

<b>Specification:</b> Mintech.CV6223 <b>Issue 1</b> <b>Dated May 1968.</b> <b>To be used in conjunction with K1001</b>	<div style="text-align: center;"><u>SECURITY</u></div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <u>Specification</u> Unclassified         </div> <div style="width: 45%;"> <u>Valve</u> Unclassified         </div> </div>
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Indicates change

<b>TYPE OF VALVE:</b> Power Travelling Wave Tube for Pulsed Operation in "S" Band		<b>MARKING</b>  See K1001/4 Serial Number	
<b>CATHODE:</b> Dispenser		<b>BASE</b> Special, designed to fit socket in mount	
<b>ENVELOPE:</b> Glass enclosed within a metal capsule giving a pre-focused unit.			
<b>PROTOTYPE</b> VX8547			
<b>RATINGS AND CHARACTERISTICS</b> (Not for Inspection Purposes) All limiting values are absolute and Non-simultaneous			
<b>NOTE</b>			
Heater Voltage (V) 6.3±3%		A, F	
Max.Heater Current Surge (A) 3.0			
Min. Operating Range (kMc/s) 2.7 to 3.3		E	
Min. High Level Gain (db) 26.0		BCE	
Min. Low Level Gain (db) 28.0		BCE	
Min. Peak Power Output (W) 250		E	
Max. Pulse Length (pSec) 20.0			
Max. Duty Cycle 0.005			
Max. Negative Cathode Voltage with respect to Anode, Helix and Collector Strapped (kV) 7.5			
Max. Peak Anode Current (A) 0.20			
Max. Peak Helix Current (A) 0.25			
Max. Mean Helix Current (mA) 1.00			
Max. Peak Cathode Current (A) 1.5			
Nom. Magnetic Field (Gauss) 800		C	
Min. Water Flow (litre/min.) 1			
Max. Outlet Water Temperature (°C) 50			
<b>MOUNTING POSITION</b> Axis Horizontal			
<b>CONNECTIONS</b> (For pin reference see drawing page 7)			
<b>PIN</b>		<b>ELECTRODE</b>	
1		Heater	
2		Cathode/Heater	
3		Anode	
4		Helix	
		Collector	
		Connection by means of a flying lead	
<b>R.F. CONNECTIONS</b> 50 ohms Co-axial Type C Connector			
<b>DIMENSIONS</b> See Drawing Page 7			

NOTES

- A. H.T. Voltages shall not be applied until at least three minutes after the application of the heater voltage.
- B. The pulse voltage is to be adjusted for optimum gain at 3.3 KMc/s. With this voltage and the specified coil current, the rated performance is available over the frequency range 2.7 - 3.3 KMc/s. For high level operation the voltage should be increased to that value stamped on the tube.
- C. The tube is to be operated in a mount (catalogue No. 5950-99-914-8096) in which the field is produced by a solenoid operating at  $21A \pm 0.5A$  under the conditions specified in the operating sheet supplied with each tube.
- D. The following are typical operating conditions optimised at 3.3 KMc/s with 250W peak output, and are intended as a guide to the user.

Pulse length:	15.0 $\mu$ sec
P.R.F.	275 p.p.s.
$V_{\text{collector anode}}$ & helix:	0
$V_k$ :	-5.0 kV
$I_{\text{coll}}$ :	0.80 pk
$I_{\text{hx}}$ :	0.10A pk
$I_a$ :	0.01 pk
$V_f$ :	6.3V
$I_F$ :	1.0A
$I_{\text{solenoid}}$ :	21.0A
Gain:	30 dB at 2.7 kMc/s 30 dB at 3.0 kMc/s 29 dB at 3.3 kMc/s

- E. The minimum operating range is that frequency range over which the rating values to which this note refers, may be obtained.
- F. If d.c. heater supplies are used, the positive end of the supply must be connected to the heater/cathode pin (pin 2).
- G. N.A.T.O. Stock Number 5960 - 99 - 037 - 5745

## TESTS

Tests performed in addition to those applicable in K1001

Test Conditions: Unless otherwise stated  
(See Note 8)

$V_h$	$t_p$	P.R.F.	Solenoid current	Freq.	r.f. load
(V)	( $\mu$ s)	(p.p.s.)	(A)	(kMc/s)	v.s.w.r.
6.3	15.0	275	21.0	3.3	not greater than 1.2:1

K1001 5J	Test	Test Conditions	AQL %	Insp. Level	LIMITS		Units
					Min.	Max.	
6.2	<u>GROUP A</u>						
	(a) Heater Current	$V_h$ only Note 1		100%	0.75 0.49	1.05 1.2	Amps. <i>Ampl</i>
	(b) Focusing (r.f. input = 0) $I_{coll}$ (peak)	Note 2		100%	0.6	1.0	Amps.
	$I_{hx}$ (peak)				-	0.12	Amps.
	$I_a$ (peak)				-	0.03	Amps.
	(c) Low level gain	Notes 3, 4, 6, 7 Pulse input voltage		100%	29.5 4.5	- -	dB kV
	(d) High level gain	Notes 4, 5a, 5b, 6, 7 Pulse input voltage $V_o$ (max).		100%	27.5 -	- 6.5	dB kV
	(e) Focusing $I_{coll}$ (peak)	Frequency = 2700 Mc/s Notes 5a and 6		100%	-	1.0	Amps.
	$I_{hx}$ (peak)				-	0.20	Amps.
	$I_a$ (peak)				-	0.05	Amps.
	(f) Spurious Oscillation (1)	Note 9 and 6		100%	No oscillation shall be detected.		
	(2)	Note 13 and 6			No oscillation shall be detected having a power amplitude greater than 1 mW peak, or the equivalent mean power.		

K1001 5J	Test	Test Conditions	AQL %	Insp. Level	LIMITS		Units
					Min.	Max.	
6.7	<u>GROUP A</u> Cont'd						
	(g) Match.			100%			
	Input V.S.W.R.	Notes 4, 10			.3	-	Ratio
	Output V.S.W.R.	Notes 4, 10			.3	-	Ratio
	(h) Water Head	At 1 litre/minute flow		100%	-	12.0	cms/Hg.
	(i) Water pressure	At 100 lbs./sq. in. gauge for 2 minutes		100%	No leakage		
	(j) Capacitance, cathode to electrodes	To all electrodes strapped to capsule		100%	-	20 10	pF
	(k) Helix impedance	At 148.5 Mc/s $\pm$ 2 Mc/s. Measured at helix input connection. Note 10, 12.		100%	-8 -40	-40 20	pF /mmhos
	(l) Cold loss	At 3.0 kMc/s		100%	45	-	dB
GROUPS C, D and E omitted							
	<u>GROUP F</u>						
	Life	Vh = 6.3V d.c.		4%			
	End Point 1000 hours	Notes 11 and 14.					
	<u>Post Life Test</u>						
	High level gain	Conditions as in (a) to (h)			25	-	dB
	<u>GROUP G</u>						
	(n) Electrical retest after 14 days holding period	Tests and limits as contained in tests (d) and (f) in Group A		100%	See Group A		
<u>NOTES</u>							
1. Read after five minutes							
2. Set pulse input voltage to 5.5 kV.							
3. With an r.f. input of 8 mW, at 3.3kMc/s the pulse input EHT voltage is optimised to provide maximum output power.							
4. Measurements shall be made at 100 Mc/s intervals over the range 2.7 - 3.3 kMc/s. However for those tests made for type approval purposes the measurements shall be made at 25 Mc/s intervals over the range.							

- 5(a) The pulse input voltage shall be adjusted to give an optimum gain at an output of 250W.
- (b) The value of pulse input voltage for this condition shall be referred to in the specification as  $V_o$  and shall be stamped on the tube.
6. Measurements to be made in a standard mount approved by the R.R.E. Valve Authority.
7. The change in gain over any of the 100 Mc/s intervals referred to in Note 4 shall not exceed 2.5 dB.
8. H.T. voltages shall not be applied until at least three minutes after the application of the heater voltage.
9. The R.F. input shall be short circuited and the output load shall present a V.S.W.R. not less than 10:1 at 3 KMc/s. With the pulse input voltage at  $V_o$  max. +500V the load mismatch shall be varied through all phases. During these tests the output shall be observed with a matched crystal detector connected to a cathode ray oscilloscope whose combined sensitivity shall not be less than 5 mW per cm.
- No spurious oscillations shall be detected.
10. No voltages shall be applied to the tube during this test.
11. The tube voltages shall be optimised for operation at a frequency of 3.3 kMc/s but during life the frequency of operation may be anywhere in the range 2.7 to 3.3 kMc/s. The output power shall be set at  $250W \pm 10\%$ . The pulse length at  $17.5 \mu s \pm 5\%$ . the p.r.f. at  $265.0 \text{ p.p.s} \pm 2.5\%$ . End of life shall be at 1000 hours or at that time when the high level gain is less than the given limit. The number of hours of life which a valve provides shall be recorded. Where the average life of five consecutive life tests provides a value less than 900 hours, the Valve Authority shall be informed and the cause of failure investigated.
12. This test shall be performed with the valve fitted into a test socket and approved by the Valve Authority in accordance with R.R.E. Drawing No. RRB 281204.
13. The R.F. input shall be short circuited and the output load shall be matched. The pulse input voltage shall be electronically swept at 50c/s through a range of  $\pm 500$  volts about  $V_{max}$ , while the solenoid current is being varied manually between the limits of 20.5 and 21.5 amps. Alternatively the pulse input voltage may be manually swept through the above range for each of three values of solenoid current, 20.5, 21.0 and 21.5 amps.
- During these tests the output shall be monitored and either the peak or mean power of any oscillation measured as follows:-
- (a) For peak power, the output shall be measured, using a matched crystal detector connected to a cathode ray oscilloscope whose combined sensitivity shall be adequate for the measurement of 1 mW peak power. No oscillation having an amplitude greater than 1 mW peak shall be detected.
- (b) For mean power, a matched thermistor bridge having a full scale deflection of not more than 10  $\mu W$  shall be used for measurement. A crystal detector connected to an oscilloscope may be used as an aid to observing oscillation.

NOTES (Cont'd)

## 13 (cont'd)

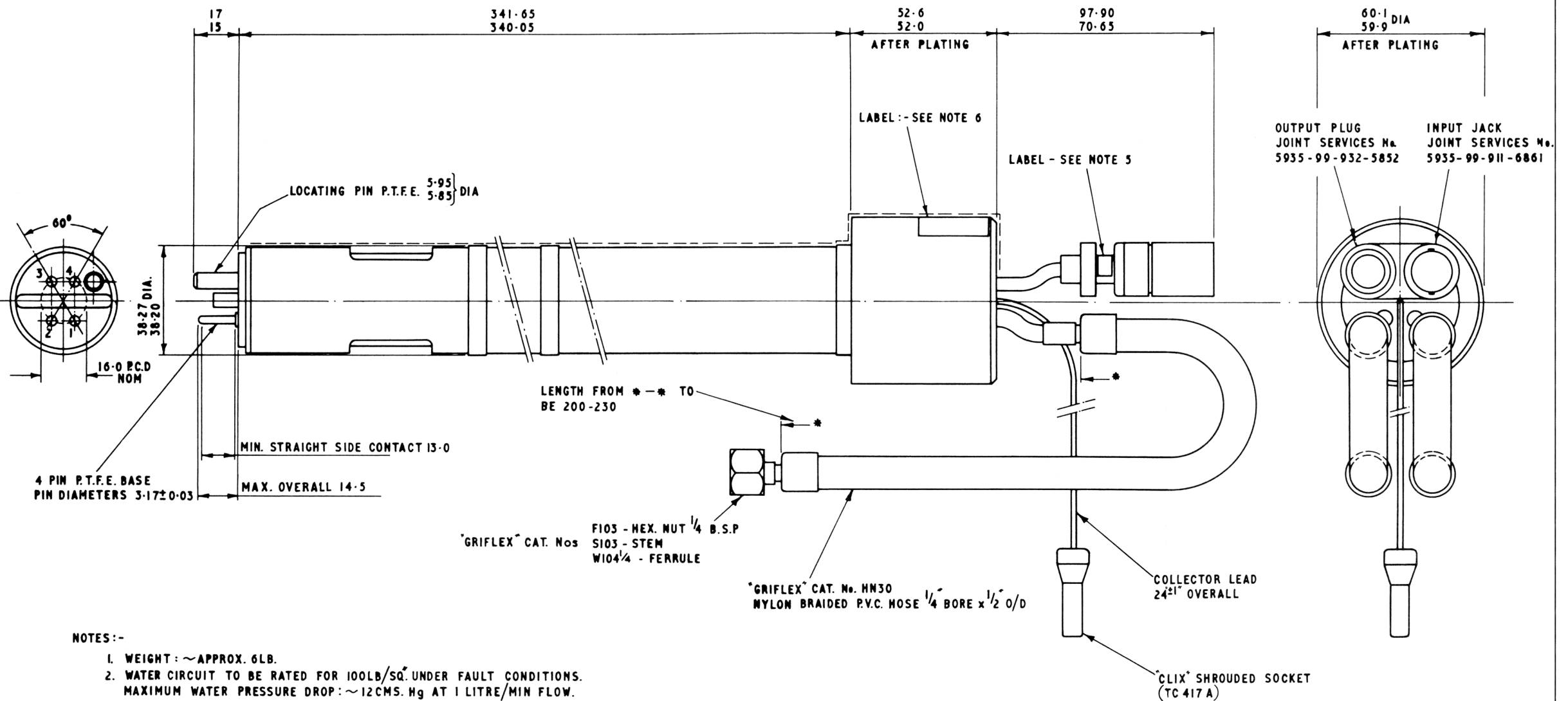
It should be noted that a tube may not oscillate on each EHT voltage pulse nor for the full duration of that pulse.

When a mean power measurement is taken therefore, the voltage sweep shall be stopped at the point of maximum oscillation and the effective p.r.f. and width of r.f. pulse shall be measured to determine the correct duty cycle.

No oscillation shall be detected having an amplitude greater than the mean power equivalent to 1mW peak.

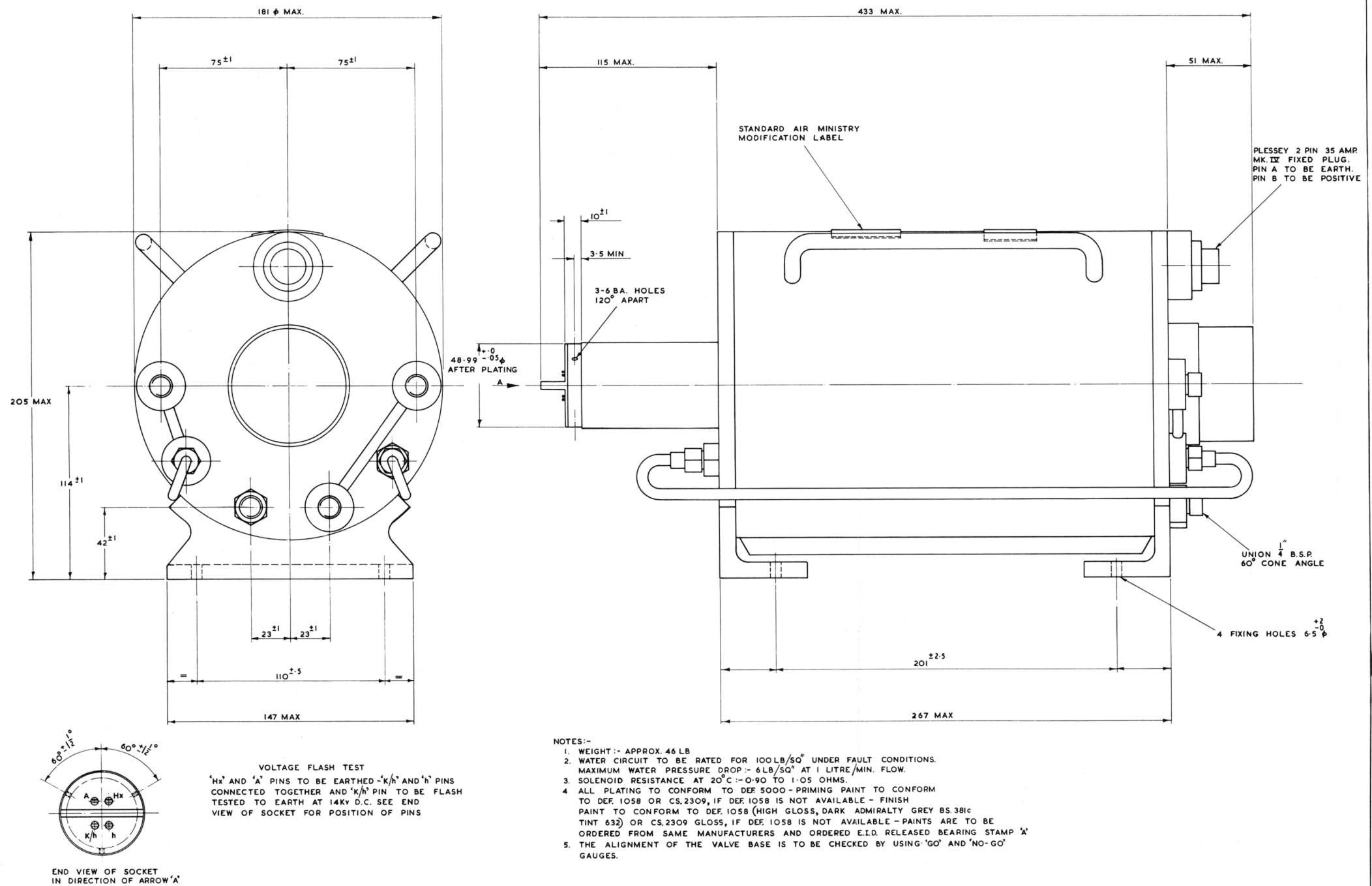
- 14 The positive end of the d.c. heater supply shall be connected to the heater/cathode connection.

# OUTLINE DRAWING (THIRD ANGLE PROJECTION)



## NOTES:-

1. WEIGHT: ~APPROX. 6LB.
2. WATER CIRCUIT TO BE RATED FOR 100LB/SQ. UNDER FAULT CONDITIONS. MAXIMUM WATER PRESSURE DROP: ~12CMS. Hg AT 1 LITRE/MIN FLOW.
3. PLATING INDICATED THUS \_\_\_\_\_ TO CONFORM TO DEF 5000.
4. CAPSULE INSPECTED FOR 'MOUNT INTERCHANGEABILITY' BY USING GAUGES APPROVED BY THE VALVE AUTHORITY.
5. LABEL - DRY-FIX TRANSFER MARKED WITH THE VALUE  $V_0$  MAX. e.g.  $V = 5.1KV$  ON A BACKGROUND OF DARK ADMIRALTY GREY TO BS 381C TINT 632
6. IDENTIFICATION LABEL: DRY-FIX TRANSFER MARKED WITH WHITE CHARACTERS ON A BACKGROUND OF DARK ADMIRALTY GREY TO BS 381C TINT 632



OUT-LINE DRAWING OF MOUNT



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ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION Mintech/CV6223 Issue 1 Dated May 1968

Amendment No.1

Page 3. Tests Group A. (a) Heater Current

- (i) In the column headed Limits, Min. - delete "0.9"  
and substitute "0.7".
- (ii) In the column headed Limits, Max. - Delete "1.2"  
and substitute "1.0".

October 1969

R.R.E.

SPECIFICATION MINTECH/CV6223, ISSUE 1, DATED MAY 1968

Amendment No 1

1 Page 3 Test Clause (a) Heater Current

In the columns headed "LIMITS, Min and Max" -  
Delete "0.9" and "1.2"  
Insert "0.75" and "1.05" respectively.

2 Page 4. Test Clause (j) Capacitance, cathode to electrodes

In the column headed "LIMITS, Max" -  
Delete "20"  
Insert "10"

3 Page 4. Test Clause (k), Helix impedance

In the column headed "LIMITS, Min" -  
Delete "1"  
Insert "0"

✓AAS  
29/4/72

# ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION MINTECH/CV6223 ISSUE 1 DATED MAY 1968

AMENDMENT NO.2 (JULY 1976)

## 1 Page 1

- (a) Delete Ministry of Technology - DLRD/RRE  
Insert Ministry of Defence (PE) - RSRE
- (b) After Specification amend "Mintech" to read "MOD(PE)"

## 2 Page 4

- (a) Group F. Amend end point to read 100 hours
- (b) Delete "High level gain. Conditions as in (a) to (h) 25 (in minimum column) dB".

Insert in "Test Conditions" column:-

"Tube to repass all Group AO 100% tests (b), (c), (d), (e), (f), (g), (k) and (l) same conditions and limits".

- (c) In Inspection level column, delete 4% insert 10%.

## 3 Page 5

### Note 11

- (a) Delete all text including and after "End of life shall be at 1000 hours etc."

Substitute "The test shall be terminated at the end of 100 hours and provided that the tube meets the Post Life test requirements it may be delivered. Where the average life of five consecutive life tests provides a value of less than 90 hours the Qualification Approval Authority shall be informed and the cause of failure investigated."