OPERATION MANUAL
MODEL AR-50V
RF BOOSTER AMPLIFIER

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GENERAL INFORMATION

1.1 Introduction

This manual supports the **Model AR-50V 50 Watt AUTOMATIC BAND SWITCHING POWER AMPLIFIER**. The manual provides general information, installation instructions, and operating instructions.

The Model AR-50V is a turn-key design for use with military communication transceivers (30-175 MHz) to extend the range of communication.

Unit identification is located on the Serial Number Label attached to the side of the amplifier.

1.2 Agency Approval

Not applicable.

1.3 Equipment Required

DC power in, RF in and RF out are the only connections required. It is designed to operate from an external 12V to 36VDC supply including 12V and 24V vehicle operation.

1.4 Safety Considerations

There are no safety concerns in operating this unit.

CAUTION SYMBOLS
This manual contains information and warnings that must be observed when servicing this unit. Where applicable, the following symbols are used in connection with this.

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ESD Sensitive Devices

1.5 Description

The Model AR-50V is a portable, rugged, water resistant, 50 Watt AUTOMATIC BAND SWITCHING RF POWER AMPLIFIER for use with VHF tactical radio equipment that supports legacy, proprietary and emerging waveforms in the 30-175 MHz frequency range. Automatic band switching occurs during operation across the full 30 to 175 MHz band. Harmonic filtering over the 30 MHz to 175 MHz range assures acceptable harmonic distortion levels. Transmission and reception is possible anywhere within the band 30 to 175 MHz

Rated output power is 50 Watts into a 50-Ohm load. Overall transmitter gain ranges from 10dB to 14dB. No tuning, switching, calibration or adjustments are required to operate the amplifier. Protections provide against overheating, excessive VSWR, high level RF input power and DC polarity reversal. The unit does not shut down or bypass when presented with a high VSWR condition as often found on multiband antennas in the 30 to 175 MHz band. The amplifier will be bypassed automatically in case of a system failure, loss of DC power or when the input signal frequency is out of range. The amplifier includes RF sensing, T/R switching, automatic band selection and DC power transient protection.

The amplifier is equipped with tri-color front panel LED indicator. The green will be on when the unit is first connected to DC power and turned on using the ON/OFF switch on the power control, or when the unit is in the active receiving state (not bypass). The LED turns amber when the unit goes into the transmission mode of operation. The LED flashes red when an over temperature condition exists but only after the input signal has been removed from the input (the carrier has dropped to zero). The over temperature alarm condition will cause the amplifier to be turned off until the temperature falls below the alarm threshold. It will resume normal operation once the temperature has fallen. The steady red LED will be activated when the input signal is around 197MHz, this condition places the AR-50V into the bypass mode. The RED LED will remain lit as long as the out of band signal is present at the input to the amplifier.

Detailed LED status is shown below.

Amplifier Mode	LED Status	Unit Status
BYBASS	GREEN when DC “on”	Unit is in bypass; direct RF in to RF out connection
RECEIVE	GREEN	Unit is in receive mode (listening, active)
TRANSMIT	AMBER	Unit is transmitting
OVER TEMP	Flash RED	PA off, bypass
OUT OF BAND	Steady RED	PA off, bypass

The amplifier in encased in a watertight aluminum enclosure. There are four bolting flanges to allow mounting to a flat surface or the optional shock mounting plate. Cooling is by natural convection, but forced air is recommended under elevated temperatures or during higher duty cycle operation.

The amplifier is designed to meet or exceed the requirements of MIL-STD-810F for vehicle mounted systems for humidity, shock and vibration.

1.6 Shipping and Handling Precautions

The AR-50V amplifier is ruggedly constructed of aluminum and will withstand general ground or air transportation shock and vibration without adverse affects to the mechanical and electrical performance. No special precautions are required for shipping. Minimal shock-absorbing material is all that is required for shipment.

1.7 Storage

It is recommended the amplifier be stored in a clean and dry environment. The following environmental limits must be observed in both storage and shipment:

- Temperature: -30 °C to +60 °C
- Humidity: <95% relative

SECTION II
INSTALLATION

2.1 Introduction

This section provides information to unpack and prepare the power amplifier for use.

2.2 Unpack and Inspect

Inspect the shipping box for damage. If the shipping box is damaged notify the courier and AR Modular RF Customer Service and photograph the unopened box for possible insurance claims. Retain the damaged shipping box and all internal cushioning material for inspection until after the amplifier condition and performance have been examined. The shipping box should contain:

- 1 ea. Model AR-50V
- 1 ea. Mating Power/Control Connector PT06A-12-4SSR (or equivalent)

2.3 Preparation for Use

The **Model AR-50V** operates from 12 to 36 VDC and consumes approximately 200 Watts (varies with conditions of operation). DC power is applied via the power connector on the back of the amplifier. Pin assignments are shown in Figure 2-1. Minimum 18 AWG is recommended for 12V (vehicle) operation with as short a length of power supply cable as needed. Power supply cables should be suitably fused at 20A close to the power source to protect the wiring system from short circuits.

PIN NUMBER	FUNCTION	SUGGESTED WIRING
A	+ Battery (12-36VDC)	**16AWG** or more
B	+ Battery (12-36VDC)	**16AWG** or more
C	- Battery (Ground)	**16AWG** or more
D	- Battery (Ground)	**16AWG** or more

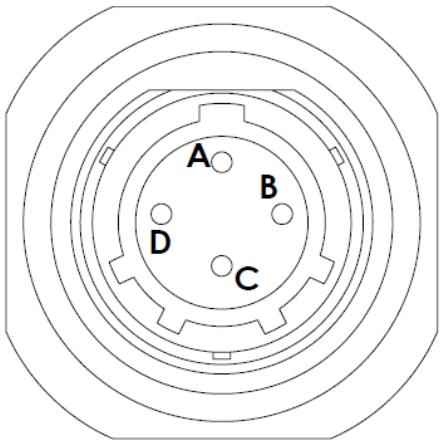


Figure 2-1, Power Connector I/O Functions

2.4 Input / Output Connections

Connections to the amplifier signal input and output connectors must be 50-Ohm. See product datasheet for connection termination types.

INPUT coaxial connection is connected to the exciter transceiver via RG400 or similar coax cable

OUTPUT coaxial connection is connected to the system antenna via LMR400, RG400 or similar coax cable dependent on the length of the connections and the system losses

NOTE: Take care not to transpose the input and output cables. Transmitting into the RF Out will not cause damage, but will prevent proper operation.

2.5 Positioning the Amplifier

The AR-50V is designed to be installed in a communications base or vehicle. There are four mounting flanges that may be used to secure the amplifier with a #8 bolt.

The Amplifier is convection-cooled. For the most efficient passive cooling it should be placed in a position where the integrated heat sink fins are vertical. Amplifier orientation is not critical for forces forced air cooling.

SECTION III
OPERATION

3.1 Introduction

The AR-50V is designed for turn key operation. See below for details.

3.2 Operation

To operate the AR-50V:

Note!
Take care not to transpose the input and output cables. Transmitting into the RF Out will not cause damage, but will prevent proper operation.

1. Connect the amplifier to the DC power source (pay attention to the pin definitions in Section 2.3). Turn on the booster amplifier using the Front Panel ON/OFF switch. The GREEN LED will light to indicate that the unit is correctly connected to the DC power supply and is ready for use

2. Connect the output of the amplifier (marked "**RF OUT ANT**") to a suitable load or antenna

3. Connect a suitable RF source or a transceiver radio to the amplifier input (marked "**RF IN RADIO**"). The input RF power required for normal full output power operation is in the range **3 to 5 watts CW**

4. Keying exciter transceiver will automatically switch the AR-50V to transmit mode and the appropriate harmonic filter will be selected. The AMBER LED illuminates during transmission and will revert to GREEN when the system has un-keyed indicating a normal active Receive mode operation.

   a. Normal CW RF input level for full output is between 3 and 5 Watts depending on the frequency of operation; exceeding 5 watts of input drive level is not recommended.

   b. Overdriving the amplifier wastes power from the primary transceiver and causes additional heating of the booster amplifier and should be avoided if possible.

5. An Over Temperature (OT) condition will cause the unit to go into thermal shut down and switch into Bypass mode. During Bypass the RED LED alarm will flash. Upon cooling, the amplifier will automatically resume normal operation. While in the OT status, RF signals are bypassed from RF IN to RF OUT

WARNING The over temperature switch is set for a 90°C case temperature. The unit will be exceptionally hot before it is ready to go in to bypass mode.

6. Unplugging the DC connector or switching the front panel switch to OFF will force the unit into an RF bypass mode between the input RF connector and the RF OUT antenna port.

3.3 Controls and Connectors

Figure 3-1 shows the control switch, LED, and connector locations.

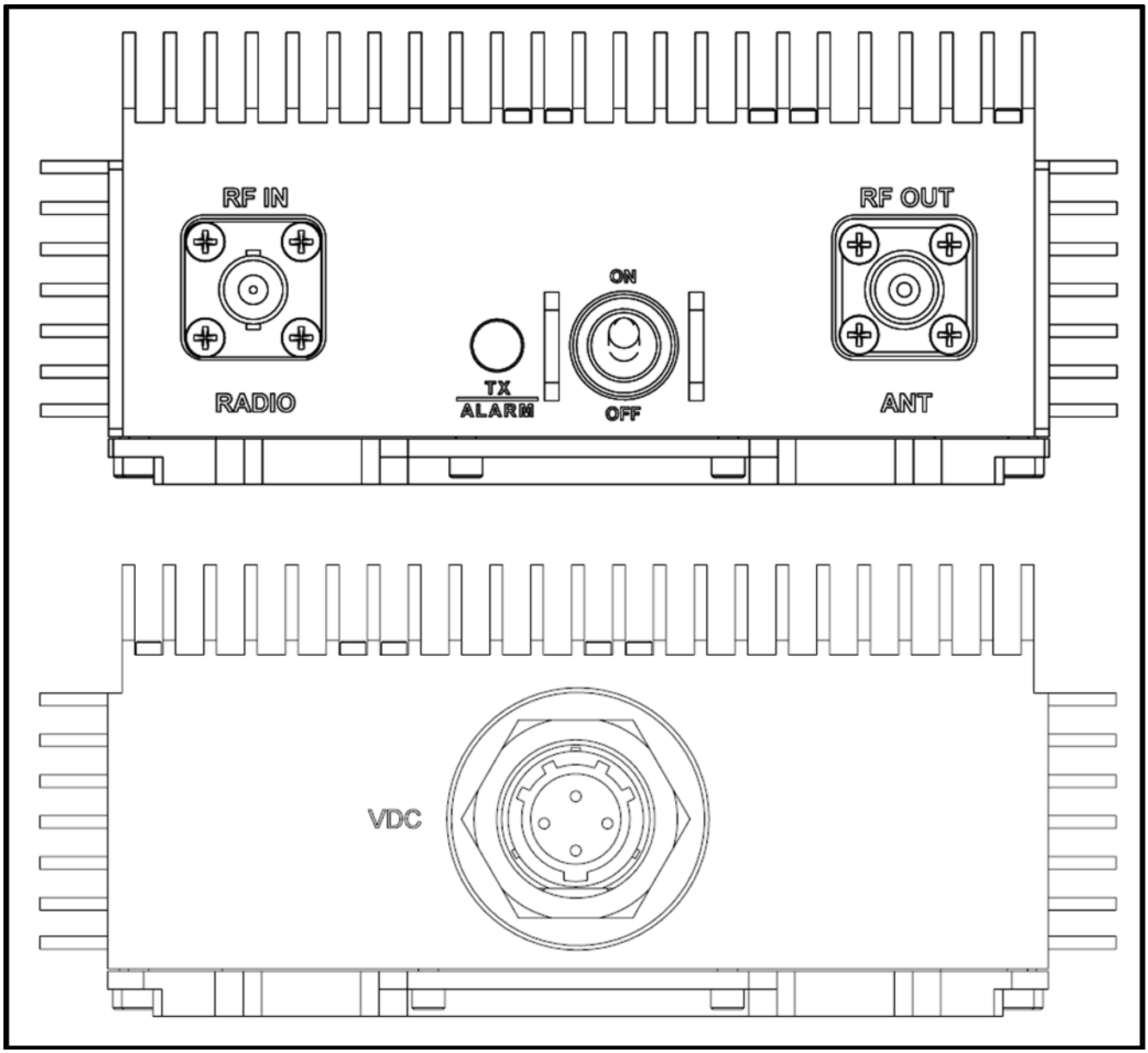
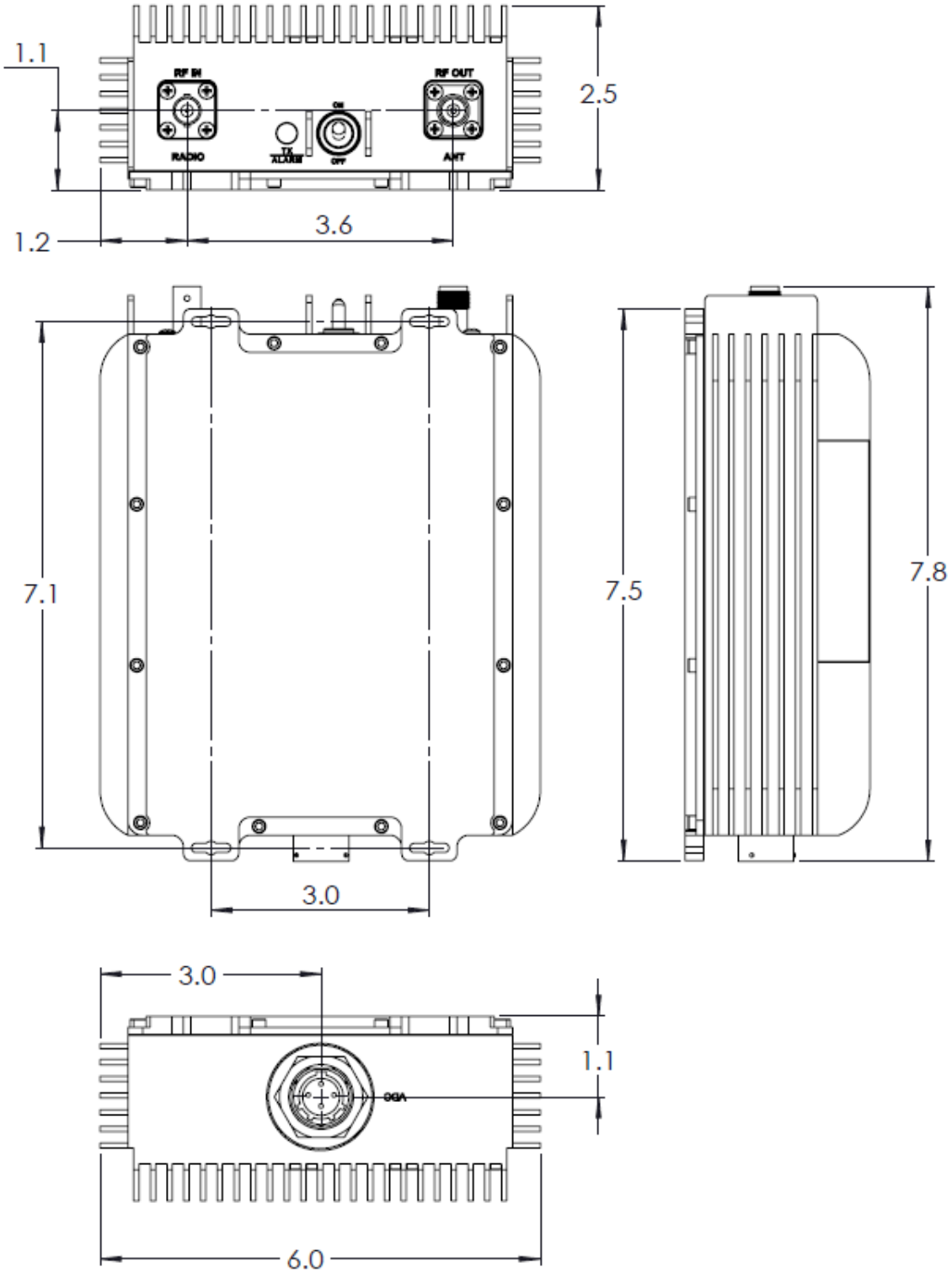


Figure 3-1, Controls & Connectors

SECTION IV
OUTLINE DRAWING



SECTION V
CUSTOMER SUPPORT

System can be returned to the factory for repair by contacting, Customer Service for a return authorization number (RMA). This RMA number must be clearly visible on the outside of the shipping container

For warranty information please refer to AR MODULAR RF Sales Order Terms and Conditions found on AmetekPDS.com

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