

# 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: HANDHELD TRANSMITTER

FCC ID: JFZT202

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: JFZT202

REPORT #: V:\A\AudioTechnica\_JFZ\1129UT6\1129UT6TestReport.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: JFZT202 in quantity, for use under FCC RULES  
PART 90.265.

### 2.1033 (C4) TECHNICAL DESCRIPTION

(1) Type of Emission: 46KF3E

Bn = 2M + 2DK  
M = 15000  
D = 8 kHz (Peak Deviation)  
K = 1  
Bn = 2(15K) + 2(8K)(1) = 46000

ALLOWED AUTHORIZED BANDWIDTH = 54 kHz.  
90.265(b)(1)

(2) Frequency Range: 169.445-171.905 MHz

(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

Vce = 9 Volts

Ice = 32 mA.

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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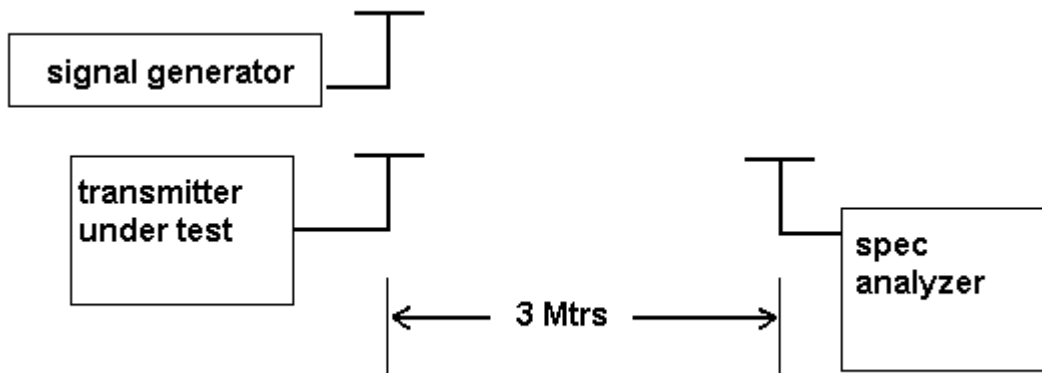
2.1046 RF Power Output.

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 as described in TIA-603-C.

## R.F. POWER OUTPUT TEST PROCEDURE



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# TIMCO ENGINEERING INC.

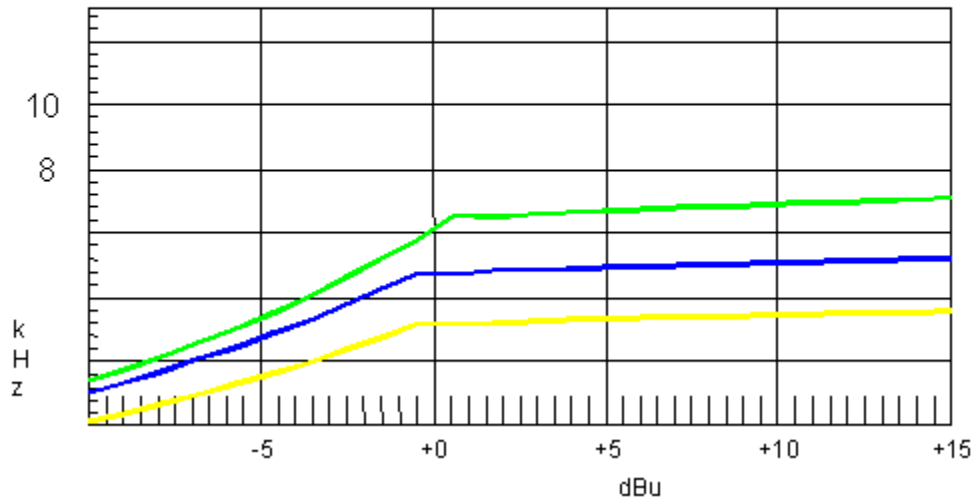
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## 2.1047(a)(b) Modulation characteristics:

### 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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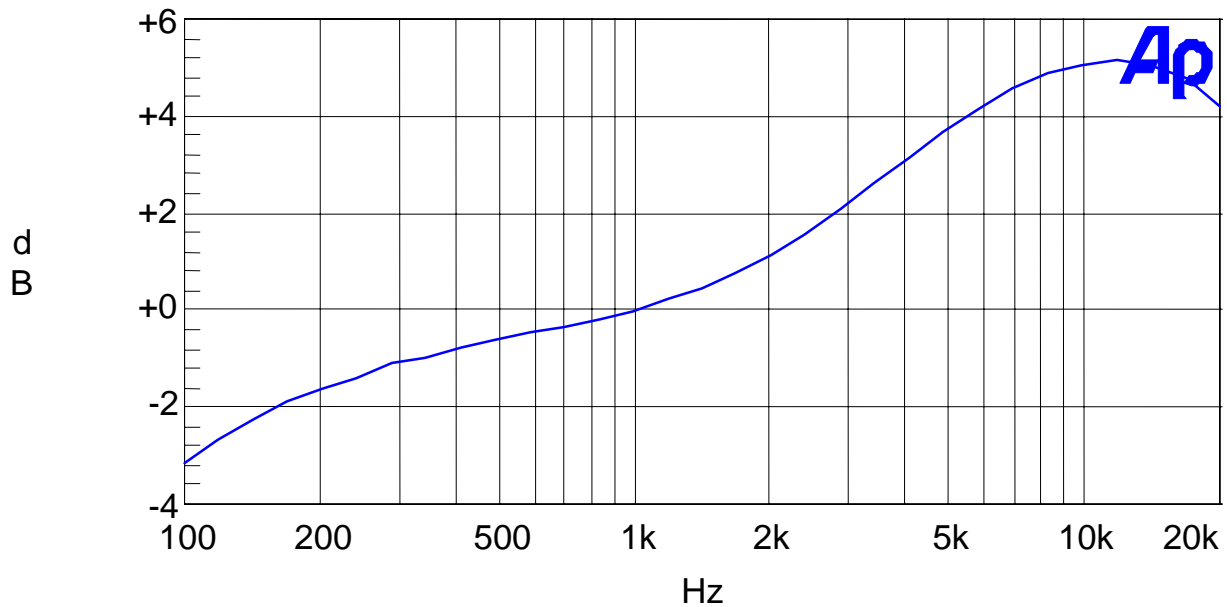
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## AUDIO\_FREQUENCY\_RESPONSE

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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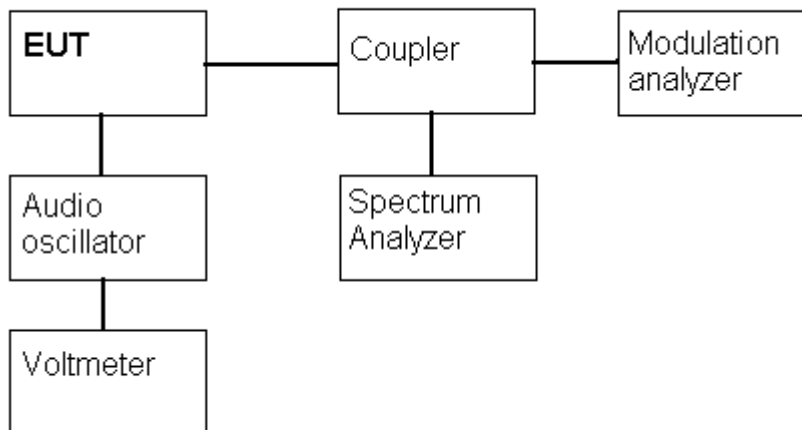
2.1049 Occupied Bandwidth:

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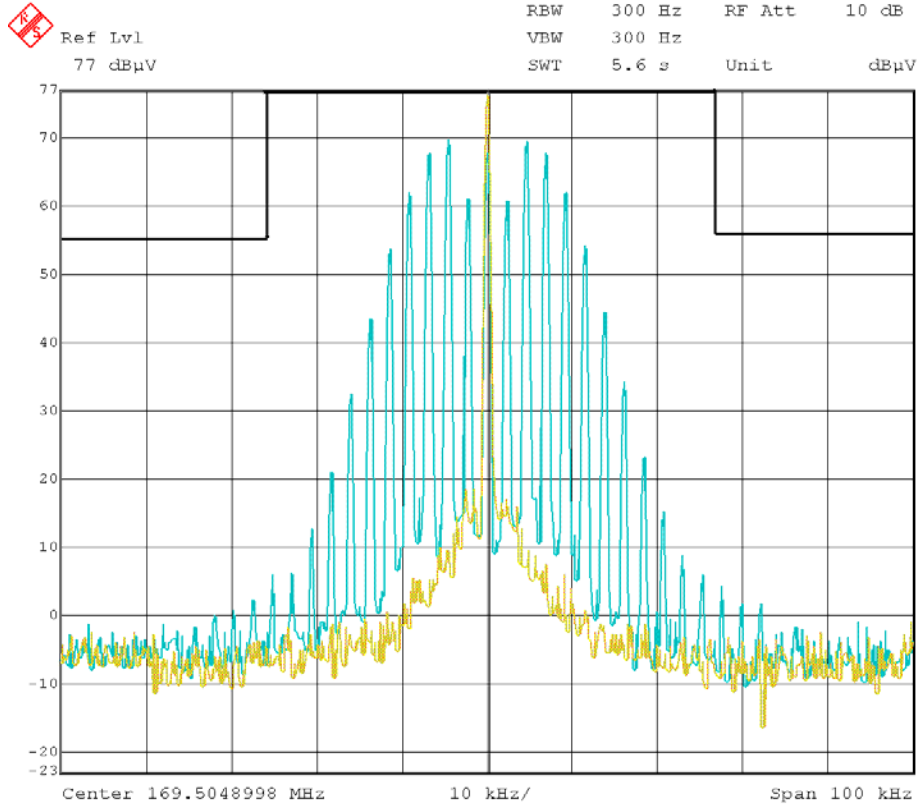
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2.1051            Spurious emissions at antenna terminals(conducted):  
Not Applicable no antenna connector.

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 dB (High power)

43 + 10 log(0.001) = 13.00 dB (Low power)

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TEST DATA:

HIGH POWER:

<b>Emission Frequency MHz</b>	<b>Ant. Polarity</b>	<b>dB Below Carrier (dBc)</b>
<b>169.50</b>	<b>V</b>	<b>0</b>
<b>339.00</b>	<b>V</b>	<b>36.00</b>
<b>508.50</b>	<b>V</b>	<b>45.20</b>
<b>678.00</b>	<b>V</b>	<b>37.19</b>
<b>847.50</b>	<b>V</b>	<b>40.62</b>
<b>1017.00</b>	<b>V</b>	<b>47.69</b>
<b>1186.50</b>	<b>V</b>	<b>52.14</b>
<b>1356.00</b>	<b>V</b>	<b>54.00</b>
<b>1525.50</b>	<b>V</b>	<b>59.63</b>
<b>1695.00</b>	<b>V</b>	<b>56.52</b>

<b>Emission Frequency MHz</b>	<b>Ant. Polarity</b>	<b>dB Below Carrier (dBc)</b>
<b>171.90</b>	<b>H</b>	<b>0</b>
<b>343.80</b>	<b>V</b>	<b>51.62</b>
<b>515.70</b>	<b>H</b>	<b>44.6</b>
<b>687.60</b>	<b>H</b>	<b>61.94</b>
<b>859.50</b>	<b>V</b>	<b>56.68</b>
<b>1031.40</b>	<b>V</b>	<b>55.27</b>
<b>1203.30</b>	<b>H</b>	<b>59.50</b>
<b>1375.20</b>	<b>H</b>	<b>60.30</b>
<b>1547.10</b>	<b>V</b>	<b>58.92</b>
<b>1719.00</b>	<b>V</b>	<b>55.63</b>

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TEST DATA:

## LOW POWER

<b>Emission Frequency MHz</b>	<b>Ant. Polarity</b>	<b>dB Below Carrier (dBc)</b>
169.50	V	0
339.00	V	34.80
508.50	V	51.10
678.00	V	31.59
847.50	V	41.62
1017.00	V	53.39
1186.50	V	51.74
1356.00	V	54.30
1525.50	V	56.13
1695.00	V	53.12

<b>Emission Frequency MHz</b>	<b>Ant. Polarity</b>	<b>dB Below Carrier (dBc)</b>
171.90	H	0
343.80	V	47.82
515.70	H	54.8
687.60	H	52.24
859.50	V	55.88
1031.40	V	58.27
1203.30	H	58.70
1375.20	H	54.70
1547.10	V	55.62
1719.00	V	53.33

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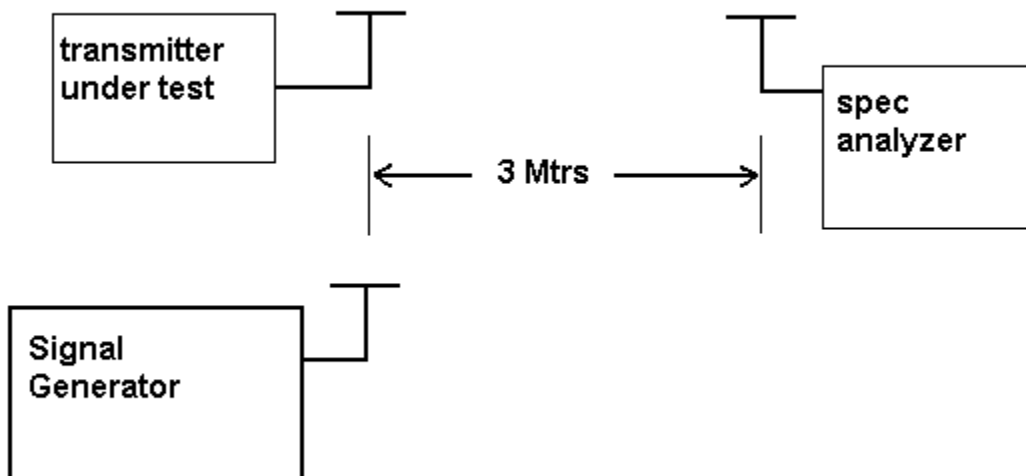
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METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the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

Assigned Frequency (Ref. Frequency): 169.504325

TEMPERATURE °C	FREQUENCY MHz	PPM	Hz
-30°C	169.510492	36.38	6148
-20°C	169.509727	31.87	5385
-10°C	169.508529	24.80	4191
-0°C	169.508332	23.64	3995
10°C	169.506979	15.66	2646
20°C	169.505653	7.83	1324
30°C	169.504014	-1.83	-311
40°C	169.501806	-14.86	-2512
50°C	169.499150	-30.53	-5160

25°C END BATT. Volt(9.0)= 7.65VDC 169.502974 -7.97

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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 Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/13/05	4/13/07
Analyzer Blue Tower RF	HP	85685A	2926A00983	CAL 9/5/05	9/5/07
Preselector Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/05	4/13/07
Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 11/28/05	11/28/07
Antenna: Dipole Kit	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
Frequency Counter	HP	5385A	2730A03025	CAL 4/15/05	4/15/07
Hygro-Thermometer	Extech	445703	0602	CAL 8/1/05	8/1/07
Measuring Tape-7.5M	Kraftixx	7.5M PROFI		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 Open-Frame Tower	HP	8449B	3008A01075	CAL 8/8/05	8/8/07
Preamplifier Analyzer Silver Tower Quasi-Peak 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 Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 4/27/04	12/8/06
Analyzer Silver Tower Spectrum Analyzer System One	HP	8566B Opt 462	3552A22064 3638A08608	CAL 12/8/04	12/8/06
Analyzer Tan 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
	HP	85650A	3303A01690	CAL 12/8/05	12/8/07
	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/05	12/7/07
	Tenney Engineering	TTRC	11717-7	CHAR 3/23/06	3/23/08

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