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# TP04100A
# ThermoStream®

## Contents

A. **OPERATOR'S MANUAL** (English)



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TEMPTRONIC CORPORATION

## Operator Notes

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# 1. Safety Precautions

## 1.1. Scope of Operator's Manual

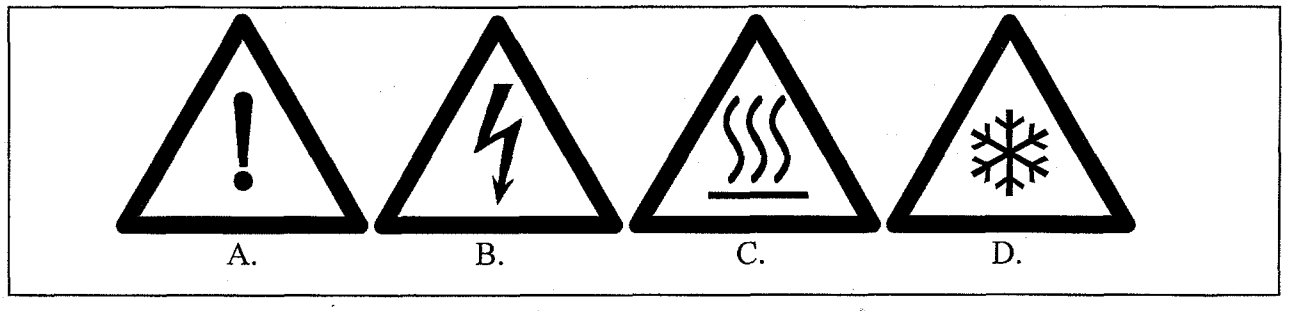
This manual contains procedures intended for use by operating personnel. Refer to the *TP04100A Interface & Applications Manual* for general and advanced operation, assembly, interfacing, interconnecting, preventive maintenance and remote operation parameters. The *TP04100A Service Manual* is for corrective maintenance procedures and is intended for use by service personnel.

## 1.2. Safety Precautions For Operating Personnel

**WARNING 1:** Operating personnel should perform only the procedures described and recommended in this manual. Only qualified service personnel familiar with the electrical shock hazards present inside the equipment should perform disassembly or corrective maintenance of the equipment.

**WARNING 2:** To avoid shock hazard, the equipment must be grounded with an adequate earth ground in accordance with local electrical codes.

**WARNING 3:** The locations of potentially dangerous voltages and other hazards such as hot or cold surfaces are identified and labeled on the equipment. Be careful to observe these warnings when installing, operating, maintaining, or servicing the equipment. Observe all warnings given in this manual.




Symbols: A. Caution, B. High Voltage, C. Hot Surface, D. Cold Surface

**WARNING 4:** Make sure to turn off the ~ (ac) line power and the compressed air to the TP04100A System before attempting to access or service the air filters. Do not perform this service unless qualified to do so.



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**WARNING 5:** Exposed surfaces in and around the output nozzle and thermal cap of the system can operate at extremely hot and cold temperatures which are unsafe to touch.

**WARNING 6:** The parts contained inside the thermal wand operate at extremely hot and cold temperatures unsafe to touch. Do not perform any maintenance inside the thermal wand assembly until the system is turned off and disconnected. Wait until the thermal wand parts have reached a safe and stable temperature near ambient.

**CAUTION 1:** Some of the packing materials in the TP04100A shipment may be a source for Electrostatic Discharge (ESD) potential. Do not unpack in the vicinity of ESD sensitive components.

**CAUTION 2:** Observe the precautions given on the equipment and within this manual to prevent damage to the equipment.

**CAUTION 3:** Before connecting the TP04100A to its electrical source, check that the ~ (ac) voltage and frequency to be supplied to the TP04100A are correct for those listed on its data plate (located on the rear panel of the controller cabinet).

**CAUTION 4:** Always hold the thermal wand firmly while positioning or re-positioning the stand arm.

**CAUTION 5:** Use proper handling and packaging procedures for ESD sensitive circuit boards. Assume that all circuit boards are the ESD sensitive type.

**CAUTION 6:** Unauthorized personnel should not remove from the equipment those panels that are provided for protection and/or cooling and/or require a tool to remove.

**CAUTION 7**: Use suitable Clean Dry Air (CDA) compressed air supply for the TP04100A system to prevent premature fouling of the filter/regulator assembly provided with the system. Improper air supply quality can lead to possible damage to system internal operating components.

**CAUTION 8**: Properly install, use and maintain the filter/regulator assembly provided with the TP04100A system. Doing so prevents moisture and/or compressor oils from being introduced into operating components of the system. If left unchecked, this can cause damage to the system not covered under warranty.

**CAUTION 9**: The two thermal runaway Safety sensors (SF1 and SF2), located on the rear panel, must remain plugged in for normal operation. If SF2 is not plugged in when the system is powered On, then an internal fuse must be replaced by qualified service personnel before normal operation can resume. Only qualified service personnel should disconnect SF1 and/or SF2.



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# 2. POWER ON AND OFF

## 2.1. Local Operation

This manual contains instructions for local operation from the front panel of the Model TP04100A ThermoStream System. Remote system operation is discussed in the *TP04100A Interface & Applications Manual.* It is advisable to gain familiarity with front panel operation before attempting remote operation.

## 2.2. Main Power Switch

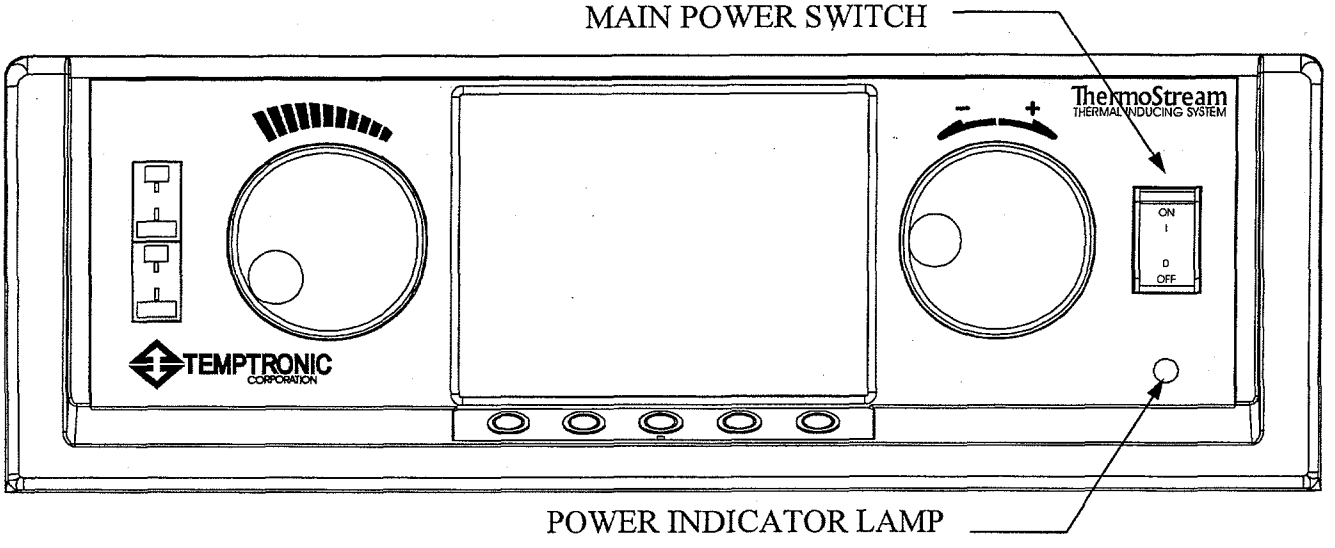



Figure 2-1 Main Power Switch

Figure 2-1 shows the Main Power Switch which is located on the right hand side of the front panel of the controller. This switch also serves as the primary ~ (ac) power circuit breaker (CB1) for the system. An IEC 320 connector for receiving the input power cord is located on the rear panel of the controller.

Before turning the power ON, be sure the line cord is connected at the rear panel of the system and is connected to the specified ~ (ac) power source and that the source is live. Actuate the Main Power Switch (CB1) upward to the **I** (ON [up]) position; to turn off power, move the switch downward to the **O** (OFF [down]) position.

The Power (on/off) Indicator Lamp becomes illuminated when power is ON. See Section 4.1, Startup by Power ON, on page 15, for system operation.



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# 3. USER INTERFACE

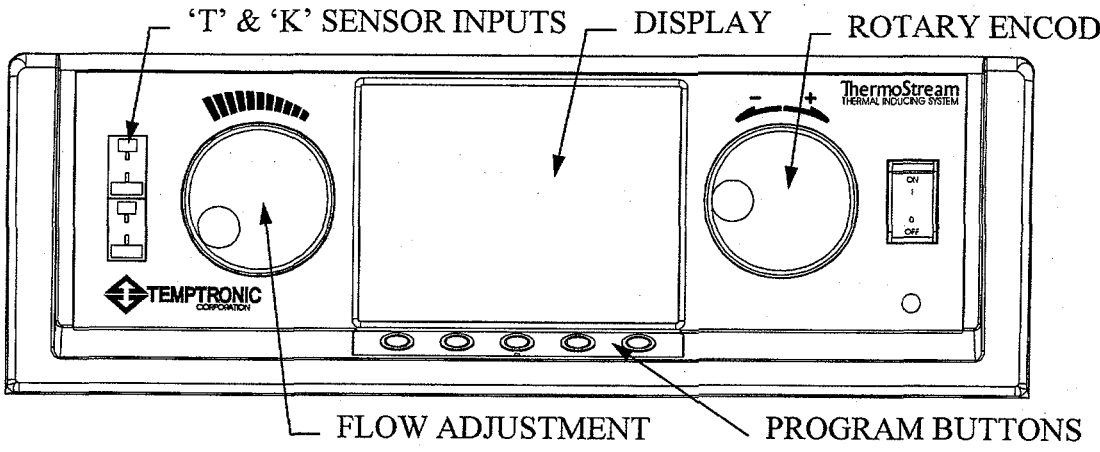



Figure 3-1 User Interface

## 3.1. Overview

The TP04100A User Interface is located on the controller cabinet front panel and has three main components (see Figure 3-1, above): 1) the Graphical Display Screen, 2) five (5) Program Buttons located below the display screen, and 3) the Rotary Encoder located to the right of the display screen.

Two additional user interface components are located to the left of the display screen: 1) the type 'T' and 'K' Device Under Test (DUT) Sensor Input sockets, and 2) the hot air Flow Adjustment valve.

## 3.2. Graphical Display Screen

The Graphical Display Screen, located at the center of the controller front panel, is an amber monochrome electroluminescent display, approximately 5.5 inch size in diagonal measurement. This graphical user interface provides a highly visible readout of operational information. It allows test engineers, production operators, and non-technical individuals optimum ease of use with minimum learning time.

The operational information screens display the following values: active temperature, the temperature setpoints, soak times, ramp rates up and down, number of cycles performed or to be performed and the control window. Additional screens facilitate programming of Test Setups,



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system configuration, define the limits of operation, calibrate the system, and copy test setups. Menu choices which correspond to various functions are displayed at the bottom of the screen, above the Program Buttons.

## 3.3. Program Buttons

There are five (5) Program Buttons in a single horizontal line below the Graphical Display Screen. These five buttons provide easy selection of the menu choices displayed along the bottom of the display screen. As the various program screens are selected, the menu choices automatically change to provide additional menu choices associated with the screen currently displayed.

## 3.4. Rotary Encoder

The Rotary Encoder, to the right of the Display Screen, is used to step through and change various system parameters and effectively replaces the traditional numeric keypad and enter key. The Encoder has two modes: Step Mode and Change Mode.

| Mode | To Initiate | Functions | To Terminate |
|---|---|---|---|
| Step | Is active (initiated) upon entering Manual Test Setup or Program Test Setup screens. (Parameters are highlighted). | **1.** Rotate Encoder knob clockwise to cycle forward through the parameter choices. **2.** Rotate Encoder knob counterclockwise to cycle backwards through the parameter choices. | Press ESC (Escape) Program Button to exit the present program screen. No Encoder knob press is required to terminate. |
| Change | Press in on the Rotary Encoder knob once. (Parameter will blink). | **1.** Rotate Encoder knob clockwise to increase the parameter value. **2.** Rotate Encoder knob counterclockwise to decrease the parameter value. | Press Encoder knob once to accept the parameter change and return to Step Mode; or, press ESC (Escape) Program Button to cancel the parameter change and return to Step Mode. |

**Table 3-1 Rotary Encoder Operation: Step Mode and Change Mode**

As given in Table 3-1, above, by rotating the encoder knob in **Step Mode**, the various system parameters that can be set and/or changed are graphically highlighted, each one in succession. A



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clockwise rotation moves through the parameter choices forward while a counterclockwise rotation moves backwards through the choices.

In **Change Mode**, rotating the encoder knob changes the individual system parameter selected for change. A clockwise rotation increases the parameter value while a counterclockwise rotation decreases the value.

**Step Mode** is only available in the Manual Test Setup and Program Test Setup screens, and on the Program Operation screen. Step Mode is active (initiated) automatically upon entering either screen. Rotate the encoder knob in either direction until the parameter to be changed is highlighted. Press in on the encoder knob once to set the encoder into **Change Mode**.

Once in Change Mode the **selected parameter will blink** to signify the system is in Change Mode and the parameter selected can now be changed. Rotate the encoder knob to increase or decrease the setpoint value to the desired setting.

When the **desired setting** has been reached, **press in the encoder knob** a second time to replace the old parameter value with the new parameter value.

If the operator does not want to change the selected parameter, **press** the **ESC** Program Button to **cancel the parameter change**, exit the Change Mode and return to the Step Mode.

Unlike ESC, if the operator presses the **DONE** Program Button, then the current (highlighted) Test Setup values are saved to the "0" Test Setup (see note on "Default '0' Test Setup" at end of "Manual Test Setup Screen: Overview" section, page 23).

## 3.5. 'T' and 'K' DUT Sensor Inputs

The 'T' and 'K' DUT Sensor Inputs are located to the far left of the Graphical Display Screen, and are used with external type 'T' and type 'K' thermocouple sensors to monitor the actual temperature of the device/component being thermally tested. Complete application, operation and use of DUT sensors is discussed in the *TP04100A Interface & Applications Manual*.

## 3.6. Flow Adjustment Valve

The Flow Adjustment valve is located to the left of the Graphical Display Screen. This valve is used to vary the output flow from the Thermal Wand of the ThermoStream for the temperatures of +33.1 °C through +225 °C, over the range of 2 to 6 Standard Cubic Feet per Minute (SCFM). Complete operation and use of the Flow Adjustment valve is discussed in the *TP04100A Interface & Applications Manual*.



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# 4. STARTUP AND SHUTDOWN

## 4.1. Startup by Power ON

To startup the TP04100A System initially or after it has been turned off:

1. Check that the system is connected to the specified compressed air source and the air is turned on.
2. Be sure the line cord is connected at the rear panel of the system and is connected to the specified ~ (ac) power source and that the source is live.
3. Actuate the Main Power Switch located on the front panel of the controller cabinet upward to the ▌ (ON [up]) position to start operation of the TP04100A. Note that the Power (on/off) Indicator Lamp should illuminate.



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## 4.2. System Startup Screen

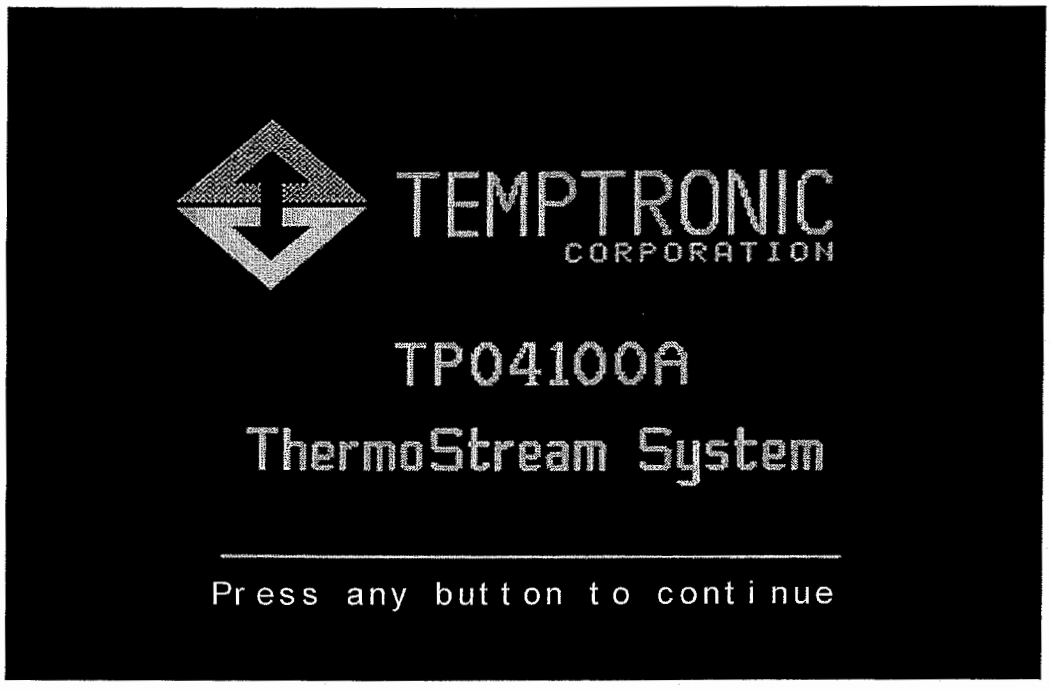



Figure 4-1 System Startup Screen

The *System Startup Screen* (see Figure 4-1, above) is displayed after the power has been turned ON. It features the Temptronic Corporation Logo and identifies the TP04100A ThermoStream System.

The system is ready for operation when the *System Startup Screen* is displayed.

Press any Program Button to continue to the *Top Menu Screen.*

NOTE: If "Auto start in MANUAL OPERATION" is set to "ON" in the *Configure System Screen* (see *TP04100A Interface and Applications Manual*), then the system will automatically start in Manual mode, and display the *Manual Operation Screen* (press ESC to access the *Top Menu Screen).*



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## 4.3. Top Menu Screen: Manual Operation Mode

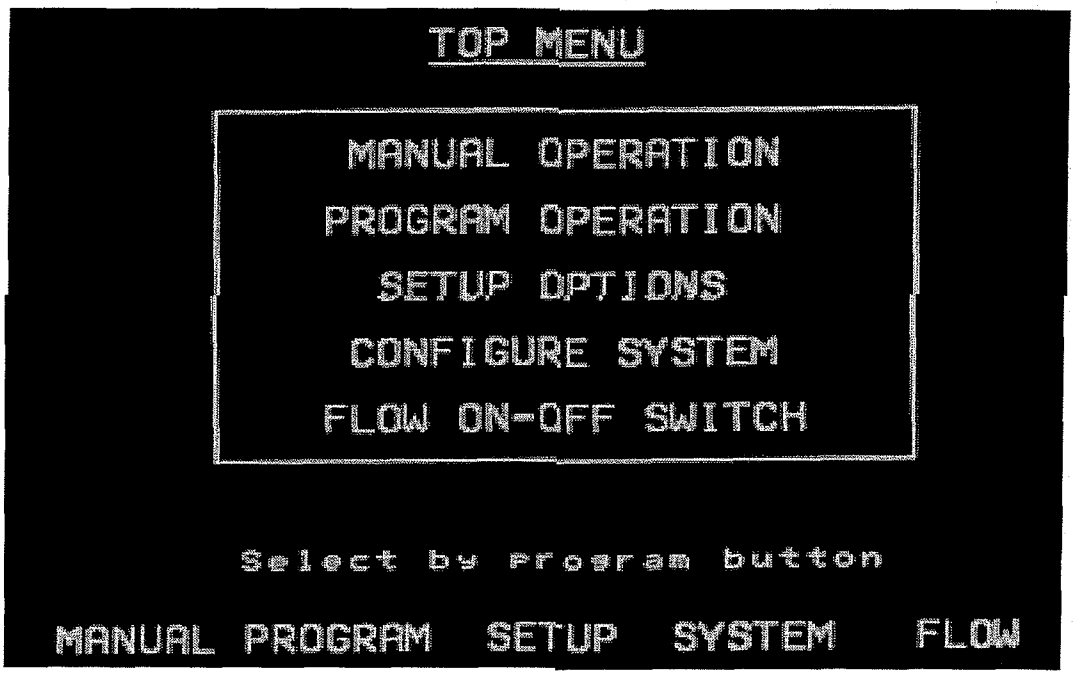



Figure 4-2 Top Menu Screen

After pressing any button on the *System Startup Screen,* the *Top Menu Screen* is displayed (see Figure 4-2, above). This screen allows immediate access to the MANUAL and PROGRAM OPERATION screens (where temperature testing is performed), and allows access to the SETUP OPTIONS and CONFIGURE SYSTEM screens.

The FLOW selection allows the operator to toggle the air flow of the Thermal Wand ON and OFF without temperature control. The first press of the FLOW program button turns the air flow ON, the second press turns it OFF. This allows the operator to verify and/or adjust system air flow for temperatures of +33.1 °C through +225 °C by using the Flow Adjustment knob located to the left of the Graphical Display Screen (see Figure 3-1 User Interface). Complete operation and use of the Flow Adjustment valve is discussed in the *TP04100A Interface & Applications Manual*.

Use the Program Buttons (below the display screen) to select the desired function which corresponds with each button.

For the purpose of this manual, select the "MANUAL" Program Button to continue to the *Manual Operation Screen* to operate in Manual Operation Mode (see Section 5, on page 19).



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## 4.4. Shutdown by Power OFF

To shutdown the TP04100A System after it has been turned on and operated:

1. Press the "ESC" Program Button on any program screen to return to the *Top Menu Screen*. This may require one, two or three ESC button presses.
2. Once at the *Top Menu Screen*, actuate the Main Power Switch downward to the **O** (OFF [down]) position to turn off the TP04100A. Note that the power (on/off) indicator lamp should turn off (see Figure 2-1 Main Power Switch on page 9).

**NOTE:** When moving the TP04100A to a different test location, or when shutting it down for an extended period, turn off and disconnect it from both its ~ (ac) power source and compressed air supply.



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# 5. MANUAL OPERATION SCREEN

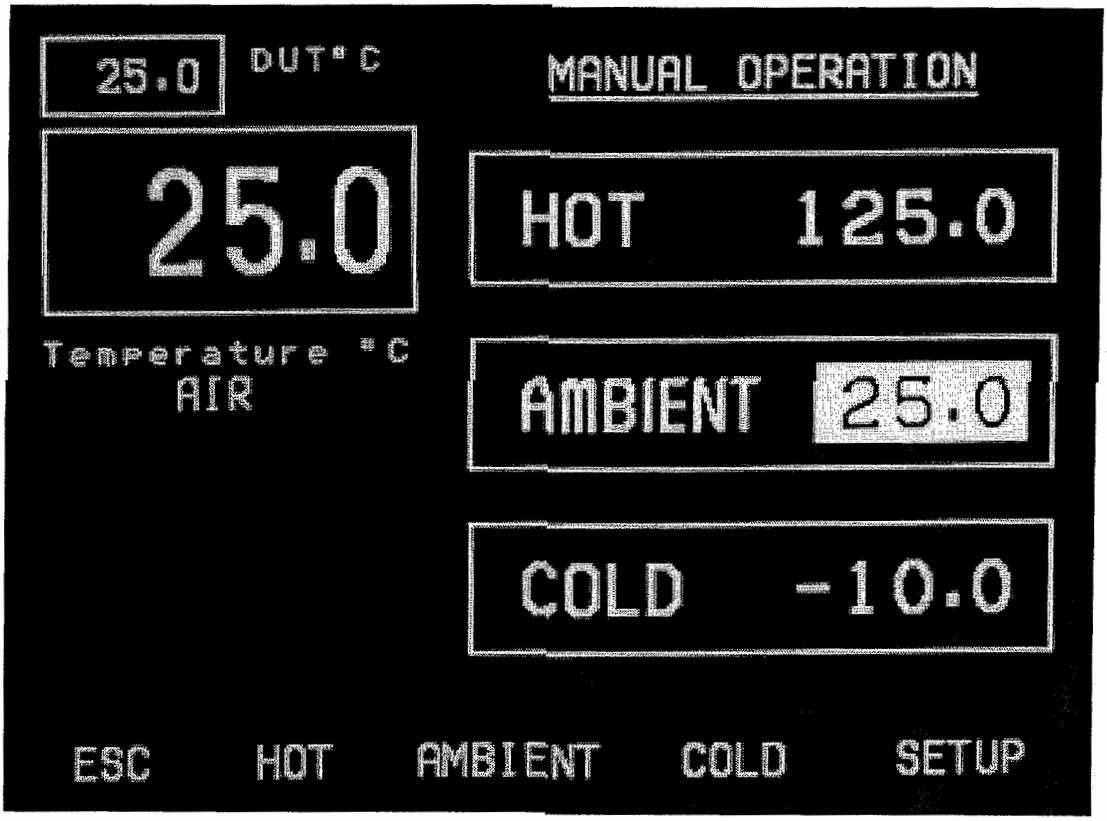



Figure 5-1 Manual Operation Screen

## 5.1. Overview

The *Manual Operation Screen* (see Figure 5-1, above) is the first screen displayed in Manual Mode. The operator can select from three programmed temperature control setpoints (HOT, AMBIENT, COLD), can change the setpoint values, can select "SETUP" to branch to the *Manual Test Setup Screen* (to change setpoint values, change/select Test Setup programs, or to initiate ramp/cycle routines), and can select ESC to return to the previous program screen.

The DUT Temperature window (see Figure 5-1, upper left) only displays when a DUT sensor has been selected and installed (see *TP04100A Interface and Applications Manual).*

To execute a function press the corresponding Program Button.

The function selections at the bottom of the display screen in Figure 5-1 are summarized as follows.



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## 5.2. Manual Operation Screen Selections

**ESC:** This selection returns the operator to the previous program screen or is used to exit the Change Mode and cancel any changes made to the selected parameter value.

**HOT:** This selection initiates air flow and starts temperature control at the programmed HOT setpoint. While the system is controlling temperature at the HOT setpoint, the menu label located above the Program Button changes from "HOT" to "STOP". By selecting the STOP button the operator can cease air flow and stop temperature control at the HOT setpoint.

To change the HOT setpoint temperature use the Rotary Encoder in Change Mode (see "Rotary Encoder", on page 12 and "Default "0" Test Setup," at end of this section). The permissible temperature range setting for the programmed HOT setpoint is +25°C to +225°C inclusive. The factory set default value is +125°C.

Alternatively, the operator can select AMBIENT or COLD Program Buttons to change temperature control to these setpoints.

**AMBIENT:** This selection initiates air flow and starts temperature control at the programmed AMBIENT setpoint. While the system is controlling temperature at the AMBIENT setpoint, the menu label located above the Program Button changes from "AMBIENT" to "STOP". By selecting the STOP button the operator can cease air flow and stop temperature control at the AMBIENT setpoint.

To change the AMBIENT setpoint temperature use the Rotary Encoder in Change Mode (see "Rotary Encoder", on page 12 and "Default "0" Test Setup" at end of this section). The permissible temperature range setting for the programmed AMBIENT setpoint is +20°C to +30°C inclusive and the factory set default value is +25°C.

Alternatively, the operator can select HOT or COLD to change temperature control to these setpoints.

**COLD:** This selection initiates air flow and starts temperature control at the programmed COLD setpoint. While the system is controlling temperature at the COLD setpoint, the menu label located above the Program Button changes from "COLD" to "STOP". By selecting the STOP button the operator can cease air flow and stop temperature control at the COLD setpoint.

To change the COLD setpoint temperature use the Rotary Encoder in Change Mode (see "Rotary Encoder", on page 12 and "Default "0" Test Setup" at end of this section). The permissible temperature range setting for the programmed COLD setpoint is +25°C to -99.9°C inclusive and the factory set default value is -10°C.

Alternatively, the operator can select either HOT or AMBIENT to change temperature control to these setpoints.



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**SETUP:** This selection accesses the *Manual Test Setup Screen* (see Figure 6-1, on page 23) where the operator can change setpoint values, change/select Test Setup programs, and initiate Ramp/Cycle routines. Select CYCLE on the *Manual Test Setup Screen* to begin temperature cycling and return to the *Manual Operation Screen*. While the system is temperature cycling, the menu label on the *Manual Operation Screen* located above the Program Button changes from "SETUP" to "STOP". By selecting the STOP button the operator can cease air flow and stop temperature cycling.

Note:

**Default "0" Test Setup:** When the setpoint is being changed, the system maintains temperature control at the old setpoint value until the new setpoint value is entered by pressing in on the Encoder knob. Once entered, the system controls at this new setpoint value. Any changes made to parameter values are automatically saved into the "0" (default) Test Setup program. Saved values are retained even if the system is turned off. If the operator does not want to change the selected parameter, press the ESC Program Button to cancel the parameter change and exit the Change Mode without saving any new values. To copy setups, see "Copy Test Setups" in the *TP04100A Installation & Applications Manual.*



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# 6. MANUAL TEST SETUP SCREEN

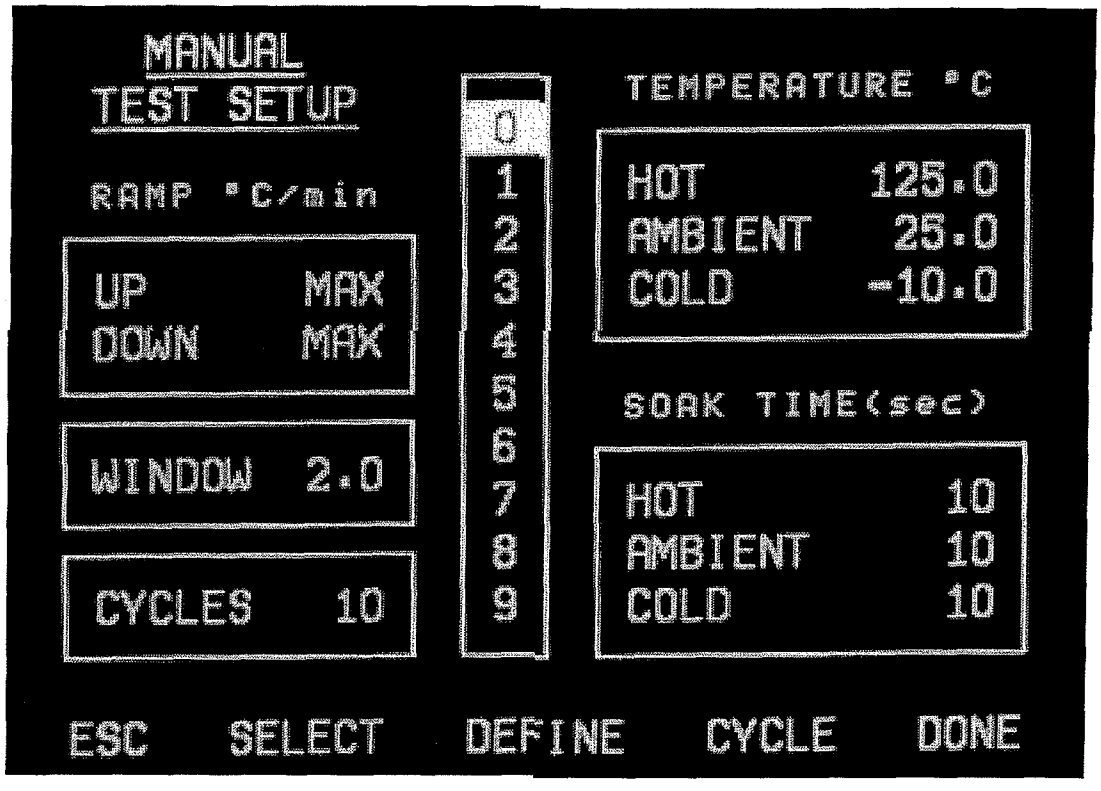



Figure 6-1 Manual Test Setup Screen

## 6.1. Overview

The *Manual Test Setup Screen* (see Figure 6-1, above) is used to view, select, change and run up to nine (9) Test Setup programs stored in system memory and used on the *Manual Operation Screen*.

Ramp/Cycle routines are also initiated from this screen and use from one to three of the *Manual Operation Screen* temperature setpoints. The Ramp/Cycle routine in Manual Operation Mode is very specific in the way it operates (see CYCLE in "Manual Test Setup Screen Selections," on page 25) and thus is limited in its capabilities. If more complicated cycling, or cycles requiring more than three setpoint temperatures are necessary, then utilize the Ramp/Cycle function in the "Program Operation Mode," described in the *TP04100A Interface & Applications Manual*.

Any changes made on this screen are saved to their respective Test Setup program number. Once a Test Setup program is created and/or changed, it can be saved and executed on the *Manual Operation Screen* by selecting the DONE function.



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To execute a function press the corresponding Program Button.

The function selections at the bottom of the display screen in Figure 6-1 are summarized as follows.

Note:

**Default "0" Test Setup**: any changes made to any active setpoint temperature or system parameter value are stored in this default "0" Test Setup program. All values in Test Setup program "0" are replaced by the new values from any of the Test Setup programs (1 through 9) when one of them is selected to run. When the system is initially turned on, Test Setup program "0" is the default program used for system operation. To copy the default "0" Test Setup into another setup, see "Copy Test Setups" in the *TP04100A Interface & Applications Manual.*



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## 6.2. Manual Test Setup Screen Selections

**ESC:** This selection returns the operator to the previous program screen or is used to exit the Change Mode and cancel any changes made to the selected parameter value.

**SELECT:** This selection steps through (highlights) the Test Setup programs 0 through 9 permissible to change and/or select. The first press highlights the "0" Test Setup program, the second press, "1" and so on down to Test Setup program "9." After reaching "9," continued pressing of the SELECT button steps through the same choices again, beginning at the "0" Test Setup. As each Test Setup is highlighted, the program parameter values automatically change to show the values stored in memory for the highlighted Test Setup program.

**DEFINE**: This selection takes the operator to the *Define Parameters Screen* (see the *TP04100A Interface & Applications Manual)*, to select "DUT Control," and set limits on air temperature and maximum test time.

**CYCLE:** This selection a) takes the present Test Setup program selected (highlighted) and places it into the "0" Test Setup program location, b) returns the operator to the *Manual Operation Screen* and, c) begins temperature cycling (see Section 5, on page 19)

.

Each cycle starts by first going to the COLD setpoint. After the soak time expires at that setpoint, the system continues "At Temperature" for any set test time, then the cycle continues to the HOT setpoint. After the soak time and any test time expires at that setpoint, the cycle continues to the AMBIENT setpoint. After the soak time and any test time expires at that setpoint, provided more than one cycle has been programmed, the TP04100A will then go to the COLD setpoint to begin the next cycle until the set number of cycles have been completed or the STOP button is pressed (see Section 6, "SETUP").

To set the soak times and/or ramp rates, use the SELECT button (see above) and the Rotary Encoder (see Section 3.4 on page 12). To skip a setpoint temperature during a cycle routine, set the soak time for that temperature to zero (0). For fastest time to temperature when cycling, set the ramp rate value to MAX.

If system **appears to "hang"** when "At Temperature" (during the "test time") and **not advance to next cycle step** when "At Temperature" (during "test time"), then "Stop" cycling, enter "Setup," select "Define" to display the *Define Parameters Screen*, and check the "Maximum test time (sec)" setting. This sets how long, in seconds, the system will remain "At Temperature" before advancing to the next cycle step. This value can be set to 0 (zero) also.

**DONE:** This selection takes the current (highlighted) Test Setup program, places it into the "0" Test Setup program location, then returns the operator to the *Manual Operation Screen* (see



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Section 5, on page 19). The program parameter values used on the *Manual Operation Screen* are always values stored in the "0" Test Setup program.



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# 7. SETUP OPTIONS SCREEN

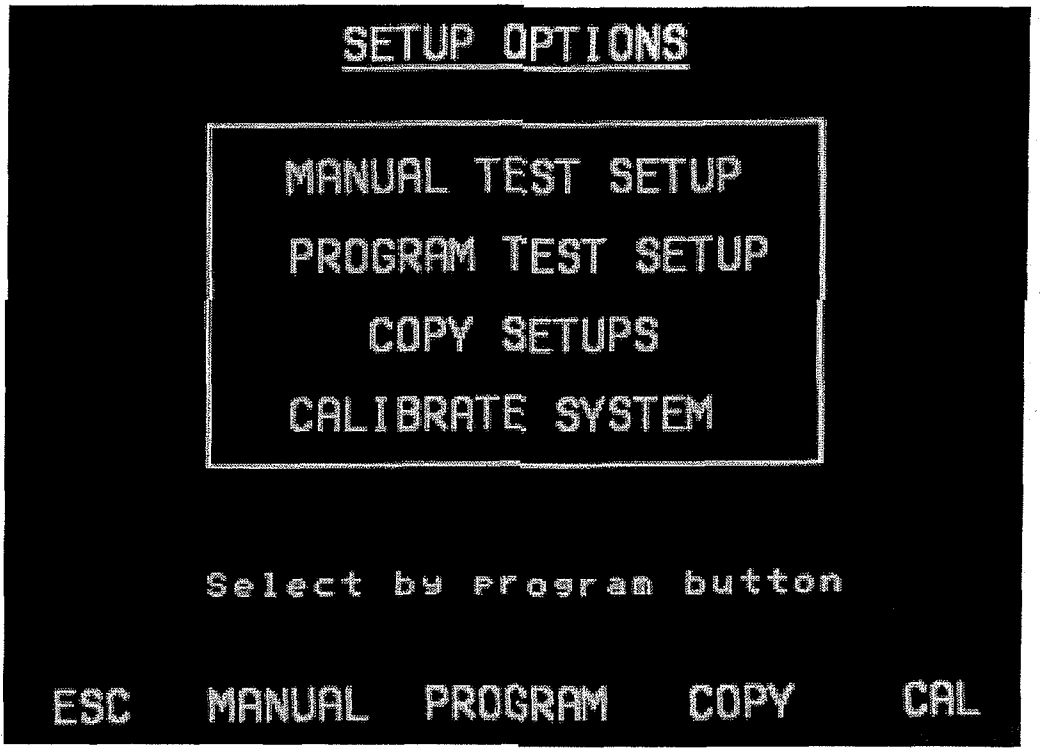



Figure 7-1 Setup Options Screen

## 7.1. Overview

The *Setup Options Screen* (see Figure 7-1, above) is one of the choices on the *Top Menu Screen* (see Figure 4-2, on page 17). Pressing MANUAL or PROGRAM allows direct selection of the *Manual* and *Program Test Setup Screens* in which the existing Test Setup files are programmed and stored.

The COPY selection allows the operator to copy one test setup into another test setup. CAL allows system calibration. See the *Copy Setup Screen* and "Calibration" sections of the *TP04100A Interface & Applications Manual.*

Use the Program Buttons (below the display screen) to select the desired function that corresponds with each button. For the purpose of this manual, select the MANUAL Program Button to continue to the *Manual Test Setup Screen* (see Section 6, on page 22). Selecting MANUAL here provides an alternative to accessing the *Manual Test Setup Screen* from the *Manual Operations Screen* SETUP selection (see page 19).



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The function selections at the bottom of the *Setup Options Screen* (see Figure 7-1) are summarized as follows.

## 7.2. Setup Options Screen Selections

**ESC:** This selection returns the operator to the previous program screen.

**MANUAL:** This selection takes the operator to the *Manual Test Setup Screen* (see Section 6, on page 22).

**PROGRAM:** This selection takes the operator to the *Program Test Setup Screen* (See the "Program Setup Screen" section of the *TP04100A Interface & Applications Manual*).

**COPY:** This selection takes the operator to the *Copy Setups Screen* (see the "Copy Setups" section of the *TP04100A Interface & Applications Manual*).

**CAL:** This selection takes the operator to the *Calibrate System Screen* (See the "Calibration" section of the *TP04100A Interface & Applications Manual*).



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