

## **Refrigerator Service Manual**

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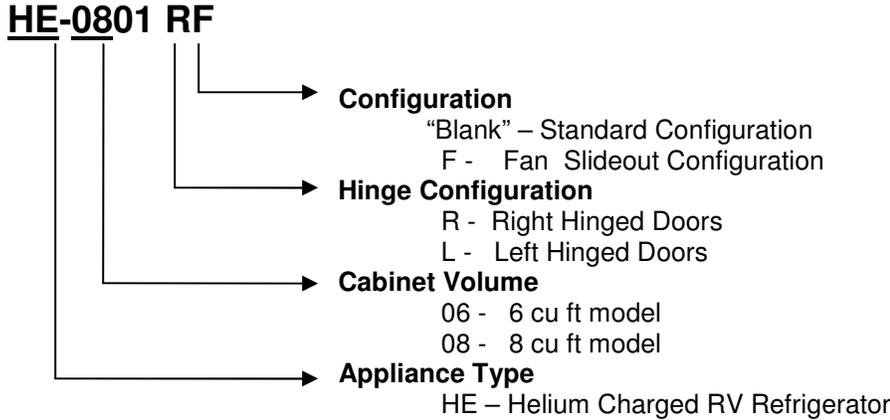
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## **Review Questions**

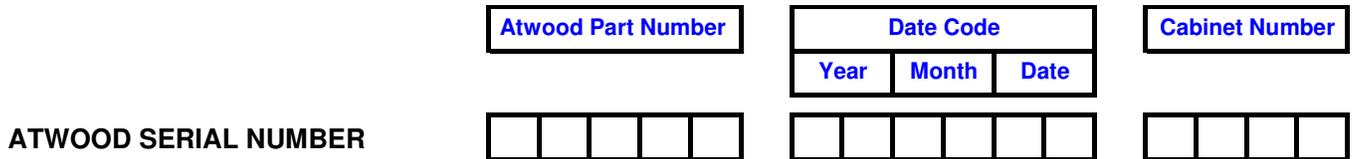
**After reviewing this manual, you will be able to answer the following questions:**

- **What is the refrigerator's AUTO mode and how does it choose the power source?**
- **How does the temperature setting affect the refrigerator's internal temperature?**
- **What is the Backup Temperature Control system? How is it connected to the thermistor?**
- **What are the pinouts for the Powerboard connectors?**
- **How to handle a "poor cooling" complaint?**
- **What are all of the fault conditions which the control can display?**
- **How can the tilt feature be verified if it is working properly?**

## Model Number Description



## Serial Number Description



Constructed based on Model Number, door hinge, fan

11001	HE-0601R
11002	HE-0601L
11003	HE-0601RF
11004	HE-0601LF
11005	HE-0801R
11006	HE-0801L
11007	HE 0801RF
11008	HE-0801LF
12001	HE-A0601R
12002	HE-A0601L
12003	HE-A0601RF
12004	HE-A0601LF
12005	HE-A0801R
12006	HE-A0801L
12007	HE A0801RF
12008	HE-A0801LF

The cabinet number starts at "0001" for each new model number, for example: if on Oct 16, 2011 the first 3 cabinets are HE-0601L and the next 3 cabinets are HE-601R, and the following 2 cabinets are HE-801LF they would have the following Atwood serial numbers:

- 110021110160001
- 110021110160002
- 110021110160003
- 110011110160001
- 110011110160002
- 110011110160003
- 110081110160001
- 110081110160002



**CONTROL PANEL**

The refrigerator control panel is located between the fresh food and freezer compartments of your refrigerator. The refrigerator control requires +12 volts DC to operate. There are three pushbuttons.

**POWER ON** – Pressing this pushbutton turns the refrigerator on and off.

**MODE** – Pressing and holding this pushbutton cycles the mode selections from AUTO, manual GAS, and manual AC. Releasing the pushbutton selects the last mode displayed. The selected mode will be displayed for approx 5 seconds before all the mode indicators are turned off. The active mode can be displayed at any time by pressing and releasing the MODE pushbutton.

**TEMP** – Pressing and holding this pushbutton cycles the temperature settings from 1 through 5 with 5 being the maximum cool setting. Releasing the pushbutton selects the last temperature setting displayed. The selected temperature setting will be displayed for approx 5 seconds before all the temperature indicators are turned off. The active temperature setting can be displayed at any time by pressing and releasing the TEMP pushbutton.

**AUTO MODE**

When the refrigerator is in the AUTO mode, the control automatically selects the best energy source which is available. When a more efficient energy source becomes available, the refrigerator automatically switches to the more efficient source. AC energy is considered the more efficient energy source and is the first choice selected by the control. Propane gas is the second choice and is selected in the AUTO mode only when AC energy is not available.

**GAS MODE**

The GAS mode can be selected either automatically or manually. When switching to gas operation, the refrigerator control begins a 40 second trial ignition cycle. During this period, the control opens the gas safety valve and begins sparking the burner. If after 40 seconds the control fails to detect the presence of a flame, the control shuts off the gas safety valve and stops sparking the burner. The CHECK indicator on the control panel turns on indicating that the burner failed to ignite. The CHECK indicator can be reset by turning the refrigerator off and then back on again and a new 40 second trial ignition cycle begins. On initial start up or after changing a propane tank, it is possible that air in the gas supply lines will require 2 or 3 ignition trials before successfully lighting the burner. If after repeated attempts, the burner fails to ignite, stop and consult your local dealer or an authorized Atwood Service Center.

**MANUAL MODES**

The manual modes allow for selection of either the AC or GAS modes directly. If the selected mode's energy source is not available, the refrigerator is turned off, the

CHECK is turned on and the selected mode indicator flashes on and off indicating which energy source is not available.

**DOOR HANDLES**

The door handles latch when closed to prevent the doors from opening travel. When closing the doors, push each door into the refrigerator cabinet until you hear a distinct "click" sound which will indicate that the door is latched. To open a door, pull the handle away from the refrigerator cabinet to unlatch the handle.

During off-season storage, the handle has a storage latch which prevents the door from completely closing. Keeping the doors partially opened during long term storage prevents odors from building up in the cabinet. To engage the storage latch, open each door about 1/2 inch, hold the door handle in the open position, and push the storage latch into the cutout of the strike plate. Never use the storage latch as a travel latch because the doors will not be fully closed.

**DOOR AJAR ALARM**

This refrigerator has an alarm to alert you if the fresh food compartment door is left not fully closed. If the door is left open for more than 2 minutes, the CHECK light will be lit and a beeper will sound a chirp approx every 5 seconds until the door is closed. The refrigerator will continue to operate normally throughout the door ajar alarm sequence.

**MOISTURE DIVIDER HEATER**

This refrigerator has a heater which is automatically controlled and prevents moisture from forming on the center divider located between the freezer and fresh food compartments.

**BACKUP TEMPERATURE CONTROL SYSTEM**

This refrigerator has a backup temperature control system which allows the owner to have variable temperature control of the refrigerator even if the temperature sensor should fail.

If the control cannot read the temperature sensor, the control uses the selected temperature setting to control the refrigerator cycle and adjust the temperature accordingly.

**THERMAL SWITCH MONITOR**

This refrigerator has a thermal switch which serves as an overheating monitor.

**TILT SENSOR TECHNOLOGY**

This refrigerator control incorporates a patent pending tilt sensor which enables the control to constantly monitor the angle at which the refrigerator is operated. This feature is protects the user from potential hazards attributed to prolonged operation at severe angles of inclination. This monitoring function is completely invisible to the user and only becomes apparent to the user in the rare event that the refrigerator has been operated for prolonged periods of time at severe tilt angles. Normal care in leveling of your vehicle will prevent this feature from ever being noticed.

## Troubleshooting Guide

### Control Display Panel Fault Table

The refrigerator's electronic control provides "fault codes" for a variety of fault conditions.

For example, if the thermal switch located on the canister just above the burner box reaches an abnormally high temperature, the thermal switch "opens" and the control display panel lights up the following indicators: CHECK, AUTO, GAS, AC, DC and they remain ON when the control is powered ON. In addition, all the power source outputs (the AC relay and the GAS valve relay output) are all disabled.

Another example, if the refrigerator is in GAS mode and the burner fails to ignite in the 45 seconds allowed, the control display panel turns on the GAS indicator, it flashes the CHECK indicator, and the beeper sounds a beep lasting 240ms.

A third example, if the door is left open for longer than 2 minutes, the CHECK indicator flashes and the beeper sounds a very short beep approximately every 2 seconds.

The table below provides a complete listing of all of these fault codes.

Condition	Beeper	CHECK	AUTO	GAS	AC	DC	NOTE
Open Thermal Switch on Heat Source	OFF	ON	ON	ON	ON	ON	
Under Voltage Condition (<8V)	OFF	ON	ON	ON	ON	ON	
Open fuse F3 (Controller)	OFF	ON	ON	ON	ON	ON	
AC Mode and No AC Supply	250ms	ON	OFF	OFF	ON	OFF	
DC Mode and No DC Supply	250ms	ON	OFF	OFF	OFF	ON	
GAS Mode and no Ignition	240ms	FLASH	any	ON	OFF	OFF	Latched after 33 sec
Door Open > 2 minutes	80ms	FLASH	any	any	any	any	any mode, every 2 sec
Thermister Open or Short	OFF	FLASH	any	any	any	any	any mode, every 10sec
Stress Monitor Fault (initial)	720ms	ON	OFF	OFF	OFF	OFF	Latched Nonvolatile
Stress Monitor Fault (after power cycle)	OFF	ON	OFF	OFF	OFF	OFF	Latched Nonvolatile
Flame Detect circuit offset too high	240ms	ON	any	ON	OFF	OFF	Detected at power up
No Communication from Display Board	any	any	any	any	any	any	Heat sources OFF

Condition	Beeper	TEMP1	TEMP2	TEMP3	TEMP4	TEMP5	NOTE
Thermister Open or Short	OFF	FLASH	FLASH	FLASH	FLASH	FLASH	FLASH if ON

Enter Diagnostic Display Mode by pressing MODE and TEMP simultaneously for 5 sec during NORMAL operation

Diagnostic Display Mode	Beeper	CHECK	AUTO	GAS	AC	DC	NOTE
	OFF	ON	STR2	STR1	STR0	OFF	Stress Monitor
		TEMP1	TEMP2	TEMP3	TEMP4	TEMP5	
		ON	OFF	TILT2	TILT1	TILT0	Tilt Monitor

Condition	Beeper	CHECK	AUTO	GAS	AC	DC	NOTE
No Communication from Display Board	any	any	any	any	any	any	Heat sources OFF

Condition	Beeper	TEMP1	TEMP2	TEMP3	TEMP4	TEMP5	NOTE
No Communication from Display Board	any	any	any	any	any	any	Heat sources OFF

## Troubleshooting Guide

### Temperature Setting Setpoints

There is a high temperature TURN ON setpoint and a low temperature TURNOFF setpoint associated with each temperature setting. The corresponding voltage at the input pin (J10-1) is listed for each temperature point. This results in an average temperature for each setting given in the small table on the right. Please note that this is the average temperature for the FIN - the average CABINET AIR temperature will be approximately 6-8 degrees warmer than the FIN temperature.

Cooling Level	High Temp to Turn ON	Volts @ High Temp for ON	Low Temp to turn OFF	Volts @ Low Temp for OFF	Temp for Strip to Turn ON	Volts for Strip to Turn ON	Avg Temp Targ	Volts @ Temp Targ
1	36	1.21	28	1.39	42	1.09	32	1.30
2	34	1.26	26	1.43	40	1.13	30	1.34
3	32	1.30	24	1.48	38	1.17	28	1.39
4	30	1.34	22	1.53	36	1.21	26	1.43
5	26	1.43	18	1.63	32	1.30	22	1.53

Note: Lower Voltage = WARMER

### Condition Poor Cooling

### Solution

#### INFORMATION GATHERING

First – we need to define what is meant by “poor cooling”.

- 1) What are the outside ambient conditions? Direct sunlight on vehicle?
- 2) What are the temperatures in the freezer air and the cabinet air?
- 3) Is there reported frost buildup in cabinet or freezer?
- 4) Is the cabinet level?
- 5) What is power source? Does problem happen with AC and GAS?
- 6) Is there evidence of “frosted elbow” (ie cooling not being used up)
- 7) Is there adequate ventilation? (ie, no blockages, etc)

Verify: In AC mode, verify AC heater is energized with 2.7amps

Verify : In GAS mode, that burner is being ignited and flame has good shape and color

Next - attempt to get accurate temp data

- 1) Suggest running cabinet overnight with thermometers placed
- 2) Get thermocouple data if possible
- 3) Have dealers/service centers run cabinet outside of RV overnight

### Poor Cooling

- 1) Refrigerators perform poorly in 100-110°F; especially in direct sunlight  
These refrigerators may perform normally in 90°F
- 2) Door gasket leakage can lead to abnormal high internal temperatures
- 3) Leakage generally caused by door mis-alignment or poor gaskets
- 4) Off level cabinets inhibit good absorber/condenser function (3° angle)
- 5) If one power source is worse – focus on that power source
- 6) Suggests poor evaporator tube contact in freezer and/or cabinet fin
- 7) Poor ventilation directly affects cooling performance
- 8) AC heater may not be delivering full power (ie damaged, open circuit)
- 8a) Incoming AC power may be below 110VAC (90-100 VAC problematic)
- 9) Gas pressure may not be 11”wc; burner may be misaligned if the flame wicks up along the side of the flue

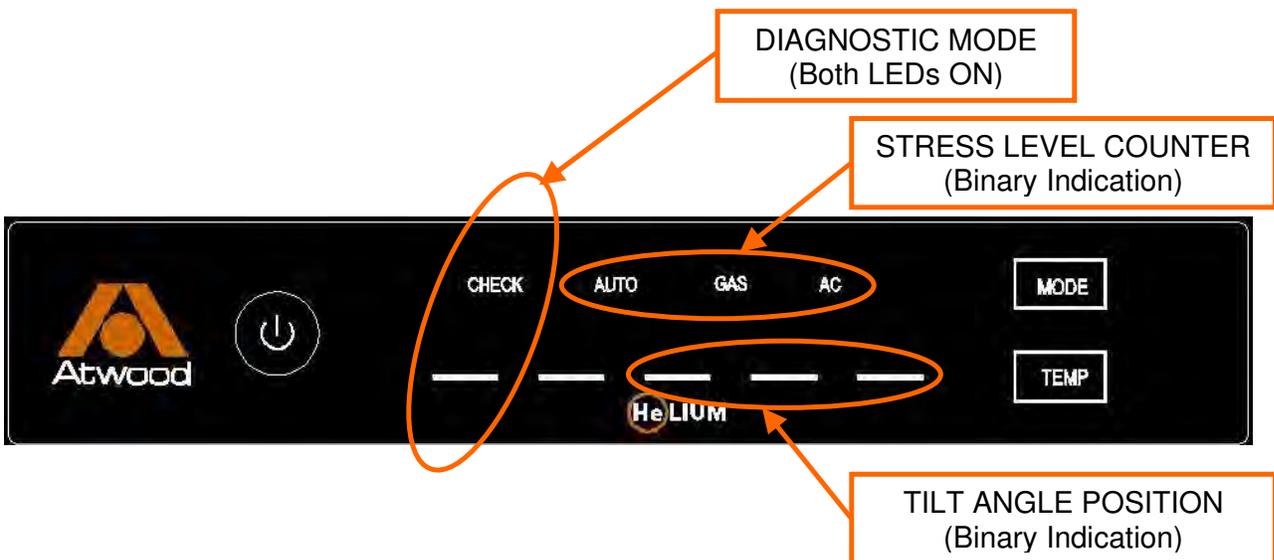
**DIAGNOSTIC MODE WORK INSTRUCTION OF REFRIGERATOR rev 1**

(NOTE: The diagnostic mode is only accessible from a normal, power on condition)

**1. Make sure the refrigerator is powered on and functioning normally.**

**2. To enter the Diagnostic Mode, perform the following steps:**

1. Press and hold both the TEMP and MODE pushbuttons together while watching the LEDs on the left hand side of the display board;
2. After about 2 seconds of holding both pushbuttons down, both the CHECK LED and the leftmost bar indicator on the temperature setting LEDs will turn on.
3. Release both the TEMP and MODE pushbuttons within 1 second of the two LEDs becoming lit and the display will be in the diagnostic mode.
  - a) The CHECK and the leftmost bar both ON indicates that the display is in diagnostic mode
  - b) The AUTO, GAS, and AC LEDs indicate the contents of the stress level counter in binary with the AC indicator being the least significant bit and the AUTO indicator being the most significant bit
  - c) The 3 LEDs on the right-hand side of the temperature setting LEDs indicate the tilt position angle of the power board in binary with the rightmost LED being the least significant bit.
4. To exit the diagnostic mode and return to normal operation, press either the MODE or TEMP buttons.



4. Normally the tilt angle position is zero (all LEDs OFF) when the powerboard is mounted on the refrigerator and the refrigerator is standing vertical. As the powerboard is tilted approximately 5 degrees either to the right or the left, one rightmost LED will light. As the powerboard is tilted to 10 and 15 degree angles off of vertical, the tilt position will count up in binary to “010” and “011” respectively. When the refrigerator is returned to the vertical position, all three LEDs should again be OFF. This indicates that the tilt sensor is performing normally. If none of the LEDs turn on as the refrigerator is tilted thru these angles – you should contact an authorized service center immediately. If when the refrigerator and the powerboard are standing vertical and all three of the LEDs are not OFF – this indicates that the tilt calibration procedure may need to be performed. Please contact an authorized service center.
5. Normally the stress level counter is zero (all LEDs OFF) indicating that the control has not been operated at severe position angles for any length of time. It is possible that the counter might display “001” or a “010” – this indicates that the refrigerator had been operated at a severe angle for short periods of time. The owner should be alerted that better care of leveling needs to be taken when operating his refrigerator particularly during long-term storage. If the counter displays “110” or “111” - the owner should contact an authorized service center immediately as the refrigerator has been operated for long periods of time at severe position angles.

**HE-0601  
 HE-0801**

**GAS ABSORPTION  
 RV REFRIGERATORS**

