

# 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](mailto:sid@timcoengr.com)

## Test Report

Product Name: BELTPACK TRANSMITTER

FCC ID: JFZT201

Applicant:

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

**Date Receipt: 5/30/2006**

**Report Date: 10/2/2006**

APPLICANT: AUDIO TECHNICA CORPORATION

FCC ID: JFZT201

REPORT #: V:\A\AudioTechnica\_JFZ\1130UT6\1130UT6TestReport.doc

COVER SHEET

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### EXHIBITS CONTAINING:

CONFIDENTIALITY REQUEST LETTER  
FCC ID LABEL SAMPLE  
SKETCH OF FCC ID LABEL LOCATION  
BLOCK DIAGRAM  
SCHEMATIC  
TUNING PROCEDURE  
CIRCUIT DESCRIPTION  
USER'S MANUAL  
TEST SET UP PHOTOGRAPH  
EXTERNAL PHOTOGRAPHS  
INTERNAL PHOTOGRAPHS

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## GENERAL INFORMATION REQUIRED FOR TYPE ACCEPTANCE

2.1033 AUDIO TECHNICA CORPORATION will manufacture the  
2.1034 FCC ID: JFZT201 in quantity, for use under FCC RULES  
PART 90.265.

### 2.1033 (C4) TECHNICAL DESCRIPTION

(1) Type of Emission: 54KF3E

$$\begin{aligned} B_n &= 2M + 2DK \\ M &= 19000 \\ D &= 8 \text{ kHz (Peak Deviation)} \\ K &= 1 \\ B_n &= 2(19k) + 2(8k)(1) = 54000 \end{aligned}$$

ALLOWED AUTHORIZED BANDWIDTH = 54 kHz.  
90.265 (b)

(2) Frequency Range: 169.445-171.905

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

(4) Maximum Output Power Rating: PWR: ERP

0.002 Watts

(5) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY  
INPUT POWER -  $(9.0V)(0.035A) = 0.31 \text{ Watts}$

2.1033 (C.10)(7) Complete Circuit Diagrams: The circuit diagram and  
block diagram are included.

(8) Instruction book. The instruction manual is included.

Tune-up procedure. The tune-up procedure is included.

2.1033 (c.11) Photo or drawing of label location are included.

2.1033 (c.12) Photos of the device are included.

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

The circuit description is included.

(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.

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2.1046

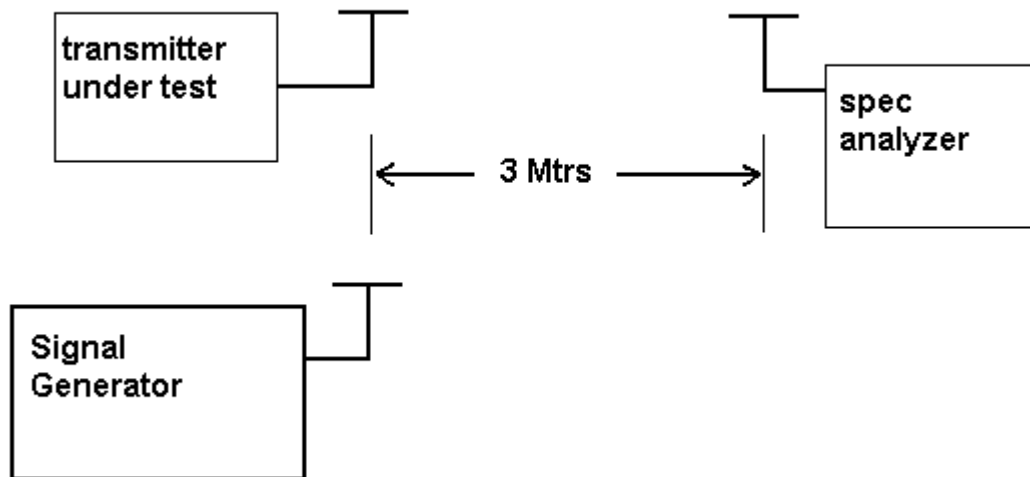
## RF Power Output.

RF power is measured as effective radiated power.

OUTPUT POWER: .002W ERP

For a device with a fixed antenna, RF power is measured as ERP as the antenna is permanently attached. The substitution method was used. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:

### R.F. POWER OUTPUT TEST PROCEDURE



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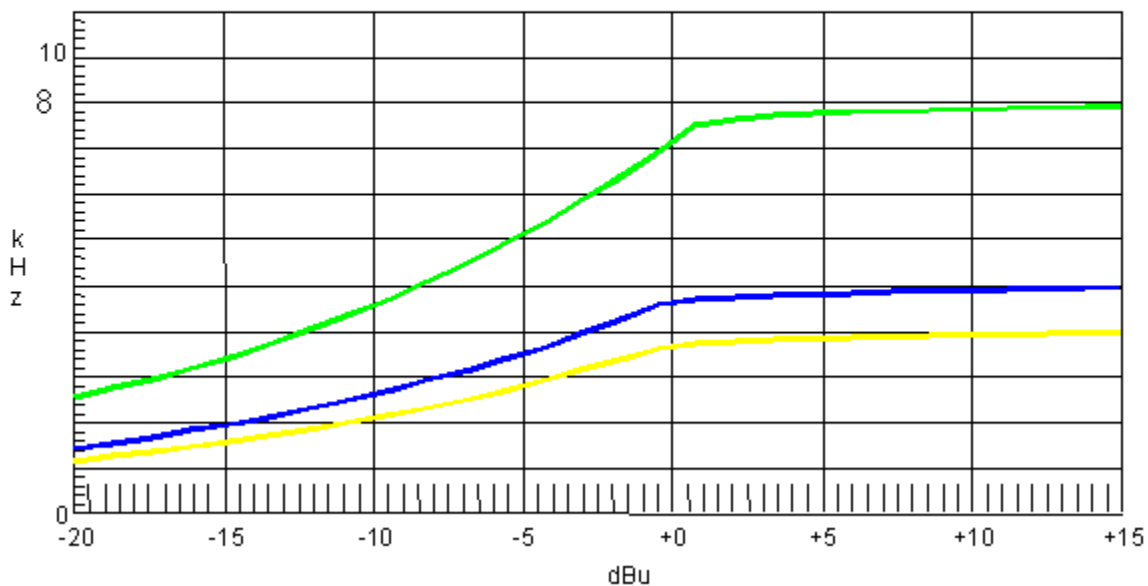
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## 2.1047(a)(b) Modulation characteristics:

### AUDIO LOW PASS FILTER

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

MODULATION LIMITING PLOTS:  
15 KHz (Green), 2.5 KHz (Blue), and 1.0 KHz (Yellow)



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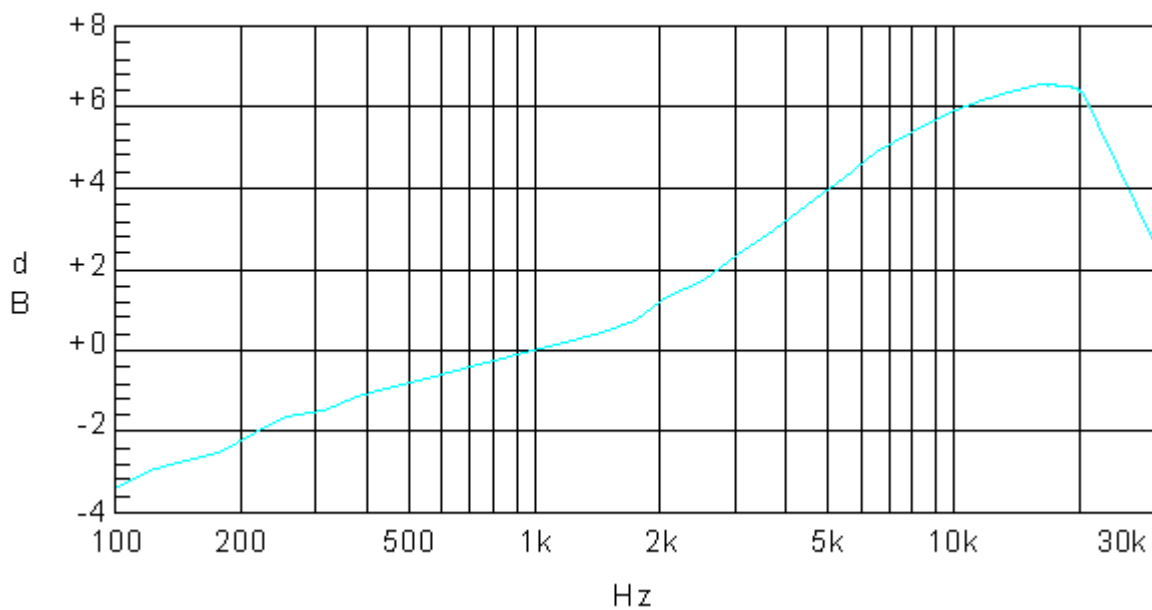
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## AUDIO\_FREQUENCY\_RESPONSE

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

### AUDIO FREQUENCY RESPONSE PLOT



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2.1049

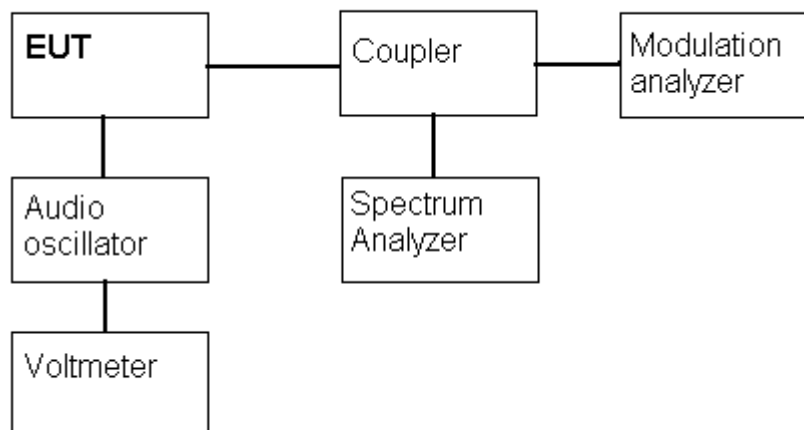
Occupied Bandwidth:

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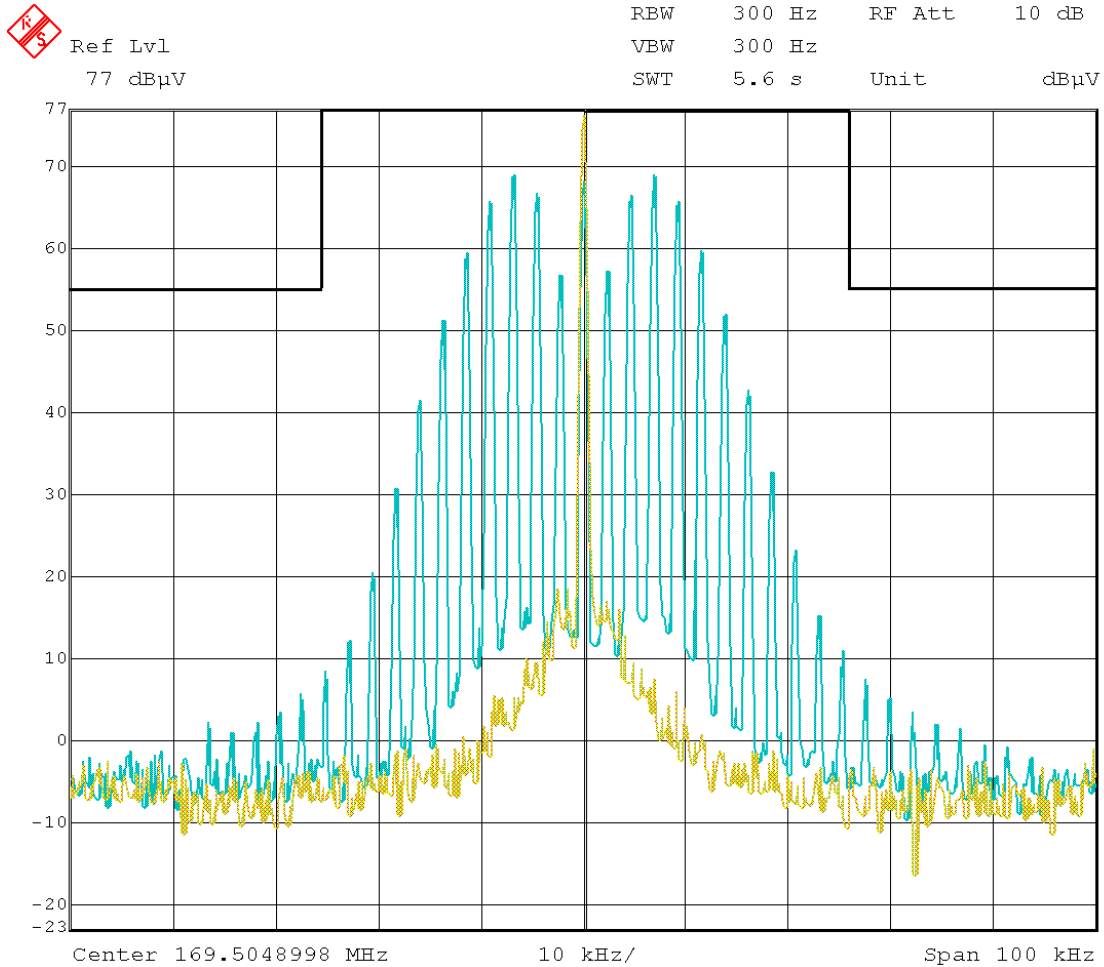
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2.1051            Spurious emissions at antenna terminals(conducted):  
Not Applicable no antenna connector.

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.

$43 + 10 \log(0.002) = 16.01 \text{ dB (High power)}$

$43 + 10 \log(0.001) = 13.00 \text{ dB (Low power)}$

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TEST DATA:

HIGH POWER:

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 169.50                 | H             | 0                      |
| 339.00                 | H             | 51.8                   |
| 508.50                 | H             | 43.6                   |
| 678.00                 | H             | 59.09                  |
| 847.50                 | H             | 59.22                  |
| 1017.00                | V             | 54.42                  |
| 1186.50                | V             | 60.05                  |
| 1356.00                | V             | 61.67                  |
| 1525.50                | V             | 61.27                  |
| 1695.00                | V             | 58.14                  |

| Emission Frequency MHz | Ant. Polarity | dB Below Carrier (dBc) |
|------------------------|---------------|------------------------|
| 171.90                 | H             | 0                      |
| 343.80                 | V             | 50.62                  |
| 515.70                 | H             | 42.1                   |
| 687.60                 | H             | 60.74                  |
| 859.50                 | V             | 55.48                  |
| 1031.40                | V             | 54.07                  |
| 1203.30                | H             | 60.50                  |
| 1375.20                | H             | 61.30                  |
| 1547.10                | V             | 58.72                  |
| 1719.00                | V             | 56.43                  |

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TEST DATA:

LOW POWER

| Emission<br>Frequency<br>MHz | Ant.<br>Polarity | dB<br>Below<br>Carrier<br>(dBc) |
|------------------------------|------------------|---------------------------------|
| 169.50                       | H                | 0                               |
| 339.00                       | V                | 46.9                            |
| 508.50                       | H                | 48.9                            |
| 678.00                       | V                | 49.19                           |
| 847.50                       | V                | 56.72                           |
| 1017.00                      | V                | 58.12                           |
| 1186.50                      | H                | 57.85                           |
| 1356.00                      | V                | 55.77                           |
| 1525.50                      | V                | 57.97                           |
| 1695.00                      | V                | 54.84                           |

| Emission<br>Frequency<br>MHz | Ant.<br>Polarity | dB<br>Below<br>Carrier<br>(dBc) |
|------------------------------|------------------|---------------------------------|
| 171.90                       | H                | 0                               |
| 343.80                       | V                | 46.82                           |
| 515.70                       | H                | 52.8                            |
| 687.60                       | H                | 53.14                           |
| 859.50                       | V                | 56.78                           |
| 1031.40                      | V                | 58.27                           |
| 1203.30                      | H                | 57.70                           |
| 1375.20                      | H                | 55.70                           |
| 1547.10                      | V                | 56.42                           |
| 1719.00                      | V                | 54.13                           |

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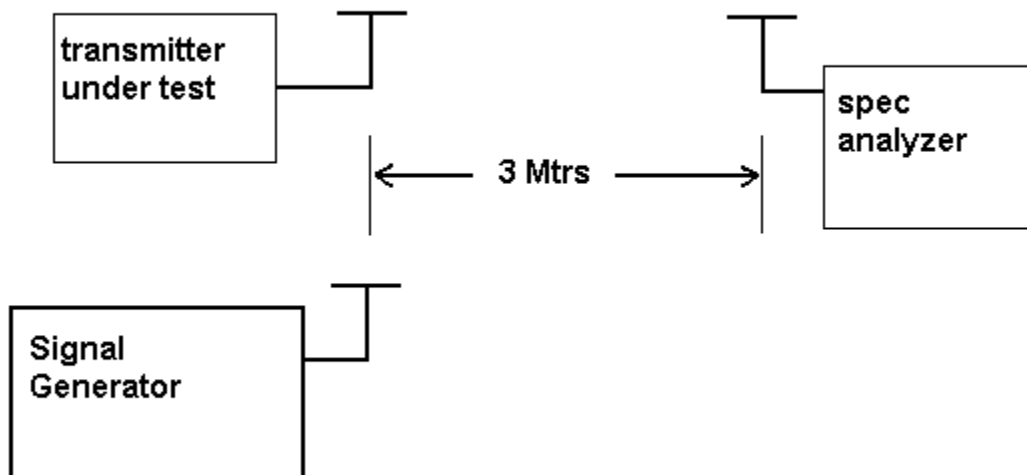
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METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the 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:  
S90.265 (b)(3)

Temperature and voltage tests were performed to verify that:  
The total emission shall remain within +/- 32.5 kHz of the  
assigned frequency.

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 recorded. 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. This procedure was repeated  
in 10° increments up to + 50°C

## MEASUREMENT DATA:

| Ref. Freq.<br>169.506799 |               |        |
|--------------------------|---------------|--------|
| TEMPERATURE °C           | FREQUENCY MHz | PPM    |
| -30°C                    | 169.511855    | 29.83  |
| -20°C                    | 169.511168    | 25.77  |
| -10°C                    | 169.508817    | 11.91  |
| -0°C                     | 169.510747    | 23.29  |
| 10°C                     | 169.508935    | 12.60  |
| 20°C                     | 169.506799    | 0.00   |
| 30°C                     | 169.503322    | -20.51 |
| 40°C                     | 169.5017375   | -29.86 |
| 50°C                     | 169.501697    | -30.10 |
| Batt. Volts              | Batt. Data    | kHz    |
| -15%                     | 169.50353     | -3.27  |

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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  |
| Analyzer<br>Blue Tower<br>Quasi-Peak<br>Adapter                   | HP              | 85650A     | 2811A01279               | CAL 4/13/05      | 4/13/07  |
| Analyzer<br>Blue Tower<br>RF                                      | HP              | 85685A     | 2926A00983               | CAL 9/5/05       | 9/5/07   |
| Preselector<br>Analyzer<br>Blue Tower<br>Spectrum<br>Analyzer     | HP              | 8568B      | 2928A04729<br>2848A18049 | CAL 4/13/05      | 4/13/07  |
| Coaxial<br>Cable #64                                              | Semflex Inc.    | 60637      | Timco #64                | CHAR<br>11/28/05 | 11/28/07 |
| Antenna:<br>Dipole Kit                                            | Electro-Metrics | TDA-30/1-4 | 152                      | CAL 3/3/06       | 3/3/09   |
| Frequency<br>Counter                                              | HP              | 5385A      | 2730A03025               | CAL 4/15/05      | 4/15/07  |
| Hygro-<br>Thermometer                                             | Extech          | 445703     | 0602                     | CAL 8/1/05       | 8/1/07   |
| Measuring<br>Tape-7.5M                                            | Kraftixx        | 7.5M PROFI |                          | CHAR<br>12/16/05 | 12/16/07 |
| Modulation<br>Analyzer                                            | HP              | 8901A      | 3435A06868               | CAL 11/4/04      | 11/4/06  |
| Digital<br>Multimeter                                             | Fluke           | FLUKE-77-3 | 79510405                 | CAL 4/15/05      | 4/15/07  |
| Analyzer<br>Open-Frame<br>Tower                                   | HP              | 8449B      | 3008A01075               | CAL 8/8/05       | 8/8/07   |
| Preamplifier<br>Analyzer<br>Silver Tower<br>Quasi-Peak<br>Adapter | HP              | 85650A     | 3303A01844               | CAL 12/8/04      | 12/8/06  |

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| Device                                                         | Manufacturer          | Model            | Serial Number            | Cal/Char Date   | Due Date |
|----------------------------------------------------------------|-----------------------|------------------|--------------------------|-----------------|----------|
| Analyzer<br>Silver Tower<br>RF<br>Preselector                  | HP                    | 85685A           | 2620A00294               | CAL 4/27/04     | 12/8/06  |
| Analyzer<br>Silver Tower<br>Spectrum<br>Analyzer<br>System One | HP                    | 8566B Opt<br>462 | 3552A22064<br>3638A08608 | CAL 12/8/04     | 12/8/06  |
|                                                                | Audio<br>Precision    | System One       | SYS1-45868               | CHAR<br>3/27/06 | 3/27/08  |
| Analyzer Tan<br>Tower<br>Preamplifier                          | HP                    | 8449B-H02        | 3008A00372               | CAL 12/8/05     | 12/8/07  |
| Analyzer Tan<br>Tower Quasi-<br>Peak Adapter                   | HP                    | 85650A           | 3303A01690               | CAL 12/8/05     | 12/8/07  |
| Analyzer Tan<br>Tower RF<br>Preselector                        | HP                    | 85685A           | 3221A01400               | CAL 12/7/05     | 12/7/07  |
| Analyzer Tan<br>Tower<br>Spectrum<br>Analyzer                  | HP                    | 8566B Opt<br>462 | 3138A07786<br>3144A20661 | CAL 12/7/05     | 12/7/07  |
| Temperature<br>Chamber                                         | Tenney<br>Engineering | TTRC             | 11717-7                  | CHAR<br>3/23/06 | 3/23/08  |

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