

DEVAR Inc.
MODEL 3065

 **C US LISTED 51JB**
INDUSTRIAL CONTROL EQUIPMENT

pH / ORP ELECTRODE INPUT
INDICATOR - CONTROLLER
Rev: 12 December 2002

DEVAR Inc.

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INTRODUCTION

The 3065 is an accurate, sophisticated, easy to configure and operate, indicating controller with a highly visible display which was designed to accept pH / ORP probes as input.

FEATURES

- 6 character alphanumeric display.
- High efficiency red LED characters, 0.54" high.
- 15 segments characters for easy to read prompts. "No more hieroglyphics!"
- Scrolling multi-word configuration prompts for clarity.
- Select either pH or ORP inputs.
- Select manual or automatic temperature compensation.
- For automatic temperature compensation, select either a 3K Balco, 1K Balco, 1K platinum RTD, or 100 Ω platinum RTD temperature sensor.
- Zero, two, or four alarm channels with front panel LED indication.
- Each alarm channel has one 10Amp SPDT relay.
- Each alarm channel has independently configured trip and reset points.
- Each alarm can be independently configured to latch.
- Each alarm can be independently configured to activate a horn.
- Each alarm can be independently configured to cause the display to flash.
- Four separate, menu selectable, horn actions.
- A security code can be set to prevent unauthorized access.
- Optional analog retransmission.

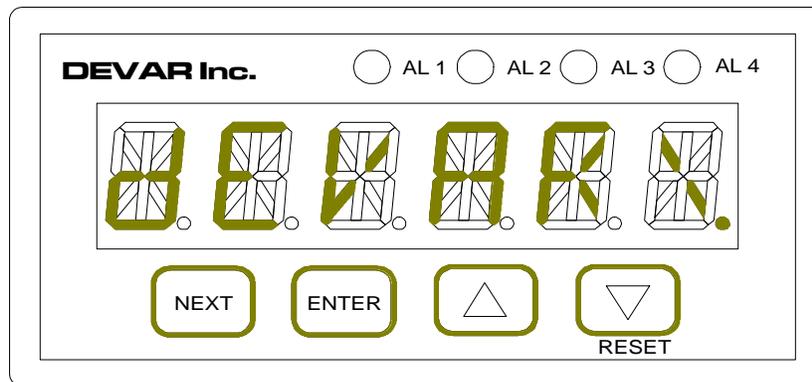


Figure 2:Front Panel

GENERAL INFORMATION

PHYSICAL LAYOUT

Front Panel

The six character display provides a process indication, a temperature indication, or plain English configuration prompts. Four LEDs indicate the status of each alarm. Four keys enable configuration and user input. See figure 1 above.

Rear Panel

All electrical connections are made through plug in screw clamp terminal blocks. A fifteen terminal connector is provided for AC power and relay contacts. A six terminal connector is provided for temperature sensor input signals and optional retransmission connections. These connectors accept 24 to 14 AWG wire. A BNC connector is provided for the input signal.

Mounting

The 3065 case is designed for panel mounting in a 1/8 DIN cutout, 48mm X 96mm. Two clamping brackets attach to and slide in milled slots on either side of the case. The brackets are clamped by screws attached to the rear panel.

BASIC OPERATION

After applying or cycling the power, the 3065 energizes the relays, indicates all alarms active, displays "DEVAR MODEL 3065 <either zero, two or four> ALARMS BUILD <time> <day> <month> <year> Start <selected input signal and last calibration>", and proceeds to indicate a process quantity based on the input signal. The unit periodically scans the front panel switches to detect any user input. At this point only NEXT, ENTER, and RESET are operational. Pressing NEXT causes the unit to enter the menu system. Pressing ENTER allows the user to access the temperature related functionality of the 3065. RESET is used to silence the horn and clear latched alarms, if these options are enabled.

ACCEPTABLE INPUTS

The 3065 accepts as input either pH or ORP probes and is compatible with probes equipped with 3K Balco, 1K Balco, 1K platinum RTD, or 100 Ω platinum RTD temperature sensors. Selecting either pH or ORP is accomplished by utilizing the front panel buttons, as is selecting the type of temperature compensation.

PROCESS INDICATION

Four characters are used to indicate all process quantities. An extra character is used to indicate the sign for either ORP or temperature values. The remaining character(s) are used to indicate the unit of measure. If the input signal becomes too large for the selected input, the unit displays "OUCH!".

DIP SWITCH SW2

Accessed through a hole in the bottom of the case, this switch controls various functions of the 3065, which are:

Pole 4: SETUP PROTECTION

Set ON causes an access code check to enter the menu system.

Pole 3: AUDIBLE ALARM

Set ON enables the horn to sound.

Pole 1: FACTORY CALIBRATION

Set ON enables modification of the factory calibration constants by activating the INPUT CAL. menu item. Performing a factory calibration requires specific equipment and technique for which a typical pH / ORP calibrator is insufficient.

Pole 2: SYSTEM INITIALIZATION

If all poles of SW2 are ON, the RESET front panel button is pressed and held, and the unit is restarted, the 3065 enters a menu where the option cards can be enabled or the EEPROM can be initialized with nominal configuration settings and calibration constants. If the EEPROM is reinitialized, a factory calibration, as described under the INPUT CAL. section below, must be performed before placing the 3065 into service. The selection of configuration settings was arbitrary. A diagram of this menu is at the end of this document. The nominal configuration settings are tabulated below.

Table of Configuration Settings after EEPROM initialization

Security code	'000000' (six zeros)
Input type	PH
Temperature Compensation	Manual, °F
Retransmission	None

Table of Alarm Channel Settings after EEPROM initialization

channel	trip	reset	horn	latch	flash	fail safe polarity
1	250	200	silent	do not latch	never	fail reset
2	500	400	silent	do not latch	never	fail reset
3	750	700	silent	do not latch	never	fail reset
4	1000	900	sound	do not latch	on alarm	fail tripped

MENU SYSTEM

Utilize the menu system to set and view the parameters that define how the 3065 operates. The menu system is activated and controlled through the front panel keypad. The parameters that can be configured are: selecting the input type, performing an input standardization, setting the alarm trip points, setting the alarm reset points, defining how and when the audible alarm operates, activating latching alarms, activating a flashing display on alarm, defining a security code, and controlling the action of any option cards. The menu system is also used to view or reset the peak and valley readings.

Inactivity time out

The 3065 is not operational while in the menu system. If no key is pressed, after approximately 40 seconds the 3065 returns to the process indication mode.

Menu Navigation

ENTER, NEXT, and RESET are used to move through the menu options. A diagram of the menu system can be found at the end of this document. The buttons used to move between different points on the diagram are clearly labeled. Press ENTER to enter a submenu or entry routine and to accept a selection. Press RESET to exit the current menu level. Press NEXT to move to the next available menu option.

example: NEXT moves from "ALARM1" to "ALARM 2"
 ENTER moves from "ALARM1" to submenu "TRIP 1"
 RESET returns from submenu "TRIP 1" to "ALARM1"

Selecting a parameter from a list

Certain parameters, such as input type, are selected from a list. ENTER is used to start the selection process. Scroll through the available choices with the <up arrow> and <down arrow> keys. Press ENTER to make the displayed item the current setting, "STORED" will be displayed as confirmation. NEXT cancels the selection process and returns to the menu prompt.

Entering a number or text

ENTER is used to start the entry process. The currently selected character will be flashing. Press NEXT to select which character to edit. Press <up arrow> or <down arrow> to change the value of the currently selected character. Press ENTER to accept the displayed value and return to the menu prompt.

DETAILS OF THE MENU SYSTEM

Note that the following paragraph headings follow the actual menu prompts, so any misspellings follow the concatenations adopted for that prompt.

PEAK AND VALLEY

This menu item is not blocked by setup protection. Submenu choices provide a method to observe and/or reset the largest and smallest process value detected.

INPUT CAL.

WARNING! The following process, if not properly executed, invalidates any accuracy claims for the 3065 and puts the unit in an undefined state of operation. The menu system will remain active, so calibration attempts can be executed until success is achieved.

Set SW2 pole 1 ON to enable input calibration through the 'INPUT CAL.' menu prompt. Input calibration consists of allowing the 3065 to sample several defined inputs. A complete calibration requires sampling the calibration points tabulated below. The overall accuracy of the 3065 depends on the accuracy of these points. An abbreviated calibration can be performed with the calibration points that correspond to the selected input of the unit. The calibration points and what they affect are:

Calibration Points	Affects
0pH = 414.12mV / 7pH = 0.00mV / 14pH = -414.12mV	pH
-2.000V / 0.000V / 2.000 V	ORP
3K Balco @-10°C = 2628.9Ω / 3K Balco @ 90°C = 3936.9Ω	Temperature / pH
1K Balco @-10°C = 876.3Ω / 1K Balco @ 90°C = 1312.3Ω	Temperature / pH
1K RTD @-10°C = 962.1Ω / 1K RTD @ 90°C = 1347.1Ω	Temperature / pH
100Ω RTD @-10°C = 96.21Ω / 100Ω RTD @ 90°C = 134.71Ω	Temperature / pH

To sample a calibration point, apply the signal, navigate to the menu prompt for that signal and press the ENTER key. For example, apply -414.12mV, navigate to the '14pH' prompt, and press ENTER. The display will alternate between 'SAMPLE' and a number several times. When sampling is complete, the unit will alternately display 'ACCEPT' and the number. Press ENTER to accept this value as the new calibration constant. Repeat this process for each of the calibration points. The number indicated during sampling corresponds to the A/D converter output for that input. The table below lists the nominal values for the calibration points. The values observed for a particular 3065 will be slightly different. Look for problems if the observed number varies significantly from the nominal value, such as observing 32689 when 2822 is expected.

Table of Values Returned for the Input Calibration Points

Input	0pH	7pH	14pH	-2V	0V	2V
Number	54479	32768	11056	6554	32768	58982

Table of Values Returned for the Temperature Sensor Calibration Points

Input	3K Balco @-10°C	3K Balco @ 90°C	1K Balco @-10°C	1K Balco @ 90°C	1K RTD @-10°C	1K RTD @ 90°C	100RTD @-10°C	100RTD @ 90°C
Number	36254	60372	4176	40560	11411	43417	7113	37529

SELECT INPUT TYPE

Press ENTER at this menu prompt to enter the selection routine. The current selection is displayed, use <up arrow> and <down arrow> to Select either ' PH ', or ' ORP '. When ENTER is pressed to select the displayed option, 'STORED' is displayed as confirmation. Press NEXT to return without making a new selection.

STANDARDIZE

The submenu options available under this menu prompt provides the means to calibrate the 3065 to a particular probe by measuring the response of that probe for a standard solution and correcting the indication accordingly. Start this standardization process by immersing the probe into a fresh sample of a standard solution. Press ENTER at the prompt and the 3065 will indicate the detected temperature and the measured value of the solution. After the response settles, press ENTER and the indicated response becomes an editable value. Edit the response to agree with the known value of the standard solution and press ENTER when satisfied.

ONE POINT

A one point standardization shifts the output response so the displayed quantity agrees with a measured sample. This will not correct for probe sensitivity changes due to aging and/or probe to probe variances. For best accuracy, the measured sample should be close to the pH of the process being measured. The standardization process described above is executed once.

TWO POINTS

A two point standardization adjusts the output response so the displayed quantity agrees with the measured samples. This will correct the 3065 calibration for probe sensitivity changes due to aging and/or probe to probe variances. For best accuracy, the measured samples should have as wide a pH span as conveniently possible, such as 4pH and 10pH. The standardization process described above is executed twice.

RELOAD FACTRY CAL

This will return the calibration constants to the original factory values. This can be used to check the condition of a probe. After reloading the factory cal, return to the process indication mode and measure a standard solution, preferably something not close to 7pH, such as 4pH or 10pH. The difference between the displayed response and the value of the standard solution will give an indication of the shift in sensitivity that is expected as a probe ages.

COMPENSATION SETUP, pH inputs

METHOD

Select either manual or automatic compensation.

UNITS

Select a temperature scale of either °F, °C, or °K.

SET TEMP, manual compensation

Entry routine to set the process temperature. The temperature can also be set by pressing ENTER when indicating pH.

DISPLAY TEMP, automatic compensation

This controls when the detected temperature is displayed. The temperature indication can either alternate with the pH indication or it can be accessed by pressing the ENTER button.

SETUP TEMP SENSOR, automatic compensation

WHICH SENSOR

Select between 3K Balco, 1K Balco, 1K RTD, and 100Ω RTD.

ADJUST TEMP SENSOR CAL

This allows the user to offset the nominal sensor response to achieve a more accurate temperature indication. Place the probe into a sample with a known temperature and allow some time for the temperature to equalize. Press ENTER, and the detected temperature is displayed. Press ENTER again and an entry routine starts that allows this indication to be modified. Modify the indication to the known temperature and press ENTER when satisfied with the results. The temperature indication now incorporates an offset that was determined by the indicated temperature and the modified value.

RESET TEMP SENSOR CAL

Press ENTER, then press ENTER again when prompted to set the temperature indication offset to zero.

TEMPERATURE OPTION, ORP inputs

SENSED TEMP

Select either to use or ignore the temperature sensor. If the sensed temperature is used, the prompts UNITS, DISPLAY TEMP, and SETUP TEMP SENSOR are available. See the COMPENSATION SETUP, pH inputs section above for a description of these options.

ALARMS

The 3065 can have either zero, two, or four alarms. The status of each alarm is indicated by a front panel LED.

TRIP and RESET

Independent trip and reset points allow alarm action (high or low alarm) and hysteresis (value between trip and reset points) to be precisely controlled. Setting the trip point to a value higher than the reset point configures that alarm as a high alarm. Setting the trip point to a value lower than the reset point configures the alarm as a low alarm. Setting the trip and reset points to the same value disables the alarm, which is held in the non-alarm condition.

HORN

Each alarm can be set to activate the horn.

LATCH

An alarm configured to latch will return to the non-alarm condition when the process meets the reset condition and the RESET button is pressed.

FLASH SCREEN

Each alarm can be set to cause the screen to flash.

FAIL SAFE POLARITY

Each alarm can be set so that on a power failure the relay will go to either the tripped or reset state. The combinations of settings and wiring can make setting up the 3065 confusing, but the following procedure will always produce the desired results. First, wire up the relays so the controlled function is in the proper state for failsafe. If failsafe is a closed contact, wire between 'P' and 'NC'. If failsafe is an open contact, wire between 'P' and 'NO'. Second, change the failsafe configuration setting to agree with the alarm state when in failsafe.

Example: A two channel 3065 is measuring the pH of an effluent tank and is controlling a pump that dumps a neutralizing agent into the tank and an external horn that sounds if the pH goes beyond an extreme. Should the power fail to the 3065, we want the pump to be off and the external horn to be on. Alarm 1 will be used for the pump, alarm 2 for the horn. An open contact turns off the pump, which corresponds to a reset alarm, so alarm 1 is wired to 'P' and 'NO'. A closed contact activates the horn, which corresponds to a tripped alarm, so alarm 2 is wired to 'P' and 'NC'. In the configuration menu, alarm 1 failsafe mode is set to "FAIL RESET" and alarm 2 failsafe mode is set to "FAIL TRIPPD".

The failsafe polarity setting should only be used to set the correct polarity for failsafe operation, and should NEVER be used to compensate for improper wiring. After installation, perform this safety test: turn everything on except for the 3065. If the controlled functions are all in their failsafe condition, the relays are wired correctly.

HORN ACTION

DIP switch SW2 pole 3 set ON allows the horn to sound. The horn is controlled by the change in the status of an alarm. Each alarm has a setting that causes the horn to sound, therefore, none, any, or all of the alarms can activate the horn. The horn can be set to operate in any of the methods detailed below. Note: 'RESET' is a front panel button and 'reset' is an alarm condition. To avoid confusion, an alarm which has been reset will be called clear.

SOUND WITH ALARM

The horn will sound when an alarm is set and is silent when all alarms are clear. If any of the alarms are configured to latch, one must press RESET to unlatch those alarms that are clear.

SOUND UNTIL RESET

The horn will sound when an alarm is set and is silent when either all alarms are clear or the RESET button is pressed. If any of the alarms are configured to latch, pressing RESET a second time will unlatch those alarms that are clear.

LATCH GOING ACTIVE

The horn will sound and stay on after an alarm trips. The horn can only be silenced by pressing the RESET button. If any of the alarms are configured to latch, pressing RESET a second time will unlatch those alarms that are clear.

LATCH WITH CHANGE

The horn will sound and stay on after an alarm either trips or clears. The horn can only be silenced by pressing the RESET button. If any of the alarms are configured to latch, pressing RESET a second time will unlatch those alarms that are clear.

CHANGE ACCESS CODE

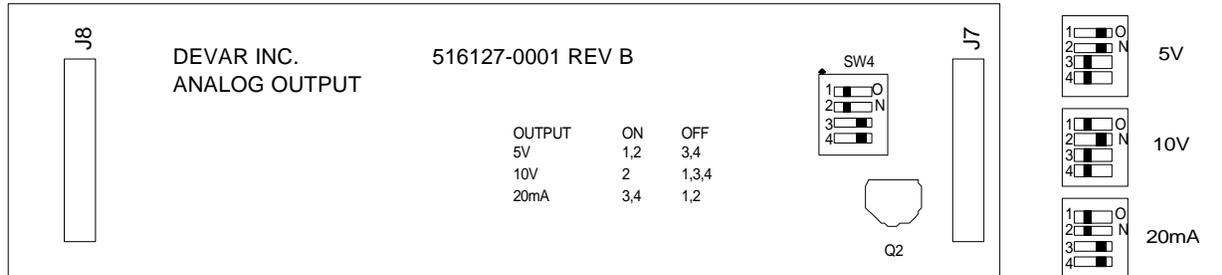
The entry routine for changing the access code is described in Entering a number or text on page 6. The access code can be any six digit number from 000000 to 999999. The factory default is 000000.

When enabled by setting DIP switch SW2 pole 4 ON, the correct access code must be entered to access the menu system. The access code check entry routine starts with an indication of 000000. Enter the code and, if correct, "OKAY" is displayed before proceeding, otherwise "dENIED" is displayed before returning to process indication.

OPTION CARD: ANALOG RETRANSMISSION

Configure the card

The analog output card is located within the case, and can be configured to produce a full scale output of either 5V, 10V or 20mA by setting DIP switch SW3 according to the following table. Note that the retransmitted signal does NOT have to be the same type of signal as the input, so a 0/10V input can be retransmitted as a 4/20mA signal.



OUTPUT	ON	OFF
10V	2	1, 3, 4
5V	1, 2	3, 4
20mA	3, 4	1, 2

Enable firmware support

Support for the analog card is provided through the 'ANALOG REXMIT' menu item, which is activated in the system initialization routine. The system initialization routine can only be activated by turning all poles of SW2 ON, then press and hold the RESET button and apply power. When 'Cont' is displayed, release the RESET button. Press NEXT until 'enable option card' is displayed, press ENTER, then press NEXT until "analog card" is displayed. Press ENTER and 'OKAY' is displayed to confirm the choice. Press RESET to return to 'Cont' and press ENTER.

Analog retransmission calibration overview

The retransmitted signal is controlled by, and linear to, the displayed process value. Any linearization applied to the input is incorporated into the retransmitted signal. The two process values that define the points at which the minimum and maximum retransmitted signal are produced are set in the menu system. The independent settings allow the retransmitted signal to have a scaling different from the input. For example, if

the scaling on the input signal is -20.0°F to 500.0°F, the scaling of the output signal can be set to something such as 0.0°F to 400.0°F or any other values that were found useful. The observed resolution of the output signal will not be better than the resolution of the display, and will never be better than 0.05% of the output signal span. To access the menu items that allow the adjustment of the settings that control the analog retransmission, press NEXT repeatedly to navigate to 'ANALOG REXMIT' and press ENTER.

Analog retransmission calibration details: set process values

Press ENTER at the menu items 'DISPLY @ MIN OUTPUT' or 'DISPLY @ MAX OUTPUT' to review or edit the process values that correspond to the minimum and maximum analog retransmission output levels.

Analog retransmission calibration details: adjust output signal

Do not attempt to trim the output signal without monitoring it! The output of the analog retransmission board is controlled by sending it a number. The number can be from 0 to 4095, and the larger the number, the larger the output. Calibration consists of adjusting the value of the number to achieve the desired output level. The menu items 'TRIM MIN OUTPUT' and 'TRIM MAX OUTPUT' allow the numbers that control these signal levels to be adjusted.

Connect an appropriate meter to the correct output terminals on the real panel, navigate to the 'TRIM <XXX> OUTPUT' menu item, and press ENTER. The display indicates the number that produces the current output level for this calibration point. Adjust the value of the displayed number to achieve calibration. The value of the flashing digit can be increased and decreased with the UP and DOWN arrow buttons. Changing the value of the displayed number will cause a decimal point to appear, which indicates that the analog output no longer corresponds to the displayed number. Press the NEXT button to update the analog output and remove the decimal point. Press the NEXT key when the decimal point is NOT displayed to select which digit to edit. ENTER acts just like NEXT if the decimal point is on, otherwise press ENTER to accept the displayed value as the calibration point and return to the menu system.

SPECIFICATIONS

GENERAL

Power	90-140VAC Single Phase 50/60Hz or 130 - 190VDC, 10VA max		
Operating Temperature	0°C to 70°C		
Dimensions	Front Bezel	48mm H x 96mm W x 12mm	polycarbonate NEMA 4X
	Panel Cutout	45mm H x 91mm W	
	Overall	48mm H x 96mm W x 166mm D 1- ¹⁵ / ₁₆ "H x 3- ³ / ₄ "W x 6- ¹ / ₂ " D	Black anodized aluminum body
Weight	0.522Kg = 1.15lbs. = 18.4oz		
Display	Six characters, 0.54" high, 15 segment, high efficiency red LED.		
User Input	Four button integrated membrane switch front panel keypad		
Relay Output	SPDT (form C) relays; 1 Phase; 7.5A at 240VAC / 24VDC ; 1/3 HP at 120VAC (7.2 FLA); ½ HP at 240VAC (4.9 FLA)		
Max Terminal Screw Torque	7 lb./in.		
Relay Operation	1) Relay de-energizes on power failure, which causes closure between P and NC. An energized relay has closure between P and NO. 2) A failsafe polarity of fail tripped de-energizes the relay in the alarm (tripped) condition, the LED is lit. A failsafe polarity of fail reset de-energizes the relay in the non-alarm (reset) condition, the LED is dark.		

INPUT

A/D converter	24 bit $\Delta - \Sigma$ type
Reference	2.5V \pm 15ppm / °C typical
Input Impedance	10 ¹³ Ohms
-3dB frequency	12Hz.
Acceptable inputs	pH / ORP probes through BNC connector
Acceptable temperature compensation sensors	BALCO: 3K @ 25°C, 1K @ 25°C Platinum RTD: 100 Ω @ 0°C, 1000 Ω @ 0°C
Display update rate	2 Hz
Accuracy	\pm 0.01% of selected range

INDICATION

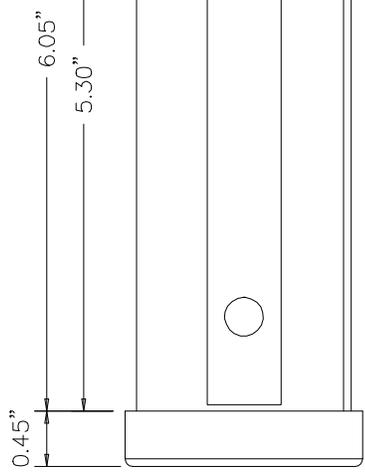
Resolution	pH	0.01pH
	ORP	0.001V
	Temperature	0.1°C or 0.1°F
Input Signal Calibration	Factory default One point standardization Two point standardization	
Temperature Sensor Adjustment	One point offset	

OPTIONAL ANALOG RETRANSMISSION

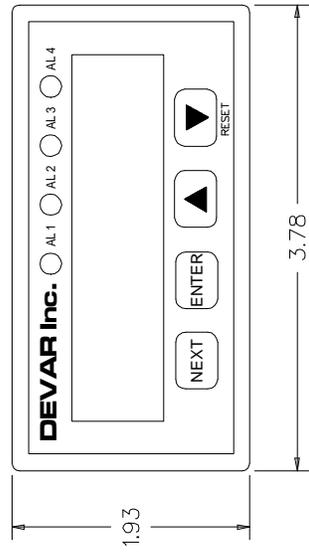
D/A converter	12 bits
Available full scale outputs	5V, 10V, 20mA
Accuracy relative to display	<0.05% of full scale output

SH	1
REV	
A	RELEASE: ECN 3176
B	REVERSE OUT_A, OUT_COM: ECN 3176A

DWG NO.	516254
DESCRIPTION	
DATE	JAN 99
APPROVED	A.G.



FRONT VIEW

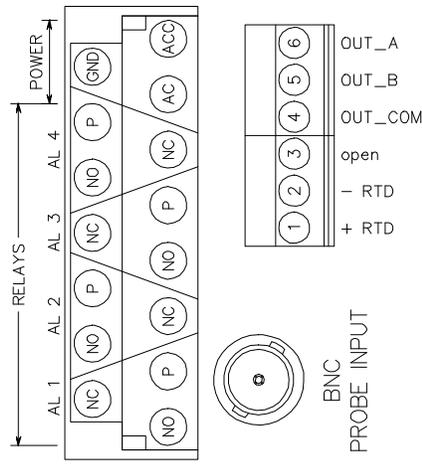


REAR VIEW

PLUG IN
TERMINAL
BLOCKS

FIELD WIRING

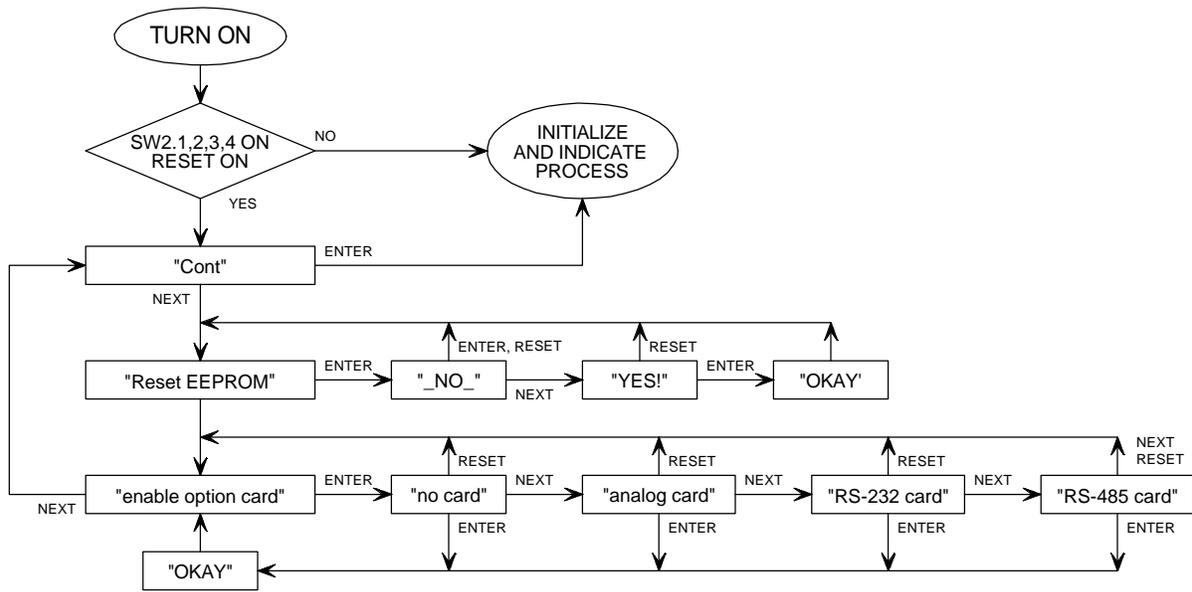
POWER: 90/140 VAC 50/60 Hz
OR 130/190 VDC
AC = AC LIVE OR ±DC (FUSED LINE)
ACC = AC NEUTRAL OR DC RETURN



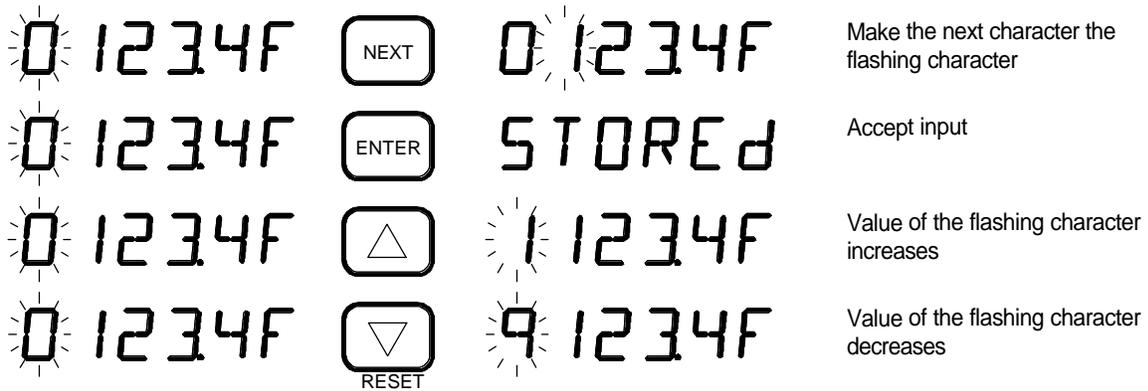
This Drawing is the sole property of DEVAR Inc. and is submitted on the understanding that the contents hereof are not published and are not to be disclosed to third persons without prior permission.	UNSPECIFIED DIMENSION TOLERANCE	CONTRACT NO.	DEVAR Inc.
	DECIMAL	+/- 0.005"	706 Bestwick Avenue, Bridgeport, Conn. 06605
	FRACTION	+/- 1/64"	TEL. (203) 368-8751 FAX. (203) 368-3747
	ANGLE	+/- 1/2 DEGREE	
MATERIAL	-N/A-	PREPARED	
FINISH	-N/A-	CHECKED	
		MECH	
		ELEC	
		DESIGN	
		APPROVED	
		APPROVED	
NEXT ASSY. NO. B/M 516255-AR		SCALE FULL	WT
			516254
			REV B
			SHEET 1 OF 1

PANEL CUTOUT
92 +0.8 -0.8 X 45 +0.8 -0.8 mm
3.622 +0.032 -0.018 X 1.772 +0.032 -0.018 INCHES

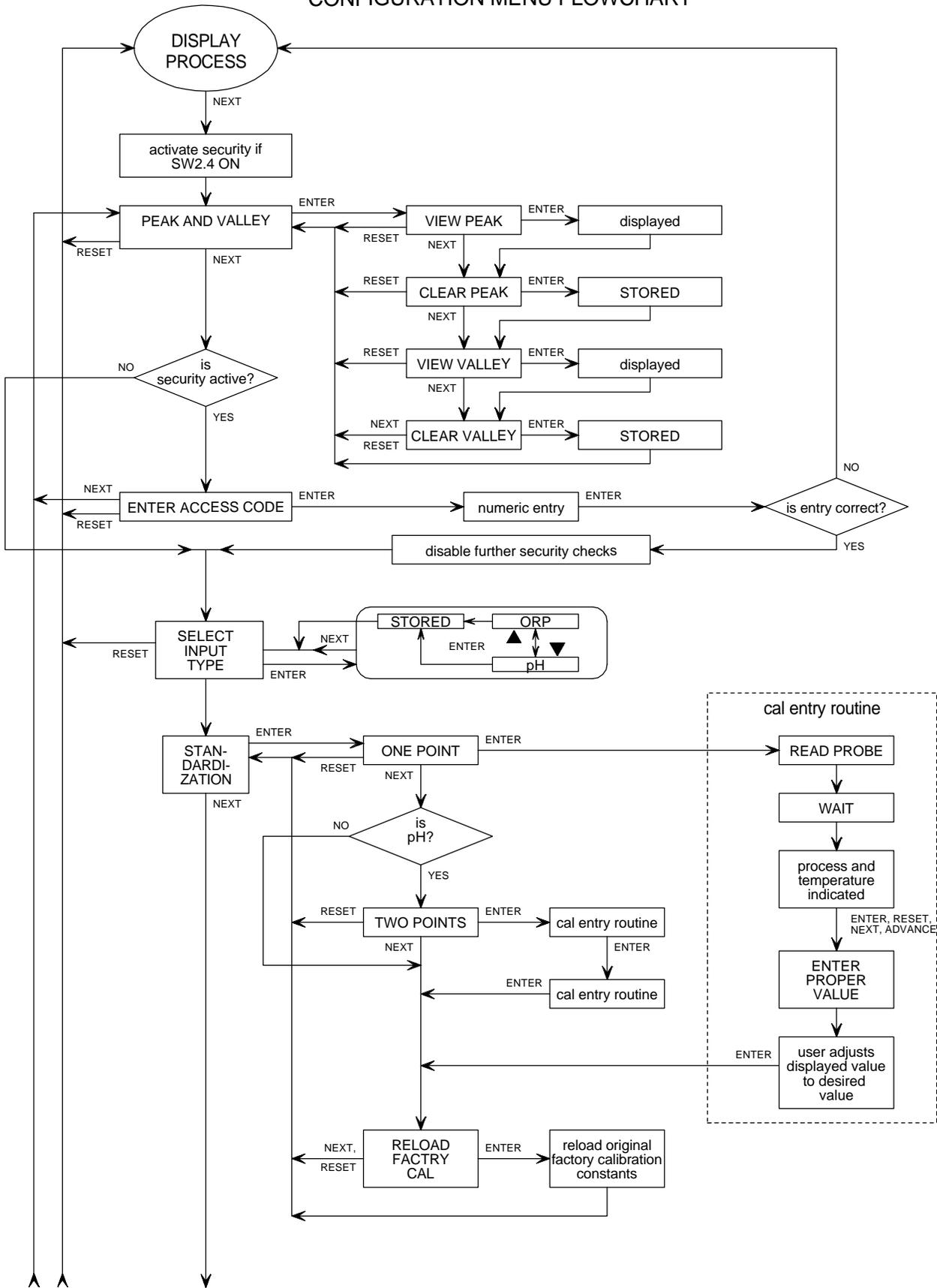
SYSTEM INITIALIZATION ROUTINE



USER AND NUMERIC INPUT KEYS



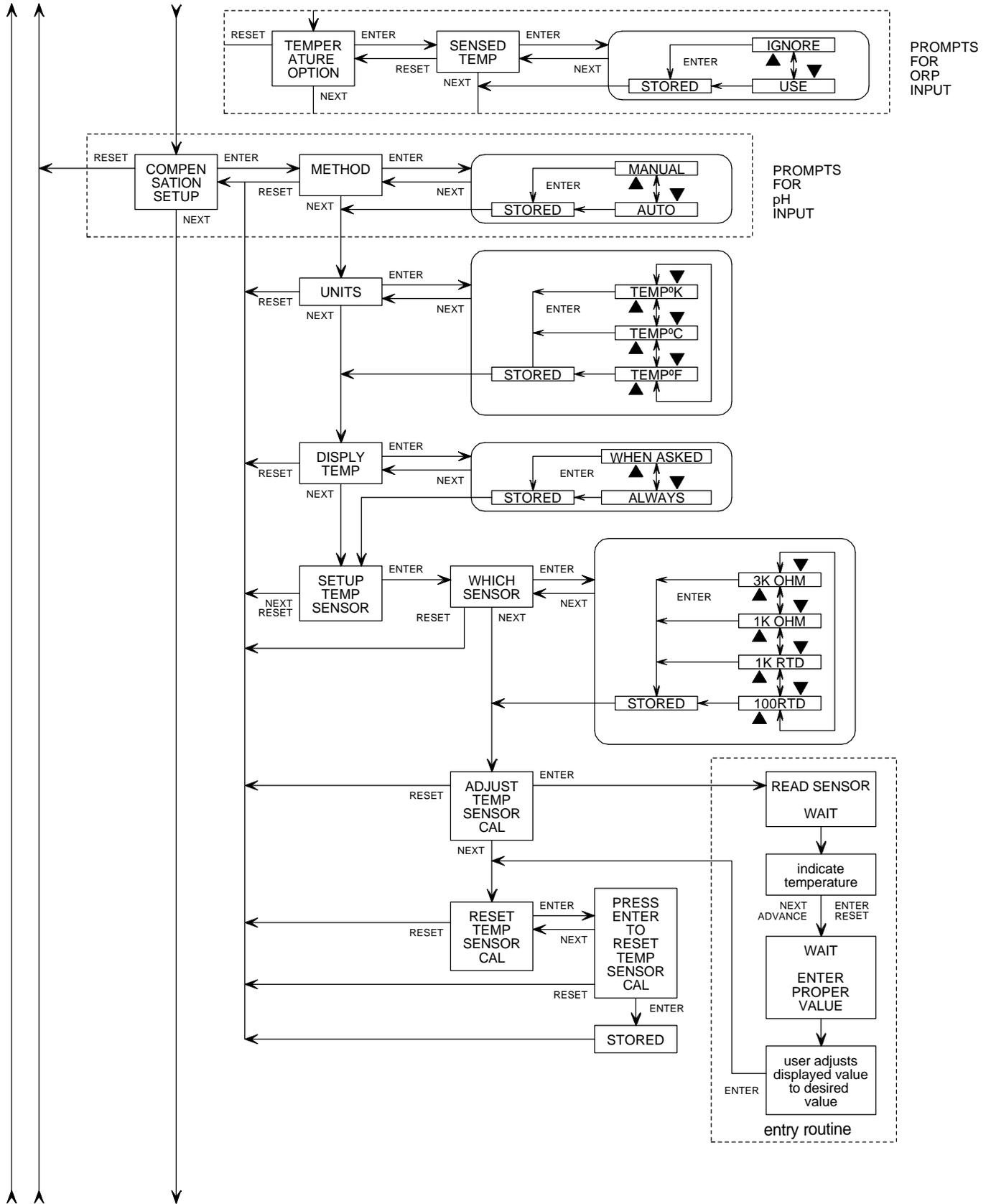
CONFIGURATION MENU FLOWCHART



TO PAGE 3

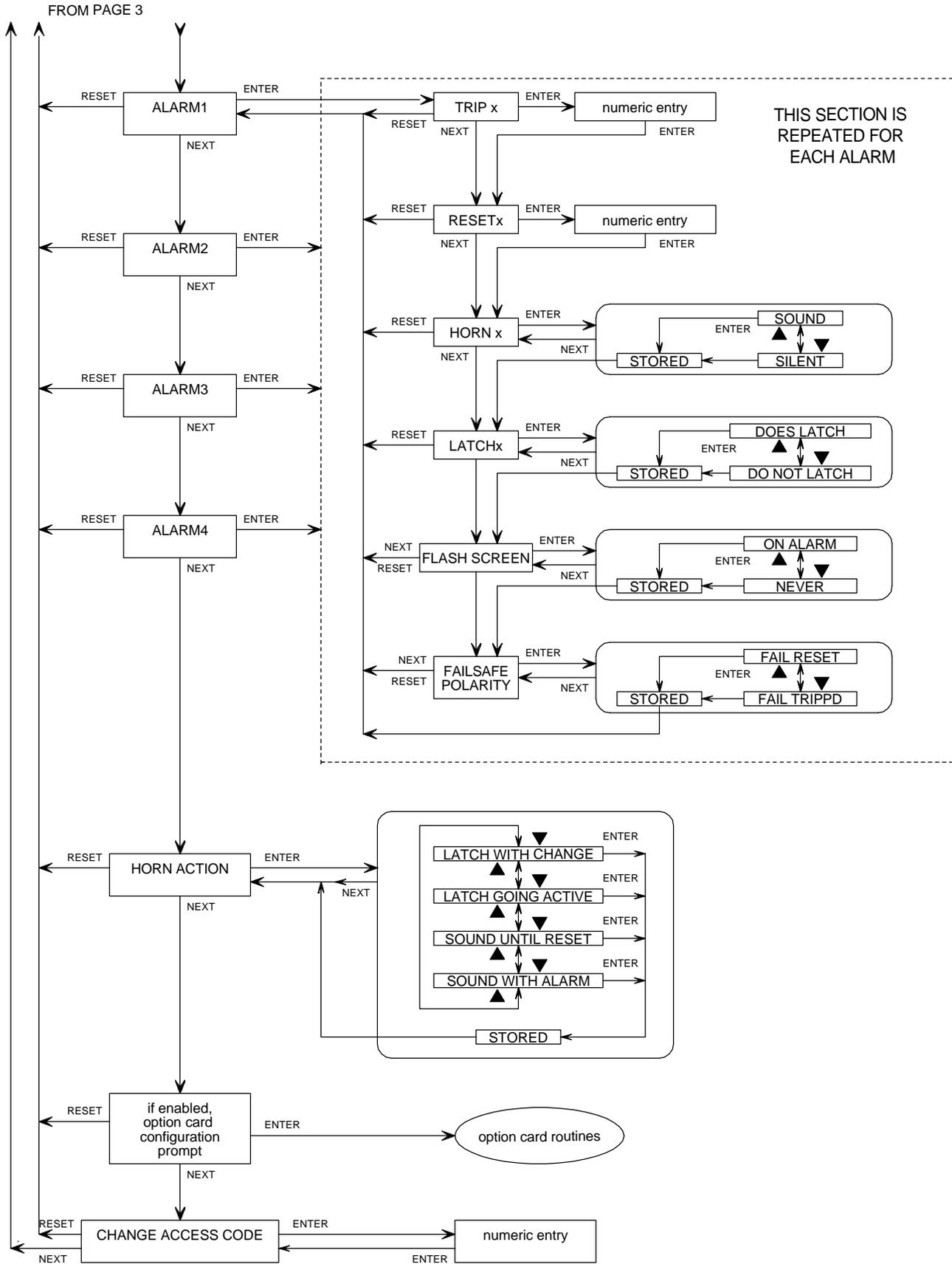
CONFIGURATION MENU FLOWCHART

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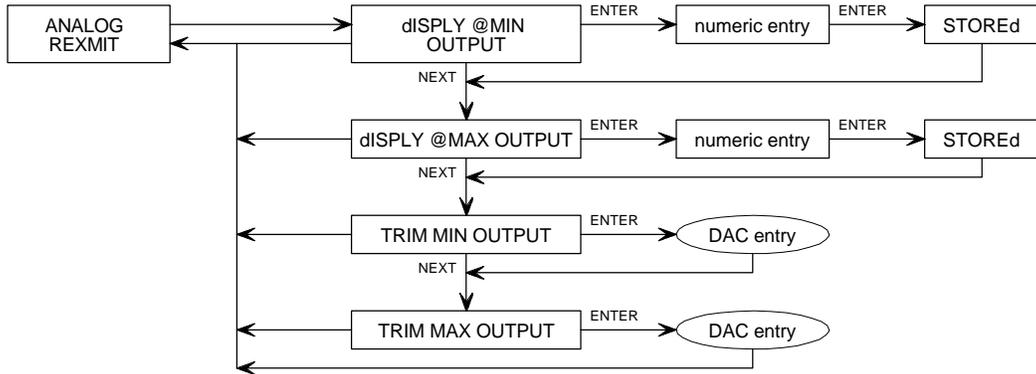


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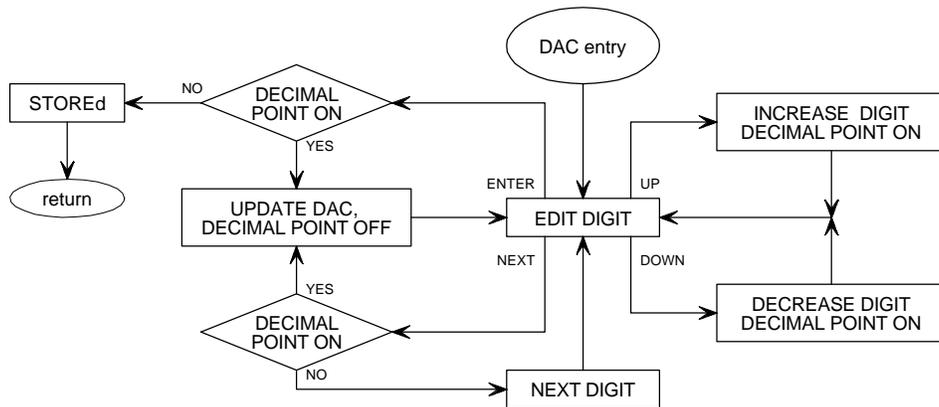
CONFIGURATION MENU FLOWCHART



OPTION CARD MENU ITEM FOR ENABLED ANALOG OUTPUT



DAC entry, TRIM ANALOG OUTPUT



SIMPLIFIED MENU SYSTEM DIAGRAM

