



EQ1 WIRELESS
AVIATION HEADSETS
&
EQ-LINK

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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”. This manual also contains programming data that refers to option products that the EQ1 headset can be used with.

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 from external noise.</i>
AEC	Active Echo Cancellation
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, EQ-Link system.

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

The EQ1 Headset is compact; it 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 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 or EQ-Link.
- Auto Muting of Auxiliary audio inputs during VHF reception.
- Auto VOX open on PTT for no loss of voice conversations.
- Wireless EQ-Link for ease of installation in Aircraft.
- Optional MP3/Cell Phone (Bluetooth) Interface.

EQ1 HEADSET



EQ-LINK



3. BASIC OPERATION

The EQ1 uses a simple '**PRESS**' and '**ROTATE**' system to navigate through the various setting 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 an EQ-Link unit is located. If your unit detects an EQ-Link that it is not paired with, then a low tone will be heard and the headset will continue to look for your paired device.

If no EQ-Link 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 rotate anti-clockwise, the level setting will be spoken to you. The volume will always start at a level of 4 to avoid loud sounds at 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 by removing the side tone in the operator's headset.

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, Note; *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.

3.4. EQ-Link Controls

The EQ-Link has a number of controls and system inputs, these are described below:

Mini USB Used for charging.

3.5mm Audio User for Cell Phone/Blue Tooth or MP3 player.

Status Button Used to read battery capacity, transmitted to headset.

Used also to change mode from Master to Slave.

Used to enter Menu Mode for advanced features.

Status LED's Green is used for charging indication and Master Indication.

Yellow is used for PTT indication and Slave Indication.



4. ADVANCED OPERATION (HEADSET MODE)

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

4.1. Headset Mode

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, PASSENGER and EQ-LINK”



Press knob to confirm the menu selection.

When in MASTER Mode the headset is now the master controller for the other headset. 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.

NOTE: *For this function to work with the EQ-Link the PTT must be wired into the GA sockets as per normal convention.*

4.2. Base Programming (optional)

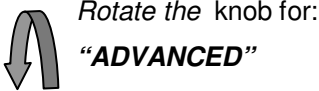
In some cases the headset will be supplied with Base Communications device, if this is not used, please ignore comments for Base Communications.

Enter the programming voice menu as above.

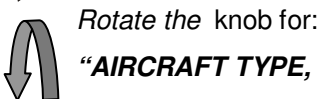
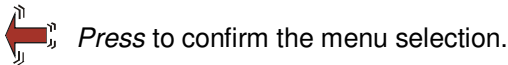
See details in section 9 for flow operation.

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

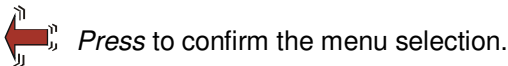
This programming is optional but strongly recommended and is used to distinguish aircraft from each other in busy situations or close start up proximity. It can also be used as a comfort factor that you are locked onto the correct Base Controller.



“ADVANCED”



“AIRCRAFT TYPE, Registration. 1,2,3,4 and PROGRAM”



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 1,2,3,4*** menu options program the last 4 digits of your aircraft registration.

Use the PROGRAM menu to update and confirm the settings in that headset and to the Base Controller,

NOTE: YOU MUST BE Locked onto the base controller if you wish to update the base at this time. Only a headset in pilot configuration will be able to remotely update the Base Controller.

5. SYSTEM FUNCTIONS

5.1. EQ-Link

The EQ-Link is the heart of your headset system that wirelessly connects the headsets and provides the interface for your radio and communications system.

The EQ-Link will power on when your aircraft's communication system operates.

5.2. EQ-Link Pairing

To pair a headset to a new EQ-Link:

Set Headset to EQ-Link Headset mode.

Set Headset to pairing mode from Advanced Voice Menu. (section 9.2)

Power the EQ-Link by aircraft connection or charging cable.

Ensure that the EQ-Link that you wish to pair to is set to Master.(see *P13*)

The headset should then detect the EQ-Link and announce the last 4 digits of the serial number of EQ-Link. This serial number can be found on the back to the EQ-Link. If this is the correct unit as indicated in the headset then press the button on the headset to confirm.

Your headset is then paired to this EQ-Link and will only link to this unit when in Link mode.

5.3. PTT Detection

The EQ-Link can detect when the aircraft PTT is activated, this is indicated by the YELLOW LED going fully on. This can aid in the detection of PTT Faults and also as a general PTT indication.

On each PTT press a short tone (BEEP) will be heard in the headset and when PTT is released a short tone (BOP) will also be heard. We call these comfort tones and they give feedback that you really have pressed and released the PTT button in the aircraft.

Note: only available when aircraft's headset sockets are wired for PTT

The VHF radio system has override priority and will mute all other ancillary inputs such as MP3, cell phone UHF etc; when a PTT signal is detected on this input. Some aircraft may not have this active on the headset sockets and hence this feature will not work.

5.4. MP3 or Cell Phone Interface

The EQ-Link has additional inputs suitable for Cell or MP3 type connections, these are available on the 3.5mm connector at the end of the EQ Link.

Note:

During VHF reception 3.5mm Audio input is muted to the headsets, this will always enable clear reception of all VHF radio traffic.

An EQ approved Blue Tooth Module specially designed to suit the EQ1 System is available for Cell interface. When using this module ensure that the module is mounted at least 400mm away from the EQ Link to avoid RF interference. Usually the Blue Tooth module should be positioned in an accessible area of the aircraft.

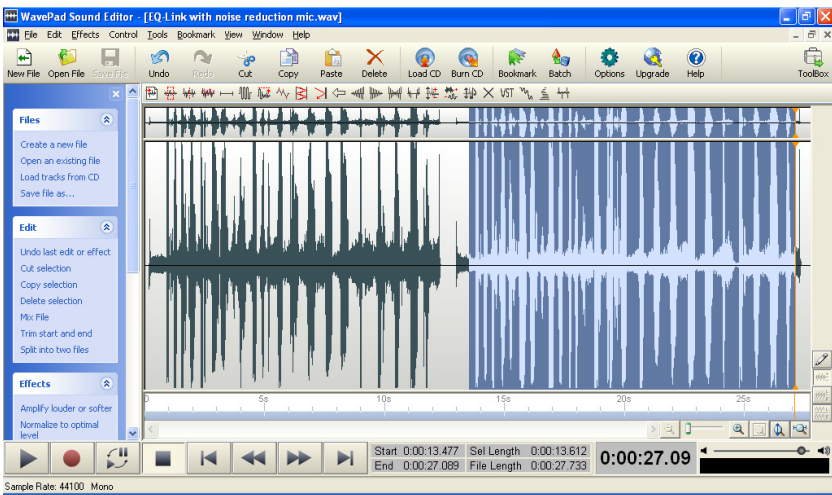
5.5. EQ-Link Communications Settings

The EQ-Link will function at peak performance when the aircraft communications settings can be adjusted to suit. The EQ-Link acts as a cable replacement for standard Headsets and as such will receive any imperfections in the aircraft communications system. The extra quietness of the EQ1 system means that some electrical noises that may not have been heard with other headsets may now become audible.

Advanced features can be activated on the EQ-Link to further assist the noise reduction performance of the system. These modes are activated by 3 fast clicks of the STATUS button on the EQ-Link. These modes will be announced on the paired headset for ease of use and understanding of the functions performed.

Standard Modes include Microphone noise cancelling DSP algorithms.

The graph below shows a cockpit recording in a typical light aircraft. It highlights the difference with noise reduction off to the left and noise reduction on to the right. The dense bits in the middle are aircraft noise.



6. INSTALLATION

6.1. Installation EQ-Link

The EQ-Link system is supplied with a standard aviation cables and connectors (jacks) to suit standard aviation connections. The EQ-Link system will automatically power ON when the aircraft communications system is turned on, and will automatically power off when the communications is switched off. A permanent optional charge cable can be connected for peace of mind to ensure the EQ equipment is always charged.

When you aircraft communications is switched of the EQ-Link and EQ1 Headset will automatically power OFF.

Simply connect your EQ-Link into where your normal headset would be connected. The EQ-Link is supplied with Velcro for simple mounting and a cable clip for additional support. For additional performance operation when multiple units are used on one aircraft simply set extra units to SLAVE mode. In this mode all the units will operate as one and not interfere with each other, their must be at lease one master in all systems.

Slave mode can be entered by pressing and holding the STATUS button for 4 seconds, the LED lights will then change every 2 seconds from Master to Slave and announce this in the headset. When on the desired mode, just release the button.

NOTE: A typical aircraft can only have one master and up to 5 slaves in the single system for peak performance, in the case of more units please contact your supplier for additional information on your options.

YOUR INSTALLATION IS NOW COMPLETE.....

7. HEADSET / EQ-LINK CHARGING

The EQ1 Headsets and EQ-Link 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 and EQ-Links are fitted with the latest NiMh low loss technology. These batteries will lose approximately 1% of their stored charge per month when not in use. Fully charged, the headsets will provide up to 28 hours of in flight use, and up to 35 hours for the EQ-Link system.

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

The headsets and EQ-Link can be charged from the supplied wall charger by simply plugging the connector into the headset socket, this will automatically power the units on and begin the charging process. This charger can charge 2 headsets or 2 EQ-Links 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.

The EQ-Link has a green LED to show charge status, this system will blink faster as the charge gets to 100%. Full charge is when the green LED is fully on. When in operation the brief pressing of the button on the EQ-Link will also announce the charge status of the EQ-Link in the paired headset speaker.

When the systems are fully charged they will 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 or keep in operation for in flight use.

The Headsets and EQ-Link system can also be in-flight charged for safe uninterrupted operation with the optional USB charging adaptor.

When the remaining battery capacity falls to 20%, (approx 5 hours flight duration) the headsets will announce a “Low Battery Capacity” warning every few minutes.

8. HINTS AND TIPS ON OPERATION.

Make sure that the headset and EQ-Link units have fully charged batteries.

Make sure the EQ-Link 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 a 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 micro-light in full climb out may require a headset 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 and the aircraft communications module to suit the user.

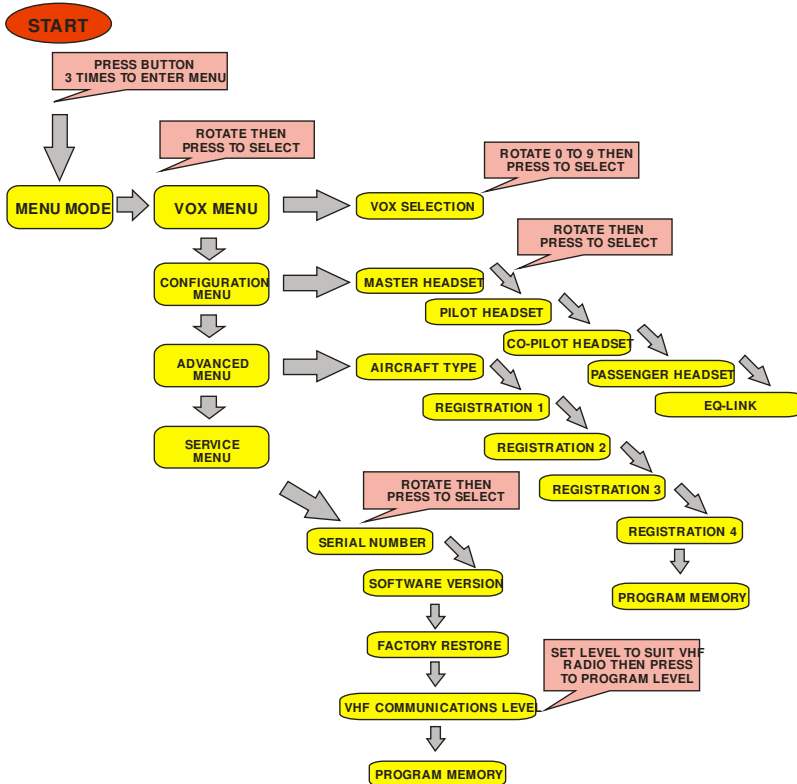
*NOTE: it is recommended that you turn the aircraft's communications system VOX (or squelch) system off or low, as the headsets will now control this for you. (** In the case of multiple EQ1 systems)*

Your EQ1 and EQ-Link system will come from the factory already paired, if this is required to be done again or you have purchased an EQ-Link separately, follow the pairing steps on page 10.

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

9. VOICE MENU PROGRAMMING HEADSETS.

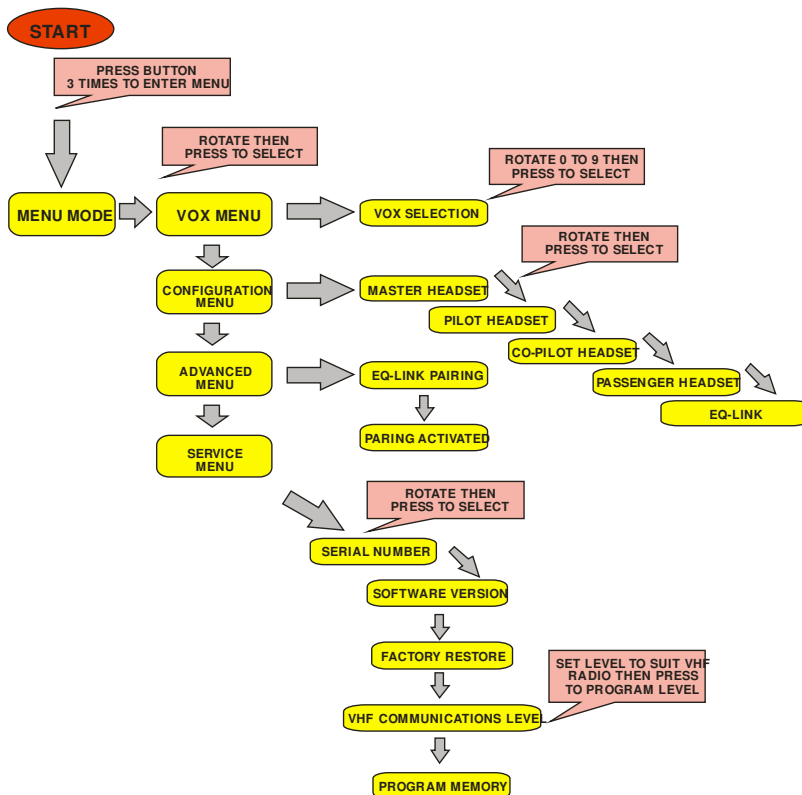
9.1. Standard Mode



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. Pairing will need to be performed in this case when using EQ-Link systems.

9.2. EQ-LINK MODE



To enter pairing mode, the Headset must have first been set to EQ-Link mode. The pairing mode voice menu will then become available to enable pairing.

NOTE:

The VHF communications LEVEL is like MIC Gain on standard headsets and can be programmed from the Pilot or EQ-Link Headset ONLY to the Base or EQ-Link Controller, the Headset must be linked at this time to perform the operation. Standard setting number is 12, higher numbers are more mic gain.

10. DEVICE SPECIFICATIONS

	GENERAL
Frequency	2.4GHz ISM Band frequency hopping
RF Power	1mW, 0dBm
	EQ-Link
DC Power	5-18volts DC for charging
Current	400mA Max
Input Audio	Nominal 1000mVpp
Output Audio	Nominal 150mVpp
	HEADSET
DC Power	Batteries AA, 2 units NiMh low loss
RF Power	1mW, 0dBm
Charge	+5 volt only 400mA max

11. 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.



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