DishDrawer™
Service Summary

This information is intended for use by individuals possessing adequate backgrounds of electrical, electronic and mechanical experience. Any attempt to repair a major appliance may result in personal injury and property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.
If further help is needed concerning this appliance call: TOLL FREE 1 0800 9 FNP USA   (1 888 9 367 872)
or write to: Fisher & Paykel Appliances Inc., 27 Hubble, Irvine, CA 92618

IMPORTANT SAFETY NOTICE

CAUTION: This machine must be electrically grounded through the grounding lead in the 3-prong power cord, if plugged into a properly grounded appliance outlet or through a separate No. 14 AWG or larger wire from the cabinet to an established ground. In all cases the grounding method must comply with any local electrical code requirements. To reduce the risk of shock, disconnect the power supply cord before servicing.

CAUTION: ALL TERMINALS AND INTERNAL PARTS SHOULD BE TREATED AS LIVE.
IMPORTANT - RECONNECT ALL GROUNDING DEVICES

If grounding wires, screws, straps, clips, nuts or washers used to complete a path to ground are removed for service, they must be returned to their original position and properly fastened.

Electronics

In the DD603 and DS603 electronic controller, the functions controlling the motor as well as controlling the user interface console have been combined into a single 16-bit Micro Controller on the main printed circuit board.

This Micro Controller also controls a transformerless 85W switchmode power supply. This power supply utilizes a large dropping resistor on the heater plate in conjunction with phase control of the mains voltage in order to produce a variable voltage rail. From this the controller can supply voltage from 5V to 85V to the various components in the DishDrawer.

The user interface comprises a printed circuit board for front controls and a touch switch panel for internal controls.

Dispensing Detergent

The Detergent Dispenser door is opened manually for detergent loading and then manually closed ready for the detergent to be transported to the wash tub by the inlet water. To enable each detergent chamber to be dispensed separately, an inlet water diverter valve controlled by the electronics is necessary.

Additionally a positive displacement pump unit and storage tank are incorporated within the dispenser to supply rinse agent. The rinse agent dispensed volume may be adjusted to suit water conditions. A glowing red light on the tank filler cap indicates an empty rinse agent tank.

The Element

The heater plate is an element consisting of a porcelain enamelled steel plate with a thick film resistive circuit printed onto the dry side. As well as the heating circuit a large dropping resistor is also printed onto the heater plate which forms part of the controllers power supply. The element is clamped in place by a lockring nut and supports the motor at the base of the tub. The heater plate is only activated during the wash cycles. It is not used for drying. The temperature is maintained by a thermistor. If a failure occurs with the electronic control of the heater plate overheat protection is provided by a thermal fuse on the heater plate itself.

Tub Home Sensor

A tub home sensor is used to determine when the tub is closed and it is safe to start a cycle. The tub home sensor consists of an infrared sender and receiver mounted on the circuit board in the controller.

Infrared light is transmitted from the sender down an optical light pipe to the side of the tub. The infrared receiver also has an optical light pipe leading from it out to the side of the tub. When the tub is closed, the two light pipes are optically connected via a prism mounted in the trim on the front of the chassis.

Drying Cycle

The fan draws air through the tub, where it absorbs water from the dishload. The moisture laden air is then mixed with a large quantity of ambient air (from the kitchen), to minimize the amount of vapor visible when exiting from the drawer front.

The fan runs continuously during the drying cycle and will restart if the tub is opened and closed again. After the drying cycle is complete, the fan continues to run for 30 minutes, but will not restart if the tub is opened.

Tub Removal

1. Open the drawer fully.
2. Depress the right-hand tub clip and push it back about 1^1/$_2$ inches. Repeat for the left-hand side.
3. The tub may now be lifted up off the drawer runners.
4. If turning it over, rotate the tub counter clockwise.
4. Slide both runners back into the product.
5. Refit in reverse manner.

Amount of Water

The tub fills with approximately 0.8 US gallons of water, almost level with the base of the sprayarm. Once this level is reached, the wash pump (which has sensed the fill via the electronics) becomes primed and pumps the water through the sprayarm which will then rotate. The load on the wash pump is constantly monitored throughout the wash cycle and the water level adjusted if necessary.

Removal of Drawer Front

To remove the drawer front, remove the two retaining pins on either side of the tub at the front using a sharp pair of long nose pliers. Pull the drawer front out slightly at the bottom and then downwards away from the handle. **Warning: Ensure the mains power has been disconnected before servicing the DishDrawer.**

Carefully remove the earth wire from the tab on the drawer front. Components on the front of the tub are now accessible. When replacing the drawer fronts ensure the web in the center of the pin is vertical.

Lid System

The lid is a single piece of polymer plastic with a static seal co-injection moulded into it. Each side of the lid is clipped into a yoke which is in turn connected to a worm drive gearbox assembly containing a small brushed DC 24V motor.

At the beginning of each wash cycle, both motors are powered up for approximately 10 seconds which pulls the lid down onto the tub. The lid remains down for the duration of the cycle and is only lifted when the DishDrawer beeps to signal the end of the cycle or if the customer pauses it to gain access to the tub.

If power to the DishDrawer fails with the lid down, you can still force the tub open manually if access is required. However, closing the drawer with the lid down can damage the lid seal. If power is not available and the drawer must be closed, remove the tub, disconnect the lid screw from the yoke and manually wind up the lid screw. Reconnect lid screw to yoke and close the drawer.

Water Softener

Some models are fitted with a Water Softener, which is designed to remove calcium, and magnesium ions that cause water to be 'hard'. The water softener will automatically remove the hardness from the water using a salt solution. It must be set to the correct local water hardness and must always be filled with granular salt made especially for dishwasher water softening systems.

A glowing red light on the Salt Reservoir Cap indicates the salt reservoir is empty.

Filter Plate

To clean the drain filter with the dish rack in place, remove the cutlery basket and open the drain filter access insert. The filter plate can be cleaned by removing the dish rack and sprayarm and unlocking the lockring nut counter-clockwise.

Motor

The Motor is a fully electronically controlled 80V, 60w, 3 phase, 6 pole, brushless DC motor, running on wash at between 2300-2850rpm depending on the cycle selected and at approximately 4200rpm on Drain.

Drain Cycle

The drain pump is a self priming centrifugal pump which only pumps when the motor is rotating in the drain direction (counter-clockwise). The outlet pipe has a non return flap valve to prevent soiled water returning to the tub.

Diagnostics Quick Reference Charts

To Enter Diagnostics Mode

DishDrawer Diagnostics can **only** be entered in Power Off mode, i.e. when there is no display on the LCD or the badge LED's are off. Diagnostics is entered by holding the **Keylock** and **Start/Pause** buttons simultaneously for 5 seconds. Ensure that **Keylock** is pushed first.

Warning: As there is no protection in this mode it is possible to turn the element on with no water in the tub. It is advised to avoid turning on the element without water in the tub.

Display/Download Mode:-

Press and hold Keylock, then Start/Pause for 5 seconds

All LEDs & LCD segments except Keylock are illuminated

Press Start/Pause

This initiates Pen upload via lower tub-home light pipe. At the same time the current and then the previous fault code will be displayed on the secondary control panel LEDs. Refer to fault code descriptions - Page 3 for LED Codes.

Press Keylock

This will clear current fault code. Note if you press Keylock again you will remove the previous fault

Press Power *to exit*

Hardware Output Test Mode:-

Press and hold Keylock, then Start/Pause for 5 seconds

All LEDs & LCD segments except Keylock are illuminated

Press Power Button Once

HO will show in the display (integrated: Heavy, Normal, Fast, Delicate, Rinse LEDs showing)

Press Start/Pause

Scroll through the following outputs using Start/Pause. Turn the outputs on & off using Keylock button.

Press Power t*o exit*

Note: Scrubbing Brush = output on, No Scrubbing Brush = output off *(on integrated models a green LED above the start/pause button is used in place of the scrubbing brush)*

C3 is used in the factory to empty the water softener before the product is packed.

LCD Display	Norm LED	Fast LED	Deli LED	Rinse LED	Hardware Output
bL	Off	Off	Off	*On*	Backlight
Er	Off	Off	*On*	Off	Element Relay
Ld	Off	Off	*On*	*On*	Lid Motors (will run for 10 seconds)
dd	Off	*On*	Off	Off	Detergent Diverter Valve
FU	Off	*On*	Off	*On*	Fill Water Valve
P1	Off	*On*	*On*	Off	Motor Wash direction (2300-2850 rpm)
P2	Off	*On*	*On*	*On*	Motor Drain direction (4200 rpm)
rd	*On*	Off	Off	Off	Rinse Aid Dispenser (dispenses current setting)
dF	*On*	Off	Off	*On*	Drying fan
LE	*On*	Off	*On*	Off	Rinse Aid LED
C1	*On*	Off	*On*	*On*	Water softener diverter valve
C2	*On*	*On*	Off	Off	Water softener brine pump
°C	*On*	*On*	Off	*On*	Displays current water temperature.
°E	*On*	*On*	*On*	Off	Displays controller rail voltage

Tub Home Sensor test:- *keylock symbol on = tub closed, off = tub open*

Fast Test Cycle:-

Press and hold Keylock, then Start/Pause for 5 seconds

All LEDs & LCD segments except Keylock are illuminated

Press Power Button Twice

FC will show in the display (integrated: Heavy, Normal, Delicate, Rinse LEDs showing)

Press Start/Pause Twice

The 5 minute fast test cycle will start

Press Power *to exit*

Warning: Only run this cycle if connected to a water supply

Continuous Cycle:-

Press and hold Keylock, then Start/Pause for 5 seconds

All LEDs & LCD segments except Keylock are illuminated

Press Power Button Three Times

CC will show in the display (integrated: Heavy, Normal, Rinse LEDs showing) **Press Start / Pause**

The last cycle that had been selected prior to going into diagnostics mode will be run continuously

Press Power *to exit*

Temperature & Voltage Display Mode:- *(not available on integrated models)*

Start a wash cycle running

Press & hold Keylock for 4 seconds

Keylock will be activated

Press & hold Start/Pause for 8 Seconds

LCD will now alternate between °C symbol & the water

Press Start/Pause

LCD will now alternate between °E symbol & the controllers rail voltage

Fault Code Descriptions

A = The answer   » = Advance to this question

F1 The flood switch is activated for more than 6 seconds

F1 HEAVY NORMAL FAST DELICATE RINSE

	Yes	No
1. Did a flood occur? (N.B. The flood may have dried up)	»2	»12
2 Is the lid sealing on the tub correctly?	»3	»A
3 Is there a high water level in the tub?	»4	»6
4 Is the water valve leaking?	»A	»5
5 Is the DishDrawer priming correctly?	»11	»6
6 Is the spray arm split?	»A	»7
7 Is the spray arm running freely?	»8	»A
8 Is water leaking from a split inlet or drain hose?	»A	»9
9 Is water leaking around the heater plate O rings.	»A	»10
10 Carry out more testing to locate the source of the leak.	»A	»A
11 The drain hose may have been blocked or partially blocked.	»A	»A
12 Is there condensation or foreign matter around the chassis flood switch PCB?	»A	»13
13 If power fails to the bottom tub or if the bottom controller is faulty it will cause the top tub to F1	»A	»14
14 Substitute the Chassis PCB	»A	»A

F4 No temperature increase has been sensed while the element is on

F4 HEAVY NORMAL FAST DELICATE RINSE

	Yes	No
1 Does the element heat in diagnostics?	»7	»2
2 Test the resistance of the element at the plug on the controller, is it OK?	»3	»5
3 Is the plug making a good connection onto the controller?	»4	»A
4 Replace the controller.	»A	»A
5 Is the wiring and the edge connections down on the element OK?	»6	»A
6 Test the resistance of the element and replace if necessary.	»A	»A
7 Is the resistance of the temperature sensor measuring from the plug on the controller OK?	»8	»9
8 Replace controller.	»A	»A
9 Is the wiring and the edge connections down to the temperature sensor OK?	»10	»A
10 Replace the element.	»A	»A

F9 Electronics Failure (EEPROM access error)

F9 HEAVY NORMAL FAST DELICATE RINSE

	Yes	No
1 Isolate the power to the DishDrawer for 10 seconds then retry, does the fault clear?	»A	»2
2 Replace controller	»A	»A

F2 The motor is not sensed to be rotating

F2 HEAVY NORMAL FAST DELICATE RINSE

	Yes	No
1 Is the rotor jammed?	»2	»3
2 Free jammed rotor, check for damage to rotor and rotor housing.	»A	»A
3 Is the stator wiring from controller OK? Check stator windings for correct resistance are they OK?	»5	»4
4 Repair wiring or replace stator as required.	»A	»A
5 Is the rotor position sensor clipped into the stator correctly and plugged onto the controller with a good connection?	»6	»A
6 Substitute with a new rotor position sensor.	»A	»A

F3 Water temperature sensed at greater than 85°C / 185°F

F3 HEAVY NORMAL FAST DELICATE RINSE

	Yes	No
1 Is incoming water greater than 85°C/185°F?	»2	»3
2 Adjust incoming water temperature.	»A	»A
3 Is the element on all the time?	»4	»5
4 Replace the electronic controller.	»A	»A
5 Are the wiring & connections from the controller to the element all OK?	»6	»A
6 Are there any signs of moisture around the temperature sensor?	»8	»7
7 Is the resistance of the temperature sensor OK?	»10	»9
8 Locate & repair source of leak.	»A	»A
9 Replace element	»A	»A
10 Run through test cycles to try & induce fault again	»A	»A

Poor Dry Performance

	Yes	No
1 Is the customer complaining of plastic items not drying? (due to their low thermal mass plastics give inherently bad drying performance)	»A	»2
2 Is the customer using rinse aid?	»3	»5
3 Is the customer using Fast or Eco cycles?	»4	»6
4 Due to lower final rinse temperatures dry performance is compromised when using Fast & Eco cycles (there is less residual heat for drying at the end of the cycle)	»A	»A
5 Advise the customer about the use of rinse aid to improve dry performance.	»A	»A
6 Is the rinse aid setting high enough for the water hardness in the area? (turn the rinse agent up to a high setting)	»7	»A
7 Check the rinse aid dispenser in diagnostics to make sure it is dispensing the correct amount.	»A	»A

U1 Machine Failed to Prime with Water within a Given Time

⊛ HEAVY NORMAL FAST DELICATE RINSE

	Yes	No
1 Is the tap turned on?	»2	»A
2 Is the spray arm in place? (spray arm may have been refitted since U1 fault occurred)	»3	»A
3 Activate the water inlet valve in diagnostics. Does any water enter the machine?	»4	»8
4 Is the impellor on the rotor slipping?	»13	»5
5 Is the supply water pressure above 30Kpa/4.3p.s.i?»	6	»7
6 Check the water inlet hoses & valves for an obstruction.	»A	»A

	Yes	No
7 Minimum incoming water pressure for correct DishDrawer operation is 30Kpa /4.3p.s.i	»A	»A8
	Is the resistance of the water valve measured at the plug on the controller OK?	»9	»11
9 Is there 24V dc coming from the controller during the water valve test?	»6	»10
10 Replace the controller	»A	»A
11 Is the wiring & edge connections down to the water valve OK?	»12	»A
12 Replace the water valve	»A	»A
13 Replace the rotor	»A	»A

Poor Wash Performance

Cause of Problem	How to Resolve Problem
Customers Complaint Food Particles left on Dishes	
Spray arm has stopped rotating.	a) One of the dishes / cutlery / utensils has fallen through the basket and jammed the spray arm, remove the obstruction. b) Filter plate, drain filter, or drain filter access panel is not installed correctly and is causing the spray arm to jam.
The product is being overloaded or incorrectly loaded with dishes.	Advise customer of correct loading.
Customer is selecting the wrong wash cycle for the soil level on the dishes.	Advise customer about reduced water temperatures (up to 20°C / 70°F lower) wash times when using Fast and Eco cycles.

Customers Complaint Coffee/Tea Stains left in Cups	
Not enough detergent being used. To remove these requires a stronger concentration of detergent in the water. More detergent is also required in hard water areas as minerals in the hard water area reduce the effectiveness of the detergent.	Fill the main-wash detergent cup to the top & for best results also fill the pre-wash detergent cup. Run on normal or heavy cycles not Eco.
The product is being overloaded which is preventing water reaching the cups on the upper cup racks.	Advise customer of correct loading.

Customers Complaint Dishes have blotchy marks on them that look like water stain marks not food	
Not enough rinse aid being used. The water is not soft enough during the final rinse and therefore hard water droplets containing impurities are drying on the dishes instead of running off during the dry cycle.	Confirm that the customer is using rinse aid. The rinse agent may need to be turned up to a higher setting (4 or 5 lights) and for optimum dry performance run the DishDrawer on normal or heavy cycles not Eco. Check that the rinse aid dispenser is dispensing correctly in diagnostics.

Customers Complaint Glasses & Cutlery have a Cloudy White film on them and/or Plates have a White Chalky Film on them	
Hard water & not enough detergent being used or water softener setting is too low (where fitted). Minerals from the water are building up on dishes.	Once this film forms on the dishes it cannot be removed by normal running in the dishwasher. They need to be cleaned by soaking them in an acidic solution such as white vinegar and water. To prevent the build up recurring the customer will need to fill both the main-wash & pre-wash detergent cups to the top with a powder detergent and we would recommend running on normal cycles. On models with a water softener, modify the setting. In problem areas with very hard water the customer may need to use a detergent additive designed for use in hard water areas or fit a water softener to the incoming water supply or purchase a Water Softener model.

Wiring Diagram - For Individual Drawer

Phase 3.5 Dishdrawer Wiring diagram (1 drawer only shown)