User Manual XC Tracer Mini V1.0

Quick Start Guide

XC Tracer Mini is an acoustic variometer powered by a solar cell. Whilst you're waiting to take off, point the device at the sun in such a way that the solar cell catches as much sunlight as possible.

Use the velcro to attach XC Tracer Mini to the shoulder strap of your harness, or to your cockpit, or onto your thigh. *(NB. Do not attach it to your helmet or hang it round your neck using a cord!).* Position the device in such a way that the solar cell catches as much sunlight as possible during the flight.

Switch on XC Tracer Mini by pressing and holding the red button until you hear beep-beep. The vario will make some beeping sounds, and the white LED will start blinking every 2-3 seconds. Don't worry if you forget to switch on XC Tracer Mini before taking off, you can switch it on whilst flying.

The vario won't beep on the ground, but as soon as you're flying then XC Tracer Mini will indicate the lift / sink rate with beeping tones. XC Tracer Mini has four volume settings: mute, gentle, medium and loud. You can change the volume setting with a short push of the red button, always cycling from mute – gentle - medium – loud – mute – gentle etc.

Once you've landed, turn off XC Tracer Mini by pressing and holding the red button until you hear beep-beep (after approximately 3 seconds). XC Tracer Mini will then switch off and the LED will stop blinking.

Introduction

XC Tracer Mini is an acoustic variometer powered by a solar cell. The lag-free indication of lift / sink makes it much easier to find and core thermals than when using a conventional variometer.

XC Tracer Mini has a built-in solar cell that delivers 3x more energy than is needed for running the device (when oriented perpendicular to the sun). The surplus energy is stored in a lithium polymer battery. The variometer will run for 8-12 hours with a fully charged battery without any sun, depending on the sound level. The built-in battery can be charged over the Micro USB connector should this ever be necessary.

Expose XC Tracer Mini to the sun as much as possible. Often you may have to wait for better conditions before launch so orientate XC Tracer Mini in such a way that the solar cell catches as much sunlight as possible (whilst taking care that the device doesn't overheat). As a rule of thumb in winter when the sun is low you should expose the variometer to the sun when necessary, however during the summer months the intensity of the solar radiation should be such that it's not necessary to expose the variometer to the sun before launching.

Important: XC Tracer Mini charges the battery even when it's not switched on!

Mounting

XC Tracer Mini uses data from a 9-DOF IMU (9 Degrees Of Freedom Inertial Measurement Unit), and from a pressure sensor, to compute the real-time climb rate and altitude, avoiding the undesired time lag that conventional variometers suffer (due to data filtering). For this reason mount your XC Tracer Mini in such a way that it moves as little as possible whilst you're flying.

It's therefore important that the XC Tracer Mini isn't dangling from a cord or attached to your helmet. The best approach is to attach XC Tracer Mini to your cockpit, or on the shoulder strap of your harness, or on your thigh.

But when attaching XC Tracer Mini, please remember that it needs to have the best possible view of the sun in order to maximize solar charging.

Switch On / Switch Off

Turn XC Tracer Mini on by pressing and holding the red button until you hear beep-beep. Next the battery charge status is indicated by a series of beeps (this feature is described further below). Finally XC Tracer Mini makes a beep-beep-beeeeeep and it's now ready for flight.

Turning XC Tracer Mini off is just the same - press and hold the red button until you hear beep-beep.

If you forget to switch off the vario after a flight then it will switch off automatically if it hasn't detected lift or sink for 1 minute.

Battery Indicator

After switching the device on, the battery charge status is indicated with a sequence of short beeps:

5x Beep means that the battery is charged 95% or more.

4x Beep means that the battery is charged 75% or more.

3x Beep means that the battery is charged 55% or more.

2x Beep means that the battery is charged 35% or more.

1x Beep means that the battery is charged 15% or more.

When the battery is less than 15% charged you will hear a constant beep for one second after switching the device on.

XC Tracer Mini will make a beep-beep-beeeeeep after indicating the battery charge – this means it's now ready for flight.

Energy Management

Normally the solar cell delivers enough energy to power XC Tracer Mini and charge the battery at the same time when flying. But on occasion the device might slowly discharge during a flight if it's been in your shadow for long periods, or if the sun is low, or if the sky is overcast etc. Perhaps the next flight might be different, with enough sunshine to power the device and charge the battery; however it's always a good idea to switch off the device immediately after landing.

Should it ever be necessary you can charge XC Tracer Mini using a Micro USB cable. It takes approximately 8 hours to fully charge the battery so it's best to leave it charging overnight.

Automatic Switch-Off

Automatic switch off is disabled during the first 15 minutes after switching XC Tracer Mini on, however after that it will turn itself off if it hasn't detected lift or sink for 1 minute – ie. after you've landed. In addition, low-voltage detection will switch the device off if the battery voltage drops below 3.3V.

Adjusting The Volume

XC Tracer Mini has 4 volume settings: Mute, gentle, medium and loud. You can change the volume setting with a short push of the red button, always from mute – gentle - medium – loud – mute – gentle etc.

XC Tracer Mini Configuration File

Connect XC Tracer Mini to a computer using a Micro USB Cable and once connected, switch the device on by briefly pressing the red button until you hear a beep-beep-beep. XC Tracer Mini is now running in USB-MSD (Mass Storage Device) mode. XC Tracer Mini's internal Micro SD Card will appear as an external drive in Windows Explorer or the Mac Finder. On the SD Card you will find a PDF copy of the user manual, and also the XC_TRACER_MINI.TXT configuration file. Editing this file in Notepad (Windows) or Text Editor (Mac) allows you to adjust XC Tracer Mini's settings. The various options are described below:

XC Tracer Mini Configuration File

firmwareVersion=XC_Tracer_Mini_V1.0_R01

Indicates the device's firmware version..

reset=no

Setting reset=yes resets XC Tracer Mini to the factory default settings. In order for this to work all the entries below reset=yes must be deleted, otherwise the same settings will be read in again. Reset=no is the default setting.

 # create your own vario tone settings below

beepOnlyWhenFlying=yes

When this is set XC Tracer Mini will be silent before takeoff. This is very helpful when you have configured some kind of a thermal sniffer. With beepOnlyWhenFlying=yes the variometer will be silent until XC Tracer Mini detects a climb/sink rate of +/- 0.75m/s for roughly 2-3 seconds. With beepOnlyWhenFlying=no the variometer will beep not only in flight, but also when you walk or move.

setVolume=2

There are four volume settings, 0-3. With this option you set the volume that the vario will use for beeping. When beepOnlyWhenFlying=yes is set then the vario will be silent until you fly. Once you're flying the vario will beep with the volume that you have set. Remember though, that you can change the volume during flight with a short press of the red button.

ClimbToneOnThreshold=0.2

With this setting the vario will begin to beep when the climb rate is higher than 0.2m/s. When you want to use a thermal sniffer then you can set ClimbToneOnThreshold=-0.5 for example. In this case the vario will begin to beep when the sink rate is less than -0.5m/s. In this way you can adjust the beeping tone so that you know when you're flying in lifting air, despite the fact that you're actually sinking gently. This can be helpful to find and core thermals in weak conditions.

ClimbToneOffThreshold=0.1

With this setting the vario will stop beeping when the climb rate is below 0.1m/s. You can also use negative values here, for example -0.51m/s when you use a thermal sniffer.

SinkToneOnThreshold=-3.0

The sink tone will be activated when the sink rate is below -3m/s.

SinkToneOffThreshold=-3.0

The sink tone will be deactivated when the sink rate is less than -3m/s.

tone=-10.0,200

tone=-3.0,280

tone=-0.51,300

tone=-0.5,300,800,5

tone=0.09,510,600,5

tone=0.1,510,600,50

tone=1.16,579,527,50

tone=2.67,698,450,50

tone=4.24,824,360,50

tone=6.0,1037,283,50

tone=8.0,1314,219,50

tone=10.0,1661,190,50

You must define exactly 12 tones. Additional tones will be deleted from the configuration file, and missing tones will be complemented with values stored in the Eeprom. The tones must be defined ascending from tone 1 of -10m/s to tone 10m/s of tone 12.

Important: Please avoid using exactly the same climb rate on adjacent tones as it will create problems.

tone=1.16,579,527,50 means that with a climb rate of 1.16m/s the vario will beep with a frequency of 579Hz, that the complete tone interval will last 527ms, and that the tone will be audible for 50% of the tone interval. This is a typical tone that is used when indicating climbing.

tone=-3.0,280 means that with a sink rate of -3.0m/s a tone of 280Hz will be emitted. As soon as the sink rate changes the tone frequency also changes, depending on the configuration. It's a good idea to only set sink rate and frequency for the sink alarm, and not set tone interval and duty cycle. This creates a nicer sink tone (not that a sink tone is ever nice!)

You can create your own tone settings using the tone simulator on www.xctracer.com, however you can also copy and paste other people's tone settings to the configuration file.

XC Tracer Mini doesn't actually save the new configuration into its internal memory until it starts up in normal flight mode. So, press the red button briefly to unmount / eject the device from your computer, disconnect it from the USB cable, then turn XC Tracer Mini on as normal.

Important: Always close the configuration file before you unmount / eject XC Tracer Mini!!!

XC Tracer Mini Firmware Update

Connect XC Tracer Mini to a computer using a Micro USB Cable and once connected, switch the device on by briefly pressing the red button until you hear a beep-beep-beep. XC Tracer Mini is now running in USB-MSD (Mass Storage Device) mode. XC Tracer Mini's internal Micro SD Card will appear as an external drive in Windows Explorer or the Mac Finder. Download the newest firmware for XC Tracer Mini V1.0 from www.xctracer.com and copy the new firmware using drag and drop to the SD card. Now press the red button briefly and the new firmware will start to be installed. During installation XC Tracer Mini will make a few beeps, then delete the firmware file from the SD card and finally switch off. The new firmware is now installed and the device is now ready to use.

Important: The information about the firmware version will only be updated once the device has been started up in normal flight mode.

If the firmware you copy to the SD card is the same version as the one that is already installed then XC Tracer Mini will simply delete the firmware from the SD card. It's impossible to install incorrect firmware on the XC Tracer Mini – all that happens is that the incompatible firmware remains on the SD card waiting to be deleted by the user.

Troubleshooting

In the rare event that XC Tracer Mini doesn't respond when you push the red button, you can perform a hard-reset by pressing and holding the red button for approximately 1 minute. The battery will then get disconnected from the electronics. After that you can restart XC Tracer Mini in flight mode, and the device will be functional again.

Warranty

XC Tracer grants a 24 month warranty for material and workmanship. Unsuitable or improper use (for example strong impact, water landing, opened enclosure, software modification etc.) normal wear and tear (battery) are excluded from the guarantee.

Technical specification

Time-lag free indication of climb / sink rate

Extremely easy operation

Firmware update by Drag & Drop

User configurable acoustics / tone simulator at www.xctracer.com

State of the art electronics including a 9-DOF IMU and mems pressure sensor

Solar cell with 22.5% efficiency

Runtime with fully charged battery and without sunshine 8-12h, depending on volume setting

Size: 44.5 x 44.5 x 16.5 mm

Weight 30g