



# Technical Information

## RS232 control of T+A K8

Document Version V1.34 11/06/14 -JK/KTP/LW-

**Required K8 Control-Firmware-Version >= V1.40**  
(included in K8 Update Packages V1.3 and higher)

K8 device could be controlled by any control device having a RS232 serial output port (e.g. PC).

Settings for the RS232 interface of the control device are as follows:

Baud rate:	115.200
Data bits:	8
Stop bits:	1
Parity:	none
Flow Control:	none

### T+A RS 232 Protocol

#### Format of the command telegrams

A command telegram to the K8 device consists of 6 bytes.

The complete telegram should be sent without pauses between these bytes.

#### Example: SYSTEM\_ON command

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
<b>Header</b> (always 0x01)	<b>Telegram length</b> (total length without header and checksum = 0x03)	<b>Address</b>	<b>command</b> (here: SystemON = 0x57) → see command table "appendix 1"	<b>flag byte</b> (always 0x02)	<b>Check sum</b> = sum of bytes 1..5 mod. 0x100
<b>0x01</b>	<b>0x03</b>	<b>0xC4</b>	<b>0x57</b>	<b>0x02</b>	<b>0x21</b>

**Byte 1, 2, 5** : these bytes have fixed values (see example)

**Byte 3** : device address according to the table of available commands (see appendix 1 )

**Byte 4** : command according to the table of available commands (see appendix 1 )

**Byte 6** : check sum == (byte1+byte2+byte3+byte4+byte5) modulo 0x100

#### **Note:**

Different addresses may be used for different device functions.

A list of these commands is given in appendix 1.

## Format of the acknowledge (ACK) telegrams

The K8 device will process each received command telegram and it will send an acknowledge telegram approx. 25...35 ms after receiving the command.

The ACK telegram consists of 2 bytes:

**Byte\_1** is the Header\_Byte of the command telegram received before (=Byte 1 of the command telegram = 0x01).

**Byte\_2** is the acknowledge byte. If this byte is equal to the check sum of the command telegram (byte6 of the command) then the command was received correctly.

If byte 2 has a value different from the check sum of the command, an error has occurred (see table below).

### Format of the ACK telegram:

Byte 1	Byte 2
RS232 address	ACK byte
0x01	= check sum of command: command correctly received = check sum -1: command ignored (system busy) = check sum -2: command not executed
	Note: If no ACK telegram is received within 35 milli-seconds after sending a command, there is either a hardware problem (cable etc.) or the telegram is erroneous (wrong address, wrong check sum ....)

After the ACK telegram, the master device is ready for the next command.

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## Appendix 1: List of K8 commands

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### Address 0xC4 User control commands

Command	Command Code(HEX)	toggle	short/long	Remark
System ON	0x57			Switch the K8 ON (--> same state as before OFF)
System OFF	0x7A			Switch the K8 OFF
<b>Input Selection</b>				
Tuner	0x17			Sytem on and select Tuner
Disc	0x23			Sytem on and select Disc
SCL	0x14			Sytem on and select Streaming Client
Sel AV	0x07	x		Sytem on and toggle between HDMI1-3, TV, AV1-4
Sel. Audio In	0x3D	x		Sytem on and toggle between AUDIO 1-3, iPOD
<b>Discrete Input Selection Commands (V1.1)</b>				
DISC	0x45			Sytem on and select Disc
FM-TUNER	0x46			Sytem on and select Tuner
SCL	0x6A			Sytem on and select Streaming Client
IPOD	0x56			Sytem on and select iPod
TV	0x59			Sytem on and select TV
AUDIO 1	0x5E			Sytem on and select Audio-1
AUDIO 2	0x65			Sytem on and select Audio-2
AUDIO 3	0x61			Sytem on and select Audio-3
AV 1	0x72			Sytem on and select AV-1
AV 2	0x4A			Sytem on and select AV-2
AV 3	0x62			Sytem on and select AV-3
AV 4	0x52			Sytem on and select AV-4
HDMI 1	0xDD			Sytem on and select HDMI-1
HDMI 2	0xDE			Sytem on and select HDMI-2
HDMI 3	0xDF			Sytem on and select HDMI-3

Command	Command Code(HEX)	toggle	short/long	Remark
<b>Amplifier Control</b>				
Volume +	0x00			Zone 1 (Main Zone)
Volume -	0x20			Zone 1 (Main Zone)
Mute	0x13	x		Toggles between speaker on/off (Zone 1)
Tone Menu	0x2C	x		Open/Close tone menu (use cursor keys)
Mode Menu	0x37	x		Open/Close decoder menu (use cursor keys)
added in V1.2				
Volume Z2+	0x4E			Zone 2
Volume Z2-	0x6E			Zone 2
Volume Z3+	0xE6			Zone 3
Volume Z3-	0xE7			Zone 3
Volume Z4+	0xE8			Zone 4
Volume Z4-	0xE9			Zone 4
Zone 1 On	0x68			Spk Zone 1 ON
Zone 1 Off	0x48			Spk Zone 1 OFF
Zone 2 On	0x58			Spk Zone 2 ON
Zone 2 Off	0x78			Spk Zone 2 OFF
Zone 3 On	0x6C			Spk Zone 3 ON
Zone 3 Off	0x4C			Spk Zone 3 OFF
Zone 4 On	0x5C			Spk Zone 4 ON
Zone 4 Off	0x7C			Spk Zone 4 OFF
All Zones Off	0x2E			Speakers of all zones off
BAL_R	0x18			global balance to the right in the main zone
BAL_L	0x38			glabal balance to the left in the main zone
BAL_F	0xE0			global balance to the front in the main zone
BAL_R	0xE1			global balance to the back in the main zone
BASS+	0xE2			raise global bass in the main zone
BASS-	0xE3			reduce global bass in the main zone
TREB+	0xE4			raise global treble in the main zone
TREB-	0xE5			reduce global treble in the main zone
LOUD_ON	0x75			loudness on in the main zone
LOUD_OFF	0x55			loudness off in the main zone
TONE_ON	0x47			tone control on in the main zone
TONE_OFF	0x7B			tone control off in the main zone
STEREO	0x4D			surround mode: stereo
SURND	0x6D			surround mode: surround
PLII-Musis	0x6F			surround mode: surround PLII(x) Music Mode
PLII-Movie	0x7D			surround mode: surround PLII(x) Movie Mode
PLII-Matrix	0x53			surround mode: surround PLII(x) Matrix Mode
Neo6-Music	0x67			surround mode: surround Neo:6 Music Mode
Neo6-Cinema	0x5D			surround mode: surround Neo:6 Cinema Mode
Disco	0x63			surround mode: disco

MENU Commands				
<b>Main / Config – Menu (SYS-Menu)</b>				
SYS Menu	0xD8	x		Configuration Menu open/close
SYS Menu Open	0x40			Open Configuration Menu
Close SYS Menu	0x60			Close active Menu
<b>Hint:</b> for menu navigation see 'Cursor control'				
<b>Source Menu (SRC Menu)</b>				
SRC Menu	0x1F	x		toggle Source Menu, open/close DISC Menu
Open SRC Menu	0xC5			= SRC short keypress
OpenSRC Config	0xC6			= SRC long keypress)
Close SRC Menu	0xC7			Close SRC / Config Menu
<b>Hint:</b> To open/close DVD/BD DISC Menu use SRC Menu toggle command (0x1F)				

Cursor Control				
^ (up)	0x34			use for SCL navigation, menus
v (down)	0x2A			use for SCL navigation, menus
< (left)	0x1A			use for SCL navigation, menus
> (right)	0x25			use for SCL navigation, menus
OK	0x26			use for SCL navigation, menus
>  (next)	0xCD			play next track, preset, ...
< (previous)	0xCC			play previous track, preset, ...
>>	0xCB			Tune up, fast forward (iPOD only)
<<	0xCA			Tune down, fast rewind (iPOD only)

miscellaneous control				
Repeat	0x36			Toggle repeat modes
Stop	0x24			
Play	0x12			Play (changed in V1.2) (depending on source - possibly toggles Play/Pause)
Pause	0x05			Pause (new in V1.2) (depending on source - possibly toggles Play/Pause)
Open/Close	0xCE			Open Disc tray (only when DISC is source)
Like (green)	0x89			Stores current track in fav. List (Tuner, SCL) DISC: GREEN
Dislike (red)	0x8A			Removes favorite from list DISC: RED
I/II (yellow)	0x87	x		Toggle between USB inputs of SCL DISC: YELLOW
^v (blue)	0x86			Search function, toggle upper/lower case for text inp DISC: BLUE
List	0x88	x		Open/close favorite list (Tuner, SCL) DISC: open subtitle selection popup
Store	0x1e			Store current station as preset (use number keys) DISC: open audio track selection popup
Info	0x8B	x		Open (navigation) list view while streaming (SCL)
0	0x03			Number keys
1	0x3a			...
2	0x06			...
3	0x16			...
4	0x02			...
5	0x09			...
6	0x3b			...
7	0x31			...
8	0x11			...
9	0x39			...

Video control				
Video Menu	0xb1	x		open/close video setting menu (use cursor keys)
Aspect Ratio	0xb2	x		Toggle aspect ratio

Status Requests (V1.2)				
Status_1	0x64			request sending of Status_1
Status_2	0x43			request sending of Status_2
Status_3	0x5B			request sending of Status_3

## Setting Volume values directly

The volume of each zone of the K8 can be set directly to a given value using the following commands. For every zone two commands exist - one that sets the given volume immediately and one that performs a volume ramp from the currently set volume to the given value.

The value of the volume is given in one percent steps from 0% (muted) to 100% (maximum volume). Due to the calculation of the internal volume value from the percent-value it can happen that not every given %-value results in a discrete volume value (shown in dB on the display of the K8) and that a slightly different value is reported by Status\_2.

Naturally the setting of separate zone volume values does work only when the respective zone is activated and set to have a "separate" volume in the Speaker section of the configuration menu of the K8. When the volume management for the zone is set to "fixed" or "off", the command is ignored. When the zone volume is "linked" to the main-zone volume, setting the volume using the VolumeZx... command has the same effect as using the VolumeZ1... command.

Because these commands use an additional byte the telegram length must be set as 4 instead of 3 that is used for all other commands.

### Example:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
<b>Header</b>	<b>Telegram length</b>	<b>Address</b>	<b>command</b>	<b>volume</b>	<b>flag byte</b>	<b>Check sum</b>
always 0x01	total length without header and checksum		here: VolumeZ1Ramp	here: 25 %	always 0x02	= sum of bytes 1..6 mod. 0xFF
<b>0x01</b>	<b>0x04</b>	<b>0xC4</b>	<b>0x00</b>	<b>0x19</b>	<b>0x02</b>	<b>0xE4</b>

direct volume setting (V1.2)			
VolumeZ1Ramp	0x00		perform volume ramp in zone 1
VolumeZ1Value	0x20		set volume value in zone 1
VolumeZ2Ramp	0x4E		perform volume ramp in zone 2
VolumeZ2Value	0x6E		set volume value in zone 2
VolumeZ3Ramp	0xE6		perform volume ramp in zone 3
VolumeZ3Value	0xE7		set volume value in zone 3
VolumeZ4Ramp	0xE8		perform volume ramp in zone 4
VolumeZ4Value	0xE9		set volume value in zone 4

## **K8 Status Messages**

The K8 automatically pushes the status information after it has changed. Additionally the status can be requested by sending the command 0x64 (Status\_1), 0x43 (Status\_2) or 0x5B (Status\_3) but normally this should not be necessary. We strongly recommend to keep the number of status requests low to avoid unnecessary traffic. The information given is different for each device and has to be decoded and displayed individually. For further information see the user manual 'Crestron T+A Macro'.

Responses of the K8 are as follows:

### **Status 1:**

The STATUS\_1 is automatically pushed by the K8 when any contained information has changed or the command STATUS\_1 was sent to the K8. It is answered by a 8 byte long status telegram having the following format:

0x01, 0xXX, 0xC4*, 0x64, <b>Stat_Byte_1, Stat_Byte_2, SrcName0, ... , SrcName15,</b> Checksum	
----- ----- -----	
HEADER (4)	STATUS BYTES (3..18) <span style="float: right;">CHK-SUM (1)</span>

The 4 header bytes depend on the length of the source name. 0xXX is between 8 and 23.

The 4 status bytes are defined as follows:

<b>Stat_Byte_1</b>	b0	Speakers Zone1 (Main)	1:= speaker Zone 1 output is ON
	b1	Speakers Z2	1:= speaker Z2 output is ON
	b2	Speakers Z3	1:= speaker Z2 output is ON
	b3	Speakers Z4	1:= speaker Z2 output is ON
	b4	unused	
	b5	Headphones	1:= Headphones active
	b6	Protection	1:= Protection / Overheat
	b7	ON	1:= System is ON
<b>Stat_Byte_2</b>	b0		
	b1		
	b2		
	b3		
	b4		
	b5		
	b6	Tone control	1:= ON
	b7	Loudness	1:= ON
<b>SrcName0 ... SrcName15</b>	b0	Source name	0..15 ASCII chars + NULL
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
	b7		

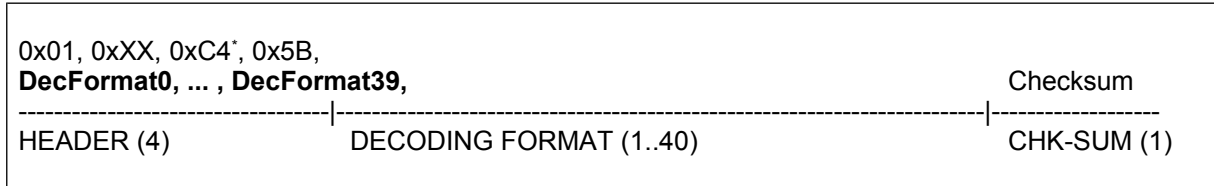
\* For some firmware revisions the 0xC4 will not be transmitted





**Status 3:**

The STATUS\_3 is automatically pushed by the K8 when the audio signal decoding format changes or the command STATUS\_3 was sent to the K8. It is answered by a status telegram with a length between 6 and 45 bytes that has the following format:



The 4 header bytes (0x01/0x05/0xC4/0x5B) are constant.  
The 4 status bytes are defined as follows:

<b>DecFormat0</b> ... <b>DecFormat39</b>	b0	Decoding Format	0..39 ASCII chars + NULL
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
b7			

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\* For some firmware revisions the 0xC4 will not be transmitted

## Document History

V 1.0	10/05/2011	JK	initial version
V 1.1	11/10/2011	JK	discrete input commands added
V 1.2	14/05/2012	KTP	split PLAY/PAUSE into two discreet commands description of DISC action for "Like", "Dislike", "I/II" and "v" description of DISC action for "List" and "Store" added Status section added lots of new commands. <b>!!! (needs K8 firmware V1.4 or later) !!!</b>
V 1.3	20.11.2012	LW	Checksum computation corrected (mod 0x100)
V 1.31	05.12.2012	LW	added SYS + SRC Menu commands
V 1.32	04.02.2013	JK	CMD Code for CMD_4 corrected
V 1.33	03.05.2013	KTP	added missing code for surround mode: disco
V 1.34	11.06.2014	JK	smaller corrections