

MILITARY SPECIFICATION**CV 7329-31**SEMICONDUCTOR DEVICE, REVERSE BLOCKING TRIODE THYRISTOR

Description:- This specification covers the detail requirements for a silicon, stud mounted, Controlled Rectifier, (P Type Trigger) and is in accordance with Specification K1007 Issue 3 except as otherwise stated.

Mechanical Dimensions and Outline:- Section B 10.3.1

Section D, Appendix 1 Drawing D.16

Connections:- Stud - Anode
 No: 1 Terminal - Cathode
 No: 2 Terminal - Trigger

Absolute Maximum Ratings:-

Maximum Voltage Ratings (Note A)

<u>Device</u>	<u>Voltage</u>
CV7329	100
CV7330	200
CV7331	300

Note A Maximum Peak Working Reverse Voltage and Maximum Forward Blocking Voltage. Applies to all waveforms including very short transients.

Rating	I_O	I_{DC}	I_{FRM}	P_T	P_T	V_{RT}	V_{FT}	i_T	I_{RRM}	T_{stg}	F
Unit	A	A	A	W	W	V	V	A	A	$^{\circ}C$	kc/s
Min	-	-	-	-	-	-	-	-	-	-55	-
Max	10	14	100	5	1	5	10	2	20	100	3
Notes	B			C	D	E	F	G	H		J

- Notes
- B. Single phase half wave resistive load at 180° conduction angle. See Figure 1 for Derating curve.
 - C. Max. Peak Trigger Power.
 - D. Max. Mean Trigger Power.
 - E. Max. Peak Reverse Trigger Voltage.
 - F. Max. Peak Forward Trigger Voltage.

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- Notes (cont'd)
- G. Max. Peak Trigger Current.
 - H. Max. Recurrent Peak Reverse (Hole Storage) Current.
 - J. This rating is not an absolute one, but is the max. value at which the other ratings apply. At higher frequencies some derating may be required.
 - K. See Figure 2 for Surge Rating Curve.
 - L. Commercial Prototype CR10-101A Etc.,

Primary Electrical Characteristics:-

Characteristic	V_{fm}	I_H	V_{TT}	I_{TT}	T_d	T_r	T_{off}
Unit	V	mA	V	mA	μS	μS	μS
Min	-	1	.25	-	-	-	-
Max	2.0	100	3.75	100	2.5	4.0	30
Notes	1	2	3	3	4	4	5

Notes

1. At $I_{fpk} = 32A$
2. Holding Current (trigger open circuit)
3. Trigger voltage and current to initiate turn on. See figure 3 for triggering curve.
4. See Figure 4 for typical turn on characteristic curves.
5. See Figure 5 for typical turn off characteristic curves.

Reliability Assurance Requirements:- Under discussion.

Applicable Documents:- TVC information Sheets Nos. 9 and 10.

Requirements:-

Marking The device shall be marked first with the CV number and then according to K1007 Issue 3, Section B1.3.4.

Quality Assurance Provisions:-

Destructive Test The tests listed in Table 2 Group B Inspection Sub Groups 2 and 3 are considered destructive.

Group C Inspection This inspection shall be conducted on the initial lot, and thereafter every ninety days or every fifth lot, whichever occurs first.

Preparation for Delivery:-

Packaging The device shall be packed according to K1007 Issue 3 Section A1.2 (c) A1S Size 1.

Joint Services Catalogue Numbers:-

CV7329	=	5960-99-037-2895
CV7330	=	5960-99-037-2896
CV7331	=	5960-99-037-2897

This specification has been prepared by, and the Qualification Approval Authority is:-

Ministry of Aviation, Royal Radar Establishment, Malvern, England.

5th November 1963

TABLE 1 GROUP A INSPECTION

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym- bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 1</u> Visual & Mechanical Inspection	5.1		0.65	I				
<u>SUB GROUP 2</u> Peak Forward Voltage Drop	9A.2	$i_{fpk} = 32A$ $f = 50 \text{ c.p.s}$ Note 1	1.0	II	V_{fpk}		2.0	V
Forward Blocking leakage Current	9A.3	$T_{amb} = 15^{\circ}C - 30^{\circ}C$ Blocking Voltage CV7329 = 100V CV7330 = 200V CV7331 = 300V Trigger open circuit.			I_B		5 5 5	mA mA mA
Reverse Leakage Current	9A.5	$T_{amb} = 15^{\circ}C - 30^{\circ}C$ Reverse Voltage CV7329 = 100V CV7330 = 200V CV7331 = 300V			I_R		5 5 5	mA mA mA
Triggering Current and Voltage	9A.7	Peak Anode Cathode forward voltage= 5V $f = 50 \text{ c.p.s}$ $T_{STUD} = 15^{\circ} - 30^{\circ}C$ Trigger Current to Fire Trigger Voltage to Fire			I_T V_T		100 2.5	mA V

GROUP A INSPECTION (Cont'd)

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym- bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 3</u> Delay Time Rise Time Turn off time	9A10.2	Anode Cathode Forward Voltage = 24V. Load Current = 10A Trigger Voltage = 4.8V Trigger current impedance = 33ohms Note 1 As above for delay time	2.5	1	t_d	-	2.5	μ sec
	9A10.3	As above for delay time			t_r	-	4.0	μ sec
	9A.10.4	Load Current = 10A Reapplied voltage = 12V. Rate of rise of reapplied voltage = 20V/ μ sec max. Trigger open circuit. Note 1.			t_{off}	-	20	μ sec
<u>SUB GROUP 4</u> Peak Forward Leakage Current. Peak Reverse Leakage Current	9A.4	$T_{amb} = 100^\circ C$ $f = 50$ c.p.s Peak Forward Voltage CV7329 = 100V CV7330 = 200V CV7331 = 300V	4.0	1	i_{fpk}	-	-	mA mA mA
	9A.5	$T_{amb} = 100^\circ C$ $f = 50$ c.p.s			i_{rpk}	-	-	

GROUP A INSPECTION (Cont'd)

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Symbol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
Reverse Trigger Leakage Current	9A.8	CV7329 = 100V				-	10	mA
		CV7330 = 200V				-	10	mA
		CV7331 = 300V				-	10	mA
Holding Current	9A.9	T _{amb} = 15°C - 30°C			I _{RT}	-	100	mA
		Trigger Voltage = -5V						I _H
		T _{amb} = 15°C - 30°C						

GROUP B INSPECTION

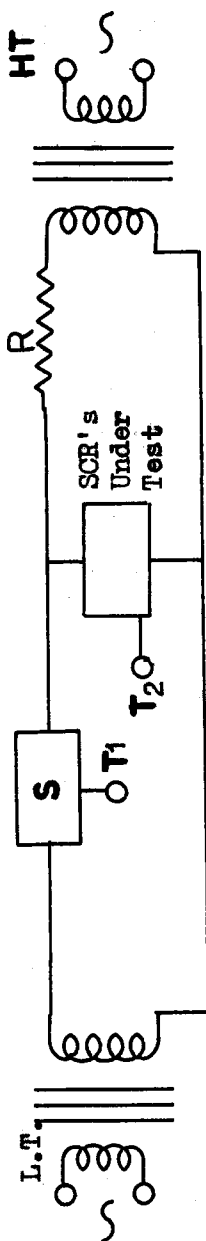
Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym- bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 1</u> Physical Dimensions	5.1	According to drawing	6.5	I _C				
<u>SUB GROUP 2</u> Temperature cycling.	5.5	-55°C to +100°C	4.0	1A				
Moisture Resistance	5.3.1							
<u>SUB GROUP 3</u> Vibration Fatigue	5.15.1		4.0	I Note 3				
<u>SUB GROUP 4</u> Torque	5.12.1	30 lbs in.	6.5	1A				
<u>GROUPS 5 & 6</u> Omitted								
<u>SUB GROUP 7</u> High Temperature Life	6.2.1	Non Operating T _{stg} = + 100°C Duration = 1000 hrs.	4	1 Note 3				
<u>SUB GROUP 8</u> Operation Life	6.33.2	Max. Peak Working Reverse Voltage and Max. Forward Blocking Voltage CV7329 - 100V CV7330 - 200V CV7331 - 300V f = 50 c.p.s Note 2	4.0	1A				

GROUP B INSPECTION (Cont'd)

Examination or Test	K1007/NATO REF.	TEST CONDITIONS Specific Conditions	AQL %	Insp. Level	Sym- bol	LIMITS		Units
						Min.	Max.	
<u>Post Test End Points for Sub Groups 2,3,4,7 & 8</u> Forward Blocking leakage current Reverse leakage current Trigger current and voltage	9A.3 9A.5 9A.7	As in Group A Sub Group 2 As in Group A Sub Group 2 As in Group A Sub Group 2			I_S I_R I_T V_T	- - -	6 6 110 2.75	mA mA mA V

NOTES

1. Device mounted on a suitable heat sink to ensure T_{stud} is within the temperature range $15^{\circ}\text{C} - 30^{\circ}\text{C}$.
2. Basic life test circuit:-
Half Wave circuit.



R - Reverse current limiting resistor. T_1 & T_2 = Triggering signals.

S - may be a controlled rectifier.

The forward current shall not be less than the value corresponding to the chosen stud temperature and conduction angle (about 90°C) (See Fig 1 and D3).

The effectiveness of trigger control shall be demonstrated.

3. The maximum sample size shall be 125.

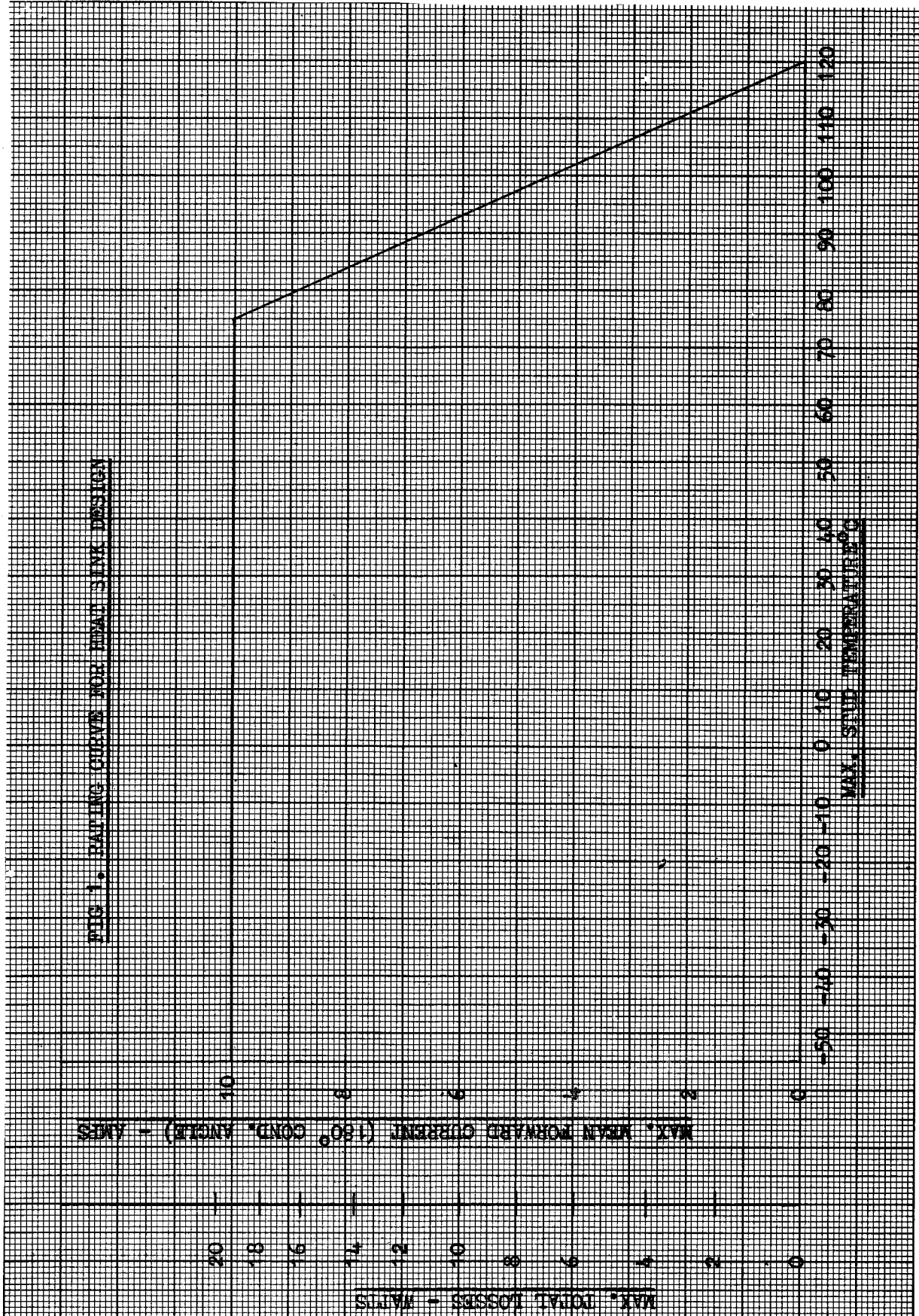


FIG 1. RATING CURVE FOR HEAT SINK DESIGN

Fig 2

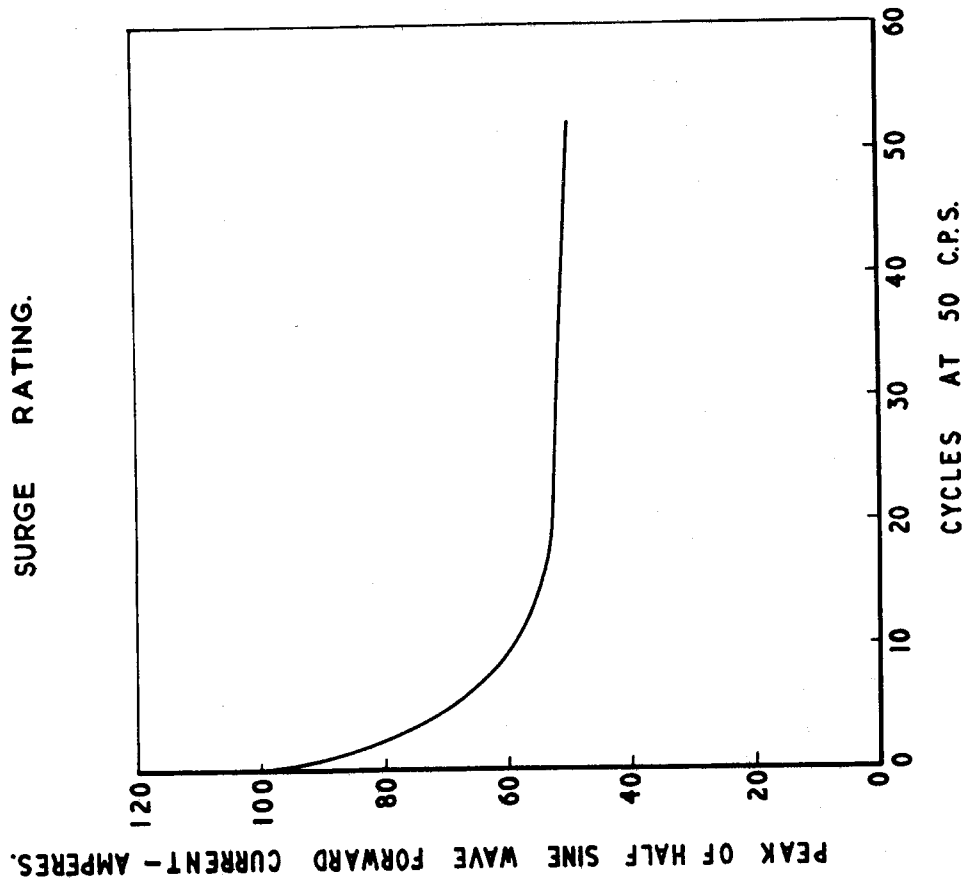


Fig 3

SILICON CONTROLLED RECTIFIERS.
TRIGGER CHARACTERISTICS.

THE CURVES SHOW THE MINIMUM VALUES OF
VOLTAGE AND CURRENT REQUIRED FOR RELIABLE
OPERATION.

MAXIMUM TRIGGER VOLTAGES PERMISSIBLE
ARE +10 VOLTS AND -3 VOLTS

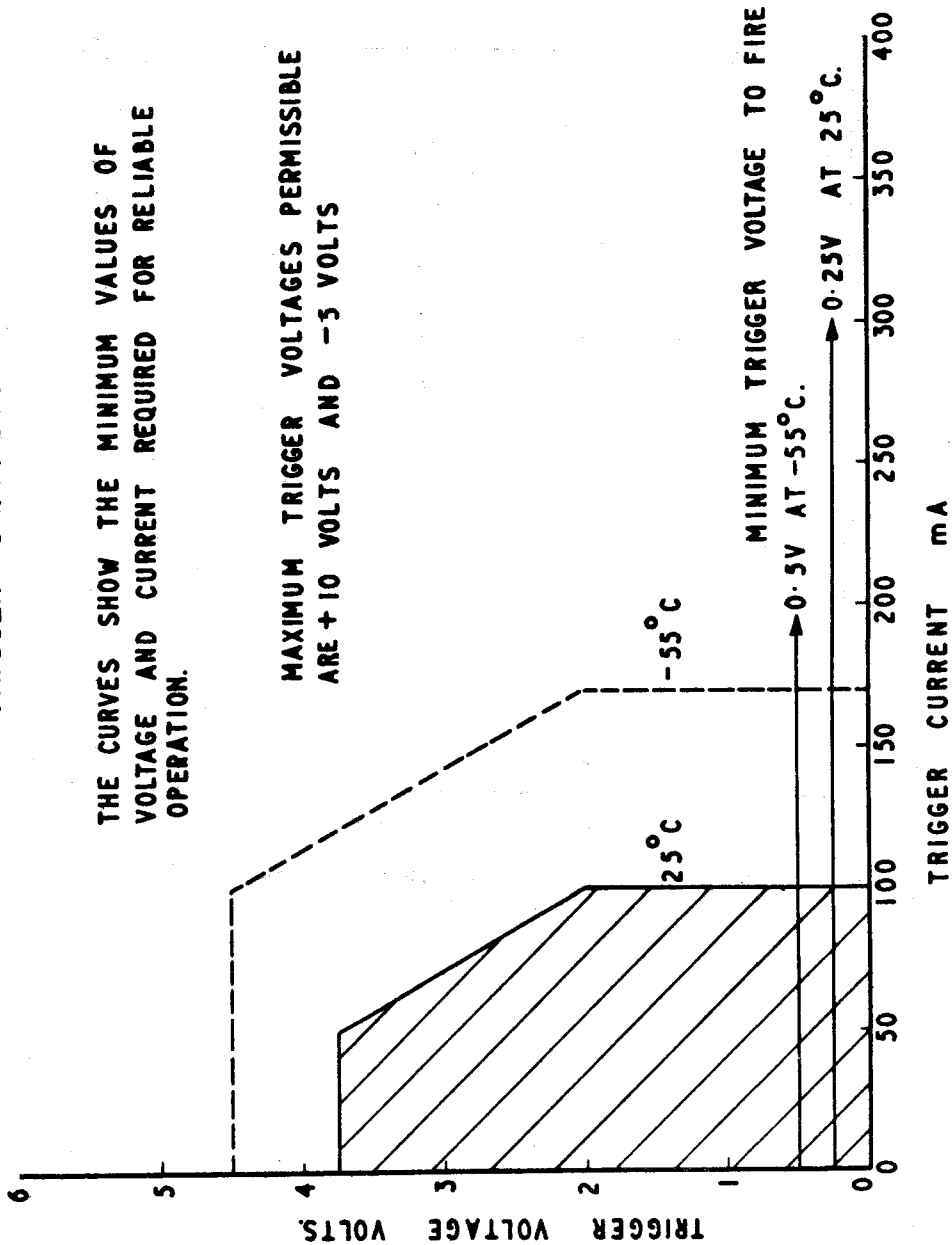


FIG. 5
TYPICAL TURN-OFF CHARACTERISTICS

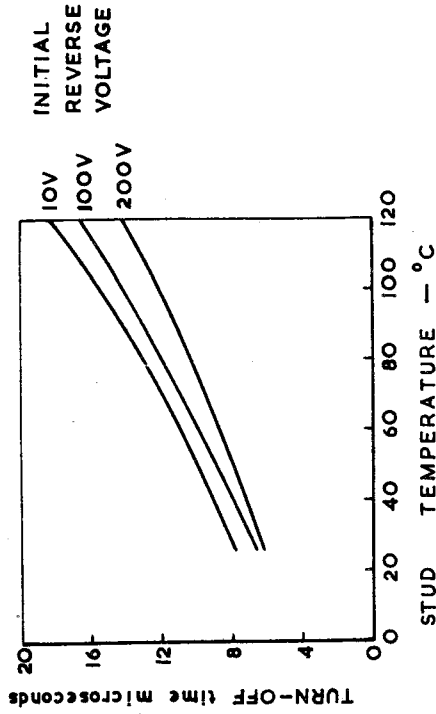


FIG. 4
TYPICAL TURN-ON CHARACTERISTICS

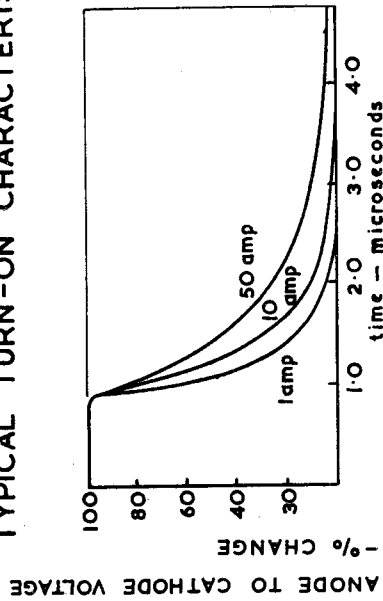


Fig. D1

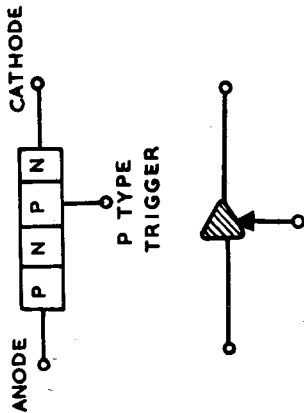
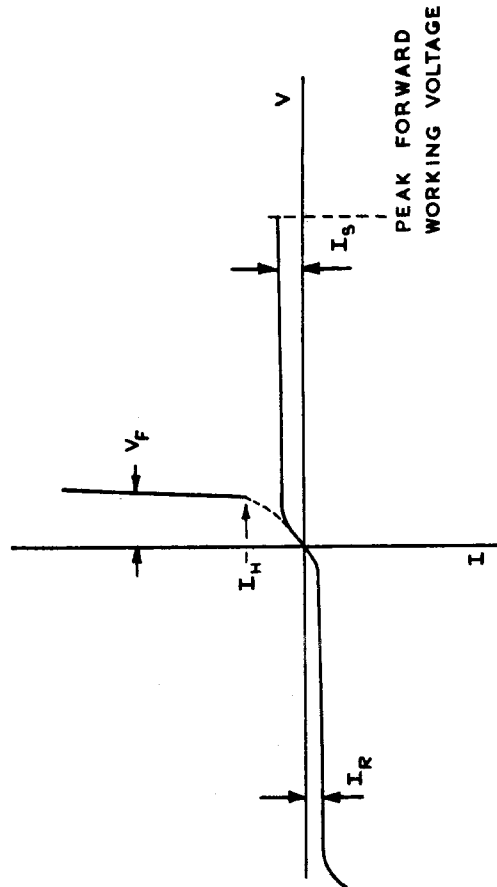


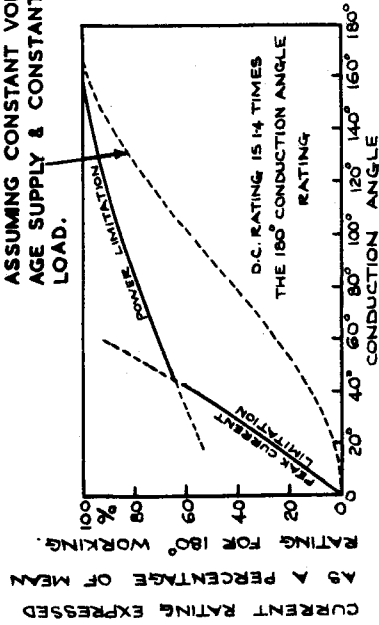
Fig. D2



APPLICATION DATA

Fig. D3

NORMAL FALL OF MEAN CURRENT WITH VARIATION OF CONDUCTION ANGLE ASSUMING CONSTANT VOLTAGE SUPPLY & CONSTANT LOAD.



MEAN CURRENT RATING AGAINST CONDUCTION ANGLE (SINGLE PHASE, SINUSOIDAL WORKING).