OPERATION MANUAL
MODELS AR-50SE / AR-50D / AR-50FE / AR-50K
RF BOOSTER AMPLIFIER

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SECTION I
GENERAL INFORMATION

1.1 Introduction

This manual provides general information, installation, and operation instructions for four **AR MODULAR RF AMPLIFIER MODELS:**

- **AR-50SE/D: 50-Watt PEP, 30-88 MHz T/R Switching Booster Amplifier**
- **AR-50FE/K: 50-Watt PEP, 30-512 MHz T/R Switching Booster Amplifier**

Models **AR-50SE/D** and **AR-50FE/K** are self-contained and are intended to operate from an external DC power supply for use in 12V and 24V vehicles.

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

Models **AR-50SE/D** and **AR-50FE/K** are for use with military communication transceivers (30-88MHz and 30-512MHz, respectively) to extend the range of communication. External DC power must be provided to operate this unit – see product datasheets for specific power details.

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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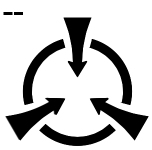


ESD Sensitive Devices

1.5 Description

Models **AR-50SE/D** and **AR-50FE/K** are portable, rugged, water resistant for use with SINCGARS, VHF and UHF tactical radio equipment and support legacy, proprietary and emerging waveforms in the 30-88 MHz and 30-512 MHz frequency ranges, respectively. Automatic band switching occurs throughout the full operating frequency ranges for both models. Harmonic filters assure acceptable harmonic distortion levels. Transmission is possible anywhere within the band 30 to 88 MHz and 30-512 MHz, respectively.

Rated output power for both models is 50 Watts into a 50-Ohm load with typical overall gain in the range of 10 to 14 dB. No tuning, switching or adjustments are required to operate these models. Protection is provided against overheating, excessive VSWR, high level RF input power and inadvertent DC polarity reversal. The models do not shut down or bypass when presented with a high VSWR conditions often presented by multiband antennas in these frequency ranges. The amplifiers 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 Level Control (ALC), DC power transient protection, and auto band switching.

The amplifiers are also equipped with tri-color front panel LED indicator. The LED is GREEN when the unit is connected to DC power and the amplifier is turned ON. The LED is also GREEN when the unit is in the active receive 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 set into bypass mode until the temperature falls below the alarm threshold. Normal operation will resume once unit temperature unit has fallen back below the safe operating limit. For the **AR-50SE/D**, a steady red LED will be activated when the input signal is outside the operating range of the amplifier - this condition places the **AR-50SE/D** into the bypass mode. The LED will remain RED until an in-band signal is applied. The **AR-50FE/K** does not have out of band protection. Operating outside the frequency range of the **AR-50FE/K** is not recommended under any circumstances and can produce undesirable performance that may damage the unit.

Detailed LED status is shown below.

Unit Condition	LED Status	Unit Status
BYBASS	GREEN when DC “on”	Bypass
ACTIVE RECEIVE	GREEN	Active Receive
TRANSMISION	AMBER	Transmission
OVER TEMP	Flash RED	PA off, bypass
OUT OF BAND[1]	Steady RED	PA off, bypass

[1] OUT OF BAND feature exists on the AR-50SE/D only. The AR-50FE/K does not have OUT OF BAND protection.

The amplifiers are constructed out of watertight cast aluminum cases. Cooling is by natural convection. Forced air is recommended during high temperatures or high duty cycle operation.

The amplifiers are 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 power amplifiers are ruggedly constructed of cast aluminum and will withstand general ground or air transportation shock and vibration without adversely affecting the mechanical and electrical performance when commercially accepted packaging practices and materials are employed. No special precautions are required.

1.7 Storage

The power amplifier must be stored in a clean and dry environment. The following environmental limits must be observed in both storage and shipment.

- Temperature: -40 °C. to +90 °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 has serious damage, notify the courier and AR Modular RF Customer Service. If possible, 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-50SE/D AR-50FE/K
• 1 ea. Mating Power/Control Connector PT06E-14-5S(SR)

2.3 Preparation for Use

Models **AR-50SE/D** and **AR-50FE/K** are designed to operate off standard 12 and 24 V vehicle power supplies. DC power is applied via the power connector. Pin assignments are shown in Figure 2-1. Adequate power cable is required – minimum 16AWG recommended for 12 VDC operation – with cable length as short as possible. It is recommended power supply cables are fused at 20A close to the power source to protect the wiring system in the event of a short circuit.

NOTE: Connect the Grounding Stud to the vehicle chassis using 10 AWG (minimum) wire. ***MAXIMUM recommended torque is 8.75 in-lbs.***

PIN NUMBER	FUNCTION	SUGGESTED WIRING
A	+ Battery (12-33VDC)	**16AWG,** minimum
B	+ Battery (12-33VDC)	**16AWG,** minimum
C	- Battery (Ground)	**16AWG,** minimum
D	- Battery (Ground)	**16AWG,** minimum

Figure 2-1, Power Connector I/O Functions

2.4 Input / Output Connections

Connections to the amplifier Radio and Antenna ports require 50-Ohm coaxial cable. RG400 or equivalent is acceptable for the Radio port. Time Microwave LMR400 cable or equivalent is recommended for the Antenna port. Length of cable and acceptable system losses should be considered when choosing cable type. Male RF Coaxial connectors are required to connect to the amplifier RF ports – see product datasheets for connector type specifics.

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

2.5 Positioning the Amplifier

Models **AR-50SE/D** and **AR-50FE/K** are designed to be installed in a communications base or vehicle.

The amplifiers are convection and radiation cooled. For the most efficient cooling, units should be placed in a position where the integrated heat sink fins are vertical. Unit position is less critical when force airflow cooling is available.

SECTION III
OPERATION

3.1 Introduction

Operation of the **Model AR-50SE/D** and **Model AR-50FE/K** requires no special skills and is limited to the description given below.

3.2 Operation

To operate the **AR-50SE/D and AR-50FE/K**:

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 as described in SECTION II, INSTALLATION. Turn on the booster amplifier using the Front Panel ON/OFF switch and the LED will light will be GREEN to indicate that the unit is correctly connected to the DC power supply and is ready for use

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

3. Connect the radio port of the amplifier (marked "**RF IN, RADIO**") to a suitable RF source or a transceiver radio. See product datasheets for rated input RF power levels for normal and safe operation

4. Key the exciter transceiver and the amplifier will automatically select the correct harmonic filter. The **AMBER** LED illuminates during transmission and will revert to **GREEN** when the system has un-keyed indicating a normal active Receive mode operation

5. An Over Temperature (OT) condition will cause the unit to go into thermal shut down and switch into bypass mode The **RED** LED alarm will flash until the temperature drops back to a safe operating level and the amplifier will automatically resume normal operations. While in the OT status, RF signal is bypassed from RF IN (RADIO) to RF OUT (ANTENNA).

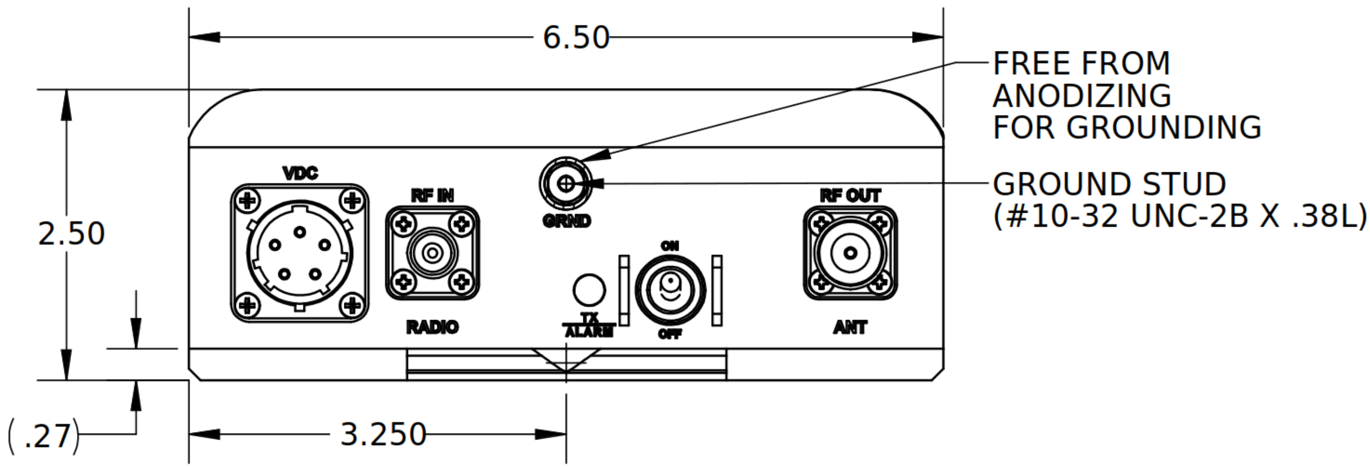
!WARNING! Do not try to test the Over temperature bypass switching function by applying a continuous CW signal. The unit may ultimately be damaged if it is driven by a long, uninterrupted CW signal because the over temp controller will NOT force the unit into a bypass condition until the input signal carrier is removed. Note that the overtemp switch is set at such a temperature that the resulting unit case temperature can be exceptionally hot before the unit is triggered into 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 **RF IN** (Radio) and **RF OUT** (ANT) ports.

3.3 Controls and Connectors

Figure 3-1 shows the general configuration of Control Switch, LED, GND Stud, and Connector Locations on the front panel of the **Model AR-50SE/D** and **AR-50FE/K.** Connector type configurations may vary. NOTE - ***For the ground stud, the MAXIMUM recommended torque is 8.75 in-lbs.***

FRONT VIEW



REAR VIEW

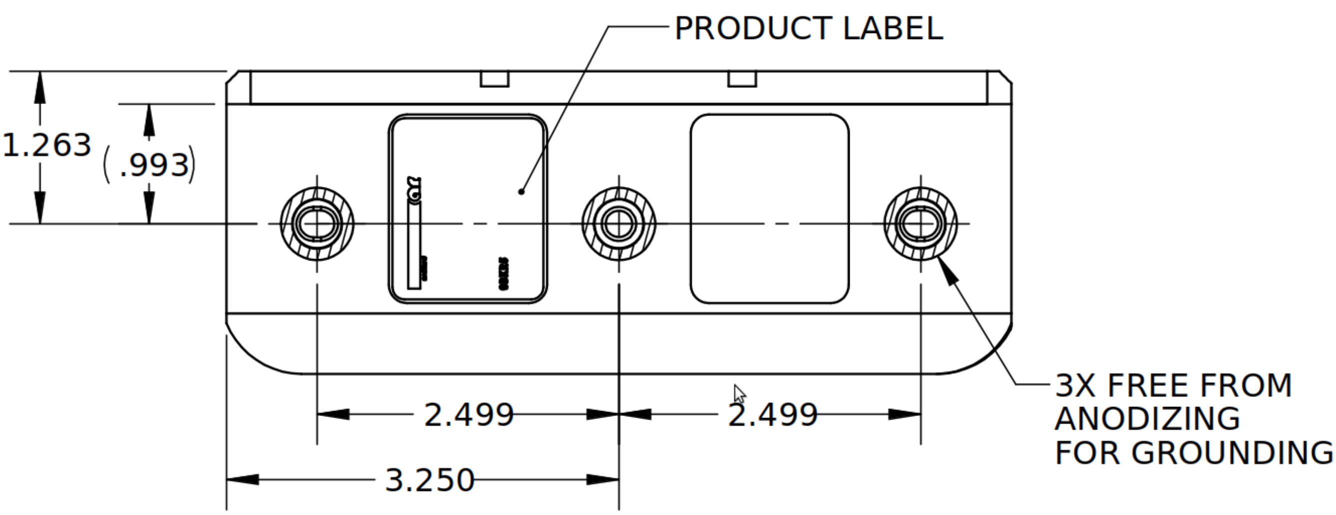


Figure 3-1, Controls & Connectors

SECTION IV
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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