



Donut Robot[®] Mark VI

Operator's Manual and Technical Supplement

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If you accept the machine from the shipping company, you are, in effect, saying that the machine is in good condition, and you must pay for the machine. Belshaw cannot pay for shipping damage, because the freight company has accepted the machine from Belshaw in good condition, and is responsible for its safe delivery. **For your protection,** inspect the machine to see that no parts are bent, scratched, or otherwise damaged. If any damage has occurred in shipping, file a freight claim with the shipping company immediately.

IMPORTANT

Keep this manual for reference purposes.
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EQUIPMENT RECORD

Please provide the information below when you correspond with us about your machine.

Purchased by _____

Installed by _____

Date of Installation _____

Model number _____

Serial number _____

011108

MN-1032EN

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Preface

The Donut Robot Mark VI is designed to automatically cut and fry cake donut products, and to fry yeast-raised donut products. It is not designed to cut or fry any other products.

The Mark VI uses electrical elements to heat shortening in its kettle. In the European Community, the machine is available with the following electrical configurations:

- 380 volts, 3 phase, 50 hertz
- 415 volts, 3 phase, 50 hertz

The Donut Robot Mark VI produces only 71.5 dB(A) of equivalent continuous A-weighted sound pressure at work stations. This has been determined during a dry run of the machine, using a Bruel & Kjaer sound level meter, type 2236.

The Mark VI is meant to be used on a flat, stationary table or countertop. The operator must work safely at all times and read this manual and follow its instructions and warnings.

Study the instructions and warnings in this manual carefully. A thorough understanding of how to install, maintain, and safely operate the Donut Robot Mark VI will prevent production delays and injuries.

To use the Mark VI safely, heed the following warnings and all other warnings that appear in this manual:

- Make sure the machine is secured to the work surface. Doing so will prevent the machine from moving or falling, which could cause serious injury.
- Never let water and hot shortening come in contact with each other. Moisture causes hot shortening to spatter, which may cause serious burns.

- Do not overfill the kettle with shortening. If shortening overflows the kettle, it could cause serious burns or could cause someone to slip on the floor and be seriously injured.
- Hot shortening can cause serious burns. Make sure that the system and the shortening are cool before attempting any adjustment, repair, disassembly, or cleaning.
- To avoid electrocution or other injury, unplug the machine before attempting any adjustment, repair, disassembly, or cleaning.
- To avoid damaging the machine, never use force to assemble, disassemble, operate, clean, or maintain it.
- Be careful never to get shortening, water, or other materials on the floor. If anything does get spilled on the floor, mop it up immediately. Materials on the floor can cause people to slip or fall, resulting in serious injury or loss of life.
- To prevent unintentional startup and possible fire, unplug the machine if there is a local power outage. When the power is restored, it is safe to plug the machine in again.
- To avoid electrocution, make sure that all electrical cords are not frayed or cracked and that they do not pass through any water or shortening.
- Make sure that all electrical cords are routed so that no one will trip over them.
- Always turn the thermostat knob below 200°F/93°C before filtering shortening,

draining the fryer, or cleaning the fryer. Draining shortening with the heating element on may cause fire, serious injury, or even death.

- Before attempting to remove the conveyor assembly from the fryer, always allow the shortening to cool and drain the shortening out of the fryer. If you do not, shortening may splash on you and on the floor, creating a safety hazard. If the shortening is hot, you may suffer serious burns.

Read each step **completely** before doing what it tells you to do.

Making Yeast-Raised Donuts

1. Remove the hopper and plunger, the cutter head, and the swing column, if they are installed.
2. Pivot the splash guard down. (See Figure 1-1.)
3. When the shortening reaches the correct frying temperature, it should just cover the flight bars.

Shortening expands as it increases in temperature. This means that unless the shortening is at frying temperature when you put it in the kettle, you should put it in gradually. Let the shortening in the kettle heat up before you add more.

Put shortening in the kettle using one of these methods:

- Use the optional EZ Melt to melt shortening and transfer it to the kettle. See your EZ Melt manual.
- Pre-melt shortening in a pan on the stove and carefully pour it into the kettle.

WARNING

Hot shortening causes severe burns.

- Put solid shortening into the kettle, packing it tightly around the elements and bulbs.

WARNING

Air spaces can cause the shortening to overheat and catch on fire.

4. Turn the heating element on by turning the thermostat knob to the desired temperature. Two pilot lights will come on. The one on the top of the heater head indicates that the heating element has been turned on (that the thermostat is set above 200°F/93°C). The one on the front of the heater head indicates that the shortening has not yet reached the desired temperature. This light will go out if the high temperature limit control breaks the circuit.

Note: If the high temperature limit control does break the circuit, push the red reset button on the back of the heater head.

5. Wait for the shortening to reach the desired temperature. When it does, the light on the front of the heater head will go out. **DO NOT** run the conveyor until all the shortening has melted.
6. Install your Feed Table and load proof cloths on it. Refer to Section 5, "Related Products," for complete installation and operation instructions for the Feed Table.
7. Choose the appropriate fry time for your product using the fry time control knob on the heater head.
8. Using the switch on the heater head, select one cut per pocket. Although the machine will not be cutting donuts, it needs to be at this setting when frying yeast-raised products.

9. Turn on the conveyor drive using the power switch on the heater head.

Note: If the conveyor becomes jammed, a warning buzzer will sound about a minute later and stop when the conveyor is turned off. The conveyor drive is impedance-protected so it will not burn out due to jamming.

WARNING

If the conveyor becomes jammed: 1. Turn off the conveyor drive and the heater. 2. Allow the system to cool down. HOT SHORTENING IS DANGEROUS. 3. Determine the cause of the jamming. 4. Clear it. 5. Restart the system.

10. Continue adding shortening to the kettle to maintain the proper shortening level (see step 1). There are two ways to do this:
 - Use the optional EZ Melt, transfer more shortening from it. See the EZ Melt manual.
 - Pre-melt some shortening in a pan on the stove and carefully pour it into the kettle.
11. Continue loading proof cloths onto the Feed Table as needed.

Making Cake Donuts

1. Pivot the splash guard toward the outfeed end of the fryer. (See Figure 1-2.)
2. Install the swing column, connect the swing connecting rod, install the cutter head, and install the hopper and plunger, if you have not done so already.
3. When the shortening reaches the correct frying temperature, it should just cover the flight bars.

Shortening expands as it increases in temperature. This means that unless the shortening is at frying temperature when you put it in the kettle, you should put it in gradually. Let the shortening in the kettle heat up before you add more.

Put shortening in the kettle using one of these methods:

- Use the optional EZ Melt to melt shortening and transfer it to the kettle. See your EZ Melt manual.
- Pre-melt shortening in a pan on the stove and carefully pour it into the kettle.

WARNING

Hot shortening causes severe burns.

- Put solid shortening into the kettle, packing it tightly around the elements and bulbs.

WARNING

Air spaces can cause the shortening to overheat and catch on fire.

-
4. Turn the heating element on by turning the thermostat knob to the desired temperature. Two pilot lights will come on. The one on top of the heater head indicates that the heating element has been turned on (that the thermostat is set above 200°F/93°C). The one on the front of the heater head indicates that the shortening has not yet reached the desired temperature. This light will go out if the high temperature limit control breaks the circuit.

Note: If the high temperature limit control does break the circuit, push the red reset button on the back of the heater head.

5. Wait for the shortening to reach the desired temperature. When it does, the pilot on the front of the heater head will go out. **DO NOT** run the conveyor until all the shortening has melted.
6. Disengage the swing connecting rod from the swing column throw arm and swing the hopper away from over the fryer.
7. Adjust the size selector dial on the cutter head's crankshaft assembly. This dial regulates the donut weight. The higher the setting, the larger the donuts will be. Adjust the dial setting as follows:
 - a. Unscrew the dial lock nut 1/2 turn.
 - b. Turn the dial to the desired position, as indicated by the marks on the crank plate.
 - c. Tighten the dial in place with the lock nut. Tighten it using your fingers only.
8. Put dough into the hopper. Prime the hopper to expel any air that may be trapped in the bottom of it. To prime the hopper:
 - a. Hold a mixing bowl under the cutter.
 - b. Hold down the prime switch on the cutter head and run the cutter until it has dropped two or three donuts into the bowl.

Note: Holding down the prime switch causes the cutter to run continuously without the normal delay between cuts.

- c. Put the dough in the bowl back in the hopper.

9. Return the hopper into position over the fryer and reconnect the swing connecting rod to the swing column throw arm.
10. Choose the appropriate fry time for your product using the fry time control knob on the heater head.
11. Using the switch on the heater head, select the number of donuts—one or two—you want to cut during each swing cycle of the hopper.
12. Turn on the cutter using the power switch on the cutter head.
13. Turn on the conveyor drive using the power switch on the heater head.

Note: If the conveyor becomes jammed, a warning buzzer will sound about a minute later and stop when the conveyor is turned off. The conveyor drive is impedance-protected so it will not burn out due to jamming.

WARNING

If the conveyor becomes jammed: 1. Turn off the conveyor drive and the heater. 2. Allow the system to cool down. HOT SHORTENING IS DANGEROUS. 3. Determine the cause of the jamming. 4. Clear it. 5. Restart the system.

14. Continue adding shortening to the kettle to maintain the proper shortening level (see step 3). There are two ways to do this:
 - If you are using the optional EZ Melt, transfer more shortening from it. See your EZ Melt manual.
 - Melt some shortening in a pan on the stove and carefully pour it into the kettle.

-
15. Continue adding dough to the hopper as needed. Add dough to the hopper without priming it again as long as it does not become empty. If the hopper does become empty, it must be primed again.
 16. When filling the hopper for the last time, use all of the dough in the hopper. To do so, push the dough to the bottom of the hopper using a rubber scraper or spatula. Be careful not to jam the scraper in the donut cutter.

WARNING
To avoid injury, never put your hand in or under the hopper while the machine is on.

WARNING

Thoroughly clean and dry the floor if shortening, water, or other materials are spilled. Materials spilled on the floor can cause serious injury or loss of life.

WARNING

To avoid electrocuting yourself or damaging the machine, never allow water, steam, shortening, cleaning solution, or any other liquid to enter the heater head or cutter head assemblies.

Daily

You must clean the hopper and the plunger daily, or after each use. Follow these general guidelines:

- Use household dishwashing detergent. Do not use strong alkali cleaners such as lye, soda ash, or trisodium phosphate, as these discolor and corrode aluminum.
- Wash, dry, and lubricate parts thoroughly to prevent rusting.
- When washing parts by hand, wash each part separately; do not put any other utensil or dish in the sink with the part being washed.

To clean the hopper and the plunger:

1. Unplug the cutter head power cord.
2. Remove the plunger and the hopper. To do so, reverse the procedures found in steps 2 and 3 of “Assembling the Cutter” in Section 1 of the Technical Supplement.
3. Pre-soak the parts, if necessary, to loosen stubborn or dried-on deposits.
4. Wash the hopper and the plunger separately in hot water and a detergent recommended for aluminum. Use a non-scratching plastic scouring cloth to remove soil and restore luster.
5. Rinse the hopper and the plunger separately in clear, hot water (170°-190°F/77°-88°C).
6. Dry each part completely.
7. Dip the plunger and the hopper cylinder in mineral oil or liquid shortening to prevent rust and sticking.
8. Wipe the cutter head assembly with a soft cloth dampened with hot water and an appropriate cleaner. Wipe it with another damp cloth to remove the cleaner. Wipe it dry.

WARNING

To avoid electrocution or damage to the machine, never immerse the cutter head.

As Needed

Filter the shortening in the fryer daily or weekly, depending on the level of donut production. The method used to filter the shortening depends on whether you are using an optional EZ Melt, an optional Filter Flo Siphon, or neither.

Filtering with an EZ Melt

If you have an EZ Melt, you should rinse the conveyor and the kettle when you filter shortening. To rinse and filter using an EZ Melt, follow the steps below. Refer to your EZ Melt manual for complete instructions.

1. Disconnect the machine from the power source.
2. Unplug the cutter head power cord.
3. Let the shortening cool to 100°F/38°C.
4. Drain the shortening from the fryer kettle into the EZ Melt. To do this, reach under the table and open the drain valve underneath the Donut Robot. Let the shortening drain into the EZ Melt. See Figure 2-1.

WARNING

Thoroughly clean and dry the floor if shortening is spilled. Shortening on the floor can cause serious injury or loss of life.

5. Using the rinsing hose of the EZ Melt, rinse the conveyor assembly and the kettle with shortening. Allow the shortening to drain into the EZ Melt.
6. Close the drain valve.

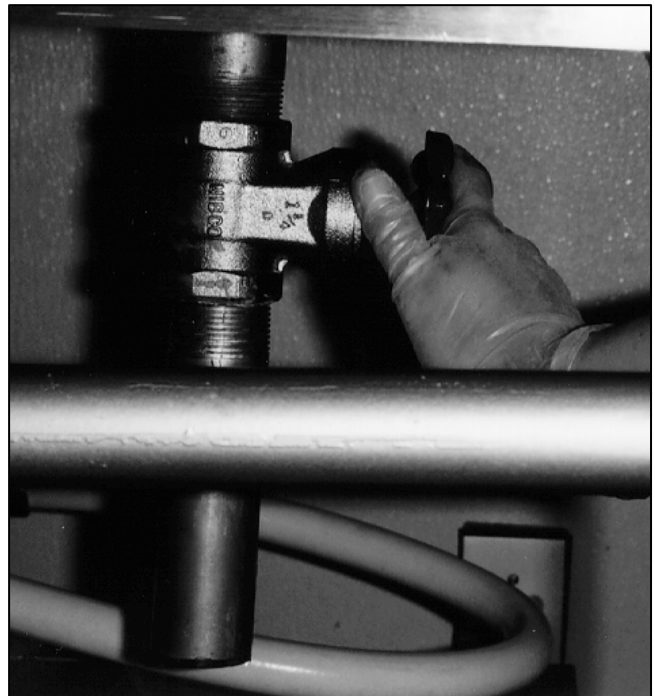


Figure 2-1. Opening the Drain Valve.

Filtering with a Filter Flo Siphon

To filter shortening using an optional Filter Flo Siphon, refer to “Filter Flo Siphon” in Appendix A for instructions.

Filtering without Accessories

If you do not have an EZ Melt or a Filter Flo Siphon, follow the steps below to filter your shortening. You could also use this procedure if you wanted to clean your turner and drop plate.

1. Disconnect the machine from the power source.
2. Let the shortening cool to 100°F/38°C.
3. Unplug the cutter head power cord.
4. Lift the cutter head off the swing column.
5. Remove the conveyor assembly as explained below. Get another person to help you.
 - a. Obtain two pieces of wood, at least 1” x 1” x 15” (2.5 cm x 2.5 cm x 38 cm).
 - b. Lift off the swing connecting rod.

- c. Lift the conveyor assembly from the conveyor locating pin and pull it away from the heater head to disengage the main drive shaft coupling from the conveyor drive coupling.
- d. Lift the outfeed end of the conveyor. Slide one piece of wood under the conveyor and lay it across the top of the kettle. Lift the other end of the conveyor and do the same with the other piece of wood. The conveyor will now be resting on the two pieces of wood. Let the shortening drain off of the conveyor and into the kettle. See Figure 2-2.



Figure 2-2. Draining the Shortening off of the Conveyor.

- 6. If you want to clean the turner assembly, remove and clean it as follows:
 - a. Move the flight bars of the conveyor until the turner is in the middle of a flight pocket.
 - b. Swing the turner cam weight up.
 - c. Lift up and pull out on the turner cam assembly. See Figure 2-3.
 - d. Lift out the turner assembly. See Figure 2-4.
 - e. Wash the turner cam assembly and turner assembly using mild detergent and warm water.



Figure 2-3. Removing the Turner Cam Assembly.



Figure 2-4. Removing the Turner Assembly.

- f. Rinse the turner cam assembly and turner assembly in clear water.
- g. Dry these parts thoroughly.

WARNING

Dry all parts thoroughly. Moisture causes hot shortening to spatter, which may cause serious injury.

7. If you want to clean the drop plate, remove it by lifting its forward end and sliding it toward the rear of the conveyor. (See Figure 2-5. The Donut Robot Mark V is shown.) Wipe the drop plate with a damp cloth.

CAUTION

If the drop plate is scratched, donuts will stick to it. To prevent this from happening, always wipe the drop plate in the direction of the grain in the metal, which runs parallel to the length of the conveyor, and never use abrasive cleaners.



Figure 2-5. Removing the Drop Plate.

8. After the shortening has drained off of the conveyor assembly, set the conveyor assembly aside.
 - Check again to see that the shortening in the kettle has cooled to 100°F/38°C.
10. Remove the shortening from the fryer kettle. Follow these steps:
 - a. Place a large metal bucket underneath the drain valve.
 - b. Attach a filter to the bucket.

- c. Slowly open the drain valve and allow the shortening to drain out. (See Figure 2-1.)
- d. If the bucket becomes full, close the drain valve. Continue draining shortening into another bucket.

WARNING

Do not use plastic buckets. If the shortening is not cool enough, the buckets will melt; possibly causing you to be burned, and causing shortening to get on the floor.

WARNING

Do not allow the shortening to overflow the buckets. Shortening will get on the floor, and if the shortening is not cool enough, you may be burned.

WARNING

Thoroughly clean and dry the floor if shortening is spilled. Shortening on the floor can cause serious injury or loss of life.

11. Brush off any carbon that has accumulated on the heating element. Accumulated carbon can cause corrosion and ineffective heating.
12. Tilt the heater head assembly back, raising the heating element out of the kettle.
13. Using a non-abrasive, non-metallic spatula, scrape the carbon, sediment, and any remaining shortening into the drain valve.
14. Tilt the heater head assembly down.
15. Put the drop plate, turner cam assembly, and turner assembly back on the conveyor assembly.

16. Install the conveyor assembly.
17. Close the drain valve.

Monthly

To ensure that your Mark V-DW continues to work well and to make good products, you must clean the conveyor and the kettle thoroughly every month. There are four basic steps to cleaning the conveyor and the fryer kettle: removing the shortening, washing, rinsing, and drying. You must perform all four steps and perform them in the order listed.

Removing the Shortening

1. Disconnect the machine from the power source.
2. Unplug the cutter head power cord.
3. Let the shortening cool to 100°F/38°C.
4. Remove the shortening from the fryer kettle. To do this, place an EZ Melt or a large metal bucket underneath the drain valve. Slowly open the drain valve and allow the shortening to drain out. (See Figure 2-1.) If you are using a bucket and the bucket becomes full, close the drain valve. Continue draining into another bucket.

WARNING

Thoroughly clean and dry the floor if shortening is spilled. Shortening on the floor can cause serious injury or loss of life.

5. Lift the cutter head off the swing column.
6. If you have an EZ Melt, use the rinsing hose to rinse the conveyor assembly and the kettle with shortening. Allow the shortening to drain into the EZ Melt.
7. When all of the shortening has dripped off of the conveyor assembly, remove the conveyor assembly as follows:

- a. Disengage the swing connecting rod from the swing column.
 - b. Lift the conveyor assembly from the conveyor locating pin and pull it away from the heater head to disengage the main drive shaft coupling from the conveyor drive coupling.
 - c. Remove and set aside the conveyor assembly.
8. Brush off any carbon that has accumulated on the heating element. Accumulated carbon can cause corrosion and ineffective heating.
 9. If you have an EZ Melt, use the rinsing hose to rinse the kettle with shortening. Allow the shortening to drain into the EZ Melt.
 10. Install the conveyor assembly.
 11. Close the drain valve.

Washing

1. Pour hot water into the kettle, up to the normal level of the shortening. Add about 2 oz/59 ml of trisodium phosphate or other appropriate cleaner.
2. Connect the machine to the power source. Heat the solution to 200°F/93°C. Turn on the conveyor. Keep the solution at this temperature for 15-20 minutes.
3. Turn off the conveyor and scrub the soiled parts while the solution is under heat. Do not use any abrasive cleaners or scrapers.
4. Turn off the heater and disconnect the machine from the power source. Allow the cleaning solution to cool to 100°F/38°C.
5. Remove the cleaning solution from the fryer kettle. To do this, place a large metal bucket underneath the drain valve. Slowly open the drain valve and allow the cleaning solution to drain into the bucket. If the bucket becomes full, close the drain valve and replace the bucket. Continue draining into another bucket.

WARNING

Do not use plastic buckets. If the cleaning solution is not cool enough, the buckets will melt; possibly causing burns, and causing cleaning solution to get on the floor.

WARNING

Do not allow the cleaning solution to overflow the buckets. Cleaning solution will get on the floor, and if the solution is not cool enough, you may be burned.

WARNING

Thoroughly clean and dry the floor if cleaning solution is spilled. Liquid on the floor can cause serious injury or loss of life.

6. Remove the conveyor and tilt the heater head back as you did before.
7. Lift the kettle out of the fryer case.
8. Rinse the kettle thoroughly and dry it on the outside.
9. Install the kettle, tilt the heater head assembly down, and install the conveyor assembly as before.
10. Close the drain valve.

Rinsing

1. Pour clean water into the kettle, up to the normal level of the shortening.
2. Connect the machine to the power source. Heat the water to 200°F/93°C.
3. Run the conveyor for 5-10 minutes.
4. Turn off the heater and disconnect the machine from the power source. Allow the water to cool to 100°F/38°C.

5. Remove the water from the fryer kettle by placing a large metal bucket underneath the drain valve. Slowly open the drain valve and allow the water to drain into the bucket. If the bucket becomes full, close the drain valve and replace the bucket. Continue draining into another bucket.

WARNING

Do not use plastic buckets. If the water is not cool enough, the buckets will melt; possibly causing you to be burned, and causing water to get on the floor.

WARNING

Do not allow the water to overflow the buckets. Water may spill, and if the water is not cool enough, you may be burned.

WARNING

Thoroughly clean and dry the floor if water is spilled. Water on the floor can cause serious injury or loss of life.

Drying

1. With the help of another person, lift the conveyor assembly out of the fryer case. Tilt the heater head assembly back.
2. Thoroughly dry all parts, including the conveyor, the heating elements, and the inside of the kettle.

WARNING

All parts must be dried thoroughly. Moisture causes hot shortening to spatter, which may cause serious injury.

3. Assemble the Donut Robot as before and close the drain valve.

3

Maintenance

WARNING

To avoid being burned, electrocuted, or otherwise injured, always unplug the machine and allow it to cool before performing any maintenance.

Lubricating

Daily

Before using the machine each day, apply edible-grade mineral oil to the plunger connecting rod. The oil should penetrate the ball lock and the spring socket. See Figure 3-1.



Figure 3-1. Lubricating the Connecting Rod Assembly.

Weekly

Apply a few drops of SAE 30 machine oil to the swing column where it contacts the swing column bracket.

Taking Care of the Plunger, Hopper, and Cylinder

The plunger, hopper, and cylinder of your Donut Robot are precision instruments. If you take good care of them, they will perform well for years. Follow these guidelines:

- Clean these parts only in the manner explained in this manual.
- Handle these parts with care. Avoid dropping them on hard surfaces.
- Do not force the machine if it becomes jammed. To avoid damaging the plunger, disassemble the machine and remove any obstructions.

4

Donut-Making Helps

Tips on Making Quality Cake Donuts

- Use the correct batter temperature.
In general, the correct batter temperature is 75°-80° (24°-27°C). Check the mix manufacturer's instructions, as the recommended temperature range may vary.
If the batter is too warm, the donuts will lack volume and may "ring out" or be misshapen. If the batter is too cold, the donuts will stay under the shortening too long, fry too slowly, and crack open or ball up. They may also absorb excess shortening and lose volume.
- Use the correct floor time.
A floor time of 10 minutes between mixing and cutting allows the baking powder to react with the water. This helps the donuts attain the proper volume and absorb the proper amount of shortening.
If the floor time exceeds 30 minutes, the mix will gas off, the donuts will lose volume and shape and will absorb too much shortening.
- Use the correct frying temperature.
The correct shortening temperature for frying is 370°-380°F (188°-193°C).
If the shortening is too hot, the donuts will fry too quickly on the outside and will lose volume. The donuts may also become dense inside.

If the shortening is too cold, the donuts will spread too rapidly, will form large rings, will tend to crack open, will be too light in appearance, and will absorb too much shortening.

- Maintain the proper shortening level. We recommend a distance of 1 1/4" (3.2 cm) between the cutter and the shortening.

If the shortening is too deep, the donuts may not turn over when they reach the turner, causing them to cook unevenly.

If the shortening is too shallow (too far below the cutter), the donuts may not drop flat, may turn over while submerging and surfacing, and may become irregular, cracked, or rough-cruste

- Ensure that the donuts absorb the right amount of shortening.

Donuts should absorb 1-1/2 to 3 oz (42 to 85 g) of shortening per dozen, depending on their weight. You can achieve proper absorption by following tips 1-3.

- If the donuts do not absorb enough shortening, they will not keep well.

If they absorb too much shortening, they will lose volume and may become misshapen. If this happens, follow tips 1-3, mix the batter a little longer than usual, turn the donuts as soon as they become golden brown, and turn the donuts only once.

Temperature Conversion

To convert temperatures from Fahrenheit to Celsius, subtract 32 from °F and divide the result by 1.8. For example, $212^{\circ}\text{F} - 32 / 1.8 = 100^{\circ}\text{C}$.

To convert temperatures from Celsius to Fahrenheit, multiply °C by 1.8 and add 32 to the result. For example, $(100^{\circ}\text{C} \times 1.8) + 32 = 212^{\circ}\text{F}$.

°F	°C	°F	°C
55	12.8	340	171.1
60	15.6	345	173.9
65	18.3	350	176.7
70	21.2	355	179.4
75	23.9	360	182.2
80	26.7	365	185.0
325	162.8	370	187.8
330	165.6	375	190.6
335	168.3	380	193.3

Ratios of Plunger Sizes to Donut Weights

The weights given are for donuts without icings or other toppings. They are provided for reference only, as weights vary according to the density of the batter.

Plunger Size	Donut Weight per Dozen
1"	5-8 oz (142-227 g)
1 7/16"	10-17 oz (283-482 g)
1 9/16"	14-21 oz (397-595 g)
1 13/16"	19-23 oz (539-652 g)

Calculating Correct Water Temperature

The following is an example of how to calculate the correct water temperature to use. You must use your own room temperature, dry mix temperature, desired batter temperature, and, if you are making yeast-raised donuts, estimated temperature increase during mixing.

	Cake Donuts		Yeast-Raised Donuts	
	°F	°C	°F	°C
Room temperature	72	22.2	72	22.2
Dry mix temperature	+70	+21.1	+70	+21.1
Total A	142	43.3	142	43.3
Desired batter temperature	75	23.9	80	26.7
	<u>x3</u>	<u>x3</u>	<u>x3</u>	<u>x3</u>
Total B	225	71.7	240	80.1
Total B	225	71.7	240	80.1
-Total A	<u>-142</u>	<u>-43.3</u>	<u>-142</u>	<u>-43.3</u>
Desired water temp. for cake donuts	83°F	28.4°C	98	36.8
			↓	↓
			98	36.8
Temperature increase during mixing (average: 30°F [17°C])			<u>-30</u>	<u>-17</u>
Desired water temperature for yeast-raised donuts	68°F		68°F	19.8°C

5

Related Products

This appendix contains information about the following products which you might use with the Donut Robot®:

- Feed Table
- Roto Cooler
- Icing Finishing Tree and Roto Cooler
- Filter Flo Siphon

FT2-DW Feed Table

SPECIFICATIONS				
Dimensions	Shipping Weight	Electrical Data	Construction	Standard Equipment
L = 49"/124.5 cm W = 19-1/8"/48.6 cm H = 11"/28 cm	55 lb./ 24.8 kg	115 V 1 Phase 50 Hz	Stainless steel, nickel-plated mild steel, and aluminum alloys.	Complete conveyor assembly, including drive system and controls. Does not include proofing cloths or proofing boards.

The FT2-DW Feed Table is designed to supply proofed yeast-raised donuts to the Mark VI.

The Feed Table produces less than 70 dB(A) of equivalent continuous A-weighted sound pressure at work stations. This has been determined while the machine has been running, using a Bruel & Kjaer Sound level meter, type 2236.

The Feed Table is meant to be used on a flat, stationary table or countertop, positioned end-to-end with the Donut Robot. The operator is expected to read and follow these instructions and warnings.

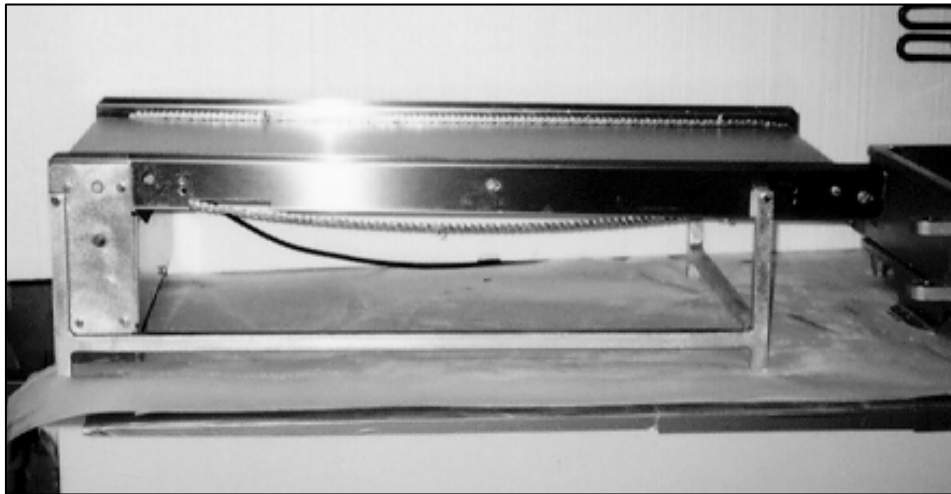


Figure 5-1. FT2-DW Feed Table.

Operation

1. Test to make sure that the automatic timing for the Feed Table is working. To do this:
 - a. Turn on the Donut Robot's conveyor drive.
 - b. Turn on the Feed Table's conveyor drive.

The Feed Table should receive a signal from the Donut Robot, move forward the distance needed to supply one pocket of donuts, and then stop until it receives the next signal.

2. Proof your donuts on the proofing cloths from the Feed Table.
3. Put a proofing board, with a proofing cloth on it, on the Feed Table.
4. Press the prime switch on the power head assembly. The hooks on the Feed Table will grab the proofing cloth off of the proofing board. Allow the cloth to advance to the front of the Feed Table.
5. Release the prime switch and turn on the main power. Remove the proofing board.

When the Feed Table is on, the Feed Table automatically advances donuts when the Donut Robot is ready to accept them. After

the donuts go into the fryer, the proofing cloths are carried underneath the Feed Table and fall onto the work surface.

6. Continue putting proofing cloths on the Feed Table.

CAUTION

To avoid damaging the Feed Table, never use force to assemble or operate it.

Maintenance and Cleaning

After Each Use

Use a soft, damp cloth for cleaning.

WARNING

To avoid electrocuting yourself or damaging the machine, never allow any liquid to enter the power head.

Roto Cooler

SPECIFICATIONS				
Dimensions	Shipping Weight	Electrical Data	Construction	Standard Equipment
Dia.=31"/79 cm H=6-5/8"/17 cm	17 lb/7.7 kg	120 V 1 Phase 50 Hz	Basket: High-density polyethylene. Base: Spun, polished, heavy-gauge aluminum.	Basket and turntable base with power cord and motor.

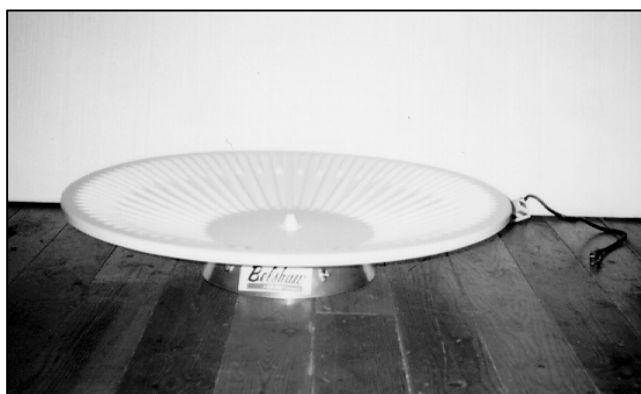


Figure 5-2. Roto Cooler.

The Roto Cooler is designed to catch and cool donuts as they drop from the outfeed end of the Donut Robot.

The Roto Cooler produces less than 70 dB(A) of equivalent continuous A-weighted sound pressure at work stations. This has been determined while the machine has been running, using a Bruel & Kjaer Sound level meter, type 2236.

The Roto Cooler is meant to be used on a flat, stationary table or countertop. The operator is expected to read and follow these instructions.

To use the Roto Cooler:

1. Place the Roto Cooler near the outfeed end of the Donut Robot so donuts will fall into it.
2. Connect the Roto Cooler power cord to the 120 V outlet on back of the Donut Robot's heater head.
3. Turn on the Roto Cooler. It will rotate and receive donuts. Remove cooled donuts from the Roto Cooler as needed.
4. When finished using the Roto Cooler, turn it off and unplug it.

WARNING

To avoid electrocuting yourself or damaging the machine, never immerse the base of the Roto Cooler.

5. Clean the Roto Cooler using soap and water and a non-abrasive cloth or scrubber.

Icing Finishing Tree and Roto Cooler

SPECIFICATIONS				
Dimensions	Shipping Weight	Electrical Data	Construction	Standard Equipment
Dia.=31"/79 cm H=32"/81 cm	24 lb/11 kg	120 V 1 Phase 50 Hz	Trays: Heavy-gauge aluminum. Basket: High-density polyethylene. Base: Spun, polished, heavy-gauge aluminum.	Power turntable and four trays, three of which have dividers.



Figure 5-3. Icing Finishing Tree and Roto Cooler.

The Roto Cooler is designed to catch and cool donuts as they drop from the outfeed end of the Donut Robot. It is meant to be used on a flat, stationary table or countertop.

The Roto Cooler produces less than 70 dB(A) of equivalent continuous A-weighted sound pressure at work stations. This has been determined while the machine has been running, using a Bruel & Kjaer Sound level meter, type 2236.

The Icing Finishing Tree, which mounts on the Roto Cooler, is designed to hold toppings in which donuts can be dipped. The operator is expected to read and follow these instructions.

To use the Roto Cooler and the Icing Finishing Tree:

1. Attach the Icing Finishing Tree to the Roto Cooler. Fill the trays with toppings.
2. Install and operate the Roto Cooler as explained in the previous section.
3. Decorate the donuts with the toppings in the trays.
4. When you are finished using the Roto Cooler and the Icing Finishing Tree, turn off the Roto Cooler and unplug it.

WARNING

To avoid electrocuting yourself or damaging the machine, never immerse the base of the Roto Cooler.

5. Clean the trays of the Roto Cooler and the Icing Finishing Tree using soap and water and a non-abrasive cloth or scrubber.

Filter Flo Siphon

SPECIFICATIONS			
Dimensions	Shipping Weight	Construction	Standard Equipment
H=16"/41 cm Dia.=6-1/4"/16 cm	3 lb/1.4 kg	Siphon tube and valve: nickel-plated steel. Handle: wood. Filter ring: powder-coated. Filters: flannel. Mounting brackets: aluminum alloy.	Siphon assembly including valve, filter, filter ring, and clamp.

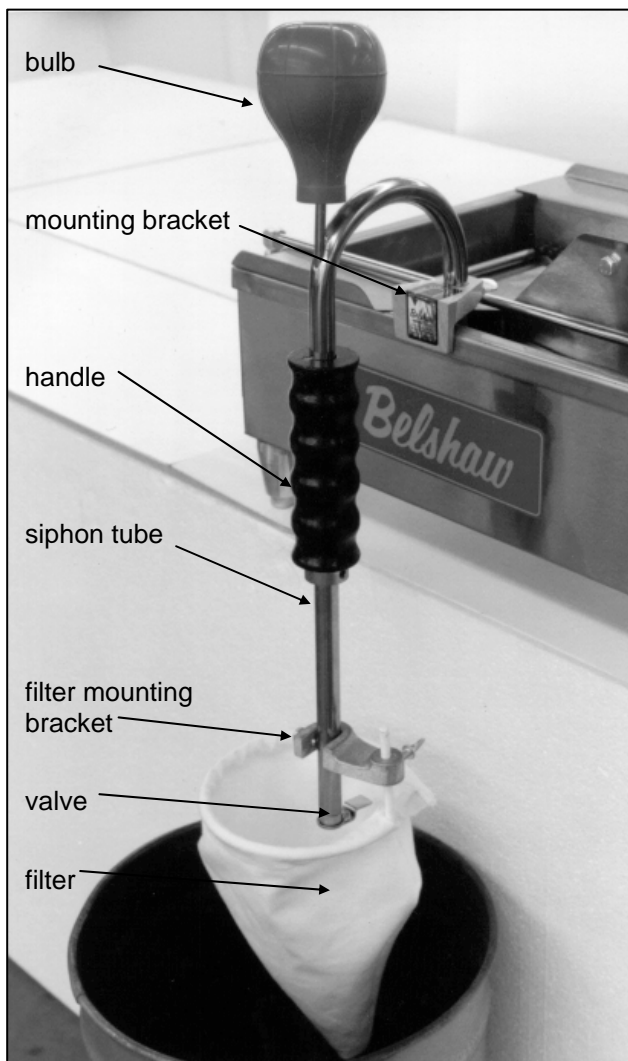


Figure 5-4. Filter Flo Siphon.

The Filter Flo Siphon is designed to drain and filter shortening from the kettle of the Donut Robot. The operator is expected to read and follow these instructions.

Installation

1. Let the shortening cool to 100°F/38°C.

WARNING

Hot shortening can cause serious burns. Never touch hot shortening. Never wear shorts while using the Filter Flo Siphon.

2. Place the mounting bracket, with the siphon tube in it, on the lip of the kettle. You may place it on the infeed end of the kettle, or on the front side of the kettle. If you place it on the front side, you must disconnect the swing connecting rod from the throw arm and move it out of the way.
3. Position the opening of the siphon tube near the bottom of the kettle.
4. Tighten the thumb screw in the mounting bracket.

5. Attach the filter assembly to the lower part of the siphon tube, as shown in Figure A-5. To do this:
 - a. Slide the opening in the filter mounting bracket around the siphon tube.
 - b. Adjust the filter mounting bracket vertically to ensure that the filter does not touch the valve assembly.
 - c. Tighten the screw that holds the filter mounting bracket to the siphon tube.
 - d. Tighten the screw that holds the filter retaining ring to the filter mounting bracket.

WARNING

Make sure that both screws in the filter assembly are tight. If they are not, the filter assembly might slide off of the siphon tube during operation, causing shortening to splatter.

6. Place a five-gallon metal container under the filter.

WARNING

Do not use a plastic container. Hot shortening could melt the container, possibly burning you and getting shortening on the floor. Shortening on the floor could cause you to slip or fall, resulting in injury or even death.

Operation

1. Compress the bulb quickly and release it quickly. Do this only once. Shortening should flow into the container.

CAUTION

Do not compress the bulb more than once. Doing so could allow hot shortening to get into the bulb, damaging your equipment.

2. Watch the container as the shortening flows into it. If the shortening rises to within 2"/5 cm of the top of the container, do the following:
 - a. With one hand, hold the siphon by the handle. With the other hand, loosen the thumb screw that holds the siphon assembly to the mounting bracket on the lip of the kettle.
 - b. Slowly lift the siphon assembly so its opening is above the shortening. Do not remove it from the mounting bracket.
 - c. Tighten the thumb screw.
 - d. When the shortening stops flowing and the valve closes, move the container out from under the filter.
 - e. Place another five-gallon metal container under the filter.
 - f. With one hand, hold the siphon by the handle. With the other hand, loosen the thumb screw that holds the siphon assembly to the mounting bracket on the lip of the kettle.
 - g. Slowly lower the siphon assembly so its opening is near the bottom of the kettle.
 - h. Tighten the thumb screw.
 - i. Restart the siphon, as explained in step 1.
 - j. Continue watching the container and repeat the above procedure as needed.

WARNING

If you allow shortening to overflow the container, the shortening could burn you, and it will get on the floor, possibly causing slips, falls, injury, or even death. If shortening does get on the floor, thoroughly clean and dry the floor right away.

3. When the shortening stops flowing, tilt up the side of the kettle opposite the siphon. Place a wedge under the side of the kettle to hold it up. The remaining shortening will now flow toward the siphon.
4. Set aside the container of shortening.
5. Remove the filter assembly.
6. Place a different container under the valve assembly and start the siphon again. Drain the remaining shortening and discard it; it will be full of sediment.

Cleaning

1. Remove the siphon from the Donut Robot.
2. Squeeze the bulb several times to expel shortening from the siphon.
3. Wipe the siphon clean and hang it with the bulb side up so any remaining shortening will drain. Place a pan under the siphon to collect the shortening.
4. Rinse the filter bag and hang it to dry. You may launder it as needed.

WARNING

After washing, be sure the Filter Flo Siphon is completely dry before using it again. Moisture will cause hot shortening to spatter, which may cause serious injury.



Donut Robot®

Mark VI

Technical Supplement

Belshaw Bros., Inc.

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Auburn, WA 98001 USA

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E-mail: service@belshaw.com • <http://www.belshaw.com>

If you accept the machine from the shipping company, you are, in effect, saying that the machine is in good condition, and you must pay for the machine. Belshaw cannot pay for shipping damage, because the freight company has accepted the machine from Belshaw in good condition, and is responsible for its safe delivery. **For your protection,** inspect the machine to see that no parts are bent, scratched, or otherwise damaged. If any damage has occurred in shipping, file a freight claim with the shipping company immediately.

IMPORTANT

Keep this manual for reference purposes.

To unpack the Donut Robot® Mark VI and transport it to the work station:

1. Remove the foam and other packing materials from the two boxes.
2. Carry the hopper, plunger, and column to the work station.
3. Coil the cutter head power cord and carry the cutter head to the work station.
4. Carry the conveyor assembly to the work station.
4. Remove the clevis pins that hold the heater head in place, and lift the heater head out of the fryer.
5. Coil the power cord and carry the heater head to the work station.
6. Move the fryer case and kettle to the work station.

EQUIPMENT RECORD

Please provide the information below when you correspond with us about your machine.

Purchased by _____

Installed by _____

Date of Installation _____

Model number _____

Serial number _____

011108

MN-1033EN

Belshaw Bros., Inc.

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Auburn, WA 98001 USA

Phone: + -1-206-322-5474 • Fax: + -1-206-322-5425

E-mail: service@belshaw.com • <http://www.belshaw.com>

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Preface

This technical supplement to the Donut Robot® Mark VI Operator's Manual contains much information that users and service persons may find helpful, including the following:

- Detailed maintenance and troubleshooting guides
- Parts lists and assembly drawings of the Mark VI and related products
- Wiring diagrams of related products
- Instructions on the testing and calibration of electrical components
- Information to make your donut production easier

Remember that this is a supplement, not the official operator's manual. Use this supplement at your own risk. While we have made every effort to inform you of how to behave safely, Belshaw denies any liability for the use of the information contained herein.

1

Installation

To help familiarize you with the major parts of your Donut Robot® Mark VI, please study the photographs below.

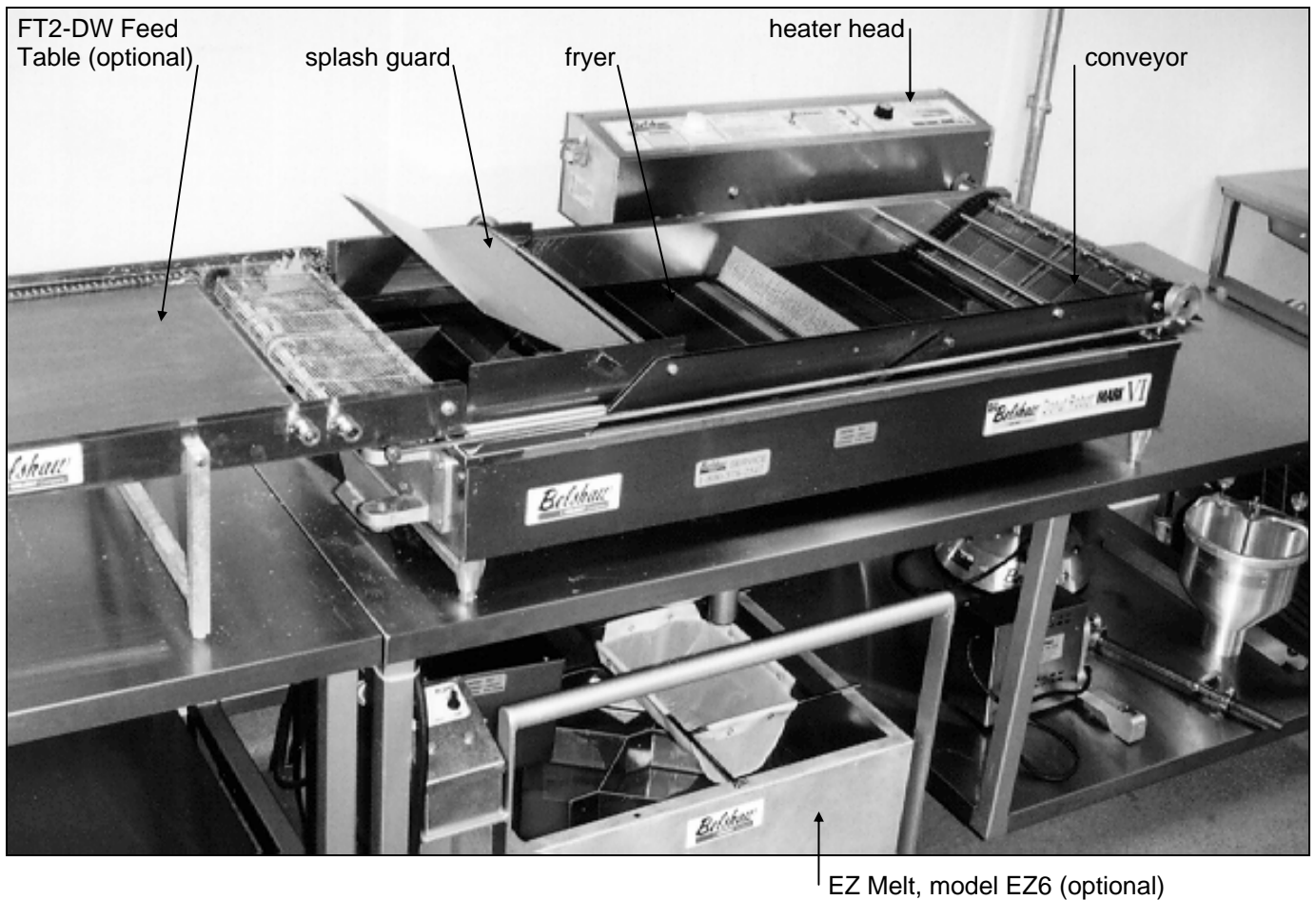


Figure 1-1. Donut Robot Mark VI, Set up for Producing Yeast-Raised Donuts.

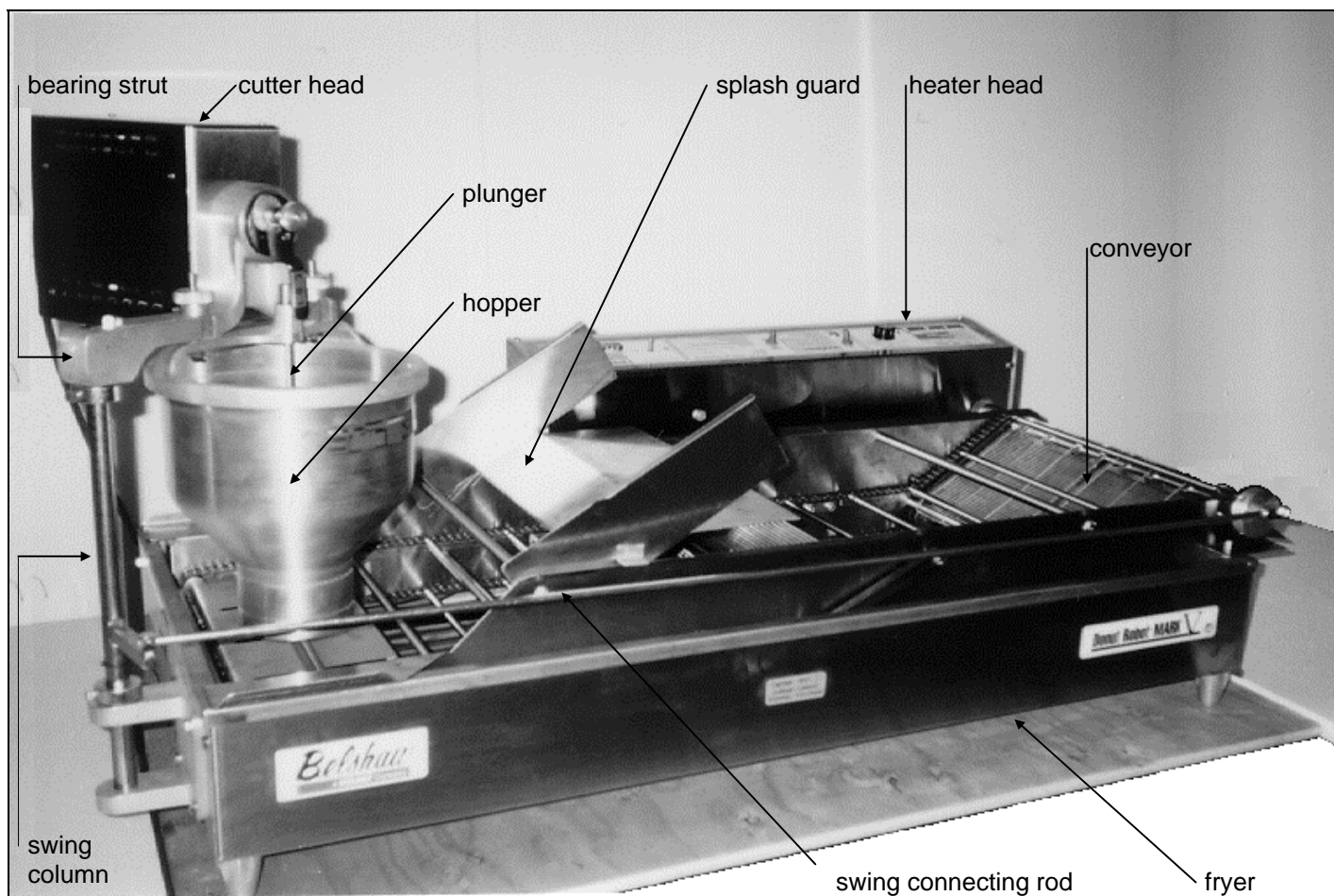


Figure 1-2. Donut Robot Mark VI, Set up for Producing Cake Donuts.

Unpacking the Fryer

To unpack the Donut Robot® Mark VI and transport it to the work station:

1. Remove the foam and other packing materials from the two boxes.
2. Carry the hopper, plunger, and swing column to the work station.
3. Coil the cutter head power cord and carry the cutter head to the work station.
4. Carry the conveyor assembly to the work station.
5. Remove the clevis pins that hold the heater head in place, and lift the heater head out of the fryer.

6. Coil the power cord and carry the heater head to the work station.
7. Move the fryer case and kettle to the work station.

Initial Cleaning

Thoroughly clean your Donut Robot Mark VI before using it. Remove all packing materials. Refer to Section 3, "Cleaning."

WARNING

To avoid electrocuting yourself or damaging the machine, never allow any kind of liquid to enter the cutter head or heater head assemblies.

WARNING

Never let water and hot shortening come in contact with each other. Moisture causes hot shortening to spatter, which may cause serious injury. Prior to use, make sure that the kettle and any other parts you have washed are dry.

After cleaning, assemble the fryer and cutter as explained below.

Assembling the Fryer

1. Place the fryer case on a flat, stationary surface.
2. Screw the fryer's legs in as far as they will go.
3. Set the kettle into the fryer case. The end of the kettle that has the locating pin must be placed at the outfeed end of the fryer case. The lip of the kettle should fit securely over the edge of the case.
4. Install the heater head assembly as follows:
 - a. Align the holes in the heater head end caps with the holes in the heater head mounting brackets.
 - b. Slide the clevis pins through the holes so that the pin heads are on the outsides.
 - c. Insert the hairpin clips in the holes in the clevis pins.
5. Lower the heater head assembly into position so the thermostat bulb bracket rests on or very near the bottom of the kettle.

6. Install the conveyor assembly as follows:
 - a. Hold the conveyor at the angle shown in Figure 1-3 and slide the conveyor drive coupling over the main drive shaft coupling. The conveyor coupling has a notch in it. Turn the conveyor coupling until the head of the socket head screw in the drive coupling can slide into this notch. See Figure 1-3.



Figure 1-3. Joining the Couplings.

- b. Lower the front side of the conveyor assembly so the hole in the conveyor flange fits over the locating pin on the lip of the kettle. See Figure 1-4.



Figure 1-4. Installing the Conveyor.

Read steps 7 and 8 only if you are preparing to make cake donuts.

7. Insert the swing column into the swing column mounting bracket. Make sure the plastic spacer washer is on the swing column between the lower set collar and the swing column mounting bracket. See Figure 1-5.

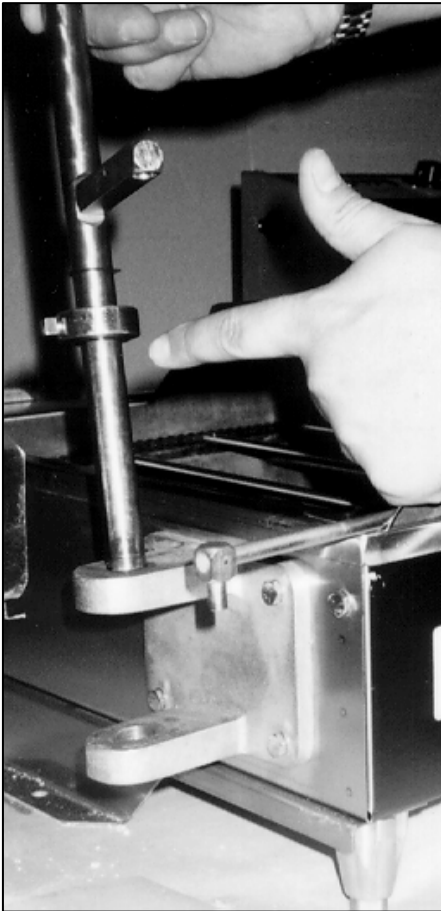


Figure 1-5. Inserting the Swing Column.

8. Connect the swing connecting rod to the throw arm of the swing column. A locating pin on the swing connecting rod rests in a hole in the throw arm. See Figure 1-6.



Figure 1-6. Connecting the Swing Connecting Rod.

9. Be sure your power source matches the specifications on the data plate. Connect the machine to the power source.
10. Turn on the conveyor only and check to see that it operates smoothly. The power switch for the conveyor drive is on the heater head.

Assembling the Cutter

Read this section only if you are preparing to make cake donuts.

1. Set the cutter head assembly onto the swing column. See Figure 1-7.

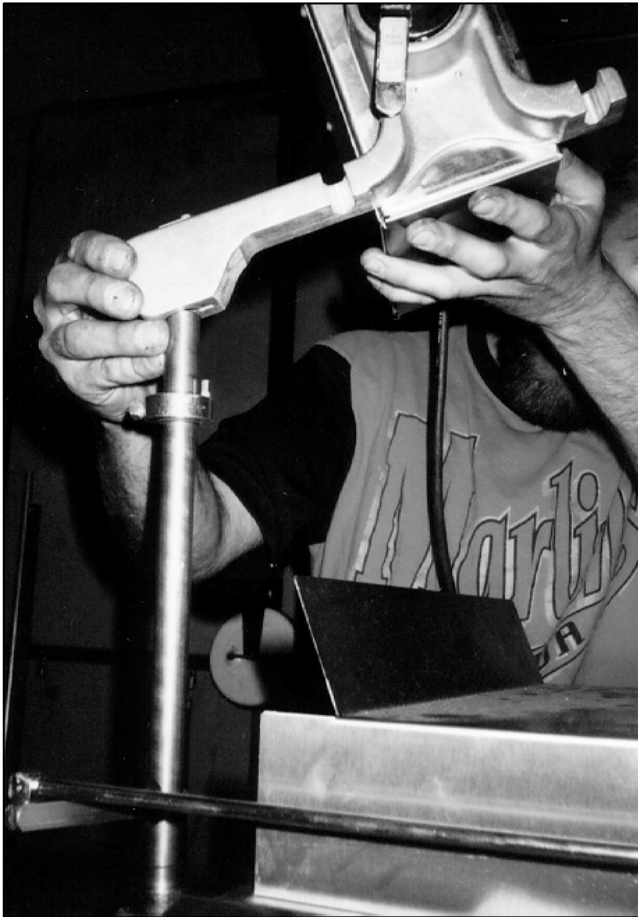


Figure 1-7. Mounting the Cutter Head Assembly.

2. Mount the hopper by sliding the two mounting studs on the hopper arch into the notches on the bearing strut. Secure the hopper with the thumb nuts. See Figure 1-8.



Figure 1-8. Mounting the Hopper.

3. Install the plunger as follows:
 - a. Lift the plunger connecting rod assembly up and out of the way.
 - b. Put the narrow part of the plunger's center rod through the slot in the center of the hopper arch.
 - c. Lower the plunger until the wider part at the top of the center rod enters the round opening in the hopper arch and the plunger's piston just enters the hopper cylinder.
 - d. Lower the connecting rod assembly and insert the pin on the rod into the hole near the top of the center rod. See Figure 1-9.



Figure 1-9. Installing the Plunger.

4. Plug the power cord from the cutter head assembly into the outlet on the back of the heater head.
5. Test the cutter head to ensure that it is operating properly. Turn it on using the prime switch on the cutter head. The cutter should run continuously. Turn off the cutter.

Adjusting the Hopper

Read this section only if you are preparing to make cake donuts.

WARNING

To avoid injury, always unplug the machine before making adjustments.

1. The bottom of the hopper should be 1 7/8" / 2.5 cm above the flight bars. To set the height of the hopper:
 - a. Hold the cutter and the hopper from below.
 - b. Loosen the set screw in the lower set collar on the swing column.

- c. Raise or lower the swing column as needed.
- d. Tighten the set screw. See Figure 1-10.



Figure 1-10. Adjusting the Height of the Hopper.

2. As the hopper swings back and forth over the kettle, the hopper cylinder should stop the same distance away from either side of the kettle at each end of the swing.

To check the swing of the hopper, turn on the conveyor. If you need to center the swing of the hopper, follow these steps:

- a. Turn off the conveyor.
- b. Loosen the set screws in the upper set collar.
- c. Swivel the bearing strut as needed.
- d. Tighten the set screws. (See Figure 1-11.)
- e. Double-check the swing of the hopper by turning on the conveyor. Then turn off the conveyor.



Figure 1-11. Adjusting the Swing of the Hopper.

Leveling and Securing the Fryer

Check to see if the fryer is level. If it is not, adjust the heights of the legs. Be sure that all six legs rest on the work surface when the fryer is level.

Bolt the fryer to the work surface as follows:

1. There are brackets on the ends of the fryer case. Each has a hole in it. Mark the locations of the holes on the work surface.
2. Drill holes through the work surface.
3. Insert bolts through the holes.
4. Tighten nuts onto the bolts to ensure that the Donut Robot will not move.

Moving the Fryer

If you ever need to move the fryer to a different work station, follow this procedure:

1. Turn off the machine and disconnect it from the power source. Unplug the cutter head power cord.
2. Allow the machine and the shortening to cool.

WARNING

Do not touch hot shortening. It can cause serious burns.

3. Remove and set aside the plunger, the hopper, and the cutter head, in that order.
4. Disconnect the swing connecting rod. Remove and set aside the swing column.
5. Remove the shortening from the fryer as explained in “Removing the Shortening” in Section 3.
6. To avoid dropping the machine or getting shortening on the floor, wipe excess shortening off of the fryer and conveyor.

WARNING

Thoroughly clean and dry the floor if shortening is spilled. Materials on the floor can cause people to slip or fall, resulting in serious injury or loss of life.

7. Set aside the conveyor.
8. Remove the clevis pins that hold the heater head in place. Remove the heater head from the fryer.
9. To prevent tripping, coil the power cord. Move the heater head to the new work station.
10. Remove the bolts that secure the fryer to the work surface.

-
11. Move the fryer to its new location.
 12. Install the heater head.
 13. Move and install the conveyor
 14. Move and install the swing column.
Connect the swing connecting rod.
 15. To prevent tripping, coil the cutter head
power cord. Move and install the cutter
head.
 16. Move and install the hopper and the plunger.
 17. Level and secure the fryer.

FT2-DW Feed Table

SPECIFICATIONS				
Dimensions	Shipping Weight	Electrical Data	Construction	Standard Equipment
L = 49"/124.5 cm W = 19-1/8"/48.6 cm H = 11"/28 cm	55 lb./ 24.8 kg	115 V 1 Phase 50 Hz	Stainless steel, nickel-plated mild steel, and aluminum alloys.	Complete conveyor assembly, including drive system and controls. Does not include proofing cloths or proofing boards.

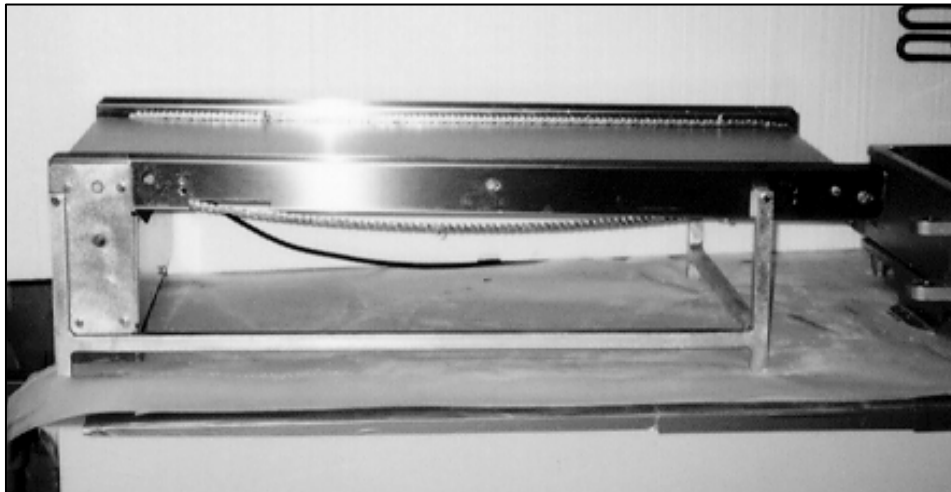


Figure 1-12. FT2-DW Feed Table.

The FT2-DW Feed Table is designed to supply proofed yeast-raised donuts to the Mark VI.

The Feed Table produces less than 70 dB(A) of equivalent continuous A-weighted sound pressure at work stations. This has been determined while the machine has been running, using a Bruel & Kjaer Sound level meter, type 2236.

The Feed Table is meant to be used on a flat, stationary table or countertop, positioned end-to-end with the Donut Robot. The operator is expected to read and follow these instructions and warnings.

Installation

1. Unplug the cutter head power cord of your Donut Robot.
2. Release the plunger from the cutter head.
3. Unscrew and lift off the hopper assembly.
4. Lift off the cutter head and swing column assemblies.
5. Lift the outfeed end of the Feed Table and set the brace under the trip shelf over the edge of the kettle.

WARNING
To avoid injury, make sure that the Feed Table is turned off before proceeding.

6. Plug the Feed Table power cord into the outlet on the end of the heater head.
7. Set the Donut Robot to cut one cut per pocket.

2

Maintenance

WARNING

To avoid being burned, electrocuted, or otherwise injured, always unplug the machine and allow it to cool before performing any maintenance.

Lubricating

Daily

Before using the machine each day, apply edible-grade mineral oil to the plunger connecting rod. The oil should penetrate the ball lock and the spring socket. See Figure 2-1.



Figure 2-1. Lubricating the Connecting Rod Assembly.

Weekly

- * Apply a few drops of SAE 30-weight machine oil to the swing column where it contacts the swing column bracket.
- * Remove the heater head cover and lightly coat the gear teeth with multi-purpose grease. Replace the cover. See Figure 2-2.

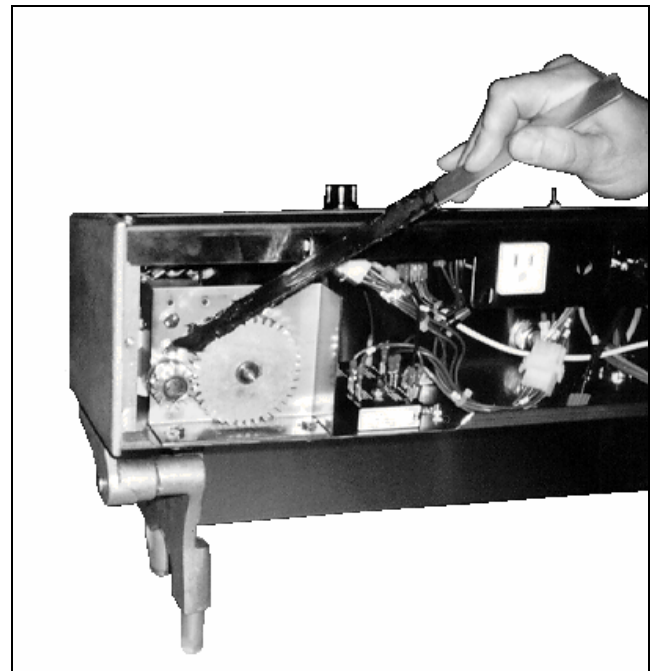


Figure 2-2. Lubricating the Drive Gears.

Yearly

Lubricate the conveyor drive motor as explained below.

1. Disconnect the machine from the power source.
2. Remove the back cover of the heater head.
3. Unscrew the two bolts that connect the conveyor drive assembly to the bottom of the heater head.

CAUTION

Be gentle with all parts of the conveyor drive assembly, especially when pulling it out of the heater head and putting it back in the heater head.. Damaging the parts could stop production.

4. Carefully pull the motor out of the heater head. See Figure 2-3.

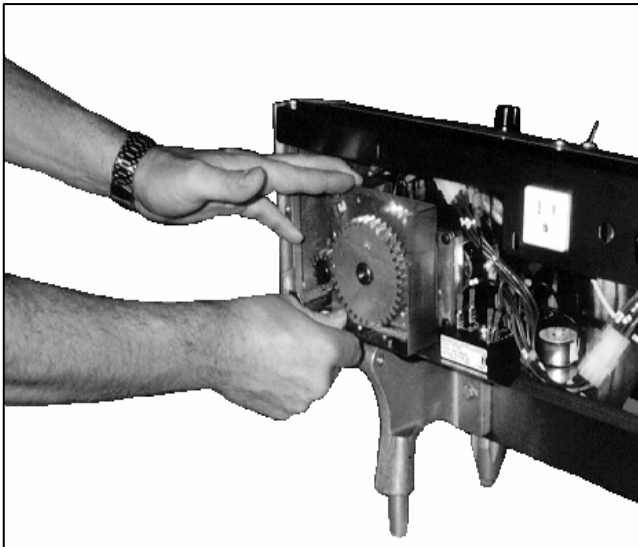


Figure 2-3. Removing the Conveyor Drive Motor.

5. Apply 4 to 6 drops of SAE 30-weight machine oil through the lubricating hole in the bearing cap until the felt pad is saturated. See Figure 2-4.

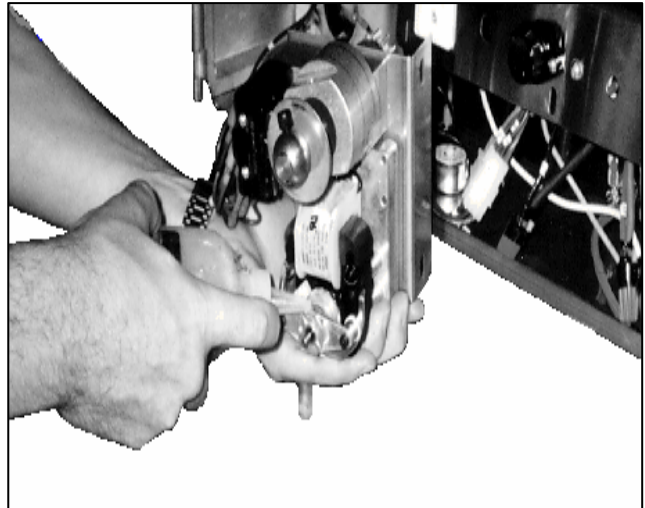


Figure 2-4. Lubricating the Conveyor Drive Motor.

6. Carefully put the motor back in the heater head, bolt the motor to the heater head, and replace the back cover of the heater head.

Checking the Thermostat

If the quality of your product decreases, check the accuracy of the thermostat. Heat some shortening in the fryer, measure the temperature of the shortening using a thermometer you know to be accurate, and compare this reading to the thermostat setting. It is important that you put the thermometer in the top 1" (2.5 cm) or so of shortening, because this is where the donuts are fried, and this is where the temperature should be consistent. If you need to calibrate the thermostat, consult Section 5, "Electrical Components."

If you ever want to test the continuity of the thermostat or any of the switches on your Donut Robot, refer to Section 5, "Electrical Components."

Taking Care of the Plunger, Hopper, and Cylinder

The plunger, hopper, and cylinder of your Donut Robot are precision instruments. If you take good care of them, they will perform well for years.

Follow these guidelines:

- * Clean these parts only in the manner explained in this manual.
- * Handle these parts with care. Avoid dropping them on hard surfaces.
- * Do not force the machine if it becomes jammed. To avoid damaging the plunger, disassemble the machine and remove any obstructions.

Feed Table FT2DW

After Each Use

Use a soft, damp cloth for cleaning.

WARNING
To avoid electrocuting yourself or damaging the machine, never allow any liquid to enter the power head.

Adjust conveyor chain tension

If the tension of the conveyor chains needs adjusting, follow these steps:

1. Loosen the hex head bolts that hold the roller shaft at the outfeed end of the conveyor.
2. Pull the shaft until the chains reach the correct tension. The tension is correct when you can lift the chains about 1³/₂,5 cm above the surface of the Feed Table. Each chain should have the same tension.
3. Tighten the hex head bolts that hold the roller shaft.

3

Troubleshooting

This section is designed as an aid in troubleshooting with the Donut Robot® Mark VI and with the FT2-DW Feed Table. It is not a substitute for a qualified technician. If you encounter a problem that is not covered in this section, or if you try the remedies suggested here and find that they do not correct the problem, call Belshaw Bros. One of our customer support representatives will be happy to help you.

To call Belshaw, first dial the appropriate international access code, then 1-206-322-5474 (United States).

CAUTION

If you perform repairs yourself or have them performed by anyone other than Belshaw Bros. or a service technician authorized by Belshaw Bros., you do so at your own risk.

If your Donut Robot becomes badly worn or seriously out of adjustment, send it to our factory for complete rebuild and repair service. Return your machine, freight prepaid, with your instructions for service, your phone number, and the name of the person for us to contact when we have made a cost estimate. In most cases, the machine can be shipped back, freight collect, within five days.

To avoid down time, call us to see whether we have a machine we can loan to you while your machine is being serviced.

Ship machines in need of servicing to:

Belshaw Bros., Inc.
814 44th Street NW, Suite 103.
Auburn, WA 98001 USA

If you need a replacement part, use the parts lists in Section 3 to determine the part number and description. When you order the part, please specify the following:

- * The model name of the machine.
- * The serial number of the machine.
- * The voltage, phase, and hertz of the machine.
- * The part number.
- * The part description, including the size, if applicable.
- * The quantity desired.

Mark VI

Following is a troubleshooting chart to help you identify and solve problems with your Mark VI. See also Section 6, "Donut-Making Helps."

WARNING

To avoid being burned, electrocuted, or otherwise injured, unplug the machine and allow it to cool before disassembling, repairing, or wiring.

THE DONUTS BALL OR BLISTER.	
Possible Causes	What To Do
The dough is too cold.	See Section 6, “Donut-Making Helps.”
The shortening is too hot.	Decrease the temperature setting.
The dough is overmixed.	Review the mixing procedure.
The donuts are too large.	Adjust the dial on the cutter head to produce smaller donuts.
The shortening is old or contaminated.	WARNING
	To avoid being burned, turn off the machine and allow the shortening to cool.
	Replace the bad shortening with fresh shortening.
THE DONUTS ARE SHAPED IMPERFECTLY.	
Possible Causes	What To Do
The shortening level is too low.	Add shortening to reach the proper level.
The drop plate is out of position.	WARNING
	To avoid being burned, turn off the machine and allow the shortening to cool.
	Reposition the drop plate.
The tip of the cylinder is dirty.	WARNING
	To avoid injury, turn off the machine and remove the hopper.
	Clean the cylinder.
The tip of the cylinder is nicked.	Replace the hopper.
The size-selection dial is not tightened.	Tighten the thumb nut.
The dough is overmixed.	Review the mixing procedure.

THE DONUTS ARE UNDERCOOKED.	
Possible Causes	What To Do
The shortening is not hot enough.	Increase the temperature setting.
The conveyor is moving too quickly.	Decrease the speed of the conveyor, using the knob labeled “Fry Time in Seconds.”
The dough is too cold.	See Section 6, “Donut-Making Helps.”
The dough has not had enough floor time.	See Section 6, “Donut-Making Helps.”
The thermostat reads inaccurately.	Calibrate the thermostat.
THE DONUTS ARE OVERCOOKED.	
Possible Causes	What To Do
The shortening is too hot.	Decrease the temperature setting. The temperature setting should never exceed 375°F (191°C).
The conveyor is moving too slowly.	Increase the speed of the conveyor, using the knob labeled “Fry Time in Seconds.”
The thermostat reads inaccurately.	Calibrate the thermostat.
THE CUTTER SWING COLUMN CHATTERS.	
Possible Causes	What To Do
	WARNING
	To avoid injury, before doing either of the following, turn off the machine.
The nylon thrust washer is missing.	Install the nylon thrust washer between the swing column bracket and the set collar.
There is not enough lubrication between the swing column and the swing column mounting bracket.	Lubricate the upper and lower legs of the bracket with SAE 30-weight machine oil.

THE CONVEYOR BITES THE DONUTS.	
Possible Causes	What To Do
The donuts are not cooking enough.	See “The donuts are undercooked” below.
The shortening level is too low.	Add shortening to reach the proper level.
	WARNING
	Before doing any of the following, turn off the machine and allow the shortening to cool.
The turner is bent or packed with cooked food particles.	Straighten and/or clean the turner.
The cam weight is sticking due to the accumulation of varnish.	Clean to remove the cooked-on varnish.
The fryer is not level.	Level the fryer.
THE CUTTER OPERATES CONTINUOUSLY.	
Possible Causes	What To Do
	WARNING
	To avoid being burned, electrocuted, or otherwise injured, before doing any of the following, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source.
One of the microswitches is defective. (There are three microswitches in the conveyor drive assembly and one microswitch in the cutter head.)	For help in testing the microswitches, refer to Section 5, “Electrical Components.” Replace any defective microswitches.
Something is interfering with the nylon brake dog in the cutter head.	Clear away the cause of the interference.
The brake spring in the cutter head is weak or broken.	Replace the spring.

THE HEATING ELEMENT FAILS TO MAINTAIN THE PROPER TEMPERATURE.

Possible Causes	What To Do
The input voltage is incorrect.	Supply the correct power as specified on the data plate.
Sediment has accumulated around the thermostat bulb.	WARNING
	To avoid being burned, turn off the machine and allow the shortening to cool.
	Clean to remove the sediment. (You should clean the Donut Robot regularly and thoroughly.)
The thermostat has been calibrated incorrectly.	Recalibrate the thermostat.
The thermostat is defective.	WARNING
	To avoid being burned or electrocuted, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source.
	Replace the thermostat.

THE DONUTS DROP AT THE WRONG TIME.

Possible Cause	What To Do
The hopper swing is adjusted incorrectly.	WARNING
	To avoid injury, turn off the machine.
	Adjust the hopper swing. See “Adjusting the Hopper” in Section 1, “Installation,” of the operator’s manual.

THE CONVEYOR IS JAMMED.	
Possible Causes	What To Do
	WARNING
	To avoid injury, before doing any of the following, turn off the machine and allow the shortening to cool.
Cooked food particles are wedged between a chain opening and a sprocket tooth.	Clean to remove the food particles. Clean the Donut Robot regularly and thoroughly.
The turner slot is packed with cooked food particles.	Clean to remove the food particles.
The drop plate is out of position and is interfering with the conveyor.	Reposition the drop plate.
Something is interfering with the free movement of the turner cam and cam weight.	Remove the obstruction.
The heating element is bent and is interfering with the turner.	Straighten the heating element.
The turner is out of position and is catching on a flight bar below.	Lift and move the outfeed end of the conveyor to disengage the conveyor coupling from the conveyor drive shaft. Turn the conveyor back 2-3 pockets. The turner will return to the correct position.
The conveyor drive shaft and the drive motor shaft are out of alignment.	Remove the cover of the drive assembly. Loosen the four mounting spacers so the drive assembly can be moved. Align the motor shaft with the conveyor shaft. When they are aligned, tighten the mounting spacers. Replace the cover.

THE MOTOR OVERHEATS.	
Possible Causes	What To Do
The power requirements of the machine do not match the power source.	Supply the correct power as specified on the data plate.
	WARNING
	To avoid being burned or electrocuted, before doing the following, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source.
The motor is binding.	Repair or replace the motor.
The motor is defective.	Repair or replace the motor.
THE CUTTER CUTS DOUBLE WHEN YOU HAVE SELECTED ONE CUT PER POCKET.	
Possible Causes	What To Do
	WARNING
	To avoid being burned or electrocuted, before doing any of the following, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source.
The nylon brake dog is binding on the cutter brake motor.	Loosen the brake dog. If the spring is missing or weak, replace it. If the brake dog is worn, replace it.
An internal wire is interfering with the nylon brake dog.	Move the wire.
The arm on the cutter head microswitch is bent.	Bend the arm back into position or replace the microswitch.
The wires on the cutter head microswitch are reversed.	Make the correct connections.

THE CUTTER WILL NOT OPERATE, BUT THE CONVEYOR RUNS.	
Possible Causes	What To Do
The cutter head power cord is not plugged in to the outlet on the back of the heater head.	Connect the cutter head power cord to the correct outlet.
	WARNING
	To avoid being burned, electrocuted, or otherwise injured, before doing any of the following, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source.
The set screws in the cutter head cam are loose.	Tighten the set screws.
The cutter head power cord is broken.	Repair or replace the cutter head power cord.
The cutter motor is defective.	Replace the cutter motor.
One of the microswitches is defective. (There are three microswitches in the conveyor drive assembly and one microswitch in the cutter head.)	For help in testing the microswitches, refer to Section 5, "Electrical Components." Replace any defective microswitches.
The cutter head power switch is defective.	Replace the cutter head power switch.
The circuit breaker on the back of the heater head is defective.	Replace the circuit breaker.
The cutter head assembly wiring harness is not connected.	Check the connection between the pin housing in the conveyor drive assembly and the socket housing in the heater head. Also, make sure that the pins are securely seated in the pin housing.
The cuts-per-pocket switch is defective.	Replace the cuts-per-pocket switch.

THE ELEMENT WILL NOT HEAT, AND THE CONVEYOR WILL NOT RUN.	
Possible Causes	What To Do
The power cord is not plugged in, or the outlet has no power.	Connect the machine to a good power source.
	WARNING
	To avoid being burned or electrocuted, before doing any of the following, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source.
The power cord is defective.	Replace the power cord.
The transformer is defective.	Replace the transformer.
The connections to the transformer are bad.	Rewire the connections to the transformer.
THE ELEMENT WILL NOT HEAT, BUT THE CONVEYOR RUNS.	
Possible Causes	What To Do
The high temperature limit control switch has been tripped.	Push the red reset button on the back panel of the heater head.
The thermostat has been calibrated incorrectly.	Recalibrate the thermostat.
	WARNING
	To avoid being burned or electrocuted, before doing any of the following, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source.
The high temperature limit control is defective.	Replace the high temperature limit control.
The thermostat is defective.	Replace the thermostat.
The contactor for the transistor is defective.	Replace the contactor.
The connections to the contactor are bad.	Rewire the connections to the contactor.

THE ELEMENT HEATS, BUT THE CONVEYOR WILL NOT RUN.

Possible Causes	What To Do
The input voltage is incorrect.	Supply the correct power as specified on the data plate.
The circuit breaker has been tripped.	Reset it by moving the white switch on the back of the heater head to “off” and then to “on.” If the conveyor still will not run, see that the power source agrees with the specifications on the data plate. If the problem persists, see below.
	WARNING
	To avoid being burned, electrocuted, or otherwise injured, before doing any of the following, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source.
There is a short circuit.	Find it and repair it. (First, see “The circuit breaker has been tripped” above.)
The wiring harness in the conveyor drive assembly is not connected.	Check the connection of the pin connector from the conveyor drive assembly to the socket connector in the heater head enclosure. Make sure the pins in the pin housing are securely seated in the housing.
The conveyor drive power switch is defective.	Replace the switch.
The nylon brake dog is binding on the conveyor brake motor.	If the brake dog is worn, replace it. If it is too tight, loosen it. If the spring is weak or missing, replace it.
The brake motor is defective.	Replace the brake motor.
An internal wire is interfering with the nylon brake dog.	Move the wire.
A fan blade is caught on a wire.	Move the wire.
The conveyor is jammed.	Clear the obstruction.
The couplings are not engaged.	Engage the couplings.
The conveyor drive coupling is slipping.	Tighten the two set screws.

FT2-DW Feed Table

Troubleshooting

Feel free to call Belshaw Bros. One of our customer support representatives will be happy to help you. When calling, please specify the following:

- * The model name of the machine.
- * The serial number of the machine.
- * The voltage, phase, and hertz of the machine.

To call, first dial the appropriate international access code, then 1-206-322-5474 (United States).

CAUTION
If you perform repairs yourself or have them performed by anyone other than Belshaw Bros. or a service technician authorized by Belshaw Bros., you do so at your own risk.

For factory service, return your machine, freight prepaid, with your instructions for service, your phone number, and the name of the person for us to contact when we have made a cost estimate.

Ship machines in need of servicing to:

Belshaw Bros., Inc.
814 44th Street NW, Suite 103.
Auburn, WA 98001 USA

Following is a troubleshooting chart to help you identify and solve problems with your FT2-DW Feed Table.

WARNING
To avoid being burned, electrocuted, or otherwise injured, unplug the machine and allow it to cool before disassembling, repairing, or wiring.

THE CONVEYOR CHAINS DO NOT ADVANCE WHEN THE MAIN POWER IS ON OR WHEN THE PRIME SWITCH IS PRESSED, AND THE PILOT LIGHT DOES NOT COME ON.

Possible Causes	What To Do
The power cord is not connected.	Plug in the power cord.
The circuit breaker for the gear box outlet on the Donut Robot's heater head is tripped.	Push the white reset button near the outlet.
	<p>WARNING</p> <p>To avoid electric shock or other injury, before doing any of the following, unplug the machine.</p>
The black or white wire in the power cord is broken or poorly connected.	Repair the cord and/or make the proper connection.
The fuse on the Feed Table is blown.	Replace the fuse.
The fuse for the Donut Robot's conveyor is blown.	Replace the fuse.

THE CONVEYOR CHAINS DO NOT ADVANCE WHEN THE MAIN POWER IS ON, BUT THEY DO ADVANCE WHEN THE PRIME SWITCH IS PRESSED.	
Possible Causes	What To Do
	WARNING
	To avoid electric shock or other injury, before doing any of the following, unplug the machine.
The red wire in the power cord is broken or poorly connected.	Repair the cord and/or make the proper connection.
The microswitch in the power head is defective.	Replace the microswitch.
The microswitch in the Donut Robot's signal circuit is defective.	Replace the microswitch.
THE CONVEYOR CHAINS DO NOT ADVANCE AT ALL, DO NOT ADVANCE FAR ENOUGH, OR DO NOT ADVANCE THE SAME DISTANCE DURING EACH CYCLE, BUT THE PILOT LIGHT DOES COME ON.	
Possible Cause	What To Do
The cam in the power head is loose.	WARNING
	To avoid electric shock or other injury, before doing the following, unplug the machine.
	Tighten the cam set screw.

THE CONVEYOR CHAINS ADVANCE CONTINUOUSLY WHEN THE MAIN POWER IS ON.	
Possible Causes	What To Do
	WARNING
	To avoid electric shock or other injury, before doing any of the following, unplug the machine.
The brake is defective.	Repair or replace the brake.
The cam in the power head is loose.	Tighten the cam set screw.
The microswitch in the power head is defective.	Replace the microswitch.
The microswitch in the Donut Robot's signal circuit is defective.	Replace the microswitch.
TWO ROWS OF DONUTS ARE ADVANCED DURING EACH CYCLE.	
Possible Causes	What To Do
	WARNING
	To avoid electric shock or other injury, before doing either of the following, unplug the machine.
The brake is defective.	Repair or replace the brake.
The cam in the power head is loose.	Tighten the cam set screw.

4

Electrical Components

This section explains how to test the continuity of electrical components in the Donut Robot® Mark VI. These include the toggle switches, the microswitches, and the thermostat.

The section also contains a document by the Robertshaw Controls Company, the maker of the thermostat we use in the Donut Robot Mark VI. It explains how to check, adjust, and recalibrate the thermostat.

Continuity Testing

To test the continuity of a toggle switch:

WARNING

To avoid the possibility of electric shock, disconnect the machine from the power source before testing.

1. Disconnect the machine from the power source.
2. Disconnect the terminal wires from the switch.
3. Obtain a continuity tester or a volt-ohm meter. If neither of these instruments is available, make a continuity tester using a battery and a bulb. (See Figure 5-1.)
4. Connect the wires of the continuity tester to the switch terminals, as shown in Figure 5-1, and test the switch in the ON and OFF positions. The switch should show continuity only when in the ON position.

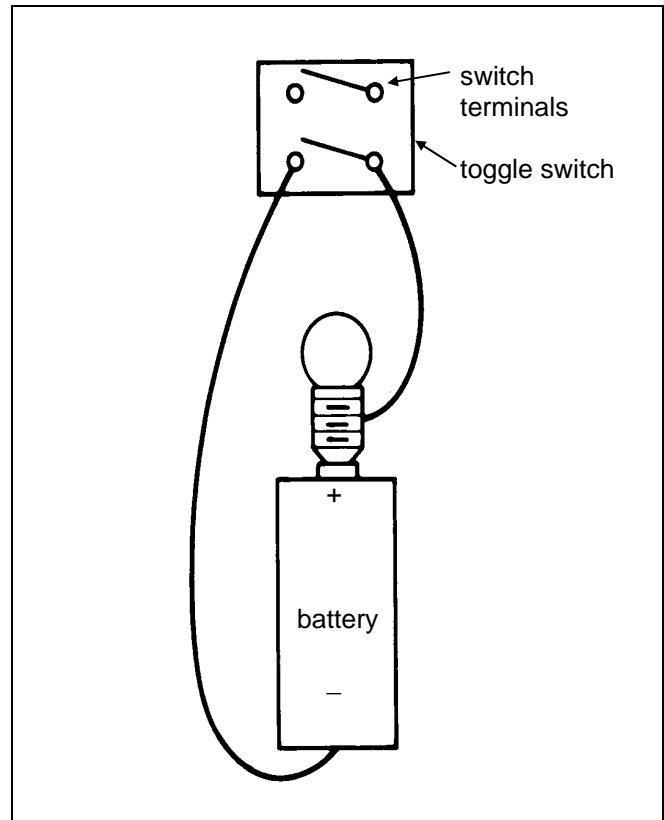


Figure 4-1. Toggle Switch Continuity Test.

To test the continuity of a microswitch:

WARNING

To avoid the possibility of electric shock, disconnect the machine from the power source before testing.

1. Disconnect the machine from the power supply.
2. Disconnect the terminal wires from the switch.
3. Obtain a continuity tester or a volt-ohm meter. If neither of these instruments is

available, make a continuity tester using a battery and a bulb. (See Figure 5-2.)

4. Connect one wire of the continuity tester to the microswitch's common (COM) terminal and the other wire to the normally open (NO) terminal, as shown in Figure 5-2. The switch should show continuity only when the microswitch actuator arm is depressed.
5. To test the normally closed (NC) terminal, move the wire from the normally open (NO) terminal to the normally closed terminal. Now the switch should show continuity only when the actuator arm is not depressed.

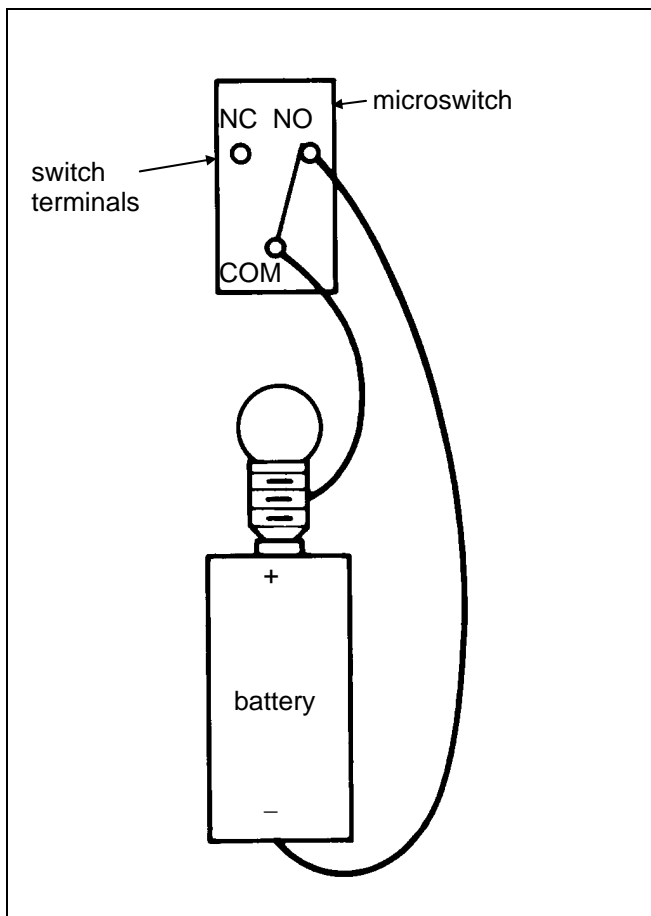


Figure 4-2. Microswitch Continuity Test.

To test the continuity of the thermostat:

WARNING

To avoid the possibility of electric shock, disconnect the machine from the power source before testing.

1. Disconnect the machine from the power supply.
2. Disconnect the terminal wires from the thermostat.
3. Connect the continuity tester across the B terminals indicated in Figure 5-3. This set of contacts should be closed whenever the thermostat is on. To test, start with the thermostat in the OFF position. Then turn the thermostat up until you hear a distinct click (at about the 175°F [79°C] setting). At this time, there should be continuity across the B terminals.

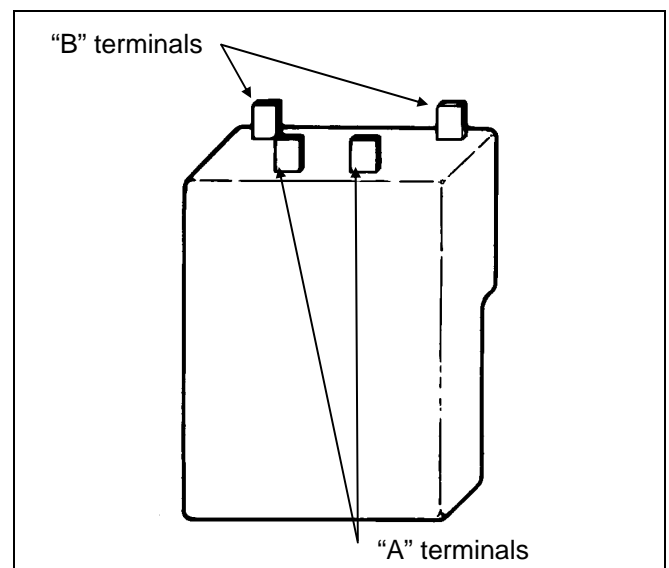


Figure 4-3. Thermostat Terminals.

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4. Connect the continuity tester across the A terminals indicated in Figure 5-3. Start with the thermostat in the OFF position and turn the thermostat up until you hear a distinct click. If there is no continuity (the indicator or light does not come on), proceed to step 5.
 5. With the continuity tester still connected, turn the thermostat knob to OFF and remove the knob. There is an adjusting screw in the center of the knob stem. Turn it counter-clockwise until there is continuity. If there is no continuity (the indicator or light does not come on), then the thermostat is defective. If there is continuity, proceed to step 6.
 6. Immerse the thermostat sensing bulb in a pan of boiling water and set the thermostat at about 212°F (100°C). The continuity tester's indicator or light should go off. If the indicator or light does not go off, increase the temperature setting of the thermostat until it does. Then recalibrate the thermostat according to the manufacturer's instructions. If the indicator or light will not go off at any setting or recalibration, then the thermostat is defective.

See Parts List Drawing Insert Page.