

# 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: WIRELESS MICROPHONE

FCC ID: JFZT5000C

Applicant:

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

**Date Receipt: FEBRUARY 3, 2004**

**Date Tested: FEBRUARY 26, 2004**

APPLICANT: AUDIO TECHNICA CORPORATION

FCC ID: JFZT5000C

REPORT #: T:\A\AudioTechnica\_JFZ\123UT4\123UT4TestReport.doc

COVER SHEET

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### EXHIBITS CONTAINING:

CONFIDENTIALITY LETTER  
BLOCK DIAGRAM  
SCHEMATICS  
PARTS LIST  
USERS MANUAL  
LABEL SAMPLE  
LABEL LOCATION  
EXTERNAL PHOTOGRAPHS  
INTERNAL PHOTOGRAPHS  
ALIGNMENT PROCEDURE  
OPERATIONAL DESCRIPTION  
TEST SET UP PHOTOGRAPH

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## GENERAL INFORMATION REQUIRED FOR TYPE ACCEPTANCE

- 2.1033(c)(1)(2) AUDIO TECHNICA CORPORATION will manufacture the T5000C in quantity, for use under FCC RULES PART 74.801, LOW POWER AUXILIARY STATIONS.

AUDIO TECHNICA CORPORATION  
2206 NARUSE, MACHIDA  
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JAPAN

2.1033 **TECHNICAL DESCRIPTION**

- (3) Instruction book. The instruction manual is included in the exhibits.
- (4) Type of Emission: 12K0F3E
- Bn = 2M + 2DK  
M = 15000  
D = 45kHz(Peak Deviation)  
K = 1  
Bn = 2(15k) + 2(45k)(1) = 120k
- ALLOWED AUTHORIZED BANDWIDTH = 200kHz.
- (5) Frequency Range: Part 74: 541.50 - 566.375 MHz
- (6) Power Range and Controls: UNIT has no controls.
- (7) Maximum Output Power Rating: .010 Watts into 50 ohms resistive load.
- (8) DC Voltages and Current into Final Amplifier:
- FINAL AMPLIFIER ONLY  
3.0V BATTERY  
Vce = 3.0 Volts  
Ice = 0.16 mA.
- Pin = 0.48
- (9) Tune-up procedure. The tune-up procedure is given in the exhibits.
- (10) Complete Circuit Diagrams: The circuit diagram and block diagram are included in the exhibits.

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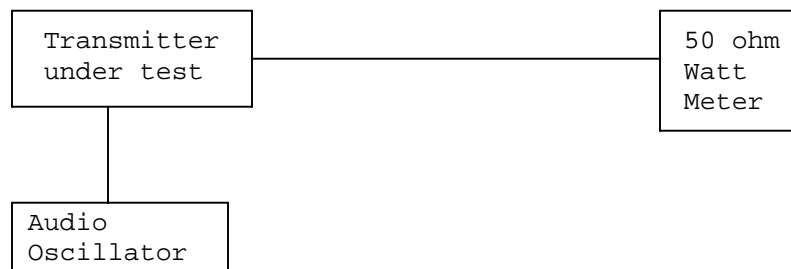
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- 2.1033(c)(11) Photo or Drawing of Label and sketch of location:  
See the exhibits.
- 2.1033(c)(12) Photos of Equipment:  
See the exhibits.
- (13) Description of all circuitry and devices provided for determining and stabilizing frequency.
- Description of any circuits or devices employed for suppression of spurious radiation, for limiting modulation, and for limiting power.
- This circuit description is included in the exhibits.
- Limiting Modulation:  
The transmitter audio circuitry is contained in IC101, IC102 and IC103.
- Limiting Power:  
There is no provision for limiting power.
- (14) Digital modulation. This unit does not use digital modulation.
- 2.1033(c)(15) The data required by 2.1046 through 2.1057 is submitted below.
- 2.1046 **RF power output**
- RF power measured is:  
OUTPUT POWER: .010 WATTS CONDUCTED

## R.F. POWER OUTPUT TEST PROCEDURE



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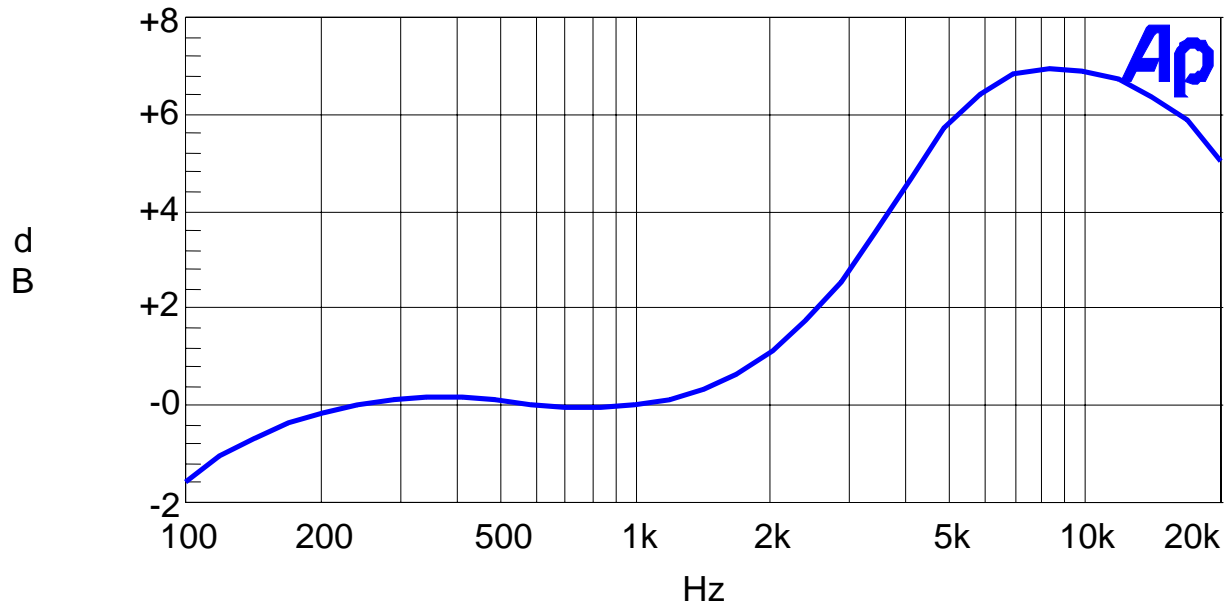
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2.1047(a)(b) Modulation characteristics:

## AUDIO FREQUENCY RESPONSE

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

### Audio Frequency Response Plot



## AUDIO LOW PASS FILTER

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

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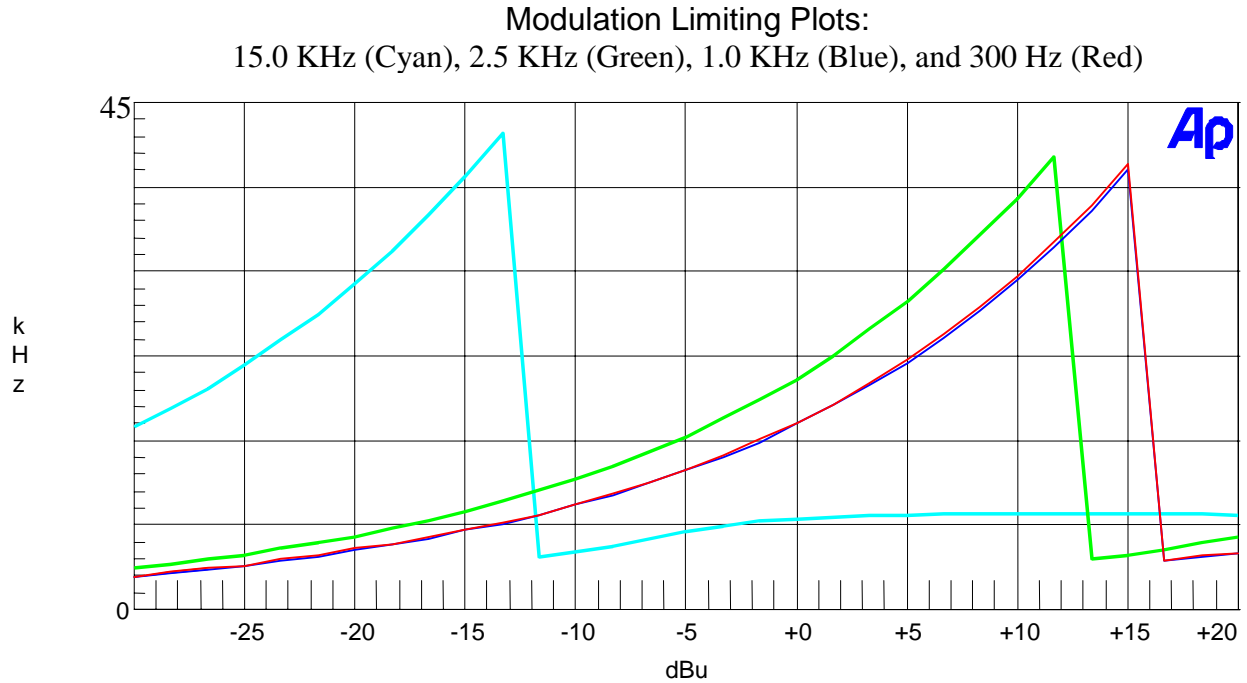
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2.1047(b)  
74.249 (d)

## Audio input versus modulation

A plot of the audio input versus deviation is shown below.



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2.1049(c)

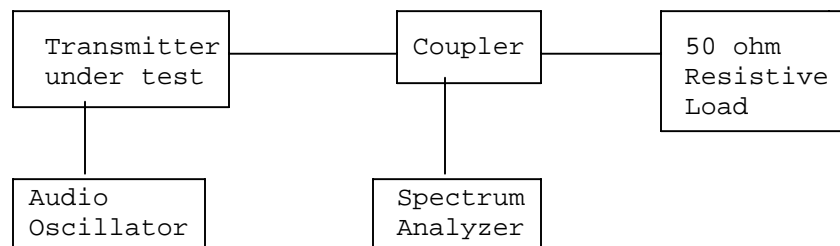
## Occupied Bandwidth:

Data in the plots show that all sidebands between 50 & 100% for 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 plots follow.

## Wireless Microphone transmitter:

Test procedure diagram

### OCCUPIED BANDWIDTH MEASUREMENT



REQUIREMENT: PART 74: 200kHz EMISSION BANDWIDTH.

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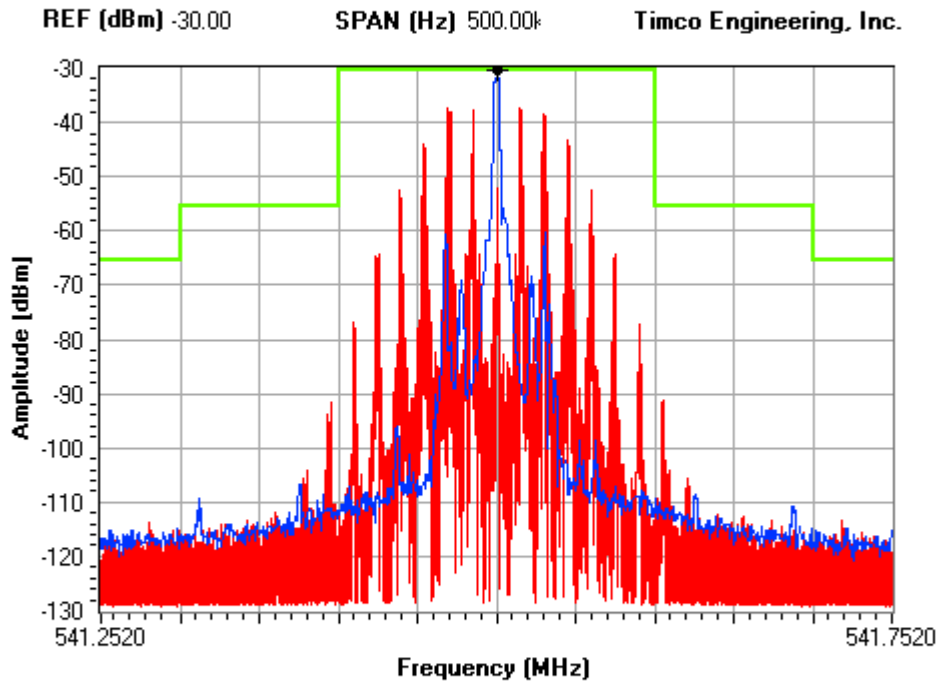
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## OCCUPIED BANDWIDTH

### NOTES:

AUDIO TECHNICA CORPORATION - FCC ID: JFZT5000C  
 OCCUPIED BANDWIDTH PLOT

### FCC 74.535 Mask A



<b>RBW</b>	<b>VBW</b>	<b>ST (sec)</b>	Peak	541.50	-30.30	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
300 Hz	100 kHz	10	MKR2	541.45	-107.10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Center Frequency (Hz)</b>	541.502M		MKR3	541.25	-116.70	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Marker Delta (Hz)</b>	0.00		HwMK	23.076	6.27	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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

2.1053(a)(b) **Field strength of spurious emissions:**

**NAME OF TEST:** RADIATED SPURIOUS EMISSIONS (541.50 MHz)

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

$$43 + 10\log(0.010) = 23.00 \text{ dB}$$

**TEST DATA:**

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
541.50	V	7.10	0	0	0
1083.00	V	-52.50	1.02	3.28	57.33
1624.50	V	-53.40	1.12	5.05	56.58
2166.00	V	-49.00	1.23	5.81	51.52
2707.50	V	-53.30	1.32	6.92	54.80
3249.00	V	-47.50	1.37	7.35	48.63
3790.50	V	-49.70	1.43	7.61	50.62
4332.00	V	-50.20	1.48	8.05	50.73

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2.1053(a)(b) **Field strength of spurious emissions:**

**NAME OF TEST:** RADIATED SPURIOUS EMISSIONS (553.875 MHz)

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

$$43 + 10\log(0.010) = 23.00 \text{ dB}$$

**TEST DATA:**

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
553.88	V	7.00	0	0	0
1107.75	V	-48.70	1.02	3.38	53.34
1661.63	V	-57.10	1.14	5.08	60.16
2215.50	V	-53.10	1.24	5.95	55.39
2769.38	H	-49.70	1.33	6.97	51.06
3323.25	V	-49.80	1.38	7.41	50.77
3877.13	V	-49.10	1.44	7.63	49.91
4431.00	V	-48.30	1.49	8.17	48.63

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2.1053(a)(b) **Field strength of spurious emissions:**

**NAME OF TEST:** RADIATED SPURIOUS EMISSIONS (566.375 MHz)

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

$$43 + 10\log(0.010) = 23.00 \text{ dB}$$

**TEST DATA:**

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
566.38	V	7.50	0	0	0
1132.75	V	-53.00	1.03	3.48	58.05
1699.13	V	-58.10	1.14	5.11	61.63
2265.50	H	-39.20	1.25	6.09	41.86
2831.88	H	-38.90	1.33	7.02	40.72
3398.25	V	-36.50	1.39	7.47	37.92
3964.63	V	-40.60	1.45	7.64	41.90
4531.00	V	-38.30	1.51	8.21	39.09
5097.38	V	-49.30	1.62	7.79	50.63

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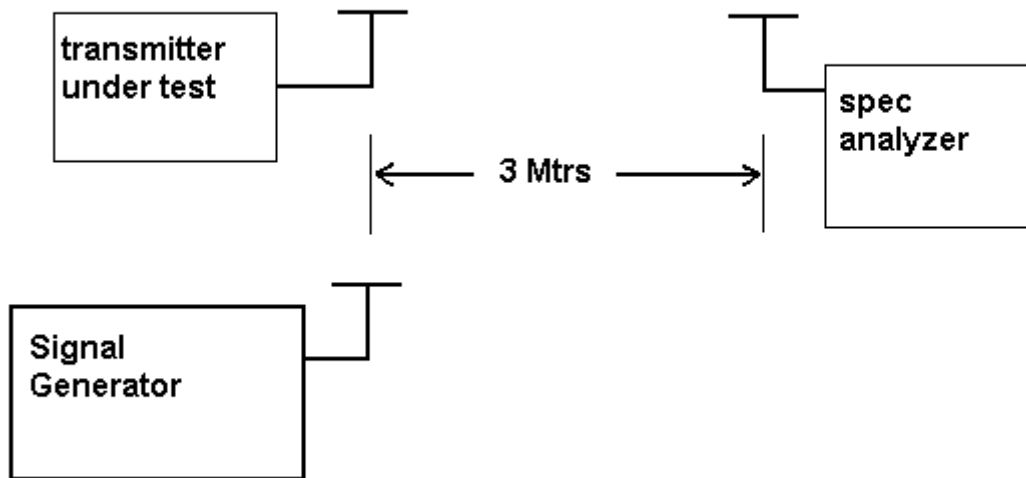
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## Method of Measuring Radiated Spurious Emissions



**METHOD OF MEASUREMENT:** The procedure used was TIA/EIA STANDARD 603. 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. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 NW SR 45 Newberry, Florida 32669.

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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)(74.861e.4) specification limit.

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-degree increments up to + 50 degrees C.

## MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 541.500 045

<u>TEMPERATURE °C</u>	<u>FREQUENCY MHz</u>	<u>PPM</u>
-30	541.501 414	+ 2.53
-20	541.501 915	+ 3.45
-10	541.502 736	+ 4.97
0	541.502 775	+ 5.04
10	541.502 021	+ 3.65
20	541.500 701	+ 1.21
30	541.499 508	- 0.99
40	541.498 319	- 3.19
50	541.497 590	- 4.53

<u>VOLTS</u>	<u>Batt. Data</u>	<u>Batt. PPM</u>	
-15%	2.55	541.499 943	- 0.19

**RESULTS OF MEASUREMENTS:** The test results indicates that the EUT meets the requirements.

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## EMC Equipment List

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/13/06
AC Voltmeter	HP	400FL	2213A14499	CAL 10/9/01	10/9/03
Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/15/03	4/15/05
Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 4/15/03	4/15/05
Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/15/03	4/15/05
Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/04
Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/21/01	3/21/04
Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	153	CAL 9/26/02	9/26/05
Frequency Counter	HP	5385A	2730A03025	CAL 3/7/03	3/7/05
Hygro-Thermometer	Extech	445703	0602	CAL 10/4/02	10/4/04
Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
Measuring Tape-7.5M	Kraftixx	7.5M		CHAR 2/1/02	2/1/04
Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
Multimeter	Fluke	FLUKE-77-3	79510405	CHAR 9/26/01	9/26/03
Silver Tower Preamplifier	HP	8449B	3008A01075	CHAR 1/28/02	1/28/04
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/14/02	10/14/04

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Silver Tower RF Preselector	HP	85685A	2620A00294	CAL	10/14/04
Silver Tower Spectrum Analyzer System One	HP	8566B Opt 462	3552A22064 3638A08608	CAL	10/14/04
Tan Tower Preamplifier	HP	8449B- H02	3008A00372	CAL	9/23/05
Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL	9/23/05
Tan Tower RF Preselector	HP	85685A	3221A01400	CAL	9/23/05
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL	9/23/05
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR	1/22/04

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