T+A **Technical Information**

20.11.2012 -JK-

RS232 control of MP 1250/60 R

MP1250 devices (with software version 1.30 or higher) and all MP1260 devices can be controlled by any device having a RS232 serial output port (PC, CRESTRON home automation system etc.). The MP12X0 can be connected directly to the control device via a RS232 cable (standalone mode) or through the RS232/R-Link interface adapter (R-Link system mode).

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	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** (0x22=CD slave device → see also note below)	**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**	**0x22** (see below)	**0x57**	**0x02**	**0x7F**

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

Byte 3 : the R-Link address depends on the device which has been selected in the MP12X0 system configuration menu (See Appendix 2)

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

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 (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 (device off, not a valid command for the addressed device)
	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.

Control of T+A Source devices

For slave devices there are two possible modes of external control:

Standalone mode:

The **T+A** MP12X0 can be controlled directly by a control device (PC, CRESTRON home automation system etc.) using a RS232 connection.

R-Link System mode:

If the MP12X0 will be used in conjunction with other **T+A** R-Link devices connected via R-Link cables, the whole system should be connected to the control device (PC, CRESTRON home automation system etc.) only by a **T+A** RS232 adapter. All external control commands will be processed by this adapter and routed to the appropriate device via the R-Link connection.

Appendix 1: List of MP12X0 commands

Command	Command Code (HEX)	toggle	short/ long *	Remark
ON/OFF	0x01	x		**Hint**: better use the "discrete" System ON, OFF, STANDBY commands.
System ON	0x57			Switch the device ON
System OFF	0x7A			Switch the device completely OFF
Input Selection Note: If in STANDBY the master device and the addressed R-Link source device are both switched ON				
CMD_SRC_SCL	0xE0			Select Source: SCL
CMD_SRC_D1	0xE1			Select Source: D1
CMD_SRC_D2	0xE2			Select Source: D2
CMD_SRC_TUN	0xE3			Select Source: Tuner (only available for MP1260)
Navigation Control Commands				
CMD_UP_NEXT	0x34			browse view: navigate up / play view: next track
CMD_DN_PREV	0x2A			browse view: navigate up / play view: next track
CMD_R	0x25			select
CMD_L	0x1A			cancel
CMD_FFWD	0xCB			***Long:*** Fast Forward (iPOD only)
CMD_FRWD	0xCA			***Long:*** Fast Rewind (iPOD only)
CMD_PAUSE	0x05			Pause
CMD_STOP	0x24			Stop
CMD_OK	0x26			Ok
CMD_LIST	0x88			jump to favourite list
CMD_INFO	0x8B			toggle between browse / play view
CMD_HOME	0xE4			jump to top menu
CMD_RPTMODE	0x8E	x		toggle repeat mode
CMD_MIXMODE	0x8F	x		toggle mix mode
CMD_SEARCH/ CMD_CASE	0x86			(depends on device state) browse view: trigger search function menu: toggle upper /lower case
misc commands				
CMD_LIKE	0x89			store current track as favourite
CMD_DISLIKE	0x8A			delete favourite
CMD_INV_ON	0xEE			invert on
CMD_INV_OFF	0xEF			invert off
CMD_OVS1	0xF0			oversampling algorithm: FIR long
CMD_OVS2	0xF1			oversampling algorithm: FIR short
CMD_OVS3	0xF2			oversampling algorithm: Bezier/ IIR
CMD_OVS4	0xF3			oversampling algorithm: Bezier
CMD_1	0x3A		x	key 1/. ***short***:play preset 1 / ***long***: store preset 1
CMD_2	0x06		x	key 2/a/b/c ***short***:play preset 2 / ***long***: store preset 2
CMD_3	0x16		x	key 3/d/e/f ***short***:play preset 3 / ***long***: store preset 3
CMD_4	0x02		x	key 4/g/h/i ***short***:play preset 4 / ***long***: store preset 4
CMD_5	0x09		x	key 5/j/k/l ***short***:play preset 5 / ***long***: store preset 5
CMD_6	0x3B		x	key 6/m/n/o ***short***:play preset 6 / ***long***: store preset 6
CMD_7	0x31		x	key 7/p/q/r/s ***short***:play preset 7 / ***long***: store preset 7
CMD_8	0x11		x	key 8/t/u/v ***short***:play preset 8 / ***long***: store preset 8
CMD_9	0x39		x	key 9/w/y/z ***short***:play preset 9 / ***long***: store preset 9
CMD_0	0x03		x	key 0/' ' ***short***:play preset 0 / ***long***: store preset 0

additional commands from RC				
CMD_CURUP	0x1F	x	x	***short***: Toggles Source Select menu ***long***: (depends on the current player state) - search (browse view) - up_low case(menu open) - filter (play view)
CMD_F1/2	0x32		x	***short***: (F1) like ***long***: (F2)dislike
CMD_F3/4	0x0B	x	x	***short***: (F3) toggle play and browse view ***long***: (F4) jump to favourite list
CMD_F5/6	0x36	x	x	***short***: (F5) toggle repeat mode ***long***: (F6) toggle mix mode
CMD_F1	0x83			F1 (like)
CMD_F2	0x84			F2 (dislike)
CMD_F3	0x85	x		F3 (toggle play and browse view)
CMD_F4	0x8D			F4 (jump to favourite list)
CMD_F5	0x8E	x		F5 (toggle repeat mode)
CMD_F6	0x8F	x		F6 (toggle mix mode)
CMD_SRC_OP_LG	0xC6			Open Source Setup Menu
CMD_SRC_CLOSE	0xC7			Close Source Setup Menu

* : for executing the long function please repeat the command for more than 6 times (rate approx. 120ms)

Appendix 2: List of MP12X0 addresses

selected device (sys config. menu)	**address** (hex)
CD	0x22
TUNER	0x24
TAPE 1	0x26
TAPE 2	0x28
TV / VIDEO	0x2A
AUX 1	0x2C
AUX 2	0x2E
AUX 3	0x30
DVD	0x32
STB	0x34
VCR	0x36
AUX / AV-1	0x38
AUX / AV-2	0x3A
DBR	0x3C

Appendix 3: Document History

05/06/2008 (jk)	initial version	V100
25/07/2008 (jk)	- address table added - commands renamed	V101
22/12/2008 (jk)	- preset control added	V102
21/10/2009 (jk)	- Tuner selection for MP1260 added	V110
20/11/2012(JF)	Checksum → mod 0x100	V111