

ELECTRONIC VALVE SPECIFICATION
CV7169-CV7177

ISSUE 1 DATED, SEPTEMBER, 1961
AMENDMENT No. 1

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J.S. Catalogue Numbers:- Amend to read as follows

CV7169	5960-99-037-2460
CV7170	5960-99-037-2461
CV7171	5960-99-037-2462
CV7172	5960-99-037-2463
CV7173	5960-99-037-2464
CV7174	5960-99-037-2465
CV7175	5960-99-037-2466
CV7176	5960-99-037-2467
CV7177	5960-99-037-2468

February, 1962
(10660)

GENERAL POST OFFICE: E-IN-C(S)

General Post Office E in C(S)

Specification: G.P.O./CV 7169 - CV 7177 Issue No 1 Dated September 1961 To be used in conjunction with K 1007.	SECURITY.	
	<u>Specification</u> Unclassified	<u>Valve</u> Unclassified.

← Indicates a change

TYPE OF DEVICE - Silicon Voltage Reference Diode. (Note A) PROTOTYPE - VR-B series	MARKING CV Number, Polarity marking, Factory and date code. See K 1007/4
<u>RATINGS AND CHARACTERISTICS</u> (Not for Inspection purposes) <u>All limiting Values are absolute.</u>	<u>DIMENSIONS</u> K1007/A1/D10
Max. dissipation at 25°C ambient air (W) 2 Max. Continuous forward current at 25°C ambient air. (A) 2.75 Operating ambient temperature range - 55°C to + 150°C. Nominal reference voltage at 25°C ambient air, I _R = 20 mA CV 7169 (V) 3.50 CV 7170 4.25 CV 7171 4.75 CV 7172 5.25 CV 7173 5.75 CV 7174 6.25 CV 7175 7.00 CV 7176 8.00 CV 7177 9.00 Max. continuous reference current at 25°C ambient air. CV 7169 (mA) 525 B CV 7170 470 B CV 7171 430 B CV 7172 400 B CV 7173 370 B CV 7174 345 B CV 7175 285 B CV 7176 235 B CV 7177 210 B	Note. <u>MOUNTING POSITION</u> Any. <u>PACKAGING</u> K1007/14 J.S. Catalogue Numbers are:- CV 7169 5960 - 99 - 2460 CV 7170 5960 - 99 - 2461 CV 7171 5960 - 99 - 2462 CV 7172 5960 - 99 - 2463 CV 7173 5960 - 99 - 2464 CV 7174 5960 - 99 - 2465 CV 7175 5960 - 99 - 2466 CV 7176 5960 - 99 - 2467 CV 7177 5960 - 99 - 2468.

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<u>RATINGS & CHARACTERISTICS Cont'd</u>			NOTE
Typical Slope resistance at $I_R = 20\text{mA}$ at 25°C ambient air.			
CV7169	(Ω)	17.2	C
CV7170		16.0	C
CV7171		14.4	C
CV7172		11.0	C
CV7173		4.5	C
CV7174		1.8	C
CV7175		1.5	C
CV7176		1.5	C
CV7177		1.6	C
Typical Mean Temperature coefficients of reference voltage at $I_R = 20\text{mA}$ Temperature range, 25°C to 60°C ambient air			
CV7169	(%/°C)	-.053	D
CV7170		-.039	D
CV7171		-.026	D
CV7172		-.011	D
CV7173		+.015	D
CV7174		+.033	D
CV7175		+.045	D
CV7176		+.057	D
CV7177		+.065	D
Max. reverse leakage current at -2V $T_{amb} = 100^\circ\text{C}$.			
CV7169	(μA)	200	
CV7170		200	
CV7171		150	
CV7172		150	
CV7173		100	
CV7174		100	
CV7175		50	
CV7176		20	
CV7177		20	

NOTES

- (A) These devices are primarily intended as close tolerance reference diodes and for this purpose they should be operated with reference currents of 20mA or greater.
- (B) For derating above 25°C ambient air see Figure 1.
- (C) For the typical variation of slope resistance with reference current see Figure 2
- (D) For typical changes in reference voltage with ambient temperature above 25°C see Figures 3 - 11 incl. For limit diodes, whose reference voltage lies between two nominal values, interpolation between two curves will give an indication of voltage change. Similarly, interpolation between current curves is useful for intermediate values of current.

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K1007	TEST	TEST CONDITIONS	AQL %	INSE LEVEL	SYM- BOL	LIMITS		UNITS
						MIN	MAX.	
5.F.2	<u>GROUP A.</u> Reference Voltage	Tamb. = 25±5°C I _R = 20mA. CV7169 CV7170 CV7171 CV7172 CV7173 CV7174 CV7175 CV7176 CV7177		100%	V _Z	2.9 3.9 4.4 4.9 5.4 5.9 6.4 7.4 8.4	4.1 4.6 5.1 5.6 6.1 6.6 7.6 8.6 9.6	V V V V V V V V V
5.F.3	Slope Resistance	Tamb. = 25±5°C I _R = 20mA. CV7169 CV7170 CV7171 CV7172 CV7173 CV7174 CV7175 CV7176 CV7177		100%	r _Z	15 14 12 6 0 0 0 0 0	20 19 18 17 10 4 4 4 4	Ω Ω Ω Ω Ω Ω Ω Ω Ω
	<u>GROUP B.</u>	OMITTED						
5.F.5	<u>GROUP C.</u> Reverse Leakage Current	V _R = -2V Tamb. = 100±5°C CV7169 CV7170 CV7171 CV7172 CV7173 CV7174 CV7175 CV7176 CV7177	2.5	1	I _R	- - - - - - - - -	200 200 150 150 100 100 50 20 20	μA μA μA μA μA μA μA μA μA
5.F.4	<u>GROUP D</u> Mean Temperature Coefficient of Reference Voltage.	I _R = 20mA Tamb. = +25°C and +60°C. CV7169 CV7170 CV7171	6.5	1A	S _Z	-0.07 -0.056 -0.042	-0.040 -0.025 -0.010	%/°C

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K1007	TEST	TEST CONDITIONS	AQL %	INSP. LEVEL	SYM- BOL	LIMITS		UNITS
						MIN	MAX.	
	<u>GROUP D Cont'd</u>	CV7172 CV7173 CV7174 CV7175 CV7176 CV7177				-0.030 -0.015 0 +0.025 +0.040 +0.050	+0.025 +0.040 +0.048 +0.058 +0.075 +0.080	
	<u>GROUP E</u>							
10.2	Temperature Cycling	No Voltage, Three Cycles -55°C to +100°C.		1C				
10.3	Climatic Cycling	No Voltages, Note 1						
	<u>Post Temperature and Climatic Cycling Tests</u>	Combined AQL.	10					
8	Inoperatives Reference Voltage	As in Group A	6.5		V _Z	Note 2		V
	Slope Resistance	As in Group A	6.5		r _Z	Note 2		Ω
11.3	Fatigue	No Voltages.		1C				
	<u>Post Fatigue Tests</u>							
8	Inoperatives Reference Voltage	As in Group A	6.5		V _Z	Note 2		V
	Slope Resistance	As in Group A	6.5		r _Z	Note 2		Ω
11.4	Shock	No Voltages, Hammer Angle = 60°		T.A.				
10.1	Lead Fragility	No Voltages, Note 3	6.5	1C				
11.5	Soldering		6.5	1C				
	<u>GROUP F</u>							
13	Life	Tamb. range +25°C to +150°C, d.c. reference current not less than the value corresponding to the chosen Tamb. according to the derating curve on Figure 1.		1A				
13.3	<u>Life Test End point 1000 Hours</u>							
	Reference Voltage.	As in Group A.	6.5		V _Z	Note 2		V

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K1007	TEST	TEST CONDITIONS	AQL %	INSP. LEVEL	SYM- BOL	LIMITS		UNITS
						MIN	MAX.	
13.4 13.5	<u>GROUP F (Contd)</u>							
	Slope Resistance	As in Group A.	6.5		r _Z	Note 2		Ω
	Storage Life (1)	t = 150 hours, T _{amb} = -55°C		1				
	Storage Life (2)	t = 150 hours, T _{amb} = +100°C		1				
	<u>Post Storage Life Tests</u>							
		COMBINED AQL FOR STORAGE (1) POST TESTS		6.5				
	COMBINED AQL FOR STORAGE (2) POST TESTS		6.5					
	Reference Voltage	As in Group A	4.0		V _Z	Note 2		V
	Slope Resistance	As in Group A	4.0		r _Z	Note 2		Ω
8	<u>GROUP G</u>							
	Retest after 28 days holding period			100%				
	Inoperatives		0.5					
	Reference Voltage	As in Group A	1.0		V _Z	Note 2		V
	Slope Resistance	As in Group A.	1.0		r _Z	Note 2		Ω
<u>NOTES</u>								
(1) The samples of diodes shall be subjected to conditioning in accordance with K1007 Section 10.1 and shall then be subjected to temperature cycling and climatic cycling in sequence and shall then pass the post temperature and climatic cycling tests.								
(2) To Group A test limits of reference voltage or slope resistance.								
(3) Diodes used for this test must have undergone at least 28 cycles of the climatic test in accordance with K1007 Section 10.3.1 or 10.3.2 or 6 cycles in accordance with Section 10.3.3.								

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DATA SHEET

VOLTAGE REFERENCE DIODE DERATING CURVE

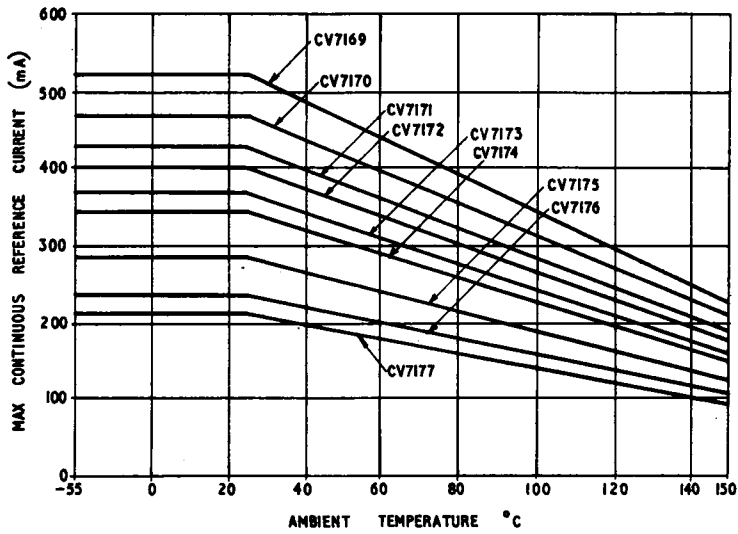


FIG. 1 CV7169 - CV7177

DATA SHEET
TYPICAL VARIATIONS OF SLOPE RESISTANCE
WITH REFERENCE CURRENT

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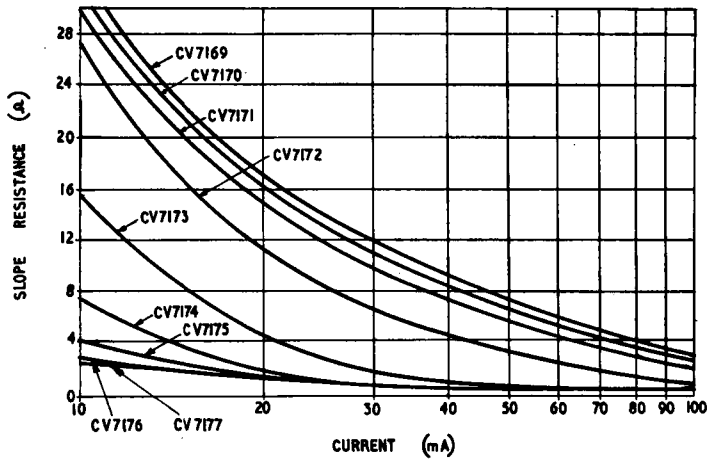


FIG.2 CV7169 - CV7177

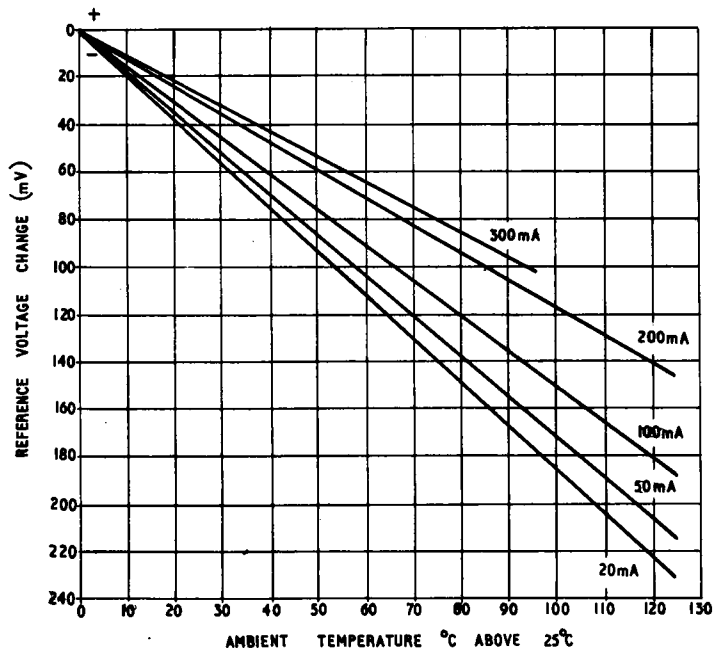


FIG.3 CV7169
TYPICAL VARIATION OF REFERENCE VOLTAGE
WITH AMBIENT TEMPERATURE

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DATA SHEET

TYPICAL VARIATIONS OF REFERENCE VOLTAGE
WITH AMBIENT TEMPERATURE

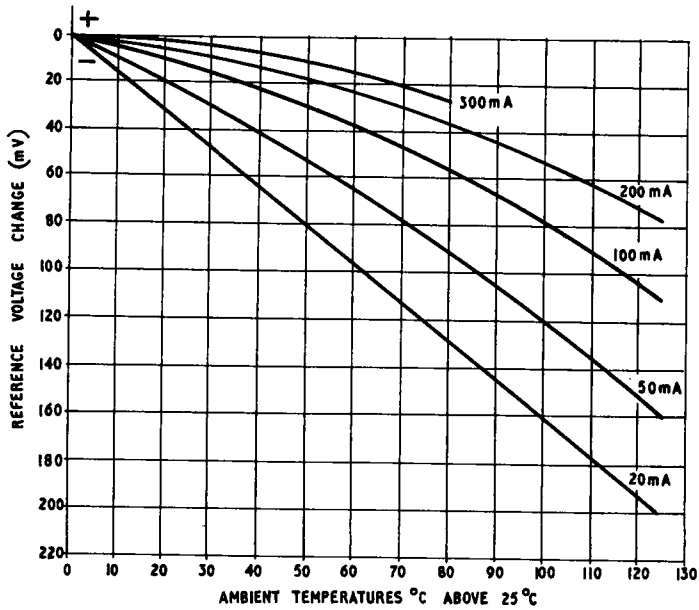


FIG. 4 CV 7170

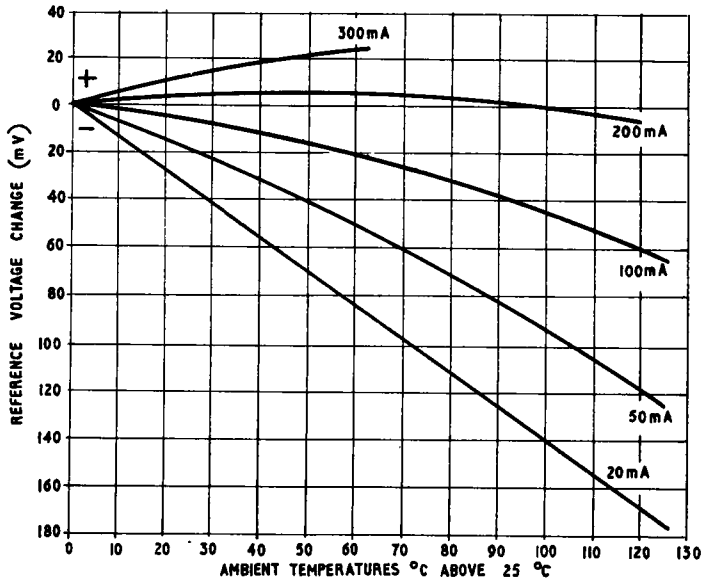


FIG. 5 CV 7171

DATA SHEET
TYPICAL VARIATIONS OF REFERENCE VOLTAGE
WITH AMBIENT TEMPERATURE

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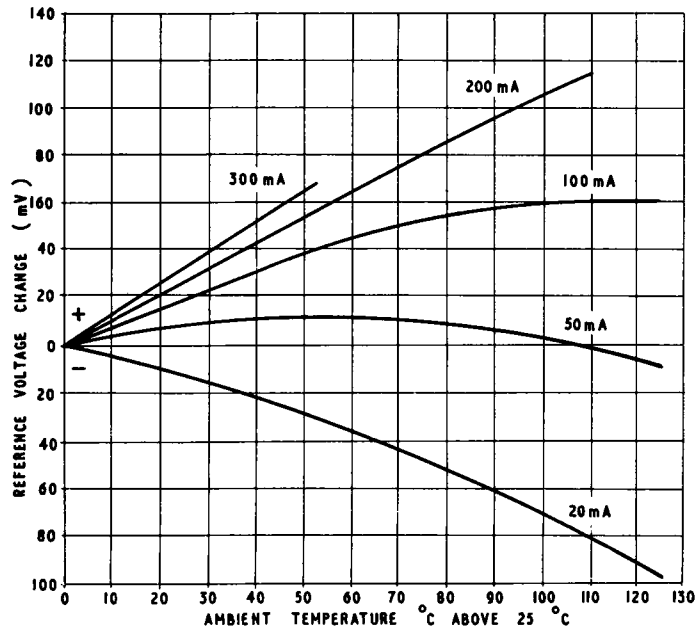


FIG. 6 CV7172

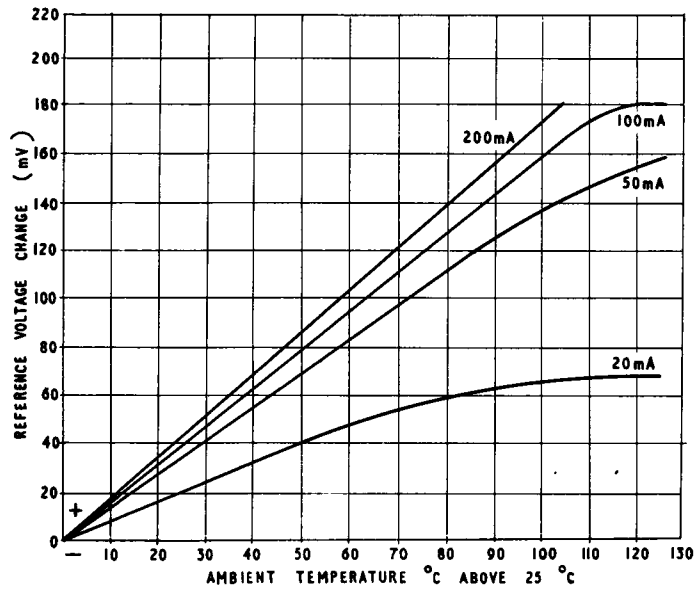


FIG. 7 CV7173

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DATA SHEET

TYPICAL VARIATIONS OF REFERENCE VOLTAGE
WITH AMBIENT TEMPERATURE

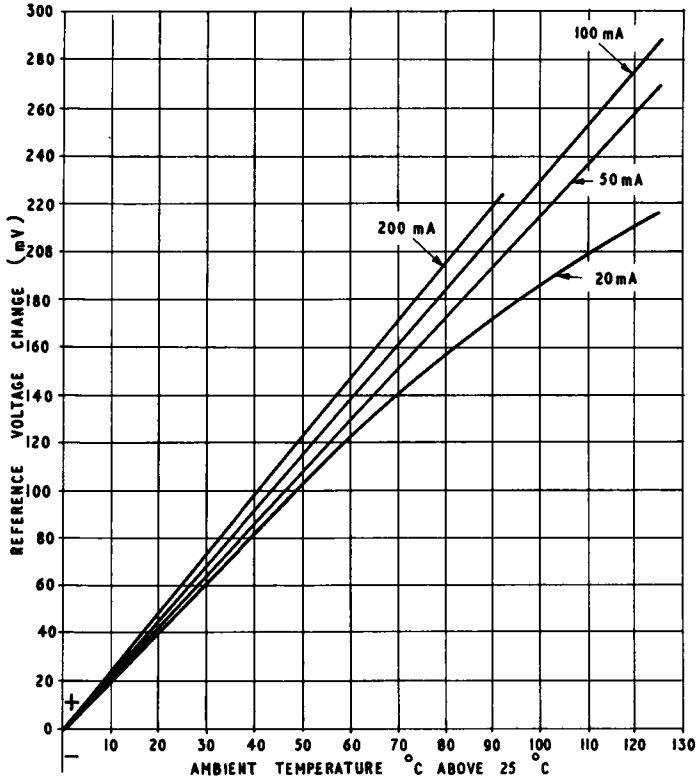


FIG. 8 CV7174

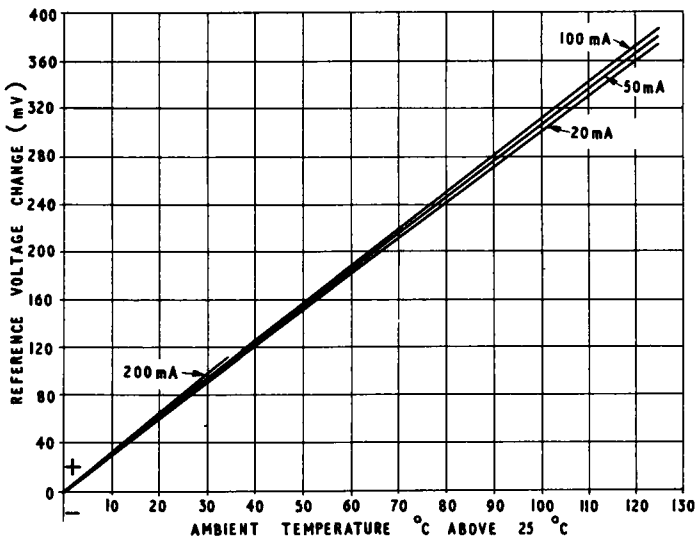


FIG. 9 CV7175

DATA SHEET

TYPICAL VARIATIONS OF REFERENCE VOLTAGE WITH AMBIENT TEMPERATURE

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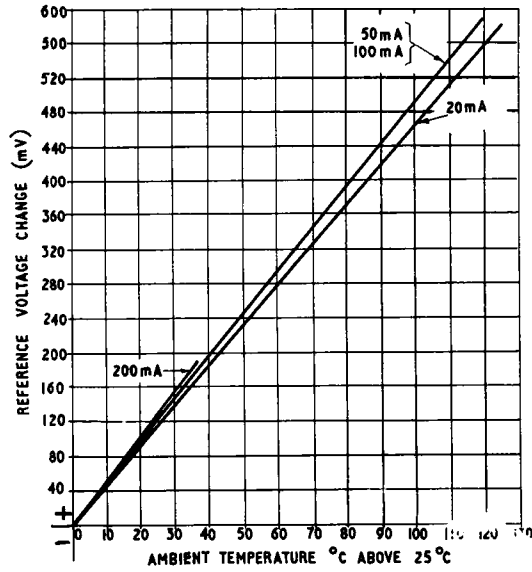


FIG. 10 CV 7176

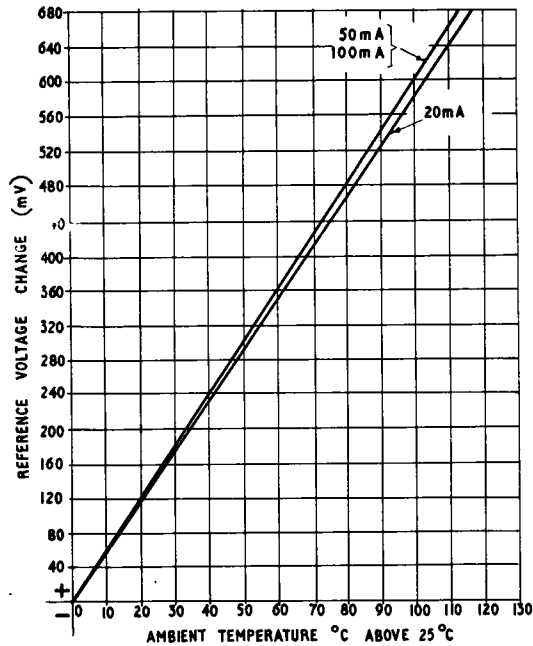


FIG. 11 CV 7177