

TABLE OF CONTENTS LIST

APPLICANT: HELLBERG SAFETY AB

FCC ID: QF9LOCAL

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.....METHOD OF MEASURING OCCUPIED BANDWIDTH
PAGE	14.....FIELD STRENGTH OF SPURIOUS EMISSIONS
PAGE	15.....METHOD OF MEASURING RADIATED SPURIOUS EMISSIONS
PAGE	16.....FREQUENCY STABILITY
PAGE	17-19..LIST OF TEST EQUIPMENT

EXHIBITS CONTAINING:

EXHIBIT 1.....	LABEL SAMPLE AND LOCATION
EXHIBIT 2.....	EXTERNAL PHOTOGRAPHS
EXHIBIT 3.....	INTERNAL PHOTOGRAPHS
EXHIBIT 4.....	BLOCK DIAGRAM
EXHIBIT 5.....	SCHEMATIC
EXHIBIT 6.....	USER'S MANUAL
EXHIBIT 7.....	CIRCUIT DESCRIPTION
EXHIBIT 8.....	ALIGNMENT PROCEDURE
EXHIBIT 9.....	PARTS LIST
EXHIBIT 10.....	TEST SET UP PHOTO

APPLICANT: HELLBERG SAFETY AB

FCC ID: QF9LOCAL

REPORT #: H/HellbergSafety_\3846but2\3846but2TestReport.doc

TABLE OF CONTENTS LIST

GENERAL_INFORMATION_REQUIRED FOR_TYPE_ACCEPTANCE

2.1033(c)(1)(2)HELLBERG SAFETY AB will manufacture the FCCID:
QF9LOCAL FAMILY RADIO SERVICES 14 CHANNEL
TRANSCIEVER in quantity, for use under FCC RULES
PART 95. The UUT is a PTT Radio with a maximum duty
cycle of 50%.

HELLBERG SAFETY AB
BOX 3002
443 03 STENKULLEN, SWEDEN

2.1033 (c) TECHNICAL_DESCRIPTION

2.1033(c)(3) Instruction book. A draft copy of the instruction manual is included as EXHIBIT 6.

2.1033(c) (4) Type of Emission: 9K30F3E
95.631

$$B_n = 2M + 2DK$$
$$M = 3000$$

D = 1650

$$B_n = 2(3000) + 2(1650) = 9300$$

95.633(c)	Authorized Bandwidth	12.5 kHz
-----------	----------------------	----------

2.1033(c)(5) Frequency Range: 1. 462.5625 8. 467.5625
95.627 2. 462.5875 9. 467.5875
3. 462.6125 10. 467.6125
4. 462.6375 11. 467.6375
5. 462.6625 12. 467.6625
6. 462.6875 13. 467.6875
7. 462.7125 14. 467.7125 MHz

2.1033(c)(6)(7) Power Output shall not exceed 0.50 Watts effective
95.639 radiated power. There can be no provisions for
95.649 increasing the power or varying the power.

95.647 The antenna is an integral part to the unit, it cannot be removed without rendering the unit inoperative. In order to remove the antenna the case must be unscrewed, then the PCB assemblies must be removed then the antenna can be removed.

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

FINAL AMPLIFIER ONLY

$V_{ce} = 4.8 \text{ Volts DC}$ $I_{ce} = 0.20\text{A.}$

$$P_{in} = 0.96 \text{ Watts}$$

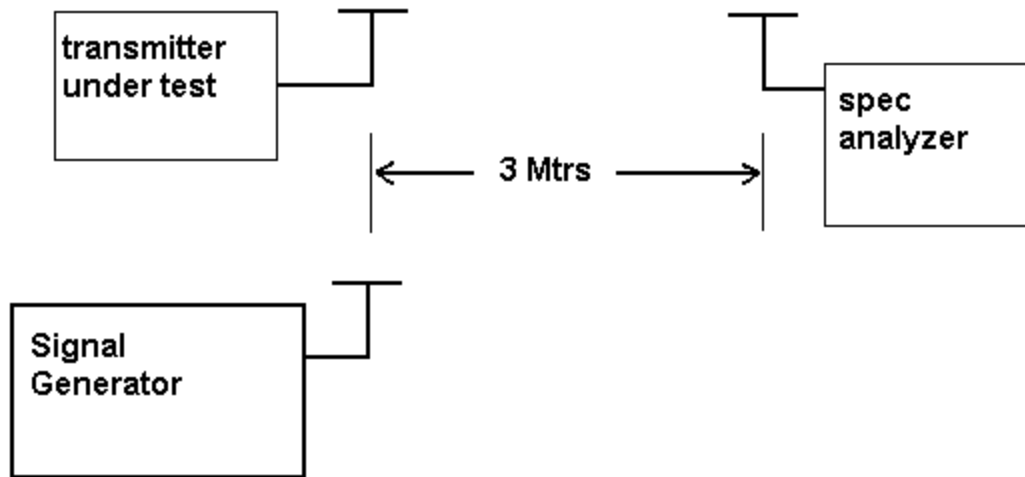
- 2.1033(c)(9) Tune-up procedure. The tune-up procedure is included as Exhibit #8.
- 2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is included as Exhibit #5. The block diagram is included as Exhibit #4.
- 2.1033(c)(11) A photograph or a drawing of the equipment identification label is 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 #'s 2-3.
- 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.

2.1046(a) RF power output.

95.639 RF power is measured by measuring the radiated power at 3 meters and then replacing the transmitter with a signal generator to determine the effective radiated power. The ERP shall not exceed 0.500 Watts.

MEASURED POWER OUTPUT = .145 WATTS ERP

R.F. POWER OUTPUT
TEST SET UP



2.1047(a)(b) Modulation characteristics:

AUDIO FREQUENCY RESPONSE

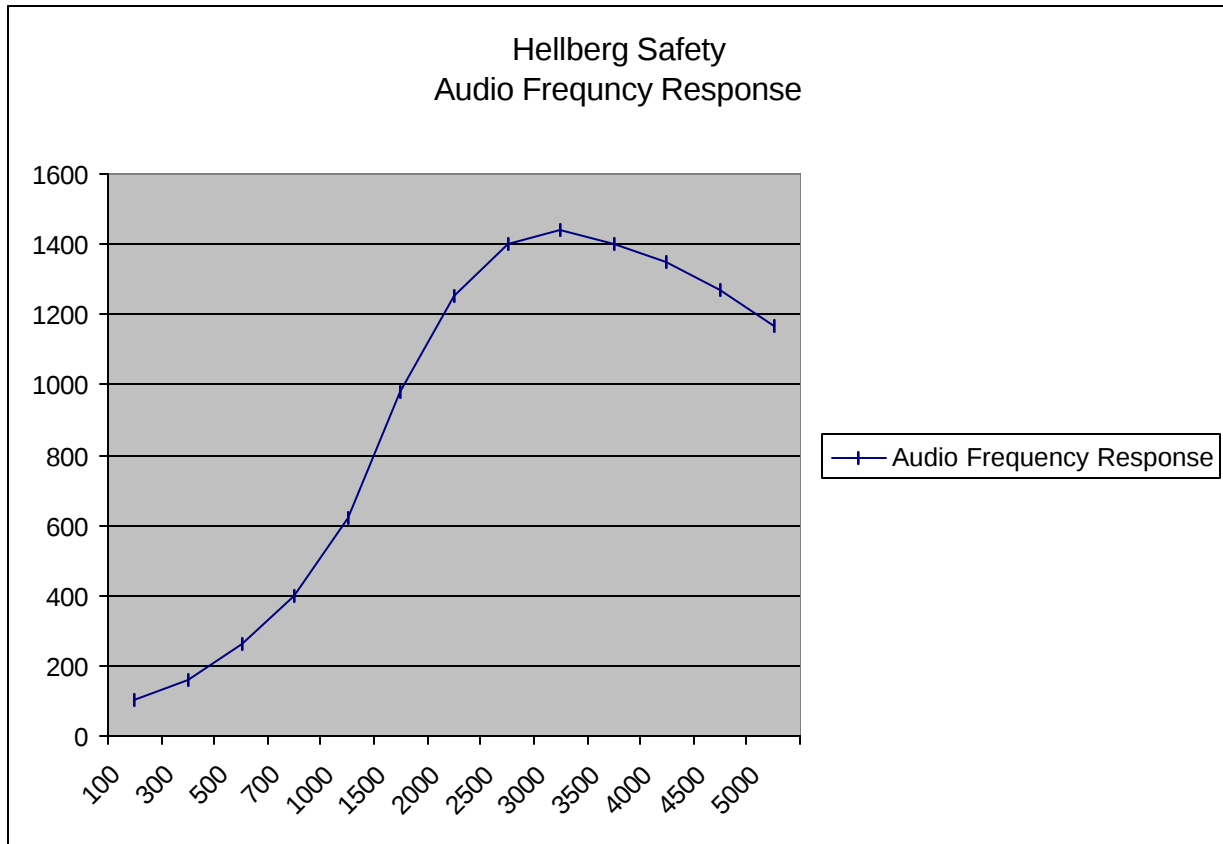
The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown on page 5. The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured.

2.1047(b) Audio input versus modulation

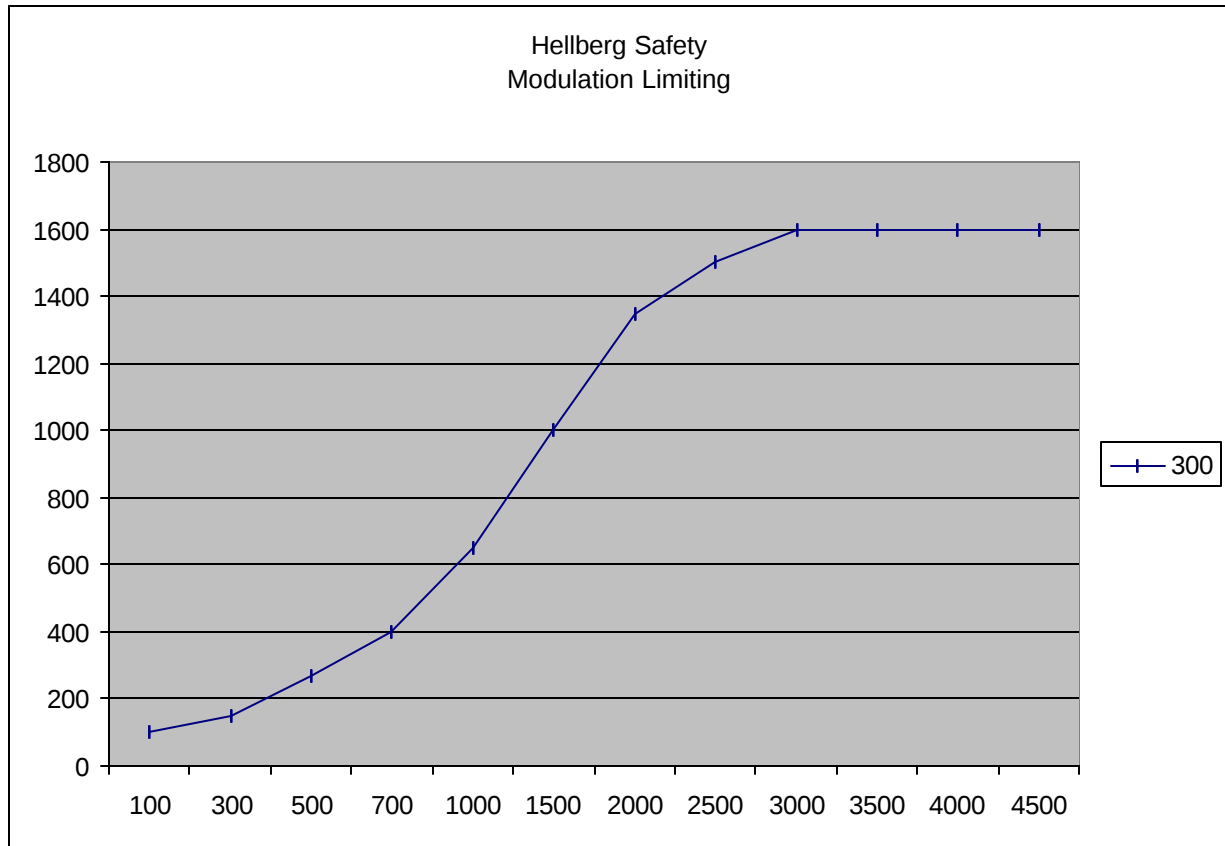
The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are shown in pages 6-8. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

95.637(b) 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.

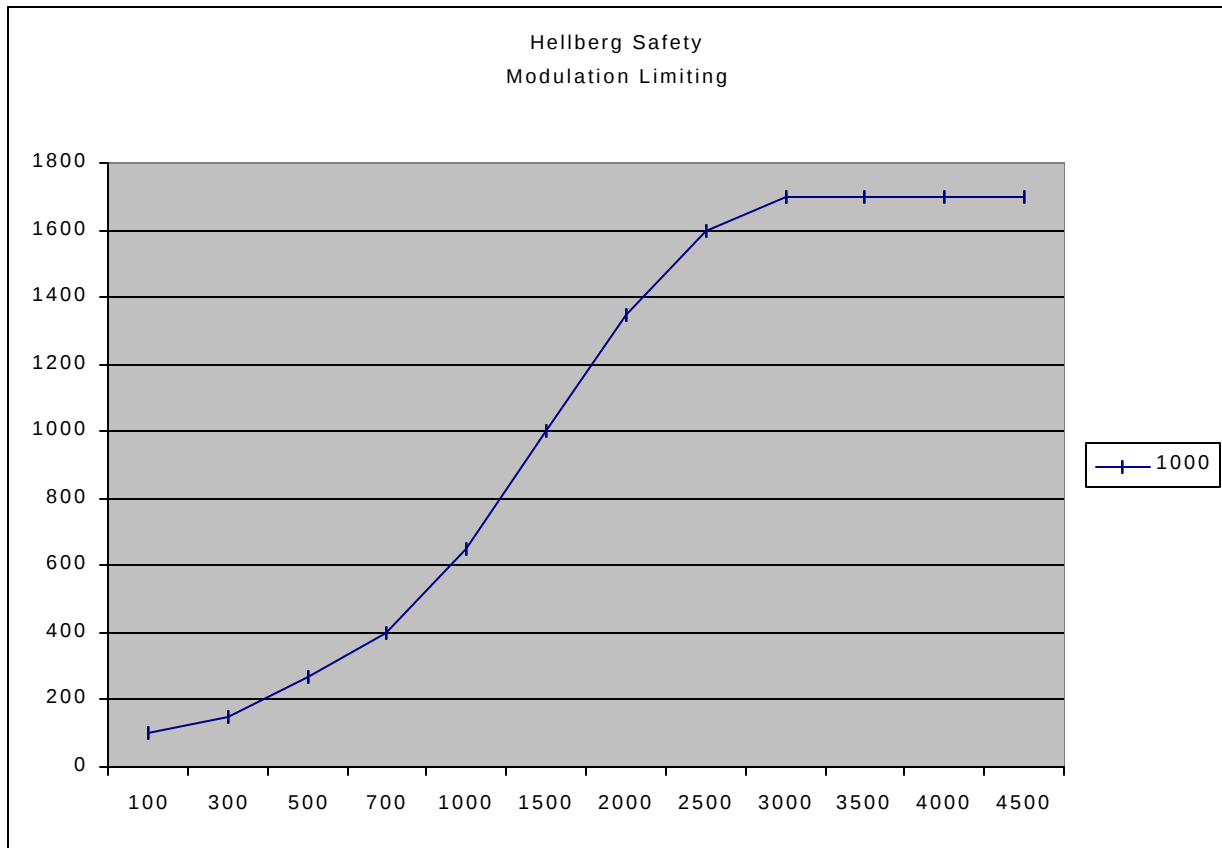
AUDIO FREQUENCY RESPONSE GRAPH



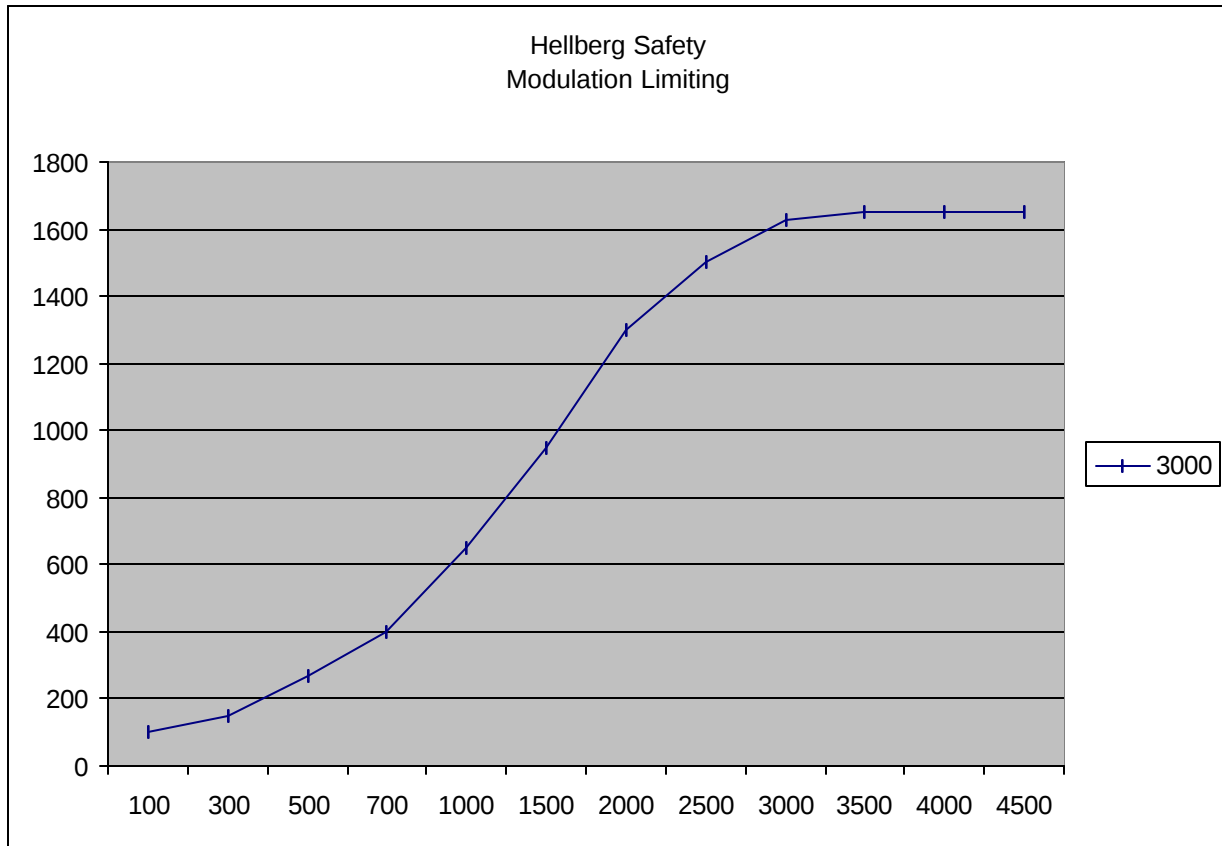
MODULATION LIMITING PLOT - 300 Hz



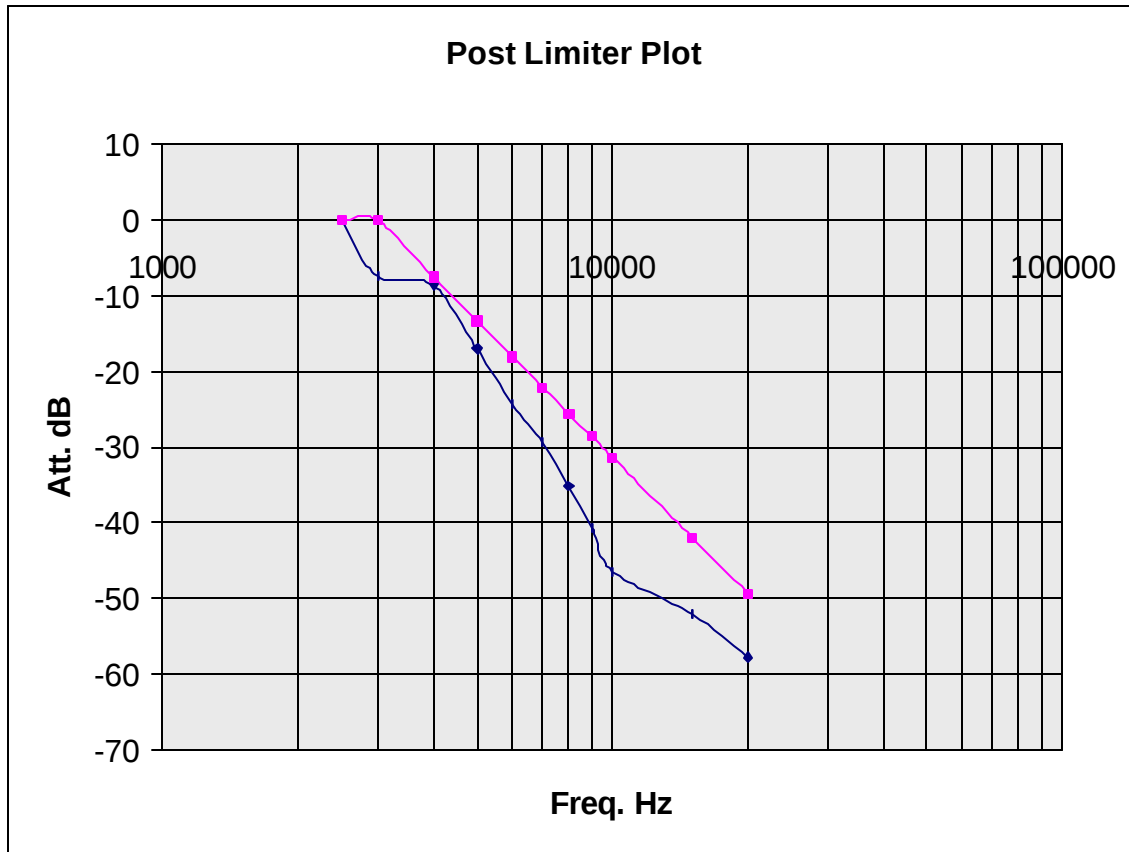
Modulation Limiting 1 kHz



MODULATION LIMITING PLOT 3000 Hz



AUDIO LOW PASS FILTER PLOT

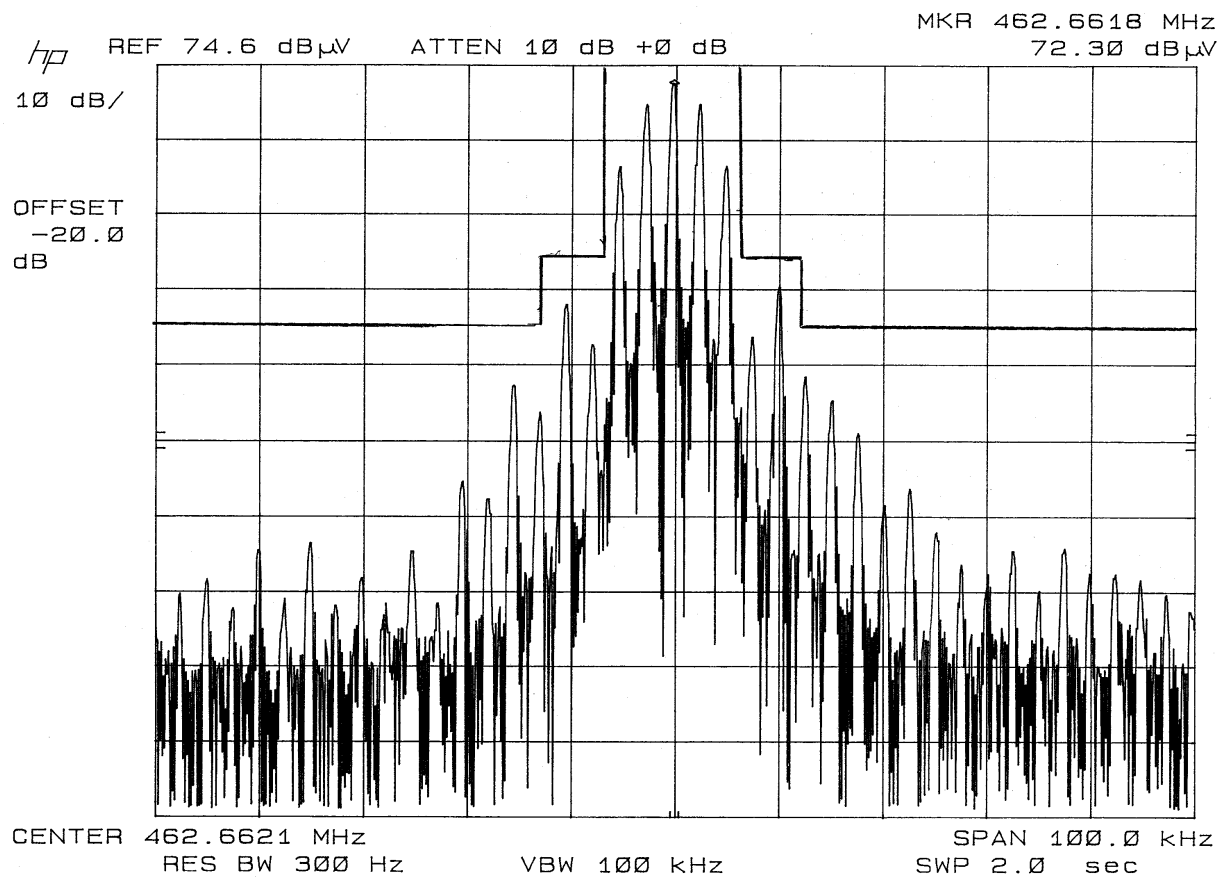


2.1049(c)
95.633(c)

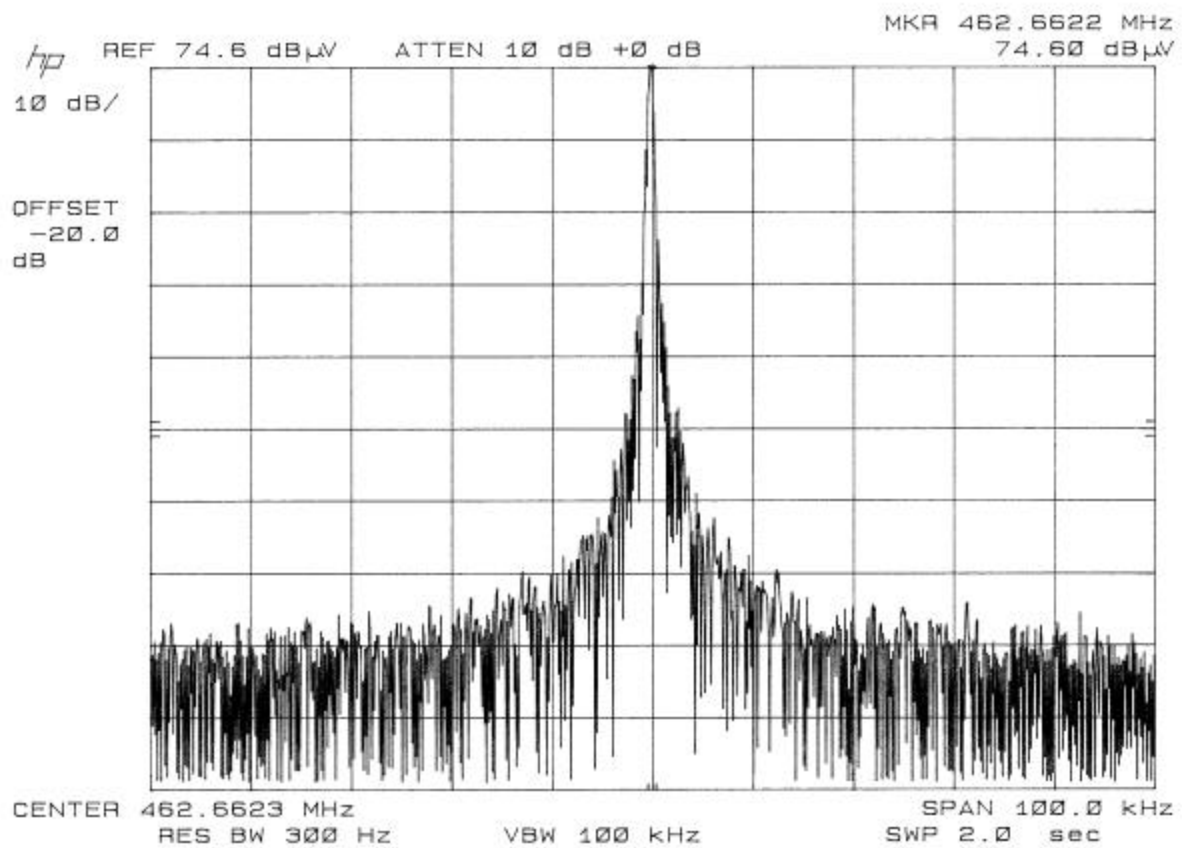
EMISSION BANDWIDTH:

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.

OCCUPIED BANDWIDTH PLOT



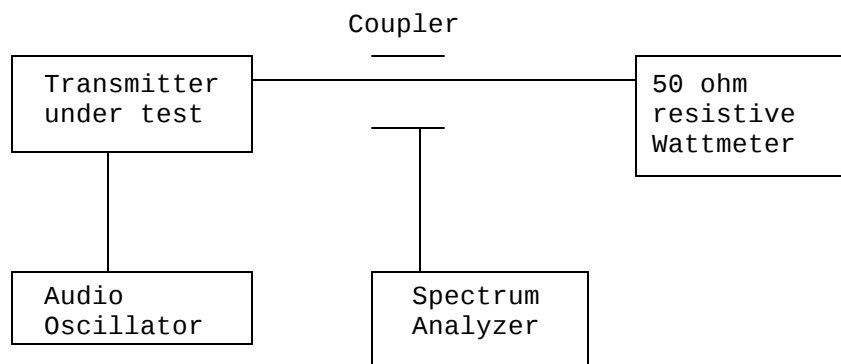
OCCUPIED BANDWIDTH CW PLOT



Radiotelephone transmitter with modulation limiter.

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



2.1051 Not Applicable, no antenna terminal allowed.

2.1053 UNWANTED RADIATION:

95.635(b)(4)

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

$$43 + 10\log(TP) = 43 + 10\log(.145) = 35 \text{ dB}$$

TEST DATA:

Emission Frequency MHz	Field Strength dbuv/m	dB below carrier	dBm
462.60	118.99	0	21.6
925.30	63.48	56	-34
1,388.00	60.12	59	-37
1,850.70	53.49	66	-44
2,313.40	48.17	71	-49
2,776.00	41.89	77	-55
3,238.70	44.33	75	-53
3,701.40	45.21	74	-52
4,164.10	45.96	73	-51
4,626.80	50.92	68	-46

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength of 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 substitution 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: HELLBERG SAFETY AB

FCC ID: QF9LOCAL

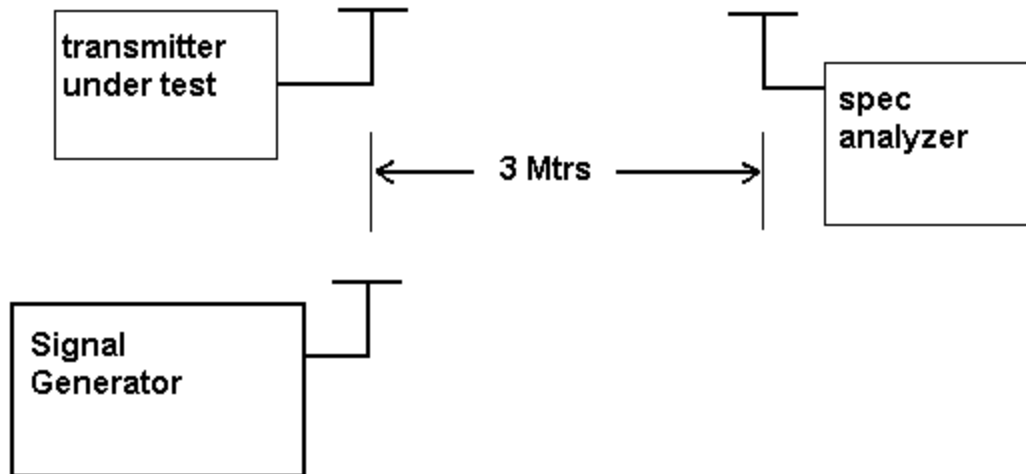
REPORT #: H/HellbergSafety_\3846but2\3846but2TestReport.doc

Page 14 of 19

2.1053
95.635

UNWANTED RADIATION:

Method of Measuring Radiated Spurious Emissions



2.1055 Frequency_stability:

Temperature and voltage tests were performed to verify that the frequency remains within the 0.00025%, 2.5 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 -20 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 endpoint of the battery voltage of 4.1 VDC.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 462.662 620

TEMPERATURE °C	FREQUENCY MHz	PPM
REFERENCE_____	462.662 620	00.00
-20_____	462.662 480	-0.30
-10_____	462.663 605	2.13
0_____	462.663 771	2.49
+10_____	462.663 644	2.21
+20_____	462.662 994	0.81
+30_____	462.662 216	-0.87
+40_____	462.661 582	-2.24
+50_____	462.661 475	-2.47
BATT. End-Point 4.1 V/dc	462.662 656	0.08

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
	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

APPLICANT: HELLBERG SAFETY AB

FCC ID: QF9LOCAL

REPORT #: H/HellbergSafety_\3846but2\3846but2TestReport.doc

Page 17 of 19

	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

APPLICANT: HELLBERG SAFETY AB

FCC ID: QF9LOCAL

REPORT #: H/HellbergSafety_\3846but2\3846but2TestReport.doc

Page 18 of 19

	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

APPLICANT: HELLBERG SAFETY AB
 FCC ID: QF9LOCAL
 REPORT #: H/HellbergSafety_\3846but2\3846but2TestReport.doc
 Page 19 of 19