

INCH-POUND

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SUPERSEDING
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MILITARY SPECIFICATION SHEET
ELECTRON TUBE, MAGNETRON
TYPE 6517 1/

Inactive for new design
after 21 July 1997.

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

The requirements for acquiring the electron tube described
herein shall consist of this specification sheet and MIL-PRF-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/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 CONDITIONS:

Parameter:	If	tk	Du	tpc	lb
Unit:	A	sec	---	μs	mAdc
Tolerance:	---	---	---	0.3	± 2.5
	75	600	.00125	3.0	62.5

Note 15

Test Frequencies
F ₁ =1250 ± 2 MHz
F ₂ =1300 ± 2 MHz
F ₃ =1350 ± 2 MHz

GENERAL:

First Article Test – Required. See note 21.

This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

1/ Replaces type RK6517/QK-358 (NSN 5960-00-507-6096), Cardion P/N 400615 (NSN 5960-00-925-8159)

TABLE I. Testing and inspection.

Requirement or test	MIL-STD-1311 Method	Conditions	Symbol	Limits		Unit
				Min	Max	
<u>First Article Test</u>						
Forced convection	1143	See Note 21 $\Delta P=5.0$ in. water See notes 5, 8, 11 and 14	ΔT	--	40	$^{\circ}C$
Shock test	1042	Shock=15 g; no voltages; See notes 1 and 14	--	--	--	--
Mechanical tuning fatigue	4223	See notes 13 and 14	Cycles	500	--	--
<u>Conformance inspection, part 1</u>						
Heater voltage	1261	$I_f=75A$	Ef	2.0	3.0	V
Heater-cathode warmup time	4303	$I_f=75A$ See notes 3 and 9	tk	--	600	sec
Pulse voltage	4306	F3	epy	50	60	kv
Power output	4250	F1, F2, F3	Po	1250	--	W
Mechanical tuning range	4223	Anode T = 50 to 100 $^{\circ}C$ See note 20 Upper limit Lower limit	F F	1350 --	-- 1250	MHz MHz
Pulse stability	4315	F2; VSWR=1.5/1 See note 19	MP	--	1	%
<u>Conformance inspection, part 2</u>						
Low-frequency vibration	1031	No voltage	--	--	--	--
RF bandwidth	4308	F1, F2, F3 See note 16	BW	--	1.0	MHz
Frequency pulling factor	4310	F2; See note 18	F	--	5	MHz
Frequency pushing factor	4311	F2; See note 17	F	--	0.5	MHz
Pulse stability	4315A	F1, F3; See note 19	MP	--	0.5	%
Pressurizing	4003		--	45	--	lb _i /in ²
Operating torque of force	4223	See notes 11 and 12	Torque	--	70	in-oz
Tuner stop endurance	4223	See note 11	Torque	150	--	in-oz
<u>Conformance inspection, part 3</u>						
Life test		Group D; See note 10	t	500	--	hrs
Life test end points:						
Power output	4250	F1, F2, F3	Po	1000	--	W
Pulse stability	4315	See note 19	MP	--	1	%
Pulse voltage	4306	F3	epy	45	--	kv
Forced convection	1143	$\Delta P=5.0$ in. water See notes 5, 8, 11 and 14	Δt	--	40	$^{\circ}C$
Shock test	1042	Shock=15g; no voltages; See notes 1 and 14	--	--	--	--
Mechanical tuning fatigue	4223	See notes 13 and 14	Cycles	500	--	--

See notes at end of table.

TABLE I. Testing and inspection - continued

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 non-oscillating 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 $\pm 15^\circ$ 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.
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.
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:	$\pm 5\%$
Inverse voltage:	12%
Post pulse:	0%

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

TABLE I. Testing and inspection - continued

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.
21. First article sample inspection shall conform to the requirements of appendix E of MIL-PRF-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.

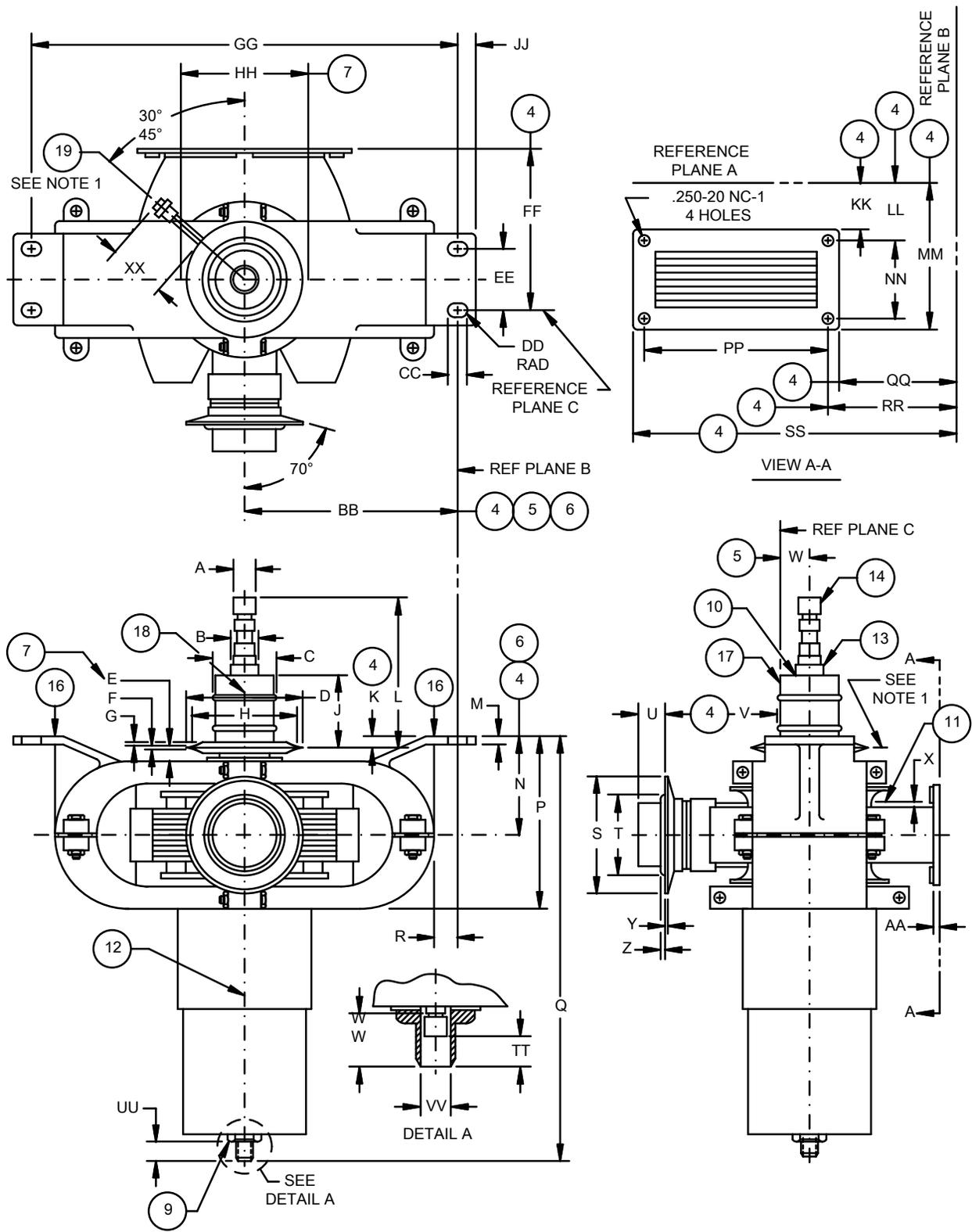


FIGURE 1. Outline drawing of type 6310.

Dimensions														
Ltr	inch		mm		Ltr	inch		mm		Ltr	inch		mm	
	min	max	min	max		min	max	min	max		min	max	min	max
Quality Conformance Insp., Part 1					TT	.285	.345	7.24	8.76	RR	4.375	4.875	111.13	123.83
A	.865	.880	21.97	22.35	UU	.453	.503	11.51	12.76	SS	-	12.676	-	321.97
B	.905	.925	22.99	23.50	VV	.435	.445	11.05	11.30					
E	.385	-	9.78	-	WW	.600	.655	15.24	16.64	Reference Only (No Inspection)				
H	4.485	4.515	113.92	114.68						D	3.480	3.485	88.39	88.52
J	2.727	3.031	69.27	76.99	Quality Conformance Insp., Part 2					F	.062	-	1.57	-
K	.454	.516	11.53	13.11	C	-	2.875	-	73.03	G	.125	.130	3.18	3.30
L	5.700	5.950	144.78	151.13	P	-	7.125	-	180.98	M	.370	.375	9.40	9.53
N	3.758	4.008	95.45	101.80	R	.750	-	19.05	-	Q	-	16.850	-	427.99
S	4.485	4.515	113.92	114.68	HH	5.500	-	139.70	-	T	3.120	3.124	79.25	79.35
V	4.064	4.314	103.23	109.50	JJ	-	.781	-	19.84	U	-	1.157	-	29.39
BB	8.132	8.382	206.55	212.90	KK	1.620	-	41.15	-	W	1.125	1.375	28.58	34.93
CC	.692	.722	17.58	18.34	LL	2.031	2.531	51.59	64.29	X	.120	.125	3.05	3.18
DD	.205	.225	5.21	5.72	MM	-	6.176	-	155.87	Y	.062	-	1.57	-
EE	2.485	2.515	63.12	63.88	NN	3.190	3.220	81.03	81.79	Z	.068	.072	1.73	1.83
FF	6.125	6.625	155.58	168.28	PP	7.260	7.290	184.40	185.17	AA	.120	.125	3.05	3.18
GG	16.375	16.625	415.93	422.28	QQ	4.000	-	101.60	-	XX	2.250		57.15	

NOTES:

- Reference plane "A" lies on finished surface of mounting brackets.
- Reference plane "B" is perpendicular to reference plane "A" passing through the center of slots in brackets as shown.
- Reference plane "C" is perpendicular to reference planes "A" and "B" passing through the center of slots in brackets as shown.
- Includes angular as well as lateral deviation.
- Parts on this centerline may vary from the location by .125 inch.
- Refers to centerline of output as determined by the center of the flange.
- Applies to 5.500 min. dia. for Marmon clamp.
- Spline specifications: Periodic inspection (see note 14).
14 1/2° pressure angle
48 pitch
12 teeth
.256 pitch diameter
- This .625 – 24 (must accept go thread pitch diameter gauge only) major diameter not to be less than .6145 (15.61 mm).
- Bushing temperature.
- Anode temperature
- Tuner temperature
- Common cathode connection.
- Heater connection.
- All solder joints or output and oil sealing flanges to provide a hermetic seal.
- These surfaces to be coplanar within .025 in (0.635 mm).
- A double diameter plug gauge 1.260 in (32.00 mm) O.D., .925 in (23.50 mm) I.D. with 0.0625 in (1.59 mm) X 45 seconds chamfer on the O.D. shall pass over the cathode terminal and drop a minimum .125 in (3.18 mm) below the surface indicated.
- A hole on the upper corona shield of the cathode bushing to be used for heater adapter orientation shall lie within 2 degrees of a plane passing through the center of the cathode bushing and the centerline of the output.
- Oil vent pipe termination mates with Wiggins P/N P1705. A Wiggins P/N P1705 connector, or equal, with threaded oil-tight cap, shall be installed on each tube when delivered by the manufacturer.

FIGURE 1. Outline drawing of type 6310 - Continued

Referenced documents. In addition to MIL-PRF-1, this document references the following: MIL-STD-1311.

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Custodians:
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Navy - EC
Air Force - 85
DLA - CC

Preparing activity:
DLA - CC
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Review activities:
Air Force - 99

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