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"

Annex 1
5/68

MINISTRY OF TECHNOLOGY - DLRD/RRE

VALVE ELECTRONIC **CV6223**

Specification: Mintech. CV 6223
Issue 1 Dated May 1968.
To be used in conjunction with K1001

SECURITY	
Specification	Valve
Unclassified	Unclassified

Indicates change

TYPE OF VALVE: Power Travelling Wave Tube for Pulsed Operation in "S" Band

CATHODE: Dispenser

ENVELOPE: Glass enclosed within a metal capsule giving a pre-focused unit.

PROTOTYPE VX6547

MARKING

See K1001/4
Serial Number

BASE

Special, designed to fit socket in mount

MOUNTING POSITION

Axis Horizontal

CONNECTIONS

(For pin reference see drawing page 7)

PIN	ELECTRODE
1	Heater
2	Cathode/Heater
3	Anode
4	Helix
	Collector Connection by means of a flying lead

R.F. CONNECTIONS

50 ohms Co-axial Type C Connector

DIMENSIONS

See Drawing Page 7

RATINGS AND CHARACTERISTICS

(Not for Inspection Purposes)

All limiting values are absolute and Non-simultaneous

			NOTE
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	(μSec)	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	

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 ± 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 μsec
P.R.F.	275 p.p.s.
$V_{collector^{anode}}$ & helix:	0
V_k:	-5.0 kV
I_{coll}:	0.80 pk
I_{hx}:	0.10A pk
I_a:	0.01 pk
V_f:	6.3V
I_f:	1.0A
$I_{solenoid}$:	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

CV6223

TESTS

Tests performed in addition to those applicable in K1001

Test Conditions: Unless otherwise stated (See Note 8)

V_h (V)	tp (μs)	P.R.F. (p.p.s.)	Solenoid current (A)	Freq. (kMc/s)	r.f. load 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 Min.	LIMITS Max.	Units
	GROUP A						
	(a) Heater Current	V_h only Note 1		100%	~~0.9~~ 0.75	~~1.2~~ 1.05	Amps.
	(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
6.2	(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	Frequency = 2700 Mc/s		100%			
	I_{coll}(peak)	Notes 5a and 6			-	1.0	Amps.
	I_{hx}(peak)				-	0.20	Amps.
	I_a (peak)				-	0.05	Amps.
	(f) Spurious Oscillation	Note 9 and 6		100%	No oscillation shall be detected.		
	(1)						
	(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 Min.	LIMITS Max.	Units
	GROUP A Cont'd						
6.7	(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 ± 2 Mc/s. Measured at helix input connection. Note 10, 12.		100%	-8 ~~+~~ 0	-40 20	pF /mmhos
	(l) Cold loss	At 3.0 kMc/s		100%	45	-	dB
	GROUPS C, D and E omitted						
	GROUP F						
	Life	Vh = 6.3V d.c.		4%			
	End Point 1000 hours Post Life Test	Notes 11 and 14.					
	High level gain	Conditions as in (a) to (h)			25	-	dB
	GROUP G						
	(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		

NOTES

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 Mlc/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 ± 10%. The pulse length at 17.5 µS ± 5% . the p.r.f. at 265.0p.p.s± 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 ± 500 volts about V_o 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 µW 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.

CV6223

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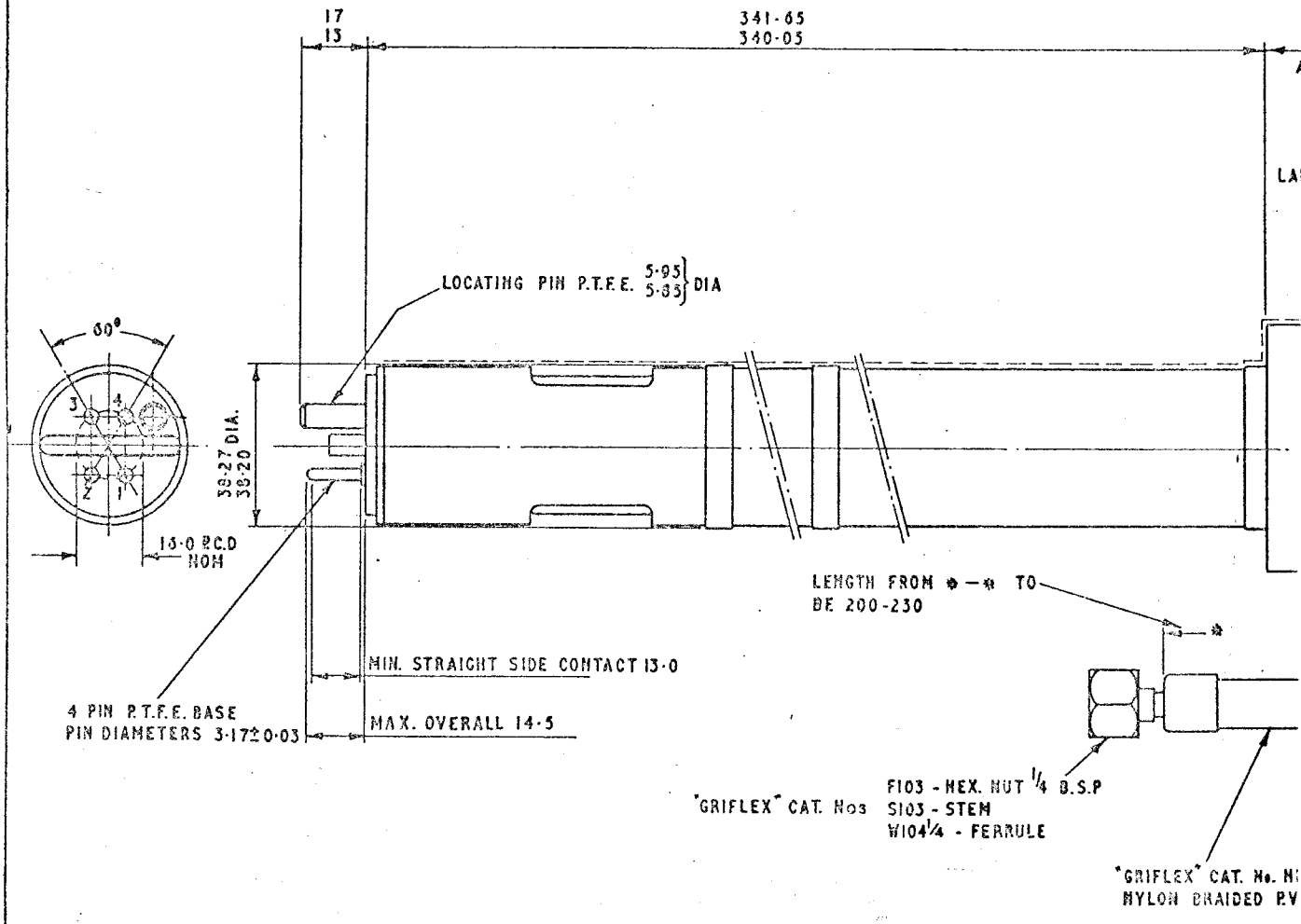
OUTLINE D

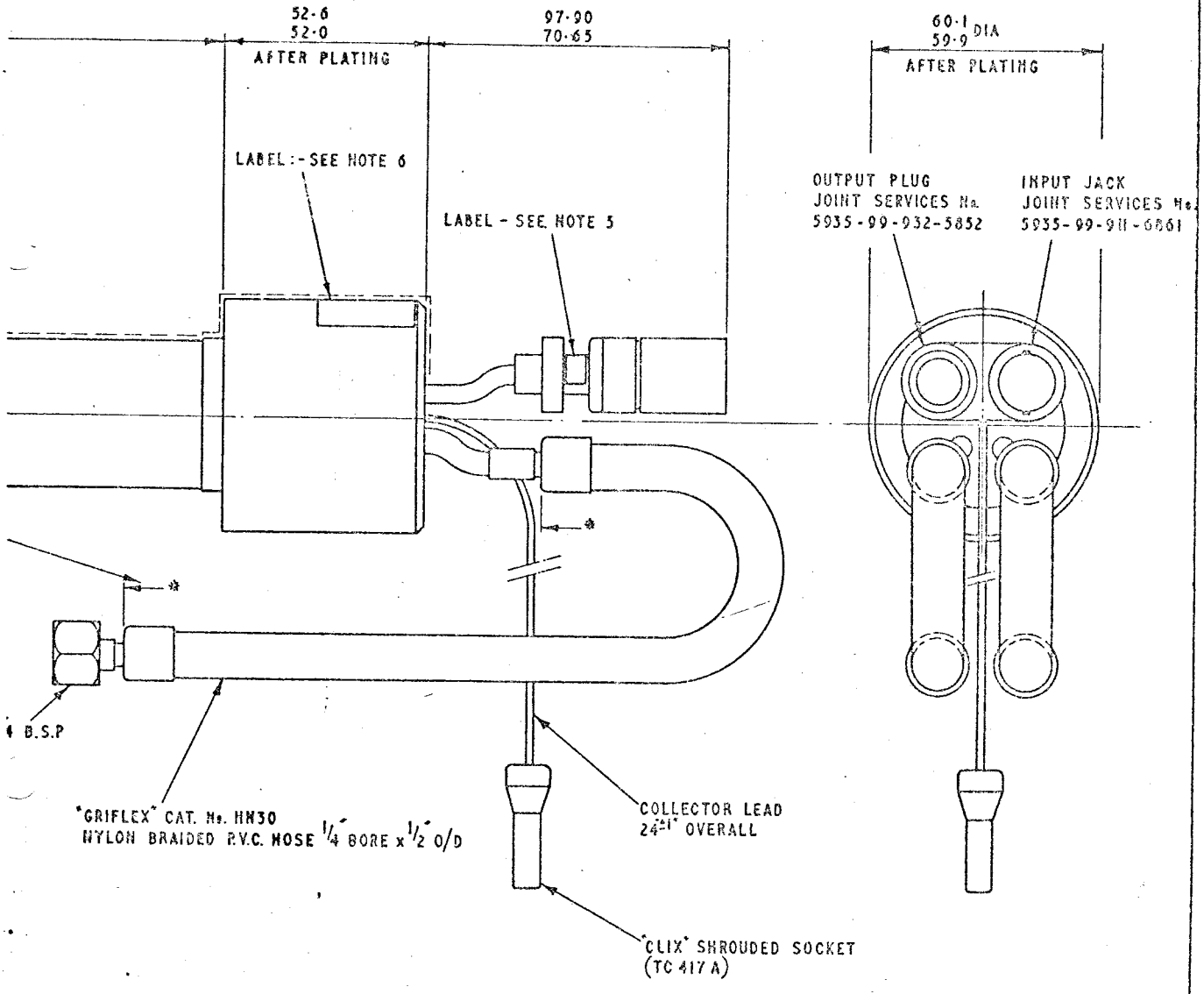
(THIRD ANGLE PR

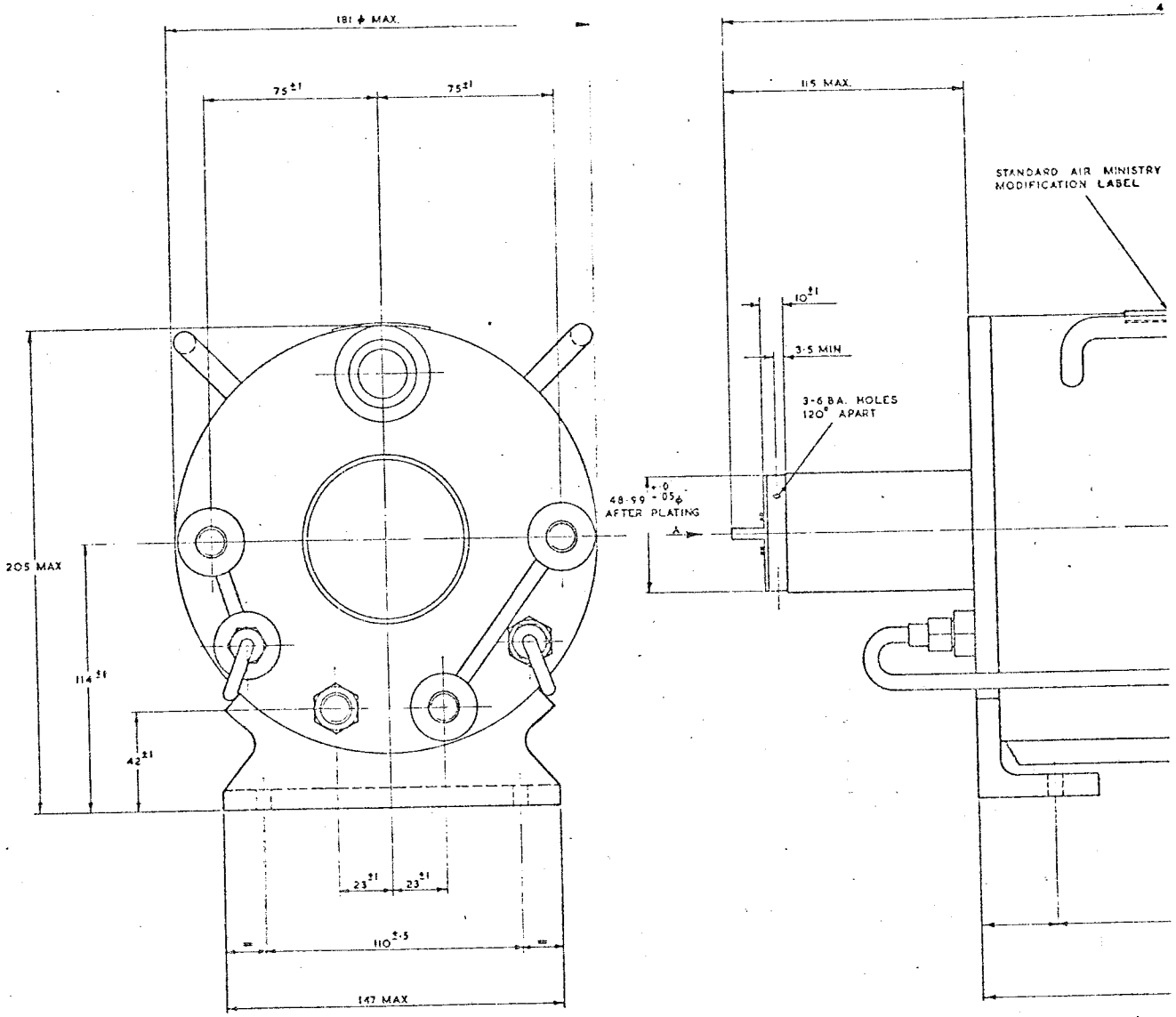


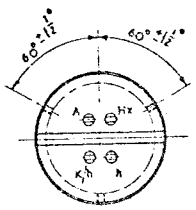
NOTES:-

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 DEE 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 BS381C TINT 632

OUTLINE DRAWING
(THIRD ANGLE PROJECTION)







END VIEW OF SOCKET IN DIRECTION OF ARROW 'A'

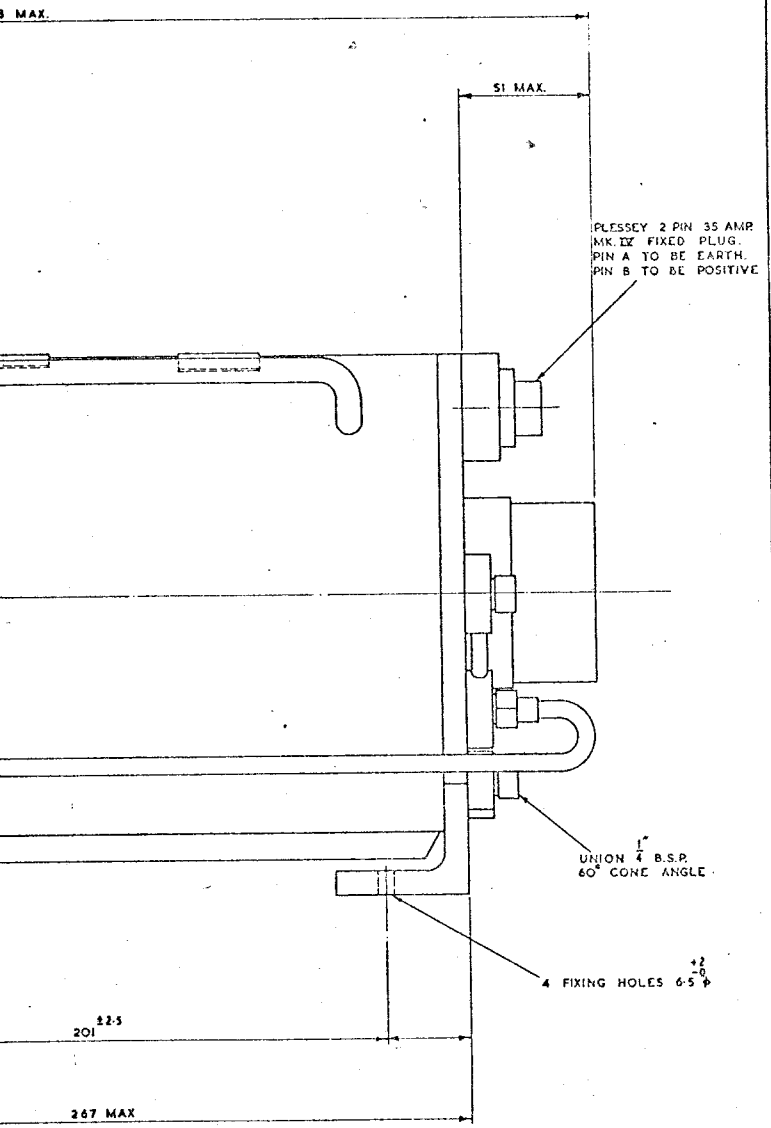
VOLTAGE FLASH TEST

'Hx' AND 'A' PINS TO BE EARTHED - 'K/h' AND 'h' PINS CONNECTED TOGETHER AND 'K/h' PIN TO BE FLASH TESTED TO EARTH AT 14Kv D.C. SEE END VIEW OF SOCKET FOR POSITION OF PINS

NOTES:-

1. WEIGHT :- APPROX. 46 LB
2. WATER CIRCUIT TO BE RATED FOR 100 LB/SQ" UNDER FA MAXIMUM WATER PRESSURE DROP :- 6 LB/SQ" AT 1 LITRE/
3. SOLENOID RESISTANCE AT 20°C :- 0·90 TO 1·05 OHMS.
4. ALL PLATING TO CONFORM TO DEF 5000 - PRINTING PAI TO DEF 1058 OR CS.2309, IF DEF 1058 IS NOT AVAILABL PAINT TO CONFORM TO DEF 1058 (HIGH GLOSS, DARK TINT 632) OR CS.2309 GLOSS, IF DEF 1058 IS NOT AVA ORDERED FROM SAME MANUFACTURERS AND ORDERED
5. THE ALIGNMENT OF THE VALVE BASE IS TO BE CHECK GAUGES.

OUT-LINE DRAWING OF MOUNT



T CONDITIONS.
N. FLOW.

TO CONFORM
- FINISH
MIRALTY GREY BS. 381c
ABLE - PAINTS ARE TO BE
I.D. RELEASED BEARING STAMP 'A'
BY USING 'GO' AND 'NO-GO'