

**APPLICANT:** Tactical Electronics Corporation

**FCC ID:** EFOSX500

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**EXHIBITS CONTAINING:**

EXHIBIT 1.....FCC ID LABEL SAMPLE AND SKETCH OF LOCATION  
EXHIBIT 2.....BLOCK DIAGRAM  
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EXHIBIT 4.....PARTS LIST  
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APPLICANT: TACTICAL ELECTRONICS CORPORATION

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GENERAL INFORMATION REQUIRED  
FOR TYPE ACCEPTANCE

2.1033 Tactical Electronics Corporation will sell the  
(c)(1)(2) FCC ID: EFOSX500 VHF transceiver in quantity,  
for use under FCC RULES PART 22 & 90.

2.1033 (c) TECHNICAL DESCRIPTION

2.1033 (3) User Manual See Exhibit 14

2.1033 (4) Type of Emission:

11K25F1D for 12.5 kHz

For 12kHz

$B_n = 2M + 2DK$

$M = 9600$  Bits per second

$D = 825$  Hz (Peak Deviation)

$K = 1$

$B_n = 2(9600/2) + 2(825)(1) = 9600 + 1650 = 11.25k$

For 12.5 kHz

ALLOWED AUTHORIZED BANDWIDTH = 11.25 kHz.

11K0F3E for 12.5 kHz

For 12.5 kHz

$B_n = 2M + 2DK$

$M = 3,000$  Hz

$D = 2500$  Hz (Peak Deviation)

$K = 1$

$B_n = 2(3000) + 2(2500)(1) = 6.0k + 5.0k = 11.0k$

For 12.5 kHz

ALLOWED AUTHORIZED BANDWIDTH = 11.25 kHz.

90.209(b)(5)

2.1033 (5) Frequency Range: 421-512 MHz

(6) Power Range and Controls: There are NO user Power controls.

(7) Maximum Output Power Rating:  
into a 50 ohm resistive load.

(8) DC Voltages and Current into Final Amplifier:  
SEE NEXT PAGE

(9) Tune-up procedure. The tune-up procedure is given  
in EXHIBIT 8.

2.1033 (10) Complete Circuit Diagrams: The circuit diagram is  
included as EXHIBIT 2. The block diagram is included as  
EXHIBIT 3.

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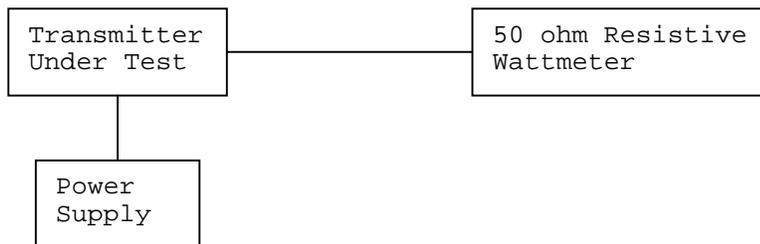
- (11) Function of each electron tube or semiconductor device or other active circuit device:  
SEE EXHIBIT 14.
- (8) Instruction book. The instruction manual is included as EXHIBIT 14.
- (10) Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in the instruction manual.
- 2.1033(c)(11) A photograph or drawing of the equipment identification label is shown in Exhibit 1.
- 2.1033(c)(12) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout and label location are shown in Exhibit 6-7.
- 2.1033(c)(13) For equipment employing digital modulation, a detail description of the modulation technique. This UUT uses FSK to modulate the transmitter.
- 2.1033(c)(14) data required for 2.1046 to 2.1057 See Below
- 2.1046(a) RF power output.  
RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage of 7.2 VDC, and the transmitter properly adjusted the RF output measures:

POWER OUTPUT

INPUT POWER - :  $(7.2V)(0.1A) = .72$  Watts

OUTPUT POWER: 0.10 Watts Conducted

METHOD OF MEASURING RF POWER OUTPUT

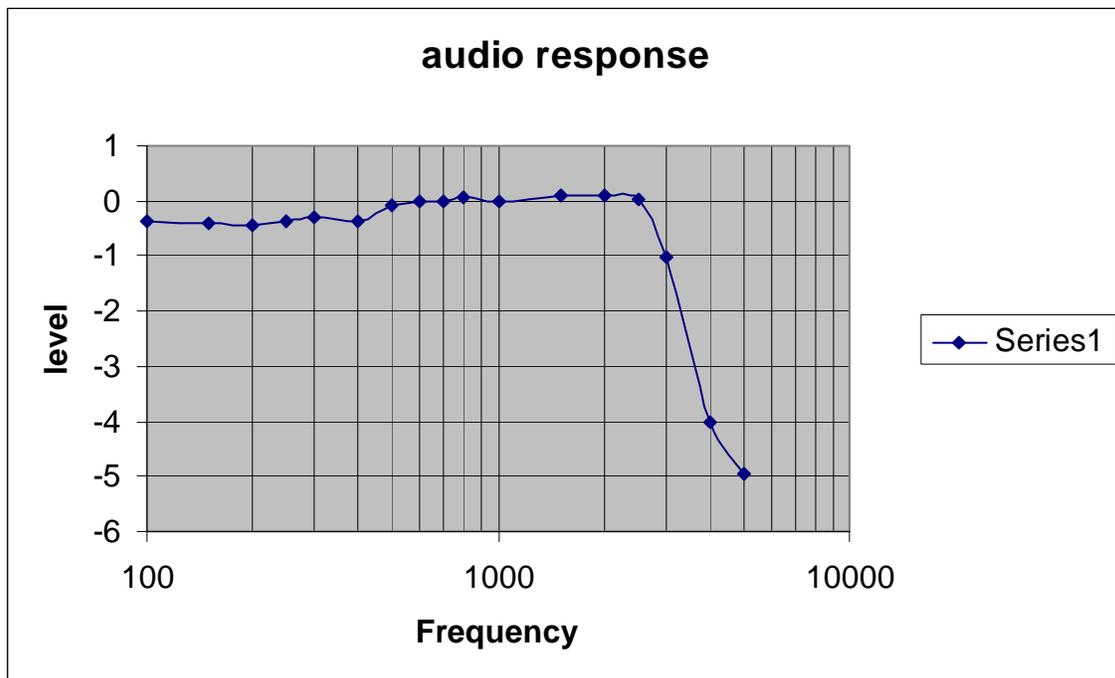


2.1047(a)(b) Modulation characteristics:

AUDIO FREQUENCY RESPONSE

The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown on page 5. 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.

**AUDIO FREQUENCY RESPONSE GRAPH**

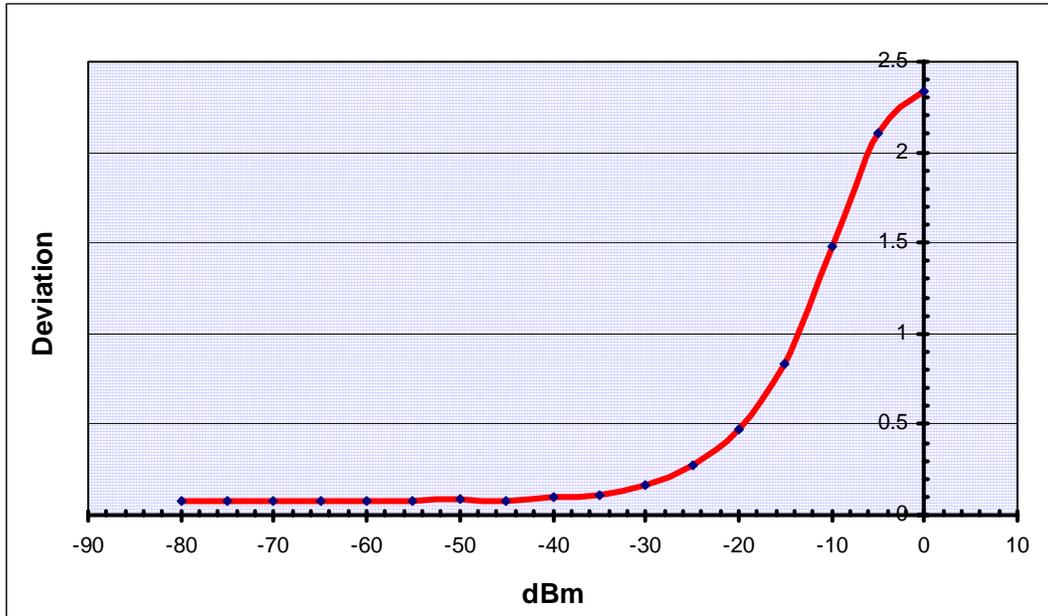


2.1047(b)

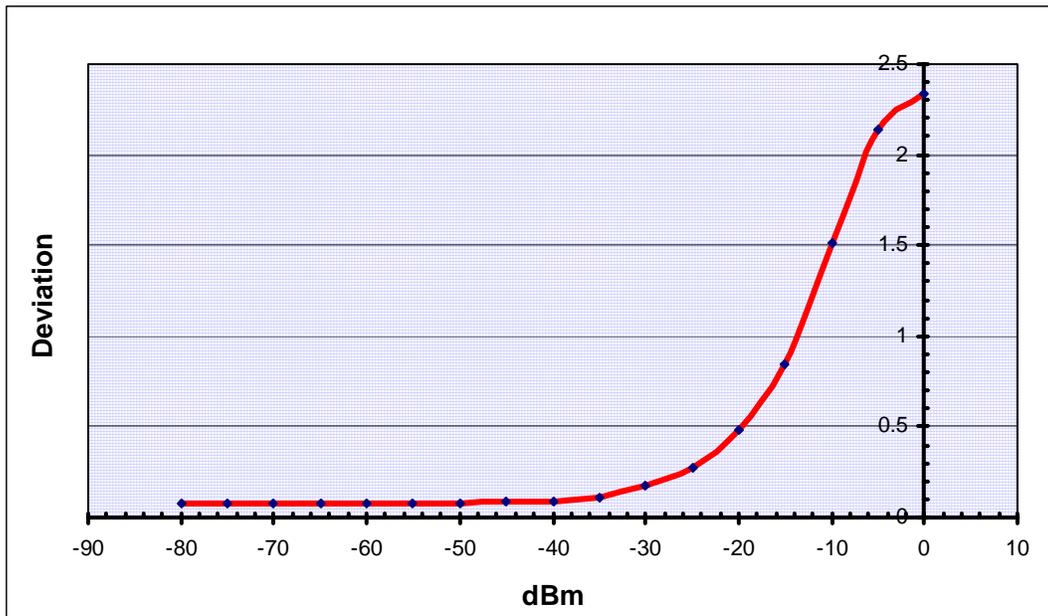
Audio input versus modulation

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 pages 6-8. Curves are provided for audio input frequencies of 300, 1000, and 2500 Hz.

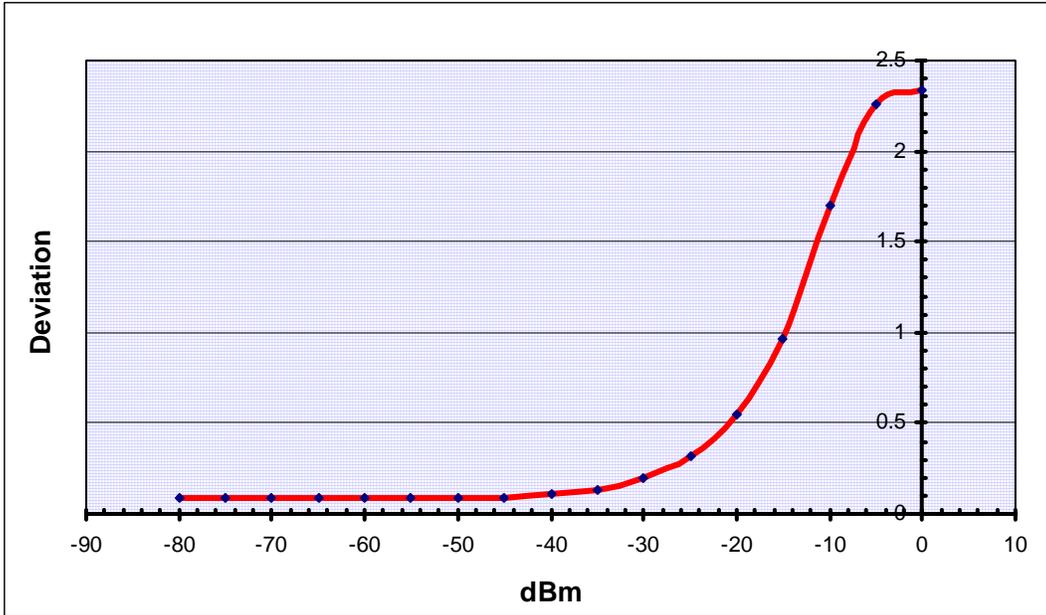
**MODULATION LIMITING PLOT - 300 Hz**



**MODULATION LIMITING PLOT - 1000 Hz**



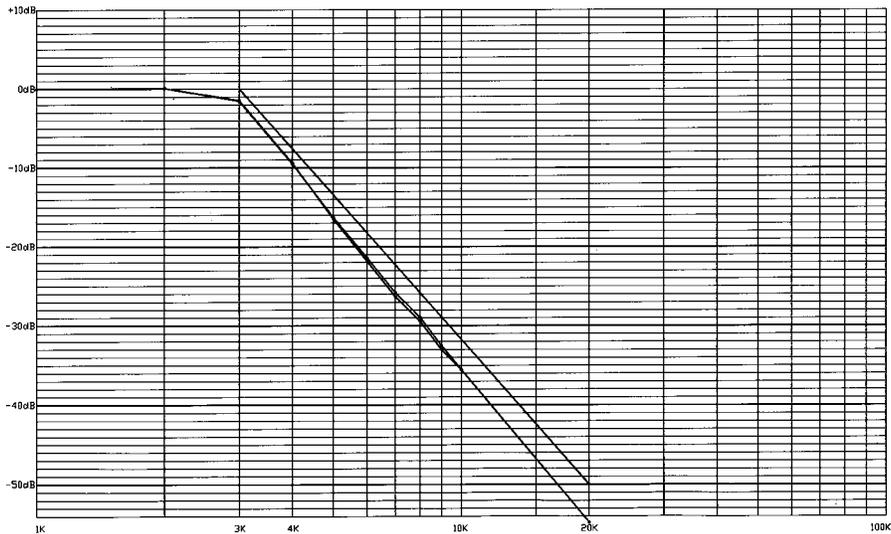
MODULATION LIMITING PLOT - 2500 Hz



Post Limiter Filter The filter must be between the modulation limiter and the modulated stage. At any frequency between 3 & 20 kHz the filter must have an attenuation of  $60\log(f/3)$  greater than the attenuation at 1kHz. See the plot; page 9.

2.1049 Audio Low Pass Filter.

Audio Low Pass Filter



2.1049 Occupied bandwidth:

90.210(b,)

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211 (b), the power of any emission must be attenuated below the un-modulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz but not more than 10 kHz: At least  $83 \log(f_d/5)$  dB; (2) ON any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but not more than 250% of the authorized bandwidth: At least  $29 \log(f_d^2/11)$  dB or 50 dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least  $43 + 10 \log(P_o)$  dB.

90.210(d) Emission Mask D - 12.5 kHz channel bandwidth equipment.

For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ : Zero dB.
- (2) On any frequency from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27 (f_d - 2.88 \text{ kHz})$  dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation.

Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least  $43 + \log(P)$  dB.

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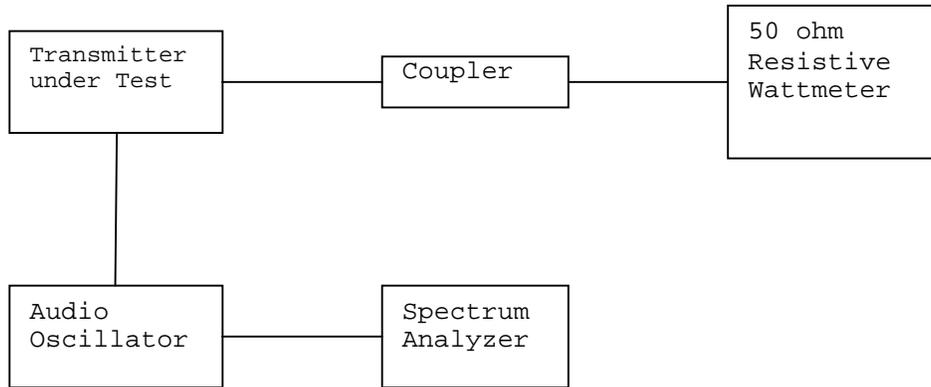
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Radiotelephone Transmitter with Modulation Limiter

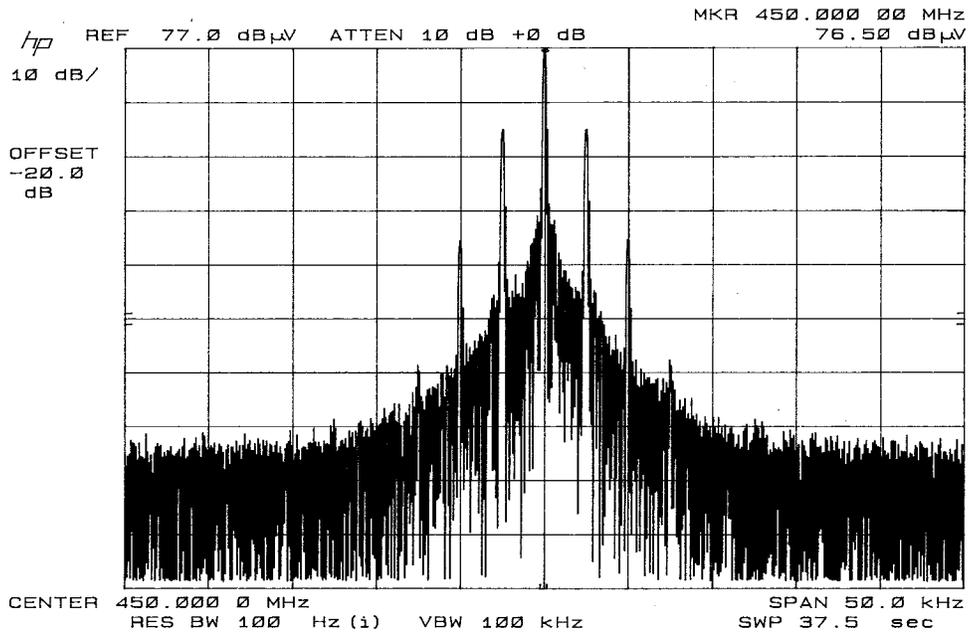
Test procedure: TIA/EIA-603 para 2.2.11 , with the exception that various tones were used.

Test procedure diagram

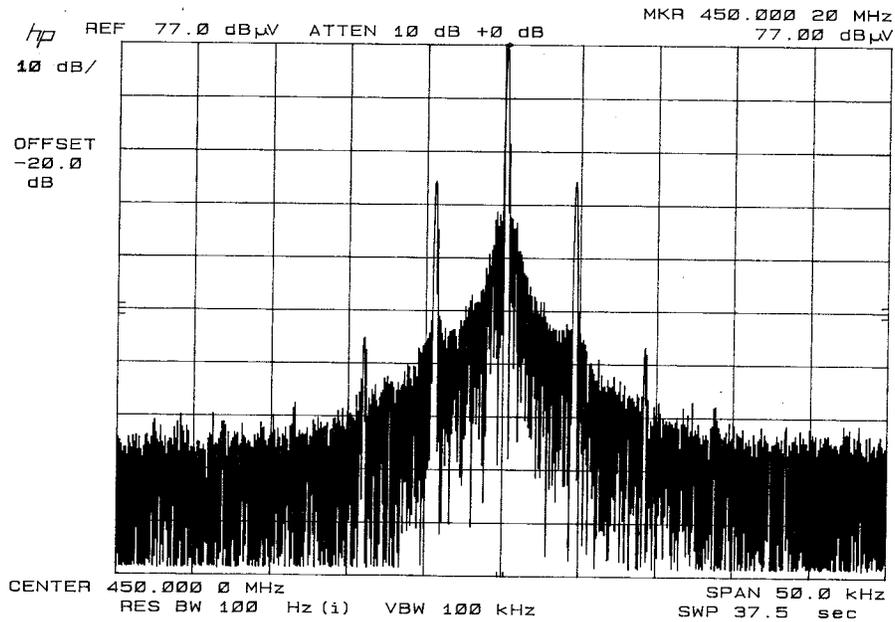
OCCUPIED BANDWIDTH MEASUREMENT



OCCUPIED BANDWIDTH PLOT - AUDIO INPUT



OCCUPIED BANDWIDTH PLOT - DIGITAL INPUT



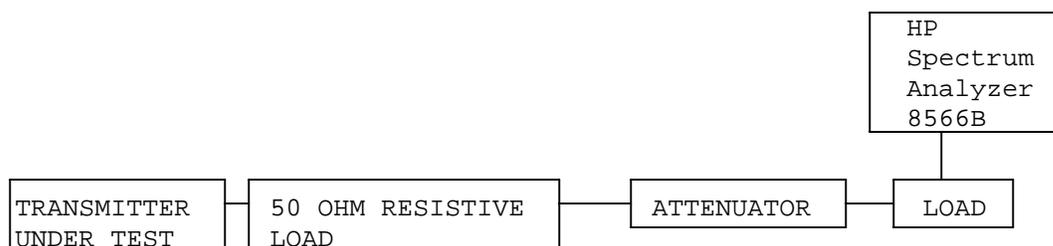
2.1051 Spurious emissions at antenna terminals (conducted):  
 2.1052 Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

REQUIREMENTS: Emissions must be 50 +10log(Po) dB below the mean power output of the transmitter.

For 12.5 kHz  $50 + 10\log(0.1) = 40.00$  dB

| EMISSION<br>FREQUENCY MHz | dB BELOW<br>CARRIER |
|---------------------------|---------------------|
|                           |                     |
| 450                       | 0.0                 |
| 900                       | 76.4                |
| 1350                      | 77.6                |
| 1800                      | 81.2                |
| 2250                      | 66.1                |
| 2700                      | 78.0                |
| 3150                      | 57.1                |
| 3600                      | 50.9                |
| 4050                      | 47.8                |
| 4500                      | 68.2                |
|                           |                     |
| 460                       | 0                   |
| 920                       | 73.5                |
| 1380                      | 79.1                |
| 1840                      | 73.7                |
| 2300                      | 74.5                |
| 2760                      | 95.5                |
| 3220                      | 72.7                |
| 3680                      | 52.7                |
| 4140                      | 66                  |
| 4600                      | 77.6                |
|                           |                     |
| 475                       | 0                   |
| 950                       | 73.6                |
| 1425                      | 77.7                |
| 1900                      | 77.0                |
| 2375                      | 66.4                |
| 2850                      | 70.8                |
| 3325                      | 61.9                |
| 3800                      | 48.8                |
| 4275                      | 69.1                |
| 4750                      | 71.6                |

Method of Measuring Conducted Spurious Emissions



METHOD OF MEASUREMENT: The procedure used was TIA/EIA-603 STANDARD without any exceptions. An audio generator was connected to the UUT through a dummy microphone circuit and the output of the transmitter connected to a standard load and from the standard load through a pre-selector filter of the spectrum analyzer. The spectrum was scanned from 400 kHz to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 849 N.W. State Road 45, Newberry, Florida 32669.

2.1053                      Field strength of spurious emissions:  
NAME OF TEST:                RADIATED SPURIOUS EMISSIONS  
REQUIREMENTS:              Emissions must be 50 +10log(Po) dB below the  
   mean power output of the transmitter.

$$50 + 10\log(0.1) = 40.00 \text{ dB}$$

**TEST DATA:**

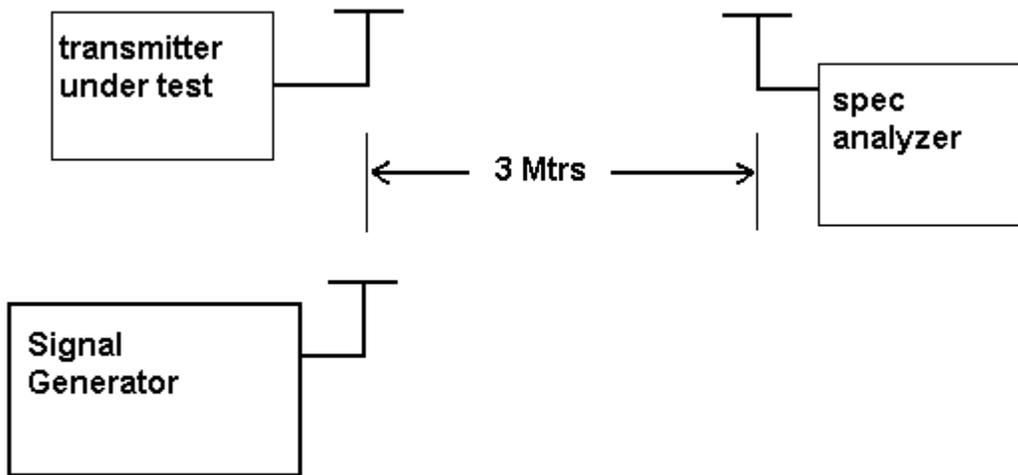
| Emission Frequency MHz | ANT. POLARITY | Signal Generator Level (dBm) | Coax Loss (dB) | Substitution Antenna (dBd) | ERP (dBc) |
|------------------------|---------------|------------------------------|----------------|----------------------------|-----------|
| 450                    | H             | 23.65                        | 0              | -0.45                      | 0         |
| 900                    | H             | -35.45                       | 0.7            | -0.55                      | 58.65     |
| 1350                   | V             | -44.25                       | 1              | 4.85                       | 67.45     |
| 1800                   | H             | -45.55                       | 1.1            | 5.25                       | 68.75     |
| 2250                   | H             | -41.05                       | 1.2            | 6.85                       | 64.25     |
| 2700                   | H             | -49.75                       | 1.3            | 7.05                       | 72.95     |
| 3150                   | V             | -39.20                       | 1.35           | 7.15                       | 62.4      |
| 3600                   | V             | -36.05                       | 1.4            | 7.55                       | 59.25     |
| 4050                   | V             | -29.00                       | 1.45           | 7.55                       | 52.2      |
| 4500                   | V             | -40.95                       | 1.5            | 8.35                       | 64.15     |

| Emission Frequency MHz | ANT. POLARITY | Signal Generator Level (dBm) | Coax Loss (dB) | Substitution Antenna (dBd) | ERP (dBc) |
|------------------------|---------------|------------------------------|----------------|----------------------------|-----------|
| 460                    | H             | 23.45                        | 0              | -0.45                      | 0         |
| 920                    | H             | -36.75                       | 0.7            | -0.85                      | 59.75     |
| 1380                   | H             | -45.35                       | 1.1            | 4.85                       | 68.35     |
| 1840                   | V             | -32.75                       | 1.2            | 5.25                       | 55.75     |
| 2300                   | H             | -49.9                        | 1.25           | 6.85                       | 72.9      |
| 2760                   | V             | -62.3                        | 1.35           | 7.05                       | 85.3      |
| 3220                   | V             | -41.6                        | 1.35           | 7.45                       | 64.6      |
| 3680                   | V             | -38.05                       | 1.4            | 7.55                       | 61.05     |
| 4140                   | H             | -43.6                        | 1.45           | 7.55                       | 66.6      |
| 4600                   | V             | -47.15                       | 1.5            | 8.25                       | 70.15     |

| Emission Frequency MHz | ANT. POLARITY | Signal Generator Level (dBm) | Coax Loss (dB) | Substitution Antenna (dBd) | ERP (dBc) |
|------------------------|---------------|------------------------------|----------------|----------------------------|-----------|
| 475                    | H             | 23.95                        | 0              | -0.55                      | 0         |
| 950                    | H             | -25.25                       | 0.7            | -1.15                      | 48.65     |
| 1425                   | H             | -42.45                       | 1.1            | 4.95                       | 65.85     |
| 1900                   | H             | -41.15                       | 1.2            | 5.25                       | 64.55     |
| 2375                   | H             | -34.4                        | 1.25           | 6.85                       | 57.8      |
| 2850                   | H             | -49.4                        | 1.35           | 7.15                       | 72.8      |
| 3325                   | V             | -33.55                       | 1.4            | 7.55                       | 556.95    |
| 3800                   | V             | -35.7                        | 1.45           | 7.55                       | 59.1      |
| 4275                   | V             | -36                          | 1.45           | 8.05                       | 59.4      |
| 4750                   | V             | -50.55                       | 1.5            | 7.85                       | 73.95     |

METHOD OF MEASUREMENTS: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

Method of Measuring Radiated Spurious Emissions



2.1055 Frequency stability:  
90.213(a)(1)

Temperature and voltage tests were performed to verify that the frequency remains within the .00015%, 1.5 ppm specification limit, for 25 kHz spacing & 0.00025% for 12.5 kHz spacing. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25°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 -30°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° increments up to + 50 degrees C. Readings were also taken at minus 15% of the battery voltage of 7.2VDC, which we estimate to be the battery endpoint.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 460.000 000 MHz

| <u>TEMPERATURE_°C</u> | <u>FREQUENCY_MHz</u> | <u>PPM</u> |
|-----------------------|----------------------|------------|
| REFERENCE_____        | 460.000 000          | 00.0       |
| -30_____              | 460.000 363          | 0.79       |
| -20_____              | 460.000 374          | 0.81       |
| -10_____              | 460.000 477          | 1.04       |
| 0_____                | 460.000 562          | 1.22       |
| +10_____              | 460.000 510          | 1.11       |
| +20_____              | 460.0 002            | 0.43       |
| +30_____              | 459.999 822          | -0.39      |
| +40_____              | 459.999 633          | -0.80      |
| +50_____              | 459.999 429          | -1.24      |

-15% Battery End-Point VDC 460.000 186 0.40

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was +1.22 ppm.

2.1055(a)(1) Frequency stability:  
90.214 Transient Frequency Behavior

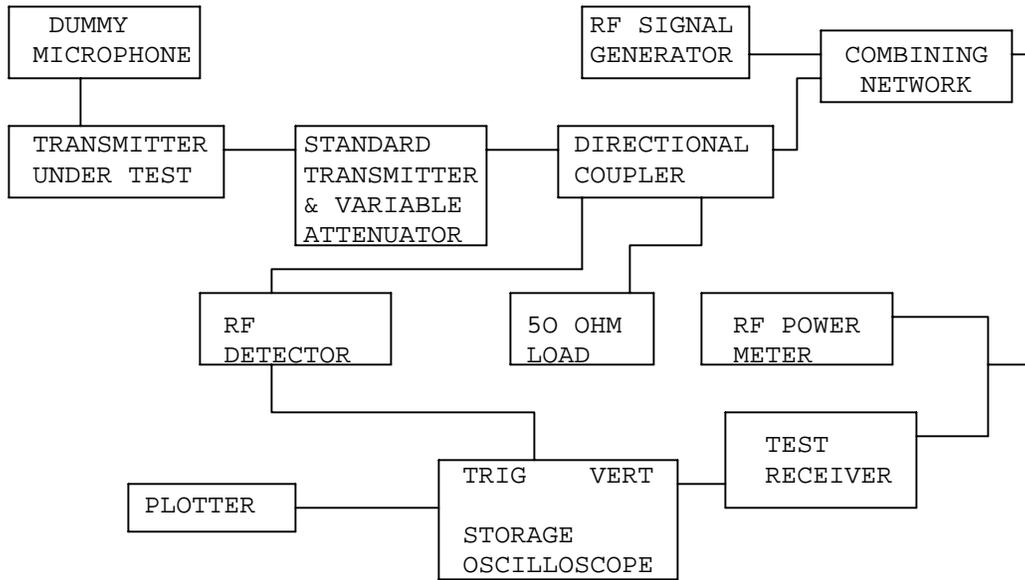
REQUIREMENTS: In the 450-500MHz frequency band, transient frequencies must be within the maximum frequency difference limits during the time interval indicated below for 12.5kHz Channels:

| Time Interval | Maximum Frequency | Portable Radios<br>450-500 MHz |
|---------------|-------------------|--------------------------------|
| t1            | +12.5 kHz         | 10.0 ms                        |
| t2            | +6.25 kHz         | 25.0 ms                        |
| t3,t4         | +12.5 kHz         | 10.0 ms                        |

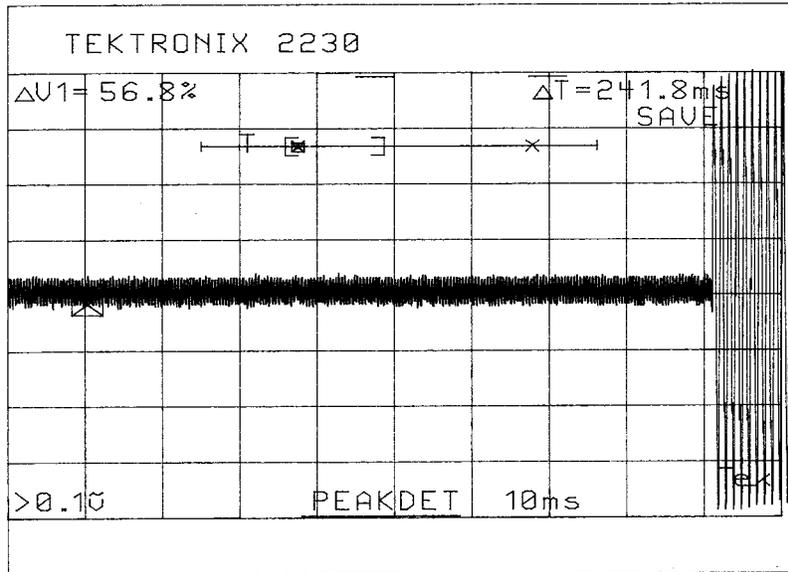
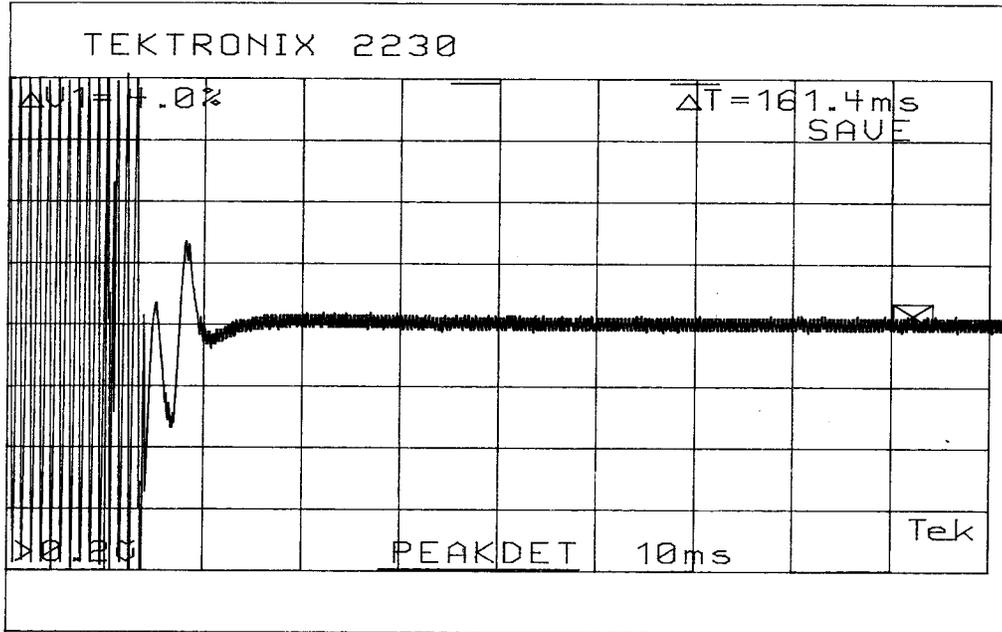
TEST PROCEEDURE: TIA/EIA TS603 PARA 2.2.19, the levels were set as follows;

1. Using the variable attenuator the transmitter level was set to 40 dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
3. Reduce the attenuation between the transmitter and the RF detector by 30 dB.
4. With the levels set as above the transient frequency behavior was observed & recorded.

2.1055            Frequency stability:  
90.214            Transient Frequency Behavior  
(Continued)



TRANSIENT FREQUENCY BEHAVIOR  
12.5 KHz



## MPE CALCULATION

Where:

Power = 100 mWatts

Frequency is 480 MHz

Time averaging is : 50% Transmit on time is 15 minutes in 30 minute period.

Uncontrolled exposure

Conclusions: For a 20 cm separation distance an antenna with 13 dBd of gain can be used.

W := 0.1      power in Watts      D := 1      Duty Factor in decimal % (1=100%)

E := 15.0 exposure time in minutes      U := 30      (use 6 for controlled and 30 for uncontrolled)

$$W_{exp} := W \cdot D \cdot \left( \frac{E}{U} \right)$$

$$PC := \frac{E}{U}$$

PC = 0.5      percent on time

W<sub>exp</sub> = 0.05      Watts

Po := 50      mWatts      dBd := 13      antenna gain      f := 480      Frequency in MHz

G := dBd + 2.15      gain in dBi

G<sub>n</sub> := 10 <sup>$\frac{G}{10}$</sup>       gain numeric

$$S := \frac{f}{1500}$$

controlled exposure

300 for controlled

1500 for uncontrolled

G<sub>n</sub> = 32.734

S = 0.32

$$R := \sqrt{\frac{(Po \cdot G_n)}{(4 \cdot \pi \cdot S)}}$$

$$R_{inches} := \frac{R}{2.54}$$

R = 20.175      distance in centimeters  
required for compliance

R<sub>inches</sub> = 7.943

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# EMC Equipment List

Last Update: 6/27/03

|   | DEVICE  | MFGR   | MODEL           | SERNO                                  | CAL/CHAR DATE   | DUE DATE or STATUS                                 |
|---|---|--|-----------------|--|---|--|
|   | 3-Meter OATS  | TEI  | N/A             | N/A                                    | Listed<br>1/13/03                                     | 1/13/06  |
|   | 3/10-Meter OATS   | TEI  | N/A             | N/A                                    | Listed<br>3/26/01                                     | 3/26/04  |
| X | Receiver, Beige Tower Spectrum Analyzer<br><br>RF Preselector<br><br>Quasi-Peak Adapter<br><br>Preamplifier       | HP   | 8566B Opt 462   | 3138A07786<br>3144A20661               | CAL<br>8/31/01  | 8/31/03  |
| X |   | HP   | 85685A          | 3221A01400                             | CAL<br>8/31/01  | 8/31/03  |
| X |   | HP   | 85650A          | 3303A01690                             | CAL<br>8/31/01  | 8/31/03  |
| X |   | HP   | 8449B-H02       | 3008A00372                             | CHAR<br>3/4/01  | 3/4/03   |
|   |   | Receiver, Blue Tower Spectrum Analyzer<br><br>RF Preselector<br><br>Quasi-Peak Adapter | HP              | 8568B                                  | 2928A04729<br>2848A18049<br>2926A00983                | CAL<br>4/15/03<br>CAL<br>4/15/03<br>CAL<br>4/15/03 |
|   | Receiver, Silver/Grey Tower Spectrum Analyzer<br><br>RF Preselector<br><br>Quasi-Peak Adapter<br><br>Preamplifier | HP   | 8566B Opt 462   | 3552A22064<br>3638A08608<br>2620A00294 | CAL<br>10/14/02<br>CAL<br>10/14/02<br>CAL<br>10/14/02 | 10/14/04<br>10/14/04<br>10/14/04                   |
|   |   | HP   | 85685A          | 3303A01844                             | CAL<br>10/14/02                                       | 10/14/04   |
|   |   | HP   | 8449B           | 3008A01075                             | CHAR<br>1/28/02                                       | 1/28/04  |
|   |   | Biconnical Antenna   | Electro-Metrics | BIA-25                                 | 1171  | CAL<br>4/26/01                                     |
| X | Biconnical Antenna  | Eaton  | 94455-1         | 1096                                   | CAL<br>10/1/01  | 10/1/03  |
|   | Biconnical Antenna  | Eaton  | 94455-1         | 1057                                   | CAL<br>3/18/03  | 3/18/05  |
|   | BiconiLog Antenna   | EMCO   | 3143            | 9409-1043                              |   |  |
| X | Log-Periodic Antenna  | Electro-Metrics  | LPA-25          | 1122                                   | CAL<br>10/2/01  | 10/2/03  |
|   | Log-Periodic Antenna  | Electro-Metrics  | EM-6950         | 632                                    | CHAR<br>10/15/01                                      | 10/15/03   |
|   | Log-Periodic Antenna  | Electro-Metrics  | LPA-30          | 409                                    | CAL<br>3/4/03   | 3/4/05   |

|   | <b>DEVICE</b>                      | <b>MFGR</b>                 | <b>MODEL</b> | <b>SERNO</b> | <b>CAL/CHAR DATE</b> | <b>DUE DATE or STATUS</b> |
|---|------------------------------------|-----------------------------|--------------|--------------|----------------------|---------------------------|
|   | Log-Periodic Antenna               | Eaton                       | 96005        | 1243         | CAL<br>5/8/03        | 5/8/05                    |
|   | Dipole Antenna Kit                 | Electro-Metrics             | TDA-30/1-4   | 152          | CAL<br>3/21/01       | 3/21/04                   |
|   | Dipole Antenna Kit                 | Electro-Metrics             | TDA-30/1-4   | 153          | CAL<br>9/26/02       | 9/26/05                   |
|   | Double-Ridged Horn Antenna         | Electro-Metrics             | RGA-180      | 2319         | CAL<br>2/17/03       | 2/17/05                   |
| X | Horn Antenna *(at 3 meters)        | Electro-Metrics             | EM-6961      | 6246         | CAL<br>3/31/03       | 3/31/05                   |
|   | Horn Antenna *(at 10 meters)       | Electro-Metrics             | EM-6961      | 6246         | CAL<br>6/4/03        | 6/4/05                    |
|   | Horn Antenna                       | ATM                         | 19-443-6R    | None         | No Cal Required      |                           |
|   | Passive Loop Antenna               | EMC Test Systems            | EMCO 6512    | 9706-1211    | CHAR<br>7/10/01      | 7/10/03                   |
|   | Harmonic Mixer with Horn Antenna   | Oleson Microwave Labs       | M08HW/A      | F30425-1     | CHAR<br>4/25/03      | 4/25/05                   |
|   | Harmonic Mixer with Horn Antenna   | Oleson Microwave Labs       | M12HW/A      | E30425-1     | CHAR<br>4/25/03      | 4/25/05                   |
|   | Line Impedance Stabilization . . . | Electro-Metrics             | ANS-25/2     | 2604         | CAL<br>10/9/01       | 10/9/03                   |
|   | Line Impedance Stabilization . . . | Electro-Metrics             | EM-7820      | 2682         | CAL<br>3/12/03       | 3/12/05                   |
|   | Termaline Wattmeter                | Bird Electronic Corporation | 611          | 16405        | CAL<br>5/25/99       | 5/25/01                   |
|   | Termaline Wattmeter                | Bird Electronic Corporation | 6104         | 1926         | CHAR<br>12/12/01     | 12/12/03                  |
| X | Oscilloscope                       | Tektronix                   | 2230         | 300572       | CHAR<br>2/1/01       | 2/1/03                    |
|   | System One                         | Audio Precision             | System One   | SYS1-45868   | CHAR<br>4/25/02      | 4/25/04                   |
| X | Temperature Chamber                | Tenney Engineering          | TTRC         | 11717-7      | CHAR<br>1/22/02      | 1/22/04                   |
| X | AC Voltmeter                       | HP                          | 400FL        | 2213A14499   | CAL<br>10/9/01       | 10/9/03                   |
|   | AC Voltmeter                       | HP                          | 400FL        | 2213A14261   | CHAR<br>10/15/01     | 10/15/03                  |
|   | AC Voltmeter                       | HP                          | 400FL        | 2213A14728   | CHAR<br>10/15/01     | 10/15/03                  |
| X | Digital Multimeter                 | Fluke                       | 77           | 35053830     | CHAR<br>1/8/02       | 1/8/04                    |
|   | Digital Multimeter                 | Fluke                       | 77           | 43850817     | CHAR<br>1/8/02       | 1/8/04                    |
|   | Digital Multimeter                 | HP                          | E2377A       | 2927J05849   | CHAR<br>1/8/02       | 1/8/04                    |

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|   | <b>DEVICE</b>             | <b>MFGR</b>             | <b>MODEL</b>         | <b>SERNO</b> | <b>CAL/CHAR DATE</b> | <b>DUE DATE or STATUS</b> |
|---|---------------------------|-------------------------|----------------------|--------------|----------------------|---------------------------|
|   | Multimeter                | Fluke                   | FLUKE-77-3           | 79510405     | CHAR<br>9/26/01      | 9/26/03                   |
| X | Peak Power Meter          | HP                      | 8900C                | 2131A00545   | CHAR<br>1/26/01      | 1/26/03                   |
|   | Power Meter               | HP                      | 432A                 | 1141A07655   | CAL<br>4/15/03       | 4/15/05                   |
|   | Power Meter<br>And Sensor | Bird                    | 4421-107<br>4022     | 0166<br>0218 | CAL<br>4/16/03       | 4/16/05                   |
|   | Power Sensor              | HP                      | 478A                 | 72129        | CAL<br>4/15/03       | 4/15/05                   |
|   | Digital Thermometer       | Fluke                   | 2166A                | 42032        | CAL<br>1/16/02       | 1/16/04                   |
|   | Thermometer               | Traulsen                | SK-128               |              | CHAR<br>1/22/02      | 1/22/04                   |
| X | Thermometer               | Extech                  | 4028                 | 14871-2      | CAL<br>3/7/03        | 3/7/05                    |
|   | Hygro-Thermometer         | Extech                  | 445703               | 0602         | CAL<br>10/4/02       | 10/4/04                   |
|   | Frequency Counter         | HP                      | 5352B                | 2632A00165   | CAL<br>11/28/01      | 11/28/03                  |
|   | Frequency Counter         | HP                      | 5385A                | 2730A03025   | CAL<br>3/7/03        | 3/7/05                    |
| X | Power Sensor              | Agilent<br>Technologies | 84811A               | 2551A02705   | CHAR<br>1/26/01      | 1/26/03                   |
|   | Service Monitor           | IFR                     | FM/AM 500A           | 5182         | CAL<br>11/22/00      | 11/22/02                  |
| X | Comm. Serv. Monitor       | IFR                     | FM/AM 1200S          | 6593         | CAL<br>5/12/02       | 5/12/04                   |
| X | Signal Generator          | HP                      | 8640B                | 2308A21464   | CAL<br>2/15/02       | 2/15/04                   |
| X | Sweep Generator           | Wiltron                 | 6648                 | 101009       | CAL<br>4/15/03       | 4/15/05                   |
|   | Sweep Generator           | Wiltron                 | 6669M                | 007005       | CAL<br>3/3/03        | 3/3/05                    |
| X | Modulation Analyzer       | HP                      | 8901A                | 3435A06868   | CAL<br>9/5/01        | 9/5/03                    |
|   | Modulation Meter          | Boonton                 | 8220                 | 10901AB      | CAL<br>4/15/03       | 4/15/05                   |
|   | Near Field Probe          | HP                      | HP11940A             | 2650A02748   | CHAR<br>2/1/01       | 2/1/03                    |
|   | BandReject Filter         | Lorch Microwave         | 5BR4-2400/<br>60-N   | Z1           | CHAR<br>3/2/01       | 3/2/03                    |
|   | BandReject Filter         | Lorch<br>Microwave      | 6BR6-2442/<br>300-N  | Z1           | CHAR<br>3/2/01       | 3/2/03                    |
|   | BandReject Filter         | Lorch<br>Microwave      | 5BR4-10525/<br>900-S | Z1           | CHAR<br>3/2/01       | 3/2/03                    |

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|   | <b>DEVICE</b>        | <b>MFGR</b>         | <b>MODEL</b>        | <b>SERNO</b> | <b>CAL/CHAR DATE</b> | <b>DUE DATE or STATUS</b> |
|---|----------------------|---------------------|---------------------|--------------|----------------------|---------------------------|
|   | Notch Filter         | Lorch Microwave     | 5BRX-850/<br>X100-N | AD-1         | CHAR<br>4/17/03      | 4/17/05                   |
|   | High Pass Filter     | Unk                 | 3768(5)-400         | 041          | CHAR<br>12/17/02     | 12/17/04                  |
|   | High Pass Filter     | Microlab            | HA-10N              |              | CHAR<br>10/4/01      | 10/4/03                   |
|   | High Pass Filter     | Microlab            | HA-20N              |              | CHAR<br>2/7/03       | 2/7/05                    |
|   | Audio Oscillator     | HP                  | 653A                | 832-00260    | CHAR<br>3/1/01       | 3/1/03                    |
| X | Audio Generator      | B&K Precision       | 3010                | 8739686      | CHAR<br>12/1/02      | 12/1/04                   |
|   | Frequency Counter    | HP                  | 5382A               | 1620A03535   | CHAR<br>3/2/01       | 3/2/03                    |
|   | Frequency Counter    | HP                  | 5385A               | 3242A07460   | CAL<br>3/7/03        | 3/7/05                    |
|   | Amplifier            | HP                  | 11975A              | 2738A01969   | CHAR<br>3/1/01       | 3/1/03                    |
|   | Egg Timer            | Unk                 |                     |              | CHAR<br>8/31/01      | 8/31/03                   |
|   | Measuring Tape, 20M  | Kraftixx            | 0631-20             |              | CHAR<br>2/1/02       | 2/1/04                    |
| X | Measuring Tape, 7.5M | Kraftixx            | 7.5M PROF1          |              | 2/1/02               | 2/1/04                    |
| X | Coaxial Cable #51    | Insulated Wire Inc. | NPS 2251-2880       | Timco #51    | CHAR<br>1/23/02      | 1/23/04                   |
|   | Coaxial Cable #64    | Semflex Inc.        | 60637               | Timco #64    | CHAR<br>1/24/02      | 1/24/04                   |
|   | Coaxial Cable #65    | General Cable Co.   | E9917 RG233/U       | Timco #65    | CHAR<br>1/23/02      | 1/23/04                   |
| X | Coaxial Cable #106   | Unknown             | Unknown             | Timco #106   | CHAR<br>1/23/02      | 1/23/04                   |

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