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APPLICANT: COLUMBIA TELECOMMUNICATIONS GROUP, INC.

FCC ID: GAFFRS14MV

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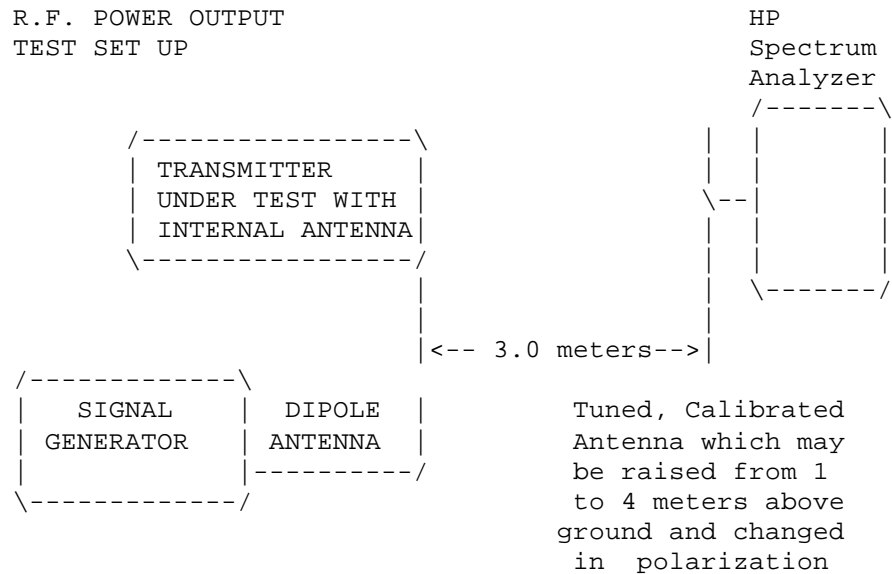
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- 2.1033(c)(9) Tune-up procedure. The tune-up procedure is included in the IN EXHIBIT 8A-8B.
- 2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT 5A-5B of this report. The block diagram is included as EXHIBIT 4 of this report.
- 2.1033(c)(11) A photograph or a drawing of the equipment identification label is included as exhibit No. 1.
- 2.1033(c)(12) Photographs(8"X10") of the equipment of sufficient clarity to reveal equipment construction and layout, including meters, labels for controls, including any view under shields - See EXHIBIT 3A-3G.
- 2.1033(c)(13) Digital modulation is not allowed.
- 2.1033(c)(14) The data required by 2.1046 through 2.1057 is submitted below.
- 2.1046(a) RF\_power\_output.

95.639 RF power is measured by measuring the radiated power at 3 meters and then replacing the transmitter with a signal generator to determine the effective radiated power. The ERP shall not exceed 0.500 Watts.  
 MEASURED POWER OUTPUT = 100 milliWatts ERP



Equipment placed 80cm above ground on a rotatable platform.

2.1047(a)(b)      Modulation characteristics:

AUDIO FREQUENCY RESPONSE

The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown in exhibit 4. The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured.

2.1047(b)      Audio input versus modulation

The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are shown in exhibits 5-7. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

95.637(b)      Post Limiter Filter The filter must be between the modulation limiter and the modulated stage. At any frequency between 3 & 20KHz the filter must have an attenuation of  $60\log(f/3)$  greater than the attenuation at 1KHz. See the plot; exhibit 8.

2.989(c)      EMISSION BANDWIDTH:

95.633(c)

Data in the plots shows that the sidebands from greater than 50% to 100% of the authorized bandwidth must be attenuated by at least 25dB and from 100 to 250% the sidebands must be attenuated by at least 35dB. Beyond 250% the sidebands must be attenuated by at least  $43 + \log_{10}(TP)$ . The transmitter was modulated with 2500 Hz, adjusted for 50% modulation plus 16 dB. The spectrum analyzer was set with the unmodulated carrier at the top of the screen. The test procedure diagram follows. See the occupied bandwidth plots; exhibits 11A-11B.

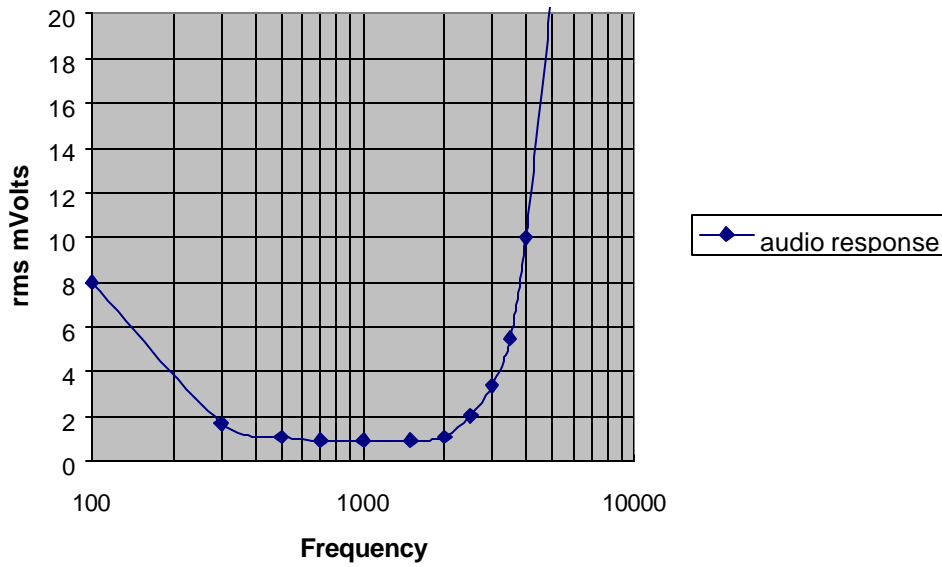
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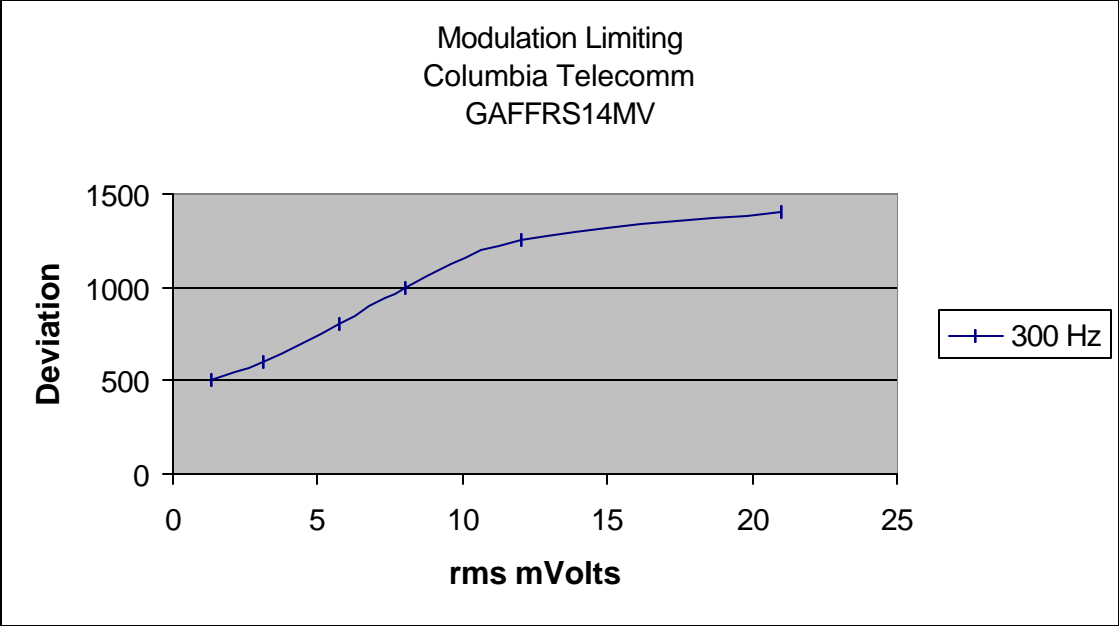
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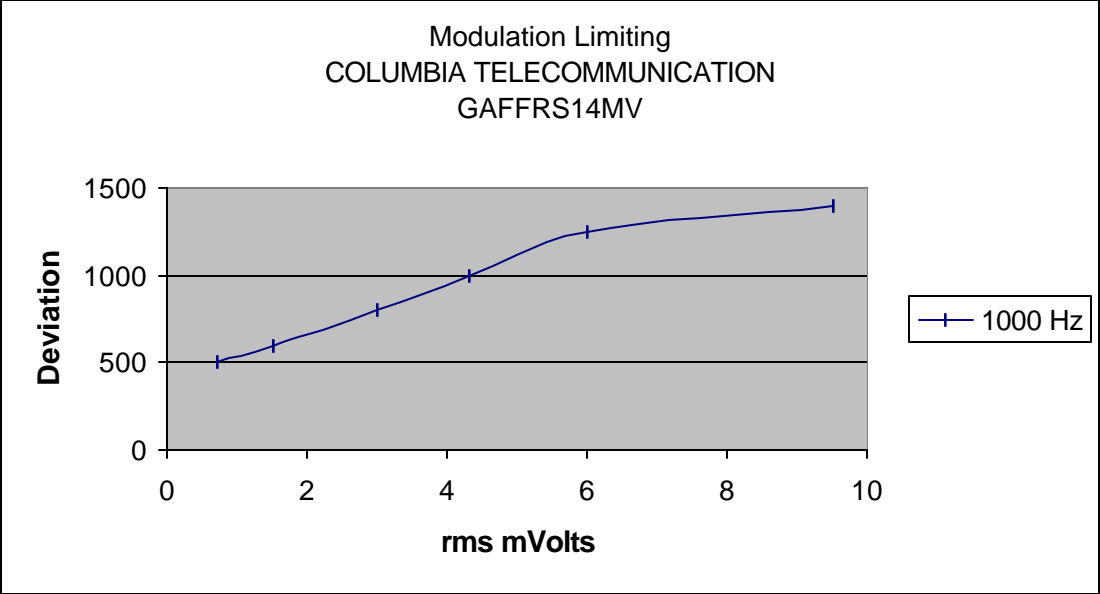
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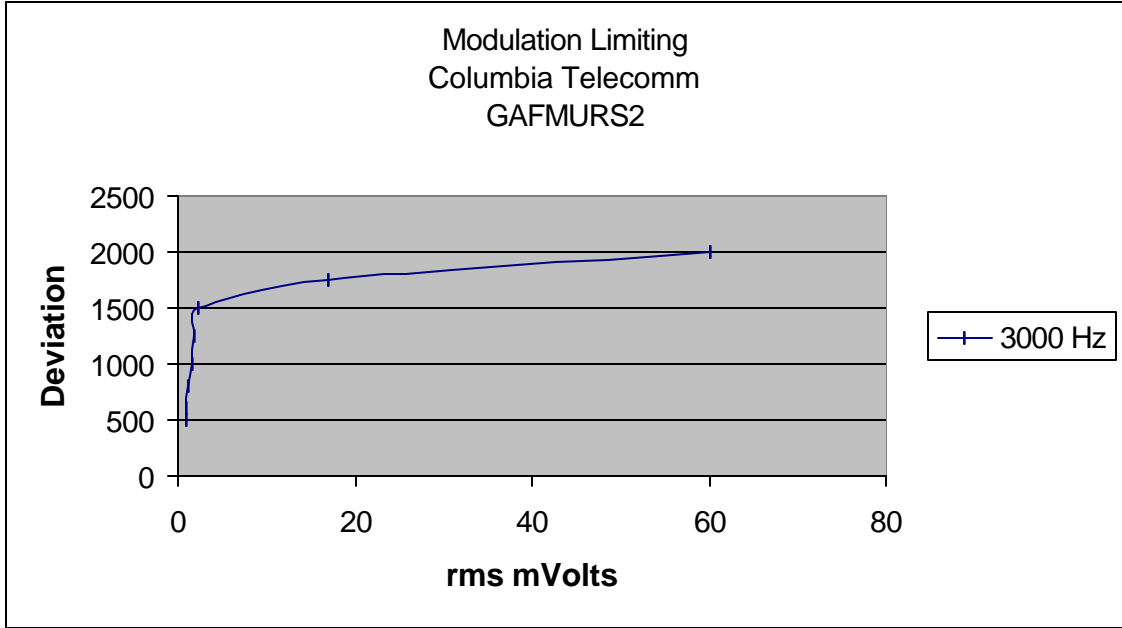
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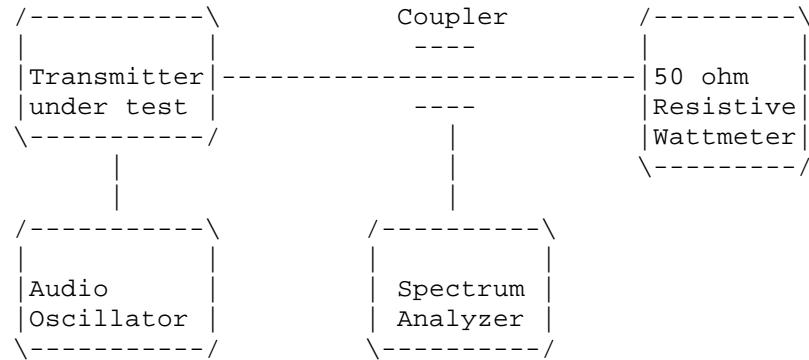


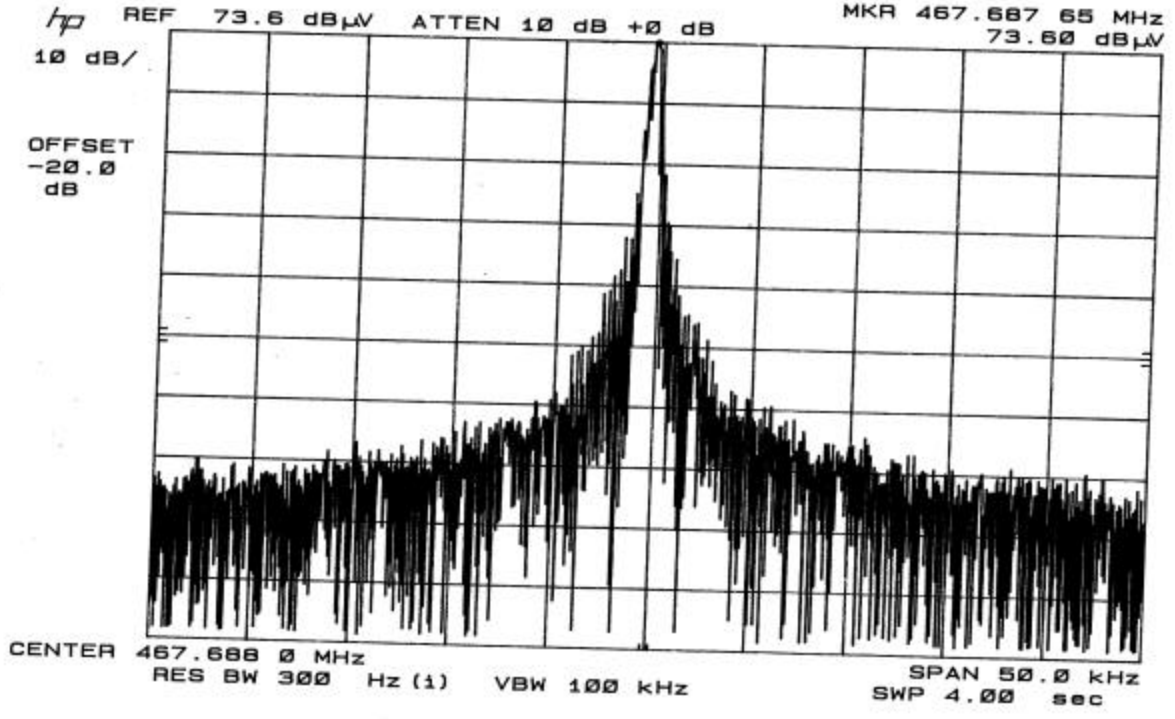
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Radiotelephone transmitter with modulation limiter.

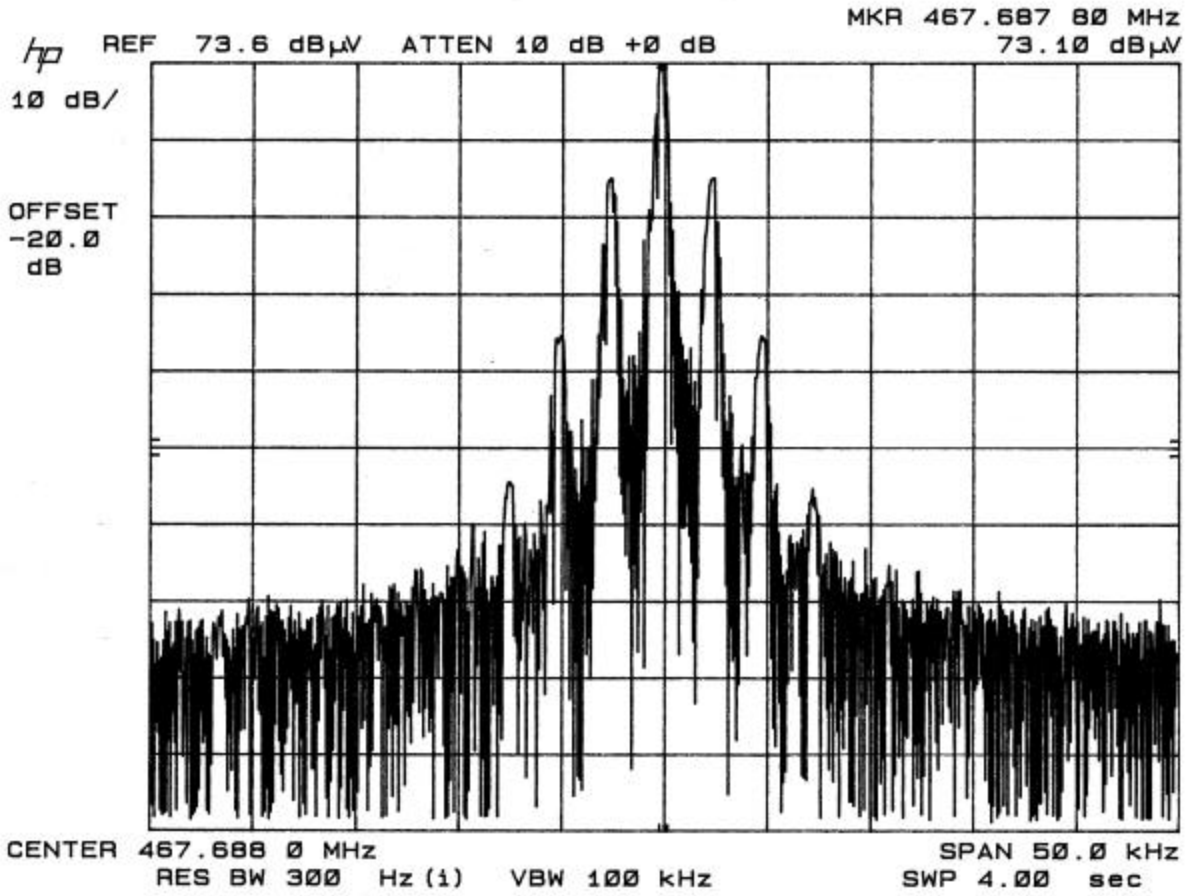
Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT





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2.1051 Not Applicable, no antenna terminal allowed.

2.1053 UNWANTED RADIATION:  
95.635(b)(4)

REQUIREMENTS: Emissions must be attenuated by at least the following below the output of the transmitter.

$$43 + 10\log(TP) = 43 + 10\log(0.10) = 33 \text{ dB}$$

TEST DATA:

Tuned Frequency MHz	Emission Frequency MHz	Ant. Polarity	Field Strength dBuv/m	Margin dB
462.59	462.60	V	0.0	0.00
462.59	925.00	V	40.7	7.70
462.59	1,388.00	V	46.3	13.30
462.59	1,850.00	H	55.55	22.55
462.59	2,313.00	V	52.02	19.02
462.59	2,776.00	V	60.82	27.82
462.59	3,238.00	V	51.89	18.89
462.59	3,701.00	H	38.46	5.46
462.59	4,163.00	H	43.58	10.58
462.59	4,626.00	H	53.72	20.72

MARGIN = (Field strength of Fund - 33 dB) - FS OF EMISSION

METHOD OF MEASUREMENT: The procedure used was TIT/EIA STANDARD 603 USING THE SUBSTITUTION method. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer, and an appropriate antenna - see test equipment list. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

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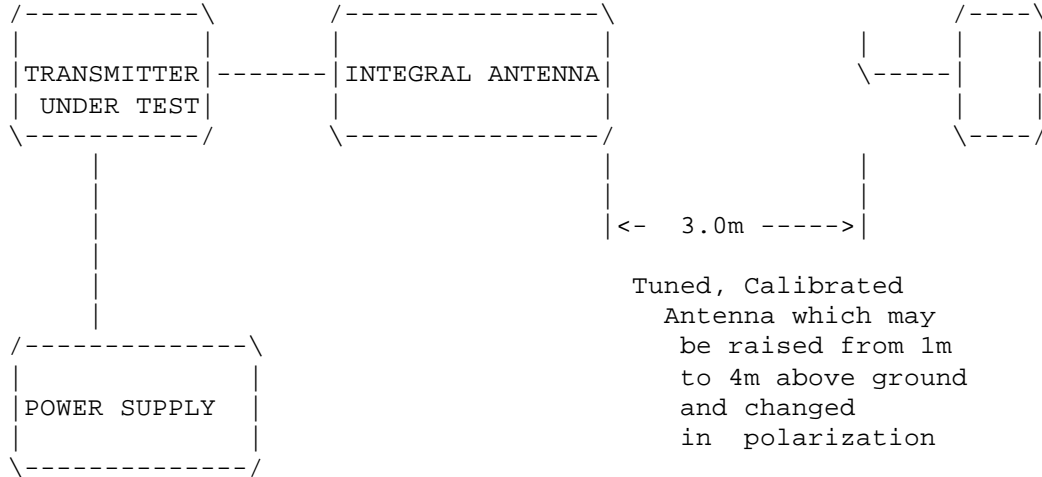
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2.1053  
95.635

UNWANTED\_RADIATION:

Method of Measuring Radiated Spurious Emissions

Hewlett Packard  
Spectrum  
Analyzer  
HP8566B



Equipment placed 80cm above ground  
on a rotatable platform.

2.1055

Frequency stability:

Temperature and voltage tests were performed to verify that the frequency remains within the 0.00025%, 2.5 ppm specification limit. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25 degrees C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -20 degrees C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15 second intervals. The worst case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to + 50 degrees C.

Readings were also taken at plus and minus 15% of the battery voltage of 4.5 VDC.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 462.661 566

TEMPERATURE_C	FREQUENCY_MHz	PPM
REFERENCE_____	462.661 566	00.00
-20_____	462.660 479	-2.35
-10_____	462.661 500	-0.14
0_____	462.661 781	0.47
+10_____	462.661 907	0.74
+20_____	462.661 833	0.58
+30_____	462.661 657	0.20
+40_____	462.662 493	-0.16
+50_____	462.661 706	0.30

BATT. End-Point 5.1V/dc 462.661 550 -0.03  
BATT. End-Point 6.9V/dc 462.661 556 -0.02

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was -2.35 to 0.74 ppm. The maximum frequency variation with voltage was -0.03 ppm.

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TEST EQUIPMENT LIST

1. Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/  
preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter  
HP 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02,  
S/N 3008A00372
2. Biconnical Antenna: Eaton Model 94455-1, S/N 1057
3. Biconnical Antenna: Electro-Metrics Model BIA-25, S/N 1171
4. Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
5. Log-Periodic Antenna: Electro-Metrics Model LPA-30, S/N 409
6. Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180  
1-18 GHz, S/N 2319
7. 18-26.3GHz Systron Donner Standard Gain Horn #DBE-520-20
8. Horn 40-60GHz: ATM Part #19-443-6R
9. Line Impedance Stabilization Network: Electro-Metrics Model  
ANS-25/2, S/N 2604
10. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
11. Frequency Counter: HP Model 5385A, S/N 3242A07460
12. Peak Power Meter: HP Model 8900C, S/N 2131A00545
13. Open Area Test Site #1-3meters
14. Signal Generator: HP 8640B, S/N 2308A21464
15. Signal Generator: HP 8614A, S/N 2015A07428
16. Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N  
9706-1211
17. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153
18. AC Voltmeter: HP Model 400FL, S/N 2213A14499
19. Digital Multimeter: Fluke Model 8012A, S/N 4810047
20. Digital Multimeter: Fluke Model 77, S/N 43850817
21. Oscilloscope: Tektronix Model 2230, S/N 300572

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