RS232 control of K6.

The DVD-Surround-Receiver K6 with Crestron compatible software (see appendix 2) is compatible to be controlled by a connected control-system having a RS232 serial output port (PC, CRESTRON home automation system etc.) through the RS232/R-Link interface adapter.
For details about connecting and operating the adapter see the user manual of the adapter "UM_RS232_Adapt.doc".

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 R-series devices use the standard T+A RS232 command protocol as described in detail in the documents "TA_RS232_protocol.doc" and "RS_232_Command_Codes.doc".

Format of the command telegrams

A command telegram to the R-system master device consists of 6 bytes. The complete telegram should be sent without pauses between the bytes.

Example: SYSTEM_ON command

Byte 1 RS232 adapter address	Byte 2 Telegram length	Byte 3 R-Link address	Byte 4 R-Link command	Byte 5 R-Link flag byte	Byte 6 Check sum
(always 0x01)	(R-Link address + R-Link command + R-Link flag byte = 0x03)	(0xC8=Amplifier / Master device → see also note below)	(here: SystemON = 0x57) → see command table "Appendix 1"	(always 0x02)	= sum of bytes 1..5 mod. 0x100
0x01	**0x03**	**0xC8**	**0x57**	**0x02**	**0x25**

Byte 1, 2, 3, 5 : these bytes have the fixed values as shown in the table above for all R-system master devices

Byte 4 : R-Link 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

Note:
The R-Link address **0xC8** is used for all standard amplifier commands.

There exist a few additional commands (system commands) for some special functions. For these commands the address **0xC4** has to be used. Currently this is only needed for requesting the status information which is normally not necessary due to the fact that the status is automatically pushed after changing.

Format of the acknowledge (ACK) telegrams

The R-System master 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 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 (byte_6 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.

Special System Commands

The software versions that include the “extended control” feature (see Appendix 2) will automatically ‘push’ status information about the K6 status. Additionally this status can be requested by sending the command 0x64 (Status_1) or 0x43 (Status_2) to the RLink-address 0xC4. Responses are as follows:

Status 1:

The STATUS_1 command to the master is answered by a 8 byte long status telegram having the following format:

0x01, 0x05, 0xC4, 0x64,	**Status_Byte_1, Status_Byte_2, Status_Byte_3**	Checksum
HEADER (4)	STATUS BYTES (3)	CHK-SUM (1)

The 4 header bytes (0x01/0x05/0xC4/0x64) are constant.
The 3 status bytes are defined as follows:

Status_Byte_1	b0	unused		
	b1	Speaker_A	1:= speaker A output is ON	
	b2	Speaker_B	1:= speaker B output is ON	
	b3	unused		
	b4	unused		
	b5	unused		
	b6	unused		
	b7	unused		
Status_Byte_2	b0	Listen Source (0...14)	0:= not defined 1:= CD 2:= TUNER 3:= TAPE 1 4:= TAPE 2 5:= TV/Video 6:= AUX 1 7:= AUX 2	8:= AUX 3 9:= DVD 10:= STB 11:= VCR 12:= AUX/AV 1 13:= AUX/AV 2 14:= DBR (Digital Radio) 15:= not def. / future use
	b1			
	b2			
	b3			
	b4	Recording Source (0...14)		
	b5			
	b6			
	b7			
Status_Byte_3	b0	Loudness	1:= Loudness ON	
	b1	Flat	1:= Tone control OFF	
	b2	unused		
	b3	unused		
	b4	unused		
	b5	unused		
	b6	Standby	1:= K6 in Standby	
	b7	On	1:= K6 is ON	

Status 2:

The STATUS_2 command to the master will be answered by a 10 byte long status telegram having the following format:

0x01, 0x07, 0xC4, 0x43, **Status_Byte_1, ..., Status_Byte_5,**	Checksum
HEADER (4) STATUS BYTES (5)	CHK-SUM (1)

The 4 header bytes (0x01/0x07/0xC4/0x43) are constant.
The 5 status bytes are defined as follows:

Status_Byte_1	b0	unused	
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
	b7		
Status_Byte_2	b0	Volume of main room (0...99)	
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
	b7		
Status_Byte_3	b0	unused	
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
	b7		
Status_Byte_4	b0	Volume of 2nd room (0...99)	
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
	b7		
Status_Byte_5	b0	unused	
	b1		
	b2		
	b3		
	b4		
	b5		
	b6		
	b7		

Appendix 1: List of Master (Amplifier) commands (Address 0xC8)

Command	**Command Code** (HEX)	**toggle**	**Remark**
System ON	0x57		Switch the master device ON
System Standby	0x77		Switch the system (master and source devices) to STANDBY
System OFF	0x7A		Switch the system completely OFF
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	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	0x6E		
Balance_L	0x38		one step to the left
Balance_R	0x18		one step to the right
LOUDness	0x2C	x	
LOUDness ON	0x75		
LOUDness OFF	0x55		
FLAT	0x0C	x	
FLAT ON	0x7B		tone control defeat
FLAT OFF	0x47		tone control on
Speaker Control			
SPKR	0x13	x	Switches the speaker outputs insequence ON and OFF: A -> B -> A+B -> OFF **Hint**: better use the “discrete” Speaker_A/Speaker_B ON + OFF commands
Speaker_A ON	0x68		Speaker A output ON
Speaker_A OFF	0x48		Speaker A output OFF
Hint: Although the SR1535R has no Speaker B/C/D outputs itself it reacts to the commands and switches external amps. When 2nd room functions are enabled the speakers C/D are mapped to 2nd room speakers A/B (2nd room amp needs special software).			
Speaker_B ON	0x58		Speaker B output ON
Speaker_B OFF	0x78		Speaker B output OFF
Speaker_C ON	0x6C		Speaker C output ON
Speaker_C OFF	0x4C		Speaker C output OFF
Speaker_D ON	0x5C		Speaker D output ON
Speaker_D OFF	0x7C		Speaker D output OFF
Surround control			
Surround EX/ES	0x6F		Surround EX/ES mode
Surround 5.1	0x6D		Surround 5.1 mode
Stereo	0x4D		Stereo mode
Mono	0x5D		Mono mode
Mono I	0x3D		use left channel for Mono
Mono II	0x53		use right channel for Mono
Disco	0x63		SoundField: Disco
Hall	0x76		SoundField: Hall
Opera	0x7E		SoundField: Opera
Arena	0x71		SoundField: Arena
Club	0x69		SoundField: Club
Church	0x79		SoundField: Church
MCH-Input	0x67		Use Multichannel-Input if assigned to active source
SURND	0x37	x	toggle between Surround- and Preamp-Mode
PRE	0x0E		switch to HQ-Stereo-Mode

Source selection (Group commands)			
CD	0x23	x	CD ←→ DVD
Tuner	0x17		Tuner
Tape	0x35		Tape
DAT/Tape-2	0x15	x	VCR-1 ←→ VCR-2
Video/TV	0x07	x	TV ←→ STB
AUX	0x3D	x	AUX/P → AUX-AV-1 → AUX-AV-2 ...
MC/Aux-2	0x27		AUX/P
MM/Aux-3	0x1D	x	AUX-AV-1 ←→ AUX-AV-2
Source selection (discrete commands)			
SRC_CD	0x45		CD
SRC_Tuner	0x46		Tuner
SRC_Tape-1	0x49		Tape
SRC_TV	0x59		TV
SRC_Aux-2	0x65		AUX/P
SRC_Aux-3	0x61		CAM
SRC_DVD	0x42		DVD
SRC_STB	0x62		STB
SRC_VCR-1	0x52		VCR-1
SRC_Aux-AV-1	0x72		Aux-AV-1
SRC_Aux-AV-2	0x4A		Aux-AV-2
SRC_VCR-2	0x66		VCR-2
Main / Config - Menu			
AMP Menu (short)	0x40		Open Main Menu
AMP Menu (long)	0x41		Open Configuration Menu
Close AMP Menu	0x60		Close active Menu (Main or Configuration)
Hint: The Menu navigation is done by the keys NEXT (0x34), PREV (0x2A), FF (0x25), RW (0x1A) and OK (0x26) which are normally forwarded to the active source device.			

Appendix 2: List of compatible software Versions for K6

K6-PAL / SCART:

Basic functions (can be controlled by RS232 commands)
- Display-Controller V1.30 and later
- DVD-Controller V3.13 and later

Extended functions (sends status compatible with T+A Crestron Macro V1.40)
- Display-Controller V1.37 and later
- DVD-Controller V3.13 and later

K6-PAL / Component Video:

Basic functions (can be controlled by RS232 commands)
- Display-Controller V3.10 and later
- DVD-Controller V5.11 and later

Extended functions (sends status compatible with T+A Crestron Macro V1.40)
- Display-Controller V3.16 and later
- DVD-Controller V5.11 and later

K6-NTSC / Component Video:

Basic functions (can be controlled by RS232 commands)
- Display-Controller V2.10 and later
- DVD-Controller V4.11 and later

Extended functions (sends status compatible with T+A Crestron Macro V1.40)
- Display-Controller V2.13 and later
- DVD-Controller V4.11 and later

The Display-Controller with basic functions do support a requestable status but we recommend not using this feature. The information of this old requestable status is different from the new status introduced with the T+A Crestron Macro V1.40.