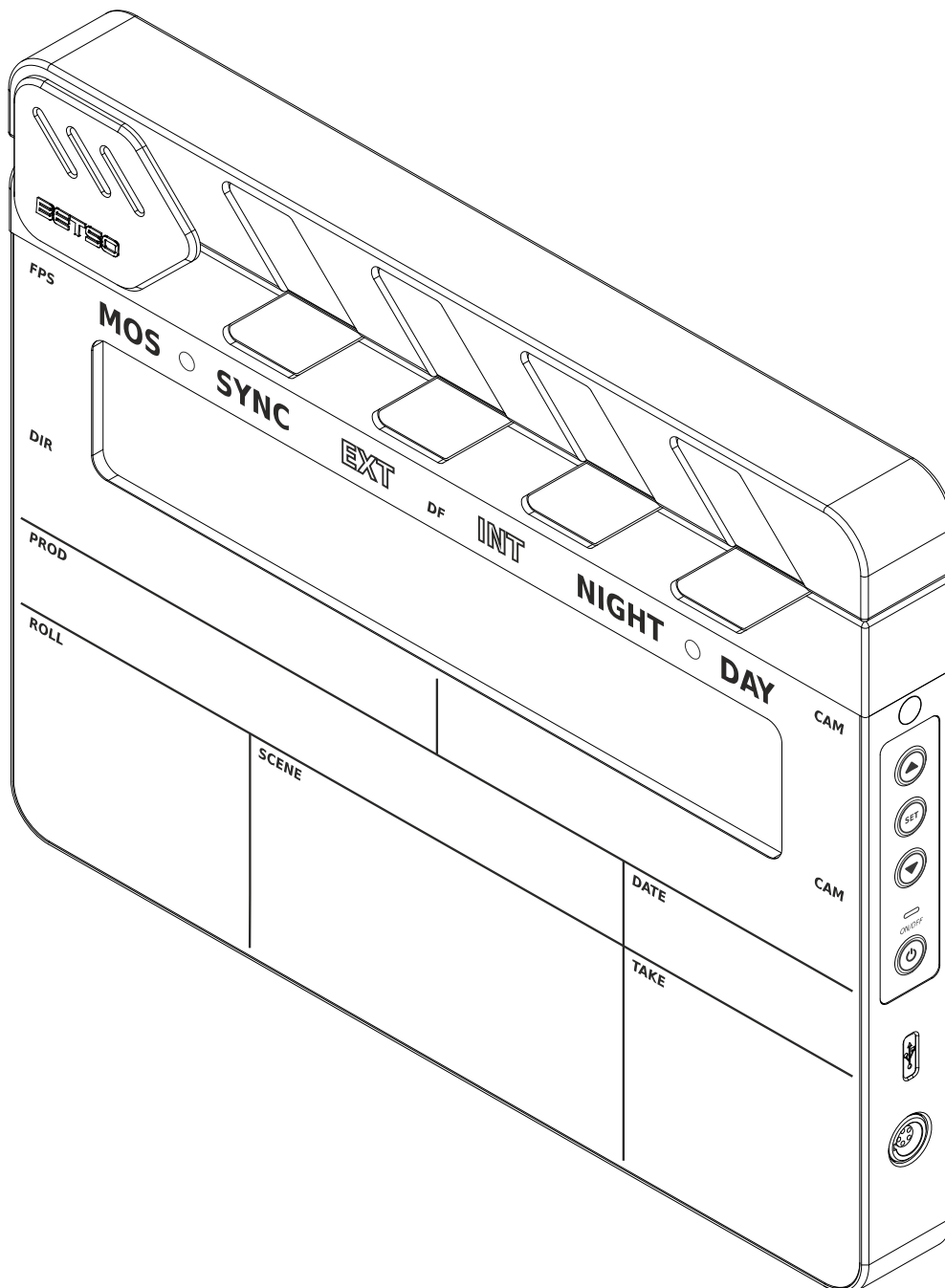


WTCS-1

Wireless time code slate in slim, lightweight and durable design



Contents

| | |
|--|----|
| 1. Product description..... | 4 |
| 2. Top features..... | 4 |
| 3. Control elements..... | 5 |
| 4. Insertion of batteries / accumulators..... | 6 |
| 5. External power supply..... | 6 |
| 6. Turning ON/OFF..... | 7 |
| 7. Menu control..... | 7 |
| 8. Setting of WTCS-1..... | 8 |
| 8.1 Display settings..... | 8 |
| 8.1.1 LED brightness – setting of brightness of LED display..... | 8 |
| 8.1.2 Backlight – setting of brightness of slate writing sheet backlight..... | 8 |
| 8.1.3 Display – setting of displayed data during opened arm of the slate..... | 9 |
| 8.1.4 TC hold..... | 9 |
| 8.1.5 UB hold..... | 9 |
| 8.2 Time code..... | 10 |
| 8.2.1 Frame rate - setting frame rate of generated Time Code..... | 10 |
| 8.2.2 TC Default - setting of default Time Code start time/frame..... | 10 |
| 8.2.3 Offset - setting of Time Code offset for jamming or RF transmission..... | 11 |
| 8.2.4 User bits - setting of User Bits of generated Time Code..... | 11 |
| 8.2.5 Jamming - setting of jamming to external TC source..... | 12 |
| 8.2.6 Cross jamming - jamming WTCS-1 with different TC frame rate..... | 12 |
| 8.2.7 Jamming calibration - calibration to TC source during jamming..... | 12 |
| 8.3 Wireless..... | 13 |
| 8.3.1 Unit type - setting of wireless behavior of WTCS-1..... | 13 |
| 8.3.2 Channel - setting of RF time code system channel..... | 14 |
| 8.3.3 Location - setting of usage location for regulatory compliance..... | 14 |
| 8.3.4 Wi-Fi..... | 14 |
| 8.3.4.1 Wi-Fi On/Off – enabling and disabling Wi-Fi features..... | 15 |
| 8.3.4.2 Wi-Fi password..... | 15 |
| 8.3.4.3 Wi-Fi channel..... | 15 |
| 8.4 Special..... | 16 |
| 8.4.1 Battery type – setting type of batteries powering WTCS-1..... | 16 |
| 8.4.2 Time and date..... | 16 |
| 8.4.2.1 Time - setting of actual time..... | 16 |
| 8.4.2.2 Date D.M.Y - setting of actual date..... | 17 |
| 8.4.3 Display orientation – setting of LED display orientation..... | 17 |
| 8.4.4 Auto on - setting of automatic power on when TC source is connected..... | 17 |
| 8.4.5 Max. brightness after clap..... | 18 |
| 8.4.6 Board LEDs flash - feature of flashing of smart arm LEDs..... | 18 |
| 8.4.7 TC backup..... | 19 |
| 8.4.8 GPS time TC – generation time code with UTC time of GPS signal..... | 19 |
| 8.4.9 GPS calibration – calibration of internal TCXO using GPS module..... | 19 |
| 8.5 System..... | 20 |

| | |
|---|-----------|
| 8.5.1 Serial number - serial number of WTCS-1..... | 20 |
| 8.5.2 HW version - version of hardware of WTCS-1..... | 20 |
| 8.5.3 SW version - version of software of WTCS-1..... | 20 |
| 8.5.4 Contains FCC ID: 2AJWB-RFM1 - inbuilt transmitter module..... | 21 |
| 8.5.5 Contains IC: 21968-RFM1 - inbuilt transmitter module..... | 21 |
| 9. Control of WTCS-1..... | 21 |
| 9.1 Clap..... | 21 |
| 9.2 Change of display brightness..... | 22 |
| 9.3 SMPTE time code signal frame rate information..... | 22 |
| 9.4 Battery level display..... | 22 |
| 10. Informative 3 color (RGB) LED function..... | 23 |
| 11. MovieSlate 8 Application quick functionality setup..... | 23 |
| 12. Recommended accessories..... | 24 |
| 13. Troubleshooting..... | 24 |
| 14. Technical specification..... | 25 |
| 15. LEMO connector wiring..... | 26 |
| 16. FCC regulatory information (USA) FCC Statements..... | 26 |
| 17. Industry Canada (IC) regulatory information..... | 27 |
| 18. Avis de conformité à la réglementation d'Industrie Canada..... | 28 |
| 19. EC Declaration of conformity..... | 29 |

Used symbols



Indicates text that has only informative character. If you overlook this information, it can't result in product damage by it's mishandling.



Indicates text that has important instruction character. If you overlook this information, it may result in product damage.

Thank you for purchasing BETSO product!

Please pay sufficient attention to the following user manual of your new product BETSO. Following these instructions, you will avoid the possible damages of your new device and at the same time, they will be presented to you all the available features that allow you to take advantage of the potential of the product.

For the latest information about our products BETSO please contact your local distributor or visit our website <http://www.betso.eu>.

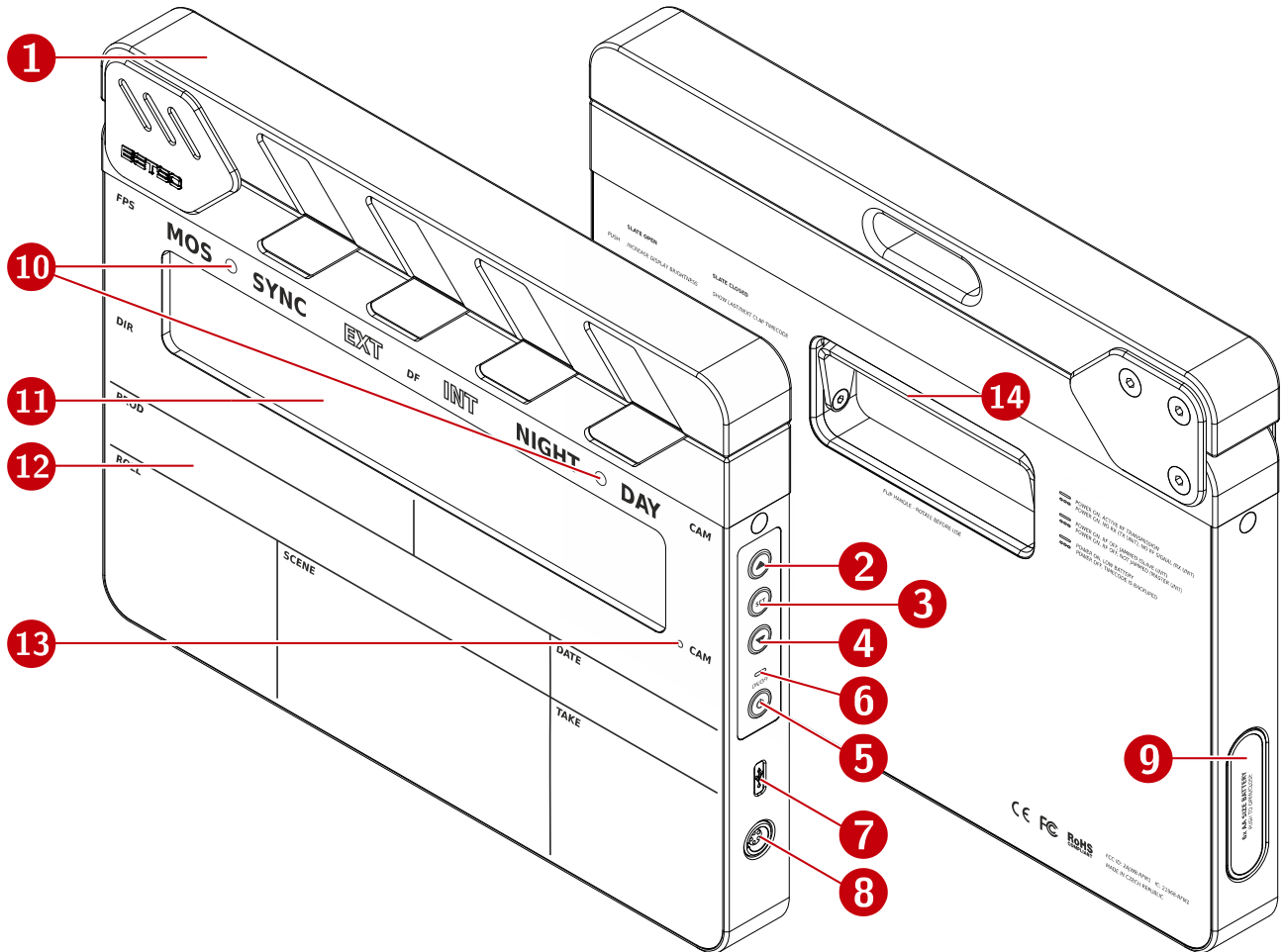
1. Product description

New BETSO WTCS-1 wireless time code slate is carefully designed to meet rising demands on displayed information capability, overall product durability and lightweight and "plug and play" functionality. BETSO WTCS-1 is Wi-Fi enabled device with super bright graphical LED display and implemented cooperation with iOS MovieSlate 8 application thanks which it is capable to display metadata on WTCS-1 display. BETSO WTCS-1 has also our latest RF transceiver module for wireless transmission of time code and status information. And of course a lot of more cool features to make your work easier.

2. Top features

- big, super bright, antiglare graphical LED display with 9 step manual or automatic brightness level
- big slate writing sheet with bright backlight
- precise mechanic construction from anodized aluminium alloy and stiff wood
- integrated Wi-Fi functionality with iOS MovieSlate 8 application support for easy metadata transfer to the slate
- wireless digital RF link protocol for time code distribution and units state monitoring on the wireless range of up to 500 m
- intuitive control with quick, menu based setting of all advanced functions
- inbuilt backup battery which can hold time code running for up to 3 hours
- inbuilt accelerometer for automatic display orientation setting
- intelligent functions full-brightness and led-flash
- easy recall the sync time of a last clap
- optional displaying of time code / user bits
- generates all frame rates (23.976 fps - 30 fps) drop frame and non drop frame SMPTE TC formats includes its 0.5 and 2 multiples (12.5 fps, 15 fps, 50 fps, etc.)
- automatic ON & JAM function, which allows to turn on and JAM simultaneously without need to turn WTCS-1 on first
- low consumption allowing operating time up to 370 hours in standby (closed arm of the slate) and up to 100 hours in active mode (depends on display brightness)
- advanced monitoring of batteries level with signalization of discharged batteries
- variable power supply 6x AA batteries/accu or external 7-15 V DC power supply
- microUSB connector for easy firmware upgrade

3. Control elements



- | | |
|----------------------------------|--|
| 1. Arm of the slate | 8. LEMO 5-pin connector |
| 2. Button „UP“ | 9. Battery door |
| 3. Button „SET“ | 10. Smart arm LEDs |
| 4. Button „DOWN“ | 11. Graphical LED display |
| 5. Button „POWER“ | 12. Slate writing sheet with backlight |
| 6. Informative 3 color (RGB) LED | 13. Ambient light sensor |
| 7. MicroUSB connector | 14. Folding handle |

4. Insertion of batteries / accumulators

Prior to batteries insertion, check the correct polarity indicated on inner side of battery compartment. To power WTCS-1 insert six AA alkaline/lithium cells or accumulators and close the door.



WTCS-1 is protected against destruction by inserting battery with wrong polarity.



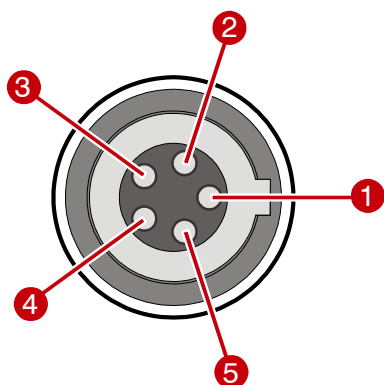
Warning: Never insert the batteries if you use the external power supply. It may result in the damage of the device and rapid batteries discharge!



Warning: Never leave batteries inside of a product which will be unused for more than a week! Never leave discharged batteries inside to avoid battery leakage!

5. External power supply

External power supply 7 - 15V DC is possible to connect using a special cable connected to the input LEMO connector, which connection is shown below.



1. GND
2. TC input
3. GPS input
4. External power 7V – 15V DC
5. TC output



Warning: Never insert the batteries if you use the external power supply. It may result in the damage of the device and rapid batteries discharge!



Warning: Never connect the external power with the voltage higher than 15V. It would cause serious damage of the device.

6. Turning ON/OFF

| | |
|--------------------|-----------------------------------|
| Turning device ON | long pressing POWER button |
| Turning device OFF | long pressing POWER button |



After turning ON the WTCS-1, there will be displayed BETSO logo and after that, WTCS-1 will start to operate according to previous setting in the menu.



If jamming is enabled and there is an external TC source connected to WTCS-1, it starts to jam immediately.

7. Menu control

| | |
|---------------------|---|
| Enter the menu | long press of SET button |
| Exit the menu | long press of SET button in main menu |
| Enter the submenu | short press of SET button |
| Exit the submenu | long press of SET button |
| Move up | short press of UP button |
| Move down | short press of DOWN button |
| Enter the setting | short press of SET button |
| Change setting | short press of UP / DOWN button |
| Confirm the setting | short or long press of SET button |



After exiting of the menu, all critical changes will be made upon question confirmation, other changes are set immediately.



Setting will be saved during regular turning off process, unpredicted battery removal will result in unsaved menu setting. Low battery power off will save setting correctly.

8. Setting of WTCS-1

Menu control is described in previous chapter 7 Menu control.

8.1 Display settings

In this section of menu there are located all settings related with display settings.

8.1.1 LED brightness – setting of brightness of LED display

Menu / Display settings / LED brightness

This function sets brightness of graphical LED display and immediately applies new settings.

- Auto** WTCS-1 sets brightness automatically according to ambient light
- 1 ... 9** manual setting of brightness on one of 9 constant brightness levels



Brightness of the LED display can be set also from state where slate has opened arms and display is showing time code or user bits without the need of entering the menu. In that case brightness can be adjusted by simple press of button **UP** or **DOWN**.

8.1.2 Backlight – setting of brightness of slate writing sheet backlight

Menu / Display settings / Backlight

This functions sets brightness of slate writing sheet backlight with the possibility to completely turn off the backlight.

- Off** backlight is turned off
- Low** backlight has low brightness
- Middle** backlight has medium brightness
- High** backlight has high brightness

8.1.3 Display – setting of displayed data during opened arm of the slate

Menu / Display settings / Display

This feature allows the user to specify which data will be displayed on the display of the slate after the opening of the arm of the slate. There is the possibility to display the time code or the user bits.

| | |
|-----------------|---|
| Timecode | after the opening of the arm of the slate it will be continuously displayed time code |
| Userbits | after the opening of the arm of the slate it will be continuously displayed user bits |

8.1.4 TC hold

Menu / Display settings / TC hold

This feature allows the user to set the time during which there will be displayed time code on the display of the slate after the clap.

0 frs ... 60 s time set in number of frames or seconds of time code



After a clap time code is always displayed first during "TC hold" time, and then user bits are displayed during "UB hold" time.

8.1.5 UB hold

Menu / Display settings / TC hold

This feature allows the user to set the time during which there will be displayed user bits on the display of the slate after the clap.

0 frs ... 60 s time set in number of frames or seconds of time code



After a clap time code is always displayed first during "TC hold" time, and then user bits are displayed during "UB hold" time.

8.2 Time code

In this section of menu there are located all settings related with time code.

8.2.1 Frame rate - setting frame rate of generated Time Code

Menu / Time code / Frame rate

This function allows to set different frame rate of generated time code. When cross jamming is enabled, this frame rate will be used after jamming. WTCS-1 can generate any type of time code including 0.5 and 2.0 multiples of standard frame rates.

| | |
|--------------------------|---|
| Standard rate TC: | 30, 30DF, 29.97, 29.97DF, 25, 24, 23.976 |
| 2x multiplied rate TC: | 60, 60DF, 59.54, 59.54DF, 50, 48, 47.952 |
| 0.5x multiplied rate TC: | 15, 15DF, 14.985, 14.985DF, 12.5, 12, 11.988 |

8.2.2 TC Default - setting of default Time Code start time/frame

Menu / Time code / Default

This function allows to set up default beginning time and frame of generated time code after turning WTCS-1 on.

HH:MM:SS:FF HH: hours, MM: minutes, SS: seconds, FF: frame number



Invalid drop frame time code formats are permitted.

8.2.3 **Offset** - setting of Time Code offset for jamming or RF transmission

Menu / Time code / Offset

This function allows to set offset of generated time code related to jamming source or TX in RF RX mode.

-10.0 fr to +10.0 fr offset setting from -10 frames to +10 frames in step of 0.1 frames



This function is very helpful for compensation of TC offset when using some types of HD camcorders.

8.2.4 **User bits** - setting of User Bits of generated Time Code

Menu / Time code / User bits

WTCS-1 allows to choose one of the following possible User bits sources, which will be inserted in the generated time code.

As jammed TC User bits of generated TC are the same as User bits of jamming source at the time of jamming

Manual set User bits of generated TC are manually set in format:

U₈U₇:U₆U₅:U₄U₃: U₂U₁

Each User bit can be set in the range of 0 - 9, A - F

External TC This setting allows to insert external Time Code connected to WTCS-1 to User bits of output Time Code of WTCS-1

RTC This settings will insert real time clock data to User bits of generated time code in one of the following format:

YYYY:MM:DD (Year:Month:Day)

MM:DD:HH:MM (Month:Day:Hour:Minute)

DD:HH:MM:SS (Day:Hour:Minute:Second)

8.2.5 Jamming - setting of jamming to external TC source

Menu / Time code / Jamming

| | |
|----------------------|--|
| Once / Manual | WTCS-1 can be jammed once without asking and then user has to confirm next jamming |
| Continuous | WTCS-1 will be jammed without asking every time new TC source is inserted |
| Disable | Automatic jamming is disabled. Useful for forced master mode. Jamming is still available upon request by button press |



When jamming continuous option is selected and external TC source is connected, every time measured TC offset exceeds 0.05 frames, WTCS-1 jams to this new time code.

8.2.6 Cross jamming - jamming WTCS-1 with different TC frame rate

Menu / Time code / Cross jamming

This function enables WTCS-1 to be jammed from external TC source preserving TC frame rate set in TC frame rate option (chapter 8.2.1).

| | |
|----------------|---------------------------|
| Enable | Cross jamming is enabled |
| Disable | Cross jamming is disabled |



Example. When WTCS-1 is set to 25 fps and TC source has 30 fps, WTCS-1 will be jammed to external TC time/frames, but will have the same frame rate as set in TC frame rate, in this case 25 fps.

8.2.7 Jamming calibration - calibration to TC source during jamming

Menu / Time code / Jamming calibration

This function enables or disables WTCS-1 to perform calibration to time code precision of time code source during jamming.

- OFF** Jamming calibration is turned off
ON Jamming calibration is turned on



Ultimate advantage of jamming calibration feature is, that WTCS-1 will be in much better synchronization to time code source, when this feature is enabled. E.g. standard precision of WTCS-1 after GPS calibration is +/- 0.05 ppm. Considering that industry standard of other manufacturers is much worse around +/- 0.5 ppm and taking in account aging of up to +/- 1 ppm and other factors as temperature etc..., total error can be significantly more than +/- 1 ppm. This error will not arise, when jamming calibration is turned ON, with this feature WTCS-1 can get in sync with time code source to precision of +/-0.1 ppm.

8.3 Wireless

In this section of menu there are located all settings related with wireless behavior of WTCS-1.

8.3.1 Unit type - setting of wireless behavior of WTCS-1

Menu / Wireless / Unit type

This function allows to choose wireless behavior of WTCS-1. On of the following settings can be used:

- RF OFF** WTCS-1 doesn't use wireless transmission and works in cable mode
TX WTCS-1 is configured to transmit time code on one of the selected channel. All RXs on the same channel will jam to TX
RX WTCS-1 is configured to receive time code on one of the selected channel and jam to transmitting TX. To identify each RX in the wireless network, one ID number has to be selected in the range of **ID 1 ... ID 20**



When WTCS-1 is used as single device on the set, we recommend to use RF OFF mode to save battery life.

8.3.2 Channel - setting of RF time code system channel

Menu / Wireless / Channel

WTCS-1 incorporates our new digital RF link protocol which uses frequency hopping spread spectrum to extend wireless range and noise immunity to maximum possible values. The user can operate up to five independent RF time code systems using different channel for each time code system.

Set same channel on each device intended to connect to the same TX:

Channel **1 ... 5**

8.3.3 Location - setting of usage location for regulatory compliance

Menu / Wireless / Location

Depending of location on the World, where WTCS-1 is being used, correct corresponding setting of Location has to be made in menu setting to ensure regulatory compliance. Change of this parameter is protected by password "**1993**".

Europe Use when you operate WTCS-1 in Europe

USA & Canada Use when you operate WTCS-1 in USA or Canada

Japan Use when you operate WTCS-1 in Japan



Change of this parameter is protected by password "**1993**".



Warning: Never use different location setting than location where product is currently used!

8.3.4 Wi-Fi

In this section of menu there are located all settings related with wireless behavior of Wi-Fi.

8.3.4.1 Wi-Fi On/Off – enabling and disabling Wi-Fi features

Menu / Wireless / Wi-Fi / Wi-Fi On/Off

This setting enables or disables Wi-Fi features for WTCS-1.



If Wi-Fi features are enabled, WTCS-1 creates new Wi-Fi access point, which users can connect to from iOS devices and use MovieSlate 8 Application for advanced metadata displaying functionality of WTCS-1 after sticks event.



If Wi-Fi features are not being used, it is recommended to have Wi-Fi features disabled to save the batteries life.

8.3.4.2 Wi-Fi password

Menu / Wireless / Wi-Fi / Wi-Fi password

Allows user to set custom Wi-Fi access point WPA2-PSK security key.

00000000 ... 99999999 key has 8 number format



Default key is set to „**00000000**”.

8.3.4.3 Wi-Fi channel

Menu / Wireless / Wi-Fi / Wi-Fi channel

Allows user to set custom Wi-Fi access point channel.

1 ... 11 In USA and Canada

1 ... 13 In Europe

1 ... 14 In Japan



If WTCS-1 is used in the environment where a lot of other Wi-Fi devices are used, users can easily switch to Wi-Fi channel that is less occupied.

8.4 Special

In this section of menu there are located other special features not directly related with previous categories. E.g. power saving features etc...

8.4.1 Battery type – setting type of batteries powering WTCS-1

Menu / Special / Battery type

This function allows to choose right chemical type of cells powering WTCS-1. Only then you can see the right status of the batteries condition on LED display.

| | |
|-----------------|--|
| Alkaline | WTCS-1 is using alkaline cells |
| NiMH | WTCS-1 is using NiMH cells |
| Lithium | WTCS-1 is using lithium cells (1.5V only!) |



We recommend to set right type of batteries to get valid information about batteries status and right turning OFF moment when the batteries are dead.

8.4.2 Time and date

In this sub menu can be adjusted actual time and date

8.4.2.1 Time - setting of actual time

Menu / Special / Time and date / Time

This setting allows to adjust actual time in **24h - HH:MM:SS** format.

| | |
|-----------|---------|
| HH | hours |
| MM | minutes |
| SS | seconds |

8.4.2.2 **Date D.M.Y** - setting of actual date

Menu / Special / Time and date / Date

This setting allows to adjust actual date in **DD.MM.YYYY** format.

| | |
|-------------|-------|
| DD | day |
| MM | month |
| YYYY | year |

8.4.3 **Display orientation** – setting of LED display orientation

Menu / Special / Display orientation

| | |
|----------------|--|
| Auto | LED display orientation is set according to slate physical orientation thanks to inbuilt accelerometer |
| Normal | LED display is standardly oriented |
| Rotated | LED display is rotated upside down |

8.4.4 **Auto on** - setting of automatic power on when TC source is connected

Menu / Special / Auto on

This function allows to turn on WTCS-1 when TC source is connected to LEMO input connector. When Enable + JAM is set, jamming will start immediately after WTCS-1 is turned on and TC source is still connected to LEMO input.

| | |
|---------------------|---|
| Enable | Auto on function is enabled |
| Enable + JAM | Auto on function is enabled and jamming starts after turning on |

Disable Auto on function is disabled



We recommend to set this option to „Enable + JAM“. Then you can easily turn on and JAM WTCS-1 to external TC source and avoid necessity to use standard turning ON/OFF and jamming procedure.

8.4.5 Max. brightness after clap

Menu / Special / Max. brightness after clap

Max. brightness after clap function will increase the brightness of the display after the clap to maximum value during displaying time code, user bits („TC hold“ + „UB hold“) and metadata.

On / Off this feature can be enabled and disabled



Allows the user to save the energy of the batteries by setting the display brightness to a lower value than would be necessary for a proper camera record under the actual light conditions. Thanks to this feature the data displayed by the slate after a clap will be always very well readable on the record made by camera under any light conditions.

8.4.6 Board LEDs flash - feature of flashing of smart arm LEDs

Menu / Special / Board LEDs flash

This function allows to set the condition, when smart arm LEDs are turned on for easy synchronization.

- 00 frame** LEDs are turned on during each 00 frame of each second
- Clap** LEDs are turned on only in frame in which clap of slate's arm occurred
- 00 frame + clap** LEDs are turned on in both conditions: during each 00 frame end after clap
- Off** LEDs are never turned on

8.4.7 TC backup

Menu / Special / TC backup

This feature allows user to set up the time for which time code will continue to run even after removal of main battery. Internal backup battery is installed in WTCS-1 for this purpose and it allows to run time code for up to 3 hours.

5 minutes ... 3 hours TC backup time can be set from 5 minutes to 3 hours in several steps



Display functionality and wireless connectivity are both suppressed in TC backup mode, when main batteries are removed.

8.4.8 GPS time TC – generation time code with UTC time of GPS signal

Menu / Special / GPS time TC

This function allows to generate accurate time code with UTC time and number of frames according to setting Time code / Frame rate. This is really useful for example for synchronization of two camcorders on different places in the world.

Synchronize It starts synchronization with UTC time (only with BETSO GPS module)

Exit It cancels synchronization and goes back to main menu



If there is no GPS signal or no GPS module connected to WTCS-1 and „Synchronize“ is chosen, it won't start generation of UTC time code.

8.4.9 GPS calibration – calibration of internal TCXO using GPS module

Menu / Special / GPS calibration

This function allows to calibrate internal TCXO using GPS signal. It means that one second generated by WTCS-1 will last the exactly same time as accurate GPS atomic clock based second.

| | |
|------------------|--|
| Calibrate | It starts calibration (only with BETSO GPS module) |
| Exit | It cancels calibration and goes back to main menu |



If there is no GPS signal or no GPS module is connected to WTCS-1 and „Calibrate“ is chosen, it won't cause any calibration problems. Calibration just won't start.

8.5 System

In this section of menu there are located system information without setting possibility.

8.5.1 Serial number - serial number of WTCS-1

Menu / System / Serial number

Serial number provide unique identification for your WTCS-1 for warranty and technical support.

8.5.2 HW version - version of hardware of WTCS-1

Menu / System / HW version

Version of WTCS-1 motherboard hardware.

8.5.3 SW version - version of software of WTCS-1

Menu / System / SW version

Version of WTCS-1 firmware.



Actual firmware can be found at <http://www.betso.eu/support>.

8.5.4 **Contains FCC ID: 2AJWB-RFM1** - inbuilt transmitter module

Menu / System / Contains FCC ID: 2AJWB-RFM1

To display information about inbuilt transmitter module, go to Menu / System where FCC ID of inbuilt transmitter is displayed.

8.5.5 **Contains IC: 21968-RFM1** - inbuilt transmitter module

Menu / System / Contains IC: 21968-RFM1

To display information about inbuilt transmitter module, go to Menu / System where IC ID of inbuilt transmitter is displayed.

9. Control of WTCS-1

| | |
|--------------------------------------|---|
| clap | the clap of the arm of the slate |
| change of display brightness | press UP / DOWN button when arm is opened |
| battery power indication | short press POWER button |
| time code frame rate readout | short press SET button |
| listing through last clap time codes | press UP / DOWN button when arm is closed |

9.1 Clap

After the clap of the arm of the slate, currently running time code will be stopped on the display of the slate and it will be kept steady on the display during the "TC hold" time. When TC hold time elapses, displayed information changes to user bits which will be kept steady on the display during the "UB hold" time.



Whenever after the clap you can recall the time code of the frame in which the last clap occurred by short press **UP / DOWN** button when arm is closed

9.2 Change of display brightness

The slate allows the user to adapt the brightness of the display to the actual light conditions. There are nine fixed levels of display brightness and one automatic mode available. The last setting is automatically saved.

In automatic brightness settings the brightness of the display is set automatically according to actual light condition measured on light sensor.



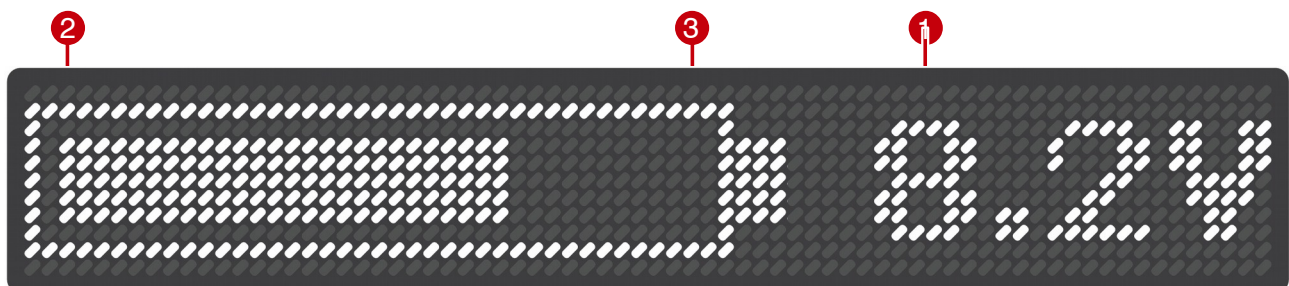
Feature “Max. brightness after clap” allows the user to use lower brightness than would be necessary for a proper camera record under the actual light conditions. See chapter 8.4.5 Max. brightness after clap.

9.3 SMPTE time code signal frame rate information

This feature displays the frame rate of the receiving SMPTE time code signal on the display of the slate.

9.4 Battery level display

Displays a bar graph of battery level. If the batteries are just before discharge and the last segment of the bar graph is already flashing, immediately replace the batteries with the new ones.



1. Battery voltage in volts
2. The lower level segment – indicates discharged batteries
3. The higher level segment – indicates fully charged / new batteries

10. Informative 3 color (RGB) LED function

| | |
|-----------------------|---|
| Blue ON | Power On + active RF transmission |
| Blue Blinking | Power On + No RX units (if WTCS-1 is set as TX unit) Power On + No Rf signal (if WTCS-1 is set as RX unit) |
| Green ON | Power On, Rf Off, jammed (WTCS-1 is used as slave unit) |
| Green Blinking | Power On, Rf Off, Not jammed (WTCS-1 is used as master unit) |
| Red ON | Power On, Low batteries indication |
| Red Blinking | Power Off, time code is backed up |
| All OFF | Power Off |

11. MovieSlate 8 Application quick functionality setup

- Run the iOS Settings app > Wi-Fi – and join the network created by WTCS-1
- Run MovieSlate 8 Application
- Make sure MovieSlate's Pro Features are enabled.
- Go to the MovieSlate tab
- Tap the time code display
- Tap the SYNC button in the keypad
- Tap Receive, then tap Wi-Fi (or enable SETTINGS > TIMECODE + SYNC > AUTO-RECEIVE WIFI).
- Upon connection, MovieSlate 8 will indicate that it has synced with the WTCS-1 and start displaying its synced time code.

- Select SETTINGS > BEHAVIOR > SHOT TRIGGERS > CLAPPER OR WTS
- Select SETTINGS > BEHAVIOR > SHOW CREDITS > ALWAYS or ONLY WITH SYNCED WTS
- Choose which credits / metadata should be displayed after Sticks Open / Sicks Clap and Shot Ends events should be displayed and their corresponding order and displaying time in SETTINGS > BEHAVIOR > SHOW CREDITS (AT SHOT START/END) section
- Switch to MovieSlate view

12. Recommended accessories

Optional accessories include various cables for the connection of the time code signal and writing sheet protector.

For the latest information about our products BETSO please contact your local distributor or visit our websites <http://www.betso.eu>

13. Troubleshooting

It is not possible to turn on WTCS-1

Most probably batteries inside of WTCS-1 are dead. Please insert new batteries and try it again. If problem still remains, please contact your BETSO distributor.



Warning: Never insert the batteries if you use the external power supply. It may result in the damage of the device and rapid batteries discharge!



1. Warning: Never connect the external power with the voltage higher than 15 V. It would cause serious damage of the device.



Warning: Never connect the outputs of WTCS-1 to microphone inputs with phantom power turned on. It would cause serious damage of WTCS-1.

Safety instruction



Never open an electrical device! All reparations must be performed by an authorized service center. In the case of opening of the device away from the

authorized service center, you will automatically lose the warranty of the device.



Do not use the electrical device in the places with high humidity, especially take care to protect the device against direct contact with water.



To clean the device, use a dampened piece of cloth. Never use any chemical solvents!

14. Technical specification

| | |
|-------------------------|---|
| Display | Graphical 1" high, white LED display with adjustable brightness |
| Dimensions (h x w x d) | 230 x 185 x 24 mm (9.0" x 7.3" x 0.9") |
| Weight (w/o batteries) | approx. 760g (1.68 lb) |
| Mechanical construction | CNC milled, anodized aluminium alloy and stiff wood |
| Powering | 6x AA battery (alkaline or lithium) / 6x accu (NiMH, NiCd) |
| | External powering 7 - 15 V DC |
| Current consumption | approx. 30 - 1000 mA * |
| | approx. 4 mA in stand-by mode (arms of the slate closed) |
| Battery life | Up to 100 hours ** |
| SMPTE TC formats | 23,976 fps - 30 fps including DF and NDF (also 0.5 and 2 multiples: 11.98 fps - 60 fps supported) |
| TCXO Crystal | GPS calibrated temperature compensated oscillator (+/- 0.1 ppm) |
| Accuracy error | Less than 0.3 frames/24 hours (w/o RF transmission) 0.0 Fr with RF transmission |
| Input TC sensitivity | 0.2 - 10 V (p-p) |
| Frequency range | 902 - 928 MHz (USA/Canada) |
| | 863 - 870 MHz (Europe) |

| | |
|--------------------|---------------------------|
| | 920.6 - 923.4 MHz (Japan) |
| Number of channels | 5 |
| RF output power | 10mW (10dBm) |
| Operating range | up to 500m *** |

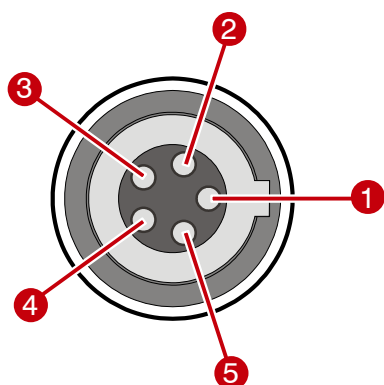
* depends on the brightness of LED display

** with the lowest display brightness

*** within the line of sight

15. LEMO connector wiring

Used type: LEMO EGG.0B.305.CLL



1. GND
2. TC input
3. GPS input
4. External power 7V – 15V DC
5. TC output

16. FCC regulatory information (USA) FCC Statements

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

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



Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are

designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

17. Industry Canada (IC) regulatory information

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter IC ID: 21968-RFM1 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

| Antenna | Manufacturer | Impedance [Ω] | Gain [dBi] |
|----------------|---------------------|--|-------------------|
| ANT-868-PW-LP | Linx Technologies | 50 | 2.1dBi |

18. Avis de conformité à la réglementation d'Industrie Canada

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- 1) l'appareil ne doit pas produire de brouillage;
- 2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Conformément aux réglementations d'Industry Canada, les émetteurs radio de cet appareil ne peuvent fonctionner qu'à l'aide d'une antenne dont le type et le gain maximal (ou minimal) pour ces émetteurs - transmetteurs sont approuvés par Industry Canada. Pour réduire le risque d'interférence éventuelle pour les autres utilisateurs, le type et le gain de l'antenne doivent être choisis de manière à ce que la puissance isotrope rayonnée équivalente (p.i.r.e.) minimale nécessaire à une bonne communication soit fournie.

Le présent émetteur radio IC ID: 21968-RFM1 a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

| Antenna | Fabricant | Impédance [Ω] | Gain [dBi] |
|---------------|-------------------|------------------------|------------|
| ANT-868-PW-LP | Linx Technologies | 50 | 2.1dBi |

To comply with FCC and Industry Canada RF radiation exposure limits for general population, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times and must not be co-located or operating in conjunction with any other antenna or transmitter.

19. EC Declaration of conformity



BETSO ELECTRONICS s.r.o.

Elisky Premyslovny 1335, 156 00 Prague 5 – Zbraslav, Czech Republic

Reg. number: 28955706

declare that this device

BETSO WTCS-1

specification: Wireless time code slate in slim, lightweight and durable design

frequency range: 863 - 870 MHz (Europe)

radiated power: 10 mW (10 dBm) max.

conform to the essential requirements of the R&TTE Directive 1999/5/EC. To demonstrate compliance with these requirements, the following standards were consulted:

EN 300 220 (Radio spectrum Matters ERM)

EN 301 489 (Electromagnetic Compatibility)

EN 60065/2002 (Safety of Electrical Equipment)

Conformity assessed via Annex III. using a Technical Construction and Results of measurements.

September 2017

A handwritten signature in blue ink, appearing to read 'J. Zastera', is written over a light blue rectangular background.

Ing. Jan Zastera

general manager

E-mail: zastera@betso.eu