

CV 461  
CV 462  
CV 463

|   |                      |              |
|---|----------------------|--------------|
| Specification MOS(A)/CV461<br>Specification MOS(A)/CV462<br>Specification MOS(A)/CV463<br>Issue 3 Dated 25.11.52<br>To be read in conjunction with K1001,<br>excluding clauses 5.2 and 5.8. | <u>SECURITY</u>      |              |
|   | <u>Specification</u> | <u>Valve</u> |
|   | UNCLASSIFIED         | UNCLASSIFIED |

—————► Indicates a change

|   |       |        |                       |  |
|---|-------|--------|-----------------------|--|
| TYPE OF VALVE - Broad-band TB Cell  |       |        | <u>MARKING</u>        |  |
| PROTOTYPE - VX4088; VX4089; VX4090  |       |        | See K1001/4           |  |
| <u>RATING</u>   |       |        | <u>DIMENSIONS</u>     |  |
|   |       |        | See Drawing on Page 4 |  |
| Min. Transmitter Peak Power   | (kW)  | 5      |                       |  |
| Max. Transmitter Peak Power   | (kW)  | to 200 |                       |  |
| Frequency Coverage - CV461  | (Mcs) | 9315   |                       |  |
|   |       | to     |                       |  |
|   |       | 9435   |                       |  |
| - CV462   | (Mcs) | 9180   |                       |  |
|   |       | to     |                       |  |
|   |       | 9300   |                       |  |
| - CV463   | (Mcs) | 9020   |                       |  |
|   |       | to     |                       |  |
|   |       | 9140   |                       |  |
| <u>NOTE</u>   |       |        |                       |  |
| A. At least one washer of the dimensions shown in the Drawing on Page 4, shall be supplied with each valve.           |       |        |                       |  |
| B. Higher power levels up to 200 Kw may be used, but this will result in a shorter life period of less than 200 hours |       |        |                       |  |

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TESTS

To be performed in addition to those applicable in K1001

|   | Test Conditions  | Test   | Limits |       | No.<br>Tested | Note          |
|---|--|--|--------|-------|---------------|---------------|
|   |  |  | Min.   | Max.  |               |               |
| a | Valve shall be mounted as shown in Drawing on Page 5 and terminated in a matched load.<br>Test Frequency (Fo)<br>CV461 = 9375 Mcs $\pm$ 0.05%<br>CV462 = 9240 Mcs $\pm$ 0.05%<br>CV463 = 9080 Mcs $\pm$ 0.05%  | Tuning Susceptance   | -0.06  | +0.06 | 100%          | 1<br><br>2,4. |
| b | As for Test (a)  | Equivalent Conductance   | -      | 0.1   | 100%          | 2             |
| c | Valve shall be mounted as shown in Drawing on Page 5 and terminated in a matched load. Line to be energised with 4kW peak RF.<br>Frequency = 9240 Mcs $\pm$ 1.5%<br>Tp = 1 usec $\pm$ 10%<br>PRF = 1000 pps $\pm$ 10%<br>Test to be performed at least 7 days after pumping and not less than 24 hours after any previous discharge. | Firing Time (secs)<br>i.e. Time interval between application of power and tube firing  | -      | 10    | 100%          |               |
| d | As for Test (c)  | Arc Loss (db)  | -      | 0.8   | 100%          | 3             |
| e | As for Test (c), except that the line shall be energised with 12 to 15 kW peak RF derived from a higher power source through an attenuator of at least 6 db.<br>Frequency = 9240 Mcs $\pm$ 1.5%<br>Tp = 1 usec $\pm$ 10%<br>PRF = 1000 pps $\pm$ 10%   | Recovery Loss (db)<br>Measured by a signal generator pulse injected 2 usecs after trailing edge of the transmitter pulse. Signal generator frequency:<br>CV461 = 9375Mcs $\pm$ 0.05%<br>CV462 = 9240Mcs $\pm$ 0.05%<br>CV463 = 9080Mcs $\pm$ 0.05% | -      | 2.0   | 100%          |               |
| f | As for Test (a)  | Loaded Q   | -      | 6.5   | TA            | 4             |

## TESTS (Cont'd)

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CV 463

|   | Test Conditions   | Test   | Limits               |             | No.<br>Tested | Note |
|---|---|--|----------------------|-------------|---------------|------|
|   |   |  | Min.                 | Max.        |               |      |
| g | As for Test (e)<br>Load Standing Wave Ratio<br>to be less than 1.03:1 | High-level Standing Wave<br>Ratio<br>CV461<br>CV462<br>CV463 | 0.91<br>0.91<br>0.87 | -<br>-<br>- | S             | 5    |

## NOTES

1. The susceptance may be measured by comparing the phase of the reflection with that of a valve which is resonant at the test frequency. The susceptance is given by:-

$$\frac{B}{Y_0} = \frac{(1 + 2 G/Y_0)}{2} \tan \frac{4\pi\Delta 1}{\lambda_g} \approx (1.1) \frac{2\pi\Delta 1}{\lambda_g} \text{ for small } \Delta 1$$

Where  $\lambda_g$  is the guide wavelength and  $\Delta 1$  is the phase shift measured in the same units as  $\lambda_g$  and where  $G/Y_0$  is assumed to be 0.05.

2. A curve of SWR vs Frequency is plotted around a centre value of Test Frequency ( $F_0$ ). See Test Clause (a). The valve is resonant ( $B = 0$ ) at the frequency corresponding to the maximum SWR. The value of SWR is:-

$$S = \frac{1}{G/Y_0} + 1 \quad \text{therefore } G/Y_0 = \frac{1}{S-1}$$

If the valve has passed the susceptance test ( $B < 0.06 Y_0$ ), the SWR measured at Test Frequency ( $F_0$ ) is very nearly equal to  $\frac{1}{G/Y_0} + 1$  and may be used to measure  $G$ .

3. The power loss in the arc shall be less than 680 W peak:-

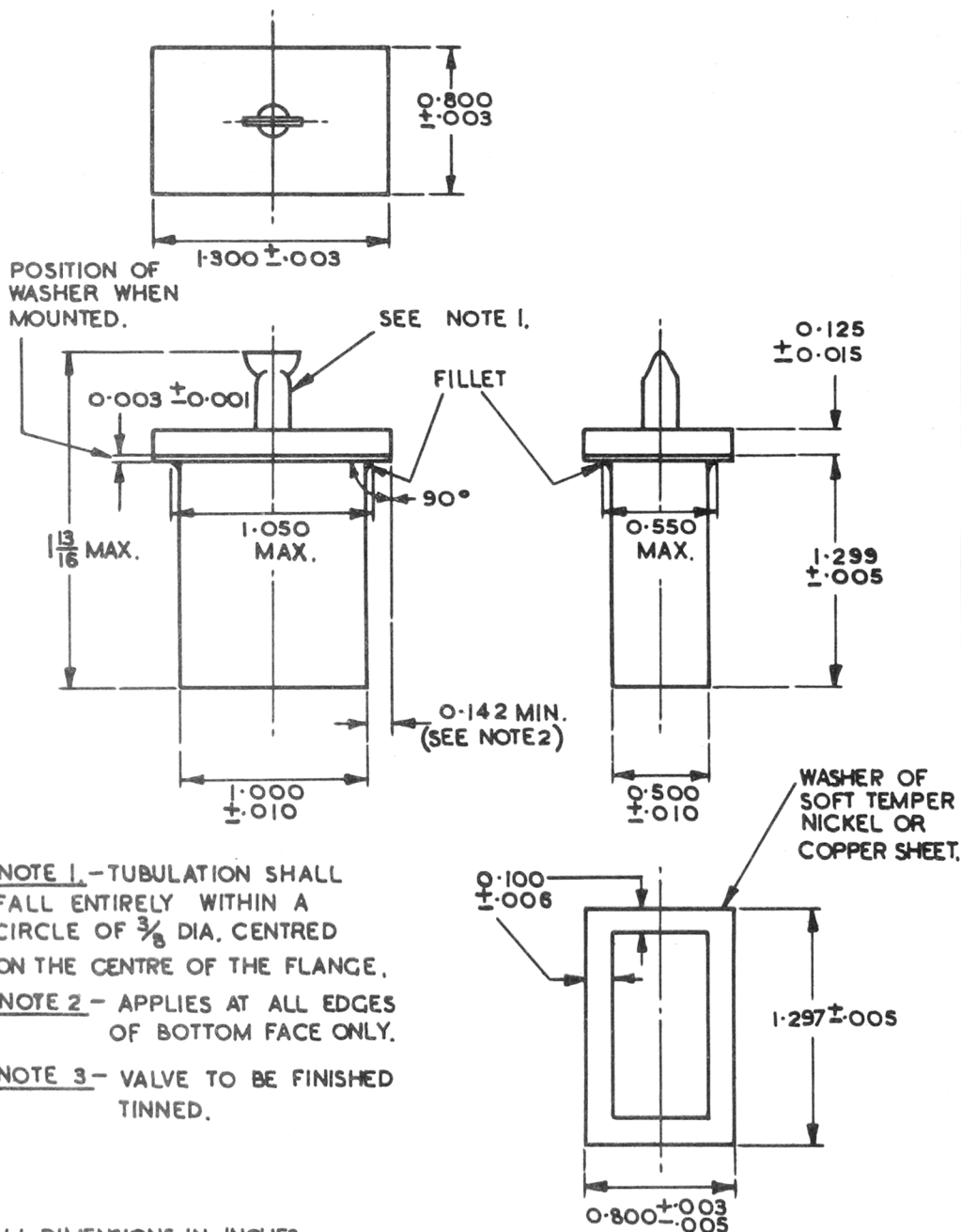
$$\frac{P}{P - P_L} = \frac{4000}{4000 - 680} = 1.20 \text{ (0.8db)}$$

4. Loaded Q is defined as:-

$$Q_L = \frac{F_0 \frac{dB/Y_0}{dF}}{2(1 + G/Y_0)} \quad \text{where } F_0 = \text{Test Frequency. See Test Clause (a).}$$

5. This test may be made at low levels, simulating the arc by a metallic short in intimate contact with the inside of the window.

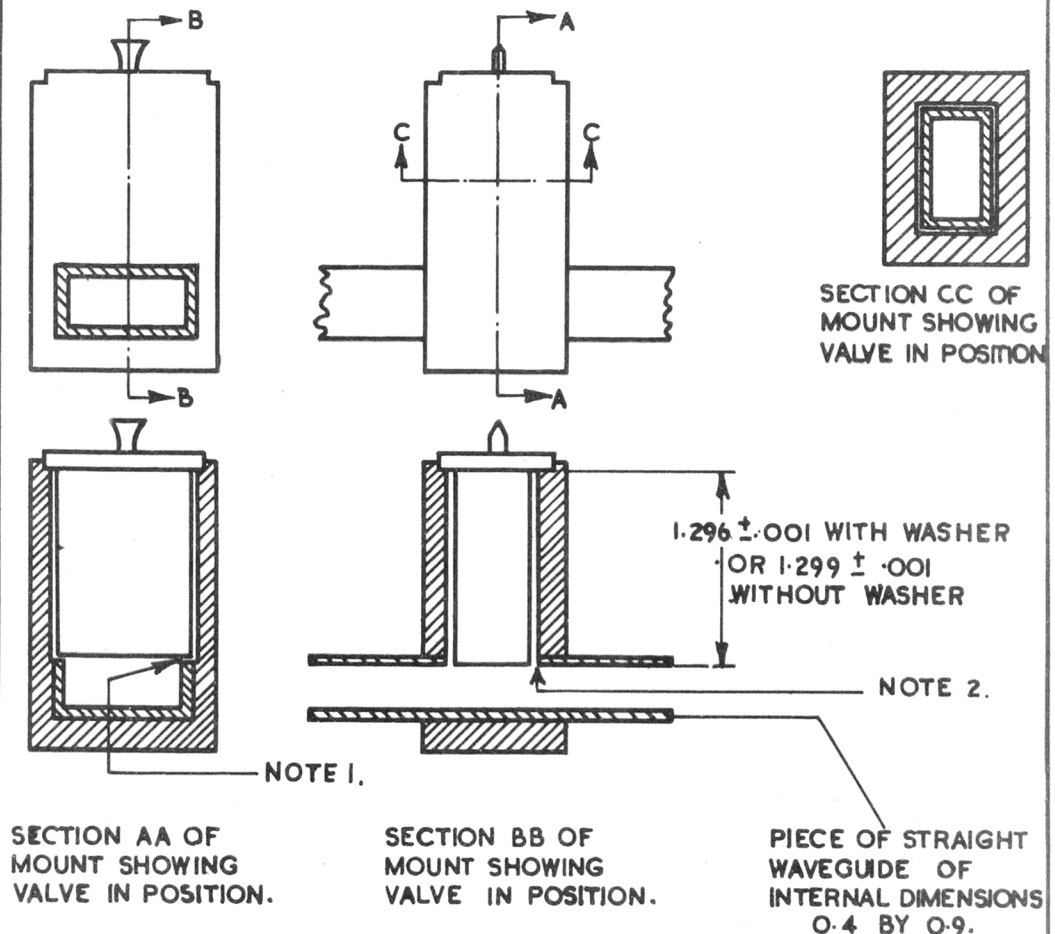
DIMENSIONS OF CV 461, CV462 & CV 463.



# MOUNT FOR TESTING CV461, CV462 AND CV463.

NOTE 1. 0.015 CUT-AWAY AT SIDE OF WAVEGUIDE MEASURED FROM THE PLANE OF THE INNER SURFACE OF THE TOP OF THE WAVEGUIDE.

NOTE 2 0.030 TO 0.040 SPACING ALL ROUND THE VALVE.



ALL DIMENSIONS IN INCHES

SPECIFICATION CV461/2/3  
ISSUE 3 DATED 25.11.52

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AMENDMENT NO. 1

PAGE 1 RATING

Amend Max. Transmitter Peak Power to read 50KW NOTE  
B

ADD: NOTE B: Higher power levels up to 200KW may  
be used, but this will result in a  
shorter life period of less than  
200 hours.

JULY 1961

ROYAL RADAR ESTABLISHMENT

13.11.61  
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