

# AV-TC 30 SI

RS422 VCR Protocol Converter with:

- Video Insertion of Time Code
- LTC Generator
- optional: LTC and VITC Reader





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## A1 Safety Instructions

- General rules:** Only use the device as directed in a dry atmosphere. Treat the AV-TC 30 SI with the same care as other studio devices. Please follow the advice in the following operators manual. Whenever it is likely that safe operation is impaired, the instrument must be made inoperative and secured against unintended operation. The appropriate service authority must then be informed.
- Damages in transit:** If the device shows obvious damages from transit the shipper in question must be notified and the dealer must be informed.
- Positioning:** Position device only where sufficient air circulation can be maintained. Extreme temperatures, dust, humidity, shocks and strong electromagnetic fields must be avoided.
- Maintenance:** Use a moist soft textured fabric cloth when cleaning the housing. Do not use polish or any other cleaning agents.
- Repairs:** The AV-TC 30 SI does not require any extra maintenance. There are no user serviceable parts inside the device. Repairs should be sent to an authorized service partner.
- EMC:** The EMC regulations are observed only under the following condition: use high quality shielded cables at data inputs and outputs.

## A2 Copyright

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## **A3 CE Declaration of conformity**

We,

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herewith declare under our sole responsibility that the

### **AV-TC 30 SI**

meets the intent of the following directives, standards and specifications:

89/336/EEC Electromagnetic Compatibility

EN 50081-1 Emissions

- EN 55022
- EN 55103-1

EN 50082-1 Immunity

- EN 55024
- EN 55103-2



## 1. Functions overview

- AV-TC 30 SI is equipped with serial interface RS422. The protocol used corresponds to the "SONY PROTOCOL OF REMOTE-1 (9-pin) CONNECTOR". AV-TC 30 SI is able to read time and user data from the serial interface, and to make these data visible at its front display and in a video window, as well as to convert the data into a LTC. As an option Time Code (LTC and VITC) can be read from the build-in readers, and the reader values can be requested by the serial interface.
- Various RS422 operating modes can be selected. AV-TC 30 SI is able to work as a "Master" (controlling device) or a "Slave" (controlled device), it can monitor an existing RS422 line, and it can work as a LTC generator with pre-set features by serial commands.
- The frame rate (24, 25, 30, 30drop) will be automatically detected and indicated. This automatic mode can be switched off.
- The television standards 625/50 (PAL) or 525/60 (NTSC) of the composite video signal (CVBS) are both accepted. This automatic mode can be switched off.
- The insertion window can be positioned over the whole visible screen. Size, brightness and background mask may be adjusted.
- Time or user can be selected to be shown at the 8-digits front display.
- The Time Code at reader input will be regenerated as LTC. The LTC output is locked to the video signal. The LTC generator can be set to various jam-sync modes.
- All settings by key functions will be permanently stored. After power-on the last operating mode will be regained.
- The front key panel may be disabled ("lock" feature).

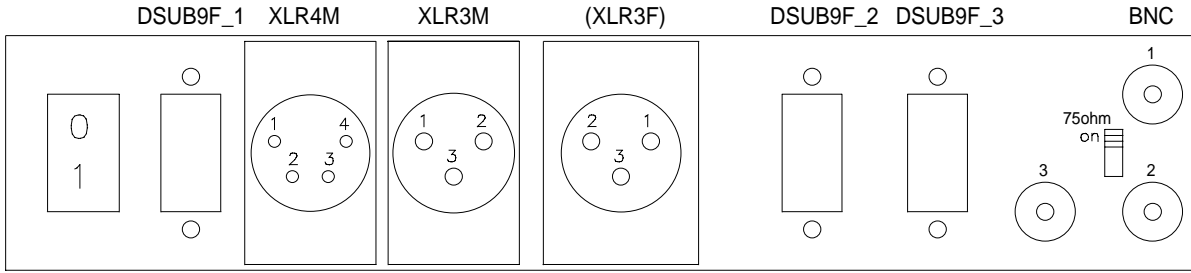
### Extensions (options):

- LTC reader (option R).
- VITC reader (option V). This enables the converter function VITC to LTC.
- BYPASS. External key to switch on/off the insertion window.
- More options according to your application can easily be realised.

## 2. AV-TC 30 SI front



## 3. Connections at the rear and technical data



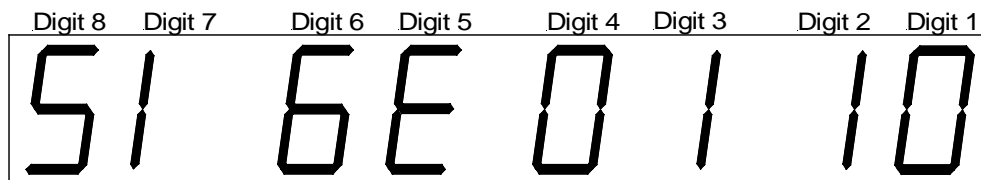
1: Frame Ground	-----	1	----	1
8: R-A	-----	2	----	2
7: T+B	-----	3	----	3
2: T-A	-----	4	----	4
5:	-----	5	----	5
4: RxC (GND)	-----	6	----	6
3: R+B	-----	7	----	7
6: TxC (GND)	-----	8	----	8
9: Frame Ground	-----	9	----	9

<b>Dimensions</b>	214 (W) x 43 (H) x 262 (D) mm [½ 19", 1U]
<b>Weight</b>	1.5 kg approx.
<b>Operating temperature</b>	5°C to 40°C
<b>Allow. humidity of air</b>	35% to 85%
<b>Power supply</b>	12 - 16V DC
<b>Power consumption</b>	typical 450mA at 14V
<b>video</b>	BNC 1 = composite video input, CVBS, 1Vpp at 75Ω (±0.1V) BNC 2 = video output, loop-through from BNC 1 BNC 3 = video + insertion output, 1 Vpp at 75Ω (±1%)
<b>LTC output</b>	XLR3M: 1=GND, 2/3=signal, balanced, 1Vpp approx.
<b>LTC input (option)</b>	XLR3F: 1=GND, 2/3=signal, balanced, 100mV-5Vpp
<b>Interface RS422</b>	DSUB9F connectors. DSUB9F_1: used for operating modes Master, Slave, Record DSUB9F_2/DSUB9F_3: used for operating mode Monitor.

## 4. Status display after power-on

After switching the unit on the data of the non-volatile memory will be tested. If the test fails the display shows **reset** and the factory values will be stored. If the test passes the unit will be set into same state as before switching off.

After that the display shows a status messages. At same time all LED's will light-up for test purposes. Example:



Digits 8 and 7 indicate the device type: "SI" = AV-TC 30 SI.

Digits 6 and 5 indicate the revision of firmware (e.g. "6.E").

Digit 4 = 0: display and video window switched to reader values.  
= 1: display and video window switched to generator values

Digit 3 = 0: LTC generator module is not plugged.  
= 1/2/3/4: LTC generator module is plugged and the jam-sync mode is indicated:  
1 = "flying wheel", 2 = "converter", 3 = "jam-diff", 4 = "one-time jam".

Digit 2 = 0: serial interface module is not plugged.  
= 1/2/3/4/5: serial interface module is plugged and the RS422 operating mode is indicated: 1 = "RS422 disabled", 2 = "slave", 3 = "master", 4 = "monitor", 5 = "record".

Digit 1 = 0: VITC reader module is not plugged.  
= 1: VITC reader module is plugged.

## 5. Description of the status LED's

LED's **25**, **30**, **30df** indicate the current detected frame rate of the Time Code:

Frame rate = 24:	LED's all off.
Frame rate = 25:	LED <b>25</b> lights-up.
Frame rate = 30:	LED <b>30</b> lights-up.
Frame rate = 30 drop:	LED <b>30df</b> lights-up.

LED **1**. **half frame** flashes with every VITC of the first field (option VITC reader).

LED **V8** flashes with the fields 1 and 2 of the PAL 8-field sequence, if the colour lock flag of the Time Code is set to 1.

LED **error** flashes in case of a reader error, e.g. time values not plausible or discontinuous order of the frames of the LTC or RS422 Time Code.

## 6. RS422 operating modes

### 6.1 Functions overview

The preferable data format of the RS422 is 38400/8/odd/1, but it is possible to select any parity and one of the baud rates 4800/9600/19200/38400. The data protocol corresponds to the "SONY PROTOCOL OF REMOTE-1 (9-pin) CONNECTOR" for the remote control of VCR's.

Four RS422 operating modes may be set at the unit:

**MASTER:** AV-TC 30 SI acting as a "controller" or "master", i.e. the unit transmits commands to a "slave" (e.g. a VCR). Time Code data - adjustable as VITC, LTC or CTL (=Timer 1) - are requested, which then may be visibly inserted and displayed as well as generated as LTC. The connection between AV-TC 30 SI and the slave must be made at DSUB9F\_1 via „twisted“ wiring.

**MONITOR:** AV-TC 30 SI "monitors" a RS422 interface between a "controller" or "master" and a "controlled device" or "slave". AV-TC 30 SI is passive, i.e. neither transmitting commands nor responding to them. If a return of Time Code data is detected, they will be visibly inserted and displayed as well as generated as LTC. The cables to master and slave units are connected at DSUB9F\_2 and DSUB9F\_3.

**SLAVE:** AV-TC 30 SI acting as a "controlled device" or as a "slave", i.e. a "controller" or "master" transmits commands which will be responded to by AV-TC 30 SI. Application: AV-TC 30 SI reads Time Code (optional LTC and/or VITC) and transfers the read data via RS422 on request. There is a straight (1:1) connection between AV-TC 30 SI and the controller at DSUB9F\_1.

**RECORD:** AV-TC 30 SI acting as a "controlled device" or as a "slave", i.e. a "controller" or "master" transmits commands which will be responded to by AV-TC 30 SI. Especially AV-TC 30 SI works as a LTC generator, there will be LTC at the output always (unlimited flying wheel). Application: AV-TC 30 SI outputs a continuous LTC for tape recording. The generator can get a pre-set by serial RS422 command. There is a straight (1:1) connection between AV-TC 30 SI and the controller at DSUB9F\_1.

Please notice further parts of the firmware:

- Jam-sync features for frame accurate Time Code regeneration: "jam-diff" and "one-time jam".
- Switch display and video insertion between reader and generator values.
- LTC output with muting feature.

## 6.2 Selecting the operation mode

Press buttons **hold** and → simultaneously, and the display will indicate:

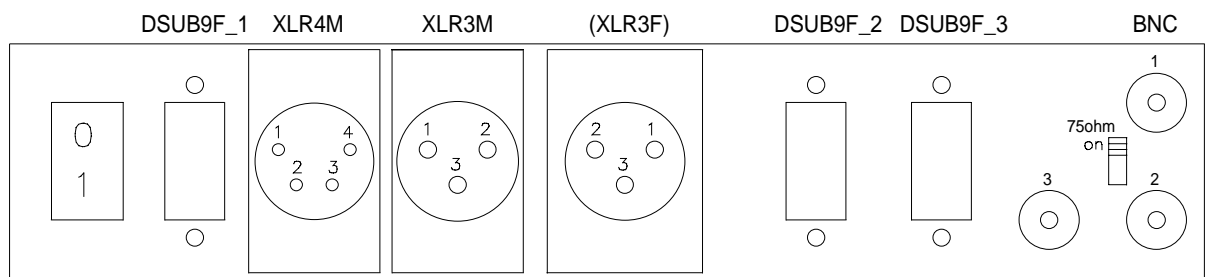
- MAS** = Master
- Mon** = Monitor
- SLA** = Slave
- rEC** = Record
- oFF** = off: serial interface disabled, the built-in Time Code readers are now enabled.

Change the operating mode by pressing the ↑ key.

Use **hold** key to save the selection made and to quit the setting mode.

Use **time** or **user** to quit the setting mode without saving the changes made.

## 6.3 Connections at the rear



1: Frame Ground	-----	1 ----	1
8: R-A	-----	2 ----	2
7: T+B	-----	3 ----	3
2: T-A	-----	4 ----	4
5:	-----	5 ----	5
4: RxC (GND)	-----	6 ----	6
3: R+B	-----	7 ----	7
6: TxC (GND)	-----	8 ----	8
9: Frame Ground	-----	9 ----	9

### MASTER mode:

Connect at DSUB9F\_1 (no connections at DSUB9F\_2 and DSUB9F\_3). Use a "twisted" cable connection, i.e. twist 2 with 8, 3 with 7, 4 with 6.

A 100Ω load has to be soldered at TC30 side between pins 8 and 3 if a long cable is used.

### MONITOR mode:

The connection is made at DSUB9F\_2 (e.g. Master) and DSUB9F\_3 (e.g. Slave), no connection at DSUB9F\_1.

### SLAVE or RECORD mode:

Connect at DSUB9F\_1 (no connections at DSUB9F\_2 and DSUB9F\_3). Use a "straight" (1:1) cable connection. A 100Ω load has to be soldered at TC30 side between pins 8 and 3 if a long cable is used.

## 6.4 MASTER mode

AV-TC 30 SI reads Time Code (time and user bits) via RS422. LTC or VITC from the rear panel inputs will be ignored. AV-TC 30 SI transmits Time Code requests, the kind of Time Code has to be selected via keys **LTC**, **CTL** (= Timer 1 data) or **VITC** (see chapter "Selection of readers"). Only one selection is possible. Key **auto** has no function. The Time Code received by RS422 is treated like a Time Code from the (optional) built-in readers (LTC or VITC), i.e. these values will be displayed in the video window and at the front display, as well as generated as LTC.

In case this mode is mainly used for making the RS422 values visible, the display and the video window should be switched to reader values (see chapter "Display and insertion of time and user").

In case this mode is mainly used for converting the RS422 values into a frame accurate LTC, the jam-sync features of the generator should be noticed. The display and the video window can be switched manually to reader or generator values (see chapter "Display and insertion of time and user").

The *error* LED will be lighting even with correct data reception, if e.g. the time values are jumping, down-counting or still values. The LED will go out if time values are being received in up-counting sequence, so a continuous LTC can be generated.

AV-TC 30 SI transmits the following commands:

If LTC has been selected (see "Selection of readers"):

LTC time	\$61 \$0C \$01 \$6E
LTC user	\$61 \$0C \$10 \$7D

If VITC has been selected (see "Selection of readers"):

VITC time	\$61 \$0C \$02 \$6F
VITC user	\$61 \$0C \$20 \$8D

If CTL has been selected (see "Selection of readers"):

Timer 1	\$61 \$0C \$04 \$71
---------	---------------------

### Connection:

Connect at DSUB9F\_1 (no connections at DSUB9F\_2 and DSUB9F\_3). Use a "twisted" cable connection, i.e. twist 2 with 8, 3 with 7, 4 with 6.

A 100Ω load has to be soldered at TC30 side between pins 8 and 3 if a long cable is used.

## 6.5 MONITOR mode

With this mode no commands will be transmitted by AV-TC 30 SI. It is expected that a master transmits Time Code requests, which will be responded to by a slave. AV-TC 30 SI receives the returns from the slave and evaluates every Time Code return (time or user) as if this Time Code had been read as LTC or VITC. LTC or VITC from the rear panel inputs will be ignored.

The kind of Time Code which should be accepted is to select using keys **LTC**, **CTL** (= Timer 1) or **VITC**. Combinations of e.g. LTC and CTL are valid, even the mode **auto** may be switched on. Especially with mode **auto** the display has to be watched for "jumping" time values, in that case different kinds of Time Code are detected at the serial interface.

The accepted values will be displayed in the video window and at the front display, as well as generated as LTC.

In case this mode is mainly used for making the RS422 values visible, the display and the video window should be switched to reader values (see chapter "Display and insertion of time and user").

In case this mode is mainly used for converting the RS422 values into a frame accurate LTC, the jam-sync features of the generator should be noticed possible (problem: since AV-TC 30 SI is only "monitoring", the time transfer to the generator may not be synchronous). The display and the video window can be switched manually to reader or generator values (see chapter "Display and insertion of time and user").

The *error* LED will be lighting even with correct data reception, if e.g. the time values are jumping, down-counting or still values. The LED will go out if time values are being received in up-counting sequence, so a continuous LTC can be generated.

### Connection:

The connection is made at DSUB9F\_2 (e.g. Master) and DSUB9F\_3 (e.g. Slave), no connection at DSUB9F\_1.

## 6.6 SLAVE mode

AV-TC 30 SI reads Time Code via its (optionally) built-in readers, i.e. LTC or VITC has to be connected. The current Time Code values may now be transferred via RS422. With this operating mode the display and the video window will automatically be switched to reader values.

AV-TC 30 SI responds to commands or requests according to the table as follows:

Command/Request (hexadecimal)					Return (hexadecimal)				
Description	CMD1 /DC	CMD2	DATA	CHECK	Description	CMD1 /DC	CMD2	DATA	CHECK
Device type request	\$00	\$11	-	\$11	Type NTSC	\$12	\$11	\$20 \$47	\$8A
					Type PAL	\$12	\$11	\$21 \$47	\$8B
Timer mode request	\$60	\$36	-	\$96	Timer mode	\$71	\$36	\$00	\$A7
LTC reader time req.	\$61	\$0C	\$01	\$6E	Time	\$74	\$04	*1	\$CHECK
VITC reader time req.	\$61	\$0C	\$02	\$6F	Time	\$74	\$06	*1	\$CHECK
LTC/VITC time req.	\$61	\$0C	\$03	\$70	Time	\$74	\$04	*1	\$CHECK
Timer 1 time req.	\$61	\$0C	\$04	\$71	Time	\$74	\$00	*1	\$CHECK
Timer 2 time req.	\$61	\$0C	\$08	\$75	Time	\$74	\$01	*1	\$CHECK
LTC reader user req.	\$61	\$0C	\$10	\$7D	User	\$74	\$05	*2	\$CHECK
VITC reader user req.	\$61	\$0C	\$20	\$8D	User	\$74	\$07	*2	\$CHECK
LTC/VITC user req.	\$61	\$0C	\$30	\$9D	User	\$74	\$05	*2	\$CHECK
LTC time+user req.	\$61	\$0C	\$11	\$7E	Time+user	\$78	\$04	*3	\$CHECK
VITC time+user req.	\$61	\$0C	\$22	\$8F	Time+user	\$78	\$06	*3	\$CHECK
LTC/VITC time+user	\$61	\$0C	\$33	\$A0	Time+user	\$78	\$04	*3	\$CHECK
Status request	\$61	\$20	*4	\$CHECK	Status *5				
Any other					ACK	\$10	\$01	\$11	

**\$CHECK** = hexadecimal sum of all preceding bytes.

- \*1 BCD time = \$frames \$seconds \$minutes \$hours.  
The time corresponds to the time at the display or video window of AV-TC 30 SI.
- \*2 User data = \$user1+2 \$user3+4 \$user5+6 \$user 7+8.  
The user data corresponds to the user at the display or video window of AV-TC 30 SI.
- \*3 BCD time same as \*1 + user data same as \*2.
- \*4 Status request, for details see "SONY PROTOCOL OF REMOTE-1 (9-pin) CONNECTOR".
- \*5 Status return, only the bits "play", "standby on" and "servo lock" are set to "1", for details see "SONY PROTOCOL OF REMOTE-1 (9-pin) CONNECTOR".

### Connection:

Connect at DSUB9F\_1 (no connections at DSUB9F\_2 and DSUB9F\_3). Use a „straight“ (1:1) cable connection. A 100Ω load has to be soldered at TC30 side between pins 8 and 3 if a long cable is used.

## 6.7 RECORD mode

AV-TC 30 SI generates LTC. Time and user bits can get a pre-set by serial RS422 command. The built-in Time Code readers may be enabled to use a jam-sync feature. The generator continuously counts the time upwards even if no Time Code can be read. The LTC output will automatically lock to a video or black-burst signal (signal input at BNC\_1). The current Time Code values may now be transferred via RS422. With this operating mode the display and the video window will automatically be switched to generator values.

AV-TC 30 SI responds to commands or requests according to the table of mode SLAVE with the following extensions or differences:

Command/Request (hexadecimal)					Return (hexadecimal)				
Description	CMD1 /DC	CMD2	DATA	CHECK	Description	CMD1 /DC	CMD2	DATA	CHECK
Time Code Preset	\$44	\$04	*1	\$CHECK	ACK	\$10	\$01		\$11
Userbit Preset	\$44	\$05	*2	\$CHECK	ACK	\$10	\$01		\$11
Generator time req.	\$61	\$0A	\$01	\$6C	Time	\$74	\$08	*1	\$CHECK
Generator time + user	\$61	\$0A	\$11	\$7C	Time + user	\$74	\$08	*3	\$CHECK
Generator user req.	\$61	\$0A	\$10	\$7B	Time	\$74	\$09	*2	\$CHECK
Status request	\$61	\$20	*4	\$CHECK	Status *5				
Any other					ACK	\$10	\$01	\$11	

**\$CHECK** = hexadecimal sum of all preceding bytes.

- \*1 BCD time = \$frames \$seconds \$minutes \$hours.  
The time corresponds to the time at the display or video window of AV-TC 30 SI.
- \*2 User data = \$user1 + 2 \$user3 + 4 \$user5 + 6 \$user 7 + 8.  
The user data corresponds to the user at the display or video window of AV-TC 30 SI.
- \*3 BCD time same as \*1 + user data same as \*2.
- \*4 Status request, for details see "SONY PROTOCOL OF REMOTE-1 (9-pin) CONNECTOR".
- \*5 Status return, only the bits "play", "standby on" and "servo lock" are set to "1", for details see "SONY PROTOCOL OF REMOTE-1 (9-pin) CONNECTOR".

### Connection:

Connect at DSUB9F\_1 (no connections at DSUB9F\_2 and DSUB9F\_3). Use a „straight“ (1:1) cable connection. A 100Ω load has to be soldered at TC30 side between pins 8 and 3 if a long cable is used.

## 7. Short description of key functions

### 7.1 Display and insertion of time and user

<b>time</b>	switches the display to show the time of the Time Code. In case the display already shows the time, the video window of the time will be switched on/off.
<b>user</b>	switches the display to show the user of the Time Code, a decimal point at the units of frames (digit 1) distinguishes to the time display. In case the display already shows the user, the video window of the user will be switched on/off.
<b>hold</b>	“Freezes” the display values as long as this key is pressed.

AV-TC 30 SI basically works as a Time Code reader, i.e. the display and the insertion shows reader values. But some operating modes make the generator function more important, so it is possible to switch the display and the insertion to show the generator values:

Press keys **hold** and ↓ simultaneously, this switches the display to indicate the status. Digit 4 (tens of seconds) shows the current selection:

- 0 = reader values
- 1 = generator values

Press **CTL** key to switch between the operating modes, then press **hold** key to save the new model! Pressing key **time** or **user** instead will quit the programming mode without saving the changes.

### 7.2 Selection of readers

<b>auto</b>	Automatic mode. VITC reader (optional), LTC reader and CTL counter will be switched on. Taking the priority rule “VITC over LTC over CTL” into account the values will be displayed, inserted and regenerated. The corresponding LED indicates the reader source. With no reader input the indicator LED’s will extinguish after 1 second except LED <i>auto</i> .
<b>LTC</b>	No function during automatic mode. If LED <i>auto</i> does not light-up: Pressing this key will switch the LTC reader on/off (LED on/off). With VITC and/or CTL selected at same time the priority rule (see above) applies.
<b>CTL</b>	No function during automatic mode. If LED <i>auto</i> does not light-up: Pressing this key will switch the CTL counter on/off (LED on/off). With VITC and/or LTC selected at same time the priority rule (see above) applies.
<b>VITC</b>	No function during automatic mode. If LED <i>auto</i> does not light-up: Pressing this key will switch the VITC reader (optional) on/off (LED on/off). With LTC and/or CTL selected at same time the priority rule (see above) applies.

### 7.3 Adjusting the insertion window:

← ↑ → ↓

Changes the position of the window.

Please note: to get the window for only time or only user at the very border of the screen, the time/user arrangement (see keys **frames+mask**) must be taken into account:

	top left	top right	bottom left	bottom right
time only	no. 1 or 3	no. 2 or 3	no. 1 or 4	no. 2 or 4
user only	no. 2 or 4	no. 1 or 4	no. 2 or 3	no. 1 or 3

**size** Switches the character size (3 steps). Step 3 is not possible if the time/user arrangement is side by side, see keys "*frames + mask*".

**white** Selects the characters brightness (5 steps).

**mask + white** Both keys pressed simultaneously: selects the brightness of the background or border (4 steps).

**mask** Switches the character mode: with background mask, with border, without background mask or border.

**frames+mask** Both keys pressed simultaneously: changes the time/user arrangement.

No. 1 = time and user side by side: 23:55:30:08 12345678

No. 2 = user and time side by side: 12345678 23:55:30:08

No. 3 = time above user: 23:55:30:08  
12345678

No. 4 = user above time: 12345678  
23:55:30:08

No. 1 and 2 only are possible with size = 1 or 2.

**frames** Changes the representation of time or user data:

If currently the time (or both time and user) is at the insertion window, the representation of the time data can be changed (6 steps):

Hrs:Min:Sec:Frames	Hrs:Min
Hrs:Min:Sec	Min:Sec
Min:Sec:Frames	Sec:Frames

If currently the user **only** (see keys *time/user*) is at the insertion window, the representation of the user data can be changed (10 steps). The first eight steps simply manipulates the individual user digits, example for user = 12345678:

12345678	34.56.78
345678	34.56
123456	12.34
3456	12.34.78

In case the user data represents a date, there can a suitable representation be selected. The symbols (e.g. ".") may be changed, see keys *user + frames*.

Two representations show a date provided that the user bits carries the date according to the special format EBU Technical Information I29-1995 (BBC format). The representations are:

DD.MM.YY and YY.MM.DD

The symbols (e.g. ".") may be changed, see keys *user+frames*.

**user + frames** If currently the user (or both time and user) is at the insertion window, the symbol used in some user representations can be changed (see key *frames*).  
4 choices: . : - /

## 7.4 Special key functions

**frames + ←** Verify or change baud rate, see chapter "Parameters of serial interface".

**frames + →** Verify or change parity, see chapter "Parameters of serial interface".

**frames + VITC** Enter mode "Set-up the VITC reader".

**auto** After a long key press: enables to change the automatic modes.

**hold + LTC** Set-up the muting feature of the LTC output.

**hold + ↓** Display shows status information (same to "after power-on"). Using key *time* or *user* switches off the status display.

During status display two set-ups can be changed:

- Switch display/video window to show reader values or generator values (see chapter "Display and insertion of time and user").
- Select the operating mode of the LTC generator, see chapter "Jam-sync features".

**hold + →** Verify or change the RS422 operating modes.

**hold + ←** Key lock feature on/off: display shows **LOCK on** or **LOCK off** according to the current selection. After a long key press: **on** changes to **off** and v.v.

**auto + VITC** Only after a long key press: "RESET", stores the factory setting and starts the unit anew.

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## 8. LTC generator

### 8.1 Jam-sync features

The reader Time Code will be regenerated as LTC, the LTC output locks to a video source. The jam-sync function transfers reader values to the generator. There are four different jam-sync functions of the LTC generator. Verify and change the function during status display:

Press keys **hold** and ↓ simultaneously, this switches on the status display. Digit 3 of the display (units of seconds) indicates the jam-sync function:

- 1 = "Flying Wheel",
- 2 = "Converter",
- 3 = "Jam-Diff",
- 4 = "One-Time Jam".

Press key **LTC** to change between these functions, then press key **hold** to store the new operating mode. If instead key **time** or **user** is pressed the setting is switched off without saving the changes, the last mode will be kept.

The choice of this operating mode will not effect the operation of the reader (display, video window, ...).

#### 8.1.1 Feature "Flying Wheel"

The Time Code reader checks the incoming values: the time has to be plausible and in up-counting order. If all tests have passed, these values will be transferred to the LTC generator. The generator automatically compensates for drop-outs up to 25 frames, i.e. it will go on counting if the reader fails. After 25 frames without new reader input the generator stops (outputs LTC with identical frames).

The LTC coding always meets the "forward" direction.

This operating mode should be selected if a clean LTC should be recorded triggered by any reader input.

#### 8.1.2 Feature "Converter"

The LTC generator accepts every reader value as long as the time passes the plausibility check. The generator stops at once if the reader fails. In case the reader transfers "still" values the generator will regenerate it with same data. In case the input time counts down, the LTC output coding meets the "reverse" direction, until the input counts up again. A built-in VITC reader will not give any direction sense.

## 8.1.3 Feature “Jam-Diff”

Checking the reader values to verify plausible and up-counting time values (feature “flying wheel”) will not prevent frame jumps occurring in case of lack of synchronisation between reader and generator. In this case, the following feature may achieve a clean LTC output:

Only if the difference between the reader and the generator time values exceeds a threshold value (in this case 3 frames), the read value will be transferred to the generator, otherwise the generator will count on freely. This way it is possible to generate a continuous Time Code without any frame jumps. After a 4-frames difference the generator accepts all reader values for a period of two seconds before it switches to the “free-running” mode again. That way a frame-accurate lock will be achieved even e.g. after a start (run-up time) of a VCR. The generator as well synchronises automatically to the reader values if the VCR is in fast forward or fast rewind mode.

The generator remains in the “free-running mode” if no new reader values will be read (infinite “flying wheel”).

With this proceeding please note the following:

If the last reader value (2 seconds after a 4-frame-difference) has been transferred and the reader Time Code is not yet phase-locked to the generator Time Code (e.g. if a run-up phase is delayed), it might occur that values will be generated which constantly differ to the reader Time Code for up to 3 frames.

If the reader Time Code is not locked to the generator, a difference is being build up which will reach the threshold value. Then a correction will be made, i.e. instead of frequently generating 1-frame jumps, 4-frame jumps will be made (but less frequently). The shorter the time of processing the more probable a correct regeneration.

## 8.1.4 Feature “One-Time Jam”

This feature lets the generator automatically count upwards, locked to a video source. Only with a manual input (pressing a button) a single transfer of reader values to the generator happens. This ensures that a clean LTC will be generated without frame jumps. With this operating mode the generator will only accept plausible, up-counting Time Code values. A frame-accurate regeneration will be achieved if the transfer happens at a time when reader and generator Time Code is locked to the same source.

The reader selection has to be switched to **auto** (LED *auto* lights up). Then every press at the **CTL** key triggers a “One-Time JAM”, i.e. the next readout value (plausible and in up-counting sequence) will be transferred to the generator.

## 8.2 Muting the LTC output

Three different operating modes can be selected for the LTC output:

1. Output will always be active, i.e. LTC will be output even with "still" values.
2. Output will be switched off ("mute") automatically if no new time values for the generator are supplied.
3. Output will be switched off ("mute") automatically if no new time values can be read.

The difference between 2. and 3. results from the different operating modes of the generator. With some of the jam-sync modes the generator counts the time automatically, even without new reader values. In this case the LTC output would be active with mode 2. and "mute" with mode 3.

At mode 2 (generator) LTC output will be switched off after reception of three identical time values. At mode 3 (reader) switching off occurs after one second lack of Time Code input, this enables to regenerate an external Time Code even of low (jog) speed or frequency.

### Operating:

Press keys **hold** and **LTC** simultaneously, this switches the display:

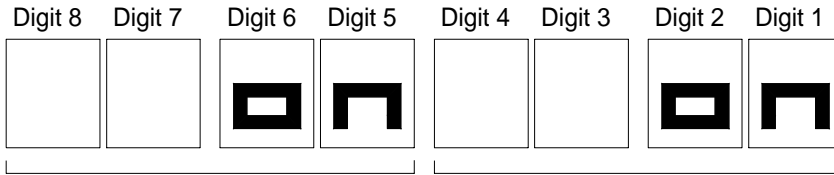
- |   |      |                                       |
|---|------|---------------------------------------|
| 1 | off  | = operating mode 1                    |
| 2 | on G | = operating mode 2 (generator values) |
| 3 | on r | = operating mode 3 (reader values)    |

Change the current setting using key  $\uparrow$  or  $\downarrow$ .

Press key **hold** to store the new setting. If instead key **time** or **user** is pressed the setting will not be stored.

## 9. Automatic modes

With a long press at key **auto** the display changes to show the current operating modes regarding the frame rate and television system, e.g.:



Television system:

**on** = automatic  
**525** = 525/60 NTSC  
**625** = 625/50 PAL

Frame rate:

**on** = automatic  
**24** = 24 frames/sec, fixed  
**25** = 25 frames/sec, fixed  
**30** = 30 frames/sec, fixed  
**30d** = 30 frames/sec drop mode, fixed

The flashing field can be set using keys ↑ and ↓, the next field can be selected using keys ← and →.

Key **hold** will store the new operating mode and switch off this setting mode.

Key **time** or **user** pressed instead of key **hold** will switch the setting off without saving the changes, the last setting will be kept.

## 10. Parameters of the serial interface

For standard RS422 applications the parameters should be set to 38400/8/odd/1. But it is possible to select any parity bit and to choose one of the baud rates 4800/9600/19200/38400. The number of data bits (= 8) and stop bits (= 1) is fixed.

### Display and change baud rate:

Press keys **frames** and ← simultaneously. The display switches to show the baud rate.  
Use key ↑ and ↓ to change: **4800**, **9600**, **19200**, **38400**.  
Press key **hold** to save the changes and to quit the setting mode.  
Pressing key **time** or **user** instead will quit the setting mode without saving the changes.

### Display and change parity:

Press keys **frames** and → simultaneously. The display switches to show the parity selection.  
Use key ↑ and ↓ to change: **no**, **odd**, **even**, **1** (fixed to a mark parity bit), **0** (fixed to a space parity bit).  
Press key **hold** to save the changes and to quit the setting mode.  
Pressing key **time** or **user** instead will quit the setting mode without saving the changes.

## 11. VITC reader (option)

As an option a VITC reader module can be built-in. A "1" at the first digit of the status display (after power-on) indicates that this module is plugged.

The lines of the video signal which should be considered as VITC lines can be selected. Factory setting is the whole range 6 – 22. LINE MODE or BLOCK MODE may be selected, i.e. evaluating only two specific video lines or a range of lines, defined by start and end line.

To adjust or check the current setting press keys **VITC** and **frames** simultaneously, the display will switch for example to (LINE MODE, line 18 and 20):

Digit 8	Digit 7	Digit 6	Digit 5	Digit 4	Digit 3	Digit 2	Digit 1
L			8	+	+	2	0
L = LINE MODE b = BLOCK MODE		1. Line		+ = LINE MODE - = BLOCK MODE		2. Line	

Use keys:

**auto** to change between LINE MODE and BLOCK MODE.

← to decrement line 1.

↑ to increment line 1.

→ to increment line 2.

↓ to decrement line 2.

Please note:

- The valid range of line setting is 6 - 22.
- Line 1 cannot have a value greater than line 2. In case line 1 = line 2 only this specific video line is checked for VITC data.

Key **hold** will store the new operating mode and switch off this setting mode.

Key **time** or **user** pressed instead of key hold will switch the setting off without saving the changes, the last setting will be kept.