
GPS-
Logger
SM MODELLBAU
oben - top
www.sm-modellbau.de
COM
DUPLEX
2.4 GHz
MSB
MULTIPLEX SENSOR BUS
HOTT

Description and operating instructions

1. Introduction

The GPS-Logger is a complete GPS system that was specifically developed for the needs of model construction field.
It is extremely small and light, but has outstanding features and possibilities.
With up to 10 Hz sampling rate and the micro-SD memory card almost unlimited recordings with high resolution and detail are possible.
Telemetry via 2.4 GHz systems with a return channel is now a firm component of the GPS-Logger and fully integrated.

In line with our philosophy to support as many systems as possible, the GPS-Logger also works via the telemetry:

Jeti Duplex EX

Multiplex M-Link

Graupner/SJ HoTT

Robbe/Futaba FASSTest S.BUS2

JR DMSS

The GPS-Logger independently recognizes the use of, the Jeti, Multiplex, and HoTT telemetry systems. When used with Futaba or JR the telemetry must be pre-specified in the settings.

Since an additional barometric (air pressure) altitude sensor with high resolution is also integrated, a Vario is available in the GPS-Logger with the telemetry in use. Likewise extensive alarms are programmable, which are announced by telemetry on the respective transmitter.
When operating with Multiplex M-Link all data on the sensor bus is automatically logged by the GPS-Logger and also written to the memory card ➔ MSB Data logger.

The new competition format OLC, the On Line Contest, is well supported by the GPS-Logger. The necessary IGC file can be created directly, without any other conversion software being needed.
In addition to its own measurements, the GPS-Logger can also read all the data live from the UniLog 1/2 via a direct cable connection and write it to the memory card.

Via our UniDisplay all values measured by the GPS-Logger can be directly viewed live. Naturally all settings and alarms can also be programmed easily by UniDisplay.

The presentation and interpretation of data is made in 3D in Google Earth™. All that is required is to convert into Google Earth ™ format using our free software "SM GPS Konverter" and the also free Google Earth ™ standard version.

The well known software LogView www.logview.info also supports our GPS-Logger. Here, the GPS data can also be converted to Google Earth™ format. In addition the values can be shown in normal curves and much more besides.

Based on Java and therefore suitable for the Mac or Linux in addition to Windows there is the GNU Data Explorer for evaluating the data. ➔ www.nongnu.org/dataexplorer

Whether sailplane, aerobatics plane, helicopter, HLG or Slowflyer, the GPS-Logger can be used in almost any sector due to its small weight and compact size. Naturally the GPS-Logger is not only suitable for flying models, it can also be used in RC-boats, RC-car etc.

2. What the GPS-Logger can do

- 10Hz GPS, and so 10 readings per second➔ particularly good data resolution
- Micro SD memory card ➔ almost unlimited recording and simple selection of data
- Data stored in plain text on the memory card ➔subsequent processing with many programmes possible
- Altitude measurement with automatic reset to zero at switch on
- barometric vario
- Direct creation of the IGC file for On line Contest (OLC)
- Full telemetry support for Jeti duplex, Multiplex M-Link Graupner HoTT, Futaba FASSTest S.BUS2 and JR DMSS
- Direct connection of the UniLog 1 and UniLog is 2 possible for data capture (not during FASSTest and JR DMSS operation)
- Recording of all data on the Multiplex Sensor Bus when operating with M-Link
- Recording of receiver battery voltage
- Powered by the receiver battery
- Internal backup battery for a quick start of the GPS
- Start of recording set by different adjustable conditions
- Current status is indicated by three LEDs
- Direct viewing of recorded values live with our UniDisplay (not during FASSTest and JR DMSS operation)
- Parameter settings over PC, UniDisplay, or telemetry is possible
- Fast conversion of data into 3D presentation in Google Earth™ with our free “SM GPS Konverter”“software.
  The programme is available on the Internet at www.sm-modellbau.de in the menu option **Software & Updates**
- Support by LogView software www.logview.info LogView is a very comprehensive yet easy to use evaluation programme for the PC that supports a multiplicity of different measuring devices and battery chargers from the model construction field.
- Support by the GNU Data Explorer software www.nongnu.org/dataexplorer
  The GNU Data Explorer is based on Java and therefore suitable for the Mac or Linux.
- Free firmware updates via PC possible using our USB interface cable (the firmware file is available on the Internet at www.sm-modellbau.de in the menu option **Software & Updates**)
- Useable almost everywhere due to its compact size and low weight

3. Technical data

GPS Data Rate	1 Hz, 2 Hz, 5 Hz, 10 Hz adjustable.
Memory Type	Micro SD or micro SDHC card (supplied with 2 GB card)
Recording duration	With 10 Hz data rate and full utilization of approx. 200 kByte/minute storage requirement ➔ 7 days recording with 2 GB card
Power supply	Supplied from receiver (from 3,6 V to maximum of 8.5 V)
Power consumption	70 mA in full operation
External connections	GPN servocable for power supply and/or telemetry COM connection for UniDisplay, UniLog 1/2, and firmware update Slot for micro SD card
Dimensions	32 x 21 x 11 mm
Mass	11 g without cables
GPS Module	Sensitivity up to -165 dBm Maximum acceleration 4g (that refers only to position detection, the module is constructed using SMD techniques and can withstand substantially higher acceleration)

4. Operation of the GPS-Logger

4.1. Installation

Due to the low weight and the compact design, installation is unproblematic.

Attention must be paid to ensure that the GPS antenna is pointing up and there are no shielding materials such as metal or carbon fibre above it.
It has been shown that when used with telemetry systems the GPS-Logger should not be installed right next to the receiver antennas.

Attachment with a Velcro strap on a board is sufficient and makes easy access possible to the memory card.

4.2. Memory cards

As memory card practically all commercial micro SD cards with FAT16 or FAT32 file system can be used. Also SDHC cards and memory capacities over 2 GB are supported. However not all cards are equally suitable, since some cards exhibit an unfavourable behaviour with continuous storing of data. If an unsuitable card is used, the recording may run intermittently or even stop.
We recommend the use only with the card provided or available as an accessory from us.

The card is inserted into the slot on the back and pushed in until it clicks and is flush. The GPS-Logger does not have an ejector for the memory card, the card is simply pulled out again with the fingers.

4.3. Meaning of the LED

The GPS-Logger has three coloured LEDs.
After switching on a run of the three LED indicates the internal initialization.

In operation there are the following signals:

- orange LED shines permanently ➔ GPS ready, but still no 3D fix, i.e. GPS positioning not yet possible
- green LED shines permanently ➔ GPS and 3D fix ready, i.e. GPS positioning available
- orange LED flashes at the set recording rate ➔ GPS recording data, but still no 3D fix
- green LED flashes at the set recording rate ➔ GPS recording data, 3D fix
- red LED flashes ➔ no memory card pushed in.

4.4. Basic settings

The settings of the GPS-Logger can be made with our software “SM GPS Konverter” on your PC or laptop, with our UniDisplay, or via the Jeti or HoTT telemetry.

The settings are always backed up in parallel in the GPS-Logger and on the memory card. When using the PC software “SM GPS Konverter” new settings are written to the card, these are then taken up next time you start the device.

➔ In this way it is possible to use different memory cards for different models and automatically get the correct settings.

The following settings are important so the GPS-Logger can measure correctly :

- "Telemetrie Auswahl“ specifies the telemetry used. Here, from firmware v1.04, must be specified, whether as previously Jeti / HoTT / Multiplex are searched automatically, or whether it is fixed and Futaba S.BUS2 or JR DMSS Telemetry is specified.
- "Datenrate" selects the recording speed
  The higher the value the larger the recorded file, but also the fine detail is recorded more accurately. In model operation 10 Hz makes a lot of sense to capture all the detail.
- **“Startmodus”** sets the recording start method. See section 4.6.
- **“UTC Zeitzone”** defines the time zone fixed relative to UTC time (=universal time). E.g. in Germany in summer time set to UTC +2, in the winter set to UTC +1.
- **“Vario Schwelle”** is the threshold for the Vario signal via telemetry, and a Vario tone is only generated via telemetry if the climb / sink is greater than the threshold.
- **“Vario Ton”** sets whether the Vario is active during climb / sink or both. The Vario tone can also be switched off completely here.
- **“IGC Modus”** specifies whether the GPS-Logger records an IGC file.
  This is a special operating mode activated for competitions of the Online Contest (OLC) where a digitally signed IGC file is written on the memory card. This file can be used directly for the exchange of competition fligh s. More under section 7.
- **“Autostop”** sets the recording stop. See section 4.6.

4.5. Telemetry Alarms

These alarms are output via the connected telemetry to the transmitter. Depending on the system a beep is sounded and / or there is a warning by voice output.
Once the model has landed the acoustic output stops automatically to ensure that no disturbing messages are output before the model is turned off.

- **“Hohe”** The alarm is active as long as the set level is exceeded. Well suited for a tow plane to fly to a certain level.
- **“Speed”** The alarm is active when the set speed is exceeded.
- **“Entfernung”** The alarm is active as long as the set distance (straight line from start point by GPS) is exceeded.
- **“Strecke”** The alarm is activated when the set route distance is exceeded.
- **“Rx Spannung”** to monitor the receiver supply. The alarm is active as long as it is below the set voltage threshold.

4.6. Start and stop of the recording

The GPS-Logger has several possibilities for starting data recording. The appropriate options can be set with our software “SM GPS-Konverter”, with the UniDisplay or via the Jeti telemetry.

Normally you should select one of the possible Startup options and also select Auto Stop. It is then ensured that every flight is automatically recorded separately.

The recording of data can be started/stopped in the following way:

- **Manual start via telemetry**:
  The recording is started and stopped in the Jeti Duplex or Graupner HoTT telemetry (text mode) by depressing a key at the transmitter.
  This start method functions even when any other start option is selected.
- **Automatic start with 3D-Fix**:
  The recording begins automatically as soon as sufficient satellites are received and an initial 3D position determination made (3D-fix).
- **Automatic start with speed > 20 km/h**:
  The recording begins automatically as soon as the measured speed exceeds 20 km/h for the first time. The prerequisite is that the GPS already has a 3D-fix.
- **Automatic start at > 20 m distance:**
  The recording begins automatically as soon as the distance from the first measured point after switching on exceeds 20 m . The prerequisite is that the GPS already has a 3D-fix.
- **Start by re-inserting the memory card**:
  Regardless of the selected start option, a recording can be started immediately on an active GPS-Logger by pulling out and re-inserting the memory card.
- **Automatic stop after landing:**
  With the option “Autostop landing” the recording ends automatically 10 seconds after the landing, that is if for 10 seconds the speed is less than 10 km/h.

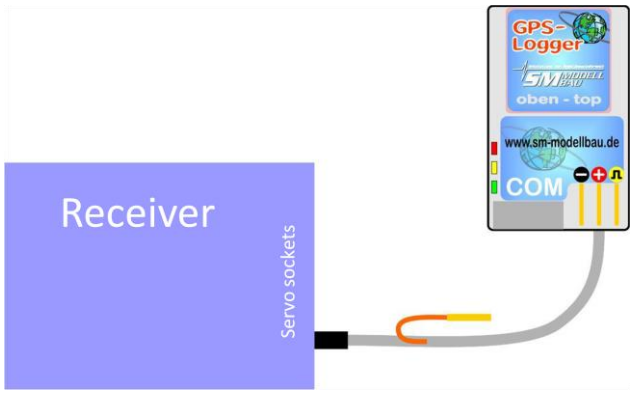
With each start of recording the GPS-Logger begins a new file. The file names are numbered consecutively and have the following format:
“**2013-01-01 SM GPS Logdatei 0001.nmea** “
If a recording is started and the internal clock does not provide a valid date (no GPS received or internal battery empty) then the date will be 2013-01-01

To distinguish between different firmware versions these files are always stored in a folder with this format:
“**SM GPS-Logger vX.XX**”

With Jeti Duplex and HoTT the recording can be stopped via telemetry, otherwise the recording is best terminated by the option “Auto-Stop”. The recording can also be stopped simply by interruption of the supply current. That is intended and OK.

5. Connection Examples

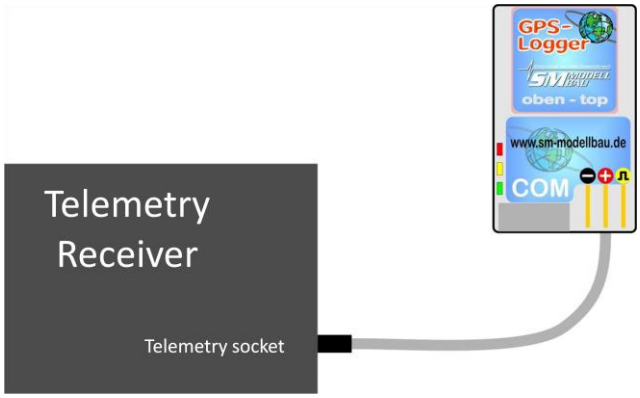
Direct connection to any receiver.



The cable is plugged directly into a free servo connection and supplies the GPS-Logger with power.

Since the Logger sends telemetry data on the signal line, the signal wire should in this case be removed at the receiver. Just simply remove the orange wire contact and insulate with heat shrink sleeve.

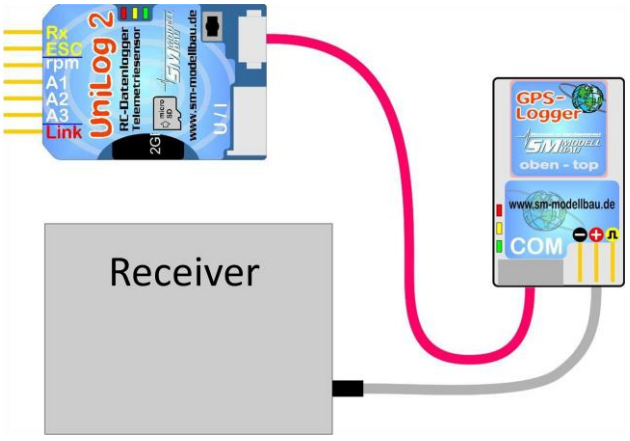
Direct connection to a Telemetry Receiver as a telemetry sensor.



The GPS-Logger is connected direcly to the telemetry connection.
With HoTT, M-Link, Robbe / Futaba S.BUS2 and JR DMSS other senspors can be connected also on a V cable.
With Jeti Duplex, more sensors are connected via the E4 expander.

Connection of the GPS-Logger to UniLog

The GPS-Logger can be connected directly to the UniLog 1 or UniLog 2 with the leads stock no. 2720 or 2721.
In this way the GPS-Logger also records the data from the Unilog on its memory card in parallel with its own data. Everything may then be displayed synchronised in Google Earth™.
The UniLog must be supplied with power via its current sensor or from the receiver, The GPS-Logger is supplied from the receiver via the telemetry connection.



Note: Only the three-core cables stock no. 2720 and 2721 may be used! With the 4 core cable no. 2401 the two internal voltages are connected which can cause problems.
The connection to Unilog 1 or 2 does not work with FASSTest or JR DMSS operation.
The COM port cannot be used here.

6. Use of the UniDisplay

For connection of the GPS-Logger, firmware v1.25 or higher must used in the UniDisplay. An update for the UniDisplay can be downloaded free of charge from our homepage (www.sm-modelbau.de).
The UniDisplay and GPS-Logger are connected with the cable provided with the display. The connector location can be seen on the top of the GPS-Logger and is labelled “COM”. The cable connection can be made either way round, which end is used is irrelevant.
The display is powered by the GPS-Logger and turns on automatically as soon as the GPS-Logger is connected. The display can be attached at any time to the GPS-Logger.
The GPS-Logger must therefore be supplied with power either via an attached receiver or directly with a receiver battery.

In FASSTest and JR DMSS operation the UniDisplay only works if already plugged in when switching on. The telemetry is only activated when the UniDisplay is unplugged again.

Menu:
First the menu is activated. The menu options can be selected with the “plus” and “Minus” buttons, and the appropriate item selected with “Enter.

Live data display screen 1: .
- **“Plus”** starts and stops the recording.
- **“Minus”** changes between Live/MIN/MAX values.
- **“Enter”** changes between the Live screens 1, 2 and 3.
- **“Esc”** changes back to the menu.

Top right is the current file number. Including changes in the past, Time, date and time.
“Speed” shows the genuine 3D speed, thus speed in relation to base plus vertical speed!
“Hoehe” is the barometric height in relation to the starting point.
“Strecke” is the travelled (flight path) distance.
At **“Pos”** “the current position of the GPS is seen in relation to the starting point. The air line distance and the angle in relation to north are shown.

Live data display screen 2:
A press of **“Enter”** moves to the next screen with more data.
“GPS” shows the GPS altitude from sea level (asl). Also shown are latitude (Breit) and longitude (Laeng) of the current GPS position.
“GZ” represents the glide ratio of the last 100 m flight path.
Following is the calculated average speed on these 100 m.
If no value for the glide can be indicated (model climbing), “—“ appears here. Finally the current air pressure measured by the barometric pressure sensor is shown in the last line.

Live data display screen 3:

A further press of **"Enter"** moves to the third screen with more data.
"RxSpannung" is the measured receiver voltage.
"Datenrate" shows the current recording rate.
In the last line is the current status of satellites and GPS.

Setup:

Here the menu for all settings of the GPS-Logger appears.
In the second line is the firmware version of the GPS-Logger and also the serial number.
Move through the menu options with **"Plus"** and **"Minus"**, and select the appropriate point with **"Enter"**.

Settings screens 1 - 4:

Here the settings of the GPS-Logger are summarized.
Move through the menu options with **"Plus"** and **"Minus"**, and select the appropriate point with **"Enter"**. The arrow then becomes a Dot and the selected value can be changed with **"Plus"** and **"Minus"**. A press on **"Esc"** or **"Enter"** stores the change.
For **the individual points see also** 4.4. „

GPS Alarms:
Alarms can be set here both with Jeti Duplex and M-Link and are announced from the transmitter module and/or the transmitter.

When the arrow is in the left column and the appropriate menu option activated with **"Enter"**, the value of the alarm can be set.

If with **"Plus"** or **"Minus"** the arrow is shifted to the right and the menu option activated with **"Enter",** the alarm can be activated (**"+"**) or deactivated (**"-"**) with **"Plus"** or **"Minus"**.

UniLog Alarms:
Alarms can be set here in relation to operation with Jeti Duplex and the UniLog 1 / 2 connected to the GPS-Logger.

When the arrow is in the left column and the appropriate menu option activated with **"Enter"**, the value of the alarm can be set. If with **"Plus"** or **"Minus"** the arrow is shifted to the right and the menu option activated with **"Enter",** the alarm can be activated (**"+"**) or deactivated (**"-"**) with **"Plus"** or **"Minus"**.
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M-Link addresses:
For transfer of GPS-Logger measured values by M-Link, addresses can be assigned here for display on Multiplex transmitters. Each address may only be assigned once to any attached M-Link sensor, including the M-Link receiver. The Bus system ceases to function with multiple assignments.

If a value is not to be transmitted chose the address "—". This value becomes the highest permissible Address 15.

7. Using in on-line Contest (OLC)

On-line Contest, OLC for short, has been for many years a popular decentralized competition type in man-carrying sport sailplanes and paragliders. Here the flights of the participants are recorded with GPS and then transferred by Internet into the OLC system. There each flight is automatically evaluated according to the Online Contest rules and the participant receives points for the flight.
Starting from 2011 this system is now available for model fliers, so that they also can compare their flights with one another within their own area. Participation is completely free. The flight task is basically the fastest possible speed round a triangular course of predetermined size (of course in pure gliding flight). More details can be found on the OLC website:
http://rc.onlinecontest.org

The special thing is that it is flown decentralised. Each pilot can therefore fly at any location i.e. if he has the time and desire, if the conditions appear right for it, etc. All the entered flights can be viewed constantly on line, daily detailed evaluations and ranking lists are given, as well as an annual ranking at the end of the year.

Starting from firmware v1.02, the GPS-Logger can now also directly produce the IGC file which is needed for the flight evaluation in Online Contest. So no more conversion of files is necessary, just the .igc file transferred from the memory card directly into the OLC system and the flight is evaluated. This file is also signed internally by the GPS-Logger, so that the OLC server can examine this in file manipulation (this is the highest quality class for documentation).

IGC mode must be activated in the settings of the GPS-Logger.

With the GPS-Konverter, entries for pilot name, model type, model name, and the competition class can also be given. These designations are stored on the memory card and entered into each IGC file. By this means, if you use a separate memory card for each model, the correct data can always automatically be transferred to the IGC file.

Characteristics in the IGC mode:
- The IGC file is written in addition to the normal NMEA file on the memory card.
- The IGC file has a special file name in the IGC format.
- Recording ends automatically as soon as the GPS-Logger is stationary for 10 seconds. During these 10 seconds the green and orange LED flash alternately.
- It is also possible to start the recording with different conditions as before.

The file is signed and valid for the OLC message only if the recording has been completed correctly.

8. Telemetry Operation

Apart from its functions as data logger the GPS-Logger is also a full telemetry sensor for different 2.4 GHz remote control systems. From the GPS-Logger the telemetry systems of Jeti Duplex, Multiplex M-Link, and Graupner HoTT Robbe/Futaba FASSTest S.BUS2 and JR DMSS are supported.
The telemetry operation is similar for all supported system: Live data is displayed on the transmitter or on external display, and with Jeti Duplex and HoTT the GPS-Logger can also be operated from the transmitter.
If the system has a voice output, then this is also supported by the GPS-Logger.
The alarm output depends on the telemetry system. In some systems the GPS-Logger generates the alarms, in others the thresholds are set directly on the transmitter.
Please note the information on this below.

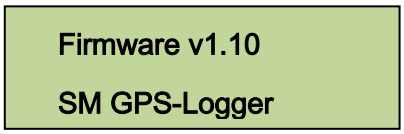
8.1. Jeti Duplex

The GPS-Logger is a complete telemetry sensor for Jeti Duplex 2.4 GHz systems. All measured values can be transferred live to the ground and displayed on the JetiBox. The Jeti Expander E4 for the connection of up to 4 sensors is supported.

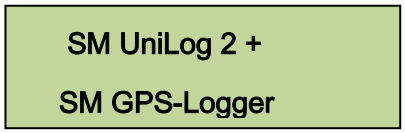
From firmware v1.06 the new Jeti Duplex EX protocol is also supported. So now display is possible on the JetiBox Profi or the new transmitters. Please learn about this new display capability in the instructions for the JetiBox Profi.

8.1.1. Operation of the GPS-Logger with the JetiBox

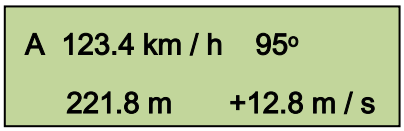
After the start of transmission the JetiBox is changed to Mx for the attached sensors.



A press the on the ▼ key changes to the GPS-Logger. During initialisation you see start-up screen then the measured data is displayed.



If at start-up an attached UniLog 1 / 2 is detected, the starting screen displays accordingly.

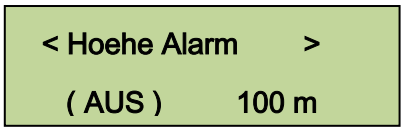


As soon as the first screen with measured data appears, the different data screens can be selected with presses of ◄ and ► keys.
A pressure on the key ▲ starts the recording of data in the GPS-Logger, which is indicated by an audible signal. A further pressure on ▲ terminates the recording.

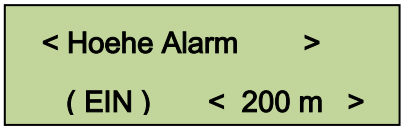
A simultaneous long pressure on the keys ◄ and ► changes between the display of Live / MAX / MIN values.

The first item on the screen is an indicator of the current active data screen and/or the status of the GPS-Logger:

A	first data screen, following screens B, C, etc.	>	maximum values are indicated
*	recording running	<	minimum values are indicated



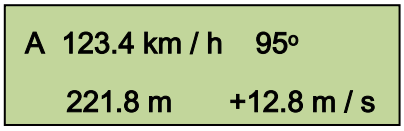
A press of key ▼ changes to the settings. Again with the keys ◄ and ► the different screens and the desired point are selected.



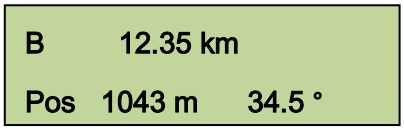
After a further press of key ▼ the selected value can then be changed (keys ◄ and ►). With a simultaneous pressure on ▲ and ▼ the alarm is switched **On** (EIN) or **Off** (AUS).

Changed settings are only stored with the move back to the selection level with ▲.

8.1.2. Display of measured values on the JetiBox

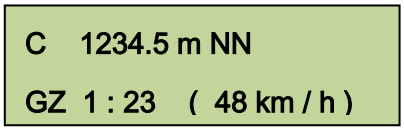


Top: True 3D velocity, relative flight direction (0° = away from pilot, 90° = right, 180° = back, 270° = to the left)
Bottom: Barometric height from start point, current climb rate

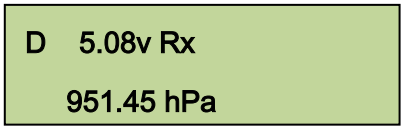


Top: Distance (flight path)

Bottom: Current GPS position in relation to start point.

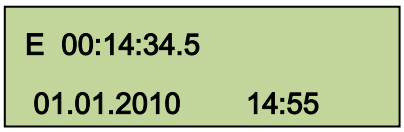


Top: GPS altitude over seal level (NN)
Bottom: Measured glide ratio of the last 100 m flight path followed by the average speed over this 100 m



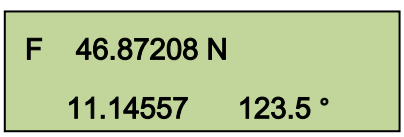
Top: Receiver battery voltage

Bottom: Current air pressure



Top: Elapsed recording time.

Bottom: current date / time.

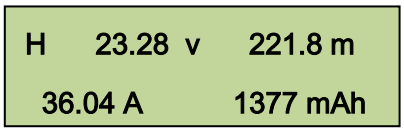


Top: Current Latitude
Bottom: Current Longitude, followed by current direction of travel.

Top: Number of satellites, GPS status

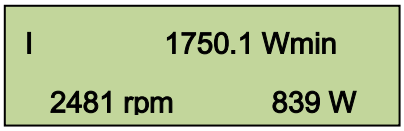
Bottom: Current recording rate, current file number.

If a UniLog 1 / 2 is attached to the GPS-Logger and is read, the measured values of the UniLog will also appear here. Values the UniLog 1 does not deliver remain free i.e. on 0:



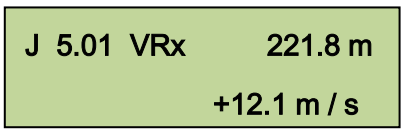
Top: Drive voltage, barometric altitude from starting point

Bottom: Drive current, capacity used



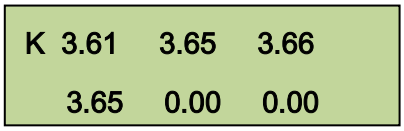
Top: energy used

Bottom: rpm, drive power



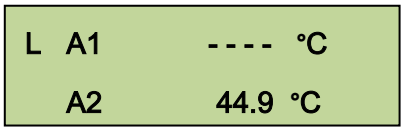
Top: Rx voltage, barometric altitude from starting point

Bottom: Vario as a numerical value



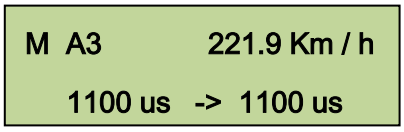
Top: Single cells 1 - 3

Bottom: Single cells 4 – 6

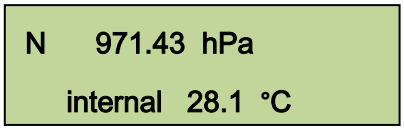


Top: Sensor value at port A1

Bottom: Sensor value at port A2



Top: Sensor value at port A3
Bottom: Servo impulse at the Rx connection, servo impulse at the ESC connection



Top: current air pressure

Bottom: internal temperature of the UniLog 1 / 2.

8.1.3. Alarms

When operating on the Jeti transmitter modules, with the display of data on the simple JetiBox, all alarms and also the Vario sounds are generated directly from GPS-Logger All settings are also made on the GPS-Logger.

The Jetibox Profi and the Jeti transmitter can, in Jeti EX mode, generate alarms and Vario tones themselves. These are then preset in the Box or transmitter. Alarms that are set in GPS-Logger remain as additional output.

8.2. Multiplex M-Link

The GPS-Logger is also a full telemetry sensor for the Multiplex M-Link 2.4 GHz system. The measured GPS values can be transferred live to the ground and be displayed directly on the Multiplex the Royal Pro or COCKPIT SX transmitter.
The connection is made direct to the M-Link receiver with the patch cable provided as described in section 6.
On the ground the data is displayed directly on the Multiplex the Royal Pro or COCKPIT SX transmitters.

The settings for telemetry can be made either with the UniDisplay (see chapter 7) or with our “SM GPS-Konverter” software on a PC. The addresses for display on the Multiplex remote control (the line that the respective value is indicated in) can also be freely selected.

To make it easier to find a model there is a special Landing Out mode:
In M-Link after 2 minutes without moving, Latitude and Longitude are displayed on the addresses Vario and Speed every 5 seconds. It changes the display between the decimal value with the unit “mAh” and the decimal value with the unit “ml”. Meaningful units – such as degrees and minutes – are unfortunately not allowed in M-Link.
The values to 4 digits with leading zeros are replaced, from “4912 mAh” “268 ml” is “4912” “0268” and in the correct notation 49° 12.0268′.

8.2.1. Alarms

All alarms on M-link are produced directly from GPS-Logger. All settings are also made in the GPS-Logger.
<u>There is a peculiarity with the Vario settings</u>:
Since the Multiplex transmitter itself produces the Vario tone, the GPS-Logger suppresses climb values which are smaller than “Vario threshold”. Thus this range is hidden from the transmitter tone.
Example: -
“Vario rising threshold” is set to 0,5 m/s “Vario sinking threshold” is set to -1 m/s
–„Vario tone is set to “on”
➔ if the model rises faster than 0.5 m/s, the value is sent and the transmitters beeps
➔ if the model rises or sinks more slowly, the value 0 sent and the transmitter remains silent

As an additional feature the UniLog 2 writes all data continuously on the Multiplex M-Link bus system and stores it in parallel with its own data on the memory card. So you can expand your M-Link sensor system to a practically infinitely large Data logger!

Later the values at each individual waypoint can be evaluated directly in a 3D representation in Google Earth™. In addition the curve in Google Earth™ can be coloured according to a selected M-Link value.

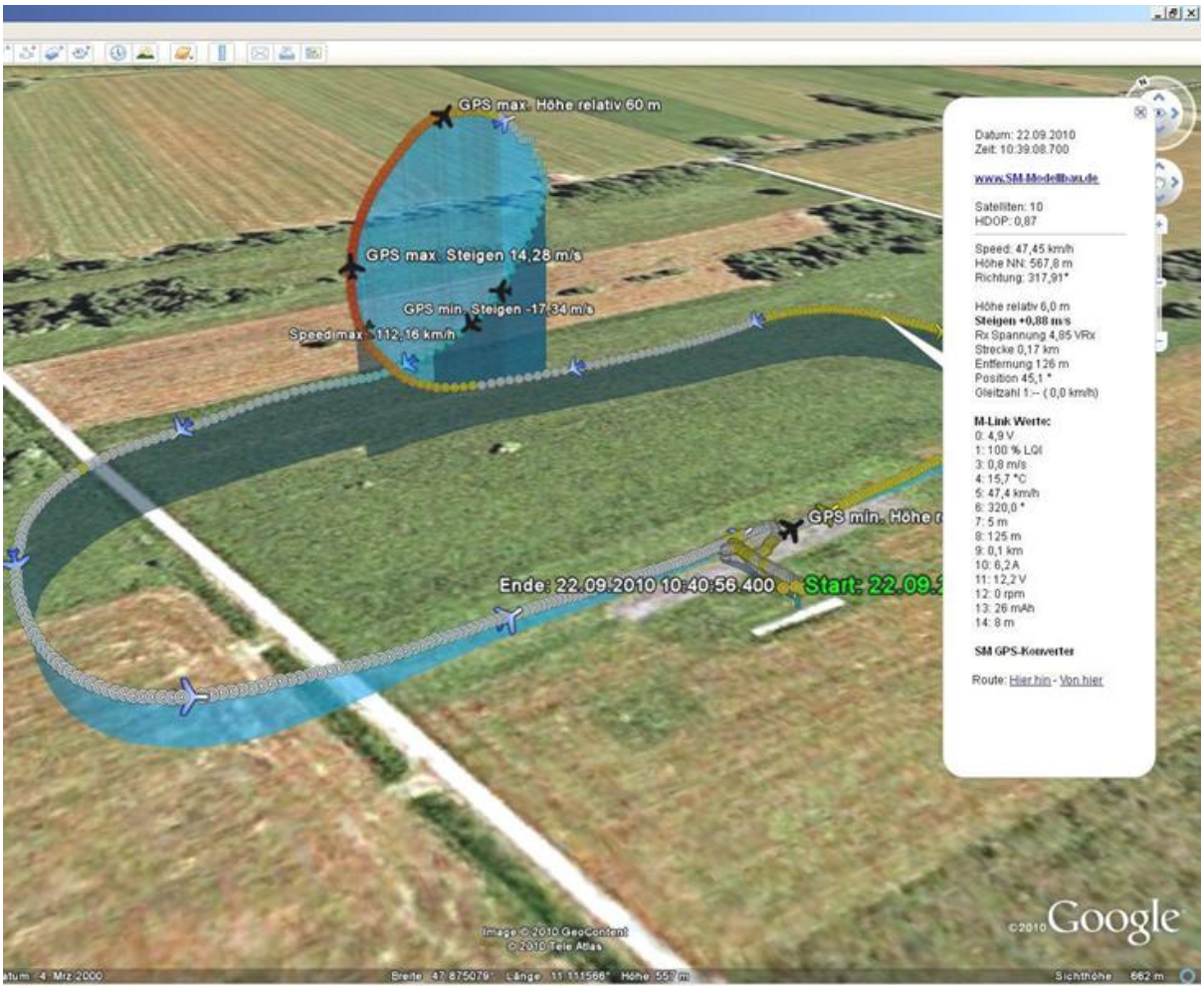


Illustration 1: Airfield circuit with loop. Full M-Link equipment with GPS, UniLog and temperature sensor.

8.3. Telemetry operation with Graupner HoTT

The GPS-Logger is also a full telemetry sensor for the Graupner HoTT 2.4 GHz system. The measured values can be transmitted live to the ground and displayed directly on either the Smart Box at the HoTT transmitter or directly in the display of the HoTT transmitter. The connection to the HoTT receiver is made with the Patch cable provided, between the connection on the GPS-Logger and "T" on the HoTT receiver.
The UniLog 2 supports both the Text Mode" and the "Digital Mode" of the HoTT system. In both modes of operation all adjustable alarms on the GPS-Logger are indicated at the transmitter by beeps or speech output.

As of firmware v1.05 the GPS-Logger supports HoTT telemetry in version V4. Earlier HoTT versions are no longer supported. Please download the appropriate firmware on your HoTT to use the telemetry with the GPS-Logger.

Very important is the proper selection of sensors connected in the transmitter telemetry menu. Since with the HoTT telemetry V4 multiple sensors can be operated in parallel you must specify exactly which sensors are actually connected to the receiver.

8.3.1. Alarms

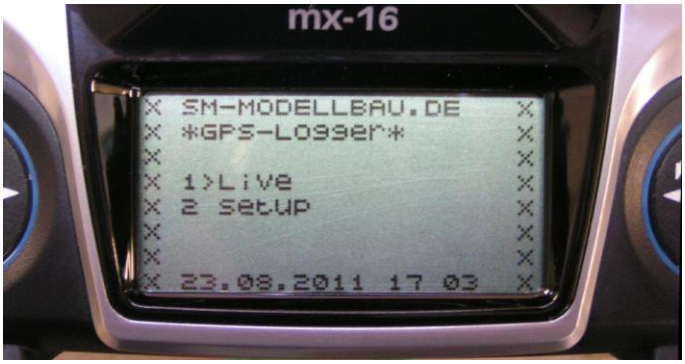
The GPS-Logger supports both the Text Mode" and the "Digital Mode" of the HoTT system. In both modes of operation all adjustable alarms on the GPS-Logger are indicated at the transmitter by beeps or speech output.

<u>There is a peculiarity with the Vario settings:</u>
Since the HoTT transmitter itself produces the Vario tone, the GPS-Logger suppresses climb values which are smaller than "Vario threshold". Thus this range is hidden from the transmitter tone.
Example: -
"Vario rising threshold" is set to 0,5 m/s "Vario sinking threshold" is set to -1 m/s
–„Vario tone is set to "on"
➔ if the model rises faster than 0.5 m/s, the value is sent and the transmitters beeps
(for transmitters without built-in speaker to listen to the vario sound like the voice output only with headphones)
➔ if the model rises or sinks more slowly, the value 0 sent and the transmitter remains silent
If the change is always required, "Vario threshold" must be adjusted to 0,1 m/s and "Vario tone" set to "up/down".

8.3.2 Text Mode

Go to text mode and "Settings, View". Using the "up" and "down" keys of the left keypad of the transmitter, the "GPS" can be called from the GPS-Logger. With a click to the right you now get the text display of the GPS-Logger from the receiver data.

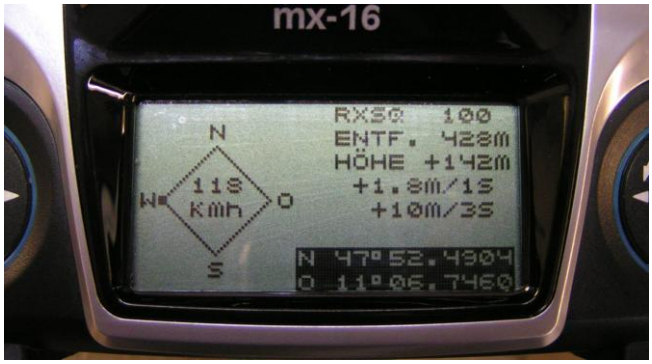
This operation is done with the right keypad of the transmitter. Structure and contents are completely identical to the screens of the UniDisplay, see also chapter 6.



Here all alarms can be set then indicated on the transmitter by beeping or voice output as appropriate.
Operation in text mode appears a bit sluggish since the data cannot be updated so frequently.

8.3.3. Digital Mode

For the digital mode “GPS” must be activated in the Telemetry settings of the HoTT Transmitter. The GPS-Logger then sends the data in this Format, so that the transmitter can display those values in the appropriate screens. From the default display of the transmitter the Digital mode can be selected using the “left” and “right” keys of the left keypad. With the “up” and “down” buttons “GPS” can now be selected for the display of data from the GPS-Logger. Use the “left” and “right” buttons of the left keypad to change between the GPS-Logger screens.



Some values from the GPS-Logger are shown differently:
Climb rate in m/3s
shows the value “Altitude gain”. The height difference in the last 10 seconds.
Latitude and Longitude
are displayed reversed if that is recorded on the GPS-Logger memory card.

8.4. Futaba S.Bus2

As of firmware v1.010 the GPS-Logger can be used with the Robbe / Futaba telemetry FASSTest as an S.BUS2 sensor.

The telemetry in this case cannot be detected automatically and must be selected in advance in the settings of the GPS-Logger.

The GPS-Logger is thereby connected like any other sensor to the S.BUS2 slot of the receiver.
Currently the GPS-Logger is not yet registered in the transmitters, so it uses already existing sensor protocols. We tested the integration with the T14SG firmware v1.4, and the T18MZ Firmware v2.3.1 on the receivers and R7008SB R7003SB. Older firmware versions support the integration but possibly incomplete.

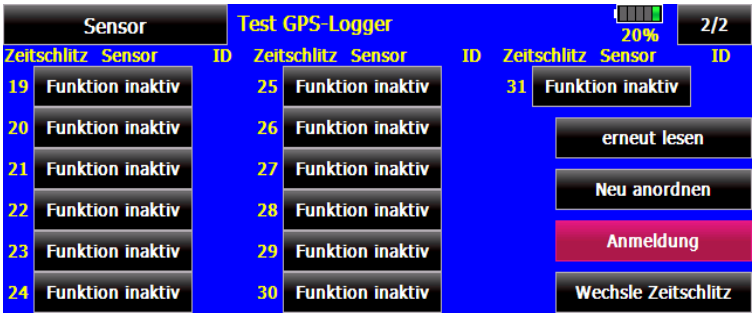
With S.BUS2 Servo data sensor values can be connected to the same data line. But since the servo data is far more important than the sensor values we strongly recommend that you make a strict separation. All servos go to the S.BUS1 connection of the receiver, all the sensors on the S.BUS2. Thus, in the event of an error, a sensor can never interfere with the data for the servos. If nevertheless the GPS-Logger is to be operated together with the servos on S.BUS2, is absolutely mandatory that a connection cable No. 9110 is used between GPS-Logger and S.BUS2! Thus the sensor is decoupled from the bus so far that any influence on the servo data is impossible.

8.4.1. Registration on the Transmitter

To use the GPS-Logger with the S.BUS2, it must like all S.BUS2 sensors be first registered on the transmitter. Use the “Llink" connector on the GPS-Logger on a V cable with the "SI / F" connector on the transmitter and a receiver battery connected for the power supply . The GPS-Logger behaves like a Robbe / Futaba sensor and is thus closely integrated into the system. Please also refer to the transmitter instructions.
However, the GPS-Logger currently uses three Robbe / Futaba sensor values to represent all measured values. Some values cannot be mapped to the correct unit. Here one must remember the assignment with theT14SG, in the T18MZ you can rename the sensors and thus the assignment is easier to understand.

The example of the T18MZ here follows the steps of the application:

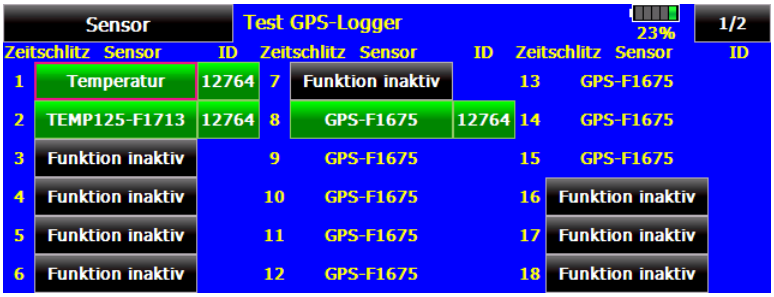
If the GPS-Logger connected to the transmitter and is supplied with power, it is invoked in the sensor menu item "Login". In this way the sensor is registered in the transmitter and assigned free slots. The sensor and transmitter save this assignment.



To be able to represent all values the menu item "Login" on the transmitter must necessarily be called three times. The message "OK" will appear four times, at the fifth time the message is "sensor already exists".

When the application of all three sensors is complete, the sensor list looks like this:

In T18MZ the sensors can then be renamed.

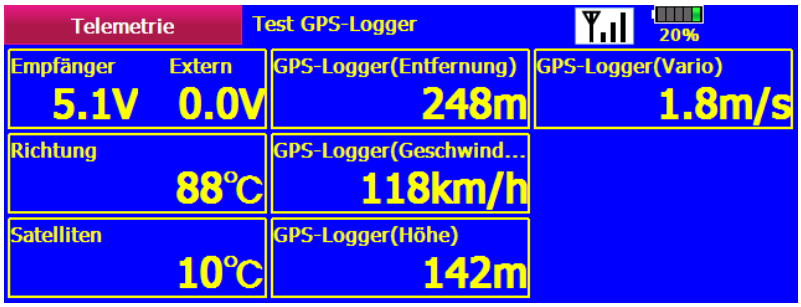


6 slots are occupied by the three GPS-Logger sensors:

Sensor	Name	Slots	Original designation	In GPS-Logger	Value examples
1	GPS-1675	4	ENTFERNG	Distance	248 m
			GESCHWIND	Speed	118 km/h
			HEIGHT	Height	142 m
			VARIO	Vario	1.8 m/s
2	SBS-01T	1	TEMPERAT	Direction to model	88°
3	TEMP125	1	TEMPERAT	Satellite	10° C = 10 sat

Now connect the GPS-Logger to the receiver and call up the transmitter telemetry display.

Here again the T18MZ for example.



See the same values in the T14SG as follows (here the names cannot be changed):

8.4.2. Alarms

In principle with S.BUS2 the alarms are defined in the transmitter. The GPS-Logger has no way to directly trigger an alarm on the transmitter.

8.5 JR Propo DMSS

As from firmware v1.10 the GPS-Logger can also be used with the JR Propo DMSS telemetry. Currently the JR Telemetry has no GPS, therefore in this version only the transfer of height and Vario is possible. GPS data such as speed and coordinates are to be addedc later.

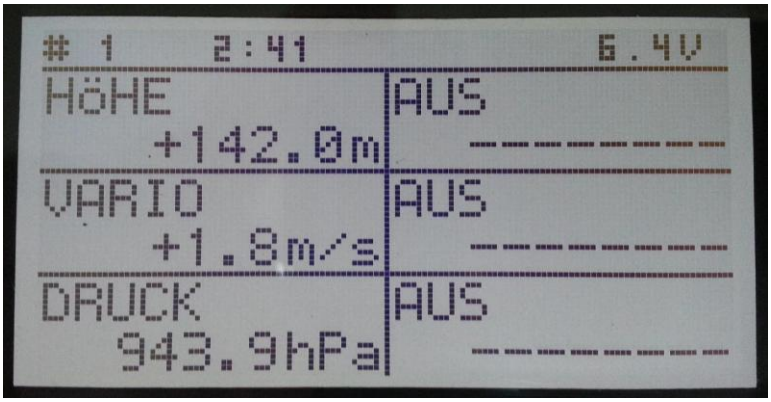
The telemetry in this case cannot be detected automatically and must be set in advance in the settings of the GPS-Logger.

The GPS-Logger is connected like any other sensor to the sensor slot of the receiver and transfers the following data:
>Luftdruck**,** Höhe, Vario (pressure, height, Vario) (sensor address 0x03 "Pressure/Altitude")

No more sensors occupying the same addresses can be connected. For the free addresses, further sensors can easily be plugged into the receiver in parallel to UniLog 2 with a Y cable.

We tested the connection with the XG8 transmitter firmware version 0001-0012 and the RG831B receiver.

8.5.1. Presentation on the Transmitter



All values can be displayed directly, and the sequence is freely selectable.

8.5.2. Alarms
In principle with JR DMSS the alarms are defined in the transmitter. The GPS-Logger has no way to directly trigger an alarm on the transmitter. All alarm thresholds and also Vario tone generation are therefore set in the transmitter.

9. Operation with UniLog / UniLog 2

The GPS-Logger can be connected directly to the UniLog 1 or UniLog 2 with the leads stock no. 2720 or 2721.
This result in the following possibilities:

- The recording of all measured values from the UniLog / UniLog 2 on the memory card of the GPS-Logger synchronously with the other data.
- Display of the the UniLog / UniLog2 measured values on the ground via Jeti Duplex telemetry.
- Monitoring of adjustable limit values by Jeti Duplex telemetry.
- Practically unlimited memory expansion for the UniLog 1.
- Evaluation of the UniLog / UniLog 2 data at each waypoint on Google Earth™.

In order to show the battery capacity used from the UniLog 1, the port A2 must be set to “capacity mAh” in the setup!

Connection to the UniLog 1 or UniLog 2 does not work during FASTest and JR DMSS operation. The COM port cannot be used here.

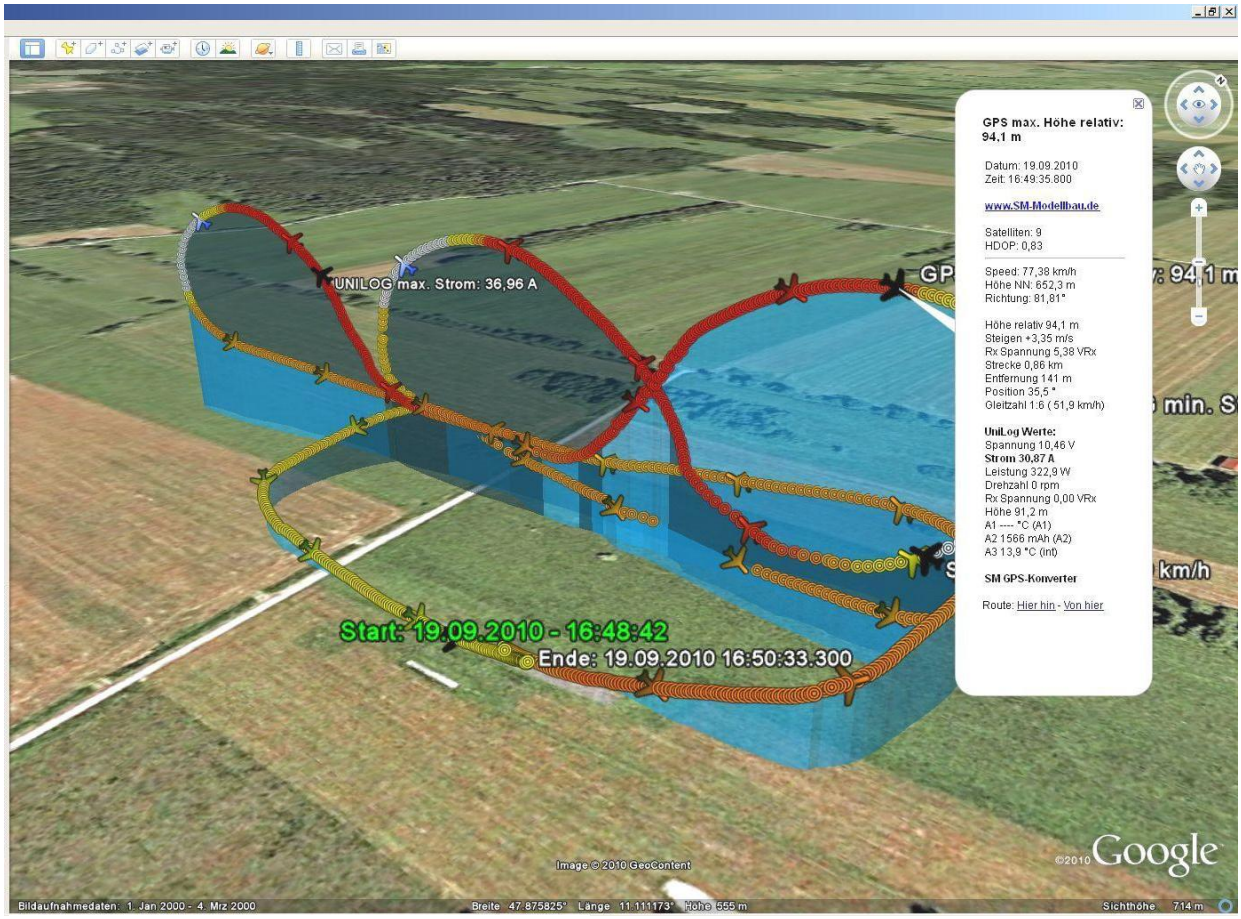


Illustration 2: Cuban Eight with UniLog data

10. The “SM GPS-Konverter” software

On our homepage, in Software & Updates, you will find the free software “SM GPS-Konverter”. Using this, the data is read from the GPS-Logger and converted immediately into .kmz for use in Google Earth™. During conversion several options are available to later colour or highlight certain values in the 3D view.

If you hover the mouse over the buttons, you will see short help texts for the operation.

10.1. File Conversion

The software opens with the “Convert” tab. Here a file can be selected from the GPS-Logger and converted with adjustable options into the Google Earth™ .kmz format. If desired the resulting file can be displayed immediately in Google Earth™.

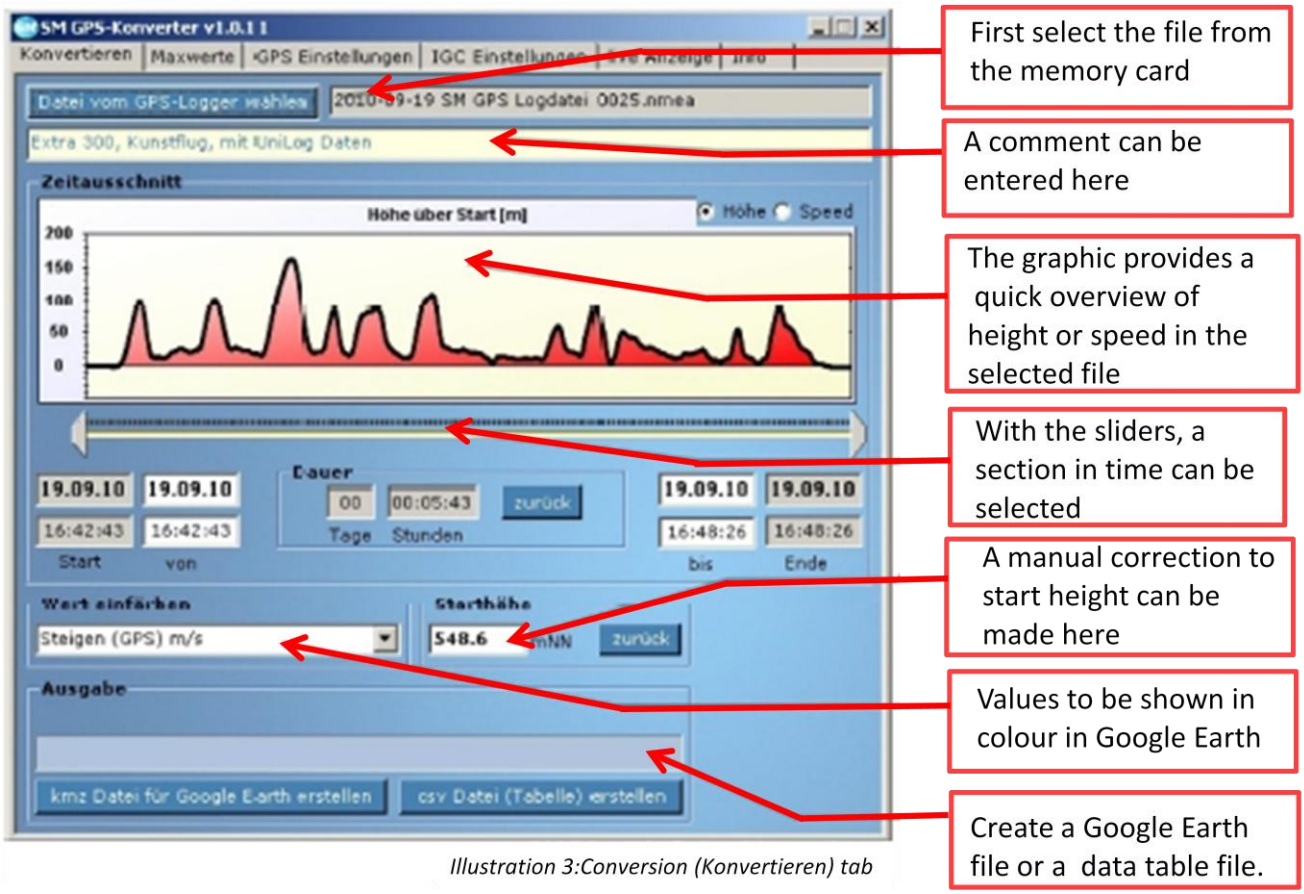


Illustration 3:Conversion (Konvertieren) tab

10.2. Minimum and Maximum Values

Once a file has been converted all the extremes of values can clearly be seen in the ""Maximum" window.

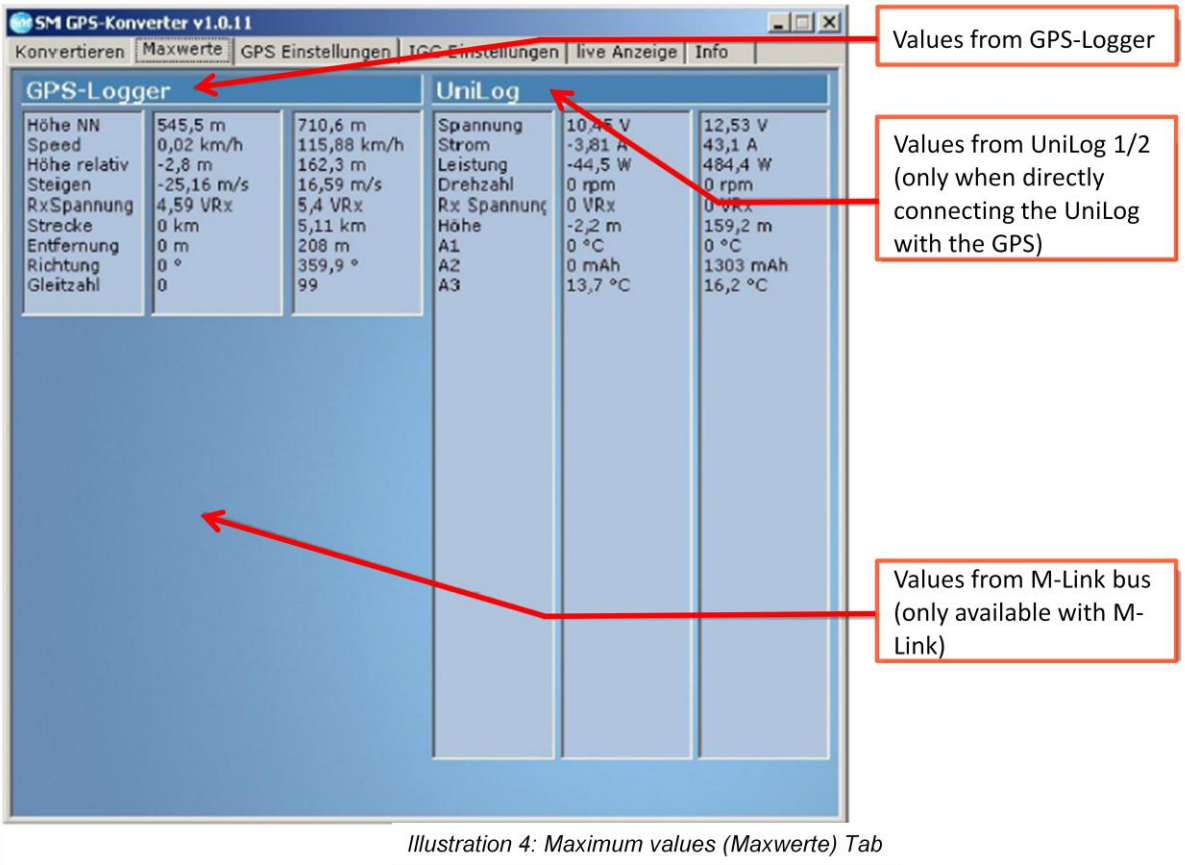


Illustration 4: Maximum values (Maxwerte) Tab

10.3. GPS settings

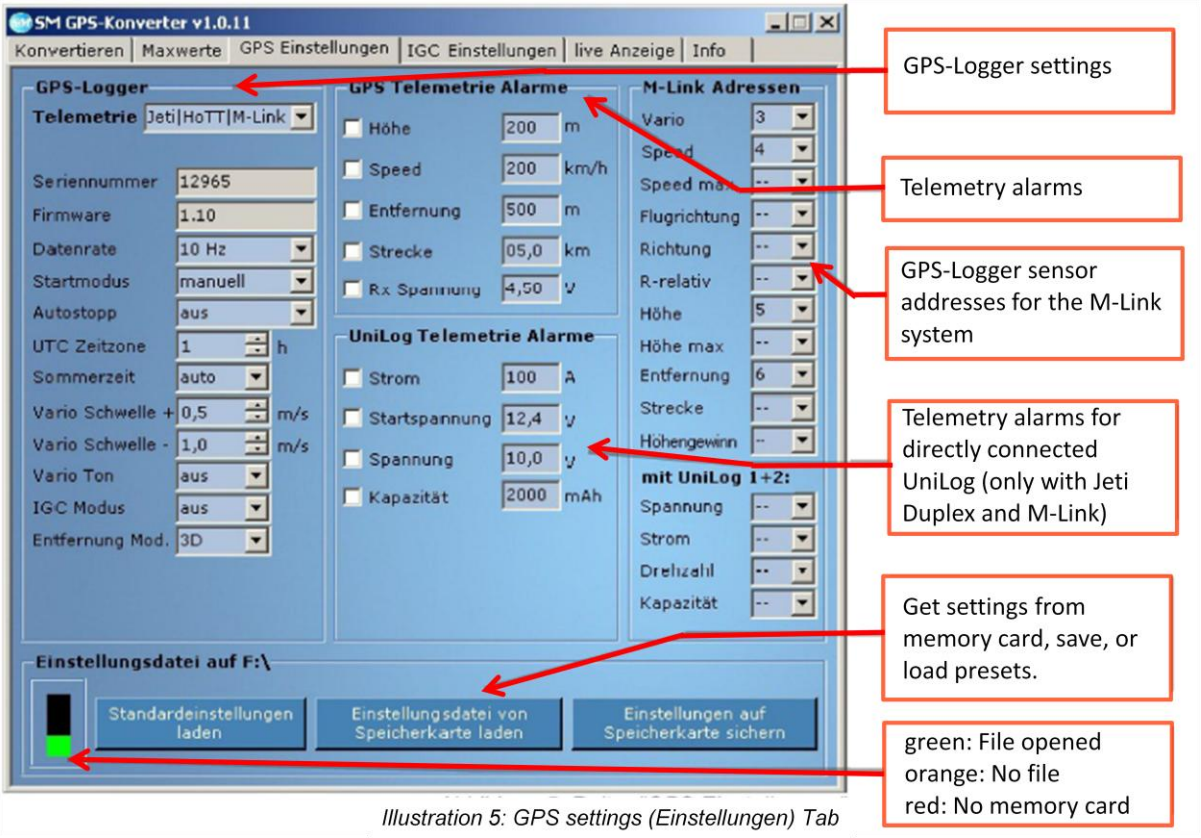


Illustration 5: GPS settings (Einstellungen) Tab

10.4. IGC settings

Here preferences can be specified for the IGC mode. These texts are included in the IGC file from the GPS-Logger. When evaluating the data in the online contest matching fields can thus be filled automatically.

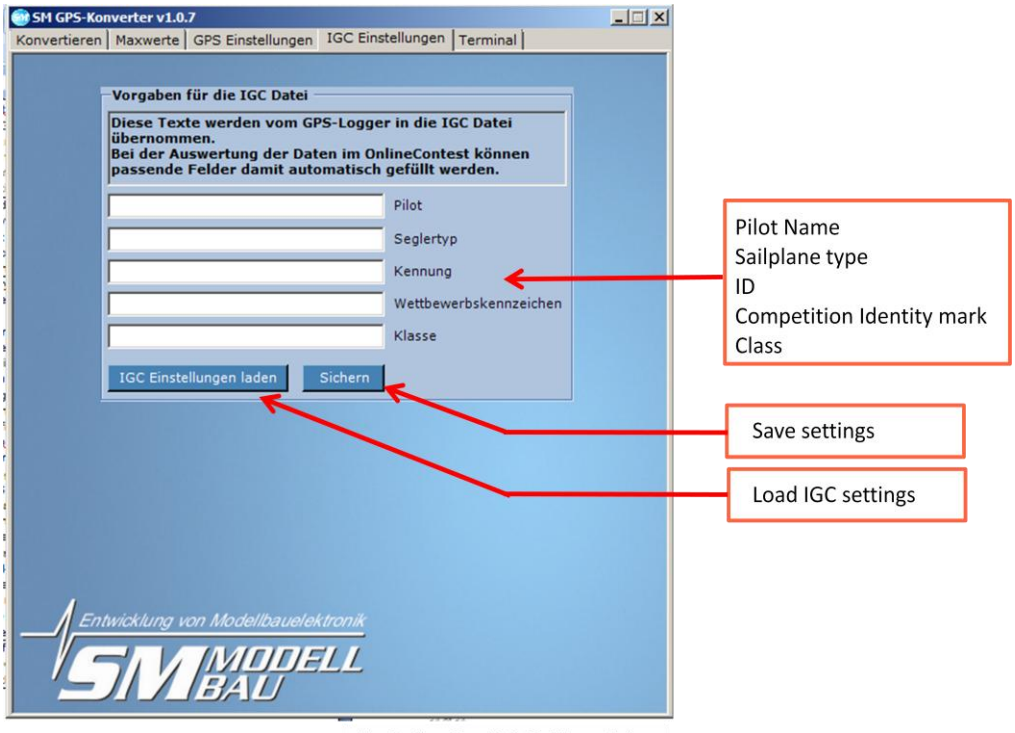


Illustration 5a: IGC Settings Tab

10.5. Live Access to the GPS-Logger

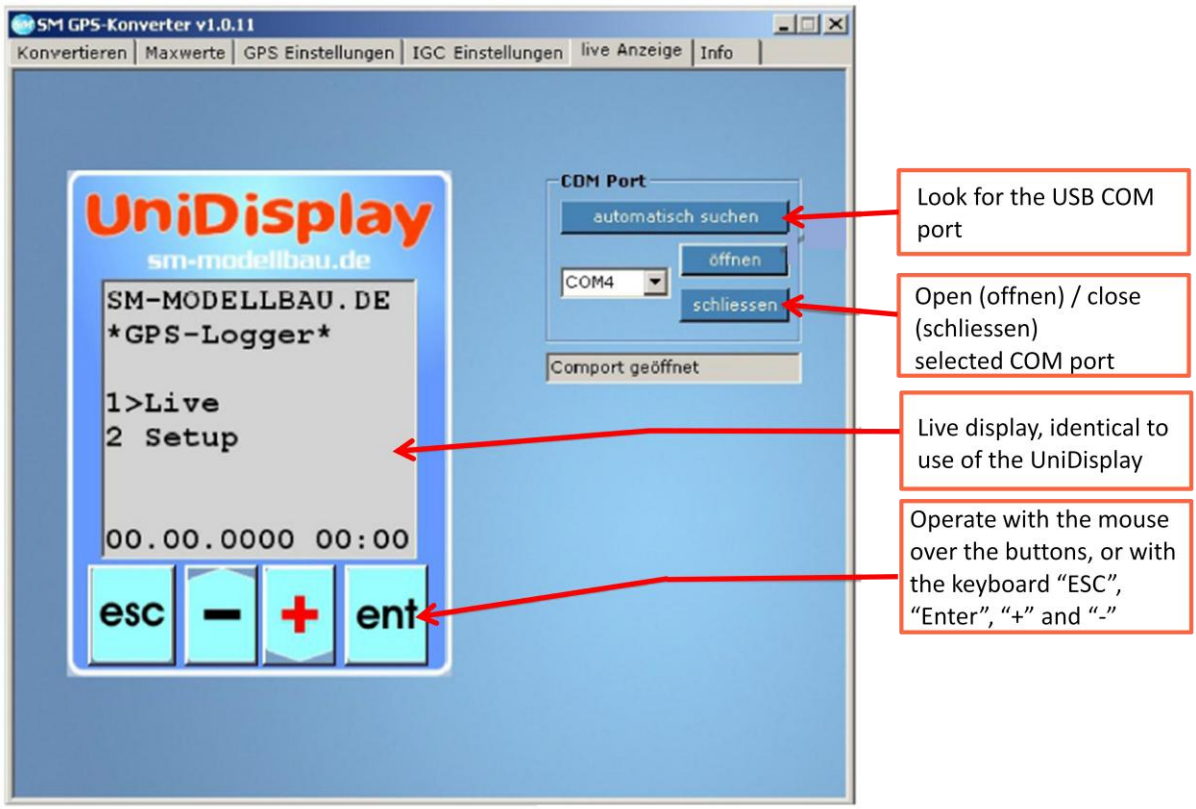


Illustration 6: Terminal Tab

The GPS-Logger must be supplied with external power for connection to the PC!
For example, directly to a 4 cell Receiver battery.

10.6. Info / settings of the SM GPS Konverter

In the “Info” tab can be found programme information and also settings for Google Earth ™ and for the automatic online update.
Here the SM GPS Konverter searches on our website for new versions of the programme and the firmware of the GPS-Logger and can install them.

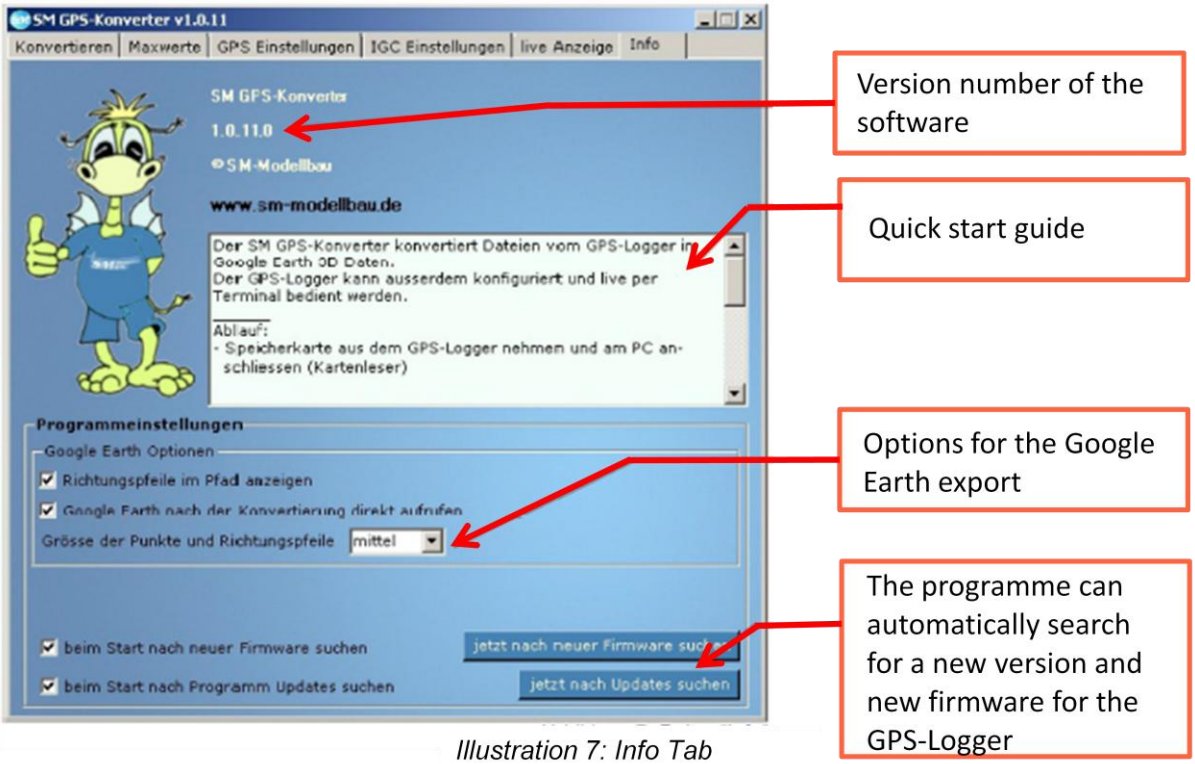


Illustration 7: Info Tab

11. Firmware update of the GPS-Logger

With our USB interface a firmware update can also be uploaded to the GPS-Logger. To make an update, a Windows PC with USB interface and installed driver for the USB interface is necessary.
In each case of improvements in our software, an appropriate file with the update is made available free of charge on our homepage www.sm-modellbau.de within the menu item **Software & Updates**.
The zip file must, after downloading, be first unpacked. Afterwards the exe program is started. Further steps are described directly in the software.

After an update the GPS-Logger must be switched on again so the version can be updated. Only then does the GPS Konverter show the new firmware version correctly.

If the PC software “SM GPS Konverter” is started, the programme can automatically search for a new firmware on our server. If a newer file is found, the update may be downloaded and run automatically if desired. Thus the GPS-Logger is always up to date.

12. Scope of Delivery

The GPS-Logger is available under two order numbers that differ only in the items included. In both cases the GPS-Logger is complete and ready to use.

- **Order no. 2700**
  - GPS-Logger
  - 2 Gb micro SD memory card and USB card reader
  - Connecting cable to receiver
  - USB interface cable for operation from a PC and for subsequent firmware updates
  - Detailed full colour instruction manual

- **Order no. 2701**
  - As no. 2700 but without the USB cable

The USB cable is identical to the cable used with the UniLog 1 / 2, LipoWatch, UnDisplay, etc. If this cable is not already available, it should be purchased via no. 2700 in order to be able to upload new firmware onto the GPS-Logger.

13. Version history

Here you will find all firmware versions and the changes to the previous version.
You can find the current version of your GPS-Logger firmware with our software “SM GPS-Konverter” or the UniDisplay.

Version number	Date	Comment
1.00	10-2010	First retail version
1.01		Internal test version
1.02	03-2011	1. Minor bug fixes and enhancements 2. Autostart with 3D fix is now delayed for 10 s after the fix so that the GPS start height can stabilize ➔ in this time orange and green shine. 3. Support for the .igc file format added so the GPS-Logger can directly generate the files for the online Contest 9OLC) (see section *)
1.03	03-2011	1. Bug fixed in the distance calculation when using M-Link telemetry. 2. 2. M-Link extended for the direct output of the values from a connected UniLog, in addition maximum speed and maximum altitude available as a separate sensor value.
1.04	08-2011	1. Telemetry with Graupner HoTT added. 2. Adjustment to M-Link data logging for receiver firmware 1.20 3. The M-Link value “Address” is now giving he direction to the model instead of flight direction. 4. With M-Link the threshold and tones for climbing are rethought, undesired values are suppressed to stop the sounding of tones from the transmitter. 5. Jeti telemetry now supports the Jeti Expander E4. 6. The .igc filename was changed to the .igc defaults. 7. Autostop option inserted: terminates recording 10 s after the landing. 8. Recording can arbitrarily be started again after stopping (3D-Fix Start goes only one time). 9. Off-field landing mode: after landing and after 2 minutes without movement the coordinates of the model are transferred over telemetry ➔ Jeti and HoTT are changed to the correct screen ➔ with M-Link, Latitude and Longitude are dispalayed in the addresses Vario and Speed in 5 seconds. 10. Min. and max. values of the current measurements can be called up on UniDisplay, Jeti and HoTT. 11. Adjustment for data transfer from the UniLog 2
1.05	01-2012	1 Support for Graupner HoTT telemetry V4 (V3 no longer supported from this version) 2 In HoTT the Vario sound and threshold adjusted,

		unwanted values and sounds are suppressed. 3 New value “RelativeDirection” shows via telemetry the direction of flight relative to the start point. 4 M-link addresses are now checked for double occupancy.
1.06	04-2012	1 Jeti Duplex EX support installed. 2 Installed filters for nonsensical maximum values. 3 Errors in distance and glide ratio resolved. 4 M-Link: Unit before the decimal point in latitude and longitude display changed to “mAh”, since an empty unit is no longer allowed. 5 New setting: “distance mode” can switch between 2D and 3D calculation. 6 Landing detection now evaluates the climb, to prevent the erroneous switching off of recording. 7 IGC mode: v1.05 did not write barometric altitude values to the IGC file.
1.07	05-2012	1 Jeti Duplex EX optimised so that the measured values are transmitted faster. 2 New values with Jeti Duplex EX, Air Pressure and Glide ratio. 3 Vario now has separate thresholds for climbing and sinking. 4 M-Link: Outlanding mode writes the coordinates only to the Bus, the original values remain on the memory card. 5 New setting: automatic Daylight Saving Time switch. 6 Time zone is now correctly included in time, date, year. 7 Incomplete values were sometimes written to the memory card
1.08	11-2012	1 Jeti Duplex EX : again faster transmission of data. 2 Jeti Duplex EX: Vario tone did not work on all systems 3 Fixed issue with many files on memory card: under some circumstances no new files could be created and the GPS-Logger rebooted. 4 Set UniLog alarms are triggered if the connection to the UniLog is interrupted during the current operation.
1.09	01-2013	1 Jeti EX: Correction for Jeti DC-16 transmitter firmware v1.07 2 Jeti EX: West and East was reversed in longitude.
1.10	04-2013	1 Futaba FASSTest S.BUS2 telemetry added. 2 JR DMSS telemetry added. 3 New measured value “Altitude gain”: change in height over the last 10 seconds recalculated every second > with Jeti EX and M-Link as a new value and with HoTT as m/3s.