

TABLE OF CONTENTS LIST

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

TEST REPORT:

PAGE	1-2....COVER SHEET - GENERAL INFORMATION & TECHNICAL DESCR.
PAGE	3.....RF POWER OUTPUT
PAGE	4.....MODULATION CHARACTERISTICS
PAGE	5.....AUDIO FREQUENCY RESPONSE PLOT
PAGE	6.....MODULATION LIMITING PLOT - 300 Hz
PAGE	7.....MODULATION LIMITING PLOT - 1000 Hz
PAGE	8.....MODULATION LIMITING PLOT - 3000 Hz
PAGE	9.....AUDIO LOW PASS FILTER PLOT
PAGE	10.....OCCUPIED BANDWIDTH
PAGE	11.....OCCUPIED BANDWIDTH PLOT
PAGE	12.....OCCUPIED BANDWIDTH PLOT - CW
PAGE	13.....SPURIOUS EMISSIONS AT ANTENNA TERMINALS
PAGE	14.....METHOD OF MEASURING SPURIOUS EMISSIONS AT ANTENNA TERM.
PAGE	15.....FIELD STRENGTH OF SPURIOUS EMISSIONS
PAGE	16.....METHOD OF MEASURING RADIATED SPURIOUS EMISSIONS
PAGE	17.....FREQUENCY STABILITY
PAGE	18-21..LIST OF TEST EQUIPMENT

EXHIBITS CONTAINING:

EXHIBIT	1.....FCC ID LABEL SAMPLE
EXHIBIT	2.....SKETCH OF LOCATION
EXHIBIT	3.....BLOCK DIAGRAM
EXHIBIT	4.....SCHEMATICS
EXHIBIT	5.....USER'S MANUAL
EXHIBIT	6.....EXTERNAL PHOTOS
EXHIBIT	7.....INTERNAL PHOTOS
EXHIBIT	8.....TUNING PROCEDURE
EXHIBIT	9.....CIRCUIT DESCRIPTION
EXHIBIT	10.....TEST SETUP PHOTOGRAPHS

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

TABLE OF CONTENTS LIST

GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

2.1033(c)(1)(2) MIDLAND RADIO CORPORATION will manufacture the
FCCID: MMA710150A VHF TRANSCEIVER in quantity, for use
under FCC RULES PART 90.

MIDLAND RADIO CORPORATION
1120 CLAY STREET
NORTH KANSAS CITY, MO 64116

2.1033 (c) TECHNICAL DESCRIPTION

2.1033(c)(3) Instruction book. A draft copy of the instruction
manual is included as EXHIBIT 5.

2.1033(c)(4) Type of Emission: 10K6F3E
90.209

Bn = 2M + 2DK
M = 3000
D = 1900
Bn = 2(3000)+2(2300) = 10.6k

90.217(b) Authorized Bandwidth 12.5 kHz

2.1033(c)(5) Frequency Range: 30-50 MHz
90.209

2.1033(c)(6)(7) Power Output shall not exceed 59 Watts into a 50 ohm
90.205 resistive load. There are no user power controls.

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

FINAL AMPLIFIER ONLY
Vce = 13.6 Volts
IC LOW = 7.9 A
IC HIGH = 10.8 A

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

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is
included as EXHIBIT 4. The block diagram is included
as EXHIBIT 3.

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 1 of 21

- 2.1033(c)(11) A photograph or a drawing of the equipment identification label is included as Exhibit #1.
- 2.1033(c)(12) Photographs(8"X10") of the equipment of sufficient clarity to reveal equipment construction and layout, including meters, labels for controls, including any view under shields - See EXHIBIT 6-7.
- 2.1033(c)(13) Digital modulation is not allowed.
- 2.1033(c)(14) The data required by 2.1046 through 2.1057 is submitted below.

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 2 of 21

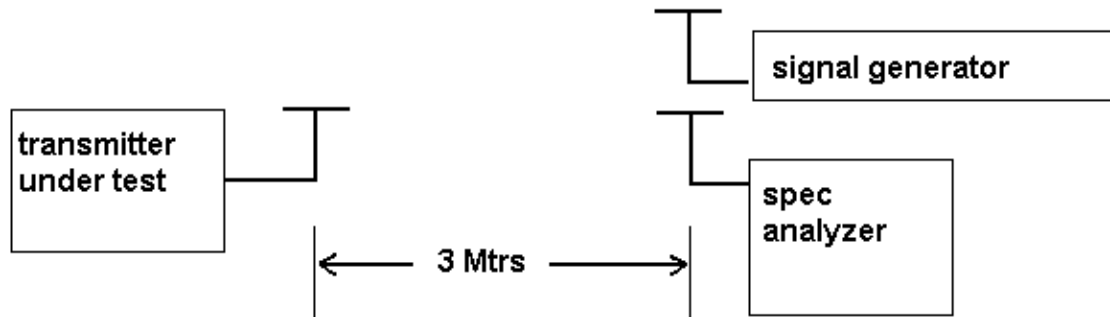
2.1046(a) RF power output.

90.205 RF power is measured by connecting a 50 ohm, Resistive wattmeter to the RF output connector. With a nominal battery voltage of 13.6 VDC, and the Transmitter properly adjusted, the RF output measures:

INPUT POWER: HIGH: $(13.6V)(7.9A) = 107.44$ Watts
INPUT POWER: LOW: $(13.6V)(10.8A) = 146.88$ Watts

OUTPUT POWER: HIGH: 59 Watts
LOW: 33 Watts

METHOD OF MEASURING RF POWER OUTPUT



APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 3 of 21

2.1047(a)(b) Modulation characteristics:

AUDIO FREQUENCY RESPONSE

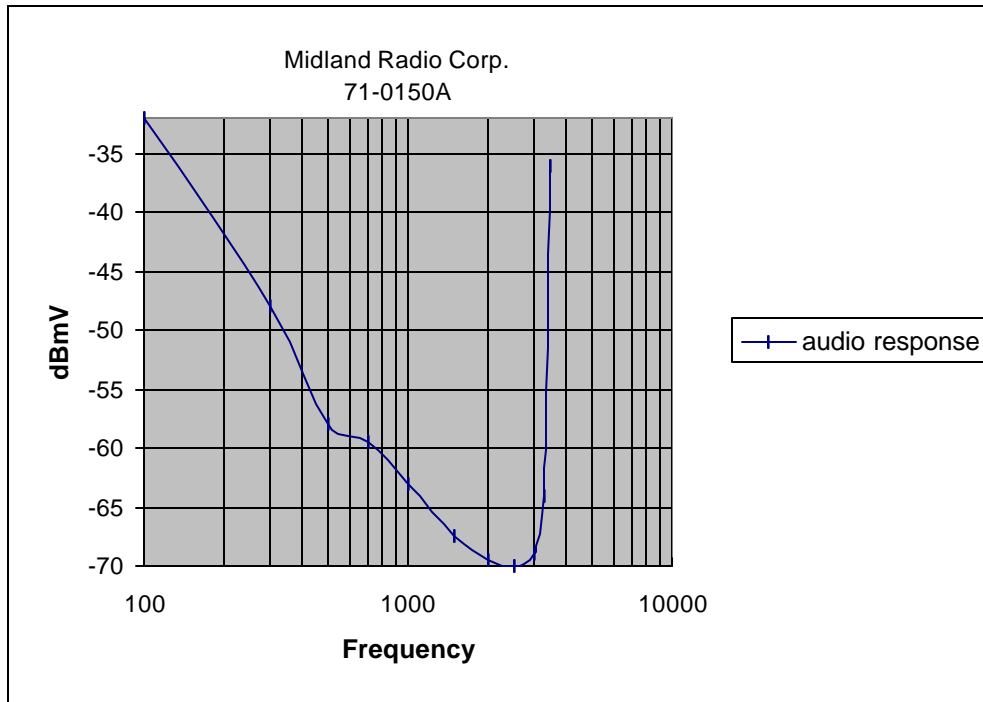
The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown on page 5. The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured.

2.1047(b) Audio input versus modulation

The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are shown in pages 6-8. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

Post Limiter Filter The filter must be between the modulation limiter and the modulated stage. At any frequency between 3 & 20 kHz the filter must have an attenuation of $60\log(f/3)$ greater than the attenuation at 1KHz. See the plot; page 9.

AUDIO RESPONSE GRAPH



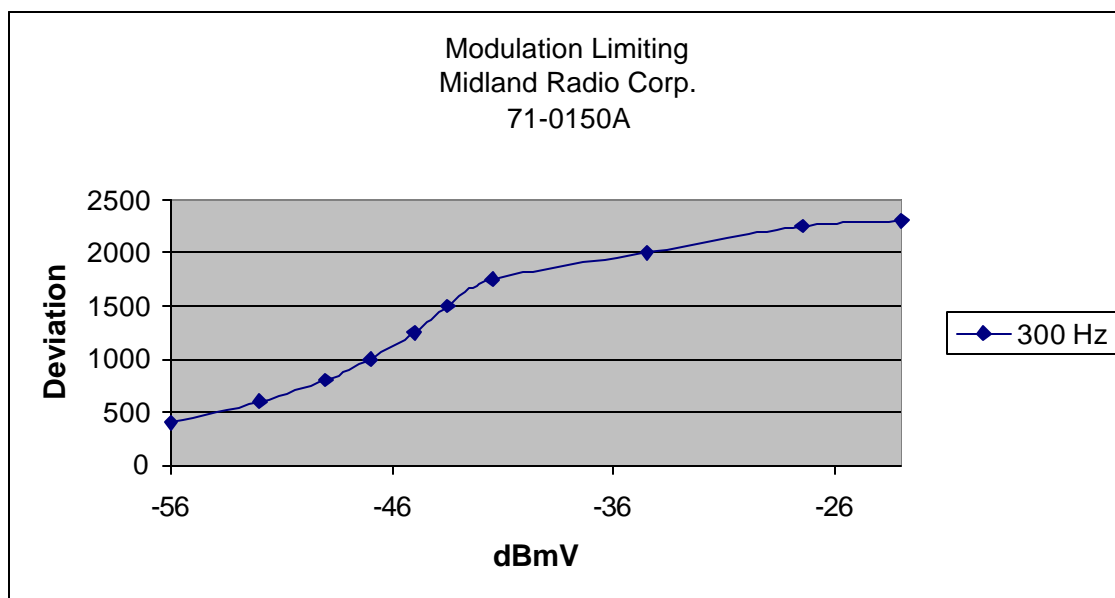
APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 5 of 21

MODULATION LIMITING GRAPH - 300 Hz



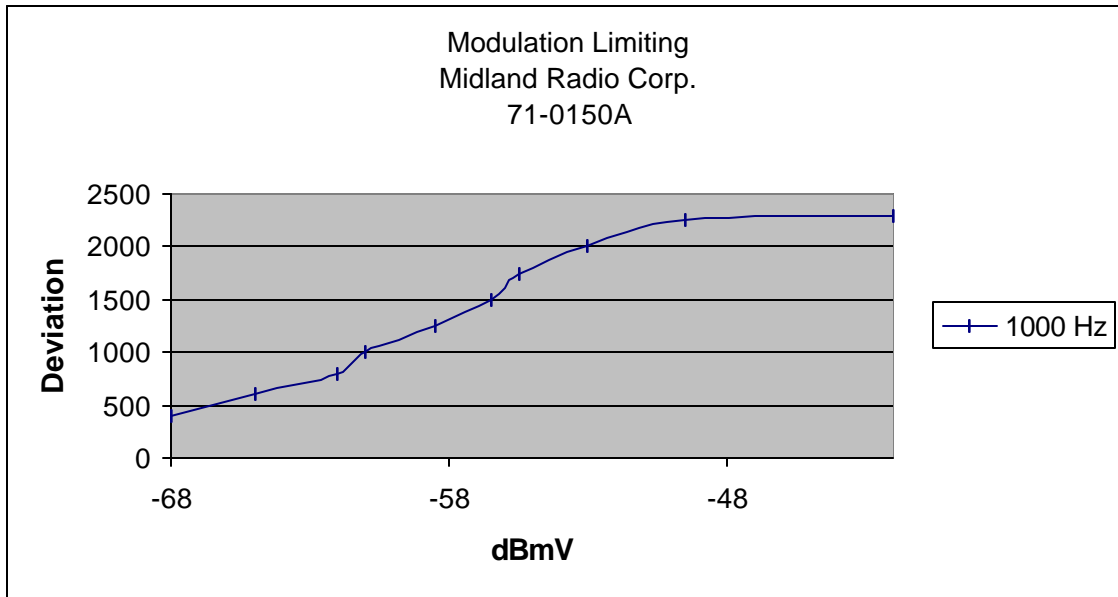
APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 6 of 21

MODULATION LIMITING - 1000 Hz



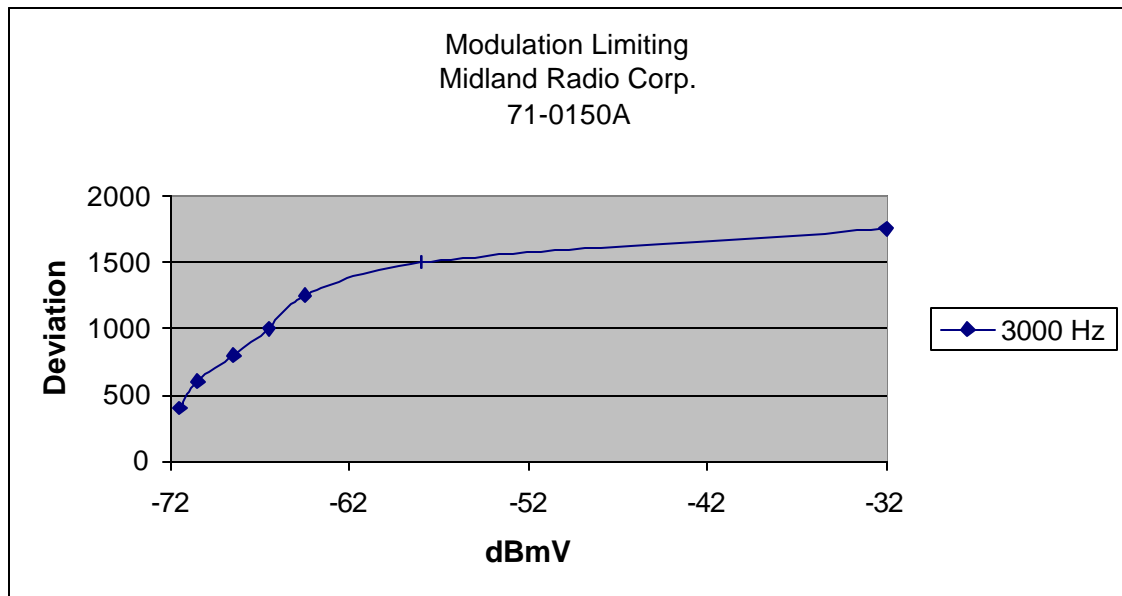
APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 7 of 21

MODULATION LIMITING - 3000 Hz



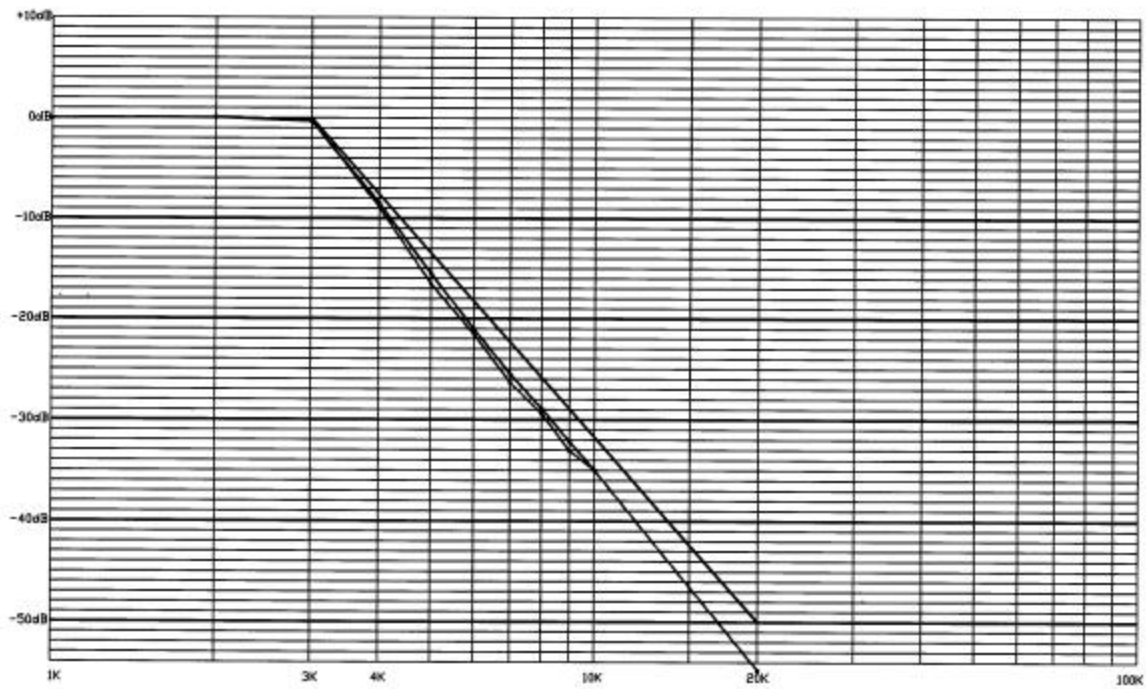
APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 8 of 21

Frequency Response of the Audio Low Pass Filter



APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 9 of 21

90.210(b)

2.1049(c)

EMISSION BANDWIDTH:

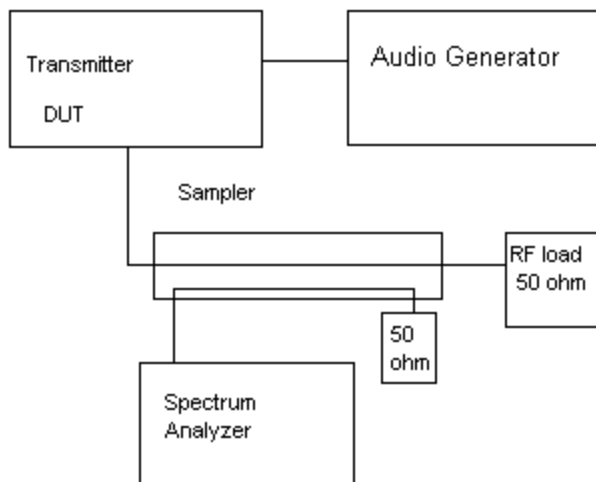
Data in the plots shows that the sidebands from greater than 50% to 100% of the authorized bandwidth must be attenuated by at least 25 dB and from 100 to 250% the sidebands must be attenuated by at least 35 dB. Beyond 250% the sidebands must be attenuated by at least $43 + \log_{10}(TP)$. The transmitter was modulated with 2500 Hz, adjusted for 50% modulation plus 16 dB. The spectrum analyzer was set with the unmodulated carrier at the top of the screen. The test procedure diagram follows. See the occupied bandwidth plots; pages 11, 12.

Radiotelephone transmitter with modulation limiter.

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT

Occupied BW Test Equipment Setup



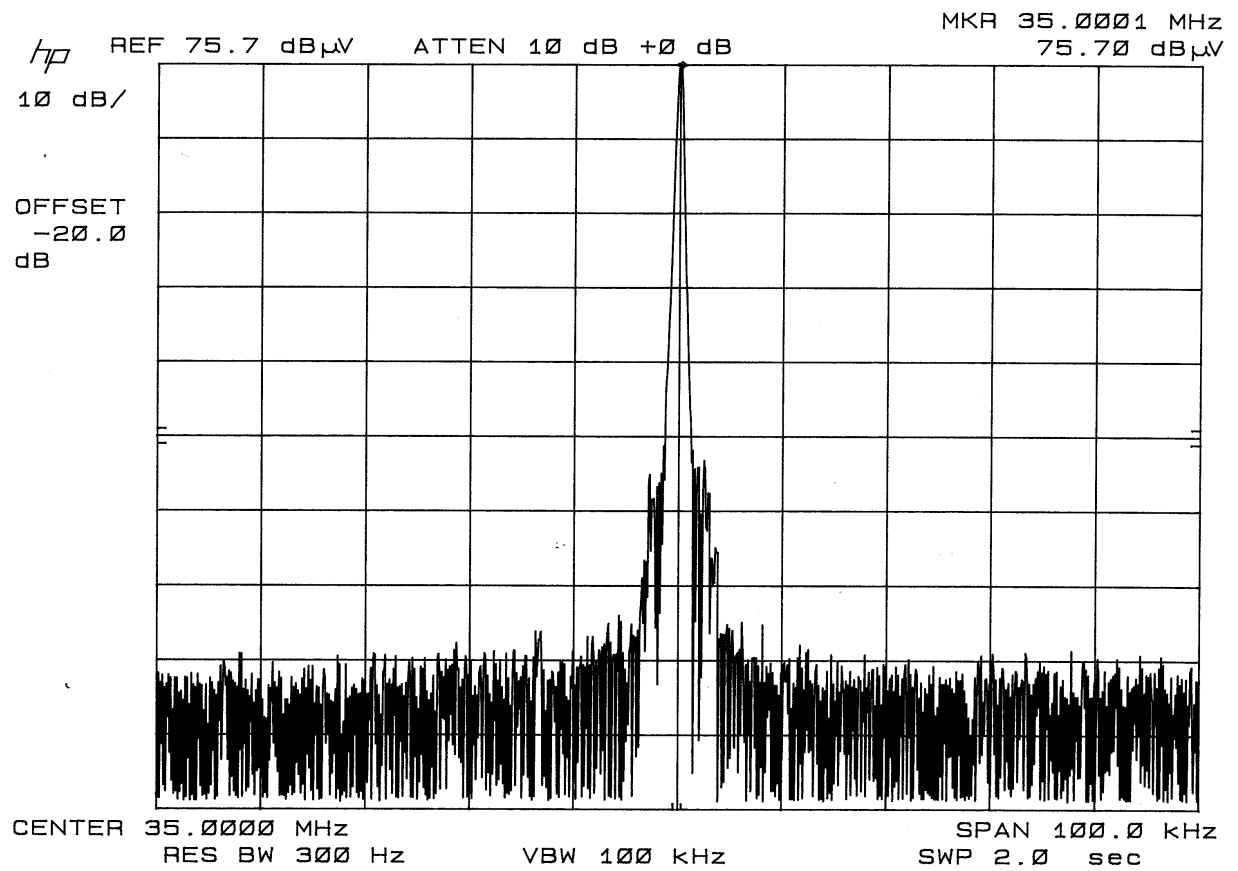
APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 10 of 21

OCCUPIED BANDWIDTH PLOT - CW

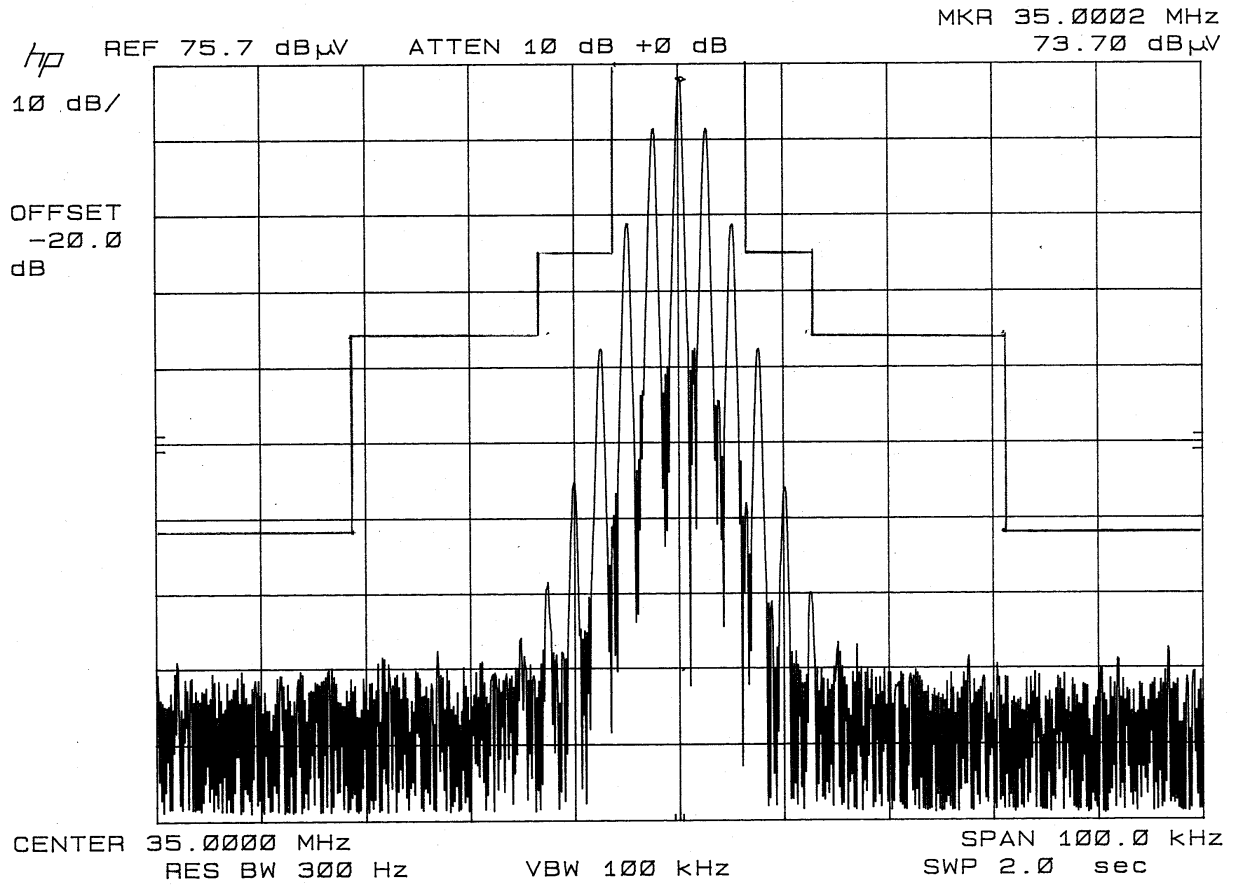


APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

OCCUPIED BANDWIDTH PLOT



APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 12 of 21

2.1051 Spurious emissions at antenna terminals(conducted):
 Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

REQUIREMENTS: Emissions must be $50 + 10\log(P_o)$ dB below the mean power output of the transmitter.

HIGH POWER - $50 + 10\log(59) = 67.71$ dB

LOW POWER - $50 + 10\log(33) = 65.2$ dB

EMISSION	dB BELOW	dB BELOW
FREQUENCY MHz	CARRIER	CARRIER
	LOW POWER	HIGH POWER
40.00	00.0	00.0
80.00	-68.7	-70.3
120.00	-100.0	-97.5
160.00		
200.00		-120.3

APPLICANT: MIDLAND RADIO CORPORATION

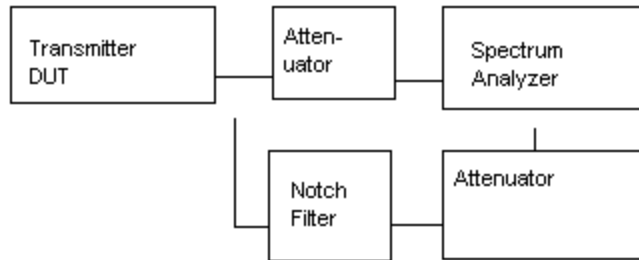
FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 13 of 21

Method of Measuring Conducted Spurious Emissions

Spurious Emissions at
Antenna Terminals



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 400 kHz 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 N.W. State Road 45, Newberry, Florida 32669.

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 14 of 21

2.1053 Field strength of spurious emissions:

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

REQUIREMENTS: Emissions must be $50 + 10\log(P_o)$ dB below the mean power output of the transmitter.

 HIGH POWER - $50 + 10\log(59) = 67.71$ dB

 LOW POWER - $50 + 10\log(33) = 65.2$ dB

TEST DATA:

Tuned Frequency MHz	Emission Frequency MHz	ATTN dBc	dBm
HIGH POWER			
40.0 MHz	40.00	0.00	48
40.0 MHz	80.00	70.3	-23
40.0 MHz	120.00	97.5	-50
40.0 MHz	200.00	120.3	-73
LOW POWER			
40.0 MHz	40.00	0.00	45
40.0 MHz	80.00	68.7	-24
40.0 MHz	120.00	100	-55

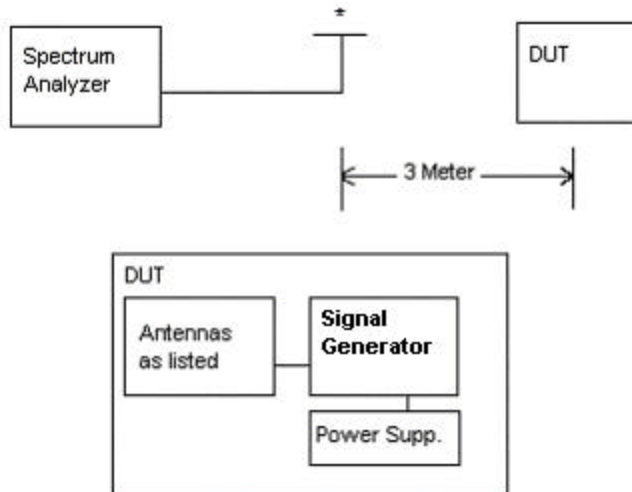
METHOD OF MEASUREMENTS: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitutin method. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Method of Measuring Radiated Spurious Emissions



APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 16 of 21

2.1055 Frequency stability:
90.213(a)(1)

Temperature and voltage tests were performed to verify that the frequency remains within the .0020%, 20 ppm specification limit. The EUT 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 minus 15% of the battery voltage of 13.6VDC, which we estimate to be the battery endpoint.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 34.999 930 MHz

TEMPERATURE_°C	FREQUENCY_MHz	PPM
REFERENCE_____	34.999 930	00.0
-30_____	34.9999 694	+ 1.12
-20_____	34.999 972	+ 1.19
-10_____	34.9999 717	+ 1.19
0_____	34.999 965	+ 1.01
+10_____	34.999 955	+ 0.70
+20_____	34.9999 379	+ 0.22
+30_____	34.9999 278	- 0.07
+40_____	34.9999 243	- 0.17
+50_____	34.9999 233	- 0.19

-15% Battery End-Point VDC 34.9999 298 - 0.01

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was +1.19 ppm.

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

Page 17 of 21

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 Spectrum Analyzer (Blue)	HP	8568B	2928A04729	CHAR 10/22/01	10/22/03
X	RF Preselector (Blue)	HP	85685A	2848A18049 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

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	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
	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
X	Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04
X	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

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	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
	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

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	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

APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMA710150A

REPORT #: T:\M\MidlandRadio_MMA\737UT2\737UT2TestReport.doc