

KTL Test Report: 0L0437RUS1

Applicant: VXT, L.L.C.
3750 Industrial Court
Suite H
Suwanee, GA 30024

**Equipment Under Test:
(E.U.T.)** PM-45C1-01 Handheld Radio

FCC ID: PBPM-45C1-01

In Accordance With: **FCC Part 90, Subpart I**
Private Land Mobile Transmitter

Tested By: KTL Dallas Inc.
802 N. Kealy

Authorized By:



Tom Tidwell, EMC/Wireless Group Manager

Date: 1/27/01

Total Number of Pages: 34

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EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Section 1. Summary of Test Results

Manufacturer: XY Golf

Model No.: M-45C1-01

Serial No.: S02

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 90, Subpart I.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See “ Summary of Test Data”.

**NVLAP LAB CODE: 100426-0**

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EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	90.205	100 W	1.5 W	Complies
Audio Frequency Response	TIA EIA-603.3.2.6	N/A	N/A	N/A
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A	N/A	N/A
Modulation Limiting	TIA EIA-603.3.2.6		+/-0.19 kHz	Complies
Occupied Bandwidth	90.210	Mask D	Mask D	Complies
Spurious Emissions at Antenna Terminals	90.210	50+10Log(P)	-66.07 dB (-34.4 dBm)	Complies
Field Strength of Spurious Emissions	90.210	50+10Log(P)	-24.5 dBm erp	Complies
Frequency Stability	90.213	5 ppm	0.4 ppm	Complies
Transient Frequency Behavior	90.214			

Footnotes:

1. This transmitter does not have a provision for voice modulation.

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EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Section 2. General Equipment Specification**Transmitter**

Supply Voltage Input:	3.6 Vdc battery										
Frequency Range:	450 - 480 MHz										
Necessary Bandwidth:	12 kHz										
Type(s) of Modulation:	<table><thead><tr><th>F3E (Voice)</th><th>F1D</th><th>F2D</th><th>D7W (QAM)</th><th>Other</th></tr></thead><tbody><tr><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr></tbody></table>	F3E (Voice)	F1D	F2D	D7W (QAM)	Other	☐	☐	☒	☐	☐
F3E (Voice)	F1D	F2D	D7W (QAM)	Other							
☐	☐	☒	☐	☐							
Data Rate(s)	4800, 9600 bps										
Internal/External Data Source:	Internal										
Emission Designator:	20K0										
Output Impedance:	50 ohms										
RF Power Output (rated):	2 W										
Duty Cycle:	Two transmissions per minute										
Channel Spacing(s):	12.5 kHz										
Operator Selection of Operating Frequency:	Set in software										
Power Output Adjustment Capability:	Not adjustable by user										

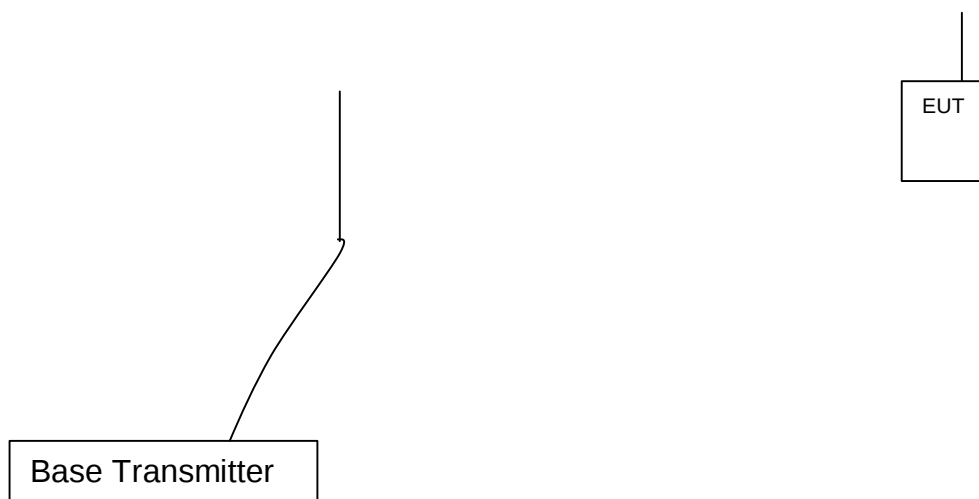
EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

System Description

The EUT is a handheld data radio that is used on a golf course to communicate with a base unit (Model B-45C1-01). This system allows course data to be transmitted to the golfer. The handheld unit includes a GPS receiver to coordinate the location of the golfer. This information is transmitted back to the base unit.

These radios operate in the 450 - 480 MHz band on 12.5 kHz channels.

System Diagram



EQUIPMENT: M-45C1-01 Handheld Radio

PROJECT NO.: 0L0437RUS1

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: D. LightTom Tidwell & Debbie Jensen	DATE: 1/4/01

Measurement Results: Complies.**Measurement Data:**

Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Measured/Rated (dB)
450	33	33	0
465	33	33	0
480	33	33	0

Measurement Conditions:

Temperature: 22 °C

Humidity: 50 %

Measurement Uncertainty: +/- 0.62 dB

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Section 4. Modulation Characteristics

NAME OF TEST: Modulation Characteristics

PARA. NO.: 2.987

TESTED BY: D. LightTom Tidwell & Debbie Jensen

DATE: 1/14/01

Measurement Results: Complies.**Measurement Data:** See following pages**Measurement Conditions:** Temperature: **22** °C
Humidity: **50** %**Measurement Uncertainty:** +/- .01 kHz**Description of modulation:** The carrier is frequency modulated with a single channel of digital information with the use of a modulating sub-carrier.**Description of baseband filtering:** The transmitter does not use a low-pass filter.

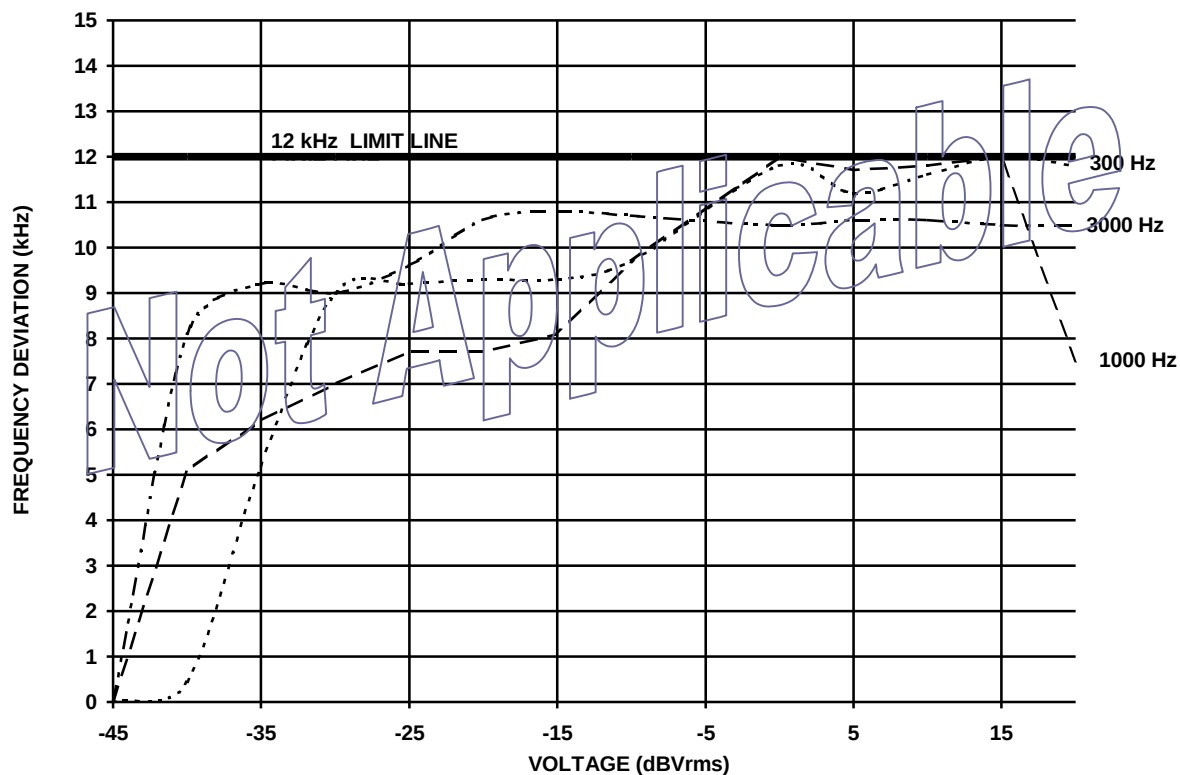
EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****Section 4.3 Modulation Limiting**

NAME OF TEST: Modulation Limiting

PARA. NO.: 2.987(b)

TESTED BY: Tom TidwellTom Tidwell & Debbie Jensen

DATE: 12/29/00

Maximum deviation for non-voice modulation: **+/- .19 kHz.**

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Section 5. Occupied Bandwidth

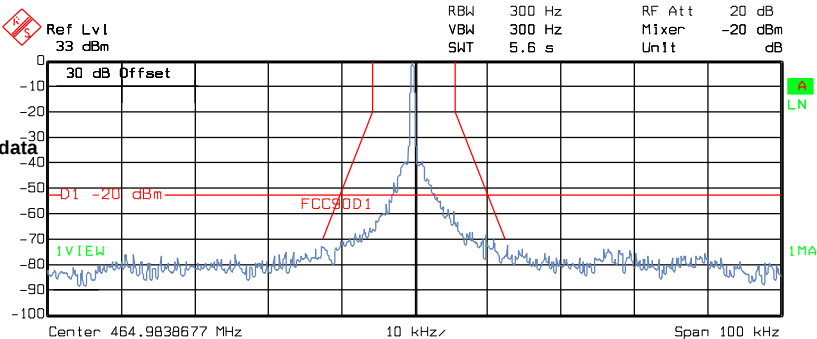
NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: Tom TidwellTom Tidwell & Debbie Jensen	DATE: 12/29/00

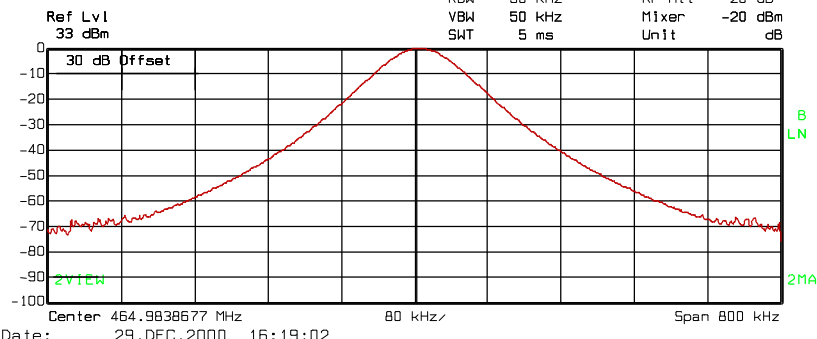
Measurement Results: Complies.**Measurement Data:** See attached data**Measurement Conditions:**
Temperature: 23 °C
Humidity: 25 %**Measurement Uncertainty:** +/- 0.6 dB

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Test Data - Occupied Bandwidth

Data Plot		Occupied Bandwidth	
Page 1 of 1		Complete ☒ Preliminary ☐	
Job No.:	0L0437R	Date:	12/29/00
Specification:	CFR 47, 90.210(D)	Temperature(°C):	23
Tested By:	Tom Tidwell	Relative Humidity(%)	25
E.U.T.:	M-45C1-01 Mobile Unit		
Configuration:	TX at center frequency		
Sample Number:	S01		
Location:	Lab 1	RBW:	300 Hz
Detector Type:	Peak	VBW:	300 Hz
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1045
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1604	Cable #4:	
Attenuator #2:	1477	Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/- .6 dB		

Modulated 9600bps ASCII data	
	RBW 300 Hz VBW 300 Hz SWT 5.6 s RF Att 20 dB Mixer -20 dB Unit dB
Center 464.9838677 MHz	Span 100 kHz

Unmodulated	
	RBW 50 kHz VBW 50 kHz SWT 5 ms RF Att 20 dB Mixer -20 dB Unit dB
Center 464.9838677 MHz	Span 800 kHz

Date: 29.DEC.2000 16:19:02

Notes: Transmit mid channel

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Section 6. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.991
TESTED BY: Tom TidwellTom Tidwell & Debbie Jensen	DATE:12/29/00

Measurement Results: Complies.**Measurement Data:** See attached data**Measurement Conditions:** Temperature: **23** °C
 Humidity: **25** %**Measurement Uncertainty:** +/- 0.6 dB

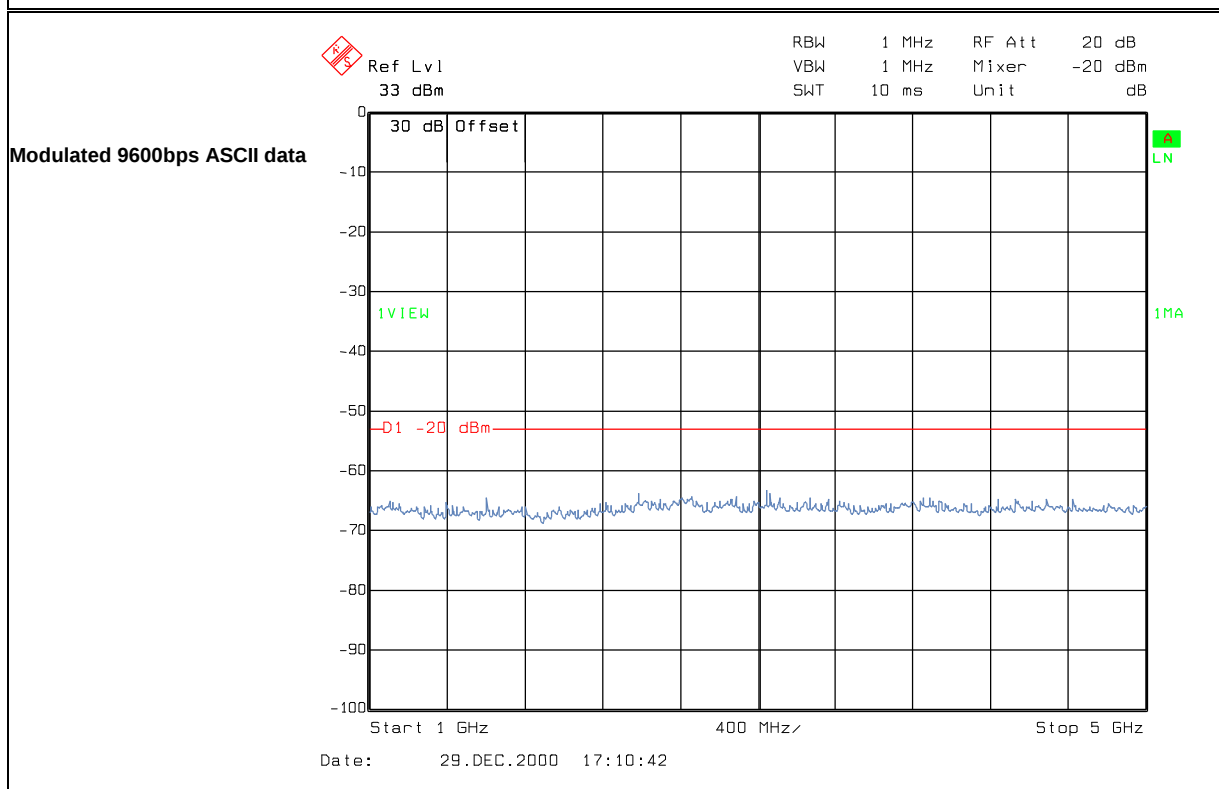
PROJECT NO.: 0L0437RUS1

Data Plot		<u>Antenna Port Spurious Emissions</u>	
Page <u>1</u> of <u>2</u>		Complete <u>X</u>	
Job No.: <u>0L0437R</u>	Date: <u>12/29/00</u>		Preliminary _____
Specification: <u>CFR 47, 90.210(D)</u>	Temperature(°C): <u>23</u>		
Tested By: <u>Tom Tidwell</u>	Relative Humidity(%) <u>25</u>		
E.U.T.: <u>M-45C1-01 Mobile Unit</u>			
Configuration: <u>TX at center frequency</u>			
Sample Number: <u>S01</u>			
Location: <u>Lab 1</u>			
Detector Type: <u>Peak</u>			
<u>Test Equipment Used</u>			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: <u>1045</u>		
Filter: _____	Cable #2: _____		
Receiver: <u>1036</u>	Cable #3: _____		
Attenuator #1: <u>1604</u>	Cable #4: _____		
Attenuator #2: <u>1477</u>	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: <u>+/- .6 dB</u>			
Modulated 9600bps ASCII data Ref Lvl 33 dBm Marker 1 [T1] 31.65 dBm RBW 30 kHz RF Att 20 dB 465.43086172 MHz VBW 30 kHz Mixer -20 dBm SWF 2.7 s Unit dB ▼1 [T1] 31.65 dBm Δ1 [T1] -66.07 dB 464.58917836 MHz -D1 -20 dBm Start 30 MHz 97 MHz Stop 1 GHz Date: 29.DEC.2000 17:19:05			
Notes: <u>Transmit mid channel</u>			

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****Test Data - Spurious Emissions at Antenna Terminals****Data Plot Antenna Port Spurious Emissions**

Page 2 of 2

Job No.: 0L0437R Date: 12/29/00
CFR 47,
Specification: 90.210(D) Temperature(°C): 23
Tested By: Tom Tidwell Relative Humidity(%) 25
E.U.T.: M-45C1-01
Configuration: TX at center frequency



Notes: Transmit mid channel

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Section 7. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions

PARA. NO.: 2.993

TESTED BY: Chinda PoyTom Tidwell & Debbie Jensen

DATE: 01/09/01

Measurement Results: Complies.**Measurement Data:** See attached data**Measurement Conditions:**
Temperature: 22 °C
Humidity: 50 %**Measurement Uncertainty:** +/- 3.6 dB

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****Test Data - Radiated Emissions – Model M-45C1-01 Handheld Golf GPS Unit**

Field Strength of Spurious Emissions										
Page <u>1</u> of <u>1</u>								Complete <u>X</u>		
Job No.: 0L0437R		Date: 1/8/01						Preliminary _____		
Specification: Part 90		Temperature(°C): <u>22</u>								
Tested By: David Light		Relative Humidity(%) <u>50</u>								
E.U.T.: Mobil Unit										
Configuration: Transmit Data Continuously										
Sample Number: S02										
Location: AC 3		RBW: 100 kHz < 1 GHz, 1 MHz > 1 GH						Measurement		
Detector Type: Peak		VBW: 100 kHz < 1 GHz, 1 MHz > 1 GH						Distance: <u>3</u> m		
Test Equipment Used										
Antenna:		Directional Coupler:								
Pre-Amp: 1016		Cable #1: 1484								
Filter:		Cable #2: 1485								
Receiver: 1464		Cable #3:								
Attenuator #1:		Cable #4:								
Attenuator #2:		Mixer:								
Additional equipment used: _____										
Measurement Uncertainty: +/-3.6 dB										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
930	-58.0	29.8		0	3.7		-24.5	0.003524	V	
1395	-33.8	31.5		32.8	4.8		-30.4	0.000918	V	
1860	-49.1	29.9		32.9	6.4		-45.8	0.000026	V	
2325	-54.0	34.1		33.1	6.9		-46.2	0.000024	V	
2790	-58.6	35.6		33.6	8.0		-48.7	0.000014	V	
3255	-59.8	37.1		33.7	8.1		-48.3	0.000015	V	
3720	-62.6	40.4		33.3	8.0		-47.5	0.000018	V	
4185	-64.3	42.8		33.2	7.9		-46.8	0.000021	V	
4650	-65.3	41.2		33.2	9.2		-48.2	0.000015	V	
930	-59.8	30.4		0	3.7		-25.7	0.002685	H	
1395	-36.1	31.1		32.8	4.8		-33.1	0.000494	H	
1860	-44.5	32.7		32.9	6.4		-38.4	0.000146	H	
2325	-49.6	36.7		33.1	6.9		-39.2	0.000121	H	
2790	-57.0	34.6		33.6	8.0		-48.0	0.000016	H	
3255	-54.1	35.8		33.7	8.1		-43.9	0.000041	H	
3720	-60.6	34.3		33.3	8.0		-51.6	0.000007	H	
4185	-58.1	35.2		33.2	7.9		-48.2	0.000015	H	
4650	-60.1	35.5		33.2	9.2		-48.6	0.000014	H	
Notes: scanned to 10th harmonic										

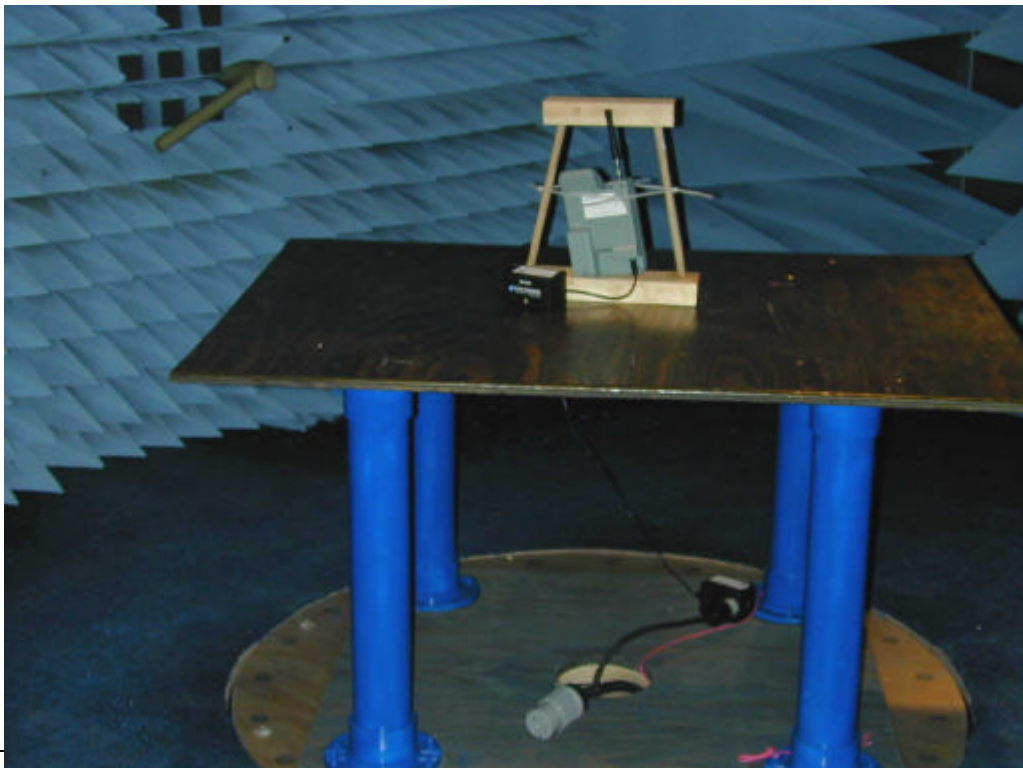
EQUIPMENT: **M-45C1-01 Handheld Radio**

PROJECT NO.: **0L0437RUS1**

Photographs of Test Setup - Model M-45C1-01 Handheld Golf GPS Unit
FRONT VIEW



REAR VIEW



EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Section 8. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.995
TESTED BY: D. LightTom Tidwell & Debbie Jensen	DATE: 1/11/01

Measurement Results: Complies.**Measurement Data:** See attached data**Measurement Conditions:** See data**Measurement Uncertainty:** $\pm 1 \times 10^{-7}$

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****Test Data - Frequency Stability****Frequency Stability**Client: XY GOLFW.O.# 0L0437REUT: MOBILE UNITS/N: S02Date: 1/11/01Tech: D. LIGHTAssigned Frequency: 460.000000 MHz

Test Equipment used: 283-1026

Temperature	Voltage	Frequency Error(from assigned)
20 °C	115 VAC (Nominal)	+184 Hz
20 °C	98 VAC	+188 Hz
20 °C	132	+188 Hz
10 °C	115 VAC	+190 Hz
0 °C	115 VAC	+195 Hz
-10 °C	115 VAC	+98 Hz
-20 °C	115 VAC	-121 Hz
-30 °C	115 VAC	-191 Hz
30 °C	115 VAC	+42 Hz
40 °C	115 VAC	-73 Hz
50 °C	115 VAC	-119 Hz

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1**

Section 9. Transient Frequency Behavior

NAME OF TEST: Transient Frequency Behaviour	PARA. NO.: 90.214
TESTED BY: D. LightTom Tidwell & Debbie Jensen	DATE: 1/08/01

Measurement Results: Complies.**Measurement Data:** See attached data**Measurement Conditions:**
Temperature: 22 °C
Humidity: 50 %**Measurement Uncertainty:** +/- .5 kHz

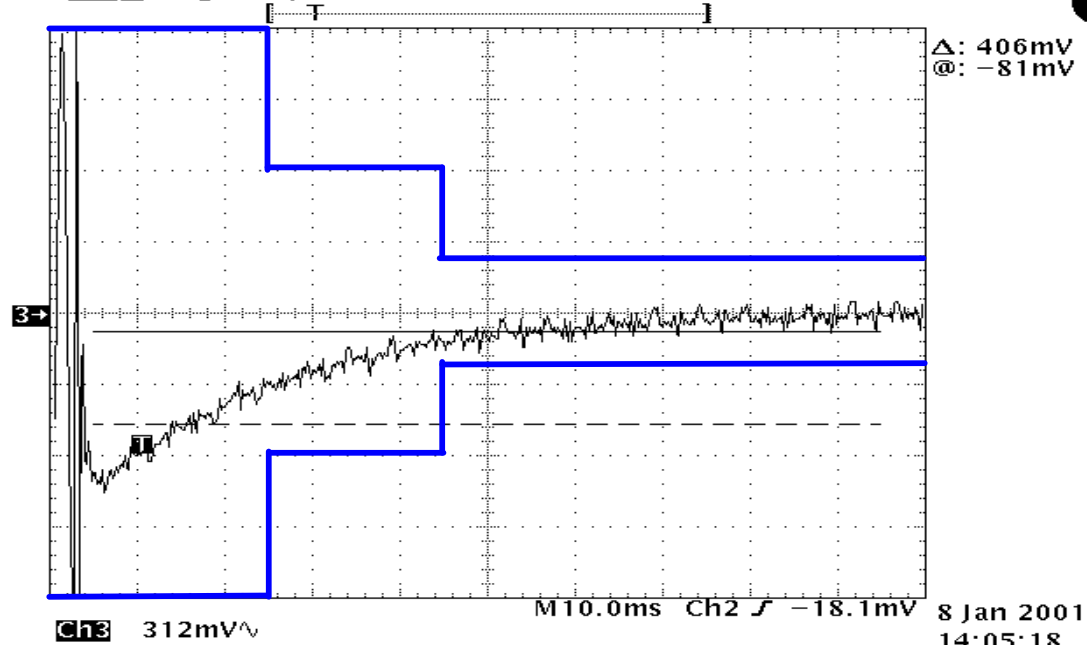
PROJECT NO.: 0L0437RUS1

Data Plot		<u>Transient Frequency Behavior</u>	
Page <u>1</u> of <u>2</u>		Complete _____ Preliminary _____	
Job No.: 0L0437R	Date: 1/8/01		
Specification: PART 90	Temperature(°C): <u>22</u>		
Tested By: Tom Tidwell	Relative Humidity(%): <u>50</u>		
E.U.T.: Base			
Configuration: TX at mid channel			
Sample Number: S01			
Location: Lab 1	RBW: #N/A		
Detector Type:	VBW:		
<u>Test Equipment Used</u>			
Antenna:	Directional Coupler:		
Pre-Amp:	Cable #1:		
Filter:	Cable #2:		
Receiver:	Cable #3:		
Attenuator #1	Cable #4:		
Attenuator #2:	Mixer:		
Additional equipment used:			
	1091	1051	1081
	1043	1054	1463
Measurement Uncertainty: +/-3.6 dB			
Tek Stop: Single Seq 5.00kS/s			
8 Jan 2001 14:18:13			
Notes: _____			

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****Test Data - Transient Frequency Behavior****Data Plot Frequency Behavior**

Page 2 of 2

Job No.:	0L0437R	Date:	1/8/01
Specification:	PART 90	Temperature(°C):	22
Tested By:	Tom Tidwell	Relative Humidity(%)	50
E.U.T.:	Base		
Configuration:	TX at mid channel		

Tek **Stop** Single Seq 5.00kS/s

Notes:

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****Section 10. Test Equipment List**

ASSET	Description	Manufacturer Model No.	Serial No.	Cal. Date	Cal. Due
406	POWER METER	HP 436A	2512A22082	02/17/00	02/16/01
414	POWER SENSOR (0.0001-4.2 GHz)	HEWLETT PACKARD 8482A (50ohm,0.3uW-100mW)	2349A09820	N/A	N/A
1051	Radio Communication Analyzer	Rhode & Schwarz CMTA-54	835875/002	03/14/00	03/14/01
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99	06/14/01
1604	ATTENUATOR	NARDA 776B-20	NONE	09/30/00	09/29/01
1477	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W5	NONE	CBU	N/A
1045	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	05/23/00	05/23/01
1016	AMPLIFIER	HEWLETT PACKARD 8449A	2749A00159	05/24/00	05/24/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/02/02
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	05/25/00	05/25/01
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	05/25/00	05/25/01
283	ENVIROMENTAL CHAMBER	ENVIROTRONICS SH27	129010083	04/06/00	04/06/01
1026	FREQUENCY COUNTER	HEWLETT PACKARD 5350B	8232A01493	08/17/00	08/17/01
1091	COMBINER	MINI-CIRCUITS ZA3PD-1.5	NONE	CBU	N/A
1081	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	05/23/00	05/23/01
1043	Flexible cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	09/30/00	09/29/01
1054	DUAL DIRECTIONAL COUPLER	NARDA 3020A	34366	Cal Not Req	N/A
1463	Color 4 Ch Digitizing Oscilloscope	Tektronix TDS684A	B010460	04/13/00	04/13/01
411	SIGNAL GENERATOR	MARCONI 2022D	119223029	CNR	N/A

Annex A - Test Methodologies

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****NAME OF TEST: RF Power Output****PARA. NO.: 2.985**

Minimum Standard: Para. No. 90.205(a). The maximum allowable station ERP is dependent upon the stations HAAT and required service area and will be authorized in accordance with Table 1 of 90.205(d).

Method Of Measurement:Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

EQUIPMENT: **M-45C1-01 Handheld Radio***PROJECT NO.:* **0L0437RUS1**

NAME OF TEST: Audio Frequency Response

PARA. NO.: 2.987(a)

Test Method: TIA/EIA-603

Minimum Standard: TIA/EIA-603, Para. 3.2.6 from 300 Hz to 3000 Hz. The transmitter audio frequency response shall have a nominal 6 dB per octave pre-emphasis characteristic.

NAME OF TEST: Audio Low-Pass Filter Frequency Response

PARA. NO.: 2.987(a)

Test Method: TIA/EIA-603

Minimum Standard: TIA/EIA-603

NAME OF TEST: Modulation Limiting
--

PARA. NO.: 2.987(a)

Test Method: TIA/EIA-603

Minimum Standard: TIA/EIA-603

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****NAME OF TEST: Occupied Bandwidth****PARA. NO.: 2.989****Minimum Standard:** Para. No. 90.210, see table 1 below for applicable mask.**Table 1**

Frequency Band (MHz)	Mask for equipment with Low Pass Filter	Mask for equipment without Low Pass Filter
Below 25	A or B	A or C
25 - 50	B	C
72 - 76	B	C
150 - 174	B, D or E	C, D or E
150 Paging only	B	C
220 - 222	F	F
421 - 512	B, D or E	C, D or E
450 paging only	B	H
806 - 821/ 851 - 866	B	G
821 - 824/ 866 - 869	B	H
896 - 901/ 935 - 940	I	J
902 - 928	K	K
929 - 930	B	G
Above 940	B	C
All other bands	B	C

Test Method:

RBW: 1% of emission bandwidth in 0 - 1 GHz range. 1 MHz at frequencies above 1 GHz.

VBW: $\Rightarrow$ RBW

The spectrum is search up to 10 times the fundamental frequency.

EQUIPMENT: **M-45C1-01 Handheld Radio***PROJECT NO.:* **0L0437RUS1**

NAME OF TEST: Field Strength of Spurious

PARA. NO.: 2.993

Minimum Standard: Para. No. 90.210, see table 1 for applicable mask.

Test Method: The effective radiated power of the spurious emissions was measured using the substitution antenna method. The EUT is placed on a turntable at three meters distance from the receive antenna. When a spurious emission is detected, the level of the emission is maximized by rotating the turntable and adjusting the height of the receive antenna. The EUT is then replaced with a substitution antenna fed with a signal generator. The level of the signal generator is adjusted until the spurious level previously detected is duplicated. The erp of the spurious emission is the input level to the substitution antenna corrected for any gain of the substitution antenna with reference to a dipole.

EQUIPMENT: **M-45C1-01 Handheld Radio**PROJECT NO.: **0L0437RUS1****NAME OF TEST: Frequency Stability****PARA. NO.: 2.995**

Minimum Standard: Para. No. 990.213. The transmitter carrier frequency shall remain within the assigned frequency below in ppm.

Table 2

Frequency Band (MHz)	Fixed And Base Stations	Mobile Stations	
		> 2 Watts o/p pwr	< 2 Watts o/p pwr
Below 25	100	100	200
25 - 50	20	20	50
72 - 76	5	-	50
150 - 174	5	5	5
220 - 222	0.1	1.5	1.5
421 - 512	2.5	5	5
806 - 821	1.5	2.5	2.5
821 - 824	1.0	1.5	15
851 - 866	1.5	2.5	2.5
866 - 869	1.0	1.5	1.5
869 - 901	0.1	1.5	1.5
902 - 928	2.5	2.5	2.5
929 - 930	1.5	-	-
935 - 940	0.1	1.5	1.5
1427 - 1435	300	300	300
Above 2450	-	-	-

NAME OF TEST: Transient Frequency Behaviour**PARA. NO.: 2.214****Minimum Standard:****Transient Frequency Behaviour for Equipment Designed to Operate on 25 kHz Channels**

Time intervals ^{1,2}	Maximum Frequency difference ³ (kHz)	Frequency ranges (MHz) All equipment					
		Base station and portable radios			Mobile Radios		
		150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)	150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)
t ₁ ⁴	± 25	5.0	10.0	20.0	5.0	10.0	5.0
t ₂	± 12	20.0	25.0	50.0	20.0	25.0	20.0
t ₃ ⁴	± 25	5.0	10.0	10.0	5.0	10.0	5.0

Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz & 6.25 kHz Channels

Time intervals ^{1,2}	Maximum Frequency difference ³ (kHz)	Frequency ranges (MHz) All equipment		
		150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)
t ₁ ⁴	± 12.5 / ± 6.25	5.0	10.0	20.0
t ₂	± 6.25 / ± 3.125	20.0	25.0	50.0
t ₃ ⁴	± 12.5 / ± 6.25	5.0	10.0	10.0

EQUIPMENT: **M-45C1-01 Handheld Radio**

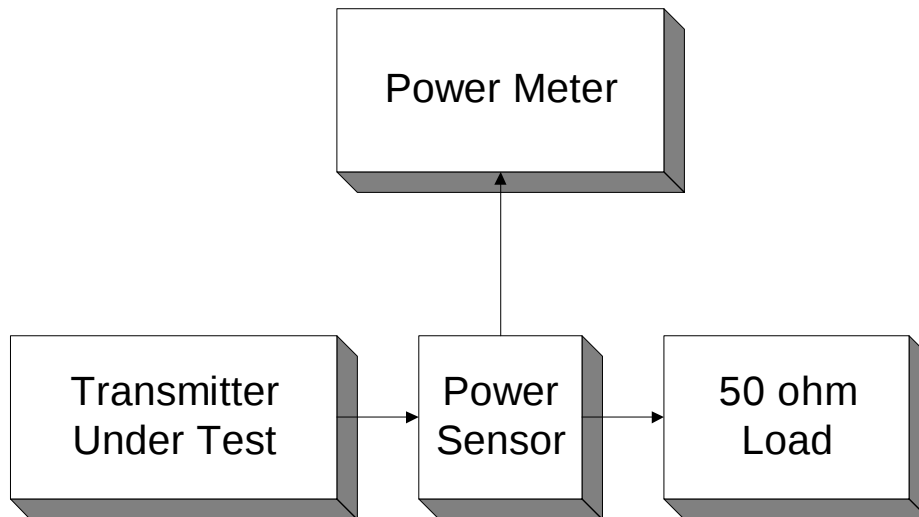
PROJECT NO.: **0L0437RUS1**

Annex B - Test Diagrams

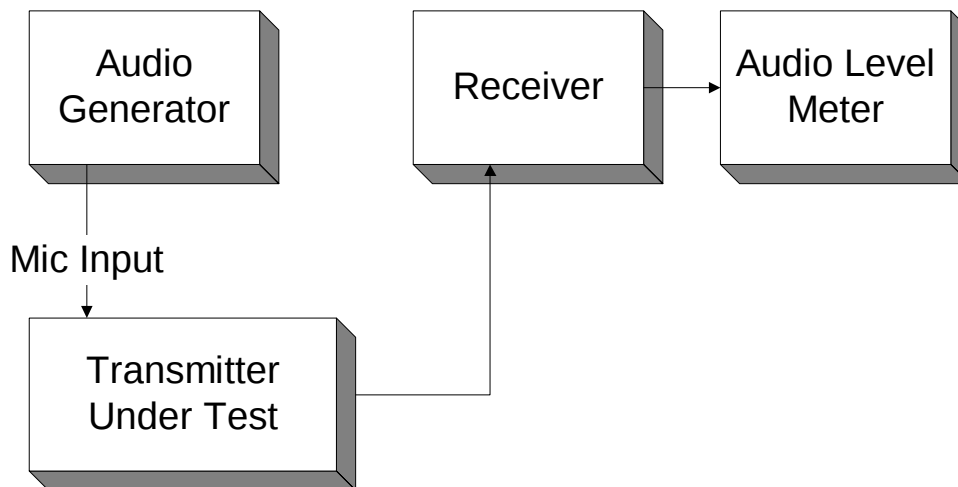
EQUIPMENT: **M-45C1-01 Handheld Radio**

PROJECT NO.: **0L0437RUS1**

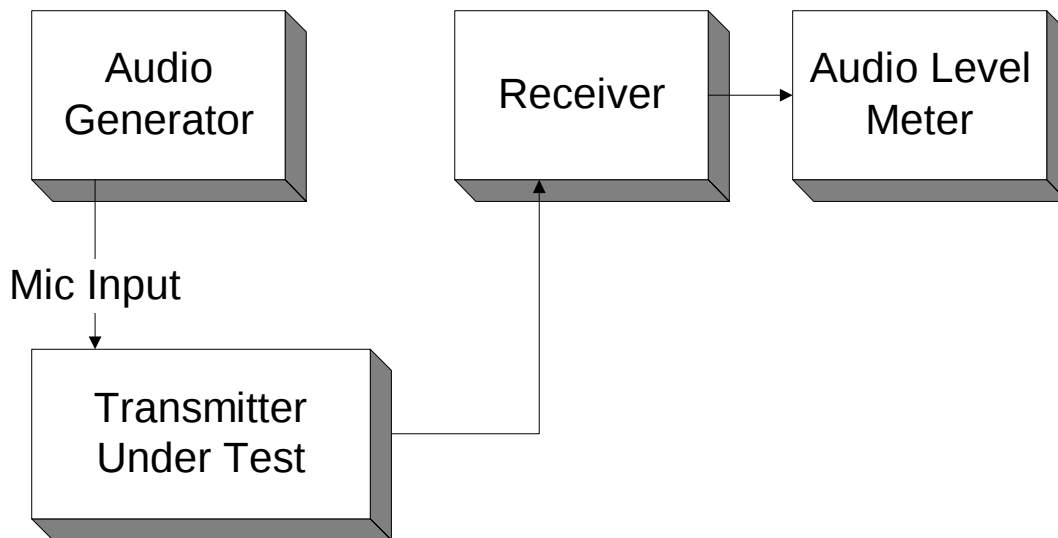
Para. No. 2.985 - R.F. Power Output



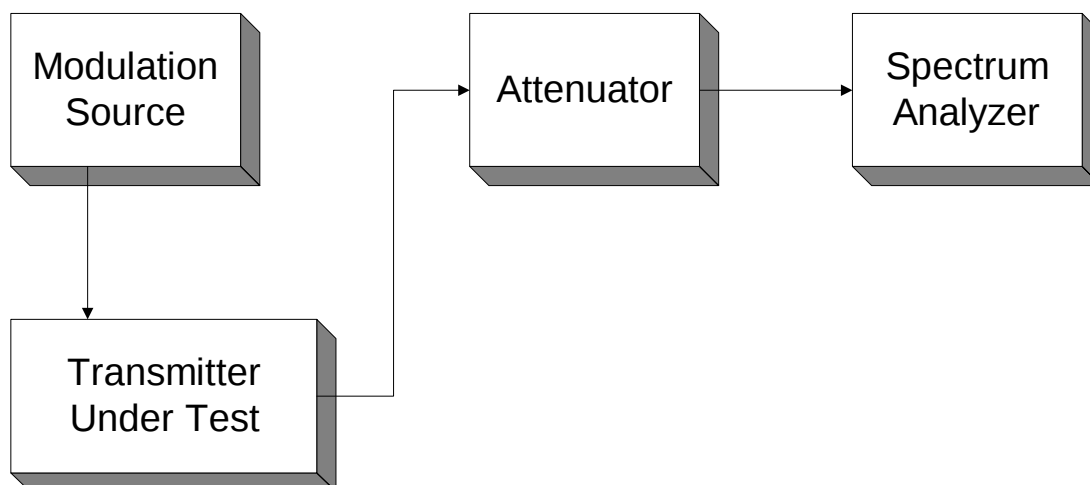
Para. No. 2.987(a) - Audio Frequency Response



Para. No. 2.987(b) - Modulation Limiting



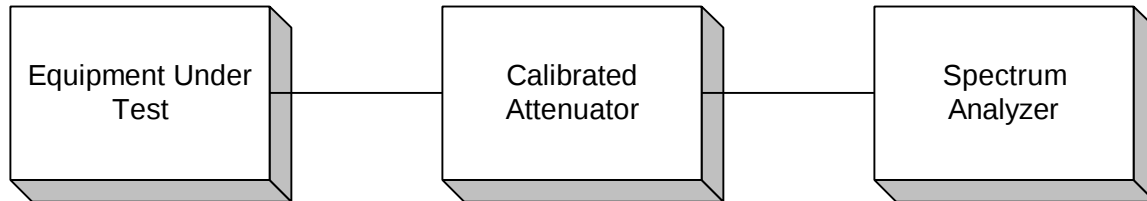
Para. No. 2.989 - Occupied Bandwidth



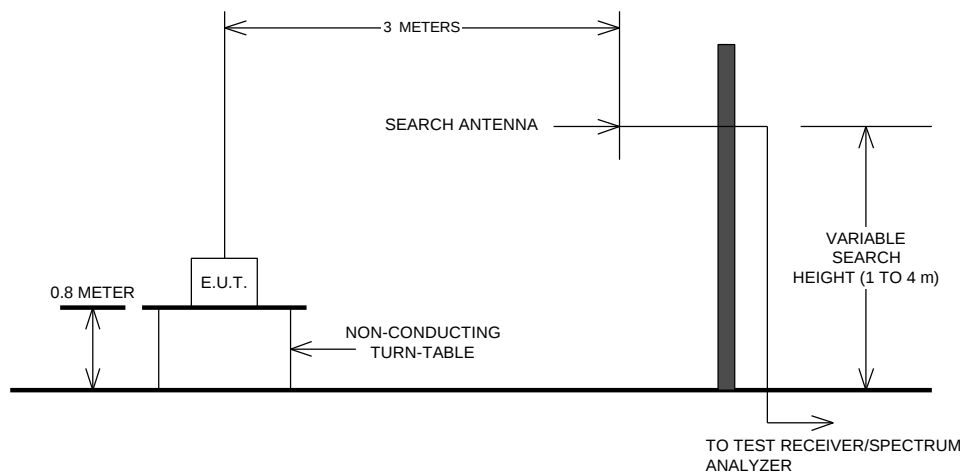
EQUIPMENT: **M-45C1-01 Handheld Radio**

PROJECT NO.: **0L0437RUS1**

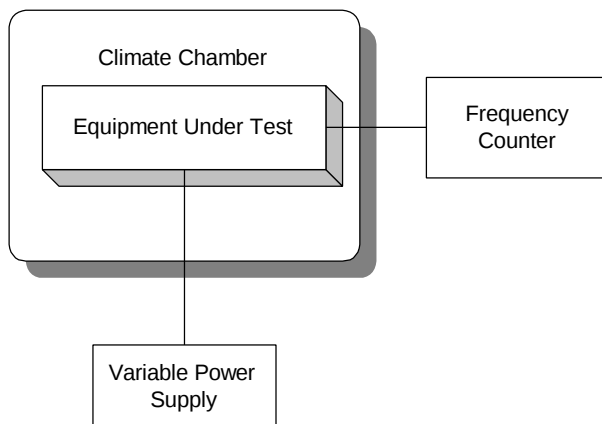
Para. No. 2.991 - Spurious Emissions at Antenna Terminals

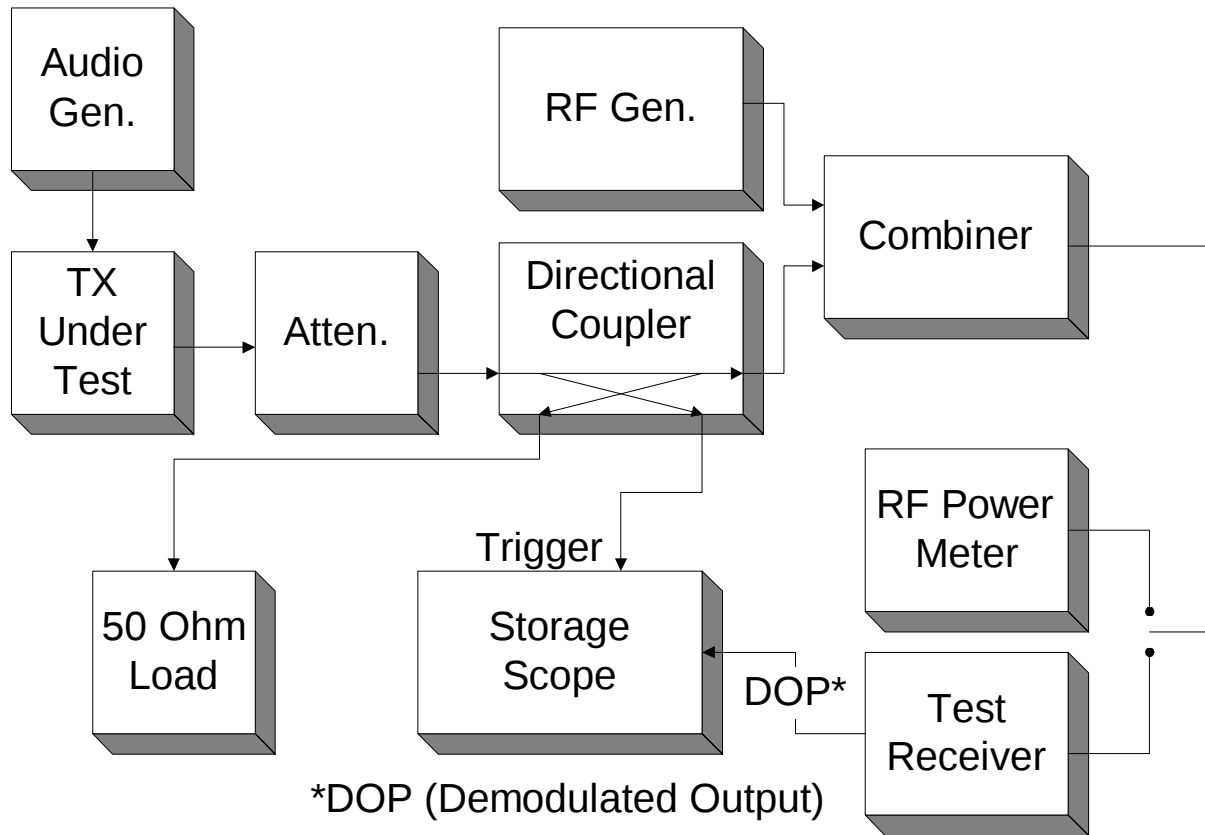


Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability



Para. No. 90.214 - Transient Frequency Behaviour**Voice**

This measurement was made using measurement procedure TIA/EIA Land Mobile FM or PM Communications Equipment Measurement and Performance Standards TIA/EIA-603 February 1993 Telecommunications Industry Association (American National Standard ANSI/TIA/EIA-603-1992 Approved: October 27, 1992) Para. no. 2.2 Methods of Measurement for Transmitters Para. no. 2.2.19 Transient Frequency Behaviour (page no. 83).

Data

This measurement was made using measurement procedure TIA/EIA Digital C4FM/CQPSK Transceiver Measurement Methods TSB102.CAAA Para. no. 2.2.17 Transient Frequency Behaviour (page no. 74).