ALGE-TIMING

Version-E23-11-23

Radio System TED2

Manual

Important Information

General

Before using your ALGE-TIMING device read the complete manual carefully. It is part of the device and contains important information about installation, safety and its intended use. This manual cannot cover all conceivable applications. For further information or in case of problems that are mentioned not at all or not sufficiently detailed, please contact your ALGE-TIMING representative. You can find contact details on our homepage www.alge-timing.com

Safety

Apart from the information of this manual all general safety and accident prevention regulations of the legislator must be taken into account.
The device must only be used by trained persons. The setting-up and installation must only be executed according to the manufacturer's data.

Intended Use

The device must only be used for its intended applications. Technical modifications and any misuse are prohibited because of the risks involved! ALGE-TIMING is not liable for damages that are caused by improper use or incorrect operation.

Power supply

The stated voltage on the type plate must correspond to voltage of the power source. Check all connections and plugs before usage. Damaged connection wires must be replaced immediately by an authorized electrician. The device must only be connected to an electric supply that has been installed by an electrician according to IEC 60364-1. Never touch the mains plug with wet hands! Never touch live parts!

Cleaning

Please clean the outside of the device only with a smooth cloth. Detergents can cause damage. Never submerge in water or open. The cleaning must not be carried out by hose or high-pressure (risk of short circuits or other damage).

Liability Limitations

All technical information, data and information for installation and operation correspond to the latest status at time of printing and are made in all conscience considering our past experience and knowledge. Information, pictures and description do not entitle to base any claims. The manufacturer is not liable for damage due to failure to observe the manual, improper use, incorrect repairs, technical modifications, use of unauthorized spare parts. Translations are made in all conscience. We assume no liability for translation mistakes, even if the translation is carried out by us or on our behalf.

Disposal

If a label is placed on the device showing a crossed out dustbin on wheels (see drawing), the European directive 2002/96/EG applies for this device.
Please get informed about the applicable regulations for separate collection of electrical and electronical waste in your country and do not dispose of the old devices as household waste. Correct disposal of old equipment protects the environment and humans against negative consequences!

Copyright by ALGE-TIMING GmbH

Declaration of Conformity

We hereby declare that the following product complies with the below stated standards. All components used by us are CE certified by their producer and are not modified by ALGE-TIMING GmbH.

We, **ALGE-TIMING GmbH**
Rotkreuzstraße 39
6890 Lustenau

declare in sole responsibility that the radio receiver

TED2-RX

complies with the following standards/normative documents and in case of intended use complies with the basic requirements of Radio Equipment Directive 2014/53/EU

Telecommunication (TC)terminal device
Short Range Device

Applied harmonized standards:

EMC: EN55022:2006+A1:2007
EN55024:1998+A1:2001+A2:2003
EN61000 3-2:2006 + A1:2009 + A2:2009
EN61000 3-3:2008

Additional information:
The product complies with the low voltage directive 73/23/EEC and EMC directive 2004/108EG and carries the CE sign.

Lustenau, 2023-01-25

ALGE-TIMING GmbH
Albert Vetter

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We, **ALGE-TIMING GmbH**
Rotkreuzstraße 39
6890 Lustenau

declare in sole responsibility that the radio transmitter

TED2-TX

complies with the following standards/normative documents and in case of intended use complies with the basic requirements of Radio Equipment Directive 2014/53/EU

Telecommunication (TC)terminal device	Radio Equipment
Short Range Device	**Device class 1**

Applied harmonized standards:

	EN 60950-1:2006+A11:2009+A1:2010+A12:2011
EMC:	EN 300113-2 V.1.4.1
	EN 301489-1 V1.8.1 2008
	EN 301489-3 V1.4.1 2002
	EN55022:2006+A1:2007
	EN55024:1998+A1:2001+A2:2003
	EN61000 3-2:2006 + A1:2009 + A2:2009
	EN61000 3-3:2008

Additional information:
The product complies with the low voltage directive 73/23/EEC and EMC directive 2004/108EG and carries the CE sign.

Lustenau, 2023-01-25

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Albert Vetter

Table of Contents

1 Introduction

The TED2 is a timing device with integrated a long-range radio system in the 433MHz ISM band. Time measurement data or large display data can be transmitted over distances up to 4.5 km. The TED2 radio system is equipped with 2 timing channels and an RS232 interface for data transmission. In addition, the timing data can be transferred directly to a PC via a USB-C interface. The TED2 devices are powered by an internal Li-Ion rechargeable battery. The battery is charged via the USB-C socket. In the following text the transmitter is called TX and the receiver is called RX. The transmitter can be recognized by the green cover and the receiver by the red cover.

Attention:
The TED2 works with “time of day” and “ID-numbers”, therefore TED2 is not compatible with the previous model TED.

2 Device Description

The TED2 timing system works based on the time of day. It is automatically synchronized with the time of day via the integrated GPS. The devices have two timing channels with 1/10.000 second precision.

Turn on:
Press the ON button, confirm with ↵. This procedure prevents unintentional switching on. If you just press ON, the name (ID) of the device is displayed.

Turn off:
Press the OFF button for 3 seconds. Release the OFF button to confirm and press it again. With ESC or any other key, you can cancel the shutdown.

2.1 Data transmission

2.1.1 Transmission of times

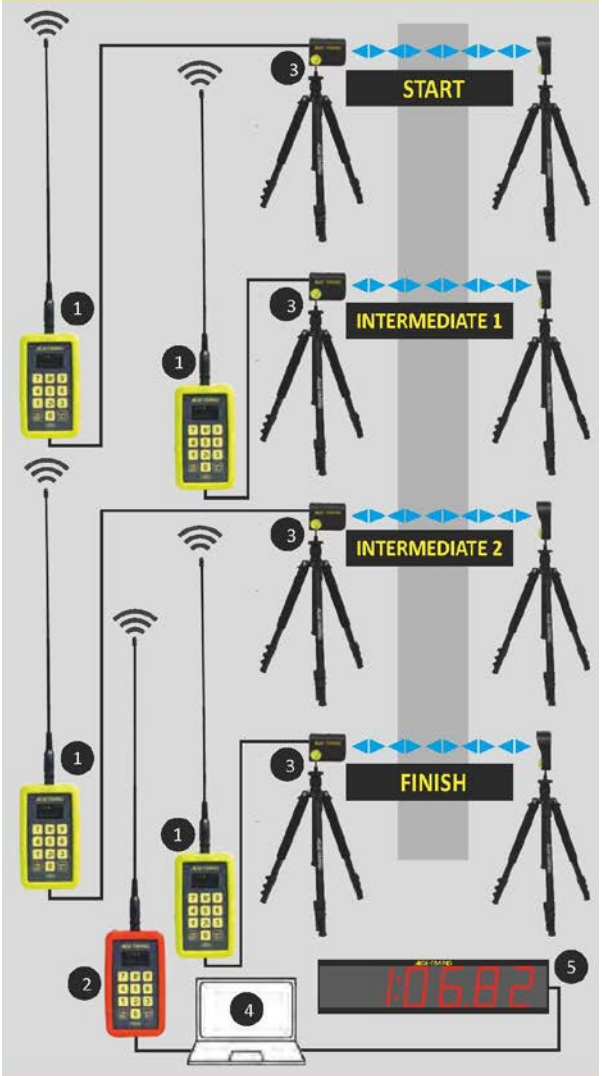
The times are transmitted three times in a row using a special process (patent pending). This serves to ensure transmission security and to prevent deletions. Depending on the channel, the transmission can take up to 2.1 seconds. If the first transmission is successful, the time pulse can be output as a pulse by the receiver with a delay of exactly 0.1s. However, since the ID-number is transmitted with the TED2 system, we recommend connecting the Timy2 or Timy3 using cable 319-03 or 327-02.
The impulse output is only intended for compatibility with older devices. For this you need then a cable 000-xx per channel. The transmission is not so safe in this mode, because it must be done within 0.1s and also a resend of times is not possible.

Hint:
With the OPTIcx, the pulse output only works for the start. This is not suitable for the target, since only a short pulse is output. The target image would then be cut off if necessary.

Attention:
Secure data transmission works with the Timy2 or Timy3 with the programs PC-Timer, Backup and Stopwatch. For the other programs, please use the TED-RX compatibility mode with the 327-02 cable. See also 3.1.9

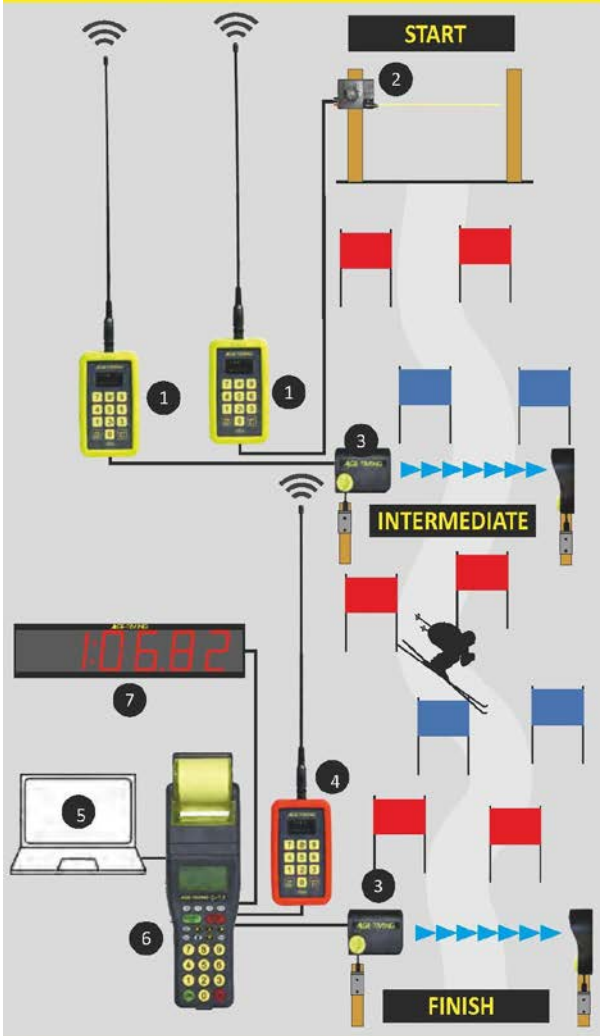
2.1.2 Example Schematics

Timing with two Intermediate Times and PC



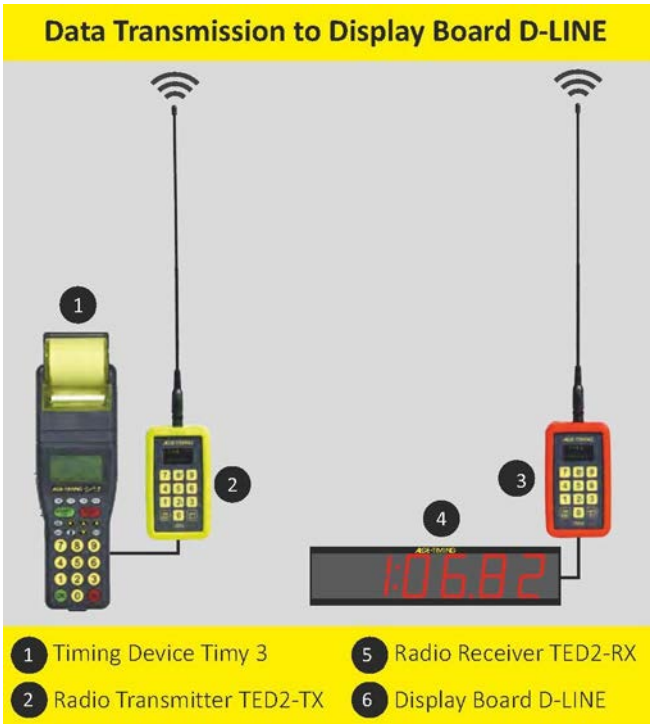
1 Radio Transmitter TED2-TX
2 Radio Receiver TED2-RX
3 Photocell PR1a-RT
4 PC for Timing Operation
5 Display Board D-LINE

Ski Alpine with Intermediate Time



1 Radio Transmitter TED2-TX
2 Startgate STSn1M
3 Photocell PR1a-R
4 Radio Receiver TED2-RX
5 Evaluation PC
6 Timing Device Timy3 WP
7 Display Board D-LINE

2.1.3 Transmission of RS232 Data



The data transmission of RS232 data is designed for large display data. However, any other data can also be transmitted. The baud rate on the transmitter is set to 2400 baud. The receiver automatically recognizes whether it is a matter of times or dates. Times are automatically output at 9600 baud, data at 2400 baud.
The data interface is an input for the transmitter and an output for the receiver.

2.2 Display

The OLED display of the TED2 has a resolution of 128 x 64. The display is switched off after 5 minutes without activity. Any button or a timing pulse reactivates the display.

2.2.1 Status Bar

When the device is switched on, the main menu appears. A status bar appears at the top of the display.

Example for TED2-TX:

Example for TED2-RX:

Symbols of the status bar:


No GPS reception at the moment.


A blinking dot means a valid GPS signal is being received


GPS is disabled after synchronization


TED2-TX: The Icon is animated while sending 


TED2-RX: field strength – no reception or no transmission (yet)


TED2-RX: field strength – moderate reception


TED2-RX: field strength – very good reception

TED2 is connected with an USB-**H**ost (e.g. with Printer)

TED2 is connected with an USB-**D**evice (e.g. PC or Power supply)


TED2 has no USB connection


TED2 Battery is full


TED2 Battery is 2/3 charged


TED2 Battery is charging (animated Icon)

TED2 has been synchronized with GPS

TED2 has not (yet) been synchronized

Device is a transmitter

Device is a receiver

Set radio channel number

The first icon from the left is the GPS status. The next icon from the left is the last received signal strength (RX) or shows the transmission process (TX).

The third icon is the USB icon. It is crossed out if there is no USB data connection. Note: A power supply or power bank has no data connection. In this case, the icon stays strike through.

The fourth icon from the left is the battery icon which shows the power state and state of charge. The fifth icon shows the synchronization state. At the beginning, there is no synchronization. After synchronization, it shows the type of synchronization. Possible state is GPS or EXT. The device must be synchronized for timing. You will not receive any timestamp without. Standard setting is GPS synchronization, which has the highest possible accuracy.
The default setting is GPS synchronization, which allows for the highest possible accuracy. At the right end there is information as to whether it is a transmitter (TX) or receiver (RX) and which radio channel is set.
On the main screen, a bib is blinking. To confirm the next bib press ENTER. To change the bib enter the number and confirm with ENTER.

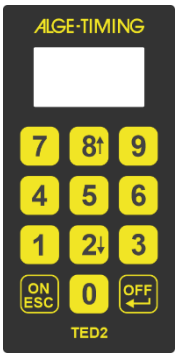
Note:
If you want to suppress a wrong pulse, you can enter “0”+ENTER. This disables upcoming pulses. You can identify the disabled state with a blinking circle.

2.2.2 Time

On the bottom part of the screen, you can see the running time.
On the very bottom of the screen, you can find the latest timing pulse (channel, bib and time).

2.3 Keypad

The TED2 has a splash-proof foil keyboard with 12 buttons.



2.4 Connections

2.4.1 Timing channels

The TED2 is equipped with two timing channels on banana plugs. One green and black(C0), and one red and black (C1) with a precision of 1/10,000 seconds. The channel usage can be adjusted in the menu from C0..C9

2.4.2 USB

The TED2 device has a USB-C interface which can be used for charging and data transmission to a PC. This USB interface simulates a virtual COM port. For Windows 7 OS and older you need a driver to use this COM port. For newer OS you can install the MT1 driver (same driver for TED2) to show the correct name in the device manager, but it is not necessary. This virtual COM port uses the same data protocol as the Timy series and TDC 800x series.

No data connection to the PC is shown with a crossed out USB symbol.

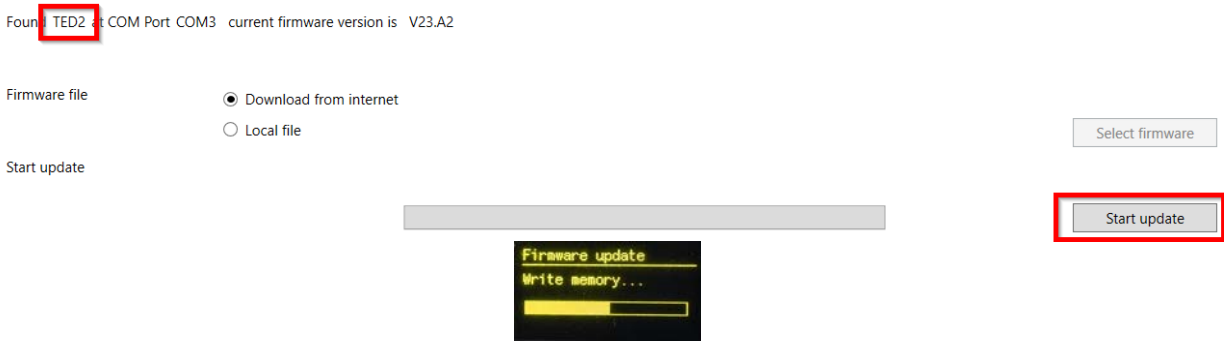
Valid data connection to the PC and charging:

The flash symbol shows an existing external power supply. When the battery is charging the battery symbol shows an animation. The TED2 does not have to be switched on for charging.

Note:
A "D" (device) is shown when connected to a PC or charger. When connecting to a printer “H” (host) will be displayed.

2.4.2.1 Firmware Update

You need the Firmware Update software for a firmware update.
Start with installing this software; then connect the TED2 to the PC. The firmware update software automatically detects the connected device. You can choose if you want to update the latest firmware version from the internet or from a local file, which can be useful for offline installation.
As soon as the TED2 is found in the firmware update software, you can press “Start update” to start the updating process.



After finishing the download, press the ON/ESC button to restart the device.

3 Operation

In the main menu you can enter the next bib and confirm with ↵.

3.1 Menu

Open the selection menu with the ESC button. Press ESC once again for returning to the main screen. Use the arrow buttons (‘2’ for scroll up, ‘8’ for scroll down) to choose the menu item. Press ↵ to confirm the selection.

3.1.1 Channel state

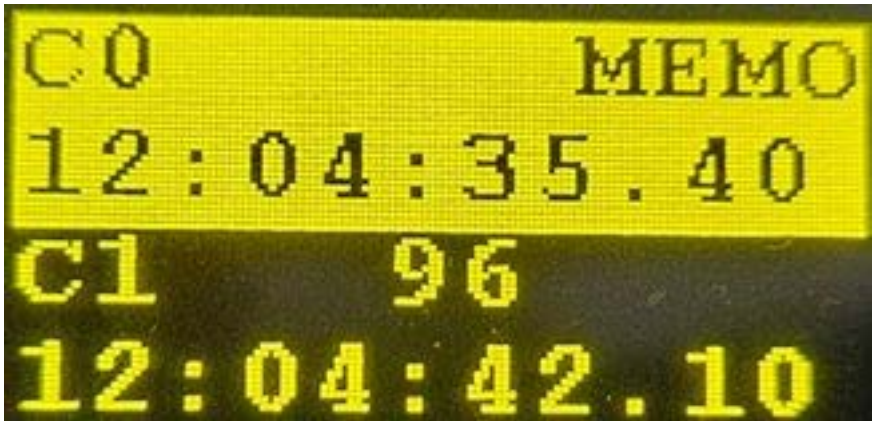
First menu item is the channel menu. In this menu, you can set the timing channels “Active”, “Disabled” and “Blocked”. If a timing channel is “Disabled”, no time is stored. That is used during breaks to avoid unnecessary data transmission. Use “Blocked” during the event when you are not sure if the next pulse is valid or not. Use “Active” for normal operation. You can navigate with the arrow buttons. To react very fast, this setting is immediately active. You do not have to confirm. You can return to the main menu with the ESC or ↵ button.
At the main screen, you can see the current state in the left lower corner. A blinking circle around the C is shown if channels are blocked. It is crossed out if the channels are disabled, and it does not blink during normal operation.

3.1.2 Permanent trigger (Pulse Hold)

If a timing channel is continuously triggered, the channel display will start flashing after 5 seconds (default). This would be e.g. the case when the light barrier is not properly aligned. If this error occurs, an error status is transmitted to the receiver every 10 seconds. A corresponding error message is then displayed at the receiver to inform the timer if necessary.

The message is closed with the ESC key. With the "OFF" button, the message is permanently deactivated at the receiver.
This function can be set separately for each timing channel. Further details can be found under point 3.1.6.1

3.1.3 Memo



With the “memo” menu you can switch to memo-mode. This mode is used if it is not clear which competitor is next, e.g. at the finish area when you cannot see the competitor come closer.
The bib number at the first time blinks. You can confirm the given bib with ↵ or you can enter a new bib and confirm with ↵.
If you want to delete an pulse, enter bib ‘0’ or press ESC and confirm with ↵.
If you want to edit another pulse, you can exit the edit mode with 2 x ESC. Then scroll to the desired time. Press ↵ to edit. You can enter the bib and confirm it with ↵.
Exit the memo mode with ESC.

It can happen, that 2 competitors pass at the same time. You will get only one impulse then. You can double the time by press+hold the ESC button for at least for 3 seconds. The display will then show "COPY" instead of "Memo". Confirm time doubling with the Enter button. Repeat for more than two competitors.

3.1.4 Scroll

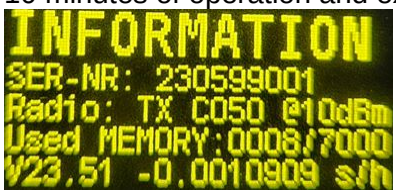
At the “scroll” menu, you can check the timing pulses and edit the bib information. Scroll with the arrow buttons (2 for scroll up, 8 for scroll down) to the time you want to change. With ↵ you can edit the bib number. Enter the new bib and confirm with ↵. If you enter the bib ‘0’, the time is be deleted.
Exit the scroll mode with ESC.

3.1.5 General <GENERAL>

This is the menu for general information and settings.

3.1.5.1 Information <Info>

General information about the TED2 device like serial number, sync setting, used memory, software version and current accuracy of the device (only available with GPS 3D-fix and minimum 10 minutes of operation and external power).



When you press the arrow down (8) button in the info menu you can change the following special settings:

3.1.5.2 Clear memory <Clear Mem>

The TED2 automatically saves all timing impulses. When switched off, the times are stored in flash memory. When switched on, these times are automatically restored. When the memory is full, the oldest pulses are overwritten.
Here you can delete saved times. Confirm with ↵ if you want to continue. Otherwise press ESC to exit.

3.1.5.3 Send Memory over RS232 <Send Mem>

You can send the stored data via the RS232 interface (yellow and black banana socket).

3.1.5.4 Print Memory <Print Mem>

It is possible to print all the stored data on a printer P6-USB. This function is only available, if the USB-interface recognizes a printer.

3.1.5.5 Synchronization of other devices <Sync out>

You can synchronize other devices with a timing pulse on C0. A confirmation is displayed on the minute.

Hint:
This function is only active if the TED2 has already been synchronized.

3.1.5.6 GPS reception <GPS>

If there is no GPS available:

Below picture shows the normal operation with more than 3 satellites in view. In this example there are 7 satellites in use and 26 satellites in view. You also can see the altitude and GPS signal strength of the 7 best satellites which are used.

The GPS receiver uses GPS, GLONASS and GALILEO satellites.

3.1.6 Settings

3.1.6.1 Channel settings (Green Chan. und Red Chan.)

Use the arrow keys ('2' for up, '8' for down) to select the setting.
With ↵ you can edit this setting. Select the setting and confirm it with ↵. Pressing the ESC button exits the setting without changing it.

State:
This shows whether the channels are active (Active), deactivated (Disabled) or blocked (Blocked). This is always the same for both channels. How you can change the status is described in 3.1.1.

Channels:
Here you can determine the channel use for the green or red channel. By default, the green channel is C0 and the red channel is C1. But if you want to measure an intermediate time with C2, for example, then you can change that accordingly here. If the receiver receives the set channel within 0.1s, a pulse is output at the banana sockets for 100ms. This is mainly for compatibility with older devices.

Delay time:
You can use the delay time to suppress multiple pulses. However, do not select this too large, otherwise pulses that occur in quick succession could be suppressed. By default, this is 1s for C0 and 0.3s for C1.

Pulse hold:
This function is used to detect permanent triggers. If a channel has not returned to the idle state after the set time has elapsed, a warning is issued. On the corresponding device, the channel starts flashing continuously. This status is also transmitted from the sender to the receiver. A warning with the continuously triggered channel is then displayed at the receiver.

In this example, the timing channel C1 at the transmitter is constantly triggered.
By default, this function is deactivated for channel C0 (pulse hold = 0.0). For C1, the default time is 5 seconds.

3.1.6.2 Time Zone

The UTC (Greenwich) time is received via the GPS. You can set the time zone here so that your local time zone and, if applicable, daylight saving time are taken into account. By default, CET = UTC+1 is set.

To change the setting, press the Enter button. Use the arrow keys to change the value in 0.5-hour increments. Confirm the new setting with the Enter key. Exit the menu with the ESC button.

3.1.6.3 Frequency

In this menu you can set the desired transmission frequency. The transmission frequency is divided into channels (channel 0 to 138 or 433.0625 to 434.7875Mhz). Transmitter and receiver must use the same channel. If the set frequency is already occupied by another radio system, then you must change the channel on the transmitter and receiver accordingly. Channel 99 is set by default.

3.1.6.4 TX Power

The device works in the EU-wide harmonized ISM band. In the EU, radio devices up to 10mW (SRD) can be used without a license. Some countries allow up to 500mW transmission power. Depending on the country, a transmission power >10mW is forbidden, requires a license or is even allowed. As a user, you must inquire in advance whether a higher transmission power is permitted in the area used. If you set a transmission power that is greater than 10mW, a warning appears as to whether the setting is legal:

If the setting is legal in the area you are using, then select Yes, it is legal. Otherwise please select "Have no idea". The transmission power is then reset to standard.
This menu is only available on the transmitter.

3.1.7 Resend of times

In this menu you can forward times manually if one or more times have not arrived. You can use the arrow keys to set the number of times to be forwarded. Start the forwarding process with . ↵. Use the ESC button to leave the menu without sending. This menu is only available on the transmitter.

Hint:

If you want to forward a specific time: switch to scroll mode. Use ↵ to select the time (= edit start number). Then press again ↵ . The time is then immediately resent.

3.1.8 Field test

This menu is only available on the transmitter. Start the field strength test in this menu with ↵. The transmitter then starts to transmit continuously for 60 seconds. When the receiver recognizes the signal, the field strength is displayed large. The larger the triangle is displayed, the better the received signal is. This allows you to determine a suitable location for the transmitter and receiver. Usually this should be as high as possible above the ground.

The higher this value, the better the reception. If no field strength is displayed on the receiver, then it is out of range. Stable reception is possible from around 1200mV.
You can cancel this field strength test at any time with "ESC".

3.1.9 Compatibility settings TED-RX

Various devices and programs such as Timy Training Ref use the TED-RX mode. For this compatibility mode you need the cable 327-02
By default, TED-RX mode is turned off.
Please do not use the TED-RX mode for the Timy programs Stopwatch and Backup. The standard mode is significantly more secure due to multiple transmissions. For standard mode use cable 319-03 or 327-02 (green plug is not connected)
This menu is only available on the receiver.

4 GPS and Synchronization

After switching on the TED2, the internal GPS receiver is activated. If a valid GPS signal is received, the TED2 will be synchronized by the GPS. For a valid GPS signal you must receive at least 4 GPS satellites. If the GPS synchronized time does not match with the actual time of day, then you have to adjust the time zone (see 3.1.6.2). Only when the device is synchronized can the TED2 process timing pulses or output them as pulses. This also affects the compatibility mode for the TED2-RX with cable 327-02.
If you don't have GPS reception (e.g. in indoor arenas), you can either go outside the arena to synchronize the device with the time of day or do this manually.

4.1 Manual Synchronization

You can also manually synchronize the TED2 to the time of day. However, this is only possible as long as the device has not been synchronized via GPS.

- Press key ON ESC
- Press key 2↓ as many times until the display highlights <General>
- Press key OFF ↵
- Press key 2↓ as many times until the display highlights <Synchronize>
- Press key OFF ↵
- Input the time of day with hours and minutes

- Press key OFF
- The display is now ready for the sync signal and shows the adjusted time of day

- When the entered time of day is reached, generate a start impulse via channel C0 (green and black banana socket). The time of day starts with this impulse.

Attention: If synchronization occurs manually, no further synchronization is possible until the device is switched off. The GPS receiver is switched off.

4.2 GPS-Display

The internal GPS receiver is always activated. You can see the status of the GPS receiver in the upper left corner of the status bar.

No GPS reception:

Good GPS reception with 3D-fix:

3D-Fix is displayed with four dots around the circle. The blinking dot in the middle shows the correct reception of the highly precise second pulse.

Note:
The distance between two or more TED2 devices must be at least 30 cm as otherwise the GPS reception can be disturbed.

4.3 Auto trim function

Every clock (quartz) has a deviation. This deviation depends on temperature and aging. That means that the clock sometimes runs faster or slower.
As soon as the TED2 receives a 3D-fix, it is able to auto trim the internal quartz. The longer the TED2 receives a GPS signal the more accurate it gets. That eliminates influences from temperature and aging. With this technique, no re-synchronization is necessary, which would cause a time jump. Current accuracy is displayed in the info menu (see 3.1.5.1).

Note:
In battery operation, the GPS is deactivated after synchronization to save energy (from firmware V21.C1). The quartz adjustment only works with an external power supply.

5 Software

5.1 Evaluation software

If your evaluation software works with serial data and supports the communication protocol (Timy or TDC 800x series, time of day format), you can use it to read the time stamp directly via the USB interface.
Since firmware V23.51, a distinction has been made in the log as to whether it is a sequential start number or a manually entered start number. If a start number is entered explicitly, then this time will be marked with a "*" as "correct". This corresponds to the functionality of the Timy Backup with STN* feature.

5.1.1 Evaluation with Time.NET2

If you want to use the TED2 directly with the Time.NET2:
Please set "TED2" or "Timy Backup" as the device under "Time measurement (RS23)" if you want to use the STN* feature. The STN* feature recognizes whether a start number is consecutive or has been entered manually. For example, if the starter had forgotten to enter a start number, it would be recognized as "potentially invalid".
If you do not want to use the STN* feature, then set "Timy Stopwatch" as the device.

6 Technical data

Measuring range:	23 hours 59 minutes 5.9999 seconds
Timing channel precision:	1/10,000 s
Number of timing channels:	2 channels with banana socket, adjustable C0-C9
Operating temperature:	-20 to +65 °C
Time base:	self-calibrating TCXO quartz
Synchronization:	external via internal GPS or via external impulse
Power supply:	External: with USB type C cable Internal: Li-Ion battery, 3.6 V / 10.4 Wh
Charging time:	approx. 4 hours at +25 °C
Operating time:	TED2-TX: 24 h at 20 °C and with one pulse per minute TED2-RX: 12 h at 20 °C and with one pulse per minute
Charging time:	approx. 2.5 hours at +25 °C
Storable times:	7,000
Transmission range:	up to 1.5km@10mW and up to 4.5 km@500mW free LoS
Radio Frequency:	433MHz ISM Band (433.0625-434.7875MHz) 139 adjustable frequencies in a 12.5 kHz grid
Transmission power:	Standard 10mW, adjustable from 5mW to 500mW
Modulation:	FM modulation
Antenna:	BNC antenna
Display:	OLED display with 128 x 64 pixels
Housing:	Splash-proof plastic housing with shock-absorbing silicone cover
Keyboard:	Splash-proof membrane keyboard with 12 keys
Dimensions:	152 x 81 x 40 mm (without antenna)
Weight:	320g (without antenna)

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