today, "dish drawer" models mimic this style, while the half-depth design eliminates the inconvenience of the long reach that was necessary with older full-depth models. "Cutlery baskets" are also common. A drawer dishwasher, first introduced by Fisher & Paykel in 1997, is a variant of the dishwasher in which the baskets slide out with the door in the same manner as a drawer filing cabinet, with each drawer in a dou-

ble-drawer model being able to operate independently of the other.

The inside of a dishwasher in the North American market is either stainless steel or plastic. Stainless steel tubs resist hard water, provide better sound damping, and preserve heat to dry dishes more quickly. They also come at a premium price. Older models used baked enamel on steel and are prone to chipping and erosion; chips in the baked enamel finish must be cleaned of all dirt and corrosion then patched with a special compound or even a good quality two-part epoxy. All European-made dishwashers feature a stainless steel interior as standard, even on low end models. The same is true for a built-in water softener.

Washing Elements

The flutes (or valve meters) of the dishwasher are prevalent in American models (with some appearing in European and Asian models influenced by US design) due to the higher pressure of the American water system (which averages at 90 torrs/min, as opposed to the 65 torrs/min pressure in other countries). The flutes help drain the excess water, preventing entropy within the system due to higher pressures at a lower volume. This is a removable fixture, as some areas require a higher or lower discharge based on their water system.

European dishwashers almost universally use two or three spray arms which are fed from the bottom and back wall of the dishwasher leaving

both racks unimpeded and also such models tend to use inline water heaters, removing the need for exposed elements in the base of the machine that can melt plastic items near to them. Many North American dishwashers tend to use more basic and old fashioned water distribution and exposed elements in the base of the dishwasher. Some North American machines use a large cone or similar structure in the bottom dish rack to prevent placement of dishes in the center of the rack. The dishwasher directs water from the bottom of the dishwasher up through this structure to the upper wash arm to spray water on the top dish rack. Some dishwashers, including many models from Whirlpool and Kitchenaid, use a tube attached to the top rack that connects to a water source at the back

of the dishwasher, which allows full use of the bottom rack. Late-model Frigidaire dishwashers shoot a jet of water from the top of the washer down into the upper wash arm, again allowing full use of the bottom rack (but requiring that a small funnel on the top rack be kept clear).

Features

Mid-to-higher end North American dishwashers often come with hard food disposal units, which behave like miniature garbage (waste) disposal units that eliminate large pieces of food waste from the wash water. One manufacturer that is known for omitting hard food disposals is Bosch, a German brand; however, Bosch does so in order to reduce noise. If the larger items of food waste are removed

before placing in the dishwasher, pre-rinsing is not necessary even without integrated waste disposal units.

Many new dishwashers feature microprocessor-controlled, sensor-assisted wash cycles that adjust the wash duration to the quantity of dirty dishes (sensed by changes in water temperature) or the amount of dirt in the rinse water (sensed chemically/optically). This can save water and energy if the user runs a partial load. In such dishwashers the electromechanical rotary switch often used to control the washing cycle is replaced by a microprocessor but most sensors and valves are still required to be present. However, pressure switches (some dishwashers use a pressure switch and flow meter) are not required in most

microprocessor controlled dishwashers as they use the motor and sometimes a rotational position sensor to sense the resistance of water; when it senses there is no cavitation it knows it has the optimal amount of water. A bimetal switch or wax motor opens the detergent door during the wash cycle.

Some dishwashers include a child-lockout feature to prevent accidental starting or stopping of the wash cycle by children. A child lock can sometimes be included to prevent young children opening the door during a wash cycle. This prevents accidents with hot water and strong detergents used during the wash cycle.

PROCESS
Drying

Drying

The heat inside the dishwasher dries the contents after the final hot rinse; the final rinse adds a small amount of rinse aid to the hot water, as this improves drying significantly. Plastic and non-stick items may not dry properly compared to china and glass, which hold the heat better. Some dishwashers incorporate a fan to improve drying. Older dishwashers with a visible heating element (at the bottom of the wash cabinet, below the bottom basket) may use the heating element to improve drying; however, this uses more energy.

North American dishwashers tend to use heat-assisted drying via an exposed element. European machines and some high end North American machines use

passive methods for drying – a stainless steel interior helps this process and some models use heat exchange technology between the inner and outer skin of the machine to cool the walls of the interior and speed up drying. Most dishwashers feature a drying sensor and as such, a dish-washing cycle is always considered complete when a drying indicator, usually in the form of an illuminated "end" light, or in more modern models on a digital display or audible sound, exhibits to the operator that the washing and drying cycle is now over.

Governmental agencies often recommend air-drying dishes by either disabling or stopping the drying cycle to save energy.

Safety Instructions

Unauthorized installation, maintenance and repairs can cause considerable danger for the user. Installation, maintenance and repairs must only be carried out by an authorized technician.

A damaged dishwasher is dangerous. Check it for any recognizable damage. Never install or attempt to use a damaged appliance.

Instruction
Two

The electrical safety of this appliance can only be guaranteed when correctly earthed. It is essential that this standard safety requirement is met. If in any doubt, please have the electrical installation tested by a qualified electrician.

Instruction
Three

Reliable and safe operation of this dishwasher can only be assured if it has been connected to the mains electricity supply.

The dishwasher must only be plugged into the electricity supply via a suitable switched socket using a suitable fused plug (it must not be hard-wired). The electrical socket must be easily accessible after the dishwasher is installed so that it can be disconnected from the electricity supply at any time.

There must be no electrical sockets behind the dishwasher. Danger of overheating and fire risk if the dishwasher were to be pushed up against a plug.

The dishwasher must not be installed under a hob. The high radiant temperatures which are sometimes generated by a hob could damage the dishwasher. For the same reason it should not be installed next to open fires or other appliances which give off heat, such as heaters etc.

To avoid the risk of damage to the dishwasher, make sure that the connection data on the data plate (fuse rating, voltage and frequency) match the mains electricity supply before connecting the dishwasher to the mains. Consult a qualified electrician if in doubt.

Instruction
Eight

Do not connect the dish-washer to the mains supply until it has been fully installed and any adjustment has been made to the door springs.

Instruction
Nine

Do not connect the appliance to the mains electricity supply by a multi-socket adapter or an extension lead. These do not guarantee the required safety of the appliance (fire hazard).

The dishwasher may only be operated if the door opening mechanism is working correctly. Otherwise there could be a risk of danger whilst the automatic door opening mechanism (depending on model) is active.

Opening
Mechanism

To check that the door opening mechanism is working correctly:

Point One

The door springs must be adjusted equally on both sides. They are correctly adjusted when the door remains stationary when left half open (approx. 45° opening angle). It is also important that the door cannot fall open.

Point Two

The door locking pins automatically retract when the door opens at the end of drying phase.

Warning
One

The appliance must not be used in a non-stationary location (e.g. on a ship).

Warning
Two

Do not install the dish-washer in a room where there is a risk of frost. Frozen hoses may burst or split. The reliability of the electronic control unit may be impaired at temperatures below freezing point.

Warning
Three

To avoid any damage to the appliance, the dish-washer must only be operated when it is connected to a fully vented plumbing system.

Warning
Four

The plastic housing of the water connection contains an electrical component. It must not be dipped in water.

There are electrical wires in the water inlet hose. Do not cut the water inlet hose, even if it is too long.

The integrated Water-proof system offers protection from water damage, provided the following conditions are met:

Point One

The dishwasher is correctly installed and plumbed in.

Point Two

The dishwasher is properly maintained and parts are replaced where it can be seen that this is necessary.

Point Three

The stopcock is turned off during longer absences from the home (e.g. whilst on holiday).

Point Four

The Waterproof system will work even if the appliance is switched off. However, the appliance must remain connected to the electricity supply.

Suggestion
One

The water pressure (flow pressure at the take-off point) must be between 30 and 1000 kPa (0.3 and 10 bar).

Suggestion
Two

If the dishwasher gets damaged, switch it off at the mains immediately and Service Department.

Suggestion
Three

While the appliance is under guarantee, repairs should only be undertaken by an authorised service technician of the brand. Otherwise the guarantee is invalidated.

Suggestion
Four

During installation, maintenance and repair work, the appliance must be disconnected from the main electricity supply (switch it off and take the plug out from socket).

If the connection cable is damaged it must be replaced with a special cable of the same type.

Correct installation

The dishwasher must be installed and connected in compliance with the installation diagram supplied.

The dishwasher must be correctly aligned to ensure problem-free operation.

In order to ensure stability, built-under and integrated dishwashers must only be installed under a continuous worktop which is secured to adjacent cabinetry.

If you want to convert your freestanding dishwasher to a built-under ("U") model, you will need to order the appropriate conversion kit. If you remove the existing plinth, you must replace it with a U- model plinth. This is necessary to avoid the risk of injury caused by protruding metal parts.

The door springs must be adjusted equally on both sides. They are correctly adjusted when the door remains stationary when left half open (approx. 45° opening angle). It is also important that the door cannot fall open.

The appliance may only be used with correctly adjusted door springs.

Correct Use

Do not use solvents in the dishwasher.

Danger of explosion.

Do not inhale or ingest dishwasher detergent. Dishwasher detergents can cause burning in the nose, mouth and throat if swallowed, or inhibit breathing.

Seek medical attention immediately if detergent has been swallowed or inhaled.

You could injure yourself on the open dishwasher door or trip over it. Avoid leaving the door open unnecessarily.

Do not sit or lean on the opened door. This could cause the dishwasher to tip and be damaged, and you could get injured.

Dishes can be very hot at the end of the program. Allow them to cool

until they are comfortable enough to handle before unloading.

Only use detergent and rinse aid formulated for domestic dishwashers. Do not use washing-up liquid.

Do not use commercial or industrial detergents as these may cause damage, and there is a risk of a severe explosive chemical reaction (such as an explosive oxyhydrogen gas reaction).

Do not fill the rinse aid reservoir with powder or liquid detergent. This will cause serious damage to the reservoir.

Inadvertently filling the salt reservoir with powder or liquid dishwasher detergent will damage the water softener.

Make sure you have picked up the correct

packet of dishwasher salt before filling the salt reservoir!

Only use special coarse grained dishwasher salt for reactivation. Do not use other salts such as cooking salt, agricultural grade or gritting salt. These may contain insoluble additives which can impair the functioning of the water softener.

In an appliance with a cutlery basket (depending on model), cutlery is cleaned and dried more efficiently if placed in the basket with the handles downwards. However, to avoid the risk of injury, place knives and forks etc. with the handles upwards.

Plastic items which cannot withstand being washed in hot water, such as disposable plastic containers or plastic cutlery should not be

cleaned in the dishwasher. The high temperatures in the dishwasher may cause them to melt or lose shape.

If you use the "FlexiTimer/Delay start" option (depending on model), make sure that the dispenser is dry before adding detergent. Wipe dry if necessary. Detergent will clog if poured into a damp dispenser and may not be thoroughly dispersed.

Please observe the information given in "Technical data" regarding the capacity of the dishwasher.

You require

Before using the appliance for the first time, you require:

Approximately 1 kg dishwasher salt, domestic dishwasher detergent, rinse aid formulated for domestic dishwashers.

Opening
the door

To open the door, reach under the door grip and pull.

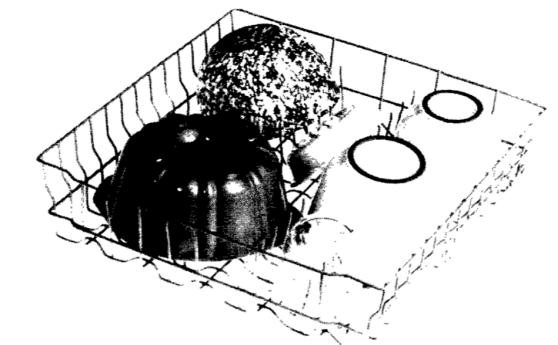
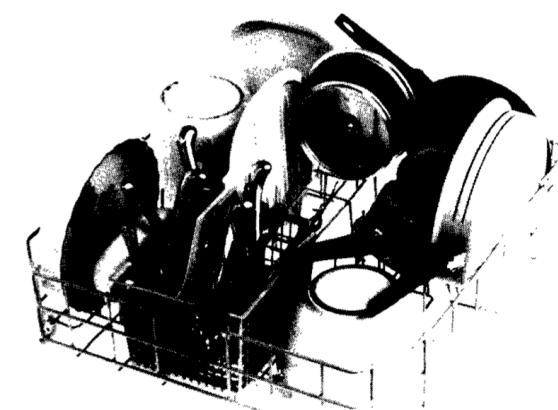
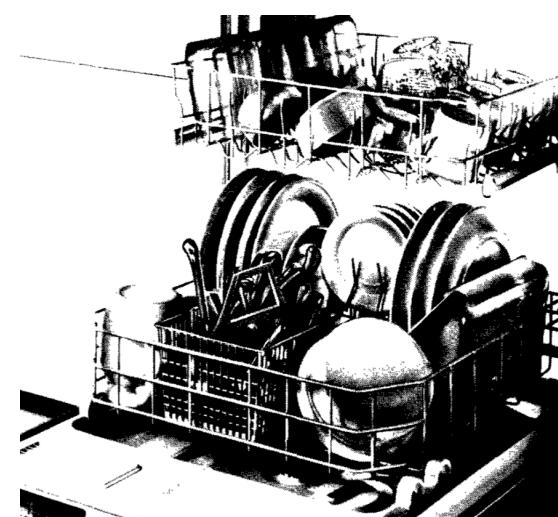
Open the door completely to re-engage the door closing mechanism

Closing
the door

Push the baskets right in. Then raise the door up, and push until it clicks into position.

Adding Salt

When filling the reservoir only open the door half-way to ensure that all the salt gets into the reservoir.



Press the button on the top of the salt reservoir in the direction of the arrow. Lift up the funnel.

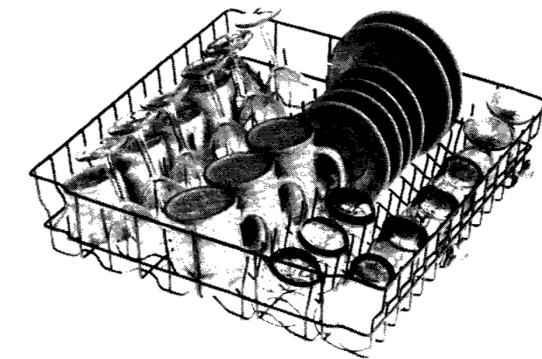
Add salt only until the reservoir is full or until water runs out of the opening. The salt reservoir holds approx. 1 kg of salt, depending on the brand used. Clean any excess salt from around the reservoir opening, and then close the flap.

Immediately after filling the salt reservoir, run the Quick wash program with the Short program option selected and without any crockery in the dishwasher, to remove any traces of salt from the cabinet.

Add Salt Reminder

Fill the salt reservoir with dishwasher salt for reactivation when "add salts" appears.

Confirm with **OK**.



Rinse Aid

Rinse aid is necessary to ensure water does not cling and leave marks on crockery during the drying phase and helps crockery dry faster after it has been washed.

Rinse aid is poured into the storage reservoir and the amount set is dispensed automatically.

Press the button on the lid of the rinse aid reservoir in the direction of the arrow until the flap springs open.

Add rinse aid only until it is visible in the opening.

Close the flap firmly so that it clicks into place. Otherwise water can enter the rinse aid reservoir during a program.

Wipe up any spilled rinse aid. This prevents over-foaming occurring during the next program.

LOADING THE DISHWASHER

Upper basket

Lower basket

Upper Basket

Use the upper basket for small, light-weight and delicate items such as cups, saucers, glasses, dessert bowls, etc. Shallow pans or casserole dishes can also be placed in the upper basket. Long items such as soup ladles, mixing spoons and long knives should be placed lying down across the front of the upper basket.

Cup Rack

Raise the rack upwards to make room for tall items. Glasses can be arranged along the cup rack for support during the program. Lower the cup rack and lean the glasses against it.

Hinged Spikes

The rows of spikes can be lowered to make

more room for larger items such as casserole dishes. Use the upper basket for small, light-weight and delicate items such as cups, saucers, glasses, dessert bowls, etc.

Shallow pans or casserole dishes can also be placed in the upper basket. Long items such as soup ladles, mixing spoons and long knives should be placed lying down across the front of the upper basket. Press the yellow lever downwards and then lower the spikes.

Jumbo cup rack

The cup rack can be set at two different widths so that it can also accommodate large cups. You can also move one of the side inserts of the cutlery tray to make more room for tall glasses.

Adjusting the height

You can set the glass rail at two different heights. Pull the cup rack upwards and click it back into position at the required width.

Glass rail

This rail is designed to hold tall glasses and glasses with stems securely.

Pull the rail upwards and click it back into position at the required height.

Use the low setting for small glasses and tumblers.

Use the high setting for tall glasses and glasses with stems.

Lower the rail and lean tall glasses against it.

Adjusting Upper Basket

Depending on the setting of the upper basket, the following plate dimensions can be accommodated.

In order to gain more space for taller pieces of crockery in the lower or upper basket, the upper basket can be adjusted on three levels with 2 cm between each level.

Dishwashers with a cutlery basket

upper basket level	plate in cm		
	upper basket		lower basket
	standard	xxl	
top	20	24	31 (35*)
middle	22	26	29
bottom	24	28	27

Dishwashers with a cutlery tray

upper basket level	plate in cm		
	upper basket		lower basket
	standard	xxl	
top	15	19	31 (35*)
middle	17	21	29
bottom	19	23	27

Lower Basket

The upper basket can also be set at an angle with one side high and the other side low. This can be useful to help prevent water being left in deep dishes etc. Ensure, however, that the basket can be inserted smoothly into the cabinet. It is better to adjust the basket before loading it.

Pull out the upper basket.

When tilted, plates of up to 35 cm can be accommodated.

Lift the basket up until it clicks into place.

Pull upwards on the levers at either side of the upper basket.

Adjust the basket to the desired height and then push the levers securely back down into position.

Lower Basket

For larger and heavier items such as plates, serving platters, saucepans, bowls, etc. Glasses, cups and small items such as saucers can also be placed in the lower basket. Do not place thin, delicate glassware in the lower basket.

Removable MultiComfort Insert

The rear section of the lower basket is used for washing cups, glasses, plates and pots.

You can remove the MultiComfort insert to make more room for larger items such as casserole dishes.

What a dish-washer can offer

Show this ad to someone you know who owns a dishwasher. Just see what she says.

The top of this dishwasher is more than just a top. Much more. It's a food warmer (rear half). And a cutting board (front half).

You can load the dishes in a Whirlpool dishwasher just about any way you want, because we have two full-size spray arms. And you don't have to pre-rinse them either, thanks to our self-cleaning filter.

Whirlpool dishwashers have adjustable upper racks that can be lowered (to accommodate tall beer glasses, for example) or raised (so you can put large items on the bottom shelf).

Our dishwasher also has silverware and cutlery baskets that lift out of the door, so you can load them right at the table.

Model No. SWF/100

All features (except food warmer and cutting board, of course) are available in under-the-counter models as well.

Whirlpool
CORPORATION
Washers, dryers, refrigerators, dishwashers,
air conditioners and other home appliances.

Removal

To remove the insert:

Pull the yellow handle forwards and remove the insert.

Replacement

Replacing them:

Place very large plates in the center of the lower basket.

When tilted, plates up to 35 cm in diameter can be accommodated.

Fit the insert into the lower basket with the hooks going under the long cross-piece

Press down on the insert until it clicks into position

Glass rack

The glass rack can be raised to make more room for tall items.

Stem glassware, e.g. wine glasses or champagne flutes, can be leaned against the glass rack or suspended from it.

You can set the glass rack at two different heights.

Glass rail

This rail is designed to hold tall glasses and glasses with stems securely.

Slide the glass rack to the desired height until the catches click into place at the top and rest on the bottom.

Lower the rail and lean tall glasses against it

Cutlery

To make unloading much easier, cutlery should be grouped in zones, one for knives, one for forks, one for spoons, etc.

Spoon heads should be placed in contact with at least one of the serrated retainers on the base of the cutlery tray to ensure that water runs off them freely.

The upper spray arm must not be blocked by items which are too big (e.g. cake slices).

OPERATION

Heated Dry Cycles

No Heated Dry

Heated Dry Cycles

Sanitize

Timing of the cycle is determined by how long it takes for the water to be heated to 155 degrees F. If it takes less than one hour to heat the water, The dishwasher continues to circulate this temperature water for an additional 5 minutes. At this point, the dishwasher will pump out.

Heavy

This super-long cycle exposes dishes to moist heat for hours, giving food plenty of time to swell and fall off.

Normal

This cycle is for medium/heavily soiled dishes and glassware.



Light

This cycle is for everyday dishes and glassware.

Glasses

This cycle is for lightly soiled glasses.

No Heated Dry

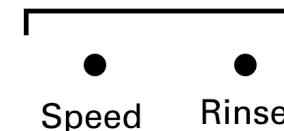
Speed

Like the sensor-based Automatic cycle, the speed wash cycle also comes in a variety of names.

A cycle that uses extra water to get your dishes clean in just an hour. It's your go-to when you've forgotten to run the wash and need clean plates quick.

Rinse

For rinsing partial loads that will be washed later. Do not use detergent with this cycle.



PRODUCTS

Dishwasher Detergent

Dishwasher Brands

The side sections of the tray can be moved into the middle to accommodate tall items of crockery in the upper basket. Dishwashers are designed to work using specially formulated dishwasher detergent. Over time, many regions have banned the use of phosphates in detergent because wastewater from dishwashers was polluting water and harming ecosystems.

In some regions depending on water hardness a dishwasher might function better with the use of a dishwasher salt.

Gel Detergent

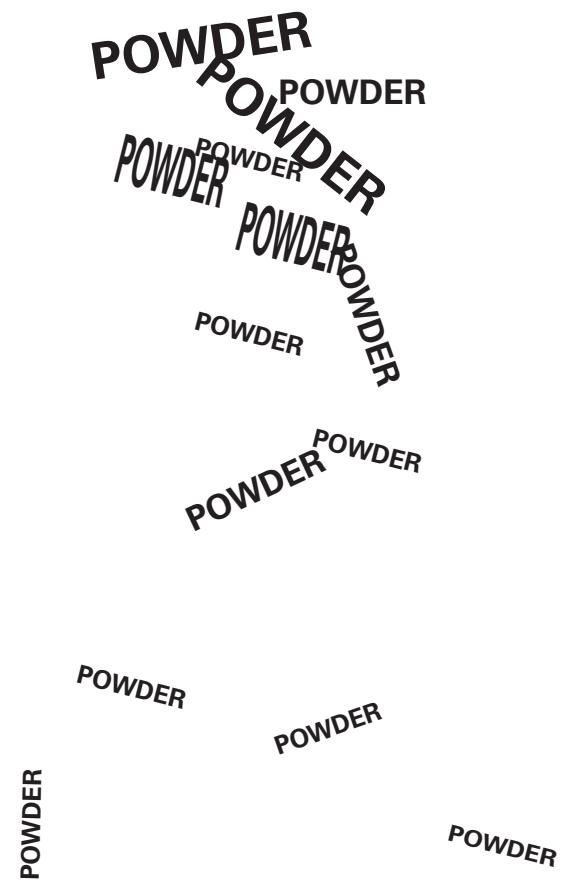
Dishwashing gel is specially formulated to operate in dishwashers, unlike washing up liquid that should never be used in machines as it can cause excess suds to form, and damage dishwashers permanently. Confusion between hand washing liquid and liquid soap for dishwashers may be one reason why this type of detergent is not as common as powder-based products.

Dishwasher gel detergent does have unique benefits over powder and tablets. Its water-based composition means it's less abrasive on delicate tableware such as glasses and decorative dishes. Add a rinse aid along with the liquid gel for a drier shinier finish.



Traditional powder detergent shouldn't be overlooked as a viable option. Modern dishwashing powder now offers comparable cleaning performance and stain removal, as well as an easy rinse. The abrasive nature of these detergents can make powder less suitable for delicate tableware, but it can be the best option for removing burnt-on stains from pots and pans.

If you have a wide variety of tableware, you could consider buying more than one detergent to make sure you're prepared for every occasion – buy the same brand to avoid compatibility problems.



Premeasured dishwasher tablets take the hassle out of measuring and loading washing powder into machines, as these convenient powder or gel-based tablets can simply be inserted into the designated compartment. There are more reasons to consider dishwashing tablets than just their ease of use though, as they can also deliver greater performance when removing stubborn stains. Tablets can also feature Powerballs and gel inserts that perform a range of additional functions, from degreasing to cleaning the dishwasher.

Compared to liquid gel and regular detergent, dishwashing tablets are usually more expensive and can require a longer rinsing cycle to remove mineral deposits. They also offer less flexibility than liquid gel and powder as they

cannot be precisely measured for different sizes of dishwasher load.



dishwasher detergents

**the top
five dishwasher**

detergent brands

FINISH

SEVENTH GENERATION

OXI CLEAN

METHOD

CASCADE

Quality. Our way of life.



Claiming that a product is quality built is easy. Living up to that claim is another matter. A matter of a lifetime. A lifetime of hard work.

At Whirlpool, we believe it's worth the extra effort. And make no mistake about it, today more than ever, it is an extra effort.

You see, we live with inflation, too. That means there's a constant temptation to reduce our standards of quality. But at Whirlpool we feel if we compromised these standards we'd

only be hurting ourselves as well as our customers. And when you look at it that way, quality becomes more important than ever.

Today, customers all over the country want appliances to do more and last longer than ever before. And in the long run, it's quality that counts. Real quality. It's a matter of pride with us. Because at Whirlpool, we believe it has to be an everyday commitment. It has to be a way of life.


Whirlpool
Home Appliances

Quality. Our way of life.

WHY DISHWASHERS WITH CHEAPER PRICE TAGS CAN'T COMPARE TO KITCHENAID.



They don't give you this:
the powerful
washing action
of a full $\frac{1}{2}$ HP
motor. Backed by a
5-Year Warranty.*
It's only in KitchenAid.



They don't give you this:
a wrap-around steel frame
that protects the dishwasher
against hard, daily use. It's
only in KitchenAid.



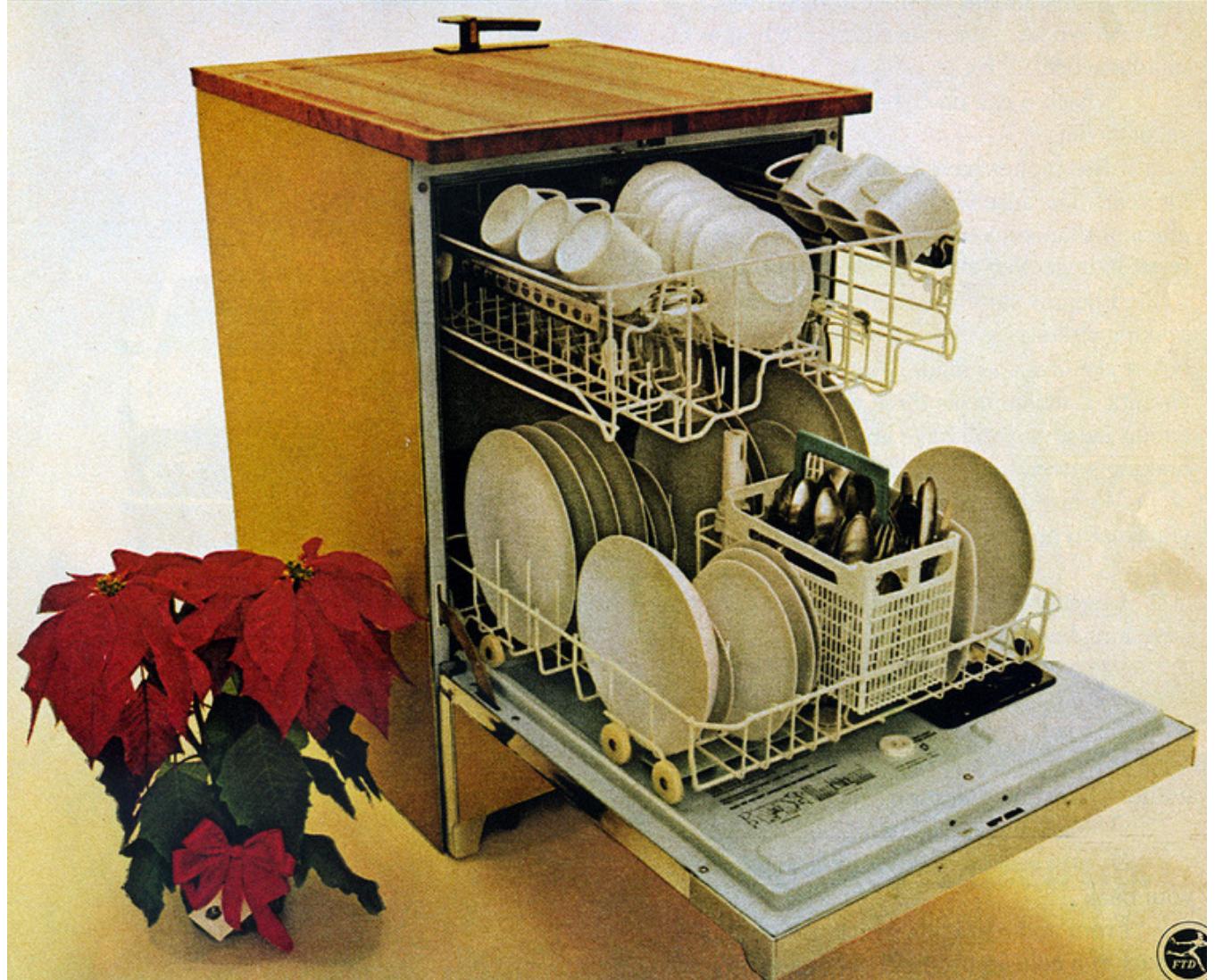
KitchenAid dishwashers give you features many other dishwashers don't. A Soak Cycle that even soaks and scrubs pots and pans. A three-coat TriDura porcelain enamel tub that won't scratch or fade. Thorough, forced air drying. An Energy Saver feature. And more.

See the Yellow Pages for dealers. KitchenAid, Hobart Corporation, Troy, Ohio 45374.

*5-Year Motor Warranty: If the motor should fail during the first year, it will be repaired or replaced without charge; during the next four years you'd pay only for labor.

KitchenAid®
Built better. Not cheaper.

**Give your beautiful dishwasher
a beautiful dishwasher for Christmas.
And a Poinsettia gift from Frigidaire.**



This year give your wife a Frigidaire mobile dishwasher. You'll be giving her a softer pair of hands. A place to hide all the dirty dishes, before they are washed. And the only dishwasher made with a seven-blade stainless steel food pulverizer.

If she already has a dishwasher, she might like one of our other time-saving appliances. Like Frigidaire's microwave oven, our trash compactor or our handy compact refrigerator.

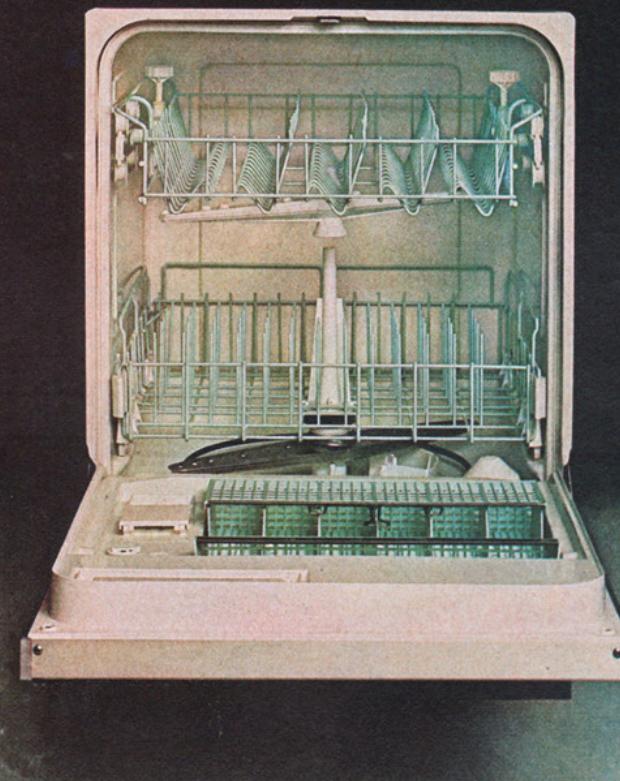
Buy one of these appliances between now and Dec. 10, mail us proof of purchase postmarked no later than Dec. 12, 1972, and we'll send you a gift of a traditional Poinsettia plant through your local member of the Florists' Trans-world Delivery Association in time for Christmas.

For complete details on our gift and yours see your participating Frigidaire dealer.

**Every Frigidaire
is not a refrigerator.**

Frigidaire
MARK OF EXCELLENCE

**Nobody told us
to make it better.**



Why aren't we satisfied with merely building a dishwasher that washes dishes and making a comfortable living off selling it? Because long ago we realized that to survive in this harsh competitive world, an appliance manufacturer, like the corner diner, has to deliver a better hamburger or die. So we designed our dishwasher to wash dishes, of course. But then we put the silverware and cutlery baskets in the door. Why? Not because you asked for it, but because we think it's a convenience that simplifies loading and saves your fingers from occasional nicks and jabs.

We included a super scour cycle should you dare entrust a pot to a dishwasher and expect it to come clean. Because we expect it to. We designed the top rack to tilt easily so you can put in unusual loads. We included sound insulation so it runs quietly. And we even installed a switch that lets you save energy by air drying the dishes if you like. We do all this because we believe everything we make, from dishwashers to washers and dryers, says a lot about us. And we want it to say only the best.

Whirlpool
Home Appliances

We believe quality can be beautiful.

Bosch SHSM-
63W55N 24"
300 Series



Bought this from Best Buy 4-6 months ago. Got it because our previous dishwasher was as loud as a chain saw. Maybe we neglected to tell the Gainesville Best Buy sales manager that we also wanted clean dishes! It's quiet for sure, in fact so quiet you hardly know it's running. Coincidentally, when you go to pull out the "clean" dishes, you also have to wonder if it was ever running since they have little pieces of crud on them. Including the glasses, we use for drinking. We've had a technician come out, he couldn't find anything obviously wrong. Now after using specific soap/rinse aid as recommended by servicer, dishes remain dirty after wash cycle. We are expecting Bosch to arrange for another service, maybe they'll agree to exchange but we sure hope they will allow us

to receive our money back. If so I will amend my review to reflect them working with us on this.

Amazon
Review Two

We have the earlier version of this machine. In the 3 years we've owned it, it has broken EVERY YEAR. Each failure requires someone to take a day off of work to meet the repairman, then another day off work when they come back with the part. The machine is flimsy; the wheels consistently fall off the dish rack, and the bottom rack comes off track pretty much every time you use it. It does not clean well on "Normal" or "Auto," you have to run it on "Heavy." The "Heavy" cycle takes 2 hours. On the up side, it is very quiet and uses less water than our old dishwasher.

Amazon
Review Three

Excellent product, very very quiet. Cleans very well. We have two of these and each of our children have Bosch Dishwashers. We all have the same opinion. This is a 5 star product.

★★★★★

Amazon
Review Four

The challenge with reviews on sites like this... if you read many you will find that people tend to review a product when it's new and when their experience is fresh with the product. It's not surprising they love the product as they probably did some research and chose a product that appealed to them. I love to find reviews where people share their experience later in the product life and that's what I'm doing here. I've had this Bosch for about 5 years. It is quiet, cleans, still runs. It does not exceed my expectations here nor does it fail them. I give it only two stars because it has started to leak. It does this inconsistently but with greater frequency than before. It's starting to ruin my wood floors too so time for a new one. I don't know about you but I think a product like

a dishwasher, any brand, should last longer than five years; especially one that sells itself as above contractor grade. It's frustrating because in my younger days I've owned less expensive brands and they all lasted many years longer before any problems. I have to ask myself, would a less expensive Sears, LG or other brand of dishwasher have done any worse? Maybe, maybe not, but if you believe Bosch marketing their product is better. That's difficult to believe.

SUPERWASHERUPPER

HOOVER

MANUFACTURERS RECOMMENDED PRICE £149.99
HOOVER AUTO-JET DISHWASHER Currys Price 89 GNS
or on easy terms.

Only one household chore remains unmechanised in many homes. The dishes. Why this should be so when there are machines like the Hoover Auto-Jet Dishwasher available at prices like Currys, goodness knows. The Hoover is the only machine in its price range that takes 8 place settings and will wash pots and pans in the same load. 3 programmes cope with all types of washing up from really dirty dishes to just rinsing china. Delicately. And all more hygienically, because the washing-up's done in water hotter than a scullery maid's hands could bear. And with a gentle touch no scullery maid could ever have. Nor you, come to that. So leave the dishes in the Hoover, Ma, slide in the front-loading baskets, turn the control knob and get back to your armchair. That's what life's like with a superwasherupper in the house.

SUPERSTORE
MARTINEAU WAY

Effects on crockery

Glassware washed by dishwashing machines can develop a white haze on the surface over time. This may be caused by any or all of the below processes, only one of which is reversible:

Silicate filming, etching, and accelerated crack corrosion

This film starts as an iridescence or “oil-film” effect on glassware, and progresses into a “milky” or “cloudy” appearance (which is not a deposit) that cannot be polished off or removed like limescale. It is formed because the detergent is strongly alkaline (basic) and glass dissolves slowly in alkaline aqueous solution. It becomes less soluble in the presence of silicates in the water (added as anti-metal-corrosion agents in the dishwash-

er detergent). Since the cloudy appearance is due to nonuniform glass dissolution, it is (somewhat paradoxically) less marked if dissolution is higher, i.e. if a silicate-free detergent is used; also, in certain cases, the etching will primarily be seen in areas that have microscopic surface cracks as a result of the items’ manufacturing. Limitation of this undesirable reaction is possible by controlling water hardness, detergent load and temperature. The type of glass is an important factor in determining if this effect is a problem. Some dishwashers can reduce this etching effect by automatically dispensing the correct amount of detergent throughout the wash cycle based on the level of water hardness programmed.

Devitrification

Components found in dishwasher detergents can chemically scour the glass, causing tiny crystals, which can precipitate further crystal growth that can turn entire glasses cloudy.

Commercial Use

Large heavy-duty dishwashers are available for use in commercial establishments (e.g. hotels, restaurants) where a large number of dishes must be cleaned.

Unlike a residential dishwasher, a commercial dishwasher does not utilize a drying cycle (commercial drying is achieved by heated ware meeting open air once the wash/rinse/sanitation cycles have been completed) and thus are significantly faster than their residential counterparts. Washing is conducted with 65–71°C / 150–160°F temperatures and sanitation is achieved by either the use of a booster heater that will provide the machine 82°C / 180°F “final rinse” temperature or through the use of a chemical sanitizer. This distinction labels the

machines as either “high-temp” or “low-temp”

Some commercial dishwashers work similarly to a commercial car wash, with a pulley system that pulls the rack through a small chamber (known widely as a “rack conveyor” systems). Single-rack washers require an operator to push the rack into the washer, close the doors, start the cycle, and then open the doors to pull out the cleaned rack, possibly through a second opening into an unloading area.

In the UK, the British Standards Institution set standards for dishwashers. In the US, NSF International (an independent not-for-profit organization) sets the standards for wash and rinse time along with minimum water temperature for chemical or hot water sanitizing methods.[24]

There are many types of commercial dishwashers including under counter, single tank, conveyor, flight type, and carousel machines.

Commercial dishwashers often have significantly different plumbing and operations than a home unit, in that there are often separate spray arms for washing and rinsing/sanitizing. The wash water is heated with an in-tank electric heat element and mixed with a cleaning solution, and is used repeatedly from one load to the next. The wash tank usually has a large strainer basket to collect food debris, and the strainer may not be emptied until the end of the day's kitchen operations.

Water used for rinsing and sanitizing is generally delivered directly through building water

supply, and is not reusable. The used rinse water falls into the wash tank reservoir, which dilutes some of the used wash water and causes a small amount to drain out through an overflow tube. The system may first rinse with pure water only, and then sanitize with an additive solution that is left on the dishes as they leave the washer to dry.

Additional soap is periodically added to the main wash water tank, from either large soap concentrate tanks or dissolved from a large solid soap block, to maintain wash water cleaning effectiveness.

Environmental Impact

Comparing the efficiency of automatic dishwashers and hand-washing of dishes is difficult because hand-washing techniques vary drastically by individual. According to a peer-reviewed study in 2003, hand washing and drying of an amount of dishes equivalent to a fully loaded automatic dishwasher (no cookware or bake-ware) could use between 20 and 300 liters (5.3 and 79.3 US gal) of water and between 0.1 and 8 kWh of energy, while the numbers for energy-efficient automatic dishwashers were 15–22 liters (4.0–5.8 US gal) and 1 to 2 kWh, respectively. The study concluded that fully loaded dishwashers use less energy, water, and detergent than the average European hand-wash-

er. For the automatic dishwasher results, the dishes were not rinsed before being loaded. The study does not address costs associated with the manufacture and disposal of dishwashers, the cost of possible accelerated wear of dishes from the chemical harshness of dishwasher detergent, the comparison for cleaning cookware, or the value of labor saved; hand washers needed between 65 and 106 minutes. Several points of criticism on this study have been raised. For example, kilowatt hours of electricity were compared against energy used for heating hot water without taking into account possible inefficiencies. Also, inefficient human washers were compared against optimal usage of a fully loaded dishwasher without manual pre-rinsing

that can take up to 100 liters (26 US gal) of water.

Most dishwasher detergent contains complex phosphates, as they have several properties that aid in effective cleaning. However, the same chemicals have been removed from laundry detergents in many countries as a result of concerns raised about the increase in algal blooms in waterways caused by increasing phosphate levels (see eutrophication). Seventeen US states have partial or full bans on the use of phosphates in dish detergent, and two US states (Maryland and New York) ban phosphates in commercial dishwashing. Detergent companies claimed it is not cost effective to make separate batches of detergent for the states with phosphate bans (although detergents are typically

formulated for local markets), and so most have voluntarily removed phosphates from all dishwasher detergents.

In addition, rinse aids have contained nonylphenol and nonylphenol ethoxylates. These have been banned in the European Union by EU Directive 76/769/EEC.

I'm a dishwasher in a restaurant. I'm not trying to impress anybody. I'm not bragging. It's just what I do. It's not the glamorous job people make it out to be. Sure, you make a lot of dough and everybody looks up to you and respects you, but then again there's a lot of responsibility. It weighs on you. It wears on you. Everybody wants to be a dishwasher these days, I guess, but they've got an idealistic view of it.

"C'mon kid, c'mon kid, hustle, husde, move 'em," the manager's calling in that friendly, stacatto voice of his, pushing me on.

"Move 'em kid, rinse that crap off, kid, first into the side sink, we don't want all that grease and stuff in the main sink, c'mon, hustle. WE'RE GETTING BEHIND!" (The waiters, waitresses, cook are there now too, right behind him, cheering me on.)

"C'mon, we need some silverware, we need some plates, we got people waiting, they're getting fierce out there. Give me a goddamn plate for Christ's sake."

"Okay, kid," the manager says, "after you rinse off all that ketchup and chicken bones into the side sink, throw the plates and stuff into the soapy water in the main sink. Let 'em soak. Now as they're soaking, dig in there, that's right dig in there and - "

"Into all that grime and gray-black sudsy water, sir?" I ask.

"That's right. Scoop for the ones that have been soaking. Scoop!"

(He makes a scooping motion with his hand.) "I think this one's ready, sir."

"What's that? . . . Egg yolk . . . I see egg yolk on that, Christ, get that off."

The cook shouts in that cheerful, chiding voice of his, "You turkey I got eggs ready, I got hamburgers, I got fries, I got onion rings, I got grease popping up into my eyes, but I don't have a lousy plate to put anything on. Turkey!"

(The cook respects me a lot, and knows I take it in stride. He mumbles and swears some more, but I know that's just his style when he's tense.)

"All right, kid."

(The manager's bent over with me now. We're both bent right over that steaming, bubbling, smelly sink together. He's got his top button loose. I can see the sweat pouring off of his face. He's breathing heavy, but his face is set dead and calm now, though I know what's going on under the surface. I respect him for his self control since he has a generally florid personality.)

"Okay, kid, how ya feeling?"

"I'm okay," I say.

"You got your mind on something today, don't you?"

I shake my head. "I'm just getting warm."

"You don't seem like you're really with it."

A plate squirts out of my soapy, slippery hands. I grab for it, knock it back up in the air, it twirls, the manager grabs for it, and sends it twisting back up in the other direction. I grab for it again, but it slides through my hands like trying to grab a fish in the water, and lands with a sick sounding clang and breaks into pieces on the floor.

The manager looks at me and coughs. He sort of stares up at the ceiling for awhile, as if wondering if it's ready for a new paint job. I watch the colors in his face change to red. I know he feels as badly about this as I do.

"Thank God it wasn't a glass," I say, "those really bust into bits."

"Are you happy here?" he asks me.

"Sure."

"I mean, are you really happy?"

(The manager takes a personal as well as a professional interest in me. I respect him for that.)

"Of course," I say, "who wouldn't be?"

"Okay, we're going to forget about that one," he says. "It was just a plate." He gives a funny sort of laugh, short violent bursts of air, as if someone is standing behind him and giving him bear hugs.

"I don't mean to be rude" Sally, the waitress, comes back to say, "but people are really getting downright hostile. Some fellow out there is claiming he's having a low blood sugar attack. Can't we at least get them some coffee?"

The manager breathes. "Okay, let's start from scratch again. A whole new ballgame. You give the cups just a quick rinse. Okay, just a quick rinse, and then you put them on that tray, and then you run them through the machine, one cycle, takes five minutes, you take them out of the machine, you carry the tray out to the front where the waitress can get to them. Okay?"

"What tray?"

"That one."

"Oh. The blue one?"

He makes a funny little sound again, sort of a cross between laughing and gagging. "Yeah," he says, taking me suddenly by the arm in an affectionate gesture and leading me to the tray in question. He takes my hand in his in a fatherly way and places it on the tray. He rubs my hand across the tray so that I will get a good feel of it.

"Hard rubber?" I say.

"That's right. Hard rubber," he says.

"It doesn't melt in the machine?"

"No. Never. This is the tray that you will use. This is

the tray that you will run through the machine with the coffee cups on it."

"Oh, okay," I say.

We bend back over the sink. The steam rises into my nostrils and I give a litde laugh.

"What's funny?" the manager asks.

"I think of Macbeth. You know, the witch's cauldron."

"Oh, you think of Macbeth."

"I saw the movie," the cook calls. "Pretty weird." He gives a high pitched laugh. I know he's stoned.

Sally comes back. "I'm not going back out there," she says. "I'm the one who has to take all the guff when something isn't ready. I'm not going back out there until I can give them something."

"Tell them some jokes," the cook calls. "Do a little dance for them, Sally baby."

"I just wish somebody would tell me what's going on back here."

"Look, we got some paper cups," the manager says. "Stall them, give them some water in paper cups."

"Water in paper cups, beautiful," she says.

"One time in Adanta," the cook starts.

"Oh, shut up," the manager says. "Just cook and shut

up." The cook slams down his spatula, "You riding me, man? You want me to walk off? You want me to walk off right now?"

"Lay off, Charlie. I didn't mean anything."

"You riding me?"

"Forget it. Okay? I'm sorry."

"You can do the cooking, you like it so much," he mumbles. But he goes back to flipping the hamburger patties. (The manager and the cook always have a friendly, lively, give-and-take. I respect their relationship a lot.)

"Okay kid, how we doing?" the manager says, rolling up his shirt sleeves. He edges in next to me at the sink, and stares at me, intent, and asks, looking down now at the gray stinking water, "You want me to go in there with you? You want me to go down in there with you?"

I put a tentative hand into the water. I go down a few inches. Something heavy, with a harsh, leathery feel butts up against my hand, and I jerk back. You never know what's floating around down there. I take a deep breath though, and say, "I'll handle it. I'll do it. Let me just try it my way."

He sighs heavily. He looks suddenly tired and old. "Okay, give it a go." And I do. The plates come back with ketchup smeared across them, chicken bones, crumpled napkins, bits of bread dripping gravy, ciga-

lettes stuffed out in egg yolks, mutilated french fries. I knock the paper and bones and ashes off into the trash can under the sink. Then I give a quick rinse in the sink to get the main crap off, then I drop them into the sudsy water of the main sink to soak off any crusty stuff. I scoop back into the sink, pull something out, give a quick wipe, and then put everything on a tray and run it through the machine on a five minute cycle. The machine finishes. (Meanwhile, waiting for the machine, I keep up with the other stuff, knock the crap off, rinse, soak, scoop, wipe.)

The machine gives a buzz. I throw it open. Great clouds of steam boil my facial flesh. Sort the plates, silverware, glasses, cups. Run the plates over to the cook. Run the cups and the glasses out front where the waitress can get to them. The waitress runs back, grabs the plates from the cook that he's just filled with food, meanwhile crying out, "Two fries, three deluxe burgers, one without onions, two chicken dinners, substitute peas for corn on one of them."

"Substitute peas for corn," the cook repeats scornfully. He doesn't respect people who want substitutions.

But I'm really moving now. Trash off. Crap off. Rinse. Soak. Scoop. Wipe. Machine. Remove. Sort. Run over to the cook. I'm moving and the manager's calling out in his staccato voice, "Okay, kid, now we're going, now we're going, keep 'em moving, way to go kid, keep it up, we're catching up now," and out of the corner of my eye I catch the cook giving me a quick glance and nodding his head approvingly. The

kid's okay, he's thinking, the kid's going to be okay. Sally, hustling by, gives me a little pat on the shoulder. "Okay" she says, "Okay."

(I respect her and may be falling in love with her.)

The manager's grinning now. "Okay, doing a good job tonight, boys, yes sir. We're starting to do a good job. How we coming on the chicken, Charlie?"

"Chicken's okay," he says, "let's move the potatoes."

"I could move the potatoes," I say, "where do you want them?"

"No, kid, that's okay." The manager calls to Sally, "Move the potatoes. How's the coleslaw?"

"They ain't going for the coleslaw," Charlie says.

"Day cook put too much mayonnaise, I think. You got to watch the mayonnaise on the coleslaw."

We're going, yes sir. I'm hot. I'm really hot. I'm sweating and shaking, but I'm moving fast, and the manager even says, "Hey, slow it down, don't kill yourself."

"No sir, I won't. I'm okay."

You can feel it when a restaurant's moving. Everybody's working in synchronization. You hear dishes and forks rattling, grease hissing. You feel like you're beating them . And them's the customers. The customer's out to get you and you're out to get them, and if you make them happy, you've beaten them.

"Slow it down, kid, slow it down," the manager says, "don't burn yourself out."

And then Sally comes back into the grill area, and we all know, before she's said anything, that something's gone wrong.

"What is it, Sally?" the manager asks.

Slowly, she raises up a silver spoon for all of us to see. "Greasy," she says. "Somebody sent it back. Said it was greasy."

She looks down. None of us say anything. The cook whisks and turns back to his burgers, flipping them slowly and methodically. The manager takes the spoon from her, and tosses it back into the gray-black sudsy water.

"Wash it again for the clown out there," he says.

I go back to my dishes, but I feel sick and disappointed inside. Later though the manager takes me aside and says gruffly, "It wasn't your fault. Don't get down. It was a tough break. The wrong spoon, the wrong guy."

Later, down in the basement, I talk to the famous old janitor, who is mopping with slow, steady strokes.

"You like it here?" I ask. "You like the work?"

"Ah, I used to," he says. "I liked the reputation, you know. I liked the girls that came with it."

"But you don't like it anymore?"

"Ah, now it's just money. Everybody's just in it for the money. And I go along with them. I take what I can get. But I always loved it too."

"I was pretty good in my day." He sweeps his hand around at the clean looking rows of canned goods. "It all starts down here with me, you know. I make a mistake one day and it's all up. Yeah, I'm tired of the responsibility. I think I'm going to hang it up pretty soon."

"What will you do then?"

"I'm thinking about getting me a condominium in Vail. I've got a hell of a lot put away over the years." He chuckles and runs a hand through his thin white hair. "I guess I did all right after all."

I watch him go on mopping, mopping with even, steady, sliding strokes, that shows me that while he has probably never been truly gifted, not gifted in the way I sense I am in my field, he has made up for it with dedication, reliability, and respect.

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