

## Section 1

# Introduction & Specifications

## 1-1. INTRODUCTION

1-2. The Model 3330B Programmable Constant Current-Constant Voltage Calibrator is a dc calibration instrument which produces output currents from 0 to 111.11110 milliamperes and output voltages from 0 to 1111.1110 volts dc. Output current selection is provided in three ranges and is accurate to within 0.006% of the selected range. Output voltage selection is also available in three ranges with accuracies as stated in paragraph 1-6. Over current and voltage protection features are also provided, thus preventing harm from occurring to devices being tested with this instrument.

1-3. Front panel indicators provide visual indication of the output current or voltage and the operating modes of the instrument. In-line decade dials and a panel meter indicate the magnitude of the selected output. Indicator lamps provide visual indication of the various operating modes.

1-4. Systems capability is enhanced by remote control of most operating features. Remote operation is possible through the rear panel Remote connector using either contact closures or DTL/TTL logic. Programming coding requirements are binary 8-4-2-1.

1-5. The instrument is completely solid-state in design, and module plug-in construction is used for ease in maintenance. The instrument is designed for bench-top use or installation in a 19-inch electronic equipment rack. The chassis is also drilled to accept rack mounting slides.

## 1-6. SPECIFICATIONS

### 1-7. Constant Voltage Mode

#### ANALOG OUTPUTS

10V Range - 0 to 11.111110 volts dc (1 uv steps)  
100V Range - 0 to 111.11110 volts dc (10 uv steps)  
1000V Range - 0 to 1111.1110 volts dc (100 uv steps)

#### ACCURACY OF OUTPUT: (% of Programmed Level)

10V range -  $\pm 0.003\%$  or  $\pm 30$  uv  
100V range -  $\pm 0.003\%$  or  $\pm 300$  uv  
1000V range -  $\pm 0.003\%$  or  $\pm 3$  mv

*NOTE: Above accuracies apply for 90 days at standard reference conditions of  $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$  (nominal calibration temperature, constant line voltage, up to 70% relative humidity, and constant external load.) With uninterrupted operation for more than one hour at loads greater than 25 mA, the specified accuracy is  $\pm 0.005\%$  over an operating temperature range of  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ .*

#### OUTPUT CURRENT:

10V and 100V Ranges - 0 to 100 milliamperes at any programmed level.  
1000V Range - 0 to 50 milliamperes at any programmed level.

#### TEMPERATURE COEFFICIENT OF OUTPUT:

Less than 4 ppm of programmed level or 0.4 ppm of range/ $^{\circ}\text{C}$ .

## STABILITY OF OUTPUT:

10V Range - 5 ppm of output or 10 uv/day  
 15 ppm of output or 30 uv/month

100V Range - 5 ppm of output or 100 uv/day  
 15 ppm of output or 300 uv/month

1000V Range - 5 ppm of output or 1 mv/day  
 15 ppm of output or 3 mv/month

## NOTE

*Stabilities apply at standard conditions described under accuracy of output.*

## RIPPLE AND NOISE:

	UP TO 50 MA LOAD	UP TO 100 MA LOAD
10V Range	60 uv rms	100 uv rms
100V Range	70 uv	100 uv
1000V Range	100 uv	Not applicable

## LINE/LOAD REGULATION:

5 ppm of programmed level or 2 ppm of range for combined 10% line voltage and full-load changes.

## 1-8. Constant Current Mode

## ANALOG OUTPUTS:

1 MA Range - 0 to 1.1111110 ma (0.1 na steps)  
 10 MA Range - 0 to 11.1111110 ma (1 na steps)  
 100MA Range - 0 to 111.111110 ma (10 na steps)

## ACCURACY OF OUTPUT:

$\pm 0.006\%$  of programmed level, or  $\pm 0.0006\%$  of current range.

## NOTE

*Accuracy applies for 90 days at standard reference conditions described under constant voltage mode.*

## TEMPERATURE COEFFICIENT OF OUTPUT:

Less than 6 ppm of programmed level or .4 ppm of range/ $^{\circ}\text{C}$ .

## STABILITY OF OUTPUT:

10 ppm of programmed level or 1 ppm of range/day.  
 30 ppm of programmed level or 6 ppm of range/month.

## NOTE

Stabilities apply at standard conditions described under constant voltage mode.

## COMPLIANCE VOLTAGE:

1 ma and 10 ma Ranges - up to 1000V  
 100 ma Range - up to 500V  
 (See voltage limit)

## RIPPLE AND NOISE:

For negative ground or floating operation.

MA RANGE	RIPPLE
1 MA	20 na
10 MA	100 na
100 MA	1 ua

## LOAD REGULATION:

1 MA Range - 2 ppm of range per 100V compliance  
 10 MA Range - 5 ppm of range  
 100 MA Range - 5 ppm of range

## 1-9. General Specifications

## CURRENT LIMIT (voltage or current operation):

Remote mode - Programmable in 12 steps from 1.0 to 110 ma. (see input/output table)  
 Local mode - Continuously adjustable from 1 ma to 110 ma.

## NOTE

*Limit indication by contact closure (see input/output table), and front panel lamp.*

## VOLTAGE TRIP (voltage or current operation):

Remote mode - Programmable in 10% steps from 10% to 110% of trip range (see input/output table)

Local Mode - Can be calibrated to be continuously adjustable from 10% to 110% of range (see Voltage Trip calibration procedure).

**NOTE**

Output goes to zero and unit returns to standby if trip point is exceeded. Limit indication by contact closure (see Table 1-1) and front panel lamp.

**ISOLATION:**

Programming lines are isolated from output. Output is isolated and guarded from chassis. Potential between programming lines and either side of output should not exceed 1150V.

**METER:**

For local operation, switch selectable to indicate 0 to 1100 VDC or 0 to 110 ma.

**PROGRAMMING INPUTS/OUTPUTS:**

All inputs/outputs through a 50 pin rear panel connector. Mating connector furnished with instrument. See Table 1-1 for line functions.

**OUTPUT CONNECTIONS:**

Separate output and sense terminals provided for four-terminal connection to the load. All front

Table 1-1. PROGRAMMING INPUTS AND OUTPUTS

INPUTS	LINES	CODING	INPUTS	LINES	CODING
		Logic "0" = +4.5 to +20V or open circuit			40 = 0100
		Logic "1" = 0 to +0.5V or closed circuit			50 = 0101
STANDBY OPERATE	1	STANDBY = "0" ✓ OPERATE = "1"			60 = 0110
MODE	1	VOLTAGE = "0" ✓ CURRENT = "1"	VOLTAGE TRIP:		70 = 0111
RANGE	2	CODE	VOLTAGE TRIP RANGE	2	80 = 1000
10V or 1 MA		"00" (Code "11" not allowed)	10V TRIP RANGE		90 = 1001
100V or 10 MA		"01"	100V TRIP RANGE		100 = 1010
1000V or 100MA		"10"	1000V TRIP RANGE		110 = 1011
OUTPUT LEVEL (7 Decades)	28	DECADE CODING	REMOTE TRIP LEVEL (10% to 110% of selected range)	4	CODE
		DIGIT 8421			00
		0 = 0000			01 (Code "11" Not Allowed)
		1 = 0001			10
		2 = 0010			CODING
		3 = 0011			RANGE % 8421
		4 = 0100			<1% = 0000
		5 = 0101			10% = 0001
		6 = 0110			20% = 0010
		7 = 0111			30% = 0011
		8 = 1000			40% = 0100
		9 = 1001			50% = 0101
		10 = 1010			60% = 0110
					70% = 0111
VOLTAGE TRIP/ CURRENT LIMIT:			POLARITY	1	80% = 1000
LOCAL/REMOTE	1	LOCAL = "0" REMOTE = "1"	CROWBAR	1	90% = 1001
CURRENT LIMIT: REMOTE LIMIT LEVEL	4	CODING	OPERATE FLAG OUTPUT	1	100% = 1010
		MA 8421	CURRENT LIMIT FLAG OUTPUT	1	110% = 1011
		1.0 = 0000			(+) = "0"
		10 = 0001			(-) = "1"
		20 = 0010	VOLTAGE TRIP FLAG	1	OFF = "0"
		30 = 0011			ON = "1"
					CONTACTS CLOSED IN OPERATE MODE
					CONTACTS OPEN IN NORMAL OPERATION
					CONTACTS OPEN IN NORMAL OPERATION

panel output, guard, and chassis connections are duplicated on the rear panel.

**OPERATION:**

Local via front panel controls or remote via program input; selectable at front panel.

**RESPONSE TIME:**

- 1, 10, 100 ma Ranges - 300 milliseconds typical - dependent on load resistance.
- 10V Range - 60 milliseconds.
- 100V Range - 300 milliseconds
- 1000V Range - 3 seconds.

**NOTE**

*When on the 1000V range, maximum repetition rate of a sequentially programmed instruction should not exceed the time intervals contained in Figure 1-1.*

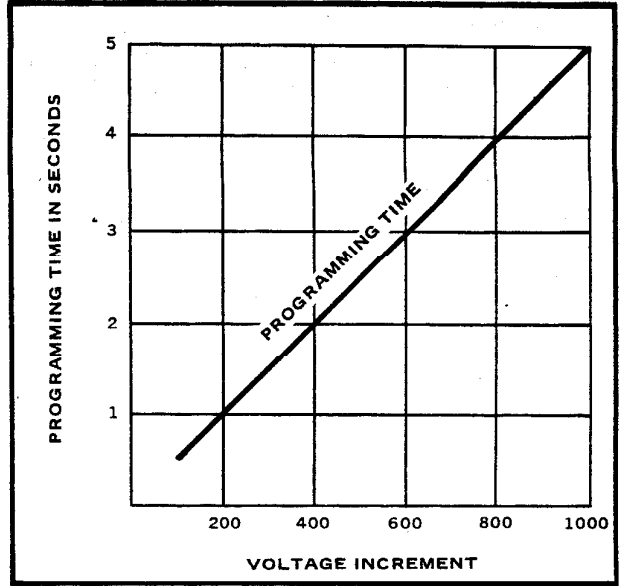


Figure 1-1. ALLOWABLE PROGRAMMING INTERVALS, 1000V RANGE AND CURRENT MODE

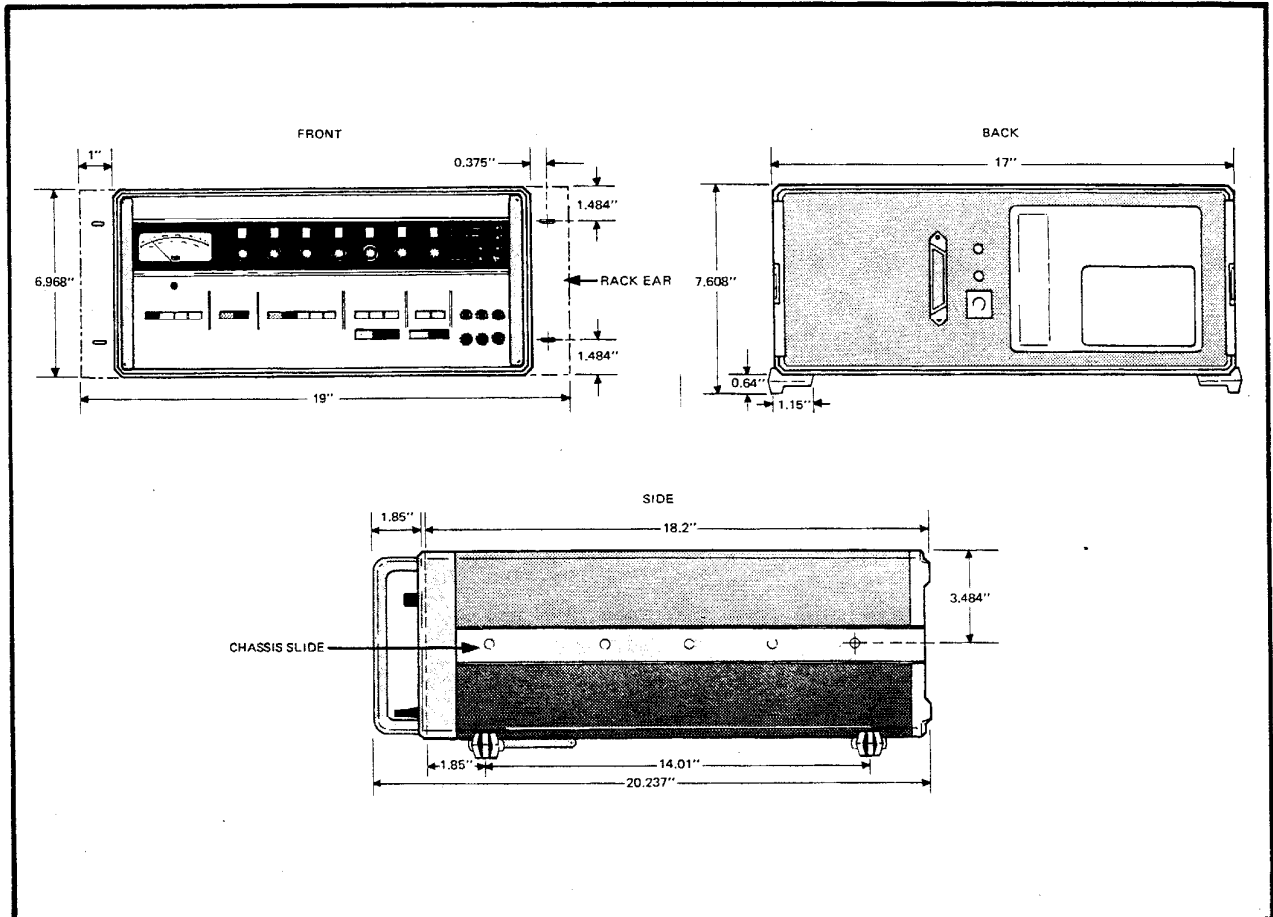


Figure 1-2. MODEL 3330B OUTLINE DRAWING

**TEMPERATURE:**

OPERATING - 0° to +50°C  
NON-OPERATING - -40°C to +65°C

**RELATIVE HUMIDITY:**

0 to 70%

**SHOCK:**

15 g, 11 millisecond half-sine wave (MIL-T-21200)

**VIBRATION**

10 Hz to 55 Hz, 3g maximum (MIL-T-21200)

**ALTITUDE:**

OPERATING - 0 to 10,000 ft.  
NON-OPERATING - 0 to 50,000 feet

**INPUT POWER:**

115/230 VAC  $\pm 10\%$ , 48 to 62 Hz single phase at  
approximately 130 VA fully loaded.

**SIZE:**

7" high x 17" wide x 18" deep

**WEIGHT:**

58 pounds

**MOUNTING:**

**Bench:** Self-supported or included custom-  
designed feet.

**Rack:** Accepts optional brackets MEE-7003 for  
19" rack mounting and optional 18"  
chassis slides MEE-8078 (24" slides also  
available).