SYLVANIA

engineering data service

SYLVANIA

7006

ADVANCE DATA

MECHANICAL DATA

MIL-E-1 Ref.	Test	Condition	Sym.	Min.	Max.	Unit
4.9.2	Overall Dimensions	$7\frac{11}{16}$ x $6\frac{5}{8}$ x 4-21/64 inches	.....	.....	.....	.....
	Net Weight	11 lbs. approx.	.....	.....	.....	.....
	**Shock	Note 22	.....	.....	.....	.....
	**Vibration	Oscillation 1 Note 15	ΔF	.....	±1	Mc
	**Frequency Drift	Note 26	ΔF	.....	25	Mc
	Tuner Resettability	Note 3	.....	.....	50	Mc
	Tuning Ratio	Nominal Ratio 5:1	.....	.....	.....	Mc/turn of worm shaft
	Tuning Rate		.....	.....	100	Mc/sec
	Coupling	Standard Choke Flange UG-52/U	.....	.....	.....	.....
	Mounting Position	Any	.....	.....	.....	.....

RATINGS

DEPENDENT RATINGS ABSOLUTE

Parameters	ib	Pi	Du	tp
Unit	amps	watts	.....	μs
Maximum	30	690	.0013	3.3
Minimum	.....	.....	.....	.....

CAUTION: The dependent absolute ratings are interrelated, and it does not necessarily follow that combinations of ratings can be attained simultaneously. The provisions of Mil-E-1 paragraph 6.5 apply in the selection of the operating point.

INDEPENDENT RATINGS ABSOLUTE

Parameters (Note 1)	Ef	If (surge)	tk	Tuner	Anode	Cathode Terminal	Osc (1)	Osc (2)
Unit	V	A	sec	°C	°C	°C	rrv	rrv
Maximum	.....	12	.....	150	150	165	kv/μsec	kv/μsec
Minimum	.....	.....	120	−55	−55	−55	70	70

CAUTION: The independent absolute ratings must not be exceeded. These independent absolute ratings are limiting values beyond which the serviceability of any individual tube may be impaired.

QUICK REFERENCE DATA

Sylvania Type 7006 is a high power, tunable X-Band magnetron operating in the frequency range between 9000 to 9600 Mc. Type 7006 is electrically and mechanically interchangeable with the fixed frequency 4J50. The 7006 is similar to type 6874 but operates at a higher rate of rise of voltage.

SYLVANIA ELECTRIC PRODUCTS INC.

SPECIAL TUBE OPERATIONS
WOBURN, MASS.

Prepared and Released By The TECHNICAL PUBLICATIONS SECTION EMPORIUM, PENNSYLVANIA

JULY, 1958

ELECTRICAL DATA

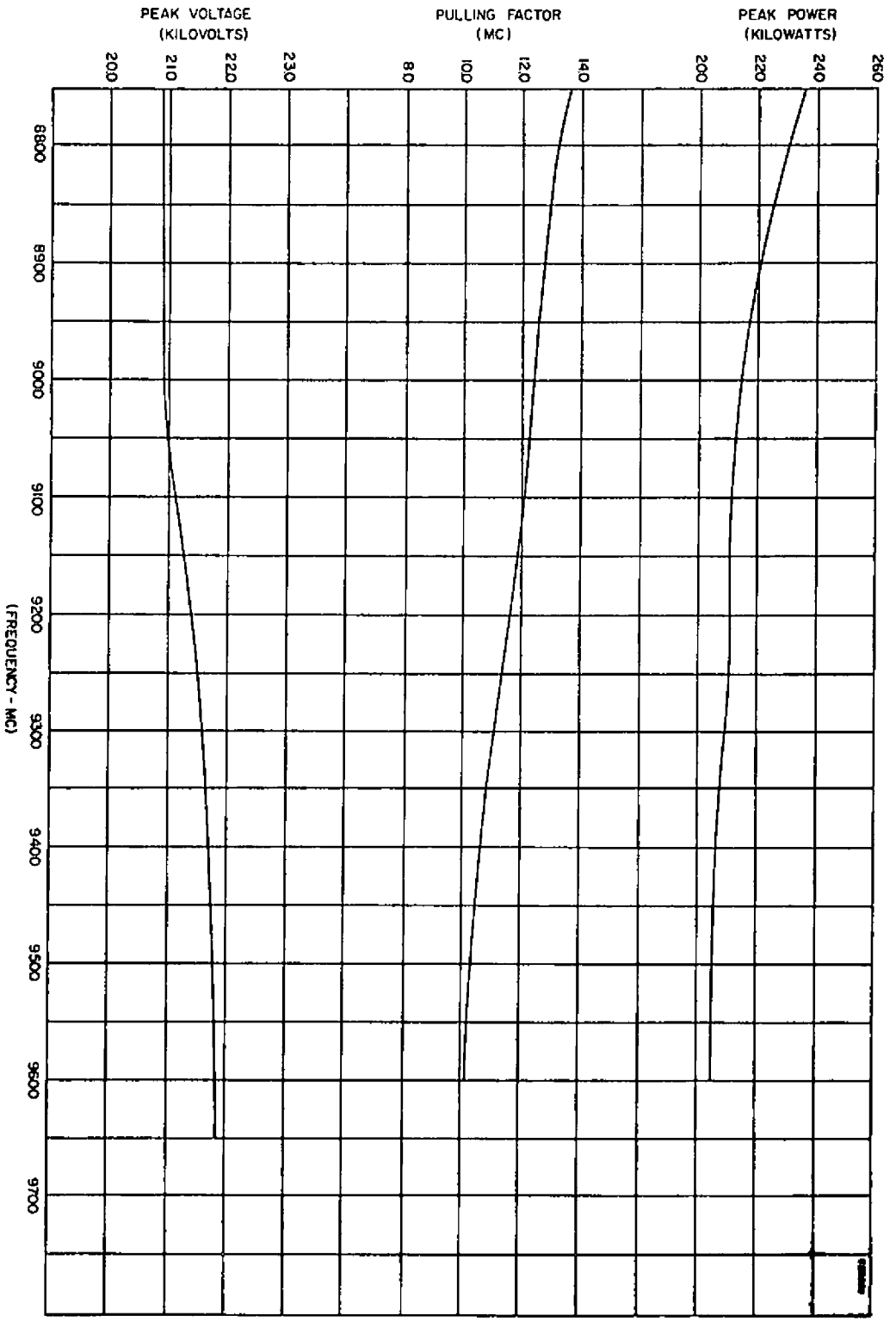
MIL-E-1 Ref.	Test	Conditions	Sym.	Min.	Max.	Unit
4.10.8	Heater Current	Ef = 13.75 V	If	3.00	3.75	A
	Coupling	Standard Choke Flange UG-52/U	.....	.....	.....	.....
4.16.3	*Oscillation 1*	Note 5, 6				
4.16.3.2	Heater Cathode Warm-up Time	tk = 120 sec. max. Ef = 0 volts for test Note 1 (b)	....	....	....	....
4.16.3.3	Pulse Characteristics	tp = 0.2 to 0.3 μs rrv 225 kv/μs (min.) Du = .001 Note 7	....	....	....	....
4.16.3.4	Average Anode Current	Ib = 27.5 mADc	.....	.....	.....	.....
4.16.3.6	Power Output	Method A t = 300 (max.) Note 8	Po:	190	.....	W
4.16.3.6	Power Output	Note 8 & 17	Po:	145	.....	W
4.16.1.3	Stability	Note 11, 4	M.P.	.....	.25	%
4.16.3.5	Pulse Voltage	Note 4	epy:	19.0	23.0	kv
4.16.3.7	Spectrum-Measurements	Osc. 1; Note 4 and 9	.....	.....	.....	.....
	R.F. Bandwidth		BW	.....	2.5/tp	Mc
	Minor Lobes		Ratio	6	.....	db
4.10.7.3.2	Tunable Freq.	Osc. 1, Anode T 100°C. Approx.	Δ F:	.....	600	Mc
	*Back-lash	Note 4, 10	Δ F:	.....	10	Mc
4.16.5	Pulling-Factor	Osc. 1: Note 4 (1.5 VSWR max.)	Δ F:	.....	15	Mc
4.16.3	*Oscillation 2*	Note 5, 6				
4.16.3.2	Heater Cathode Warm-up Time	tk = 120 sec. (max.) Ef = 0 volts for test Note 1 (b).	....	....	....	....
4.16.3.3	Pulse Characteristics	tp = .4 to .5 μs rrv = 225 kv/μs (min.) Du = .001, Note 7	.....	.....	.....	.....
4.16.3.4	Average Anode Current	Ib = 27.5 mADc	.....	.....	.....	.....
4.16.1.3	*Stability	Note 11, 4	M.P.	.....	.25	%
4.16.3.6	Power Output	Method A, t = 300 (max.) Note 8	Po:	190	.....	W
4.16.3.7	Spectrum-Measurements	Note 4	.....	.....	.....	.....
	R.F. Bandwidth		BW	.....	2.5/tp	Mc
4.11	Intermittent Life Test	Group D: Note 12, 13, 23	t:	500	.....	cycles

Conditions	Ib mADc	Ef V	Duration Minutes
Standby	0	13.75	2.5
Osc. 1	27.5	0	30
Off	0	0	10

4.11.4	Life Test End Points	Note 14	.....	.....	.....	.....
		Osc. 2 Note 4, Power Output	Po:	150	.....	W
		Osc. 2 Note 4, Bandwidth	Bw:	.....	3.0/tp	Mc
		Osc. 2 Note 4, 11, Missing Pulses:	M.P.	.....	.5	%
		Tuning Characteristics, Note 24	Δ F	.....	50	Mc
4.9.14	**Temperature Co-efficient	Osc. 1 Note 20	ΔF/°C	.....	0.25	Mc
4.9.15	**Lower Temp. Operation	Osc. 1 T_1 = -65°C T_2 = -55°C	.....	.....	.....	.....
		T_3 = 85°C, tk = 180 Max. Note 21	.....	.....	.....	.....
	**Tuner Life	Note 19	.....	1000	.....	cycles

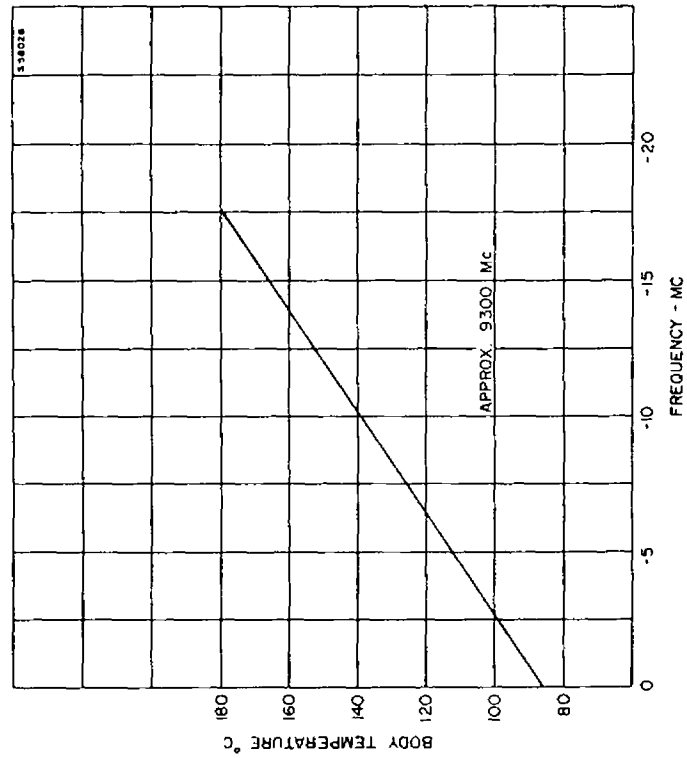
NOTES:

1. (a) The tube shall be able to operate without high voltage breakdown with the high voltage bushing pressurized to 600 mm. of Hg.
   (b) Cooling should be provided to keep anode temperature below 125°C and cathode terminal below 165°C at "BH" on outline drawing.
   (c) During high voltage pulse operation reduce heater voltage according to the following formula:
   $$Ef = 13.75\ (1-\frac{P1}{450})$$
2. Dial markings per outline drawing.
3. On evidence of satisfactory quality, the inspector may limit this test to ten tubes per month when tube is in continuous production.
4. These measurements shall be made at three frequencies across the band: at mid-frequency ±5 Mc, and within ±5 Mc of each extreme.
5. Termination of magnetron during test shall be equivalent to waveguide line with a VSWR not greater than 1.05 except where specifically noted.
6. A pulser of the discharging network type shall be employed for this measurement.
7. The rrv shall be expressed in kilovolts per microsecond defined by the steepest tangent to the leading edge of the voltage pulse above 50% amplitude. Any capacitance used in viewing system shall not exceed 6 μμfd.
8. The minimum power output requirement must be satisfied over the specified frequency band. This test is also to determine that there are no serious defaults of performance over the tuning range.
9. The termination of the magnetron during test shall be equivalent to waveguide line with a VSWR of 1.5 adjusted in phase to produce the maximum degradation.
10. The frequency obtained by turning the tuner worm to a given setting in one direction shall be reproducible within specified limits when returning to that same setting from the opposite direction after thermal equilibrium.
11. Stability shall be measured in terms of the average number of output pulses missing, expressed as a percent of the number of input pulses applied during the period of observation. The missing pulses of (M.P.), due to any causes, are considered to be "missing" if the r.f. energy is less than 70 percent of the normal energy level. The VSWR of Note 9 shall be adjusted to that phase of producing maximum instability and the missing pulses counted during any consecutive 5-minute interval of a 15-minute test period.
12. VSWR = 1.5 cycled through 360 electrical degrees every 15 minutes.
13. The life test "ON" time shall be 250 hours.
14. If, during life test, the tube does not meet the specified limits, it shall be recycled for an additional 20 cycles. At such time the tests shall be repeated. Should the tube fail the second test, it shall then be considered unsatisfactory.
15. The tube shall be operating under the conditions of oscillation 1. The tube shall be subjected to continuous vibration of 0.02 inches double amplitude or 5 g's, whichever is the limiting value, from 5 - 500 cps. The frequency shall be varied continuously for 10 minutes in each of the three mutually perpendicular planes.
16. The tube shall be capable of operating under osc. 1 and at 23.0 ma anode current over the specified frequency range with a 1.5 VSWR mismatch varied through all phases at a waveguide pressure of 12 psia with no waveguide breakdown.
17. The power shall be equal to that specified under osc. 1 and at Ib = 21 ma.
18. The tube shall be capable of operating at 27.5 ma, .001 Du. 180 kv/μsec rrv and 1.0 ±0.1 μsec tp over the specified frequency range with a 1.5 VSWR varied through all phases with no breakdown at a pressure of 15 psia.
19. One cycle is defined as a complete excursion over the total tuning range and back to starting point. The cycling rate shall be approximately 6 cycles per minute. This is not an operating test except that at the end of the 1000 cycles the tube when operated shall exhibit a continuous spectrum over the tuning range.
20. The temperature co-efficient for any 30°C range between −55°C and +150°C shall be less than the specified value.
21. The tube shall be stored for 24 hours at each of the indicated temperatures. After storage the tube shall meet the limits of the pulse voltage test, when operated at te center value frequency.
22. Two shocks in each direction along each of three mutually perpendicular axes of 30 G's and 11 millisec shock duration. The tube is not required to operate during this test. After the test the tube shall meet the limits of all tests in osc. 1.
23. Starting at the low frequency end, the tube frequency shall be increased 50 Mc, each down time, until the maximum frequency is reached. At this point the cycle should be repeated. The frequency, range shall be traversed at least once during this test.
24. When the dial settings obtained in the initial tuner calibration are approached in a clockwise direction, the frequencies measured shall not vary from the original frequencies by more than the amount specified.
25. The tuner dial settings versus frequency information shall be marked on the tube. This information shall be given for every 100 Mc. frequency increment. The frequency shall be read with the anode at approximately 115°C.
26. The frequency drift from start to stabilized frequency shall not be more than the specified amount and at least one-half the total frequency drift will occur during the first two minutes.

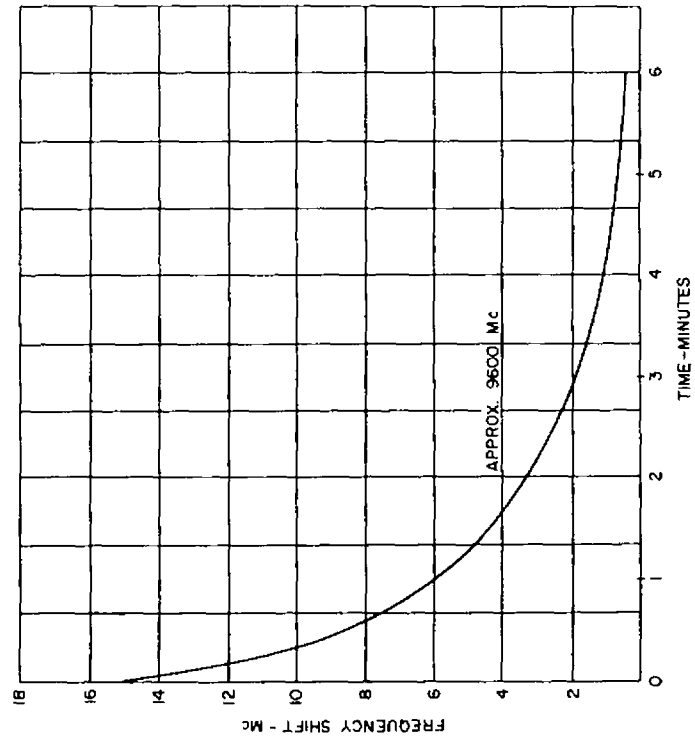


PERFORMANCE DATA

FREQUENCY SHIFT DATA



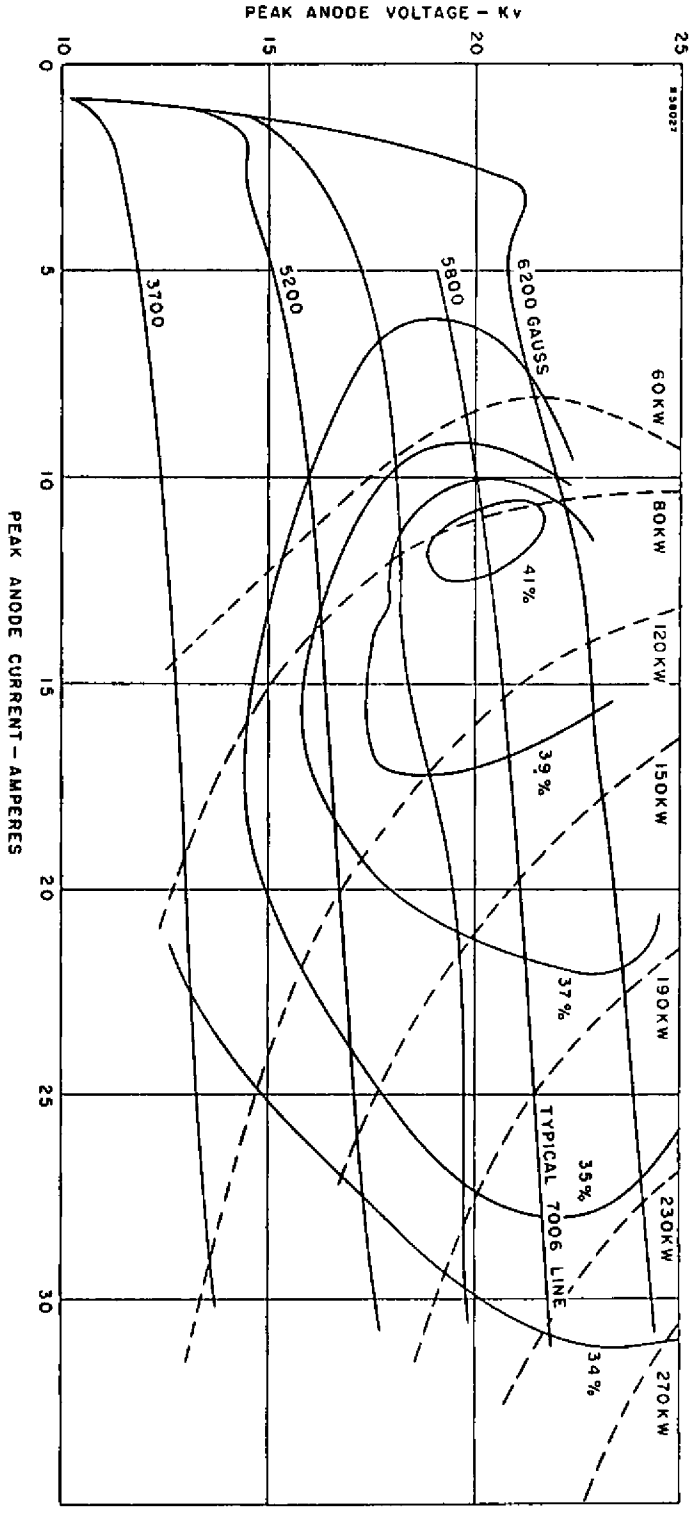
FREQUENCY
VS
BODY TEMPERATURE



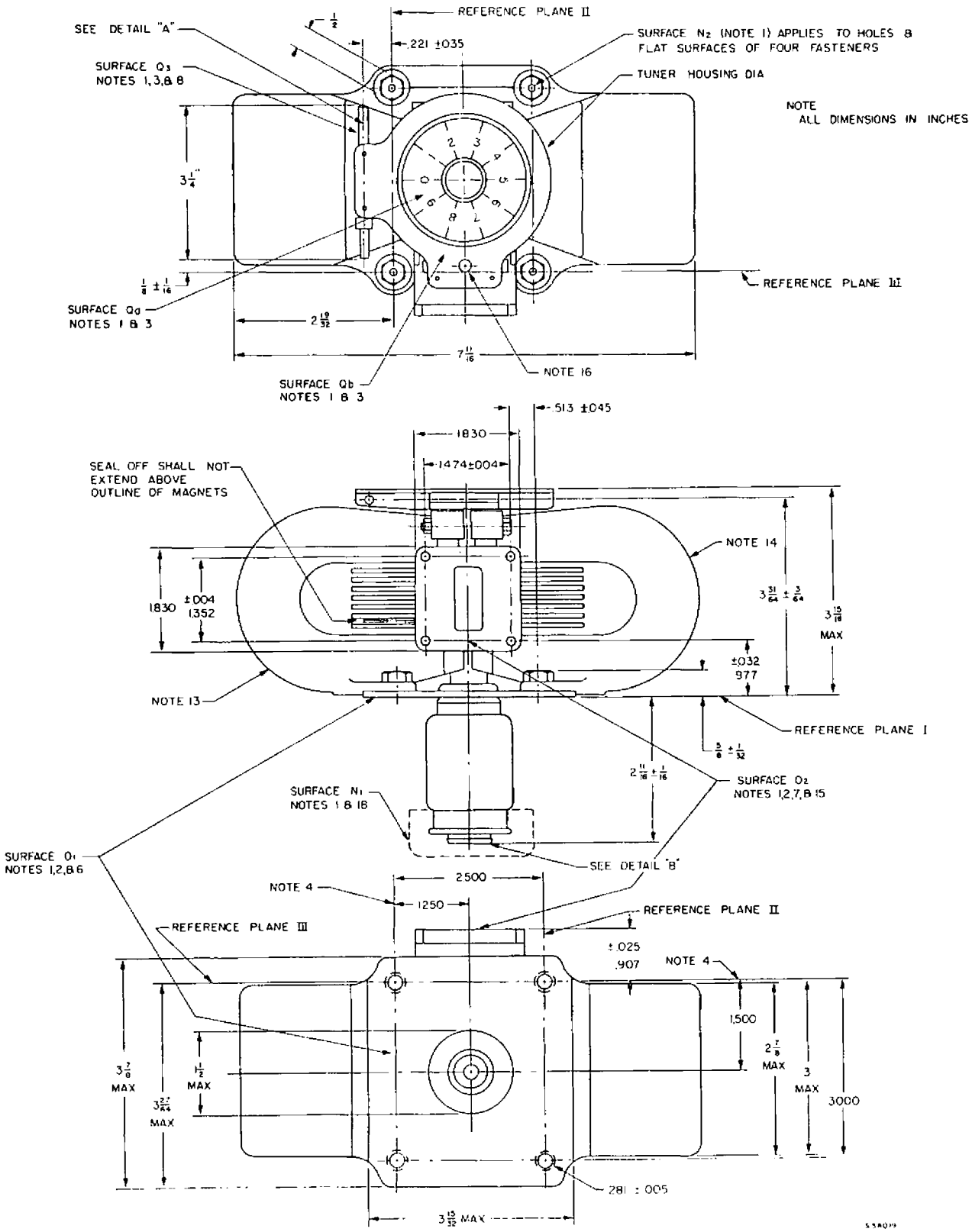
FREQUENCY DRIFT
VS
TIME FROM APPLICATION
OF
ANODE POWER

AVERAGE PERFORMANCE CHART

Tp = 1m Sec. Du = .001



OUTLINE


REFERENCE PLANE II
SEE DETAIL "A"
.221 ±035
SURFACE N2 (NOTE 1) APPLIES TO HOLES & FLAT SURFACES OF FOUR FASTENERS
SURFACE Q3 NOTES 1,3,& 8
TUNER HOUSING DIA
NOTE ALL DIMENSIONS IN INCHES
3 1/4"
REFERENCE PLANE III
SURFACE Qa NOTES 1 & 3
NOTE 16
SURFACE Qb NOTES 1 & 3
.513 ±045
1.830
1.474±004
SEAL OFF SHALL NOT EXTEND ABOVE OUTLINE OF MAGNETS
NOTE 14
1.830
±004
1.352
±032
977
NOTE 13
REFERENCE PLANE I
SURFACE N1 NOTES 1 & 18
SURFACE O2 NOTES 1,2,7,8 15
SURFACE O1 NOTES 1,2,8 6
SEE DETAIL "B"
NOTE 4
2.500
1.250
REFERENCE PLANE II
REFERENCE PLANE III
±.025
.907
NOTE 4
1.500
MAX
MAX
MAX
3.000
MAX
.281 ± .005
MAX

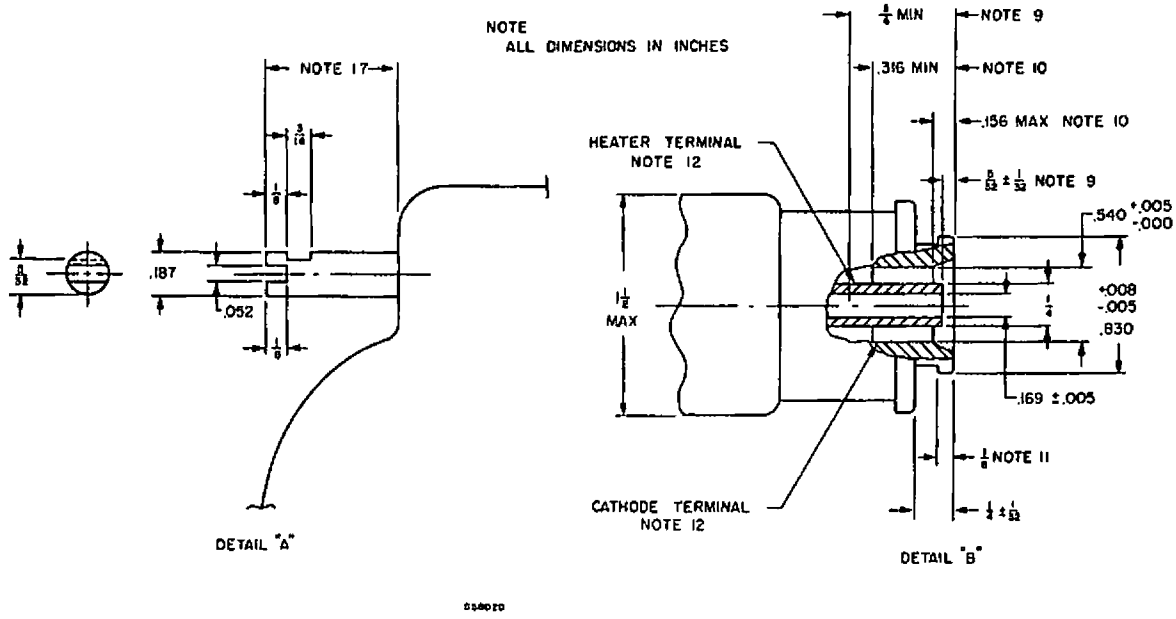


DIAGRAM NOTES:

1. *All metal surfaces are covered by black finish, except those marked N, O, or Q. Surfaces marked N or O shall be silver, nickel plated or brass surfaces.*
2. *Hermetic connections can be made to surfaces 01 and 02.*
3. *Surfaces marked Q are tuner parts and shall have the following markings:*
   (a) Black line running between index hole and tuner dial on an aluminum, silver, nickel plated or brass surface.
   (b) Decimal dial face numbered from 0 to 9 with 1/10 division marks applied to a black surface.
4. *The axis of the cathode terminal shall be within a radius of 3/64" of the specified location, Note 5 applies.*
5. *The limits include angular as well as lateral deviations.*
6. *All points on the mounting surface shall be within .015" of Reference Plane 1.*
7. *With the flange on a plane surface a .005" thickness gauge 1/8" wide shall not enter.*
8. *Clockwise rotation of the indicated end of the worm shaft will result in decreased frequency. One hundred and thirty-eight (138) turns of the worm shaft are required to traverse the frequency range in one direction.*
9. *These dimensions define the extremities of the cylindrical section given by the .169" dimension.*
10. *These dimensions define the extremities of the cylindrical sections given by the .540" dimension. The step with the maximum depth of .156" is optional.*
11. *No clamping means to bear beyond this dimension.*
12. *The heater terminal shall be concentric with the cathode terminal within .010".*
13. *Marking—Warning: Maintain minimum clearance of 2 inches between the magnet and magnetic material.*
14. *Marking—Type number and commercial or military stamp.*
15. *The opening in the waveguide shall be enclosed by a dust cover when the tube is not in use.*
16. *Number appearing here indicates number of complete revolutions of gear from 0 to 6.*
17. *It shall be possible for a sleeve .195" I.D. by .406" O.D. to pass over ends of shaft to within 1/4 inch of face of the worm bracket.*
18. *Silver plate or nickel plate over full extent of plug connection as defined in Notes 9 and 10.*