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FCC ID: MKDAR147

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TEST EQUIPMENT LIST

1. Spectrum Analyzer: Hewlett Packard 8566B - Opt 462, w/  
preselector 85685A, & Quasi-Peak Adapter HP 85650A, & HP  
8449B - OPT H02 Cal. 6/26/98
2. Signal Generator, Hewlett Packard 8640B, cal. 10/1/98
3. Eaton Biconnical Antenna Model 94455-1  
20-200 MHz Serial No. 0997 Cal. 5/15/98
4. Electro-Metric Dipole Kit, 20-1000 MHz, Model TDA-30 10/15/98
5. Electro-Metric Horn 1-18 GHz, Model RGA-180, Cal. 8/15/98
6. Electro-Metric Antennas Model TDA-30/1-4, Cal. 10/15/98
7. Electro-Metric Line Impedance Stabilization Network Model  
No. EM-7821, Serial No. 101; 100KHz-30MHz 50uH. Cal. 11/19/98
8. Electro-Metric Line Impedance Stabilization Network Model  
No. EM-7820, Serial No. 2682; 10KHz-30MHz 50uH. Cal. 11/19/98
9. Special low loss cable was used above 1 GHz
10. Tenney Temperature Chamber

TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without  
the written approval of TIMCO ENGINEERING, INC.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD  
C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a prese-  
lector. The bandwidth of the spectrum analyzer was 100 kHz with an  
appropriate sweep speed. The analyzer was calibrated in dB above a  
microvolt at the output of the antenna. The resolution bandwidth was  
100KHz and the video bandwidth was 300KHz. The ambient temperature of  
the UUT was 65oF with a humidity of 52%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was estab-  
lished by adding the meter reading of the spectrum analyzer (which is  
set to read in units of dBuV) to the antenna correction factor sup-  
plied by the antenna manufacturer. The antenna correction factors are  
stated in terms of dB. The gain of the Preselector was accounted for  
in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF = FS  
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STAN-  
DARD C63.4-1992 using a 50uH LISN. Both lines were observed.  
The bandwidth of the spectrum analyzer was 10kHz with an appro-  
priate sweep speed. The ambient temperature of the UUT was 80oC with a  
humidity of 76%.

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TEST PROCEDURES CONTINUED

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ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES: The unit under test was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSIC63.4-1992 with the EUT 40 cm from the vertical ground wall.

CIRCUIT\_DESCRIPTION:

In the receive mode the signal comes in on the receive antenna to the low pass filter to the antenna change over switch. Then to a tuned circuit and then to the RF amplifier Q3. From Q3 the signal goes to a bandpass filter to the mixer Q4. The output of the Mixer goes to a 10.7MHz crystal filter then to the IF amplifier Q5 and then to 2nd mixer and IF amplifier intergrated circuit A1A1. The output of the detector drives the audio amplifier U5 which is connected to the speaker.

ANTENNA\_AND\_GROUND\_CIRCUITRY

This unit makes use of a external 5 inch antenna. The antenna is inductively coupled. This unit is powered from a 9.0V battery.

No ground connection is provided. The unit relies on the ground tract of the printed circuit board.

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NAME OF TEST: RADIATION INTERFERENCE

RULES PART NUMBER: 15.109

REQUIREMENTS: 30 to 80 MHz: 40.0 dBuV/M @ 3 METERS  
88 to 216 MHz: 43.5 dBuV/M  
216 to 960 MHz: 46.0 dBuV/M  
ABOVE 960 MHz: 54.0 dBuV/M

TEST RESULTS: A search was made of the spectrum from 30 to 1000 MHz and the measurements indicate that the unit DOES meet the FCC requirements.

TEST DATA:

TUNED FREQ MHz	EMISSION FREQUENCY MHz	METER READING AT 3 METERS dBuV	ANTENNA		FIELD STRENGTH dBuV/m@3m	MARGIN dB	ANT
			COAX LOSS dB	CORRECTION FACTOR dB			
144.00	133.34	20.10	0.80	14.44	35.34	8.16	V
144.00	266.68	27.40	1.40	13.86	42.66	3.34	H
144.00	400.02	17.30	1.60	17.00	35.90	10.10	H
144.00	533.36	7.10	1.60	19.57	28.27	17.73	H
146.00	135.32	18.90	0.80	15.17	34.87	8.63	V
146.00	270.64	25.40	1.40	13.97	40.77	5.23	H
146.00	405.96	13.00	1.60	17.14	31.74	14.26	H
146.00	541.28	5.50	1.60	19.63	26.73	19.27	H
148.00	137.32	16.00	0.80	15.91	32.71	10.79	V
148.00	274.64	22.90	1.40	14.09	38.39	7.61	H
148.00	411.96	14.50	1.60	17.28	33.38	12.62	H
148.00	549.28	6.70	1.60	19.69	27.99	18.01	H

SAMPLE CALCULATION: FSdBuV/m = MR(dBuV) + ACFdB.

TEST PROCEDURE: ANSI STANDARD C63.4-1992 using a Hewlett Packard Model 8566B spectrum analyzer, a Hewlett Packard Model 85685A Preselector, a Hewlett Packard Model 85650A Quasi-Peak adapter, an Electro-Metric Dipole Kit, and an Eaton Model 94455-1 Biconical Antenna. The bandwidth of spectrum analyzer was 100 kHz with an appropriate sweep speed. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The receiver was put into the coherent mode by placing an antenna driven by a signal generator off site. The UUT was tested in 3 orthogonal planes.

PERFORMED BY: S. S. SANDERS

DATE: FEBRUARY 5, 1999

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