

Timecode converter according to RS422 VTR protocol

Functions overview

This unit basically is a TC300 but equipped with a serial interface RS422, a special rear plate and a special firmware. Time code input now should be the RS422, so only optional a LTC or D-VITC reader will be installed. The preferable data format of the RS422 is 38400/8/odd/1. The data protocol corresponds to the 9-pin remote control of VTRs.

Three operating modes may be selected at the unit:

1. **MASTER:** TC300 acting as a „controller“ or „master“, i.e. the unit transmits commands to a „slave“ (e.g. a VTR). Time code data (adjustable as VITC, LTC or CTL) are requested, which then may be visibly inserted and displayed as well as generated as LTC or D-VITC. The connection between TC300 and the slave must be made at DSUB9F_1 via „twisted“ wiring.
2. **MONITOR:** TC300 „monitors“ an RS422 interface between a „controller“ or „master“ and a „controlled device“ or „slave“. TC300 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 or D-VITC. The cables to master and slave units are connected at DSUB9F_2 and DSUB9F_3.
3. **SLAVE:** TC300 acting as a „controlled device“ or as a „slave“, i.e. a „controller“ or „master“ transmits commands which will be responded to by TC300. Application: TC300 reads time code (LTC or D-VITC) and transfers the read data via RS422 upon request. There is a 1:1 connection between TC300 and the controller at DSUB9F_1.

Operating

Enter menu **4.5.2** (Set-Up / Interface / Protocol) to select the operating mode of the RS422 interface:

SONY	TC300 remote control as described in the operating manual
MASTER	TC300 = master, mode 1
MONITOR	TC300 = monitor, mode 2
SLAVE	TC300 = slave, mode 3

Enter menu **4.5.7** (Set-Up / Interface / Request) to select the kind of time code:

LTC
VITC
TIMER (= CTL)

With mode MASTER only this kind of time code will be requested, with mode MONITOR only this kind of time code will be accepted.

TC300, Option S

Operating mode 1 = master

TC300 „reads“ time code (time and user bits) via RS422. LTC or D-VITC should not be connected simultaneously at the rear or should be switched off at menu 2.1. The time code received by RS422 is treated with highest priority, i.e. as long as an RS422 time code could be read the LTC or D-VITC time code will be ignored. The time code values will be shown visibly in an insertion window and at the front display and could be used as source to jam-sync the time code generator.

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

TC300 transmits the following commands:

If LTC has been selected (see operating):

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

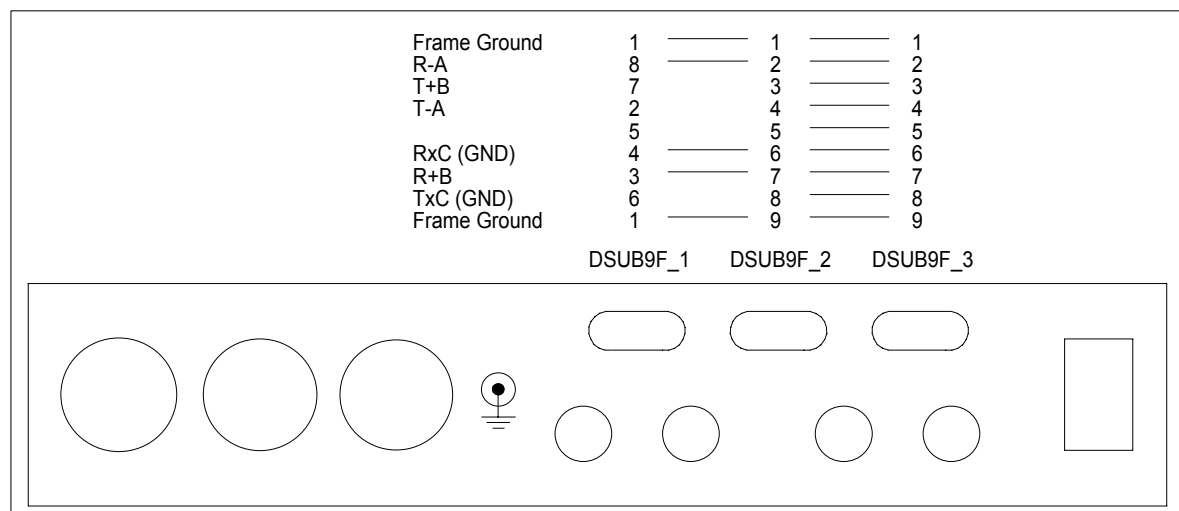
If VITC has been selected (see operating):

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

If TIMER (CTL) has been selected (see operating):

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

Connections



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.**

An 100Ω load has to be soldered at TC300 side between pins 8 and 3 if a long cable is connected.

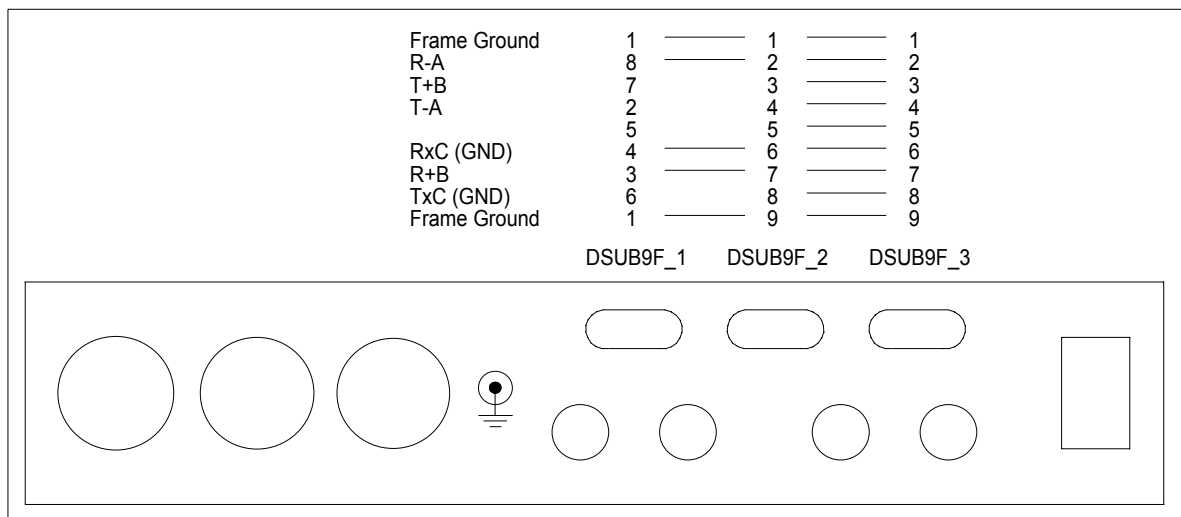
TC300, Option S

Operating mode 2 = monitor

This mode nearly is identical with mode 1 but no commands will be transmitted from TC300. It is expected that a master transmits time code requests, which will be responded to by a slave. TC300 receives the returns from the slave and evaluates every time code return (time or user). Problem may arise using the time code generator: TC300 only monitors the serial interface, so the data transfer to the generator may not be synchronized to the video.

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

Connections



Connect at **DSUB9F_2** (e.g. master) and **DSUB9F_3** (e.g. slave), no connection at DSUB9F_1.

TC300, Option S

Operating mode 3 = slave

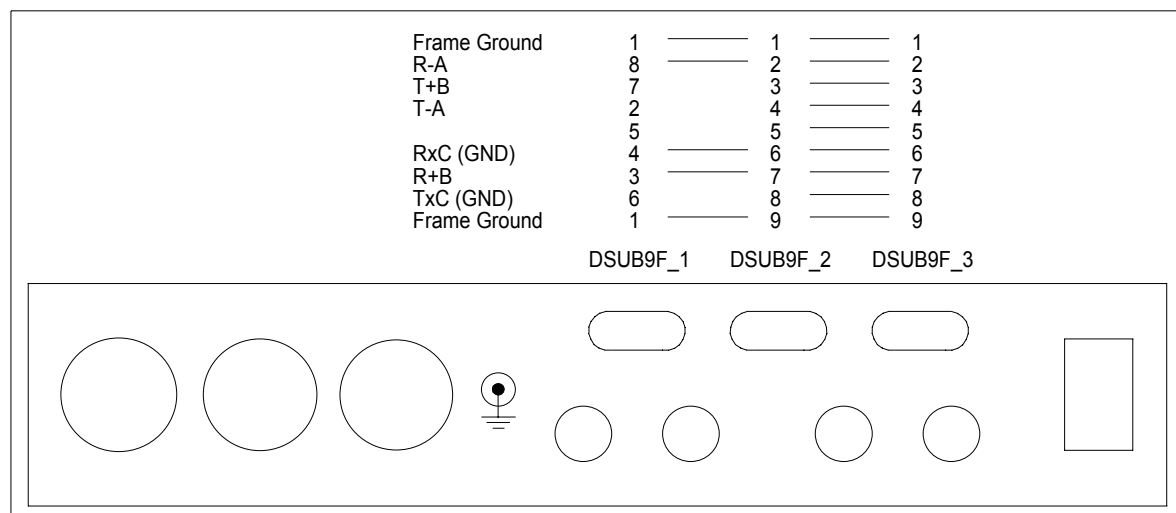
TC300 reads time code via its built-in readers, i.e. LTC or D-VITC has to be connected. The current value may now be transferred via RS422.

TC300 responds to commands or requests according to the table below:

command/request	hex.	return
Device type	\$00 \$11 \$11	\$12 \$11 \$11 \$00 \$34
Timer mode	\$60 \$36 \$96	\$71 \$36 \$00 \$A7
LTC time	\$61 \$0C \$01 \$6E	\$74 \$04 *1 *3
VITC time	\$61 \$0C \$02 \$6F	\$74 \$06 *1 *3
Timer 1	\$61 \$0C \$04 \$71	\$74 \$00 *1 *3
Timer 2	\$61 \$0C \$08 \$75	\$74 \$01 *1 *3
LTC user	\$61 \$0C \$10 \$7D	\$74 \$05 *2 *3
VITC user	\$61 \$0C \$20 \$8D	\$74 \$07 *2 *3
Status request	\$61 \$20 *4 *3	*5
Other	\$10 \$01 \$11	(= ACK)

- *1 BCD time = \$frames \$seconds \$minutes \$hours
The time corresponds to the time data at the TC300 display.
- *2 User data = \$user1+2 \$user3+4 \$user5+6 \$user 7+8
The user corresponds to the user data at the TC300 display.
- *3 Check sum = hexadecimal sum of all bytes (without carry) sent before.
- *4 Status request, for details see SONY protocol.
- *5 Status return, only the bits „play“ and „servo lock“ are set =1 (for details see SONY protocol).

Connections



Connect at **DSUB9F_1** (no connections at DSUB9F_2 and DSUB9F_3). **Use a „straight“ (1:1) cable connection.**

An 100Ω load has to be soldered at TC300 side between pins 8 and 3 if a long cable is connected.

Special time code „Jam-Sync“ mode: Jam Difference

The problem of normal Jam-Sync

As a standard proceeding, a read time code is checked regarding time plausibility and up-counting sequence before it will be transferred to the time code generator. Such check will not prevent frame jumps occurring in case of e.g. lack of synchronization between reader and generator. This special Jam-Sync mode improves the time code regeneration - at least if the recording time is limited.

Functional description

Only if the difference between the read time code and the actually generated value 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 the generator outputs a continuous time code without any frame jumps.

A frame accurate lock after a start will be achieved by accepting all read values for a period of two seconds after the threshold has been exceeded. This overcomes a lost of synchronization during e.g. the run-up time of a VCR.

The generator remains in the „free-running mode“ if no more values will be read (infinite „flywheel“).

With this proceeding please note:

1. If the last reader value (2 seconds after exceeding the threshold) has been transferred while 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 continuously which constantly differ to the reader time code, difference up to 3 frames.
2. In case the reader time code is not synchronized to the generator, a difference is being build up which will exceed the threshold. Then a correction will be made, i.e. instead of frequently generating one-frame jumps now - less frequently - 4-frames jumps occur. The shorter the time of processing (recording) the less will be the probability of frame jumps.

Operating

At menu 1.3.1 (Generator / Jam Sync / Mode) select:

CVRT W/ TOLERANCE