

LTC generator with LTC reader

# TC 30 G





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**A2 COPYRIGHT**

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## A1 Safety Instructions

- General rules:** Only use the device as directed in a dry atmosphere. Treat the **TC 30 G** with the same care as other studio devices. Please follow the advice in the following operators manual.
- 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 **TC 30 G** does not require any extra maintenance. There are no user serviceable parts inside the device. Repairs should be sent to an authorized service partner.

## A2 Copyright

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## A3 CE Declaration of conformity

We,

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herewith declare under our sole responsibility that the

## TC 30 G

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

The following preconditions have to be fulfilled:

- Only high-quality shielded cables have been used to connect data inputs/outputs.



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## Functions overview

TC30G is a LTC Time Code generator. Choosing the frame rate (25, 30, 30 drop) the LTC will be generated according to the EBU or the SMPTE specification resp.

Time or user data can be displayed at the 8 digits 7-segment LED display.

Time and user data can be preset.

The LTC can be synchronised to internal x`tal or to a video signal.

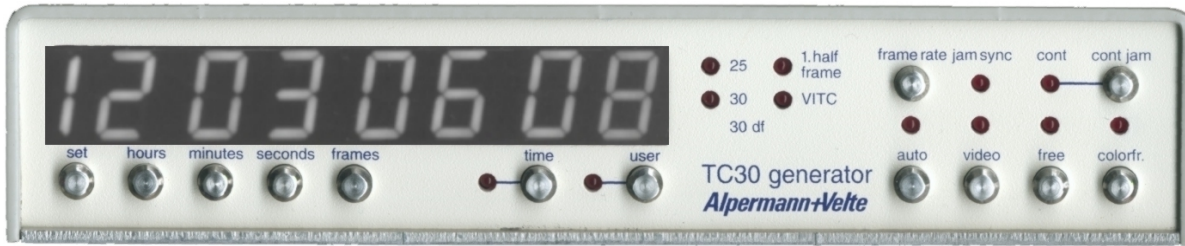
There are several jam modi to transfer (set) time and/or user data from the LTC input to the LTC generator. It is possible to jam only time, only user, or both.

The jam could be one time or continuously.

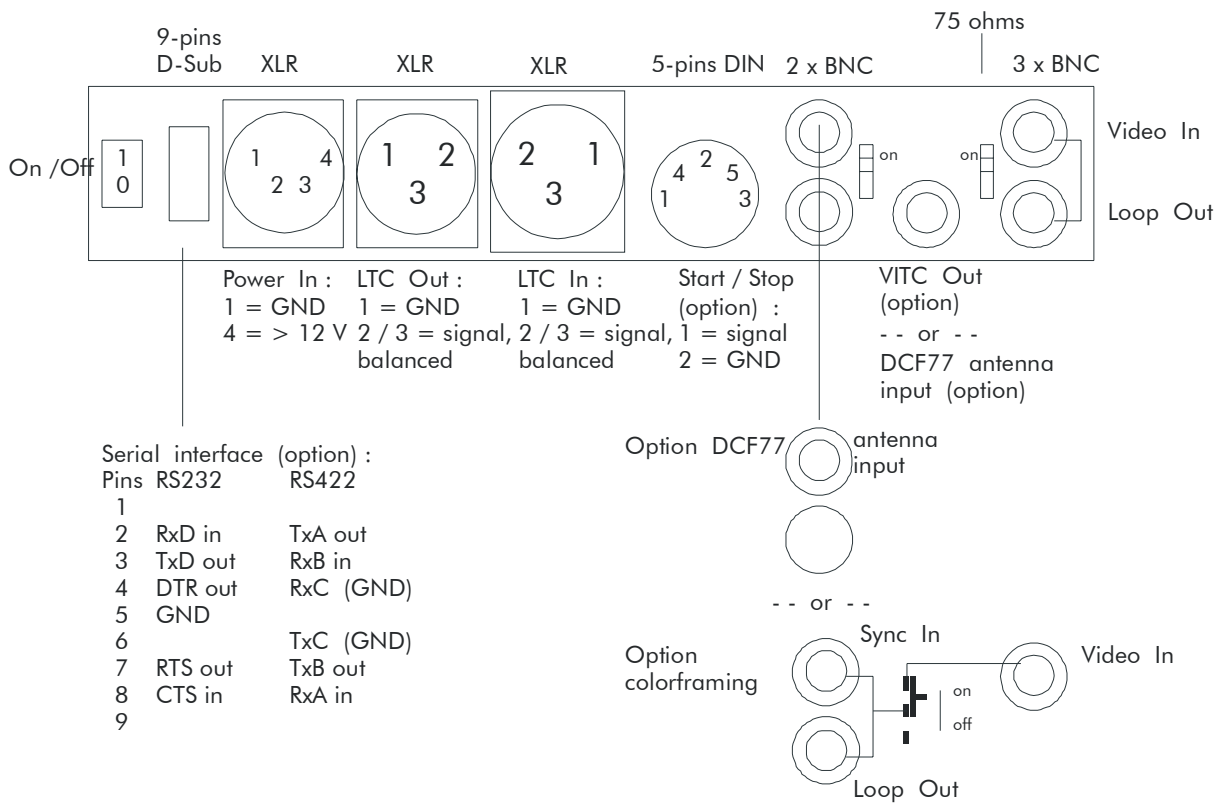
## Extensions (options)

1. For more jam-features the TC30G-JSS is provided. The LTC generator can be synchronised to the LTC input. In case no LTC can be read the generator will stop (STOP-mode) or it will automatically go on counting (FREE-mode). A jam offset value can be realised.
2. As an option a VITC generator could be installed. VITC data are then generated into a video signal in parallel to the LTC data.
3. As an option a colorframing module could be installed. There are the possibilities to generate the 4-field sequence, the 8-field sequence by using a black-burst signal with the 8-field flag, or to have a module which deduces the 8-field sequence out of the video signal.
4. As an option a serial interface (RS232 or RS422) could be installed. this serves to remote control the unit and to transfer the current Time Code data.
5. Please request for a DCF77 receiver if the generator should be synchronised to the radio time.
6. With the START/STOP option the generator can be stopped via an external signal.

## TC 30 G Front



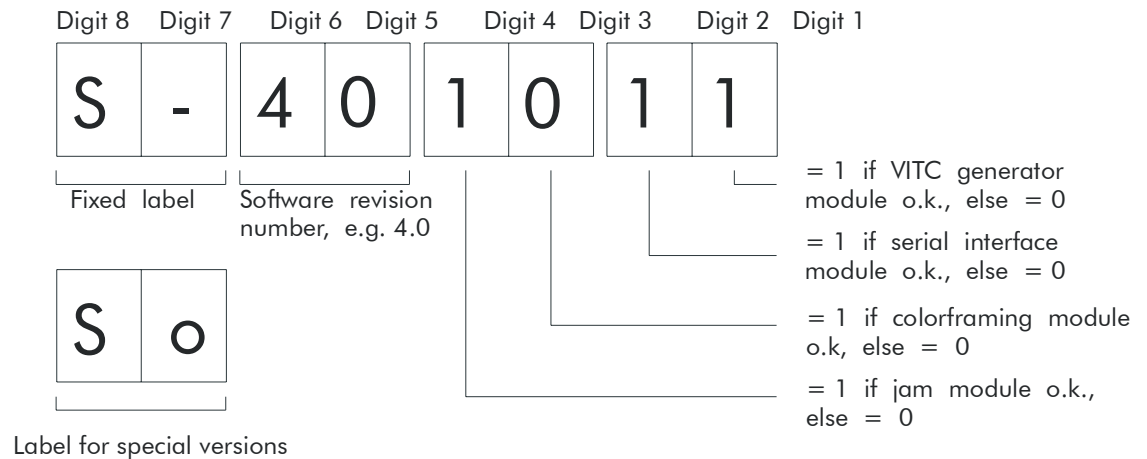
## Connections at the rear



## Status display after power-on

All settings are stored in an EEPROM. After power-on all stored data will be checked and then be taken as the operating parameters.

Just after power-on the 8-digits display shows for approx. 2 seconds the software revision and which modules are built in, e.g :



Does the check of the stored data fail a memory reset occurs and the display will show

R E S E T

before displaying the operating parameters.

## Locking keys

Those keys, which directly switch a Time Code function, can be locked. The following keys are concerned: 'auto', 'video', 'free', 'colorfr', 'cont jam', cont jam' + 'time', cont jam' + 'user'.

To enable or disable the lock press key 'set', then key 'minutes'. The display shows the current status:

"LOCK on" or "LOCK off".

Change the status by pressing key 'minutes'. At the end press key 'set' again.

## Time / user display

Pressing key 'time' the display shows the time of the Time Code, pressing key 'user' the display shows the userbits of the Time Code. The corresponding LED lights up.

## Framerate

The current selected frame rate is indicated by the corresponding LED:

LED '25' lits:            frame rate = 25  
LED '30' lits:            frame rate = 30 (non drop)  
LED '30' flashes:        frame rate = 30 (drop mode)

The frame rate may be altered using the set mode:

Press key 'set', then key 'frame rate'. The display shows the frame rate and with every further press of key 'frame rate' it changes cyclical: "25 Fr" – "30 Fr" – "30 dF". Press key 'set' to quit the set mode.

## Preset time

Press key 'set', then key 'time'. The preset value appears which has been set at last.

Press key 'frames' to set the frame values (digits 1/2) in the range 0 – 24 or 0 – 29, depending on framerate.

Press key 'seconds' to set the seconds (digits 3/4) in the range 0 – 59.

Press key 'minutes' to set the minutes (digits 5/6) in the range 0 – 59.

Press key 'hours' to set the hours (digits 7/8) in the range 0 – 23.

Press key 'time' to save the values and to quit the set mode.

Pressing key 'set' will quit the set mode without saving new data.

## Preset userbits

Press key 'set', then key 'user'. The preset value appears which has been set at last.

As in case of the time preset the keys 'frames', 'seconds', 'minutes', 'hours' serve to change the digits 1/2, 3/4, 5/6, 7/8. The valid range now is hexadecimal \$00 - \$FF.

Press key 'user' to save the values and to quit the set mode.

Pressing key 'set' will quit the set mode without saving data.

## Jam mode

The jam mode serves to regenerate a recorded LTC, to continue a LTC which has partly been recorded, or to set the generator with reader values.

Connect a LTC source at the XLR input LTC In.

Function	Key	Description
1 x jam time + user	'cont jam'	Time and userbits of the LTC source will be transferred one time to the generator, after that the jam function will automatically be switched off. In case no LTC can be read LED 'jam sync' flashes.
cont jam time + user	'cont jam' approx. 2 seconds	Pressing this key for approx. 2 seconds will switch on the continuous jam function, the LED 'cont' lits. In case no LTC can be read LED 'jam sync' flashes, other case it will lit.
1 x jam time	'time' + 'cont jam'	Both keys pressed at sam time will activate the 1 x jam function only to transfer the time of the source.
1 x jam user	'user' + 'cont jam'	Both keys pressed at same time will activate the 1 x jam function only to transfer the userbits of the sorce.
cont jam time	'time' + 'cont jam' approx. 2 seconds	Both keys pressed at same time for approx. 2 seconds will activate the continuous jam function, but only to transfer the time of the source. The userbits of the generator are left unchanged.
cont jam user	'user' + 'cont jam' approx. 2 seconds	Both keys pressed at same time for approx. 2 seconds will activate the continuous jam function, but only to transfer the userbits of the source. The time is counted up free-running.

Each activated jam function is switched off by pressing key 'cont jam' again.

LED 'cont' - lits as long as a continuous jam function is active.

LED 'jam sync' - lits as long as the source LTC can be read during a jam function,  
- flashes, if no LTC can be read during a jam function.

## Show status

Press key 'set', then key 'auto'. The 8-digits display will show the status same way as after power-on.

Key 'set' pressed again will switch off the status display.



The LED '1. half frame' flashes with the 1. field frequency of the derived colorlock, i.e. every 4 fields if the 4-field colorlock has been achieved, every 8 fields if the 8-field colorlock has been achieved. Even if no colorframing mode is selected (LED 'colorfr. off) the LED '1. half frame' indicates the possible lock mode by the frequency of flashing.

## VITC generator (optional)

As an option a VITC generator module may be installed. In parallel to the LTC the time and user data would then be inserted as VITC in the vertical blanking interval. A "1" of the 1. digit is shown after power-on if this module is built in.

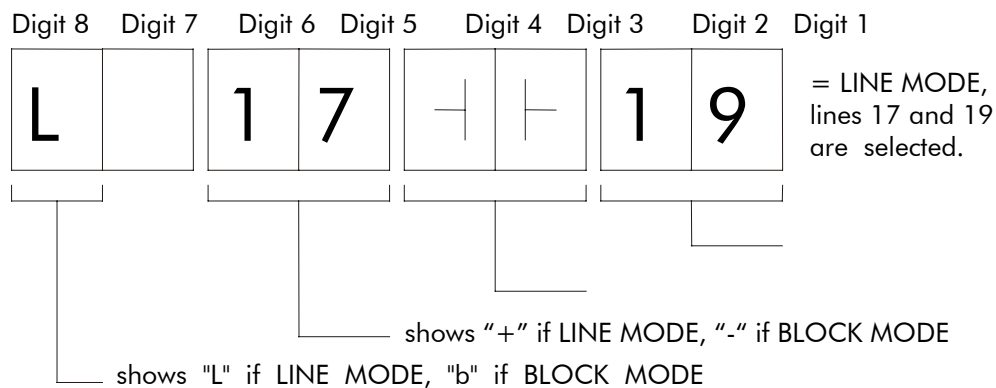
The LED 'VITC' lights up as soon as VITC is generated. For that simply connect a (C)VBS video signal at BNC connector 'Video In'. The LED '1. half frame' flashes with every 1. field of the video signal (except colorframing – see above).

The lines of the video where the VITC should be placed are to select. Factory setting is line 17 and line 19. The range is 6 to 22 if frame rate = 24 or 25, and 10 to 20 if frame rate = 30. Additionally two modes are to select:

LINE MODE = VITC is inserted in just the two lines,

BLOCK MODE = VITC is inserted in a consecutive block of lines, defined by start and end lines.

Press key 'set', then key 'video'. E.g. the display shows



The flashing element is to change: press key 'hours' to let the 1. line value flash,  
press key 'minutes' to let the 2. line value flash,  
press key 'seconds' to let digit 8 ("L" or "b") flash.

Change the values by pressing key 'frames':

Change BLOCK/LINE MODE: press key 'seconds', then key 'frames'.

Change 1. line: press key 'hours', then key 'frames' repeated until the desired value appears.

Change 2. line: press key 'minutes', then key 'frames' repeated until the desired value appears.

Please notice:

- The valid range of lines is 6-22 or 10-20, depending on framerate.
- In LINE MODE the two lines must be non-consecutive, line 1 < line 2.
- In BLOCK MODE line 1 ≤ line 2, in case of = VITC is generated in only one line.

Press key 'video' to save the setting and to quit the set mode.

Pressing key 'set' will quit the set mode without saving the new values.

## Serial interface (optional)

As an option a serial interface RS232 or RS422 may be installed to remote control the unit and to request the current time data.

The data format of 8 data bits and 1 stop bit is fixed, the parity bit and the baudrate are to select.

Display and change the baudrate:

Press key 'set', then press key 'jam'. The display shows the current baudrate, e.g.:  
bd 9600

Press key 'frame rate' repeated to adjust to a value from 600 to 19200 baud.

Press key 'set' to save this value and to quit the set mode.

Display and change the parity:

Press key 'set', then press key 'cont jam'. The display shows the selected parity:

PA	000	=	No parity bit generated, no parity bit received.
PA	001	=	Odd parity bit.
PA	011	=	Even parity bit.
PA	101	=	Mark ("1") parity bit transmitted, parity check disabled.
PA	111	=	Space ("0") parity bit transmitted, parity check disabled.

Press key 'frame rate' repeated to adjust one of these modes.

Press key 'set' to save this value and to quit the set mode.



## Table of interface commands

Command/Request					Return				
Description	Hex value				Descr- iption	Hex value			
	CMD1/ DC	CMD2	DATA	CHECK		CMD1 /DC	CMD2	DATA	\$CHECK
Request device type	\$00	\$11	-	\$11	Device type	\$12	\$11	*1	\$CHECK
Set frame rate = 25	\$01	\$80	\$25	\$A6	ACK	\$10	\$01	-	\$11
Set frame rate = 30	\$01	\$80	\$30	\$B1	ACK	\$10	\$01	-	\$11
Set frame rate = 30drop	\$01	\$80	\$70	\$F1	ACK	\$10	\$01	-	\$11
Sync. = auto	\$01	\$81	\$00	\$82	ACK	\$10	\$01	-	\$11
Sync. = video	\$01	\$81	\$01	\$83	ACK	\$10	\$01	-	\$11
Sync. = internal x'tal	\$01	\$81	\$02	\$84	ACK	\$10	\$01	-	\$11
Jam off	\$01	\$82	\$00	\$83	ACK	\$10	\$01	-	\$11
1 x jam time + user	\$01	\$82	\$01	\$84	ACK	\$10	\$01	-	\$11
Cont Jam time + user	\$01	\$82	\$02	\$85	ACK	\$10	\$01	-	\$11
1 x jam time only	\$01	\$82	\$05	\$88	ACK	\$10	\$01	-	\$11
Cont jam time only	\$01	\$82	\$06	\$89	ACK	\$10	\$01	-	\$11
1 x jam user only	\$01	\$82	\$09	\$8C	ACK	\$10	\$01	-	\$11
Cont jam user only	\$01	\$82	\$0A	\$8D	ACK	\$10	\$01	-	\$11
VITC block mode	\$01	\$83	\$00	\$84	ACK	\$10	\$01	-	\$11
VITC line mode	\$01	\$83	\$01	\$85	ACK	\$10	\$01	-	\$11
Set VITC lines	\$02	\$84	*2	\$CHECK	ACK	\$10	\$01	-	\$11
Colorframing off	\$01	\$85	\$00	\$86	ACK	\$10	\$01	-	\$11
Colorframing on	\$01	\$85	\$01	\$87	ACK	\$10	\$01	-	\$11
Generator "go"	\$01	\$86	\$00	\$87	ACK	\$10	\$01	-	\$11
Generator "stop"	\$01	\$86	\$01	\$88	ACK	\$10	\$01	-	\$11
Set time *5	\$44	\$04	*3	\$CHECK	ACK	\$10	\$01	-	\$11
Set user *5	\$44	\$05	*4	\$CHECK	ACK	\$10	\$01	-	\$11
Request time	\$61	\$0A	\$01	\$6C	Time	\$74	\$08	*3	\$CHECK
Request time + flag *6	\$61	\$0A	\$02	\$6D	Time + flag	\$74	\$08	*3	\$CHECK
Request user	\$61	\$0A	\$10	\$7B	User	\$74	\$09	*4	\$CHECK

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

ACK = acknowledge = o.k. return.

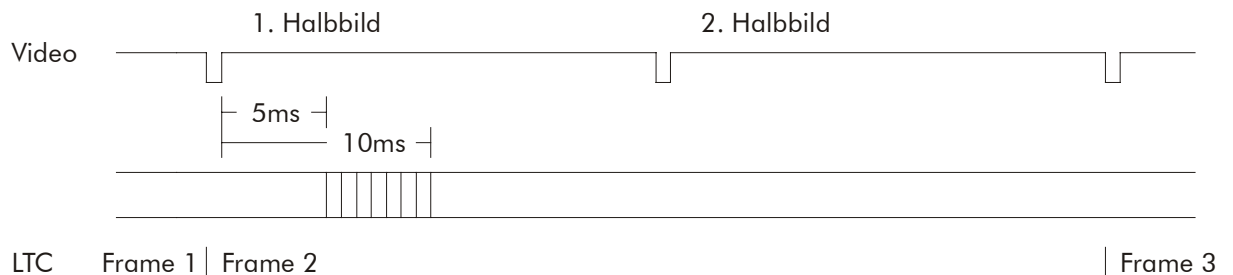
In case of an error a NAK = not acknowledge could be returned:

\$11 \$12 \$ERROR \$CHECK, with \$ERROR =

- BIT 7: -
- BIT 6: Framing error
- BIT 5: Overrun error
- BIT 4: Parity error
- BIT 3: -
- BIT 2: Checksum error
- BIT 1: Unplausible data
- BIT 0: Undefined command

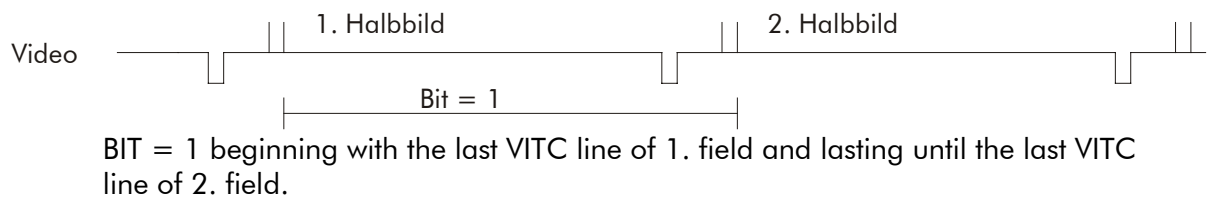
## Remarks to the interface commands

- \*1 DATA 1 = BIT 7 : 0  
 BIT 6 : 0  
 BIT 5 : 0  
 BIT 4 : 0  
 BIT 3 : 1 = LTC jam module o.k., else = 0.  
 BIT 2 : 1 = colorframing module o.k., else = 0.  
 BIT 1 : 1 = interface module o.k., else = 0.  
 BIT 0 : 1 = VITC module o.k., else = 0.  
 DATA 2 = Software revision number.
- \*2 DATA 1 = BCD value of the first line (start line), notice the valid range.  
 DATA 2 = BCD value of the second line (end line), notice the valid range
- \*3 DATA 1 = BCD frames  
 DATA 2 = BCD seconds  
 DATA 3 = BCD minutes  
 DATA 4 = BCD hours
- \*4 DATA 1 = User digits 1/2  
 DATA 2 = User digits 3/4  
 DATA 3 = User digits 5/6  
 DATA 4 = User digits 7/8
- \*5 Time and user are to set framewise (VITC is locked to LTC).  
 In case of video synchronisation the following timing is valid:



In the range 5ms – 10ms after V1 data transfer process will be active, so at this time no set command should be finally received. If the last bit of the set command is received in the range 10ms after V1 of frame1 and 5ms after V1 of frame2 it will be the correct timing to generate the set data as frame3.

- \*6 "Flag" is the field identification bit, it is set (=1) during the 1. field of the video (only in case of VITC option). It is send as Bit 7 of DATA4, i.e. the most significant bit of the hours. If possible use baudrate = 19200 and take care of following timing:



BIT = 1 beginning with the last VITC line of 1. field and lasting until the last VITC line of 2. field.