INCH-POUND

MIL-PRF-1/1254E
2 July 2004
SUPERSEDING
MIL-PRF-1/1254D
2 July 1999

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, GAS SWITCHING
TYPE 7381

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 document and the latest issue of MIL-PRF-1.

DESCRIPTION: Dual TR (bandpass) used with short-slot hybrid couplers.

ABSOLUTE RATINGS:

Parameter: Unit:	Transmitter po kw	Frequency MHz	Ignitor voltage V dc	Operating temperature °C
Minimum: Maximum:	10-3 200	8,490 9,610	-800 ---	-55 +125

PHYSICAL CHARACTERISTICS: See figure 1.

TEST CONDITIONS:

Parameter: Unit: Tolerance:	Transmitter po kw ± 10% 40	Ii µA dc ± 3% 100	tp µs ± 1.5% 1.0	prr pps ± 5% 1,000	R1 MegΩ 5% 4.9

See footnotes at end of table I.

Test frequencies	
F	MHz ± 0.1%
F1	8,490
F2	8,600
F3	8,800
F4	9,000
F5	9,200
F6	9,400
F7	9,610

GENERAL:

Qualification: Required.

TABLE I. Testing and inspection.

Inspection	MILSTD-1311 Method	Conditions	Symbol	Limits Min	Limits Max	Unit
Qualification inspection						
Barometric pressure, reduced	1002	Ebb = -800 V dc; Ri = 4.9 MegΩ each ignitor; pressure = 10.1 psia (max)	---	---	---	---
Degradation due to vibration	4021	t = 15 minutes	---	---	---	---
Transmitter-receiver isolation	4491	F = F1 and F7 F = F2, F3, F4, F5, and F6 Ii = 100 μA dc on each ignitor	Ratio Ratio	10 15	--- ---	dB dB
High-level VSWR	4474	po = 20 kw ± 10%; F = F4 ± 5%	---	---	1.2	---
Spike leakage energy (2)	4452	T = TA 4/ T = +125°C 4/ T = +125°C 5/ tp1 = 1.0 ± 0.15 μs; tp2 = 0.5 ± 0.15 μs; F = F1 and F7	Ws Ws Ws	--- --- ---	0.3 0.5 0.15	ergs ergs ergs
Flat leakage power (2)	4452	T = TA 4/ T = +125°C 4/ T = +125°C 5/ tp1 = 1.0 ± 0.15 μs; tp2 = 0.5 ± 0.15 μs; F = F1 and F7	po po po	--- --- ---	80 150 15	mW mW mW
Conformance inspection, part 1						
Temperature cycling	4006	-55°C to +125°C 1/	---	---	---	---
Ignitor ignition time	4401	Ebb = -800 V dc; Ri = 4.9 MegΩ each ignitor	t	---	5	sec
Ignitor voltage drop	4406	Ii = 100 μA dc on each ignitor	Eid	200	450	V dc
Low-level VSWR	4473	F = F1, F4, and F7	---	---	1.2	---
Duplexer loss	4489	F = F4	Li	---	1.1	dB
Spike leakage energy (1)	4452	F = F4 T = TA 4/ T = +125°C 5/ tp1 = 1.0 ± 0.15 μs; tp2 = 0.5 ± 0.15 μs	Ws Ws	--- ---	0.3 0.15	ergs ergs
Flat leakage power (1)	4452	F = F4 T = TA 4/ T = +125°C 5/ tp1 = 1.0 ± 0.15 μs; tp2 = 0.5 ± 0.15 μs	po po	--- ---	80 15	mW mW

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	MIL-STD-1311 Method	Conditions	Symbol	Limits		Unit
				Min	Max	
Conformance inspection, part 2						
Pressure operation	---	50 psia (min) 3/	---	---	---	---
Ignitor noise ratio	4460	F = F1 +30 MHz; F = F4; F = F7 -30 MHz Ii = 100 µA dc (min)	Nr	---	1.3	---
Arc loss	4486	F = F4	Li	---	0.8	dB
Vibration (2)	4021	F = 45 to 55 Hz; 20 G; t = 10 minutes; Ii = 100 µA dc on each ignitor 8/	Eid	100	---	V dc
Low-level VSWR	4473	F = F2, F3, F4, and F5	---	---	1.2	---
Duplexer loss	4489	F = F1 and F7	Li	---	1.2	dB
Spike leakage energy (2)	4452	T = +125°C 4/; Ii = 100 µA dc on each ignitor	Ws	---	0.5	ergs
Flat leakage power (2)	4452	T = +125°C 4/; Ii = 100 µA dc on each ignitor	po	---	150	mW
Recovery time	4471	T = TA and +125°C; po = 150 kw ± 10%; tp = 1.0 µs ± 0.05 µs; F = F4 ± 5%	t	---	3.0	µs
Conformance inspection, part 3						
Temperature-cycling life test	4006	T = -55°C to +125°C; Ebb = -800 V dc; Ri = 4.9 MegΩ each ignitor; Group C; 10 Hz (min) 2/	Li	50	---	µA dc
Life-test provisions	---	po = 150 kw ± 5% Eff = -800 V dc; Ri = 4.9 MegΩ on each ignitor; t = 100 hours at +125°C and 400 hours at +85°C; Group D 6/	---	---	---	---
Life-test end points:	---					
Ignitor voltage drop (1)	4406	Ii = 100 µA dc	Eid	225	475	V dc
Recovery time	4471	T = TA po = 150 kw tp = 1.0 µs ± .05%	t	---	8	µs
Duplexer	4489	F = F4	Li	---	1.2	dB
Spike leakage energy	4452	T = +125°C 4/	Ws	---	0.5	erg
Mixer NF degradation	---	6/	NF	---	2.0	dB

See footnotes at top of next page.

TABLE I. Testing and inspection - Continued.

1/ The tube shall be subjected to the number of temperature cycles and temperature limits specified. The tube shall be maintained at each end-point temperature for sufficient time to reach equilibrium, but not for less than 5 minutes. Changes in temperature from end point to end point shall be gradual but the cycle shall not exceed 30 minutes. After cycling, the tube shall be allowed to return to room temperature, held for 24 hours, and then shall be tested for the specified limits of ignitor ignition time and ignitor voltage drop.

2/ The minimum temperature rate of change shall be 2.5°C/minute. The test shall be conducted with aluminum flanges (see figure 2) securely attached to each end of the tube. The ignitor current shall be monitored during the test and shall remain within the limit specified.

3/ The air pressure specified shall be applied to the input and output window of the tube for a period of 2 hours, after which the pressure shall be reduced to atmospheric pressure. The pressure is permitted to decrease by 10 percent of the specified value during the test interval. After this test, the tube shall pass the ignitor voltage test.

4/ The leakage energy shall be measured for each channel individually.

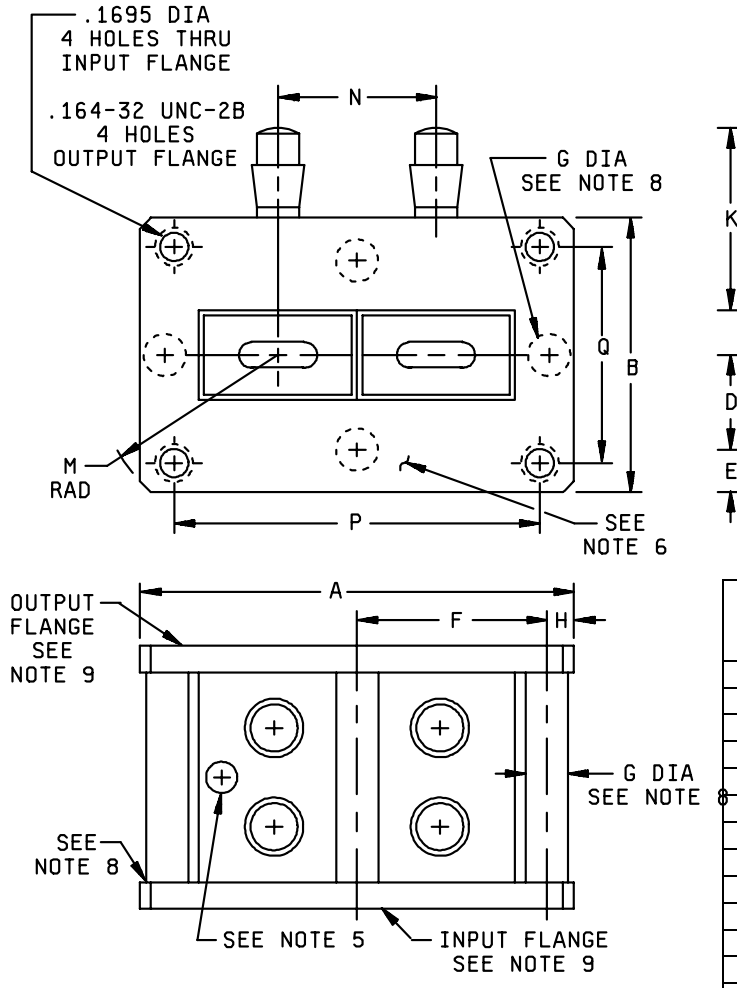
5/ The leakage energy shall be measured for the receiver arm as shown in test circuit A.

6/ During the life test, each channel shall be terminated with 01037-1N23WE silicon diode mounted in a balanced mixer. The diode will satisfy DSCC Drawing 01037 of the latest issue. The mixers will be mounted as shown in test circuit B. The local oscillator input during life shall be terminated with 100-ohm video loads. When tubes are being life tested at elevated temperatures, the diode shall be maintained at 25°C nominal.

At the beginning of the life test, the balanced mixers shall each have a noise figure less than 8.0 dB. The mixer noise figures shall be remeasured periodically during the course of the test. The interval between measurement shall be not more than 100 hours. Should diode failure occur, the failed diode shall be replaced and the life test continued. If a diode failure occurs during the last 100 hours of the required life test, the failed diode shall be replaced and the life test continued for a minimum of 100 additional hours. However, only one diode failure per each balanced mixer shall be allowed during the life test. If a failure of the test equipment (keep-alive-power supply, etc.) occurs and damages all diodes, the diodes shall be replaced and the life test continued. If the test equipment failure occurs during the last 100 hours of required life test, the diodes shall be replaced and the life test continued for a minimum of 100 additional hours. The noise figure of the two balanced mixers must remain within the specified limits throughout the life test.

7/ All measurements that include short-slot hybrids shall be made with gaskets bolted between input and output flanges of tube and mating flanges.

8/ The tube shall be vibrated in a plane parallel to the ignitor axis under the conditions specified. Input flange shall be rigidly coupled to the vibrating table, either coupled directly for horizontally vibrating table, or coupled through an "L" shaped mount for vertically vibrating table. The tube shall be positioned so that both ignitors are equidistant from the vibrating table surface. The output flange shall be rigidly connected to a standard 12 ± .500 inch dual length of RG52U bronze waveguide with standard dual flanges at each end. Vibration frequency shall be adjusted in the range specified until resonance is obtained. Vibration shall continue at the resonant frequency for the specified time. The ignitor voltage drop shall be monitored during the year.

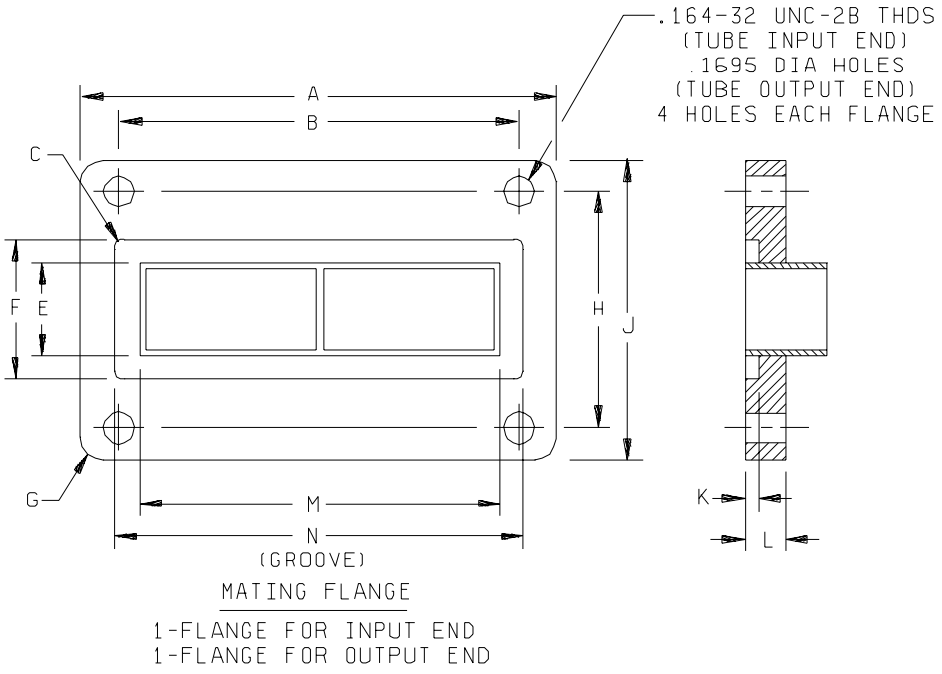


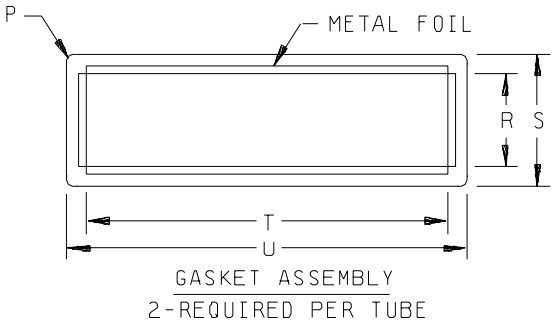
Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 1				
J	.200	---	5.08	---
K	1.000	1.125	25.40	28.58
L	1.545	1.565	39.24	39.75
M	1.109	1.140	28.17	28.96
N	.920	.980	23.37	24.89
Conformance inspection, part 2				
P	2.165	2.175	54.99	55.25
Q	1.276	1.284	32.40	32.61
R	.156	---	3.96	---
S	.245	.255	6.22	6.48
Qualification				
A	2.560	2.590	65.02	65.79
B	1.610	1.640	40.83	41.66
C	.375	---	9.53	---
D	.546	.578	13.87	14.68
E	.234	.265	5.94	6.73
F	1.109	1.140	28.17	28.96
G	.234	.265	5.94	6.73
H	.140	.171	3.56	4.34

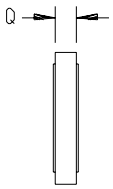
NOTES:

1. Metric equivalents (to the nearest 0.01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.
2. The rectangle formed by the four mounting holes on each flange shall be centered on the flange face within .031 inch (0.79 mm).
3. Silver plate 100 MSI, or equivalent.
4. Rhodium flash over silver plate optional.
5. Exhaust tube shall not extend beyond flange and shall not block mounting holes.
6. Input flange of tube shall be flat within .004 inch (0.10 mm).
7. Finish: black paladin primer followed by optical black baking enamel, or approved equivalent, to all outside surfaces except contacting surfaces of flanges, holes, and threads of flanges and electrode insulators and caps.
8. Four .250 inch (6.35 mm) diameter rods brazed or welded to flanges in eight places on tube flanges spaced as shown on figure 1. Rods for mechanical support only.
9. Mark "input" or "output" on edge of each flange as appropriate.

FIGURE 1. Outline drawing of electron tube type 7381.







Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	2.560	2.590	65.02	65.79
B	2.164 holes	2.176 holes	54.96 holes	55.27 holes
C	---	.047 R	---	1.19 R
E	.497	.503	12.62	12.78
F	.753	.758	19.13	19.25
G	---	.120 R	---	3.05 R
H	1.276	1.284	32.41	32.61
J	1.610	1.640	40.89	41.66
K	.069	.071	1.75	1.80
L	.210	.230	5.33	5.84
M	1.946	1.954	49.43	49.63
N	2.203	2.208	55.96	56.08
P	---	.047 R	---	1.19 R
Q	---	.110 TYP	---	2.79 TYP
R	.508	---	12.90	---
S	---	.709	---	18.01
T	1.959	---	49.76	---
U	---	2.162	---	54.91

FIGURE 2. Mating flange and gasket assembly.

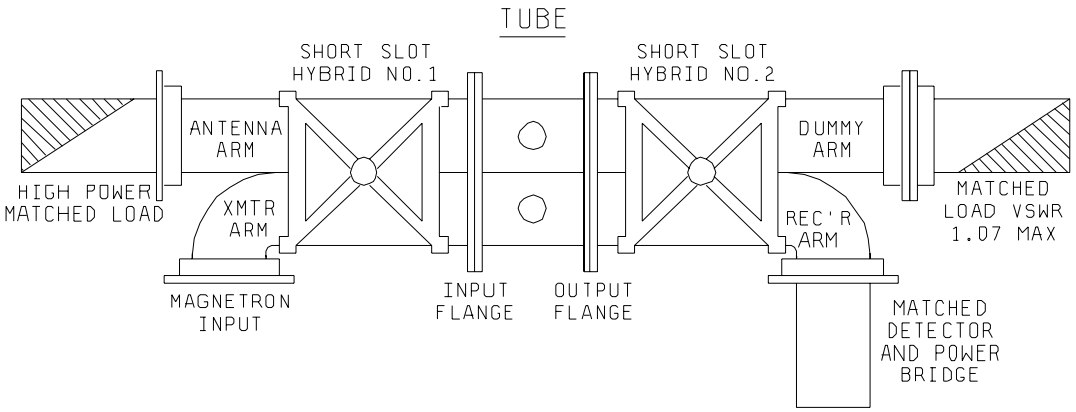


FIGURE 3. Test circuit A.

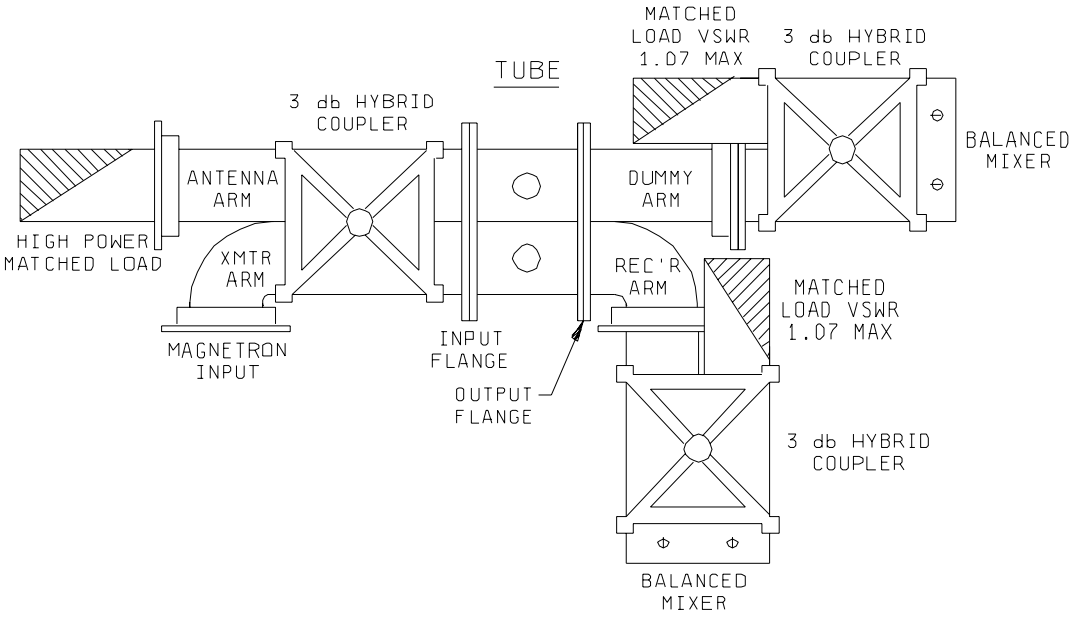


FIGURE 4. Test circuit B.

NOTES

Referenced documents. In addition to MIL-PRF-1, this specification sheet sheet references MIL-STD-1311 and DSCC Drawing 01037.

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

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