

Operating Manual

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Configuration and Programming

TCI / TCD

Alpermann+Velte

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B1 Configuration

The functions of the TCI / TCD will be adjusted by the configuration memory. The memory contains 100 Bytes.

Every parameter is described as followed:

Main function / Sub function		P21
Parameter 1	Function 1	C00
Parameter 2	Function 2	C01
Parameter 3	Function 3	C02

The meaning in particular:

Main function	The functions group of the parameters
Sub function	The parameter itself
Parameter 1-3	These settings can be made.
Function 1-3	Descriptions of settings
P21	Under this insert you will find the parameter in the configuration memory
C00-C02	These parameters will be stored in the configuration memory

The specifications P** and C** are only relevant if the TCI-70 is configured without the Windows-program. You will find further details in the appendix C1.

The following parameters can be adjusted:

Generator

Frame-rate

TCI / TCD generates Time Code of frame-rates 25, 30 and 30DF.

Generator / Rate		POC
Auto	The frame-rate is being set according to video mode PAL: 25, NTSC: 30 Drop	C00
25	25 Frames / s	C01
30	30 Frames / s	C02
30 DF	29,97 Frames / s (Drop-Frame)	C03

Stop

If the generator is being stopped, e.g. by a JAM-Mode or a serial command, it can still generate the last frame or switch itself off.

Generator / Stop		POD
Stop	Identical frame in stop mode are generated.	C00
Off	The generator is switched off in stop mode.	C01

Sync

The generator can synchronise itself to different sources.

Generator / Sync		POE
Video	Sync source is the V1 pulse of the video.	C00
Free	The generator runs free on quartz basis	C01

LTC

Gain

The level of the LTC-Generator can be adjusted or switched off completely. The level refers to 0VU = -10 dBV

Generator / LTC / Gain		POF
Off	The LTC generator is switched off.	C00
-24 dB	LTC level	C01
-21 dB	LTC level	C02
-18 dB	LTC level	C03
-15 dB	LTC level	C04
-12 dB	LTC level	C05
-9 dB	LTC level	C06
-6 dB	LTC level	C07
-3 dB	LTC level	C08
0 dB	LTC level	C09
-3 dB	LTC level	C0A
-6 dB	LTC level	C0B
-9 dB	LTC level	C0C

Edge

The cut-off characteristics of the LTC-output can be adjusted.

Generator / LTC / Edge		P14
25 μ s	LTC cut off characteristics	C00
50 μ s	LTC cut off characteristics	C01

VITC

The allowed range for the generation of VITC data stretches over picture line 6 to 22, in the video rate PAL and 10 to 20 with NTSC.

Mode

The VITC generator can generate one or two lines, or be switched off. We recommend that when two VITC-lines are generated, they should not be neighboring lines. Therefore the second line should be at least two higher than the first. To generate VITC in just one line, both lines must be set identically.

Generator / VITC / Mode		P10
Off	The VITC generator is switched off	C00
2 Lines	1 or 2 lines VITC are generated	C01

Line 1

Setting the first VITC line. Picture lines 6 to 22 (PAL) respectively 10 to 20 (NTSC) are available.

Generator / VITC / Line 1		P11
6	First possible VITC-line (PAL)	C06
...		...
10	First possible VITC-line (NTSC)	C0A
...		...
20	Last possible VITC-line (NTSC)	C14
...		...
22	Last possible VITC-line (PAL)	C16

Line 2

Setting the second VITC-line. Picture lines 6 to 22 (PAL) respectively 10 to 20 (NTSC) are available.

Generator / VITC / Line 2		P12
6	First possible VITC-line (PAL)	C06
...		...
10	First possible VITC-line (NTSC)	C0A
...		...
20	Last possible VITC-line (NTSC)	C14
...		...
22	Last possible VITC-line (PAL)	C16

Time

The start frame of the generator can be adjusted. This frame can be called up on the generator when the device is switched on or if desired via function key.

Generator / Time		P18
hh:mm:ss:ff	Start frame	L ^{*1}

^{*1} The start frame will be transmitted via configuration interface in the format hhmmsff. For a start rate of 10:00:02:00 the command L10000200 is send.

Reader

Frame-rate

TCI / TCD reads Time Code of frame rates 25, 30 and 30DF. With the setting AUTO the frame-rate from the read Time Code is determined automatically.

Reader / Rate		P29
Auto	The frame rate is set according to video mode. PAL: 25, NTSC: 30 Drop	C00
25	25 Frames / Seconds	C01
30	30 Frames / Seconds	C02
30 DF	29,97 Frames / Seconds (drop frame)	C03

Source

If the TCI / TCD is equipped with several readers (e.g. LTC and VITC) you can chose which source should be used. If several sources are called up, a priority control decides which source is used. VITC has for example a higher priority than LTC. As long as VITC is being read LTC will be ignored. Only if VITC breaks down it switches over to the LTC reader.

Reader / Source		P2A
Off	All readers are switched off.	C00
LTC	Only the LTC reader is switched on	C01
VITC	Only the VITC reader is switched on	C02
Auto	All readers are switched on	C7F

VITC

Mode

The VITC-reader can run in different mode.

Reader / VITC / Mode		P2C
Auto	The complete vertical blanking interval is being searched for VITC.	C00
2 Lines	One or two lines are being searched for the vertical interval.	C01

Line 1

Setting the first VITC line. To read VITC in just one line, line 1 and line 2 must be set alike. The picture lines 6 to 22 (PAL) respectively 10 to 20 (NTSC) are available.

Reader / VITC / Line 1		P2D
6	First possible VITC line (PAL)	C06
...		...
10	First possible VITC line (NTSC)	C0A
...		...
20	Last possible VITC line (NTSC)	C14
...		...
22	Last possible VITC line (PAL)	C16

Line 2

Setting the second VITC-line. The picture lines 6 to 22 (PAL) respectively 10 to 20 (NTSC) are available.

Reader / VITC / Line 2		P2E
6	First possible VITC line (PAL)	C06
...		...
10	First possible VITC line (NTSC)	C0A
...		...
20	Last possible VITC line (NTSC)	C14
...		...
22	Last possible VITC line (PAL)	C16

Jam-Sync

The setting of the programmable jam function. Jam transmits Time Codes from reader to generator. This for example, allows to regenerate a Time Code or transform LTC into VITC.

Mode

The jam-function can be switched on or off. Besides the below described settings a single crossover of rates is possible (Single Jam). The command can be set off by the Windows program. This is described above.

Jam / Mode		P1C
Off	Jam is switched off	C00
Continuous	Continuous rates are transmitted from reader to generator. If the reader does not provide values, the generator continues to count freely.	C01
Cont. 0 Frames	The generator does not count by itself but will be overwritten with reader values.	C02
Cont. Wheel	Like "Continuous", but the generator continues to count a selectable number of pictures, only (see "Wheel") if the reader does not provide further values before it is interrupted.	C03

Wheel

The number of frames, that are continuously counted in Jam-Mode "Cont N Frames", before the generator stops.

Jam / Wheel		P1E
1	Smallest possible amount of frames	C01
...		...
99	Biggest possible amount of frames	C63

Values

With jam sync time and/or user can be adopted as well as a cross jam can be carried out (Time of reader sets user of generator).

Jam / Values		P1D
Time	Jam sync only time	C01
User	Jam sync only user	C02
Time, User	Jam sync time and user	C03
Time to User	Cross jam	C04

Offset

With jam sync an offset can be added. It is also possible to subtract times. A negative offset of one second for example is reached with the setting 23:59:59:00. If the offset should be used will be determined by the following "Use Offset".

Jam / Offset		P20
hh:mm:ss:ff	Offset	L ^{*1}

^{*1} The offset will be handed over via the configuration interface in the format hhmmssff. For an offset of 23:59:59:00 the command L23595900 will be send.

Use Offset

Jam / Use Offset		P1F
Off	Offset will be ignored	C00
On	Offset will be used	C01

Insertion

Reader- or generator rates can be overlaid into the visible picture. There are several different formats and styles available.

Source

Insert / Source		P3C
Off	The insertion is switched off	C00
Gen Time	Time of generator is inserted (hh:mm:ss:ff)	C01
Read Time	Time of reader is inserted (hh:mm:ss:ff)	C02
Gen User	User of generator is inserted (uu:uu:uu:uu)	C03
Read User	User of reader is inserted (uu:uu:uu:uu)	C04
Gen DMHM	Real-time is inserted (DD:MM:hh:mm)	C05
Read DMHM	Real-time of reader ID inserted (DD:MM:hh:mm)	C06
Gen DHM	Real-time of generator is inserted (DD:hh:mm:ss)	C07
Read DHMS	Real-time of reader is inserted (DD:hh:mm:ss)	C08
Gen D:M:M:S	Real-time of generators is inserted (DD:MM:mm:ss)	C09
Read D:M:M:S	Real-time of reader is inserted (DD:MM:mm:ss)	C0A

Insert / Source		P3C
Gen Time (6)	Time of Generators is inserted with 6 digits (hh:mm:ss)	C0B
Read Time (6)	Time of reader is inserted with 6 digits (hh:mm:ss)	C0C
Gen User (6)	User of Generators is inserted with 6 digits (uu:uu:uu)	C0D
Read User (6)	User of reader is inserted with 6 digits (uu:uu:uu)	C0E

hh = hours, mm = minutes, SS = seconds, ff = frames, DD = day, MM = month, uu = user

Pos X

The horizontal position of video insertion. Dependent of preset size („Size“, see below) different ranges are possible.

Insert / Pos X		P3E
0	Smallest possible value (insertion in left picture frame)	C00
...		...
69	Biggest possible value for big insertions (insertion in right picture frame)	C45
...		...
126	Biggest possible value for small insertions (insertion in right picture frame)	C7E

Pos Y

The vertical position of the video insertion. Dependent of video norm (PAL or NTSC) and preset size („Size“, see below) different ranges are possible.

Insert / Pos X		P3F
0	Smallest possible value (insertion in upper picture frame)	C00
...		...
103	Biggest possible value for NTSC and big insertion (insertion in lower picture frame)	C67
...		...
111	Biggest possible value for NTSC and small insertion (insertion in lower picture frame)	C6F
...		...
127	Biggest possible value for PAL and big insertion (insertion in lower picture frame)	C7F
...		...
135	Biggest possible value for PAL and small insertion (insertion in lower picture frame)	C87

Size

The size of the insertion can be adjusted in two steps.

Insert / Size		P40
Small	Small insertion	C00
Large	Big insertion	C01

Style

The style of the insertion can be adjusted.

Insert / Style		P41
White on Black	White characters on black mask	C00
Black on White	Black characters on white mask	C01
White	White characters without mask	C02
Black	Black characters without mask	C03

Head Switch Filter

To improve the quality of the insertion the clamping of the video signal in the vertical field blanking interval can be switched off. This can be useful if the video signal is provided by a VTR.

Insert / Head Switch Filter		P42
Off	It will be clamped in the V-interval	C00
On	It will not be clamped in the V-interval	C01

Data interface

The following insertions concern the data interface, that is located on the rear panel of the TCI / TCD. On the contrary to the configuration interface on the front panel it can be configured in parts.

Protocol

The protocol of the data interface.

Interface / Protocol		P48
Sony	Modified Sony protocol	C00
TC60	TC60 protocol	C02
TC60 ND	New data protocol of the TC60	C03
TCI50	TCI50 protocol	C06
TC60 Gen Req	Generator data in TC60 protocol	C0A
TC60 Gen ND	Generator data in new data protocol of the TC60	C0B
TC60 Gen Set	Set generator from new data protocol of the TC60	C0C
TC60 ND Wheel	TC60 protocol with wheel	C0D

Baud rate

Interface / Baud rate		P49
2400	Baud rate of the data interface	C00
4800	Baud rate of the data interface	C01
7200	Baud rate of the data interface	C02
9600	Baud rate of the data interface	C03
19200	Baud rate of the data interface	C04
38400	Baud rate of the data interface	C05

Format

Interface / Format		P4A
8N1	8 Data bits, no parity, 1 stop bit	C00
8N2	8 Data bits, no parity, 2 stop bits	C09
8O1	8 Data bits, odd parity, 1 stop bit	C01
8E1	8 Data bits, even parity, 1 stop bit	C02
8M1	8 Data bits, parity bit set, 1 stop bit	C03
8S1	8 Data bits, parity bit cleared, 1 stop bit	C04
7N2	7 Data bits, no parity, 2 stop bits	C0A
7O1	7 Data bits, odd parity, 1 stop bit	C05
7E1	7 Data bits, even Parity, 1 stop bit	C06
7M1	7 Data bits, parity bit set, 1 stop bit	C07
7S1	7 Data bits, parity bit cleared, 1 stop bit	C08

Real-time functions

The following items belong to the real-time functions.

Real-time / Source		P50
Off	Real time mode is deactivated	C00
Clock	Real time information is taken from the built-in battery-backed real time clock.	C01
Serial	Real time information is taken from data interface.	C02

Zone

This sets the time zone, the real-time information's are generated in.

Real-time / Zone		P51
UTC	UTC (Universal Time Coordinated) is the base for all other time zones. DST switching never happens.	C00
Berlin	Offset to UTC: +1 hour, in summer +2 hours	C01
New York	Offset to UTC: -5 hours, in summer -4 hours	C02

DST

The calculation of the point of time of the automatic DST change-over can be adjusted to different countries..

Real-time / DST		P52
Off	No automatic DST change-over.	C00
Europe	DST begins at the last Sunday of March at 2:00 and ends at the last Sunday of October at 3:00. While DST the clock is moved forward by one hour.	C01
USA	DST begins at the first Sunday of April at 2:00 and ends at the last Sunday of October at 3:00. While DST the clock is moved forward by one hour.	C02

Keyboard

Function Key 1

Programming of function key F1

Keyboard / Function Key 1			P5C
No operation	No function		C00
Reorga	Reorganize configuration memory		C01
Ins Up	Move insertion up. When insertion has reached the upmost position, the next key-press will cause the insertion to be placed in the lowest possible position.	Insert / Pos Y	C04
Ins Down	Move insertion down. When insertion has reached the lowest position, the next key-press will cause the insertion to be placed in the highest possible position.	Insert / Pos Y	C05
Ins Left	Move insertion to the left. When insertion has reached the leftmost position, the next key-press will cause the insertion to be placed in the furthest right possible position.	Insert / Pos X	C06
Ins Right	Move insertion to the right. When insertion has reached the rightmost position, next key-press will cause the insertion to be placed in the furthest left possible position.	Insert / Pos X	C07
Ins Style	Change style of insertion	Insert / Style	C08
Ins Size	Change size of insertion	Insert / Size	C09
Ins Style Size	Change style and size of insertion	Insert / Style Insert / Size	C0A
Ins T/U	Toggle insertion between time and user	Insert / Source	C0B
Ins R/G	Toggle insertion between reader and generator	Insert / Source	C0C
Ins T/U/R/G	Toggle insertion between generator/time, reader/time, generator/user and reader/user	Insert / Source	C0D
Ins Hold	Stop insertion / keep running		C0E
Ins on/off	Toggle insertion between on and off	Insert / Source	C0F
Insert Frames	Toggle between insertion with display of frames and without.	Insert / Source	C10
Disp Time/User	Toggle display between time and user	Display / Source	C11
Disp Read/Gen	Toggle display between reader and generator	Display / Source	C12
Disp T/U/R/G	Toggle display between generator/time, reader/time, generator/user and reader/user	Display / Source	C13
Disp Frames	Toggle display between 6 and 8 digit display	Display / Source	C14

Keyboard / Function Key 1			P5C
Disp Bright +	Every key-press causes the display to become brighter. When the maximum brightness has been reached, the two decimal points will light up shortly. The next key-press will cause the display to start at the lowest brightness and then continue to escalate upwards. (7 brightness levels)	Display / Bright	C15
Disp Bright -	Every key-press causes the display to become dimmer. When the minimum brightness has been reached, the two decimal points will light up shortly. The next key-press will cause the display to start at the highest brightness and then become successively dimmer. (7 brightness levels)	Display / Bright	C16
Disp Hold	Pause display / continue display		C17
Gen Start / Stop	Toggle between "generator run" and "generator stop"		C18
Gen Start	Let the generator run		C19
Gen Set	Set time of generator to preset start time and start it	Gen / Time	C1A
Single Jam	Perform single jam		C1B
Gen Stop	Stop generator		C1C
Gen Reset	Set time of generator to 00:00:00:00 and stop it		C1D
Load Profile 0	Loads saved profile 0		C1E
...			...
Load Profile 9	Loads saved profile 9		C27
Real-time On/Off	Toggle between real time mode on/off		C29
Insert Top/Bottom	Toggle between insertion on the top of the screen or on the bottom of the screen.	Insert / Pos Y	C2A
Clock Adjust	30-second correction of the real time clock and the generator.		C2C
Clock Preset	Real time clock and generator set		C2D

Function Key 2-4

Programming of function key F2 to F4

Keyboard / Function Key 2			P5D
Keyboard / Function Key 3			P5E
Keyboard / Function Key 4			P5F
	See programming of F1		

Display

Source

Display / Source		P59
Gen Time	Display "time" from the generator (hh:mm:ss:ff)	C00
Gen User	Display "user" from the generator (uu uu uu uu)	C01
Read Time	Display "time" from the reader (hh:mm:ss:ff)	C02
Read User	Display "user" from the reader (uu uu uu uu)	C03
Gen Time (6)	Display "time" from the generator will be in 6 digit format (hh:mm:ss)	C04
Gen User (6)	Display "user" from the generator will be in 6 digit format (hh:mm:ss)	C05
Read Time (6)	Display "time" from the reader will be in 6 digit format (hh:mm:ss)	C06
Read User (6)	Display "user" from the reader will be in 6 digit format (hh:mm:ss)	C07

Bright

Display / Bright		P5A
1	Lowest brightness	C01
...		...
7	Highest brightness	C07

General

Norm

The Norm of the attached video-signal:

Misc / Norm		P58
PAL	PAL or SECAM video, 625 lines, 25 Hz	C00
NTSC	NTSC Video, 525 lines, 29,97 Hz	C01

B2 User profile

The following user profiles can be booted with command Bx. Only the divergences of the factory profile are mentioned.

203: TC60RLV, Sony-Protocol, 38400,8,O,1		B203
Generator / VITC / Mode	Off	P10
Insert / Source	Off	P3C
Interface / Protocol	Sony	P48
Interface / Baud rate	38400	P49
Interface / Format	8O1	P4A

204: TC60RLV, TC60-Protokoll, 9600,8,O,1		B204
Generator / VITC / Mode	Off	P10
Insert / Source	Off	P3C
Interface / Protocol	TC60	P48
Interface / Baud rate	9600	P49
Interface / Format	8O1	P4A

205: VITC/LTC Reader/Inserter		B205
Generator / VITC / Mode	Off	P10
Insert / Source	Read Time	P3C
Insert / Pos X	116	P3E
Insert / Pos X	125	P3F
Insert / Size	Small	P40
Insert / Style	WOB	P41
Insert / Head Switch Filter	Off	P42
Interface / Protocol	Sony	P48
Interface / Baud rate	38400	P49
Interface / Format	8O1	P4A
Misc / Norm	PAL	P58

207: Real time from the serial interface		B207
Insert / Source	Gen Time (6)	P3C
Interface / Protocol	Meinberg R	P48
Interface / Baudrate	2400	P49
Interface / Format	7E1	P4A
Real-time / Source	Serial	P50
Display / Source	Gen Time (6)	P59
Keyboard / Function Key 1	Insert Frames	P5C
Keyboard / Function Key 2	Insert T/U/R/G	P5D
Keyboard / Function Key 3	Insert On/Off	P5E
Keyboard / Function Key 4	Real-time On/Off	P5F

208: Real time from the real time module		B208
Insert / Source	Gen Time (6)	P3C
Real-time / Source	Clock	P50
Display / Source	Gen Time (6)	P59
Keyboard / Function Key 1	Clock Adjust	P5C
Keyboard / Function Key 2	Clock Set	P5D
Keyboard / Function Key 3	Insert On/Off	P5E

C Appendix

C1 Configuration interface

The Configuration interface on the front panel of the TCI / TCD works with 38400bps, 8 Data bits, 1 Stop bit, no parity. Commands consist of command letters (capitalisation is checked) followed by a up to 8-digit hexadecimal number, that can be left out according to the command in question. The command is completed with Enter (CR, 0xD). The TCI / TCD sends all received symbols back as an echo and answers to the command with a result code (two characters) or with one or two up to 8-digit hexadecimal numbers. Mistakes during input can be cancelled by pressing Backspace (BS, 0x8).

The interface can be operated manually with a terminal program, e.g. (HyperTerm / Windows 95/NT, Terminal / Windows 3.1x, Telix / DOS, etc.). Set full duplex mode without local echo. The connection can be checked by pressing Enter, the TCI / TCD will reply with OK.

Commands to TCI / TCD

Command	Meaning
a	Request time reader
Ax	Set Generator time
B	Load Factory-Settings
Bx	Load profile x
c	Read byte from the configuration memory
cx	Read byte from configuration memory to address x
Cx	Write byte x in the configuration memory
d	Test User Reader
Dx	Set Generator User
e2	Test Status Reader
e3	Test Time and User Reader
e4	Test Time and Status Reader
e20	Test Time Generator
e21	Test User Generator
e23	Test Time and User Generator
e96	Test Software-configuration
e97	Test Hardware-configuration
e98	Test Serial number
e99	Test Version number
E41	Single Jam-Sync
E42	Quit Single Jam-Sync
i	Read word from configuration memory
ix	Read word from configuration memory to address x
Ix	Write word x in configuration memory
l	Read long-word from configuration memory
lx	Read long-word from configuration to address x

Command	Meaning
Lx	Write long-word x in configuration memory
O	Open configuration block
p	Read address index
Px	Set address index to x
Q	Reorganize configuration block
S	Read configuration block

Responses from TCI / TCD

Answer	Meaning
OK	OK = everything is alright
x	Result, one long-word
x,y	Result, two long-word
AR	Address Range = rate range of address wrong
CL	CLosed = configuration block not open
CO	Command AbOrted = command aborted
NC	No Config = no free configuration block left
OP	OPen = configuration block already opened
OV	Overrun
PI	Parameter Invalid = Parameter invalid
PM	Parameter Missing = Parameter missing
PR	Parameter Range = rate range of parameter wrong
UC	Unknown Command = unknown command
XE	eXecute Error = mistake at implementation

The system configuration is set with the commands P, C, I and L. With the commands c, i and l can be supervised. The procedure is as following:

- Chose configuration address with command P. You find the addresses in the chapter "Configuration". The setting "Insert / Source" has for example address 3C.
- Dependent on the type of the data field you can call up the momentarily set rate with the commands c, i and l.
- Also, dependent on the type of the data field you can change its rate with the commands C, I and L.
- A further possibility to configure the device is by using the preset profiles. They can be booted with command B. B without further parameters boots the rate profile. B with a number boots one of the user profiles.
- Changes have an immediate effect.

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Example: Switch off video insertion

Setting	Response from TCI / TCD	Comment
P3C	P3C	Chose Insert / Source
	OK	
C	C	Test recent rate
	1	At the moment 1 (Gen Time) is set
C00	C00	Switch off insertion
	OK	

Example: Video insertion below left with real-time notification

Setting	Response from TCI / TCD	Comment
P3C	P3C	Insert / Source
	OK	
C08	C08	Switch on insertion reader
	OK	
P3E	P3E	Chose Insert / Pos X
	OK	
C00	C00	Set position left
	OK	
P3F	P3F	Chose Insert / Pos Y
	OK	
C88	C88	Set position below
	OK	

Example: Shift device in mode TC60RV with RS422 Sony-recorder-simulation.

Setting	Response from TCI / TCD	Comment
B203	B203	Load profile 203
	OK	

Example: Shift device in mode TC60RV with TC60-request-protokoll.

Setting	Response from TCI / TCD	Comment
B204	B204	Load profile 204
	OK	

C2 Data interface

The following protocols concern the data interface on the rear panel of the TCI / TCD.

Sony-Recorder protocol

Interface / Protocol (P48) = SONY (C00)

TCI / TCD simulates a recorder with serial interface (usually RS422). The following requests are answered:

Request	Hexadecimal	Response
Device Type	0x00 0x11 *3	0x12 0x11 0x11 0x00 *3 (at 25fps) 0x12 0x11 0x10 0x00 *3 (at 30fps)
Set Generator Time	0x44 0x04 *6 *3	0x10 0x01 *3 (ACK)
Set Generator User	0x44 0x05 *2 *3	0x10 0x01 *3 (ACK)
Time mode	0x60 0x36 *3	0x71 0x36 0x00 *3
Set Video Format	0x41 0x81 *8 *3	0x10 0x01 *3 (ACK)
Get Video Format	0x60 0x81 *3	0x71 0x81 *8 *3
Set Framerate Generator	0x41 0x82 *9 *3	0x10 0x01 *3 (ACK)
Get Framerate Generator	0x60 0x82 *3	0x71 0x82 *9 *3
Set Framerate Reader	0x41 0x83 *9 *3	0x10 0x01 *3 (ACK)
Get Framerate Reader	0x60 0x83 *3	0x71 0x83 *9 *3
Generator Stop	0x41 0xC5 0x00 *3	0x10 0x01 *3 (ACK)
Generator Start	0x41 0xC5 0x01 *3	0x10 0x01 *3 (ACK)
Generator Time	0x61 0x0A 0x01 *3	0x74 0x08 *1 *3
Generator User	0x61 0x0A 0x10 *3	0x74 0x09 *2 *3
Generator Time+User	0x61 0x0A 0x11 *3	0x74 0x08 *1 *2 *3
LTC Time	0x61 0x0C 0x01 *3	0x74 0x04 *1 *3
VITC Time	0x61 0x0C 0x02 *3	0x74 0x06 *1 *3
LTC or VITC Time	0x61 0x0C 0x03 *3	0x74 0x04 *1 *3 (LTC), or 0x74 0x06 *1 *3 (VITC)
Timer 1	0x61 0x0C 0x04 *3	0x74 0x00 *1 *3
Timer 2	0x61 0x0C 0x08 *3	0x74 0x01 *1 *3
LTC User	0x61 0x0C 0x10 *3	0x74 0x05 *2 *3
LTC Time+User	0x61 0x0C 0x11 *3	0x74 0x04 *1 *2 *3
VITC User	0x61 0x0C 0x20 *3	0x74 0x07 *2 *3
VITC Time+User	0x61 0x0C 0x22 *3	0x74 0x06 *1 *2 *3
LTC or VITC User	0x61 0x0C 0x30 *3	0x74 0x05 *1 *3 (LTC), or 0x74 0x07 *1 *3 (VITC)
LTC or VITC Time+User	0x61 0x0C 0x33 *3	0x74 0x04 *1 *2 *3 (LTC), or 0x74 0x06 *1 *2 *3 (VITC)
Status	0x61 0x20 *4 *3	*5
Other Requests or Command		0x10 0x01 *3 (ACK)
Invalid Request		0x11 0x12 *7 *3 (NAK)

*1: BCD-Time = Frames / Seconds / Minutes / Hours. Regardless of special requests (LTC or VITC) the recent Time Code is send

*2: User dates = User 2+1 / User 4+3 / User 6+5 / User 8+7

*3: Check word = Sum of the previous words

*4: Status request, details see Sony-Protocol

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- *5: Status request. Only the bits "PLAY" and "SERVO LOCK" are = 1 (see Sony-Protocol)
- *6: BCD-Time = Frames / Seconds / Minutes / Hours. To set the generator frame accurate, the command should be send in the first video field.
- *7: Error code. Bit 7 = timeout, 6 = framing, 5 = overrun, 4 = parity, 3 = unit in wrong mode, 2 = checksum, 1 = data not plausible, 0 = unknown command
- *8: Video Format. 0x01 = PAL, 0x02 = NTSC
- *9: Framerate. 0x00 = Auto, 0x25 = 25 fps, 0x24 = 24 fps, 0x30 = 30 fps, 0xB0 = 30 fps drop

Transmission of reader data on request

Interface (P48) / Protocol = TC60 Req (C02)

TCI / TCD transmits data, if following rates were received:

Request		Data from TCI / TCD			
ASCII	Hex				
T	0x54	time, 4 BCD-words, hours / minutes / seconds / frames			
U	0x55	User data, 4 words, User 8+7 / User 6+5 / User 4+3 / User 2+1			
V	0x56	Time + User, 8 words, Hours / Minutes / Seconds / Frames User 8+7 / User 6+5 / User 4+3 / User 2+1			
W	0x57	Time + Status bits, 5 Words, Hours / Minutes / Seconds / Frames / Status word. The 8 bits of the status word are:			
		VITC		LTC	
		Bit 7	0	Bit 7	Direction, 0 = forward
		Bit 6	1 = Identification read VITC	Bit 6	0 = Identification read LTC
		Bit 5	Bit 75 in VITC (field PAL)	Bit 5	Bit 59 in LTC
		Bit 4	Bit 74 in VITC	Bit 4	Bit 58 in LTC
		Bit 3	Bit 55 in VITC	Bit 3	Bit 43 in LTC
		Bit 2	Bit 35 in VITC (field NTSC)	Bit 2	Bit 27 in LTC
		Bit 1	Bit 15 in VITC (color locked)	Bit 1	Bit 11 in LTC (color locked)
Bit 0	Bit 14 in VITC (drop flag)	Bit 0	Bit 10 (drop flag)		
F	0x46	Status bits, 1 word (see above)			
R	0x52	Frame-rate, 1 word BCD: The automatically determined frame rate (24, 25,30) is transmitted.			

All requests are followed by an immediate response, that means the dates that are recently in the memory will be transmitted. If you use small characters instead of capital letters t (0x74), u (0x75), v (0x76), w (0x77), f (0x66), r (0x72), the response only follows with next read Time Code. That way the communication can be synchronised with the Time Code.

Transmission of generator data on request

Interface (P48) / Protocol = TC60 Gen Req (C0A)

Same as TC60 Req (C02), but generator values will be sent.

Automatic transmission of reader data

Interface / Protocol (P48) = TC60 ND (C03)

TCI / TCD transmits time and user after every read Time Code (field) in 10 words:

No.	Upper Nibble Bits 4-7	Lower Nibble, Bits 0-3
1.	0	D (hexadecimal)
2.	8 th User digit	Tens hours
3.	7 th User digit	Units hours
4.	6 th User digit	Tens minutes
5.	5 th User digit	Units minutes
6.	4 th User digit	Tens seconds
7.	3 rd User digit	Units seconds
8.	2 nd User digit	Tens frames
9.	1 st User digit	Units frames
10.	Check word = Sum of words 1-9 without carry	

Automatic transmission of reader data with wheel

Interface / Protocol (P48) = TC60 ND Wheel (C0D)

Same as TC60 ND (C03), but the timecode values continue counting if the timecode source was lost. In this case, the start byte is 0x0E instead of 0x0D and the user digits are set to 0.

Automatic transmission of generator data

Interface / Protocol (P48) = TC60 Gen ND (C0B)

Same as TC60 ND (C03), but generator values will be sent.

Reception of generator data

Interface / Protocol (P48) = TC60 Gen Set (C0C)

The generator is set from data sent in a protocol "TC60 Gen ND" defined above.

Optional Protocols

If desired, special protocols can be added to make adjustments in existing systems. In this case, you should get in touch with us.