United Electronics

Aluminum Aging Furnace AF-58913/AF-59686

Operator’s Manual

Introduction

The AF-58913/AF-59686 is a furnace designed for heat treatment of aluminum pieces in an industrial environment. It uses a conveyor system to move the pieces into the furnace chamber, sliding doors to close off the entry and exit when the conveyor is not moving, and an electric heater (model AF-59813) or gas burner (model AF-59686) to provide heat.

About This Manual

This manual is intended to assist the furnace operator in operating the furnace, diagnosing several types of simple problems, and performing repairs on certain user-serviceable components. It is not intended to be a reference for service technicians performing other work on the machine.

Important Safety Warnings

- To prevent electric shock, disconnect power before servicing. 120 volts AC is present whenever the plug is inserted in the outlet, even if the machine is off.
- To reduce the risk of fire, do not allow the machine to operate unattended.
- If the machine emits an unusual noise or odor, or if it produces smoke, immediately disconnect the power and call for service.

Automatic Page

Most functions of the machine are performed using the Automatic page (see figure 1) of the display.

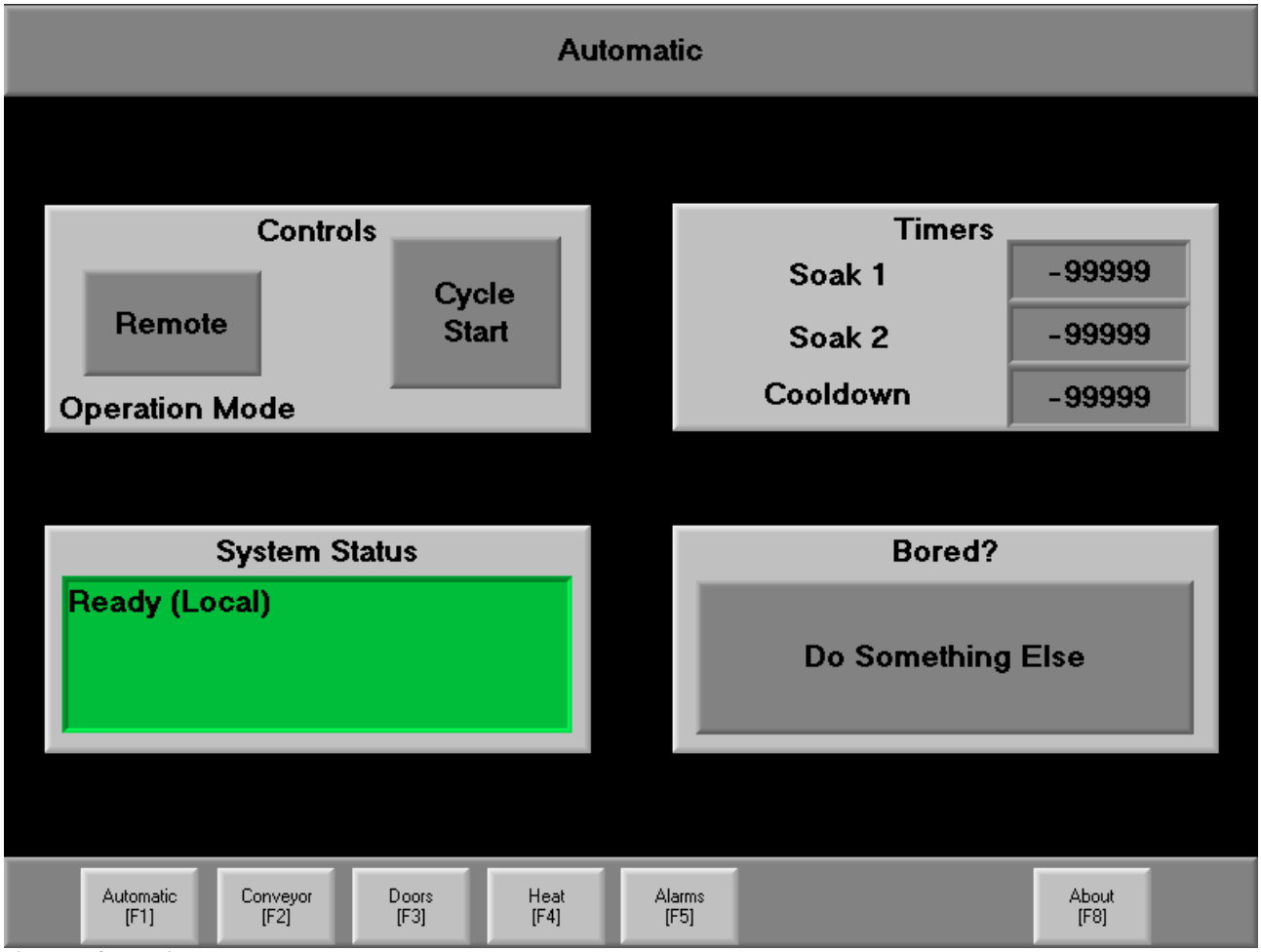

Figure 1 – Automatic Page

To start a cycle, first ensure that the system status display indicates that the system is ready. If it does not, use the conveyor, doors, or alarms pages (covered later in this manual) as necessary to correct the condition displayed.

Once the system is ready, use the operation mode control to select either local or remote operation. In local mode, the cycle start button on-screen is used to start the cycle, while in remote mode, a remote start switch is used. After the mode is selected and a start signal is received, the following occurs:

- Entry and exit doors open
- Conveyor moves into the furnace
- Entry and exit doors close
- Circulation fan starts, periodically reversing direction
- Furnace heats to approximately 100°F
- Temperature is maintained at 100°F for 180 seconds
- Heat increases to 140°F
- Temperature is maintained at 140°F for 180 seconds
- Heat is disabled and the fan continues to run for 30 seconds

- Fan stops
- Entry and exit doors open
- Conveyor moves to the far right
- Display indicates "End of Process" for 10 seconds (another start signal will skip this delay)
- Conveyor moves to the far left
- Entry and exit doors close

If at any point in the process it is desired to skip one of the timers, press the associated time remaining display to set the remaining time to 0. This can be done at any point in the cycle after the conveyor begins to move for the first time.

Conveyor Page

The conveyor page (see figure 2) is used to monitor the status of and manually operate the conveyor.

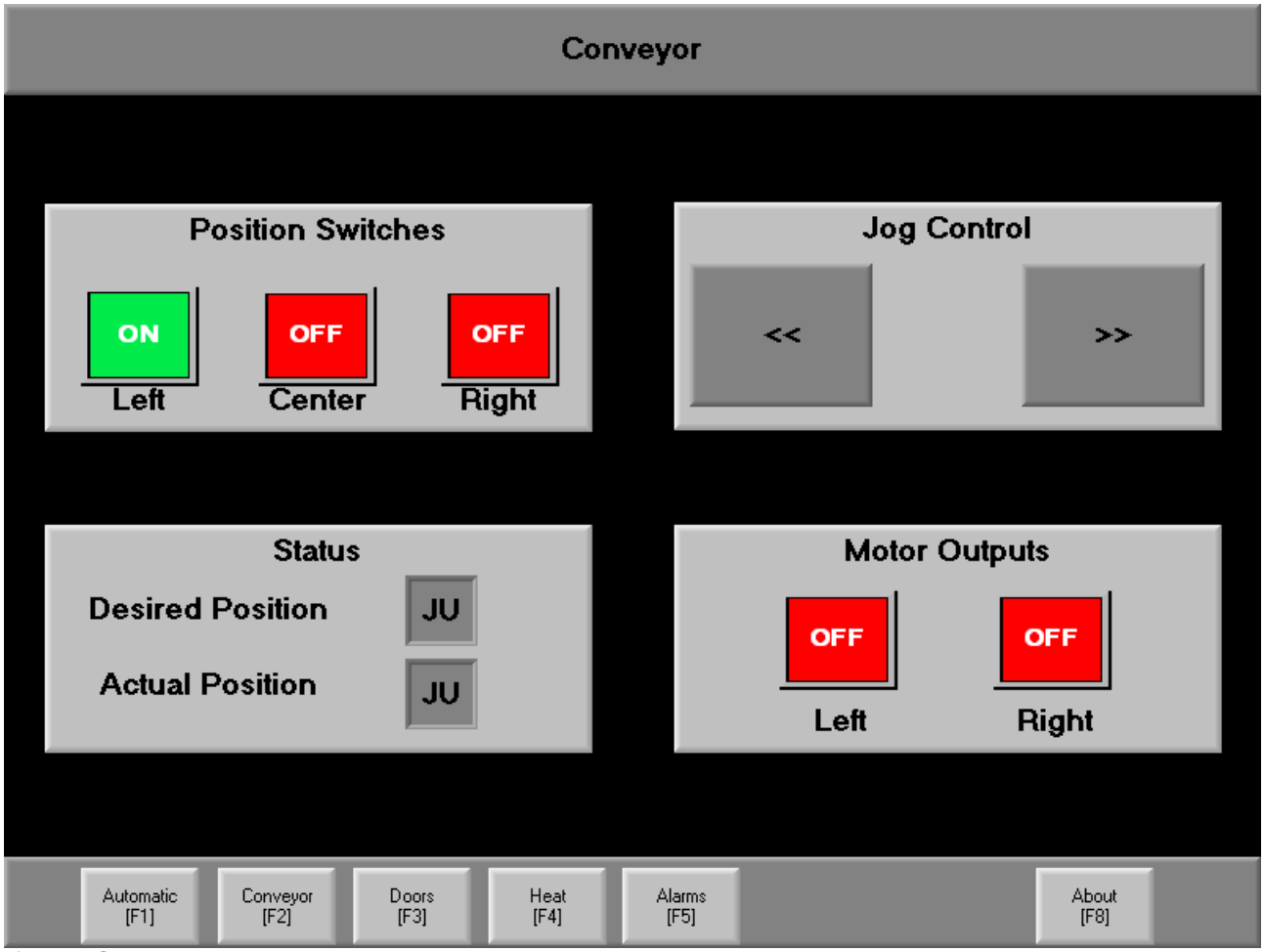

Figure 2 – Conveyor Page

This page is divided into four parts as follows:

- **Position Switches:** Indicates the status of the limit switches at each end of the conveyor travel as well as the center position sensor.
- **Jog Control:** When the furnace is not currently operating and no alarms are present, pressing and holding one of these buttons will move the conveyor in the corresponding direction.

- **Status:** Indicates the current position of the conveyor as well as its destination. The possible values are:
  - LL: Full Left
  - LM: Left of Center
  - CL: Center
  - RM: Right of Center
  - RL: Full Right
  - JU: Unknown or Invalid
- **Motor Outputs:** Shows the signals being sent to the conveyor motor.

Doors Page

The doors page (see figure 3) is used to monitor the status of and to manually control the doors.

Figure 3 – Doors page

This page is divided into four parts as follows:

- **Position Switches:** Shows the status of the door limit switch inputs.
- **Jog Control:** When the furnace is idle, press and hold these buttons to open/close the doors.
- **Status:** Shows the position and destination of both doors, either OP for open or CL for closed.
- **Motor Outputs:** Shows the signals being sent to the door motors.

Heat Page

The heat page (see figure 4) is used to view the status of and manually control the heater and fan.

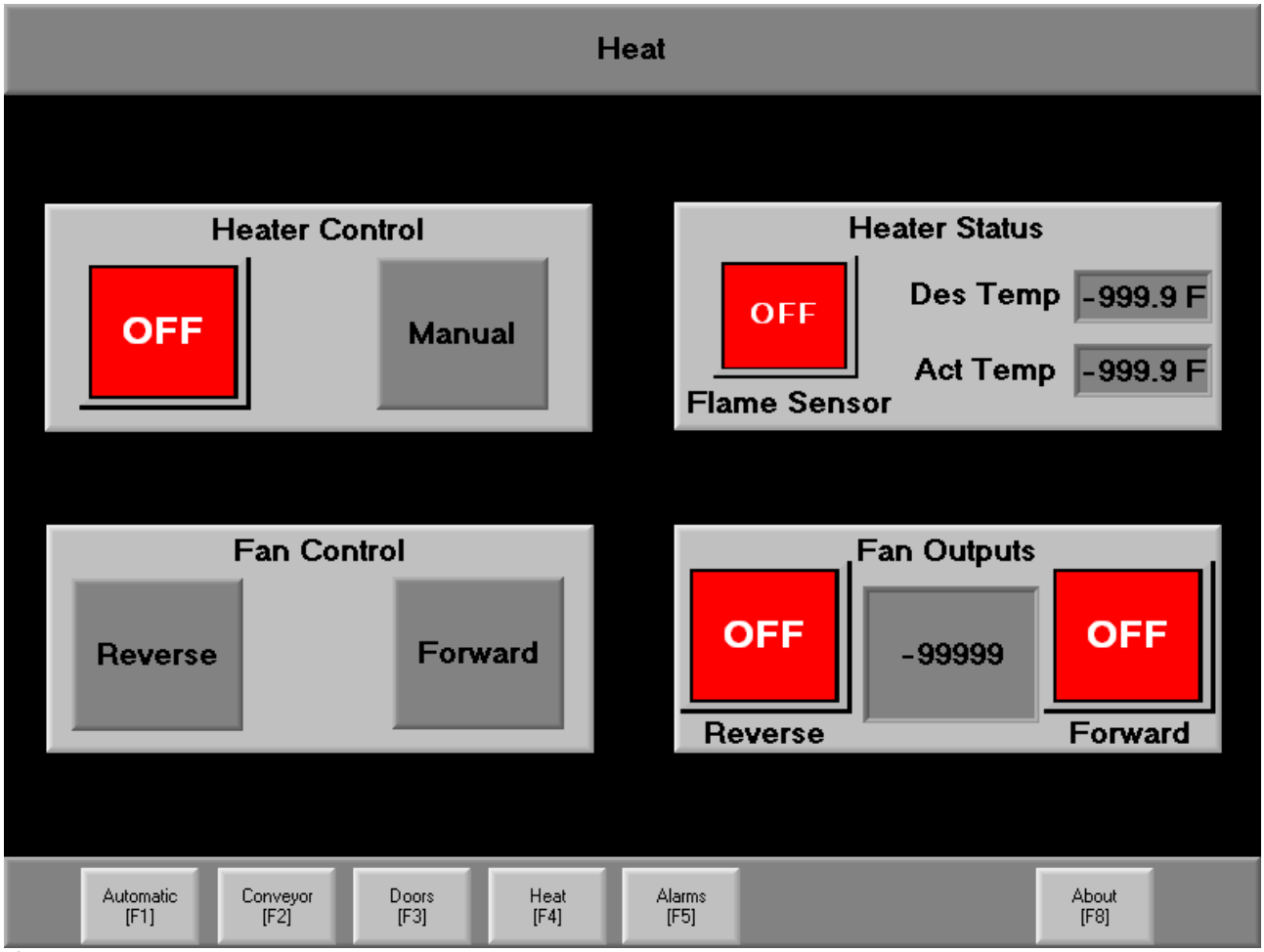

Figure 4 – Heat page

This page is divided into four sections as follows:

- **Heater Control:** Shows whether the heater is on or off. When the furnace is idle, pressing and holding the manual button will enable the heater.
- **Heater Status:** Shows whether the sensor has detected a flame (for gas models) or that the heater is operational (for electric models) as well as the current and set point temperatures.
- **Fan Control:** When the furnace is idle, pressing and holding the reverse or forward button will cause the fan to run in the corresponding direction.
- **Fan Outputs:** Shows the current direction (if any) of the fan as well as its current speed.

About Page

The about page (see figure 5) shows the model and serial numbers of the furnace.

Figure 5 – About page

Shutdown Page

The shutdown page (see figure 6) is displayed whenever ESC is pressed.

Figure 6 – Shutdown page

When this page is active, all furnace activity stops and the power may be disconnected without causing an alarm when power is reapplied. If this page was inadvertently selected and continued operation is desired, pressing the restart button will cause the furnace to resume normal operation.

Alarms Page

The alarms page displays any errors that occur during operation of the furnace. If one or more errors are present, this page will show a list of the subsystems (conveyor, doors, heat, and system) in which errors have occurred. If the condition causing the error has been cleared, pressing reset will clear the alarms. Otherwise, pressing the details button for any subsystem will show a list of all alarms currently present.

Each alarm line shows an alarm ID number for finding the corresponding entry in the troubleshooting table, as well as the name of the alarm, a red light bulb icon if the condition causing the alarm is still present, a yellow check mark if the alarm has been acknowledged, and a button to view details about the alarm.

When viewing details about an alarm, all of the previous information is still displayed, along with a description of what caused the alarm. The “Ack” (acknowledge) button will silence the buzzer, and the “Reset” button will clear the alarm if the condition causing it is no longer present.

Troubleshooting

Conveyor Alarms		
ID/Name	**Likely Causes**	**Solutions**
000 – Motor Fwd Timeout	• Conveyor jammed • Conveyor motor or relay failure • Conveyor right limit switch failure	• Remove obstruction • Check conveyor motor, relays, and limit switches. Replace as necessary.
001 – Motor Rev Timeout	• Conveyor jammed • Conveyor motor or relay failure • Conveyor left limit switch failure	• Remove obstruction • Check conveyor motor, relays, and limit switches. Replace as necessary.
002 – Position Loss	• Power loss during conveyor motion • Conveyor limit switch manually pressed • Conveyor limit switch failure • Bright light pointed at conveyor center sensor	• Acknowledge alarm, reset all other alarms, and manually move conveyor to the far left • Ensure that limit switches are not being pressed manually • Check limit switches and replace as necessary • Do not expose the center sensor to bright lights
011 – External Alarm	• Alarm signal was received from an external device (conveyor drive, safety guard, etc.)	• Check external device
014 – Conveyor Overshoot	• Conveyor limit switch manually pressed • Conveyor center sensor failure	• Ensure that limit switches are not being pressed manually • Check center sensor, adjust or replace as necessary

Door Alarms		
ID/Name	**Likely Causes**	**Solutions**
003 – Entry Open Timeout 004 – Entry Close Timeout 005 – Exit Open Timeout 006 – Exit Close Timeout	• Door jammed • Door motor, relay, or limit switch failure • Door mechanical failure	• Remove obstruction • Check motor, relays, and limit switches. Replace as necessary. • Check and repair door mechanism
007 – Entry Door Limit Error 008 – Exit Door Limit Error	• Door limit switch manually pressed • Door limit switch failure	• Ensure that limit switches are not being manually pressed • Check limit switches, replace as necessary
012 – External Alarm	• Alarm signal was received from an external device (door drive, lock, etc.)	• Check external device
System Alarms		
ID/Name	**Likely Causes**	**Solutions**
009 – Power Loss	• Furnace not shut down properly • Loose power connection • Failing 24V power supply	• Always press ESC before removing power • Check and tighten all terminals • Check 24V power supply, replace as necessary
010 – Emergency Stop	• Emergency stop button activated	• Reset stop button
013 – External Alarm	• Alarm signal was received from an external device (battery backup, temperature monitor, etc.)	• Check external device
Heat Alarms		
ID/Name	**Likely Causes**	**Solutions**
015 – Unexpected Ignition 016 – Extinguish Timeout	• Sensor cover missing • Sensor out of adjustment • Heat relay failure	• Reinstall light sensor cover • Adjust potentiometer on fan/sensor board • Check heat relay, replace as necessary
017 – Ignition Failure	• Heater failure • Sensor out of adjustment • Heat relay failure	• Replace heater • Adjust potentiometer on fan/sensor board • Check heat relay,

		replace as necessary
018 – External Alarm	• Alarm signal was received from an external device (gas valve, safety cover, etc.)	• Check external device
019 – Heat Timeout	• Cover open • Room too cold	• Close cover • Heat area around furnace to at least 50°F