



Your Solutions Partner

Service Manual

FLEXIBLE BATCH BROILER

MODELS

FBB-EO-208

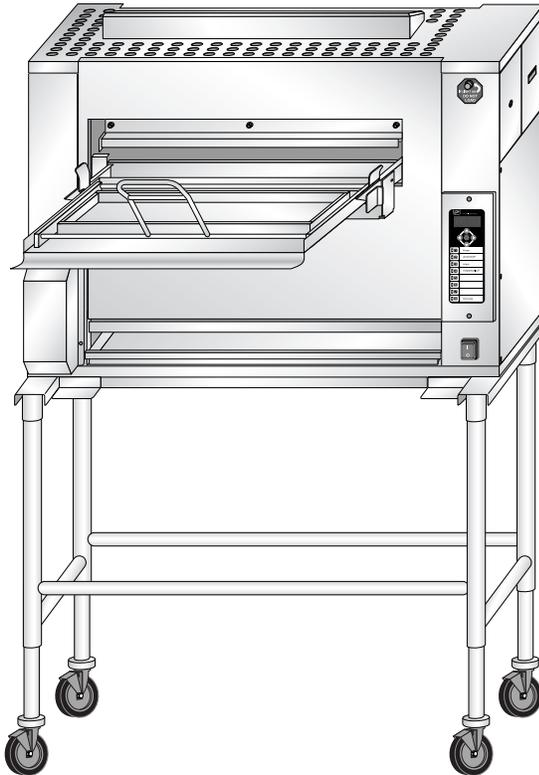
FBB-EC-208

FBB-EO-230

FBB-EC-230

FBB-EO-240

FBB-EC-240



Please read this manual completely before attempting to install, operate or service this equipment

This document is prepared for trained Duke service technicians. It is not to be used by anyone not properly qualified to perform these procedures.

This Service Manual is not all encompassing. If you have not been trained on servicing this product, be sure to read the manual completely before attempting servicing. Be sure all necessary tools, test equipment, and skills are available. Those procedures for which you do not have the proper skills and test equipment must be performed only by a qualified Duke trained service technician.

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IMPORTANT WARNING AND SAFETY INFORMATION

THIS MANUAL HAS BEEN PREPARED FOR PERSONNEL QUALIFIED TO INSTALL ELECTRICAL EQUIPMENT, WHO SHOULD PERFORM THE INITIAL FIELD START-UP AND ADJUSTMENTS OF THE EQUIPMENT COVERED BY THIS MANUAL.

READ THIS MANUAL THOROUGHLY BEFORE OPERATING, INSTALLING OR PERFORMING MAINTENANCE ON THE EQUIPMENT.

⚠ WARNING Failure to follow all the instructions in this manual can cause property damage, injury or death.

⚠ WARNING Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.

⚠ WARNING Electrical connections should be performed only by a certified professional.

⚠ WARNING Electrical and grounding connections must comply with the applicable portions of the National Electric Code and/or all local electric codes. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING Before connecting the unit to the electrical supply, verify that the electrical and grounding connections comply with the applicable portions of the National Electric Code and/or other local electrical codes. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING Before connecting the unit to the electrical supply, verify that the electrical connection agrees with the specifications on the data plate. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING UL73 grounding instructions: This appliance must be connected to a grounded, metal, permanent wiring system. Or an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment-grounding terminal or lead on the appliance. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING Appliances equipped with a flexible electric supply cord, are provided with a grounding plug. It is imperative that this plug be connected into a properly grounded receptacle. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING If the receptacle is not the proper grounding type, contact an electrician. Do not remove the grounding prong from the plug. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING Before performing any service that involves electrical connection or disconnection and/or exposure to electrical components, always perform the Electrical LOCKOUT/TAGOUT Procedure. Disconnect all circuits. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING Before removing any sheet metal panels or servicing this equipment, always perform the Electrical LOCKOUT/TAGOUT Procedure. Be sure all circuits are disconnected. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING Do not operate this equipment without properly placing and securing all covers and access panels. Failure to comply with this procedure can cause property damage, injury or death.

⚠ WARNING Do not use or store gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance. Failure to comply can cause property damage, injury or death.

⚠ WARNING In the event of a power failure, do not attempt to operate this appliance. Failure to comply can cause property damage, injury or death.

TABLE OF CONTENTS

INTRODUCTION	5
INSTALLATION.....	5
OPERATION.....	5
CLEANING	5
SPECIFICATIONS.....	6
MODEL NUMBER KEY	6
TOOLS.....	6
REMOVAL AND REPLACEMENT OF COMPONENTS	7
COVERS AND PANELS	7
Fuse Access Panel	7
Element Connection Access Panel.....	7
Electrical Access Panel.....	7
Product Pan Shelf.....	8
Discharge Hood	8
Discharge Chute	8
Discharge Pan	8
Discharge Grease Pan	9
Discharge Access Panel.....	9
Main Grease Pan.....	10
Grease V-Pan	10
Loader Tray.....	10
Conveyor Drive Motor Cover	11
Top Service Panel.....	11
Removing the Front Panel.....	12
Removing the Rear Panel.....	12
Removing the Element Cover Panel.....	12
COMPONENT REMOVAL	13
Conveyor Drive Motor Assembly	13
Conveyor Drive Chain.....	14
Conveyor Drive Motor Sprocket.....	14
Conveyor Drive Motor Capacitor	15
Cook Chamber Temperature Probe.....	16
Control Board.....	17
Step-Down Transformer.....	17
Solid-State Relays	18
Main Power Switch	18
Mechanical Relays.....	19
Replacing Conveyor Links	19
HEATING ELEMENTS.....	20
FUSE REPLACEMENT	22
ADJUSTMENTS	23
DRIVE CHAIN DEFLECTION ADJUSTMENT	23
CONVEYOR POSITION ADJUSTMENT	23
ASH SCRAPER BRACKET ADJUSTMENT	24
LOADER DOOR SEAL BRACKET	24
PRODUCT STOP BRACKET ADJUSTMENT	25

SEQUENCE OF OPERATION 26

TROUBLESHOOTING27

 COMPONENT CHECK PROCEDURES27

 Checking the Power Switch27

 Checking the Control Board.....27

 Testing the Temperature Probe.....27

 Checking the Conveyor Drive Motor27

 Testing the Conveyor Drive Motor28

 Checking Conveyor Drive Motor Capacitor28

 Testing the Relays28

 Testing the Transformers29

 Voltage Test29

 Resistance Check.....29

 Testing the Mechanical Relays29

 Continuity Test29

 Testing the Contactors29

 Voltage Test29

 CONTROL DIAGNOSTICS30

 Programming30

 Diagnostics30

 TROUBLESHOOTING CHART32

PREVENTIVE MAINTENANCE.....35

ELECTRICAL SCHEMATIC – FLEXIBLE BATCH BROILER36

CUSTOMER ASSISTANCE.....39

INTRODUCTION

INSTALLATION

For detailed installation instructions, refer to the Installation and Operation Manual.

OPERATION

For specific operating instructions, refer to the Installation and Operation Manual.

CLEANING

For specific cleaning instructions, refer to the Installation and Operation Manual.

SPECIFICATIONS

ELECTRICAL						
MODEL NUMBER	VOLTAGE	AMPS	CYCLE	PHASE	POWER	CATALYST
FBB-EO-208	208	68	60	3	23.5 kW	NO
FBB-EC-208	208	68	60	3	23.5 kW	YES
FBB-EO-230	230	62	60	3	23.5 kW	NO
FBB-EC-230	230	62	60	3	23.5 kW	YES
FBB-EO-240	240	60	50	3	23.5 kW	NO
FBB-EC-240	240	60	50	3	23.5 kW	YES

SHIPPING WEIGHT	lbs	Kg
BATCH BROILER (STANDARD)	530	240
SHIPPING DIMENSIONS	Standard	Metric (cm)
L X W X H	47" X 34" X 68"	119.4 X 86.4 X 172.7

MODEL NUMBER KEY

FBB-EX-Y-ZZ

X = O (No Catalyst) or C (Catalyst)

Y = 208 VAC, 230 VAC or 240 VAC

ZZ = 2 Digit Country Identifier

TOOLS

STANDARD

- Standard set of hand tools.
- Volt-Ohm Meter (VOM) with AC current clamp
(Any quality VOM with a sensitivity of at least 20,000 ohms per volt can be used).
- Conveyor Link Removal Pliers

REMOVAL AND REPLACEMENT OF COMPONENTS

COVERS AND PANELS



WARNING

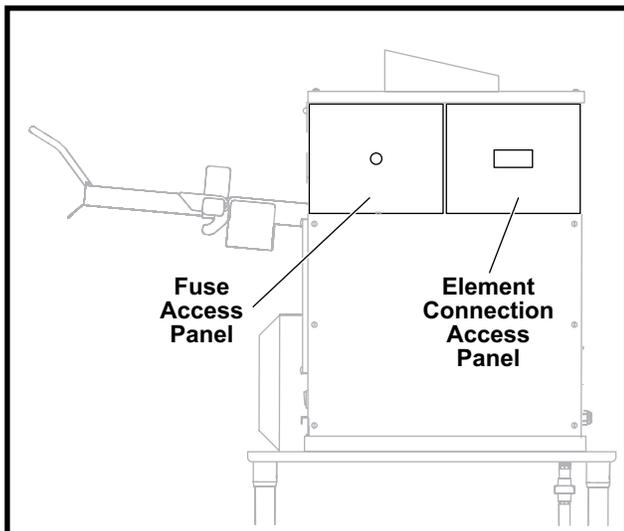
DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

Caution: If the broiler has been operating, broiler panels and components may be hot. Use PROPER PROTECTION.

Fuse Access Panel

The Fuse Access Panel provides access to the Upper Flame Sensors, Igniters and Blower Hose.

1. Remove Fuse Access Panel by lifting up and removing from broiler.
2. Install Fuse Access Panel by lowering into the side grooves.



Upper Access Panels

Element Connection Access Panel

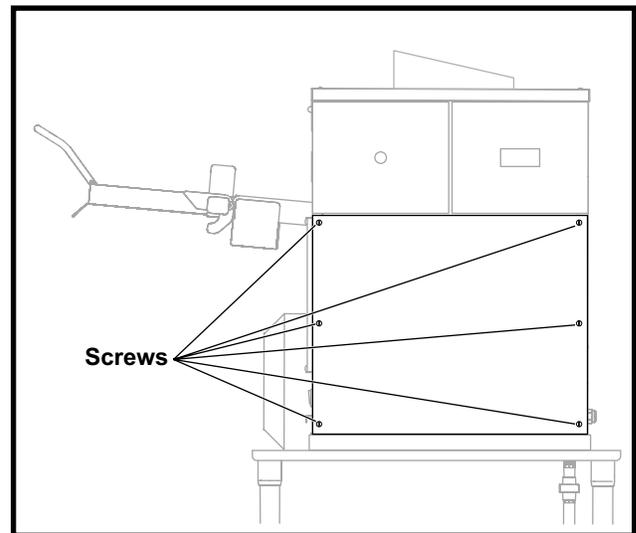
The Element Connection Access Panel provides access to the electrical connection for the Heating Elements.

1. First remove Fuse Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Remove Element Connection Access Panel by lifting up and removing from broiler
3. Install Electrical Connection Access Panel by lowering into the side grooves.

Electrical Access Panel

The Electrical Access Panel provides access to the Transformers, Blower Motor, Conveyor Motor Capacitor, and electrical connections to the Control Board.

1. Remove the six screws securing the Electrical Access Panel.
2. Remove the panel from the broiler.
3. Reverse procedure to install the Electrical Access Panel.



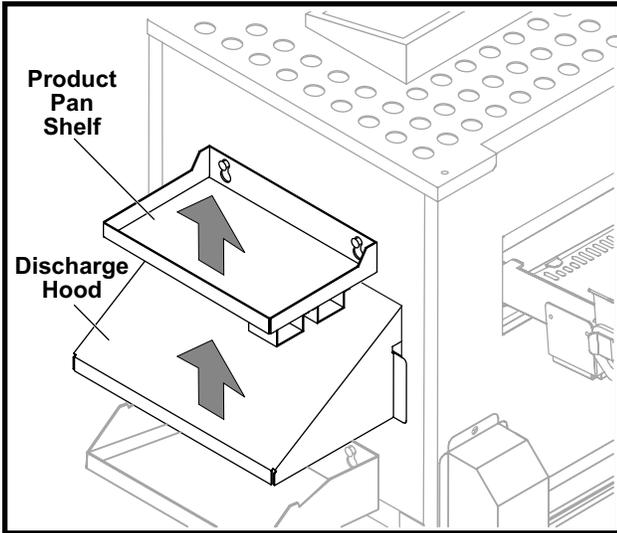
Electrical Access Panel

Product Pan Shelf

The Product Pan Shelf is located on the discharge side of the broiler and holds the unused holding pans.

1. Lift the pan shelf up and remove.

- To install the pan shelf, slide the keyholes over the two screws and slide pan shelf down.



Product Pan Shelf and Discharge Hood

Discharge Hood

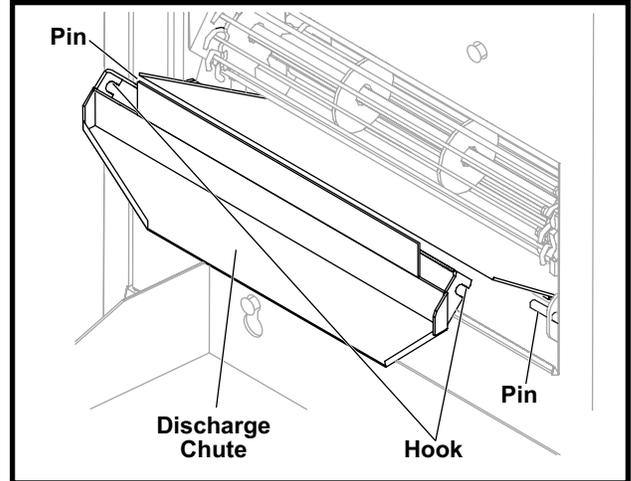
The Discharge Hood is located on the discharge side of the broiler under the Product Pan Shelf.

- Remove the Product Pan Shelf.
- Remove the Discharge Hood by lifting out.
- Install Discharge Hood by lowering into the side grooves.
- Reinstall the Product Pan Shelf.

Discharge Chute

The Discharge Chute is located under the Discharge Hood and guides the patties from the conveyor into the Discharge Pan.

- Remove Product Pan Shelf.
- Remove the Discharge Hood.
- Remove Discharge Chute by lifting off of the two side pins.
- Reverse procedure to install Discharge Chute, being sure to rest the hooks onto the pins on both sides.

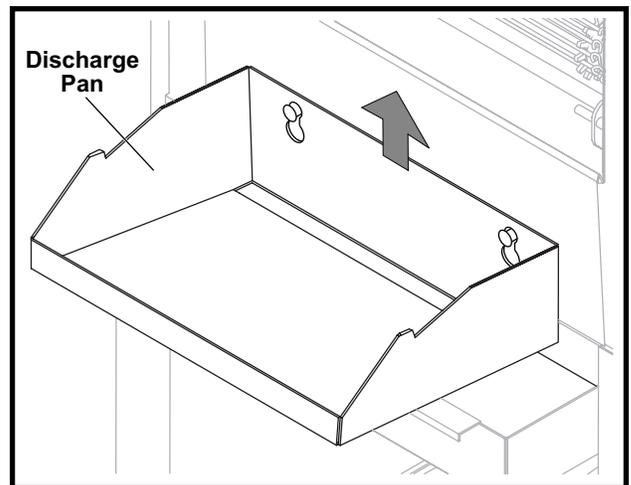


Discharge Chute

Discharge Pan

The Discharge Pan is located on the discharge side of the broiler below the Discharge Hood and is used to support the Product Pan (not supplied).

- Remove the Product Pan if present.
- Slide Discharge Pan up and out of keyhole slots.
- Install Discharge Pan by lowering it into the thumbscrews.



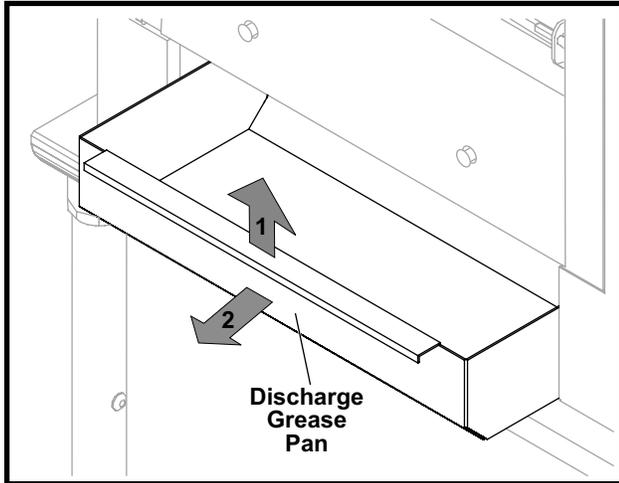
Discharge Pan

Discharge Grease Pan

The Discharge Grease Pan is located below the Discharge Pan and catches any grease drippings.

1. Tilt Discharge Grease Pan up to unhook and pull forward to remove.
2. When installing the Discharge Grease Pan, be sure to tilt up and push all the way back.

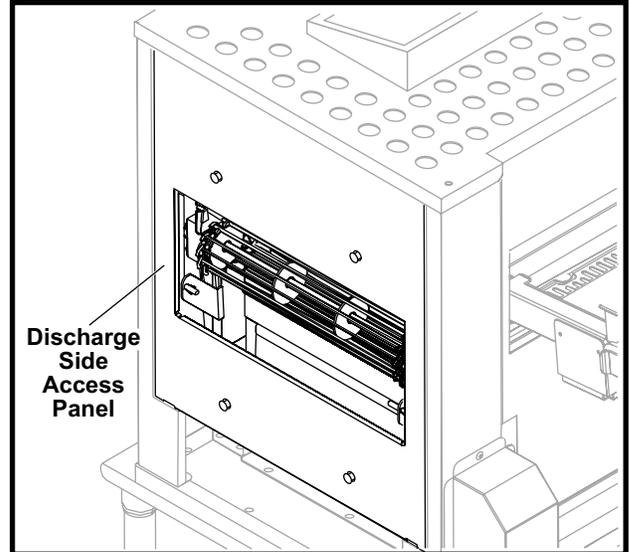
NOTE: Correct positioning will not allow pan removal without upward tilt.



Discharge Grease Pan

Discharge Access Panel

1. Remove the PHU Pan Shelf.
2. Remove Discharge Hood.
3. Remove Discharge Chute.
4. Remove Discharge Pan.
5. Remove Discharge Grease Pan.
6. Remove Discharge Access Panel by lifting it up and out.
7. Reverse procedure to install Discharge Access Panel.



Discharge Access Panel

Main Grease Pan

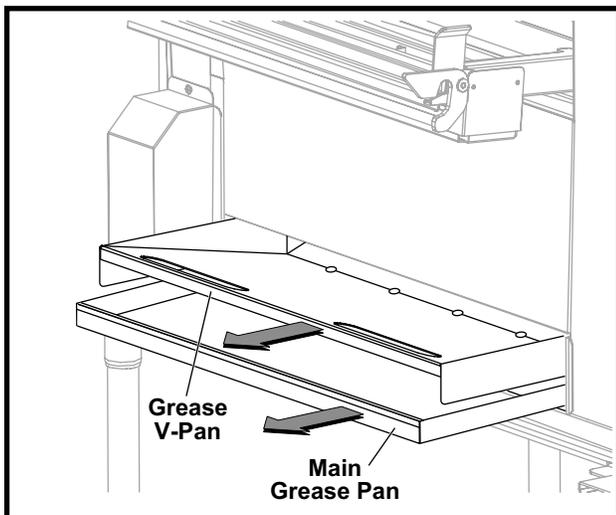
The Main Grease Pan is located on the front of the broiler under the Grease V-Pan.

Remove the Main Grease Pan by sliding straight out of broiler.

Grease V-Pan

The Grease V-Pan is located on the front of the broiler under the Loader Tray.

Remove pan by sliding straight out from broiler.



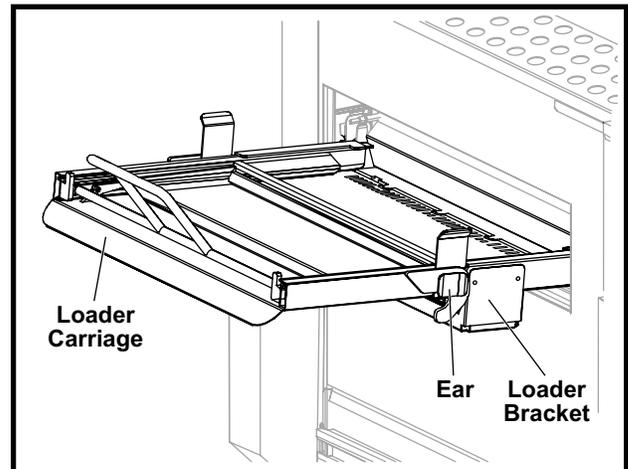
Grease V-Pan and Main Grease Pan

Loader Tray

The Loader Tray is located on the front of the broiler and slides into the channels on the Loader Brackets.

1. Remove Loader by sliding it out of the Loader Tray.

2. Remove Loader Tray from the Loader Brackets by pulling forward and disengaging ears on Loader Tray from keepers on the Loader Brackets.
3. Install Loader Tray by sliding it into bracket and engaging ears with keepers.



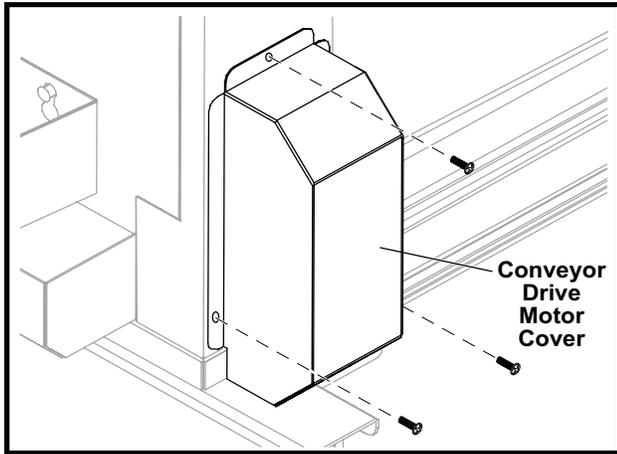
Loader Tray

Conveyor Drive Motor Cover

The Conveyor Drive Motor Cover, located on the lower front of the broiler on the discharge side, covers the Drive Chain Motor.

1. Remove the Main Grease Pan and the Grease V-Pan.

2. Remove the three screws securing the cover to the broiler.
3. Lift Conveyor Drive Motor Cover off the broiler.



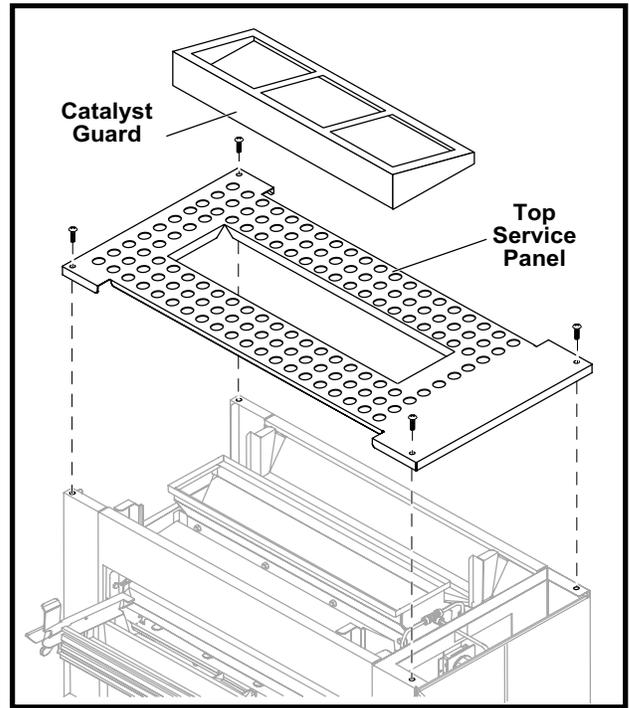
Conveyor Drive Motor Cover

Top Service Panel

The perforated Top Service Panel provides access to the two Infrared Burners

1. Remove the four screws securing the perforated Top Service Panel.
2. Remove the perforated Top Service Panel from the broiler.

3. Reverse procedure to install the perforated Top Service Panel.

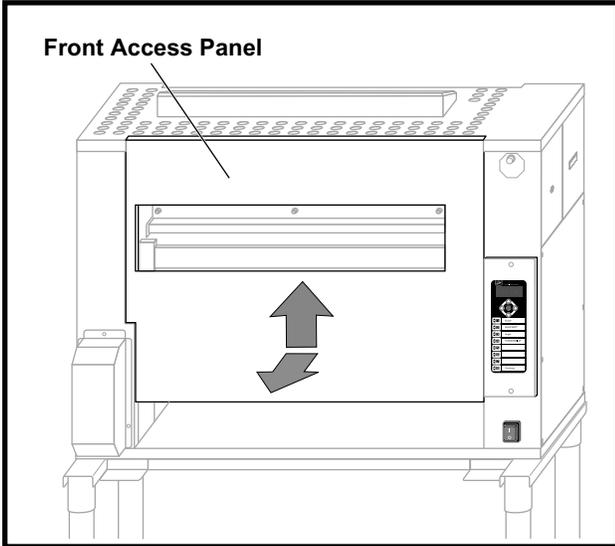


Top Service Panel

Removing the Front Panel

1. Slide the Loader out of the Loader Tray.
2. Unlatch the Loader Tray and slide it out of the Loader Tray Mounting Brackets.
3. Pull the Main Grease Pan out of the front of the broiler.

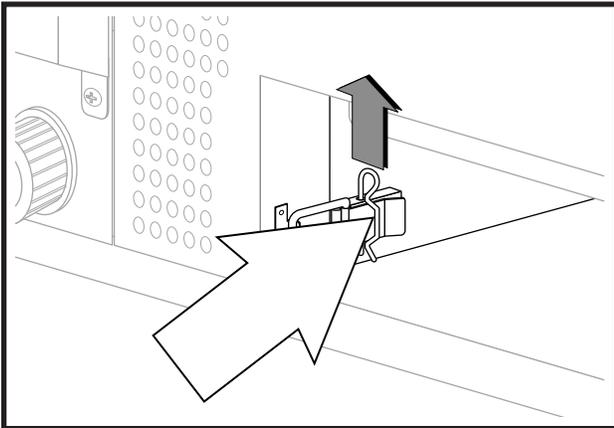
4. Pull the Grease V-Pan out of the front of the broiler.
5. Lift Front Panel up and away from broiler.
6. Reverse these steps to reinstall these parts.



Front Panel

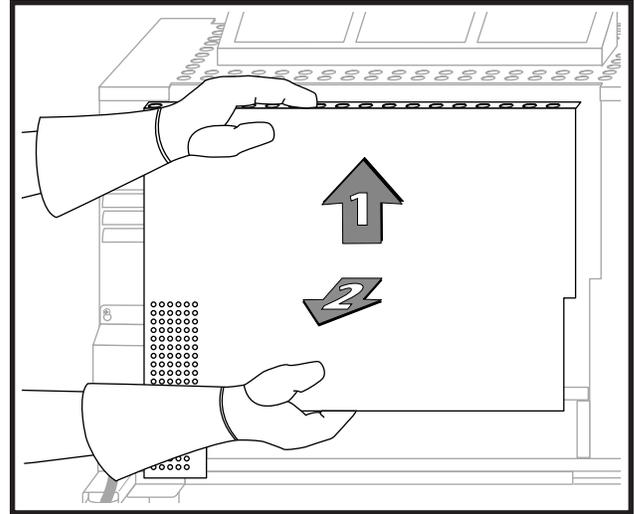
Removing the Rear Panel

1. Remove Cotter pin and unfasten latch.



Rear Panel Cotter Pin & Latch

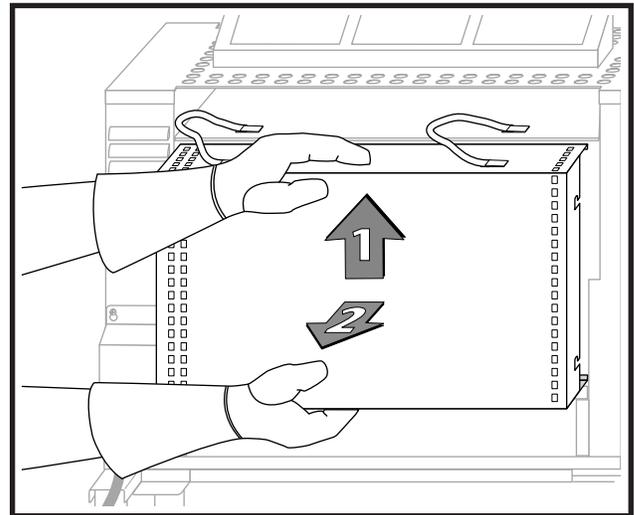
2. Lift Rear Panel up and away from broiler.
3. Reverse to reinstall the Rear Panel.



Rear Access Panel

Removing the Element Cover Panel

1. Remove the Rear Panel
2. Lift the Element Cover Panel up and away and remove from the broiler.



Element Cover Panel

3. The Panel is connected to the broiler with safety cables. Swing the panel up and place it on top of the broiler.
4. Reverse to reinstall the Element Cover Panel.

COMPONENT REMOVAL

CONVEYOR DRIVE MOTOR ASSEMBLY

The Conveyor Drive Motor Assembly is located in the lower front of the broiler at the discharge end. The motor drives the Conveyor by use of a drive chain.



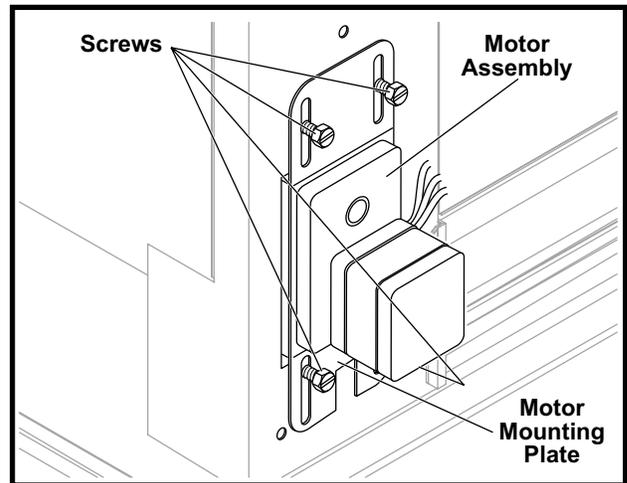
WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove the Conveyor Drive Motor Cover. Refer to the COVERS and PANELS section of the manual.
2. Disconnect wires to motor.
3. Remove Discharge Access Panel. Refer to the COVERS and PANELS section of the manual.
4. Remove four screws securing motor to mounting plate and remove motor.
5. Raise motor mounting plate to disengage drive chain from motor pulley.
6. Remove sprocket from motor shaft. Sprocket is secured to motor shaft by two set screws.

7. Reverse procedure to install a new motor. Ensure that one of the sprocket set screws is tightened to the flat side of the motor shaft.

NOTE: When installing the new motor, be sure to engage the chain on the motor sprocket. Adjust the tension on the chain to allow 3/16" chain deflection, as described in the procedure DRIVE CHAIN DEFLECTION ADJUSTMENT in the ADJUSTMENT Section, before tightening the motor mounting plate screws.



Conveyor Drive Motor Assembly

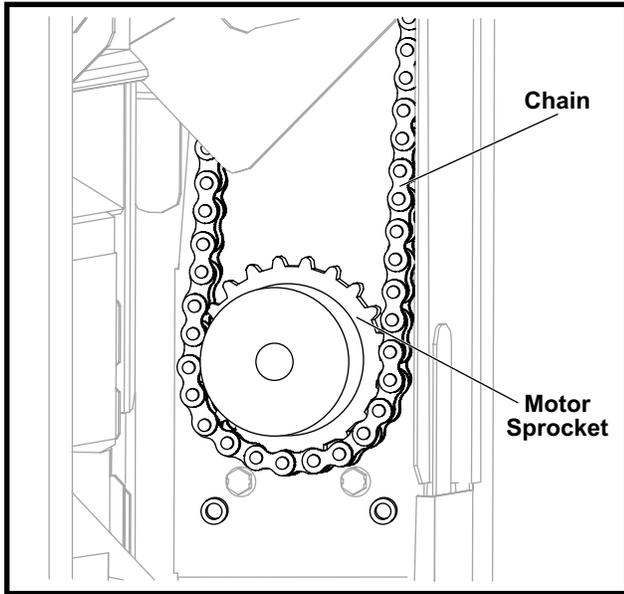
CONVEYOR DRIVE CHAIN

The Conveyor Drive Chain connects the drive motor to the Conveyor.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.



Drive Chain and Sprockets

1. Remove Conveyor Drive Motor Cover. Refer to the COVERS and PANELS section of the manual.
2. Remove Discharge Access Panel. Refer to the COVERS and PANELS section of the manual.
3. Disconnect motor wires.
4. Remove four screws securing motor mounting plate.
5. Raise motor mounting plate to disengage drive chain from motor sprocket.
6. Disengage chain from conveyor sprocket.
7. Remove chain from broiler by removing the master link.
8. Reverse procedure to install a new chain.

NOTE: When installing the new chain, be sure to engage the chain on the motor sprocket and conveyor sprocket. Then adjust the tension on the chain to allow 3/16" chain deflection, as described in the procedure DRIVE CHAIN DEFLECTION ADJUSTMENT in the ADJUSTMENT Section, before tightening the motor mounting plate screws.

CONVEYOR DRIVE MOTOR SPROCKET

The Conveyor Drive Motor Sprocket is attached to the motor shaft.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove Conveyor Drive Motor Cover. Refer to the COVERS and PANELS section of the manual.
2. Remove Discharge Access Panel. Refer to the COVERS and PANELS section of the manual.
3. Disconnect the motor wires.
4. Remove the four screws securing motor mounting plate.
5. Raise motor mounting plate to disengage drive chain from motor sprocket.
6. Disengage drive chain from motor sprocket.
7. Loosen the two setscrews on motor sprocket and remove sprocket from motor shaft.
8. Reverse procedure to install a new Conveyor Drive Motor Sprocket, ensuring that one set screw is tightened to the flat side of the motor shaft.

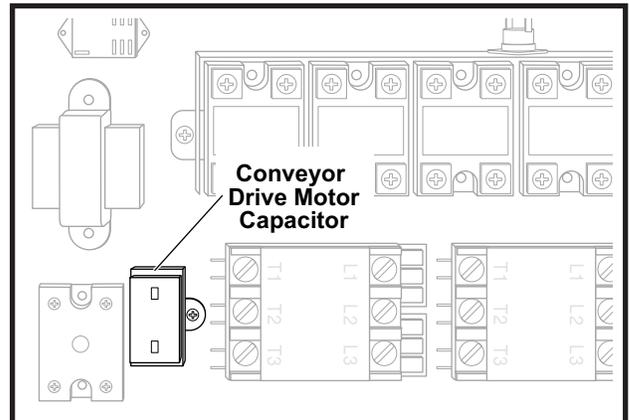
NOTE: When installing the new Conveyor Drive Motor Sprocket, be sure to engage the chain on the motor sprocket and conveyor sprocket, then adjust the tension on the chain to allow 3/16" chain deflection as described in the procedure DRIVE CHAIN DEFLECTION ADJUSTMENT in the ADJUSTMENT Section, before tightening the motor mounting plate screws.

CONVEYOR DRIVE MOTOR CAPACITOR**WARNING**

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Disconnect wires to Conveyor Drive Motor Capacitor.
3. Discharge the capacitor Apply a short across the two capacitor terminals.
4. Remove screw securing capacitor to frame and remove Conveyor Drive Motor Capacitor.

5. Reverse procedure to install a new Conveyor Drive Motor Capacitor.



Conveyor Drive Motor Capacitor

COOK CHAMBER TEMPERATURE PROBE

The Cook Chamber Temperature Probe connects to the bottom of the Control Board and is located on the back of the broiler.

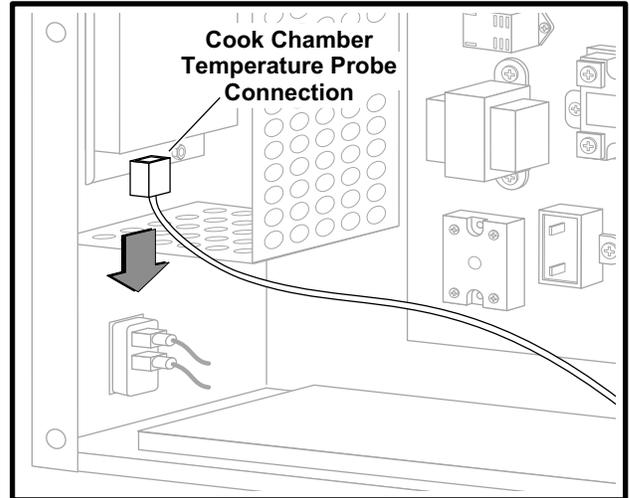


WARNING

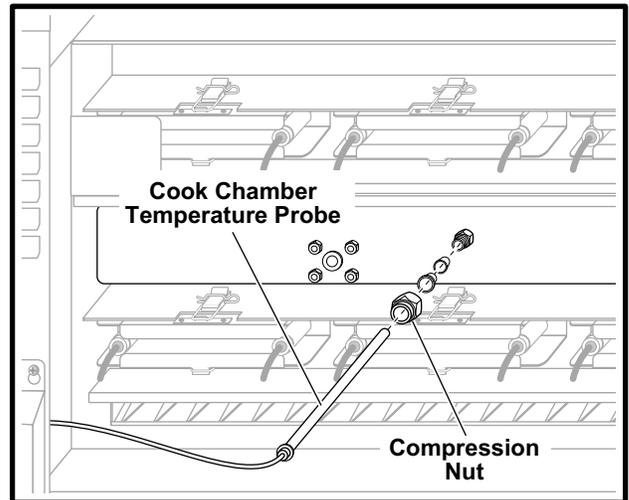
DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Remove the Rear Panel. Refer to the COVERS and PANELS section of the manual.
3. Remove the two screws that secure the Control Board Bezel.
4. Disconnect the Cook Chamber Temperature Probe connector at the bottom of the Control Board.
5. Remove the Cook Chamber Temperature Probe from the broiler by loosening the compression nut.
6. Slide the Cook Chamber Temperature Probe out of the broiler.
7. Route new Temperature Probe through Control Shroud and through panel.
8. Make connection at the Control Board and replace Control Board Bezel.

9. Slide new compression nut, fitting and sleeve onto Temperature Probe sheath.
10. Insert Temperature Probe into tube fully and tighten compression nut.



Cook Chamber Temperature Probe Connection



Cook Chamber Temperature Probe Mounting

Control Board

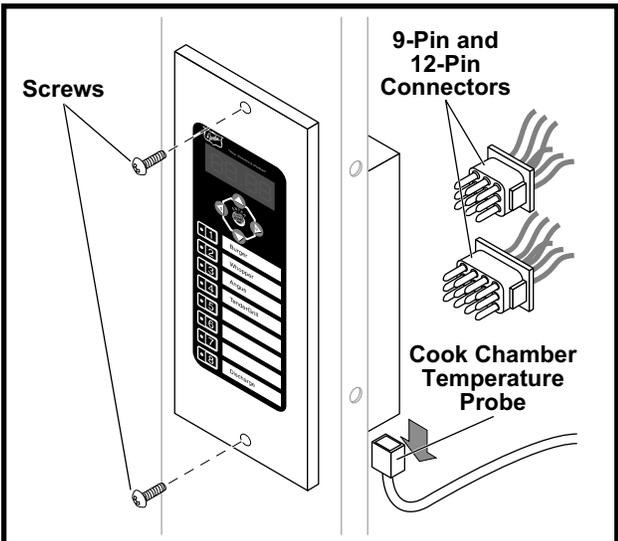
The Control Board is located on the front of the broiler. Control Board programming is preset at the factory with standard BURGERKING® recipes. Any fine adjustments made at the restaurant level are the responsibility of the restaurant manager.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Remove the two screws on the front of the Control Board.
3. Disconnect the Cook Chamber Temperature Probe connector at the bottom of the Control Board.
4. Disconnect the 9-pin and 12-pin connectors from the back of the Control Board Bezel..
5. Remove Control Board from broiler.
6. Reverse procedure to install new Control Board.
7. Alert the restaurant manager the Control Board has been replaced and fine adjustments may be required.



Control Board

Step-Down Transformer

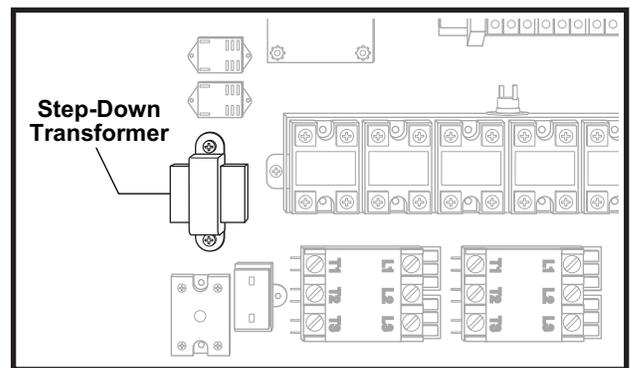
The Step-down Transformer is accessible by removing the Electrical Access Panel. The Transformer reduces the incoming voltage to 24 VAC.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Disconnect wires from the Transformer to be removed.
3. Remove screws securing Transformer to frame.
4. Remove Transformer.
5. Reverse procedure to install a Transformer.



Step-Down Transformers

SOLID-STATE RELAYS

The Solid-State Relays are accessible by removing the Electrical Access Panel. There are a total of Seven SSR's. Six control the heating elements and one controls the conveyor motor.

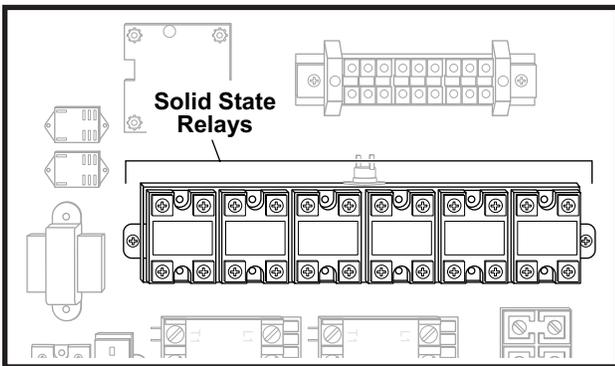
Please note that there are three types of Solid State Relays used within the broiler. Each has separate input and output operating voltages, as well as different maximum output current ratings.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove the Panel. Refer to the COVERS and PANELS section of the manual.
2. Disconnect wires from the Solid-State Relay to be removed.
3. Remove screws securing Solid-State Relay to frame.
4. Remove Solid-State Relay.
5. Peel protective film which covers the thermal compound pad on the back of the new Solid State Relay before replacing.
6. Reverse procedure to install a Solid-State Relay.



Solid State Relays

MAIN POWER SWITCH

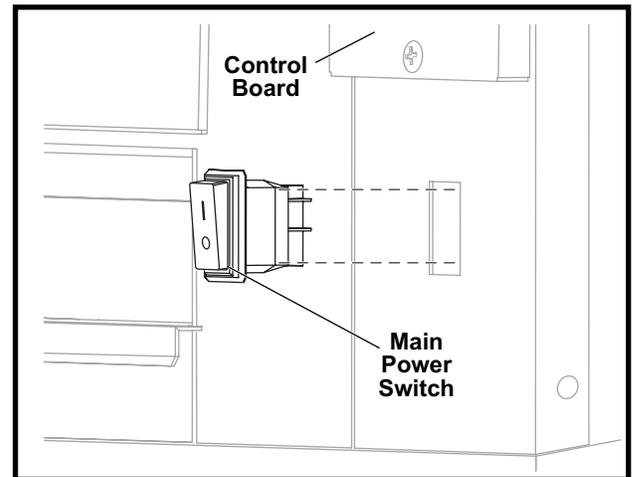
The Main Power Switch is located on the front of the broiler below the Control Board.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Disconnect switch wires.
3. Pinch the spring tabs on the top and bottom of the switch and slide out through front of panel.
4. Reverse procedure to install a new Main Power Switch.



Main Power Switch

MECHANICAL RELAYS

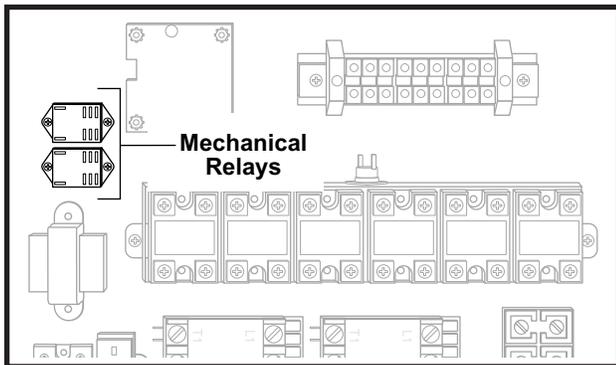
The Mechanical Relays are accessible by removing the Electrical Access Panel. There are Two Mechanical Relays that are used in the Safety Panel Interlock system.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Disconnect wires from the Mechanical Relay to be removed.
3. Remove screws securing Mechanical Relay to frame.
4. Remove Mechanical Relay.
5. Reverse procedure to install an Mechanical Relay.



Mechanical Relays

REPLACING CONVEYOR LINKS

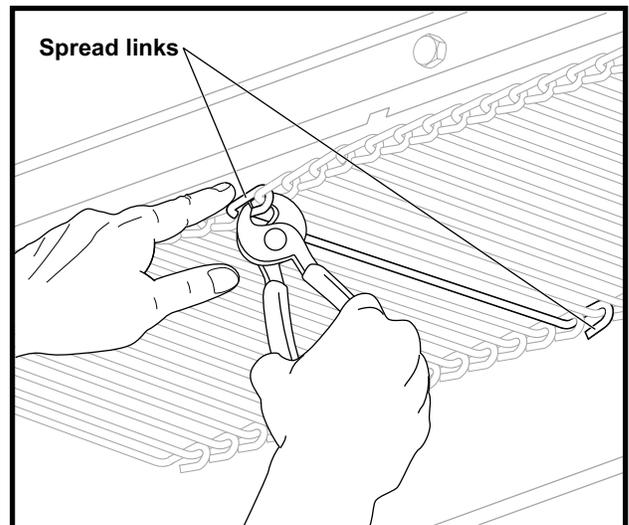


WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Turn off and unplug the broiler.
2. Remove the front operator parts and panels. Refer to the COVERS and PANELS section of the manual.
3. Spread the damaged link with Link Tool at both ends.
4. Remove the damaged link.
5. Install the new link.
6. Use pliers to close both ends of the link.
7. Check for proper operation. It may be necessary to add or remove shims behind or under the bushing blocks to ensure proper tension.

NOTE: Never remove a link without replacing a link.



Conveyor Links

HEATING ELEMENTS



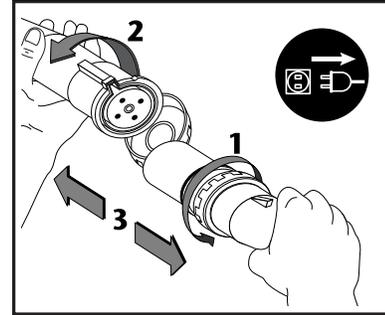
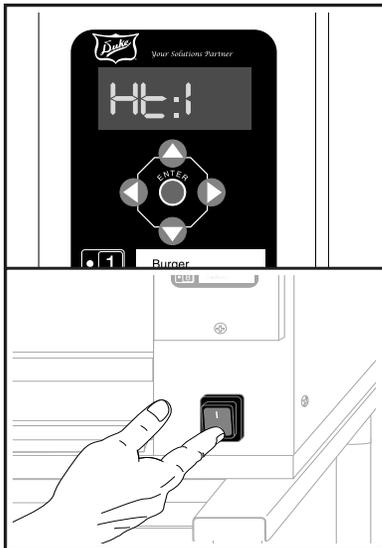
WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

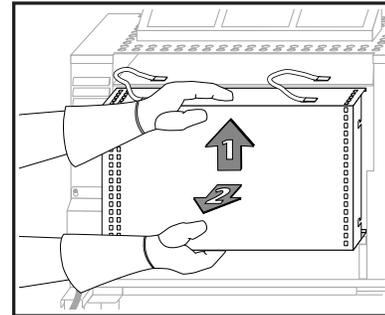
NOTE: In the event of an element failure, the Controller will display an error message and indicate which element has failed. Refer to the Troubleshooting Label on the right side of the Broiler to identify the appropriate element location. The controller will display:

- Ht:1
- Ht:2
- Ht:3
- Ht:4
- Ht:5
- Ht:6

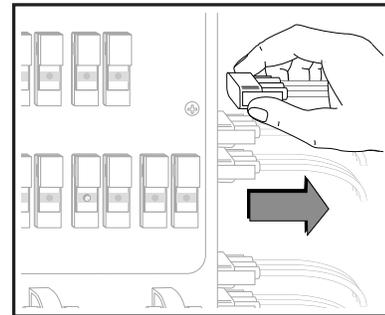
1. Turn off power and unplug the Broiler.



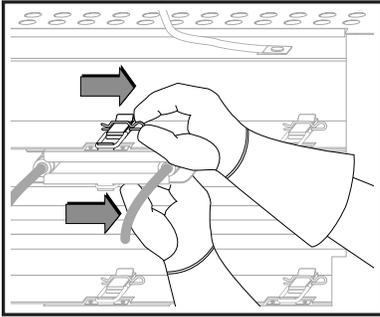
2. Lift and remove rear access panel.
3. Remove the element cover panel. Refer to the COVERS and PANELS section of the manual.



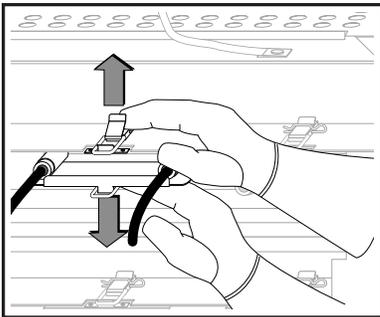
4. Remove the Fuse Access Panel and the Element Connection Access Panels. Refer to the COVERS and PANELS section of the manual.
5. Disconnect the appropriate element plug from the interior panel by squeezing in the connector's tabs.



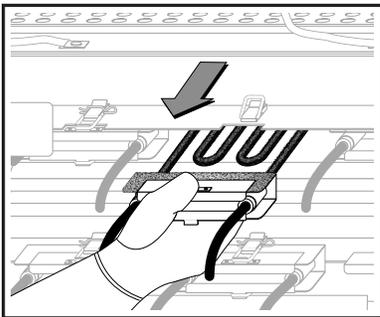
- Disengage the clip by first removing the retaining pin on both top and bottom of element module.



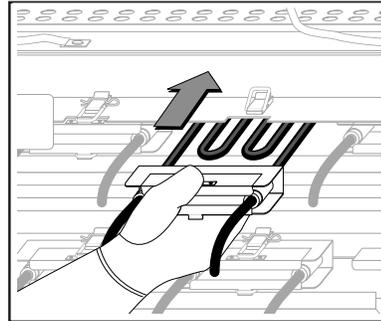
- Pull clip forward to disengage.



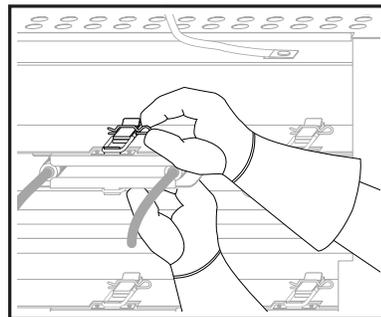
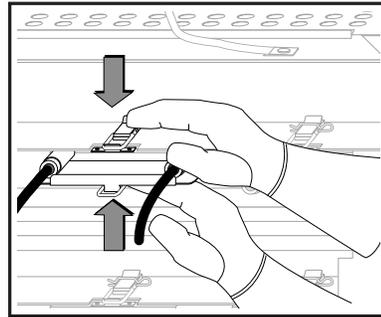
- Slowly remove element module and replace with identical configuration. Replacement element must also be slid into support bracket at the front of the Broiler (Clips and Hooks will not align properly if the wrong element module is re-inserted.)



- Slide element module in place and reengage clips and re-insert retaining pins.



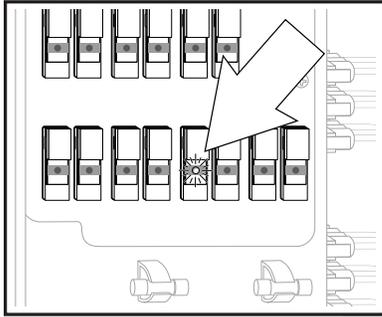
- Reengage clips and re-insert retaining pins.



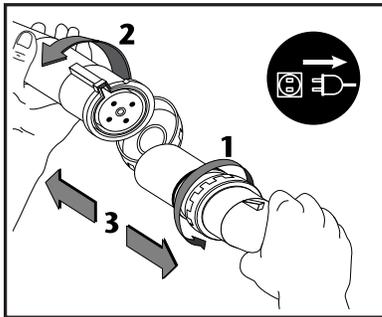
- Reconnect element connector to interior panel connector.
- Reinstall the Element Cover Panel.
- Reinstall the Rear Panel and fasten the retaining latch.
- Reinstall the Element Access Panel.
- Plug in the Broiler.
- Turn on the Main Power Switch.

FUSE REPLACEMENT

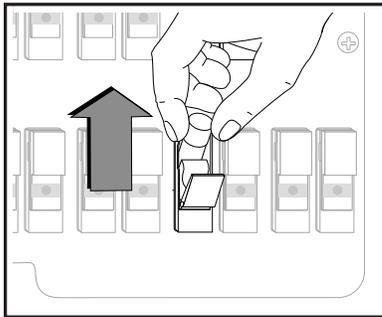
1. Check the fuses on the Fuse Panel. A lit Indicator lamp means a blown fuse.



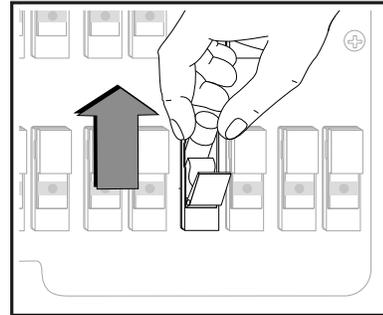
2. Unplug the broiler.



3. Open the fuse holder(s) to remove any blown fuse(s).



4. Replace any blown fuse(s) with correctly rated replacement fuse(s).



5. Close the fuse holder. Plug in the broiler and check the indicator lamps. They should not be lit with a good fuse in place.
6. Reinstall the Fuse Access Panel
7. Broiler will go into preheat mode indicating proper operation.



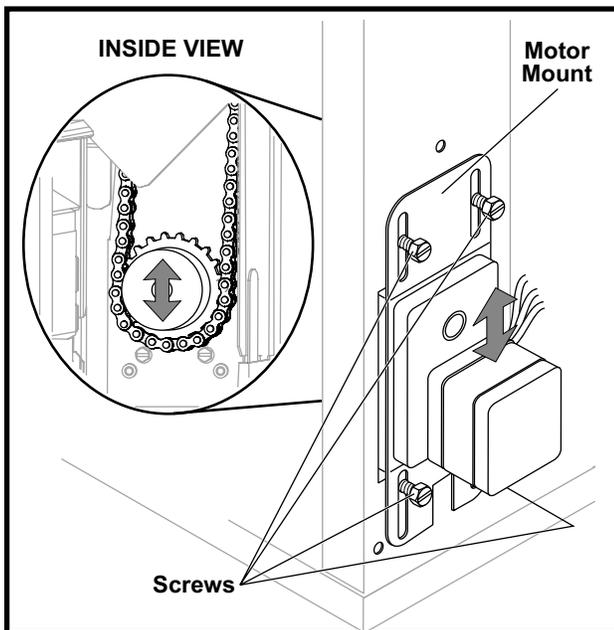
NOTE: This unit also comes equipped with a safety interlock system located on the rear access panel for additional user safety. The rear access panel must be mounted correctly or power will not be supplied to heating elements.

ADJUSTMENTS

DRIVE CHAIN DEFLECTION ADJUSTMENT

The Drive Chain connects the drive motor to the Conveyor.

1. Check that the deflection in the Drive Chain does not exceed 3/16" inch maximum. If the chain requires adjustment, proceed to step 2.
2. Remove Discharge Access Panel. Refer to the COVERS and PANELS section of the manual.
3. Remove Conveyor Drive Motor Cover.
4. Loosen the four screws securing the motor mount to the frame.
5. Move the motor mount up or down as necessary to provide 3/16" deflection at center of chain.
6. Secure the motor mount in place by tightening the four motor mount screws.
7. Install Conveyor Drive Motor Cover.
8. Install Discharge Access Panel.



Drive Chain Deflection Adjustment

CONVEYOR POSITION ADJUSTMENT

The Conveyor position is adjusted by adding shims between the Conveyor Shaft Bearing and the frame.

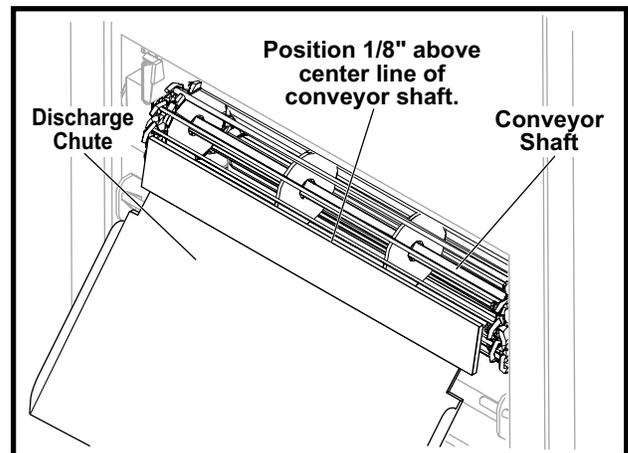
1. Remove Discharge Hood to provide visual access to the Conveyor.
2. Adjust Conveyor height as described in the following illustration.
3. Remove the two screws securing the bearing to the frame.
4. Insert shims as necessary between the bearing assembly and the frame.
5. Check Conveyor position.

NOTE: Leading edge of Discharge Chute should be about an 1/8" above the center line of the Conveyor shaft. When correctly adjusted, the Conveyor link should just graze the backside of the chute. If adjusted too high, the link will roll over the top of the leading edge of the Discharge Chute causing a Conveyor jam.

6. If additional shims are required, repeat step 4.

NOTE: Additional shims are located inside the Drive Motor Cover.

7. Use the Diagnostic Mode on the Control to run the Conveyor for several full revolutions to confirm that no jamming occurs.

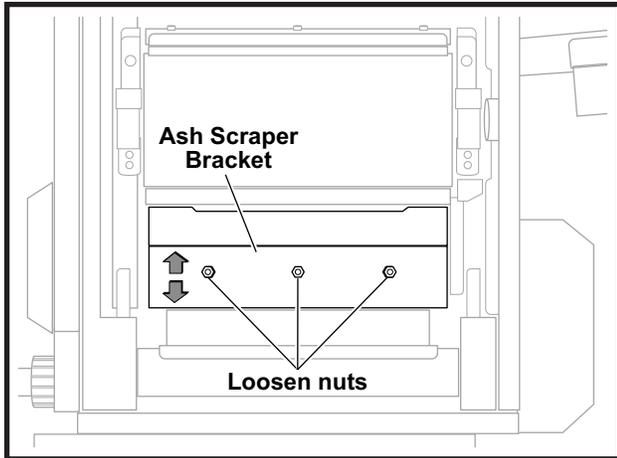


Conveyor Discharge Shaft Adjustment

ASH SCRAPER BRACKET ADJUSTMENT

The Ash Scraper Bracket support the Ash Scraper on the Discharge end of the Broiler.

1. Remove Discharge Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Loosen three nuts which secure the Ash Scraper Bracket and adjust bracket up or down as needed.

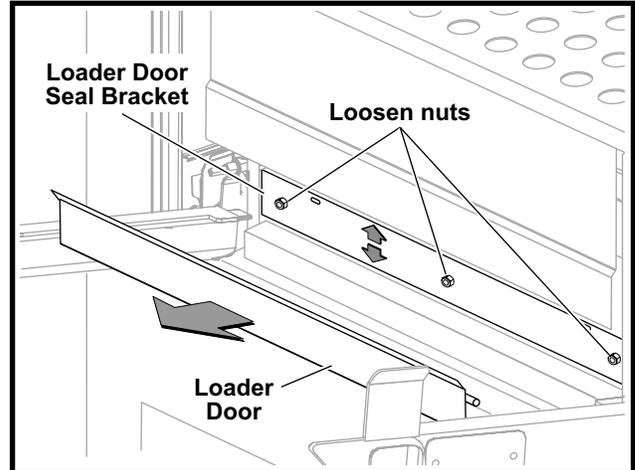


Ash Scraper Bracket Adjustment

LOADER DOOR SEAL BRACKET

The Loader Door Seal Bracket supports the Loader Door and assists to seal any gap between the Loader Door and the Loader Ramp.

1. Remove the Loader Door.
2. Loosen three nuts which secure the Loader Seal Door Bracket and adjust bracket up or down as needed.

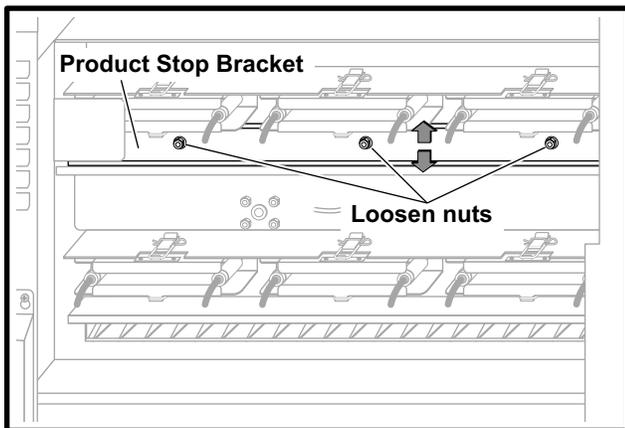


Loader Door Seal Bracket

Product Stop Bracket Adjustment

The Product Stop Bracket sits above the cook chain on the back wall of the cook cavity. It prevents product from being loaded and pushed up on top of the cook chain links.

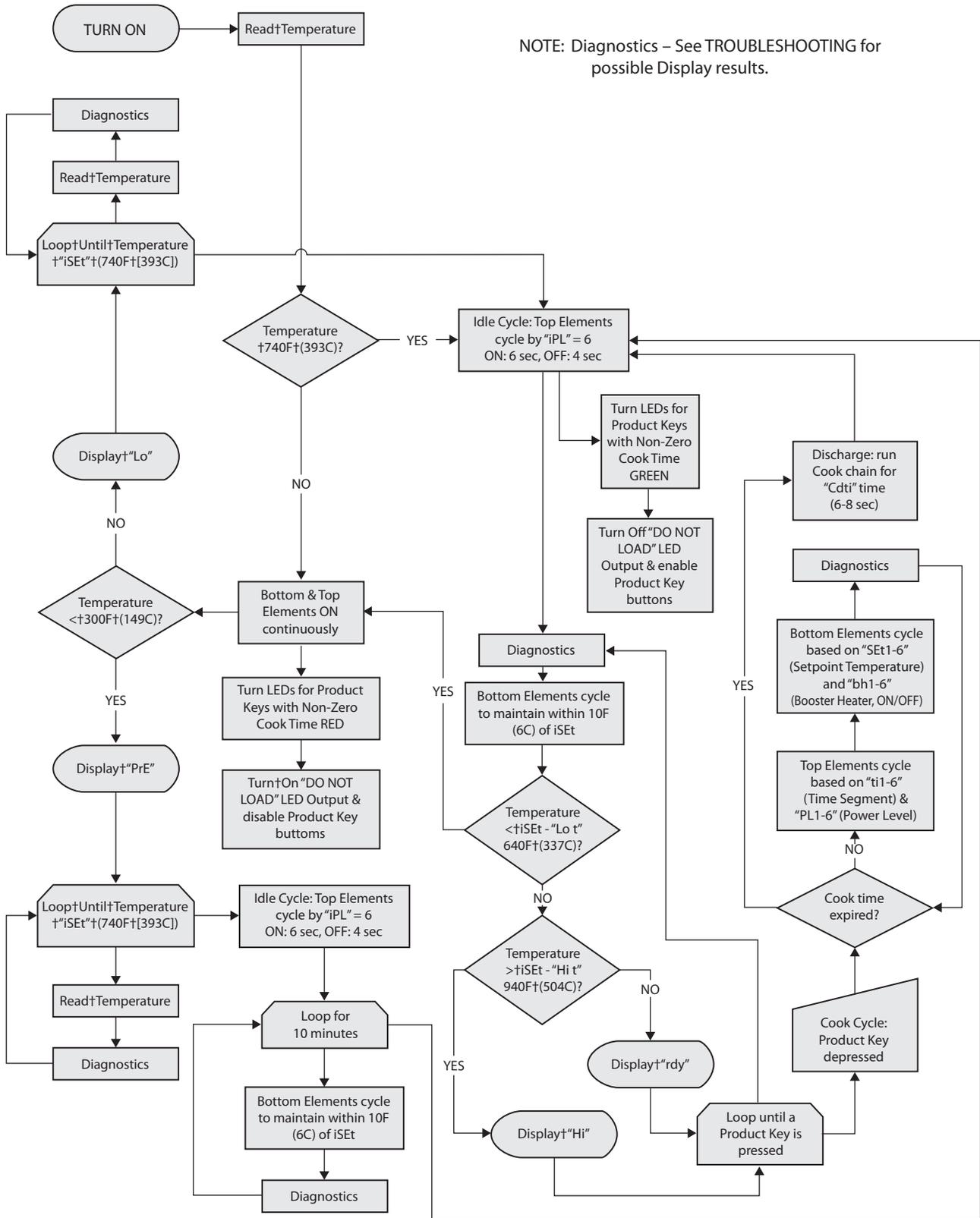
1. Remove the Rear Panel and Element Cover Panel. Refer to the COVERS and PANELS section of the manual.
2. Loosen three nuts which secure the Product Stop Bracket and adjust bracket up or down as needed.



Product Stop Bracket Adjustment

SEQUENCE OF OPERATION

NOTE: Diagnostics – See TROUBLESHOOTING for possible Display results.



TROUBLESHOOTING

The following troubleshooting information includes checking procedures for various electrical components in order to help identify faulty components. The troubleshooting guide below is designed to identify various symptoms and provide the suggested remedy.

COMPONENT CHECK PROCEDURES

Checking the Power Switch

The Power Switch has a built-in LED that lights red when the switch is in the on position. Check the following before replacing the switch.

- Make sure the power cord is plugged into the correct receptacle. The broiler operates on 208/240 VAC 60 Hz line current.
- Check the circuit breaker assigned to the broiler.
- Try a different receptacle before replacing the switch.
- It's possible for the LED in the switch to fail. Turn the switch on and check the Control Board display. If the display is active, the LED is burned out, replace the switch.

Checking the Control Board

Under normal conditions, the Control Board displays the current status of the broiler. It can be used as a diagnostic tool, when it is working properly.

Try the following before replacing the Control Board.

- Cycle the broiler off and on; observe the Control Board.
- Try running the Control Board through a couple of different cook cycles.

NOTE: If the Control Board is still not performing properly, try these procedures:

1. Turn the broiler off.
2. Remove the Control Board.
3. Check each connection on the back of the Control Board. Make sure they are all connected correctly.
4. Loosely attach the Control Board, turn the broiler on. Observe the display and product key LEDs.
5. Turn the power off and reattach the Control Board if the problem is solved.

Testing the Temperature Probe

1. Turn the broiler OFF.
2. Remove two screws which secure the Control Board Bezel, and remove the Control Board.
3. Disconnect the Temperature Probe connector at the bottom of the Control Board.
4. Use an Ohmmeter to check resistance on the Temperature Probe. An open or shorted measurement would indicate a fault.

Checking the Conveyor Drive Motor

The Conveyor Drive Motor is located on the front of the broiler on the lower discharge side. Before replacing it, check the Conveyor for jammed meat product. Next, try turning the Conveyor discharge shaft with the Multipurpose Broiler Tool. If the Conveyor does not turn, check the following items:

- Check the Discharge Chute.
- Check the Loader Ramp.
- Check the Ash Scraper.
- Check the Cook Chain (Conveyor).
- Check the Flame Arrestor.

Testing the Conveyor Drive Motor

The Conveyor Drive Motor may be tested without removing it from the broiler.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Turn off and disconnect the broiler.
2. Remove the Conveyor Drive Motor Cover.
3. Tag and disconnect the wires.
4. Use an Ohmmeter to measure resistance.
5. Attempt to run the Drive Motor when it's disengaged from the Drive Chain.

NORMAL MOTOR RESISTANCE (230 VAC, 60 HZ)

Wires to Test	Resistance
Black and Brown	98.1 Ω
Black and Orange	98.1 Ω
Brown and Orange	196.2 Ω

Checking Conveyor Drive Motor Capacitor

If the motor tests OK, check the Capacitor. The Capacitor is located in the service area on the control side of the broiler.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Disconnect the wires connected to the Capacitor.

3. Discharge the Capacitor by shorting both terminals to ground at the same time.
4. Use an Ohmmeter to test the Capacitor.

NOTE: If both the Drive Motor and Capacitor test OK, the problem is probably with the Drive Motor Relay.

Testing the Relays

There are seven Solid-State Relays in the broiler. Six control the Heating Elements, while the other controls the Conveyor Drive Motor.



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
2. Turn ON the Main Power Switch.
3. The Heating Elements are energized when the Controller calls for heat. To test the relay, check for voltage on the input of the relay. See the chart below. At the same time, monitor AC current to Heating Elements. When no relay input voltage is present, there will be no amperage draw on the output of the relay.

NOTE: (SSR4) is unique and operates with a DC voltage input

Relay #	Input Voltage Range	Typical Voltage Reading	Max. Output Amps
SSR1	18-36 VAC	24 VAC	50 A
SSR2	18-36 VAC	24 VAC	50 A
SSR3	18-36 VAC	24 VAC	50 A
SSR4	4-32 VDC	6 VDC	50 A
SSR5	18-36 VAC	24 VAC	50 A
SSR6	18-36 VAC	24 VAC	50 A

The Conveyor Drive Motor runs when the Drive Motor Relay is energized by the Control.

The Solid State Relay that controls the Conveyor Drive Motor, utilizes a 4.5 - 32 VDC (typically 6 VDC) input signal to switch up to 10A on the output.

TESTING THE TRANSFORMERS

The 24-volt Step-Down Transformer in the broiler supplies power to the Control Board. Either a voltage or a resistance check can be used to test the Transformer.

Voltage Test

1. Make sure the broiler is turned OFF.
2. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
3. Disconnect the secondary winding.
4. Turn the broiler on.
5. Using a VOM, test the voltage output across the secondary winding. Voltage should be 24 VAC.

Resistance Check



WARNING

DISCONNECT THE ELECTRICAL POWER TO THE BROILER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES.

1. Turn the broiler OFF.
2. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
3. Tag and disconnect the wires of the Transformer to be tested.
4. Measure the resistance across the primary. Primary Resistance = $71.5 \Omega \pm 10\%$.
5. Measure resistance across secondary.
6. Secondary Resistance = $1.3 \Omega \pm 10\%$.

TESTING THE MECHANICAL RELAYS

The two Mechanical Relays work in conjunction with the safety interlocks to allow safe access to the various areas of the Broiler.

When working properly, they allow AC input voltage to the two Contactors, which allow the elements to heat.

Continuity Test

1. Make sure broiler is turned OFF.
2. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
3. Disconnect a single contact terminal on the Mechanical Relay and tape off for safety.
4. Turn the broiler on.
5. Test continuity across the two contact terminals. With Safety Interlock panels installed, continuity should be present.

TESTING THE CONTACTORS

The two Contactors in the broiler lie in series with each other and supply power to the Elements.

Voltage Test

1. Make sure the broiler is turned OFF.
2. Remove the Electrical Access Panel. Refer to the COVERS and PANELS section of the manual.
3. Turn the broiler on.
4. Visually validate that the Contactor is energizing and "pulling in".
5. If Contactor does not energize, ensure 208/240 VAC is present at the input coil.

CONTROL DIAGNOSTICS

The Broiler Control consists of two programming modes and two diagnostic modes. To enter any of these 4 modes, it is required to first hold down the ENTER button for a few seconds until CODE is displayed. Then enter the 4 digit passcode provided below and press ENTER.

Programming

1. Recipe related programming (Refer to Owner's Manual)
Passcode: 1 8 2 7
2. Broiler functionality programming (Refer to Owner's Manual)
Passcode: 3 6 4 5

Diagnostics

1. Diagnostic Test
Passcode: 3 4 2 4
After entering the code and pressing ENTER, DIAG will be displayed and then the display will show 8888.
The following options are available:
 - a) Pressing the ▼ key will run the Conveyor Drive Motor.
NOTE: Do not run the Conveyor Drive Motor for more than 6 seconds at a time. It will overheat.
Pressing the ▼ key a second time will energize the Cook Light.
 - b) Pressing the ▲ key once will initiate an Element Diagnostic test with the TOP ELEMENTS ON only.
 - a. S1 = H1 Current
 - b. S2 = H2 Current
 - c. S3 = H3 Current
 - c) Pressing the ▲ key a second time will initiate an Element Diagnostic test with the BOTTOM ELEMENTS ON only.
 - a. S1 = H4 Current
 - b. S2 = H5 Current
 - c. S3 = H6 Current
 - d) Pressing the ▲ key a third time will initiate an Element Diagnostic test with ALL ELEMENTS OFF.
 - a. S1 = H1 & H4 Current
 - b. S2 = H2 & H5 Current
 - c. S3 = H3 & H6 Current
 - e) Pressing the ▲ key a fourth time will go back to the home screen, 8888.
 - f) Pressing the ENTER button from here will exit Diagnostic mode.

2. Failure Counts

The Control Board keeps track of how many times product buttons are depressed. It also tracks Element failures and other various failures as shown below.

Passcode: 1 2 3 4

Prd1 = Prd1 depressions

Prd2 = Prd2 depressions

Prd3 = Prd3 depressions

Prd4 = Prd4 depressions

Prd5 = Prd5 depressions

Prd6 = Prd6 depressions

Prd7 = Prd7 depressions

Prd8 = Prd8 depressions

tP1 = HT1 Element failures

tP2 = HT2 Element failures

tP3 = HT3 Element failures

tP4 = HT4 Element failures

tP5 = HT5 Element failures

tP6 = HT6 Element failures

SrEr = Failures of ALL ELEMENTS OFF Element Diagnostic Test

dBEr = Communication failures between Diagnostic Board and Control Board

rtot = Total Run Time (Hours)

TROUBLESHOOTING CHART

Symptom	Cause	Remedy
Control display does not light up	No Power	Verify 208/240 VAC, 3 phase, present at receptacle. Confirm 208 VAC or 240 VAC on Serial Number Label. Ensure 208/240 VAC, line-to-line, at incoming terminal block.
	On / Off Switch	Ensure 208/240 VAC across input / output of switch.
	Transformer	Ensure 24 VAC across Transformer secondary winding.
	Wiring	Check for broken or improper wire connection.
Display flashes “PnL” & “oFF” – (Panel Off Error)	Back Panel Safety Interlock	Check that back panel is safely secured.
	Element Connection Access Panel Safety Interlock	Check that side panel is safely secured.
	Magnet Alignment	Check alignment of Safety Magnets on back and side panels.
	Safety Interlock	With panels installed, check for continuity on Safety Interlocks.
	Mechanical Relay	Ensure Mechanical Relays energize when panels are installed. With panels installed, measure 24 VAC at relay coils.
	Transformer	Check for 24 VAC on secondary of Transformer.
Display shows “Ht:x”, where x is 1,2,3,4,5,6 – (Heater Error)	Element	Identify correct Heater location and test continuity.
	Fuse	Test continuity of appropriate Fuse.
	Solid State Relay	Ensure Solid State Relay switches ON / OFF at appropriate intervals. Test for closed or open output condition.
	Control	Test Solid State Relay inputs for appropriate signal from control.
	Wiring	Check for broken or improper wire connection.

Symptom	Cause	Remedy
Display shows “hT:Er” – (Possible error during “PrE”)	Element	Identify correct Heater location and test continuity.
	Fuse	Test continuity of appropriate Fuse.
	Solid State Relay	Ensure Solid State Relay switches ON / OFF at appropriate intervals. Test for closed or open output condition.
	Wiring	Check for broken or improper wire connection.
	Heat Loss	Check for missing or damaged panels.
Displays flashes “tEST” & “Prod” – (Test Product)	Refer to “Ht:x”	This error may occur at the end of a cook cycle and should be followed by a “Ht:x” error.
Display shows “Hi” – (High Temperature Error)	Solid State Relay	Ensure Solid State Relay switches ON / OFF at appropriate intervals. Test for closed or open output condition.
	Control	Test Solid State Relay inputs for appropriate signal from control.
	Wiring	Check for broken or improper wire connection.
Display shows “Lo” – (Low Temperature Error)	Refer to “Ht:x”	“Lo” may be followed by a “Ht:x” error.
	Refer to “Ht:x”	“Lo” may be followed by a “PnL” & “oFF” error.
	Refer to “hT:Er”	“Lo” may be followed by a “hT:Er” error.
	Heat Loss	Check for missing or damaged panels.
Display shows “Sr:Er” – (Failure of “ALL OFF” Diagnostic Test)	Element	Identify correct Heater location and test continuity.
	Fuse	Test continuity of appropriate Fuse.
	Solid State Relay	Ensure Solid State Relay switches ON / OFF at appropriate intervals. Test for closed or open output condition.
	Wiring	Check for broken or improper wire connection.
	Diagnostic Board	Ensure board powers on.
	Control	Test Solid State Relay inputs for appropriate signal from control.
	Current Sensor	Measure continuity on Current Sensors.
Display shows “dB:Er”	Wiring	Check harness connection between Diagnostic Board and Control Board.
	Diagnostic Board	Ensure board powers on.
	Control	Ensure board powers on.
	Current Sensor	Measure continuity on Current Sensors.

Symptom	Cause	Remedy
Display shows “ trip ”	High Limit Thermostat	Test continuity on Thermostat located on Relay Heat Sink.
	Cooling Fan	Ensure Cooling Fan runs when On / Off Switch is turned ON.
	Cooling obstruction	Clean Cooling Fan and any other item which may not be allowing Relay Heat Sink to dissipate heat effectively.
Display shows “ Prob ”	Temperature Probe	Test continuity for open or shorted Temperature Probe.
Cook Chain does not move / Runs all the time	Discharge Chute	Discharge Chute is not properly in place.
	Cook Chain obstruction	Cook Chain is catching on another item, i.e. ash scraper, loader ramp, flame arrestor. May require adjustment of Ash Scraper Bracket.
	Cook Chain not properly adjusted	It may be necessary to install shims behind or underneath shaft bearings to ensure proper position and tension of the cook chain.
	Loose Drive Chain	Deflection of Drive Chain should be approximately 3/16”.
	Loose Motor Sprocket	When tightening, ensure motor sprocket is orientated the same way as the shaft sprocket.
	Control	Ensure Control is signaling to energize the Conveyor Motor Relay.
	Solid State Relay	Ensure Conveyor Motor Relay is closing. Replace Solid State Relay if Conveyor Motor runs non-stop.
	Conveyor Motor	Test Conveyor Motor for fault.
	Capacitor	Test Conveyor Motor Capacitor for fault.

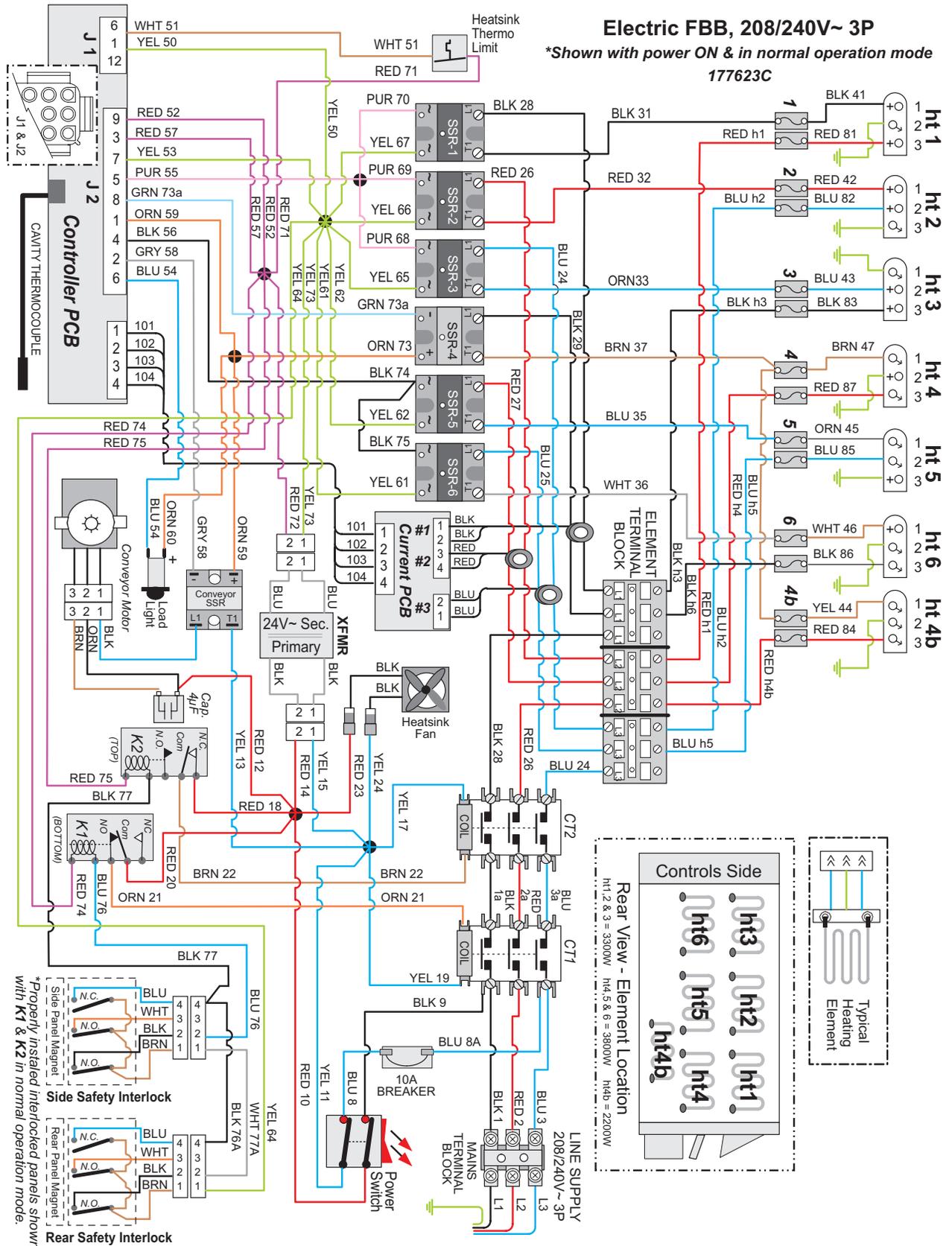
PREVENTIVE MAINTENANCE

SEMIANNUAL

It is recommended to perform preventative maintenance on the Broiler every 6 months. Over time, dust and debris will accumulate, electrical connections will loosen, and the following procedures and inspections should be made to extend the life of the components within the Broiler.

1. Vacuum dust and dirt from the cooling fan and heat sink fins.
2. Perform a visual inspection of the Broiler, noting and repairing any electrical connection which appears damaged.
3. Check tightness of all electrical connections throughout the Broiler. Pay particularly close attention to all Element, Solid State Relay, and Terminal Block connections as these will be more affected over time.
4. Check tightness of electrical connections within Plug and at receptacle

ELECTRICAL SCHEMATIC – FLEXIBLE BATCH BROILER



NOTES



NOTES

CUSTOMER ASSISTANCE

To aid in reporting this unit in case of loss or theft, please record below the model number and serial number located on the unit. We also suggest you record all the information listed and retain for future reference.

MODEL NUMBER _____	SERIAL NUMBER _____
DATE OF PURCHASE _____	
DEALER _____	TELEPHONE _____
SERVICER _____	TELEPHONE _____

NORTH AMERICA & LATIN AMERICA

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St. Louis, MO 63102
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Toll Free: 1-800-735-3853
Fax: 314-231-5074

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EU Headquarter Office
Duke Manufacturing
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UK & IRELAND

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Woodbury Salterton
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Tel: 01395 234140
FAX: 01395 234154

ASIA

Asia Office
Duke Food Service Equipment
(shanghai) Company Limited
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658 Nong Jin Zhong Road
Shanghai, China 200335
Tel: +86 21 6876 9272
Fax: +86 21 33600628

TO ACCESS INTERNET: www.dukemfg.com

Please provide the following information when you write or call: model number, serial number, date of purchase, your complete mailing address (including zip code), and description of the problem.



Your Solutions Partner

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