Electrolux

ELECTROLUX HOME PRODUCTS NORTH AMERICA

Technical Training Manual Fall 2004

Includes:

New Electronic Tumble Action Washer and Dryer
New Electronic Side by Side Refrigeration Controls
New Precision Direct Feed Dishwasher
New Freestanding Range Improvements
Frequently Asked TID Questions and Solutions

Information Supplied by Electrolux Home Products Technical Information Department

Published by Electrolux Home Products Regional Service Quality Managers

August 2004

SAFE SERVICING PRACTICES - ALL APPLIANCES

To avoid personal injury and/or property damage, it is important that **Safe Servicing Practices** be observed. The following are some limited examples of safe practices:

1. **DO NOT** attempt a product repair if you have any doubts as to your ability to complete it in a safe and satisfactory manner.

2. Before servicing or moving an appliance:
   - Remove the power cord from the electrical outlet, trip the circuit breaker to the OFF position, or remove the fuse.
   - Turn off the gas supply.
   - Turn off the water supply.

3. Never interfere with the proper operation of any safety device.

4. **USE ONLY REPLACEMENT PARTS CATALOGED FOR THIS APPLIANCE. SUBSTITUTIONS MAY DEFEAT COMPLIANCE WITH SAFETY STANDARDS SET FOR HOME APPLIANCES.**

5. **GROUNDING**: The standard color coding for safety ground wires is **GREEN**, or **GREEN** with **YELLOW STRIPES**. Ground leads are not to be used as current carrying conductors. It is **EXTREMELY** important that the service technician reestablish all safety grounds prior to completion of service. Failure to do so will create a hazard.

6. Prior to returning the product to service, ensure that:
   - All electrical connections are correct and secure
   - All electrical leads are properly dressed and secured away from sharp edges, high-temperature components, and moving parts
   - All non-insulated electrical terminals, connectors, heaters, etc. are adequately spaced away from all metal parts and panels
   - All safety grounds (both internal and external) are correctly and securely connected
   - All panels are properly and securely reassembled

ATTENTION!!!

This service manual is intended for use by persons having electrical and mechanical training and a level of knowledge of these subjects generally considered acceptable in the appliance repair trade. Electrolux Home Products cannot be responsible, nor assume any liability, for injury or damage of any kind arising from the use of this manual.

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Be sure to file your claims electronically within 60 days.

(ServiceBench Toll Free Number 1-877-472-3624)

Service Assistance Center:

1-866-646-6810 from 8:00 a.m. - 6:00 p.m. Eastern Time Zone

In order to better serve our valued Home Service Providers, Electrolux Home Products has restructured its **Service Assistance Center**. The new **TOLL FREE** number will take care of your warranty questions, such as claims processing, payrate inquiries, and in-warranty authorizations. Please keep in mind that they are not the technical department. All technical questions should be directed to the Technical Information Department at 1-888-842-3660.

Technical Information Department:

Call 1-888-842-3660 and enter your 8-digit account number followed by the pound (#) sign. Then press:

Option 2 for Refrigerators, Freezers, A/C, or Dehumidifiers
Option 3 for Range Products
Option 4 for Laundry or Dishwasher Products

Service Manuals and Technical Guides Printed in 2001:

5995345245 Next Generation Top Mount Refrigerators 2000
5995353256 Product Information & Technical Guide S x S Refrigerators October 1999 – May 2001
5995355665 Product Information & Technical Guide Top Mount Refrigerators October 1999 – May 2001
5995361523 Next Generation 30" Electric Free Standing Ranges Service Manual
5995348223 24" Built-in Dishwashers Electronic Control (Updates) Precision Wash Service Manual
5995352423 Next Generation S x S Refrigerators Service Manual
5995355186 24" Built-in Dishwashers 2001 Mechanical Models Precision Wash Service Manual

Service Manuals and Technical Guides Printed in 2002:

5995361531 Next Generation 30" & 36" Gas Free Standing Ranges Service Manual
5995371183 Dishwasher 2002 Mechanical Models Service Manual
5995369229 2000-2001 Freezers Product Information & Technical Guide
5995374443 Product Information & Technical Guide Next Gen S x S and TM Refers June 2001-March 2002
5995369211 Tumble Action Washers with AC Drive Motor Service Manual
5995362828 30" & 40" Electric Freestanding Ranges (For Serial Numbers starting with **NF**) Service Manual
5995373155 27" Dryers Gas and Electric Models

Service Manuals and Technical Guides Printed in 2003:

5995393138 Tumble Action Washers with Electronic Controls
5995393146 27" Dryers Gas & Electric Models with Electronic Controls
5995377099 Top Load Washers 2.7 & 3.0 Cu. Ft. Tubs
5995381885 27" Gas and Electric Laundry Centers
5995383824 Product Information and Technical Guide S x S and TM Refers April 2002-December 2002
5995392593 Product Information and Technical Guide S x S and TM Refers January 2003-June 2003
5995391595 Product Information and Technical Guide2000 Room Air Conditioners

Service Manuals and Technical Guides Printed in 2004:

5995402384 Product Information and Technical Guide S x S and TM Refers July 2003-Dec 2003
5995406146 Laundry Center Front Load Washer Service Manual
5995413183 Product Information and Technical Guide 2004 Air Conditioners
5995413308 Product Information and Technical Guide S x S and TM Refers Jan 2004-Mar 2004

EHP Contact Information:

ELECTROLUX HOME PRODUCTS, INC.
250 Bobby Jones Expressway
Augusta, Georgia 30907

NOTE: When calling these numbers, please listen to all menu options as they may change.

Departments	Reason for Call	Phone Number	Fax Number
Customer Care Center	Consumer Issues (excluding replacements)	706-860-4110 (Option 7)	706-651-7135
Damage Claim Center (Servicing Dealers only)	Return Authorization Damage Claims Damage Allowances	800-456-4669 (Option 1)	
National Locator	Parts, Service, Dealer Use and Care Guides	800-444-4944	
Parts Department	Parts Questions	800-599-7569 (Option 2)	706-228-6539
Product Specialist (DDPS)	Product Exchange	800-456-4669 (Option 2)	706-651-7135
Technical Information Department (TID)	Wiring Diagrams Technical Feedback Technical Specs	888-842-3660 (Option 2 Refrigerators, Freezers, A/C, Dehum) (Option 3 Cooking Products) (Option 4 Laundry or Dishwashers)	
Service Contracts (NOTE: This info is also available online at Frigidaire.com or Servicebench.com)	Contact Status Number Type (Full or Deduct) Model/serial number Expiration date	706-860-4110 (Option 6)	706-651-7735
Service Assistance Center (SAC)	Warranty Inquiries Payrate Inquiries Claims Processing	866-646-6810	706-228-6609

Regional Service Quality Managers are a vital part of the **Service Assistance Center and Technical Information Department**. In addition to field administrative duties they ensure that our authorized technicians have up to date knowledge on all Electrolux products by conducting field training classes twice a year. Please check online at Servicebench.com for upcoming training schedules.

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ken.hall@electrolux.com

EHP Service Region Map:

Important Service Information:

Submission of Warranty Claims Time Frame

Effective March 1st, 2004, all warranty claims must be submitted no later than 60 days after completion of service. Claims not submitted within this time frame will be rejected. If you have any questions please contact the Service Assistance Center at 866-646-6810.

Elux Express Shipment Program

Each Parts Distributor location (branch) can order up to ten different part numbers (line items) per day through the ELUX EXPRESS part shipment program. These parts will be shipped 2nd day Air direct to the Parts Distributor location. The parts will arrive within 2 business days with no shipping charges to the Parts Distributor. In effect, Electrolux Home Products has suspended all freight charges on EMERGENCY 2nd day orders. However, if the Parts Distributor has to ship the part from their location once they receive it, there may be added freight charges and possibly additional day(s) delay in getting the part. But the Parts Distributor does not have to wait until he has a stock order to provide you the part to satisfy our mutual customer.

Failed Parts Return Program

EHP needs your help. In order to substantially improve the quality of our finished goods, EHP must analyze component part failures within the warranty period. This effort requires closer connectivity between our service community and the supply base. Therefore, we are asking service technicians to help us by returning specific parts that fail in the field to the appropriate factory for testing. You can easily identify which parts need to be returned to EHP. The replacement parts will come with a prepaid FedEx shipping label that will allow you to ship the old, failed part back to EHP. It is very important that these parts are returned with a copy of the service invoice included and/or the questionnaire sent with the replacement is filled out. Be sure to use the pre-paid FedEx shipping label provided by EHP because not all parts are returned to the same location. Thank you for your help in this very important project to improve product quality.

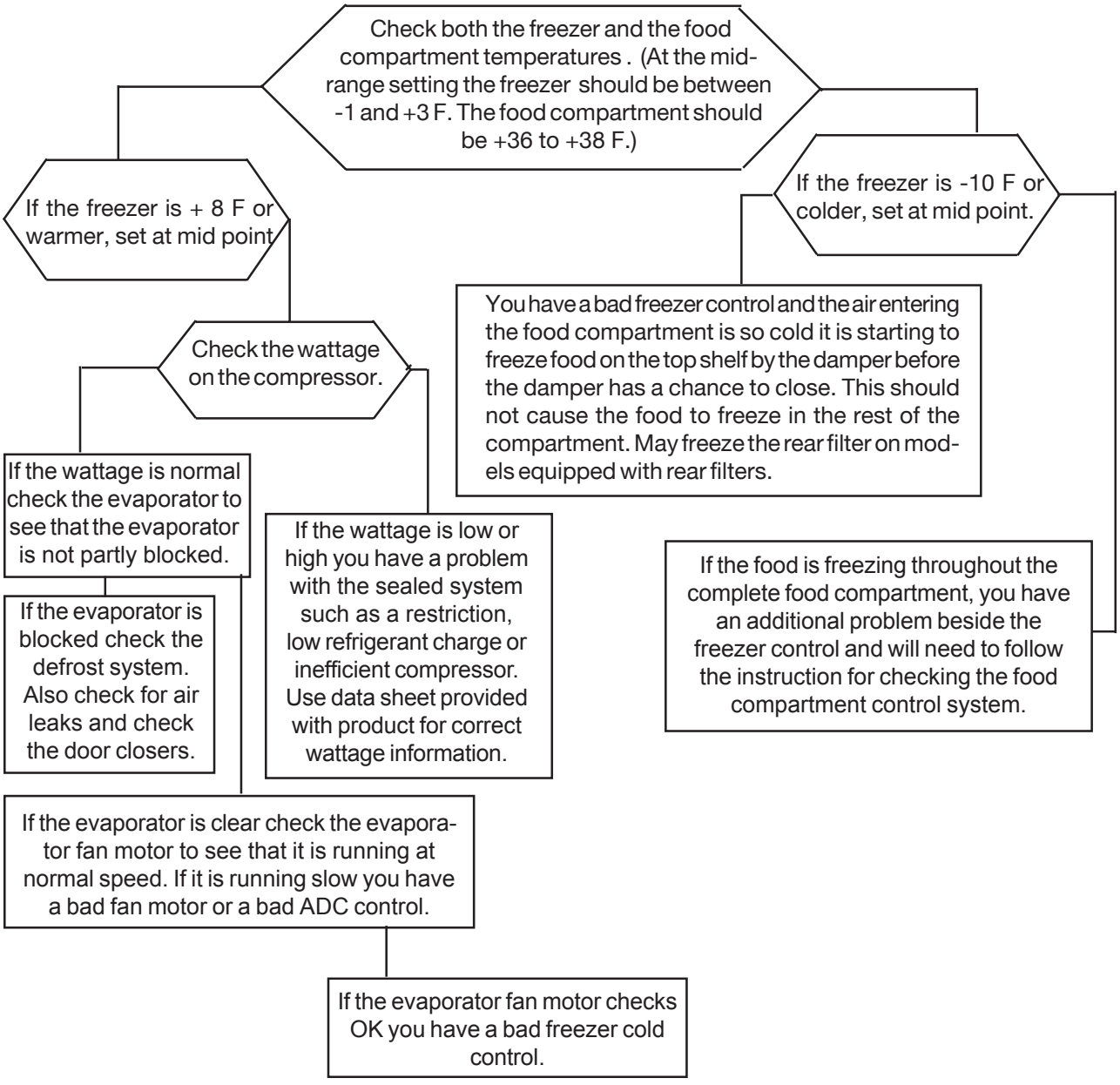
Refrigeration Information:

PROBLEM: Freezing food in food compartment on Standard Side by side Refrigerators.

CAUSE: There are a number of problems that can result in freezing of food in the food compartment (or having warm food compartment temperatures).

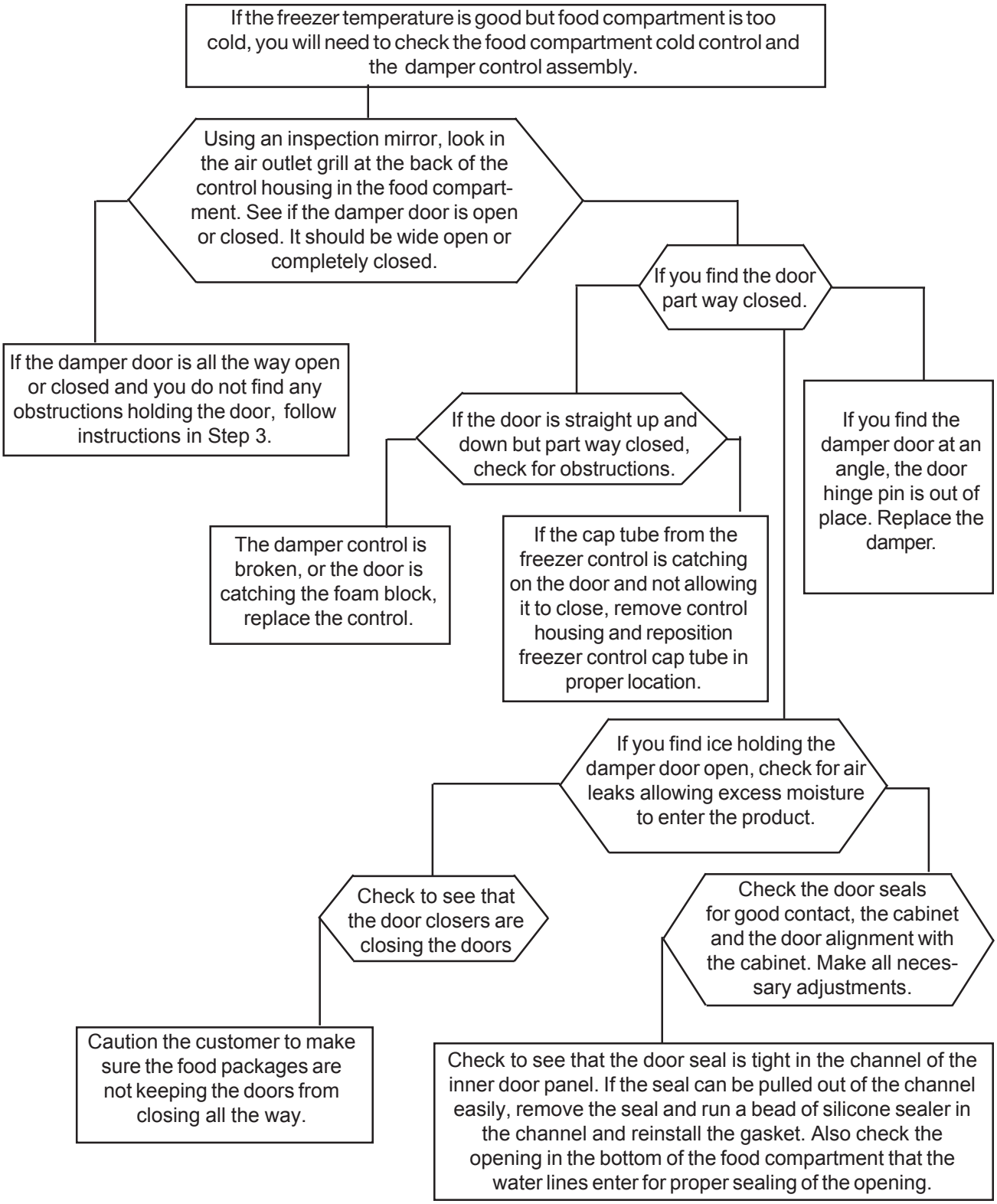
SOLUTION: The freezer temperature should be in the -1 to +3F range (factory mid range setting) and the food compartment should be +36 to +38 F (factory mid range setting). When checking the refrigerator use the information below as a guide to insure you cover all the possible causes of food freezing in the food compartment or the water filter freezing.

Step 1:



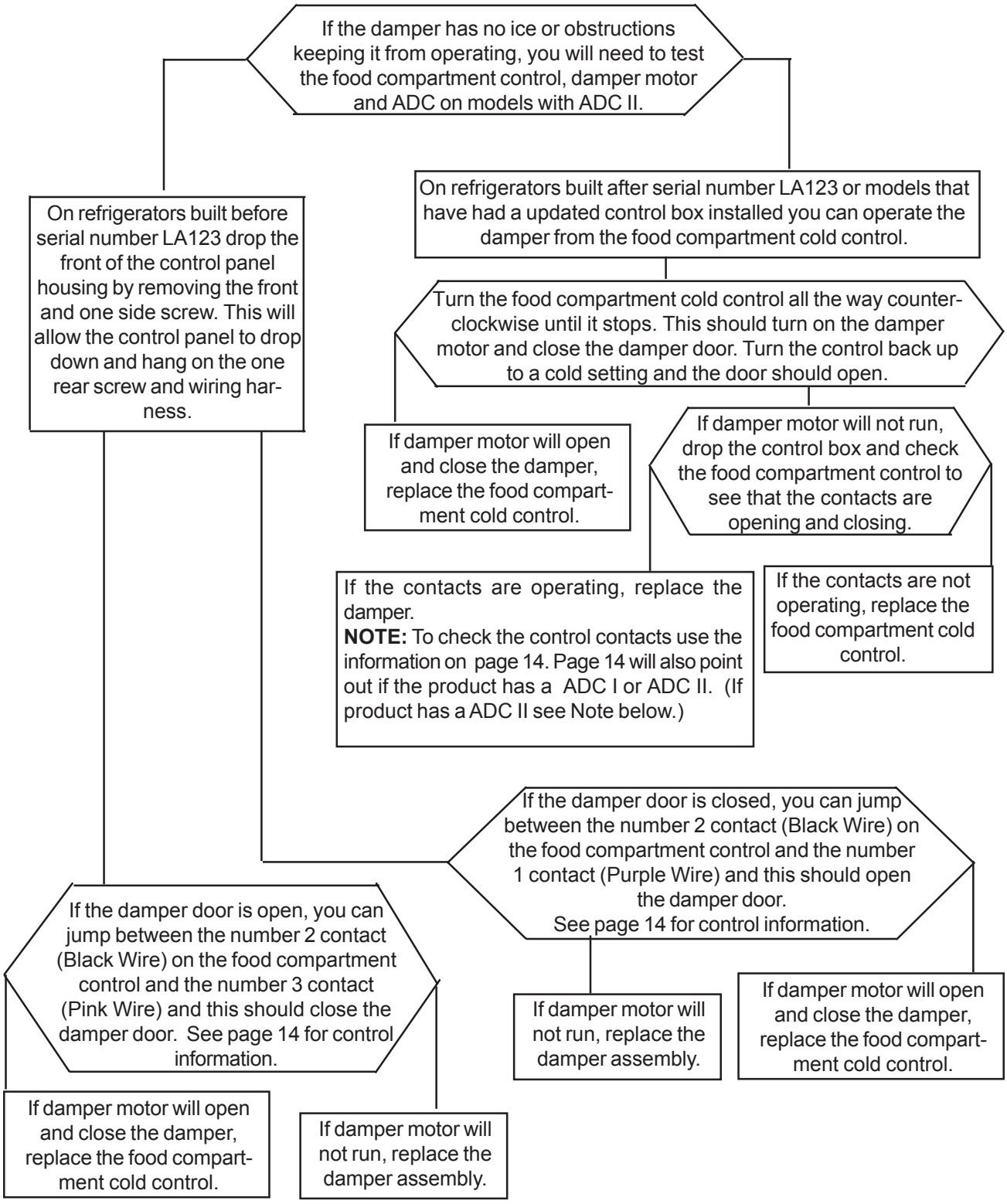
NOTE: Keep in mind the food compartment cold control closes the damper door at +15 F and reopens the door at +35 F at the mid range setting. The temperature of the air coming through the damper must be +15 F at the mid range to close the damper. If the air temperature is +18 F the damper will not close and the food in the food compartment will freeze.

Step 2:



NOTE: If there is ice in the damper door holding the damper door open, ther e is an excess amount of moisture entering the product and it is not all condensing on the evaporator coil. When the circulating air still contains a large amount of moisture as it turns to go through the damper, it will slow down and this will allow the moisture to condense on the damper door. The moisture will then run down and freeze on the bottom of the housing. If the cause of the ice forming on the bottom of the damper housing is a result of heavy use in a humid environment, there is a heater available to install on the bottom of the damper housing. The heater is part number 5303918267.

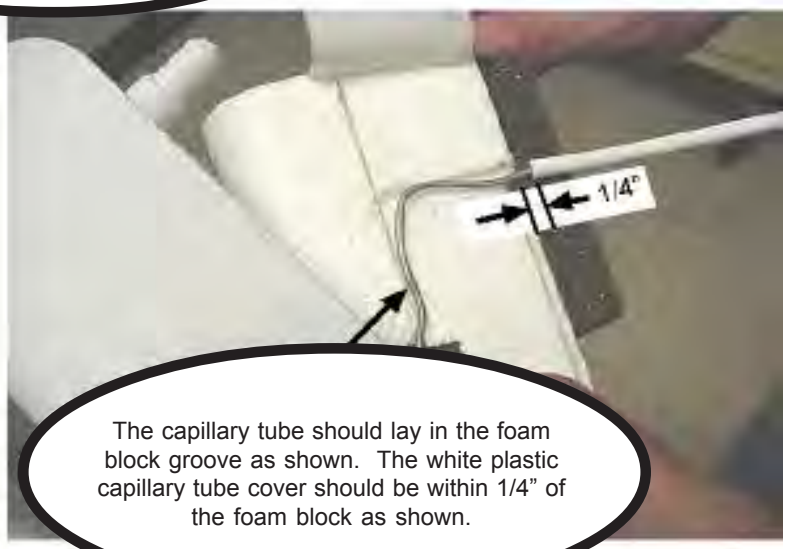
Step 3:



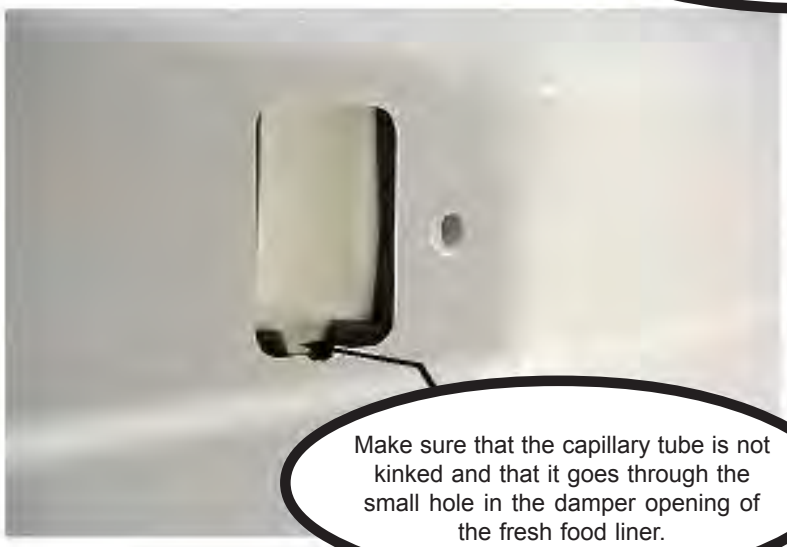
NOTE: If you are testing a product with a ADC II follow the instructions on page 14 through 18 to test the food compartment control damper and ADC.

Items to look for when replacing the control box assembly:

When the control box assembly is removed make sure that the white plastic capillary tube cover is removed along with the capillary tube.

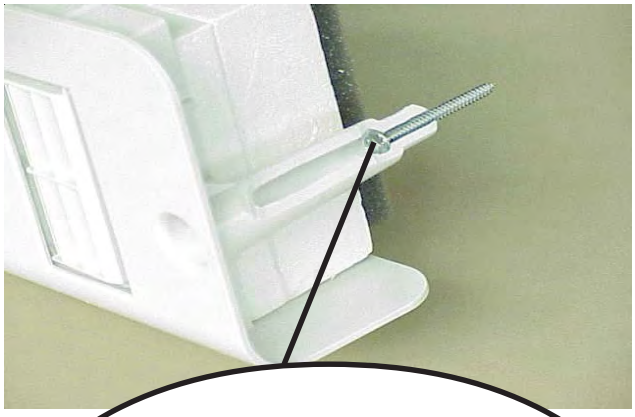


The capillary tube should lay in the foam block groove as shown. The white plastic capillary tube cover should be within 1/4" of the foam block as shown.



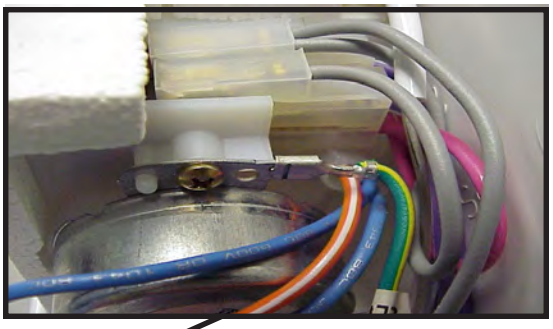
Make sure that the capillary tube is not kinked and that it goes through the small hole in the damper opening of the fresh food liner.

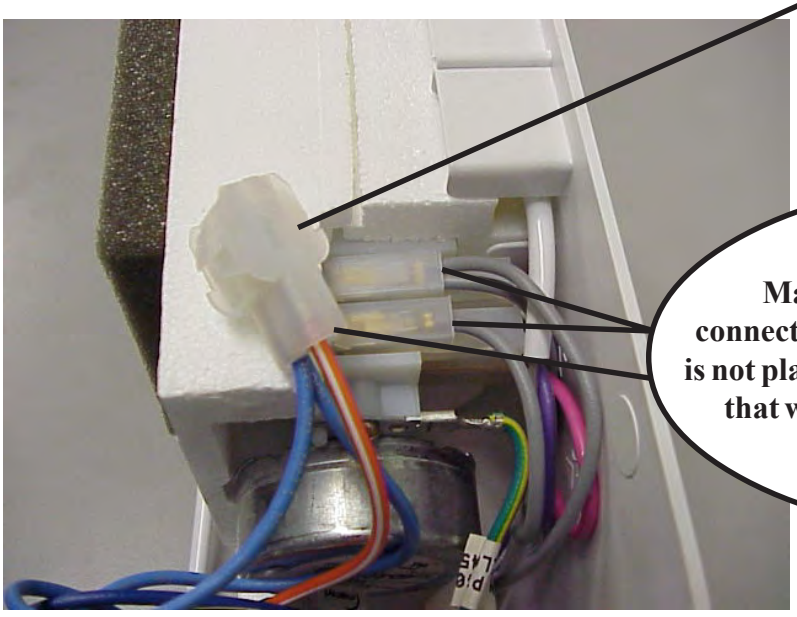
Items to look for when replacing the control box assembly (cont):



When the control box is installed properly the housing will be touching the food compartment liner

When the control box assembly is reinstalled make sure the screw in the back of the control box is all the way in and tight





Make sure the cam switches are connected correctly and the wiring harness is not placed under the switches in a position that will allow them to get into the cam

Damper Heater Kit P/N 5303918267 for the 2001 Side by Side Refrigerators:

This kit will allow the installation of a 1.0 Watt heater on the bottom of the air damper assembly to control frost or ice from collecting on the bottom of the housing stopping the door from closing when the control is satisfied.

1. Remove the control housing from the food compartment.
2. Remove the damper assembly from the control housing and separate the two foam blocks covering the housing. **CAUTION:** Use caution when separating the block so not to break the foam.
3. Remove the film from heater (See Figure 1) and attach to inlet side of housing on bottom. (See Figure 2)

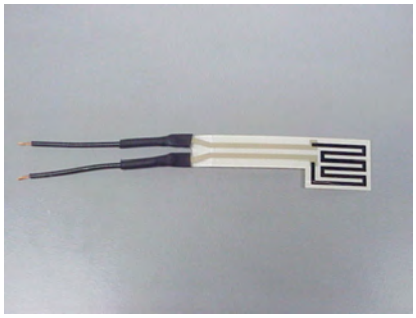


FIGURE 1

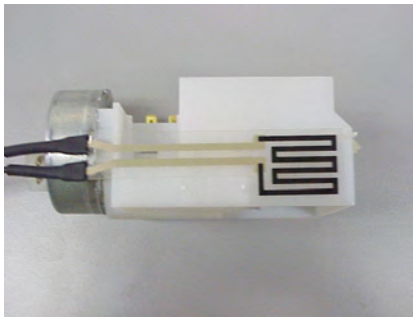


FIGURE 2

4. Slide inlet side of foam block over housing and heater. (See Figure 3) Now slide outlet side of foam block over the housing. (See Figure 4)

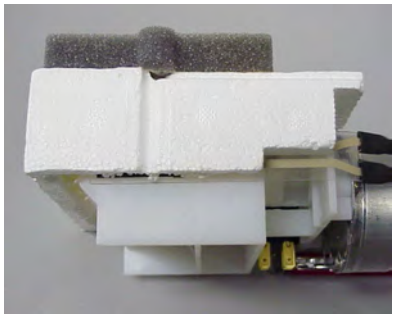


FIGURE 3

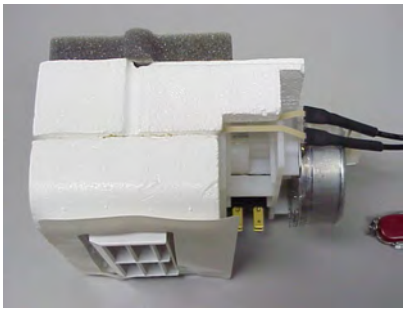


FIGURE 4

5. Re-Install damper in control housing. Cut the Blue wire going to the damper motor (See Figure 5) and using the connector and heat shrink in kit splice one side of the heater to the neutral wire. (Blue Wire)
6. Cut the Red wire going from the defrost control or timer to the compressor (See Figure 5) and using the connector and heat shrink in kit, splice one side of the heater to the line wire. (Red Wire)

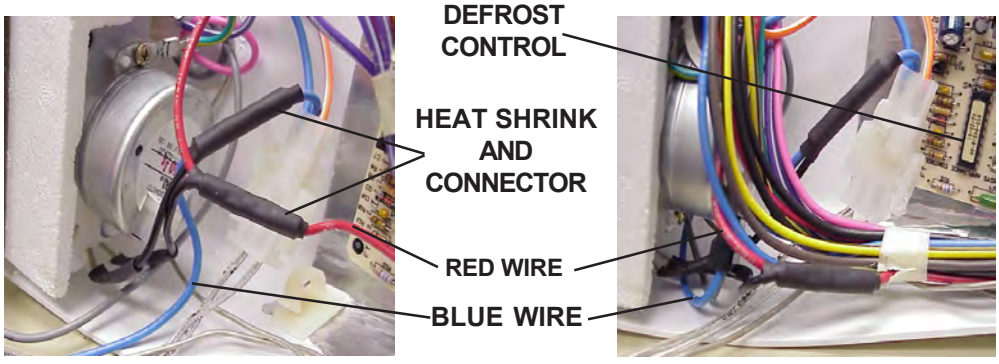


FIGURE 5

Cold Control and ADC Changes on Standard 23 and 26 Cu. Ft. Side by Side Refrigerators:

A change in the food compartment cold control on side by side refrigerators from the GE to a Robertshaw took place in January of 2003. The new Robertshaw control is in use in the control box kit part number 5303918283 and is used in production of refrigerators built after serial number LA301. The controls can be identified by the marking on the control and the color of the body of the control. The GE will have the GE Logo on the end of the control and it has a white body on the contact set part of the control. The Robertshaw will have the name Robertshaw on the end of the control and it has a gray body on the contact set part of the control. The electrical connection will be different between the two controls, on the GE control the number 1 contact has a purple wire with a white tracer, number 2 has a black and number 3 has a pink wire connected to it. (See Figure 3) On the new Robertshaw control the number 1 contact is pink, the number 2 is still black and the number 3 is purple with a white tracer. (See Figure 4) As you can see the pink and purple with the white tracer are reversed between the two controls. The new wiring diagrams will show both controls. The confusion in the field is servicers installing the 5303918283 kit are connecting the Robertshaw control up to the information on the product wiring diagram that is for the original GE control. This is also the case when servicers are installing the food compartment cold control. This will cause the damper to stay closed when the food compartment is calling for cooling, but the damper door will open when the control is turned to the off position.

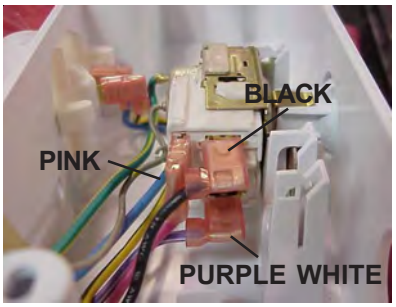


FIGURE 3

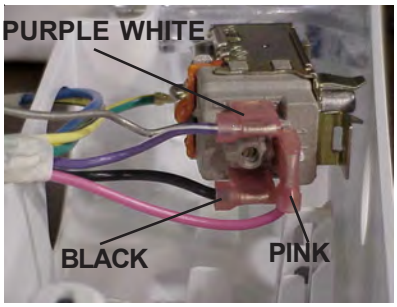


FIGURE 4

The ADC II went into production in August, 2003. There is now a kit part number 5303918302 that has the ADC II part number 241508001 and wire adapter part number 241527000 in the kit. This kit will allow you to install the ADC II in place of the ADC 1.

FIGURE 5

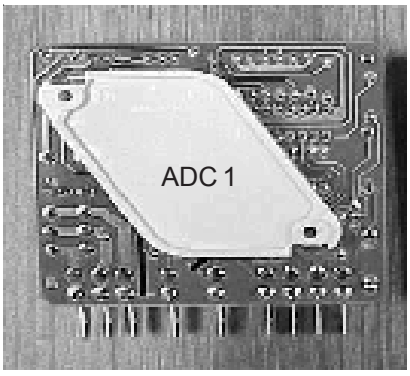
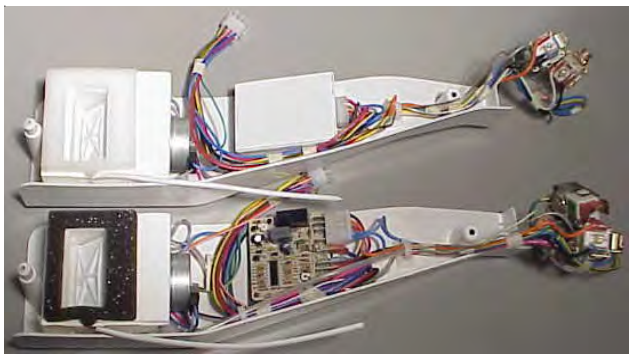


FIGURE 6

Summary of Changes to the Control Box on Standard 23 and 26 Cu. Ft. Side by Side Refrigerators:

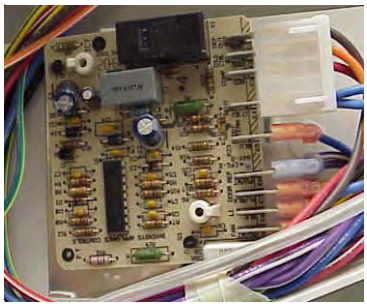
The new damper and ADC went into production the end of July 2003 on 23 foot and second week of August 2003 on the 26 foot side by side refrigerators. (See Figure 1 below.) The ADC II is smaller and mounts in its own frame in the same location as the ADC I. (See Figure 2below.) The new damper is mounted in the same location. (See Figure 3 below.) The part number of the new damper is 240521107 and the part number for the ADC II is 241508001. The food compartment cold control will change from a 3 terminal to a 2 terminal control. NOTE: There will be a few control boxes that will still have the 3 terminal control but the number 1 contact is not used. (See Figure 4 next page.) The control box is mounted the same way as in the past but there will be a difference in the way the control system is tested. The damper motor is now controlled through the ADC II.

NEW CONTROL BOX

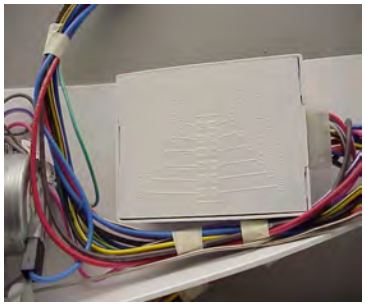


OLD CONTROL BOX

FIGURE 1

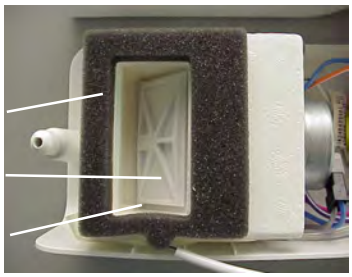


ADC I



ADC II

FIGURE 2

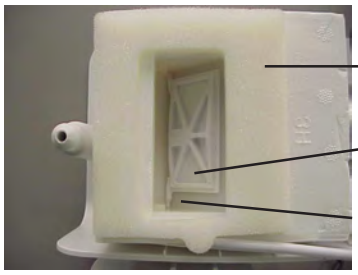


SMALLER SEAL

LONGER DOOR

FLAG PIVOT PINS

OLD DAMPER



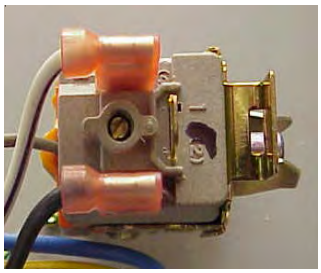
LARGER SEAL

SHORTER DOOR

ROUND AND LARGER PIVOT PINS

NEW DAMPER

FIGURE 3

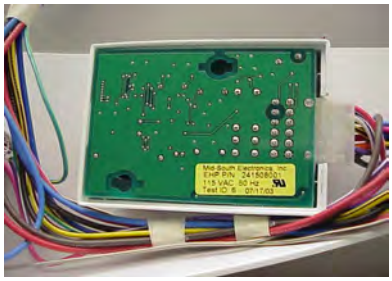


NOTE : THE FOOD COMPARTMENT CONTROL USED WITH ADC I USED 3 CONTACT POINTS. THE FOOD COMPARTMENT CONTROL USED WITH ADC II WILL ONLY NEED 2. IF THE PRODUCT HAS A 3 TERMINAL CONTROL OR IF YOU INSTALL A 3 WIRE CONTROL, CONNECT THE BLACK WIRE TO TERMINAL NUMBER 2 AND THE PURPLE WITH WHITE TRACER WILL CONNECT TO TERMINAL 3. TERMINAL NUMBER 1 IS NOT USED.

FIGURE 4

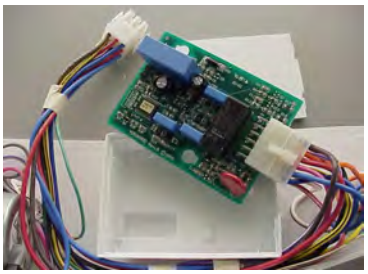
The replacement of the cold controls and damper are the same on both control boxes. The ADC II is mounted inside a box. To replace, use a small screwdriver and release the tabs in the front of the control box. (See Figure 5.) This will allow you to remove the cover and get to the board. (See Figure 6.) Now lift the ADC out of the housing and disconnect the plug. (See Figure 7.)

FIGURE 5



LIFT OFF COVER

FIGURE 6



LIFT BOARD OUT AND DISCONNECT

FIGURE 7

How the ADC II functions:

NOTE: All voltage testing is 115 Volt AC.

The food compartment cold control sends 115 V to the ADC when the control calls for cooling in the food compartment and the control contacts close. When the cold control sends 115 V in on the number 9 contact, the ADC will send 115 V out the purple white wire on number 3 contact to open the damper door. When the food compartment control cut out point is reached the contact will open. This will remove the 115 V signal from the number 9 contact. The ADC will now remove the 115 V from the purple white wire and send the voltage to the pink wire on number 8 contact and the damper door will close. The freezer control is supplying the 115 V to the common contact of the relay on the ADC by way of the orange wire on number 4 contact. The compressor is connected to the normally closed contact on the relay by way of the red wire on number 6 contact of the ADC. The defrost heater is connected to the normally open contact of the relay by way of the brown wire on the number 2 contact of the ADC. The food compartment light switch is connected to the ADC by way of yellow black wire on the number 7 contact.

You can start the refrigerator into or bring the refrigerator out of a defrost cycle by pushing the food compartment light switch 5 times in 6 seconds. The evaporator fan motor operates off the ADC by way of the red white wire on the number 11 contact. The evaporator fan will run when the food or the freezer compartment controls call for cooling. There is a wire connected to the ADC from the defrost limit switch by way of the blue black wire on number 12 contact. A signal change when the defrost thermostat opens tells the ADC to turn off the defrost heater and allow a 6 minute delay, then turn the compressor and condenser fan back on and start the evaporator fan after one additional minute. 115V to the ADC's power supply can be tested by placing one lead of a volt meter into the light blue neutral wire on number 10 contact and the other lead to the black wire on the number 1 contact. With the lead from your voltage meter still in the light blue wire you can check the voltage output of each of the wires as explained above. If you get the correct voltage readings the ADC is good. Use the pin/plug diagram shown in Figure 8 for test points and correct wire color code. This diagram can also be found on the cover of the ADC but can be hard to read.

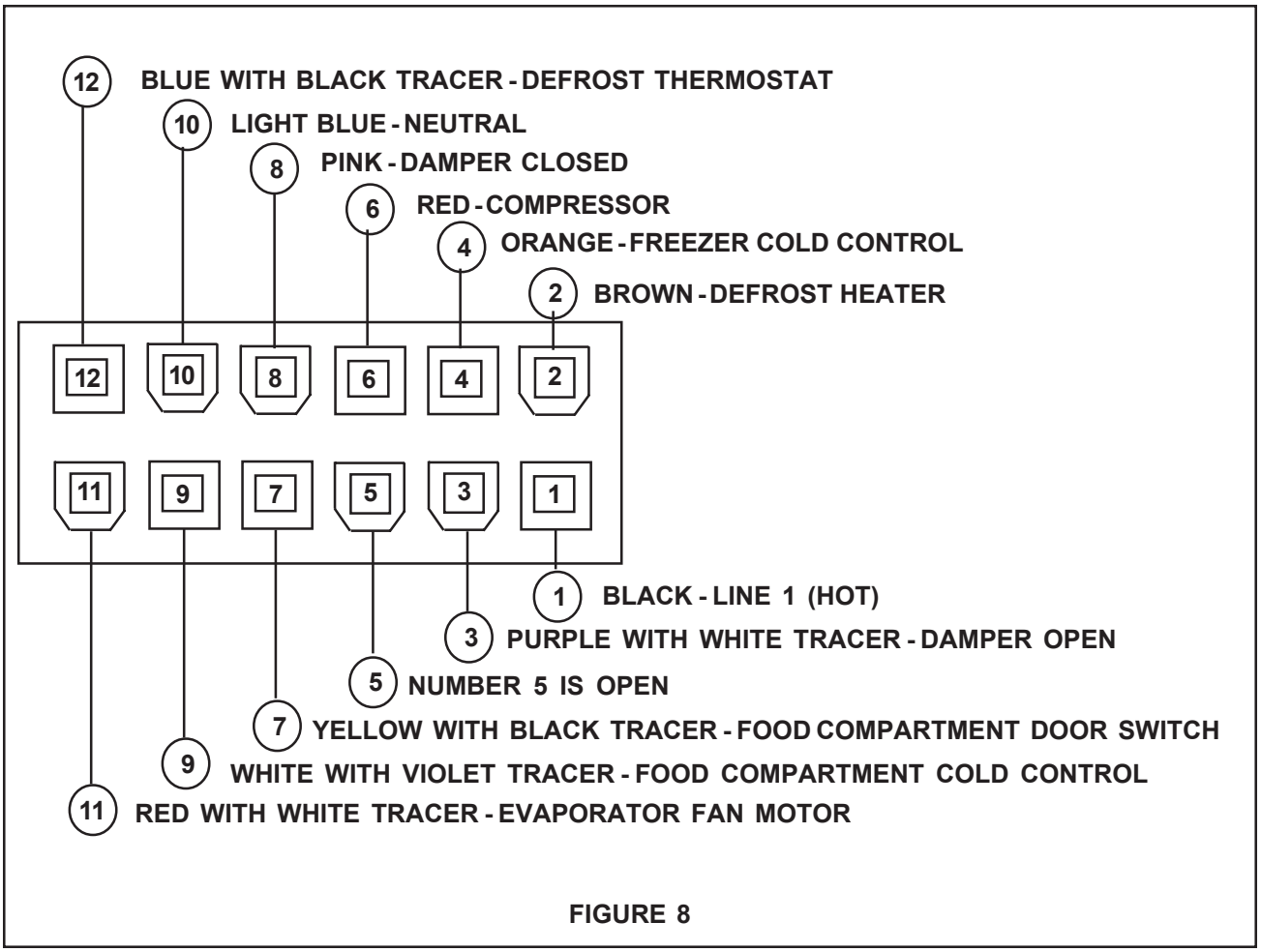
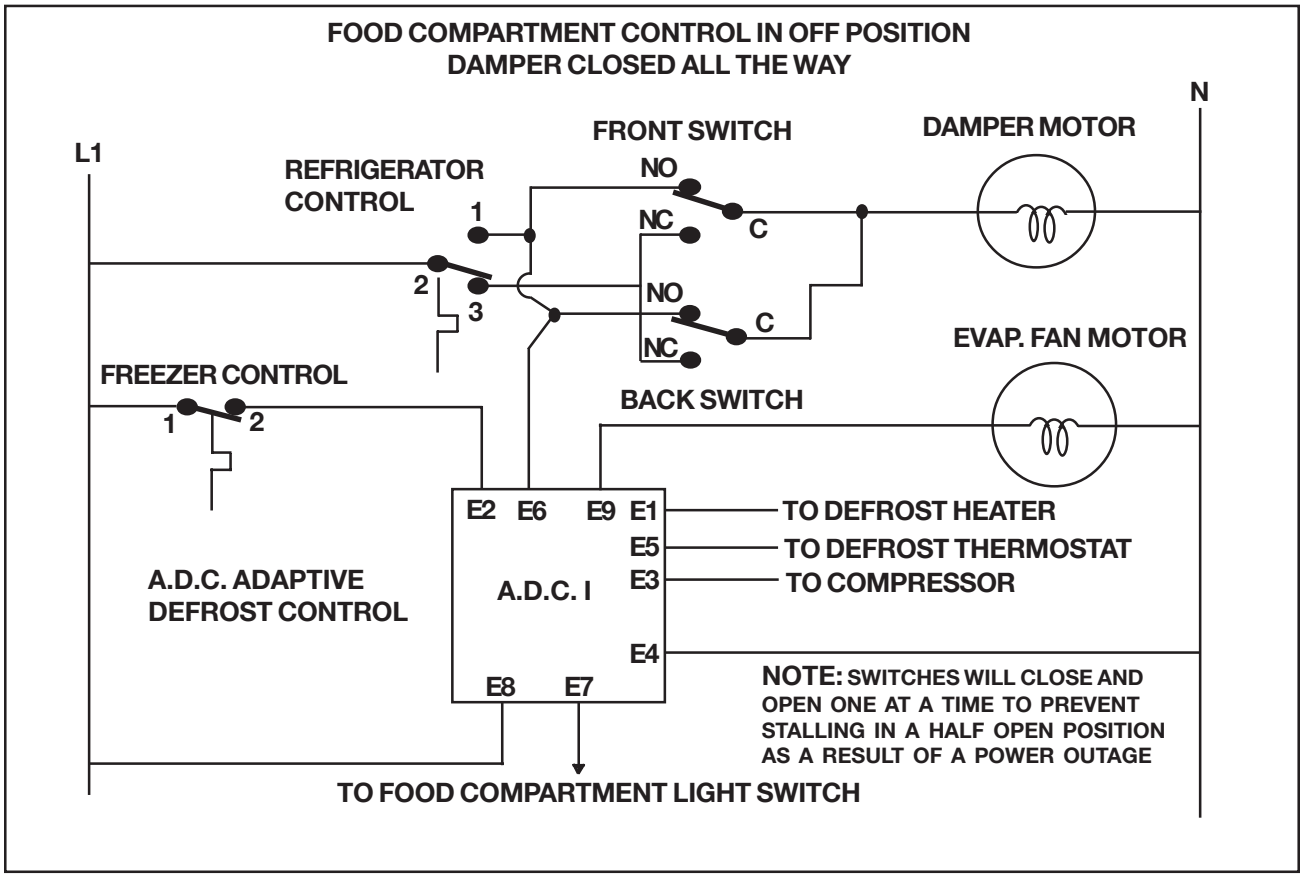


FIGURE 8

Sample Schematic of ADC I Control:

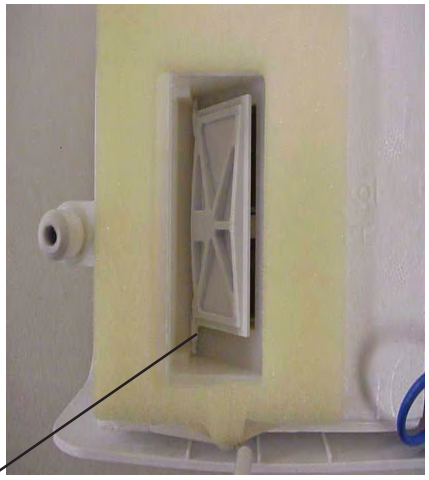


How to tell the difference between damper assembly 240521103 used to build kit 5304428265 as well as the control box kit 5303918282 and the 5303918283 kits built before October 2003:

The new damper part number 240521107 went into production in June 2003 on 23 and 26 foot side by sides. The damper kit 5303918283 was converted to the new damper in September production and became available in October. The changes made to the damper door and the pivot point for the door allow for extra clearance. The round pins are not prone to freezing in place. The changes in the design made it possible to remove the damper heater part number 5303918276 from the damper used in the 5303918283 kit. However, the heater is still available as a service kit from service parts.

DOOR IS SHORTER BY 1/4 INCH TO ALLOW ADDITIONAL CLEARANCE TO STOP ICE FROM BUILDING BETWEEN THE DOOR AND THE HOUSING STOPPING THE DOOR FROM CLOSING

THE PIVOT POINTS ON THE DOOR WAS CHANGED FROM FLAT TO ROUND TO STOP ICE FROM COLLECTING BETWEEN THE PIVOT AND THE HOUSING



Part numbers for replacement parts in the control box:

Damper	240521107
Damper Heater	5303918267
Adaptive Defrost Control (ADC II)	241508001
Adaptive Defrost Control Kit to Convert a ADC 1 to ADC II	5303918302
Food Compartment Control	240383703
Freezer Compartment Control	5304421067
Damper Heater Kit	5303918267

PROBLEM: Icemaker bale arm is dropping all the way down after a harvest cycle as a result the shut off switch is remaining open and the ice maker stops producing ice. A very slight tap on the arm will allow it to drop the rest of the way down and the icemaker will start to operate.

CAUSE: The bale arm spring is not strong enough to overcome freezing grease or a wire nut not positioned correctly or a bind on the face plate of the ice maker. (See Figure 1) Ice is forming inside the housing or on the on/off switch. The lever arm is sticking and adding additional pressure on the bail arm.

SOLUTION: In October of 2003 the supplier of the ice maker changed to a low-temperature grease that will not absorb water to eliminate the grease becoming water soaked and freezing. Additional quality checks were put in place to insure the wiring is in the correct location and a new tool was made to improve the alignment of the housing and the face plate. To repair the ice makers in the field you can order bail arm spring p/n 3206348 which is a stronger spring. When replacing the spring remove all the lubricant and replace with low temperature food grade lubricant p/n 5304435999. (See Figure 2) Check the arm lever to see that the screw is tight but not so tight to cause the arm to bind. This screw is a shoulder type and if it is loose check to see that the lever arm is on the shoulder not not pinched between the shoulder and the housing.(See Figures 3) Before you reinstall the steel plate add a screw to the open screw hole or fill the hole with sealer. (See Figure 4) When reinstalling the front face plate after the spring is replaced check to see that wire nut is in the correct location. (See Figure 5). After the steel face plate is installed loosen the screws slightly if you feel a binding on the bail arm as you lift it up and down by hand. (See Figure 6)

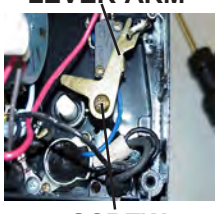
BAIL ARM STICKING

FIGURE 1

CLEAN REPLACE LUB.

FIGURE 2

LEVER ARM



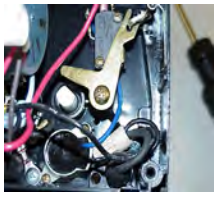
SCREW

FIGURE 3

FILL SCREW HOLE

FIGURE 4

INCORRECT



CORRECT

FIGURE 5

LOOSEN MOUNTING SCREWS

FIGURE 6

PROBLEM: Ice cubes falling over the side or back of the ice bucket on side by side refrigerators with the ice maker mounted across the back of the freezer.

CAUSE: Deflector missing or out of place on ice maker and on some models from the ice bucket.

SOLUTION: On side by side refrigerators with the ice maker mounted across the back there is a deflector part number 241583301 mounted on the stripper of the ice maker. (See Figures 1and 2) This deflector has two reasons for being installed correctly. First it directs additional air at the bottom of the ice maker to increase production. Second it stops ice from falling over the back of the bucket. It is important that it is in place and the bucket is all the way back against the stop.

FIGURE 1

FIGURE 2

The second deflector is part number 241587401 (Figure 3) it is mounted on the right rear side of the ice bucket (Figure 4) on 26 cubic foot side by sides. It fills the gap between the shelf (Figure 5) and the back of the ice bucket

FIGURE 3

MOUNT ON RIGHT REAR
SIDE OF ICE BUCKET

FIGURE 4

USED TO FILL GAP

BETWEEN SHELF AND LINER

FIGURE 5

PROBLEM: Ice and frost forming on the solenoid and auger motor on side by side refrigerators.

CAUSE: Air leaking into the refrigerator and/or heavy usage is producing a lot of additional moisture inside the refrigerator.

SOLUTION: For air leaking into the refrigerator see Service Bulletin January 2004, page 7 for sealing the water line opening in the bottom of the food compartment. This will help control a lot of moisture infiltration into the cabinet. It should be checked on all products and sealed if necessary. In addition to sealing the air leaks, if you can add additional air flow through the housing where the auger and solenoid are mounted, this will help keep the moisture from condensing and building up on the auger and solenoid. You can add the additional ventilation by drilling 6-3/8 inch holes in the bottom of the housing. (See Figure 1) Also drill 15 - 3/8 holes in the back of the plastic cover over the housing. (See Figure 2) The cover can not be removed and disposed of. It is a UL requirement that this cover is installed to prevent a person from putting their hands into the wiring when reaching behind the housing to clean the product. The foam block over the solenoid needs to be sealed tight against the steel housing top to bottom. This may require that the wires to the solenoid be rerouted to allow the block to sit correctly. (See Figure 3) If you can not get the block to sit correctly in place the block can be removed when the ventilation holes are opened in the housing. It is better to remove the block than have a block that will not seal against the steel housing. Replacement rear covers are available with holes already drilled. For 23 cu. ft. units, order p/n 241577301. For 26 cu. ft. units, order p/n 241577302.

FIGURE 1

FIGURE 2

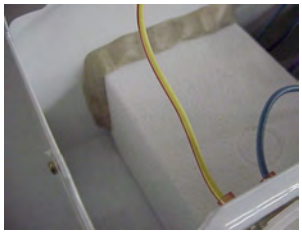


FIGURE 3

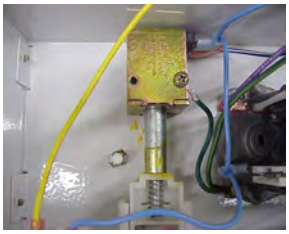


FIGURE 4

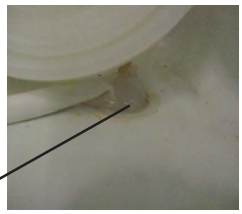
PROBLEM: Heavy frost build up on evaporator but defrost system is working. Ice is building on cube ice solenoid and/or auger motor as well as damper.

CAUSE: Air is leaking into the product

SOLUTION: In addition to checking for a good seal between the door gasket and the cabinet, also check for a good fit of the door gasket into the door channel. Another place to look that is missed by a lot of servicers is the seal on the opening in the cabinet at the point the water lines enter. This opening is in the bottom right corner of the food compartment behind the light shield. The opening must be sealed all the way around. It would be a recommended service practice to have a servicer check the opening on any product you are servicing to make sure it is sealed.

WATER LINE OPENING

MAKE SURE OPENING IS SEALED COMPLETELY



PROBLEM: Repeated leaking of front water filter.

CAUSE: High water pressure.

SOLUTION: We have found from testing that water pressure in the 90 PSI and higher range have caused repeated leaking of front water filters. The filter and base can be replaced and adjusted properly, then in 4 to 6 months the filter starts to leak again. There is now an in-line regulator that can be installed in the inlet side of the water filter. (See Figure 1) The part number for the regulator is 241556001. The regulator will hold the pressure on the filter and water system at 60 to 65 PSI with up to 150 PSI line pressure.

To install:

1. Remove the cover from the water lines going to the front filter.
2. Remove the inlet water line (Brown line on right hand side)
3. Push the water pressure regulator into the filter base inlet.
4. Reinstall the water line and cover.

REGULATOR INSTALLED ON INLET SIDE OF THE WATER FILTER

FIGURE 1

NOTE: On current production, the "o" rings have changed to a larger size, the ends of the filter are slightly longer, the back of the filter housing is not heat welded to the main housing, and the screw and the screw holes are removed from the back of the housing.

PROBLEM: Front water filter will not eject when button is pressed to release filter

CAUSE: It was found in test by the vendor and the factory that the spring clip in the base that holds the filter in place had a burr on one of the four fingers.

SOLUTION: The release lever would release three of the fingers, but the 4th (upper left hand) would catch on the filter and not let go unless you push in on the filter and the button at the same time. The spring clip is symmetrical, so it could be put in with the burr at the top left (worst position from a functional stand point) or right bottom (best position). There is now a 100% Line check in place to make sure the filter will release. In the field the spring clip can be removed and turned over and reinstalled or the filter base replaced to take care of the problem.

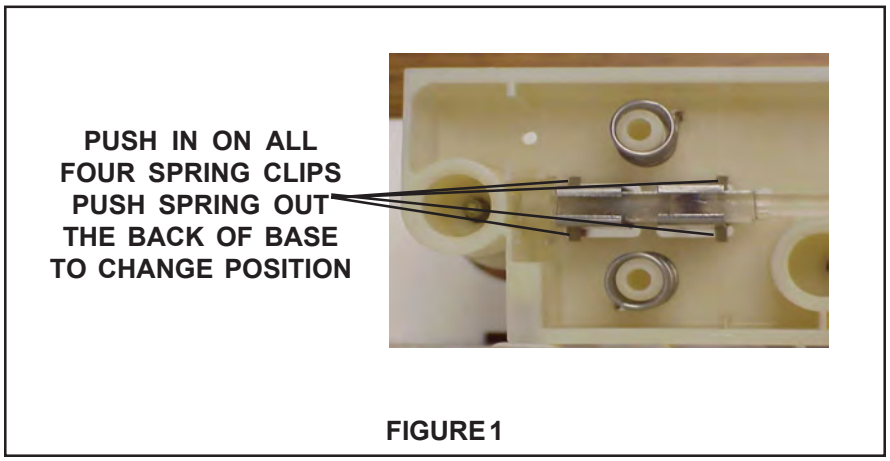


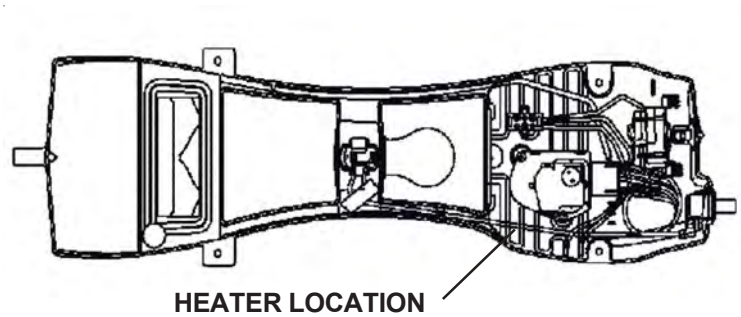
FIGURE 1

PROBLEM: Top mount refrigerator installed in a garage and the food in the freezer is defrosting when the temperature in the garage goes below 55 F.

CAUSE: On top mount refrigerators the compressor and evaporator fan are cycled from the food compartment temperature. When the ambient room temperature gets colder than 55 F the cold control waits for the food compartment to warm enough to close its contacts. This long off time allows the freezer temperature to get high enough that food can start to defrost.

SOLUTION: There is a kit for refrigerators installed in applications where the temperature can go as low as 34 F and still maintain good freezer temperatures. The kit part number is 5303918301 and contains a heater that mounts in the control box. An instruction sheet is included to illustrate the heater installation.

NOTE: This is not a warranty repair. Claims filed with this part number will be rejected.



PROBLEM: Use of hard start kits.

CAUSE: We have found a number of hard start kits installed on refrigerators returned from the field. We have also found reference to hard start kits being installed on products when looking at service reports in Service Bench.

SOLUTION: Electrolux will not pay for a hard start kit on a warranty claim. The reason for this is Electrolux Home Products does not want hard start kits permanently attached to compressors on products we have manufactured. The original starter package used to start the compressor has a overload set to the compressor manufacturer's specification for the maximum amount of current the compressor can safely pull. The overload is approved by UL for use with that compressor. The overload also is very close to the body of the compressor and can monitor the temperature of the compressor case. It will shut off the compressor if the case temperature exceeds a safe level. The product is built this way to protect both the compressor and the customer's property from damage.

There are problems with hard start kits that do not fall into the original manufacturer's specifications. Number one, the overload range on the hard start kit is in most cases well over the acceptable range set by the compressor manufacturer and UL. Number two, the hard start kit does not monitor the compressor case temperature of the compressor and therefore can not shut off the compressor if it is getting too hot. Number three, the hard start kit does get hot and this greatly limits where the kit can be installed without causing damage to the wiring or waterlines in the product. This is why Electrolux does not recommend the use of a hard start kit other than a temporary means of operating the product until the correct parts can be installed. This means you could install a hard start kit temporarily to keep the product operating in the event you do not have the correct replacement starter or compressor on hand to properly repair the product.

Before you install a hard start kit on a inoperative compressor you should connect the compressor on a test cord and check the current draw with a watt meter or amperage tester. If the current draw is within the specifications on the service data sheet provided with the product, and the system is operating OK on the test cord, the starter needs to be replaced. If you do not have the correct starter you could use a hard start kit to keep the product operating until you can return with the correct part. Use caution when installing the hard start kit to see that it is not close to the wiring or waterlines in the machine compartment and that it is far enough away from the customer's floor so it will not cause any discoloration to flooring or carpet. If the current draw is just a little over the rating on the service data sheet, the hard start kit may keep the compressor operating for a short period of time until you can install a new compressor. Because the overload on the hard start kit is raised higher than the original OEM part it may be able to operate the compressor for a short period of time. It is not a permanent cure, if a compressor is starting to go bad it needs to be replaced. If the starter is bad it needs to be replaced with the correct part for the compressor in the product.

VCC or Variable Speed Compressors:

The new series of very high efficiency compressors is equipped with all new electrical components consisting of a power input electronic control.

Power Input Electronic Control (Inverter):

The solid state power input electronic control consists of the following:

Low voltage power supply
EMI Filter and Voltage Suppressor Circuit
AC-DC Converter
Three-phase Inverter Bridge
Serial communication
Microcontroller or DSP Controller Protection
Voltage Sensor

The Inverter replaces the Solid State Relay, the Overload Protector, and the Run Capacitor. The Inverter has 115 VAC current to it all the time the refrigerator is connected to the line voltage. It picks up the voltage directly from the service cord. It receives a 2 to 5 volt DC signal from the main control board located under the refrigerator in the left front opening behind the toe grill.

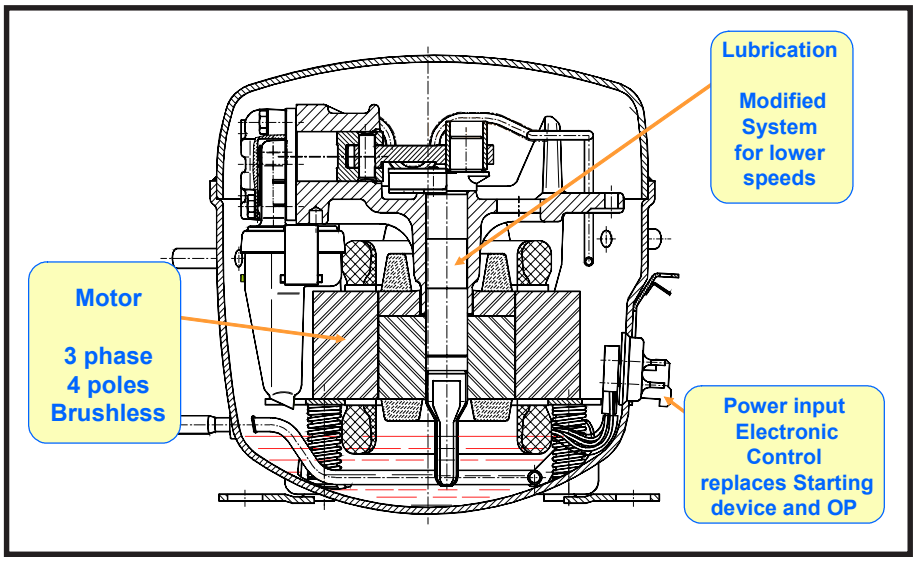
Inverter Compressor

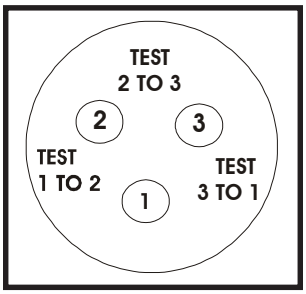
To Check/Replace the Inverter:

1. Use a Multimeter or a good Voltmeter set on 300 VAC to test the voltage going into the Inverter from the service cord. Do not disconnect the Molex connector. Slide your probes from your meter in along side the wires until you connect with the terminal itself. You should read 115 VAC +/- 10%. If the reading is less than that, check the power cord and supply voltage.
2. Set your meter to DC on a scale as close to 10 volts as is available. Do not disconnect the Molex connector. Slide your probes from your meter in along side the wires until you connect with the terminal itself. You should read between 2 to 5 VDC. If the reading is not within range of that, replace the main control board.
3. If the voltage checks good, remove the Inverter from the compressor by removing one screw at the bottom of the Inverter that goes through the bracket that is welded to the compressor. Pull the inverter away from the compressor. Use a small flat bladed screwdriver to remove plug from compressor terminals. Using an ohmmeter, check the resistance between compressor terminals (see Testing Compressor). If the compressor checks good, replace the Inverter.

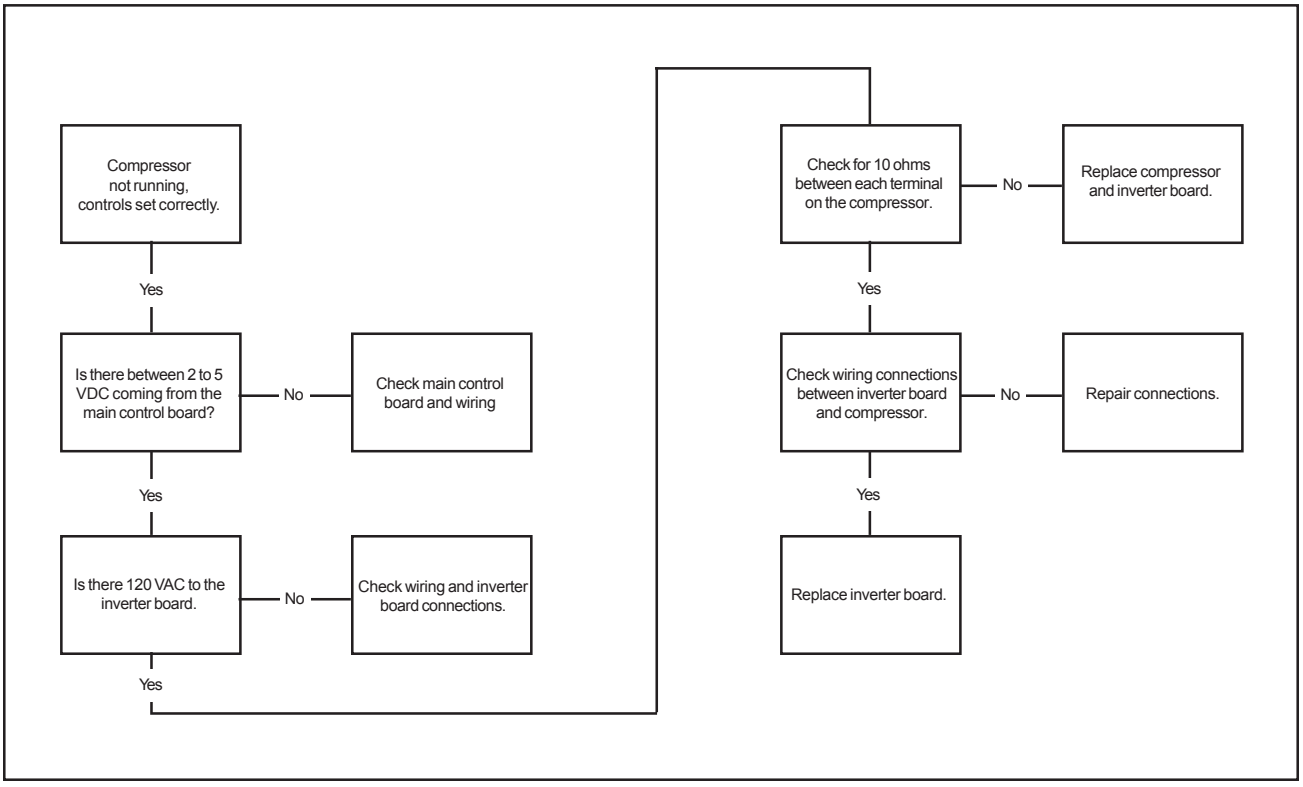
Compressor:

The compressor is a 3 phase, 4 pole brushless DC motor. To test the compressor, use an ohmmeter and read the resistance between the terminals. (See drawing.) You should read 10 ohms +/- 10%.





Troubleshooting the VCC Compressor:



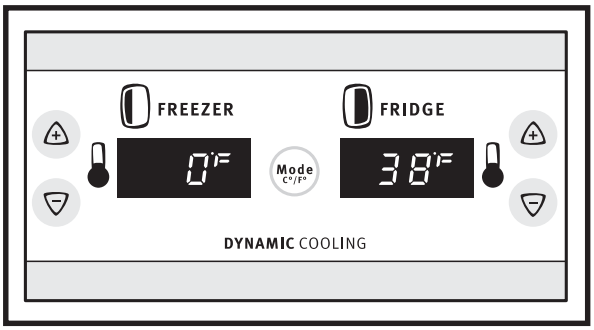
SxS Electronic Control System:

Damper Assembly

Motorized door (+12 VDC) located between the freezer section and the fresh food section of the refrigerator. The door will open to a certain position when there are refrigeration requirements in the fresh food section. The damper motor, which positions the door, is a 12 VDC, 2 phase, bipolar stepper motor.

Freezer Temperature Control

An electronic thermostat regulates the temperature of the frozen food section. A Negative Temperature Coefficient Thermistor monitors freezer compartment temperature. Loads controlled at the compressor, condenser fan and evaporator fan motor enabling and speed.



Fresh Food Temperature Control

An electronic thermostat regulates the temperature of the fresh food section. A Negative Temperature Coefficient Thermistor monitors fresh food compartment temperature. The damper motor (position) and evaporator fan motor enabling and speed are controlled by the electronic control.

Defrost Heater

A 450 watt heating element (115 VAC) located in the evaporator assembly to melt frost during the defrost cycle. The defrost heater is connected to the NO contact of a relay. Defrost Heater operation is detected and internally monitored by the microprocessor.

Defrost Termination Thermostat (DTT)

Bi-metal disc thermostat attached via a clamp to the evaporator tubing. During the defrost cycle, the device is a closed circuit between the defrost heater and Neutral. The DTT is designed to open at a predetermined temperature ending the defrost cycle

Standard Compressor

Motorized pump (115VAC) that creates the high and low pressures required for heat exchange. The Standard Compressor is controlled by a relay.

Evaporator Fan

Motorized Fan (12 VDC) that circulates freezer and fresh food section air. The evaporator fan motor speed is controlled via a +12 VDC circuit. NOTE: If the fan motor is running when the freezer door is opened, the speed will change from HIGH (2700 RPM) to LOW (2000 RPM).

Condenser Fan

Motorized Fan (115 VAC) that circulates air through the condenser coils. Either a Relay or Triac, depending on compressor used, controls condenser Fan Motor.

Fresh Food Door Sensor

Magnetically activated reed switch. Switch will detect Fresh Food Door state.

Air Filter

Motorized Fan (12VDC) that circulates air through a filter in the Fresh Food Section. The Filter Fan Motor is controlled via a power transistor. (Not on all models.)

Sensors

Negative Temperature Coefficient Thermistor. (10kW ±2% @ 25°C.)

Fresh Food Lights

Fresh Food Lights are enabled and disabled depending on the Fresh Food Door Sensor state. Light on maximum is 10 minutes. Interior lights will shut off after 10 minutes if the door is left open. Closing and re-opening the door will reset the sequence.

Alarm

Audible Transducer (Piezo)

Control, Main Board

Power Supply ... AC Input Voltage – 115 V AC @ 60 Hz.

Control, User Interface

Power Supply ... Input - 5VDC (from Main Board)

Numeric Display

Version A …2 digit, 7 segment numeric with degrees symbol, minus sign segment and a 4 segment character to represent F and C (magnetically activated reed switch that detects Fresh Food Door state).

Version B … 1 digit, 7 segment numeric. Fresh Food Door Sensor (magnetically activated reed switch that detects Fresh Food Door state).

Fahrenheit & Centigrade Temperature (Some models)

Allows customer to change temperature readings from Fahrenheit to Centigrade and back.

Alarms and Signals:

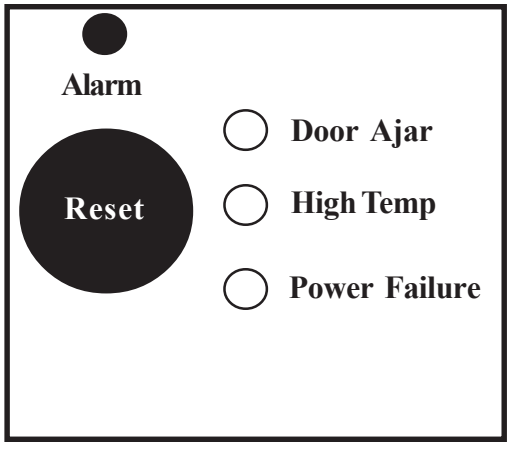
Temperature Alarm

Enabling is automatic and started at the time product is plugged in POR (power on Reset) but is delayed until actual Freezer temperature = Freezer temperature set point and actual Fresh Food temperature = Fresh Food temperature set point. Once set points are reached, Alarm LED (Green) will come ON, steady state, indicating Alarm is active.

NOTE: The term POR (Power On Reset) appears many times in this section. POR simply means to remove the power cord from the electrical outlet, wait a few seconds, then plug the power cord back into the receptacle.

Alarm Condition

Alarm is enabled and active. Temperature parameters are within tolerances. Alarm LED (Green) is ON and steady state. When POR (power on reset), the Alarms are delayed (180 Minute maximum) until set point temperatures are reached.



Reset Button

Press once to reset any Alarm condition. Alarm LED (steady green). Press and hold reset 3 seconds (you will hear one beep) to turn all alarm functions Off. Press and hold reset 3 seconds (you will hear one beep) to turn all alarm functions On.

Door Ajar

If either door is open for 5 minutes, this light blinks and control beeps. Condition is reset if the opened door is closed or reset button is pressed.

Door Ajar & High Temp

Fresh Food and/or Freezer doors have been open for at least 5 minutes and temperatures have exceeded recommended limits.

Power Failure (flashing yellow)

If power has failed momentarily, this light blinks.

High Temp

Temperatures have exceeded recommended limits. NOTE: If the user unplugs the unit and the setpoints have been reached, when the product is plugged back in (POR) the “Power Off” indicator will be on. If the user has the product unplugged long enough to cause a unsafe temperature condition, the “High Temp” indicator will also be on when the product is plugged back in.

Showroom Setting

Activation

Press and hold Fresh Food Temperature UP (WARMER) Key while pressing the fresh food temperature DOWN (COLDER) key 3 times within 5 seconds. Both displays will flash “0” for 10 seconds. While the displays are flashing, press the Freezer Temperature UP key to confirm activation.

Deactivation

Mode automatically deactivates at a power on reset

Active Function Displays

- Freezer/Fresh Food Temperature Keys
- Fresh Food Lights
- Alarm Key. Key Tone ONLY
- Air Filter Key. Key Tone and green LED toggles On & Off
- All other functions are disabled including alarm(s) enabling

NOTE: The “Show Room” mode only operates with a main power board version 3.1 or greater and doesn’t recognize Alarm/Power Off conditions during activation.

Fresh Food Lights

Fresh Food Lights are enabled and disabled depending on the Fresh Food Door Sensor state. Light on maximum is 10 minutes. Interior lights will shut off after 10 minutes if the door is left open. Closing and re-opening the door will reset the sequence.

Change Between Fahrenheit and Centigrade (on some models)

To change from Fahrenheit to Centigrade, press the Mode key. To change from Centigrade to Fahrenheit, press the Mode key.

Advance Into Defrost Cycle Manually

Activation

Press and hold Freezer Temperature UP (WARMER) Key while pressing the fresh food temperature DOWN (COLDER) key 5 times within 6 seconds. This will advance the processor into defrost cycle.

Deactivation

Press and hold Freezer Temperature UP (WARMER) Key while pressing the fresh food temperature DOWN (COLDER) key 5 times within 6 seconds. This will advance the processor out of defrost cycle. Or just leave the refrigerator alone and it will go through a normal defrost cycle and start running after defrost limit switch has turned off the heater and the controller has allowed for a normal drip time.

Temperature Control Settings:

Version A User Interface is a two position read out for Freezer and Food Compartment. Version B User Interface is a one position read out for Freezer and Food Compartment.

Freezer (Version A)

Temperature UP key increments temperature setting up one degree, F or C, for each key press. Setting Upper Limit = +6°F (-14°C).

Temperature DOWN key decrements temperature down setting one degree, F or C, for each key press. Setting Lower Limit = -6° F (-21°C). Each key press (Temperature UP or DOWN) displays temperature setting. Actual temperature will be displayed after 10 seconds of no key entries and during normal operation.

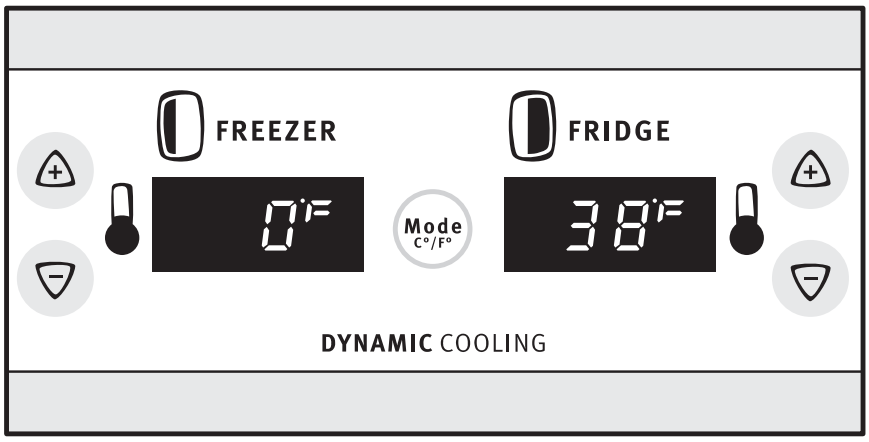
Displays are off when Fresh Food Door is closed. Communications remain active. Default = 0°F (-18°C).

Food Compartment (Version A)

Temperature UP key increments temperature setting one degree, F or C, each key press. Setting Upper Limit = 47°F (8°C).

Temperature DOWN key decrements temperature setting one degree, F or C, each key press. Setting Lower Limit = 33°F (1°C).

Each key press (Temperature UP or DOWN) displays temperature setting. Actual temperature will be displayed after 10 sec. if no key pressed and during normal operation.



UIB Version A

Freezer (Version B)

Temperature Colder key increments setting one number each key press. Setting Upper Limit = 9

Temperature Warmer key increments setting one number each key press. Setting Lower Limit = 0 (Off).

Number Setting to Temperature Conversion

0 = Off (All Loads. Damper Closed). Displays = “0”.
1 = +6°F (-14°C).
2 = +4 (-15.5°C).
3 = +3 (-16°C).
4 = +2 (-17°C).
5 = 0°F (-18°C).
6 = -2°F (-19°C).
7 = -3°F (-19.5°C).
8 = -4°F (-20°C).
9 = -6°F (-21°C).

Displays are off when Fresh Food Door is closed. Communications remain active. Default = 5.

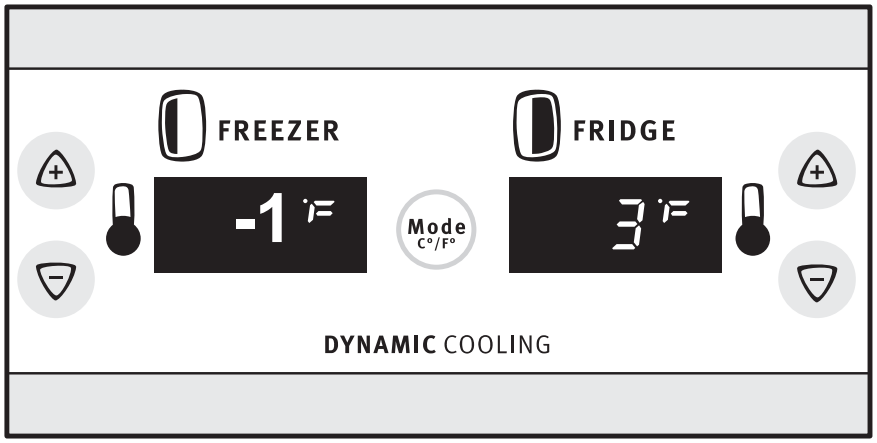
Food Compartment (Version B)

Temperature Colder key increments setting one number each key press. Upper Limit = 9

Temperature Warmer key increments setting one number each key press. Lower Limit = 1

Number Setting to Temperature Conversion

1 = 47°F (8°C).
2 = 44°F (6.5°C).
3 = 43°F (5.5°C).
4 = 41°F (4°C).
5 = 37°F (3.5°C).
6 = 36°F (3°C).
7 = 35°F (2.5°C).
8 = 34°F (2°C).
9 = 33°F (1°C).
Default = 5



UIB Version B

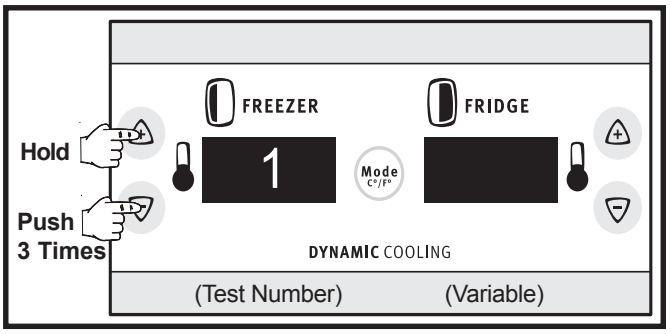
Service Diagnostics

With a series of key presses, diagnostic data can be viewed via the UIB display to help troubleshoot the product.

Activation

To enter the test mode, press and hold the Freezer Temperature UP (Warmer) key while pressing the Freezer Temperature DOWN (Colder) key 3 times within 5 seconds.

The freezer display will show “1” which is the first test. The fresh food display will be blank. Each press of the freezer temperature up (Warmer) or the freezer temperature DOWN (Colder) key will step you through the service menu tests,”1” through “8”. Each press of the fresh food temperature UP (Warmer) or fresh food temperature DOWN (Colder) key will step you through variables of each test. NOTE: If you are in test 1 and press the freezer up key you will go to test 8. If you are in at the start of test 1 and press the food compartment up key it will beep at you.



Deactivation

Press and hold Freezer Temperature “UP” key for 5 seconds until you hear one beep. Mode automatically deactivates after 5 minutes if no key entry.

Service Test Menu

Test 1 - Firmware Version

Variable 1. Display main board software version.

Variable 2. Display user interface software version.

Test 2 - Evaporator Fan Test

Variable 1. Motor runs at high speed continuously until variable is exited. Display will show H for high speed.

Variable 2. Motor runs at Low speed continuously until variable is exited. Display will show L for low speed. High Speed is 2700 and low is 2000 RPM.

Test 3 - Freezer temperature, last 24 hours. (Defrost temperature omitted)

Variable 1. Display Minimum Temperature (Coldest temperature)

Variable 2. Display Maximum Temperature (Warmest temperature)

Variable 3. Display Average Temperature

NOTE: On products with two position read out in the freezer and food compartment the one or two digit temperature will appear in the food display to give you the test temperature. On products with one position read out in the freezer and food compartment, the first number of the temperature will be constant for 1 second. The second number (if needed) of the temperature will flash twice in one second. It will alternate back and forth to give you the test temperature.

Variable 4. Freezer sensor circuit condition;

Flash “1” Freezer sensor OK
Flash “2” Freezer sensor open
Flash “3” Freezer sensor shorted

Variable 5. Disables buffer to allow technician to place his finger on the freezer sensor and observe an immediate temperature rise.

NOTE: The upper control limit is 4 degrees over set temperature.

Test 4 - Fresh Food temperature, Last 24 hours

Variable 1. Display Minimum Temperature
Variable 2. Display Maximin Temperature
Variable 3. Display Average Temperature

NOTE: On products with two position read out in the freezer and food compartment, a one or two digit temperature will appear in the food display to give you the test temperature. On products with one position read out in the freezer and food compartment, the first number of the temperature will be constant for 1 second. The second number of the temperature will flash twice in one second. It will alternate back and forth to give you the test temperature.

Variable 4. Fresh Food sensor circuit condition will be displayed in Fresh Food Window:
Flash “1” Fresh Food sensor OK
Flash “2” Fresh Food sensor open
Flash “3” Fresh Food sensor shorted

Variable 5. Disables buffer to allow technician to place his finger on the Fresh Food sensor and observe an immediate rise in temperature.

NOTE: The upper control limit is 4 degrees over set temperature.

Test 5 - Damper Motor is a 12 volt DC Stepper motor

Variable 1. Damper to full open (O)

Variable 2. Damper to mid position (o)

Variable 3. Damper to full closed (--)

NOTE: Stepper motors require alternating polarities of DC current to operate. This is accomplished with a circuit on the main board. Applying straight 12 V DC to the damper motor will not make the motor run and it could damage the motor windings. Only test the damper motor through the refrigerator control system.

Test 6 - Defrost

Variable 1. Number of defrosts, last 72 hours

Variable 2. Duration of last defrost heater on time in minutes

Variable 3. Will turn on defrost heater

If current flow to heater is sensed, the letter ‘D’ will be displayed. If no current flow is sensed, the letter ‘D’ will flash. This will continue until servicer advances to another test or 5 minutes have passed without a key entry.

NOTE: If the defrost limit switch opens during the time the heater is on the D will change to a flashing D, indicating there is no current flow.

Test 7 - Compressor and condenser fan on

Variable 1. Compressor run time percentage in last 72 hours

Variable 2. Number of compressor cycles last 24 hours

Variable 3. Average compressor speed (Variable speed compressor only) Speed is displayed as a number between 16 and 45 (X100).

Variable 4. Run compressor and condenser fan motor. The display will flash the letter “C” when the compressor and condenser fan are running.

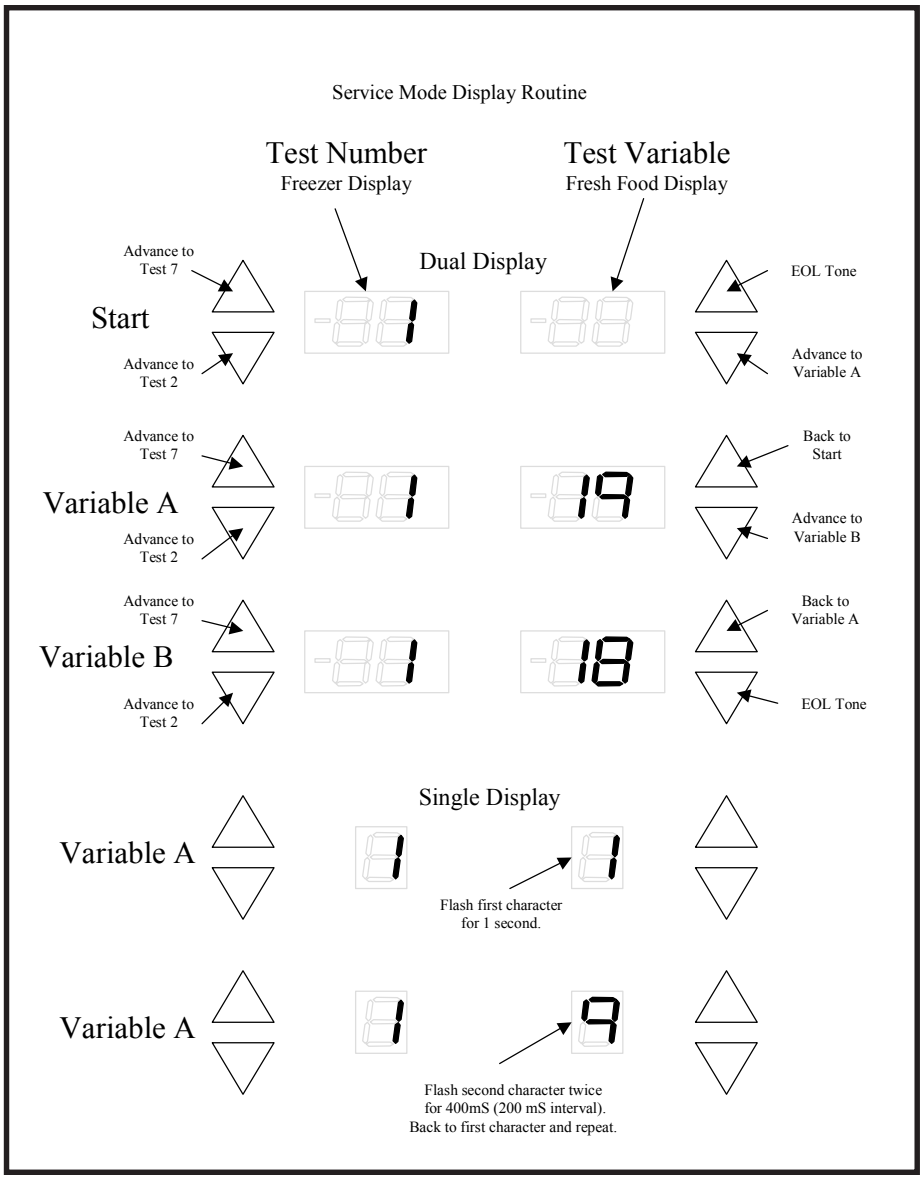
NOTE: This test will display a “0” on models with standard speed compressors.

Test 8 - Default Settings / Clear Service Data

Variable 1. Display “1” Indicates default settings have been changed and/or there is service data in memory.

Variable 2. Display “0” Indicates Factory Defaults (resets temperature settings to 0 and 37° F) and service data memory cleared.

NOTE: To reset temperatures to factory default, clear the service memory, and enable the system to start recording new data, press and hold the fresh food UP (WARMER) key while pressing the fresh food DOWN (COLDER) key 3 times within 30 seconds.



Key commands for service

Manual Defrost:

Activation
Press and hold Freezer Temperature UP (WARMER) Key while pressing the fresh food temperature DOWN (COLDER) key 5 times within 6 seconds.

Deactivation
Press and hold Freezer Temperature UP (WARMER) Key while pressing the fresh food temperature DOWN (COLDER) key 5 times within 6 seconds.

Function

Initates a normal defrost cycle. All other functions are disabled including alarm(s) enabling.

NOTE: The refrigerator will come out of the defrost cycle on it's own.

Misc Information:

On SxS ice and water through the door models with Fast Freeze (or Express Freeze), the Freezer temperature set point is automatically adjusted to -6°F. The set point will return to the previous setting after the mode terminates in 16 hours.

On SxS ice and water through the door models with Fast Ice (or Express Ice), the Freezer temperature set point is automatically adjusted to -6°F. The set point will return to the previous setting after the mode terminates in 12 hours.

Compressor operation is terminated at ambient temperatures over 85°C (185°F). Compressor operation continues at 65°C (149°F).

Water through the door on Top Mount Refrigerator:

EHP will be introducing a water thru the door feature on high end 18 and 21 cu. ft. Top Mount refrigerators. These units will be low profile, water dispenser only located in the refrigerator door. The door will be non-reversible and initially produced in right hand swing. A water sump will be included.

The water will be filtered through our Pure Source™ water filtering system that will be mounted in the back right upper corner of the refrigerator compartment. The water tank is mounted inside the refrigerator door, against the inner door liner. It will deliver (at first use) approximately 37 to 42 degree F water for the first three 12 ounce glasses filled.

Laundry Information:

Electronic Control Tumble Action Washer and Dryer:

Below are the control panel displays of the electronic controlled tumble action washer and dryer.

Figure 1
Electronic Control Tumble Action Washer Model GLTF2070CS0 Control Panel

Figure 2
Electronic Control Dryer Models GLE942CS0 and GLQ942CS0 Control Panel

Troubleshooting the Electronic Tumble Action Washer and Dryer:

Washer Fault Codes:

Display shows: F 01
Indicates: An internal fault in the control.
Correction: Touch the STOP/CANCEL pad. If the display continues to display F 01 or if the code returns when the washer is restarted, replace the control.

Display shows: F 02
Indicates: A water temperature problem.
Correction: First check to see if the incoming water hoses are connected properly. If so, disconnect both wires from the water temperature sensor and measure the resistance of the sensor. If the reading is less than 3K or more than 163K, replace the sensor. If the reading is between 3K and 163K, reconnect the wires to the sensor and unplug the small four pin plug from the control board. Measure the resistance between pins 3 and 4 in the plug. If the reading is the same as the sensor reading, replace the control board. If the meter reading is not the same as that at the sensor, the wiring between the control board and sensor is defective.

Display shows: F 03
Indicates: Water level problem caused by either no incoming water or the drain pump is not working.
Correction: Touch the STOP/CANCEL pad to clear the F 03. Check the drum for water. If the drum has a normal fill of water, touch the Drain/Spin pad and press the start pad. If the water does not pump out, remove the front access panel and measure the voltage drop across terminals of the drain pump. If the meter reads 120 VAC, the drain pump is defective or the drain hose is plugged. If the meter reads zero, disconnect power, remove the large four pin plug (JX) and the eight pin plug (J11) from the back of the control. Measure the resistance between pin 3 in the four pin plug and pin 3 of the eight pin plug. If the meter reads open, the wires between the control board and the drain pump are defective. If the meter reads around 15 Ohms, the control board should be replaced.

If the drum does not have water in it, start the washer in the Normal Cycle and select Warm Wash. If the washer does not fill, make sure the faucets are turned on, unplug one of plugs from the water valve and measure the voltage drop across the terminals in the plug. If the meter reads 120VAC, the water valve is defective. If the meter reads zero, measure for voltage from each terminal in the plug to neutral. If the meter reads zero from each terminal, the pressure switch or the wiring to the pressure switch is defective. If the meter reads 120VAC from one terminal, the control board or the wiring from the valve to the control board is defective.

If the washer is over filling, check the pressure switch or the tube to the pressure switch.

Display shows: F 04
Indicates: The washer is not advancing through it increments.
Correction: Touch STOP/CANCEL pad to clear the F 04. Select and start the washer in the Heavy Duty wash cycle with the Heavy Soil/Stain Option deactivated. If the tub does not start turning while filling or within 30 seconds after the fill is completed, troubleshoot for a motor will not run problem. If the motor is running and the tub is filled, let the washer run for at least 6 minutes. Measure the voltage between pin one of the 8 pin connector (J11) and pin 7 of the 7 pin connector (J6). The voltage should be below 50 VAC when the timer advance is off and line voltage when the timer advance is on. If the meter reading does not switch between these two readings, the motor speed control is defective. If the meter reading switches between these two readings, the electronic control board is defective.

Display shows: F 05
Indicates: A problem with the key pad.
Correction: Disconnect the keypad ribbon from the control and reconnect the ribbon. Try all keypad switches to see they all function correctly. If they do not, then try cleaning the end of the ribbon with a soft cotton cloth. Reinstall the ribbon and program the washer to operate. If the code reoccurs, replace the touch pad.

Display shows: ddo
Indicates: Drawer reed switch is not closed.
Correction: Make sure the drawer is closed. If the drawer is closed, check that the magnet in the drawer is in the correct position. If the magnet is in the correct position, check the reed switch.

Display shows: dr
Indicates: Door switch is not closed.
Correction: Check that the door is closed and the door catch is not broken. If so, replace the door lock assembly.

Washer Function Testing:

A test program is built into the control to allow different functions to be activated without waiting for the function to occur in the cycle.

There are two ways to activate the test program:

1. Remove power from the washer. Then reconnect power to the washer and within 10 seconds press and hold the temps and the stop pads for at least 2 seconds, then release. The control is now in the test function.
2. Press and hold the CYCLES and OPTIONS pads until the option LED stops blinking (up to 10 seconds). Then press and hold the TEMPS and STOP/CANCEL pads for at least 2 seconds and release. The control is now in the test function.

To test the membrane, touch each pad and see that the appropriate LED or the appropriate display symbol illuminates.

To test the program:

1. Press the STOP/CANCEL pad and then the START pad. (H) will appear in the display and the hot water valve circuit is activated.

2. Retouch the START pad and the test will advance to the cold water test. (C) will appear in the display and the cold water valve circuit is activated.

3. Retouch the START pad and the test will advance to the warm water test. (HC) will appear in the display and both the hot water valve circuit and the cold water valve circuit are activated.

4. Retouch the START pad and the test will advance to the bleach dispenser test. (bL) will appear in the display and the bleach solenoid circuit is activated.

5. Retouch the START pad and the test will advance to the fabric softener test. (FA) will appear in the display and the fabric softener solenoid circuit is activated.

6. Retouch the START pad and the test will advance and release the door solenoid. (dr) will appear in the display and the door can be opened.

7. Retouch the START pad and the test will advance to the agitation and warm water test. (HC) will appear in the display and the drum will fill with warm water and agitate.

8. Retouch the START pad and the test will advance to the final spin test. (FS) will appear in the display and in about 30 seconds the washer will go into final spin.

Press the STOP/CANCEL pad, then the START pad to repeat the test. To remove the washer from the test mode, disconnect power from the washer or press and hold the CYCLES and the STOP/CANCEL pads for at least 2 seconds, then release.

Demo Mode - For sales demonstration of the board LED's without function of the washer, remove power from the washer. Reconnect power to the washer and within 10 seconds, hold the STOP/CANCEL pad for at least 6 seconds. To remove the washer from the test mode, disconnect power from the washer or press and hold the stop and the CYCLES pads for at least 2 seconds, then release.

Dryer Fault Codes:

Display shows: F 01
Indicates: An internal fault in the control.
Correction: Touch the STOP/CANCEL pad. If the display continues to display F 01 or if the code returns when the dryer is restarted, replace the control.

Display shows: F 02
Indicates: Control temperature sensor open or shorted.
Correction: Removed the wires from the control temperature sensor and measure the resistance of the sensor. If the meter does not read 50,000 Ohms +/- 10% replace the sensor. If the meter reading is within 10% of 50,000 Ohms, check the wiring between the electronic control board and the sensor. If the wiring is good, replace the electronic control board.

Display shows: F 03
Indicates: No heat
Correction: Touch the STOP/CANCEL pad to clear the F 03. Program the dryer for a Normal Dry with High heat and touch START. Measure the voltage drop across the terminals of relay RL 2 on the electronic control board. If the meter reads 240 VAC on electric models or 120 VAC on gas models, replace the electronic control board. If the meter reads zero, remove power from the dryer and disconnect the black wire electric models and orange wire gas models from the relay. Reconnect power and measure the voltage drop between the red wire on the relay RL 2 to neutral. If the meter reads zero, the wire between the incoming line and relay RL 2 is open. If the meter reads 120 VAC, check the rest of the heating circuit as described in the trouble shooting section.

Display shows: F 04
Indicates: The drying time has exceeded the program time for that cycle.
Correction: Touch the STOP/CANCEL pad. Program the dryer for a Normal Cycle with High heat and touch START. Check for anything that would extend the dry time such as:
1. Dryer not heating.
2. Restricted vent.
3. Blower fan blade broken or loose.
4. Dryer installed in a closet with a solid door.
5. Bad connection in sensor bar circuit or dirty sensor bars.

If the dryer operates normally but the F 04 code returns, replace the control.

Display shows: F 05
Indicates: A problem with the key pad.
Correction: Disconnect the keypad ribbon from the control and reconnect the ribbon. Try all keypad switches to see they all function correctly. If they do not, try cleaning the end of the ribbon with a soft cotton cloth. Reinstall the ribbon and program the dryer to operate. If the code reoccurs, replace the touch pad.

Display shows: PAU
Indicates: A problem with power to the motor.
Correction: Check connections to the control board, door switch, thermal limiter, or motor.

Dryer Function Testing:

A test program is built into the control to allow different functions to be activated without waiting for the function to occur in the cycle.

There are two ways to activate the test program:
1. Remove power from the dryer. Then reconnect power and within 10 seconds press and hold the TEMPS and the STOP/CANCEL pads for at least 2 seconds, then release. The control is now in the test function.
2. Press and hold the CYCLES and OPTIONS pads until the option LED stops blinking (up to 10 seconds). Then press and hold the TEMPS and STOP/CANCEL pads for at least 2 seconds and release. The control is now in the test function.

To test the program:

1. After activation, the Press Saver icon should be illuminated.

2. Touch the START pad and the test will advance to the heat test. (H) will appear in the display, the drive motor will run and the electric heating element or gas burner will operate depending on the model.

3. Retouch the START pad and the test will advance to the no heat (air fluff) test. (AF) will appear in the display and the drive motor will run.

4. Retouch the START pad and the test will advance to the auto dry moisture counts test. The Auto Dry icon will illuminate and a number will appear in the display. Open the door, place your hand against the sensor bars and the amount of the number in the display should go down.

5. Retouch the START pad and the test will advance to the membrane test. The display will be blank. Press each pad and the LED's should light.

6. Retouch the START pad and the test will advance to the cool down test. The Cool Down icon will illuminate and a number will appear in the display and the drive motor will run.

7. Retouch the START pad and the test will advance to the timed dry test. The Timed Dry icon will illuminate and a number will appear in the display. The drive motor will run and the electric heating element or gas burner will operate depending on the model.

Press the STOP/CANCEL pad, then the START pad to repeat the test. To remove the dryer from the test mode, disconnect power to the dryer or press and hold the CYCLES and STOP/CANCEL pads for at least 2 seconds, then release.

PROBLEM: The display shows error code F 04 on electronic control tumble action washer which indicates the washer is not advancing through its increments.

CAUSE: Faulty electronic control board or motor speed control board.

SOLUTION: Touch the STOP/CANCEL pad to clear the F 04. Select and start the washer in the Heavy Duty wash cycle with the Heavy Soil/Stain option deactivated. If the tub does not start turning while filling or within 30 seconds after the fill is completed, troubleshoot for a motor will not run problem. If the motor is running and the tub is filled, let the washer run for at least 6 minutes. Measure the voltage between pin one of the 8 pin connector (J11) and pin 7 of the 7 pin connector (J6). The voltage should be below 50 VAC when the timer advance is off and line voltage when the timer advance is on. If the meter reading switches between these two readings, the electronic control board is defective. If the meter reading does not switch between these two readings, the motor speed control is defective. The replacement motor speed control MUST be a Generation 2 style (134149200, 134306000 or a later sub). If the Generation 1 style (131887601 or 131887601GE) motor speed control board is installed, certain cycles and spin speed may not function correctly.

PROBLEM: Cycle Not Advancing or Timer Stalling Symptoms Update on Tumble Action Washers

CAUSE: The root cause of washer stalling in cycle (timer not advancing) on horizontal axis washers is electrical noise generated primarily by the timer contacts opening and closing which can interfere with proper operation of the speed control board. At times, depending on ambient environmental conditions, this electrical noise can cause the motor controller board to receive corrupt signals and remain on "stand by condition" resulting in the cycle not advancing. By manually advancing the timer to the next step in the cycle or by turning the washer's power off and on, the electrical noise is discharged and the washer will perform until electrical noise may happen to interfere once again.

SOLUTION: To resolve this issue, three jumpers have been added to the current motor controller board to reduce electrical noise levels around the microprocessor. Testing has proven this change to the board significantly reduces occurrence of control lock-up. The motor controller board assembly with external jumpers is Part Number 134306000, identified by an information label with the number 134058400 Rev C or 134258700 on it. The label may be yellow, orange, red, white, green, etc.

134306000 will replace the following part numbers:

131770700
131887601
134149200

If the SCU 134306000 has been replaced and the timer continues to stall, replace with SCU 131887601GE.

PROBLEM: Small amount of water spills out on floor when the tumble action washer door is opened after cycle is completed.

CAUSE: Water left in the bellows (boot) after the cycle.

SOLUTION: Order bellows (boot) kit, 5303937187. This kit will contain a new bellows with a drain back feature (Figure 1), a spring clamp (Figure 2), three tube spacers and a set of instructions. The new style bellows attaches to the front panel by means of a spring clamp instead of adhesive. (Replaces 5303937140.) See the kit instructions on the following pages.

Figure 1

Figure 2

PROCEDURE FOR REPLACING THE DOOR BOOT (BELLOWS) KIT P/N 5303937187

This tutorial will show you how to do the job, what pitfalls to avoid, and will include some great tips. Some boots are glued to the front panel and some are attached with a wire spring clamp. Directions for removing and replacing each type are as follows:

1) If the machine has a Dryer stacked on top, or is positioned in such a way that it would be too much bother to move, you will be better off leaving it where it is. However, if it is possible, it would be easier to do this job if the machine could be leaned back against a wall (protect the wall against being defaced though). By leaning it back, the tubs will hang back from the front panel and you will have increased space to work. If leaning it back is not possible, then use a 6 or 8 inch block of wood to wedge between the front panel and the tub to hold the tub back out of the way.

2) If the boot is attached to the lip around the perimeter of the opening on the front panel with glue, use a razor blade (Figure1) to carefully slice the glued spots on the boot away from the front panel. If the boot is attached to the lip around the perimeter of the opening with a wire spring clamp, insert a small screwdriver between the spring and the boot at the six o'clock position (Figure 2). Gently pulling down and out on the spring, continue to work the wire clamp off the boot (Figure 3).

Figure 1

Figure 2

Figure 3

Figure 4

3) Once the boot is loose from the front panel, push it into the opening of the tub and out of the way (Figure 4). At this point, if the machine is not leaning back, take your block of wood and while pushing back on the tub through the opening, wedge the block between the front panel and the tub about ten inches to the bottom - right of the opening. This will afford you more space to work with the boot.

4) You will now notice that the boot is still attached to the duct that is located just inside the front panel at the upper left corner from the opening. This is where the water, soap, bleach and fabric softener enter the tub. To remove (and later on, reattach) the clamp holding this in place on the end of the duct you will have to make yourself a tool from a three inch piece of 3/8 inch soft copper tubing

5) In Figure 5, you will see that the end of the tube is flattened somewhat so that it can be slipped over the twisted ends of the clamp as shown in Figure 6. Twist the tube counterclockwise to slip the clamp and set both the tool and the wire clamp aside. Pull the boot free from the duct.

Figure 5

Figure 6

6) Using both hands, grab onto the boot at the top of the opening to the tub and pull downward and toward you with slow steady pressure. As the boot is pulled free from the outer lip of the tub (at the top), the coiled spring that holds the boot from the groove behind the lip around the opening to the front shell will become visible. You can either continue pulling on the boot until it comes off or you can hook the spring (with a piece of coat hanger fashioned into a hook) and pull it off and then pull the boot off separately.

7) Once the boot is off, examine the lip that extends around the entire perimeter of the front opening of the front half of the tub (the front half and the rear half are so named because when bolted together, forms the outer tub that surrounds the inner tub). The boot has a lip that will have to be folded into the groove behind the lip on the front tub shell. To start this, examine the new boot and locate the groove in front of the lip that corresponds to the similar lip and tab on the tub shell. It will make this job a lot easier if you can obtain some liquid dishwashing soap from the consumer, and sparingly lubricate this groove on the boot to make it easier to slip onto the lip of the tub shell (See Figure 7). No soap is preferable to too much soap. Have a cloth handy to wipe the soap from your fingers.

Figure 7

Figure 8

8) Once the groove in the boot is lubed with soap, locate the arrow as shown in Figure 8 that is located on the top of the boot (located to the right of the extrusion that slips over the duct). This arrow must point up when the boot is installed.

9) With the boot in one hand and the other hand spreading the lip and groove (on the boot near the arrow), force the lip into the groove behind the lip at the top of the opening on the tub shell (Figure 9).

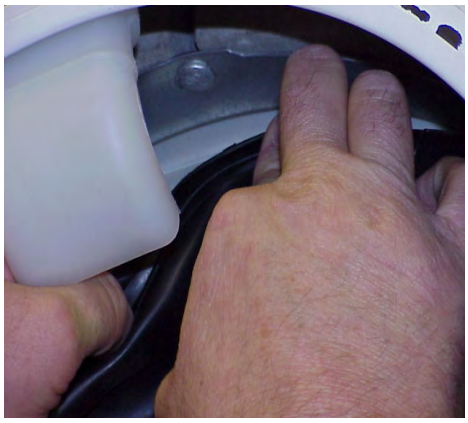


Figure 9

Figure 10

10) With one hand holding the boot so it does not slip off, use the other hand to continue spreading the lip and groove of the boot further to the right. In this way you continue this action 360 degrees around until the boot is mounted onto the front tub shell (Figure10). Don't give up, rest one hand at a time if needed. Whatever you do, **do not** remove both hands until the boot is on (unless you want it to fall off and then you get to start over with it).

11) Now is the time to put the spring back on. Included in the BOOT KIT is a set of three spacers (an example of which is shown in Figure 11 below). These spacers are to be used to hold the spring in place in the groove on the outside perimeter of the boot. As it will take both hands to stretch this spring into place, these spacers will prevent the spring from popping out when you let go of it to use both hands to stretch it further around the boot. Begin by pushing the spring down into the groove just forward from where the boot contacts the front tub shell at about the 12 o'clock position. While holding the spring in place with one hand, use the other to tightly wedge the spacer above it, between the spring (in its groove) and the weight ring above it as shown in Figure 12.

Figure 11

Figure 12

12) Working your way to the right, push the spring down into the groove. When you have placed the spring about 90 degrees around the opening from the first spacer, the spring will begin to get tight. Push in another spacer at that point (making sure to keep checking the first spacer, if it pops out - the spring will pop out).

13) Continue working your way around (while checking both spacers, you don't want them to slip out) until you reach 180 degrees from the first spacer. Install the third spacer.

14) The spring will be extremely tight now as shown in Figure 13. Once you have gone more than half way around, the spring will be easier to roll into the rest of the groove (so long as all three spacers are holding tight). When you have the spring in place, make sure to remove the three spacers before proceeding to step # 15.

15) Replace the boot extrusion back onto the duct and pull it up over the ridge on the duct near the top of the opening (Figure 14). Reinstall the clamp in such a way that the clamp sits between the ridges on the extrusion and above the ridge on the duct. Snap the clamp closed with the copper tubing tool that you used previously.

Figure 13

Figure 14

16) Before attaching the new boot to the front panel, clean the surface where the boot will fit against the front panel.

17) Remount the boot onto the front panel as shown in Figure 15, making sure that the boot is not wrinkled. If large wrinkles exist, this may pool water in the boot and dribble onto the floor when the door is opened. If this is the case, pull it loose from the front panel and remount it slightly more clockwise or counter clockwise as needed.

18) Insert the wire spring clamp from the kit into the groove at the top of the boot (Figure 16). Work the clamp into the groove all the way around the boot making sure the clamp is oriented to the 6 o'clock position. Close the door to assure proper sealing of the boot to the door. Run the washer to check for leaks.

Figure 15

Figure 16

Top Load & Laundry Center Washers:

New for 2004:

Beginning January 1, 2004, the DOE (Department of Energy) has mandated that all clothes washers meet a maximum energy usage rating. One of the components used in obtaining this rating is a 70/30 water valve. What this means is when the water valve is energized in the warm wash temperature setting, the incoming mixture of water will be 70% cold and 30% hot. This valve will not affect water temperatures on models with an ATC (Automatic Temperature Control). ATC models have a new control board with non-compliant water temperature settings. On some models, if a warm rinse is selected, the washer will fill with cold water during rinse, followed by a warm spray rinse during spin.

On all super capacity model washers (3.0 ft³ wash basket), the pressure switch has been changed to lower the water level.

Previous models:

High Water Level Setting	Low Water Level Setting
13.5 – 15.2 inches	5.5 – 7.8 inches

New models:

High Water Level Setting	Low Water Level Setting
10.8 – 13.0 inches	4.3 – 6.6 inches

Models affected are:

CWS3600AS1	GLET1031CS0	GLWS1649AS4
FWS1233AS2	GLET1142CS0	GLWS1749AS4
FWS1339AC0	GLGT1031CS0	GLWS1939AS1
FWS1339AC1	GLGT1031CS1	GLWS1939CC0
FWS1339ZDC0	GLGT1142CS0	GLWS1979AS3
FWS833AS2	GLGT1142CS1	GSWS9719AS2
GCET1031CS0	GLWS1233AQ2	GWS1339CS0
GCET1142CS0	GLWS1233AS2	GWS1339CS1
GCGT1142CS0	GLWS1339CC0	GWS1749CS0
GCGT1142CS1	GLWS1339CS0	GWS833CS0
GES831CS0	GLWS1339CS1	MWS833AS2

WARNING!! Any attempt to modify the pressure switch or replace it with an older style switch is a violation of Federal Law and will void the warranty.

Dryers:

PROBLEM: Customer complaining of taking 2 or 3 drying cycles to dry clothes. Vent is clear, short and goes directly outside.

CAUSE: Not enough of an air restriction in the exhaust system to keep the heated air in the drum.

SOLUTION: Add elbows and additional 4 inch pipe to the exhaust. If the exhaust hood has a 4 inch opening, change to a 2½ inch opening. Make sure the system back pressure does not exceed the maximum manometer reading of 0.75 inches of water column.

Dishwasher Information:

PROBLEM: Steam or moisture leaking from top of console

CAUSE: Compression of the door seal very tight at the bottom of the door which is not allowing top of door to seal.

SOLUTION: The compression of the door seal will relax with time. To stop these leaks two small spacers can be added to the back of the latch assembly. This will move the door into the seal and stop the leak. See Figure 1.

Instructions for installing spacers:

Parts needed for this repair: 2ea. 5300809968 spacers

1. Disconnect power to unit
2. Remove outer door panel and console.
3. Remove door latch assembly.
4. Add spacers behind latch on both mounting screws. See Figure 1
5. Reinstall door latch; remember to turn screw counter clockwise to allow threads of screw to drop into the threads already cut into the plastic door panel before tightening screw.
6. Check latch cam (hook) making sure it is all the way into the hole in the strike. See Figure 2.
7. In some cases the door seal may need to be replaced to improve closure.

Washer behind latch assembly

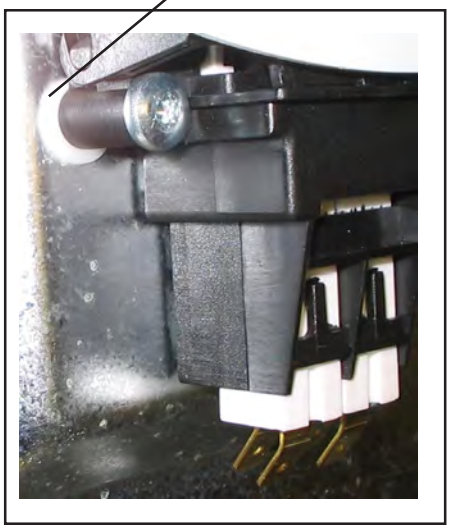


Figure 1

Latch cam hook all the way into strike

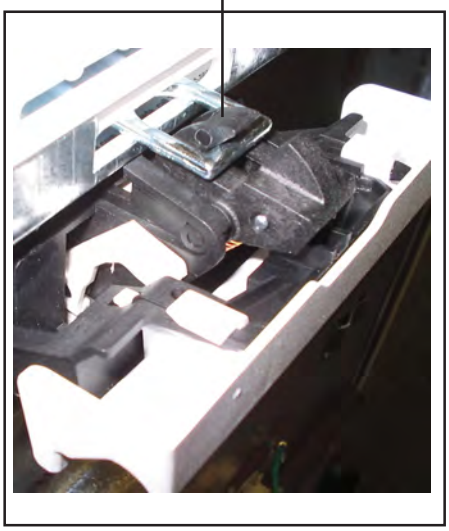
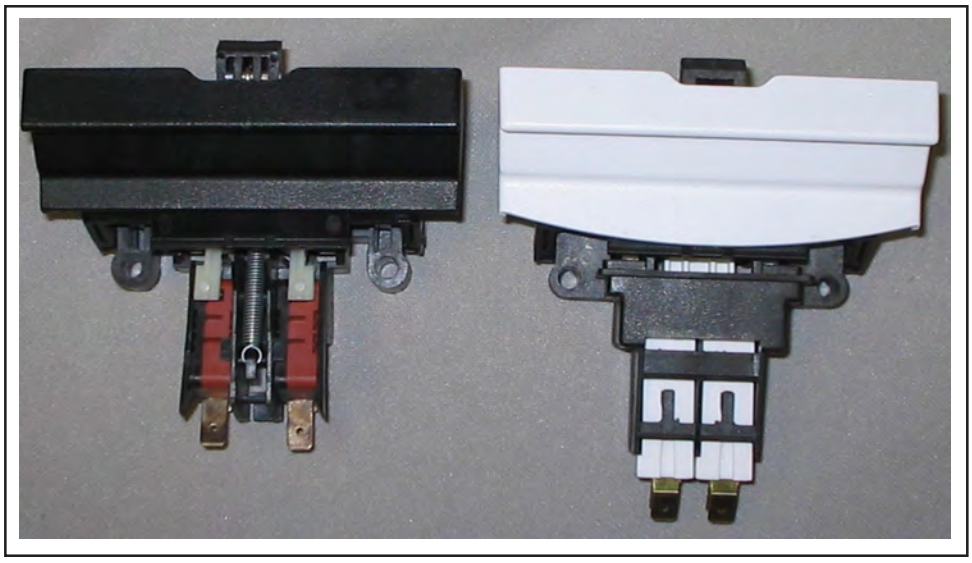


Figure 2

PROBLEM: New door latch does not close the same as the original.

CAUSE: The new Light Touch latch does not have the same opening and closing force as the original. This is to make it easier for the customer to open and close the dishwasher door.

SOLUTION: The new latch mounts the same as the original but does not have the square tab on the backside. It does wire the same however. When installing this new latch the door seal may also need replacing because of the difference in closing force. See pictures of both latches below. Notice the new latch has the door switches mounted closer together without the cam spring between them.



Original latch New Light Touch latch

PROBLEM: Timer stalling in cycle on manual timer models.

CAUSE: Incoming water temperature.

SOLUTION: We receive a number of calls for timers stalling or just not completing the cycle. Talking with servicers on the phone, a number of timers have been changed just to have the customer call back to say it is still not working. To assist in finding the cause for this problem, here is a procedure you can follow that can help find the cause for this complaint.

Before you make the trip to the customer's home it would be a good idea to call them by phone to have them start the dishwasher for you so it can be getting hot while you are on the way to the house. It will not be necessary to have the dishwasher loaded with dishes or detergent on this call. The dishwasher needs to run for about 25 minutes, this will aid you in checking this problem. When you first arrive, determine from the customer what cycle and options were set at the time of failure. You will also need to know what position the timer had stalled, as well as for how long the timer stayed at that location. Next check the water temperature at the sink. This way you will know how hot the water was when the customer started the dishwasher for you.

With this information it is time to check the dishwasher. First to be checked is the heater and safety thermostat; both of these are located and checked from underneath. They are on the bottom, left side of the tub. Check the heater for continuity. You should get a resistance reading on the heater. The safety thermostat should just read closed. Next reset the controls and reposition the timer to just before the location the customer found the timer when it had stalled. After setting the timer and the option switch make sure power is going to the heater to heat the water. Once this all has been done check the temperature of the water in the tub. The timer should advance on into the stall. You now need to wait until the temperature rises in the tub to close the control thermostat. The control thermostat is located under the tub to the right side behind the junction box.

Shown below is a chart that lists the different control thermostats currently used on dishwashers. This chart shows the temperature settings of the different thermostats as well as the temperature of the water in the tub.

Thermostat Name	Part number	Setting	Tub Temperature
Temp Assure	154227805	117° ± 5.5°	127° ± 5°
Temp boost	154227806	127° ± 5.5°	137° ± 5°
Sanitize	154227807	137° ± 5.5°	147° ± 5°
High Temp Wash	154227808	122° ± 5.5°	132° ± 5°

Water is heated in the dishwasher by falling back onto the heater as it is being sprayed inside the tub. The temperature of the water will raise about one degree every four minutes. As the water falls back onto the heater, then onto the tub the thermostat senses this change in temperature. If you can watch the water temperature without opening the door you can follow this temperature rise. Once the water temperature has reached the proper temperature the control thermostat should close to advance the timer. If the thermostat does not close, take a jumper wire and carefully short across the control thermostat to see if the timer then advances. If the timer only advances after shorting across the control thermostat replace this thermostat. If you need to replace the control thermostat add thermomastic to the head of new part before installing into tub. This will give a better contact between the thermostat and the tub. When mounting the new thermostat into the tub make sure it is good and tight in the mounting hole.

If the timer does not advance after the thermostat is shorted out, check the wires from the thermostat to the selector switch, then on to the timer to make sure all connections are good and tight. The control thermostat only controls the timer motor in the delay cycle, a loose connection can keep the timer from advancing.

PROBLEM: Not cleaning the dishes.

CAUSE: Clean dishes depend on water temperature, amount of detergent used, proper loading of the racks, and condition of the water (hardness).

SOLUTION: To find the cause for the dishwasher not cleaning dishes check these items: loading of the racks, the amount of detergent, temperature of the water, and water hardness. This is a brief over view of each of these items to give a better understand how these work to clean the dishes.

When loading the racks care must be taken to insure the water can reach the total surface of the items for the food to be removed. The user's instructions picture the best way of loading each rack for proper cleaning. If plates and/or bowls are loaded touching each other, this will prevent water from reaching all parts of the items in question. Two items touching can also be the cause of other complaints as well. Each item needs to be placed in the rack so water can be sprayed onto and run off freely. This will help ensure a clean load. The upper rack loading is more important because tall glasses and bottles with small openings require a more direct spray from the rotating spray arm. These items need to be loaded for the spray arm to pass directly underneath them, where water can be sprayed inside and all the way up to the top of the item to insure it is cleaned properly. Flatware loaded into the silverware basket needs to be loaded loosely for good cleaning as well. Do not let the flatware nest together. The more open the items are, the better the cleaning process.

The detergent used in a dishwasher is specially formulated to emulsify the greases and oils that bond food soil to the dishes. This detergent is dissolved by hot water, and then sprayed around in the tub. While cleaning, hot water used to aid the detergent is also working against it. Minerals in the water can bond with the food which will prevent it from being removed properly. To prevent this there are additives in the detergent to make the water wetter. This just means that minerals in the water are being held in suspension so the food can be rinsed off cleanly. Dishwashing detergents should not suds. This can cause water spots and streaking of the glassware. Finally, care must be taken that the detergent does not damage the finish of the dishes along with being environmentally friendly. The customer may need to try different brands of detergents to find the one that works best for them. The proper amount of detergent is important for cleaning and the product manufacturer will give you guidelines on determining this amount. This is based on how hard the water is in the customer's home. When a new dishwasher is installed it is always best to have the customer start off by actually measuring the detergent. Dishwashers today are using much less water. Starting off with actually measuring the detergent will give them a better idea as to the proper amount needed for cleaning.

The importance of hot water to cleaning dishes is essential for cleaning dishes. Hot water must first dissolve the detergent, then spray the mixture around in the tub to soften and loosen the food and then rinse the food from the dishes. Water temperature needed to dissolve detergents can very, but never less then 107° F. To insure this temperature is reached, the incoming water on the first fill needs to be no lower than 120°F. It is common knowledge that water entering the tub on the first fill will lose temperature. If this temperature is at or above 120°F at the kitchen sink faucet it should still be hot enough at the dishwasher to dissolve the detergent for the pre wash. With the smaller amounts of water being used today to conserve energy this makes water temperature more difficult to maintain. Consumers may have to change the methods they have used in past for starting a load of dishes. It becomes necessary to start a wash load by running tap water to purge cool water from the hot water line before a cycle is started. This will ensure that proper water temperature can be maintained to the end of the cycle. Using less water per fill, coupled with water heaters that cannot be adjusted and customers desiring to keep water temperatures below 115°F leads to a problem of not cleaning the dishes. What is a technician to do? The only alternative is to advise the customer of the cause for their problem, advise them of what needs to be done, then allow them to make the decision as to how they wish to correct the water temperature problem.

SOLUTION (cont):

Water conditions as well as water temperatures can and do change from season to season and time to time. For this reason water hardness can and may be a factor in wash ability complaints at different times of the year. This is one condition that may get over looked while determining the solution to the customer's complaint.

Some information used in writing this was found in articles listed on the internet site of The Soap and Detergent Association (www.cleaning101.com).

PROBLEM: Dishes not dry when cycle ends.

CAUSE: Several factors involved.

SOLUTION: For dishes to come out dry requires more than heat from the heater in the bottom of the tub. This has always been the truth. The reality of this has become more evident today with the need to conserve energy and resources. A dishwasher that is not drying can be a very complex problem to solve for the technicians in the field. This article is intended to help find a solution to this complaint.

What does it take to dry a load of dishes? This list of five items, if worked properly, will result in a dry load of clean dishes. The importance of each and how they work together follows.

1. Heat from the heater
2. Hot water used in cleaning the dishes
3. Proper loading of the racks and baskets
4. Rinse aid
5. Air flow

1. Heat from the Heater

In the past, the heater in the tub has been the primary component for drying in the dishwasher, but its role has been lessened somewhat by other items today. The heater is first used in dishwashers to maintain and increase water temperature for the main wash and rinses. The heater is first activated prior to the main wash and will be activated in each fill after. As the water is heated the dishes will get hotter as well. Once the cycle reaches the dry phase the dishes should be at least 120°F for them to dry. In the dry phase the tub environment will be one of high humidity and steam. The first few minutes of the dry phase the timer allows the steam to escape with out the heater being energized. As this phase continues the heater is turned on in a pulsing pattern to force the steam from the tub. This change of environment allows for the evaporation of the water from the hot dishes. The dishes start to dry.

2. Hot water used in cleaning the dishes

Hot water is a very important resource used in a dishwasher. Hot water is used to first dissolve the detergent, then to activate the chemicals in the detergent which are intended to soften and loosen the food soil found on the dishes. After this has been accomplished the hot water then is used to rinse this food soil from the dishes. While in the process of cleaning, this same hot water will be increasing the temperature of both the dishes and the inside of the tub. Earlier model dishwashers using a high pressure wash system used larger amounts of water in the tub on each fill. The large volume of water did get the tub and dishes hot quite quickly. Products today are using much smaller amounts of water to conserve energy and resources, for this reason the incoming water must be hotter today than in the past. It is important that the incoming water is 120°F each time the tub is filled. With smaller amounts of water the temperature of this water will decrease very rapidly, this will affect the performance of the detergent as well as the drying.

3. Proper loading of the racks and baskets

Rack and basket loading are as important to cleaning and drying a load of dishes as good hot water and detergent are. If the racks are not loaded properly food soil cannot be removed from the dish surfaces. One thing to keep in mind when it comes to loading the racks is, if the water can't get to it, it will not come off. Then when you think about drying, if the water can't leave it, it won't dry. The racks and basket must be loaded so the water will sheet off the dishes. If the items are too close together water will bridge between them and form a pool of water. If water pools it will not be in contact with the hot surface of the dishes and will not evaporate as it should. The flatware in the silverware basket can nest together. In this case water actually bonds the pieces together. Nesting will keep the items from drying but will also keep them from cleaning as well.

4. Rinse aid

Rinse aid in the past was something that was not necessary. However, this is not the case today. Rinse aid is used to break the surface tension of water so it will spread out over the surface of dishes in a thin film. This thin sheeting action reduces water spots, keeps streaks from forming and evaporates the water much faster which improves the drying performance.

Rinse aid is now a necessity due to the lower energy usage of current designed dishwashers. Previous models relied on high wattage heaters and larger amounts of water to get the dishes hot enough to dry. This method cannot be used today because of the need to conserve energy and resources. Drying today uses an evaporation method with the hot dishes. With smaller amounts of water during the wash and rinse cycles, rinse aids effectively thin the water and allow the hot dishes to dry themselves.

5. Air flow

Last is air flow. This is both in and out of the tub in the dry phase. The inside of the tub of a dishwasher will become a very humid environment. For the dishes to come out dry at the end of the cycle, as much humidity as possible must be removed. This is where the vent and venting system comes into play. All dishwashers have a vent of some kind for removing the moisture from the air in the tub. If the vent is to the outside of the tub, there has to be a way to get air in so steam can be expelled. On most products air is brought into the tub through the bottom of the door. Air is pulled into the tub, as the steam is released from the top of the door. As the humidity in the tub is reduced, the water on the hot dishes starts to evaporate. The heater is cycled on basically to increase the temperature of the incoming air and force the steam out at a faster rate.

Precision Direct Feed Dishwasher:

Wash Distribution System

The wash system consists of a wash pump and motor assembly to provide water under pressure to three spray arms to loosen and remove food. Water sprayed from these arms will alternate starting first with the bottom arm then changing to both the center and upper spray arms simultaneously. Water passes through a filter and soil director to remove food particles so that only clean water is sprayed onto the dishes for cleaning.

The remaining parts in the wash system are the sump assembly which acts as a reservoir for clean water and the delivery tube to supply water to the upper two spray arms. See Figure 1.

Alternating Wash System

The alternating wash system used in this dishwasher will only spray from the lower arm or the upper set of arms at a time.

Alternating the spray is achieved with a check ball moving between two holes in the sump. One hole is located in the rear of the sump for the upper two spray arms; the second is located out the top of the volute cover for the lower arm. The check ball rests at the end of a ramp molded into the sump partially blocking the rear hole. As water under pressure enters the volute cover, the check ball is held tightly into the rear hole restricting water flow from this opening. See Figure 2.

Water is now forced to leave the remaining hole from the top of the cover into the lower spray arm. See Figure 3. The force of the water entering and leaving the arm causes it to turn. The ball covering the rear hole allows a small amount of water to enter into the delivery tube. The delivery tube fills with water at a rate of approximately four inches a minute. This water is used for changing the spray from the lower arm to the upper two spray arms.

Figure 1

Figure 2

Figure 3

All wash and rinse cycles start using the lower wash arm. Changing spray from bottom to upper spray arms is accomplished with the wash pump stopping for not more then .6 of a second. This pause removes water pressure from the rear of the check ball, allowing the water that has accumulated in the delivery tube to reenter the sump moving the check ball away from the hole and up the ramp. See Figure 4.

The pump is restarted, water pressure now is against the back of the check ball holding the ball into the top hole. Water exits out the rear hole into the delivery tube and sends water to the upper spray arms. See Figure 5. Water is divided in the delivery tube with 80% going to the center spray arm and 20% to the upper arm. Spray will continue from the upper arms for approximately 90 seconds then the pump will pause for 3 seconds. This allows time for the delivery tube to completely drain and the check ball to fall back to the bottom of the ramp. The cycle restarts with water being sprayed from the bottom again.

Figure 4

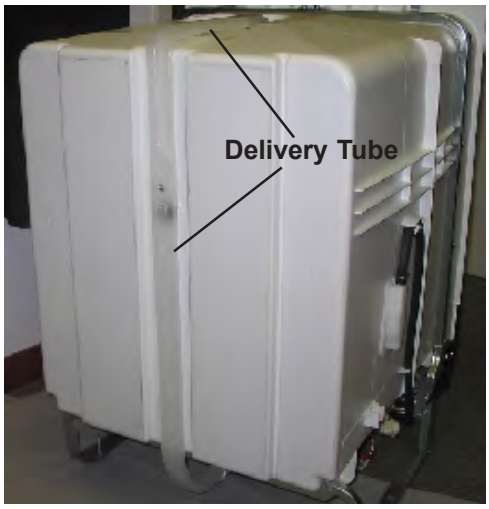


Figure 5

Wash Motors

The direct feed model dishwashers offer two different wash pumps: a single speed wet rotor style motor and a variable speed DC motor. The style of motor used on a specific model will depend on the features offered. All direct feed model dishwashers use a separate drain pump for draining the unit.

Single Speed Wet Rotor Motor

This wash pump operates on 120VAC current and has 3 functional parts: a 1/12th hp drive motor, impeller and macerator blade. This will circulate water at a rate of 12 gallons per minute. This wash pump and motor assembly, is replaced as a complete assembly. See Figure 6.

Variable Speed Wash Motor

Models with the variable speed motor improves washing for select cycles and loads. The speed of the motor will be determined by the electronic control based on the cycle selected. The control will monitor motor speed with input from a Hall Effect sensor that is mounted to the rear of the wash motor. Input voltage for operating the motor will be 120VAC with the motor changing this to VDC with a built-in rectifier. See Figure 7.

Figure 6

Figure 7

Spray Arms
The lower spray arm is designed using three extentions that spray water into the lower rack. Each arm also has a leg on the under side for cleaning the sump filter This spray arm is turned by water pressure in a clockwise direction at a rate of approximately 40 rpm. All wash and rinse cycles start with water sprayed from the lower arm. See Figure 8.

The center spray arm is mounted on a short delivery tube to the under side of the upper rack (see Figure 9). The rotation of this arm will be clockwise at a rate of 20 rpm. The short delivery tube to which the spray arm is mounted joins up to the rear of the tub with a bellows this allows the upper rack free movement in and out. This end will also allow the rack to be adjusted up and down on models with an adjustable upper rack. As water enters this delivery tube, water pressure expands the bellows forming a seal to the rear tub wall.

The upper spray arm located in the top of the tub turns in a counter clockwise direction, and sprays simultaneously with the center spray arm. This spray arm is threaded to the end of the delivery tube. It is removed by turning the locking nut counter clockwise. This arm comes as an assembly consisting of an arm and locking nut. The spray arm will turn at about 40 rpm. See Figure 10.

Figure 8

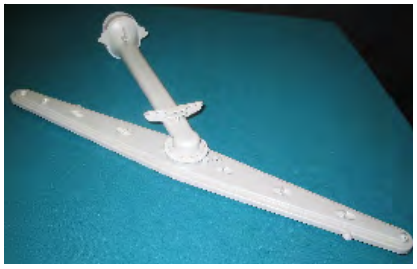


Figure 9

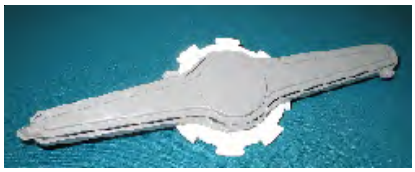


Figure 10

Stainless Steel Filter
A stainless steel filter covers the entire sump area (see Figure 11). The filter is designed to remove all food particals from the water so only cleaned water can re-enter the sump. This filter has a fine mesh polyester center basket and a soil diverter for directing soil trapped by the filter to the rear section of the sump. The spray arm support is used to hold the filter tightly in place.

Heater
A heater is mounted in the bottom of the tub to increase water temperature during wash and to also assist in drying the dishes (see Figure 12). The wattage draw of the heater can vary depending on the job it has to perform. When heating water, the draw can be 900 watts. This wattage will drop to approximately 700 watts in the dry cycle. This design of the heater provides energy efficiency. Mounted next to the heater on the under side of the tub is a safety thermostat. This thermostat will open if the temperature in the tub reaches 200°F.

Figure 11

Figure 12

Fill System

The fill system of this dishwasher consists of the water fill valve and a safety float switch (see Figure 13). Power from the control is applied to the water fill valve through the float switch. The water valve is an electrically operated valve with a flow washer that regulates the amount of water based on the water pressure applied to the valve inlet. Water pressure needs to be between 20 and 120 psi for the dishwasher to have the proper amount of water for operation. The float switch will shut off power to the valve if the tub over fills with water. Water enters the tub through an air gap mounted to the left side of the tub. See Figure 14.

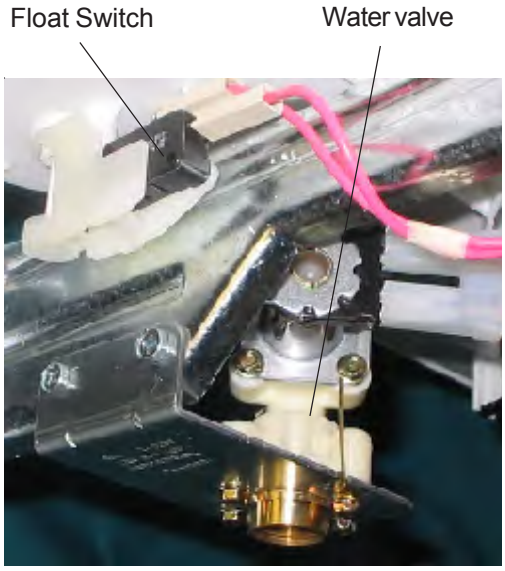


Figure 13

Figure 14

Drain Pump

The only function of the drain pump is to remove water from the dishwasher. It is driven by a 1/25th hp drive motor. It consists of 3 functional parts: pump cover, impeller/armature, and stator. The replacement pump comes as an assembly. However, the pump cover can be removed for cleaning. The drain pump is mounted directly to the front of the sump. See Figure 15.

Drying/Venting System

The vent for the dishwasher is on the upper left side of the inner door panel (see Figure 16). Steam and heat exit the tub during the dry cycle from this vent through a duct between the inner door panel and the outside of the console. Mounted in this duct is a baffle which is opened and closed by a wax motor. This baffle is normally open. Once a cycle is started, power is applied to the wax motor actuator by the control. This causes the actuator to close the baffle and it will remain closed until the dry portion of the cycle is reached. In the dry cycle, power is removed from the actuator causing the baffle to open. Steam is now released from the tub. This door will remain open after the cycle is completed until a new cycle is started. The vent duct is mounted with three screws and a self adhesive gasket. See Figure 17.

Figure 15

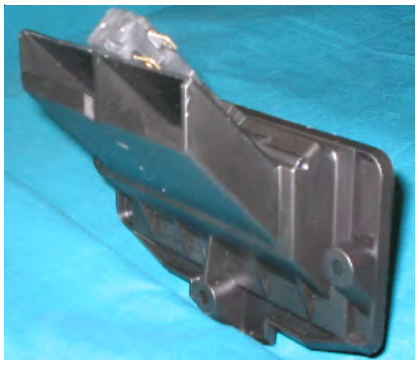


Figure 16

Figure 17

Detergent and Rinse Aid Dispensing System

The detergent and rinse aid dispenser consists of two dispensers combined in one housing that are controlled with one wax motor actuator. The first time the control energizes the actuator the cover over the detergent side of the dispenser opens dispensing detergent for the main wash cycle. The second time the actuator is energized rinse aid is released for the final rinse cycle. The detergent side of the dispenser consists of two cups: the smaller cup is for detergent used in the pre-wash cycle, the second larger cup is intended for the main wash. The rinse aid section has a clear indicator to show the presence of agent in the dispenser. On models with a digital display, the control will display an LO when the rinse agent is low in the dispenser. There is also an adjustable hub inside the dispenser (seen by removing the cap) to control the amount of agent dispensed. This detergent and rinse aid dispenser is replaced as a complete assembly. The cap for the rinse aid dispenser is the only separate part available for the dispenser. See Figure 18.

Figure 18

Dispenser Operation

The dispenser has two detergent cups both covered by the same cover. In the bottom center of the spring loaded cover is a thumb release. By pushing up on this release, the cover will open. The larger of the two cups, under the cover, is used for the main wash cycle the smaller for the pre-wash. With the detergent added, the cover is closed. The cover is slotted so the detergent from the smaller pre-wash cup can be washed out without the cover opening. After the fill in the main wash, the control applies power to the wax motor actuator. See Figure 19. The plunger of the wax motor extends, pressing down on a pivot arm attached to the latch for the cover. This releases the cover to dispense the detergent. On the opposite end of this pivot arm is a pin that rides up in the actuating arm for the rinse aid dispenser.

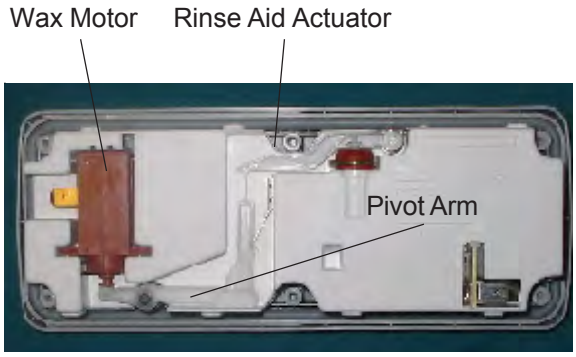


Figure 19

With power removed from the wax motor, the plunger retracts the pin and the rinse aid actuator falls down the back side of the actuator. The dispenser is now ready to dispense the rinse aid. The control again applies power to the wax motor, and as the pivot arm raises the rinse aid actuator the rinse agent is added into the dishwasher. When power is removed from the wax motor the pivot arm rises and a leaf spring mounted to the side on the dispenser forces the actuator arm to the starting position for the next cycle.

Door Latch Assembly

The door latch assembly has two functions: one is to hold the inner door panel against the door seal around the tub, the second is to open and close both door switches. See Figure 20.

When the door is closed, a strike mounted on top of the tub forces a spring loaded catch to rotate back into the latch handle. As the catch makes contact with the handle, a hook moves up into the strike and locks the door in place. The rotating of the catch releases the door switch actuator and allows both door switches to close.

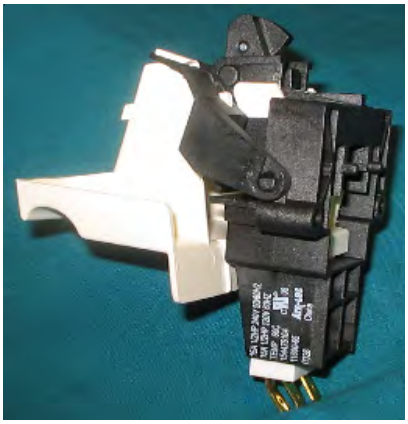


Figure 20

When the door latch handle is raised, the upward pressure on the handle pushes up on the catch that now pushes back on the door switch actuator which opens the door switches. This pushes the hook out of the strike to allow the door to open.

Thermistor and Soil Sensor Assembly
The thermistor and soil sensor are assembled in the same housing and mounted directly in front of the wash pump intake. See Figure 21 for location and Figure 22 for closeup.

Thermistor
The control is programmed with preset wash and rinse temperatures for each cycle. The use of a thermistor in the sump provides water temperature information to the control to maintain these temperatures. The control provides options for the user to select a higher temperature wash as well as a sanitize rinse.

Soil Sensor
A soil sensor is used to adjust the cycle length based on the amount of food soil found in the water. This sensing is performed in all wash cycles with the exception of the Rinse only cycle. The sensor, mounted to the under side of the sump directly in front of the wash motor intake, is made up of a transmitter and a receiver. At the proper time a light signal is passed between the transmitter and the receiver. The amount of light that is received is then measured and returned to the control. This information is used by the control to adjust the cycle time.

At the end of the pre-wash, the control stops the wash motor for 30 seconds. This allows the wash water and food soil to settle for the soil sensor to check the soil level in the water. If no soil is found, the cycle can be adjusted. The tub is then drained and refilled for the first rinse. At the conclusion of the first rinse the wash motor pauses again for 30 seconds and the water is rechecked for a change in condition. If no soil is found, the cycle may be shortened or, if large amounts of soil are found, the cycle may be extended. The control can use either one or both pauses to adjust the cycle time.

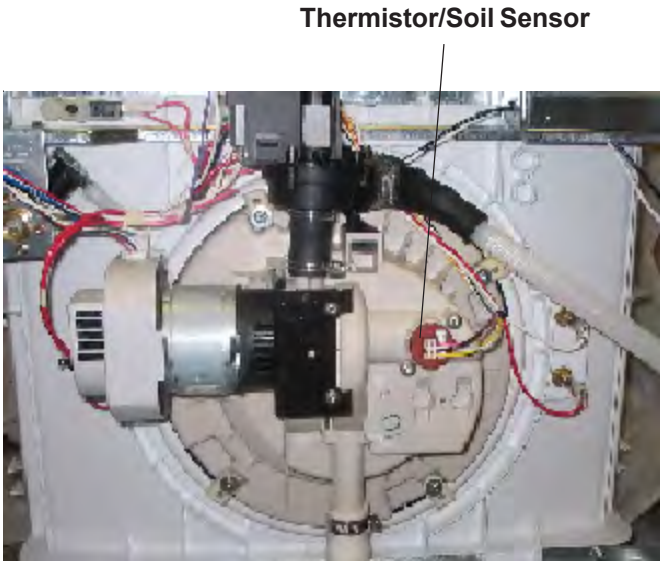


Figure 21

Figure 22

To ensure the pre-programmed water temperature for the wash cycle is reached, the control can pause the main wash cycle up to 10 minutes in a Temp assure cycle. This temp assure cycle is automatic and not selected as an option. If the Hi- temp wash option is selected, the control will pause the main wash section once again for up to 10 minutes to increase the water temperature to 140°F. Whether or not the water temperature is reached in this 10 minute pause, the cycle will continue without indication that it reached or did not reach this temperature. When the Sanitize option is chosen, the National Sanitation Foundation requires in the final rinse cycle that 155°F be reached and maintained for a certain amount of time. During the final rinse, the control pauses the time remaining for up to 30 minutes to reach this 155°F temperature before proceeding to the end of the cycle. Should the cycle meet the requirements defined for the sanitize option, the Sanitize light will come on and stay on until the door is opened. If the requirements are not met the sanitize light will not come on at the end of the cycle.

Electronic Control
All of the functions and operations of the dishwasher are directed and monitored by the electronic control. On some models the control will adjust cycle times to increase water temperature in the main wash then again in the final rinse if the temperature is not hot enough to clean properly. Also on select models the control will monitor the amount of soil loosened from the dishes then increase or decrease the cycle time based on this information.

A cycle is started when the user makes a selection of cycles and options from an electronic keypad or option switch mounted to the top of the control console. With the cycle selected and started, the control uses sensors to monitor soil level, water temperature, motor speed, and makes all of the cycle adjustments needed to achieve a clean load of dishes. Cycles available and options will very depending on model. Models may also have digital displays for monitoring cycle time or small LED's for user convenience. When the cycle is completed the control will display a clean light to inform the user that the cycle has ended, this light will stay lit until the door is opened. Power to operate the 12VAC control transformer is supplied directly from the dishwasher junction box and is not affected by door opening.

Wash Cycles
The number of different cycles will vary depending on model. The difference in these cycles can be the number of washes and rinses as well as differences in assured water temperatures for wash and rinse segments of the cycle. The control can also restrict the use of certain energy options for a cycle. On models with a variable speed motor, the proper motor speed is selected by the control for the cycle. The following cycles can be found on those models:

Ultimate Scrub, Pots & Pans
This cycle is intended for heavier soiled dishes. This cycle will be the longest available to the user. It will have the most rinses along with the highest temp assure water temperature of any other cycle. The high temperature wash and sanitize rinse are automatically selected and cannot be disabled in this cycle. The soil sensor is used in this cycle for adjusting the length of the cycle to ensure proper cleaning. On models with a variable speed wash motor the highest motor speeds will be used in all cycles to remove as much soil as possible.

Normal Wash Cycle
This cycle is used for normally soiled dishes. The control will use the soil sensor to adjust the number of rinses needed in this cycle to insure proper cleaning. The assured water temperature is automatically select for this cycle at 135°F for the main wash and 140°F in the final rinse. The user can select a high temperature wash, sanitize rinse and no heat dry options and can use the delay start in this cycle. On models with the variable speed motor the control will select the proper motor speeds for both the wash and rinse portion of the cycle.

China/Crystal Cycle
This cycle is used for delicate crystal or china. The fact that these items require special handling, the water temperature for the wash and rinse cycles will be lower, the main wash temperature will be 125°F and the final rinse temperature at 130°F. The control will also lock out the water heating options and not use soil sensing in this cycle. On variable speed models the motor speeds will also be selected by the control.

Light Wash/Econo Wash
These cycles are used for lightly soiled dishes. The assured water temperature of 135°F in the main wash and 140°F in the final rinse is automatically selected by the control. The use of all energy options are available and soil sensing will be used. On variable speed models the proper motor speeds for all cycles are selected by the control.

Rinse Only Cycle
This cycle is for dishes to be cleaned at a later time. The cycle has two rinses. No energy options can be selected, and no dry cycle.

Upper Rack or Lower Rack Cycle
These cycles are light wash cycles intended for use when only one rack is loaded. Both of these cycles will have a pre wash, main wash, and one final rinse. Both spray arms will be utilized in each cycle as well. The difference between the two cycles is the length of the cycle along with the number of times the spray changes between the arms. The cycle for lower rack will change averaging 60% sprayed from the lower arm and 40% center and upper arms. The reason for spraying from center and upper arms is to force food down toward the filter. The upper rack cycle will change averaging 50% from the lower arm to keep the filter cleaned then 50% from the upper and center arms for cleaning the rack. The control provides assured water temperature in the final rinse of 135°F. The hi-temp wash and the hi-temp rinse cannot be selected in these two cycles but the no heat dry can be selected.

Speed Clean Cycle
This cycle (on select models) offers a fast wash for light to regular soiled dishes. It has two washes and two rinses with only a no heat dry energy option available. This cycle does have Temp Assure settings for the main wash of 128°F and 125°F in the final rinse.

Favorite Cycle
This cycle is programmed by the user after selecting a desired Wash cycle with options (if any) and will remain programmed in the control. Once programmed, the control will repeat the cycle as entered whenever the Favorite Cycle key is pressed. To program this cycle you make the selection of wash cycle and options then pressing and holding the “Favorite Cycle” key for three seconds. The Favorite Cycle can be changed by again making your selections of cycle and options then holding in the Favorite Cycle pad for three seconds.

Other Options

Turbo Boost
Models with the variable speed motor offer this option. If selected the motor speed will increase in the wash and rinse cycles to 3450 rpm to improve the cleaning performance. This option cannot be used in all cycles.

Wash Silencer
Models with the variable speed motor offer this option. If selected the motor speed will be reduced to 2800 rpm to decrease audible noise in the wash and rinse cycles. This option cannot be used in all cycles.

Delay Start
After a cycle has been selected and before the Start pad is pressed the user can select a delay start option. The hours of delay can very depending on model and can range from 1 hour to 24 hours in one hour increments. Setting the hours of delay is accomplished by pressing the delay start pad for the number of hours to delay. After the number is reached the countdown begins. Once the count down starts, pressing the start/ cancel pad once will have no effect on the cycle. However, if the start/ cancel pad is pressed a second time in succession, the delay will be canceled and the cycle will start.

No Heat Dry/Control Lock
This option will disable the heating element during the dry cycle and can be selected at any time prior to the dry cycle.

The control lock feature enables the user to lock the controls so the cycle cannot be accidentally changed. To lock the controls press and hold the No Heat Dry key for 3 seconds until the indicator lights. To unlock controls press and hold the No Heat Dry key for 3 seconds until indicator goes out.

Testing the Control System

There are two tests that can be used on the control system for checking the control as well as the thermistor and the soil sensor. These tests can be performed from idle and are intended to assist in diagnosing problems in the control circuit.

Water Temperature Test

This test will check the thermistor to ensure it is reading the proper water temperature. Start a cycle and once the tub has filled with water press the START / CANCEL pad twice. This will stop the cycle and place the dishwasher in idle. Then press the Start/Cancel and Normal Wash pads simultaneously. The temperature of the water in the tub will read on the display using the last two digits of the water temperature. If the temperature is greater then 99°F a decimal point is illuminated along with the 2 digits of the temperature.

Water/Service Test

This test checks the operation of both the control to operate the dishwasher as well as the components in the dishwasher. This test is entered from idle by pressing and holding the No Heat Dry and the Start/ Cancel key pads simultaneously for 1.5 seconds. The test will follow the below chart through the dishwasher operations. By pressing the Start/ Cancel key, the cycle can be advanced manually to the next sequence. The last step of this test will illuminate both the Clean and Sanitize LED's. Once the door is opened the control returns to idle.

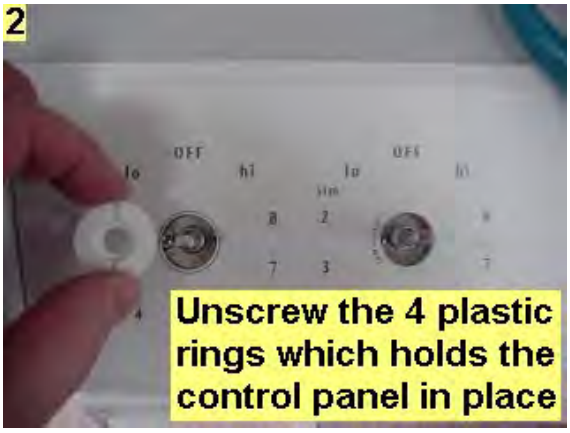
STEP	DESCRIPTION	TOTAL TIME (SEC.)	WATER VALVE	CIRCULATION MOTOR	DRAIN MOTOR	HEATER	DISPENSOR	VENT	WASHING LED	RINSING LED	DRYING LED	SANITIZE LED	SENEING LED	CLEAN LED	ELLUIPSE ROTATION
1	FILL / DISP	60	1	0	0	0	1	1	1	0	0	0	1*	0	0
2	FILL / DISP	27	1	0	0	0	0	1	1	0	0	0	1*	0	0
3	WASH / HEAT (3450rpm)	45	0	1	0	1	0	1	1	0	0	0	1*	0	0
4	PAUSE	0.4	0	0	0	1	0	1	1	0	0	0	1*	0	0
5	WASH / HEAT (2800rpm)	75	0	1	0	1	0	1	0	1	0	0	0	0	1
6	WASH / HEAT / DISP(3450rpm)	60	0	1	0	1	1	1	0	1	0	0	0	0	0
7	DRAIN	90	0	0	1	0	0	0	0	1	0	0	0	0	0
8	DRY	90	0	0	1	X	0	0	0	0	1	0	0	0	0
	TOTAL	447							0	0	0	1	0	1	0
					X= Denotes selectable option										
	Sanitize and Clean LED stay on until door is opened or cycle started														
	* LED is on only if voltage feedback is present from the soil/thermistor sensor														

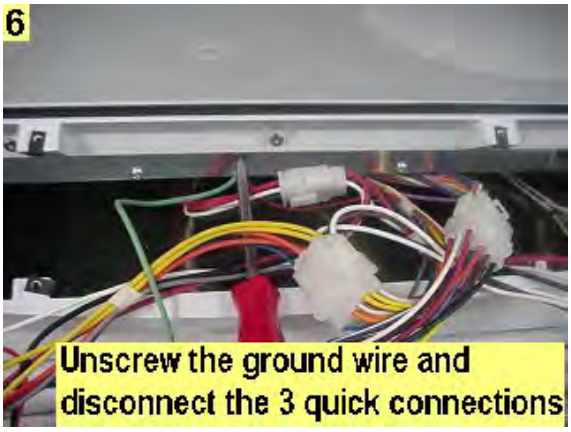
Range Information:

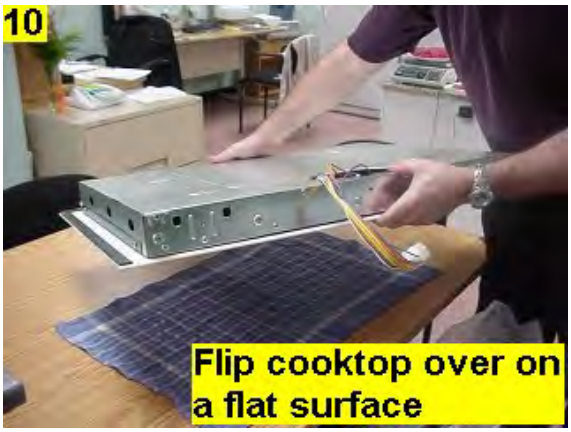
PROBLEM: On the new Frigidaire Slide-in & Drop-in models with serial number NF34xxxxxx and over, how do you access the switches, EOC, etc?

CAUSE: No instructions for disassembly.

SOLUTION: With this new design, disassembly is different than the older Slide-in and Drop-in ranges. Below are the steps to follow in order to access these components. On some models, the EOC is attached to the control panel. However, the way to access it is the same.







Reverse procedure to reassemble the cooktop and control panel.

PROBLEM: Loose oven door handle, and/or screw strips out of handle core on certain models with serial VF402 thru VF416, Freestanding Ranges.

CAUSE: Screw does not fully engage into handle cavity.

SOLUTION: The screw length has been increased by approximately 3/16” inch to 1-1/2” inches (see Figure 1).

Order two replacement screws part number 316278700. Screw part number remains the same as original and service parts stock has been purged. Always check the length of replacement screw.

If handle cavity core has been damaged, replace handle.

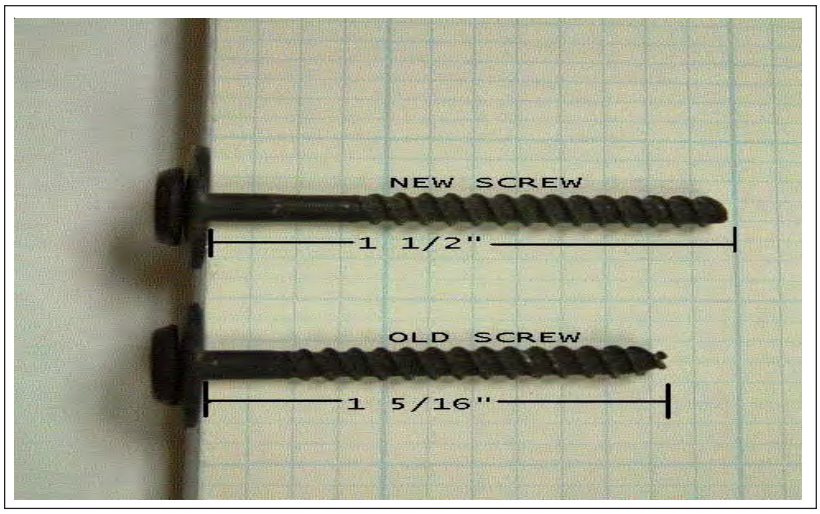


Figure 1

QUESTION: On gas and electric ranges, what is the U.L. and/or A.G.A. maximum allowable surface temperature?

ANSWER: When Frigidaire tests side panels and doors for skin temperature, certain U.L. and/or A.G.A. guidelines must be followed.

1. Product must be undamaged, correctly assembled and have the correct oven temperature.
2. All skin temperatures are based on a room temperature of 77 F (25 C) and an oven set temperature of 400 F.
3. Oven must be cycling at 400 F for one hour before test is conducted.
4. Pyrometers, (temperature testers), must be of high quality and properly adjusted.
5. An increase or decrease of 1 F in the room ambient temperature, will allow a 1 F increase or decrease in the maximum allowable surface temperature of the range.

Side Panel, Painted	152 F
Side Panel, Porcelain	160 F
Oven Door, Glass	172 F
Oven Door, Painted	152 F
Oven Door, Porcelain	160 F
Warmer Drawer, Painted	152 F
Warmer Drawer, Porcelain	160 F
Cooktop	No Temperature Limits Apply
Lower Console	No Temperature Limits Apply
Oven Vent Area	No Temperature Limits Apply

	Knobs And Handles		Skirt	
	Plastic*	Metal	Plastic*	Metal
Conventional Gas & Electric	167 F	131 F	182 F	152 F
Self-Clean Gas at Clean Temperature	167 F	131 F	182 F	152 F
Self-Clean Electric at Clean Temperature	182 F	152 F	182 F	152 F

* Includes plastic with metal plating not more than 0.005" thick and metal with a plastic or vinyl covering not less than 0.005" thick

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PROBLEM: Servicers are replacing EOC due to blanking out.

CAUSE: Electrical noise from lubrication inside door switch.

SOLUTION: Install new switch. Lubrication has been removed internally. (See 2004 Service Bulletin, Vol. 24, Issue 2, Page 4.)

PROBLEM: Painted burner bowls are chipping.

CAUSE: Bowl supports are too tight.

SOLUTION: Bend supports to loosen.

PROBLEM: Many EOCs returned to factory are fully functional.

CAUSE: Servicer not checking oven sensor circuit.

SOLUTION: Always check the complete oven sensor circuit from back of EOC through wiring to the oven sensor. F3 fault code is defective wiring or defective sensor.

PROBLEM: Improper diagnosis of product.

CAUSE: Lack of basic knowledge for proper diagnosis of range products.

SOLUTION: Technicians need to have basic service knowledge such as the ability to read schematic and wiring diagrams, proper use of test equipment and common adjustments found in most Service Data Sheets attached to products as well as in Service Manuals. Some basic questions received in TID:

Gas Ranges

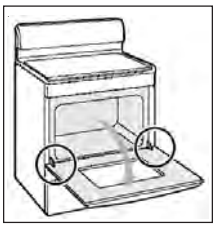
- How to adjust the simmer flame
- How to adjust the standing pilot
- Checking oven ignitor amp draw (must be greater than 2.9 amps)
- Using a CO detector (take reading after 20 minutes of running)

Electric Ranges

- How to properly test the oven sensor circuit (Gas & Electric)
- How to properly replace a ceramic element (different wiring for different elements)

Improvements to 30 " Freestanding Range Products:

Larger oven cavity.
Oven door hinge is now mounted inside door.
Oven door disassembles differently with each glass installed in proper order.
No screws in front when repairs require body side panel removal.
New controls.
Improved reinforcement to drawer with new drawer glide design.

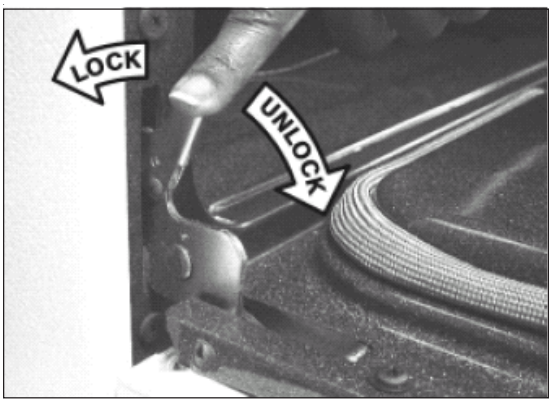


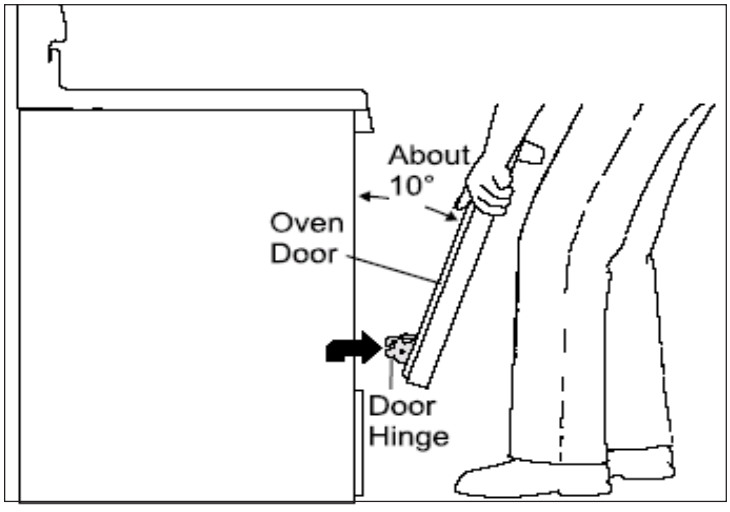
Oven door construction:

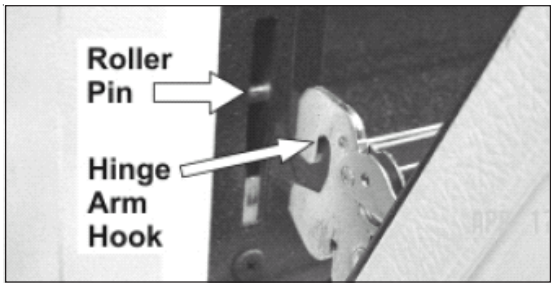
The door construction has changed substantially. The door hinges had previously been mounted in the chassis. The new construction moves the hinges to the interior of the door.

To remove the door, a locking lever on the hinge is lowered to the unlock position. The door can then be lifted off by opening the door about 10° and lifting it off of the roller pins.

The door can be returned to the unit by hooking the hinge arm back on the roller pins and moving the locking lever up to its locked position.

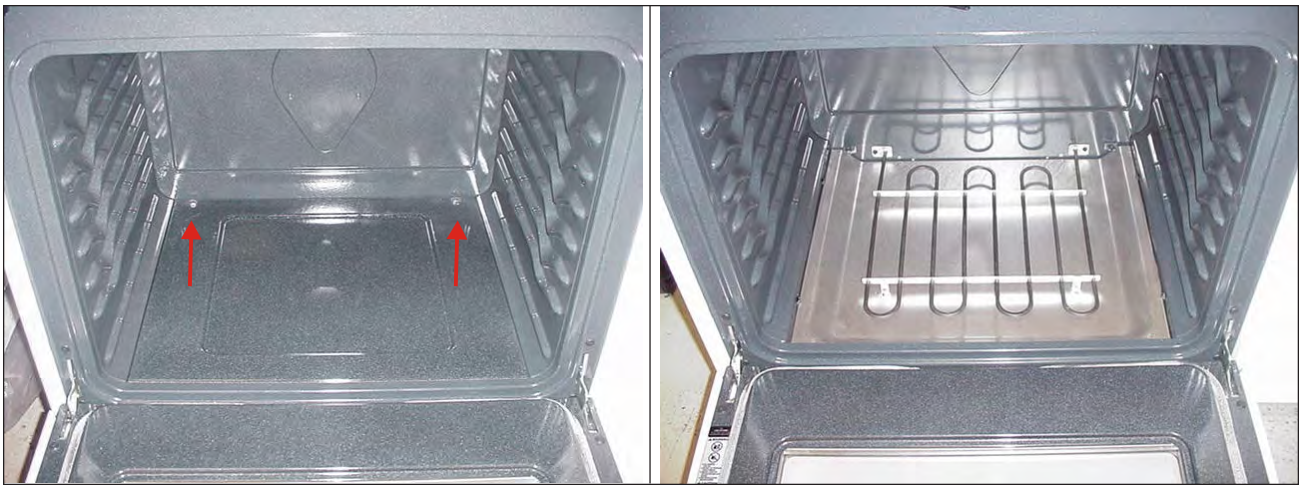






Hidden bake element:

Several models in the new line-up will include a feature called hidden bake. The bake element is hidden beneath the oven bottom. The bottom is held in place with two thumb screws at the rear. When the oven bottom is removed, the element can be serviced in the usual way.

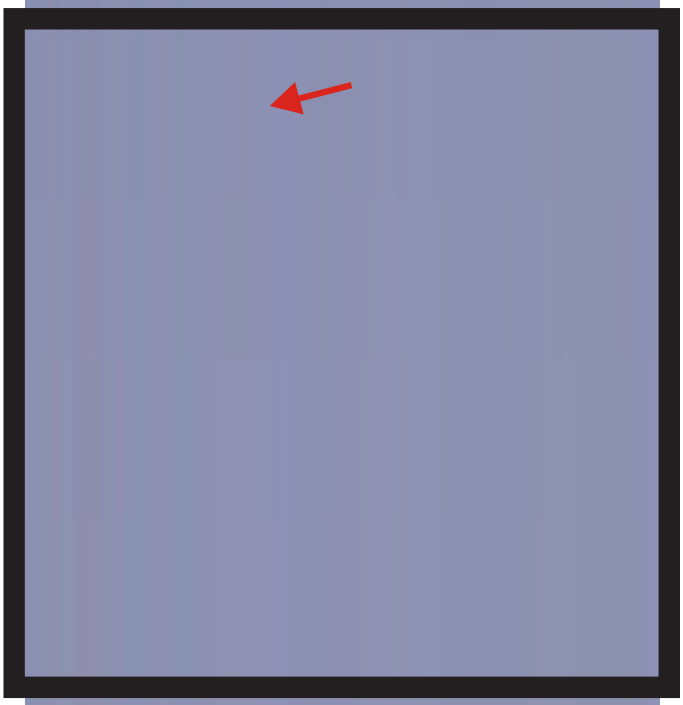


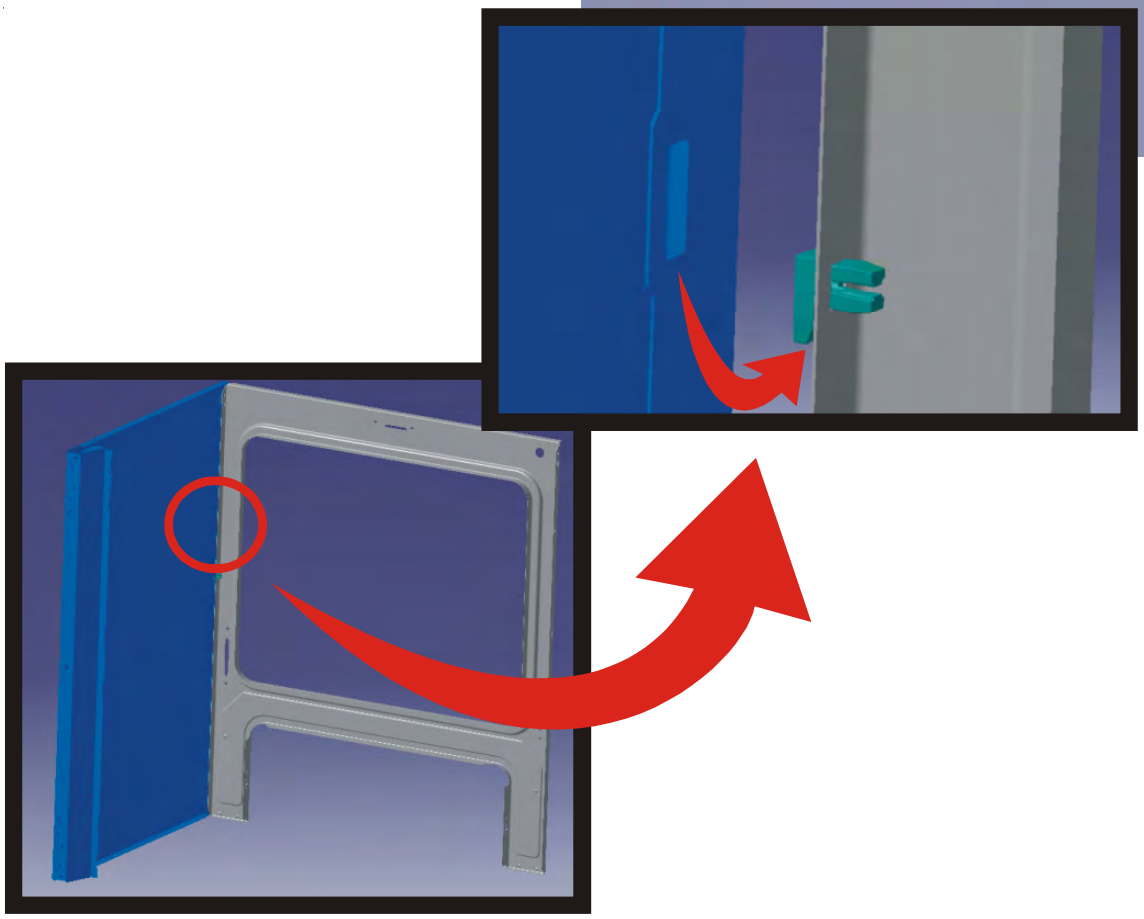
Leveling legs relocated:

The front leveling leg has been moved forward and is now mounted on the face of the chassis. This allows for easier adjustment and improves performance. The rear leveling leg features heavier construction and is also a new part number.

Body Side Panel Attachment:

Changing the body side panel still requires the removal of screws along the top and rear flanges. There are two new hidden fasteners that must now be addressed. The first is a screw on the inside flange of the body side just behind the face of the chassis. The picture at the right shows a rear view of only the oven chassis and side panel. The hidden screw is indicated by the red arrow.
The second hidden fastener is located further down this same flange. The diagram below has the oven removed to reveal the location of the fastener. A plastic retainer is screwed to the side of the chassis. A square opening in the side panel hooks on the underside of the fastener. The last step in removing the side panel is to raise the chassis and allow the side panel to slip out from beneath the fastener.





Cooktop lockout feature:

A cooktop lockout feature will be present on some models. A button on the control is used to activate the lockout feature which will prevent all surface elements from being accidentally turned ON. This feature will only lock the cooktop. Once the cooktop feature is activated, any attempt to start a cooktop element will sound a warning with 3 beeps and the elements will not turn ON. This feature may generate some service requests for customer instruct.

To turn the cooktop lockout feature ON:
1. Be sure all surface element controls are set to the OFF position.
2. Press and hold until one beep is heard (about 3 seconds). If a triple beep sounds instead, check all surface elements and turn them to the OFF position and repeat this step. The cooktop locked indicator light will turn ON and the cooktop controls and functions are locked out until the cooktop is unlocked.

To turn the cooktop lockout feature OFF:
1. Be sure all surface element controls are set to the OFF position.
2. Press and hold until one beep is heard (about 3 seconds). If a triple beep sounds instead, check all surface elements and turn them to the OFF position and repeat this step. The cooktop locked indicator light will turn OFF and the cooktop may be used normally.

NOTE: Starting a self-clean cycle will also turn ON the cooktop lockout feature. The cooktop will remain locked until the self-clean cycle has completed and the oven door has unlocked. If a power failure occurs after the cooktop lockout has been activated, you must turn OFF the cooktop lockout feature before being able to use the cooktop features again.

New Oven Control Feature Descriptions:

The following function definitions define the key sequences associated with the function, and provide additional details on its operation:

Clean Modes – The following clean modes are provided with the corresponding controls:

Speed Clean – A fixed 2 hour duration clean function activated by selecting the “Speed Clean” function, then either the Start key (if high-end Frigidaire), or one of the slew keys (the duration can NOT be altered by additional slew keys). After the 1st key activation, the time digits are to display “—-“, then the corresponding duration is displayed after the 2nd key sequence.

Clean – A fixed 3 hour duration clean function activated by selecting the “Clean” function, then either the Start key (if high-end Frigidaire), or one of the slew keys (the duration can NOT be altered by additional slew keys). After the 1st key activation, the time digits are to display “—-“, then the corresponding duration is displayed after the 2nd key sequence.

Maxx Clean – A fixed 4 hour duration clean function activated by selecting the “Maxx Clean” function, then either the Start key (if high-end Frigidaire), or one of the slew keys (the duration can NOT be altered by additional slew keys). After the 1st key activation, the time digits are to display “—-“, then the corresponding duration is displayed after the 2nd key sequence.

Delay Clean – All the above clean options can be delayed (just like any other cooking, non-broil function) to a later time using the “Start Time” key. The user simply programs the clean function (as described above), then programs the delay time using the “Start Time” key. Just like any other delayed cooking function, the control must accept either programming order for implementing the function (i.e. Enter the start time, then the clean function, or visa versa). After a delay clean function is programmed by the user, the control MUST lock the cavity door at program time, not at the start time. Similar to a delayed cooking function, the “CLEAN” and “DELAY” ICONs must be illuminated after programming takes place.

Convection Convert – This function will adjust the set temperature entered by the user for a normal bake operation by a fixed value (typically 25^0 F). This value should be adjustable via the alteration of the EEPROM. After the user programs a normal bake or timed bake cooking function, the user will simply press the Convection Convert button to activate the function. After activation, the user will witness the set temperature being decremented the fixed amount in the temperature digit locations.

If the user has programmed a convection convert timed cooking function, at 75% of the timed duration (down to the minute resolution), the control will generate an audio end of cycle tone sequence, and the temperature digits will illuminate "CF" for the remaining 25% of the timed cook duration. The "CF" will indicate to the user to Check their Food. The audio end of cycle tone sequence will occur 5 times total during the last 25% of the timed cooking duration, including the 75% point, and the end of timed cooking cycle. An active Convection Convert function will NOT alter the overall timed cooking parameters entered by the user.

If the user activates the Convection Convert function after entering a normal bake recipe, and the bake recipe calls out a temperature too low for the convection convert process, the control will reject the request with the normal key error code audio message. For instance, if the user enters a normal bake recipe with a set temperature of 315 F, the converted temperature of 285 F would be below the minimum 300 F convection bake or roast cooking limit, and the control will reject the request.

Favorite Setting – This function is used to store 1 or more normal bake cooking recipes when a dedicated key is assigned to the function. This function can be used to store stand-alone bake operations or timed bake operations. *This key cannot be used to store delayed baking functions, nor can it store a convection convert setting*. These functions can be added manually after a favorite setting is recalled. If the control contains a numeric key pad (a higher-end control), the control will store/recall 3 favorite settings.

To activate the storage of a Favorite Setting recipe, the user will first press the "Favorite Setting" key followed then by choosing which favorite setting number to be stored by pushing 1, 2 or 3. They will then enter the desired normal bake cooking program. When the final portion of the program is entered, the user is to press and hold the "Start" key for 3 seconds. If the control does not have a start key (hence slew keys), the user will simply press & hold the "Favorite Setting" key for 3 seconds after the last portion of the recipe is entered.

To recall a stored Favorite Setting, the user simply needs to press the "Favorite Setting" key and then press start. If the control has the capability of storing more than 1 recipe, the user can select 1, 2 or 3 using the numeric keypad, then press start. For the 2^{nd} key step on a slew based control, the user simply needs to activate one of the slew keys to start the previously stored favorite setting. No factory default recipes will be provided with the oven or free-standing range.

To remove or clear an existing recipe, the user simply needs to start the recall process by activating the "Favorite Settings" key, then pressing cancel. If the control has the capability of storing more than 1 recipe, the user can select 1, 2 or 3 using the numeric keypad, then press cancel.

Keep Warm – This feature can be implemented as a "stand alone" feature, or can be part of a cooking program after a timed cooking function. The function can not be activated prior to a delayed start cooking process.

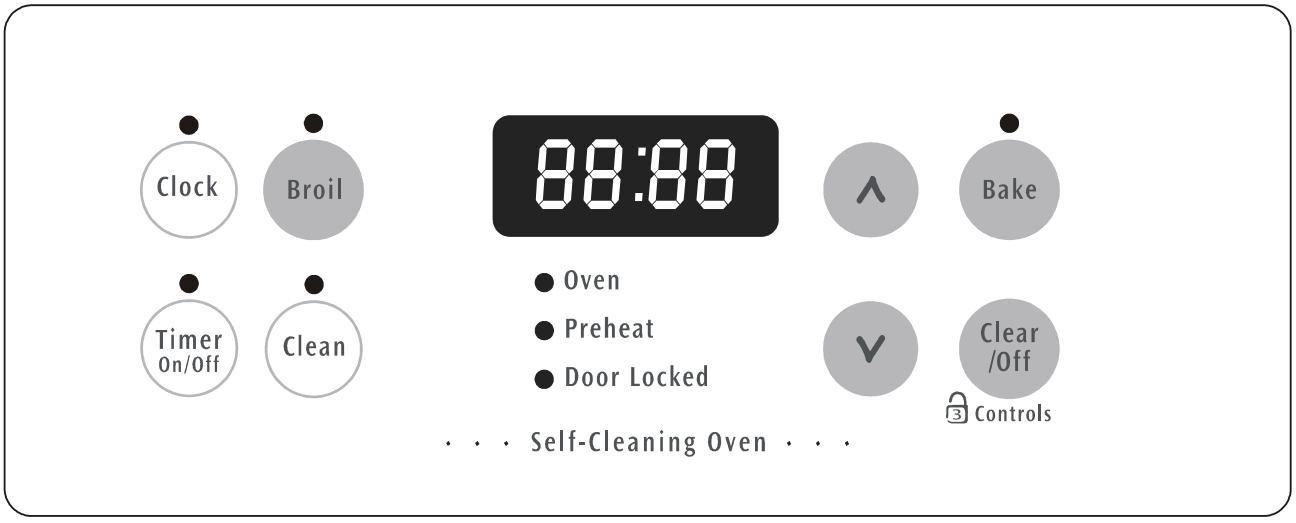
When activated by the user (by pressing the corresponding "Keep Warm" key, then pressing "Start" or a slew key) the control is to maintain a minimum cavity temperature of ~ 170 F (fixed set temperature must be adjustable via an EEPROM value) for the duration of the operation. During active operation, the letters "HLd" will be displayed on the temperature digits for the corresponding cavity. An active Keep Warm operation cannot exceed 3 hours duration.

Sales Demo mode – This control feature (when activated) will configure the entire control to act like a normal oven to the user, however the control will not fire any relays to any high-current loads, for both cavities. The default mode is non-sales demo mode. Selection of this mode is only possible during the 1^{st} 30 seconds after a power-up condition. When the control is in sales demo mode, the display will have to flash "Sd" on one of the displays for ~ 1 second, every 30 seconds.

To select the function, the user simply has to activate the “Cook Time” key continuously for over 12 seconds during the 1st 30 seconds after power-up. The display will indicate the present mode by displaying a “Sd” or “–“. If the control has slew keys, then the user can toggle between the 2 states using the slew keys. If the control does not have slew keys, the user selects between the 2 modes using the “Clean” key. If no slew keys are present, the selection is saved by activating the “Start” key. If slew keys are present, then the selection is saved by a key timeout condition.

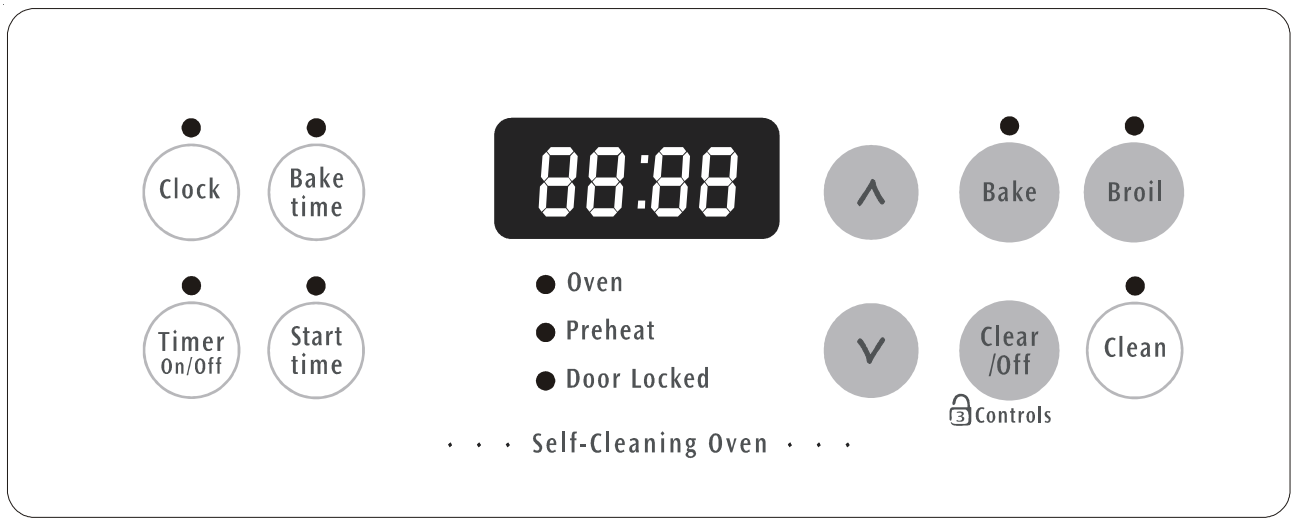
Individual New Oven Controls:

Modified ES200 control
- Expanded fault codes
- Showroom demo feature



ES200 Oven Control

Modified ES300 control
- Expanded fault codes
- Showroom demo feature



ES300 Oven Control

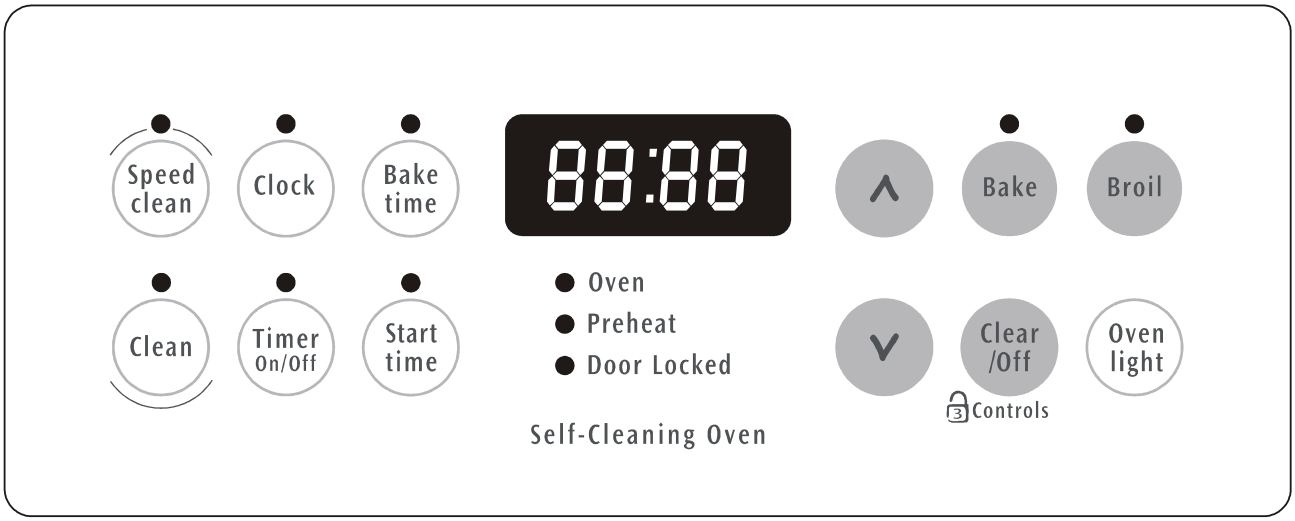
New ES330 control

- Light switch on control
- Expanded fault codes
- Showroom demo feature
- Powers and communicates to a mini-oven

ES330 Oven Control

New ES340 control

- Light switch on control
- Speed clean defaults to 2 hour clean cycle
- Clean defaults to 3 hour clean cycle
- Expanded fault codes
- Showroom demo feature
- Powers and communicates to a mini-oven



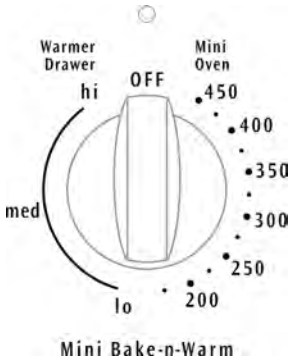
ES340 Oven Control

New ES510 control

- Light switch on control
- Speed clean defaults to 2 hour clean cycle
- Clean defaults to 3 hour clean cycle
- Maxx clean defaults to 4 hour clean cycle
- Keep warm starts at low temperature after bake cycle
- Convection auto conversion
- Favorite setting saves a favorite temperature
- Expanded fault codes
- Powers and communicates to a mini-oven

ES510 Oven Control

New Mini-Oven Control:



Mini Bake-n-Warm

New Expanded Oven EOC Fault Codes:

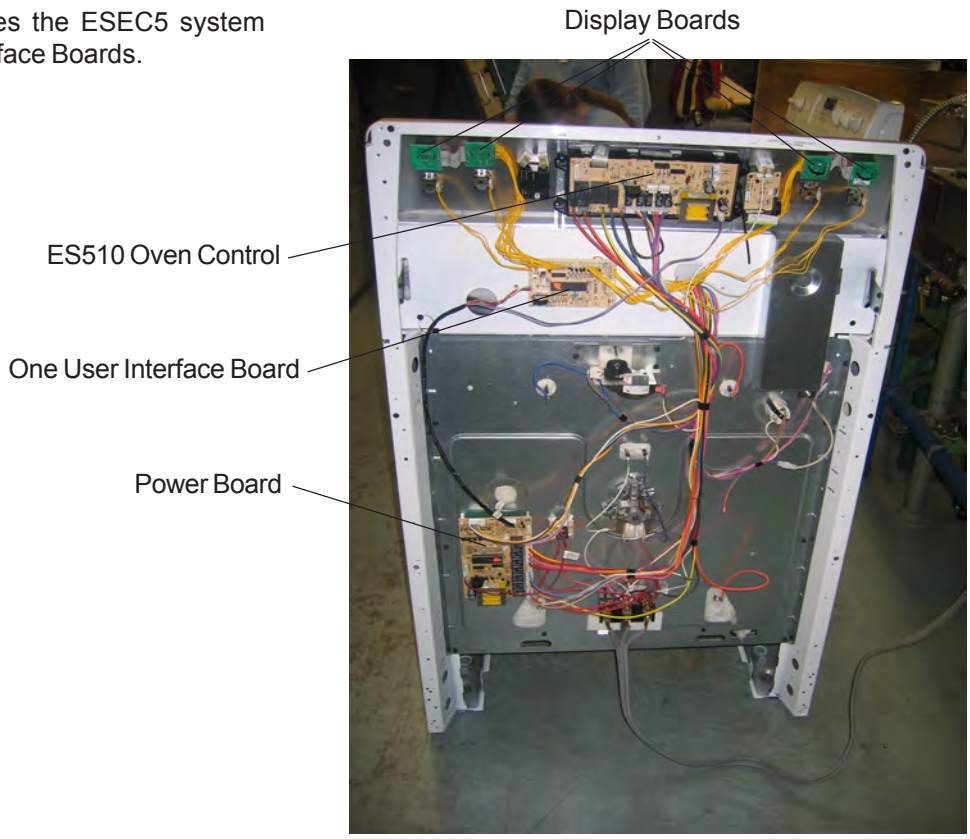
F1 Internal fault (EOC)
F10 Runaway temperature
F11 Shorted keypad
F12 Defective micro ID
F13 Defective EEPROM ID/Checksum

F3 External fault
F30 Open oven sensor
F31 Shorted oven sensor

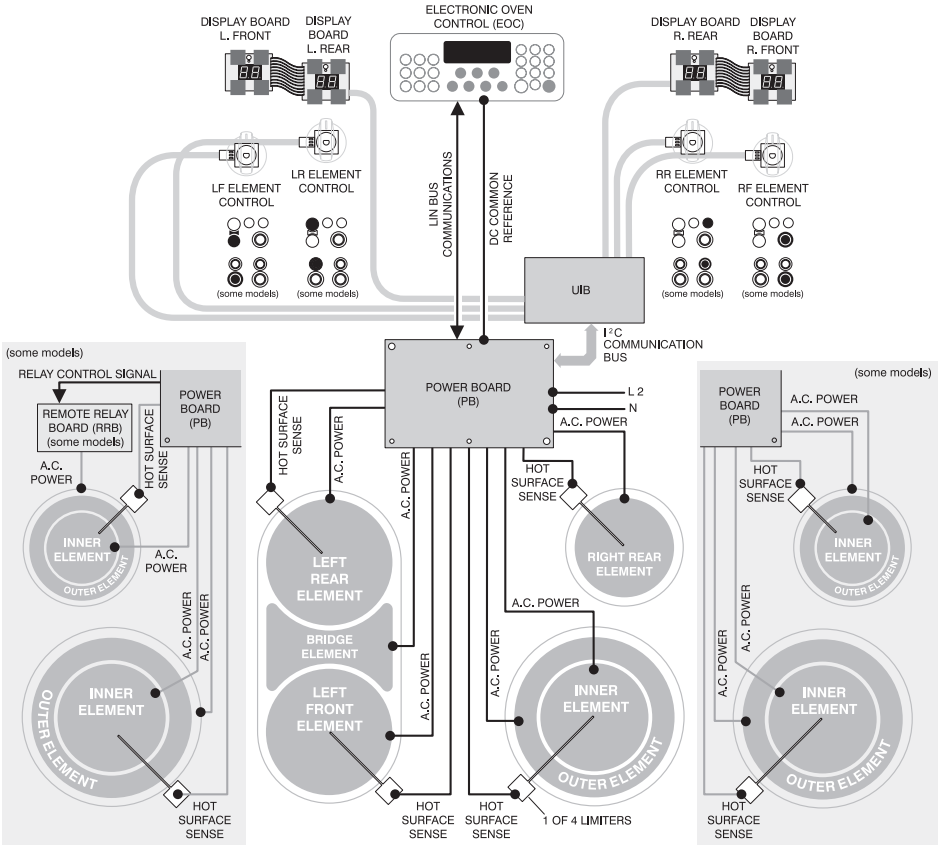
F9 Door latch motor circuit fault
F90 Maximum unlock time exceeded
F91 Maximum unlock attempts exceeded
F92 Maximum door open time exceeded
F93 Maximum lock time exceeded
F94 Maximum lock attempts exceeded

New ESEC10R Controls:

This system replaces the ESEC5 system that had 2 User Interface Boards.



ESEC 10R System Diagram:



Service Data Sheet for the ESEC 10R Electronic Surface Control System:

SERVICE DATA SHEET

NOTICE - This service data sheet is intended for use by persons having electrical and mechanical training and a level of knowledge of these subjects generally considered acceptable in the appliance repair trade. The manufacturer cannot be responsible, nor assume any liability for injury or damage of any kind arising from the use of this data sheet.

SAFE SERVICING PRACTICES

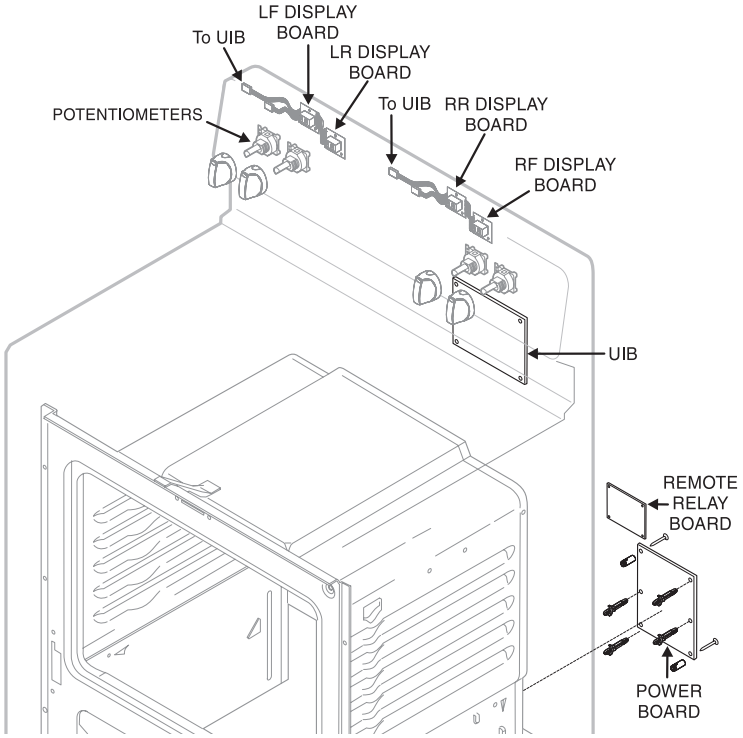
To avoid the possibility of personal injury and/or property damage, it is important that safe servicing practices be observed. The following are examples, but without limitation, of such practices.

1. Before servicing or moving an appliance remove power cord from electrical outlet, trip circuit breaker to OFF, or remove fuse.
2. Never interfere with the proper installation of any safety device.
3. GROUNDING: The standard color coding for safety ground wires is *GREEN* or *GREEN WITH YELLOW STRIPES*. Ground leads are not to be used as current carrying conductors. **It is extremely important that the service technician reestablish all safety grounds prior to completion of service. Failure to do so will create a potential safety hazard.**
4. Prior to returning the product to service, ensure that:
   - All electric connections are correct and secure.
   - All electrical leads are properly dressed and secured away from sharp edges, high-temperature components, and moving parts.
   - All uninsulated electrical terminals, connectors, heaters, etc. are adequately spaced away from all metal parts and panels.
   - All safety grounds (both internal and external) are correctly and securely reassembled.

ELECTRONIC SURFACE ELEMENT CONTROL (ESEC) - This range is equipped with an Electronic Surface Element Control (ESEC), which precisely controls the smoothtop cooking elements at multiple settings. (The Warming Zone element is not controlled by the ESEC). For the user, the elements are operated in the same way as with conventional controls, by pushing in and turning the knob to the desired setting. The setting is shown in the digital display above the knob, instead of using graphics on the control panel.

ESEC Hot Element Indicator ("HE") - While an element surface is hot, that element's display will show "HE". This is in place of the usual hot surface indicator light on ranges with conventional controls.

ESEC Lockout Feature ("- -") - The electronic oven control's Clean and Lock features will not operate when a surface element is ON. Conversely, the surface elements controlled by the ESEC will not operate when an oven control Clean or Lock mode is active. When the oven control is in a Clean or Lock mode, "- -" will appear in the ESEC displays to signify that the surface elements are locked out. NOTE: The "HE" (hot element) display will always have priority over the "- -" display.



ESEC System Components - The ESEC system consists of a **Power Board** (main control board mounted on the mainback of the range) and User Interface Board or **UIB** (circuit boards with digital displays, mounted in the coontrol panel), four **Potentiometers** (push-to-turn control for each element) and the **ESEC Harness** that connects the boards and the oven control. The ESEC boards communicate with each other to control the elements and with the oven control for the lockout modes. (See the ESEC System Diagram.)

IMPORTANT

DO NOT REMOVE THIS BAG OR DESTROY THE CONTENTS

P/N 316417609 (0407)

Service Data Sheet for the ESEC 10R Electronic Surface Control System (cont):

SERVICE DATA SHEET

ELECTRONIC SURFACE ELEMENT CONTROL (ESEC 10R)

Symptom	Likely Failure Condition/Cause	Suggested Corrective Action
F5 A0	**Bad EEPROM checksum.**	1. Contact technical line for further assistance.
F5 00	**No LinBUS master communiction.**	1. Bad EOC. 2. Bad Power Board. 3. Bad ESEC Harness 4. Contact technical line for further assistance.
F5 01	**Power Board not communicating.**	1. Bad ESEC harness. 2. Contact technical line for assistance.
F5 02	**UIB not communicating.**	1. Bad UIB. 2. Bad Power Board. 3. Bad ESEC harness. 4. Contact technical line for further assistance.
F5 F0	**Watchdog timer timed out - Power Board.**	1. Bad UIB. 2. Bad Power Board. 3. Bad ESEC harness. 4. Contact technical line for further assistance.
F5 FF	**Watchdog timer timed out - UIB.**	1. Contact technical line for further assistance.
F7 10 **F7 20** **F7 30** **F7 40**	**Potentiometer LF is open.** **Potentiometer LR is open.** **Potentiometer RR is open.** **Potentiometer RF is open.**	1. Bad potentiometer. 2. Bad UIB. 3. Contact technical line for assistance.
F7 11 **F7 21**	**Potentiometer LF is shorted.** **Potentiometer LR is shorted.**	1. Bad potentiometer. 2. Bad UIB. 3. Contact technical line for assistance.

New Freestanding Oven Basic Features:

Five burner gas cooktop

Gas oven broil burner

New wide oven cavity and six level rack support system

New oven door hinge and door removal

Oven door broil stop position

New oven door hinge

Room Air Conditioner Information:

PROBLEM: A very low percentage of room air conditioners 25K BTU (FAS256N2A) and 29K BTU (FAS296N2A) units built for the 2004 selling season have exhibited fan motor vibration which can cause breakage of its own bracket.

CAUSE: This is not a safety issue! In some situations (only when line voltage is over 240 volts and the unit's fan speed is set at 99% or Max), the fan motor will not start smoothly, which will eventually cause the fan motor bracket to break. If this happens, it will most likely occur in the first usage.

SOLUTION: We have established a kit to resolve this issue. Please utilize kit 5304440661 (Motor with Capacitor) in place of part number 309630616 (Fan Motor). All orders that you currently have with EHP for part number 309630616 will sub to the kit number 5304440661. This kit includes a new capacitor, PN 309908001. This new capacitor can be purchased separately as well and included with any current inventory of the fan motor.

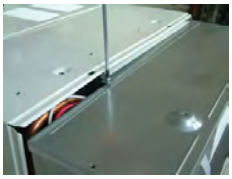
~~309630616~~	Motor ***(Do not order just the motor, order the kit 5304440661.)***
309908001	Capacitor
5304440661	Motor & Capacitor Kit ***(Use kit when replacing the motor or if the motor in unit is OK, just add the capacitor.)***

1. Remove two screws on the top of the cabinet.

2. Pull chassis out of cabinet.

3. Remove the screw on the plastic enclosure.

4. Remove three screws on the top and one on the front of the metal top cover. Place the top cover to the side.



5. Remove the capacitor clamp mounting screw.

6. Disconnect the white wire leading from the motor to the capacitor (position "C").

7. Connect the red jumper wire (p/n VR008N4K6) “U” type terminal to the capacitor (position “C”), and connect the other end terminal to the additional capacitor supplied with this kit (any terminal on the 2.5uf, 450V, p/n 455000101).


8. Connect the wire wire again which was disconnected at step 6 to the red jumper wire “U” type terminal at the capacitor “C” position.

9. Connect one terminal of the black jumper wire (p/n VB008N4N4) to the “FAN” position on the capacitor, and the other end to the opposite terminal used in step 7 of the additional capacitor supplied with this kit.


10. Re-secure the round capacitor to the control box with the capacitor clamp.

11. Attach the square type capacitor to the control box using the screw (p/n A141509) supplied in the kit.

12. Re-attach the top cover.

13. Secure the enclosure.

14. Slide the chassis back into the cabinet.

15. Secure the two screws on the top of the cabinet.

16. Check assembly and operate the unit.

Stainless Steel Outdoor Grills:

Service Companies must be authorized to perform service.

Service companies should be aware that EHP has now launched it's new line of stainless outdoor kitchens. EHP will be selling these grills under both the Electrolux | ICON™ and Frigidaire brand labels.

A third-party vendor, Sure Heat Manufacturing, will provide parts and warranty service for these grills. Service requests for the 57" Electrolux ICON™ stainless grill will be channeled through the 1-877-4ELECTROLUX (877-435-3287) phone number. Calls for the Frigidaire stainless grills will be channeled through the Frigidaire support number, which is 800-320-0859.

Servicing dealers and service companies should note that any and all calls for service on either the Electrolux ICON™ or Frigidaire grills must be pre-authorized by SureHeat. Call the Frigidaire support number (800-320-0859) prior to completing service. Otherwise, any claim for payment will be rejected. Servicing dealers who would like to become authorized to work on Frigidaire or Electrolux ICON™ grills must contact the A-1 Home Service Company at (800-920-8337). Upon authorization, servicing dealers will be able to submit claims for payment to the A-1 Home Service Company. A-1 is Sure Heat's authorized service company.