TABLE OF CONTENTS LIST

APPLICANT: RANGER ELECTRONIC COMMUNICATIONS.

FCC ID: MEE-DX-929

TEST REPORT:

PAGE 1.....COVER SHEET – GENERAL INFORMATION & TECHNICAL DESCR.
PAGE 2.....TECHNICAL DESCRIP. CONTINUED & RF POWER OUTPUT
PAGE 3.....AUDIO FREQUENCY RESPONSE
PAGE 4-5....AUDIO INPUT VS MODULATION GRAPH
PAGE 6.....OCCUPIED BANDWIDTH TEST PROCEDURES
PAGE 7.....OCCUPIED BANDWIDTH PLOT
PAGE 8.....OCCUPIED BANDWIDTH PLOT –CW
PAGE 9.....OVER MODULATION TRANSIENT RESPONSE
PAGE 10.....OVER MODULATION TRANSIENT RESPONSE PLOTS
PAGE 11.....SPURIOUS EMISSIONS AT ANTENNA TERMINALS TEST PROCEDURE
PAGE 12.....UNWANTED EMISSIONS
PAGE 13.....METHOD OF MEASURING RADIATED EMISSIONS
PAGE 14.....FREQUENCY STABILITY
PAGE 15-17..LIST OF TEST EQUIPMENT

EXHIBITS CONTAINING:

EXHIBIT 1...SCHEMATICS
EXHIBIT 2...BLOCK DIAGRAM
EXHIBIT 3...EXTERNAL PHOTOGRAPHS
EXHIBIT 4...INTERNAL PHOTOGRAPHS
EXHIBIT 5...FCC ID LABEL SAMPLE AND SKETCH OF LOCATION
EXHIBIT 6...PARTS LIST
EXHIBIT 7...TUNING PROCEDURE
EXHIBIT 8...CIRCUIT DESCRIPTION
EXHIBIT 9...OWNER’S MANUAL
EXHIBIT 10..TEST SETUP PHOTOGRAPH
EXHIBIT 11..AMPLIFIER SPECIFICATION

GENERAL_INFORMATION_REQUIRED FOR_TYPE_ACCEPTANCE

2.1033(c)(1)(2) RANGER ELECTRONIC COMMUNICATIONS. will manufacture the FCC ID: MEE-DX-929 CITIZENS BAND 40 CHANNEL TRANSCEIVER in quantity, for use under FCC RULES PART 95 SUBPART D.

RANGER ELECTRONIC COMMUNICATIONS.
70 PEI NEI STREET, SHULIN 238
TAIPEI HSIEN, TAIWAN

2.1033(c)(3) Instruction book. A draft copy of the instruction manual is included as Exhibit # 10.

2.983 (d) TECHNICAL DESCRIPTION

2.1033(c)(4) Type of Emission: 6KOOA3E
95.633 ALLOWED AUTHORIZED BANDWIDTH = 8.0 kHz
95.625 Frequency Range: 26.965 – 27.405 MHz

Calculation:

Max modulation (M) in kHz = 3 kHz
Bn = 2*M = 2*3 kHz = 6 kHz Amplitude Modulation
`

Power Range and Controls: There are NO user Power controls.

2.1033(c)(7) Maximum Output Power Rating as defined in the rules:
4 Watts carrier power when transmitting emissions type A3E.

2.1033(c)(8) DC 13.8 Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY
Vce = 13.8 Volts DC
Ice = 1.98 A.
Pin = 27.32 Watts

2.1033(c)(9) Tune-up procedure. The tune-up procedure is included as Exhibit # 8.

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is included as Exhibit # 2. The block diagram is included as Exhibit # 1.

2.1033(c)(11) A photograph for drawing of the FCC ID Label and the where it will be placed on the device is included as Exhibit # 5.

2.1033(c)(12) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout, including meters, label for controls, including any view under shields are included as Exhibit # 3-4.

2.1033(c)(13) Digital modulation. This unit does not use digital modulation.

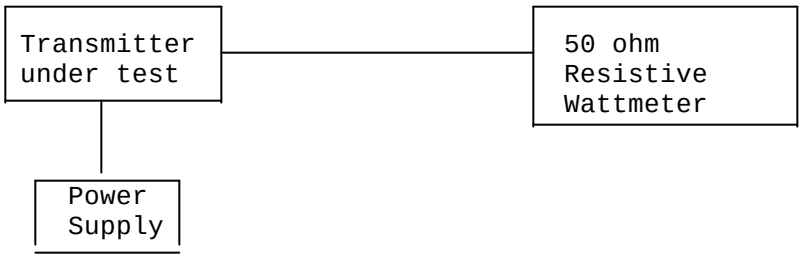
2.1033(c)(14) The data required by 2.1046 through 2.1057 is submitted below.

2.1046 RF power output.

The EUT was connected to a resistive coaxial attenuator of normal load impedance, and the unmodulated output power was measured by means of an R.F. Power Meter.

With applied voltage of 13.8 VDC, output measurement results are:

Power Output = 3.8 Watts



95.645(a) No control, switch, or other type adjustment, which, when manipulated can results in a violation of the rules.

95.655 All frequency determining elements, including crystals, PLL integrated circuits, and channel selection are permanently mounted and soldered internal to the transmitter and cannot be accessed through the front panel or from the enclosure exterior.

95.667 Dissipation rating of the final amplifier which supplies RF power to the antenna terminal must not exceed 10 W. This EUT uses 2SC2078, 27 MHz High Frequency Power Amplifier. The specification sheet is shown as Exhibit 11. Collector dissipation is listed at 1.2 Watts.

95.669 External Controls:
This EUT meets the applicable provisions of 95.669. External controls are limited to the control functions as described in Chapter 3 of the users manual.

95.671 The serial number of each unit will be implemented in accordance with 95.671. Please see label sample submitted.

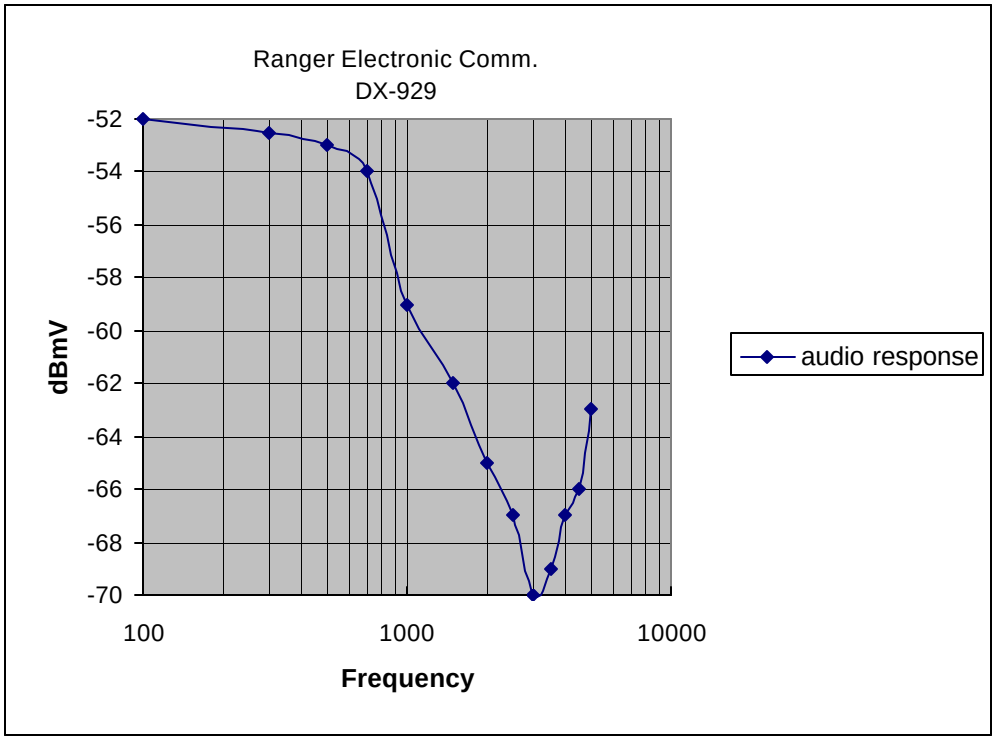
95.673 A copy of Part 95, Subpart D, of the FCC rules, current at the time of packing of the transmitter will be furnished with each EUT marketed.

2.1047 Modulation characteristics:

2.1047(a) AUDIO FREQUENCY RESPONSE

The audio frequency response was measured in accordance with EIA Specification RS-382A. The audio frequency response curve is shown below. The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured.

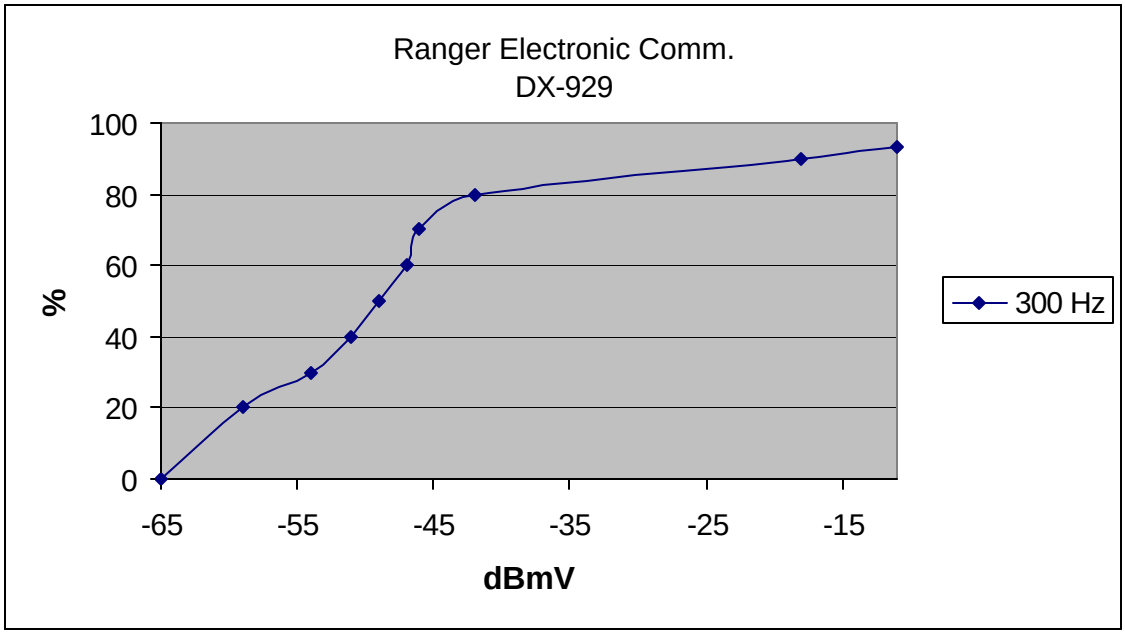
AUDIO FREQUENCY RESPONSE GRAPH



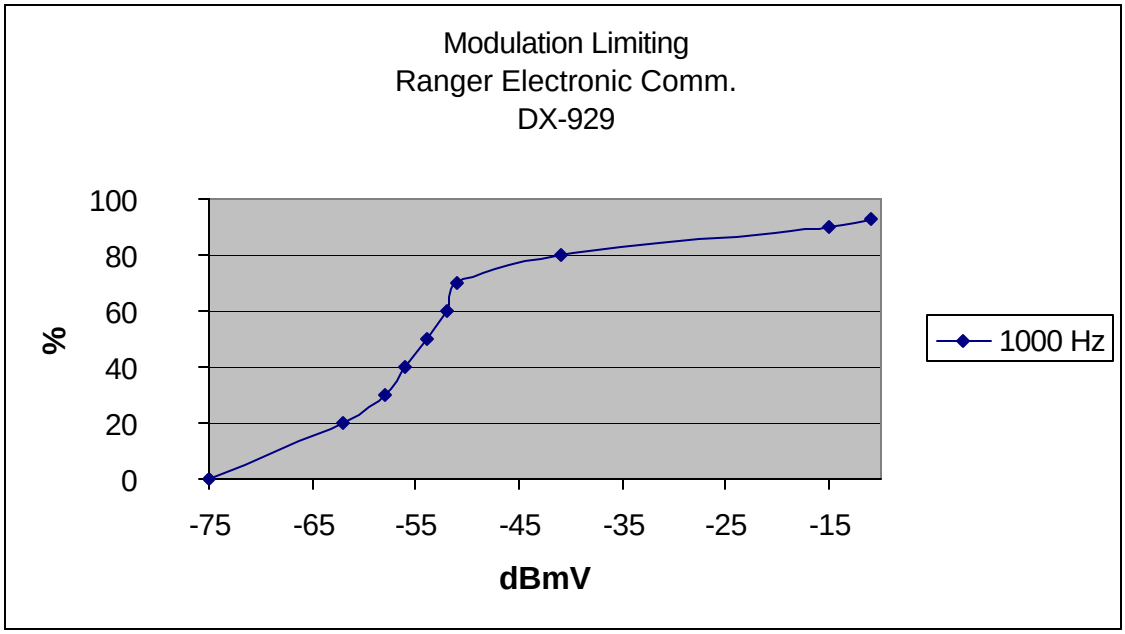
2.1047(b) Audio input versus modulation

The audio input level needed for a particular percentage of modulation was measured in accordance with EIA Specification RS-382A. The audio input curves versus modulation are below. Curves are provided for audio input frequencies of 300, 1000, and 2500 Hz.

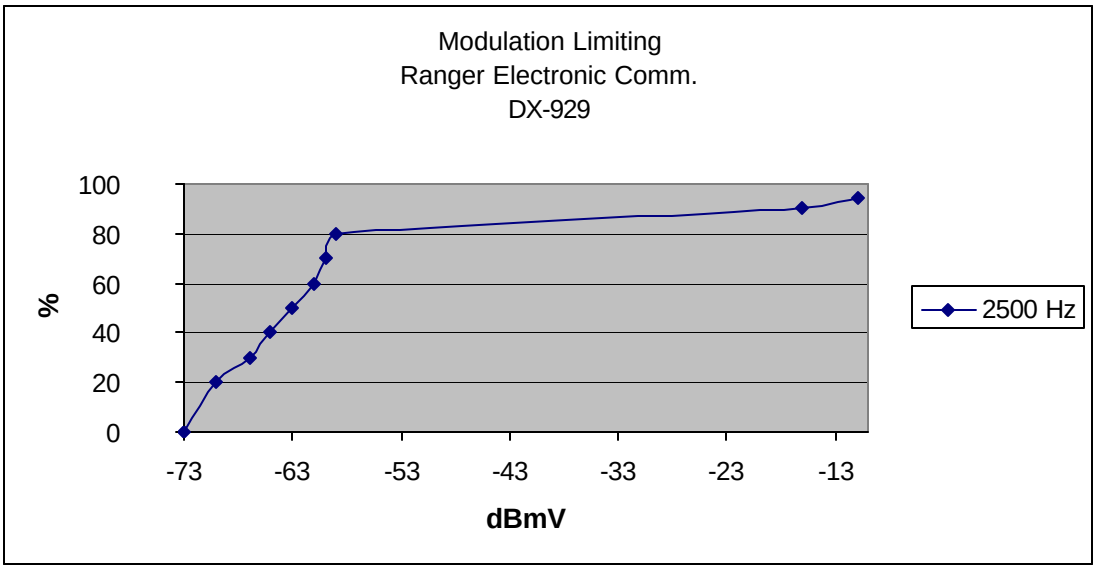
MODULATION LIMITING PLOT – 300 Hz



MODULATION LIMITING PLOT – 1000 Hz



MODULATION LIMITING PLOT – 2500 Hz



2.1049
95.633

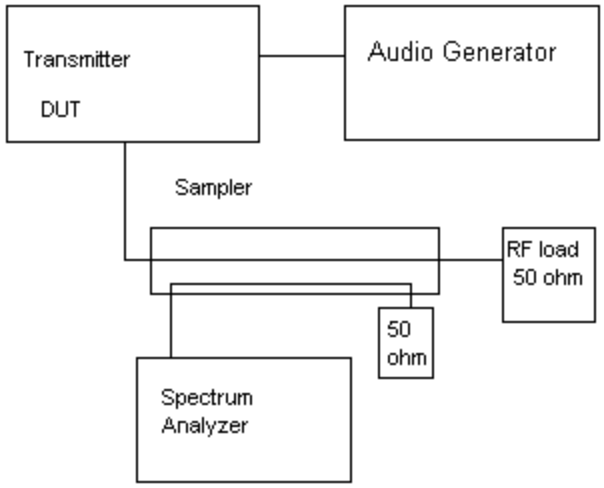
Occupied bandwidth:

Data in the plots shows that the sidebands from greater than 50% to 100% of the authorized bandwidth must be attenuated by at least 25dB and from 100 to 250% the sidebands must be attenuated by at least 35dB. Beyond 250% the sidebands must be attenuated by at least 53+log10(TP). The transmitter was modulated with 2500 Hz, 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 photographs follow.

Transmitter with modulation limiter.

Test procedure diagram

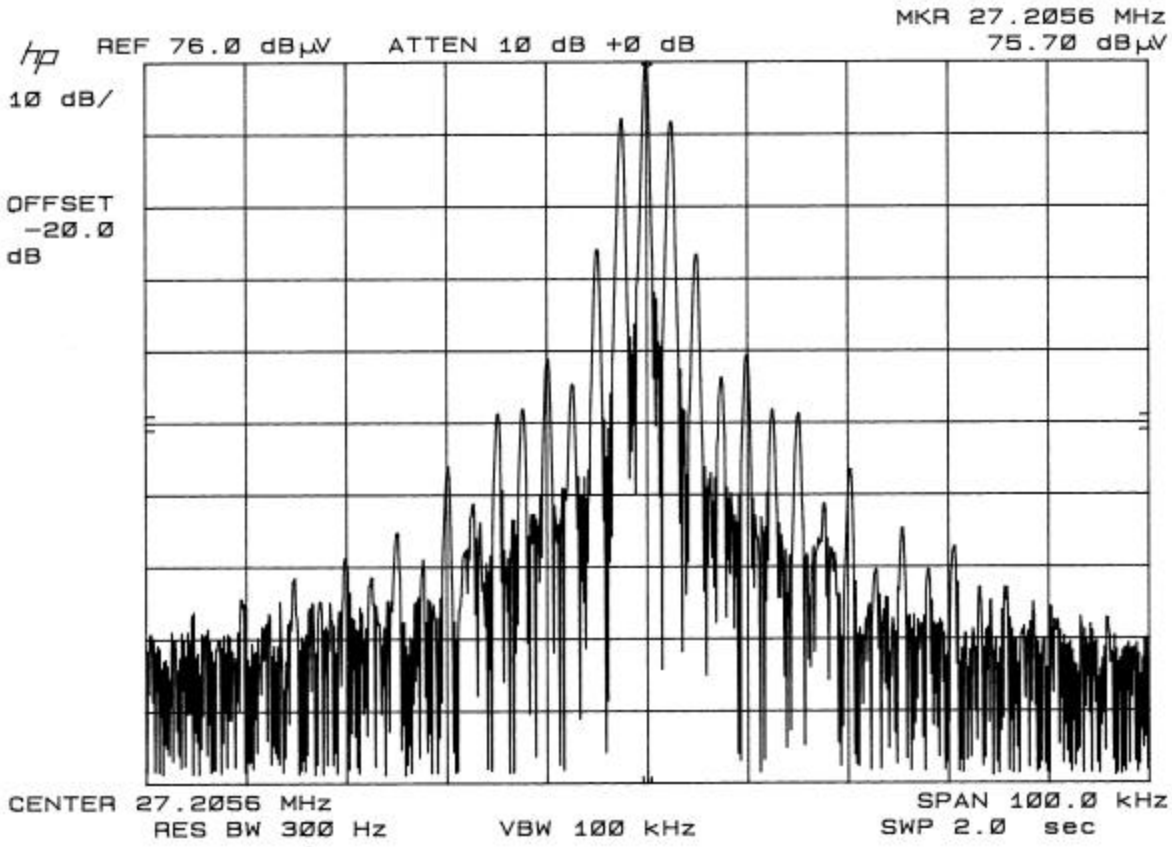
Occupied BW Test Equipment Setup



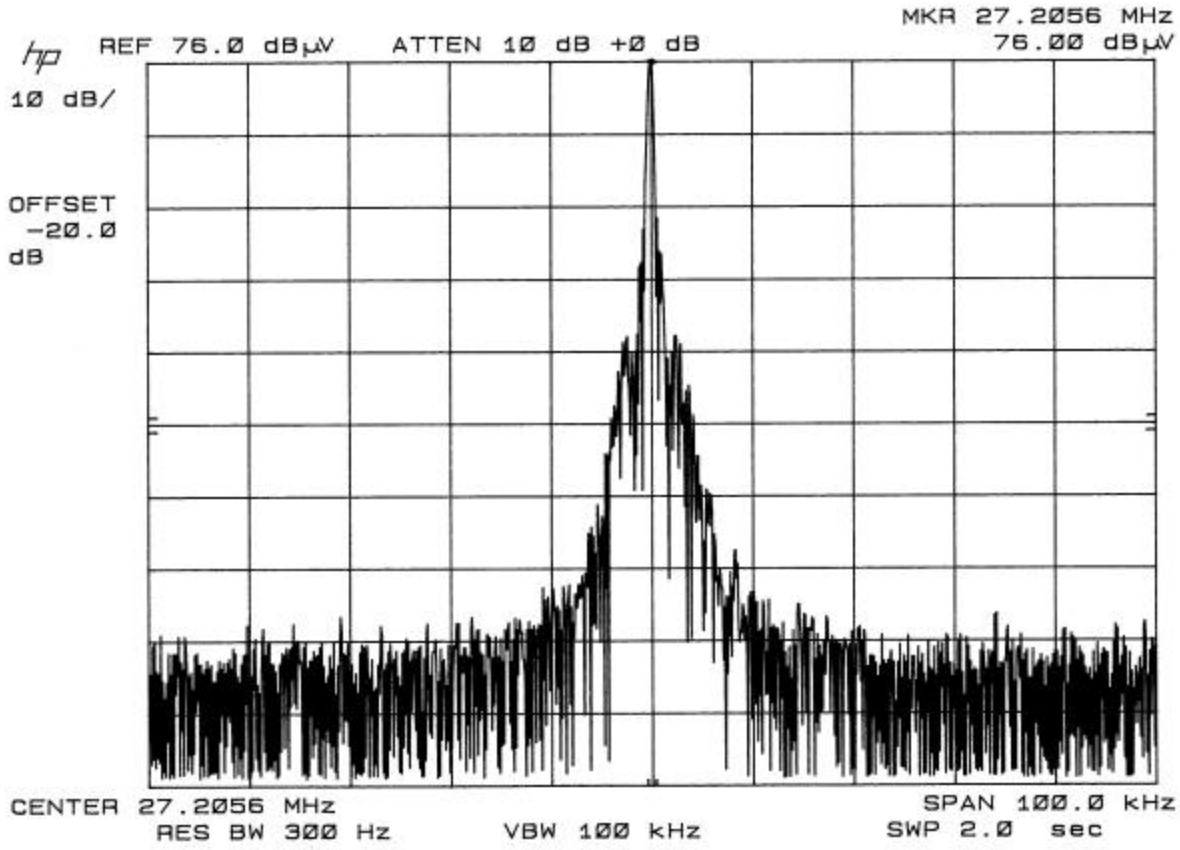
Data was taken at low, mid , and high frequency.

Only the worse case data is shown

OCCUPIED BANDWIDTH PLOT



OCCUPIED BANDWIDTH CW PLOT



2.1047 OVER MODULATION TRANSIENT RESPONSE

A. MEASUREMENT PROCEDURE

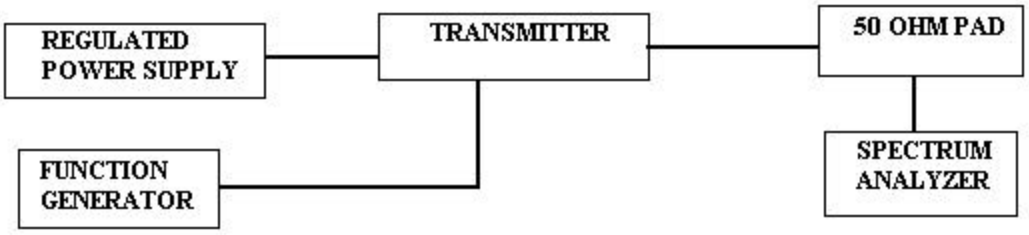
1. Set audio modulating signal at 2500Hz, at a level 16dB greater than required for 50% modulation at audio frequency of maximum response. This signal is pulsed at one(1) P.P.S. with a pulse width of 0.5sec.

2. Tune the Spectrum Analyzer to the channel on which channel on which the transmitter is set and adjust the settings as for the measurement of occupied bandwidth.

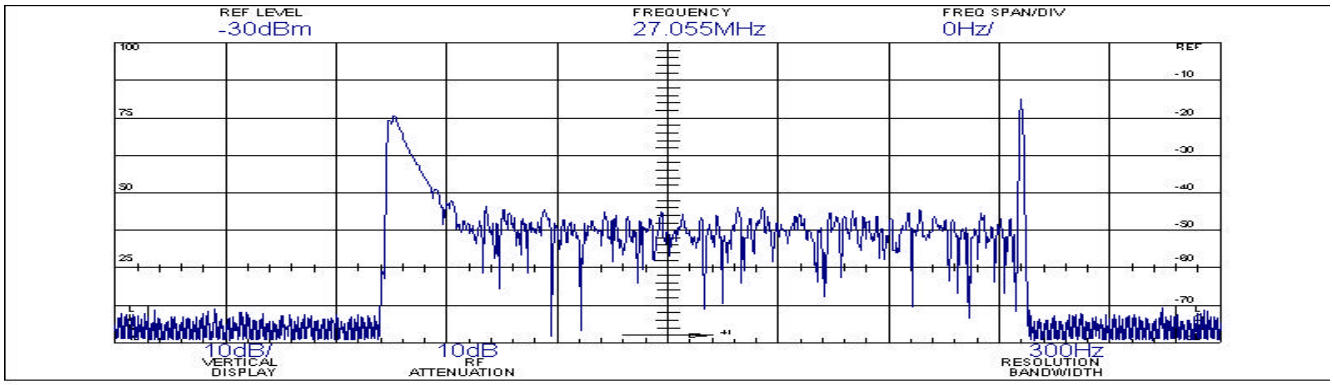
3. Then tune the Spectrum analyzer to the adjacent channel (+,-10KHz) to that on which the transmitter is set, place it in the "ZERO-SCAN", then observe the transients caused by the pulsed modulation.

4. The transients must have a duration of less than 100 milliseconds and be attenuated by at least 26dB.

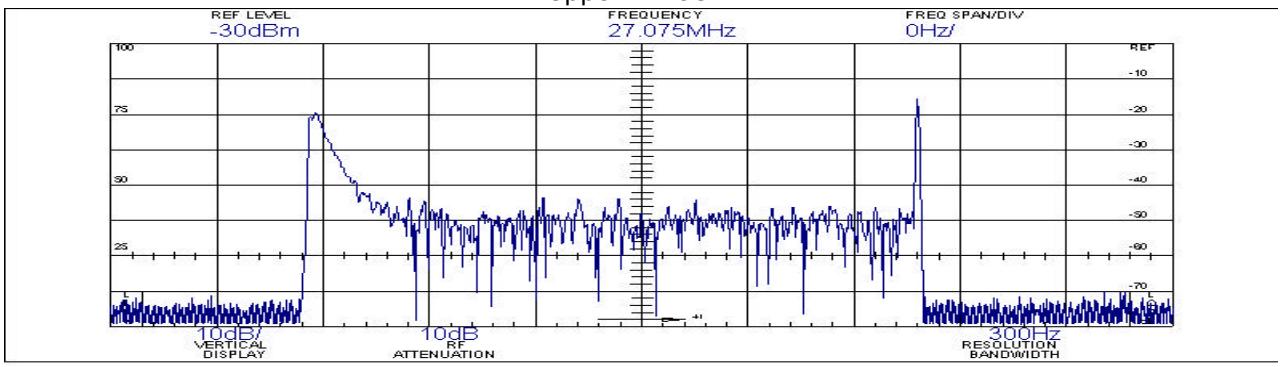
B. TEST SET UP



Lower Plot



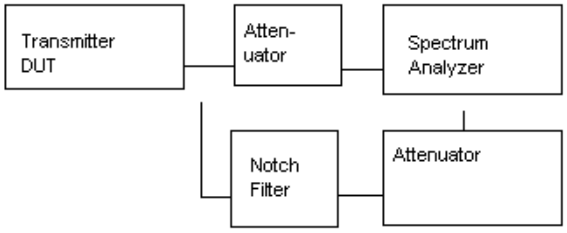
Upper Plot



The horizontal span is 500 milliseconds or 50 millseconds/division.

2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS:
The following data shows the level of conducted spurious responses at the antenna terminal. The test procedure used was TIA/EIA 603 with the exception that the emissions were recorded in dBc. The spectrum was scanned from 0.4 MHz to at least the 10th harmonic of the fundamental.

Spurious Emissions at
Antenna Terminals



Method of Measuring Conducted Spurious Emissions

NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

REQUIREMENTS: Emissions must be 53+10log(Po) dB below the mean power output of the transmitter.

53 + 10log(2.7) = 56 dB or 60dB Whichever is the lesser.

EMISSION FREQUENCY MHz	dB BELOW CARRIER
27.38	00.0
54.78	-70.6
82.2	-63.6
109.6	-82.4
137.0	-75.2
164.4	-81.9
191.81	-75.7
219.21	-80.2
246.61	-81.3
274.01	-82.6

METHOD OF MEASUREMENT: The procedure used was TIA/EIA-603 STANDARD without any exceptions. An audio generator was connected to the UUT through a dummy microphone circuit and the output of the transmitter connected to a standard load and from the standard load through a pre-selector filter of the spectrum analyzer. The spectrum was scanned from 400KHz to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 849 STATE ROAD, NEWBERRY FLORIDA 32669.

2.1053
95.635(b)(8)(9)

UNWANTED RADIATION:

REQUIREMENTS: Emissions must be attenuated by at least the following below the output of the transmitter.

53 + 10log(2.7) = 56dB or

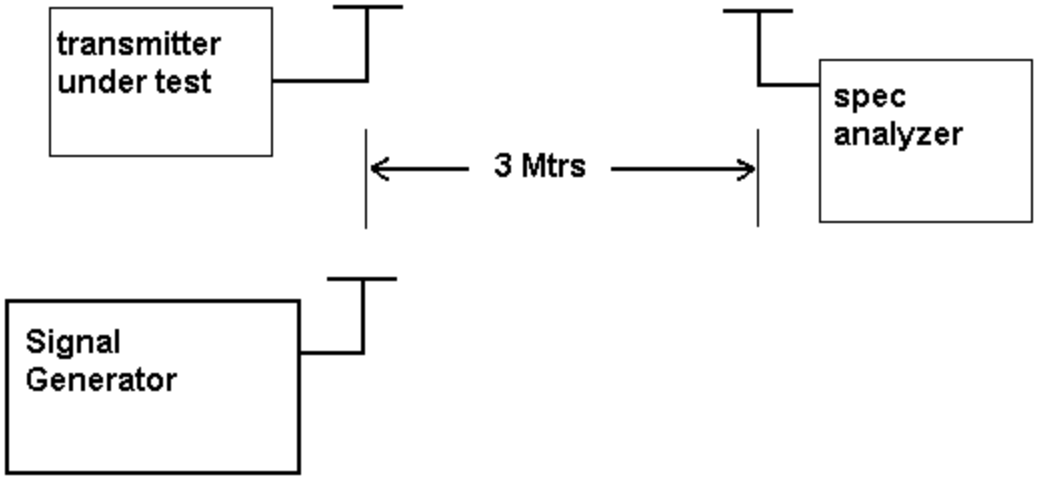
Greater than 60dB for any frequency beyond twice the fundamental.

TEST DATA:

Emission Frequency MHz	ATTN dBc	Margin dBm
27.38	0	36
54.8	119	-83
82.2	120	-84
109.6	108	-72
137.0	99	-63
164.4	95	-59
191.8	90	-54
219.2	102	-66
246.62	104	-68
274.02	109	-73

METHOD OF MEASUREMENT: The procedure used was C63.4-1992 with the the unit was operating into its permanently attached antenna at a height of four feet. The spectrum was scanned from 30 MHz 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 849 NW State Road 45, Newberry, FL 32669.

Method of Measuring Radiated Spurious Emissions



Equipment was placed 80 cm above the ground on a rotating platform.

Appropriate antenna raised from 1 to 4 M.

2.1055(a)(b)(d) Frequency stability:

Temperature and voltage tests were performed to verify that the frequency remains within the .005%, 50 ppm 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.

Readings were also taken at the end point of the battery voltage of 13.8VDC.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 27.205 350

TEMPERATURE°C	FREQUENCY MHz	PPM
REFERENCE	27.205 350	00.00
-30	27.2058 622	18.84
-20	27.205 841	18.04
-10	27.2057 728	15.55
0	27.205 683	12.24
+10	27.205 575	8.26
+20	27.2053 886	1.43
+30	27.2052 488	-3.71
+40	27.2051 084	-8.87
+50	27.2050 367	-11.51
85% BATT.End-Point 11.75VDC	27.2053 481	-0.06

EMC Equipment List

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
X	3-Meter OATS	TEI	N/A	N/A	Listed 12/22/99	12/22/02
	3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
	Receiver, Beige Tower					
	Spectrum Analyzer (Tan)	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03
	RF Preselector (Tan)	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
	Quasi-Peak Adapter (Tan)	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
X	Receiver, Blue Tower					
X	Spectrum Analyzer (Blue)	HP	8568B	2928A04729 2848A18049	CHAR 10/22/01	10/22/03
X	RF Preselector (Blue)	HP	85685A	2926A00983	CHAR 10/22/01	10/22/03
X	Quasi-Peak Adapter (Blue)	HP	85650A	2811A01279	CHAR 10/22/01	10/22/03
X	Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
	Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
	Biconnical Antenna	Eaton	94455-1	1057	CHAR 3/15/00	3/15/02
	BiconiLog Antenna	EMCO	3143	9409-1043		
X	Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
	Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
	Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CHAR 10/16/01	10/16/03
	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	CHAR 11/24/00	11/24/03
	Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 12/19/01	12/19/03
	Horn Antenna	Electro-Metrics	EM-6961	6246	CAL 3/21/01	3/21/03
	Horn Antenna	ATM	19-443-6R	None	No Cal Required	
	Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/03

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Line Impedance Stabilization . . .	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
	Line Impedance Stabilization . . .	Electro-Metrics	EM-7820	2682	CAL 3/16/01	3/16/03
	Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 5/25/99	5/25/01
	Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CAL 12/12/01	12/12/03
	Oscilloscope	Tektronix	2230	300572	CHAR 2/1/01	2/1/03
	Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04
	AC Voltmeter	HP	400FL	2213A14499	CAL 10/9/01	10/9/03
	AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/03
	AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/03
X	Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/04
	Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/04
	Digital Multimeter	HP	E2377A	2927J05849	CHAR 1/8/02	1/8/04
	Multimeter	Fluke	FLUKE-77-3	79510405	CAL 9/26/01	9/26/03
	Peak Power Meter	HP	8900C	2131A00545	CHAR 1/26/01	1/26/03
	Digital Thermometer	Fluke	2166A	42032	CAL 1/16/02	1/16/04
	Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/04
X	Temp/Humidity gauge	EXTech	44577F	E000901	CHAR 1/22/02	1/22/04
	Frequency Counter	HP	5352B	2632A00165	CAL 11/28/01	11/28/03
	Power Sensor	Agilent Technologies	84811A	2551A02705	CAL 1/26/01	1/26/03
	Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	11/22/02
	Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 5/12/02	5/12/04
	Signal Generator	HP	8640B	2308A21464	CAL 11/15/01	11/15/03
	Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
	Near Field Probe	HP	HP11940A	2650A02748	CHAR 2/1/01	2/1/03

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	BandReject Filter	Lorch Microwave	5BR4-2400/ 60-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	6BR6-2442/ 300-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	5BR4-10525/ 900-S	Z1	CHAR 3/2/01	3/2/03
	High Pas Filter	Microlab	HA-10N		CHAR 10/4/01	10/4/03
	Audio Oscillator	HP	653A	832-00260	CHAR 3/1/01	3/1/03
	Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	3/2/03
	Frequency Counter	HP	5385A	3242A07460	CHAR 12/11/01	12/11/03
	Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
	Amplifier	HP	11975A	2738A01969	CHAR 3/1/01	3/1/03
	Egg Timer	Unk			CHAR 8/31/01	8/31/03
	Measuring Tape, 20M	Kraftixx	0631-20		CHAR 2/1/02	2/1/04
	Measuring Tape, 7.5M	Kraftixx	7.5M PROFI		2/1/02	2/1/04
	Coaxial Cable #51	Insulated Wire Inc.	NPS 2251-2880	Timco #51	CHAR 1/23/02	1/23/04
	Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/04
	Coaxial Cable #65	General Cable Co.	E9917 RG233/U	Timco #65	CHAR 1/23/02	1/23/04
	Coaxial Cable #106	Unknown	Unknown	Timco #106	CHAR 1/23/02	1/23/04