Chapter

TESTS and DIAGRAMS

Statement of Attestation

TRANSMITTER POWER MEASURED IN dbm

	Fundamental	+ / - 25 kHz	1 Harmonic	2 Harmonic	3 Harmonic	4 Harmonic	5 Harmonic
118.000	+33	-01	-54	-41	-59	-55	-73
119.000	+33	-13	53	-41	-58	-56	-72
120.000	+33	-15	-52	41	-58	-56	-72
121.000	+33	-15	-52	-43	-58	-57	-71
122.000	+33	15	-51	-44	-57	-58	-70
123.000	+33	-08	-52	-44	-57	-59	-69
124.000	+33	-05	51	-45	-57	-61	-68
125.000	+33	-00	-41	-46	-57	-65	-67
126.000	+33	-02	-52	-46	-57	-65	-67
127.000	+33	-15	-53	-46	-57	-61	-68
128.000	+33	-15	53	-46	-57	-61	-68
129.000	+33	+02	-54	-47	-57	-58	-69
130.000	+33	+02	-51	-48	-57	57	-70
131.000	+33	05	-52	-48	-58	-61	-73
132.000	+33	-08	-51	-48	-58	64	-74
133.000	+31	-15	50	-49	-58	-66	-74
134.000	+31	-13	-52	-49	-60	-68	-77
135.000	+31	-15	-51	-50	-61	-69	-76
136.000	+31	-15	53	-51	-61	-70	-76
136.975	+31	-15	-54	51	-60	-72	-80

Transmitter Modulation Characteristics

[Required by Section 2.987 (d) and 87.73(a)]

Modulation of the transmitter in normal use resulted in modulation peaks of at least 70% and did not exceed 100%

Transmitter modulation characteristics of audio frequencies from 100hz to 5000hz were measured as follows per section 2.987(a).

Hz	% Modulation
100	50
300	60
500	75
800	80
1000	85
1200	85
1400	85
1600	85
1800	85
2000	85
2200	85
2400	85
2600	85
2800	85
3000	85
3500	75
4000	65
4500	60
5000	50

TEMPERATURE MEAUSREMENT TESTS

The unit was tested in a temperature controlled test chamber. The temperature was lowered to –20 degrees centigrade and raised to +55 degrees centigrade. Measurement of transmit frequency at each 10 degree multiple. The frequency did not vary more than .001% over the temperature range. Transmit power and receive sensitivity remained unchanged from –20 degrees centigrade to +55 degrees centigrade.

At temperatures under 25 degrees centigrade, the unit remained off at all times except during brief times when transmit and receive test were made. This assured that the components were chilled to the maximum.

At temperatures over 25 degrees centigrade, the unit was left on at all times. This assured that the components were heated to the maximum.

VARIATIONS OF AMBIENT TEMPERATURE AND PRIMARY SUPPLY VOLTAGE

[Refer to Section 2.995 (a) (2)(d)(1)]

Raising the primary voltage from 12v to 15.8v increased the transmitter power from a nominal 2.5 watts to 5 watts. Frequency variation was less than .001%. Refer to Section 2.995(a)(2)(d)(1).

FREQUENCY STABILITY TEST

[Refer to Section 2.995 (a) (2)(d)(1)]

Variations of frequency versus change in temperature measurements are as follows per section2.995:

Degrees Celsius	Frequency MHz
-20	121.5005
-10	121.5004
0	121.5004
+10	121.5000
+20	121.5000
+30	121.5000
+40	121.4999
+50	121.4998
+55	121.4995

Maximum frequency deviation is .001%.

Statement of Compliance

This equipment has been tested in accordance with the requirements contained in the appropriate commission regulations. To the best of my knowledge, these test were performed using measurement procedures consistent with industry or Commissions standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by the engineering department of Val Avionics, Ltd. Located at 3280 25th street SE in Salem, Oregon.

James L. Harr, Chief Engineer

Chapter

TESTS and DIAGRAMS

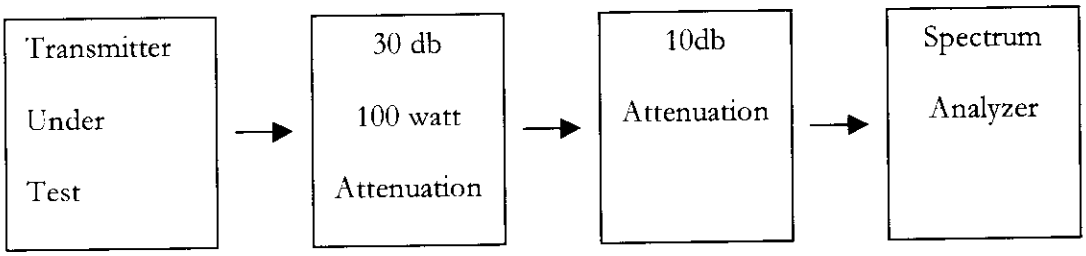
Statement of Attestation

Transmitter Spectrum Measurement of Fundamentals and Harmonics

[Refer to Sections 2.985 and 2.991]

The transmitter was connected to the spectrum analyzer through a 100 watt 30db 50 ohm pad and a 10db 50 ohm. The transmitter was keyed at 1 MHz intervals from 118.000 MHz to 136.975 MHz. The transmitter was modulated with a 2500 Hz tone sufficient to produce 85% modulation.

All measurements were made in dbm references. The fundamentals were measured first and then plus and minus 25Khz. Harmonics up to the 5th harmonics were made and recorded. Harmonics up to the 10th harmonics were explored and found to exceed the requirements by more than 20db.



TRANSMITTER POWER MEASURED IN dbm

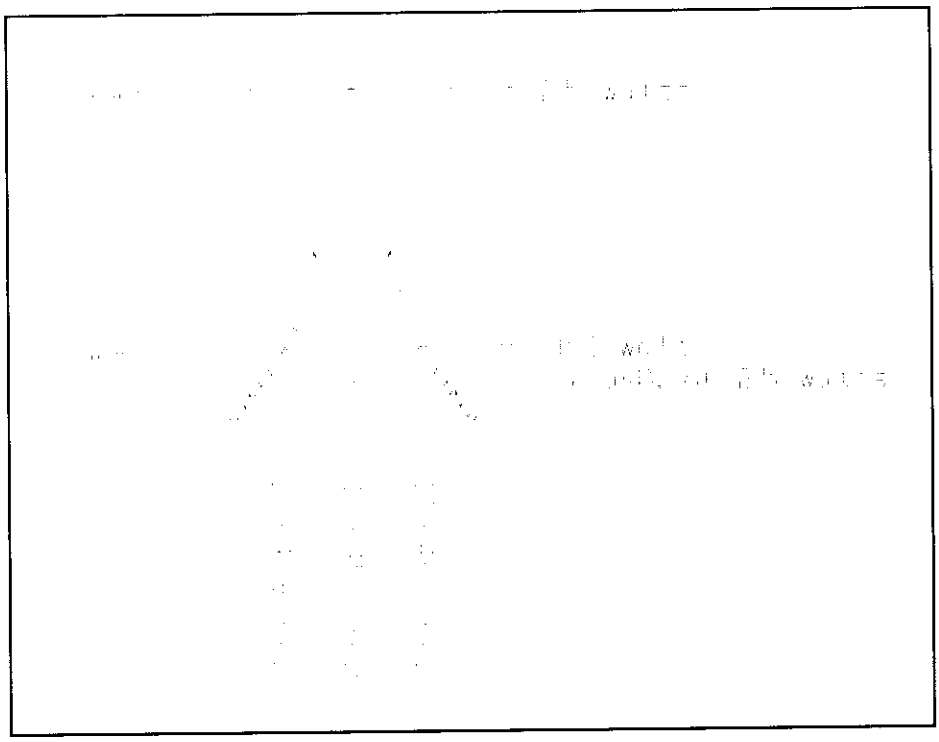
[Refer to Sections 2.985 and 2.991]

	Fundamental	+/- 25 kHz	1 Harmonic	2 Harmonic	3 Harmonic	4 Harmonic	5 Harmonic
118.000	+33	-01	-54	-41	-59	-55	-73
119.000	+33	-13	-53	-41	-58	-56	-72
120.000	+33	-15	-52	-41	-58	-56	-72
121.000	+33	-15	-52	-43	-58	-57	-71
122.000	+33	-15	-51	-44	-57	-58	-70
123.000	+33	-08	-52	-44	-57	-59	-69
124.000	+33	-05	-51	-45	-57	-61	-68
125.000	+33	-00	-41	-46	-57	-65	-67
126.000	+33	+02	-52	-46	-57	-65	-67
127.000	+33	-15	-53	-46	-57	-61	-68
128.000	+33	-15	-53	-46	-57	-61	-68
129.000	+33	+02	-54	-47	-57	-58	-69
130.000	+33	+02	-51	-48	-57	-57	-70
131.000	+33	-05	-52	-48	-58	-61	-73
132.000	+33	-08	-51	-48	-58	-64	-74
133.000	+31	-15	-50	-49	-58	-66	-74
134.000	+31	-13	-52	-49	-60	-68	-77
135.000	+31	-15	-51	-50	-61	-69	-76
136.000	+31	-15	-53	-51	-61	-70	-76
136.975	+31	-15	-54	-51	-60	-72	-80

AWOS 760 VHF Transmitter Occupied Bandwidth Measurements

[Refer to section 2.989]

25 Khz spectrum monitored with carrier modulated at 85% with 2500 Hz



900427.dwg

This test was made at 118.000 Mhz, 123.450 Mhz, 130.000 Mhz, and 136.975 Mhz with similar test results. All of which exceed the requirements of .5% of Section 2.989 of Commission's rules.

Transmitter Modulation Characteristics

[Required by Section 2.987 (d) and 87.73(a)]

Modulation of the transmitter in normal use resulted in modulation peaks of at least 70% and did not exceed 100%

Transmitter modulation characteristics of audio frequencies from 100hz to 5000hz were measured as follows per section 2.987(a).

Hz	% Modulation
100	50
300	60
500	75
800	80
1000	85
1200	85
1400	85
1600	85
1800	85
2000	85
2200	85
2400	85
2600	85
2800	85
3000	85
3500	75
4000	65
4500	60
5000	50

FIELD STRENGTH OF SPURIOUS RADIATION

[Refer to Section 2.993]

The unit was set up on a revolving stand and operated under Normal standby conditions three (3) meters from the receiving dipole antennas which were constructed as illustrated in Drawing number 900428. The antenna was then connected to a spectrum analyzer and an analysis of the frequencies from 20 MHz to 1000 MHz was made.

As indicated in table 6.1 no spurious radiations were found which exceeded radiation measurement requirements.

BALUM CONSTRUCTION FOR FIELD STRENGTH MEASURE DIPOLE ANTENNAS

Frequency Range Mhz	Length C Inches	Length D Inches	Constructed Dipole Length
25-65	34.3	43.3	25'
65-180	14.2	16.25	8'
180-400	6.125	7.5	3'
400-1000	2.7	3.0	1.5'

The constructed dipoles were made of one inch PVC Pipe with the dipole wire taped to them. The wires were then cut to the proper length for each frequency tested.

Field Strength of Spurious Radiation

Table 6.1

Frequency Mhz	Spectrum Explored	Radiated Harmonic dbm
20	+/- 5Mhz	<-100
25	+/- 5Mhz	<-100
30	+/- 5Mhz	-90.6
35	+/- 5Mhz	-95.6
40	+/- 5Mhz	-95.6
45	+/- 5Mhz	-92.6
50	+/- 5Mhz	<-100
55	+/- 5Mhz	<-100
60	+/- 5Mhz	<-100
65	+/- 5Mhz	<-100
70	+/- 5Mhz	<-100
75	+/- 5Mhz	<-100
80	+/- 5Mhz	<-100
90	+/- 10Mhz	<-100
100	+/- 10Mhz	<-100
110	+/- 10Mhz	<-100
120	+/- 10Mhz	<-100
130	+/- 10Mhz	-91.6
140	+/- 10Mhz	<-100
150	+/- 10Mhz	-98.6
160	+/- 10Mhz	<-100
170	+/- 10Mhz	<-100
180	+/- 10Mhz	<-100
190	+/- 10Mhz	<-100
200	+/- 50Mhz	<-100
225	+/- 50Mhz	<-100
250	+/- 50Mhz	-96.1
275	+/- 50Mhz	-93.1
300	+/- 50Mhz	-91.1
350	+/- 50Mhz	<-100
400	+/- 50Mhz	-97.1
450	+/- 50Mhz	-95.1
500	+/- 50Mhz	<-100
550	+/- 50Mhz	<-100
600	+/- 50Mhz	<-100
650	+/- 50Mhz	<-100
700	+/- 50Mhz	-95.1
750	+/- 50Mhz	<-100
800	+/- 50Mhz	<-100
850	+/- 50Mhz	<-100
900	+/- 50Mhz	<-100
1000	+/- 50Mhz	<-100

FREQUENCY STABILITY TEST

[Refer to Section 2.995 (a) (2)]

The unit was tested in a temperature controlled test chamber. The temperature was lowered to -30 degrees centigrade and raised to +60 degrees centigrade. Measurement of transmit frequency at each 10 degree multiple. The frequency did not vary more than .001% over the temperature range.

At temperatures under 25 degrees centigrade, the unit remained off at all times except during brief times when transmit and receive test were made. This assured that the components were chilled to the maximum.

At temperatures over 25 degrees centigrade, the unit was left on at all times. This assured that the components were heated to the maximum.

Variations of frequency versus change in temperature measurements are as follows per section2.995:

Degrees Celsius	Frequency MHz
-30	121.5005
-20	121.5005
-10	121.5004
0	121.5004
+10	121.5000
+20	121.5000
+30	121.5000
+40	121.4999
+50	121.4998
+55	121.4995
+60	121.4995

Maximum frequency deviation is .001%.

VARIATIONS OF PRIMARY SUPPLY VOLTAGE

[Refer to Section 2.995 (d)(1)]

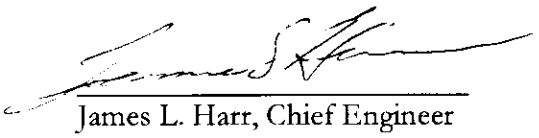
The primary voltage was varied from 10.2v to 13.8v and the transmit frequency was monitored. The transmit frequency did not vary more .001%.

Revision History

1	08/24/98	Chapter 6	Added Text and Diagrams	Remove & Replace
		Page 28	Added text to first paragraph	
		Page 29	Added reference sections to table	
		Page 30	Added Transmitter Occupied Bandwidth Measurements	
		Page 32	Added Field Strength of Spurious Radiation	
		Page 33	Added Table 6.1	
		Page 34	Added Frequency Stability Test to include ranges of -30 to +60	
		Page 35	Corrected Text from 12v to 15.8v to 10.2v to 13.8v	
1	08/24/98	Chapter 1	Added Text General Information	
		Page 1	Added Text	Remove & Replace
		Page 2	Added Information to Specifications	Remove & Replace
		Page 3	Added Text to Installation	Remove & Replace
		Page 6	Added Pin Assignment Diagram	Add

Statement of Compliance

This equipment has been tested in accordance with the requirements contained in the appropriate commission regulations. To the best of my knowledge, these test were performed using measurement procedures consistent with industry or Commissions standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by the engineering department of Val Avionics, Ltd. Located at 3280 25th street SE in Salem, Oregon.



James L. Harr, Chief Engineer

VAL AVIONICS LIMITED
3280 25th Street SE - P O Box 13025 – Salem, OR 97309
(503) 370-9429 – 1-800-255-1511 - FAX (503) 370-9885
Email: info@valavionics.com – www.valavionics.com

F2

August 24, 1998

FAA, Spectrum Engineering Division
800 Independence Avenue SW
Washington, DC 20591

Reference: Code of Federal Regulations Title 47 Telecommunication,
Section 87.147(d)

Subject: Notification of filing Type Acceptance Application to FCC.

Gentleperson,

I hereby submit notification of Type Acceptance Application for our AWOS 760 VHF transmitter made with the FCC in accordance with Code of Federal Regulations, Title 47, Section 87.147(d).

This pending application was filed under FCC ID: EZN5PRAWOS760

The "AWOS 760" communication transmitter is a device specifically designed for installation as a component part for existing Automated Weather Observing Systems (AWOS); and to conform to FAA Advisory Circular 150/5220-16B.

The "AWOS 760" VHF transmitter relative data is shown listed below:

Manufacturers_Model_Number	
Part Number	803000
Frequency Range	118.000 to 136.975 MHz
Channel Spacing	25 kHz
Frequency Stability	.001%
Spurious Emissions	Greater than 80 dB down from carrier
Modulation	Adjustable (70 to 90% Typical)
Temperature Range	-30 to +60 Degrees Celsius
Transmit Power	2.5 watts
Antenna Characteristics	50 Ohm, Vhf, Broadband Type
Emission Type	6K00A3E

Duty Cycle	100%
Design	All Solid State, Printed Circuit Board & Point to Point Wiring
Mounting	Rigid Mounting, No Shock Mounting Required
Physical Dimensions	Width: 6.00 inches (15.24 cm) Height: 1.9 inches (4.83 cm) Length: 11.0 inches (27.94 cm)
Weight	5.0 Lbs. (2.27kg)
Voltage	12.0 Vdc
Current	Standby 200 mA Transmit 1.5A

VAL AVIONICS LIMITED
3280 25th Street SE - P O Box 13025
– Salem, OR 97309
(503) 370-9429 – 1-800-255-1511 -
FAX (503) 370-9885
Email: info@valavionics.com –
www.valavionics.com

F2

F3

August 27, 1998

Federal Communication Commission
OET [oetech@fccsun07w.fcc.gov]
Attention: Mr. Bill Inglis

Re: FCC ID:
EZN5PRAWOS760 [Correspondence
ID: 2882]
731 Confirmation Number:
EA90045

Subject: Your email of Friday,
August 21, 1998.

To show compliance with Sections
2.983 through 2.995, we submit the
following:

SECTION		
2.983	Application for Type Acceptance	Change 2 to 2.5 to correct typographical error
2.985	RF Power Output	Refer to Chapter 6, page 28 and 29
2.987	Modulation Characteristics	Refer to Chapter 6, page 31
2.989	Occupied Bandwidth	Refer to Chapter 6, page 30
2.991	Spurious Emissions at Antenna Terminals	Refer to Chapter 6, page 28 and 29
2.993	Field Strength of Spurious Radiation	Refer to Chapter 6, page 32 and 33
2.995	Frequency Stability	Refer to Chapter 6, page 34 and 35

The AWOS 760 is a 760-channel communication transmitter designed to provide one way communication within the frequency range of 118.000 MHz to 136.975 MHz in 25 kHz increments.
The AWOS 760-communication transmitter was designed to conform to FAA Advisory Circular 150/5220-16B for use as a ground based VHF transmitter for Automated Weather Observing Systems (AWOS).
The AWOS 760 communication transmitter has Federal Communications Commission (FCC) type acceptance filed under FCC ID: EZN5PRCOM760
The AWOS 760 consists of two major sections: Main Board and Transmitter Board.
Specifications
Physical Dimensions:Width: 6.00 inches (15.24 cm)
Height: 1.9 inches (4.83 cm)
Length: 11.0 inches (27.94 cm)
Weight5.0 Lbs. (2.27 kg)
Voltage:12.0 Vdc
Current:Standby 200 mA; Transmit 1.5 A
Frequency Range:118.000 to 136.975 MHz
Channel Spacing25 kHz
Frequency Stability:. 001%
Spurious EmissionsGreater Than 80 dB down from carrier
ModulationAdjustable (70 to 90% Typical)
Temperature Range-30 to +60 Degrees Celsius
Transmit Power:2.5 watts
Emission6K00A3E
Duty Cycle 100%
DesignAll Solid State. Printed Circuit Board & Point to Point Wiring.
MountingRigid Mounting, No Shock Mounting Required.
FCC IDEZN5PRAWOS760
Unit Part Number803000
Operation

CONTROLS:
ON/OFF SWITCH turns on and off the main power to the unit.
INDICATOR LIGHT Illuminates when the unit is powered up.
DB-9 CONNECTOR connections for power, ground, mic audio, and transmit key are made at this connector..
ANTENNA JACK connects to a broad band VHF 50 Ohm loaded antenna
FREQUENCY CALIBRATION capacitor C427 can be adjusted to center the output frequency.

MODULATION ADJUST potentiometer R423 can be adjusted to vary the modulation level.
POWER ADJUST potentiometer R419 can be adjusted to vary the output power.
DIPSWITHCES M0-M4 selects the whole MHz frequency (see table, Chapter 5)
DIPSWITCHES K2-K5 selects the tenth MHz frequency (see table, Chapter 5)
DIPSWITCHES K0-K1 selects the 25 kHz spacing (see table, Chapter 5)

Installation

This section contains suggestions and factors to consider before installing the AWOS 760 transmitter. Close adherence to these suggestions will assure more satisfactory performance from the equipment.
Unpack the equipment and inspect each item for evidence of damage incurred during shipment. If a damage claim must be filed, save the shipping container and all packing materials to substantiate your claim. The claim should be filed with the Transportation Company as soon as possible. The shipping container and packing material should be saved in any case in the event that storage or reshipment of the equipment is necessary.
The AWOS 760 installation will conform to standards designated by the customer, installing agency, and existing conditions as to the unit location and type of installation. The installing agency will supply and fabricate all external cables for interface to their system as appropriate. VAL Avionics, Ltd will supply the connectors required.
The most important contribution to improved reliability of this equipment is to limit the maximum operating temperature. While modern designs consume less total energy, the heat dissipated per unit volume (Watts/cubic inch) remains much the same due to contemporary high density packaging techniques. While each individual unit may or may not require forced air cooling, the combined heat generated by several various units within a typical AWOS cabinet assembly can significantly degrade the reliability of the AWOS 760 transmitter if provisions for adequate cooling are not incorporated in the particular installation.
NOTE: The AWOS 760 vhf transmitter must be mounted in the AWOS system cabinet in a lengthwise vertical position, cooling fins facing out, parallel into the convective airflow provided by an air intake vent at the bottom of the cabinet and air exhaust vent on the upper side designed into the AWOS cabinet.
FAILURE TO PROVIDE THIS TYPE OF INSTALLATION ENVIRONMENT WILL VOID MANUFACTURERS WARRANTY!
Before the AWOS 760 transmitter can be operated, the

customer must obtain a Radio Station License from the Federal Communications Commission (FCC). This license can be obtained by filing the appropriate form obtained from the local FCC Field Office.

NOTE: THE VHF TRANSMITTER IN THE AWOS 760 IS GUARANTEED TO MEET FEDERAL COMMUNICATIONS COMMISSION ACCEPTANCE OVER THE OPERATING TEMPERATURE RANGE ONLY WHEN A VAL AVIONICS LIMITED CRYSTAL IS USED IN THE STABILIZED MASTER OSCILLATOR. USE OF OTHER THAN A VAL AVIONICS LIMITED CRYSTAL IS CONSIDERED AN UNAUTHORIZED MODIFICATION AND MAY VOID THE WARRANTY.

The pin assignment and function for P401/J401 are as follows:

PIN_TERMINAL	
1	12.0 VDC UNIT POWER INPUT
2	TRANSMITTER KEY
3	NO CONNECTION (FOR FUTURE USE)
4	NO CONNECTION (FOR FUTURE USE)
5	TRANSMITTER AUDIO INPUT
6	NO CONNECTION (FOR FUTURE USE)
7	NO CONNECTION (FOR FUTURE USE)
8	NO CONNECTION (FOR FUTURE USE)
9	UNIT GROUND

Transmitter Spectrum Measurement of Fundamentals and Harmonics [Refer to Sections 2.985 and 2.991]

The transmitter was connected to the spectrum analyzer through a 100 watt 30db 50 ohm pad and a 10db 50 ohm. The transmitter was keyed at 1 MHz intervals from 118.000 MHz to 136.975 MHz. The transmitter was modulated with a 2500 Hz tone sufficient to produce 85% modulation.

All measurements were made in dbm references.

The fundamentals were measured first and then plus and minus 25Khz. Harmonics up to the 5th harmonics were made and recorded. Harmonics up to the 10th harmonics were explored and found to exceed the requirements by more than 20db.

Transmitter

Under

Test
30 db

100 watt

Attenuation
10db

Attenuation
Spectrum

Analyzer

TRANSMITTER POWER MEASURED IN dbm

[Refer to Sections 2.985 and 2.991]

F1							
118.000	+33	-01	-54	-41	-59	-55	-73
119.000	+33	-13	-53	-41	-58	-56	-72
120.000	+33	-15	-52	-41	-58	-56	-72
121.000	+33	-15	-52	-43	-58	-57	-71
122.000	+33	-15	-51	-44	-57	-58	-70
123.000	+33	-08	-52	-44	-57	-59	-69
124.000	+33	-05	-51	-45	-57	-61	-68
125.000	+33	-00	-41	-46	-57	-65	-67
126.000	+33	+02	-52	-46	-57	-65	-67
127.000	+33	-15	-53	-46	-57	-61	-68
128.000	+33	-15	-53	-46	-57	-61	-68
129.000	+33	+02	-54	-47	-57	-58	-69
130.000	+33	+02	-51	-48	-57	-57	-70
131.000	+33	-05	-52	-48	-58	-61	-73
132.000	+33	-08	-51	-48	-58	-64	-74
133.000	+31	-15	-50	-49	-58	-66	-74
134.000	+31	-13	-52	-49	-60	-68	-77
135.000	+31	-15	-51	-50	-61	-69	-76
136.000	+31	-15	-53	-51	-61	-70	-76
136.975	+31	-15	-54	-51	-60	-72	-80
	F2	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**

AWOS 760 VHF Transmitter Occupied Bandwidth Measurements [Refer to section 2.989]

25 Khz spectrum monitored with carrier modulated at 85% with 2500 Hz

900427.dwg This test was made at 118.000 Mhz, 123.450 Mhz, 130.000

Mhz, and 136.975 Mhz with similar test results. All of which exceed the requirements of .5% of Section 2.989 of Commission 's rules.Transmitter Modulation Characteristics [Required by Section 2.987 (d) and 87.73(a)]

Modulation of the transmitter in normal use resulted in modulation peaks of at least 70% and did not exceed 100%

Transmitter modulation characteristics of audio frequencies from 100hz to 5000hz were measured as follows per section 2.987(a).

Hz	
100	50
300	60
500	75
800	80

1000	85						
1200	85						
1400	85						
1600	85						
1800	85						
2000	85						
2200	85						
2400	85						
2600	85						
2800	85						
3000	85						
3500	75						
4000	65						
4500	60						
5000	50						
FIELD STRENGTH OF SPURIOUS RADIATION [Refer to Section 2.993]	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**
The unit was set up on a revolving stand and operated under Normal standby conditions three (3) meters from the receiving dipole antennas which were constructed as illustrated in Drawing number 900428. The antenna was then connected to a spectrum analyzer and an analysis of the frequencies from 20 MHz to 1000							

MHz was made. As indicated in table 6.1 no spurious radiations were found which exceeded radiation measurement requirements.

BALUM CONSTRUCTION FOR FIELD STRENGTH MEASURE DIPOLE ANTENNAS

Frequency_Range_Mhz							
25-65	34.3	43.3	25'				
65-180	14.2	16.25	8'				
180-400	6.125	7.5	3'				
400-1000	2.7	3.0	1.5'				
	F2	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**

The constructed dipoles were made of one inch PVC Pipe with the dipole wire taped to them. The wires were then cut to the proper length for each frequency tested.

Field Strength of Spurious Radiation

Table 6.1

Frequency_

Mhz		
20	+/- 5Mhz	<-100
25	+/- 5Mhz	<-100
30	+/- 5Mhz	-90.6
35	+/- 5Mhz	-95.6
40	+/- 5Mhz	-95.6
45	+/- 5Mhz	-92.6
50	+/- 5Mhz	<-100
55	+/- 5Mhz	<-100
60	+/- 5Mhz	<-100
65	+/- 5Mhz	<-100
70	+/- 5Mhz	<-100
75	+/- 5Mhz	<-100
80	+/- 5Mhz	<-100
90	+/- 10Mhz	<-100
100	+/- 10Mhz	<-100
110	+/- 10Mhz	<-100
120	+/- 10Mhz	<-100
130	+/- 10Mhz	-91.6
140	+/- 10Mhz	<-100
150	+/- 10Mhz	-98.6
160	+/- 10Mhz	<-100
170	+/- 10Mhz	<-100
180	+/- 10Mhz	<-100
190	+/- 10Mhz	<-100
200	+/- 50Mhz	<-100
225	+/- 50Mhz	<-100
250	+/- 50Mhz	-96.1
275	+/- 50Mhz	-93.1
300	+/- 50Mhz	-91.1
350	+/- 50Mhz	<-100
400	+/- 50Mhz	-97.1
450	+/- 50Mhz	-95.1
500	+/- 50Mhz	<-100
550	+/- 50Mhz	<-100
600	+/- 50Mhz	<-100
650	+/- 50Mhz	<-100
700	+/- 50Mhz	-95.1
750	+/- 50Mhz	<-100
800	+/- 50Mhz	<-100
850	+/- 50Mhz	<-100
900	+/- 50Mhz	<-100
1000	+/- 50Mhz	<-100

FREQUENCY STABILITY TEST [Refer to Section 2.995 (a) (2)]	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**

The unit was tested in a

temperature controlled test chamber. The temperature was lowered to -30 degrees centigrade and raised to +60 degrees centigrade. Measuremen t of transmit frequency at each 10 degree multiple. The frequency did not vary more than .001% over the temperature range. At temperatures under 25 degrees centigrade, the unit remained off at all times except during brief times when transmit and receive test were made. This assured that the components were chilled to the maximum. At temperatures over 25 degrees centigrade, the unit was left on at all

times. This assured that the components were heated to the maximum.

Variations of frequency versus change in temperature measurements are as follows per section2.995 :

Degrees_Celsius	
-30	121.5005
-20	121.5005
-10	121.5004
0	121.5004
+10	121.5000
+20	121.5000
+30	121.5000
+40	121.4999
+50	121.4998
+55	121.4995
+60	121.4995

F2 **F3** **F4** **F5** **F6** **F7** **F8**

Maximum frequency deviation is .001%.

VARIATIONS OF PRIMARY SUPPLY VOLTAGE [Refer to Section 2.995 (d)(1)]

The primary voltage was varied from

10.2v to 13.8v and the transmit frequency was monitored. The transmit frequency did not vary more .001%.

Statement of Compliance

This equipment has been tested in accordance with the requirements contained in the appropriate commission regulations. To the best of my knowledge, these test were performed using measuremen t procedures consistent with industry or Commission s standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufacture d, imported or marketed,

as defined in the Commission 's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measuremen ts were made by the engineering department of Val Avionics, Ltd. Located at 3280 25th street SE in Salem, Oregon.

_____

_____

_____

James L. Harr, Chief Engineer

Revision History

F1

F1	F2	F3	F4	F5	F6	F7	F8
		Page 28	Added text to first paragraph				
		Page 29	Added reference sections to table				
		Page 30	Added Transmitter Occupied Bandwidth Measurements				
		Page 32	Added Field Strength of Spurious Radiation				
		Page 33	Added Table 6.1				
		Page 34	Added Frequency Stability Test to include ranges of – 30 to +60				
		Page 35	Corrected Text from 12v to 15.8v to 10.2v to 13.8v				
1	08/24/98	Chapter 1	Added Text General Information				
		Page 1	Added Text	Remove & Replace			
		Page 2	Added Information to Specifications	Remove & Replace			
		Page 3	Added Text to Installation	Remove & Replace			
		Page 6	Added Pin Assignment	Add			

Diagram

VAL AVIONICS LIMITED

3280 25th Street SE - P O Box 13025 – Salem, OR 97309
(503) 370-9429 – 1-800-255-1511 - FAX (503) 370-9885
Email: info@valavionics.com – www.valavionics.com

August 27, 1998

Federal Communication Commission
OET [oetech@fccsun07w.fcc.gov]
Attention: Mr. Bill Inglis

Re: FCC ID: EZN5PRAWOS760 [Correspondence ID: 2882]
731 Confirmation Number: EA90045

Subject: Your email of Friday, August 21, 1998.

To show compliance with Sections 2.983 through 2.995, we submit the following:

SECTION	TITLE	COMMENTS
2.983	Application for Type Acceptance	Change 2 to 2.5 to correct typographical error
2.985	RF Power Output	Refer to Chapter 6, page 28 and 29
2.987	Modulation Characteristics	Refer to Chapter 6, page 31
2.989	Occupied Bandwidth	Refer to Chapter 6, page 30
2.991	Spurious Emissions at Antenna Terminals	Refer to Chapter 6, page 28 and 29
2.993	Field Strength of Spurious Radiation	Refer to Chapter 6, page 32 and 33
2.995	Frequency Stability	Refer to Chapter 6, page 34 and 35

Please remove and replace Chapter 6 Test and Diagrams with Chapter 6 Test and Diagrams, Revision 1. All changes and revisions regarding Testing and compliance were made in this chapter. See Revision History Page 37.

Please remove and replace Chapter 1 General Information with Chapter 1 General Information, Revision 1. Additional information was added to the Specifications and Installation sections. See Revision History Page 37.

It was further stated in your correspondence, that we indicated the transmitter can be operated at a reduced power and that no mention of testing at the lower power levels were made.

The AWOS 760 has been designed as a component part of an **A**utomated **W**eather **O**bservation **S**ystem. The design characteristics are such to comply with FAA Advisory Circular 150/5220-16B. As a result the AWOS 760 has been designed and tested with a 2.5 watt output. The only adjustment of the output power is provided by potentiometer R419 which allows for final fine-tuning of the transmit power across the spectrum of operation. The full range of adjustment is approximately +/- 1 watt. At no time is it intended to operate the AWOS 760 outside of the appropriate tolerance for the output power of 2.5 watts.

After careful review of the material submitted with our application 731 [Confirmation Number: EA90045] we cannot find any reference pertaining to the operation of the AWOS 760 with a transmit power output of greater than or less than 2.5 watts. Also, it is noted that all testing has been performed with the tolerance of this power level.

We have submitted a letter to FAA pursuant to Section 87.147(d) of the Rules. A courtesy copy of the letter dated and mailed on August 24, 1998 is shown as an attachment.

Sincerely,

Jim Harr, Chief Engineer

VAL AVIONICS, LTD.

3280 25th Street SE – P O Box 130250 – Salem, OR 97309
(503) 370-9429 – FAX (503) 370-9885 – Email: info@valavionics.com

August 27, 1998

Federal Communication Commission
Equipment Approval Service
P O Box 358315
Pittsburgh, PA 15251-5315

Re: FCC ID: EZN5PRAWOS760 [Correspondence ID:2882]
731 Confirmation Number: EA90045

Subject: Your email of Friday, August 21, 1998.

To show compliance with Sections 2.983 through 2.995, we submit the following:

SECTION	TITLE	COMMENTS
2.983	Application for Type Acceptance	Change 2 to 2.5 to correct typographical error
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2.989	Occupied Bandwidth	Refer to Chapter 6, page 30
2.991	Spurious Emissions at Antenna Terminals	Refer to Chapter 6, page 28 and 29
2.993	Field Strength of Spurious Radiation	Refer to Chapter 6, page 32 and 33
2.995	Frequency Stability	Refer to Chapter 6, page 34 and 35

Please remove and replace Chapter 6 Test and Diagrams with Chapter 6 Test and Diagrams, Revision 1. All changes and revisions regarding Testing and compliance were made in this chapter. See Revision History Page 37.

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After careful review of the material submitted with our application 731 [Confirmation Number: EA90045] we cannot find any reference pertaining to the operation of the AWOS 760 with a transmit power output of greater than or less than 2.5 watts. Also, it is noted that all testing has been performed with the tolerance of this power level.

We have submitted a letter to FAA pursuant to Section 87.147(d) of the Rules. A courtesy copy of the letter dated and mailed on August 24, 1998 is shown as an attachment.

Sincerely,

Jim Harr, Chief Engineer

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1	08/24/98	Chapter 6	Added Text and Diagrams	Remove & Replace
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Email: info@valavionics.com – www.valavionics.com

August 24, 1998

FAA, Spectrum Engineering Division
800 Independence Avenue SW
Washington, DC 20591

Reference: Code of Federal Regulations Title 47 Telecommunication,
Section 87.147(d)

Subject: Notification of filing Type Acceptance Application to FCC.

Gentleperson,

I hereby submit notification of Type Acceptance Application for our AWOS 760 VHF transmitter made with the FCC in accordance with Code of Federal Regulations, Title 47, Section 87.147(d).

This pending application was filed under FCC ID: EZN5PRAWOS760

The "AWOS 760" communication transmitter is a device specifically designed for installation as a component part for existing Automated Weather Observing Systems (AWOS); and to conform to FAA Advisory Circular 150/5220-16B.

The "AWOS 760" VHF transmitter relative data is shown listed below:

Manufacturers Model Number	AWOS 760
Part Number	803000
Frequency Range	118.000 to 136.975 MHz
Channel Spacing	25 kHz
Frequency Stability	.001%
Spurious Emissions	Greater than 80 dB down from carrier
Modulation	Adjustable (70 to 90% Typical)
Temperature Range	-30 to +60 Degrees Celsius
Transmit Power	2.5 watts
Antenna Characteristics	50 Ohm, Vhf, Broadband Type
Emission Type	6K00A3E
Duty Cycle	100%
Design	All Solid State, Printed Circuit Board & Point to Point Wiring
Mounting	Rigid Mounting, No Shock Mounting Required
Physical Dimensions	Width: 6.00 inches (15.24 cm) Height: 1.9 inches (4.83 cm) Length: 11.0 inches (27.94 cm)
Weight	5.0 Lbs. (2.27kg)
Voltage	12.0 Vdc
Current	Standby 200 mA Transmit 1.5A

Sincerely,

Robie A. Furlong, President

Copy to: FCC

The "AWOS 760" VHF transmitter relative data is shown listed below:

Manufacturers Model Number	AWOS 760
Part Number	803000
Frequency Range	118.000 to 136.975 MHz
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Frequency Stability	.001%
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Antenna Characteristics	50 Ohm, Vhf, Broadband Type
Emission Type	6K00A3E
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Design	All Solid State, Printed Circuit Board & Point to Point Wiring
Mounting	Rigid Mounting, No Shock Mounting Required
Physical Dimensions	Width: 6.00 inches (15.24 cm) Height: 1.9 inches (4.83 cm) Length: 11.0 inches (27.94 cm)
Weight	5.0 Lbs. (2.27kg)
Voltage	12.0 Vdc
Current	Standby 200 mA Transmit 1.5A

Sincerely,

Robie A. Furlong, President

Copy to: FCC

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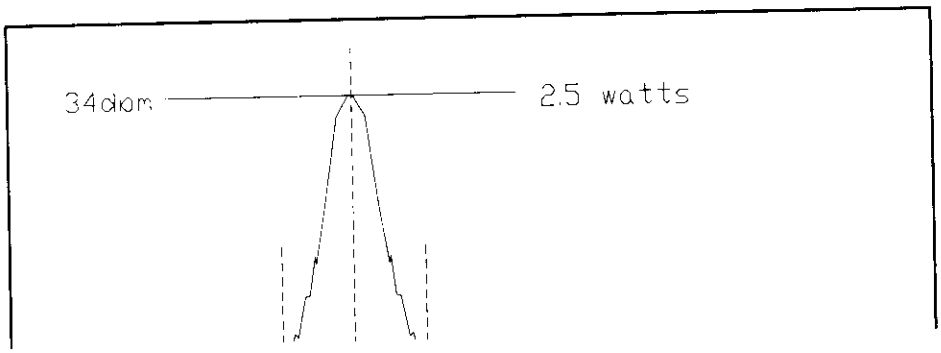
AWOS 760 VHF Transmitter Occupied Bandwidth Measurements

[Refer to section 2.989]

25 Khz spectrum monitored with carrier modulated at 85% with 2500 Hz



Chapter

TESTS and DIAGRAMS

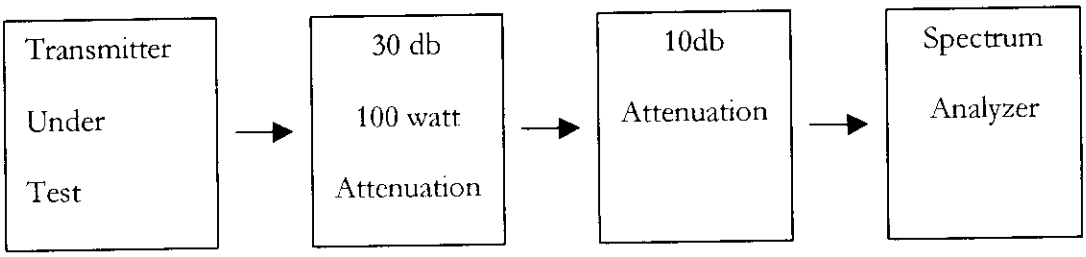
Statement of Attestation

Transmitter Spectrum Measurement of Fundamentals and Harmonics

[Refer to Sections 2.985 and 2.991]

The transmitter was connected to the spectrum analyzer through a 100 watt 30db 50 ohm pad and a 10db 50 ohm. The transmitter was keyed at 1 MHz intervals from 118.000 MHz to 136.975 MHz. The transmitter was modulated with a 2500 Hz tone sufficient to produce 85% modulation.

All measurements were made in dbm references. The fundamentals were measured first and then plus and minus 25Khz. Harmonics up to the 5th harmonics were made and recorded. Harmonics up to the 10th harmonics were explored and found to exceed the requirements by more than 20db.



TRANSMITTER POWER MEASURED IN dbm

[Refer to Sections 2.985 and 2.991]

	Fundamental	+/- 25 kHz	1 Harmonic	2 Harmonic	3 Harmonic	4 Harmonic	5 Harmonic
118.000	+33	-01	-54	-41	-59	-55	-73
119.000	+33	-13	-53	-41	-58	-56	-72
120.000	+33	-15	52	-41	-58	-56	-72
121.000	+33	-15	-52	-43	-58	-57	-71
122.000	+33	-15	-51	-44	-57	-58	-70
123.000	+33	-08	-52	-44	-57	-59	-69
124.000	+33	-05	-51	-45	-57	-61	-68
125.000	+33	-00	-41	-46	-57	-65	-67
126.000	+33	+02	-52	-46	-57	-65	-67
127.000	+33	-15	-53	-46	-57	-61	-68
128.000	+33	-15	-53	-46	-57	-61	-68
129.000	+33	+02	-54	-47	-57	-58	-69
130.000	+33	+02	-51	-48	-57	-57	-70
131.000	+33	-05	-52	-48	-58	-61	-73
132.000	+33	-08	-51	-48	-58	-64	-74
133.000	+31	-15	-50	-49	-58	-66	-74
134.000	+31	13	-52	-49	-60	-68	-77
135.000	+31	-15	-51	-50	-61	-69	-76
136.000	+31	-15	-53	51	-61	-70	-76
136.975	+31	-15	-54	-51	-60	-72	-80

Chapter

TESTS and DIAGRAMS

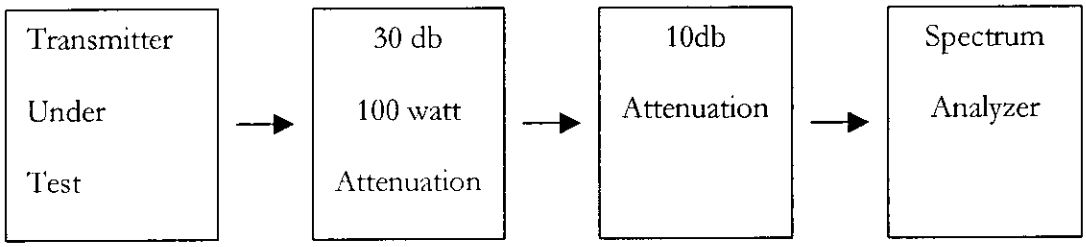
Statement of Attestation

Transmitter Spectrum Measurement of Fundamentals and Harmonics

[Refer to Sections 2.985 and 2.991]

The transmitter was connected to the spectrum analyzer through a 100 watt 30db 50 ohm pad and a 10db 50 ohm. The transmitter was keyed at 1 MHz intervals from 118.000 MHz to 136.975 MHz. The transmitter was modulated with a 2500 Hz tone sufficient to produce 85% modulation.

All measurements were made in dbm references. The fundamentals were measured first and then plus and minus 25Khz. Harmonics up to the 5th harmonics were made and recorded. Harmonics up to the 10th harmonics were explored and found to exceed the requirements by more than 20db.



TRANSMITTER POWER MEASURED IN dbm

[Refer to Sections 2.985 and 2.991]

	Fundamental	+/- 25 kHz	1 Harmonic	2 Harmonic	3 Harmonic	4 Harmonic	5 Harmonic
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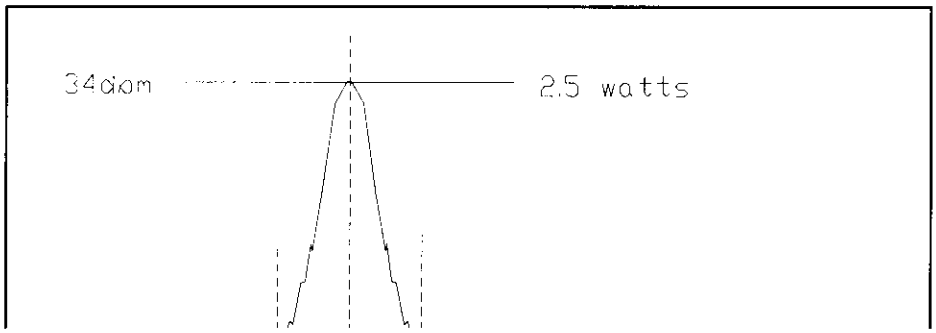
119.000	+33	13	-53	-41	-58	-56	-72
120.000	+33	-15	-52	-41	-58	-56	-72
121.000	+33	-15	-52	-43	58	-57	-71
122.000	+33	15	-51	-44	57	-58	-70
123.000	+33	-08	-52	-44	57	-59	-69
124.000	+33	-05	-51	-45	57	-61	-68
125.000	+33	-00	41	-46	-57	-65	-67
126.000	+33	+02	-52	-46	-57	-65	-67
127.000	+33	-15	-53	-46	-57	-61	-68
128.000	+33	-15	53	-46	57	-61	-68
129.000	+33	+02	54	-47	-57	-58	-69
130.000	+33	+02	-51	48	-57	-57	-70
131.000	+33	-05	-52	-48	-58	-61	-73
132.000	+33	-08	-51	-48	-58	-64	-74
133.000	+31	-15	-50	-49	58	-66	74
134.000	+31	-13	-52	-49	-60	-68	-77
135.000	+31	-15	-51	-50	-61	-69	-76
136.000	+31	15	-53	-51	-61	-70	76
136.975	+31	-15	-54	-51	-60	72	-80

AWOS 760 VHF Transmitter Occupied Bandwidth Measurements

[Refer to section 2.989]

25 Khz spectrum monitored with carrier modulated at 85% with 2500 Hz



Chapter

TESTS and DIAGRAMS

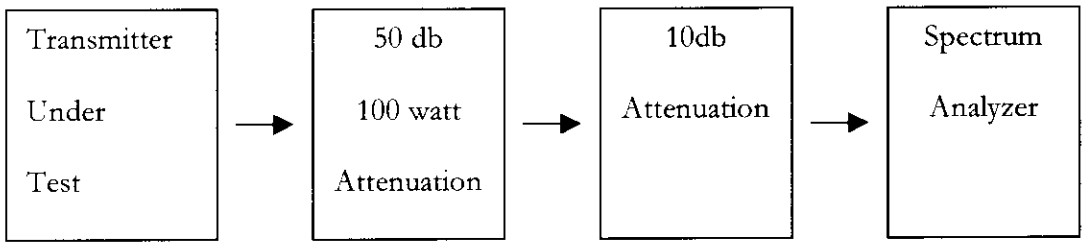
Statement of Attestation

Transmitter Spectrum Measurement of Fundamentals and Harmonics

[Refer to Sections 2.985 and 2.991]

The transmitter was connected to the spectrum analyzer through a 100 watt 50db 50 ohm pad and a 10db 50 ohm. The transmitter was keyed at 1 MHz intervals from 118.000 MHz to 136.975 MHz. The transmitter was modulated with a 2500 Hz tone sufficient to produce 85% modulation.

All measurements were made in dbm references. The fundamentals and harmonics were measured. Harmonics up to the 5th harmonics were made and recorded. Harmonics up to the 10th harmonics were explored and found to exceed the requirements by more than 20db. (See Table 6.2)



TRANSMITTER POWER MEASURED IN dbm

[Refer to Section 2.991]

(Table 6.2)

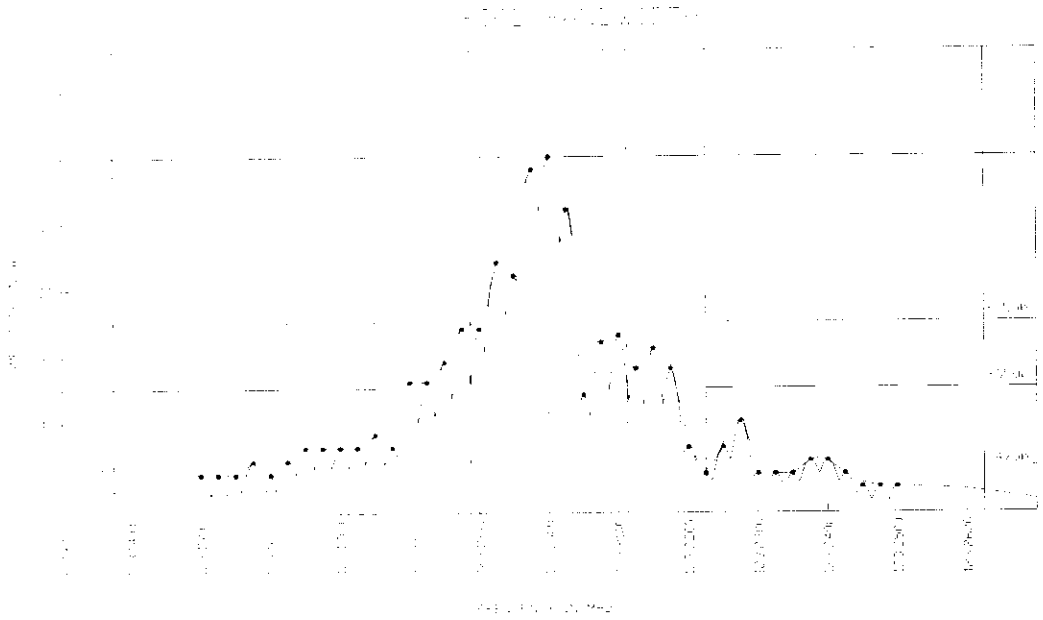
	Fundamental	1 Harmonic	2 Harmonic	3 Harmonic	4 Harmonic	5 Harmonic
118.000	34	-18	*	*	-30	-22
119.000	34	-20	*	*	-26	-20
120.000	34	-20	*	*	-28	-24
121.000	34	-18	*	*	-18	-16
122.000	34	-20	*	*	-28	-16
123.000	34	-16	*	*	-16	-24
124.000	34	-16	*	*	-24	-22
125.000	34	-16	-32	*	-18	-24
126.000	34	-14	-32	*	-20	-22
127.000	34	-16	-32	*	-20	-30
128.000	34	-16	-32	*	-22	*
129.000	34	-16	-30	*	-24	*
130.000	34	-16	-32	*	-26	*
131.000	34	-16	-30	*	-25	*
132.000	34	-16	-30	*	-22	*
133.000	34	-16	-30	*	-20	*
134.000	34	-16	-30	*	-20	*
135.000	34	-18	-28	*	-20	*
136.000	34	-18	-30	*	-20	*
136.975	34	-18	*	*	-18	*

*Emissions attenuated greater than 67db.

AWOS 760 VHF Transmitter Occupied Bandwidth Measurements

[Refer to section 2.989]

25 Khz spectrum monitored with carrier modulated at 85% with 2500 Hz



900427.dwg

This test was made at 118.000 Mhz, 123.450 Mhz, 130.000 Mhz, and 136.975 Mhz with similar test results. All of which exceed the requirements of .Section 2.989 and Section 87.139 of Commission's rules. (See Table 6.3 for reference data)

OCCUPIED BANDWIDTH *[Table 6.3]*

Frequency Mhz	Amp db	Frequency Mhz	Amp db	Frequency Mzh	Amp db
123.130000	-60	123.158125	-60	123186250	-60
123.130625	-60	123.158750	-60	123.186875	-60
123.131250	-60	123.159375	-60	123.187500	-26
123.131875	-60	123.160000	-56	123.188125	-60
123.132500	-60	123.160625	-60	123.188750	-60
123.133125	-60	123.161250	-59	123.189375	-58
123.133750	-60	123.161875	-60	123.190000	-26
123.134375	-60	123.162500	-54	123.190625	-60
123.135000	-60	123.163125	-60	123.191250	-60
123.135625	-60	123.163750	-59	123.191875	-56
123.136250	-60	123.164375	-60	123.192500	-16
123.136875	-60	123.165000	-52	123.193125	-58
123.137500	-60	123.165625	-59	123.193750	-60
123.138125	-60	123.166250	-55	123.194375	-58
123.138750	-60	123.166875	-59	123.195000	-18
123.139375	-60	123.167500	-52	123.195625	-58
123.140000	-60	123.168125	-60	123.196250	-59
123.140625	-60	123.168750	-56	123.196875	-38
123.141250	-60	123.169375	-59	123.197500	-2
123.141875	-60	123.170000	-52	123.198125	-40
123.142500	-60	123.170625	-59	123.198750	-59
123.143125	-60	123.171250	-59	123.199375	-36
123.143750	-60	123.171875	-59	123.200000	0
123.144375	-60	123.172500	-52	123.200625	-38
123.145000	-60	123.173125	-59	123.201250	-58
123.145625	-60	123.173750	-59	123.201875	-52
123.146250	-60	123.174375	-59	123.202500	-8
123.146875	-60	123.175000	-42	123.203125	-56
123.147500	-60	123.175625	-59	123.203750	-60
123.148125	-60	123.176250	-58	123.204375	-60
123.148750	-60	123.176875	-60	123.205000	-36
123.149375	-60	123.177500	-52	123.205625	-60
123.150000	-56	123.178125	-58	-123.206250	-60
123.150625	-60	123.178750	-60	123.206875	-60
123.151250	-60	123.179375	-60	123.207500	-28
123.151875	-60	123.180000	-42	123.208125	-60
123.152500	-56	123.180625	-60	123.208750	-60
123.153125	-60	123.181250	-58	123.209375	-60
123.153750	-60	123.181875	-58	123.210000	-27
123.154375	-60	123.182500	-42	123.210625	-60
123.155000	-56	123.183125	-60	123.211250	-60
123.155625	-60	123.183750	-60	123.211875	-60
123.156250	-60	123.184375	-60	123.2128500	-32
123.156875	-60	123.185000	-31	123.213125	-60
123.157500	-54	123.185625	-60	123.213750	-60

OCCUPIED BANDWIDTH [Table 6.3]

Frequency Mhz	Amp db	Frequency Mhz	Amp db
123.214375	-60	123.242500	-56
123.215000	-29	123.243125	-60
123.215625	-60	123.243750	-60
123.216250	-60	123.244375	-60
123.216875	-60	123.245000	-58
123.217500	-32	123.245625	-60
123.218125	-60	123.246250	-60
123.218750	-60	123.246875	-60
123.219375	-60	123.247500	-58
123.220000	-52	123.248125	-60
123.220625	-59	123.248750	-60
123.221250	-60	123.249375	-60
123.221875	-60	123.250000	-58
123.222500	-56	123.25062	-60
123.223125	-60	123.251250	-60
123.223750	-60	123.251785	-60
123.224375	-58	123.252500	-60
123.225000	-52	123.253125	-60
123.225625	-60	123.253750	-60
123.226250	-60	123.254375	-60
123.226875	-60	123.255000	-60
123.227500	-40	123.255625	-60
123.228125	-60	123.256250	-60
123.228750	-60	123.256875	-60
123.229375	-60	123.257500	-60
123.230000	-56	123.258125	-60
123.230625	-59	123.258750	-60
123.231250	-59	123.259375	-60
123.231875	-59	123.260000	-60
123.232500	-56	123.260625	-60
123.233125	-60	123.261250	-60
123.233750	-60	123.261875	-60
123.234375	-60	123.262500	-60
123.235000	-56	123.263125	-60
123.235625	-60	123.263750	-60
123.236250	-59	123.264375	-60
123.236875	-59	123.265000	-60
123.237500	-54	123.265625	-60
123.238125	-59	123.266250	-60
123.238750	-59	123.266875	-60
123.239375	-60	123.267500	-60
123.240000	-54	123.236812	-60
123.240625	-60	123.268750	-60
123.241250	-60	123.269375	-60
123.241875	-60	123.270000	-60

Transmitter Modulation Characteristics

[Required by Section 2.987 (d) and 87.73(a)]

Modulation of the transmitter in normal use resulted in modulation peaks of at least 70% and did not exceed 100%

Transmitter modulation characteristics of audio frequencies from 100hz to 5000hz were measured as follows per section 2.987(a).

Hz	% Modulation
100	50
300	60
500	75
800	80
1000	85
1200	85
1400	85
1600	85
1800	85
2000	85
2200	85
2400	85
2600	85
2800	85
3000	85
3500	75
4000	65
4500	60
5000	50

FIELD STRENGTH OF SPURIOUS RADIATION

[Refer to Section 2.993]

The unit was set up on a revolving stand and operated under Normal standby conditions three (3) meters from the receiving dipole antennas which were constructed as illustrated in Drawing number 900428. The antenna was then connected to a spectrum analyzer and an analysis of the frequencies from 20 MHz to 1000 MHz was made.

As indicated in table 6.1 no spurious radiations were found which exceeded radiation measurement requirements.

BALUM CONSTRUCTION FOR FIELD STRENGTH MEASURE DIPOLE ANTENNAS

Frequency Range Mhz	Length C Inches	Length D Inches	Constructed Dipole Length
25-65	34.3	43.3	25'
65-180	14.2	16.25	8'
180-400	6.125	7.5	3'
400-1000	2.7	3.0	1.5'

The constructed dipoles were made of one inch PVC Pipe with the dipole wire taped to them. The wires were then cut to the proper length for each frequency tested.

Field Strength of Spurious Radiation

Table 6.1

Frequency Mhz	Spectrum Explored	Radiated Harmonic dbm
20	+/- 5Mhz	<-100
25	+/- 5Mhz	<-100
30	+/- 5Mhz	-90.6
35	+/- 5Mhz	-95.6
40	+/- 5Mhz	-95.6
45	+/- 5Mhz	-92.6
50	+/- 5Mhz	<-100
55	+/- 5Mhz	<-100
60	+/- 5Mhz	<-100
65	+/- 5Mhz	<-100
70	+/- 5Mhz	<-100
75	+/- 5Mhz	<-100
80	+/- 5Mhz	<-100
90	+/- 10Mhz	<-100
100	+/- 10Mhz	<-100
110	+/- 10Mhz	<-100
120	+/- 10Mhz	<-100
130	+/- 10Mhz	-91.6
140	+/- 10Mhz	<-100
150	+/- 10Mhz	-98.6
160	+/- 10Mhz	<-100
170	+/- 10Mhz	<-100
180	+/- 10Mhz	<-100
190	+/- 10Mhz	<-100
200	+/- 50Mhz	<-100
225	+/- 50Mhz	<-100
250	+/- 50Mhz	-96.1
275	+/- 50Mhz	-93.1
300	+/- 50Mhz	-91.1
350	+/- 50Mhz	<-100
400	+/- 50Mhz	-97.1
450	+/- 50Mhz	-95.1
500	+/- 50Mhz	<-100
550	+/- 50Mhz	<-100
600	+/- 50Mhz	<-100
650	+/- 50Mhz	<-100
700	+/- 50Mhz	-95.1
750	+/- 50Mhz	<-100
800	+/- 50Mhz	<-100
850	+/- 50Mhz	<-100
900	+/- 50Mhz	<-100
1000	+/- 50Mhz	<-100

FREQUENCY STABILITY TEST

[Refer to Section 2.995 (a) (2)]

The unit was tested in a temperature controlled test chamber. The temperature was lowered to -30 degrees centigrade and raised to +60 degrees centigrade. Measurement of transmit frequency at each 10 degree multiple. The frequency did not vary more than .001% over the temperature range.

At temperatures under 25 degrees centigrade, the unit remained off at all times except during brief times when transmit and receive test were made. This assured that the components were chilled to the maximum.

At temperatures over 25 degrees centigrade, the unit was left on at all times. This assured that the components were heated to the maximum.

Variations of frequency versus change in temperature measurements are as follows per section2.995:

Degrees Celsius	Frequency MHz
-30	121.5005
-20	121.5005
-10	121.5004
0	121.5004
+10	121.5000
+20	121.5000
+30	121.5000
+40	121.4999
+50	121.4998
+55	121.4995
+60	121.4995

Maximum frequency deviation is .001%.

VARIATIONS OF PRIMARY SUPPLY VOLTAGE

[Refer to Section 2.995 (d)(1)]

The primary voltage was varied from 10.2v to 13.8v and the transmit frequency was monitored. The transmit frequency did not vary more .001%.

Statement of Compliance

This equipment has been tested in accordance with the requirements contained in the appropriate commission regulations. To the best of my knowledge, these test were performed using measurement procedures consistent with industry or Commissions standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis. I further certify that the necessary measurements were made by the engineering department of Val Avionics, Ltd. Located at 3280 25th street SE in Salem, Oregon.

James L. Harr, Chief Engineer

Revision History

1		08/24/98	Chapter 6	Added Text and Diagrams	Remove & Replace
			Page 28	Added text to first paragraph	
			Page 29	Added reference sections to table	
			Page 30	Added Transmitter Occupied Bandwidth Measurements	
			Page 32	Added Field Strength of Spurious Radiation	
			Page 33	Added Table 6.1	
			Page 34	Added Frequency Stability Test to include ranges of -30 to +60	
			Page 35	Corrected Text from 12v to 15.8v to 10.2v to 13.8v	
1		08/24/98	Chapter 1	Added Text General Information	
			Page 1	Added Text	Remove & Replace
			Page 2	Added Information to Specifications	Remove & Replace
			Page 3	Added Text to Installation	Remove & Replace
			Page 6	Added Pin Assignment Diagram	Add
1	A	10/01/98	Chapter 6	Re test for Sections 2.991 & 2.989	Remove & Replace
			Page 28	Added Text to reflect new test results.	
			Page 29	Added new test results to Table 6.2 .	
			Page 30	Added new diagram to reflect new test results	
			Page 31	Added Table 6.3	