

JOINT ELECTRON DEVICE ENGINEERING COUNCILS

JEDEC Electron Tube Council

JEDEC Semiconductor Device Council

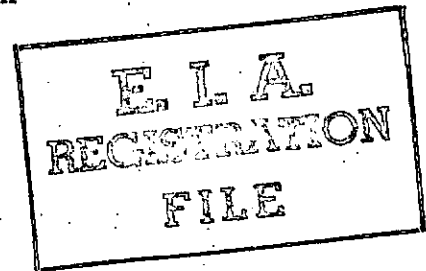


EIA Building
2001 Eye Street, N. W.
Washington, D. C. 20006

Announcement
of
Electron Device Type Registration

Release No. 5230

April 25, 1966



The Joint Electron Device Engineering Council announces the registration of the following electron device designation

6177A

according to the ratings and characteristics found on the attached data sheets on the application of

JT-13 Committee on
Microwave Devices

This registration is made as a committee action. The registration data are in conformity with the military specification, 1/666D, and serve to make the type a matter of record.

Drawing for the connection tester mentioned under note 24 is on file at EIA under Release No. 5230 and is available upon application.

SPECIFICATIONS FOR ELECTRON TUBE TYPE 6177A

The provisions of MIL-E-1 apply to this specification. Note 22

Description: Magnetron, continuous wave, fixed frequency, electromechanically frequency modulated.

ABSOLUTE RATINGS

	Ib mA _{dc}	Pi W	Reed Drive V Note 1	Reed Drive W .55	FM Deviation Mc 87	Eb V 350
Maximum:	35	12	Note 1	.55	87	350
Minimum:	--	--	--	--	--	--
		Ef V	Enhk V 45	tk sec --	Shell T °C 110	σ' 1.5
Maximum:		7.0	45	--	110	1.5
Minimum:		5.7	--	40	--	--
		Note 2			Note 3	Note 4

The absolute ratings must not be exceeded under any conditions, otherwise the serviceability of the tube may be impaired. It does not necessarily follow that combinations of absolute ratings can be applied simultaneously. The provision of MIL-E-1E 6.5 apply on the selection of the operating point.

Storage, Handling, and Installation

Cooling: Convection
Magnet Isolation: Note 5
Mounting Support: Note 6
Mounting Position: Base Horizontal

Output Coupling: Note 7
Input Connections: Note 7
Vibration Shock: Note 8
Weight: Approx. 1 pound

MIL-E-1E Ref.	Test or Title	Conditions or Notes	Min.	Max.
3.2	Qualification	Required		
	Marking:			
E-50.2	Holding Period:	t = 168 hours		
	Dimensions:	Raytheon Dwg. C-64910, Rev.#20		
	Salt Spray Corrosion	Omit		
1136	Carton Drop	Package Group 9; Container Size A; Drop Test (1), Note 23		
1031	Vibration; Low Frequency	No Voltage		

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Ref.	Test or Title	Conditions	Min.	Max.
1301	Heater Current:	$E_f = 6.3V$	$I_f: 0.54$	0.66 A
1336	Heater Cathode Leakage	$E_{hk} = \pm 45V_{dc}$	$I_{hk}: --$	75 μA_{dc}
----	Reed Coils D.C. Resistance:	Stabilized Shell T = Approx. 25°C		
		Coil Current = 25 mA _{dc} max. for test	Drive Coil Resistance: 0.3 Pickup Coil Resistance: 0.55	0.4 Ohms 0.7 Ohms
----	Transfer Loss (1):	$F = 120 \pm 3\%$ Note 9	Voltage Ratio: 28	35 db
----	Transfer Loss (2):	$F = 5000 \pm 3\%$; Note 9	Voltage Ratio: 12	-- db
----	Natural Reed Frequency:	Note 10	F: 275	350 cps
----	Null Reed Frequency:	Note 11	F: 500	600 cps
----	Reed Secondary Resonances:	Note 12		
4.16.3	<u>Operation (1):</u>	Note 13		
----	Standing Wave Ratio:	$\sigma' = 1.10$ max.		
4.16.3.2	Heater Cathode Warmup Time:	$t_k = 40$ sec. at $E_f = 6.3V$ $E_f = 6.3V$ for test		
----	Anode Voltage:	$I_b = 30$ mA _{dc}	$E_b: 280$	330 V _{dc}
4307	Power Output:	Note 22	$P_o: 1.0$	--- W
4310	Pulling Factor:	Operation (1)	$\Delta F: ---$	4.0 Mc
4218	Frequency:	Note 14	F: 4268	4350 Mc
4.16.3	<u>Operation (2):</u>	Note 13		
----	Standing Wave Ratio:	$\sigma' = 1.15$ max.		
----	FM Drive Voltage:	$F = 120 \pm 3\%$; Note 15	Vac: 0.15	0.35 Vac
----	Distortion:	Note 16		
----	Bandwidth Linearity:	Note 17	Deviation: --	15 %

Ref.	Test or Title	Conditions or Notes	Min.	Max.
----	FM Deviation:	Note 18		
	Room Temperature:	After t = 3 min.	Deviation: --	+8 %
		After t = 12 min.	Deviation: --	+8 %
	Cold Test (-55°C):	After t = 10 min.	Deviation: --	+8 %
		After t = 20 min.	Deviation: --	+8 %
	Hot Test (+70°C):	t = 20 min.	Deviation: --	+4 %
----	Dynamic Impedance:	Note 19		
4.11	Life Test	Group C; Note 20	t: 1000	-- hrs.
4.11.4	Life Test End Point	Operation (1) Distortion; Note 16 Dynamic Impedance: Note 21	Po: 0.8 Eb: 270	-- W 345 Vdc

- Note 1: The maximum voltage applied to the reed drive coil shall not be sufficient to cause distortion of the pickup coil voltage.
- Note 2: The maximum value specified is for a non-oscillating condition.
- Note 3: The temperature is to be measured at the point indicated on the Electron Tube Dwg. Raytheon C-64910.
- Note 4: Frequency skipping or unstable operation may be encountered at some phase positions when the mismatch occurs at the end of a "long" line.
- Note 5: In handling and mounting the magnetron care must be exercised to prevent demagnetization. Ferromagnetic materials or energized magnets shall not be brought within one inch of the tube.
- Note 6: Non-magnetic sheet metal clamps shall be used as additional support to that provided by the base pins.
- Note 7: See electron tube drawing: Raytheon C-64910, Rev. #20.
- Note 8: Reasonable care should be used in the storage, installation, and use of the tube to avoid imparting vibration or shock in excess of the values which it is designed to withstand.
- Note 9: A rms input of 0.1 Vac shall be applied to the drive coil of the reed modulator at the specified frequency. The rms output across the pickup coil terminals shall be within the specified amount with reference to 0.1 Vac. This test shall be made with a high grade volt meter.

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- Note 10: The reed modulator shall be driven over the required frequency range with an input of .01 Vac or less. The frequency shall be adjusted so the rms voltage across the pickup coil terminals is a maximum. The natural reed frequency shall be considered the frequency at which the rms voltage across the pickup coil is a maximum, and shall fall within the frequency limits specified.
- Note 11: The reed modulator shall be driven over the required frequency range with approximately 0.1 Vac input. The frequency shall be adjusted so the rms voltage across the pickup coil terminals is a minimum. The null frequency shall be considered the frequency at which the rms voltage across the pickup coil is a minimum and shall fall within the frequency limits specified.
- Note 12: A constant sinusoidal voltage of 10 millivolts rms shall be applied to the reed drive coil. When the frequency of this voltage is varied from 5 to 10 kilocycles the voltage across the pickup coil at the secondary resonance shall not increase more than 6 db above the voltage which would be measured in the absence of the secondary resonance. No secondary resonances shall occur in the range 1 to 5 kilocycles which is greater than 1 db above the voltage measured in the absence of the secondary resonance. This test shall be conducted with normal operating voltages applied to the heater and cathode with the tube at normal operating temperature.
- Note 13: The heater shall be energized for 40 seconds before the application of Eb. After the application of Eb a two minute stabilizing period shall be observed. The rate of rise of Eb shall not exceed 50 kilovolts per second.
- Note 14: To be measured at approximately 30°C ambient, and at approximately 3 minutes after application of Eb.
- Note 15: This voltage shall be obtained from a high quality audio oscillator. With the reed coil connected in a closed loop circuit as shown in Figures 2 and 3 or equivalent, 76 Mc peak to peak frequency modulation of the carrier signal shall be obtained with the drive voltage adjusted within the specified limits. The measurement of rms drive voltage shall be made 6 minutes after the application of Eb, and at least 2 minutes after the application of 76 megacycles drive voltage. The closed loop circuit shall be stable. When the audio oscillator voltage is reduced to zero, no voltage indicating closed loop audio frequency oscillation shall be present across the reed modulator drive coil.
- Note 16: The tube shall be placed in operation as specified for frequency modulation, and the drive voltage shall be increased from 0 volts to 15% above that voltage required for 76 megacycles peak to peak frequency modulation. When viewed on an oscilloscope connected at the magnetron reed drive pins, the wave form of the drive voltage shall not show any visible distortion as compared to the wave form of the audio output voltage of the signal generator. This test shall be made at least two minutes after the application of the drive voltage required for 76 megacycles of peak to peak frequency deviation.
- Note 17: The peak to peak r.f. bandwidth versus reed drive shall be obtained in the following manner: Float the 42 and 84 mc. bandwidth versus drive points. A straight line passing through the origina and extending to the 84 mc. point shall be the reference line upon which calculations are based. At the 42 mc. drive level, compute the difference frequency between the actual 42 mc. point and that frequency indicated on the reference line. The calculated difference frequency divided by 42 mc. shall be considered the percentage of non linearity, and shall be below the maximum limit specified. This test shall be made with the tube stabilized before each measurement.

Note 18: The tube shall be placed in oscillation as in Operation (2). The peak to peak bandwidth at the start of the room temperature test shall be approximately 60 megacycles, and the modulator input drive voltage used during the -55°C test and the $+70^{\circ}\text{C}$ test shall be the same as that used during the room temperature test. In each instance, the bandwidth deviation is with respect to the room temperature test bandwidth at $t = 20$ minutes. The bandwidth deviation must stay within the specified percentage of the reference bandwidth after the specified times.

Note 19: The anode current, shall be continuously sinusoidally modulated from 5 to 60 milliamperes peak. The tube shall look into an r.f. system whose VSWR is 2.0 average and which is adjustable in phase. At any load phase, and between the current extremes of 15 and 45 milliamperes, the slope of the voltage current characteristic shall not become less than zero ohms. FM drive voltage shall then be applied at that value previously determined by the test described in Note 15. At any load phase there shall be no evidence of moding. The rated heater and anode voltages must have been applied for at least 4 minutes previous to this test. The viewing oscilloscope shall be calibrated for a sensitivity of approximately 15 milliamperes per inch horizontally, and 30 volts per inch vertically when performing this test.

Note 20: Life test shall be conducted with E_f and E_b as defined under conditions for Operation (1). A 60 cps potential of 0.2 Vac shall be applied to the Reed Drive Coil. The pickup coil shall remain open-circuited during this test. Voltages shall be cycled in the following manner:

<u>Condition</u>	<u>Duration</u>	<u>E_f</u>	<u>I_b</u>	<u>E Reed</u>
1	40 sec	6.3V	0	0
2	105 min	6.3V	30 mAdc	0.2Vac
3	15 min	0V	0	0

Total minimum life time is defined as a total of 1000 hours of condition (2).

Note 21: The anode current shall be continuously modulated from 5 to 60 milliamperes peak. The tube shall look into a mismatched load whose VSWR is 1.50 minimum and which is adjustable in phase. At any load phase and between the current extremes of 15 and 45 milliamperes, there shall be no break in the voltage-current characteristic.

Note 22: This test shall be performed after at least 20 minutes of tube operation.

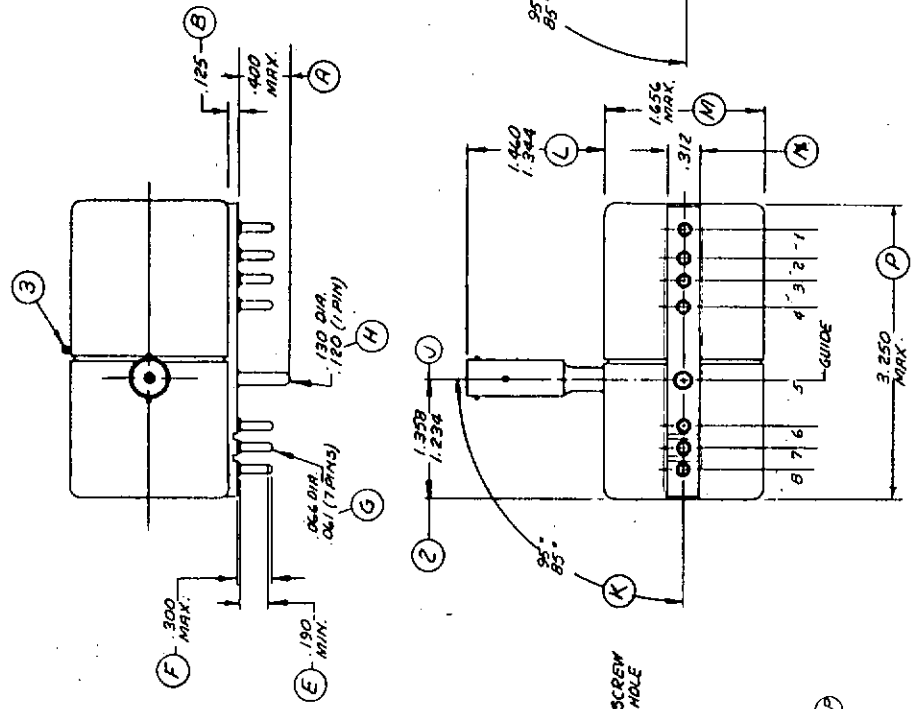
Note 23: Not required for Qualification approval.

Note 24: The following drawings also form part of the specification:

Raytheon Electron Tube, C-64910, Rev. #20
Raytheon Connection Tester, T-30418, Rev. #1

- 1 - TUBE BASE MUST BE CAPABLE OF BEING CHECKED IN ACCORDANCE WITH THE FOLLOWING PROCEDURE:
THE GAUGE SHALL BE ATTACHED TO SUCH AN ACCESSORY WGT. AS WILL GIVE THE TOTAL WGT. DESCRIBED ON THE GAUGE DRAWING. THE ENTIRE LENGTH OF PIN SHALL PASS INTO THE GAUGE AND ON WITHDRAWAL SHALL BECOME DISENGAGED WITHOUT LIFTING THE TOTAL WGT. OF ASSEMBLED GAUGE AND ACCESSORY WGT. (2 LBS. TOTAL) (0.91 Kgs).
- 2 - CENTER OF #5 GUIDE PIN AND CENTER OF OUTPUT SOCKET LIE ON SAME CENTERLINE WITHIN DIMENSION SHOWN.
- 3 - ANODE TEMPERATURE TO BE MEASURED AT THIS POINT.
- 4 - THE CATHODE SHALL BE CONNECTED TO PIN #7 THROUGH A 1000 OHM WIRE WOUND RESISTOR ENCLOSED WITHIN THE TUBE SHELL.
- 5 - COUPLE WITH BNC CONNECTOR DC 89/U.
- 6 -
- 7 - DIMENSIONS WITHOUT TOLERANCES ARE FOR INFORMATION AND ARE NOT REQUIRED FOR INSPECTION PURPOSES.
- 8 - THE AQL FOR COMBINED MECHANICAL DEFECTIVES IN MEASUREMENTS ACCEPTANCE TESTS, PART 1, SHALL BE ONE (1) PERCENT.

PIN	AN-6177A PART
1	DRIVE (H)
2	PICKUP (H)
3	PICKUP (H)
4	DRIVE GROUND
5	ANODE GROUND
6	HEATER
7	CATHODE
8	HEATER



DIM.	AQL PERCENT DEFECTIVE	INSPECTION LEVEL	INCHES		LIMITS		R-RANGES	
			MAX.	MIN.	MAX.	MIN.	MAX.	MIN.
QUALIFICATION TESTS								
A					4.00			10.16
E			.190				3.00	7.62
F							.061 DIA.	1.530
G					1.234		1.358	31.75
J								6.98
R								
MEASUREMENTS ACCEPTANCE TESTS, PART 1								
K					85°			42.06
M					1.656			
Q					85°			
MEASUREMENTS ACCEPTANCE TESTS, PART 2								
H					1.20 DIA.		3.05	3.30
L					1.344		1.460	
P					NOTE 1		3.250	
NOMINAL DIMENSIONS								
B								3.18
N								7.92

*MM DIMENSIONS ARE DERIVED FROM ORIGINAL INCH DIMENSIONS

DIM.	LIMITS		LIMITS		LIMITS	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
AA	.025	.035	.035	.045	.045	.055
BB	.025	.035	.035	.045	.045	.055
CC	.025	.035	.035	.045	.045	.055
DD	.025	.035	.035	.045	.045	.055
EE	.025	.035	.035	.045	.045	.055
FF	.025	.035	.035	.045	.045	.055
GG	.025	.035	.035	.045	.045	.055

