RS232 control of K2Blu

The K2Blu with software version 1.22/2.24 or later can be controlled by any control device having a RS232 serial output port (PC, CRESTRON home automation system etc.).

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

The K2Blu uses the standard T+A RS232 command protocol as described in detail in the documents "TA_RS232_protocol.doc".

Format of the command telegrams

A command telegram to the K2Blu consists of 6 bytes. The complete telegram should be sent without pauses between the bytes.

Example: SYSTEM_ON command

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
RS232 adapter Address (always 0x01)	**Telegram length** (R-Link address + R-Link command + R-Link flag byte = 0x03)	**R-Link Address** (0xC4=Master device)	**R-Link command** (here: SystemON = 0x57) → see command table "appendix 1"	**R-Link flag byte** (always 0x02)	**Check sum** = sum of bytes 1..5 mod. 0x100
0x01	**0x03**	**0xC4**	**0x57**	**0x02**	**0x21**

Byte 1, 2, 5 : these bytes have the fixed values as shown in the table above for all R-System devices

Byte 3 : R-Link address for the K2Blu (MASTER)

Byte 4 : Command according to the table of RCII commands (see "RS_232_Command_Codes.doc")

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

Format of the acknowledge (ACK) telegrams

The K2Blu will process each received command telegram and it will send an acknowledge telegram approx. 25...35 ms after receiving the command. If there is an error in the message no acknowledge might be issued.

The ACK telegram consists of 2 bytes:
Byte_1 is the RS232 address 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: = check sum –1: = check sum –2:	command correctly received command ignored (system busy) 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.

Functions that require a long keypress

Some functions need a long keypress to be invoked using the remote control. A similar mechanism is also possible for control through RS232. If the telegram with a command is constantly repeated with a rate of approx. 110 ms the command will be interpreted as a long keypress. Commands that may have functions when received this way are marked with „(short)“ and „long“ in the following table.

Control of the T+A K2Blu

The complete K2Blu including it's built-in sources is controllable using the MASTER address.
Any received command will be processed and forwarded to the currently active source. This applies to internal sources as well as to external sources that are connected to the K2Blu using E-Link.
Because the K2Blu forwards commands on the E-Link that are not addressed to itself, it is possible to send commands to external sources that are connected through E-Link to the K2Blu by addressing them directly.
The internal sources of the K2Blu can not be addressed directly. Only the currently selected source can be controlled (e.g. if the current source is RADIO you cannot send any command to DVD or SCL etc.).

IMPORTANT: Due to the ability of the K2Blu to communicate with Metz TVs, it checks if there is a Metz TV connected everytime the K2Blu is powered up. For this purpose the command 0xA2 is sent out. This command 0xA2 must not be acknowled by the serial control device, otherwise the K2Blu will change into METZ mode and RS232 control will be disabled. The K2Blu will retry two times and afterwards be in RS232 control mode.

K2Blu Status Messages

The K2Blu automatically pushes the status information after it has changed. Additionally the status can be requested by sending the command 0x64 (Status_1) or 0x43 (Status_2) 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 K2Blu are as follows:

Status 1:

The STATUS_1 is automatically pushed by the K2Blu when any contained information has changed or the command STATUS_1 was sent to the K2Blu. It is answered by a 8 byte long status telegram having the following format:

```
0x01, 0x05, 0xC4, 0x64, Stat_Byte_1, Stat_Byte_2, Stat_Byte_3, Checksum
-----------------------------------|-------------------------------------------------------------|----------------
HEADER (4)                         STATUS BYTES (3)                                              CHK-SUM (1)
```

The 4 header bytes (0x01/0x05/0xC4/0x64) are constant.
The 4 status bytes are defined as follows:

Stat_Byte_1	b0	Protection	1:= Protection / Overheat	
	b1	Speaker_A	1:= speaker A output is ON	
	b2	Speaker_B	1:= speaker B output is ON	
	b3	Subwoofer_A	1:= Subwoofer enabled	
	b4	Center_A	1:= Center enabled	
	b5	Headphones	1:= Headphones active	
	b6			
	b7	ON	1:= System is ON	
Stat_Byte_2	b0	Listen Source (1...9)	1:= DISC 2:= TUNER 3:= REC 4:= IPOD 5:= TV 6:= Analog in 7:= dig. Optical in	8:= dig. Coaxial in 9:= SCL 10:= Bluetooth Audio
	b1			
	b2			
	b3			
	b4	unused		
	b5			
	b6			
	b7			
Stat_Byte_3	b0	LOUDness	1:= Loudness is ON	
	b1	Speaker Mode	0:= 2-Channel 1:= 2-Channel virt. Surnd 2:= 3-Channel Music	3:= 3-Channel Movie
	b2			
	b3			
	b4	Sound Mode	0:= Normal 1:= Dynamic 2:= Warm	3:= Speech 4:= Cinema
	b5			
	b6			
	b7			

Status 2:

The STATUS_2 is automatically pushed by the K2Blu when the volume has changed or the command STATUS_2 was sent to the K2Blu. It is answered by a 7 byte long status telegram having the following format:

0x01, 0x04, 0xC4, 0x43,	**Status_Byte_1, Status_Byte_2,**	Checksum
HEADER (4)	STATUS BYTES (2)	CHK-SUM (1)

The 4 header bytes (0x01/0x04/0xC4/0x43) are constant.
The 2 status bytes are defined as follows:

Status_Byte_1	b0	Volume of main room (0...70)	
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
	b7		
Stat_Byte_2	b0	Volume of 2nd room (0...70)	
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
	b7		

Appendix 1: List of Master commands

Command	Code (HEX)	toggle	Remark
Power Control			
System ON	0x57		Switch the system ON
System Standby	0x77		Switch the system to STANDBY
System OFF	0x7A		Switch the system to STANDBY
On/Standby	0x01	x	Toggle the System between ON and STANDBY
Volume + Tone Control			
VOL_PLUS	0x00		Performs 1 volume step of the main room volume. **Hint**: Repeat these commands for continuous volume increase/decrease (command repetition rate = 100...110 ms)
VOL_MINUS	0x20		
VOL_B_PLUS [1)]	0x4E		Performs 1 volume step of the 2nd room volume (if enabled) **Hint**: Repeat these commands for continuous volume increase/decrease (command repetition rate = 100...110 ms)
VOL_B_MINUS [1)]	0x6E		
Balance_L	0x38		one step to the left (only main room)
Balance_R	0x18		one step to the right (only main room)
LOUDness	0x2C	x	open / close Tone Menu
LOUDness ON	0x75		
LOUDness OFF	0x55		
Speaker Control			
SPKR	0x13	x	Switches the speaker outputs in sequence: A -> B -> A+B **Hint**: better use the Speaker_A/B_ON/OFF commands
Speaker_A ON	0x68		Speaker A output ON
Speaker_A OFF	0x48		Speaker A output OFF
Speaker_B ON	0x58		Speaker B output ON
Speaker_B OFF	0x78		Speaker B output OFF
Speaker_A	0x1C	x	Speaker A on/off
Speaker_B	0x3C	x	Speaker B on/off
Off	0x2E		Speaker A and B off
Source selection [2)] (Group commands)			
SCL	0x14		SCL (short) / iPod (long)
DISC	0x23		Disc
A1/PH	0x3D		Analog in -> Optical in -> -> Coaxial in -> Bluetooth Audio ...
A2/TV	0x07		TV
A3/TUN	0x17		Tuner
REC	0x35		Recorder
Source selection [2)] (discrete commands)			
SRC_DVD	0x42		Disc
SRC_CD	0x45		Disc
SRC_Tuner	0x46		Tuner
SRC_Tape1	0x49		Recorder
SRC_Tape2	0x56		iPod
SRC_TV	0x59		TV
SRC_Aux1	0x5E		Analog in
SRC_Aux2	0x65		dig. Optical in (may be used for TV)
SRC_Aux3	0x61		Bluetooth Audio
SRC_STB	0x62		dig. Coaxial in (may be used for TV)
SRC_DBR	0x6A		Streaming Client
Main / Config - Menu			
AMP Menu	0xD8	x	Configuration Menu open/close
AMP Menu Open	0x40		Open Configuration Menu
Close AMP Menu	0x60		Close active Menu
Hint: for menu navigation see 'Cursor control'			
Sound control			
SURND	0x37	x	toggle Stereo / Virtual / 3ch Music / 3ch Movie - Mode
Stereo Mode	0x4D		select Stereo Mode
Virtual Surround	0x6D		select Virtual Surround Mode
3ch Music Mode	0x69		select 3ch Music Mode (only if center channel enabled)
3ch Movie Mode[1]	0x7E		select 3ch Movie Mode (only if center channel enabled)

Command		Code (HEX)	toggle	Remark	
Basic Device Control (this codes have varying functions for the different sources – see user manual)					
Tune Up	▶	0x25		Step / Search forward / Cursor	(short)/(long)
Tune Down	◀	0x1A		Step / Search reverse / Cursor	(short)/(long)
PREV	▼	0x2A		Previous / Cursor	
NEXT	▲	0x34		Next / Cursor	
PLAY	I▶	0x12		Play	
PAUSE	II	0x05	x	Pause on/off	
STOP	■	0x24		Stop	
OPEN		0xCE	x	Open / Close	
REPEAT	⮌	0x36	x	toggle the Repeat Mode	(short)/(long)
RETURN		0xC2			
RED	☹	0x8A			
GREEN	☺	0x89			
YELLOW	I/II	0x87			
BLUE	▲▼	0x86			
LIST	≣	0x88			
STORE	⮕	0x1E			
INFO	ⓘ	0x8B			
DISP	◎	0x08			
F1		0x32			
F2		0x84			
F3		0x0B			
F4		0x8D			
Numberical keys					
0		0x03		key 0/' ‘	
1		0x3A		key 1/.	
2		0x06		key 2/a/b/c	
3		0x16		key 3/d/e/f	
4		0x02		key 4/g/h/i	
5		0x09		key 5/j/k/l	
6		0x3B		key 6/m/n/o	
7		0x31		key 7/p/q/r/s	
8		0x11		key 8/t/u/v	
9		0x39		key 9/w/y/z	
Source Menu					
SRC Menu		0x1F	x	toggle Source Menu	(short)/(long)
Open SRC Menu		0xC5		like SRC Menu (short keypress)	
Open SRC Config		0xC6		like SRC Menu (long keypress)	
Close SRC Menu		0xC7		Close SRC Menu / Config	
Cursor Control					
The Menu/List navigation is done using the keys:					
Tune Up	▶	0x25			
Tune Down	◀	0x1A			
PREV	▼	0x2A			
NEXT	▲	0x34			
OK		0x26			

1) Only if Zone-2 is enabled.
2) If in STANDBY the master device and the addressed E-Link source device are both switched ON.

Appendix 2: Document History

14/05/2014 (ktp)	initial version	Vx.20
22/10/2014 (lw)	checksum corrected	