THE B203 TIMER CONTROLLER FROM REVOX

Description

The B203 is an interactive "Switcher-Timer-PC Interface" controller. Specifically designed to be integrated in the current REVOX line, the B203 is powered via the B285 receiver serial port and can be linked via patch cords (max. 8 inputs) to the "brain" of the B215, B225, PR99, B291 as well as to the less recent units equipped with serial link retrofits.
The connection of 3 B206 transceivers for multiroom operation as well as a RS-232 port are available for more sophisticated remote or computer controlled operations.
Physically the B203 can best be integrated in the 200 serie when sitting on top of the B225. The association of the two is matching the height of the B215 or B285 and may therefore be installed in a conventional REVOX disco-rack U-board.
On the front panel of the B203 a function display and the I.R. sensor are visible. On the back a row of sockets are available for connection to the other units of the system. From right to left: 1 parallel remote control, 8 device outlets, 3 B206 extensions (ABC), 1 RS 232 port and an on/off battery buffer switch.

The switcher (easy/select)

After selecting the easy mode, the "easyness" of the operation of the REVOX system becomes obvious, for example: Just pressing the "play next" button on the B205 remote control will trigger a serie of operations: In a split of a second the CD player is switched on, starts to play the first cut, the receiver is also switched on, the input "disc" is selected and soon the music comes out through the preselected speaker output (i.e. speaker A) with the correct preselected power-on volume! Another example?
Pressing "tape 1" on the receiver will switch on the B285 as well as start the B215 in play mode, or from another room, via the B206, pressing "play" will activate the B215 in play mode and the music will be heard through the preselected speaker.
In practice, the "easy" configuration is entered only once the first time used (it can of course be altered anytime). The menu: Time, date, language, easy on/off, timer on/off and speaker selection. When completed the user can sit back, relax and enjoy music literally at the touch of a button.

The Timer (event)

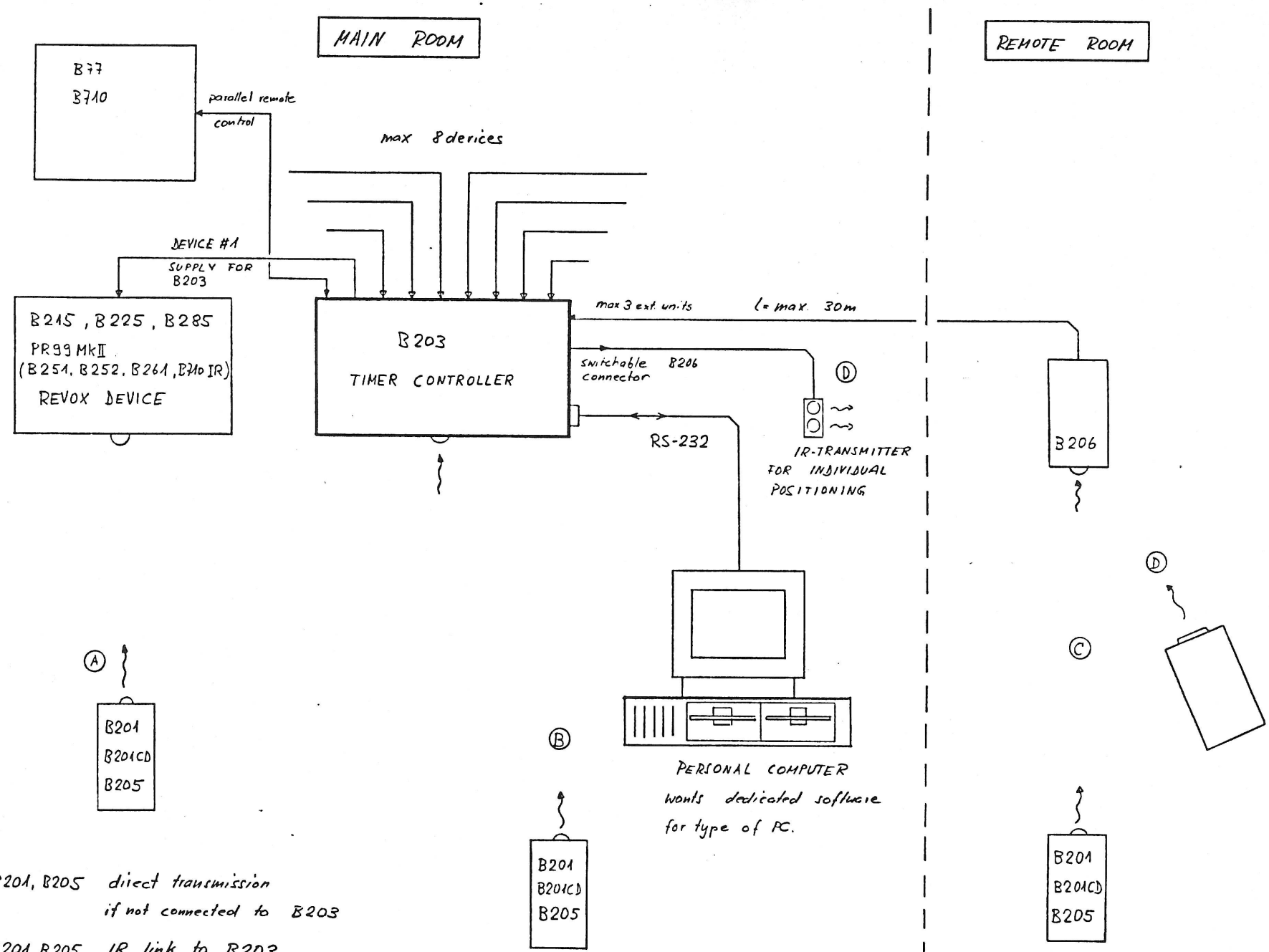
The B203 timer programming operations are very much like those practiced in video recorders. One can select and program up to 5 "events". Each event occurs at a given starting time, date (or day(s) of the week). Then, after selecting among sources such as tuner, CD, tape, phono, one can direct the signal to a recorder, amplifier or speaker. The program will be interrupted at a stop-time, to mark the end of the event.
3 back-up batteries secure the program in case of power failure.
An "exit" button can be used to escape and reset a programming in progress and another button is available to the user to "test" a programmed event independently from the schedule and with no harm to the pre-established sequence.
This quite sophisticated timer, as one can see, will become handy for "early-bed-goers"-audiophiles!

The PC Interface (RS-232 interface)

All B203 internal functions ("easy" and "timer") can be individually activated with control feedback.
The connection to a maximum of 8 units can be realised via "bibus" cables and each unit can be individually activated with control feedback (if implemented).
A unit equipped with a parallel socket (9-pol) can be individually activated as well (no control feedback).

Interface RS 232 Hardware

Full duplex, 3 wire connector (GND, Tx, Rx) 1200 baud, 1 start bit, 1 stop bit, 8 data bits, no parity software handshaking
X on, X off.
DIN-plug.
Serial PC-interface.



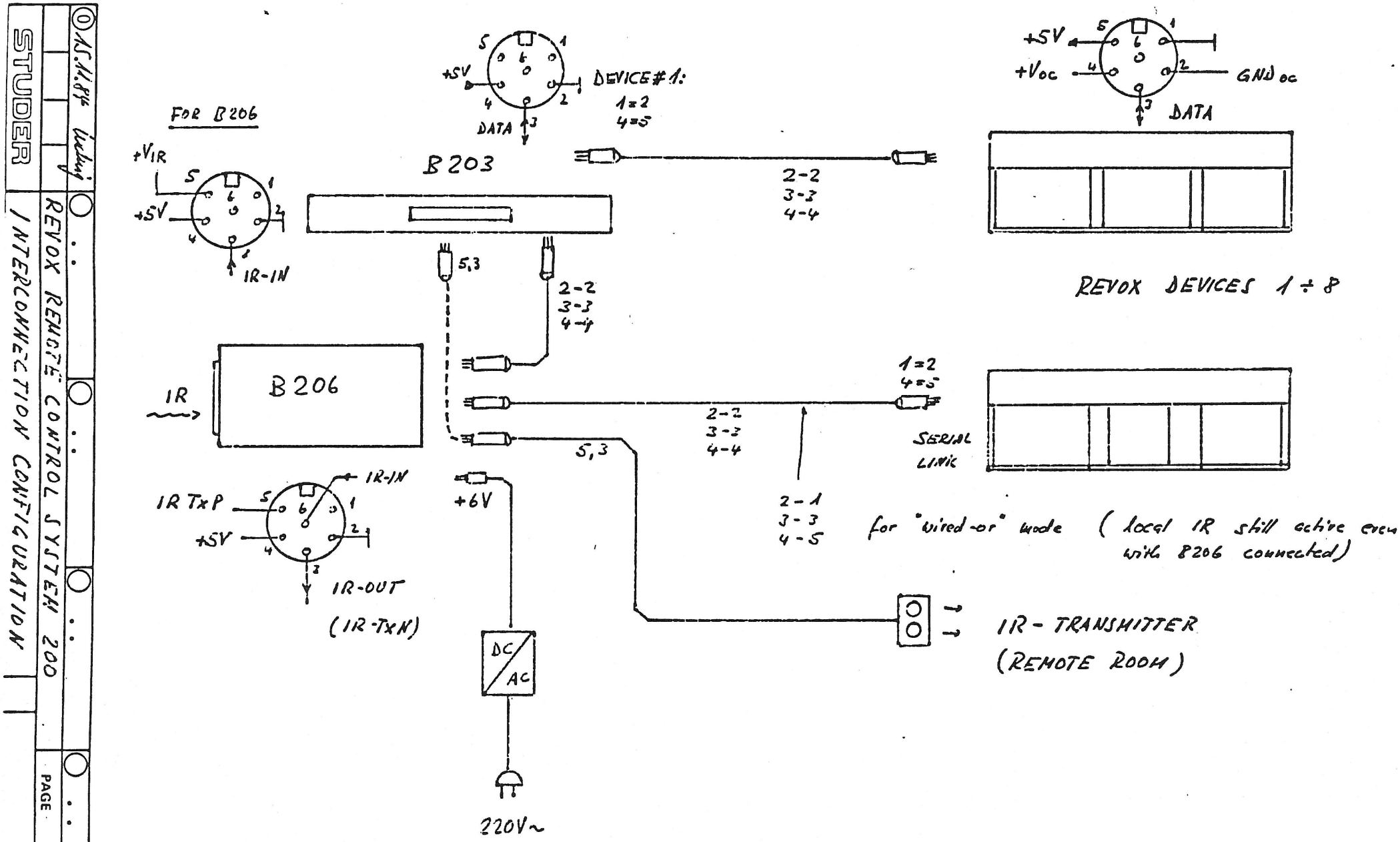
Ⓐ B201, B205 direct transmission if not connected to B203

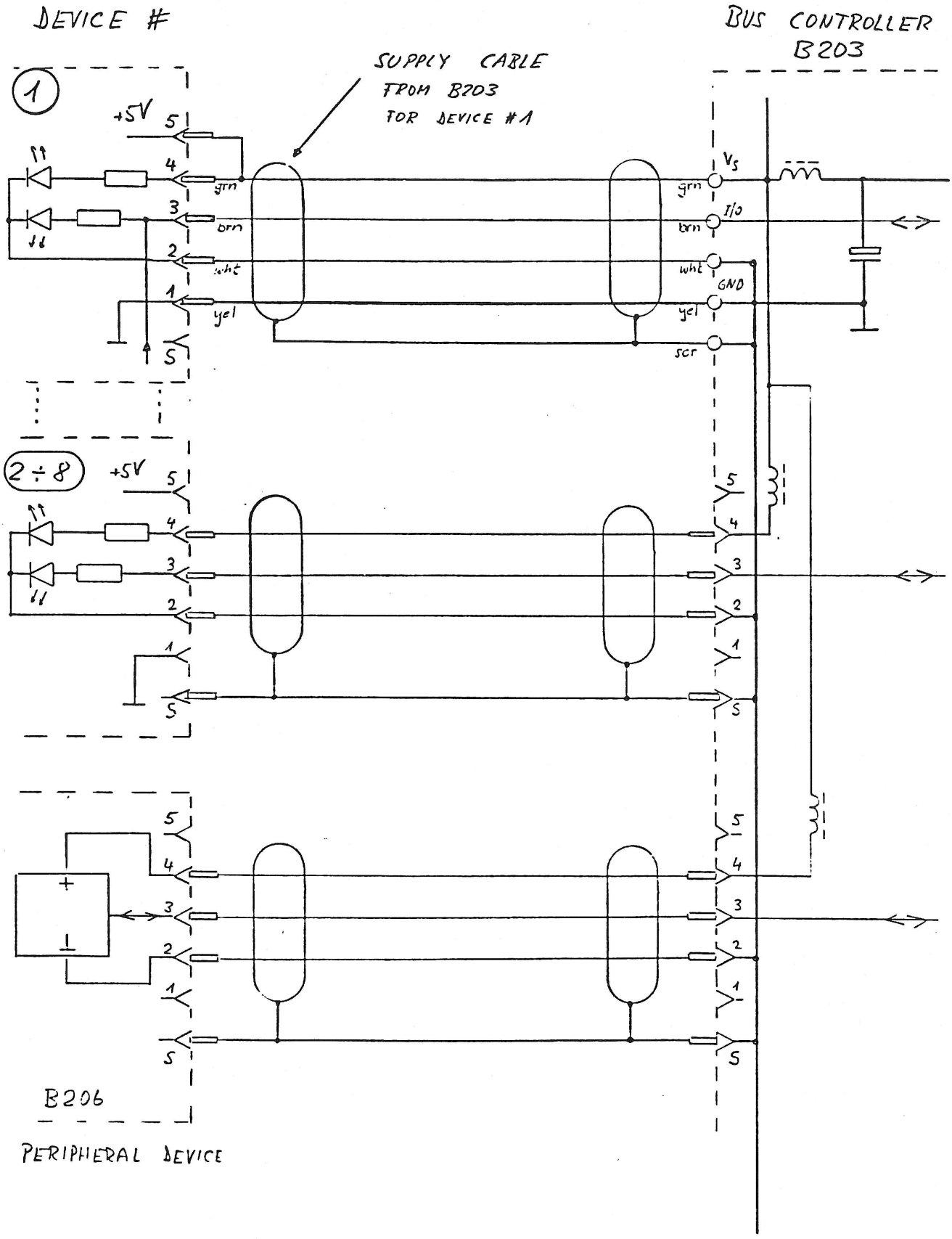
Ⓑ B201, B205 IR link to B203

Ⓒ B201, B205 IR link to B203 via B206 + remote wiring

Ⓓ Transmission of any IR-code format from main/remote room to pluggable IR-Transmitter (same B206 part)

0	12.9.84	Ludwig	STUDER	GENERAL CONFIGURATION
1	1.10.84	Ludwig	REVOX REMOTE CONTROL SYSTEM	PAGE 1 OF 1

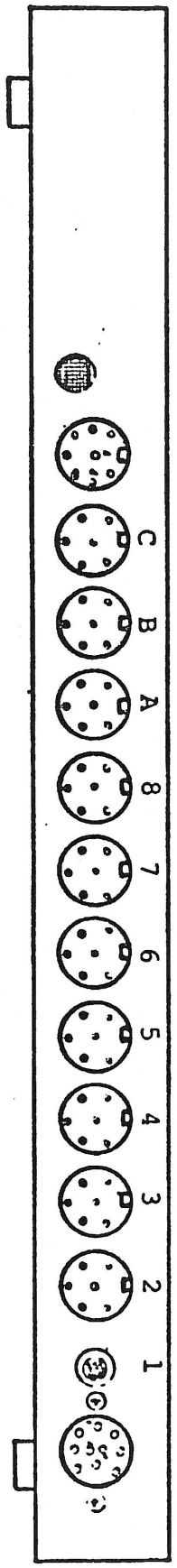

STUDER
REVOX REMOTE CONTROL SYSTEM 200
INTERCONNECTION CONFIGURATION
PAGE OF
FOR B206
+VIR
+5V
IR-IN
B206
IR
IR TxP
IR-OUT
(IR-TxN)
B203
DEVICE#1:
1=2
4=5
DATA
2-2
3-3
4-4
5,3
+6V
DC
AC
220V~
+Voc
GND oc
REVOX DEVICES 1 ÷ 8
SERIAL LINK
2-1
3-3
4-5
for "wired-or" mode (local IR still active even with B206 connected)
IR - TRANSMITTER
(REMOTE ROOM)



0 29.0384 ludwig				
	REVOX SYSTEM 200			PAGE 1 OF 1
STUDER	SIGNAL / GROUND WIRING		SC	

PLEASE CHECK CAREFULLY TO USE THE APPROPRIATE JACK WHEN INSTALLING A NEW DEVICE CONFIGURATION!

DISCONNECT ALL MAINS PLUGS TO DEVICES 1÷8 WHEN CHANGING CONFIGURATION!



BACKUP-BATTERY ON/OFF
(normally set to "on"-position)

RS-232 FROM/TO PC

B206 used as remote receiver

MODE "R": same use as with socket B, C.
MODE "T": connect here the IR transmission adapter of the B206 set. See operating instructions for B206 set.

REVOX DEVICES WITH SERIAL I/O
1÷8 wired pins: 2-2
3-3
4-4

DEVICE # 1 DELIVERING DC POWER FOR B203

PARALLEL REMOTE COMMANDS
to B710/B77 wired pins: 1÷9

BACK PANEL VIEW

ATTENTION!
DO NOT CONNECT PR99 WITHOUT
'IFIED CONNECTEOR!: (24VDC à PIN 5)

1.5 RS 232 Interface

All internal functions (EASY function and TIMER) as well as the connected equipment can be selectively operated via the RS232 serial port of the B203.
The operating state of the B203 as well as the status of the connected equipment (if designed for this) can be inquired via this interface.

Interface hardware
- Full-duplex, 3-wire connection (GND, Tx, Rx)
- 1200 Baud, 1 start bit, 1 stop bit, 8 data bits, no parity bit.
- Software handshaking (Xon, Xoff)

Software versions
Two software versions are available:
- B203-C (customer version), contains the equipment modules for: B215, B226, B225 with microprocessor board 1.769.327, B285 (B291 without RS232 module).
- B203-IND (industry version), contains the equipment module for: B215, A725, A725-2, PR99 MKII, B225 with microprocessor board 1.769.327 and B226.

The units conforming to the industrial version are identified on the rear with an additional label (IND).
For identification of the software version the B203 should be switched off and on again (turn batteries off and unplug/reconnect the cable of terminal 1). The industrial version (B203-IND) is identified by a flashing star in the display field (TIMER OFF).

1.5.1 Dialog B203 <--> personal computer

To achieve the fastest possible communication, the commands and feedbacks have been kept as short as possible in the form of ASCII strings.
The length of a string as well as its layout is specific to the corresponding equipment and depends on the device identifier, however, it cannot exceed 79 characters. A string is always terminated with a carriage return (ASCII 13).
The character set comprises the digits 0 to 9 and the letters A to Z. To prevent confusion with Ø and 1 the characters O, I, l are used as little as possible. In order to prevent misinterpretation (& % $: ; ..) the space and the minus sign (-) are the only valid special characters.
Upper and lower case characters are interpreted by the B203 as equivalent. The B203 transmits only upper case characters.
On request by the personal computer the status of a unit is returned in the form of a string. The format of the feedback is alphanumeric.

1.5.2 Command format

The command string starts always with the connection number (0...9) followed by the command chain which is always terminated with <CR> (ASCII 13). The carriage return is no longer mentioned in the following text even though it is part of each command string. In the examples it is represented by the character "<".

A. Channel number (1st string segment)
****
0 B203 internal
1 Terminal 1 (SERIAL LINK)
2 Terminal 2 (SERIAL LINK)
| | |
8 Terminal 8 (SERIAL LINK)
9 Parallel remote control

- The terminal No. "0" designates a general command for the B203. This address provides, e.g., access for using the feedback of the TIMER and EASY functions.
- Terminal numbers "1...8" address the subsequent instruction set for the equipment connected to the corresponding terminal.
- Terminal number "9" corresponds to the 9-pin socket of the parallel remote control for the B710 or B77. It can be controlled either with the commands specific to these units or with individual signals (6+1 bits) or as byte (6+1 bits). This means that expansions of auxiliary functions can be programmed by the user (e.g. for changing over speaker groups, illumination, or for operating a slide control, etc.). ■ To ensure that the correct instruction set related to the specific unit is used, the user or the timer must always call the device identifiers first.
  Commands that are not defined in the equipment table are interpreted as incorrect by the B203.
  When the device identifier is called, the B203 responds with a feedback that contains only the terminal number and the device identifier. (Device identifier: see under "Feedback format").
- An invalid entry is acknowledged by the B203 with ASCII 007 (BEL).

1.5.3 Feedback format

On request by the computer the B203 returns the status of a unit in the form of a string. This string starts with a terminal number, followed by the device identifier and the status messages. The string is terminated with <CR LF> (Carriage Return, Line Feed).
The record layout of the status messages depends on the device identifier and is, therefore, specific to the unit.

A. Channel number (1st string segment)
****
0 B203 internal
1 Terminal 1 (SERIAL LINK)
2 Terminal 2 (SERIAL LINK)
| | | |
8 Terminal 8 (SERIAL LINK)
9 Parallel remote control

B. Device identifier (2nd and 3rd segment)
****
00 No identifier from the unit (unit without feedback)
01 PR99 MKII
02 A725 (software: 1.025.621.23)
03 B285
04 B215
05 B225-2 (with microprocessor board 1.769.327.00)
06 B226
07 A725-2 (software: 1.025.621.24)
08 B291

50 B203-C (e.g. output 5.0)
51 B203-IND (e.g. output 5.1)
| | | |
98 B203-C (max. output 9.8)
99 B203-IND (max. output 9.9)

- Number for C and IND versions is always in pairs.
  Example: Release B203-C ... 50 ... 56 ... 98
  Release B203-IND ... 51 ... 57 ... 99
- The device identifier is a 2-digit number and always follows immediately the terminal number. This number is assigned consecutively for each development or change for accessing the information stored in the equipment ROM.
- If the connected unit does not have a device identifier, it cannot supply any feedback (e.g. B225). For reasons of time optimization this terminal is no longer scanned by the B203.

Note:
- With the return of the output number a possibly changed structure of the feedback strings can be redefined.

1.5.4 Pin assignment

A 3-wire cable is required for the connection between the serial port of the B203 • Timer Controller and a home computer or personal computer by means of an RS232 serial interface. (Max. cable length 3 meters).

B203 RS232 5-pol. DIN	Personal-Computer RS232 25-pol. D-Type
2 GND	7 GND
3 OUT (Tx)	3 IN (Rx)
4 IN (Rx)	2 OUT (Tx)

Commands for STUDER A725 • COMPACT DISC PLAYER
****

O	Standby
S	Stop (and power on)
P	Play/Next (and power on)
J	Index scan
W	Pause
D	Switch to disc time indication
T	Switch to track time indication
U	Autostop on
V	Autostop off
E	Load (move drawer in or out)
H	Locate
M	Pause without muting
Gmmss	Position laser pickup at disc time in minutes (mm) : seconds (ss). Depending on the preceding device status either play continues or pause is activated.
Cnn	Position laser pickup at index (nn). Depending on the preceding device status either play continues or pause is activated.
Ynn	Play disc from track (nn).
Znn	Position laser pickup at track (nn) and switch to pause.
X	Inquiry device status
N	Inquire catalog No.

Certain CD producers write the number of the CD (catalog No. also into the contents list of the CD. If this is the case, this number can be inquired with the command [N]. If no catalog number is stored, this field will be output with all zeros.

Status messages A725
****

String format:
  ABBCDDEEFFFFGGGG<

A. Channel number (1st string segment)
****
0 B203 internal
1 Terminal 1 (SERIAL LINK)
2 Terminal 2 (SERIAL LINK)
| | |
8 Terminal 8 (SERIAL LINK)
9 Parallel remote control

B. Equipment identifier (2nd - 3rd string segment)
****
02 A752 (software: 1.025.621.23)
07 A725-2 (software: 1.025.621.24)

C. Device status (4th string segment)
****

	A725-2:	A725:
0	Standby	Play
1	Stop	Faderstart
2	Play	Pause
3	Play + Autostop	Play + Loop
4	Play + Loop	Autostop
5	Play + Autostop + Loop	
6	Pause	
7	Pause + Loop	
9	Pause without muting	

D. Track number (5th - 6th string segment)
****
nn Number of current rack (decimal)

E. Index number (7th - 8th string segment)
****
nn Number of current index (decimal)

F. Elapsed time (9th - 12th string segment)
****
mmss Depending on the display either the time since the start of the disc or the start of the track is displayed (minutes = mm, seconds = ss).

G. Remaining time (13th - 16th string segment)
****
mmss Depending on the display either the time remaining to the end of the disc or the end of the track is displayed (minutes = mm, seconds = ss).

Separate string for catalog number
****

String format:
  ANnnnnnnnnnnnnn000<

A. Channel number (1st string segment)
****
0   B203 internal
1   Terminal 1 (SERIAL LINK)
2   Terminal 2 (SERIAL LINK)
| | |
8   Terminal 8 (SERIAL LINK)
9   Parallel remote control

N. Identifier (2nd string segment)
****
N   Identifier for catalog No.

n. Catalog No. (3rd - 18th string segment)
****
nn...n000   Catalog No., the last three digits are always
            zero.

Status response from B 291

a. Status:

nibble1	nibble2	nibble3	nibble4
1	Hex size	Hex state	afvh if=1
	0 33 norm	0 play	a arm in
	1 45 norm	2 pause	f fader off
	2 33 spec	3 stop/pause	v vari on
	3 45 spec	6 returning	h power on
		A autosearch	

b. Varispeed:

nibble1	nibble2	nibble3	nibble4
5	Hex sign	Hi digit	Lo digit
	0 +	0...9	0...9
	1 -		

Status response from PR99 Mk2

1xyz		status with
	z : 0	undefined state
	1	stop
	2	fast forward
	3	rewind
	4	play
	5	record
	6	dump
	7	zero locate
	8	address-locate
	9	tape out
	x : 1bbb	set-mode
	: 0bbb	normal mode
	: b000	speed 1.19 cm/sec
	: b001	speed 2.38 cm/sec
	....	
	: b110	speed 76 cm/sec
	y : 1bb0	pause
	b1b0	repeat
8x .. Dx		counter hrs, mins, secs as in general specification.

Status response from A725

a. identifier

nibble :	n1	n2	n3	n4	
	0	2	2	5	

b. actual track

4	1	n	n	(track-no. nn)

c. actual index

4	2	n	n	(index-no. nn)

d. actual time : minutes

4	3	m	m	(minutes mm)

e. actual time : seconds

4	4	s	s	(seconds ss)

d. actual remaining time : minutes

4	5	m	m	(minutes mm)

e. actual remaining time : seconds

4	6	s	s	(seconds ss)

note:
times are track-times or disc-times, depending on display setting.

f. player-status

1	xxx	yyy	zzz	
			1zz	pause
			z1z	play + loop
			zz1	autostop
		yy1		faderstart on

g. disk_catalog_number

2	digp	a	b

digp: which pair of digits (0..7)
a,b: digits

Note:
catalog_number is considered to be a string of 16 bcd digits, the last 3 always being 0, which leads to a 13 digit number.

Status response from A725-2 (software: 1.025.621.24)

nibble :	n1	n2	n3	n4	
a. identifier	0	7	2	5	
b. actual track	4	1	n	n	(track-no. nn)
c. actual index	4	2	n	n	(index-no. nn)
d. time played	4	3	m	m	(minutes mm)
e. time played	4	4	s	s	(seconds ss)
d. remaining time	4	5	m	m	(minutes mm)
e. remaining time	4	6	s	s	(seconds ss)

note:
times are track-time or disc-time, depending on display setting.

f. player-status

1	xxxx	yyyy	zzzz	
	0	none	1	pause
	1	stop	1	play + loop
	2	stoppping	1	autostop
	3	start	1	faderstart on
	4	lead-in		
	5	fill TOC		
	6	play		
	7	scan		
	8	pause		
	9	skip		
	A	drawer running in		
	B	drawer running out		
	C	cue play		
	D	cue pause		
	E	power off		
	F	scan pause		

g. disc-catalog-number

2	digp	a	b

digp: which pair of digits (0..7)
a,b: digits

Note:
catalog-number is considered to be a string of 16 bcd digits, the last 3 always being 0, which leads to a 13 digit number.

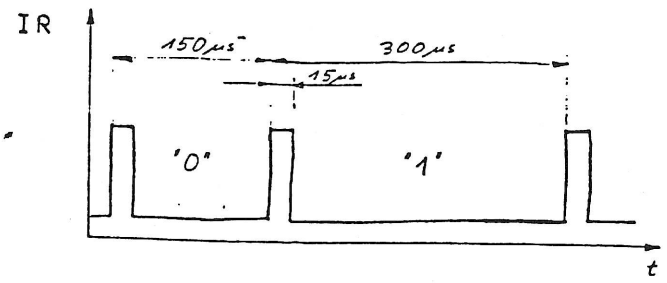
2.2.2 Tabelle aller IR-Codes.

D = Commands only without ∞-key
∞ = Commands only with ∞-key
x = Commands not accessible via hand-held IR-Transmitters
Access to hD, hG only via B205

Data bits HEX	Matrix	AMPLIFIER B 251	TUNER B 261	RECEIVER B 285/286	CD-PLAYER B225, B226	CASS.REC. B 215	TAPE RECORDER PR 99 MK2	TURNTABLE B791/795, B291
111111 00	aA	POWER OFF	POWER OFF	D POWER OFF	POWER OFF	POWER OFF PAUSE+REC PLAY +REC STOP REW << FORW >>>> MONITOR LOC-1 LOC-2 PAUSE PLAY LOOP	STOP PAUSE+REC PLAY+REC STOP REW << FORW >>>> MONITOR Z-LOC A-LOC PAUSE PLAY REPEAT PAUSE ON PAUSE OFF	STOP, POWER OFF
011111 01	aB							
101111 02	aC							
001111 03	aD							
110111 04	aE							
010111 05	aF							
100111 06	aG							
000111 07 x	aH							
111011 08 x	bA							
011011 09	bB							
101011 0A	bC							
001011 0B	bD							
110011 0C x	bE							
010011 0D x	bF							
100011 0E	bG				∞ < REW			D <
000011 0F	bH				∞ > FORW			D >
111101 10	cA				∞ PAUSE			D LOW/LIFT
011101 11	cB		D 1	D 1	∞ 1			
101101 12	cC		D 2	D 2	∞ 2			
001101 13	cD		D 3	D 3	∞ 3			
110101 14	cE		D 4	D 4	∞ 4			
010101 15	cF		D 5	D 5	∞ 5			
100101 16	cG		D 6	D 6	∞ 6			
000101 17	cH		D 7	D 7	∞ 7			
111001 18	dA		D 8	D 8	∞ 8			
011001 19	dB		D 9	D 9	∞ 9			
101001 1A	dC		D 10	D 0	∞ 0			
001001 1B x	dD		D 11		∞ PREEMPH.ON			
110001 1C x	dE		D 12		∞ PREEMPH.OFF			
010001 1D x	dF		D 13		∞ LOCAL TIME			
100001 1E x	dG		D 14		∞ TOTAL TIME			
000001 1F x	dH		D 15		∞ PAUSE ON			
111110 20 x	eA		D 16		∞ LOCATE			
011110 21 x	eB		D 17		∞ LOAD			
101110 22 x	eC		D 18		∞ AUTOSTP ON			
001110 23 x	eD		D 19		∞ AUTOST. OFF			
110110 24 x	eE		D 20		∞ PAUSE W/O M			
010110 25	eF		D SCAN LAST					
100110 26	eG		D SCAN NEXT	D SCAN NEXT	∞ PLAY NEXT B226 IND. SCAN			
000110 27	eH		D +10/ON	D ENTER	∞ STOP			
111010 28	fA	VOLUME ⇔		TAPE MON 2				
011010 29	fB	VOLUME —		LOUDNESS				
101010 2A	fC	TAPE 2		TAPE 2				
001010 2B	fD	DISC		DISC				
110010 2C	fE	BALANCE L		BALANCE L				
010010 2D	fF	BALANCE R		BALANCE R				
100010 2E	fG	VOLUME +		VOLUME +				
000010 2F	fH	VOLUME −		VOLUME −				
111100 30	gA	TAPE 1		TAPE 1				
011100 31	gB	TUNER						
101100 32	gC	PHONO		PHONO				
001100 33	gD	AUX						
110100 34	gE	−20dB		−20dB				
010100 35	gF	TONE		TONE				
100100 36	gG	REC=MON		D TAPE MON 1				
000100 37	gH				PLAY/NEXT			
111000 38	hA							
011000 39 x	hB		HIGH BLEND	HIGH BLEND				
101000 3A x	hC		MUTING	MUTING				
001000 3B	hD		REC CAL Key	D SPEAKERS A				
110000 3C x	hE		STORE Key	STORE				
010000 3D x	hF		MONO Key	MONO				
100000 3E	hG		ST ONLY Key	D SPEAKERS B				
000000 3F x	hH		ANTENNA	TEST MODE				

2.2.3 Aufbau des IR-Code

Impulszug-Diagramm



■ Fig.2.4

IR-Code:

Der serielle Code besteht aus 4 "Adress-Bits" und 6 "Daten-Bits". Dazu kommen noch ein Startpuls und ein Stopp-Puls sowie ein Vorbereitungspuls.

Als Beispiel das "Wort" 1000110010 (Balance L)

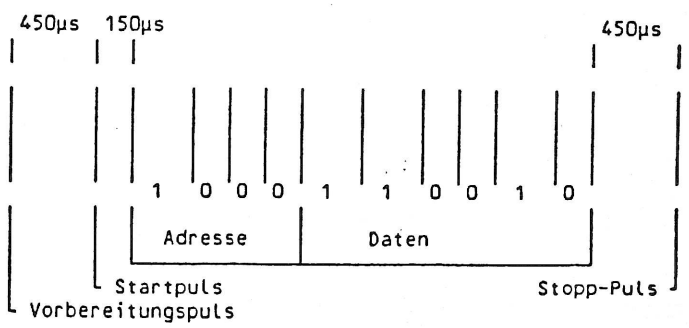


Fig.2.5

1.8 IR - BEFEHLSVERZEICHNIS

"0E" — D = Commands only without *-key
"0F" — * = Commands only with *-key

Hex Adar.	IR-Code Cmd.	Matrix	AMPLIFIER B 251	TUNER B 261	RECEIVER B 285/286	CD-PLAYER B225, B226	CASS.REC. B 215	TAPE RECORDER PR 99 MK2	TURNTABLE B791/795, B291
0E,0F	00	aA	POWER OFF	POWER OFF	D POWER OFF	POWER OFF	POWER OFF	STOP	STOP, POWER OFF
	01	aB					PAUSE+REC	PAUSE+REC	
	02	aC					PLAY +REC	PLAY+REC	
	03	aD					STOP	STOP	
	04	aE					REW <<	REW <<	
	05	aF					FORW >>	FORW >>	
	06	aG					MONITOR	MONITOR	
	07	* aH					LOC-1	Z-LOC	
	08	* bA					LOC-2	A-LOC	
	09	bB					PAUSE	PAUSE	
	0A	bC					PLAY	PLAY	
	0B	bD					LOOP	REPEAT	
	0C	* bE						PAUSE ON	
	0D	* bF						PAUSE OFF	
	0E	bG				* < SEARCH			D <
	0F	bH				* > SEARCH			D >
	10	cA				* PAUSE			D LOW/LIFT
	11	cB		D 1	D 1	* 1			
	12	cC		D 2	D 2	* 2			
	13	cD		D 3	D 3	* 3			
	14	cE		D 4	D 4	* 4			
	15	cF		D 5	D 5	* 5			
	16	cG		D 6	D 6	* 6			
	17	cH		D 7	D 7	* 7			
	18	dA		D 8	D 8	* 8			
	19	dB		D 9	D 9	* 9			
	1A	dC		D 10	D 0	* 0			
	1B	* dD		D 11		* PREEMPH.ON			
	1C	* dE		D 12		* PREEMPH.OFF			
	1D	* dF		D 13		* LOCAL TIME			
	1E	* dG		D 14		* TOTAL TIME			
	1F	* dH		D 15		* PAUSE ON			
	20	* eA		D 16		* LOCATE			
	21	* eB		D 17		* LOAD			
	22	* eC		D 18		* AUTOSTP ON			
	23	* eD		D 19		* AUTOSTP OFF			
	24	* eE		D 20		* PAUSE W/O M			
	25	eF		D SCAN LAST					
	26	eG		D SCAN NEXT	D SCAN NEXT	* PLAY NEXT			
	27	eH		D +10/ON	D ENTER	B226 IND. SCAN * STOP			
	28	fA	VOLUME ++		TAPE MON 2				
	29	fB	VOLUME —		LOUDNESS				
	2A	fC	TAPE 2		TAPE 2				
	2B	fD	DISC		DISC				
	2C	fE	BALANCE L		BALANCE L				
	2D	fF	BALANCE R		BALANCE R				
	2E	fG	VOLUME +		VOLUME +				
	2F	fH	VOLUME -		VOLUME -				
	30	gA	TAPE 1		TAPE 1				
	31	gB	TUNER						
	32	gC	PHONO		PHONO				
	33	gD	AUX						
	34	gE	-20dB		-20dB				
	35	gF	TONE		TONE				
	36	gG	REC=MON		D TAPE MON 1				
	37	gH				PLAY/NEXT			
	38	hA		PILOT SIMUL.					
	39	* hB		HIGH BLEND	HIGH BLEND				
	3A	* hC		MUTING	MUTING				
	3B	hD		REC CAL Key	D SPEAKERS A				
	3C	* hE		STORE Key	STORE				
	3D	* hF		MONO Key	MONO				
	3E	hG		ST ONLY Key	D SPEAKERS B				
	3F	* hH		ANTENNA	TEST MODE				
03	1F				Id. request	Id. request	Id. request	Id. request	Id. request
03	20						Response request	with *-addr.	
03	21						Response request	w/o * addr.	
03	22					Resp. request			
03	23								Resp.req. B291
03	24				Resp.request				
04	00					Search sec 0	LOC-1 sec 0	A-LOC sec 0	
04	09					sec 9	sec 9	sec 9	
04	0A					sec 0x	sec 0x	sec 0x	
04	0F					sec 5x	sec 5x	sec 5x	
04	10					min 0	min 0	min 0	
04	19					min 9	min 9	min 9	
04	1A					min 0x	min 0x	min 0x	
04	1F						min 5x	min 5x	
04	20							hrs 0	
04	23					min 9x			
04	29							hrs 9	
04	2A							hrs 0x	
04	33							hrs 9x	
04	34							hrs "-" sign	
04	3C					goto disc-time	set LOC-1	SET MODE	
04	3D						record cue	unset	
04	3E						TRANS to LOC-2	TRANS to A-LOC	
04	3F						search cue	RESET COUNTER	
05	00								low digit .0x
	09								.9x
05	10								high digit +0.x%
05	19								+9.x%
05	20								high dig. -0.x%
05	29								-9.x%
05	30								VARISPEED ON
05	31								VARISPEED OFF
05	32								"33"
05	33								"33" SPECIAL
05	34								"45"
05	35								"45" SPECIAL
05	36								PU LOW, PWR ON
05	37								PU LIFT
05	38								PU LEFT ON
05	39								PU RIGHT ON
05	3A								PU L/R OFF