TECHNICAL CHARACTERISTICS

1 TECHNICIAL CHARACTERISTICS

The following paragraphs list the technical characteristics of the XDD-300X transmitter/receiver.

1.1 TRANSMITTER TECHNICAL CHARACTERISTICS

Magnetron Type	SFD-349
Operating Frequency	9100 to 9600 MHz
Pulse Repetition Frequency (PRF) And Pulse Duration (Pulsewidth)	**Pulsewidth** **PRF** 2.0 usec 250 1.0 usec 500 0.4 usec 1180 (All pulse width's and PRF'S are variable within duty cycle limits)
Peak Power	300 kW
TR Switching	Ferrite Duplexer with 5 usec recovery time. Isolation of 20 dB minimum with a solid state single long-life TR limiter

1.2 RECEIVER TECHNICAL CHARACTERISTICS.

RF Frequency	9100 to 9600 MHz (see transmitter frequency)
Noise Figure (input to receiver)	2dB maximum, using low noise GaAsFET amplifier.
Mixer	Balanced Coaxial
Local Oscillator	Frequency Synthesizer with AFC.
IF Amplifiers	Digital
Intermediate Frequency	30 MHz

IF Bandwidth	Intensity- 0.60 MHz +/- 250 KHz Velocity- 1.20 MHz +/- 250 KHz 3.00 MHz +/- 250 KHz
Dynamic Range	90 dB nominal
Sensitivity	-114 dBm @ .060 MHz Bandwidth
Range Normalization	Provided by the radar control processor with one over range squared or other values downloaded from the host computer.

S F D - 3 4 9

CEM COAXIAL MAGNETRON

TEST SPECIFICATION

Varian/Beverly

Type No SFD-349 Page 1 Of 24

Effective _____ Revision _____

ELECTRON TUBE, SFD-349 6MC COAXIAL MAGNETRON PULSED

REVISIONS

Page 3 - deleted MIL-T-5422 reference. 4308 changed "to" to "and".
Page 4 - 4308 changed "to" to "and". Page 6 - 1031 deleted "part II"
Page 9 - Note 14 changed from 15 to 65 Hz to 5 to 20; 20.
Page 10 - Note 15. Changed 4 ± 1 to 3 turns min, Note 18, 20 changed "min of 150" to 150 + 10, -0. Page 12, Note 33 "seconds (Min)" to "+10, -0 sec."
Note 34 Deleted "The test shall be performed using a.c. ... on the heater..."
Page 13, Note 46 changed 15 Hz to 5 Hz, "fifteen" min. to "7 1/2" min...
Page 14, changed note from "The tube shall then be vibrated at the indicated resonant conditions for a period of 10 minutes. If more than one resonant frequency is encountered, the test period may be accomplished at the most severe resonance, or the period may be divided among the resonant frequencies, whichever is most likely to produce failure." to "The tube shall then be vibrated at the two most severe resonant conditions for a period of 10 minutes each."

The above per agreement with customer 12-66. | 7/21/67 | 7-18-67

B - Page 6 - Backlash, add "Note 37", change "2" MHz to "3" MHz max.
Page - 10 - Note 15 change turns from "160 ± 1" to "160 ± 2"
Page 12 - Note 37 change "...dial...setting...setting". to "...shaft...angular position. ...position....."

Per WRL letter 17 April 1967 | 8/8/67 | 8-8-67

C - Page 3 - Pushing: change "MHz/a to "KHz/a", page 15, change note "25" to note "27"; Page 19; add note "25", Page 21, Note 15 change plane "B" to "C".

10-6-67 | 10-6-67

D - Page 2 - Tuner Torque change 96 to 48
Page 3 - Pushing change 0.1 to 100
Page 5 - Spectrum measurements; add Mil Ref 4308
Page 8 - Note 3, change 96 to 48
Page 9 - Note 14 change "fifteen" to "thirty"
Page 13 - Note 41 change 13.5 to 13.75
Note 46, change 7 1/2 to 15;"change .15 to 500-15" to "15-500-15"
Page 15 - Change (N) 3.046 to 3.406; add letters (AT), (J), (N), (K), (P); add Fig 1a
Page 16 - Add BN .515 ± .010; add letters (G), (C) max, (A) and Fig 1a, note 28
Page 17, 18, 19, 20, add Fig's 1c, 1d, 1e, 1f respectively
Page 19, added UNC-2B to thread callout
Page 22 added Note 28
Page 23, 24, add (AT), (AL), (BN), add mm

to agree with customer drawing D and reflect tube capability

12/20/67 | 12-20-67

E - Figure 1a 3.390 was 3.406, sheet 24, Nominal Dimension Letter N was 3.406 In., 86.50 MM.

15APR68

3

ELECTRICAL:

MECHANICAL: G.E. Glenfield

APPLICATIONS: 7-7-67

Varian/Beverly Type No SFD-349 Page 1A Of 24

TEST SPECIFICATION APPROVAL SHEET

TITLE ELECTRON TUBE, SFD-349 CEM® COAXIAL MAGNETRON PULSED

ELECTRICAL	MECHANICAL	APPLICATIONS
P BAHR	G. GLENFIELD	W.A. GERAKL

REV	LOCATION	DESCRIPTION	DATE	APPROVAL
F	Page 1	Add new first page 1A.		
	Page 15	Added (4) to (AU) .010 tolerance was .003 on (AU) (26) was (17)		
	Page 16	(19) was (20)		
	Page 17	Added (26) to (AM)		
	Page 18	(23) was (24)		
	Page 20	Width of tuner slot was .040 ± .002 (BF)		
	Page 22	Note 17. Read "The dimension applies to the axis of the tuner input shaft, which nominally lies on reference plane "B". The dimensional limits are plus and minus this nominal location". Note 23. Read "This--------length "E". Note 24. Read "This surface shall be parallel with the axis of tuner drive shaft within .005 T.I.R. and shall also be parallel with Ref. plane "C" within .015 T.I.R." Note 26.- "Z" was 23.		EO 593
	Page 23A	"AU" was - 1.247 ± 1.253 - 31.67 - 31.83.	7/23/70	
G	Pages 15-17, 23-24, 19, 20	As per SCN #74-0989	6/21/	
H	Page 8	Changed values for Pi and Ef in Note 5. per ECO 76-2238	11/23/76	
J		Update MIL Methods and update outline drawing, Figure 1 per ECO #77-2403.	3/16/77	
K		Changes per ECO 79-3435.	2/8/79	
L	pages 15, 16, 17	Add directional arrows, ECO 79-3547	4/24/79	

TEST SPECIFICATION

Varian/Beverly

Type No SFD-349 Page 2 Of 24

Effective _____ Revision E

ELECTRON TUBE, SFD-349 CEM® COAXIAL MAGNETRON PULSED

The provisions of the latest issue of MIL-E-1 apply to this specification

DESCRIPTION 8,500 to 9600 MHz, tunable frequency, integral magnet, air cooled, 220 kw nominal peak power output. Unipotential cathode.

ABSOLUTE MAXIMUM AND MINIMUM RATINGS: Note 1

INDEPENDENT

PARAMETER	If Surge	tk	VSWR	Tuner Torque	Body Temp	Input Bushing Temp	Pressurization Input	Pressurization Output		
UNITS	a	sec		in-oz	°C	°C	psia	psia		
MAXIMUM	12	---	1.5:1	48	125	165	45	45		
MINIMUM	--	150	----	--	-55	-55	15	15		
NOTES				3	2	2	4			

DEPENDENT

PARAMETER	Ef	If	ib	Pi	pi	Du	tpc	prr	rrv
UNITS	V	A	a	W	kw	—	μsec	pps	kv/μsec
MAXIMUM	15	3.6	30	680	680	0.0011	2.8	5500	160
MINIMUM	--	---	15	---	---	---	0.2	---	90
NOTES	5						6		7

MECHANICAL

MOUNTING POSITION ___ Any

SUPPORT _____ Mounting flange

COOLING _____ Forced air (note 10)

OUTLINE _____ Figure 1

MAGNET _____ Note 8

COUPLING _____ WR112 Figure 1

NET WEIGHT _____ 13.5 pounds nominal

TEST SPECIFICATION

Varian/Beverly

Type No. SFD-349 Page 3 Of 24

Effective ____ Revision L

MIL-E-1 MIL-STD 1311	TEST	CONDITIONS	SYMBOL	LIMITS MIN	LIMITS MAX	UNITS
4.1.1(b)	Qualification Approval Tests					
4.2	Qualification	Required for JAN. marking (see note 9)				
1143	Air cooling	Osc. (2) notes 2, 10 11	ΔT	---	90	°C
4027	Temperature coefficient	Osc. (2) T = 70°C to 115°C; F = F2, notes 2, 12, 23	$\Delta F/\Delta T$	---	0.25	MHz/°C
4223	Tuner torque	-55° approx. non-operating, 150°C max operating Osc. (2)	Dynamic static	--- ---	8 10	in-oz in-oz
1042	Shock	30 G; 11 ± 1 msec duration; no voltages note 13	---	---	---	---
	Variable frequency vibration (operating)	Osc. (2) F = F3, notes 14 and 36	---	---	---	---
	Frequency mod.	See note 34	ΔF	---	1.0	MHz
4315	Stability	See note 16	MP	---	0.5	%
4266	Input capacitance	Cathode terminal to mounting plate	C	9	14	pF
4223	Tuner life	No voltages, note 17		5×10^4	---	cycles
4311	Pushing factor	Osc. (2) ib = 15 to 27 a, notes 23 and 44, F1, F2, F3	$\Delta F/\Delta i_b$	---	100	KHz/a
4310	Pulling factor	Osc. (2) notes 23 and 45, F1, F2, F3	ΔF	---	5	MHz
4308	Spectrum measurements	Osc. (1) ib = 15 and 27.5 a, notes 23, 24, F1, F2, F3				
	RF bandwidth		BW	---	2.0/tpc	MHz

TEST SPECIFICATION

Varian/Beverly

Type No SFD-349 Page 4 Of 24

Effective _____ Revision L

MIL-E-1 MIL-STD-1311	TEST	CONDITIONS	SYMBOL	LIMITS MIN.	LIMITS MAX.	UNITS
	Minor lobes		S L	-10	---	db
4250	Power output	Osc. (2) note 32	Po	200	---	watts
4308	Spectrum measurements	Osc. (2) ib = 25 and27.5 a notes 23 & 24 F1, F2, F3				
	RF bandwidth		BW	---	2.0/tpc	MHz
	Minor lobes		S L	-8	---	db
----	Low temperature operation	Osc. (2) F = F2 see notes 15 and 19	MP	---	0.5	%
4302	Thermal drift	Osc. (2) F = F3 t = 20 minutes see note 20	ΔF	---	18	MHz
1006	Salt spray	See notes 21 and 22	Static torque	---	12	in-oz
1011	Humidity	See note 22	Static torque	---	12	in-oz
4.1.1(a)	Quality Conformance Inspection Part 1	Notes 30 and 31				
30(b)	Dimensions	Per figure 1	---	---	---	---
4.8.5	Holding period	t = 168 hours				
4003	Pressurization	45 psia minimum input and output assemblies see notes 25 and 26				
4289	Heater current	Ef = 13.75 V tk = 150 sec. min. see note 27	If	2.9	3.3	A
	Oscillation (1)					
----	Coupling	VSWR = 1.1 max. except as noted see notes 28 and 29				

6

Varian/Beverly

TEST SPECIFICATION

Type No SFD-349 Page 5 Of 24

Effective _____ Revision L

MIL-E-1 MIL-STD-1311	TEST	CONDITIONS	SYMBOL	LIMITS MIN.	LIMITS MAX.	UNITS
4303	Heater-cathode warm-up time	Ef - 13.75 V tk = 150 sec. min. see note 5				
4304	Pulse characteristics	tpc= 0.25 ± 0.05 μs Du = 0.001 trv = 160 kv/μs min. see notes 6 and 7				
---	Average anode current	Ib = 27.5 mAdc				
4308	Spectrum measurements	See notes 23 and 24 F1, F2, F3				
	RF bandwidth		BW	---	2.0/tpc	MHz
	Minor lobes		S L	-10	---	db
4315	Stability	See notes 19 and 23 F1, F2, F3	MP	---	0.25	%
4223	Tunable frequency	Upper limit Lower limit see note 15	F F	9600 ---	--- 8500	MHz MHz
	Oscillation (2)					
----	Coupling	VSWR 1.1 max. except as noted see notes 28 and 29				
4303	Heater-cathode warm-up time	Ef = 13.75 V tk = 150 sec. min. see note 5				
4304	Pulse characteristics	tpc= 2.35 ± 0.25 μs Du = 0.001 trv = 160 kv/μs min. see notes 6 and 7				
---	Average anode current	Ib = 27.5 mAdc				
4306	Pulse voltage	See note 23; F1, F2, F3	epy	20.0	23.0	kv
4308	Spectrum measurements	See notes 23 and 24 F1, F2, F3				
	RF bandwidth		BW		2.0/tpc	MHz

7

TEST SPECIFICATION

Varian/Beverly

Type No. SFD-349 Page 6 Of 24

Effective _____ Revision 4

MIL-E-1 MIL-STD 1311	TEST	CONDITIONS	SYMBOL	LIMITS MIN	LIMITS MAX	UNITS
	Minor lobes		SL	-8	---	db
4315	Stability	See notes 19, and 23 F1, F2, F3	MP	---	0.25	%
4315	Starting stability	F = F2 see notes 19 and 33	MP	---	0.25	%
4250	Power output	See note 23 F1, F2, F3	Po	200	270	watts
----	Frequency modulation	F = F1, F2, F3 see note 34	FM	---	0.1	MHz
4.1.1(d)	Quality Conformance Inspection Part 2	Note 30				
3.6	Marking	See figure 1 see note 35				
---	High frequency vibration (operating)	Osc. (2) F = F3 per MIL-T-5422E (ASG) curve IV see notes 36 and 46				
	Frequency modulation	See note 34 F1, F2, F3	FM		5	MHz
	Stability	See note 16 F1, F2, F3	MP		2	%
4223	Resetability	Osc. (2) Note 37 F1 + 50 ± 5 MHz F2 ± 5 MHz F3 - 50 ± 5 MHz	ΔF	---	3	MHz
4223	Tuner drive torque	Room temp. (25°C) see note 38	Dynamic torque	---	8	in-oz

8

TEST SPECIFICATION

Varian/Beverly

Type No SFD-349 Page 7 Of 24

Effective _____ Revision L

MIL-E-1 MIL-STD 1311	TEST	CONDITIONS	SYMBOL	LIMITS MIN.	LIMITS MAX.	UNITS
	Special Testing					
4.6	Life Testing					
4551	Life tests	Group D; VSWR 1.5 min cycled through λg every 15 min. approx. see note 41		1500 1250	--- ---	cycles hours
4.6.2	Life test end points	See note 42				
4250	Power output	Osc. (2) note 23 F1, F2, F3	Po	160	---	watts
4223	Tunable frequency	Osc. (2) upper limit Osc. (2) lower limit	F F	9600 ---	--- 8500	MHz MHz
4308	Spectrum measurements	Osc. (1) and Osc. (2) notes 23 and 24 F1, F2, F3				
	RF bandwidth		BW	---	2.5/tpc	MHz
	Minor lobes		S L	-6	---	db
4315	Stability	Osc. (1) see notes 19 and 23; F1, F2, F3	MP	---	0.5	%
4315	Stability	Osc. (2) see notes 19 and 23; F1, F2, F3	MP	---	0.5	%
	Tuning characteristics	See note 43	F	---	3	MHz

NOTES:

1. The requirements of paragraph 6.5 of MIL-E-1E shall apply. For the assistance of designers of electronic equipment, the ratings have been divided into two groups as follows:

   a. Independent (ratings which may be obtained simultaneously).

   b. Dependent (ratings which are interrelated and may not necessarily be obtained simultaneously).

2. The temperature is to be measured at the point indicated on figure 1.

3. The tuning mechanism shall be capable of withstanding a static torque of 48 in-oz at the ends of its travel.

4. The magnetron shall be capable of normal operation without electrical breakdown with the input bushing in air at normal atmospheric conditions.

5. Prior to the application of high voltage, the cathode shall be heated to the required initial operating temperature. This shall be done by applying 13.75 volts ± 5 percent for 150 seconds minimum. On the application of anode voltage, the heater voltage shall be reduced according to the following:

	Du	Ib(mAdc)	Ef(V) ± 5%
Standby	----	----	13.75
Operate	0.001	27.5	0

For Pi equal to or greater than 600 watts Ef = 0

For Pi between 375 w and 600 w: $E_f = 19.0 \left(1 - \frac{Pi}{600}\right)^{+1.4}_{-0.7}$ volts

For Pi less than 375 watts $E_f = 13.75 \left(1 - \frac{Pi}{800}\right)$ volts $^{+1.4}_{-0.7}$ volts

6. The characteristics of the applied pulse must be those which result in proper starting and oscillation. The rate of rise of the voltage pulse, the percentage of pulse voltage ripple, and the rate of pulse voltage fall are among the more important considerations. The cognizant service electron tube group should be consulted regarding pulse characteristics as related to the specific application.

7. The rate of rise of voltage (rrv) shall be expressed in kilovolts per microsecond (kv/μs) defined by the steepest tangent to the leading edge of the voltage pulse above the 70 percent amplitude point. Any capacitance used in the viewing (measuring) circuit shall not exceed 6 picofarads (pf).

8. In handling and mounting the magnetron, care must be exercised to prevent demagnetization. See figure 1. The use of magnetic inspection tools is prohibited.

9. The activity responsible for the qualified products list is the Naval Ship Engineering Center, Department of the Navy, Washington, D.C., 20360, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance

NOTES: (Cont'd)

with "Provisions Governing Qualification". (Copies of "Provisions Governing Qualification" may be obtained upon application to Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania, 19120.

10. With a total airflow of approximately 40 c.f.m. at approximately 760 mm. Hg., 25°C, divided equally and directed through the cooling fins toward the body of the tube from two 3/4 inch ducts placed 1/2 to 3/4 inch from the cooling fins, the specified rise above ambient temperature shall not be exceeded.

11. The frequency shall be the frequency of minimum power output between F1 and F3.

12. Temperature measurements shall be made only after thermal equilibrium has been reached. The frequency shall be measured at the extremes of any 30°C temperature range.

13. The tube shall be subjected to five shocks of the specified peak amplitude and duration in each of three mutually perpendicular directions. Following impact tests, the tube shall show no mechanical failure and shall meet all power output and voltage requirements of oscillation (2).

14. The magnetron shall be mounted in a resonance free jig and vibrated with sinusoidal excitation in each of three mutually perpendicular planes through the following amplitudes:

5 Hz to 20 Hz	0.1 inch D.A.
20 Hz to 500 Hz	2 G

Cycling test: The frequency shall vary from 5-500-5 Hz with approximately logarithmic progression, and shall require approximately thirty minutes to traverse the range. This constitutes one cycle. The magnetron shall be vibrated for two such cycles in each of the three planes.

Resonance test: Mechanical resonant frequencies of the magnetron shall be determined during the cycling test. The tube shall then be vibrated at the indicated resonant conditions for a period of 30 minutes. If more than one resonant frequency is encountered, the test period may be accomplished at the most sever resonance, or the period may be divided among the resonant frequencies whichever is most likely to produce a failure.

Vibration Test Schedule (Times shown refer to one axis)

Type	Rm. Temp. Time
Resonance	30 minutes
Cycling	30 minutes

Interpulse frequency stability (FM) and RF stability (MP) shall not exceed the limits specified.

NOTES:

15. The frequency range F1 to F3 shall be traversed by a tuning shaft rotation of 160 ± 2 turns. A mechanical over-run of 3 turns min shall be provided at each end of the tuning range before contacting the mechanical stops.

16. A missing pulse is defined as one whose energy within ± 1 percent frequency range of the normal operating frequency is 70 percent or less than that of a normal pulse. The tube shall be considered stable if the specified missing pulse limit is not exceeded during the vibration time and acceleration levels as specified in the operating vibration test.

17. The tuning shaft shall be continuously driven at a speed of 1400 ± 50 rpm. At the completion of the test the tube shall meet oscillation (1) requirements. The backlash shall not exceed 3 MHz. During the test, the tuning shaft may not be lubricated. A cycle consists of two complete excursions each in opposite directions through the tuning range of the magnetron.

18. The ambient temperature of the chamber shall be -55°C. The cooling air supplied to the magnetron shall be at -55°C at 40 cubic feet maximum per minute. The Temperature of the magnetron shall be allowed to stabilize at this ambient temperature for a minimum of four hours.

At the conclusion of this exposure period and while at this temperature, heater voltage of 13.75 V shall be applied for a 150 + 10, - 0 seconds before application of anode voltage. This stability test shall be 3 minute duration to begin after 30 seconds of anode operation.

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 causes, are considered to be missing if the RF energy is less than 70 percent of the normal energy level. The stability shall be measured when a VSWR of 1.5 minimum is introduced in the load at a distance of 1 ± 0.05 meters from the magnetron flange and the phase is adjusted at the start of each measurement interval to produce maximum instability. The missing pulse count shall be performed over a 3 minute test interval.

20. Cooling air shall be applied so that under the conditions of OSC (2) the temperature (TA) as measured at the indicated area per figure 1, shall fall between 80 and 100°C. After thermal equilibrium has been reached, measure and record the actual frequency. The tube shall then be allowed to cool with no voltages applied for at least 15 minutes before the following test. Anode voltage, as specified for OSC (2), shall be applied after a 150 +10, -0 seconds heater warm-up time. The frequency shall then be measured at approximately 3 minute intervals until 20 minutes has elapsed. A graph of frequency versus time shall be constructed using the data. The maximum frequency deviation from the previously recorded thermal equilibrium frequency shall not exceed the limit specified.

NOTES:

21. The salt solution concentration shall be 20 percent. The length of the salt spray test shall be 50 hours. Upon completion of test, salt deposits resulting from the exposure conditions may be removed by rinsing with tap water. The tuning mechanism may be completely cycled (cw and ccw) once prior to measuring static torque. There shall be no degradation outside of measurement accuracy of electrical characteristics.

22. The waveguide output flange and the high voltage input bushing shall be enclosed for the Humidity and Salt Spray tests.

23. Though the requirement exists continually from F1 to F2, tests shall be performed at the following frequencies:

F1 = 8500 ± 5 MHz
F2 = 9000 ± 5 MHz
F3 = 9600 ± 5 MHz

24. The radio frequency bandwidth and side lobes shall be within the limits specified when a VSWR of 1.5 minimum is introduced in the load at a distance of 1 ± 0.05 meters from the magnetron flange and the phase is adjusted at the start of each measurement to produce maximum degradation. A satisfactory spectrum is one whose slope does not change sign more than once for power levels greater than the specified db below its peak.

25. The seal formed by clamping the magnetron mounting plate against a suitable magnetron test fixture shall be hermetically tight for one minute minimum with the specified air pressure applied so as to surround the entire input bushing below the mounting plate.

26. The seal formed by clamping the magnetron output flange against a suitable magnetron test fixture shall be hermetically tight for one minute minimum with the specified air pressure applied internally to the test fixture.

27. The magnetron shall be capable of withstanding a heater surge current of 3.5 times the rated heater current.

28. The minimum air pressure to assure prevention of electrical breakdown in the output coupling shall be 15 psia for voltage standing wave ratios up to 1.5 with phase shift variable over 360 electrical degrees. The magnetron shall be coupled directly to UG-52 B/U choke flange modified so that mounting holes provide clearance for No. 8 bolts.

29. The modulator shall be such that energy per pulse delivered to the tube, if arcing occurs, shall not greatly exceed the normal energy per pulse. The tube heater shall be protected against arcing by use of a connector that places a minimum of 4000 pf across the heater directly at the input terminals.

NOTES:

30. The AQL for the combined defectives for attributes in Quality Conformance Inspection Part 1, excluding inoperatives and mechanical shall be 1 percent. A tube having one or more defects shall be counted as one defective. Standard MIL-STD-105, Inspection Level II shall apply. For Part 2 the AQL percent defects shall be 6.5 percent, Inspection Level S3 shall apply.

Rejection and resubmittals shall be in accordance with MIL-STD-105, section 12.

31. Unless otherwise specified, all tests required by this specification shall be made under the following atmospheric conditions:

Temperature 25 ± 10°C
Relative Humidity 90% or less
Barometric Pressure - Local Standard

32. The power output shall be continuous over the range from F1 to F3. At no frequency in this range shall the power output be less than the specified values.

33. After the non-operational holding period of 168 hours minimum, the anode voltage shall be applied 150 + 10, - 0 sec. after the application of the standby heater voltage (Ef). The missing pulse count test interval of 3 minutes shall start immediately after the application of anode voltage.

34. For frequency modulation measurements during vibration, the maximum peak to peak frequency deviation shall not exceed the specifications. The test shall be run excluding thermal drift and pushing effects. The test equipment shall have a bandpass of 10 MegaHertz minimum at the 3 db points. Frequency modulation is defined as inter-pulse frequency changes, commonly called clatter.

35. In addition to regular markings the tuner dial settins for the following frequencies shall be marked on the tube. The accuracy of these settings shall be ± 5 MHz at the start of life under conditions of oscillation (2) with the anode temperature approximately 80°C as measured at the point specified on figure 1 when tuning is performed in the order of increasing the frequency.

Frequency MHz	Dial Setting	Frequency MHz	Dial Setting
8500	----	9150	----
8650	----	9300	----
8800	----	9450	----
9000	----	9600	----

36. At the completion of this test, the tube shall meet the power output and voltage requirements of oscillation (2) of the Quality Conformance Inspection, Part 1, and the tuner drive torque and backlash requirements of Part II.

37. The frequency obtained by turning the tuning shaft to a given angular position in one direction shall be reproducible within the specified limits when returning to that same position from the opposite direction after thermal equilibrium.

14

NOTES:

38. The tube shall meet the limit specified herein after it has been subjected to the shock and vibration tests.

39. DELETED.

40. DELETED.

41. Starting at F1 increasing to F3, then decreasing to F1, the frequency of the magnetron will be changed in 150 MHz increments after each 50 hours (approximately) of high voltage operation. The duration of the switching interval between Osc. (1) and Osc. (2) shall not exceed 5 seconds. The following cycle shall apply:

Condition	ib (a)	Ef (V)	Duration
Standby	0	13.75	2.5 min
Osc. (1)	27.5	0	25.0
Osc. (2)	27.5	0	25.0
Off	0	0	7.5

42. If during life test, the tube does not meet the specific limits, it shall be recycled for an additional five cycles. At such time, the tests shall be repeated. The tube will be considered satisfactory if it passes the second test.

43. At each of the dial settings and under the operating conditions specified in note 35, the measured frequency shall not differ from the stated frequency by more than the amount specified when tuning is performed in the order of increasing the frequency.

44. The pushing factor shall be measured in three steps, 4 amperes each (15a to 19a, 19a to 23a, 23a to 27a) and no value shall exceed the limits specified herein. The peak current through the magnetron shall alternately be the limits as specified under this test condition. These tests shall be run to exclude the effects of thermal drift and frequency instability not due to pushing.

45. The frequency deviation (maximum frequency minus minimum frequency) shall not exceed the stated limits when a VSWR of 1.5 minimum, introduced into the load at a distance 1 ± 0.05 meters from the magnetron flange, is varied throughout all phases.

46. The magnetron shall be mounted in a resonance free jig and vibrated with sinusoidal excitation in each of three mutually perpendicular planes through the following amplitudes for both resonance and cycling tests.

5 Hz	to 20 Hz	0.1 inch D.A.
20 Hz	to 35 Hz	2 G
35 Hz	to 75 Hz	0.036 inch D.A.
75 Hz	to 500 Hz	10 G

Cycling test: The frequency shall increase from 15-500-15 Hz with approximately logarithmic progression, and shall require approximately 15 minutes to

NOTES: (Cont'd)

traverse the range. This constitutes one cycle. The magnetron shall be vibrated for two such cycles in each of the three planes.

Resonance test: Mechanical resonant frequencies of the magnetron shall be determined during the cycling test. The tube shall then be vibrated at the two most severe resonant conditions for a period of 10 minutes each.

TEST SPECIFICATION

Varian/Beverly

Type No SFD-349 Page 15 Of 24

Effective _____ Revision L

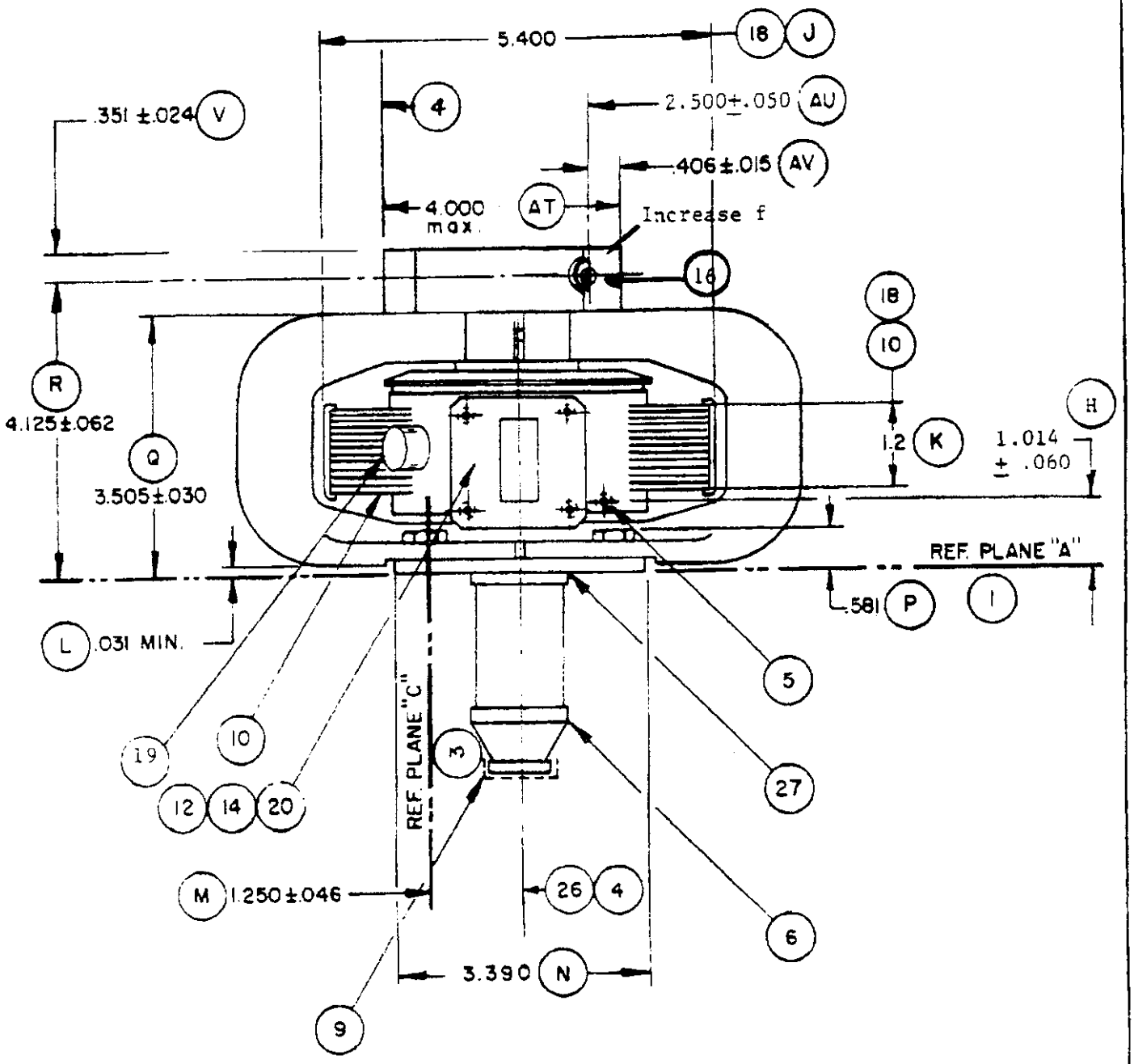

FIGURE 1a