



**VAL AVIONICS LTD**

# **COM 2000**

**VHF Transceiver**



# **Installation and Operator's Manual**

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VAL AVIONICS LTD  
COM 2000 - VHF TRANSCEIVER  
INSTALLATION AND OPERATOR'S MANUAL

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# 1 SECTION I - GENERAL INFORMATION

## 1.1 INTRODUCTION

Thank you for purchasing our COM 2000 – *VHF Transceiver*. Here at Val Avionics Ltd., our core design philosophy is based on the ease of installation and use. The 2000 represents 20 years of refinement in that process, based on the feedback of customers that have used the COM 760. The COM 2000 takes the original idea of the COM 760: a simple to use, reliable, and without the frills of other radios; Overhauled and incorporating new and exciting features.

That design philosophy translates into the ease of installation and simple operation makes the COM 2000 – *VHF Transceiver* a communication solution for a wide variety of aircraft panels, from the Homebuilt through heavy twins. The COM 2000 satisfies the need for compact, fully intergraded, quality radio that can be counted on to provide years of reliable service.

Before installing and /or using your new COM 2000 please read this manual completely. This will ensure proper installation and familiarize you with all of the features your COM has to offer.

## 1.2 SCOPE

This manual will provide detailed information about the installation and operation of the COM 2000 – *VHF Transceiver*. It will also provide equipment limitation information and instructions for continued airworthiness.

## 1.3 EQUIPMENT DESCRIPTION

The COM 2000 has been designed for simplicity. It is straight forward to install and operate. Using state of the art technology Val Avionics Ltd. has created a radio that will provide the pilot with simple and easy to operate communications.

The COM 2000 also has an enhanced display that features both active and standby frequency displays. As an added feature from the classing COM 760, the unit now features non-volatile memory for both the active and standby frequencies. No longer do you need a memory power line to maintain your frequencies. Also included is a revolutionary 15 channel quick access memory (The largest in the industry). The display also incorporates the latest in high intensity LED technology which provides excellent view ability even in direct sunlight.

The unit's controls have been designed for simple user interface. The concentric knobs on the right side of the unit select the standby frequency, with a push button flip-flop to load the standby frequency into the active window. The inner concentric knob on the left side of the unit selects the volume. The outer left knob controls the squelch allowing a pilot to quiet noisy channels, or receive weak signals, all from the twist of a knob. The push button on the left side knob set lets the user select a previously stored channel in memory. A long push of the left button will power the unit down.

The COM 2000 has one internal receiver. The internal receiver operating from 118.00 MHz to 137.975 MHz. This receiver is capable of receiving down to 2 $\mu$ V with a 6dB signal to noise ratio.

The COM 2000 has many audio inputs and outputs to facilitate any installation. The unit has 2 capacitively coupled audio inputs for adding a Nav receiver audio output or other such audio device. The COM also has a 5W speaker output and 50mW headphone output.

## 1.4 SPECIFICATIONS

**Table 1: Specifications**

SPECIFICATIONS	CHARACTERISTICS
Environmental:	(RTCA/DO160D)
Physical Dimensions:	
Height	1.0 inches ( cm)
Width	6.25 inches ( cm)
Depth	9.0 inches ( cm)
Weight:	3.25 pounds (1.5 kg)
Mounting:	Panel mounted, no shock mounting required
Temperature Range:	-20 to +55 Celsius with short time operations at +70 Celsius
Power Requirements:	
Voltage	11.0 to 30.0 VDC
Current	0.5 Amp Rec. 2.5 Amp max transmit
Receiver:	
VHF Frequency	118.00 to 136.975 MHz
Sensitivity	2 $\mu$ V to provide a 6dB S+N:N
Channel Spacing	25 kHz
Stability	$\pm$ .002%
Selectivity	$\geq$ 60dB
Audio output	5W to 4 $\Omega$ Spk 50mW to 600 $\Omega$ Phone
Marker Receiver	75 MHz
AGC Characteristics	From 10 $\mu$ V to 200 $\mu$ V the audio level will not vary more than 3db.
Transmitter:	
Carrier Power	8W nom. RMS
Duty Cycle	50%
Manufacturer's Model Number	<b>INS 429</b>
Part Number	VPN 0800101-1

## 1.5 EQUIPMENT SUPPLIED

**Table 2: Equipment Supplied**

QTY	DESCRIPTION	PART NUMBER
1	COM 2000 – 760 Channel Radio	<b>0800105</b>
1	INSTALLATION KIT	<b>651002</b>

## 1.6 EQUIPMENT REQUIRED BUT NOT SUPPLIED

**Table 3: Equipment Not Supplied**

QTY	DESCRIPTION	PART NUMBER
1	Circuit Breaker 5 amp	Potter & Brumsfield W58-2 (Ref VPN 0331005)
1	Aircraft Cabin Speaker	Ref aircraft parts manual for specific part number
1	Contact Crimping Tool w/ Positioning Tool	AMP P/N 601966-1 AMP P/N 601699-5

## 1.7 LICENSE REQUIREMENTS

None

## 2 SECTION II - INSTALLATION

### 2.1 GENERAL INFORMATION

#### 2.1.1 Scope

This section of the manual will provide the needed information to successfully complete the installation of your new COM 2000 – *VHF Transceiver*. Please read this section completely before proceeding with the installation process. Although the COM 2000 installation procedures are designed with the do-it-yourselfer in mind, we at Val Avionics Ltd. strongly suggest that you seek the advice of a qualified avionics installation facility before beginning this or any other installation project. Qualified avionics installation technicians can offer good advice as to time-tested installation practices and techniques that can save you many hours of time and frustration.

### 2.2 UNPACKING AND INSPECTION

Use care when unpacking the equipment. Inspect the unit and supplied parts for visual signs of damage during shipment. Examine the unit for loose screws, dents, broken buttons and other signs of damage that may have occurred during shipment. Verify the contents of the container with the list in section 1.5. If any damaged or missing parts are discovered during the inspection save the shipping material and contact the freight carrier to file a claim. If it is suspected that parts were omitted from the container please feel free to contact Val Avionics Ltd., to acquire the missing items.

### 2.3 EQUIPMENT INSTALLATION PROCEDURES

#### 2.3.1 Cooling Requirements

Forced air-cooling is not required for the COM 2000 – *VHF Transceiver*. However, when planning the location for mounting, ensure adequate spacing from heat producing sources such as heating or defrosting ducts.

#### 2.3.2 Mounting Requirements

The COM 2000 mounting tray should be rigidly mounted in the avionics stack using the hardware provided in the installation kit. Ensure that the mounting location will provide easy access and a clear view of the equipment's front panel from the pilot's position. Ensure that the mounting position will provide adequate clearance between the unit and the associated wire harness and the aircraft controls. Bracing at the rear of the unit should be installed to ensure rigidity in the panel. Consult FAA Advisory Circular AC 43.13-2A for acceptable practices and techniques.

### 2.3.3 Wire Harness Fabrication

Val Avionics Ltd. has provided a basic factory fabricated wire harness (VPN 751027) with your new COM 2000 – *VHF Transceiver*. Use of the factory fabricated wire harness will ensure proper operation of the COM 2000, reduction in the occurrence of interfering signals and ground loops, greatly reduced installation time, and provide prolonged trouble-free performance of your new equipment.

Although strongly recommended, it is not required to use the factory fabricated wire harness when installing the COM 2000. A wiring harness can be fabricated in the field. Refer to appendix B of this manual for a complete wiring diagram. The COM 2000 is connected to the aircrafts avionics bus via a 5 AMP circuit breaker. All wires must be 22 AWG MIL-SPEC, unless otherwise noted in accordance with current regulations. Two and three conductor shielded MIL-C-27500 or equivalent wire must be used where indicated. Use AMP Contact Crimping Tool (AMP P/N 601966-1) with Positioning Tool (AMP P/N 601699-5) or equivalent to ensure good quality contacts. Refer to FAA Advisory Circular AC 43.13-2A for acceptable practices and techniques.

### 2.3.4 COM 2000 Installation

#### 2.3.4.1 Mounting

The COM 2000 is rigidly mounted in the aircrafts avionics stack. Once a location has been selected, a visual inspection should be made of the area directly behind the panel which, will be occupied by the COM 2000 and harness assembly for obvious obstructions such as heater ducts, control cables, fuel and oil lines or any other obstruction. Pay particular attention to the control yoke assembly. It should be moved to the full limit of travel and verified that sufficient clearance exists prior to beginning installation. Most aircraft instrument panels will already have existing radio mounting cutouts. If the location you have selected requires that a mounting hole be cut, refer to Figure 4: Panel Cut Out on Page 15 for the mounting template. Mark and cut the mounting holes as required.

Position the unit's mounting tray in its upright position, and from the rear of the panel. With the unit held in place, insert the two of the supplied 6-32 X 3/8" screws from the front and tighten as appropriate. The installing agency must fabricate and attach rear support brackets to the aircraft structure behind instrument panel as appropriate to support the rear of the COM 2000. Then, attach these brackets to the provided attachment points on the rear of the unit with the supplied 6-32 1/4" Screws.

#### 2.3.4.2 Antennas

One antenna is required for the COM 2000 installation. A standard COM antenna can be used with the unit such as a COMANT CI-121 or equivalent. Follow the antenna manufacture's installation Manual to ensure proper installation of the antenna.

#### 2.3.4.3 Audio

The COM 2000 has two auxiliary audio inputs and two audio outputs, Speaker audio and Headset audio. In installations with two radio and/or more audio devices, it is strongly recommended that these audios be coupled to a quality audio selector panel such as a Val Avionics AP 100. For complete details, refer to the interconnect wiring diagrams in Appendix B.

## **2.4 POST INSTALLATION CHECK**

### **2.4.1 Operational Check**

Refer to section three of this manual. Check all functions of the COM 2000 for proper operation. Check the operational functions of other equipment installed in the aircraft in accordance with the individual manufacture's operation manuals to insure that no cross interference exists as a result of this installation.

### **2.4.2 Final Inspection**

Verify that the wiring is bundled away from all controls and that no part of the installation interferes with the movement of the aircraft controls. Move all of the aircraft controls through their full range of movement while visually verifying that the installation does not mechanically interfere with the control movement. Verify that the wiring harnesses are properly secured to the aircraft structure in accordance with accepted practices as described in AC 43.13 and that adequate strain relief and service loops have been provided. Ensure that there are no kinks or sharp bends in the wire harnesses. Verify that the wire bundles are not exposed to any sharp or abrasive surfaces. Complete log book entries, FAA form 337, weight and balance computations and other documentations as required.

## **2.5 LIMITATIONS**

There are no known limitations to the operation of the COM 2000. Instructions for Continued Airworthiness and Return to Service Instructions can be found in Appendix C.

## 3 SECTION III - OPERATION

### 3.1 GENERAL INFORMATION

#### 3.1.1 Scope

This section will provide detailed operating instructions for your new COM 2000 – *VHF Transceiver*. Please read this section completely to become familiar with all of the features of the unit.



Figure 1: Unit Controls

#### 3.1.2 Display Functions

Upon power up the unit will display initialization codes. After initialization, the unit will display an active and standby frequency represented by “Axxx.xxx Sxxx.xxx” with the x’s representing the frequency. The first frequency starting with the “A” is the active frequency, and the “S” is the standby frequency. When the unit is transmitting the “A” will be replaced with a “T” to represent active transmit. When the unit is selecting a memory station, the “A” and “S” will no longer be visible and the active portion will contain the seven-character description and the standby will contain the frequency associated with the description.

#### 3.1.3 User Controls

Refer to Figure 1: Unit Controls. The user controls consist of two sets of concentric rotary knobs. Both sets of knobs contain three parts, the inner knob (the small one) the outer knob (the large one) and a momentary push button (the end of the small knob). The left outer inner knob controls the squelch as well as the position of the cursor in memory edit. The left inner knob controls the volume, allows for selection of a stored memory, and selects characters in memory edit. The right knobs control the frequency, whether it is the standby frequency or entering the memory frequency.

##### 3.1.3.1 Turning the unit on/off

To turn the unit on, momentarily press the left hand inner knob. The unit will go through a short initialization routine at start up and then begin operation at the same settings that were loaded at the last power down. To turn the unit off, press and hold the left inner knob for three seconds.

### **3.1.3.2 Setting Active and Standby Frequency**

The knob functions of the right hand set are as follow; the inner knob will change the frequency by KHz or the numbers to the right of the decimal point (118.**125**) in 25kHz increments. The outer knob will change the frequency by MHz or the numbers to the left of the decimal point (**119**.125) in 1 MHz increments. Only the frequency in the standby position will change. The standby frequency is displayed at the bottom on the left side of the display and is identified by the letter “S” to the left of the frequency (**S**108.15). To load the standby frequency in to the active position, momentarily press on the inner knob. This will swap the standby frequency with the active frequency. The active frequency is identified by the letter “A” at the left of the frequency display (**A**118.125).

### **3.1.3.3 Changing the Volume**

Rotating the left hand inner knob controls the receiver’s audio volume. “VOL” will be displayed in the standby frequency display and the volume level is indicated by the numeric value after “VOL” (i.e. “VOL **15**”). The volume level can be adjusted from **0** to **20** by rotating the left hand inner knob. Normal display operation resumes after 2 seconds.

### **3.1.3.4 Changing the Minimum Received Signal Level (Squelch)**

Rotating the left hand outer knob controls the receiver’s internal signal strength cutoff (Squelch). “SQL” will be displayed in the standby frequency display and the volume level is indicated by the numeric value after “SQL” (i.e. “SQL **15**”). The squelch level can be adjusted from **OFF** to **20** by rotating the left hand inner knob. Normal display operation resumes after 2 seconds.

### **3.1.3.5 Selecting a Stored Memory Station**

A quick push of the left hand knob enters the stored station retrieval. If no memory stations are available, the display will show “NO MEM” and return to normal operation. Rotating the inner left hand knob scrolls through the previously entered memory stations. In the left side (previously the active display) the pre-programmed label will be shown, and the right side (previously the standby display) will show the associated frequency. Once the desired frequency is displayed, a quick push of the left hand knob will cause the selected frequency to be loaded into the Standby window and the unit will return to normal operation. To exit without selecting a memory frequency, just wait 5 seconds without twisting any knob and the display will return to normal, or push the right hand knob to exit instantly.

### **3.1.3.6 Entering / Editing / Deleting a Stored Memory Station**

Val Avionics does not recommend entering or editing stored frequencies in flight. Doing so can be a distraction to the pilot.

#### ***3.1.3.6.1 Selecting a stored frequency to be created / edited /deleted***

By pushing both left and right buttons, the unit will enter the stored frequency edit select mode. If there are no frequencies entered, or the unit is selecting an open memory slot, the unit will show no text in the active window, and the standby will display “<EMPTY>”. When adding a new frequency, rotate the inner left knob until the display shows “<EMPTY>”. To edit a currently existing frequency, rotate to the frequency / station label that is to be edited.

### ***3.1.3.6.2 Creating / Editing a stored frequency***

Depress the left hand button to enter the edit mode, which is characterized by a blinking cursor at the leftmost position of the label text. By rotating the left inner knob, a new character can be selected for the memory location. By rotating the left outer knob, the position of the cursor can be changed. Once the label has been entered, rotating the right knobs will allow for the frequency to be selected. When the data is entered as desired, pressing the left hand button will exit the edit mode and return to the previous state. If desired, additional frequencies can be edited or added by repeating the above steps.

### ***3.1.3.6.3 Deleting a Stored frequency***

Once the undesired frequency has been selected (see 3.1.3.6.1), press the right hand knob. A confirmation will appear in the Standby window, rotate the left hand inner knob to select “Y”, and press the right hand knob to confirm. This deletes the stored information.

### ***3.1.3.6.4 Exiting the stored frequency editing functions***

To exit and return to normal operation, pressing both buttons will return to normal operation.

## **3.2 System Configuration**

### **3.2.1 Accessing Setup Functions**

During startup, the unit's setup can be assessed by pressing both buttons simultaneously until the unit shows an active frequency and “MicG xx”. In this mode, the Microphone Gain and Sidetone values can be configured. In this mode, the unit will transmit and receive any frequency that is located in the active window and the frequency knobs (right hand inner and outer) will directly control the active frequency. The left hand inner knob adjusts the Microphone gain, and the left hand outer knob adjusts the Sidetone. To exit this mode and resume normal operation, press both buttons simultaneously.

## 4 SECTION IV - WARRANTY AND SERVICE

### 4.1 LIMITED WARRANTY

The equipment delivered with this Standard Factory Warranty is manufactured by Val Avionics, Ltd. and is guaranteed against defective materials and workmanship for one year from date of original retail purchase. Any unit found to be defective due to material and workmanship during the warranty period will be repaired or replaced at the sole discretion of Val Avionics Ltd.

Val Avionics, LTD liability under this warranty is limited to servicing, repairing or adjusting any equipment returned prepaid to the Val Avionics' factory by express written or verbal authorization for that purpose and to repair or replace defective parts thereof.

If, upon examination, it is determined that a malfunction has been caused by misuse of the equipment, installation or operation not in accordance with factory instructions, accident or negligent damage, alterations of any manner, and repair by other than the factory, the repairs will not be covered under the warranty. In such cases, an estimate will be submitted for approval before repair is initiated. In most cases, Val avionics, Ltd. will provide 72-hour turn around on its warranty and repair service. We recommend that contact be made with the FACTORY CUSTOMER SERVICE DEPARTMENT prior to any unit return and obtain RETURN AUTHORIZATION AND INSTRUCTIONS. This will provide proper control and expedite service.

Val Avionics, Ltd. reserves the right of continuous product development without obligation to install changes in previously manufactured products.

Installation of Val Avionics, Ltd. products must conform to methods acceptable by the Federal Aviation Administration as described in the appropriate Federal Aviation Regulations (FAR's) and Advisory Circulars (AC's).

To ensure proper warranty registration, type or print clearly the application information on the enclosed PRODUCTS WARRANTY REGISTRATION FORM and return to Val Avionics, Ltd.

### 4.2 SERVICE

Repair service for the INS 429 *Integrated Navigation System* is available at our manufacturing facility. Units in need of servicing should be returned prepaid to Val Avionics Ltd at the following addresses.

**If you are shipping by the US Postal Service** address To:

Val Avionics  
P.O. Box 13025  
Salem, OR 97309

**If you are shipping by FedEx, UPS** or other shipping company, address to:

Val Avionics  
3280 25<sup>th</sup> ST SE  
Salem, OR 97302

## 5 Appendix A – INSTALLATION DRAWINGS AND CONNECTOR LAYOUT

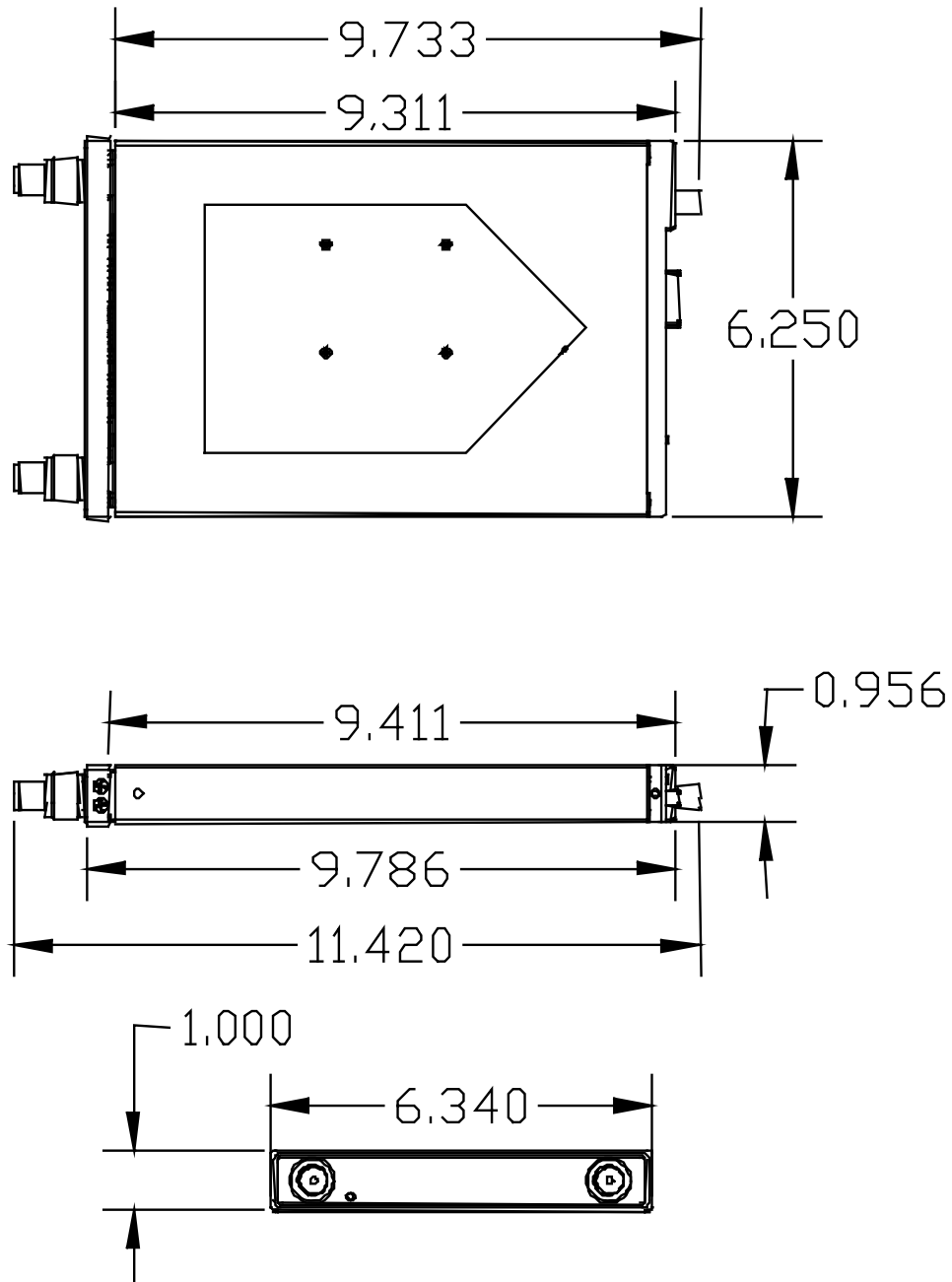
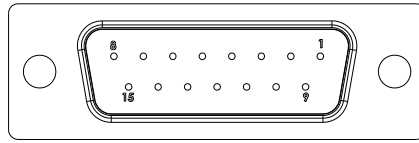
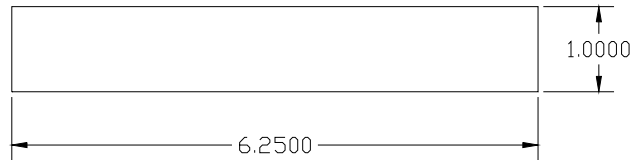


Figure 2: Physical Dimensions

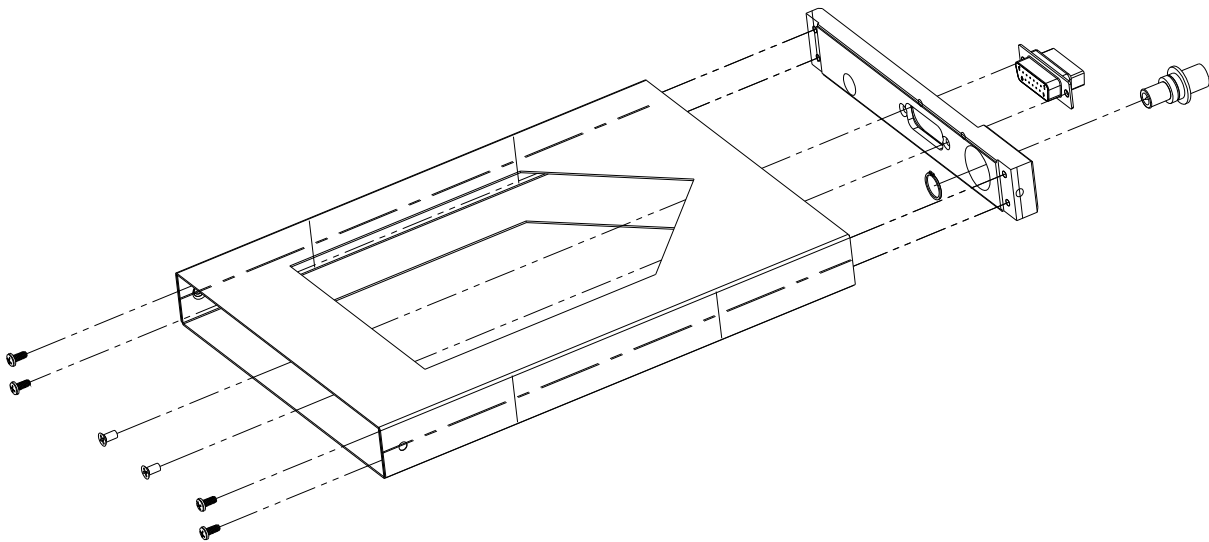


**Figure 3: P1 Connector Pin Out**



(Drawing Not to Scale)

**Figure 4: Panel Cut Out**

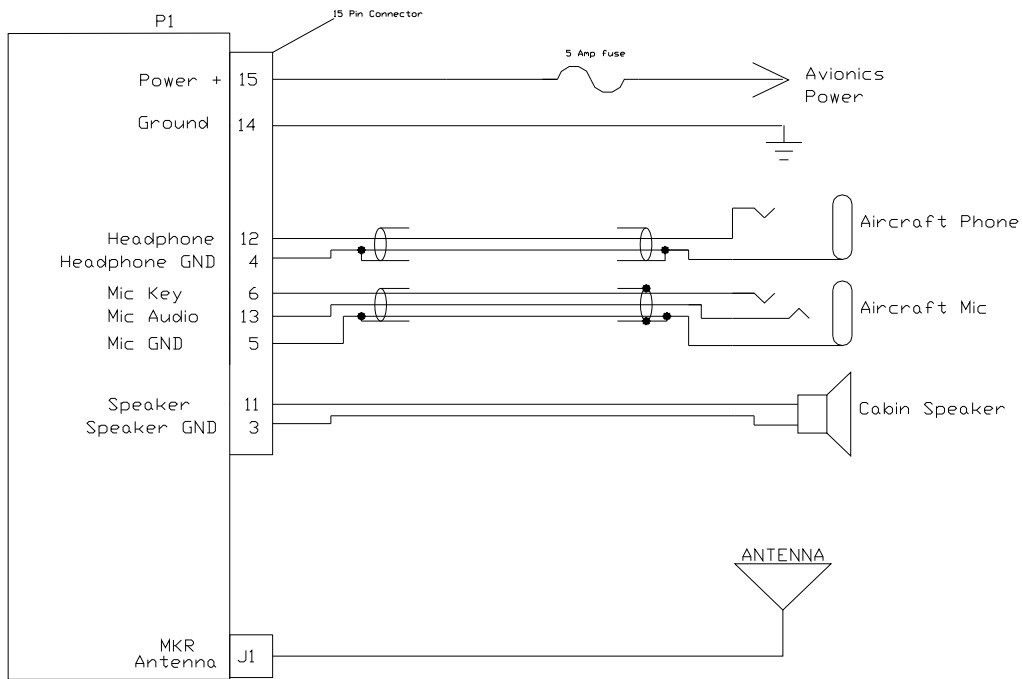


**Figure 5: Mounting Tray Assembly Exploded View**

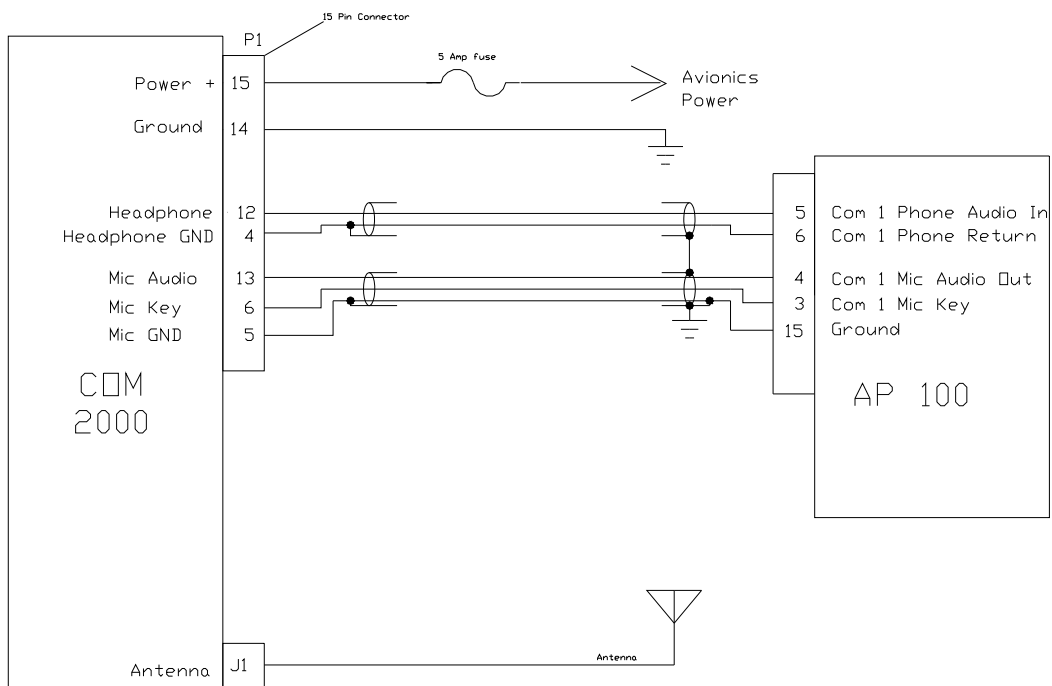
**Table 4: Rear Connector Pin Functions**

Pin	Function	I/O
1	Future Expansion	Output
2	Aux In 2	Input
3	Speaker Ground	
4	Headphone Ground	
5	Mic Ground	
6	Key	Input
7	Aux Ground	
8	Main Power	Input
9	Future Expansion	Input
10	Aux In 1	Output
11	Speaker	Output
12	Headphone	Output
13	Mic Audio	Input
14	Airframe Ground	
15	Main Power	Input

## 6 Appendix B – WIRING DIAGRAMS



**Figure 6: COM 2000 Basic Wiring Diagram**



**Figure 7: Interface with AP100**

## 7 Appendix C – INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

### 7.1 MAINTENANCE INSTRUCTIONS

Maintenance of the INS 429 Integrated Navigation System is on condition only. **No periodic maintenance is required.** VOR calibration, in accordance with 14 CFR 91.171, is required to be checked every 30 days. If unit is found to be out of calibration, send unit in for service. If unit is removed for service, upon re-installation perform Post Installation check as described in section 2.4 of this manual.