

TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: sid@timcoengr.com

Test Report

Product Name: BELTPACK TRANSMITTER

FCC ID: JFZT701

Applicant:

**AUDIO TECHNICA CORPORATION
2206 NARUSE, MACHIDA
TOKYO 194
JAPAN**

Date Receipt: 5/23/2006

Date Tested: 7/6/2006

APPLICANT: AUDIO TECHNICA CORPORATION

FCC ID: JFZT701

REPORT #: A\AudioTechnica_JFZ\1079AUT6\1079AUT6TestReport.doc

COVER SHEET

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GENERAL INFORMATION REQUIRED FOR TYPE ACCEPTANCE

2.1033 AUDIO TECHNICA CORPORATION will manufacture the
2.1034 FCC ID: JFZT701 in quantity, for use under FCC RULES
PART 74.801, LOW POWER AUXILIARY STATIONS.

2.1033 (C4) TECHNICAL DESCRIPTION

(1) Type of Emission: 96KF3E

Bn = 2M + 2DK
M = 10000
D = 28 kHz (Peak Deviation)
K = 1
Bn = 2(10K) + 2(28K)(1) = 76K

ALLOWED AUTHORIZED BANDWIDTH = 200 kHz.
74.861(e)(5)

(2) Frequency Range: Part 74: 542 - 561 MHz
TEST FREQ = 542, 552, 561.

(3) Power Range and Controls: Unit has no controls.

(4) Maximum Output Power Rating: PWR: ERP

High Power .006W ERP
Low Power .002W ERP

(5) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY
3.0V BATTERY
Vce = 2.9 Volts
Ice = 28 mA.

2.1033 (C.10)(7) Complete Circuit Diagrams: The circuit diagram is included as Exhibit 4. The block diagram is included as an exhibit.

(8) Instruction book. The instruction manual is included as an exhibit.

(9) Tune-up procedure. The tune-up procedure is given in an exhibit.

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- (10) Description of all circuitry and devices provided for determining and stabilizing frequency.

The transmitter frequency is controlled by a crystal, see the exhibits for specifications.

- (11) Description of any circuits or devices employed For suppression of spurious radiation, for limiting modulation, and for limiting power.

This circuitry is described in the exhibits.

Limiting Modulation:
The transmitter audio circuitry is contained in circuit description exhibit.

Limiting Power:
There is no provision for limiting power.

- (12) Digital modulation. This unit does not use digital modulation.

2.983(e) The data required by 2.1046 through 2.1057 is submitted below.

2.1046 RF Power Output.

RF power is measured as effective radiated power.

OUTPUT POWER: High Power .006W ERP
Low Power .002W ERP

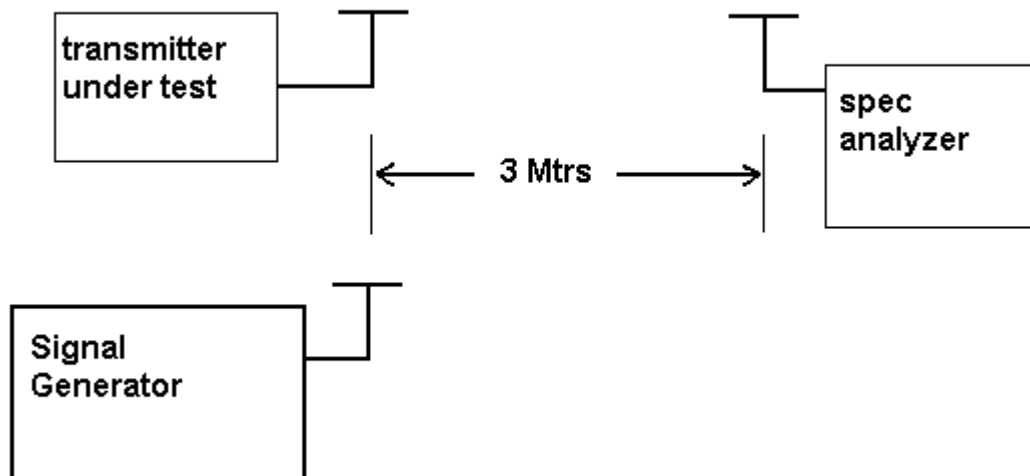
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R.F. POWER OUTPUT TEST PROCEDURE



See EIA/TIA 603 substitution method.

2.1047(a)(b) Modulation characteristics:

AUDIO LOW PASS FILTER

The audio low pass filter is not required in this unit.

AUDIO FREQUENCY RESPONSE

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

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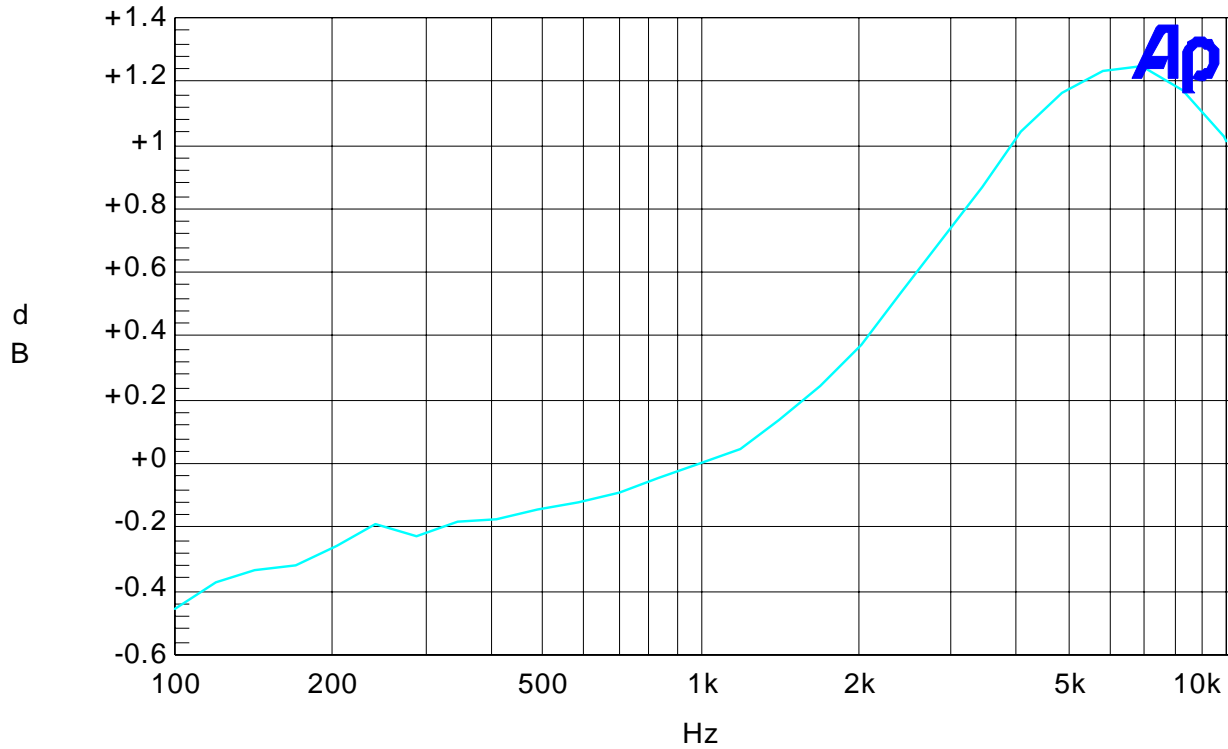
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Audio Frequency Response



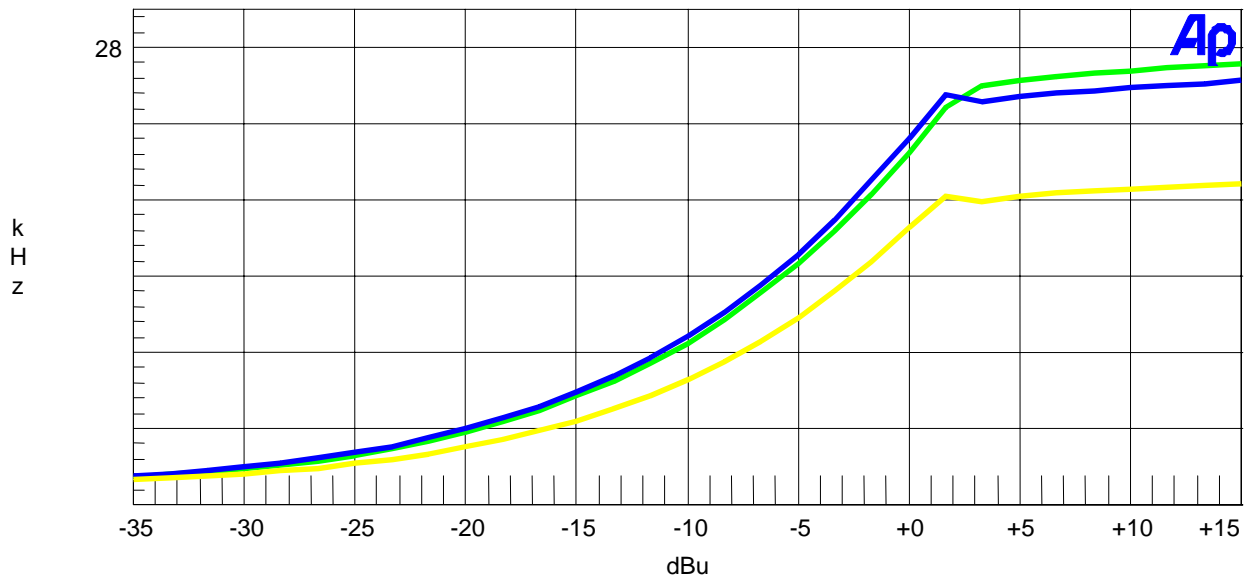
| Color | Line Style | Thick | Data | Axis |
|-------|------------|-------|------------------------|------|
| Cyan | Solid | 1 | AnIr.Level A!Normalize | Left |

MaxFreq.at1

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Modulation Limiting Plots:
 15 KHz (Green), 2.5 KHz (Blue), and 1 KHz (Yellow). Max deviation: 28 K



| Color | Line Style | Thick | Data | Axis |
|--------|------------|-------|--------------|------|
| Green | Solid | 3 | Anlr.Level A | Left |
| Blue | Solid | 3 | Anlr.Level A | Left |
| Yellow | Solid | 3 | Anlr.Level A | Left |

modulation limiting.at1

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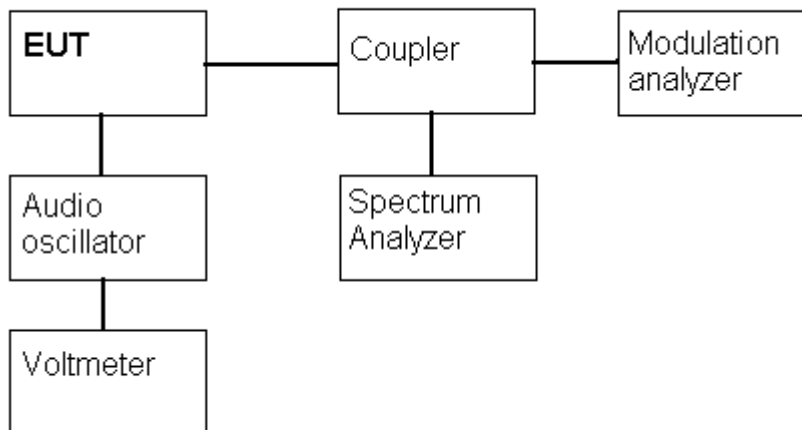
2.1049 Occupied Bandwidth:

Data in the plots show that all sidebands between 50 & 100% of the authorized bandwidth are attenuated by at least 25dB. From 100 to 250% of the authorized bandwidth they are attenuated by at least 35dB and beyond 250% $43 \log(P_o)$ dB. The plot shows the transmitter modulated with 15000 Hz (the highest modulation frequency), adjusted for 50% modulation plus 16 dB. The spectrum analyzer was set with the un-modulated carrier at the top of the screen. The test procedure diagram and occupied bandwidth plot follows.

Microphone transmitter

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



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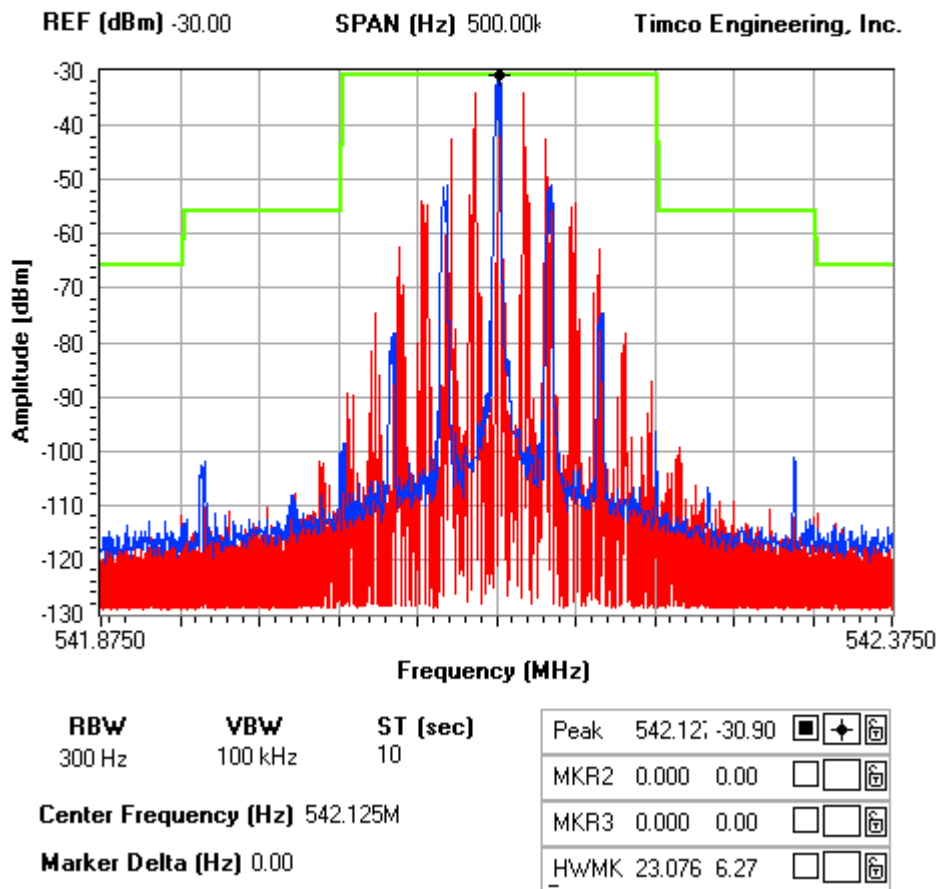
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NOTES:

AUDIO TECHNICA CORPORATION - FCC ID: JFZT701
 OCCUPIED BANDWIDTH PLOT



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2.1051 Spurious emissions at antenna terminals(conducted):
Not Applicable no antenna connector.

2.1053(a)(b) Field Strength of Radiated Spurious Emissions:

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

$$43 + 10 \log(.006) = 20.78 \text{ dB}$$

HIGH POWER:

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 542.13 | V | 0 |
| 1084.26 | V | 67.37 |
| 1626.39 | V | 61.69 |
| 2168.52 | V | 47.92 |
| 2710.65 | V | 57.61 |
| 3252.78 | V | 47.17 |
| 3794.91 | V | 57.80 |
| 4337.04 | V | 58.85 |
| 4879.17 | V | 58.70 |
| 5421.30 | V | 57.65 |

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 552.00 | V | 0 |
| 1104.00 | V | 68.06 |
| 1656.00 | V | 59.05 |
| 2208.00 | V | 49.48 |
| 2760.00 | V | 59.05 |
| 3312.00 | V | 49.90 |
| 3864.00 | V | 51.97 |
| 4416.00 | V | 55.14 |
| 4968.00 | V | 58.79 |
| 5520.00 | V | 57.40 |

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2.1053(a)(b) Field Strength of Radiated Spurious Emissions:

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

HIGH POWER: 43 + 10log(.006) = 20.78 dB

LOW POWER: 43 + 10log(.002) = 16.01 dB

HIGH POWER:

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 561.26 | V | 0 |
| 1122.52 | V | 62.99 |
| 1683.78 | V | 57.13 |
| 2245.04 | V | 49.78 |
| 2806.30 | V | 58.22 |
| 3367.56 | V | 48.47 |
| 3928.82 | V | 52.47 |
| 4490.08 | V | 54.76 |
| 5051.34 | V | 56.78 |
| 5612.60 | V | 53.88 |

LOW POWER:

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 542.13 | V | 0 |
| 1084.26 | V | 64.77 |
| 1626.39 | V | 59.89 |
| 2168.52 | V | 49.42 |
| 2710.65 | V | 57.71 |
| 3252.78 | V | 49.67 |
| 3794.91 | V | 56.20 |
| 4337.04 | V | 58.65 |
| 4879.17 | V | 56.20 |
| 5421.30 | V | 55.75 |

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2.1053(a)(b) Field Strength of Radiated Spurious Emissions:

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

REQUIREMENTS: Emissions must be $43 + 10\log(P_o)$ dB below the mean power output of the transmitter.

HIGH POWER: $43 + 10\log(.006) = 20.78$ dB

LOW POWER: $43 + 10\log(.002) = 16.01$ dB

LOW POWER:

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 552.00 | V | 0 |
| 1104.00 | V | 66.56 |
| 1656.00 | V | 60.35 |
| 2208.00 | V | 48.78 |
| 2760.00 | V | 60.35 |
| 3312.00 | V | 54.10 |
| 3864.00 | V | 53.17 |
| 4416.00 | V | 54.34 |
| 4968.00 | V | 56.59 |
| 5520.00 | V | 56.10 |

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 561.26 | V | 0 |
| 1122.52 | V | 62.19 |
| 1683.78 | V | 57.53 |
| 2245.04 | V | 48.78 |
| 2806.30 | V | 57.42 |
| 3367.56 | V | 55.17 |
| 3928.82 | V | 51.87 |
| 4490.08 | V | 52.56 |
| 5051.34 | V | 55.18 |
| 5612.60 | V | 52.68 |

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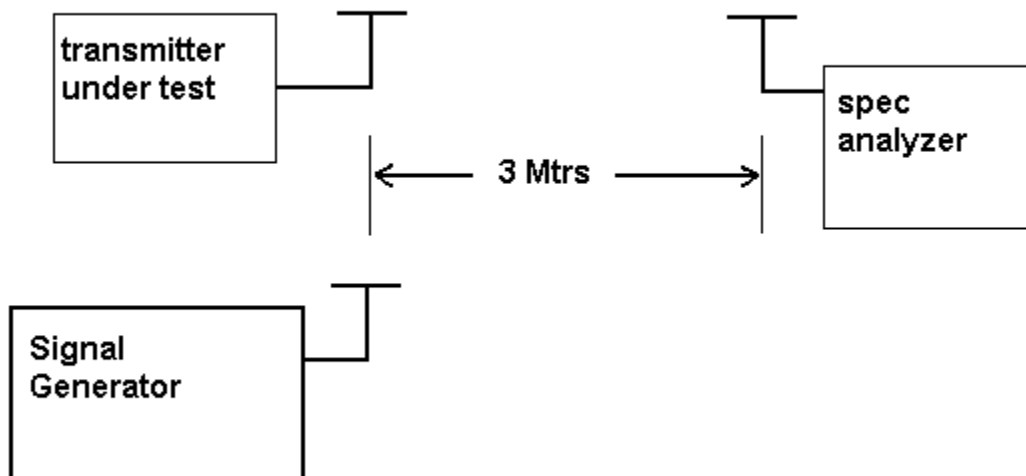
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METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the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

Method of Measuring Radiated Spurious Emissions



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2.1055 Frequency_Stability:
S74.861(e)(4)

Temperature and voltage tests were performed to verify that the frequency remains within the .0050%, (50 ppm)(74.861 e.4) 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 -30 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.

MEASUREMENT DATA:

Ref. Freq. 542.124610

| TEMPERATURE °C | FREQUENCY MHz | PPM |
|----------------|---------------|-------|
| -30°C | 542.129470 | 8.96 |
| -20°C | 542.130650 | 11.14 |
| -10°C | 542.130573 | 11.00 |
| -0°C | 542.129563 | 9.14 |
| 10°C | 542.127840 | 5.96 |
| 20°C | 542.125824 | 2.24 |
| 30°C | 542.123921 | -1.27 |
| 40°C | 542.121826 | -5.14 |
| 50°C | 542.120502 | -7.58 |
| Batt. Volts | Batt. Data | PPM |
| -15% | 542.124506 | -0.19 |
| +15% | 542.124578 | -0.06 |

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2.1033 (c.11) Photo or drawing of label:

See exhibits

2.1033 (c.12) Photos of device under test:

See exhibits

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TEST EQUIPMENT LIST

| Device | Manufacturer | Model | Serial Number | Cal/Char Date | Due Date |
|---------------------------------|-----------------|-------------|---------------|----------------|-------------------------|
| 3/10-Meter OATS | TEI | N/A | N/A | Listed 3/27/04 | 3/26/07 |
| 3-Meter OATS | TEI | N/A | N/A | Listed 1/11/06 | 1/10/09 |
| AC Voltmeter Analyzer | HP | 400FL | 2213A14499 | CAL 7/19/04 | 7/19/06 |
| Blue Tower Quasi-Peak Adapter | HP | 85650A | 2811A01279 | CAL 4/13/05 | 4/13/07 |
| Analyzer | HP | 85685A | 2926A00983 | CAL 9/5/05 | 9/5/07 |
| Blue Tower RF Preselector | HP | 8568B | 2928A04729 | CAL 4/13/05 | 4/13/07 |
| Analyzer | HP | | 2848A18049 | | |
| Blue Tower Spectrum Analyzer | Semflex Inc. | 60637 | Timco #64 | CHAR 11/28/05 | 11/28/07 |
| Coaxial Cable #64 | Electro-Metrics | TDA-30/1-4 | 152 | CAL 3/3/06 | 3/3/09 |
| Antenna: Dipole Kit | Electro-Metrics | TDA-30/1-4 | 153 | | Out for Repair and Char |
| Antenna: Dipole Kit | | | | | |
| Frequency Counter | HP | 5385A | 2730A03025 | CAL 4/15/05 | 4/15/07 |
| Hygro-Thermometer | Extech | 445703 | 0602 | CAL 8/1/05 | 8/1/07 |
| Antenna: Log-Periodic | Electro-Metrics | LPA-25 | 1122 | CAL 8/26/04 | 8/26/06 |
| Measuring Tape-7.5M | Kraftixx | 7.5M PROF I | | CHAR 12/16/05 | 12/16/07 |
| Modulation Analyzer | HP | 8901A | 3435A06868 | CAL 11/4/04 | 11/4/06 |
| Digital Multimeter | Fluke | FLUKE-77-3 | 79510405 | CAL 4/15/05 | 4/15/07 |
| Analyzer | HP | 8449B | 3008A01075 | CAL 8/8/05 | 8/8/07 |
| Open-Frame Tower Preamplifier | HP | 85650A | 3303A01844 | CAL 12/8/04 | 12/8/06 |
| Analyzer | HP | 85685A | 2620A00294 | CAL 4/27/04 | 12/8/06 |
| Silver Tower Quasi-Peak Adapter | | | | | |
| Analyzer | | | | | |
| Silver Tower | | | | | |

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RF

| | | | | | |
|--|--------------------------|-------------------------|--------------------------|--------------------------------|--------------------|
| Preselector Analyzer Silver Tower Spectrum Analyzer System One | HP | 8566B Opt 462 | 3552A22064 3638A08608 | CAL 12/8/04 | 12/8/06 |
| Preselector Analyzer Tower Preamplifier Analyzer Tan Tower Quasi- Peak Adapter Analyzer Tan Tower RF Preselector Analyzer Tan Tower Spectrum Analyzer Temperature Chamber | Audio Precision HP | System One 8449B-H02 | SYS1-45868 3008A00372 | CHAR 3/27/06 CAL 12/8/05 | 3/27/08 12/8/07 |
| Preselector Analyzer Tan Tower Spectrum Analyzer Temperature Chamber | HP | 85650A | 3303A01690 | CAL 12/8/05 | 12/8/07 |
| Preselector Analyzer Tan Tower Spectrum Analyzer Temperature Chamber | HP | 85685A | 3221A01400 | CAL 12/7/05 | 12/7/07 |
| Preselector Analyzer Tan Tower Spectrum Analyzer Temperature Chamber | HP | 8566B Opt 462 | 3138A07786 3144A20661 | CAL 12/7/05 | 12/7/07 |
| Preselector Analyzer Tan Tower Spectrum Analyzer Temperature Chamber | Tenney Engineering | TTRC | 11717-7 | CHAR 3/23/06 | 3/23/08 |

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