

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: HANDHELD WIRELESS MICROPHONE

FCC ID: JFZT220D

Applicant:

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

Date Receipt: OCTOBER 20, 2004

Date Tested: OCTOBER 27, 2004

APPLICANT: AUDIO TECHNICA CORPORATION

FCC ID: JFZT220D

REPORT #: A\AudioTechnica_JFZ\1723UT4\1723UT4TestReport.doc

COVER SHEET

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EXHIBITS INCLUDING:

CONFIDENTIALITY LETTER
BLOCK DIAGRAM
SCHEMATICS
PARTS LIST
LABEL SAMPLE
LABEL LOCATION
USERS MANUAL
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) AUDIO TECHNICA CORPORATION will manufacture the T220D
2.1033(c)(2) in quantity, for use under FCC RULES PART 74.801, LOW
POWER AUXILIARY STATIONS.

AUDIO TECHNICA CORPORATION
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2.1033 TECHNICAL DESCRIPTION

(c)(1) Maximum Output Power Rating: 1 Watt into 50 ohms
resistive load.

(c)(3) Instruction book. The instruction manual is included
in the exhibits.

(c)(4) Type of Emission: 126K0F3E

$B_n = 2M + 2DK$
 $M = 3 \text{ kHz}$
 $D = 60 \text{ kHz}$
 $K = 1$
 $B_n = 2(3k) + 2(60k)(1) = 126k$

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

(c)(6) Frequency Range: 655-680 MHz

(c)(7) Power Range and Controls: UNIT has no controls.

(c)(9) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY
High
 $V_{ce} = 3.0 \text{ VDC}$
 $I_{ce} = 0.317 \text{ A}$
 $P_{in} = 0.951 \text{ Watts}$

(c)(10) Tune-up procedure. The tune-up procedure is included
in the exhibits.

(c)(11) Complete Circuit Diagrams: The circuit diagram and
block diagram are included in the exhibits.

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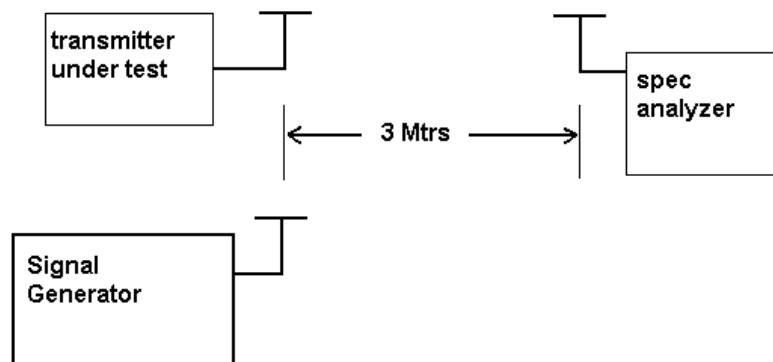
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- 2.1033(c)(12) Photo or Drawing of Label and sketch of location:
Please see the exhibits.
- 2.1033(c)(13) Photos of Equipment:
Please see the exhibits.
- (c)(14) Description of all circuitry and devices provided for determining and stabilizing frequency.
- Description of any circuits or devices employed for suppression of spurious radiation, for limiting modulation, and for limiting power.
- This circuitry 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.
- (15) Digital modulation. This unit does not use digital modulation.
- 2.1033(c)(16) The data required by 2.1046 through 2.1057 is submitted below.
- 2.1046 **RF power output**
RF power measured is:
- OUTPUT POWER: 0.008 WATTS ERP
- R.F. POWER OUTPUT TEST PROCEDURE**



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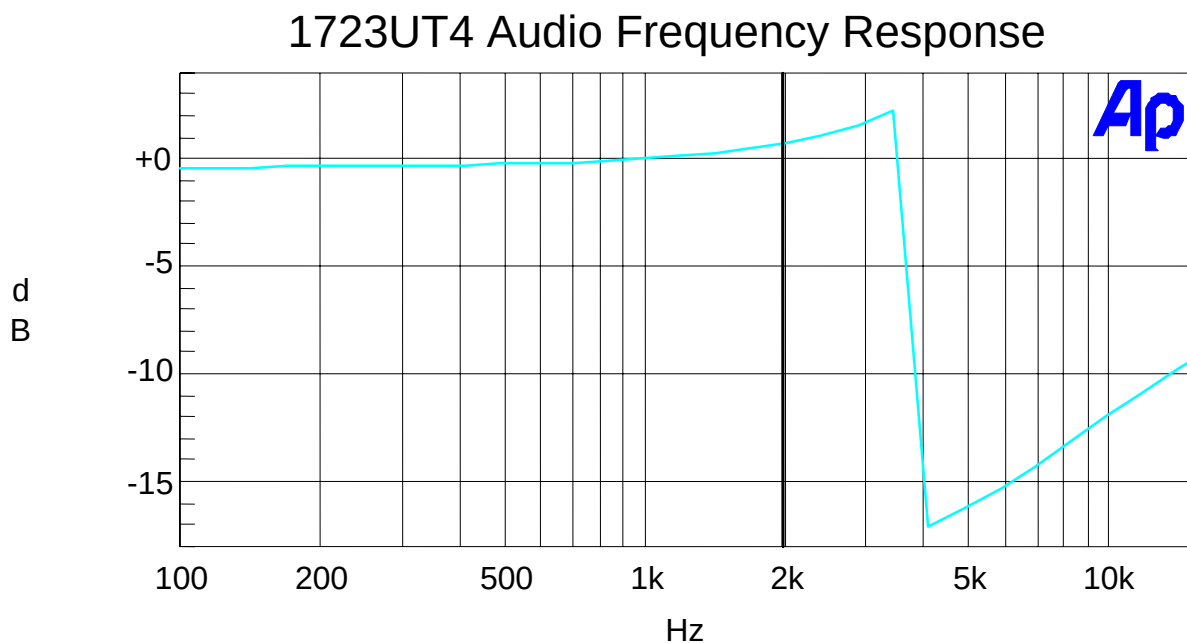
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2.1047(a)(b)

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 LOW PASS FILTER

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

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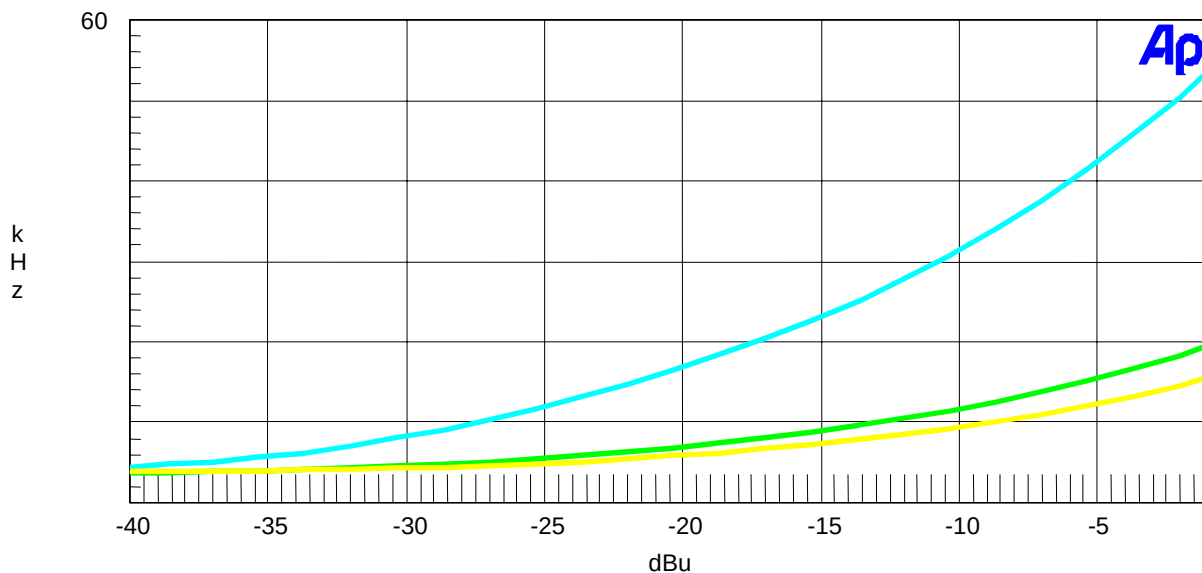
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2.1047(b)

Audio input versus modulation

A plot of the audio input versus deviation is shown in the following plots.

1723UT4 Modulation Limiting



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2.1049

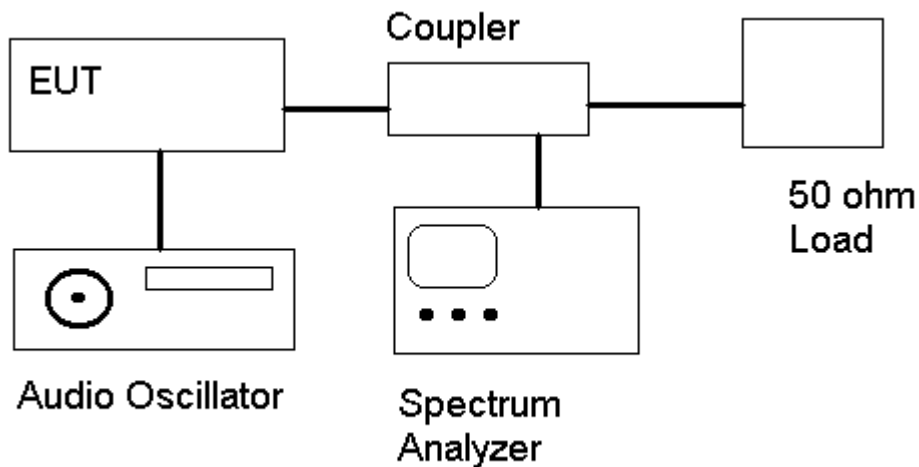
Occupied bandwidth:

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 35 dB and beyond 250% $43 + \log(P_o)$ dB. The plot show 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.

Microphone transmitter

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



REQUIREMENT: 200kHz EMISSION BANDWIDTH

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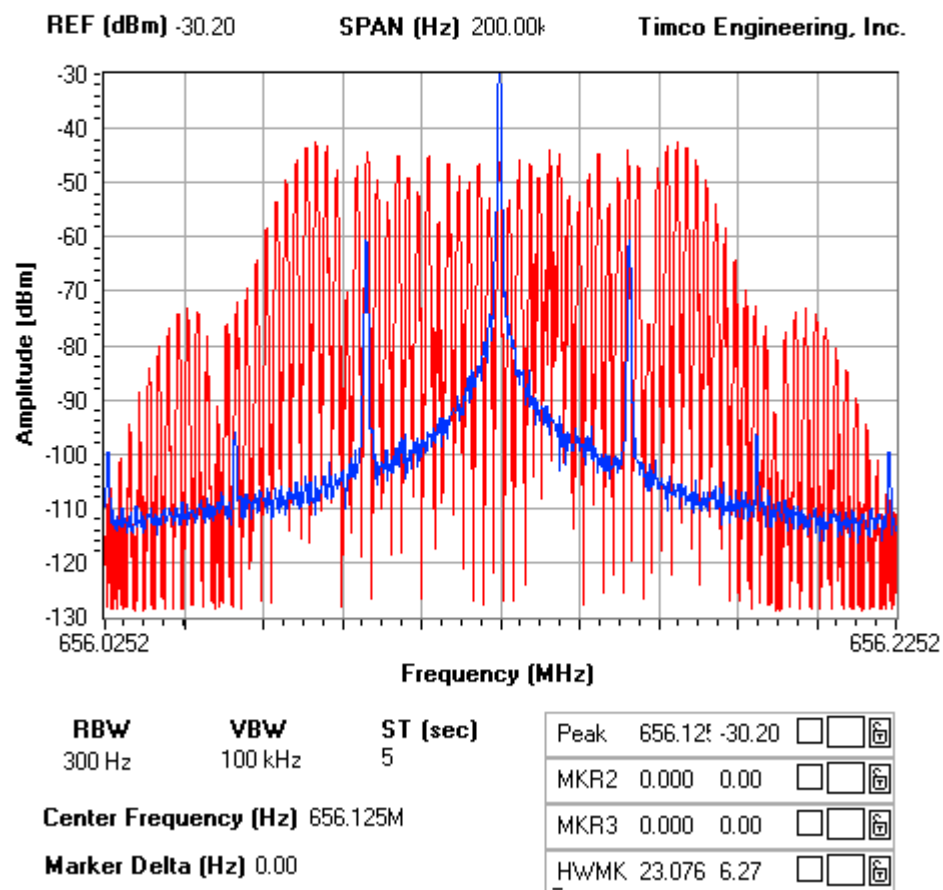
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OCCUPIED BANDWIDTH

NOTES:

1723ut4 occupied bandwidth



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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

REQUIREMENTS:

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

$$43 + 10 \log(0.008) = 22.03 \text{ dB}$$

TEST DATA:

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
656.10	V	8.90	0	-0.1	0
1312.20	V	-49.80	1.06	4.2	55.46
1968.30	V	-47.70	1.19	5.23	52.46
2624.40	V	-53.70	1.31	6.95	56.86
3280.50	V	-52.60	1.38	7.42	55.36
3936.60	V	-35.50	1.44	7.55	38.19
4592.70	V	-41.70	1.52	8.24	43.78
5248.80	H	-60.70	1.65	8.05	63.1
5904.90	V	-56.60	1.86	8.92	58.34
6561.10	H	-58.90	1.96	8.95	60.71

TEST DATA:

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
678.40	V	8.90	0	0.06	0
1356.90	V	-49.40	1.07	4.38	55.05
2035.40	V	-53.50	1.21	5.36	58.31
2713.90	V	-57.20	1.32	7.02	60.46
3392.40	V	-55.40	1.39	7.49	58.26
4070.80	V	-45.50	1.46	7.66	48.26
4749.30	V	-52.20	1.56	8.05	54.67
5427.80	H	-60.40	1.69	8.26	62.79
6106.30	V	-54.00	1.91	8.99	55.88
6784.80	H	-55.20	1.98	9.66	56.48

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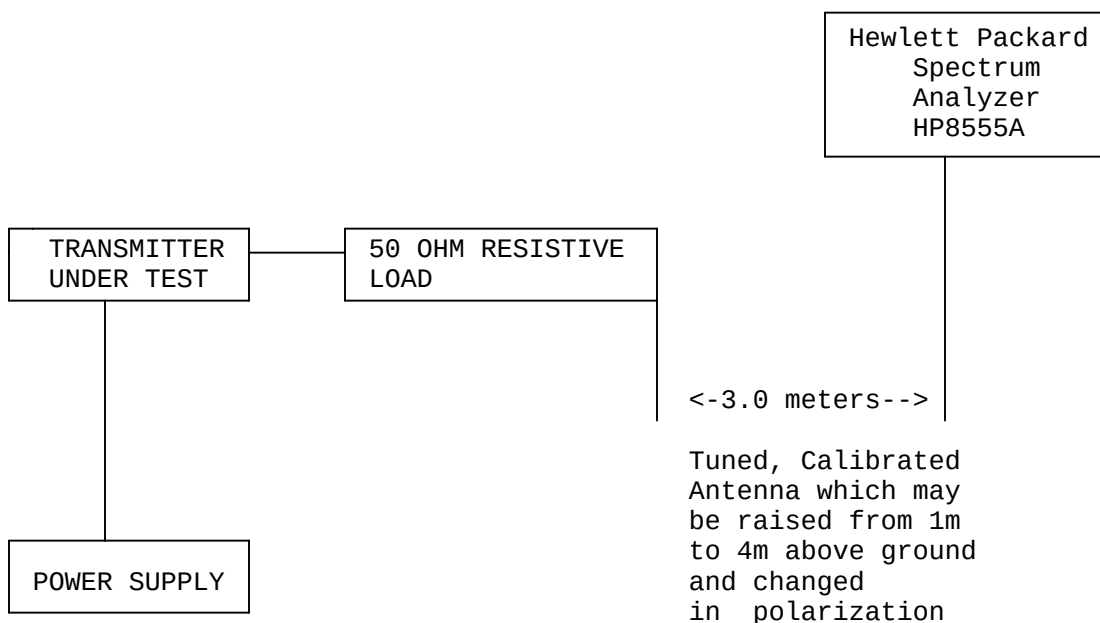
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Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground
on a rotatable platform.

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.

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2.1055 Frequency stability: 74.861(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:

Assigned Frequency (Ref. Frequency): 656.125 294

TEMPERATURE°C	FREQUENCY_MHz	PPM
REFERENCE	656.125 294	
-30	656.125 18	- 0.17
-20	656.127 382	+ 3.18
-10	656.128 23	+ 4.47
0	656.128 107	+ 4.29
10	656.127 300	+ 3.06
20	656.126 26	+ 1.47
30	656.125 294	0.00
40	656.124 705	- 0.90
50	656.124 828	- 0.71
<u>Batt. Data</u>		<u>Batt. PPM</u>
656.125 287		- 0.01

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 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/12/06
AC Voltmeter	HP	400FL	2213A14499	CAL 7/19/04	7/19/06
Blue Tower	HP	85650A	2811A01279	CAL 4/15/03	4/15/05
Quasi-Peak Adapter					
Blue Tower RF	HP	85685A	2620A00294	CAL 4/27/04	4/27/06
Preselector					
Blue Tower	HP	8568B	2928A04729	CAL 4/15/03	4/15/05
Spectrum Analyzer			2848A18049		
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 8/26/04	8/26/06
Measuring Tape-7.5M	Kraftixx	7.5M PROFI		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	CAL 3/22/04	3/22/06
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 3/22/04	3/22/06
Silver Tower RF	HP	85685A	2926A00983	CAL 3/22/04	3/22/06
Preselector					
Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 3/22/04	3/22/06
System One	Audio Precision	System One	SYS1-45868	CHAR 4/25/02	4/25/04

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Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 9/23/03	9/23/05
Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 9/23/03	9/23/05
Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 9/23/03	9/23/05
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 9/23/03	9/23/05
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04

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