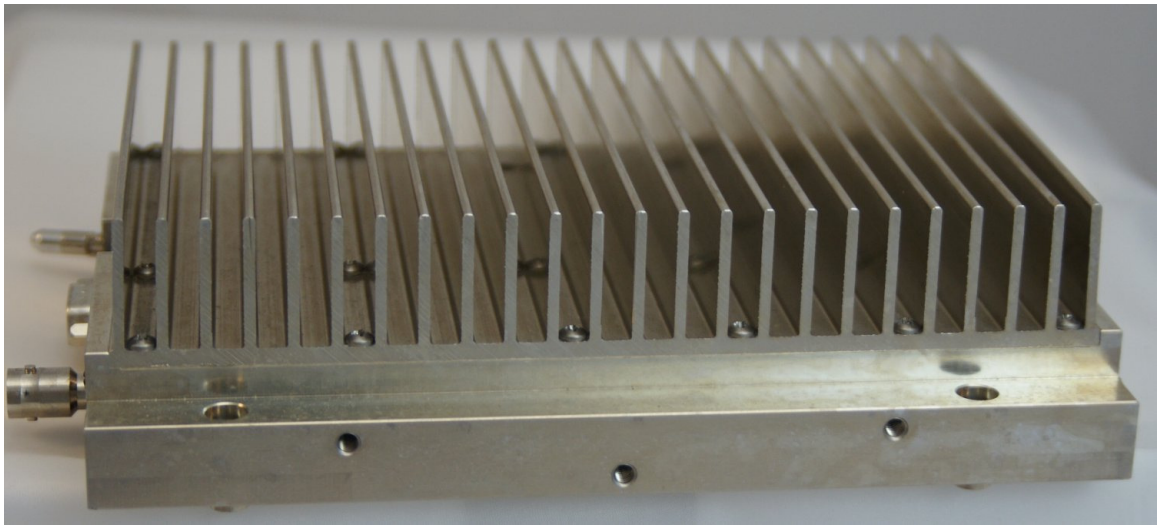
Tuneup Procedure information is found on pages 8-11

VAL AVIONICS LTD

AWOS 2000

VHF Transmitter



Maintenance and Repair Manual

Revision 1
April 2012

P/N 172211

Table of Contents

1 Introduction

This manual is intended to provide instructions and guidelines for the maintenance and repair of the VAL AWOS 2000.

WARNING: This unit contains static sensitive devices. Service personnel must ensure that proper precautions are taken to prevent damage to this equipment from electrostatic discharge (ESD). Disassembly and repair should only be accomplished in an approved ESD workstation, and performed by properly trained and grounded personnel.

1.1 General Description

The AWOS 2000 is a full-featured VHF transmitter designed for fixed remote installation. The AWOS 2000 uses a two-stage transmitter. The user interface consists of DIP-switches to control the active frequency and three adjustments for controlling power, modulation and frequency. The unit case is constructed from milled aluminum; the boards are constructed using high quality materials and use the latest techniques in manufacturing technology.

In order to achieve the desired reliability, size, and power requirements, surface mounted components are used extensively. Specialized equipment and procedures are required to repair circuit boards having surface mounted components. Val Avionics LTD. does not authorize the repair of AWOS 2000 circuit boards. All circuit boards and assemblies from the AWOS 2000 can be economically replaced if necessary.

The following modules and printed circuit board assemblies are available for replacement:

Main Board:
Printed circuit board, which contains the microcontroller, power supply circuitry, and audio components.

Transmitter Board:
Contains the two-stage transmitter.

1.2 Detailed Description

Internally the AWOS 2000 is divided into two printed circuit boards: the main board and transmitter. The block diagram in Figure 1 below shows the relationships between the major circuits and modules within the AWOS 2000.

1.2.1 Main Board Assembly

The main board assembly contains the microcontroller, power supply, audio circuitry and RF TX generator.

1.2.1.1 Microcontroller

This board contains a microchip PIC16F818 microcontroller featuring 1kB of EEPROM memory running at 8MHz. Other circuits on the board are used for input/output functions such as controlling the frequency and controlling the transmitter boards.

The block diagram in Figure 2 below shows the interaction between the various main board circuits.

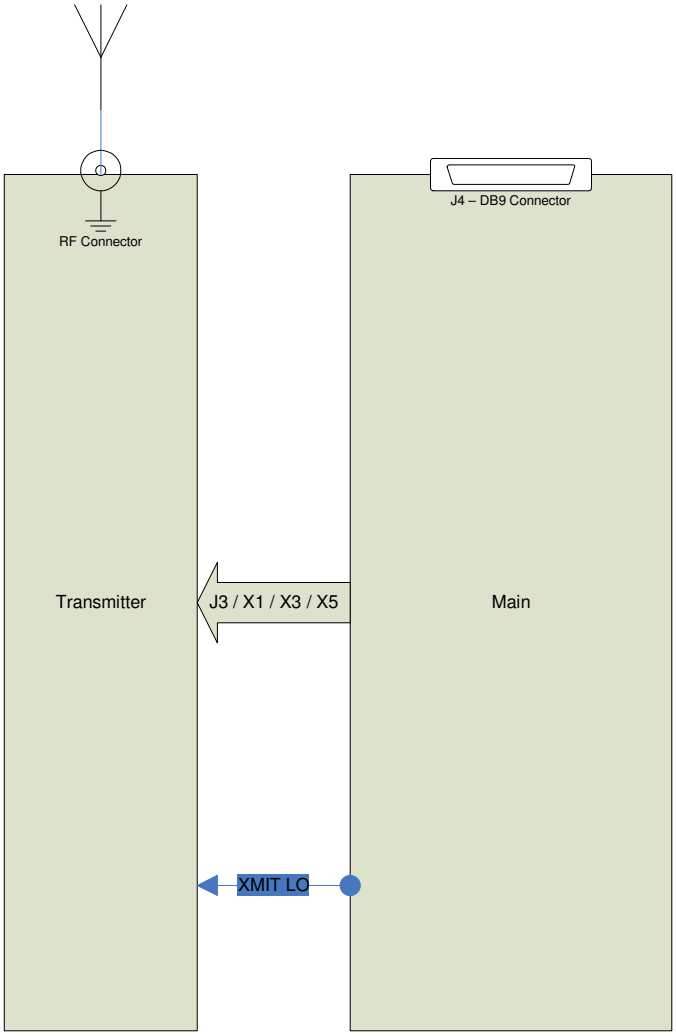


Figure 1: AWOS 2000 Block Diagram

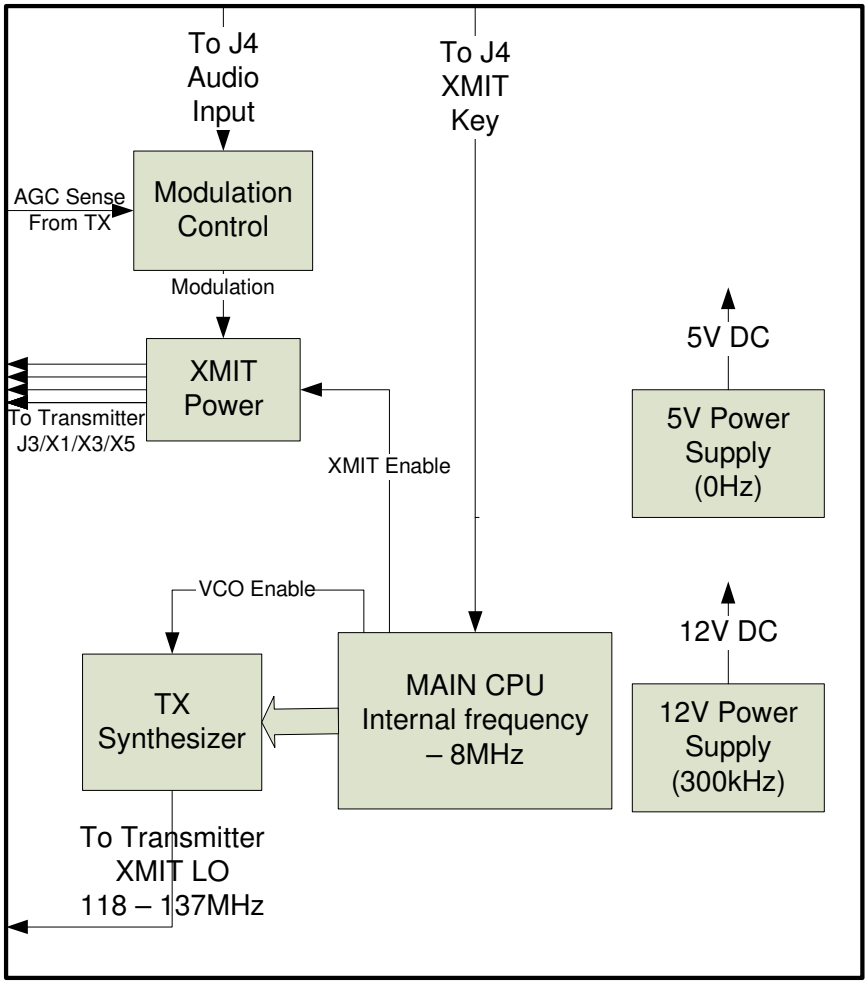


Figure 2: AWOS2000 Mainboard Block Diagram

1.2.1.2 Power Supply Circuits

The power supply section of the main board supplies 12V for the transmitter and 5V for the microcontroller and audio circuitry. The unit is turned on and off by a digital circuit operated by the left rotary encoder push button. The 12V power supply is a self-contained module that outputs 12V ±10%. The 5V power supply is also a linear regulator that outputs 5V ±5%.

1.2.1.3 Modulation Control

The audio section of the main board receives the audio input and regulates the output to the transmitter board.

1.2.1.4 RF TX Generator

The RF TX generator consists of a frequency synthesizer and high-precision crystal oscillator. The frequency synthesizer uses the high-precision oscillator as a reference frequency for the phase detector in the synthesizer. The resulting frequency is used to drive the transmitter board. The RF TX generator is contained within a shielding fence/cover and connection to the transmitter board is made via a RG-174 cable.

The block diagram in Figure 3 shows the interaction between components in the RF TX generator.

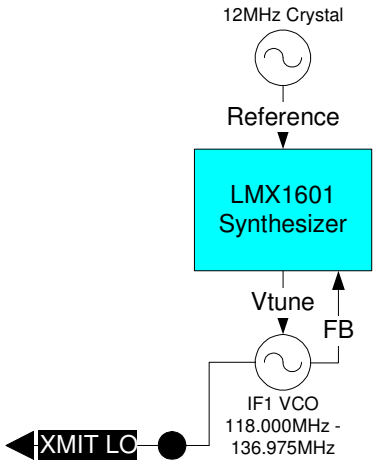


Figure 3: TX LO Generator Block Diagram

1.2.2 Transmitter Board

The transmitter receives RF signals from the main board to the first stage of the transmitter. The signal is amplified through the first stage to drive the gate of the final. The RF signal from the second stage is mixed with the microphone audio signal from the main board to drive the final and produce the amplitude-modulated signal. The resulting signal is then monitored by a diode demodulator to provide a DC signal back to the mainboard to control the power output across the temperature range of the unit.

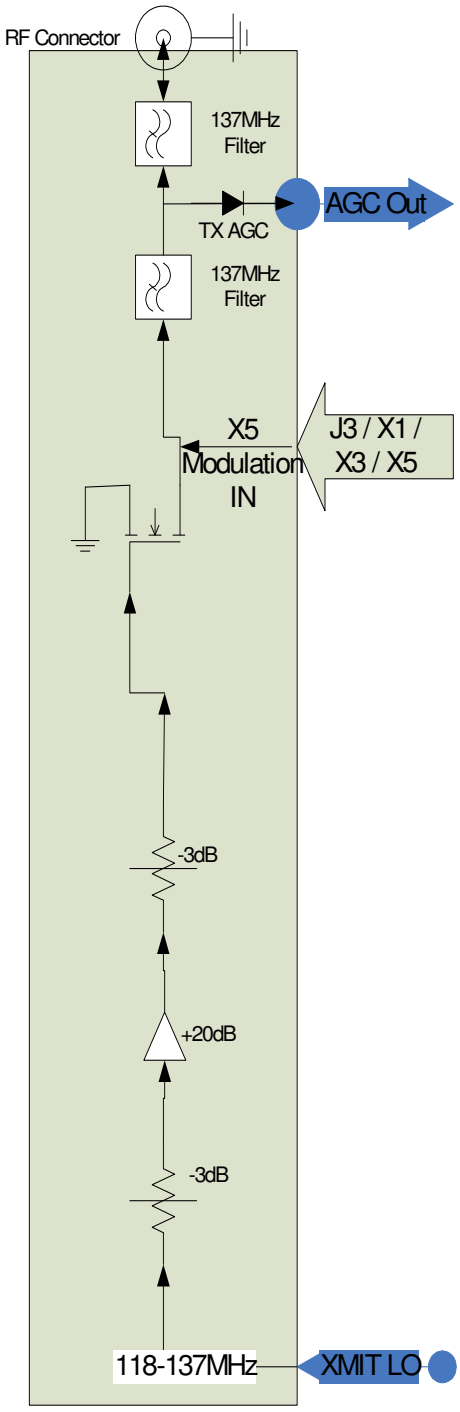


Figure 4: AWOS 2000 Transmitter Block Diagram

2 Troubleshooting

2.1 Troubleshooting Equipment Required

- 0 to 30V DC/5 amp power supply
- Digital multimeter
- 20MHz oscilloscope

2.2 Initial Troubleshooting Operations

The first step in troubleshooting the AWOS 2000 is to remove the cover assembly (see Section 3.1) and verify the unit as being properly powered.

2.3 Power Supply Check

1. Check the DC voltage between U119 pin 3 and ground. The voltage should be between 4.5 and 5.5V. If the voltage is out of limit specified replace the main board.
2. Check the DC voltage between L107 and ground. The voltage should be between 11 and 13V. If the voltage is out of limit specified replace the main board.

2.4 *Troubleshooting Chart*

PROBLEM	RECOMMENDED ACTION
Unit will not power on	Check external power connection Send unit for Service
Weak or garbled transmit	Replace antenna and/or antenna cable Send unit for Service
Weak or no modulation	Adjust modulation setting Replace antenna and/or antenna cable Send unit for Service

3 Disassembly Instructions

To avoid damaging the AWOS 2000's circuit boards and assemblies the following procedures should be carefully followed. Assembly drawings are included in Section 5 for reference.

3.1 Removal of the Covers

1. Remove all external power and sources before disassembly.
2. From the top the unit remove the 21 4-40 x ¼" (p/n 5010xx) screws retaining the top heatsink.
3. Remove the top cover by lifting it upwards.

3.2 Board and Module Disassembly

3.2.1 Main Board Removal

1. Remove the covers as described in Section 3.1.
2. Remove the 2 4-40 x ¼" nuts retaining J104 on the rear of the unit
3. Remove the 6 2-56 x ¼" panhead screws from the main board.
4. De-solder the coax cable from J105
5. Carefully slide the main board upward, pulling it away from the transmitter boards.

3.2.4 Transmitter Board Removal

1. Due to the complexity of removing the transmitter board, if the transmitter board is found to require servicing, it is recommended that the entire unit be sent to Val Avionics for service.
2. Remove the covers as described in Section 3.1.
3. Remove the main board as described in Section 3.2.2.
4. De-solder J302.
5. De-solder and remove J304.
6. Remove the 12 2-56 x ¼" pan head screws from the transmitter board.
7. Remove the 2 4-40 x ¼" roundhead screws from Q304.

8. Lift the transmitter board from the unit.

3.3 Reassembling the Unit

1. Reverse the disassembly instructions for the modules that have been disassembled.

4 Service and Testing

4.1 Initial Alignment / Return to Service

After completing all necessary maintenance and/or service, the following test procedure is provided to ensure that all AWOS 2000 functions are operating properly.

4.1.1 Test Equipment Required

- A 0 to 30V DC/ 5 amp power supply
- AWOS 2000 installation/mounting harness
- Digital multimeter
- Oscilloscope 20 MHz minimum
- Radio service monitor (IFR 1200S recommended)
- Standard radio headset

4.1.2 Setup

- Pre-set the power supply to +13.75V DC.
- Connect the positive output of the power supply to the red power-in wire on the harness.
- Connect the negative output of the power supply to the black wire on the harness.
- Connect the wiring harness to J101.
- Connect the headset to the microphone and headphone jacks.
- Connect the RF input to the service monitor.
- Apply power to the system.
- Monitor the power and voltage with the digital multimeter and set the power supply to +13.75V DC.
- If unit is not already on set the power switch to turn the unit on.

4.1.3 Transmitter Alignment and Test

- Set the DIP-switches to 118.900 MHz.
- Adjust R427 (Power Adj.) to midpoint.
- Reduce R308 to minimum by turning the flathead screws attached counter-clockwise until you hear a click.
- While monitoring with the digital multimeter with the unit transmitting, increase R308 to 2V by turning the flathead screws clockwise.
- Verify that the current supplied by the external power supply is less than 2 amps.
- Increase R308 until the output power is 2.5 watts at 118.900 MHz. If the voltage from R308 is greater than 4 Volts unit needs service.
- Adjust R423 (Mod %) to 30% with the supplied audio.
- Verify that there are no spurs across the band using a spectrum analyzer.
- When reinstalling at a site, please follow the AWOS 2000 Owners / Operators Manual for final calibration instructions.

Table 1: Rear Connector Pin Functions

PIN TERMINAL	FUNCTION
1	GROUND (AUDIO RETURN)
2	POWER INPUT (+13.75 Vdc)
3	POWER INPUT (+13.75 Vdc)
4	TRANSMITTER KEY
5	GROUND
6	GROUND (KEY RETURN)
7	GROUND
8	No Connection
9	AUDIO IN

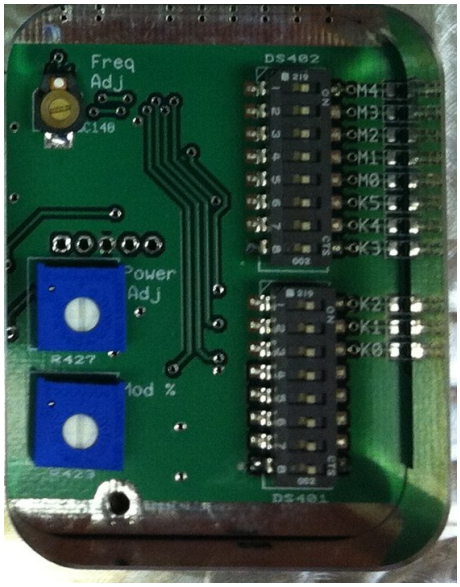


Figure 5: AWOS 2000 Controls

5 Appendix

5.1 Table of Parts

The AWOS 2000 contains no field serviceable parts. Please contact Val Avionics for repair.

5.2 Specifications

Physical Dimensions:	Width: 5.9 inches
	Height: 2.3 inches
	Length: 7.45 inches
Weight	3.0 Lbs.
Voltage:	13.75 ± 0.5 Vdc
Current:	Standby 250 mA; Transmit 2.0 A
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 (50 to 90% Typical)
Temperature Range	-35 to +55 Celsius
Transmit Power:	2.5 watts
Emission	6K 00A3E
Duty Cycle	100%
Design	All Solid State. Printed Circuit Board & Point to Point Wiring.
Mounting	Rigid Mounting, No Shock Mounting Required.
FCC ID	EZN5PRAWOS2000
Unit Part Number	0800202