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APPLICANT: MIDIAN ELECTRONICS INC.

FCC ID: NOWSPVD-2

TEST REPORT:

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GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

- 2.1033 (c)(1)(2) MIDIAN ELECTRONICS INC. will sell the
FCC ID: NOWSPVD-2 VHF transceiver in quantity,
for use under FCC RULES PART 90.
- (3) Instruction book. The instruction manual is included
as EXHIBIT 6A-6C.

2.1033 (c) TECHNICAL DESCRIPTION

- 2.1033 (4) Type of Emission: 7K3F2D For 25 kHz
7K3F2D For 12.5 kHz
For 25kHz and 12 kHz
- 90.209(b)(5) $B_n = 2M + 2DK$
 $M = 4,000$ Bits per second
 $D = 1.65\text{KHz}$ (Peak Deviation)
 $K = 1$
 $B_n = 2(4000/2) + 2(1.65K)(1) = 4.0K + 3.3K = 7.3K$

ALLOWED AUTHORIZED BANDWIDTH = 20.0 kHz

FOR 12.5Khz

ALLOWED AUTHORIZED BANDWIDTH = 11.25 kHz

- 2.1033 (5) Frequency Range: 30-50 MHz
- (6) Power Range and Controls: There are NO user Power
controls.
- (7) Maximum Output Power Rating:
0.1 Watts ,
into a 50 ohm resistive load.
- (8) DC Voltages and Current into Final Amplifier:
- DC POWER INPUT
FINAL AMPLIFIER ONLY
Vce = 7.8 Volts
Ic = .55 A
- (9) Tune-up procedure. The tune-up procedure is given
in EXHIBIT 6A-6C.

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- 2.1033 (10) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT 3. The block diagram is included as EXHIBIT 4.
- 2.1033(c)(10) Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in EXHIBIT 5.
- 2.1033(c)(11) A photograph or drawing of the equipment identification label is shown in Exhibit 1.
- 2.1033(c)(12) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout and label location are shown in Exhibit 7-11.
- 2.1033(c)(13) For equipment employing digital modulation, a detail description of the modulation technique. This UUT uses FSK to modulate the transmitter.
- 2.1033(c)(14) data required for 2.1046 to 2.1057 See Below
- 2.1046(a) RF power output.
RF power is measured by connecting a 50 ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage of 7.8 VDC, and the transmitter properly adjusted the RF output measures :

POWER MEASUREMENTS:

INPUT POWER - HIGH: $(7.8V)(0.550A) = 4.29 \text{ Watts}$

INPUT POWER - LOW: $(7.8V)(0.2A) = 1.56 \text{ Watts}$

OUTPUT POWER: HIGH: .10 Watts
LOW: .038 Watts

METHOD OF MEASURING RF POWER OUTPUT



2.1047(a) Voice Modulation characteristics:
NOT APPLICABLE, F2 type of emission.

2.1049 Audio Low Pass Filter
This UUT does not have a low pass filter.

2.1049 Occupied bandwidth:

90.210(c,) (Emission Mask C)

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211(b), the power of any emission must be attenuated below the unmodulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency(f_d in kHz) of more than 5kHz but not more than 10 kHz: At least $83 \log(f_d/5)$ dB; (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency(f_d in kHz) of more than 10kHz, but not more than 250% of the authorized bandwidth: At least $29 \log(f_d^2/11)$ dB or 50dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least $43 + 10 \log(P_o)$ dB.

90.210(d) Emission Mask D - 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.

(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27 (f_d - 2.88 \text{ kHz})$ dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.

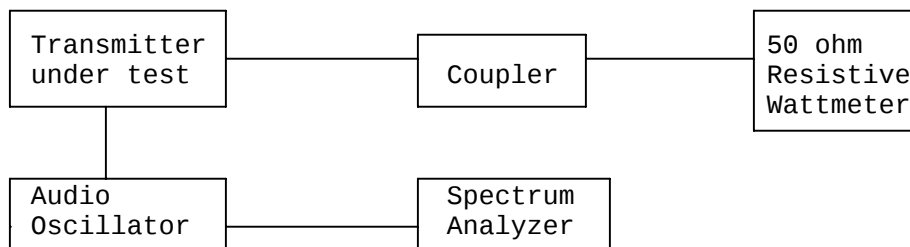
Data in the plots shows that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least $43 + \log(P)$ dB.

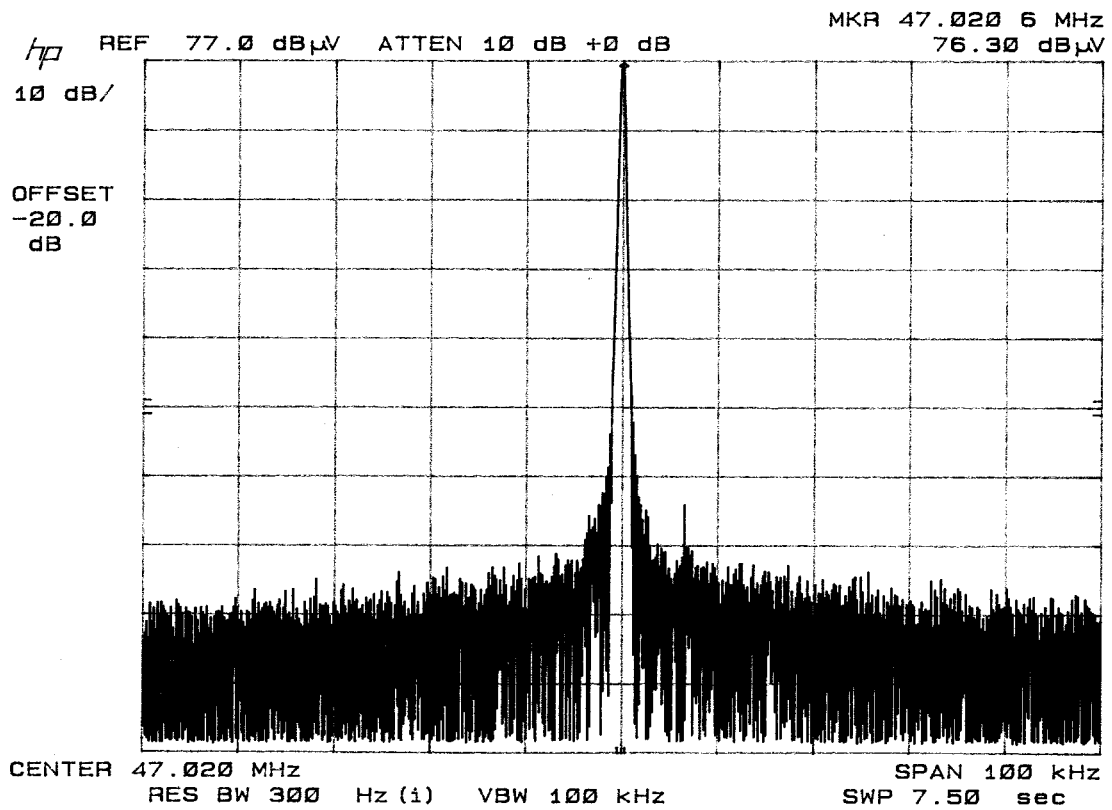
Radiotelephone transmitter with modulation limiter.

Test procedure: TIA/EIA-603 para 2.2.11 , with the exception that various tones were used.

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT





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2.1051 Spurious emissions at antenna terminals(conducted):

2.1052 Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500Hz 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.

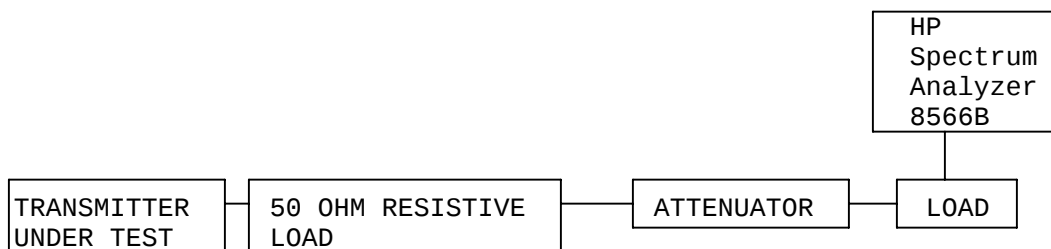
Method of Measuring Conducted Spurious Emissions (conducted)

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

For 25 kHz $43 + 10\log(0.1) = 43 - 10.0 = 33.0\text{dB}$

EMISSION FREQUENCY MHZ	DB BELOW CARRIER
47.00	00.0
94.00	52.9
141.00	39.4
188.00	45.2
235.10	53.9
282.10	64.4
329.10	79.3
376.10	78.8
423.10	82.6
470.20	79.7

Method of Measuring Conducted Spurious Emissions



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

2.1053
90.210(c)(3)
NAME OF TEST:

Field strength of spurious emissions:

RADIATED SPURIOUS EMISSIONS

REQUIREMENTS:

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

$$43 + 10\log(0.10) = 33.0 \text{ dB}$$
$$43 + 10\log(0.038) = 28.8 \text{ dB}$$

TEST DATA:

Low Power

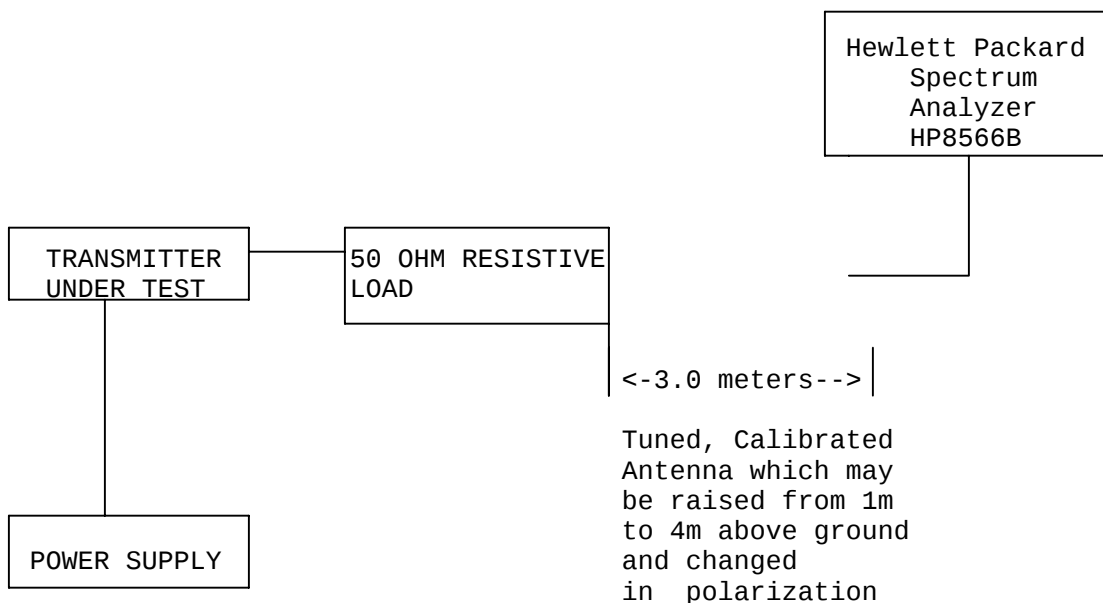
Emission Frequency MHz	Attenuation dBc	Margin dB
47.10	0.0	0.0
94.00	37.08	8.28
141.00	37.80	9.00
188.00	49.71	20.91
235.00	31.50	2.70
282.00	50.56	21.76
329.10	43.13	14.33
376.10	51.88	23.08
423.10	51.97	23.17
470.20	56.94	28.14

High Power

Emission Frequency MHz	Attenuation dBc	Margin dB
47.20	0.0	0.0
94.0	36.48	3.48
141.00	36.90	3.90
188.00	47.81	14.81
235.00	37.60	4.60
282.10	52.16	19.16
329.10	43.03	10.03
376.10	51.82	18.82
423.10	51.77	18.77
470.20	52.10	19.10

METHOD OF MEASUREMENT: The tabulated Data shows the results of the radiated field strength emissions and attenuation calculated per TIA/EIA 603. The spectrum was scanned from 30 MHz to at least the Tenth harmonic of the fundamental. This test was conducted per TIA/EIA 603. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 N.W. STATE ROAD 45, NEWBERRY, FLA. 32669.

Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground on a rotatable platform.

2.1055 Frequency stability:

90.213(a)(1)

Temperature and voltage tests were performed. 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 85% and 115% of the supply voltage.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 47.017 226 MHz

TEMPERATURE_°C	FREQUENCY_MHz	PPM
REFERENCE_____	47.017 226	0.00
-30_____	47.018 3517	23.95
-20_____	47.018 360	23.13
-10_____	47.018 3794	24.54
0_____	47.018 152	19.71
+10_____	47.017 866	13.62
+20_____	47.017 3669	3.01
+30_____	47.016 9199	-6.50
+40_____	47.016 5128	-15.16
+50_____	47.016 0745	-24.48

-15% 11.05 End-Point VDC	47.017 2209	-0.10
+15% 14.95 End-Point VDC	47.017 2076	-0.38

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was 24.54 ppm.

Measurement Procedures:

Measurement techniques have been in accordance with TIA/EIA STD 603-1992.

TEST EQUIPMENT LIST

- 1._X_Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/ preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter HP 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02, S/N 3008A00372 Cal. 8/31/01 Due 8/31/02
- 2._X_Biconnical Antenna: Eaton Model 94455-1, S/N 1057, Cal. 10/1/01 Due 10/1/02
- 3.___ Biconnical Antenna: Electro-Metrics Model BIA-25, S/N 1171 Cal. 4/26/01 Due 4/26/03
- 4.___ Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632 Char. 3/15/00 Due 3/15/01
- 5._X_Log-Periodic Antenna: Electro-Metrics Model LPA-30, S/N 409 Char. 3/15/00 Due 3/15/01
- 6.___ Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180, 1-18 GHz, S/N 2319 Cal. 4/27/99 Due 4/27/00
- 7.___ 18-26.3GHz Systron Donner Standard Gain Horn #DBE-520-20 No Cal Required
- 8.___ Horn 40-60GHz: ATM Part #19-443-6R No Cal Required
- 9.___ Line Impedance Stabilization Network: Electro-Metrics Model EM-7820, w/NEMA Adapter S/N 2682 Cal. 3/16/01 Due 3/16/02
- 10._X_Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7 Char. 1/27/01 Due 1/27/02
- 11._X_Frequency Counter: HP Model 5385A, S/N 3242A07460 Char. 11/20/00 Due 11/20/01
- 12.___ Peak Power Meter: HP Model 8900C, S/N 2131A00545 Char. 1/26/01 Due 1/26/02
- 13._X_Open Area Test Site #1-3meters Cal. 12/22/99
- 14.___ Signal Generator: HP 8640B, S/N 2308A21464 Cal. 11/15/01 Due 11/15/02
- 15.___ Passive Loop Antenna: EMC0 Model 6512, 9KHz to 30MHz, S/N 9706-1211 Char. 6/10/00 Due 6/10/01
- 16.___ Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153 Char. 11/24/00 Due 11/24/01
- 17.___ AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 10/9/01 Due 10/09/02
- 18._X_Digital Multimeter: Fluke Model 77, S/N 43850817 Cal. 11/16/00 Due 11/16/01
- 19.___ Oscilloscope: Tektronix Model 2230, S/N 300572 Char. 2/1/01 Due 2/1/02