ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV7080-2

ISSUE NO. 1 DATED 23.10.59

AMENDMENT NO. 1

Page 4	Group B	5.D.2.	Amend the maximum current from 1.0 mA to 3.0 mA.
	Group C	5.D.3.1.	Amend the maximum base emitter voltage from 1.3 volts to 2.0 volts.

July, 1961.
N.72452/D.

Ministry of Aviation/S.R.D.E.

VALVE ELECTRONIC (SEMICONDUCTOR DEVICE) **CV 7080-2**

Ministry of Aviation. D.L.R.D. / S.R.D.E.

Specification: MOA/CV7080/81/82. Issue 1 dated 18-1-60. To be read in conjunction with K1007	SECURITY Specification: Unclassified Valve: Unclassified

⟶ Indicates a change

TYPE OF VALVE: Germanium P.N.P. Junction Power Transistor

PROTOTYPES: GET571, GET572, GET573 (VX3269)

RATINGS and CHARACTERISTICS

(Not for inspection purposes)

All limiting valves are absolute

			Note
Max. Collector dissipation (P_c):			
(a) Transistor in free air at 55°C	(W)	1.33	A
(b) Transistor mounted on heat sink			B
Max. Operating temperature	(°C)	90	
Max. Storage temperature	(°C)	75	
Min. Storage temperature	(°C)	-55	
Max. Peak collector current	(A)	12	
Max. Peak collector-base voltage V_{cb} CV7080	(V)	16	
CV7081	(V)	32	
CV7082	(V)	64	
Max. Peak collector-emitter voltage V_{ce} CV7080	(V)	16	
CV7081	(V)	32	
CV7082	(V)	40	
Max. Peak V_{ce} with the emitter reverse biased by greater than 0.5 V (as in conventional Class B push-pull amplifier) CV7080	(V)	16	
CV7081	(V)	32	
CV7082	(V)	64	
Typical mounted thermal resistance junction to heat sink			
(a) mounted directly on heat sink	(°C/W)	2.0	C
(b) mounted via mica washer provided	(°C/W)	3.5	C
Max. Collector leakage current at 85°C ambient	(mA)	10	C

MARKING

C.V. Number and if possible, the Factory Code and Date Code - see K1007/4

BASE

Lead Identification
Lead No. 1 Emitter
Lead No. 2 Base
Lead No. 3 Collector

DIMENSIONS

As K1007/A1.D4A & C.

The transistor shall be complete with a mica washer, two insulating bushes and two ⅜" long cheese head 4 BA steel screws with nuts and washers.

BODY

The body shall be connected to the collector. The emitter and base leads shall be insulated from body.

MOUNTING POSITION

Any

The transistor shall be attached to the heat sink with two 4 BA steel screws.

PACKAGING

See K1007/14

NOTE A

Suspended in free air at normal pressure; see Rating Curve on page 2, Fig. 2.

NOTE B

See Rating curve on page 2, Fig. 1.

NOTE C

For use in calculation of thermal stability. Full information for power dissipation is given on Pages 2 & 3. See test for collector current in Group C of acceptance tests.

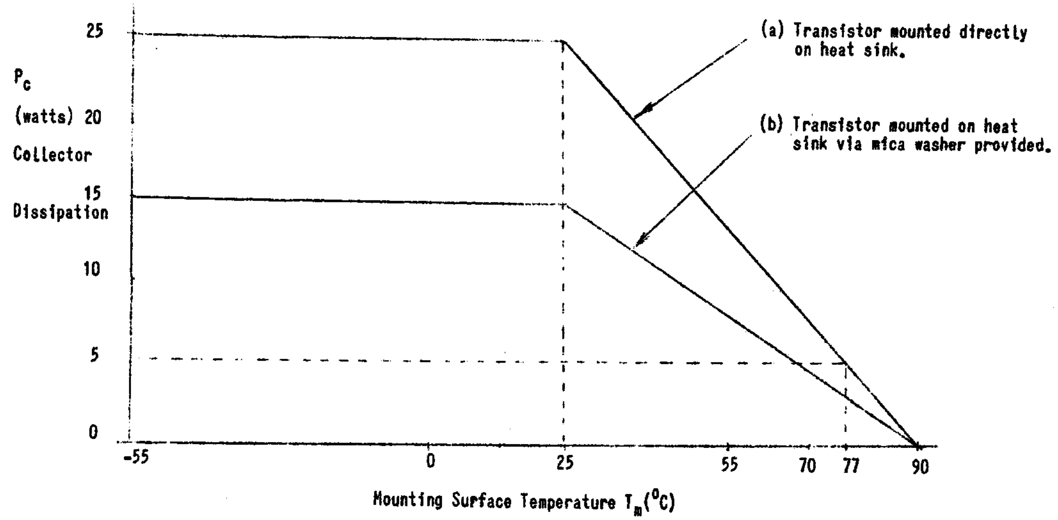
NOTE D

The Joint Services Catalogue Numbers are -

CV7080	5960 - 99 - 037 - 2138
CV7081	5960 - 99 - 037 - 2139
CV7082	5960 - 99 - 037 - 2140

Z.20551.

Fig. 1. Rating curve : transistor mounted on heat sink

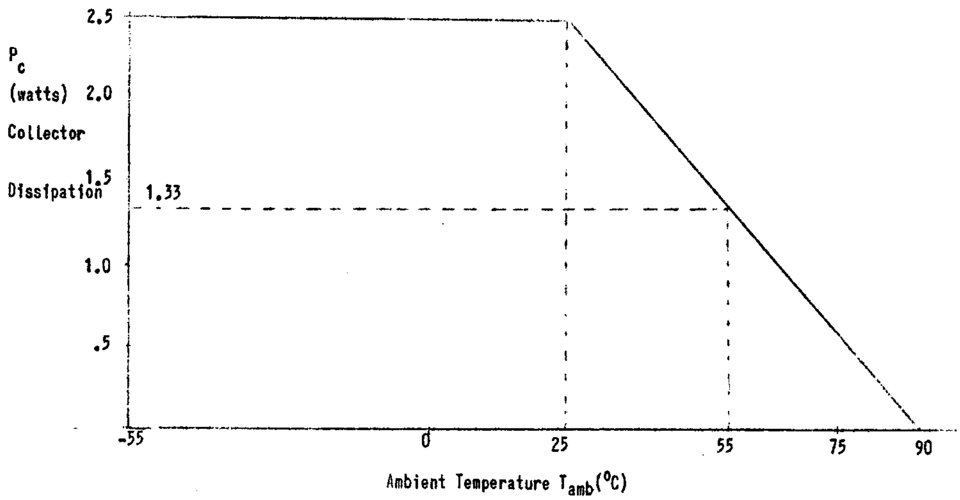


The mounting surface temperature T_m is the temperature of the surface on which the transistor is mounted (with mica washer when applicable).

The mounting surface temperature T_m corresponding to the required dissipation P_c is obtained from the rating curve above. The thermal resistance θ of a cooling fin for use in an ambient temperature T_{amb} is then given by:

$$\theta = \frac{(T_m - T_{amb})}{P_c} \ {}^{o}C/W$$

Fig. 2. Rating curve : transistor alone in free air



NOTES FOR THE GUIDANCE OF THE EQUIPMENT DESIGNER.

(a) Measurement of Mounting Surface Temperature T_m.

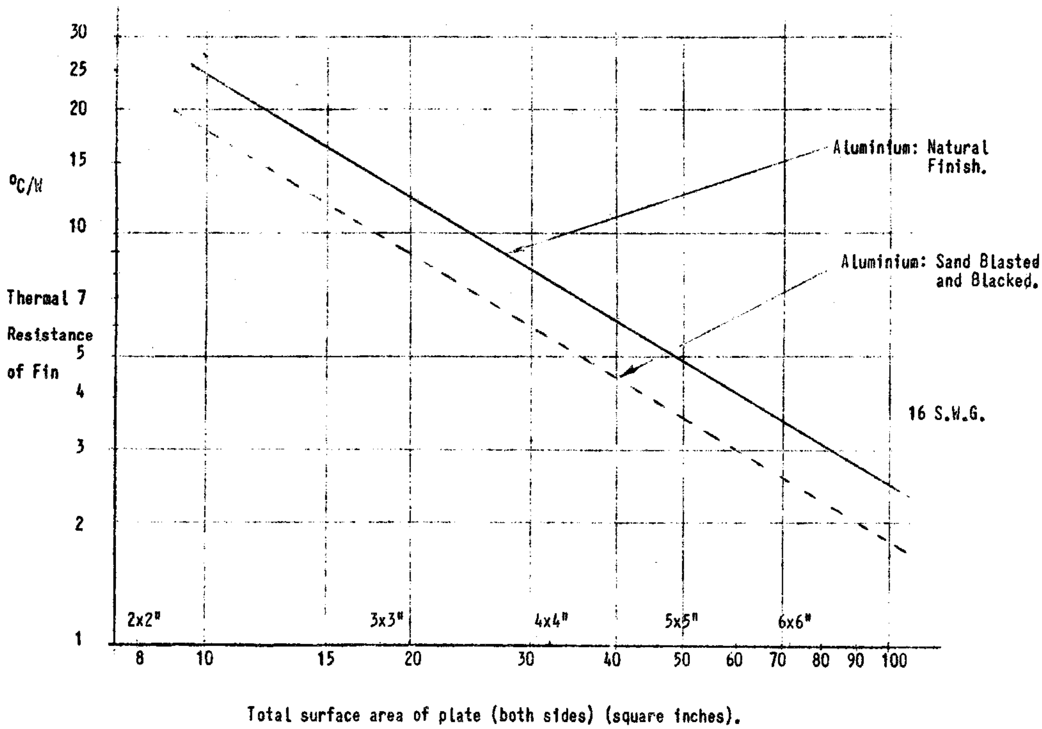
The mounting surface temperature must be measured to ensure that the transistor power rating is not exceeded and the following method of measurement is recommended.

A pure copper spacer ⅛" thick of the same plan as K1007 A1 D4A and hole sizes and disposition as the mounting surface of the transistor is inserted between the transistor (with mica washer when applicable) and the heat sink. A 0.08 inch dia. hole is drilled into the edge of this spacer to a depth of at least 0.25 inch and the temperature is measured with a thermocouple using wires not exceeding 0.01 inch dia.

(b) Thermal Resistance of Heat Sinks.

Fig. 3 below relates thermal resistance and total area of flat plate cooling fins of aluminium, vertically mounted. Cadmium plated steel has properties similar to natural aluminium. Copper fins have a thermal resistance roughly 20% better than natural aluminium.

Fig. 3.



Example: To find fin required to dissipate 5 watts in an ambient temperature of 45°C.

From Fig. 1 $T_m = 77^{\circ}C \therefore \theta = \frac{77 - 45}{5} = 6.4^{\circ}C/W$.

From Fig. 3 the fin size necessary is about 4½ inches square.

Natural finish aluminium, 16 S.W.G., mounted vertically.

TESTS

K1007	Test	Test Conditions	AQL %	Insp. Level	Sym.	Limits Min.	Limits Max.	Units
	GROUP A - omitted							
	GROUP B							
5D.2	Collector current	V_{eb} = -1.5 V (all types) V_{cb} = - 16 V (CV7080) V_{cb} = - 32 V (CV7081) V_{cb} = - 64 V (CV7082)	0.65	II	I_c		1	mA
5D.3.5.	Collector-emitter breakdown voltage	V_{cc} = -160 V I_b = 0 Notes 1 and 2 Total collector load resistance = 600 Ω ± 10% CV7080 CV7081 CV7082	 0.65 0.65 0.65	 II II II	 V_{ce} V_{ce} V_{ce}	 16 32 40		 V V V
5D.3	Saturation Voltage	I_c = - 12 A I_b = -1.6 A Notes 2 and 3	0.65	II	V_{sat}		0.5	V
	GROUP C							
5D.3.1.	Base-emitter voltage	V_{ce} = -0.5 V Notes 2 and 4 I_c = - 12 A	2.5	I	V_{be}		1.3	V
5D.2	Collector current	As in Group B but T_{amb} = 85°C V_{cb} = -12V (all Types)	2.5	I	I_c		10	mA
5D.5	Cut-off frequency of h_{fb}	V_{ce} = - 6 V I_c = - 10 mA Note 5	2.5	I	f_α	150		kc/s
5D.2.2.	Reverse emitter-base Leakage current	V_{eb} = - 6 V (CV7080) V_{eb} = - 12 V (CV7081 & 82) I_c = 0	2.5 2.5	I I	I_{ebo} I_{ebo}		1 1	mA mA
	GROUP D - omitted							
	GROUP E - Physical Tests							
10.2	TEMPERATURE CYCLING	Three cycles -55°C to +75°C No voltages. Note 6		IC				
10.3	CLIMATIC CYCLING	No voltages. Note 6						
	Post temperature and Climatic Cycling Tests	Combined AQL	10					
8	Inoperatives	No voltages	6.5					
	Collector current	As in Group C	6.5		I_c		12	mA
	Collector-emitter breakdown voltage	As in Group B CV7080 CV7081 CV7082	6.5 6.5 6.5		V_{ce} V_{ce} V_{ce}	14 30 37		V V V
	Saturation voltage	As in Group B but I_b = -2.0 A	6.5		V_{sat}		0.5	V
	FATIGUE			IC				
	Post Fatigue Tests	Combined AQL	10					
8	Inoperatives	No voltages	6.5					
	Saturation voltage	As in Group B but I_b = -2.0 A	6.5		V_{sat}		0.5	V
11.4	SHOCK	No voltages		TA				

K1007	Test	Test Conditions	AQL %	Insp. Level	Sym.	Limits Min.	Limits Max.	Units
	Post Shock Tests	Combined AQL	10					
8	Inoperatives	No voltages	6.5					
	Saturation voltage	As in Group B but I_b = -2.0 A	6.5		V_{sat}		0.5	V
10.1	LEAD FRAGILITY	No voltages. Note 7	6.5	IC				
11.5	SOLDERING	No voltages	6.5	IC				
	GROUP F							
13	LIFE	V_{cb} = - 16 V (CV7080) V_{cb} = - 32 V (CV7081) V_{cb} = - 40 V (CV7082) T_m = 30 - 85°C P_c = Max. rated. Note 8		IA				
13.3	Life Test End Points	Combined AQL	10					
8	Inoperatives		6.5					
	Collector current	As in Group C	6.5		I_c		15	mA
	Collector-emitter breakdown voltage	As in Group B CV7080 CV7081 CV7082	6.5 6.5 6.5		V_{ce} V_{ce} V_{ce}	14 30 37		V V V
	Saturation voltage	As in Group B but I_b = -2 A	6.5		V_{sat}		0.5	V
13.4	STORAGE LIFE (1)	t = 150 hours T = -55°C		I				
13.5	STORAGE LIFE (2)	t = 150 hours T = +75°C		I				
	Post Storage Life Tests							
	Repeat Group A tests	Combined AQL for (a) storage life (1) and (b) storage life (2)	 2.5 4.0					
	GROUP G							
5.3. 2.11.	Retest after 28 days holding period			100%				
8	Inoperatives		0.5					
	Saturation voltage	As in Group B	2.0		V_{sat}		0.5	V

NOTES

1. The circuit shown in K1007 5D.3.2/1 may be used with base circuit disconnected; alternatively, to reduce the power dissipation, the collector d.c. supply may be replaced by a pulse supply (e.g. rectified a.c.) and the high current d.c. voltmeter and the I_c current meter replaced by an oscillograph.

2. Transistor attached to a heat sink of at least 6" x 6" x 1/8" copper.

3. This test ensures that the large signal current gain is at least 7.5. For this test it may be convenient to feed both the base and collector currents through series resistors from adjustable voltage supplies. See circuit K1007, 5D.3.2/1 where V_{cc} and V_{bb} are approximately 12V, R_c approximately 1 ohm and R_b approximately 7 ohms. For V_{sat} tests in groups E and F V_{bb} should be approximately 15 volts.

4. The circuit arrangement referred to in Note 3 above offers a convenient test method without risk of exceeding the rated dissipation.

5. The h_{fb} (alpha) cut-off frequency is the frequency at which the h_{fb} (alpha) drops to .707 of its low frequency value. The low frequency value shall be 1/10th of the specified h_{fb} cut-off frequency or lower.

6. The sample of transistors 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 post climatic cycling tests.

7. Transistors 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.

8. The mounting surface is maintained at a chosen temperature T_m (in the range 30 - 85°C) and the corresponding power P_c is dissipated at the maximum rated voltage V_{cb}. This corresponding power is obtained from the rating curve of Fig. 1 on page 2 and will depend on whether the manufacturer elects to insulate the transistor with the mica washer provided.