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OPERATING INSTRUCTIONS

CA0100 INCINERATOR

US Army

JOB NO. 9355

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OPERATING PROCEDURE

1. INCINERATOR OPERATION

1.1. DAILY INSPECTION

1.1.1. **FUEL SUPPLY**. Ensure there is an adequate supply of fuel that will last for the intended duration of incinerator operation.

1.1.2. **FUEL VALVES**. Ensure all fuel supply valves are open, both inside and outside of the container.

1.1.3. **ELECTRICAL SUPPLY**. Ensure the electrical connector is securely connected to its receptacle.

1.1.4. **CIRCUIT BREAKERS**. Ensure all the circuit breakers the Panel Board (circuit breaker box) located at the rear of the incinerator are turned on.

1.1.5. **VENTILATION**. If the ambient temperature is above 86°F (30°C) open the doors at both ends of the container.

1.1.6. **GENERAL INSPECTION**. Inspect the incinerator shell for “hot spots” (paint discoloration), which is an indication that refractory may have deteriorated and repairs are needed. Look for fuel leaks around the burners and fuel lines. After starting the incinerator, listen for odd sounds that may indicate that a component is in need of maintenance.

1.2. WASTE LOADING

1.2.1. Open the primary chamber door and place a load of waste into the chamber. **DO NOT OVERLOAD THE CHAMBER**. Waste should not be pilled above the bottom of the burner openings. Spread the waste evenly over the bottom of the chamber. If you have a mix of wet and dry waste, place the dry waste on the bottom and the wet waste on top.

WARNING

NEVER OPEN THE PRIMARY CHAMBER DOOR IF SMOKE OR FLAMES ARE VISIBLE WITHIN THE CHAMBER OR THE TEMPERATURE IS ABOVE 428°F. PERSONAL INJURY MAY OCCUR

1.2.2. Remove non-combustible items from waste stream if possible.

1.2.3. The following is a list of items that should not be incinerated.

- Batteries
- Electronic devices
- Chemicals
- Aerosol cans
- Pressurized tanks (oxygen, propane, acetylene, etc)

1.2.4. Close and latch the primary chamber door securely.

1.3. POWER UP

1.3.1. Pull the [**POWER ON**] button located on the front of the control panel.

1.3.1.1. The internal light will illuminate to indicate that control power is on.

1.3.1.2. The Operator Interface Terminal will illuminate, and after a short delay, a “start-up dialog box” will be displayed. You can either press the [**START**] button within this dialog box, or simply wait a few seconds for the MAIN SCREEN to be displayed.

1.4. OPERATING PARAMETERS

1.4.1. Enter or verify the desired *Operating Parameter Settings* on the Operator Interface Terminal. The following tables list all the operating parameters, along with their factory default settings.
(*see section 2 for instructions on changing the operating parameters*)

Primary Parameters (Screen 1)

PARAMETER	DEFAULT	UNITS Opt 1	MIN Opt 2	MAX Opt 3
Purge Time	60	Seconds	10	999
Primary Burn Time	300	Minutes	1	999
Cool-Down Time	120	Minutes	1	999

Primary Parameters (Screen 2)

PARAMETER	DEFAULT	UNITS Opt 1	MIN Opt 2	MAX Opt 3
Primary Burner On	1190 (645)	°F (°C)	32	2372
Primary Burner Mod	1200 (650)	°F (°C)	32	2372
Primary Burner Off	1400 (760)	°F (°C)	32	2372
Primary Over Temperature	1800 (985)	°F (°C)	32	2372

Primary Parameters (Screen 3)

PARAMETER	DEFAULT	UNITS Opt 1	MIN Opt 2	MAX Opt 3
Primary Blower Mod	1250 (675)	°F (°C)	32	2372
Primary Blower On	1575 (560)	°F (°C)	32	2372
Primary Blower Off	1600 (870)	°F (°C)	32	2372
Primary Blower Off/On	OFF	OFF	ON	
Primary Blower Mode	HAND	HAND	AUTO	
Primary Blower Hand Speed	50	%	25	100

Secondary Parameters

PARAMETER	DEFAULT	UNITS Opt 1	MIN Opt 2	MAX Opt 3
Secondary Burn Time	120	Minutes	1	999
Secondary Warm-up	1800 (985)	°F (°C)	32	2372
Secondary Burner Mod	1832 (1000)	°F (°C)	32	2372
Secondary Blower Mod	1840 (1005)	°F (°C)	32	2372
Secondary Over Temperature	2000 (1095)	°F (°C)	32	2372

1.5. START-UP

1.5.1. From the MAIN SCREEN of the Operator Interface Terminal, press the button labeled [**START INCINERATOR**].

1.5.1.1. The incinerator will start and initiate the following sequence of operation.

1.6. SEQUENCE OF OPERATION

1.6.1. INITIALIZATION

Initialization begins when the [**START INCINERATOR**] push button is pressed.

1.6.1.1. Combustion Air Louver opens and remains open until the end of the cool-down cycle or until the incinerator is turned off.

1.6.1.2. Waste Oil Injection Pump and Heater energize to heat the waste oil to its proper operating temperature if the Waste Oil Injection System is turned on.

1.6.2. PURGE CYCLE

1.6.2.1. The Primary Blower energizes to purge any flammable gasses from the chambers before the burners are ignited. The *Purge Time* setting controls the duration of this cycle.

1.6.3. WARM-UP CYCLE

The warm-up cycle begins at the end of the purge cycle.

1.6.3.1. The primary blower is de-energized and the secondary burner(s) are energized at their high-fire rate until the secondary chamber temperature has reached the *Secondary Warm-up* setting. When the warm-up temperature is reached the secondary blower will energize to supply combustion air to the secondary chamber.

1.6.4. PRIMARY BURN-DOWN CYCLE

The primary burn-down cycle begins at the end of the warm-up cycle. The *Primary Burn Time* setting controls the duration of this cycle.

1.6.4.1. **PRIMARY BURNERS**. When the primary burn-down cycle begins, the primary burners will energize and the unit will begin to consume the waste in the primary chamber. When the primary chamber temperature reaches the *Primary Burner Off* setting the primary burners will de-energize. When the primary chamber temperature falls below the *Primary Burn On* setting, the primary burners will re-energize. If the unit is equipped with modulating type burners, the burners will modulate between their low and high-fire settings in an attempt to maintain the primary chamber at the *Primary Burner Mod* setting. The primary burners will operate in this manner until the end of the primary burn-down cycle, at with time they will de-energize, and remain de-energized, throughout the remainder of the operation.

1.6.4.2. **PRIMARY BLOWER**. If the [PRIMARY BLOWER OFF/ON] switch is set to "ON" then the primary blower will energize.

1.6.4.2.1. **AUTO MODE**. If the [PRIMARY BLOWER HAND/AUTO] switch is set to "AUTO" the blower will run as long as the chamber temperature is below the *Primary Blower Off* setting. If the chamber temperature exceeds the *Primary Blower Off* setting, the blower will de-energize and remain de-energized until the chamber temperature falls below the *Primary Blower On* setting, at which time the blower will re-energize. If your unit is equipped with a modulating blower, its speed will be modulated to maintain the primary chamber temperature at the *Primary Blower Mod* setting.

1.6.4.2.2. **HAND MODE**. If the [PRIMARY BLOWER HAND/AUTO] switch is set to "HAND" the blower will always be on regardless of chamber temperature. If your unit is equipped with a modulating blower, the blower will run at the *Primary Blower Hand Speed* setting.

1.6.4.3. **SECONDARY BURNER**. The secondary burners will modulate between their low and high-fire settings to maintain the secondary chamber temperature at the *Secondary Burner Mod* setting. Your unit is equipped with either the standard two-stage modulation (where the burner modulates between a fixed low and high-fire setting) or the optional fully modulating burner (where the burner is infinitely modulated between its low and high-fire settings).

1.6.4.4. **SECONDARY BLOWER**. The secondary blower is energized during this cycle to provide combustion air to the secondary chamber. If your unit is equipped with a modulating blower, its speed will be modulated to maintain the secondary chamber temperature below the *Secondary Blower Mod* setting.

1.6.4.5. **DOOR LOCK (MARINE SERIES)**. If your unit is a USCG approved Marine Series Incinerator, there is a door locking mechanism that will engage when the primary chamber temperature is above 428 °F. The door cannot be opened until the chamber temperature falls below this limit.

1.6.4.6. **DRAFT INTERLOCK (MARINE SERIES)**. If your unit is a USCG approved Marine Series Incinerator, it is equipped with a draft switch that will turn off the primary burner and primary blower in the event of a loss of draft pressure. The draft switch will inhibit burner and blower operation for one (1) minute after draft returns to its normal pressure.

1.6.5. SECONDARY BURN-DOWN CYCLE

The secondary burn-down cycle begins at the end of the primary burn-down cycle. The *Secondary Burn Time* setting controls the duration of this cycle. The secondary burn down cycle's function is to consume the smoke produced

by the smoldering ashes in the primary chamber. Typically, the secondary burn-down time is set for one hour for dry waste and two hours for wet waste.

1.6.5.1. **PRIMARY BLOWER**. The primary blower will function in the same manner as it was set for the primary burn-down cycle; it will either be ON in HAND MODE, ON in AUTO MODE, or OFF.

1.6.5.2. **SECONDARY BURNER**. The secondary burners are energized and will modulate between low and high-fire to maintain the secondary chamber temperature at the *Secondary Burner Mod* setting.

1.6.5.3. **SECONDARY BLOWER.** The secondary blower is energized. If your unit is equipped with a modulating blower, its speed will be modulated to maintain the secondary chamber temperature below the *Secondary Blower Mod* setting.

1.6.6. COOL-DOWN CYCLE

The cool-down cycle begins at the end of the secondary burn-down cycle. The *Cool-Down Time* setting controls the duration of this cycle. This cycle's function is to cool the primary chamber enough to enable the door to be opened for re-loading of the chamber and for ash removal.

1.6.6.1. **PRIMARY BLOWER**. During the cool-down cycle only the primary blower is energized. If your unit is equipped with a modulating blower, it will run at its maximum speed. Typically the cool-down time is set for two hours.

1.6.7. INCINERATOR SHUT-DOWN

1.6.7.1. The incinerator will automatically shut down at the end of the cool-down cycle, or whenever the [**STOP INCINERATOR**] button is pressed. Note that the [**STOP INCINERATOR**] button should only be used when there is no waste left in the primary chamber, as the incinerator will produce smoke if the waste in the primary chamber has not been totally consumed.

1.6.8. EMERGENCY SHUT-DOWN

1.6.8.1. In an emergency situation, press the [**CONTROL POWER**] push-button located on the front of the control panel. This will turn off the control power to the incinerator, shutting off all burners and blowers.

1.6.8.2. If the incinerator is not going to be used for prolonged periods of time, press the [**CONTROL POWER**] push-button to disconnect the control power to the Operator Interface Terminal.

1.6.9. OPEN DOOR/ASH REMOVAL

1.6.9.1. The incinerator door should not be opened until the primary temperature display on the operator interface reads less than 428°F (220°C)

2. OPERATOR INTERFACE TERMINAL

The Operator Interface Terminal (OIT) provides the user with system status, alarm annunciation, chamber temperatures, cycle times, incinerator controls, and operating parameter entry.

2.1. TOUCH SCREEN

2.1.1. The Operator Interface screen is *touch-sensitive*. Pressing on the screen where a button or key appears will cause that button or key to be activated. When a button or key is pressed its appearance will change to indicate that it has been activated.

CAUTION

Only use your bare fingers to press the buttons on the screen.
Never use a tool or any other object, as they may scratch or damage the screen.

2.2. SCREEN NAVIGATION

The screen navigation keys are always located at the bottom of each screen. They are used to move from one screen to another. Press and release a navigation key to activate it.

2.2.1. [**NEXT**] key displays the next screen.

2.2.2. [**PREV**] key displays the previous screen.

2.2.3. [**MAIN**] key display the main screen.

2.2.4. [**MENU**] key displays a menu screen that allows access to advanced features normally only used during commissioning or maintenance.

2.3. POPUP KEYPAD

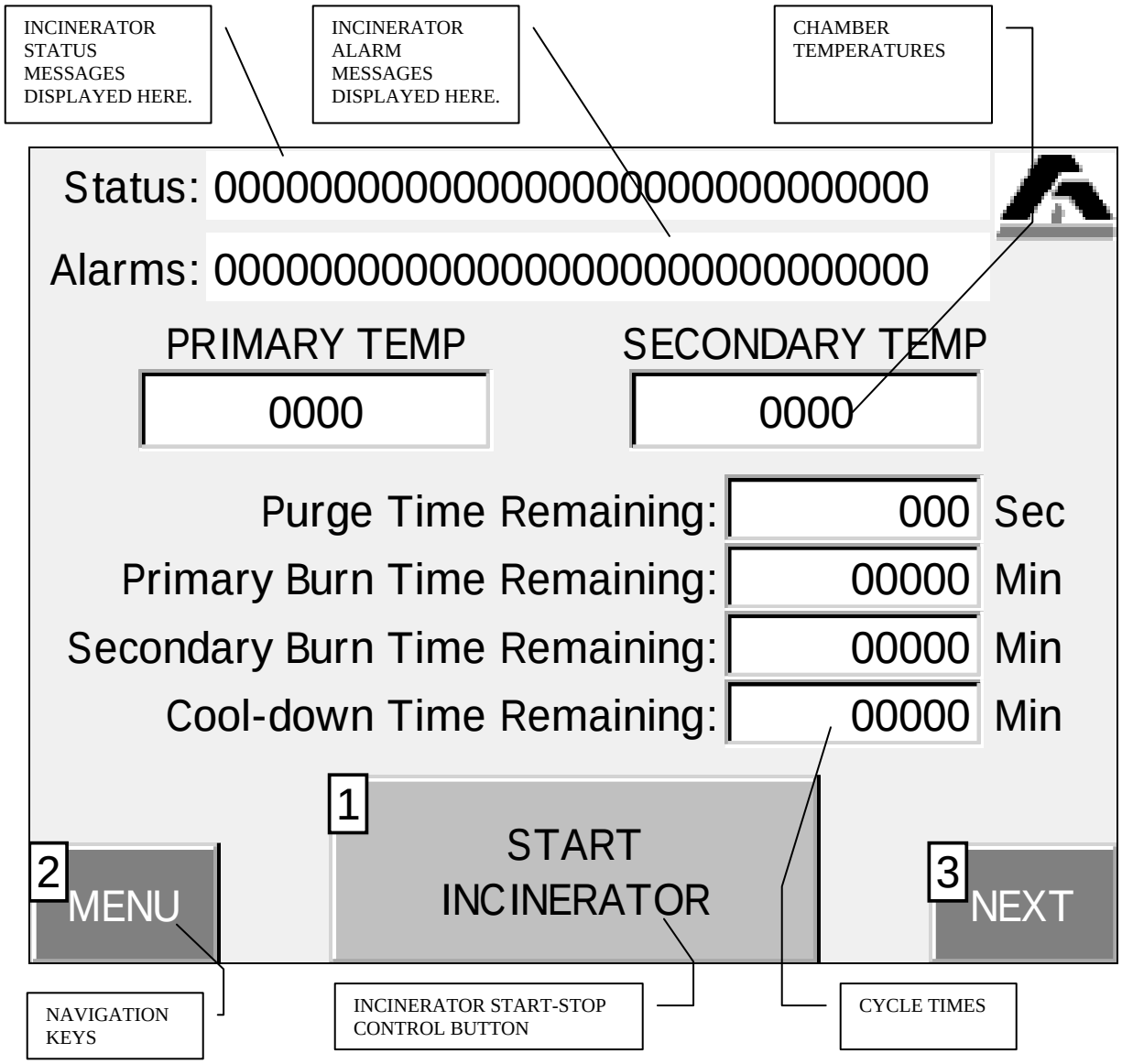
2.3.1. When a numeric entry object is activated a *popup keypad* will be displayed.

2.3.2. The initial entry value will be the current setpoint value. Use the numeric keys to enter the new value. If the value needs to be negative, press the minus key [-] either before or after you enter the new value. If you make a mistake, press the [BSP] (back space) key to erase the last digit(s) entered. You can press the [ESC] (escape) key at any time close the keypad without changing the parameter value. When you are finished entering the new value, press the [↵] (enter) key.

2.3.3. If the value you entered is outside a preset limit, it will be replaced by that parameter's default value (refer to the parameter settings table in paragraph 1.3).

2.4. MAIN SCREEN

The MAIN SCREEN is the default screen at power-up. Incinerator status, alarm annunciation, cycle times, incinerator control and screen navigation keys are displayed on this screen. The MAIN SCREEN should always be selected during normal incinerator operation.



2.4.1. **STATUS**. The top line displays the incinerator status. The status messages displayed are as follows:

INCINERATOR OFF	Incinerator is off.
PURGE CYCLE	Incinerator is in purge cycle
WARM-UP CYCLE	Incinerator is in warm-up cycle
PRIMARY BURN CYCLE	Incinerator is in primary burn-down cycle.
SECONDARY BURN CYCLE	Incinerator is in secondary burn-down cycle.
COOL DOWN CYCLE	Incinerator is in cool-down cycle.
CURING CYCLE	Incinerator is in a curing cycle

2.4.2. **ALARMS**. The second line displays the incinerator alarms. If more than one alarm is active, the display will scroll through each alarm ever four seconds. The alarm messages that are displayed are as follows:

DOOR OPEN	Primary chamber door is open.
PRIMARY BURNER #1 FAIL	Primary burner #1 failed.
PRIMARY BURNER #2 FAIL	Primary burner #2 failed.
SECONDARY BURNER #1 FAIL	Secondary burner #1 failed.
SECONDARY BURNER #2 FAIL	Secondary burner #2 failed.
PRIMARY THERMOCOUPLE OPEN	Primary chamber thermocouple open (failed).
SECONDARY THERMOCOUPLE OPEN	Secondary chamber thermocouple open (failed).
PRIMARY OVER-TEMPERATURE	Primary chamber over temperature.
SECONDARY OVER-TEMPERATURE	Secondary chamber over temperature.
PRIMARY BLOWER (MS1) FAULTED	Primary blower motor overload relay tripped.
SECONDARY BLOWER (MS2) FAULTED	Secondary blower motor overload relay tripped.

2.4.3. **PRIMARY TEMP**. Display of the actual Primary chamber temperature in degrees Fahrenheit.

2.4.4. **SECONDARY TEMP**. Display of the actual Secondary chamber temperature in degrees Fahrenheit.

2.4.5. **PURGE TIME REMAINING**. Displays the time remaining in the purge cycle. When the value decrements to zero the cycle has completed.

2.4.6. **PRIMARY BURN TIME REMAINING**. Displays the time remaining for primary burn-down cycle. When the value decrements to zero the cycle has completed.

2.4.7. **SECONDARY BURN TIME REMAINING**. Displays the time remaining for secondary burn-down cycle. When the value decrements to zero the cycle has completed.

2.4.8. **COOL-DOWN TIME REMAINING**. Displays the time remaining for cool-down cycle. When the value decrements to zero the cycle has completed and the incinerator will automatically shut off.

2.4.9. **INCINERATOR START (STOP) BUTTON**. Use this button to start and stop the incinerator sequence of operation. When the button legend reads "**START INCINERATOR**", pressing the button will startup the incinerator. When the button legend reads "**STOP INCINERATOR**", pressing the button will stop the incinerator.

2.5. CHANGING PARAMETERS

Parameters are changed by simply pressing on the object that displays the parameter.

2.5.1. When a numeric entry object is pressed a *popup keypad* will be displayed.

2.5.2. The initial entry value will be the current setpoint value. Use the numeric keys to enter the new value. If the value needs to be negative, press the minus key [-] either before or after you enter the value. If you make a mistake, press the [BSP] (backspace) key to erase the last digit(s) entered. You can press the [ESC] (escape) key at any time to close the keypad without changing the parameter value. When you are finished entering a new value, press the [↵] (enter) key.

2.5.3. If the value you entered is outside a preset limit, it will be replaced by that parameter's default value (refer to the parameter settings table in section 1, paragraph 1.3, for the default values).

2.6. PARAMETER ENTRY SCREENS

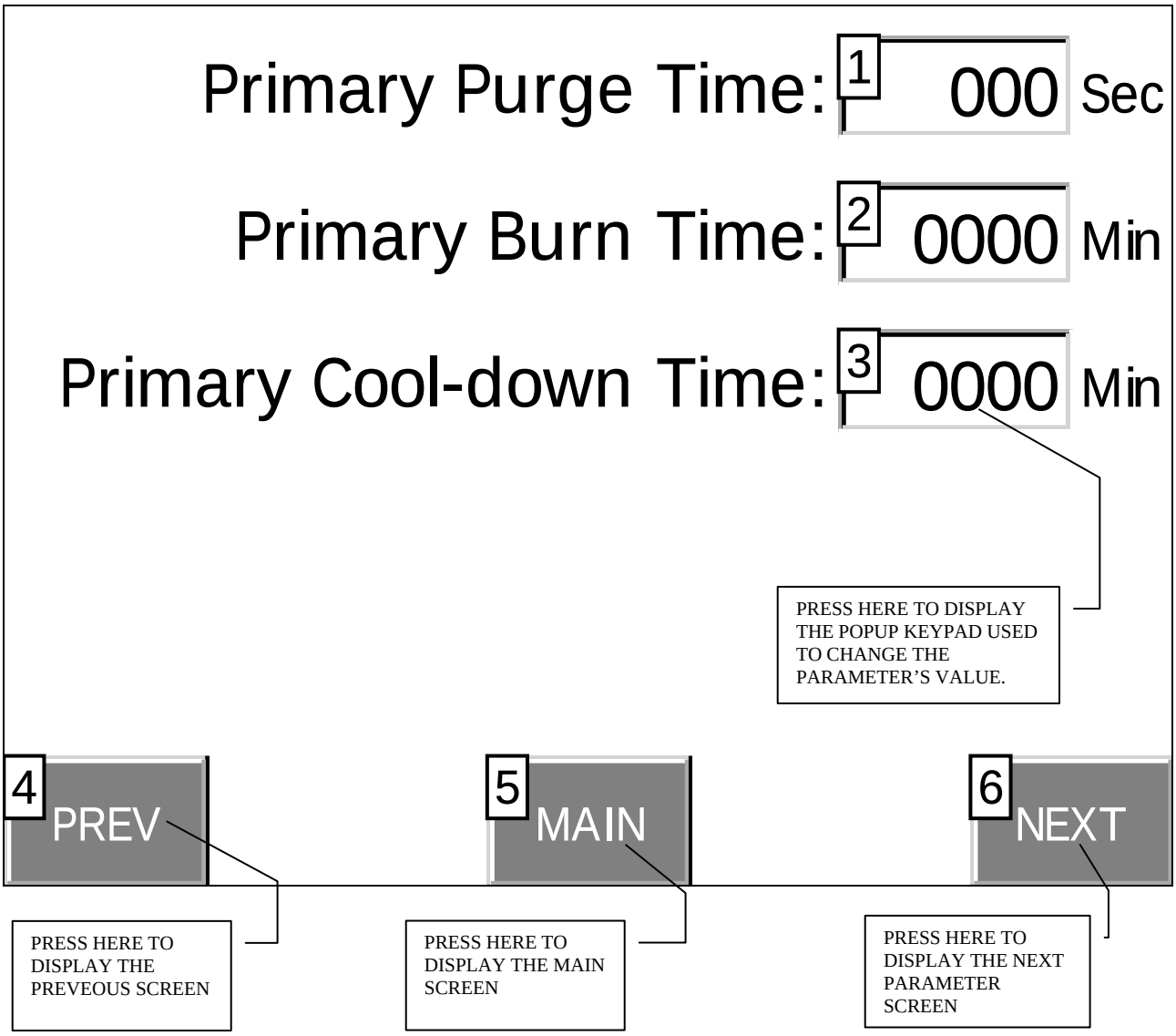
The PARAMETER ENTRY SCREENS allow the user to view and/or change the incinerator cycle times, burner and blower temperature settings, and blower operating modes.

2.6.1. There are three screens for the primary chamber parameters, and one screen for the secondary chamber parameters. Primary screen 1 displays the primary cycle times. Primary screen 2 displays the primary burner temperature settings. Primary screen 3 displays the primary blower temperature settings and blower operating modes. The secondary screen displays all of the secondary chamber settings.

2.6.2. From the MAIN SCREEN, press the [**NEXT**] key to display these screens in the order described above.

2.7. PRIMARY PARAMETERS - SCREEN 1

SCREEN 1 allows the user to view and/or change the PRIMARY CYCLE TIMES.



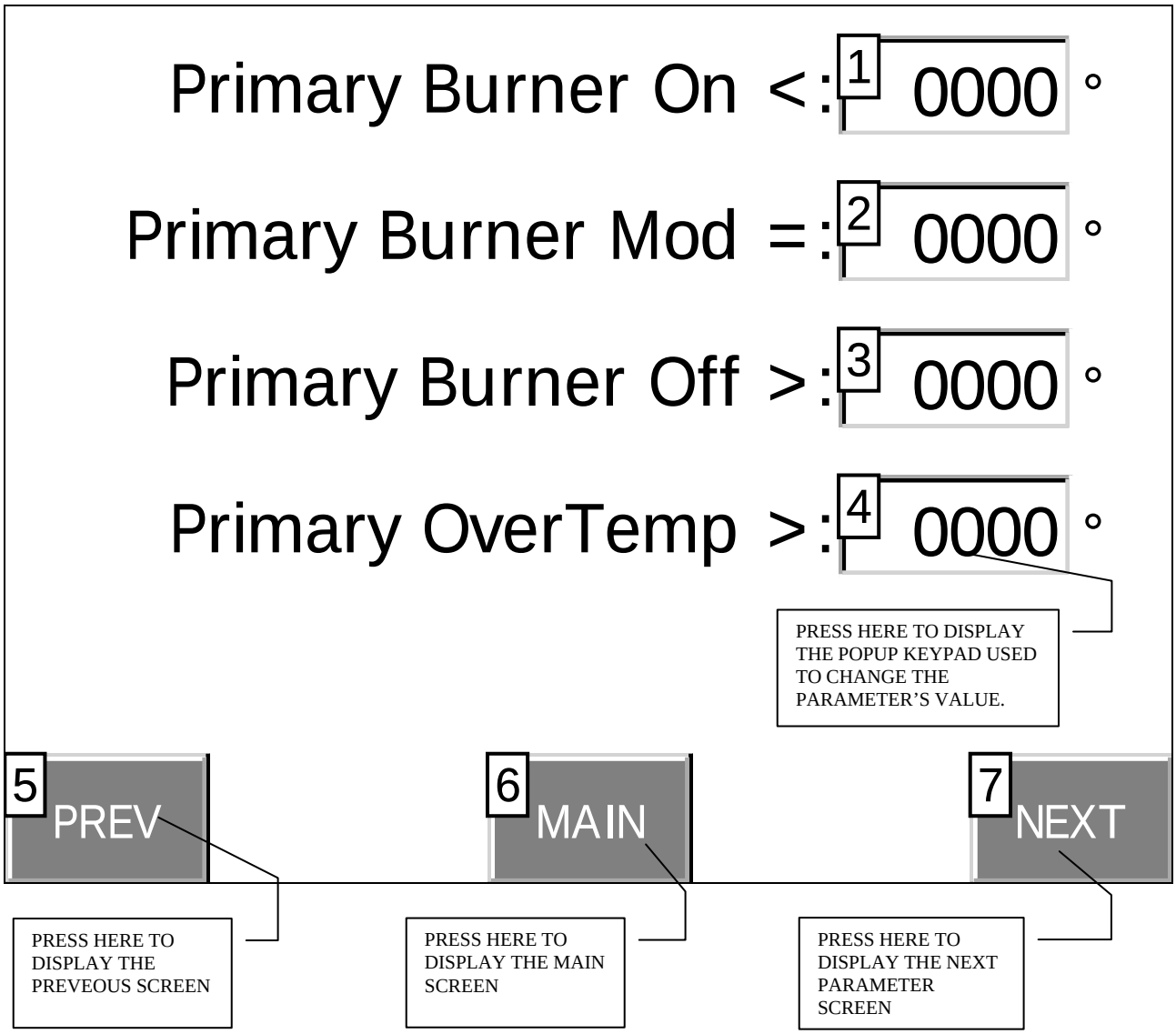
2.7.1. **PRIMARY PURGE TIME [1]**. Purge time sets the duration that the primary blower is energized before the warm-up cycle is started. This "purging" prevents an explosion from taking place if combustible gases are present in the chambers when the burners are energized.

2.7.2. **PRIMARY BURN TIME [2]**. Primary burn time sets the duration of the PRIMARY BURN CYCLE. This is the duration that the primary burner will be enabled to consume the waste in the primary chamber.

2.7.3. **PRIMARY COOL-DOWN TIME [3]**. Primary cool-down time sets the duration of the PRIMARY COOL-DOWN CYCLE. This is the duration that the primary blower is energized after the secondary burn cycle has completed. The cool-down cycle's function is to cool the primary chamber enough to enable the door to be opened for re-loading of waste or ash removal.

2.8. PRIMARY PARAMETERS - SCREEN 2

SCREEN 2 allows the user to view and/or change the PRIMARY BURNER TEMPERATURES.



2.8.1. **PRIMARY BURNER ON [1]**. If the burner is off, and the temperature in the chamber is below this setpoint, the primary burner will energize. Note the burner will de-energize only if the temperature in the chamber rises above the primary burner off setpoint. The burner on and off setpoints work in conjunction to prevent the chamber from getting too hot or too cool.

2.8.2. **PRIMARY BURNER MOD [2]**. If your unit is equipped with a modulating type burner, the firing rate of the burner will be modulated in an attempt to maintain this temperature setpoint. This parameter should be set greater than the burner-on setting, and less than the burner-off setting. Even if your unit is equipped with a simple off-on burner, keep this parameter set between the burner-on and burner-off setpoints.

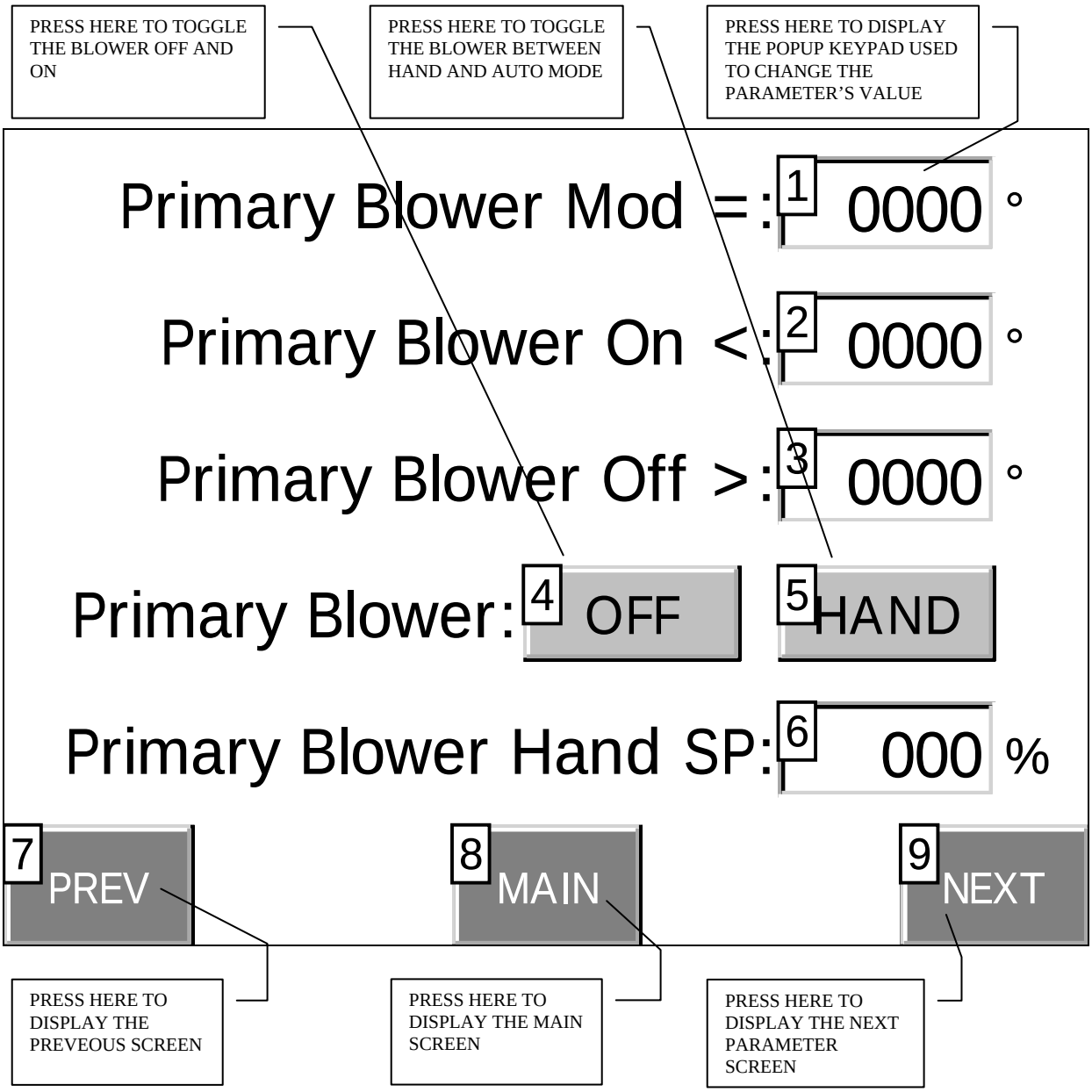
2.8.3. **PRIMARY BURNER OFF [3]**. If the burner is on, and the temperature in the chamber rises above this setpoint, the primary burner will de-energize. Note

the burner on and off setpoints work in conjunction to prevent the chamber from getting too hot or too cool.

2.8.4. **PRIMARY OVERTEMP [4]**. If the temperature in the chamber rises above this setpoint the PRIMARY OVER TEMPERATURE ALARM will be displayed. If your unit is equipped with the optional alarm light, it will illuminate in a flashing on and off state until the temperature falls below this setpoint.

2.9. PRIMARY PARAMETERS - SCREEN 3

SCREEN 3 allows the user to view and/or change the PRIMARY BLOWER TEMPERATURES and BLOWER OPERATING MODES.



2.9.1. **PRIMARY BLOWER MOD [1]**. If your unit is equipped with a modulating type blower, the speed of the blower will be modulated in an attempt to maintain this temperature setpoint. This parameter should be 50° higher than the PRIMARY BURNER MOD setpoint. Also, this parameter should be set less than

the blower-on setting. Even if you unit is equipped with a constant speed blower, keep this parameter set less than the blown-on setpoint.

2.9.2. **PRIMARY BLOWER ON [2]**. If the blower is off, and the temperature in the chamber falls below this setpoint, the blower will energize. Note the blower on and off setpoints work in conjunction to prevent the chamber from getting too hot or too cool.

2.9.3. **PRIMARY BLOWER OFF [3]**. If the blower is on, and the temperature in the chamber rises above this setpoint, the blower will de-energize. Note the blower on and off setpoints work in conjunction to prevent the chamber from getting too hot or too cool.

2.9.4. **PRIMARY BLOWER ON-OFF [4]**. Pressing this button toggles the primary blower between its ON and OFF states.

2.9.4.1. **OFF**. When the button displays "OFF" the blower is disabled and will not operate during the burn cycle.

2.9.4.2. **ON**. When the button displays "ON" the blower is enabled and will function according to the blower mode button.

2.9.5. **PRIMARY BLOWER HAND-AUTO [5]**. Pressing this button toggles the primary blower between its HAND and AUTO modes.

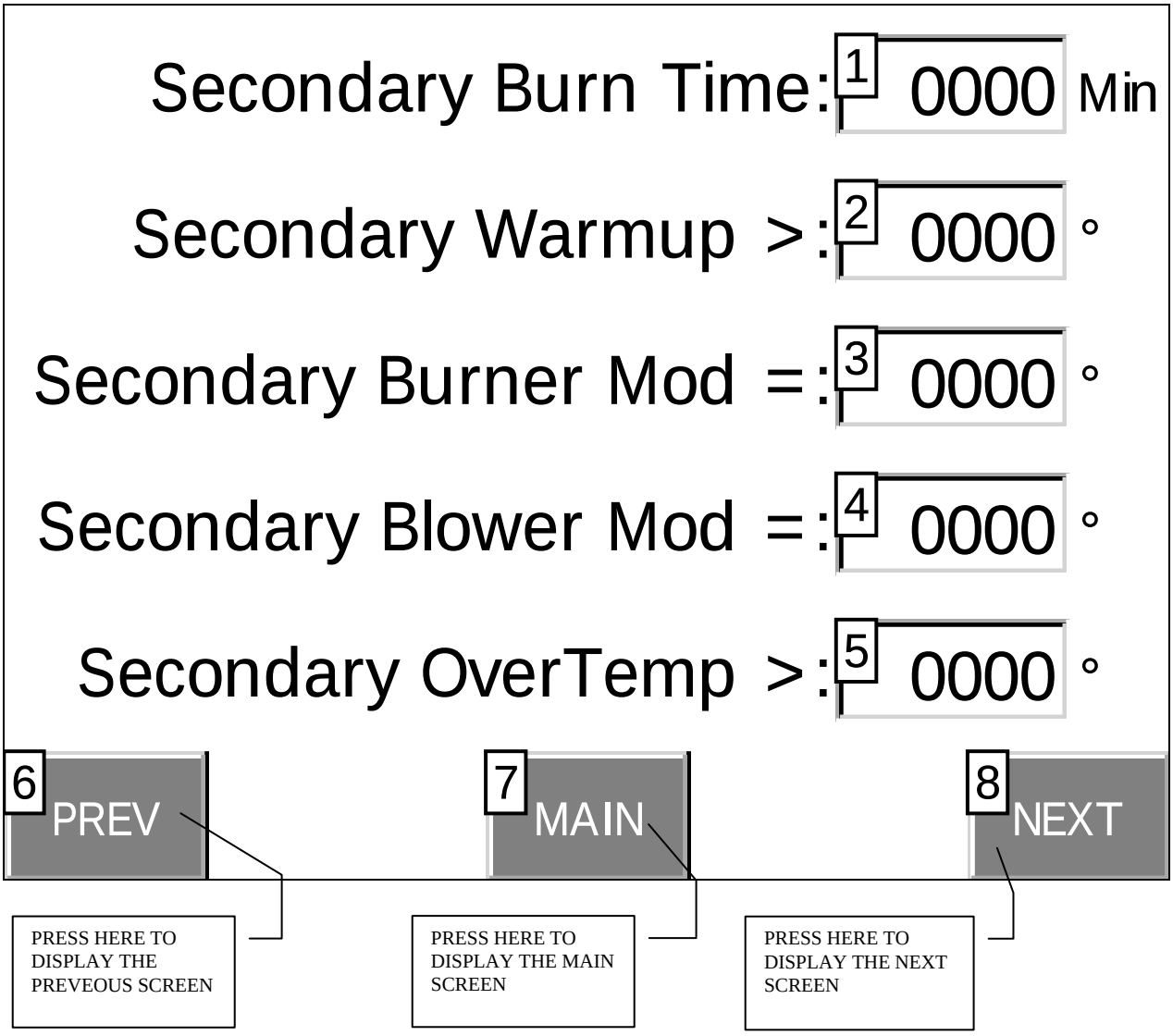
2.9.5.1. **HAND.** When the button displays "HAND" the blower will run at a constant speed during the burn cycle. The blower-off setpoint is disregarded, and only the primary over-temperature alarm will disable the blower. If your unit is equipped with a modulating blower, it will run at the PRIMARY BLOWER HAND speed setpoint.

2.9.5.2. **AUTO.** When the button displays "AUTO" the blower is enabled. If the chamber temperature is below the blower-off setpoint the blower is energized. If the chamber rises above the blower-off setpoint the blower is de-energized and will remain de-energized until the temperature falls below the blower-on setpoint. If your unit is equipped with a modulating blower, its speed will be modulated in an attempt to maintain the chamber temperature at the PRIMARY BLOWER MOD setpoint.

2.9.6. **PRIMARY BLOWER HAND SP [6]**. If your unit is equipped with a modulating blower, this setpoint controls the speed of the blower when it is in the HAND mode. Note this setpoint cannot be set less than the MIN CV setpoint that is programmed into the blower PID parameter screen. See paragraph 2.12 for details on the MIN CV parameter.

2.10. SECONDARY PARAMETERS SCREEN

The SECONDARY PARAMETERS SCREEN allows the user to view and/or change the SECONDARY CHAMBER PARAMETERS.



2.10.1. **SECONDARY BURN TIME [1]**. Secondary burn time sets the duration of the SECONDARY BURN CYCLE. This is the duration that the secondary burner and blower will remain energized to consume the smoke produced by any smoldering ashes in the primary chamber.

2.10.2. **SECONDARY WARM-UP [2]**. This is the temperature that the secondary chamber must exceed to complete the secondary warm-up cycle. The secondary chamber temperature must exceed this setpoint for one minute before the primary burn cycle can be started. The function of the warm-up cycle is to ensure the secondary chamber is hot enough to completely combust the flammable gasses and particulates emitted from the primary chamber.

2.10.3. **SECONDARY BURNER MOD [3]**. The secondary burner will be modulated between its low and high-fire settings to maintain this temperature setting. If your unit is equipped with a fully modulating type burner, the firing rate of

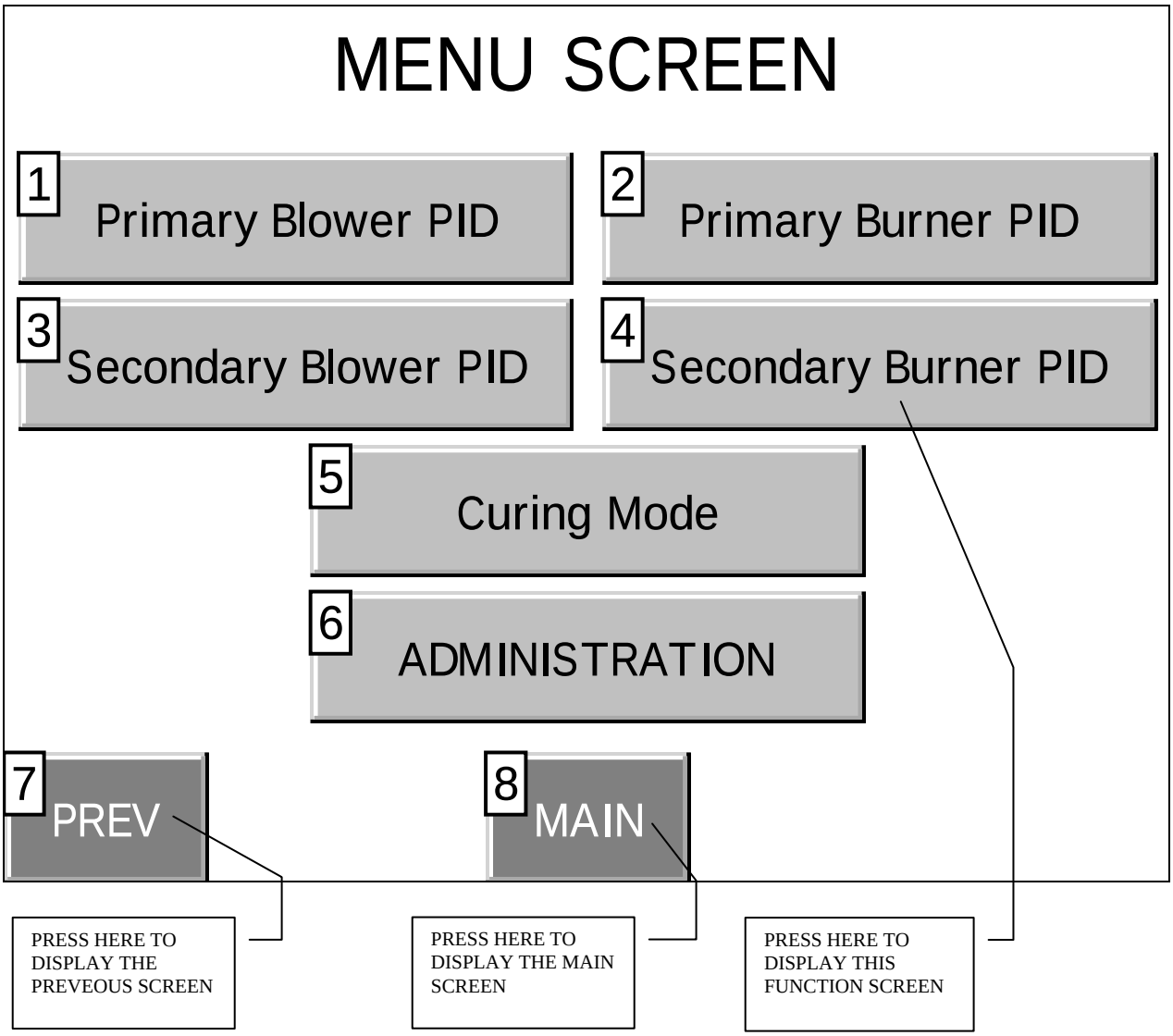
the burner will be infinitely modulated in an attempt to maintain this temperature setpoint, otherwise it will be modulated between a fixed low and high-fire setting. This parameter should be set greater than the secondary warm-up setting, and less than the secondary blower mod setting.

2.10.4. **SECONDARY BLOWER MOD [4]**. If your unit is equipped with a modulating type blower, the speed of the blower will be modulated in an attempt to maintain this temperature setpoint. This parameter should be set slightly higher than the secondary burner mod setpoint.

2.10.5. **SECONDARY OVERTEMP [5]**. If the temperature in the chamber rises above this setpoint the SECONDARY OVER TEMPERATURE ALARM will be displayed. If your unit is equipped with the optional alarm light, it will illuminate in a flashing on and off state until the temperature falls below this setpoint. The primary burner and primary blower will be disabled until the secondary chamber temperature falls below this setpoint.

2.11. MENU SCREEN

The MENU SCREEN allows the user to access special function screens that are not normally accessed on a routine basis. The menu screen allows the user to "go to" a particular screen by simply pressing its menu button.



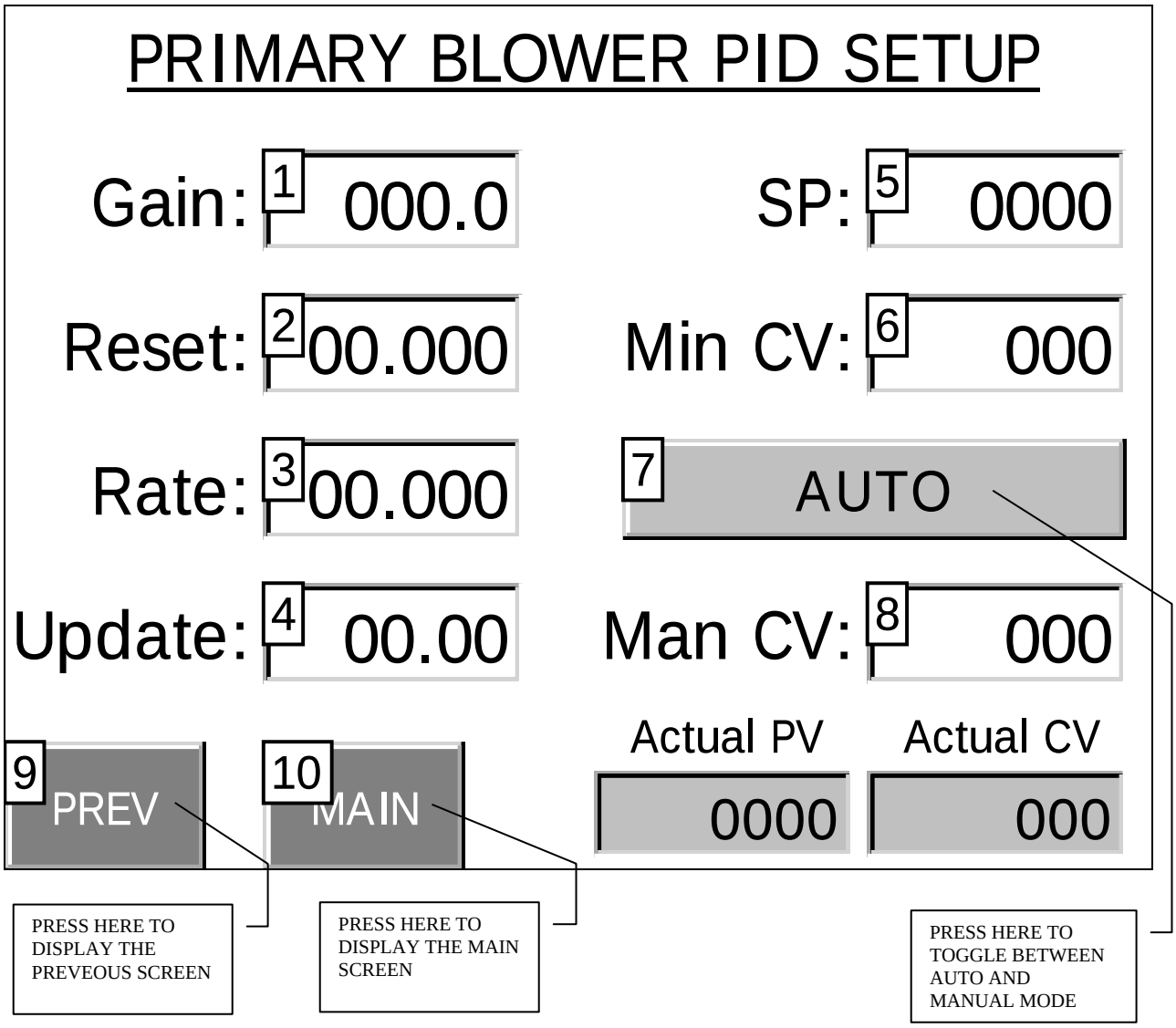
2.11.1. When pressed, buttons [1] through [4] will display their respective PID setup screens. Button [5] will display the curing mode screen, and button [6] will display the administration screen.

2.11.2. Note the PID screens should only be accessed by qualified technicians who have knowledge in tuning PID loops, or under supervision of a factory technician. The curing mode screen is only accessed during commissioning, or when refractory repairs have been made and new refractory must be cured. The administration screen allows the user to adjust the screen contrast, clean the screen without activating any buttons or objects, and allows access to password secured screens used by factory technicians.

2.12. PID TUNING SCREEN

The PID TUNING SCREEN allows the user to tune the PID loops associated with their respective devices. The tuning screens are only applicable if their respective devices have been installed on the unit. In other words, if your unit has been installed with the optional modulating blowers, then the blower PID tuning screens are applicable to your incinerator. If your unit does not have the optional modulating blowers, then these screens have no control over the fixed speed blowers installed on your unit.

Because all the PID tuning screens are identical in layout and function, only one screen will be explained.



2.12.1. **GAIN [1]**. This sets the gain for the loop. Valid entry values are between 0.1 and 100.0. Default value is 10.0. If the gain is positive, the loops is "reverse acting", the control value (CV) will decrease as the process value (PV) increases. If the gain is negative, the loops is "direct acting", the control value will increase as the process value increases. Note that only the secondary blower is "direct acting", as the temperature increases, the blower speed increases.

2.12.2. **RESET [2]**. This sets the reset time (integral) for the loop. Valid entry values are between 0.001 and 10.000. Default value is 1.000.

2.12.3. **RATE [3]**. This sets the rate time (derivative) for the loop. Valid entry values are between 0.001 and 10.000. Default value is 1.000.

2.12.4. **UPDATE [4]**. This sets the loop update time in seconds. Valid entry values are between 0.001 and 10.000. Default value is 0.5.

2.12.5. **SP [5]**. This is the loop setpoint (SP). Valid entry values are between 0 and 2300. Default values are the "MOD" setpoints (see paragraph 1.3).

2.12.6. **MIN CV [6]**. This is the minimum control value (CV) that the loop will output. Valid entry values are between 0 and 100%. Default values for blower loops are 25%. The default value for burner loops is 0%.

2.12.7. **AUTO-MANUAL [7]**. This button toggles the loop between auto and manual mode. When the loop is in auto mode, the CV is controlled by the PID loop equation. When the loop is in manual mode, the CV is controlled by the MAN CV setpoint. This feature is used to setup the burner low and high fire settings, and for adjusting the blower VFD maximum frequency setting for full load current draw on the motor.

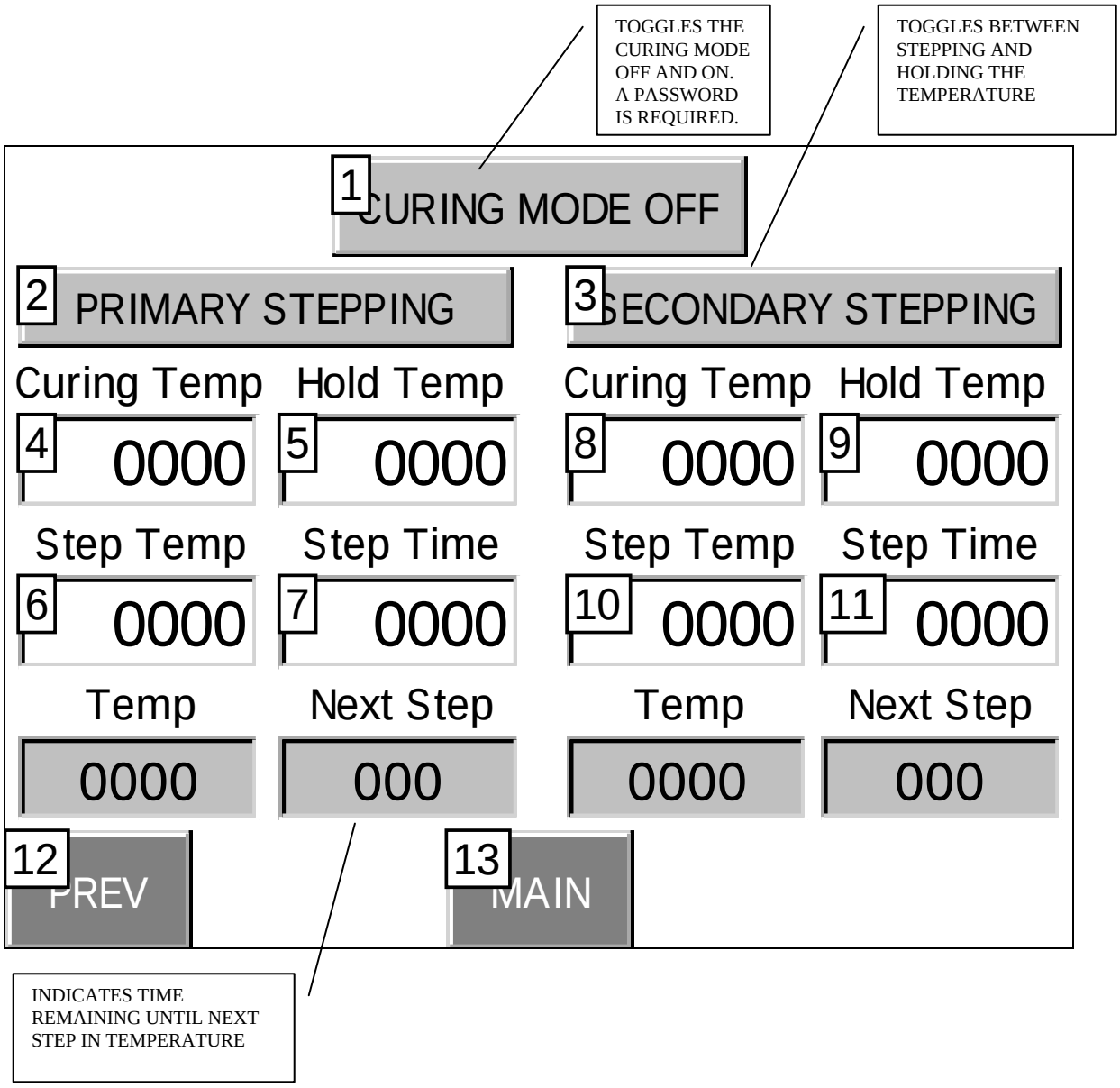
2.12.8. **MAN CV [8]**. This setpoint is used when the loop is in manual mode. The ACTUAL CV will follow this value. Valid ranges are from MIN CV to 100%.

2.12.9. **ACTUAL PV**. This is the actual process variable in degrees.

2.12.10. **ACTUAL CV**. This is the actual control value, normalize between 0.00 and 1.00, with 0.00 equal to 0% and 1.00 equal to 100%.

2.13. CURING SCREEN

The CURING SCREEN is a special function screen used by ACS technicians when commissioning the incinerator, or by the user when refractory repairs have been made and need to be cured.



2.13.1. **CURING MODE ON-OFF [1]**. This button toggles the curing mode on and off. A valid password is required to turn the curing mode on. If on, entering an invalid password turns the curing mode off.

2.13.2. **PRIMARY STEPPING-HOLDING [2]**. This button toggles the primary chamber curing mode between stepping the primary temperature and holding the primary temperature. When the button reads “holding”, the temperature will be maintained at the CURING TEMP setpoint.

2.13.3. **SECONDARY STEPPING-HOLDING [3]**. This button toggles the secondary chamber curing mode between stepping the secondary temperature and

holding the secondary temperature. When the button reads "holding", the temperature will be maintained at the CURING TEMP setpoint.

2.13.4. **CURING TEMP [4 & 8]**. This is the temperature that the burners will maintain during the curing cycle. The burners will de-energize when the temperature exceeds this setpoint, and will energize when the temperature falls below this setpoint.

2.13.5. **HOLD TEMP [5 & 9]**. When the CURING TEMP setpoint equals, or exceeds, this setpoint, stepping of the CURE TEMP setpoint stops and the chamber is held at the CURE TEMP setpoint.

2.13.6. **STEP TEMP [6 & 10]**. This is the step value that will be added to the CURE TEMP setpoint at the step time interval. For example, if the STEP TEMP is 50, and the STEP TIME is 30, the value 50 will be added to the CURE TEMP setpoint every 30 minutes.

2.13.7. **STEP TIME [7 & 11]**. This is the time interval between curing temperature steps, or the interval between adding the STEP TEMP setpoint to the CURE TEMP setpoint.

2.13.8. **TEMP**. This is the actual chamber temperature.

2.13.9. **NEXT STEP**. This is the time, in minutes, remaining until the next step in temperature occurs.

2.13.10. **CURING MODE EXAMPLE**

2.13.10.1. CURING TEMP at 100°F (50°C).
HOLD TEMP at 400°F (200°C).
STEP TEMP at 50°F (25°C).
STEP TIME at 60 minutes.

2.13.10.2. Toggle step/hold to stepping

2.13.10.3. Toggle the CURING MODE to ON.

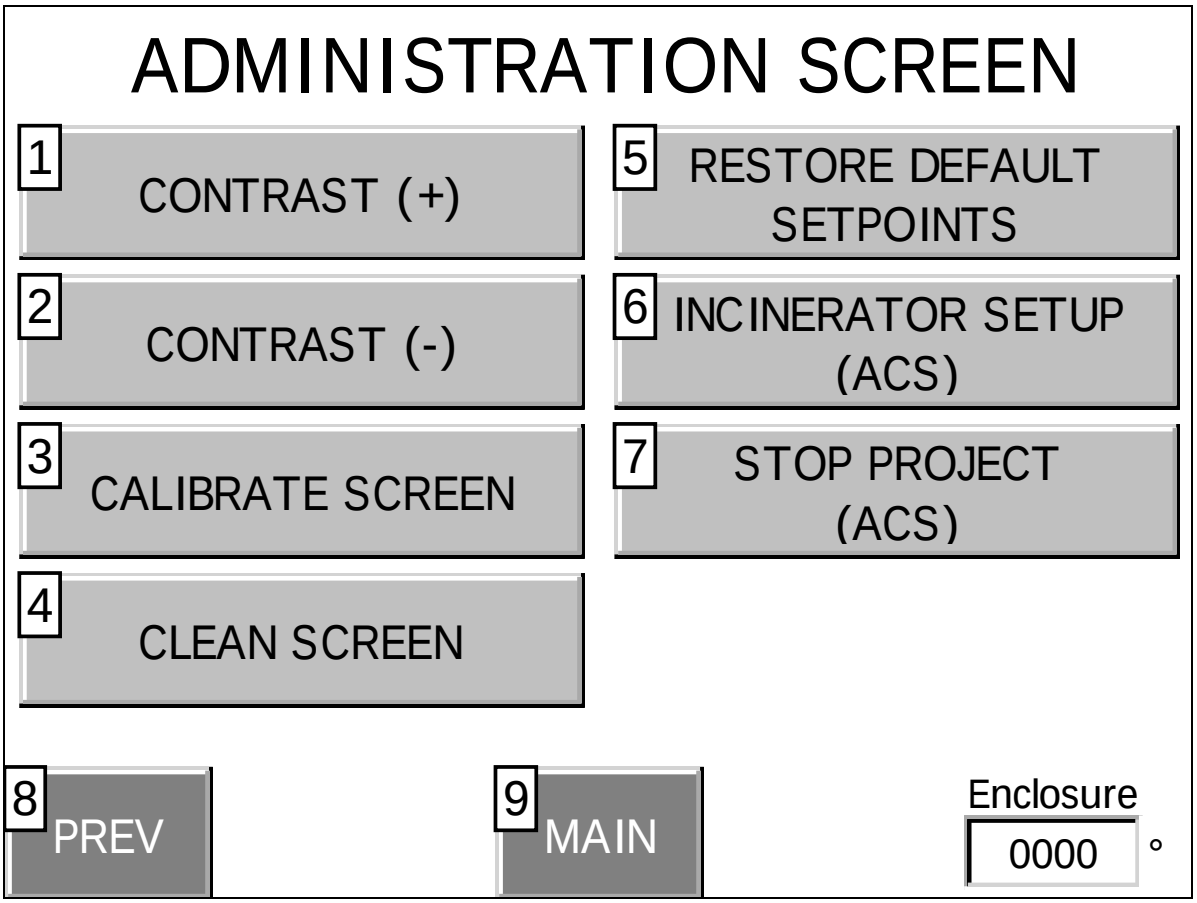
2.13.10.3.1. When the CURING MODE is set to ON the burners will ignite and run until the chamber temperature reaches the CURING TEMP setpoint. The burners will cycle off and on at this temperature setting until the STEP TIME interval expires. When the STEP TIME interval expires, the STEP TEMP setpoint will be added to the CURING TEMP setpoint. The burners will now cycle off and on at the new CURING TEMP setpoint. This algorithm will continue until the CURING TEMP setpoint equals the HOLD TEMP setpoint, at which time the cycle will automatically switch from *stepping* to *holding*. The burners will continue to cycle off and on at the CURING TEMP setpoint until new CURING TEMP and HOLD TEMP settings have been entered and the STEP/HOLD toggled back to STEPPING.

2.13.10.3.2. To slowly cool the chamber after the highest curing temperature has been reached, set the STEP TEMP setpoint to a *negative* value and set the CURING TEMP setpoint 100°F less than the HOLD TEMP setpoint. Toggle STEP/HOLD to STEPPING. The CURING TEMP

setpoint will be decremented at the STEP TIME interval until its value is less than 100°F. Note the burners will continue to cycle on and off (at some temperature below 100°F) until the curing mode is turned off.

2.14. ADMINISTRATION SCREEN

The ADMINISTRATION SCREEN is a special function screen that allows for adjusting the screen contrast and for calibrating the "touch" coordinates. It also allows you to clean the touch screen by deactivating the buttons for a short period of time. The RESTORE DEFAULT SETPOINTS button will access another screen where all the factory default values can be restored. The HMI SETUP and STOP PROJECT buttons are for factory use. They are password protected and should not be activated by the user unless directed to do so by a factory technician. The enclosure temperature is also indicated on this screen.



2.14.1. **CONTRAST (+) [1]**. Each time this button is pressed the screen contract will be increased (made darker).

2.14.2. **CONTRAST (-) [2]**. Each time this button is pressed the screen contract will be decreased (made lighter).

2.14.3. **CALIBRATE SCREEN [3]**. When this button is pressed a calibration screen will appear with instruction on how to calibrate the touch screen. You will need a stylus (do not use a ball point pen or pencil) to calibrate the screen. Just follow the on-screen directions when they appear.

2.14.4. **CLEAN SCREEN [4]**. This button de-actives the touch screen for 30 seconds to allow time to clean the screen.

2.14.5. **RESTORE DEFAULT SETPOINTS [5]**. This button displays the default setpoint screen where all the parameters can be restored to the factory default settings.

2.14.6. **INCINERATOR SETUP [6]**. This button displays factory setup screens where the options for modulating blowers, modulating burners and units of temperature measurement are selected. This setup screen also enables or disables selected burner alarms. This button is password protected.

2.14.7. **STOP PROJECT [7]**. This button is used to stop the project to allow for downloading of a new program. This button is password protected.

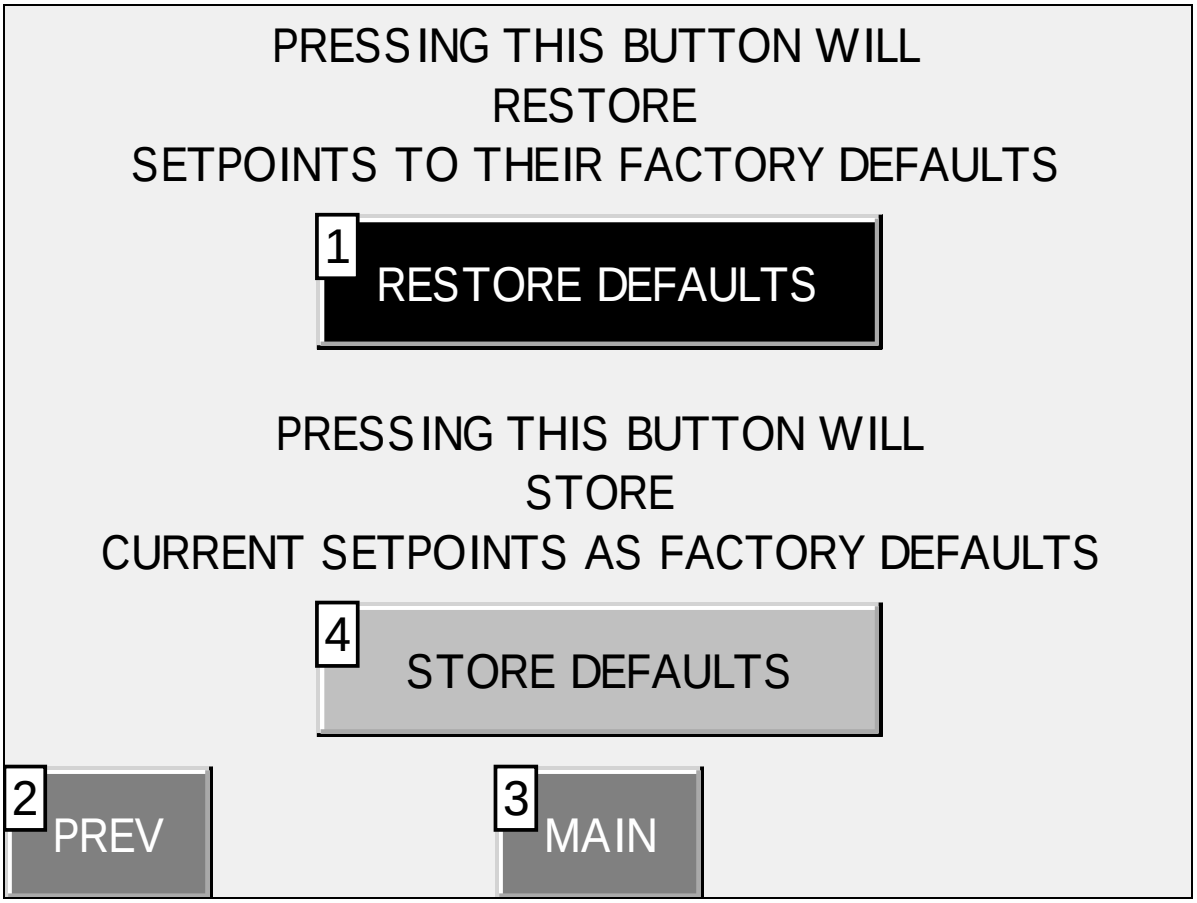
2.14.8. **ACS PASSWORD [8]**. Pressing this object displays an alpha-numeric screen for entering the password.

2.14.9. **LOGIN [9]**. Pressing this button logs the password into the system. If the password was valid, the password protected objects can be activated, if the password was invalid, password protected objects are disabled. Note the password is only active for about 5 minutes, and then it is automatically logged out.

2.14.10. **ENCLOSRE TEMPERATURE**. This displays the internal temperature of the control enclosure. The electronic components within the enclosure are rated for a maximum of 120°F (50°C). If this reading is in excess of 120°F (50°C), steps must be taken to decrease the temperature or premature failure of the components will occur.

2.15. RESTORE DEFAULT SETTINGS SCREEN

The RESTORE DEFAULT SETTINGS SCREEN allows for restoring the factory default settings for all parameters, including the PID parameters.



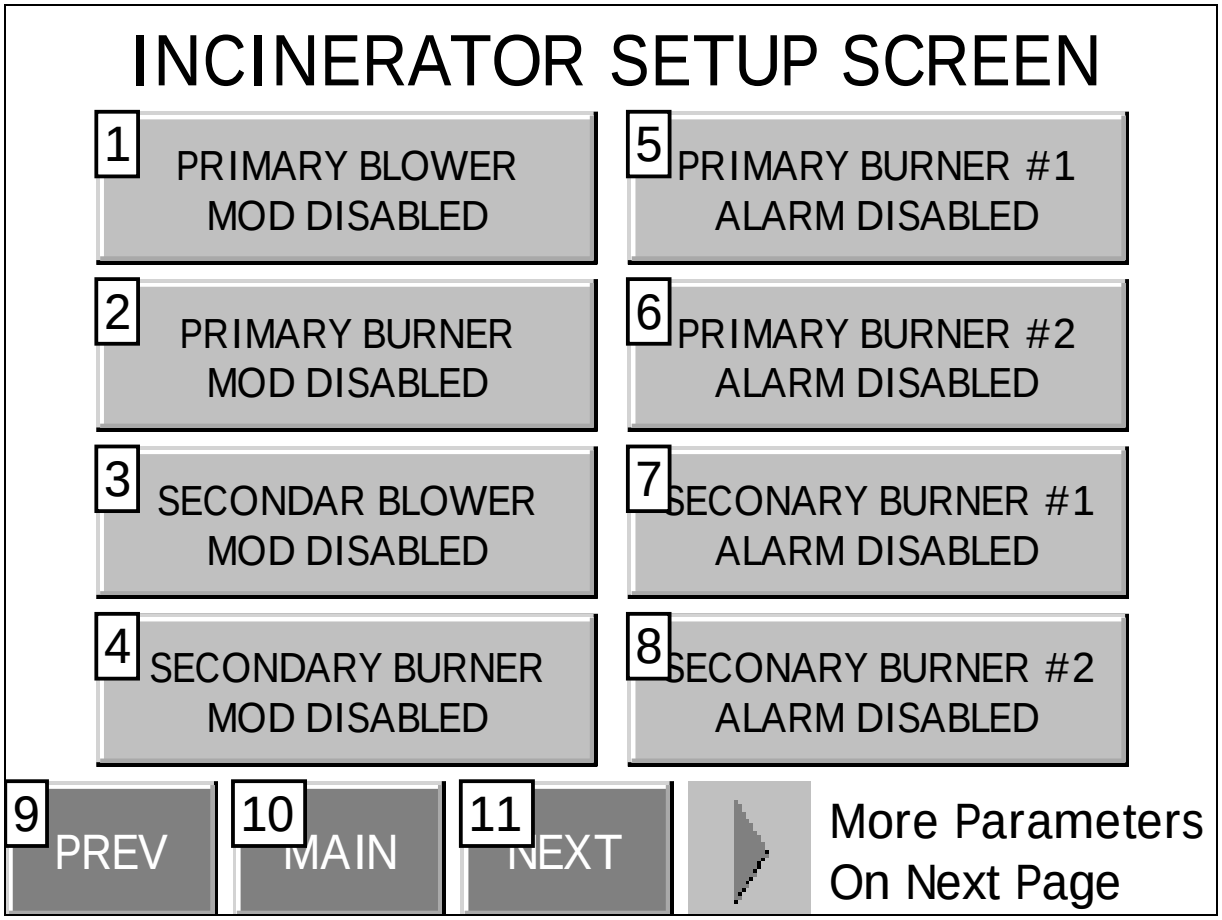
2.15.1. **RESTORE DEFAULTS [1]**. Pressing this button will restore all of the factory default settings. When the settings have been restored, the administration screen will automatically be displayed.

2.15.2. **RESTORE DEFAULTS [1]**. Pressing this button will restore all of the factory default settings. When the settings have been restored, the administration screen will automatically be displayed.

2.15.3. **NAVIGATION KEYS**. To exit this screen without restoring the settings, press either the PREV or MAIN navigations keys.

2.16. INCINERATOR SETUP SCREEN

The INCINERATOR SETUP SCREEN is used by factory technicians during the commissioning of the incinerator electrical control system. Before the unit is started, all of the optional equipment that was installed on the unit is enabled or disabled.



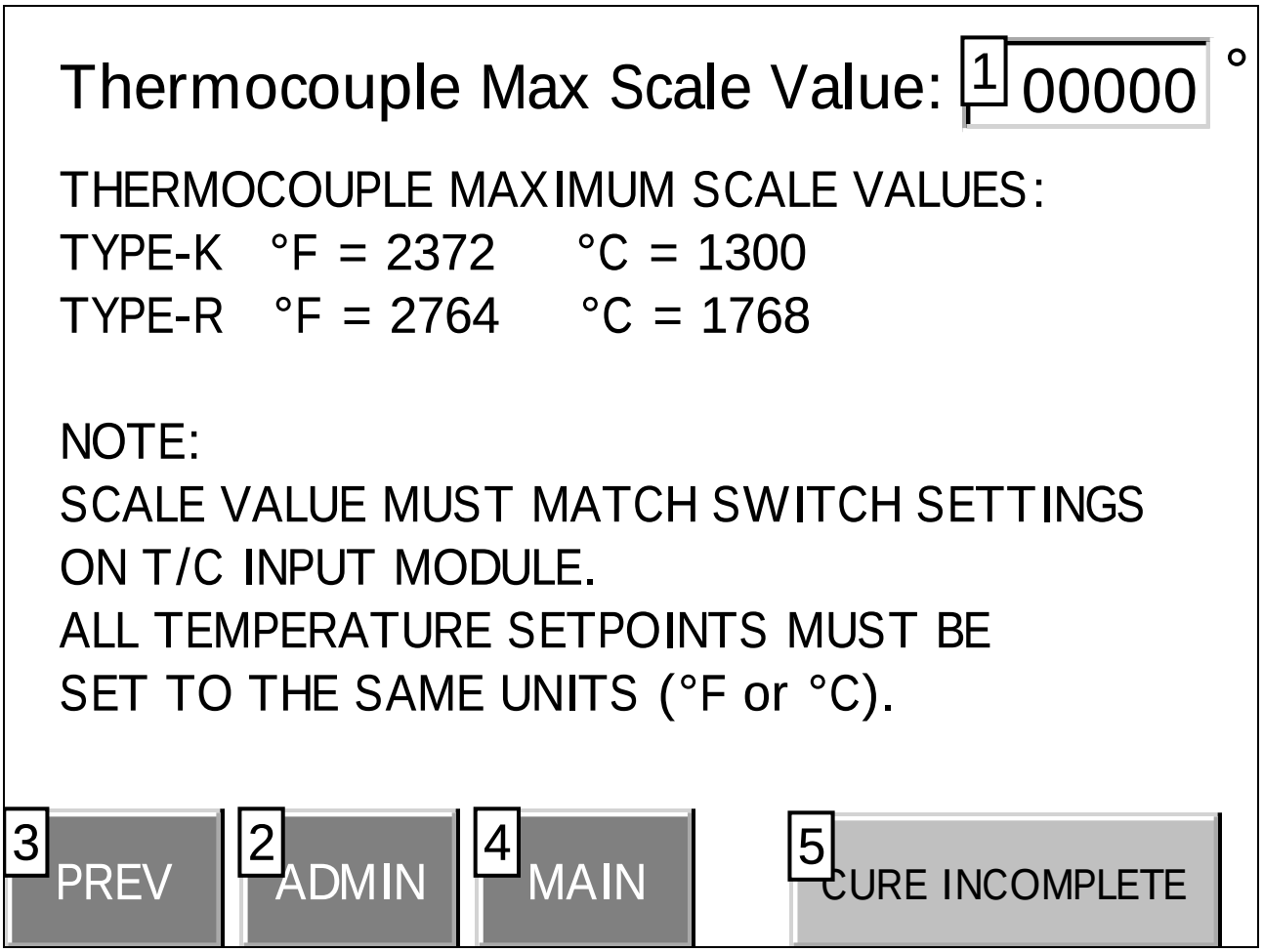
2.16.1. **BLOWER MOD ENABLED/DISABLED BUTTON [1 & 3]**. These buttons tell the control system weather or not modulating air blowers are installed on the incinerator.

2.16.2. **BURNER MOD ENABLED/DISABLED BUTTON [2 & 4]**. These buttons tell the control system weather or not fully modulating burners are installed on the incinerator.

2.16.3. **BURNER ALARM ENABLED/DISABLED BUTTON [5 - 8]**. These buttons tell the control system weather or not a particular burner has been installed and to either enable or disable the alarm logic for it.

2.17. TEMPERATURE MEASUREMENT UNITS SELECTION

This screen sets the scale for the type of thermocouple that was installed on the incinerator. The max scale factor is set to agree with the type of thermocouple (K or R), and the units of measurement (°F or °C) that the temperature will be displayed in.



2.17.1. **THERMOCOUPLE MAX SCALE VALUE [1]**. This parameter is set to match one of the four values listed in the table as shown on the screen. Either type of thermocouple (K or R) can be set to report temperature in °F or in °C. Note that the thermocouple input module's dip switch setting must also match up with this scale setting.

2.17.2. **CURE INCOMPLETE/COMPLETE [5]**. This button will set or reset the curing complete flag within the PLC. The incinerator will not operate until the curing cycle has been completed. This button must read "CURE COMPLETE" before the incinerator will operate.

End of Document. [⇧] [⇩] [⇦] [⇨] [↵]