

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION MOS/CV 4040 ISSUE 2 DATED 6.11.56

AMENDMENT NO.1.

Page 1. Amend 'Specification MOS/CV4040' to read  
'Specification MOA/CV4040'.

Page 2. Group B. Negative Grid Voltage

Amend the limits column to read as follows:-

Min. '8.4' (no change); LAL '11.3';  
Bogey '12.5' (no change);  
UAL '13.7'; Max. '15.8'; (no change);  
ALD '2.7'

March, 1964.

T.V.C. for R.R.E.

(222284).

|   |                      |              |
|---|----------------------|--------------|
| Specification MOS/CV4040<br>Issue 2 Dated 6.11.56<br>To be read in conjunction with K1001, BS448 and BS1409 | <u>SECURITY</u>      |              |
|   | <u>Specification</u> | <u>Valve</u> |
|   | UNCLASSIFIED         | UNCLASSIFIED |

Indicates a change ←

|  |      |                          |                         |
|--|------|--------------------------|-------------------------|
| TYPE OF VALVE - Reliable Pulse Tetrode       |      | <u>MARKING</u>           |                         |
| CATHODE - Indirectly-heated                  |      | See K1001/4              |                         |
| ENVELOPE - Glass                             |      |                          |                         |
| PROTOTYPE - CV416                            |      |                          |                         |
| <u>RATING</u>                                |      | <u>BASE</u>              |                         |
| All limiting values are absolute             |      | See BS448/B7G/1.1        |                         |
|  |      | <u>CONNECTIONS</u>       |                         |
|  |      | <u>Pin</u>               | <u>Electrode</u>        |
| Heater Voltage (V)                           | 6.3  | 1                        | Control Grid g1         |
| Heater Current (A)                           | 0.3  | 2                        | Cathode k               |
| Max. Anode Voltage (V)                       | 600  | 3                        | Heater h                |
| Max. Anode Dissipation (W)                   | 3.5  | 4                        | Heater h                |
| Max. Screen Voltage (V)                      | 600  | 5                        | Anode a                 |
| Max. Screen Dissipation (W)                  | 0.7  | 6                        | Beam Plates bp          |
| Max. Heater-Cathode Voltage (V)              | 100  | 7                        | Screen Grid g2          |
| Mutual Conductance (mA/V)                    | 8.3  |                          |                         |
| Max. Bulb Temperature (°C)                   | 165  |                          |                         |
| Max. Shock (short duration) (g)              | 500  |                          |                         |
| Max. Acceleration (continuous operation) (g) | 2.5  |                          |                         |
| <u>CAPACITANCES (pF)</u>                     |      | <u>DIMENSIONS</u>        |                         |
| Cin (nom)                                    | 6.2  | See BS448/B7G/2.1        |                         |
| Cout (nom)                                   | 5.2  | Size Ref. No. 2          |                         |
| Ca, g1 (nom)                                 | 0.03 | <u>Dimensions (mm)</u>   | <u>Min.</u> <u>Max.</u> |
|  |      | A Seated height          | -    47.5               |
|  |      | B Diameter               | 16.0    19.0            |
|  |      | D Overall length         | -    54.5               |
|  |      | <u>MOUNTING POSITION</u> |                         |
|  |      | Any                      |                         |

NOTES

- A. Tested at  $V_g = V_{g2} = 250V$ ;  $V_{g1} = -6.25V$  ( $I_a = 6\mu A$  approx. tested under pulsed conditions).
- B. Caution to Electronic Equipment Design Engineers: Special attention should be given to the temperature of valves to be operated in aircraft. Reliability will be seriously impaired if the maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the valve and will be reduced appreciably if absolute maximum ratings are exceeded. Both reliability and performance will be jeopardised if heater voltage ratings are exceeded: life and reliability performance are directly related to the degree that regulation of the heater voltage is maintained at its centre-rated value.

To be performed in addition to those applicable in K1001 and in the specified order unless otherwise agreed with the inspecting Authority.

| Test Conditions - unless otherwise specified |                                    |  |                  |                   |                        |                 |        |                    |        |                   |      |                |    |
|--|------------------------------------|--|------------------|-------------------|------------------------|-----------------|--------|--------------------|--------|-------------------|------|----------------|----|
|  |                                    | Vh<br>(V)<br>6.3   | Va<br>(V)<br>200 | Vg2<br>(V)<br>200 | Ia<br>(mA)<br>17.0     |                 |        |                    |        |                   |      |                |    |
| K1001  | Test                               | Test Conditions  | AQL<br>%         | Insp<br>Level     | Sym<br>bol             | Limits          |        |                    |        |                   |      | Units          |    |
|  |                                    |  |                  |                   |                        | Min             | L/L    | Bopey              | U/L    | Max               | A/LD |                |    |
| 7.1  | Glass Strain                       | No voltages  | 6.5              | I                 |                        |                 | -      |                    |        |                   |      |                |    |
| 5.2  | <u>GROUP A</u><br>Insulation       | Vg1 - all = -100V<br>Vg2 - all = -300V<br>Va - all = -300V                                       |                  | 100%              | R                      | 100             | -      | -                  | -      | -                 |      | M<br>M<br>M    |    |
|  | Reverse Grid Current               | Rg1 = 500k Max   |                  | 100%              | Ig1                    | -               | -      | -                  | -      | 0.75              |      | uA             |    |
|  | <u>GROUP B</u><br>Heater Current   | Combined AQL<br>Vhk = ± 100V<br>Ia = 100uA   | 1.0              | II                | Ih                     | 0.27            | -      | 0.30               | -      | 0.33              |      | A              |    |
|  | Heater-cathode Leakage Current     |  | 0.65             | II                | Ihk                    | -               | -      | -                  | -      | 10                |      | uA             |    |
|  | Negative Grid Voltage              |  | 0.65             | II                | V2                     | -               | -      | -                  | 2      | -                 |      | uA             |    |
|  | Negative Grid Voltage              |  | 0.65             | II                | V2                     | Vg1             | 8.4    | -                  | -      | -                 | 15.8 |                | V  |
|  | Negative Grid Voltage for cut-off  |  | 0.65             | II                | V2                     | Vg1             | -      | -                  | 10.8   | 12.5              | 14.2 | 1.8            | V  |
|  | Screen Current                     |  | 0.65             | II                | V2                     | Ig2             | 2.05   | -                  | -      | -                 | 5.1  |                | mA |
| Mutual Conductance                           | 0.65                               | II   | V2               | gm                | 2.6                    | -               | -      | -                  | 5.0    | -                 | mA/V |                |    |
|  |                                    |  |                  |                   |                        | -               | 3.1    | 3.6                | 4.0    | -                 | 1.1  | mA/V           |    |
| 7.2  | <u>GROUP C</u><br>Change in Vg2    | Combined AQL<br>Vg1 reduced by 2V, Vg2 reduced to maintain Ia = 17mA                             | 6.5              | I                 | Vg2                    | 15              | -      | -                  | -      | 25                |      | V              |    |
|  | Pulse Anode Current                | Va = Vg2 = 300V<br>Vg1 = -100V<br>Pulse amp = +100V<br>tp = 10 to 15 usecs<br>Duty cycle = 10.25 | 2.5              | I                 | Ia (pk)                | 133             | -      | -                  | -      | -                 |      | mA             |    |
|  | Vibration Noise Output             | Va(b) = 250V<br>Vg1 = -17V<br>RL = 2k  | 2.5              | I                 | Va AC                  | -               | -      | -                  | -      | 60                |      | mV (pk-pk)     |    |
| 7.2  | <u>GROUP D</u><br>Grid Emission    | Vh = 7.0V<br>Vg1 = -38V<br>Rg1 = 500k  | 6.5              | IA                | Ig1                    | -               | -      | -                  | -      | -1.5              |      | uA             |    |
|  | Capacitance                        | Measured on a 1 Mc/s bridge with the valve mounted in a fully screened socket. Shielded          | 6.5              | IC                | C out<br>C in<br>Ca gl | 4.4<br>5.2<br>- | -<br>- | 5.2<br>6.2<br>0.03 | -<br>- | 6.1<br>7.1<br>.05 |      | pF<br>pF<br>pF |    |
|  | Base Strain                        | No voltages  | 6.5              | IA                |                        |                 |        |                    |        |                   |      |                |    |
| 11.2   | <u>GROUP E</u><br>Resonance Search | Va(b) = 250V<br>Vg1 = -17V<br>RL = 2k<br>Frequency range 25-500 c/s                              | 2.5              | IC                |                        |                 |        |                    |        |                   |      |                |    |
|  | Vibration Noise Output             |  |                  |                   | Va AC                  | -               | -      | -                  | -      | Record            |      | mV (pk-pk)     |    |
|  | Resonant Frequency                 |  |                  |                   | f                      | 200             | -      | -                  | -      | Record            |      | c/s            |    |

| KLO01   | Test  | Test Conditions   | AQL %  | Insp. Level | Sym- bol  | Limits   |        |        |        |            | Units      |
|---------|---|---|--|-------------|-----------|----------|--------|--------|--------|------------|------------|
|         |   |   |  |             |           | Min.     | LAL    | Bogey  | UAL    | Max.       |            |
| 11.3    | Fatigue   | Vh = 6.9V switched<br>1 min on, 3 mins off<br>Va = Vg2 = 0<br>Frequency = 170 c/s<br>Min pk accel = 5g<br>Duration = 30, 39, 30hrs. |  | IA          |           |          |        |        |        |            |            |
|         | <u>Post Fatigue Tests</u><br>Vibration Noise Output   | Va(b) = 250V<br>Vg1 = -17V<br>RL = 2k   | 2.5  |             | Va AC     | -        | -      | -      | -      | 100        | mV (pk-pk) |
|         | Heater-cathode<br>Leakage Current   | Vhk = + 100V  | 2.5  |             | Ihk       | -        | -      | -      | -      | 30         | uA         |
|         | Reverse Grid Current<br>Mutual Conductance  | Rg1 = 500k Max.   | 2.5<br>2.5   |             | Igl<br>gm | -<br>2.5 | -<br>- | -<br>- | -<br>- | 1.5<br>5.0 | uA<br>mA/V |
| 11.4    | Shock   | No voltages<br>Hammer angle = 30°   |  | IA          |           |          |        |        |        |            |            |
|         | <u>Post Shock Tests</u><br>Vibration Noise Output   | Va(b) = 250V<br>Vg1 = -17V<br>RL = 2k   | 2.5  |             | Va AC     | -        | -      | -      | -      | 100        | mV (pk-pk) |
|         | Heater-cathode<br>Leakage current   | Vhk = + 100V  | 2.5  |             | Ihk       | -        | -      | -      | -      | 30         | uA         |
|         | Reverse Grid Current<br>Mutual Conductance  | Rg1 = 500k Max.   | 2.5<br>2.5   |             | Igl<br>gm | -<br>2.5 | -<br>- | -<br>- | -<br>- | 1.5<br>5.0 | uA<br>mA/V |
| AVI/5   | <u>GROUP F</u><br>Life  | Va=250V; Vg2=200V;<br>Vhk=100V; Rg1=500k;<br>Rk=1000  |  |             |           |          |        |        |        |            |            |
| AVI/5.1 | <u>Stability Life Test</u><br>Change in Pulse Anode Current   | Note 1  | 1.0  | I           | Ia (pk)   | -        | -      | -      | -      | 20         | %          |
| AVI/5.3 | Intermittent Life Test  |   |  |             |           |          |        |        |        |            |            |
| AVI/5.6 | <u>Life Test End-point</u><br>(500 hrs)<br>Inoperatives<br>Heater Current<br>Heater-cathode<br>Leakage Current<br>Reverse Grid Current<br>Pulse Anode Current<br>do Average change<br>Negative Grid Voltage<br>Insulation | Vhk = + 100V<br>Rg1 = 500k Max<br>Note 1<br><br>Vg1 - all = -100V<br>Vg2 - all = -300V<br>Va - all = -300V                          | 6.5<br>2.5<br>2.5<br>2.5<br>2.5<br>2.5<br>4.0<br>4.0 | IA          |           |          |        |        |        |            |            |
|         |   |   |  |             | Ih        | 0.27     | -      | -      | -      | 0.33       | A          |
|         |   |   |  |             | Ihk       | -        | -      | -      | -      | 10         | uA         |
|         |   |   |  |             | Igl       | -        | -      | -      | -      | 1.0        | uA         |
|         |   |   |  |             | Ia(pk)    | 100      | -      | -      | -      | -          | mA         |
|         |   |   |  |             | Ia(pk)    | -        | -      | -      | -      | 25         | %          |
|         |   |   |  |             | Vg1       | 7.4      | -      | -      | -      | 15.8       | V          |
|         |   |   |  |             | R         |          |        |        |        |            | M          |
|         |   |   |  |             |           | 50       | -      | -      | -      | -          | M          |
|         |   |   |  |             |           | 50       | -      | -      | -      | -          | M          |
|         |   |   |  |             |           | 50       | -      | -      | -      | -          | M          |

| K1001          | Test                                      | Test Conditions | AQL % | Insp. Level | Symbol | Limits |     |       |     |      |     | Units |
|----------------|---|-----------------|-------|-------------|--------|--------|-----|-------|-----|------|-----|-------|
|                |   |                 |       |             |        | Min.   | LAL | Bogey | UAL | Max. | ALD |       |
| <b>GROUP F</b> |   |                 |       |             |        |        |     |       |     |      |     |       |
| A VI           | <u>Life Test End-point</u><br>(1000 hrs.) |                 | 10.0  | IA          |        |        |     |       |     |      |     |       |
|                | Inoperatives                              |                 | 4.0   |             |        |        |     |       |     |      |     |       |
|                | Heater Current                            |                 | 4.0   |             | Ih     | 0.27   | -   | -     | -   | 0.33 |     | A     |
|                | Leakage Current                           | Vhk = + 100V    | 4.0   |             | Ihk    | -      | -   | -     | -   | 1.0  |     | uA    |
|                | Reverse Grid Current                      | Rgl = 500k Max. | 4.0   |             | Igl    | -      | -   | -     | -   | 1.5  |     | uA    |
|                | Pulse Anode Current                       | Note 1          | 4.0   |             | Ia(pk) | 90     | -   | -     | -   | -    |     | mA    |
|                | Negative Grid Voltage                     |                 | 6.5   |             | Vgl    | 6.6    | -   | -     | -   | 15.8 |     | V     |
| <b>GROUP G</b> |   |                 |       |             |        |        |     |       |     |      |     |       |
| A IX           | Electrical re-test after                  |                 |       | 100%        |        |        |     |       |     |      |     |       |
| /2.5           | 28-day holding period                     |                 |       |             |        |        |     |       |     |      |     |       |
| AVI            | Inoperatives                              |                 | 0.5   |             |        |        |     |       |     |      |     |       |
| /5.6           | Reverse Grid Current                      | Rgl = 500k Max  | 0.5   |             | Igl    | -      | -   | -     | -   | 1.0  |     | uA    |

**NOTE**

- The test conditions specified for Pulse Anode Current in Group C shall apply.