MILITARY SPECIFICATION SHEET

ELECTRON TUBE, MAGNETRON

TYPE 6517 1/

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The complete requirements for procuring the electron tube described herein shall consist of this document and the latest issue of Specification MIL-E-1.

DESCRIPTION: Mechanically tunable, 1,250-1,350 MHz, pulsed type, air-cooled, 1.0 MW, integral magnet.

ABSOLUTE RATINGS:

Parameter:	ib	Pi	pi	Du	tpc	eb	If	tk
Unit:	a	kW	Mw	--	µs	kv	A	sec
Maximum:	60	4.3	3.5	.0013	4.62	70	90	---
Minimum:	35	---	---	--	1.0	--	--	600
							Note 2	

Parameter:	VSWR	Tuner-torque	Anode T	Bushing T	Output Pressurization
Unit:	-----	in-oz	°C	°C	lb_f/in^2
Maximum:	1.5	125	100	150	45
Minimum:	---	---	---	---	11
	Note 4		Note 5	Note 5	Note 6

PHYSICAL CHARACTERISTICS:

Dimensions:	See figure 1
Input bushing:	See note 7
Cathode:	Unipotential
Mounting position:	See note 9
Weight:	90 pounds

TEST CONDITION:

Parameter:	If	tk	Du	tpc	Ib
Unit:	A	sec	--	µs	mAdc
Tolerance:	--	---	--	0.3	±2.5
	75	600	.00125	3.0	±2.5
				Note 15	

TEST FREQUENCIES
F_1 = 1250 ±2 MHz
F_2 = 1300 ±2 MHz
F_3 = 1350 ±2 MHz

REQUIREMENT OR TEST: GENERAL

(D) First Article Test - Required See Note 21

1/ Replaces Type RK6517/QK-358 (FSN 5960-507-6096)
Cardion P/N 400615 (FSN 5960-925-8159)

(D) Denotes changes

6517

FSC 5960

METHOD	REQUIREMENT OR TEST	CONDITIONS	SYMBOL	LIMITS MIN	LIMITS MAX	UNIT
	First Article Test	See Note 21				
1143	Forced convection	ΔP = 5.0 in. water See notes 5, 8, 11 and 14	ΔT	---	40	°C
1042	Shock test	Shock = 15 g; no voltages; See notes 1 and 14	---	---	---	---
4223	Mechanical tuning fatigue	See notes 13 and 14	Cycles	500	---	---
	Quality conformance inspection, part 1					
1261	Heater voltage	I_f = 75 A	Ef	2.0	3.0	V
4303	Heater-cathode warmup time	I_f = 75 A See notes 3 and 9	tk	---	600	sec
4306	Pulse voltage	F_3	epy	50	60	kv
4250	Power output	F_1, F_2, F_3	Po	1250	---	W
4223	Mechanical tuning range	Anode T = 50 to 100°C See note 20				
		Upper limit	F	1350	---	MHz
		Lower limit	F	---	1250	MHz
4315	Pulse stability	F2; VSWR = 1.5/1 See note 19	MP	---	1	%
	Quality conformance inspection, part 2					
1031	Low-frequency vibration	No voltage	---	---	---	---
4308	RF bandwidth	F_1, F_2, F_3 See note 16	BW	---	1.0	MHz
4310	Frequency pulling factor	F_2; See note 18	F	---	5	MHz
4311	Frequency pushing factor	F_2; See note 17	F	---	0.5	MHz
4315A	Pulse stability	F_1, F_3; See note 19	MP	---	0.5	%
4003	Pressurizing		---	45	---	lb_f/in^2
4223	Operating torque of force	See notes 11 and 12	Torque	---	70	in-oz
4223	Tuner stop endurance	See note 11	Torque	150	---	in-oz

METHOD	REQUIREMENT OR TEST	CONDITIONS	SYMBOL	LIMITS MIN	LIMITS MAX	UNIT
	Quality conformance inspection, part 3					
(D)	Life test	Group D; See note 10	t	500	---	hrs
	Life test end points:					
4250	Power output	F_1, F_2, F_3	Po	1000	---	W
4315	Pulse stability	See note 19	MP	---	1	%
4306	Pulse voltage	F_3	epy	45	---	kv
1143	Forced convection	ΔP = 5.0 in. water See notes 5, 8, 11 and 14	Δt	---	40	°C
1042	Shock test	Shock = 15g; no voltages; See notes 1 and 14	---	---	---	---
4223	Mechanical tuning fatigue	See notes 13 and 14	Cycles	500	---	----

NOTES:

1. The magnetron shall be mounted on a test plate and shocked 10 times on each mutually perpendicular axis parallel to the reference planes shown in figure 1. The shock pulse shall have a duration of approximately 11 ms as measured at the quarter amplitude points of the acceleration shock wave.

2. The maximum value specified is for a nonoscillating condition. Heater-surge current shall not exceed 100 amperes.

3. Specifications for heater operation shall be supplied with each tube. The preheat and operate voltage shall be indicated on the magnet of the tube.

4. Frequency skipping or unstable operation may be encountered at some phase positions when the mismatch occurs at the end of a "long" line.

5. Temperatures shall be measured at the points indicated on figure 1.

6. During operation, the gas used in pressurization shall provide insulating properties at least equal to that of clean-dry air at the pressure indicated.

7. During operation the high voltage bushing shall be immersed in a liquid insulating medium with properties equivalent to Esso Univolt 35 oil.

8. ΔT shall be the temperature rise of the anode above that of the coolant temperature at the inlet. ΔP shall be the pressure drop across the anode coolant jacket.

9. The tube shall be mounted with the cathode vertical within $\pm 15°$ during test.

10. The frequency shall be varied between F1, F2, and F3 at eight hour intervals during the life test. Power input to the tube during the life test shall be cycled according to the following schedule:

Preheat:	10 minutes $\pm 10\%$
Oscillate:	7.5 hours $\pm 10\%$
All voltages off:	20 minutes $\pm 10\%$

11. This test shall be conducted at room temperature (approximate 25°C).

12. The tuner drive mechanism shall not be "set" against either mechanical stop.

NOTES: -Continued

13. The tuner mechanism shall be cycled at a rate of approximately 1 cycle per minute (cpm) between 1 and 36 turns, measured clockwise from the mechanical stop. The turns shall be counted at the point of drive.

(D) 14. Performance of these tests is required when First Article Testing is required by the contract.

15. Typical pulse characteristics for power output are as follows: VSWR = 1.1:1, unless otherwise specified.

trc:	.25 µs	(measured 20 to 85%)
tfc:	1.5 µs	(measured 0 to 85%)
trv:	.55 µs	(measured 20 to 85%)
tfv:	3.0 µs	(measured 0 to 85%)
Spike or ripple:	+5%	
Inverse voltage:	12%	
Post pulse:	0%	

Voltage or current spike, ripple, inverse, and post pulse oscillation must be at a minimum.

16. Stability will not be measured under this test. The RF bandwidth shall be within the limits specified when a VSWR of 1.5/1 is introduced in the load at a distance of approximately 0.5 meter from the magnetron coupling flange, the phase being adjusted for maximum power output.

17. The pulling measurement shall be made in such a manner that thermal effects do not introduce significant errors.

18. The peak anode current shall be varied between 45a and 55a at a minimum rate of 50 Hz or less. The frequency measurement is the difference between the frequency extremes observed.

19. Stability shall be measured in terms of the average number of output pulses missing, expressed as a percentage of the number of input pulses applied during the period of observation. The missing pulses (MP), due to any cause, are considered to be "missing" if the rf energy is less than 75 percent of the normal energy level in a ±1 percent frequency range of the normal operating frequency. The VSWR shall be adjusted to that phase producing maximum instability and the missing pulses counted during the last 3 minutes of a 6 minute test period. Measurements shall be made at the load phase positions corresponding to maximum instability.

20. The frequency range of 1250 to 1350 MHz shall be covered by 43 tuner turns maximum. The number of tuner turns needed from mechanical stop to mechanical stop shall be 48 turns minimum and 51 turns maximum. A minimum of 2 turns shall exist from the mechanical stop to the beginning of the frequency band at 1250 MHz, and from the end of the frequency band at 1350 MHz to the other mechanical stop.

(D) 21. First article sample inspection shall conform to the requirements of appendix F of MIL-E-1 and shall consist of performing all tests specified on this specification sheet. In addition, first article sample approval shall include satisfactory demonstration of tube-to-system compatibility. Invitation for bids should provide that the preparing activity reserves right to waive the requirements for first article samples as to those bidders offering a product which has been previously procured or tested by the Government, and that bidders offering such products who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending procurement.

Custodians:
Army - EL
Navy - EC
Air Force - 85

Review activities:
Air Force - 99

User activities:
Navy - AS, OS, MC, CG, SH

Preparing activity:
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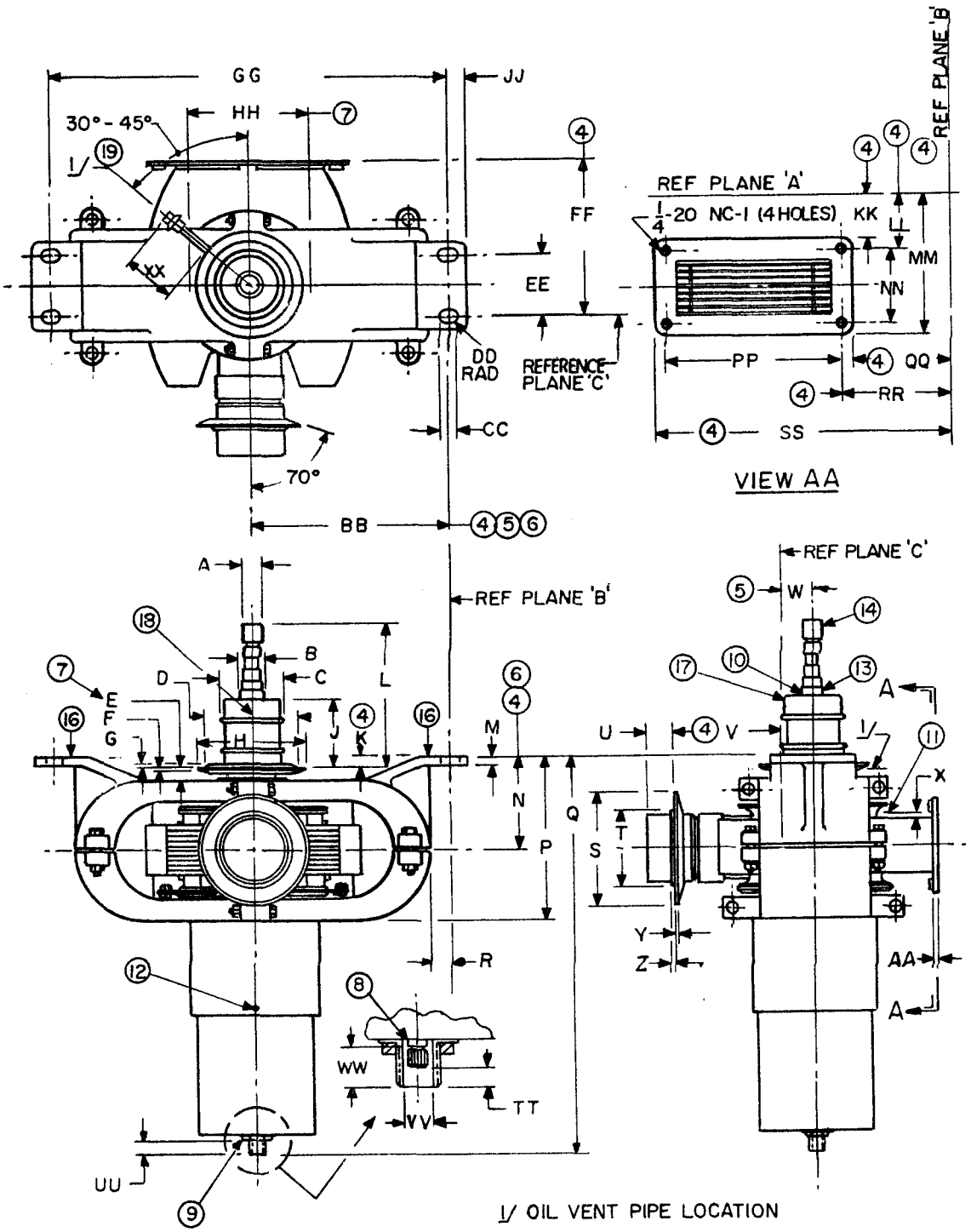

FIGURE 1 Outline drawing for tube 6517

DIMENSIONS

LTR	INCHES		MM	
	MIN	MAX	MIN	MAX
QUALITY CONFORM INSP. PT. 1				
A	.865	.880	21.97	22.35
B	.905	.925	22.99	23.50
E	.385	—	9.78	—
H	4.485	4.515	113.92	114.68
J	2.727	3.031	69.27	76.99
K	.454	.516	11.53	13.11
L	5.700	5.950	144.78	151.13
N	3.758	4.008	95.45	101.80
S	4.485	4.515	113.92	114.68
V	4.064	4.314	103.23	109.50
BB	8.132	8.382	206.55	212.90
CC	.692	.722	17.58	18.34
DD	.205	.225	5.21	5.72
EE	2.485	2.515	63.12	63.88
FF	6.125	6.625	155.58	168.28
GG	16.375	16.625	415.93	422.28

LTR	INCHES		MM	
	MIN	MAX	MIN	MAX
TT	.285	.345	7.24	8.76
UU	.453	.503	11.51	12.76
VV	.435	.445	11.05	11.30
WW	.600	.655	15.24	16.64
QUALITY CONFORM INSP. PT. 2				
C	—	2.875	—	73.03
P	—	7.125	—	180.98
R	.750	—	19.05	—
HH	5.500	—	139.70	—
JJ	—	.781	—	19.84
KK	1.620	—	41.15	—
LL	2.031	2.531	51.59	64.29
MM	—	6.176	—	156.87
NN	3.190	3.220	81.03	81.79
PP	7.260	7.290	184.40	185.17
QQ	4.000	—	101.60	—

LTR	INCHES		MM	
	MIN	MAX	MIN	MAX
RR	4.375	4.875	111.13	123.83
SS	—	12.676	—	321.97
REFERENCE (NO INSPECTION)				
D	3.480	3.485	88.39	88.52
F	.062	—	1.57	—
G	.125	.130	3.18	3.30
M	.370	.375	9.40	9.53
Q	—	16.850	—	427.99
T	3.120	3.124	79.25	79.35
U	—	1.157	—	29.39
W	1.125	1.375	28.58	34.93
X	.120	.125	3.05	3.18
Y	.062	—	1.57	—
Z	.068	.072	1.73	1.83
AA	.120	.125	3.05	3.18
XX	2.250		57.15	

NOTES:

1. Reference plane "A" lies on finished surface of mounting brackets.
2. Reference plane "B" is perpendicular to reference plane "A" passing through the center of slots in brackets as shown.
3. Reference plane "C" is perpendicular to reference planes "A" and "B" passing through the center of slots in brackets as shown.
4. Includes angular as well as lateral deviation.
5. Parts on this centerline may vary from the location by .125 inch.
6. Refers to centerline of output as determined by the center of the flange.
7. Applies to 5.500 min. dia. for Marmon clamp.
8. Spline specifications: Periodic inspection (see note 14).

14 1/2° pressure angle
48 pitch
42 teeth
.875 pitch diameter

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