

VALVE ELECTRONICADMIRALTY SIGNAL AND RADAR ESTABLISHMENT

CV313

|   |                                      |                              |
|---|--------------------------------------|------------------------------|
| Specification AD/CV313<br>Issue No. 4 dated 3.12.58<br>To be read in conjunction with K1001<br>ignoring clauses 4.1, 5.2, 5.3, 5.8. | <u>SECURITY</u>                      |                              |
|   | <u>Specification</u><br>Unclassified | <u>Valve</u><br>Unclassified |

—→ Indicates a change

|   |  |  |                                   |  |
|---|--|--|-----------------------------------|--|
| <u>TYPE OF VALVE:</u> Pulse Modulator Tetrode.  |  |  | <u>MARKING</u><br><br>See K1001/4 |  |
| <u>CATHODE:</u> - Directly heated thoriated tungsten  |  |  |                                   |  |
| <u>ENVELOPE:</u> - Silica   |  |  |                                   |  |
| <u>PROTOTYPE:-</u> VX8215   |  |  |                                   |  |
| <u>RATINGS</u><br><br>All limiting values are absolute  |  |  | Note                              | <u>DIMENSIONS &amp; CONNECTIONS</u><br><br>See drawing on Page 4<br>(See Note F) |
| Filament Voltage (V) 11.5+0.5<br>-0.2   |  |  |                                   |  |
| Filament Current (A) 64   |  |  |                                   |  |
| Max. d.c. Anode Voltage (kV) 55   |  |  |                                   |  |
| Max. Peak Anode Voltage (kV) 60   |  |  |                                   |  |
| Max. Screen Voltage (kV) 6  |  |  | C                                 |  |
| Max. Mean Anode Dissipation (W) 700   |  |  |                                   |  |
| Max. Mean Screen Dissipation (W) 250  |  |  |                                   |  |
| Max. Positive Control-Grid Voltage (Pulsed) (kV) 6  |  |  |                                   |  |
| Max. Negative Control-Grid Voltage (kV) 7   |  |  |                                   |  |
| Max. Cathode Current (Pulsed) (A) 50  |  |  | B                                 |  |
| <u>CAPACITANCES (pF)</u>  |  |  |                                   |  |
| Cac 31  |  |  |                                   |  |
| Cge 52  |  |  |                                   |  |
| Cag 3   |  |  |                                   |  |
| <u>NOTES</u>  |  |  |                                   |  |
| A. The filament current starting surge must not exceed 100A   |  |  |                                   |  |
| B. These ratings apply to pulsed operations with pulses not exceeding 1 $\mu$ s in duration and pulse repetition rates not exceeding 1500 pps. If it is desired to operate the valve under other conditions the Specifying Authority should be consulted. |  |  |                                   |  |
| C. This value applies only if the anode heating is evenly distributed. The temperature of the hottest part of the anode must not exceed 840°C.  |  |  |                                   |  |
| D. As much ventilating space as possible should be allowed around the valve.  |  |  |                                   |  |
| E. <u>WARNING:</u> During operation at high anode voltages there will be a considerable emission of X-rays from this valve and care must be taken to ensure that these rays do no harm to personnel.  |  |  |                                   |  |
| F. Further details of the valve-holder shown on page 4, in which each valve is supplied, can be obtained from the Specifying Authority.   |  |  |                                   |  |

To be performed in addition to those applicable in K1001.  
The tests are to be done after a Holding Period of at least 14 days.

| a. | Test Conditions |                    |                 |                  |                  |         |                      | Test                 | Limits |      | No. Tested | Note  |
|----|-----------------|--------------------|-----------------|------------------|------------------|---------|----------------------|----------------------|--------|------|------------|-------|
|    | See K1001/A.111 |                    |                 |                  |                  |         |                      |                      | Min.   | Max. |            |       |
|    | Connect to H.P. |                    | Connect to L.P. |                  | Connect to earth |         |                      | Capacitances (pF)    |        |      |            |       |
|    | a               | f1,f2,g1,g2 holder |                 | -                |                  |         | Cae                  | 27                   | 35     | TA   |            |       |
|    | g1              | a,f1,f2,g2, holder |                 | -                |                  |         | Cge                  | 43                   | 61     | TA   |            |       |
|    | a               | g1                 |                 | f1,f2,g2, holder |                  |         | Cag                  | 2.1                  | 3.7    | TA   |            |       |
|    | Vf (V)          | Va (kV)            | Vg2 (kV)        | Vg1 (kV)         | Vg1 (pulse) (kV) | Ia (mA) | Test Duration (Mins) |                      |        |      |            |       |
| b  | 0               | 60                 | 0               | 0                | 0                | -       | 1                    | Field Emission (nA)  | -      | 100  | 100%       | 1     |
| c  | 11.5            | -                  | -               | -                | -                | -       | -                    | Filament Current (A) | 60     | 67   | 100%       | 2     |
| d  | 11.5            | 55                 | 5               | Adj.             | -                | 0.1     | -                    | -Vg1 (kV)            | -      | 4    | 100%       |       |
| e  | 11.5            | 65                 | 5               | See Note 4       | 5                | -       | 10                   | Ia (pulse) (A)       | 25     | -    | 100%       | 4,5,6 |
| f  | 11.5            | 4                  | 5.75 ±0.05      | See Note 4       | 5                | -       | -                    | Ik (pulse) (A)       | 50     | -    | 100%       | 3,4   |
| g  | 11.0            | 4                  | 5.75 ±0.05      | See Note 4       | 5                | -       | -                    | Ik (pulse) (A)       | 45     | -    | 100%       | 3,4   |
| h  | 11.5            | -                  | -               | -                | -                | -       | -                    | Ik Emission (A)      | 70     | -    | 100%       | 7     |
| j  | 11.5            | 1                  | 1               | Adj.             | -                | 1000    | 10                   | -Ig1 (mA)            | -      | 10   | 100%       |       |
| k  | 11.5            | 48                 | 5               | See Note 8       | -                | -       | -                    | Life (hours)         | 500    | -    | 4%         | 8     |

## NOTES

1. In this test there shall be a limiting resistance of 1 M ohms in the anode circuit, and there shall be no sign of sparking in the valve during the test.
2. The filament tensioning springs shall be observed as the filament voltage is varied up and down between 0 and 11.5 volts. If the springs do not move freely and smoothly as the filament expands and contracts, the valve shall be rejected.
3. The load shall be short circuited.
4. Substantially rectangular positive pulses of 5kV amplitude and of  $T_p = 1 \mu s$  and PRF = 500 pps shall be applied to grid 1. The grid 1 bias shall be provided by the grid current pulses, with  $R_g = 2.8 \text{ M ohms}$  and  $C_g = 0.025 \mu F$ .
5. The anode load shall be of 2000 ohms resistance and of negligible inductance.
6. The H.T. voltage shall be raised slowly to its full value and held there for 10 minutes. There shall be no arcing or sparking in the valve during the last 5 minutes of the test period.

NOTES (Cont'd)

7. The cathode emission current shall be measured by Method 1 of Appendix 5 of K1001, with the collecting voltage applied to the anode, screen and control grid connected together equal to 6 kV.
8. The first valve of each production lot of 25 valves shall be life-tested at the specified  $V_a$  (48 kV) and  $V_{g2}$  (5kV) in a pulse modulator circuit which, as the result of the application of substantially rectangular voltage pulses to  $g_1$ , provides substantially rectangular current pulses of 36A peak in a non-inductive anode load of 1250 ohms resistance, with  $T_p = 1/\mu\text{s}$  and  $\text{FRF} = 1500$  pps, and with the effective anode-cathode capacitance of the valve in the circuit equal to  $75 \pm 25$  pF. The grid bias shall be provided by the grid current pulses with  $R_g = 2.8$  megohms and  $C_g = 0.06/\mu\text{F}$ . The life test may be done in a modulator which uses more than one CV313 valve, provided that the operating conditions for the valve under test remain the same as specified here.

The valve shall be regarded as having satisfied the life test requirements if, during the test, there has been no more than one high-voltage break-down inside the valve in any 24-hour period, and if, after 500 hours operation, the valve still meets the requirements of tests "a" and "g" of the specification and shows no more than  $50 \mu\text{A}$  of reverse grid current in test "h".

If the first valve of the lot of 25 valves passes the life test, the lot shall be accepted. However, if this valve fails to pass the test, another valve from the same lot shall be life tested. If this second valve passes the test, the lot shall be accepted; but if this valve also fails to pass the test, the lot shall be rejected. A rejected lot may be re-submitted for acceptance following a joint investigation by the Contractor and the Government Authority concerned.

