Donut Robot®
Mark I
Operator’s Manual
and
Technical Supplement
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Preface

The Donut Robot® Mark I is designed to automatically cut and fry cake donut products. It can also be used to fry yeast-raised donuts.

It is meant to be used on a flat, stationary table or countertop, with the operator standing opposite the heater head of the machine. The operator must work safely at all times and read this manual and follow its instructions and warnings.

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

- 220 volts, 1 phase, 50 hertz
- 240 volts, 1 phase, 50 hertz

The Donut Robot Mark I produces less than 70 dB(A) of equivalent continuous A-weighted sound pressure at work stations. This has been determined during a run of the machine with shortening in the kettle, using a Bruel & Kjaer sound level meter, type 2236.

To use the Mark I 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.
1. **Operation**

**Read** each step **completely** before following its directions.

1. When the shortening reaches the correct frying temperature, it should reach the middle of the flight bars.

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

   Put shortening in the kettle using one of these methods:
   - Pre-melt shortening in a pan on the stove and carefully pour it into the kettle.
   - Use the optional EZ Melt to melt shortening and transfer it to the kettle. See the EZ Melt manual.

   **WARNING**

   **Do not touch hot shortening. It can cause 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.**

2. 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.

3. Wait for the shortening to reach the desired temperature. When it does, the pilot light on the front of the heater head will go out. **DO NOT** run the conveyor until all the shortening has melted.

4. If using the optional Shortening Reserve Tank, fill it with shortening. Then position it on the conveyor side panels either ahead of or behind the turner, but not above it. The heat of the fryer will melt the shortening in the tank.

5. 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.
6. Adjust the machine to provide the appropriate fry time for your product, as follows:
   a. Decide on the fry time you desired—either 63, 70, 95, or 120 seconds. Choose 63 seconds only if using the GP model.
   b. Locate the gear cover on the back of the heater head.
   c. Use the label on the gear cover to determine which set of gears the gear belt should be on to provide the correct fry time.
   d. Slide the gear cover up.
   e. Move the belt to the appropriate set of gears.
   f. Slide the gear cover down, ensuring that the belt tightener rests on the belt.

7. Put dough into the hopper.

8. Turn on the cutter using the power switch on the cutter head.

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.

10. Continue adding shortening to the kettle to maintain the proper shortening level (see step 1). There are three ways to do this:
    - Melt some shortening in a pan on the stove and carefully pour it into the kettle.
    - If you are using the optional EZ Melt, transfer more shortening from it. See your EZ Melt manual.
    - If you are using the optional Shortening Reserve Tank, push open the supply valve.

11. Continue adding dough to the hopper as needed.

12. 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**

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

   HOT SHORTENING IS DANGEROUS.
Read each step completely before following its directions.

**WARNING**

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

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**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.

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**Cleaning the Hopper and the Plunger**

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 hopper.
   - **On Standard Model**
     a. Push up on the hopper so the plunger spring compresses.
     b. Pull the hopper away from the hopper resting pins.
   - **On GP Model**
     a. Release the plunger by swinging up the connecting rod.
     b. Loosen the thumb nuts that hold the hopper in place.
     c. Pull the hopper away from the bearing strut.
3. Remove the plunger from the hopper.
   - **On Standard Model**
     a. Press down on the plunger head and lift the release tab.
     b. Rotate the release tab 1/2 turn so the square key slides into the slot in the bail.
     c. Pull the plunger up and out of the hopper, passing the center rod through the slot.
   - **On GP Model**
     Pull the plunger out of the hopper, passing the center rod through the slot in the bail.
4. Pre-soak the hopper and the plunger, if necessary, to loosen stubborn or dried-on deposits.
5. 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.

6. Rinse the hopper and the plunger separately in clear, hot water (170°F-190°F/77°C-88°C).

7. Dry each part completely.

8. Dip the plunger and the hopper cylinder in mineral oil or liquid shortening to prevent rust and sticking.

9. 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.

CAUTION

To avoid electrocuting yourself or damaging the machine, never immerse the cutter head.

Cleaning the Conveyor and the Kettle

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

WARNING

To avoid burning or electrocuting yourself, unplug the machine before cleaning the fryer.

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 and column out of the column mounting bracket.

5. Remove the conveyor assembly as follows:
   a. Obtain two pieces of wood, each at least 1” x 1” x 11” (2.5 x 2.5 x 28 cm).
   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. 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 3-1.

Figure 3-1. Draining the Shortening off of the Conveyor.

6. After the shortening has drained off of the conveyor assembly, turn the conveyor assembly around and place it on the work surface. Set aside the pieces of wood.
7. 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 out of position.
   c. Lift up and pull out on the turner cam assembly. See Figure 3-2.
   d. Lift out the turner assembly. See Figure 3-3.
   e. Wash the turner cam assembly and turner assembly using mild detergent and warm water.
   f. Rinse the turner cam assembly and turner assembly in clear water.
   g. Dry these parts thoroughly.

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

8. 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 3-4.) 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.

9. Check again to see that the shortening in the kettle has cooled to 100°F/38°C.
10. Remove the shortening from the kettle using one of these methods:

- Use an optional Filter Flo Siphon to siphon the shortening into one or more large metal buckets. (See the instructions in Appendix A.) Be careful not to disturb the sediment that has accumulated in the bottom of the kettle.

- Tilt the heater head assembly back, raising the heating element out of the kettle. Lift the kettle out of the fryer case and carefully pour the shortening into one or more large metal buckets. Be careful not to disturb the sediment that has accumulated in the bottom of the kettle.

- Using a small saucepan or a metal pitcher, scoop as much of the shortening as you can into one or more large metal buckets. Then lift the kettle out of the fryer case and carefully pour the rest of the shortening into a metal bucket. Be careful not to disturb the sediment that has accumulated in the bottom of the kettle.

11. Return the kettle to the fryer case, if you have removed it, and tilt the heater head assembly down.

12. Brush off any carbon that has accumulated on the heating element. Accumulated carbon can cause corrosion and ineffective heating.

13. Tilt the heater head assembly back, raising the heating element out of the kettle.

14. Lift the kettle out of the fryer case. Remove and dispose of the remaining shortening and the accumulated sediment. Dry the outside of the kettle.

15. Put the kettle back in the fryer case.

16. Tilt the heater head assembly down.

17. Put the drop plate, turner cam assembly, and turner assembly back on the conveyor assembly.

18. Install the conveyor assembly.

**WARNING**

**WARNING**

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

**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.
**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 conveyor and tilt the heater head back as you did before.

6. Remove the cleaning solution from the kettle using one of these methods:
   - If you have an optional Filter Flo Siphon, remove its filter assembly. Then use the Filter Flo to siphon the cleaning solution into one or more large metal buckets. (See the instructions in Appendix A.) When the cleaning solution has stopped draining, carefully carry the buckets to the sink and slowly pour the solution into the sink.
   - Lift the kettle out of the fryer case, carefully carry it to the sink, and slowly pour the cleaning solution into the sink.
   - Using a small saucepan or a metal pitcher, scoop as much of the cleaning solution as you can into one or more large metal buckets. Then lift the kettle out of the fryer case and carefully pour the rest of the cleaning solution into a metal bucket. Carefully carry the buckets to the sink and slowly pour the solution into the sink.

**WARNING**

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

- 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.

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

7. Lift the kettle out of the fryer case, if you have not done so already.

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.

**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. Lift the conveyor assembly out of the fryer case. Tilt the heater head assembly back.

6. Remove the water from the kettle using one of these methods:

- If you have an optional Filter Flo Siphon, remove its filter assembly. Then use the Filter Flo to siphon the water into one or more large metal buckets. (See the instructions in Appendix A.) When the water has stopped draining, carefully carry the buckets to the sink and slowly pour the water into the sink.

- Lift the kettle out of the fryer case, carefully carry it to the sink, and slowly pour the cleaning solution into the sink.

- Using a small saucepan or a metal pitcher, scoop as much of the water as you can into one or more large metal buckets. Then lift the kettle out of the fryer case and carefully pour the rest of the water into a metal bucket. Carefully carry the buckets to the sink and slowly pour the water into the sink.

**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.

**Drying**

1. Thoroughly dry all parts, including the conveyor, the heating element, and the inside of the kettle.

2. Assemble the Donut Robot as before.
### WARNING

To avoid being burned, electrocuted, or otherwise injured, always unplug the machine and allow it to cool down before making adjustments, clearing obstructions, lubricating, cleaning, or disassembling.

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**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.

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**Lubricating**

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 4-1.

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**Figure 4-1. Lubricating the Connecting Rod—GP Model.**
4 Related Products

This appendix contains information about the following products which you might use with your Donut Robots:

- Roto Cooler
- Icing Finishing Tree and Roto Cooler
- Sugaring Tray and Roto Cooler
- Filter Flo Siphon
- Shortening Reserve Tank

**Roto Cooler**

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Shipping Weight</th>
<th>Electrical Data</th>
<th>Construction</th>
<th>Standard Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dia.=24”/61 cm</td>
<td>16 lb/7.3 kg</td>
<td>120 V</td>
<td>Basket: High-density polyethylene. Base: Spun, polished, heavy-gauge aluminum.</td>
<td>Basket and turntable base with power cord and motor.</td>
</tr>
<tr>
<td>H=6-5/8”/17 cm</td>
<td></td>
<td>1 Phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 Hz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 you are finished using the Roto Cooler, turn it off and unplug it.

**WARNING**

To avoid electrocuting yourself or damaging the machine, never submerge 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

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Shipping Weight</th>
<th>Electrical Data</th>
<th>Construction</th>
<th>Standard Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dia.=24”/61 cm H=32”/81 cm</td>
<td>28 lb/12.7 kg</td>
<td>120 V 1 Phase 50 Hz</td>
<td>Trays: Heavy-gauge aluminum. Basket: High-density polyethylene. Base: Spun, polished, heavy-gauge aluminum.</td>
<td>Power turntable and four trays, three of which have dividers.</td>
</tr>
</tbody>
</table>

Figure A-2. Icing Finishing Tree and Roto Cooler.

The Roto Cooler is meant to be used on a flat, stationary table or countertop.

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 submerge 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.
**Sugaring Tray and Roto Cooler**

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Shipping Weight</th>
<th>Electrical Data</th>
<th>Construction</th>
<th>Standard Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dia.=17-1/4”/44 cm H=6-5/8”/17 cm</td>
<td>16 lb/7.3 kg</td>
<td>120 V 1 Phase 50 Hz</td>
<td>Spun, polished, heavy-gauge aluminum.</td>
<td>Power turntable with sugar tray.</td>
</tr>
</tbody>
</table>

**Figure A-3. Sugaring Tray and Roto Cooler.**

The Roto Cooler base makes the Sugaring Tray rotate. It produces less than 70 dB(A) of equivalent continuous A-weighted sound pressure at work stations. This has been determined while running the machine, using a Bruel & Kjaer sound level meter, type 2236. The Roto Cooler base is meant to be used on a flat, stationary table or countertop.

The Sugaring Tray, which mounts on the Roto Cooler base, is designed to catch donuts as they drop from the outfeed end of the Donut Robot, and to hold toppings in which donuts can be dipped. The operator is expected to read and follow these instructions.

To use the Sugaring Tray and Roto Cooler:

1. Put sugar, powdered sugar, or cinnamon-sugar in the tray.
2. Place the Sugaring Tray and Roto Cooler near the outfeed end of the Donut Robot so donuts will fall into the tray.
3. Connect the Roto Cooler power cord to the 120 V outlet on back of the Donut Robot’s heater head.
4. Turn on the Roto Cooler base. The Sugaring Tray will rotate and receive donuts.
5. Coat the donuts with the topping in the tray.
6. When you are finished using the Sugaring Tray, turn off and unplug the Roto Cooler base.

### WARNING

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

7. Clean the Sugaring Tray using soap and water and a non-abrasive cloth or scrubber.
**Filter Flo Siphon**

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Shipping Weight</th>
<th>Construction</th>
<th>Standard Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dia.=6-1/4”/16 cm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hot shortening can cause serious burns. Never touch hot shortening. Never wear shorts while using the Filter Flo Siphon.</strong></td>
</tr>
</tbody>
</table>

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.

Figure A-4. Filter Flo Siphon.
5. Attach the filter assembly to the lower part of the siphon tube, as shown in Figure A-4. 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 screw 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.

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### Operation

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

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not compress the bulb more than once. Doing so could allow hot shortening to get into the bulb, damaging your equipment.</td>
</tr>
</tbody>
</table>

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 that 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. Carry the siphon to the sink. Hold the valve over the sink.

3. Squeeze the bulb several times to expel shortening from the siphon.

4. 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.

5. 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.
**Shortening Reserve Tank**

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Shipping Weight</th>
<th>Capacity</th>
<th>Construction</th>
<th>Standard Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>L=6-1/2”/17 cm</td>
<td>1 lb 10 oz/ 0.7 kg</td>
<td>2 lb 8 oz/1.1 kg shortening</td>
<td>Nickel-plated steel tank; non-corrosive self-closing valve.</td>
<td>Shortening reserve tank and valve assembly.</td>
</tr>
<tr>
<td>W=4-3/16”/11 cm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D=4”/10 cm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Shortening Reserve Tank is designed to supply melted shortening to the kettle of the Donut Robot. The operator is expected to read and follow these instructions.

To use the Shortening Reserve Tank:

1. Position the Shortening Reserve Tank on the conveyor side panels. Make sure that you do not position it above the donut turner.

### WARNING

Be careful if you put hot shortening into the tank. Hot shortening can cause serious burns.

2. Place shortening in the tank.
3. Turn on the Donut Robot. The heat of the fryer will melt the shortening in the tank.
4. To supply shortening to the fryer, open the valve by pushing down on the valve assembly.
5. When you are done making donuts, drain the remaining shortening into the fryer.
6. When the shortening and equipment have cooled completely, remove the Shortening Reserve Tank and wash it.
5 Donut-Making Helps

**Tips on Making Quality Cake Donuts**

- **Use the correct batter temperature.**
  
  In general, the correct batter temperature is 75°F-80°F/24°C-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°F-380°F/188°C-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” 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-crusted.

- **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.

Example: \(212°F - 32/1.8 = 100°C\)

To convert temperatures from Celsius to Fahrenheit:
- Multiply °C by 1.8 and add 32 to the result.

Example: \((100°C \times 1.8) + 32 = 212°F\)

### 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, and desired batter temperature.

<table>
<thead>
<tr>
<th>°F</th>
<th>°C</th>
<th>°F</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>12.8</td>
<td>76</td>
<td>24.4</td>
</tr>
<tr>
<td>56</td>
<td>13.3</td>
<td>77</td>
<td>25.0</td>
</tr>
<tr>
<td>57</td>
<td>13.9</td>
<td>78</td>
<td>25.6</td>
</tr>
<tr>
<td>58</td>
<td>14.4</td>
<td>79</td>
<td>26.1</td>
</tr>
<tr>
<td>59</td>
<td>15.0</td>
<td>80</td>
<td>26.7</td>
</tr>
<tr>
<td>60</td>
<td>15.6</td>
<td>325</td>
<td>162.8</td>
</tr>
<tr>
<td>61</td>
<td>16.1</td>
<td>330</td>
<td>165.6</td>
</tr>
<tr>
<td>62</td>
<td>16.7</td>
<td>335</td>
<td>168.3</td>
</tr>
<tr>
<td>63</td>
<td>17.2</td>
<td>340</td>
<td>171.1</td>
</tr>
<tr>
<td>64</td>
<td>17.8</td>
<td>345</td>
<td>173.9</td>
</tr>
<tr>
<td>65</td>
<td>18.3</td>
<td>350</td>
<td>176.7</td>
</tr>
<tr>
<td>66</td>
<td>18.9</td>
<td>355</td>
<td>179.4</td>
</tr>
<tr>
<td>67</td>
<td>19.4</td>
<td>360</td>
<td>182.2</td>
</tr>
<tr>
<td>68</td>
<td>20.0</td>
<td>365</td>
<td>185.0</td>
</tr>
<tr>
<td>69</td>
<td>20.6</td>
<td>370</td>
<td>187.8</td>
</tr>
<tr>
<td>70</td>
<td>21.2</td>
<td>375</td>
<td>190.6</td>
</tr>
<tr>
<td>71</td>
<td>21.7</td>
<td>380</td>
<td>193.3</td>
</tr>
<tr>
<td>72</td>
<td>22.2</td>
<td>385</td>
<td>196.1</td>
</tr>
<tr>
<td>73</td>
<td>22.8</td>
<td>390</td>
<td>198.9</td>
</tr>
<tr>
<td>74</td>
<td>23.3</td>
<td>395</td>
<td>201.7</td>
</tr>
<tr>
<td>75</td>
<td>23.9</td>
<td>400</td>
<td>204.4</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>PLUNGER SIZE</th>
<th>DONUT WEIGHT PER DOZEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1”</td>
<td>5-8 oz/142-227 g</td>
</tr>
<tr>
<td>1 7/16”</td>
<td>10-17 oz/283-482 g</td>
</tr>
<tr>
<td>1 9/16”</td>
<td>14-21 oz/397-595 g</td>
</tr>
<tr>
<td>1 13/16”</td>
<td>19-23 oz/539-652 g</td>
</tr>
</tbody>
</table>
Donut Robot®
Mark I & Mark I GP

Technical Supplement

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1 Installation
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  Initial Cleaning 2
  Assembling the Fryer 2
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6 Appendix
  Parts List Drawing Insert Page Insert
This technical supplement to the Donut Robot® Mark I Operator’s Manual contains much information that users and service persons may find helpful:

- Detailed maintenance and troubleshooting guides
- Parts lists and assembly drawings of the Mark I
- Instructions on the testing and calibration of electrical components

Remember that this is a supplement, not the official operator’s manual. You 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.
To help familiarize you with the major parts of your Donut Robot® Mark I, please study the photograph below.

Figure 1-1. Donut Robot Mark I–GP Model.
Unpacking the Fryer

To unpack the Donut Robot® Mark I 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.
5. Tilt the heater head back. Remove the kettle from the fryer case and carry it to the work station.
6. Tilt the heater head down.
7. Coil the main power cord and place it in the fryer case.
8. Move the heater head and fryer case to the work station.

Initial Cleaning

Thoroughly clean the Donut Robot Mark I before using it. Refer to Section 3, “Cleaning,” for cleaning instructions.

WARNING

To avoid electrocuting yourself or damaging the machine, never allow water, steam, cleaning solution, or other 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 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. Tilt the heater head assembly back.
4. Set the kettle into the fryer case. The end of the kettle that has a sloping bottom 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.
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 1-2 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 1-2.)
   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.
7. Be sure your power source matches the specifications on the data plate. Connect the machine to the power source.

8. Turn the thermostat knob above 200º F (93º C). Turn on the conveyor and check to see that it operates smoothly. The power switch for the conveyor drive is on the heater head.

9. Turn off the conveyor and turn the thermostat knob below 200º F (93º C).

**Assembling the Cutter**

Install the column and the cutter head assembly by sliding the column into the column mounting bracket. See Figure 1-3.

**On Standard Model**

1. Install the plunger as follows:
   a. Put the narrow part of the plunger’s center rod through the slot in the center of the bail.
   b. Lower the piston into the hopper cylinder.
   c. Guide the white square key into the slot in the center of the bail. See Figure 1-4.
2. Lock the plunger in place as follows:
   a. While pressing down on the plunger head and lifting up on the release tab, rotate the square key 1/2 turn.
   b. Lower the release tab so the peg key locks into the slot in the bail. See Figure 1-5.

3. Mount the hopper as follows:
   a. Tilt the hopper and position the plunger head under the cutter head roller.
   b. Push up on the hopper so the plunger spring compresses.
   c. Place the bail on the hopper resting pins. See Figure 1-6.
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. To do this, first turn on the conveyor; then turn on the cutter using the power switch on the cutter head. Turn off the cutter.

On GP Model

1. Mount the hopper by sliding the two mounting studs on the bail into the notches on the bearing strut. Secure the hopper with the thumb nuts. See Figure 1-7.

![Figure 1-7. Mounting the Hopper–GP Model.](image)

2. Install the plunger as follows:
   a. Pull the plunger connecting rod 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 bail.
   c. Lower the plunger until the wider part at the top of the center rod enters the round opening in the bail and the plunger’s piston just enters the hopper cylinder. There is a small round hole in the spider valve of the plunger. It must slide over the plunger positioning pin in the cylinder. See Figure 1-8.
d. Lower the connecting rod and insert the pin into the hole near the top of the center rod. See Figure 1-9.

3. Plug the power cord from the cutter head assembly into the outlet on the back of the heater head.

4. Test the cutter head to ensure that it is operating properly. To do this, turn on the conveyor; then turn on the cutter using the power switch on the cutter head. Turn off the cutter.

**Adjusting the Hopper**

**WARNING**

To avoid electrocuting yourself, always disconnect the machine from the power source before making adjustments.

The bottom of the hopper should be 1”/2.5 cm above the flight bars. To set the height of the hopper:

1. Hold the cutter and the hopper from below.
2. Loosen the set screw in the lower set collar on the column.
3. Raise or lower the column as needed.
4. Tighten the set screw.
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.
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 and column, in that order.
4. Remove the shortening from the fryer as explained in the Operator's Manual.
5. To avoid dropping the machine or getting shortening on the floor, wipe excess shortening off of the fryer and the 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.

6. Set aside the conveyor.
7. Tilt back the heater head. Remove and set aside the kettle.
8. Tilt the heater head down.
9. To prevent tripping, coil the power cord and set it inside the fryer case. Move the heater head and the fryer case to the new work station.
10. Tilt back the heater head.
11. Move and install the kettle.
12. Tilt the heater head down.
13. Move and install the conveyor.
14. Move and install the column.
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.
2 Maintenance

WARNING

To avoid being burned, electrocuted, or otherwise injured, always disconnect the machine from the power source and allow it to cool down before making adjustments, clearing obstructions, lubricating, cleaning, or disassembling.

Lubricating

Every six months, lubricate the conveyor drive motor:

1. Disconnect the machine from the power source.

2. If you do not have an offset screwdriver or a very short screwdriver, you will need to remove the drive belt cover (item 12 in Figure 4-3) before proceeding. To do this, remove the two hex-head machine screws that hold it in place, and then slide it up until it comes off.

3. Tilt back the heater head.

4. Remove the heater head skirt (item 22 in Figure 4-3).

CAUTION

Be gentle with all parts of the conveyor drive motor. Damaging the parts could stop production.

5. Remove the heater head bottom (item 21 in Figure 4-3).

6. Locate the drive motor (item 25 in Figure 4-3) and its bearing cap. The bearing cap is beneath the motor fan.

7. Apply 4 to 6 drops of SAE 30 machine oil through the lubricating hole in the bearing cap. See Figure 2-1.

8. Replace the heater head bottom and the heater head skirt.

9. Return the heater head to its usual position.

10. If you removed the drive belt cover, replace it.
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.”

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.
This section is designed as an aid in troubleshooting, not as a substitute for a qualified technician. You may encounter a problem with your machine that is not covered in this section, or you may try the remedies suggested here and find that they do not solve the problem. If this happens, call your dealer or another qualified technician. Also, call your dealer if you need a replacement part.

If your dealer cannot help you, please call Belshaw Bros. We will try to help you solve the problem over the phone. When you call, please specify the following:

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

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

If your machine needs to be repaired, consult your dealer or another local, qualified technician. If they cannot repair your machine, Belshaw can provide factory service. First call us for a return goods authorization. Then send your machine to us, 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.

Ship your machine to:
Belshaw Bros., Inc.
814 44th Street NW, Suite 103
Auburn, WA 98001 USA

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

Following is a troubleshooting chart to help you identify and solve some basic problems. For additional information regarding baking mixes, temperature, and fry time, refer to “Donut-Making Helps” in the Operator's Manual.

**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

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The shortening is too hot.</td>
<td>Decrease the temperature setting.</td>
</tr>
<tr>
<td>The dough is over-mixed.</td>
<td>Review the mixing procedure.</td>
</tr>
<tr>
<td>The donuts are too large.</td>
<td>Adjust the dial on the cutter head to produce smaller donuts.</td>
</tr>
<tr>
<td>The shortening is old or contaminated.</td>
<td><strong>WARNING</strong></td>
</tr>
<tr>
<td></td>
<td>To avoid being burned or otherwise injured, turn off the machine and allow the shortening to cool.</td>
</tr>
<tr>
<td></td>
<td>Replace the bad shortening with fresh shortening.</td>
</tr>
</tbody>
</table>

# The Donuts Are Shaped Imperfectly

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The shortening level is too low.</td>
<td>Add shortening to reach the proper level.</td>
</tr>
<tr>
<td>The drop plate is out of position.</td>
<td><strong>WARNING</strong></td>
</tr>
<tr>
<td></td>
<td>To avoid being burned or otherwise injured, turn off the machine and allow the shortening to cool.</td>
</tr>
<tr>
<td></td>
<td>Reposition the drop plate.</td>
</tr>
<tr>
<td>The tip of the cylinder is dirty.</td>
<td><strong>WARNING</strong></td>
</tr>
<tr>
<td></td>
<td>To avoid injury, turn off the machine and remove the hopper.</td>
</tr>
<tr>
<td></td>
<td>Clean the cylinder.</td>
</tr>
<tr>
<td>The tip of the cylinder is nicked.</td>
<td>Replace the hopper.</td>
</tr>
<tr>
<td>The size-selection dial is not tightened.</td>
<td>Tighten the thumb nut.</td>
</tr>
<tr>
<td>The dough is overmixed.</td>
<td>Review the mixing procedure.</td>
</tr>
</tbody>
</table>
### THE DONUTS ARE UNDERCOOKED.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The shortening is not hot enough.</td>
<td>Increase the temperature setting.</td>
</tr>
<tr>
<td>The conveyor is moving too quickly.</td>
<td>Decrease the speed of the conveyor, using the method described in Section 2, “Operation,” of the operator’s manual.</td>
</tr>
<tr>
<td>The dough has not had enough floor time.</td>
<td>See “Donut-Making Helps” in the Operator's Manual.</td>
</tr>
<tr>
<td>The thermostat reads inaccurately.</td>
<td>Calibrate the thermostat.</td>
</tr>
</tbody>
</table>

### THE DONUTS ARE OVERCOOKED.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The shortening is too hot.</td>
<td>Decrease the temperature setting. The temperature setting should never exceed 375°F/191°C.</td>
</tr>
<tr>
<td>The conveyor is moving too slowly.</td>
<td>Increase the speed of the conveyor, using the method described in “Operation” in the Operator’s Manual.</td>
</tr>
<tr>
<td>The thermostat reads inaccurately.</td>
<td>Calibrate the thermostat.</td>
</tr>
</tbody>
</table>
### THE CONVEYOR BITES THE DONUTS.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The donuts are not cooking enough.</td>
<td>See “The donuts are undercooked” above.</td>
</tr>
<tr>
<td>The shortening level is too low.</td>
<td>Add shortening to reach the proper level.</td>
</tr>
</tbody>
</table>

**WARNING**

To avoid being burned or otherwise injured, before doing any of the following, turn off the machine and allow the shortening to cool.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The turner is bent or packed with cooked food particles.</td>
<td>Straighten and/or clean the turner.</td>
</tr>
<tr>
<td>The cam weight is sticking due to the accumulation of varnish.</td>
<td>Clean to remove the cooked-on varnish.</td>
</tr>
<tr>
<td>The fryer is not level.</td>
<td>Level the fryer.</td>
</tr>
</tbody>
</table>

### THE CUTTER OPERATES CONTINUOUSLY.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
</table>

**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.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the microswitches is defective. (There are three microswitches in the conveyor drive assembly and one microswitch in the cutter head.)</td>
<td>For help in testing the microswitches, refer to Section 5, “Electrical Components.” Replace any defective microswitches.</td>
</tr>
<tr>
<td>Something is interfering with the nylon brake dog in the cutter head.</td>
<td>Clear away the cause of the interference.</td>
</tr>
<tr>
<td>The brake spring in the cutter head is weak or broken.</td>
<td>Replace the spring.</td>
</tr>
</tbody>
</table>
## THE HEATING ELEMENT FAILS TO MAINTAIN THE PROPER TEMPERATURE.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The input voltage is incorrect.</td>
<td>Supply the correct power as specified on the data plate.</td>
</tr>
</tbody>
</table>
| Sediment has accumulated around the thermostat bulb. | **WARNING**
To avoid being burned or otherwise injured, 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, electrocuted, or otherwise injured, turn off the machine, allow the shortening to cool, and disconnect the machine from the power source. Replace the thermostat. |

## THE MOTOR OVERHEATS.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The power requirements of the machine do not match the power source.</td>
<td>Supply the correct power as specified on the data plate.</td>
</tr>
<tr>
<td>The motor is binding.</td>
<td>Repair or replace the motor.</td>
</tr>
<tr>
<td>The motor is defective.</td>
<td>Repair or replace the motor.</td>
</tr>
</tbody>
</table>
### THE CONVEYOR IS JAMMED.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARNING</strong></td>
<td></td>
</tr>
<tr>
<td>To avoid being burned or otherwise injured, before doing any of the following, turn off the machine and allow the shortening to cool.</td>
<td></td>
</tr>
<tr>
<td>Cooked food particles are wedged between a chain opening and a sprocket tooth.</td>
<td>Clean to remove the food particles. Clean the Donut Robot regularly and thoroughly.</td>
</tr>
<tr>
<td>The turner slot is packed with cooked food particles.</td>
<td>Clean to remove the food particles.</td>
</tr>
<tr>
<td>The drop plate is out of position and is interfering with the conveyor.</td>
<td>Reposition the drop plate.</td>
</tr>
<tr>
<td>Something is interfering with the free movement of the turner cam and cam weight.</td>
<td>Remove the obstruction.</td>
</tr>
<tr>
<td>The heating element is bent and is interfering with the turner.</td>
<td>Straighten the heating element.</td>
</tr>
<tr>
<td>The turner is out of position and is catching on a flight bar below.</td>
<td>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.</td>
</tr>
<tr>
<td>The conveyor drive shaft and the drive motor shaft are out of alignment.</td>
<td>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.</td>
</tr>
</tbody>
</table>
### THE CUTTER WILL NOT OPERATE, BUT THE CONVEYOR RUNS.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cutter head power cord is not plugged in to the outlet on the back of the heater head.</td>
<td>Connect the cutter head power cord to the correct outlet.</td>
</tr>
<tr>
<td>The set screws in the cutter head cam are loose.</td>
<td>Tighten the set screws.</td>
</tr>
<tr>
<td>The cutter head power cord is broken.</td>
<td>Repair or replace the cutter head power cord.</td>
</tr>
<tr>
<td>The cutter motor is defective.</td>
<td>Replace the cutter motor.</td>
</tr>
<tr>
<td>One of the microswitches is defective. (There are three microswitches in the conveyor drive assembly and one microswitch in the cutter head.)</td>
<td>For help in testing the microswitches, refer to Section 5, “Electrical Components.” Replace any defective microswitches.</td>
</tr>
<tr>
<td>The cutter head power switch is defective.</td>
<td>Replace the cutter head power switch.</td>
</tr>
<tr>
<td>The circuit breaker on the back of the heater head is defective.</td>
<td>Replace the circuit breaker.</td>
</tr>
<tr>
<td>The cutter head assembly wiring harness is not connected.</td>
<td>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.</td>
</tr>
<tr>
<td>The cuts-per-pocket switch is defective.</td>
<td>Replace the cuts-per-pocket switch.</td>
</tr>
</tbody>
</table>

**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 ELEMENT WILL NOT HEAT, AND THE CONVEYOR WILL NOT RUN.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The power cord is not plugged in, or the outlet has no power.</td>
<td>Connect the machine to a good power source.</td>
</tr>
<tr>
<td></td>
<td><strong>WARNING</strong></td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>The power cord is defective.</td>
<td>Replace the power cord.</td>
</tr>
<tr>
<td>The transformer is defective.</td>
<td>Replace the transformer.</td>
</tr>
<tr>
<td>The connections to the transformer are bad.</td>
<td>Rewire the connections to the transformer.</td>
</tr>
</tbody>
</table>

### THE ELEMENT WILL NOT HEAT, BUT THE CONVEYOR RUNS.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The high temperature limit control switch has been tripped.</td>
<td>Push the red reset button on the back panel of the heater head.</td>
</tr>
<tr>
<td>The thermostat has been calibrated incorrectly.</td>
<td>Recalibrate the thermostat.</td>
</tr>
<tr>
<td></td>
<td><strong>WARNING</strong></td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>The high temperature limit control is defective.</td>
<td>Replace the high temperature limit control.</td>
</tr>
<tr>
<td>The thermostat is defective.</td>
<td>Replace the thermostat.</td>
</tr>
<tr>
<td>The contactor for the transistor is defective.</td>
<td>Replace the contactor.</td>
</tr>
<tr>
<td>The connections to the contactor are bad.</td>
<td>Rewire the connections to the contactor.</td>
</tr>
</tbody>
</table>
THE ELEMENT HEATS, BUT THE CONVEYOR WILL NOT RUN.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>What To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>The input voltage is incorrect.</td>
<td>Supply the correct power as specified on the data plate.</td>
</tr>
<tr>
<td>The circuit breaker has been tripped.</td>
<td>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.</td>
</tr>
<tr>
<td>There is a short circuit.</td>
<td>Find it and repair it. (First, see “The circuit breaker has been tripped” above.)</td>
</tr>
<tr>
<td>The wiring harness in the conveyor drive assembly is not connected.</td>
<td>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.</td>
</tr>
<tr>
<td>The conveyor drive power switch is defective.</td>
<td>Replace the switch.</td>
</tr>
<tr>
<td>The nylon brake dog is binding on the conveyor brake motor.</td>
<td>If the brake dog is worn, replace it. If it is too tight, loosen it. If the spring is weak or missing, replace it.</td>
</tr>
<tr>
<td>The brake motor is defective.</td>
<td>Replace the brake motor.</td>
</tr>
<tr>
<td>An internal wire is interfering with the nylon brake dog.</td>
<td>Move the wire.</td>
</tr>
<tr>
<td>A fan blade is caught on a wire.</td>
<td>Move the wire.</td>
</tr>
<tr>
<td>The conveyor is jammed.</td>
<td>Clear the obstruction.</td>
</tr>
<tr>
<td>The couplings are not engaged.</td>
<td>Engage the couplings.</td>
</tr>
<tr>
<td>The conveyor drive coupling is slipping.</td>
<td>Tighten the two set screws.</td>
</tr>
</tbody>
</table>

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 following pages contain lists of the parts that make up the Donut Robot® Mark I, the Roto Cooler, and the Icing Finishing Tree. Each list refers to an exploded-view assembly drawing.

Use the figures as reference guides only.

<table>
<thead>
<tr>
<th>IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>The assembly figures in this section are meant as guides. See the Appendix for more specific information.</td>
</tr>
</tbody>
</table>
FIGURE 4-1. MARK I MAIN ASSEMBLY–STANDARD.
FIGURE 4-2. MARK I MAIN ASSEMBLY–GP.
FIGURE 4-3. MARK I CUTTER HEAD ASSEMBLY–STANDARD.
FIGURE 4-4. MARK I CUTTER HEAD ASSEMBLY—GP.
FIGURE 4-5. MARK I HEATER HEAD ASSEMBLY–STANDARD.
FIGURE 4-6. MARK I CONVEYOR ASSEMBLY–STANDARD.
FIGURE 4-7. MARK I CONVEYOR ASSEMBLY–GP.
FIGURE 4-8. ROTO COOLER MAIN ASSEMBLY.
FIGURE 4-9. ICING FINISHING TREE MAIN ASSEMBLY.
This section explains how to test the continuity of electrical components in the Donut Robot® Mark I. 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 I. It explains how to check, adjust, and recalibrate the thermostat.

**Continuity Testing**

To test the continuity of a toggle switch:

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 C-1, and test the switch in the ON and OFF positions. The switch should show continuity only when in the ON position.

![Figure 5-1. Toggle Switch Continuity Test.](image1)

To test the continuity of a microswitch:

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 C-1, and test the switch in the ON and OFF positions. The switch should show continuity only when in the ON position.
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.
4. Connect the continuity tester across the A terminals indicated in Figure C-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 counterclockwise 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.

Figure 5-3. Thermostat Terminals.