



# WIRELESS AVIATION HEADSETS

**SkySports**  
INNOVATIONS

...improving life in the open cockpit

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### **Caution**

No internal changes to the equipment may be performed or this could void the user's authority to operate the equipment.

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# 1. INTRODUCTION

## 1.1. About This Manual

The main purpose of this manual is to provide information to ensure the optimum use and performance of the EQ1 Wireless Communications system.

It also provides advanced information for users who require extra functions other than those supplied “out of the box”.

## 1.2. Glossary of Terms

VOX	Voice Operated Switch <i>This is a mechanism whereby the voice sounds trigger an electronic switch to turn a circuit on, usually it links the microphone to the transmitter or other headsets.</i>
SIDE TONE	<i>This is the small amount of your own voice that you hear in your own ears when talking.</i>
ANC	Active Noise Cancellation <i>This process used electronic circuits to reduce the sounds that you hear in your own ear.</i>
Hz	Hertz (measure of frequency)
ID	Identification
kHz	Kilohertz (measure of frequency)
MHz	Megahertz (measure of frequency)
PSU	Power Supply Unit
PTT	Press To Talk
DSP	Digital Signal Processor

## **2. FUNCTIONAL OVERVIEW**

Thank You for purchasing the EQ1 system.

The EQ1 Wireless Communications system is a state of the art audio communication device specifically designed for Aviation headset applications in high noise open cockpit aircraft.

The EQ1 Headset is an extremely compact and includes re-chargeable batteries and active noise cancelling circuits for optimum listening pleasure. The headset features only essential controls to ensure ease of operation. Advanced configuration and operations can be accessed using the simple voice menu controls.

The development of the EQ1 Wireless Communications system represents a significant breakthrough in the field of high noise communications without wires. For the first time, pilots have access to a product which is affordable, yet offers a very high grade of voice and active noise performance and yet is very simple to use.

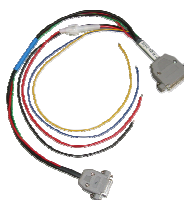
The technical specification of the EQ1 will enable reliable communications up to distances of 10 meters, depending on conditions. In addition, the EQ1 transceiver incorporates superior signal handling capability, which ensures excellent reception even in the most crowded radio environments.

In short, this revolutionary new system incorporates the very latest in RF design technology, making the EQ1 the most compact, versatile, high performance Headset communications solution available in the commercial market today suitable for high noise open and closed cockpit applications.

## 2.1. System Features

*The system includes the following functionality:*

- Full voice annunciation system for ease of user interface navigation and control.
- Individual Headset Volume and VOX controls to suit the user.
- Voice priority of programmed headset (Pilot, Co-Pilot, Passenger).
- Peer to Peer Operation for use without Base Controller.
- Auto Muting of Auxiliary audio inputs during VHF reception.
- Auto VOX open on PTT for no loss of voice conversations.
- Wireless PTT for ease of installation in Aircraft.
- Optional MP3/Cell Phone Interface.



### 3. BASIC OPERATION

The EQ1 uses a simple '**PRESS**' and '**ROTATE**' system to navigate through the various settings using the multi function knob on the left side of the headset.



#### 3.1. Turning ON and OFF

To turn the headset **ON** press and hold the knob for 2 seconds you will be 'introduced' to the headset, and hours of life remaining.

You will then hear an audible beep every 5 seconds until a base unit is located. The Base unit that is nearest your headset will be the first to be locked onto. Optionally the base controller identification may also be spoken to you, in normal cases this is the aircraft type and registration ID.

If this option is programmed and not the same as your headset then you have an option to release from this base and search for another. The instructions to confirm selection are spoken to you.

If no base unit is found, the unit will automatically turn off after 2 minutes.

To turn the Headset **OFF**, press and hold the knob, a count down will then be initiated. (3.....2.....1... Battery xx Hours)

When the message "**HEADSET OFF**" is heard the knob can be released.

## 3.2. Volume Adjustment

The volume is adjusted by rotation of the knob, to increase rotate clockwise and to decrease wind anti-clockwise, the level setting will be spoken to you. The volume will always start at a level of 4 to avoid large sounds on turn on in your ear.



Increase and decrease by rotation and listen to the spoken indicator.

### 3.3. VOX Adjustment

The digital VOX system is used to turn off or close the microphone on each headset, this in turn stops noise being transmitted to other headsets and the VHF Aircraft radio when no conversations are taking place. This also helps reduce noise in the operators headset due to increased side tone.

The VOX value is adjusted in the voice menu system, this is accessed by pressing the knob 3 times, just like mouse clicks on a computer.



**PRESS 3 TIMES**

The Headset will then speak “**MENU MODE**”.

When this is performed the Headset enters the Voice Menu System, if no more actions take place then the headset will exit the menu system after 10 seconds.



Rotate the knob for:

**“VOX SETTINGS, CONFIGURATION and ADVANCED”**



Press knob to confirm the menu selection.

When in the VOX Menu the knob can be rotated to select the value and sensitivity of the VOX circuits, a higher number means a louder voice is required to activate the VOX system.



**“ONE, TWO, THREE.....TEN”**



When the desired VOX setting is reached press the knob to save and confirm the setting.

The Headset will then automatically leave the menu system and return to normal operation.

## 4. ADVANCED OPERATION

When in the voice menu system more advanced options can be configured, these include headset type, configuration and Base Controller Programming.

### 4.1. Headset Type

Enter the programming voice menu as above.



*Rotate the knob for:*

***“CONFIGURATION”***



*Press knob to confirm the menu selection.*



*Rotate the knob for:*

***“MASTER, PILOT, CO-PILOT and PASSENGER”***



*Press knob to confirm the menu selection.*

When in MASTER Mode the headset acts like a Base Controller and can communicate directly with other headsets. We call this PEER to PEER mode. This can be used when headsets need to talk directly and no other transmissions are required on other equipment such as VHF Radio.

When in PASSENGER mode the headset functions as per normal until the VHF radio PTT is activated, in this case the Passenger Microphone is muted so that any conversations by the passenger is not sent on the VHF Radio.

## 4.2. Base Programming (optional)

Enter the programming voice menu as above.

See details in section 9 for flow operation.

***NOTE: Only a Headset Configured to “PILOT” has this programming ability to update the BASE CONTROLLER.***

This programming is optional and is only used to distinguish aircraft from each other in busy situations or close start up proximity. It can also be used as a comfort factor that you are locked onto the correct Base Controller.



*Rotate the knob for:*

***“ADVANCED”***



*Press to confirm the menu selection.*



*Rotate the knob for:*

***“AIRCRAFT TYPE, Registration Set 1 to 4 and PROGRAM”***



*Press to confirm the menu selection.*

When in the AIRCRAFT TYPE menu rotate the knob to best describe your aircraft and press the knob to confirm your selection.

Use the ***Registration Set 1 to 4*** menu options program the last 4 digits of your aircraft registration.

Use the PROGRAM menu to update and confirm the settings to the Base Controller, YOU MUST BE Locked onto the base controller you wish to update at this time. Any headset can be configured, but only the pilot will remotely update the Base Controller.

## **5. SYSTEM FUNCTIONS**

### **5.1. Base Controller**

The Base Controller is the heart of your headset system and connects the headsets and provides the interface for your radio system.

The Base Controller supplies switched power to your aircraft VHF radio, and also controls when it turns its own power off. This will occur 2 minutes after the aircraft ignition is turned off. This time is so that the headsets and VHF radio remain active to enable disembarkation from the aircraft with the headsets active.

### **5.2. Remote Wireless PTT**

Your system is supplied with one wireless PTT controller, additional Wireless PTT's can be purchased and a maximum of 4 Wireless PTT modules can be added to your system. Each PTT is individually coded so that it will not operate the PTT on other aircraft in the area. If a new PTT is to added into the system then the new device must be "paired" with the Base Controller for it to function.

The "paring" process can only take place within 15 seconds of the Base Controller being turned on from a cold start.

To pair a new PTT, turn the Aircraft power on so that the Base Controller becomes active and within the start up period of 15 seconds press the new PTT at least 10 times. After this the new PTT will become registered and function in your system.

The wireless PTT's have been designed for over 1 million key presses, in the advent of the battery going flat a voice announcement will take place on every PTT press. In this event the PTT needs to be replaced.

Remember that the Base Controller takes 2 minutes to turn fully off when the Aircraft ignition is turned off. You must wait this time for a cold start. You can determine this as the VHF radio is turned off by the Base Controller at this time.

### **5.3. Wired PTT**

The Base Controller is supplied standard with the VHF wired PTT input, this can be switched to any convenient ground point on the Aircraft for activation.

Additional inputs and outputs are provided for an auxiliary radio system to run in parallel with the VHF system.

The VHF radio system has override priority and will mute all other inputs when a signal is detected on this input.

All PTT signals have a stuck PTT timer that will release the PTT to the VHF radio if any PTT switch gets held ON more than 15 seconds.

### **5.4. MP3 or Cell Phone Interface**

The Base Controller has additional inputs suitable for Cell or MP3 type connections, these are available on AUX1 and AUX2 inputs and outputs. In addition MP3 or Cell can be connected with the optional cable to each headset.

AUX1 is used for Cell Phone Interface

AUX2 is used for MP3 type interface

Note:

During VHF reception AUX1 and AUX2 are muted to the headsets.

During Headset VOX operation AUX2 is muted to the active headset.

## **6. INSTALLATION**

The EQ1 system is supplied with a standard cable to suit XCOM or Micro-Air VHF radio's, other cables or adaptor harnesses are available from the manufacturer to suit other VHF Radio Types.

Only 3 wire connections are needed to complete the installation, these are battery positive (RED), battery negative (BLACK) and an ignition feed (YELLOW) from the master switch or ignition circuit. The DB15 harness is also plugged into the VHF Radio.

If the wireless PTT is to be used, then no other connections need be made. If a hard wired PTT is already fitted then this can be connected to the "BLUE" PTT in wire. The other side of the PTT switch should be connected to ground in a suitable location.

The EQ1 Base Communications module comes with double sided Velcro, and can be positioned in a convenient location as required and out of the way.

Ensure that the locating screws are tight on both the DB15 (VHF Radio) and the DB25 (Base Controller).

YOUR INSTALLATION IS NOW COMPLETE.....

## 7. HEADSET CHARGING

The EQ1 Headsets have the most advanced battery monitoring and charging system of any headset system on the market today, this ensures that your flying will be trouble free and you are able to judge the operational time of your headsets correctly.

The headsets are fitted with the latest NiMH low loss technology and these batteries will lose approximately 1% of their stored charge per month when not in use. Fully charged the headsets will provide up to 24 hours of in flight use.

***NOTE: The built in charge capacity indicator accuracy will diminish and not provide accurate indications of headsets that are stored for extended periods of time. Simply re-charge the system to bring back to full accurate capacity.***

The headsets can be charged from the supplied wall charger by simply plugging the connector into the headset socket, this will automatically power the headset on and begin the charging process. This charger can charge 2 headsets at the same time. Every minute the headset will announce the state of charge as a percentage of charge accumulated. This can also be gauged at any time by briefly pressing the ON/OFF control knob. From completely discharged the headsets should take approximately 8 hours to charge.

When the Headsets are fully charged they will announce this and go into a preserve mode to keep the batteries at a fully charged state with no overcharging. When charging is complete you can just remove the power and the headsets will automatically turn off.

The Headsets can also be in-flight charged for fail-safe operation with the optional charging adaptor.

When the remaining battery capacity falls to 20% (5 hours flight duration), the headsets will announce a "Low Battery Capacity" warning every minute.

## **8. HINTS AND TIPS ON OPERATION.**

Make sure that the headset units have fully charged batteries.

Make sure the Base Controller is not behind metal walls in the aircraft as this will limit the effective range of the system.

Make sure the VHF antenna or other high powered transmitters are at least 2 meters from the headset system. If the VHF antenna is too close to the headset then Radio frequency feed back will occur in the headset when transmitting on VHF. This will result in an echo like feedback in each headset and live echo on VHF transmit frequencies.

Set the VOX operation to suit the noise profile of the Aircraft, a high noise aircraft like a microlight in full climb out may require a vox setting of 6 to 8.

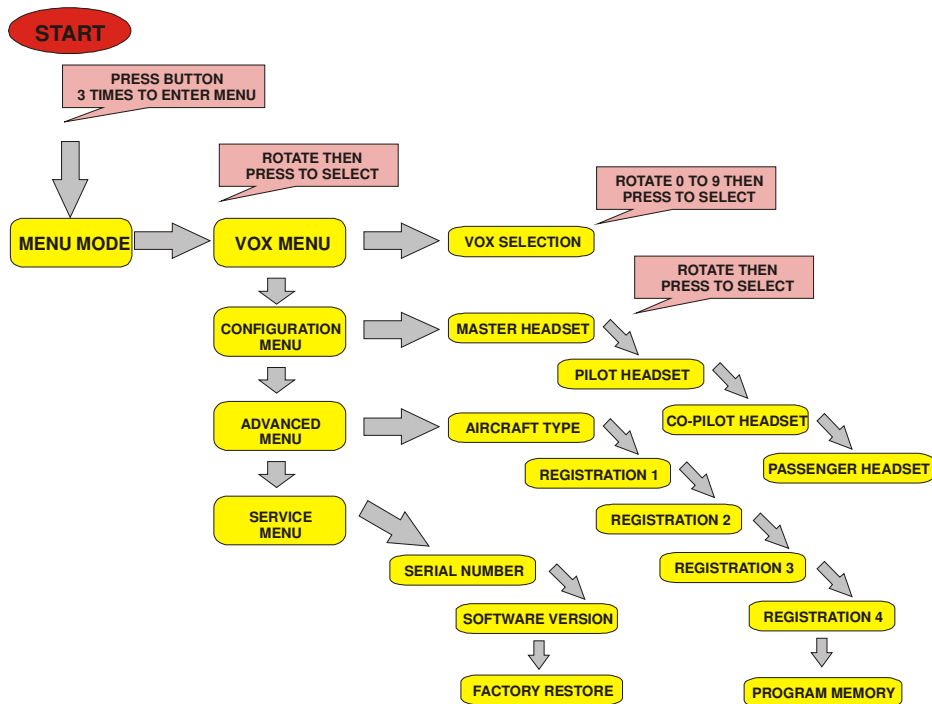
Ensure the correct position of the EQ1 microphone, one finger width from the mouth. This is very important for correct operation. Make sure you are speaking into the correct side on the microphone, this is marked with **“EQ”** and should face the mouth. As this system is designed for high noise all noises away from the microphone are attenuated. Getting the microphone in the correct position is VERY IMPORTANT.

Set the VHF Radio Squelch OFF and listen to the noise, then adjust the VHF radio Volume for a comfortable level. Reset the VHF radio squelch as required. The overall volume of all conversations and the VHF radio can then be controlled on each headset to suit the user.

If many EQ1 units are operating in the same area, then you can set your own ID of the aircraft to enable better selection of your desired aircraft base controller.

**DO NOT LEAVE YOUR HEADSET IN FULL SUN OR CLOSED HIGH TEMPERATURE ENVIRONMENTS.**

## 9. PUSH BUTTON PROGRAMMING.



The tree diagram shows how to program each of the sections of the headset.

Voice guides will help navigate through the menu system, if unsure the system will time out and return to normal operation after 5 seconds. If a mistake is made it can be reprogrammed. If completely lost and unsure the **FACTORY RESTORE** option will reset the Headset to an out of box state as delivered from the factory.

## 10. PIN OUTS-BASE CONTROLLER

The following is the list of pin-outs for the EQ1 Base Controller.

<b>PIN</b>	<b>Function</b>	<b>Notes</b>	<b>PIN</b>	<b>Function</b>	<b>Notes</b>
1	+12 volts	Main Input	14	+12 volts	Main Input
2	+12 volt out	To VHF Radio	15	Ignition feed	Ignition Switch
3	+12 volt out	To VHF Radio	16	+5 volts	Headset Charge
4	RS232 Txd	Expansion	17	RS232 Rxd	Expansion
5	Relay Comm	Expansion	18	Relay NO	Expansion
6	AUX Out 1	Audio Out Cell	19	AUX In 1	Audio In Cell
7	VHF Speaker	Audio Input	20	UHF Speaker	Audio In
8	Audio Ground	Ground	21	UHF Mic	Audio Out
9	VHF Mic	Audio Out	22	AUX In 2	Audio In MP3
10	SKY DAT	Data Input	23	VHF PTT Out	OC output
11	UHF PTT Out	OC Output	24	VHF PTT In	Ground to activate
12	UHF PTT In	Ground to Activate	25	Ground	Main Ground
13	Ground	Main Ground			

Please consult the manufacturer for additional use or connections into these pins.

### *Standard Cable Colours:*

<b>RED</b>	+12 volts
<b>BLACK</b>	Ground
<b>YELLOW</b>	Ignition
<b>BLUE</b>	PTT Input from Switch

## 11. DEVICE SPECIFICATIONS

	<b>GENERAL</b>
Frequency	2.4GHz ISM Band frequency hopping
RF Power	1mW, 0dBm
	<b>BASE CONTROLLER</b>
DC Power	10-16volts DC
Current	60mA Max
Input Audio	Nominal 1000mVpp
Output Audio	Nominal 150mVpp
	<b>HEADSET</b>
DC Power	Batteries AA, 2 units NiMh low loss
RF Power	1mW, 0dBm
Charge	+5 volt only 400mA

## 12. LEGAL

### **ONE YEAR LIMITED WARRANTY**

Lysar Industries warrants this product is to be free from defects in material and workmanship under normal and proper use, for the period on ONE YEAR from the date of original purchase and agrees, at its option, to repair or replace such parts showing factory defects to the following provisions:

This Warranty applies only to a new product, which has been sold through authorized channels of distribution. The purchaser voids the warranty if he or other not authorized Lysar Industries attempt to repair or service the unit, or if any parts are not supplied by Lysar Industries are inserted in the unit. Defective products or parts must be returned to the point of sale. This warranty does not cover cable breakages or any breakages caused by normal wear and tear. THE FOREGOING IS YOUR SOLE REMEDY FOR FAILURE IN SERVICE OR DEFECT, LYSAR INDUSTRIES SHALL NOT BE LIABLE FOR UNDER THIS OR ANY IMPLIED WARRANTY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. This warranty is in lieu of all other warranties, express or implied, INCLUDING THE WARRANTY OR MERCHANTABILITY OR FITNESS FOR USE, WHICH WARRANTIES ARE HEREBY EXCLUDED.

### ***This device complies with Part 15 of the FCC Rules.***

Operation is subject to the following two conditions;

- 1/ This device may not cause harmful interference and
- 2/ This device must accept any interference received, including interference that may cause undesired operation.



N22996

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