



# REFLOW SOLDER OVEN MODEL GF-12HC/HT-N INSTRUCTION MANUAL

## WARNING:

FAILURE TO READ AND FOLLOW THESE INSTRUCTIONS IN THEIR ENTIRETY PRIOR TO INSTALLATION AND OPERATION MAY VOID WARRANTY AND RESULT IN PERSONAL INJURY AND DAMAGE TO PROPERTY! Please pay particular attention to all items marked "CAUTION!" in manual. Be sure that all personnel who are to operate this machine are first fully familiar with this manual and are instructed on proper safety procedures, practices and precautions.

## 1. Installation

Carefully uncrate the machine and remove it from its pallet. Place it in a suitable location, allowing sufficient working area at the front and ends of the machine, and approximately three feet behind it.

### CAUTION!

Do not lift or move the machine by its conveyor as it may be damaged due to excessive loading.

- A. Lift pallet and remove 4 screws
- B. Remove oven from pallet
- C. Carefully tilt the machine backwards and install the 2 jacking feet (leveling feet), into the threaded holes at the bottom front base legs. Proceed to carefully tilt the machine toward its front and install 2 jacking feet at the bottom rear base.
- D. Utilizing the jacking screws, carefully level and machine at its permanent location. Please check that the hood opens and closes properly, and relevel as necessary.
- E. Attach 4" diameter (155mm) metal duct to the header flange located on top of the machine. Provide suction to draw approximately 100 cubic feet per minute maximum (2832 liters per min max.).
- F. Connect to appropriate electrical power source, per wiring diagram attached.

## 2. Model GF-12HC-HT Utilities & Specifications

Electrical Power	220 VAC, 50/60 Hz, 1Ø , 5.4 kW
Max Board Width	12" (305 mm)
Max Temperature GF-12HC	482° F (250° C)
Max Temperature GF-12HC-HT	662° F (350° C)
Heated Tunnel Length	2 6" (660 mm)
Overall Dimensions	3 9" x 33" x 19" (990 x 838 x 483 mm)

### **IMPORTANT!**

Check all connections and carefully inspect entire machine and installation prior to start-up.

## 3. Operation

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- A. Turn all switches to OFF position.
- B. Make sure entire conveyor path is clear and close hood.
- C. Turn MAIN POWER switch on.

An EMERGENCY STOP switch (E-Stop) is located at the right front of the oven which, when activated, immediately shuts power to the conveyor and all heat controllers. The red, mushroom headed switch is normally in the up position and may be activated by depressing the E-Stop switch down. Accordingly, the E-Stop may be reset by pulling the red mushroom head upward.

- D. Turn machine on using procedures outlined in Process Sentry™ computer controller in section IV. of this manual

### **CAUTION!**

Keep fingers, hair, loose clothing, jewelry and other objects away from conveyor ends to prevent risk of injury!

Note that hood may be lifted up at any time, However, a safety switch will shut down that module's heating elements.

### **CAUTION!**

If hood is lifted while machine is hot, avoid touching all interior and surrounding surfaces (including conveyor belt and heater emitters), as serious burns and injuries may result!

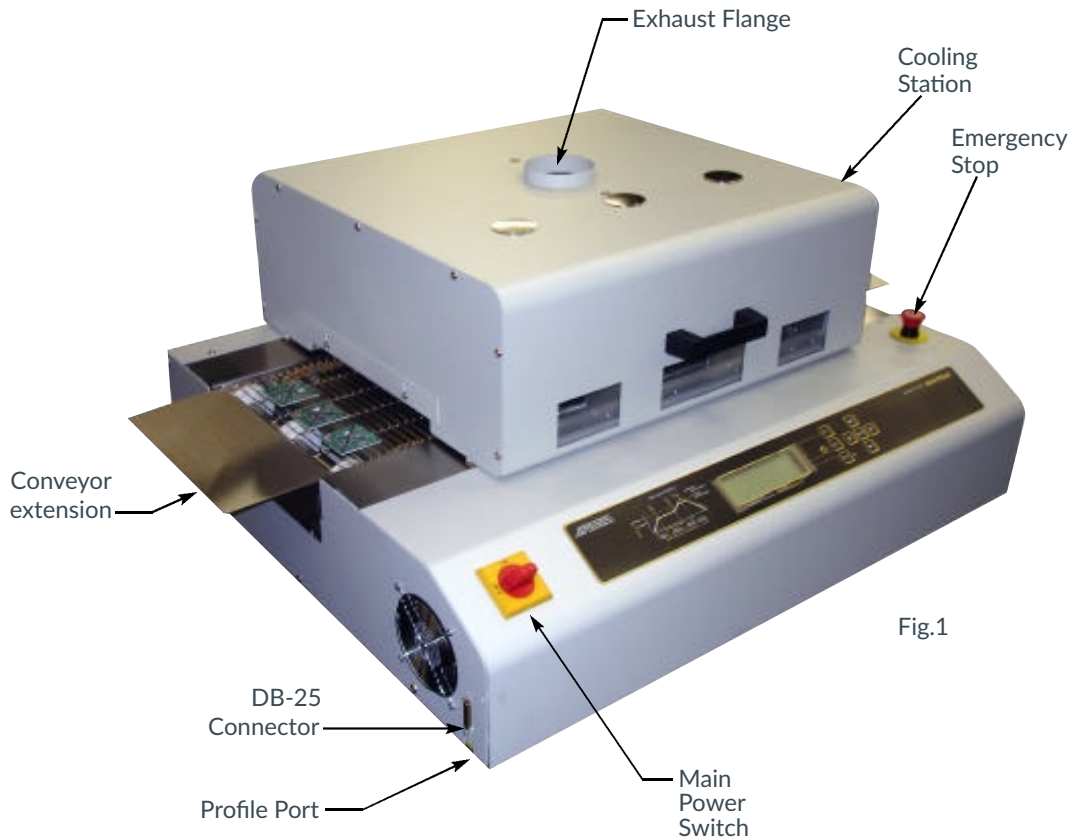


Fig.1

## 4. Oven Operation Using Computer Controlled Process Sentry™

The APS ProcessSentry™ is a microprocessor based, dedicated computer used for controlling and operating all parameters of the GF-12HC oven. The computer operates in one of 6 modes. Process Sentry™ includes a 7 day timer, 100 menu storage, English or metric units, RS 232 interfaceable, SPC fault monitoring and graphic profiling.

### A. MACHINE START-UP:

1. Turn Main Power Switch ON
2. Press any key to continue
3. Press F1 or F2 to scroll through mode selections
4. Press F3 to select one of 6 available modes:
  - a. VIEW
  - b. WORK
  - c. SET UP
  - d. PROFILE
  - e. LOG
  - f. TUNE
5. Press F3 to exit selected mode

B. VIEW Mode: Operator can observe menu numbers 0-100. When switching to WORK mode, parameters seen in VIEW mode will be displayed for use.

C. WORK Mode: Used to turn machine on and operate it after profile menu number is chosen in VIEW mode. Minor parameter changes may now be made in WORK mode on-the-fly.

1. Press F1 (START). ACT (actual) temperature will blink until it reaches Set Point.
2. To activate profile probe on board as it runs through oven, affix temperature probe to board. Actual temperature at probe will be displayed at top right of screen under the word "T prof"
3. To display the graphic display on the screen press F1. The screen then shows the profile curve in real time (beeps every second and makes a mark on the curve). It also displays current temperature, maximum temperature, maximum heat ramp rate and the maximum cooling ramp rate. The curve starts automatically when the temperature probe reaches 100°F (37°C).
4. Press F1 (PROFILE) to deactivate profile probe and return to WORK display.
5. To stop machine, press F3 (alarm sounds, LED lights to warn that machine is off and conveyor continues to run), press F3 again to turn LED and conveyor off.
6. To make "on-the-fly" changes in parameters while machine is running:
  - a. Press F2 (ADJUST) and ENTER key simultaneously (code to enter on-the-fly adjustments). The last parameter change made will be highlighted.
  - b. Scroll to appropriate field using left and right arrows (◀▶)
  - c. Use scroll up, scroll down arrows (▲▼) to change setting of each parameter.
  - d. When on-the-fly adjustments are complete press F2 and ENTER again simultaneously to re-enter normal WORK mode.
7. Auxiliary external output: a DC output signal is provided on the main control board at pin #8. This signal may be used to power a solid state relay which can turn on or off any external device such as a computer, a printer, exhaust fans, input or output conveyors etc. To toggle the signal on, press the left and right arrows (◀▶) simultaneously. "EXT" will appear on the top of the display toward the right side. To toggle the signal off, press the left and right arrows (◀▶). "EXT" will disappear from the display.

#### D. SET UP Mode: (For Maintenance or adjustments only)

1. Press Security Code F2 ◀-▶-◀- and hold simultaneously until table appears
2. Scroll to appropriate field using left and right arrows (◀▶)
3. Scroll up, scroll down arrows (▲▼) change setting of each parameter:
  - a. MENU
    - a. FULL option: allows access to all modes
    - b. SAFE option: allows access to VIEW and WORK modes only
  - b. ZONES - Shows total number of heating zones in machine
  - c. TEMP - Change from °F to °C (automatically converts all programs)
  - d. SPEED - Change from feet per minute (fpm) to meters per minute (m/m) (automatically converts all programs)
  - e. RAMP T OUT - Do Not Change (Factory set)
  - f. SCHEDULE - Press Enter to display 7-day timer, set Start and Stop Time and desired profile for each day. When a day is set to "OFF", the automatic timer is disabled. Press F3 to return to SETUP menu
  - g. PROB - Measure the resistance of the external thermocouple to be used for profiling a product. Round value to nearest 10 and enter into PROB setting.

NOTE: This must always be performed whenever an external thermocouple is replaced.

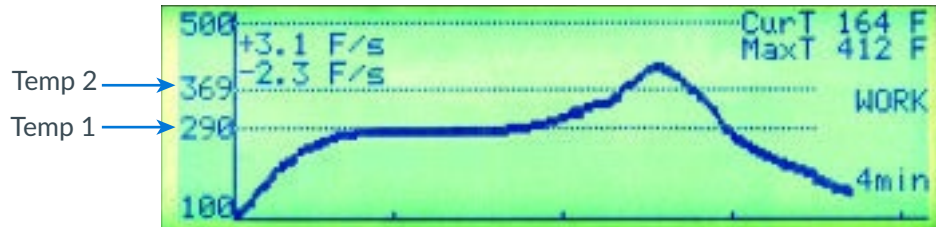
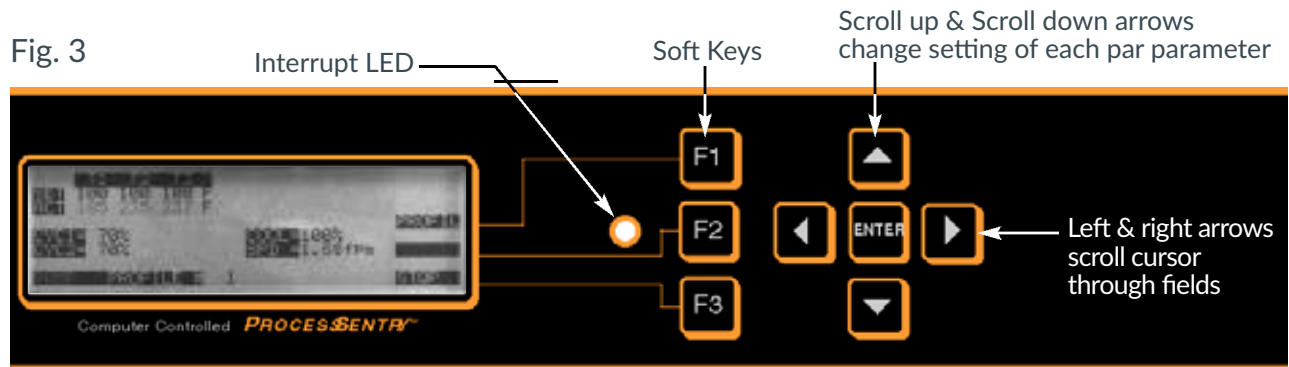


Fig. 2

Graphic profile display

Fig. 3



- h. CYCS - Shows number of cyclonic generators in machine
- i. COOL - Jacket and/or control panel cooling fans stay on for indicated time of up to 60 minutes (in 10 minute increments) after shutdown.
- j. CONVEYOR - DO NOT CHANGE (factory set)
- k. CALIB - Disables internal thermocouple calibration offset
- l. Change Date and Time (at bottom of screen)

**E. PROFILE Mode:** Operator can change settings of all displayed parameters.

1. Scroll left, scroll right arrows (◀▶) move the cursor through the profile fields (Item flashing is ready to be changed)
2. Scroll up, scroll down arrows (▲▼) change setting of each parameter
3. PROF- (Fig. 3) For changing graphic profile display settings including: Time in minutes (choice of 4 or 8 min.), Maximum Temp (choice of 500°F/260°C or 700°F/371°C), Temp 1 (arbitrary horizontal reference line normally set for activation temperature), & Temp 2 (arbitrary horizontal reference line normally set for melting temperature).
4. CYC - For changing cyclonic generator settings from 20% to 100% in 10% increments. To turn cyclonics off, set to 0%
5. COOL - For changing cooling station settings from 20% to 100% in 10% increments. To turn cooling station off, set to 0%
6. SPD - Sets conveyor speed in feet per minute or meters per minute

**F. LOG Mode:** Displays history of machine - date, time, profile no., and event which occurred. Two pages of information are stored. Press F1 (SCRL) to toggle between pages. When both pages are full, any new entry automatically erases the oldest entry.

**G. TUNE Mode:** DO NOT CHANGE (factory set).

H. STATUS LIGHT TOWER (option) - When main power is switched on, the light tower executes a test sequence. The red, amber and green lights will light momentarily in sequence. When in WORK mode, the amber light indicates that machine is ramping but parameters are not within setpoint range. When parameters are within range, the amber light turns off and the green light is activated. When any fault occurs or when WORK mode is stopped, the red light activates.

#### I. ENHANCED PRINTING OPTION:

A serial printer or PC may be connected to the DB-25 connector located on the left end of the control panel near the fan grille. With a PC, launch Microsoft Hyperterminal and set up the parameters below. With a serial printer set parameters, below:

BAUD: 4800 bps  
DATABITS: 8  
STOP BITS: 1  
PARITY: NONE  
FLOW CONTROL: NONE

#### FUNCTIONS ARE AS FOLLOWS:

1. To print a profile from one of the stored menus: in profile mode, press F2.
2. To print the event log: in LOG mode, press F2

NOTE: Whenever a log event occurs while machine is in WORK or TUNE mode, the event will automatically print.

3. To collect SPC data:

In WORK mode, press F2, left ( ) and up ( ) arrow simultaneously to print instantaneous list of all actual parameters.

4. To print a profile graph:

In WORK mode, press F1 to enter graph screen. The profile will automatically be printed in real time.

#### J. PC INTERFACE OPTION

Follow instructions provided in PC interface manual

## 5. Shutdown

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### CAUTION!

Failure to follow proper shutdown procedures may result in machine damage, fire or personal injury!

A. Clear all product from machine conveyor.

B. To stop machine, press F3 (alarm sounds, LED lights to warn that machine is off, conveyor continues to run), press F3 again to turn LED and conveyor off.

C. For auto-timer, refer to the SET-UP MODE section of these instructions. This should be pre-programmed in SET UP mode; Press F3 to enter WORK mode. Press F2 to enable automatic start timer. Next start/stop time is displayed above current time.

## **CAUTION!**

DO NOT TURN MAIN POWER SWITCH OFF, AS THIS WILL DEFEAT THE CHAMBER COOLING FAN TIMER, and thus prevent the machine from cooling itself sufficiently prior to full shutdown.

After the chamber cooling fan timer has expired, the main MAIN POWER switch may be turned off, **providing automatic timer is not being utilized**. Computer is provided with battery for real time clock. **If time and date are not correct on initial start-up, battery must be replaced.**

## **6. Maintenance**

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### **CAUTION!**

NEVER CLEAN OR PERFORM MAINTENANCE ON THIS MACHINE WHILE IT IS HOT OR CONNECTED TO ELECTRICAL POWER.

- A. Check that the machine has fully cooled to room temperature and disconnect electrical power at the circuit breaker. All switches should be turned off.
- B Machine exterior panels may be cleaned periodically with a household type glass cleaner or mild detergent using a clean soft cloth. Viewing windows (partially exterior polycarbonate), should be cleaned with a non-abrasive, soft, lint-free cloth, as it is susceptible to scratching.
- C. Upper heating zones may be cleaned by using the hood to gain access. The upper emitters and chamber surfaces tend to accumulate deposits caused by vaporized flux and fumes, resulting in decreased efficiency of emitters and reflective surfaces.
- D. Lower heating zones may be accessed by gently lifting the conveyor belt. The lower zones tend to accumulate fallen dust and debris.

### **IMPORTANT!**

**Be careful when performing cleaning or maintenance functions near the emitters, as they are fragile and susceptible to breakage.**

- E. Apply a light coat of high temperature furnace lubricant (non-silicone based), to the upper surfaces of the brass conveyor support guides as necessary. Conveyor squeaking or scratching sounds indicate an absence of sufficient lubrication.
- F. Bearings used in your machine are pre-lubricated and sealed, thus requiring no regular maintenance.
- G. Prior to each start-up, make a thorough visual inspection of the entire machine, and repair or replace any worn or defective parts. fumes, resulting in decreased efficiency of emitters and reflective surfaces.
- D. Lower heating zones may be accessed by gently lifting the conveyor belt. The lower zones tend to accumulate fallen dust and debris.

## **7. Inert Gas Option**

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1. Connect room temperature nitrogen to fitting at rear of flow meter.
2. Turn flow meter knob counter-clockwise until the floating steel ball in the meter indicates the desired nitrogen volume. (300 SCFH is a recommended starting point).

3. To decrease the O<sub>2</sub> PPM level, increase the nitrogen volume. To increase the O<sub>2</sub> PPM level, decrease the nitrogen volume.
4. The oven must be purged with nitrogen for a minimum of 10 minutes prior to soldering.
5. IMPORTANT: When soldering is completed, it is important to turn off flow meter in order to stop the flow of nitrogen.

